

APPENDIX A: TEST DATA

Liquid Level Photo

MSL 2450MHz D=150mm



Date/Time: 2007/4/20 14:13:52

Test Laboratory: Advance Data Technology

NX6125-11b-Ch1-Mode 1

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2412 MHz

Communication System: 802.11b ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
 Medium: MSL2450 Medium parameters used: $f = 2412$ MHz; $\sigma = 1.94$ mho/m; $\epsilon_r = 53.9$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 14 mm (The bottom side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Low Channel 1/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.267 mW/g

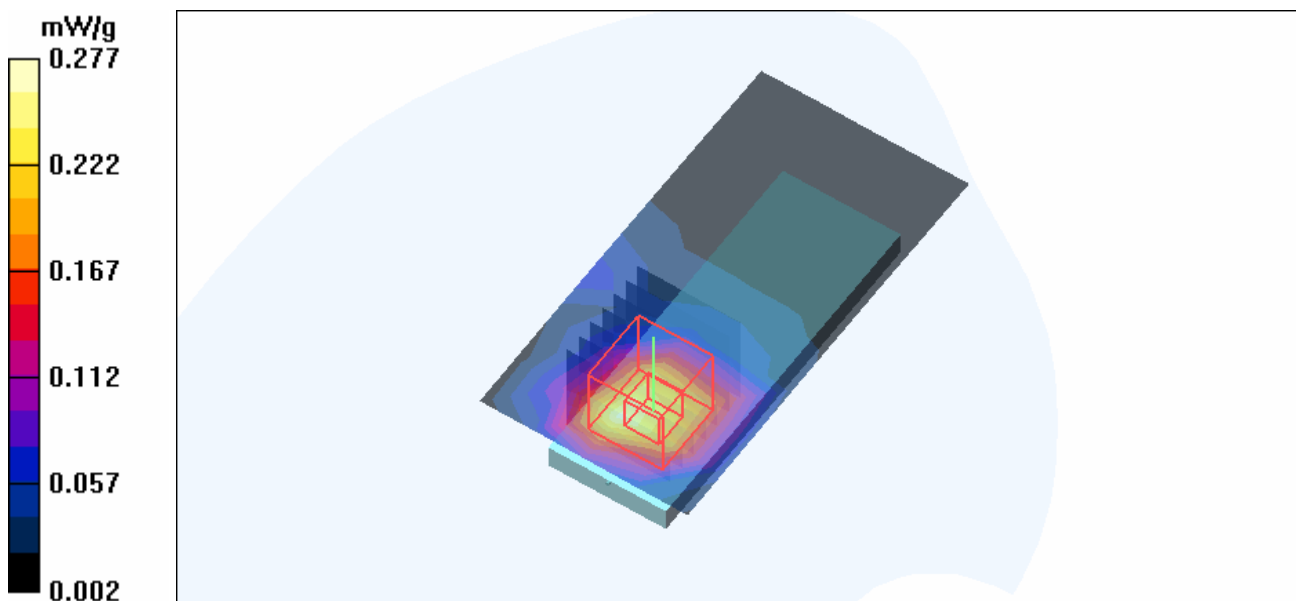
Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.7 V/m

Peak SAR (extrapolated) = 0.579 W/kg

SAR(1 g) = 0.259 mW/g; SAR(10 g) = 0.128 mW/g

Maximum value of SAR (measured) = 0.277 mW/g



Date/Time: 2007/4/20 14:30:33

Test Laboratory: Advance Data Technology

NX6125-11b-Ch6-Mode 1

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2437 MHz

Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
 Medium: MSL2450 Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 53.8$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 14 mm (The bottom side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (5x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.388 mW/g

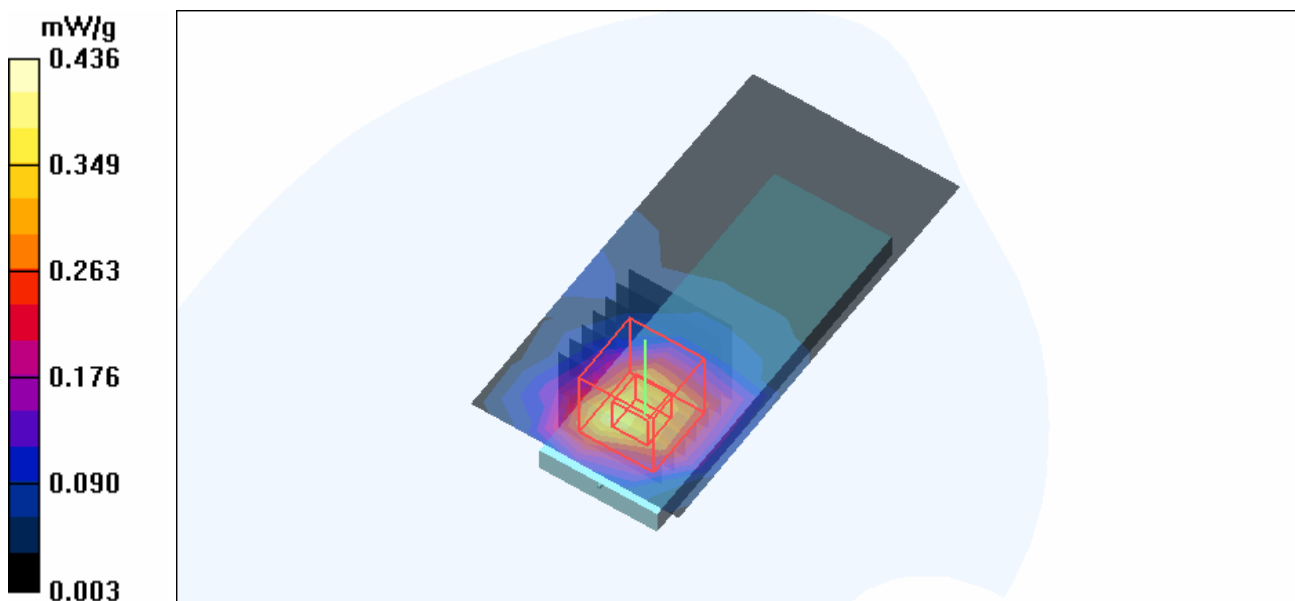
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 15.1 V/m

Peak SAR (extrapolated) = 0.910 W/kg

SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.198 mW/g

Maximum value of SAR (measured) = 0.436 mW/g



Date/Time: 2007/4/20 14:46:16

Test Laboratory: Advance Data Technology

NX6125-11b-Ch11-Mode 1

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2462 MHz

Communication System: 802.11b ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
 Medium: MSL2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 2.01 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 14 mm (The bottom side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 11/Area Scan (5x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.343 mW/g

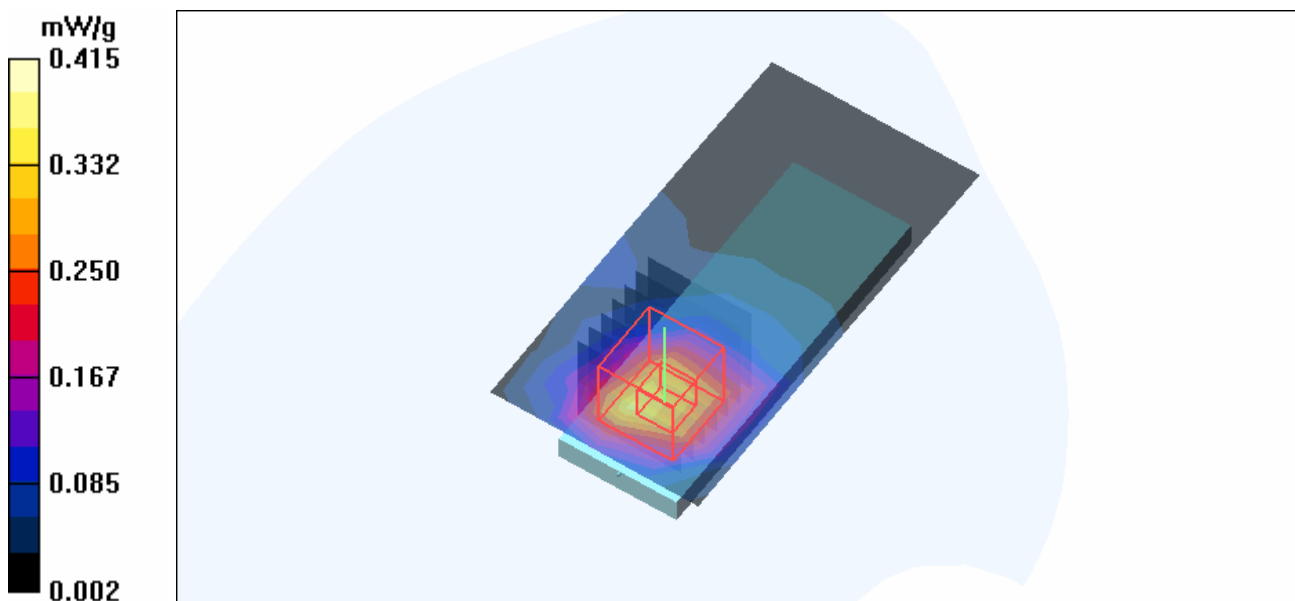
High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.3 V/m

Peak SAR (extrapolated) = 0.869 W/kg

SAR(1 g) = 0.382 mW/g; SAR(10 g) = 0.187 mW/g

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



Date/Time: 2007/4/20 15:04:29

Test Laboratory: Advance Data Technology

NX6125-11g-Ch1-Mode 2

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2412 MHz

Communication System: 802.11g ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL2450 Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.94 \text{ mho/m}$; $\epsilon_r = 53.9$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 14 mm (The bottom side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Low Channel 1/Area Scan (5x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.369 mW/g

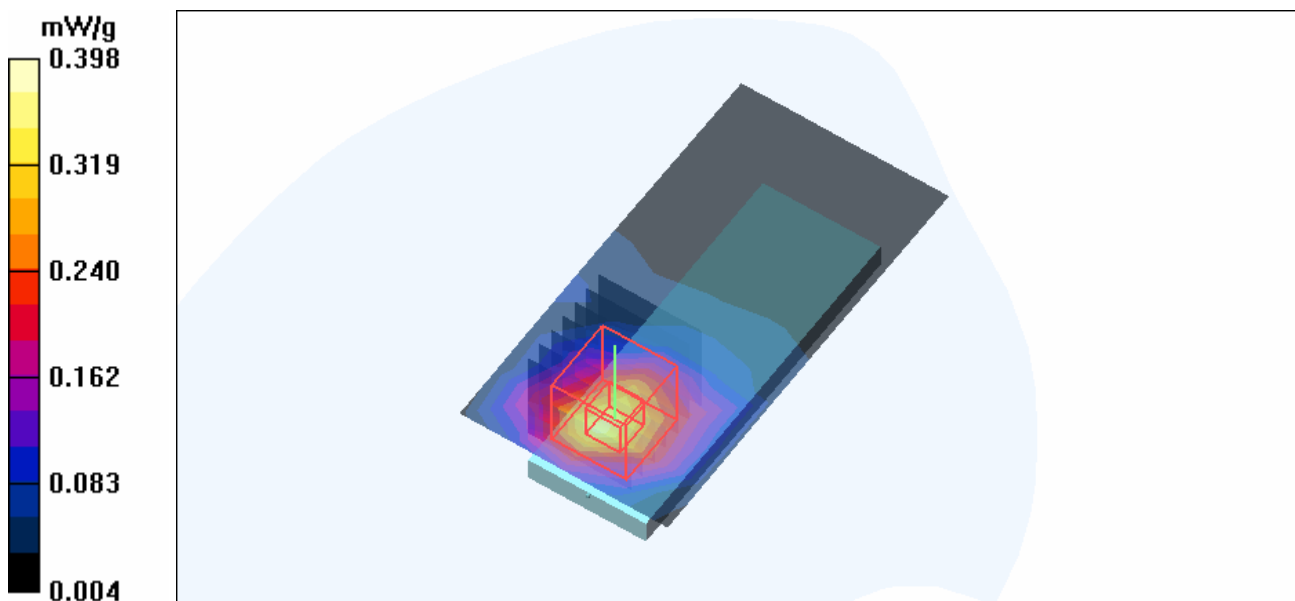
Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 15.0 V/m

Peak SAR (extrapolated) = 0.820 W/kg

SAR(1 g) = 0.369 mW/g; SAR(10 g) = 0.187 mW/g

Maximum value of SAR (measured) = 0.398 mW/g



Date/Time: 2007/4/20 15:20:11

Test Laboratory: Advance Data Technology

NX6125-11g-Ch6-Mode 2

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2437 MHz

Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 14 mm (The bottom side of the EUT to the Phantom)

Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.372 mW/g

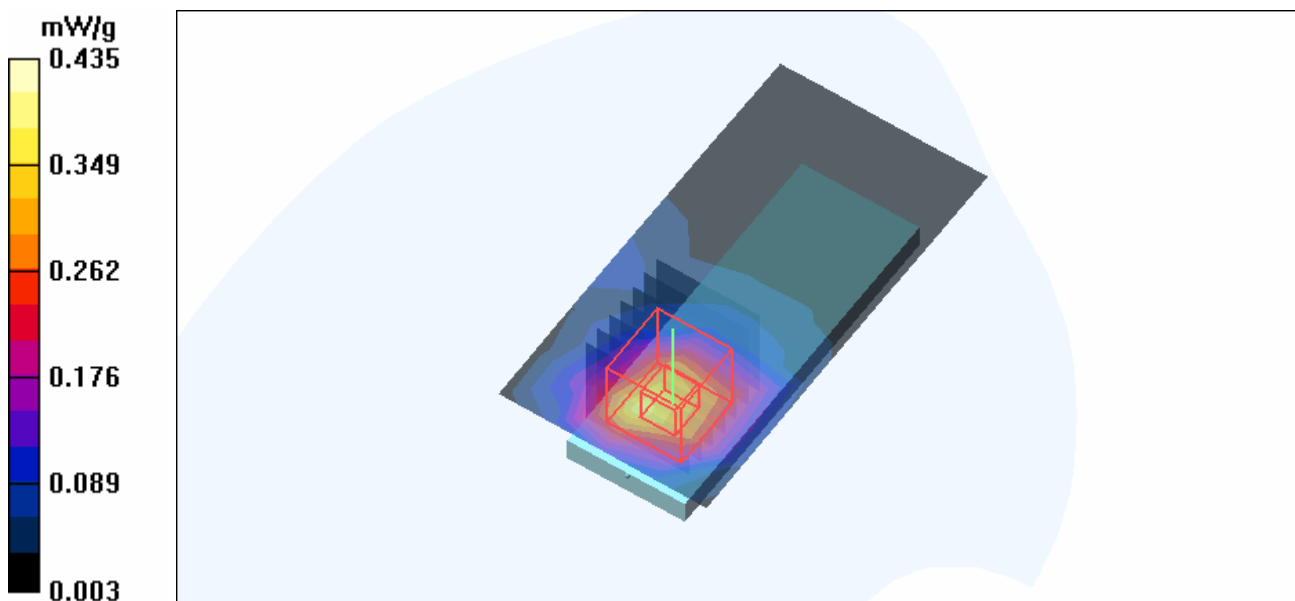
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.9 V/m

Peak SAR (extrapolated) = 0.917 W/kg

SAR(1 g) = 0.403 mW/g; SAR(10 g) = 0.199 mW/g

Maximum value of SAR (measured) = 0.435 mW/g



Date/Time: 2007/4/20 15:38:32

Test Laboratory: Advance Data Technology

NX6125-11g-Ch11-Mode 2

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2462 MHz

Communication System: 802.11g ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 2.01 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 14 mm (The bottom side of the EUT to the Phantom)

Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 11/Area Scan (5x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

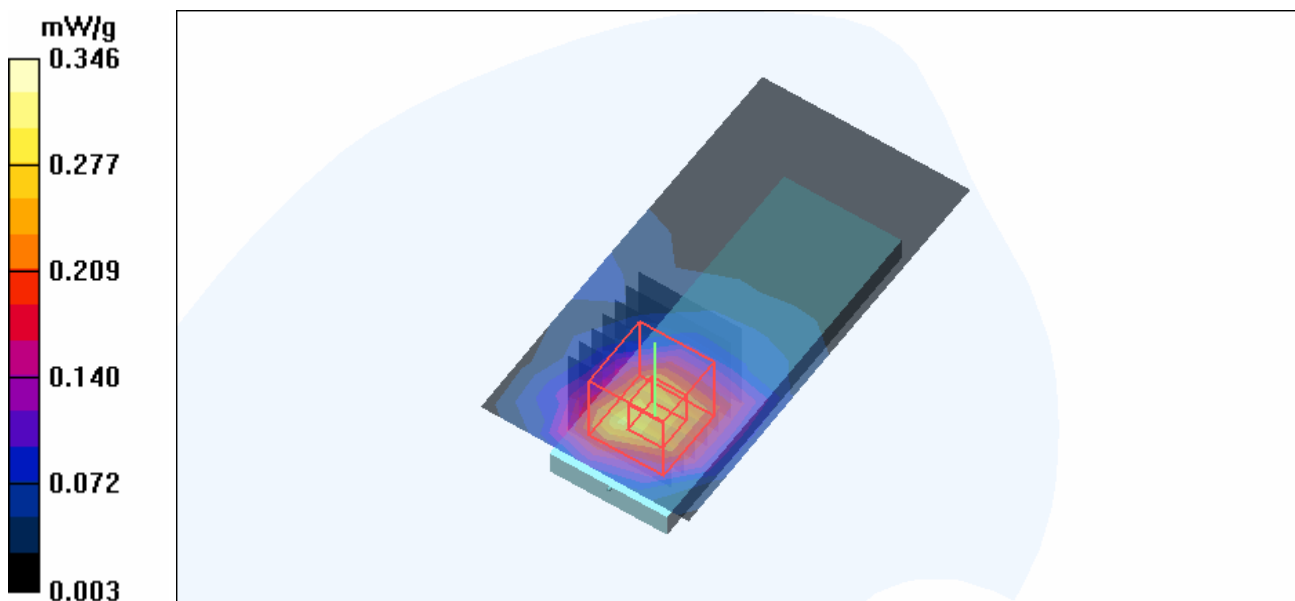
High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 13.1 V/m

Peak SAR (extrapolated) = 0.723 W/kg

SAR(1 g) = 0.318 mW/g; SAR(10 g) = 0.155 mW/g

Maximum value of SAR (measured) = 0.346 mW/g



Date/Time: 2007/4/20 16:03:54

Test Laboratory: Advance Data Technology

NX6125-11n-20M-Ch1-Mode 3

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2412 MHz

Communication System: 802.11n ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL2450 Medium parameters used: $f = 2412$ MHz; $\sigma = 1.94$ mho/m; $\epsilon_r = 53.9$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 14 mm (The bottom side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Low Channel 1/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.353 mW/g

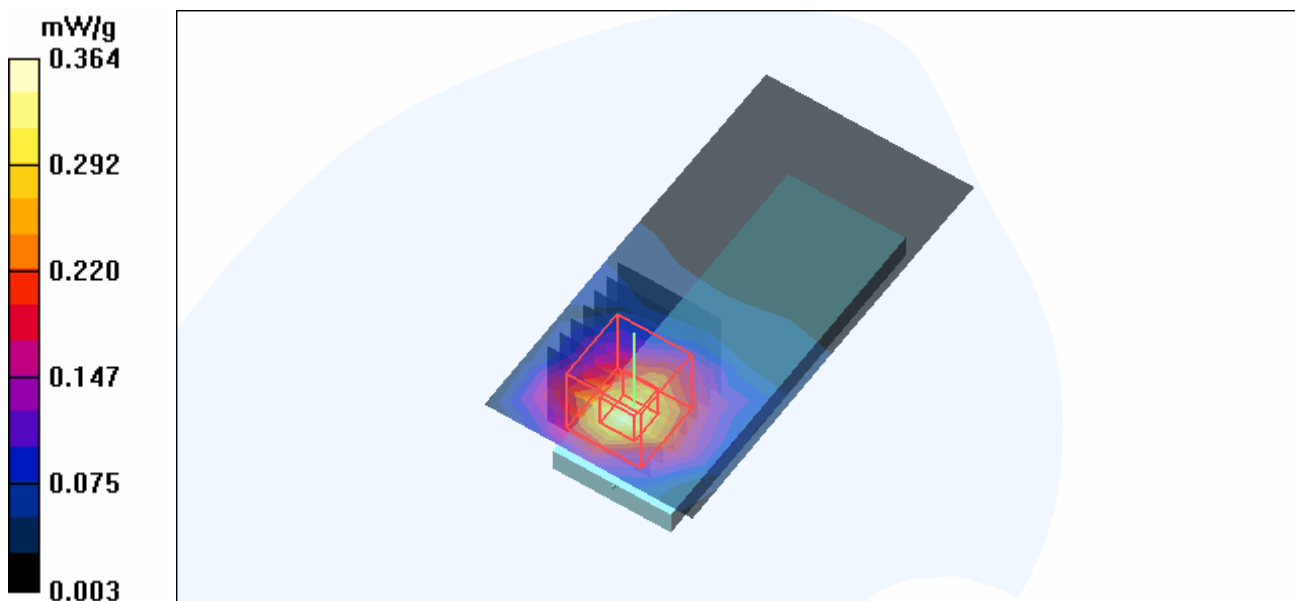
Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.5 V/m

Peak SAR (extrapolated) = 0.750 W/kg

SAR(1 g) = 0.342 mW/g; SAR(10 g) = 0.174 mW/g

Maximum value of SAR (measured) = 0.364 mW/g



Date/Time: 2007/4/20 16:20:14

Test Laboratory: Advance Data Technology

NX6125-11n-20M-Ch6-Mode 3

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2437 MHz

Communication System: 802.11n ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 14 mm (The bottom side of the EUT to the Phantom)

Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.453 mW/g

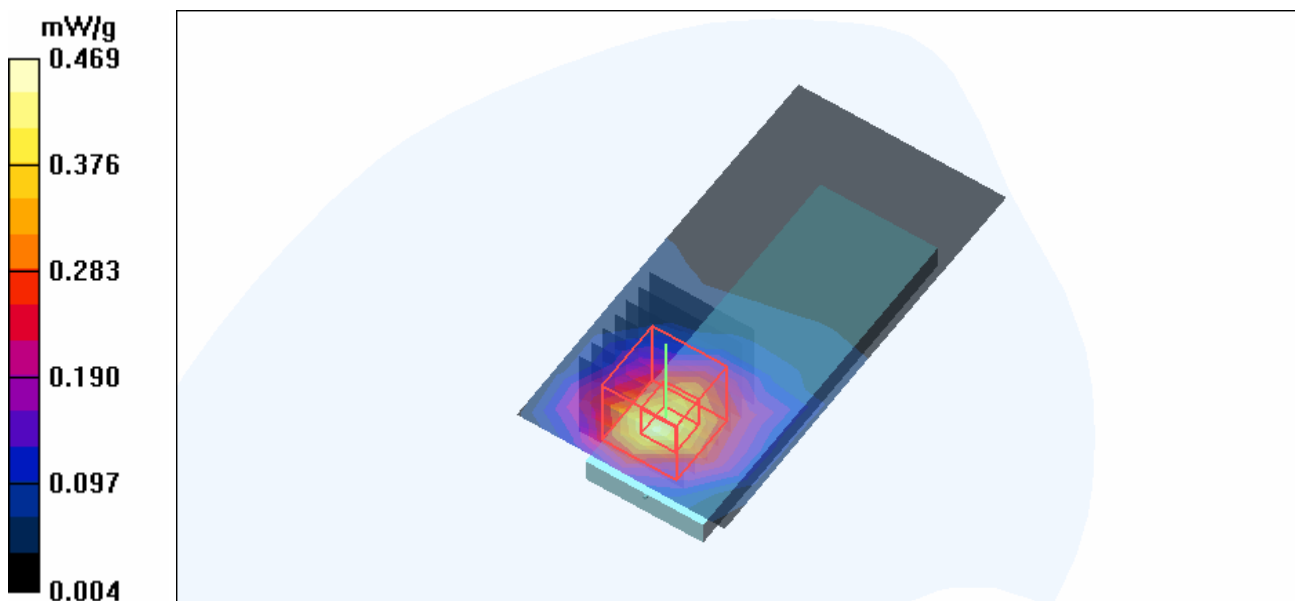
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

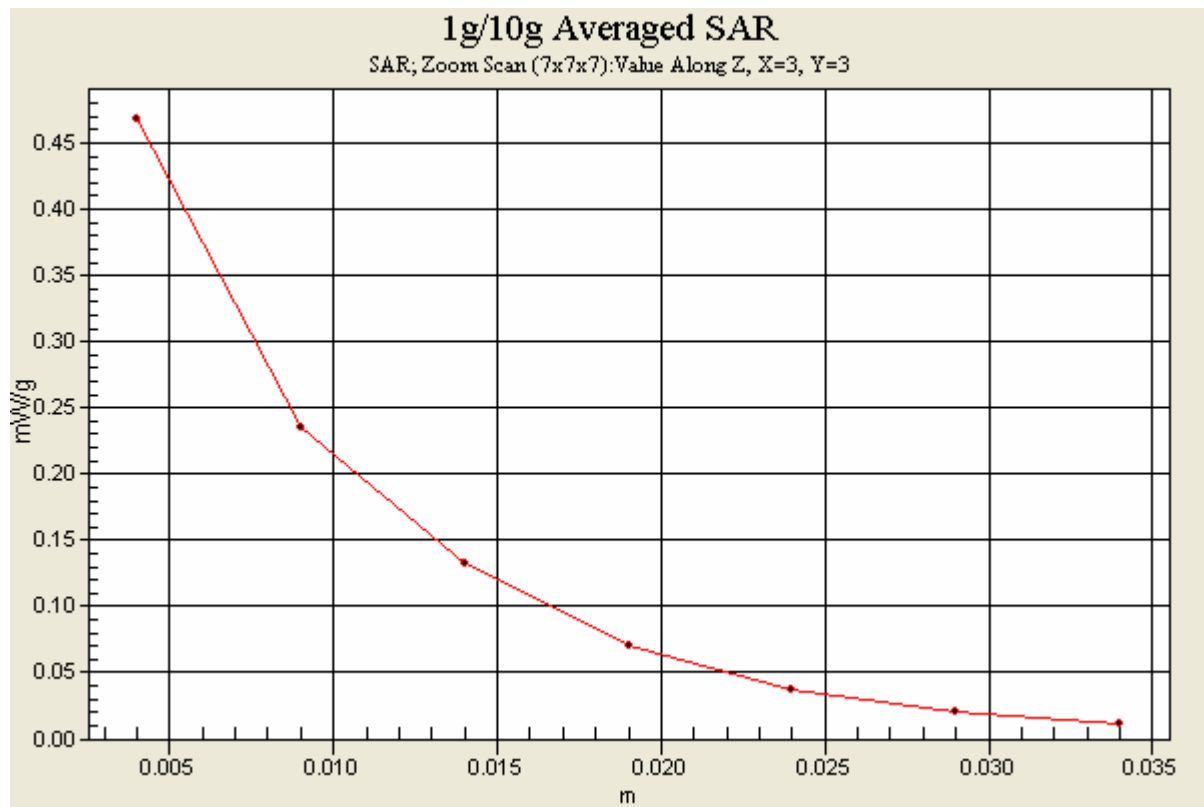
Reference Value = 16.2 V/m

Peak SAR (extrapolated) = 0.967 W/kg

SAR(1 g) = 0.441 mW/g; SAR(10 g) = 0.225 mW/g

Maximum value of SAR (measured) = 0.469 mW/g





Date/Time: 2007/4/20 16:36:00

Test Laboratory: Advance Data Technology

NX6125-11n-20M-Ch11-Mode 3

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2462 MHz

Communication System: 802.11n ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 2.01 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 14 mm (The bottom side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 11/Area Scan (5x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.289 mW/g

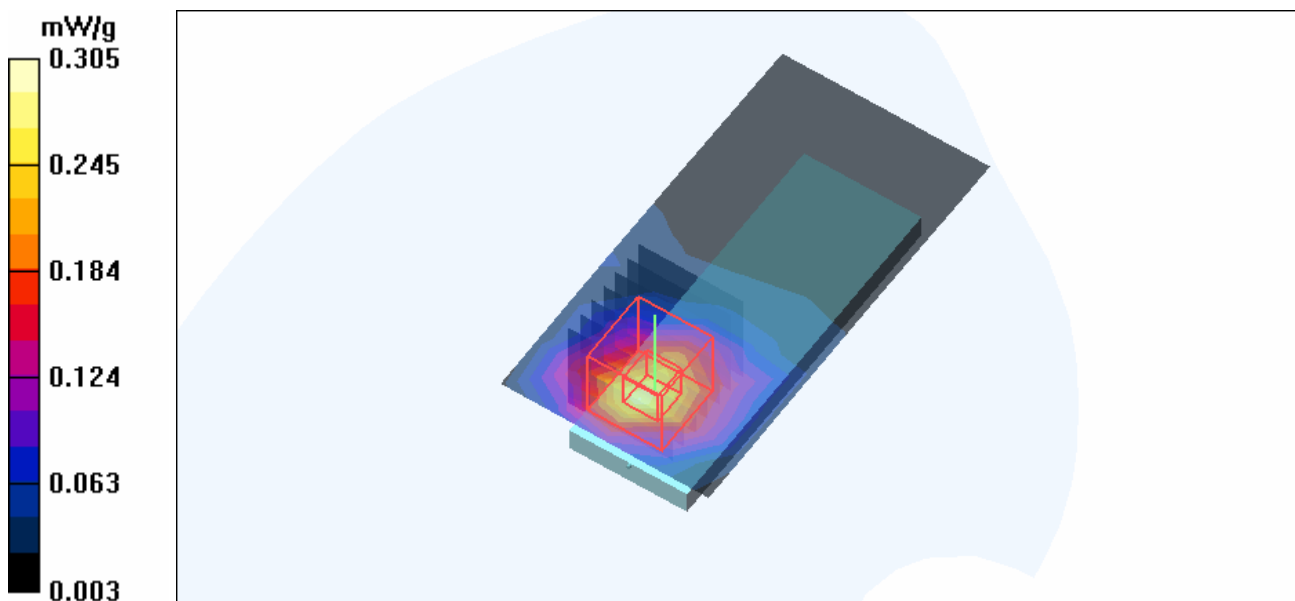
High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.6 V/m

Peak SAR (extrapolated) = 0.627 W/kg

SAR(1 g) = 0.284 mW/g; SAR(10 g) = 0.144 mW/g

Maximum value of SAR (measured) = 0.305 mW/g



Date/Time: 2007/4/20 16:53:12

Test Laboratory: Advance Data Technology

NX6125-11n-40M-Ch1-Mode 4

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2422 MHz

Communication System: 802.11n ; Frequency: 2422 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: $f = 2422 \text{ MHz}$; $\sigma = 1.95 \text{ mho/m}$; $\epsilon_r = 53.9$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 14 mm (The bottom side of the EUT to the Phantom)

Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Low Channel 1/Area Scan (5x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.212 mW/g

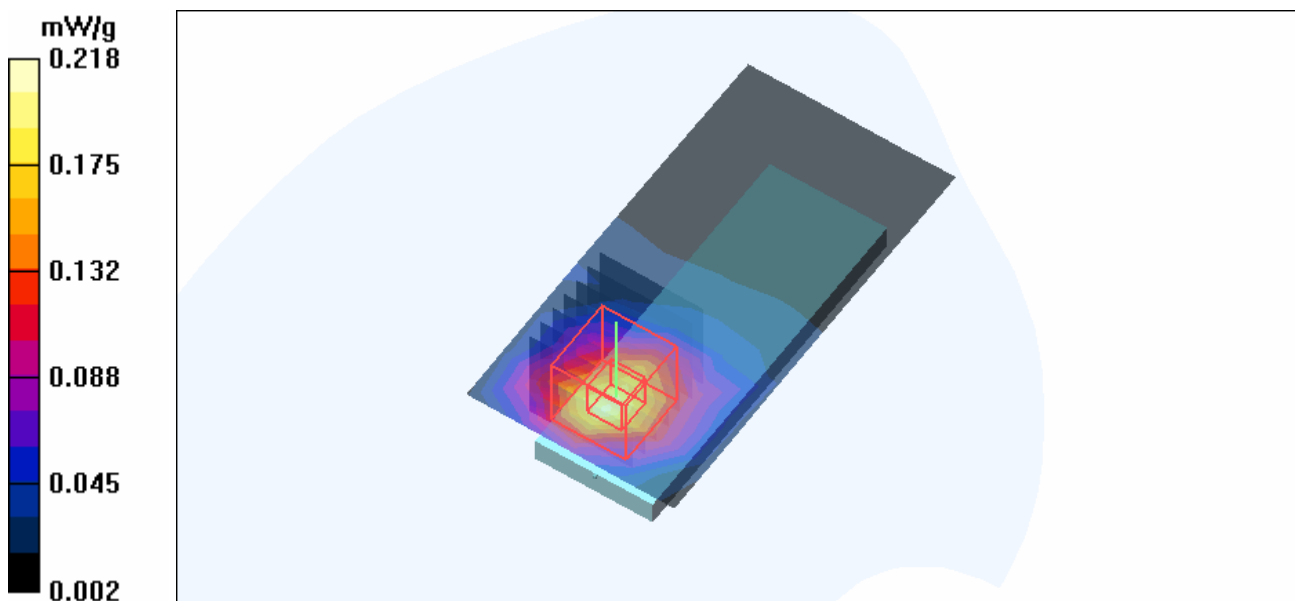
Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 11.1 V/m

Peak SAR (extrapolated) = 0.436 W/kg

SAR(1 g) = 0.204 mW/g; SAR(10 g) = 0.105 mW/g

Maximum value of SAR (measured) = 0.218 mW/g



Date/Time: 2007/4/20 17:08:43

Test Laboratory: Advance Data Technology

NX6125-11n-40M-Ch4-Mode 4

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2437 MHz

Communication System: 802.11n ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 14 mm (The bottom side of the EUT to the Phantom)
Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 4/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.228 mW/g

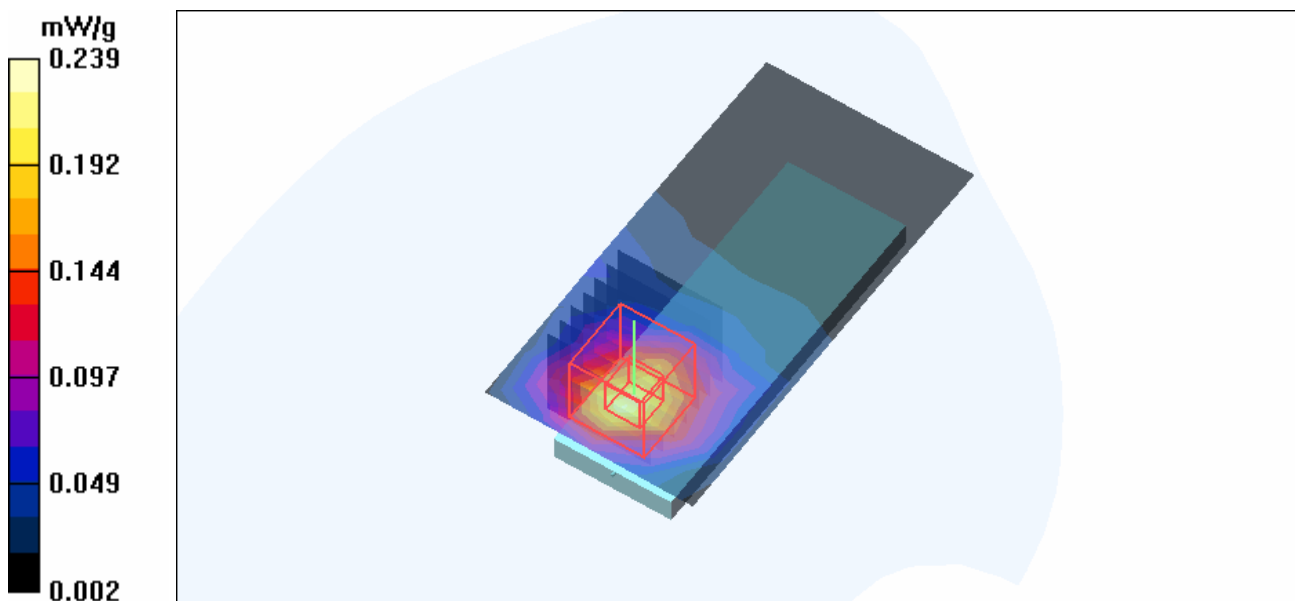
Mid Channel 4/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.4 V/m

Peak SAR (extrapolated) = 0.499 W/kg

SAR(1 g) = 0.225 mW/g; SAR(10 g) = 0.114 mW/g

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



Date/Time: 2007/4/20 17:24:27

Test Laboratory: Advance Data Technology

NX6125-11n-40M-Ch7-Mode 4

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2452 MHz

Communication System: 802.11n ; Frequency: 2452 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: $f = 2452$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 14 mm (The bottom side of the EUT to the Phantom)
Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 7/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.243 mW/g

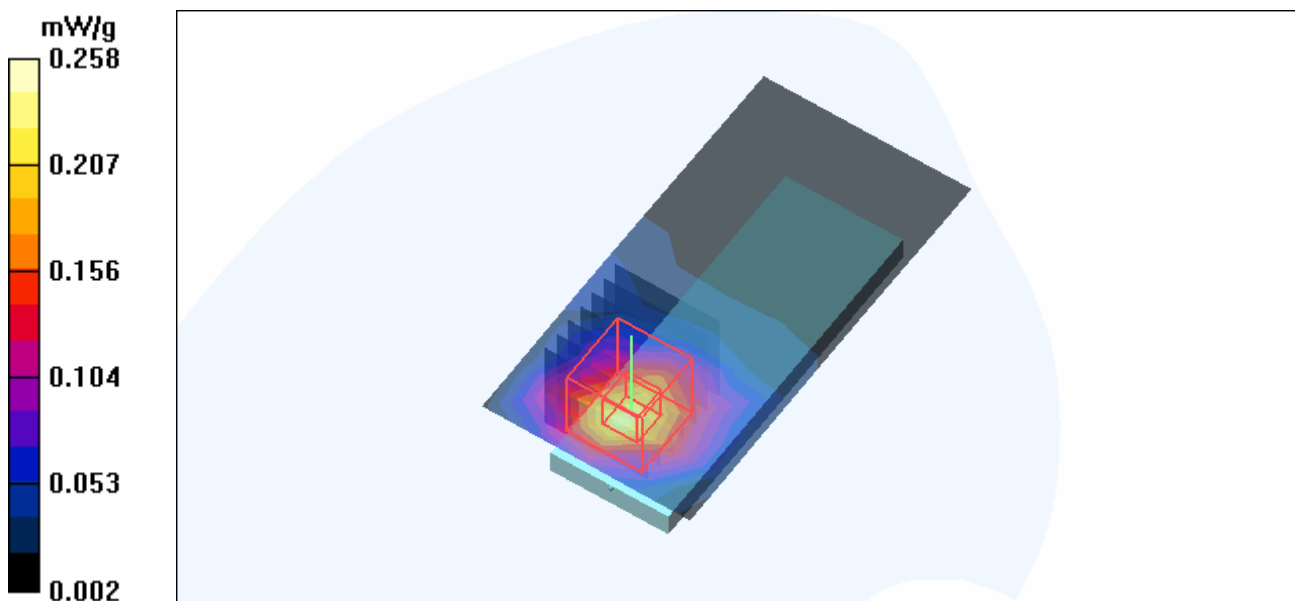
High Channel 7/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.8 V/m

Peak SAR (extrapolated) = 0.536 W/kg

SAR(1 g) = 0.240 mW/g; SAR(10 g) = 0.121 mW/g

Maximum value of SAR (measured) = 0.258 mW/g



Date/Time: 2007/4/20 17:59:14

Test Laboratory: Advance Data Technology

960-11b-Ch6-Mode 5

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2437 MHz

Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
 Medium: MSL2450 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 15 mm (The bottom side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.404 mW/g

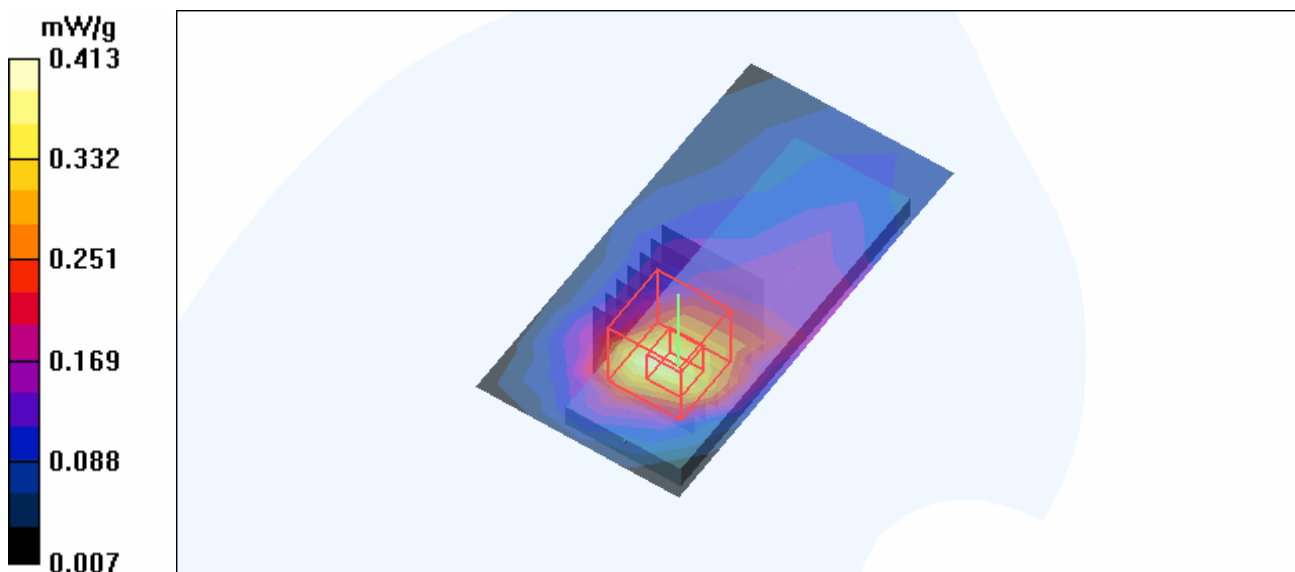
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.2 V/m

Peak SAR (extrapolated) = 0.913 W/kg

SAR(1 g) = 0.390 mW/g; SAR(10 g) = 0.198 mW/g

Maximum value of SAR (measured) = 0.413 mW/g



Date/Time: 2007/4/20 18:19:13

Test Laboratory: Advance Data Technology

960-11g-Ch6-Mode 6

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2437 MHz

Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 15 mm (The bottom side of the EUT to the Phantom)

Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.383 mW/g

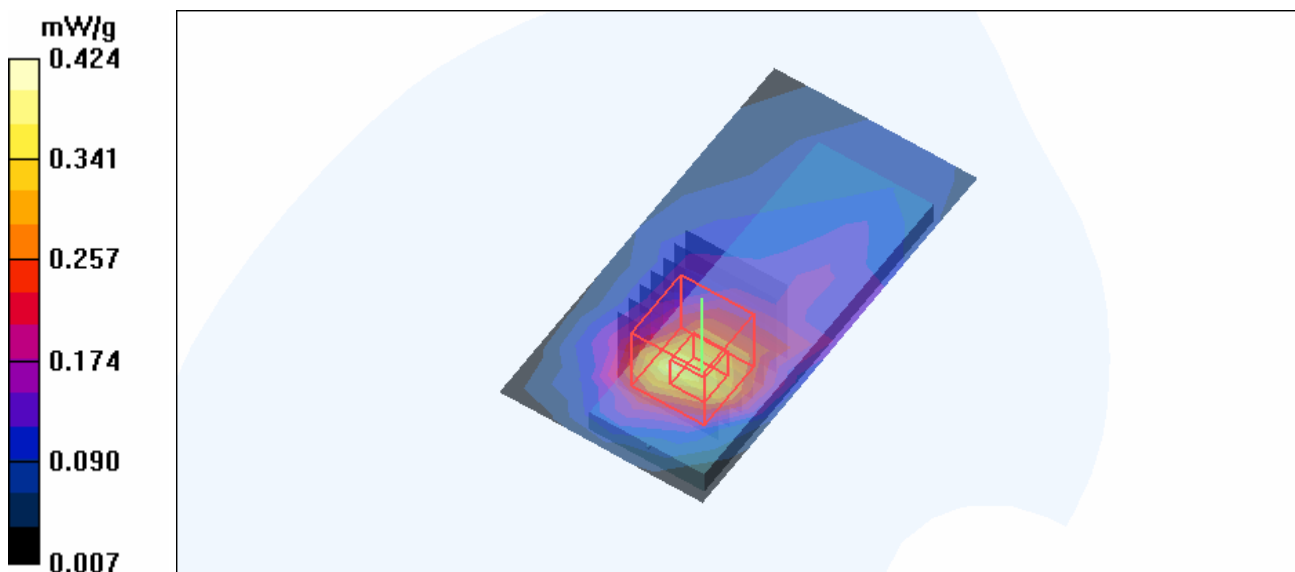
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.2 V/m

Peak SAR (extrapolated) = 0.924 W/kg

SAR(1 g) = 0.399 mW/g; SAR(10 g) = 0.202 mW/g

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



Date/Time: 2007/4/20 18:38:53

Test Laboratory: Advance Data Technology

960-11n-20M-Ch6-Mode 7

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2437 MHz

Communication System: 802.11n ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 15 mm (The bottom side of the EUT to the Phantom)
Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.437 mW/g

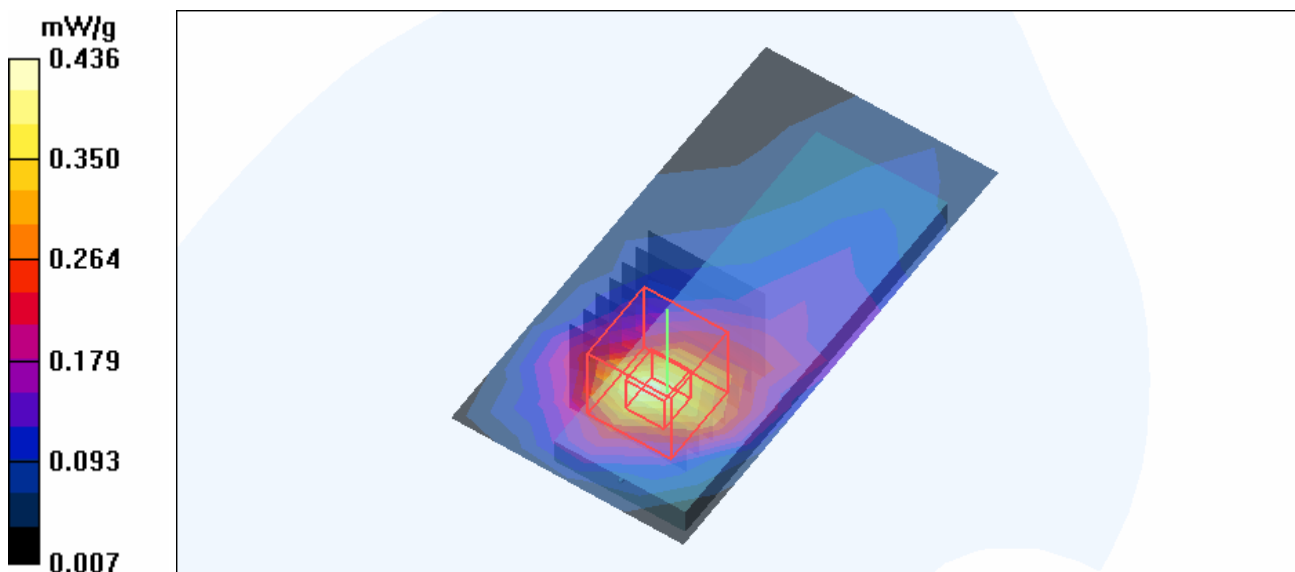
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.4 V/m

Peak SAR (extrapolated) = 0.930 W/kg

SAR(1 g) = 0.412 mW/g; SAR(10 g) = 0.213 mW/g

Maximum value of SAR (measured) = 0.436 mW/g



Date/Time: 2007/4/20 18:57:20

Test Laboratory: Advance Data Technology

960-11n-40M-Ch7-Mode 8

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2452 MHz

Communication System: 802.11n ; Frequency: 2452 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: $f = 2452$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 15 mm (The bottom side of the EUT to the Phantom)

Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 7/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.238 mW/g

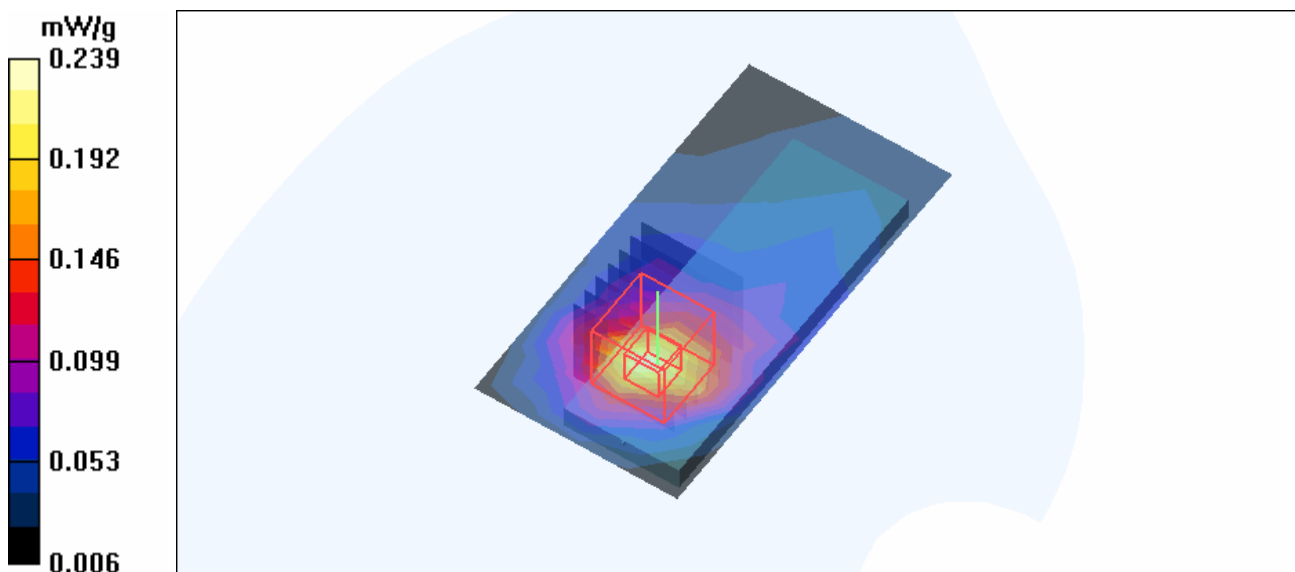
High Channel 7/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.77 V/m

Peak SAR (extrapolated) = 0.524 W/kg

SAR(1 g) = 0.226 mW/g; SAR(10 g) = 0.117 mW/g

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



Date/Time: 2007/4/20 19:15:53

Test Laboratory: Advance Data Technology

970-11b-Ch6-Mode 9

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2437 MHz

Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
 Medium: MSL2450 Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 53.8$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 15 mm (The bottom side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (5x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.385 mW/g

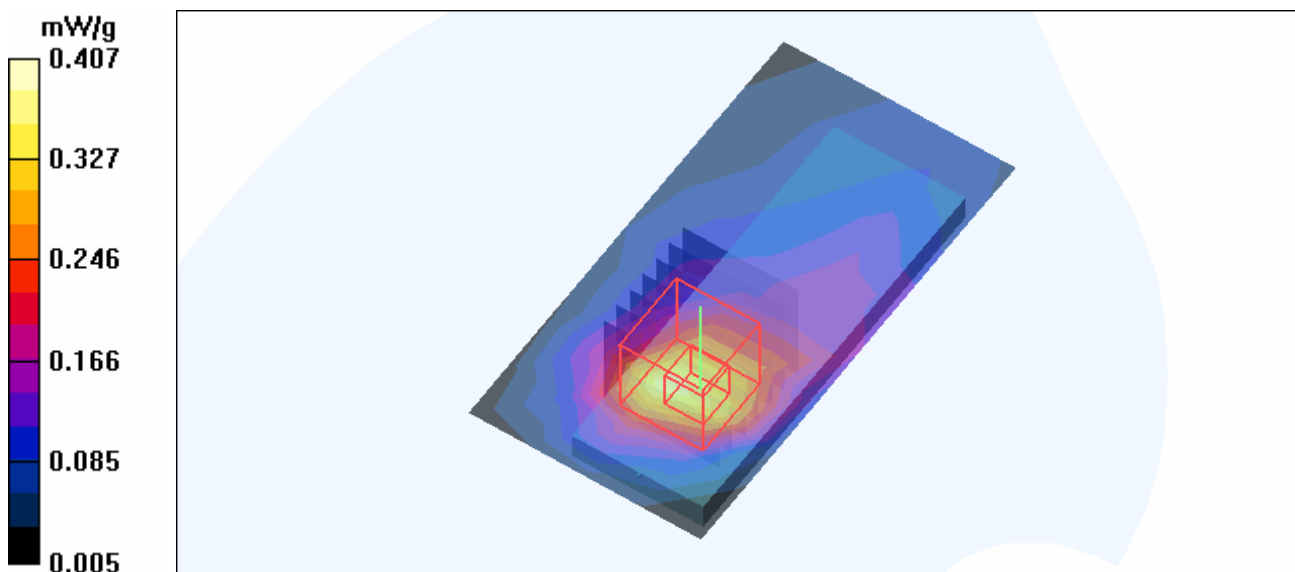
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.6 V/m

Peak SAR (extrapolated) = 0.904 W/kg

SAR(1 g) = 0.385 mW/g; SAR(10 g) = 0.197 mW/g

Maximum value of SAR (measured) = 0.407 mW/g



Date/Time: 2007/4/20 19:33:07

Test Laboratory: Advance Data Technology

970-11g-Ch6-Mode 10

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2437 MHz

Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 15 mm (The bottom side of the EUT to the Phantom)
Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.387 mW/g

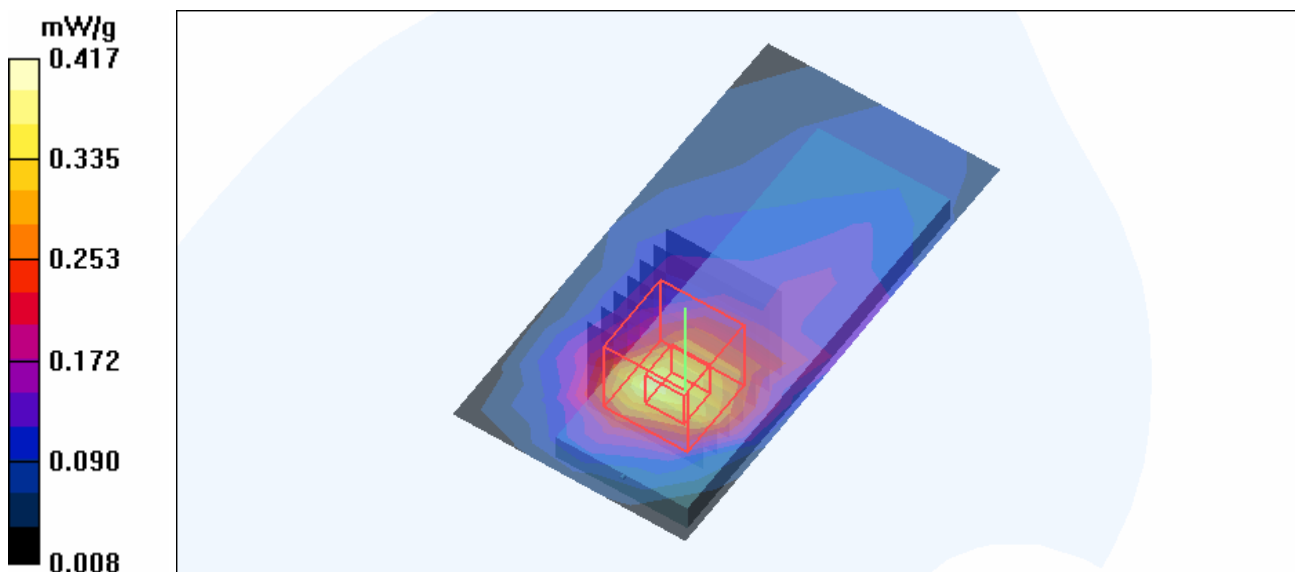
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.2 V/m

Peak SAR (extrapolated) = 0.929 W/kg

SAR(1 g) = 0.397 mW/g; SAR(10 g) = 0.202 mW/g

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



Date/Time: 2007/4/20 19:51:16

Test Laboratory: Advance Data Technology

970-11n-20M-Ch6-Mode 11

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2437 MHz

Communication System: 802.11n ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL2450 Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 53.8$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 15 mm (The bottom side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (5x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.437 mW/g

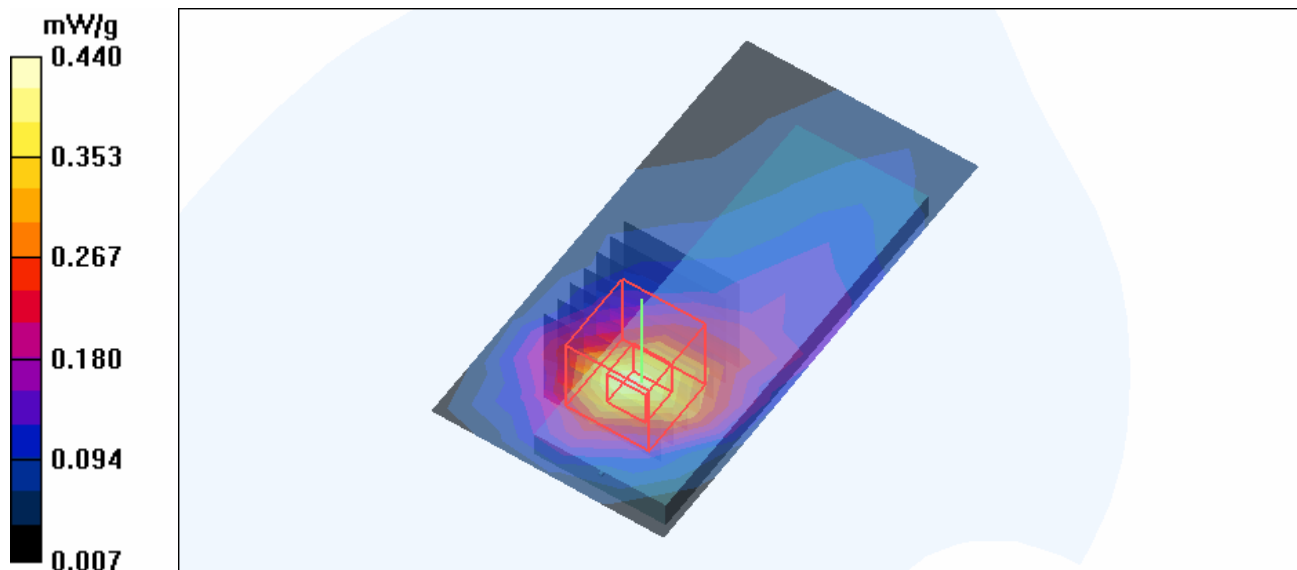
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 13.4 V/m

Peak SAR (extrapolated) = 0.930 W/kg

SAR(1 g) = 0.412 mW/g; SAR(10 g) = 0.213 mW/g

Maximum value of SAR (measured) = 0.440 mW/g



Date/Time: 2007/4/20 20:13:47

Test Laboratory: Advance Data Technology

970-11n-40M-Ch7-Mode 12

DUT: N1 Wireless Express Card ; Type: F5D8071 v3000 ; Test Frequency: 2452 MHz

Communication System: 802.11n ; Frequency: 2452 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: $f = 2452$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 15 mm (The bottom side of the EUT to the Phantom)
Antenna type : Printed Antenna ; Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2006/9/7
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 7/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.260 mW/g

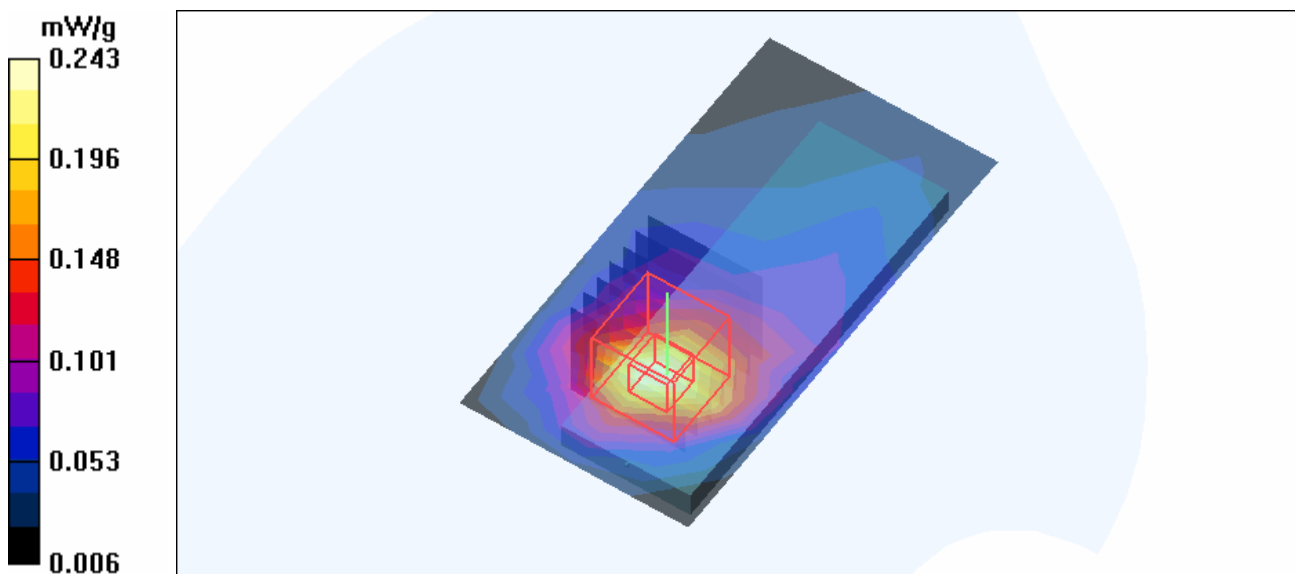
High Channel 7/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.7 V/m

Peak SAR (extrapolated) = 0.516 W/kg

SAR(1 g) = 0.231 mW/g; SAR(10 g) = 0.120 mW/g

Maximum value of SAR (measured) = 0.243 mW/g



Date/Time: 2007/4/20 13:17:12

Test Laboratory: Advance Data Technology

System Validation Check-MSL 2450MHz

DUT: Dipole 2450 MHz ; Type: D2450V2 ; Serial: 716 ; Test Frequency: 2450 MHz

Communication System: CW ; Frequency: 2450 MHz; Duty Cycle: 1:1; Modulation type: CW
 Medium: MSL2450; Medium parameters used: $f = 2450$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm
 Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom)
 Air temp. : 23.3 degrees ; Liquid temp. : 22.2 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.35, 4.35, 4.35) ; Calibrated: 2006/11/23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2006/9/7
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=10mm, Pin=250mW/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (measured) = 14.5 mW/g

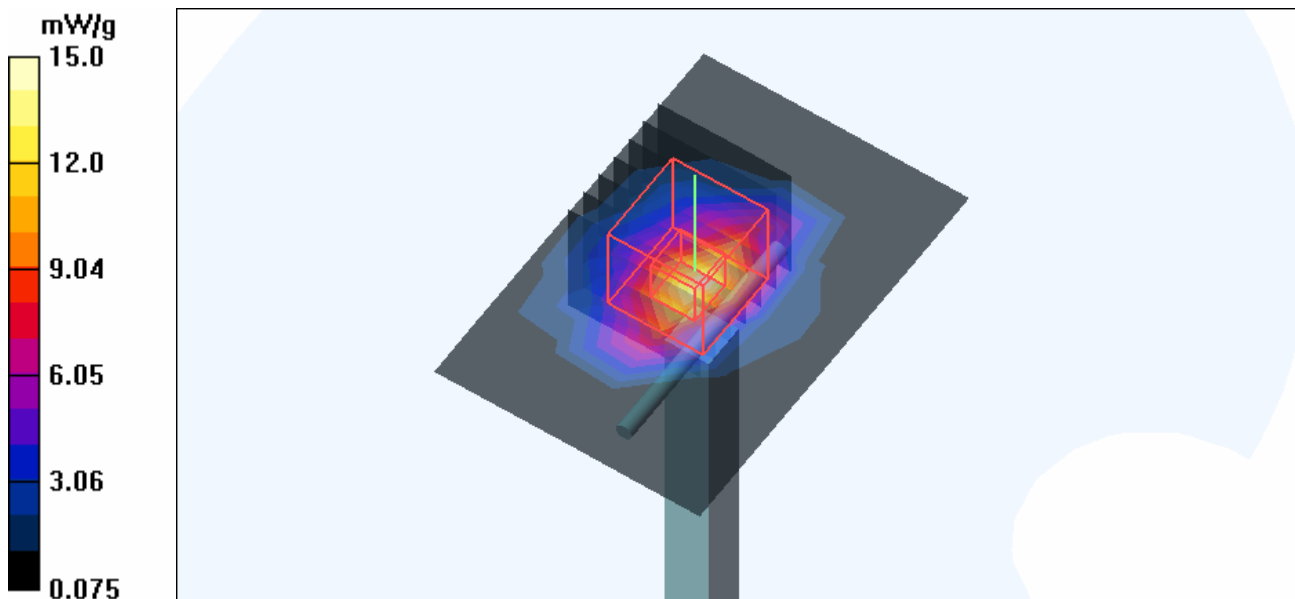
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.9 V/m; Power Drift = -0.104 dB

Peak SAR (extrapolated) = 32.1 W/kg

SAR(1 g) = 13.5 mW/g; SAR(10 g) = 6.1 mW/g

Maximum value of SAR (measured) = 15.0 mW/g



APPENDIX B: ADT SAR MEASUREMENT SYSTEM



APPENDIX C: PHOTOGRAPHS OF SYSTEM VALIDATION





APPENDIX D: SYSTEM CERTIFICATE & CALIBRATION

D1: SAM PHANTOM

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 CA
Series No	TP-1150 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles. Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

- [1] CENELEC EN 50361
- [2] IEEE P1528-200x draft 6.5
- [3] IEC PT 62209 draft 0.9

(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 28.02.2002

Signature / Stamp

F. Bombault

**Schmid & Partner
Engineering AG**

Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

Thomas Kofe

D2: DOSIMETRIC E-FIELD PROBE



Accredited by the Swiss Federal Office of Metrology and Accreditation
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 **ADT (Auden)**

Certificate No: **ET3-1790_Nov06**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN-1790**

Calibration procedure(s) **QA CAL-01 v5
Calibration procedure for dosimetric E-field probes**

Calibration date: **November 23, 2006**

Condition of the calibrated item **In Tolerance**

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: November 23, 2006

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



Accredited by the Swiss Federal Office of Metrology and Accreditation
 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
ConF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
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
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

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 effect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * *frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- 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 ET3DV6

SN:1790

Manufactured:	May 28, 2003
Last calibrated:	December 20, 2004
Recalibrated:	November 23, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1790

Sensitivity in Free Space^A

Diode Compression^B

NormX	2.04 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	91 mV
NormY	2.10 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	93 mV
NormZ	1.84 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	98 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL **900 MHz** **Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	9.2	4.9
SAR _{be} [%]	With Correction Algorithm	0.1	0.2

TSL **1750 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	12.6	8.4
SAR _{be} [%]	With Correction Algorithm	0.5	0.0

Sensor Offset

Probe Tip to Sensor Center **2.7 mm**

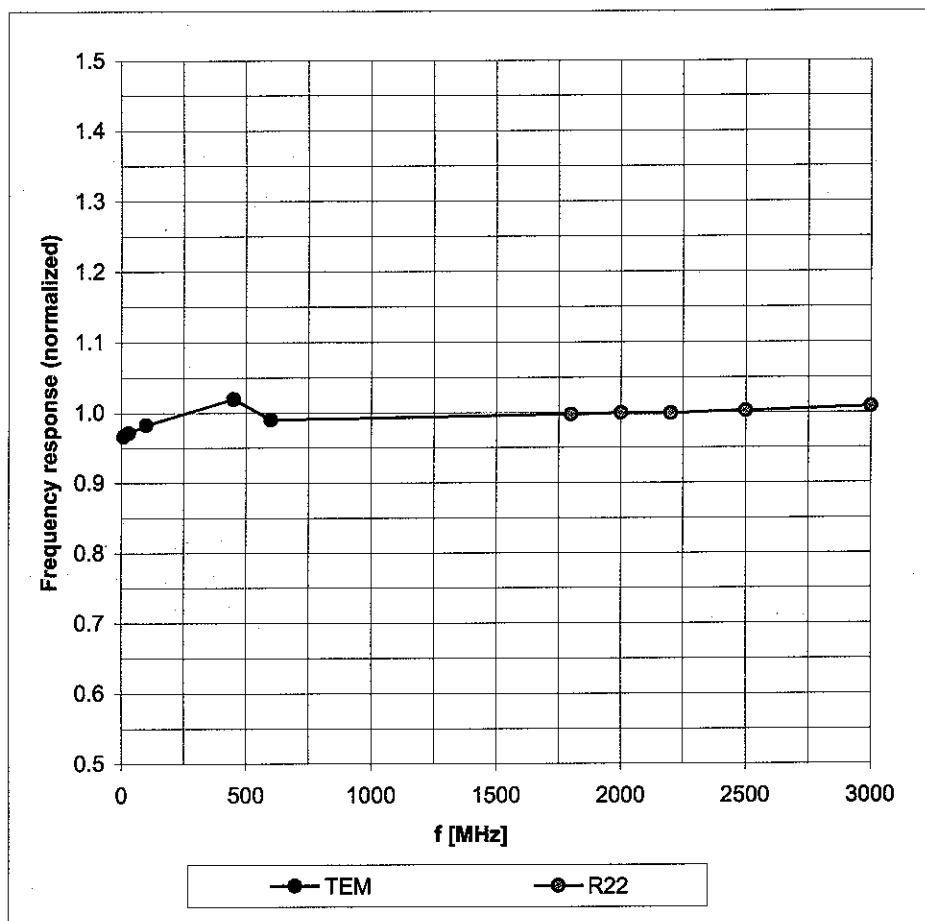
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).

^B Numerical linearization parameter: uncertainty not required.

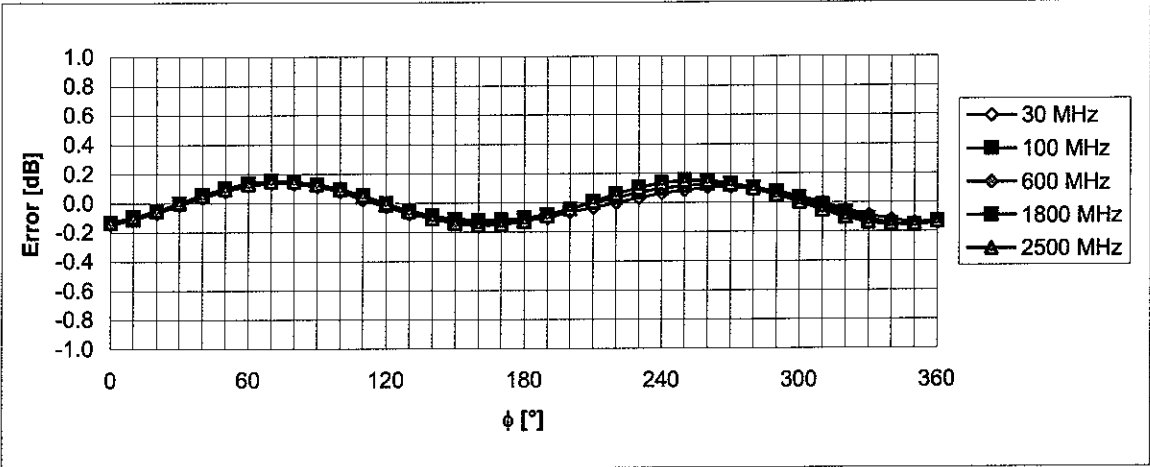
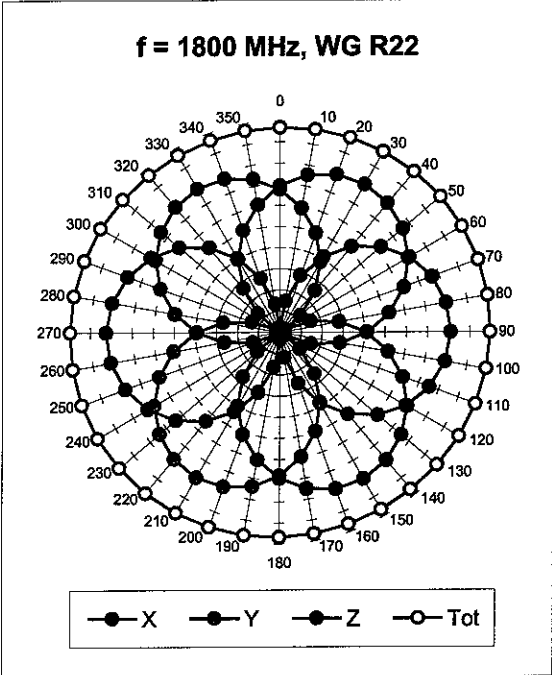
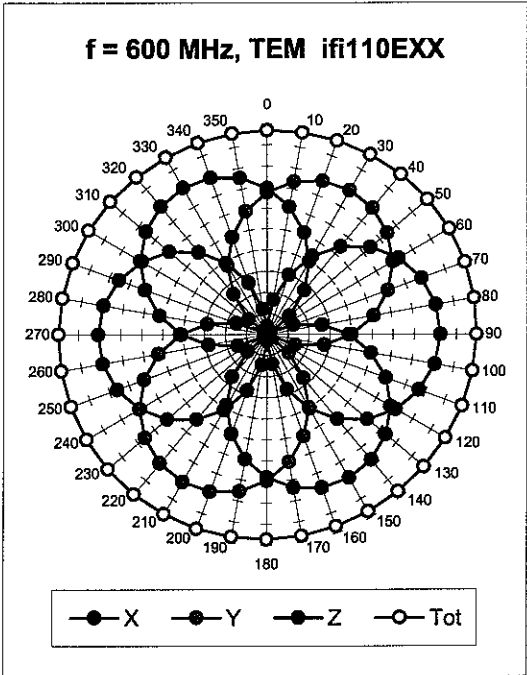
Frequency Response of E-Field

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



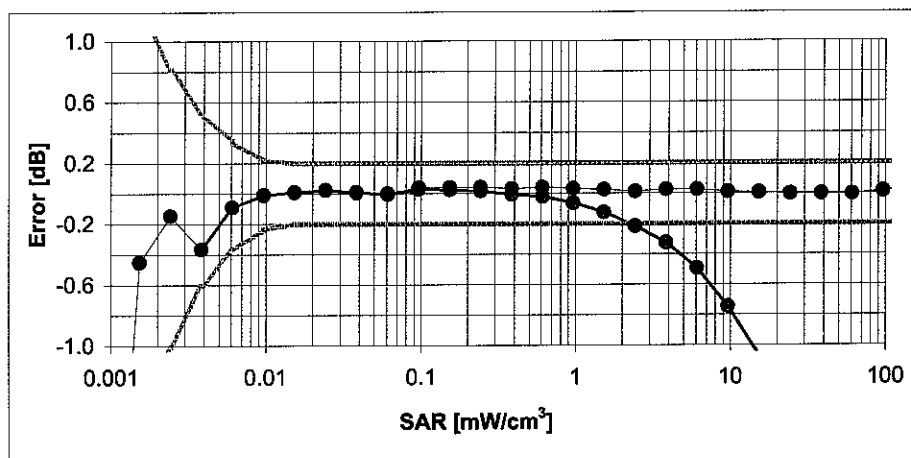
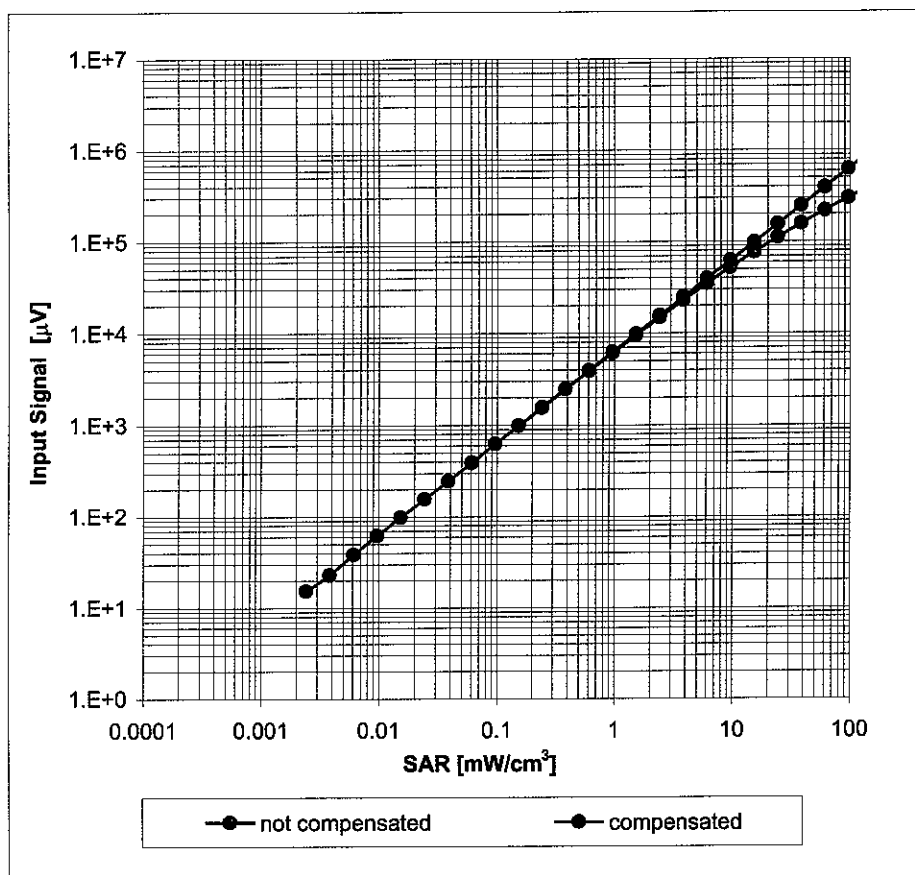
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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



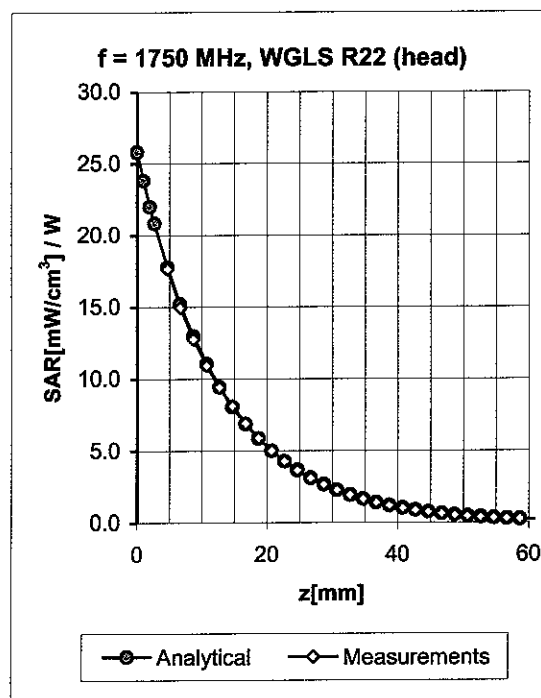
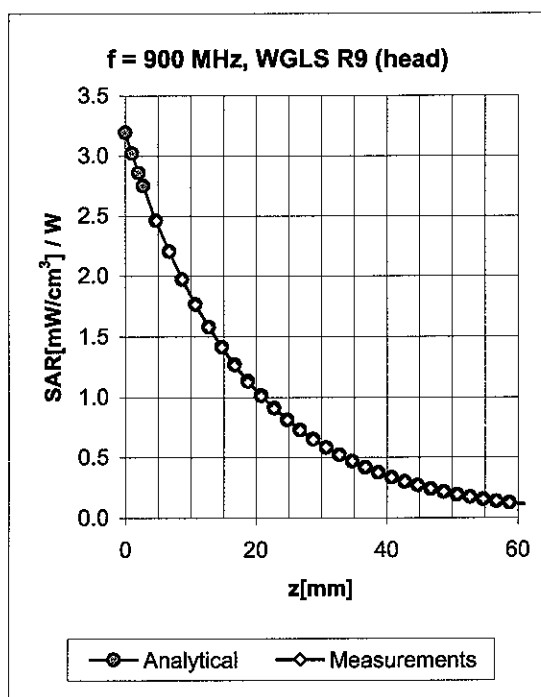
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$)



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

Conversion Factor Assessment

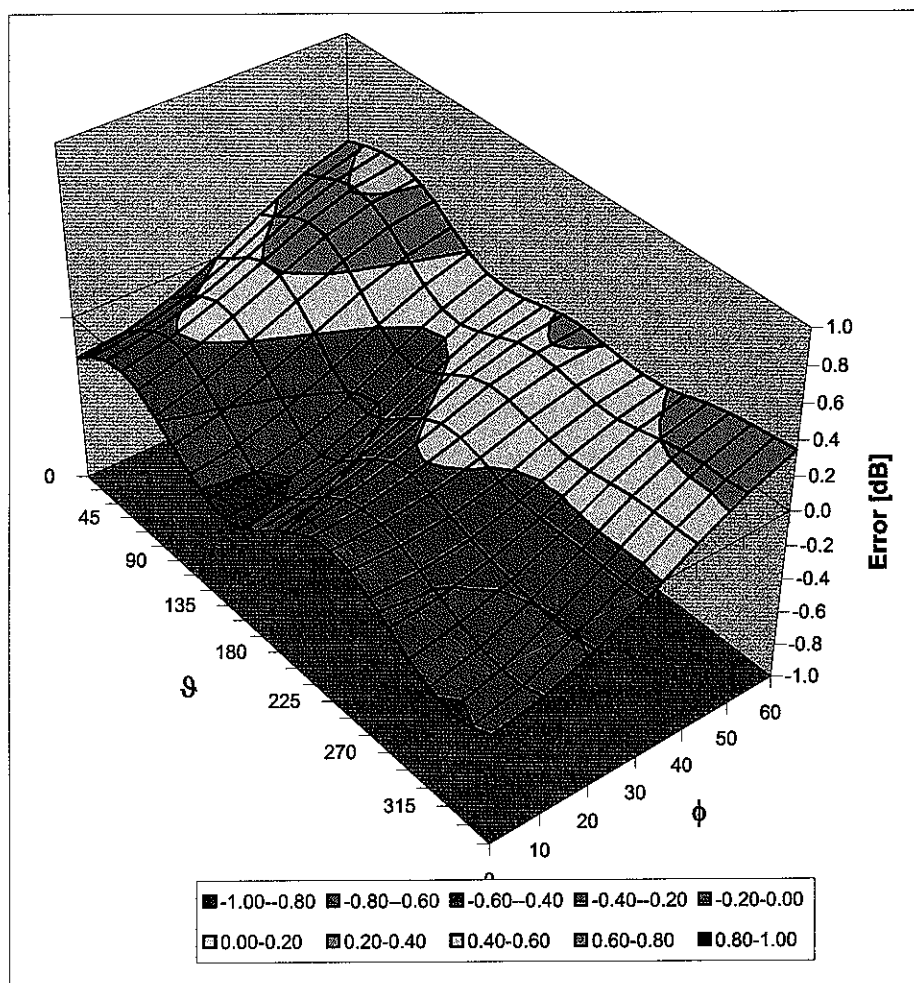


f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.32	2.45	6.71 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.50	2.47	5.48 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.57	2.47	5.27 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.66	1.94	4.76 ± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.32	2.78	6.35 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.55	2.76	4.85 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.70	2.39	4.59 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.64	1.81	4.35 ± 11.8% (k=2)

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Deviation from Isotropy in HSL

Error (ϕ , θ), $f = 900$ MHz



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

D3: DAE



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Accreditation No.: **SCS 108**

Client **ADT (Auden)**

Certificate No: **DAE3-510_Sep06**

CALIBRATION CERTIFICATE

Object **DAE3 - SD 000 D03 AA - SN: 510**

Calibration procedure(s) **QA CAL-06.v12
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **September 07, 2006**

Condition of the calibrated item **In Tolerance**

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	7-Oct-05 (Sintrel, No.E-050073)	Oct-06
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1002	15-Jun-06 (SPEAG, in house check)	In house check Jun-07

	Name	Function	Signature
Calibrated by:	Daniel Steinacher	Technician	

Approved by:	Fin Bornholt	R&D Director
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Issued: September 7, 2006

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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 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:** DAE input resistance at the connector, during internal auto-zeroing and during measurement.
- **Low Battery Alarm Voltage:** Typical value for information. Below this voltage, a battery alarm signal is generated.
- **Power consumption:** Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

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

Calibration Factors	X	Y	Z
High Range	404.194 $\pm$ 0.1% (k=2)	404.254 $\pm$ 0.1% (k=2)	404.622 $\pm$ 0.1% (k=2)
Low Range	3.97522 $\pm$ 0.7% (k=2)	3.96545 $\pm$ 0.7% (k=2)	3.95957 $\pm$ 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	42 ° $\pm$ 1 °
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Appendix

1. DC Voltage Linearity

High Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	200000	200000.2	0.00
Channel X	+ Input	20000	20007.72	0.04
Channel X	- Input	20000	-19999.52	0.00
Channel Y	+ Input	200000	199999.5	0.00
Channel Y	+ Input	20000	20005.14	0.03
Channel Y	- Input	20000	-20000.72	0.00
Channel Z	+ Input	200000	200000.5	0.00
Channel Z	+ Input	20000	20006.06	0.03
Channel Z	- Input	20000	-20002.05	0.01

Low Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	2000	1999.9	0.00
Channel X	+ Input	200	200.02	0.01
Channel X	- Input	200	-200.32	0.16
Channel Y	+ Input	2000	2000.0	0.00
Channel Y	+ Input	200	199.46	-0.27
Channel Y	- Input	200	-200.72	0.36
Channel Z	+ Input	2000	1999.9	0.00
Channel Z	+ Input	200	199.12	-0.44
Channel Z	- Input	200	-201.06	0.53

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	17.19	16.90
	- 200	-16.29	-16.91
Channel Y	200	14.52	14.16
	- 200	-15.49	-15.51
Channel Z	200	-8.86	-9.32
	- 200	7.79	7.80

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	-	1.86	-0.06
Channel Y	200	0.60	-	4.31
Channel Z	200	-2.51	-0.39	-

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	15894	16343
Channel Y	16116	16300
Channel Z	16080	16129

5. Input Offset Measurement

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

Input 10M Ω

	Average (μ V)	min. Offset (μ V)	max. Offset (μ V)	Std. Deviation (μ V)
Channel X	0.39	-0.84	1.32	0.26
Channel Y	-1.02	-1.58	0.05	0.26
Channel Z	0.18	-0.50	1.13	0.28

6. Input Offset Current

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

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2001	199.6
Channel Y	0.2001	198.3
Channel Z	0.2001	199.1

8. Low Battery Alarm Voltage (verified during pre test)

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

9. Power Consumption (verified during pre test)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.0	+6	+14
Supply (- Vcc)	-0.01	-8	-9

D4: SYSTEM VALIDATION DIPOLE



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Accreditation No.: **SCS 108**

Client **ADT (Auden)**

Certificate No: **D2450V2-716_Aug06**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 716**

Calibration procedure(s) **QA CAL-05.v6
Calibration procedure for dipole validation kits**

Calibration date: **August 21, 2006**

Condition of the calibrated item **In Tolerance**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ES3DV2	SN 3025	28-Oct-05 (SPEAG, No. ES3-3025_Oct05)	Oct-06
DAE4	SN 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov-06

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 22, 2006

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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:

- 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
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
- 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:

- DASY4 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.

Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 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 $\pm$ 0.2) °C	39.8 $\pm$ 6 %	1.80 mho/m $\pm$ 6 %
Head TSL temperature during test	(22.7 $\pm$ 0.2) °C	-----	-----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	condition	
SAR measured	250 mW input power	14.0 mW / g
SAR normalized	normalized to 1W	56.0 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	56.4 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.53 mW / g
SAR normalized	normalized to 1W	26.1 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	26.3 mW / g $\pm$ 16.5 % (k=2)

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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	52.1 ± 6 %	1.97 mho/m ± 6 %
Body TSL temperature during test	(23.4 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.4 mW / g
SAR normalized	normalized to 1W	53.6 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	53.0 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 normalized	normalized to 1W	24.8 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	24.6 mW / g ± 16.5 % (k=2)

² Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$54.2 \Omega + 1.9 j\Omega$
Return Loss	- 27.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$49.7 \Omega + 3.7 j\Omega$
Return Loss	- 28.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.147 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.

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 10, 2002

DASY4 Validation Report for Head TSL

Date/Time: 21.08.2006 14:39:00

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN716

Communication System: CW-2450; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB_060425;

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.84$ mho/m; $\epsilon_r = 39.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025 (HF); ConvF(4.4, 4.4, 4.4); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Pin = 250 mW; d = 10 mm 2/Zoom Scan (7x7x7)/Cube 0:

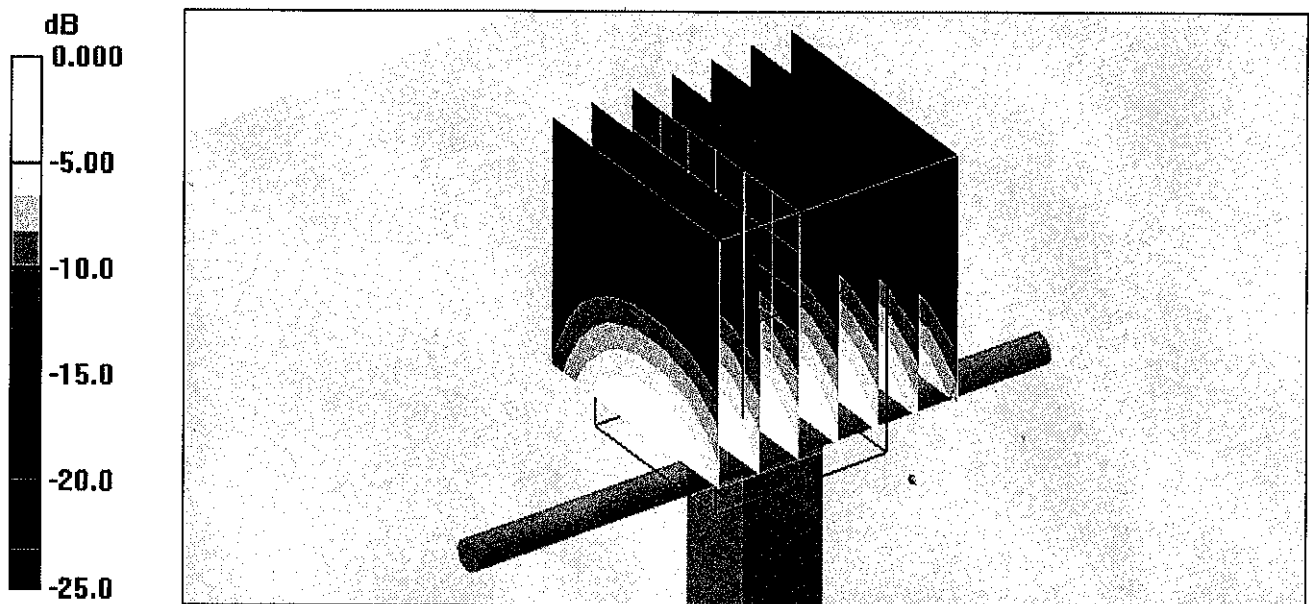
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 89.6 V/m; Power Drift = 0.022 dB

Peak SAR (extrapolated) = 28.9 W/kg

SAR(1 g) = 14 mW/g; SAR(10 g) = 6.53 mW/g

Maximum value of SAR (measured) = 15.5 mW/g



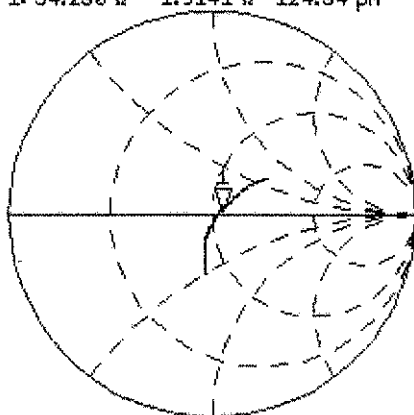
0 dB = 15.5mW/g

Impedance Measurement Plot for Head TSL

21 Aug 2006 10:09:29
CH1 S11 1 U FS 1: 54.230 Ω 1.9141 Ω 124.34 μH 2 450.000 000 MHz

*
Del
Cor

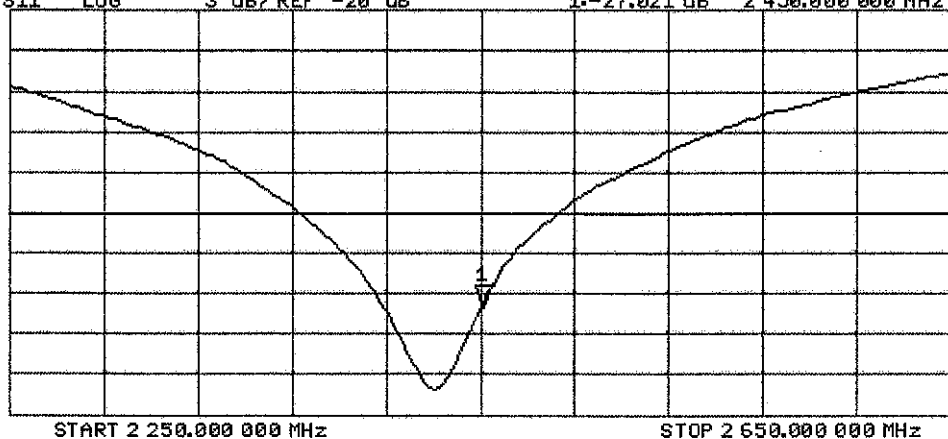
Avg
16



CH2 S11 LOG 3 dB/REF -20 dB 1: -27.021 dB 2 450.000 000 MHz

Cor

Avg
16



DASY4 Validation Report for Body TSL

Date/Time: 21.08.2006 16:08:52

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN716

Communication System: CW-2450; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: MSL U10;

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.96$ mho/m; $\epsilon_r = 51.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025 (HF); ConvF(4.06, 4.06, 4.06); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

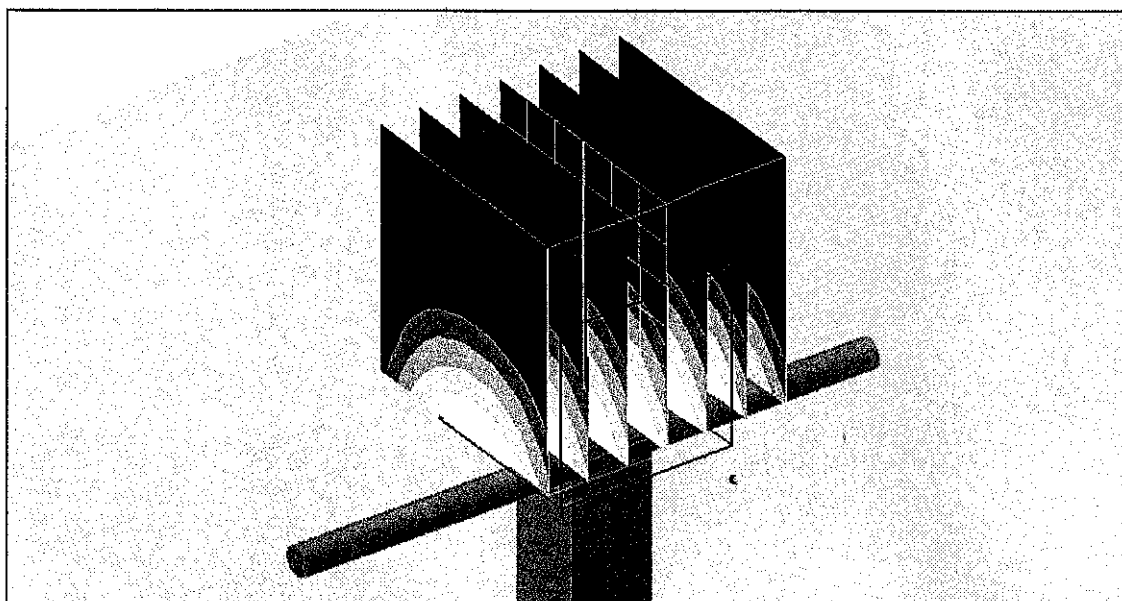
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.4 V/m; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 28.8 W/kg

SAR(1 g) = 13.4 mW/g; SAR(10 g) = 6.2 mW/g

Maximum value of SAR (measured) = 14.8 mW/g



0 dB = 14.8mW/g

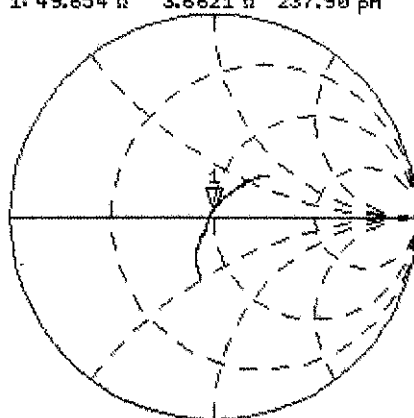
Impedance Measurement Plot for Body TSL

21 Aug 2006 10:10:19
 CH1 S11 1 U FS 1: 49.654 Ω 3.6621 Ω 237.90 μ H 2 450.000 000 MHz

*
 Del
 Cor

Avg
 16

↑



CH2 S11 LOG 3 dB/REF -20 dB 1: -28.665 dB 2 450.000 000 MHz

Cor

Avg
 16

↑

