## Appendix 2-4: Measurement data / Platform(3): Digital camera(1)

### Step 1: Worst position search

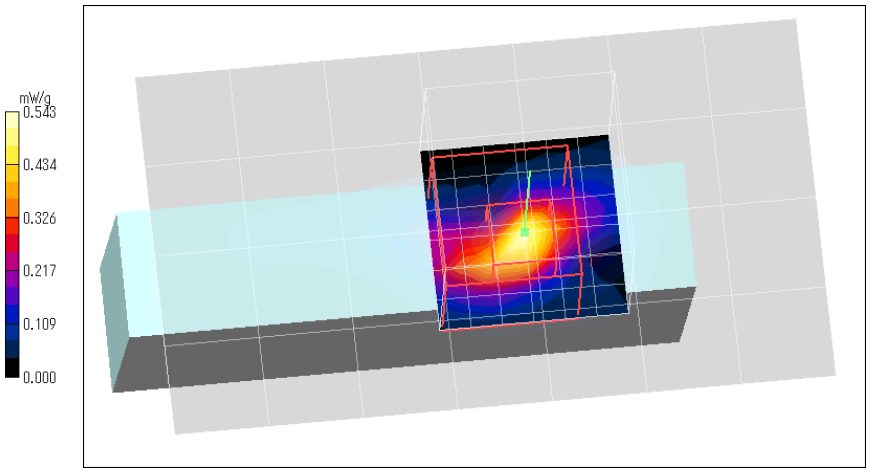
### Step 1-1: Top-rear & touch (separation distance=0mm), 2412MHz, 11b(1Mbps)

**EUT: WLAN module (Platform: Digital camera(1)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2412 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8deg.C.)**: f = 2450 MHz; $\sigma$ = 1.95 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r2,dc1,top-rear&touch(d0mm),11b(1m,14d),m2412(1)/**
**Area Scan (8x5x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.447 mW/g
**Area Scan (71x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.482 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 12.5 V/m; Power Drift = -0.20 dB, Maximum value of SAR (measured) = 0.543 mW/g
Peak SAR (extrapolated) = 0.979 W/kg
**SAR(1 g) = 0.270 mW/g; SAR(10 g) = 0.089 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 151mm
*.ambient: 24.0deg.C. / 48%RH; liquid temperature: (before) 23.5 deg.C. /(after) 23.4 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 28, 2011

**Appendix 2-4: Measurement data / Platform(3): Digital camera(1) (cont'd)**
**Step 1: Worst position search (cont'd)**

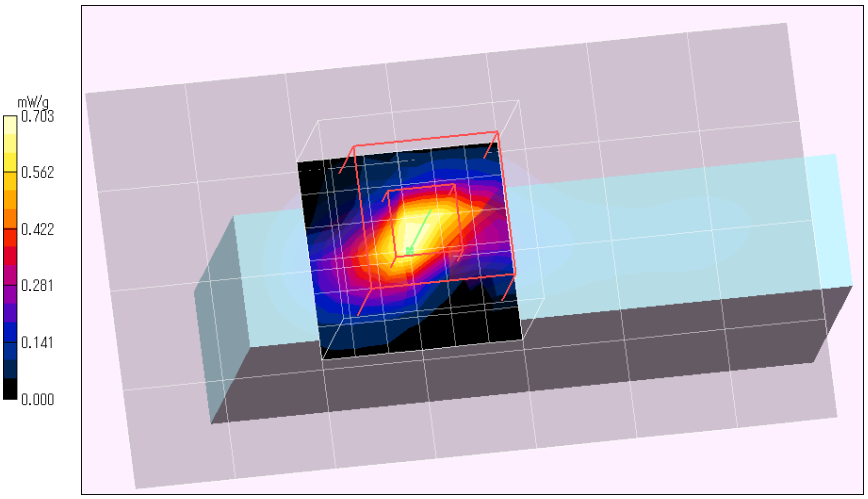
**Step 1-2: Top & touch (separation distance=0mm), 2412MHz, 11b(1Mbps)**
**->Worst SAR(1g) of platform (3)**

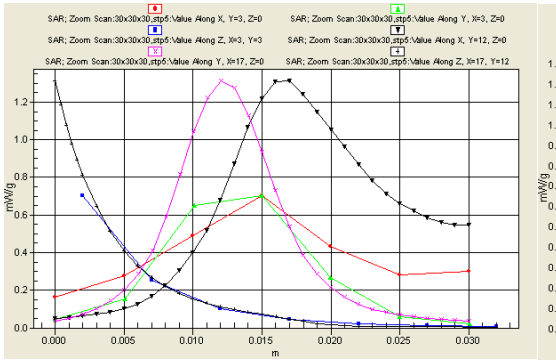
**EUT: WLAN module (Platform: Digital camera(1)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2412 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8deg.C.)**: f = 2450 MHz; $\sigma$ = 1.95 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

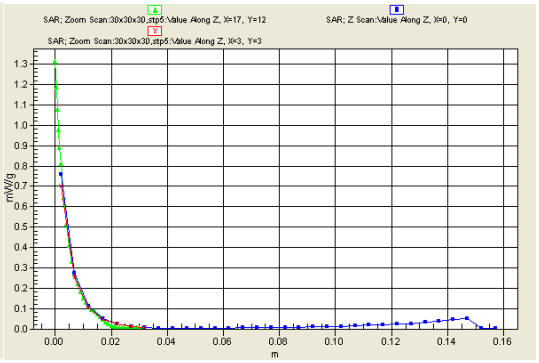
DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r5,dc1,top&touch(d0mm),11b(1m,14d),m2412(1)/**
**Area Scan (8x5x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.598 mW/g
**Area Scan (71x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.620 mW/g
**Z Scan (1x1x32):** Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 0.759 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 11.7 V/m; Power Drift = -0.100 dB, Maximum value of SAR (measured) = 0.703 mW/g
Peak SAR (extrapolated) = 1.31 W/kg
**SAR(1 g) = 0.370 mW/g (Worst SAR(1g)of platform(3)); SAR(10 g) = 0.114 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 151mm
*.ambient: 24.3deg.C. / 47%RH; liquid temperature: (before) 23.3 deg.C. /(after) 23.3 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 28, 2011

**Appendix 2-4: Measurement data / Platform(3): Digital camera(1) (cont'd)**
**Step 1: Worst position search (cont'd)**

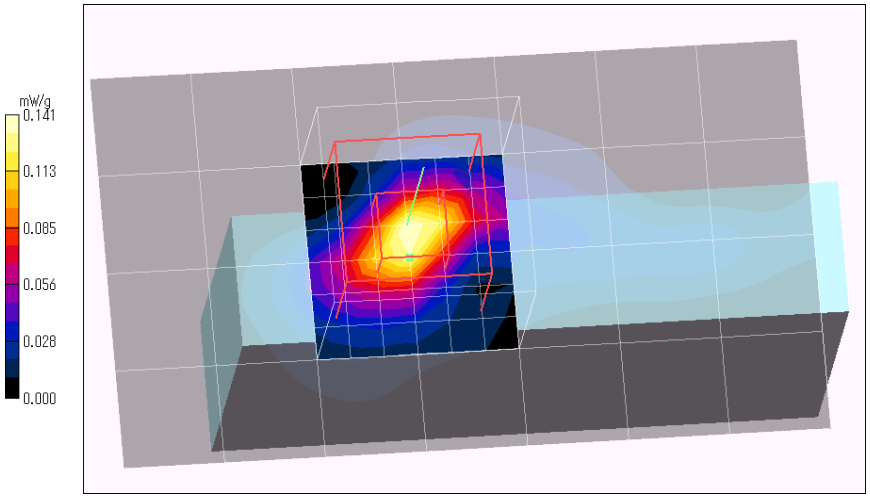
**Step 1-3: Top & separation distance=5mm, 2412MHz, 11b(1Mbps)**

**EUT: WLAN module (Platform: Digital camera(1)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2412 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8deg.C.)**: f = 2450 MHz; $\sigma$ = 1.95 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r8,dc1,top&gap=5mm,11b(1m,14d),m2412(1)/**
**Area Scan (8x5x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.124 mW/g
**Area Scan (71x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.124 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 6.33 V/m; Power Drift = 0.20 dB, Maximum value of SAR (measured) = 0.141 mW/g
Peak SAR (extrapolated) = 0.215 W/kg
**SAR(1 g) = 0.084 mW/g; SAR(10 g) = 0.029 mW/g**




Additional information:
*.position: distance of EUT to phantom: 5mm (7mm to liquid), liquid depth: 151mm
*.ambient: 24.5deg.C. / 47%RH; liquid temperature: (before) 23.3 deg.C. /(after) 23.3 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 28, 2011

**Appendix 2-4: Measurement data / Platform(3): Digital camera(1) (cont'd)**
**Step 1: Worst position search (cont'd)**

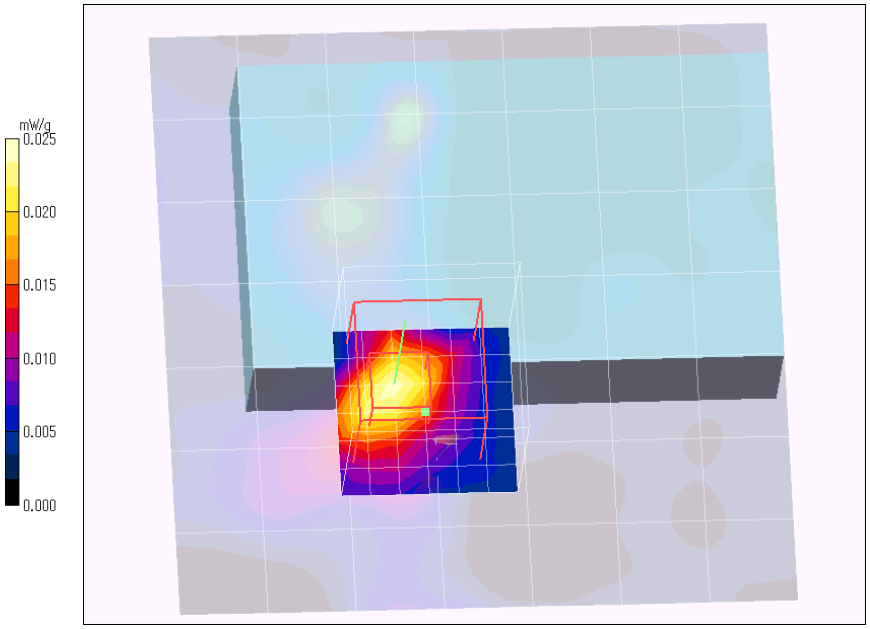
**Step 1-4: Front (Lens) & touch (separation distance=0mm), 2412MHz, 11b(1Mbps)**

**EUT: WLAN module (Platform: Digital camera(1)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2412 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8deg.C.)**: f = 2450 MHz; $\sigma$ = 1.95 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r10,dc1,front-touch(d0),11b(1m,14d),m2412(1)/**
**Area Scan (8x8x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.022 mW/g
**Area Scan (71x71x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.029 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 3.13 V/m; Power Drift = -0.20 dB, Maximum value of SAR (measured) = 0.025 mW/g
Peak SAR (extrapolated) = 0.048 W/kg
**SAR(1 g) = 0.018 mW/g; SAR(10 g) = 0.00814 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 151mm
*.ambient: 24.8deg..C. / 45%RH; liquid temperature: (before) 23.3 deg.C. /(after) 23.3 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 28, 2011

**Appendix 2-4: Measurement data / Platform(3): Digital camera(1) (cont'd)**
**Step 1: Worst position search (cont'd)**

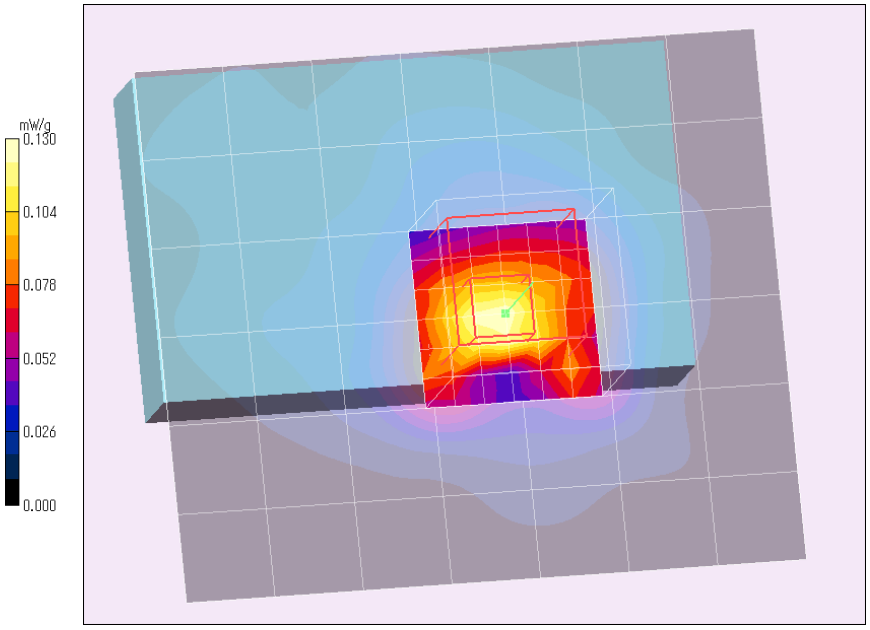
**Step 1-5: Rear (LCD) & touch (separation distance=0mm), 2412MHz, 11b(1Mbps)**

**EUT: WLAN module (Platform: Digital camera(1)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2412 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8deg.C.)**: f = 2450 MHz; $\sigma$ = 1.95 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r11,dc1,rear-touch(d0),11b(1m,14d),m2412(1)/**
**Area Scan (8x7x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.127 mW/g
**Area Scan (71x61x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.127 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 5.26 V/m; Power Drift = -0.154 dB, Maximum value of SAR (measured) = 0.130 mW/g
Peak SAR (extrapolated) = 0.218 W/kg
**SAR(1 g) = 0.089 mW/g; SAR(10 g) = 0.044 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 151mm
*.ambient: 24.6deg.C. / 45%RH; liquid temperature: (before) 23.3 deg.C. /(after) 23.3 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 28, 2011

**Appendix 2-4: Measurement data / Platform(3): Digital camera(1) (cont'd)**
**Step 1: Worst position search (cont'd)**

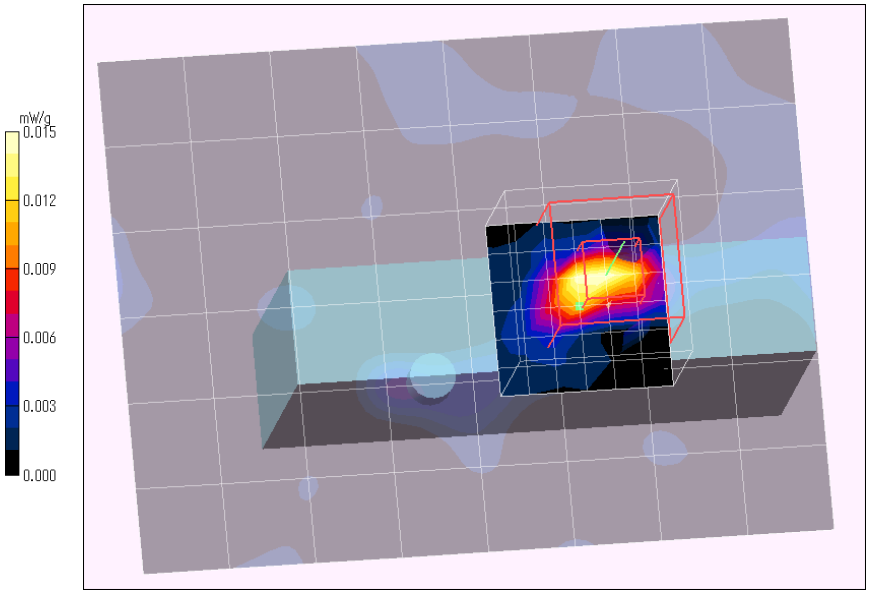
**Step 1-6: Bottom & touch (separation distance=0mm), 2412MHz, 11b(1Mbps)**

**EUT: WLAN module (Platform: Digital camera(1)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2412 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8deg.C.)**: f = 2450 MHz; $\sigma$ = 1.95 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r12,dc1,btm-touch(d0),11b(1m,14d),m2412(1)/**
**Area Scan (9x7x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.012 mW/g
**Area Scan (81x61x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.019 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 0.815 V/m; Power Drift = 0.20 dB, Maximum value of SAR (measured) = 0.015 mW/g
Peak SAR (extrapolated) = 0.025 W/kg
**SAR(1 g) = 0.00679 mW/g; SAR(10 g) = 0.002 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 151mm
*.ambient: 24.6deg.C. / 45%RH; liquid temperature: (before) 23.3 deg.C. /(after) 23.3 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 28, 2011

**Appendix 2-4: Measurement data / Platform(3): Digital camera(1) (cont'd)**
**Step 1: Worst position search (cont'd)**

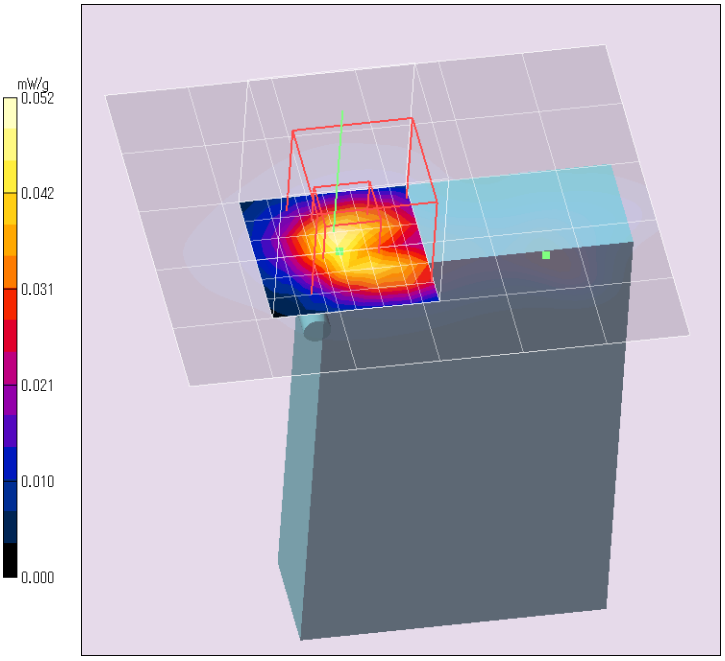
**Step 1-7: Left & touch (separation distance=0mm), 2412MHz, 11b(1Mbps)**

**EUT: WLAN module (Platform: Digital camera(1)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2412 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8deg.C.)**: f = 2450 MHz; $\sigma$ = 1.95 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r13,dc1,lft&touch(d0mm),11b(1m,14d),m2412(1)/**
**Area Scan (7x6x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.039 mW/g
**Area Scan (61x51x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.042 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 4.56 V/m; Power Drift = -0.158 dB, Maximum value of SAR (measured) = 0.052 mW/g
Peak SAR (extrapolated) = 0.077 W/kg
**SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.014 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 151mm
*.ambient: 24.5deg.C. / 43%RH; liquid temperature: (before) 23.3 deg.C. /(after) 23.3 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 28, 2011

**Appendix 2-4: Measurement data / Platform(3): Digital camera(1) (cont'd)**
**Step 1: Worst position search (cont'd)**

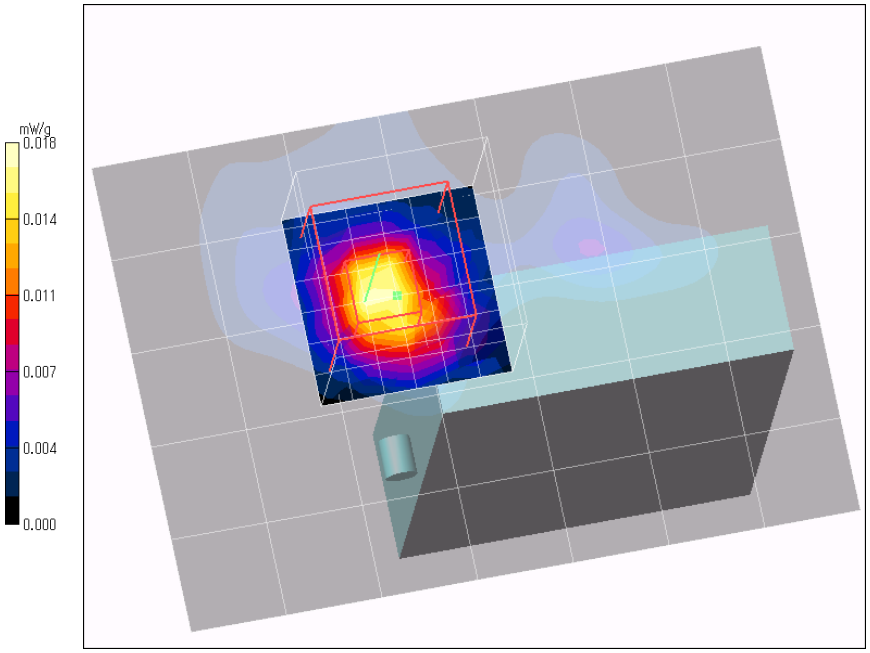
**Step 1-8: Right & touch (separation distance=0mm), 2412MHz, 11b(1Mbps)**

**EUT: WLAN module (Platform: Digital camera(1)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2412 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8deg.C.)**: f = 2450 MHz; $\sigma$ = 1.95 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r14,dc1,right&touch(d0mm),11b(1m,14d),m2412(1)/**
**Area Scan (8x6x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.014 mW/g
**Area Scan (71x51x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.015 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 2.33 V/m; Power Drift = -0.016 dB, Maximum value of SAR (measured) = 0.018 mW/g
Peak SAR (extrapolated) = 0.027 W/kg
**SAR(1 g) = 0.010 mW/g; SAR(10 g) = 0.00382 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 151mm
*.ambient: 24.5deg.C. / 43%RH; liquid temperature: (before) 23.3 deg.C. /(after) 23.3 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 28, 2011

**Appendix 2-4: Measurement data / Platform(3): Digital camera(1) (cont'd)**

**Step 2: Change the channels**

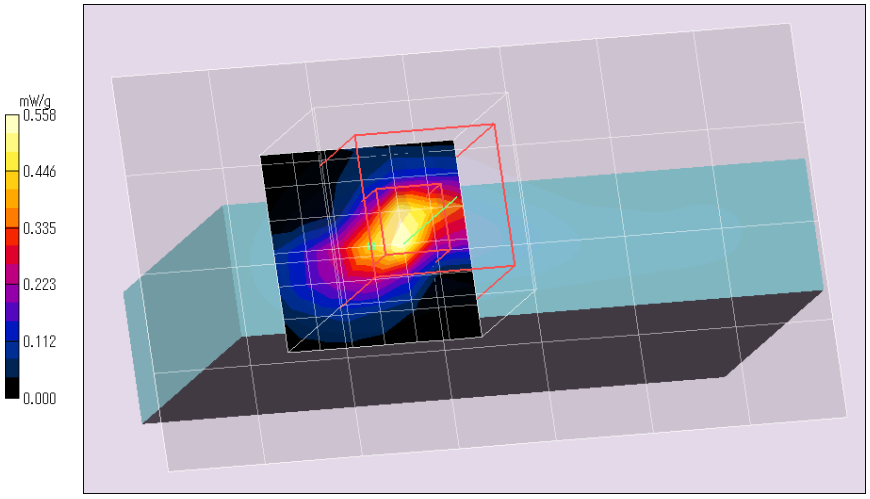
**Step 2-1: 2437MHz / 11b(1Mbps), Top & touch (separation distance=0mm)**

**EUT: WLAN module (Platform: Digital camera(1)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2437 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8deg.C.)**: f = 2450 MHz; $\sigma$ = 1.95 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r6,dc1,chg.CH:top&touch(d0mm),11b(1m,14d),m2437(6)/**
**Area Scan (8x5x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.255 mW/g
**Area Scan (71x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.322 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 11.6 V/m; Power Drift = -0.20 dB, Maximum value of SAR (measured) = 0.558 mW/g
Peak SAR (extrapolated) = 1.01 W/kg
**SAR(1 g) = 0.286 mW/g; SAR(10 g) = 0.089 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 151mm
*.ambient: 24.3deg.C. / 47%RH; liquid temperature: (before) 23.3 deg.C. /(after) 23.3 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 28, 2011

**Appendix 2-4: Measurement data / Platform(3): Digital camera(1) (cont'd)**
**Step 2: Change the channels (cont'd)**

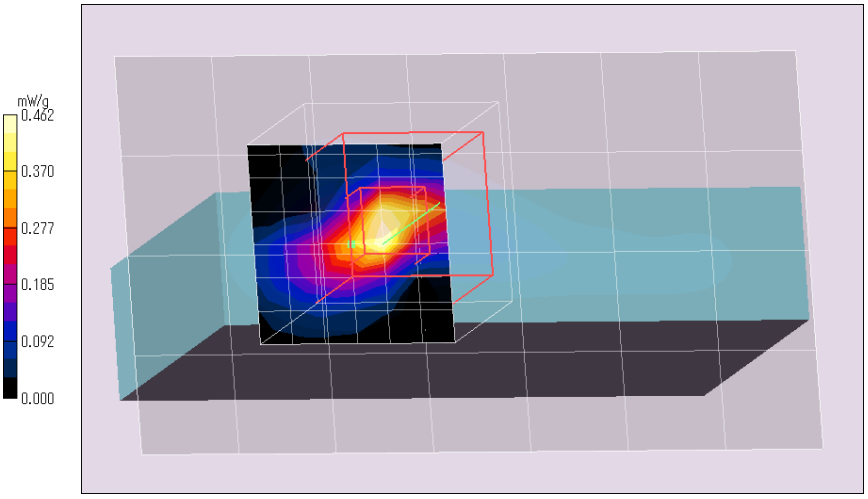
**Step 2-2: 2462MHz / 11b(1Mbps), Top & touch (separation distance=0mm)**

**EUT: WLAN module (Platform: Digital camera(1)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2462 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8deg.C.)**: f = 2450 MHz; $\sigma$ = 1.95 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r7,dc1,chg.CH:top&touch(d0mm),11b(1m,14d),m2462(11)/**
**Area Scan (8x5x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.239 mW/g
**Area Scan (71x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.274 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 8.78 V/m; Power Drift = -0.066 dB, Maximum value of SAR (measured) = 0.462 mW/g
Peak SAR (extrapolated) = 0.833 W/kg
**SAR(1 g) = 0.233 mW/g; SAR(10 g) = 0.072 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 151mm
*.ambient: 24.3deg.C. / 47%RH; liquid temperature: (before) 23.3 deg.C. /(after) 23.3 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 28, 2011

**Appendix 2-4: Measurement data / Platform(3): Digital camera(1) (cont'd)**

**Step 3: Change the operation mode**

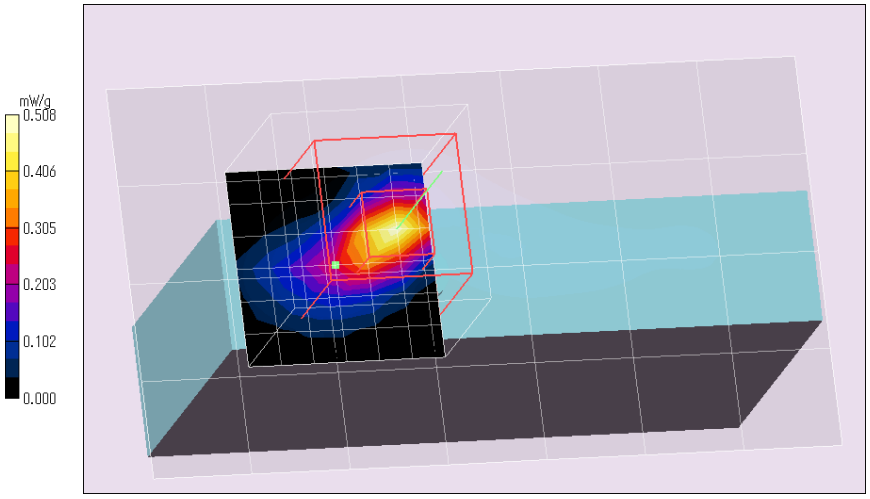
**Step 3-1: 11n(40HT) (MCS0) / 2422MHz, Top & touch (separation distance=0mm)**

**EUT: WLAN module (Platform: Digital camera(1)); Type: WM217; Serial: 8C1**
**Communication System: 11n-40HT(MCS0, BPSK/OFDM); Frequency: 2422 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8deg.C.)**: f = 2450 MHz; $\sigma$ = 1.95 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r9,dc1,chg.op.mode:top&touch(d0mm),11n-40(mcs0,12d),m2422(3)/**
**Area Scan (8x5x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.188 mW/g
**Area Scan (71x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.198 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 4.77 V/m; Power Drift = 0.20 dB, Maximum value of SAR (measured) = 0.508 mW/g
Peak SAR (extrapolated) = 0.832 W/kg
**SAR(1 g) = 0.237 mW/g; SAR(10 g) = 0.070 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 151mm
*.ambient: 24.5deg.C. / 47%RH; liquid temperature: (before) 23.3 deg.C. /(after) 23.3 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 28, 2011

## Appendix 2-5: Measurement data / Platform(4): Digital camera(2)

### Step 1: Worst position search

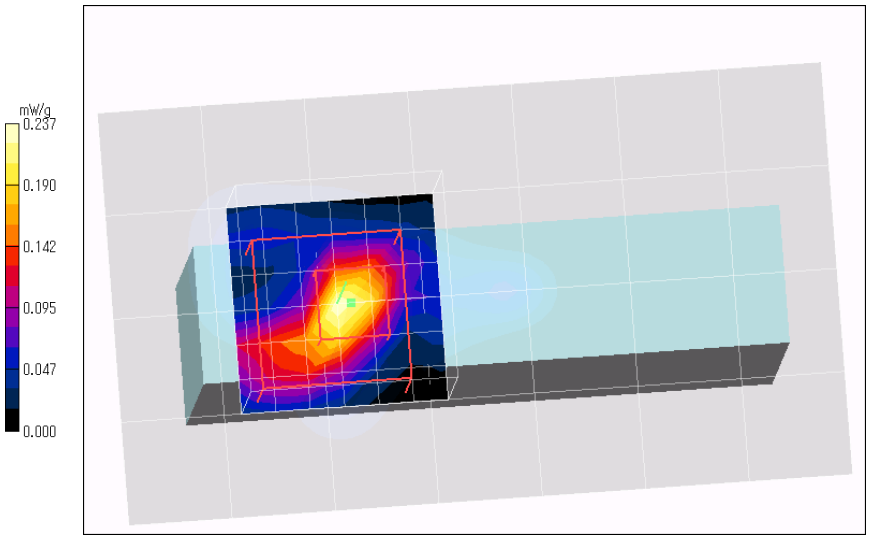
### Step 1-1: Top & touch (separation distance=0mm), 2462MHz, 11b(1Mbps)

**EUT: WLAN module (Platform: Digital camera(2)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2462 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used (23.8deg.C.): f = 2450 MHz; $\sigma$ = 1.94 S/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r1,dc2,top&touch(d0mm),11b(1m,14d),m2462(11)/**
**Area Scan (8x5x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.166 mW/g
**Area Scan (71x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.182 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 7.90 V/m; Power Drift = -0.174 dB, Maximum value of SAR (measured) = 0.237 mW/g
Peak SAR (extrapolated) = 0.379 W/kg
**SAR(1 g) = 0.126 mW/g; SAR(10 g) = 0.045 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 153mm
*.ambient: 23.9deg.C. / 48%RH; liquid temperature: (before) 23.7 deg.C. /(after) 23.6 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 29, 2011

**Appendix 2-5: Measurement data / Platform(4): Digital camera(2) (cont'd)**
**Step 1: Worst position search (cont'd)**

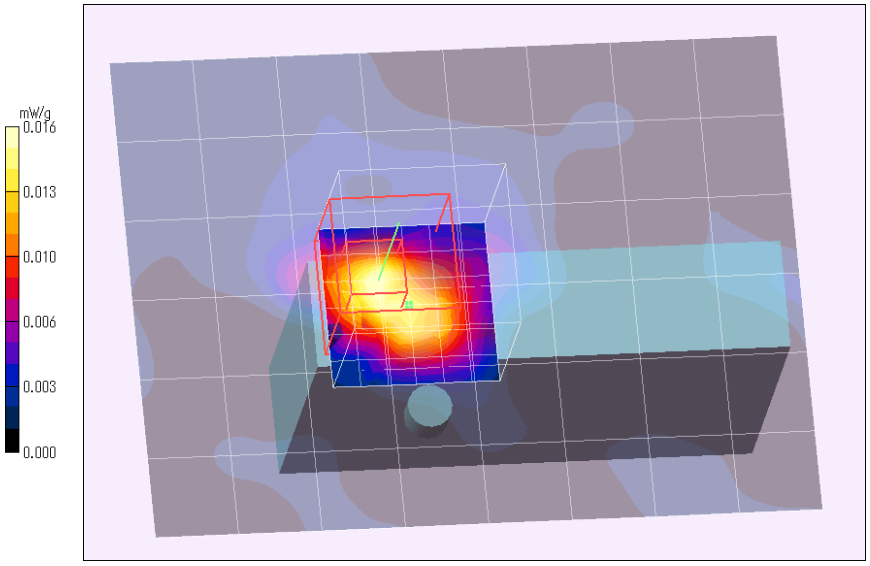
**Step 1-2: Bottom & touch (separation distance=0mm), 2462MHz, 11b(1Mbps)**

**EUT: WLAN module (Platform: Digital camera(2)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2462 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used (23.8deg.C.): f = 2450 MHz; $\sigma$ = 1.94 S/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r6,dc2,btm-touch(d0),11b(1m,14d),m2462(11)/**
**Area Scan (9x7x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.018 mW/g
**Area Scan (81x61x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.020 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 2.24 V/m; Power Drift = -0.163 dB, Maximum value of SAR (measured) = 0.016 mW/g
Peak SAR (extrapolated) = 0.021 W/kg
**SAR(1 g) = 0.011 mW/g; SAR(10 g) = 0.00532 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 153mm
*.ambient: 24.3deg.C. / 50%RH; liquid temperature: (before) 23.5 deg.C. /(after) 23.4 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 29, 2011

**Appendix 2-5: Measurement data / Platform(4): Digital camera(2) (cont'd)**
**Step 1: Worst position search (cont'd)**

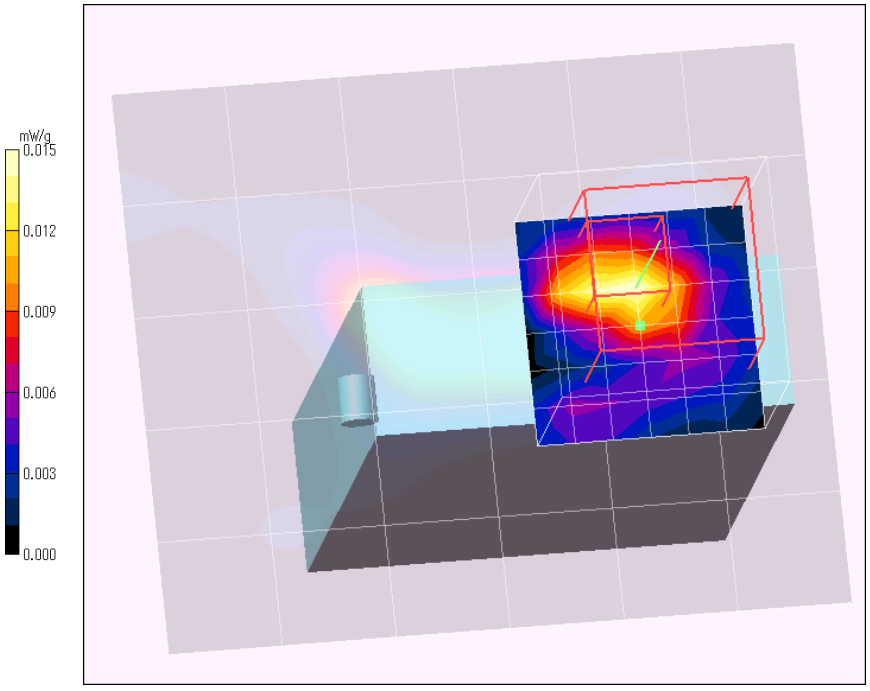
**Step 1-3: Left & touch (separation distance=0mm), 2462MHz, 11b(1Mbps)**

**EUT: WLAN module (Platform: Digital camera(2)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2462 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used (23.8deg.C.): f = 2450 MHz; $\sigma$ = 1.94 S/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r7,dc2,lft&touch(d0mm),11b(1m,14d),m2462(11)/**
**Area Scan (7x6x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.015 mW/g
**Area Scan (61x51x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.032 mW/g

**Zoom Scan:30x30x30,stp5 2 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 2.95 V/m; Power Drift = -0.20 dB, Maximum value of SAR (interpolated) = 0.032 mW/g
Peak SAR (extrapolated) = 0.014 W/kg
**SAR(1 g) = 0.00468 mW/g; SAR(10 g) = 0.00208 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 153mm
*.ambient: 24.3deg.C. / 50%RH; liquid temperature: (before) 23.4 deg.C. /(after) 23.4 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 29, 2011

**Appendix 2-5: Measurement data / Platform(4): Digital camera(2) (cont'd)**
**Step 1: Worst position search (cont'd)**

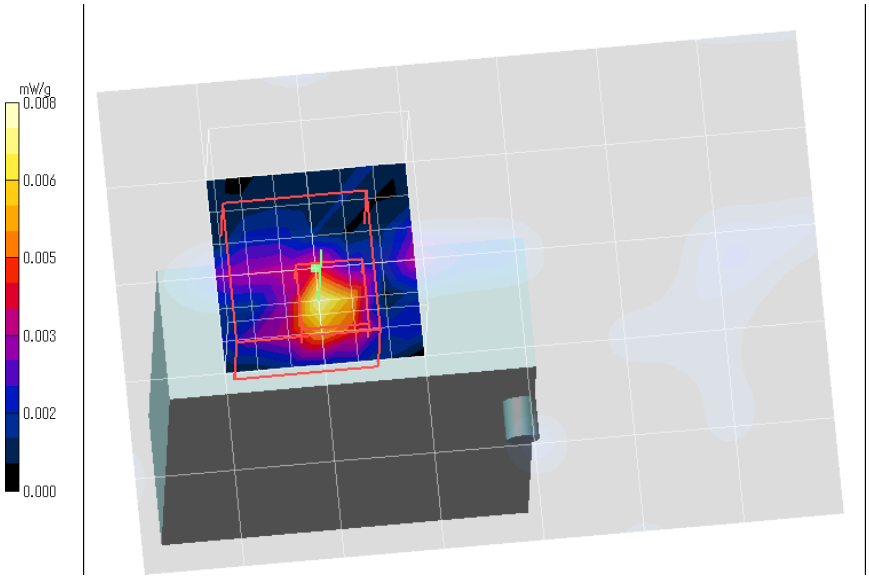
**Step 1-4: Right & touch (separation distance=0mm), 2462MHz, 11b(1Mbps)**

**EUT: WLAN module (Platform: Digital camera(2)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2462 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used (23.8deg.C.): f = 2450 MHz; $\sigma$ = 1.94 S/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r8,dc2,right&touch(d0mm),11b(1m,14d),m2462(11)/**
**Area Scan (8x6x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.003 mW/g
**Area Scan (71x51x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.003 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 1.22 V/m; Power Drift = 0.20 dB, Maximum value of SAR (measured) = 0.008 mW/g
Peak SAR (extrapolated) = 0.010 W/kg
**SAR(1 g) = 0.00398 mW/g; SAR(10 g) = 0.00109 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 153mm
*.ambient: 24.3deg.C. / 53%RH; liquid temperature: (before) 23.4 deg.C. /(after) 23.4 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 29, 2011

**Appendix 2-5: Measurement data / Platform(4): Digital camera(2) (cont'd)**
**Step 1: Worst position search (cont'd)**

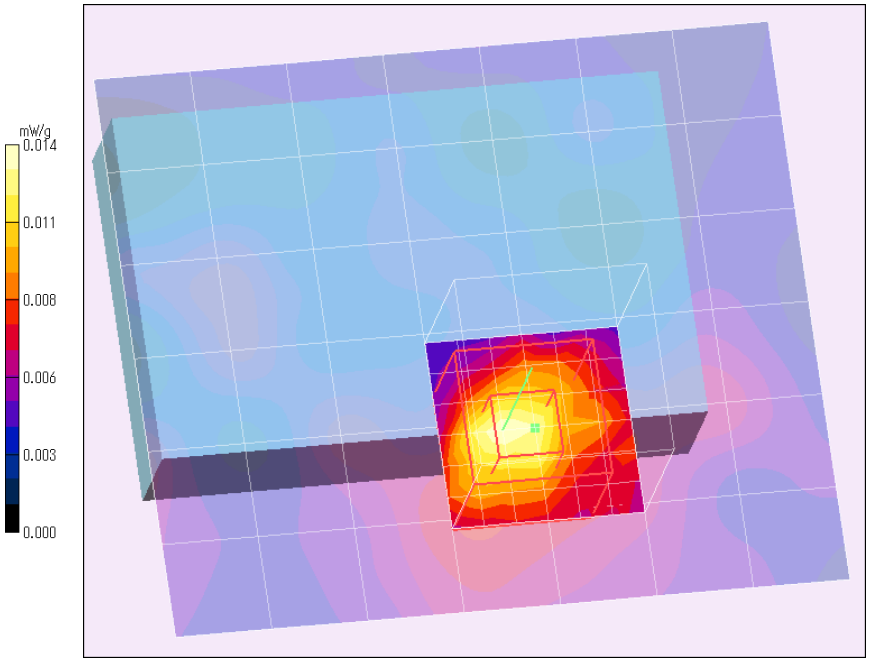
**Step 1-5: Rear (LCD) & touch (separation distance=0mm), 2462MHz, 11b(1Mbps)**

**EUT: WLAN module (Platform: Digital camera(2)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2462 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used (23.8deg.C.): f = 2450 MHz; $\sigma$ = 1.94 S/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r9,dc2,rear(lcd)-touch(d0),11b(1m,14d),m2462(11)/**
**Area Scan (8x7x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.013 mW/g
**Area Scan (71x61x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.013 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 2.75 V/m; Power Drift = 0.121 dB, Maximum value of SAR (measured) = 0.014 mW/g
Peak SAR (extrapolated) = 0.027 W/kg
**SAR(1 g) = 0.010 mW/g; SAR(10 g) = 0.00709 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 153mm
*.ambient: 24.3deg.C. / 53%RH; liquid temperature: (before) 23.4 deg.C. /(after) 23.4 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 29, 2011

**Appendix 2-5: Measurement data / Platform(4): Digital camera(2) (cont'd)**
**Step 1: Worst position search (cont'd)**

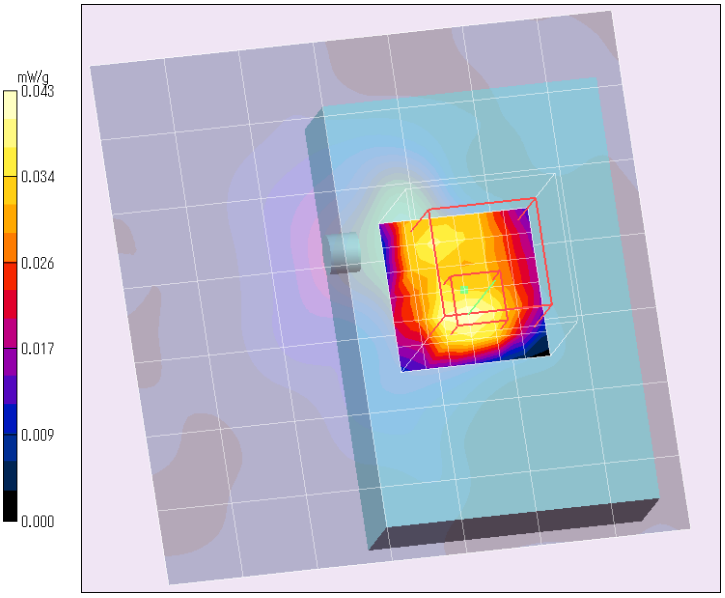
**Step 1-6: Front (Lens) & touch (separation distance=0mm), 2462MHz, 11b(1Mbps)**

**EUT: WLAN module (Platform: Digital camera(2)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2462 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used (23.8deg.C.): f = 2450 MHz; $\sigma$ = 1.94 S/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r10,dc2,front(lens)-touch(d0),11b(1m,14d),m2462(11)/**
**Area Scan (8x8x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.040 mW/g
**Area Scan (71x71x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.075 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 3.52 V/m; Power Drift = -0.20 dB, Maximum value of SAR (measured) = 0.043 mW/g
Peak SAR (extrapolated) = 0.070 W/kg
**SAR(1 g) = 0.031 mW/g; SAR(10 g) = 0.018 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 153mm
*.ambient: 24.3deg.C. / 50%RH; liquid temperature: (before) 23.4 deg.C. /(after) 23.4 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 29, 2011

**Appendix 2-5: Measurement data / Platform(4): Digital camera(2) (cont'd)**

**Step 2: Change the channels**

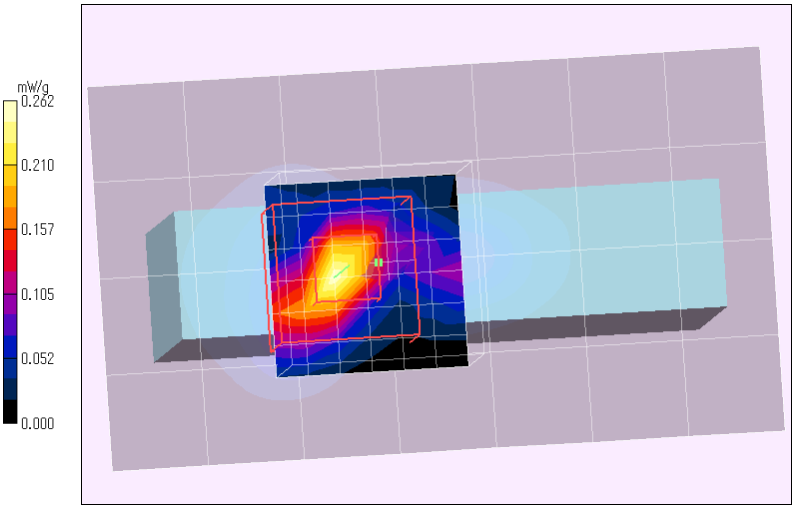
**Step 2-1: 2412MHz / 11b(1Mbps), Top & touch (separation distance=0mm)**
**-> Worst SAR(1g) of platform (4)**

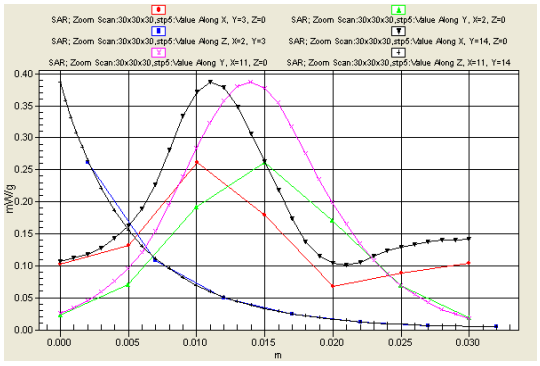
**EUT: WLAN module (Platform: Digital camera(2)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2412 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used (23.8deg.C.): f = 2450 MHz; $\sigma$ = 1.94 S/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$**

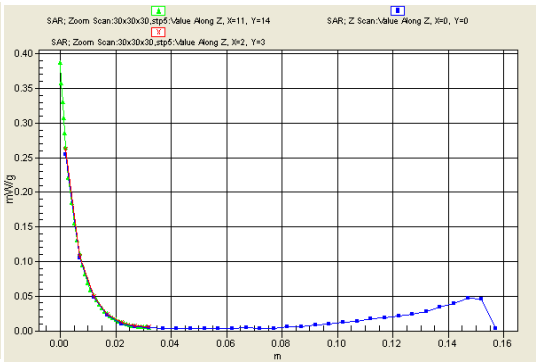
DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r2,dc2,CHG.ch:top&touch(d0mm),11b(1m,14d),m2412(1)/**
**Area Scan (8x5x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.101 mW/g
**Area Scan (71x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.102 mW/g
**Z Scan (1x1x32):** Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 0.255 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 10.8 V/m; Power Drift = -0.166 dB, Maximum value of SAR (measured) = 0.262 mW/g
Peak SAR (extrapolated) = 0.387 W/kg
**SAR(1 g) = 0.135 mW/g (<-Worst SAR(1g) of platform(4)); SAR(10 g) = 0.049 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 153mm
*.ambient: 23.9deg.C. / 48%RH; liquid temperature: (before) 23.6 deg.C. /(after) 23.6 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 29, 2011

**Appendix 2-5: Measurement data / Platform(4): Digital camera(2) (cont'd)**
**Step 2: Change the channels (cont'd)**

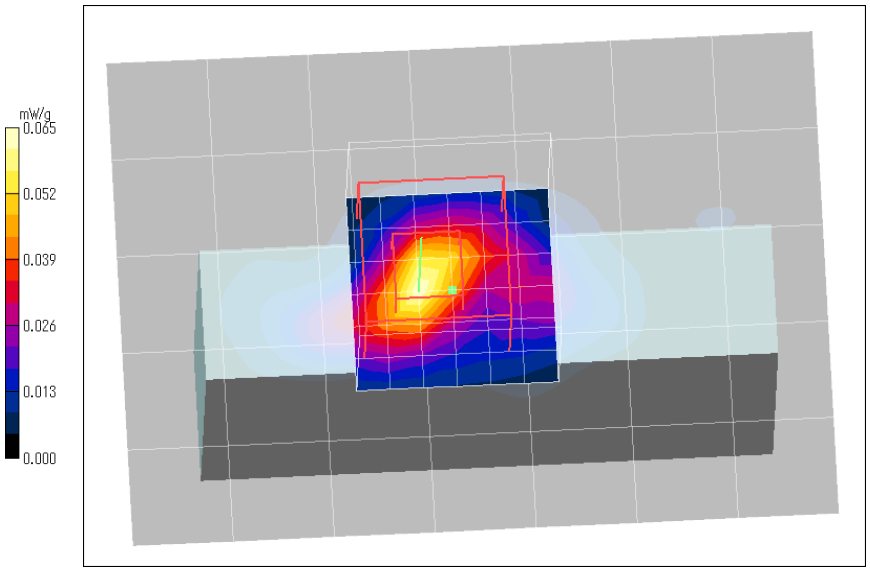
**Step 2-2: 2412MHz, Top & separation distance=5mm / 11b(1Mbps)**

**EUT: WLAN module (Platform: Digital camera(2)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2412 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used (23.8deg.C.): f = 2450 MHz; $\sigma$ = 1.94 S/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r4,dc2,gap5mm:top&gap=5mm,11b(1m,14d),m2412(1)/**
**Area Scan (8x6x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.045 mW/g
**Area Scan (71x51x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.083 mW/g
**Z Scan (1x1x32):** Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 0.063 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 4.48 V/m; Power Drift = 0.055 dB, Maximum value of SAR (measured) = 0.065 mW/g
Peak SAR (extrapolated) = 0.090 W/kg
**SAR(1 g) = 0.038 mW/g; SAR(10 g) = 0.016 mW/g**




Additional information:
*.position: distance of EUT to phantom: 5mm (7mm to liquid), liquid depth: 153mm
*.ambient: 24.0deg..C. / 48%RH; liquid temperature: (before) 23.5 deg.C. /(after) 23.5 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 29, 2011

**Appendix 2-5: Measurement data / Platform(4): Digital camera(2) (cont'd)**
**Step 2: Change the channels (cont'd)**

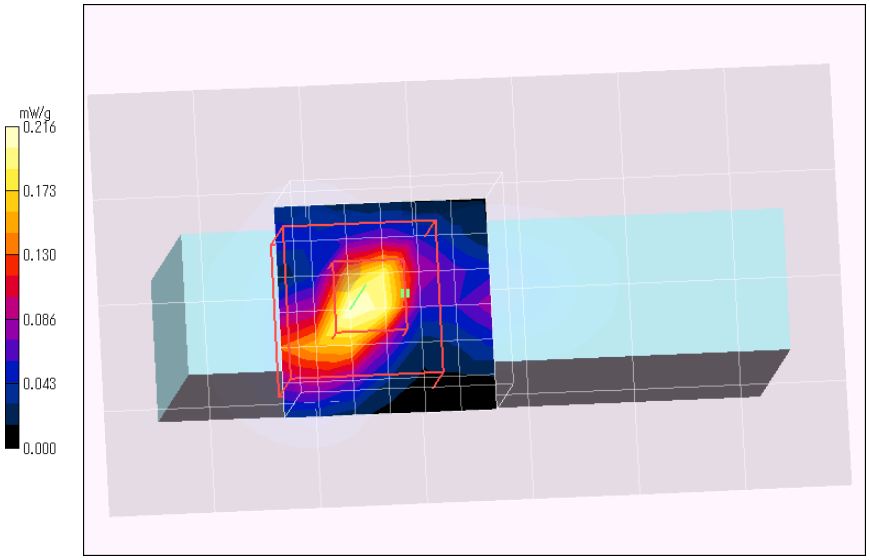
**Step 2-3: 2437MHz / 11b(1Mbps), Top & touch(separation distance=0mm)**

**EUT: WLAN module (Platform: Digital camera(2)); Type: WM217; Serial: 8C1**
**Communication System: 11b(1Mbps, DBPSK/DSSS); Frequency: 2437 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used (23.8deg.C.): f = 2450 MHz; $\sigma$ = 1.94 S/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r3,dc2,chg.CH:top&touch(d0mm),11b(1m,14d),m2437(6)/**
**Area Scan (8x5x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.085 mW/g
**Area Scan (71x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.086 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 10.3 V/m; Power Drift = -0.128 dB, Maximum value of SAR (measured) = 0.216 mW/g
Peak SAR (extrapolated) = 0.366 W/kg
**SAR(1 g) = 0.122 mW/g; SAR(10 g) = 0.044 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 153mm
*.ambient: 23.9deg.C. / 48%RH; liquid temperature: (before) 23.6 deg.C. /(after) 23.5 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 29, 2011

**Appendix 2-5: Measurement data / Platform(4): Digital camera(2) (cont'd)**

**Step 3: Change the operation mode**

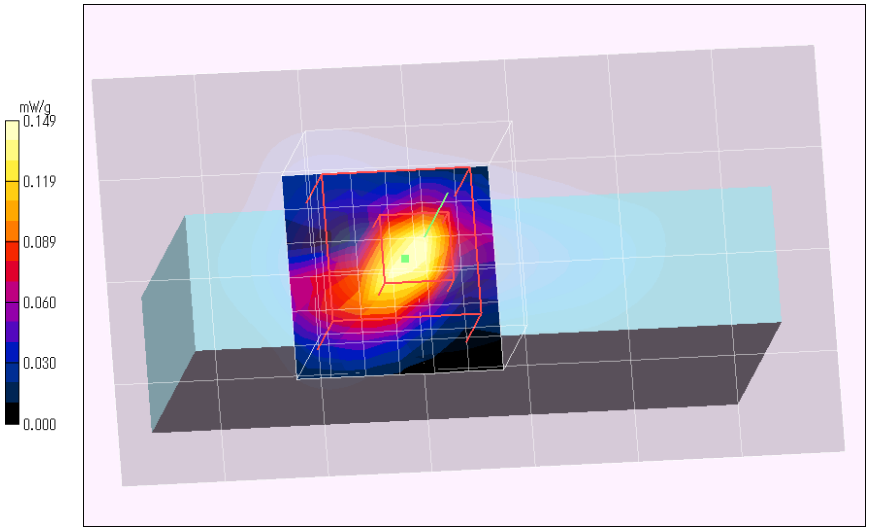
**Step 3-1: 11n(40HT) (MCS0) / 2422MHz, Top & touch(separation distance=0mm)**

**EUT: WLAN module (Platform: Digital camera(2)); Type: WM217; Serial: 8C1**
**Communication System: 11n-40HT(MCS0, BPSK/OFDM); Frequency: 2422 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used (23.8deg.C.): f = 2450 MHz; $\sigma$ = 1.94 S/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration:
- Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**fcc,r5,dc2,chg.op.mode:top&touch(d0mm),11n-40(mcs0,12d),m2422(3)/**
**Area Scan (8x5x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.164 mW/g
**Area Scan (71x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 0.168 mW/g

**Zoom Scan:30x30x30,stp5 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 7.74 V/m; Power Drift = 0.16 dB, Maximum value of SAR (measured) = 0.149 mW/g
Peak SAR (extrapolated) = 0.262 W/kg
**SAR(1 g) = 0.086 mW/g; SAR(10 g) = 0.031 mW/g**




Additional information:
*.position: distance of EUT to phantom: 0mm (2mm to liquid), liquid depth: 153mm
*.ambient: 24.1deg.C. / 49%RH; liquid temperature: (before) 23.5 deg.C. /(after) 23.5 deg.C.
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 29, 2011

# APPENDIX 3: Test instruments

## Appendix 3-1: Equipment used

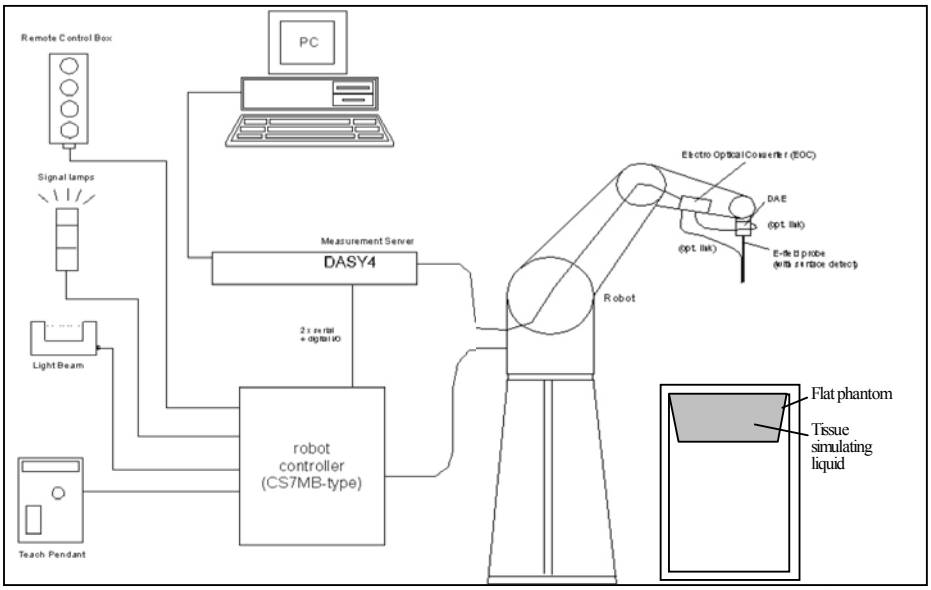
| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|---|---|---|---|---|---|---|
| COTS-KSAR-01 | DASY4 | Schmid&Partner Engineering AG | DASY4 V4.7 B80 | - | SAR | - |
| COTS-KSEP-01 | Dielectric measurement | Agilent | 85070 | 1 | SAR | - |
| KSAR-01 | SAR measurement system | Schmid&Partner Engineering AG | DASY4 | 1088 | SAR | Pre Check |
| SSRBT-01 | SAR robot | Schmid&Partner Engineering AG | RX60B L | F04/5Z71A1/A/01 | SAR | 2011/02/02 * 12 |
| KDAE-01 | Data Acquisition Electronics | Schmid&Partner Engineering AG | DAE4 | 626 | SAR | 2011/02/10 * 12 |
| KPB-01 | Dosimetric E-Field Probe | Schmid&Partner Engineering AG | EX3DV4 | 3679 | SAR | 2011/05/19 * 12 |
| KSDA-01 | Dipole Antenna | Schmid&Partner Engineering AG | D2450V2 | 822 | SAR | 2011/01/05 * 24 |
| KPFL-01 | Flat Phantom | Schmid&Partner Engineering AG | Oval flat phantom ELI 4.0 | 1059 | SAR | Pre Check |
| SSNA-01 | Network Analyzer | Agilent | 8753ES | US39171777 | SAR | 2011/01/04 * 12 |
| KEPP-01 | Dielectric probe | Agilent | 8710-2036 | 2540 | SAR | 2011/01/16 * 12 |
| KSG-08 | Signal Generator | Rohde & Schwarz | SMT06 | 100763 | SAR | 2011/06/07 * 12 |
| KPA-12 | RF Power Amplifier | MILMEGA | AS2560-50 | 1018582 | SAR | Pre Check |
| KCPL-07 | Directional Coupler | Pulsar Microwave Corp. | CCS30-B26 | 0621 | SAR | Pre Check |
| KPM-05 | Power meter | Agilent | E4417A | GB41290718 | SAR(dipl) | 2011/03/22 * 12 |
| KPSS-01 | Power sensor | Agilent | E9327A | US40440544 | SAR(dipl) | 2011/03/22 * 12 |
| SPSS-02 | Power sensor | Agilent | E9327A | US40440545 | SAR(pf) | 2011/06/28 * 12 |
| KAT10-P1 | Attenuator | Weinschel | 24-10-34 | BY5927 | SAR | 2011/02/17 * 12 |
| KAT10-CS1 | Attenuator | HUBER+SUHNER | 6810.17.A | 768898-1 | SAR | 2011/01/17 * 12 |
| KAT10-CS2 | Attenuator | HUBER+SUHNER | 6810.17.A | 768898-2 | SAR | 2011/01/17 * 12 |
| KRU-01 | Ruler(300mm) | Shinwa | 13134 | - | SAR | 2011/03/28 * 12 |
| KRU-02 | Ruler(150mm,L) | Shinwa | 12103 | - | SAR | 2011/03/28 * 12 |
| KRU-05 | Ruler(100x50mm,L) | Shinwa | 12101 | - | SAR | 2011/05/26 * 12 |
| KRU-06 | Ruler(500x250mm,L) | Shinwa | 10640 | - | SAR | 2011/07/27 * 12 |
| KOS-13 | Digtal thermometer | HANNA | Checktemp-2 | KOS-13 | SAR | 2011/01/19 * 12 |
| KOS-14 | Thermo-Hygrometer data logger | SATO KEIRYOKI | SK-L200THII α / SK-LTHII α-2 | 015246/08169 | SAR | 2011/01/19 * 12 |
| SOS-11 | Humidity Indicator | A&D | AD-5681 | 4063424 | SAR | 2011/02/23 * 12 |
| KPM-08 | Power meter | Anritsu | ML2495A | 6K00003356 | Ant.pwr | 2011/09/12 * 12 |
| KPSS-04 | Power sensor | Anritsu | MA2411B | 012088 | Ant.pwr | 2011/09/12 * 12 |
| KAT10-S3 | Attenuator | Agilent | 8490D 010 | 50924 | Ant.pwr | 2011/02/17 * 12 |
| SSA-04 | Spectrum Analyzer | Advantest | R3272 | 101100994 | SAR(moni.) | 2010/12/09 * 12 |
| KSLM245-01 | Tissue simulation liqud (2450MHz,body) | Schmid&Partner Engineering AG | SL AAM 245 | - | SAR | (Daily check) Target value ±5% |
| No.7 Shielded room | SAR shielded room (2.76m(W)x3.76m(D)x2.4m(H)) | TDK | - | - | SAR | *(Daily check) Ambient noise: < 12mW/kg* |

**The expiration date of calibration is the end of the expired month.**
**As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.**
**All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.**
**[Test Item] SAR: Specific Absorption Rate, Ant.pwr: Antenna terminal conducted power**

## Appendix 3-2: Dosimetry assessment setup

These measurements were performed with the automated near-field scanning system DASY4 from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9 m), which positions the probes with a positional repeatability of better than +/- 0.02 mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines to the data acquisition unit. The SAR measurements were conducted with the dosimetry probes EX3DV4, SN: 3679 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the procedure described in [2] with accuracy of better than +/-10%. The spherical isotropy was evaluated with the procedure described in [3] and found to be better than +/-0.25 dB.

## Appendix 3-3: Configuration and peripherals




The DASY4 system for performing compliance tests consist of the following items:

| | |
|---|---|
| 1 | A standard high precision 6-axis robot (Stäubli RX family) with controller and software.<br>An arm extension for accommodating the data acquisition electronics (DAE). |
| 2 | A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system. |
| 3 | A data acquisition electronic (DAE), which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC. |
| 4 | The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection.<br>The EOC is connected to the measurement server. |
| 5 | The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts. |
| 6 | A probe alignment unit which improves the (absolute) accuracy of the probe positioning. |
| 7 | A computer operating Windows XP. |
| 8 | DASY4 software. |
| 9 | Remote control with teaches pendant and additional circuitry for robot safety such as warning lamps, etc. |
| 10 | The phantom. |
| 11 | The device holder for EUT. (low-loss dielectric palette) |
| 12 | Tissue simulating liquid mixed according to the given recipes. |
| 13 | Validation dipole kits allowing to validate the proper functioning of the system. |

## Appendix 3-4: System components

### 1) EX3DV4 Probe Specification

EX3DV4 E-field Probe

**Construction:**
- Symmetrical design with triangular core.
- Built-in shielding against static charges.
- PEEK enclosure material (resistant to organic solvents, e.g., DGBE).

**Calibration (S/N 3679):**
Basic broad band calibration in air.
Conversion Factors(Head and Body): 2450, 5200, 5300, 5500, 5600, 5800MHz

**Frequency:**
10 MHz to > 6GHz, Linearity: ±0.2 dB (30MHz to 6GHz)

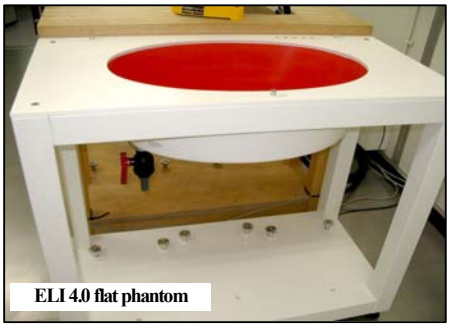
Directivity:
±0.3 dB in HSL (rotation around probe axis)
±0.5 dB in tissue material (rotation normal to probe axis)

**Dynamic Range:**
10μW/g to > 100 mW/g; Linearity: ±0.2 dB (noise: typically < 1μW/g)

**Dimensions:**
Overall length: 330mm (Tip: 20mm)
Tip diameter: 2.5mm (Body: 12mm)
Typical distance from probe tip to dipole centers: 1mm

**Application:**
High precision dosimetric measurement in any exposure scenario (e.g., very strong gradient fields).Only probe which enables compliance testing for frequencies up to 6GHz with precision of better 30%.

### 2) Phantom (Flat type)



ELI 4.0 flat phantom

**Construction:**
A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom position and measurement grids by manually teaching three points with the robot.

**Shell Thickness:**
Bottom plate: 2 ±0.2mm

**Dimensions:**
Bottom elliptical: 600×400mm, Depth: 190mm

**Filling Volume:**
Approx. 30 liters

### 3) Device Holder

Device holder

For this measurement, the urethane foam was used as device holder.

In combination with the Twin SAM Phantom V4.0/V4.0c or ELI4, the Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Transmitter devices can be easily and accurately positioned.
The low-loss dielectric urethane foam was used for the mounting section of device holder.

## Appendix 3-5: Test system specification

**RX60L Robot**

| | | | | | |
|---|---|---|---|---|---|
| •Number of Axes | : | 6 | •Payload | : | 1.6 kg |
| •Reach | : | 800mm | •Repeatability | : | ±0.025mm |
| •Control Unit | : | CS7M | •Programming Language | : | V+ |
| •Manufacture | : | Stäubli Unimation Corp. Robot Model: RX60 | | | |

**DASY4 Measurement server**

| | | |
|---|---|---|
| •Features | : | 166MHz low power Pentium MMX.<br>32MB chipdisk and 64MB RAM Serial link to DAE (with watchdog supervision) 16 Bit A/D converter for surface detection system. Two serial links to robot (one for real-time communication which is supervised by watchdog) Ethernet link to PC (with watchdog supervision).<br>Emergency stop relay for robot safety chain. Two expansion slots for future applications. |
| •Manufacture | : | Schmid & Partner Engineering AG |

**Data Acquisition Electronic (DAE)**

| | | | | | |
|---|---|---|---|---|---|
| •Features | : | Signal amplifier, multiplexer, A/D converter and control logic.<br>Serial optical link for communication with DASY4 embedded system (fully remote controlled).<br>2 step probe touch detector for mechanical surface detection and emergency robot stop (not in -R version) | | | |
| •Measurement Range | : | 1µV to > 200mV (16bit resolution and two range settings: 4mV, 400mV) | | | |
| •Input Offset voltage | : | < 1µV (with auto zero) | | | |
| •Input Resistance | : | 200MΩ | •Battery Power | : | > 10hr of operation (with two 9V battery) |
| •Dimension | : | 60×60×68mm | •Manufacture | : | Schmid & Partner Engineering AG |

**Software**

| | | | | | |
|---|---|---|---|---|---|
| •Item | : | Dosimetric Assessment System DASY4 | | | |
| •Software version No. | : | DASY4, V4.7 B80 | •Manufacture / Origin | : | Schmid & Partner Engineering AG |

**E-Field Probe**

| | | | | | |
|---|---|---|---|---|---|
| •Model | : | EX3DV4 (sn: 3679) | •Construction | : | Symmetrical design with triangular core |
| •Frequency | : | 10MHz to 6GHz | •Linearity | : | ±0.2dB (30MHz to 3GHz) |
| •Manufacture | : | Schmid & Partner Engineering AG | | | |

**Phantom**

| | | | | | |
|---|---|---|---|---|---|
| •Type | : | ELI 4.0 oval flat phantom | •Shell Material | : | Fiberglass |
| •Shell Thickness | : | Bottom plate: 2 ±0.2mm | •Dimensions | : | Bottom elliptical: 600×400mm, Depth: 190mm |
| •Manufacture | : | Schmid & Partner Engineering AG | | | |

## Appendix 3-6: Simulated tissue composition

| Ingredient | Mixture (%) |
|---|---|
| | **Body 2450MHz** (type: SL AAM 245) |
| Water | 52-75 % |
| $C_8H_{18}O_3$ (Diethylene glycol monobutyl ether (DGBE)) | 25-48% |
| NaCl | <1.0% |
| Manufacture | Schmid&Partner Engineering AG |

## Appendix 3-7: Simulated tissue parameter confirmation

The dielectric parameters were checked prior to assessment using the 85070E dielectric probe kit.
The dielectric parameters measurement is reported in each correspondent section.

| Dielectric parameter measurement results | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Freq. [MHz] | Ambient | | Liq.T.[deg.C.] | | Liquid Depth [mm] | Parameters | Target value | | Measured | Deviation for #1 (Std.)[%] | Limit [%] | Deviation for #2 (Cal.)[%] | Limit [%] |
| | | Temp [deg.C.] | Humidity [%RH] | Before | After | | | #1:Std. (*1) | #2:Cal. (*2) | | | | | |
| Sept. 15, 2011 | 2450 | 25 | 57 | 24.9 | 24.9 | 158 | Relative permittivity: εr [-] | **52.7** | **52.5** | 50.18 | **-4.8** | ±5 | **-4.4** | ±5 |
| | | | | | | | Conductivity: σ [S/m] | **1.95** | **1.96** | 1.985 | **+1.8** | ±5 | **+1.3** | ±5 |
| Sept. 16, 2011 | 2450 | 25 | 62 | 24.5 | 24.6 | 158 | Relative permittivity: εr [-] | **52.7** | **52.5** | 50.25 | **-4.6** | ±5 | **-4.3** | ±5 |
| | | | | | | | Conductivity: σ [S/m] | **1.95** | **1.96** | 1.942 | **-0.4** | ±5 | **-0.9** | ±5 |
| Sept. 21, 2011 | 2450 | 24 | 62 | 24.1 | 24.2 | 154 | Relative permittivity: εr [-] | **52.7** | **52.5** | 50.40 | **-4.4** | ±5 | **-4.0** | ±5 |
| | | | | | | | Conductivity: σ [S/m] | **1.95** | **1.96** | 1.932 | **-0.9** | ±5 | **-1.4** | ±5 |
| Sept. 28, 2011 | 2450 | 24 | 50 | 23.8 | 23.7 | 151 | Relative permittivity: εr [-] | **52.7** | **52.5** | 50.16 | **-4.8** | ±5 | **-4.5** | ±5 |
| | | | | | | | Conductivity: σ [S/m] | **1.95** | **1.96** | 1.947 | **-0.1** | ±5 | **-0.7** | ±5 |
| Sept. 29, 2011 | 2450 | 24 | 47 | 23.8 | 23.7 | 153 | Relative permittivity: εr [-] | **52.7** | **52.5** | 50.38 | **-4.4** | ±5 | **-4.0** | ±5 |
| | | | | | | | Conductivity: σ [S/m] | **1.95** | **1.96** | 1.944 | **-0.3** | ±5 | **-0.8** | ±5 |

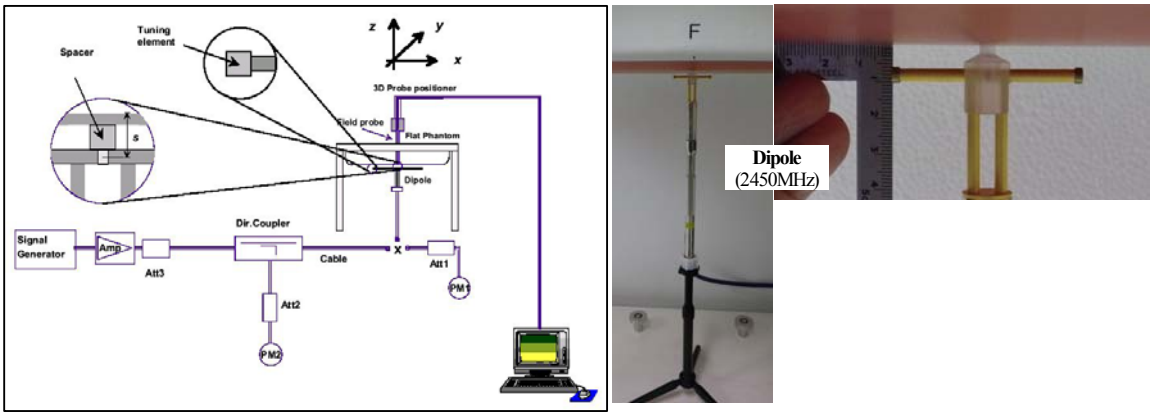
*1. The target value is a parameter defined in OET65, Supplement C.
*2. The target value is a parameter defined in the calibration data sheet of D2450V2 (sn:822) dipole calibrated by Schmid & Partner Engineering AG (Certification No. D2450V2-822_Jan11, the data sheet was failed in this report.).

## Appendix 3-8: System check data

Prior to the SAR assessment of EUT, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The system check results are in the table below.

| System check results | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Freq. [MHz] | Liquid Type | Ambient | | Liquid Temp. [deg.C.] | | | Liquid Depth [mm] | Permittivity measured εr [-] | Conductivity measured σ [S/m]] | Power drift [dB] | System check target & measured | | | |
| | | | | | | | | | | | | SAR 1g [W/kg] (at 1W) | | Deviation [%] | Limit [%] |
| | | | Temp [deg.C.] | Humidity [%RH] | Check | Before | After | | | | | Target value | Measured (*4) | | |
| Sept. 15, 2011 | 2450 | Body | 24.9 | 43 | 24.9 | 24.9 | 24.8 | 158 | 50.2 | 1.99 | -0.071 | **50.9**(*3) | 50.4 (12.6 (at 250mW)) | **-1.0** | ±10 |
| Sept. 16, 2011 | 2450 | Body | 24.6 | 52 | 24.5 | 24.5 | 24.5 | 158 | 50.2 | 1.94 | -0.080 | **50.9**(*3) | 49.2 (12.3 (at 250mW)) | **-3.3** | ±10 |
| Sept. 21, 2011 | 2450 | Body | 23.6 | 56 | 24.2 | 24.0 | 24.0 | 154 | 50.4 | 1.93 | -0.049 | **50.9**(*3) | 48.4 (12.1 (at 250mW)) | **-4.9** | ±10 |
| Sept. 28, 2011 | 2450 | Body | 23.8 | 48 | 23.8 | 23.7 | 23.6 | 151 | 50.2 | 1.95 | -0.035 | **50.9**(*3) | 49.2 (12.3 (at 250mW)) | **-3.3** | ±10 |
| Sept. 29, 2011 | 2450 | Body | 24.1 | 51 | 23.8 | 23.7 | 23.6 | 153 | 50.4 | 1.94 | -0.091 | **50.9**(*3) | 48.8 (12.2 (at 250mW)) | **-4.1** | ±10 |

**Note: Refer to Appendix 3-9 System Check measurement data for the above result representation in plot data.**
*3. The target value is a parameter defined in the calibration data sheet of D2450V2 (sn:822) dipole calibrated by Schmid & Partner Engineering AG (Certification No. D2450V2-822_Jan11, the data sheet was failed in this report.).
*. We performed the system check based on FCC requirement, "The 1-g or 10-g SAR values measured using the required tissue dielectric parameters should be within 10% of manufacturer calibrated dipole SAR values. However these manufacturer calibrated dipole target SAR values should be substantially similar to those defined in IEEE Standard 1528." and FCC permits "SAR system verification with the actual liquid used for EUT's SAR measurement, should be the default operating procedures." We confirmed the this dipole manufacture's validation data for head is within 5% against IEEE Standard 1528 (manufacture's cal.: 54.4W/kg (+3.8% vs. std.: 52.4W/kg). so we can only use Body liquid validation data for our system check procedure
*4. The measurement value was normalized to 1W forward power.




**Test setup for the system performance check**

## Appendix 3-9: System check measurement data

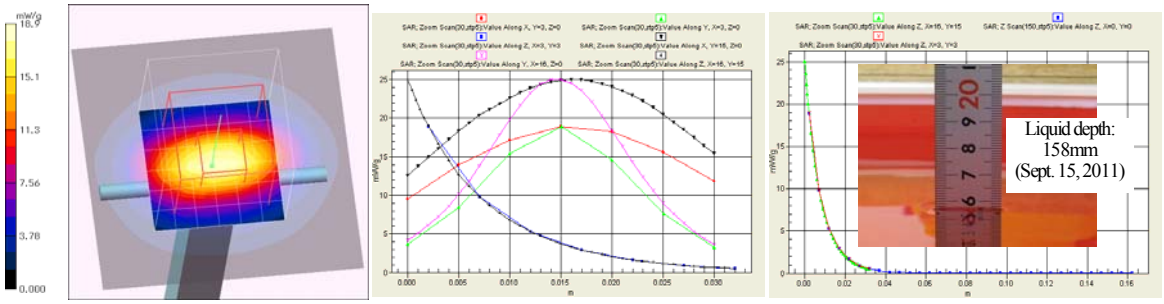
### 2450MHz system check (Body) / Forward conducted power: 250mW

**(September 15, 2011) EUT: Dipole 2450 MHz; Type: D2450V2; Serial: 822**
**Communication System: CW; Frequency: 2450 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (24.9deg.C.)**: f = 2450 MHz; $\sigma$ = 1.99 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration: - Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection) - Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**Area Scan(60,stp15) (41x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 19.1 mW/g
**Z Scan(150,stp5) (1x1x33):** Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 18.9 mW/g

**Zoom Scan(30,stp5) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 98.7 V/m; Power Drift = -0.071 dB, Maximum value of SAR (measured) = 18.9 mW/g
Peak SAR (extrapolated) = 25.0 W/kg (-7.4%, vs. speag-cal.=27.0W/kg)
**SAR(1 g) = 12.6 mW/g** (-1.0%, vs. speag-cal.=12.73mW/g)**; SAR(10 g) = 6.03 mW/g**



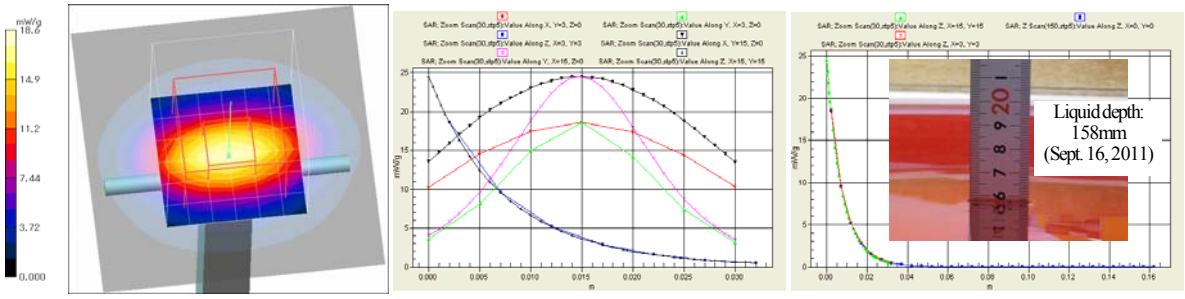

Additional information:
*.position: distance of dipole to phantom: 8mm (10mm to liquid), liquid depth: 158mm
*.ambient: 24.9deg.C / 43 %RH; liquid temperature: (before) 24.9 deg.C /(after) 24.8 deg.C
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 15, 2011

**(September 16, 2011) EUT: Dipole 2450 MHz; Type: D2450V2; Serial: 822**
**Communication System: CW; Frequency: 2450 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (24.5deg.C.) **: f = 2450 MHz; $\sigma$ = 1.94 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration: - Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection) - Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**Area Scan(60,stp15) (41x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 18.5 mW/g
**Z Scan (1x1x33):** Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 18.5 mW/g

**Zoom Scan(30,stp5) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 99.5 V/m; Power Drift = -0.080 dB, Maximum value of SAR (measured) = 18.6 mW/g
Peak SAR (extrapolated) = 24.5 W/kg (-9.3%, vs. speag-cal.=27.0W/kg)
**SAR(1 g) = 12.3 mW/g** (-3.3%, vs. speag-cal.=12.73mW/g)**; SAR(10 g) = 5.82 mW/g**




Additional information:
*.position: distance of dipole to phantom: 8mm (10mm to liquid), liquid depth: 158mm
*.ambient: 24.6deg.C / 52 %RH; liquid temperature: (before) 24.5 deg.C /(after) 24.5 deg.C
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 16, 2011

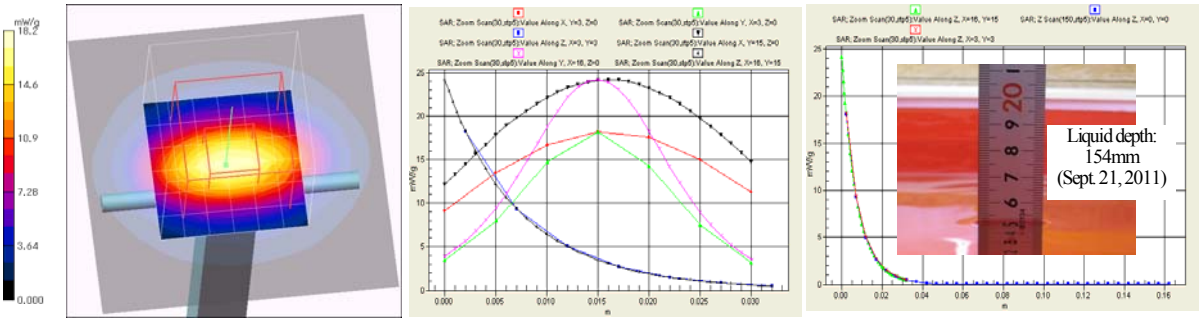
**Appendix 3-9: System check measurement data (cont'd)**
**2450MHz system check (Body) / Forward conducted power: 250mW**

**(September 21, 2011) EUT: Dipole 2450 MHz; Type: D2450V2; Serial: 822**
**Communication System: CW; Frequency: 2450 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (24.1deg.C.)**: f = 2450 MHz; $\sigma$ = 1.93 S/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration: - Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection) - Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**Area Scan (41x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 18.4 mW/g
**Z Scan (1x1x33):** Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 18.1 mW/g

**Zoom Scan(30,stp5) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 99.1 V/m; Power Drift = -0.049 dB, Maximum value of SAR (measured) = 18.2 mW/g
Peak SAR (extrapolated) = 24.2 W/kg (-10.4%, vs. speag-cal=27.0W/kg)
**SAR(1 g) = 12.1 mW/g** (-4.9%, vs. speag-cal=12.73mW/g)**; SAR(10 g) = 5.72 mW/g**



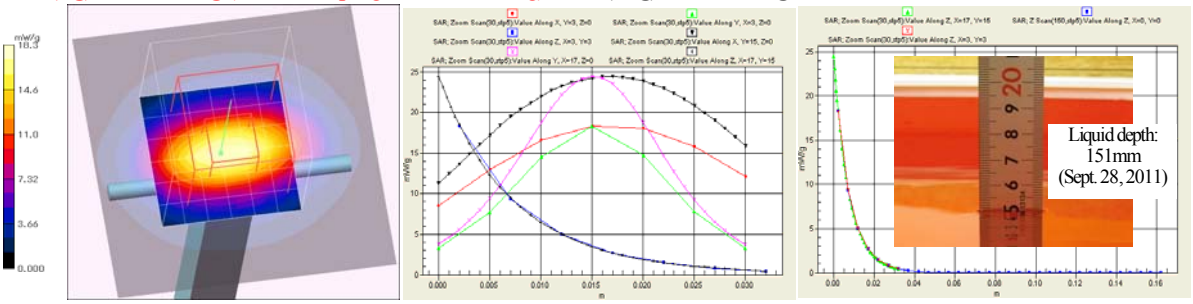

Additional information:
*.position: distance of dipole to phantom: 8mm (10mm to liquid), liquid depth: 154mm
*.ambient: 23.6deg.C / 56 %RH; liquid temperature: (before) 24.0 deg.C /(after) 24.0 deg.C
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 21, 2011

**(September 28, 2011) EUT: Dipole 2450 MHz; Type: D2450V2; Serial: 822**
**Communication System: CW; Frequency: 2450 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8deg.C.)**: f = 2450 MHz; $\sigma$ = 1.95 S/m; $\varepsilon_r$ = 50.2; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration: - Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection) - Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**Area Scan(60,stp15) (41x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 18.6 mW/g
**Z Scan(160,stp5) (1x1x33):** Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 18.2 mW/g

**Zoom Scan(30,stp5) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 99.8 V/m; Power Drift = -0.035 dB, Maximum value of SAR (measured) = 18.3 mW/g
Peak SAR (extrapolated) = 24.4 W/kg (-9.6%, vs. speag-cal=27.0W/kg)
**SAR(1 g) = 12.3 mW/g** (-3.3%, vs. speag-cal=12.73mW/g)**; SAR(10 g) = 5.78 mW/g**




Additional information:
*.position: distance of dipole to phantom: 8mm (10mm to liquid), liquid depth: 151mm
*.ambient: 23.8deg.C / 48 %RH; liquid temperature: (before) 23.7 deg.C /(after) 23.6 deg.C
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 28, 2011

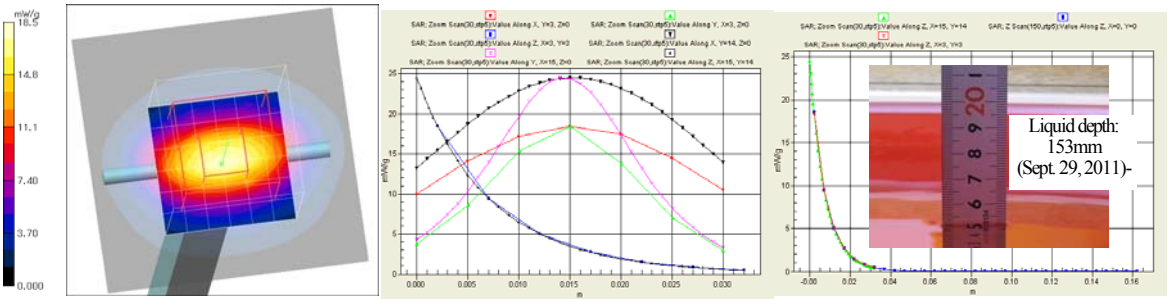
**Appendix 3-9: System check measurement data (cont'd)**
**2450MHz system check (Body) / Forward conducted power: 250mW**

**(September 29, 2011) EUT: Dipole 2450 MHz; Type: D2450V2; Serial: 822**
**Communication System: CW; Frequency: 2450 MHz; Crest Factor: 1.0**
**Medium: M2450; Medium parameters used** (23.8 deg.C.)**: f = 2450 MHz; $\sigma$ = 1.94 S/m; $\varepsilon_r$ = 50.4; $\rho$ = 1000 kg/m$^3$**

DASY4 Configuration: - Probe: EX3DV4 - SN3679; ConvF(7.34, 7.34, 7.34); Calibrated: 2011/05/19
- Sensor-Surface: 2mm (Mechanical Surface Detection) - Electronics: DAE4 Sn626; Calibrated: 2011/02/10
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1059; Phantom section: Flat Section
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**Area Scan(60,stp15) (41x41x1):** Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (interpolated) = 18.3 mW/g
**Z Scan(1x1x33):** Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 18.5 mW/g

**Zoom Scan(30,stp5) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm;
Reference Value = 97.1 V/m; Power Drift = -0.091 dB, Maximum value of SAR (measured) = 18.5 mW/g
Peak SAR (extrapolated) = 24.5 W/kg (-9.3%, vs. speag-cal=27.0W/kg)
**SAR(1 g) = 12.2 mW/g** (-4.1%, vs. speag-cal=12.73mW/g)**; SAR(10 g) = 5.75 mW/g**




Additional information:
*.position: distance of dipole to phantom: 8mm (10mm to liquid), liquid depth: 153mm
*.ambient: 24.1deg.C / 51 %RH; liquid temperature: (before) 23.7 deg.C /(after) 23.6 deg.C
*.white cubic: zoom scan area, red big cubic: SAR(10g ), red small cubic: SAR(1g)
*.Tested by: Hiroshi Naka / Tested place:No.7 shielded room / Date tested: September 29, 2011

## Appendix 3-10: System check uncertainty

| Uncertainty of system check setup | Under 3GHz | |
|---|---|---|
| | 1g SAR | 10g SAR |
| combined measurement uncertainty of the measurement system (k=1) | ± 9.9% | ± 9.6% |
| expanded uncertainty (k=2) | ± 19.9% | ± 19.3% |

| | Error Description | Uncertainty Value | Probability distribution | Divisor | ci (1g) | ci (10g) | ui (1g) | ui (10g) | vi, veff |
|---|---|---|---|---|---|---|---|---|---|
| A | **Measurement System** | | | | | | (std.uncertainty) | (std.uncertainty) | |
| 1 | Probe calibration | ±5.9 % | Normal | 1 | 1 | 1 | ±5.9 % | ±5.9 % | ∞ |
| 2 | Axial isotropy | ±4.7 % | Rectangular | √3 | 0.7 | 0.7 | ±1.9 % | ±1.9 % | ∞ |
| 3 | Hemispherical isotropy (flat, <5°) | ±2.6 % | Rectangular | √3 | 0.7 | 0.7 | ±1.1 % | ±1.1 % | ∞ |
| 4 | Boundary effects | ±1.0 % | Rectangular | √3 | 1 | 1 | ±1.2 % | ±1.2 % | ∞ |
| 5 | Probe linearity | ±4.7 % | Rectangular | √3 | 1 | 1 | ±2.7 % | ±2.7 % | ∞ |
| 6 | System detection limit | ±1.0 % | Rectangular | √3 | 1 | 1 | ±0.6 % | ±0.6 % | ∞ |
| 7 | System readout electronics | ±0.3 % | Normal | 1 | 1 | 1 | ±0.3 % | ±0.3 % | ∞ |
| 8 | Response time | ±0.0 % | Rectangular | √3 | 1 | 1 | ±0.0 % | ±0.0 % | ∞ |
| 9 | Integration time | ±0.0 % | Rectangular | √3 | 1 | 1 | ±0.0 % | ±0.0 % | ∞ |
| 10 | RF ambient - noise | ±3.0 % | Rectangular | √3 | 1 | 1 | ±1.7 % | ±1.7 % | ∞ |
| 11 | RF ambient - reflections | ±3.0 % | Rectangular | √3 | 1 | 1 | ±1.7 % | ±1.7 % | ∞ |
| 12 | Probe positioner mechanical tolerance | ±0.4 % | Rectangular | √3 | 1 | 1 | ±0.2 % | ±0.2 % | ∞ |
| 13 | Probe positioning with respect to phantom shell | ±2.9 % | Rectangular | √3 | 1 | 1 | ±1.7 % | ±1.7 % | ∞ |
| 14 | Max.SAR evaluation | ±1.0 % | Rectangular | √3 | 1 | 1 | ±0.6 % | ±0.6 % | ∞ |
| B | **Dipole** | | | | | | | | |
| 15 | Dipole axis to liquid distance | ±2.0 % | Rectangular | √3 | 1 | 1 | ±1.2 % | ±1.2 % | ∞ |
| 16 | Input power and SAR drift measurement | ±4.7 % | Rectangular | √3 | 1 | 1 | ±4.7 % | ±4.7 % | 3 |
| C | **Phantom and Setup** | | | | | | | | |
| 17 | Phantom uncertainty | ±4.0 % | Rectangular | √3 | 1 | 1 | ±2.3 % | ±2.3 % | ∞ |
| 18 | Liquid conductivity (target) | ±5.0 % | Rectangular | √3 | 0.64 | 0.43 | ±1.8 % | ±1.2 % | ∞ |
| 19 | Liquid conductivity (meas.) | ±2.9 % | Normal | 1 | 0.64 | 0.43 | ±1.9 % | ±1.2 % | 3 |
| 20 | Liquid permittivity (target) | ±5.0 % | Rectangular | √3 | 0.6 | 0.49 | ±1.7 % | ±1.4 % | ∞ |
| 21 | Liquid permittivity (meas.) | ±2.9 % | Normal | 1 | 0.6 | 0.49 | ±1.7 % | ±1.4 % | 3 |
| | **Combined Standard Uncertainty** | | | | | | **±9.9** % | **±9.6** % | 88 |
| | **Expanded Uncertainty (k=2)** | | | | | | **±19.9** % | **±19.3** % | |

*. This measurement uncertainty budget is suggested by IEEE 1528 and determined by Schmid & Partner Engineering AG.[6]

**Appendix 3-11: Calibration certificate: Dipole (D2450V2) (sn:822)**

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

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

Accredited by the Swiss Accreditation Service (SAS)
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: UL Japan (PTT)

Certificate No: D2450V2-822_Jan11

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D2450V2 - SN: 822 |
| Calibration procedure(s) | QA CAL-05.v8<br>Calibration procedure for dipole validation kits |
| Calibration date: | January 05, 2011 |

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Power sensor HP 8481A | US37292783 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Reference 20 dB Attenuator | SN: 5086 (20g) | 30-Mar-10 (No. 217-01158) | Mar-11 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 30-Mar-10 (No. 217-01162) | Mar-11 |
| Reference Probe ES3DV3 | SN: 3205 | 30-Apr-10 (No. ES3-3205_Apr10) | Apr-11 |
| DAE4 | SN: 601 | 10-Jun-10 (No. DAE4-601_Jun10) | Jun-11 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06 | 100005 | 4-Aug-99 (in house check Oct-09) | In house check: Oct-11 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-10) | In house check: Oct-11 |

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

Issued: January 5, 2011

**Appendix 3-11: Calibration certificate: Dipole (D2450V2) (sn:822) (cont'd)**

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

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

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

**Glossary:**

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

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

**Additional Documentation:**

d) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

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

**Appendix 3-11: Calibration certificate: Dipole (D2450V2) (sn:822) (cont'd)**

## Measurement Conditions

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

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.6 |
| **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 ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 39.2 | 1.80 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 37.9 ± 6 % | 1.74 mho/m ± 6 % |
| **Head TSL temperature during test** | (21.0 ± 0.2) °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.5 mW / g |
| SAR normalized | normalized to 1W | 54.0 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **54.4 mW /g ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.33 mW / g |
| SAR normalized | normalized to 1W | 25.3 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **25.3 mW /g ± 16.5 % (k=2)** |

**Appendix 3-11: Calibration certificate: Dipole (D2450V2) (sn:822) (cont'd)**

## 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 | 52.5 ± 6 % | 1.96 mho/m ± 6 % |
| **Body TSL temperature during test** | (21.0 ± 0.2) °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 12.8 mW / g |
| SAR normalized | normalized to 1W | 51.2 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **50.9 mW / g ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.91 mW / g |
| SAR normalized | normalized to 1W | 23.6 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **23.6 mW / g ± 16.5 % (k=2)** |

**Appendix 3-11: Calibration certificate: Dipole (D2450V2) (sn:822) (cont'd)**

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 54.3 Ω + 3.6 jΩ |
| Return Loss | - 25.4 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 49.7 Ω + 5.2 jΩ |
| Return Loss | - 25.6 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.159 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 | December 11, 2008 |

**Appendix 3-11: Calibration certificate: Dipole (D2450V2) (sn:822) (cont'd)**

## DASY5 Validation Report for Head TSL

Date/Time: 04.01.2011 14:12:13

Test Laboratory: SPEAG, Zurich, Switzerland

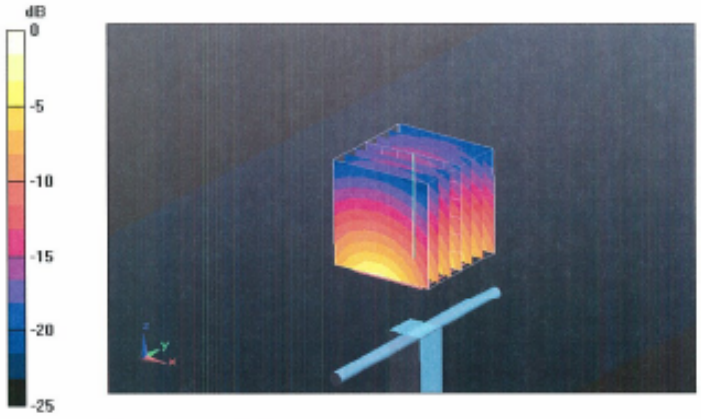
**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:822**

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.75 mho/m; $\varepsilon_r$ = 38.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6 Build (401)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.5 V/m; Power Drift = 0.039 dB
Peak SAR (extrapolated) = 27.7 W/kg
**SAR(1 g) = 13.5 mW/g; SAR(10 g) = 6.33 mW/g**
Maximum value of SAR (measured) = 17.4 mW/g

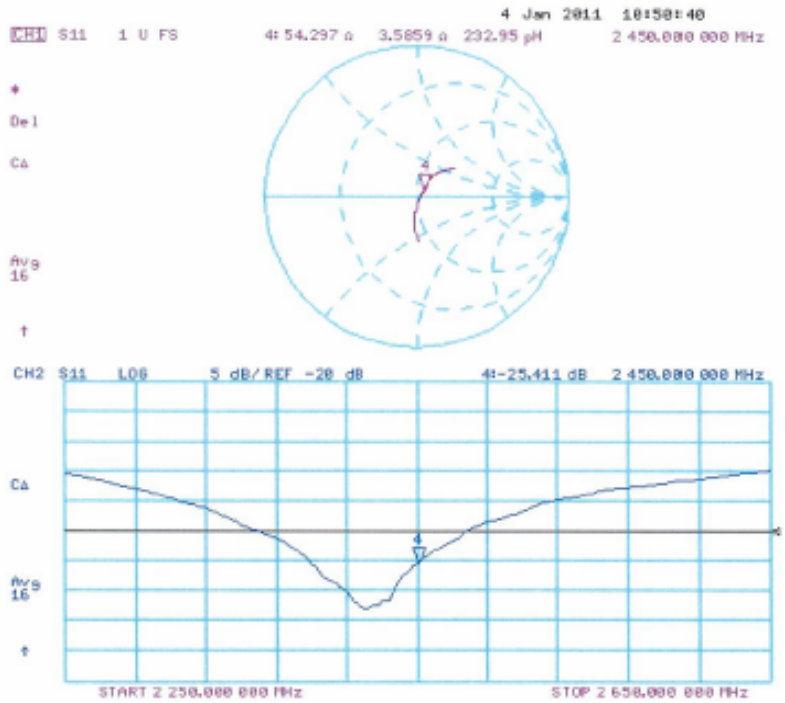



0 dB = 17.4mW/g

Certificate No: D2450V2-822_Jan11 Page 6 of 9

**Appendix 3-11: Calibration certificate: Dipole (D2450V2) (sn:822) (cont'd)**

## Impedance Measurement Plot for Head TSL



**Appendix 3-11: Calibration certificate: Dipole (D2450V2) (sn:822) (cont'd)**

## DASY5 Validation Report for Body

Date/Time: 05.01.2011 12:40:53

Test Laboratory: SPEAG, Zurich, Switzerland

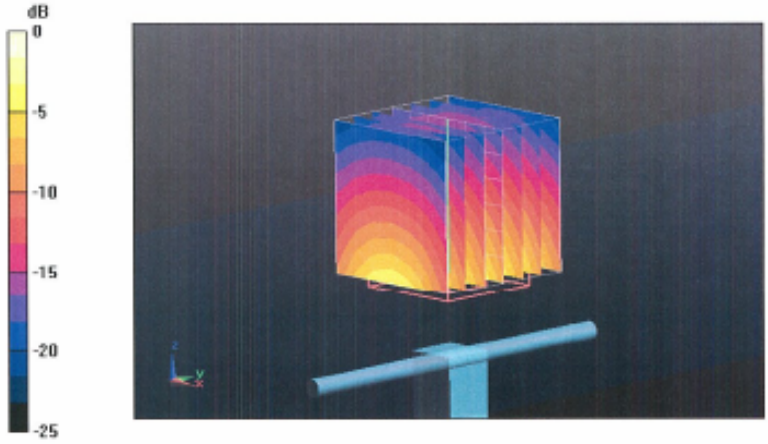
**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:822**

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.97 mho/m; $\varepsilon_r$ = 52.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.31, 4.31, 4.31); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6 Build (401)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.7 V/m; Power Drift = -0.024 dB
Peak SAR (extrapolated) = 27.1 W/kg
**SAR(1 g) = 12.8 mW/g; SAR(10 g) = 5.91 mW/g**
Maximum value of SAR (measured) = 16.9 mW/g

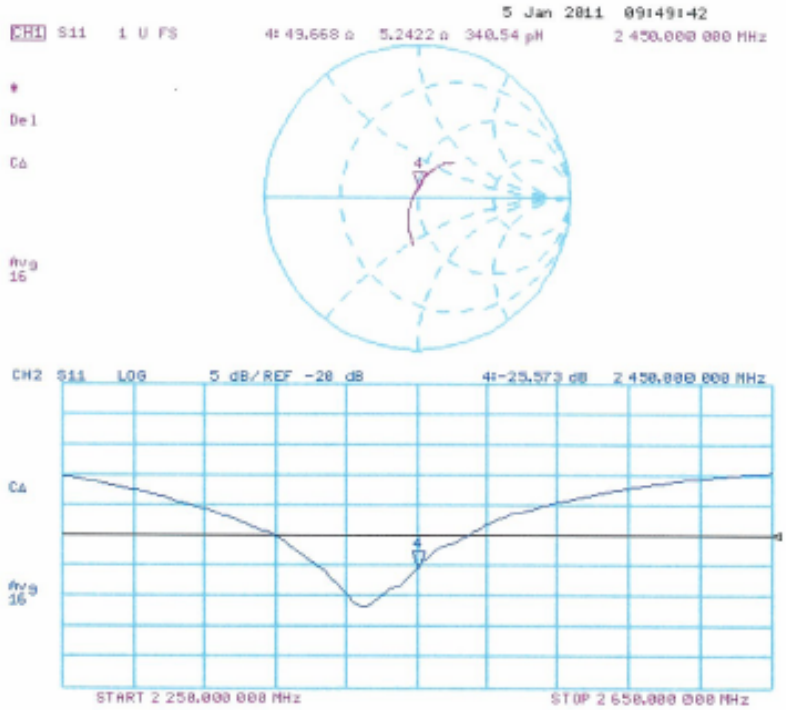



0 dB = 16.9mW/g

Certificate No: D2450V2-822_Jan11 Page 8 of 9

**Appendix 3-11: Calibration certificate: Dipole (D2450V2) (sn:822) (cont'd)**

## Impedance Measurement Plot for Body TSL



**Appendix 3-12: Calibration certificate: E-Field Probe (EX3DV4) (sn:3679)**

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

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

Accredited by the Swiss Accreditation Service (SAS)
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: UL Japan (PTT)

Certificate No: EX3-3679_May11

# CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3679

Calibration procedure(s): QA CAL-01.v7, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v3
Calibration procedure for dosimetric E-field probes

Calibration date: May 19, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter E4419B | GB41293874 | 31-Mar-11 (No. 217-01372) | Apr-12 |
| Power sensor E4412A | MY41498087 | 31-Mar-11 (No. 217-01372) | Apr-12 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 29-Mar-11 (No. 217-01368) | Apr-12 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 29-Mar-11 (No. 217-01367) | Apr-12 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 29-Mar-11 (No. 217-01370) | Apr-12 |
| Reference Probe ES3DV2 | SN: 3013 | 29-Dec-10 (No. ES3-3013_Dec10) | Dec-11 |
| DAE4 | SN: 654 | 3-May-11 (No. DAE4-654_May11) | May-12 |
| | | | |
| Secondary Standards | ID | Check Date (in house) | Scheduled Check |
| RF generator HP 8648C | US3642U01700 | 4-Aug-99 (in house check Oct-09) | In house check: Oct-11 |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (in house check Oct-10) | In house check: Oct-11 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Katja Pokovic | Technical Manager | |
| Approved by: | Fin Bomholt | R&D Director | |

Issued: May 19, 2011

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

**Appendix 3-12: Calibration certificate: E-Field Probe (EX3DV4) (sn:3679) (cont'd)**

**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
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| NORMx,y,z | sensitivity in free space |
| ConvF | sensitivity in TSL / NORMx,y,z |
| DCP | diode compression point |
| CF | crest factor (1/duty_cycle) of the RF signal |
| A, B, C | modulation dependent linearization parameters |
| Polarization 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., ϑ = 0 is normal to probe axis |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

## Methods Applied and Interpretation of Parameters:

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

**Appendix 3-12: Calibration certificate: E-Field Probe (EX3DV4) (sn:3679) (cont'd)**



# Probe EX3DV4

# SN:3679

Manufactured: September 9, 2008
Calibrated: May 19, 2011

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

**Appendix 3-12: Calibration certificate: E-Field Probe (EX3DV4) (sn:3679) (cont'd)**

EX3DV4– SN:3679

May 19, 2011

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3679

## Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm ($\mu V/(V/m)^2$)[A] | 0.59 | 0.54 | 0.53 | ± 10.1 % |
| DCP (mV)[B] | 94.8 | 96.0 | 97.1 | |

## Modulation Calibration Parameters

| UID | Communication System Name | PAR | | A dB | B dB | C dB | VR mV | Unc[E] (k=2) |
|---|---|---|---|---|---|---|---|---|
| 10000 | CW | 0.00 | X | 0.00 | 0.00 | 1.00 | 128.0 | ±3.0 % |
| | | | Y | 0.00 | 0.00 | 1.00 | 118.6 | |
| | | | Z | 0.00 | 0.00 | 1.00 | 117.6 | |

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

[A] The uncertainties of NormX,Y,Z do not affect the $E^2$-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

**Appendix 3-12: Calibration certificate: E-Field Probe (EX3DV4) (sn:3679) (cont'd)**



# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3679

## Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) [C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 2450 | 39.2 | 1.80 | 6.99 | 6.99 | 6.99 | 0.62 | 0.71 | ± 12.0 % |
| 5200 | 36.0 | 4.66 | 4.62 | 4.62 | 4.62 | 0.45 | 1.80 | ± 13.1 % |
| 5300 | 35.9 | 4.76 | 4.40 | 4.40 | 4.40 | 0.45 | 1.80 | ± 13.1 % |
| 5500 | 35.6 | 4.96 | 4.27 | 4.27 | 4.27 | 0.45 | 1.80 | ± 13.1 % |
| 5600 | 35.5 | 5.07 | 4.11 | 4.11 | 4.11 | 0.50 | 1.80 | ± 13.1 % |
| 5800 | 35.3 | 5.27 | 4.11 | 4.11 | 4.11 | 0.50 | 1.80 | ± 13.1 % |

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

**Appendix 3-12: Calibration certificate: E-Field Probe (EX3DV4) (sn:3679) (cont'd)**



# DASY/EASY - Parameters of Probe: EX3DV4- SN:3679

## Calibration Parameter Determined in Body Tissue Simulating Media

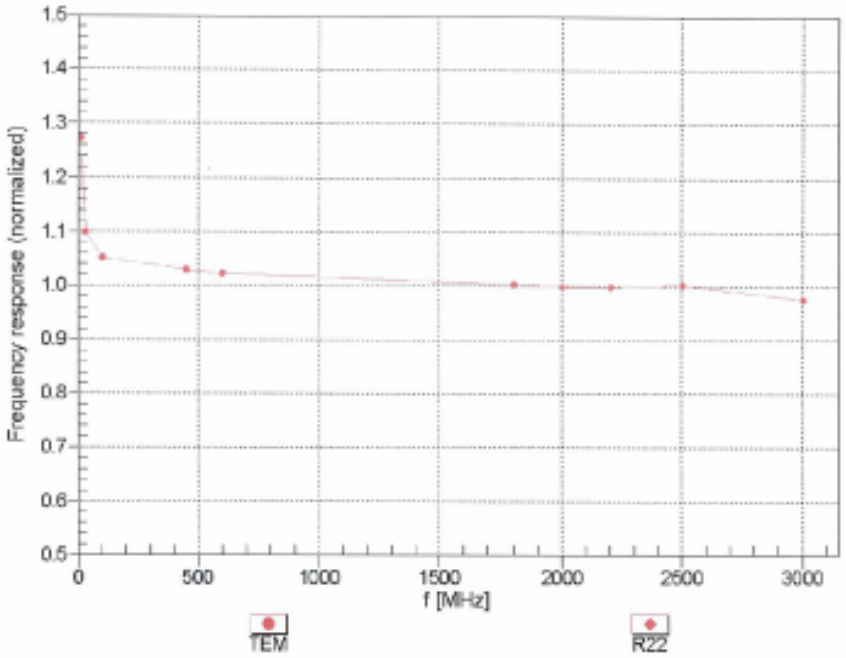
| f (MHz) [C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 2450 | 52.7 | 1.95 | 7.34 | 7.34 | 7.34 | 0.74 | 0.67 | ± 12.0 % |
| 5200 | 49.0 | 5.30 | 4.10 | 4.10 | 4.10 | 0.52 | 1.95 | ± 13.1 % |
| 5300 | 48.9 | 5.42 | 3.88 | 3.88 | 3.88 | 0.55 | 1.95 | ± 13.1 % |
| 5500 | 48.6 | 5.65 | 3.65 | 3.65 | 3.65 | 0.58 | 1.95 | ± 13.1 % |
| 5600 | 48.5 | 5.77 | 3.45 | 3.45 | 3.45 | 0.60 | 1.95 | ± 13.1 % |
| 5800 | 48.2 | 6.00 | 3.94 | 3.94 | 3.94 | 0.55 | 1.95 | ± 13.1 % |

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

**Appendix 3-12: Calibration certificate: E-Field Probe (EX3DV4) (sn:3679) (cont'd)**

EX3DV4– SN:3679 May 19, 2011

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



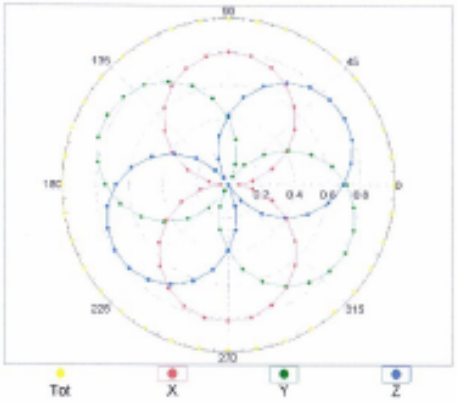

Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

**Appendix 3-12: Calibration certificate: E-Field Probe (EX3DV4) (sn:3679) (cont'd)**

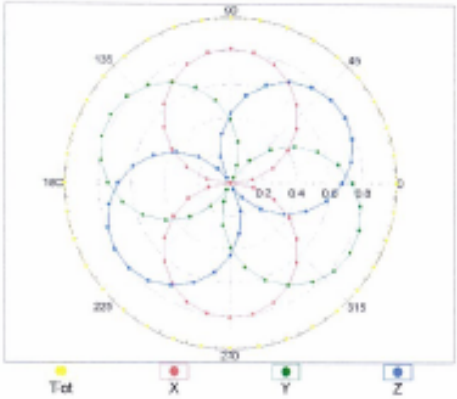
EX3DV4– SN:3679 May 19, 2011

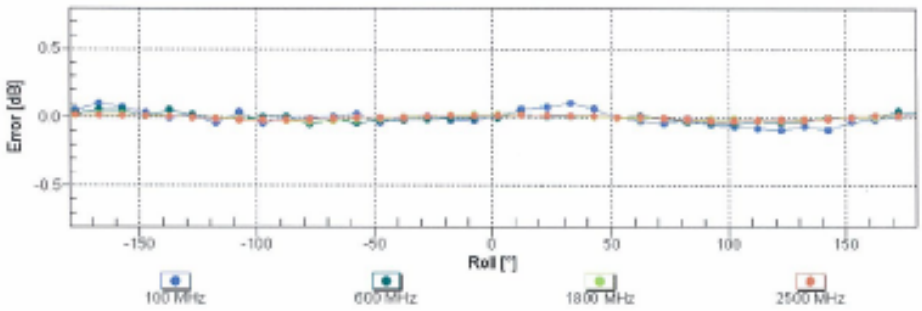
## Receiving Pattern ($\phi$), $\vartheta$ = 0°

f=600 MHz,TEM




f=1800 MHz,R22



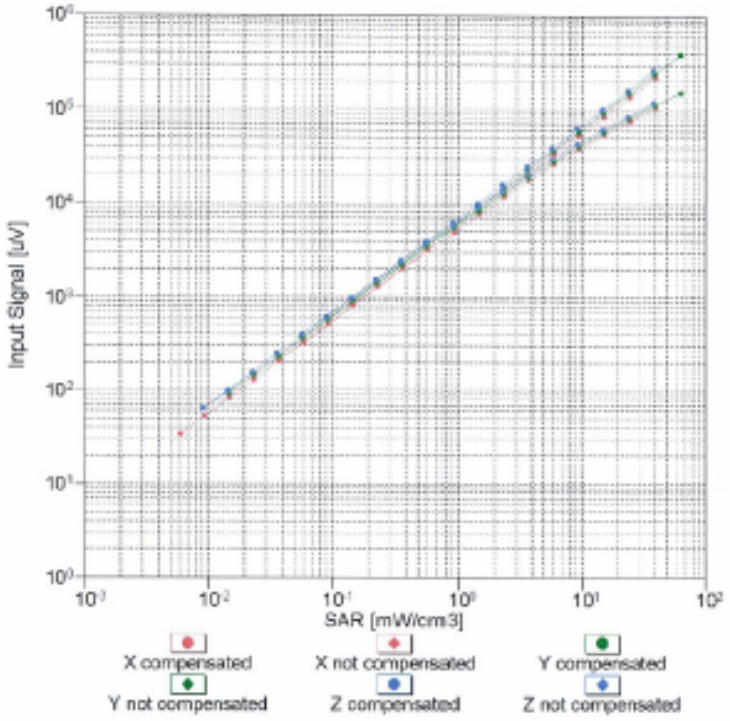

**Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)**

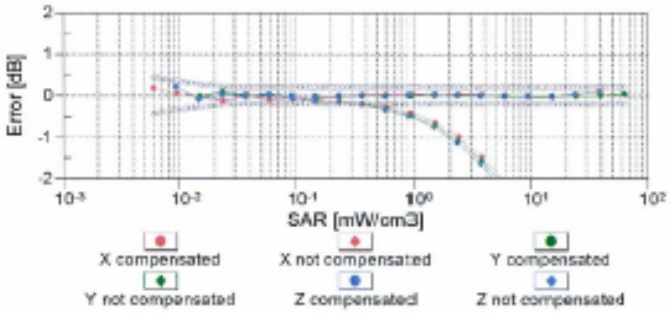
Certificate No: EX3-3679_May11 Page 8 of 11

**Appendix 3-12: Calibration certificate: E-Field Probe (EX3DV4) (sn:3679) (cont'd)**

EX3DV4- SN:3679 May 19, 2011

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




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

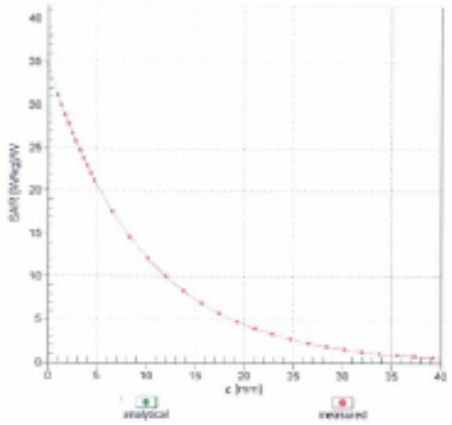
Certificate No: EX3-3679_May11 Page 9 of 11

**Appendix 3-12: Calibration certificate: E-Field Probe (EX3DV4) (sn:3679) (cont'd)**

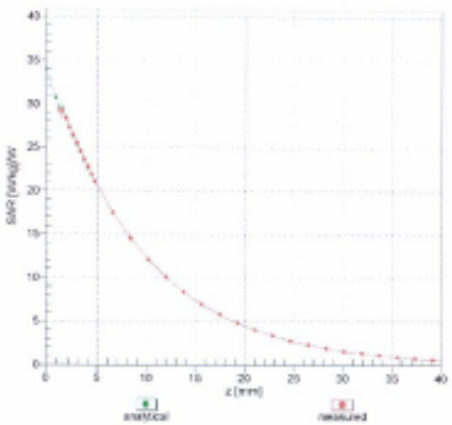
EX3DV4– SN:3679 May 19, 2011

## Conversion Factor Assessment

f = 2450 MHz,WGLS R22 (H_convF)

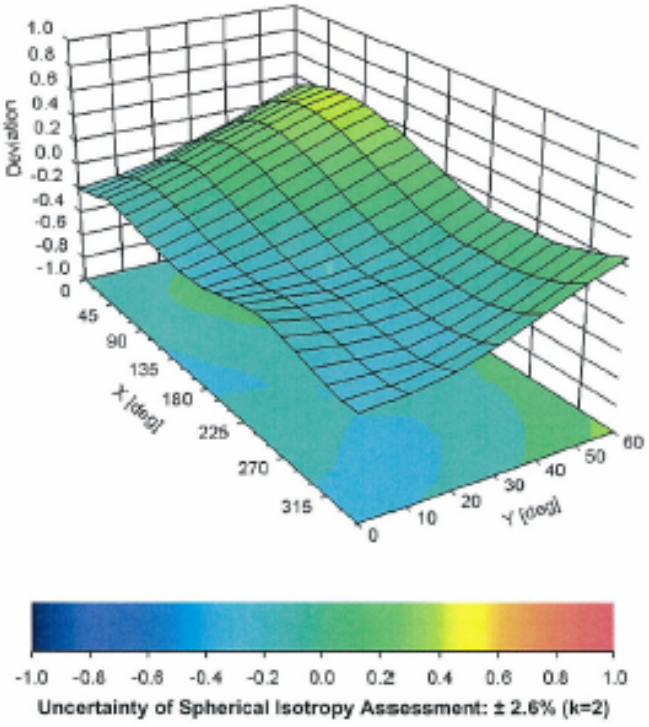


f = 2450 MHz,WGLS R22 (M_convF)



## Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz







Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

**Appendix 3-12: Calibration certificate: E-Field Probe (EX3DV4) (sn:3679) (cont'd)**



# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3679

## Other Probe Parameters

| | |
|---|---|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | Not applicable |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disabled |
| Probe Overall Length | 337 mm |
| Probe Body Diameter | 10 mm |
| Tip Length | 9 mm |
| Tip Diameter | 2.5 mm |
| Probe Tip to Sensor X Calibration Point | 1 mm |
| Probe Tip to Sensor Y Calibration Point | 1 mm |
| Probe Tip to Sensor Z Calibration Point | 1 mm |
| Recommended Measurement Distance from Surface | 2 mm |

**Appendix 3-13: Reference**

[1] ANSI, ANSI/IEEE C95.1-1992: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, The Institute of Electrical and Electronics Engineers, Inc., New York, NY 10017, 1992.

[2] Katja Pokovic, Thomas Schmid, and Niels Kuster, "Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies", in ICECOM '97, Dubrovnik, October 15-17, 1997, pp. 120-124.

[3] Katja Pokovic, Thomas Schmid, and Niels Kuster, "E-_field probe with improved isotropy in brain simulating liquids", in Proceedings of the ELMAR, Zadar, Croatia, 23-25 June, 1996, pp.172-175.

[4] W. Gander, Computermathematik, Birkhaeuser, Basel, 1992.

[5] W. H. Press, S. A. Teukolsky,W. T. Vetterling, and B. P. Flannery, Numerical Recepies in C, The Art of Scientific Computing, Second Edition, Cambridge University Press, 1992.

[6] SPEAG uncertainty document for DASY 4 System from SPEAG (Schmid & Partner Engineering AG).