DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981

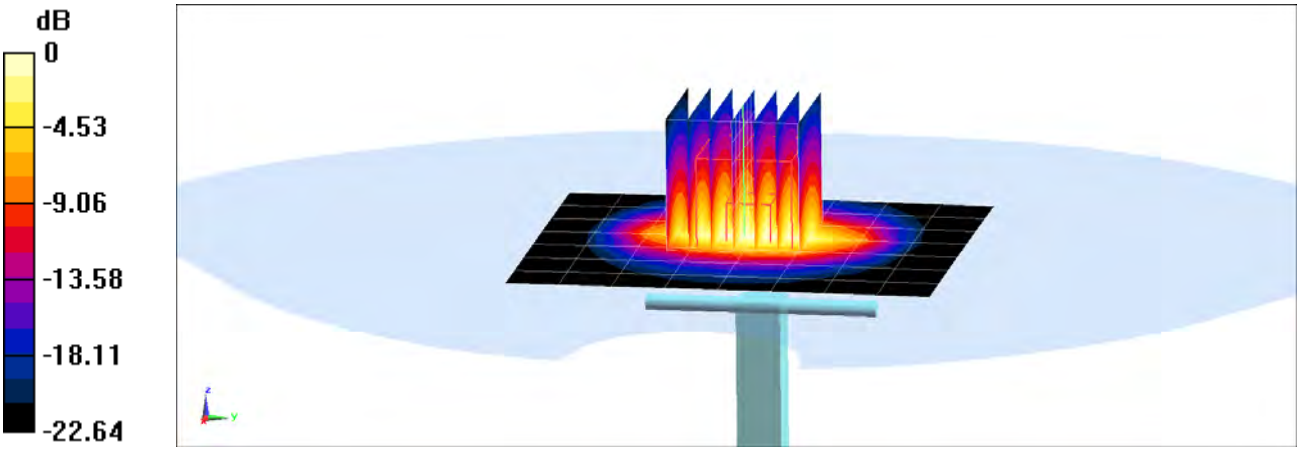
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.876 S/m; ε_r = 41.135; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-02-2019; Ambient Temp: 20.5°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN3589; ConvF(6.46, 6.46, 6.46) @ 2450 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 11.4 W/kg
SAR(1 g) = 5.32 W/kg
Deviation(1 g) = 1.72%



0 dB = 8.99 W/kg = 9.54 dBW/kg

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1004

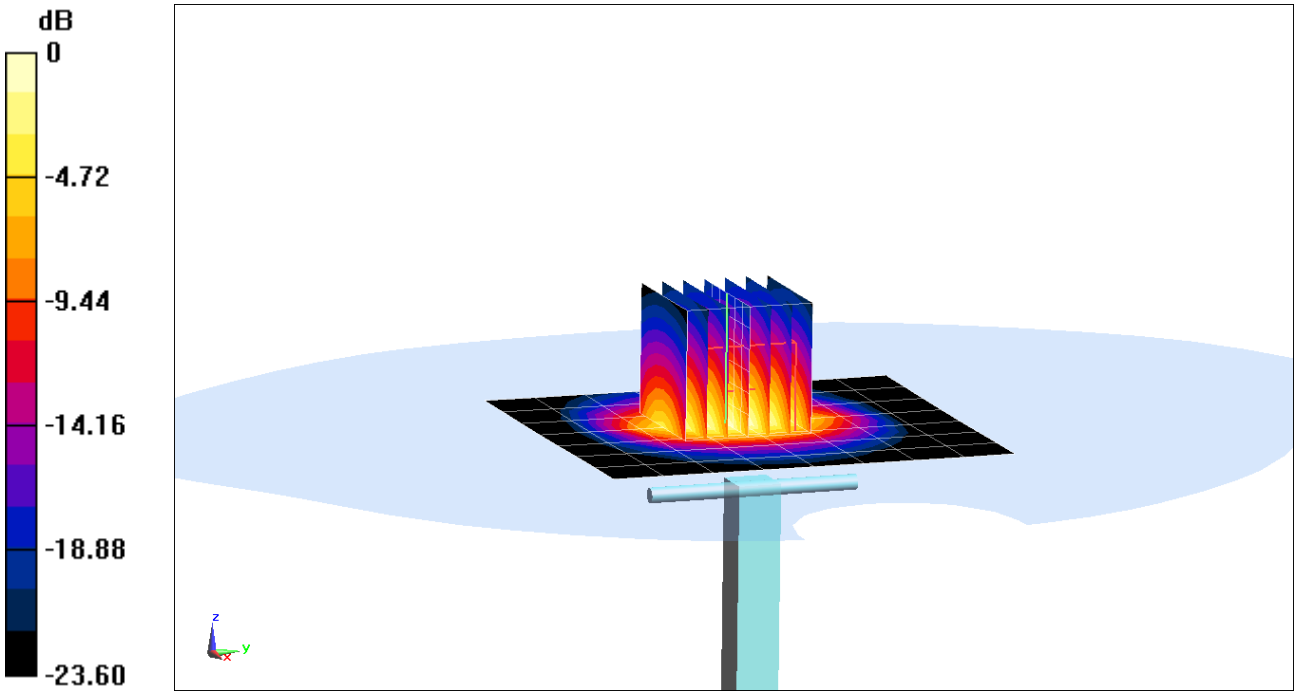
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2600 MHz; σ = 1.932 S/m; ε_r = 38.324; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-29-2019; Ambient Temp: 23.2°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7410; ConvF(7.24, 7.24, 7.24) @ 2600 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 12.0 W/kg
SAR(1 g) = 5.53 W/kg
Deviation(1 g) = -1.07%



0 dB = 9.53 W/kg = 9.79 dBW/kg

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1004

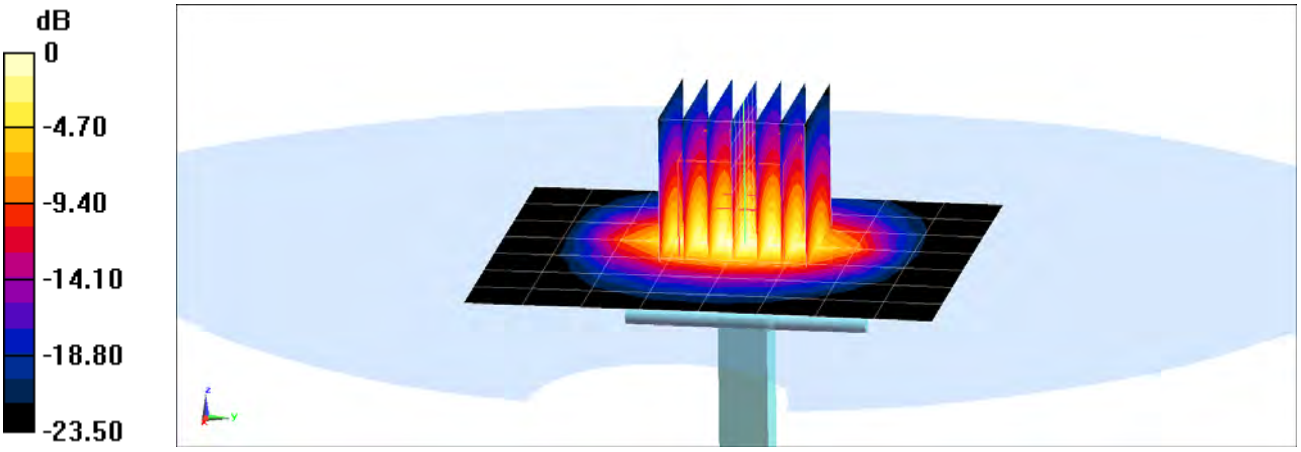
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2600 MHz; σ = 1.994 S/m; ε_r = 40.858; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-02-2019; Ambient Temp: 20.5°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN3589; ConvF(6.25, 6.25, 6.25) @ 2600 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 12.7 W/kg
SAR(1 g) = 5.83 W/kg
Deviation(1 g) = 4.29%



0 dB = 10.1 W/kg = 10.04 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191

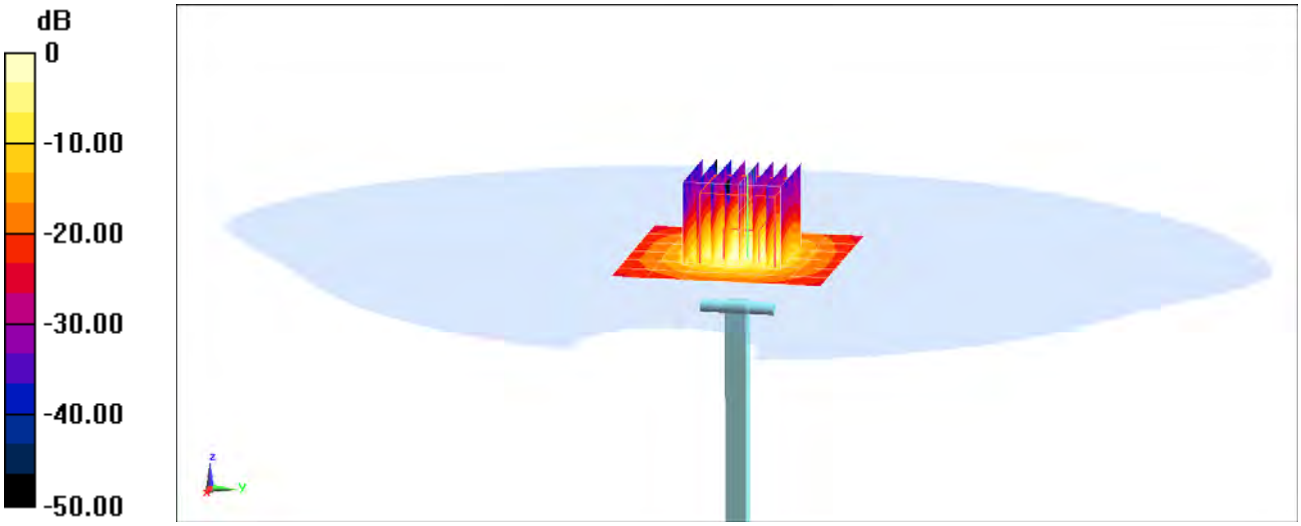
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5250 MHz; σ = 4.7 S/m; ε_r = 36.031; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-28-2019; Ambient Temp: 19.8°C; Tissue Temp: 19.5°C

Probe: EX3DV4 - SN7409; ConvF(5.2, 5.2, 5.2) @ 5250 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 16.0 W/kg
SAR(1 g) = 3.79 W/kg
Deviation(1 g) = -3.93%



0 dB = 8.99 W/kg = 9.54 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191

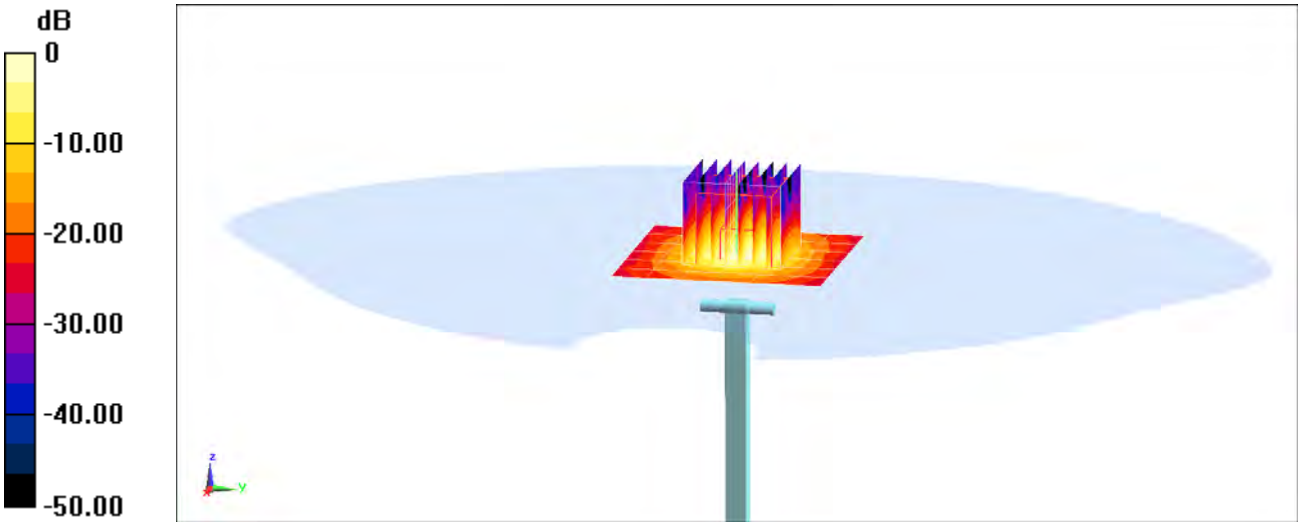
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used:
f = 5600 MHz; σ = 5.063 S/m; ε_r = 35.531; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-28-2019; Ambient Temp: 19.8°C; Tissue Temp: 19.5°C

Probe: EX3DV4 - SN7409; ConvF(4.77, 4.77, 4.77) @ 5600 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 18.0 W/kg
SAR(1 g) = 4.01 W/kg
Deviation(1 g) = -4.07%



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

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191

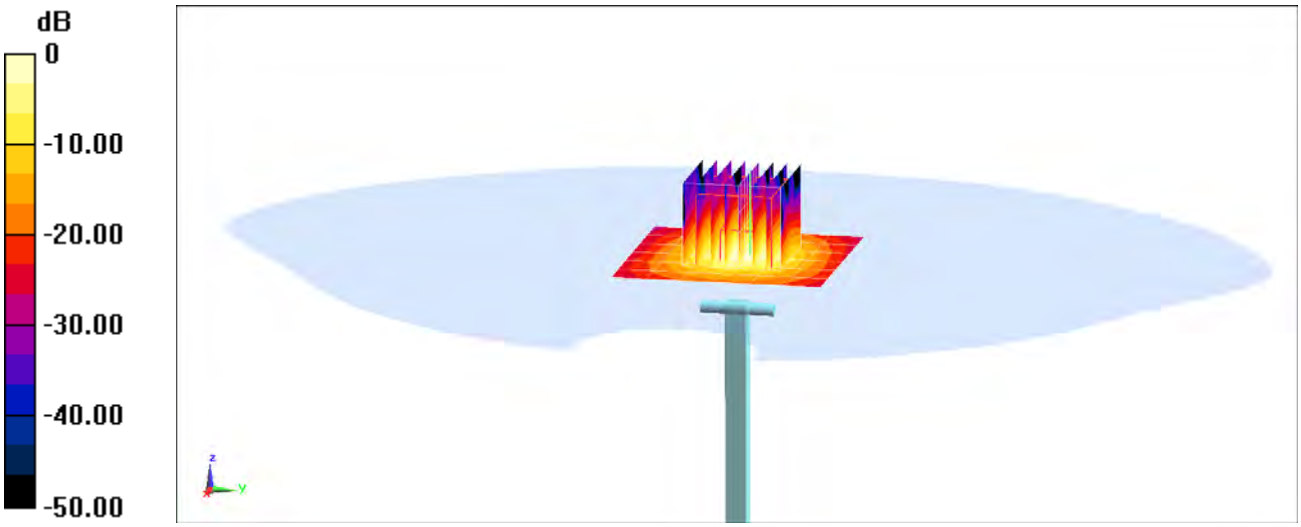
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
$f = 5750$ MHz; $\sigma = 5.248$ S/m; $\varepsilon_r = 35.34$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-28-2019; Ambient Temp: 19.8°C; Tissue Temp: 19.5°C

Probe: EX3DV4 - SN7409; ConvF(4.82, 4.82, 4.82) @ 5750 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 18.0 W/kg
SAR(1 g) = 3.89 W/kg
Deviation(1 g) = -1.64%



0 dB = 9.50 W/kg = 9.78 dBW/kg

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1003

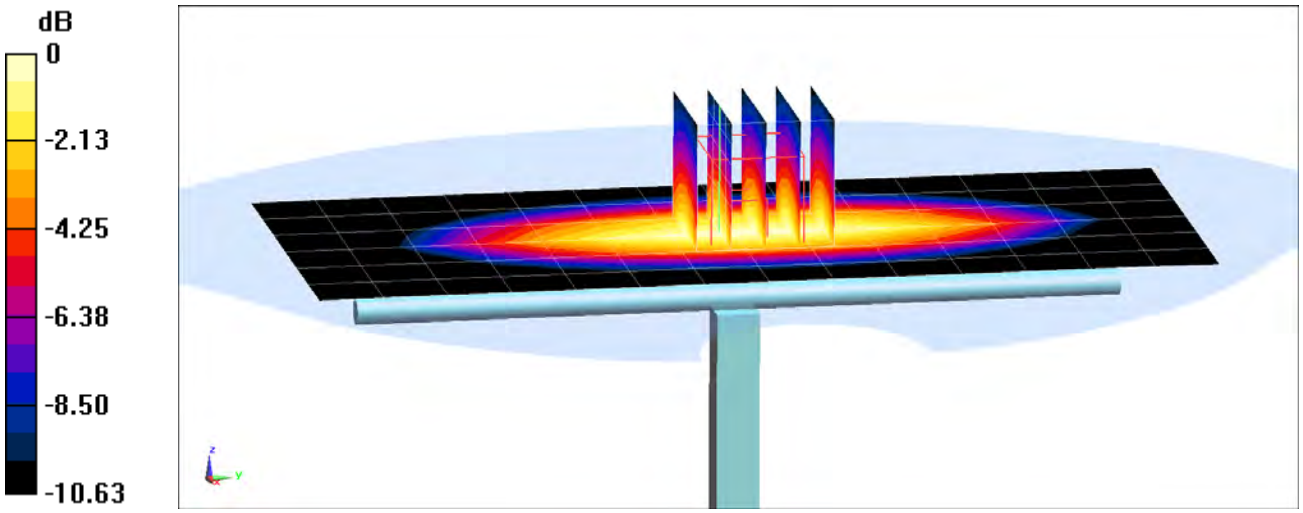
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.976 S/m; ε_r = 53.193; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-11-2019; Ambient Temp: 21.9°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN3589; ConvF(8.34, 8.34, 8.34) @ 750 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

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) = 2.71 W/kg
SAR(1 g) = 1.72 W/kg
Deviation(1 g) = 0.23%



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

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1003

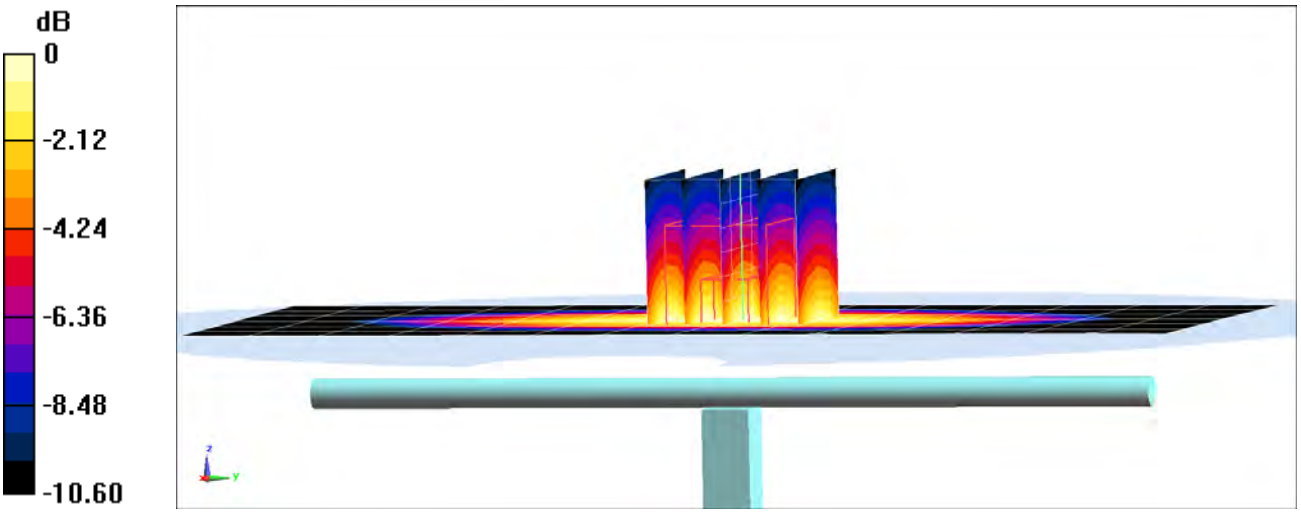
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.967 S/m; ε_r = 53.508; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-13-2019; Ambient Temp: 22.9°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN3589; ConvF(8.34, 8.34, 8.34) @ 750 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 2.71 W/kg
SAR(1 g) = 1.71 W/kg; SAR(10 g) = 1.13 W/kg
Deviation(1 g) = -0.35%; Deviation(10 g) = -1.05%



0 dB = 2.32 W/kg = 3.65 dBW/kg

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1161

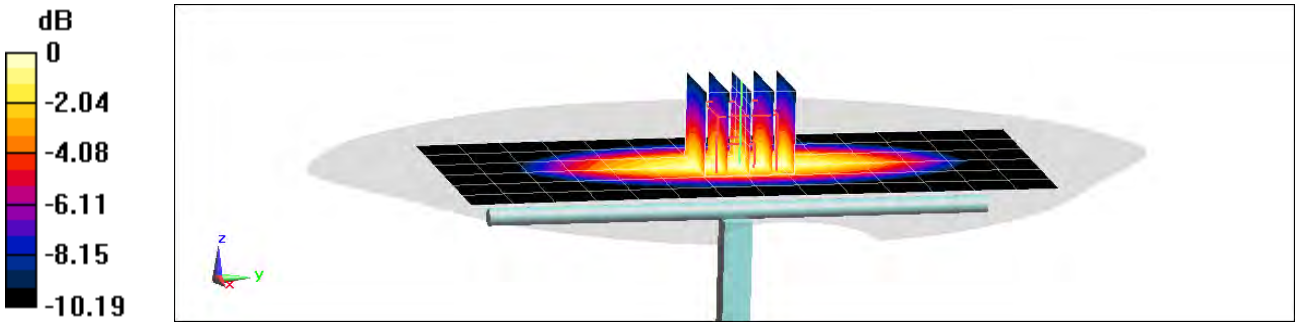
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 750 MHz; σ = 0.956 S/m; ε_r = 54.048; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-05-2019; Ambient Temp: 21.7°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN7488; ConvF(11.28, 11.28, 11.28) @ 750 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 2.52 W/kg
SAR(1 g) = 1.67 W/kg
Deviation(1 g) = -0.95%



0 dB = 2.22 W/kg = 3.46 dBW/kg

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DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d047

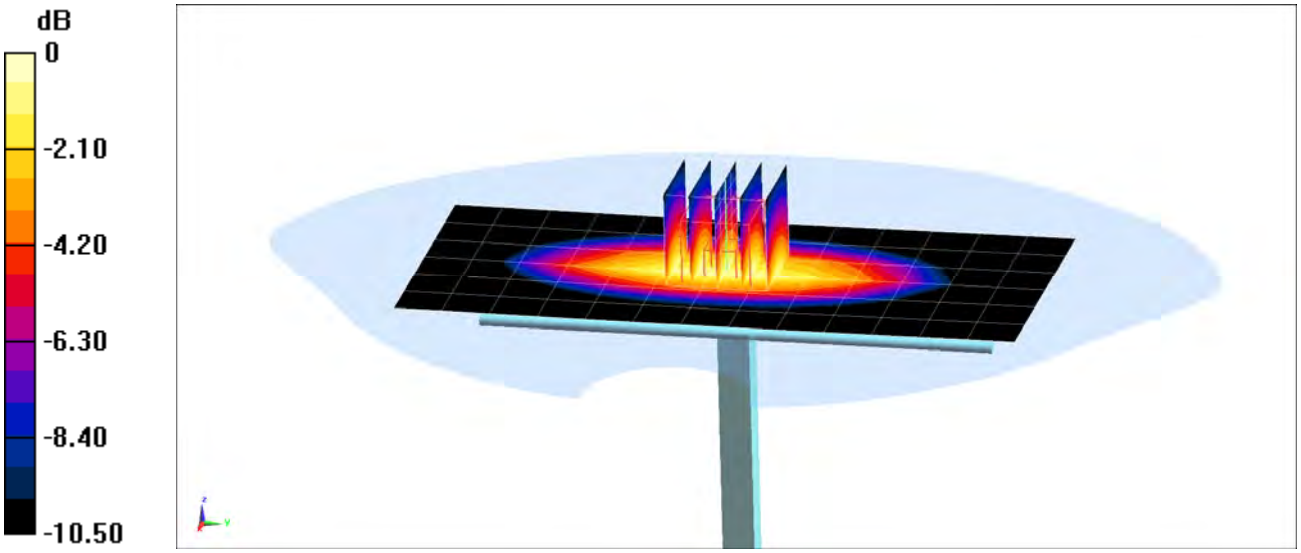
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.967 S/m; ε_r = 53.744; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 2-06-2019; Ambient Temp: 22.2°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 835 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

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) = 3.13 W/kg
SAR(1 g) = 2.08 W/kg; SAR(10 g) = 1.37 W/kg
Deviation(1 g) = 7.11%; Deviation(10 g) = 7.70%



0 dB = 2.77 W/kg = 4.42 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d047

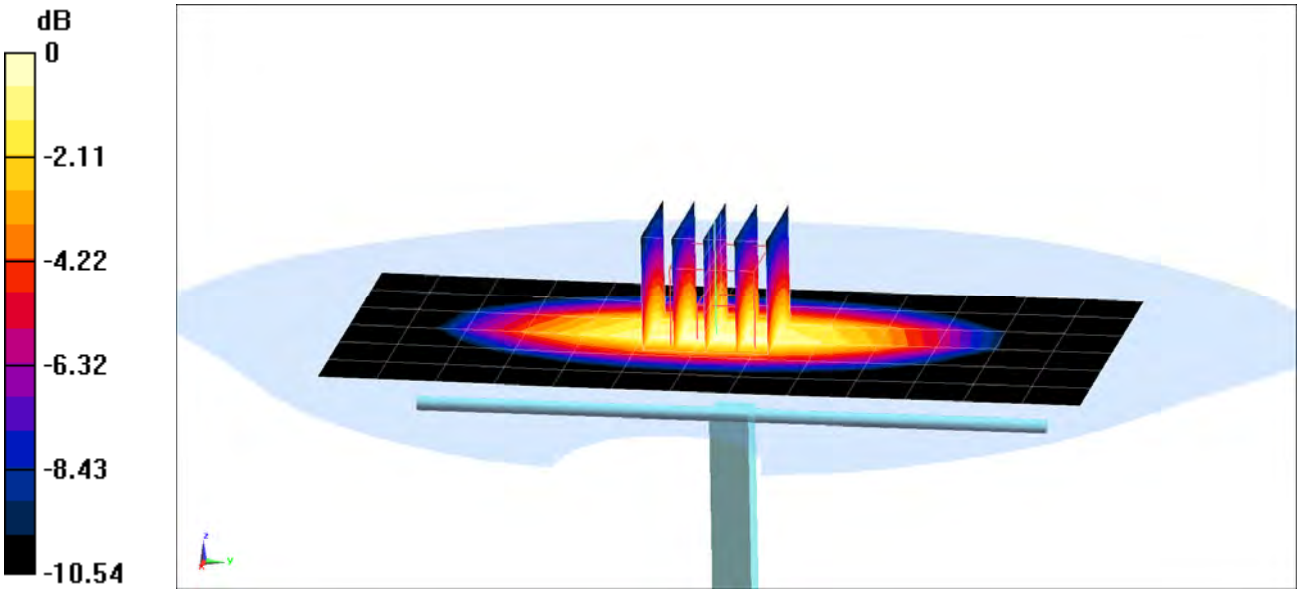
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.968 S/m; ε_r = 52.959; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-11-2019; Ambient Temp: 21.9°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 835 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 3.04 W/kg
SAR(1 g) = 2.02 W/kg
Deviation(1 g) = 4.02%



0 dB = 2.70 W/kg = 4.31 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d047

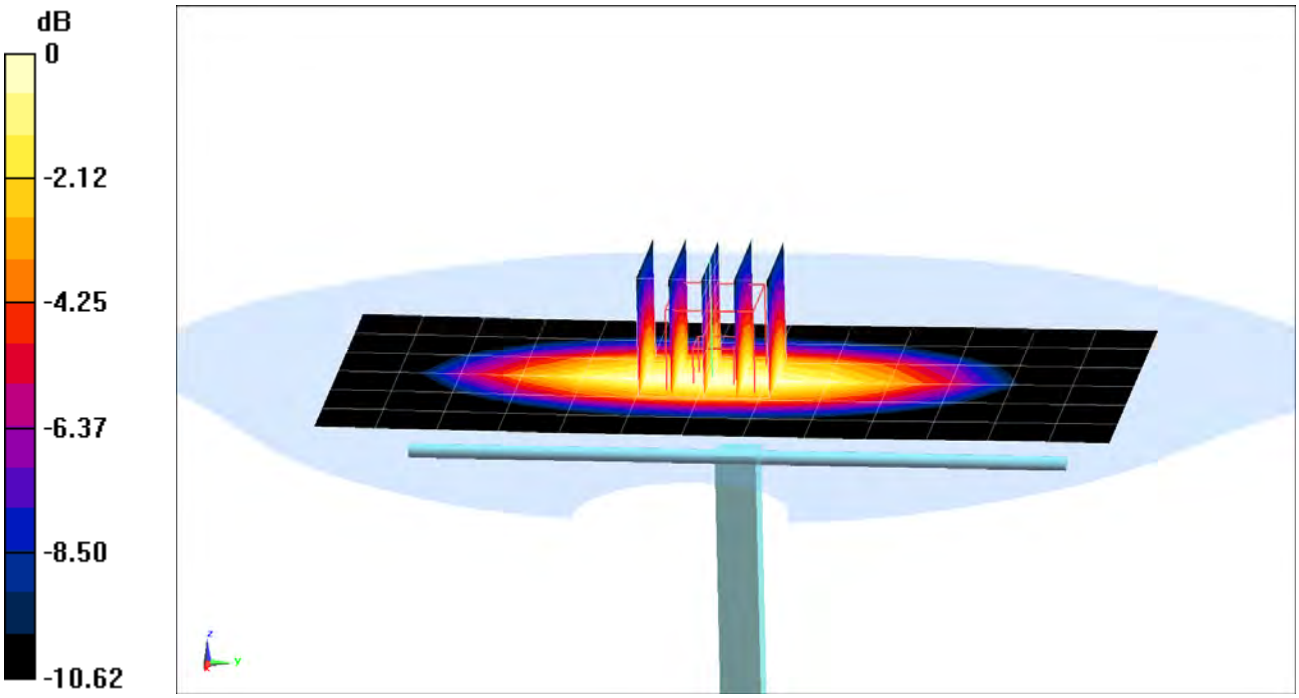
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.978 S/m; ε_r = 54.177; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-13-2019; Ambient Temp: 21.9°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 835 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 3.11 W/kg
SAR(1 g) = 2.05 W/kg; SAR(10 g) = 1.35 W/kg
Deviation(1 g) = 5.56%; Deviation(10 g) = 6.13%



0 dB = 2.74 W/kg = 4.38 dBW/kg

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d047

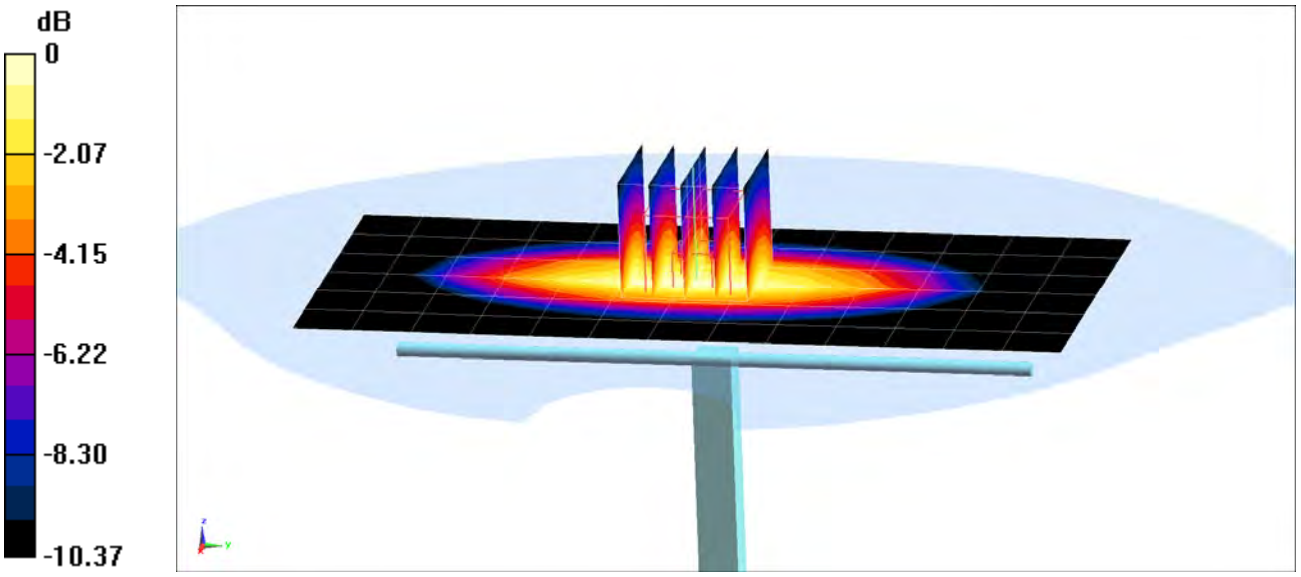
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.975 S/m; ε_r = 53.775; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-18-2019; Ambient Temp: 21.5°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 835 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 3.09 W/kg
SAR(1 g) = 2.05 W/kg; SAR(10 g) = 1.35 W/kg
Deviation(1 g) = 5.56%; Deviation(10 g) = 6.13%



0 dB = 2.74 W/kg = 4.38 dBW/kg

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DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d133

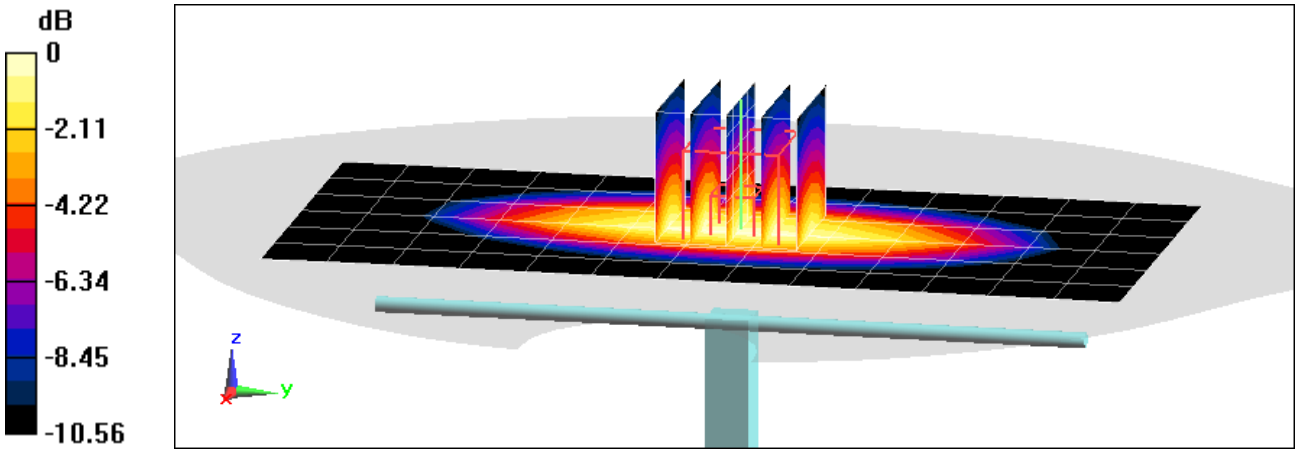
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used:
f = 835 MHz; σ = 0.988 S/m; ε_r = 53.868; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-10-2019; Ambient Temp: 20.7°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7488; ConvF(11.03, 11.03, 11.03) @ 835 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 2.90 W/kg
SAR(1 g) = 1.91 W/kg
Deviation(1 g) = -2.05%



0 dB = 2.56 W/kg = 4.08 dBW/kg

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1150

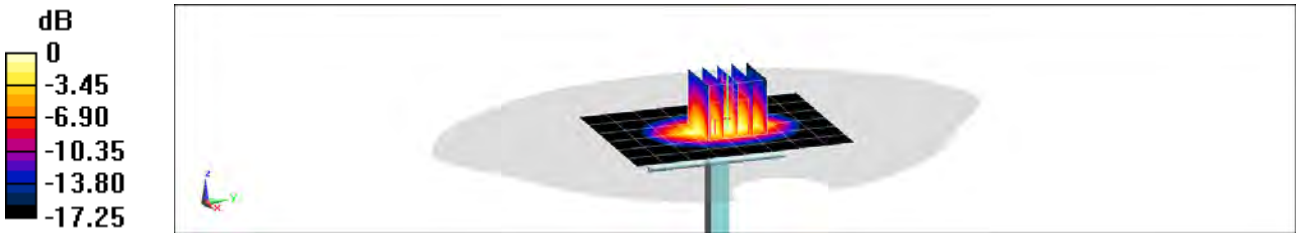
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.518 S/m; ε_r = 51.068; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-24-2019; Ambient Temp: 20.8°C; Tissue Temp: 20.2°C

Probe: ES3DV3 - SN3347; ConvF(5.17, 5.17, 5.17) @ 1750 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 6.67 W/kg
SAR(1 g) = 3.8 W/kg
Deviation(1 g) = 3.83%



0 dB = 4.73 W/kg = 6.75 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1150

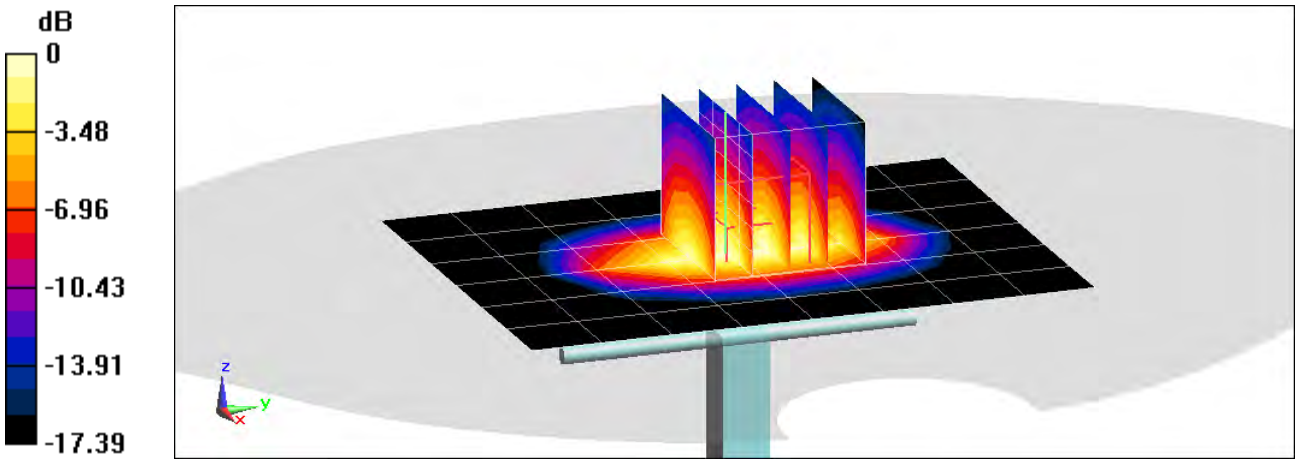
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.487 S/m; ε_r = 51.249; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-28-2019; Ambient Temp: 20.3°C; Tissue Temp: 20.4°C

Probe: ES3DV3 - SN3347; ConvF(5.17, 5.17, 5.17) @ 1750 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 6.37 W/kg
SAR(1 g) = 3.64 W/kg; SAR(10 g) = 1.95 W/kg
Deviation(1 g) = -0.55%; Deviation(10 g) = 0.52%



0 dB = 4.52 W/kg = 6.55 dBW/kg

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1150

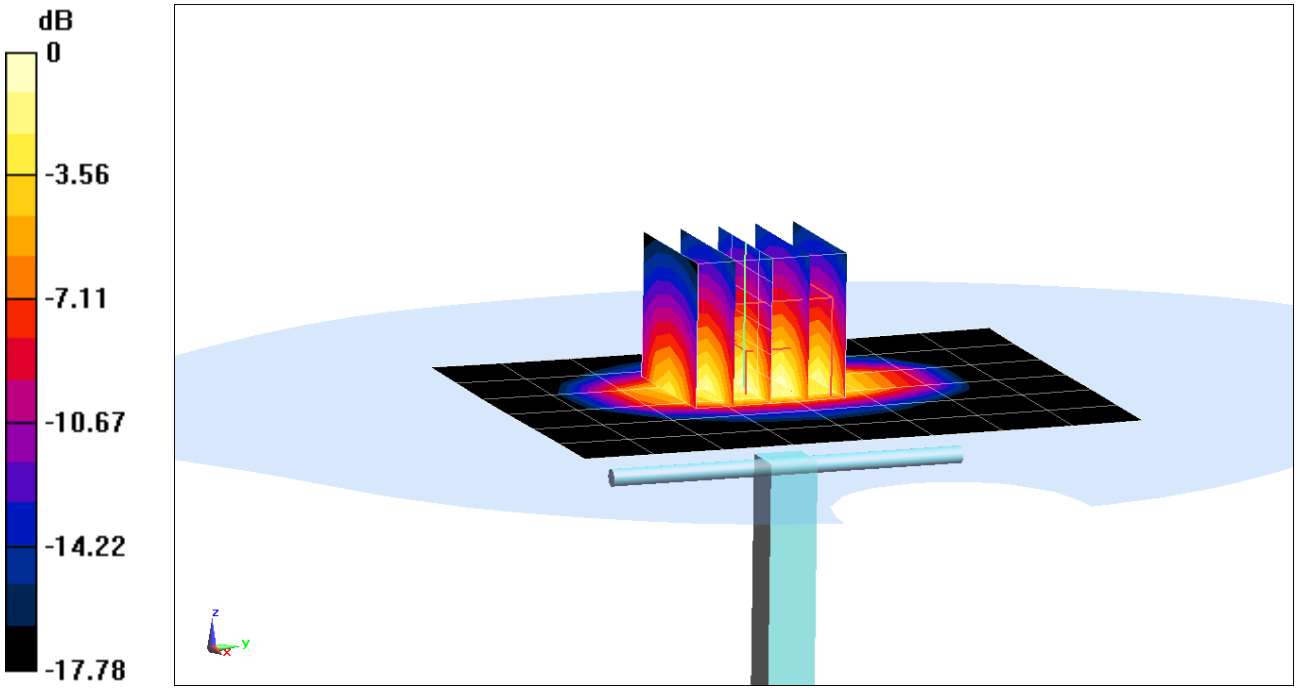
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.508 S/m; ε_r = 51.531; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-22-2019; Ambient Temp:23.2°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7410; ConvF(8.06, 8.06, 8.06) @ 1750 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 6.91 W/kg
SAR(1 g) = 3.82 W/kg
Deviation(1 g) = 4.37%



0 dB = 5.79 W/kg = 7.63 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1150

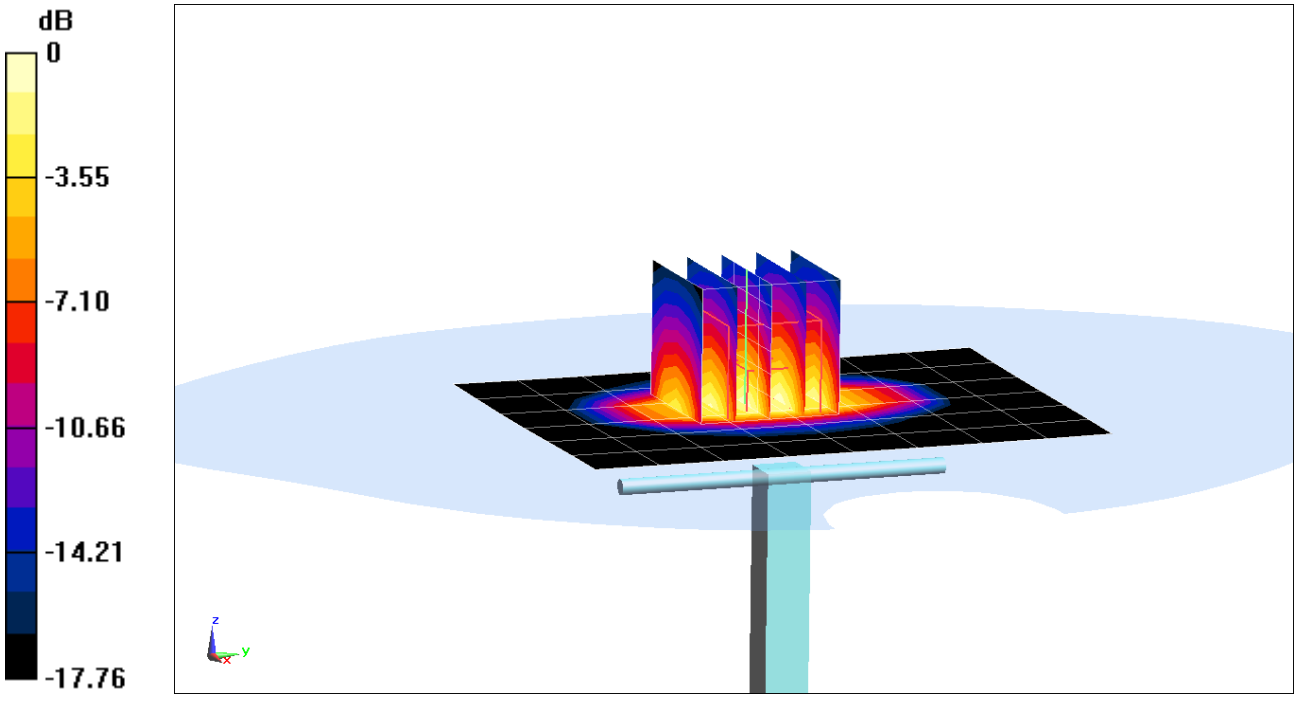
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.51 S/m; ε_r = 51.247; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-24-2019; Ambient Temp: 21.3°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN7410; ConvF(8.06, 8.06, 8.06) @ 1750 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 6.94 W/kg
SAR(10 g) = 2 W/kg
Deviation(10 g) = 3.09%



0 dB = 5.78 W/kg = 7.62 dBW/kg

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1150

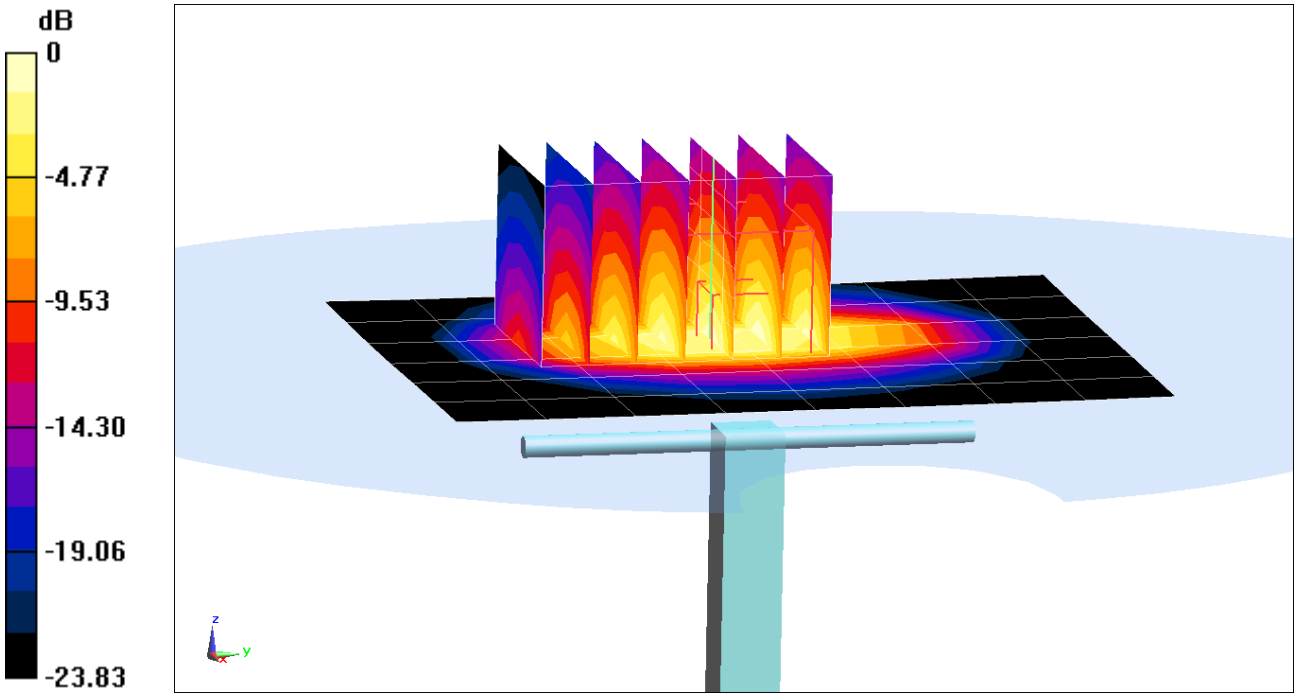
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.507 S/m; ε_r = 51.26; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-26-2019; Ambient Temp: 22.4°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN7410; ConvF(8.06, 8.06, 8.06) @ 1750 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.24 W/kg
SAR(1 g) = 3.95 W/kg
Deviation(1 g) = 7.92%



0 dB = 6.02 W/kg = 7.80 dBW/kg

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

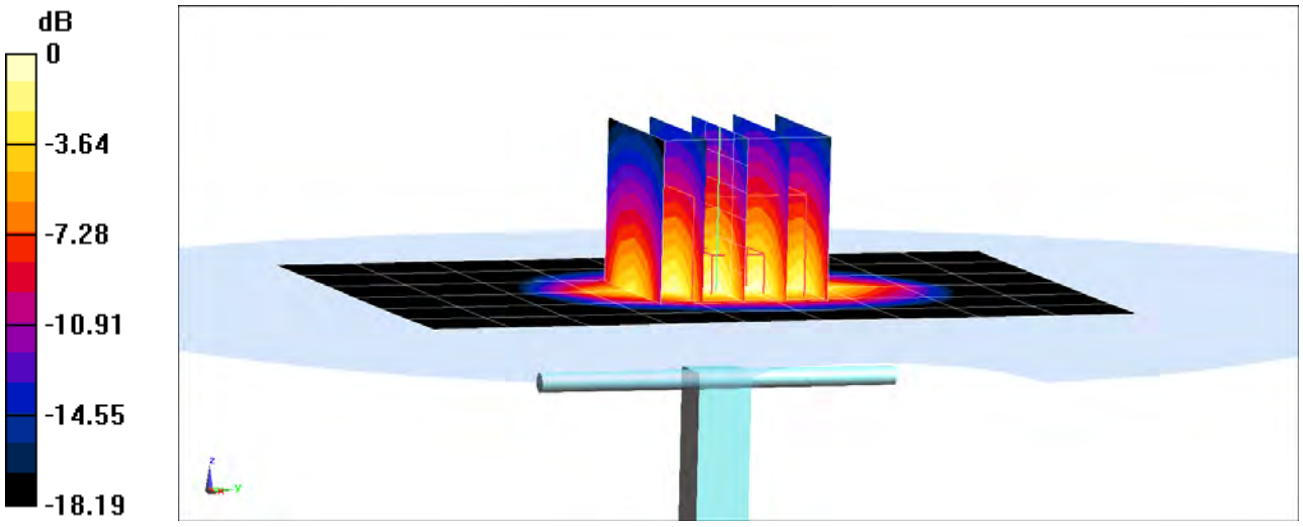
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.576 S/m; ε_r = 53.852; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-31-2019; Ambient Temp: 23.3°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3332; ConvF(4.77, 4.77, 4.77) @ 1900 MHz; Calibrated: 8/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.44 W/kg
SAR(1 g) = 4.2 W/kg; SAR(10 g) = 2.19 W/kg
Deviation(1 g) = 6.60%; Deviation(10 g) = 5.80%



0 dB = 5.25 W/kg = 7.20 dBW/kg

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d080

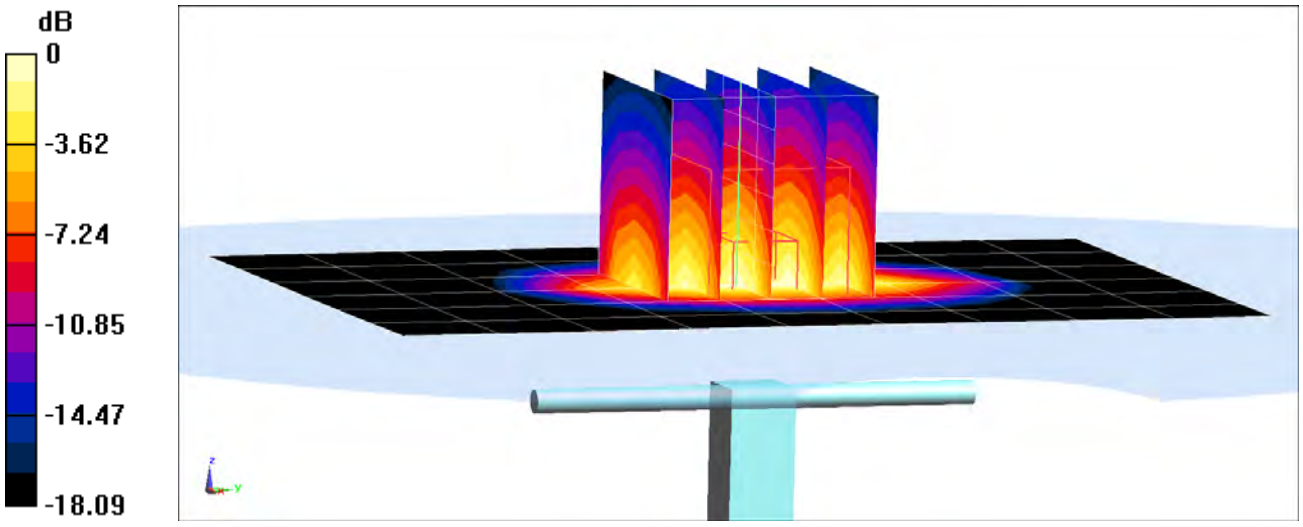
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.571 S/m; ε_r = 54.13; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-04-2019; Ambient Temp: 23.3°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3332; ConvF(4.77, 4.77, 4.77) @ 1900 MHz; Calibrated: 8/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.35 W/kg
SAR(1 g) = 4.14 W/kg; SAR(10 g) = 2.16 W/kg
Deviation(1 g) = 5.61%; Deviation(10 g) = 4.85%



0 dB = 5.18 W/kg = 7.14 dBW/kg

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

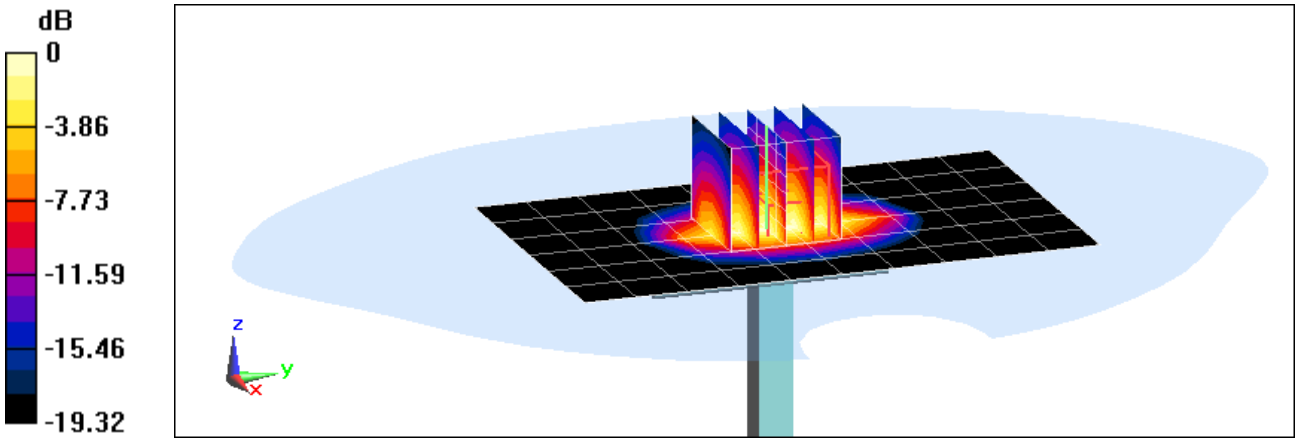
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.562 S/m; ε_r = 52.582; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-20-2019; Ambient Temp: 20.3°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1900 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.88 W/kg
SAR(1 g) = 4.2 W/kg; SAR(10 g) = 2.14 W/kg
Deviation(1 g) = 6.60%; Deviation(10 g) = 3.38%



0 dB = 6.49 W/kg = 8.12 dBW/kg

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

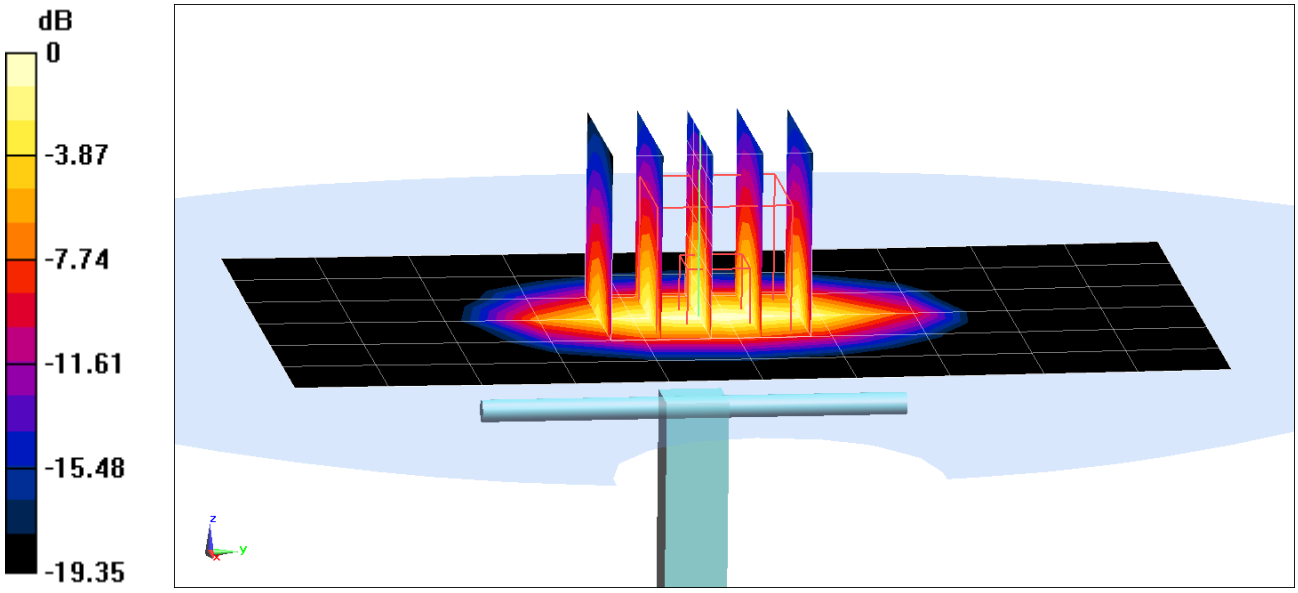
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.559 S/m; ε_r = 50.964; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-24-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1900 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.89 W/kg
SAR(1 g) = 4.18 W/kg; SAR(10 g) = 2.12 W/kg
Deviation(1 g) = 6.09%; Deviation(10 g) = 2.42%



0 dB = 6.48 W/kg = 8.12 dBW/kg

DUT: Dipole 2300 MHz; Type: D2300V2; Serial: 1073

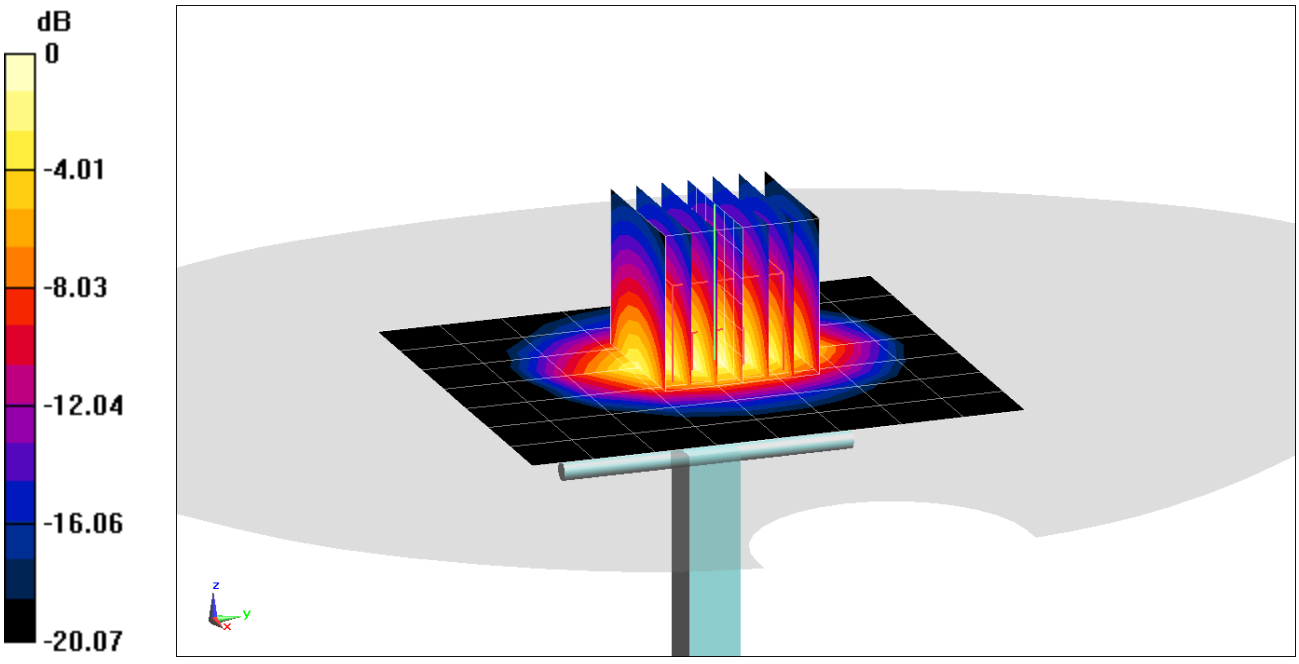
Communication System: UID 0, CW; Frequency: 2300 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2300 MHz; σ = 1.858 S/m; ε_r = 52.369; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-07-2019; Ambient Temp: 21.8°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3319; ConvF(4.63, 4.63, 4.63) @ 2300 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2300 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) = 9.05 W/kg
SAR(1 g) = 4.74 W/kg; SAR(10 g) = 2.28 W/kg
Deviation(1 g) = -0.63%; Deviation(10 g) = -1.72%



0 dB = 6.14 W/kg = 7.88 dBW/kg

DUT: Dipole 2300 MHz; Type: D2300V2; Serial: 1073

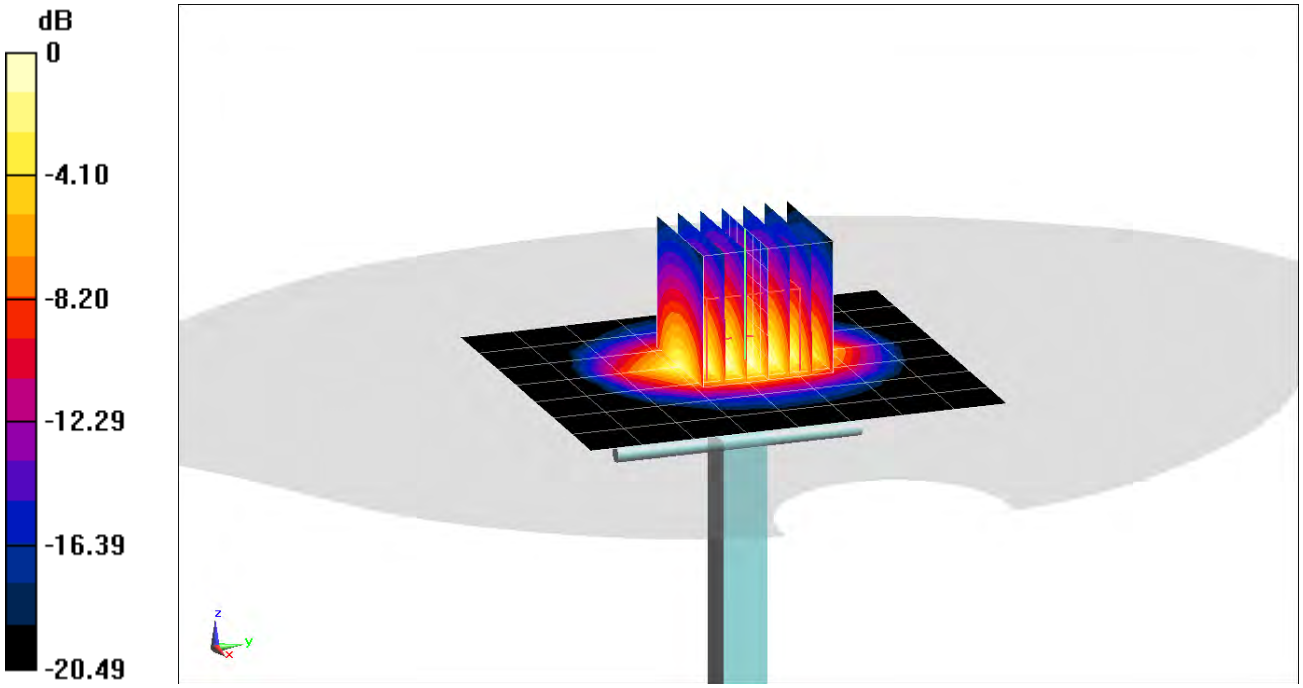
Communication System: UID 0, CW; Frequency: 2300 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2300 MHz; σ = 1.867 S/m; ε_r = 52.942; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-18-2019; Ambient Temp: 21.9°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3319; ConvF(4.63, 4.63, 4.63) @ 2300 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2300 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) = 9.46 W/kg
SAR(1 g) = 4.89 W/kg; SAR(10 g) = 2.34 W/kg
Deviation(1 g) = 2.52%; Deviation(10 g) = 0.86%



0 dB = 6.36 W/kg = 8.03 dBW/kg

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981

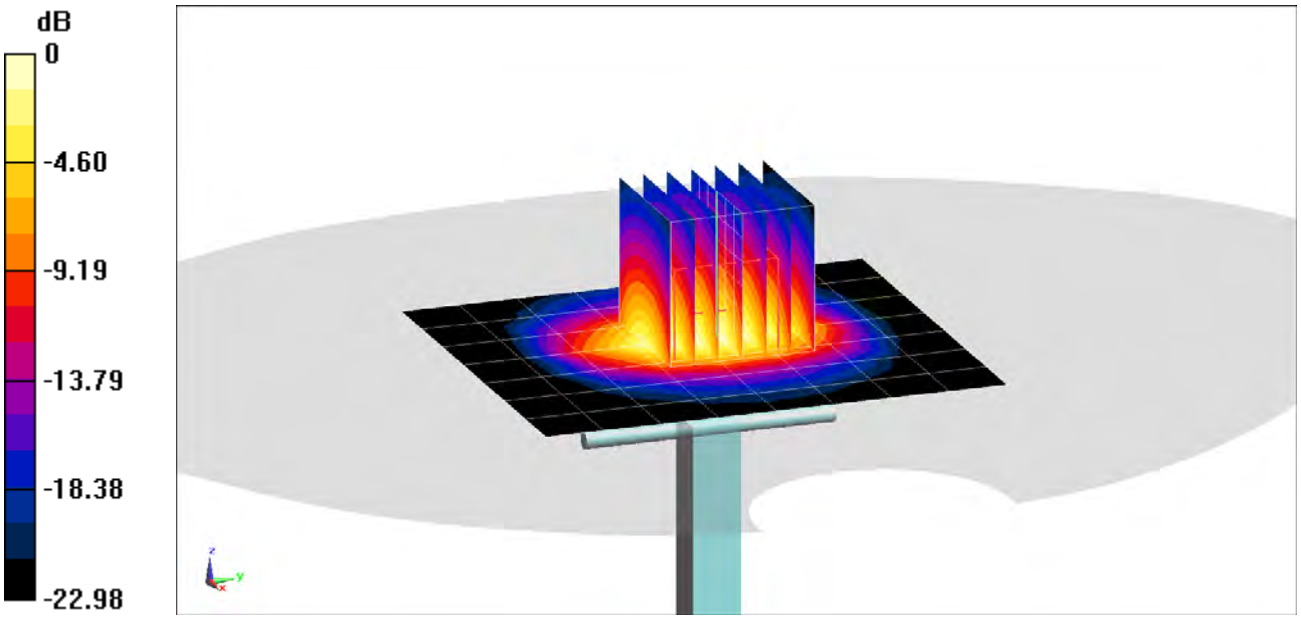
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.035 S/m; ε_r = 50.649; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-29-2019; Ambient Temp: 22.6°C; Tissue Temp: 20.5°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 10.6 W/kg
SAR(1 g) = 5.06 W/kg; SAR(10 g) = 2.3 W/kg
Deviation(1 g) =-0.59%; Deviation(10 g) = -4.96%



0 dB = 6.69 W/kg = 8.25 dBW/kg

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981

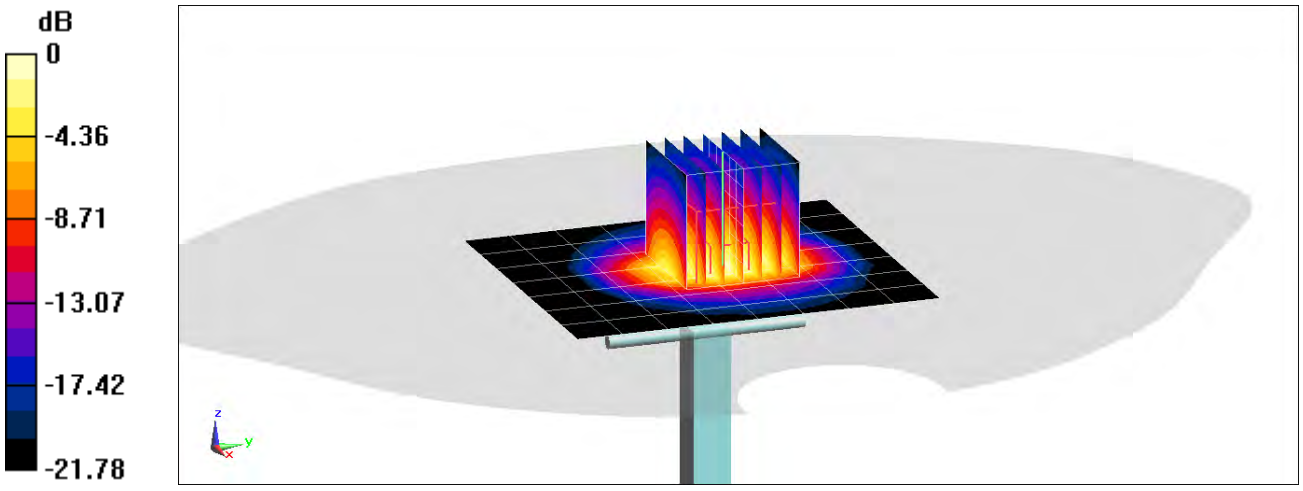
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.041 S/m; ε_r = 51.597; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-02-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 10.0 W/kg
SAR(1 g) = 4.9 W/kg; SAR(10 g) = 2.25 W/kg
Deviation(1 g) = -3.73%; Deviation(10 g) = -7.02%



0 dB = 6.49 W/kg = 8.12 dBW/kg

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DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981

