

# APPENDIX A: TEST DATA

## Liquid Level Photo

MSL 2450MHz D=151mm



HSL 2450MHz D=150mm



Test Laboratory: Advance Data Technology

**Internal Ant-11b-CH1-Mode 1**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2412 MHz**

Communication System: 802.11b ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: CCK  
 Medium: MSL2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.96 \text{ mho/m}$ ;  $\epsilon_r = 51$ ;  $\rho = 1000 \text{ kg/m}^3$  ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The bottom side of the EUT to the Phantom)

Antenna type : Chip Antenna ; Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**Low Channel 1/Area Scan (7x13x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.029 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 = 3.15 V/m

Peak SAR (extrapolated) = 0.056 W/kg

**SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.017 mW/g**

Maximum value of SAR (measured) = 0.028 mW/g

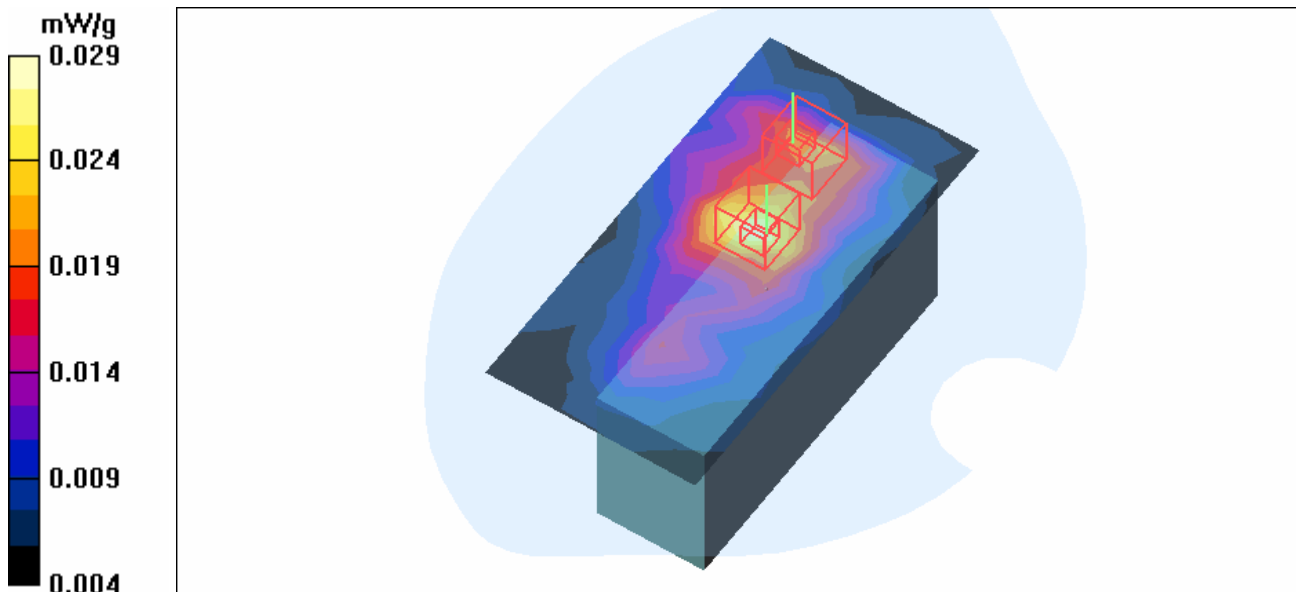
**Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

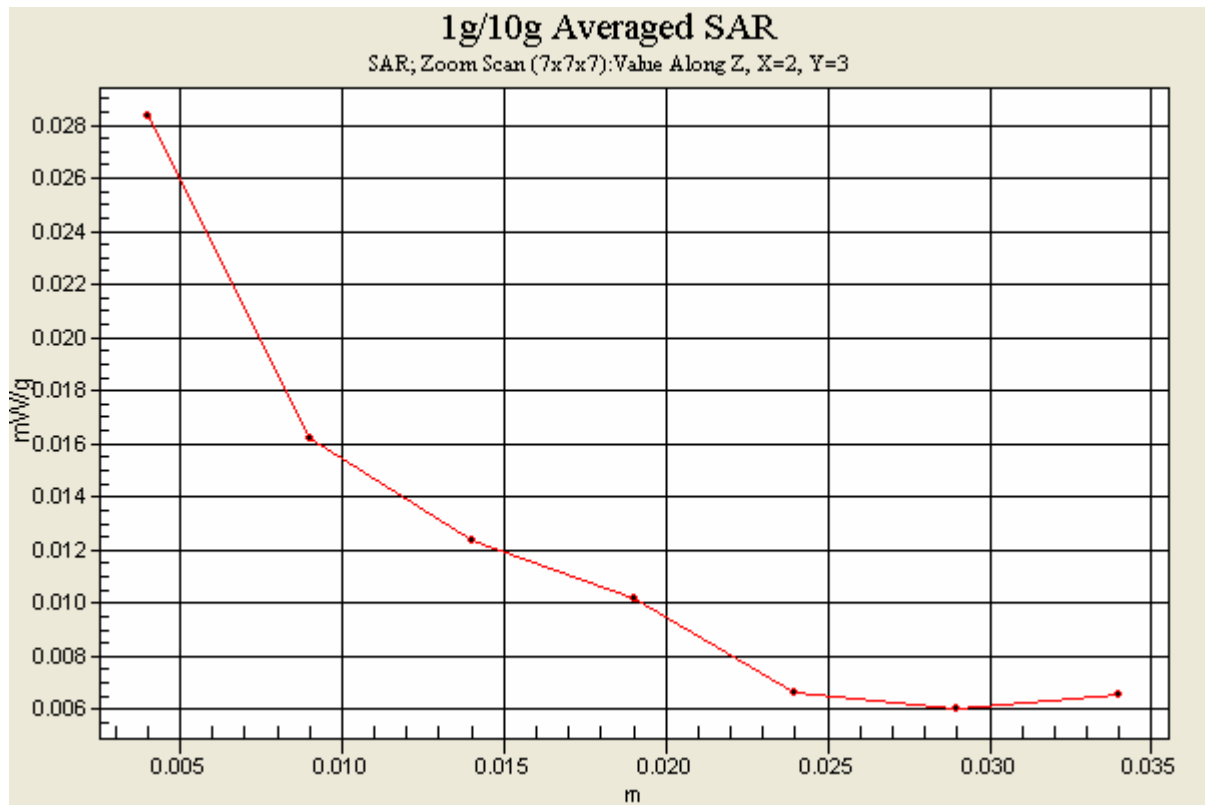
Reference Value = 3.15 V/m

Peak SAR (extrapolated) = 0.083 W/kg

**SAR(1 g) = 0.027 mW/g; SAR(10 g) = 0.016 mW/g**

Maximum value of SAR (measured) = 0.080 mW/g





Test Laboratory: Advance Data Technology

**Internal Ant-11b-CH6-Mode 1**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2437 MHz**

Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: CCK

Medium: MSL2450 Medium parameters used:  $f = 2437 \text{ MHz}$ ;  $\sigma = 2 \text{ mho/m}$ ;  $\epsilon_r = 51$ ;  $\rho = 1000$

$\text{kg/m}^3$  ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The bottom side of the EUT to the Phantom)

Antenna type : Chip Antenna ; Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17

- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202

- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**Mid Channel 6/Area Scan (7x13x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.023 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 = 3.37 V/m

Peak SAR (extrapolated) = 0.046 W/kg

**SAR(1 g) = 0.021 mW/g; SAR(10 g) = 0.014 mW/g**

Maximum value of SAR (measured) = 0.025 mW/g

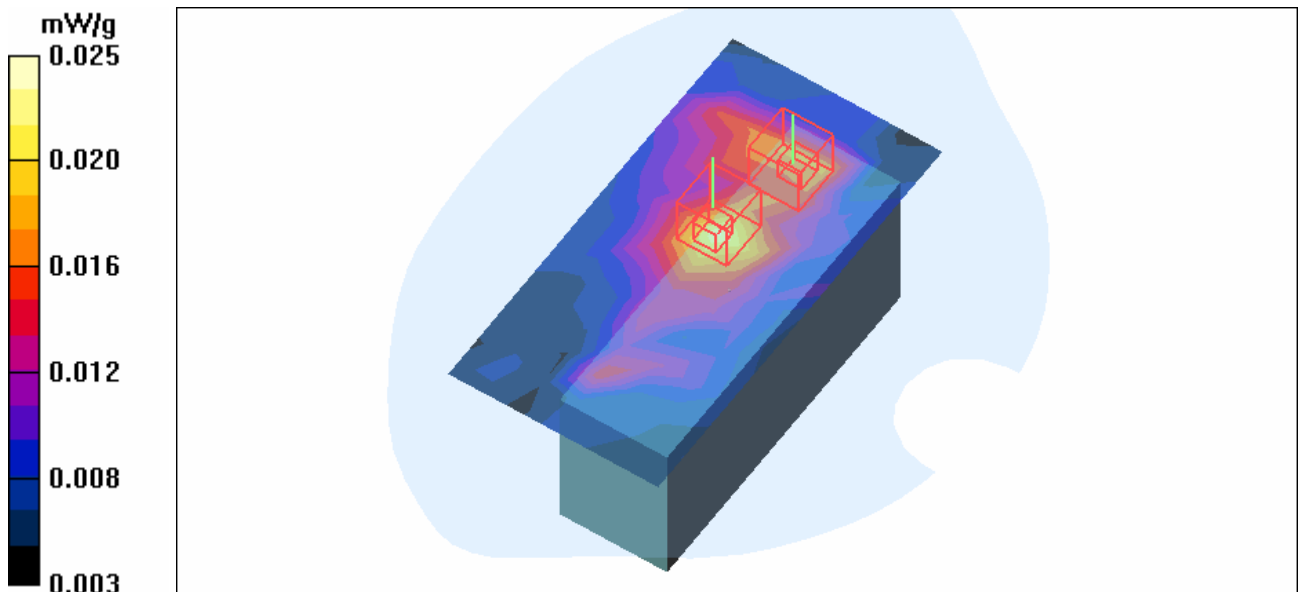
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 3.37 V/m

Peak SAR (extrapolated) = 0.035 W/kg

**SAR(1 g) = 0.020 mW/g; SAR(10 g) = 0.013 mW/g**

Maximum value of SAR (measured) = 0.022 mW/g



Test Laboratory: Advance Data Technology

**Internal Ant-11b-CH11-Mode 1**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2462 MHz**

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

Medium: MSL2450 Medium parameters used:  $f = 2462$  MHz;  $\sigma = 2.04$  mho/m;  $\epsilon_r = 50.9$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The bottom side of the EUT to the Phantom)

Antenna type : Chip Antenna ; Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**High Channel 11/Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.024 mW/g

**High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.10 V/m

Peak SAR (extrapolated) = 0.057 W/kg

**SAR(1 g) = 0.024 mW/g; SAR(10 g) = 0.015 mW/g**

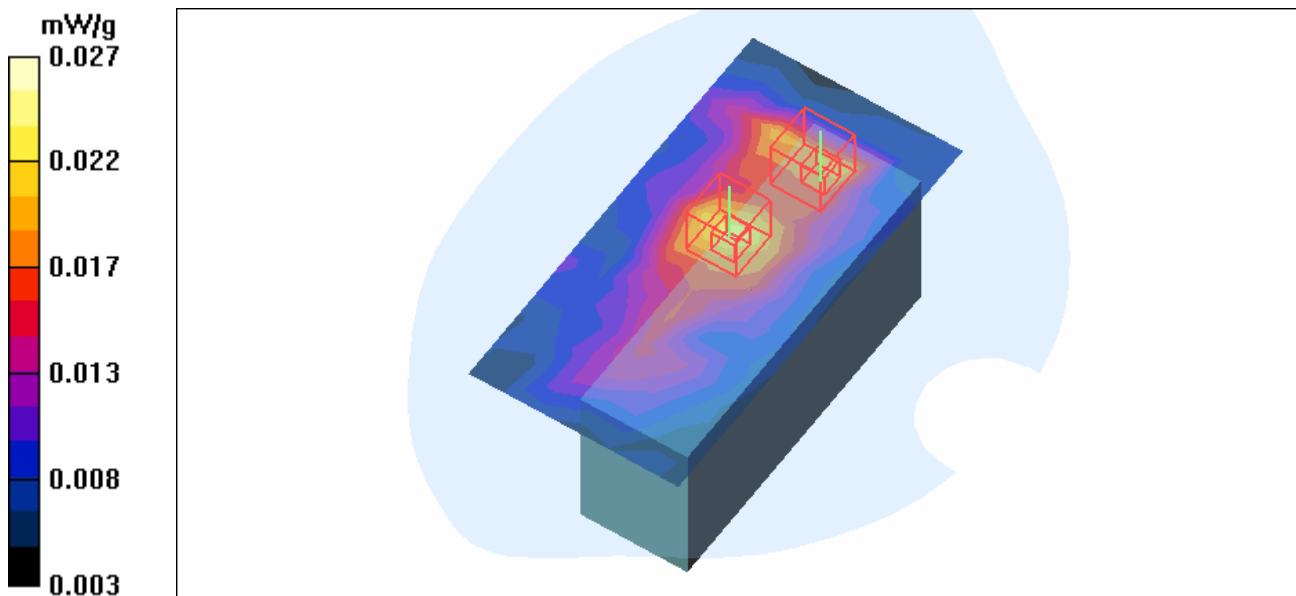
Maximum value of SAR (measured) = 0.027 mW/g

**High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.10 V/m

Peak SAR (extrapolated) = 0.053 W/kg

**SAR(1 g) = 0.021 mW/g; SAR(10 g) = 0.014 mW/g**



Test Laboratory: Advance Data Technology

**Internal Ant-11g-CH1-Mode 2**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2412 MHz**

Communication System: 802.11g ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: OFDM  
 Medium: MSL2450 Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 51$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The bottom side of the EUT to the Phantom)

Antenna type : Chip Antenna ; Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**Low Channel 1/Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.013 mW/g

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

Reference Value = 2.00 V/m

Peak SAR (extrapolated) = 0.018 W/kg

**SAR(1 g) = 0.010 mW/g; SAR(10 g) = 0.00738 mW/g**

Maximum value of SAR (measured) = 0.012 mW/g

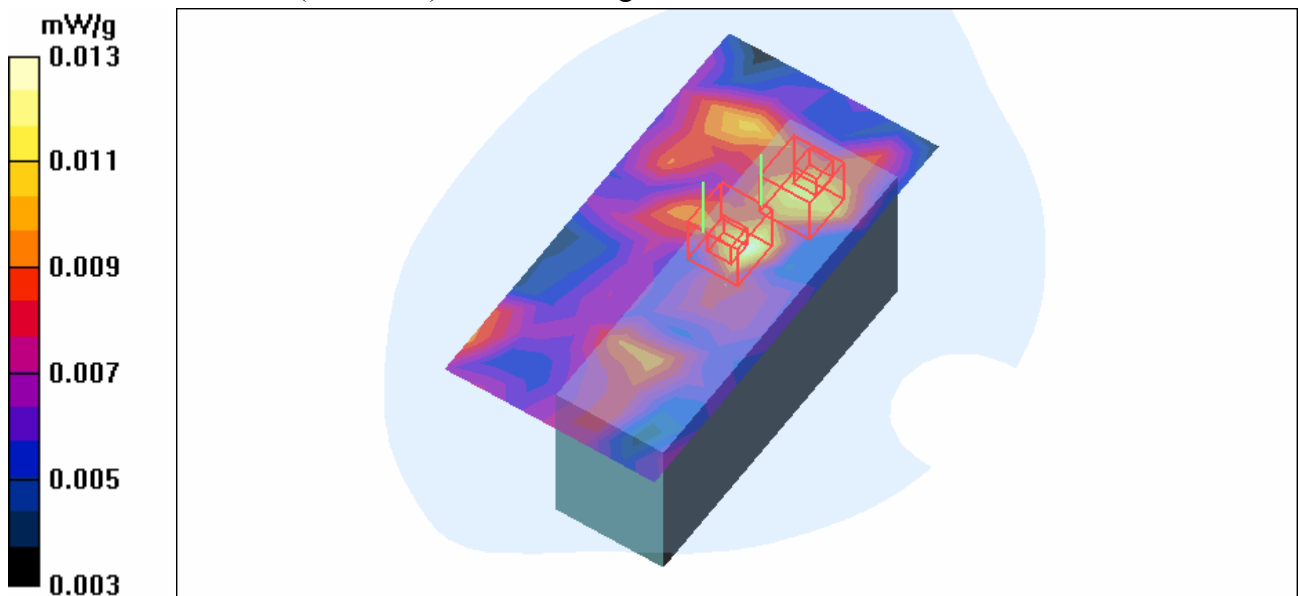
**Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.00 V/m

Peak SAR (extrapolated) = 0.012 W/kg

**SAR(1 g) = 0.00774 mW/g; SAR(10 g) = 0.00634 mW/g**

Maximum value of SAR (measured) = 0.010 mW/g



Test Laboratory: Advance Data Technology

**Internal Ant-11g-CH6-Mode 2**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2437 MHz**

Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: OFDM

Medium: MSL2450 Medium parameters used:  $f = 2437 \text{ MHz}$ ;  $\sigma = 2 \text{ mho/m}$ ;  $\epsilon_r = 51$ ;  $\rho = 1000$

$\text{kg/m}^3$  ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The bottom side of the EUT to the Phantom)

Antenna type : Chip Antenna ; Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**Mid Channel 6/Area Scan (7x13x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.010 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 = 2.30 V/m

Peak SAR (extrapolated) = 0.018 W/kg

**SAR(1 g) = 0.00853 mW/g; SAR(10 g) = 0.00683 mW/g**

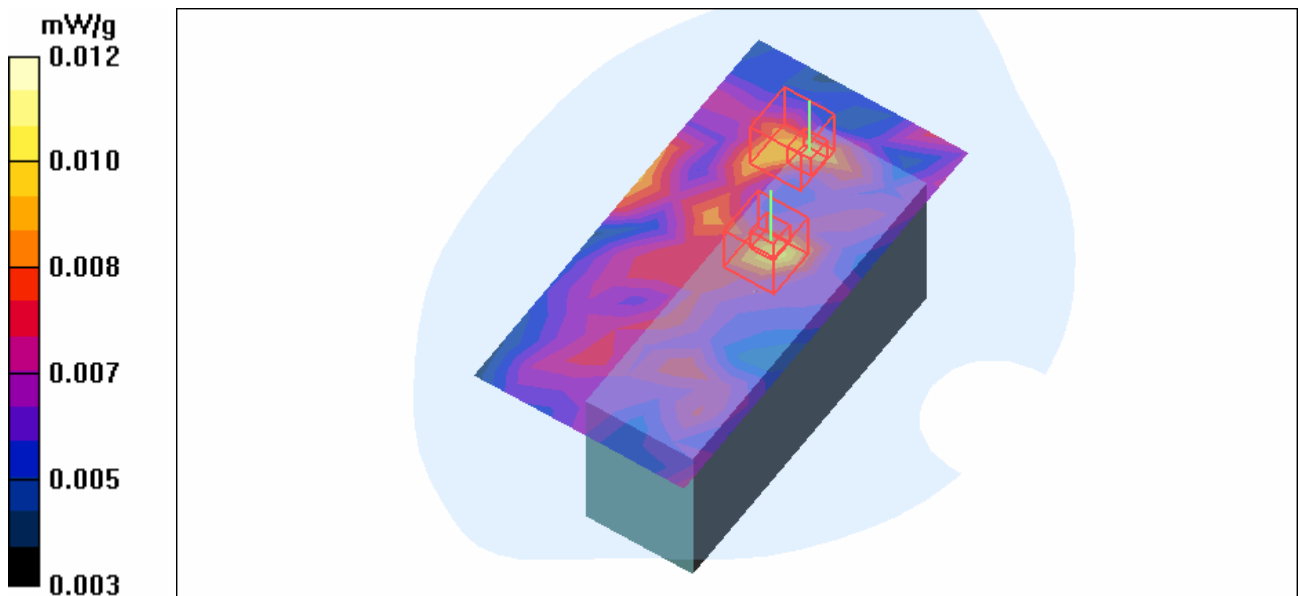
Maximum value of SAR (measured) = 0.012 mW/g

**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 2.30 V/m

Peak SAR (extrapolated) = 0.017 W/kg

**SAR(1 g) = 0.00922 mW/g; SAR(10 g) = 0.00696 mW/g**



Test Laboratory: Advance Data Technology

**Internal Ant-11g-CH11-Mode 2**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2462 MHz**

Communication System: 802.11g ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: OFDM  
 Medium: MSL2450 Medium parameters used:  $f = 2462 \text{ MHz}$ ;  $\sigma = 2.04 \text{ mho/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$  ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The bottom side of the EUT to the Phantom)

Antenna type : Chip Antenna ; Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**High Channel 11/Area Scan (7x13x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.011 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 = 1.97 V/m

Peak SAR (extrapolated) = 0.018 W/kg

**SAR(1 g) = 0.00743 mW/g; SAR(10 g) = 0.0066 mW/g**

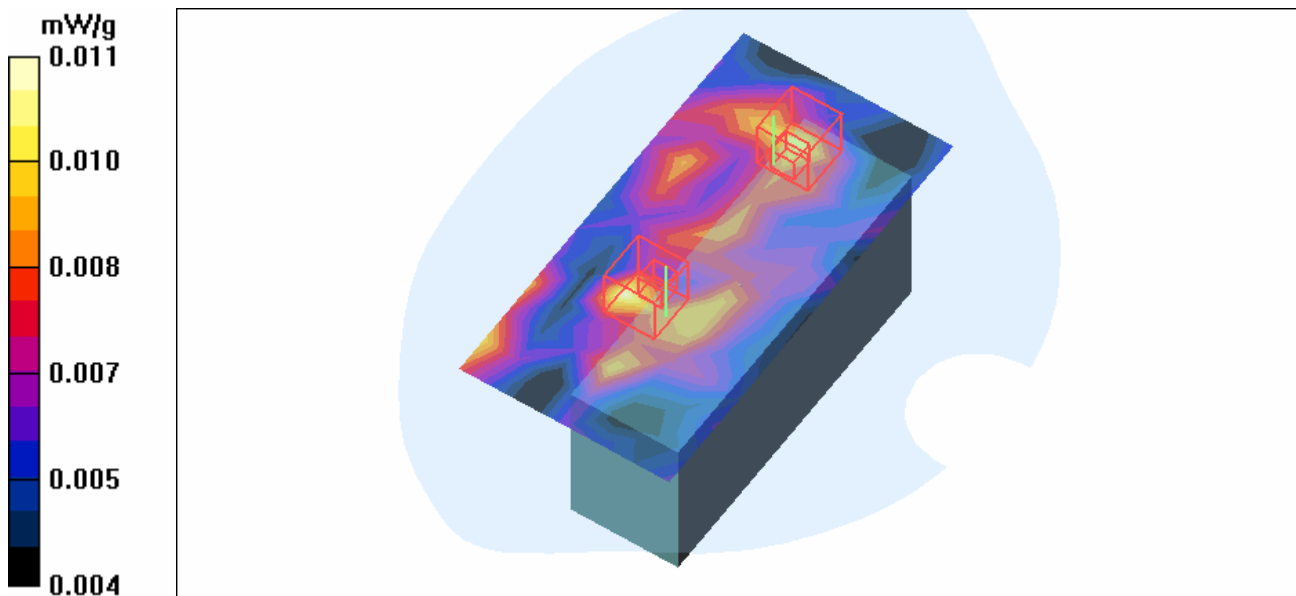
Maximum value of SAR (measured) = 0.010 mW/g

**High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 1.97 V/m

Peak SAR (extrapolated) = 0.014 W/kg

**SAR(1 g) = 0.00929 mW/g; SAR(10 g) = 0.00742 mW/g**





Test Laboratory: Advance Data Technology

**Internal Ant-11b-CH1-Mode 3**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2412 MHz**

Communication System: 802.11b ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: CCK  
 Medium: MSL2450 Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 51$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The edge side of the EUT to the Phantom)

Antenna type : Chip Antenna ; Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**Low Channel 1/Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.012 mW/g

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

Reference Value = 1.89 V/m

Peak SAR (extrapolated) = 0.024 W/kg

**SAR(1 g) = 0.011 mW/g; SAR(10 g) = 0.0082 mW/g**

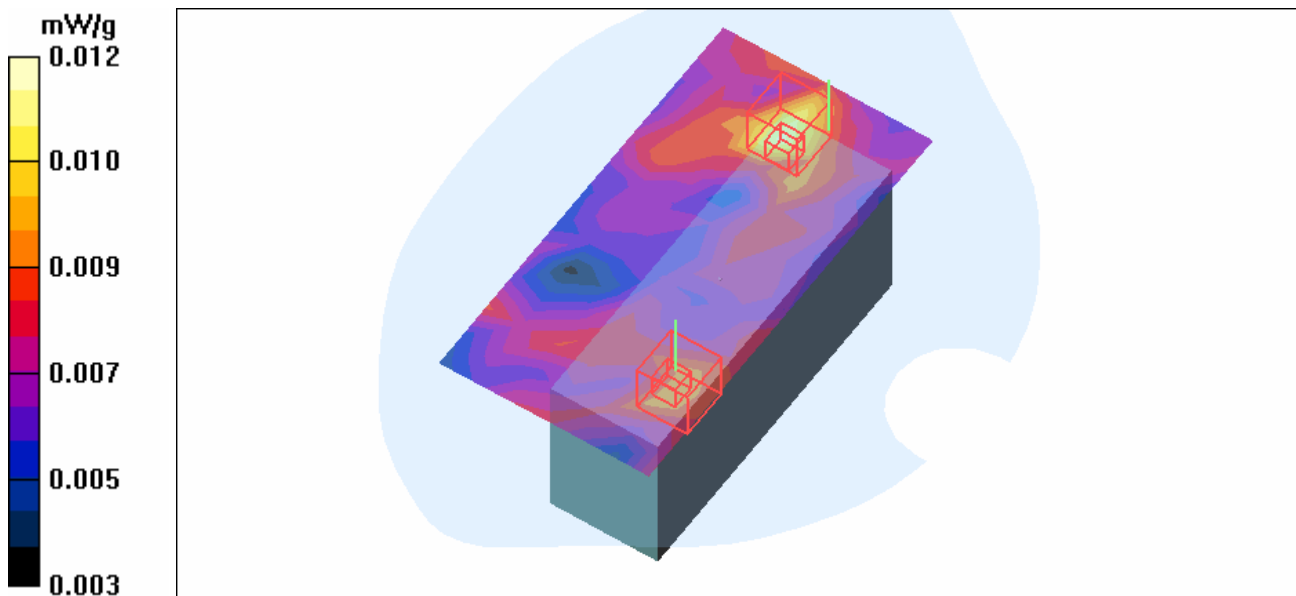
**Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.89 V/m

Peak SAR (extrapolated) = 0.041 W/kg

**SAR(1 g) = 0.010 mW/g; SAR(10 g) = 0.00803 mW/g**

Maximum value of SAR (measured) = 0.011 mW/g



Test Laboratory: Advance Data Technology

### Internal Ant-11b-CH6-Mode 3

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2437 MHz**

Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: CCK

Medium: MSL2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 51$ ;  $\rho = 1000$

$\text{kg/m}^3$  ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The edge side of the EUT to the Phantom)

Antenna type : Chip Antenna ; Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17

- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202

- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**Mid Channel 6/Area Scan (7x13x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.012 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 = 1.91 V/m

Peak SAR (extrapolated) = 0.036 W/kg

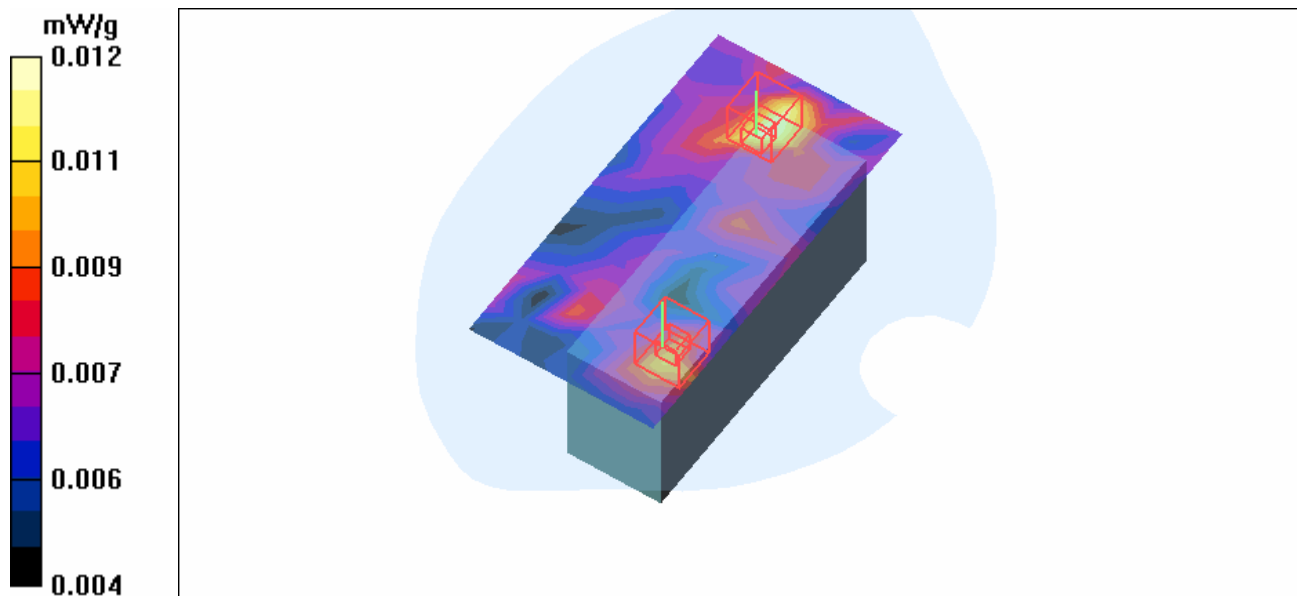
**SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.00795 mW/g**

**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 1.91 V/m

Peak SAR (extrapolated) = 0.029 W/kg

**SAR(1 g) = 0.011 mW/g; SAR(10 g) = 0.00786 mW/g**



Test Laboratory: Advance Data Technology

**Internal Ant-11b-CH11-Mode 3**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2462 MHz**

Communication System: 802.11b ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: CCK  
 Medium: MSL2450 Medium parameters used:  $f = 2462$  MHz;  $\sigma = 2.04$  mho/m;  $\epsilon_r = 50.9$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The edge side of the EUT to the Phantom)

Antenna type : Chip Antenna ; Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**High Channel 11/Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.012 mW/g

**High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.03 V/m

Peak SAR (extrapolated) = 0.024 W/kg

**SAR(1 g) = 0.011 mW/g; SAR(10 g) = 0.00844 mW/g**

Maximum value of SAR (measured) = 0.013 mW/g

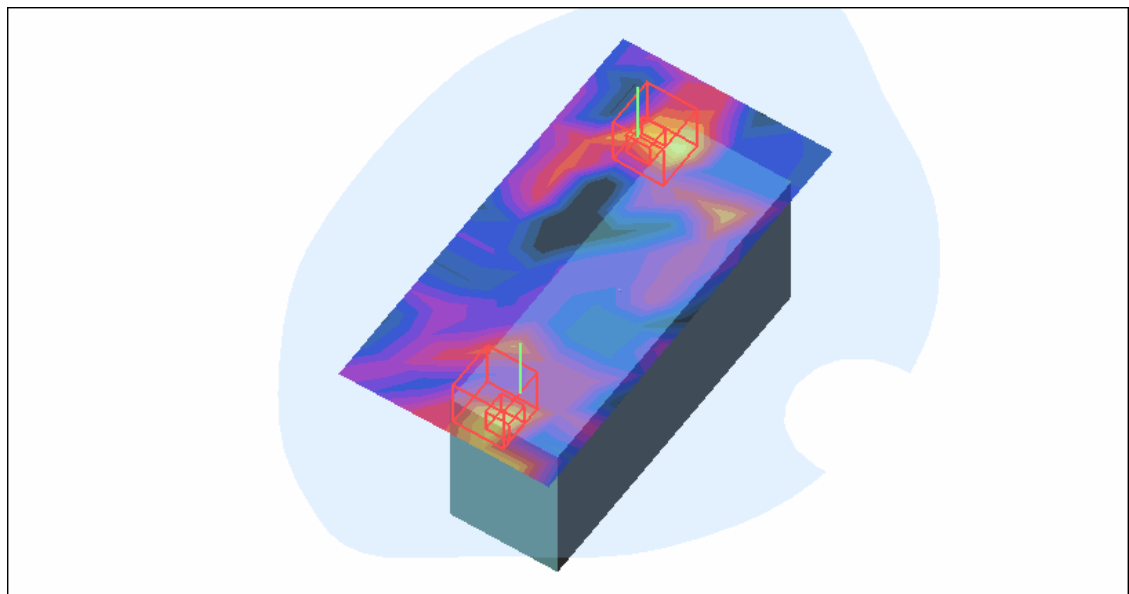
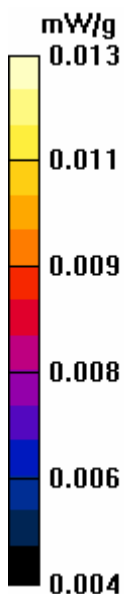
**High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.03 V/m

Peak SAR (extrapolated) = 0.016 W/kg

**SAR(1 g) = 0.00906 mW/g; SAR(10 g) = 0.00732 mW/g**

Maximum value of SAR (measured) = 0.011 mW/g



Test Laboratory: Advance Data Technology

## Internal Ant-11g-CH1-Mode 4

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2412 MHz**

Communication System: 802.11g ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: OFDM  
 Medium: MSL2450 Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.96$  mho/m;  $\epsilon_r = 51$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The edge side of the EUT to the Phantom)

Antenna type : Chip Antenna ; Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**Low Channel 1/Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.009 mW/g

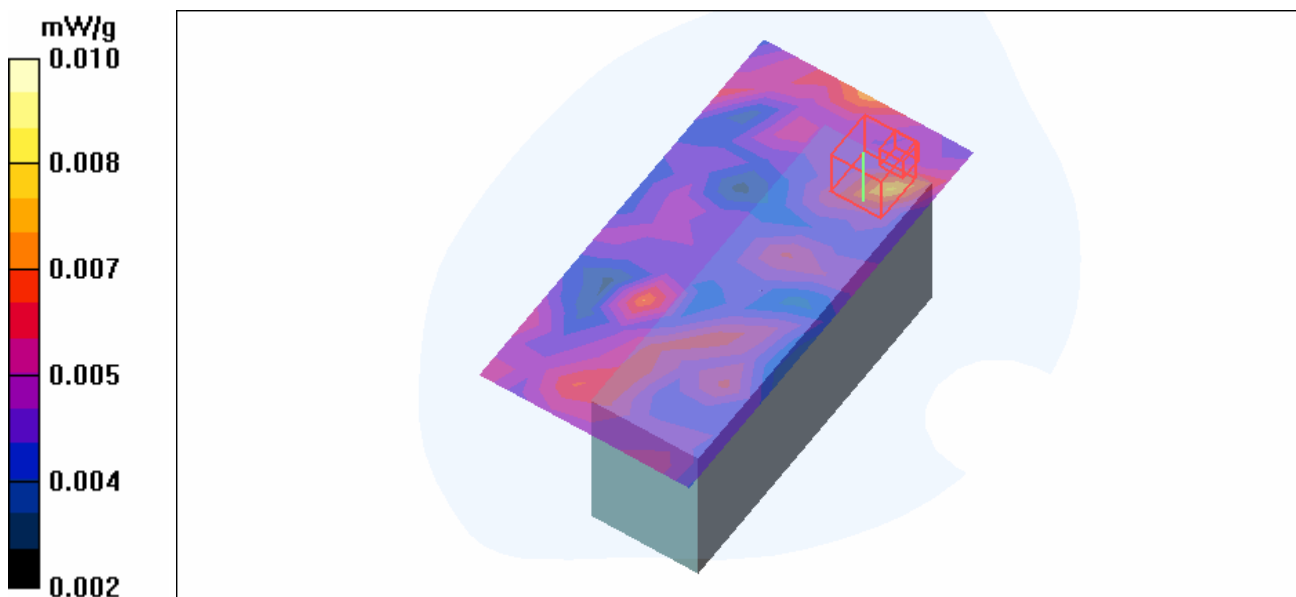
**Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.74 V/m

Peak SAR (extrapolated) = 0.010 W/kg

**SAR(1 g) = 0.00668 mW/g; SAR(10 g) = 0.00611 mW/g**

Maximum value of SAR (measured) = 0.010 mW/g



Test Laboratory: Advance Data Technology

### Internal Ant-11g-CH6-Mode 4

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2437 MHz**

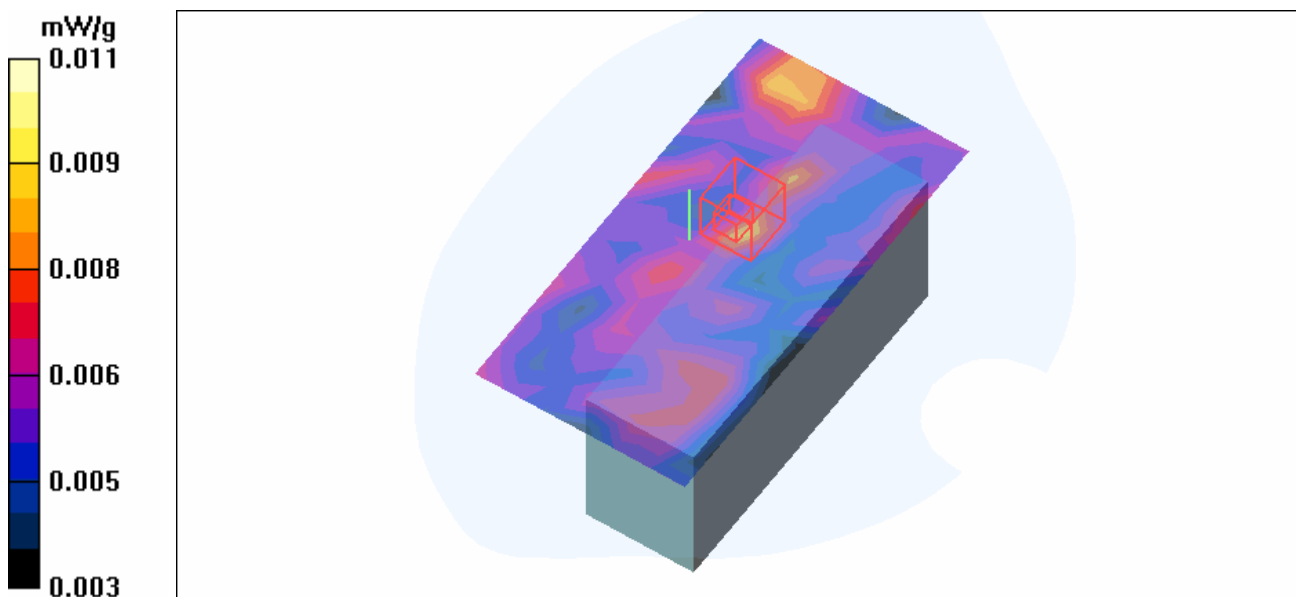
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: OFDM  
 Medium: MSL2450 Medium parameters used:  $f = 2437 \text{ MHz}$ ;  $\sigma = 2 \text{ mho/m}$ ;  $\epsilon_r = 51$ ;  $\rho = 1000 \text{ kg/m}^3$  ; Liquid level : 151 mm  
 Phantom section: Flat Section ; Separation distance : 0 mm (The edge side of the EUT to the Phantom)  
 Antenna type : Chip Antenna ; Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**Mid Channel 6/Area Scan (7x13x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$   
 Maximum value of SAR (measured) = 0.009 mW/g

**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$   
 Reference Value = 1.90 V/m  
 Peak SAR (extrapolated) = 0.011 W/kg  
**SAR(1 g) = 0.00774 mW/g; SAR(10 g) = 0.00644 mW/g**  
 Maximum value of SAR (measured) = 0.011 mW/g



Test Laboratory: Advance Data Technology

### Internal Ant-11g-CH11-Mode 4

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2462 MHz**

Communication System: 802.11g ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: OFDM  
Medium: MSL2450 Medium parameters used:  $f = 2462$  MHz;  $\sigma = 2.04$  mho/m;  $\epsilon_r = 50.9$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The edge side of the EUT to the Phantom)  
Antenna type : Chip Antenna ; Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

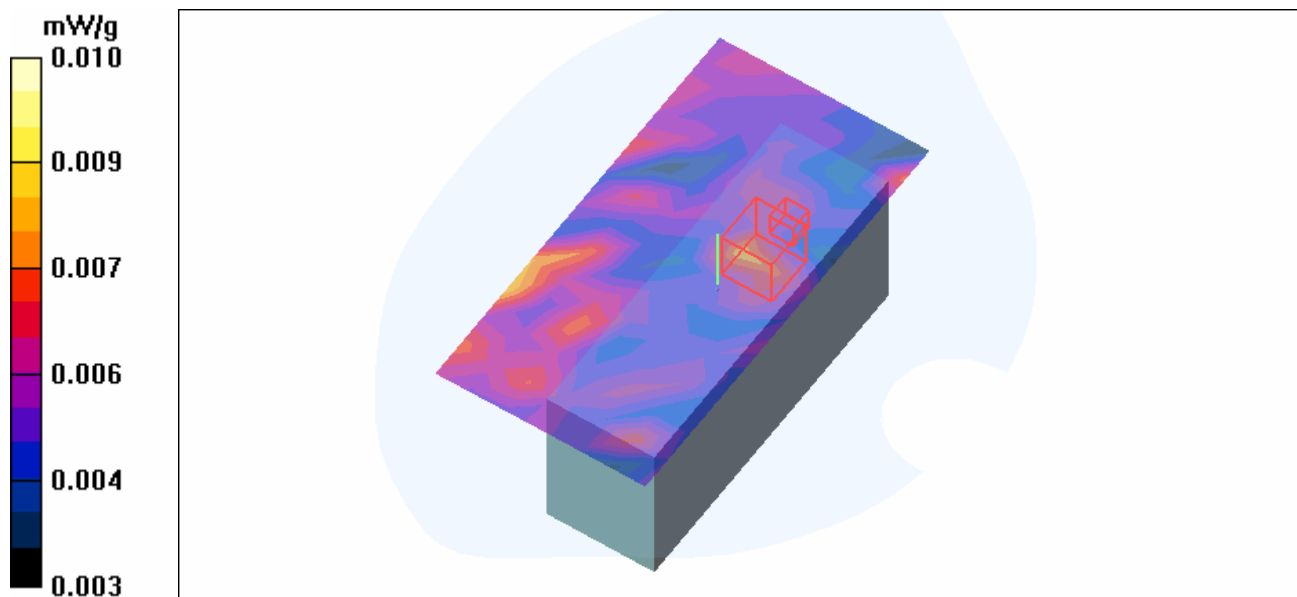
**High Channel 11/Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 0.010 mW/g

**High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.99 V/m

Peak SAR (extrapolated) = 0.010 W/kg

**SAR(1 g) = 0.00747 mW/g; SAR(10 g) = 0.00655 mW/g**



Test Laboratory: Advance Data Technology

## Internal Ant-11b-CH1-Mode 5

### DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2412 MHz

Communication System: 802.11b ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: CCK  
Medium: HSL2450 Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.76$  mho/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$   
 $\text{kg/m}^3$  ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The bottom side of the EUT to the Phantom)

Antenna type : Internal Antenna ; Air temp. : 22.8 degrees ; Liquid temp. : 21.9 degrees

#### DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.41, 4.41, 4.41) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

#### Low Channel 1/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.030 mW/g

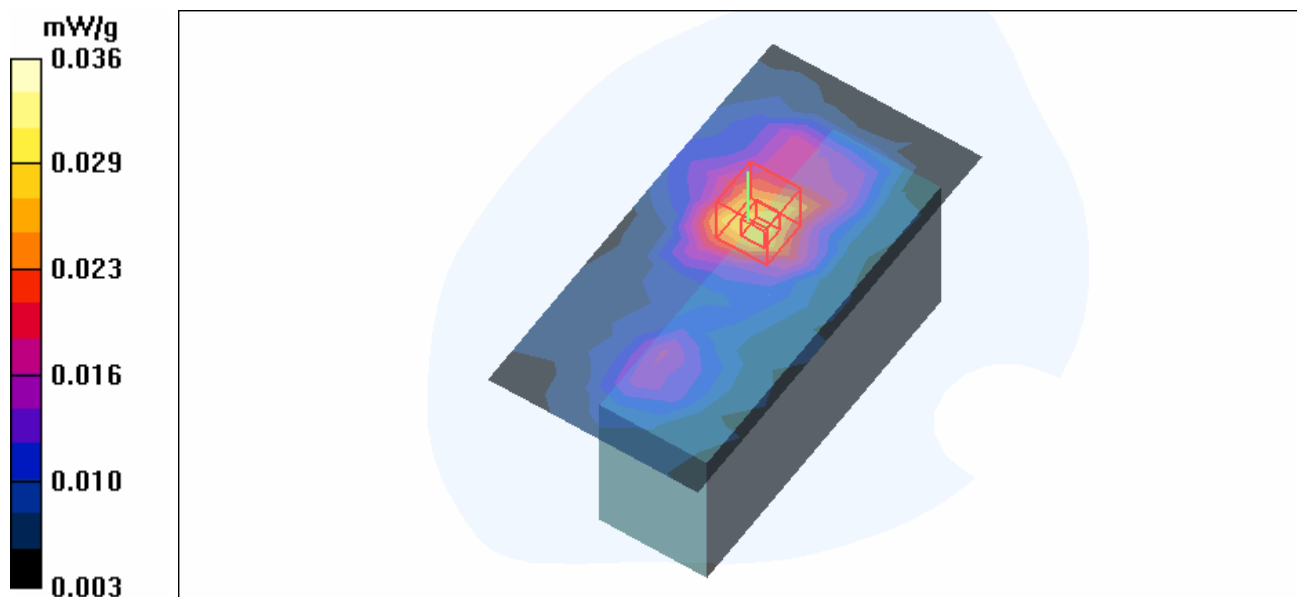
#### Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.79 V/m

Peak SAR (extrapolated) = 0.059 W/kg

**SAR(1 g) = 0.033 mW/g; SAR(10 g) = 0.020 mW/g**

Maximum value of SAR (measured) = 0.036 mW/g



Test Laboratory: Advance Data Technology

**Internal Ant-11b-CH6-Mode 5**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2437 MHz**

Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: CCK  
 Medium: HSL2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.8$  mho/m;  $\epsilon_r = 38.6$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The bottom side of the EUT to the Phantom)

Antenna type : Internal Antenna ; Air temp. : 22.8 degrees ; Liquid temp. : 21.9 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.41, 4.41, 4.41) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**Mid Channel 6/Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.034 mW/g

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

Reference Value = 1.97 V/m

Peak SAR (extrapolated) = 0.063 W/kg

**SAR(1 g) = 0.035 mW/g; SAR(10 g) = 0.021 mW/g**

Maximum value of SAR (measured) = 0.037 mW/g

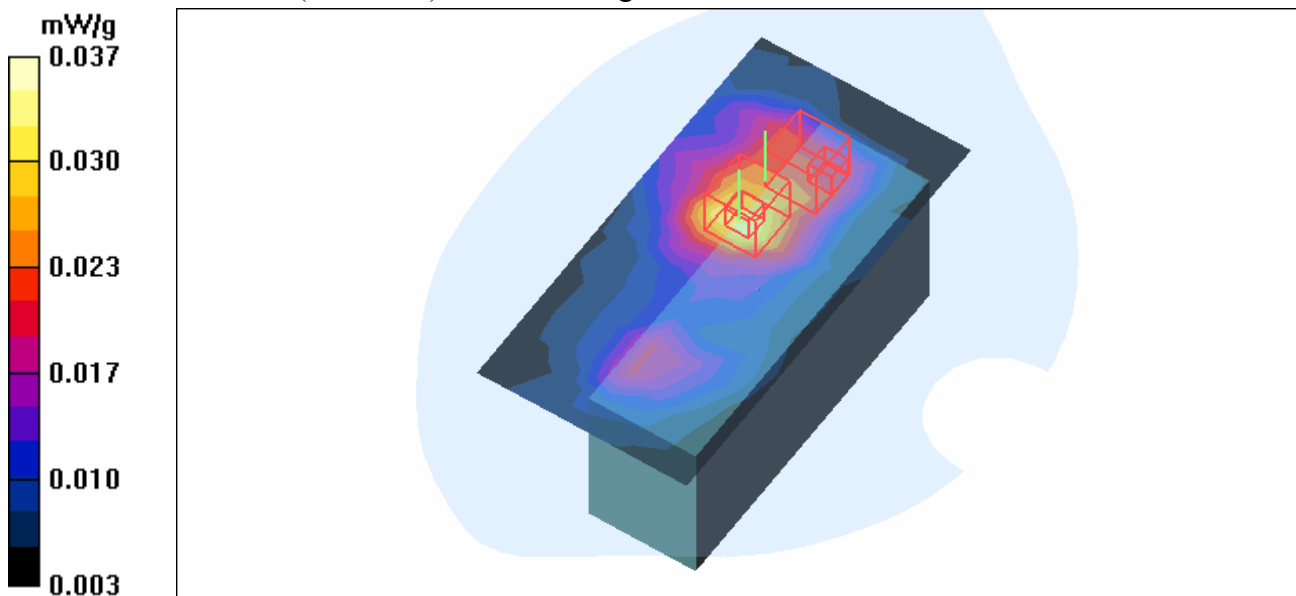
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.97 V/m

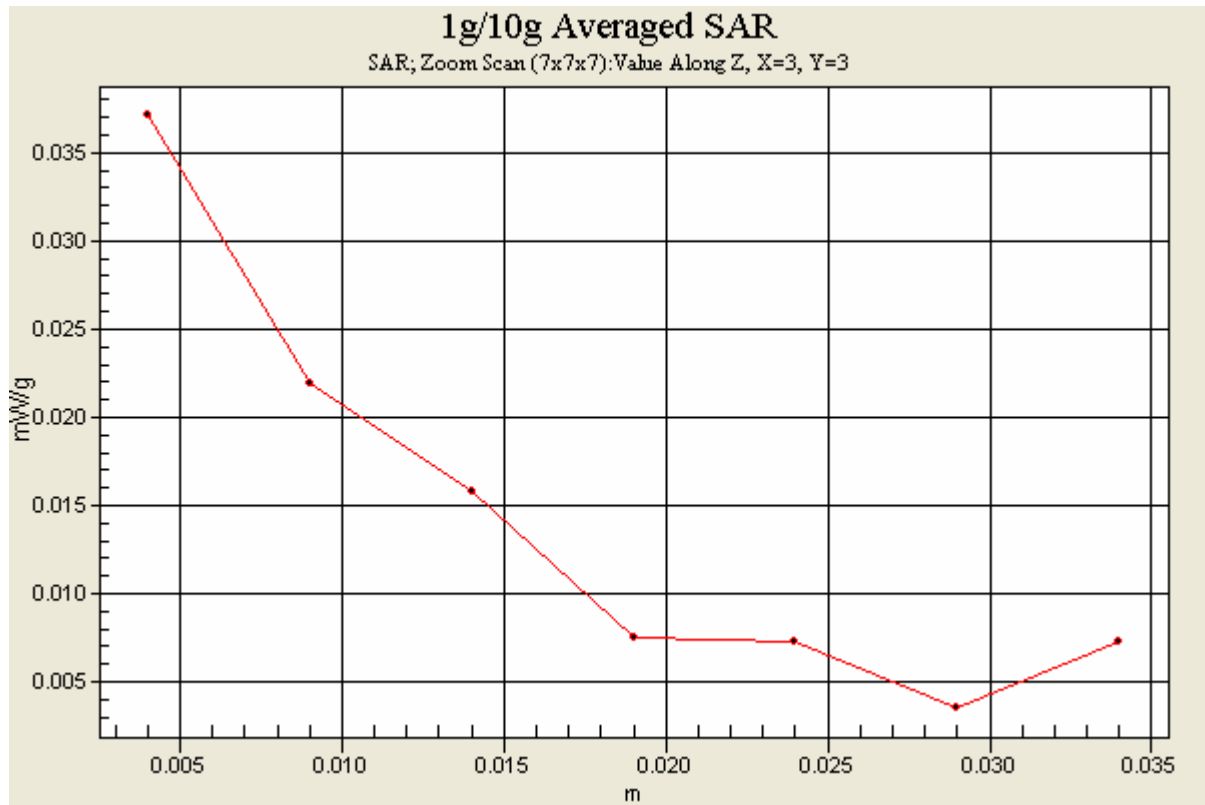
Peak SAR (extrapolated) = 0.046 W/kg

**SAR(1 g) = 0.024 mW/g; SAR(10 g) = 0.015 mW/g**

Maximum value of SAR (measured) = 0.028 mW/g







Test Laboratory: Advance Data Technology

**Internal Ant-11b-CH11-Mode 5**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2462 MHz**

Communication System: 802.11b ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: CCK  
 Medium: HSL2450 Medium parameters used:  $f = 2462 \text{ MHz}$ ;  $\sigma = 1.83 \text{ mho/m}$ ;  $\epsilon_r = 38.4$ ;  $\rho = 1000 \text{ kg/m}^3$  ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The bottom side of the EUT to the Phantom)

Antenna type : Internal Antenna ; Air temp. : 22.8 degrees ; Liquid temp. : 21.9 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.41, 4.41, 4.41) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**High Channel 11/Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.032 mW/g

**High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.79 V/m

Peak SAR (extrapolated) = 0.068 W/kg

**SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.018 mW/g**

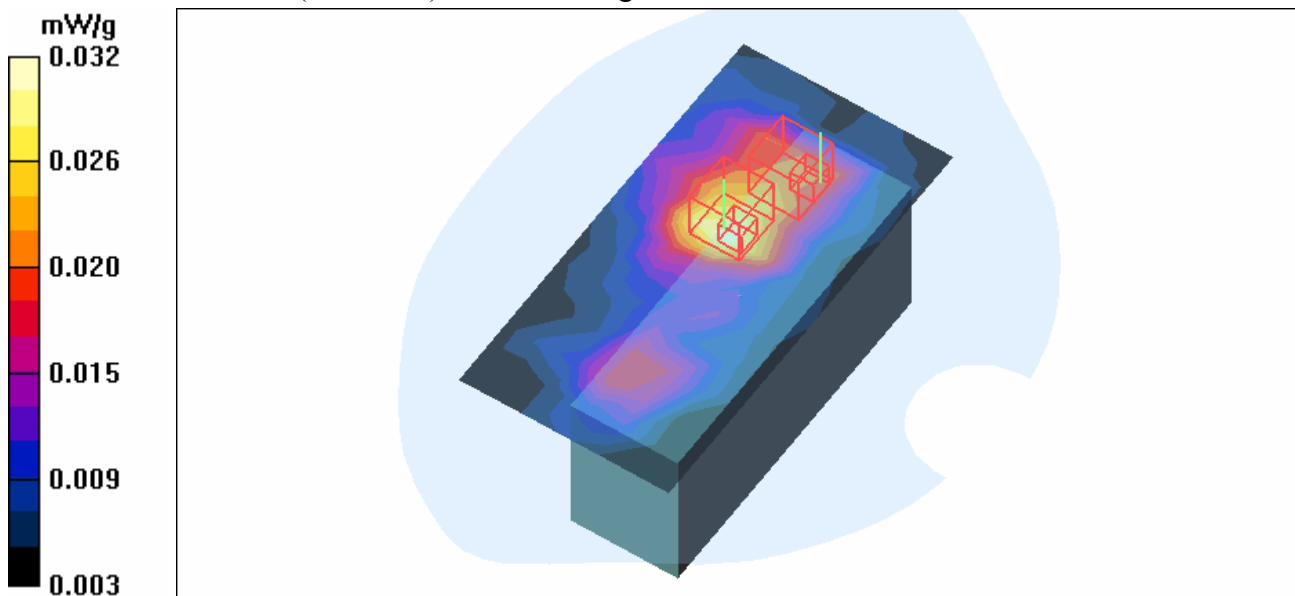
**High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.79 V/m

Peak SAR (extrapolated) = 0.044 W/kg

**SAR(1 g) = 0.024 mW/g; SAR(10 g) = 0.014 mW/g**

Maximum value of SAR (measured) = 0.026 mW/g



Test Laboratory: Advance Data Technology

**Internal Ant-11g-CH1-Mode 6**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2412 MHz**

Communication System: 802.11g ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: OFDM  
 Medium: HSL2450 Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.76$  mho/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The bottom side of the EUT to the Phantom)

Antenna type : Internal Antenna ; Air temp. : 22.8 degrees ; Liquid temp. : 21.9 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.41, 4.41, 4.41) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**Low Channel 1/Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.014 mW/g

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

Reference Value = 2.19 V/m

Peak SAR (extrapolated) = 0.021 W/kg

**SAR(1 g) = 0.010 mW/g; SAR(10 g) = 0.00555 mW/g**

Maximum value of SAR (measured) = 0.012 mW/g

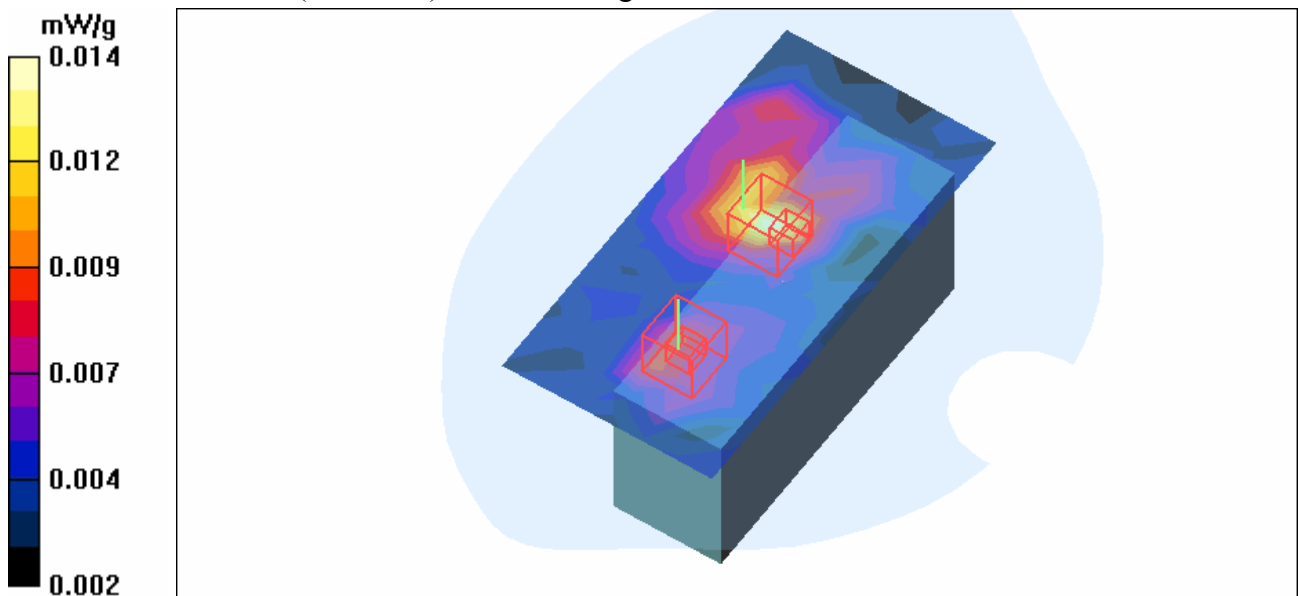
**Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.19 V/m

Peak SAR (extrapolated) = 0.010 W/kg

**SAR(1 g) = 0.00729 mW/g; SAR(10 g) = 0.0052 mW/g**

Maximum value of SAR (measured) = 0.008 mW/g



Test Laboratory: Advance Data Technology

**Internal Ant-11g-CH6-Mode 6**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2437 MHz**

Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: OFDM  
 Medium: HSL2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.8$  mho/m;  $\epsilon_r = 38.6$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The bottom side of the EUT to the Phantom)

Antenna type : Internal Antenna ; Air temp. : 22.8 degrees ; Liquid temp. : 21.9 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.41, 4.41, 4.41) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**Mid Channel 6/Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.012 mW/g

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

Reference Value = 2.13 V/m

Peak SAR (extrapolated) = 0.030 W/kg

**SAR(1 g) = 0.011 mW/g; SAR(10 g) = 0.00726 mW/g**

Maximum value of SAR (measured) = 0.011 mW/g

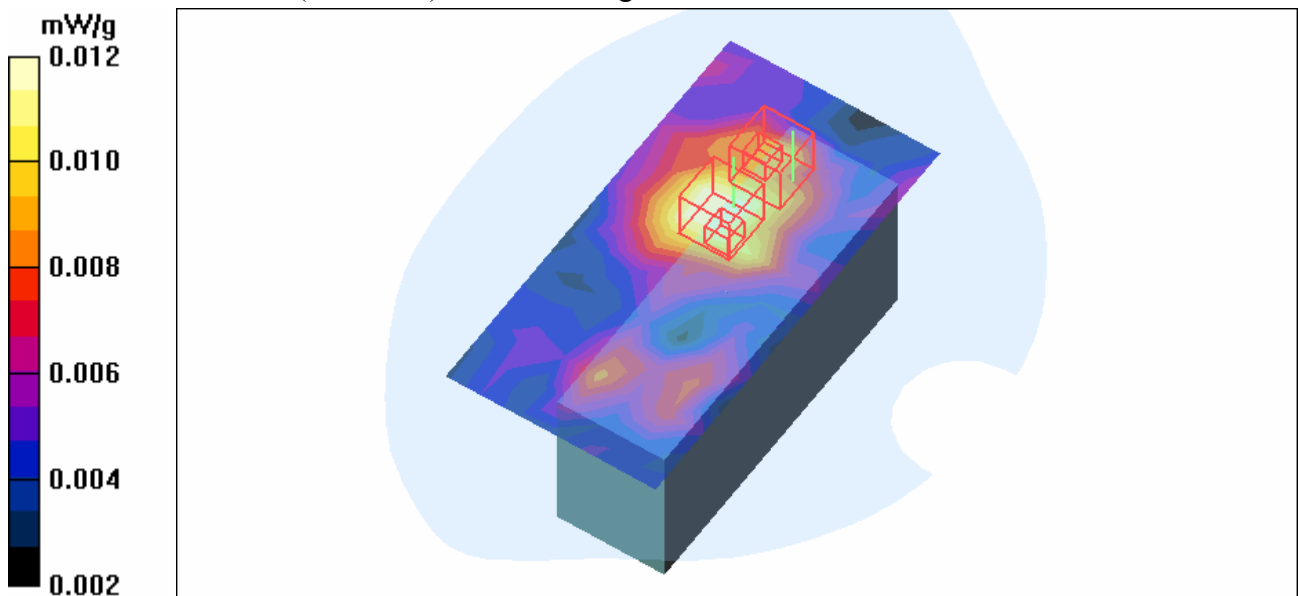
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.13 V/m

Peak SAR (extrapolated) = 0.014 W/kg

**SAR(1 g) = 0.0073 mW/g; SAR(10 g) = 0.00582 mW/g**

Maximum value of SAR (measured) = 0.009 mW/g



Test Laboratory: Advance Data Technology

**Internal Ant-11g-CH11-Mode 6**

**DUT: 802.11b/g Wireless Transmitter ; Type: WT-3 ; Test Frequency: 2462 MHz**

Communication System: 802.11g ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: OFDM  
 Medium: HSL2450 Medium parameters used:  $f = 2462$  MHz;  $\sigma = 1.83$  mho/m;  $\epsilon_r = 38.4$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 0 mm (The bottom side of the EUT to the Phantom)

Antenna type : Internal Antenna ; Air temp. : 22.8 degrees ; Liquid temp. : 21.9 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.41, 4.41, 4.41) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510 ; Calibrated: 2005/8/17
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44 ; Postprocessing SW: SEMCAD, V1.8 Build 171

**High Channel 11/Area Scan (7x13x1):** Measurement grid: dx=15mm, dy=15mm  
 Maximum value of SAR (measured) = 0.010 mW/g

**High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.72 V/m

Peak SAR (extrapolated) = 0.019 W/kg

**SAR(1 g) = 0.00855 mW/g; SAR(10 g) = 0.00631 mW/g**

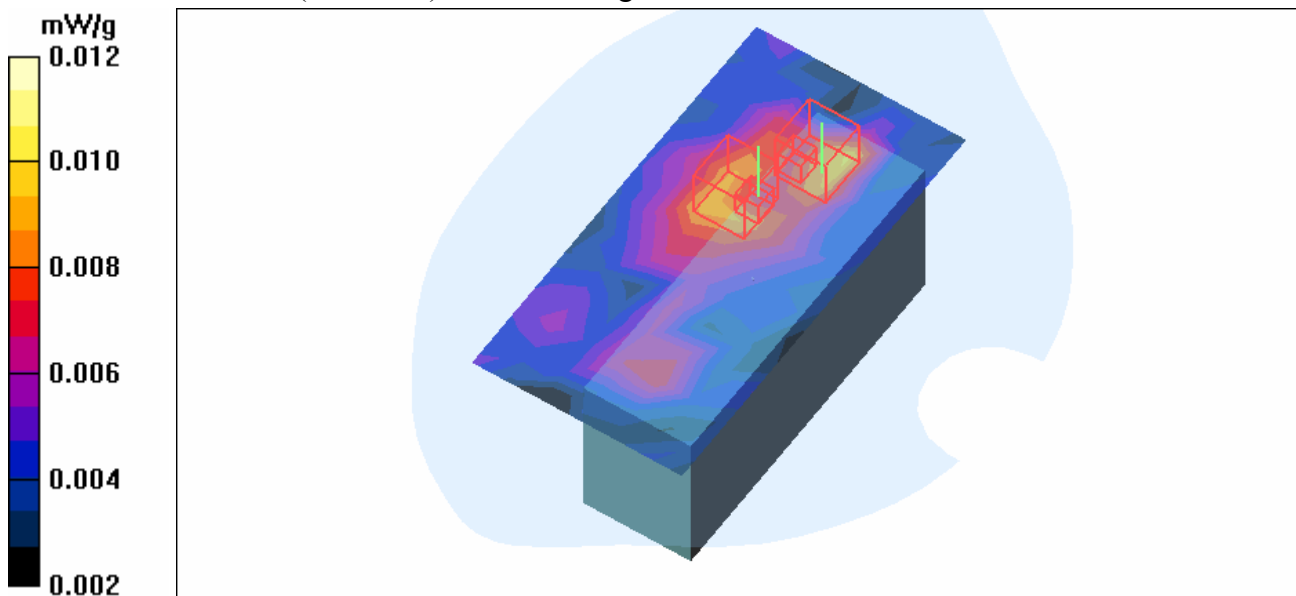
**High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.72 V/m

Peak SAR (extrapolated) = 0.018 W/kg

**SAR(1 g) = 0.010 mW/g; SAR(10 g) = 0.00724 mW/g**

Maximum value of SAR (measured) = 0.012 mW/g



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;  $\sigma = 2.02$  mho/m;  $\epsilon_r = 50.9$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 151 mm  
 Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 22.5 degrees ; Liquid temp. : 21.5 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.13, 4.13, 4.13) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2005/8/17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**d=10mm, Pin=250mW/Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm  
 Maximum value of SAR (measured) = 14.9 mW/g

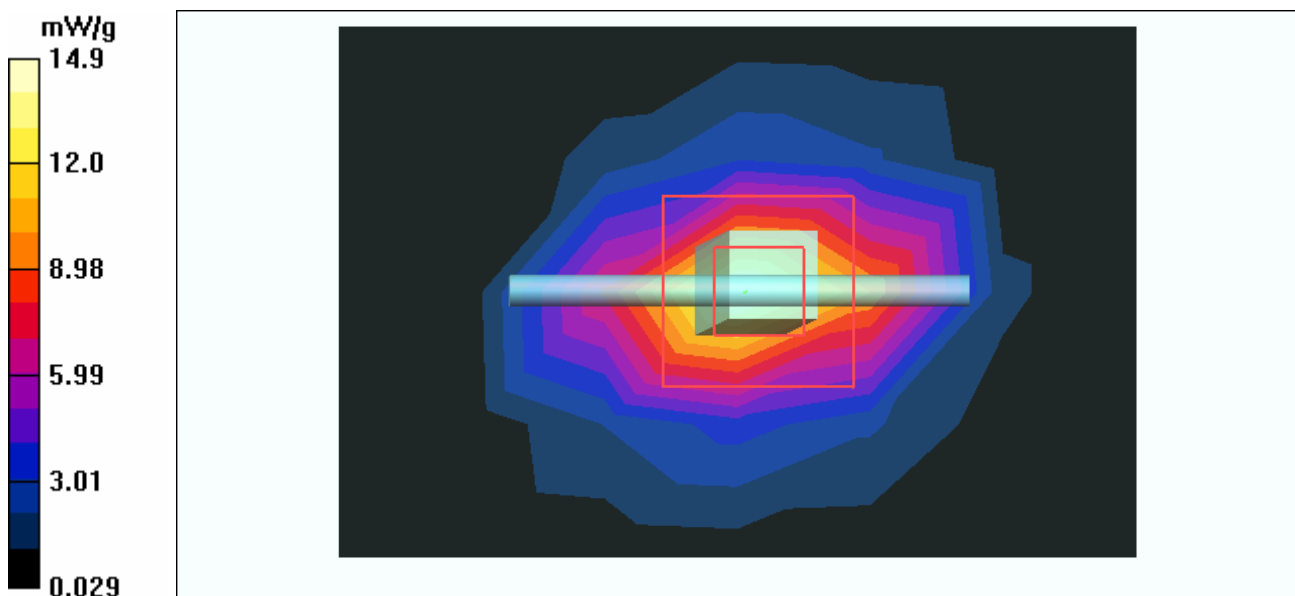
**d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.9 V/m; Power Drift = -0.139 dB

Peak SAR (extrapolated) = 29.1 W/kg

**SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.08 mW/g**

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



Test Laboratory: Advance Data Technology

## System Validation Check-HSL 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: HSL2450; Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.81$  mho/m;  $\epsilon_r = 38.5$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
 Liquid level : 150 mm  
 Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom)  
 Air temp. : 22.8 degrees ; Liquid temp. : 21.9 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1687 ; ConvF(4.41, 4.41, 4.41) ; Calibrated: 2005/9/15
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2005/8/17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**d=10mm, Pin=250mW/Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm  
 Maximum value of SAR (measured) = 15.0 mW/g

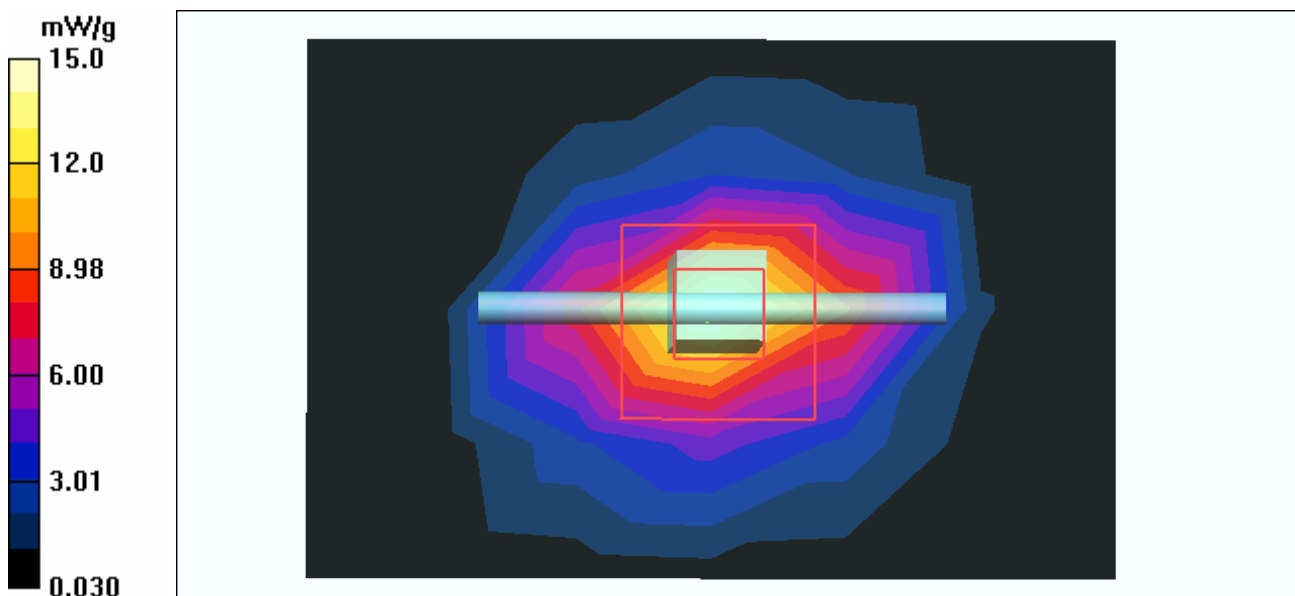
**d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.5 V/m; Power Drift = -0.144 dB

Peak SAR (extrapolated) = 27.6 W/kg

**SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.12 mW/g**

Maximum value of SAR (measured) = 14.9 mW/g

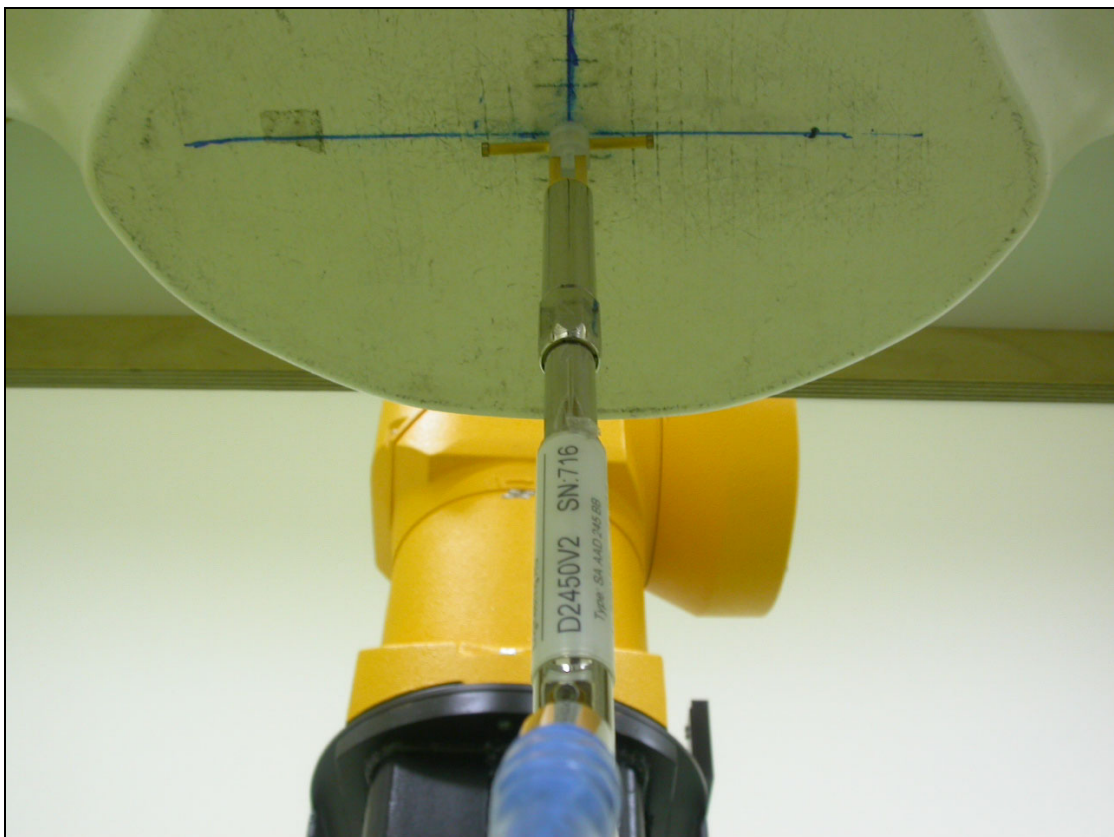


## APPENDIX B: ADT SAR MEASUREMENT SYSTEM





## 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

*Johannes Kofler*



**D3: DAE**

**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 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: **DAE3-510\_Aug05**

## CALIBRATION CERTIFICATE

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

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

Calibration date: **August 17, 2005**

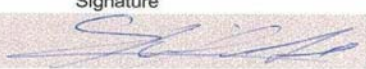

Condition of the calibrated item **In Tolerance**

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 ( $22 \pm 3$ )°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-Sep-04 (Sintrel, No.E-040073)	Sep-05
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1002	29-Jun-05 (SPEAG, in house check)	In house check Jun-06

Calibrated by:	Name <b>Eric Hainfeld</b>	Function <b>Technician</b>	Signature 
Approved by:	Name <b>Fin Bornholt</b>	Function <b>R&amp;D Director</b>	Signature 

Issued: August 17, 2005

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



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



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

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

DAE digital 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 $\mu$ 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	403.415 $\pm$ 0.1% (k=2)	403.485 $\pm$ 0.1% (k=2)	403.851 $\pm$ 0.1% (k=2)
Low Range	3.95575 $\pm$ 0.7% (k=2)	3.93409 $\pm$ 0.7% (k=2)	3.95875 $\pm$ 0.7% (k=2)

### Connector Angle

Connector Angle to be used in DASY system	44 $^{\circ}$ $\pm$ 1 $^{\circ}$
---	----------------------------------

## Appendix

### 1. DC Voltage Linearity

High Range	Input ( $\mu\text{V}$ )	Reading ( $\mu\text{V}$ )	Error (%)
Channel X + Input	200000	200000.5	0.00
Channel X + Input	20000	20004.73	0.02
Channel X - Input	20000	-19990.82	-0.05
Channel Y + Input	200000	200000.4	0.00
Channel Y + Input	20000	20002.02	0.01
Channel Y - Input	20000	-19995.68	-0.02
Channel Z + Input	200000	200000.2	0.00
Channel Z + Input	20000	20006.25	0.03
Channel Z - Input	20000	-19996.09	-0.02

Low Range	Input ( $\mu\text{V}$ )	Reading ( $\mu\text{V}$ )	Error (%)
Channel X + Input	2000	2000.1	0.00
Channel X + Input	200	200.36	0.18
Channel X - Input	200	-200.01	0.00
Channel Y + Input	2000	1999.9	0.00
Channel Y + Input	200	199.23	-0.38
Channel Y - Input	200	-200.56	0.28
Channel Z + Input	2000	2000	0.00
Channel Z + Input	200	199.08	-0.46
Channel Z - Input	200	-200.99	0.50

### 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 ( $\mu\text{V}$ )	Low Range Average Reading ( $\mu\text{V}$ )
Channel X	200	17.56	16.61
	- 200	-15.84	-17.03
Channel Y	200	14.35	14.26
	- 200	-15.35	-15.86
Channel Z	200	-8.76	-8.81
	- 200	7.41	7.46

### 3. Channel separation

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

	Input Voltage (mV)	Channel X ( $\mu\text{V}$ )	Channel Y ( $\mu\text{V}$ )	Channel Z ( $\mu\text{V}$ )
Channel X	200	-	3.17	0.64
Channel Y	200	0.23	-	3.72
Channel Z	200	-0.73	-0.05	-



#### 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	15976	16467
Channel Y	16203	16387
Channel Z	16171	16268

#### 5. Input Offset Measurement

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

Input 10M $\Omega$

	Average ( $\mu$ V)	min. Offset ( $\mu$ V)	max. Offset ( $\mu$ V)	Std. Deviation ( $\mu$ V)
Channel X	0.21	-0.66	0.72	0.27
Channel Y	-1.17	-3.01	0.16	0.33
Channel Z	-1.42	-2.98	-0.81	0.29

#### 6. Input Offset Current

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

#### 7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2001	201.1
Channel Y	0.2001	199.6
Channel Z	0.2000	200.5

#### 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