



Plot 22: Date/Time: 9/13/2014 4:04:01 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GPRS850; Frequency: 836.6 MHz; Duty Cycle: 1:4

Medium parameters used: $f = 837$ MHz; $\sigma = 0.992$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(9.63, 9.63, 9.63); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1432; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2 2slot/Area Scan (101x181x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.449 mW/g

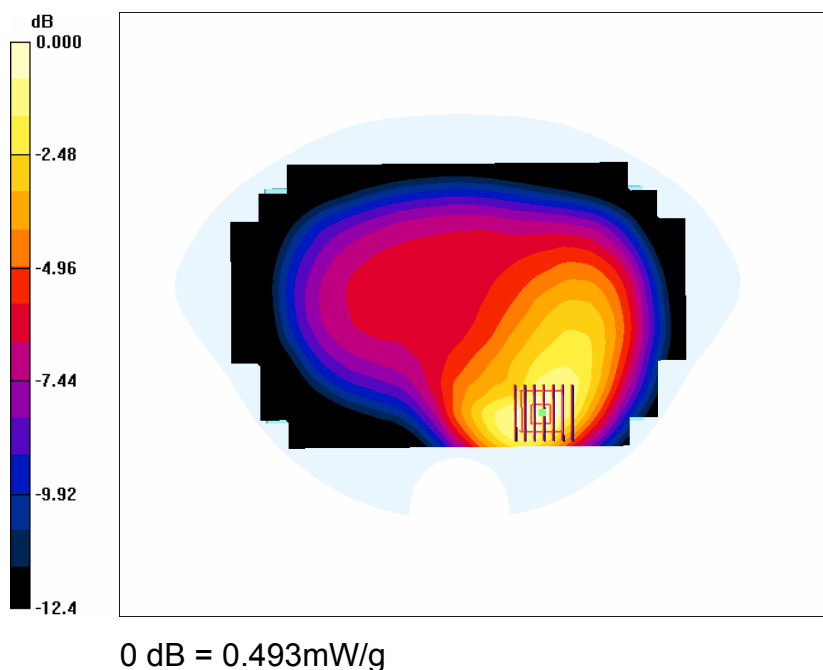
Side2 2slot/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.5 V/m; Power Drift = 0.016 dB

Peak SAR (extrapolated) = 0.723 W/kg

SAR(1 g) = 0.456 mW/g; SAR(10 g) = 0.184 mW/g

Maximum value of SAR (measured) = 0.493 mW/g





Plot 23: Date/Time: 9/13/2014 4:56:01 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GPRS850; Frequency: 836.6 MHz; Duty Cycle: 1:2.67

Medium parameters used: $f = 837$ MHz; $\sigma = 0.992$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(9.63, 9.63, 9.63); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1432; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2 3slot /Area Scan (101x181x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.527 mW/g

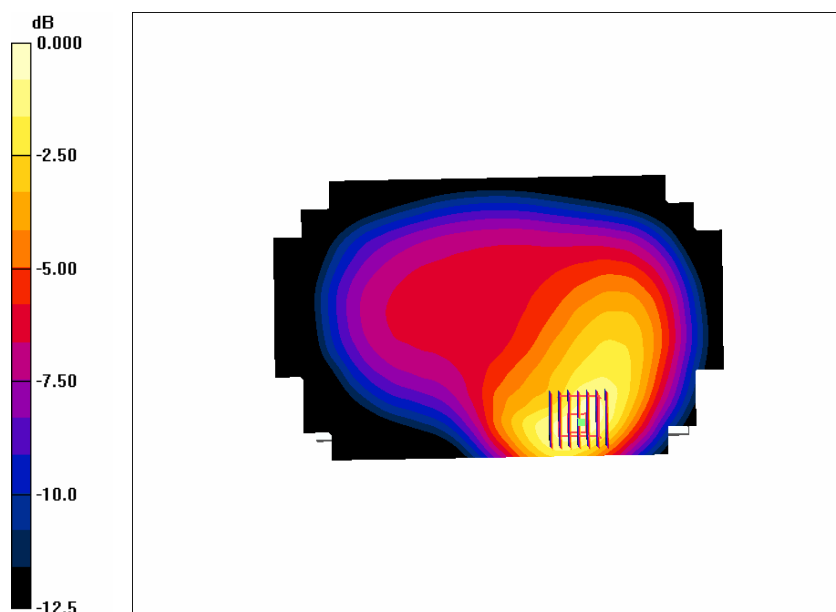
Side2 3slot /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.8 V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 0.783 W/kg

SAR(1 g) = 0.485 mW/g; SAR(10 g) = 0.199 mW/g

Maximum value of SAR (measured) = 0.525 mW/g



0 dB = 0.543mW/g



Plot 24: Date/Time: 9/13/2014 5:40:01 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GPRS850; Frequency: 836.6 MHz; Duty Cycle: 1:2

Medium parameters used: $f = 837$ MHz; $\sigma = 0.992$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(9.63, 9.63, 9.63); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1432; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2 4slot/Area Scan (101x181x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.548 mW/g

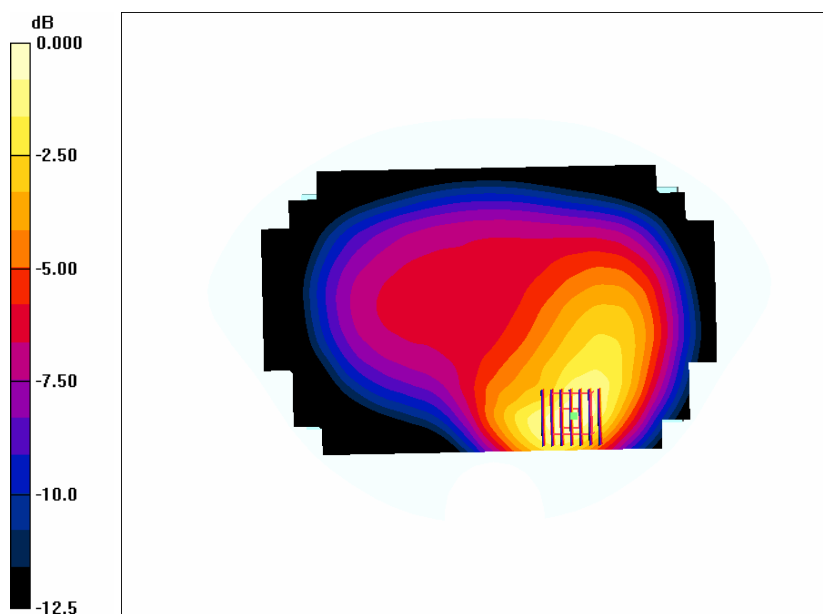
Side2 4slot/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.1 V/m; Power Drift = 0.007 dB

Peak SAR (extrapolated) = 0.808 W/kg

SAR(1 g) = 0.503 mW/g; SAR(10 g) = 0.112 mW/g

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



0 dB = 0.525mW/g



Plot 25: Date/Time: 9/13/2014 6:13:21 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GPRS850; Frequency: 836.6 MHz; Duty Cycle: 1:2

Medium parameters used: $f = 837$ MHz; $\sigma = 0.992$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(9.63, 9.63, 9.63); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1432; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side3 4slot/Area Scan (41x131x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.465 mW/g

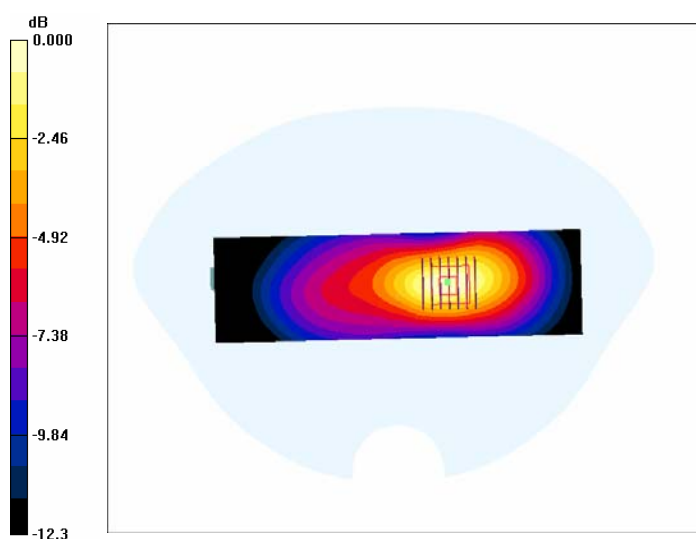
Side3 4slot/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.9 V/m; Power Drift = 0.035 dB

Peak SAR (extrapolated) = 0.692 W/kg

SAR(1 g) = 0.428 mW/g; SAR(10 g) = 0.159 mW/g

Maximum value of SAR (measured) = 0.472 mW/g



0 dB = 0.472mW/g



Plot 26: Date/Time: 9/13/2014 7:01:12 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GPRS850; Frequency: 836.6 MHz; Duty Cycle: 1:2

Medium parameters used: $f = 837$ MHz; $\sigma = 0.992$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(9.63, 9.63, 9.63); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1432; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side6 4slot/Area Scan (41x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.285 mW/g

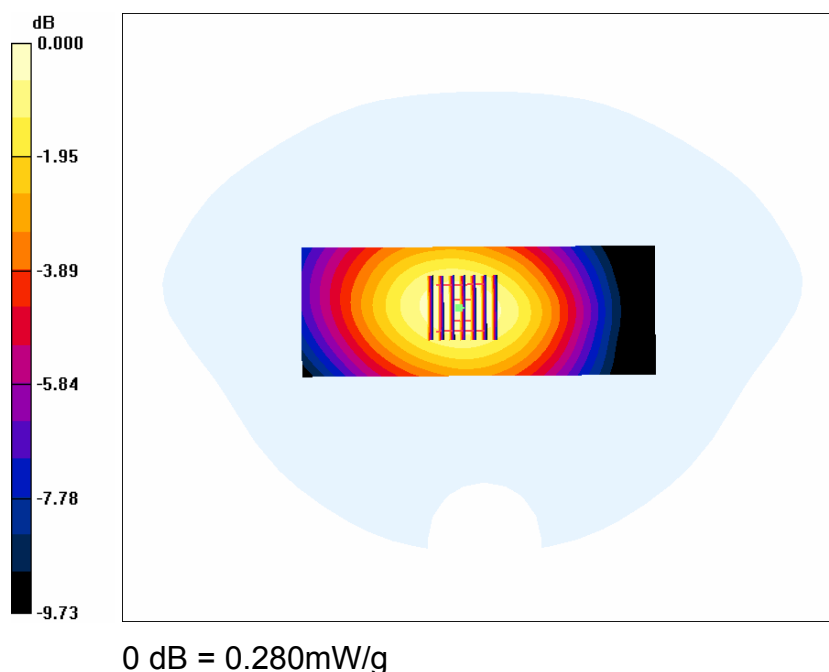
Side6 4slot/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.01 V/m; Power Drift = -0.132 dB

Peak SAR (extrapolated) = 0.605 W/kg

SAR(1 g) = 0.275 mW/g; SAR(10 g) = 0.152 mW/g

Maximum value of SAR (measured) = 0.280 mW/g





Plot 27: Date/Time: 9/13/2014 7:55:14 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: EGPRS850; Frequency: 836.6 MHz; Duty Cycle: 1:2

Medium parameters used: $f = 837$ MHz; $\sigma = 0.992$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(9.63, 9.63, 9.63); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1432; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2 4slot/Area Scan (101x181x1): Measurement grid: dx=15mm, dy=15mm

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

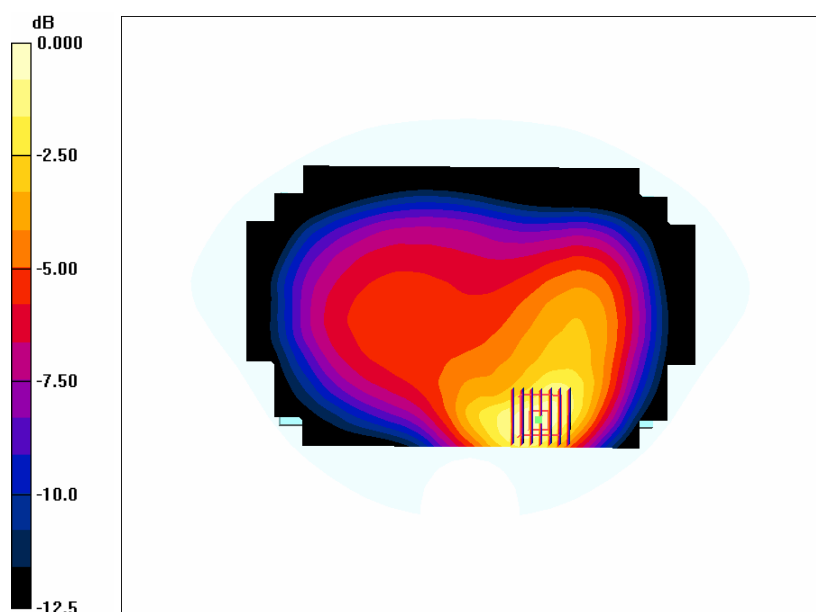
Side2 4slot/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.8 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 1.674 W/kg

SAR(1 g) = 0.553 mW/g; SAR(10 g) = 0.287 mW/g

Maximum value of SAR (measured) = 0.625 mW/g



0 dB = 0.625mW/g



Plot 28: Date/Time: 9/13/2014 8:35:43 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GSM850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 837$ MHz; $\sigma = 0.992$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(9.63, 9.63, 9.63); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1432; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side 2/Area Scan (101x181x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.239 mW/g

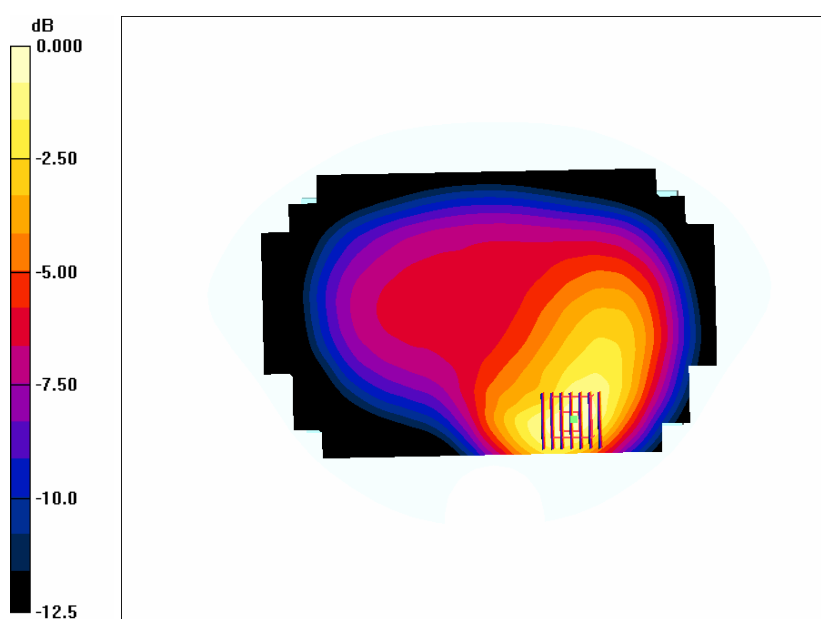
Side 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.58 V/m; Power Drift = -0.056 dB

Peak SAR (extrapolated) = 0.353 W/kg

SAR(1 g) = 0.226 mW/g; SAR(10 g) = 0.140 mW/g

Maximum value of SAR (measured) = 0.246 mW/g



0 dB = 0.525mW/g



Plot 29: Date/Time: 9/13/2014 3:36:21 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GPRS1900; Frequency: 1880 MHz; Duty Cycle: 1:8

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.54 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$

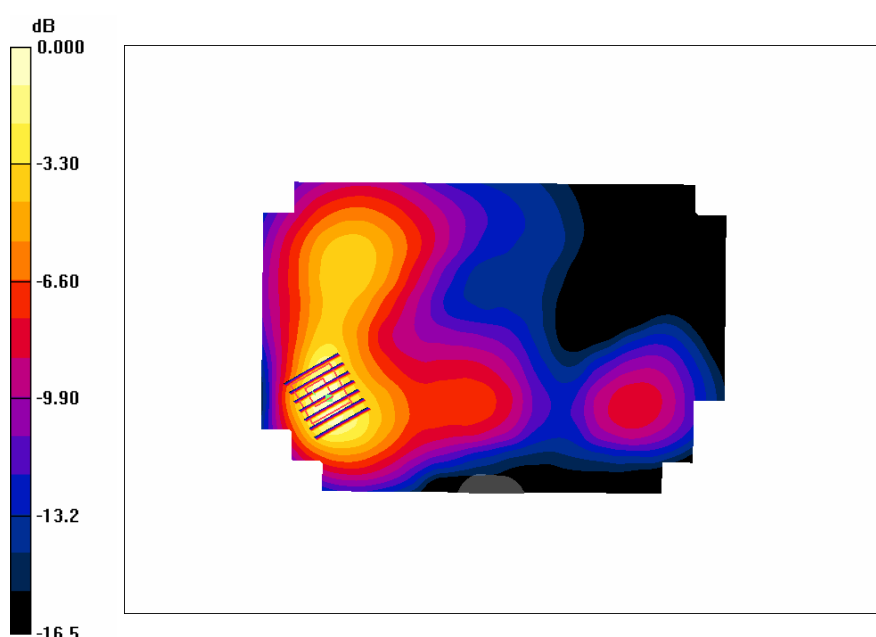
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(7.83, 7.83, 7.83); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1360; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2 1slot/Area Scan (101x181x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 0.204 mW/g

Side2 1slot/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$,
Reference Value = 3.72 V/m; Power Drift = 0.116 dB
Peak SAR (extrapolated) = 0.291 W/kg
SAR(1 g) = 0.181 mW/g; SAR(10 g) = 0.111 mW/g
Maximum value of SAR (measured) = 0.195 mW/g



0 dB = 0.195mW/g



Plot 30: Date/Time: 9/13/2014 4:22:21 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GPRS1900; Frequency: 1880 MHz;Duty Cycle: 1:4

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(7.83, 7.83, 7.83); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1360; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2 2slot/Area Scan (101x181x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.288 mW/g

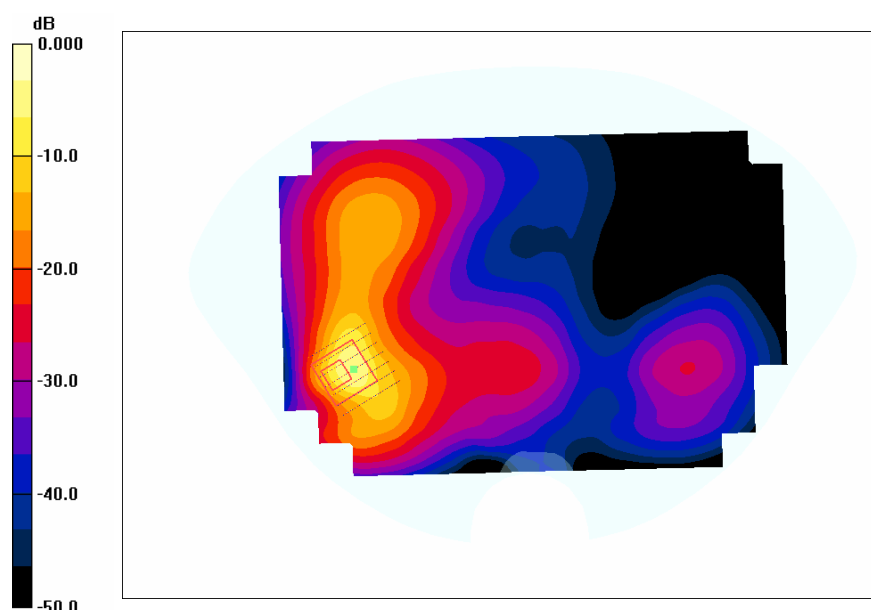
Side2 2slot/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.62 V/m; Power Drift = 0.176 dB

Peak SAR (extrapolated) = 0.533 W/kg

SAR(1 g) = 0.266 mW/g; SAR(10 g) = 0.126 mW/g

Maximum value of SAR (measured) = 0.288 mW/g



0 dB = 0.288mW/g



Plot 31: Date/Time: 9/13/2014 5:18:11 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GPRS1900; Frequency: 1880 MHz; Duty Cycle: 1:2.67

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(7.83, 7.83, 7.83); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1360; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2 3slot/Area Scan (101x181x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.370 mW/g

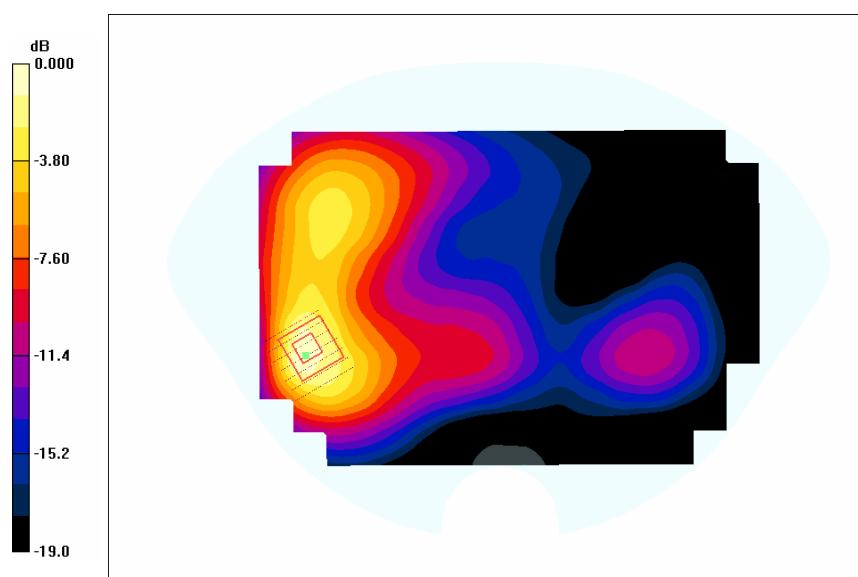
Side2 3slot/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.53 V/m; Power Drift = 0.165 dB

Peak SAR (extrapolated) = 0.758 W/kg

SAR(1 g) = 0.318 mW/g; SAR(10 g) = 0.133 mW/g

Maximum value of SAR (measured) = 0.370 mW/g



0 dB = 0.370mW/g



Plot 32: Date/Time: 9/13/2014 5:57:24 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GPRS1900; Frequency: 1880 MHz; Duty Cycle: 1:2

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(7.83, 7.83, 7.83); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1360; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2 4slot/Area Scan (101x181x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.424 mW/g

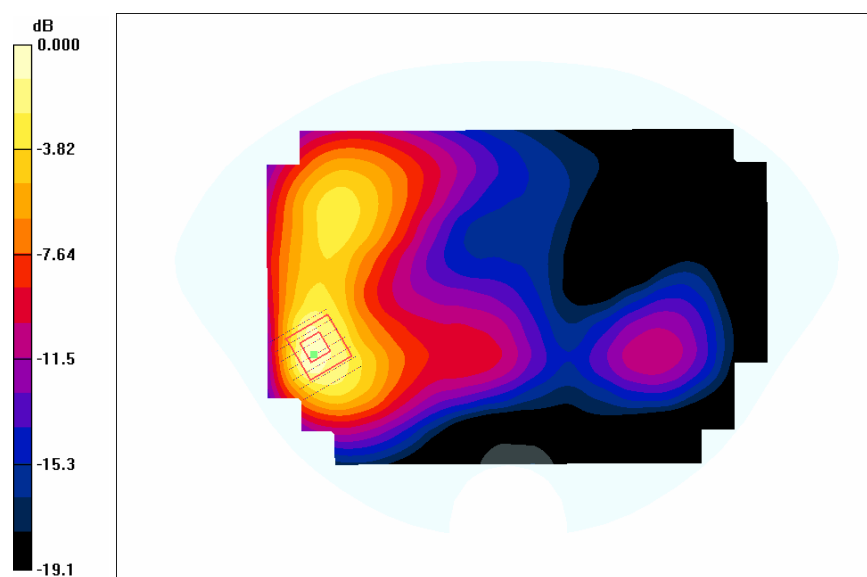
Side2 4slot/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.99 V/m; Power Drift = 0.082 dB

Peak SAR (extrapolated) = 0.952 W/kg

SAR(1 g) = 0.363 mW/g; SAR(10 g) = 0.156 mW/g

Maximum value of SAR (measured) = 0.416 mW/g



0 dB = 0.416mW/g



Plot 33: Date/Time: 9/13/2014 6:46:23 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GPRS1900; Frequency: 1880 MHz; Duty Cycle: 1:2

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.54 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(7.83, 7.83, 7.83); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1360; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side3 4slot /Area Scan (41x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.309 mW/g

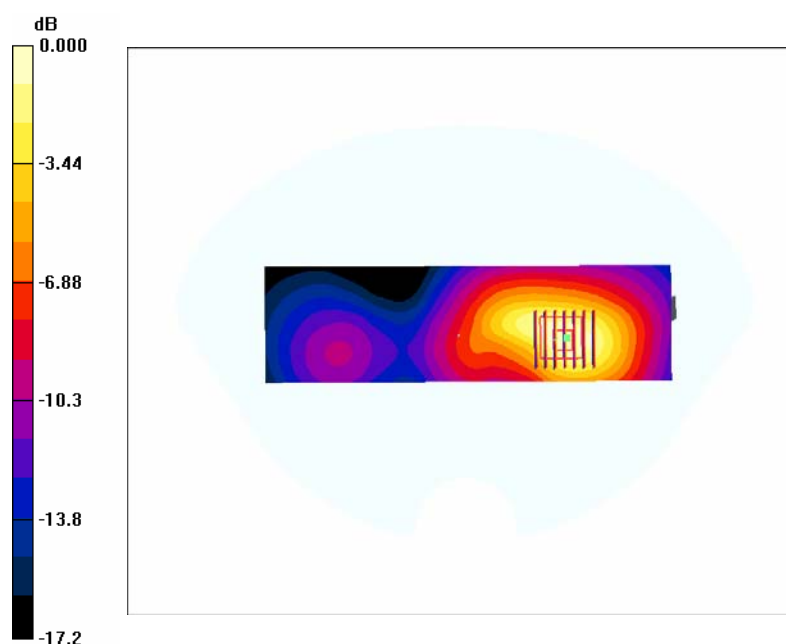
Side3 4slot /Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 4.92 V/m ; Power Drift = 0.129 dB

Peak SAR (extrapolated) = 0.478 W/kg

SAR(1 g) = 0.281 mW/g ; SAR(10 g) = 0.163 mW/g

Maximum value of SAR (measured) = 0.309 mW/g



0 dB = 0.309 mW/g



Plot 34: Date/Time: 9/13/2014 7:26:12 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GPRS1900; Frequency: 1880 MHz; Duty Cycle: 1:2

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(7.83, 7.83, 7.83); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1360; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side6 4slot /Area Scan (41x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.151 mW/g

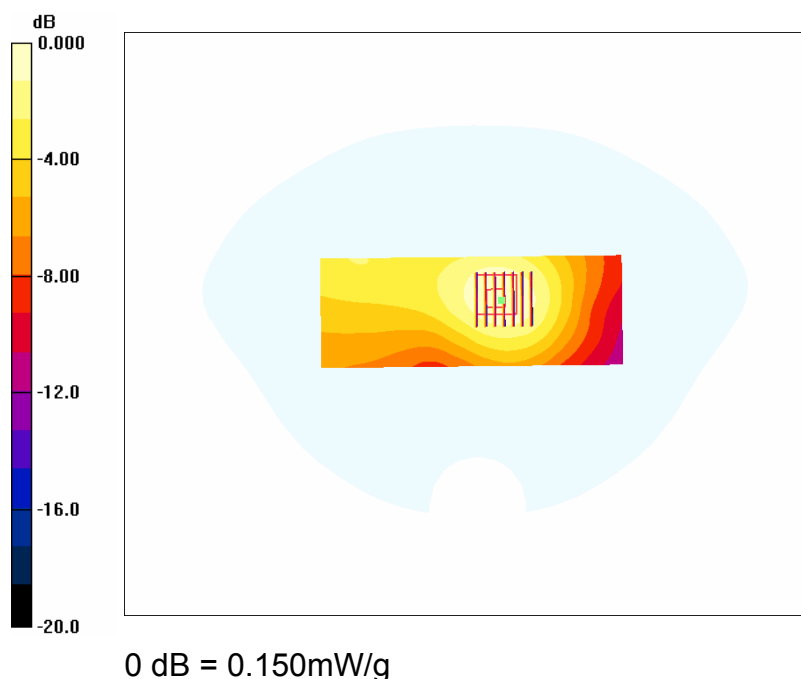
Side6 4slot /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.13 V/m; Power Drift = 0.107 dB

Peak SAR (extrapolated) = 0.377 W/kg

SAR(1 g) = 0.147 mW/g; SAR(10 g) = 0.078 mW/g

Maximum value of SAR (measured) = 0.150 mW/g





Plot 35: Date/Time: 9/13/2014 8:03:11 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: EGPRS1900; Frequency: 1880 MHz; Duty Cycle: 1:2
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(7.83, 7.83, 7.83); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1360; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2 4slot /Area Scan (101x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.483 mW/g

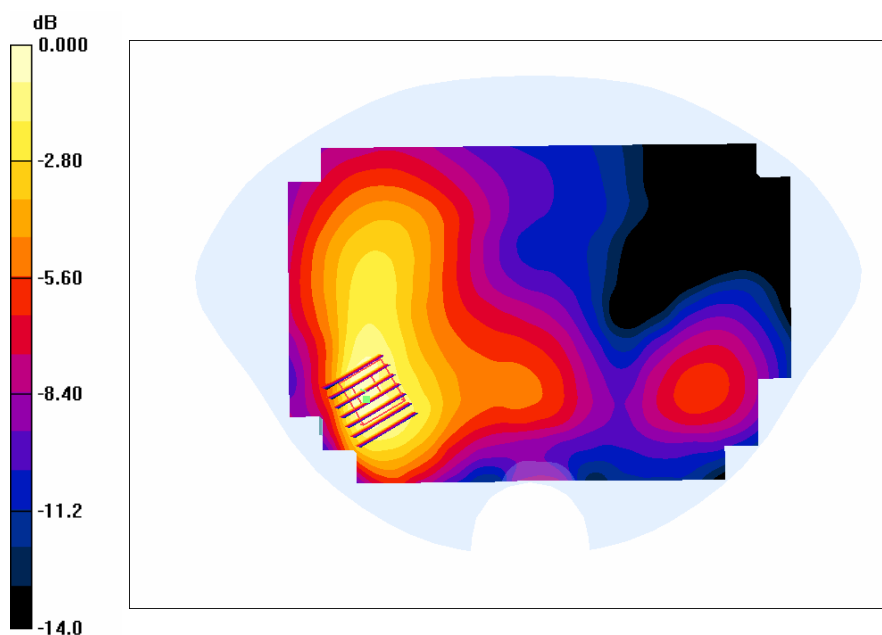
Side2 4slot /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.50 V/m; Power Drift = 0.028 dB

Peak SAR (extrapolated) = 1.066 W/kg

SAR(1 g) = 0.413 mW/g; SAR(10 g) = 0.209 mW/g

Maximum value of SAR (measured) = 0.439 mW/g



0 dB = 0.439mW/g



Plot 36: Date/Time: 9/13/2014 8:57:35 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.54 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(7.83, 7.83, 7.83); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1360; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2/Area Scan (101x181x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.256 mW/g

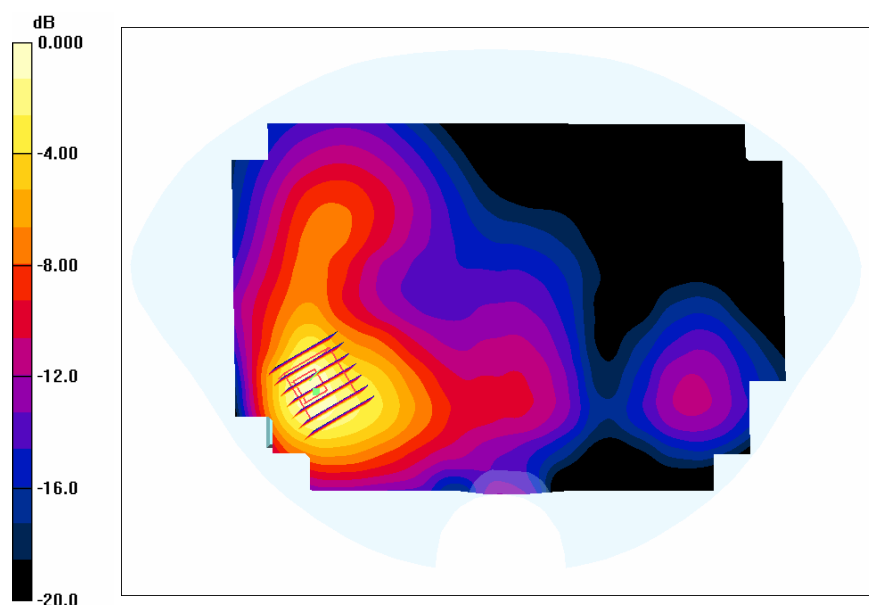
Side2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 4.39 V/m; Power Drift = 0.069 dB

Peak SAR (extrapolated) = 0.430 W/kg

SAR(1 g) = 0.232 mW/g; SAR(10 g) = 0.126 mW/g

Maximum value of SAR (measured) = 0.252 mW/g



0 dB = 0.252mW/g



Plot 37: Date/Time: 9/13/2014 9:18:21 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: W850; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837 \text{ MHz}$; $\sigma = 0.992 \text{ mho/m}$; $\epsilon_r = 55.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(9.63, 9.63, 9.63); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1432; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2/Area Scan (101x181x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.538 mW/g

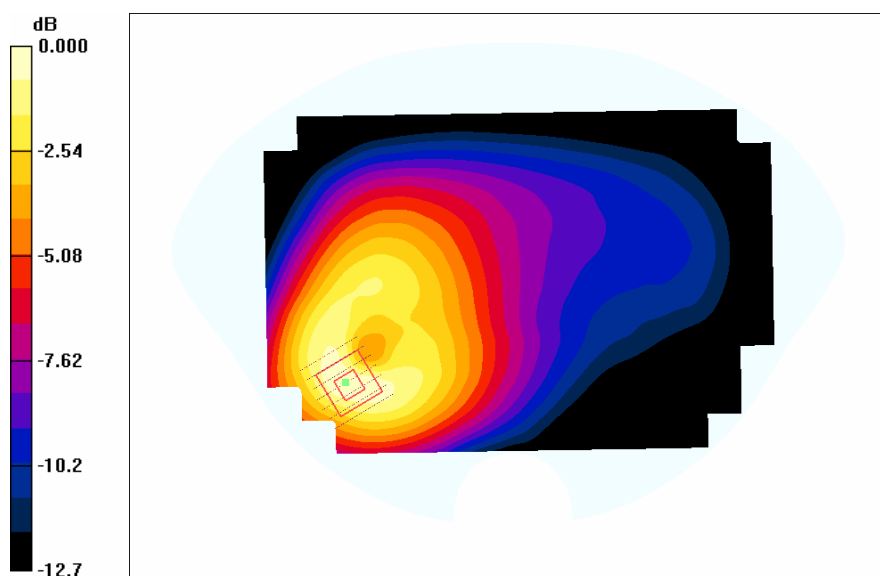
Side2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 2.77 V/m; Power Drift = 0.144 dB

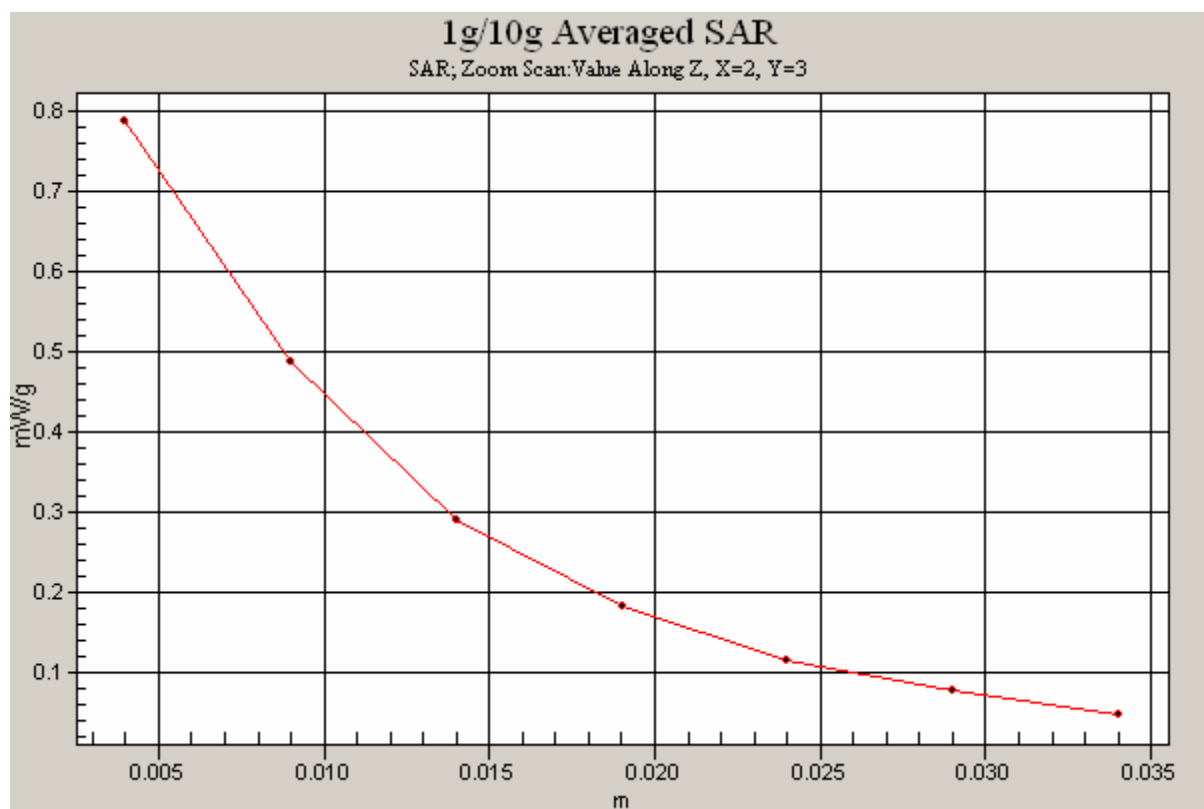
Peak SAR (extrapolated) = 1.25 W/kg

SAR(1 g) = 0.712 mW/g; SAR(10 g) = 0.387 mW/g

Maximum value of SAR (measured) = 0.787 mW/g



0 dB = 0.787mW/g





Plot 38: Date/Time: 9/13/2014 10:10:24 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: W850; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 0.992$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(9.63, 9.63, 9.63); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1432; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side3 4slot/Area Scan (41x131x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.649 mW/g

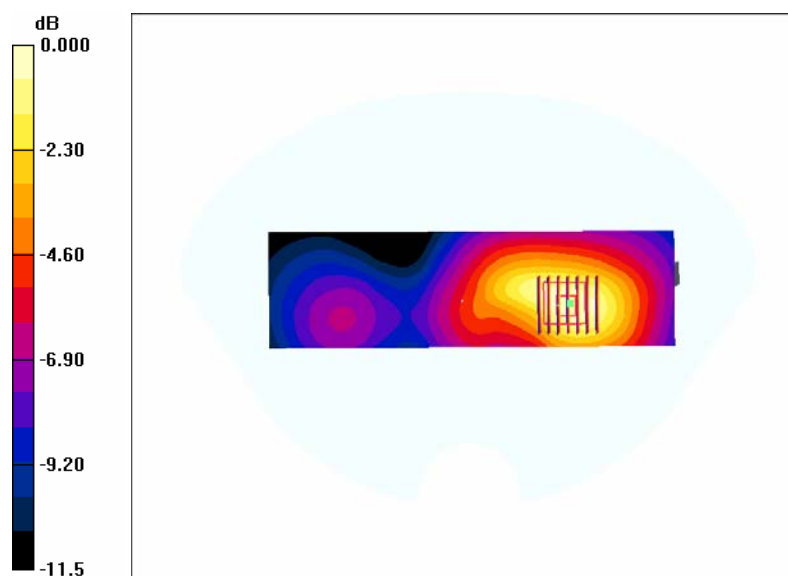
Side3 4slot/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.51 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 1.11 W/kg

SAR(1 g) = 0.611 mW/g; SAR(10 g) = 0.324 mW/g

Maximum value of SAR (measured) = 0.711 mW/g



0 dB = 0.711mW/g



Plot 39: Date/Time: 9/13/2014 10:53:12 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: W850; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 0.992$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(9.63, 9.63, 9.63); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1432; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side6 /Area Scan (41x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.416 mW/g

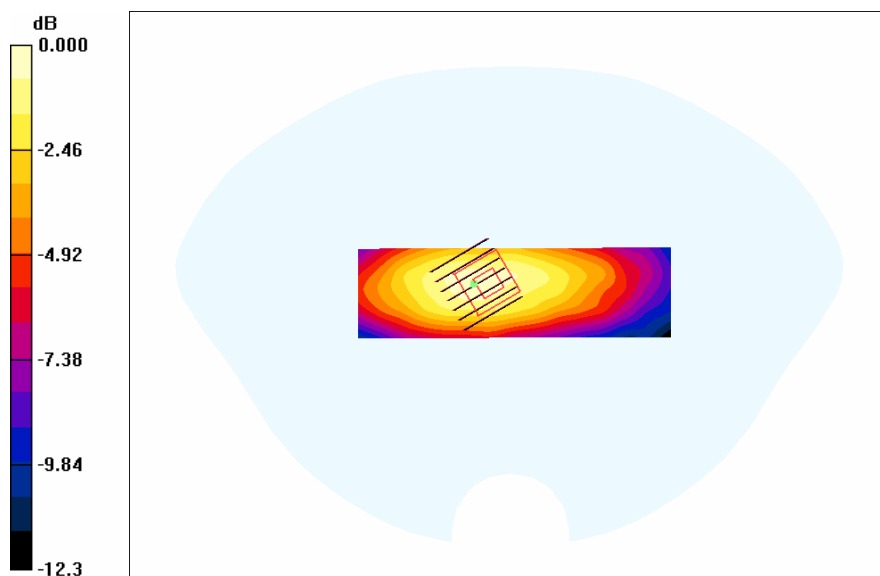
Side6 /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.75 V/m; Power Drift = -0.011 dB

Peak SAR (extrapolated) = 0.731 W/kg

SAR(1 g) = 0.399 mW/g; SAR(10 g) = 0.212 mW/g

Maximum value of SAR (measured) = 0.470 mW/g



0 dB = 0.470mW/g



Plot 40: Date/Time: 9/13/2014 11:35:27 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: W850; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837$ MHz; $\sigma = 0.992$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(9.63, 9.63, 9.63); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1432; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2 With HS/Area Scan (101x181x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.363 mW/g

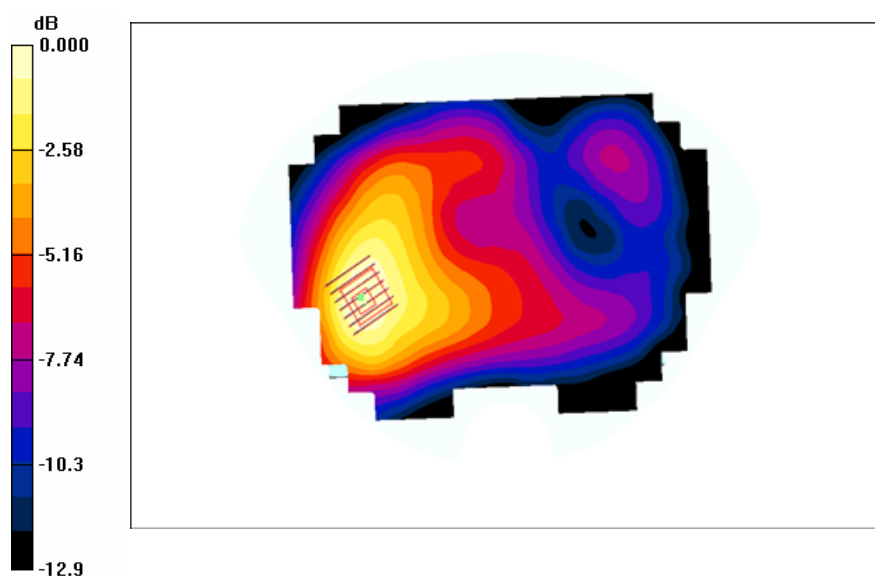
Side2 With HS/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.82 V/m; Power Drift = 0.124 dB

Peak SAR (extrapolated) = 0.691 W/kg

SAR(1 g) = 0.361 mW/g; SAR(10 g) = 0.179 mW/g

Maximum value of SAR (measured) = 0.365 mW/g



0 dB = 0.365mW/g



Plot 41: Date/Time: 9/13/2014 12:17:28 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: W1900; Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.54 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(7.83, 7.83, 7.83); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1360; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2/Area Scan (101x181x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.595 mW/g

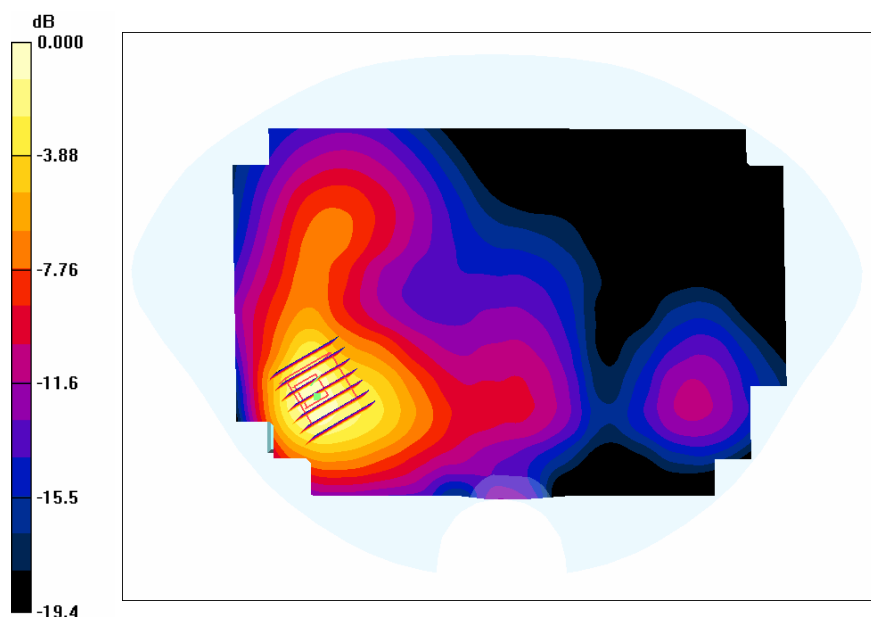
Side2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 8.29 V/m; Power Drift = 0.125 dB

Peak SAR (extrapolated) = 1.370 W/kg

SAR(1 g) = 0.594 mW/g; SAR(10 g) = 0.252 mW/g

Maximum value of SAR (measured) = 0.605 mW/g



0 dB = 0.605mW/g



Plot 42: Date/Time: 9/13/2014 13:16:36 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: W1900; Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.54 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(7.83, 7.83, 7.83); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1360; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side3/Area Scan (41x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.415 mW/g

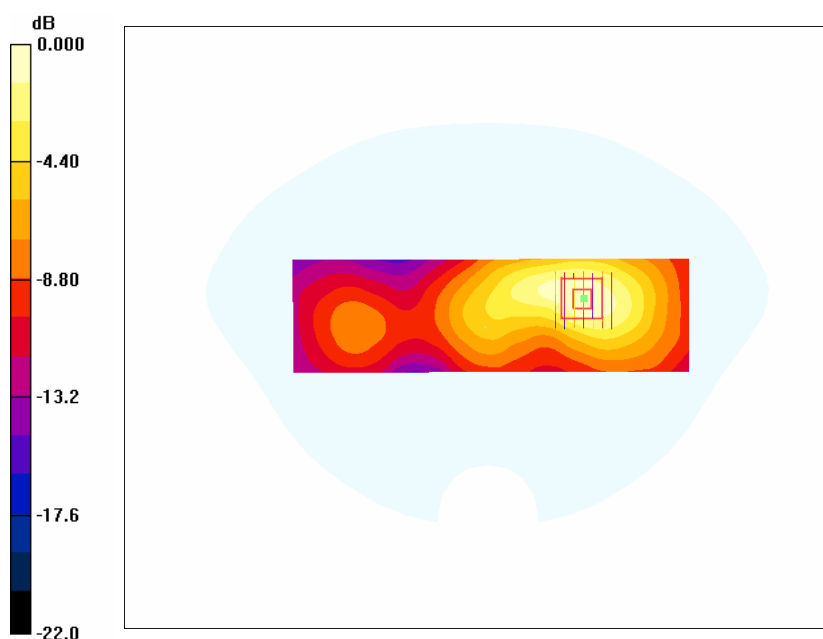
Side3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 6.55 V/m; Power Drift = 0.102 dB

Peak SAR (extrapolated) = 1.180 W/kg

SAR(1 g) = 0.406 mW/g; SAR(10 g) = 0.213 mW/g

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



0 dB = 0.417mW/g



Plot 43: Date/Time: 9/13/2014 14:02:52 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: W1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(7.83, 7.83, 7.83); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1360; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side6/Area Scan (41x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.320 mW/g

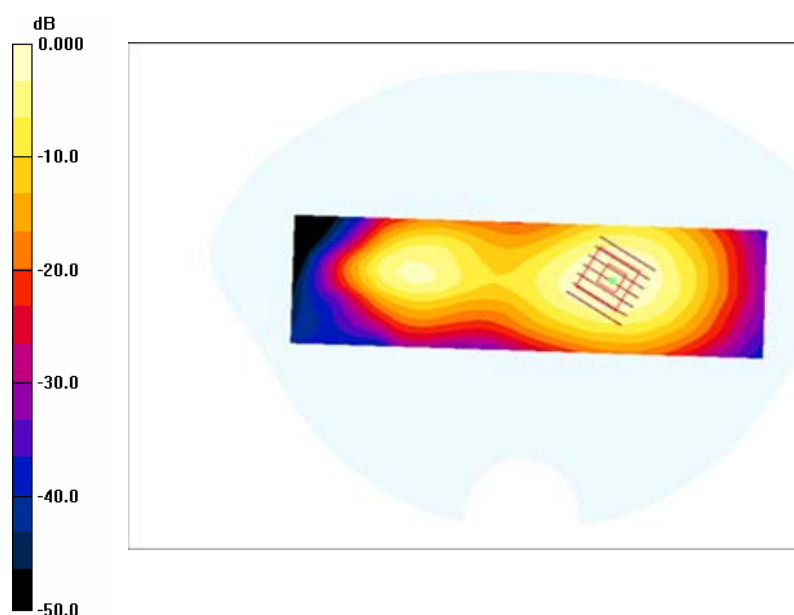
Side6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.60 V/m; Power Drift = -0.082 dB

Peak SAR (extrapolated) = 0.733 W/kg

SAR(1 g) = 0.319 mW/g; SAR(10 g) = 0.131 mW/g

Maximum value of SAR (measured) = 0.320 mW/g



0 dB = 0.020mW/g



Plot 44: Date/Time: 9/13/2014 14:53:25 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: PT-701; Type: SI PIN; Serial: IMEI Number

Program Name: PT-701

Communication System: W1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.54 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3898; ConvF(7.83, 7.83, 7.83); Calibrated: 3/10/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn914; Calibrated: 12/18/2013
- Phantom: SAM with TP1360; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Side2 with HS/Area Scan (101x181x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.235 mW/g

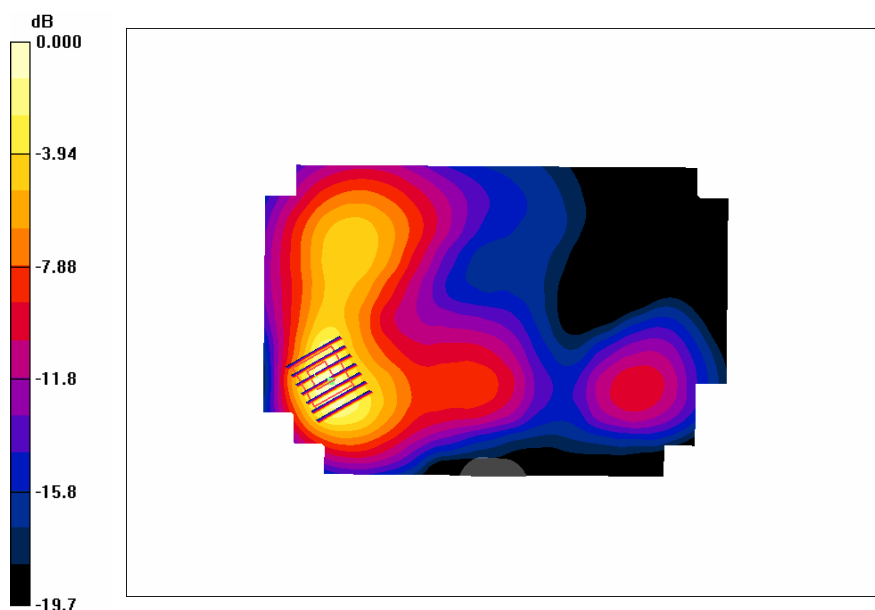
Side2 with HS/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 2.92 V/m; Power Drift = 0.010 dB

Peak SAR (extrapolated) = 0.509 W/kg

SAR(1 g) = 0.212 mW/g; SAR(10 g) = 0.107 mW/g

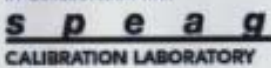
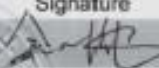
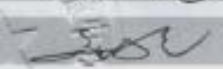
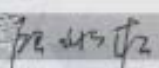
Maximum value of SAR (measured) = 0.234 mW/g



0 dB = 0.234mW/g



Appendix C. Probe Calibration Data:

		In Collaboration with  CALIBRATION LABORATORY			
Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 E-mail: Info@emcete.com		Fax: +86-10-62304633-2504 Http://www.emcete.com			
Client	Auden	Certificate No: Z14-97001			
CALIBRATION CERTIFICATE					
Object	EX3DV4 - SN:3898				
Calibration Procedure(s)	TMC-OS-E-02-195 Calibration Procedures for Dosimetric E-field Probes				
Calibration date:	March 10, 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)℃ and humidity<70%. Calibration Equipment used (M&TE critical for calibration)					
Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)		Scheduled Calibration	
Power Meter NRP2	101919	01-Jul-13 (TMC, No.JW13-044)		Jun-14	
Power sensor NRP-Z91	101547	01-Jul-13 (TMC, No.JW13-044)		Jun-14	
Power sensor NRP-Z91	101548	01-Jul-13 (TMC, No.JW13-044)		Jun-14	
Reference10dBAttenuator	BT0520	12-Dec-12(TMC,No.JZ12-867)		Dec-14	
Reference20dBAttenuator	BT0267	12-Dec-12(TMC,No.JZ12-866)		Dec-14	
Reference Probe EX3DV4	SN 3846	03-Sep-13(SPEAG,No.EX3-3846_Sep13)		Sep-14	
DAE4	SN 777	22-Feb-13 (SPEAG, DAE4-777_Feb13)		Feb -14	
DAE4	SN 905	11-Jun-13 (SPEAG, DAE4-905_Jun13)		Jun -14	
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)		Scheduled Calibration	
SignalGeneratorMG3700A	6201052605	01-Jul-13 (TMC, No.JW13-045)		Jun-14	
Network Analyzer E5071C	MY46110673	15-Feb-14 (TMC, No.JZ14-781)		Feb-15	
Calibrated by:	Name	Function	Signature		
	Yu Zongying	SAR Test Engineer			
Reviewed by:	Qi Dianyuan	SAR Project Leader			
Approved by:	Lu Bingsong	Deputy Director of the laboratory			
Issued: March 12, 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
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 $\theta=0$ 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 300MHz to 3GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}: Assessed for E-field polarization $\theta=0$ ($f \leq 900\text{MHz}$ in TEM-cell; $f > 1800\text{MHz}$: waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -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 (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}; VR_{x,y,z}: A,B,C 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 $f \leq 800\text{MHz}$) and inside waveguide using analytical field distributions based on power measurements for $f > 800\text{MHz}$. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued 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 $\pm 50\text{MHz}$ to $\pm 100\text{MHz}$.
- 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).



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Http://www.emcite.com

Probe EX3DV4

SN: 3898

Calibrated: March 10, 2014

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)



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DASY – Parameters of Probe: EX3DV4 - SN: 3898

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm($\mu V/(V/m)^2$) ^A	0.50	0.54	0.48	±10.8%
DCP(mV) ^B	106.5	104.9	101.2	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB· μV	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	203.2	±2.1%
		Y	0.0	0.0	1.0		211.8	
		Z	0.0	0.0	1.0		194.9	

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

^A The uncertainties of Norm X, Y, Z do not affect the E²-field uncertainty inside TSL (see Page 5 and Page 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.



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DASY – Parameters of Probe: EX3DV4 - SN: 3898**Calibration Parameter Determined in Head Tissue Simulating Media**

f [MHz] ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha ^g	Depth ^g (mm)	Unct. (k=2)
750	41.9	0.89	10.32	10.32	10.32	2.94	0.48	±12%
850	41.5	0.92	9.85	9.85	9.85	0.09	1.71	±12%
900	41.5	0.97	9.83	9.83	9.83	0.29	0.92	±12%
1750	40.1	1.37	8.38	8.38	8.38	0.19	1.35	±12%
1900	40.0	1.40	8.20	8.20	8.20	0.19	1.43	±12%
2000	40.0	1.40	8.19	8.19	8.19	0.18	1.54	±12%
2450	39.2	1.80	7.55	7.55	7.55	0.50	0.76	±12%
2600	39.0	1.96	7.34	7.34	7.34	0.80	0.59	±12%
5200	36.0	4.66	5.52	5.52	5.52	0.39	1.24	±13%
5300	35.9	4.76	5.23	5.23	5.23	0.39	1.01	±13%
5500	35.6	4.96	4.95	4.95	4.95	0.41	1.10	±13%
5600	35.5	5.07	4.74	4.74	4.74	0.42	1.16	±13%
5800	35.3	5.27	4.84	4.84	4.84	0.44	1.07	±13%

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

^f At frequency 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 the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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DASY – Parameters of Probe: EX3DV4 - SN: 3898

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)
750	55.5	0.96	10.18	10.18	10.18	0.95	0.64	±12%
850	55.2	0.99	9.63	9.63	9.63	0.19	1.33	±12%
900	55.0	1.05	9.63	9.63	9.63	0.23	1.14	±12%
1750	53.4	1.49	8.16	8.16	8.16	0.19	1.57	±12%
1900	53.3	1.52	7.83	7.83	7.83	0.19	1.63	±12%
2000	53.3	1.52	8.10	8.10	8.10	0.15	3.04	±12%
2450	52.7	1.95	7.49	7.49	7.49	0.61	0.75	±12%
2600	52.5	2.16	7.06	7.06	7.06	0.58	0.77	±12%
5200	49.0	5.30	4.80	4.80	4.80	0.47	1.05	±13%
5300	48.9	5.42	4.60	4.60	4.60	0.42	1.43	±13%
5500	48.6	5.65	4.25	4.25	4.25	0.45	1.56	±13%
5600	48.5	5.77	4.22	4.22	4.22	0.46	1.41	±13%
5800	48.2	6.00	4.34	4.34	4.34	0.50	1.27	±13%

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

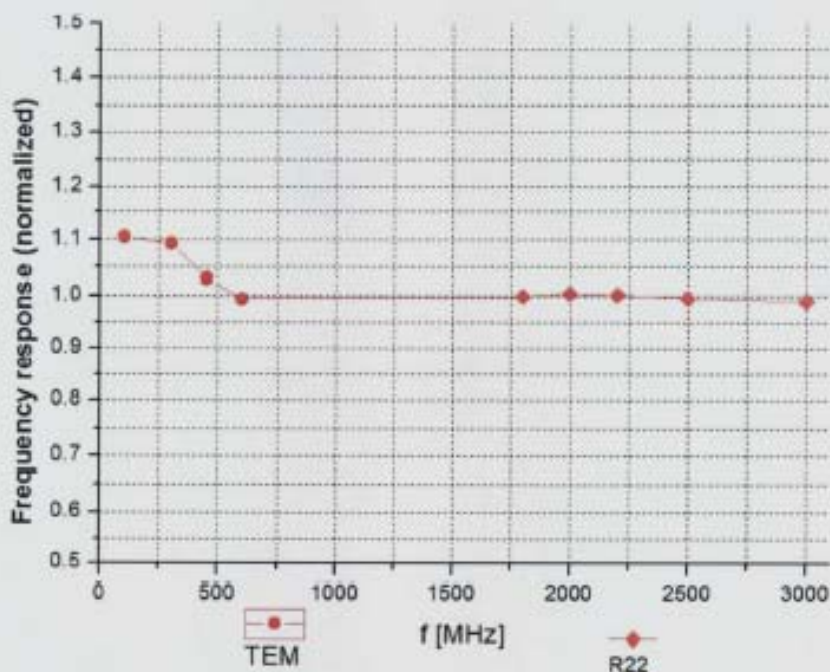
^F At frequency below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty 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 the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



Add: No.52 Huayuanhei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: Info@emcite.com Http://www.emcite.com

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



Uncertainty of Frequency Response of E-field: $\pm 7.5\%$ ($k=2$)

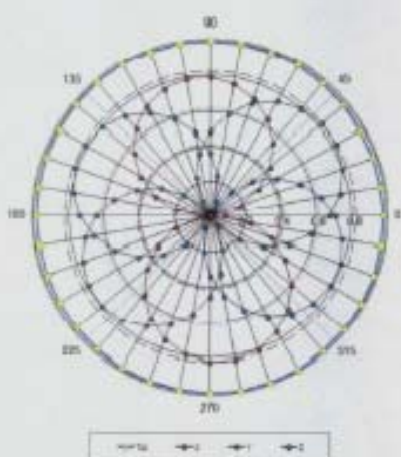


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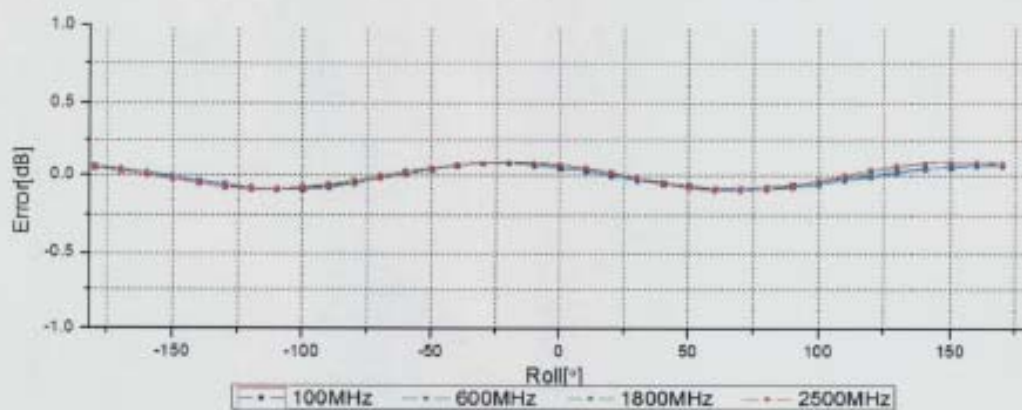
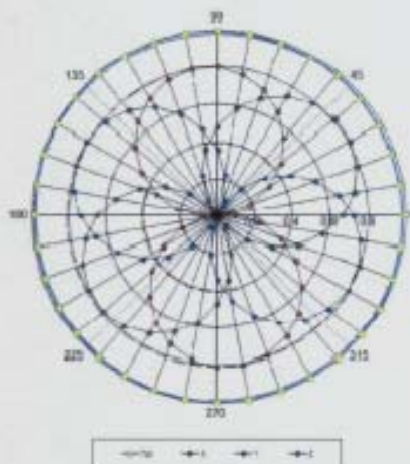
Add: No.52 Huayunbei Road, Haidian District, Beijing, 100191, China
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Receiving Pattern (Φ), $\theta=0^\circ$

f=600 MHz, TEM



f=1800 MHz, R22



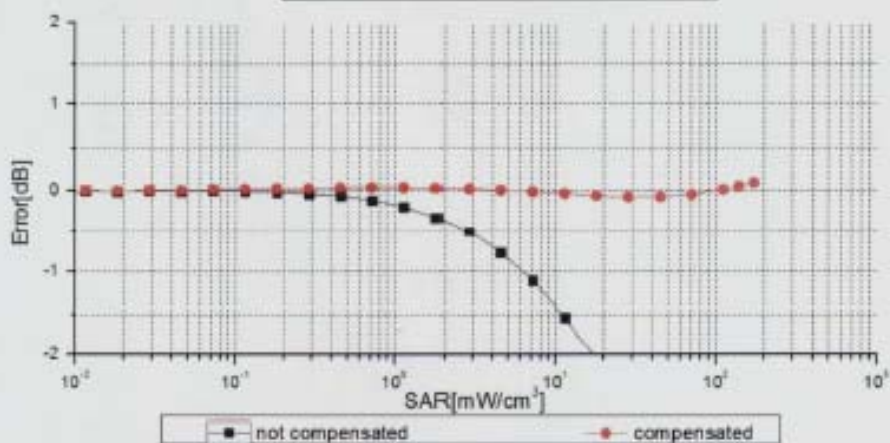
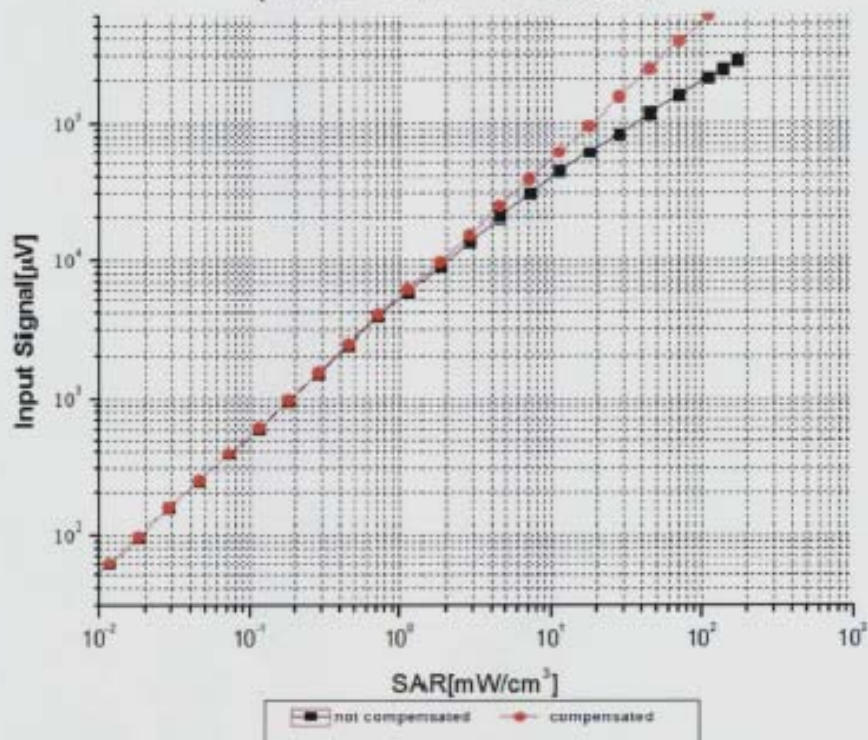
Uncertainty of Axial Isotropy Assessment: $\pm 0.9\%$ (k=2)



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Dynamic Range f(SAR_{head}) (TEM cell, f = 900 MHz)



Uncertainty of Linearity Assessment: $\pm 0.9\%$ (k=2)

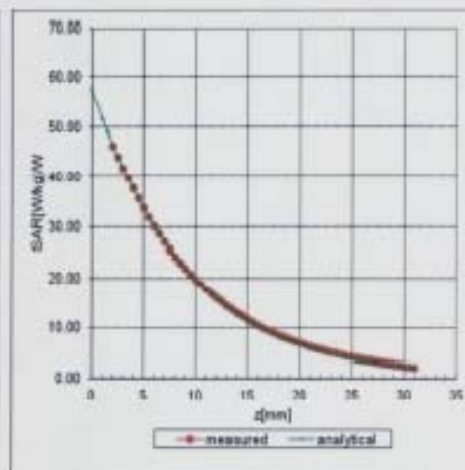
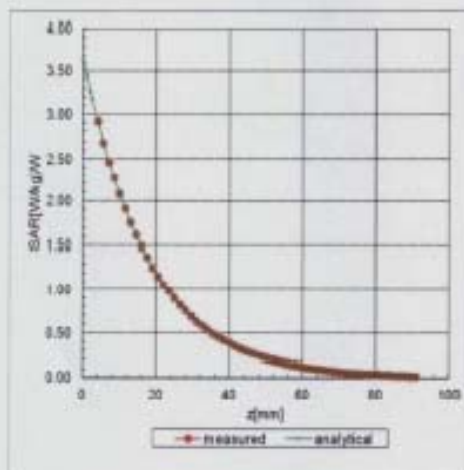


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E-mail: Info@emcite.com Http://www.emcite.com

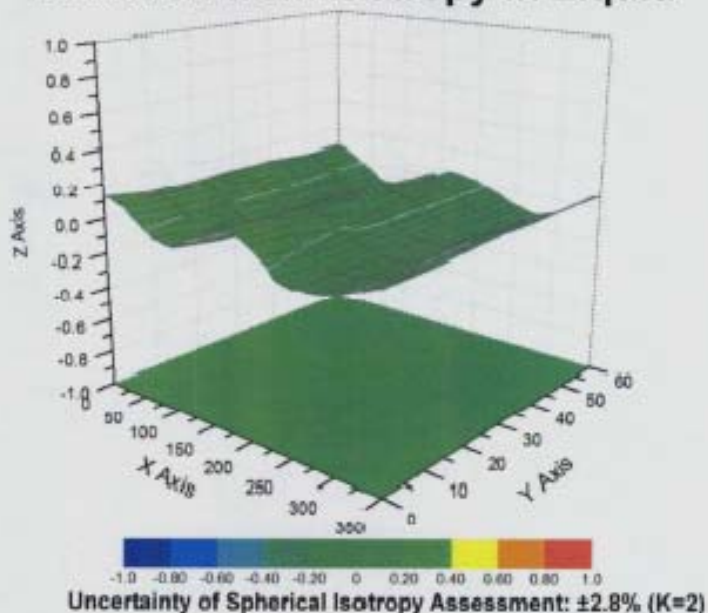
Conversion Factor Assessment

f=900 MHz, WGLS R9(H_convF)

f=2450 MHz, WGLS R26(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: $\pm 2.8\%$ (K=2)



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E-mail: info@emcite.com Http://www.emcite.com

DASY - Parameters of Probe: EX3DV4 - SN: 3898

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	71
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	2mm



February 14, 2014

**Acceptable Conditions for SAR Measurements Using Probes and Dipoles
Calibrated under the SPEAG-TMC Dual-Logo Calibration Program to
Support FCC Equipment Certification**

The acceptable conditions for SAR measurements using probes, dipoles and DAEs calibrated by TMC (*Telecommunication Metrology Center of MITT in Beijing, China*), under the Dual-Logo Calibration Certificate program and quality assurance (QA) protocols established between SPEAG (*Schmid & Partner Engineering AG, Switzerland*) and TMC, to support FCC (*U.S. Federal Communications Commission*) equipment certification are defined and described in the following.

- 1) The agreement established between SPEAG and TMC is only applicable to calibration services performed by TMC where its clients (companies and divisions of such companies) are headquartered in the Greater China Region, including Taiwan and Hong Kong. This agreement is subject to renewal at the end of each calendar year between SPEAG and TMC. TMC shall inform the FCC of any changes or early termination to the agreement.
- 2) Only a subset of the calibration services specified in the SPEAG-TMC agreement, while it remains valid, are applicable to SAR measurements performed using such equipment for supporting FCC equipment certification. These are identified in the following.
 - a) Calibration of dosimetric (SAR) probes EX3DVx, ET3DVx and ES3DVx.
 - i) Free-space E-field and H-field probes, including those used for HAC (hearing aid compatibility) evaluation, temperature probes, other probes or equipment not identified in this document, when calibrated by TMC, are excluded and cannot be used for measurements to support FCC equipment certification.
 - ii) Signal specific and bundled probe calibrations based on PMR (probe modulation response) characteristics or other test signal based probe linearization methods not fully described in SAR standards are handled according to the requirements of KDB 865664; that is, "Until standardized procedures are available to make such determination, the applicability of a signal specific probe calibration for testing specific wireless modes and technologies is determined on a case-by-case basis through KDB inquiries, including SAR system verification requirements."
 - b) Calibration of SAR system validation dipoles, excluding HAC dipoles.
 - c) Calibration of data acquisition electronics DAE3Vx, DAE4Vx and DAEasyVx.
 - d) For FCC equipment certification purposes, the frequency range of SAR probe and dipole calibrations is limited to 700 MHz - 6 GHz and provided it is supported by the equipment identified in the TMC QA protocol (a separate attachment to this document).
 - e) The identical system and equipment setup, measurement configurations, hardware, evaluation algorithms, calibration and QA protocols, including the format of calibration certificates and reports used by SPEAG shall be applied by TMC. Equivalent test equipment and measurement configurations may be considered only when agreed by both SPEAG and the FCC.

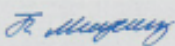
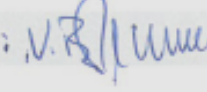


- f) The calibrated items are only applicable to SPEAG DASY 4 and DASY 5 systems or higher version systems that satisfy the requirements of this KDB.
- 3) The SPEAG-TMC agreement includes specific protocols identified in the following to ensure the quality of calibration services provided by TMC under this SPEAG-TMC Dual-Logo calibration agreement are equivalent to the calibration services provided by SPEAG. TMC shall apply the required protocols without modification and, upon request, provide copies of documentation to the FCC to substantiate program implementation.
 - a) The Inter-laboratory Calibration Evaluation (ILCE) stated in the TMC QA protocol shall be performed between SPEAG and TMC at least once every 12 months. The ILCE acceptance criteria defined in the TMC QA protocol shall be satisfied for the TMC, SPEAG and FCC agreements to remain valid.
 - b) Check of Calibration Certificate (CCC) shall be performed by SPEAG for all calibrations performed by TMC. Written confirmation from SPEAG is required for TMC to issue calibration certificates under the SPEAG-TMC Dual-Logo calibration program. Quarterly reports for all calibrations performed by TMC under the program are also issued by SPEAG.
 - c) The calibration equipment and measurement system used by TMC shall be verified before each calibration service according to the specific reference SAR probes, dipoles, and DAE calibrated by SPEAG. The results shall be reproducible and within the defined acceptance criteria specified in the TMC QA protocol before each actual calibration can commence. TMC shall maintain records of the measurement and calibration system verification results for all calibrations.
 - d) Quality Check of Calibration (QCC) certificates shall be performed by SPEAG at least once every 12 months. SPEAG shall visit TMC facilities to verify the laboratory, equipment, applied procedures and plausibility of randomly selected certificates.
- 4) A copy of this document, to be updated annually, shall be provided to TMC clients that accept calibration services according to the SPEAG-TMC Dual-Logo calibration program, which should be presented to a TCB (*Telecommunication Certification Body*), to facilitate FCC equipment approval.
- 5) TMC shall address any questions raised by its clients or TCBs relating to the SPEAG-TMC Dual-Logo calibration program and inform the FCC and SPEAG of any critical issues.

Note: It is expected that TMC (*Telecommunication Metrology Center*) may change its name in 2014. For this KDB to remain valid, it must be updated by TMC before the name change occurs. The SPEAG-TMC Dual-Logo calibration certificate shall also be updated accordingly to reflect the change.



Appendix D. DAE Calibration Data:

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland				S Schweizerischer Kalibrierdienst S Service suisse d'étalonnage C 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 Auden		Certificate No: DAE4-914_Dec13		
CALIBRATION CERTIFICATE				
Object	DAE4 - SD 000 D04 BK - SN: 914			
Calibration procedure(s)	QA CAL-06.v26 Calibration procedure for the data acquisition electronics (DAE)			
Calibration date:	December 18, 2013			
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	
Keithley Multimeter Type 2001	SN: 0810278	01-Oct-13 (No:13976)	Oct-14	
Secondary Standards	ID #	Check Date (in house)	Scheduled Check	
Auto DAE Calibration Unit	SE UWS 053 AA 1001	07-Jan-13 (in house check)	In house check: Jan-14	
Calibrator Box V2.1	SE UMS 006 AA 1002	07-Jan-13 (in house check)	In house check: Jan-14	
Calibrated by:	Name R.Mayoraz	Function Technician	Signature 	
Approved by:	Fin Bomholt	Deputy Technical Manager		
Issued: December 18, 2013				
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.				

Certificate No: DAE4-914_Dec13 Page 1 of 5



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



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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

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.

**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	405.118 $\pm$ 0.02% (k=2)	404.310 $\pm$ 0.02% (k=2)	403.890 $\pm$ 0.02% (k=2)
Low Range	3.98952 $\pm$ 1.50% (k=2)	3.98612 $\pm$ 1.50% (k=2)	3.99042 $\pm$ 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	64.5 ° $\pm$ 1 °
---	------------------

**Appendix****1. DC Voltage Linearity**

High Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	200035.19	-0.12	-0.00
Channel X + Input	20001.72	-1.52	-0.01
Channel X - Input	-20006.18	0.51	-0.00
Channel Y + Input	200036.49	1.00	0.00
Channel Y + Input	19999.76	-3.26	-0.02
Channel Y - Input	-20007.63	-0.81	0.00
Channel Z + Input	200035.76	0.54	0.00
Channel Z + Input	20000.37	-2.65	-0.01
Channel Z - Input	-20008.14	-1.30	0.01

Low Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	1999.47	-0.12	-0.01
Channel X + Input	199.91	0.38	0.19
Channel X - Input	-200.52	-0.12	0.06
Channel Y + Input	1999.45	-0.10	-0.00
Channel Y + Input	199.13	-0.35	-0.18
Channel Y - Input	-200.77	-0.27	0.13
Channel Z + Input	1999.45	0.04	0.00
Channel Z + Input	198.18	-1.21	-0.61
Channel Z - Input	-201.73	-1.15	0.57

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	-12.42	-14.05
	- 200	15.91	14.42
Channel Y	200	-5.09	-5.23
	- 200	4.77	4.36
Channel Z	200	4.87	4.87
	- 200	-7.31	-7.72

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	-	2.26	-3.82
Channel Y	200	7.97	-	3.05
Channel Z	200	9.34	6.11	-

**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	16145	15538
Channel Y	16158	16194
Channel Z	16035	16180

5. Input Offset Measurement

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

Input 10M Ω

	Average (μ V)	min. Offset (μ V)	max. Offset (μ V)	Std. Deviation (μ V)
Channel X	1.33	0.47	2.40	0.34
Channel Y	0.79	-1.05	2.82	0.74
Channel Z	-1.14	-2.26	1.30	0.66

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

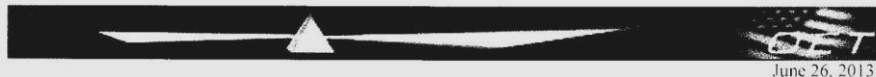
	Zeroing (k Ω m)	Measuring (M Ω m)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

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)

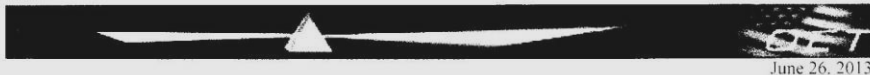
Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9



**Acceptable Conditions for SAR Measurements Using Probes and Dipoles
Calibrated under the SPEAG-TMC Dual-Logo Calibration Program to
Support FCC Equipment Certification**

The acceptable conditions for SAR measurements using probes, dipoles and DAEs calibrated by TMC (*Telecommunication Metrology Center of MITT in Beijing, China*), under the Dual-Logo Calibration Certificate program and quality assurance (QA) protocols established between SPEAG (*Schmid & Partner Engineering AG, Switzerland*) and TMC, to support FCC (*U.S. Federal Communications Commission*) equipment certification are defined and described in the following.

- 1) The agreement established between SPEAG and TMC is only applicable to calibration services performed by TMC where its clients (companies and divisions of such companies) are headquartered in the Greater China Region, including Taiwan and Hong Kong. This agreement is subject to renewal at the end of each calendar year between SPEAG and TMC. TMC shall inform the FCC of any changes or early termination to the agreement.
- 2) Only a subset of the calibration services specified in the SPEAG-TMC agreement, while it remains valid, are applicable to SAR measurements performed using such equipment for supporting FCC equipment certification. These are identified in the following.
 - a) Calibration of dosimetric (SAR) probes EX3DVx, ET3DVx and ES3DVx.
 - i) Free-space E-field and H-field probes, including those used for HAC (hearing aid compatibility) evaluation, temperature probes, other probes or equipment not identified in this document, when calibrated by TMC, are excluded and cannot be used for measurements to support FCC equipment certification.
 - ii) Signal specific and bundled probe calibrations based on PMR (probe modulation response) characteristics are handled according to the requirements of KDB 865664; that is, "Until standardized procedures are available to make such determination, the applicability of a signal specific probe calibration for testing specific wireless modes and technologies is determined on a case-by-case basis through KDB inquiries, including SAR system verification requirements."
 - b) Calibration of SAR system validation dipoles, excluding HAC dipoles.
 - c) Calibration of data acquisition electronics DAE3Vx, DAE4Vx and DAEasyVx.
 - d) For FCC equipment certification purposes, the frequency range of SAR probe and dipole calibrations is limited to 700 MHz - 6 GHz and provided it is supported by the equipment identified in the TMC QA protocol (a separate attachment to this document).
 - e) The identical system and equipment setup, measurement configurations, hardware, evaluation algorithms, calibration and QA protocols, including the format of calibration certificates and reports used by SPEAG shall be applied by TMC.
 - f) The calibrated items are only applicable to SPEAG DASY 4 and DASY 5 or higher version systems.



June 26, 2013

- 3) The SPEAG-TMC agreement includes specific protocols identified in the following to ensure the quality of calibration services provided by TMC under this SPEAG-TMC Dual-Logo calibration agreement are equivalent to the calibration services provided by SPEAG. TMC shall, upon request, provide copies of documentation to the FCC to substantiate program implementation.
 - a) The Inter-laboratory Calibration Evaluation (ILCE) stated in the TMC QA protocol shall be performed between SPEAG and TMC at least once every 12 months. The ILCE acceptance criteria defined in the TMC QA protocol shall be satisfied for the TMC, SPEAG and FCC agreements to remain valid.
 - b) Check of Calibration Certificate (CCC) shall be performed by SPEAG for all calibrations performed by TMC. Written confirmation from SPEAG is required for TMC to issue calibration certificates under the SPEAG-TMC Dual-Logo calibration program. Quarterly reports for all calibrations performed by TMC under the program are also issued by SPEAG.
 - c) The calibration equipment and measurement system used by TMC shall be verified before each calibration service according to the specific reference SAR probes, dipoles, and DAE calibrated by SPEAG. The results shall be reproducible and within the defined acceptance criteria specified in the TMC QA protocol before each actual calibration can commence. TMC shall maintain records of the measurement and calibration system verification results for all calibrations.
 - d) Quality Check of Calibration (QCC) certificates shall be performed by SPEAG at least once every 12 months. SPEAG shall visit TMC facilities to verify the laboratory, equipment, applied procedures and plausibility of randomly selected certificates.
- 4) A copy of this document, to be updated annually, shall be provided to TMC clients that accept calibration services according to the SPEAG-TMC Dual-Logo calibration program, which should be presented to a TCB (*Telecommunication Certification Body*), to facilitate FCC equipment approval.
- 5) TMC shall address any questions raised by its clients or TCBs relating to the SPEAG-TMC Dual-Logo calibration program and inform the FCC and SPEAG of any critical issues.

Change Note: Revised on June 26 to clarify the applicability of PMR and Bundled probe calibrations according to the requirements of KDB 865664.

**Appendix E. Dipole Calibration Data:**

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



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

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**Client **Auden**Certificate No: **D835V2-4d120_Jun14****CALIBRATION CERTIFICATE**Object **D835V2 - SN: 4d120**Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHzCalibration date: **June 16, 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 EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	30-Apr-14 (No. DAE4-601_Apr14)	Apr-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

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

Issued: June 18, 2014

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



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



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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

**Measurement Conditions**

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

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

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.5 $\pm$ 6 %	0.94 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.29 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.00 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.2 $\pm$ 6 %	1.01 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.43 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.47 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.23 W/kg $\pm$ 16.5 % (k=2)

**Appendix (Additional assessments outside the scope of SCS100)****Antenna Parameters with Head TSL**

Impedance, transformed to feed point	53.0 Ω - 0.1 j Ω
Return Loss	- 30.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.6 Ω - 3.0 j Ω
Return Loss	- 28.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.396 ns
----------------------------------	----------

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 29, 2010



DASY5 Validation Report for Head TSL

Date: 16.06.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d120

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

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.94 \text{ S/m}$; $\epsilon_r = 41.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.22, 6.22, 6.22); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

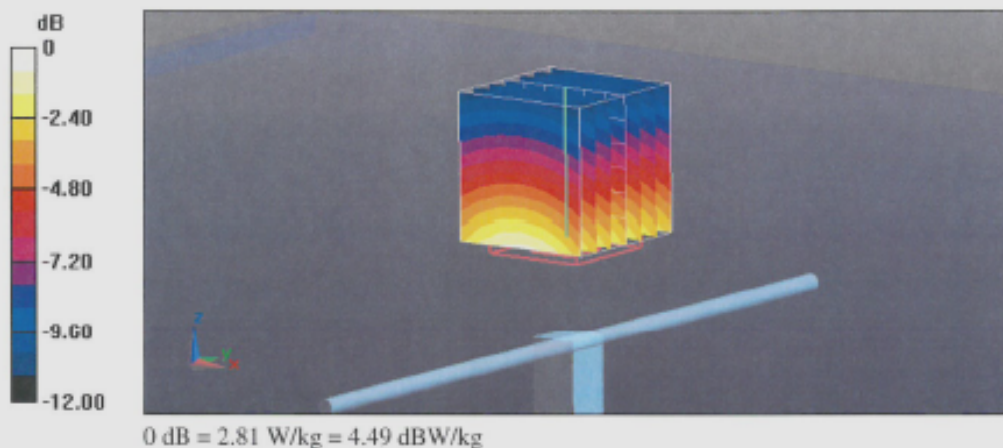
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 56.38 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 3.61 W/kg

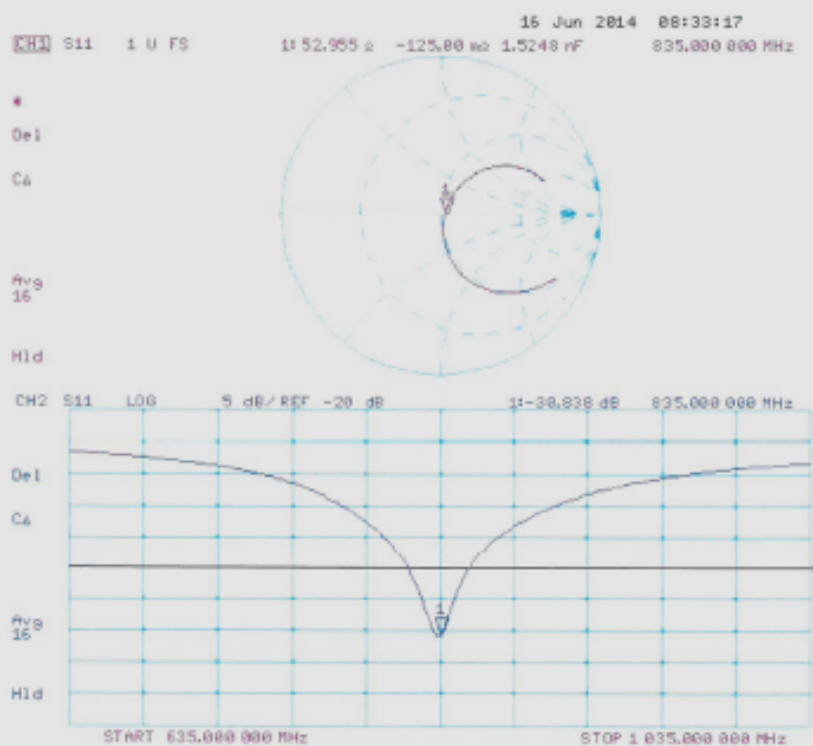
SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.54 W/kg

Maximum value of SAR (measured) = 2.81 W/kg





Impedance Measurement Plot for Head TSL





DASY5 Validation Report for Body TSL

Date: 12.06.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d120

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

Medium parameters used: $f = 835$ MHz; $\sigma = 1.005$ S/m; $\epsilon_r = 55.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.09, 6.09, 6.09); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

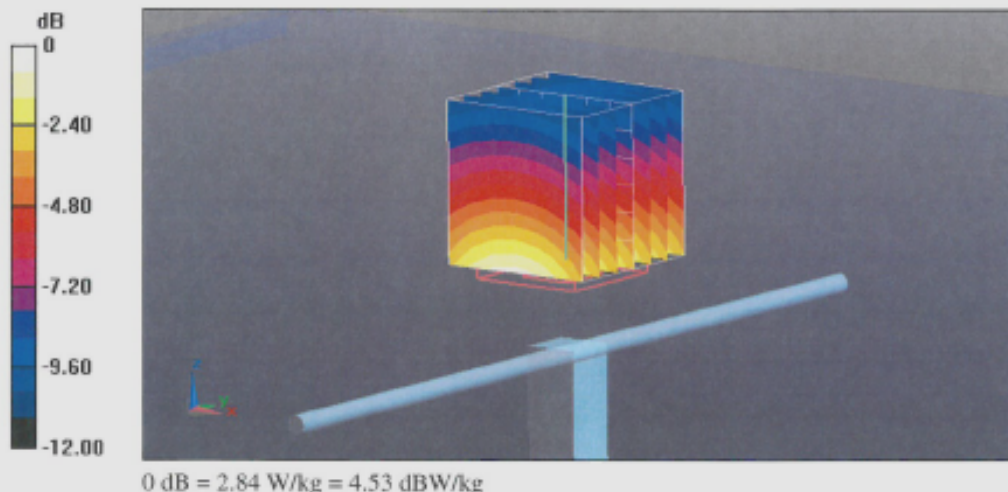
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.04 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.61 W/kg

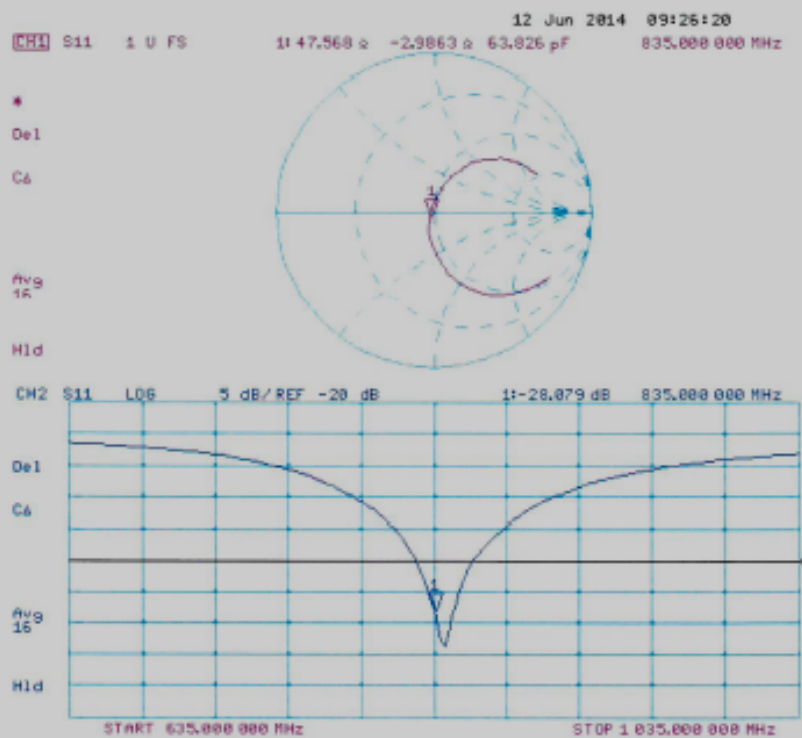
SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.59 W/kg

Maximum value of SAR (measured) = 2.84 W/kg





Impedance Measurement Plot for Body TSL





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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**Client **Auden**Certificate No: **D1900V2-5d018_Jun14****CALIBRATION CERTIFICATE**Object **D1900V2 - SN: 5d018**Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHzCalibration date: **June 18, 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 EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	30-Apr-14 (No. DAE4-601_Apr14)	Apr-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

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

Signature

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

Issued: June 18, 2014

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



**Calibration Laboratory of
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Engineering AG**
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The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 100**

Glossary:

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

Calibration Is Performed According to the Following Standards:

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

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

**Measurement Conditions**

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

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

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.5 $\pm$ 6 %	1.39 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.1 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.1 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.5 $\pm$ 6 %	1.51 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.94 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.8 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.26 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.0 W/kg $\pm$ 16.5 % (k=2)

**Appendix (Additional assessments outside the scope of SCS108)****Antenna Parameters with Head TSL**

Impedance, transformed to feed point	$51.3 \Omega + 2.5 j\Omega$
Return Loss	- 31.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$47.2 \Omega + 2.9 j\Omega$
Return Loss	- 27.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.194 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 04, 2002



DASY5 Validation Report for Head TSL

Date: 18.06.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d018

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.39$ S/m; $\epsilon_r = 39.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.06, 5.06, 5.06); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

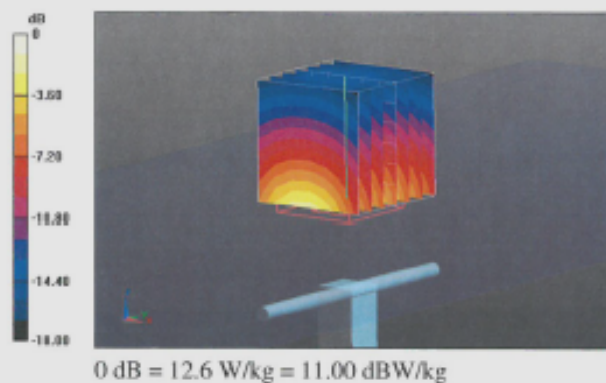
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.07 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 18.3 W/kg

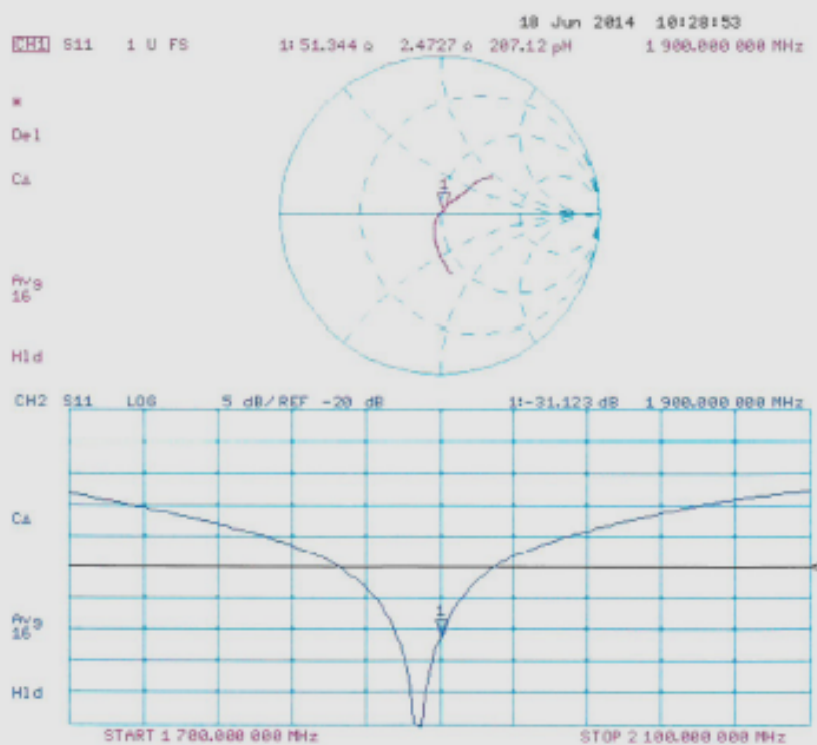
SAR(1 g) = 10 W/kg; SAR(10 g) = 5.26 W/kg

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





Impedance Measurement Plot for Head TSL





DASY5 Validation Report for Body TSL

Date: 18.06.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d018

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.51$ S/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

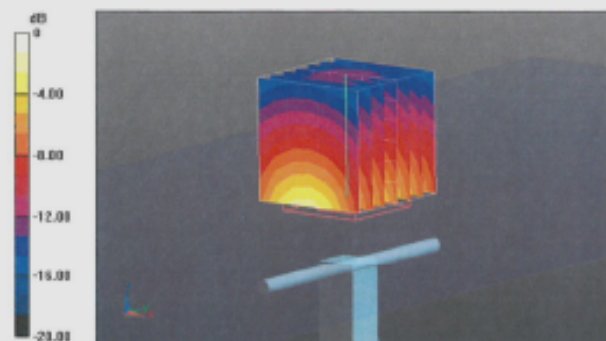
Measurement grid: $\Delta x=5$ mm, $\Delta y=5$ mm, $\Delta z=5$ mm

Reference Value = 94.36 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 17.3 W/kg

SAR(1 g) = 9.94 W/kg; SAR(10 g) = 5.26 W/kg

Maximum value of SAR (measured) = 12.5 W/kg



0 dB = 12.5 W/kg = 10.97 dBW/kg



Impedance Measurement Plot for Body TSL