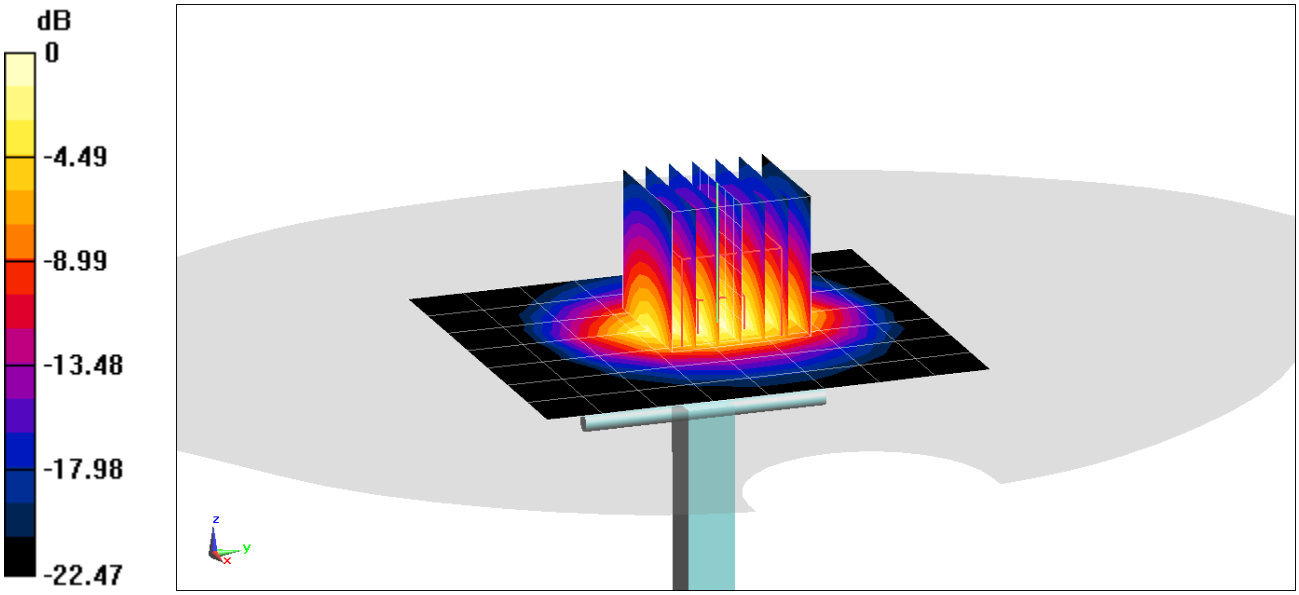
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.037 S/m; ε_r = 51.969; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-11-2019; Ambient Temp: 21.9°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 10.6 W/kg
SAR(1 g) = 5.08 W/kg
Deviation(1 g) = -0.20%



0 dB = 6.73 W/kg = 8.28 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981

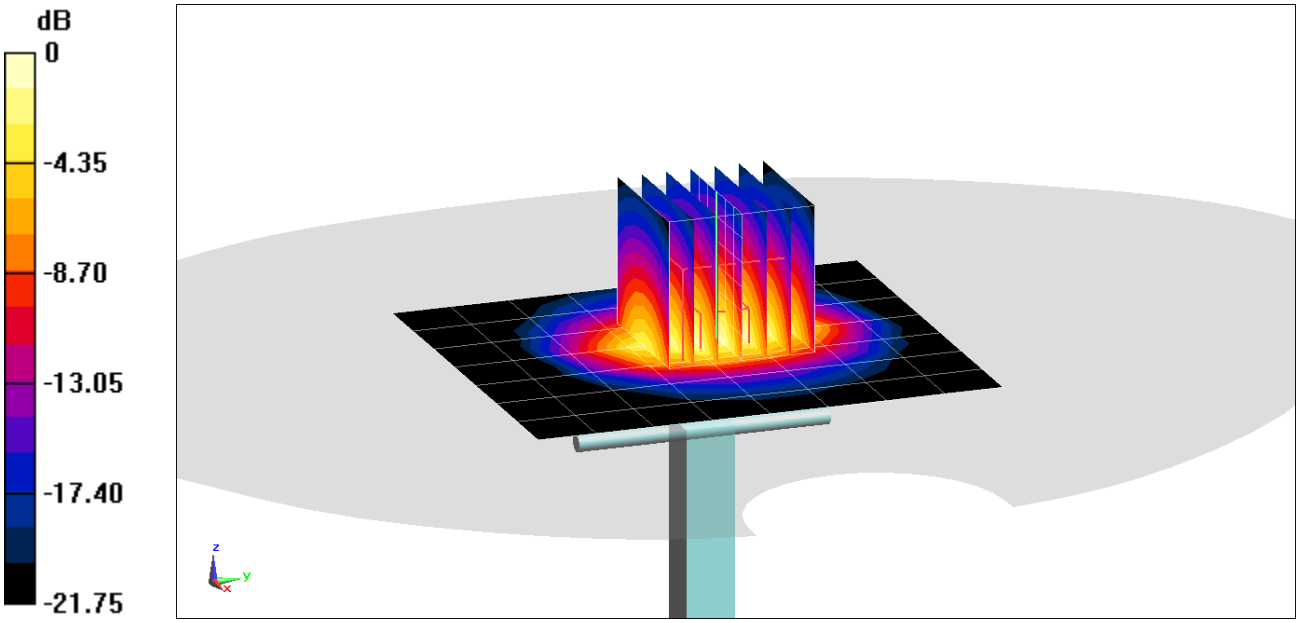
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.034 S/m; ε_r = 52.017; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2019; Ambient Temp: 21.9°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 5.11 W/kg; SAR(10 g) = 2.35 W/kg
Deviation(1 g) = 0.39%; Deviation(10 g) = -2.89%



0 dB = 6.80 W/kg = 8.33 dBW/kg

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981

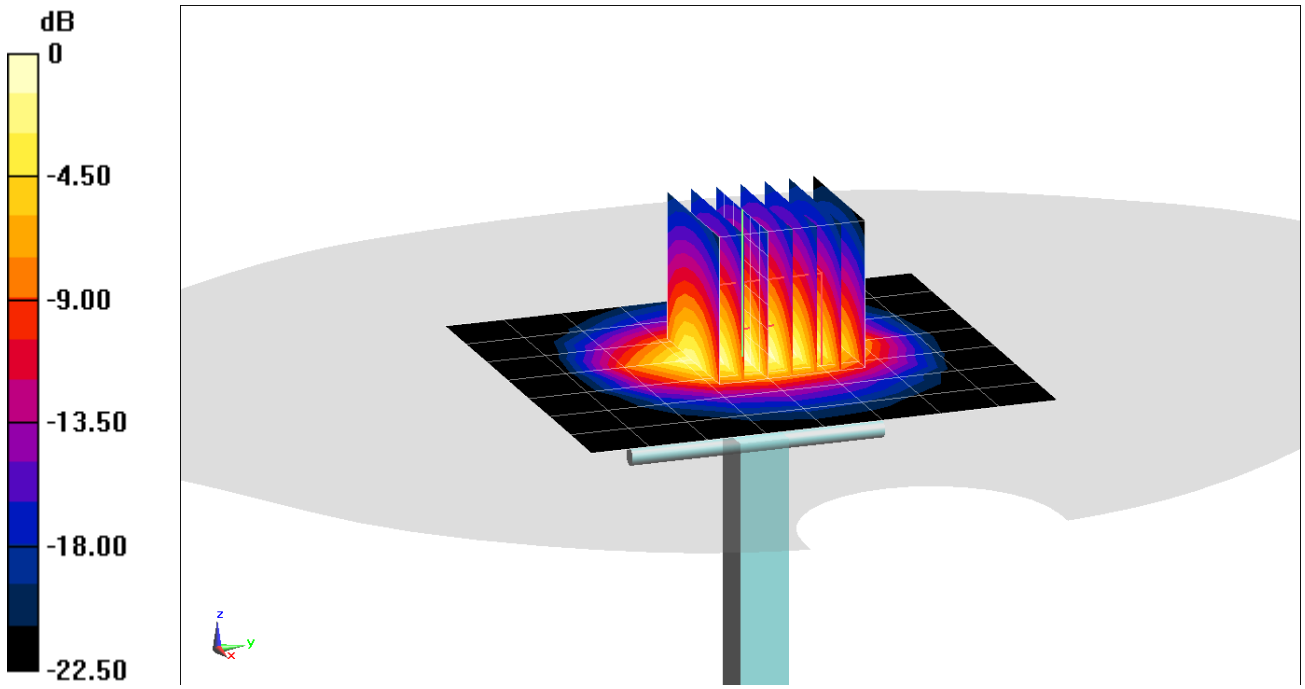
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.035 S/m; ε_r = 52.525; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-18-2019; Ambient Temp: 21.9°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 5.1 W/kg
Deviation(1 g) = 0.20%



0 dB = 6.68 W/kg = 8.25 dBW/kg

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981

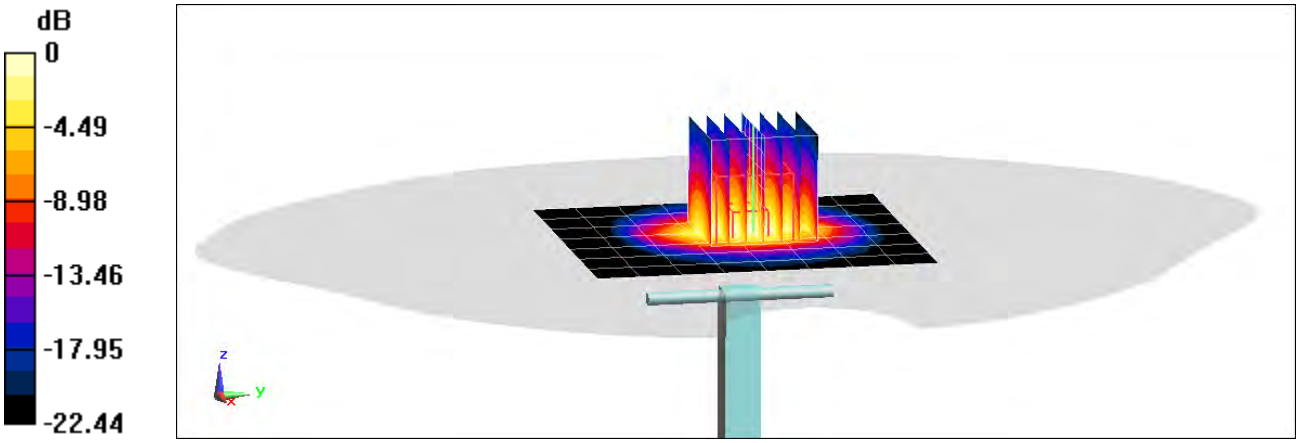
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.031 S/m; ε_r = 51.064; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-20-2019; Ambient Temp: 22.3°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 10.7 W/kg
SAR(10 g) = 2.33 W/kg
Deviation(10 g) = -3.72%



0 dB = 6.76 W/kg = 8.30 dBW/kg

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DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981

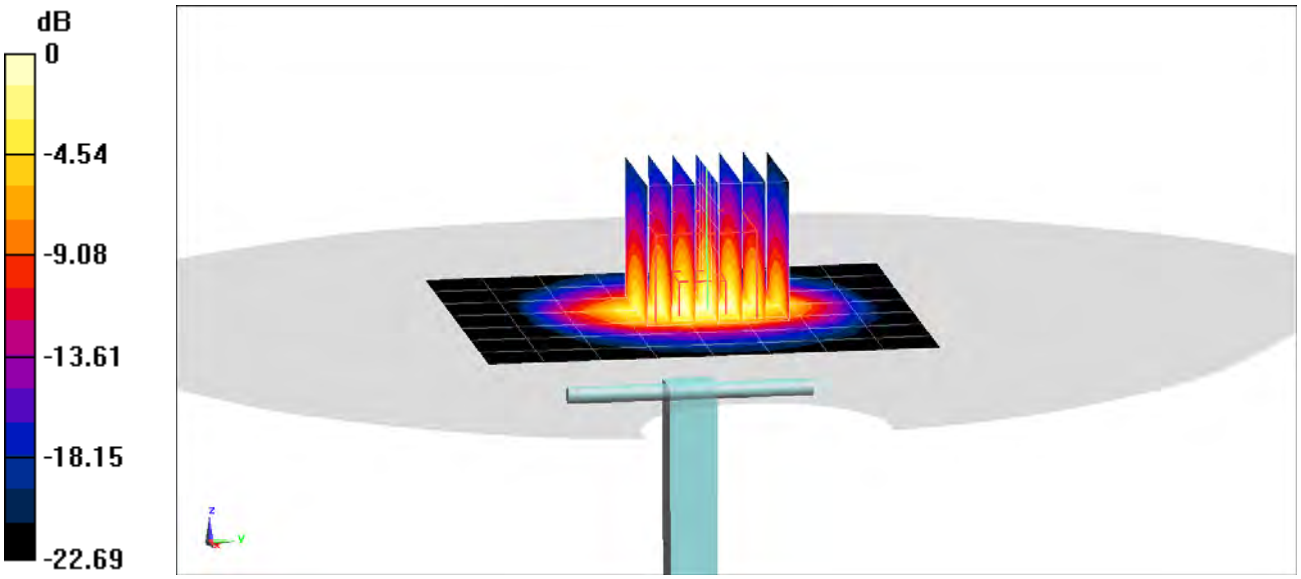
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.023 S/m; ε_r = 51.412; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-27-2019; Ambient Temp: 23.1°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 5.14 W/kg; SAR(10 g) = 2.33 W/kg
Deviation(1 g) = 0.98%; Deviation(10 g) = -3.72%



0 dB = 6.80 W/kg = 8.33 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981

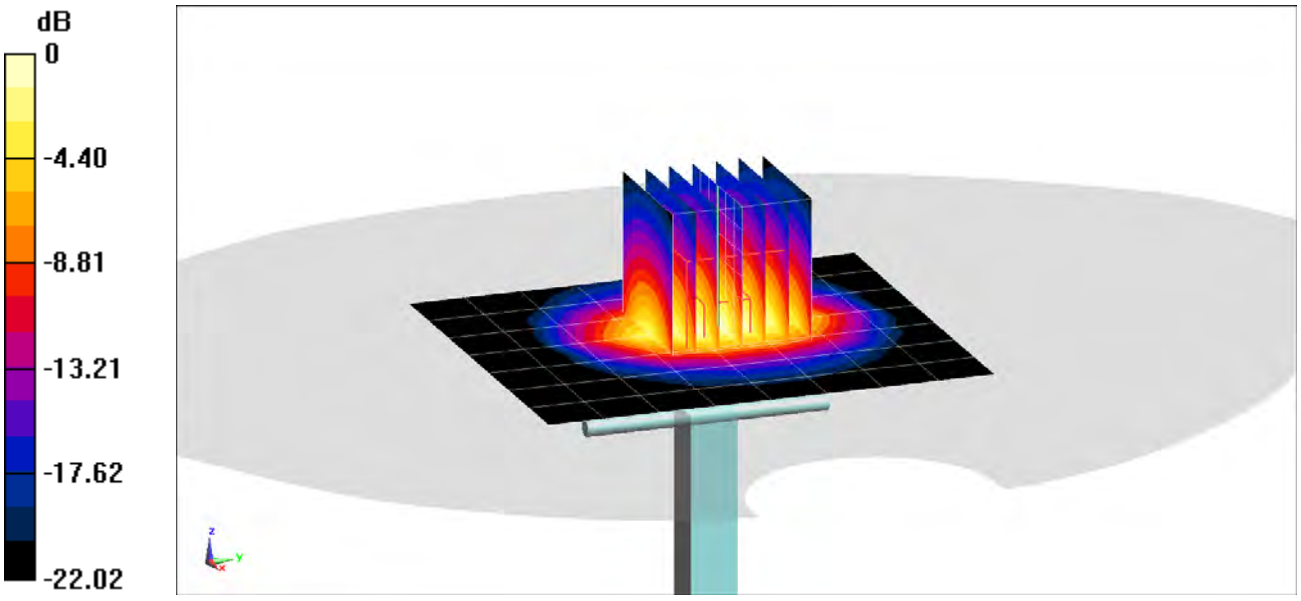
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.039 S/m; ε_r = 51.413; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-04-2019; Ambient Temp: 21.9°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 10.6 W/kg
SAR(1 g) = 5.16 W/kg; SAR(10 g) = 2.36 W/kg
Deviation(1 g) = 1.38%; Deviation(10 g) = -2.48%



0 dB = 6.87 W/kg = 8.37 dBW/kg

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1004

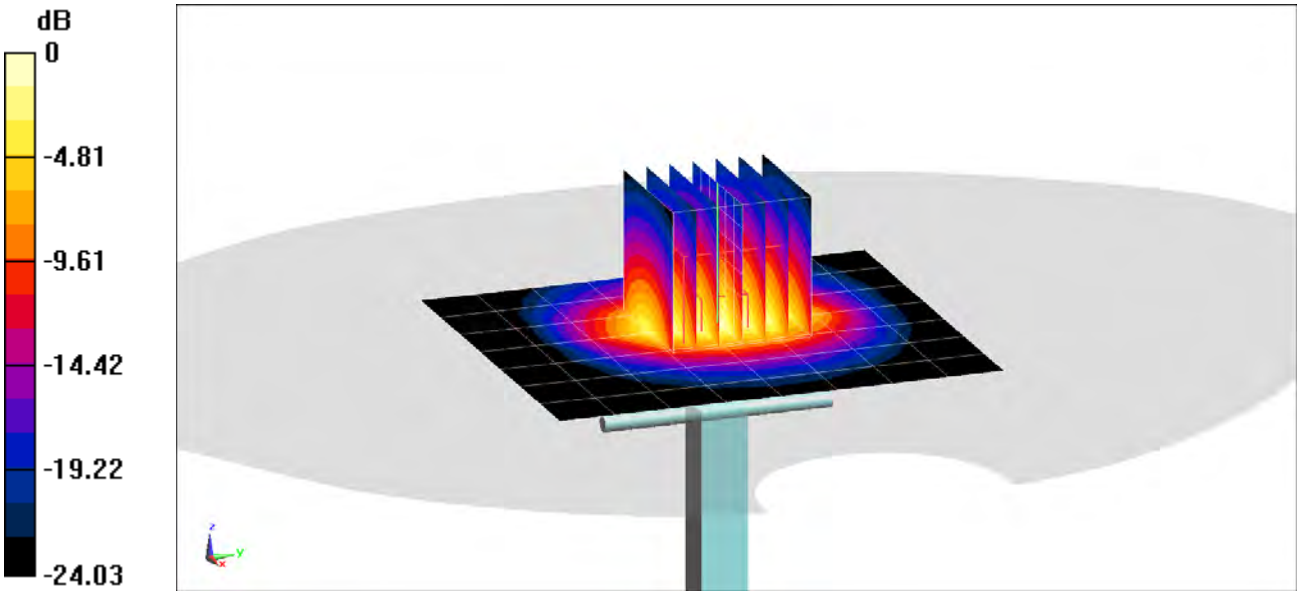
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2600 MHz; σ = 2.218 S/m; ε_r = 50.199; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-29-2019; Ambient Temp: 22.6°C; Tissue Temp: 20.5°C

Probe: ES3DV3 - SN3319; ConvF(4.33, 4.33, 4.33) @ 2600 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 11.8 W/kg
SAR(1 g) = 5.29 W/kg
Deviation(1 g) = -3.47%



0 dB = 7.14 W/kg = 8.54 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1004

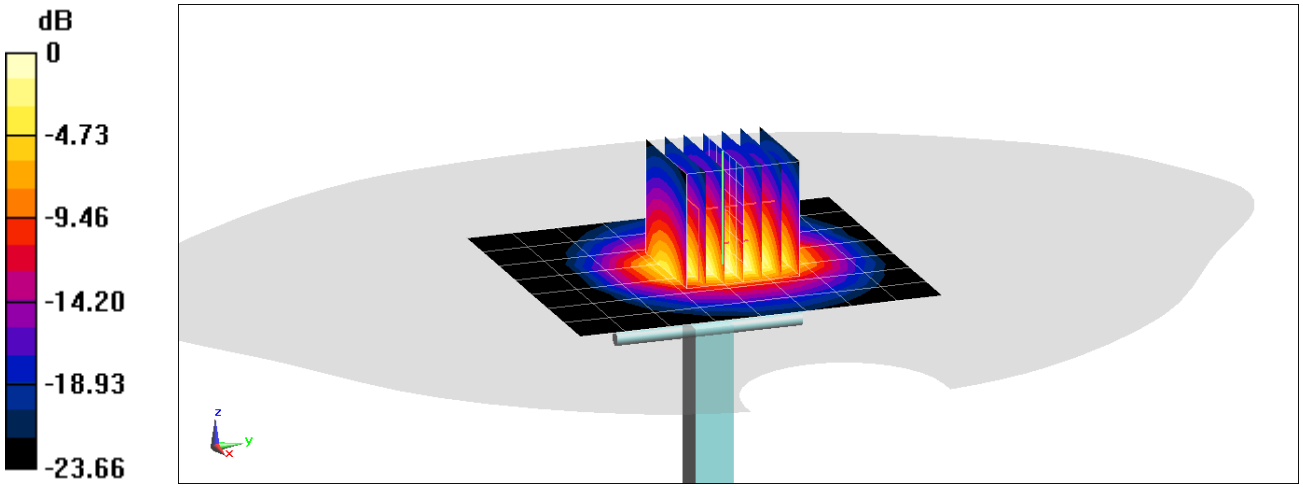
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2600 MHz; σ = 2.211 S/m; ε_r = 51.155; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-02-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3319; ConvF(4.33, 4.33, 4.33) @ 2600 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 11.5 W/kg
SAR(1 g) = 5.3 W/kg
Deviation(1 g) = -3.28%



0 dB = 7.07 W/kg = 8.49 dBW/kg

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DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1004

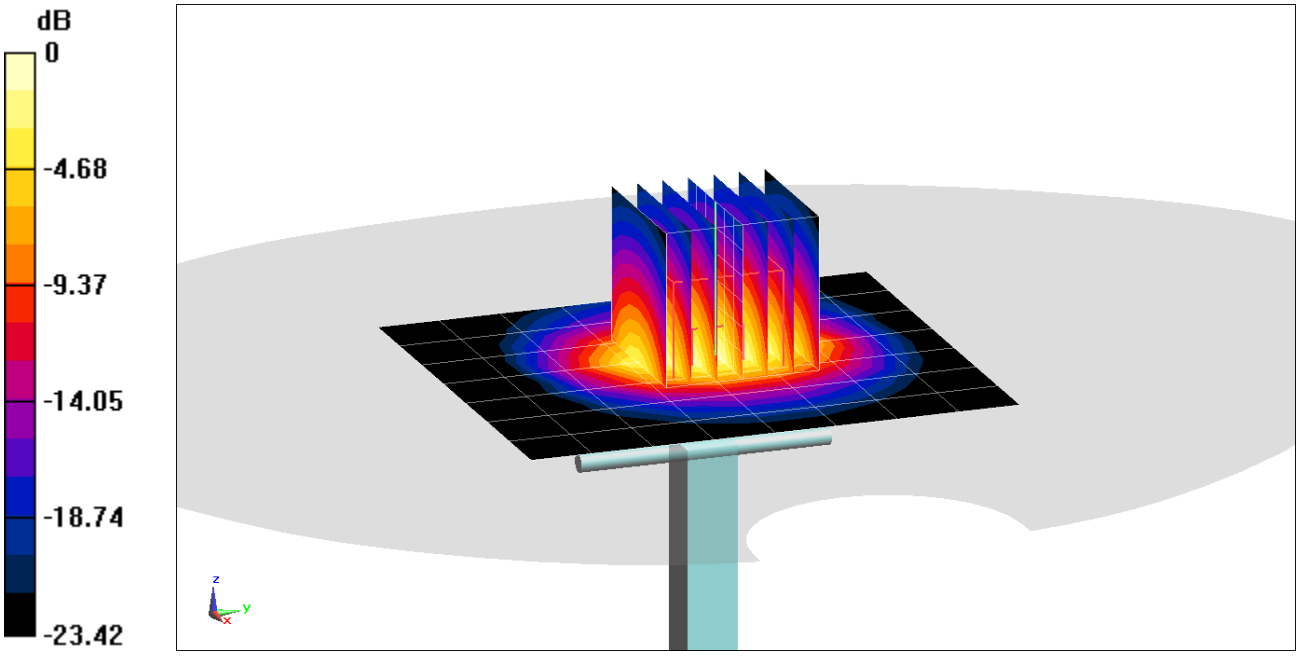
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2600 MHz; σ = 2.212 S/m; ε_r = 51.534; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2019; Ambient Temp: 21.9°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3319; ConvF(4.33, 4.33, 4.33) @ 2600 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 12.0 W/kg
SAR(1 g) = 5.48 W/kg
Deviation(1 g) = 0.00%



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

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1004

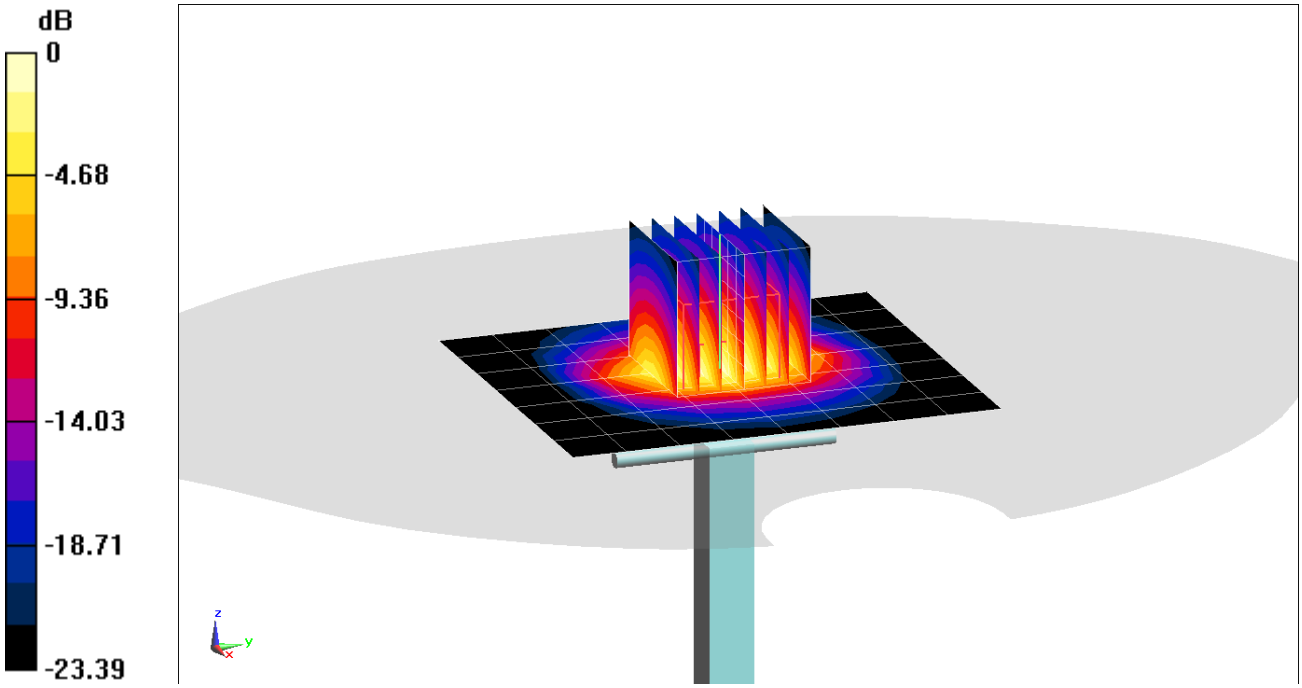
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2600 MHz; σ = 2.216 S/m; ε_r = 52.048; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-18-2019; Ambient Temp: 21.9°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3319; ConvF(4.33, 4.33, 4.33) @ 2600 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 12.0 W/kg
SAR(1 g) = 5.51 W/kg
Deviation(1 g) = 0.55%



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

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DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1004

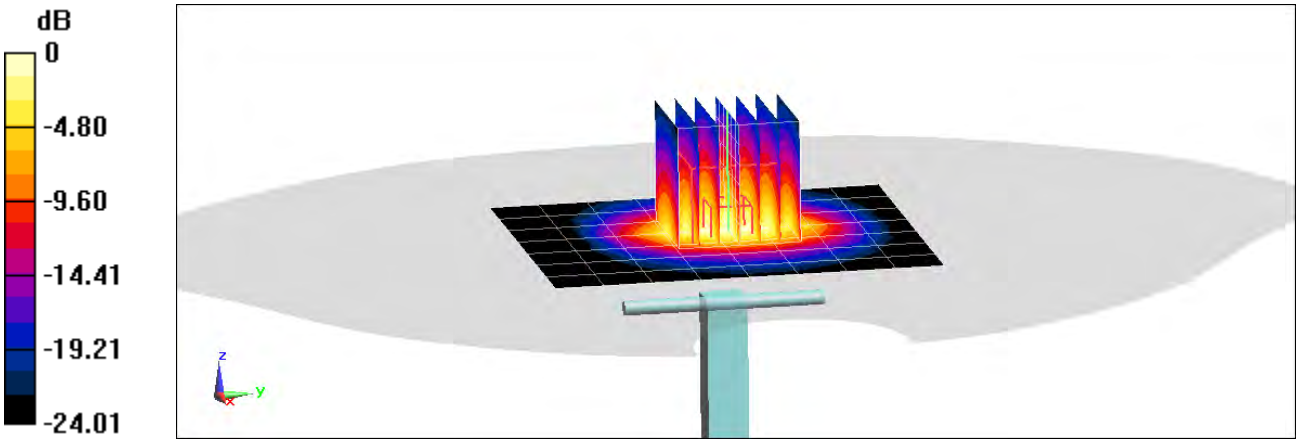
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2600 MHz; σ = 2.201 S/m; ε_r = 50.608; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-20-2019; Ambient Temp: 22.3°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3319; ConvF(4.33, 4.33, 4.33) @ 2600 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 12.3 W/kg
SAR(10 g) = 2.41 W/kg
Deviation(10 g) = -2.43%



0 dB = 7.43 W/kg = 8.71 dBW/kg

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DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1004

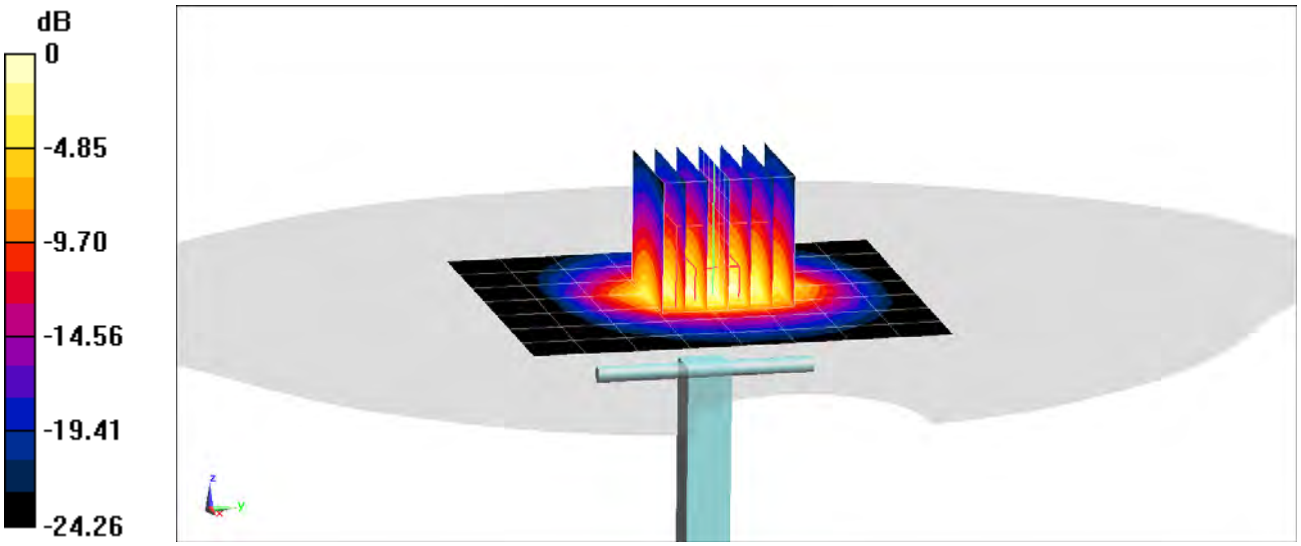
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2600 MHz; σ = 2.199 S/m; ε_r = 50.978; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-27-2019; Ambient Temp: 23.1°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3319; ConvF(4.33, 4.33, 4.33) @ 2600 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 12.4 W/kg
SAR(1 g) = 5.57 W/kg; SAR(10 g) = 2.43 W/kg
Deviation(1 g) = 1.64%; Deviation(10 g) = -1.62%



0 dB = 7.49 W/kg = 8.74 dBW/kg

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1064

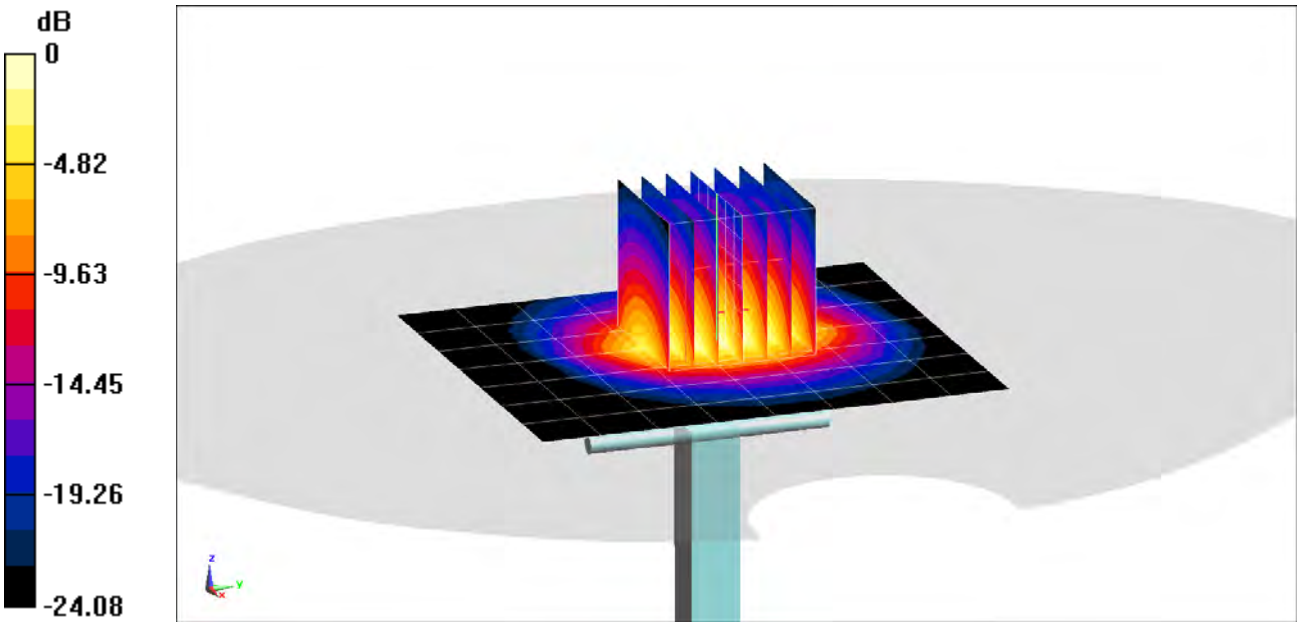
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2600 MHz; σ = 2.222 S/m; ε_r = 50.963; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-04-2019; Ambient Temp: 21.9°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3319; ConvF(4.33, 4.33, 4.33) @ 2600 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 12.3 W/kg
SAR(1 g) = 5.64 W/kg; SAR(10 g) = 2.47 W/kg
Deviation(1 g) = 3.11%; Deviation(10 g) = 1.23%



0 dB = 7.55 W/kg = 8.78 dBW/kg

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DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1057

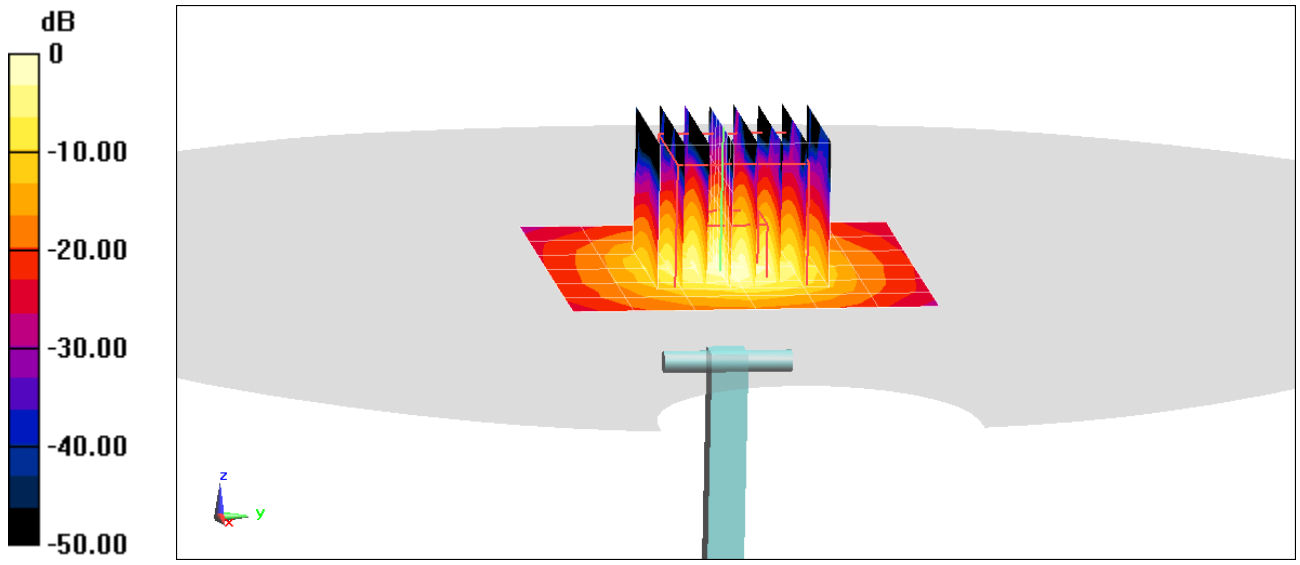
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5250 MHz; σ = 5.476 S/m; ε_r = 47.696; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-21-2019; Ambient Temp: 20.6°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN7308; ConvF(4.48, 4.48, 4.48) @ 5250 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

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) = 15.6 W/kg
SAR(1 g) = 3.73 W/kg; SAR(10 g) = 1.03 W/kg
Deviation(1 g) = -1.71%; Deviation(10 g) = -2.37%



0 dB = 9.10 W/kg = 9.59 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191

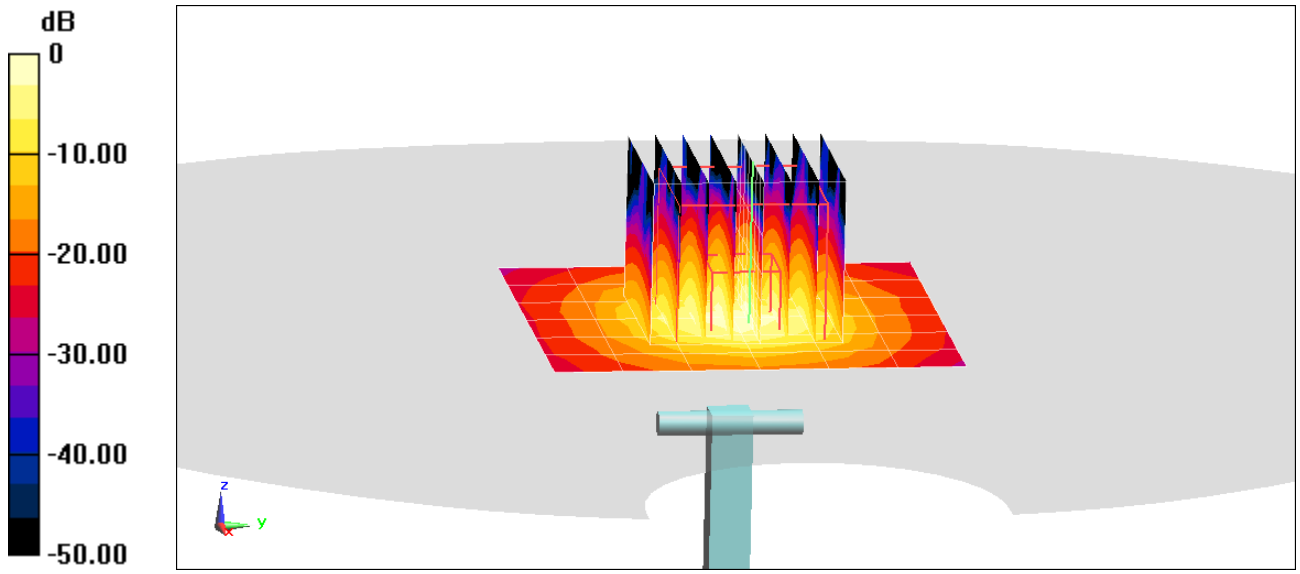
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5250 MHz; σ = 5.448 S/m; ε_r = 48.121; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-29-2019; Ambient Temp: 22.0°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7308; ConvF(4.48, 4.48, 4.48) @ 5250 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

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) = 14.3 W/kg
SAR(1 g) = 3.5 W/kg
Deviation(1 g) = -9.09%



0 dB = 8.62 W/kg = 9.36 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1057

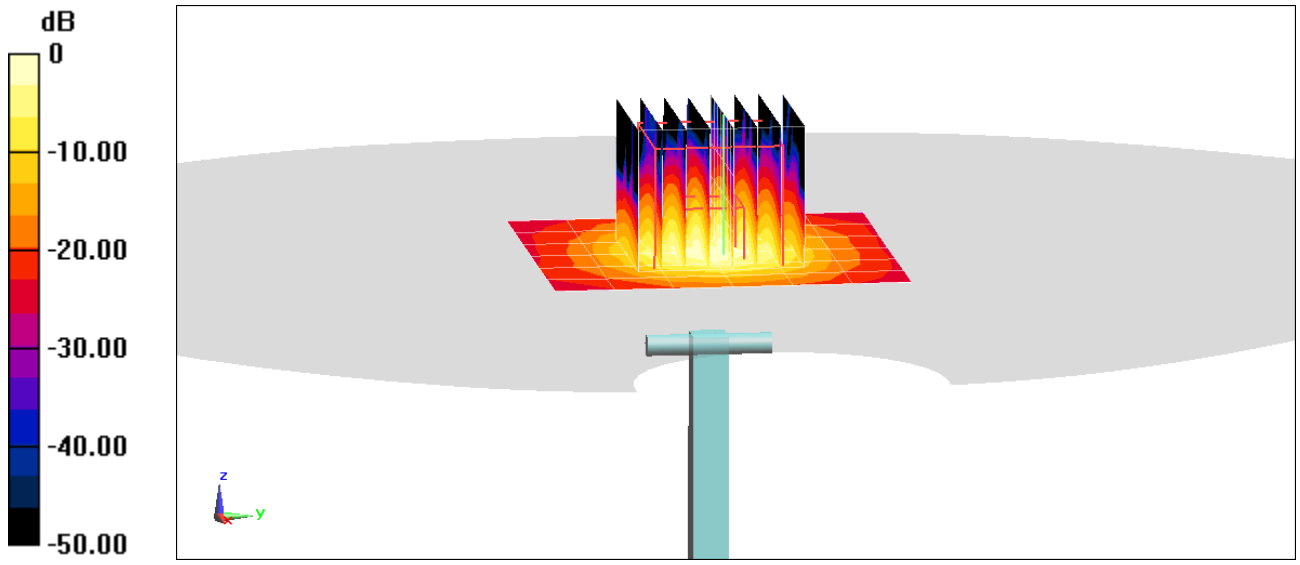
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5600 MHz; σ = 5.977 S/m; ε_r = 47.026; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-21-2019; Ambient Temp: 20.6°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN7308; ConvF(4, 4, 4) @ 5600 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

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) = 18.7 W/kg
SAR(1 g) = 4.06 W/kg; SAR(10 g) = 1.12 W/kg
Deviation(1 g) = 1.63%; Deviation(10 g) = 0.45%



0 dB = 9.84 W/kg = 9.93 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191

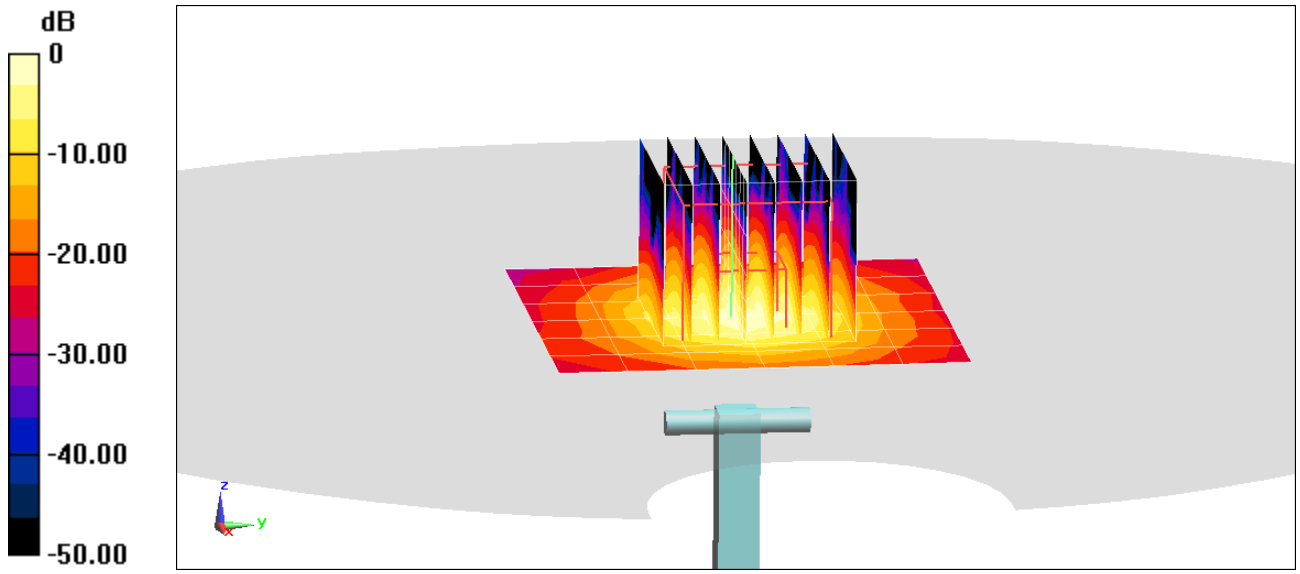
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5600 MHz; σ = 5.969 S/m; ε_r = 47.449; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-29-2019; Ambient Temp: 22.0°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7308; ConvF(4, 4, 4) @ 5600 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

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) = 17.4 W/kg
SAR(1 g) = 3.74 W/kg
Deviation(1 g) = -5.56%



0 dB = 9.20 W/kg = 9.64 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1057

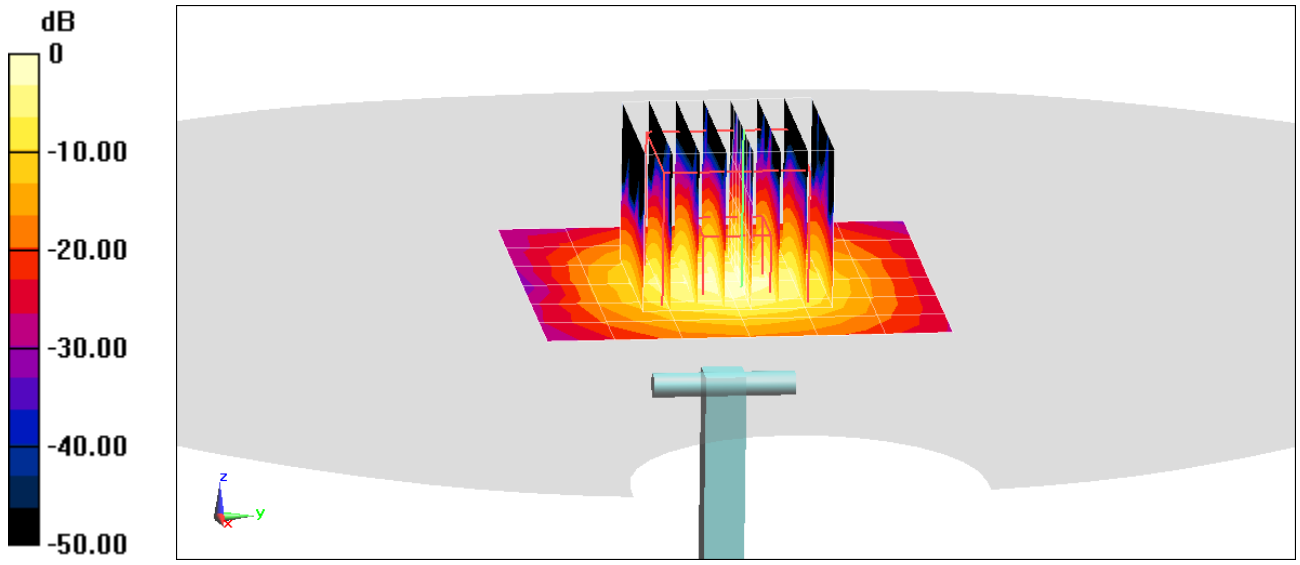
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5750 MHz; σ = 6.205 S/m; ε_r = 46.7; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-21-2019; Ambient Temp: 20.6°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN7308; ConvF(4.18, 4.18, 4.18) @ 5750 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

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) = 17.6 W/kg
SAR(1 g) = 3.65 W/kg; SAR(10 g) = 1.02 W/kg
Deviation(1 g) = -4.82%; Deviation(10 g) = -3.77%



0 dB = 9.18 W/kg = 9.63 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191

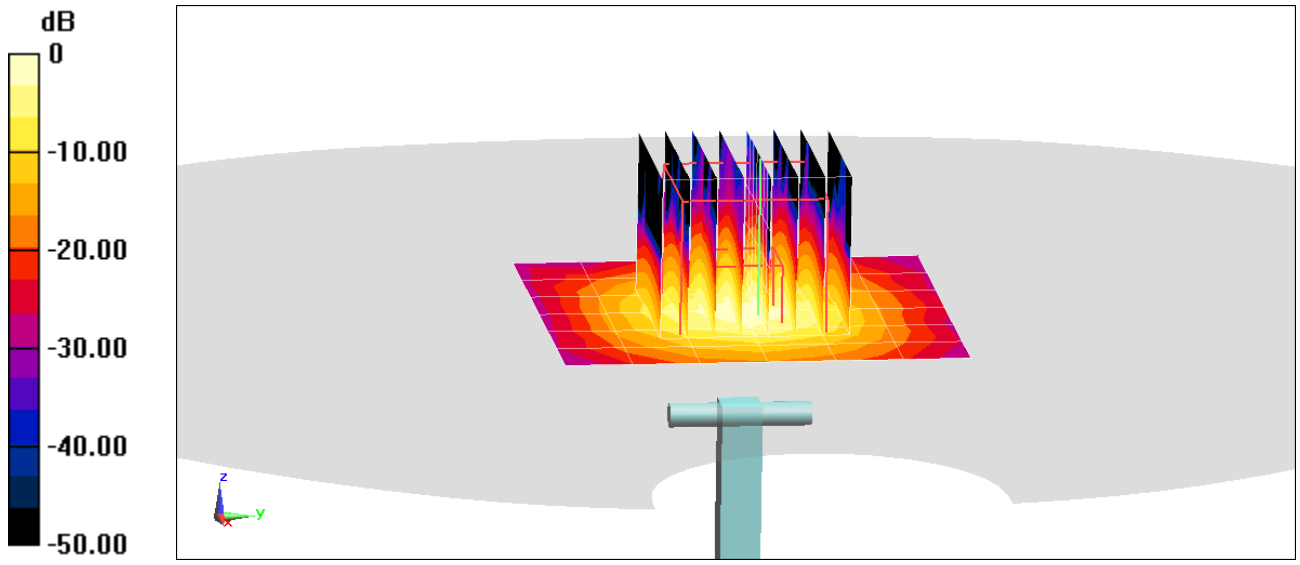
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5750 MHz; σ = 6.181 S/m; ε_r = 47.171; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-29-2019; Ambient Temp: 22.0°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7308; ConvF(4.18, 4.18, 4.18) @ 5750 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

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) = 16.2 W/kg
SAR(1 g) = 3.47 W/kg
Deviation(1 g) = -8.80%



0 dB = 8.65 W/kg = 9.37 dBW/kg

APPENDIX C: PROBE CALIBRATION

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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: D5GHzV2-1057_Jan18

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN:1057
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	January 16, 2018

BN ✓
01-25-2018

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 ✓
02/06/2019

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: 3503	30-Dec-17 (No. EX3-3503_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:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 18, 2018

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

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 V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	36.2 ± 6 %	4.55 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.91 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.8 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.8 ± 6 %	4.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**84.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.0 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.5 ± 6 %	5.06 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.0 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.3 ± 6 %	5.41 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.36 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**73.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.06 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.4 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.2 ± 6 %	5.48 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.64 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.6 ± 6 %	5.94 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.05 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**79.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.25 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.3 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.3 ± 6 %	6.15 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.72 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.2 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.2 ± 6 %	6.22 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.68 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.1 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	50.0 Ω - 5.5 jΩ
Return Loss	- 25.2 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	54.7 Ω - 2.1 jΩ
Return Loss	- 26.2 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	52.7 Ω + 0.0 jΩ
Return Loss	- 31.5 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	49.3 Ω - 6.7 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	48.4 Ω - 3.9 jΩ
Return Loss	- 27.4 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	55.3 Ω - 1.6 jΩ
Return Loss	- 25.6 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	52.6 Ω + 1.1 jΩ
Return Loss	- 31.2 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	51.8 Ω - 0.4 jΩ
Return Loss	- 34.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.203 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 27, 2006

Appendix (Additional assessments outside the scope of SCS 0108)

Measurement Conditions (f=5200 MHz)

DASY system configuration, as far as not given on page 1 and 3.

Phantom	SAM Head Phantom	For usage with cSAR3DV2-R/L

SAR result with SAM Head (Top)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.24 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**82.6 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.6 W/kg ± 19.9 % (k=2)**

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**85.6 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.7 W/kg ± 19.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.6 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.7 W/kg ± 19.9 % (k=2)**

SAR result with SAM Head (Ear)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	5.16 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**51.7 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	1.76 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**17.7 W/kg ± 19.9 % (k=2)**

Measurement Conditions (f=5800 MHz)

DASY system configuration, as far as not given on page 1 and 3.

Phantom	SAM Head Phantom	For usage with cSAR3DV2-R/L

SAR result with SAM Head (Top)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.62 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**86.3 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.1 W/kg ± 19.9 % (k=2)**

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.88 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**88.9 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.44 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.4 W/kg ± 19.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.4 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.5 W/kg ± 19.9 % (k=2)**

SAR result with SAM Head (Ear)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	5.68 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**56.8 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	1.89 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**18.9 W/kg ± 19.9 % (k=2)**

DASY5 Validation Report for Head TSL

Date: 11.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1057

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.55 S/m; ε_r = 36.2; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 4.9 S/m; ε_r = 35.8; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5750 MHz; σ = 5.06 S/m; ε_r = 35.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.51, 5.51, 5.51); Calibrated: 30.12.2017, ConvF(5.05, 5.05, 5.05); Calibrated: 30.12.2017, ConvF(4.98, 4.98, 4.98); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601 - modified; 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=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

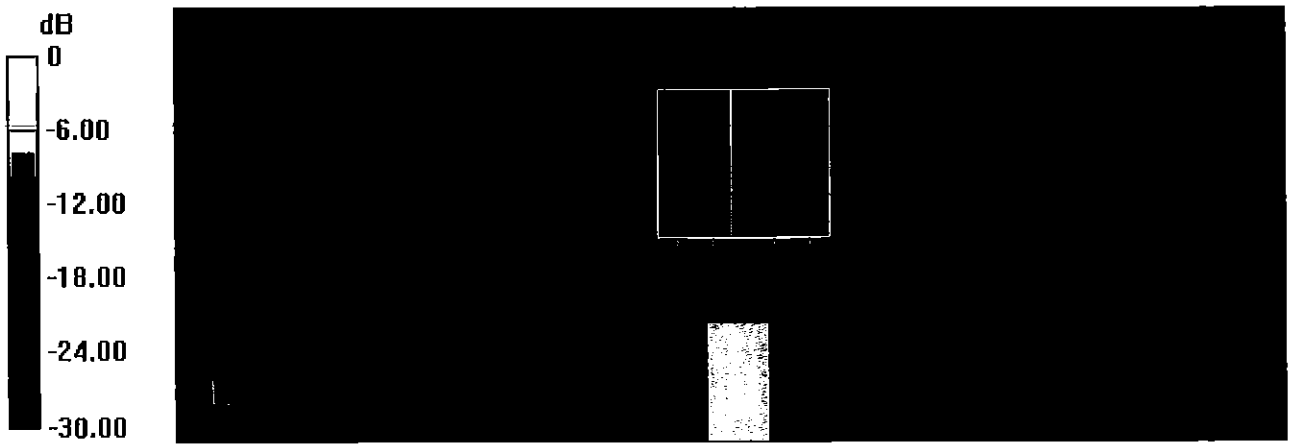
Reference Value = 72.54 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 27.5 W/kg
SAR(1 g) = 7.91 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 17.7 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 72.77 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 32.2 W/kg
SAR(1 g) = 8.41 W/kg; SAR(10 g) = 2.4 W/kg
Maximum value of SAR (measured) = 19.7 W/kg

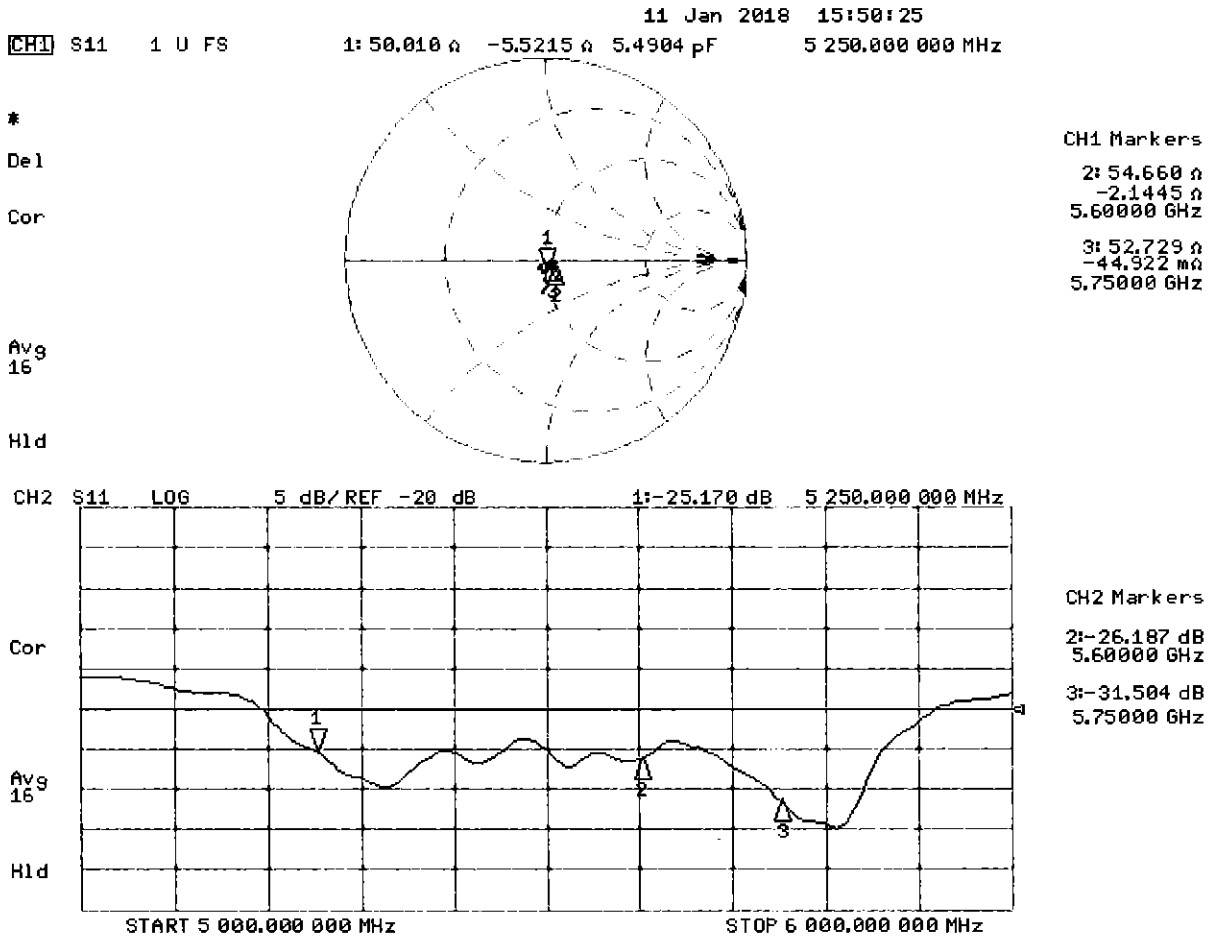
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 70.93 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 31.4 W/kg
SAR(1 g) = 8.06 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 18.9 W/kg



0 dB = 18.9 W/kg = 12.76 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 10.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1057

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz, Frequency: 5800 MHz
Medium parameters used:f = 5200 MHz; σ = 5.41 S/m; ε_r = 47.3; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5250 MHz; σ = 5.48 S/m; ε_r = 47.2; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 5.94 S/m; ε_r = 46.6; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5750 MHz; σ = 6.15 S/m; ε_r = 46.3; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5800 MHz; σ = 6.22 S/m; ε_r = 46.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.35, 5.35, 5.35); Calibrated: 30.12.2017, ConvF(5.26, 5.26, 5.26); Calibrated: 30.12.2017, ConvF(4.65, 4.65, 4.65); Calibrated: 30.12.2017, ConvF(4.57, 4.57, 4.57); Calibrated: 30.12.2017, ConvF(4.53, 4.53, 4.53); 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)

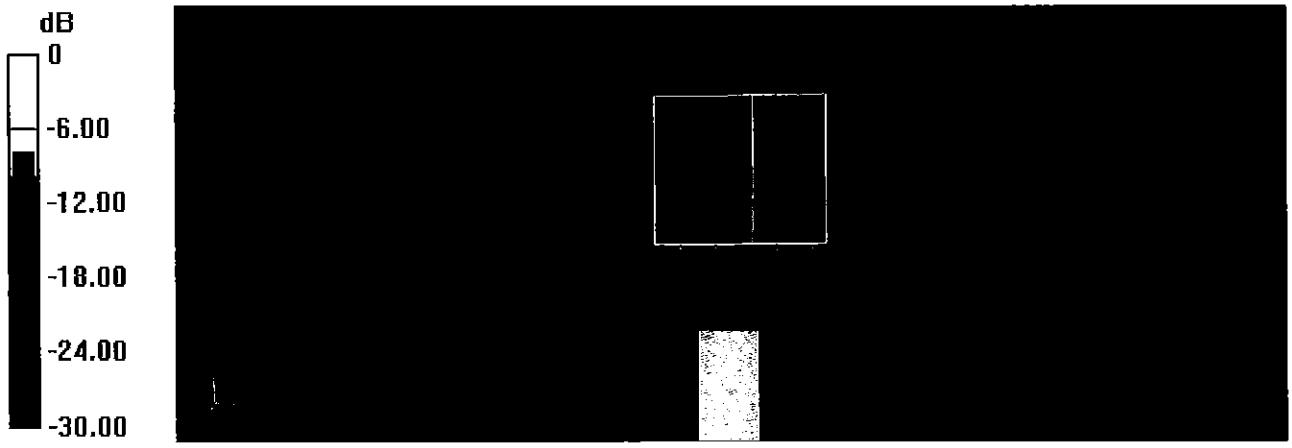
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.05 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 27.6 W/kg
SAR(1 g) = 7.36 W/kg; SAR(10 g) = 2.06 W/kg
Maximum value of SAR (measured) = 17.1 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.53 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 29.4 W/kg
SAR(1 g) = 7.64 W/kg; SAR(10 g) = 2.13 W/kg
Maximum value of SAR (measured) = 17.9 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.09 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 34.0 W/kg
SAR(1 g) = 8.05 W/kg; SAR(10 g) = 2.25 W/kg
Maximum value of SAR (measured) = 19.5 W/kg

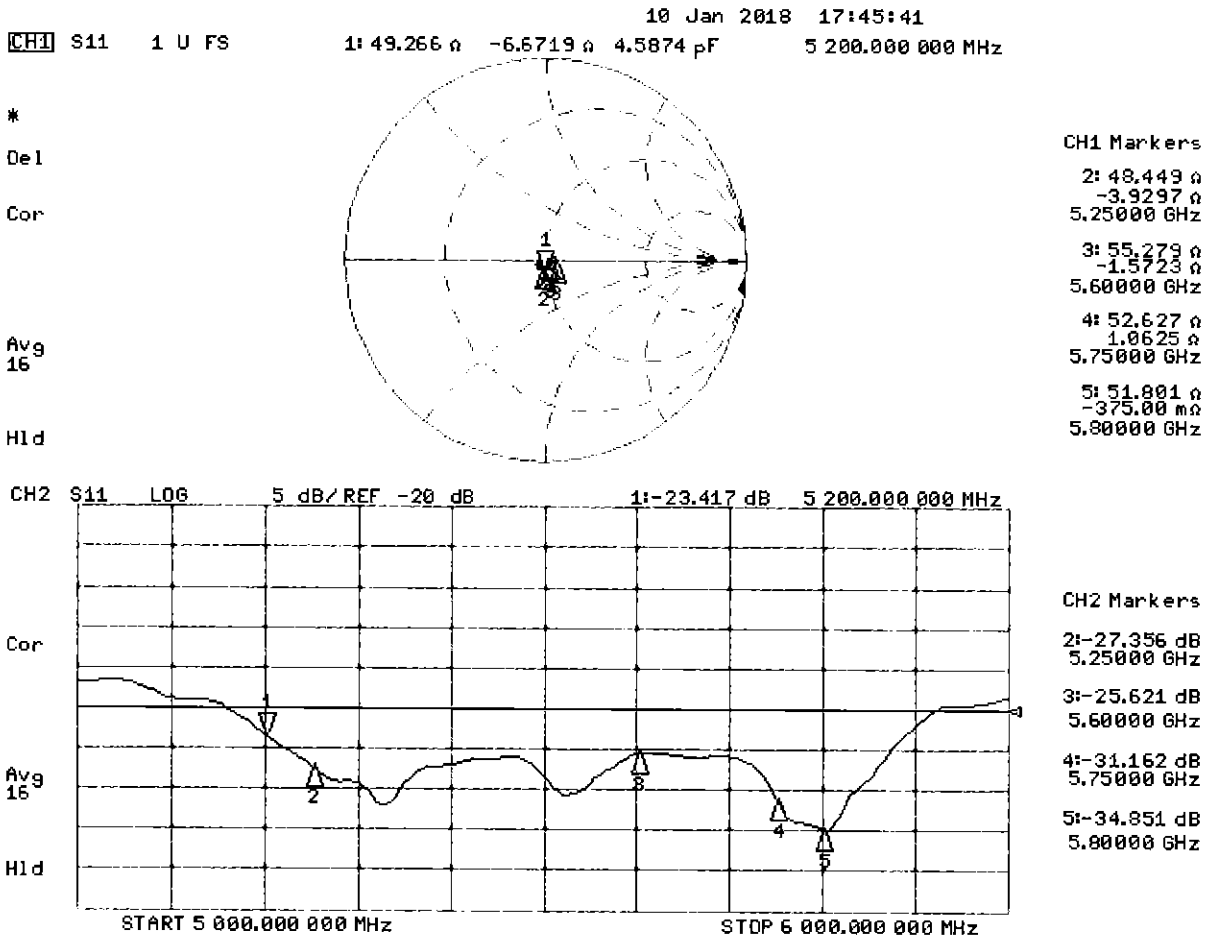
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.45 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 32.9 W/kg
SAR(1 g) = 7.72 W/kg; SAR(10 g) = 2.14 W/kg
Maximum value of SAR (measured) = 18.9 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.14 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 33.3 W/kg
SAR(1 g) = 7.68 W/kg; SAR(10 g) = 2.13 W/kg



0 dB = 18.9 W/kg = 12.76 dBW/kg

Impedance Measurement Plot for Body TSL



DASY5 Validation Report for SAM Head

Date: 16.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN:1057

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.59 S/m; εr = 36.5; ρ = 1000 kg/m3 ,
Medium parameters used: f = 5800 MHz; σ = 5.28 S/m; εr = 35.4; ρ = 1000 kg/m3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.75, 5.75, 5.75); Calibrated: 30.12.2017, ConvF(4.96, 4.96, 4.96); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

SAM Head/Top - 5200/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.99 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 30.6 W/kg
SAR(1 g) = 8.24 W/kg; SAR(10 g) = 2.35 W/kg
Maximum value of SAR (measured) = 19.7 W/kg

SAM Head/Top - 5800/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 73.00 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 36.5 W/kg
SAR(1 g) = 8.62 W/kg; SAR(10 g) = 2.41 W/kg
Maximum value of SAR (measured) = 21.9 W/kg

SAM Head/Mouth - 5200/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.79 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 29.5 W/kg
SAR(1 g) = 8.54 W/kg; SAR(10 g) = 2.37 W/kg
Maximum value of SAR (measured) = 20.7 W/kg

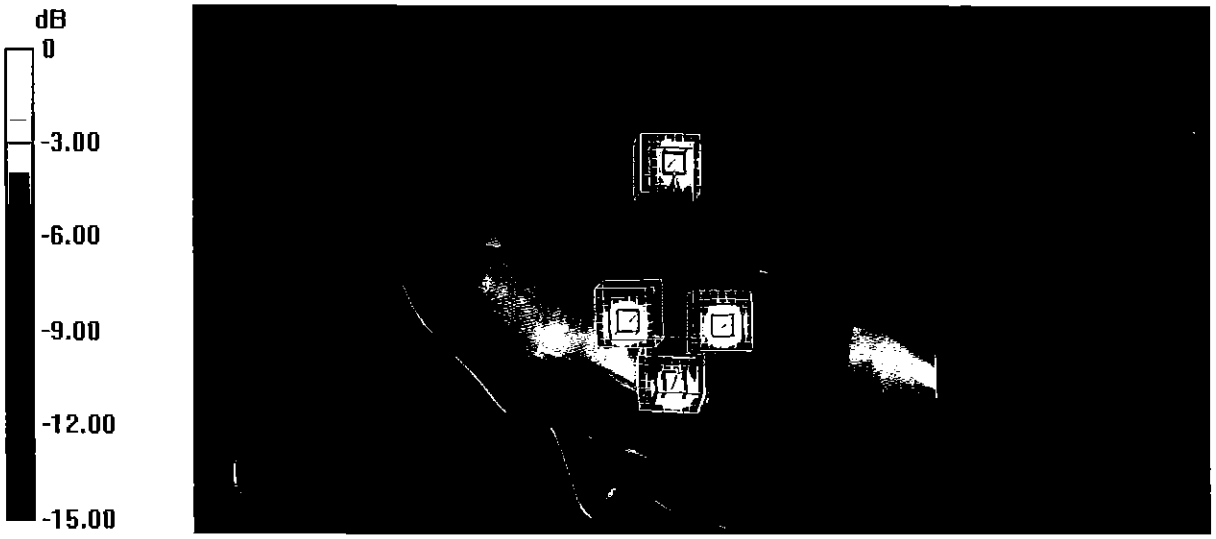
SAM Head/Mouth - 5800/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.69 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 34.9 W/kg
SAR(1 g) = 8.88 W/kg; SAR(10 g) = 2.44 W/kg
Maximum value of SAR (measured) = 23.0 W/kg

SAM Head/Neck - 5200/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.48 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 27.9 W/kg
SAR(1 g) = 8.14 W/kg; SAR(10 g) = 2.37 W/kg
Maximum value of SAR (measured) = 19.3 W/kg

SAM Head/Neck - 5800/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.90 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 33.4 W/kg
SAR(1 g) = 8.33 W/kg; SAR(10 g) = 2.35 W/kg
Maximum value of SAR (measured) = 21.8 W/kg

SAM Head/Ear - 5200/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 54.68 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 5.16 W/kg; SAR(10 g) = 1.76 W/kg
Maximum value of SAR (measured) = 11.1 W/kg

SAM Head/Ear - 5800/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 56.96 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 21.2 W/kg
SAR(1 g) = 5.68 W/kg; SAR(10 g) = 1.89 W/kg
Maximum value of SAR (measured) = 13.8 W/kg



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

Certification of Calibration

Object	D5GHzV2 – SN: 1057
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	1/16/2019
Description:	SAR Validation Dipole at 5250, 5600, and 5750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	2/8/2018	Annual	2/8/2019	US39170122
Agilent	N5182A	MXG Vector Signal Generator	4/18/2018	Annual	4/18/2019	MY47420800
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1207364
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1339018
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
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
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
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
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Seekonk	NC-100	Torque Wrench	7/11/2018	Annual	7/11/2019	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/3/2018	Annual	10/3/2019	1558
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/18/2018	Annual	6/18/2019	1334
SPEAG	DAK-3.5	Dielectric Assessment Kit	9/11/2018	Annual	9/11/2019	1091
SPEAG	EX3DV4	SAR Probe	8/23/2018	Annual	8/23/2019	7308
SPEAG	EX3DV4	SAR Probe	6/25/2018	Annual	6/25/2019	7409

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	

DIPOLE CALIBRATION EXTENSION

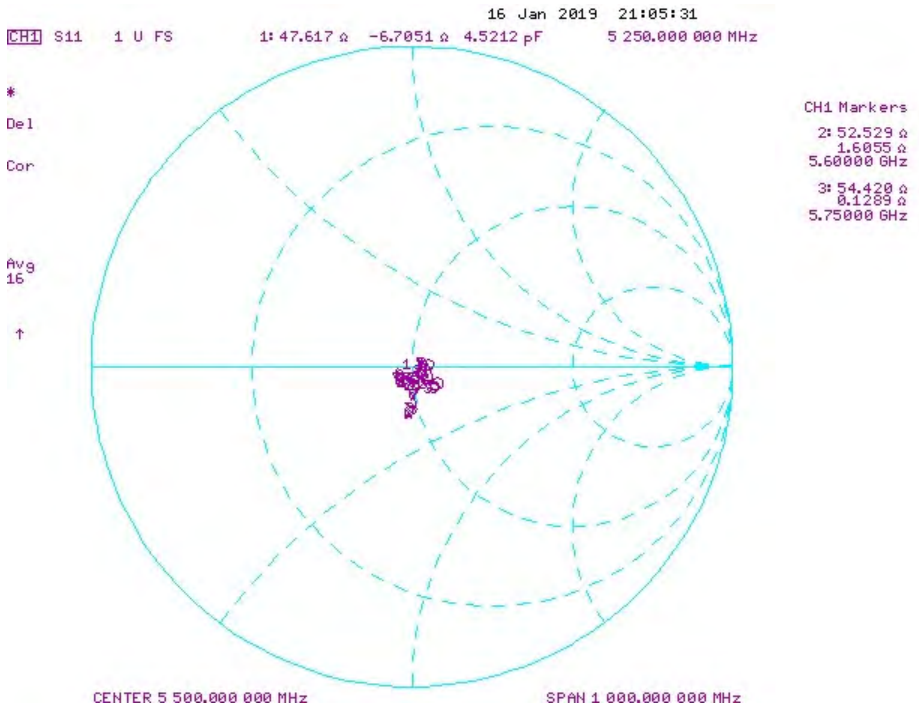
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

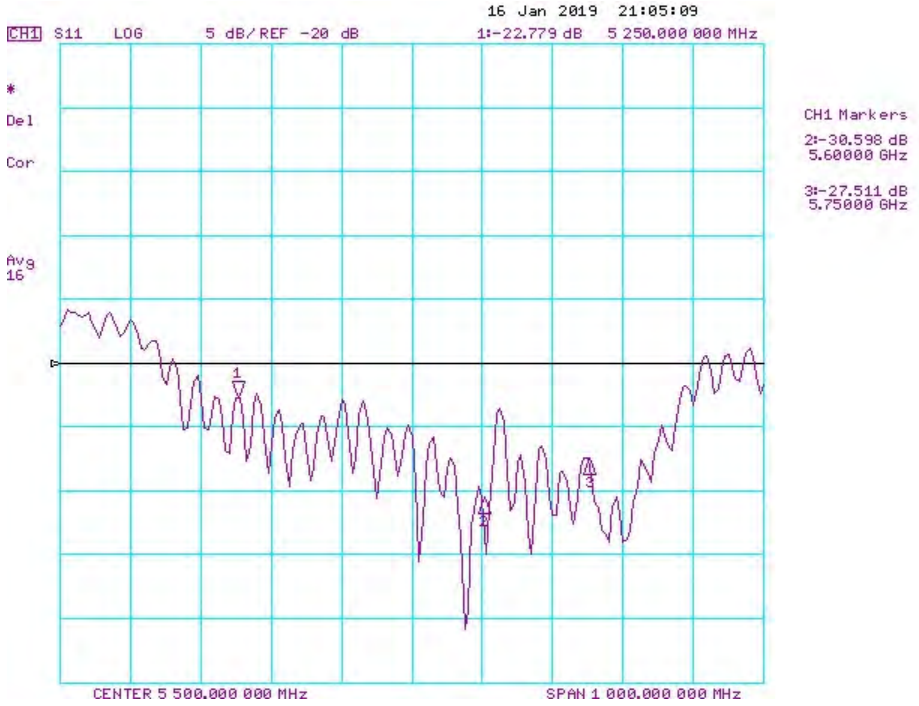
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does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

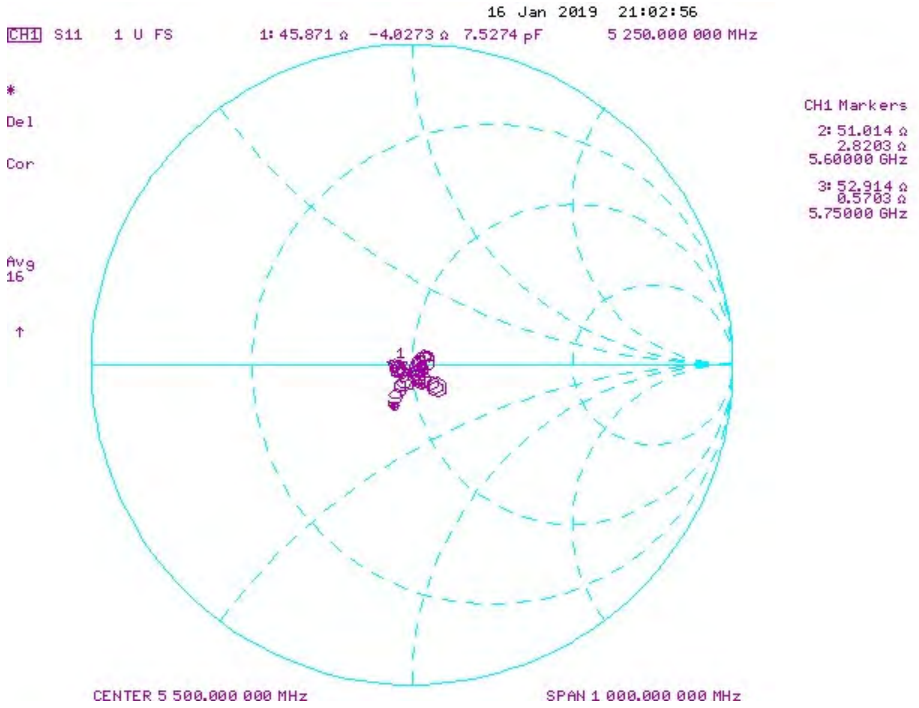
Frequency (MHz)	Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 17.0 dBm	Measured Head SAR (1g) W/kg @ 17.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 17.0 dBm	Measured Head SAR (10g) W/kg @ 17.0 dBm	Deviation 10g (%)	Certificate 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
5250	1/16/2018	1/16/2019	1.203	3.96	3.63	-8.33%	1.14	1.04	-8.77%	50	47.6	2.4	-5.5	-6.7	1.2	-25.2	-22.8	9.60%	PASS
5600	1/16/2018	1/16/2019	1.203	4.205	3.84	-8.68%	1.2	1.09	-9.17%	54.7	52.5	2.2	-2.1	1.6	3.7	-26.2	-30.6	-16.80%	PASS
5750	1/16/2018	1/16/2019	1.203	4.025	3.76	-6.58%	1.15	1.07	-6.96%	52.7	54.4	1.7	0	0.1	0.1	-31.5	-27.5	12.70%	PASS
Frequency (MHz)	Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 17.0 dBm	Measured Body SAR (1g) W/kg @ 17.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 17.0 dBm	Measured Body SAR (10g) W/kg @ 17.0 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
5250	1/16/2018	1/16/2019	1.203	3.795	3.73	-1.71%	1.06	1.03	-2.37%	48.4	45.9	2.5	-3.9	-4	0.1	-27.4	-24.5	10.50%	PASS
5600	1/16/2018	1/16/2019	1.203	3.995	4.06	1.63%	1.12	1.12	0.45%	55.3	51	4.3	-1.6	2.8	4.4	-25.6	-30.7	-20.00%	PASS
5750	1/16/2018	1/16/2019	1.203	3.835	3.65	-4.82%	1.06	1.02	-3.77%	52.6	52.9	0.3	1.1	0.6	0.5	-31.2	-30.7	1.60%	PASS

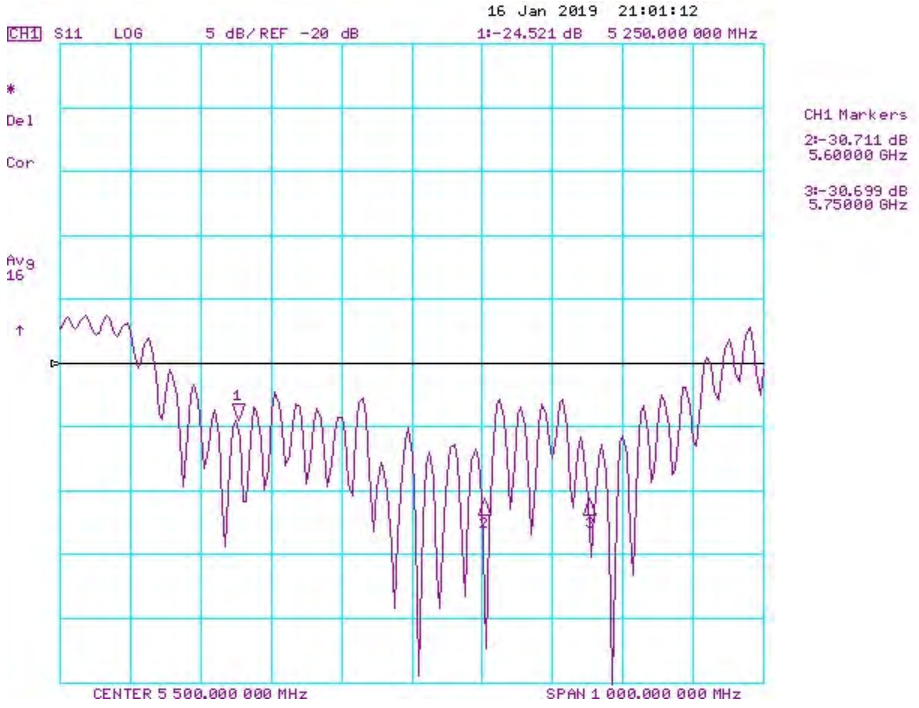
Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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S Swiss Calibration Service

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D5GHzV2-1191_Sep16**

CALIBRATION CERTIFICATE

Object D5GHzV2 - SN:1191

Calibration procedure(s) QA CAL-22.v2
Calibration procedure for dipole validation kits between 3-6 GHz

BN✓ 09-28-2016

Extended PM✓ 9/20/2018

Calibration date: September 21, 2016

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 3503	30-Jun-16 (No. EX3-3503_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	Leif Klysner
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 22, 2016

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

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

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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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 62209-2, "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
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.5 ± 6 %	4.59 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.96 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**78.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.29 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.6 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.0 ± 6 %	4.93 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.45 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.6 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.8 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.8 ± 6 %	5.08 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.99 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.27 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.4 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.4 ± 6 %	5.52 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.74 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**77.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.6 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	6.00 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.96 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**79.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.24 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.2 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.5 ± 6 %	6.21 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.65 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.2 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	55.7 Ω - 4.3 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	58.3 Ω - 3.2 jΩ
Return Loss	- 21.8 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	58.1 Ω + 4.8 jΩ
Return Loss	- 21.2 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	56.1 Ω - 3.7 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	58.9 Ω - 1.7 jΩ
Return Loss	- 21.7 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	59.5 Ω + 6.9 jΩ
Return Loss	- 19.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.204 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 28, 2003

DASY5 Validation Report for Head TSL

Date: 21.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1191

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.59 S/m; ε_r = 34.5; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 4.93 S/m; ε_r = 34; ρ = 1000 kg/m^3 , Medium parameters used: f = 5750 MHz; σ = 5.08 S/m; ε_r = 33.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

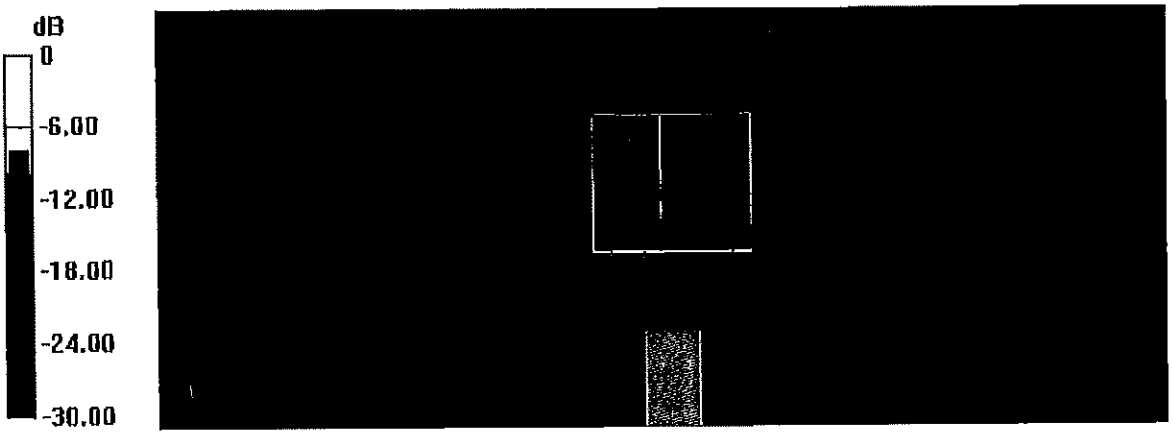
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.42, 5.42, 5.42); Calibrated: 30.06.2016, ConvF(4.89, 4.89, 4.89); Calibrated: 30.06.2016, ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 68.49 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 28.6 W/kg
SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.29 W/kg
Maximum value of SAR (measured) = 18.2 W/kg

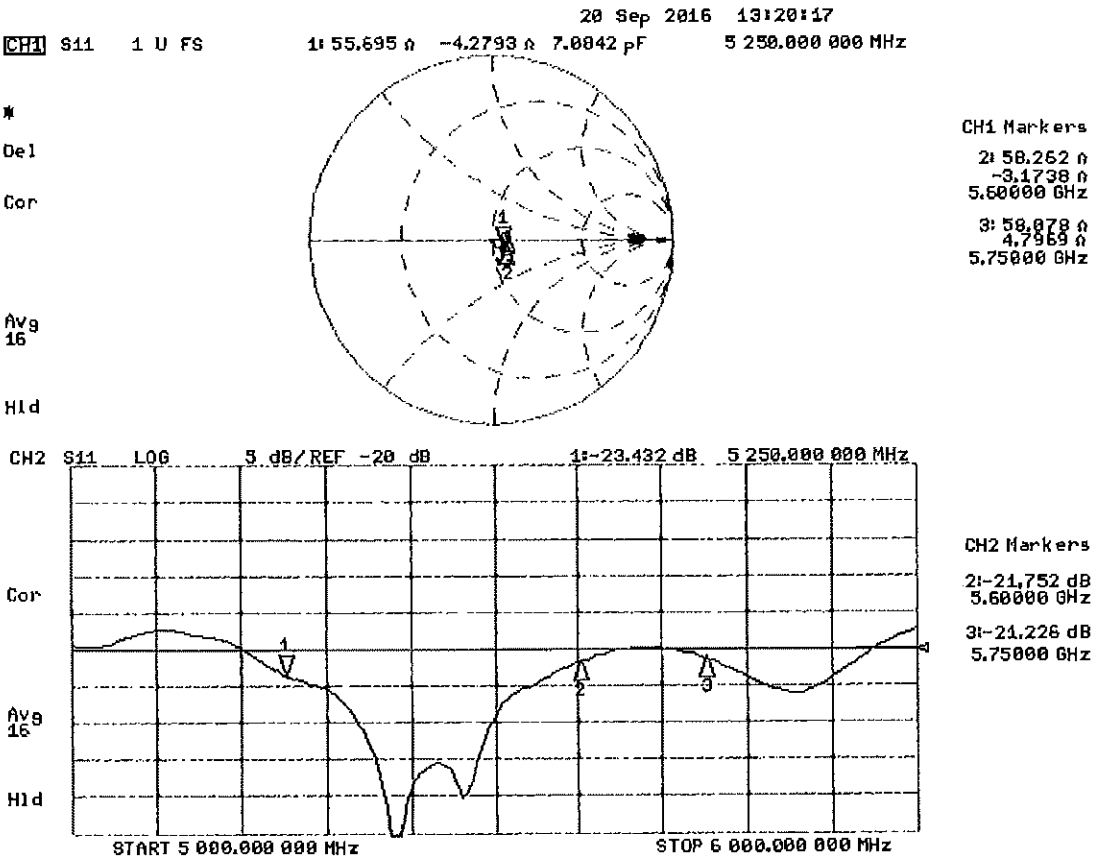
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.34 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 32.9 W/kg
SAR(1 g) = 8.45 W/kg; SAR(10 g) = 2.41 W/kg
Maximum value of SAR (measured) = 20.0 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.15 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 32.3 W/kg
SAR(1 g) = 7.99 W/kg; SAR(10 g) = 2.27 W/kg
Maximum value of SAR (measured) = 19.3 W/kg



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 20.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1191

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.52 S/m; ε_r = 47.4; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 6 S/m; ε_r = 46.8; ρ = 1000 kg/m^3 , Medium parameters used: f = 5750 MHz; σ = 6.21 S/m; ε_r = 46.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

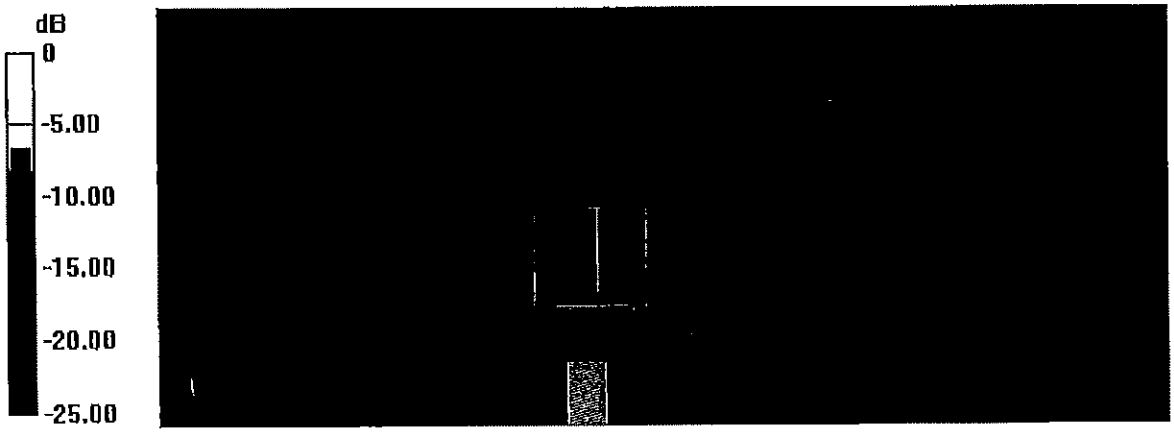
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016, ConvF(4.35, 4.35, 4.35); Calibrated: 30.06.2016, ConvF(4.3, 4.3, 4.3); Calibrated: 30.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.49 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 7.74 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 17.7 W/kg

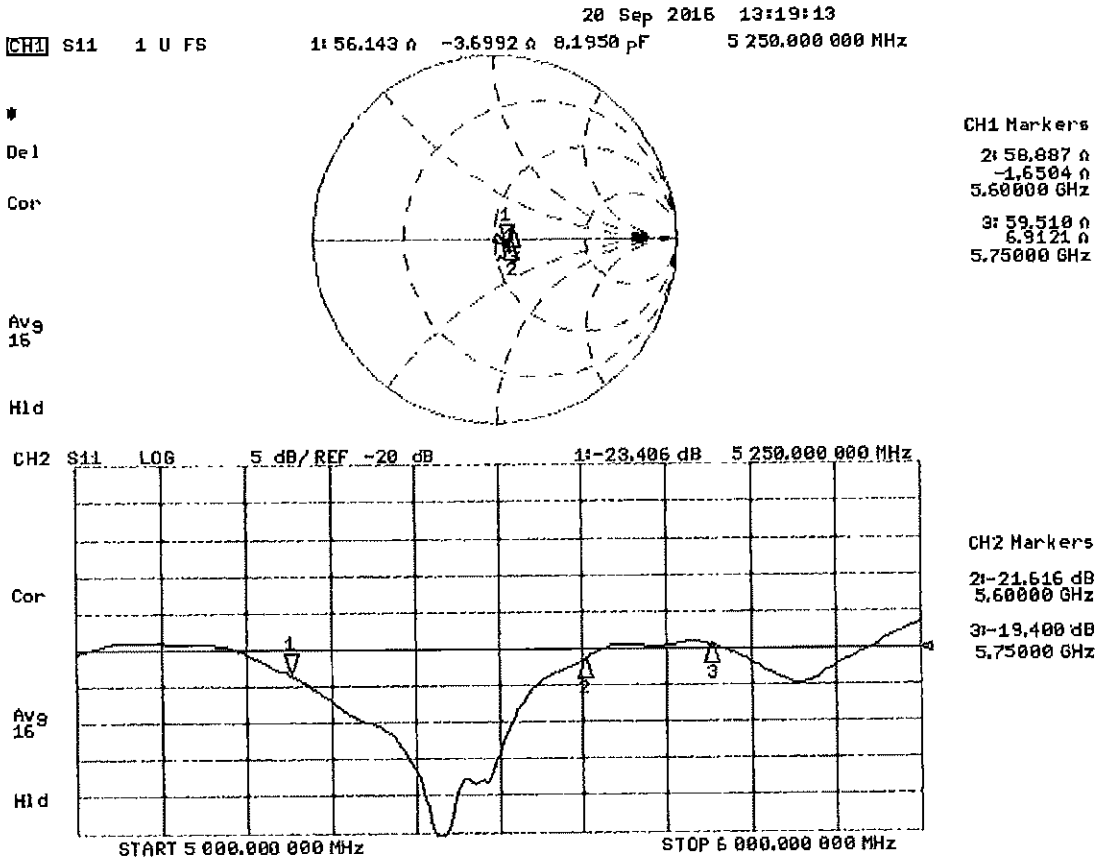
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.85 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 32.5 W/kg
SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.24 W/kg
Maximum value of SAR (measured) = 18.8 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.21 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 32.7 W/kg
SAR(1 g) = 7.65 W/kg; SAR(10 g) = 2.14 W/kg
Maximum value of SAR (measured) = 18.5 W/kg



0 dB = 17.7 W/kg = 12.48 dBW/kg

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object	D5GHzV2 – SN: 1191
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	9/19/2017
Description:	SAR Validation Dipole at 5250, 5600, and 5750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
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
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/1/2017	Annual	6/1/2018	MY53401181
Agilent	8753ES	S-Parameter Network Analyzer	10/26/2016	Annual	10/26/2017	US39170118
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/10/2017	Annual	5/10/2018	1070
SPEAG	EX3DV4	SAR Probe	1/13/2017	Annual	1/13/2018	3589
SPEAG	EX3DV4	SAR Probe	2/13/2017	Annual	2/13/2018	3914
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/16/2017	Annual	1/16/2018	1466
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/9/2017	Annual	2/9/2018	665
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1207364
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1339018
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Agilent	N5182A	MXG Vector Signal Generator	2/28/2017	Annual	2/28/2018	MY47420800
Seekonk	NC-100	Torque Wrench	11/6/2015	Biennial	11/6/2017	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	KOK

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:

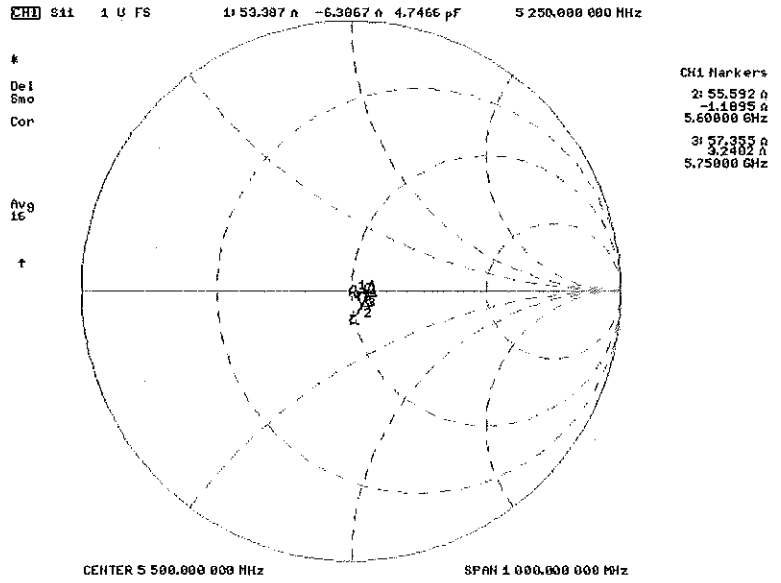
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does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

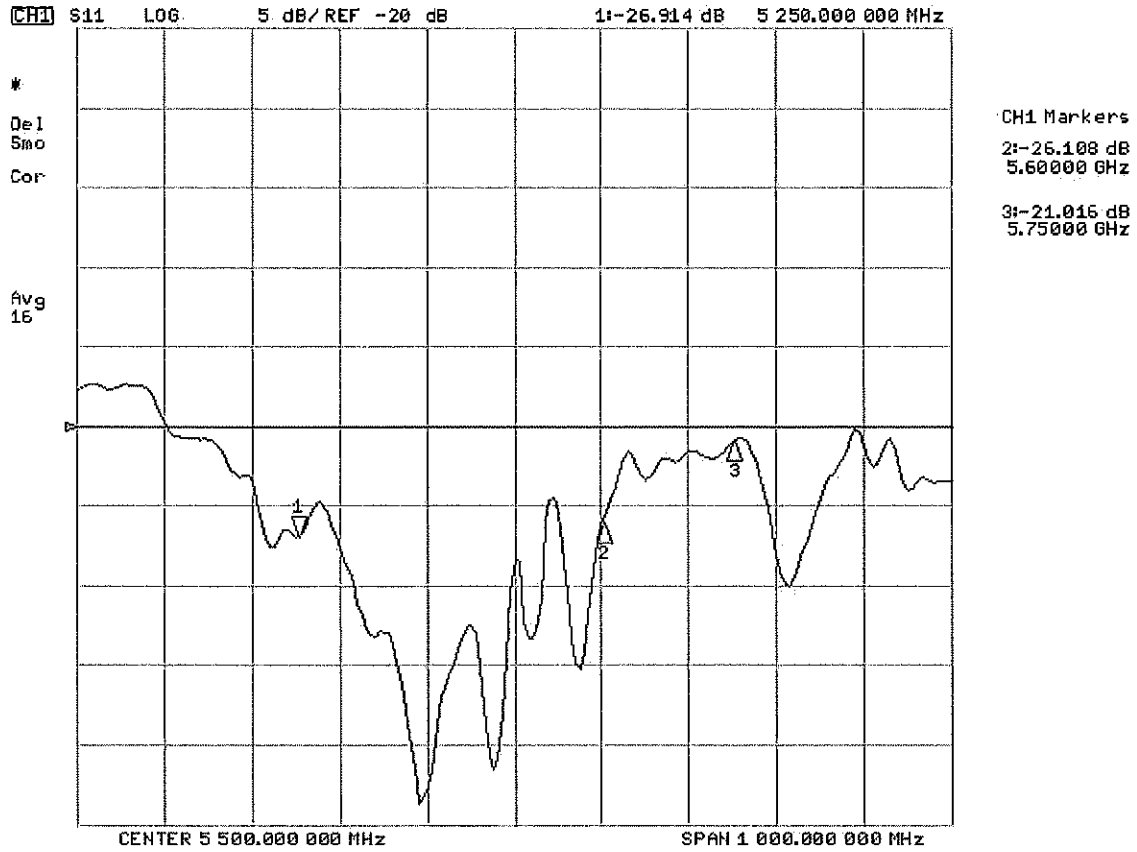
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Frequency (MHz)	Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 17.0 dBm	Measured Head SAR (1g) W/kg @ 17.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 17.0 dBm	Measured Head SAR (10g) W/kg @ 17.0 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
5250	9/21/2016	9/19/2017	1.204	3.95	3.70	-6.21%	1.13	1.05	-7.08%	55.7	53.4	2.3	-4.3	-6.4	2.1	-23.4	-26.9	-15.00%	PASS
5600	9/21/2016	9/19/2017	1.204	4.18	4.03	-3.59%	1.19	1.13	-5.04%	58.3	55.6	2.7	-3.2	-1.2	2.0	-21.8	-26.1	-19.80%	PASS
5750	9/21/2016	9/19/2017	1.204	3.96	3.94	-0.38%	1.12	1.10	-1.79%	58.1	57.4	0.7	4.8	3.2	1.6	-21.2	-21.0	0.90%	PASS

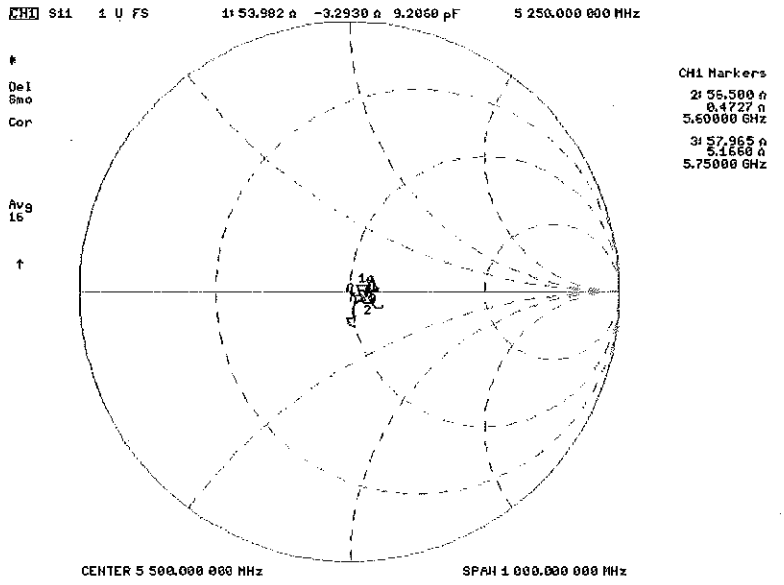
Frequency (MHz)	Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 17.0 dBm	Measured Body SAR (1g) W/kg @ 17.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 17.0 dBm	Measured Body SAR (10g) W/kg @ 17.0 dBm	Deviation 10g (%)	Certificate 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
5250	9/21/2016	9/19/2017	1.204	3.85	3.80	-1.30%	1.08	1.06	-1.85%	56.1	54.0	2.1	-3.7	-3.3	0.4	-23.4	-26.0	-11.10%	PASS
5600	9/21/2016	9/19/2017	1.204	3.96	4.06	2.53%	1.11	1.13	1.80%	58.9	56.5	2.4	-1.7	0.5	2.2	-21.7	-24.5	-12.80%	PASS
5750	9/21/2016	9/19/2017	1.204	3.81	3.66	-3.81%	1.06	1.02	-3.77%	59.5	58.0	1.5	6.9	5.2	1.7	-19.4	-21.1	-8.70%	PASS

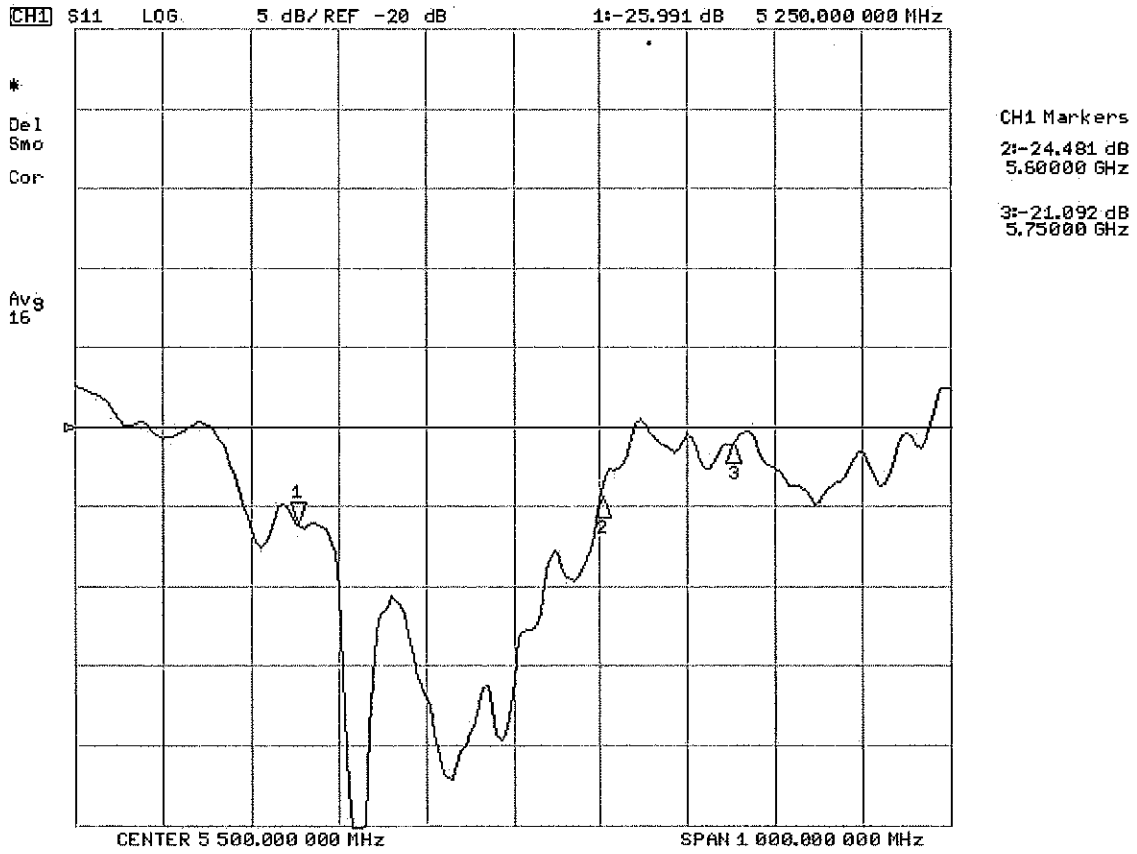
Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





Certification of Calibration

Object	D5GHzV2 – SN: 1191
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	9/11/2018
Description:	SAR Validation Dipole at 5250, 5600, and 5750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
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
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
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
Agilent	8753ES	S-Parameter Vector Network Analyzer	8/30/2018	Annual	8/30/2019	MY40003841
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	EX3DV4	SAR Probe	6/25/2018	Annual	6/25/2019	7409
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/18/2018	Annual	6/18/2019	1334
SPEAG	EX3DV4	SAR Probe	4/18/2018	Annual	4/18/2019	7357
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/11/2018	Annual	4/11/2019	1407
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1207364
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1339018
Anritsu	ML2495A	Power Meter	10/22/2017	Annual	10/22/2018	1328004
Agilent	N5182A	MXG Vector Signal Generator	4/18/2018	Annual	4/18/2019	MY47420800
Seekonk	NC-100	Torque Wrench	7/11/2018	Annual	7/11/2019	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path.

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	KOK

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:

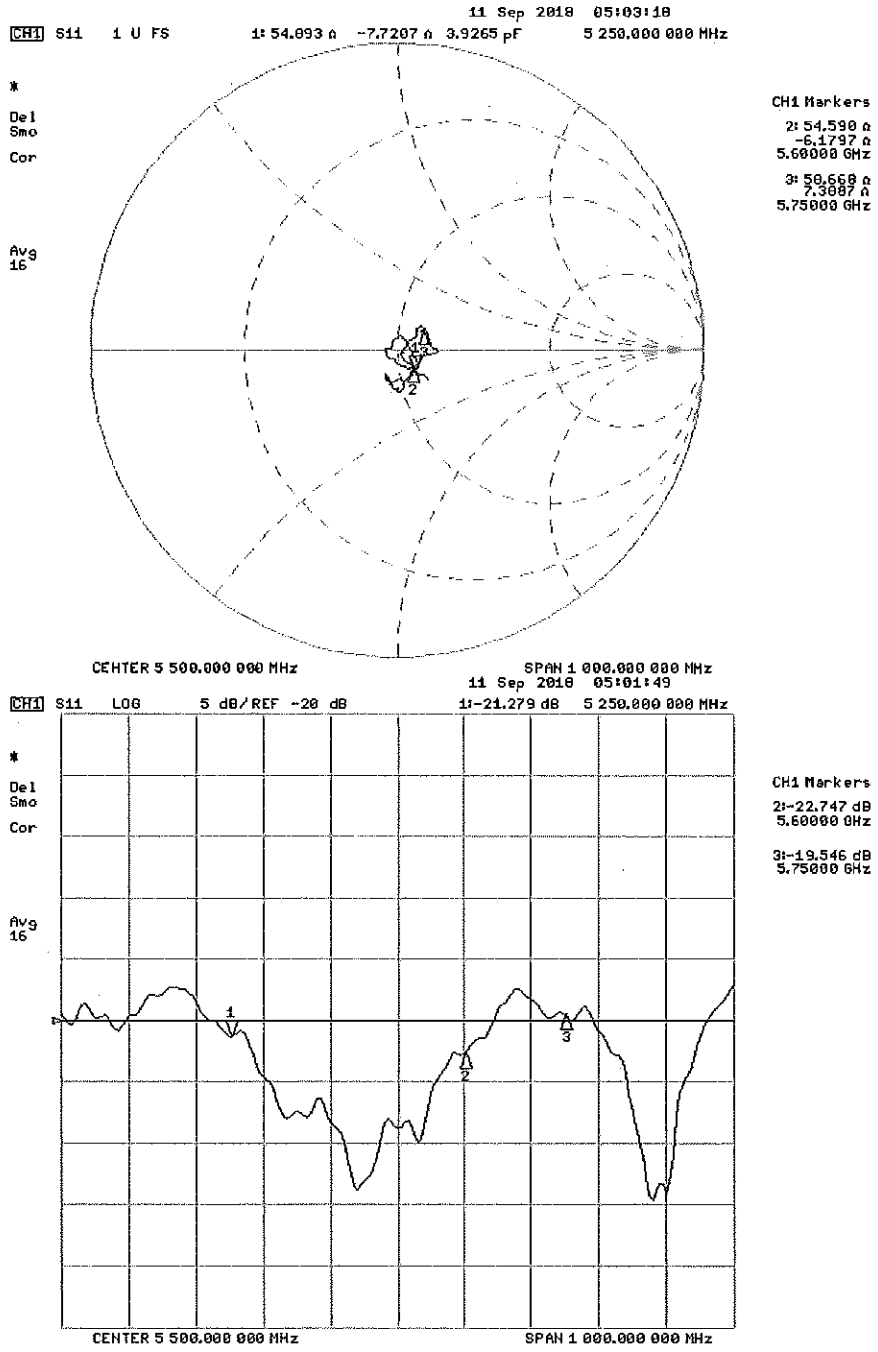
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does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

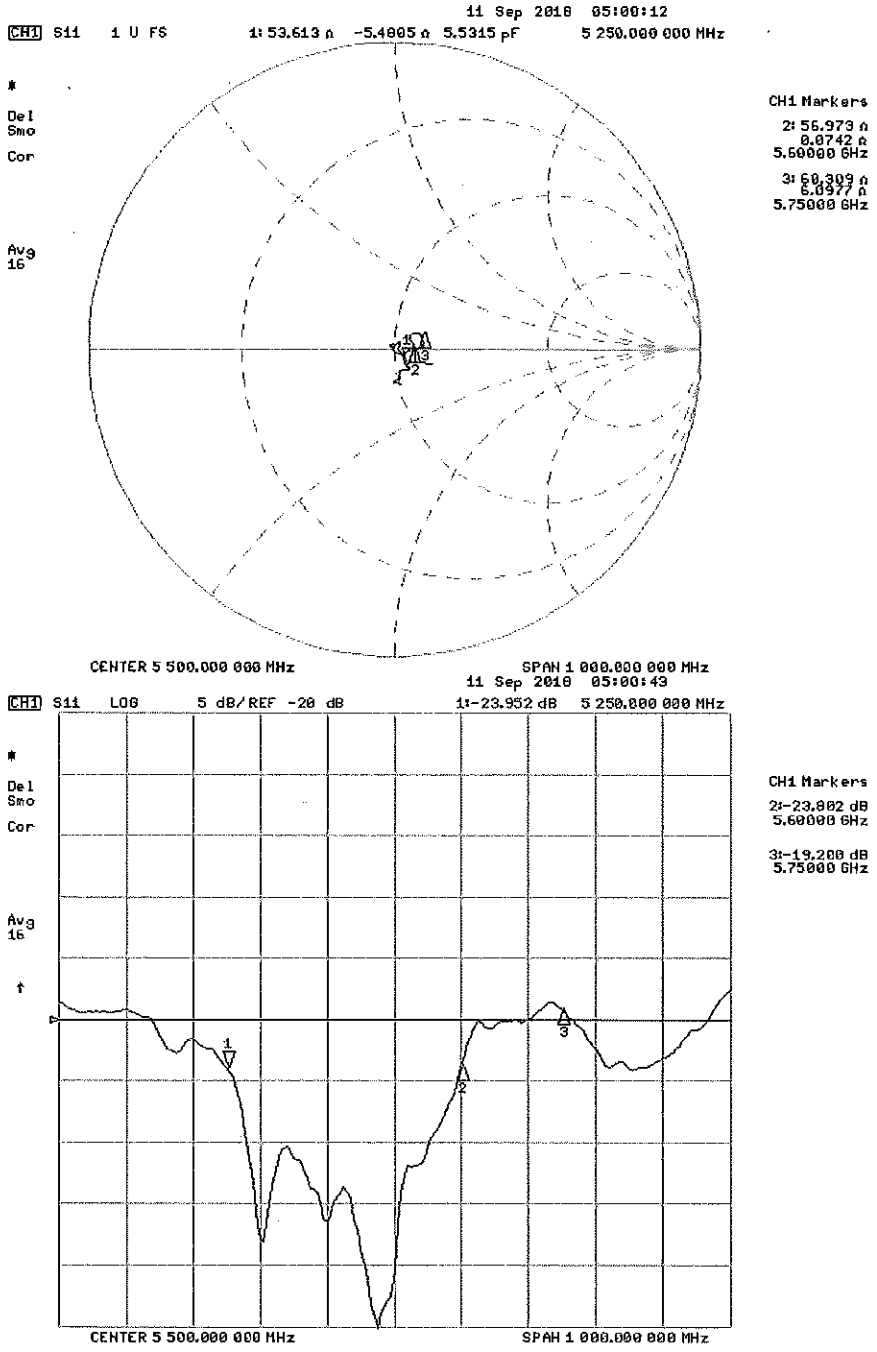
Frequency (MHz)	Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 17.0 dBm	Measured Head SAR (1g) W/kg @ 17.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 17.0 dBm	Measured Head SAR (10g) W/kg @ 17.0 dBm	Deviation 10g (%)	Certificate 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
5250	9/21/2016	9/11/2018	1.204	3.945	3.9	-1.14%	1.13	1.11	-1.77%	55.7	54.9	0.8	-4.3	-7.7	3.4	-23.4	-21.3	9.10%	PASS
5600	9/21/2016	9/11/2018	1.204	4.18	4.19	0.24%	1.19	1.18	-0.84%	58.3	54.6	3.7	-3.2	-6.2	3	-21.8	-22.7	-4.30%	PASS
5750	9/21/2016	9/11/2018	1.204	3.955	3.82	-3.41%	1.12	1.08	-3.57%	58.1	58.7	0.6	4.8	7.4	2.6	-21.2	-19.5	7.80%	PASS

Frequency (MHz)	Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 17.0 dBm	Measured Body SAR (1g) W/kg @ 17.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 17.0 dBm	Measured Body SAR (10g) W/kg @ 17.0 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
5250	9/21/2016	9/11/2018	1.204	3.85	3.6	-6.49%	1.08	1.01	-6.48%	56.1	53.6	2.5	-3.7	-5.5	1.8	-23.4	-24	-2.40%	PASS
5600	9/21/2016	9/11/2018	1.204	3.96	4.01	1.26%	1.11	1.1	-0.90%	58.9	57	1.9	-1.7	0.1	1.8	-21.7	-23.8	-9.70%	PASS
5750	9/21/2016	9/11/2018	1.204	3.805	3.88	1.97%	1.06	1.06	0.00%	59.5	60.3	0.8	6.9	6.1	0.8	-19.4	-19.2	1.00%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



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

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

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D750V3-1003_Jan18**

CALIBRATION CERTIFICATE

Object	D750V3 - SN:1003
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	January 15, 2018

BN ✓
01-25-2018

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 ✓
02/06/2019

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

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 15, 2018

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5.0 mm	
Frequency	750 MHz ± 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 ± 0.2) °C	40.9 ± 6 %	0.90 mho/m ± 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	2.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.28 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.42 W/kg ± 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 ± 0.2) °C	55.0 ± 6 %	0.96 mho/m ± 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	2.15 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.58 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.43 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.71 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.8 Ω - 2.1 jΩ
Return Loss	- 27.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.2 Ω - 6.2 jΩ
Return Loss	- 24.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.043 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	January 21, 2009

Appendix (Additional assessments outside the scope of SCS 0108)

Measurement Conditions

DASY system configuration, as far as not given on page 1 and 3.

Phantom	SAM Head Phantom	For usage with cSAR3DV2-R/L

SAR result with SAM Head (Top)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.98 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**7.94 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.32 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.05 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.22 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.52 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.01 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.06 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.52 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Ear)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.67 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.70 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**4.60 W/kg ± 16.9 % (k=2)**

Date: 12.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1003

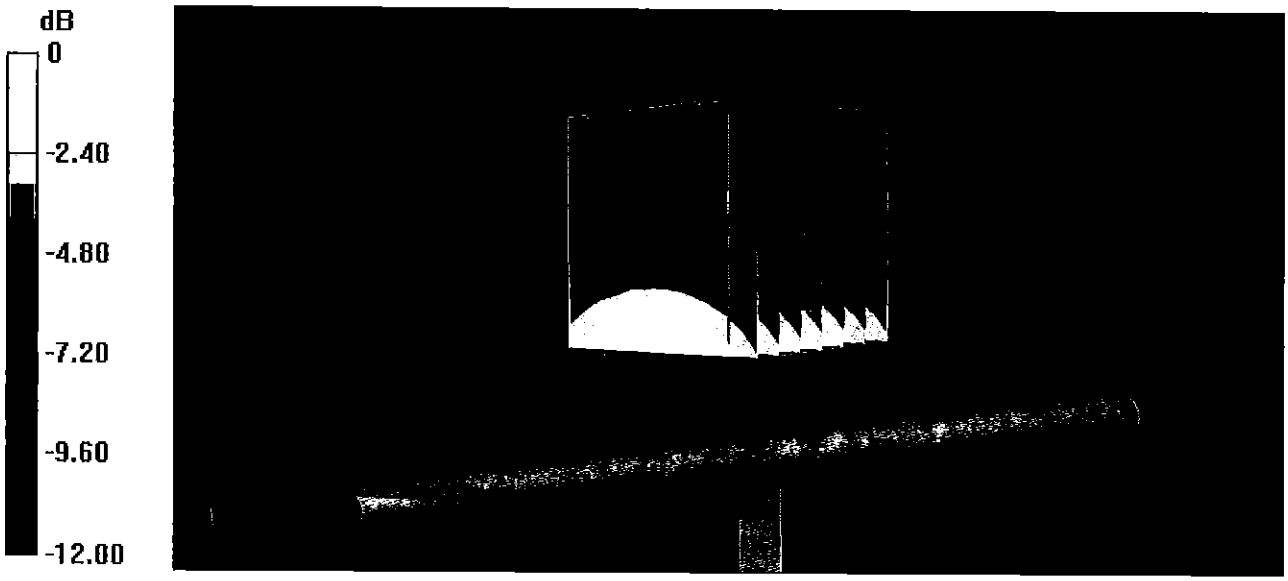
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.9 S/m; ε_r = 40.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.22, 10.22, 10.22); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

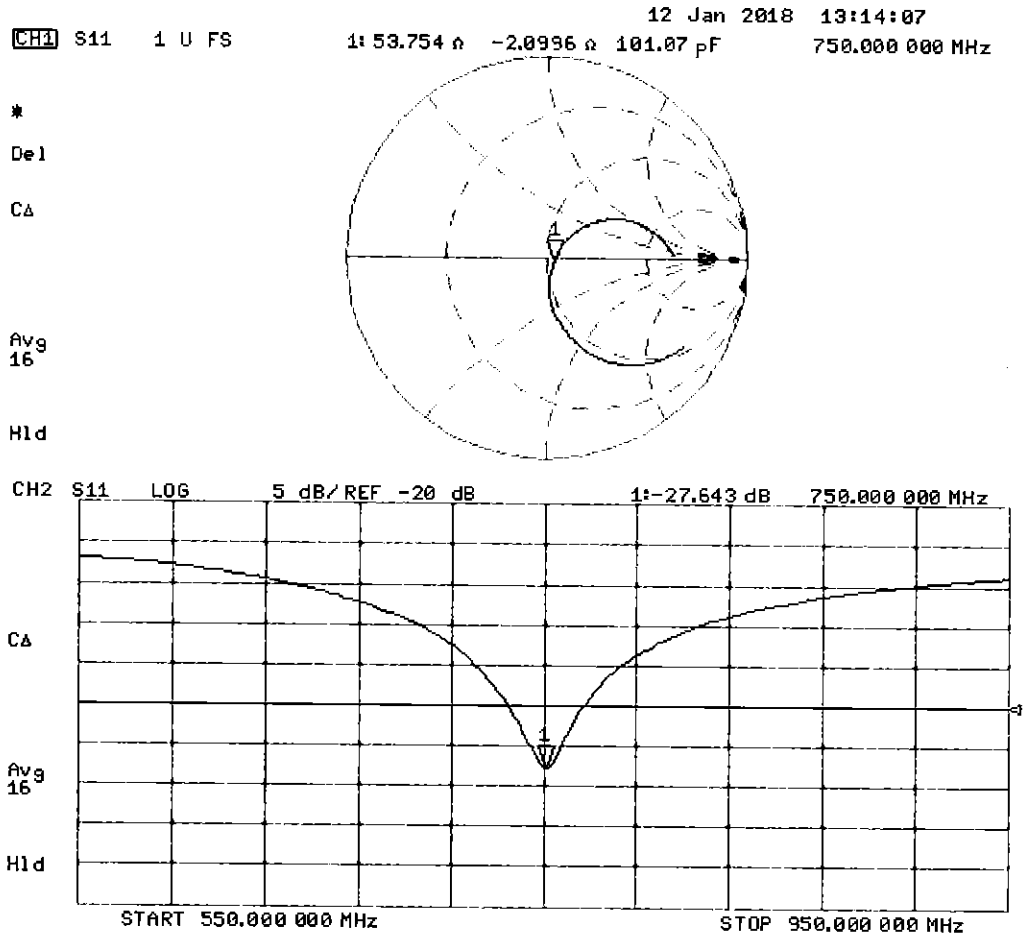
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.11 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.15 W/kg
SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.37 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



Date: 12.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1003

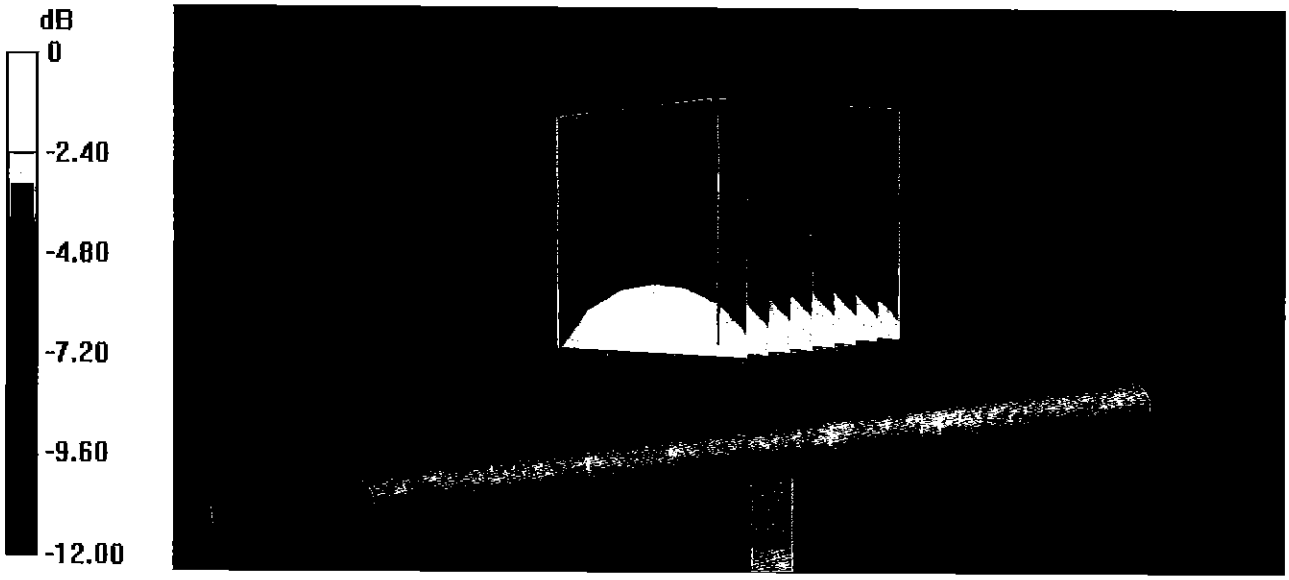
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.96 S/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.19, 10.19, 10.19); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

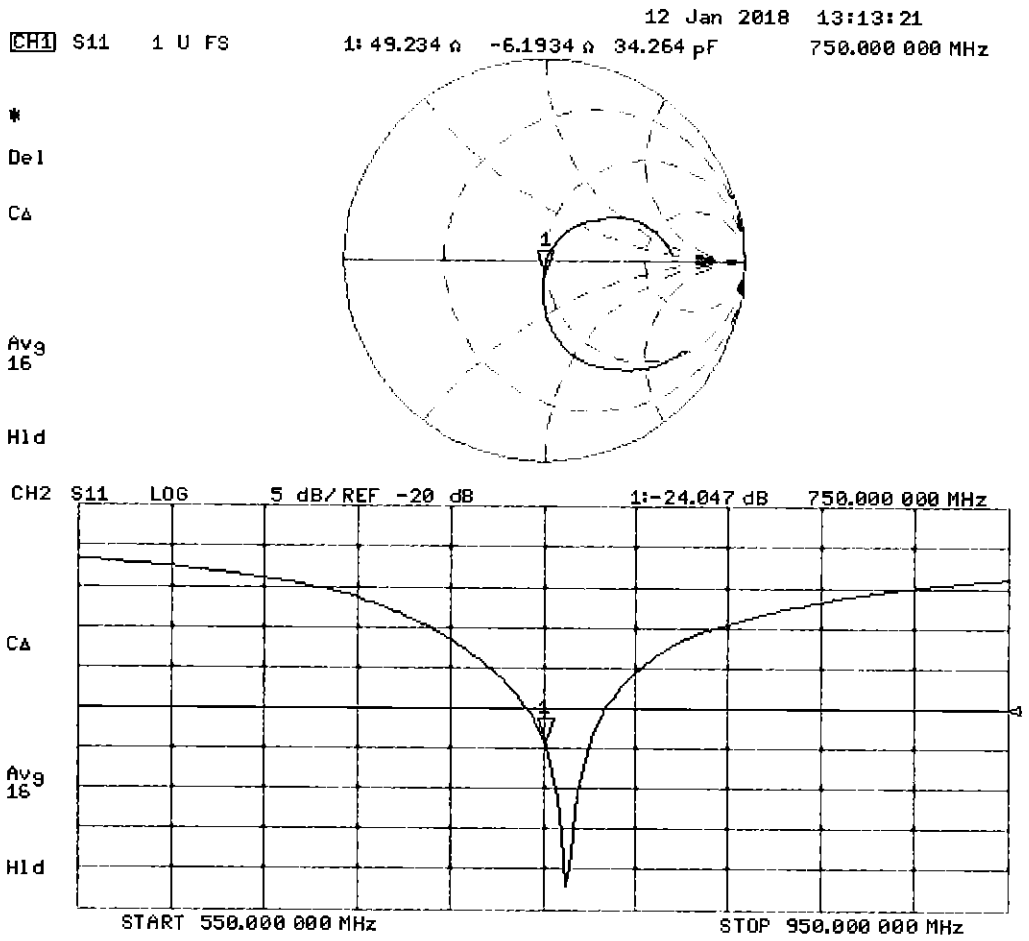
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x8x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.31 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.17 W/kg
SAR(1 g) = 2.15 W/kg; SAR(10 g) = 1.43 W/kg
Maximum value of SAR (measured) = 2.83 W/kg



0 dB = 2.83 W/kg = 4.52 dBW/kg

Impedance Measurement Plot for Body TSL



Date: 15.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1003

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.9 S/m; ε_r = 44.2; ρ = 1000 kg/m^3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

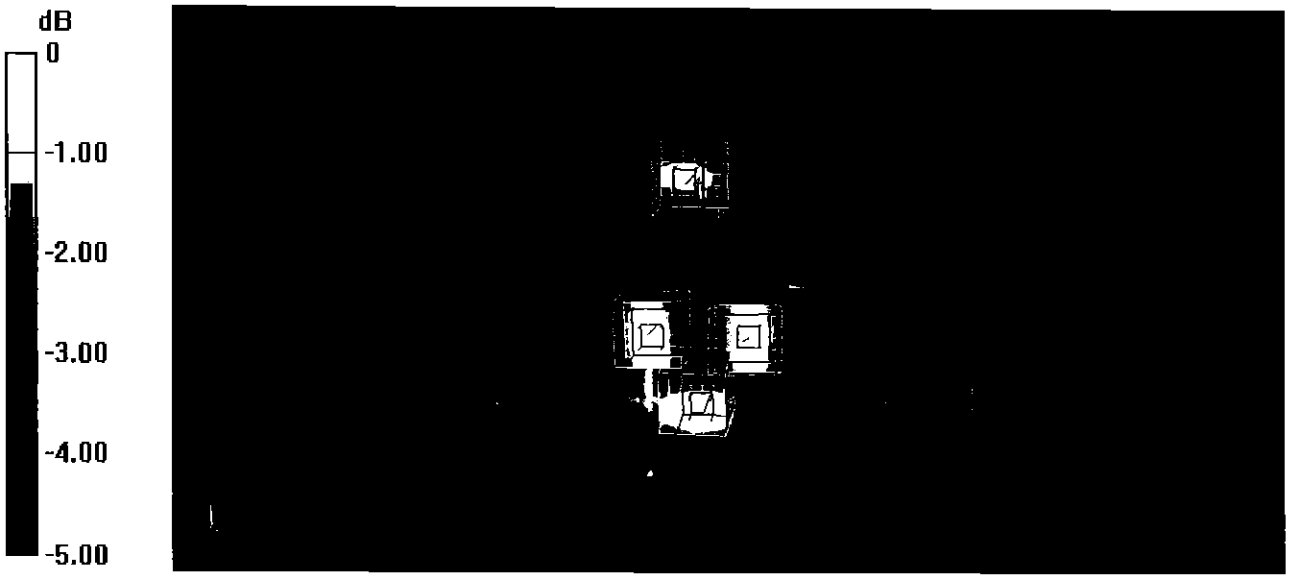
- Probe: EX3DV4 - SN7349; ConvF(10.22, 10.22, 10.22); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

SAM Head/Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.79 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 2.89 W/kg
SAR(1 g) = 1.98 W/kg; SAR(10 g) = 1.33 W/kg
Maximum value of SAR (measured) = 2.58 W/kg

SAM Head/Mouth/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.85 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 2.94 W/kg
SAR(1 g) = 2.05 W/kg; SAR(10 g) = 1.38 W/kg
Maximum value of SAR (measured) = 2.62 W/kg

SAM Head/Neck/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.29 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.78 W/kg
SAR(1 g) = 2.01 W/kg; SAR(10 g) = 1.38 W/kg
Maximum value of SAR (measured) = 2.56 W/kg

SAM Head/Ear/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.01 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 2.31 W/kg
SAR(1 g) = 1.67 W/kg; SAR(10 g) = 1.15 W/kg
Maximum value of SAR (measured) = 2.11 W/kg



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

Certification of Calibration

Object	D750V3 – SN: 1003
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	1/15/2019
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	2/8/2018	Annual	2/8/2019	US39170122
Agilent	N5182A	MXG Vector Signal Generator	4/18/2018	Annual	4/18/2019	MY47420800
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1207364
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1339018
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
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
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
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
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Seekonk	NC-100	Torque Wrench	7/11/2018	Annual	7/11/2019	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/3/2018	Annual	10/3/2019	1558
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/18/2018	Annual	6/18/2019	1334
SPEAG	DAK-3.5	Dielectric Assessment Kit	9/11/2018	Annual	9/11/2019	1091
SPEAG	EX3DV4	SAR Probe	8/23/2018	Annual	8/23/2019	7308
SPEAG	EX3DV4	SAR Probe	6/25/2018	Annual	6/25/2019	7409

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	

DIPOLE CALIBRATION EXTENSION

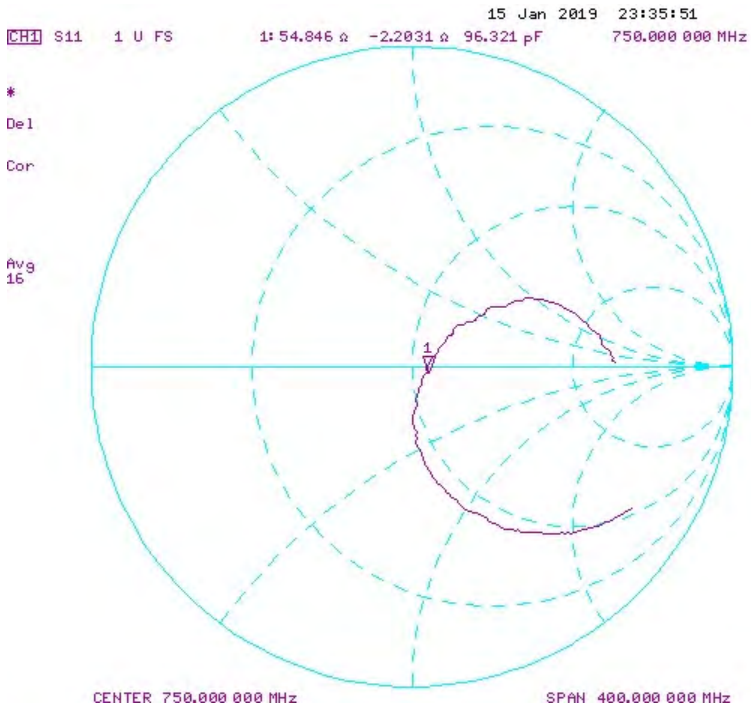
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

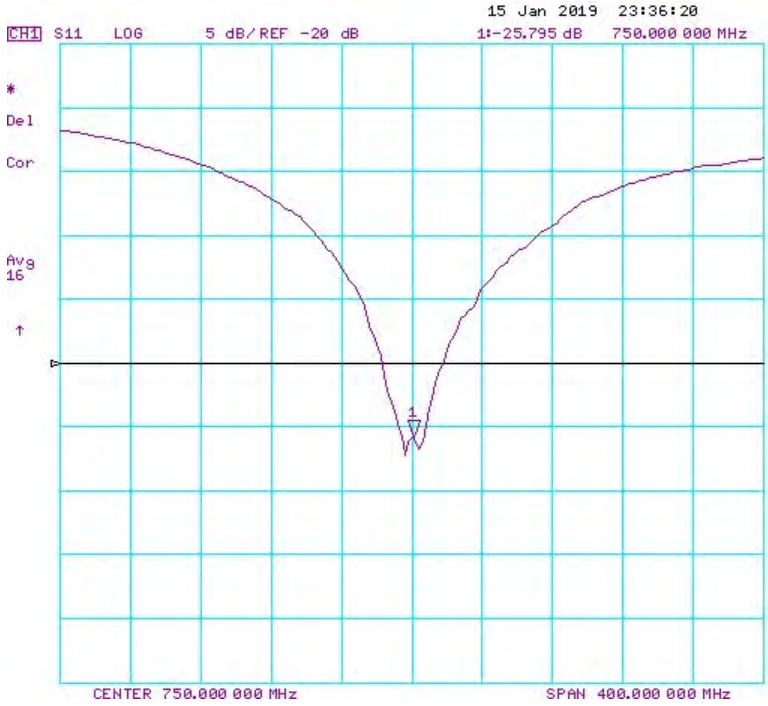
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does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

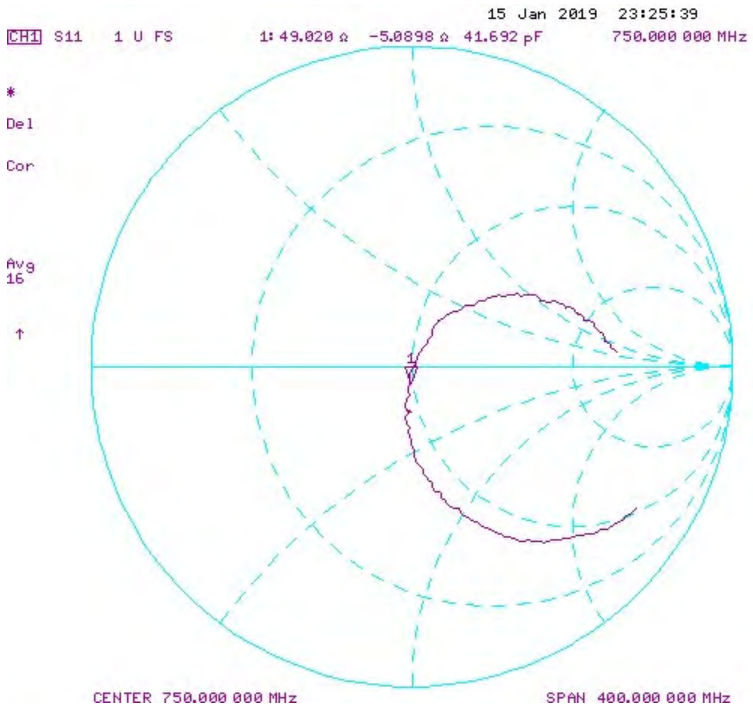
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 23.0 dBm	Measured Head SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance 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
1/15/2018	1/15/2019	1.043	1.656	1.75	5.68%	1.08	1.15	6.09%	53.8	54.8	1	-2.1	-2.2	0.1	-27.6	-25.8	6.50%	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
1/15/2018	1/15/2019	1.043	1.716	1.84	7.23%	1.14	1.23	7.71%	49.2	49	0.2	-6.2	-5.1	1.1	-24	-25.6	-6.80%	PASS

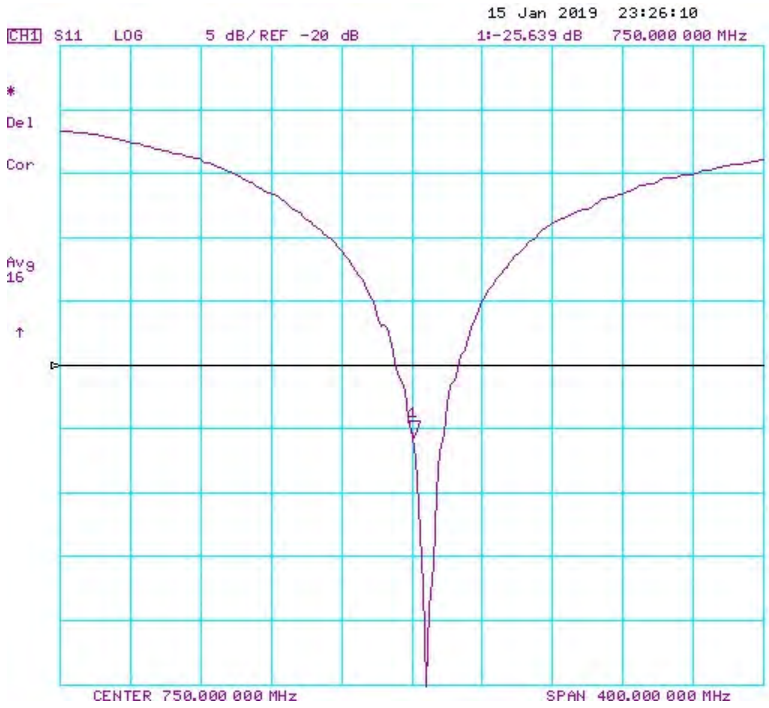
Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





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

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

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D750V3-1054_Mar17**

CALIBRATION CERTIFICATE

Object	D750V3 - SN:1054
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	March 07, 2017

BNV 03-27-2017

BNV 04-04-2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	04-Jan-17 (No. DAE4-601_Jan17)	Jan-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-18)	In house check: Oct-17

	Name	Function	Signature
Calibrated by:	Johannes Kurikka	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 14, 2017

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

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, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
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	V52.8.8
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 ± 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 ± 0.2) °C	40.9 ± 6 %	0.91 mho/m ± 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	2.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.37 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.50 W/kg ± 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 ± 0.2) °C	54.6 ± 6 %	0.99 mho/m ± 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	2.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.61 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.68 W/kg ± 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 Ω - 0.7 jΩ
Return Loss	- 26.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.7 Ω - 3.6 jΩ
Return Loss	- 28.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.033 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 08, 2011

DASY5 Validation Report for Head TSL

Date: 07.03.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1054

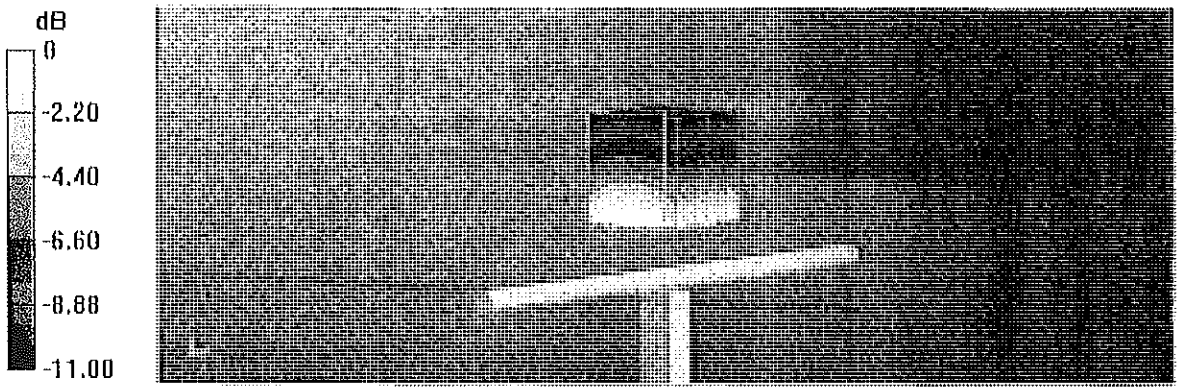
Communication System: UID 0 - CW ; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 40.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.17, 10.17, 10.17); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

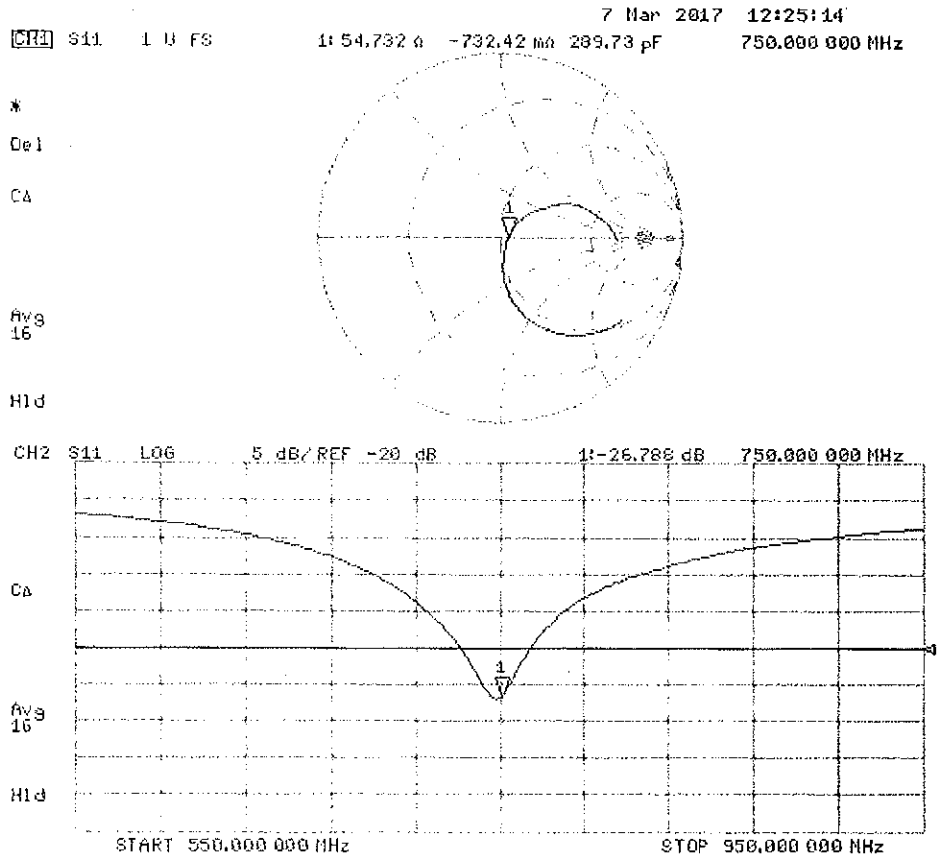
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.71 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.21 W/kg
SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.4 W/kg
Maximum value of SAR (measured) = 2.85 W/kg



0 dB = 2.85 W/kg = 4.55 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 07.03.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1054

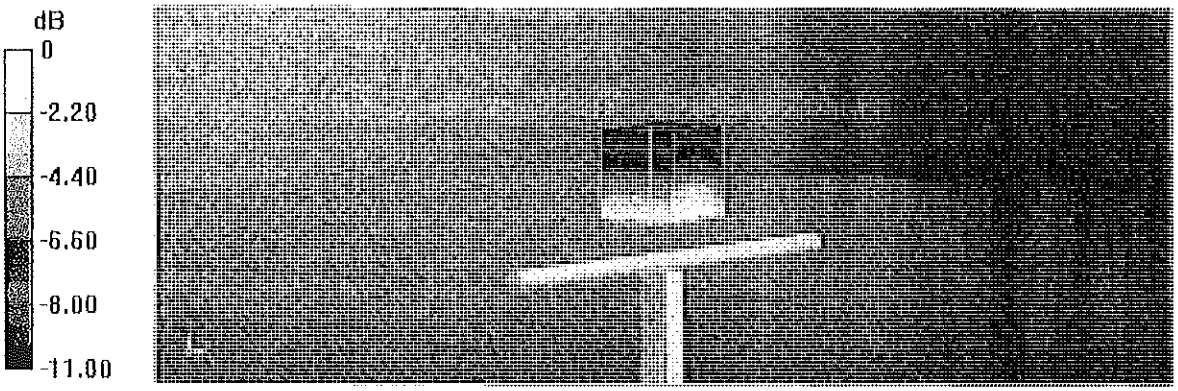
Communication System: UID 0 - CW ; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.99 S/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.99, 9.99, 9.99); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

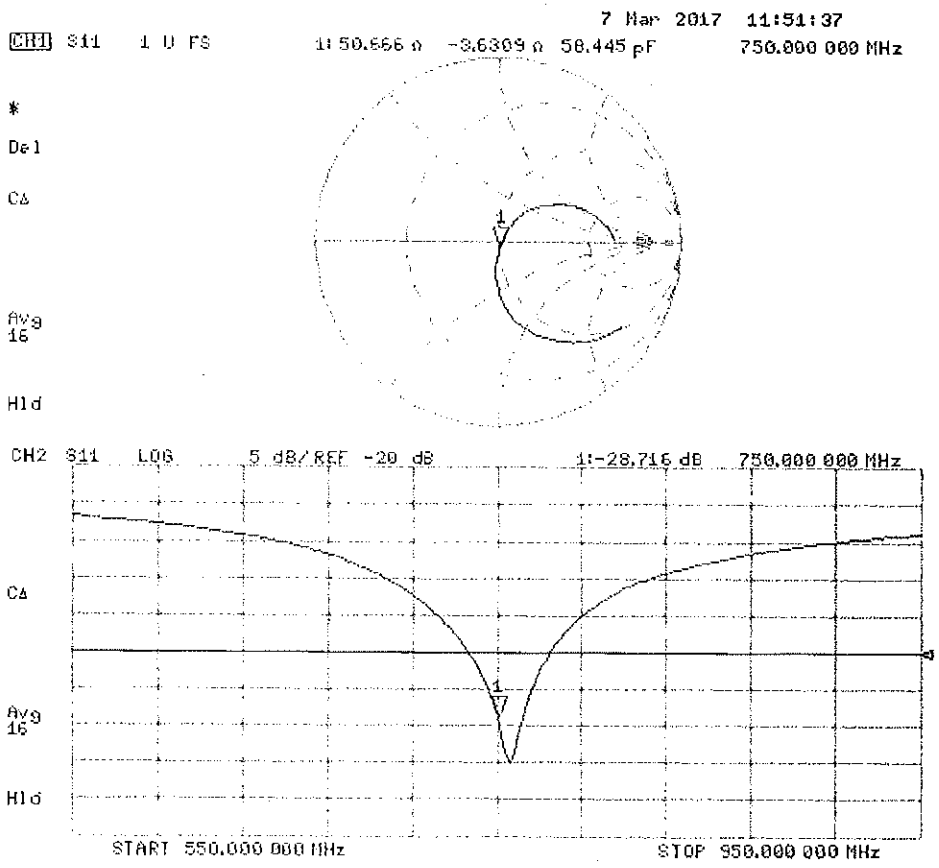
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.88 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.31 W/kg
SAR(1 g) = 2.21 W/kg; SAR(10 g) = 1.45 W/kg
Maximum value of SAR (measured) = 2.94 W/kg



0 dB = 2.94 W/kg = 4.68 dBW/kg

Impedance Measurement Plot for Body TSL



PCTEST ENGINEERING LABORATORY, INC.
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. +1.410.290.6652 / Fax +1.410.290.6654
http://www.pctest.com

Certification of Calibration

Object	D750V3 – SN:1054
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extended Calibration date:	March 07, 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	8/3/2017	Annual	8/3/2018	MY40000670
Agilent	N5182A	MXG Vector Signal Generator	1/24/2018	Annual	1/24/2019	MY47420651
Amplifier Research	1S51G6	Amplifier	CBT	N/A	CBT	433971
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1207364
Anritsu	MA2411B	Pulse Power Sensor	10/16/2017	Annual	10/16/2018	1126066
Anritsu	ML2495A	Power Meter	10/22/2017	Annual	10/22/2018	1328004
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/1/2017	Annual	6/1/2018	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	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	1/22/2018	Annual	1/22/2019	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/13/2017	Annual	7/13/2018	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/21/2017	Annual	6/21/2018	1333
SPEAG	EX3DV4	SAR Probe	7/17/2017	Annual	7/17/2018	7410
SPEAG	ES3DV3	SAR Probe	9/18/2017	Annual	9/18/2018	3287

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	KOK

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:

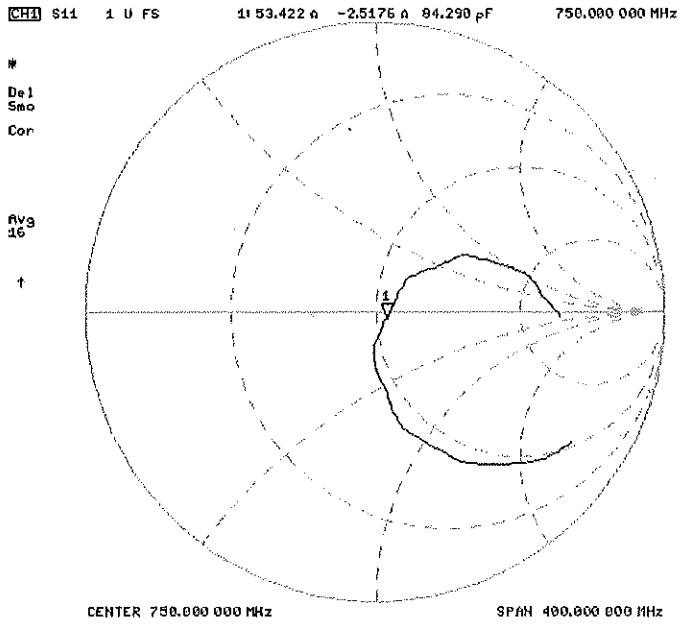
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does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

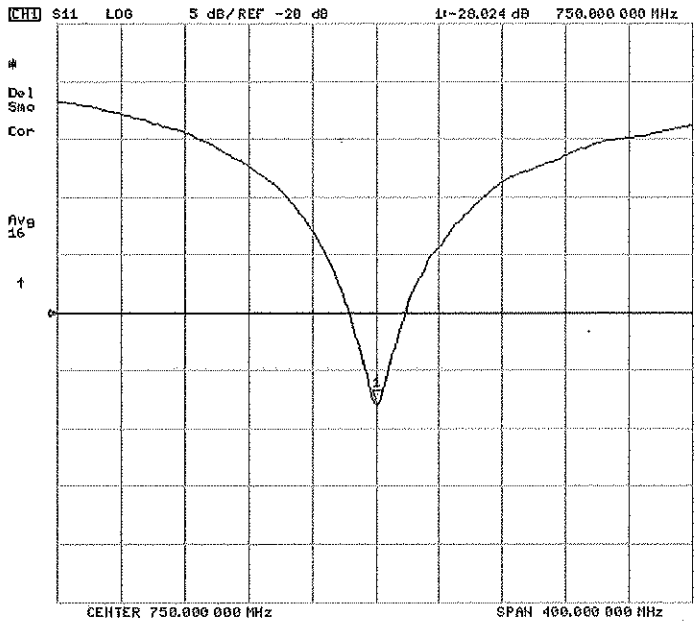
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
3/7/2017	3/7/2018	1.033	1.67	1.70	1.55%	1.10	1.11	0.91%	54.7	53.4	1.3	-0.7	-2.5	1.8	-26.8	-28.0	-4.60%	PASS

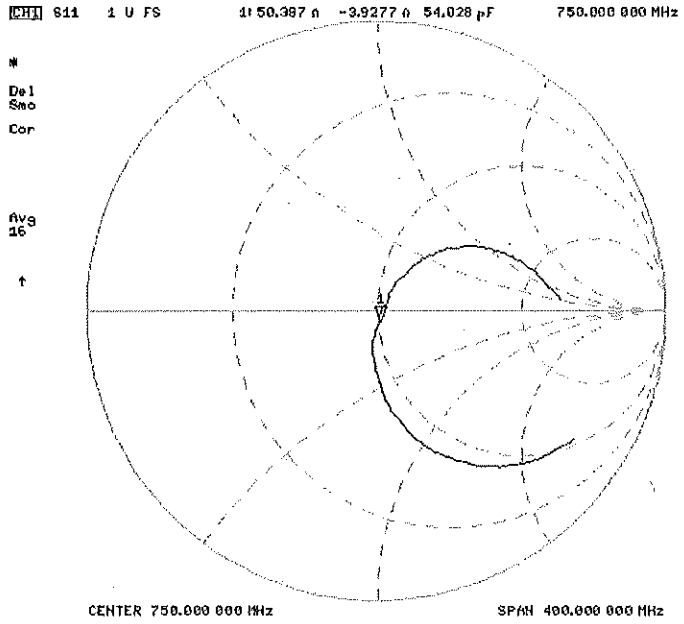
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance 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
3/7/2017	3/7/2018	1.033	1.72	1.70	-1.28%	1.14	1.12	-1.41%	50.7	50.4	0.3	-3.6	-3.9	0.3	-28.7	-28.5	0.60%	PASS

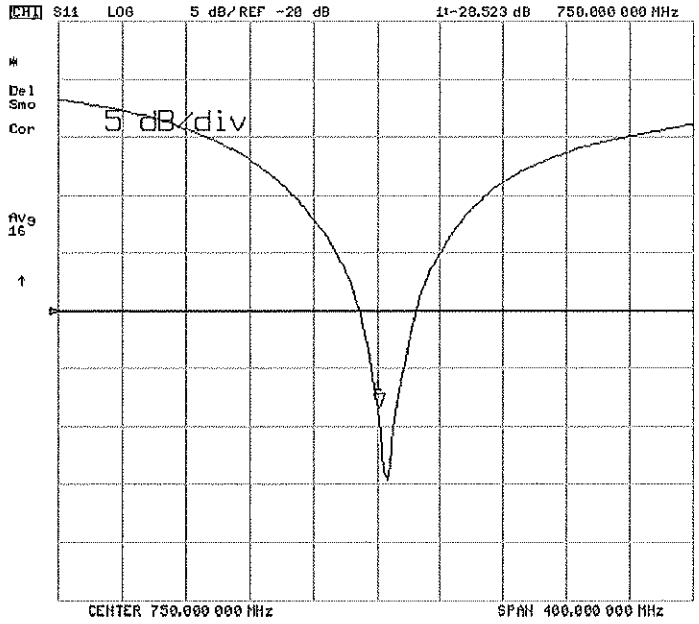
Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





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

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

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

Accreditation No.: SCS 0108

Client PC Test

Certificate No: D750V3-1161_Oct18

CALIBRATION CERTIFICATE

Object: D750V3 - SN:1161

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

Calibration date: October 19, 2018

BN ✓
10-30-2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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

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

Issued: October 22, 2018

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

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	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 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 ± 0.2) °C	40.8 ± 6 %	0.89 mho/m ± 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	2.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.03 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.32 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.26 W/kg ± 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 ± 0.2) °C	55.1 ± 6 %	0.96 mho/m ± 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	2.11 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.43 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.39 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.55 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.6 Ω - 1.9 jΩ
Return Loss	- 25.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.6 Ω - 4.2 jΩ
Return Loss	- 27.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.032 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 19, 2015

DASY5 Validation Report for Head TSL

Date: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1161

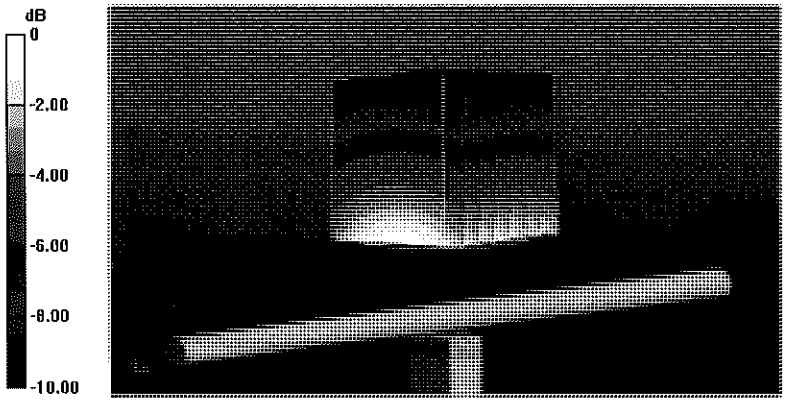
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.89 S/m; ε_r = 40.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.22, 10.22, 10.22) @ 750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

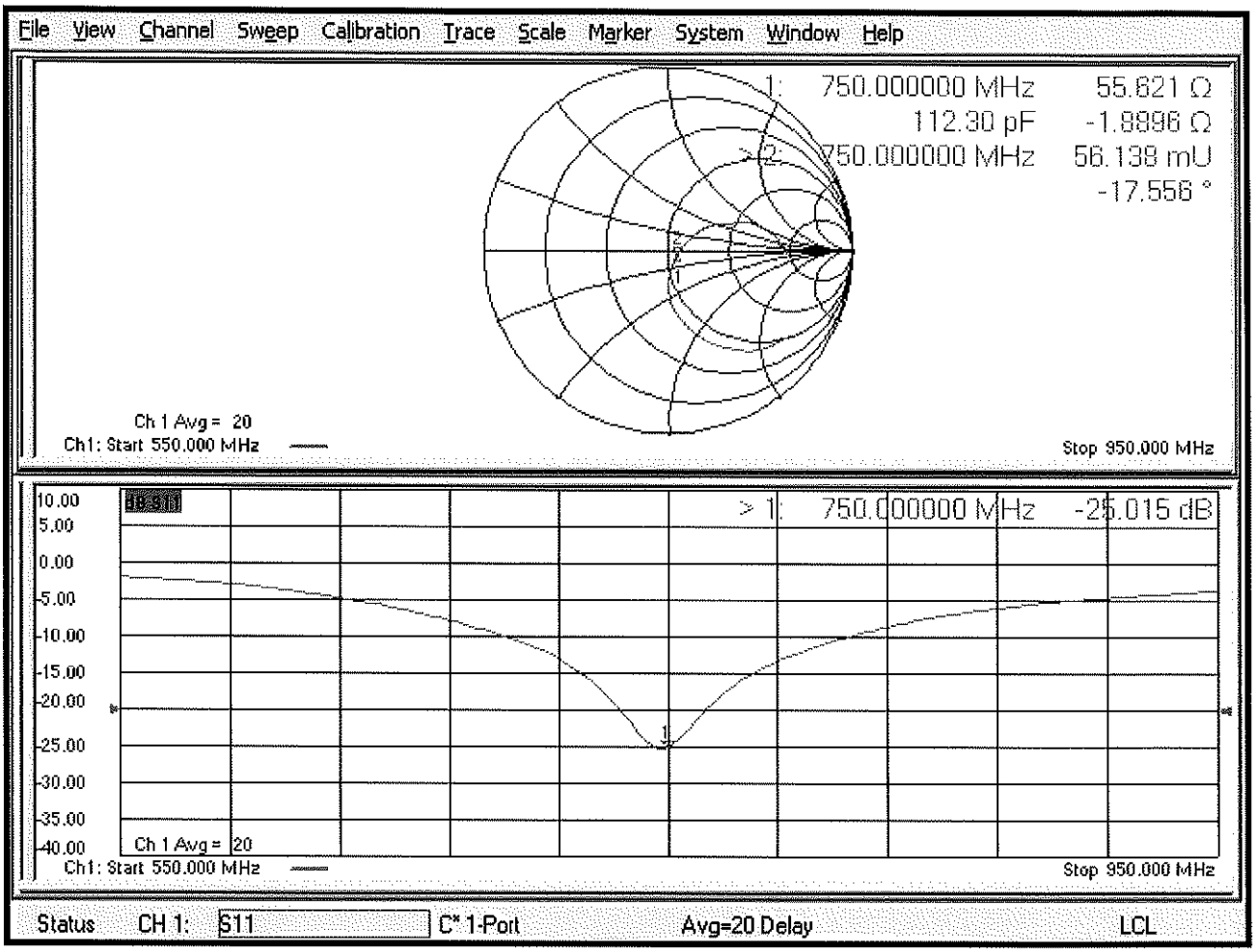
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.51 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.04 W/kg
SAR(1 g) = 2.02 W/kg; SAR(10 g) = 1.32 W/kg
Maximum value of SAR (measured) = 2.70 W/kg



0 dB = 2.70 W/kg = 4.31 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1161

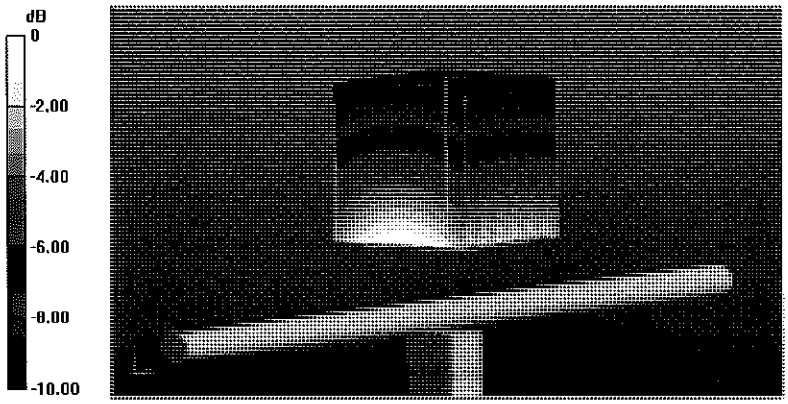
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.96 S/m; ε_r = 55.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.19, 10.19, 10.19) @ 750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

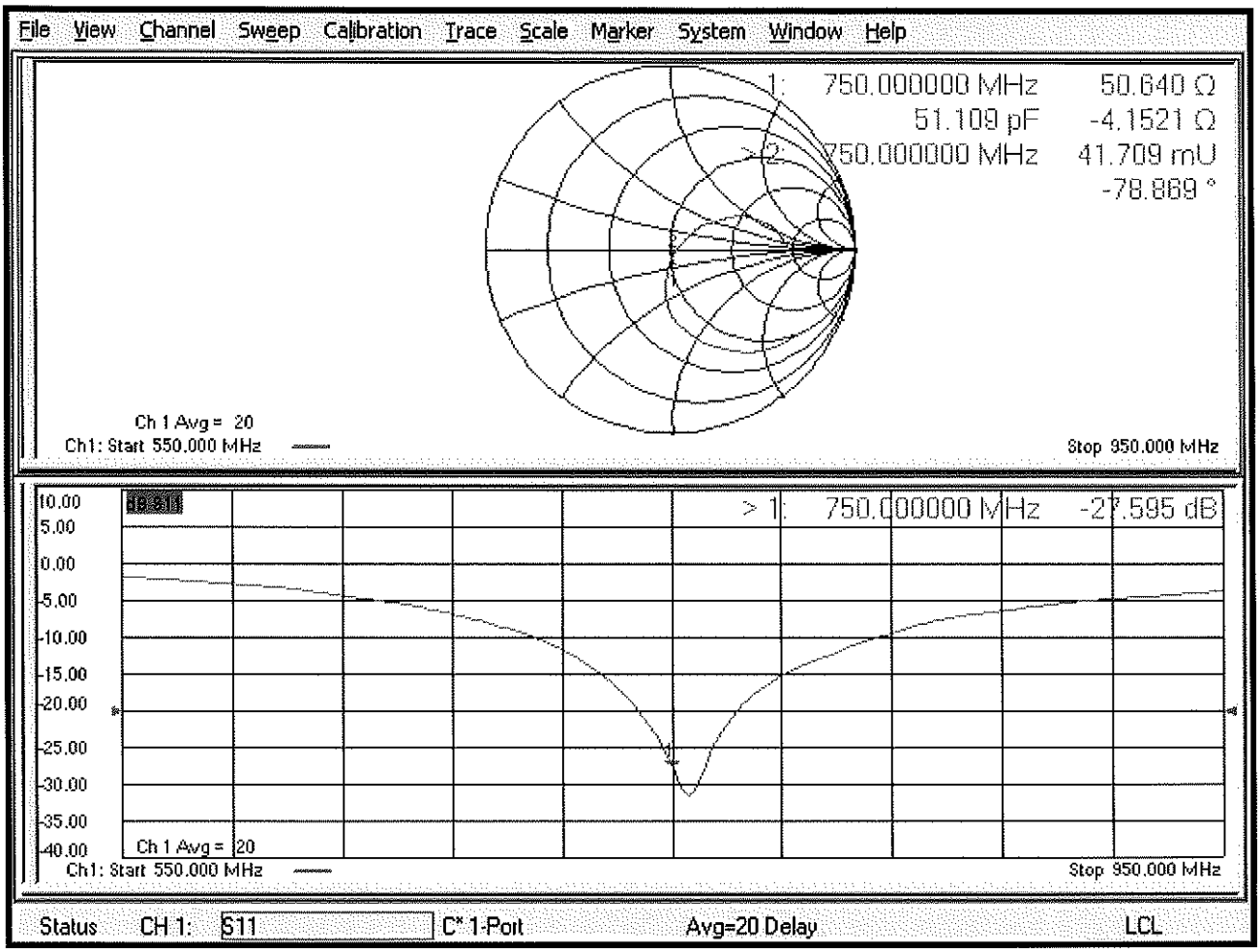
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.57 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.18 W/kg
SAR(1 g) = 2.11 W/kg; SAR(10 g) = 1.39 W/kg
Maximum value of SAR (measured) = 2.83 W/kg



0 dB = 2.83 W/kg = 4.52 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client PC Test

Certificate No: D835V2-4d047_Oct18

CALIBRATION CERTIFICATE

Object: D835V2 - SN:4d047

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

Calibration date: October 19, 2018

BN ✓
10-30-2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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

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

Issued: October 22, 2018

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

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	V52.10.2
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 ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 6 %	0.91 mho/m ± 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	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.47 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.55 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.14 W/kg ± 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 ± 0.2) °C	54.9 ± 6 %	0.98 mho/m ± 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	2.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.71 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.36 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.0 Ω - 0.5 jΩ
Return Loss	- 39.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.6 Ω - 4.1 jΩ
Return Loss	- 24.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.387 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 16, 2006

DASY5 Validation Report for Head TSL

Date: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d047

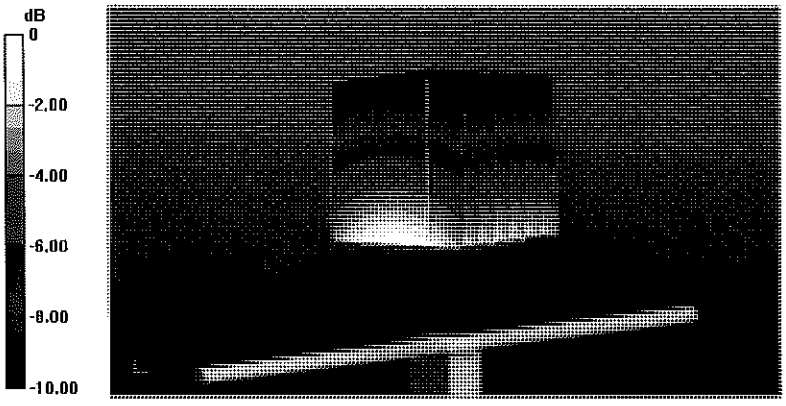
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.9, 9.9, 9.9) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

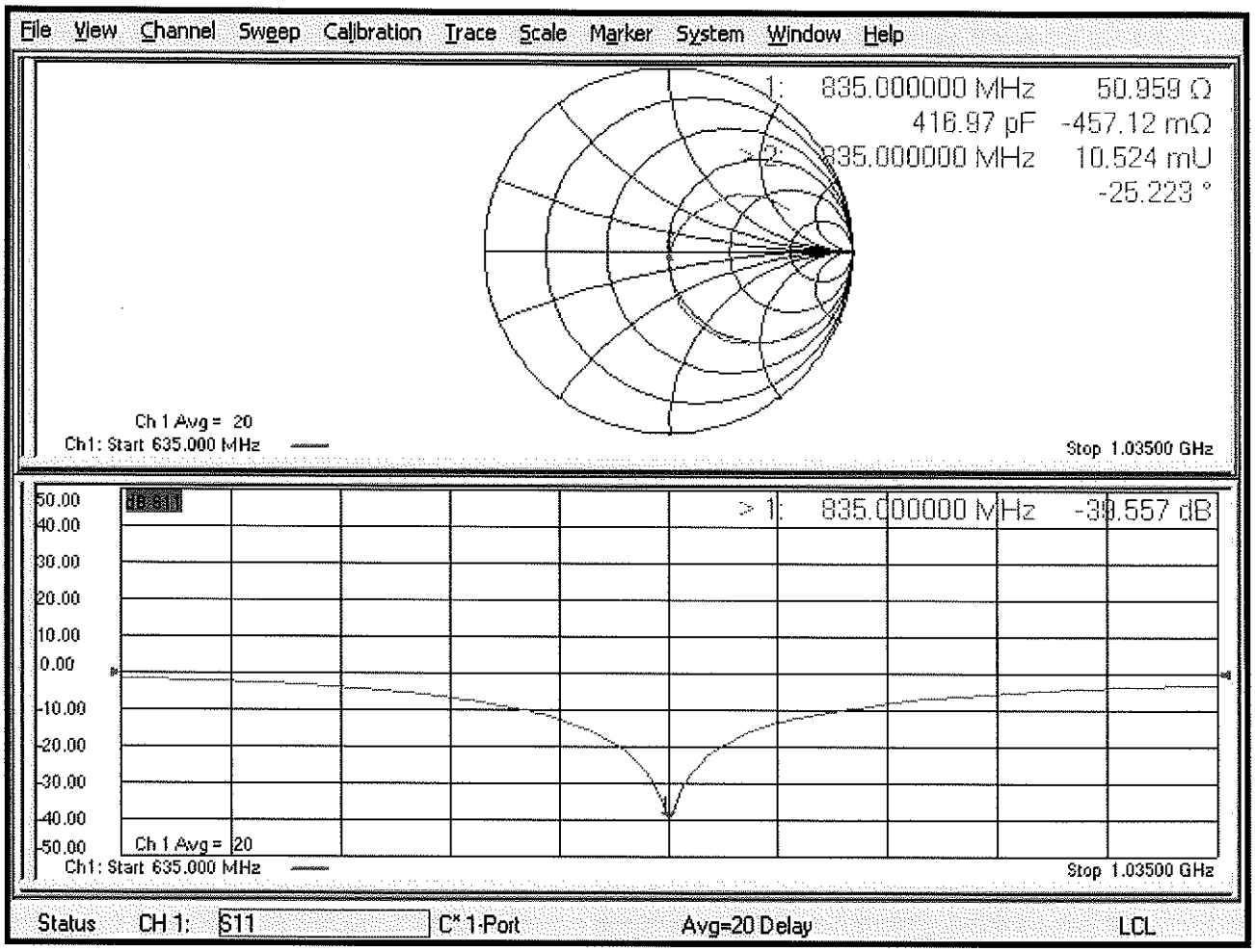
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.84 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.69 W/kg
SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (measured) = 3.24 W/kg



0 dB = 3.24 W/kg = 5.11 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d047

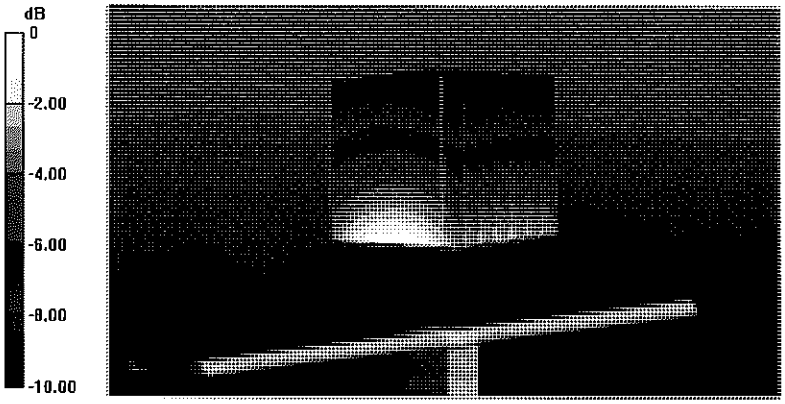
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.98 S/m; ε_r = 54.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.05, 10.05, 10.05) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

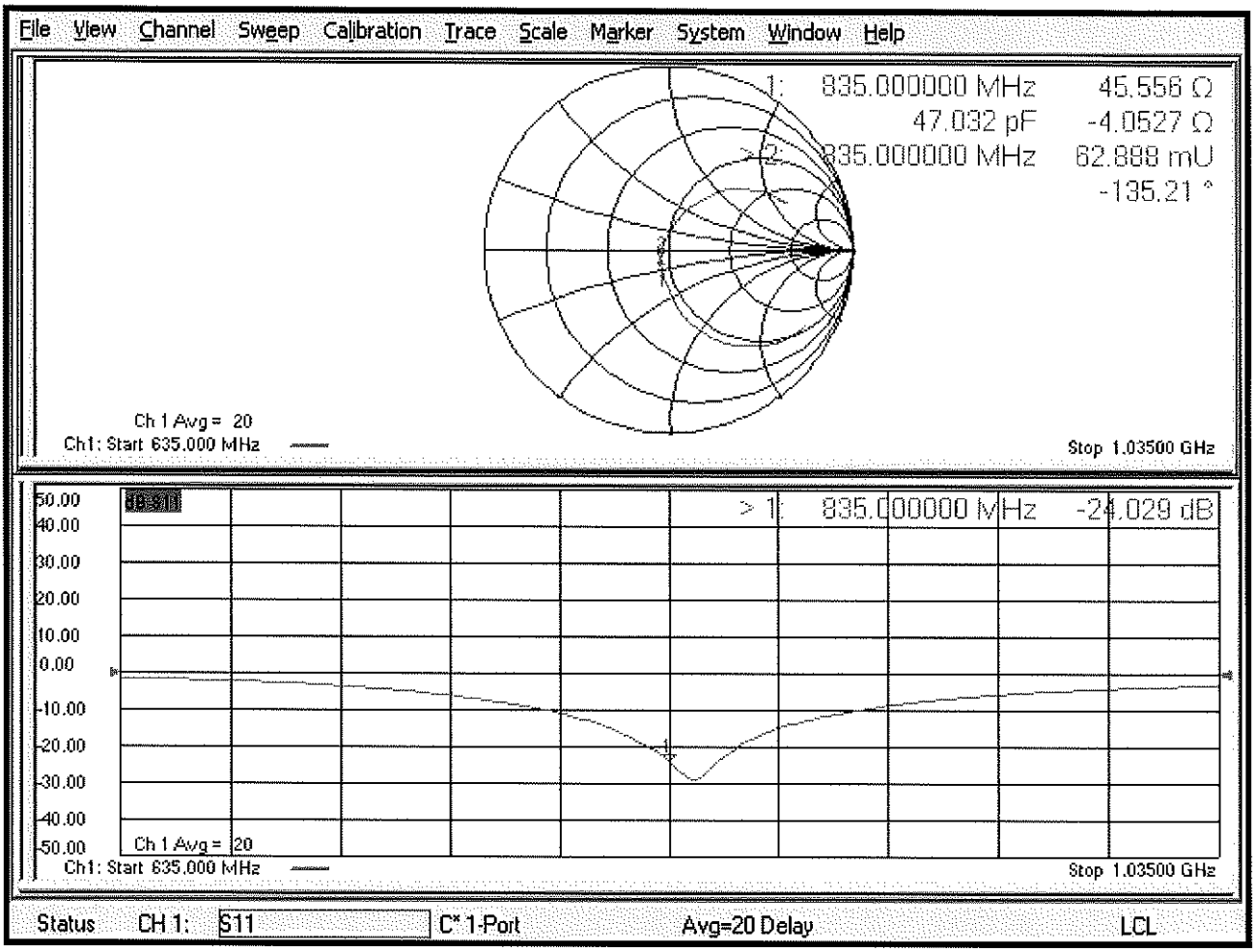
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 61.27 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.6 W/kg
Maximum value of SAR (measured) = 3.28 W/kg



0 dB = 3.28 W/kg = 5.16 dBW/kg

Impedance Measurement Plot for Body TSL



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

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S Swiss Calibration Service

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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D835V2-4d133_Oct18

CALIBRATION CERTIFICATE

Object: D835V2 - SN:4d133

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

BN ✓
10/30/2018

Calibration date: October 19, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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

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

Issued: October 22, 2018

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

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	V52.10.2
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 ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 6 %	0.91 mho/m ± 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	**9.43 W/kg ± 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	**6.10 W/kg ± 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 ± 0.2) °C	54.9 ± 6 %	0.98 mho/m ± 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	2.46 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.75 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.61 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.40 W/kg ± 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 - 2.4 jΩ
Return Loss	- 32.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.0 Ω - 6.7 jΩ
Return Loss	- 21.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.397 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 22, 2011

DASY5 Validation Report for Head TSL

Date: 19.10.2018

Test Laboratory: The name of your organization

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d133

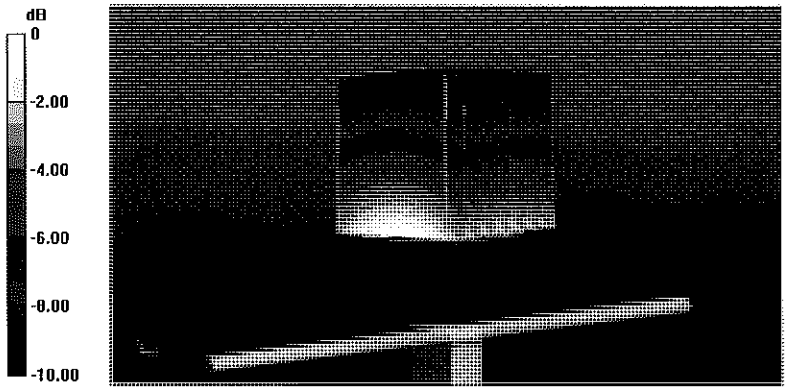
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.9, 9.9, 9.9) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

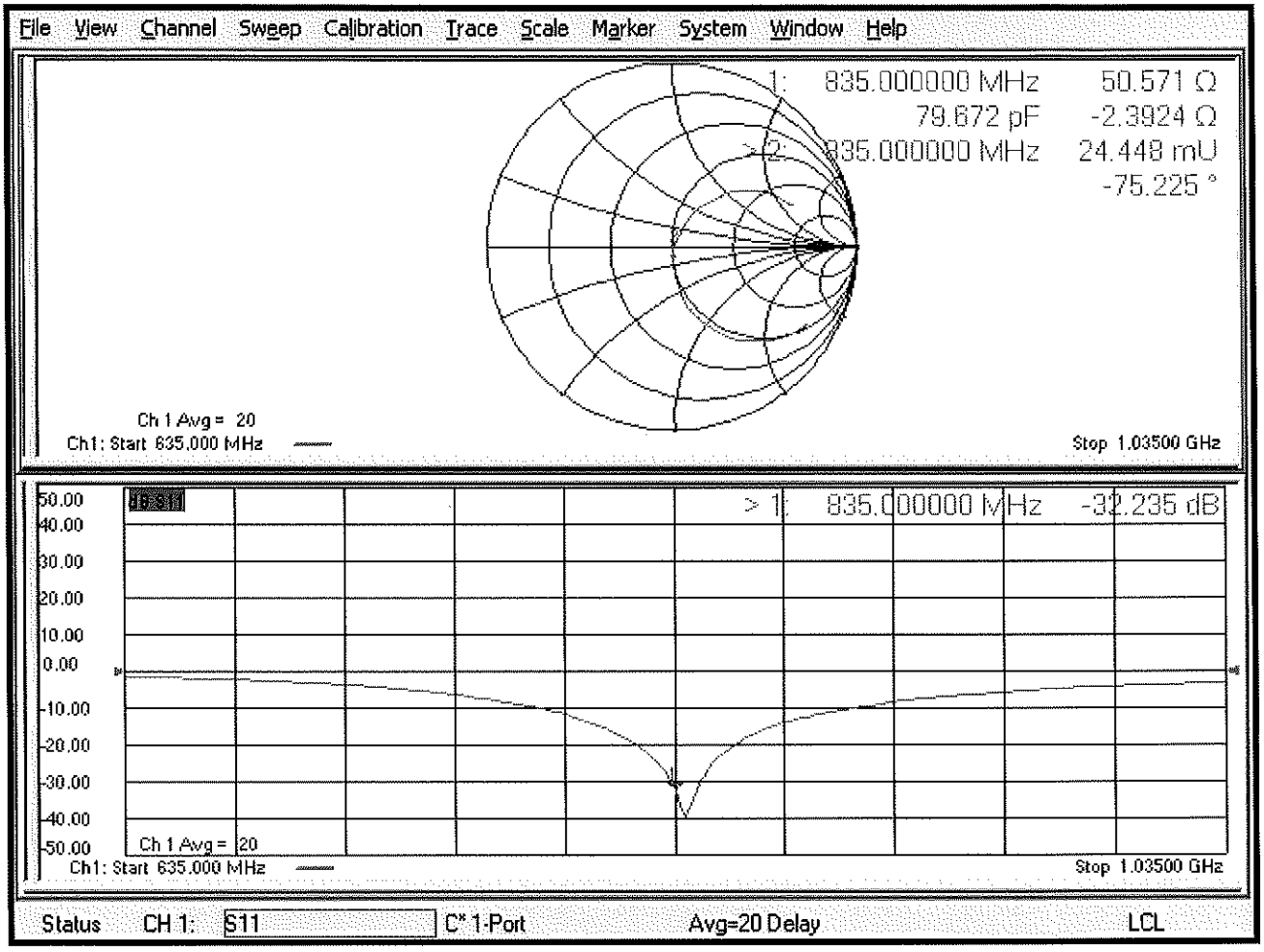
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 63.02 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.54 W/kg
Maximum value of SAR (measured) = 3.24 W/kg



0 dB = 3.24 W/kg = 5.11 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d133

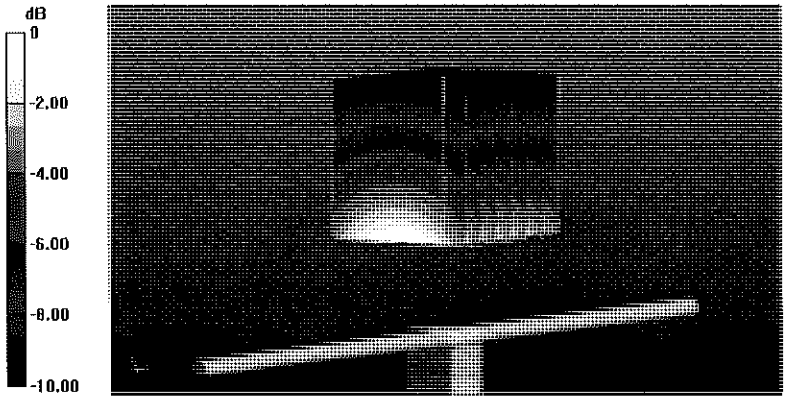
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.98 S/m; ε_r = 54.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.05, 10.05, 10.05) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

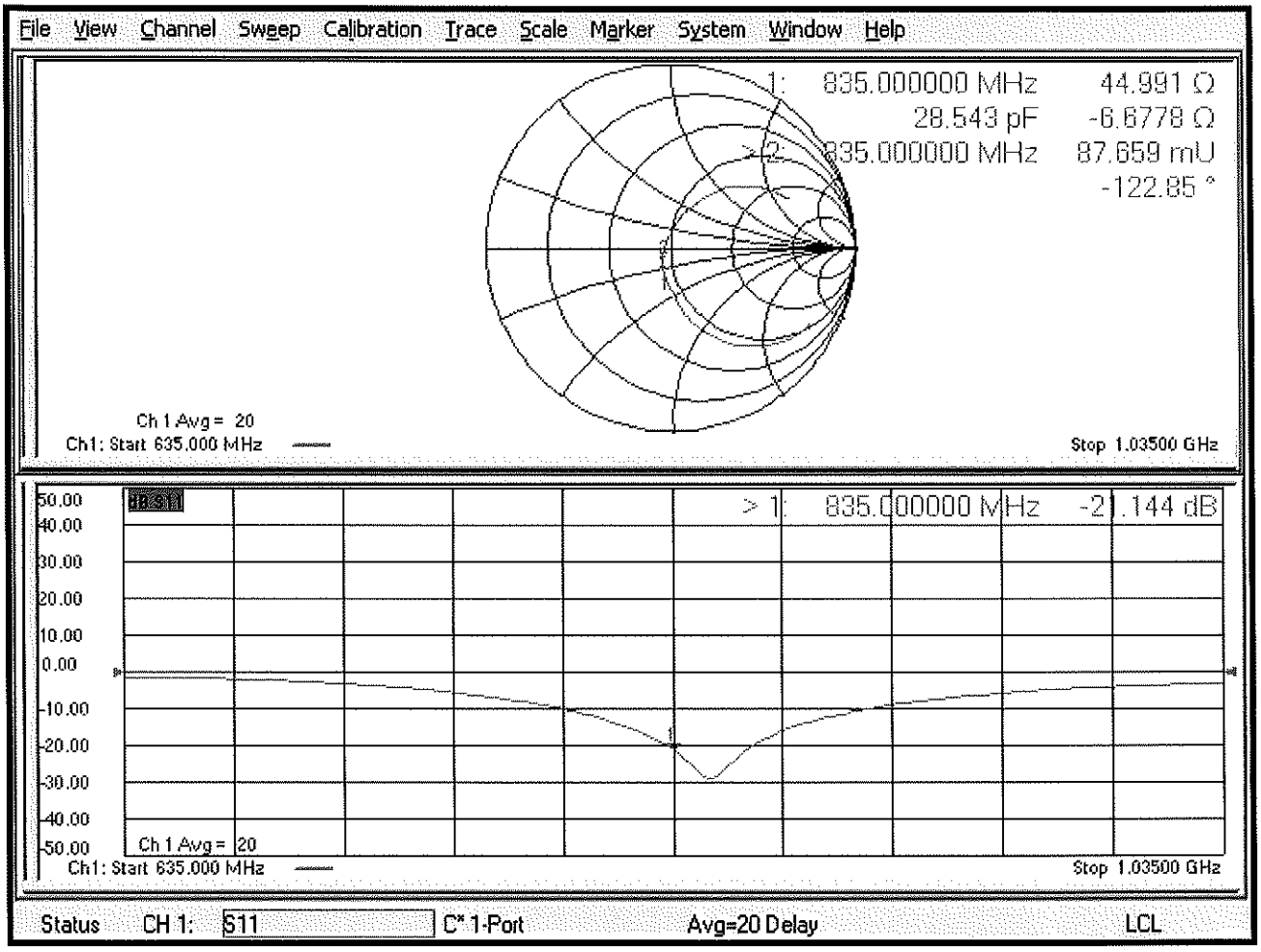
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 61.61 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.69 W/kg
SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.61 W/kg
Maximum value of SAR (measured) = 3.28 W/kg



0 dB = 3.28 W/kg = 5.16 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client PC Test

Certificate No: D1750V2-1150_Oct18

CALIBRATION CERTIFICATE

Object D1750V2 - SN:1150

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

BN✓
10/30/2018

Calibration date: October 22, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 22, 2018

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

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	V52.10.2
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 ± 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 ± 0.2) °C	38.8 ± 6 %	1.33 mho/m ± 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	9.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.76 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.2 W/kg ± 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 ± 0.2) °C	53.5 ± 6 %	1.46 mho/m ± 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	9.04 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**36.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.82 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.4 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.9 Ω - 0.4 jΩ
Return Loss	- 40.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω - 0.1 jΩ
Return Loss	- 29.2 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	April 10, 2015

DASY5 Validation Report for Head TSL

Date: 22.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1150

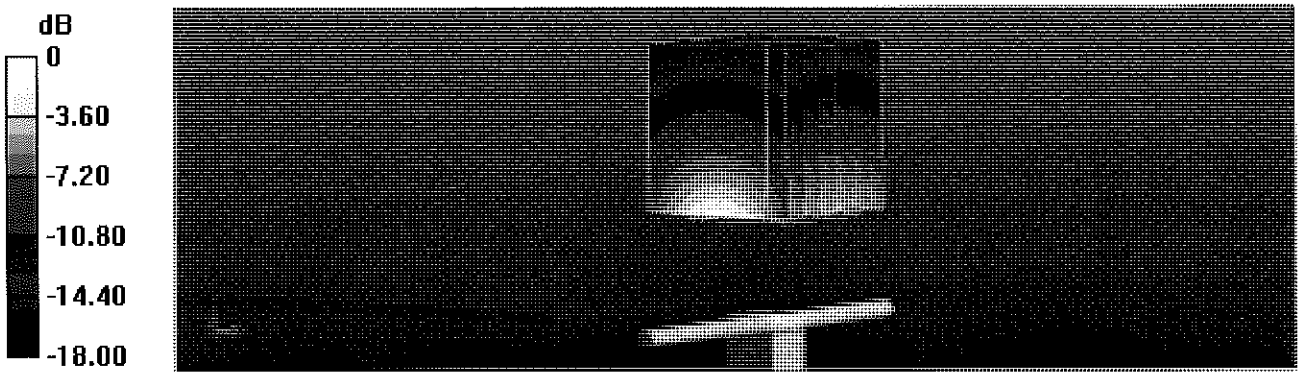
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.33 S/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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: 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)

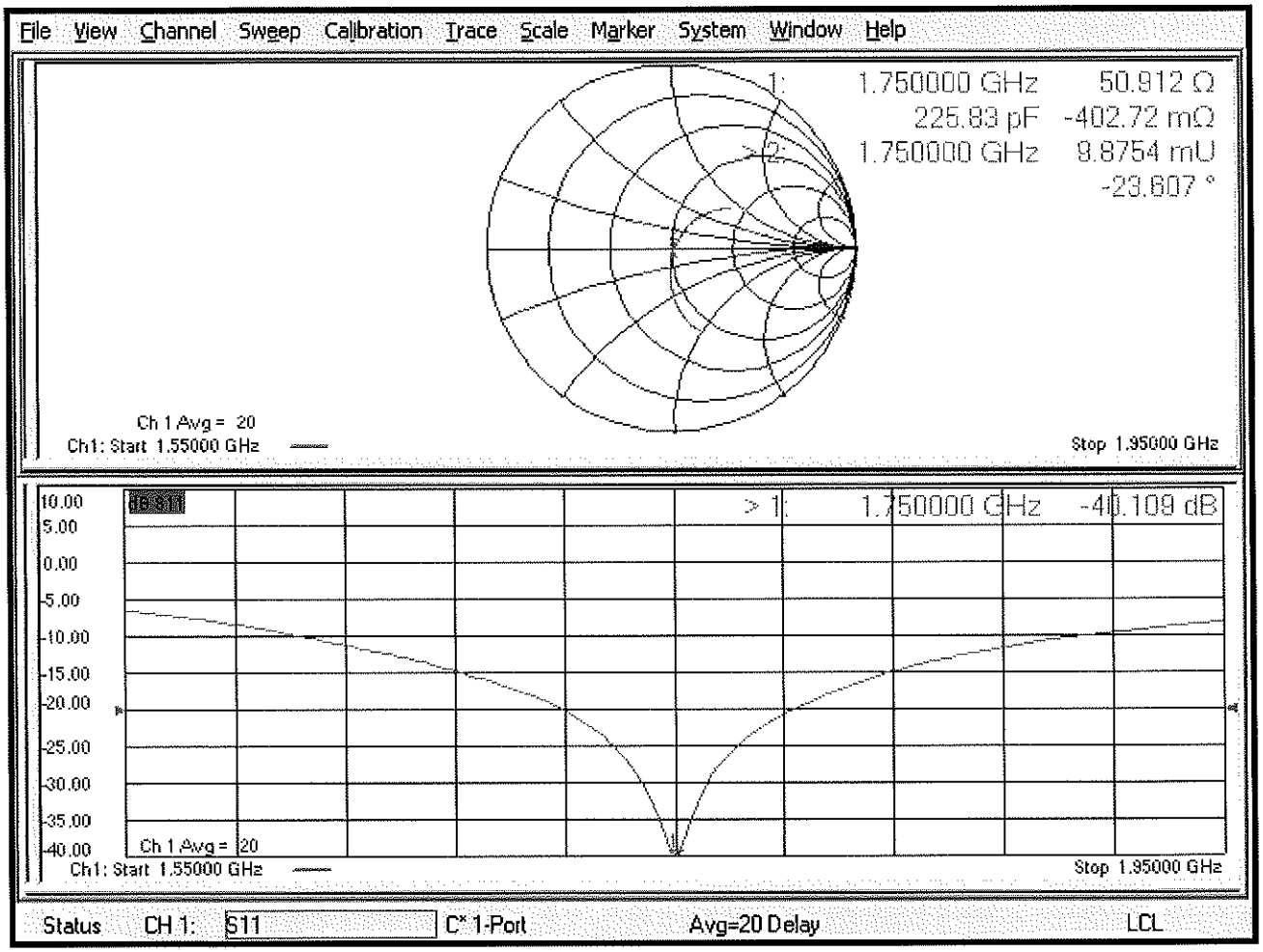
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 108.1 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 9.02 W/kg; SAR(10 g) = 4.76 W/kg
Maximum value of SAR (measured) = 14.0 W/kg



0 dB = 14.0 W/kg = 11.46 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 22.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1150

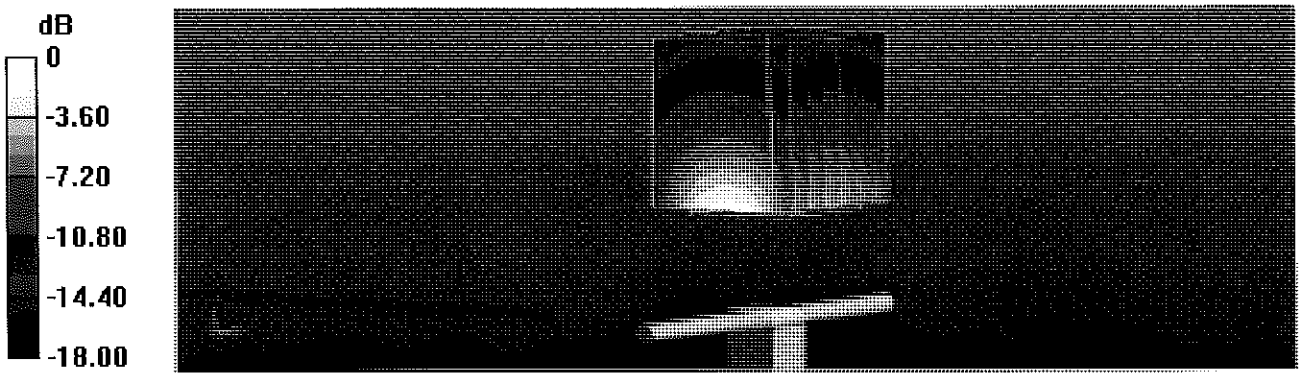
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.46 S/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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: 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)

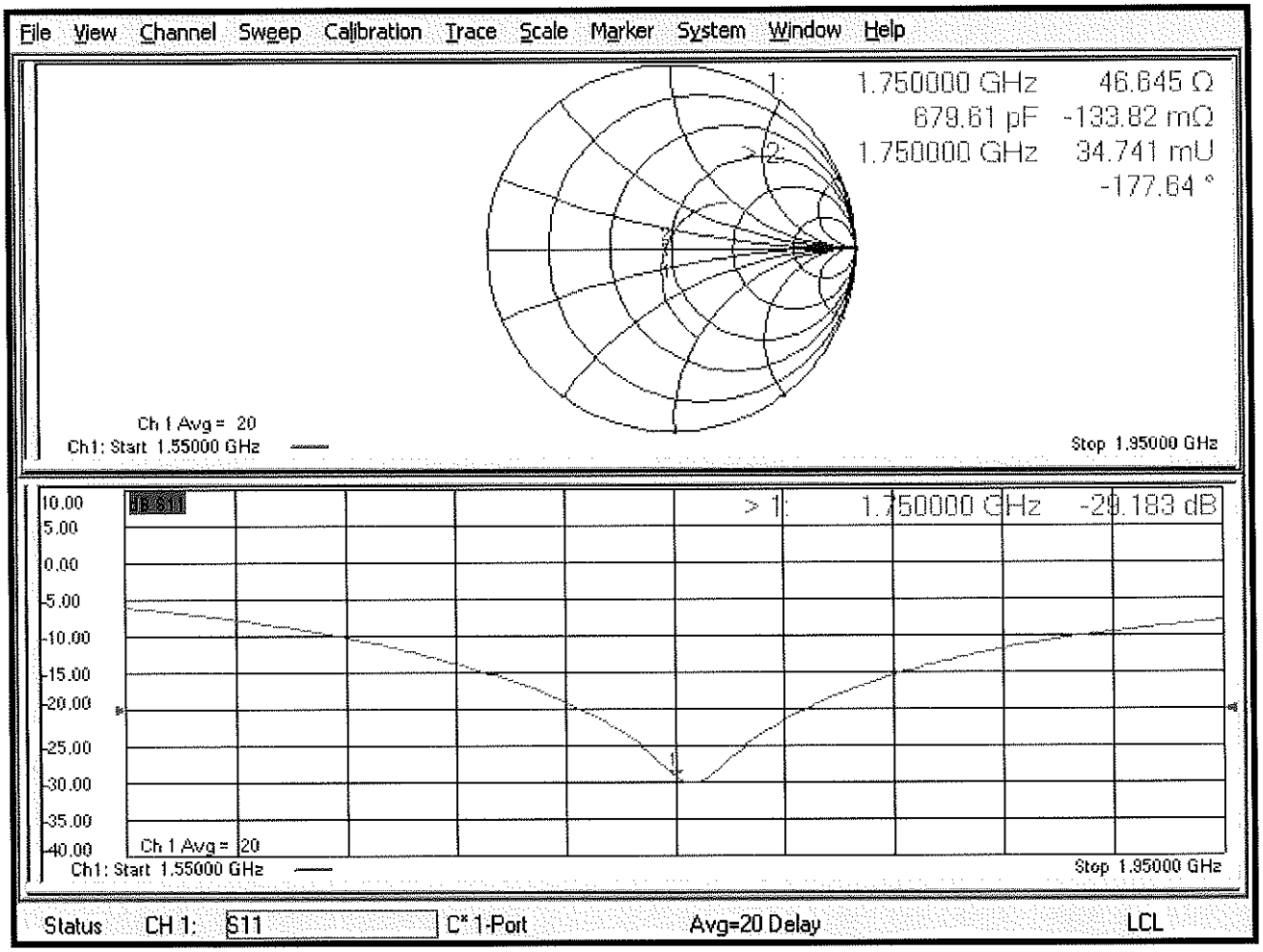
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.1 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 16.0 W/kg
SAR(1 g) = 9.04 W/kg; SAR(10 g) = 4.82 W/kg
Maximum value of SAR (measured) = 13.6 W/kg



0 dB = 13.6 W/kg = 11.34 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D1765V2-1008_May18

CALIBRATION CERTIFICATE

Object: D1765V2 - SN:1008

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

BN ✓ 7/16/2018

Calibration date: May 23, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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 Seitz	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 23, 2018

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

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	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5.0 mm	
Frequency	1750 MHz ± 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 ± 0.2) °C	39.0 ± 6 %	1.34 mho/m ± 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	8.94 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.71 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.0 W/kg ± 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 ± 0.2) °C	53.2 ± 6 %	1.46 mho/m ± 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	9.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.92 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.9 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.7 Ω - 6.5 jΩ
Return Loss	- 23.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.3 Ω - 6.0 jΩ
Return Loss	- 20.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.210 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	October 06, 2005

Appendix (Additional assessments outside the scope of SCS 0108)

Measurement Conditions

DASY system configuration, as far as not given on page 1 and 3.

Phantom	SAM Head Phantom	For usage with cSAR3DV2-R/L

SAR result with SAM Head (Top)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**37.4 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.95 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.9 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.47 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**38.2 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.4 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**37.4 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.2 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Ear)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	7.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**28.7 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.01 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**16.1 W/kg ± 16.9 % (k=2)**

DASY5 Validation Report for Head TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1765 MHz; Type: D1765V2; Serial: D1765V2 - SN:1008

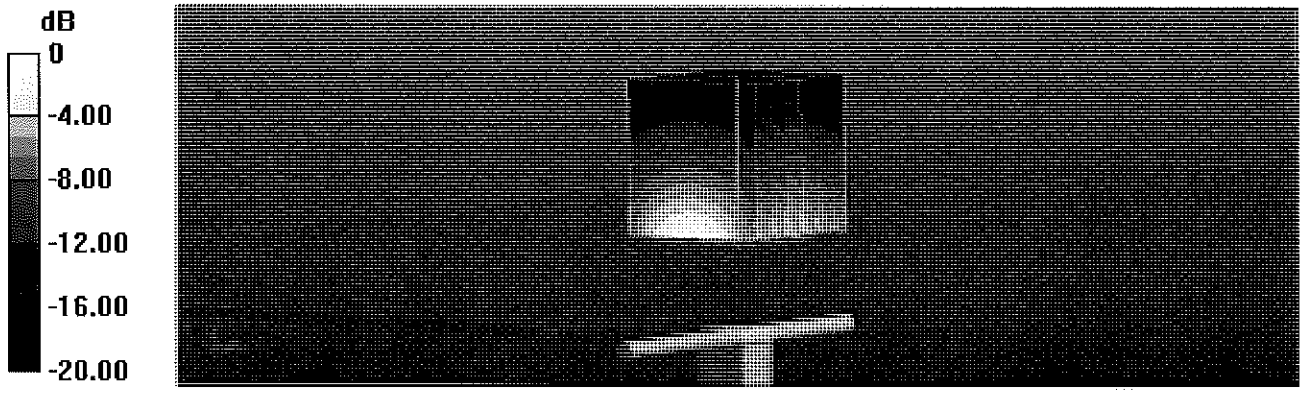
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.34 S/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

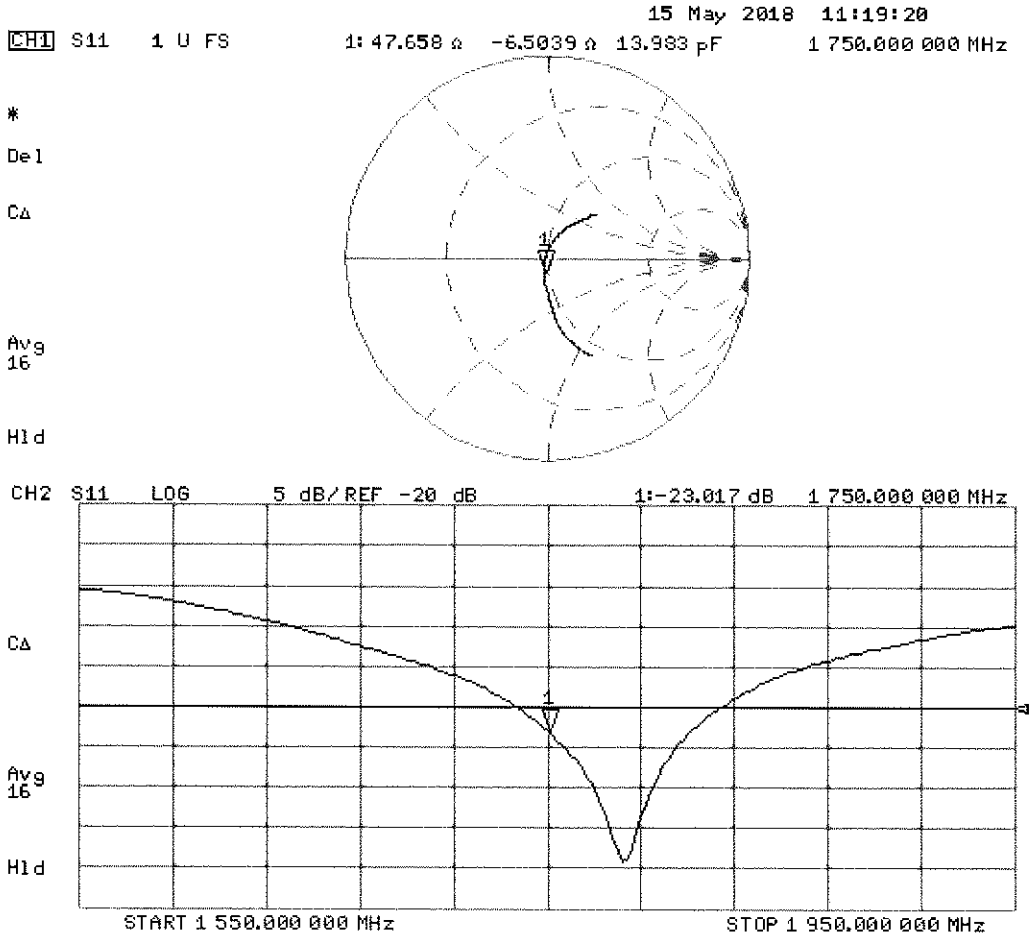
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 106.6 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 8.94 W/kg; SAR(10 g) = 4.71 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



DASY5 Validation Report for Body TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1765 MHz; Type: D1765V2; Serial: D1765V2 - SN:1008

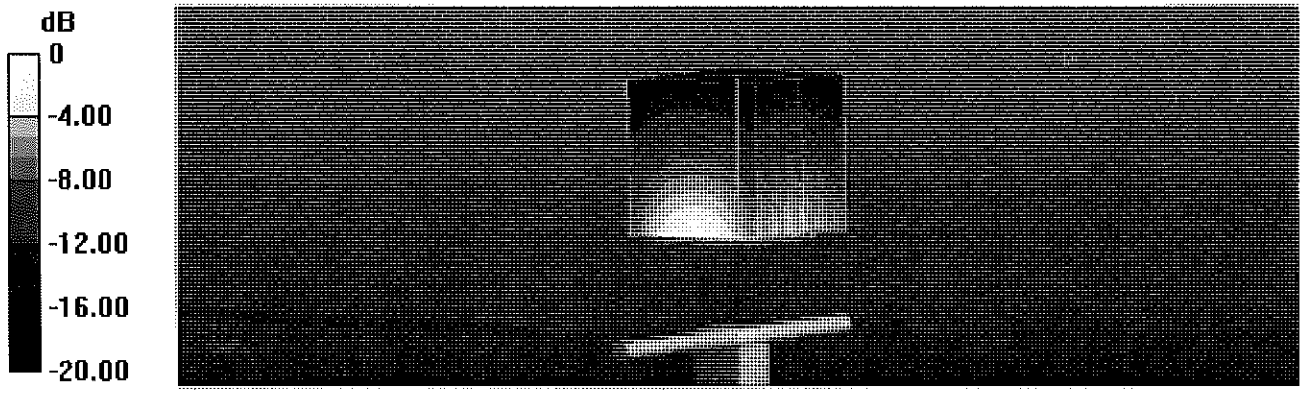
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.46 S/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

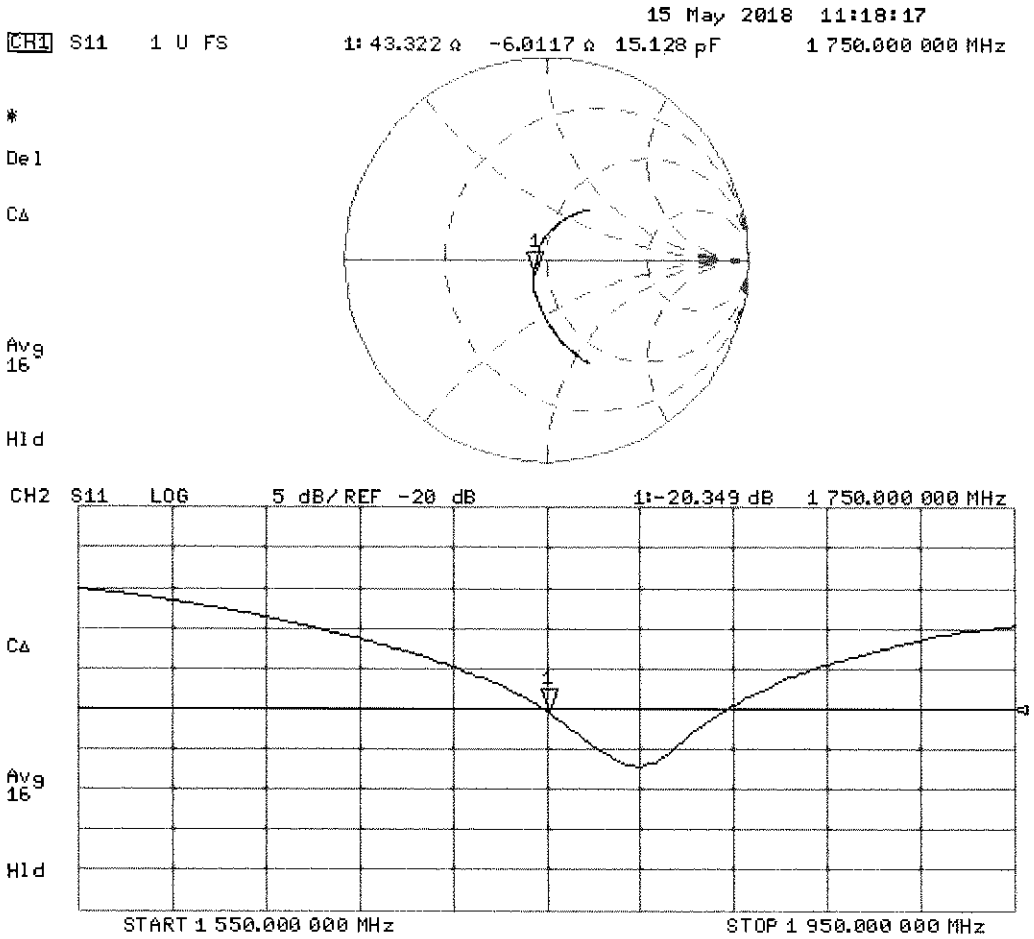
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.4 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 16.1 W/kg
SAR(1 g) = 9.21 W/kg; SAR(10 g) = 4.92 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



DASY5 Validation Report for SAM Head

Date: 23.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1765 MHz; Type: D1765V2; Serial: D1765V2 - SN:1008

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.37 S/m; ε_r = 41.8; ρ = 1000 kg/m^3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

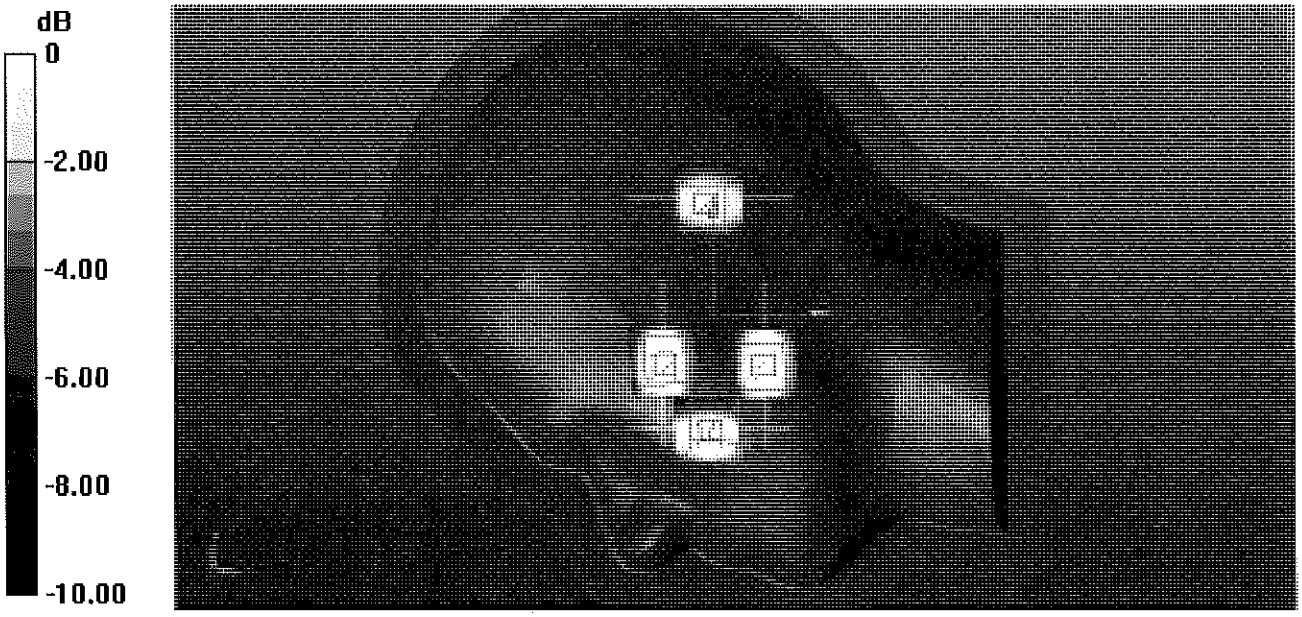
- Probe: EX3DV4 - SN7349; ConvF(8.5, 8.5, 8.5) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

SAM/Head/Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.8 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 9.26 W/kg; SAR(10 g) = 4.95 W/kg
Maximum value of SAR (measured) = 13.9 W/kg

SAM/Head/Mouth/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.2 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 16.6 W/kg
SAR(1 g) = 9.47 W/kg; SAR(10 g) = 5.06 W/kg
Maximum value of SAR (measured) = 13.7 W/kg

SAM/Head/Neck/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.7 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 9.26 W/kg; SAR(10 g) = 5.02 W/kg
Maximum value of SAR (measured) = 13.8 W/kg

SAM/Head/Ear/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.46 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 11.8 W/kg
SAR(1 g) = 7.12 W/kg; SAR(10 g) = 4.01 W/kg
Maximum value of SAR (measured) = 10.3 W/kg



0 dB = 10.3 W/kg = 10.13 dBW/kg

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: D1900V2-5d080_Oct18

CALIBRATION CERTIFICATE

Object: D1900V2 - SN:5d080

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

Calibration date: October 23, 2018

BN ✓
10-30-2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 23, 2018

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

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	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.3 ± 6 %	1.40 mho/m ± 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	9.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.8 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.7 W/kg ± 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 ± 0.2) °C	52.9 ± 6 %	1.47 mho/m ± 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	9.62 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.6 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.5 Ω + 7.9 jΩ
Return Loss	- 21.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1 Ω + 8.1 jΩ
Return Loss	- 21.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.193 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	June 28, 2006

DASY5 Validation Report for Head TSL

Date: 23.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d080

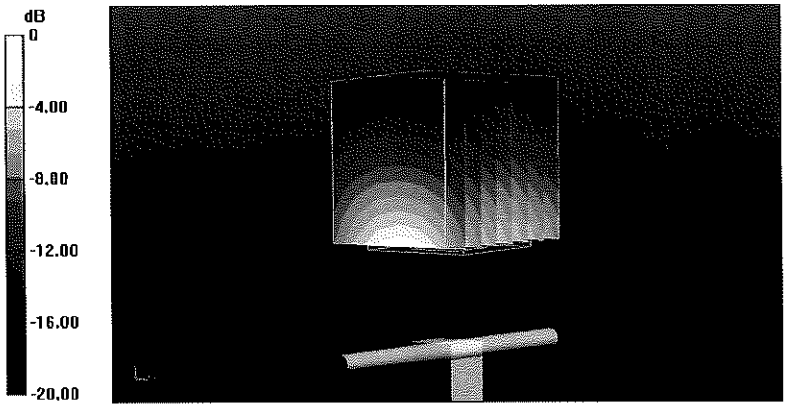
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 S/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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: 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)

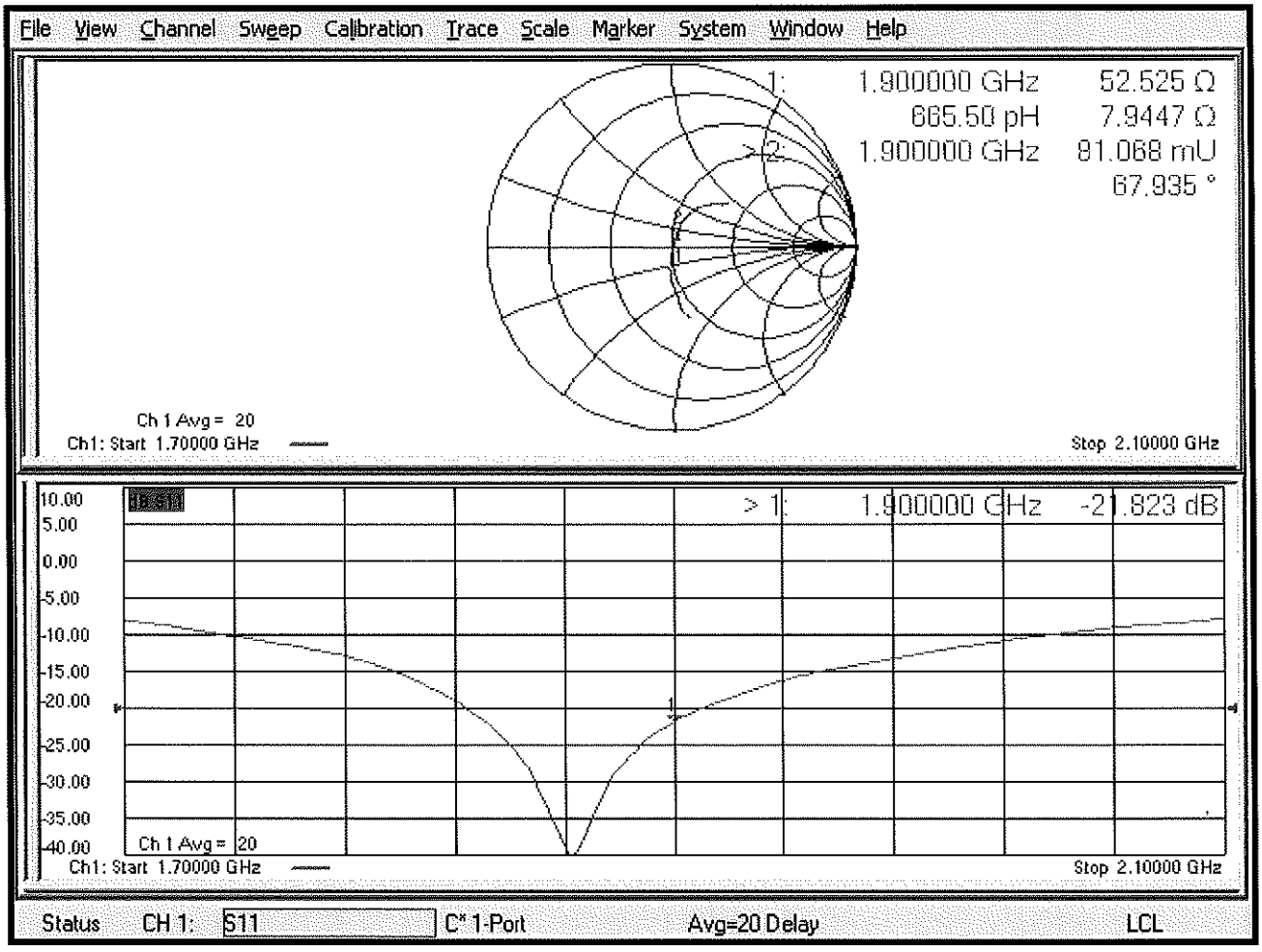
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 110.0 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 18.7 W/kg
SAR(1 g) = 9.93 W/kg; SAR(10 g) = 5.18 W/kg
Maximum value of SAR (measured) = 15.6 W/kg



0 dB = 15.6 W/kg = 11.93 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 23.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d080

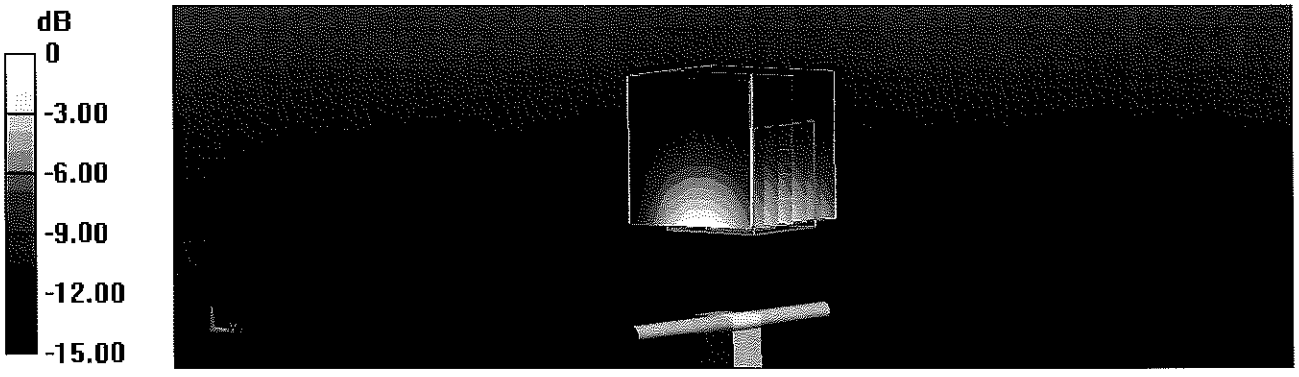
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.47 S/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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: 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)

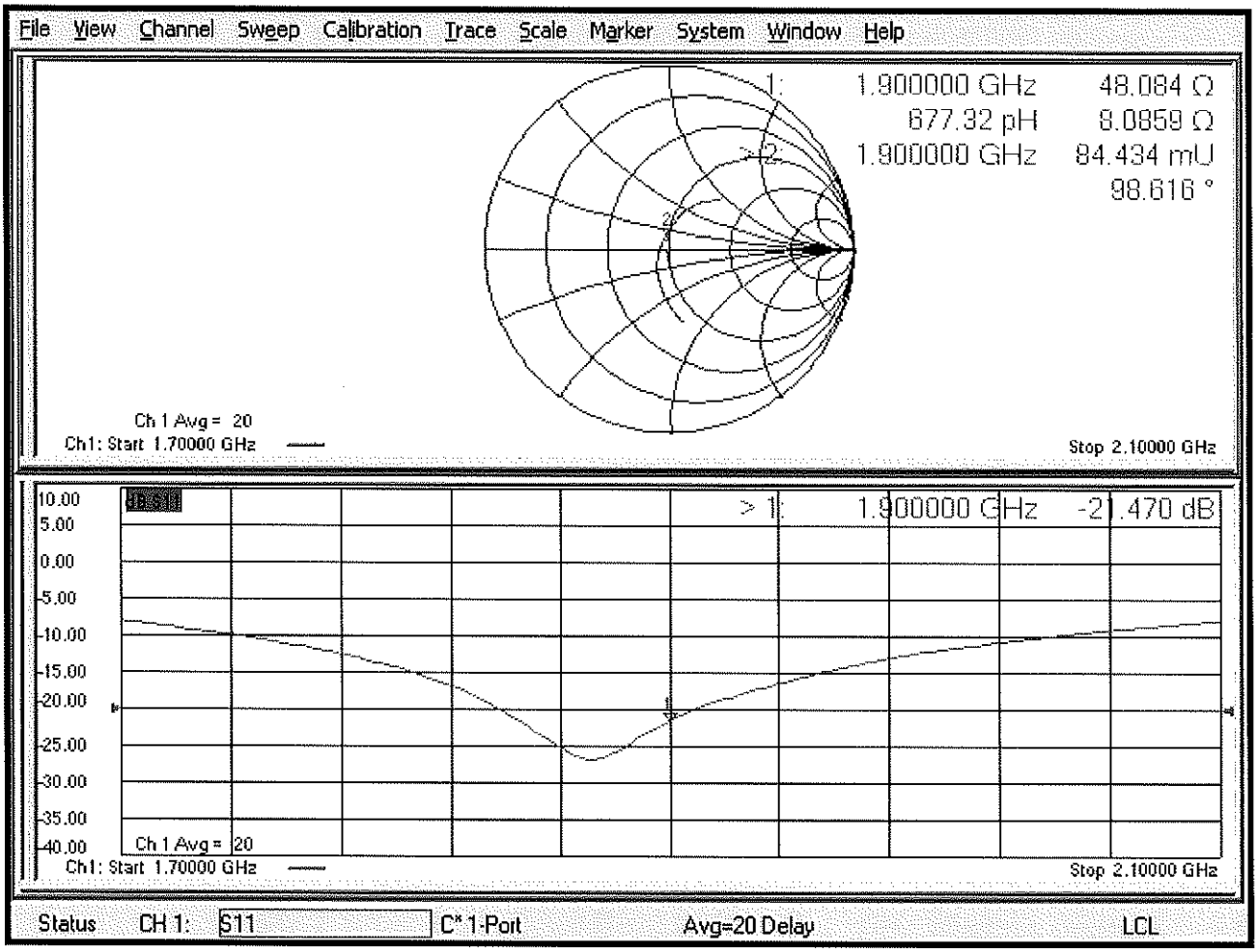
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.86 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 9.62 W/kg; SAR(10 g) = 5.09 W/kg
Maximum value of SAR (measured) = 14.1 W/kg



0 dB = 14.1 W/kg = 11.49 dBW/kg

Impedance Measurement Plot for Body TSL



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

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S Swiss Calibration Service

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Accreditation No.: SCS 0108

Client PC Test

Certificate No: D1900V2-5d149_Oct18

CALIBRATION CERTIFICATE

Object D1900V2 - SN:5d149

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

BNV
10-30-2018

Calibration date: October 23, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 23, 2018

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

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	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.3 ± 6 %	1.40 mho/m ± 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	9.80 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.11 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.5 W/kg ± 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 ± 0.2) °C	52.9 ± 6 %	1.47 mho/m ± 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	9.68 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.11 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.7 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.9 Ω + 6.3 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.5 Ω + 8.2 jΩ
Return Loss	- 21.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.193 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 11, 2011

DASY5 Validation Report for Head TSL

Date: 23.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d149

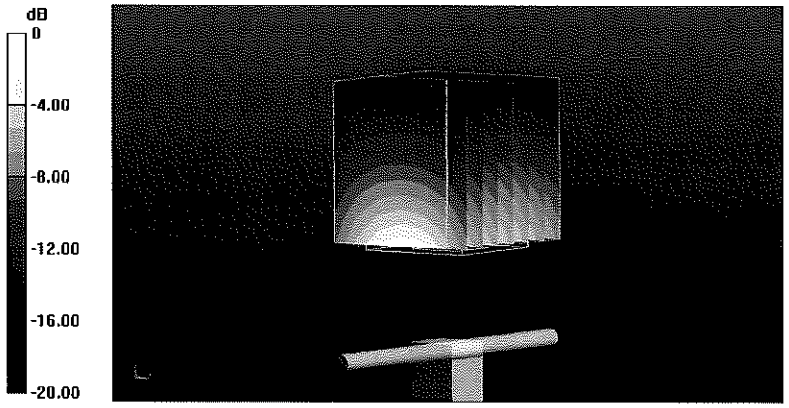
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 S/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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: 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)

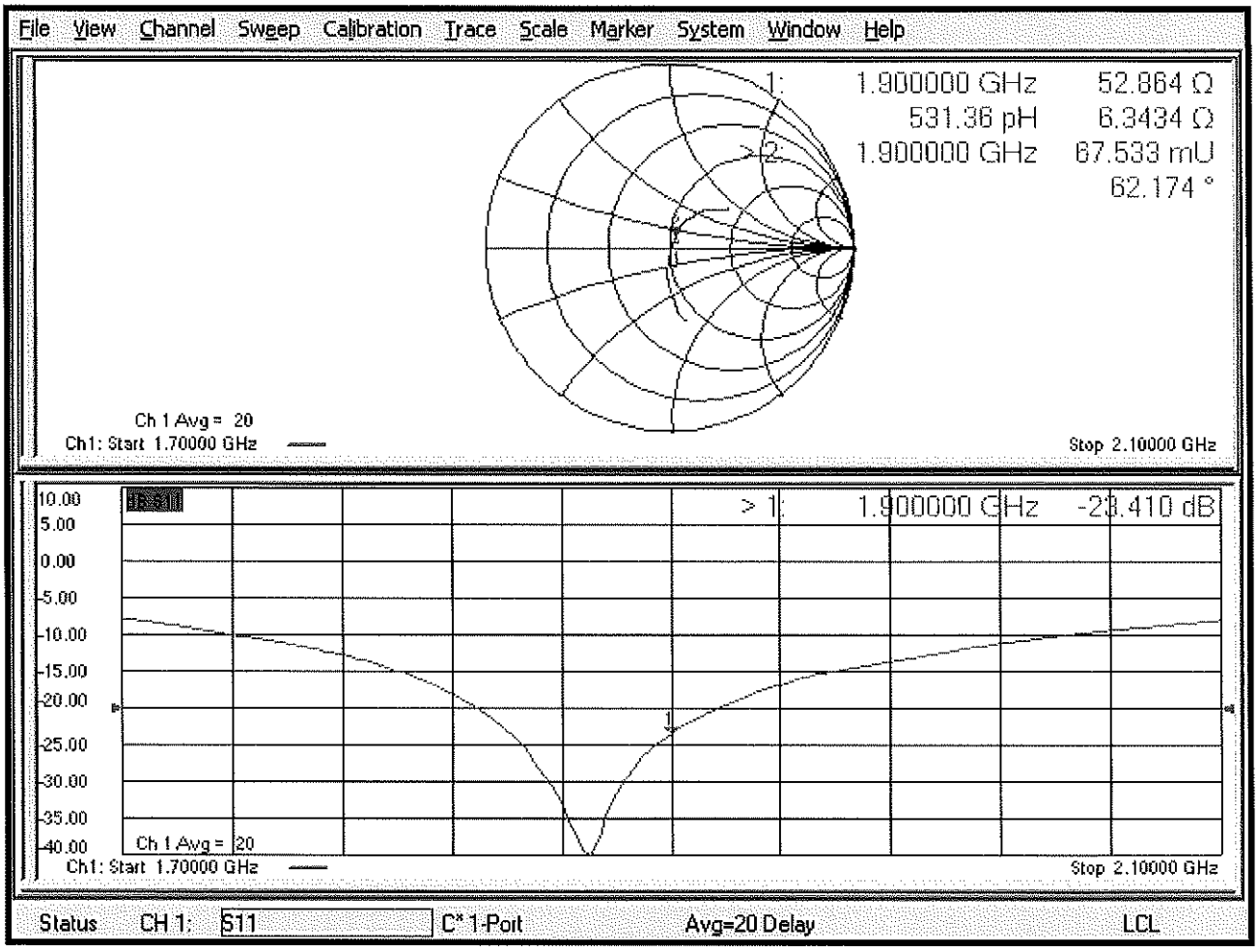
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 110.0 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 18.5 W/kg
SAR(1 g) = 9.8 W/kg; SAR(10 g) = 5.11 W/kg
Maximum value of SAR (measured) = 15.4 W/kg



0 dB = 15.4 W/kg = 11.88 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 23.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d149

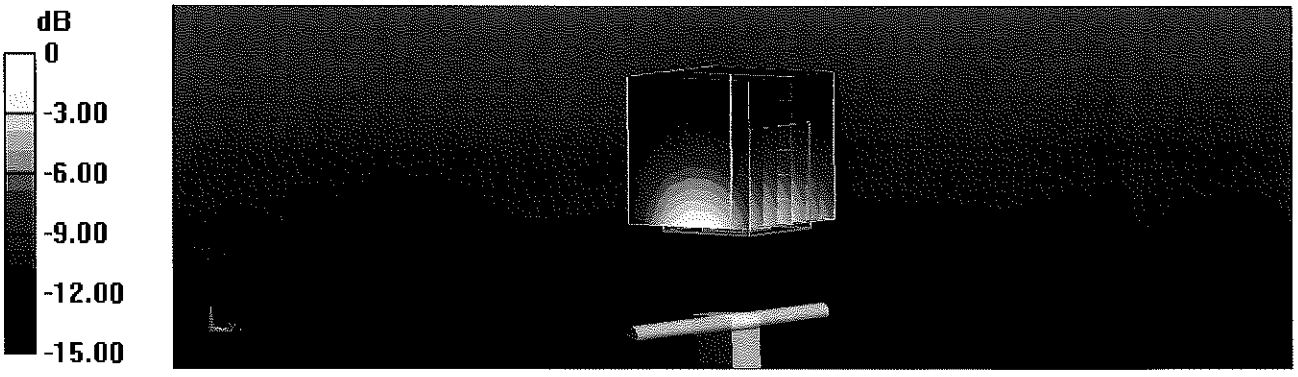
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.47 S/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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: 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)

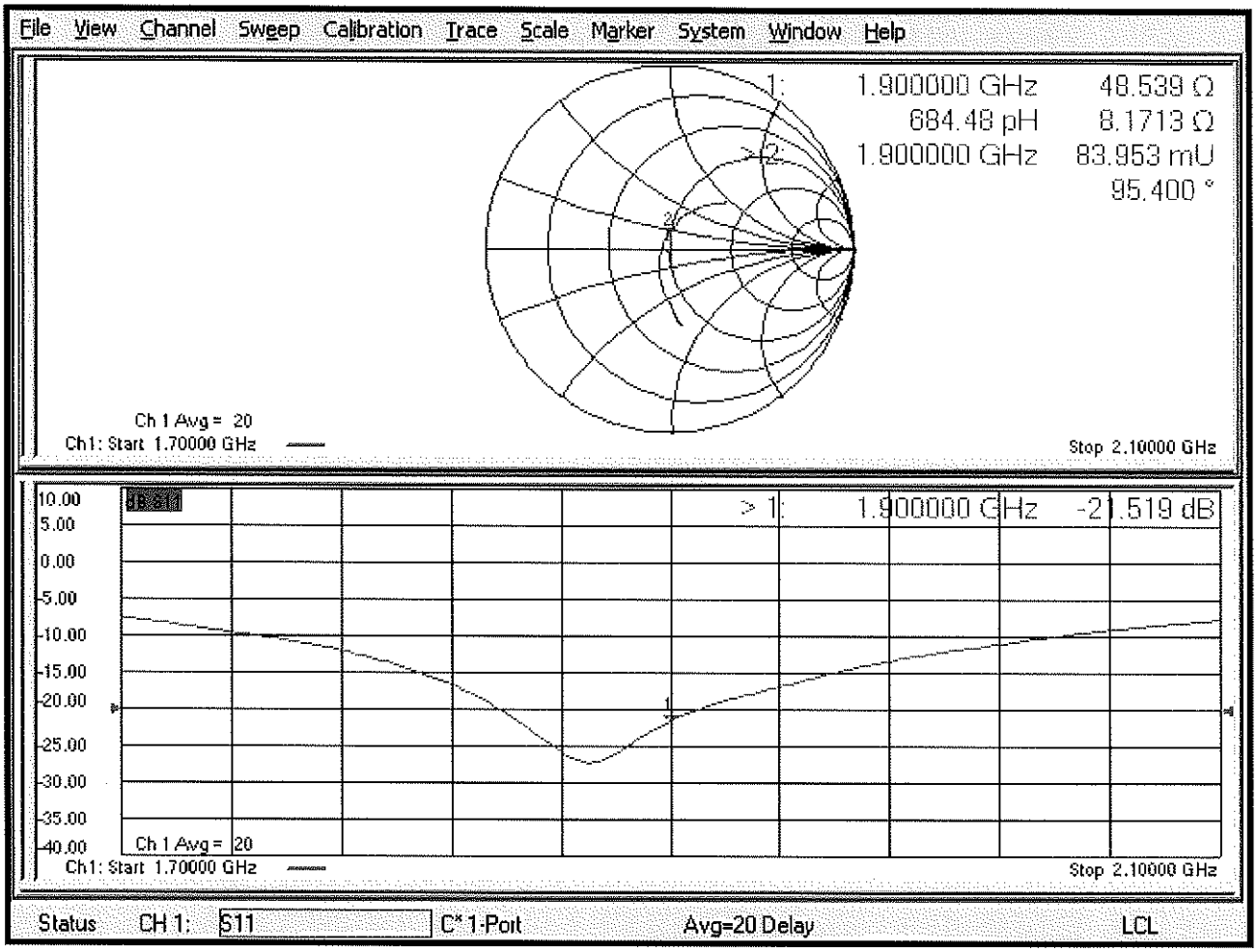
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.1 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.68 W/kg; SAR(10 g) = 5.11 W/kg
Maximum value of SAR (measured) = 14.2 W/kg



0 dB = 14.2 W/kg = 11.52 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D2300V2-1073_Aug18

CALIBRATION CERTIFICATE

Object	D2300V2 - SN:1073
Calibration procedure(s)	QA CAL-05.v10 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 13, 2018

BW
09-06-2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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 Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 13, 2018

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

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Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2300 MHz ± 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 ± 0.2) °C	38.2 ± 6 %	1.70 mho/m ± 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	12.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**49.2 W/kg ± 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 ± 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 ± 0.2) °C	52.2 ± 6 %	1.85 mho/m ± 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	12.1 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**47.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.86 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.2 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.1 Ω - 5.2 jΩ
Return Loss	- 25.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.5 Ω - 4.1 jΩ
Return Loss	- 23.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.171 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 16, 2015

Date: 13.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2300 MHz; Type: D2300V2; Serial: D2300V2 - SN: 1073

Communication System: UID 0 - CW; Frequency: 2300 MHz
Medium parameters used: f = 2300 MHz; σ = 1.7 S/m; ε_r = 38.2; ρ = 1000 kg/m^3
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) @ 2300 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)

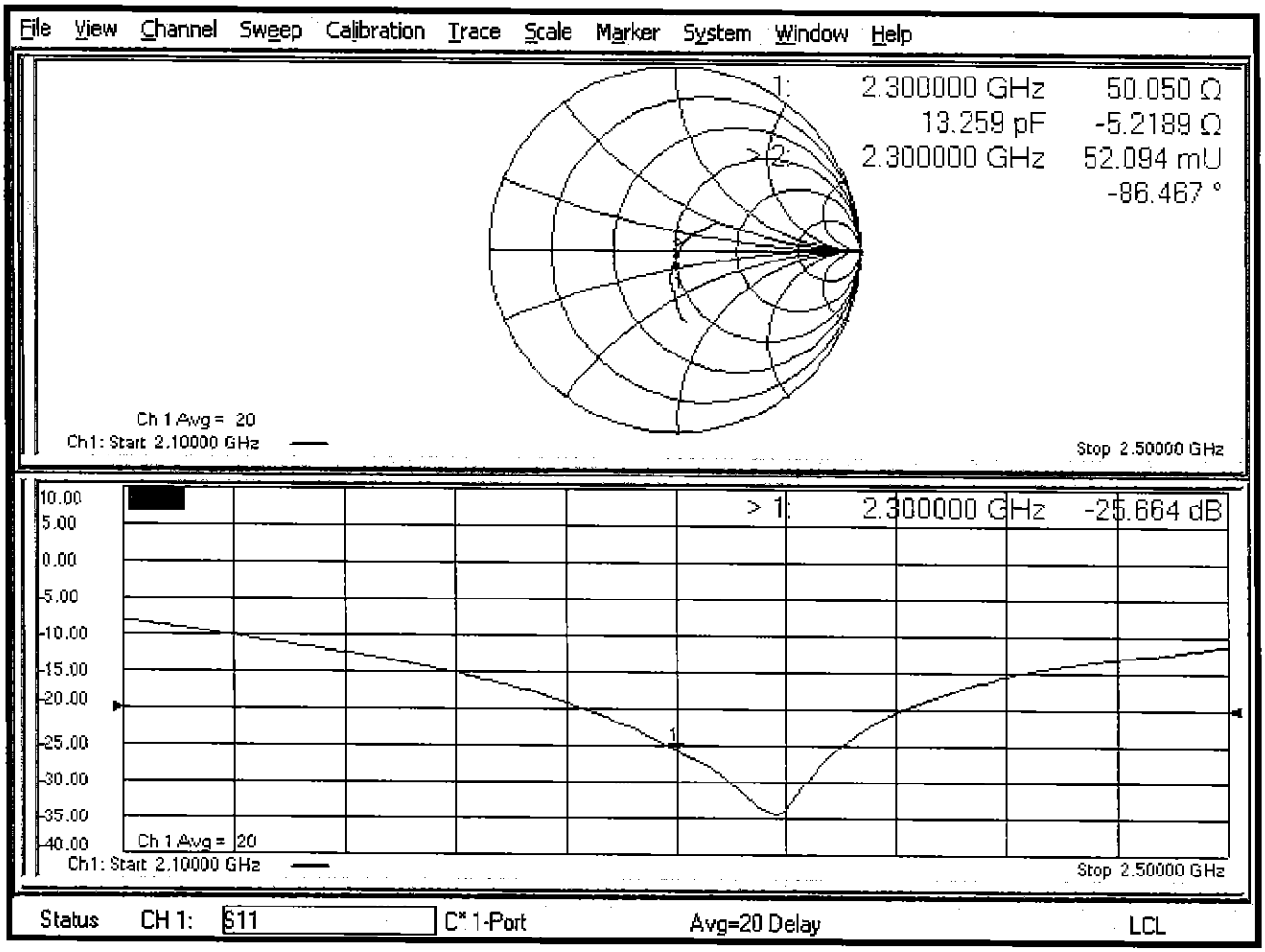
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 115.9 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 24.1 W/kg
SAR(1 g) = 12.5 W/kg; SAR(10 g) = 6.02 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 Head TSL



DASY5 Validation Report for Body TSL

Date: 13.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2300 MHz; Type: D2300V2; Serial: D2300V2 - SN: 1073

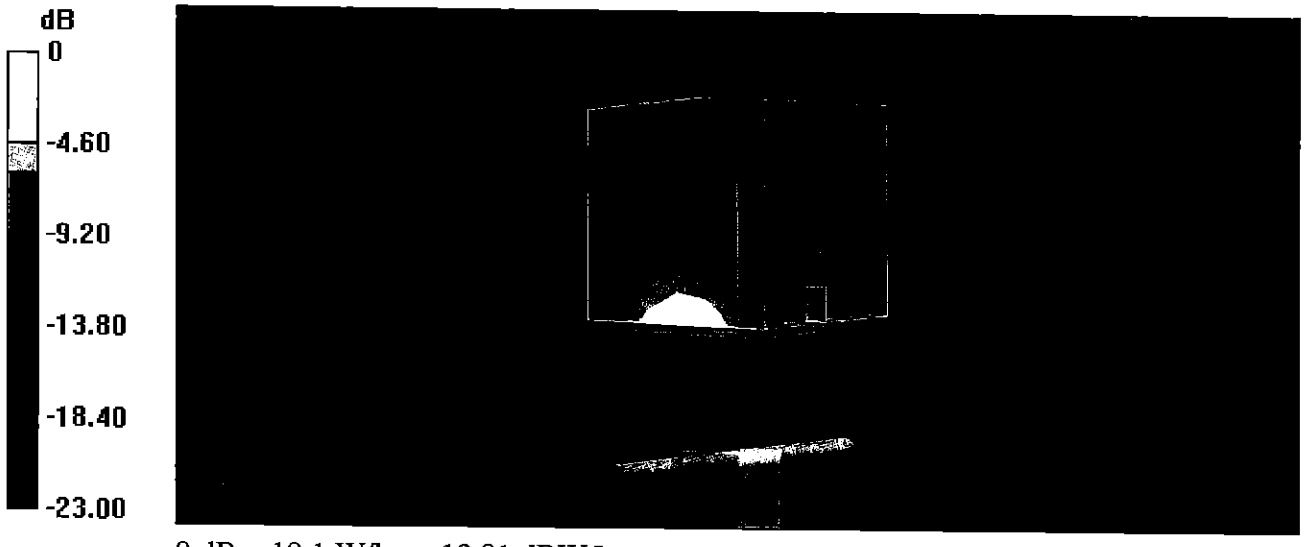
Communication System: UID 0 - CW; Frequency: 2300 MHz
Medium parameters used: f = 2300 MHz; σ = 1.85 S/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.08, 8.08, 8.08) @ 2300 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)

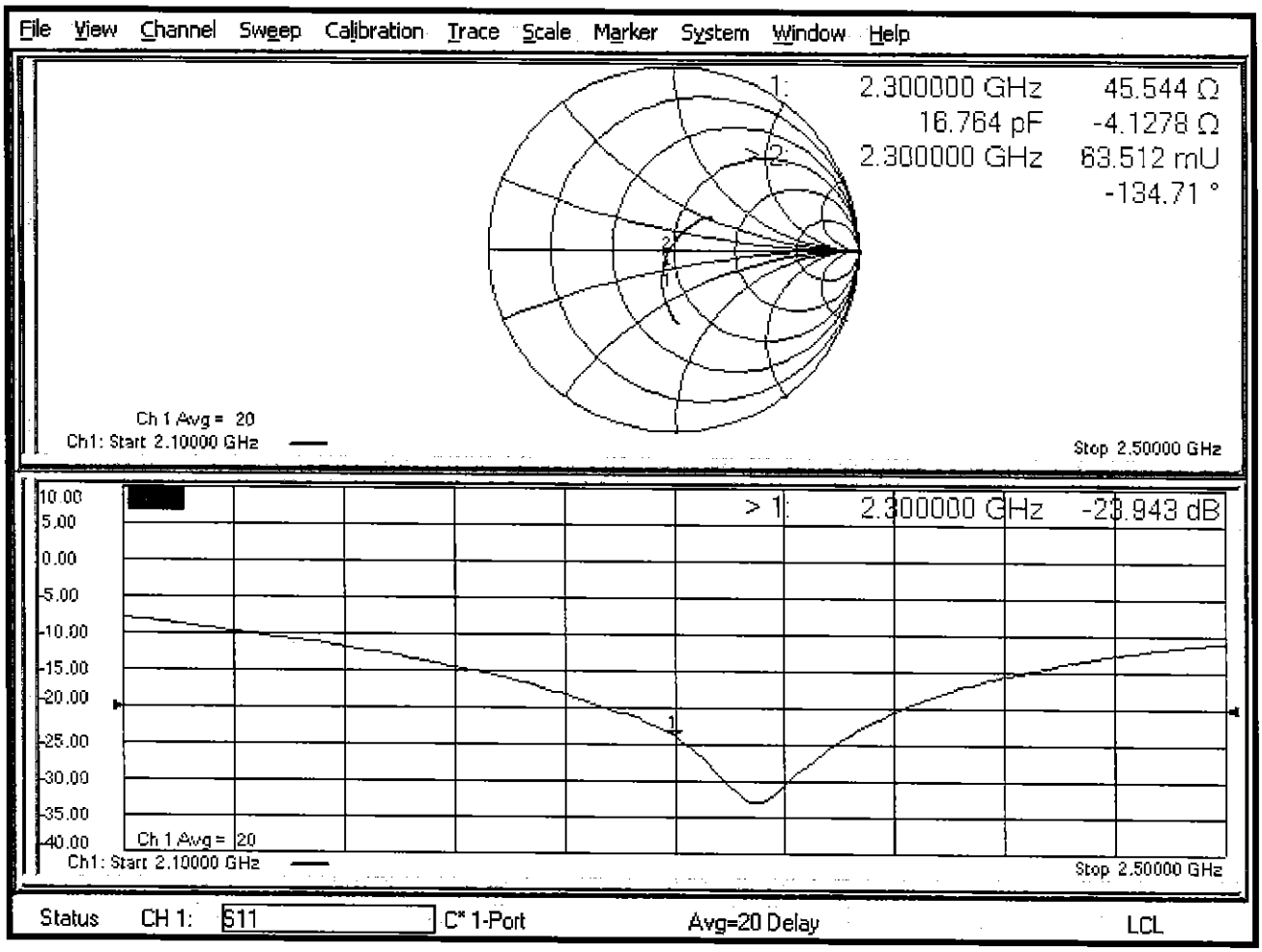
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.5 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 22.9 W/kg
SAR(1 g) = 12.1 W/kg; SAR(10 g) = 5.86 W/kg
Maximum value of SAR (measured) = 19.1 W/kg



0 dB = 19.1 W/kg = 12.81 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D2450V2-797_Sep17

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:797
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 11, 2017

SCV 10/03/2017

Extended PMV 9/20/2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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 / 08327	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-08	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

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 11, 2017

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

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	2450 MHz ± 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 ± 0.2) °C	37.8 ± 6 %	1.86 mho/m ± 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	13.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.7 W/kg ± 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 ± 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 ± 0.2) °C	51.9 ± 6 %	2.04 mho/m ± 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	13.1 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**51.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.2 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.8 Ω + 7.4 jΩ
Return Loss	- 21.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.7 Ω + 9.1 jΩ
Return Loss	- 20.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.152 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	January 24, 2006

DASY5 Validation Report for Head TSL

Date: 11.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 797

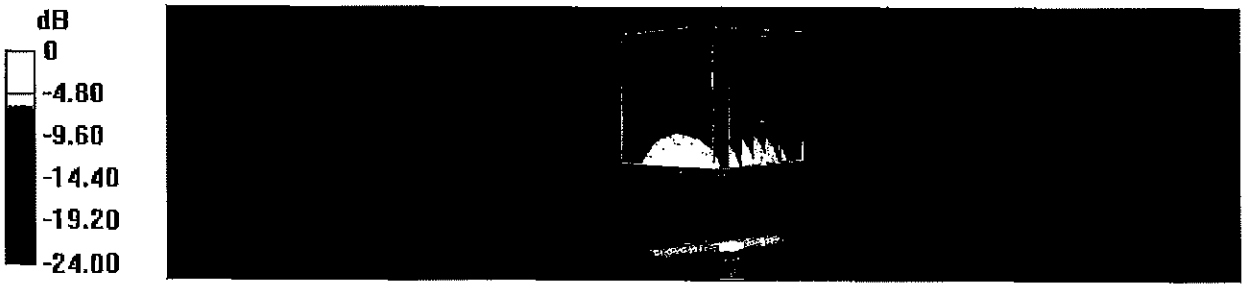
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; ε_r = 37.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.12, 8.12, 8.12); 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)

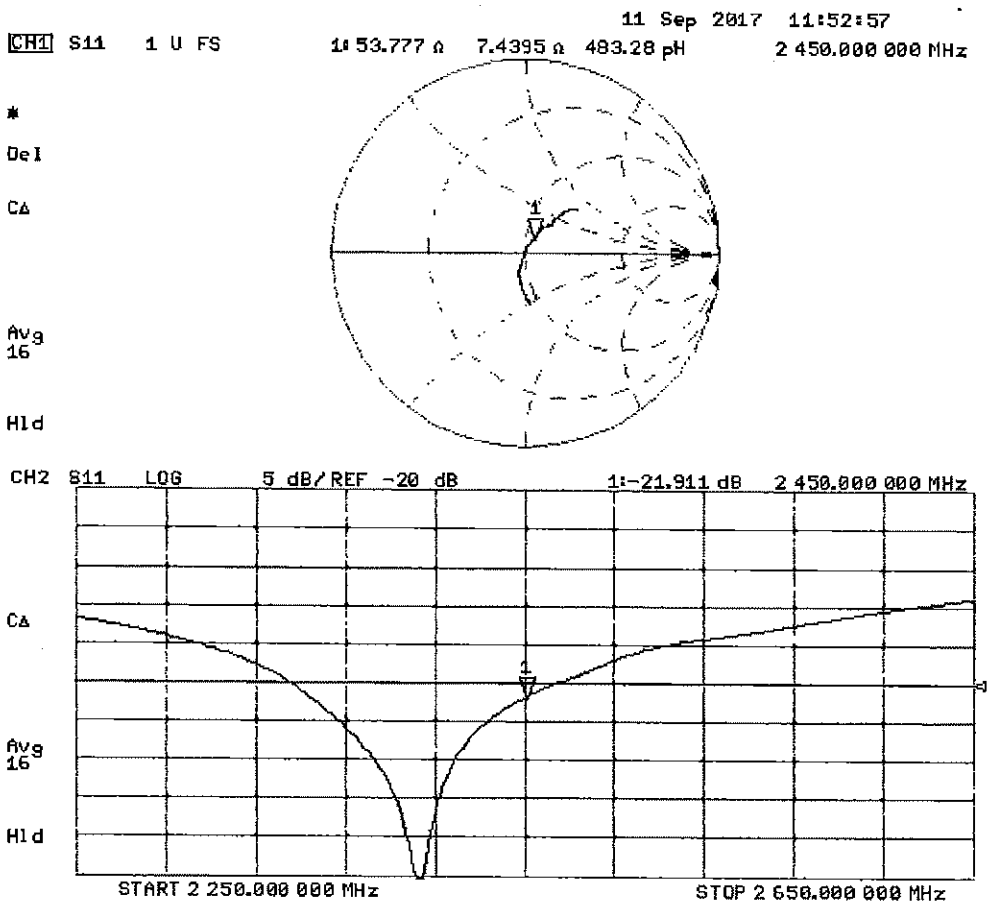
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 113.5 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 26.9 W/kg
SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.28 W/kg
Maximum value of SAR (measured) = 21.6 W/kg



0 dB = 21.6 W/kg = 13.34 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 11.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 797

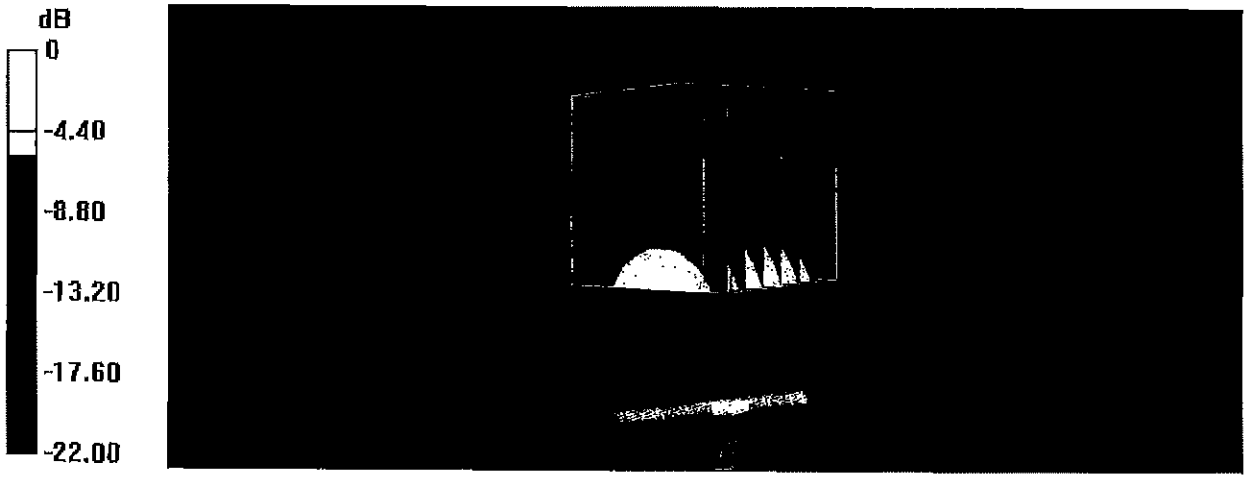
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.04 S/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.1, 8.1, 8.1); 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)

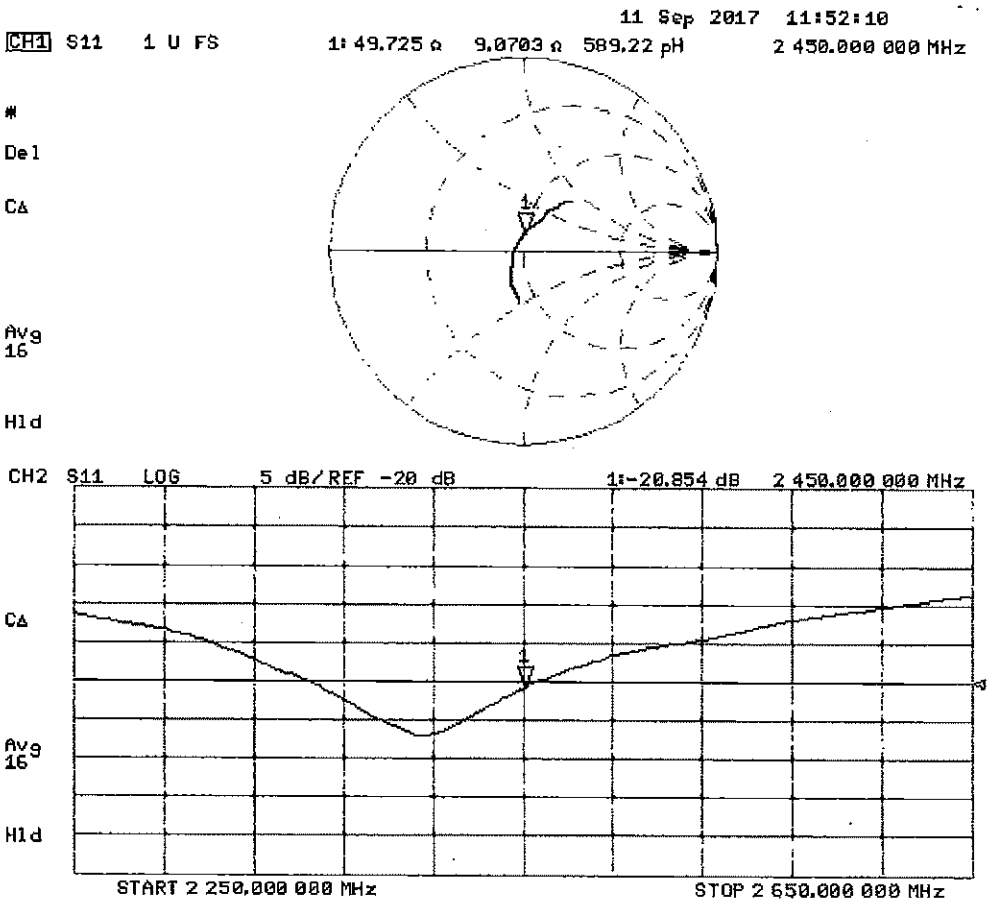
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.4 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 25.6 W/kg
SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.14 W/kg
Maximum value of SAR (measured) = 20.3 W/kg



0 dB = 20.3 W/kg = 13.07 dBW/kg

Impedance Measurement Plot for Body TSL



PCTEST ENGINEERING LABORATORY, INC.
18855 Adams Ct, Morgan Hill, CA 95037 USA
Tel. +1.410.290.6652 / Fax +1.410.290.6654
http://www.pctest.com

Certification of Calibration

Object	D2450V2 – SN: 797
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extended Calibration date:	September 11, 2018
Description:	SAR Validation Dipole at 2450 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
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
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
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
Agilent	8753ES	S-Parameter Vector Network Analyzer	8/30/2018	Annual	8/30/2019	MY40003841
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7410
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/11/2018	Annual	7/11/2019	1322
SPEAG	ES3DV3	SAR Probe	3/13/2018	Annual	3/13/2019	3319
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/7/2018	Annual	3/7/2019	1368
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1207364
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1339018
Anritsu	ML2495A	Power Meter	10/22/2017	Annual	10/22/2018	1328004
Agilent	N5182A	MXG Vector Signal Generator	4/18/2018	Annual	4/18/2019	MY47420800
Seekonk	NC-100	Torque Wrench	7/11/2018	Annual	7/11/2019	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path.

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Team Lead Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	KOK

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:

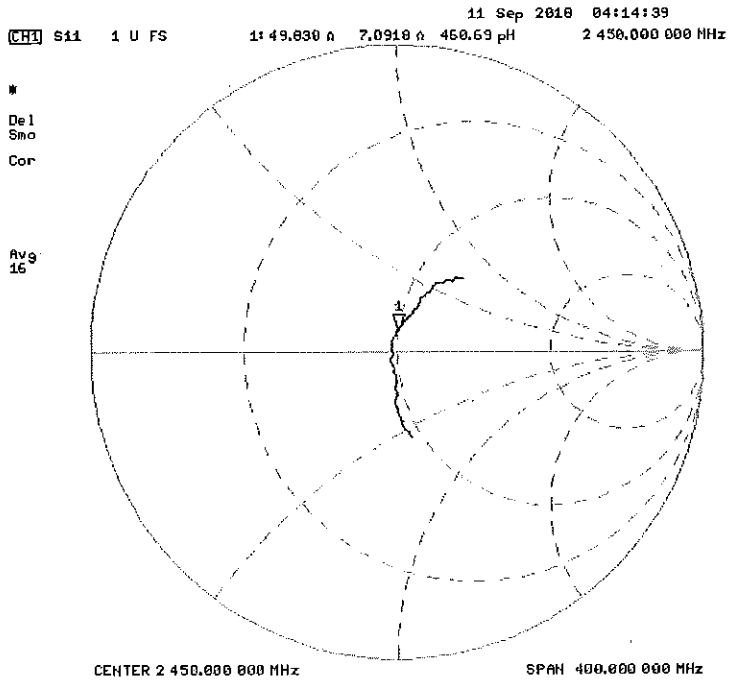
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does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

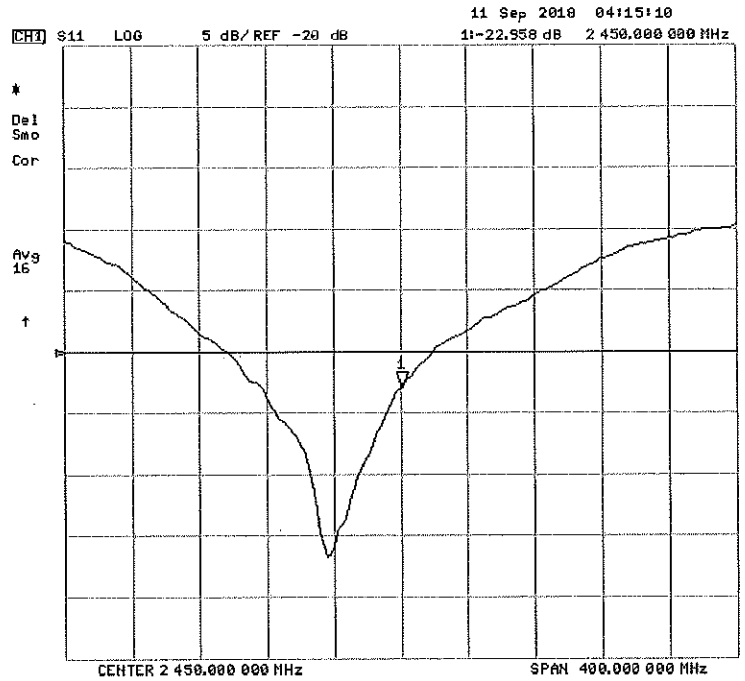
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
9/11/2017	9/11/2018	1.152	5.27	5.52	4.74%	2.48	2.54	2.42%	53.8	49.8	4	7.4	7.1	0.3	-21.9	-23	-4.80%	PASS

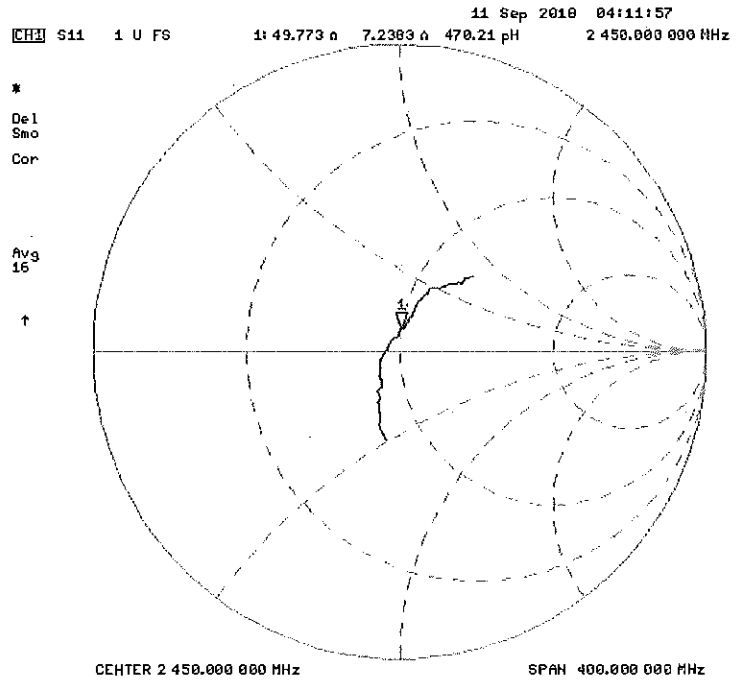
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance 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
9/11/2017	9/11/2018	1.152	5.11	5.17	1.17%	2.42	2.37	-2.07%	49.7	49.8	0.1	9.1	7.2	1.9	-20.9	-22.6	-8.20%	PASS

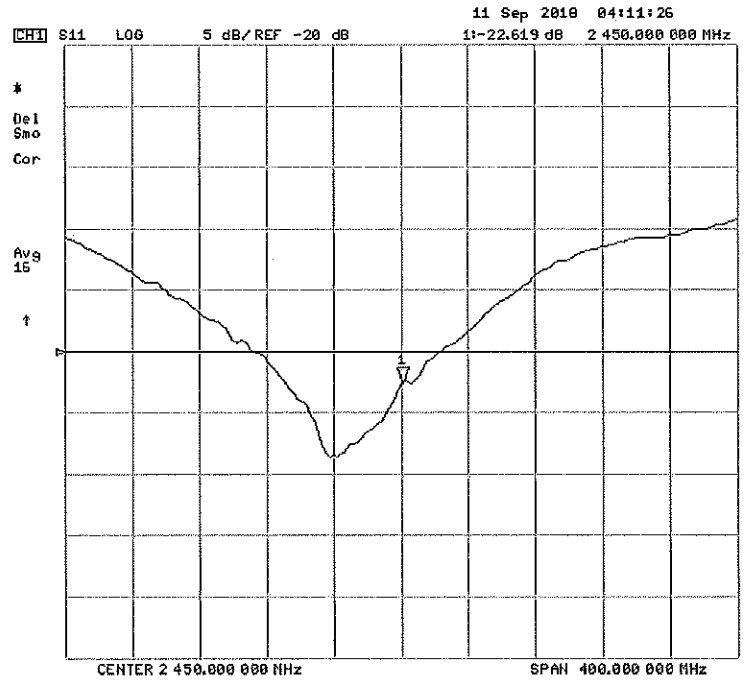
Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





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

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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: D2450V2-981_Aug18

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:981
Calibration procedure(s)	QA CAL-05.v10 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 16, 2018

BN ✓
09-06-2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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 Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 23, 2018

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

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

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Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5.0 mm	
Frequency	2450 MHz ± 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 ± 0.2) °C	37.7 ± 6 %	1.86 mho/m ± 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	13.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.20 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.4 W/kg ± 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 ± 0.2) °C	51.8 ± 6 %	2.02 mho/m ± 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	**50.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.11 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.2 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.0 Ω + 2.3 jΩ
Return Loss	- 25.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.2 Ω + 4.7 jΩ
Return Loss	- 26.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.162 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 30, 2014

Appendix (Additional assessments outside the scope of SCS 0108)

Measurement Conditions

DASY system configuration, as far as not given on page 1 and 3.

Phantom	SAM Head Phantom	For usage with cSAR3DV2-R/L

SAR result with SAM Head (Top)

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	**54.0 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.2 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Mouth)

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	**54.0 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.3 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	12.9 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**51.2 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.11 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.4 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Ear)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	8.74 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**34.7 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**17.5 W/kg ± 16.9 % (k=2)**

Date: 13.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:981

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; ε_r = 37.7; ρ = 1000 kg/m^3
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)

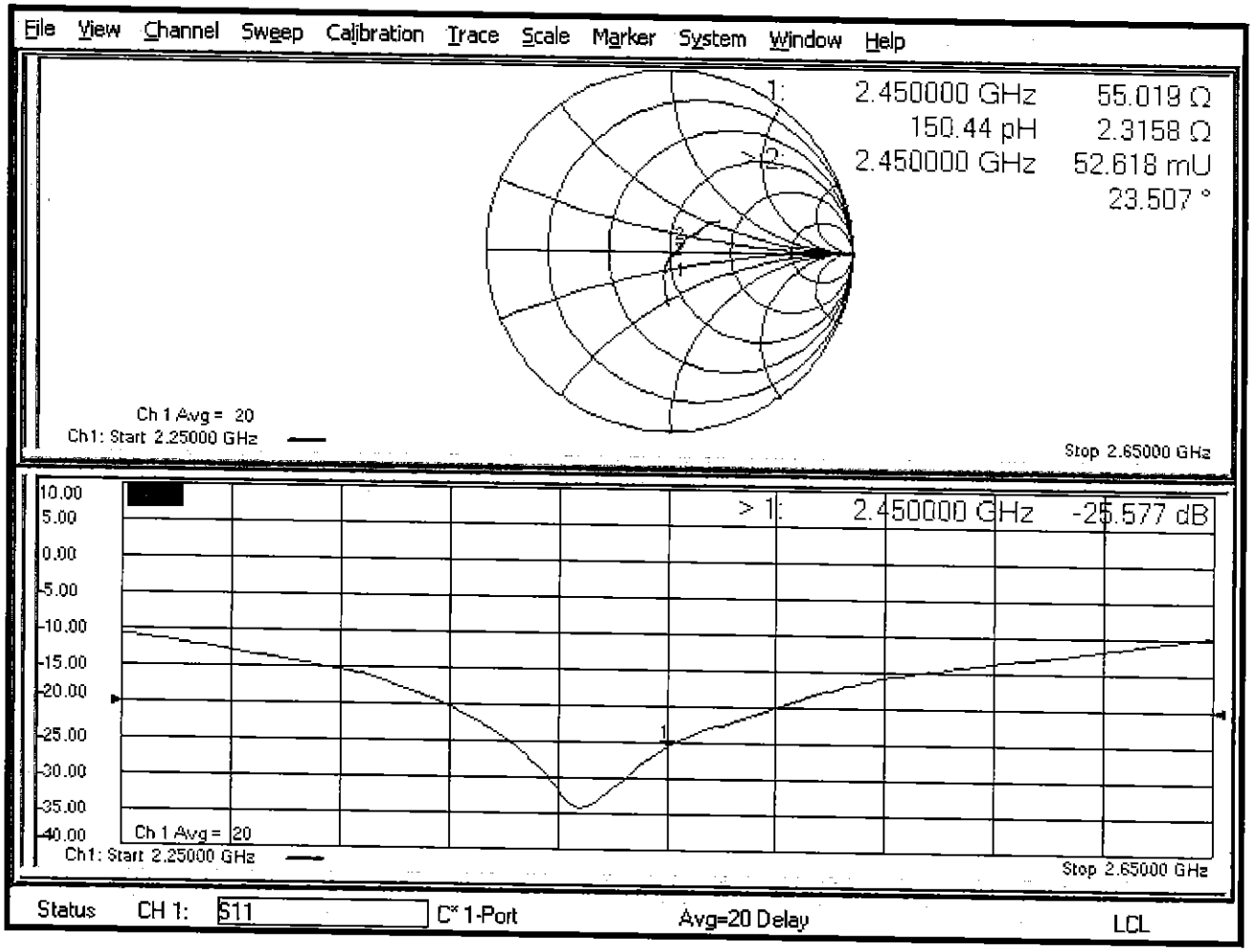
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 116.6 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 26.7 W/kg
SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.2 W/kg
Maximum value of SAR (measured) = 22.1 W/kg



0 dB = 22.1 W/kg = 13.44 dBW/kg

Impedance Measurement Plot for Head TSL



Date: 13.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:981

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.02 S/m; ε_r = 51.8; ρ = 1000 kg/m^3
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)

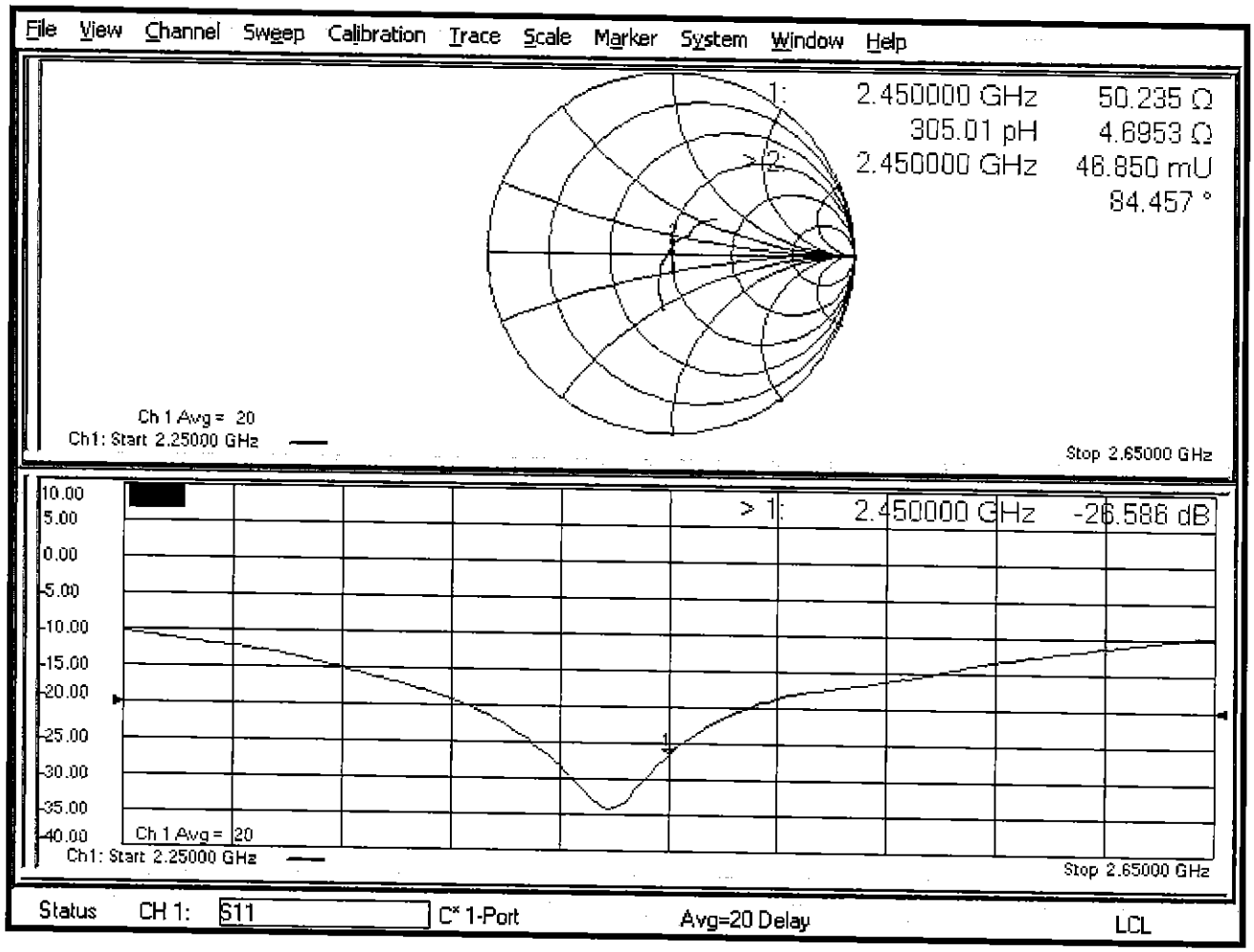
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.0 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 25.3 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.11 W/kg
Maximum value of SAR (measured) = 20.7 W/kg



0 dB = 20.7 W/kg = 13.16 dBW/kg

Impedance Measurement Plot for Body TSL



DASY5 Validation Report for SAM Head

Date: 16.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:981

Communication System: UID 0 - CW ; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.85 S/m; ε_r = 40.2; ρ = 1000 kg/m^3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

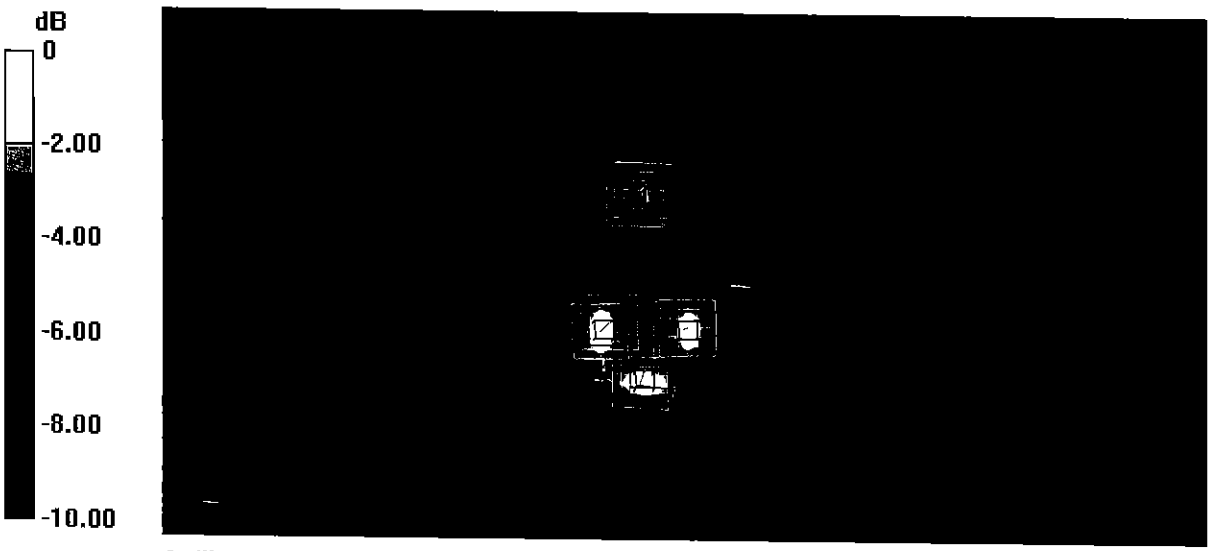
- Probe: EX3DV4 - SN7349; ConvF(7.88, 7.88, 7.88) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

SAM Head Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 116.2 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 26.4 W/kg
SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.33 W/kg
Maximum value of SAR (measured) = 22.0 W/kg

SAM Head Mouth/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 116.9 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 26.3 W/kg
SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.35 W/kg
Maximum value of SAR (measured) = 21.7 W/kg

SAM Head Neck/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 112.0 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 24.1 W/kg
SAR(1 g) = 12.9 W/kg; SAR(10 g) = 6.11 W/kg
Maximum value of SAR (measured) = 20.5 W/kg

SAM Head Ear/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.03 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 8.74 W/kg; SAR(10 g) = 4.4 W/kg
Maximum value of SAR (measured) = 13.5 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

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Accreditation No.: SCS 0108

Client PC Test

Certificate No: D2600V2-1004_Apr18

CALIBRATION CERTIFICATE

Object: D2600V2 - SN:1004

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

BN ✓
05-01-2018

Calibration date: April 11, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 12, 2018

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Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.8 ± 6 %	2.03 mho/m ± 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	14.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**55.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.1 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.1 ± 6 %	2.19 mho/m ± 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	13.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**54.8 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.20 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.7 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.7 Ω - 5.7 jΩ
Return Loss	- 24.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.0 Ω - 3.8 jΩ
Return Loss	- 24.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 23, 2006

DASY5 Validation Report for Head TSL

Date: 11.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1004

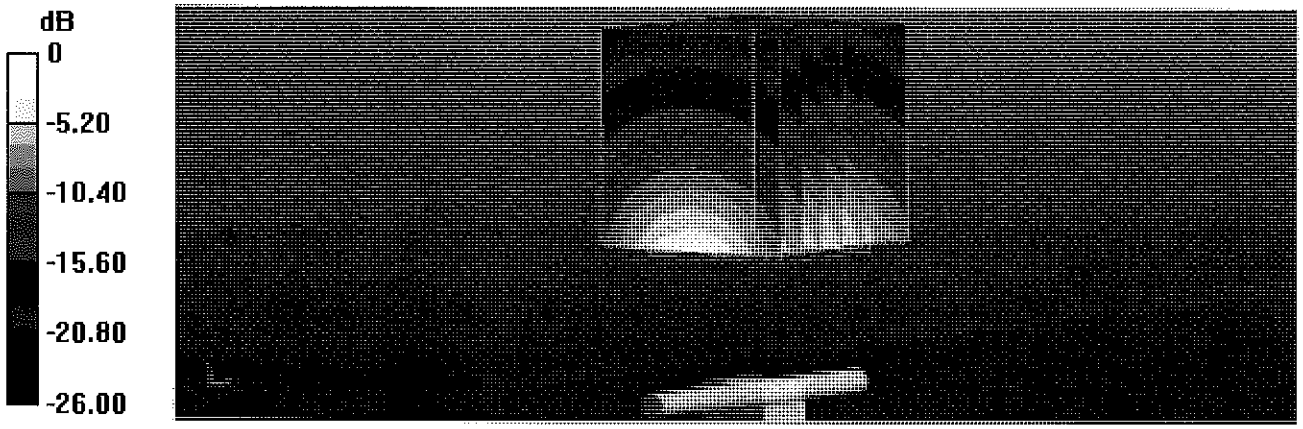
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.03 S/m; ε_r = 37.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.7, 7.7, 7.7); 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)

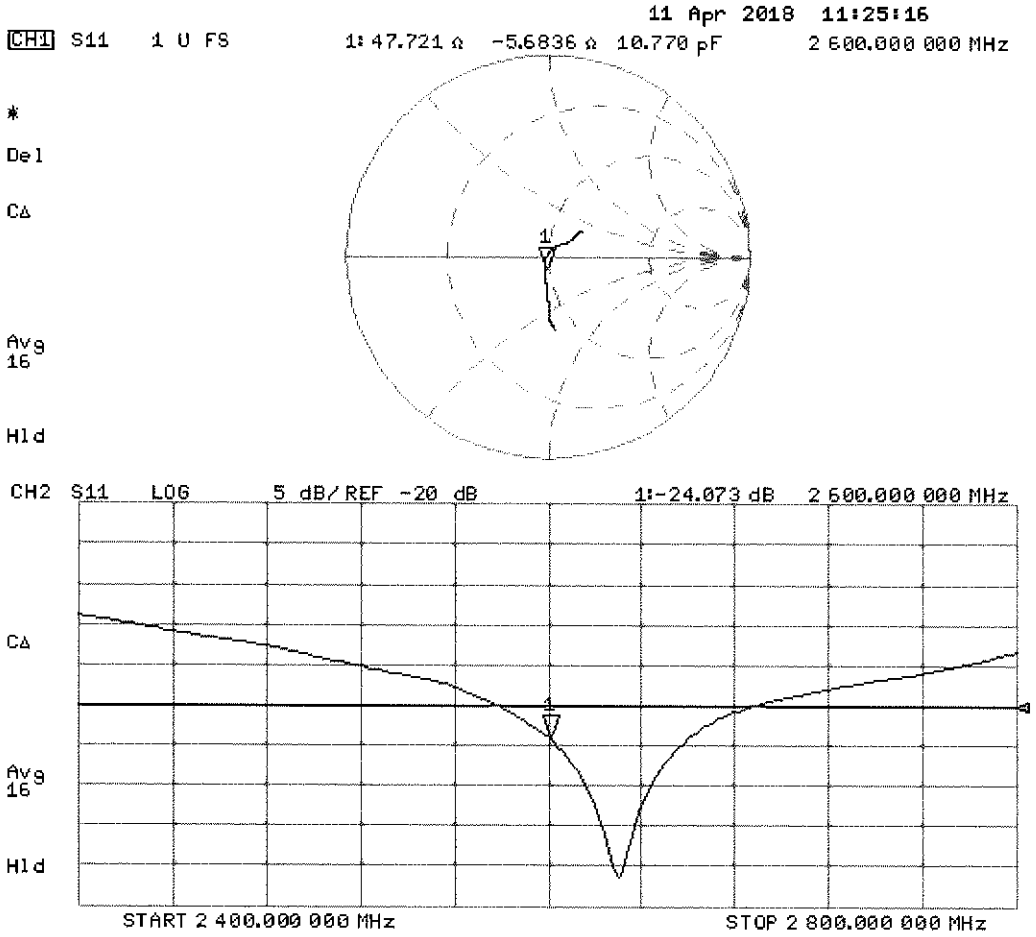
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 118.5 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 28.6 W/kg
SAR(1 g) = 14.3 W/kg; SAR(10 g) = 6.35 W/kg
Maximum value of SAR (measured) = 23.9 W/kg



0 dB = 23.9 W/kg = 13.78 dBW/kg

Impedance Measurement Plot for Head TSL



Date: 11.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1004

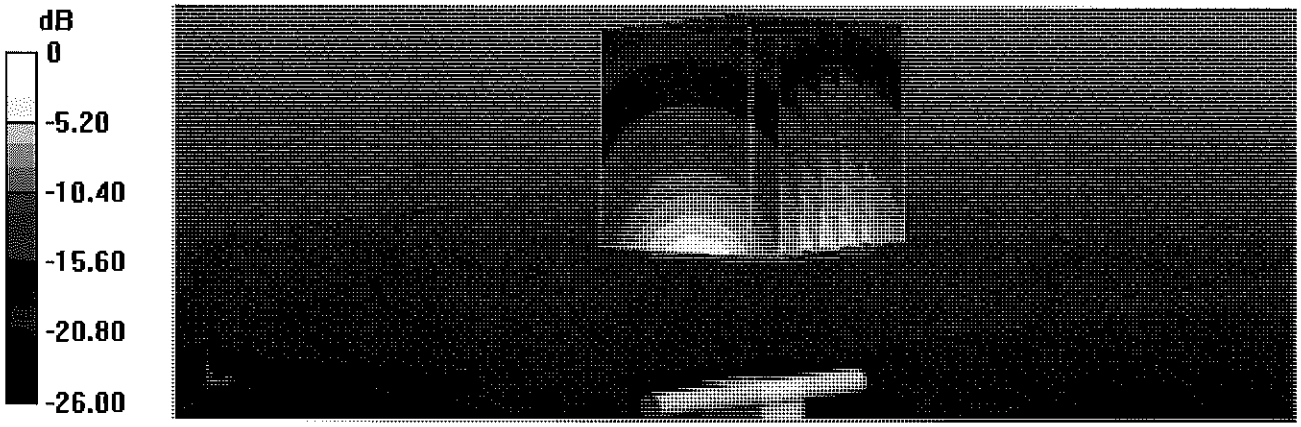
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.19 S/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.81, 7.81, 7.81); 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)

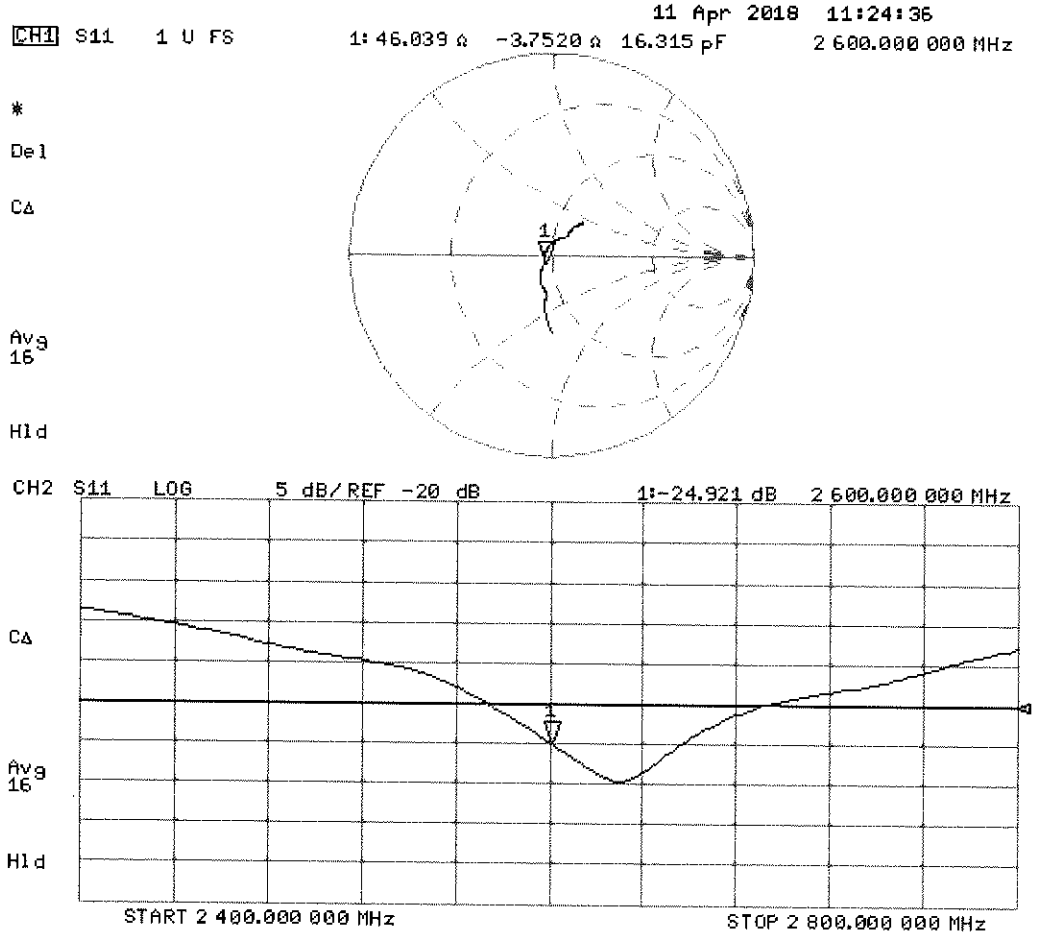
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 108.5 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 28.3 W/kg
SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.2 W/kg
Maximum value of SAR (measured) = 22.9 W/kg



0 dB = 22.9 W/kg = 13.60 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D2600V2-1064_Jun17

CALIBRATION CERTIFICATE

Object D2600V2 - SN:1064

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

Calibration date: June 07, 2017

BN 8/3/2017
Extended BN 07/18/2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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-Dec-16 (No. EX3-7349_Dec16)	Dec-17
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

	Name	Function	Signature
Calibrated by:	Johannes Kurikka	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 8, 2017

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Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.3 ± 6 %	2.02 mho/m ± 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	14.6 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**57.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.46 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.5 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.7 ± 6 %	2.22 mho/m ± 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	13.9 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**54.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.15 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.4 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.4 Ω - 6.3 jΩ
Return Loss	- 23.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.4 Ω - 4.1 jΩ
Return Loss	- 25.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.151 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 14, 2012

DASY5 Validation Report for Head TSL

Date: 07.06.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1064

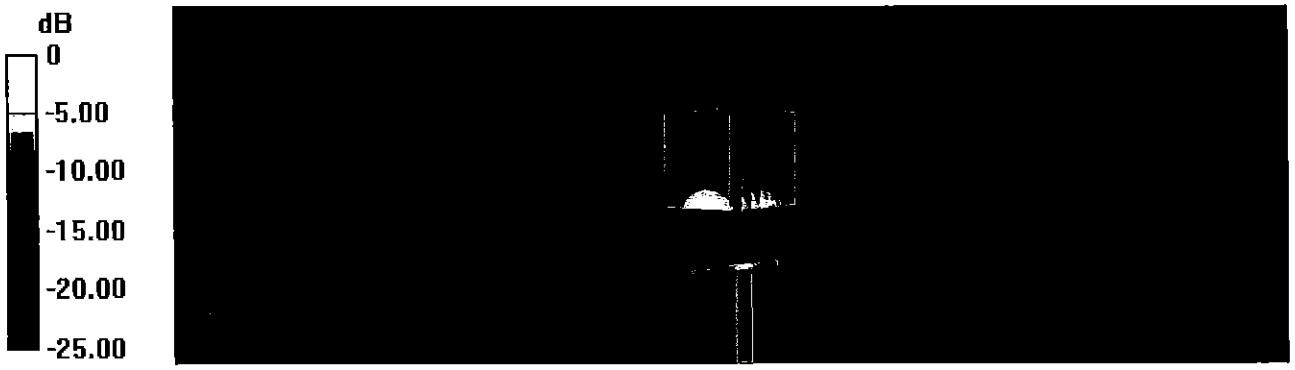
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.02 S/m; ε_r = 37.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.96, 7.96, 7.96); 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)

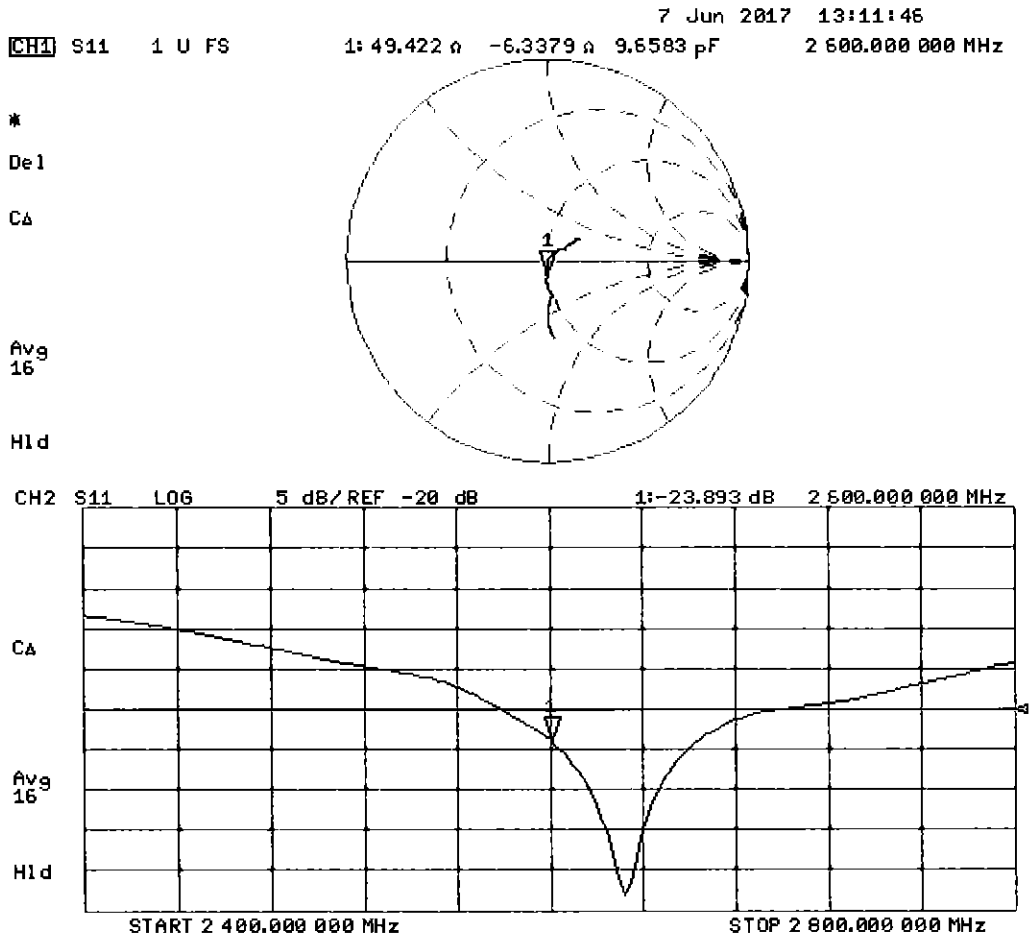
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 115.9 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 32.1 W/kg
SAR(1 g) = 14.6 W/kg; SAR(10 g) = 6.46 W/kg
Maximum value of SAR (measured) = 24.5 W/kg



0 dB = 24.5 W/kg = 13.89 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 07.06.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1064

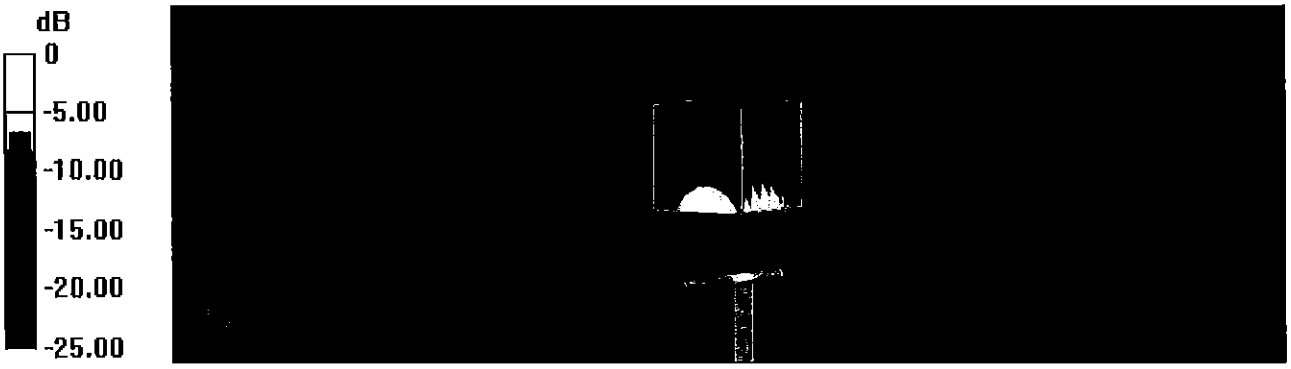
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.22 S/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.94, 7.94, 7.94); 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)

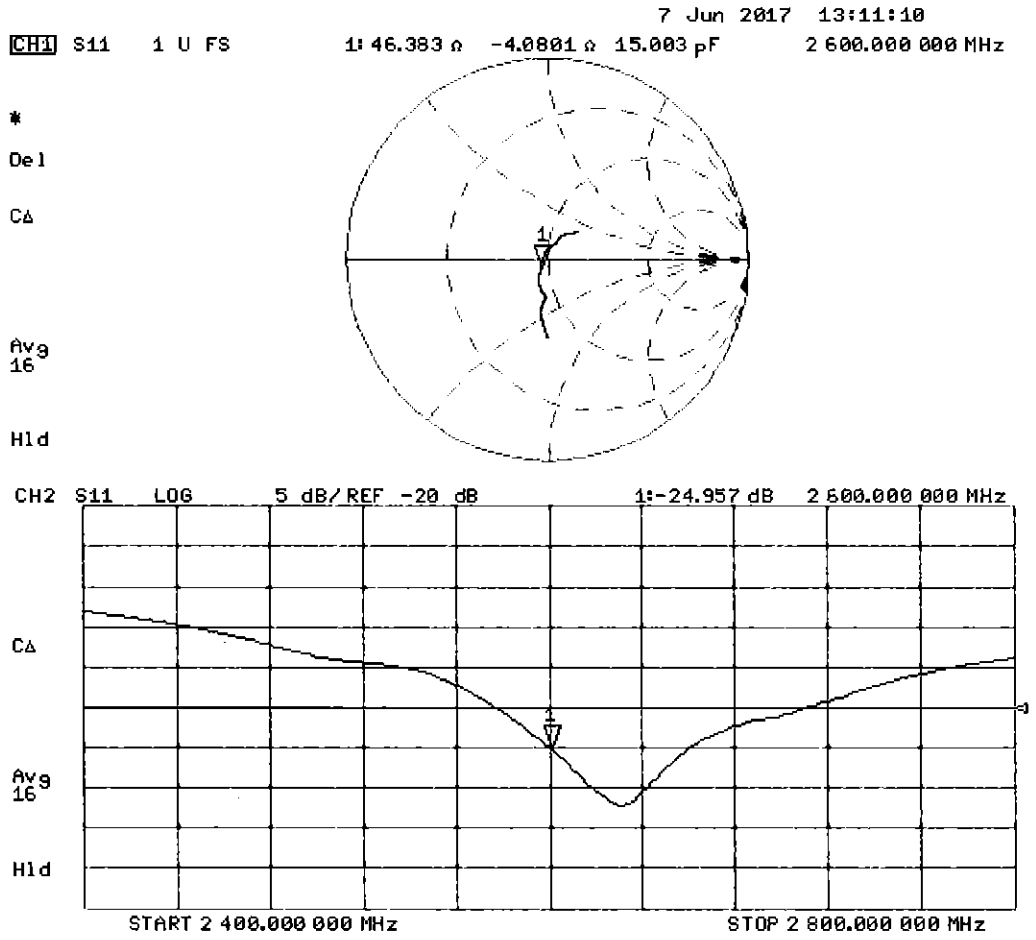
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.9 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 29.8 W/kg
SAR(1 g) = 13.9 W/kg; SAR(10 g) = 6.15 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 Body TSL



Certification of Calibration

Object	D2600V2 – SN: 1064
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extended Calibration date:	06/04/2018
Description:	SAR Validation Dipole at 2600 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E4438C	ESG Vector Signal Generator	3/24/2017	Biennial	3/24/2019	MY42082385
Agilent	8753ES	S-Parameter Network Analyzer	9/14/2017	Annual	9/14/2018	US39170118
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Anritsu	ML2495A	Power Meter	11/28/2017	Annual	11/28/2018	1039008
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1207364
Anritsu	MA2411B	Pulse Power Sensor	11/15/2017	Annual	11/15/2018	1339007
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
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	DAE4	Dasy Data Acquisition Electronics	6/21/2017	Annual	6/21/2018	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/7/2018	Annual	3/7/2019	1368
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	7/11/2017	Annual	7/11/2018	1039
SPEAG	ES3DV3	SAR Probe	8/14/2017	Annual	8/14/2018	3332
SPEAG	ES3DV3	SAR Probe	3/13/2018	Annual	3/13/2019	3319

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
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:

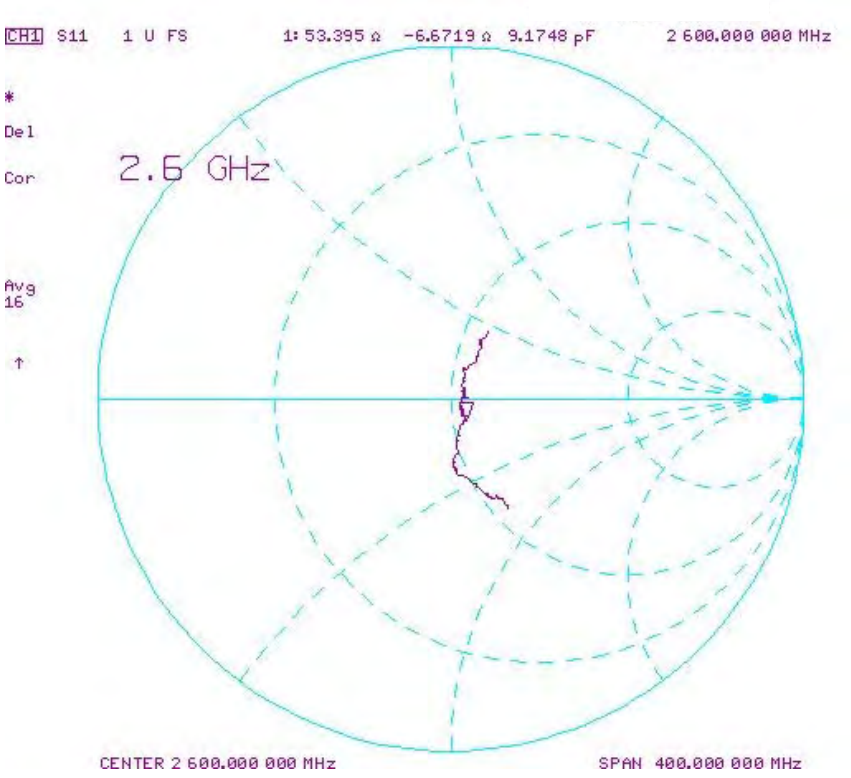
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does 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
6/7/2017	6/4/2018	1.151	5.70	5.71	0.18%	2.55	2.51	-1.57%	49.4	53.4	4.0	-6.3	-6.7	0.4	-23.9	-22.5	5.90%	PASS

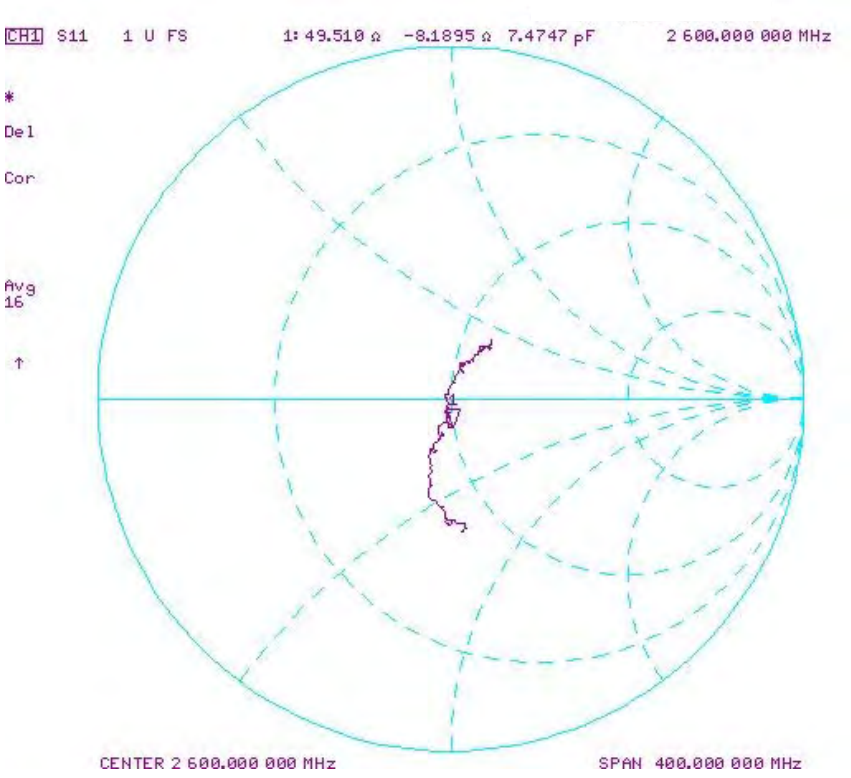
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance 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
6/7/2017	6/4/2018	1.151	5.47	5.65	3.29%	2.44	2.48	1.64%	46.4	49.5	3.1	-4.1	-8.2	4.1	-25.0	-21.8	12.80%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





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

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Accreditation No.: SCS 0108

Client PC Test

Certificate No: ES3-3319_Mar18

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3319

Calibration procedure(s): QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

BN ✓
03/30/2018

Calibration date: March 13, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
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. 217-02525)	Apr-18
Reference 20 dB Attenuator	SN: S5277 (20x)	07-Apr-17 (No. 217-02528)	Apr-18
Reference Probe ES3DV2	SN: 3013	30-Dec-17 (No. ES3-3013_Dec17)	Dec-18
DAE4	SN: 660	21-Dec-17 (No. DAE4-660_Dec17)	Dec-18
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-16)	In house check: Jun-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:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 15, 2018

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

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Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

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"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Probe ES3DV3

SN:3319

Manufactured: January 10, 2012
Calibrated: March 13, 2018

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3319

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.08	1.05	1.12	± 10.1 %
DCP (mV)[B]	104.0	103.0	104.0	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	197.9	±3.8 %
		Y	0.0	0.0	1.0		198.2	
		Z	0.0	0.0	1.0		200.6	

Note: For details on UID parameters see Appendix.

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms.V^{-2}$	T2 $ms.V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	60.52	430.8	35.08	29.64	3.011	5.10	0.615	0.538	1.010
Y	55.79	400.8	35.48	29.01	2.492	5.10	0.600	0.518	1.009
Z	63.98	455.3	34.93	29.72	3.442	5.10	0.679	0.571	1.011

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%.

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3319

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	41.9	0.89	6.70	6.70	6.70	0.80	1.21	± 12.0 %
835	41.5	0.90	6.44	6.44	6.44	0.80	1.17	± 12.0 %
1750	40.1	1.37	5.49	5.49	5.49	0.65	1.43	± 12.0 %
1900	40.0	1.40	5.29	5.29	5.29	0.76	1.30	± 12.0 %
2300	39.5	1.67	5.06	5.06	5.06	0.72	1.29	± 12.0 %
2450	39.2	1.80	4.71	4.71	4.71	0.77	1.30	± 12.0 %
2600	39.0	1.96	4.55	4.55	4.55	0.80	1.31	± 12.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3319

Calibration Parameter Determined in Body Tissue Simulating Media

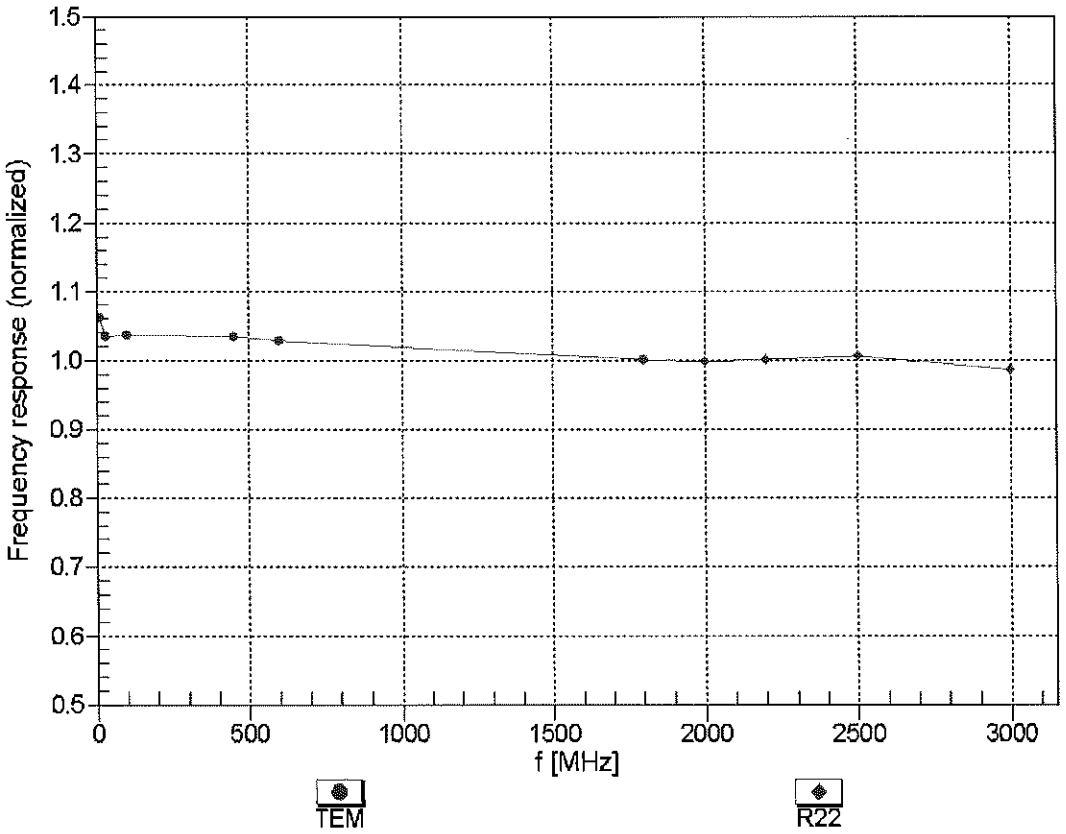
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	55.5	0.96	6.32	6.32	6.32	0.65	1.26	± 12.0 %
835	55.2	0.97	6.20	6.20	6.20	0.80	1.14	± 12.0 %
1750	53.4	1.49	5.05	5.05	5.05	0.76	1.27	± 12.0 %
1900	53.3	1.52	4.84	4.84	4.84	0.55	1.56	± 12.0 %
2300	52.9	1.81	4.63	4.63	4.63	0.80	1.30	± 12.0 %
2450	52.7	1.95	4.51	4.51	4.51	0.80	1.25	± 12.0 %
2600	52.5	2.16	4.33	4.33	4.33	0.80	1.20	± 12.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

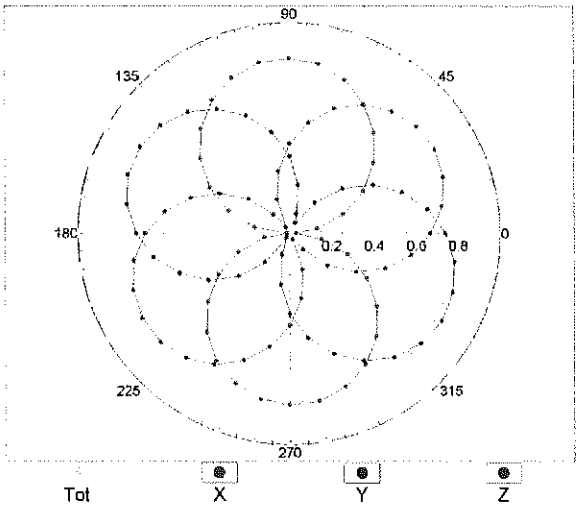
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



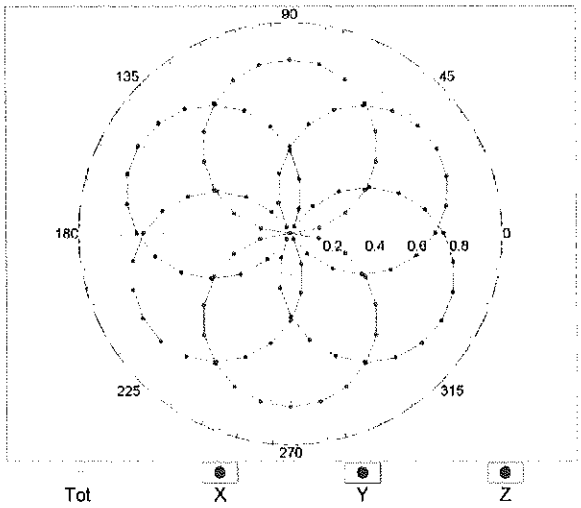
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

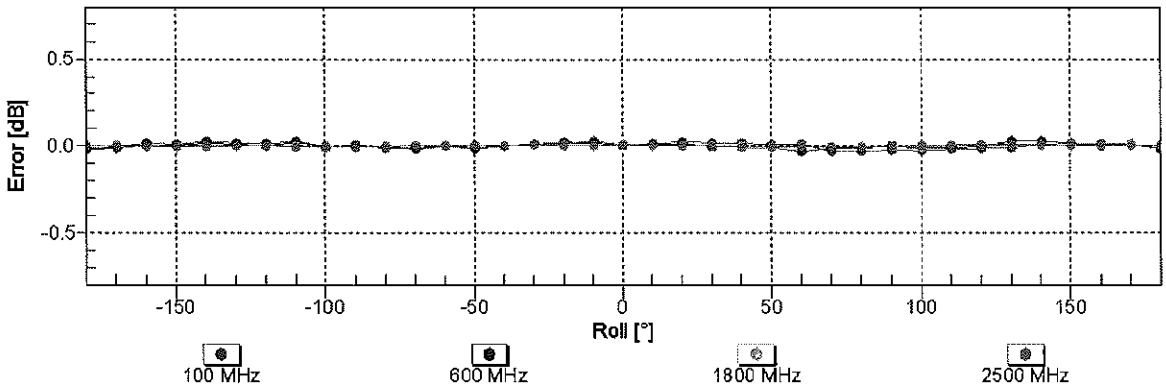
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



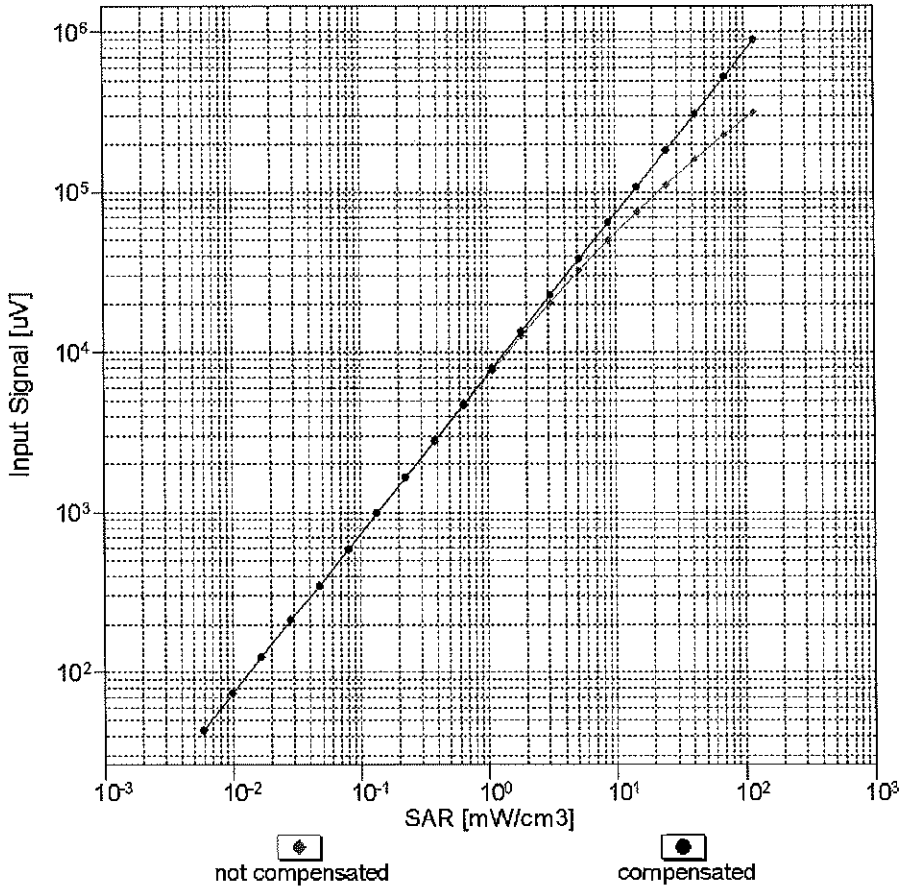
f=1800 MHz,R22

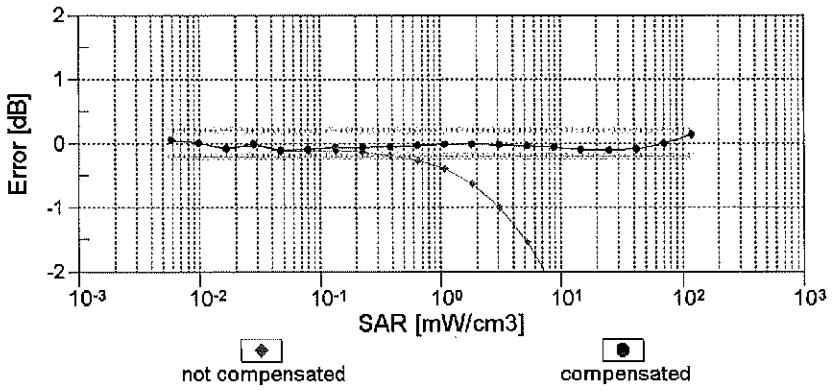




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR$_{head}$)
(TEM cell , f_{eval}= 1900 MHz)

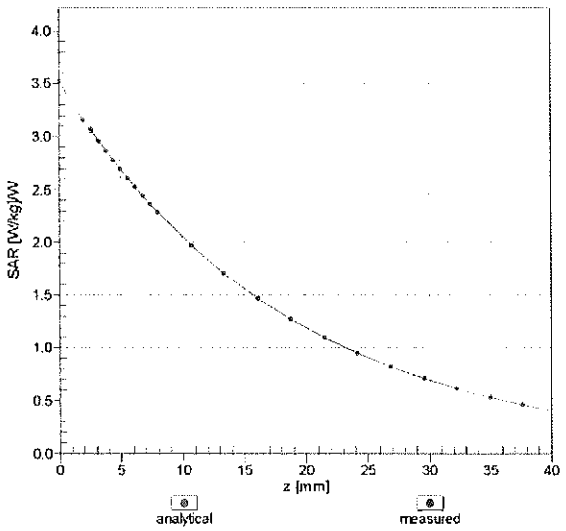




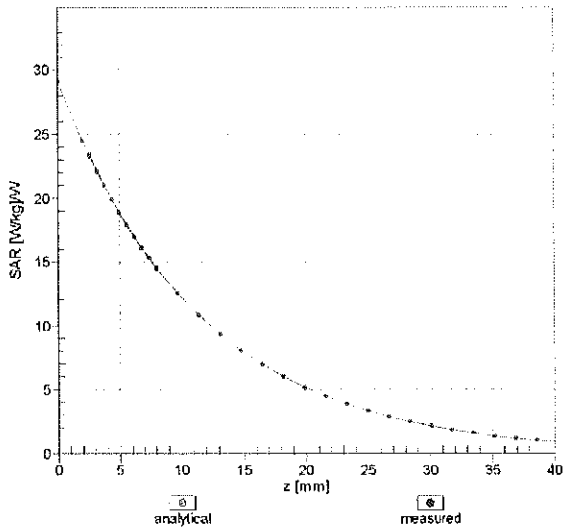
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

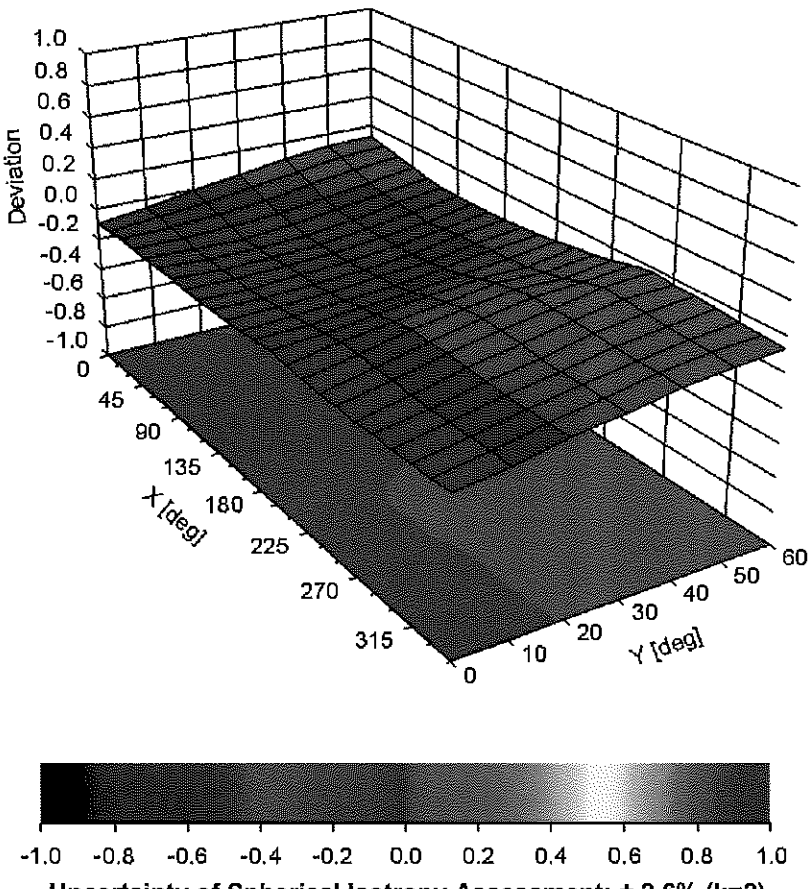


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3319

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	60.4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Appendix: Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max Unc^E (k=2)
0	CW	X	0.00	0.00	1.00	0.00	197.9	± 3.8 %
		Y	0.00	0.00	1.00		198.2	
		Z	0.00	0.00	1.00		200.6	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	9.56	81.28	19.98	10.00	25.0	± 9.6 %
		Y	8.09	78.70	18.35		25.0	
		Z	8.70	79.52	19.57		25.0	
10011-CAB	UMTS-FDD (WCDMA)	X	1.34	72.37	18.08	0.00	150.0	± 9.6 %
		Y	0.99	67.12	14.82		150.0	
		Z	1.12	68.87	16.00		150.0	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	1.37	66.58	17.00	0.41	150.0	± 9.6 %
		Y	1.25	64.92	15.59		150.0	
		Z	1.32	65.58	16.11		150.0	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	5.18	67.48	17.64	1.46	150.0	± 9.6 %
		Y	5.08	67.20	17.36		150.0	
		Z	5.20	67.32	17.47		150.0	
10021-DAC	GSM-FDD (TDMA, GMSK)	X	20.40	95.52	26.57	9.39	50.0	± 9.6 %
		Y	29.46	101.11	27.60		50.0	
		Z	14.66	89.52	24.83		50.0	
10023-DAC	GPRS-FDD (TDMA, GMSK, TN 0)	X	18.37	93.61	26.02	9.57	50.0	± 9.6 %
		Y	24.41	97.95	26.72		50.0	
		Z	13.84	88.39	24.49		50.0	
10024-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	100.00	119.56	31.31	6.56	60.0	± 9.6 %
		Y	100.00	117.39	29.93		60.0	
		Z	47.21	108.31	28.71		60.0	
10025-DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	X	21.09	108.48	41.18	12.57	50.0	± 9.6 %
		Y	17.11	102.80	38.82		50.0	
		Z	18.44	103.12	38.97		50.0	
10026-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	21.59	105.09	36.25	9.56	60.0	± 9.6 %
		Y	18.95	102.20	35.03		60.0	
		Z	18.49	100.22	34.38		60.0	
10027-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	100.00	118.49	29.83	4.80	80.0	± 9.6 %
		Y	100.00	115.83	28.28		80.0	
		Z	100.00	118.30	29.89		80.0	
10028-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	100.00	118.84	29.14	3.55	100.0	± 9.6 %
		Y	100.00	115.36	27.25		100.0	
		Z	100.00	118.10	28.92		100.0	
10029-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	15.08	97.16	32.49	7.80	80.0	± 9.6 %
		Y	12.90	93.80	31.06		80.0	
		Z	13.60	93.82	31.09		80.0	
10030-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	X	100.00	118.11	30.01	5.30	70.0	± 9.6 %
		Y	100.00	115.58	28.50		70.0	
		Z	100.00	118.16	30.20		70.0	
10031-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	X	100.00	121.01	28.44	1.88	100.0	± 9.6 %
		Y	100.00	114.03	25.11		100.0	
		Z	100.00	118.73	27.54		100.0	

10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	100.00	127.26	29.88	1.17	100.0	± 9.6 %
		Y	100.00	114.89	24.38		100.0	
		Z	100.00	122.11	27.79		100.0	
10033-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	X	21.21	99.84	27.91	5.30	70.0	± 9.6 %
		Y	19.09	97.43	26.61		70.0	
		Z	13.98	92.26	25.56		70.0	
10034-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	X	14.93	98.23	25.94	1.88	100.0	± 9.6 %
		Y	7.46	86.71	21.62		100.0	
		Z	7.45	87.10	22.42		100.0	
10035-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	X	7.98	90.77	23.49	1.17	100.0	± 9.6 %
		Y	3.97	79.58	18.90		100.0	
		Z	4.48	81.52	20.27		100.0	
10036-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	X	26.12	103.52	29.04	5.30	70.0	± 9.6 %
		Y	24.16	101.42	27.84		70.0	
		Z	15.99	94.67	26.38		70.0	
10037-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	X	14.25	97.55	25.70	1.88	100.0	± 9.6 %
		Y	7.04	85.92	21.32		100.0	
		Z	7.24	86.72	22.25		100.0	
10038-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	X	8.53	92.07	23.99	1.17	100.0	± 9.6 %
		Y	4.13	80.37	19.27		100.0	
		Z	4.65	82.31	20.62		100.0	
10039-CAB	CDMA2000 (1xRTT, RC1)	X	2.96	79.09	19.43	0.00	150.0	± 9.6 %
		Y	1.75	71.10	15.36		150.0	
		Z	2.10	73.23	16.92		150.0	
10042-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	X	53.77	109.05	28.70	7.78	50.0	± 9.6 %
		Y	79.10	112.95	28.86		50.0	
		Z	23.46	96.42	25.41		50.0	
10044-CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	X	0.00	123.18	1.26	0.00	150.0	± 9.6 %
		Y	0.02	127.84	0.07		150.0	
		Z	0.00	110.77	4.52		150.0	
10048-CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	X	11.41	83.11	24.20	13.80	25.0	± 9.6 %
		Y	12.66	85.48	24.49		25.0	
		Z	10.45	80.79	23.56		25.0	
10049-CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	X	13.41	87.55	24.40	10.79	40.0	± 9.6 %
		Y	15.25	89.77	24.55		40.0	
		Z	11.61	84.53	23.55		40.0	
10056-CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	X	13.37	87.98	25.03	9.03	50.0	± 9.6 %
		Y	13.72	88.51	24.74		50.0	
		Z	11.72	85.02	24.05		50.0	
10058-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	X	11.14	91.28	29.72	6.55	100.0	± 9.6 %
		Y	9.52	87.98	28.26		100.0	
		Z	10.41	88.91	28.62		100.0	
10059-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	X	1.60	69.38	18.31	0.61	110.0	± 9.6 %
		Y	1.43	67.15	16.67		110.0	
		Z	1.53	67.97	17.25		110.0	
10060-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	X	100.00	133.15	34.60	1.30	110.0	± 9.6 %
		Y	100.00	128.63	32.36		110.0	
		Z	100.00	130.16	33.31		110.0	

10061-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	X	24.68	111.64	31.63	2.04	110.0	± 9.6 %
		Y	11.26	97.49	27.04		110.0	
		Z	10.95	96.57	26.98		110.0	
10062-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	X	4.90	67.24	16.94	0.49	100.0	± 9.6 %
		Y	4.79	66.94	16.63		100.0	
		Z	4.90	67.05	16.74		100.0	
10063-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	X	4.95	67.42	17.09	0.72	100.0	± 9.6 %
		Y	4.84	67.10	16.77		100.0	
		Z	4.95	67.23	16.89		100.0	
10064-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	X	5.28	67.75	17.35	0.86	100.0	± 9.6 %
		Y	5.16	67.43	17.04		100.0	
		Z	5.30	67.59	17.17		100.0	
10065-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	X	5.19	67.81	17.53	1.21	100.0	± 9.6 %
		Y	5.07	67.47	17.22		100.0	
		Z	5.21	67.65	17.35		100.0	
10066-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	X	5.25	67.95	17.76	1.46	100.0	± 9.6 %
		Y	5.12	67.61	17.44		100.0	
		Z	5.27	67.80	17.59		100.0	
10067-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	X	5.57	68.10	18.21	2.04	100.0	± 9.6 %
		Y	5.44	67.80	17.92		100.0	
		Z	5.60	67.97	18.05		100.0	
10068-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	X	5.73	68.50	18.60	2.55	100.0	± 9.6 %
		Y	5.58	68.13	18.28		100.0	
		Z	5.77	68.41	18.46		100.0	
10069-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	X	5.81	68.43	18.78	2.67	100.0	± 9.6 %
		Y	5.66	68.09	18.46		100.0	
		Z	5.84	68.33	18.64		100.0	
10071-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	5.34	67.73	18.04	1.99	100.0	± 9.6 %
		Y	5.22	67.44	17.75		100.0	
		Z	5.35	67.60	17.87		100.0	
10072-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	5.42	68.35	18.39	2.30	100.0	± 9.6 %
		Y	5.29	68.00	18.07		100.0	
		Z	5.44	68.21	18.22		100.0	
10073-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	5.57	68.74	18.83	2.83	100.0	± 9.6 %
		Y	5.42	68.36	18.50		100.0	
		Z	5.60	68.62	18.66		100.0	
10074-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	5.61	68.84	19.10	3.30	100.0	± 9.6 %
		Y	5.46	68.44	18.75		100.0	
		Z	5.65	68.74	18.95		100.0	
10075-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	X	5.79	69.40	19.63	3.82	90.0	± 9.6 %
		Y	5.61	68.91	19.24		90.0	
		Z	5.85	69.35	19.51		90.0	
10076-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	5.80	69.20	19.75	4.15	90.0	± 9.6 %
		Y	5.64	68.73	19.37		90.0	
		Z	5.86	69.15	19.63		90.0	
10077-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	5.84	69.30	19.86	4.30	90.0	± 9.6 %
		Y	5.68	68.82	19.47		90.0	
		Z	5.90	69.25	19.74		90.0	

10081-CAB	CDMA2000 (1xRTT, RC3)	X	1.29	72.14	16.36	0.00	150.0	± 9.6 %
		Y	0.81	65.51	12.24		150.0	
		Z	0.99	67.68	14.05		150.0	
10082-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	X	2.36	64.73	9.48	4.77	80.0	± 9.6 %
		Y	1.97	63.15	8.18		80.0	
		Z	2.45	64.78	9.67		80.0	
10090-DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	X	100.00	119.65	31.37	6.56	60.0	± 9.6 %
		Y	100.00	117.49	29.99		60.0	
		Z	45.52	107.81	28.61		60.0	
10097-CAB	UMTS-FDD (HSDPA)	X	2.00	69.44	16.95	0.00	150.0	± 9.6 %
		Y	1.78	67.32	15.42		150.0	
		Z	1.87	67.93	15.97		150.0	
10098-CAB	UMTS-FDD (HSUPA, Subtest 2)	X	1.97	69.46	16.95	0.00	150.0	± 9.6 %
		Y	1.74	67.28	15.38		150.0	
		Z	1.84	67.91	15.95		150.0	
10099-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	X	21.45	104.88	36.18	9.56	60.0	± 9.6 %
		Y	18.89	102.07	34.98		60.0	
		Z	18.39	100.05	34.32		60.0	
10100-CAD	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	3.55	72.46	17.74	0.00	150.0	± 9.6 %
		Y	3.14	70.29	16.48		150.0	
		Z	3.35	71.19	16.95		150.0	
10101-CAD	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	3.45	68.62	16.57	0.00	150.0	± 9.6 %
		Y	3.26	67.61	15.85		150.0	
		Z	3.39	68.08	16.14		150.0	
10102-CAD	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	3.54	68.46	16.61	0.00	150.0	± 9.6 %
		Y	3.37	67.56	15.95		150.0	
		Z	3.49	67.97	16.20		150.0	
10103-CAD	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	8.98	78.82	21.57	3.98	65.0	± 9.6 %
		Y	8.50	78.15	21.17		65.0	
		Z	8.60	77.58	20.95		65.0	
10104-CAD	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	8.85	77.44	21.89	3.98	65.0	± 9.6 %
		Y	8.45	76.83	21.49		65.0	
		Z	8.72	76.72	21.48		65.0	
10105-CAD	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	8.33	76.23	21.66	3.98	65.0	± 9.6 %
		Y	7.79	75.22	21.09		65.0	
		Z	7.71	74.28	20.69		65.0	
10108-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	3.11	71.64	17.59	0.00	150.0	± 9.6 %
		Y	2.75	69.54	16.32		150.0	
		Z	2.95	70.37	16.78		150.0	
10109-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	3.12	68.50	16.56	0.00	150.0	± 9.6 %
		Y	2.92	67.41	15.75		150.0	
		Z	3.06	67.87	16.07		150.0	
10110-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	2.56	70.84	17.38	0.00	150.0	± 9.6 %
		Y	2.24	68.61	15.94		150.0	
		Z	2.42	69.44	16.48		150.0	
10111-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	2.84	69.29	16.96	0.00	150.0	± 9.6 %
		Y	2.62	68.02	15.99		150.0	
		Z	2.75	68.36	16.33		150.0	

10112-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	3.23	68.35	16.55	0.00	150.0	± 9.6 %
		Y	3.05	67.38	15.81		150.0	
		Z	3.18	67.77	16.10		150.0	
10113-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	2.98	69.28	17.01	0.00	150.0	± 9.6 %
		Y	2.77	68.14	16.13		150.0	
		Z	2.90	68.40	16.43		150.0	
10114-CAC	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	X	5.25	67.55	16.67	0.00	150.0	± 9.6 %
		Y	5.16	67.27	16.41		150.0	
		Z	5.23	67.36	16.47		150.0	
10115-CAC	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	X	5.62	67.87	16.84	0.00	150.0	± 9.6 %
		Y	5.53	67.61	16.59		150.0	
		Z	5.61	67.68	16.64		150.0	
10116-CAC	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	X	5.38	67.84	16.74	0.00	150.0	± 9.6 %
		Y	5.28	67.54	16.47		150.0	
		Z	5.37	67.64	16.53		150.0	
10117-CAC	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	5.26	67.57	16.70	0.00	150.0	± 9.6 %
		Y	5.15	67.22	16.40		150.0	
		Z	5.24	67.39	16.51		150.0	
10118-CAC	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	X	5.70	68.05	16.94	0.00	150.0	± 9.6 %
		Y	5.61	67.82	16.70		150.0	
		Z	5.67	67.81	16.71		150.0	
10119-CAC	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	X	5.36	67.79	16.73	0.00	150.0	± 9.6 %
		Y	5.26	67.48	16.45		150.0	
		Z	5.34	67.59	16.52		150.0	
10140-CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	3.59	68.46	16.53	0.00	150.0	± 9.6 %
		Y	3.41	67.56	15.87		150.0	
		Z	3.54	67.97	16.13		150.0	
10141-CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	3.70	68.46	16.65	0.00	150.0	± 9.6 %
		Y	3.53	67.64	16.03		150.0	
		Z	3.65	67.99	16.26		150.0	
10142-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	2.36	71.08	17.31	0.00	150.0	± 9.6 %
		Y	2.01	68.49	15.62		150.0	
		Z	2.20	69.37	16.30		150.0	
10143-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	2.76	70.34	17.00	0.00	150.0	± 9.6 %
		Y	2.47	68.62	15.73		150.0	
		Z	2.62	69.02	16.23		150.0	
10144-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	2.54	68.16	15.50	0.00	150.0	± 9.6 %
		Y	2.28	66.60	14.27		150.0	
		Z	2.46	67.23	14.93		150.0	
10145-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	1.75	69.86	15.18	0.00	150.0	± 9.6 %
		Y	1.29	65.55	12.27		150.0	
		Z	1.55	67.61	14.05		150.0	
10146-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	4.07	76.05	17.30	0.00	150.0	± 9.6 %
		Y	2.52	69.20	13.62		150.0	
		Z	3.50	73.50	16.33		150.0	
10147-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	5.72	80.95	19.32	0.00	150.0	± 9.6 %
		Y	3.13	72.10	15.05		150.0	
		Z	4.43	76.91	17.88		150.0	

10149-CAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	3.13	68.56	16.60	0.00	150.0	± 9.6 %
		Y	2.93	67.47	15.80		150.0	
		Z	3.07	67.93	16.12		150.0	
10150-CAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	3.24	68.40	16.59	0.00	150.0	± 9.6 %
		Y	3.05	67.43	15.85		150.0	
		Z	3.18	67.82	16.13		150.0	
10151-CAD	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	9.59	81.21	22.61	3.98	65.0	± 9.6 %
		Y	9.21	80.79	22.27		65.0	
		Z	9.05	79.62	21.87		65.0	
10152-CAD	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	8.53	77.77	21.82	3.98	65.0	± 9.6 %
		Y	8.07	77.03	21.32		65.0	
		Z	8.36	76.93	21.37		65.0	
10153-CAD	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	8.87	78.41	22.41	3.98	65.0	± 9.6 %
		Y	8.48	77.88	22.02		65.0	
		Z	8.68	77.54	21.94		65.0	
10154-CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	2.63	71.34	17.67	0.00	150.0	± 9.6 %
		Y	2.29	69.04	16.21		150.0	
		Z	2.48	69.88	16.75		150.0	
10155-CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	2.84	69.30	16.97	0.00	150.0	± 9.6 %
		Y	2.62	68.03	16.00		150.0	
		Z	2.75	68.36	16.34		150.0	
10156-CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	2.26	71.67	17.44	0.00	150.0	± 9.6 %
		Y	1.86	68.59	15.46		150.0	
		Z	2.07	69.64	16.29		150.0	
10157-CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	2.42	69.16	15.83	0.00	150.0	± 9.6 %
		Y	2.11	67.12	14.31		150.0	
		Z	2.30	67.87	15.10		150.0	
10158-CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	2.99	69.33	17.05	0.00	150.0	± 9.6 %
		Y	2.78	68.20	16.17		150.0	
		Z	2.90	68.44	16.46		150.0	
10159-CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	2.55	69.60	16.11	0.00	150.0	± 9.6 %
		Y	2.22	67.56	14.60		150.0	
		Z	2.41	68.28	15.37		150.0	
10160-CAD	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	3.02	70.16	17.19	0.00	150.0	± 9.6 %
		Y	2.77	68.66	16.17		150.0	
		Z	2.91	69.14	16.50		150.0	
10161-CAD	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	3.13	68.32	16.54	0.00	150.0	± 9.6 %
		Y	2.95	67.34	15.78		150.0	
		Z	3.07	67.70	16.08		150.0	
10162-CAD	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	3.23	68.35	16.60	0.00	150.0	± 9.6 %
		Y	3.06	67.45	15.88		150.0	
		Z	3.18	67.74	16.14		150.0	
10166-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	4.02	71.10	20.08	3.01	150.0	± 9.6 %
		Y	3.79	70.19	19.37		150.0	
		Z	4.03	70.69	19.72		150.0	
10167-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	5.24	74.71	20.79	3.01	150.0	± 9.6 %
		Y	4.82	73.39	19.92		150.0	
		Z	5.25	74.14	20.39		150.0	

10168-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	5.76	76.76	21.96	3.01	150.0	± 9.6 %
		Y	5.36	75.66	21.24		150.0	
		Z	5.73	75.99	21.47		150.0	
10169-CAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	3.69	72.72	20.82	3.01	150.0	± 9.6 %
		Y	3.33	70.78	19.63		150.0	
		Z	3.78	72.61	20.53		150.0	
10170-CAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	5.76	80.54	23.62	3.01	150.0	± 9.6 %
		Y	4.94	77.74	22.22		150.0	
		Z	5.83	79.90	23.09		150.0	
10171-AAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	4.61	75.69	20.76	3.01	150.0	± 9.6 %
		Y	3.94	72.92	19.25		150.0	
		Z	4.70	75.28	20.35		150.0	
10172-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	36.99	114.19	35.08	6.02	65.0	± 9.6 %
		Y	22.97	105.21	32.24		65.0	
		Z	26.68	106.36	32.56		65.0	
10173-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	41.01	110.69	32.32	6.02	65.0	± 9.6 %
		Y	35.83	108.35	31.36		65.0	
		Z	28.00	102.66	29.85		65.0	
10174-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	30.73	104.07	29.95	6.02	65.0	± 9.6 %
		Y	27.27	102.14	29.08		65.0	
		Z	22.20	97.35	27.81		65.0	
10175-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	3.64	72.35	20.56	3.01	150.0	± 9.6 %
		Y	3.28	70.42	19.36		150.0	
		Z	3.72	72.25	20.28		150.0	
10176-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	5.77	80.56	23.63	3.01	150.0	± 9.6 %
		Y	4.95	77.76	22.23		150.0	
		Z	5.84	79.92	23.10		150.0	
10177-CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	3.67	72.53	20.66	3.01	150.0	± 9.6 %
		Y	3.31	70.60	19.46		150.0	
		Z	3.76	72.42	20.38		150.0	
10178-CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	5.68	80.23	23.47	3.01	150.0	± 9.6 %
		Y	4.88	77.46	22.08		150.0	
		Z	5.74	79.60	22.95		150.0	
10179-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	5.14	77.96	22.04	3.01	150.0	± 9.6 %
		Y	4.38	75.13	20.57		150.0	
		Z	5.21	77.41	21.56		150.0	
10180-CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	4.59	75.59	20.70	3.01	150.0	± 9.6 %
		Y	3.92	72.83	19.19		150.0	
		Z	4.68	75.18	20.29		150.0	
10181-CAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	3.66	72.51	20.66	3.01	150.0	± 9.6 %
		Y	3.30	70.58	19.46		150.0	
		Z	3.75	72.41	20.37		150.0	
10182-CAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	5.67	80.21	23.46	3.01	150.0	± 9.6 %
		Y	4.87	77.43	22.07		150.0	
		Z	5.73	79.57	22.94		150.0	
10183-AAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	4.58	75.56	20.68	3.01	150.0	± 9.6 %
		Y	3.92	72.80	19.18		150.0	
		Z	4.67	75.15	20.27		150.0	

10184-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	3.68	72.56	20.68	3.01	150.0	± 9.6 %
		Y	3.32	70.63	19.48		150.0	
		Z	3.77	72.45	20.39		150.0	
10185-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	5.70	80.29	23.50	3.01	150.0	± 9.6 %
		Y	4.90	77.51	22.11		150.0	
		Z	5.76	79.65	22.97		150.0	
10186-AAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	4.61	75.64	20.72	3.01	150.0	± 9.6 %
		Y	3.94	72.88	19.21		150.0	
		Z	4.69	75.23	20.31		150.0	
10187-CAE	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	3.69	72.61	20.73	3.01	150.0	± 9.6 %
		Y	3.33	70.68	19.54		150.0	
		Z	3.77	72.50	20.44		150.0	
10188-CAE	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	5.93	81.11	23.91	3.01	150.0	± 9.6 %
		Y	5.09	78.33	22.53		150.0	
		Z	5.99	80.44	23.37		150.0	
10189-AAE	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	4.73	76.16	21.02	3.01	150.0	± 9.6 %
		Y	4.04	73.37	19.51		150.0	
		Z	4.82	75.73	20.60		150.0	
10193-CAC	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	X	4.67	66.99	16.47	0.00	150.0	± 9.6 %
		Y	4.56	66.66	16.13		150.0	
		Z	4.66	66.78	16.26		150.0	
10194-CAC	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	X	4.87	67.36	16.58	0.00	150.0	± 9.6 %
		Y	4.75	67.00	16.25		150.0	
		Z	4.87	67.15	16.37		150.0	
10195-CAC	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	X	4.91	67.37	16.59	0.00	150.0	± 9.6 %
		Y	4.79	67.03	16.27		150.0	
		Z	4.91	67.16	16.38		150.0	
10196-CAC	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	4.69	67.10	16.51	0.00	150.0	± 9.6 %
		Y	4.58	66.74	16.16		150.0	
		Z	4.69	66.88	16.30		150.0	
10197-CAC	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	X	4.89	67.38	16.59	0.00	150.0	± 9.6 %
		Y	4.77	67.03	16.26		150.0	
		Z	4.88	67.17	16.38		150.0	
10198-CAC	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	X	4.92	67.39	16.60	0.00	150.0	± 9.6 %
		Y	4.80	67.05	16.28		150.0	
		Z	4.91	67.18	16.39		150.0	
10219-CAC	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	X	4.64	67.11	16.47	0.00	150.0	± 9.6 %
		Y	4.53	66.75	16.12		150.0	
		Z	4.64	66.90	16.26		150.0	
10220-CAC	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	X	4.88	67.37	16.59	0.00	150.0	± 9.6 %
		Y	4.76	67.01	16.26		150.0	
		Z	4.88	67.17	16.38		150.0	
10221-CAC	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	X	4.92	67.32	16.59	0.00	150.0	± 9.6 %
		Y	4.80	66.98	16.27		150.0	
		Z	4.92	67.11	16.38		150.0	
10222-CAC	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	X	5.23	67.59	16.70	0.00	150.0	± 9.6 %
		Y	5.12	67.23	16.39		150.0	
		Z	5.22	67.42	16.51		150.0	

10223-CAC	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	X	5.61	67.92	16.89	0.00	150.0	± 9.6 %
		Y	5.46	67.48	16.54		150.0	
		Z	5.61	67.78	16.72		150.0	
10224-CAC	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	X	5.28	67.68	16.67	0.00	150.0	± 9.6 %
		Y	5.17	67.32	16.37		150.0	
		Z	5.27	67.52	16.48		150.0	
10225-CAB	UMTS-FDD (HSPA+)	X	2.96	66.82	16.01	0.00	150.0	± 9.6 %
		Y	2.82	66.09	15.31		150.0	
		Z	2.93	66.33	15.63		150.0	
10226-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	43.59	111.94	32.75	6.02	65.0	± 9.6 %
		Y	38.77	109.92	31.88		65.0	
		Z	29.30	103.58	30.20		65.0	
10227-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	32.72	105.33	30.40	6.02	65.0	± 9.6 %
		Y	30.31	104.10	29.73		65.0	
		Z	23.58	98.50	28.23		65.0	
10228-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	45.04	118.57	36.38	6.02	65.0	± 9.6 %
		Y	33.63	112.96	34.54		65.0	
		Z	30.07	109.15	33.47		65.0	
10229-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	40.99	110.67	32.33	6.02	65.0	± 9.6 %
		Y	35.91	108.38	31.38		65.0	
		Z	28.02	102.65	29.86		65.0	
10230-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	31.17	104.37	30.06	6.02	65.0	± 9.6 %
		Y	28.46	102.90	29.31		65.0	
		Z	22.72	97.78	27.95		65.0	
10231-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	42.43	117.25	35.96	6.02	65.0	± 9.6 %
		Y	31.37	111.47	34.05		65.0	
		Z	28.77	108.18	33.13		65.0	
10232-CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	40.99	110.68	32.33	6.02	65.0	± 9.6 %
		Y	35.90	108.38	31.38		65.0	
		Z	28.01	102.65	29.86		65.0	
10233-CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	31.21	104.41	30.07	6.02	65.0	± 9.6 %
		Y	28.46	102.91	29.32		65.0	
		Z	22.74	97.80	27.96		65.0	
10234-CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	39.80	115.77	35.45	6.02	65.0	± 9.6 %
		Y	29.32	109.94	33.51		65.0	
		Z	27.42	107.07	32.71		65.0	
10235-CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	41.16	110.77	32.35	6.02	65.0	± 9.6 %
		Y	36.04	108.46	31.40		65.0	
		Z	28.08	102.71	29.87		65.0	
10236-CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	31.50	104.54	30.10	6.02	65.0	± 9.6 %
		Y	28.73	103.05	29.35		65.0	
		Z	22.90	97.90	27.98		65.0	
10237-CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	42.99	117.54	36.03	6.02	65.0	± 9.6 %
		Y	31.67	111.68	34.11		65.0	
		Z	29.03	108.38	33.18		65.0	
10238-CAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	41.04	110.71	32.33	6.02	65.0	± 9.6 %
		Y	35.91	108.40	31.38		65.0	
		Z	28.02	102.67	29.86		65.0	

10239-CAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	31.24	104.44	30.08	6.02	65.0	± 9.6 %
		Y	28.46	102.92	29.32		65.0	
		Z	22.74	97.82	27.96		65.0	
10240-CAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	42.83	117.47	36.01	6.02	65.0	± 9.6 %
		Y	31.56	111.62	34.09		65.0	
		Z	28.94	108.32	33.17		65.0	
10241-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	13.21	88.13	28.12	6.98	65.0	± 9.6 %
		Y	12.19	86.75	27.34		65.0	
		Z	12.93	86.92	27.56		65.0	
10242-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	11.82	85.64	27.08	6.98	65.0	± 9.6 %
		Y	11.88	86.18	27.05		65.0	
		Z	11.71	84.70	26.62		65.0	
10243-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	9.69	83.18	27.04	6.98	65.0	± 9.6 %
		Y	8.48	80.58	25.71		65.0	
		Z	9.71	82.55	26.66		65.0	
10244-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	10.16	81.71	21.73	3.98	65.0	± 9.6 %
		Y	9.31	80.28	20.70		65.0	
		Z	9.66	80.44	21.31		65.0	
10245-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	9.99	81.19	21.49	3.98	65.0	± 9.6 %
		Y	9.12	79.71	20.44		65.0	
		Z	9.56	80.04	21.12		65.0	
10246-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	10.26	84.67	22.74	3.98	65.0	± 9.6 %
		Y	9.22	82.91	21.64		65.0	
		Z	9.02	82.03	21.79		65.0	
10247-CAD	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	8.13	78.66	21.05	3.98	65.0	± 9.6 %
		Y	7.56	77.60	20.25		65.0	
		Z	7.81	77.51	20.59		65.0	
10248-CAD	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	8.10	78.15	20.84	3.98	65.0	± 9.6 %
		Y	7.50	77.03	20.01		65.0	
		Z	7.84	77.14	20.44		65.0	
10249-CAD	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	11.10	86.20	23.88	3.98	65.0	± 9.6 %
		Y	10.38	85.15	23.14		65.0	
		Z	9.69	83.27	22.77		65.0	
10250-CAD	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	8.90	80.26	22.85	3.98	65.0	± 9.6 %
		Y	8.50	79.72	22.41		65.0	
		Z	8.55	78.98	22.26		65.0	
10251-CAD	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	8.43	78.18	21.77	3.98	65.0	± 9.6 %
		Y	7.97	77.44	21.21		65.0	
		Z	8.21	77.20	21.30		65.0	
10252-CAD	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	10.55	84.69	23.95	3.98	65.0	± 9.6 %
		Y	10.10	84.18	23.52		65.0	
		Z	9.56	82.30	22.95		65.0	
10253-CAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	8.29	77.16	21.61	3.98	65.0	± 9.6 %
		Y	7.87	76.45	21.11		65.0	
		Z	8.15	76.38	21.20		65.0	
10254-CAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	8.65	77.83	22.17	3.98	65.0	± 9.6 %
		Y	8.27	77.28	21.75		65.0	
		Z	8.49	77.01	21.74		65.0	

10255-CAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	9.28	80.86	22.71	3.98	65.0	± 9.6 %
		Y	8.89	80.40	22.35		65.0	
		Z	8.80	79.34	21.99		65.0	
10256-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	9.13	79.62	20.18	3.98	65.0	± 9.6 %
		Y	7.96	77.38	18.74		65.0	
		Z	8.84	78.74	19.97		65.0	
10257-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	8.90	78.86	19.81	3.98	65.0	± 9.6 %
		Y	7.73	76.58	18.34		65.0	
		Z	8.71	78.17	19.67		65.0	
10258-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	8.90	81.94	21.19	3.98	65.0	± 9.6 %
		Y	7.60	79.37	19.69		65.0	
		Z	8.10	80.01	20.54		65.0	
10259-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	8.43	79.20	21.67	3.98	65.0	± 9.6 %
		Y	7.92	78.34	21.01		65.0	
		Z	8.11	78.01	21.17		65.0	
10260-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	8.43	78.91	21.57	3.98	65.0	± 9.6 %
		Y	7.92	78.05	20.91		65.0	
		Z	8.14	77.80	21.11		65.0	
10261-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	10.44	84.93	23.72	3.98	65.0	± 9.6 %
		Y	9.81	84.03	23.07		65.0	
		Z	9.35	82.40	22.71		65.0	
10262-CAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	8.89	80.23	22.82	3.98	65.0	± 9.6 %
		Y	8.49	79.67	22.37		65.0	
		Z	8.55	78.95	22.23		65.0	
10263-CAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	8.43	78.18	21.77	3.98	65.0	± 9.6 %
		Y	7.96	77.43	21.21		65.0	
		Z	8.21	77.20	21.30		65.0	
10264-CAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	10.49	84.56	23.88	3.98	65.0	± 9.6 %
		Y	10.02	84.01	23.44		65.0	
		Z	9.51	82.19	22.89		65.0	
10265-CAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	8.52	77.77	21.82	3.98	65.0	± 9.6 %
		Y	8.07	77.03	21.32		65.0	
		Z	8.36	76.93	21.38		65.0	
10266-CAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	8.87	78.41	22.40	3.98	65.0	± 9.6 %
		Y	8.48	77.88	22.01		65.0	
		Z	8.68	77.54	21.94		65.0	
10267-CAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	9.58	81.18	22.60	3.98	65.0	± 9.6 %
		Y	9.19	80.75	22.26		65.0	
		Z	9.04	79.59	21.85		65.0	
10268-CAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	8.91	77.09	21.88	3.98	65.0	± 9.6 %
		Y	8.54	76.56	21.51		65.0	
		Z	8.80	76.43	21.50		65.0	
10269-CAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	8.82	76.67	21.78	3.98	65.0	± 9.6 %
		Y	8.46	76.15	21.41		65.0	
		Z	8.73	76.06	21.42		65.0	
10270-CAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	8.97	78.33	21.62	3.98	65.0	± 9.6 %
		Y	8.64	77.97	21.34		65.0	
		Z	8.71	77.32	21.10		65.0	

10274-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	X	2.72	67.23	15.95	0.00	150.0	± 9.6 %
		Y	2.57	66.31	15.13		150.0	
		Z	2.65	66.56	15.46		150.0	
10275-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	X	1.89	70.77	17.26	0.00	150.0	± 9.6 %
		Y	1.58	67.67	15.25		150.0	
		Z	1.72	68.75	16.01		150.0	
10277-CAA	PHS (QPSK)	X	6.00	70.47	14.76	9.03	50.0	± 9.6 %
		Y	5.21	68.57	13.21		50.0	
		Z	6.28	70.88	15.27		50.0	
10278-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	X	9.55	80.33	21.17	9.03	50.0	± 9.6 %
		Y	8.72	78.79	19.97		50.0	
		Z	9.29	79.51	21.06		50.0	
10279-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	X	9.72	80.54	21.26	9.03	50.0	± 9.6 %
		Y	8.86	78.97	20.05		50.0	
		Z	9.46	79.72	21.15		50.0	
10290-AAB	CDMA2000, RC1, SO55, Full Rate	X	2.18	74.40	17.31	0.00	150.0	± 9.6 %
		Y	1.44	68.27	13.81		150.0	
		Z	1.72	70.30	15.40		150.0	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	1.24	71.68	16.15	0.00	150.0	± 9.6 %
		Y	0.80	65.30	12.12		150.0	
		Z	0.97	67.39	13.90		150.0	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	2.10	80.68	20.23	0.00	150.0	± 9.6 %
		Y	0.98	68.86	14.25		150.0	
		Z	1.23	71.77	16.34		150.0	
10293-AAB	CDMA2000, RC3, SO3, Full Rate	X	4.35	92.52	24.81	0.00	150.0	± 9.6 %
		Y	1.43	74.29	17.12		150.0	
		Z	1.75	77.17	19.08		150.0	
10295-AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	X	11.19	84.61	24.64	9.03	50.0	± 9.6 %
		Y	11.12	84.62	24.20		50.0	
		Z	10.33	82.52	23.91		50.0	
10297-AAC	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	3.13	71.75	17.66	0.00	150.0	± 9.6 %
		Y	2.77	69.64	16.38		150.0	
		Z	2.96	70.46	16.84		150.0	
10298-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	2.07	71.56	16.68	0.00	150.0	± 9.6 %
		Y	1.59	67.63	14.15		150.0	
		Z	1.84	69.13	15.41		150.0	
10299-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	4.44	77.05	18.50	0.00	150.0	± 9.6 %
		Y	3.17	71.89	15.69		150.0	
		Z	3.89	74.52	17.46		150.0	
10300-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	2.98	70.18	14.87	0.00	150.0	± 9.6 %
		Y	2.33	66.80	12.64		150.0	
		Z	2.88	69.22	14.45		150.0	
10301-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	X	5.88	68.71	19.12	4.17	80.0	± 9.6 %
		Y	5.67	68.35	18.79		80.0	
		Z	5.96	68.70	19.05		80.0	
10302-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3 CTRL symbols)	X	6.49	69.93	20.23	4.96	80.0	± 9.6 %
		Y	6.06	68.48	19.24		80.0	
		Z	6.58	69.96	20.17		80.0	

10303-AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	X	6.38	70.18	20.37	4.96	80.0	± 9.6 %
		Y	5.90	68.52	19.27		80.0	
		Z	6.49	70.27	20.35		80.0	
10304-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	X	5.94	69.20	19.41	4.17	80.0	± 9.6 %
		Y	5.55	67.84	18.48		80.0	
		Z	6.02	69.19	19.33		80.0	
10305-AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)	X	8.63	79.84	25.16	6.02	50.0	± 9.6 %
		Y	8.50	80.74	25.49		50.0	
		Z	9.07	80.51	25.38		50.0	
10306-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	X	7.19	74.26	22.98	6.02	50.0	± 9.6 %
		Y	6.24	70.98	21.03		50.0	
		Z	7.44	74.65	23.11		50.0	
10307-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	X	7.43	75.32	23.26	6.02	50.0	± 9.6 %
		Y	7.08	75.34	23.24		50.0	
		Z	7.71	75.76	23.39		50.0	
10308-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	X	7.56	75.95	23.55	6.02	50.0	± 9.6 %
		Y	7.22	76.07	23.58		50.0	
		Z	7.85	76.40	23.68		50.0	
10309-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols)	X	7.34	74.67	23.20	6.02	50.0	± 9.6 %
		Y	6.34	71.28	21.21		50.0	
		Z	7.59	75.05	23.31		50.0	
10310-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	X	7.26	74.63	23.05	6.02	50.0	± 9.6 %
		Y	6.24	71.19	21.04		50.0	
		Z	7.51	75.03	23.17		50.0	
10311-AAC	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	3.50	70.87	17.20	0.00	150.0	± 9.6 %
		Y	3.12	68.92	16.05		150.0	
		Z	3.32	69.72	16.47		150.0	
10313-AAA	iDEN 1:3	X	8.27	79.76	19.38	6.99	70.0	± 9.6 %
		Y	7.09	77.48	18.12		70.0	
		Z	7.27	77.42	18.52		70.0	
10314-AAA	iDEN 1:6	X	10.52	85.41	23.73	10.00	30.0	± 9.6 %
		Y	9.80	84.47	23.05		30.0	
		Z	8.56	81.26	22.24		30.0	
10315-AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	X	1.21	66.04	16.76	0.17	150.0	± 9.6 %
		Y	1.11	64.36	15.28		150.0	
		Z	1.16	64.99	15.81		150.0	
10316-AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	X	4.78	67.20	16.69	0.17	150.0	± 9.6 %
		Y	4.67	66.87	16.36		150.0	
		Z	4.78	67.00	16.48		150.0	
10317-AAC	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	X	4.78	67.20	16.69	0.17	150.0	± 9.6 %
		Y	4.67	66.87	16.36		150.0	
		Z	4.78	67.00	16.48		150.0	
10400-AAD	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	X	4.88	67.44	16.59	0.00	150.0	± 9.6 %
		Y	4.75	67.07	16.25		150.0	
		Z	4.88	67.23	16.38		150.0	
10401-AAD	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	X	5.52	67.51	16.67	0.00	150.0	± 9.6 %
		Y	5.43	67.26	16.42		150.0	
		Z	5.50	67.29	16.46		150.0	

10402-AAD	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)	X	5.81	67.99	16.74	0.00	150.0	± 9.6 %
		Y	5.71	67.67	16.46		150.0	
		Z	5.80	67.83	16.56		150.0	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	2.18	74.40	17.31	0.00	115.0	± 9.6 %
		Y	1.44	68.27	13.81		115.0	
		Z	1.72	70.30	15.40		115.0	
10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	2.18	74.40	17.31	0.00	115.0	± 9.6 %
		Y	1.44	68.27	13.81		115.0	
		Z	1.72	70.30	15.40		115.0	
10406-AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	X	100.00	125.34	32.57	0.00	100.0	± 9.6 %
		Y	100.00	122.30	30.90		100.0	
		Z	100.00	123.59	31.86		100.0	
10410-AAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9, Subframe Conf=4)	X	100.00	121.08	31.14	3.23	80.0	± 9.6 %
		Y	100.00	119.39	30.03		80.0	
		Z	100.00	119.84	30.69		80.0	
10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	1.04	64.21	15.75	0.00	150.0	± 9.6 %
		Y	0.96	62.81	14.37		150.0	
		Z	1.00	63.31	14.86		150.0	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	4.68	67.03	16.52	0.00	150.0	± 9.6 %
		Y	4.57	66.70	16.19		150.0	
		Z	4.67	66.81	16.30		150.0	
10417-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	X	4.68	67.03	16.52	0.00	150.0	± 9.6 %
		Y	4.57	66.70	16.19		150.0	
		Z	4.67	66.81	16.30		150.0	
10418-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule)	X	4.66	67.18	16.53	0.00	150.0	± 9.6 %
		Y	4.55	66.84	16.19		150.0	
		Z	4.65	66.94	16.30		150.0	
10419-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preambule)	X	4.69	67.13	16.53	0.00	150.0	± 9.6 %
		Y	4.58	66.80	16.20		150.0	
		Z	4.68	66.91	16.31		150.0	
10422-AAB	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	X	4.81	67.13	16.54	0.00	150.0	± 9.6 %
		Y	4.70	66.81	16.22		150.0	
		Z	4.80	66.92	16.33		150.0	
10423-AAB	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	X	5.01	67.51	16.68	0.00	150.0	± 9.6 %
		Y	4.89	67.16	16.35		150.0	
		Z	5.01	67.31	16.47		150.0	
10424-AAB	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	X	4.92	67.45	16.65	0.00	150.0	± 9.6 %
		Y	4.80	67.10	16.32		150.0	
		Z	4.92	67.24	16.43		150.0	
10425-AAB	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	X	5.50	67.77	16.79	0.00	150.0	± 9.6 %
		Y	5.41	67.50	16.53		150.0	
		Z	5.49	67.58	16.59		150.0	
10426-AAB	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	X	5.51	67.80	16.80	0.00	150.0	± 9.6 %
		Y	5.41	67.51	16.53		150.0	
		Z	5.50	67.62	16.60		150.0	

10427-AAB	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	X	5.53	67.79	16.79	0.00	150.0	± 9.6 %
		Y	5.42	67.48	16.51		150.0	
		Z	5.52	67.63	16.61		150.0	
10430-AAB	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	X	4.38	70.70	18.40	0.00	150.0	± 9.6 %
		Y	4.25	70.46	18.05		150.0	
		Z	4.31	70.02	17.98		150.0	
10431-AAB	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	X	4.42	67.67	16.62	0.00	150.0	± 9.6 %
		Y	4.27	67.23	16.20		150.0	
		Z	4.41	67.37	16.37		150.0	
10432-AAB	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	X	4.70	67.52	16.63	0.00	150.0	± 9.6 %
		Y	4.57	67.13	16.26		150.0	
		Z	4.70	67.28	16.40		150.0	
10433-AAB	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	X	4.94	67.50	16.67	0.00	150.0	± 9.6 %
		Y	4.82	67.14	16.34		150.0	
		Z	4.94	67.29	16.46		150.0	
10434-AAA	W-CDMA (BS Test Model 1, 64 DPCH)	X	4.49	71.52	18.43	0.00	150.0	± 9.6 %
		Y	4.34	71.22	18.01		150.0	
		Z	4.39	70.68	17.96		150.0	
10435-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	120.92	31.06	3.23	80.0	± 9.6 %
		Y	100.00	119.22	29.95		80.0	
		Z	100.00	119.70	30.62		80.0	
10447-AAB	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	3.75	67.86	16.21	0.00	150.0	± 9.6 %
		Y	3.56	67.20	15.57		150.0	
		Z	3.73	67.41	15.90		150.0	
10448-AAB	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	X	4.24	67.45	16.49	0.00	150.0	± 9.6 %
		Y	4.10	67.00	16.05		150.0	
		Z	4.22	67.14	16.23		150.0	
10449-AAB	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	X	4.49	67.35	16.53	0.00	150.0	± 9.6 %
		Y	4.37	66.95	16.16		150.0	
		Z	4.48	67.09	16.30		150.0	
10450-AAB	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	4.67	67.26	16.53	0.00	150.0	± 9.6 %
		Y	4.56	66.89	16.18		150.0	
		Z	4.66	67.04	16.31		150.0	
10451-AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	X	3.69	68.21	15.98	0.00	150.0	± 9.6 %
		Y	3.47	67.39	15.23		150.0	
		Z	3.66	67.69	15.67		150.0	
10456-AAB	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)	X	6.36	68.35	16.93	0.00	150.0	± 9.6 %
		Y	6.27	68.07	16.69		150.0	
		Z	6.35	68.21	16.77		150.0	
10457-AAA	UMTS-FDD (DC-HSDPA)	X	3.86	65.66	16.26	0.00	150.0	± 9.6 %
		Y	3.78	65.32	15.90		150.0	
		Z	3.84	65.45	16.04		150.0	
10458-AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	X	4.10	70.68	17.90	0.00	150.0	± 9.6 %
		Y	3.95	70.36	17.40		150.0	
		Z	3.98	69.73	17.40		150.0	
10459-AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	X	5.16	67.87	18.15	0.00	150.0	± 9.6 %
		Y	5.08	67.96	18.01		150.0	
		Z	5.12	67.39	17.86		150.0	

10460-AAA	UMTS-FDD (WCDMA, AMR)	X	1.21	74.36	19.56	0.00	150.0	± 9.6 %
		Y	0.84	67.73	15.53		150.0	
		Z	0.96	69.69	16.87		150.0	
10461-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	124.72	32.88	3.29	80.0	± 9.6 %
		Y	100.00	122.71	31.63		80.0	
		Z	100.00	122.27	31.89		80.0	
10462-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	110.81	26.22	3.23	80.0	± 9.6 %
		Y	100.00	107.68	24.48		80.0	
		Z	100.00	109.58	25.81		80.0	
10463-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.02	24.88	3.23	80.0	± 9.6 %
		Y	17.57	87.04	18.79		80.0	
		Z	57.71	101.03	23.21		80.0	
10464-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	122.99	31.92	3.23	80.0	± 9.6 %
		Y	100.00	120.66	30.52		80.0	
		Z	100.00	120.59	30.96		80.0	
10465-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	110.36	26.00	3.23	80.0	± 9.6 %
		Y	69.93	103.37	23.39		80.0	
		Z	100.00	109.17	25.60		80.0	
10466-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	107.59	24.67	3.23	80.0	± 9.6 %
		Y	10.32	81.39	17.12		80.0	
		Z	32.56	94.43	21.51		80.0	
10467-AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	123.18	32.01	3.23	80.0	± 9.6 %
		Y	100.00	120.88	30.62		80.0	
		Z	100.00	120.77	31.04		80.0	
10468-AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	110.50	26.06	3.23	80.0	± 9.6 %
		Y	95.55	106.84	24.20		80.0	
		Z	100.00	109.30	25.66		80.0	
10469-AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	107.60	24.67	3.23	80.0	± 9.6 %
		Y	10.51	81.58	17.17		80.0	
		Z	33.51	94.76	21.58		80.0	
10470-AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	123.21	32.02	3.23	80.0	± 9.6 %
		Y	100.00	120.90	30.62		80.0	
		Z	100.00	120.79	31.05		80.0	
10471-AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	110.46	26.04	3.23	80.0	± 9.6 %
		Y	94.56	106.68	24.14		80.0	
		Z	100.00	109.26	25.63		80.0	
10472-AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	107.56	24.64	3.23	80.0	± 9.6 %
		Y	10.43	81.48	17.13		80.0	
		Z	33.64	94.78	21.58		80.0	
10473-AAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	123.19	32.00	3.23	80.0	± 9.6 %
		Y	100.00	120.87	30.61		80.0	
		Z	100.00	120.77	31.03		80.0	
10474-AAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	110.47	26.04	3.23	80.0	± 9.6 %
		Y	92.06	106.40	24.08		80.0	
		Z	100.00	109.26	25.64		80.0	
10475-AAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	107.57	24.65	3.23	80.0	± 9.6 %
		Y	10.30	81.37	17.09		80.0	
		Z	33.12	94.61	21.54		80.0	

10477-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	110.32	25.97	3.23	80.0	± 9.6 %
		Y	73.47	103.85	23.47		80.0	
		Z	100.00	109.13	25.57		80.0	
10478-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	107.52	24.63	3.23	80.0	± 9.6 %
		Y	10.13	81.17	17.03		80.0	
		Z	32.56	94.40	21.47		80.0	
10479-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	23.24	102.02	28.60	3.23	80.0	± 9.6 %
		Y	17.72	96.96	26.53		80.0	
		Z	12.62	91.31	25.32		80.0	
10480-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	23.79	96.38	25.31	3.23	80.0	± 9.6 %
		Y	16.50	90.35	22.90		80.0	
		Z	13.56	87.65	22.71		80.0	
10481-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	19.64	92.74	23.93	3.23	80.0	± 9.6 %
		Y	13.10	86.39	21.35		80.0	
		Z	12.05	85.29	21.66		80.0	
10482-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	8.49	84.69	22.05	2.23	80.0	± 9.6 %
		Y	5.66	78.52	19.36		80.0	
		Z	6.07	79.11	20.05		80.0	
10483-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	11.70	86.22	22.45	2.23	80.0	± 9.6 %
		Y	8.73	81.47	20.24		80.0	
		Z	8.71	81.39	20.85		80.0	
10484-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	10.50	84.41	21.86	2.23	80.0	± 9.6 %
		Y	7.92	79.90	19.71		80.0	
		Z	8.18	80.26	20.46		80.0	
10485-AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	8.12	84.44	22.68	2.23	80.0	± 9.6 %
		Y	5.95	79.56	20.54		80.0	
		Z	6.24	79.61	20.83		80.0	
10486-AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.60	75.72	19.25	2.23	80.0	± 9.6 %
		Y	4.71	73.16	17.81		80.0	
		Z	5.00	73.46	18.29		80.0	
10487-AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.48	75.06	18.99	2.23	80.0	± 9.6 %
		Y	4.65	72.64	17.60		80.0	
		Z	4.96	73.01	18.11		80.0	
10488-AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.06	80.88	21.92	2.23	80.0	± 9.6 %
		Y	5.70	77.55	20.40		80.0	
		Z	6.08	77.77	20.57		80.0	
10489-AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.31	73.88	19.45	2.23	80.0	± 9.6 %
		Y	4.75	72.25	18.50		80.0	
		Z	5.02	72.44	18.71		80.0	
10490-AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.32	73.40	19.28	2.23	80.0	± 9.6 %
		Y	4.80	71.92	18.39		80.0	
		Z	5.07	72.08	18.60		80.0	
10491-AAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	6.29	77.08	20.62	2.23	80.0	± 9.6 %
		Y	5.44	74.84	19.51		80.0	
		Z	5.78	75.12	19.66		80.0	
10492-AAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.38	72.26	19.03	2.23	80.0	± 9.6 %
		Y	4.95	71.03	18.29		80.0	
		Z	5.22	71.29	18.47		80.0	

10493-AAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.41	71.97	18.93	2.23	80.0	± 9.6 %
		Y	4.99	70.82	18.22		80.0	
		Z	5.27	71.06	18.40		80.0	
10494-AAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.26	79.46	21.31	2.23	80.0	± 9.6 %
		Y	6.08	76.70	20.04		80.0	
		Z	6.47	77.03	20.19		80.0	
10495-AAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.52	72.92	19.28	2.23	80.0	± 9.6 %
		Y	5.04	71.57	18.51		80.0	
		Z	5.33	71.88	18.69		80.0	
10496-AAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.51	72.36	19.10	2.23	80.0	± 9.6 %
		Y	5.07	71.15	18.38		80.0	
		Z	5.35	71.43	18.55		80.0	
10497-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	6.84	81.16	20.14	2.23	80.0	± 9.6 %
		Y	4.18	74.07	16.91		80.0	
		Z	4.97	76.21	18.38		80.0	
10498-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.23	71.63	15.72	2.23	80.0	± 9.6 %
		Y	2.88	66.72	12.99		80.0	
		Z	3.81	69.89	15.10		80.0	
10499-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.07	70.79	15.25	2.23	80.0	± 9.6 %
		Y	2.78	66.03	12.55		80.0	
		Z	3.73	69.33	14.75		80.0	
10500-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.25	82.07	22.09	2.23	80.0	± 9.6 %
		Y	5.64	78.16	20.30		80.0	
		Z	5.95	78.24	20.53		80.0	
10501-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.43	74.78	19.24	2.23	80.0	± 9.6 %
		Y	4.72	72.72	18.04		80.0	
		Z	4.99	72.91	18.39		80.0	
10502-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.43	74.40	19.05	2.23	80.0	± 9.6 %
		Y	4.75	72.45	17.89		80.0	
		Z	5.01	72.63	18.25		80.0	
10503-AAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	6.96	80.64	21.82	2.23	80.0	± 9.6 %
		Y	5.62	77.31	20.29		80.0	
		Z	6.00	77.58	20.48		80.0	
10504-AAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.28	73.79	19.40	2.23	80.0	± 9.6 %
		Y	4.72	72.15	18.44		80.0	
		Z	5.00	72.37	18.67		80.0	
10505-AAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.30	73.31	19.23	2.23	80.0	± 9.6 %
		Y	4.78	71.81	18.34		80.0	
		Z	5.05	72.00	18.55		80.0	
10506-AAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.19	79.29	21.23	2.23	80.0	± 9.6 %
		Y	6.02	76.53	19.97		80.0	
		Z	6.42	76.89	20.13		80.0	
10507-AAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.49	72.85	19.25	2.23	80.0	± 9.6 %
		Y	5.02	71.50	18.47		80.0	
		Z	5.31	71.82	18.66		80.0	

10508-AAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.49	72.29	19.06	2.23	80.0	± 9.6 %
		Y	5.05	71.07	18.34		80.0	
		Z	5.33	71.37	18.52		80.0	
10509-AAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	6.71	76.12	20.06	2.23	80.0	± 9.6 %
		Y	5.94	74.25	19.13		80.0	
		Z	6.28	74.57	19.27		80.0	
10510-AAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.84	71.95	18.94	2.23	80.0	± 9.6 %
		Y	5.42	70.86	18.30		80.0	
		Z	5.71	71.20	18.47		80.0	
10511-AAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.82	71.51	18.81	2.23	80.0	± 9.6 %
		Y	5.44	70.51	18.21		80.0	
		Z	5.71	70.83	18.37		80.0	
10512-AAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.61	78.80	20.90	2.23	80.0	± 9.6 %
		Y	6.48	76.29	19.75		80.0	
		Z	6.88	76.71	19.92		80.0	
10513-AAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.82	72.58	19.18	2.23	80.0	± 9.6 %
		Y	5.36	71.33	18.47		80.0	
		Z	5.67	71.74	18.66		80.0	
10514-AAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.73	71.89	18.96	2.23	80.0	± 9.6 %
		Y	5.32	70.77	18.31		80.0	
		Z	5.61	71.15	18.49		80.0	
10515-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	X	1.00	64.53	15.90	0.00	150.0	± 9.6 %
		Y	0.92	62.98	14.41		150.0	
		Z	0.96	63.54	14.94		150.0	
10516-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	X	1.68	91.06	26.34	0.00	150.0	± 9.6 %
		Y	0.55	69.99	16.34		150.0	
		Z	0.73	74.56	19.01		150.0	
10517-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	X	0.92	68.12	17.45	0.00	150.0	± 9.6 %
		Y	0.77	64.83	14.89		150.0	
		Z	0.84	65.95	15.79		150.0	
10518-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	X	4.67	67.12	16.50	0.00	150.0	± 9.6 %
		Y	4.56	66.77	16.17		150.0	
		Z	4.66	66.89	16.28		150.0	
10519-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	X	4.89	67.40	16.64	0.00	150.0	± 9.6 %
		Y	4.77	67.04	16.30		150.0	
		Z	4.89	67.19	16.43		150.0	
10520-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	X	4.74	67.39	16.57	0.00	150.0	± 9.6 %
		Y	4.61	67.01	16.22		150.0	
		Z	4.74	67.17	16.35		150.0	
10521-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	X	4.67	67.41	16.56	0.00	150.0	± 9.6 %
		Y	4.55	67.00	16.20		150.0	
		Z	4.67	67.18	16.34		150.0	
10522-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	X	4.72	67.39	16.60	0.00	150.0	± 9.6 %
		Y	4.60	67.04	16.27		150.0	
		Z	4.71	67.14	16.36		150.0	

10523-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	X	4.59	67.29	16.46	0.00	150.0	± 9.6 %
		Y	4.47	66.91	16.11		150.0	
		Z	4.58	67.04	16.22		150.0	
10524-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	X	4.67	67.35	16.59	0.00	150.0	± 9.6 %
		Y	4.55	66.98	16.24		150.0	
		Z	4.67	67.11	16.36		150.0	
10525-AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)	X	4.63	66.37	16.17	0.00	150.0	± 9.6 %
		Y	4.52	66.01	15.83		150.0	
		Z	4.62	66.13	15.94		150.0	
10526-AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle)	X	4.83	66.78	16.32	0.00	150.0	± 9.6 %
		Y	4.70	66.40	15.97		150.0	
		Z	4.82	66.54	16.09		150.0	
10527-AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle)	X	4.75	66.76	16.27	0.00	150.0	± 9.6 %
		Y	4.62	66.36	15.92		150.0	
		Z	4.74	66.51	16.04		150.0	
10528-AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle)	X	4.77	66.78	16.31	0.00	150.0	± 9.6 %
		Y	4.64	66.38	15.95		150.0	
		Z	4.76	66.54	16.08		150.0	
10529-AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle)	X	4.77	66.78	16.31	0.00	150.0	± 9.6 %
		Y	4.64	66.38	15.95		150.0	
		Z	4.76	66.54	16.08		150.0	
10531-AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle)	X	4.78	66.93	16.34	0.00	150.0	± 9.6 %
		Y	4.64	66.50	15.97		150.0	
		Z	4.77	66.69	16.10		150.0	
10532-AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle)	X	4.63	66.80	16.29	0.00	150.0	± 9.6 %
		Y	4.49	66.35	15.90		150.0	
		Z	4.62	66.56	16.05		150.0	
10533-AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle)	X	4.78	66.80	16.29	0.00	150.0	± 9.6 %
		Y	4.65	66.41	15.94		150.0	
		Z	4.77	66.55	16.05		150.0	
10534-AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle)	X	5.28	66.88	16.33	0.00	150.0	± 9.6 %
		Y	5.17	66.53	16.03		150.0	
		Z	5.27	66.70	16.13		150.0	
10535-AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc duty cycle)	X	5.35	67.03	16.39	0.00	150.0	± 9.6 %
		Y	5.24	66.69	16.10		150.0	
		Z	5.34	66.84	16.18		150.0	
10536-AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc duty cycle)	X	5.22	67.03	16.37	0.00	150.0	± 9.6 %
		Y	5.10	66.65	16.06		150.0	
		Z	5.21	66.83	16.16		150.0	
10537-AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc duty cycle)	X	5.29	67.00	16.36	0.00	150.0	± 9.6 %
		Y	5.17	66.63	16.05		150.0	
		Z	5.27	66.80	16.15		150.0	
10538-AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc duty cycle)	X	5.40	67.06	16.43	0.00	150.0	± 9.6 %
		Y	5.27	66.69	16.12		150.0	
		Z	5.39	66.88	16.23		150.0	
10540-AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc duty cycle)	X	5.30	67.01	16.42	0.00	150.0	± 9.6 %
		Y	5.19	66.66	16.12		150.0	
		Z	5.29	66.82	16.22		150.0	

10541-AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle)	X	5.28	66.90	16.36	0.00	150.0	± 9.6 %
		Y	5.16	66.53	16.05		150.0	
		Z	5.27	66.74	16.17		150.0	
10542-AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle)	X	5.43	66.95	16.40	0.00	150.0	± 9.6 %
		Y	5.32	66.61	16.11		150.0	
		Z	5.42	66.77	16.20		150.0	
10543-AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle)	X	5.51	66.95	16.41	0.00	150.0	± 9.6 %
		Y	5.40	66.65	16.14		150.0	
		Z	5.51	66.78	16.22		150.0	
10544-AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle)	X	5.56	66.97	16.30	0.00	150.0	± 9.6 %
		Y	5.46	66.64	16.02		150.0	
		Z	5.54	66.80	16.11		150.0	
10545-AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle)	X	5.78	67.41	16.46	0.00	150.0	± 9.6 %
		Y	5.68	67.09	16.19		150.0	
		Z	5.76	67.21	16.25		150.0	
10546-AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle)	X	5.66	67.27	16.41	0.00	150.0	± 9.6 %
		Y	5.55	66.90	16.11		150.0	
		Z	5.65	67.10	16.22		150.0	
10547-AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle)	X	5.75	67.34	16.43	0.00	150.0	± 9.6 %
		Y	5.64	66.99	16.14		150.0	
		Z	5.73	67.16	16.24		150.0	
10548-AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle)	X	6.10	68.57	17.02	0.00	150.0	± 9.6 %
		Y	5.97	68.15	16.70		150.0	
		Z	6.06	68.30	16.78		150.0	
10550-AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle)	X	5.68	67.21	16.39	0.00	150.0	± 9.6 %
		Y	5.57	66.88	16.11		150.0	
		Z	5.66	67.04	16.20		150.0	
10551-AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle)	X	5.70	67.30	16.39	0.00	150.0	± 9.6 %
		Y	5.58	66.93	16.09		150.0	
		Z	5.68	67.15	16.21		150.0	
10552-AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle)	X	5.59	67.05	16.28	0.00	150.0	± 9.6 %
		Y	5.48	66.70	15.99		150.0	
		Z	5.58	66.90	16.10		150.0	
10553-AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle)	X	5.69	67.10	16.33	0.00	150.0	± 9.6 %
		Y	5.57	66.76	16.05		150.0	
		Z	5.67	66.95	16.15		150.0	
10554-AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 99pc duty cycle)	X	5.97	67.34	16.39	0.00	150.0	± 9.6 %
		Y	5.87	67.02	16.12		150.0	
		Z	5.94	67.19	16.21		150.0	
10555-AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc duty cycle)	X	6.12	67.69	16.53	0.00	150.0	± 9.6 %
		Y	6.01	67.35	16.26		150.0	
		Z	6.10	67.54	16.36		150.0	
10556-AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 99pc duty cycle)	X	6.13	67.71	16.53	0.00	150.0	± 9.6 %
		Y	6.03	67.38	16.27		150.0	
		Z	6.11	67.54	16.35		150.0	
10557-AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 99pc duty cycle)	X	6.12	67.66	16.53	0.00	150.0	± 9.6 %
		Y	6.00	67.31	16.25		150.0	
		Z	6.10	67.52	16.36		150.0	

10558-AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 99pc duty cycle)	X	6.18	67.86	16.65	0.00	150.0	± 9.6 %
		Y	6.06	67.49	16.36		150.0	
		Z	6.16	67.71	16.47		150.0	
10560-AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 99pc duty cycle)	X	6.16	67.67	16.59	0.00	150.0	± 9.6 %
		Y	6.05	67.32	16.31		150.0	
		Z	6.15	67.54	16.42		150.0	
10561-AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 99pc duty cycle)	X	6.08	67.64	16.61	0.00	150.0	± 9.6 %
		Y	5.97	67.29	16.33		150.0	
		Z	6.06	67.49	16.44		150.0	
10562-AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 99pc duty cycle)	X	6.25	68.16	16.88	0.00	150.0	± 9.6 %
		Y	6.13	67.77	16.57		150.0	
		Z	6.23	68.01	16.70		150.0	
10563-AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 99pc duty cycle)	X	6.60	68.73	17.10	0.00	150.0	± 9.6 %
		Y	6.50	68.45	16.86		150.0	
		Z	6.53	68.43	16.86		150.0	
10564-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)	X	5.01	67.24	16.68	0.46	150.0	± 9.6 %
		Y	4.90	66.90	16.36		150.0	
		Z	5.01	67.05	16.49		150.0	
10565-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle)	X	5.27	67.70	16.99	0.46	150.0	± 9.6 %
		Y	5.15	67.37	16.68		150.0	
		Z	5.27	67.52	16.80		150.0	
10566-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle)	X	5.11	67.60	16.84	0.46	150.0	± 9.6 %
		Y	4.98	67.23	16.50		150.0	
		Z	5.11	67.41	16.64		150.0	
10567-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	X	5.13	67.96	17.16	0.46	150.0	± 9.6 %
		Y	5.01	67.61	16.84		150.0	
		Z	5.13	67.75	16.95		150.0	
10568-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	X	5.02	67.36	16.62	0.46	150.0	± 9.6 %
		Y	4.90	67.01	16.28		150.0	
		Z	5.02	67.16	16.41		150.0	
10569-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	X	5.07	67.97	17.18	0.46	150.0	± 9.6 %
		Y	4.96	67.67	16.89		150.0	
		Z	5.06	67.76	16.96		150.0	
10570-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle)	X	5.11	67.83	17.12	0.46	150.0	± 9.6 %
		Y	5.00	67.52	16.83		150.0	
		Z	5.11	67.61	16.91		150.0	
10571-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	X	1.43	67.78	17.55	0.46	130.0	± 9.6 %
		Y	1.29	65.83	16.01		130.0	
		Z	1.37	66.57	16.56		130.0	
10572-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)	X	1.47	68.62	18.01	0.46	130.0	± 9.6 %
		Y	1.32	66.50	16.39		130.0	
		Z	1.40	67.26	16.95		130.0	
10573-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	X	100.00	147.77	39.50	0.46	130.0	± 9.6 %
		Y	5.11	95.86	25.26		130.0	
		Z	11.46	108.94	29.46		130.0	
10574-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	X	2.11	79.07	22.64	0.46	130.0	± 9.6 %
		Y	1.59	73.49	19.59		130.0	
		Z	1.75	74.78	20.34		130.0	

10575-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)	X	4.84	67.12	16.79	0.46	130.0	± 9.6 %
		Y	4.72	66.80	16.47		130.0	
		Z	4.83	66.93	16.59		130.0	
10576-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	X	4.86	67.28	16.85	0.46	130.0	± 9.6 %
		Y	4.75	66.95	16.53		130.0	
		Z	4.86	67.08	16.65		130.0	
10577-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	X	5.09	67.60	17.02	0.46	130.0	± 9.6 %
		Y	4.97	67.26	16.71		130.0	
		Z	5.10	67.41	16.83		130.0	
10578-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	X	4.99	67.77	17.12	0.46	130.0	± 9.6 %
		Y	4.86	67.43	16.80		130.0	
		Z	4.99	67.57	16.91		130.0	
10579-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	X	4.77	67.19	16.53	0.46	130.0	± 9.6 %
		Y	4.64	66.77	16.15		130.0	
		Z	4.78	67.01	16.33		130.0	
10580-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	X	4.81	67.17	16.53	0.46	130.0	± 9.6 %
		Y	4.68	66.78	16.16		130.0	
		Z	4.82	66.97	16.32		130.0	
10581-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	X	4.90	67.87	17.09	0.46	130.0	± 9.6 %
		Y	4.77	67.49	16.75		130.0	
		Z	4.90	67.66	16.87		130.0	
10582-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	X	4.73	66.96	16.34	0.46	130.0	± 9.6 %
		Y	4.59	66.53	15.94		130.0	
		Z	4.73	66.78	16.14		130.0	
10583-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	X	4.84	67.12	16.79	0.46	130.0	± 9.6 %
		Y	4.72	66.80	16.47		130.0	
		Z	4.83	66.93	16.59		130.0	
10584-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	X	4.86	67.28	16.85	0.46	130.0	± 9.6 %
		Y	4.75	66.95	16.53		130.0	
		Z	4.86	67.08	16.65		130.0	
10585-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	X	5.09	67.60	17.02	0.46	130.0	± 9.6 %
		Y	4.97	67.26	16.71		130.0	
		Z	5.10	67.41	16.83		130.0	
10586-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	X	4.99	67.77	17.12	0.46	130.0	± 9.6 %
		Y	4.86	67.43	16.80		130.0	
		Z	4.99	67.57	16.91		130.0	
10587-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	X	4.77	67.19	16.53	0.46	130.0	± 9.6 %
		Y	4.64	66.77	16.15		130.0	
		Z	4.78	67.01	16.33		130.0	
10588-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	X	4.81	67.17	16.53	0.46	130.0	± 9.6 %
		Y	4.68	66.78	16.16		130.0	
		Z	4.82	66.97	16.32		130.0	
10589-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	X	4.90	67.87	17.09	0.46	130.0	± 9.6 %
		Y	4.77	67.49	16.75		130.0	
		Z	4.90	67.66	16.87		130.0	
10590-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	X	4.73	66.96	16.34	0.46	130.0	± 9.6 %
		Y	4.59	66.53	15.94		130.0	
		Z	4.73	66.78	16.14		130.0	

10591-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle)	X	4.98	67.15	16.87	0.46	130.0	± 9.6 %
		Y	4.87	66.85	16.57		130.0	
		Z	4.98	66.97	16.68		130.0	
10592-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc duty cycle)	X	5.15	67.50	16.99	0.46	130.0	± 9.6 %
		Y	5.04	67.19	16.69		130.0	
		Z	5.16	67.32	16.80		130.0	
10593-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc duty cycle)	X	5.09	67.46	16.91	0.46	130.0	± 9.6 %
		Y	4.96	67.12	16.59		130.0	
		Z	5.09	67.29	16.72		130.0	
10594-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc duty cycle)	X	5.14	67.60	17.04	0.46	130.0	± 9.6 %
		Y	5.02	67.28	16.73		130.0	
		Z	5.14	67.42	16.84		130.0	
10595-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc duty cycle)	X	5.11	67.58	16.95	0.46	130.0	± 9.6 %
		Y	4.99	67.24	16.64		130.0	
		Z	5.12	67.40	16.76		130.0	
10596-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc duty cycle)	X	5.05	67.59	16.96	0.46	130.0	± 9.6 %
		Y	4.93	67.24	16.64		130.0	
		Z	5.06	67.40	16.76		130.0	
10597-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc duty cycle)	X	5.00	67.53	16.87	0.46	130.0	± 9.6 %
		Y	4.88	67.16	16.53		130.0	
		Z	5.01	67.35	16.68		130.0	
10598-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc duty cycle)	X	4.98	67.77	17.12	0.46	130.0	± 9.6 %
		Y	4.86	67.40	16.79		130.0	
		Z	4.99	67.58	16.92		130.0	
10599-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle)	X	5.65	67.74	17.05	0.46	130.0	± 9.6 %
		Y	5.54	67.42	16.77		130.0	
		Z	5.65	67.58	16.87		130.0	
10600-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc duty cycle)	X	5.86	68.37	17.35	0.46	130.0	± 9.6 %
		Y	5.74	68.03	17.05		130.0	
		Z	5.87	68.25	17.19		130.0	
10601-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc duty cycle)	X	5.71	67.99	17.17	0.46	130.0	± 9.6 %
		Y	5.59	67.67	16.88		130.0	
		Z	5.71	67.84	16.99		130.0	
10602-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty cycle)	X	5.80	67.99	17.09	0.46	130.0	± 9.6 %
		Y	5.68	67.66	16.80		130.0	
		Z	5.80	67.87	16.93		130.0	
10603-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc duty cycle)	X	5.88	68.27	17.35	0.46	130.0	± 9.6 %
		Y	5.76	67.95	17.07		130.0	
		Z	5.91	68.22	17.22		130.0	
10604-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc duty cycle)	X	5.65	67.69	17.05	0.46	130.0	± 9.6 %
		Y	5.55	67.38	16.78		130.0	
		Z	5.65	67.55	16.88		130.0	
10605-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc duty cycle)	X	5.77	68.03	17.23	0.46	130.0	± 9.6 %
		Y	5.67	67.75	16.97		130.0	
		Z	5.76	67.86	17.04		130.0	
10606-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc duty cycle)	X	5.54	67.48	16.82	0.46	130.0	± 9.6 %
		Y	5.42	67.14	16.52		130.0	
		Z	5.54	67.37	16.67		130.0	

10607-AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle)	X	4.81	66.46	16.48	0.46	130.0	± 9.6 %
		Y	4.70	66.13	16.17		130.0	
		Z	4.81	66.25	16.27		130.0	
10608-AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc duty cycle)	X	5.03	66.90	16.65	0.46	130.0	± 9.6 %
		Y	4.90	66.55	16.34		130.0	
		Z	5.02	66.68	16.44		130.0	
10609-AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle)	X	4.92	66.79	16.52	0.46	130.0	± 9.6 %
		Y	4.79	66.41	16.18		130.0	
		Z	4.92	66.57	16.31		130.0	
10610-AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle)	X	4.97	66.94	16.67	0.46	130.0	± 9.6 %
		Y	4.84	66.57	16.34		130.0	
		Z	4.97	66.72	16.46		130.0	
10611-AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle)	X	4.89	66.78	16.54	0.46	130.0	± 9.6 %
		Y	4.76	66.39	16.20		130.0	
		Z	4.89	66.57	16.33		130.0	
10612-AAB	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle)	X	4.92	66.95	16.59	0.46	130.0	± 9.6 %
		Y	4.78	66.55	16.24		130.0	
		Z	4.91	66.73	16.37		130.0	
10613-AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle)	X	4.93	66.87	16.50	0.46	130.0	± 9.6 %
		Y	4.79	66.46	16.14		130.0	
		Z	4.93	66.66	16.28		130.0	
10614-AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle)	X	4.85	67.03	16.71	0.46	130.0	± 9.6 %
		Y	4.72	66.63	16.36		130.0	
		Z	4.85	66.82	16.49		130.0	
10615-AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle)	X	4.90	66.61	16.33	0.46	130.0	± 9.6 %
		Y	4.76	66.22	15.98		130.0	
		Z	4.90	66.40	16.12		130.0	
10616-AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	X	5.47	66.98	16.66	0.46	130.0	± 9.6 %
		Y	5.36	66.66	16.38		130.0	
		Z	5.46	66.82	16.47		130.0	
10617-AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle)	X	5.52	67.09	16.68	0.46	130.0	± 9.6 %
		Y	5.42	66.80	16.41		130.0	
		Z	5.52	66.93	16.49		130.0	
10618-AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle)	X	5.42	67.18	16.74	0.46	130.0	± 9.6 %
		Y	5.31	66.84	16.45		130.0	
		Z	5.41	67.00	16.54		130.0	
10619-AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle)	X	5.45	67.00	16.59	0.46	130.0	± 9.6 %
		Y	5.34	66.68	16.31		130.0	
		Z	5.44	66.82	16.40		130.0	
10620-AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle)	X	5.56	67.11	16.69	0.46	130.0	± 9.6 %
		Y	5.44	66.75	16.39		130.0	
		Z	5.56	66.95	16.51		130.0	
10621-AAB	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle)	X	5.53	67.13	16.81	0.46	130.0	± 9.6 %
		Y	5.42	66.81	16.54		130.0	
		Z	5.53	66.98	16.63		130.0	
10622-AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle)	X	5.53	67.27	16.87	0.46	130.0	± 9.6 %
		Y	5.43	66.97	16.61		130.0	
		Z	5.52	67.09	16.67		130.0	

10623-AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc duty cycle)	X	5.42	66.86	16.56	0.46	130.0	± 9.6 %
		Y	5.30	66.51	16.26		130.0	
		Z	5.42	66.73	16.39		130.0	
10624-AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc duty cycle)	X	5.61	67.03	16.70	0.46	130.0	± 9.6 %
		Y	5.50	66.72	16.43		130.0	
		Z	5.60	66.86	16.51		130.0	
10625-AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc duty cycle)	X	6.05	68.19	17.33	0.46	130.0	± 9.6 %
		Y	5.94	67.90	17.07		130.0	
		Z	6.01	67.90	17.08		130.0	
10626-AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc duty cycle)	X	5.72	66.99	16.57	0.46	130.0	± 9.6 %
		Y	5.63	66.69	16.31		130.0	
		Z	5.71	66.84	16.40		130.0	
10627-AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc duty cycle)	X	5.99	67.59	16.82	0.46	130.0	± 9.6 %
		Y	5.90	67.32	16.58		130.0	
		Z	5.97	67.39	16.62		130.0	
10628-AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc duty cycle)	X	5.80	67.20	16.57	0.46	130.0	± 9.6 %
		Y	5.69	66.85	16.29		130.0	
		Z	5.79	67.05	16.40		130.0	
10629-AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc duty cycle)	X	5.88	67.25	16.59	0.46	130.0	± 9.6 %
		Y	5.77	66.92	16.31		130.0	
		Z	5.87	67.12	16.43		130.0	
10630-AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc duty cycle)	X	6.51	69.31	17.62	0.46	130.0	± 9.6 %
		Y	6.37	68.86	17.28		130.0	
		Z	6.46	69.04	17.39		130.0	
10631-AAB	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc duty cycle)	X	6.31	68.81	17.54	0.46	130.0	± 9.6 %
		Y	6.17	68.39	17.24		130.0	
		Z	6.30	68.62	17.35		130.0	
10632-AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc duty cycle)	X	5.95	67.61	16.96	0.46	130.0	± 9.6 %
		Y	5.85	67.34	16.73		130.0	
		Z	5.94	67.45	16.78		130.0	
10633-AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc duty cycle)	X	5.89	67.42	16.71	0.46	130.0	± 9.6 %
		Y	5.75	67.01	16.39		130.0	
		Z	5.89	67.32	16.56		130.0	
10634-AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc duty cycle)	X	5.85	67.37	16.74	0.46	130.0	± 9.6 %
		Y	5.73	67.02	16.46		130.0	
		Z	5.86	67.27	16.59		130.0	
10635-AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc duty cycle)	X	5.75	66.78	16.20	0.46	130.0	± 9.6 %
		Y	5.62	66.39	15.89		130.0	
		Z	5.75	66.67	16.05		130.0	
10636-AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 90pc duty cycle)	X	6.13	67.38	16.66	0.46	130.0	± 9.6 %
		Y	6.05	67.09	16.42		130.0	
		Z	6.12	67.24	16.50		130.0	
10637-AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 90pc duty cycle)	X	6.31	67.79	16.85	0.46	130.0	± 9.6 %
		Y	6.21	67.50	16.60		130.0	
		Z	6.29	67.65	16.68		130.0	
10638-AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 90pc duty cycle)	X	6.31	67.76	16.81	0.46	130.0	± 9.6 %
		Y	6.21	67.47	16.56		130.0	
		Z	6.29	67.60	16.64		130.0	

10639-AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc duty cycle)	X	6.30	67.76	16.86	0.46	130.0	± 9.6 %
		Y	6.20	67.43	16.59		130.0	
		Z	6.29	67.63	16.70		130.0	
10640-AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc duty cycle)	X	6.34	67.87	16.86	0.46	130.0	± 9.6 %
		Y	6.22	67.50	16.57		130.0	
		Z	6.33	67.75	16.70		130.0	
10641-AAC	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc duty cycle)	X	6.33	67.58	16.73	0.46	130.0	± 9.6 %
		Y	6.23	67.29	16.48		130.0	
		Z	6.31	67.45	16.57		130.0	
10642-AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc duty cycle)	X	6.39	67.88	17.04	0.46	130.0	± 9.6 %
		Y	6.28	67.58	16.79		130.0	
		Z	6.38	67.76	16.88		130.0	
10643-AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc duty cycle)	X	6.22	67.60	16.81	0.46	130.0	± 9.6 %
		Y	6.12	67.28	16.54		130.0	
		Z	6.21	67.48	16.65		130.0	
10644-AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 90pc duty cycle)	X	6.47	68.34	17.21	0.46	130.0	± 9.6 %
		Y	6.34	67.93	16.89		130.0	
		Z	6.46	68.22	17.05		130.0	
10645-AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc duty cycle)	X	6.86	69.01	17.48	0.46	130.0	± 9.6 %
		Y	6.84	68.95	17.35		130.0	
		Z	6.77	68.66	17.21		130.0	
10646-AAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	X	39.97	118.78	39.16	9.30	60.0	± 9.6 %
		Y	36.64	117.33	38.51		60.0	
		Z	28.19	109.42	36.13		60.0	
10647-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)	X	43.22	121.45	40.07	9.30	60.0	± 9.6 %
		Y	37.61	118.78	39.06		60.0	
		Z	29.77	111.44	36.87		60.0	
10648-AAA	CDMA2000 (1x Advanced)	X	0.92	67.44	13.60	0.00	150.0	± 9.6 %
		Y	0.67	63.31	10.51		150.0	
		Z	0.80	64.88	12.09		150.0	
10652-AAB	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	4.65	69.66	17.99	2.23	80.0	± 9.6 %
		Y	4.35	68.72	17.32		80.0	
		Z	4.56	68.93	17.55		80.0	
10653-AAB	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	X	5.05	68.61	17.89	2.23	80.0	± 9.6 %
		Y	4.81	67.90	17.37		80.0	
		Z	5.01	68.17	17.57		80.0	
10654-AAB	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	X	4.97	68.24	17.87	2.23	80.0	± 9.6 %
		Y	4.75	67.55	17.37		80.0	
		Z	4.94	67.85	17.56		80.0	
10655-AAB	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	5.03	68.27	17.91	2.23	80.0	± 9.6 %
		Y	4.81	67.56	17.41		80.0	
		Z	4.99	67.90	17.61		80.0	
10658-AAA	Pulse Waveform (200Hz, 10%)	X	13.25	86.83	23.62	10.00	50.0	± 9.6 %
		Y	14.38	88.09	23.44		50.0	
		Z	11.47	83.98	22.82		50.0	
10659-AAA	Pulse Waveform (200Hz, 20%)	X	55.89	109.63	28.77	6.99	60.0	± 9.6 %
		Y	73.21	111.71	28.47		60.0	
		Z	23.49	96.54	25.38		60.0	

10660-AAA	Pulse Waveform (200Hz, 40%)	X	100.00	116.44	28.38	3.98	80.0	± 9.6 %
		Y	100.00	113.18	26.58		80.0	
		Z	100.00	116.19	28.39		80.0	
10661-AAA	Pulse Waveform (200Hz, 60%)	X	100.00	118.35	27.71	2.22	100.0	± 9.6 %
		Y	100.00	112.59	24.89		100.0	
		Z	100.00	116.83	27.13		100.0	
10662-AAA	Pulse Waveform (200Hz, 80%)	X	100.00	126.67	29.16	0.97	120.0	± 9.6 %
		Y	100.00	111.31	22.51		120.0	
		Z	100.00	120.40	26.63		120.0	

[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Calibration Laboratory of
Schmid & Partner
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Accreditation No.: SCS 0108

Client PC Test

Certificate No: ES3-3332_Aug18

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3332

Calibration procedure(s): QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

BN ✓
09-06-2018

Calibration date: August 22, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
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: S5277 (20x)	04-Apr-18 (No. 217-02682)	Apr-19
Reference Probe ES3DV2	SN: 3013	30-Dec-17 (No. ES3-3013_Dec17)	Dec-18
DAE4	SN: 660	21-Dec-17 (No. DAE4-660_Dec17)	Dec-18
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 24, 2018

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

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Accreditation No.: SCS 0108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

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"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Probe ES3DV3

SN:3332

Manufactured: January 24, 2012
Calibrated: August 22, 2018

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3332

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.00	0.93	0.88	± 10.1 %
DCP (mV)[B]	108.0	100.7	105.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	197.1	±3.0 %
		Y	0.0	0.0	1.0		178.9	
		Z	0.0	0.0	1.0		180.8	

Note: For details on UID parameters see Appendix.

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms.V^{-2}$	T2 $ms.V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	78.09	549.0	34.29	47.67	3.865	5.10	1.015	0.631	1.012
Y	48.63	359.6	37.37	27.76	1.869	5.10	0.000	0.517	1.012
Z	44.72	319.5	35.44	25.26	1.758	5.10	1.534	0.198	1.012

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%.

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3332

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	41.9	0.89	6.74	6.74	6.74	0.56	1.39	± 12.0 %
835	41.5	0.90	6.49	6.49	6.49	0.38	1.72	± 12.0 %
1750	40.1	1.37	5.37	5.37	5.37	0.64	1.38	± 12.0 %
1900	40.0	1.40	5.15	5.15	5.15	0.80	1.24	± 12.0 %
2300	39.5	1.67	4.82	4.82	4.82	0.79	1.30	± 12.0 %
2450	39.2	1.80	4.61	4.61	4.61	0.80	1.26	± 12.0 %
2600	39.0	1.96	4.50	4.50	4.50	0.80	1.38	± 12.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3332

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	55.5	0.96	6.46	6.46	6.46	0.50	1.47	± 12.0 %
835	55.2	0.97	6.29	6.29	6.29	0.49	1.52	± 12.0 %
1750	53.4	1.49	4.99	4.99	4.99	0.66	1.39	± 12.0 %
1900	53.3	1.52	4.77	4.77	4.77	0.49	1.69	± 12.0 %
2300	52.9	1.81	4.58	4.58	4.58	0.80	1.27	± 12.0 %
2450	52.7	1.95	4.42	4.42	4.42	0.80	1.23	± 12.0 %
2600	52.5	2.16	4.36	4.36	4.36	0.80	1.30	± 12.0 %

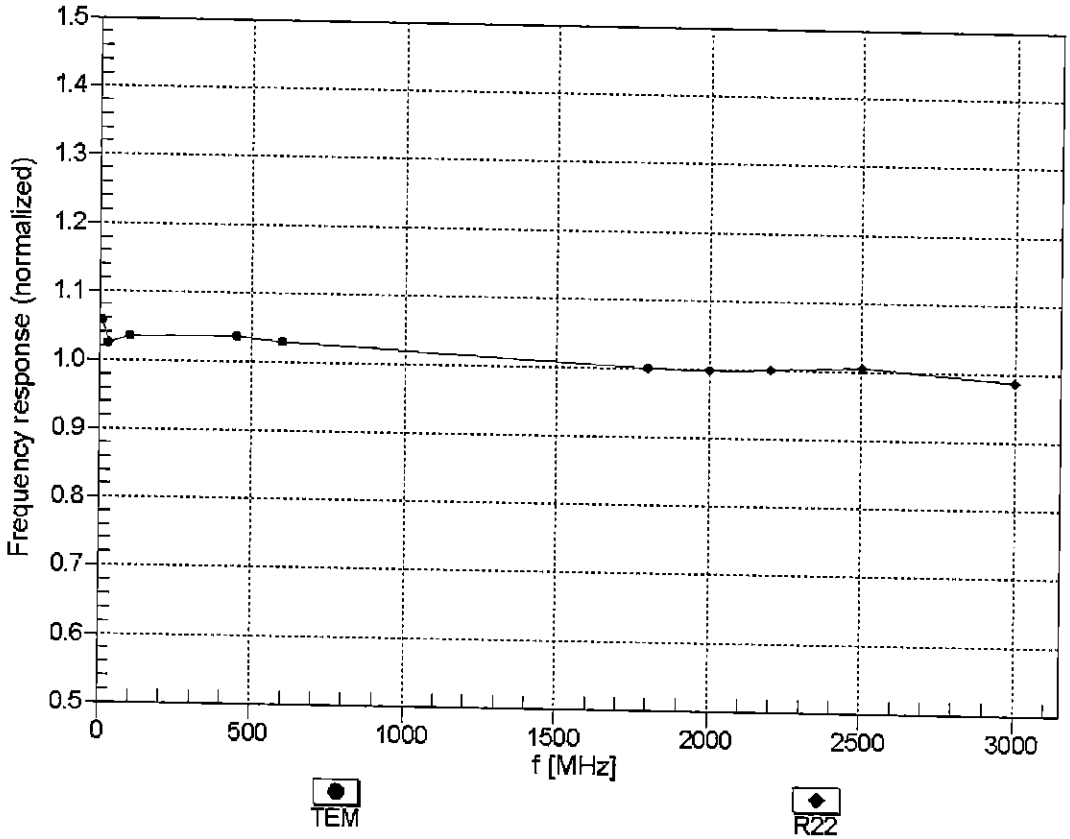
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Frequency Response of E-Field

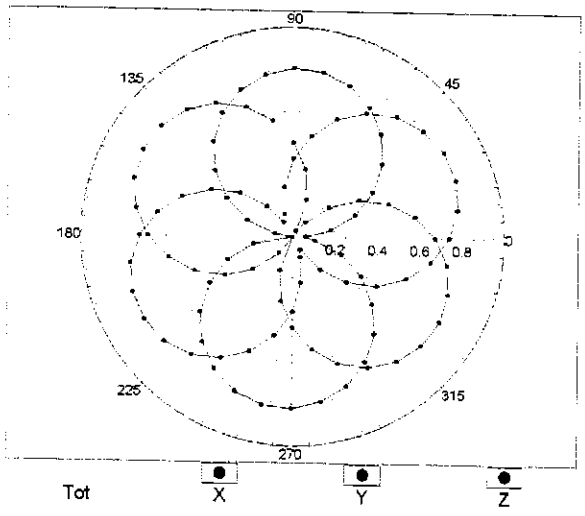
(TEM-Cell:ifi110 EXX, Waveguide: R22)



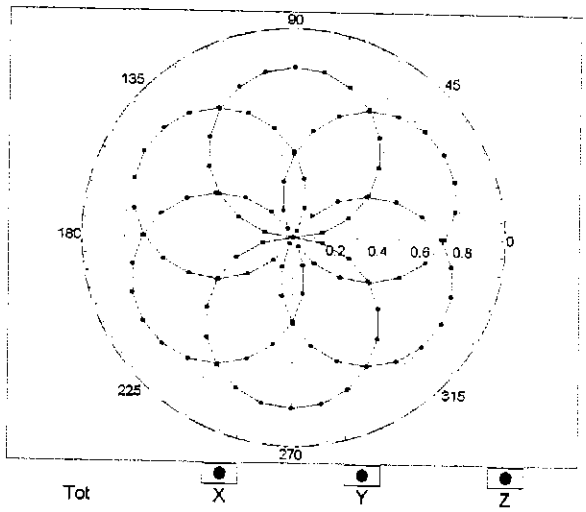
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

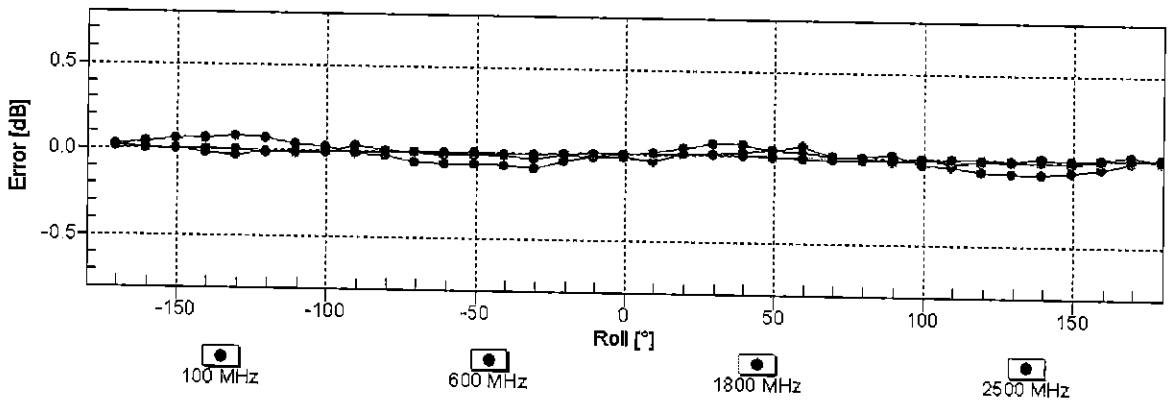
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

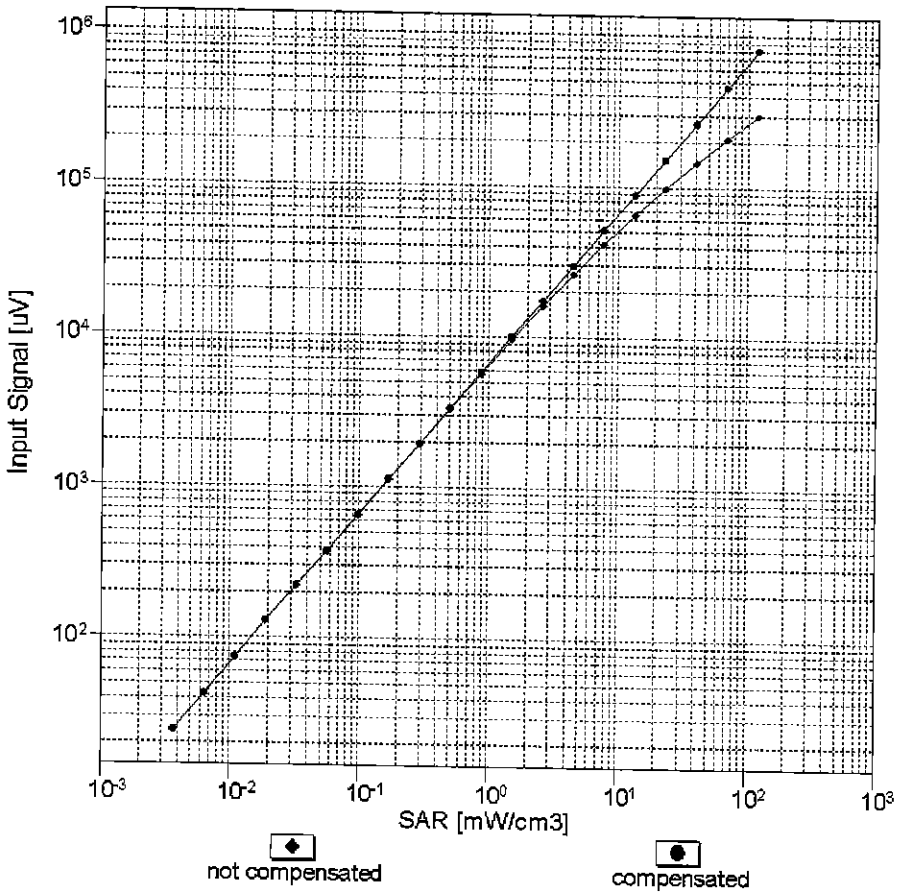


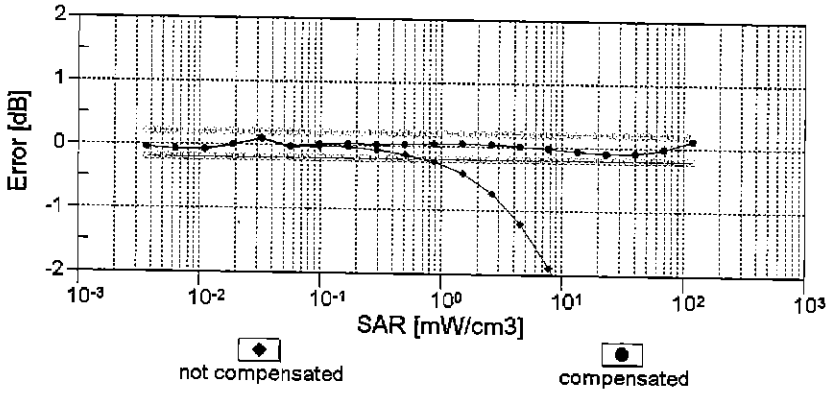


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

(TEM cell , f_{eval}= 1900 MHz)

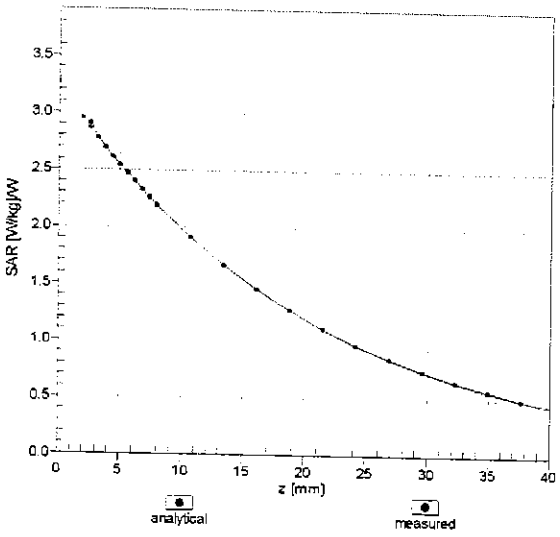




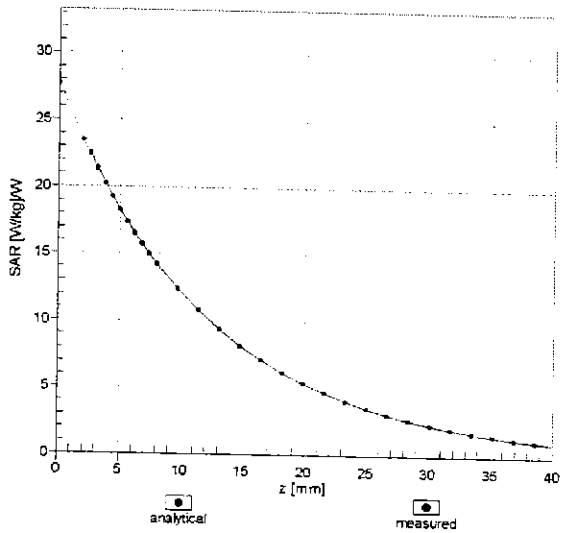
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

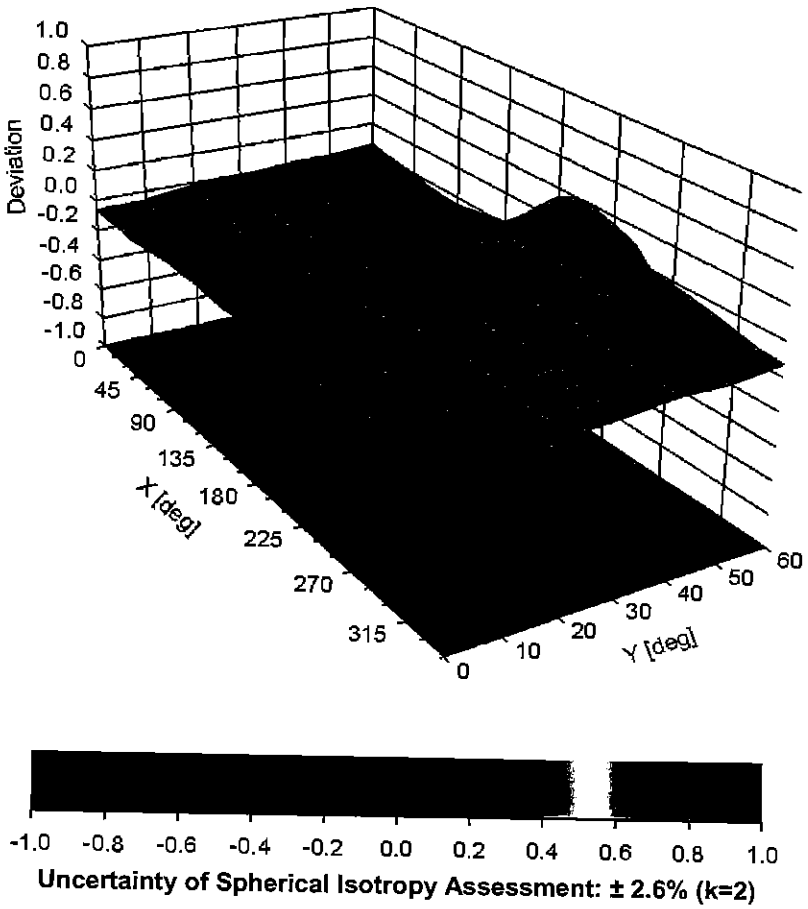


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3332

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	49.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Appendix: Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max Unc[E] (k=2)
0	CW	X	0.00	0.00	1.00	0.00	197.1	± 3.0 %
		Y	0.00	0.00	1.00		178.9	
		Z	0.00	0.00	1.00		180.8	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	9.42	78.82	19.48	10.00	25.0	± 9.6 %
		Y	6.63	76.23	16.58		25.0	
		Z	9.95	82.20	18.88		25.0	
10011-CAB	UMTS-FDD (WCDMA)	X	1.26	70.77	17.22	0.00	150.0	± 9.6 %
		Y	1.02	68.32	15.46		150.0	
		Z	1.96	80.99	21.92		150.0	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	1.45	66.89	16.90	0.41	150.0	± 9.6 %
		Y	1.23	65.24	15.98		150.0	
		Z	1.37	68.12	18.18		150.0	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	5.34	67.48	17.57	1.46	150.0	± 9.6 %
		Y	4.99	67.25	17.50		150.0	
		Z	5.00	67.78	17.86		150.0	
10021-DAC	GSM-FDD (TDMA, GMSK)	X	12.77	84.95	23.28	9.39	50.0	± 9.6 %
		Y	100.00	119.15	31.42		50.0	
		Z	100.00	120.12	31.83		50.0	
10023-DAC	GPRS-FDD (TDMA, GMSK, TN 0)	X	12.48	84.43	23.15	9.57	50.0	± 9.6 %
		Y	86.81	116.95	30.93		50.0	
		Z	100.00	120.03	31.84		50.0	
10024-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	19.50	92.72	24.37	6.56	60.0	± 9.6 %
		Y	100.00	115.50	28.55		60.0	
		Z	100.00	117.36	29.38		60.0	
10025-DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	X	20.38	102.14	37.71	12.57	50.0	± 9.6 %
		Y	13.39	98.42	37.69		50.0	
		Z	21.48	114.30	44.00		50.0	
10026-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	19.45	98.14	32.99	9.56	60.0	± 9.6 %
		Y	21.29	107.30	37.11		60.0	
		Z	29.82	117.28	40.71		60.0	
10027-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	78.41	113.09	28.82	4.80	80.0	± 9.6 %
		Y	100.00	113.99	27.00		80.0	
		Z	100.00	117.09	28.40		80.0	
10028-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	100.00	115.97	28.54	3.55	100.0	± 9.6 %
		Y	100.00	113.45	25.99		100.0	
		Z	100.00	118.36	28.18		100.0	
10029-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	15.82	94.16	30.58	7.80	80.0	± 9.6 %
		Y	12.96	95.82	32.14		80.0	
		Z	15.83	101.85	34.64		80.0	
10030-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	X	30.02	99.14	25.52	5.30	70.0	± 9.6 %
		Y	100.00	113.53	27.10		70.0	
		Z	100.00	115.93	28.18		70.0	
10031-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	X	100.00	117.08	27.44	1.88	100.0	± 9.6 %
		Y	100.00	110.43	23.19		100.0	
		Z	100.00	121.04	27.72		100.0	

10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	100.00	121.10	28.01	1.17	100.0	± 9.6 %
		Y	100.00	109.05	21.56		100.0	
		Z	100.00	131.65	30.85		100.0	
10033-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	X	15.47	91.95	25.45	5.30	70.0	± 9.6 %
		Y	36.27	107.53	28.96		70.0	
		Z	100.00	124.57	33.43		70.0	
10034-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	X	11.82	92.83	24.46	1.88	100.0	± 9.6 %
		Y	11.15	91.90	22.61		100.0	
		Z	100.00	123.85	31.14		100.0	
10035-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	X	7.24	87.64	22.66	1.17	100.0	± 9.6 %
		Y	4.86	82.23	19.22		100.0	
		Z	100.00	124.65	30.94		100.0	
10036-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	X	17.25	93.92	26.14	5.30	70.0	± 9.6 %
		Y	57.69	115.00	30.95		70.0	
		Z	100.00	124.83	33.56		70.0	
10037-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	X	11.64	92.58	24.33	1.88	100.0	± 9.6 %
		Y	9.91	90.34	22.11		100.0	
		Z	100.00	123.84	31.10		100.0	
10038-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	X	7.73	88.84	23.12	1.17	100.0	± 9.6 %
		Y	5.20	83.43	19.73		100.0	
		Z	100.00	125.47	31.30		100.0	
10039-CAB	CDMA2000 (1xRTT, RC1)	X	2.46	75.15	18.41	0.00	150.0	± 9.6 %
		Y	1.75	71.72	15.00		150.0	
		Z	52.61	118.51	29.24		150.0	
10042-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	X	15.38	87.96	22.90	7.78	50.0	± 9.6 %
		Y	100.00	114.07	28.11		50.0	
		Z	100.00	115.43	28.70		50.0	
10044-CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	X	0.00	109.43	1.47	0.00	150.0	± 9.6 %
		Y	0.07	124.46	3.53		150.0	
		Z	0.02	127.99	9.72		150.0	
10048-CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	X	11.14	80.20	23.45	13.80	25.0	± 9.6 %
		Y	18.30	92.38	25.95		25.0	
		Z	24.06	97.54	27.61		25.0	
10049-CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	X	11.59	82.45	22.87	10.79	40.0	± 9.6 %
		Y	24.33	97.29	26.07		40.0	
		Z	43.63	107.25	29.02		40.0	
10056-CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	X	12.19	83.90	23.66	9.03	50.0	± 9.6 %
		Y	17.95	93.68	25.97		50.0	
		Z	27.06	101.31	28.42		50.0	
10058-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	X	13.09	91.03	28.81	6.55	100.0	± 9.6 %
		Y	9.14	88.74	28.90		100.0	
		Z	10.48	93.03	30.88		100.0	
10059-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	X	1.79	70.10	18.30	0.61	110.0	± 9.6 %
		Y	1.40	67.63	17.15		110.0	
		Z	1.63	71.61	19.81		110.0	
10060-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	X	100.00	127.35	32.46	1.30	110.0	± 9.6 %
		Y	100.00	129.77	32.62		110.0	
		Z	100.00	138.31	36.39		110.0	

10061-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	X	21.19	104.59	28.93	2.04	110.0	± 9.6 %
		Y	21.01	109.32	30.57		110.0	
		Z	100.00	139.60	38.91		110.0	
10062-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	X	5.03	67.18	16.84	0.49	100.0	± 9.6 %
		Y	4.72	66.99	16.78		100.0	
		Z	4.74	67.59	17.18		100.0	
10063-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	X	5.09	67.39	17.01	0.72	100.0	± 9.6 %
		Y	4.76	67.15	16.92		100.0	
		Z	4.78	67.75	17.32		100.0	
10064-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	X	5.47	67.77	17.28	0.86	100.0	± 9.6 %
		Y	5.05	67.45	17.17		100.0	
		Z	5.06	67.99	17.53		100.0	
10065-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	X	5.38	67.86	17.47	1.21	100.0	± 9.6 %
		Y	4.96	67.47	17.34		100.0	
		Z	4.96	68.01	17.71		100.0	
10066-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	X	5.46	68.05	17.72	1.46	100.0	± 9.6 %
		Y	5.01	67.60	17.57		100.0	
		Z	5.01	68.13	17.93		100.0	
10067-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	X	5.80	68.19	18.18	2.04	100.0	± 9.6 %
		Y	5.33	67.84	18.06		100.0	
		Z	5.33	68.37	18.40		100.0	
10068-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	X	6.00	68.72	18.61	2.55	100.0	± 9.6 %
		Y	5.43	68.06	18.37		100.0	
		Z	5.42	68.51	18.68		100.0	
10069-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	X	6.05	68.52	18.74	2.67	100.0	± 9.6 %
		Y	5.52	68.08	18.58		100.0	
		Z	5.50	68.55	18.89		100.0	
10071-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	5.51	67.79	17.99	1.99	100.0	± 9.6 %
		Y	5.13	67.47	17.88		100.0	
		Z	5.14	67.98	18.23		100.0	
10072-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	5.64	68.50	18.36	2.30	100.0	± 9.6 %
		Y	5.17	67.98	18.20		100.0	
		Z	5.18	68.52	18.56		100.0	
10073-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	5.82	68.97	18.83	2.83	100.0	± 9.6 %
		Y	5.30	68.34	18.62		100.0	
		Z	5.31	68.89	18.99		100.0	
10074-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	5.90	69.21	19.18	3.30	100.0	± 9.6 %
		Y	5.33	68.38	18.85		100.0	
		Z	5.35	68.94	19.21		100.0	
10075-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	X	6.17	70.00	19.82	3.82	90.0	± 9.6 %
		Y	5.45	68.75	19.29		90.0	
		Z	5.46	69.27	19.63		90.0	
10076-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	6.17	69.81	19.93	4.15	90.0	± 9.6 %
		Y	5.48	68.60	19.44		90.0	
		Z	5.49	69.13	19.79		90.0	
10077-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	6.22	69.93	20.05	4.30	90.0	± 9.6 %
		Y	5.52	68.70	19.55		90.0	
		Z	5.54	69.25	19.91		90.0	

10081-CAB	CDMA2000 (1xRTT, RC3)	X	1.22	70.18	15.99	0.00	150.0	± 9.6 %
		Y	0.75	65.38	11.51		150.0	
		Z	4.57	89.94	21.35		150.0	
10082-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	X	3.24	65.99	10.64	4.77	80.0	± 9.6 %
		Y	1.56	61.71	6.84		80.0	
		Z	1.58	62.24	7.20		80.0	
10090-DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	X	19.21	92.51	24.34	6.56	60.0	± 9.6 %
		Y	100.00	115.60	28.62		60.0	
		Z	100.00	117.45	29.44		60.0	
10097-CAB	UMTS-FDD (HSDPA)	X	1.97	68.64	16.58	0.00	150.0	± 9.6 %
		Y	1.80	68.08	15.77		150.0	
		Z	2.29	73.12	18.59		150.0	
10098-CAB	UMTS-FDD (HSUPA, Subtest 2)	X	1.93	68.63	16.56	0.00	150.0	± 9.6 %
		Y	1.77	68.05	15.74		150.0	
		Z	2.25	73.20	18.63		150.0	
10099-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	X	19.33	97.96	32.93	9.56	60.0	± 9.6 %
		Y	21.25	107.21	37.08		60.0	
		Z	29.69	117.12	40.65		60.0	
10100-CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	3.63	72.34	17.50	0.00	150.0	± 9.6 %
		Y	3.12	70.54	16.77		150.0	
		Z	3.66	74.09	18.73		150.0	
10101-CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	3.54	68.64	16.46	0.00	150.0	± 9.6 %
		Y	3.22	67.66	16.03		150.0	
		Z	3.38	69.19	17.04		150.0	
10102-CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	3.63	68.48	16.50	0.00	150.0	± 9.6 %
		Y	3.32	67.62	16.12		150.0	
		Z	3.47	69.03	17.07		150.0	
10103-CAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	9.60	77.98	20.88	3.98	65.0	± 9.6 %
		Y	8.57	79.27	21.80		65.0	
		Z	9.60	82.02	23.04		65.0	
10104-CAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	9.69	77.23	21.47	3.98	65.0	± 9.6 %
		Y	8.23	77.25	21.84		65.0	
		Z	8.54	78.60	22.55		65.0	
10105-CAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	9.05	75.93	21.18	3.98	65.0	± 9.6 %
		Y	7.61	75.69	21.48		65.0	
		Z	7.84	76.85	22.11		65.0	
10108-CAF	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	3.21	71.41	17.30	0.00	150.0	± 9.6 %
		Y	2.73	69.90	16.65		150.0	
		Z	3.19	73.55	18.73		150.0	
10109-CAF	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	3.22	68.43	16.43	0.00	150.0	± 9.6 %
		Y	2.87	67.56	15.94		150.0	
		Z	3.05	69.41	17.13		150.0	
10110-CAF	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	2.65	70.36	17.02	0.00	150.0	± 9.6 %
		Y	2.21	69.13	16.28		150.0	
		Z	2.67	73.44	18.72		150.0	
10111-CAF	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	2.92	68.88	16.78	0.00	150.0	± 9.6 %
		Y	2.58	68.46	16.21		150.0	
		Z	2.91	71.43	17.92		150.0	

10112-CAF	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	3.34	68.25	16.42	0.00	150.0	± 9.6 %
		Y	2.99	67.54	15.99		150.0	
		Z	3.16	69.26	17.10		150.0	
10113-CAF	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	3.07	68.84	16.83	0.00	150.0	± 9.6 %
		Y	2.74	68.60	16.35		150.0	
		Z	3.05	71.37	17.94		150.0	
10114-CAC	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	X	5.35	67.57	16.58	0.00	150.0	± 9.6 %
		Y	5.15	67.41	16.63		150.0	
		Z	5.16	67.92	16.99		150.0	
10115-CAC	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	X	5.82	68.09	16.83	0.00	150.0	± 9.6 %
		Y	5.43	67.52	16.70		150.0	
		Z	5.42	67.96	17.01		150.0	
10116-CAC	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	X	5.49	67.82	16.62	0.00	150.0	± 9.6 %
		Y	5.24	67.61	16.66		150.0	
		Z	5.25	68.10	17.00		150.0	
10117-CAC	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	5.35	67.57	16.60	0.00	150.0	± 9.6 %
		Y	5.09	67.20	16.54		150.0	
		Z	5.11	67.72	16.91		150.0	
10118-CAC	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	X	5.80	67.95	16.77	0.00	150.0	± 9.6 %
		Y	5.56	67.88	16.89		150.0	
		Z	5.51	68.19	17.13		150.0	
10119-CAC	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	X	5.44	67.73	16.59	0.00	150.0	± 9.6 %
		Y	5.23	67.59	16.66		150.0	
		Z	5.23	68.07	17.00		150.0	
10140-CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	3.69	68.48	16.43	0.00	150.0	± 9.6 %
		Y	3.35	67.62	16.03		150.0	
		Z	3.50	69.04	16.98		150.0	
10141-CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	3.80	68.44	16.53	0.00	150.0	± 9.6 %
		Y	3.48	67.71	16.21		150.0	
		Z	3.62	69.07	17.11		150.0	
10142-CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	2.42	70.28	16.96	0.00	150.0	± 9.6 %
		Y	1.98	69.13	15.87		150.0	
		Z	2.62	74.97	18.94		150.0	
10143-CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	2.82	69.59	16.86	0.00	150.0	± 9.6 %
		Y	2.44	69.14	15.79		150.0	
		Z	3.05	73.81	18.17		150.0	
10144-CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	2.65	67.79	15.58	0.00	150.0	± 9.6 %
		Y	2.19	66.66	14.06		150.0	
		Z	2.49	69.62	15.71		150.0	
10145-CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	1.88	69.84	15.95	0.00	150.0	± 9.6 %
		Y	1.09	64.21	10.81		150.0	
		Z	1.55	69.54	13.53		150.0	
10146-CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	5.08	78.70	19.31	0.00	150.0	± 9.6 %
		Y	2.13	67.99	12.61		150.0	
		Z	4.85	77.68	16.04		150.0	
10147-CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	6.63	82.89	21.06	0.00	150.0	± 9.6 %
		Y	2.80	71.43	14.29		150.0	
		Z	32.33	99.74	22.69		150.0	

10149-CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	3.23	68.49	16.47	0.00	150.0	± 9.6 %
		Y	2.88	67.63	15.99		150.0	
		Z	3.06	69.48	17.18		150.0	
10150-CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	3.34	68.30	16.46	0.00	150.0	± 9.6 %
		Y	3.00	67.60	16.04		150.0	
		Z	3.17	69.33	17.15		150.0	
10151-CAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	9.84	79.35	21.54	3.98	65.0	± 9.6 %
		Y	9.60	82.68	23.15		65.0	
		Z	11.17	86.29	24.69		65.0	
10152-CAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	9.38	77.46	21.41	3.98	65.0	± 9.6 %
		Y	7.87	77.55	21.64		65.0	
		Z	8.30	79.24	22.48		65.0	
10153-CAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	9.69	78.02	21.96	3.98	65.0	± 9.6 %
		Y	8.35	78.61	22.44		65.0	
		Z	8.80	80.29	23.26		65.0	
10154-CAF	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	2.73	70.94	17.37	0.00	150.0	± 9.6 %
		Y	2.26	69.58	16.56		150.0	
		Z	2.76	74.09	19.07		150.0	
10155-CAF	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	2.91	68.86	16.78	0.00	150.0	± 9.6 %
		Y	2.59	68.48	16.23		150.0	
		Z	2.91	71.46	17.95		150.0	
10156-CAF	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	2.32	70.75	17.13	0.00	150.0	± 9.6 %
		Y	1.82	69.20	15.59		150.0	
		Z	2.67	76.62	19.28		150.0	
10157-CAF	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	2.51	68.55	15.88	0.00	150.0	± 9.6 %
		Y	2.02	67.19	14.01		150.0	
		Z	2.51	71.43	16.23		150.0	
10158-CAF	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	3.07	68.88	16.86	0.00	150.0	± 9.6 %
		Y	2.74	68.67	16.40		150.0	
		Z	3.06	71.46	18.00		150.0	
10159-CAF	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	2.63	68.95	16.16	0.00	150.0	± 9.6 %
		Y	2.12	67.60	14.28		150.0	
		Z	2.66	72.05	16.56		150.0	
10160-CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	3.07	69.70	16.85	0.00	150.0	± 9.6 %
		Y	2.79	69.30	16.59		150.0	
		Z	3.11	72.09	18.25		150.0	
10161-CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	3.23	68.15	16.42	0.00	150.0	± 9.6 %
		Y	2.89	67.55	15.96		150.0	
		Z	3.08	69.40	17.13		150.0	
10162-CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	3.32	68.09	16.43	0.00	150.0	± 9.6 %
		Y	3.01	67.70	16.07		150.0	
		Z	3.19	69.52	17.22		150.0	
10166-CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	4.36	71.31	20.07	3.01	150.0	± 9.6 %
		Y	3.63	70.37	19.86		150.0	
		Z	3.95	73.18	21.42		150.0	
10167-CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	5.89	75.08	20.88	3.01	150.0	± 9.6 %
		Y	4.45	73.33	20.30		150.0	
		Z	5.63	79.06	22.89		150.0	

10168-CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	6.40	76.88	21.92	3.01	150.0	± 9.6 %
		Y	5.01	75.97	21.82		150.0	
		Z	6.77	83.15	24.88		150.0	
10169-CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	4.60	75.35	21.65	3.01	150.0	± 9.6 %
		Y	2.97	69.56	19.58		150.0	
		Z	3.41	73.71	21.83		150.0	
10170-CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	7.83	83.93	24.50	3.01	150.0	± 9.6 %
		Y	4.08	75.84	22.10		150.0	
		Z	6.92	87.94	27.06		150.0	
10171-AAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	6.05	78.35	21.51	3.01	150.0	± 9.6 %
		Y	3.33	71.38	19.14		150.0	
		Z	4.75	79.49	22.76		150.0	
10172-CAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	32.12	106.34	32.04	6.02	65.0	± 9.6 %
		Y	25.48	111.02	34.77		65.0	
		Z	100.00	141.62	43.22		65.0	
10173-CAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	26.36	98.72	28.41	6.02	65.0	± 9.6 %
		Y	57.87	120.75	35.39		65.0	
		Z	100.00	131.52	37.94		65.0	
10174-CAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	22.32	94.77	26.80	6.02	65.0	± 9.6 %
		Y	36.69	110.68	32.10		65.0	
		Z	100.00	129.19	36.70		65.0	
10175-CAF	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	4.51	74.86	21.35	3.01	150.0	± 9.6 %
		Y	2.93	69.23	19.32		150.0	
		Z	3.36	73.27	21.52		150.0	
10176-CAF	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	7.84	83.95	24.51	3.01	150.0	± 9.6 %
		Y	4.09	75.86	22.12		150.0	
		Z	6.94	87.99	27.08		150.0	
10177-CAH	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	4.57	75.10	21.48	3.01	150.0	± 9.6 %
		Y	2.95	69.39	19.42		150.0	
		Z	3.39	73.47	21.63		150.0	
10178-CAF	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	7.66	83.48	24.31	3.01	150.0	± 9.6 %
		Y	4.04	75.62	21.99		150.0	
		Z	6.81	87.55	26.90		150.0	
10179-CAF	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	6.80	80.80	22.79	3.01	150.0	± 9.6 %
		Y	3.67	73.50	20.50		150.0	
		Z	5.74	83.57	24.78		150.0	
10180-CAF	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	6.00	78.18	21.42	3.01	150.0	± 9.6 %
		Y	3.32	71.31	19.09		150.0	
		Z	4.73	79.37	22.69		150.0	
10181-CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	4.56	75.08	21.47	3.01	150.0	± 9.6 %
		Y	2.95	69.37	19.41		150.0	
		Z	3.38	73.45	21.62		150.0	
10182-CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	7.65	83.46	24.30	3.01	150.0	± 9.6 %
		Y	4.04	75.59	21.97		150.0	
		Z	6.79	87.50	26.88		150.0	
10183-AAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	5.99	78.15	21.41	3.01	150.0	± 9.6 %
		Y	3.31	71.28	19.08		150.0	
		Z	4.72	79.33	22.67		150.0	

10184-CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	4.58	75.13	21.50	3.01	150.0	± 9.6 %
		Y	2.96	69.42	19.43		150.0	
		Z	3.40	73.51	21.65		150.0	
10185-CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	7.69	83.54	24.34	3.01	150.0	± 9.6 %
		Y	4.06	75.67	22.01		150.0	
		Z	6.84	87.64	26.93		150.0	
10186-AAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	6.02	78.23	21.44	3.01	150.0	± 9.6 %
		Y	3.33	71.36	19.12		150.0	
		Z	4.75	79.45	22.72		150.0	
10187-CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	4.58	75.15	21.53	3.01	150.0	± 9.6 %
		Y	2.97	69.47	19.50		150.0	
		Z	3.41	73.59	21.73		150.0	
10188-CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	8.08	84.57	24.81	3.01	150.0	± 9.6 %
		Y	4.19	76.40	22.42		150.0	
		Z	7.29	89.05	27.55		150.0	
10189-AAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	6.22	78.86	21.77	3.01	150.0	± 9.6 %
		Y	3.41	71.81	19.41		150.0	
		Z	4.95	80.26	23.14		150.0	
10193-CAC	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	X	4.78	66.90	16.38	0.00	150.0	± 9.6 %
		Y	4.50	66.72	16.26		150.0	
		Z	4.53	67.38	16.70		150.0	
10194-CAC	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	X	5.00	67.31	16.48	0.00	150.0	± 9.6 %
		Y	4.67	67.04	16.39		150.0	
		Z	4.70	67.68	16.83		150.0	
10195-CAC	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	X	5.04	67.29	16.47	0.00	150.0	± 9.6 %
		Y	4.71	67.07	16.41		150.0	
		Z	4.74	67.71	16.84		150.0	
10196-CAC	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	4.82	67.02	16.42	0.00	150.0	± 9.6 %
		Y	4.50	66.78	16.28		150.0	
		Z	4.53	67.44	16.72		150.0	
10197-CAC	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	X	5.02	67.32	16.48	0.00	150.0	± 9.6 %
		Y	4.69	67.06	16.41		150.0	
		Z	4.71	67.70	16.84		150.0	
10198-CAC	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	X	5.05	67.30	16.47	0.00	150.0	± 9.6 %
		Y	4.71	67.09	16.42		150.0	
		Z	4.74	67.73	16.86		150.0	
10219-CAC	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	X	4.77	67.05	16.40	0.00	150.0	± 9.6 %
		Y	4.45	66.80	16.24		150.0	
		Z	4.48	67.48	16.70		150.0	
10220-CAC	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	X	5.03	67.33	16.49	0.00	150.0	± 9.6 %
		Y	4.68	67.03	16.40		150.0	
		Z	4.70	67.66	16.83		150.0	
10221-CAC	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	X	5.05	67.25	16.47	0.00	150.0	± 9.6 %
		Y	4.72	67.02	16.41		150.0	
		Z	4.74	67.64	16.83		150.0	
10222-CAC	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	X	5.34	67.61	16.61	0.00	150.0	± 9.6 %
		Y	5.07	67.21	16.54		150.0	
		Z	5.08	67.73	16.91		150.0	

10223-CAC	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	X	5.70	67.79	16.71	0.00	150.0	± 9.6 %
		Y	5.40	67.54	16.73		150.0	
		Z	5.40	67.99	17.05		150.0	
10224-CAC	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	X	5.41	67.78	16.61	0.00	150.0	± 9.6 %
		Y	5.11	67.32	16.52		150.0	
		Z	5.13	67.85	16.89		150.0	
10225-CAB	UMTS-FDD (HSPA+)	X	3.05	66.58	15.96	0.00	150.0	± 9.6 %
		Y	2.76	66.27	15.37		150.0	
		Z	2.88	67.78	16.33		150.0	
10226-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	27.23	99.40	28.69	6.02	65.0	± 9.6 %
		Y	65.75	123.32	36.14		65.0	
		Z	100.00	131.74	38.09		65.0	
10227-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	22.47	95.04	26.98	6.02	65.0	± 9.6 %
		Y	52.29	117.11	33.90		65.0	
		Z	100.00	129.21	36.75		65.0	
10228-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	31.92	106.77	32.30	6.02	65.0	± 9.6 %
		Y	44.47	122.64	38.05		65.0	
		Z	100.00	141.33	43.09		65.0	
10229-CAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	26.35	98.70	28.41	6.02	65.0	± 9.6 %
		Y	58.00	120.78	35.41		65.0	
		Z	100.00	131.51	37.95		65.0	
10230-CAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	21.85	94.47	26.74	6.02	65.0	± 9.6 %
		Y	46.94	115.04	33.28		65.0	
		Z	100.00	129.06	36.65		65.0	
10231-CAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	30.80	105.98	32.00	6.02	65.0	± 9.6 %
		Y	40.17	120.41	37.37		65.0	
		Z	100.00	141.17	42.97		65.0	
10232-CAE	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	26.35	98.70	28.41	6.02	65.0	± 9.6 %
		Y	58.02	120.80	35.41		65.0	
		Z	100.00	131.52	37.95		65.0	
10233-CAE	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	21.87	94.50	26.75	6.02	65.0	± 9.6 %
		Y	46.92	115.05	33.29		65.0	
		Z	100.00	129.08	36.66		65.0	
10234-CAE	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	29.56	105.04	31.64	6.02	65.0	± 9.6 %
		Y	36.79	118.36	36.70		65.0	
		Z	100.00	140.82	42.77		65.0	
10235-CAE	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	26.39	98.75	28.42	6.02	65.0	± 9.6 %
		Y	58.45	120.95	35.45		65.0	
		Z	100.00	131.54	37.96		65.0	
10236-CAE	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	21.98	94.57	26.77	6.02	65.0	± 9.6 %
		Y	47.66	115.29	33.34		65.0	
		Z	100.00	129.02	36.63		65.0	
10237-CAE	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	31.07	106.17	32.05	6.02	65.0	± 9.6 %
		Y	40.73	120.72	37.45		65.0	
		Z	100.00	141.20	42.98		65.0	
10238-CAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	26.36	98.72	28.41	6.02	65.0	± 9.6 %
		Y	58.07	120.83	35.42		65.0	
		Z	100.00	131.54	37.95		65.0	

10239-CAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	21.89	94.52	26.76	6.02	65.0	± 9.6 %
		Y	46.90	115.06	33.29		65.0	
		Z	100.00	129.10	36.67		65.0	
10240-CAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	31.00	106.13	32.04	6.02	65.0	± 9.6 %
		Y	40.53	120.63	37.43		65.0	
		Z	100.00	141.21	42.99		65.0	
10241-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	15.20	88.40	27.99	6.98	65.0	± 9.6 %
		Y	11.69	87.73	28.05		65.0	
		Z	16.07	96.04	31.20		65.0	
10242-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	14.49	87.29	27.50	6.98	65.0	± 9.6 %
		Y	10.22	84.78	26.83		65.0	
		Z	15.79	95.59	30.95		65.0	
10243-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	12.40	86.09	27.90	6.98	65.0	± 9.6 %
		Y	8.19	81.47	26.43		65.0	
		Z	9.24	85.48	28.29		65.0	
10244-CAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	11.54	82.02	22.22	3.98	65.0	± 9.6 %
		Y	9.48	81.46	20.89		65.0	
		Z	12.71	86.40	22.44		65.0	
10245-CAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	11.44	81.67	22.06	3.98	65.0	± 9.6 %
		Y	9.07	80.51	20.47		65.0	
		Z	11.70	84.81	21.83		65.0	
10246-CAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	10.31	82.48	22.10	3.98	65.0	± 9.6 %
		Y	9.63	84.19	21.69		65.0	
		Z	14.42	91.22	24.11		65.0	
10247-CAE	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	9.10	78.58	21.15	3.98	65.0	± 9.6 %
		Y	7.30	77.79	20.02		65.0	
		Z	8.19	80.29	21.02		65.0	
10248-CAE	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	9.13	78.20	21.01	3.98	65.0	± 9.6 %
		Y	7.16	77.02	19.70		65.0	
		Z	7.86	79.17	20.57		65.0	
10249-CAE	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	10.61	82.90	22.61	3.98	65.0	± 9.6 %
		Y	11.92	88.38	24.07		65.0	
		Z	18.47	96.60	26.87		65.0	
10250-CAE	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	9.67	79.53	22.36	3.98	65.0	± 9.6 %
		Y	8.55	80.92	22.90		65.0	
		Z	9.43	83.45	23.99		65.0	
10251-CAE	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	9.25	77.73	21.44	3.98	65.0	± 9.6 %
		Y	7.81	78.08	21.44		65.0	
		Z	8.39	80.07	22.34		65.0	
10252-CAE	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	10.35	81.73	22.54	3.98	65.0	± 9.6 %
		Y	11.25	87.35	24.73		65.0	
		Z	14.90	93.35	26.99		65.0	
10253-CAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	9.18	77.01	21.32	3.98	65.0	± 9.6 %
		Y	7.67	76.96	21.38		65.0	
		Z	8.07	78.58	22.18		65.0	
10254-CAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	9.51	77.59	21.83	3.98	65.0	± 9.6 %
		Y	8.12	77.94	22.10		65.0	
		Z	8.53	79.55	22.87		65.0	

10255-CAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	9.66	79.25	21.74	3.98	65.0	± 9.6 %
		Y	9.21	82.22	23.19		65.0	
		Z	10.61	85.65	24.67		65.0	
10256-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	11.12	81.22	21.37	3.98	65.0	± 9.6 %
		Y	7.30	76.74	18.05		65.0	
		Z	8.86	79.77	18.95		65.0	
10257-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	11.03	80.77	21.15	3.98	65.0	± 9.6 %
		Y	6.90	75.55	17.47		65.0	
		Z	8.00	77.93	18.14		65.0	
10258-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	10.01	81.84	21.51	3.98	65.0	± 9.6 %
		Y	6.80	78.08	18.61		65.0	
		Z	8.78	82.35	20.16		65.0	
10259-CAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	9.31	78.82	21.54	3.98	65.0	± 9.6 %
		Y	7.80	78.97	21.06		65.0	
		Z	8.71	81.52	22.11		65.0	
10260-CAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	9.35	78.65	21.50	3.98	65.0	± 9.6 %
		Y	7.74	78.54	20.90		65.0	
		Z	8.53	80.86	21.86		65.0	
10261-CAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	10.28	82.11	22.51	3.98	65.0	± 9.6 %
		Y	10.92	86.93	24.01		65.0	
		Z	15.27	93.62	26.42		65.0	
10262-CAE	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	9.66	79.50	22.33	3.98	65.0	± 9.6 %
		Y	8.53	80.85	22.85		65.0	
		Z	9.40	83.37	23.94		65.0	
10263-CAE	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	9.25	77.74	21.45	3.98	65.0	± 9.6 %
		Y	7.80	78.07	21.44		65.0	
		Z	8.37	80.04	22.33		65.0	
10264-CAE	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	10.31	81.65	22.49	3.98	65.0	± 9.6 %
		Y	11.12	87.10	24.62		65.0	
		Z	14.67	93.03	26.86		65.0	
10265-CAE	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	9.37	77.47	21.42	3.98	65.0	± 9.6 %
		Y	7.87	77.56	21.65		65.0	
		Z	8.30	79.25	22.48		65.0	
10266-CAE	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	9.69	78.02	21.95	3.98	65.0	± 9.6 %
		Y	8.35	78.60	22.43		65.0	
		Z	8.79	80.28	23.25		65.0	
10267-CAE	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	9.83	79.33	21.53	3.98	65.0	± 9.6 %
		Y	9.57	82.63	23.13		65.0	
		Z	11.14	86.22	24.67		65.0	
10268-CAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	9.75	76.94	21.50	3.98	65.0	± 9.6 %
		Y	8.31	76.97	21.85		65.0	
		Z	8.58	78.21	22.50		65.0	
10269-CAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	9.68	76.63	21.46	3.98	65.0	± 9.6 %
		Y	8.23	76.50	21.72		65.0	
		Z	8.46	77.65	22.33		65.0	
10270-CAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	9.55	77.46	20.93	3.98	65.0	± 9.6 %
		Y	8.64	78.97	21.93		65.0	
		Z	9.32	81.05	22.93		65.0	

10274-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	X	2.73	66.78	15.78	0.00	150.0	± 9.6 %
		Y	2.55	66.65	15.27		150.0	
		Z	2.75	68.72	16.54		150.0	
10275-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	X	1.87	69.90	16.79	0.00	150.0	± 9.6 %
		Y	1.59	68.43	15.65		150.0	
		Z	2.20	75.02	19.24		150.0	
10277-CAA	PHS (QPSK)	X	7.66	72.68	16.62	9.03	50.0	± 9.6 %
		Y	4.18	66.19	11.16		50.0	
		Z	4.13	66.37	11.19		50.0	
10278-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	X	10.94	81.02	21.98	9.03	50.0	± 9.6 %
		Y	7.49	76.58	18.26		50.0	
		Z	7.86	77.61	18.61		50.0	
10279-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	X	11.14	81.24	22.06	9.03	50.0	± 9.6 %
		Y	7.62	76.77	18.37		50.0	
		Z	7.98	77.79	18.71		50.0	
10290-AAB	CDMA2000, RC1, SO55, Full Rate	X	2.02	72.05	16.87	0.00	150.0	± 9.6 %
		Y	1.33	68.08	13.10		150.0	
		Z	5.38	87.48	20.69		150.0	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	1.18	69.79	15.81	0.00	150.0	± 9.6 %
		Y	0.73	65.15	11.37		150.0	
		Z	3.84	87.72	20.65		150.0	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	1.55	75.05	18.57	0.00	150.0	± 9.6 %
		Y	1.00	69.92	14.02		150.0	
		Z	100.00	134.47	33.06		150.0	
10293-AAB	CDMA2000, RC3, SO3, Full Rate	X	2.21	80.93	21.38	0.00	150.0	± 9.6 %
		Y	2.08	79.76	18.45		150.0	
		Z	100.00	139.87	35.55		150.0	
10295-AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	X	11.13	82.58	24.08	9.03	50.0	± 9.6 %
		Y	14.34	89.67	25.47		50.0	
		Z	17.18	93.30	26.68		50.0	
10297-AAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	3.22	71.51	17.36	0.00	150.0	± 9.6 %
		Y	2.74	70.01	16.73		150.0	
		Z	3.22	73.71	18.81		150.0	
10298-AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	2.12	70.61	16.68	0.00	150.0	± 9.6 %
		Y	1.48	67.44	13.59		150.0	
		Z	2.54	76.34	17.79		150.0	
10299-AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	4.96	77.74	19.43	0.00	150.0	± 9.6 %
		Y	3.19	73.05	15.98		150.0	
		Z	13.80	92.66	22.38		150.0	
10300-AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	3.67	72.02	16.38	0.00	150.0	± 9.6 %
		Y	2.03	66.12	12.02		150.0	
		Z	2.70	70.04	13.54		150.0	
10301-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	X	6.27	69.26	19.45	4.17	80.0	± 9.6 %
		Y	5.47	68.28	18.78		80.0	
		Z	5.65	69.45	19.41		80.0	
10302-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3 CTRL symbols)	X	6.79	69.98	20.24	4.96	80.0	± 9.6 %
		Y	5.81	68.13	19.08		80.0	
		Z	5.96	69.31	19.75		80.0	

10303-AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	X	6.75	70.41	20.49	4.96	80.0	± 9.6 %
		Y	5.62	68.04	19.04		80.0	
		Z	5.78	69.30	19.73		80.0	
10304-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	X	6.25	69.31	19.47	4.17	80.0	± 9.6 %
		Y	5.32	67.54	18.34		80.0	
		Z	5.48	68.78	19.03		80.0	
10305-AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)	X	9.38	80.55	25.65	6.02	50.0	± 9.6 %
		Y	7.34	78.11	24.16		50.0	
		Z	8.77	82.65	26.09		50.0	
10306-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	X	7.69	74.65	23.27	6.02	50.0	± 9.6 %
		Y	6.25	72.73	22.09		50.0	
		Z	6.15	72.04	21.51		50.0	
10307-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	X	8.00	75.81	23.56	6.02	50.0	± 9.6 %
		Y	6.39	73.69	22.36		50.0	
		Z	6.94	76.20	23.58		50.0	
10308-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	X	8.15	76.48	23.87	6.02	50.0	± 9.6 %
		Y	6.50	74.34	22.68		50.0	
		Z	7.15	77.13	24.02		50.0	
10309-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols)	X	7.81	74.87	23.37	6.02	50.0	± 9.6 %
		Y	6.35	73.04	22.27		50.0	
		Z	6.23	72.31	21.68		50.0	
10310-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	X	7.77	75.02	23.32	6.02	50.0	± 9.6 %
		Y	6.30	73.14	22.20		50.0	
		Z	6.80	75.54	23.39		50.0	
10311-AAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	3.59	70.81	17.00	0.00	150.0	± 9.6 %
		Y	3.09	69.16	16.34		150.0	
		Z	3.58	72.40	18.16		150.0	
10313-AAA	iDEN 1:3	X	8.18	76.78	18.18	6.99	70.0	± 9.6 %
		Y	7.34	78.70	18.34		70.0	
		Z	11.68	86.01	21.10		70.0	
10314-AAA	iDEN 1:6	X	10.72	82.29	22.34	10.00	30.0	± 9.6 %
		Y	12.91	90.12	24.76		30.0	
		Z	26.29	102.62	28.75		30.0	
10315-AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	X	1.26	66.14	16.58	0.17	150.0	± 9.6 %
		Y	1.09	64.73	15.70		150.0	
		Z	1.22	67.80	18.09		150.0	
10316-AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	X	4.91	67.12	16.58	0.17	150.0	± 9.6 %
		Y	4.60	66.92	16.50		150.0	
		Z	4.62	67.56	16.93		150.0	
10317-AAC	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	X	4.91	67.12	16.58	0.17	150.0	± 9.6 %
		Y	4.60	66.92	16.50		150.0	
		Z	4.62	67.56	16.93		150.0	
10400-AAD	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	X	5.03	67.36	16.46	0.00	150.0	± 9.6 %
		Y	4.67	67.11	16.40		150.0	
		Z	4.69	67.76	16.84		150.0	
10401-AAD	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	X	5.61	67.39	16.50	0.00	150.0	± 9.6 %
		Y	5.45	67.52	16.70		150.0	
		Z	5.44	67.97	17.02		150.0	

10402-AAD	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)	X	5.92	68.01	16.64	0.00	150.0	± 9.6 %
		Y	5.63	67.57	16.57		150.0	
		Z	5.64	68.02	16.88		150.0	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	2.02	72.05	16.87	0.00	115.0	± 9.6 %
		Y	1.33	68.08	13.10		115.0	
		Z	5.38	87.48	20.69		115.0	
10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	2.02	72.05	16.87	0.00	115.0	± 9.6 %
		Y	1.33	68.08	13.10		115.0	
		Z	5.38	87.48	20.69		115.0	
10406-AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	X	100.00	123.59	32.30	0.00	100.0	± 9.6 %
		Y	100.00	127.86	33.09		100.0	
		Z	100.00	123.04	30.66		100.0	
10410-AAE	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9, Subframe Conf=4)	X	100.00	117.66	30.25	3.23	80.0	± 9.6 %
		Y	100.00	123.71	31.68		80.0	
		Z	100.00	125.06	32.10		80.0	
10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	1.03	63.82	15.39	0.00	150.0	± 9.6 %
		Y	0.95	63.14	14.76		150.0	
		Z	1.05	65.76	16.99		150.0	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	4.78	66.90	16.39	0.00	150.0	± 9.6 %
		Y	4.50	66.77	16.34		150.0	
		Z	4.53	67.42	16.78		150.0	
10417-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	X	4.78	66.90	16.39	0.00	150.0	± 9.6 %
		Y	4.50	66.77	16.34		150.0	
		Z	4.53	67.42	16.78		150.0	
10418-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule)	X	4.76	67.04	16.38	0.00	150.0	± 9.6 %
		Y	4.49	66.93	16.36		150.0	
		Z	4.53	67.63	16.83		150.0	
10419-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preambule)	X	4.79	67.00	16.40	0.00	150.0	± 9.6 %
		Y	4.51	66.88	16.36		150.0	
		Z	4.55	67.55	16.82		150.0	
10422-AAB	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	X	4.92	67.01	16.41	0.00	150.0	± 9.6 %
		Y	4.63	66.87	16.38		150.0	
		Z	4.66	67.51	16.81		150.0	
10423-AAB	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	X	5.17	67.45	16.57	0.00	150.0	± 9.6 %
		Y	4.80	67.19	16.49		150.0	
		Z	4.81	67.82	16.91		150.0	
10424-AAB	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	X	5.06	67.37	16.53	0.00	150.0	± 9.6 %
		Y	4.72	67.14	16.46		150.0	
		Z	4.74	67.79	16.90		150.0	
10425-AAB	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	X	5.61	67.73	16.66	0.00	150.0	± 9.6 %
		Y	5.37	67.58	16.73		150.0	
		Z	5.35	67.97	17.02		150.0	
10426-AAB	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	X	5.63	67.77	16.67	0.00	150.0	± 9.6 %
		Y	5.40	67.71	16.79		150.0	
		Z	5.39	68.12	17.09		150.0	

10427-AAB	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	X	5.66	67.84	16.70	0.00	150.0	± 9.6 %
		Y	5.39	67.59	16.72		150.0	
		Z	5.38	68.01	17.03		150.0	
10430-AAC	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	X	4.51	70.10	18.24	0.00	150.0	± 9.6 %
		Y	4.24	71.22	18.35		150.0	
		Z	4.53	73.23	19.40		150.0	
10431-AAC	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	X	4.58	67.49	16.53	0.00	150.0	± 9.6 %
		Y	4.18	67.35	16.31		150.0	
		Z	4.23	68.26	16.89		150.0	
10432-AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	X	4.85	67.42	16.52	0.00	150.0	± 9.6 %
		Y	4.48	67.20	16.40		150.0	
		Z	4.52	67.94	16.89		150.0	
10433-AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	X	5.09	67.45	16.57	0.00	150.0	± 9.6 %
		Y	4.73	67.17	16.48		150.0	
		Z	4.75	67.82	16.92		150.0	
10434-AAA	W-CDMA (BS Test Model 1, 64 DPCH)	X	4.59	70.69	18.26	0.00	150.0	± 9.6 %
		Y	4.35	72.09	18.28		150.0	
		Z	4.80	74.69	19.54		150.0	
10435-AAE	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	117.55	30.20	3.23	80.0	± 9.6 %
		Y	100.00	123.49	31.58		80.0	
		Z	100.00	124.81	31.99		80.0	
10447-AAC	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	3.92	67.59	16.23	0.00	150.0	± 9.6 %
		Y	3.45	67.33	15.52		150.0	
		Z	3.58	68.73	16.33		150.0	
10448-AAC	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	X	4.37	67.26	16.39	0.00	150.0	± 9.6 %
		Y	4.02	67.12	16.17		150.0	
		Z	4.08	68.05	16.77		150.0	
10449-AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	X	4.61	67.24	16.43	0.00	150.0	± 9.6 %
		Y	4.29	67.02	16.30		150.0	
		Z	4.34	67.79	16.81		150.0	
10450-AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	4.77	67.19	16.43	0.00	150.0	± 9.6 %
		Y	4.49	66.93	16.33		150.0	
		Z	4.53	67.61	16.79		150.0	
10451-AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	X	3.88	67.92	16.10	0.00	150.0	± 9.6 %
		Y	3.33	67.43	15.05		150.0	
		Z	3.49	69.03	15.93		150.0	
10456-AAB	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)	X	6.46	68.41	16.85	0.00	150.0	± 9.6 %
		Y	6.26	68.12	16.87		150.0	
		Z	6.25	68.49	17.13		150.0	
10457-AAA	UMTS-FDD (DC-HSDPA)	X	3.90	65.59	16.17	0.00	150.0	± 9.6 %
		Y	3.76	65.38	16.04		150.0	
		Z	3.79	66.03	16.51		150.0	
10458-AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	X	4.07	69.24	17.56	0.00	150.0	± 9.6 %
		Y	3.96	71.20	17.54		150.0	
		Z	4.42	73.99	18.87		150.0	
10459-AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	X	5.22	66.85	17.78	0.00	150.0	± 9.6 %
		Y	5.09	68.80	18.35		150.0	
		Z	5.15	69.70	18.77		150.0	

10460-AAA	UMTS-FDD (WCDMA, AMR)	X	1.09	71.95	18.33	0.00	150.0	± 9.6 %
		Y	0.90	69.62	16.52		150.0	
		Z	2.47	89.66	25.89		150.0	
10461-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	119.29	31.07	3.29	80.0	± 9.6 %
		Y	100.00	129.27	34.27		80.0	
		Z	100.00	135.07	36.63		80.0	
10462-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	109.03	26.12	3.23	80.0	± 9.6 %
		Y	100.00	110.72	25.52		80.0	
		Z	100.00	111.86	25.68		80.0	
10463-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	107.11	25.19	3.23	80.0	± 9.6 %
		Y	100.00	106.80	23.66		80.0	
		Z	100.00	106.90	23.37		80.0	
10464-AAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	117.90	30.29	3.23	80.0	± 9.6 %
		Y	100.00	127.01	33.06		80.0	
		Z	100.00	132.87	35.42		80.0	
10465-AAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.70	25.94	3.23	80.0	± 9.6 %
		Y	100.00	110.09	25.21		80.0	
		Z	100.00	111.09	25.32		80.0	
10466-AAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	106.79	25.02	3.23	80.0	± 9.6 %
		Y	100.00	106.23	23.39		80.0	
		Z	100.00	106.21	23.05		80.0	
10467-AAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	118.04	30.36	3.23	80.0	± 9.6 %
		Y	100.00	127.30	33.19		80.0	
		Z	100.00	133.22	35.58		80.0	
10468-AAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.80	25.99	3.23	80.0	± 9.6 %
		Y	100.00	110.30	25.31		80.0	
		Z	100.00	111.37	25.44		80.0	
10469-AAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	106.79	25.02	3.23	80.0	± 9.6 %
		Y	100.00	106.25	23.40		80.0	
		Z	100.00	106.24	23.06		80.0	
10470-AAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	118.06	30.36	3.23	80.0	± 9.6 %
		Y	100.00	127.34	33.19		80.0	
		Z	100.00	133.28	35.59		80.0	
10471-AAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.76	25.97	3.23	80.0	± 9.6 %
		Y	100.00	110.24	25.28		80.0	
		Z	100.00	111.29	25.40		80.0	
10472-AAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	106.76	25.00	3.23	80.0	± 9.6 %
		Y	100.00	106.18	23.36		80.0	
		Z	100.00	106.15	23.01		80.0	
10473-AAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	118.04	30.35	3.23	80.0	± 9.6 %
		Y	100.00	127.30	33.18		80.0	
		Z	100.00	133.25	35.58		80.0	
10474-AAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.77	25.98	3.23	80.0	± 9.6 %
		Y	100.00	110.25	25.28		80.0	
		Z	100.00	111.30	25.41		80.0	
10475-AAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	106.77	25.00	3.23	80.0	± 9.6 %
		Y	100.00	106.20	23.36		80.0	
		Z	100.00	106.17	23.02		80.0	

10477-AAE	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.66	25.92	3.23	80.0	± 9.6 %
		Y	100.00	110.04	25.18		80.0	
		Z	100.00	111.05	25.29		80.0	
10478-AAE	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	106.74	24.99	3.23	80.0	± 9.6 %
		Y	100.00	106.13	23.33		80.0	
		Z	100.00	106.08	22.98		80.0	
10479-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	17.17	94.88	26.67	3.23	80.0	± 9.6 %
		Y	100.00	126.13	34.20		80.0	
		Z	100.00	128.86	35.27		80.0	
10480-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	18.02	90.95	24.20	3.23	80.0	± 9.6 %
		Y	100.00	116.06	29.45		80.0	
		Z	100.00	117.09	29.64		80.0	
10481-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	16.69	89.16	23.39	3.23	80.0	± 9.6 %
		Y	78.52	110.97	27.74		80.0	
		Z	100.00	114.83	28.52		80.0	
10482-AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	8.60	82.86	21.58	2.23	80.0	± 9.6 %
		Y	6.37	80.68	19.69		80.0	
		Z	52.06	110.60	28.35		80.0	
10483-AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	12.06	85.41	22.66	2.23	80.0	± 9.6 %
		Y	17.37	91.48	23.08		80.0	
		Z	100.00	115.48	29.12		80.0	
10484-AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	11.38	84.32	22.32	2.23	80.0	± 9.6 %
		Y	13.11	87.46	21.88		80.0	
		Z	100.00	115.15	29.01		80.0	
10485-AAD	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	8.70	83.12	22.08	2.23	80.0	± 9.6 %
		Y	6.99	82.94	21.58		80.0	
		Z	26.69	104.60	28.39		80.0	
10486-AAD	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.25	75.65	19.36	2.23	80.0	± 9.6 %
		Y	4.71	73.88	17.80		80.0	
		Z	7.77	82.03	20.93		80.0	
10487-AAD	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.19	75.17	19.19	2.23	80.0	± 9.6 %
		Y	4.58	73.14	17.50		80.0	
		Z	7.10	80.36	20.33		80.0	
10488-AAD	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	8.05	80.66	21.48	2.23	80.0	± 9.6 %
		Y	5.99	79.49	21.25		80.0	
		Z	10.08	89.23	24.99		80.0	
10489-AAD	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.08	74.33	19.47	2.23	80.0	± 9.6 %
		Y	4.70	73.00	18.85		80.0	
		Z	5.75	77.22	20.77		80.0	
10490-AAD	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.07	73.79	19.30	2.23	80.0	± 9.6 %
		Y	4.74	72.60	18.71		80.0	
		Z	5.67	76.43	20.47		80.0	
10491-AAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.20	77.33	20.36	2.23	80.0	± 9.6 %
		Y	5.44	75.84	20.10		80.0	
		Z	7.08	81.24	22.47		80.0	
10492-AAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.12	72.85	19.06	2.23	80.0	± 9.6 %
		Y	4.82	71.42	18.57		80.0	
		Z	5.37	74.04	19.89		80.0	

10493-AAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.14	72.54	18.97	2.23	80.0	± 9.6 %
		Y	4.86	71.18	18.48		80.0	
		Z	5.36	73.62	19.72		80.0	
10494-AAE	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	8.31	79.62	20.98	2.23	80.0	± 9.6 %
		Y	6.15	77.89	20.70		80.0	
		Z	8.68	84.61	23.48		80.0	
10495-AAE	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.32	73.62	19.32	2.23	80.0	± 9.6 %
		Y	4.90	71.93	18.81		80.0	
		Z	5.49	74.66	20.19		80.0	
10496-AAE	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.28	73.03	19.14	2.23	80.0	± 9.6 %
		Y	4.92	71.46	18.66		80.0	
		Z	5.43	73.91	19.92		80.0	
10497-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.65	81.23	20.62	2.23	80.0	± 9.6 %
		Y	3.65	72.58	15.66		80.0	
		Z	21.09	94.73	22.69		80.0	
10498-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.65	74.32	17.51	2.23	80.0	± 9.6 %
		Y	2.09	63.47	10.71		80.0	
		Z	2.52	66.12	11.86		80.0	
10499-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.60	73.85	17.24	2.23	80.0	± 9.6 %
		Y	2.00	62.76	10.22		80.0	
		Z	2.24	64.62	11.02		80.0	
10500-AAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.98	81.23	21.57	2.23	80.0	± 9.6 %
		Y	6.26	80.85	21.25		80.0	
		Z	14.66	95.46	26.32		80.0	
10501-AAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.12	74.87	19.30	2.23	80.0	± 9.6 %
		Y	4.73	73.59	18.23		80.0	
		Z	6.73	79.86	20.79		80.0	
10502-AAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.10	74.47	19.13	2.23	80.0	± 9.6 %
		Y	4.73	73.21	18.02		80.0	
		Z	6.58	79.10	20.44		80.0	
10503-AAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.94	80.44	21.39	2.23	80.0	± 9.6 %
		Y	5.89	79.20	21.13		80.0	
		Z	9.82	88.78	24.83		80.0	
10504-AAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.06	74.25	19.42	2.23	80.0	± 9.6 %
		Y	4.67	72.88	18.78		80.0	
		Z	5.71	77.06	20.69		80.0	
10505-AAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.04	73.70	19.25	2.23	80.0	± 9.6 %
		Y	4.70	72.48	18.64		80.0	
		Z	5.62	76.28	20.40		80.0	
10506-AAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	8.23	79.46	20.92	2.23	80.0	± 9.6 %
		Y	6.08	77.69	20.61		80.0	
		Z	8.55	84.33	23.37		80.0	
10507-AAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.29	73.56	19.28	2.23	80.0	± 9.6 %
		Y	4.88	71.86	18.77		80.0	
		Z	5.47	74.58	20.15		80.0	

10508-AAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.26	72.96	19.10	2.23	80.0	± 9.6 %
		Y	4.90	71.38	18.62		80.0	
		Z	5.41	73.81	19.87		80.0	
10509-AAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.61	76.55	19.89	2.23	80.0	± 9.6 %
		Y	5.85	74.80	19.56		80.0	
		Z	7.10	78.86	21.43		80.0	
10510-AAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.61	72.71	18.99	2.23	80.0	± 9.6 %
		Y	5.25	70.97	18.53		80.0	
		Z	5.63	72.87	19.56		80.0	
10511-AAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.56	72.25	18.87	2.23	80.0	± 9.6 %
		Y	5.26	70.60	18.43		80.0	
		Z	5.60	72.35	19.38		80.0	
10512-AAE	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	8.64	79.13	20.66	2.23	80.0	± 9.6 %
		Y	6.45	77.03	20.24		80.0	
		Z	8.55	82.55	22.59		80.0	
10513-AAE	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.66	73.45	19.25	2.23	80.0	± 9.6 %
		Y	5.19	71.42	18.71		80.0	
		Z	5.63	73.53	19.83		80.0	
10514-AAE	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.51	72.73	19.04	2.23	80.0	± 9.6 %
		Y	5.14	70.84	18.53		80.0	
		Z	5.51	72.71	19.55		80.0	
10515-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	X	0.99	64.09	15.51	0.00	150.0	± 9.6 %
		Y	0.91	63.36	14.83		150.0	
		Z	1.02	66.28	17.27		150.0	
10516-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	X	0.99	80.49	22.15	0.00	150.0	± 9.6 %
		Y	0.72	75.52	18.82		150.0	
		Z	100.00	176.41	49.28		150.0	
10517-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	X	0.89	67.15	16.75	0.00	150.0	± 9.6 %
		Y	0.78	65.73	15.58		150.0	
		Z	1.04	72.66	20.23		150.0	
10518-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	X	4.78	67.01	16.39	0.00	150.0	± 9.6 %
		Y	4.49	66.85	16.32		150.0	
		Z	4.53	67.52	16.77		150.0	
10519-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	X	5.04	67.34	16.53	0.00	150.0	± 9.6 %
		Y	4.68	67.08	16.44		150.0	
		Z	4.70	67.72	16.87		150.0	
10520-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	X	4.88	67.34	16.47	0.00	150.0	± 9.6 %
		Y	4.53	67.04	16.36		150.0	
		Z	4.56	67.71	16.81		150.0	
10521-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	X	4.81	67.36	16.46	0.00	150.0	± 9.6 %
		Y	4.46	67.02	16.34		150.0	
		Z	4.49	67.71	16.81		150.0	
10522-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	X	4.84	67.20	16.43	0.00	150.0	± 9.6 %
		Y	4.52	67.14	16.44		150.0	
		Z	4.56	67.84	16.91		150.0	

10523-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	X	4.71	67.20	16.33	0.00	150.0	± 9.6 %
		Y	4.40	66.99	16.27		150.0	
		Z	4.45	67.74	16.78		150.0	
10524-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	X	4.80	67.20	16.44	0.00	150.0	± 9.6 %
		Y	4.47	67.06	16.40		150.0	
		Z	4.50	67.76	16.88		150.0	
10525-AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)	X	4.73	66.25	16.04	0.00	150.0	± 9.6 %
		Y	4.46	66.08	15.99		150.0	
		Z	4.50	66.81	16.47		150.0	
10526-AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle)	X	4.96	66.67	16.18	0.00	150.0	± 9.6 %
		Y	4.62	66.45	16.13		150.0	
		Z	4.66	67.17	16.61		150.0	
10527-AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle)	X	4.88	66.68	16.16	0.00	150.0	± 9.6 %
		Y	4.55	66.41	16.07		150.0	
		Z	4.59	67.15	16.56		150.0	
10528-AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle)	X	4.90	66.70	16.19	0.00	150.0	± 9.6 %
		Y	4.56	66.43	16.10		150.0	
		Z	4.61	67.16	16.59		150.0	
10529-AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle)	X	4.90	66.70	16.19	0.00	150.0	± 9.6 %
		Y	4.56	66.43	16.10		150.0	
		Z	4.61	67.16	16.59		150.0	
10531-AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle)	X	4.93	66.87	16.22	0.00	150.0	± 9.6 %
		Y	4.55	66.53	16.11		150.0	
		Z	4.59	67.26	16.61		150.0	
10532-AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle)	X	4.78	66.80	16.20	0.00	150.0	± 9.6 %
		Y	4.41	66.38	16.04		150.0	
		Z	4.46	67.13	16.55		150.0	
10533-AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle)	X	4.92	66.70	16.16	0.00	150.0	± 9.6 %
		Y	4.57	66.48	16.09		150.0	
		Z	4.62	67.24	16.59		150.0	
10534-AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle)	X	5.39	66.90	16.23	0.00	150.0	± 9.6 %
		Y	5.12	66.55	16.19		150.0	
		Z	5.14	67.09	16.56		150.0	
10535-AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc duty cycle)	X	5.48	67.05	16.29	0.00	150.0	± 9.6 %
		Y	5.20	66.78	16.29		150.0	
		Z	5.21	67.31	16.67		150.0	
10536-AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc duty cycle)	X	5.33	67.03	16.27	0.00	150.0	± 9.6 %
		Y	5.06	66.69	16.23		150.0	
		Z	5.09	67.28	16.63		150.0	
10537-AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc duty cycle)	X	5.40	66.99	16.24	0.00	150.0	± 9.6 %
		Y	5.11	66.65	16.21		150.0	
		Z	5.14	67.22	16.60		150.0	
10538-AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc duty cycle)	X	5.53	67.09	16.33	0.00	150.0	± 9.6 %
		Y	5.20	66.67	16.26		150.0	
		Z	5.22	67.20	16.63		150.0	
10540-AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc duty cycle)	X	5.41	67.00	16.30	0.00	150.0	± 9.6 %
		Y	5.14	66.71	16.30		150.0	
		Z	5.16	67.23	16.67		150.0	

10541-AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle)	X	5.42	67.02	16.32	0.00	150.0	± 9.6 %
		Y	5.11	66.54	16.21		150.0	
		Z	5.12	67.08	16.58		150.0	
10542-AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle)	X	5.54	66.95	16.29	0.00	150.0	± 9.6 %
		Y	5.26	66.62	16.26		150.0	
		Z	5.28	67.14	16.62		150.0	
10543-AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle)	X	5.67	67.05	16.35	0.00	150.0	± 9.6 %
		Y	5.34	66.68	16.32		150.0	
		Z	5.34	67.15	16.64		150.0	
10544-AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle)	X	5.64	67.00	16.21	0.00	150.0	± 9.6 %
		Y	5.43	66.63	16.17		150.0	
		Z	5.46	67.13	16.51		150.0	
10545-AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle)	X	5.86	67.34	16.31	0.00	150.0	± 9.6 %
		Y	5.66	67.18	16.39		150.0	
		Z	5.67	67.64	16.72		150.0	
10546-AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle)	X	5.77	67.34	16.33	0.00	150.0	± 9.6 %
		Y	5.50	66.85	16.24		150.0	
		Z	5.52	67.32	16.57		150.0	
10547-AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle)	X	5.87	67.43	16.36	0.00	150.0	± 9.6 %
		Y	5.58	66.90	16.26		150.0	
		Z	5.59	67.39	16.60		150.0	
10548-AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle)	X	6.12	68.32	16.77	0.00	150.0	± 9.6 %
		Y	5.96	68.26	16.91		150.0	
		Z	5.88	68.47	17.11		150.0	
10550-AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle)	X	5.79	67.25	16.29	0.00	150.0	± 9.6 %
		Y	5.55	66.95	16.31		150.0	
		Z	5.57	67.45	16.65		150.0	
10551-AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle)	X	5.80	67.34	16.30	0.00	150.0	± 9.6 %
		Y	5.53	66.88	16.23		150.0	
		Z	5.55	67.39	16.58		150.0	
10552-AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle)	X	5.70	67.13	16.22	0.00	150.0	± 9.6 %
		Y	5.44	66.67	16.13		150.0	
		Z	5.47	67.20	16.49		150.0	
10553-AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle)	X	5.80	67.16	16.25	0.00	150.0	± 9.6 %
		Y	5.52	66.70	16.18		150.0	
		Z	5.54	67.19	16.52		150.0	
10554-AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 99pc duty cycle)	X	6.03	67.39	16.30	0.00	150.0	± 9.6 %
		Y	5.86	67.00	16.26		150.0	
		Z	5.88	67.46	16.57		150.0	
10555-AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc duty cycle)	X	6.23	67.82	16.48	0.00	150.0	± 9.6 %
		Y	6.01	67.38	16.43		150.0	
		Z	6.01	67.80	16.72		150.0	
10556-AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 99pc duty cycle)	X	6.21	67.73	16.43	0.00	150.0	± 9.6 %
		Y	6.02	67.38	16.42		150.0	
		Z	6.04	67.85	16.74		150.0	
10557-AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 99pc duty cycle)	X	6.21	67.74	16.46	0.00	150.0	± 9.6 %
		Y	5.97	67.26	16.38		150.0	
		Z	5.99	67.71	16.68		150.0	

10558-AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 99pc duty cycle)	X	6.27	67.93	16.57	0.00	150.0	± 9.6 %
		Y	6.02	67.44	16.49		150.0	
		Z	6.04	67.88	16.79		150.0	
10560-AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 99pc duty cycle)	X	6.29	67.82	16.55	0.00	150.0	± 9.6 %
		Y	6.01	67.26	16.43		150.0	
		Z	6.02	67.70	16.73		150.0	
10561-AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 99pc duty cycle)	X	6.18	67.73	16.55	0.00	150.0	± 9.6 %
		Y	5.95	67.28	16.48		150.0	
		Z	5.96	67.72	16.78		150.0	
10562-AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 99pc duty cycle)	X	6.34	68.21	16.79	0.00	150.0	± 9.6 %
		Y	6.07	67.66	16.67		150.0	
		Z	6.06	68.04	16.94		150.0	
10563-AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 99pc duty cycle)	X	6.54	68.35	16.80	0.00	150.0	± 9.6 %
		Y	6.27	67.90	16.75		150.0	
		Z	6.17	68.00	16.88		150.0	
10564-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)	X	5.13	67.16	16.58	0.46	150.0	± 9.6 %
		Y	4.83	66.94	16.49		150.0	
		Z	4.85	67.53	16.89		150.0	
10565-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle)	X	5.43	67.67	16.90	0.46	150.0	± 9.6 %
		Y	5.06	67.39	16.81		150.0	
		Z	5.07	67.95	17.19		150.0	
10566-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle)	X	5.25	67.56	16.74	0.46	150.0	± 9.6 %
		Y	4.89	67.24	16.63		150.0	
		Z	4.91	67.83	17.03		150.0	
10567-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	X	5.28	67.94	17.06	0.46	150.0	± 9.6 %
		Y	4.92	67.63	16.99		150.0	
		Z	4.94	68.24	17.40		150.0	
10568-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	X	5.15	67.23	16.47	0.46	150.0	± 9.6 %
		Y	4.81	67.05	16.42		150.0	
		Z	4.83	67.65	16.83		150.0	
10569-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	X	5.21	67.93	17.06	0.46	150.0	± 9.6 %
		Y	4.89	67.75	17.06		150.0	
		Z	4.92	68.42	17.51		150.0	
10570-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle)	X	5.25	67.71	16.98	0.46	150.0	± 9.6 %
		Y	4.91	67.59	16.99		150.0	
		Z	4.93	68.22	17.41		150.0	
10571-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	X	1.55	68.26	17.49	0.46	130.0	± 9.6 %
		Y	1.27	66.22	16.43		130.0	
		Z	1.44	69.66	18.90		130.0	
10572-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)	X	1.60	69.11	17.93	0.46	130.0	± 9.6 %
		Y	1.29	67.00	16.87		130.0	
		Z	1.50	70.89	19.56		130.0	
10573-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	X	100.00	141.39	37.07	0.46	130.0	± 9.6 %
		Y	46.60	130.15	33.95		130.0	
		Z	100.00	156.98	42.98		130.0	
10574-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	X	2.35	79.26	22.24	0.46	130.0	± 9.6 %
		Y	1.71	75.87	20.88		130.0	
		Z	3.27	90.44	27.60		130.0	

10575-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)	X	4.96	67.05	16.69	0.46	130.0	± 9.6 %
		Y	4.65	66.85	16.61		130.0	
		Z	4.67	67.45	17.02		130.0	
10576-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	X	4.99	67.21	16.75	0.46	130.0	± 9.6 %
		Y	4.68	67.02	16.67		130.0	
		Z	4.70	67.64	17.09		130.0	
10577-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	X	5.25	67.57	16.93	0.46	130.0	± 9.6 %
		Y	4.87	67.30	16.84		130.0	
		Z	4.88	67.89	17.24		130.0	
10578-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	X	5.15	67.76	17.03	0.46	130.0	± 9.6 %
		Y	4.77	67.47	16.95		130.0	
		Z	4.79	68.09	17.37		130.0	
10579-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	X	4.94	67.22	16.46	0.46	130.0	± 9.6 %
		Y	4.54	66.75	16.25		130.0	
		Z	4.56	67.37	16.68		130.0	
10580-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	X	4.98	67.11	16.42	0.46	130.0	± 9.6 %
		Y	4.59	66.80	16.28		130.0	
		Z	4.60	67.42	16.71		130.0	
10581-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	X	5.08	67.93	17.03	0.46	130.0	± 9.6 %
		Y	4.68	67.53	16.91		130.0	
		Z	4.71	68.21	17.36		130.0	
10582-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	X	4.90	66.94	16.26	0.46	130.0	± 9.6 %
		Y	4.48	66.52	16.04		130.0	
		Z	4.49	67.13	16.46		130.0	
10583-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	X	4.96	67.05	16.69	0.46	130.0	± 9.6 %
		Y	4.65	66.85	16.61		130.0	
		Z	4.67	67.45	17.02		130.0	
10584-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	X	4.99	67.21	16.75	0.46	130.0	± 9.6 %
		Y	4.68	67.02	16.67		130.0	
		Z	4.70	67.64	17.09		130.0	
10585-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	X	5.25	67.57	16.93	0.46	130.0	± 9.6 %
		Y	4.87	67.30	16.84		130.0	
		Z	4.88	67.89	17.24		130.0	
10586-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	X	5.15	67.76	17.03	0.46	130.0	± 9.6 %
		Y	4.77	67.47	16.95		130.0	
		Z	4.79	68.09	17.37		130.0	
10587-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	X	4.94	67.22	16.46	0.46	130.0	± 9.6 %
		Y	4.54	66.75	16.25		130.0	
		Z	4.56	67.37	16.68		130.0	
10588-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	X	4.98	67.11	16.42	0.46	130.0	± 9.6 %
		Y	4.59	66.80	16.28		130.0	
		Z	4.60	67.42	16.71		130.0	
10589-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	X	5.08	67.93	17.03	0.46	130.0	± 9.6 %
		Y	4.68	67.53	16.91		130.0	
		Z	4.71	68.21	17.36		130.0	
10590-AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	X	4.90	66.94	16.26	0.46	130.0	± 9.6 %
		Y	4.48	66.52	16.04		130.0	
		Z	4.49	67.13	16.46		130.0	

10591-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle)	X	5.11	67.10	16.77	0.46	130.0	± 9.6 %
		Y	4.80	66.89	16.71		130.0	
		Z	4.81	67.46	17.09		130.0	
10592-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc duty cycle)	X	5.30	67.44	16.88	0.46	130.0	± 9.6 %
		Y	4.95	67.23	16.84		130.0	
		Z	4.96	67.80	17.22		130.0	
10593-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc duty cycle)	X	5.24	67.45	16.82	0.46	130.0	± 9.6 %
		Y	4.87	67.14	16.72		130.0	
		Z	4.88	67.71	17.10		130.0	
10594-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc duty cycle)	X	5.29	67.56	16.94	0.46	130.0	± 9.6 %
		Y	4.93	67.31	16.88		130.0	
		Z	4.94	67.88	17.26		130.0	
10595-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc duty cycle)	X	5.29	67.58	16.87	0.46	130.0	± 9.6 %
		Y	4.89	67.27	16.77		130.0	
		Z	4.91	67.86	17.17		130.0	
10596-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc duty cycle)	X	5.21	67.55	16.86	0.46	130.0	± 9.6 %
		Y	4.83	67.27	16.78		130.0	
		Z	4.85	67.88	17.19		130.0	
10597-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc duty cycle)	X	5.17	67.54	16.80	0.46	130.0	± 9.6 %
		Y	4.78	67.17	16.65		130.0	
		Z	4.80	67.76	17.06		130.0	
10598-AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc duty cycle)	X	5.16	67.82	17.06	0.46	130.0	± 9.6 %
		Y	4.76	67.40	16.92		130.0	
		Z	4.78	68.01	17.33		130.0	
10599-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle)	X	5.78	67.76	16.95	0.46	130.0	± 9.6 %
		Y	5.50	67.50	16.97		130.0	
		Z	5.48	67.89	17.25		130.0	
10600-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc duty cycle)	X	6.01	68.41	17.25	0.46	130.0	± 9.6 %
		Y	5.72	68.21	17.30		130.0	
		Z	5.66	68.47	17.51		130.0	
10601-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc duty cycle)	X	5.85	68.03	17.07	0.46	130.0	± 9.6 %
		Y	5.55	67.76	17.09		130.0	
		Z	5.52	68.13	17.36		130.0	
10602-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty cycle)	X	5.97	68.13	17.04	0.46	130.0	± 9.6 %
		Y	5.67	67.88	17.06		130.0	
		Z	5.65	68.28	17.35		130.0	
10603-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc duty cycle)	X	6.09	68.50	17.35	0.46	130.0	± 9.6 %
		Y	5.71	68.06	17.28		130.0	
		Z	5.71	68.52	17.60		130.0	
10604-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc duty cycle)	X	5.80	67.77	16.98	0.46	130.0	± 9.6 %
		Y	5.51	67.48	16.98		130.0	
		Z	5.55	68.08	17.37		130.0	
10605-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc duty cycle)	X	5.89	68.00	17.10	0.46	130.0	± 9.6 %
		Y	5.67	67.99	17.24		130.0	
		Z	5.64	68.35	17.51		130.0	
10606-AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc duty cycle)	X	5.66	67.48	16.72	0.46	130.0	± 9.6 %
		Y	5.34	67.07	16.63		130.0	
		Z	5.34	67.50	16.94		130.0	

10607-AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle)	X	4.93	66.37	16.37	0.46	130.0	± 9.6 %
		Y	4.64	66.20	16.32		130.0	
		Z	4.67	66.86	16.76		130.0	
10608-AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc duty cycle)	X	5.17	66.81	16.52	0.46	130.0	± 9.6 %
		Y	4.82	66.61	16.49		130.0	
		Z	4.85	67.26	16.93		130.0	
10609-AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle)	X	5.06	66.74	16.42	0.46	130.0	± 9.6 %
		Y	4.71	66.45	16.33		130.0	
		Z	4.74	67.12	16.77		130.0	
10610-AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle)	X	5.12	66.88	16.56	0.46	130.0	± 9.6 %
		Y	4.76	66.62	16.49		130.0	
		Z	4.79	67.28	16.94		130.0	
10611-AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle)	X	5.06	66.78	16.45	0.46	130.0	± 9.6 %
		Y	4.68	66.42	16.34		130.0	
		Z	4.71	67.09	16.79		130.0	
10612-AAB	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle)	X	5.07	66.89	16.47	0.46	130.0	± 9.6 %
		Y	4.69	66.60	16.39		130.0	
		Z	4.72	67.29	16.86		130.0	
10613-AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle)	X	5.09	66.84	16.39	0.46	130.0	± 9.6 %
		Y	4.69	66.47	16.27		130.0	
		Z	4.72	67.12	16.71		130.0	
10614-AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle)	X	5.02	67.07	16.64	0.46	130.0	± 9.6 %
		Y	4.63	66.65	16.50		130.0	
		Z	4.67	67.34	16.97		130.0	
10615-AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle)	X	5.05	66.55	16.22	0.46	130.0	± 9.6 %
		Y	4.68	66.26	16.11		130.0	
		Z	4.71	66.93	16.56		130.0	
10616-AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	X	5.58	67.01	16.56	0.46	130.0	± 9.6 %
		Y	5.30	66.67	16.53		130.0	
		Z	5.31	67.17	16.87		130.0	
10617-AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle)	X	5.67	67.15	16.59	0.46	130.0	± 9.6 %
		Y	5.40	66.96	16.65		130.0	
		Z	5.40	67.43	16.98		130.0	
10618-AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle)	X	5.54	67.19	16.63	0.46	130.0	± 9.6 %
		Y	5.27	66.91	16.64		130.0	
		Z	5.28	67.44	17.00		130.0	
10619-AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle)	X	5.56	66.99	16.47	0.46	130.0	± 9.6 %
		Y	5.29	66.74	16.49		130.0	
		Z	5.29	67.20	16.82		130.0	
10620-AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle)	X	5.71	67.17	16.61	0.46	130.0	± 9.6 %
		Y	5.37	66.74	16.54		130.0	
		Z	5.37	67.21	16.87		130.0	
10621-AAB	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle)	X	5.67	67.21	16.74	0.46	130.0	± 9.6 %
		Y	5.36	66.85	16.72		130.0	
		Z	5.37	67.34	17.05		130.0	
10622-AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle)	X	5.65	67.25	16.75	0.46	130.0	± 9.6 %
		Y	5.40	67.10	16.83		130.0	
		Z	5.39	67.52	17.14		130.0	

10623-AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc duty cycle)	X	5.59	67.04	16.55	0.46	130.0	± 9.6 %
		Y	5.26	66.55	16.43		130.0	
		Z	5.26	67.02	16.76		130.0	
10624-AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc duty cycle)	X	5.72	67.01	16.59	0.46	130.0	± 9.6 %
		Y	5.45	66.76	16.60		130.0	
		Z	5.45	67.20	16.91		130.0	
10625-AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc duty cycle)	X	6.03	67.67	16.96	0.46	130.0	± 9.6 %
		Y	5.87	67.91	17.22		130.0	
		Z	5.76	68.04	17.38		130.0	
10626-AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc duty cycle)	X	5.81	67.03	16.49	0.46	130.0	± 9.6 %
		Y	5.60	66.70	16.47		130.0	
		Z	5.61	67.15	16.78		130.0	
10627-AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc duty cycle)	X	6.05	67.45	16.63	0.46	130.0	± 9.6 %
		Y	5.90	67.46	16.82		130.0	
		Z	5.89	67.86	17.10		130.0	
10628-AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc duty cycle)	X	5.90	67.26	16.49	0.46	130.0	± 9.6 %
		Y	5.65	66.83	16.44		130.0	
		Z	5.64	67.23	16.72		130.0	
10629-AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc duty cycle)	X	6.01	67.37	16.53	0.46	130.0	± 9.6 %
		Y	5.73	66.92	16.48		130.0	
		Z	5.72	67.32	16.76		130.0	
10630-AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc duty cycle)	X	6.52	69.01	17.35	0.46	130.0	± 9.6 %
		Y	6.39	69.08	17.54		130.0	
		Z	6.23	69.06	17.62		130.0	
10631-AAB	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc duty cycle)	X	6.47	68.93	17.48	0.46	130.0	± 9.6 %
		Y	6.08	68.29	17.35		130.0	
		Z	6.04	68.60	17.59		130.0	
10632-AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc duty cycle)	X	6.09	67.71	16.89	0.46	130.0	± 9.6 %
		Y	5.86	67.50	16.98		130.0	
		Z	5.85	67.92	17.27		130.0	
10633-AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc duty cycle)	X	6.03	67.58	16.67	0.46	130.0	± 9.6 %
		Y	5.68	66.89	16.50		130.0	
		Z	5.69	67.38	16.83		130.0	
10634-AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc duty cycle)	X	6.01	67.57	16.72	0.46	130.0	± 9.6 %
		Y	5.67	66.94	16.58		130.0	
		Z	5.68	67.40	16.89		130.0	
10635-AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc duty cycle)	X	5.89	66.92	16.15	0.46	130.0	± 9.6 %
		Y	5.55	66.28	15.98		130.0	
		Z	5.55	66.70	16.28		130.0	
10636-AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 90pc duty cycle)	X	6.20	67.41	16.57	0.46	130.0	± 9.6 %
		Y	6.03	67.08	16.57		130.0	
		Z	6.04	67.48	16.84		130.0	
10637-AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 90pc duty cycle)	X	6.42	67.92	16.80	0.46	130.0	± 9.6 %
		Y	6.22	67.58	16.80		130.0	
		Z	6.21	67.94	17.05		130.0	
10638-AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 90pc duty cycle)	X	6.37	67.75	16.69	0.46	130.0	± 9.6 %
		Y	6.22	67.55	16.76		130.0	
		Z	6.21	67.90	17.01		130.0	

10639-AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc duty cycle)	X	6.40	67.84	16.78	0.46	130.0	± 9.6 %
		Y	6.16	67.39	16.73		130.0	
		Z	6.16	67.78	16.99		130.0	
10640-AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc duty cycle)	X	6.43	67.93	16.78	0.46	130.0	± 9.6 %
		Y	6.17	67.42	16.68		130.0	
		Z	6.17	67.80	16.95		130.0	
10641-AAC	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc duty cycle)	X	6.43	67.66	16.66	0.46	130.0	± 9.6 %
		Y	6.23	67.37	16.68		130.0	
		Z	6.24	67.78	16.96		130.0	
10642-AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc duty cycle)	X	6.52	68.06	17.01	0.46	130.0	± 9.6 %
		Y	6.25	67.55	16.94		130.0	
		Z	6.25	67.94	17.20		130.0	
10643-AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc duty cycle)	X	6.33	67.69	16.75	0.46	130.0	± 9.6 %
		Y	6.11	67.31	16.72		130.0	
		Z	6.10	67.69	16.98		130.0	
10644-AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 90pc duty cycle)	X	6.58	68.44	17.15	0.46	130.0	± 9.6 %
		Y	6.26	67.77	16.96		130.0	
		Z	6.23	68.07	17.19		130.0	
10645-AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc duty cycle)	X	6.78	68.54	17.13	0.46	130.0	± 9.6 %
		Y	6.61	68.43	17.26		130.0	
		Z	6.40	68.24	17.24		130.0	
10646-AAE	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	X	24.78	102.91	33.53	9.30	60.0	± 9.6 %
		Y	62.18	133.63	43.81		60.0	
		Z	100.00	147.17	47.73		60.0	
10647-AAE	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)	X	26.20	104.83	34.24	9.30	60.0	± 9.6 %
		Y	61.16	134.29	44.17		60.0	
		Z	100.00	148.47	48.28		60.0	
10648-AAA	CDMA2000 (1x Advanced)	X	0.97	66.86	13.86	0.00	150.0	± 9.6 %
		Y	0.59	62.80	9.54		150.0	
		Z	1.00	70.16	13.59		150.0	
10652-AAC	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	5.15	70.12	18.13	2.23	80.0	± 9.6 %
		Y	4.25	69.02	17.48		80.0	
		Z	4.61	71.14	18.58		80.0	
10653-AAC	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	X	5.54	69.21	18.03	2.23	80.0	± 9.6 %
		Y	4.68	67.95	17.51		80.0	
		Z	4.86	69.18	18.22		80.0	
10654-AAC	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	X	5.43	68.90	18.02	2.23	80.0	± 9.6 %
		Y	4.64	67.55	17.50		80.0	
		Z	4.78	68.64	18.16		80.0	
10655-AAD	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	5.48	68.99	18.07	2.23	80.0	± 9.6 %
		Y	4.70	67.51	17.53		80.0	
		Z	4.83	68.53	18.16		80.0	
10658-AAA	Pulse Waveform (200Hz, 10%)	X	11.40	81.94	22.18	10.00	50.0	± 9.6 %
		Y	19.50	92.75	24.13		50.0	
		Z	35.42	102.56	27.13		50.0	
10659-AAA	Pulse Waveform (200Hz, 20%)	X	14.93	87.71	22.77	6.99	60.0	± 9.6 %
		Y	100.00	113.85	27.97		60.0	
		Z	100.00	115.25	28.59		60.0	

10660-AAA	Pulse Waveform (200Hz, 40%)	X	100.00	114.86	28.35	3.98	80.0	± 9.6 %
		Y	100.00	110.72	25.06		80.0	
		Z	100.00	114.19	26.61		80.0	
10661-AAA	Pulse Waveform (200Hz, 60%)	X	100.00	115.39	27.09	2.22	100.0	± 9.6 %
		Y	100.00	109.17	23.03		100.0	
		Z	100.00	117.05	26.45		100.0	
10662-AAA	Pulse Waveform (200Hz, 80%)	X	100.00	120.85	27.46	0.97	120.0	± 9.6 %
		Y	100.00	103.08	18.77		120.0	
		Z	100.00	130.20	29.74		120.0	

[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.