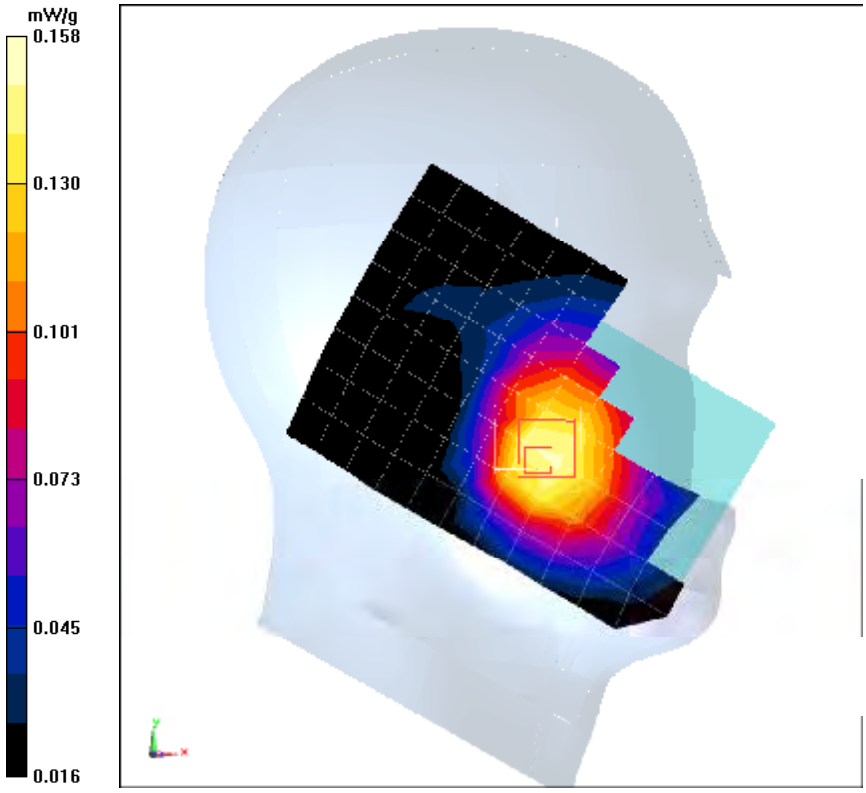
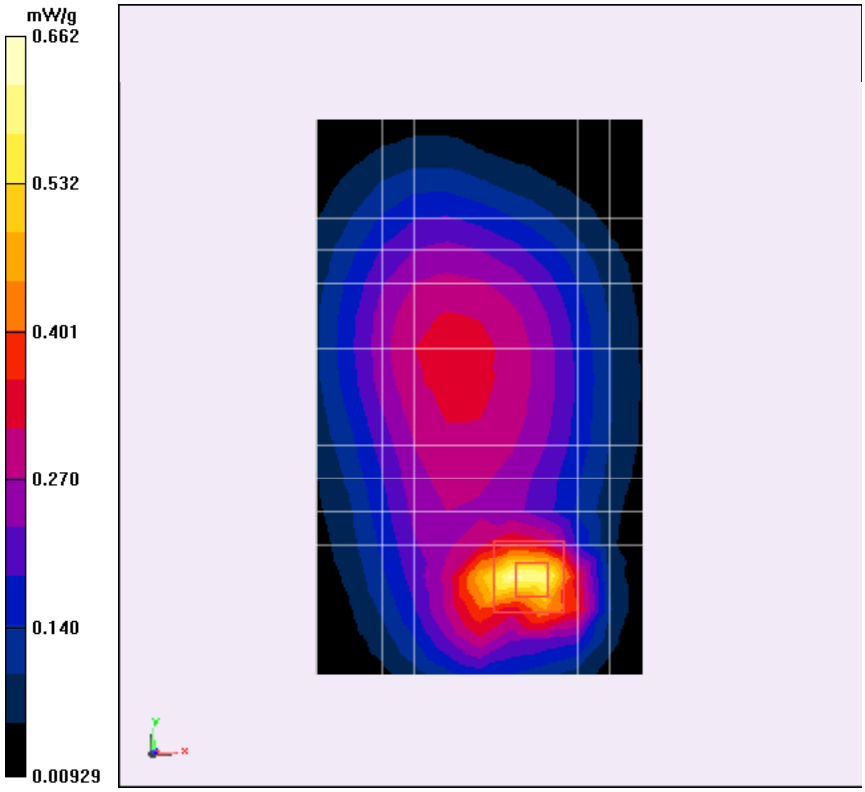
WCDMA850 Left Cheek Low

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Head 850MHz
Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.917 mho/m;εr = 40.779; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WCDMA Band V; Frequency: 826.4 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (6.02, 6.02, 6.02)
Low Cheek Left WCDMA850MHz Head/Area Scan (14x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.152 mW/g
Low Cheek Left WCDMA850MHz Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.809 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.2010mW/g
SAR(1 g) = 0.150 mW/g; SAR(10 g) = 0.113 mW/g
Maximum value of SAR (measured) = 0.158 mW/g



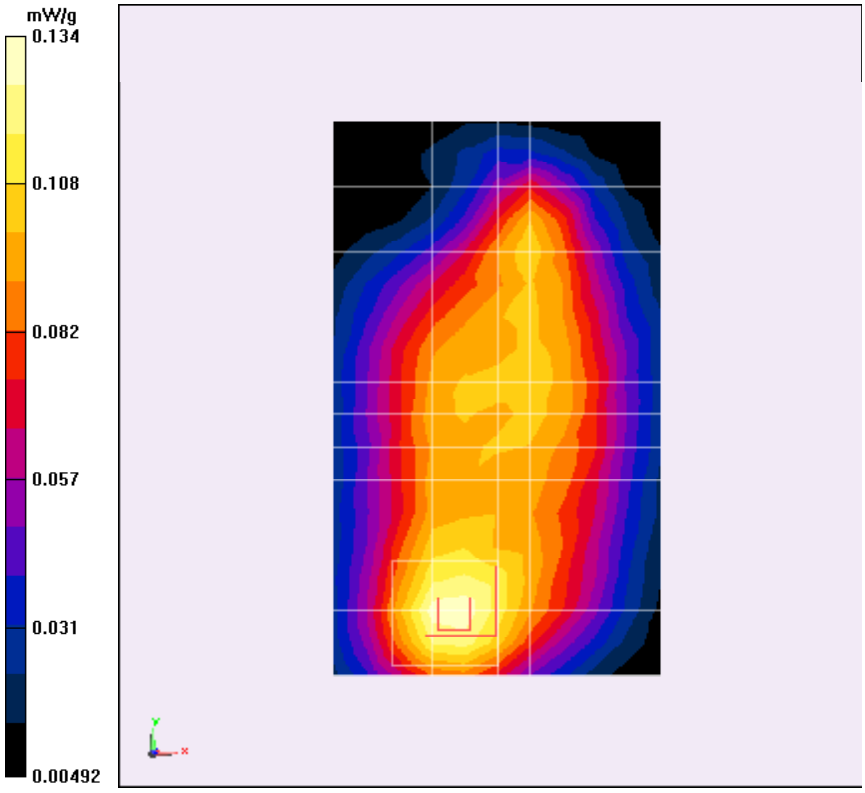
WCDMA850 Body Toward Ground Middle

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used (interpolated): f = 836.4 MHz; σ = 1.017 mho/m;εr = 55.886; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WCDMA Band V; Frequency: 836.4 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)
Middle Toward Ground WCDMA850MHz/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.632 mW/g
Middle Toward Ground WCDMA850MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.009 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.0190mW/g
SAR(1 g) = 0.579 mW/g; SAR(10 g) = 0.320 mW/g
Maximum value of SAR (measured) = 0.662 mW/g



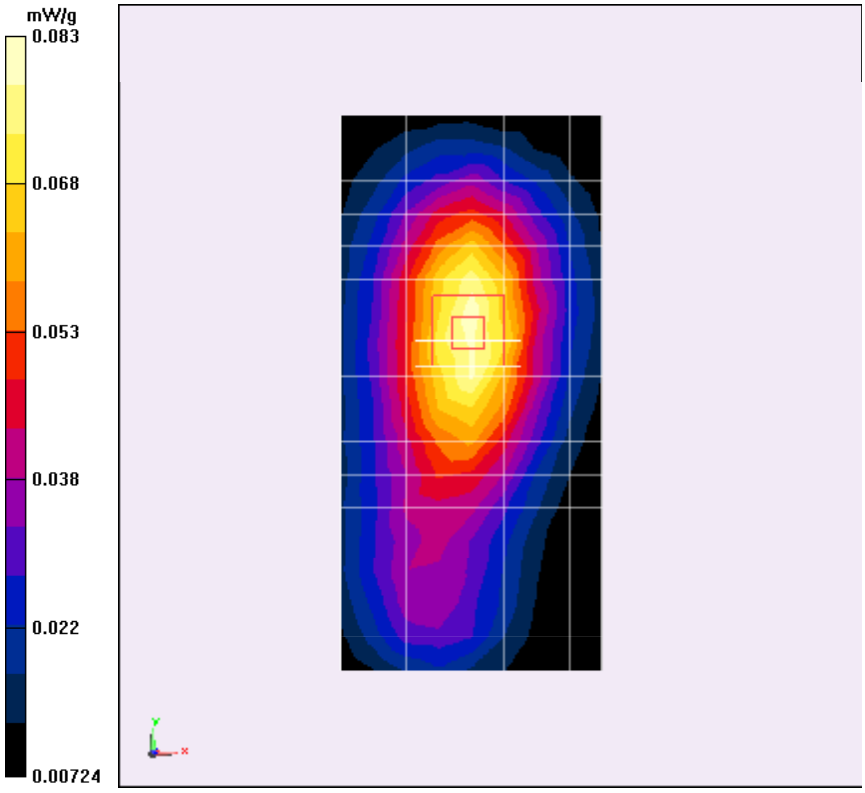
WCDMA850 Body Toward Phantom Middle

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used (interpolated): f = 836.4 MHz; σ = 1.017 mho/m;εr = 55.886; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WCDMA Band V; Frequency: 836.4 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)
Middle Toward Phantom WCDMA850MHz/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.132 mW/g
Middle Toward Phantom WCDMA850MHz/Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.077 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.1690mW/g
SAR(1 g) = 0.116 mW/g; SAR(10 g) = 0.077 mW/g
Maximum value of SAR (measured) = 0.134 mW/g



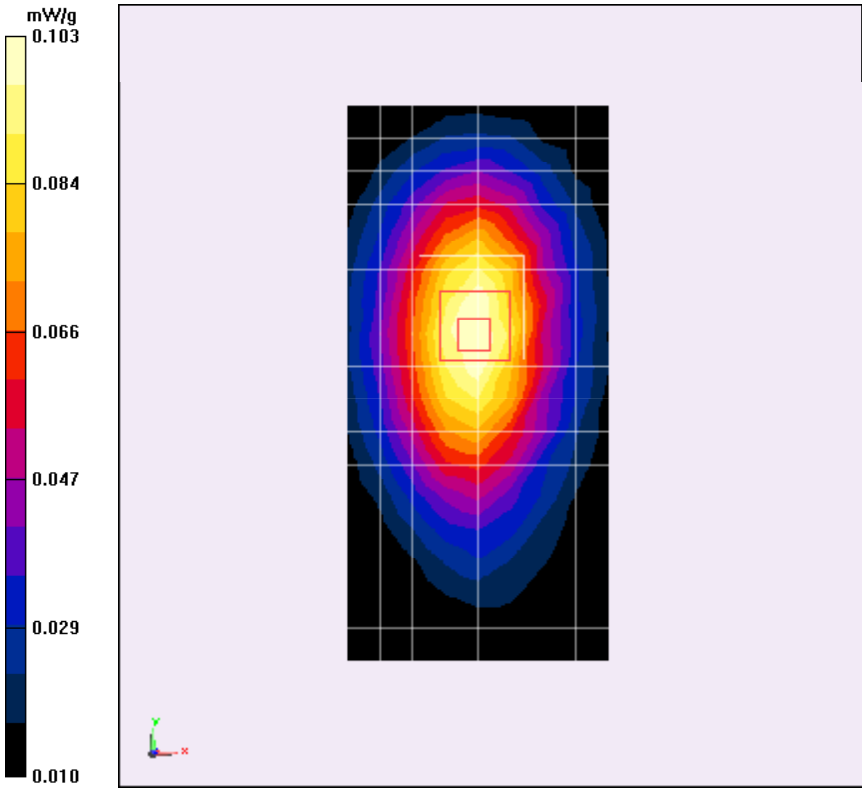
WCDMA850 Body Left Middle

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used (interpolated): f = 836.4 MHz; σ = 1.017 mho/m;εr = 55.886; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WCDMA Band V; Frequency: 836.4 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)
Middle Left WCDMA850MHz/Area Scan (9x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.082 mW/g
Middle Left WCDMA850MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.558 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.1120mW/g
SAR(1 g) = 0.078 mW/g; SAR(10 g) = 0.053 mW/g
Maximum value of SAR (measured) = 0.083 mW/g



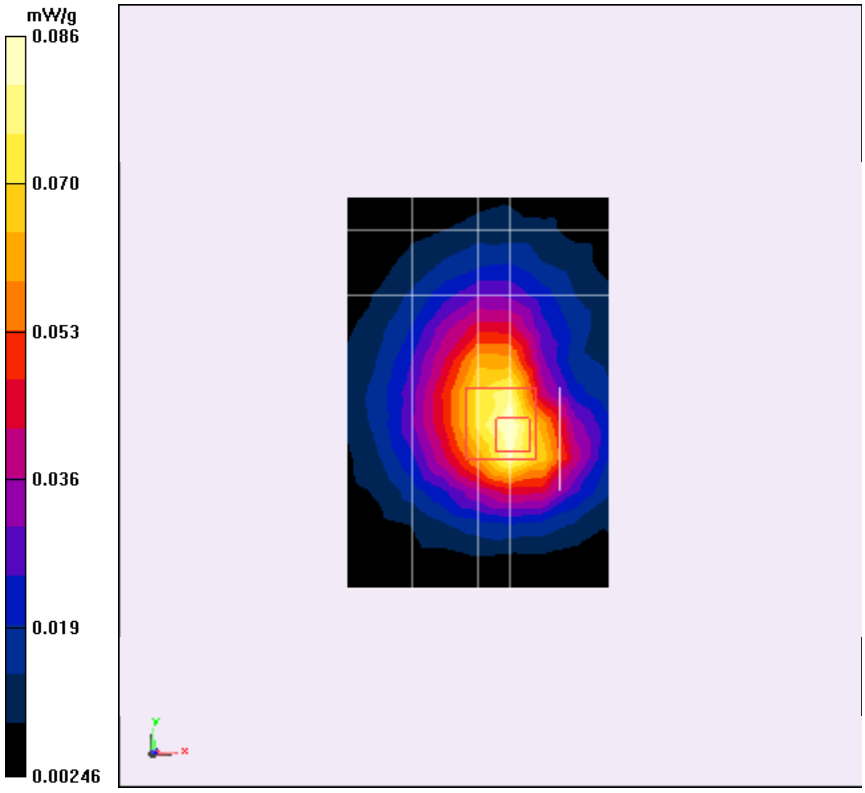
WCDMA850 Body Right Middle

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used (interpolated): f = 836.4 MHz; σ = 1.017 mho/m;εr = 55.886; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WCDMA Band V; Frequency: 836.4 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)
Middle Right WCDMA850MHz/Area Scan (9x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.104 mW/g
Middle Right WCDMA850MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.675 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.1300mW/g
SAR(1 g) = 0.096 mW/g; SAR(10 g) = 0.067 mW/g
Maximum value of SAR (measured) = 0.103 mW/g



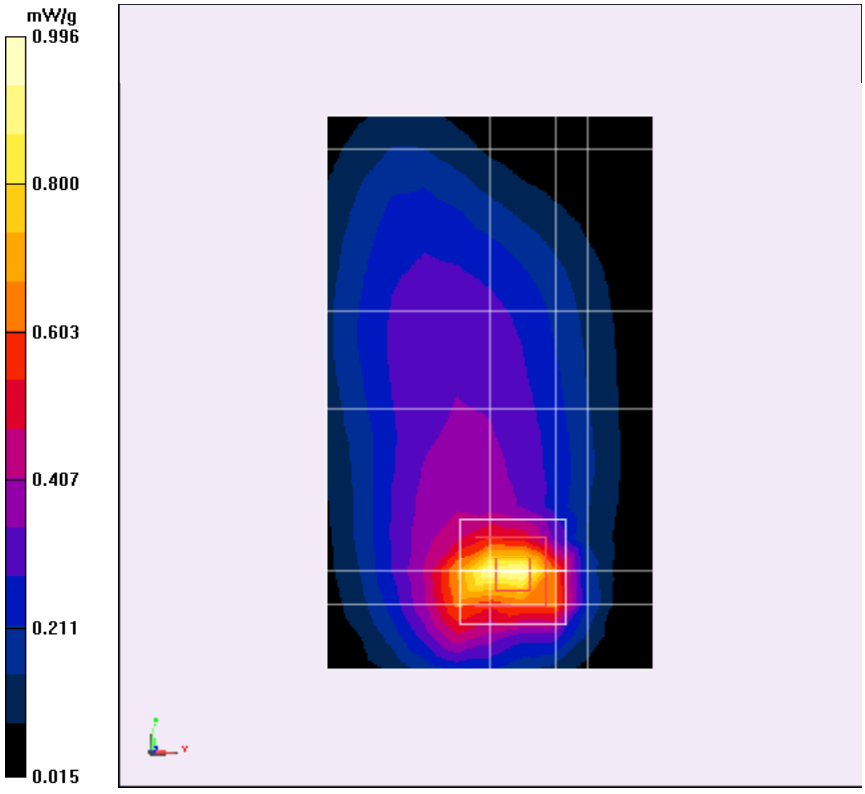
WCDMA850 Body Bottom Middle

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used (interpolated): f = 836.4 MHz; σ = 1.017 mho/m;εr = 55.886; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WCDMA Band V; Frequency: 836.4 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)
Middle Bottom WCDMA850MHz/Area Scan (9x13x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.088 mW/g
Middle Bottom WCDMA850MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.654 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.1470mW/g
SAR(1 g) = 0.081 mW/g; SAR(10 g) = 0.048 mW/g
Maximum value of SAR (measured) = 0.086 mW/g



