

Appendix 1

SAR Distribution Plots for Test System Verification

System Accuracy Verification Measurements for Head SAR Measurements

DUT Serial: D835V2 - SN:422tr

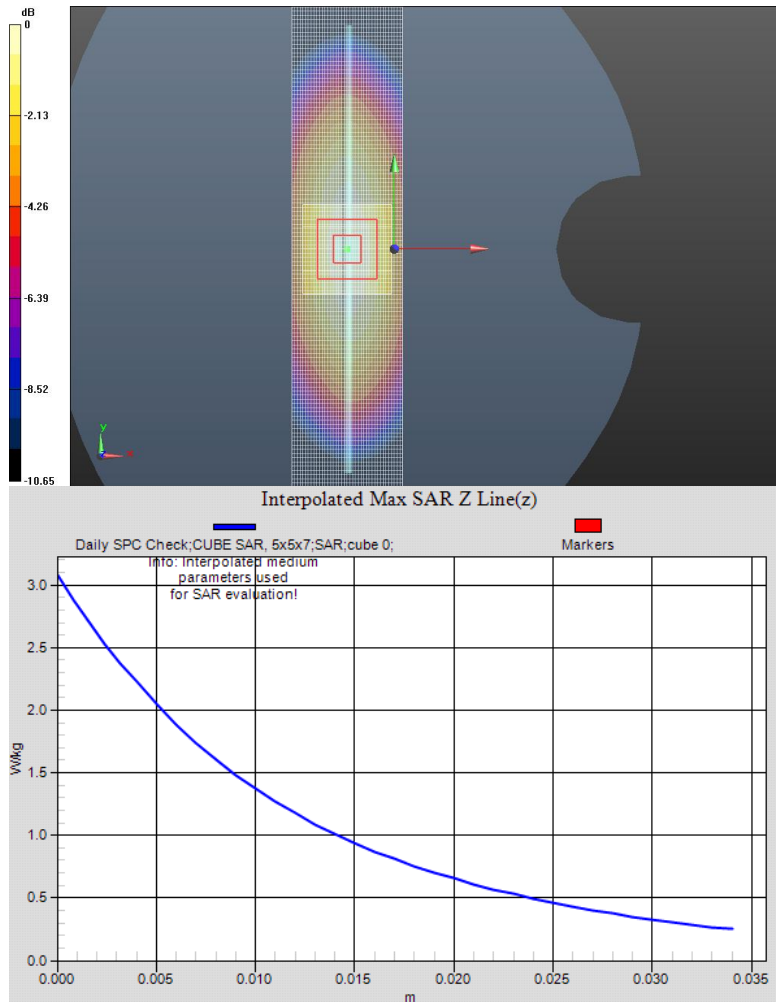
DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(6.15,6.15,6.15); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 835.0 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=835$ MHz; $\sigma = 0.9334$; $\epsilon_r = 40.27$ mho/m; $\rho = 1.000$ kg/m³

Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm
Fast SAR: SAR(1g) = 1.99 W/kg; SAR(10g) = 1.33 W/kg

Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm
Reference Value = 49.515 V/m, Power Drift = -0.017 dB
Averaged SAR: SAR(1g) = 1.99 W/kg; SAR(10g) = 1.31 W/kg



DUT Serial: D835V2 - SN:422tr

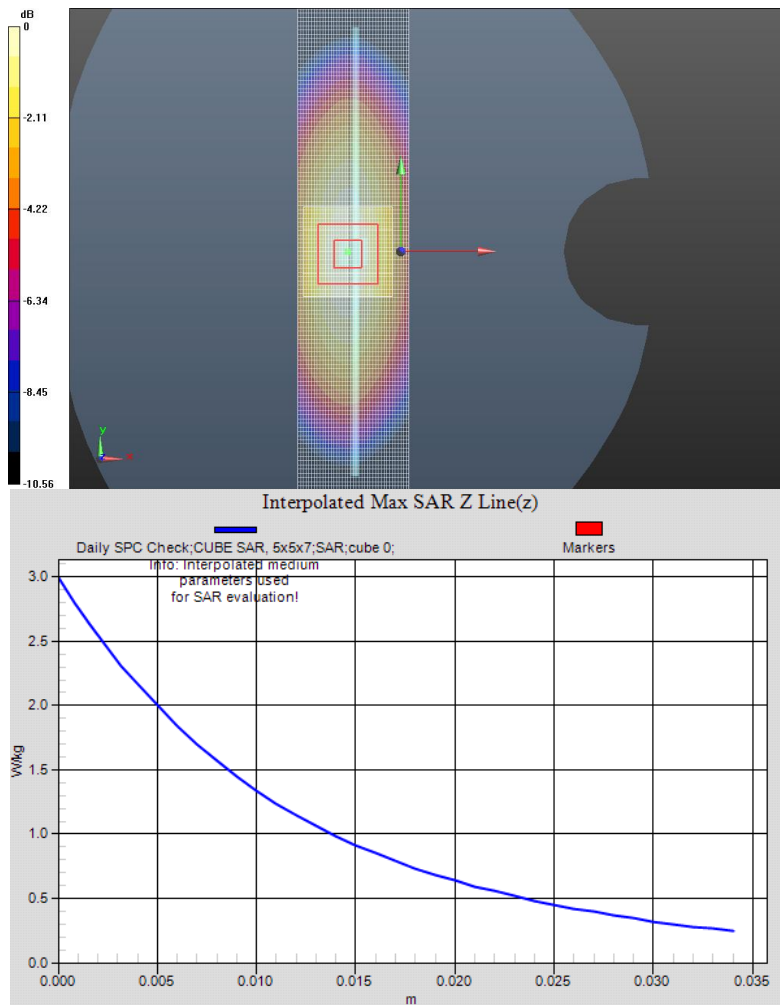
DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(6.15,6.15,6.15); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 835.0 MHz,
 Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
 Medium Parameters used: f=835 MHz; $\sigma = 0.9172$; $\epsilon_r = 39.56$ mho/m; $\rho = 1.000$ kg/m³

Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm
 Fast SAR: SAR(1g) = 1.96 W/kg; SAR(10g) = 1.31 W/kg

Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm
 Reference Value = 49.029 V/m, Power Drift = -0.0013 dB
 Averaged SAR: SAR(1g) = 1.96 W/kg; SAR(10g) = 1.29 W/kg



DUT Serial: D1800V2 - SN:259tr

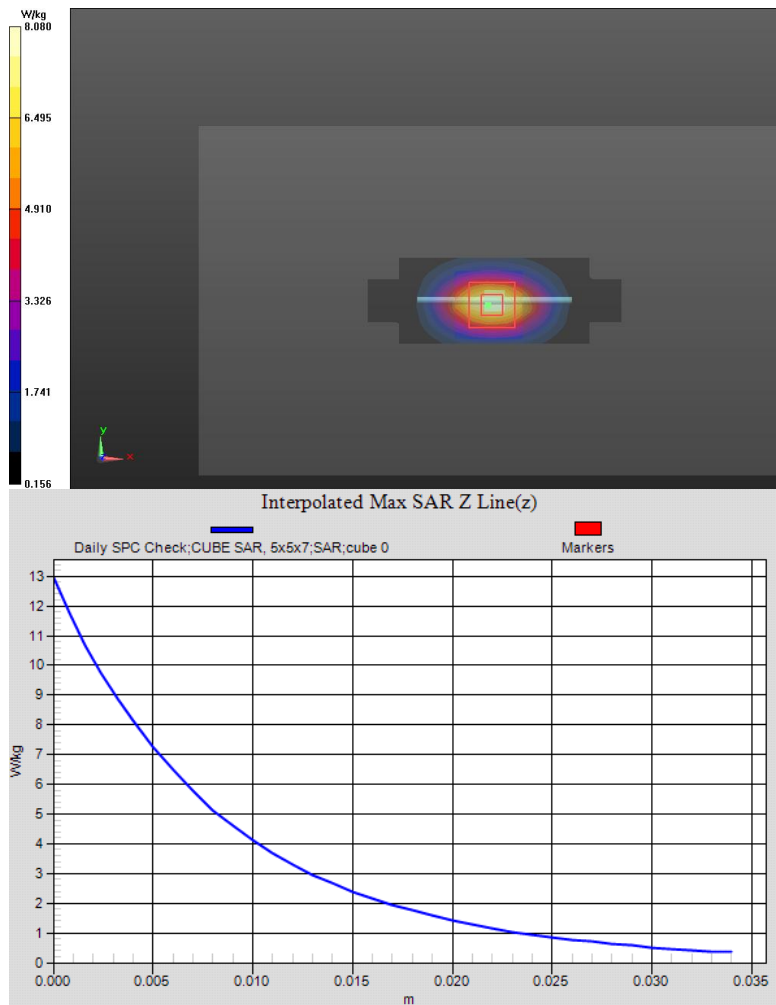
DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(5.48,5.48,5.48); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=1800$ MHz; $\sigma = 1.382$; $\epsilon_r = 37.91$ mho/m; $\rho = 1.000$ kg/m³

Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm
Fast SAR: SAR(1g) = 7.30 W/kg; SAR(10g) = 3.97 W/kg

Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm
Reference Value = 77.356 V/m, Power Drift = -0.000892 dB
Averaged SAR: SAR(1g) = 7.20 W/kg; SAR(10g) = 3.83 W/kg



DUT Serial: D2450V2 - SN:xxx

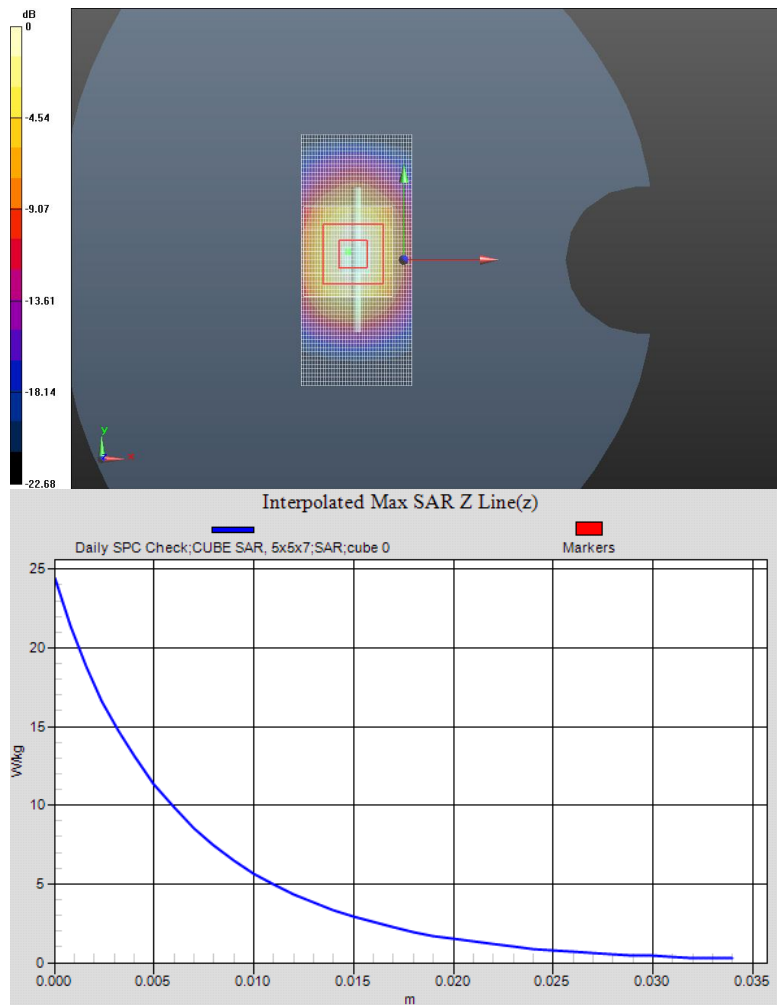
DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.43,4.43,4.43); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/11/2012
- Phantom: R#4 Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1162
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 2450 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=2450$ MHz; $\sigma = 1.861$; $\epsilon_r = 39.03$ mho/m; $\rho = 1.000$ kg/m³

Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm
Fast SAR: SAR(1g) = 11.6 W/kg; SAR(10g) = 5.47 W/kg

Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm
Reference Value = 84.150 V/m, Power Drift = 0.00375 dB
Averaged SAR: SAR(1g) = 11.3 W/kg; SAR(10g) = 5.26 W/kg



System Accuracy Verification Measurements for Body SAR Measurements

DUT Serial: D835V2 - SN:422tr

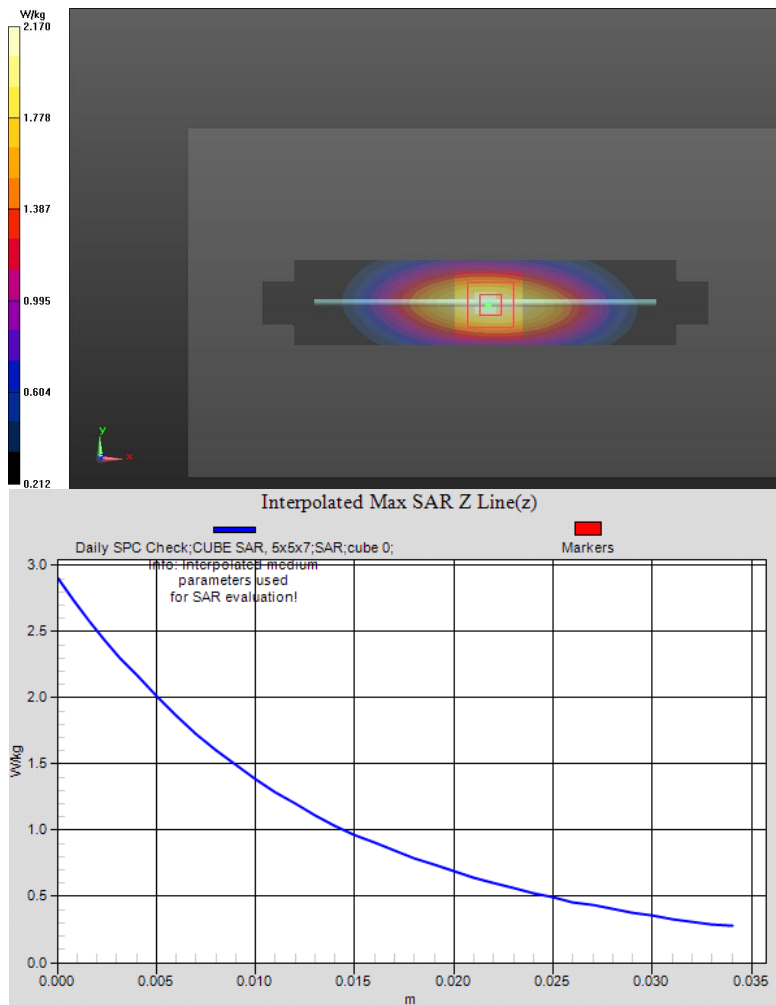
DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(6.19,6.19,6.19); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 835.0 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=835$ MHz; $\sigma = 0.9914$; $\epsilon_r = 52.38$ mho/m; $\rho = 1.000$ kg/m³

Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm
Fast SAR: SAR(1g) = 1.96 W/kg; SAR(10g) = 1.31 W/kg

Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm
Reference Value = 48.467 V/m, Power Drift = -0.168 dB
Averaged SAR: SAR(1g) = 1.95 W/kg; SAR(10g) = 1.30 W/kg



DUT Serial: D1800V2 - SN:259tr

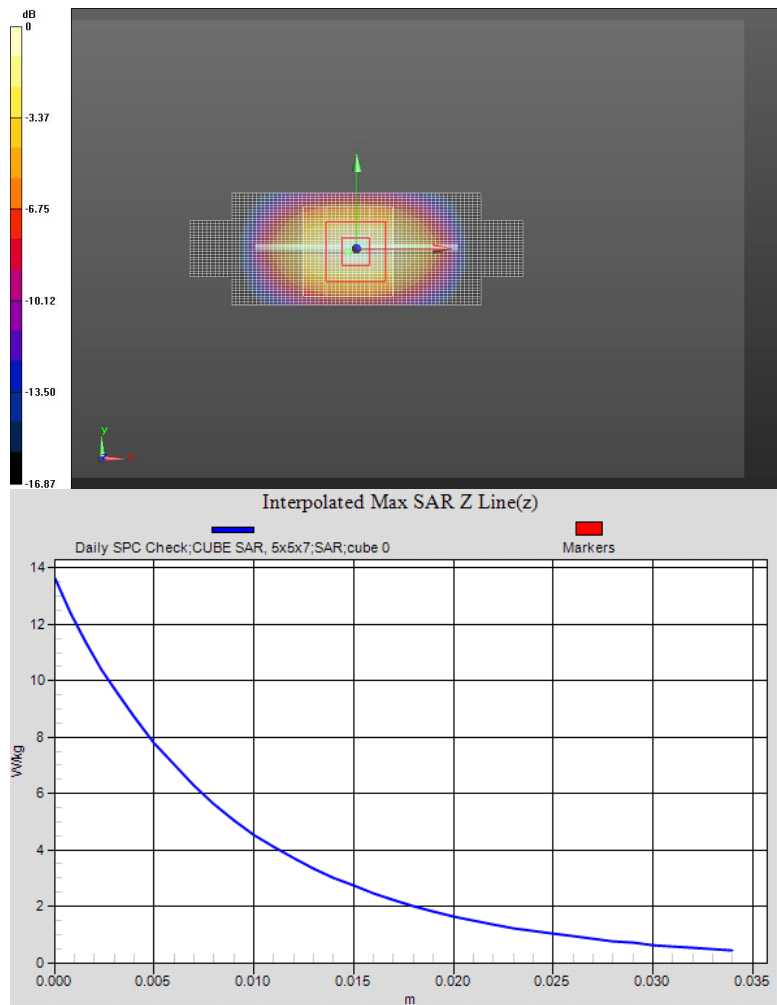
DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(4.88,4.88,4.88); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=1800$ MHz; $\sigma = 1.441$; $\epsilon_r = 50.09$ mho/m; $\rho = 1.000$ kg/m³

Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm
Fast SAR: SAR(1g) = 7.92 W/kg; SAR(10g) = 4.21 W/kg

Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm
Reference Value = 78.686 V/m, Power Drift = 0.026 dB
Averaged SAR: SAR(1g) = 7.85 W/kg; SAR(10g) = 4.15 W/kg



DUT Serial: D1800V2 - SN:259tr

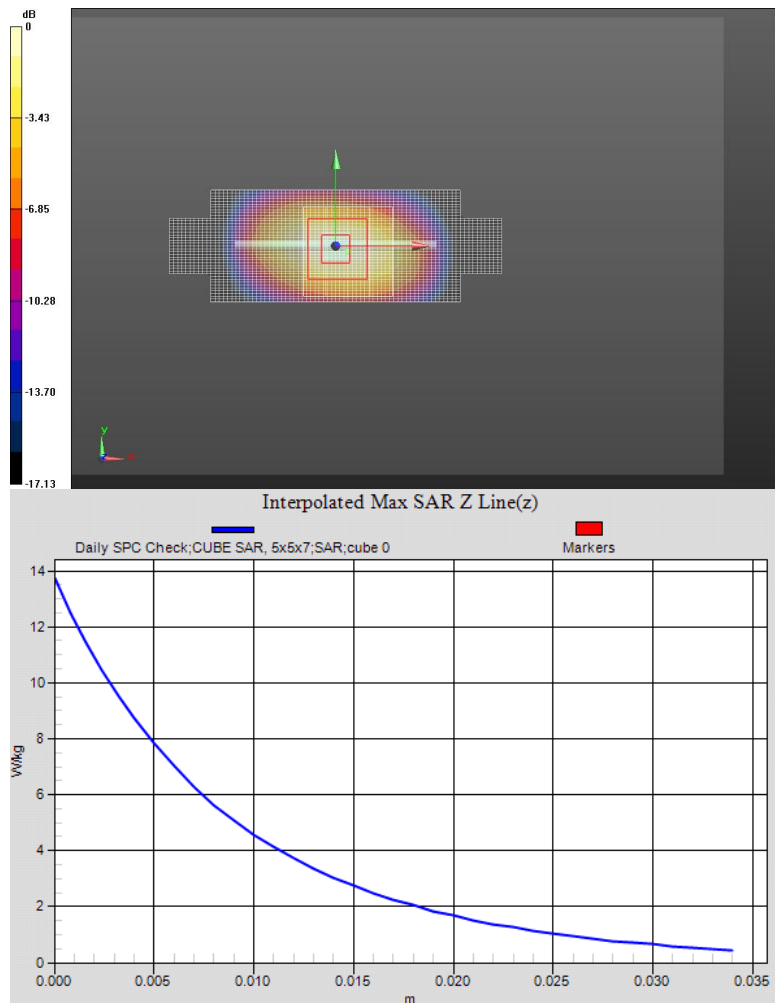
DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(4.88,4.88,4.88); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 1800 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=1800$ MHz; $\sigma = 1.449$; $\epsilon_r = 49.68$ mho/m; $\rho = 1.000$ kg/m³

Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm
Fast SAR: SAR(1g) = 7.95 W/kg; SAR(10g) = 4.25 W/kg

Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm
Reference Value = 78.798 V/m, Power Drift = 0.00697 dB
Averaged SAR: SAR(1g) = 7.87 W/kg; SAR(10g) = 4.20 W/kg



DUT Serial: D2450V2 - SN:xxx

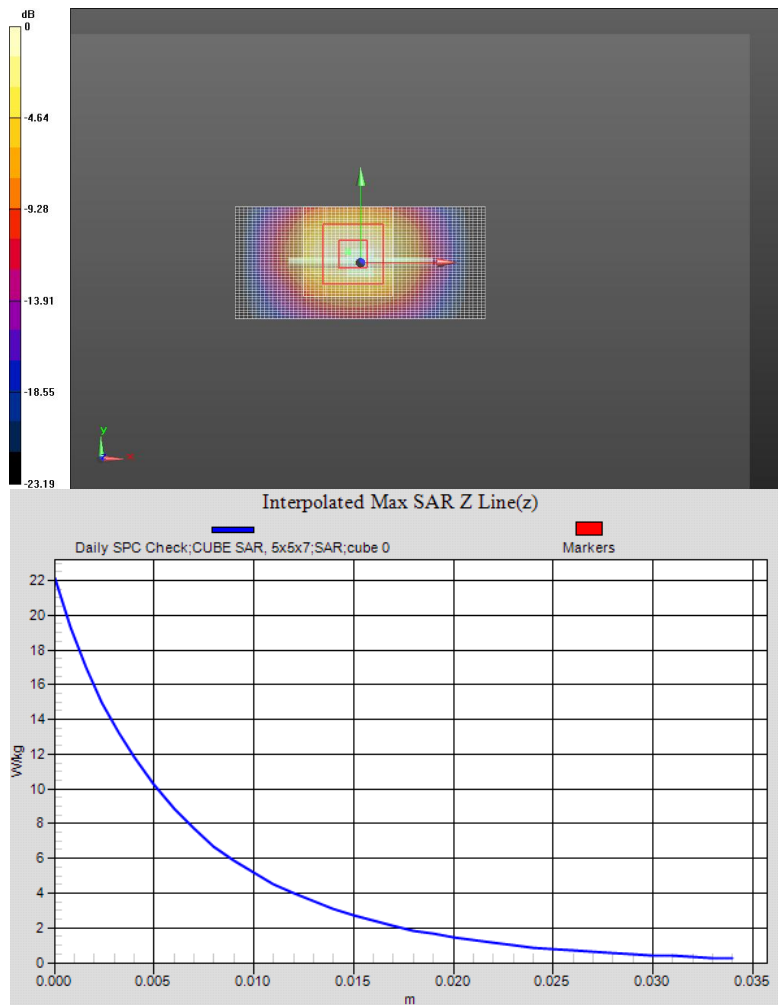
DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.13,4.13,4.13); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1312; Calibrated: 9/4/2012
- Phantom: R#4 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _CW - Dipole; Communication System Band: CW for SAR Dipoles; Frequency: 2450 MHz,
Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=2450$ MHz; $\sigma = 2.007$; $\epsilon_r = 50.92$ mho/m; $\rho = 1.000$ kg/m³

Daily SPC Check/fastSAR, Dipole Area Scan (41x141x1): Interpolated grid: dx=1.000 mm, dy=1.500 mm
Fast SAR: SAR(1g) = 10.6 W/kg; SAR(10g) = 4.90 W/kg

Daily SPC Check/CUBE SAR, 5x5x7 (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm
Reference Value = 74.751 V/m, Power Drift = -0.00507 dB
Averaged SAR: SAR(1g) = 10.2 W/kg; SAR(10g) = 4.74 W/kg



Appendix 2

SAR Distribution Plots for Head-Adjacent Test Results

Date/Time: 3/24/2013 5:30:17 AM

Test Lab: Motorola Mobility

DUT Serial: 353209050049820

DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(6.15,6.15,6.15); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _GPRS Class 12; Communication System Band: 850 MHz; Frequency: 824.2 MHz, Communication System PAR: 3.17 dB; PMF: 1.440; Duty Cycle: 1:2.075
Medium Parameters used: $f=824.2$ MHz; $\sigma = 0.9066$; $\epsilon_r = 41.24$ mho/m; $\rho = 1.000$ kg/m³

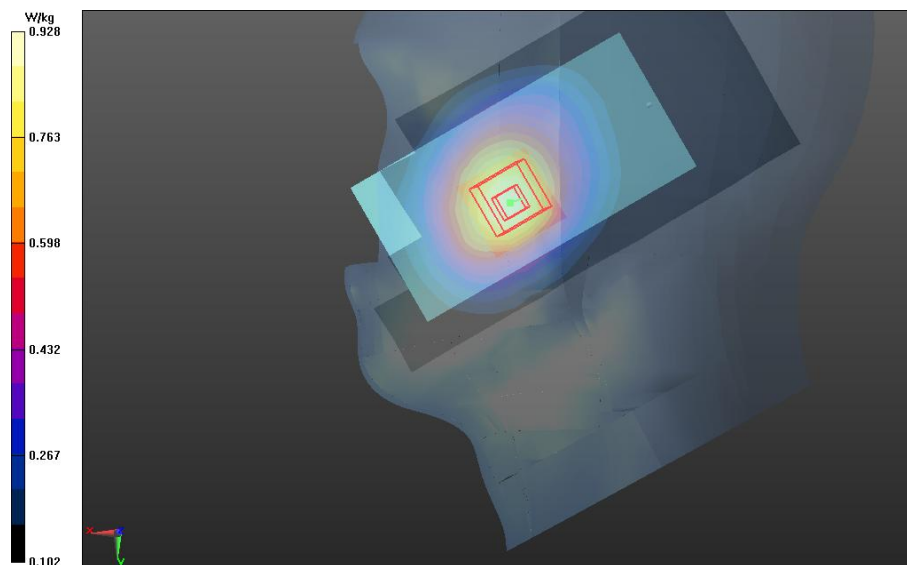
Right Head Template/15mm, Area Scan - Not for 2450 FCC TA... (61x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.874 W/kg; SAR(10g) = 0.593 W/kg

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 32.845 V/m, Power Drift = -0.121 dB

Averaged SAR: SAR(1g) = 0.873 W/kg; SAR(10g) = 0.646 W/kg



Right Head Template

Date/Time: 3/22/2013 9:44:33 PM

Test Lab: Motorola Mobility

DUT Serial: 353209050049820

DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(5.48,5.48,5.48); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#1 - Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1319
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _GPRS Class 12; Communication System Band: 1900 MHz; Frequency: 1880 MHz, Communication System PAR: 3.17 dB; PMF: 1.440; Duty Cycle: 1:2.075
Medium Parameters used: $f=1880$ MHz; $\sigma = 1.468$; $\epsilon_r = 43.81$ mho/m; $\rho = 1.000$ kg/m³

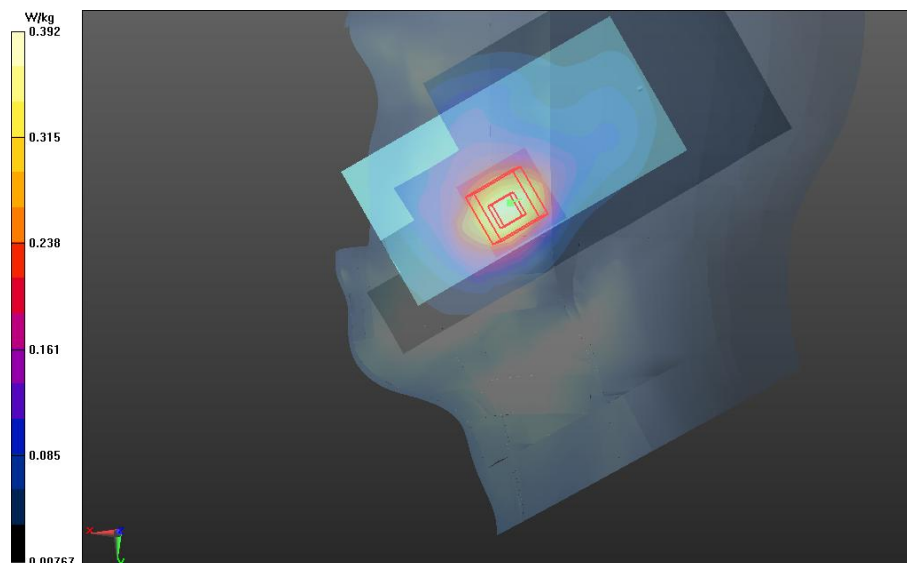
Right Head Template/15mm, Area Scan - Not for 2450 FCC TA... (61x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.359 W/kg; SAR(10g) = 0.200 W/kg

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 15.529 V/m, Power Drift = 0.021 dB

Averaged SAR: SAR(1g) = 0.364 W/kg; SAR(10g) = 0.216 W/kg



Right Head Template

Date/Time: 3/23/2013 1:11:29 AM

Test Lab: Motorola Mobility

DUT Serial: 353209050049820

DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(6.15,6.15,6.15); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#1 - Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1156
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _WCDMA; Communication System Band: WCDMA-850, Band 5; Frequency: 836.0 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=836$ MHz; $\sigma = 0.9343$; $\epsilon_r = 41.99$ mho/m; $\rho = 1.000$ kg/m³

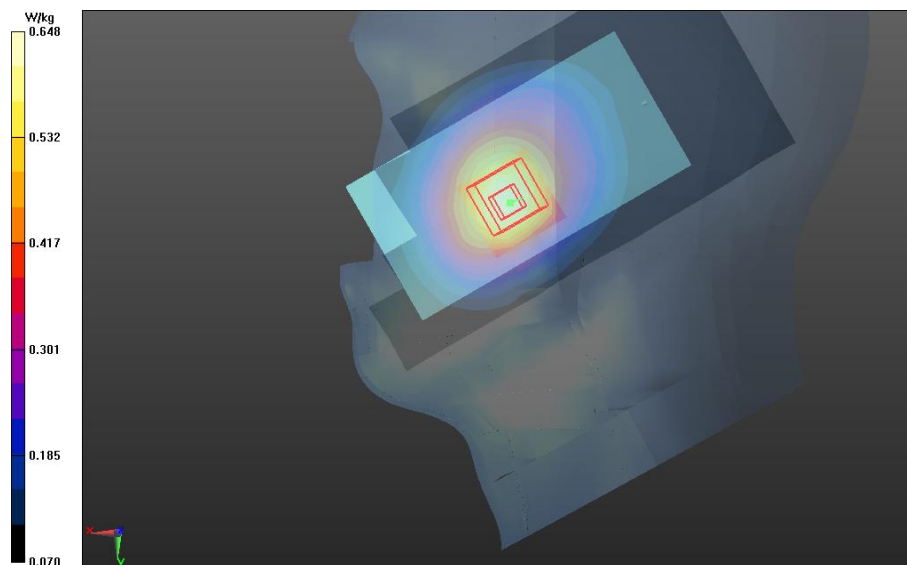
Right Head Template/15mm, Area Scan - Not for 2450 FCC TA... (61x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.609 W/kg; SAR(10g) = 0.413 W/kg

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 26.717 V/m, Power Drift = -0.034 dB

Averaged SAR: SAR(1g) = 0.611 W/kg; SAR(10g) = 0.452 W/kg



Right Head Template

Date/Time: 3/22/2013 10:17:01 PM

Test Lab: Motorola Mobility

DUT Serial: 353209050049820

DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(5.48,5.48,5.48); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#1 - Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1319
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _WCDMA; Communication System Band: WCDMA-1900, Band 2; Frequency: 1880 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=1880$ MHz; $\sigma = 1.468$; $\epsilon_r = 43.81$ mho/m; $\rho = 1.000$ kg/m³

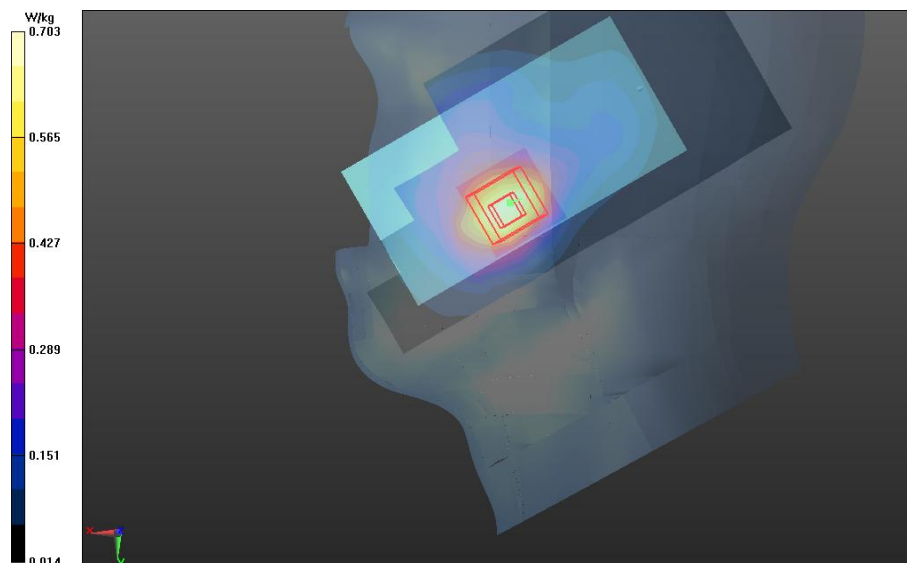
Right Head Template/15mm, Area Scan - Not for 2450 FCC TA... (61x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.649 W/kg; SAR(10g) = 0.362 W/kg

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 20.884 V/m, Power Drift = 0.017 dB

Averaged SAR: SAR(1g) = 0.652 W/kg; SAR(10g) = 0.388 W/kg



Right Head Template

Date/Time: 1/18/2013 5:14:32 PM

Test Lab: Motorola Mobility

DUT Serial: 353208050050691

Test Configuration: Cheek Touch

DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.43,4.43,4.43); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/11/2012
- Phantom: R#4 Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1162
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _Wi-Fi 2450MHz; Communication System Band: 2450MHz WIFI; Frequency: 2437 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=2437$ MHz; $\sigma = 1.847$; $\epsilon_r = 39.066$ mho/m; $\rho = 1.000$ kg/m³

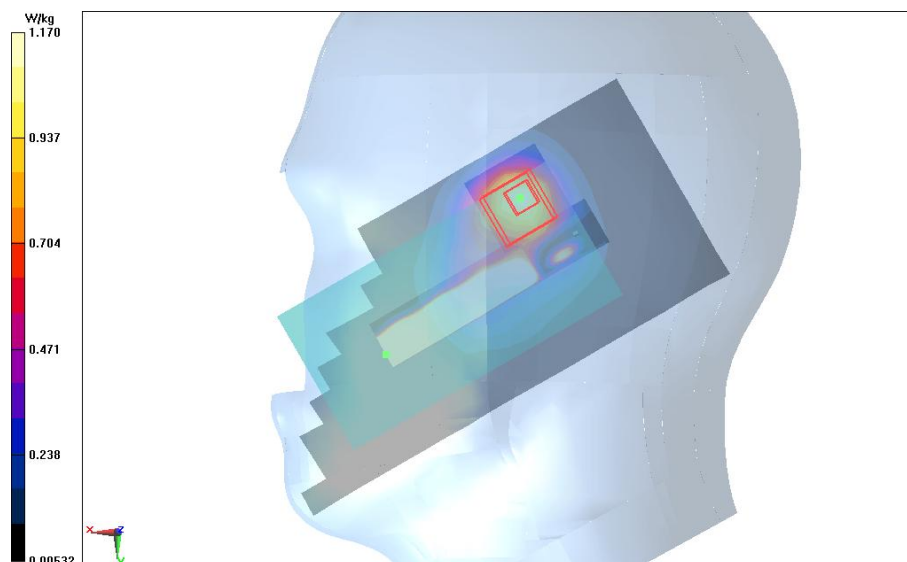
Right Head Template/10mm, Area Scan (91x241x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 1.05 W/kg; SAR(10g) = 0.546 W/kg

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 22.825 V/m, Power Drift = -0.091 dB

Averaged SAR: SAR(1g) = 1.07 W/kg; SAR(10g) = 0.544 W/kg



Right Head Template

Appendix 3

SAR Distribution Plots for Body-Worn Accessory and Mobile Hotspot Test Results

Date/Time: 3/23/2013 3:38:47 PM

Test Lab: Motorola Mobility

DUT Serial: 353209050049820

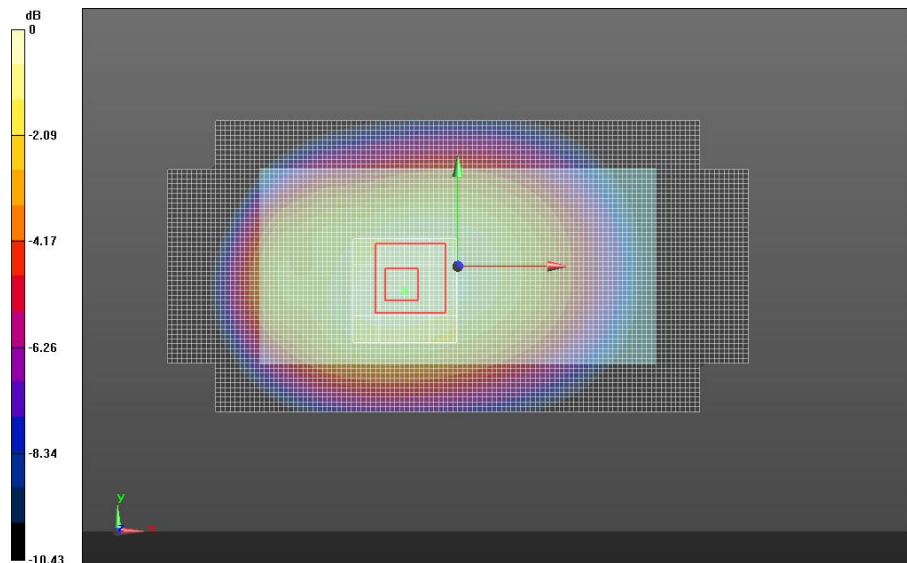
DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(6.19,6.19,6.19); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _GPRS Class 12; Communication System Band: 850 MHz; Frequency: 824.2 MHz; Communication System PAR: 3.17 dB; PMF: 1.440; Duty Cycle: 1:2.075
Medium Parameters used: $f=824.2$ MHz; $\sigma = 0.9795$; $\epsilon_r = 53.78$ mho/m; $\rho = 1.000$ kg/m³

Triple Flat Phone Template/Area Scan (15mm), not for EDGES, not for FCC 2450 TA... (181x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Fast SAR: SAR(1g) = 1.11 W/kg; SAR(10g) = 0.772 W/kg

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm
Reference Value = 34.910 V/m, Power Drift = -0.046 dB
Averaged SAR: SAR(1g) = 1.13 W/kg; SAR(10g) = 0.834 W/kg



Triple Flat Phone Template

Date/Time: 3/26/2013 12:20:26 PM

Test Lab: Motorola Mobility

DUT Serial: 353209050049820

DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(4.88,4.88,4.88); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _GPRS Class 12; Communication System Band: 1900 MHz; Frequency: 1910 MHz, Communication System PAR: 3.17 dB; PMF: 1.440; Duty Cycle: 1:2.075
Medium Parameters used: $f=1910$ MHz; $\sigma = 1.591$; $\epsilon_r = 54.33$ mho/m; $\rho = 1.000$ kg/m³

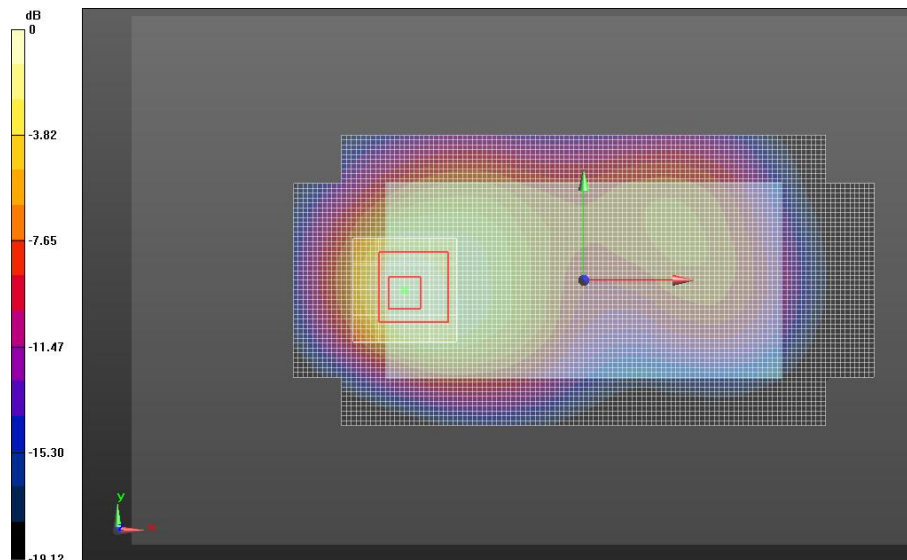
Triple Flat Phone Template/Area Scan (15mm), not for EDGES, not for FCC 2450 TA... (181x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 0.823 W/kg; SAR(10g) = 0.465 W/kg

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 20.851 V/m, Power Drift = 0.017 dB

Averaged SAR: SAR(1g) = 0.795 W/kg; SAR(10g) = 0.459 W/kg



Triple Flat Phone Template

Date/Time: 3/23/2013 9:36:19 PM

Test Lab: Motorola Mobility

DUT Serial: 353209050049820

DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(6.19,6.19,6.19); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _WCDMA; Communication System Band: WCDMA-850, Band 5; Frequency: 826.4 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=826.4$ MHz; $\sigma = 0.9820$; $\epsilon_r = 53.78$ mho/m; $\rho = 1.000$ kg/m³

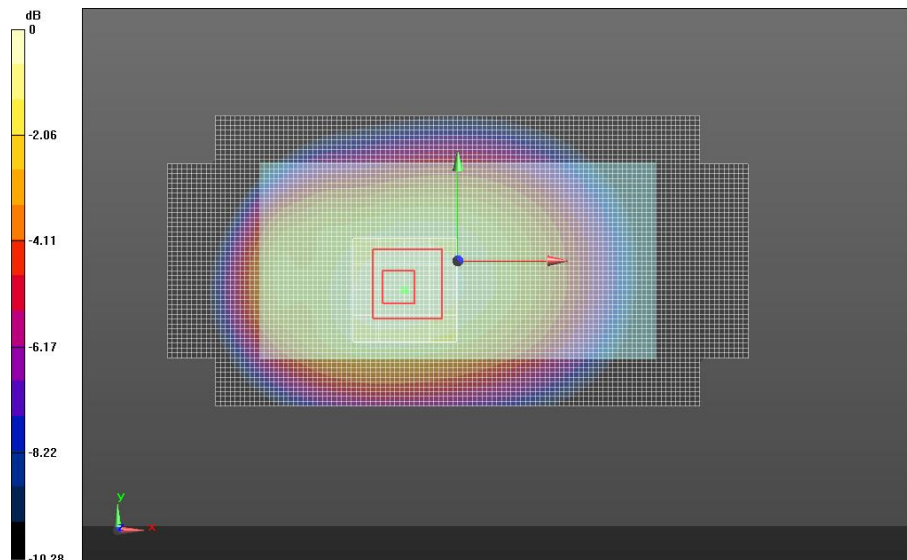
Triple Flat Phone Template/Area Scan (15mm), not for EDGES, not for FCC 2450 TA... (181x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Fast SAR: SAR(1g) = 1.16 W/kg; SAR(10g) = 0.800 W/kg

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 34.986 V/m, Power Drift = -0.013 dB

Averaged SAR: SAR(1g) = 1.17 W/kg; SAR(10g) = 0.861 W/kg



Triple Flat Phone Template

Date/Time: 3/24/2013 2:34:55 AM

Test Lab: Motorola Mobility

DUT Serial: 353209050049820

DASY Configuration:

- Probe: ES3DV3 - SN3184; ConvF(4.88,4.88,4.88); Calibrated: 4/25/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn378; Calibrated: 4/11/2012
- Phantom: R#-1, Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _WCDMA; Communication System Band: WCDMA-1900, Band 2; Frequency: 1908 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=1907.6$ MHz; $\sigma = 1.579$; $\epsilon_r = 54.71$ mho/m; $\rho = 1.000$ kg/m³

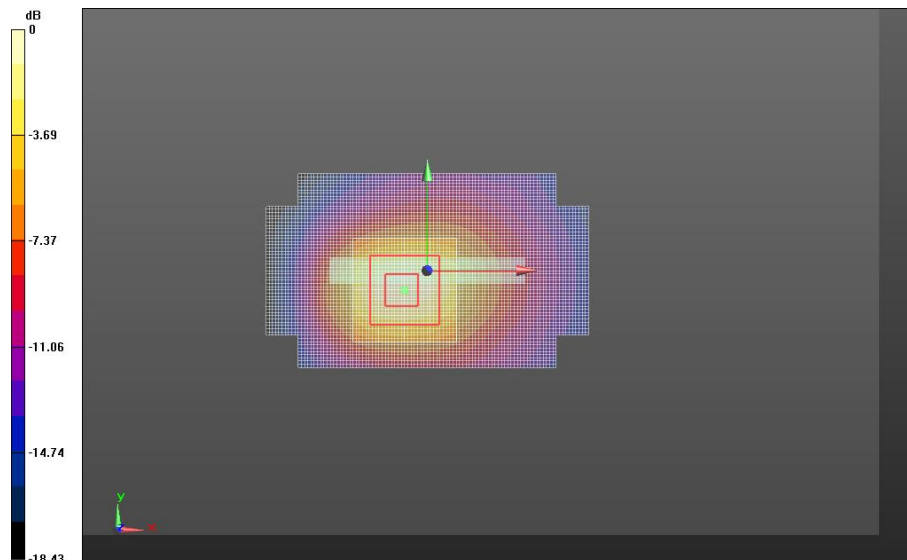
Triple Flat Phone Template/Area Scan (10mm) (261x141x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 1.07 W/kg; SAR(10g) = 0.570 W/kg

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 23.897 V/m, Power Drift = -0.063 dB

Averaged SAR: SAR(1g) = 1.13 W/kg; SAR(10g) = 0.588 W/kg



Triple Flat Phone Template

Date/Time: 1/17/2013 4:02:38 PM

Test Lab: Motorola Mobility

DUT Serial: 353208050050691

Test Configuration: Left Edge of Phone 10mm from Phantom

DASY Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.13,4.13,4.13); Calibrated: 9/13/2012;
- Sensor-Surface: 4 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1312; Calibrated: 9/4/2012
- Phantom: R#4 Triple Flat Phantom 5.1C (Rev.4); Type: QD 000 P51 CA; Serial: n/a
- DASY52 52.8.5(1059); SEMCAD X Version 14.6.8 (7028)

Communication System: _Wi-Fi 2450MHz; Communication System Band: 2450MHz WIFI; Frequency: 2437 MHz, Communication System PAR: 0.00 dB; PMF: 1.000; Duty Cycle: 1:1.000
Medium Parameters used: $f=2437$ MHz; $\sigma = 1.991$; $\epsilon_r = 50.957$ mho/m; $\rho = 1.000$ kg/m³

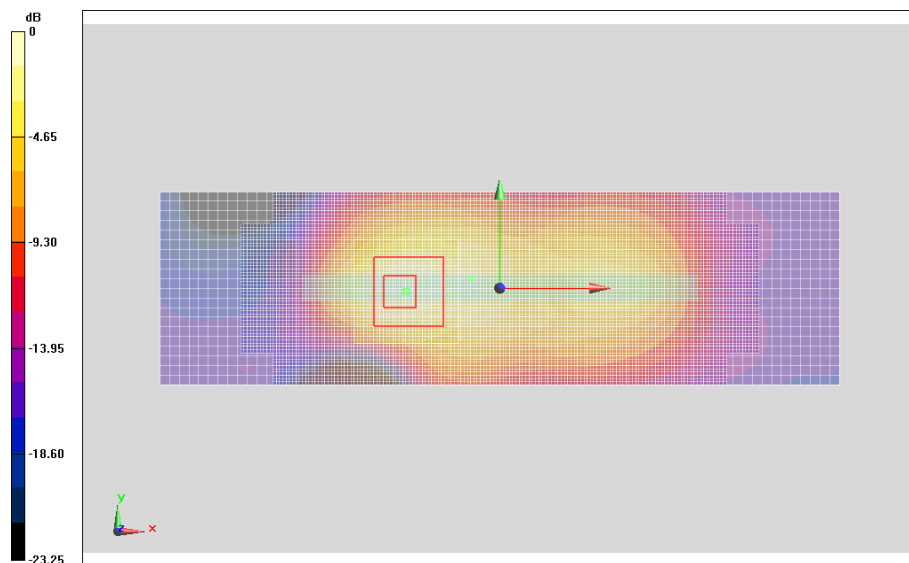
Triple Flat Phone Template/Area Scan (10mm) (261x141x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Fast SAR: SAR(1g) = 0.374 W/kg; SAR(10g) = 0.190 W/kg

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (21x21x36)/Cube 0: Interpolated grid: dx=1.600 mm, dy=1.600 mm, dz=1.000 mm

Reference Value = 12.236 V/m, Power Drift = -0.090 dB

Averaged SAR: SAR(1g) = 0.385 W/kg; SAR(10g) = 0.195 W/kg



Triple Flat Phone Template

Appendix 4

Measurement Uncertainty Budget

Uncertainty Budget for Device Under Test, for 735 MHz to 3 GHz

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e = f(d,k)</i>	<i>f</i>	<i>g</i>	<i>h = c x f / e</i>	<i>i = c x g / e</i>	<i>k</i>
Uncertainty Component	Description IEEE 1528(2003) / IEC 62209-1(2005)	Tol. (± %)	Prob Dist	Div.	<i>c_i</i> (1 g)	<i>c_i</i> (10 g)	1 g <i>u_i</i> (±%)	10 g <i>u_i</i> (±%)	<i>v_i</i>
Measurement System									
Probe Calibration [ES3DV3]	E.2.1 / 7.2.1	6.0	N	1.00	1	1	6.0	6.0	∞
Axial Isotropy	E.2.2 / 7.2.1.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2 / 7.2.1.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3 / 7.2.1.5	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4 / 7.2.1.3	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5 / 7.2.1.4	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6 / 7.2.1.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7 / 7.2.1.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8 / 7.2.1.8	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	E.6.1 / 7.2.3.6	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1 / 7.2.3.6	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mech. Tolerance	E.6.2 / 7.2.2.1	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t Phantom	E.6.3 / 7.2.2.3	2.9	R	1.73	1	1	1.7	1.7	∞
Max. SAR Evaluation (ext., int., avg.)	E.5 / 7.2.4	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2 / 7.2.2.4	3.4	N	1.00	1	1	3.4	3.4	79
Device Holder Uncertainty	E.4.1 / 7.2.2.4.2	4.5	N	1.00	1	1	4.5	4.5	11
SAR drift	6.6.2 / 7.2.3.5	0.0	R	1.73	1	1	0.0	0.0	
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1 / 7.2.2.2	6.1	R	1.73	1	1	3.5	3.5	∞
SAR Correction		1.9	R	1.73	1	0.84	1.1	0.9	∞
Liquid Conductivity (measurement)	E.3.3 / 7.2.3.3	1.3	N	1.00	0.64	0.43	0.9	0.6	6
Liquid Permittivity (measurement)	E.3.2 / 7.2.3.4	0.7	N	1.00	0.6	0.49	0.4	0.3	6
Combined Standard Uncertainty				RSS			11	11	390
Expanded Uncertainty (95% CONFIDENCE LEVEL)				<i>k=2</i>			22	22	

Appendix 5

Probe Calibration Certificates



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 **Motorola MDb**

Certificate No: **ES3-3184_Apr12**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3184**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **April 25, 2012**

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	10-Jan-12 (No. DAE4-660_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature

Issued: April 25, 2012

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



Accredited by the Swiss Accreditation Service (SAS)

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

Accreditation No.: SCS 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	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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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}; 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 $f \leq 800$ 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.

Probe ES3DV3

SN:3184

Manufactured: August 19, 2008
Calibrated: April 25, 2012

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3184

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.24	1.38	1.25	$\pm 10.1 \%$
DCP (mV) ^B	101.9	99.5	100.6	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
0	CW	0.00	X	0.00	0.00	1.00	158.6	$\pm 3.0 \%$
			Y	0.00	0.00	1.00	163.2	
			Z	0.00	0.00	1.00	156.8	

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 E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3184

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	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.38	6.38	6.38	0.24	2.29	± 12.0 %
835	41.5	0.90	6.15	6.15	6.15	0.70	1.20	± 12.0 %
1810	40.0	1.40	5.48	5.48	5.48	0.80	1.28	± 12.0 %
1950	40.0	1.40	5.19	5.19	5.19	0.65	1.38	± 12.0 %
2450	39.2	1.80	4.61	4.61	4.61	0.80	1.32	± 12.0 %
2600	39.0	1.96	4.40	4.40	4.40	0.80	1.35	± 12.0 %

^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.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3184

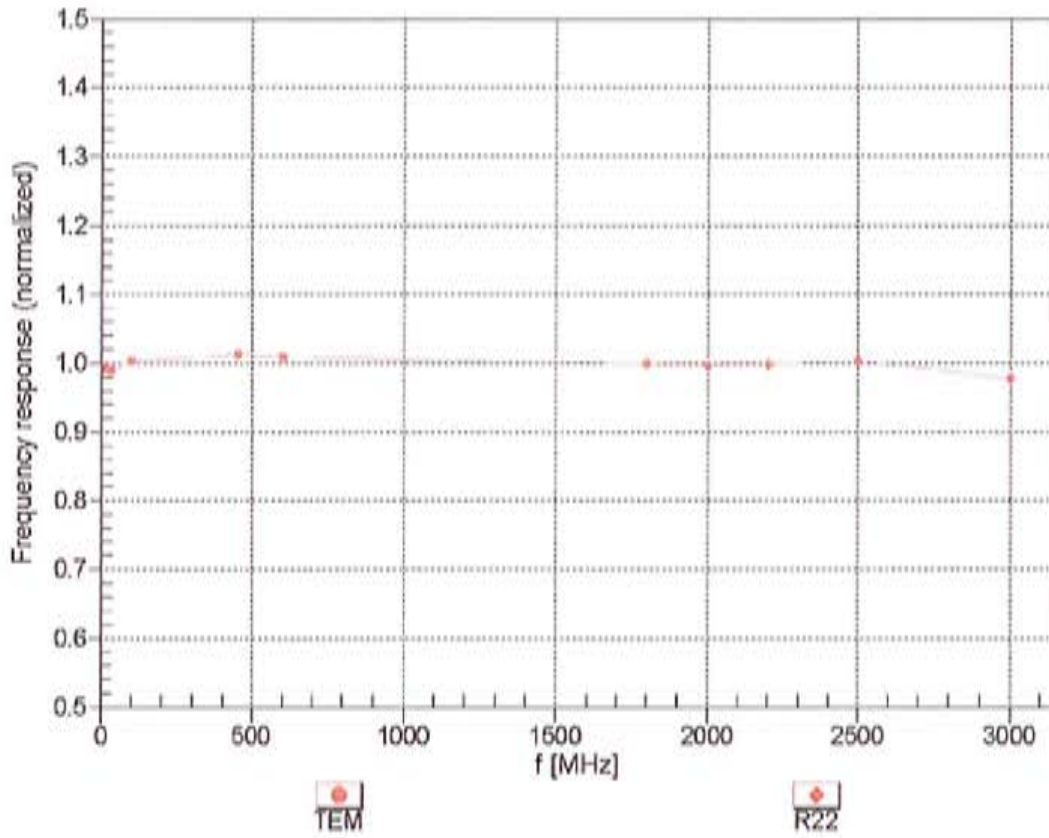
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.28	6.28	6.28	0.53	1.40	± 12.0 %
835	55.2	0.97	6.19	6.19	6.19	0.53	1.40	± 12.0 %
1810	53.3	1.52	4.88	4.88	4.88	0.55	1.49	± 12.0 %
1950	53.3	1.52	4.87	4.87	4.87	0.53	1.57	± 12.0 %
2450	52.7	1.95	4.33	4.33	4.33	0.80	0.96	± 12.0 %
2600	52.5	2.16	4.13	4.13	4.13	0.80	0.99	± 12.0 %

^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.

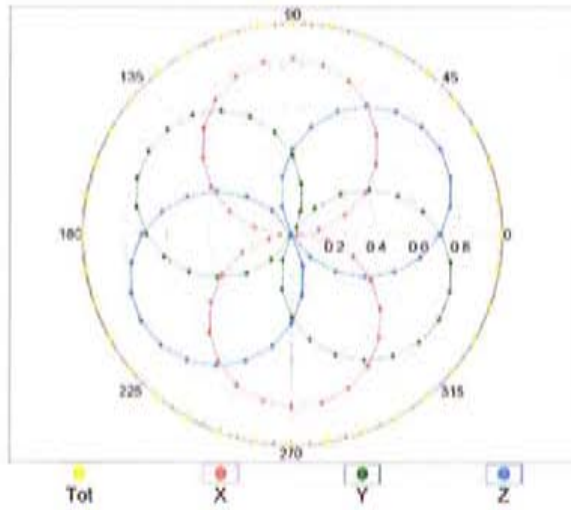
Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



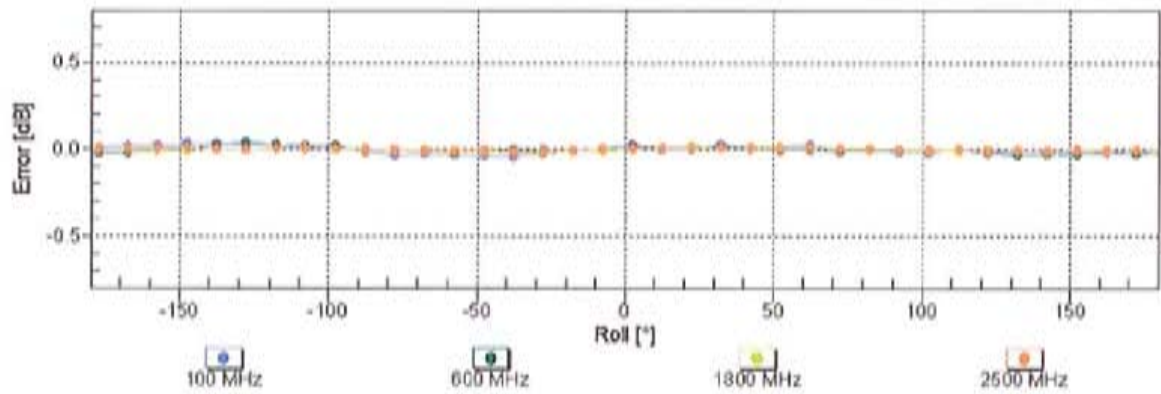
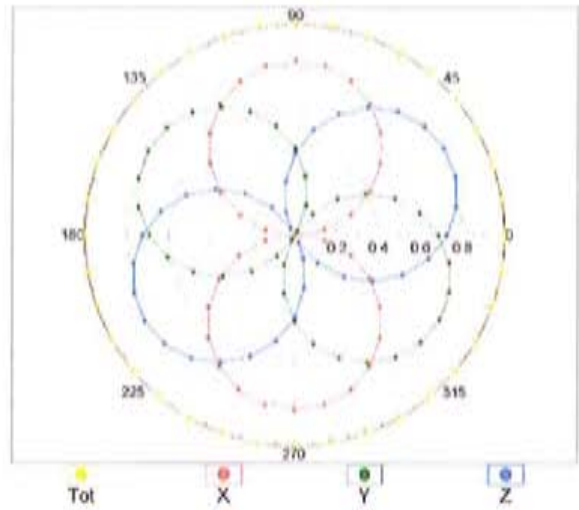
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

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

f=600 MHz, TEM

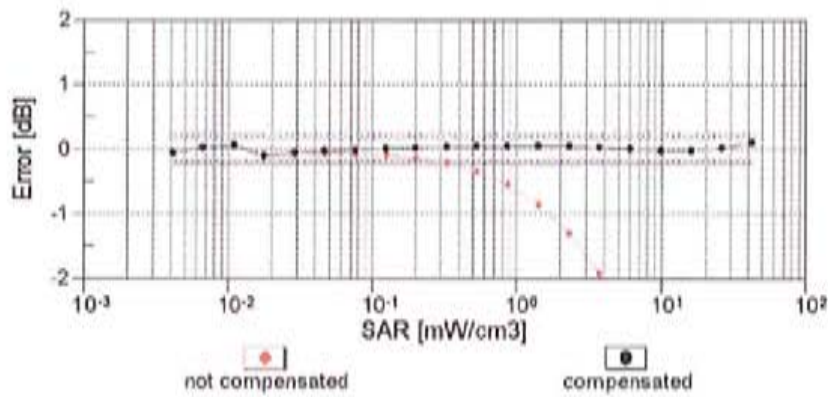
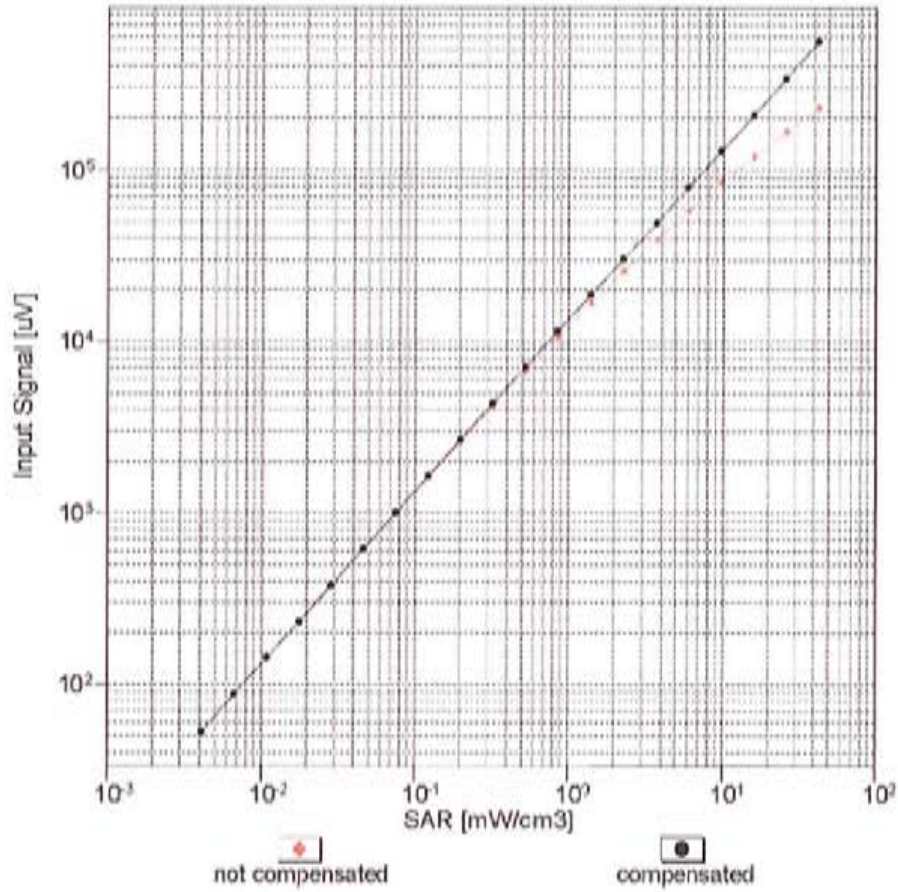


f=1800 MHz, R22



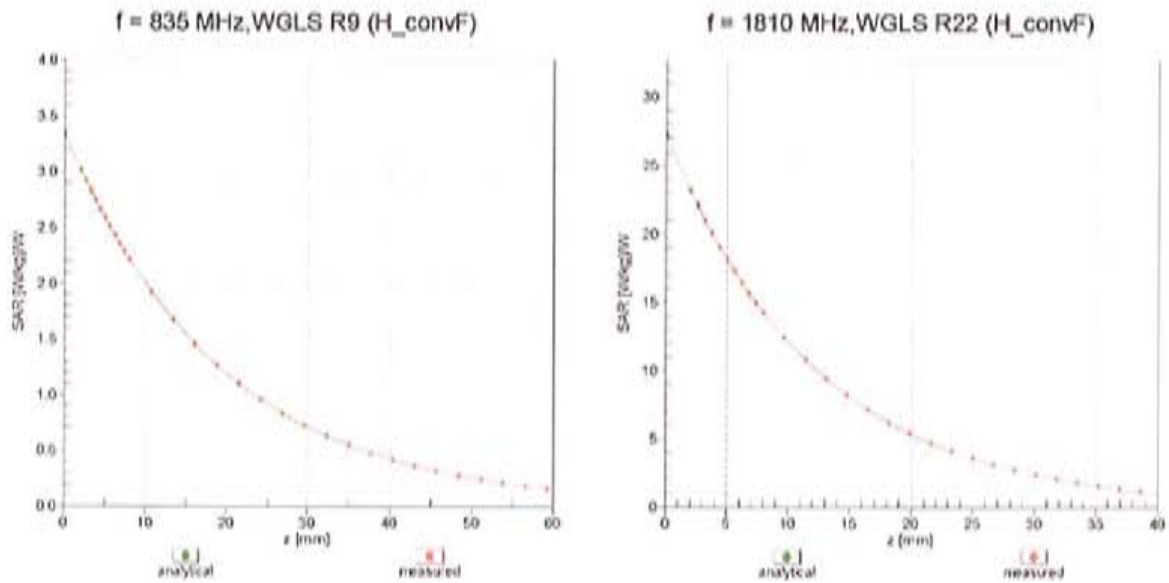
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

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

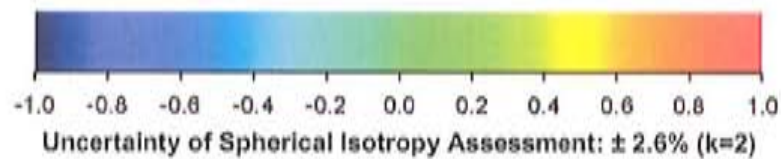
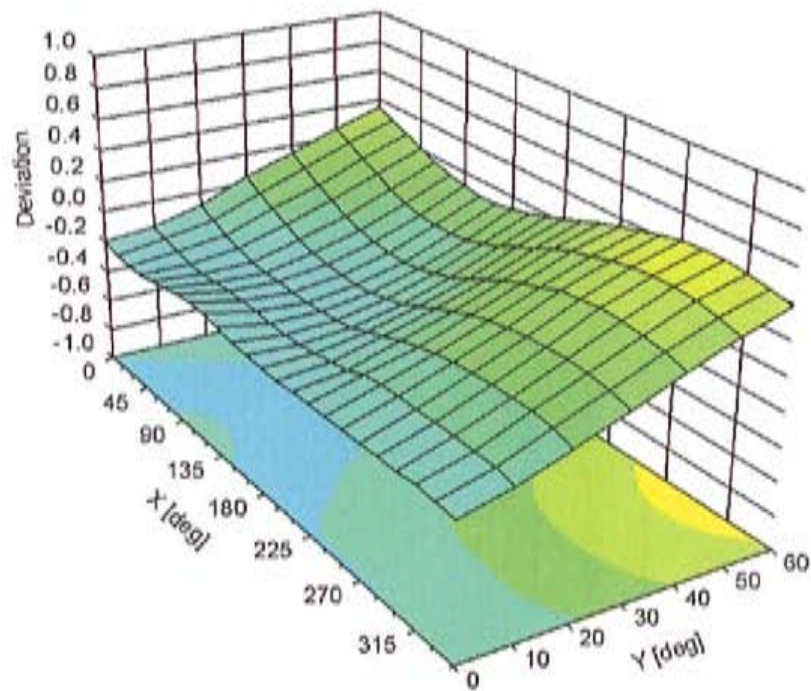


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, θ), f = 900 MHz



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3184**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	132.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm



Accredited by the Swiss Accreditation Service (SAS)
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Motorola MDb**

Certificate No: **ES3-3037_Sep12**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3037**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **September 13, 2012**

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	
			Issued: September 18, 2012
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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}; 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 $f \leq 800$ 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.

Probe ES3DV3

SN:3037

Manufactured: August 21, 2003
Calibrated: September 13, 2012

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3037

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.13	0.84	0.97	$\pm 10.1 \%$
DCP (mV) ^B	102.8	103.8	101.9	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
0	CW	0.00	X	0.00	0.00	1.00	148.4	$\pm 3.5 \%$
			Y	0.00	0.00	1.00	162.2	
			Z	0.00	0.00	1.00	177.4	

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 E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3037

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	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.46	6.46	6.46	0.24	2.00	± 12.0 %
835	41.5	0.90	6.23	6.23	6.23	0.72	1.15	± 12.0 %
1810	40.0	1.40	5.15	5.15	5.15	0.78	1.16	± 12.0 %
1950	40.0	1.40	4.96	4.96	4.96	0.79	1.15	± 12.0 %
2450	39.2	1.80	4.43	4.43	4.43	0.77	1.22	± 12.0 %
2600	39.0	1.96	4.23	4.23	4.23	0.80	1.22	± 12.0 %

^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.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3037

Calibration Parameter Determined in Body Tissue Simulating Media

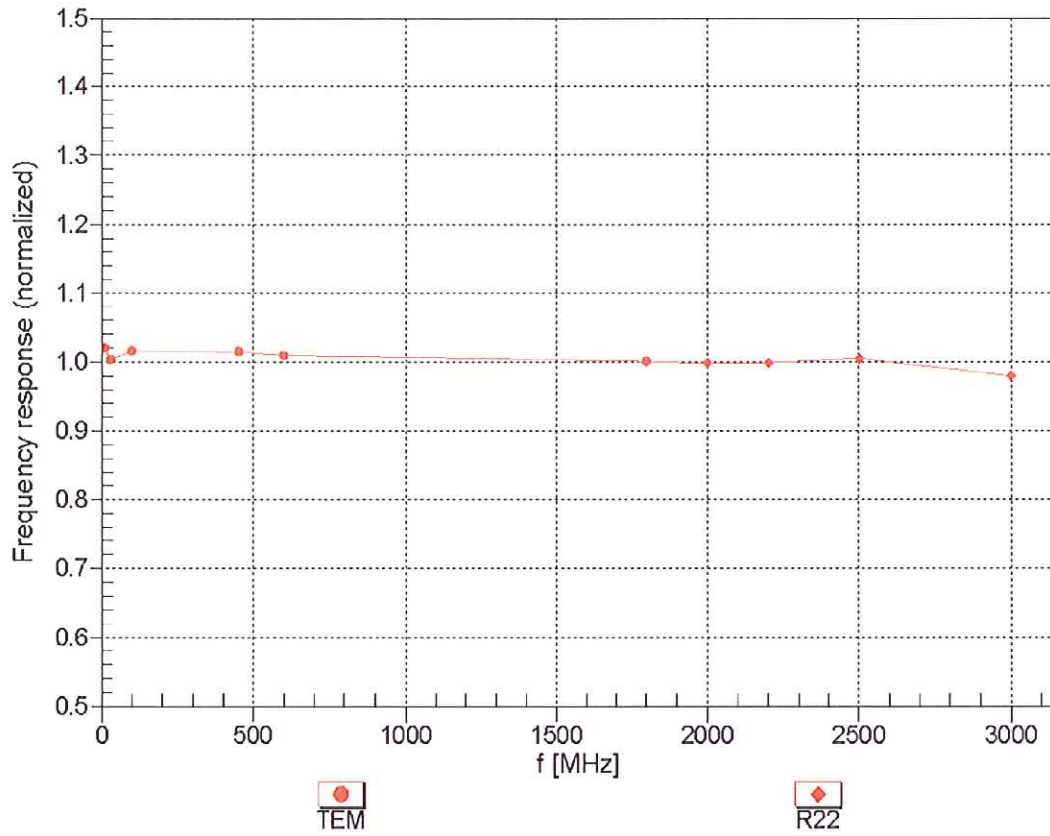
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.22	6.22	6.22	0.51	1.37	± 12.0 %
835	55.2	0.97	6.16	6.16	6.16	0.34	1.69	± 12.0 %
1810	53.3	1.52	4.83	4.83	4.83	0.66	1.32	± 12.0 %
1950	53.3	1.52	4.76	4.76	4.76	0.63	1.31	± 12.0 %
2450	52.7	1.95	4.13	4.13	4.13	0.80	0.98	± 12.0 %
2600	52.5	2.16	3.92	3.92	3.92	0.80	0.98	± 12.0 %

^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.

Frequency Response of E-Field

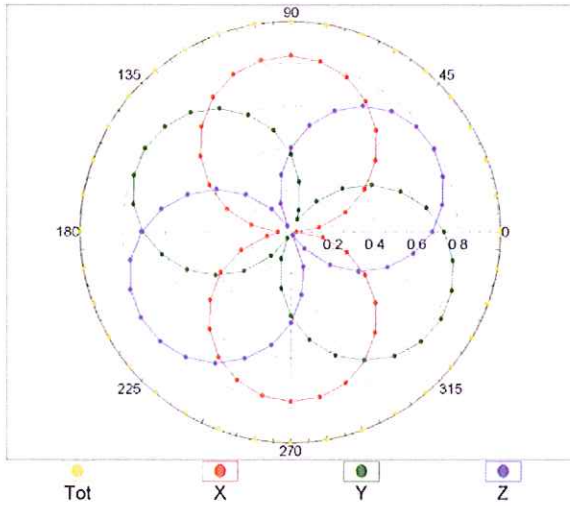
(TEM-Cell:ifi110 EXX, Waveguide: R22)



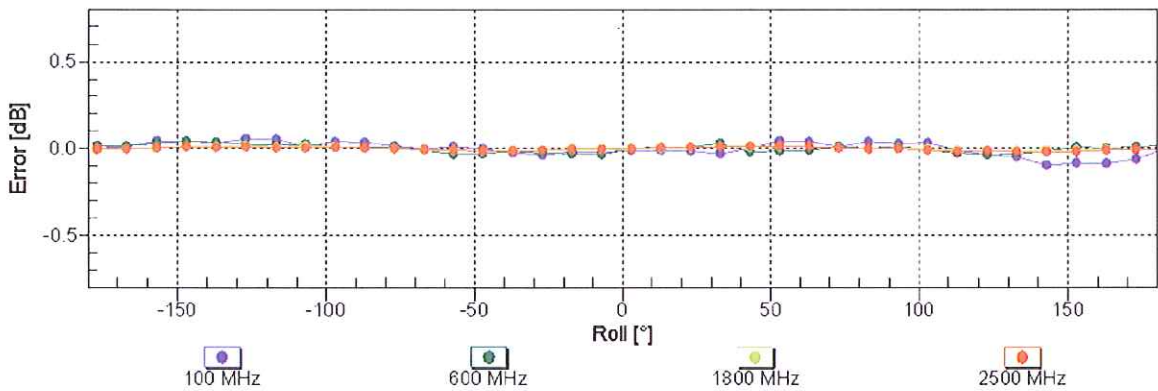
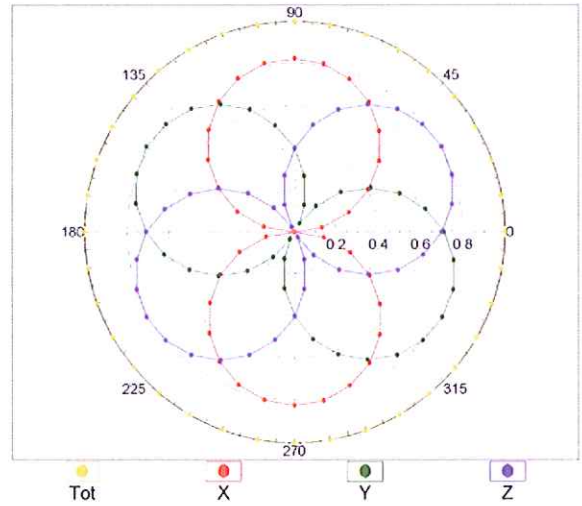
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

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

f=600 MHz,TEM

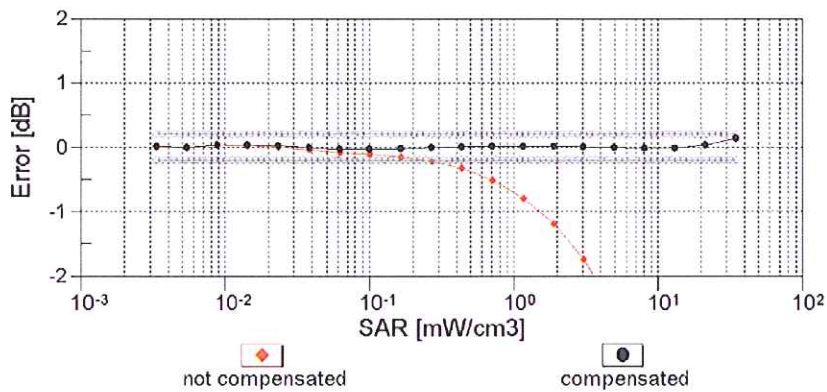
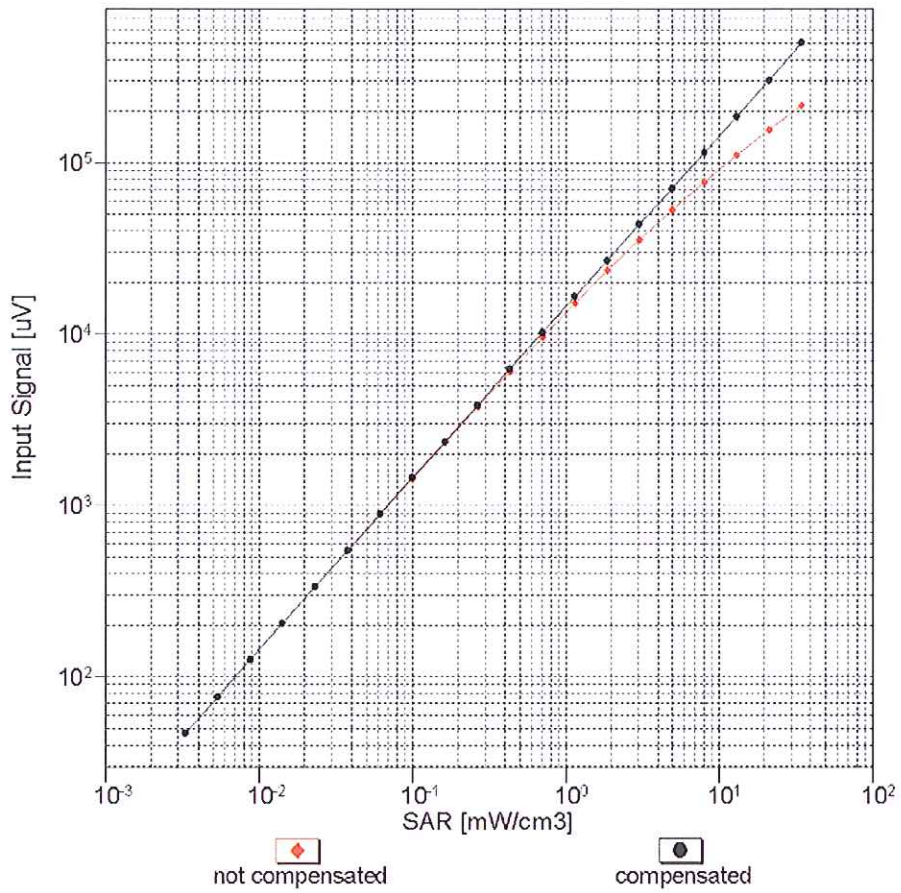


f=1800 MHz,R22



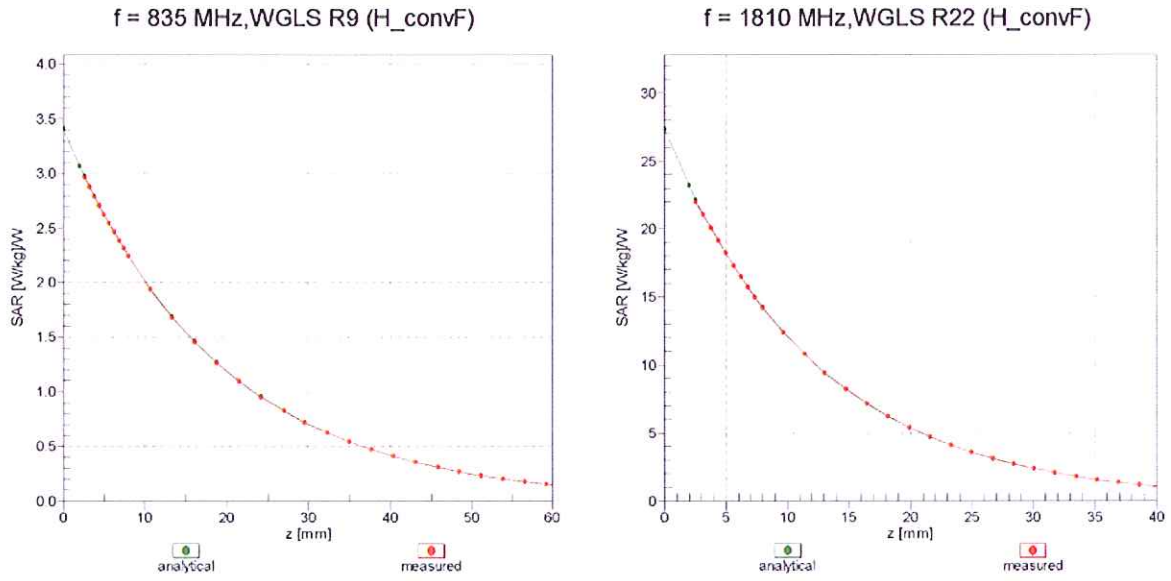
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$)

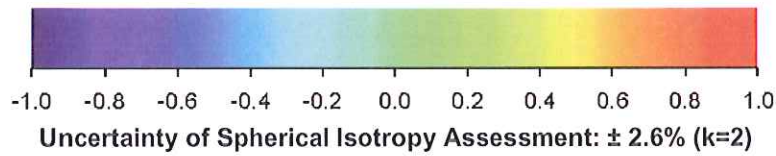
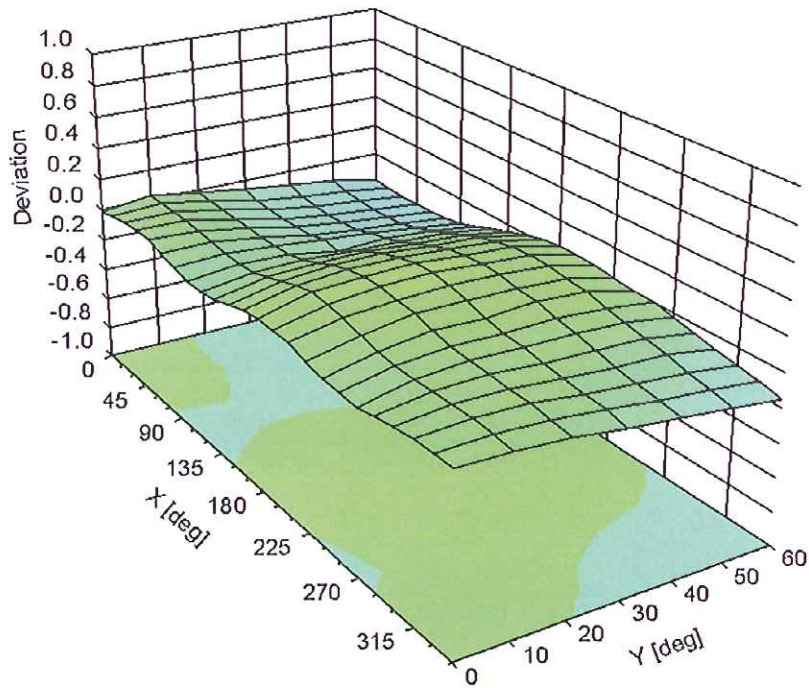


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, θ), f = 900 MHz



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3037

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	103
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm