

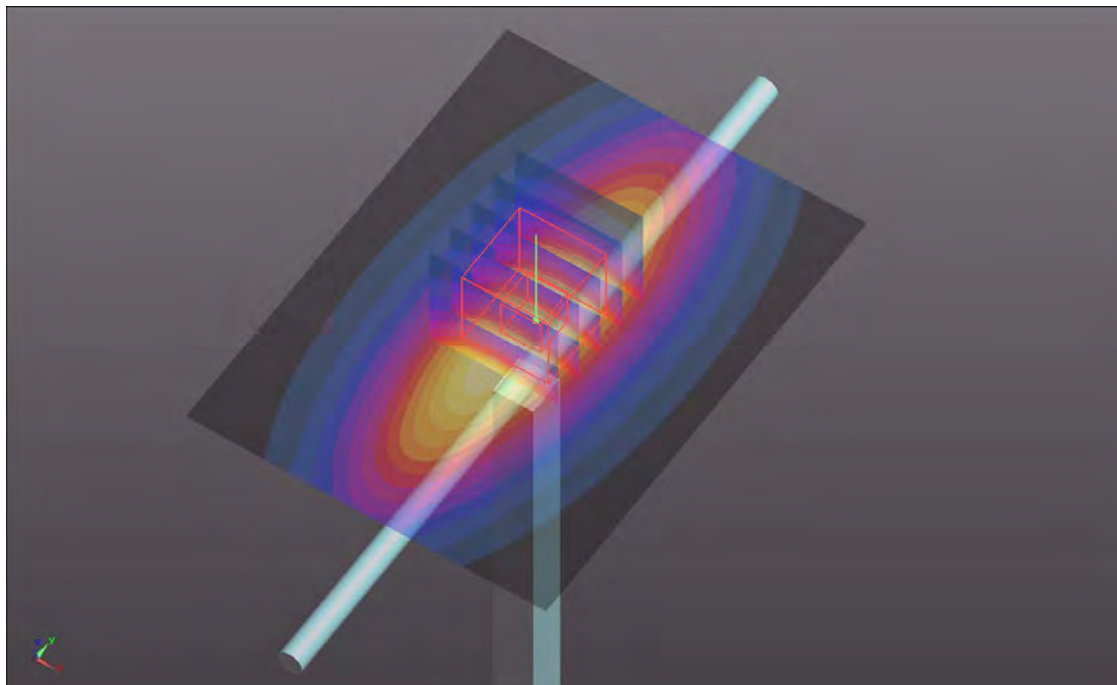
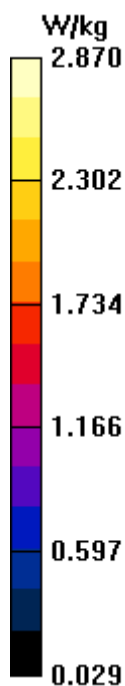
System Check_B750_160312**DUT: Dipole 750 MHz; Type: D750V3; SN: 1013**

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: B06T09N1_0312 Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.969 \text{ S/m}$; $\epsilon_r = 56.228$; $\rho = 1000 \text{ kg/m}^3$ Ambient Temperature : $23.6 \text{ }^\circ\text{C}$; Liquid Temperature : $23.1 \text{ }^\circ\text{C}$

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.94, 9.94, 9.94); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1039; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x81x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$ Maximum value of SAR (interpolated) = 2.87 W/kg **Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 56.43 V/m ; Power Drift = -0.03 dB Peak SAR (extrapolated) = 3.07 W/kg **SAR(1 g) = 2 W/kg ; SAR(10 g) = 1.32 W/kg** Maximum value of SAR (measured) = 2.69 W/kg 

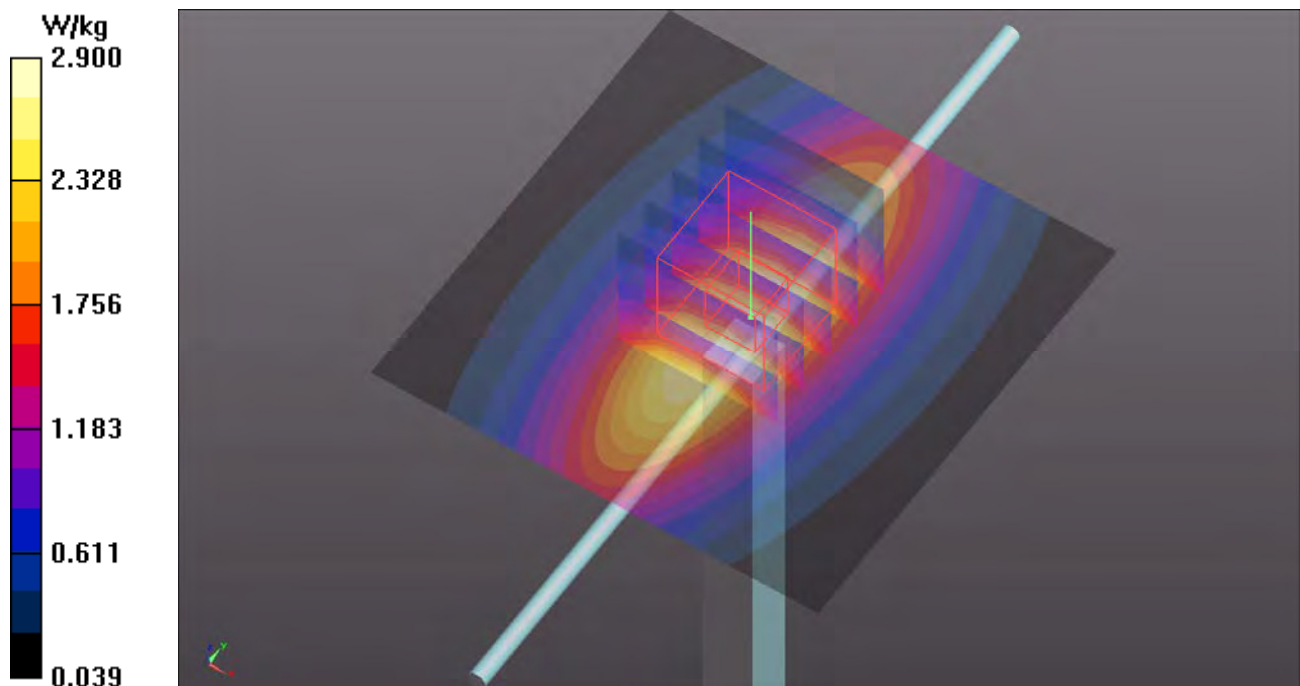
System Check_B835_160309**DUT: Dipole 835 MHz; Type: D835V2; SN: 4d121**

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: B07T10N2_0309 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.969 \text{ S/m}$; $\epsilon_r = 54.978$; $\rho = 1000 \text{ kg/m}^3$ Ambient Temperature : $23.9 \text{ }^\circ\text{C}$; Liquid Temperature : $23.6 \text{ }^\circ\text{C}$

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(9.47, 9.47, 9.47); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1277; Calibrated: 2015/07/22
- Phantom: ELI Phantom_1204; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$ Maximum value of SAR (interpolated) = 2.90 W/kg **Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 57.09 V/m ; Power Drift = -0.06 dB Peak SAR (extrapolated) = 3.27 W/kg **SAR(1 g) = 2.18 W/kg ; SAR(10 g) = 1.43 W/kg** Maximum value of SAR (measured) = 2.91 W/kg 

System Check_B1750_160314**DUT: Dipole 1750 MHz; Type: D1750V2; SN: 1055**

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: B16T20N1_0314 Medium parameters used: $f = 1750$ MHz; $\sigma = 1.434$ S/m; $\epsilon_r = 52.025$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.4 °C ; Liquid Temperature : 23.1 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(8.13, 8.13, 8.13); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1039; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 15.0 W/kg

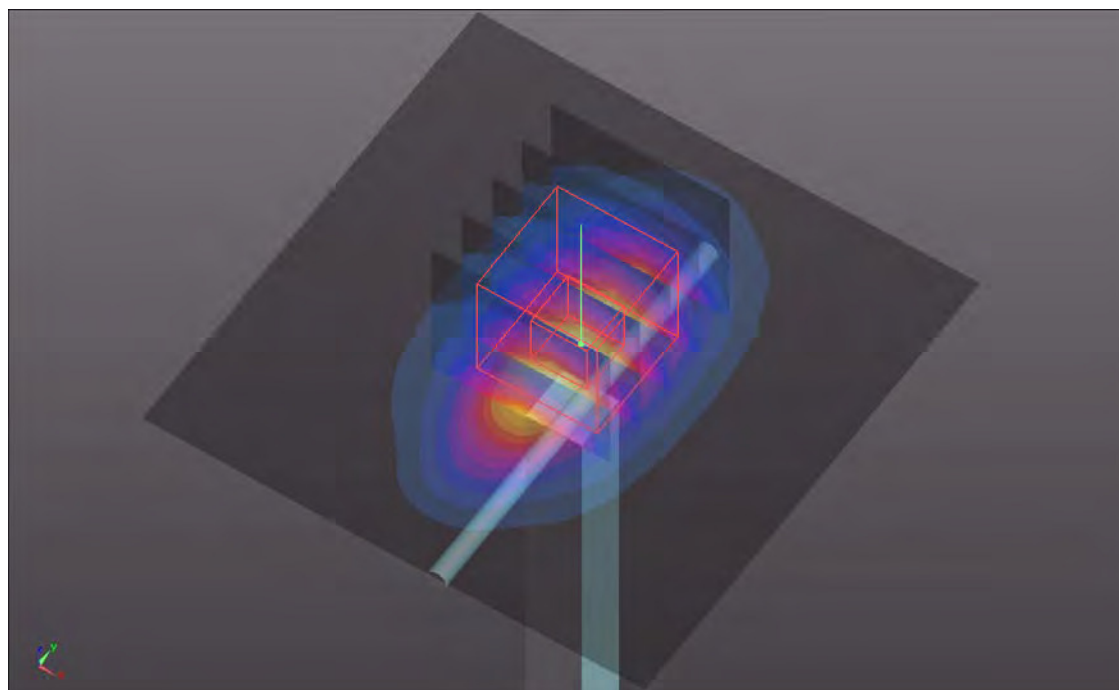
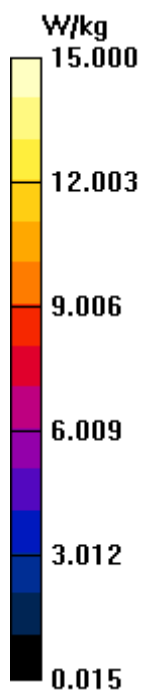
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 105.2 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 17.4 W/kg

SAR(1 g) = 10 W/kg; SAR(10 g) = 5.41 W/kg

Maximum value of SAR (measured) = 15.0 W/kg



System Check_B1900_160312**DUT: Dipole 1900 MHz; Type: D1900V2; SN: 5d036**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: B16T20N1_0312 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.584$ S/m; $\epsilon_r = 51.623$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C ; Liquid Temperature : 23.1 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1039; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 20.4 W/kg

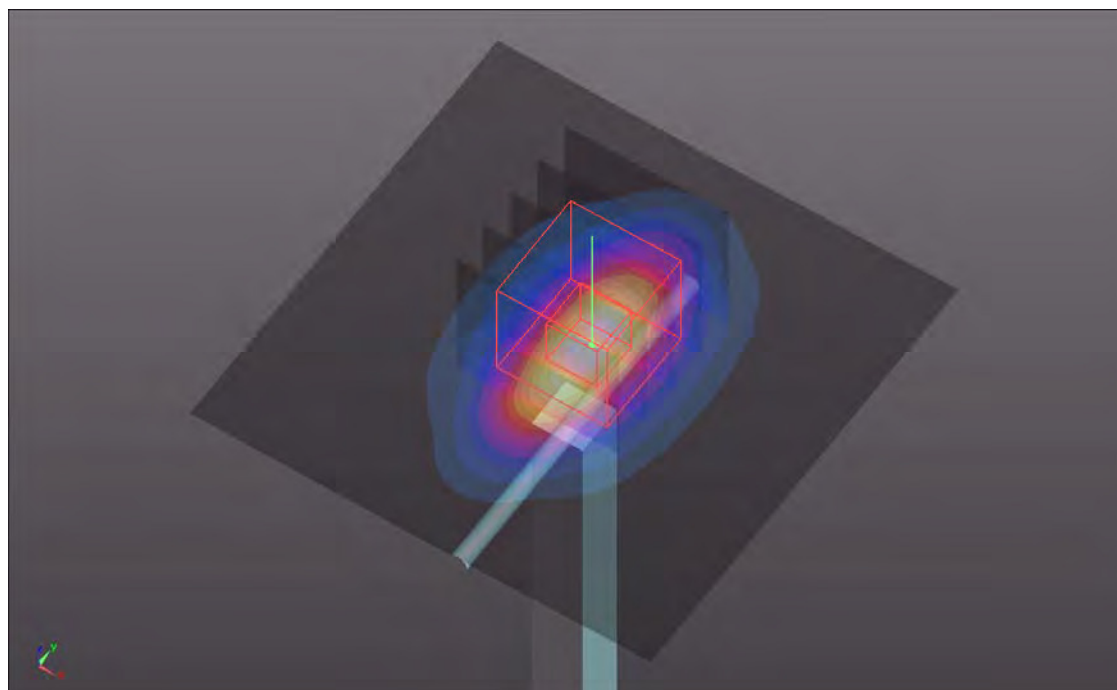
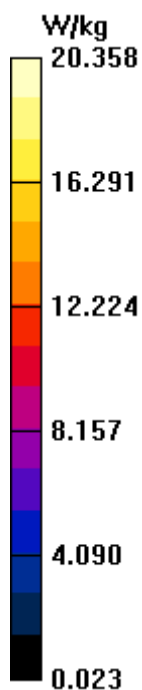
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 116.2 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 17.2 W/kg

SAR(1 g) = 9.5 W/kg; SAR(10 g) = 5 W/kg

Maximum value of SAR (measured) = 14.6 W/kg



P01 GSM850_GPRS10_Bottom Side_0cm_Ch251_Sensor_w**DUT: 160129C01**

Communication System: GPRS10; Frequency: 848.8 MHz; Duty Cycle: 1:4

Medium: B07T10N2_0324 Medium parameters used: $f = 849$ MHz; $\sigma = 0.991$ S/m; $\epsilon_r = 55.955$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (51x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.59 W/kg

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

Reference Value = 3.180 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 1.38 W/kg

SAR(1 g) = 0.829 W/kg; SAR(10 g) = 0.475 W/kg

Maximum value of SAR (measured) = 1.05 W/kg

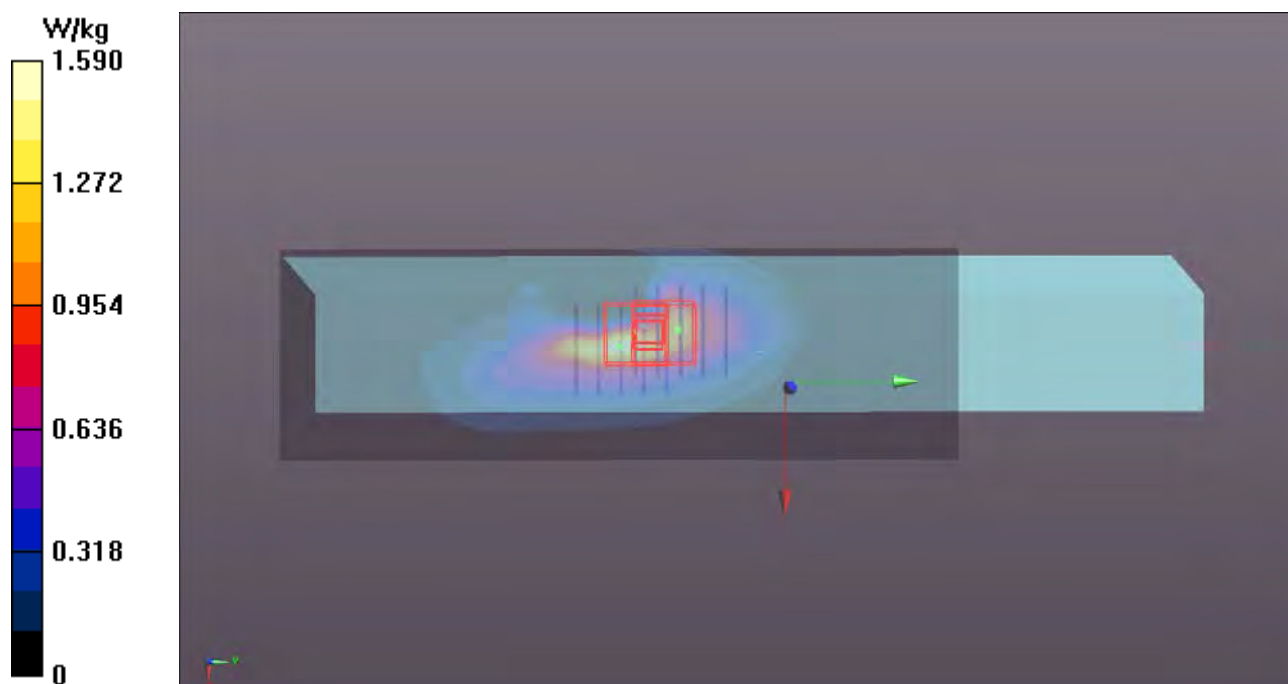
- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.180 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 1.27 W/kg

SAR(1 g) = 0.812 W/kg; SAR(10 g) = 0.504 W/kg

Maximum value of SAR (measured) = 1.10 W/kg



P02 GSM1900_GPRS10_Bottom Side_0cm_Ch810_Sensor_w**DUT: 160129C01**

Communication System: GPRS10; Frequency: 1909.8 MHz; Duty Cycle: 1:4

Medium: B16T20N2_0324 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.591$ S/m; $\epsilon_r = 50.816$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (51x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.39 W/kg

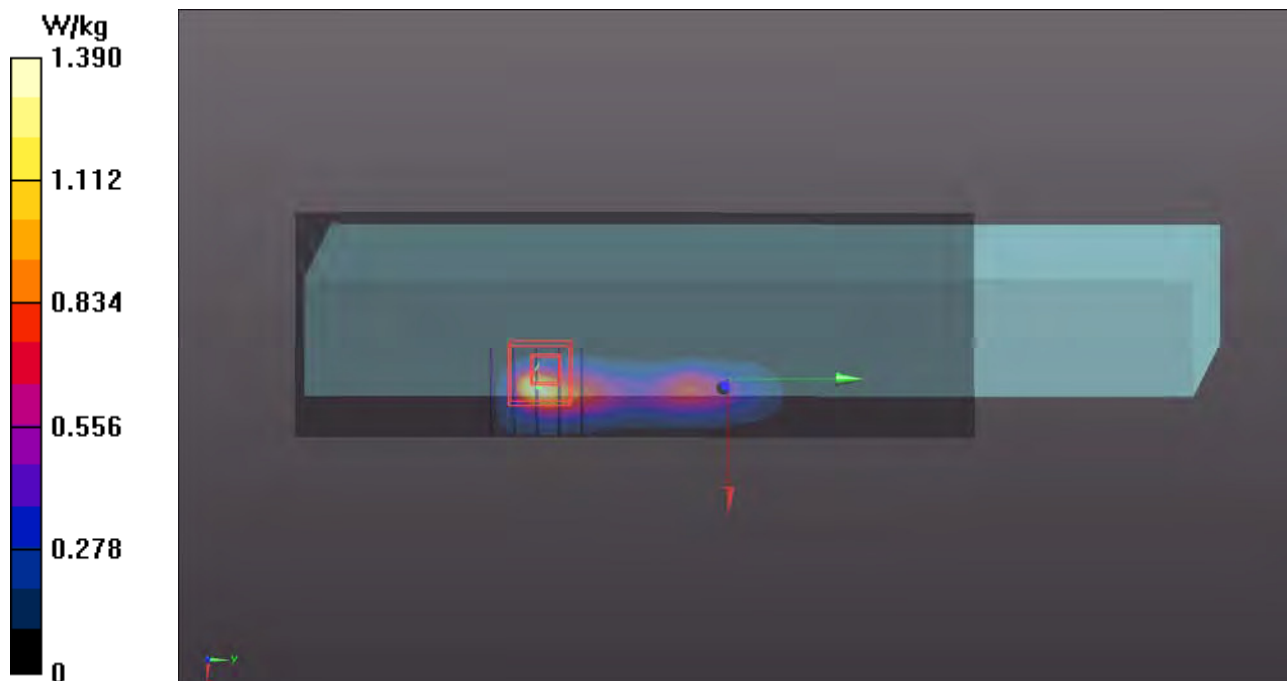
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.8110 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 1.44 W/kg

SAR(1 g) = 0.835 W/kg; SAR(10 g) = 0.409 W/kg

Maximum value of SAR (measured) = 1.23 W/kg



P03 WCDMA II_RMC12.2K_Bottom Side_0cm_Ch9262_Sensor_w**DUT: 160129C01**

Communication System: WCDMA; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium: B16T20N2_0325 Medium parameters used: $f = 1852.4$ MHz; $\sigma = 1.539$ S/m; $\epsilon_r = 50.97$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (51x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.14 W/kg

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

Reference Value = 16.53 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 1.45 W/kg

SAR(1 g) = 0.821 W/kg; SAR(10 g) = 0.429 W/kg

Maximum value of SAR (measured) = 1.22 W/kg

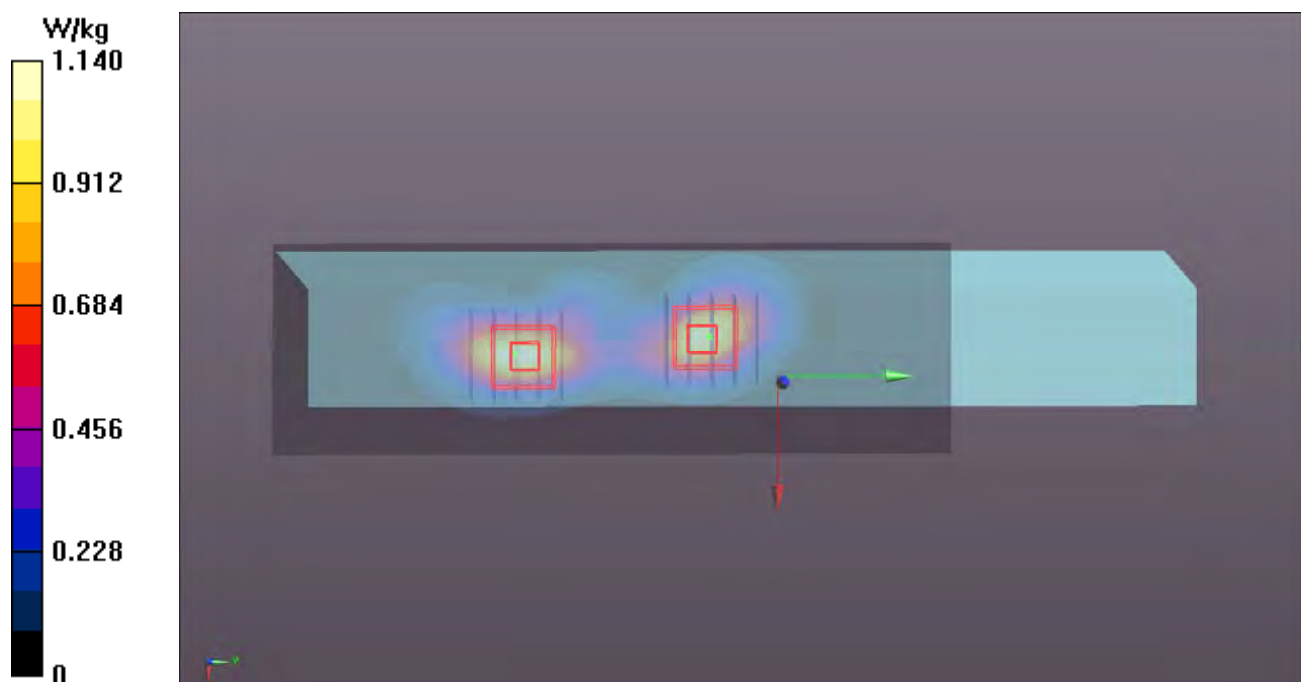
- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.53 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 1.23 W/kg

SAR(1 g) = 0.740 W/kg; SAR(10 g) = 0.408 W/kg

Maximum value of SAR (measured) = 1.05 W/kg



P04 WCDMA IV_RMC12.2K_Bottom Side_0cm_Ch1413_Sensor_w**DUT: 160129C01**

Communication System: WCDMA; Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium: B16T20N2_0325 Medium parameters used: $f = 1733$ MHz; $\sigma = 1.423$ S/m; $\epsilon_r = 51.34$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(8.13, 8.13, 8.13); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (51x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.939 W/kg

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

Reference Value = 16.97 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 1.14 W/kg

SAR(1 g) = 0.669 W/kg; SAR(10 g) = 0.351 W/kg

Maximum value of SAR (measured) = 0.977 W/kg

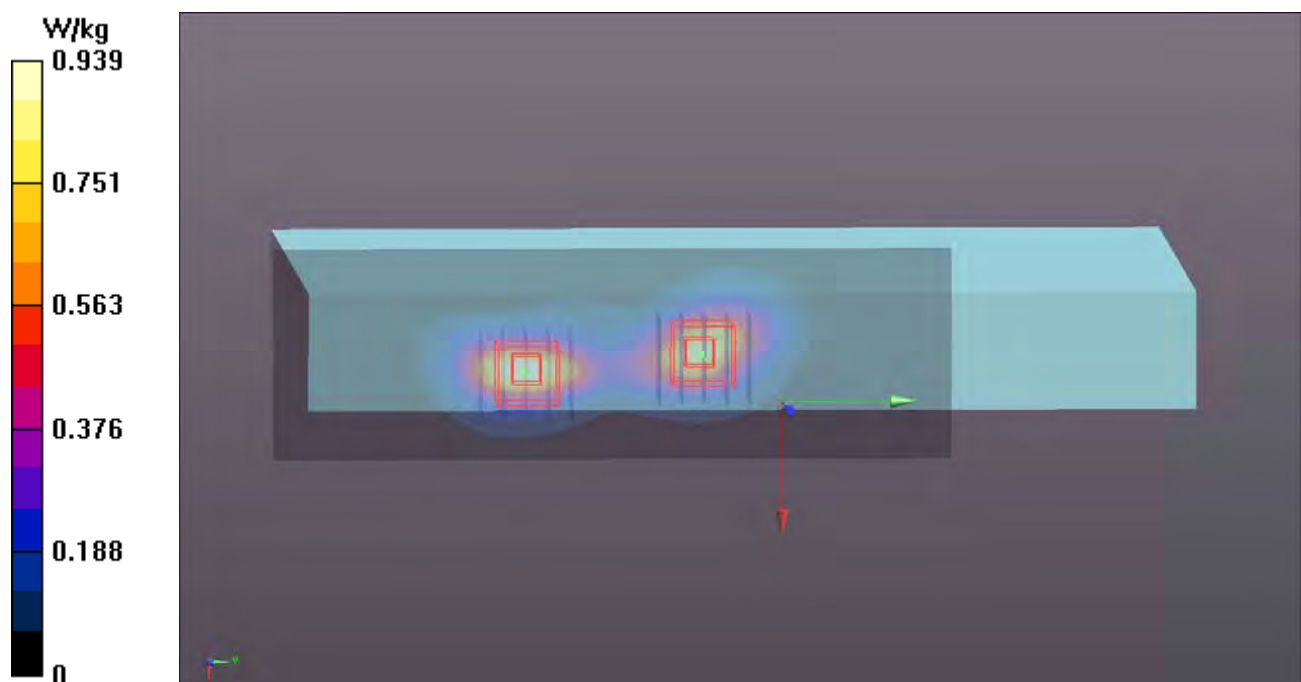
- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.97 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.996 W/kg

SAR(1 g) = 0.618 W/kg; SAR(10 g) = 0.348 W/kg

Maximum value of SAR (measured) = 0.868 W/kg



P05 WCDMA V_RMC12.2K_Bottom Side_0cm_Ch4132_Sensor_w**DUT: 160129C01**

Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: B07T10N2_0325 Medium parameters used: $f = 826.4$ MHz; $\sigma = 0.971$ S/m; $\epsilon_r = 56.164$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (51x161x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.937 W/kg

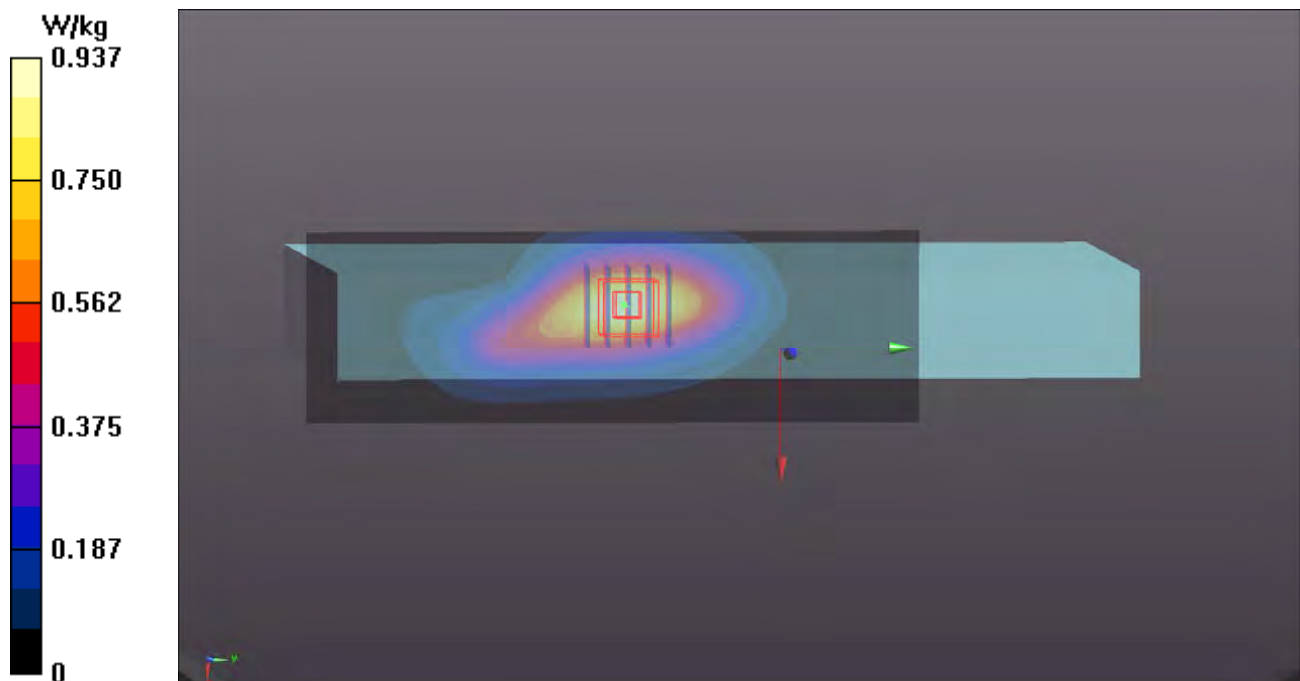
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.74 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.695 W/kg; SAR(10 g) = 0.451 W/kg

Maximum value of SAR (measured) = 0.941 W/kg



P06 CDMA2000 BC0_RTAP153.6_Bottom Side_0cm_Ch1013_Sensor_w**DUT: 160129C01**

Communication System: CDMA2000; Frequency: 824.7 MHz; Duty Cycle: 1:1

Medium: B07T10N2_0324 Medium parameters used: $f = 825$ MHz; $\sigma = 0.97$ S/m; $\epsilon_r = 56.165$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (51x161x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.04 W/kg

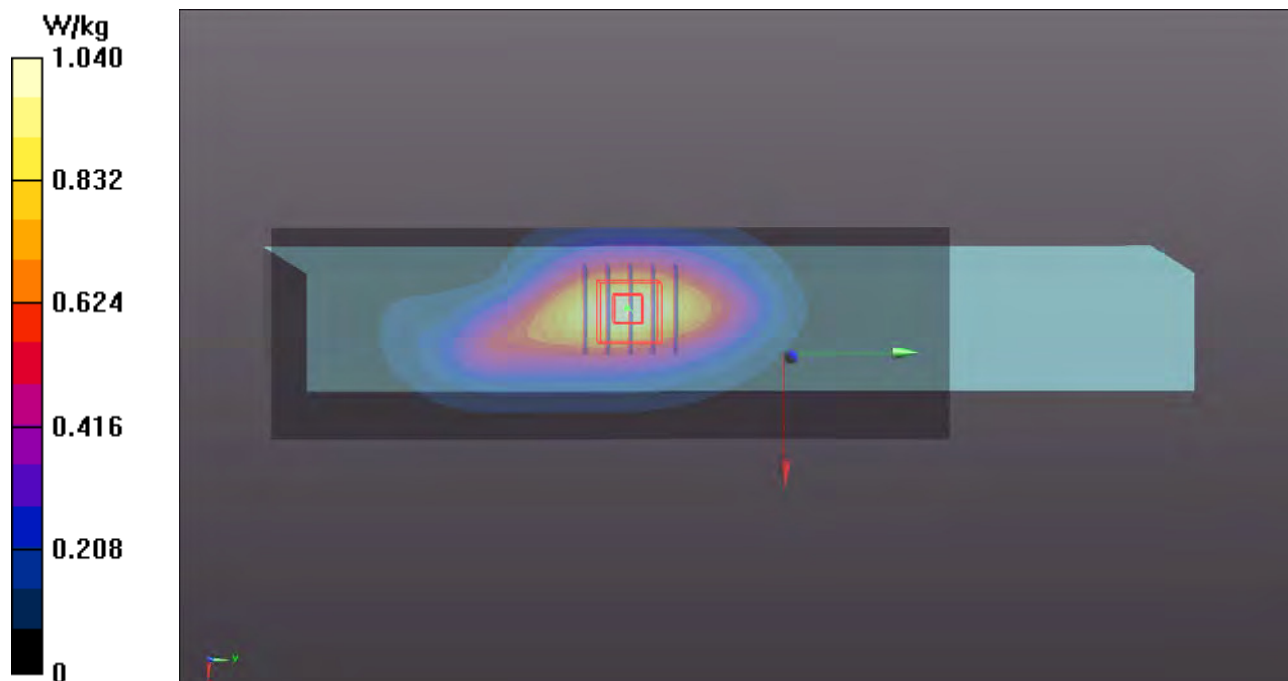
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.42 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 1.18 W/kg

SAR(1 g) = 0.773 W/kg; SAR(10 g) = 0.503 W/kg

Maximum value of SAR (measured) = 1.04 W/kg



P07 CDMA2000 BC1_RTAP153.6_Bottom Side_0cm_Ch25_Sensor_w**DUT: 160129C01**

Communication System: CDMA2000; Frequency: 1851.25 MHz; Duty Cycle: 1:1

Medium: B16T20N2_0325 Medium parameters used: $f = 1851.25$ MHz; $\sigma = 1.537$ S/m; $\epsilon_r = 50.975$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (51x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.26 W/kg

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

Reference Value = 20.01 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 1.59 W/kg

SAR(1 g) = 0.901 W/kg; SAR(10 g) = 0.470 W/kg

Maximum value of SAR (measured) = 1.35 W/kg

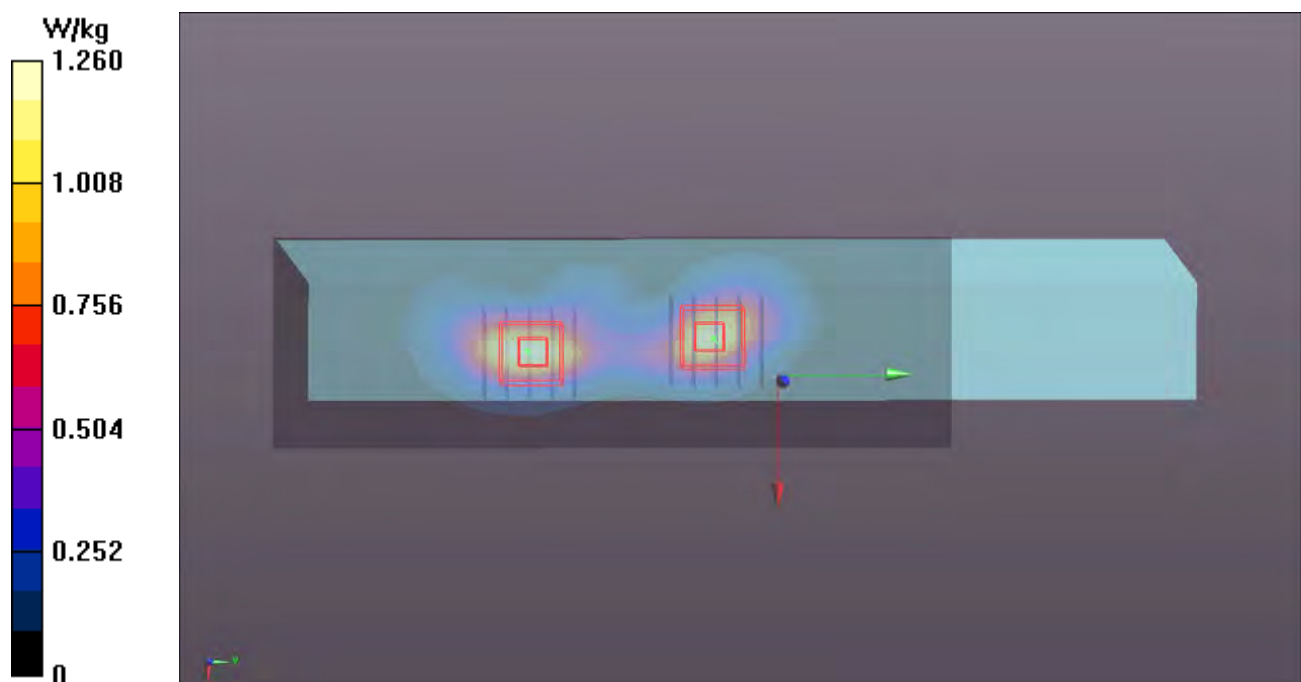
- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.01 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 1.34 W/kg

SAR(1 g) = 0.801 W/kg; SAR(10 g) = 0.442 W/kg

Maximum value of SAR (measured) = 1.13 W/kg



P08 CDMA2000 BC10_RTAP153.6_Bottom Side_0cm_Ch684_Sensor_w**DUT: 160129C01**

Communication System: CDMA2000; Frequency: 823.1 MHz; Duty Cycle: 1:1

Medium: B07T10N2_0324 Medium parameters used: $f = 823.1$ MHz; $\sigma = 0.968$ S/m; $\epsilon_r = 56.18$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (51x161x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.998 W/kg

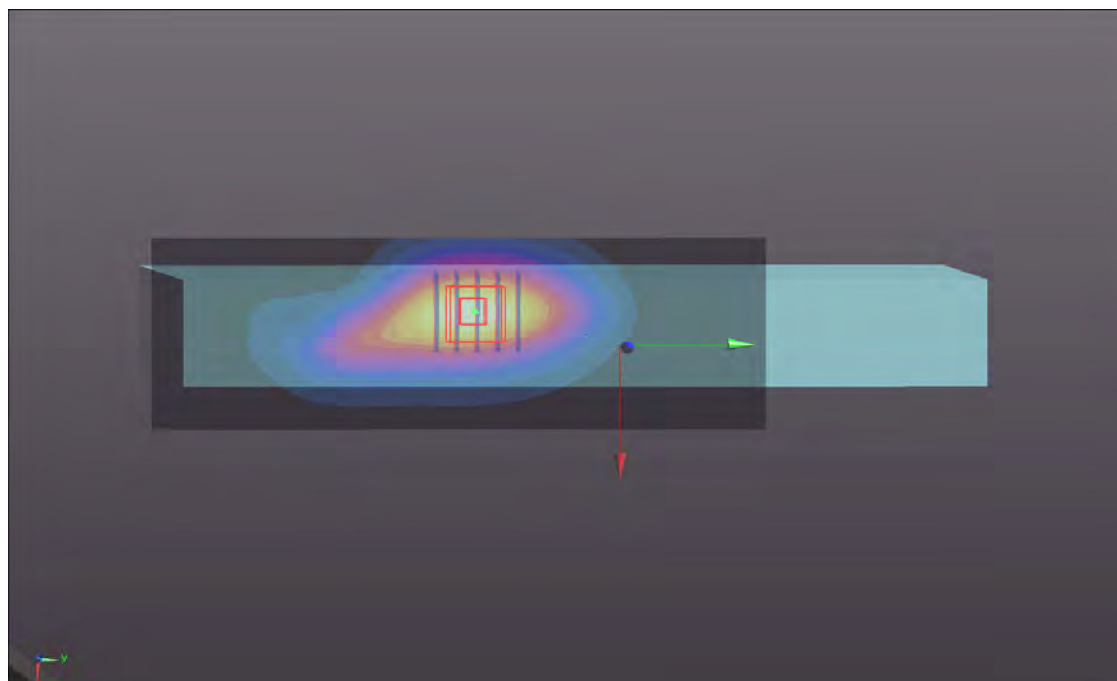
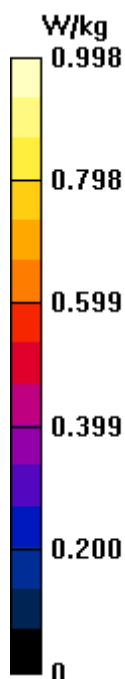
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.21 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 1.13 W/kg

SAR(1 g) = 0.739 W/kg; SAR(10 g) = 0.482 W/kg

Maximum value of SAR (measured) = 0.993 W/kg



P09 LTE 2_QPSK20M_Bottom Side_0cm_Ch18900_Sensor_w_1RB_OS0**DUT: 160129C01**

Communication System: LTE; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: B16T20N2_0324 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.563$ S/m; $\epsilon_r = 50.894$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (51x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.14 W/kg

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

Reference Value = 18.88 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.34 W/kg

SAR(1 g) = 0.812 W/kg; SAR(10 g) = 0.454 W/kg

Maximum value of SAR (measured) = 1.15 W/kg

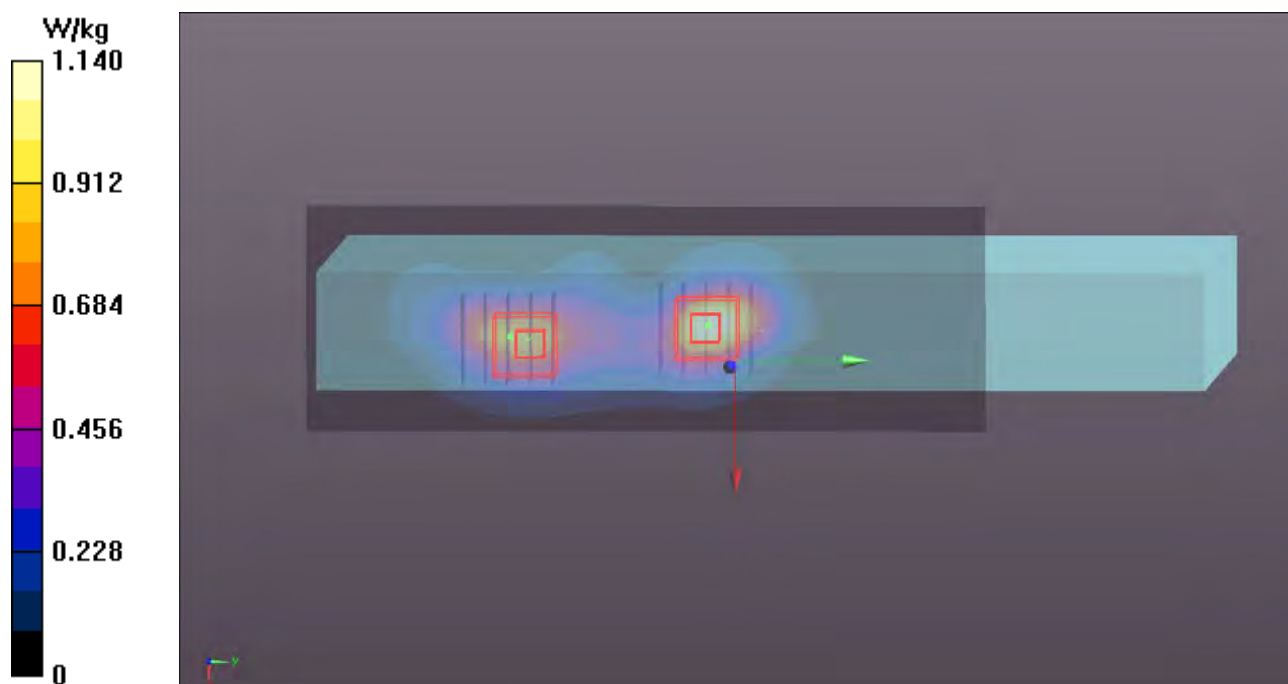
- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.88 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.35 W/kg

SAR(1 g) = 0.770 W/kg; SAR(10 g) = 0.407 W/kg

Maximum value of SAR (measured) = 1.13 W/kg



P10 LTE 4_QPSK20M_Bottom Side_0cm_Ch20300_Sensor_w_1RB_OS50**DUT: 160129C01**

Communication System: LTE; Frequency: 1745 MHz; Duty Cycle: 1:1

Medium: B16T20N2_0326 Medium parameters used: $f = 1745$ MHz; $\sigma = 1.435$ S/m; $\epsilon_r = 51.312$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(8.13, 8.13, 8.13); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (51x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.03 W/kg

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

Reference Value = 16.06 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 1.45 W/kg

SAR(1 g) = 0.844 W/kg; SAR(10 g) = 0.443 W/kg

Maximum value of SAR (measured) = 1.13 W/kg

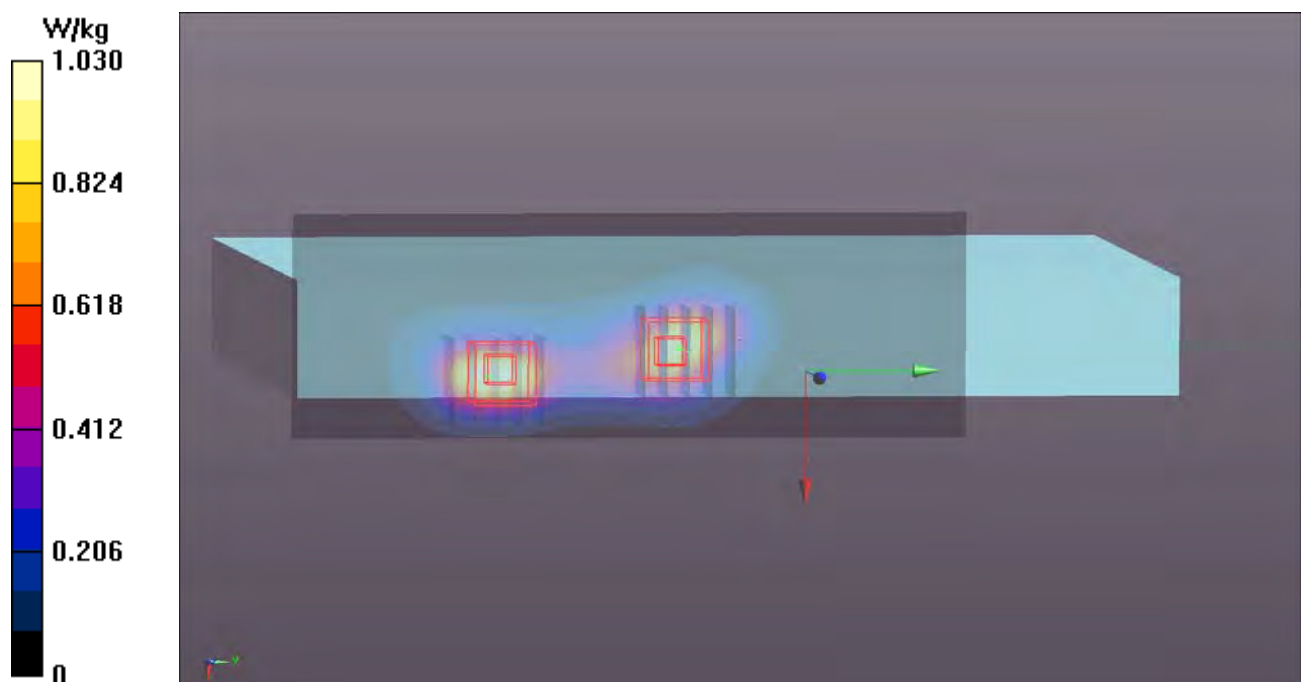
- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.06 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 1.23 W/kg

SAR(1 g) = 0.766 W/kg; SAR(10 g) = 0.433 W/kg

Maximum value of SAR (measured) = 1.05 W/kg



P11 LTE 5_QPSK10M_Bottom Side_0cm_Ch20600_Sensor_w_1RB_OS0**DUT: 160129C01**

Communication System: LTE; Frequency: 844 MHz; Duty Cycle: 1:1

Medium: B07T10N2_0324 Medium parameters used: $f = 844$ MHz; $\sigma = 0.986$ S/m; $\epsilon_r = 56.001$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (51x161x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.08 W/kg

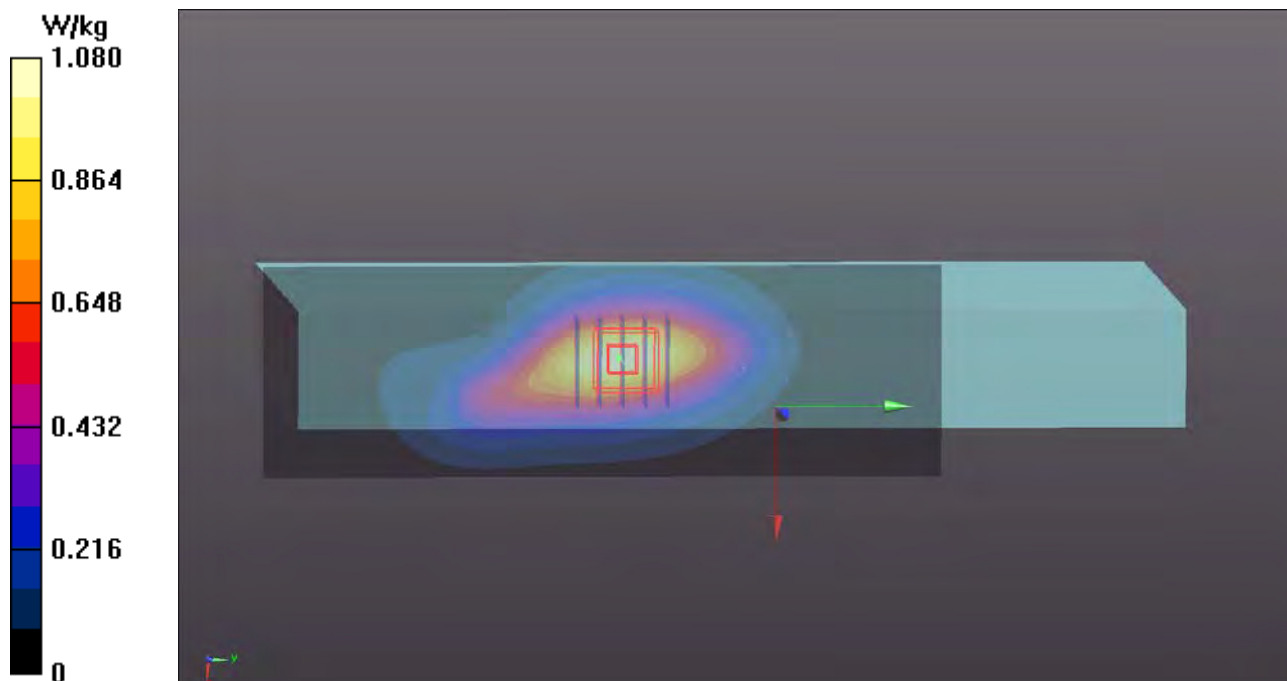
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.02 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 1.21 W/kg

SAR(1 g) = 0.786 W/kg; SAR(10 g) = 0.510 W/kg

Maximum value of SAR (measured) = 1.06 W/kg



P12 LTE 13_QPSK10M_Bottom Side_0cm_Ch23230_Sensor_w_1RB_OS0**DUT: 160129C01**

Communication System: LTE; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: B06T09N1_0312 Medium parameters used: $f = 782 \text{ MHz}$; $\sigma = 1.002 \text{ S/m}$; $\epsilon_r = 54.832$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.8°C ; Liquid Temperature : 23.2°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.94, 9.94, 9.94); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (51x161x1):** Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 1.08 W/kg

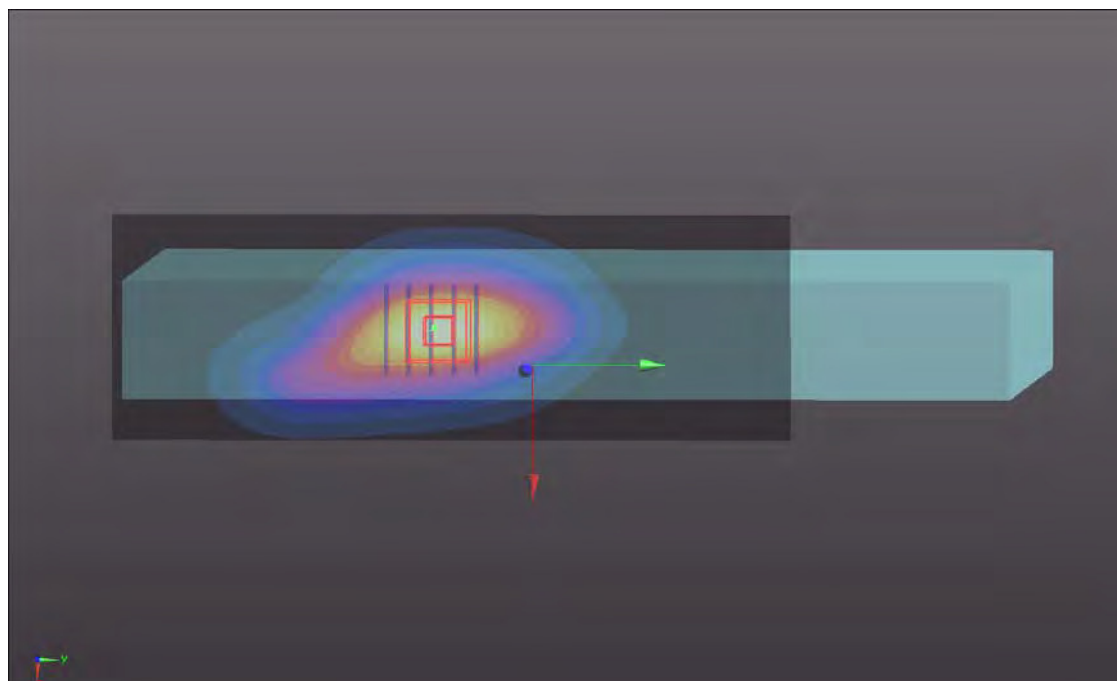
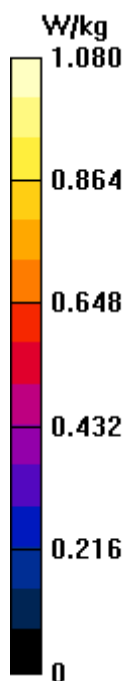
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 18.07 V/m ; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.832 W/kg ; SAR(10 g) = 0.542 W/kg

Maximum value of SAR (measured) = 1.08 W/kg



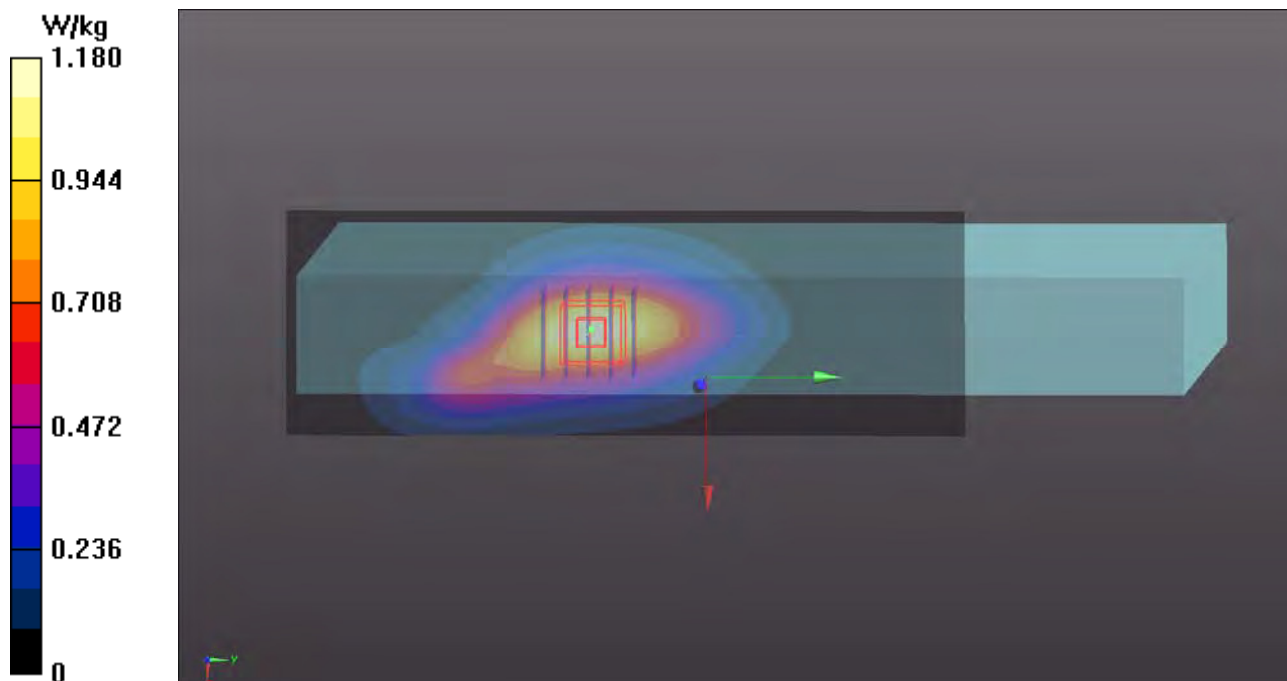
P13 LTE 17_QPSK10M_Bottom Side_0cm_Ch23780_Sensor_w_1RB_OS24**DUT: 160129C01**

Communication System: LTE; Frequency: 709 MHz; Duty Cycle: 1:1

Medium: B06T09N1_0325 Medium parameters used: $f = 709 \text{ MHz}$; $\sigma = 0.939 \text{ S/m}$; $\epsilon_r = 55.463$; $\rho = 1000 \text{ kg/m}^3$ Ambient Temperature : 23.8°C ; Liquid Temperature : 23.2°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.94, 9.94, 9.94); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (51x161x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$ Maximum value of SAR (interpolated) = 1.18 W/kg **- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 17.47 V/m ; Power Drift = 0.02 dB Peak SAR (extrapolated) = 1.32 W/kg **SAR(1 g) = 0.870 W/kg ; SAR(10 g) = 0.577 W/kg** Maximum value of SAR (measured) = 1.17 W/kg 

P14 LTE 25_QPSK20M_Bottom Side_0cm_Ch26140_Sensor_w_1RB_OS0**DUT: 160129C01**

Communication System: LTE; Frequency: 1860 MHz; Duty Cycle: 1:1

Medium: B16T20N2_0324 Medium parameters used: $f = 1860$ MHz; $\sigma = 1.546$ S/m; $\epsilon_r = 50.952$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.9 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (51x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.989 W/kg

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

Reference Value = 15.94 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.34 W/kg

SAR(1 g) = 0.771 W/kg; SAR(10 g) = 0.404 W/kg

Maximum value of SAR (measured) = 1.14 W/kg

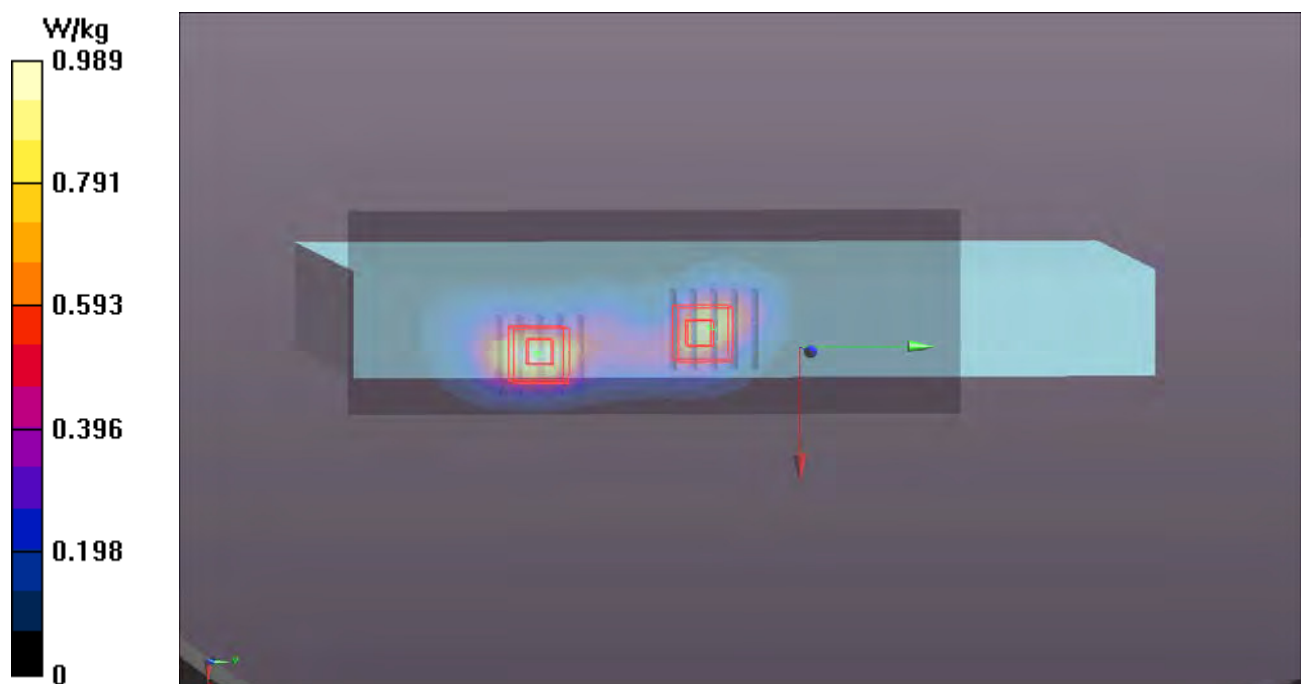
- Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.94 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.654 W/kg; SAR(10 g) = 0.362 W/kg

Maximum value of SAR (measured) = 0.884 W/kg



P20 GSM850_GPRS10_Bottom Side_0cm_Ch128_Sensor_w**DUT: 160129C01**

Communication System: GPRS10; Frequency: 824.2 MHz; Duty Cycle: 1:4

Medium: B07T10N2_0326 Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.968$ S/m; $\epsilon_r = 56.18$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.657 W/kg

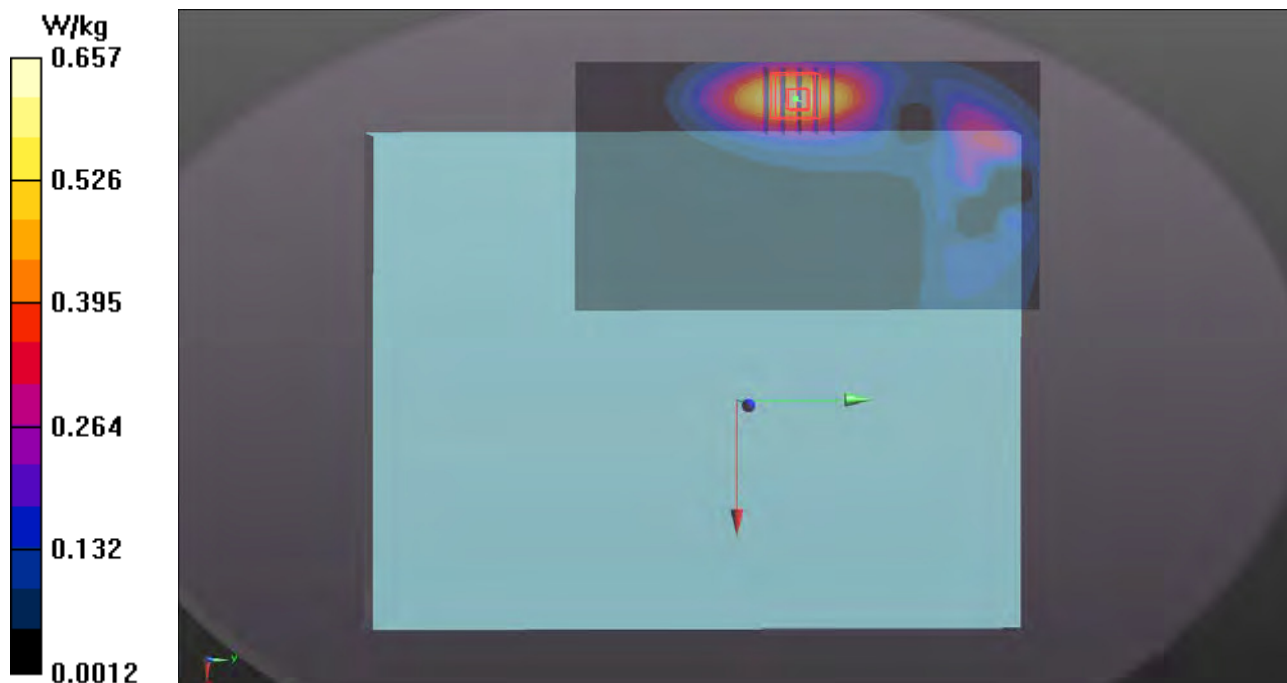
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.303 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.738 W/kg

SAR(1 g) = 0.469 W/kg; SAR(10 g) = 0.290 W/kg

Maximum value of SAR (measured) = 0.646 W/kg



P21 GSM1900_GPRS10_Bottom Side_0cm_Ch810_Sensor_w**DUT: 160129C01**

Communication System: GPRS10; Frequency: 1909.8 MHz; Duty Cycle: 1:4

Medium: B16T20N2_0326 Medium parameters used: $f = 1910$ MHz; $\sigma = 1.591$ S/m; $\epsilon_r = 50.816$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.1 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.639 W/kg

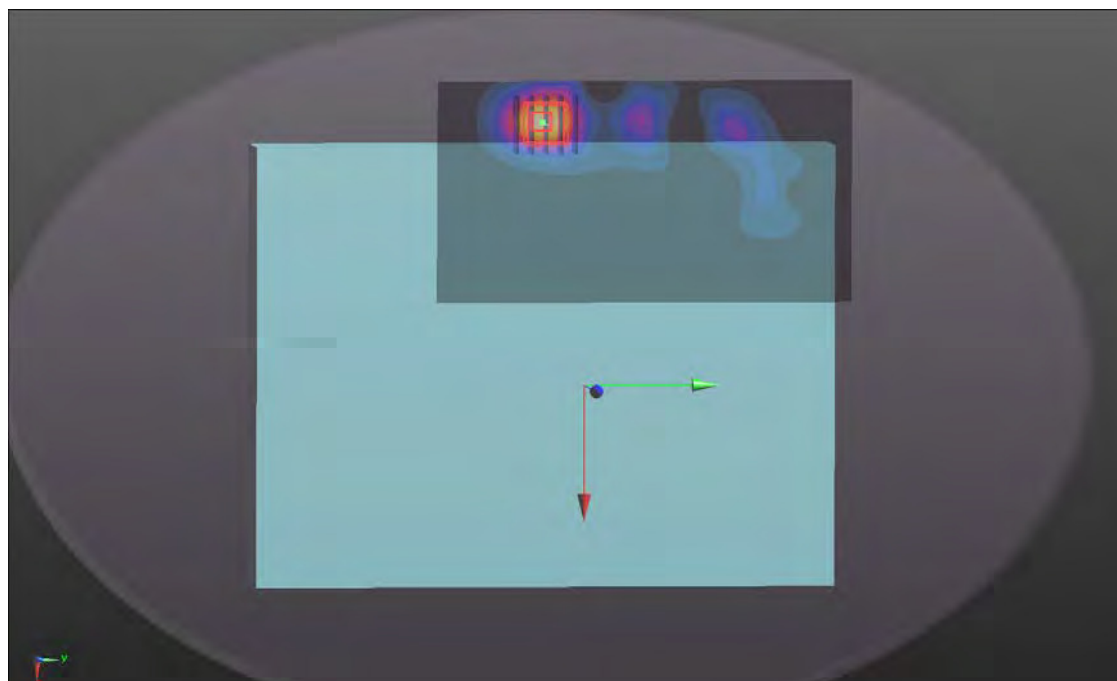
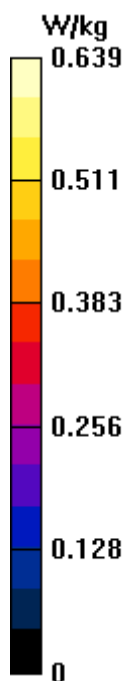
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.295 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.849 W/kg

SAR(1 g) = 0.458 W/kg; SAR(10 g) = 0.242 W/kg

Maximum value of SAR (measured) = 0.658 W/kg



P22 WCDMA II_RMC12.2K_Bottom Side_0cm_Ch9538_Sensor_w**DUT: 160129C01**

Communication System: WCDMA; Frequency: 1907.6 MHz; Duty Cycle: 1:1

Medium: B16T20N2_0326 Medium parameters used: $f = 1908$ MHz; $\sigma = 1.589$ S/m; $\epsilon_r = 50.819$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.736 W/kg

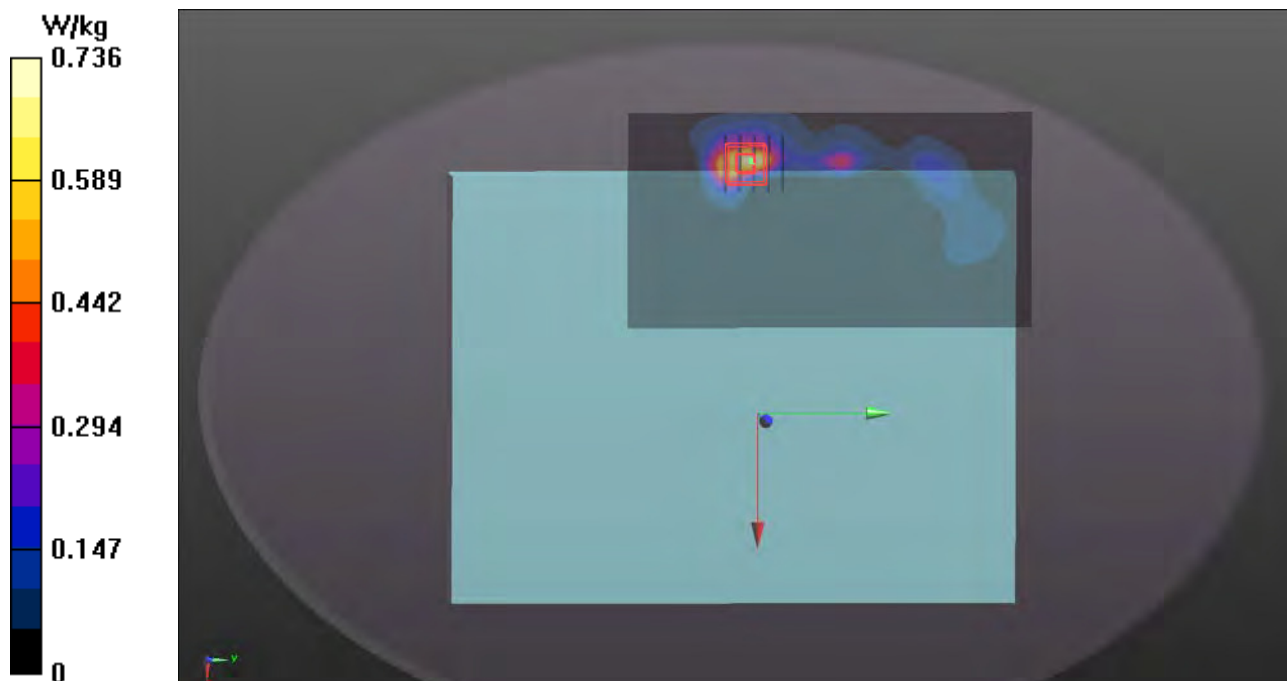
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.187 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 0.746 W/kg

SAR(1 g) = 0.425 W/kg; SAR(10 g) = 0.231 W/kg

Maximum value of SAR (measured) = 0.610 W/kg



P23 WCDMA IV_RMC12.2K_Bottom Side_0cm_Ch1513_Sensor_w**DUT: 160129C01**

Communication System: WCDMA; Frequency: 1752.6 MHz; Duty Cycle: 1:1

Medium: B16T20N2_0326 Medium parameters used: $f = 1753$ MHz; $\sigma = 1.443$ S/m; $\epsilon_r = 51.29$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(8.13, 8.13, 8.13); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.357 W/kg

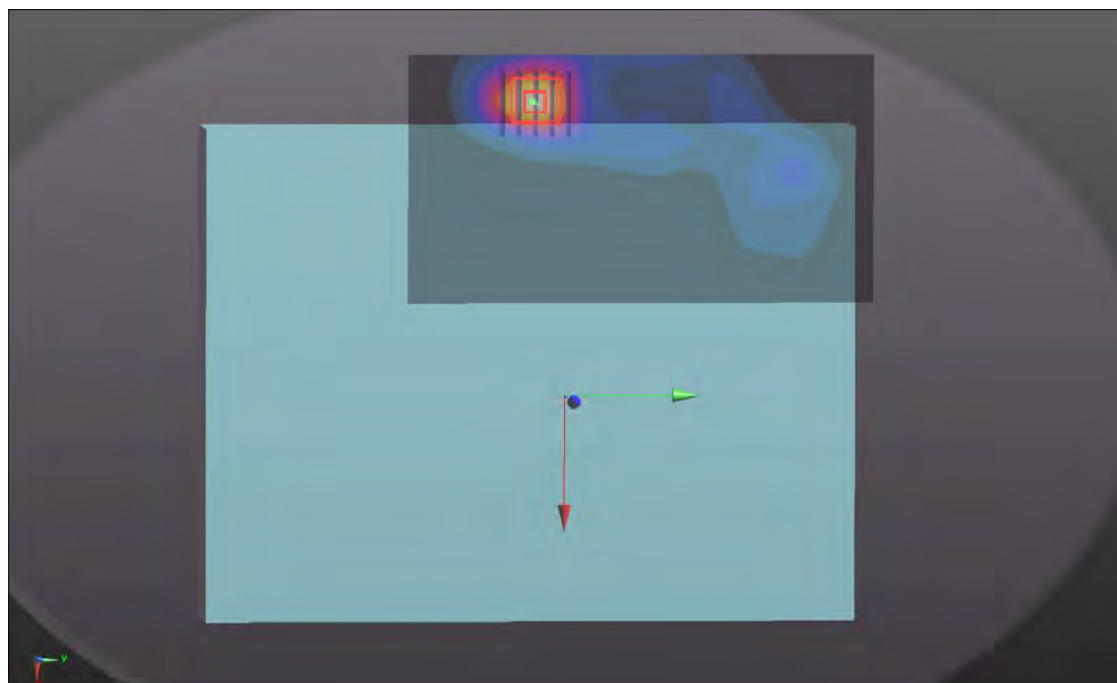
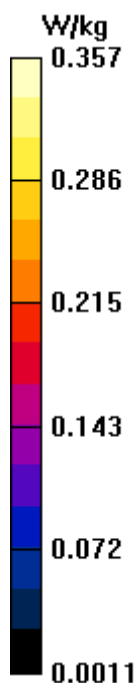
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.409 W/kg

SAR(1 g) = 0.251 W/kg; SAR(10 g) = 0.147 W/kg

Maximum value of SAR (measured) = 0.358 W/kg



P24 WCDMA V_RMC12.2K_Bottom Side_0cm_Ch4182_Sensor_w**DUT: 160129C01**

Communication System: WCDMA; Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium: B07T10N2_0326 Medium parameters used: $f = 836.4$ MHz; $\sigma = 0.98$ S/m; $\epsilon_r = 56.072$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.599 W/kg

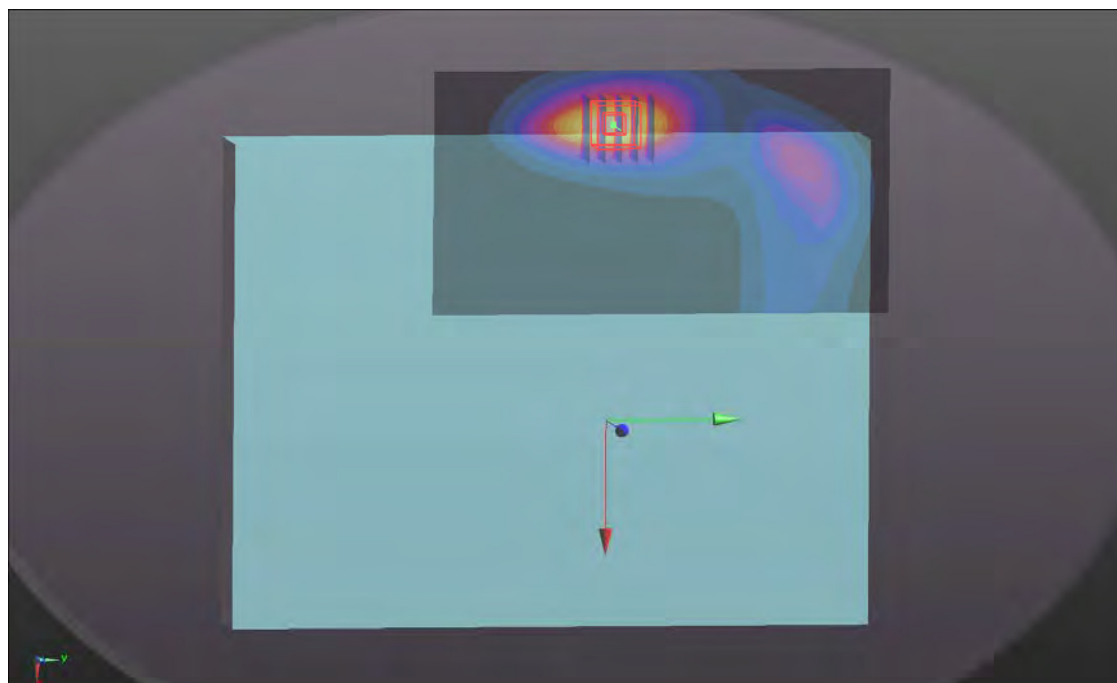
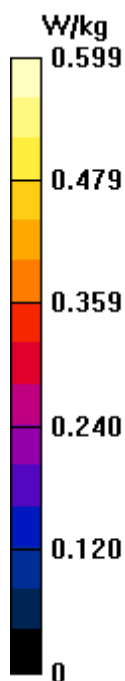
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.8840 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.697 W/kg

SAR(1 g) = 0.435 W/kg; SAR(10 g) = 0.272 W/kg

Maximum value of SAR (measured) = 0.606 W/kg



P25 CDMA2000 BC0_RTAP153.6_Bottom Side_0cm_Ch384_Sensor_w**DUT: 160129C01**

Communication System: CDMA2000; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: B07T10N2_0326 Medium parameters used: $f = 837$ MHz; $\sigma = 0.98$ S/m; $\epsilon_r = 56.066$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.629 W/kg

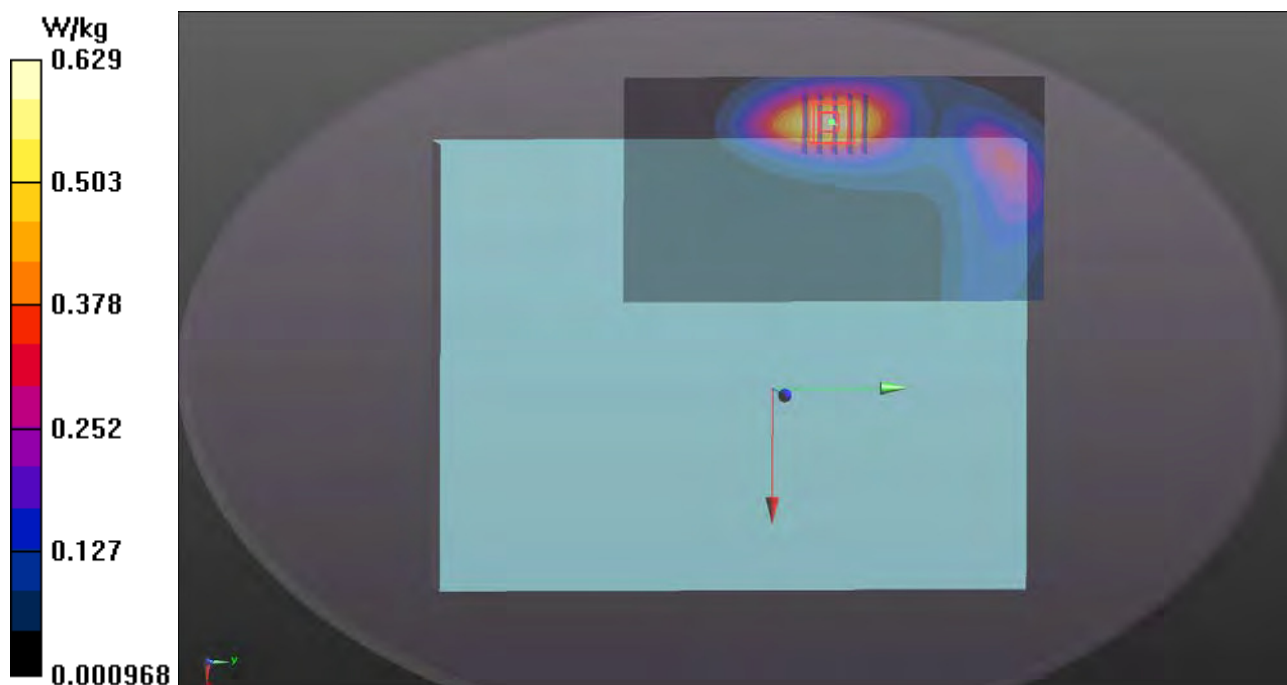
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.374 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.772 W/kg

SAR(1 g) = 0.473 W/kg; SAR(10 g) = 0.298 W/kg

Maximum value of SAR (measured) = 0.668 W/kg



P26 CDMA2000 BC1_RTAP153.6_Bottom Side_0cm_Ch600_Sensor_w**DUT: 160129C01**

Communication System: CDMA2000; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: B16T20N2_0326 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.563$ S/m; $\epsilon_r = 50.896$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.555 W/kg

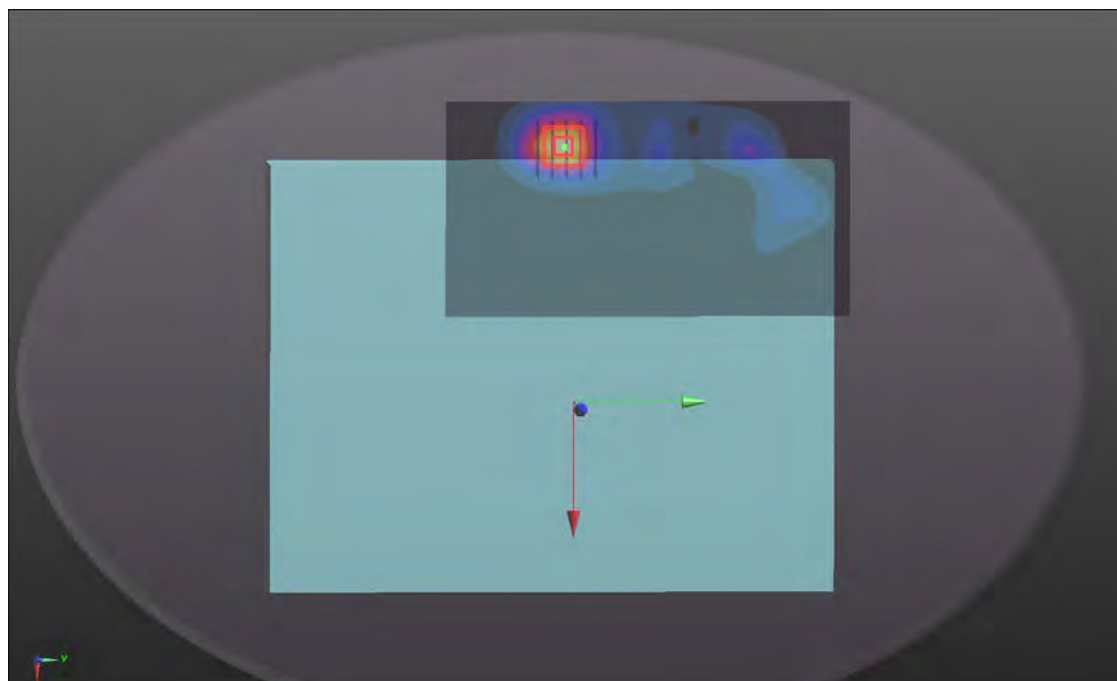
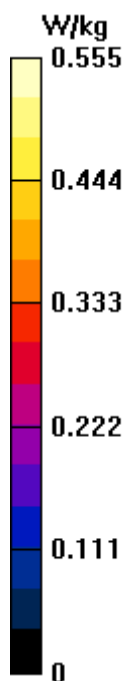
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.007 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.649 W/kg

SAR(1 g) = 0.374 W/kg; SAR(10 g) = 0.208 W/kg

Maximum value of SAR (measured) = 0.551 W/kg



P27 CDMA2000 BC10_RTAP153.6_Bottom Side_0cm_Ch580_Sensor_w**DUT: 160129C01**

Communication System: CDMA2000; Frequency: 820.5 MHz; Duty Cycle: 1:1

Medium: B07T10N2_0326 Medium parameters used: $f = 820.5$ MHz; $\sigma = 0.966$ S/m; $\epsilon_r = 56.205$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.534 W/kg

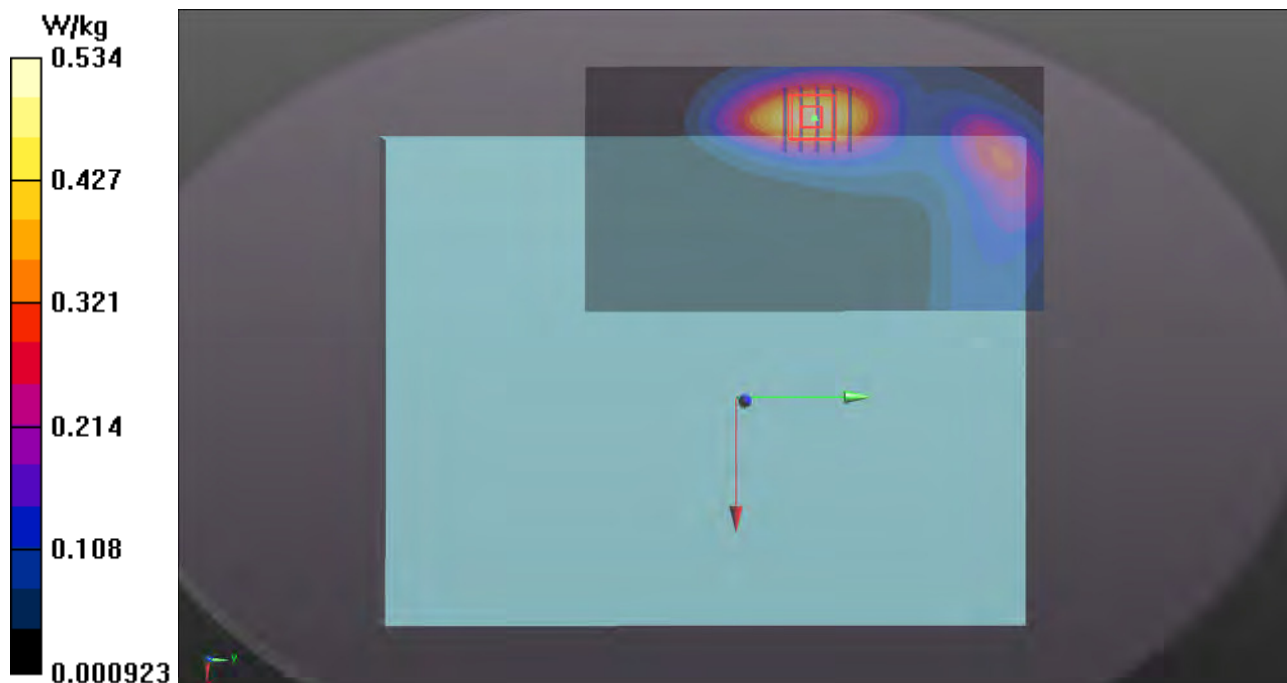
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.328 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.634 W/kg

SAR(1 g) = 0.399 W/kg; SAR(10 g) = 0.254 W/kg

Maximum value of SAR (measured) = 0.548 W/kg



P28 LTE 2_QPSK20M_Bottom Side_0cm_Ch18900_Sensor_w_1RB_OS0**DUT: 160129C01**

Communication System: LTE; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: B16T20N2_0326 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.563$ S/m; $\epsilon_r = 50.896$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (81x151x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.673 W/kg

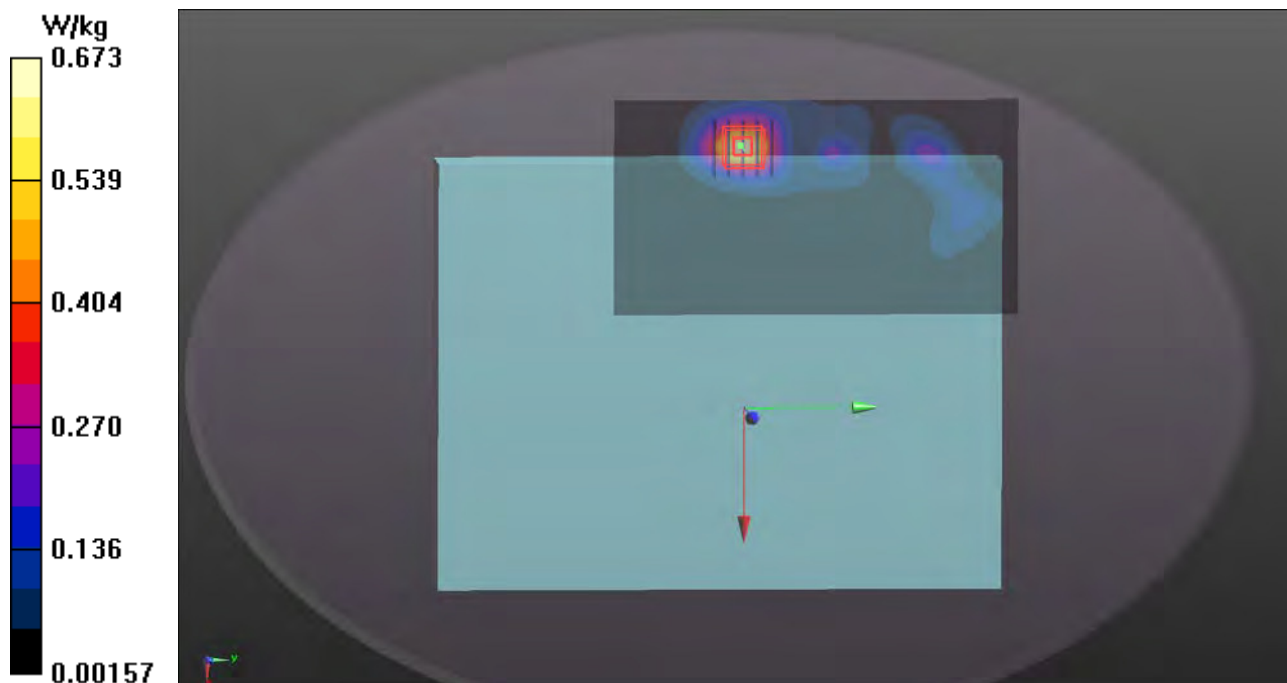
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.164 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.791 W/kg

SAR(1 g) = 0.452 W/kg; SAR(10 g) = 0.250 W/kg

Maximum value of SAR (measured) = 0.671 W/kg



P29 LTE 4_QPSK20M_Bottom Side_0cm_Ch20300_Sensor_w_1RB_OS50**DUT: 160129C01**

Communication System: LTE; Frequency: 1745 MHz; Duty Cycle: 1:1

Medium: B16T20N2_0326 Medium parameters used: $f = 1745$ MHz; $\sigma = 1.435$ S/m; $\epsilon_r = 51.312$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(8.13, 8.13, 8.13); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.583 W/kg

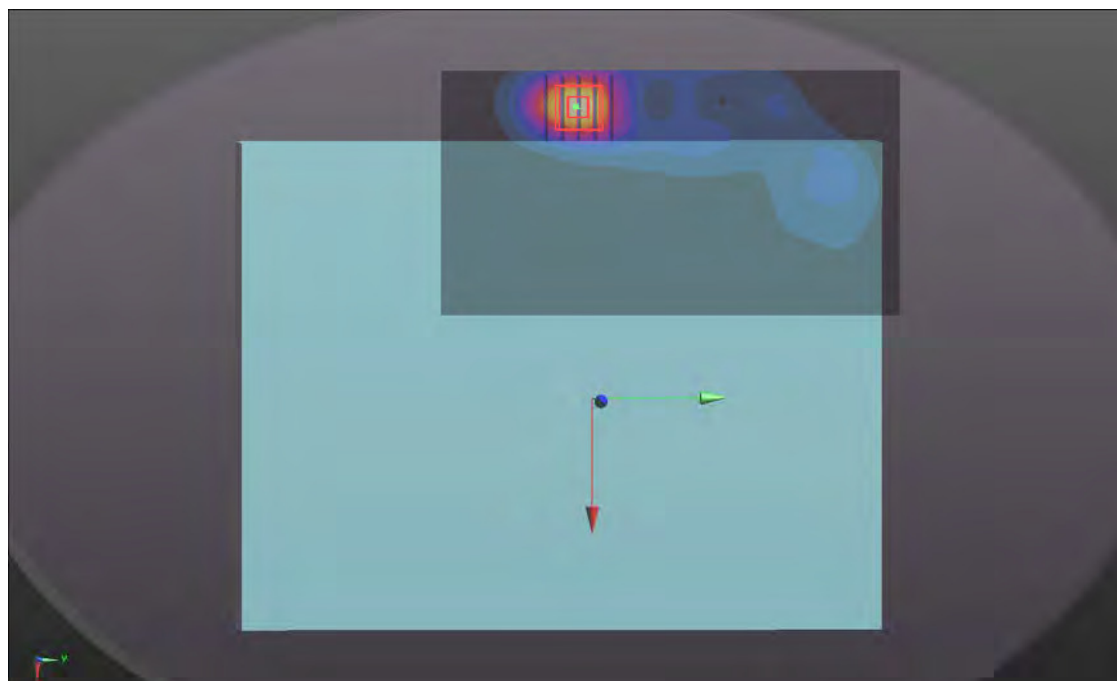
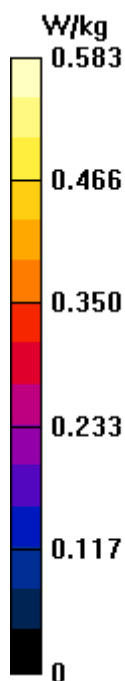
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.661 W/kg

SAR(1 g) = 0.402 W/kg; SAR(10 g) = 0.233 W/kg

Maximum value of SAR (measured) = 0.576 W/kg



P30 LTE 5_QPSK10M_Bottom Side_0cm_Ch20525_w_1RB_OS0**DUT: 160129C01**

Communication System: LTE; Frequency: 836.5 MHz; Duty Cycle: 1:1

Medium: B07T10N2_0325 Medium parameters used: $f = 836.5$ MHz; $\sigma = 0.98$ S/m; $\epsilon_r = 56.077$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x131x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.747 W/kg

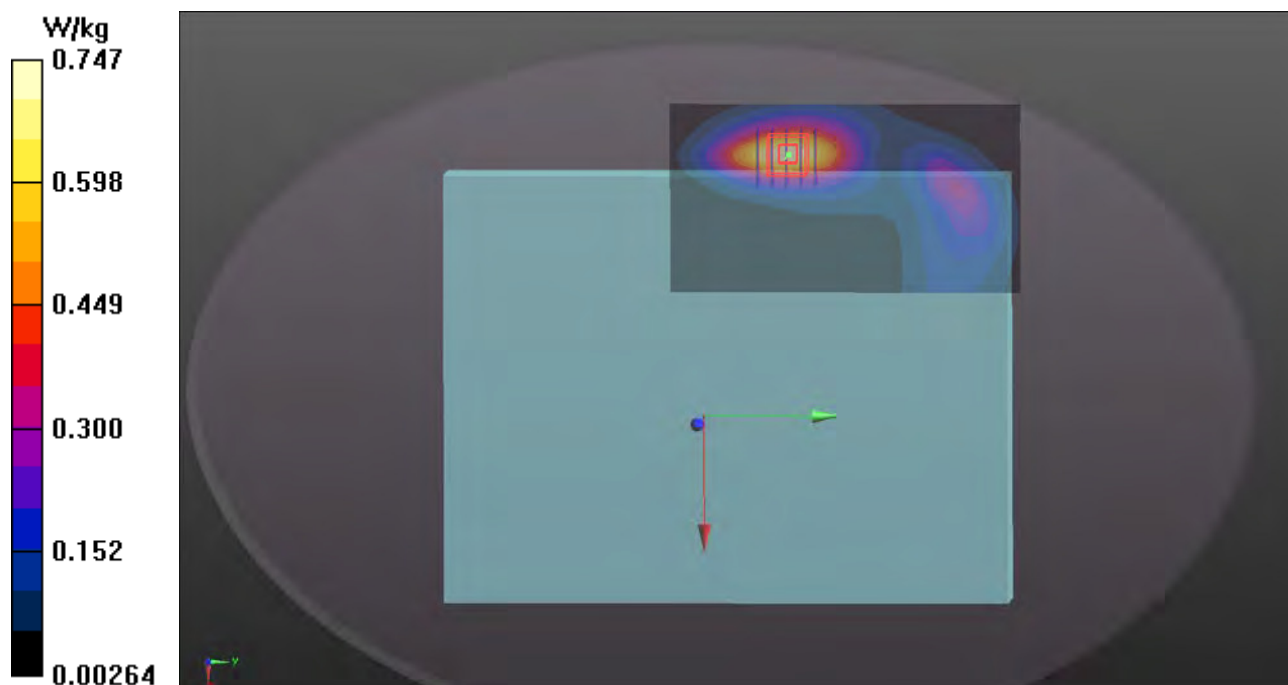
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.333 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.856 W/kg

SAR(1 g) = 0.533 W/kg; SAR(10 g) = 0.334 W/kg

Maximum value of SAR (measured) = 0.741 W/kg



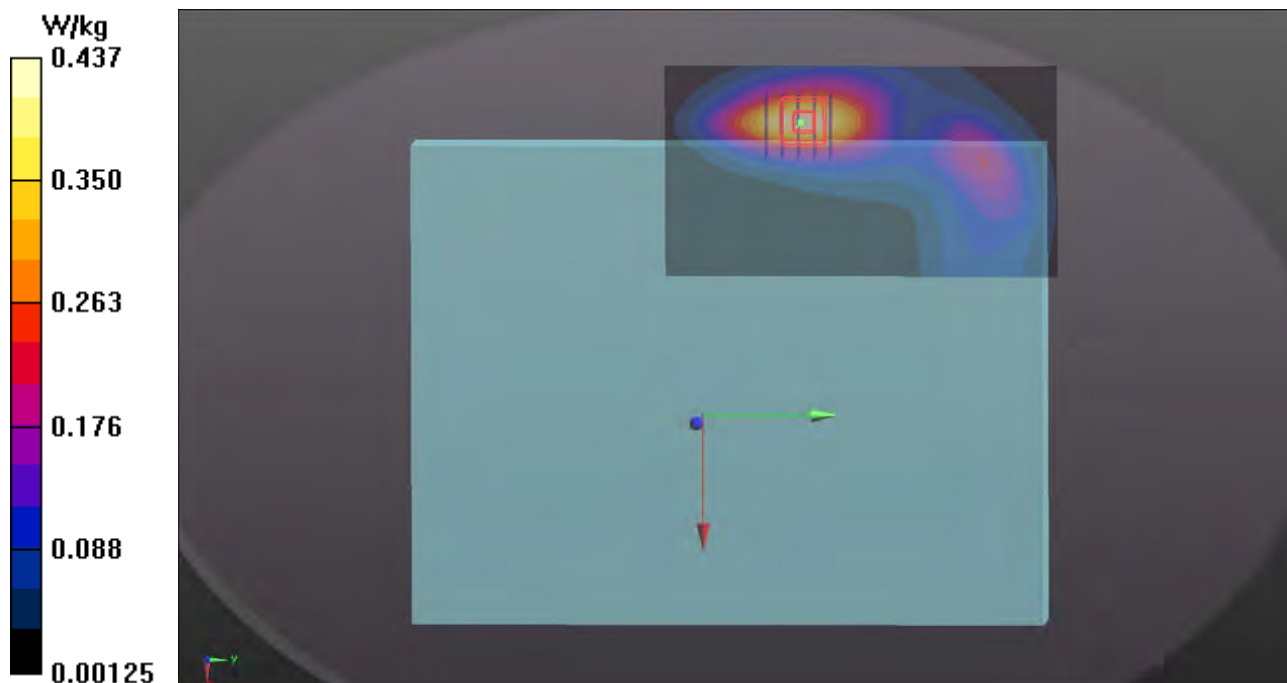
P31 LTE 13_QPSK10M_Bottom Side_0cm_Ch23230_w_1RB_OS0**DUT: 160129C01**

Communication System: LTE; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: B07T10N1_0325 Medium parameters used: $f = 782 \text{ MHz}$; $\sigma = 1.003 \text{ S/m}$; $\epsilon_r = 54.837$; $\rho = 1000 \text{ kg/m}^3$ Ambient Temperature : 23.8°C ; Liquid Temperature : 23.2°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.94, 9.94, 9.94); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (71x131x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$ Maximum value of SAR (interpolated) = 0.437 W/kg **- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 1.157 V/m ; Power Drift = 0.13 dB Peak SAR (extrapolated) = 0.508 W/kg **SAR(1 g) = 0.317 W/kg ; SAR(10 g) = 0.203 W/kg** Maximum value of SAR (measured) = 0.438 W/kg 

P32 LTE 17_QPSK10M_Bottom Side_0cm_Ch23800_w_1RB_OS24**DUT: 160129C01**

Communication System: LTE; Frequency: 711 MHz; Duty Cycle: 1:1

Medium: B06T09N1_0325 Medium parameters used: $f = 711 \text{ MHz}$; $\sigma = 0.941 \text{ S/m}$; $\epsilon_r = 55.447$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.8°C ; Liquid Temperature : 23.2°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.94, 9.94, 9.94); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1245; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- Area Scan (71x131x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.484 W/kg

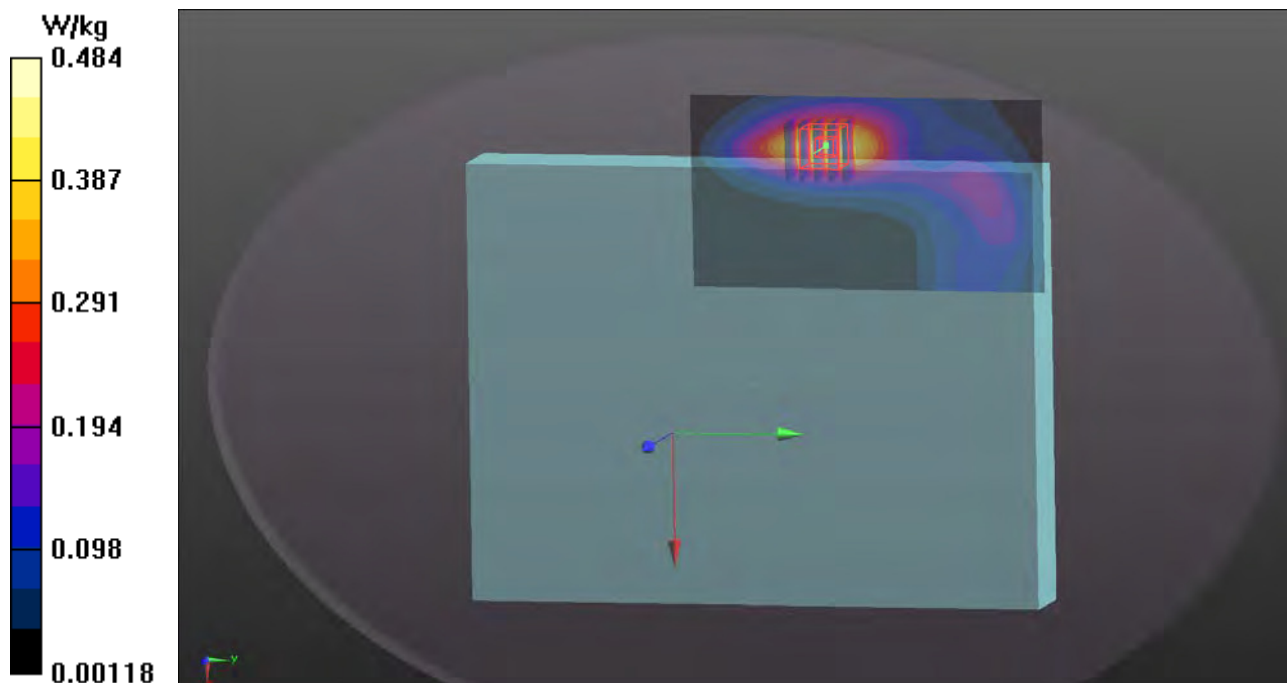
- Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 1.953 V/m ; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.552 W/kg

SAR(1 g) = 0.354 W/kg ; SAR(10 g) = 0.232 W/kg

Maximum value of SAR (measured) = 0.483 W/kg



P33 LTE 25_QPSK20M_Bottom Side_0cm_Ch26140_Sensor_w_1RB_OS0**DUT: 160129C01**

Communication System: LTE; Frequency: 1860 MHz; Duty Cycle: 1:1

Medium: B16T20N2_0326 Medium parameters used: $f = 1860$ MHz; $\sigma = 1.546$ S/m; $\epsilon_r = 50.949$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.9 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: ELI Phantom_1206; Type: QDOVA;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (81x151x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.569 W/kg

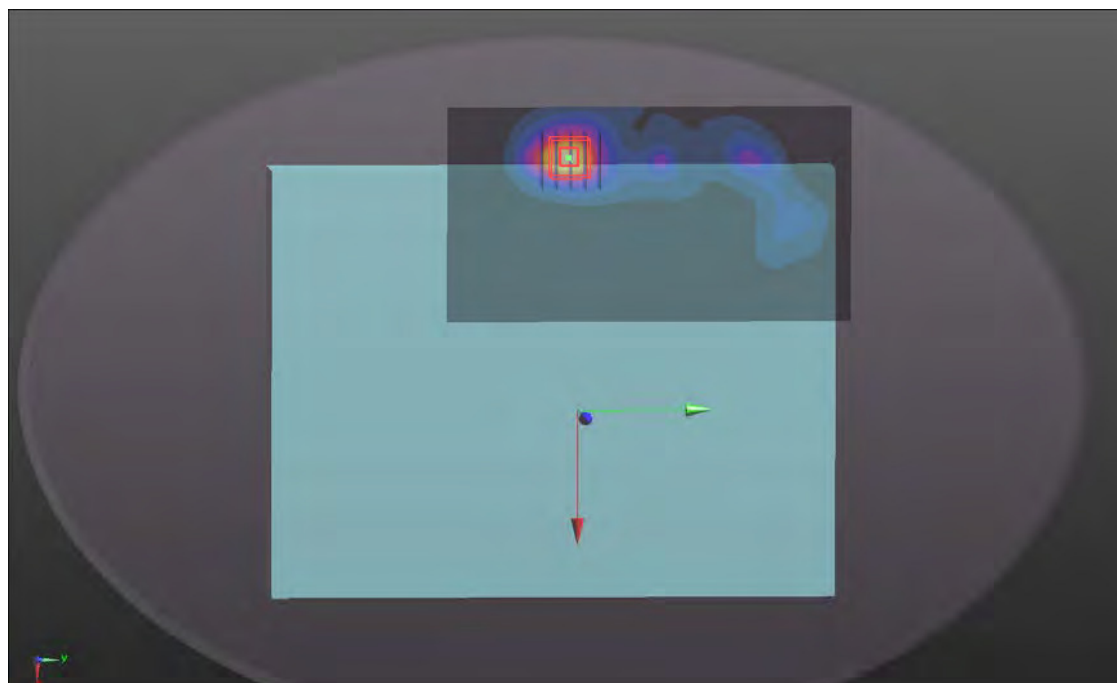
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.8820 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 0.658 W/kg

SAR(1 g) = 0.378 W/kg; SAR(10 g) = 0.208 W/kg

Maximum value of SAR (measured) = 0.561 W/kg





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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **B.V. ADT (Auden)**

Certificate No: **D750V3-1013_Aug15**

CALIBRATION CERTIFICATE

Object **D750V3 - SN: 1013**

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

Calibration date: **August 24, 2015**

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 EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	17-Aug-15 (No. DAE4-601_Aug15)	Aug-16
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

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

Signature

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

Issued: August 24, 2015

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



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Accreditation No.: **SCS 0108**

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Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	42.1 $\pm$ 6 %	0.91 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (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	8.07 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.29 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	56.3 $\pm$ 6 %	1.00 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.44 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.43 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.59 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.2 Ω - 1.1 j Ω
Return Loss	- 32.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.6 Ω - 2.2 j Ω
Return Loss	- 31.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.035 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 22, 2010

DASY5 Validation Report for Head TSL

Date: 21.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1013

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

Medium parameters used: $f = 750$ MHz; $\sigma = 0.91$ S/m; $\epsilon_r = 42.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.44, 6.44, 6.44); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; 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 = 52.87 V/m; Power Drift = 0.03 dB

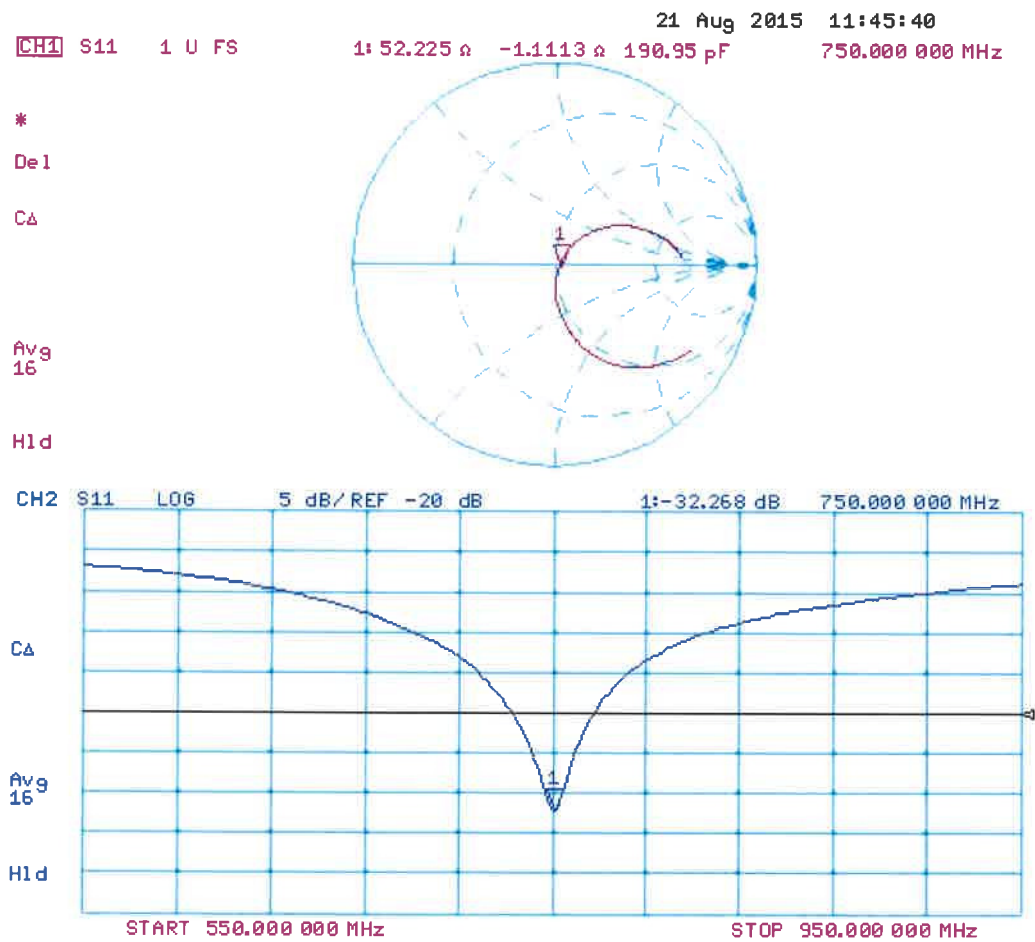
Peak SAR (extrapolated) = 3.04 W/kg

SAR(1 g) = 2.05 W/kg; SAR(10 g) = 1.34 W/kg

Maximum value of SAR (measured) = 2.40 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 24.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1013

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

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 1 \text{ S/m}$; $\epsilon_r = 56.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.21, 6.21, 6.21); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

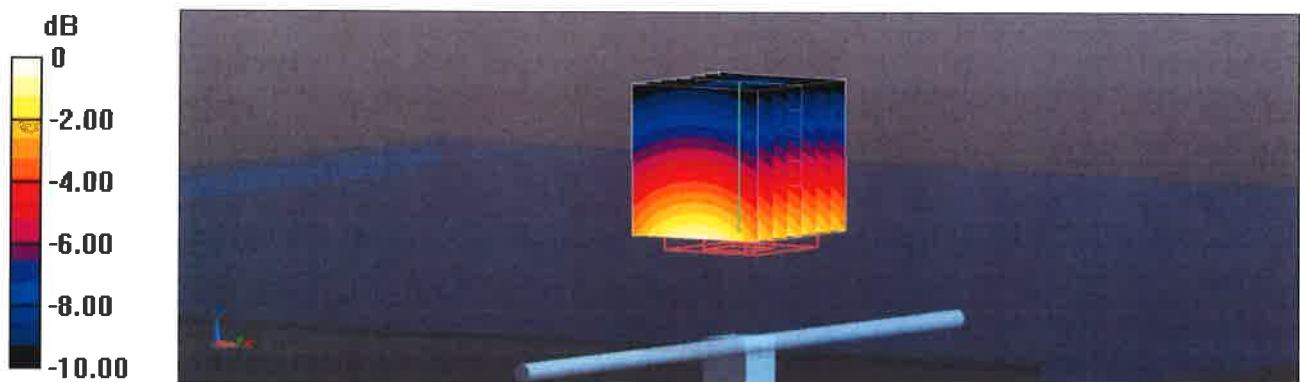
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 52.05 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.17 W/kg

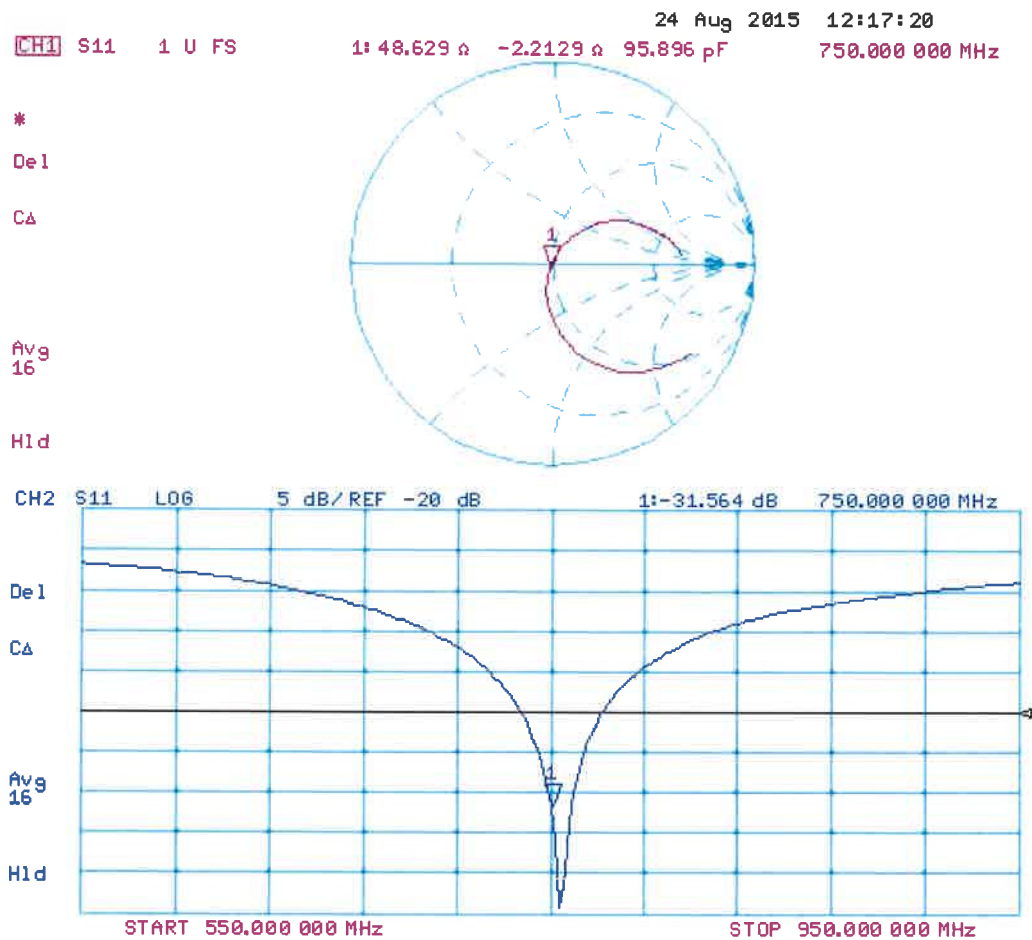
SAR(1 g) = 2.17 W/kg; SAR(10 g) = 1.43 W/kg

Maximum value of SAR (measured) = 2.54 W/kg



0 dB = 2.54 W/kg = 4.05 dBW/kg

Impedance Measurement Plot for Body TSL





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Accreditation No.: **SCS 0108**

Client **B.V. ADT (Auden)**

Certificate No: **D835V2-4d121_Aug15**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d121**

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

Calibration date: **August 24, 2015**

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 EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	17-Aug-15 (No. DAE4-601_Aug15)	Aug-16
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

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

Approved by: **Katja Pokovic** Technical Manager

Signature

Issued: August 25, 2015

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.9 $\pm$ 6 %	0.93 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.11 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.52 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.97 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	56.1 $\pm$ 6 %	1.02 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.38 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.20 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.56 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.07 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 Ω - 2.1 j Ω
Return Loss	- 31.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1 Ω - 3.2 j Ω
Return Loss	- 28.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.395 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 29, 2010

DASY5 Validation Report for Head TSL

Date: 21.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d121

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

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.93 \text{ S/m}$; $\epsilon_r = 41.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.2, 6.2, 6.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; 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:

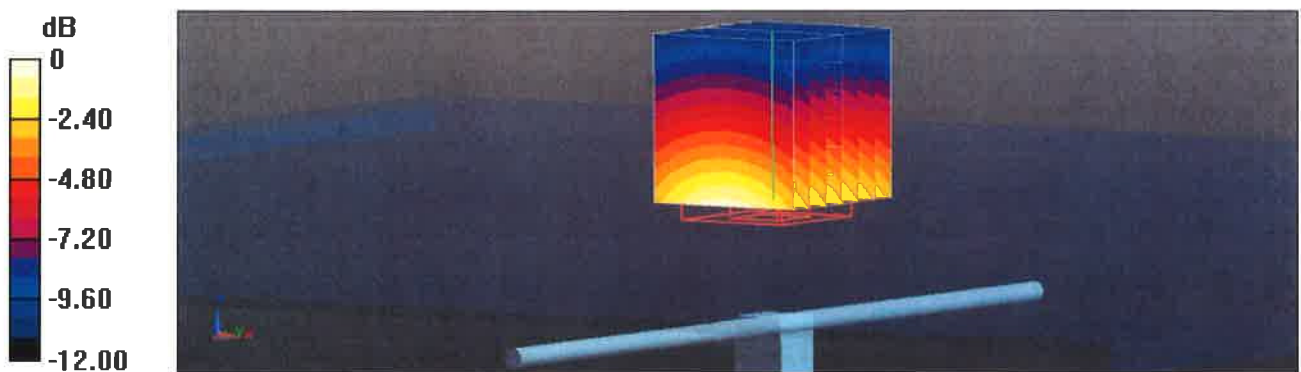
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 56.08 V/m; Power Drift = -0.00 dB

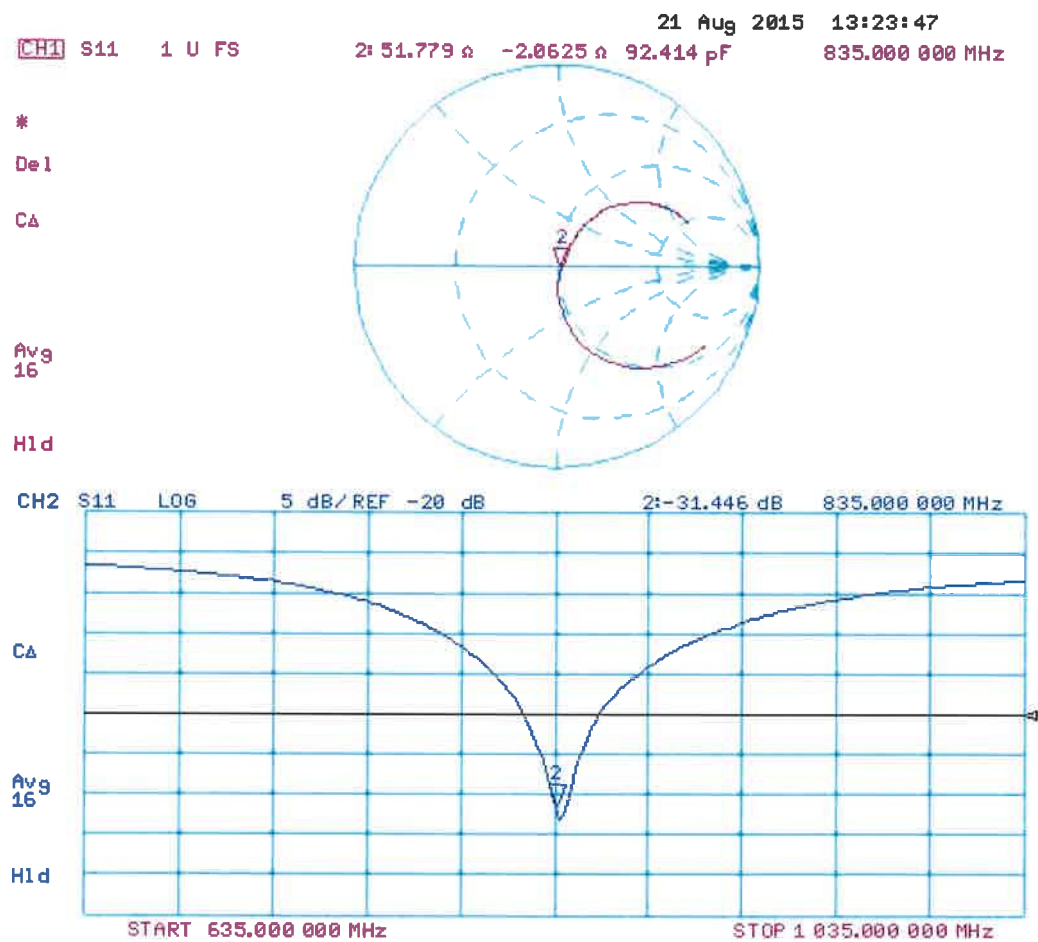
Peak SAR (extrapolated) = 3.45 W/kg

SAR(1 g) = 2.33 W/kg; SAR(10 g) = 1.52 W/kg

Maximum value of SAR (measured) = 2.74 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 24.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d121

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

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1.02 \text{ S/m}$; $\epsilon_r = 56.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.17, 6.17, 6.17); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- 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: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.32 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 3.49 W/kg

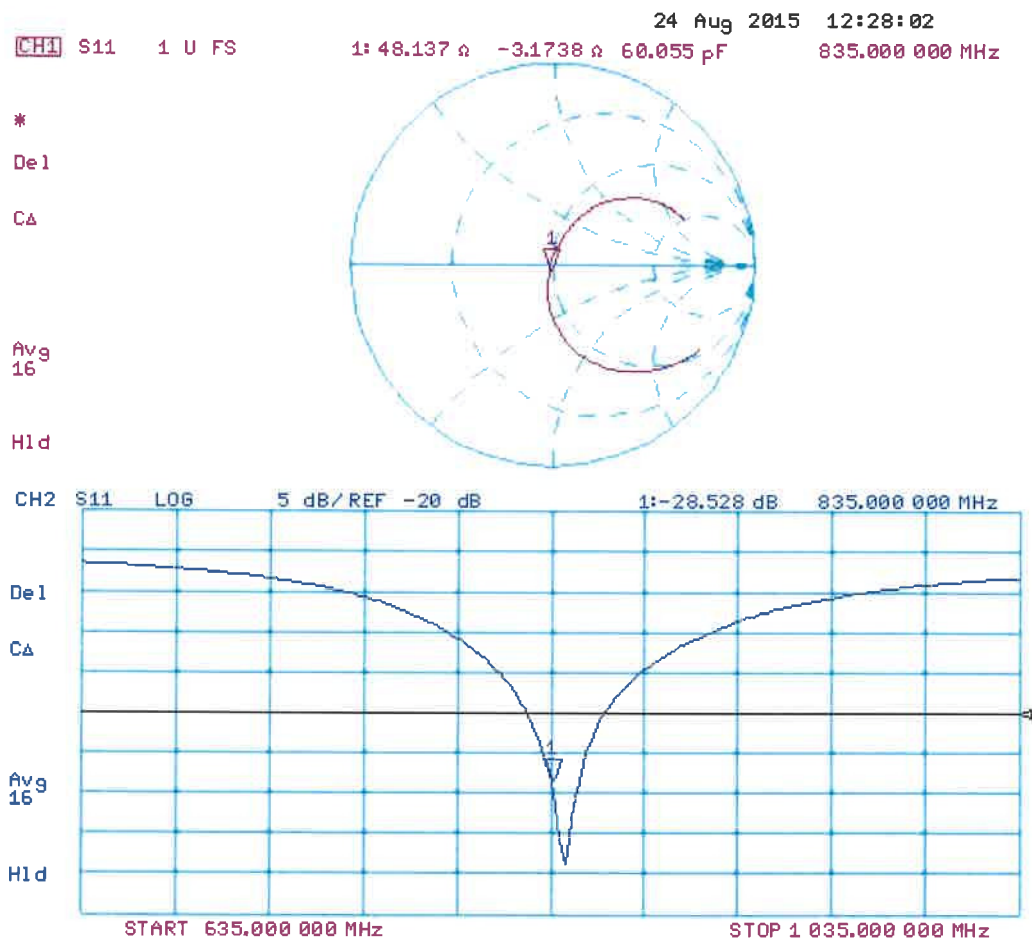
SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.56 W/kg

Maximum value of SAR (measured) = 2.77 W/kg



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

Impedance Measurement Plot for Body TSL





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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **B.V. ADT (Auden)**

Certificate No: **D1750V2-1055_Aug15**

CALIBRATION CERTIFICATE

Object **D1750V2 - SN: 1055**

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

Calibration date: **August 20, 2015**

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 EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	17-Aug-15 (No. DAE4-601_Aug15)	Aug-16
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

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

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

Signature

M. Weber

K. Pokovic

Issued: August 21, 2015

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Accreditation No.: **SCS 0108**

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Multilateral Agreement for the recognition of calibration certificates

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.8 $\pm$ 6 %	1.36 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	37.0 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.92 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.7 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.1 $\pm$ 6 %	1.48 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	37.6 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.08 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.3 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$50.5 \Omega + 1.6 j\Omega$
Return Loss	- 35.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$46.7 \Omega + 1.6 j\Omega$
Return Loss	- 28.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.222 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	February 19, 2010

DASY5 Validation Report for Head TSL

Date: 20.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1055

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

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

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.2, 5.2, 5.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

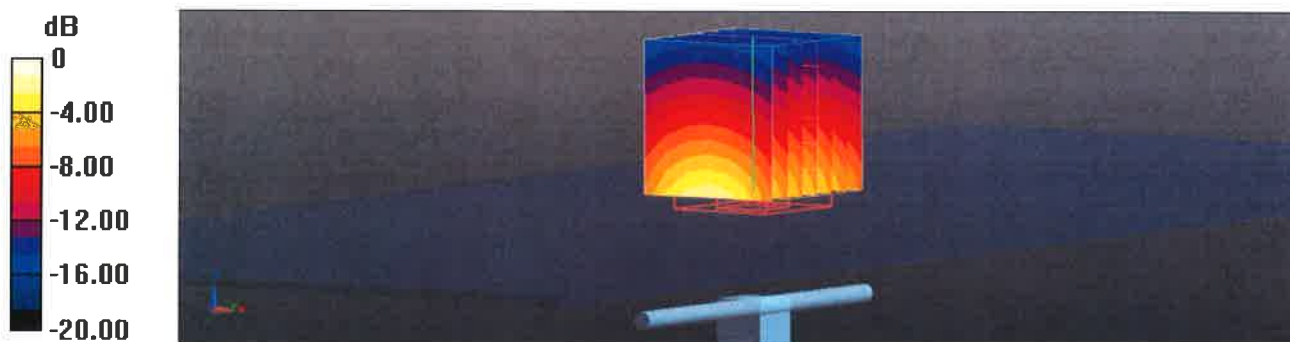
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.73 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 16.4 W/kg

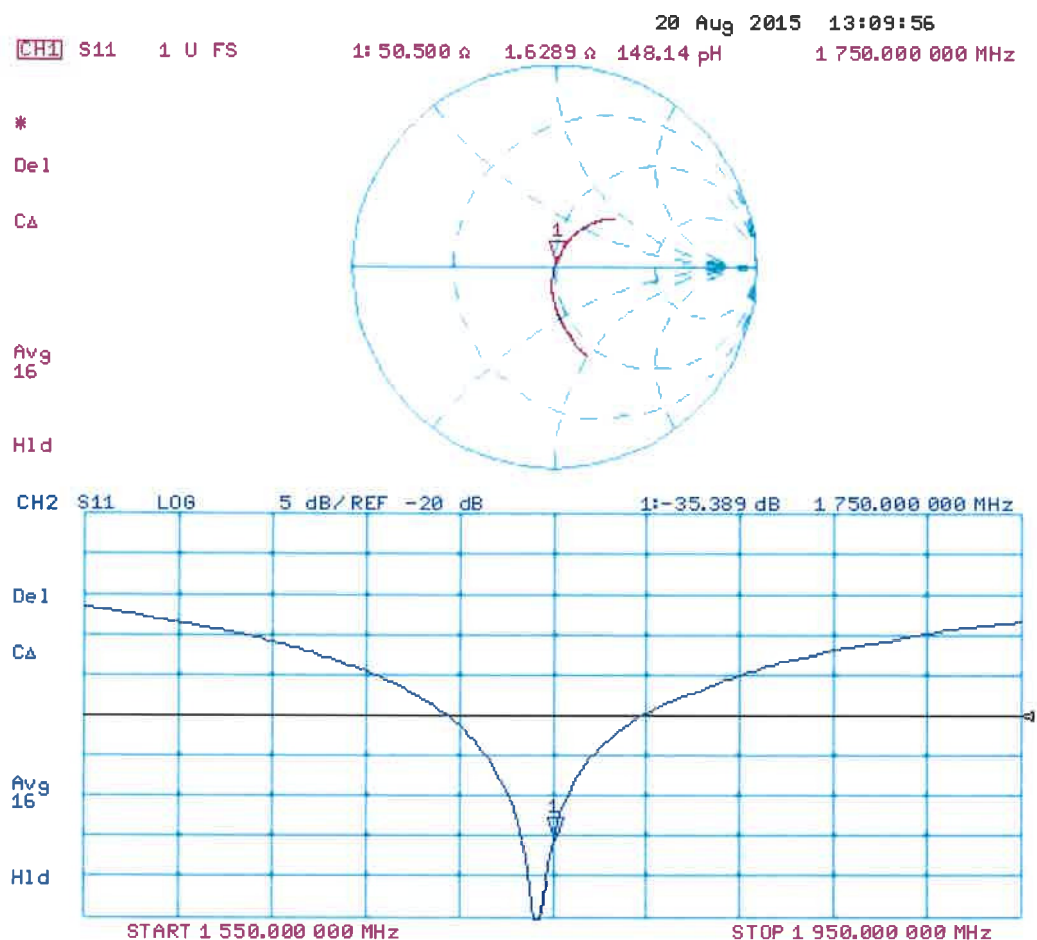
SAR(1 g) = 9.22 W/kg; SAR(10 g) = 4.92 W/kg

Maximum value of SAR (measured) = 11.7 W/kg



0 dB = 11.7 W/kg = 10.68 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 20.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1055

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

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.48$ S/m; $\epsilon_r = 52.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.88, 4.88, 4.88); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

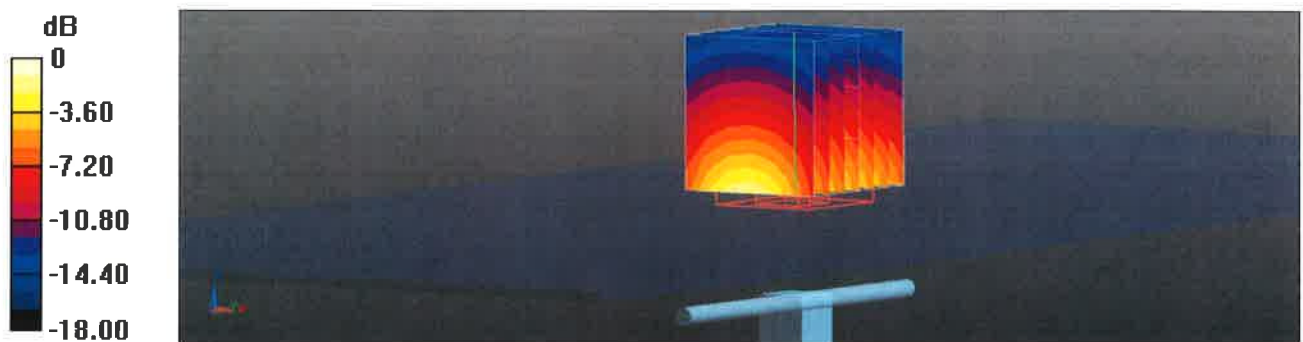
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.55 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.1 W/kg

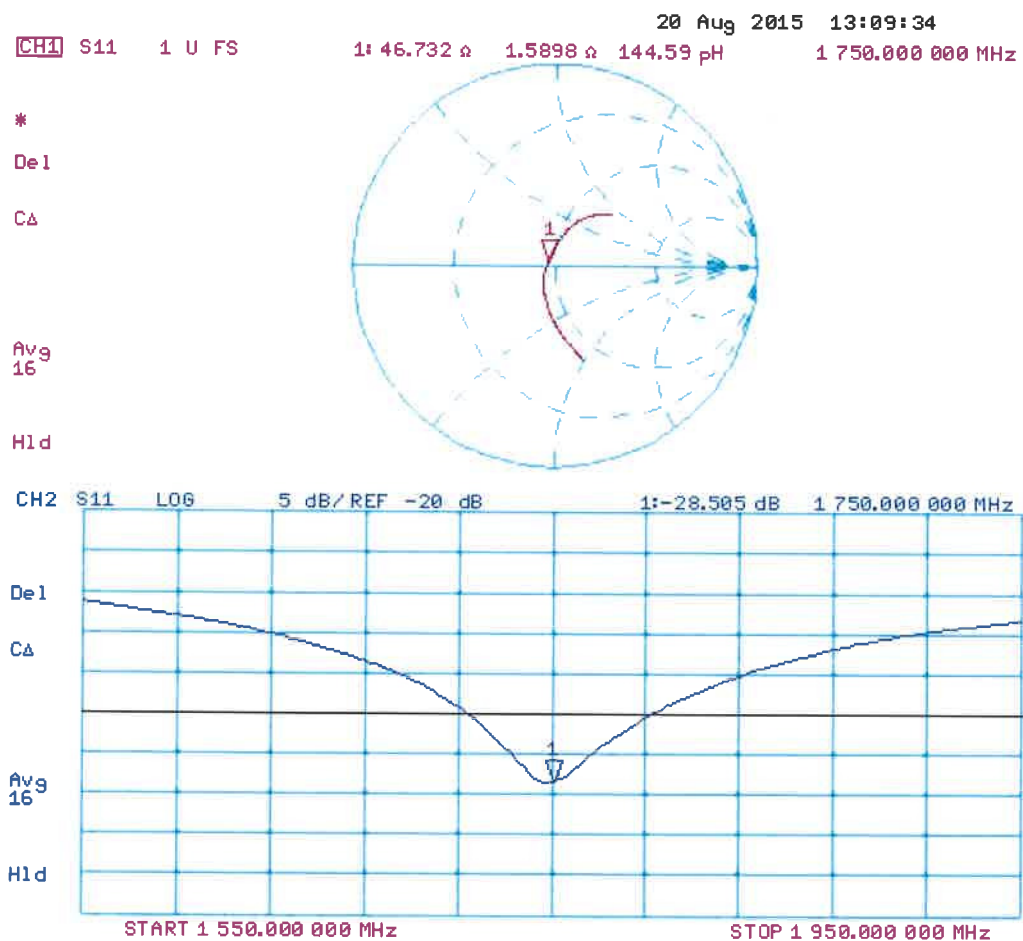
SAR(1 g) = 9.42 W/kg; SAR(10 g) = 5.08 W/kg

Maximum value of SAR (measured) = 11.9 W/kg



0 dB = 11.9 W/kg = 10.76 dBW/kg

Impedance Measurement Plot for Body TSL





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Accreditation No.: **SCS 0108**

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Multilateral Agreement for the recognition of calibration certificates

Client **B.V. ADT (Auden)**

Certificate No: **D1900V2-5d036_Jan16**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d036**

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

Calibration date: **January 22, 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 EPM-442A	GB37480704	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	US37292783	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	MY41092317	07-Oct-15 (No. 217-02223)	Oct-16
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe EX3DV4	SN: 7349	31-Dec-15 (No. EX3-7349_Dec15)	Dec-16
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100972	15-Jun-15 (in house check Jun-15)	In house check: Jun-18
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

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

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

Signature

Issued: January 25, 2016

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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.3 $\pm$ 6 %	1.39 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.73 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	38.9 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.4 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.7 $\pm$ 6 %	1.52 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.2 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	40.7 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.36 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.4 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$52.1 \Omega + 5.3 j\Omega$
Return Loss	- 25.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$47.7 \Omega + 6.9 j\Omega$
Return Loss	- 22.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.195 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 08, 2003

DASY5 Validation Report for Head TSL

Date: 22.01.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d036

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.39$ S/m; $\epsilon_r = 39.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.2, 8.2, 8.2); Calibrated: 31.12.2015;
- 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=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

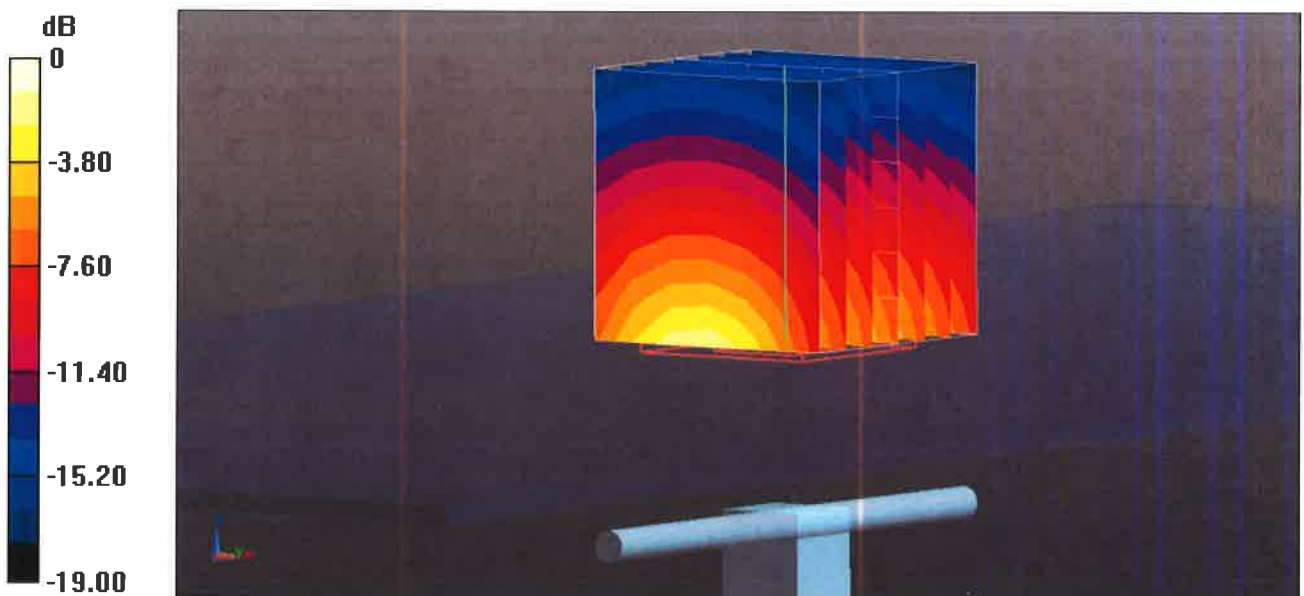
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 107.9 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 9.73 W/kg; SAR(10 g) = 5.1 W/kg

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



Impedance Measurement Plot for Head TSL

CH1

S11

1 U FS

1: 52.143 Ω

5.3047 Ω

444.35 μH

22 Jan 2016 12:07:49

1 900.000 000 MHz

*

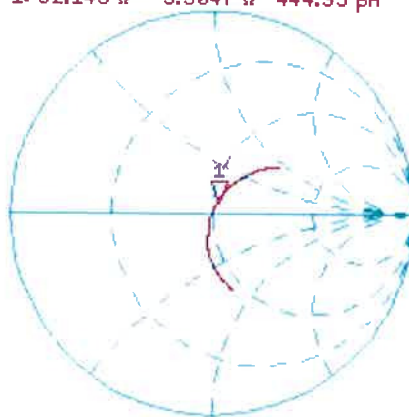
De1

CA

Avg

16

H1d



CH2

S11

LOG

5 dB/REF

-20 dB

1:-25.037 dB

1 900.000 000 MHz

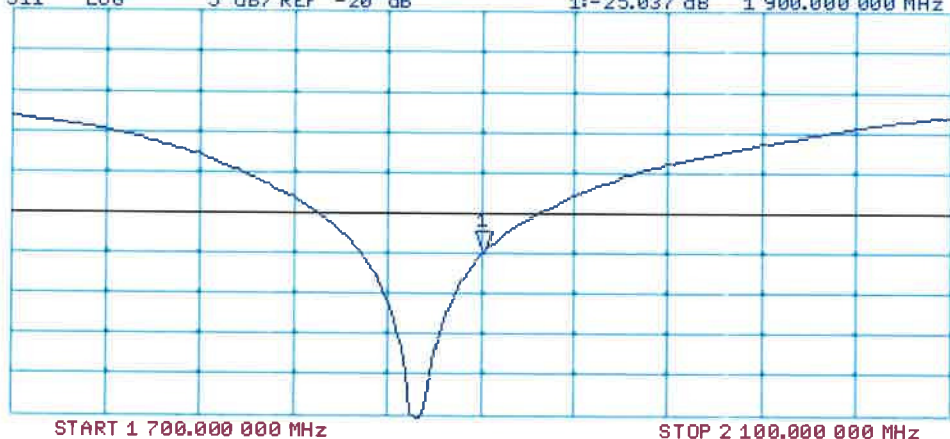
De1

CA

Avg

16

H1d



DASY5 Validation Report for Body TSL

Date: 20.01.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d036

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.52$ S/m; $\epsilon_r = 52.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.03, 8.03, 8.03); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

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

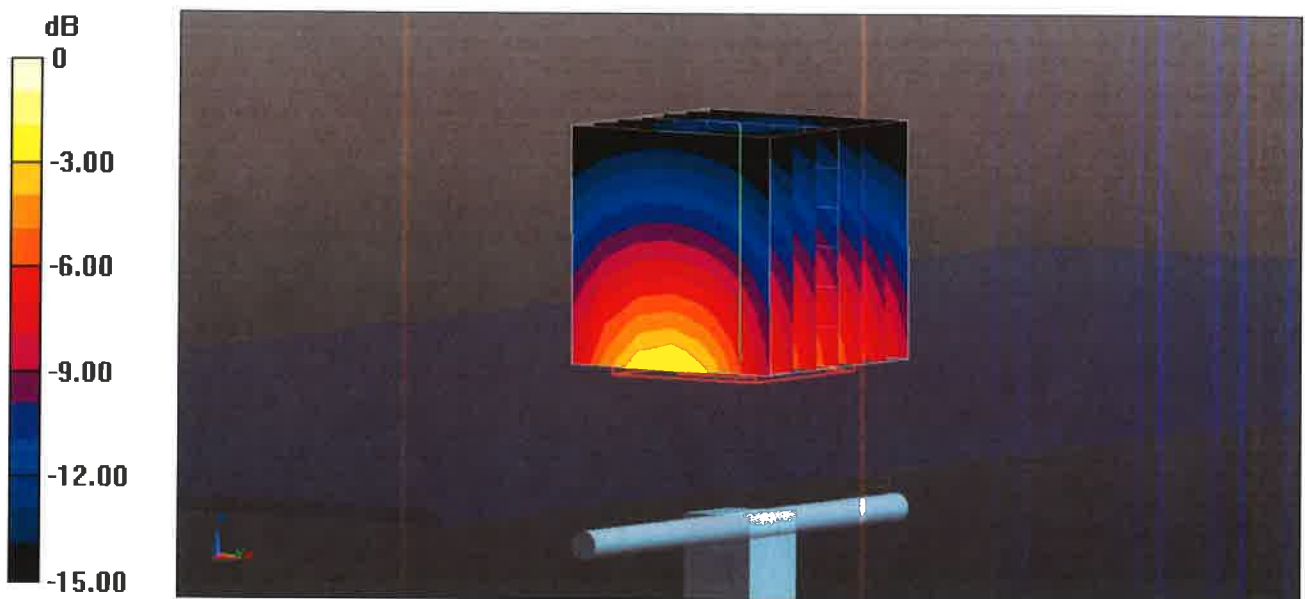
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 105.0 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 18.0 W/kg

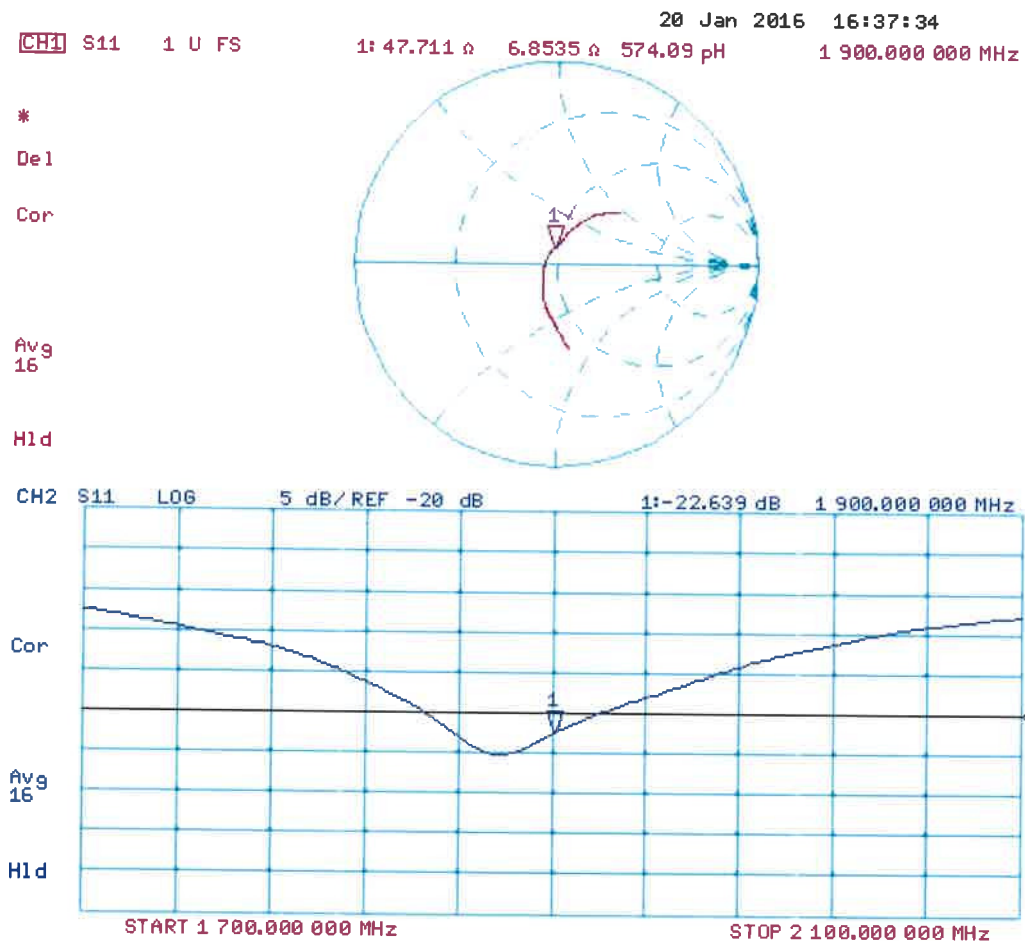
SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.36 W/kg

Maximum value of SAR (measured) = 15.3 W/kg



0 dB = 15.3 W/kg = 11.85 dBW/kg

Impedance Measurement Plot for Body TSL





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Accreditation No.: **SCS 0108**

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Client **BV ADT (Auden)**

Certificate No: **EX3-3650_Jul15**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3650**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6**
Calibration procedure for dosimetric E-field probes

Calibration date: **July 23, 2015**

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 E4419B	GB41293874	01-Apr-15 (No. 217-02128)	Mar-16
Power sensor E4412A	MY41498087	01-Apr-15 (No. 217-02128)	Mar-16
Reference 3 dB Attenuator	SN: S5054 (3c)	01-Apr-15 (No. 217-02129)	Mar-16
Reference 20 dB Attenuator	SN: S5277 (20x)	01-Apr-15 (No. 217-02132)	Mar-16
Reference 30 dB Attenuator	SN: S5129 (30b)	01-Apr-15 (No. 217-02133)	Mar-16
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 
Approved by:	Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			Issued: July 24, 2015



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

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

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,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., $\vartheta = 0$ 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:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,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
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,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 $f \leq 800$ 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 NORM_{x,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 NORM_x (no uncertainty required).

Probe EX3DV4

SN:3650

Manufactured: March 18, 2008
Calibrated: July 23, 2015

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3650

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.41	0.42	0.41	± 10.1 %
DCP (mV) ^B	100.2	100.2	102.5	

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	144.7	±3.5 %
		Y	0.0	0.0	1.0		132.2	
		Z	0.0	0.0	1.0		141.6	

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 E²-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: EX3DV4 - SN:3650

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	9.97	9.97	9.97	0.41	0.91	± 12.0 %
835	41.5	0.90	9.45	9.45	9.45	0.19	1.73	± 12.0 %
900	41.5	0.97	9.29	9.29	9.29	0.18	1.84	± 12.0 %
1450	40.5	1.20	8.52	8.52	8.52	0.21	1.22	± 12.0 %
1640	40.3	1.29	8.30	8.30	8.30	0.40	0.80	± 12.0 %
1750	40.1	1.37	8.21	8.21	8.21	0.36	0.85	± 12.0 %
1900	40.0	1.40	7.93	7.93	7.93	0.37	0.85	± 12.0 %
2000	40.0	1.40	7.94	7.94	7.94	0.40	0.85	± 12.0 %
2300	39.5	1.67	7.58	7.58	7.58	0.39	0.80	± 12.0 %
2450	39.2	1.80	7.13	7.13	7.13	0.38	0.80	± 12.0 %
2600	39.0	1.96	6.99	6.99	6.99	0.42	0.81	± 12.0 %
3500	37.9	2.91	7.16	7.16	7.16	0.32	1.28	± 13.1 %
5200	36.0	4.66	5.42	5.42	5.42	0.35	1.80	± 13.1 %
5250	35.9	4.71	5.30	5.30	5.30	0.35	1.80	± 13.1 %
5300	35.9	4.76	5.18	5.18	5.18	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.74	4.74	4.74	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.87	4.87	4.87	0.40	1.80	± 13.1 %

^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: EX3DV4 - SN:3650

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	9.44	9.44	9.44	0.18	1.67	± 12.0 %
835	55.2	0.97	9.47	9.47	9.47	0.22	1.36	± 12.0 %
900	55.0	1.05	9.27	9.27	9.27	0.24	1.27	± 12.0 %
1450	54.0	1.30	8.10	8.10	8.10	0.24	1.18	± 12.0 %
1640	53.8	1.40	8.20	8.20	8.20	0.38	0.85	± 12.0 %
1750	53.4	1.49	7.80	7.80	7.80	0.39	0.87	± 12.0 %
1900	53.3	1.52	7.59	7.59	7.59	0.43	0.80	± 12.0 %
2000	53.3	1.52	7.77	7.77	7.77	0.46	0.80	± 12.0 %
2300	52.9	1.81	7.50	7.50	7.50	0.43	0.80	± 12.0 %
2450	52.7	1.95	7.03	7.03	7.03	0.36	0.80	± 12.0 %
2600	52.5	2.16	6.90	6.90	6.90	0.25	0.95	± 12.0 %
3500	51.3	3.31	6.77	6.77	6.77	0.32	1.38	± 13.1 %
5200	49.0	5.30	4.81	4.81	4.81	0.45	1.90	± 13.1 %
5250	48.9	5.36	4.75	4.75	4.75	0.45	1.90	± 13.1 %
5300	48.9	5.42	4.64	4.64	4.64	0.45	1.90	± 13.1 %
5600	48.5	5.77	4.05	4.05	4.05	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.45	4.45	4.45	0.50	1.90	± 13.1 %

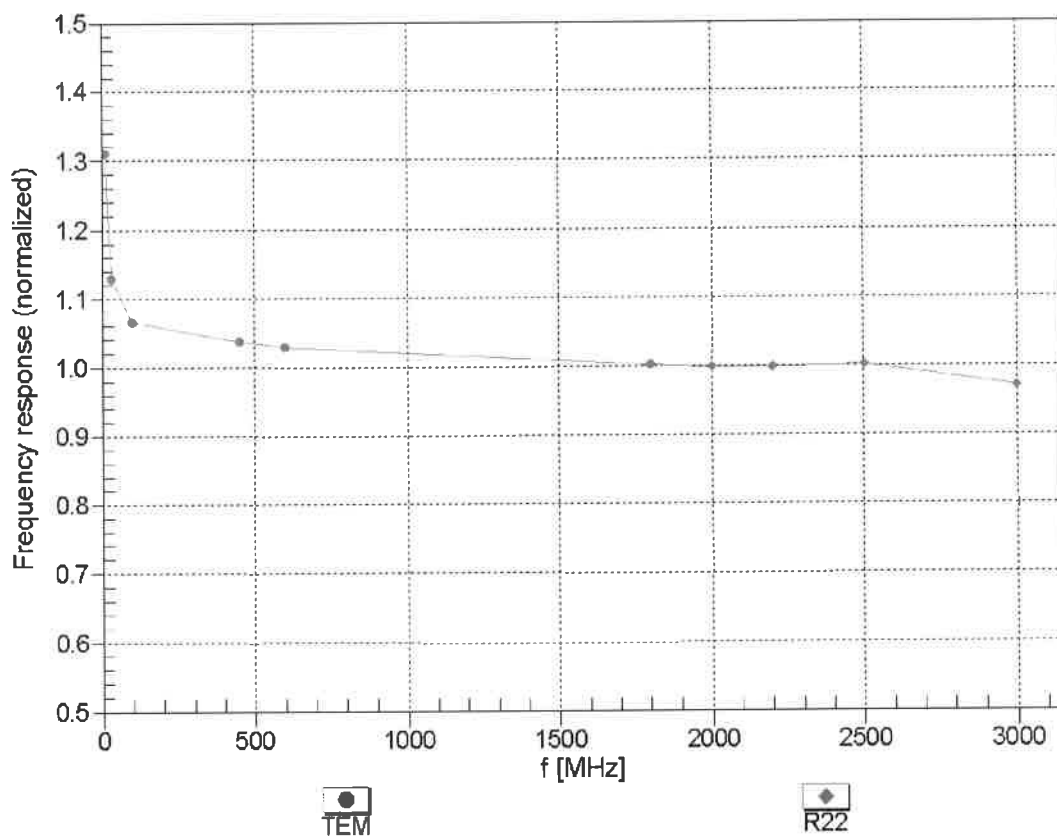
^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 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.

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Frequency Response of E-Field

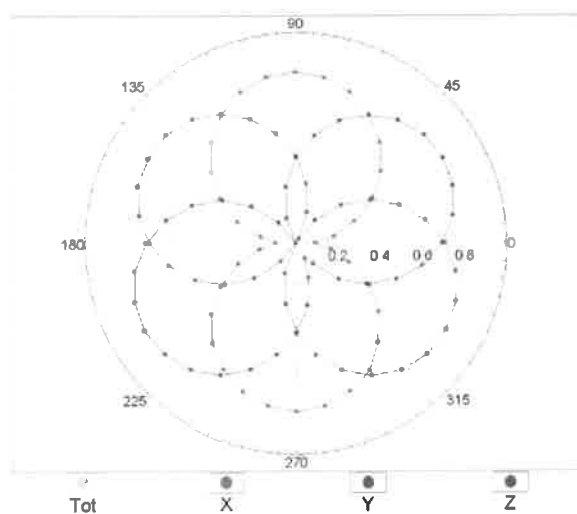
(TEM-Cell:ifi110 EXX, Waveguide: R22)



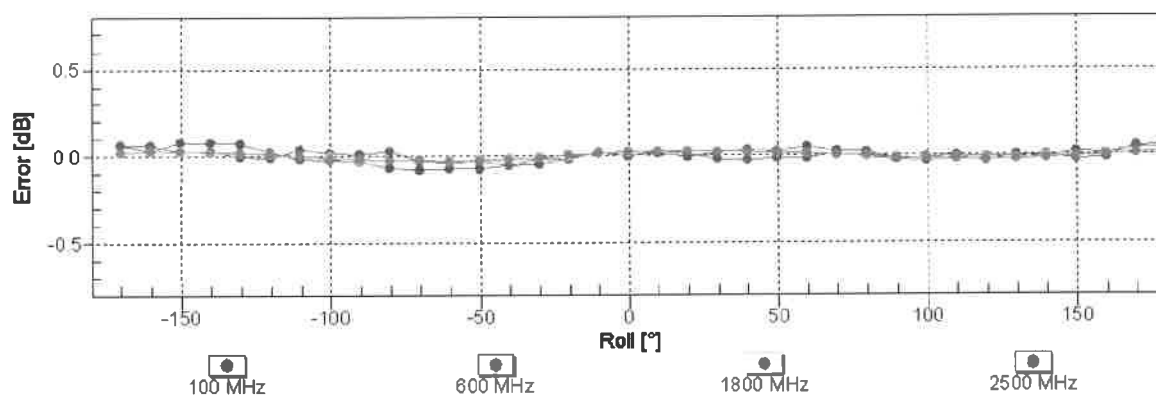
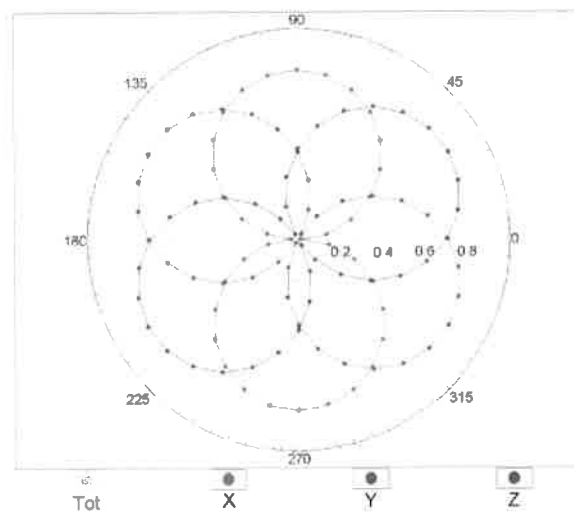
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$

f=600 MHz,TEM

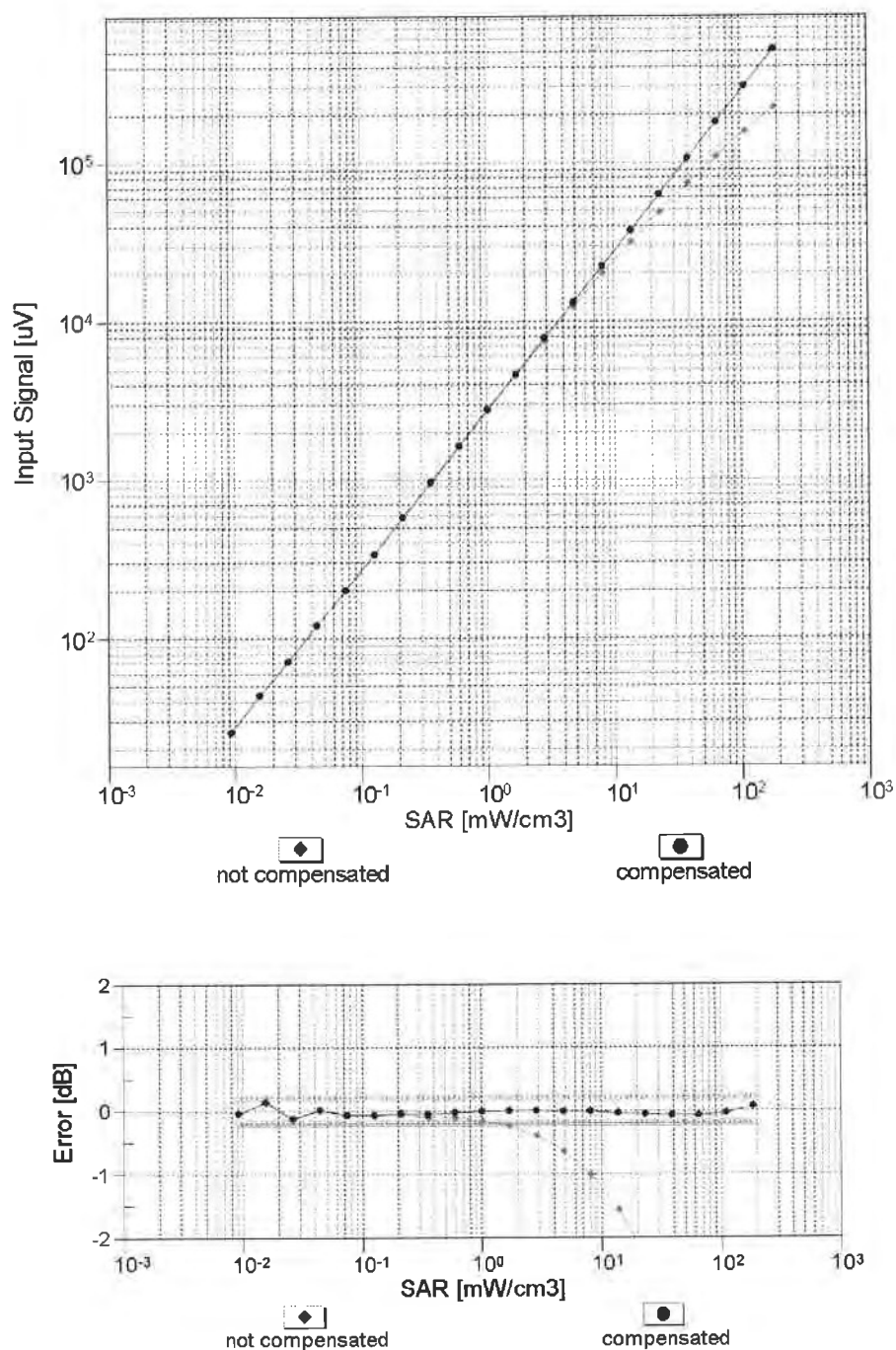


f=1800 MHz,R22



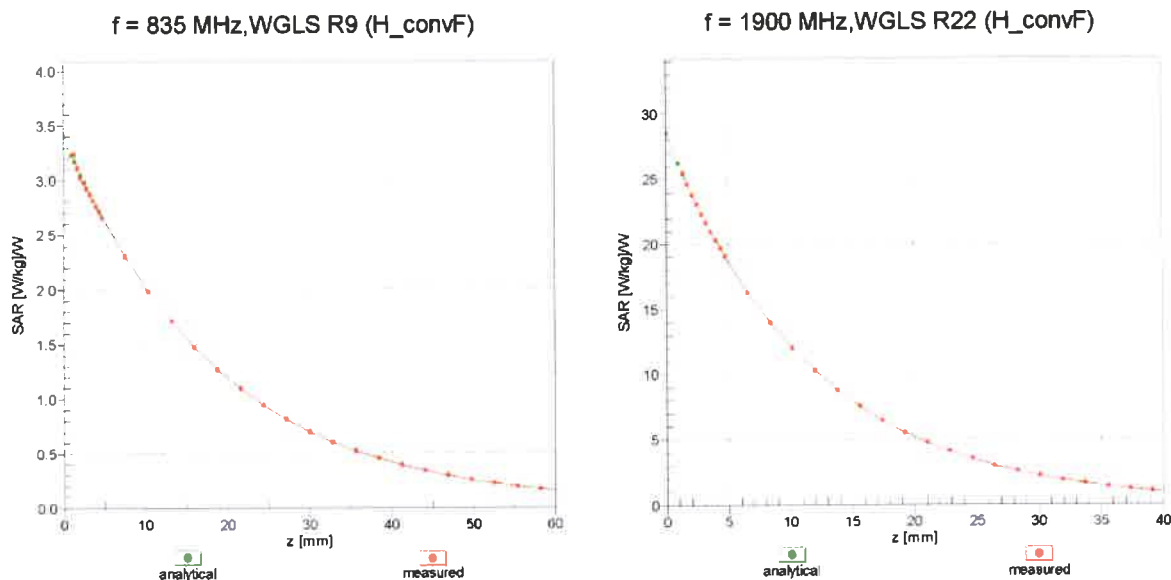
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f_{\text{eval}} = 1900 \text{ MHz}$)



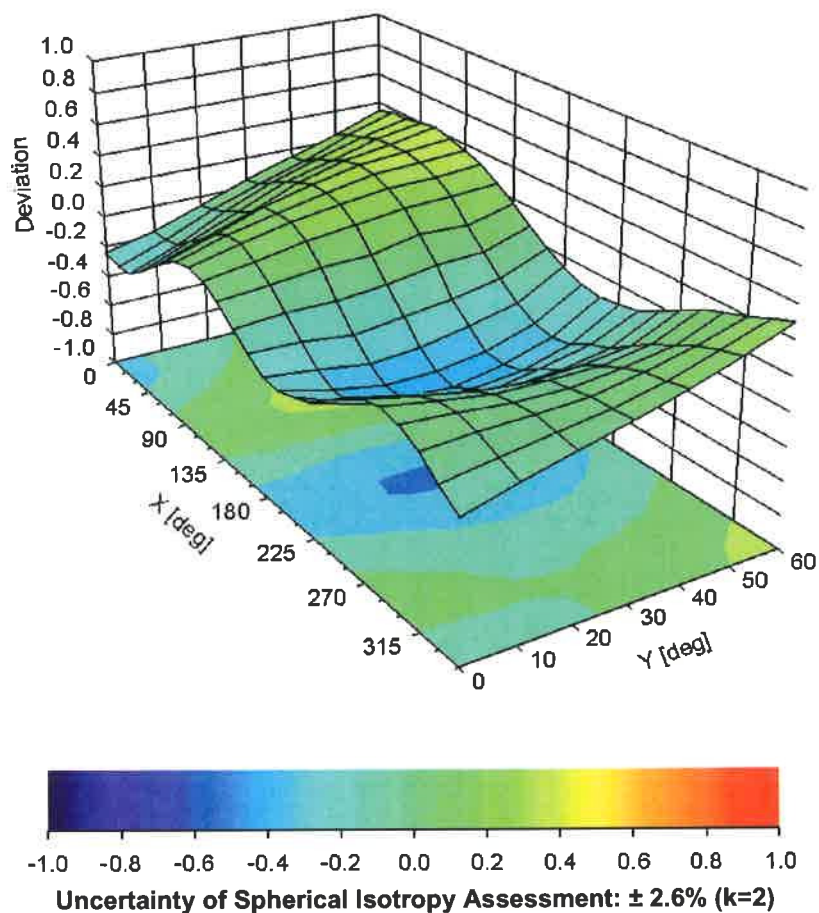
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: EX3DV4 - SN:3650

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-20.4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm



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Accreditation No.: **SCS 0108**

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Client **BV ADT (Auden)**

Certificate No: **EX3-3864_Jul15**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3864**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6**
Calibration procedure for dosimetric E-field probes

Calibration date: **July 23, 2015**

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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%.

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Reference 30 dB Attenuator	SN: S5129 (30b)	01-Apr-15 (No. 217-02133)	Mar-16
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DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
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Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 24, 2015

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Glossary:

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NORM _{x,y,z}	sensitivity in free space
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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., $\vartheta = 0$ is normal to probe axis
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- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,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.
- DCP_{x,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
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,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 $f \leq 800$ 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 NORM_{x,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 NORM_x (no uncertainty required).

Probe EX3DV4

SN:3864

Manufactured: February 2, 2012
Calibrated: July 23, 2015

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3864

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.47	0.44	0.49	± 10.1 %
DCP (mV) ^B	100.0	96.3	99.5	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	129.6	±2.7 %
		Y	0.0	0.0	1.0		144.4	
		Z	0.0	0.0	1.0		139.5	

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 E²-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: EX3DV4 - SN:3864

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	10.24	10.24	10.24	0.24	1.16	± 12.0 %
835	41.5	0.90	9.90	9.90	9.90	0.22	1.20	± 12.0 %
900	41.5	0.97	9.73	9.73	9.73	0.19	1.59	± 12.0 %
1450	40.5	1.20	8.84	8.84	8.84	0.22	1.22	± 12.0 %
1640	40.3	1.29	8.56	8.56	8.56	0.33	0.80	± 12.0 %
1750	40.1	1.37	8.49	8.49	8.49	0.34	0.80	± 12.0 %
1900	40.0	1.40	8.21	8.21	8.21	0.35	0.80	± 12.0 %
2100	39.8	1.49	8.32	8.32	8.32	0.33	0.85	± 12.0 %
2300	39.5	1.67	7.88	7.88	7.88	0.36	0.83	± 12.0 %
2450	39.2	1.80	7.35	7.35	7.35	0.39	0.82	± 12.0 %
2600	39.0	1.96	7.26	7.26	7.26	0.45	0.83	± 12.0 %
3500	37.9	2.91	6.81	6.81	6.81	0.36	1.01	± 13.1 %
5200	36.0	4.66	5.61	5.61	5.61	0.30	1.80	± 13.1 %
5250	35.9	4.71	5.41	5.41	5.41	0.35	1.80	± 13.1 %
5300	35.9	4.76	5.28	5.28	5.28	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.77	4.77	4.77	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.91	4.91	4.91	0.40	1.80	± 13.1 %

^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: EX3DV4 - SN:3864

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	9.94	9.94	9.94	0.22	1.28	± 12.0 %
835	55.2	0.97	9.83	9.83	9.83	0.25	1.19	± 12.0 %
900	55.0	1.05	9.59	9.59	9.59	0.30	1.03	± 12.0 %
1450	54.0	1.30	8.35	8.35	8.35	0.14	1.99	± 12.0 %
1640	53.8	1.40	8.53	8.53	8.53	0.40	0.80	± 12.0 %
1750	53.4	1.49	8.13	8.13	8.13	0.42	0.82	± 12.0 %
1900	53.3	1.52	7.88	7.88	7.88	0.36	0.80	± 12.0 %
2100	53.2	1.62	8.22	8.22	8.22	0.42	0.80	± 12.0 %
2300	52.9	1.81	7.61	7.61	7.61	0.37	0.90	± 12.0 %
2450	52.7	1.95	7.30	7.30	7.30	0.34	0.90	± 12.0 %
2600	52.5	2.16	7.19	7.19	7.19	0.25	0.99	± 12.0 %
3500	51.3	3.31	6.47	6.47	6.47	0.36	1.16	± 13.1 %
5200	49.0	5.30	4.75	4.75	4.75	0.40	1.90	± 13.1 %
5250	48.9	5.36	4.64	4.64	4.64	0.40	1.90	± 13.1 %
5300	48.9	5.42	4.41	4.41	4.41	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.93	3.93	3.93	0.45	1.90	± 13.1 %
5800	48.2	6.00	4.20	4.20	4.20	0.45	1.90	± 13.1 %

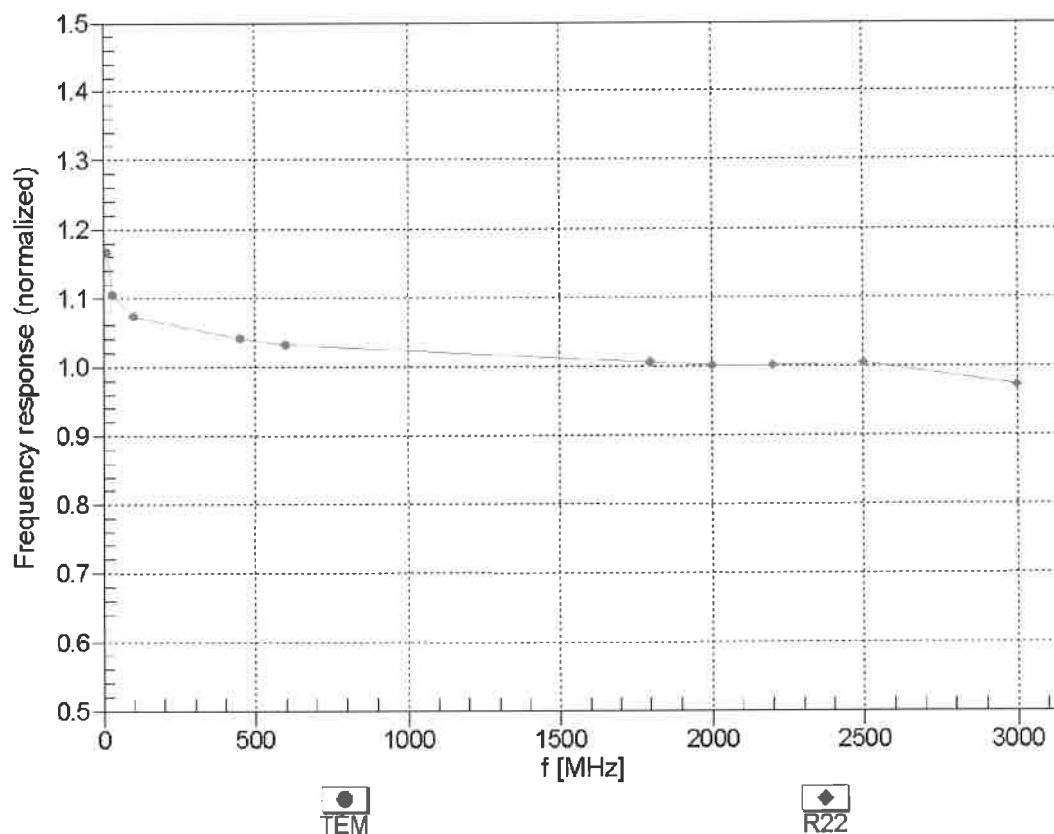
^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4 4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 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

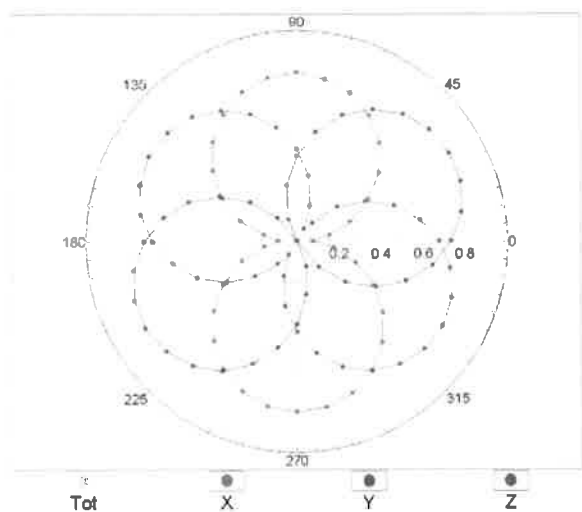
(TEM-Cell:ifi110 EXX, Waveguide: R22)



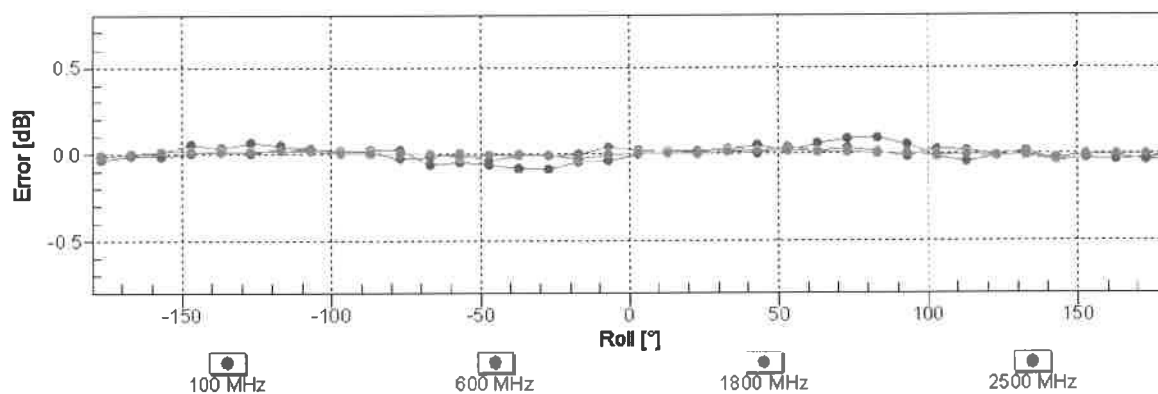
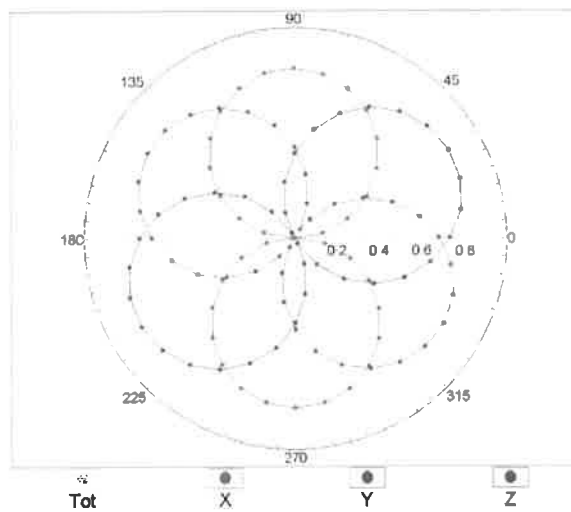
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz,TEM

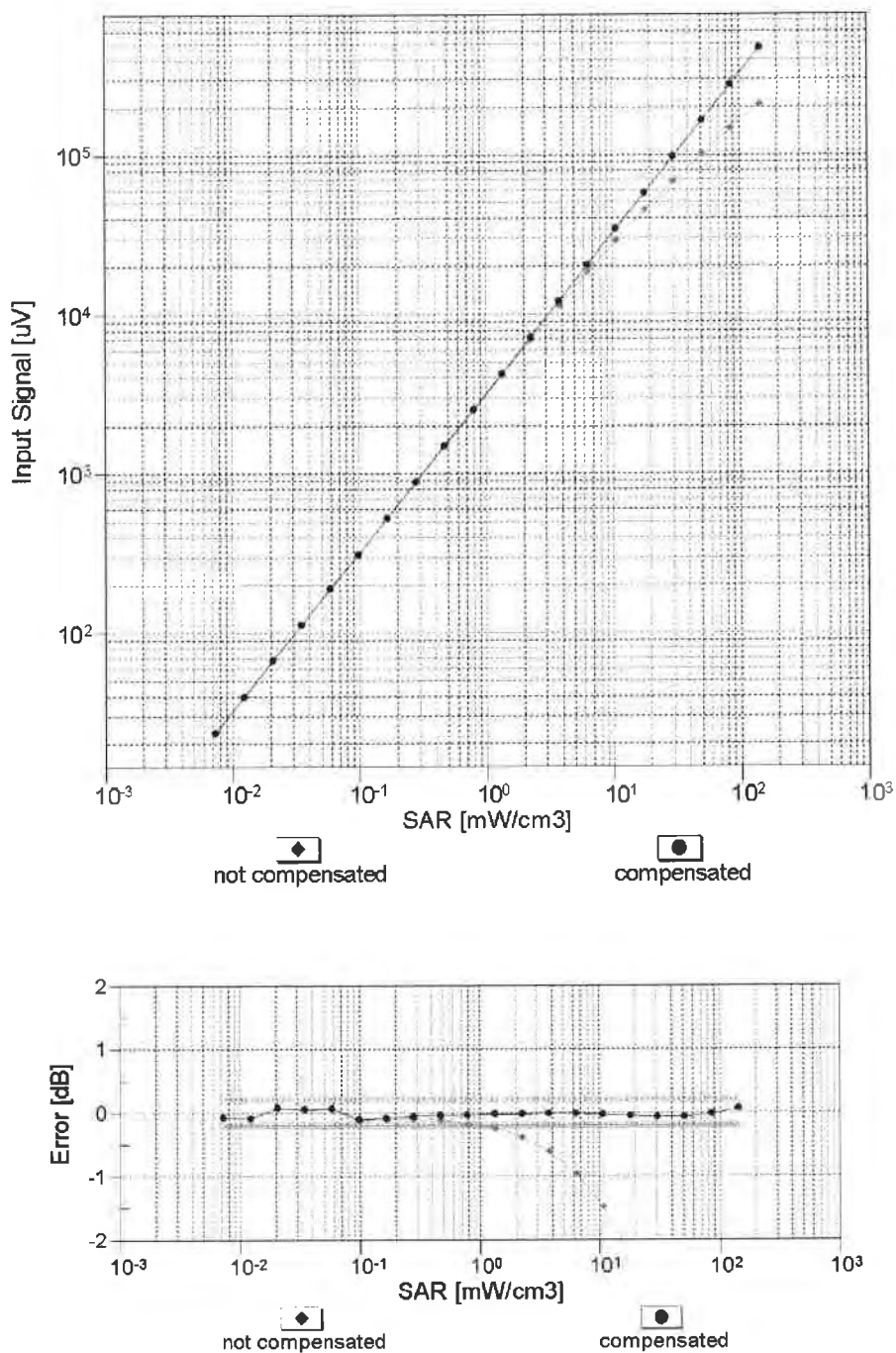


f=1800 MHz,R22



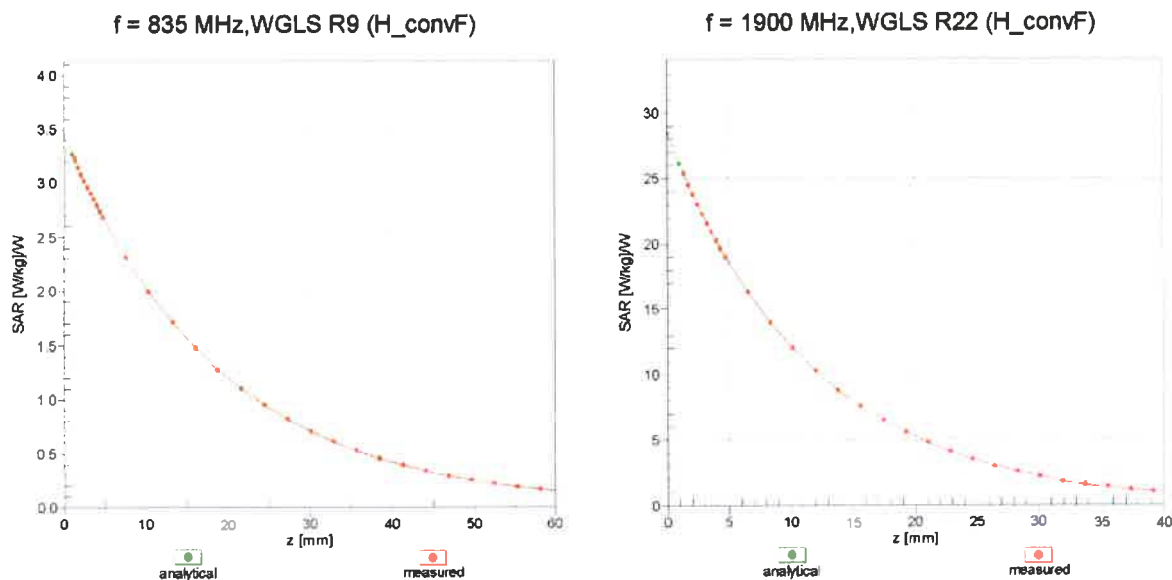
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f_{\text{eval}} = 1900 \text{ MHz}$)



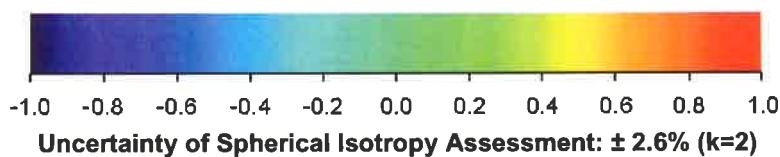
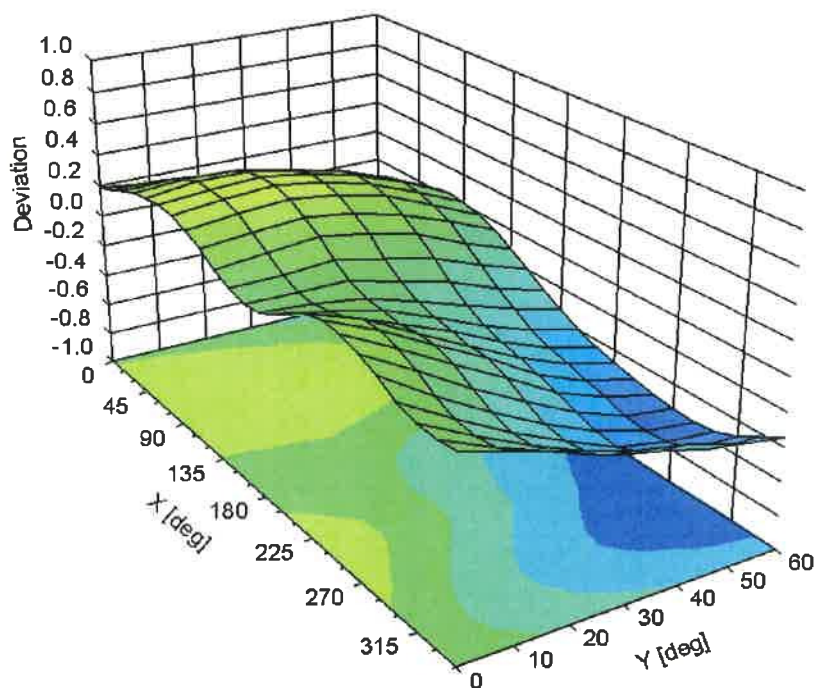
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: EX3DV4 - SN:3864

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	63
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm