

TA Technology (Shanghai) Co., Ltd.

Test Report

Report No.: RXA1412-0270SAR01R3

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UMTS Band V Back Side Low (Battery 1)

Date: 12/31/2014

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

Medium parameters used (interpolated): $f = 826.4$ MHz; $\sigma = 0.993$ mho/m; $\epsilon_r = 55.2$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Back Side Low/Area Scan (61x101x1): Measurement grid: dx=1.500mm, dy=1.500mm

Maximum value of SAR (interpolated) = 1.15 mW/g

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

Reference Value = 34.4 V/m; Power Drift = 0.017 dB

Peak SAR (extrapolated) = 1.37 W/kg

SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.821 mW/g

Maximum value of SAR (measured) = 1.16 mW/g

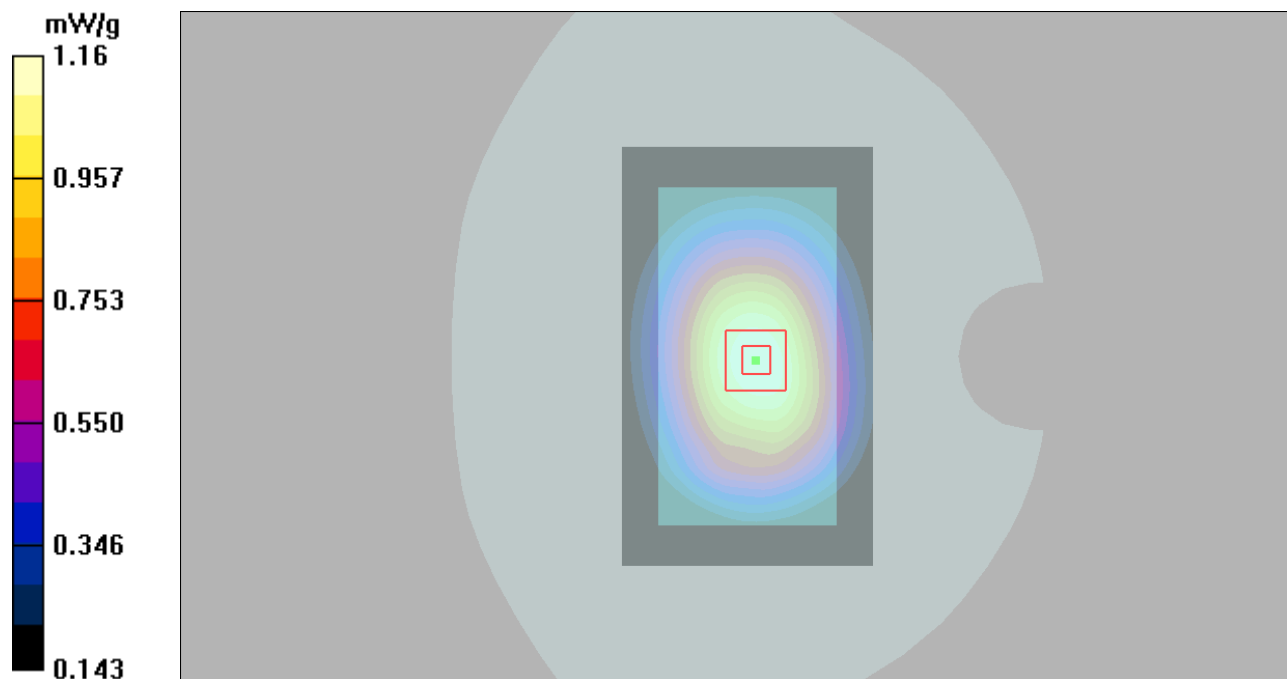


Figure 90 Body, Back Side, UMTS Band V Channel 4132

UMTS Band V Front Side High (Battery 1)

Date: 12/31/2014

Communication System: WCDMA Band V; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 847$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Front Side High/Area Scan (61x101x1): Measurement grid: dx=1.500mm, dy=1.500mm

Maximum value of SAR (interpolated) = 1.09 mW/g

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

Reference Value = 33.3 V/m; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 1.29 W/kg

SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.782 mW/g

Maximum value of SAR (measured) = 1.09 mW/g

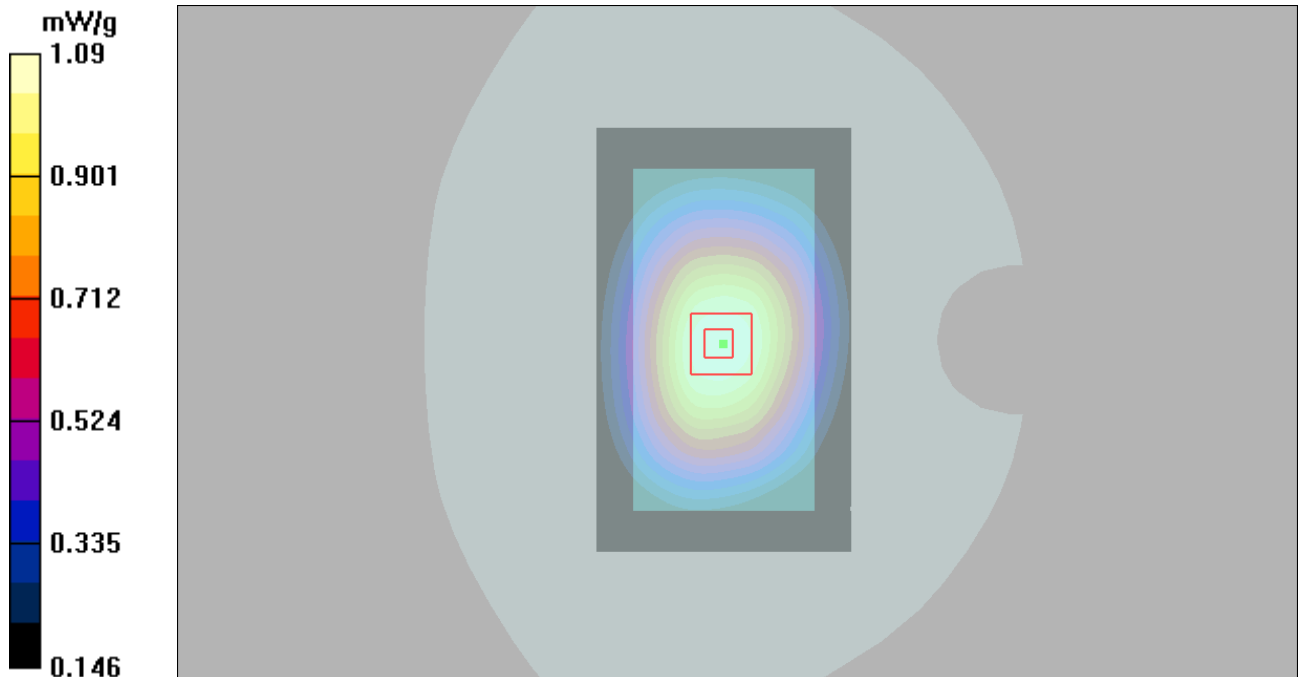


Figure 91 Body, Front Side, UMTS Band V Channel 4233

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UMTS Band V Front Side Middle (Battery 1)

Date: 12/31/2014

Communication System: WCDMA Band V; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Front Side Middle/Area Scan (61x101x1): Measurement grid: dx=1.500mm, dy=1.500mm

Maximum value of SAR (interpolated) = 0.970 mW/g

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

Reference Value = 31.4 V/m; Power Drift = -0.010 dB

Peak SAR (extrapolated) = 1.15 W/kg

SAR(1 g) = 0.924 mW/g; SAR(10 g) = 0.695 mW/g

Maximum value of SAR (measured) = 0.971 mW/g

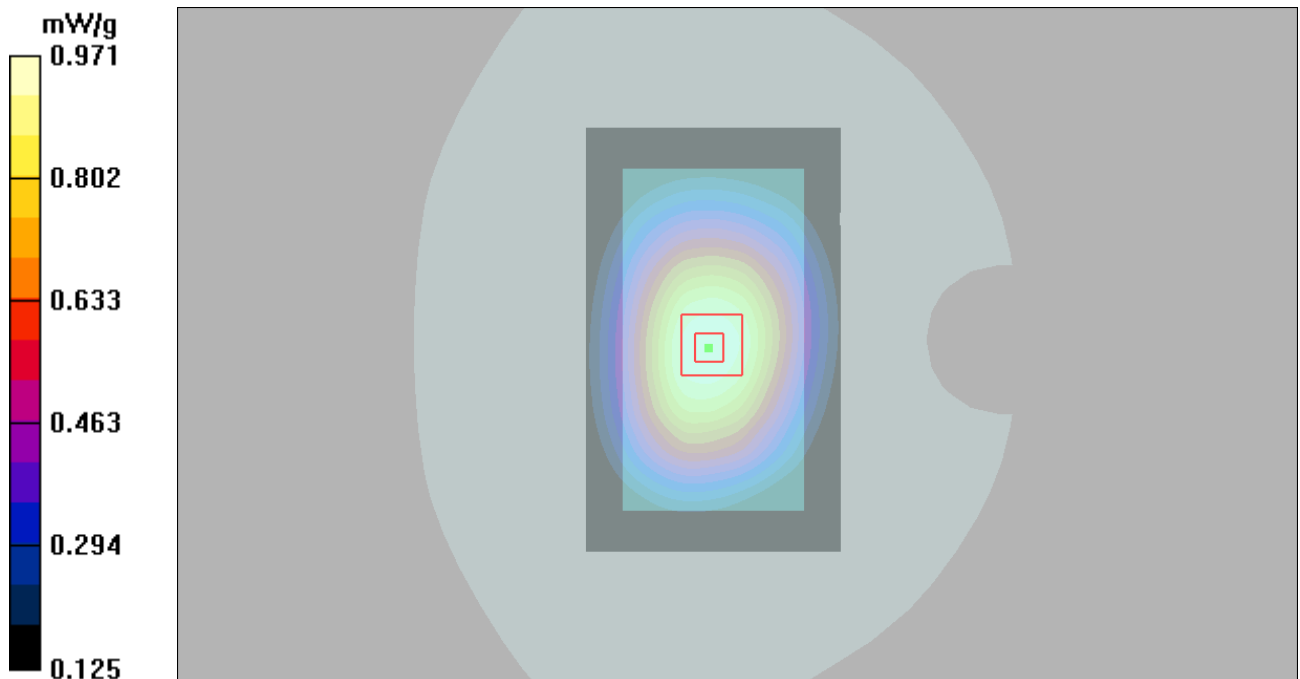


Figure 92 Body, Front Side, UMTS Band V Channel 4183

UMTS Band V Front Side Low (Battery 1)

Date: 12/31/2014

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

Medium parameters used (interpolated): $f = 826.4$ MHz; $\sigma = 0.993$ mho/m; $\epsilon_r = 55.2$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Front Side Low/Area Scan (61x101x1): Measurement grid: dx=1.500mm, dy=1.500mm

Maximum value of SAR (interpolated) = 0.946 mW/g

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

Reference Value = 31.2 V/m; Power Drift = -0.013 dB

Peak SAR (extrapolated) = 1.12 W/kg

SAR(1 g) = 0.901 mW/g; SAR(10 g) = 0.679 mW/g

Maximum value of SAR (measured) = 0.947 mW/g

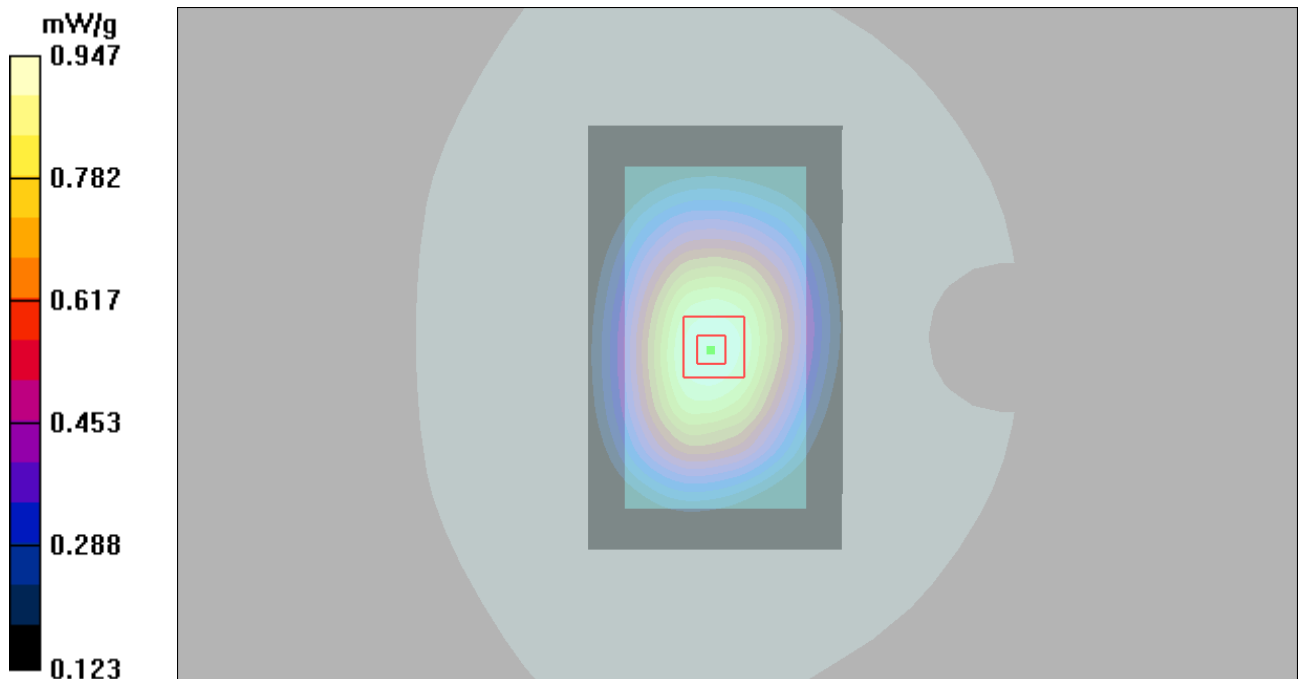


Figure 93 Body, Front Side, UMTS Band V Channel 4132

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UMTS Band V Left Edge Middle (Battery 1)

Date: 12/31/2014

Communication System: WCDMA Band V; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Left Edge Middle/Area Scan (51x151x1): Measurement grid: dx=1.000mm, dy=1.000mm

Maximum value of SAR (interpolated) = 0.485 mW/g

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

Reference Value = 21.3 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 0.631 W/kg

SAR(1 g) = 0.457 mW/g; SAR(10 g) = 0.318 mW/g

Maximum value of SAR (measured) = 0.487 mW/g

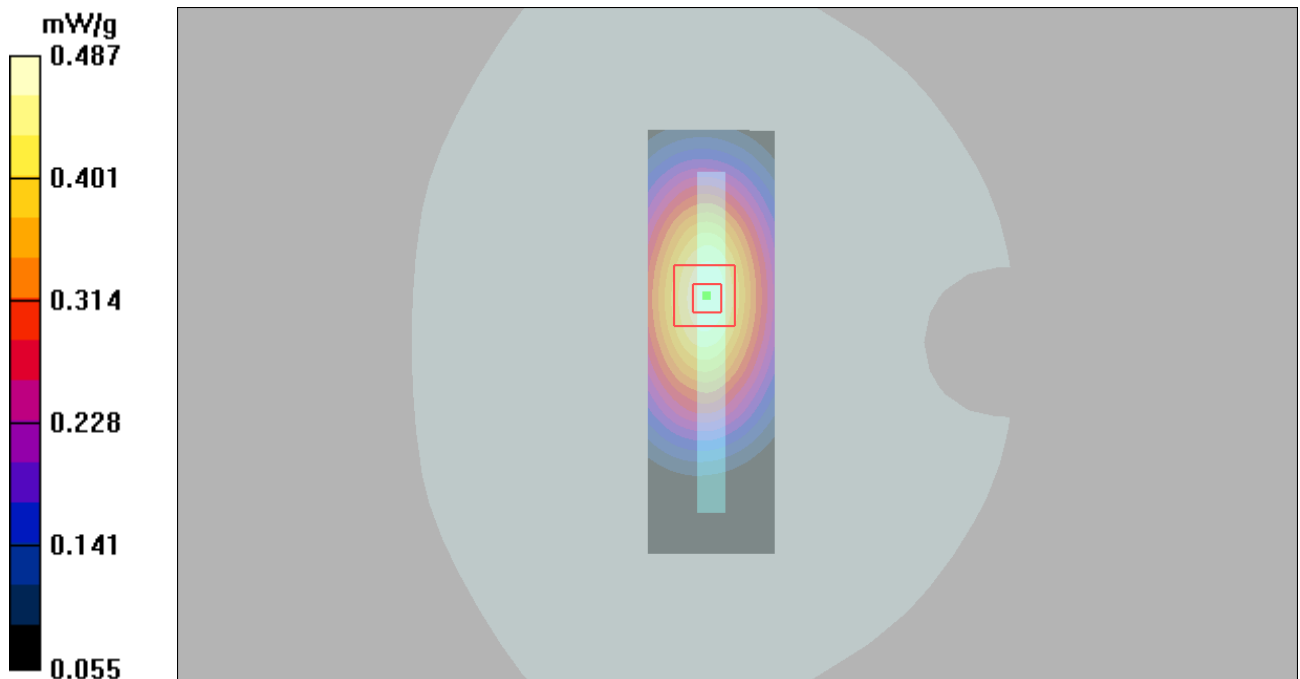


Figure 94 Body, Left Edge, UMTS Band V Channel 4183

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UMTS Band V Right Edge Middle (Battery 1)

Date: 12/31/2014

Communication System: WCDMA Band V; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Right Edge Middle/Area Scan (51x151x1): Measurement grid: dx=1.000mm, dy=1.000mm

Maximum value of SAR (interpolated) = 0.513 mW/g

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

Reference Value = 22.8 V/m; Power Drift = -0.011 dB

Peak SAR (extrapolated) = 0.671 W/kg

SAR(1 g) = 0.486 mW/g; SAR(10 g) = 0.338 mW/g

Maximum value of SAR (measured) = 0.519 mW/g

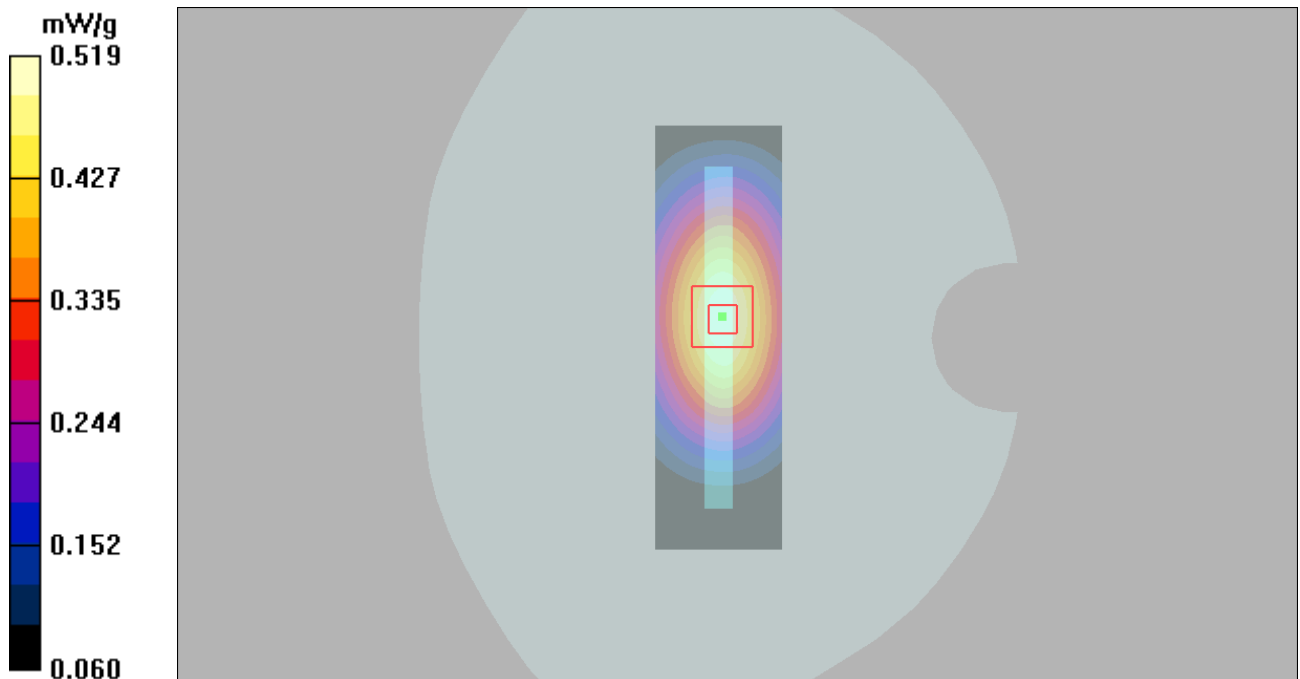


Figure 95 Body, Right Edge, UMTS Band V Channel 4183

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UMTS Band V Bottom Edge Middle (Battery 1)

Date: 12/31/2014

Communication System: WCDMA Band V; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.1$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Bottom Edge Middle/Area Scan (51x91x1): Measurement grid: dx=1.000mm, dy=1.000mm

Maximum value of SAR (interpolated) = 0.084 mW/g

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

Reference Value = 10.1 V/m; Power Drift = -0.025 dB

Peak SAR (extrapolated) = 0.177 W/kg

SAR(1 g) = 0.081 mW/g; SAR(10 g) = 0.043 mW/g

Maximum value of SAR (measured) = 0.086 mW/g

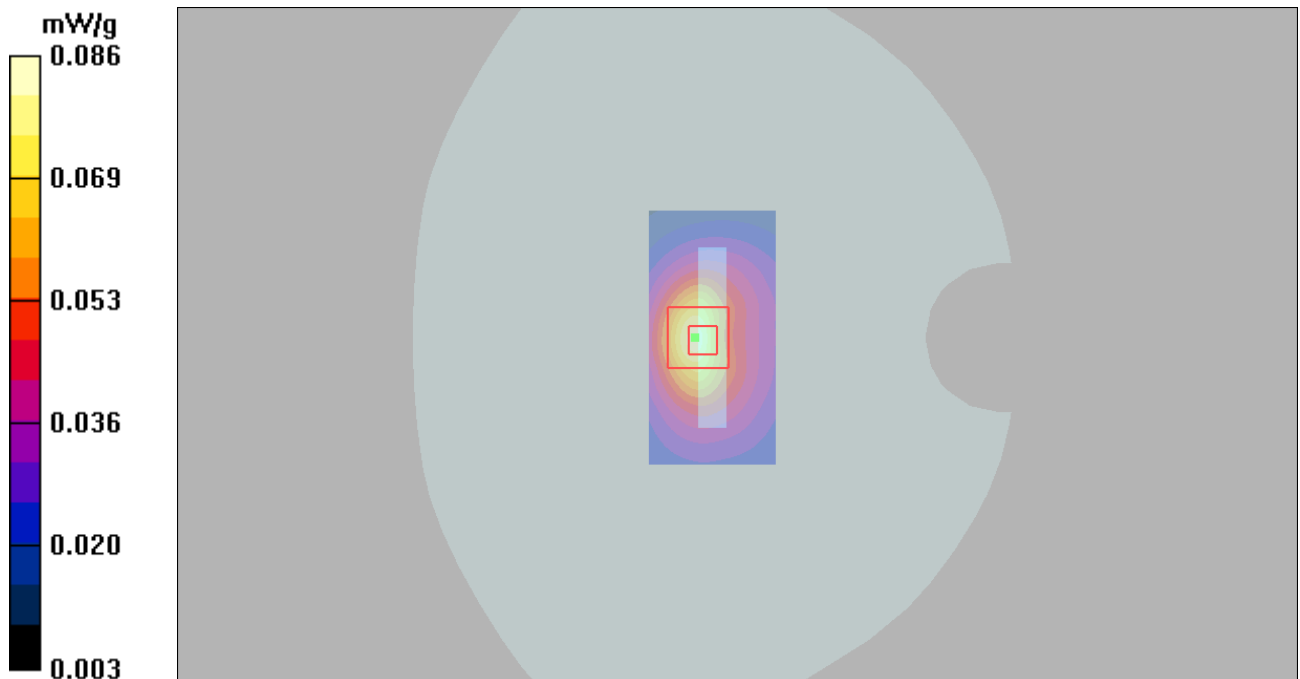


Figure 96 Body, Bottom Edge, UMTS Band V Channel 4183

UMTS Band V Back Side High (Battery 2)

Date: 12/31/2014

Communication System: WCDMA Band V; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 847$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Back Side High/Area Scan (61x101x1): Measurement grid: dx=1.500mm, dy=1.500mm

Maximum value of SAR (interpolated) = 1.06 mW/g

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

Reference Value = 32.5 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 1.26 W/kg

SAR(1 g) = 0.996 mW/g; SAR(10 g) = 0.738 mW/g

Maximum value of SAR (measured) = 1.05 mW/g

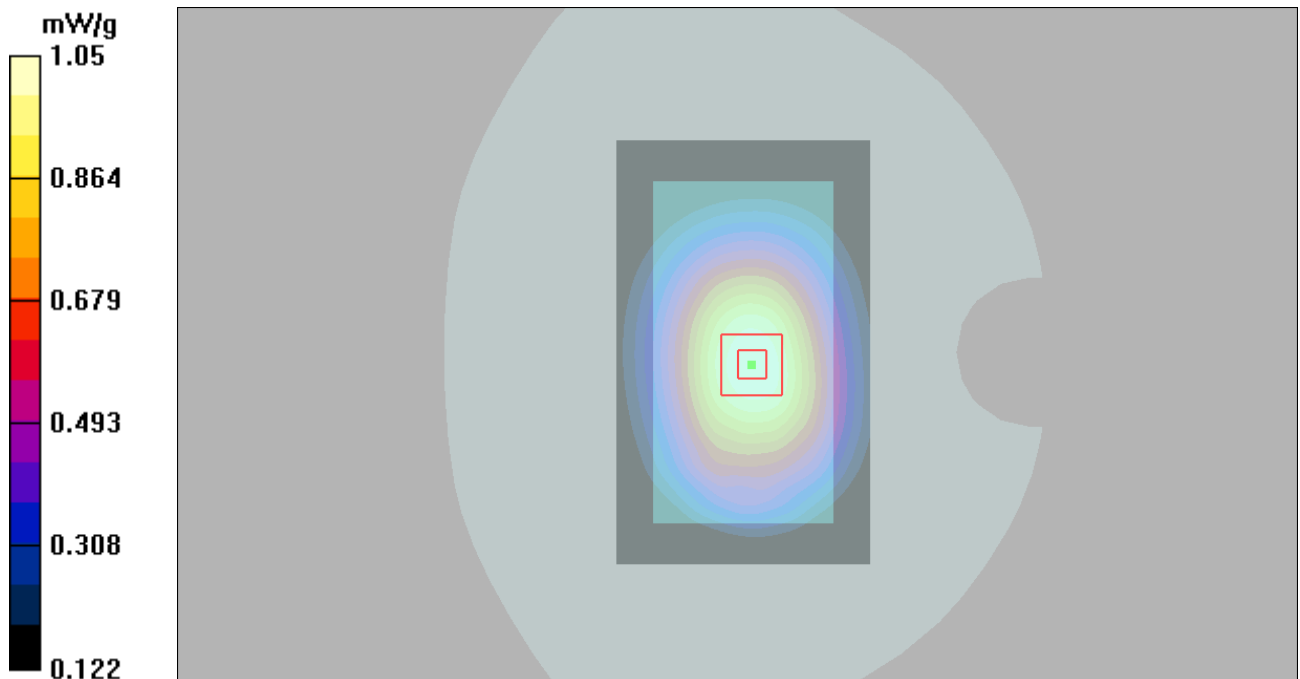


Figure 97 Body, Back Side, UMTS Band V Channel 4233

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UMTS Band V Back Side High (Earphone 1)

Date: 12/31/2014

Communication System: WCDMA Band V; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 847$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Back Side High/Area Scan (61x101x1): Measurement grid: dx=1.500mm, dy=1.500mm

Maximum value of SAR (interpolated) = 0.976 mW/g

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

Reference Value = 31.1 V/m; Power Drift = 0.036 dB

Peak SAR (extrapolated) = 1.18 W/kg

SAR(1 g) = 0.932 mW/g; SAR(10 g) = 0.690 mW/g

Maximum value of SAR (measured) = 0.985 mW/g

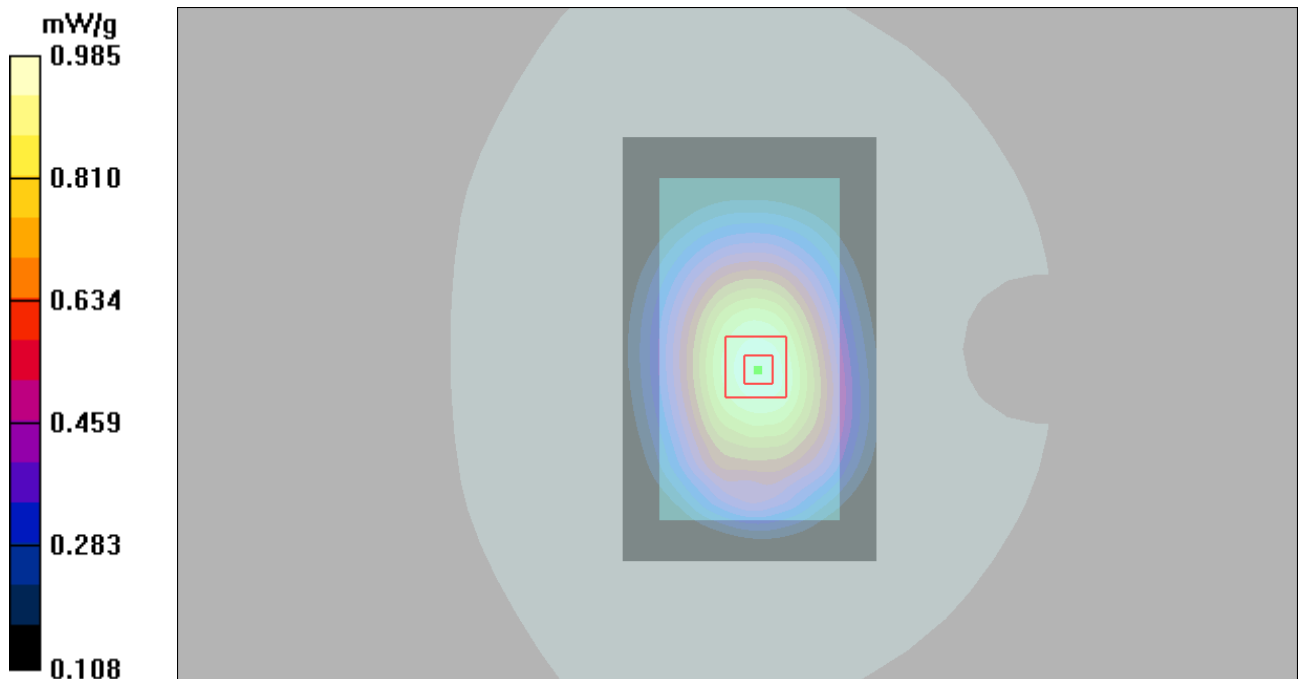


Figure 98 Body, Back Side, UMTS Band V Channel 4233

UMTS Band V Back Side High (Earphone 2)

Date: 12/31/2014

Communication System: WCDMA Band V; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 847$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Back Side High/Area Scan (61x101x1): Measurement grid: dx=1.500mm, dy=1.500mm

Maximum value of SAR (interpolated) = 0.923 mW/g

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

Reference Value = 29.3 V/m; Power Drift = -0.010 dB

Peak SAR (extrapolated) = 1.10 W/kg

SAR(1 g) = 0.868 mW/g; SAR(10 g) = 0.642 mW/g

Maximum value of SAR (measured) = 0.914 mW/g

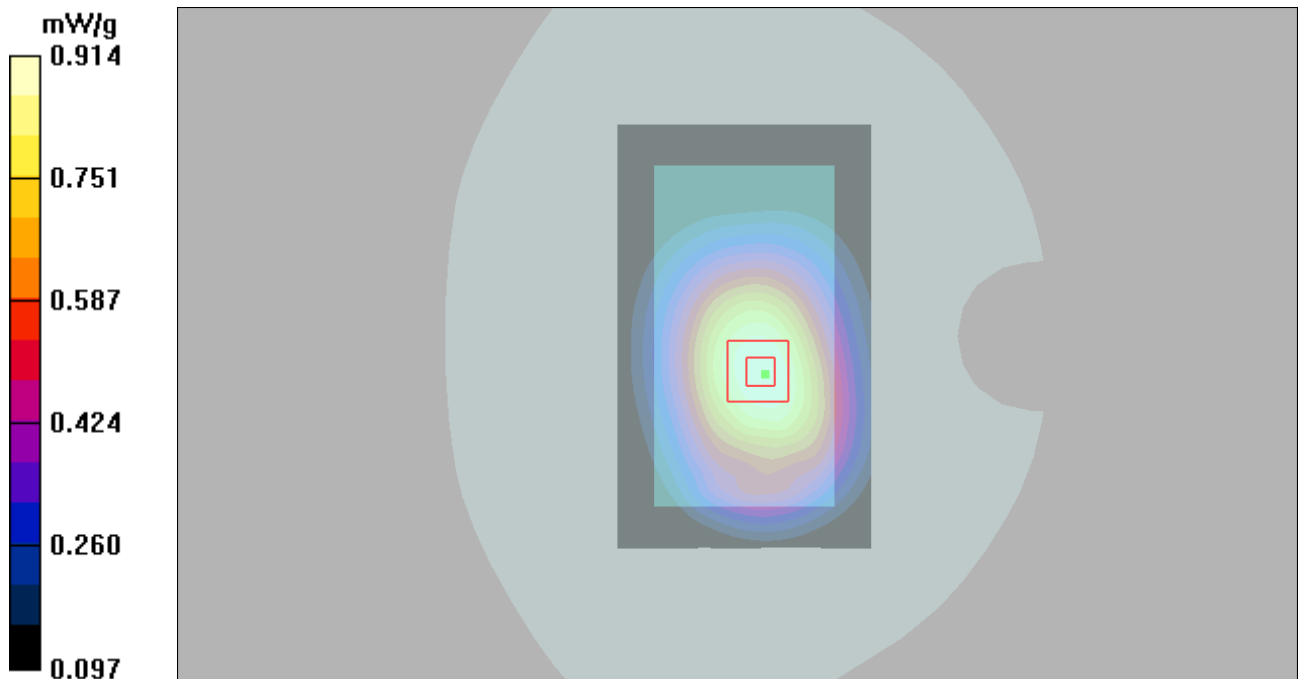


Figure 99 Body, Back Side, UMTS Band V Channel 4233

UMTS Band V Back Side High (Earphone 3)

Date: 12/31/2014

Communication System: WCDMA Band V; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 847$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Back Side High/Area Scan (61x61x1): Measurement grid: dx=1.500mm, dy=1.500mm