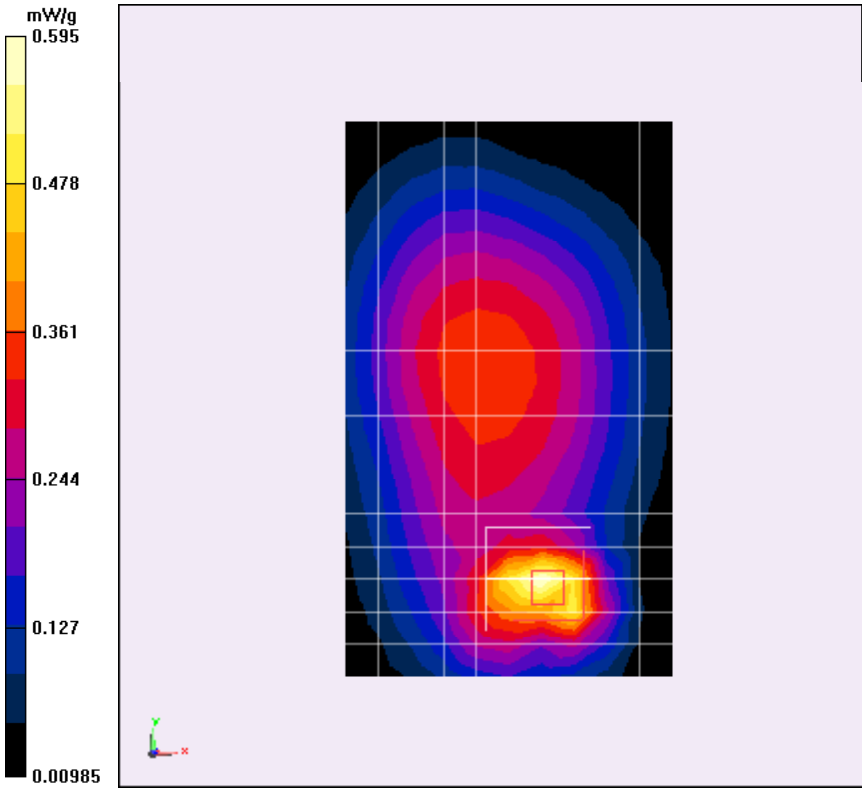
WCDMA850 Body Toward Ground High

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used: f = 846.6 MHz; σ = 1.028 mho/m;εr = 55.783; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WCDMA Band V; Frequency: 848.6 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)
High Toward Ground WCDMA850MHz/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.964 mW/g
High Toward Ground WCDMA850MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.088 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 1.5190mW/g
SAR(1 g) = 0.863 mW/g; SAR(10 g) = 0.484 mW/g
Maximum value of SAR (measured) = 0.996 mW/g



WCDMA850 Body Toward Ground Low

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used (interpolated): f = 826.4 MHz; σ = 1.007 mho/m;εr = 55.988; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WCDMA Band V; Frequency: 824.2 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)
Low Toward Ground WCDMA850MHz/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.602 mW/g
Low Toward Ground WCDMA850MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.512 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.9600mW/g
SAR(1 g) = 0.542 mW/g; SAR(10 g) = 0.300 mW/g
Maximum value of SAR (measured) = 0.595 mW/g

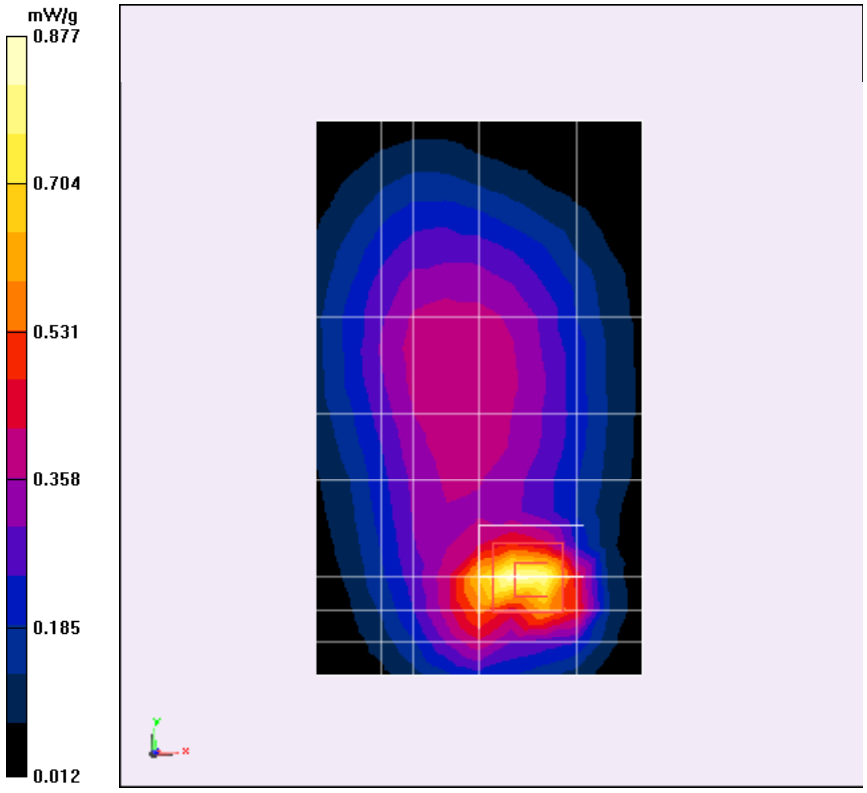


WCDMA850 Body Toward Ground High With Headset

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used: f = 846.6 MHz; σ = 1.028 mho/m;εr = 55.783; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WCDMA Band V; Frequency: 848.6 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)

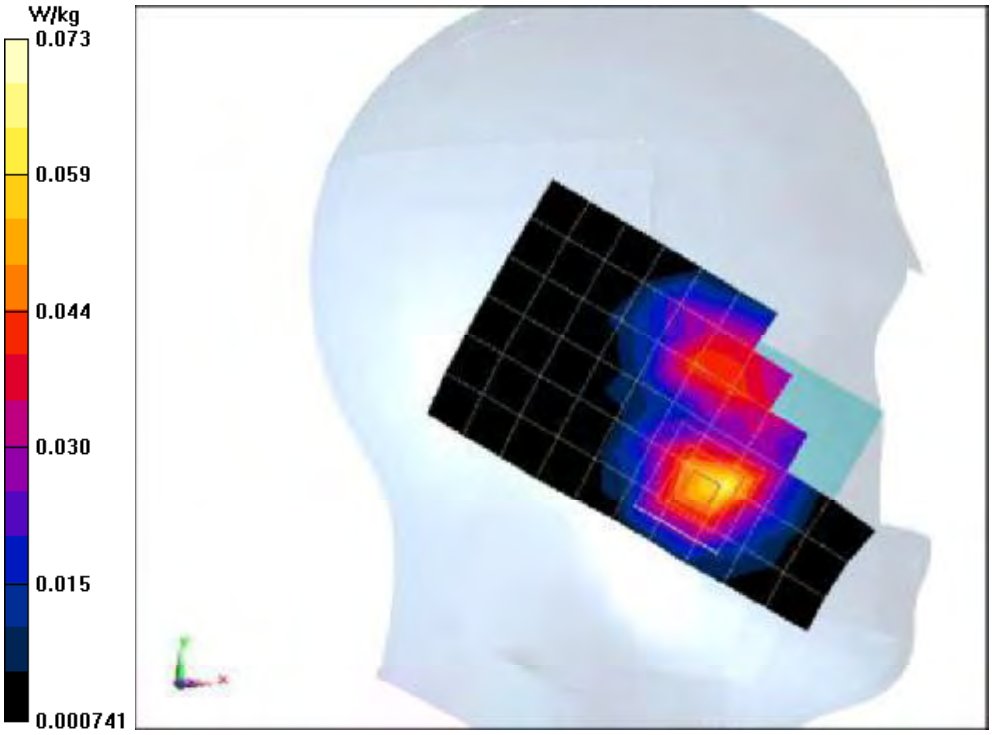
High Toward Ground WCDMA850MHz With Headset/Area Scan (11x18x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.859 mW/g

High Toward Ground WCDMA850MHz With Headset/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.644 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.3540mW/g
SAR(1 g) = 0.776 mW/g; SAR(10 g) = 0.431 mW/g
Maximum value of SAR (measured) = 0.877 mW/g



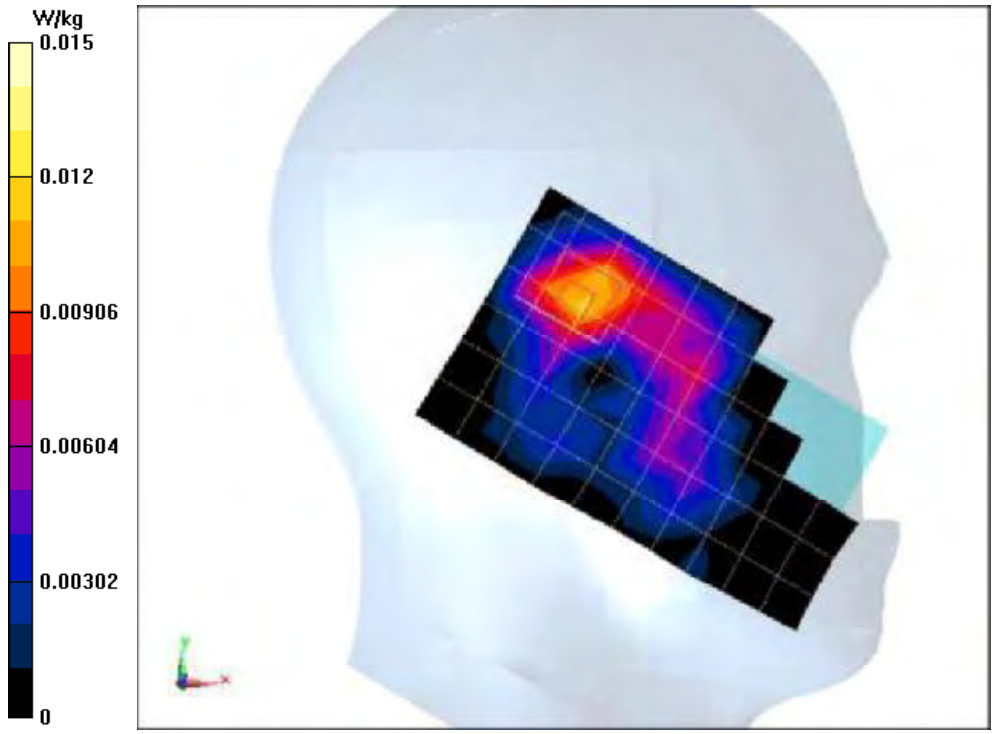
802.11b Left Cheek Low

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Head 2450MHz
Medium parameters used: f = 2412 MHz; σ = 1.787 S/m; εr = 39.087; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WiFi 2450 MHz; Frequency: 2412 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (4.34, 4.34, 4.34)
Low Cheek Left WiFi2450MHz/Area Scan (11x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0644 W/kg
Low Cheek Left WiFi2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.879 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.115 W/kg
SAR(1 g) = 0.063 W/kg; SAR(10 g) = 0.031 W/kg
Maximum value of SAR (measured) = 0.0734 W/kg



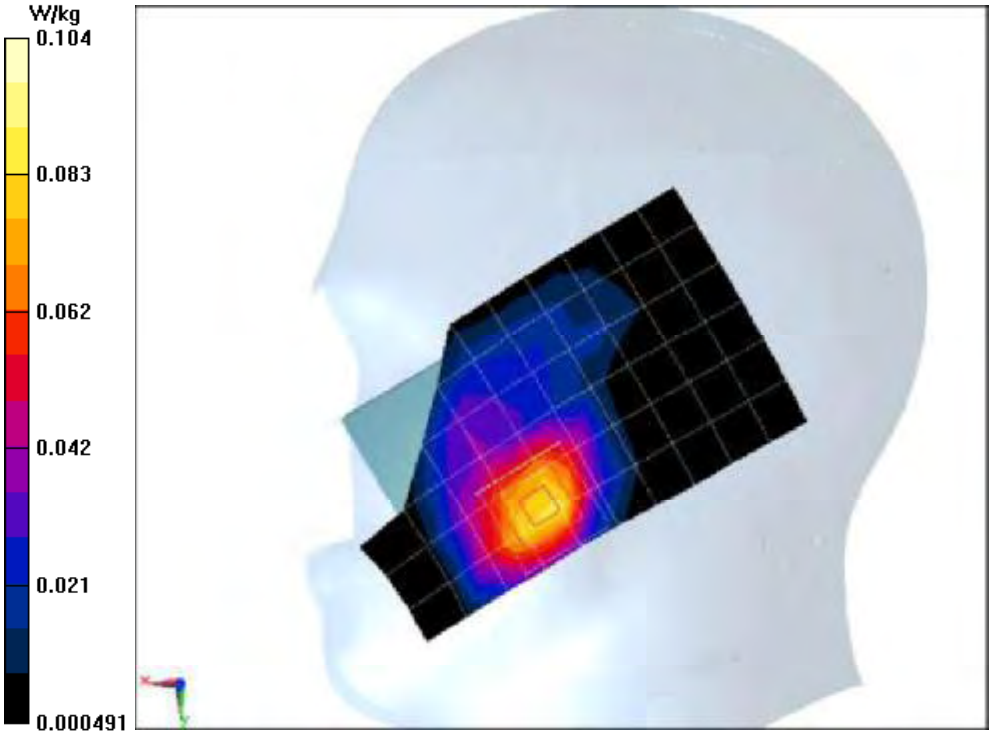
802.11b Left Tilt Low

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Head 2450MHz
Medium parameters used: f = 2412 MHz; σ = 1.787 S/m; εr = 39.087; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WiFi 2450 MHz; Frequency: 2412 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (4.34, 4.34, 4.34)
Low Tilt Left WiFi2450MHz/Area Scan (11x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0173 W/kg
Low Tilt Left WiFi2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.601 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.0650 W/kg
SAR(1 g) = 0.016 W/kg; SAR(10 g) = 0.00657 W/kg
Maximum value of SAR (measured) = 0.0151 W/kg



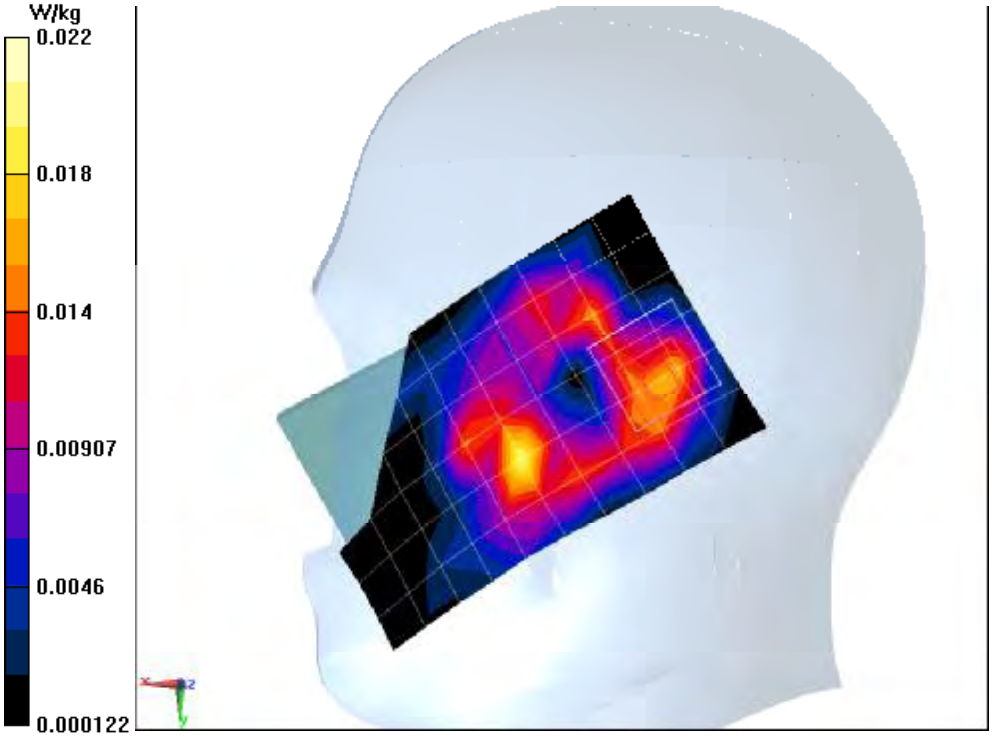
802.11b Right Cheek Low

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Head 2450MHz
Medium parameters used: f = 2412 MHz; σ = 1.787 S/m; εr = 39.087; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WiFi 2450 MHz; Frequency: 2412 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (4.34, 4.34, 4.34)
Low Cheek Right WiFi2450MHz/Area Scan (11x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0865 W/kg
Low Cheek Right WiFi2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.218 V/m; Power Drift = 0.20 dB
Peak SAR (extrapolated) = 0.197 W/kg
SAR(1 g) = 0.093 W/kg; SAR(10 g) = 0.046 W/kg
Maximum value of SAR (measured) = 0.104 W/kg



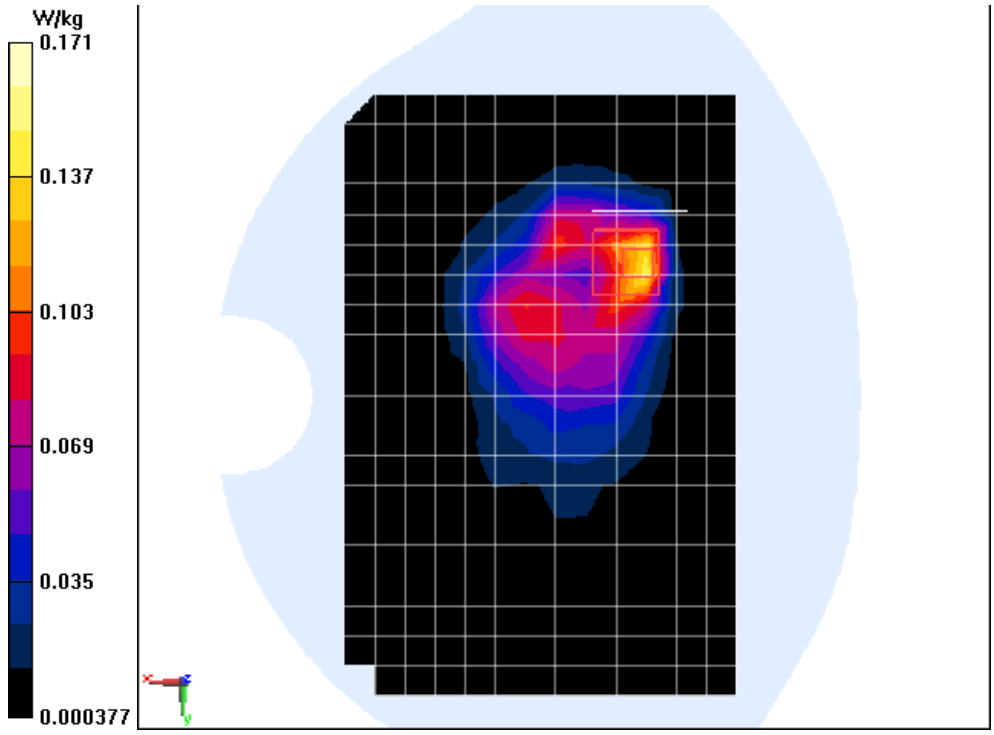
802.11b Right Tilt Low

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Head 2450MHz
Medium parameters used: f = 2412 MHz; σ = 1.787 S/m; εr = 39.087; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WiFi 2450 MHz; Frequency: 2412 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (4.34, 4.34, 4.34)
Low Tilt Right WiFi2450MHz/Area Scan (11x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0137 W/kg
Low Tilt Right WiFi2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.694 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.0460 W/kg
SAR(1 g) = 0.019 W/kg; SAR(10 g) = 0.00984 W/kg
Maximum value of SAR (measured) = 0.0225 W/kg



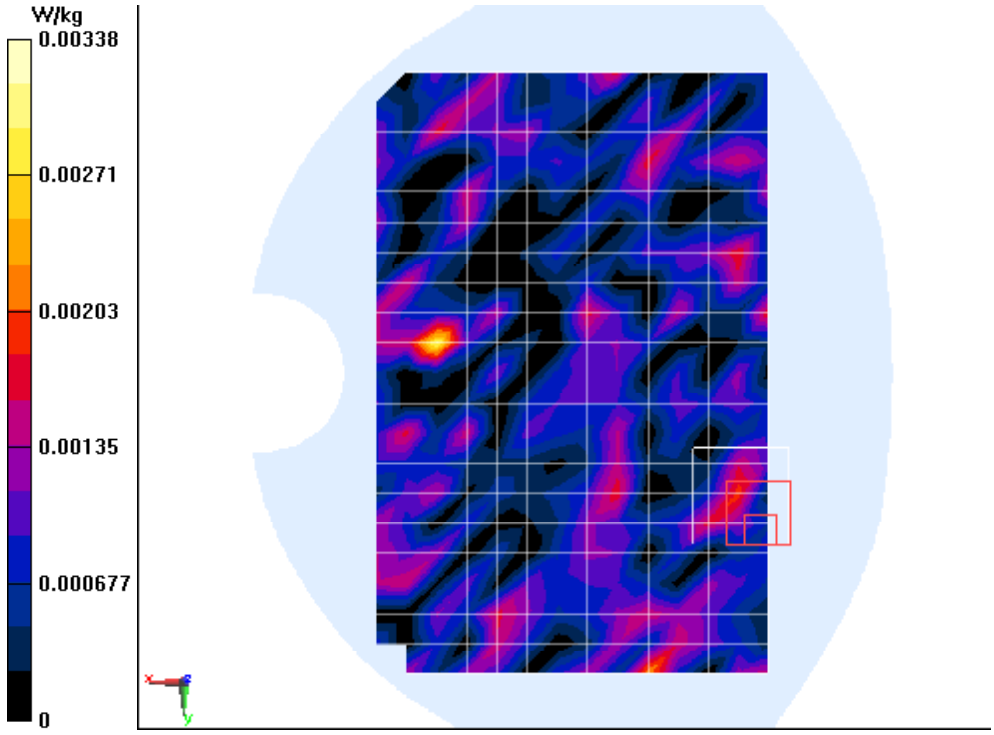
802.11b Body Toward Ground Low

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Body 2450MHz
Medium parameters used: f = 2412 MHz; σ = 1.869 S/m; εr = 53.925; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WiFi 2450 MHz; Frequency: 2412 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (4.20, 4.20, 4.20)
Low Toward Ground WiFi2450MHz/Area Scan (14x21x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.148 W/kg
Low Toward Ground WiFi2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.479 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.295 W/kg
SAR(1 g) = 0.138 W/kg; SAR(10 g) = 0.062 W/kg
Maximum value of SAR (measured) = 0.171 W/kg



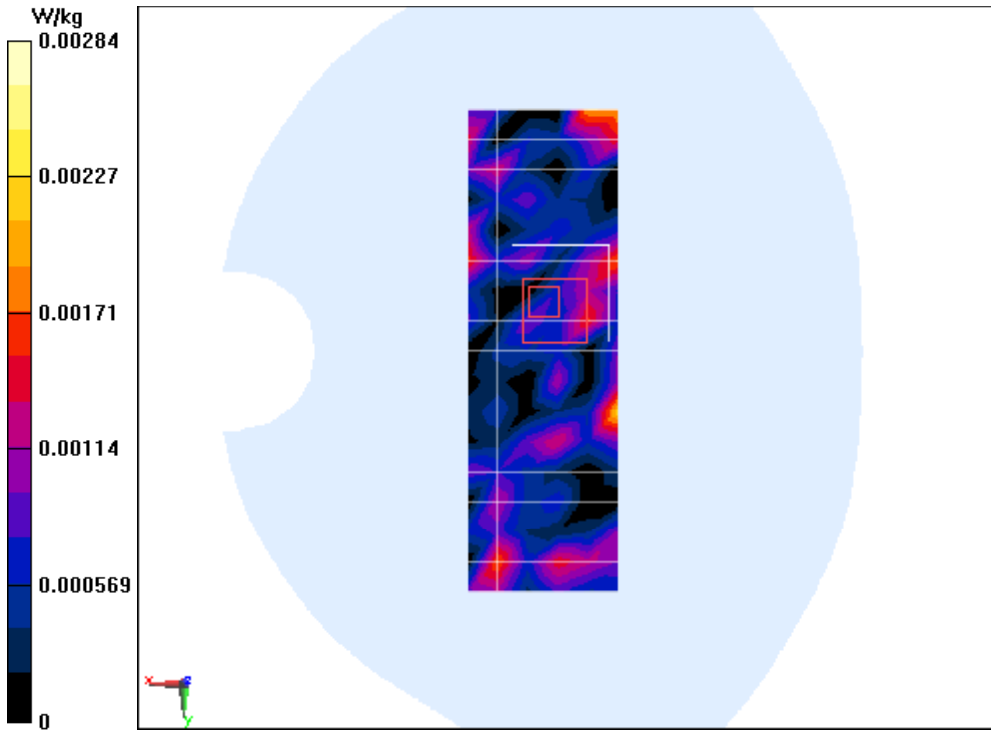
802.11b Body Toward Phantom Low

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Body 2450MHz
Medium parameters used: f = 2412 MHz; σ = 1.869 S/m; εr = 53.925; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WiFi 2450 MHz; Frequency: 2412 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (4.20, 4.20, 4.20)
Low Phantom WiFi2450MHz/Area Scan (14x21x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.00303 W/kg
Low Phantom WiFi2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.685 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.00355 W/kg
SAR(1 g) = 0.000786 W/kg; SAR(10 g) = 0.000138 W/kg
Maximum value of SAR (measured) = 0.00338 W/kg



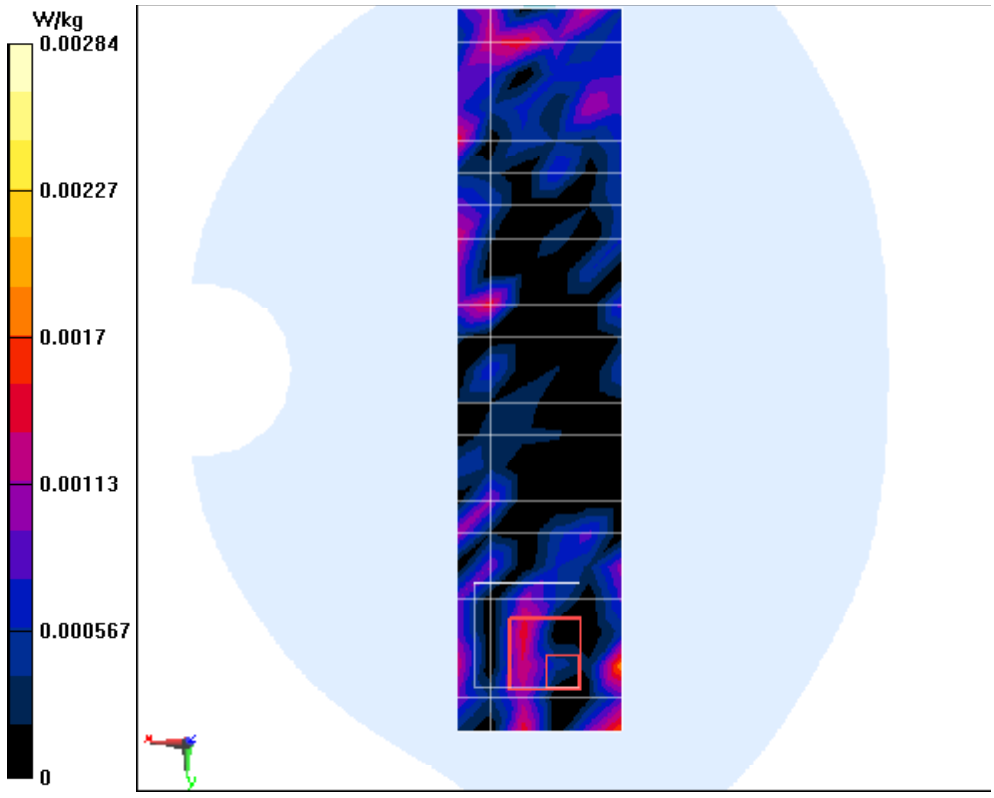
802.11b Body Left Low

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Body 2450MHz
Medium parameters used: f = 2412 MHz; σ = 1.869 S/m; εr = 53.925; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WiFi 2450 MHz; Frequency: 2412 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (4.20, 4.20, 4.20)
Low Left WiFi2450MHz/Area Scan (6x17x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.00223 W/kg
Low Left WiFi2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.866 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.00285 W/kg
SAR(1 g) = 0.00114 W/kg; SAR(10 g) = 0.000285 W/kg
Maximum value of SAR (measured) = 0.00284 W/kg



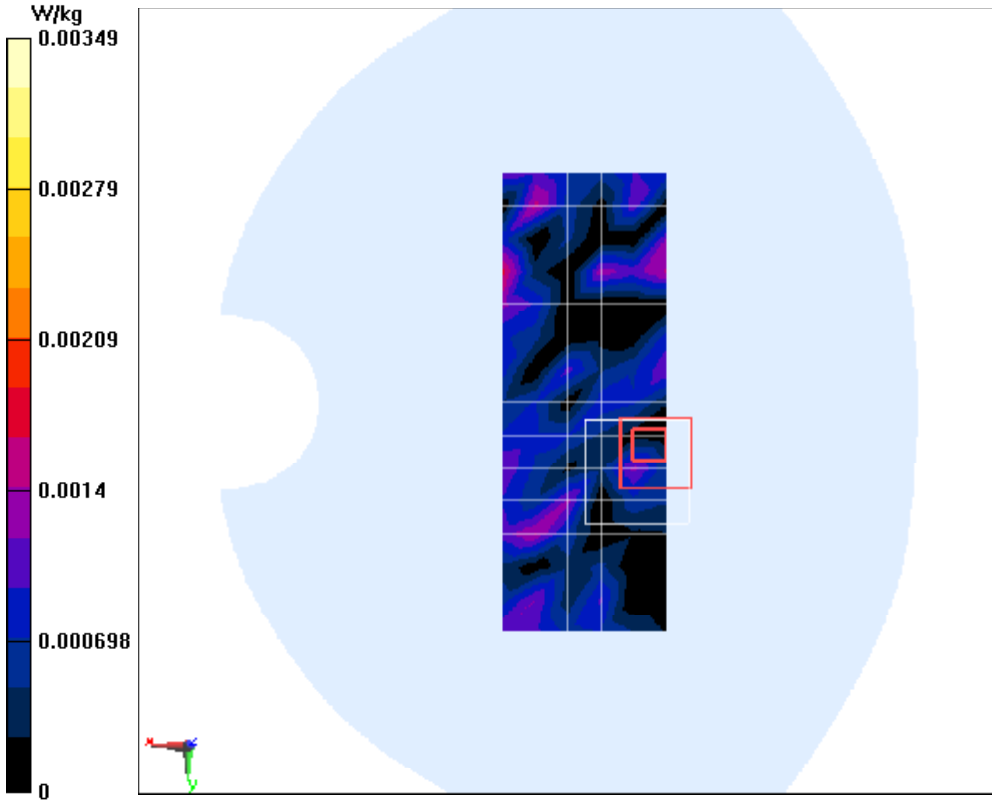
802.11b Body Right Low

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Body 2450MHz
Medium parameters used: f = 2412 MHz; σ = 1.869 mho/m; εr = 53.925; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WiFi 2450 MHz; Frequency: 2412 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (4.20, 4.20, 4.20)
Low Right WiFi2450MHz/Area Scan (6x23x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.00191 W/kg
Low Right WiFi2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.823 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.00272 mW/g
SAR(1 g) = 0.000179 mW/g; SAR(10 g) = 0.0000241 mW/g
Maximum value of SAR (measured) = 0.00284 W/kg



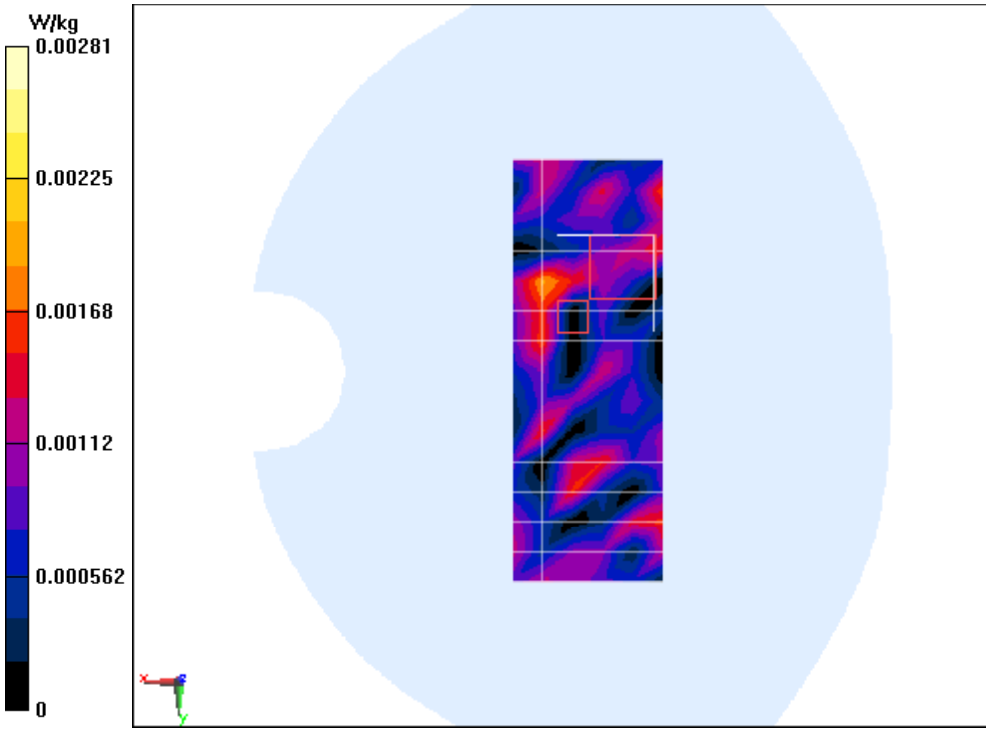
802.11b Body Top Low

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Body 2450MHz
Medium parameters used: f = 2412 MHz; σ = 1.869 mho/m; εr = 53.925; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WiFi 2450 MHz; Frequency: 2412 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (4.20, 4.20, 4.20)
Low Top WiFi2450MHz/Area Scan (6x15x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.00175 W/kg
Low Top WiFi2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.813 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.00358 mW/g
SAR(1 g) = 0.000655 mW/g; SAR(10 g) = 0.000229 mW/g
Maximum value of SAR (measured) = 0.00349 W/kg



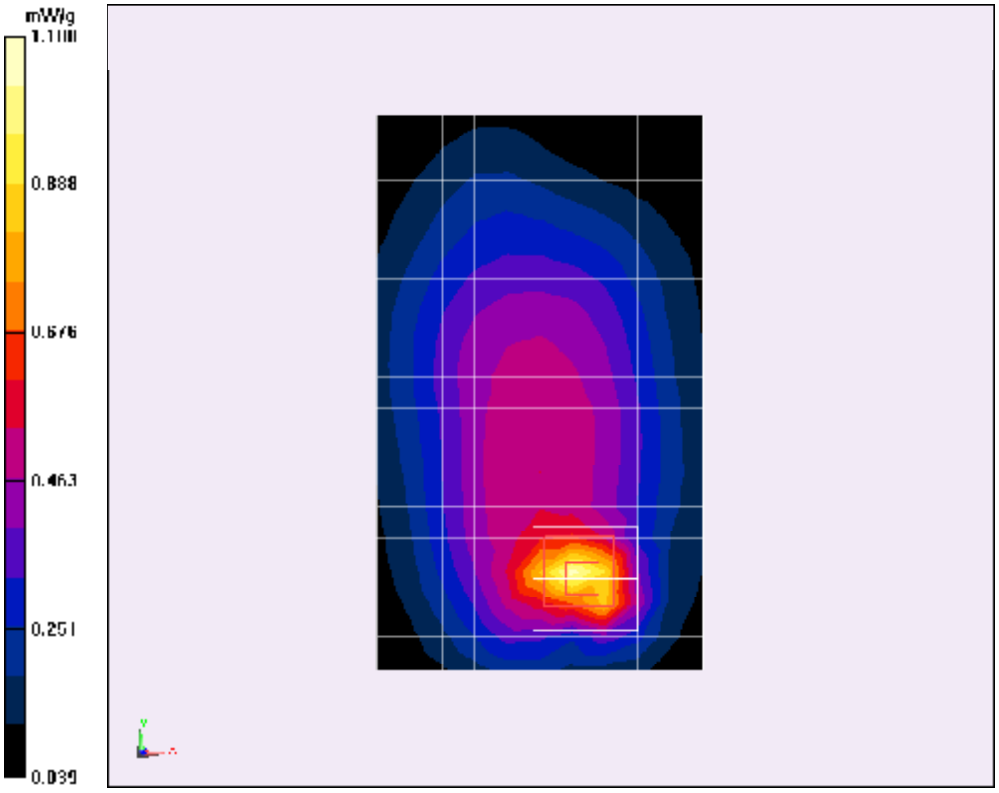
802.11b Body Bottom Low

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Body 2450MHz
Medium parameters used: f = 2412 MHz; σ = 1.869 S/m; εr = 53.925; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WiFi 2450 MHz; Frequency: 2412 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (4.20, 4.20, 4.20)
Low Bottom WiFi2450MHz/Area Scan (6x15x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.00193 W/kg
Low Bottom WiFi2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.905 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.00336 W/kg
SAR(1 g) = 0.00026 W/kg; SAR(10 g) = 0.000054 W/kg
Maximum value of SAR (measured) = 0.00281 W/kg



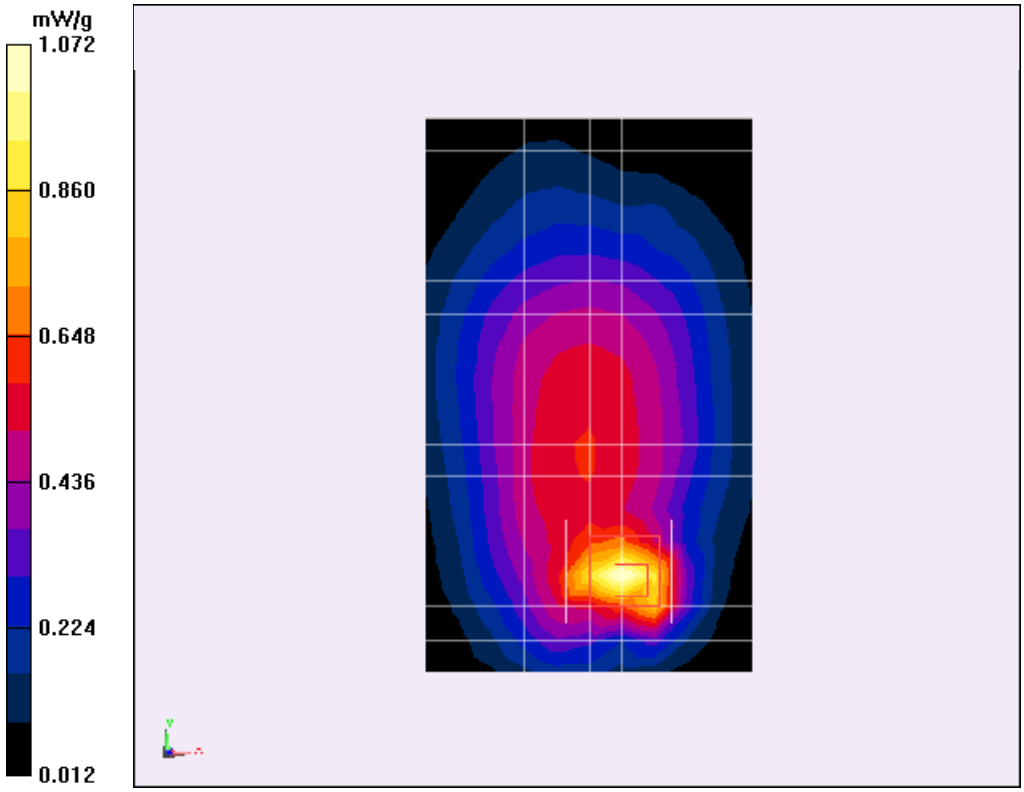
GSM850 Body Toward Ground GPRS 4TS Middle 2

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used: f = 837 MHz; σ = 1.018 mho/m;εr = 55.879; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: GPRS 4TS 850MHz; Frequency: 836.6 MHz; Duty Cycle: 1:2
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)
Middle Toward Ground GPRS 4TS 850MHz 2/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.060 mW/g
Middle Toward Ground GPRS 4TS 850MHz 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.152 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.8360mW/g
SAR(1 g) = 0.996 mW/g; SAR(10 g) = 0.540 mW/g
Maximum value of SAR (measured) = 1.100 mW/g



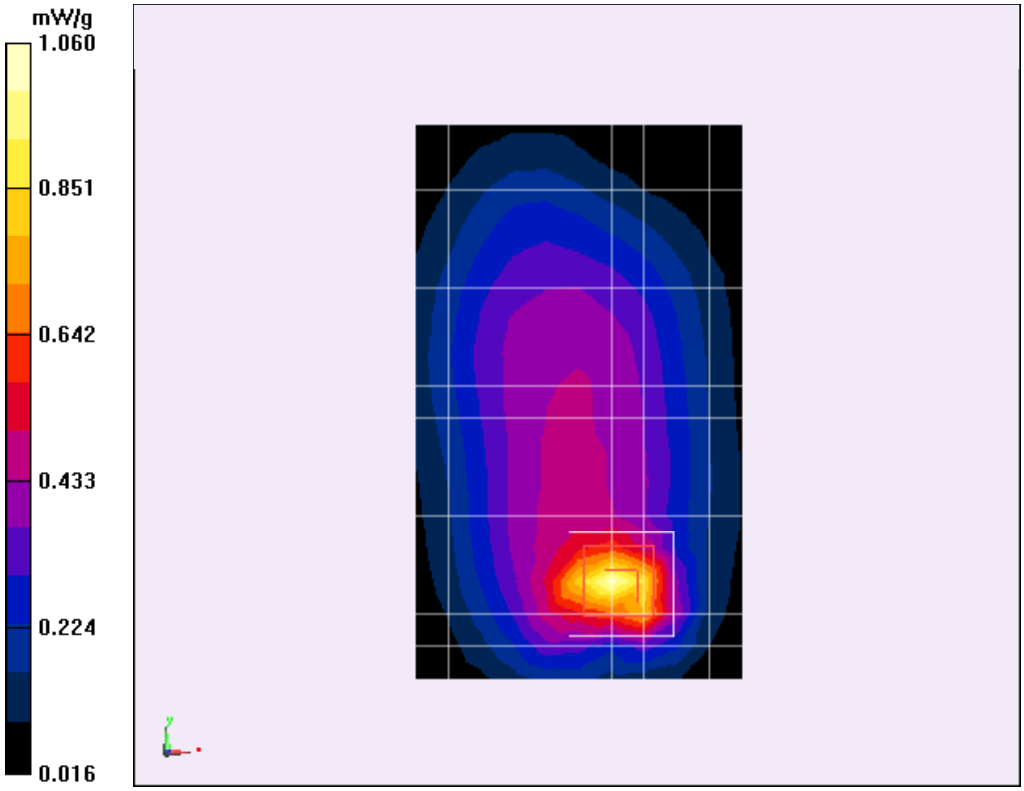
GSM850 Body Toward Ground GPRS 4TS High 2

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used: f = 849 MHz; σ = 1.03 mho/m;εr = 55.763; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: GPRS 4TS 850MHz; Frequency: 848.8 MHz; Duty Cycle: 1:2
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)
High Toward Ground GPRS 4TS 850MHz 2/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.036 mW/g
High Toward Ground GPRS 4TS 850MHz 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.258 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.8150mW/g
SAR(1 g) = 0.987 mW/g; SAR(10 g) = 0.536 mW/g
Maximum value of SAR (measured) = 1.072 mW/g



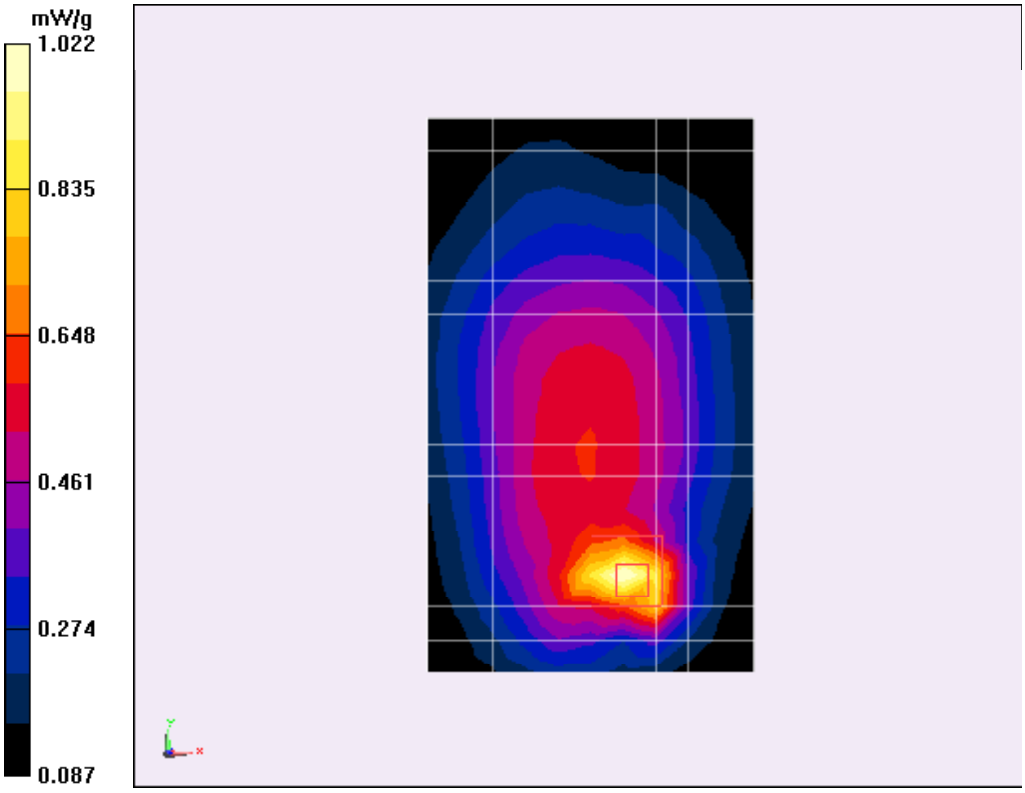
GSM850 Body Toward Ground GPRS 4TS Low 2

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used (interpolated): f = 824.2 MHz; σ = 1.005 mho/m;εr = 56.007; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: GPRS 4TS 850MHz; Frequency: 824.2 MHz; Duty Cycle: 1:2
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)
Low Toward Ground GPRS 4TS 850MHz 2/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.004 mW/g
Low Toward Ground GPRS 4TS 850MHz 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.994 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.7630 mW/g
SAR(1 g) = 0.975 mW/g; SAR(10 g) = 0.527 mW/g
Maximum value of SAR (measured) = 1.060 mW/g



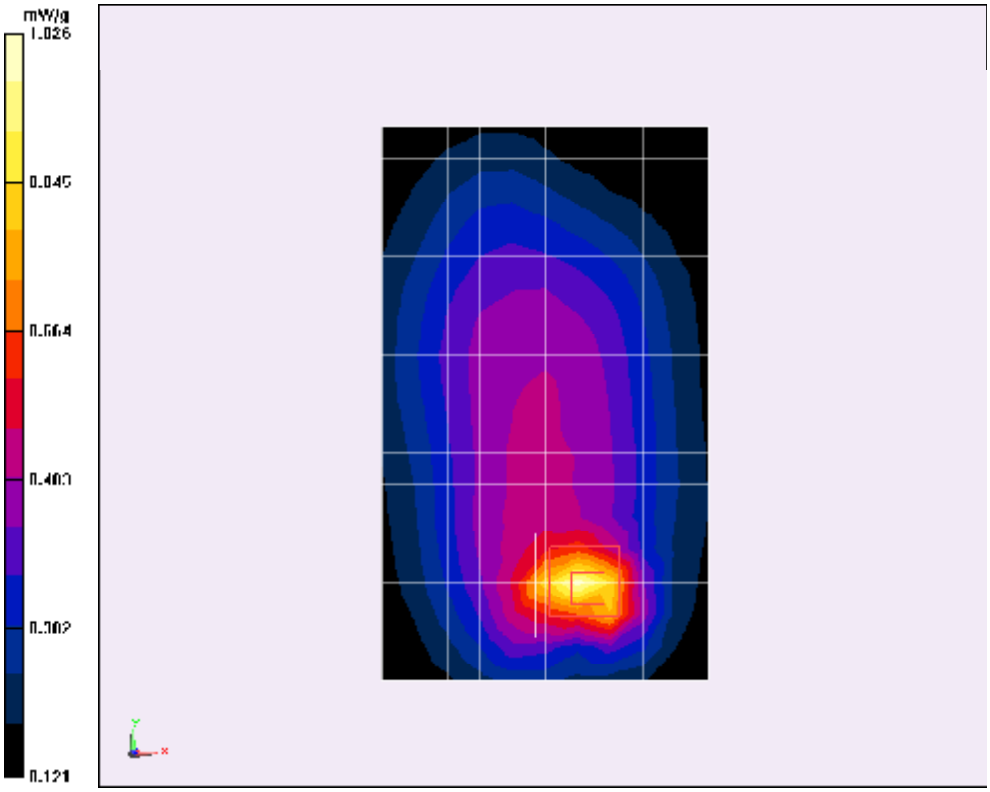
GSM850 Body Toward Ground E-GPRS 4TS Middle 2

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used: f = 837 MHz; σ = 1.018 mho/m;εr = 55.879; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: E-GPRS 4TS 850MHz; Frequency: 836.6 MHz; Duty Cycle: 1:2
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)
Middle Toward Ground E-GPRS 4TS 850MHz 2/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.038 mW/g
Middle Toward Ground E-GPRS 4TS 850MHz 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.869 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 1.7540 mW/g
SAR(1 g) = 0.972 mW/g; SAR(10 g) = 0.522 mW/g
Maximum value of SAR (measured) = 1.022 mW/g



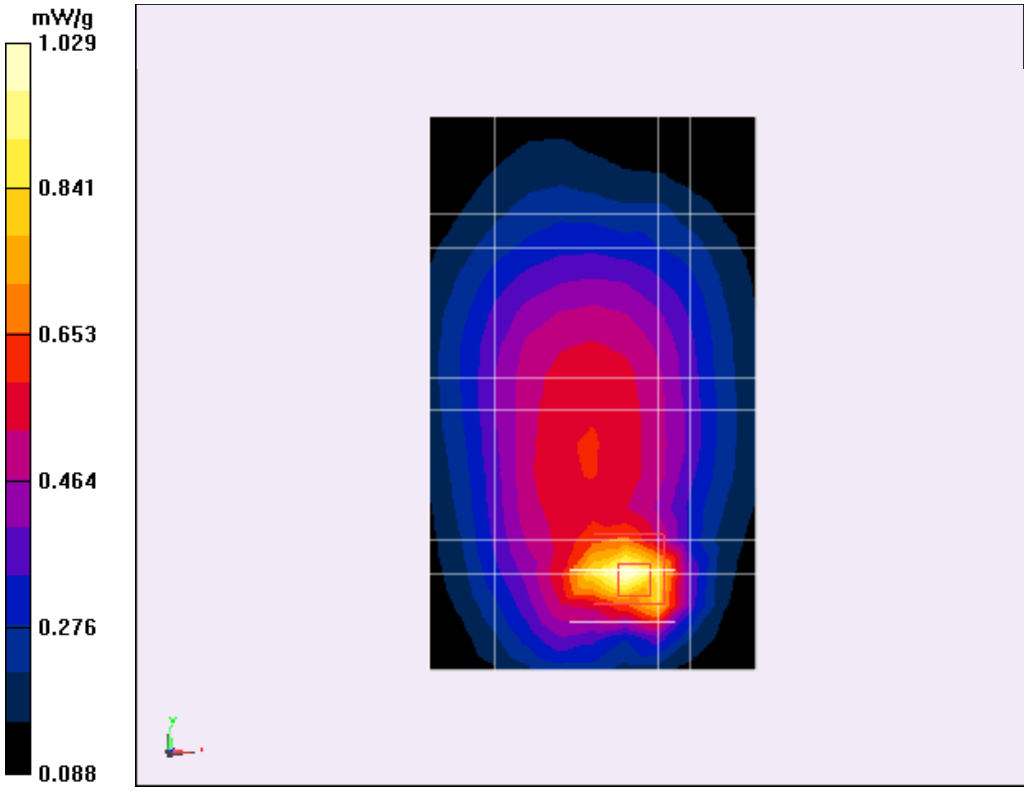
GSM1900 Body Toward Ground GPRS 4TS Middle 2

Date/Time: 05/29/2013
Electronics: DAE4 Sn797
Medium: Body 1800MHz
Medium parameters used: f = 1880 MHz; σ = 1.504 mho/m;εr = 53.319; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: GPRS 4TS 1900MHz; Frequency: 1880 MHz; Duty Cycle: 1:2
Probe: ES3DV3 - SN3158ConvF(4.60, 4.60, 4.60)
Middle Toward Ground GPRS 4TS 1900MHz 2/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.101 mW/g
Middle Toward Ground GPRS 4TS 1900MHz 2/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.102 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.6930 mW/g
SAR(1 g) = 0.962 mW/g; SAR(10 g) = 0.536 mW/g
Maximum value of SAR (measured) = 1.026 mW/g



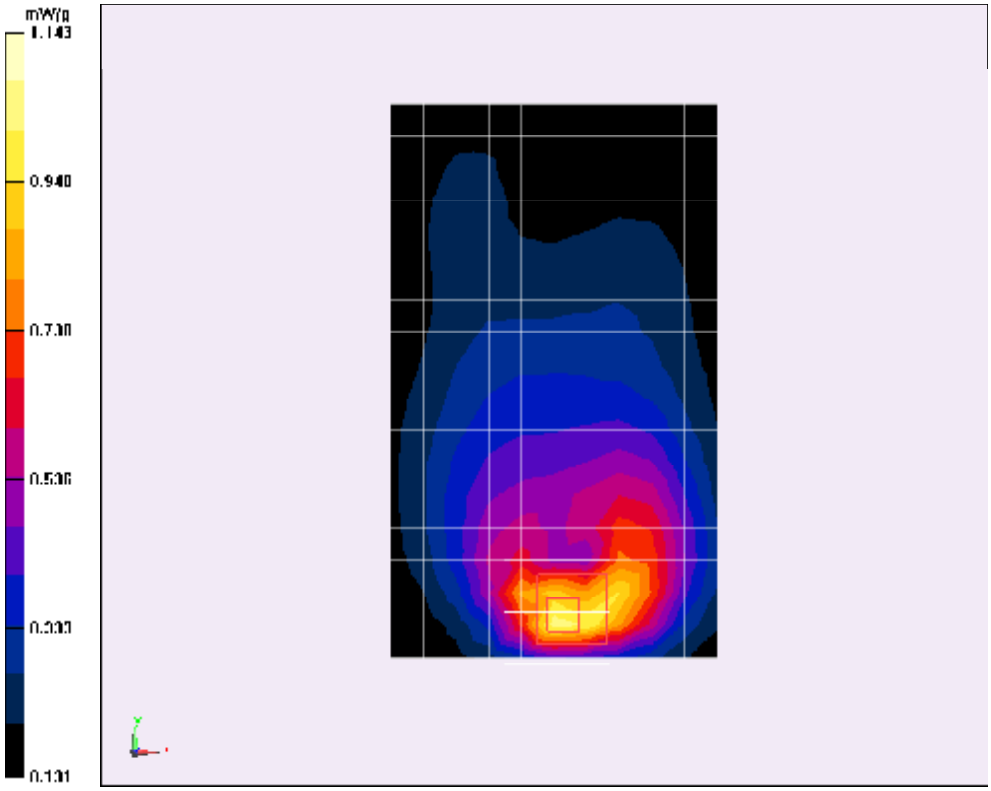
GSM1900 Body Toward Ground GPRS 4TS High 2

Date/Time: 05/29/2013
Electronics: DAE4 Sn797
Medium: Body 1900MHz
Medium parameters used: f = 1910 MHz; σ = 1.534 mho/m;εr = 53.187; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: GPRS 4TS 1900MHz; Frequency: 1909.8 MHz; Duty Cycle: 1:2
Probe: ES3DV3 - SN3158ConvF(4.60, 4.60, 4.60)
High Toward Ground GPRS 4TS 1900MHz 2/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.256 mW/g
High Toward Ground GPRS 4TS 1900MHz 2/Zoom Scan (7x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.863 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.8020 mW/g
SAR(1 g) = 0.991 mW/g; SAR(10 g) = 0.532 mW/g
Maximum value of SAR (measured) = 1.029 mW/g



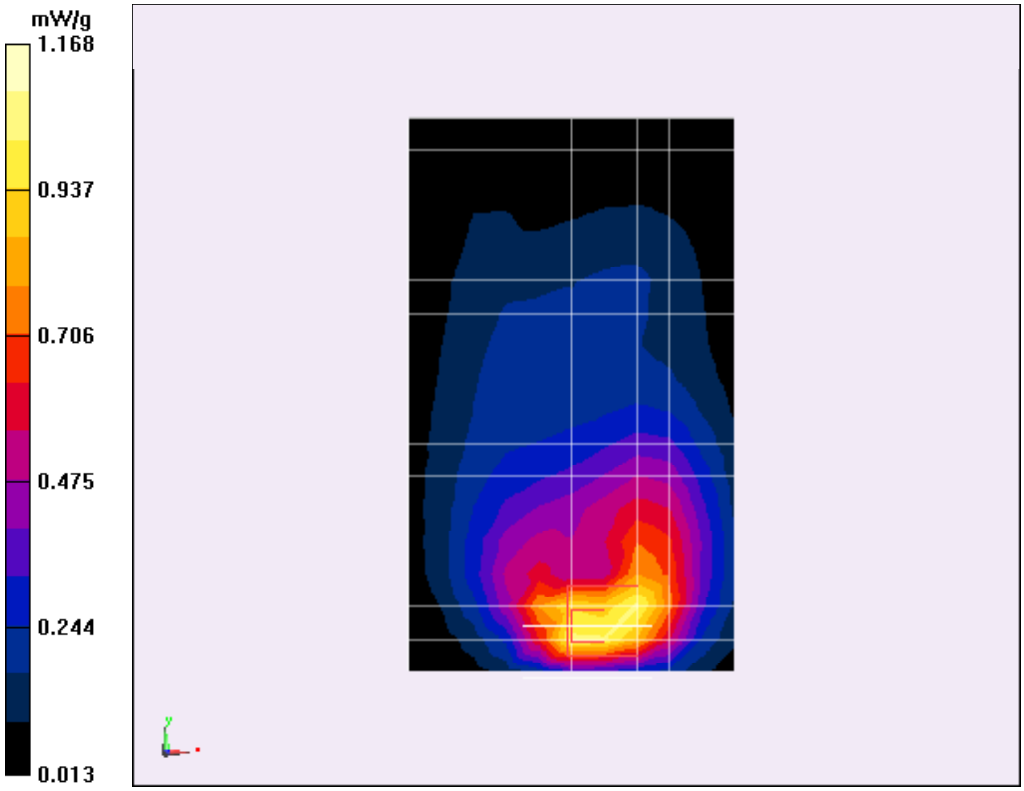
GSM1900 Body Toward Ground GPRS 4TS Low 2

Date/Time: 05/29/2013
Electronics: DAE4 Sn797
Medium: Body 1800MHz
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.483 mho/m;εr = 53.517; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: GPRS 4TS 1900MHz; Frequency: 1850.2 MHz; Duty Cycle: 1:2
Probe: ES3DV3 - SN3158ConvF(4.60, 4.60, 4.60)
Low Toward Ground GPRS 4TS 1900MHz 2/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.113 mW/g
Low Toward Ground GPRS 4TS 1900MHz 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.798 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.8020 mW/g
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.567 mW/g
Maximum value of SAR (measured) = 1.143 mW/g



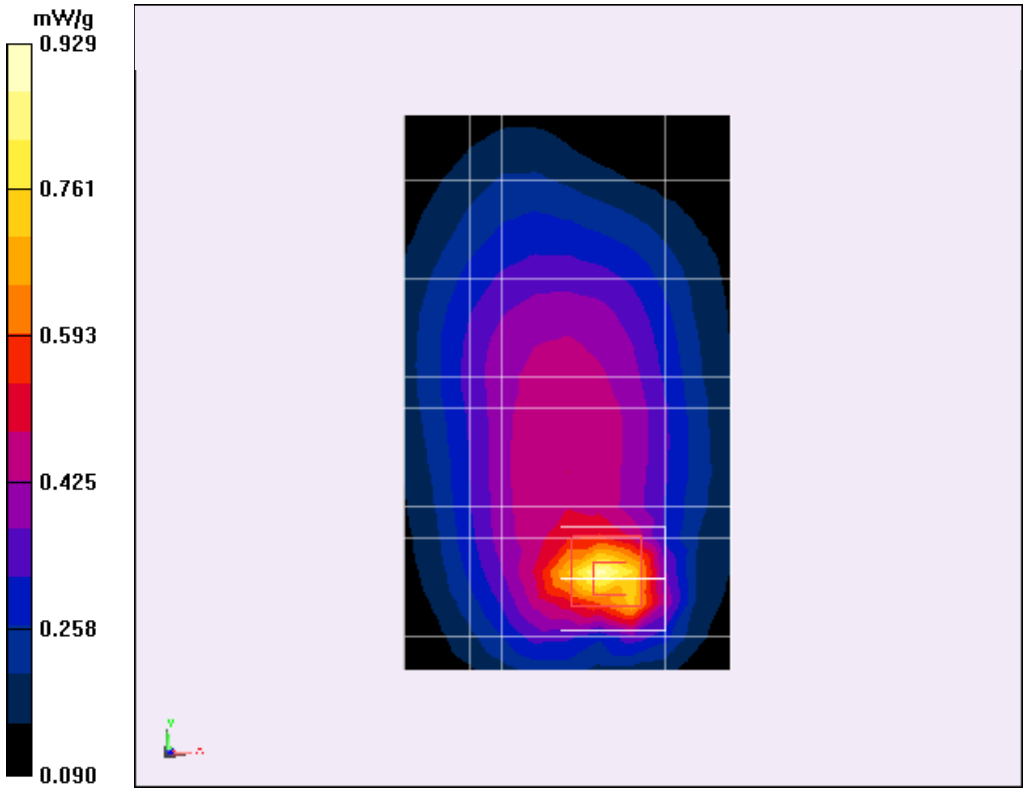
GSM1900 Body Toward Ground E-GPRS 4TS Low 2

Date/Time: 05/29/2013
Electronics: DAE4 Sn797
Medium: Body 1800MHz
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.483 mho/m;εr = 53.517; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: E-GPRS 4TS 1900MHz; Frequency: 1850.2 MHz; Duty Cycle: 1:2
Probe: ES3DV3 - SN3158ConvF(4.60, 4.60, 4.60)
Low Toward Ground E-GPRS 4TS 1900MHz 2/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.143 mW/g
Low Toward Ground E-GPRS 4TS 1900MHz 2/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.205 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.7430 mW/g
SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.567 mW/g
Maximum value of SAR (measured) = 1.168 mW/g



WCDMA850 Body Toward Ground High 2

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used: f = 846.6 MHz; σ = 1.028 mho/m;εr = 55.783; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WCDMA Band V; Frequency: 848.6 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)
High Toward Ground WCDMA850MHz 2/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.957 mW/g
High Toward Ground WCDMA850MHz 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.001 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.5060 mW/g
SAR(1 g) = 0.855 mW/g; SAR(10 g) = 0.477 mW/g
Maximum value of SAR (measured) = 0.929 mW/g

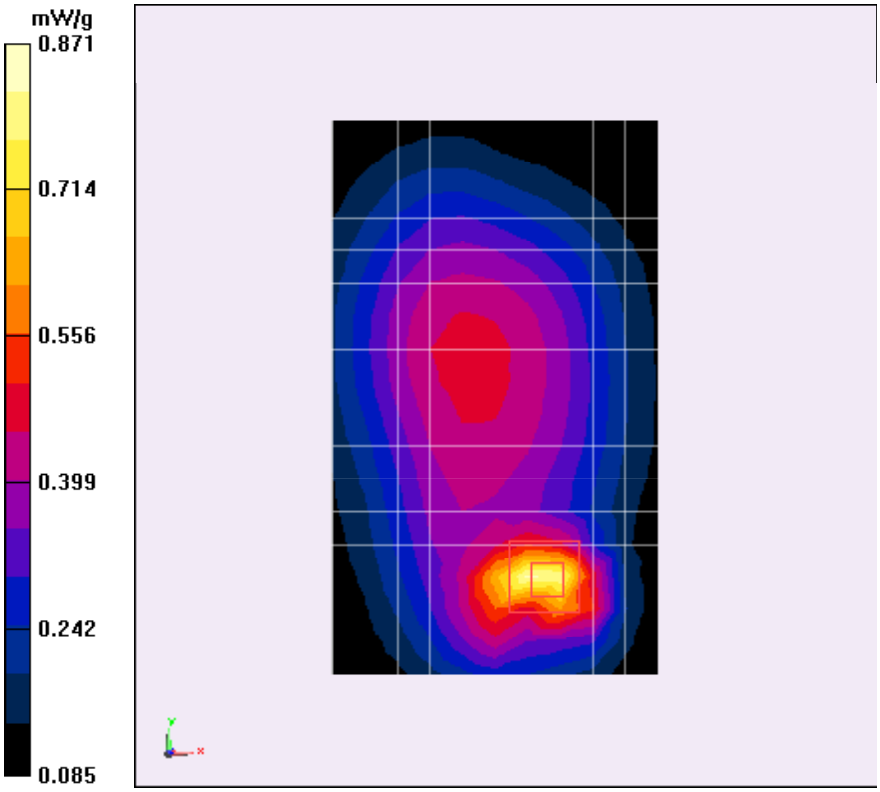


WCDMA850 Body Toward Ground High With Headset 2

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Body 850MHz
Medium parameters used: f = 846.6 MHz; σ = 1.028 mho/m;εr = 55.783; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: WCDMA Band V; Frequency: 848.6 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (5.99, 5.99, 5.99)

High Toward Ground WCDMA850MHz With Headset 2/Area Scan (11x18x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.859 mW/g

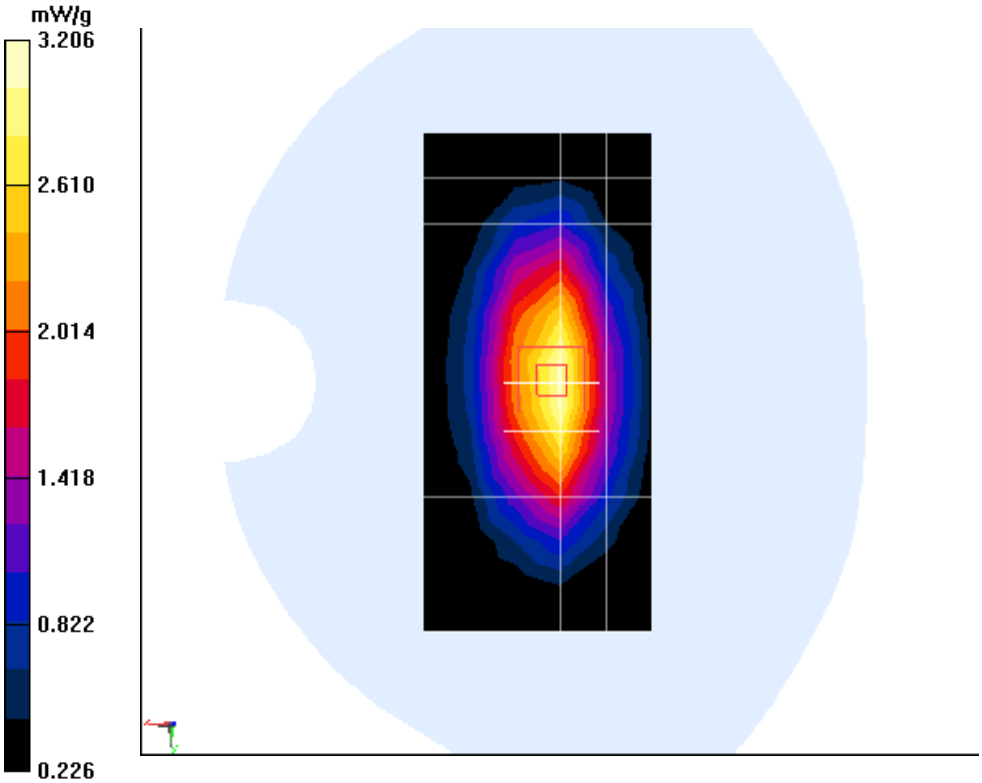
High Toward Ground WCDMA850MHz With Headset 2/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.596 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.3580 mW/g
SAR(1 g) = 0.774 mW/g; SAR(10 g) = 0.428 mW/g
Maximum value of SAR (measured) = 0.871 mW/g



ANNEX B SYSTEM VALIDATION RESULTS

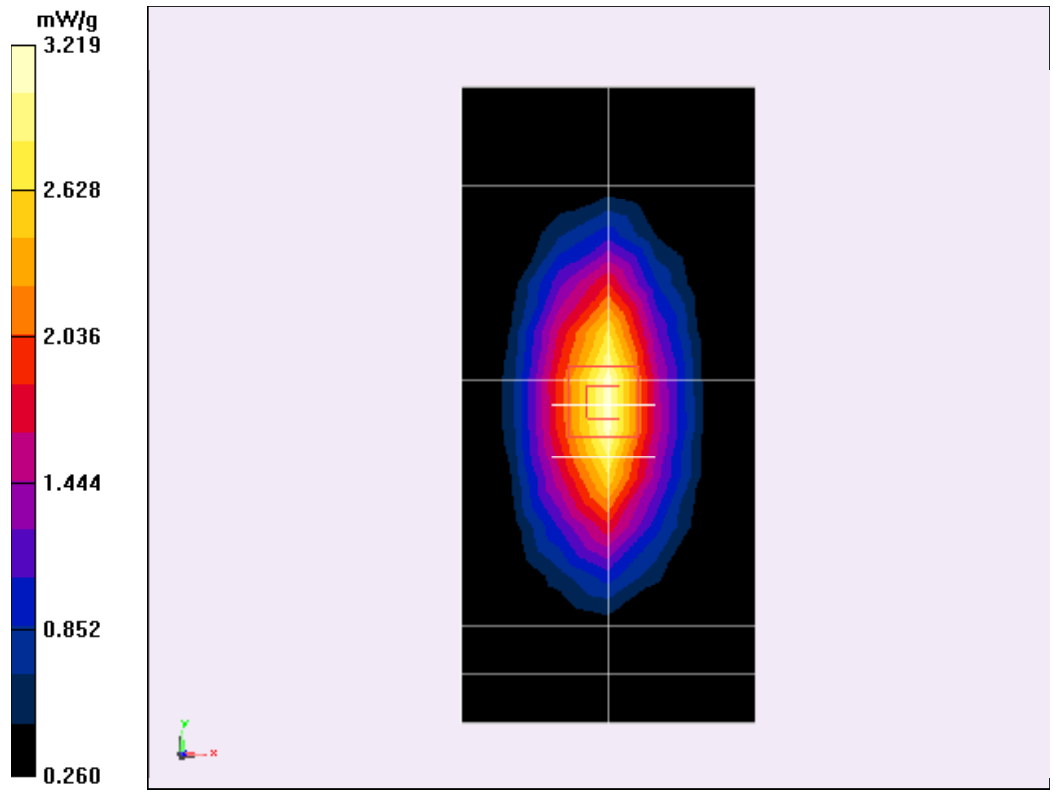
850MHz System Validation Head

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Head 850MHz
Medium parameters used: f = 850 MHz; σ = 0.981 mho/m;εr = 39.604; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF(5.93, 5.93, 5.93)
System Performance Check-850MHz Head /Area Scan (6x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.058 mW/g
System Performance Check-850MHz Head /Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 58.608 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 4.1470mW/g
SAR(1 g) = 2.71 mW/g; SAR(10 g) = 1.73 mW/g
Maximum value of SAR (measured) = 3.206 mW/g



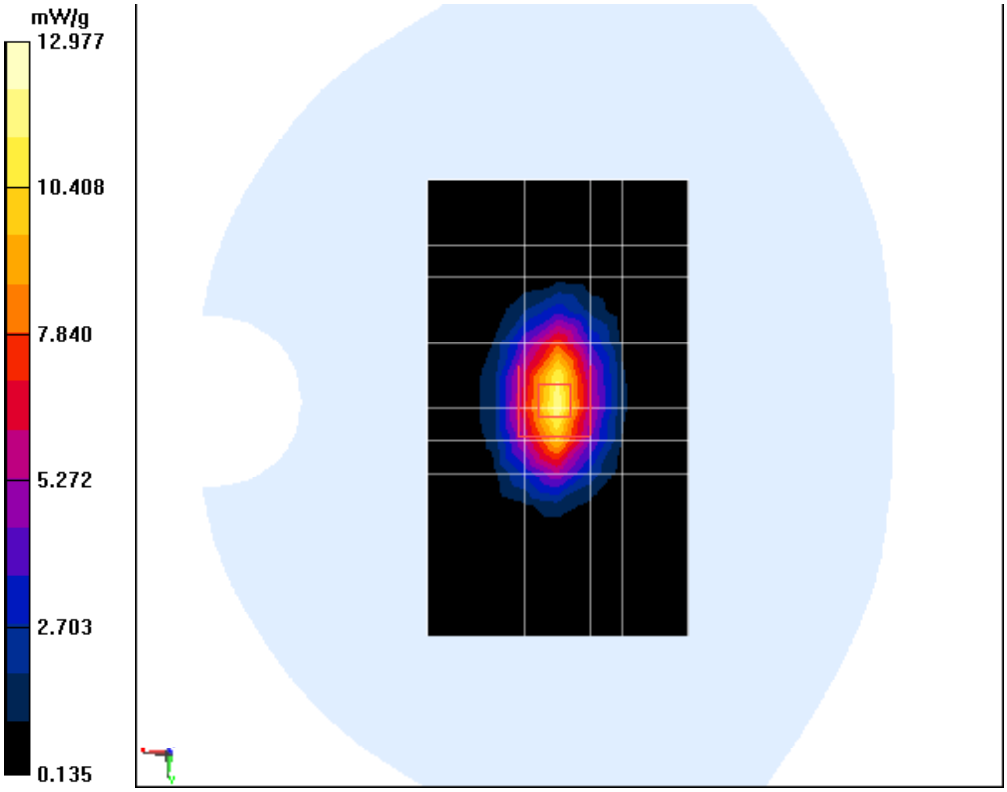
850MHz System Validation Body

Date/Time: 06/17/2013
Electronics: DAE4 Sn797
Medium: Body850MHz
Medium parameters used: f = 850 MHz; σ = 1.081 mho/m;εr = 55.231; ρ = 1000 kg/m3
Ambient Temperature:22.5° C Liquid Temperature:22.5° C
Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF(5.95, 5.95, 5.95)
System Performance Check-850MHz Body /Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.142 mW/g
System Performance Check-850MHz Body /Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 54.725 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 4.1560 mW/g
SAR(1 g) = 2.74 mW/g; SAR(10 g) = 1.78 mW/g
Maximum value of SAR (measured) = 3.219 mW/g



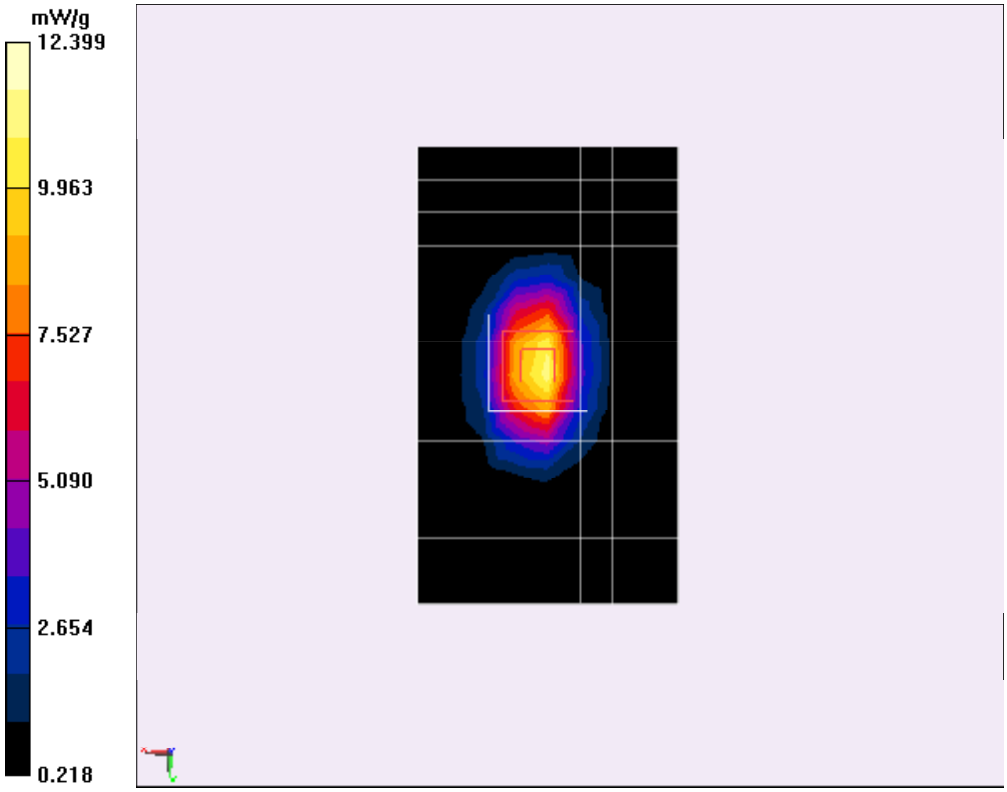
1900MHz System Validation Head

Date/Time: 05/29/2013
Electronics: DAE4 Sn797
Medium: Head 1950MHz
Medium parameters used: f = 1900 MHz; σ = 1.459 mho/m; εr = 40.531; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF(5.06, 5.06, 5.06)
System Performance Check 1900MHz Head/Area Scan (9x15x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 12.167 mW/g
System Performance Check 1900MHz Head/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.877 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 20.3730 mW/g
SAR(1 g) = 10 mW/g; SAR(10 g) = 4.91 mW/g
Maximum value of SAR (measured) = 12.977 mW/g



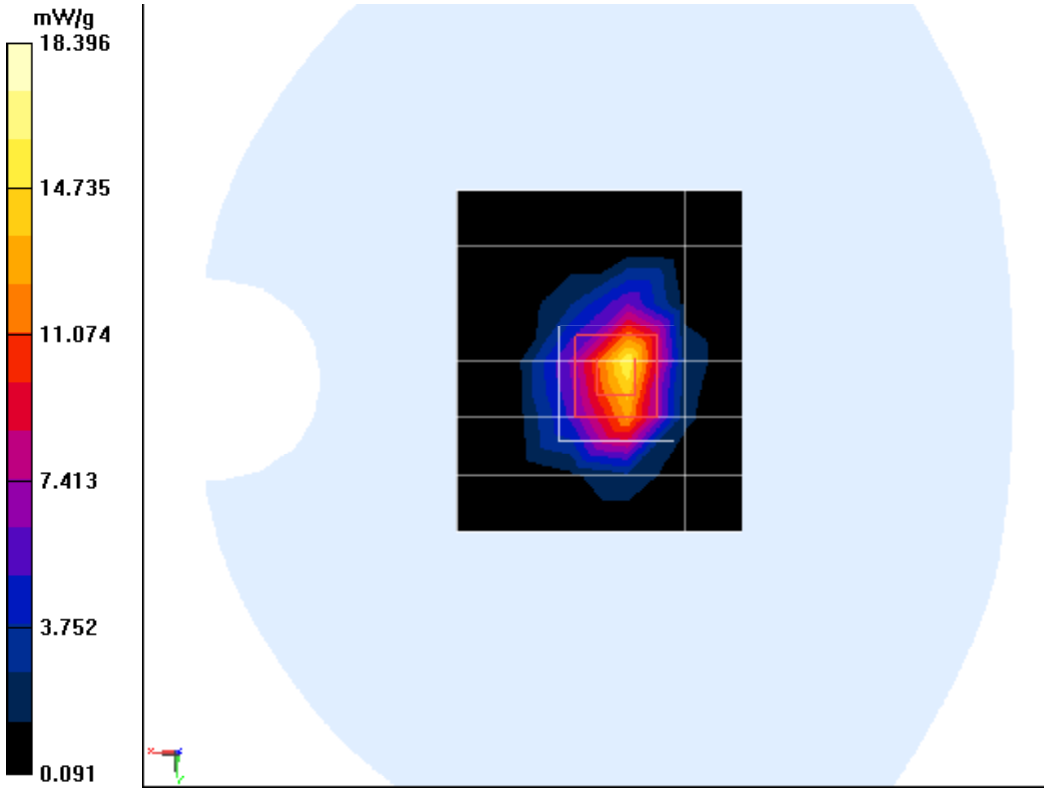
1900MHz System Validation Body

Date/Time: 05/29/2013
Electronics: DAE4 Sn797
Medium: Body 1950MHz
Medium parameters used: f = 1900 MHz; σ = 1.524 mho/m; εr = 53.237; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF(4.77, 4.77, 4.77)
System Performance Check 1900MHz Body/Area Scan (9x15x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 11.272 mW/g
System Performance Check 1900MHz Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.628 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 17.9180 mW/g
SAR(1 g) = 9.72 mW/g; SAR(10 g) = 5.03 mW/g
Maximum value of SAR (measured) = 12.399 mW/g



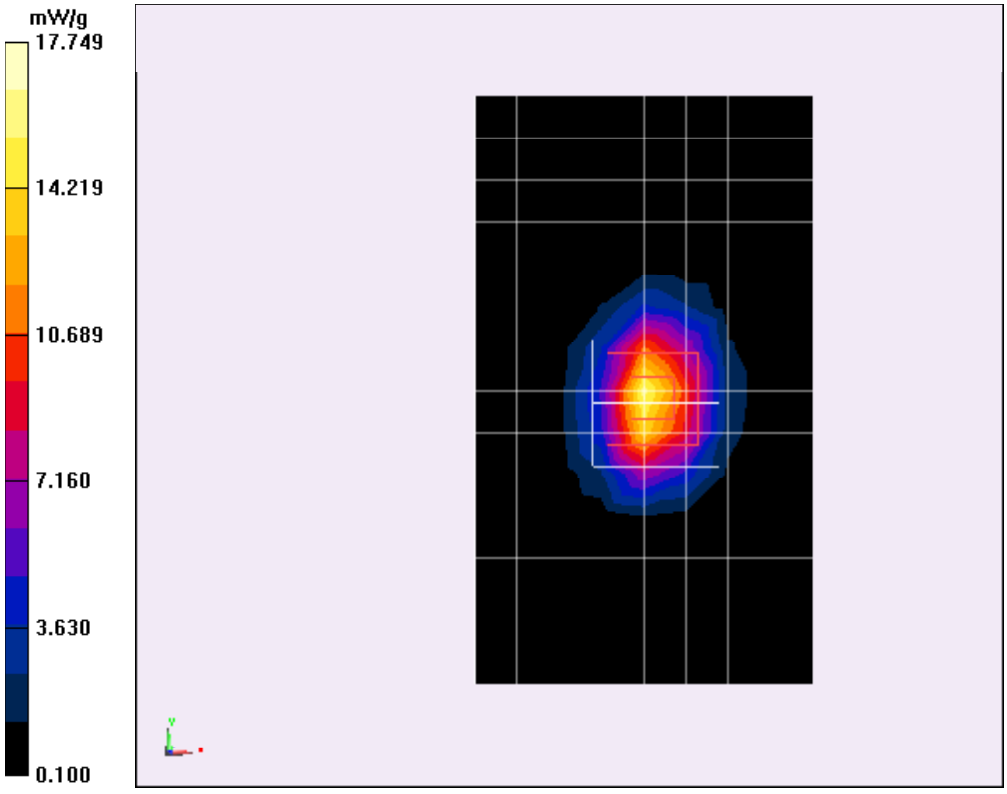
2450MHz System Validation Head

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Head 2450MHz
Medium parameters used: f = 2450 MHz; σ = 1.824 mho/m; εr = 38.867; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF(4.34, 4.34, 4.34)
System Validation 2450MHz Head /Area Scan (6x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 16.029 mW/g
System Validation 2450MHz Head /Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.5 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 29.1400 mW/g
SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.37 mW/g
Maximum value of SAR (measured) = 18.396 mW/g



2450MHz System Validation Body

Date/Time: 05/30/2013
Electronics: DAE4 Sn797
Medium: Body 2450MHz
Medium parameters used: f = 2450 MHz; σ = 1.918 mho/m; εr = 53.951; ρ = 1000 kg/m3
Ambient Temperature:22.5°C Liquid Temperature:22.5°C
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Probe: ES3DV3 - SN3158ConvF (4.20, 4.20, 4.20)
System Validation 2450MHz Body /Area Scan (9x15x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 16.913 mW/g
System Validation 2450MHz Body /Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.495 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 27.8560 mW/g
SAR(1 g) = 13.4 mW/g; SAR(10 g) = 6.19 mW/g
Maximum value of SAR (measured) = 17.749 mW/g



ANNEX C Calibration certificate

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

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

Accredited by the Swiss Accreditation Service (SAS)
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Accreditation No.: SCS 108

Client CTTL (PTT)

Certificate No: ES3-3158_Jul12

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3158

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

Calibration date: July 19, 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. 217-01506)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01506)	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

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

Issued: July 19, 2012

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Certificate No: ES3-3158_Jul12 Page 1 of 11

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Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization α	α rotation around probe axis
Polarization β	β rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., β = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) 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
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization β = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; VRx,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 ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

ES3DV3 – SN:3158 July 19, 2012

Probe ES3DV3

SN:3158

Manufactured: August 13, 2007
Calibrated: July 19, 2012

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

Certificate No: ES3-3158_Jul12 Page 3 of 11

ES3DV3– SN:3158 July 19, 2012

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3158

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μV/(V/m)^2)^A	1.09	1.21	1.21	± 10.1 %
DCP (mV)^B	103.6	103.9	101.1	

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	144.6	±3.0 %
			Y	0.00	0.00	1.00	112.7	
			Z	0.00	0.00	1.00	115.1	

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

A The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 8).
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.

ES3DV3 SN:3158 July 10, 2012

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3158

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	6.40	6.40	6.40	0.16	2.22	± 12.0 %
835	41.5	0.90	6.02	6.02	6.02	0.20	1.82	± 12.0 %
900	41.5	0.97	5.93	5.93	5.93	0.15	2.25	± 12.0 %
1750	40.1	1.37	5.30	5.30	5.30	0.67	1.40	± 12.0 %
1900	40.0	1.40	5.06	5.06	5.06	0.69	1.37	± 12.0 %
1950	40.0	1.40	4.90	4.90	4.90	0.80	1.26	± 12.0 %
2450	39.2	1.80	4.34	4.34	4.34	0.79	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.

ES3DV3- SN:3158 July 19, 2012

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3158

Calibration Parameter Determined in Body Tissue Simulating Media

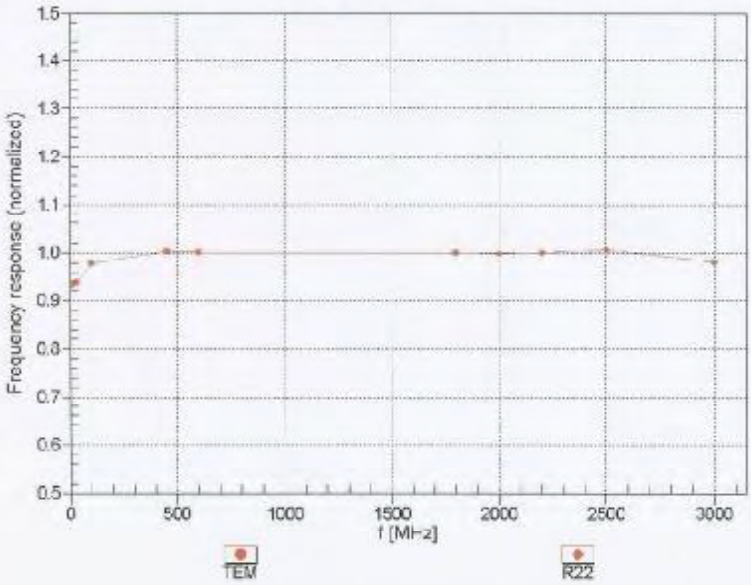
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.12	6.12	6.12	0.65	1.31	± 12.0 %
835	55.2	0.97	5.99	5.99	5.99	0.68	1.29	± 12.0 %
900	55.0	1.05	5.95	5.95	5.95	0.80	1.17	± 12.0 %
1750	53.4	1.49	4.85	4.85	4.85	0.43	1.73	± 12.0 %
1900	53.3	1.52	4.60	4.60	4.60	0.40	1.83	± 12.0 %
1950	53.3	1.52	4.77	4.77	4.77	0.65	1.39	± 12.0 %
2450	52.7	1.95	4.20	4.20	4.20	0.80	1.12	± 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.

ES3DV3- SN:3158 July 19, 2012

Frequency Response of E-Field

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

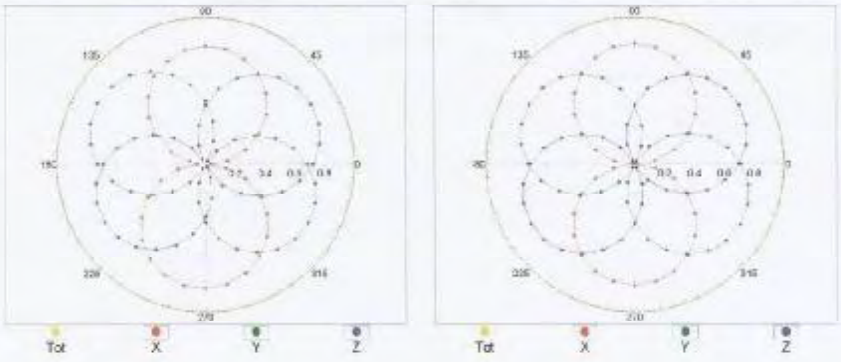


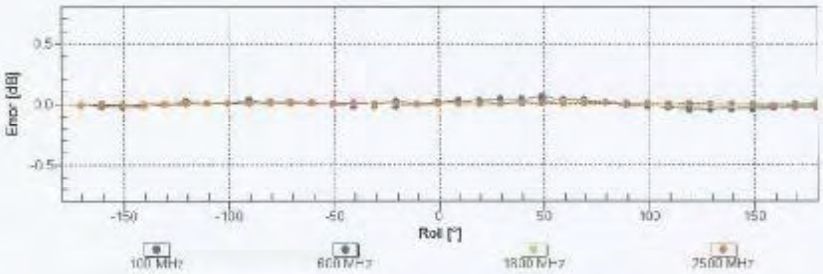
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ES3DV3- SN:3158 July 19, 2012

Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM f=1800 MHz,R22

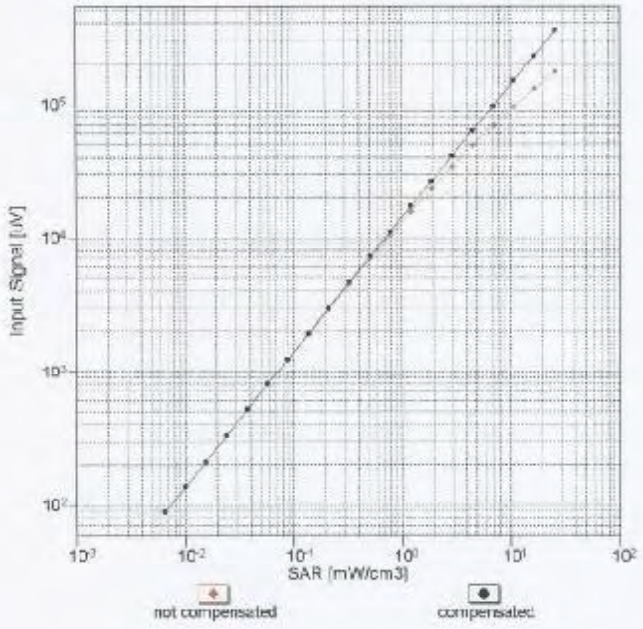


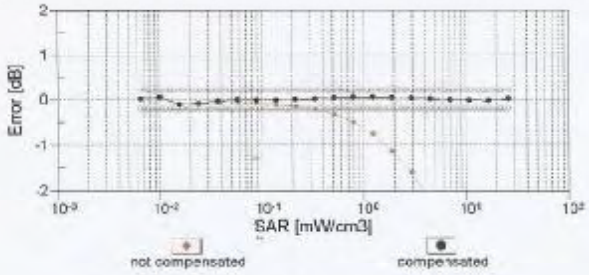


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ES3DV3- SN:3158 July 19, 2012

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





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

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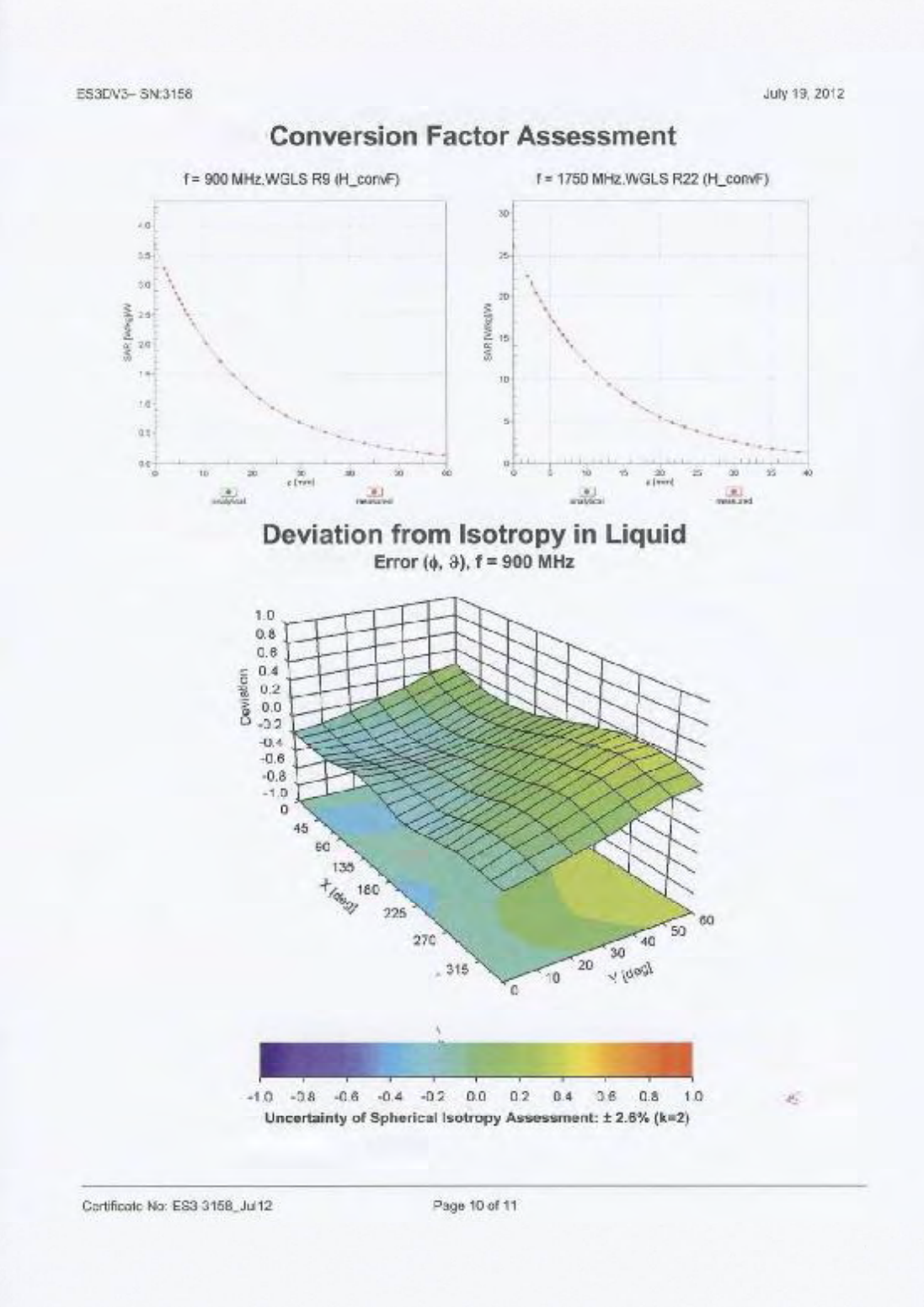
ES3DV3- SN:3158
July 19, 2012
Conversion Factor Assessment
f = 900 MHz,WGLS R9 (H_convF)
f = 1750 MHz,WGLS R22 (H_convF)
Deviation from Isotropy in Liquid
Error (ϕ, ϑ), f = 900 MHz
Deviation
X [deg]
Y [deg]
Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)
Certificate No: ES3 3158_Jul12
Page 10 of 11

ES3DV3- SN:3158 July 19, 2012

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3158

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	119.3
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

Certificate No: ES3-3158_Jul12 Page 11 of 11

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IMPORTANT NOTICE

USAGE OF THE DAE 4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:
Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:
Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:
To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

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TN_BR040315AD DAE4.doc 11.12.2009

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Accreditation No.: SCS 108

Client CTTL (PTT) Certificate No: DAE4-797_Jul12

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BJ - SN: 797
Calibration procedure(s)	QA CAL-06.v24 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	July 12, 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
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-11 (No:11450)	Sep-12
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V2.1	SE UWS 053 AA 1001	05-Jan-12 (in house check)	In house check: Jan-13

	Name	Function	Signature
Calibrated by:	R.Mayoraz	Technician	
Approved by:	Fin Bomholt	R&D Director	

Issued: July 12, 2012

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Certificate No: DAE4-797_Jul12 Page 1 of 5

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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 =	6.1μV,	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	403.853 ± 0.1% (k=2)	404.115 ± 0.1% (k=2)	403.849 ± 0.1% (k=2)
Low Range	3.96154 ± 0.7% (k=2)	3.96966 ± 0.7% (k=2)	3.98091 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	42.5 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200000.75	2.72	0.00
Channel X	+ Input	20000.22	-0.73	-0.00
Channel X	- Input	-19999.60	0.69	-0.00
Channel Y	+ Input	199997.25	-0.77	-0.00
Channel Y	+ Input	19999.62	-1.21	-0.01
Channel Y	- Input	-20001.20	-0.71	0.00
Channel Z	+ Input	199999.43	1.25	0.00
Channel Z	+ Input	19998.72	-2.11	-0.01
Channel Z	- Input	-20001.15	-0.74	0.00

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2002.39	1.15	0.06
Channel X	+ Input	202.38	0.67	0.33
Channel X	- Input	-198.41	-0.10	0.05
Channel Y	+ Input	2001.34	0.10	0.01
Channel Y	+ Input	201.39	-0.15	-0.08
Channel Y	- Input	-198.87	-0.45	0.23
Channel Z	+ Input	2001.50	0.30	0.01
Channel Z	+ Input	200.34	-1.15	-0.57
Channel Z	- Input	-200.43	-1.96	0.99

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	-3.51	-4.81
	- 200	5.86	4.15
Channel Y	200	-8.06	-9.42
	- 200	8.51	8.31
Channel Z	200	13.08	13.34
	- 200	-15.95	-15.59

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	-	-0.54	-3.23
Channel Y	200	5.85	-	0.11
Channel Z	200	9.85	4.72	-

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	15925	15845
Channel Y	15980	15231
Channel Z	16104	15491

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	1.09	-0.12	2.16	0.49
Channel Y	-0.35	-1.51	0.75	0.45
Channel Z	-0.47	-1.56	1.15	0.52

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

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Accreditation No.: SCS 108

Client CTTL (PTT) Certificate No: D900V2-1d059_Jul12

CALIBRATION CERTIFICATE

Object D900V2 - SN: 1d059

Calibration procedure(s) QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: July 10, 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 EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-03	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 11, 2012

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Certificate No: D900V2-1d059_Jul12 Page 1 of 8

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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:

a) 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
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: D900V2-1d059_Jul12 Page 2 of 6

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.8 ± 6 %	0.95 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.62 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**10.5 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.68 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.76 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.7 ± 6 %	1.05 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.73 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**10.8 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.75 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.96 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.6 Ω - 1.5 jΩ
Return Loss	- 36.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.1 Ω - 3.1 jΩ
Return Loss	- 27.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.412 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 08, 2007

DASY5 Validation Report for Head TSL

Date: 10.07.2012

Test Laboratory: SPEAG, Zurich, Switzerland

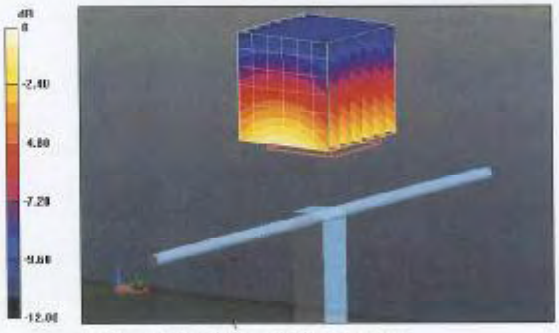
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 1d059

Communication System: CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 0.95 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

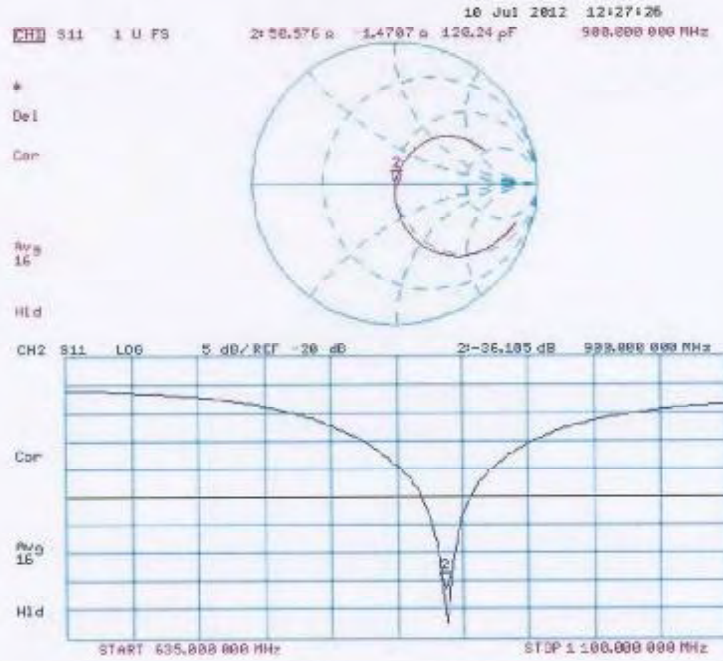
- Probe: ES3DV3 - SN3205; ConvF(5.97, 5.97, 5.97); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.708 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.929 mW/g
SAR(1 g) = 2.62 mW/g; SAR(10 g) = 1.68 mW/g
Maximum value of SAR (measured) = 3.08 mW/g



0 dB = 3.08 mW/g = 9.77 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 10.07.2012

Test Laboratory: SPEAG, Zurich, Switzerland

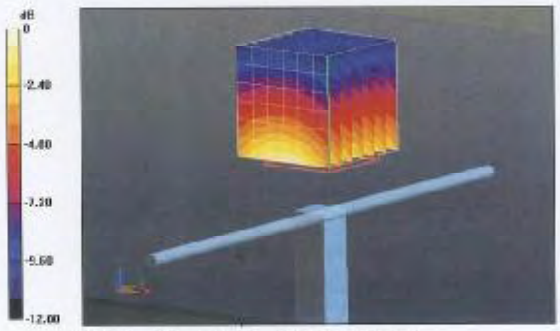
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 1d059

Communication System: CW; Frequency: 900 MHz
Medium parameters used: f = 900 MHz; σ = 1.05 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

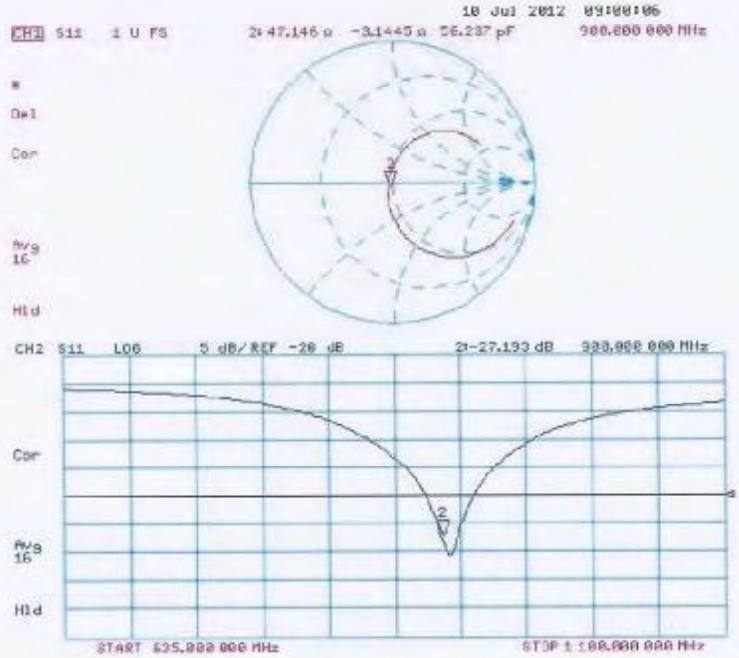
- Probe: ES3DV3 - SN3205; ConvF(5.94, 5.94, 5.94); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

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 = 56.692 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 4.198 mW/g
SAR(1 g) = 2.73 mW/g; SAR(10 g) = 1.75 mW/g
Maximum value of SAR (measured) = 3.21 mW/g



0 dB = 3.21 mW/g = 10.13 dB mW/g

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client CTTL (PTT)

Certificate No: D1900V2-5d024_Jul12

CALIBRATION CERTIFICATE

Object D1900V2 - SN: 5d024

Calibration procedure(s) QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: July 11, 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 EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 11, 2012

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

Certificate No: D1900V2-5d024_Jul12 Page 1 of 8

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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:

a) 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
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: D1900V2-5d024_Jul12 Page 2 of 8

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.9 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.80 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**39.5 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.8 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.6 ± 6 %	1.52 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**40.3 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.38 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.5 mW / g ± 16.5 % (k=2)**

Certificate No: D1900V2-5d024_Jul12 Page 3 of 8

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.3 Ω + 6.8 jΩ
Return Loss	- 23.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.8 Ω + 6.5 jΩ
Return Loss	- 23.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.198 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	September 28, 2002

DASY5 Validation Report for Head TSL

Date: 11.07.2012

Test Laboratory: SPEAG, Zurich, Switzerland

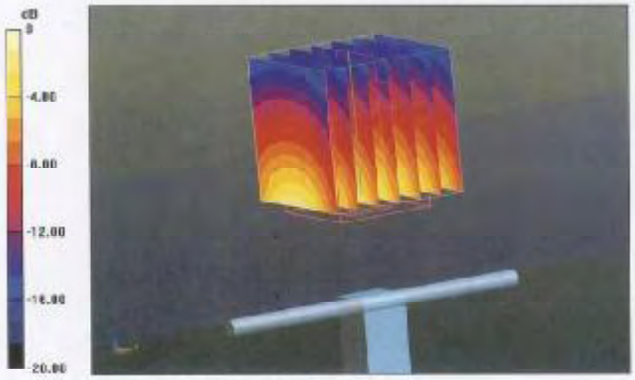
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d024

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.38 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

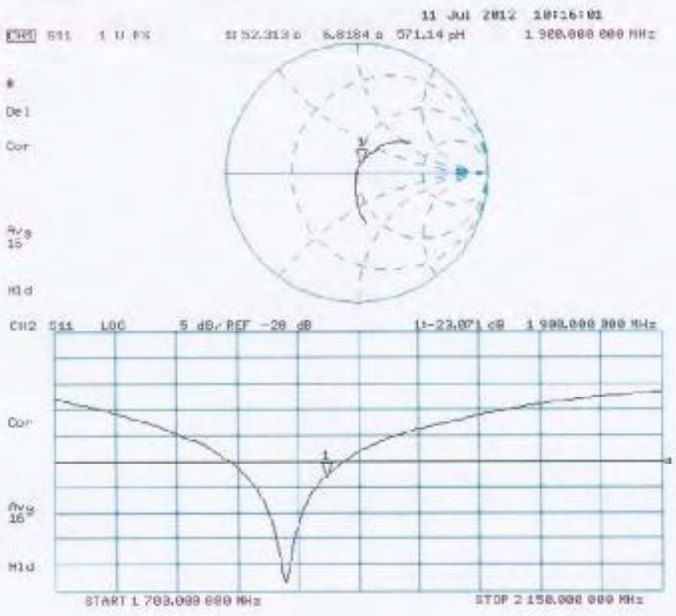
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.621 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 17.476 mW/g
SAR(1 g) = 9.8 mW/g; SAR(10 g) = 5.18 mW/g
Maximum value of SAR (measured) = 12.2 mW/g



0 dB = 12.2 mW/g = 21.73 dB mW/g

Certificate No: D1900V2-5d024_Jul12 Page 5 of 8

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 11.07.2012

Test Laboratory: SPEAG, Zurich, Switzerland

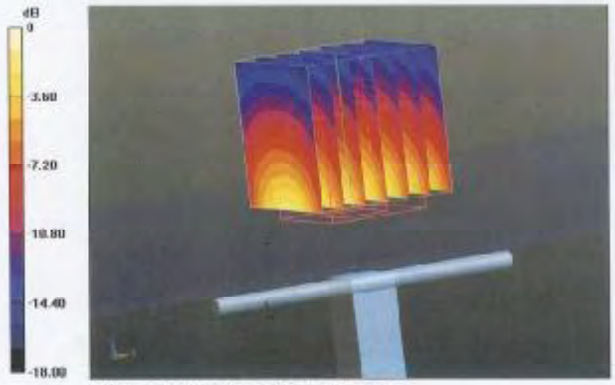
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d024

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.52 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

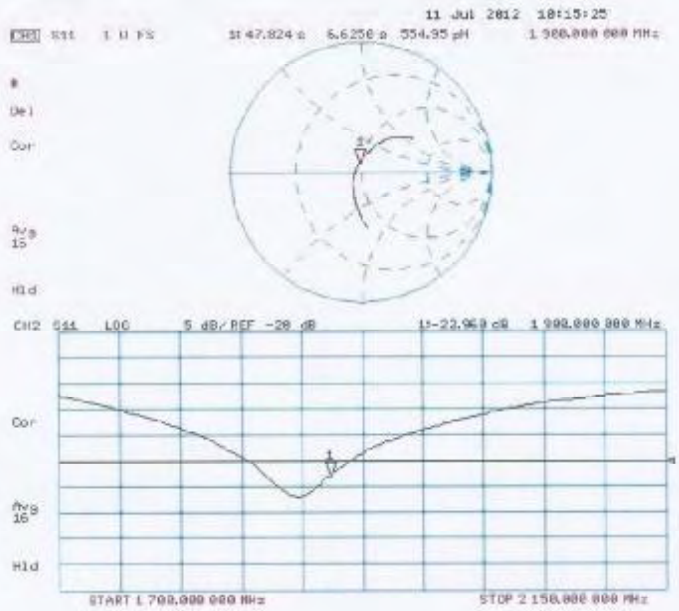
- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.844 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 17.752 mW/g
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.38 mW/g
Maximum value of SAR (measured) = 12.9 mW/g



0 dB = 12.9 mW/g = 22.21 dB mW/g

Impedance Measurement Plot for Body TSL



Certificate No: D1900V2-5d024_Jul12 Page 8 of 8

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Accreditation No.: SCS 108

Client CTTL (PTT) Certificate No: D2450V2-803_Jul12

CALIBRATION CERTIFICATE

Object D2450V2 - SN: 803

Calibration procedure(s) QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: July 09, 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 EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30 Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 901	05-Jun-12 (No. DAE4-901_Jun12)	Jun-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israa El-Naggar	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 9, 2012

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Certificate No: D2450V2-803_Jul12 Page 1 of 8

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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:

a) 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
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields: Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY5	V52.6.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.9 ± 6 %	1.85 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.5 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	53.2 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.26 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	24.8 mW / g ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.4 ± 6 %	2.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	52.1 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.20 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	24.5 mW / g ± 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.1 Ω + 2.0 jΩ
Return Loss	- 25.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.8 Ω + 4.3 jΩ
Return Loss	- 25.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.155 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 02, 2006

DASY5 Validation Report for Head TSL

Date: 09.07.2012

Test Laboratory: SPEAG, Zurich, Switzerland

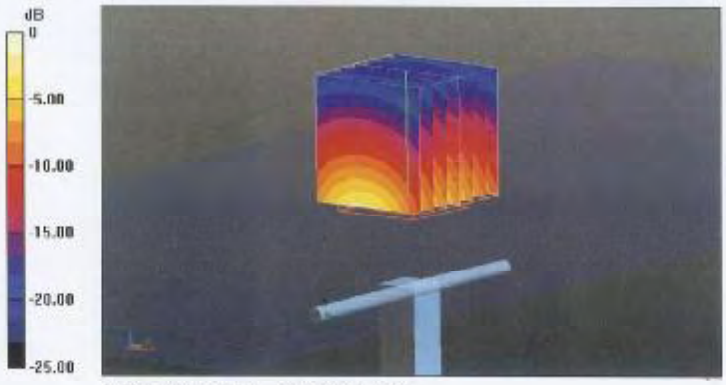
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 803

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.85 mho/m; ε_r = 38.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

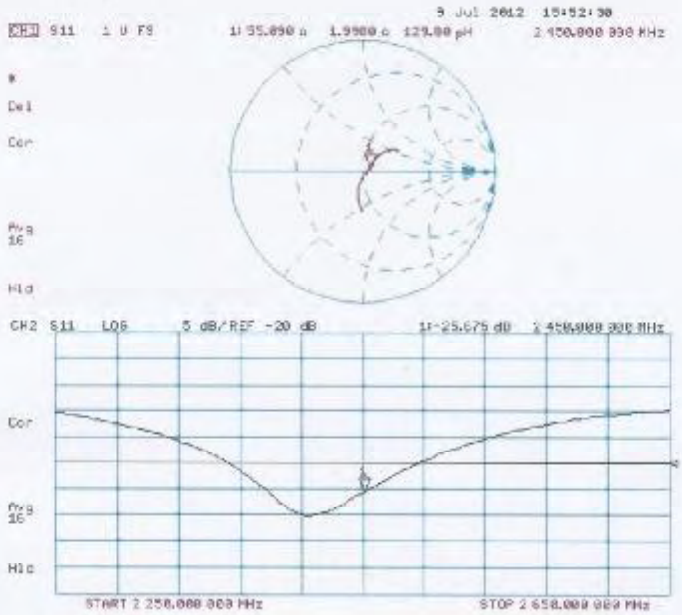
- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAL4 Sn901; Calibrated: 05.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

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 = 100.5 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 27.933 mW/g
SAR(1 g) = 13.5 mW/g; SAR(10 g) = 6.26 mW/g
Maximum value of SAR (measured) = 17.3 mW/g



0 dB = 17.3 mW/g = 24.76 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 09.07.2012

Test Laboratory: SPEAG, Zurich, Switzerland

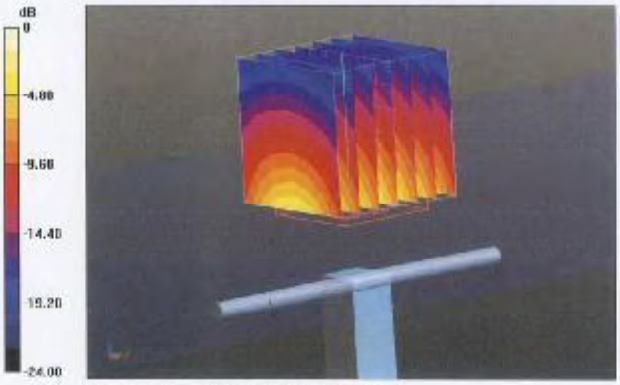
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 803

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.01 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 30.12.2011;
- Sensor Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn901; Calibrated: 05.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.591 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 27.316 mW/g
SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.2 mW/g
Maximum value of SAR (measured) = 17.5 mW/g



0 dB = 17.5 mW/g = 24.86 dB mW/g

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Impedance Measurement Plot for Body TSL