Maximum value of SAR (interpolated) = 1.04 mW/g

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

Reference Value = 31.3 V/m; Power Drift = -0.009 dB

Peak SAR (extrapolated) = 1.23 W/kg

SAR(1 g) = 0.976 mW/g; SAR(10 g) = 0.724 mW/g

Maximum value of SAR (measured) = 1.03 mW/g

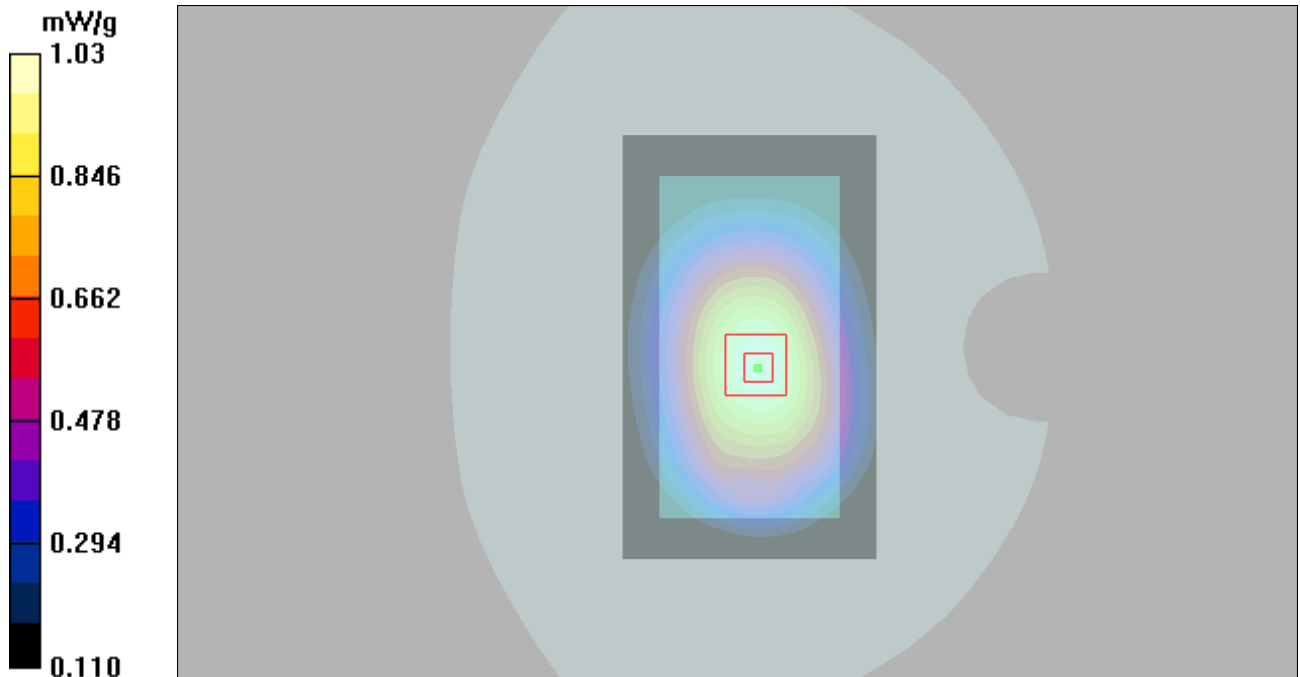


Figure 100 Body, Back Side, UMTS Band V Channel 4233

UMTS Band V Back Side High (HSDPA)

Date: 12/31/2014

Communication System: UID 0, WCDMA (0); Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 847$ MHz; $\sigma = 1.004$ S/m; $\epsilon_r = 55.772$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Back Side High/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.01 W/kg

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

Reference Value = 33.02 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.15 W/kg

SAR(1 g) = 0.953 W/kg; SAR(10 g) = 0.711 W/kg

Maximum value of SAR (measured) = 0.985 W/kg

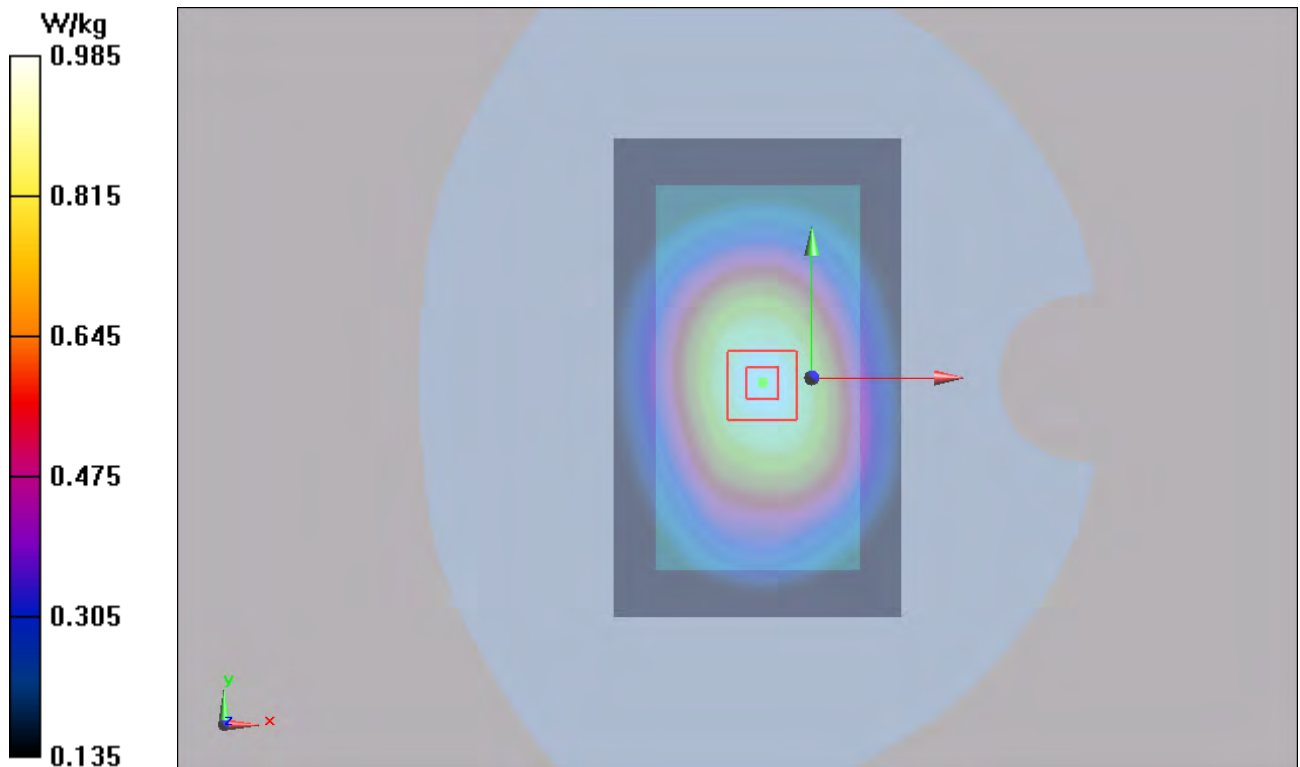


Figure 101 Body, Back Side, UMTS Band V Channel 4233

UMTS Band V Back Side High (1st Repeated SAR)

Date: 12/31/2014

Communication System: WCDMA Band V; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 847$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 11; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Back Side High/Area Scan (61x101x1): Measurement grid: dx=1.500mm, dy=1.500mm

Maximum value of SAR (interpolated) = 1.24 W/kg

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

Reference Value = 35.51 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 1.18 W/kg; SAR(10 g) = 0.875 W/kg

Maximum value of SAR (measured) = 1.24 W/kg

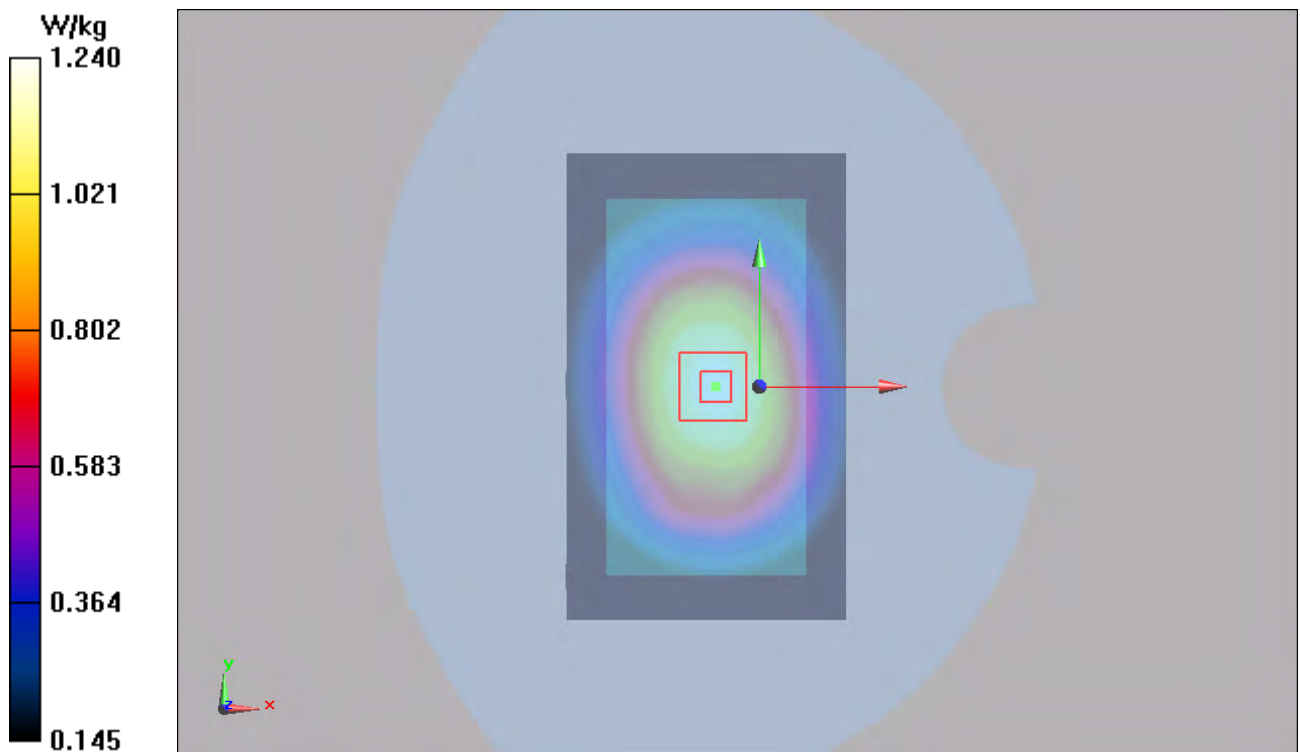


Figure 102 Body, Back Side, UMTS Band V Channel 4233

802.11b Left Cheek High (Battery 1)

Date: 1/3/2015

Communication System: 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.89$ mho/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.24, 7.24, 7.24); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Left Cheek High/Area Scan (81x131x1): Measurement grid: dx=1.200mm, dy=1.200mm

Maximum value of SAR (interpolated) = 0.454 mW/g

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

Reference Value = 14.9 V/m; Power Drift = -0.022 dB

Peak SAR (extrapolated) = 0.776 W/kg

SAR(1 g) = 0.413 mW/g; SAR(10 g) = 0.222 mW/g

Maximum value of SAR (measured) = 0.446 mW/g

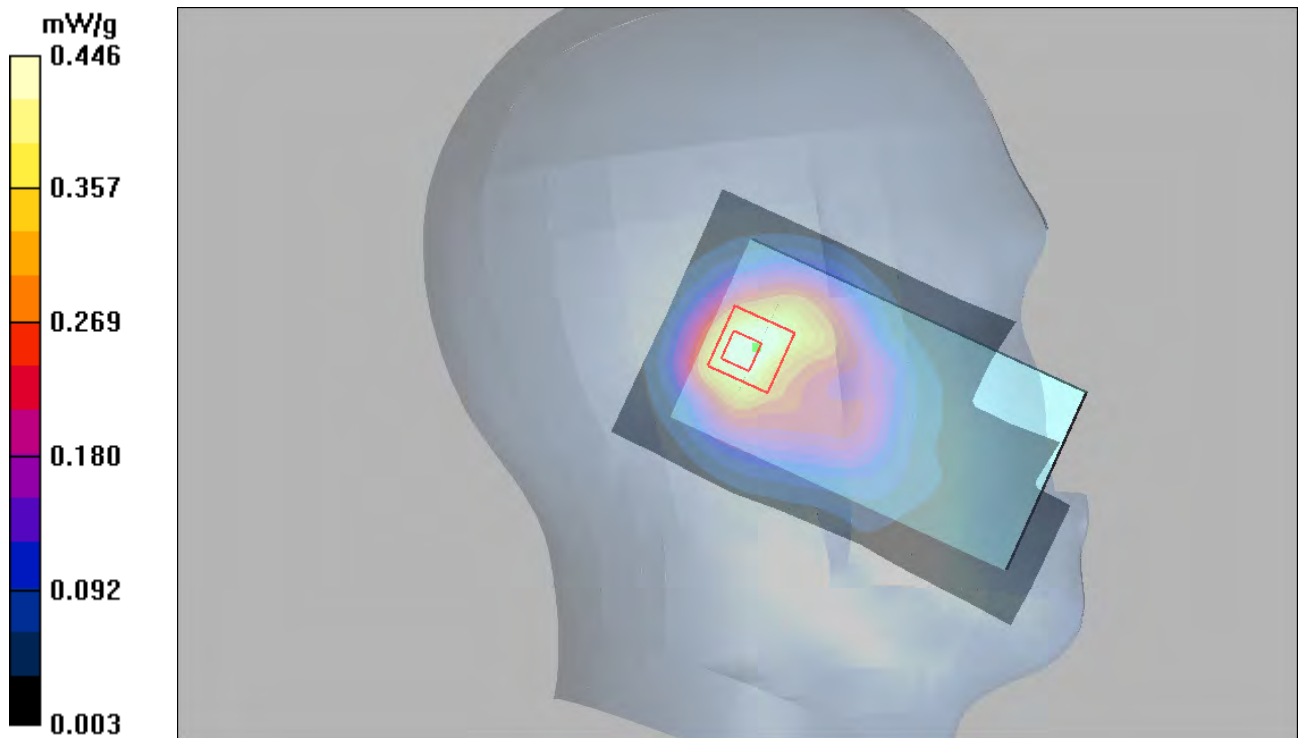


Figure 103 Left Hand Touch Cheek 802.11b Channel 11

802.11b Left Tilt High (Battery 1)

Date: 1/3/2015

Communication System: 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.89$ mho/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.24, 7.24, 7.24); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Left Tilt High/Area Scan (81x131x1): Measurement grid: dx=1.200mm, dy=1.200mm

Maximum value of SAR (interpolated) = 0.418 mW/g

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

Reference Value = 15.1 V/m; Power Drift = 0.026 dB

Peak SAR (extrapolated) = 0.739 W/kg

SAR(1 g) = 0.384 mW/g; SAR(10 g) = 0.205 mW/g

Maximum value of SAR (measured) = 0.417 mW/g

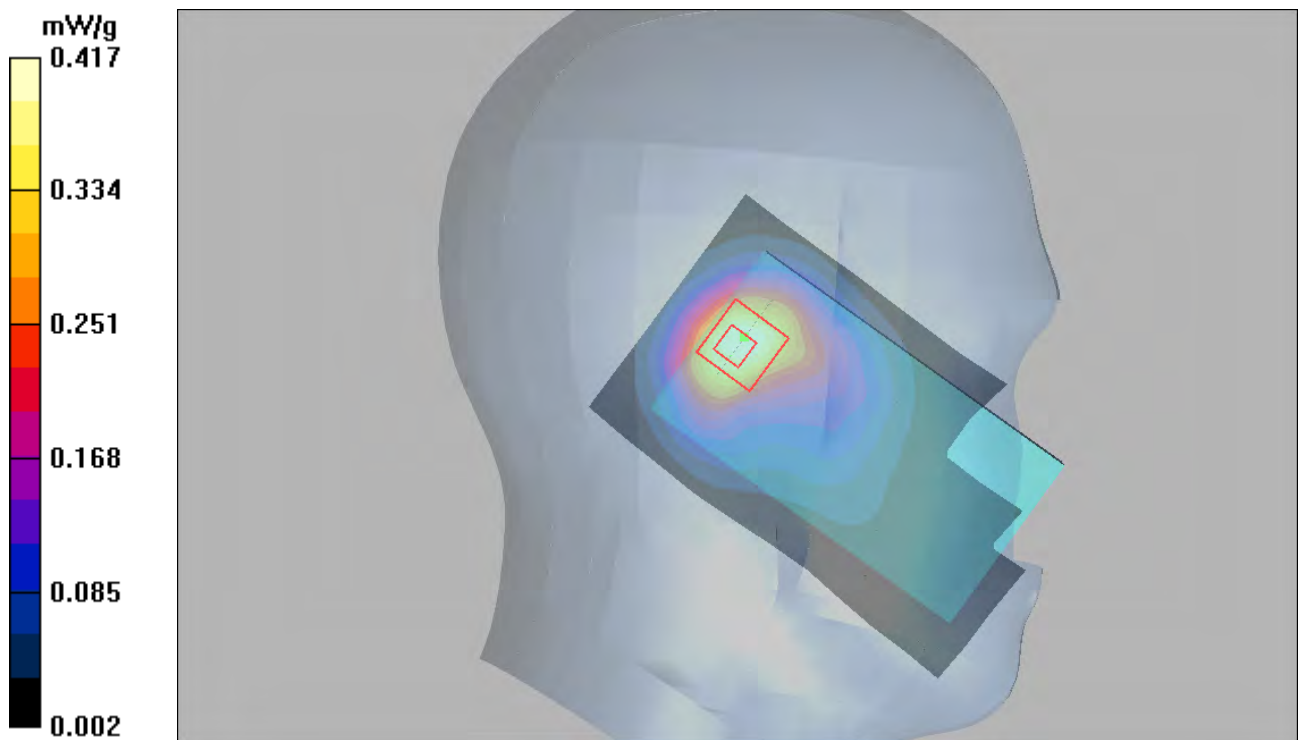


Figure 104 Left Hand Tilt 15° 802.11b Channel 11

802.11b Right Cheek High (Battery 1)

Date: 1/3/2015

Communication System: 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.895$ S/m; $\epsilon_r = 38.297$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.24, 7.24, 7.24); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Right Cheek High/Area Scan (81x131x1): Measurement grid: dx=1.200mm, dy=1.200mm

Maximum value of SAR (interpolated) = 0.827 W/kg

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

Reference Value = 13.35 V/m; Power Drift = -0.072 dB

Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.491 W/kg; SAR(10 g) = 0.246 W/kg

Maximum value of SAR (measured) = 0.524 W/kg

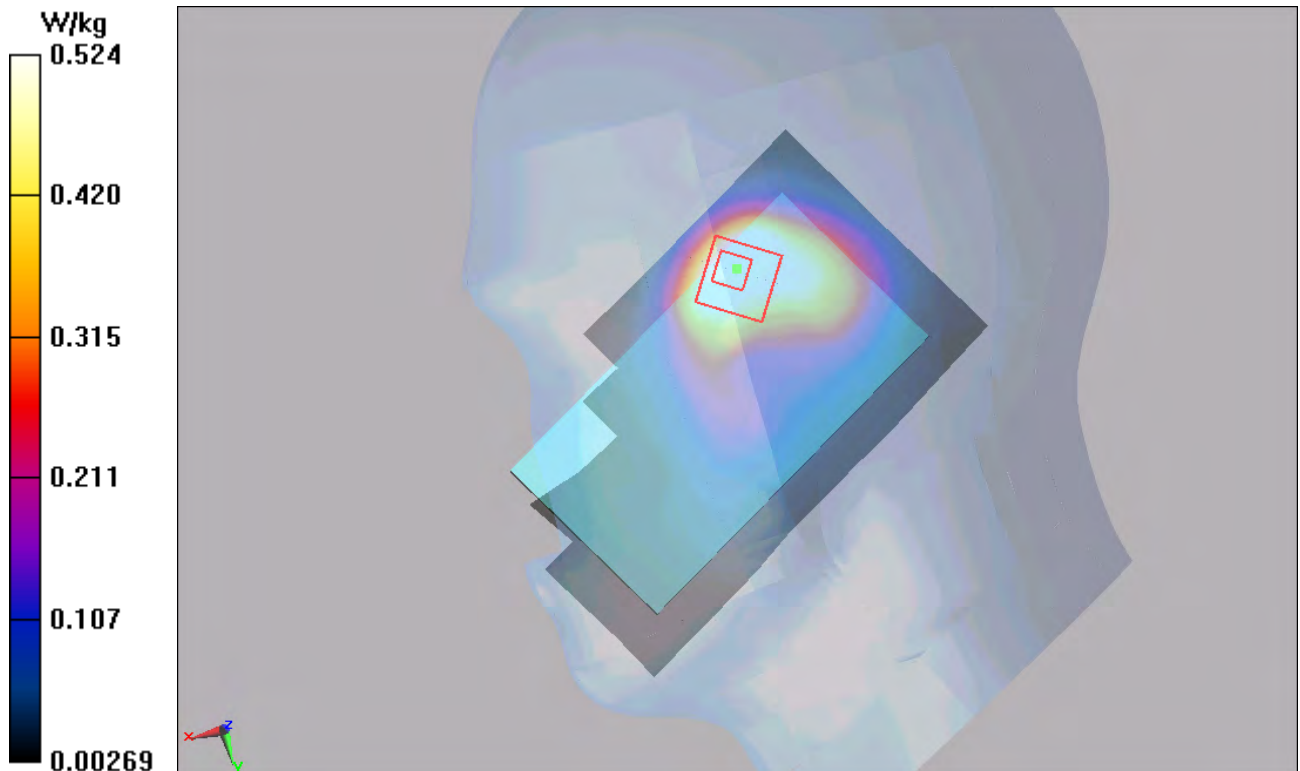


Figure 105 Right Hand Touch Cheek 802.11b Channel 11

802.11b Right Tilt High (Battery 1)

Date: 1/3/2015

Communication System: 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.89$ mho/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.24, 7.24, 7.24); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Tilt High/Area Scan (81x131x1): Measurement grid: dx=1.200mm, dy=1.200mm

Maximum value of SAR (interpolated) = 0.575 mW/g

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

Reference Value = 15.7 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 1.01 W/kg

SAR(1 g) = 0.483 mW/g; SAR(10 g) = 0.0245 mW/g

Maximum value of SAR (measured) = 0.543 mW/g

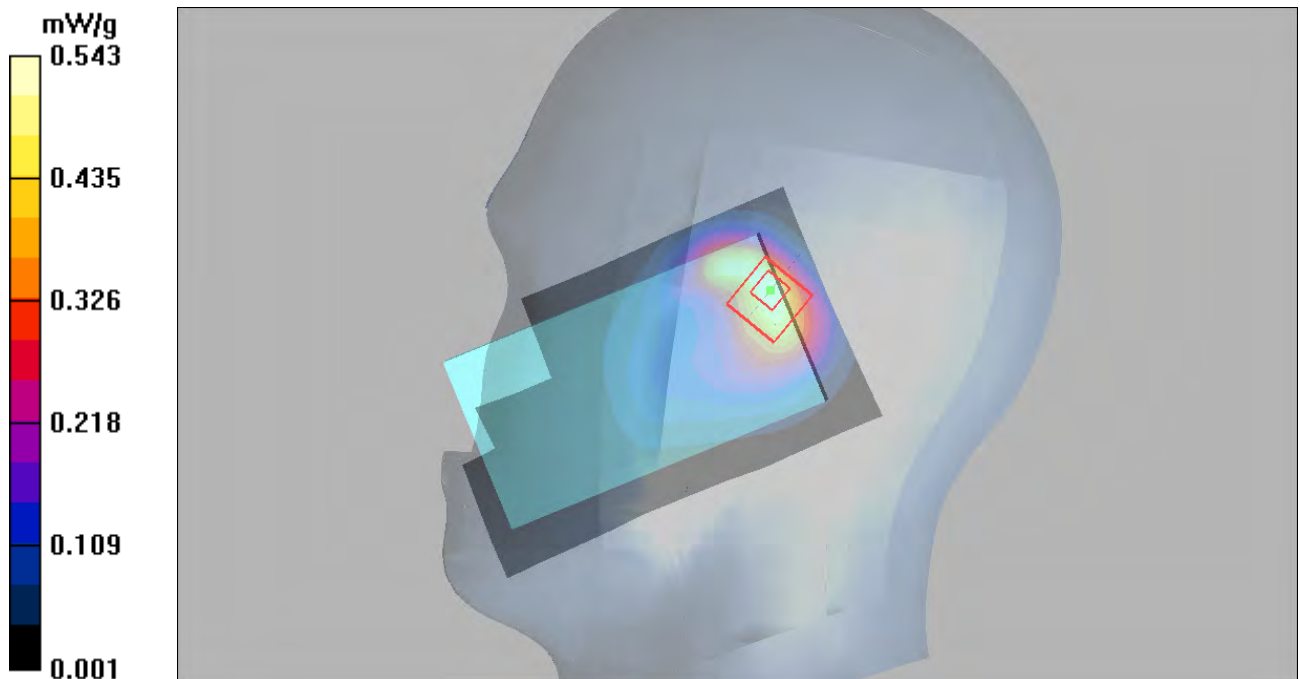


Figure 106 Right Hand Tilt 15° 802.11b Channel 11

802.11b Right Cheek High (Battery 2)

Date: 1/3/2015

Communication System: UID 0, 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.895$ S/m; $\epsilon_r = 38.297$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.24, 7.24, 7.24); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Right Cheek High/Area Scan (81x131x1): Measurement grid: dx=1.200mm, dy=1.200mm

Maximum value of SAR (interpolated) = 0.519 W/kg

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

Reference Value = 6.462 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 1.10 W/kg

SAR(1 g) = 0.468 W/kg; SAR(10 g) = 0.224 W/kg

Maximum value of SAR (measured) = 0.508 W/kg

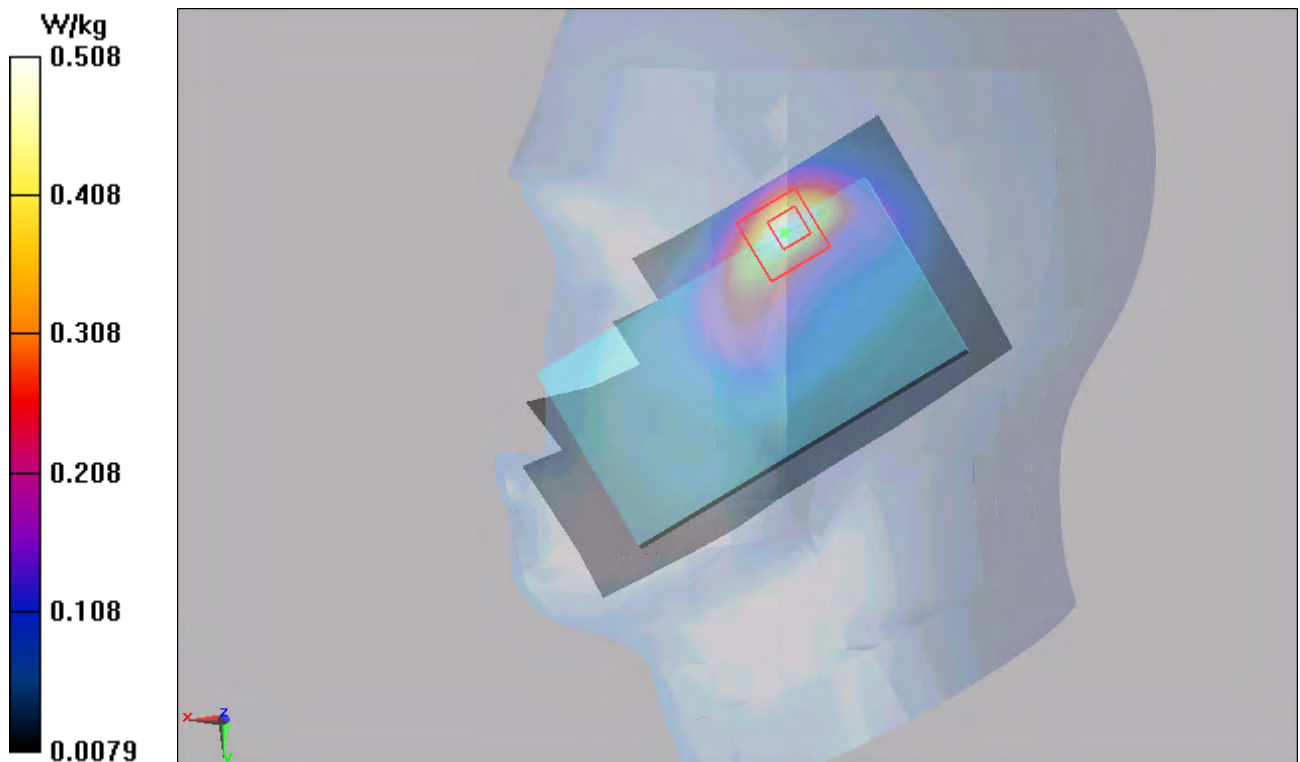


Figure 107 Right Hand Touch Cheek 802.11b Channel 11

802.11b Back Side High (Battery 1)

Date: 1/4/2015

Communication System: 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(6.97, 6.97, 6.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Back Side High/Area Scan (81x131x1): Measurement grid: dx=1.200mm, dy=1.200mm

Maximum value of SAR (interpolated) = 0.300 mW/g

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

Reference Value = 8.10 V/m; Power Drift = -0.129 dB

Peak SAR (extrapolated) = 0.573 W/kg

SAR(1 g) = 0.255 mW/g; SAR(10 g) = 0.124 mW/g

Maximum value of SAR (measured) = 0.283 mW/g

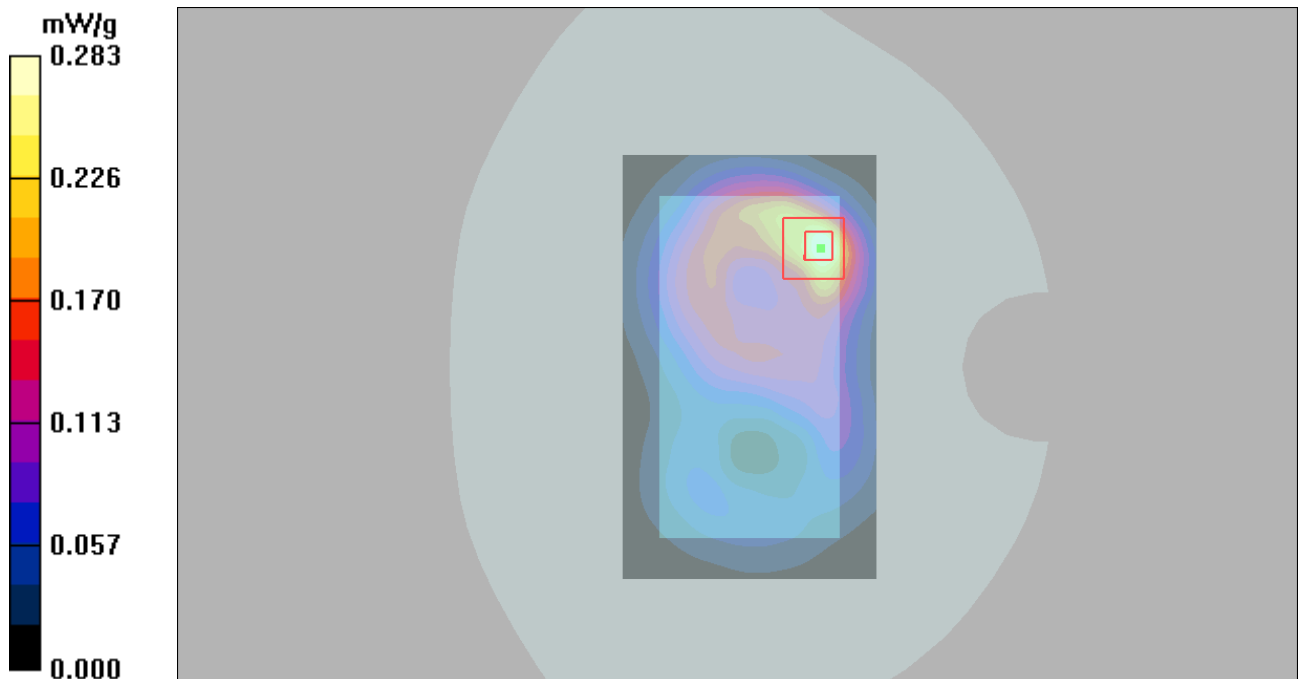


Figure 108 Body, Back Side, 802.11b Channel 11

802.11b Front Side High (Battery 1)

Date: 1/4/2015

Communication System: 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(6.97, 6.97, 6.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Front Side High/Area Scan (81x131x1): Measurement grid: dx=1.200mm, dy=1.200mm

Maximum value of SAR (interpolated) = 0.155 mW/g

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

Reference Value = 6.45 V/m; Power Drift = 0.052 dB

Peak SAR (extrapolated) = 0.292 W/kg

SAR(1 g) = 0.140 mW/g; SAR(10 g) = 0.072 mW/g

Maximum value of SAR (measured) = 0.155 mW/g

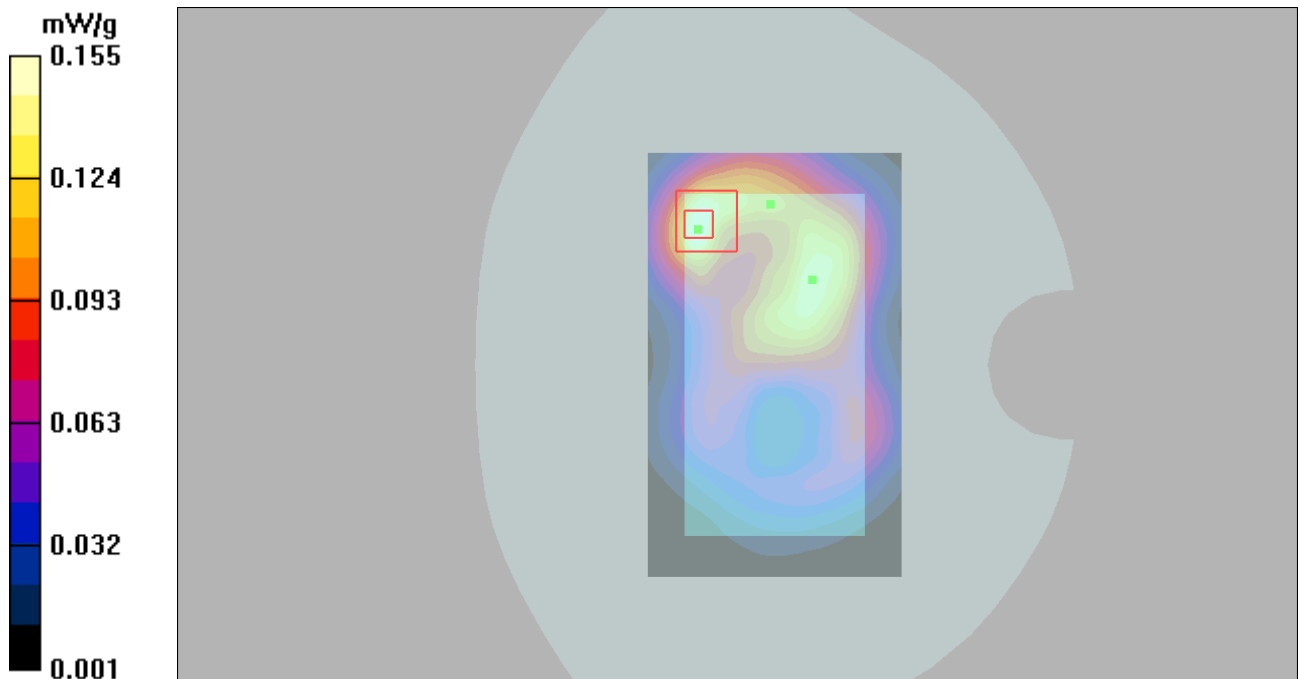


Figure 109 Body, Front Side, 802.11b Channel 11

802.11b Left Edge High (Battery 1)

Date: 1/4/2015

Communication System: 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(6.97, 6.97, 6.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Left Edge High/Area Scan (51x151x1): Measurement grid: dx=1.000mm, dy=1.000mm

Maximum value of SAR (interpolated) = 0.194 mW/g

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

Reference Value = 4.82 V/m; Power Drift = 0.028 dB

Peak SAR (extrapolated) = 0.344 W/kg

SAR(1 g) = 0.168 mW/g; SAR(10 g) = 0.085 mW/g

Maximum value of SAR (measured) = 0.183 mW/g

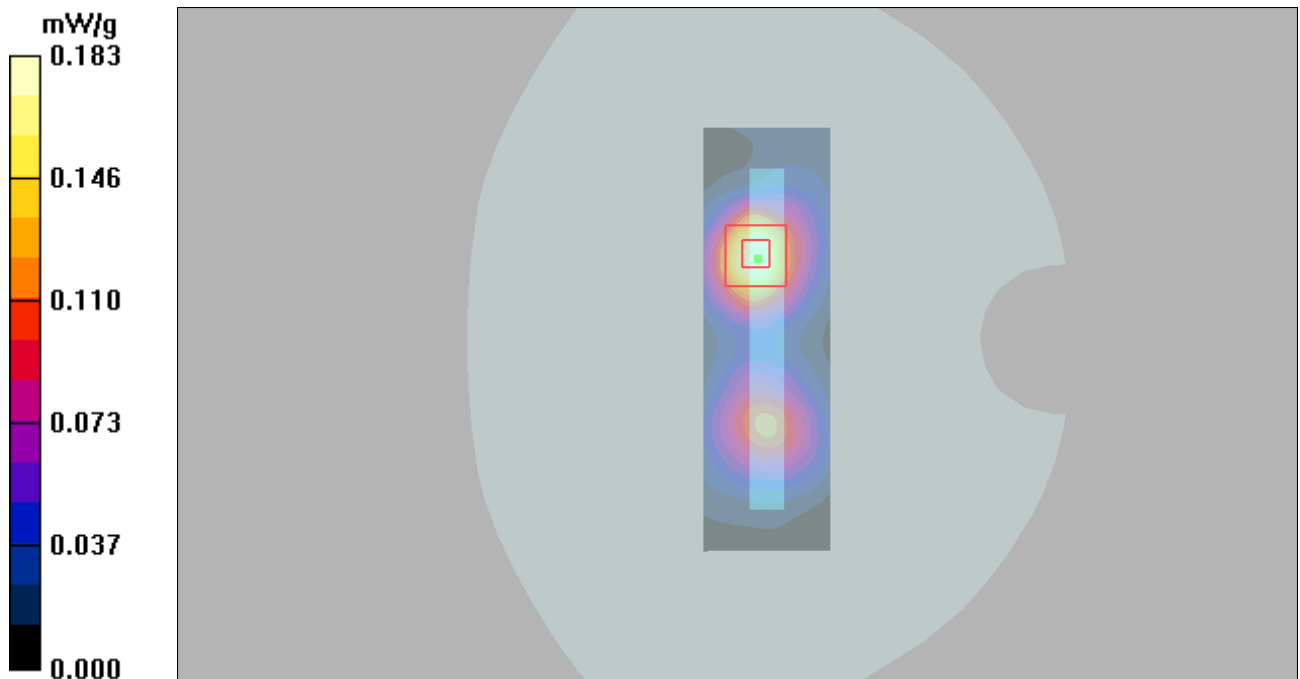


Figure 110 Body, Left Edge, 802.11b Channel 11

802.11b Top Edge High (Battery 1)

Date: 1/4/2015

Communication System: 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(6.97, 6.97, 6.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Top Edge High/Area Scan (51x91x1): Measurement grid: dx=1.000mm, dy=1.000mm

Maximum value of SAR (interpolated) = 0.270 mW/g

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

Reference Value = 12.0 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 0.505 W/kg

SAR(1 g) = 0.253 mW/g; SAR(10 g) = 0.129 mW/g

Maximum value of SAR (measured) = 0.282 mW/g

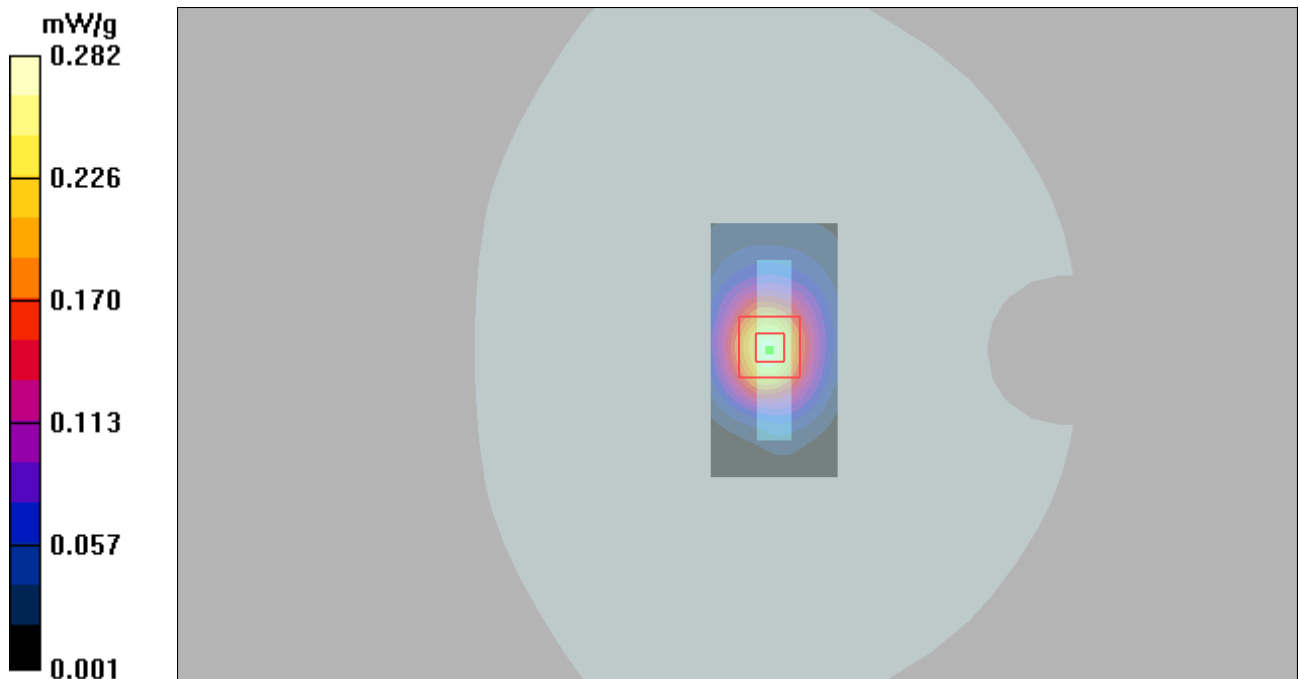


Figure 111Body, Top Edge, 802.11b Channel 11

802.11b Back Side High (Battery 2)

Date: 1/4/2015

Communication System: 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 °C Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(6.97, 6.97, 6.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Back Side High/Area Scan (81x131x1): Measurement grid: dx=1.200mm, dy=1.200mm

Maximum value of SAR (interpolated) = 0.195 mW/g

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

Reference Value = 5.27 V/m; Power Drift = 0.078 dB

Peak SAR (extrapolated) = 0.322 W/kg

SAR(1 g) = 0.177 mW/g; SAR(10 g) = 0.103 mW/g

Maximum value of SAR (measured) = 0.188 mW/g

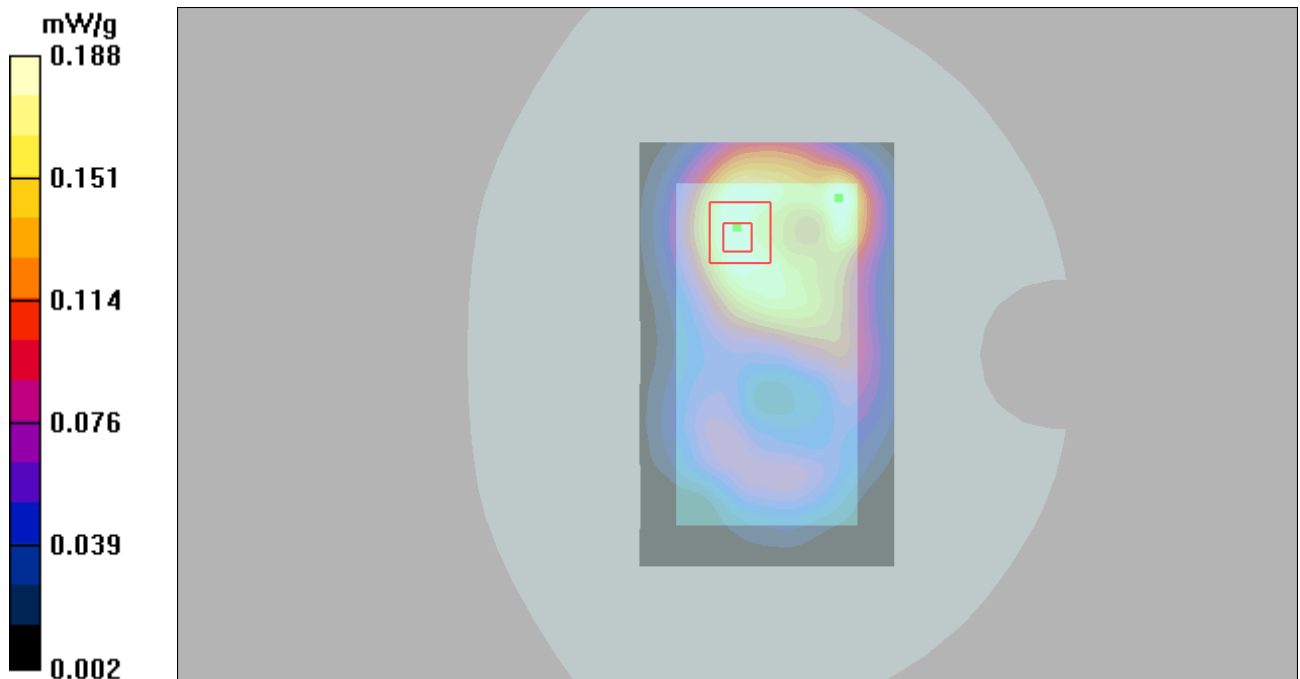


Figure 112 Body, Back Side, 802.11b Channel 11

TA Technology (Shanghai) Co., Ltd.

Test Report

Report No.: RXA1412-0270SAR01R3

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ANNEX D: Probe Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **ATL (Auden)**

Certificate No: **EX3-3977_Feb14**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3977**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v4, QA CAL-23.v5,
QA CAL-25.v6
Calibration procedure for dosimetric E-field probes**

Calibration date: **February 17, 2014**

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	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-660_Dec13)	Dec-14
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-13)	In house check: Oct-14

Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature
			Issued: February 19, 2014
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

TA Technology (Shanghai) Co., Ltd.

Test Report

Report No.: RXA1412-0270SAR01R3

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



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S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

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

Accreditation No.: **SCS 108**

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

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).

EX3DV4 – SN:3977

February 17, 2014

Probe EX3DV4

SN:3977

Manufactured: November 5, 2013
Calibrated: February 17, 2014

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

TA Technology (Shanghai) Co., Ltd.

Test Report

EX3DV4- SN:3977

February 17, 2014

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3977

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.54	0.57	0.54	$\pm 10.1\%$
DCP (mV) ^B	99.5	100.0	99.7	

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	133.3	$\pm 3.3\%$
		Y	0.0	0.0	1.0		134.9	
		Z	0.0	0.0	1.0		148.5	

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 NormX,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.

TA Technology (Shanghai) Co., Ltd. Test Report

EX3DV4- SN:3977

February 17, 2014

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3977

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 (mm) ^G	Unct. (k=2)
450	43.5	0.87	11.72	11.72	11.72	0.18	1.10	± 13.3 %
750	41.9	0.89	9.98	9.98	9.98	0.36	0.88	± 12.0 %
835	41.5	0.90	9.62	9.62	9.62	0.61	0.69	± 12.0 %
900	41.5	0.97	9.48	9.48	9.48	0.77	0.63	± 12.0 %
1750	40.1	1.37	8.14	8.14	8.14	0.78	0.60	± 12.0 %
1900	40.0	1.40	7.97	7.97	7.97	0.48	0.75	± 12.0 %
2000	40.0	1.40	7.93	7.93	7.93	0.69	0.63	± 12.0 %
2300	39.5	1.67	7.59	7.59	7.59	0.37	0.83	± 12.0 %
2450	39.2	1.80	7.24	7.24	7.24	0.27	1.10	± 12.0 %
2600	39.0	1.96	7.07	7.07	7.07	0.41	0.84	± 12.0 %
5200	36.0	4.66	5.09	5.09	5.09	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.82	4.82	4.82	0.35	1.80	± 13.1 %
5500	35.8	4.96	4.76	4.76	4.76	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.55	4.55	4.55	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.52	4.52	4.52	0.40	1.80	± 13.1 %

^C Frequency validity 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.

^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.

TA Technology (Shanghai) Co., Ltd.

Test Report

EX3DV4- SN:3977

February 17, 2014

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3977

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)	Unct. (k=2)
450	56.7	0.94	12.47	12.47	12.47	0.11	1.10	± 13.3 %
750	55.5	0.96	9.78	9.78	9.78	0.45	0.86	± 12.0 %
835	55.2	0.97	9.74	9.74	9.74	0.48	0.83	± 12.0 %
900	55.0	1.05	9.46	9.46	9.46	0.41	0.89	± 12.0 %
1750	53.4	1.49	7.69	7.69	7.69	0.41	0.88	± 12.0 %
1900	53.3	1.52	7.37	7.37	7.37	0.34	0.89	± 12.0 %
2000	53.3	1.52	7.41	7.41	7.41	0.24	1.14	± 12.0 %
2300	52.9	1.81	7.12	7.12	7.12	0.66	0.64	± 12.0 %
2450	52.7	1.95	6.97	6.97	6.97	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.68	6.68	6.68	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.50	4.50	4.50	0.45	1.90	± 13.1 %
5300	48.9	5.42	4.28	4.28	4.28	0.45	1.90	± 13.1 %
5500	48.6	5.65	4.02	4.02	4.02	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.87	3.87	3.87	0.45	1.90	± 13.1 %
5800	48.2	6.00	4.12	4.12	4.12	0.50	1.90	± 13.1 %

^C Frequency validity 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.

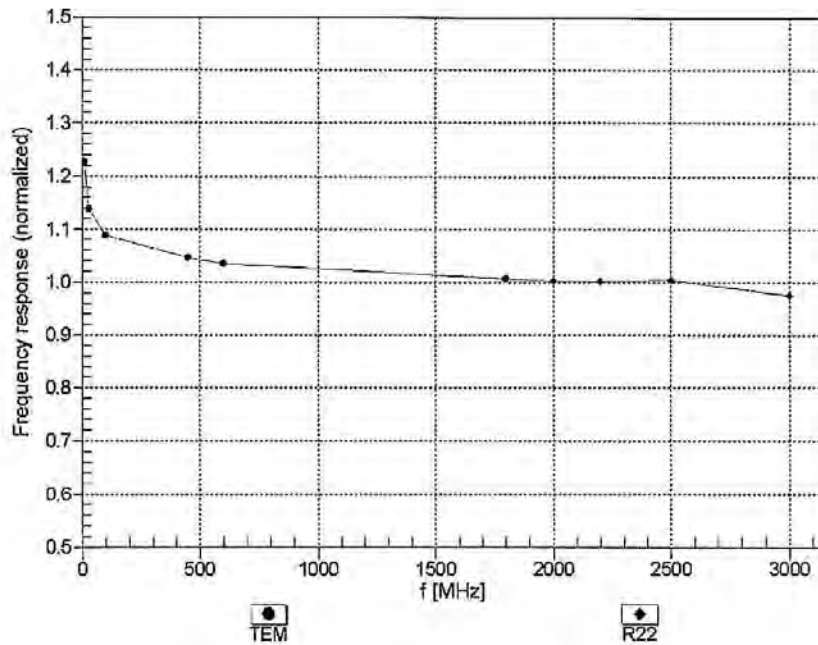
^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty 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 3-5 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4- SN:3977

February 17, 2014

Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)

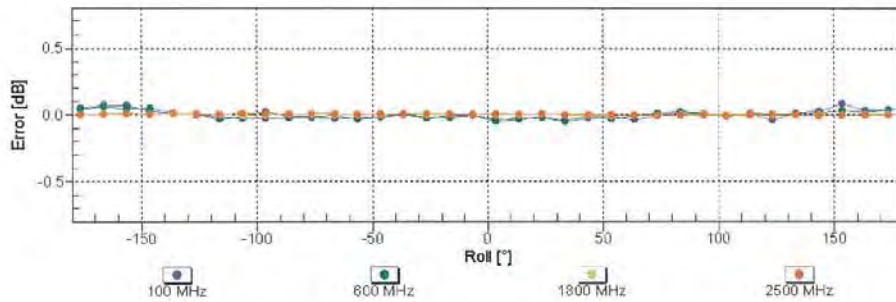
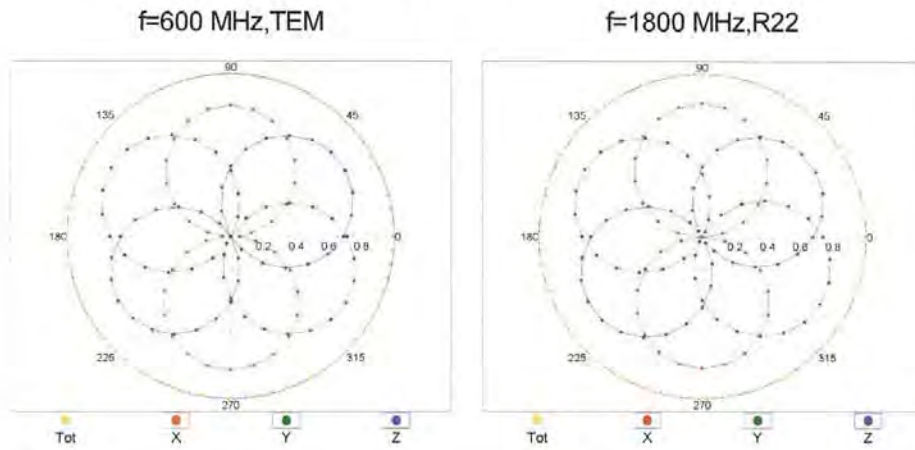


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

EX3DV4- SN:3977

February 17, 2014

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

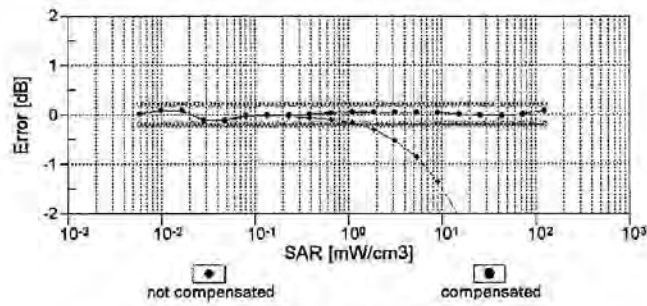
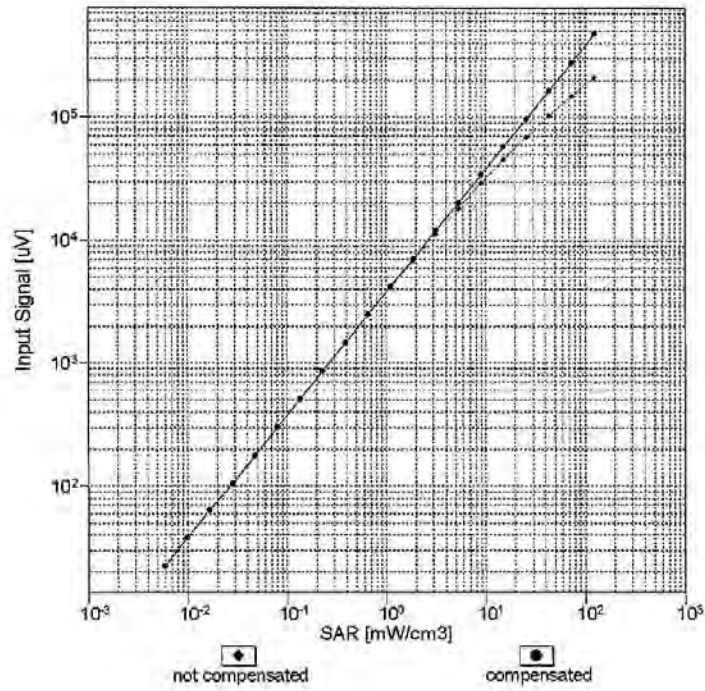


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

EX3DV4-SN:3977

February 17, 2014

Dynamic Range $f(SAR_{head})$
 (TEM cell, $f_{eval} = 1900$ MHz)

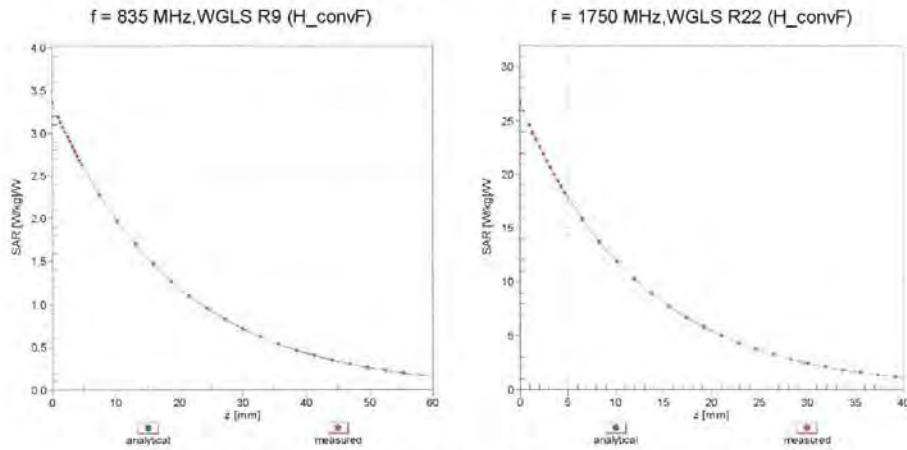


Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

EX3DV4- SN:3977

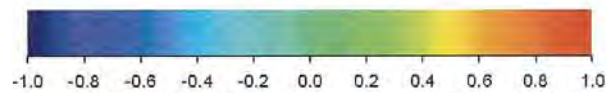
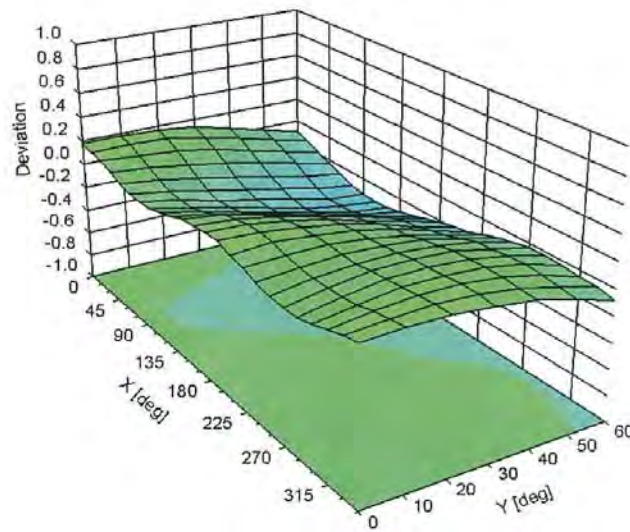
February 17, 2014

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ (k=2)

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EX3DV4- SN:3977

February 17, 2014

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3977

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	23.6
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	2 mm

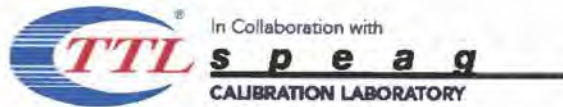
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ANNEX E: D835V2 Dipole Calibration Certificate



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Client **TA(Shanghai)** Certificate No: **Z14-97073**

CALIBRATION CERTIFICATE

Object: D835V2 - SN: 4d020

Calibration Procedure(s): TMC-OS-E-02-194
Calibration procedure for dipole validation kits

Calibration date: August 28, 2014

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(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102083	11-Sep-13 (TMC, No.JZ13-443)	Sep-14
Power sensor NRV-Z5	100595	11-Sep-13 (TMC, No. JZ13-443)	Sep -14
Reference Probe ES3DV3 DAE3	SN 3149	5- Sep-13 (SPEAG, No.ES3-3149_Sep13)	Sep-14
	SN 536	23-Jan-14 (SPEAG, DAE3-536_Jan14)	Jan -15
Signal Generator E4438C	MY49070393	13-Nov-13 (TMC, No.JZ13-394)	Nov-14
Network Analyzer E8362B	MY43021135	19-Oct-13 (TMC, No.JZ13-278)	Oct-14

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: September 4, 2014

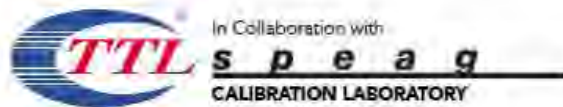
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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Glossary:

TSL	tissue simulating liquid
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 300MHz to 3GHz)", February 2005
- KDB865664, 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.

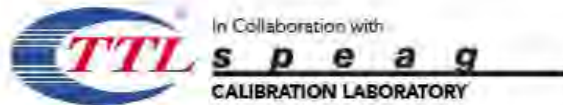
The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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Measurement Conditions

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

DASY Version	DASY52	52.8.8.1222
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.5 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.39 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.54 mW/g ± 20.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.57 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.26 mW/g ± 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	56.7 ± 6 %	0.97 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	---	---

SAR result with Body TSL

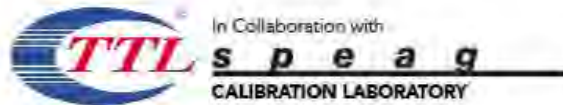
SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.37 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.54 mW/g ± 20.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.57 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.31 mW/g ± 20.4 % (k=2)

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.6Ω + 2.75jΩ
Return Loss	- 30.1dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	54.0Ω + 5.88jΩ
Return Loss	- 23.3dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1,242 ns
----------------------------------	----------

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

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

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

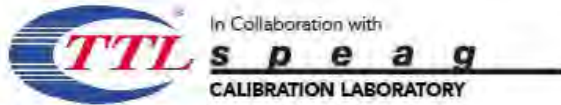
Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 28.08.2014

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020

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

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.909 \text{ S/m}$; $\epsilon_r = 42.49$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(6.21, 6.21, 6.21); Calibrated: 2013-09-05;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 2014-01-23
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

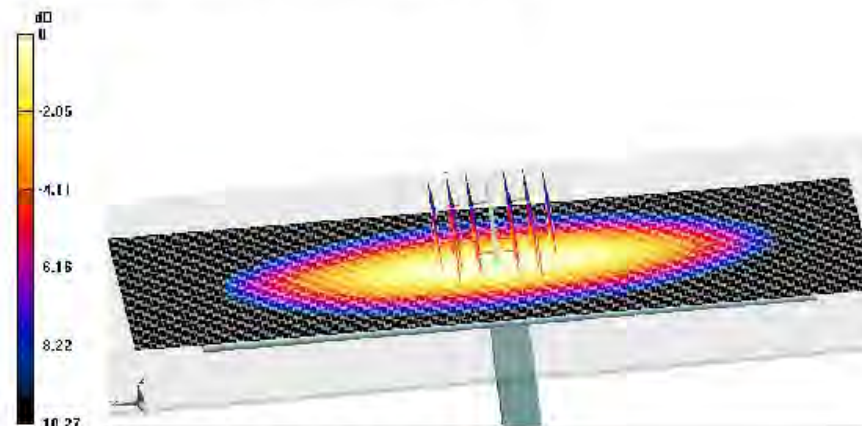
$dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 55.88 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.54 W/kg

SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.57 W/kg

Maximum value of SAR (measured) = 2.79 W/kg

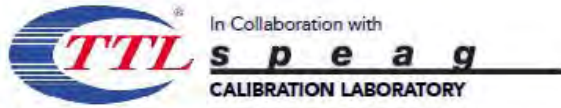


0 dB = 2.79 W/kg = 4.46 dBW/kg

TA Technology (Shanghai) Co., Ltd. Test Report

Report No.: RXA1412-0270SAR01R3

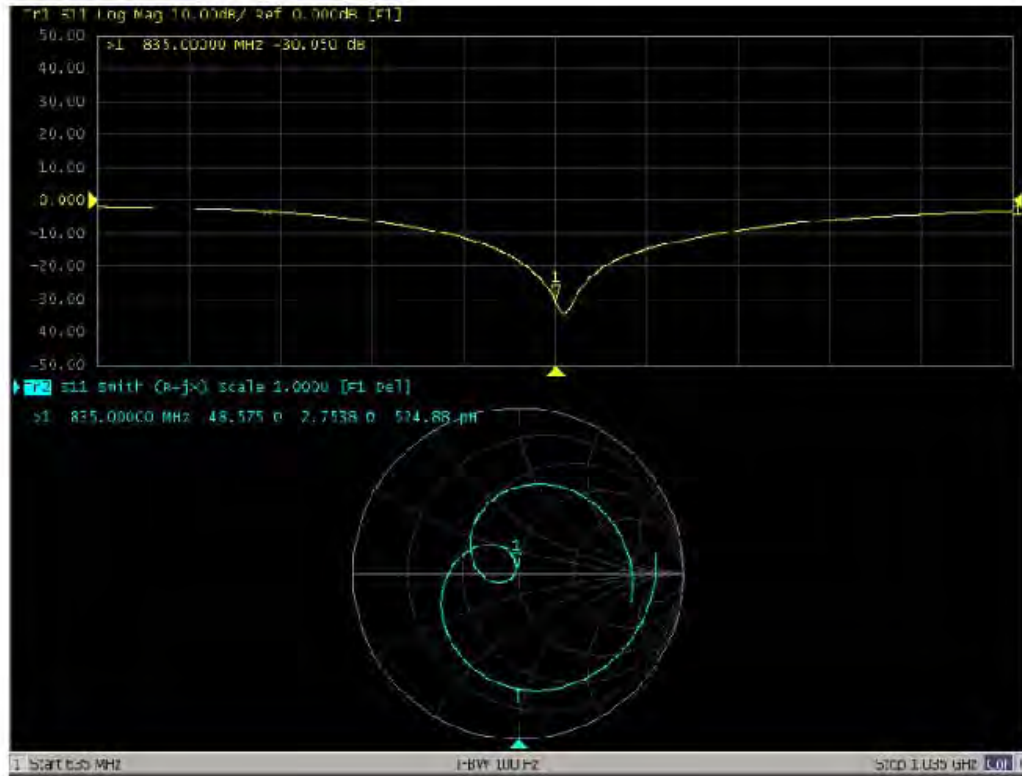
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Impedance Measurement Plot for Head TSL

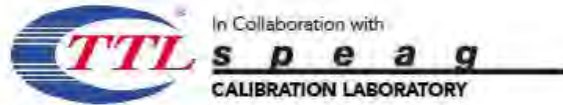


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DASY5 Validation Report for Body TSL

Date: 28.08.2014

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020

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

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.97 \text{ S/m}$; $\epsilon_r = 56.745$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(5.98, 5.98, 5.98); Calibrated: 2013-09-05;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 2014-01-23
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/2
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

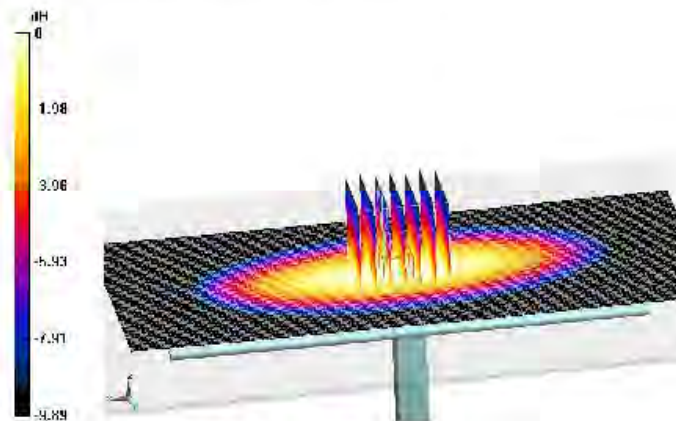
System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0; Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.515 W/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.45 W/kg

SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.57 W/kg

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

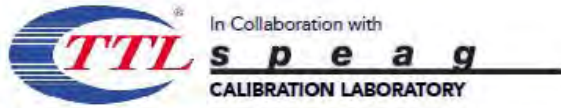


0 dB = 2.74 W/kg = 4.38 dBW/kg

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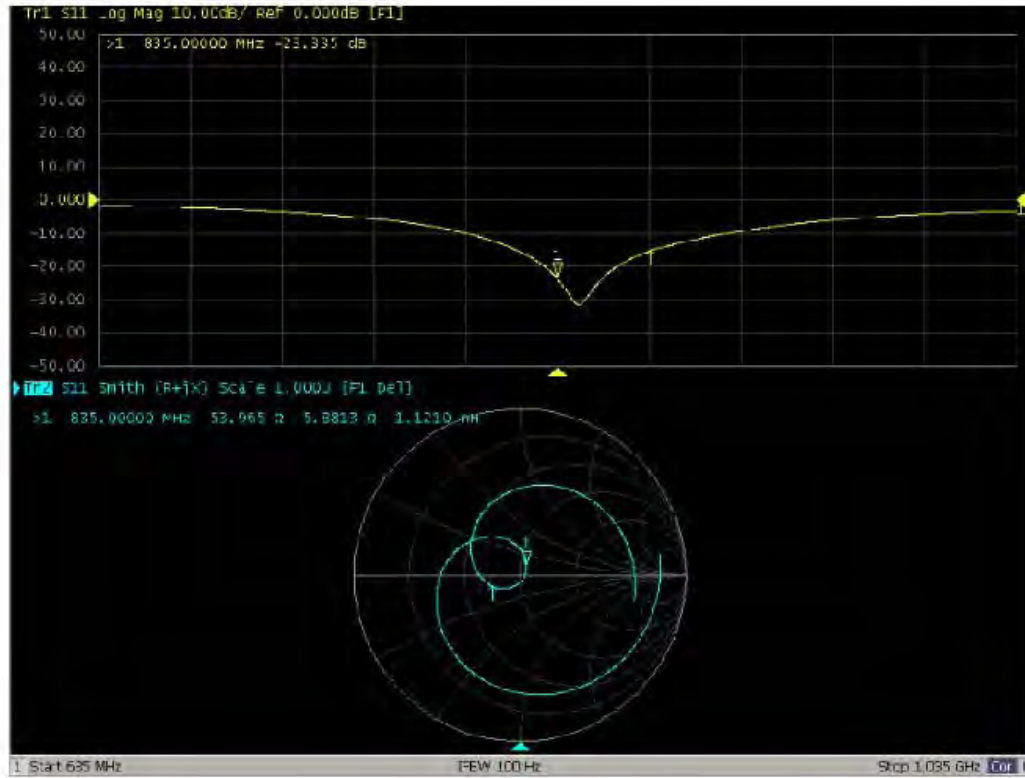
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Impedance Measurement Plot for Body TSL



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ANNEX G: D1900V2 Dipole Calibration Certificate



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Client **TA(Shanghai)** Certificate No: **Z14-97074**

CALIBRATION CERTIFICATE

Object: **D1900V2 - SN: 5d060**

Calibration Procedure(s): **TMC-OS-E-02-194**
Calibration procedure for dipole validation kits

Calibration date: **September 1, 2014**

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(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102083	11-Sep-13 (TMC, No.JZ13-443)	Sep-14
Power sensor NRV-Z5	100595	11-Sep-13 (TMC, No. JZ13-443)	Sep -14
Reference Probe ES3DV3 DAE3	SN 3149	5- Sep-13 (SPEAG, No.ES3-3149_Sep13)	Sep-14
	SN 536	23-Jan-14 (SPEAG, DAE3-536_Jan14)	Jan -15
Signal Generator E4438C	MY49070393	13-Nov-13 (TMC, No.JZ13-394)	Nov-14
Network Analyzer E8362B	MY43021135	19-Oct-13 (TMC, No.JZ13-278)	Oct-14

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: September 4, 2014

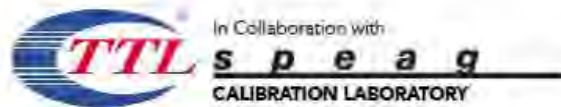
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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Glossary:

TSL	tissue simulating liquid
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 300MHz to 3GHz)", February 2005
- KDB865664, 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.

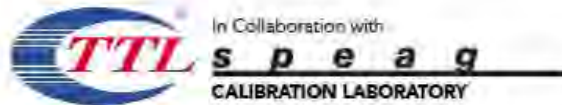
The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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Measurement Conditions

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

DASY Version	DASY52	52.8.8.1222
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.8 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.69 mW/g
SAR for nominal Head TSL parameters	normalized to 1W	39.2 mW/g ± 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.14 mW/g
SAR for nominal Head TSL parameters	normalized to 1W	20.7 mW/g ± 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

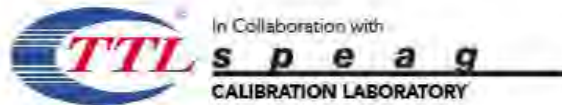
	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.8 ± 6 %	1.50 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.98 mW/g
SAR for nominal Body TSL parameters	normalized to 1W	40.0 mW/g ± 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.28 mW/g
SAR for nominal Body TSL parameters	normalized to 1W	21.1 mW/g ± 20.4 % (k=2)

TA Technology (Shanghai) Co., Ltd.

Test Report



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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.1Ω- 6.34jΩ
Return Loss	- 22.8dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	57.6Ω- 4.76jΩ
Return Loss	- 21.6dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1,248 ns
----------------------------------	----------

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

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

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

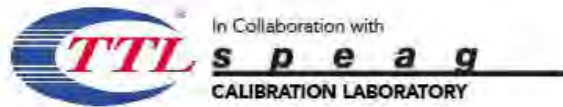
Additional EUT Data

Manufactured by	SPEAG
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TA Technology (Shanghai) Co., Ltd. Test Report

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DASY5 Validation Report for Head TSL

Date: 01.09.2014

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.371$ S/m; $\epsilon_r = 39.83$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(5.06, 5.06, 5.06); Calibrated: 2013-09-05;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 2014-01-23
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

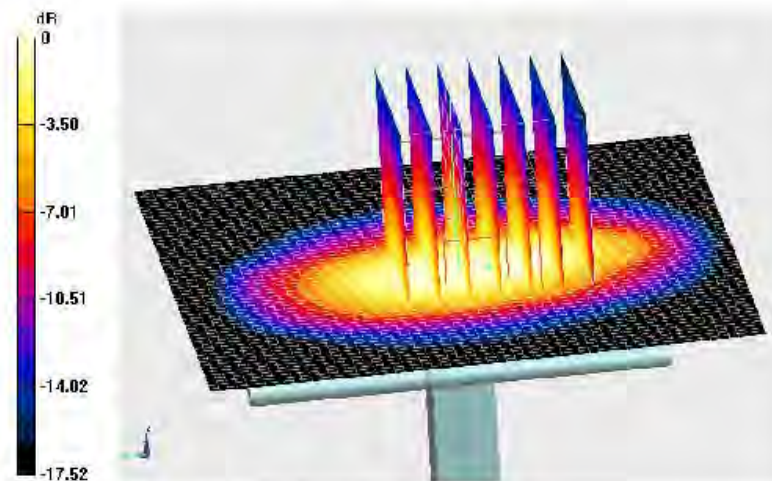
dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.911 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 17.5 W/kg

SAR(1 g) = 9.69 W/kg; SAR(10 g) = 5.14 W/kg

Maximum value of SAR (measured) = 12.2 W/kg

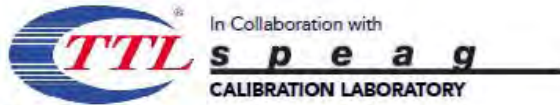


0 dB = 12.2 W/kg = 10.86 dB W/kg

TA Technology (Shanghai) Co., Ltd. Test Report

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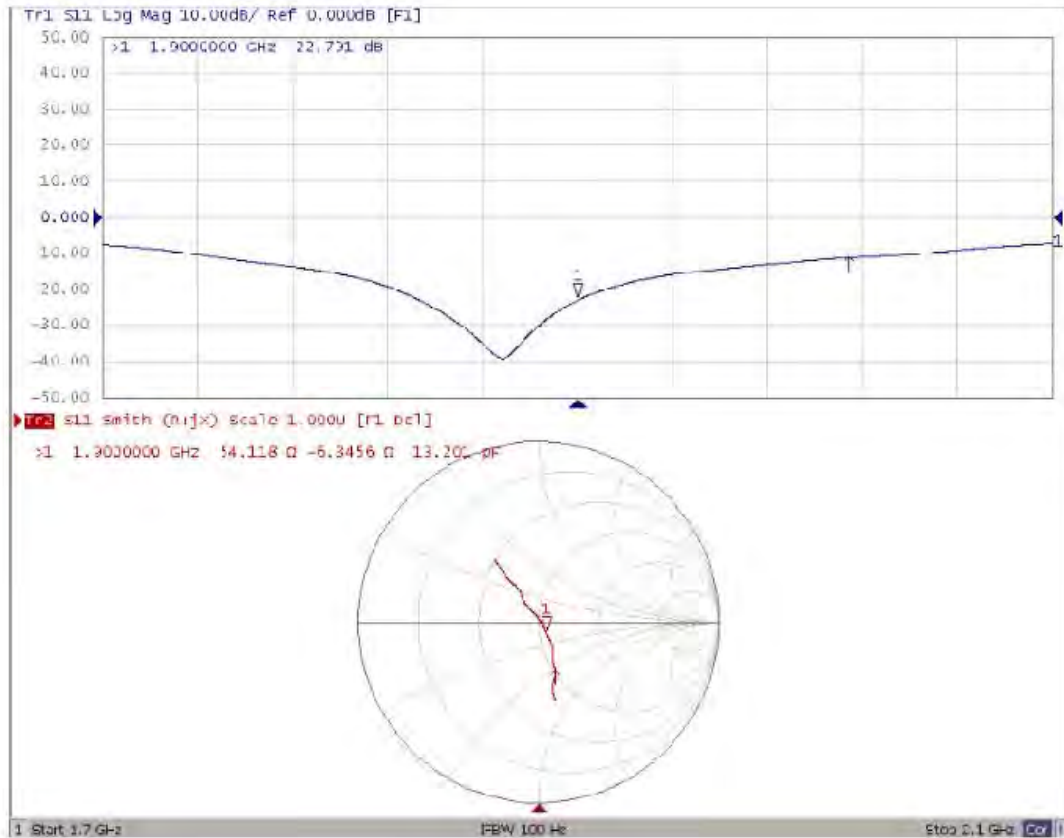
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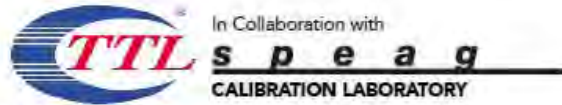
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 01.09.2014

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060

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

Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.5 \text{ S/m}$; $\epsilon_r = 51.78$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(4.72, 4.72, 4.72); Calibrated: 2013-09-03;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 2014-01-23
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/2
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

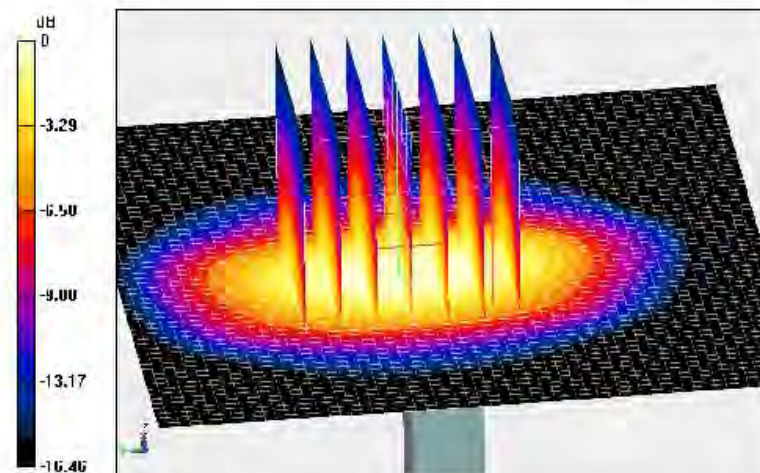
$dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 93.668 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 17.6 W/kg

SAR(1 g) = 9.98 W/kg; SAR(10 g) = 5.28 W/kg

Maximum value of SAR (measured) = 12.6 W/kg

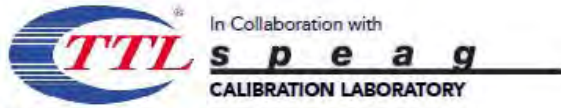


0 dB = 12.6 W/kg = 11.00 dB W/kg

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Report No.: RXA1412-0270SAR01R3

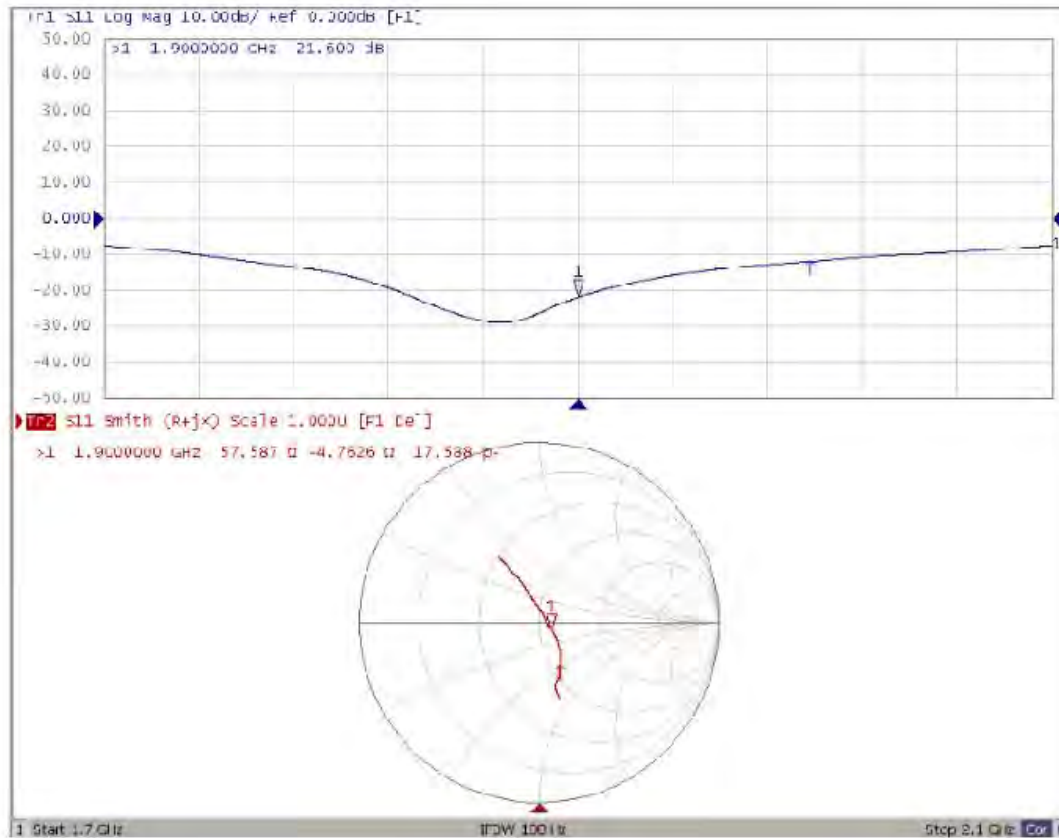
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Impedance Measurement Plot for Body TSL



TA Technology (Shanghai) Co., Ltd. Test Report

ANNEX H: D2450V2 Dipole Calibration Certificate



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Client **TA(Shanghai)** Certificate No: **Z14-97075**

CALIBRATION CERTIFICATE

Object: **D2450V2 - SN: 786**

Calibration Procedure(s): **TMC-OS-E-02-194**
Calibration procedure for dipole validation kits

Calibration date: **September 1, 2014**

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(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102083	11-Sep-13 (TMC, No.JZ13-443)	Sep-14
Power sensor NRV-Z5	100595	11-Sep-13 (TMC, No. JZ13-443)	Sep -14
Reference Probe ES3DV3 DAE3	SN 3149	5- Sep-13 (SPEAG, No.ES3-3149_Sep13)	Sep-14
	SN 536	23-Jan-14 (SPEAG, DAE3-536_Jan14)	Jan -15
Signal Generator E4438C	MY49070393	13-Nov-13 (TMC, No.JZ13-394)	Nov-14
Network Analyzer E8362B	MY43021135	19-Oct-13 (TMC, No.JZ13-278)	Oct-14

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: September 4, 2014

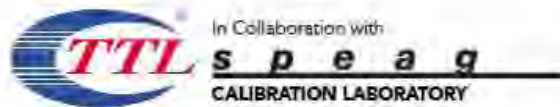
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

TA Technology (Shanghai) Co., Ltd.

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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 300MHz to 3GHz)", February 2005
- KDB865664, 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.

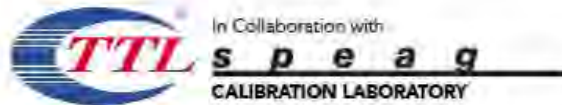
The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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Measurement Conditions

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

DASY Version	DASY52	52.8.8.1222
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.2 ± 6 %	1.84 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.2 mW/g
SAR for nominal Head TSL parameters	normalized to 1W	52.5 mW/g ± 20.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.20 mW/g
SAR for nominal Head TSL parameters	normalized to 1W	24.8 mW/g ± 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.3 ± 6 %	2.00 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

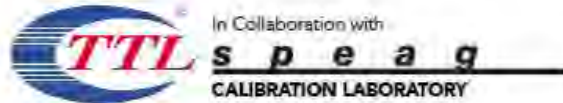
SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.3 mW/g
SAR for nominal Body TSL parameters	normalized to 1W	52.4 mW/g ± 20.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	6.20 mW/g
SAR for nominal Body TSL parameters	normalized to 1W	24.6 mW/g ± 20.4 % (k=2)

TA Technology (Shanghai) Co., Ltd.

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	57.1Ω-0.57jΩ
Return Loss	-23.6dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	56.0Ω+3.31jΩ
Return Loss	-23.7dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.192 ns
----------------------------------	----------

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

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

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

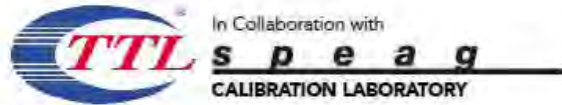
Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 01.09.2014

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 786

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

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.84$ S/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(4.48, 4.48, 4.48); Calibrated: 2013-09-05;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 2014-01-23
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW,

dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

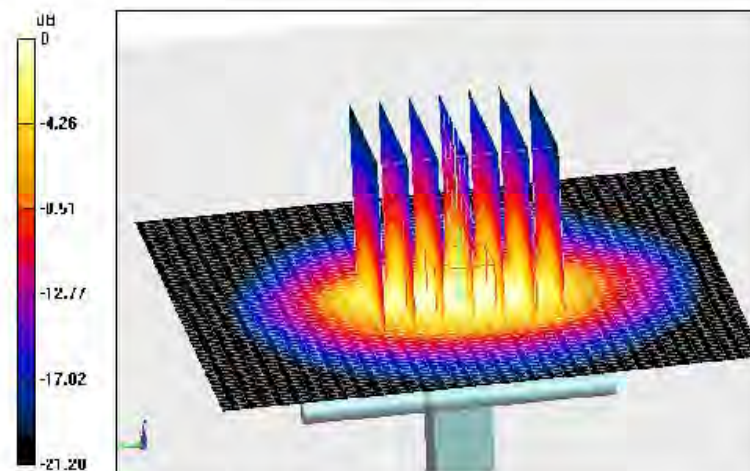
dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.583 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 26.6 W/kg

SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.2 W/kg

Maximum value of SAR (measured) = 17.3 W/kg

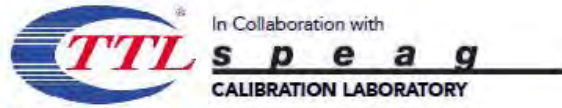


0 dB = 17.3 W/kg = 12.38 dBW/kg

TA Technology (Shanghai) Co., Ltd. Test Report

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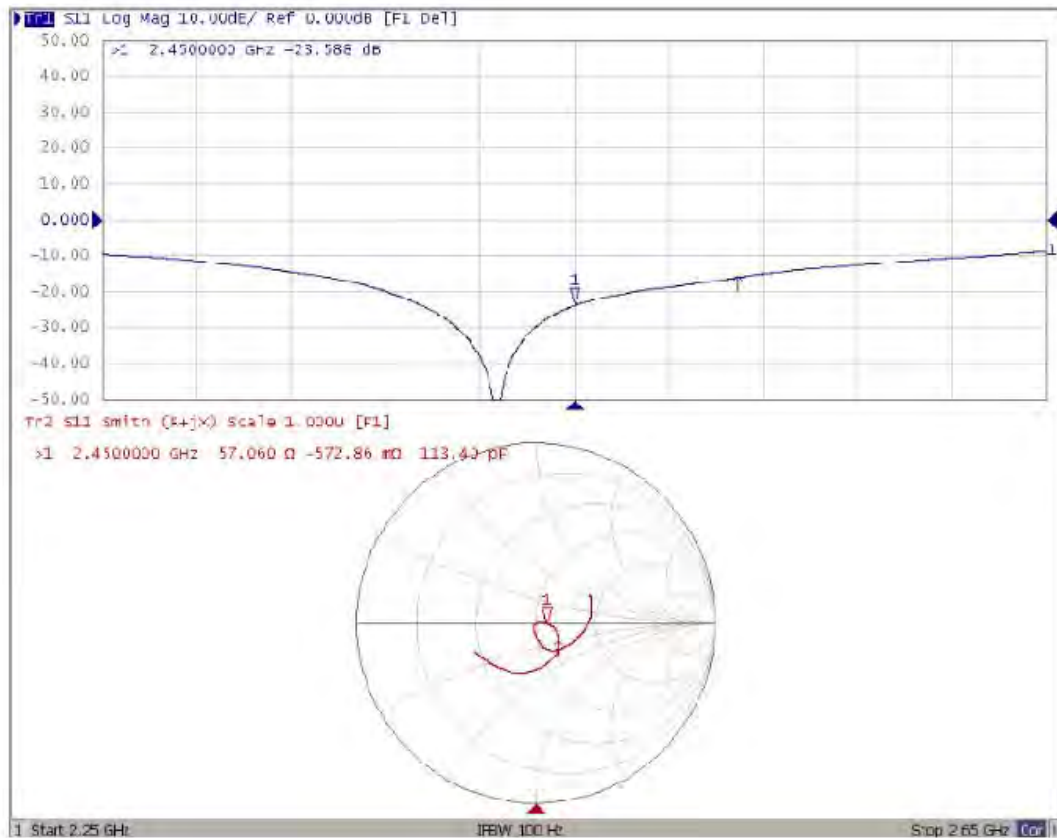
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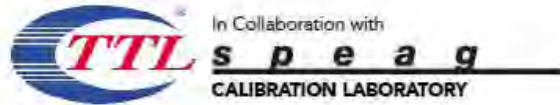
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 01.09.2014

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 786

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

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.988$ S/m; $\epsilon_r = 51.25$; $\rho = 1000$ kg/m³

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(4.21, 4.21, 4.21); Calibrated: 2013-09-03;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 2014-01-23
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/2
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW,

dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

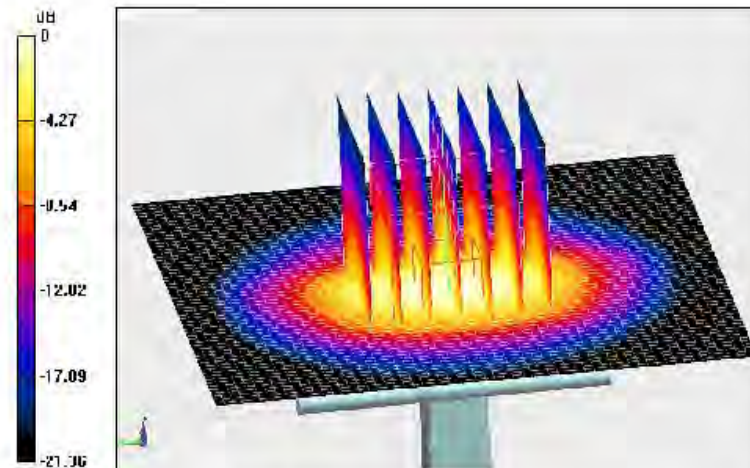
dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.120 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 27.8 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.2 W/kg

Maximum value of SAR (measured) = 17.7 W/kg

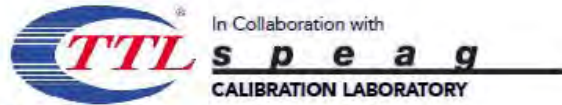


0 dB = 17.7 W/kg = 12.48 dBW/kg

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Impedance Measurement Plot for Body TSL



TA Technology (Shanghai) Co., Ltd.

Test Report

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ANNEX H: DAE4 Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **TA-Shanghai (Auden)**

Certificate No: **DAE4-1291_Nov14**

CALIBRATION CERTIFICATE			
Object	DAE4 - SD 000 D04 BM - SN: 1291		
Calibration procedure(s)	QA CAL-06.v28 Calibration procedure for the data acquisition electronics (DAE)		
Calibration date:	November 14, 2014		
<p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p>			
Primary Standards	ID #	Cal Date (Certificate No)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-14 (No:15573)	Oct-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Auto DAE Calibration Unit	SE UWS 053 AA 1001	07-Jan-14 (in house check)	In house check: Jan-15
Calibrator Box V2.1	SE UMS 006 AA 1002	07-Jan-14 (in house check)	In house check: Jan-15
Calibrated by:	Name Dominique Steffen	Function Technician	Signature
Approved by:	Fin Bornholt	Deputy Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			Issued: November 14, 2014

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



S Schweizerischer Kalibrierdienst
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary

DAE data acquisition electronics
Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
 - *DC Voltage Measurement Linearity*: Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
 - *Common mode sensitivity*: Influence of a positive or negative common mode voltage on the differential measurement.
 - *Channel separation*: Influence of a voltage on the neighbor channels not subject to an input voltage.
 - *AD Converter Values with inputs shorted*: Values on the internal AD converter corresponding to zero input voltage
 - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
 - *Input Offset Current*: Typical value for information; Maximum channel input offset current, not considering the input resistance.
 - *Input resistance*: Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
 - *Low Battery Alarm Voltage*: Typical value for information. Below this voltage, a battery alarm signal is generated.
 - *Power consumption*: Typical value for information. Supply currents in various operating modes.

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DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 μ V, full range = -100...+300 mV

Low Range: 1LSB = 61nV, full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	402.613 \pm 0.02% (k=2)	403.293 \pm 0.02% (k=2)	403.205 \pm 0.02% (k=2)
Low Range	3.97544 \pm 1.50% (k=2)	3.93356 \pm 1.50% (k=2)	3.99377 \pm 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	308.5 $^{\circ}$ \pm 1 $^{\circ}$
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Appendix (Additional assessments outside the scope of SCS108)

1. DC Voltage Linearity

High Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	200033.82	-3.10	-0.00
Channel X + Input	20004.15	-0.02	-0.00
Channel X - Input	-20004.31	1.85	-0.01
Channel Y + Input	200033.24	-3.41	-0.00
Channel Y + Input	20003.47	-0.54	-0.00
Channel Y - Input	-20006.08	0.19	-0.00
Channel Z + Input	200036.05	-0.73	-0.00
Channel Z + Input	20001.26	-2.68	-0.01
Channel Z - Input	-20007.69	-1.47	0.01

Low Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	2000.57	-0.08	-0.00
Channel X + Input	200.57	-0.14	-0.07
Channel X - Input	-199.31	-0.00	0.00
Channel Y + Input	1999.81	-0.79	-0.04
Channel Y + Input	200.05	-0.62	-0.31
Channel Y - Input	-199.06	0.30	-0.15
Channel Z + Input	2001.14	0.56	0.03
Channel Z + Input	199.16	-1.42	-0.71
Channel Z - Input	-200.73	-1.23	0.62

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	9.64	7.77
	- 200	-6.77	-8.44
Channel Y	200	13.71	13.30
	- 200	-14.01	-14.19
Channel Z	200	-16.88	-16.56
	- 200	13.70	13.86

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	3.91	-4.26
Channel Y	200	8.88	-	3.64
Channel Z	200	10.51	7.45	-

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4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16003	13374
Channel Y	15805	15470
Channel Z	16035	14317

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.37	-1.17	1.61	0.49
Channel Y	0.25	-0.91	1.56	0.48
Channel Z	-0.62	-1.83	0.60	0.47

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

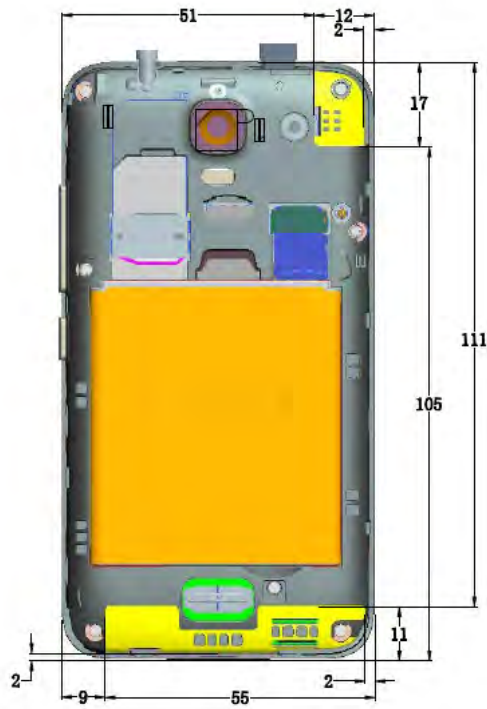
9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9

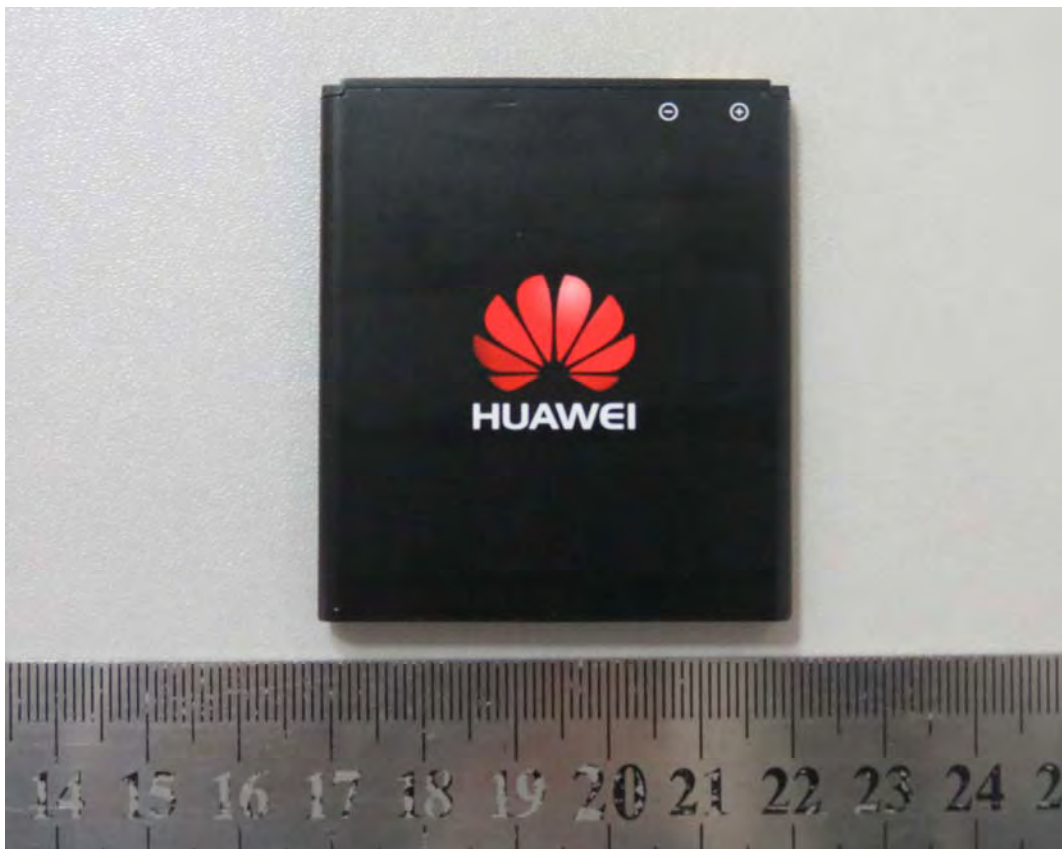
ANNEX I: The EUT Appearances and Test Configuration



a: EUT



b: Antenna



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Battery 1



Battery 2

c: Battery



Earphone 1



Earphone 2



Earphone 3

d: Earphone

Picture 8: Constituents of EUT



Picture 9: Left Hand Touch Cheek Position



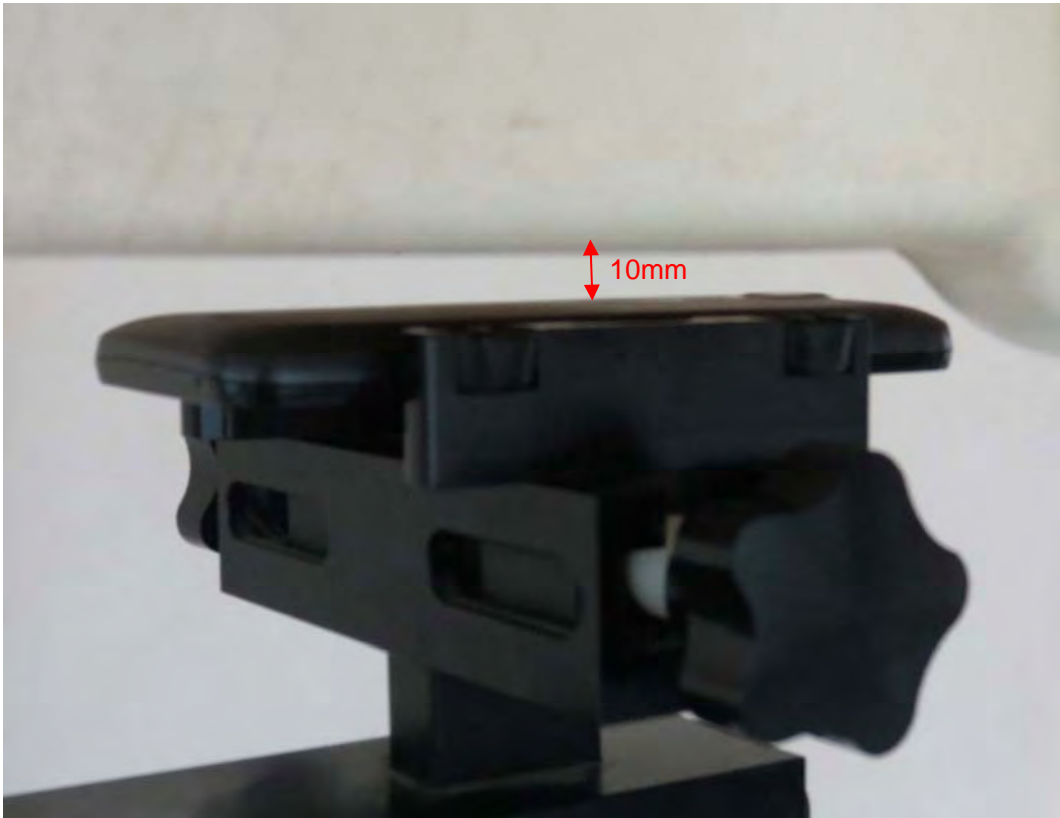
Picture 10: Left Hand Tilt 15 Degree Position



Picture 11: Right Hand Touch Cheek Position



Picture 12: Right Hand Tilt 15 Degree Position



Picture 13: Back Side, the distance from handset to the bottom of the Phantom is 10mm



Picture 14: Front Side, the distance from handset to the bottom of the Phantom is 10mm

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Picture 15: Left Edge, the distance from handset to the bottom of the Phantom is 10mm



Picture 16: Right Edge, the distance from handset to the bottom of the Phantom is 10mm



Picture 17: Top Edge, the distance from handset to the bottom of the Phantom is 10mm



Picture 18: Bottom Edge, the distance from handset to the bottom of the Phantom is 10mm

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ANNEX J: System Validation

The SAR system must be validated against its performance specifications before it is deployed. When SAR probes, system components or software are changed, upgraded or recalibrated, these must be validated with the SAR system(s) that operates with such components.

Table 26: System Validation Part 1

System No.	Probe SN.	Liquid Name	Validation Date	Frequency Point	Permittivity ϵ	Conductivity σ(s/m)
1	3977	835MHz (head)	February 17, 2014	850MHz	41.5	0.90
2	3977	1900MHz (head)	February 17, 2014	1900MHz	40.0	1.40
3	3977	2450MHz (head)	February 17, 2014	2450MHz	39.2	1.80
4	3977	835MHz (body)	February 17, 2014	850MHz	55.2	0.97
5	3977	1900MHz (body)	February 17, 2014	1900MHz	53.3	1.52
6	3977	2450MHz (body)	February 17, 2014	2450MHz	52.7	1.95

Table 27: System Validation Part 2

CW Validation	Sensitivity	PASS	PASS
	Probe Linearity	PASS	PASS
	Probe Isotropy	PASS	PASS
Mod Validation	MOD. Type	GMSK	GMSK
	MOD. Type	OFDM	OFDM
	Duty Factor	PASS	PASS
	PAR	PASS	PASS