# SAR TEST REPORT

**REPORT NO.:** SA990226L04

**MODEL NO.:** PWU1100

**RECEIVED:** Feb. 26, 2010

**TESTED:** Mar. 12 ~ Mar. 15, 2010

**ISSUED:** Mar. 18, 2010

**APPLICANT:** Ubee Interactive Corp.

**ADDRESS:** 6F-9, No. 38, Taiyuan St.Jhubei City Hsinchu County 302,Taiwan, R.O.C.

**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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# 1. CERTIFICATION

| | |
|---|---|
| **PRODUCT:** | Ubee 11N 2*2 USB dongle |
| **MODEL:** | PWU1100 |
| **BRAND:** | Ubee |
| **APPLICANT:** | Ubee Interactive Corp. |
| **TESTED:** | Mar. 12 ~ Mar. 15, 2010 |
| **TEST SAMPLE:** | ENGINEERING SAMPLE |
| **STANDARDS:** | **FCC Part 2 (Section 2.1093)** |
| | **FCC OET Bulletin 65, Supplement C (01-01)** |
| | **RSS-102** |

The above equipment (model: PWU1100) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY** : _____ , **DATE :** Mar. 18, 2010
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**APPROVED BY** : _____ , **DATE :** Mar. 18, 2010
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# 2. GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF EUT

| | | |
|---|---|---|
| **EUT** | Ubee 11N 2*2 USB dongle | |
| **MODEL NO.** | PWU1100 | |
| **FCC ID** | XCNPWU1100 | |
| **POWER SUPPLY** | 5Vdc | |
| **MODULATION TYPE** | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM | |
| **MODULATION TECHNOLOGY** | DSSS, OFDM | |
| **TRANSFER RATE** | 802.11b:11.0/ 5.5/ 2.0/ 1.0Mbps<br>802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps<br>802.11n: up to 300.0Mbps | |
| **OPERATING FREQUENCY** | 2412 ~ 2462MHz | |
| **NUMBER OF CHANNEL** | 11 for 802.11b, 802.11g, 802.11n (20MHz)<br>7 for 802.11n (40MHz) | |
| **CHANNEL FREQUENCIES UNDER TEST AND ITS CONDUCTED OUTPUT POWER** | **802.11b:** | |
| | **Antenna 0** | **Antenna 1** |
| | 20.03dBm / Ch6: 2437MHz | 20.02dBm / Ch6: 2437MHz |
| | **802.11g:** | |
| | **Antenna 0** | **Antenna 1** |
| | 23.02dBm / Ch6: 2437MHz | 23.06dBm / Ch6: 2437MHz |
| | **802.11n (20MHz):**<br>24.82dBm / Ch1: 2412MHz<br>**802.11n (40MHz):**<br>24.84dBm / Ch4: 2437MHz | |
| **MAXIMUM SAR (1g)** | 0.785W/kg | |
| **ANTENNA TYPE** | Printed antenna with 1dBi gain | |
| **ANTENNA CONNECTOR** | NA | |
| **DATA CABLE** | NA | |
| **I/O PORTS** | USB | |
| **ACCESSORY DEVICES** | NA | |

**NOTE:**

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

| MODULATION MODE | TX FUNCTION |
|---|---|
| **802.11b** | 1TX |
| **802.11g** | 1TX |
| **802.11n (20MHz)** | 2TX |
| **802.11n (40MHz)** | 2TX |

2. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

## 2.2 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to the specifications of the manufacturer, this product must comply with the requirements of the following standards:

**FCC Part 2 (2.1093)**

**FCC OET Bulletin 65, Supplement C (01- 01)**

**RSS-102**

**IEEE 1528-2003**

All test items have been performed and recorded as per the above standards.

## 2.3 GENERAL INOFRMATION OF THE SAR SYSTEM

DASY4 (software 4.7 Build 80) consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY4 software defined. The DASY4 software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion form the optical into digital electric signal of the DAE and transfers data to the PC.

### EX3DV4 ISOTROPIC E-FIELD PROBE

| | |
|---|---|
| **CONSTRUCTION** | Symmetrical design with triangular core<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |
| **FREQUENCY** | 10 MHz to > 6 GHz<br>Linearity: ± 0.2 dB (30 MHz to 6 GHz) |
| **DIRECTIVITY** | ± 0.3 dB in HSL (rotation around probe axis)<br>± 0.5 dB in tissue material (rotation normal to probe axis) |
| **DYNAMIC RANGE** | 10 μW/g to > 100 mW/g<br>Linearity: ± 0.2 dB (noise: typically < 1 μW/g) |
| **DIMENSIONS** | Overall length: 330 mm (Tip: 20 mm)<br>Tip diameter: 2.5 mm (Body: 12 mm)<br>Typical distance from probe tip to dipole centers: 1 mm |
| **APPLICATION** | High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%. |

**NOTE**

1. The Probe parameters have been calibrated by the SPEAG. Please reference “APPENDIX D” for the Calibration Certification Report.
2. For frequencies above 800MHz, calibration in a rectangular wave-guide is used, because wave-guide size is manageable.
3. For frequencies below 800MHz, temperature transfer calibration is used because the wave-guide size becomes relatively large.

## TWIN SAM V4.0

| | |
|---|---|
| **CONSTRUCTION** | The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-2003, EN 62209-1 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot. |
| **SHELL THICKNESS** | 2 ± 0.2mm |
| **FILLING VOLUME** | Approx. 25liters |
| **DIMENSIONS** | Height: 810mm; Length: 1000mm; Width: 500mm |

## SYSTEM VALIDATION KITS:

| | |
|---|---|
| **CONSTRUCTION** | Symmetrical dipole with l/4 balun enables measurement of feedpoint impedance with NWA matched for use near flat phantoms filled with brain simulating solutions.<br>Includes distance holder and tripod adaptor |
| **CALIBRATION** | Calibrated SAR value for specified position and input power at the flat phantom in brain simulating solutions |
| **FREQUENCY** | 2450MHz |
| **RETURN LOSS** | > 20dB at specified validation position |
| **POWER CAPABILITY** | > 100W (f < 1GHz); > 40W (f > 1GHz) |
| **OPTIONS** | Dipoles for other frequencies or solutions and other calibration conditions upon request |

## DEVICE HOLDER FOR SAM TWIN PHANTOM

**CONSTRUCTION**

The device holder for the mobile phone device is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles. The holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity $\varepsilon$ =3 and loss tangent $\delta$ =0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered. The device holder for the portable device makes up of the polyethylene foam. The dielectric parameters of material close to the dielectric parameters of the air.

## DATA ACQUISITION ELECTRONICS

**CONSTRUCTION**

The data acquisition electronics (DAE3) consists of a highly sensitive electrometer grade preamplifier with auto-zeroing, a channel and gain-switching multiplex, a fast 16 bit AD converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock. The mechanical probe is mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

## 2.4 TEST EQUIPMENT

**FOR SAR MEASURENENT**

| ITEM | NAME | BRAND | TYPE | SERIES NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---|---|---|---|---|---|---|
| 1 | SAM Phantom | S & P | QD000 P40 CA | TP-1150 | NA | NA |
| 2 | Signal Generator | Anritsu | 68247B | 984703 | May 21, 2009 | May 20, 2010 |
| 3 | E-Field Probe | S & P | EX3DV4 | 3578 | Jun. 26, 2009 | Jun. 25, 2010 |
| 4 | DAE | S & P | DAE4 | 861 | Jan. 22, 2010 | Jan. 21, 2011 |
| 5 | Robot Positioner | Staubli Unimation | NA | NA | NA | NA |
| 6 | Validation Dipole | S & P | D2450V2 | 716 | Mar. 17, 2009 | Mar. 16, 2010 |

**NOTE:** Before starting the measurement, all test equipment shall be warmed up for 30min.

**FOR TISSUE PROPERTY**

| ITEM | NAME | BRAND | TYPE | SERIES NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---|---|---|---|---|---|---|
| 1 | Network Analyzer | Agilent | E8358A | US41480538 | Dec. 03, 2009 | Dec. 02, 2010 |
| 2 | Dielectric Probe | Agilent | 85070D | US01440176 | NA | NA |

**NOTE:**

1. Before starting, all test equipment shall be warmed up for 30min.
2. The tolerance (k=1) specified by Agilent for general dielectric measurements, deriving from inaccuracies in the calibration data, analyzer drift, and random errors, are usually ±2.5% and ±5% for measured permittivity and conductivity, respectively. However, the tolerances for the conductivity is smaller for material with large loss tangents, i.e., less than ±2.5% (k=1). It can be substantially smaller if more accurate methods are applied.

## 2.5 GENERAL DESCRIPTION OF THE SPATIAL PEAK SAR EVALUATION

The DASY4 post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the micro-volt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

| | | |
|---|---|---|
| Probe parameters: | - Sensitivity | $Norm_i$, $a_{i0}$, $a_{i1}$, $a_{i2}$ |
| | - Conversion factor | $ConvF_i$ |
| | - Diode compression point | $dcp_i$ |
| Device parameters: | - Frequency | F |
| | - Crest factor | Cf |
| Media parameters: | - Conductivity | $\sigma$ |
| | - Density | $\rho$ |

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \bullet \frac{cf}{dcp_i}$$

| | | |
|---|---|---|
| $V_i$ | =compensated signal of channel i | (i = x, y, z) |
| $U_i$ | =input signal of channel I | (i = x, y, z) |
| Cf | =crest factor of exciting field | (DASY parameter) |
| $dcp_i$ | =diode compression point | (DASY parameter) |

From the compensated input signals the primary field data for each channel can be evaluated:

$$\text{E-fieldprobes: } E_i = \sqrt{\frac{V_1}{Norm_i \cdot ConvF}}$$

$$\text{H-fieldprobes: } H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}$$

| | | |
|---|---|---|
| $V_i$ | =compensated signal of channel I | (i = x, y, z) |
| $Norm_i$ | =sensor sensitivity of channel i μV/(V/m)2 for E-field Probes | (i = x, y, z) |
| ConvF | = sensitivity enhancement in solution | |
| $a_{ij}$ | = sensor sensitivity factors for H-field probes | |
| F | = carrier frequency [GHz] | |
| $E_i$ | = electric field strength of channel i in V/m | |
| $H_i$ | = magnetic field strength of channel i in A/m | |

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

| | |
|---|---|
| SAR | = local specific absorption rate in mW/g |
| $E_{tot}$ | = total field strength in V/m |
| $\sigma$ | = conductivity in [mho/m] or [Siemens/m] |
| $\rho$ | = equivalent tissue density in g/cm3 |

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid. The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. The generation of a high-resolution mesh within the measured volume
4. The interpolation of all measured values from the measurement grid to the high-resolution grid
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. The calculation of the averaged SAR within masses of 1g and 10g.

The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7 x 7 x 7 scans. The routines are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 30 x 30 x 30mm contains about 30g of tissue. The first procedure is an extrapolation (incl. boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume in a 1mm grid (42875 points). In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is the moved around until the highest averaged SAR is found. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

## 3. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|---|---|---|---|---|---|
| 1 | NOTEBOOK | DELL | PP18L | 29144041120 | CXSMM01BRD02D330 |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|---|---|
| 1 | NA |

**NOTE:** All power cords of the above support units are non shielded (1.8m).

# 4. DESCRIPTION OF TEST MODES AND CONFIGURATIONS

## 4.1. DESCRIPTION OF TEST CONDITION

| TEST DATE | TEST ITEM | TEMPERATURE(°C) | | HUMIDITY(%RH) | TESTED BY |
|---|---|---|---|---|---|
| | | AIMBENT | LIQUID | | |
| Mar. 12, 2010 | 1 ~ 12 | 23.0 | 22.5 | 62 | Aaron Liang |
| Mar. 15, 2010 | 13 ~ 24 | 23.2 | 22.7 | 61 | Aaron Liang |

## 4.2. CHECK FOR SCAN RESOLUTION

**Compare with different scan resolution**

With EUT hold on the worst case configuration with no any change in position or setting, 2 scans with different resolutions are preformed to evaluate the impact on the SAR value.

**Test data as below:**

| AREA SCAN RESOLUTION | ZOOM SCAN RESOLUTION | SAR VALUE(W/kg) |
|---|---|---|
| 5.0mm | 5.0mm | 0.785 |
| 5.0mm | 2.5mm | 0.779 |

Conclusion: No meaningful change detected.

## 4.3. DESCRIPTION OF TEST MODE

**Test Tool:**

Test tool is QA RT3X7X V1.3.0.0 provided by client. It can control EUT to transmit continuously at specific channel, output power level, data rates and 100 % duty signal.

**Test Date Rate:**

“Per KDB 248277, for each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than ¼ dB higher than those measured at the lowest data rate.”
Comparing output power of all modulations and data rates of each mode can find the lowest data rates has max output power. Therefore, EUT will set under lowest data rates to test.

**Test Channel:**

“Per KDB 447498, when the SAR procedures require multiple channels to be tested and the 1-g SAR for the highest output channel is less than 0.8 W/kg and peak SAR is less than 1.6 W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.”
According to test data from table of section 4.4, SAR value of highest output power channel are less than 0.8 W/kg and Peak SAR values are less than 1.6W/kg. Therefore, testing for other channels is not required.

**Test Position:**

There are 4 test positions in the report.

- ✧ Horizontal-Up
- ✧ Horizontal-Down
- ✧ Vertical-Front
- ✧ Vertical-Back

Since the distance between antenna and the tip of the dongle is bigger than 1cm, therefore SAR of Tail position is unnecessary.
Please check test setup photo.

## Test Mode Table:

| ITEM | TEST MODE | MODULATION | ASSESSMENT POSTITION | TESTED CHANNEL | ANTENNA |
|---|---|---|---|---|---|
| 1 | 802.11b | DBPSK | Horizontal-Up | 6 | Ant 0 |
| 2 | 802.11b | DBPSK | | 6 | Ant 1 |
| 3 | 802.11g | BPSK | | 6 | Ant 0 |
| 4 | 802.11g | BPSK | | 6 | Ant 1 |
| 5 | 802.11n (20MHz) | BPSK | | 1 | Ant 0, Ant 1 |
| 6 | 802.11n (40MHz) | BPSK | | 4 | Ant 0, Ant 1 |
| 7 | 802.11b | DBPSK | Horizontal-Down | 6 | Ant 0 |
| 8 | 802.11b | DBPSK | | 6 | Ant 1 |
| 9 | 802.11g | BPSK | | 6 | Ant 0 |
| 10 | 802.11g | BPSK | | 6 | Ant 1 |
| 11 | 802.11n (20MHz) | BPSK | | 1 | Ant 0, Ant 1 |
| 12 | 802.11n (40MHz) | BPSK | | 4 | Ant 0, Ant 1 |
| 13 | 802.11b | DBPSK | Vertical-Back | 6 | Ant 0 |
| 14 | 802.11b | DBPSK | | 6 | Ant 1 |
| 15 | 802.11g | BPSK | | 6 | Ant 0 |
| 16 | 802.11g | BPSK | | 6 | Ant 1 |
| 17 | 802.11n (20MHz) | BPSK | | 1 | Ant 0, Ant 1 |
| 18 | 802.11n (40MHz) | BPSK | | 4 | Ant 0, Ant 1 |
| 19 | 802.11b | DBPSK | Vertical-Front | 6 | Ant 0 |
| 20 | 802.11b | DBPSK | | 6 | Ant 1 |
| 21 | 802.11g | BPSK | | 6 | Ant 0 |
| 22 | 802.11g | BPSK | | 6 | Ant 1 |
| 23 | 802.11n (20MHz) | BPSK | | 1 | Ant 0, Ant 1 |
| 24 | 802.11n (40MHz) | BPSK | | 4 | Ant 0, Ant 1 |

**NOTE:** Assessment position of the EUT please refer to the test set up photo.

## 4.4. SUMMARY OF TEST RESULTS

| ITEM | | 1 | 2 | 3 | 4 | 5 | ITEM | | 6 |
|---|---|---|---|---|---|---|---|---|---|
| TEST MODE | | 802.11b | 802.11b | 802.11g | 802.11g | 802.11n (20MHz) | TEST MODE | | 802.11n (40MHz) |
| CHAN. | FREQ. (MHz) | MEASURED VALUE OF 1g SAR ( W/kg) | | | | | CHAN. | FREQ. (MHz) | MEASURED VALUE OF 1g SAR ( W/kg) |
| 1 | 2412 (Low) | - | - | - | - | 0.626 | 1 | 2422 (Low) | - |
| 6 | 2437 (Mid.) | 0.776 | 0.717 | 0.521 | 0.359 | - | 4 | 2437 (Mid.) | **0.785** |
| 11 | 2462 (High) | - | - | - | - | - | 7 | 2452 (High) | - |

| ITEM | | 7 | 8 | 9 | 10 | 11 | ITEM | | 12 |
|---|---|---|---|---|---|---|---|---|---|
| TEST MODE | | 802.11b | 802.11b | 802.11g | 802.11g | 802.11n (20MHz) | TEST MODE | | 802.11n (40MHz) |
| CHAN. | FREQ. (MHz) | MEASURED VALUE OF 1g SAR ( W/kg) | | | | | CHAN. | FREQ. (MHz) | MEASURED VALUE OF 1g SAR ( W/kg) |
| 1 | 2412 (Low) | - | - | - | - | 0.194 | 1 | 2422 (Low) | - |
| 6 | 2437 (Mid.) | 0.240 | 0.178 | 0.168 | 0.104 | - | 4 | 2437 (Mid.) | 0.248 |
| 11 | 2462 (High) | - | - | - | - | - | 7 | 2452 (High) | - |

| ITEM | | 13 | 14 | 15 | 16 | 17 | ITEM | | 18 |
|---|---|---|---|---|---|---|---|---|---|
| TEST MODE | | 802.11b | 802.11b | 802.11g | 802.11g | 802.11n (20MHz) | TEST MODE | | 802.11n (40MHz) |
| CHAN. | FREQ. (MHz) | MEASURED VALUE OF 1g SAR ( W/kg) | | | | | CHAN. | FREQ. (MHz) | MEASURED VALUE OF 1g SAR ( W/kg) |
| 1 | 2412 (Low) | - | - | - | - | 0.087 | 1 | 2422 (Low) | - |
| 6 | 2437 (Mid.) | 0.063 | 0.152 | 0.046 | 0.072 | - | 4 | 2437 (Mid.) | 0.108 |
| 11 | 2462 (High) | - | - | - | - | - | 7 | 2452 (High) | - |

| ITEM | | 19 | 20 | 21 | 22 | 23 | ITEM | | 24 |
|---|---|---|---|---|---|---|---|---|---|
| TEST MODE | | 802.11b | 802.11b | 802.11g | 802.11g | 802.11n (20MHz) | TEST MODE | | 802.11n (40MHz) |
| CHAN. | FREQ. (MHz) | MEASURED VALUE OF 1g SAR ( W/kg) | | | | | CHAN. | FREQ. (MHz) | MEASURED VALUE OF 1g SAR ( W/kg) |
| 1 | 2412 (Low) | - | - | - | - | 0.090 | 1 | 2422 (Low) | - |
| 6 | 2437 (Mid.) | 0.119 | 0.043 | 0.068 | 0.032 | - | 4 | 2437 (Mid.) | 0.120 |
| 11 | 2462 (High) | - | - | - | - | - | 7 | 2452 (High) | - |

**NOTE:** The worst value has been marked by boldface.

# 5. TEST RESULTS

## 5.1 TEST PROCEDURES

The EUT plugged into the notebook. Use the software to control the EUT channel and transmission power. Then record the conducted power before the testing. Place the EUT to the specific test location. After the testing, must writing down the conducted power of the EUT into the report. The SAR value was calculated via the 3D spline interpolation algorithm that has been implemented in the software of DASY4 SAR measurement system manufactured and calibrated by SPEAG. According to the IEEE 1528 standards, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- Power reference measurement
- Verification of the power reference measurement
- Area scan
- Zoom scan
- Power reference measurement

The area scan was performed for the highest spatial SAR location. The zoom scan with 30mm x 30mm x 30mm volume was performed for SAR value averaged over 1g and 10g spatial volumes.

In the zoom scan, the distance between the measurement point at the probe sensor location (geometric center behind the probe tip) and the phantom surface is 3mm and maintained at a constant distance of ±0.5mm during a zoom scan to determine peak SAR locations. The distance is 3mm between the first measurement point and the bottom surface of the phantom. The secondary measurement point to the bottom surface of the phantom is with 8mm separation distance. The cube size is 7 x 7 x 7 points consists of 343 points and the grid space is 5mm.

The measurement time is 0.5s at each point of the zoom scan. The probe boundary effect compensation shall be applied during the SAR test. Because of the tip of the probe to the Phantom surface separated distances are longer than half a tip probe diameter.

In the area scan, the separation distance is 3mm between the each measurement point and the phantom surface. The scan size shall be included the transmission portion of the EUT. The measurement time is the same as the zoom scan. At last the reference power drift shall be less than ±5%.

## 5.2 MEASURED SAR RESULT

| ASSESSMENT POSTITION | DEVICE TEST POSITION MODE | ANTENNA | TEST MODE | CHAN. | FREQ. (MHz) | TX POWER (dBm) | POWER DRIFT (dB) | MEASURED 1g SAR (W/kg) |
|---|---|---|---|---|---|---|---|---|
| Horizontal-Up | 1 | Ant 0 | 802.11b | 6 | 2437 (Mid.) | 20.03 | -0.145 | 0.776 |
| | 2 | Ant 1 | 802.11b | 6 | 2437 (Mid.) | 20.02 | -0.151 | 0.717 |
| | 3 | Ant 0 | 802.11g | 6 | 2437 (Mid.) | 23.02 | -0.101 | 0.521 |
| | 4 | Ant 1 | 802.11g | 6 | 2437 (Mid.) | 23.06 | -0.107 | 0.359 |
| | 5 | Ant 0, Ant 1 | 802.11n (20MHz) | 1 | 2412 (Low) | 24.82 | -0.028 | 0.626 |
| | 6 | Ant 0, Ant 1 | 802.11n (40MHz) | 4 | 2437 (Mid.) | 24.84 | -0.103 | **0.785** |
| Horizontal-Down | 7 | Ant 0 | 802.11b | 6 | 2437 (Mid.) | 20.03 | -0.174 | 0.240 |
| | 8 | Ant 1 | 802.11b | 6 | 2437 (Mid.) | 20.02 | -0.128 | 0.178 |
| | 9 | Ant 0 | 802.11g | 6 | 2437 (Mid.) | 23.02 | -0.124 | 0.168 |
| | 10 | Ant 1 | 802.11g | 6 | 2437 (Mid.) | 23.06 | -0.150 | 0.104 |
| | 11 | Ant 0, Ant 1 | 802.11n (20MHz) | 1 | 2412 (Low) | 24.82 | -0.164 | 0.194 |
| | 12 | Ant 0, Ant 1 | 802.11n (40MHz) | 4 | 2437 (Mid.) | 24.84 | -0.162 | 0.248 |
| Vertical-Back | 13 | Ant 0 | 802.11b | 6 | 2437 (Mid.) | 20.03 | -0.112 | 0.063 |
| | 14 | Ant 1 | 802.11b | 6 | 2437 (Mid.) | 20.02 | -0.117 | 0.152 |
| | 15 | Ant 0 | 802.11g | 6 | 2437 (Mid.) | 23.02 | -0.120 | 0.046 |
| | 16 | Ant 1 | 802.11g | 6 | 2437 (Mid.) | 23.06 | -0.087 | 0.072 |
| | 17 | Ant 0, Ant 1 | 802.11n (20MHz) | 1 | 2412 (Low) | 24.82 | -0.102 | 0.087 |
| | 18 | Ant 0, Ant 1 | 802.11n (40MHz) | 4 | 2437 (Mid.) | 24.84 | -0.189 | 0.108 |
| Vertical-Front | 19 | Ant 0 | 802.11b | 6 | 2437 (Mid.) | 20.03 | -0.189 | 0.119 |
| | 20 | Ant 1 | 802.11b | 6 | 2437 (Mid.) | 20.02 | -0.192 | 0.043 |
| | 21 | Ant 0 | 802.11g | 6 | 2437 (Mid.) | 23.02 | -0.160 | 0.068 |
| | 22 | Ant 1 | 802.11g | 6 | 2437 (Mid.) | 23.06 | -0.164 | 0.032 |
| | 23 | Ant 0, Ant 1 | 802.11n (20MHz) | 1 | 2412 (Low) | 24.82 | -0.159 | 0.090 |
| | 24 | Ant 0, Ant 1 | 802.11n (40MHz) | 4 | 2437 (Mid.) | 24.84 | -0.139 | 0.120 |

**NOTE:**

1. Test configuration of each mode is described in section 4.3.
2. In this testing, the limit for General Population Spatial Peak averaged over 1g, 1.6 W/kg, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

## 5.3 SAR LIMITS

| HUMAN EXPOSURE | SAR (W/kg) | |
|---|---|---|
| | (GENERAL POPULATION / UNCONTROLLED EXPOSURE ENVIRONMENT) | (OCCUPATIONAL / CONTROLLED EXPOSURE ENVIRONMENT) |
| Spatial Average (whole body) | 0.08 | 0.4 |
| Spatial Peak (averaged over 1 g) | **1.6** | 8.0 |
| Spatial Peak (hands / wrists / feet / ankles averaged over 10 g) | 4.0 | 20.0 |

**NOTE:**

1. This limits accord to 47 CFR 2.1093 – Safety Limit.
2. The EUT property been complied with the partial body exposure limit under the general population environment.

## 5.4 RECIPES FOR TISSUE SIMULATING LIQUIDS

For the measurement of the field distribution inside the SAM phantom, the phantom must be filled with 25 litters of tissue simulation liquid.

The following ingredients are used：

- **WATER-** Deionized water (pure H20), resistivity _16 M - as basis for the liquid
- **DGMBE-** Diethylenglycol-monobuthyl ether (DGMBE), Fluka Chemie GmbH, CAS # 112-34-5 - to reduce relative permittivity

**THE RECIPES FOR 2450MHz SIMULATING LIQUID TABLE**

| INGREDIENT | HEAD SIMULATING LIQUID 2450MHz (HSL-2450) | MUSCLE SIMULATING LIQUID 2450MHz (MSL-2450) |
|---|---|---|
| Water | 45% | 69.83% |
| DGMBE | 55% | 30.17% |
| Dielectric Parameters at 22℃ | f= 2450MHz<br>ε= 39.2 ± 5%<br>σ= 1.80 ± 5% S/m | f= 2450MHz<br>ε= 52.7 ± 5%<br>σ= 1.95 ± 5% S/m |

Testing the liquids using the Agilent Network Analyzer E8358A and Agilent Dielectric Probe Kit 85070D.The testing procedure is following as

1. Turn Network Analyzer on and allow at least 30min. warm up.
2. Mount dielectric probe kit so that interconnecting cable to Network Analyzer will not be moved during measurements or calibration.
3. Pour de-ionized water and measure water temperature (±1°).
4. Set water temperature in Agilent-Software (Calibration Setup).
5. Perform calibration.
6. Validate calibration with dielectric material of known properties (e.g. polished ceramic slab with >8mm thickness ε'=10.0, ε''=0.0). If measured parameters do not fit within tolerance, repeat calibration (±0.2 for ε': ±0.1 for ε'').
7. Conductivity can be calculated from ε'' by $\sigma = \omega \varepsilon_0 \varepsilon'' = \varepsilon'' f$ [GHz] / 18.
8. Measure liquid shortly after calibration. Repeat calibration every hour.
9. Stir the liquid to be measured. Take a sample (~ 50ml) with a syringe from the center of the liquid container.
10. Pour the liquid into a small glass flask. Hold the syringe at the bottom of the flask to avoid air bubbles.
11. Put the dielectric probe in the glass flask. Check that there are no air bubbles in front of the opening in the dielectric probe kit.
12. Perform measurements.
13. Adjust medium parameters in DASY4 for the frequencies necessary for the measurements (‘Setup Config’, select medium (e.g. Brain 900MHz) and press ‘Option’-button.
14. Select the current medium for the frequency of the validation (e.g. Setup Medium Brain 900MHz).

## FOR 2.4GHz BAND SIMULATING LIQUID

| LIQUID TYPE | | MSL-2450 | | | |
|---|---|---|---|---|---|
| SIMULATING LIQUID TEMP. | | 22.5 | | | |
| TEST DATE | | Mar. 12, 2010 | | | |
| TESTED BY | | Aaron Laing | | | |
| **FREQ. (MHz)** | **LIQUID PARAMETER** | **STANDARD VALUE** | **MEASUREMENT VALUE** | **ERROR PERCENTAGE (%)** | **LIMIT(%)** |
| 2412.0 | Permitivity ( $\varepsilon$ ) | 52.80 | 54.80 | 3.79 | ±5 |
| 2437.0 | | 52.70 | 54.60 | 3.61 | |
| 2450.0 | | 52.70 | 54.40 | 3.23 | |
| 2412.0 | Conductivity ( $\sigma$ ) S/m | 1.91 | 1.95 | 2.09 | |
| 2437.0 | | 1.94 | 1.97 | 1.55 | |
| 2450.0 | | 1.95 | 1.99 | 2.05 | |

## FOR 2.4GHz BAND SIMULATING LIQUID

| LIQUID TYPE | | MSL-2450 | | | |
|---|---|---|---|---|---|
| SIMULATING LIQUID TEMP. | | 22.7 | | | |
| TEST DATE | | Mar. 15, 2010 | | | |
| TESTED BY | | Aaron Laing | | | |
| **FREQ. (MHz)** | **LIQUID PARAMETER** | **STANDARD VALUE** | **MEASUREMENT VALUE** | **ERROR PERCENTAGE (%)** | **LIMIT(%)** |
| 2412.0 | Permitivity ( $\varepsilon$ ) | 52.80 | 54.60 | 3.41 | ±5 |
| 2437.0 | | 52.70 | 54.40 | 3.23 | |
| 2450.0 | | 52.70 | 54.30 | 3.04 | |
| 2412.0 | Conductivity ( $\sigma$ ) S/m | 1.91 | 1.94 | 1.57 | |
| 2437.0 | | 1.94 | 1.96 | 1.03 | |
| 2450.0 | | 1.95 | 1.97 | 1.03 | |

# 6. SYSTEM VALIDATION

The system validation was performed in the flat phantom with equipment listed in the following table. Since the SAR value is calculated from the measured electric field, dielectric constant and conductivity of the body tissue and the SAR is proportional to the square of the electric field. So, the SAR value will be also proportional to the RF power input to the system validation dipole under the same test environment. In our system validation test, 250mW RF input power was used.

## 6.1 TEST PROCEDURE

Before the system performance check, we need only to tell the system which components (probe, medium, and device) are used for the system performance check; the system will take care of all parameters. The dipole must be placed beneath the flat section of the SAM Twin Phantom with the correct distance holder in place. The distance holder should touch the phantom surface with a light pressure at the reference marking (little cross) and be oriented parallel to the long side of the phantom. Accurate positioning is not necessary, since the system will search for the peak SAR location, except that the dipole arms should be parallel to the surface. The device holder for mobile phones can be left in place but should be rotated away from the dipole.

1. The ”Power Reference Measurement” and ”Power Drift Measurement” jobs are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the amplifier output power. If it is too high (above ±0.1 dB), the system performance check should be repeated; some amplifiers have very high drift during warm-up. A stable amplifier gives drift results in the DASY system below ±0.02dB.

2. The ”Surface Check” job tests the optical surface detection system of the DASY system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ±0.1mm). In that case it is better to abort the system performance check and stir the liquid.

3. The ”Area Scan” job measures the SAR above the dipole on a plane parallel to the surface. It is used to locate the approximate location of the peak SAR. The proposed scan uses large grid spacing for faster measurement; due to the symmetric field, the peak detection is reliable. If a finer graphic is desired, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result.

4. The ”Zoom Scan” job measures the field in a volume around the peak SAR value assessed in the previous ”Area Scan” job (for more information see the application note on SAR evaluation).

About the validation dipole positioning uncertainty, the constant and low loss dielectric spacer is used to establish the correct distance between the top surface of the dipole and the bottom surface of the phantom, the error component introduced by the uncertainty of the distance between the liquid (i.e., phantom shell) and the validation dipole in the DASY4 system is less than ±0.1mm.

$$SAR_{tolerance}[\%] = 100 \times (\frac{(a+d)^2}{a^2} - 1)$$

As the closest distance is 10mm, the resulting tolerance $SAR_{tolerance}$[%] is <2%.

## 6.2 VALIDATION RESULTS

| SYSTEM VALIDATION TEST OF SIMULATING LIQUID | | | | | |
|---|---|---|---|---|---|
| **FREQUENCY (MHz)** | **REQUIRED SAR (mW/g)** | **MEASURED SAR (mW/g)** | **DEVIATION (%)** | **SEPARATION DISTANCE** | **TESTED DATE** |
| MSL2450 | 13.30 (1g) | 13.90 | 4.51 | 10mm | Mar. 12, 2010 |
| MSL2450 | 13.30 (1g) | 13.00 | -2.26 | 10mm | Mar. 15, 2010 |

**NOTE:** Please see Appendix for the photo of system validation test.

## 6.3 SYSTEM VALIDATION UNCERTAINTIES

In the table below, the system validation uncertainty with respect to the analytically assessed SAR value of a dipole source as given in the IEEE 1528 standard is given. This uncertainty is smaller than the expected uncertainty for mobile phone measurements due to the simplified setup and the symmetric field distribution.

| Error Description | Tolerance (±%) | Probability Distribution | Divisor | ($C_i$) | | Standard Uncertainty (±%) | | ($v_i$) |
|---|---|---|---|---|---|---|---|---|
| | | | | (1g) | (10g) | (1g) | (10g) | |
| **Measurement System** | | | | | | | | |
| **Probe Calibration** | 5.50 | Normal | 1 | 1 | 1 | 5.50 | 5.50 | ∞ |
| **Axial Isotropy** | 4.70 | Rectangular | √3 | 0.7 | 0.7 | 1.90 | 1.90 | ∞ |
| **Hemispherical Isotropy** | 9.60 | Rectangular | √3 | 0.7 | 0.7 | 3.88 | 3.88 | ∞ |
| **Boundary effects** | 2.00 | Rectangular | √3 | 1 | 1 | 1.15 | 1.15 | ∞ |
| **Linearity** | 4.70 | Rectangular | √3 | 1 | 1 | 2.71 | 2.71 | ∞ |
| **System Detection Limits** | 1.00 | Rectangular | √3 | 1 | 1 | 0.58 | 0.58 | ∞ |
| **Readout Electronics** | 0.30 | Normal | 1 | 1 | 1 | 0.30 | 0.30 | ∞ |
| **Response Time** | 0.80 | Rectangular | √3 | 1 | 1 | 0.46 | 0.46 | ∞ |
| **Integration Time** | 2.60 | Rectangular | √3 | 1 | 1 | 1.50 | 1.50 | ∞ |
| **RF Ambient Noise** | 3.00 | Rectangular | √3 | 1 | 1 | 1.73 | 1.73 | ∞ |
| **RF Ambient Reflections** | 3.00 | Rectangular | √3 | 1 | 1 | 1.73 | 1.73 | ∞ |
| **Probe Positioner** | 0.80 | Rectangular | √3 | 1 | 1 | 0.46 | 0.46 | ∞ |
| **Probe Positioning** | 9.90 | Rectangular | √3 | 1 | 1 | 5.72 | 5.72 | ∞ |
| **Max. SAR Eval.** | 4.00 | Rectangular | √3 | 1 | 1 | 2.31 | 2.31 | ∞ |
| **Dipole Related** | | | | | | | | |
| **Dipole Axis to Liquid Distance** | 2.00 | Rectangular | √3 | 1 | 1 | 1.15 | 1.15 | 145 |
| **Input Power Drift** | 5.00 | Rectangular | √3 | 1 | 1 | 2.89 | 2.89 | ∞ |
| **Phantom and Tissue parameters** | | | | | | | | |
| **Phantom Uncertainty** | 4.00 | Rectangular | √3 | 1 | 1 | 2.31 | 2.31 | ∞ |
| **Liquid Conductivity (target)** | 5.00 | Rectangular | √3 | 0.64 | 0.43 | 1.85 | 1.24 | ∞ |
| **Liquid Conductivity (measurement)** | 2.91 | Normal | 1 | 0.64 | 0.43 | 1.86 | 1.25 | ∞ |
| **Liquid Permittivity (target)** | 5.00 | Rectangular | √3 | 0.6 | 0.49 | 1.73 | 1.41 | ∞ |
| **Liquid Permittivity (measurement)** | 4.30 | Normal | 1 | 0.6 | 0.49 | 2.58 | 2.11 | ∞ |
| **Combined Standard Uncertainty** | | | | | | **11.67** | **11.37** | |
| **Coverage Factor for 95%** | | | | | | **Kp=2** | | |
| **Expanded Uncertainty (K=2)** | | | | | | **23.35** | **22.74** | |

**NOTE:** About the system validation uncertainty assessment, please reference the section 7.

## 7. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml. If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab**:
Tel: 886-2-26052180
Fax: 886-2-26051924

**Hsin Chu EMC/RF Lab**:
Tel: 886-3-5935343
Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety/Telecom Lab**:
Tel: 886-3-3183232
Fax: 886-3-3185050

**Web Site**: www.adt.com.tw

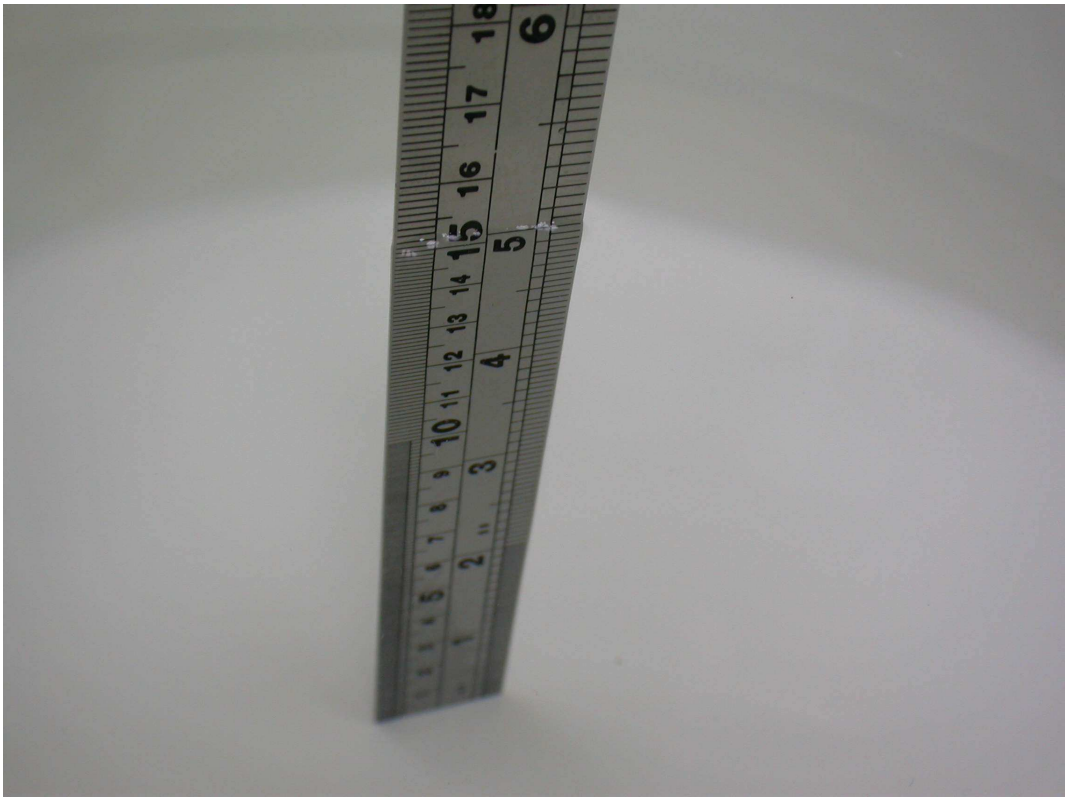
The address and road map of all our labs can be found in our web site also.

**---END---**

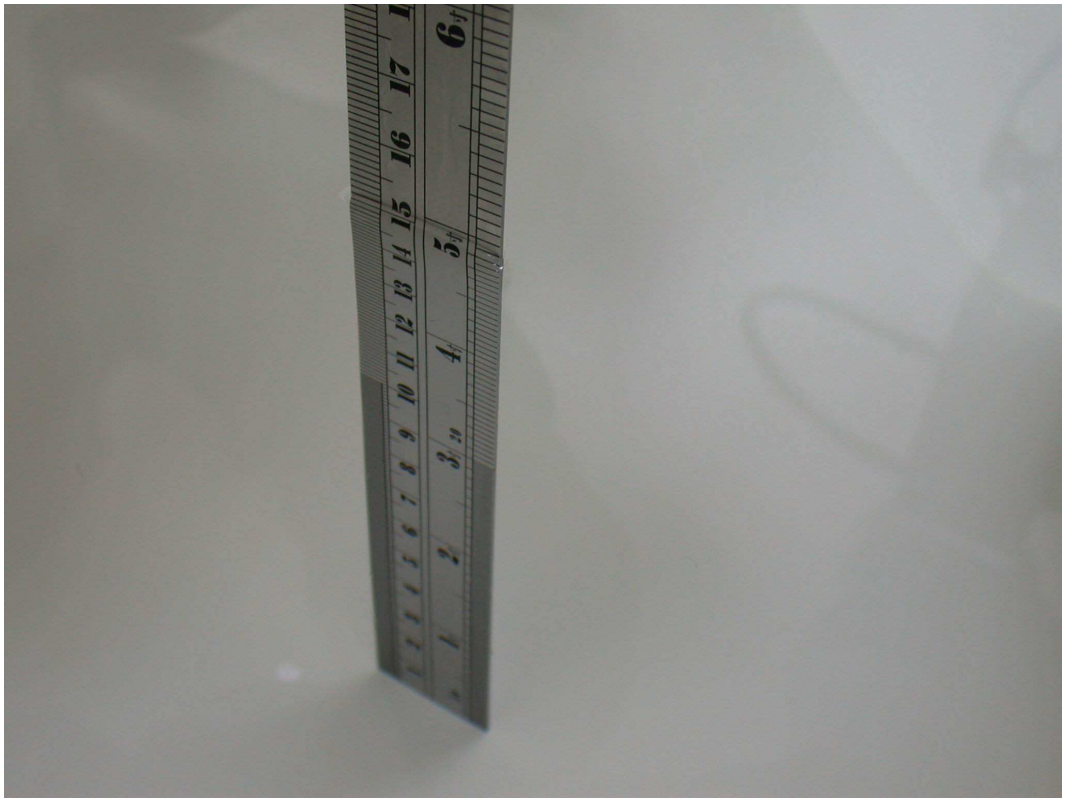
# APPENDIX A: TEST DATA

Liquid Level Photo

**Tissue MSL2450MHz D=152mm**



**Tissue MSL2450MHz D=151mm**



Date/Time: 2010/3/12 11:00:21

Test Laboratory: Bureau Veritas ADT

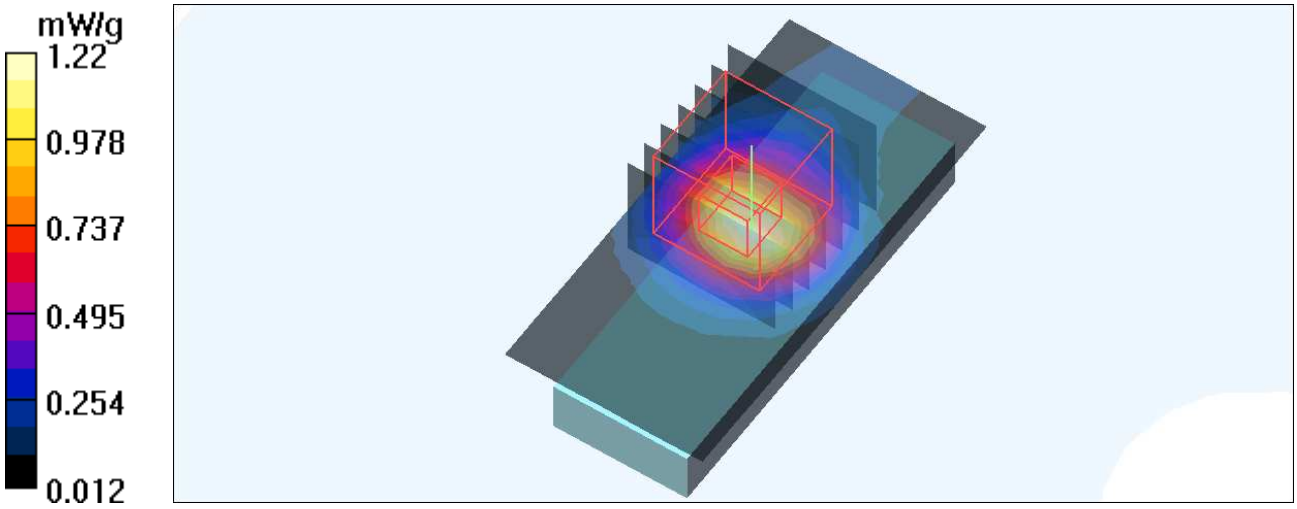
## M01-Horizontal-Up -11b-Ch6-ANT 0

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.97 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Up side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 1.22 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 24.9 V/m; Power Drift = -0.145 dB
Peak SAR (extrapolated) = 1.72 W/kg
**SAR(1 g) = 0.776 mW/g; SAR(10 g) = 0.363 mW/g**
Maximum value of SAR (measured) = 0.992 mW/g



Date/Time: 2010/3/12 12:00:48

Test Laboratory: Bureau Veritas ADT

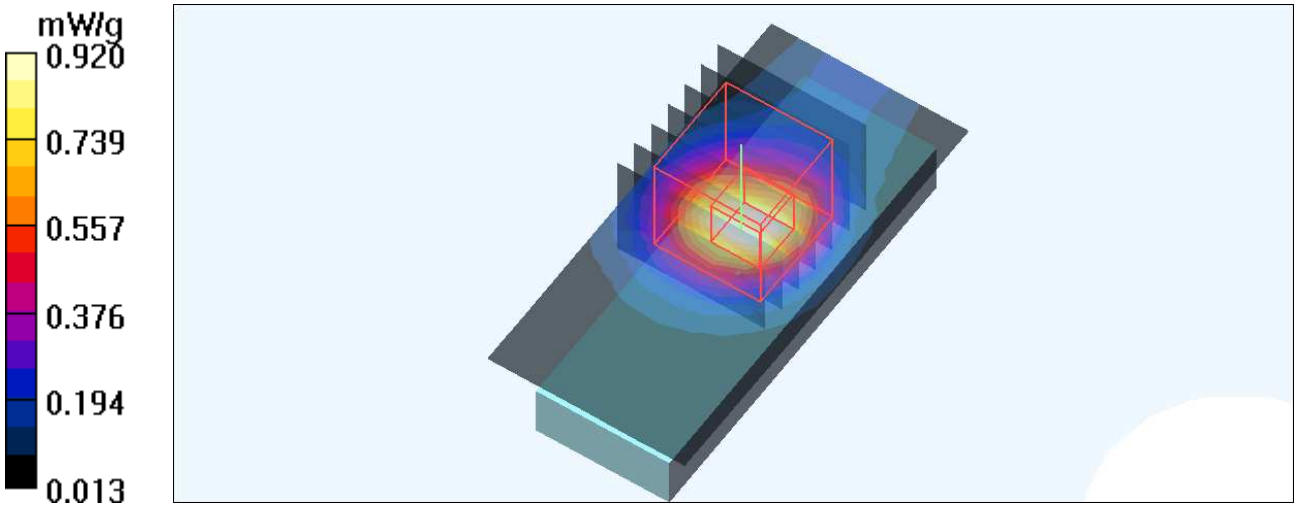
## M02-Horizontal-Up -11b-Ch6-ANT 1

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.97 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Up side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.920 mW/g

**Mid Channel 6/Zoom Scan(7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 22.3 V/m; Power Drift = -0.151 dB
Peak SAR (extrapolated) = 1.59 W/kg
**SAR(1 g) = 0.717 mW/g; SAR(10 g) = 0.327 mW/g**
Maximum value of SAR (measured) = 0.928 mW/g



Date/Time: 2010/3/12 14:02:51

Test Laboratory: Bureau Veritas ADT

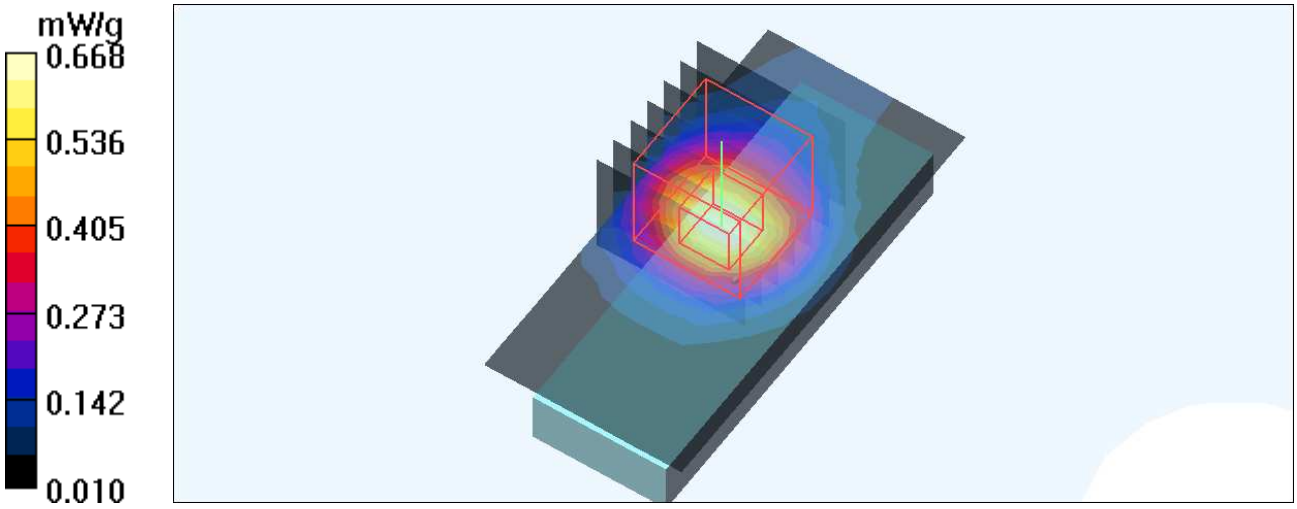
## M03-Horizontal-Up -11g-Ch6-ANT 0

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.97 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Up side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.668 mW/g

**Mid Channel 6/Zoom Scan(7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 18.8 V/m; Power Drift = -0.101 dB
Peak SAR (extrapolated) = 1.13 W/kg
**SAR(1 g) = 0.521 mW/g; SAR(10 g) = 0.246 mW/g**
Maximum value of SAR (measured) = 0.683 mW/g



Date/Time: 2010/3/12 15:01:41

Test Laboratory: Bureau Veritas ADT

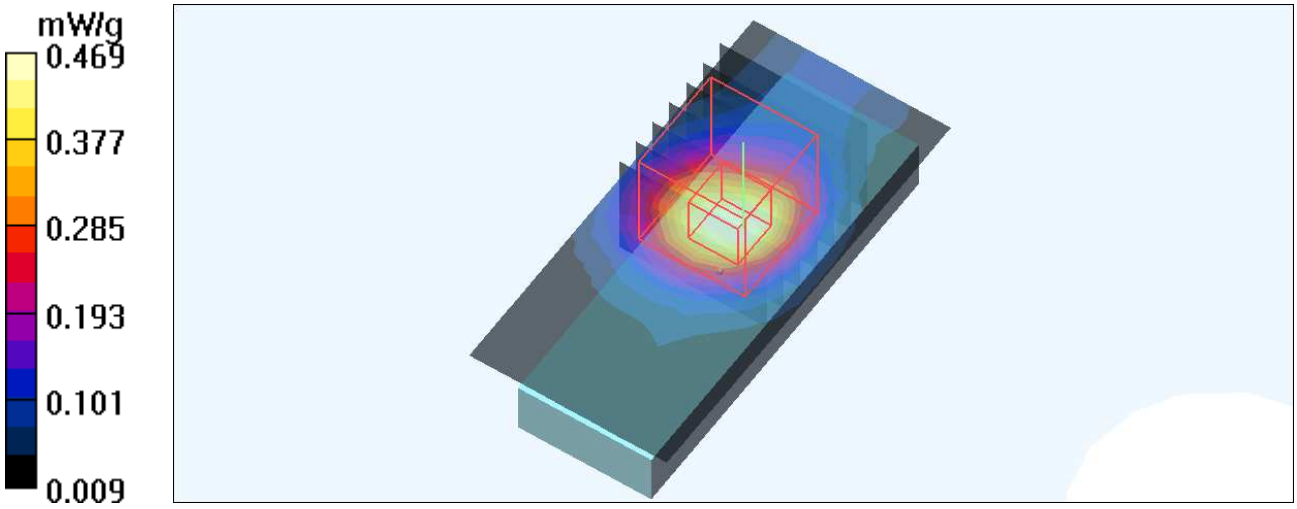
## M04-Horizontal-Up -11g-Ch6-ANT 1

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.97 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Up side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.469 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 16.1 V/m; Power Drift = -0.107 dB
Peak SAR (extrapolated) = 0.778 W/kg
**SAR(1 g) = 0.359 mW/g; SAR(10 g) = 0.168 mW/g**
Maximum value of SAR (measured) = 0.465 mW/g



Date/Time: 2010/3/12 16:00:40

Test Laboratory: Bureau Veritas ADT

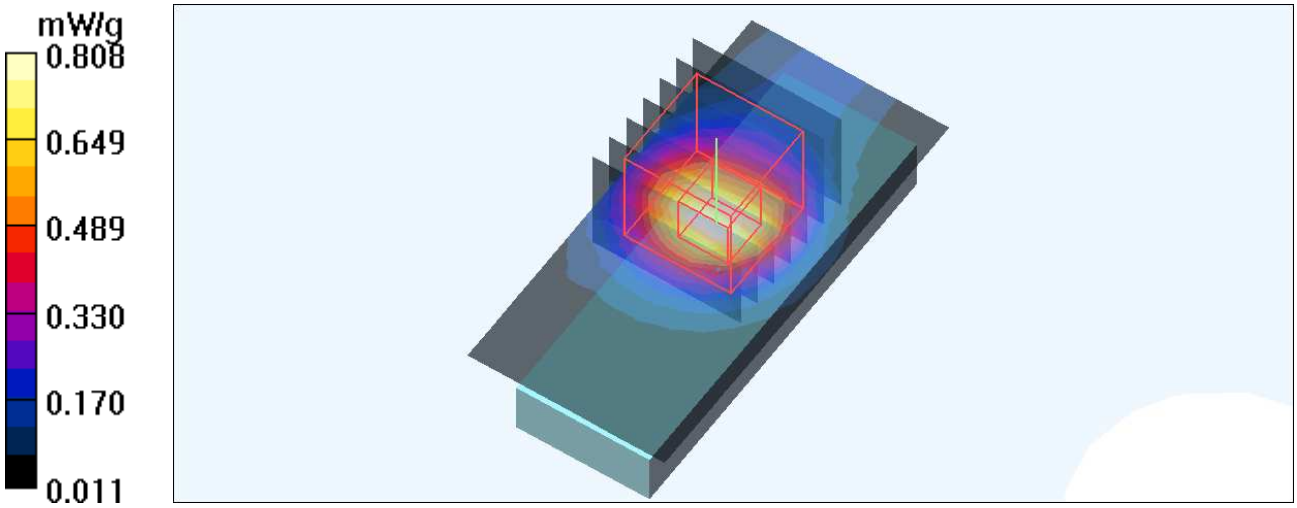
## M05-Horizontal-Up -11N-20M-Ch1

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11n 20MHz ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2412 MHz; $\sigma$ = 1.95 mho/m; $\varepsilon_r$ = 54.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Up side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Low Channel 1/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.808 mW/g

**Low Channel 1/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 20.6 V/m; Power Drift = -0.028 dB
Peak SAR (extrapolated) = 1.35 W/kg
**SAR(1 g) = 0.626 mW/g; SAR(10 g) = 0.296 mW/g**
Maximum value of SAR (measured) = 0.821 mW/g



Date/Time: 2010/3/12 17:02:19

Test Laboratory: Bureau Veritas ADT

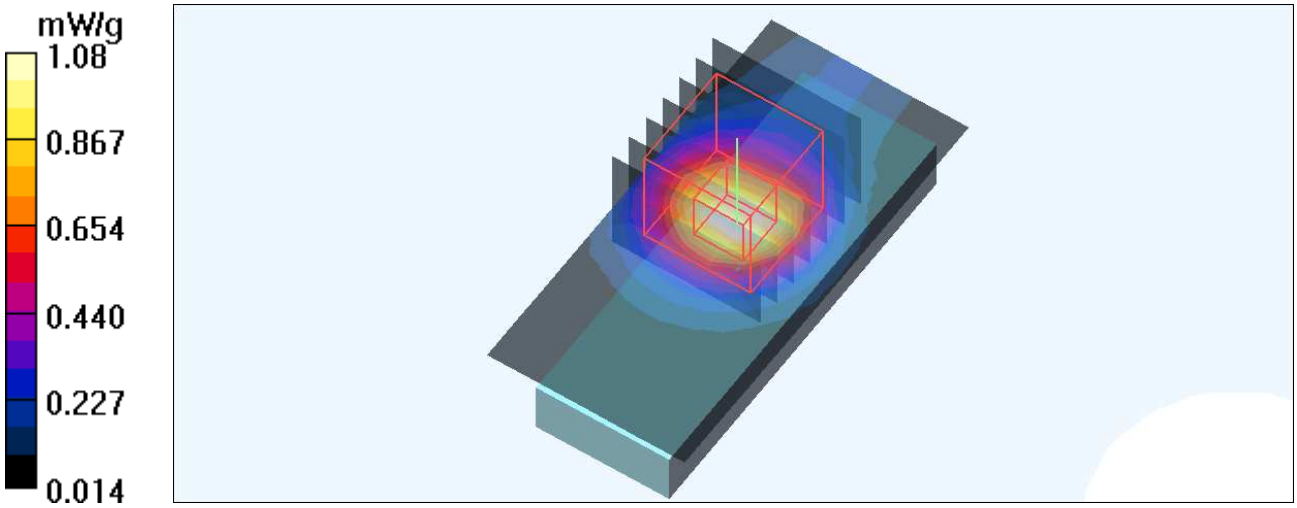
## M06-Horizontal-Up -11N-40M-Ch4

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11n 40MHz ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.97 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Up side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 4/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 1.08 mW/g

**Mid Channel 4/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 25.0 V/m; Power Drift = -0.103 dB
Peak SAR (extrapolated) = 1.71 W/kg
**SAR(1 g) = 0.785 mW/g; SAR(10 g) = 0.366 mW/g**
Maximum value of SAR (measured) = 1.03 mW/g



Date/Time: 2010/3/12 18:00:27

Test Laboratory: Bureau Veritas ADT

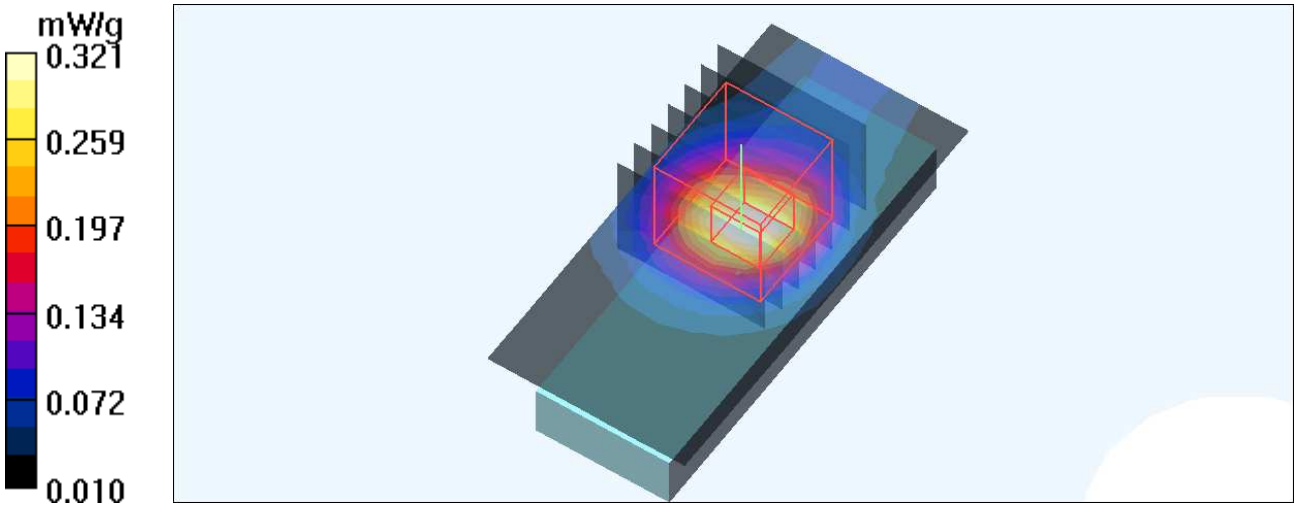
## M07-Horizontal-Down -11b-Ch6-ANT0

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.97 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Down side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.321 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 13.5 V/m; Power Drift = -0.174 dB
Peak SAR (extrapolated) = 0.502 W/kg
**SAR(1 g) = 0.240 mW/g; SAR(10 g) = 0.117 mW/g**
Maximum value of SAR (measured) = 0.309 mW/g



Date/Time: 2010/3/12 19:02:37

Test Laboratory: Bureau Veritas ADT

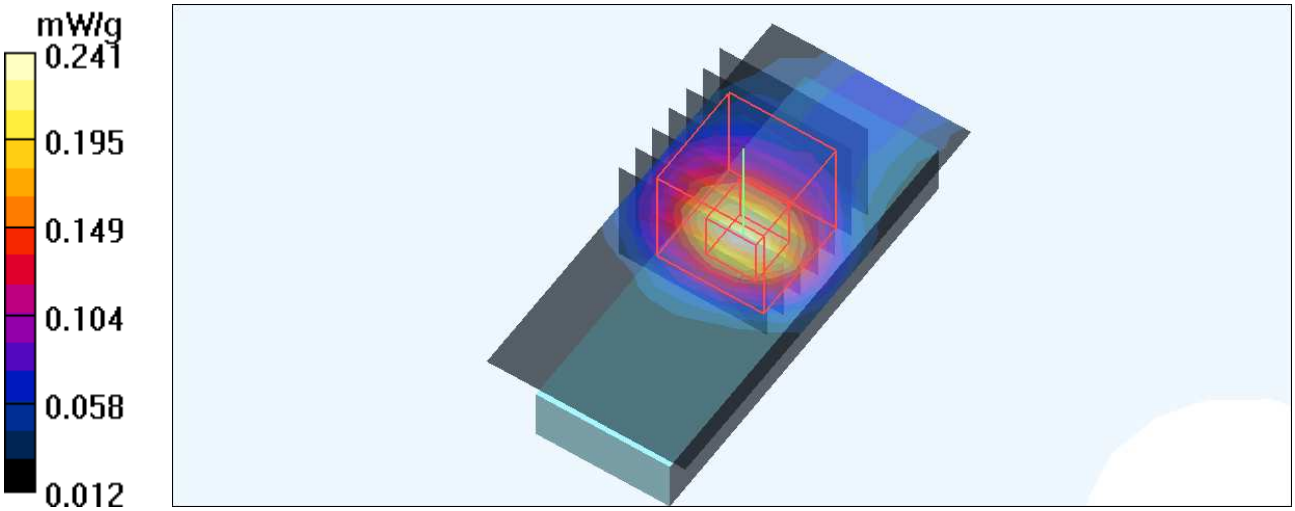
## M08-Horizontal-Down -11b-Ch6-ANT1

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.97 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Down side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.241 mW/g

**Mid Channel 6/Zoom Scan(7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 11.4 V/m; Power Drift = -0.128 dB
Peak SAR (extrapolated) = 0.358 W/kg
**SAR(1 g) = 0.178 mW/g; SAR(10 g) = 0.091 mW/g**
Maximum value of SAR (measured) = 0.228 mW/g



Date/Time: 2010/3/12 20:03:10

Test Laboratory: Bureau Veritas ADT

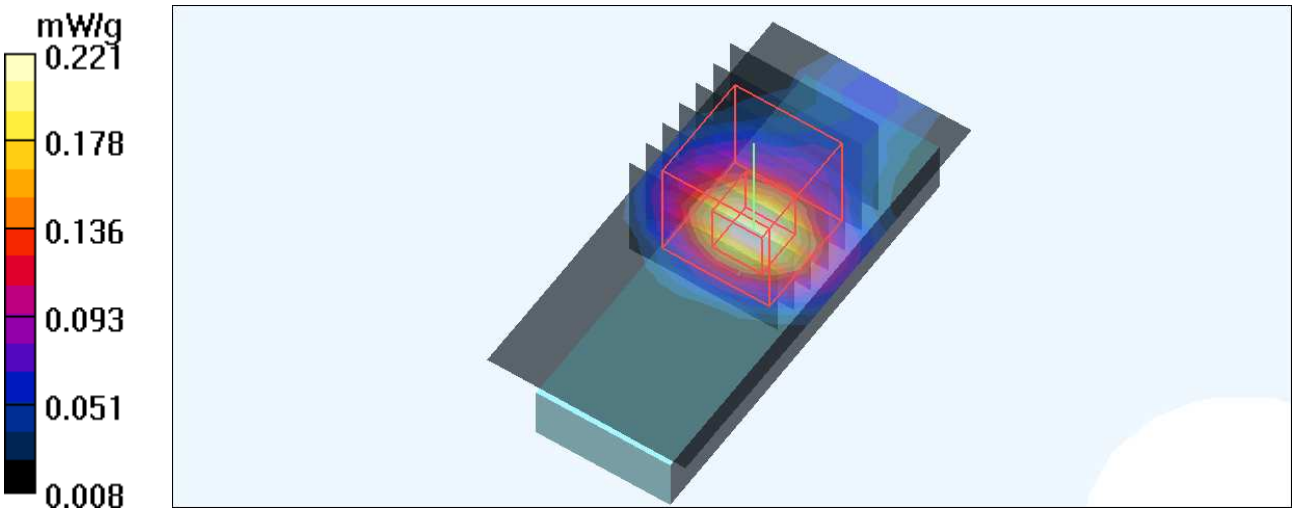
## M09-Horizontal-Down -11g-Ch6-ANT0

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.97 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Down side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.221 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 11.3 V/m; Power Drift = -0.124 dB
Peak SAR (extrapolated) = 0.356 W/kg
**SAR(1 g) = 0.168 mW/g; SAR(10 g) = 0.082 mW/g**
Maximum value of SAR (measured) = 0.215 mW/g



Date/Time: 2010/3/12 21:00:30

Test Laboratory: Bureau Veritas ADT

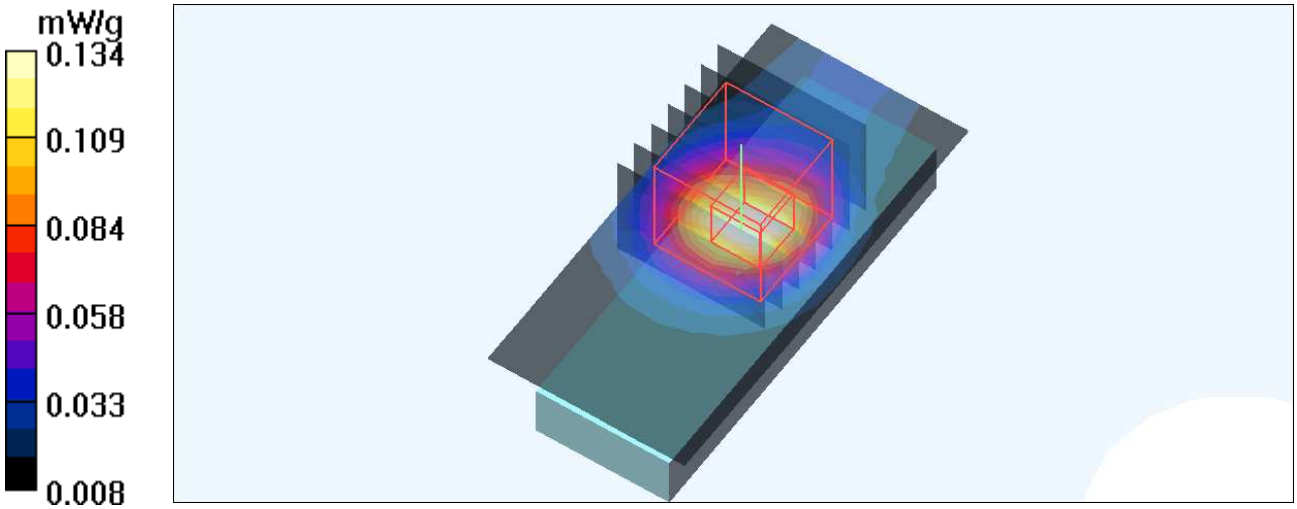
## M10-Horizontal-Down -11g-Ch6-ANT1

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.97 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Down side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.134 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 8.54 V/m; Power Drift = -0.150 dB
Peak SAR (extrapolated) = 0.216 W/kg
**SAR(1 g) = 0.104 mW/g; SAR(10 g) = 0.055 mW/g**
Maximum value of SAR (measured) = 0.132 mW/g



Date/Time: 2010/3/12 22:01:04

Test Laboratory: Bureau Veritas ADT

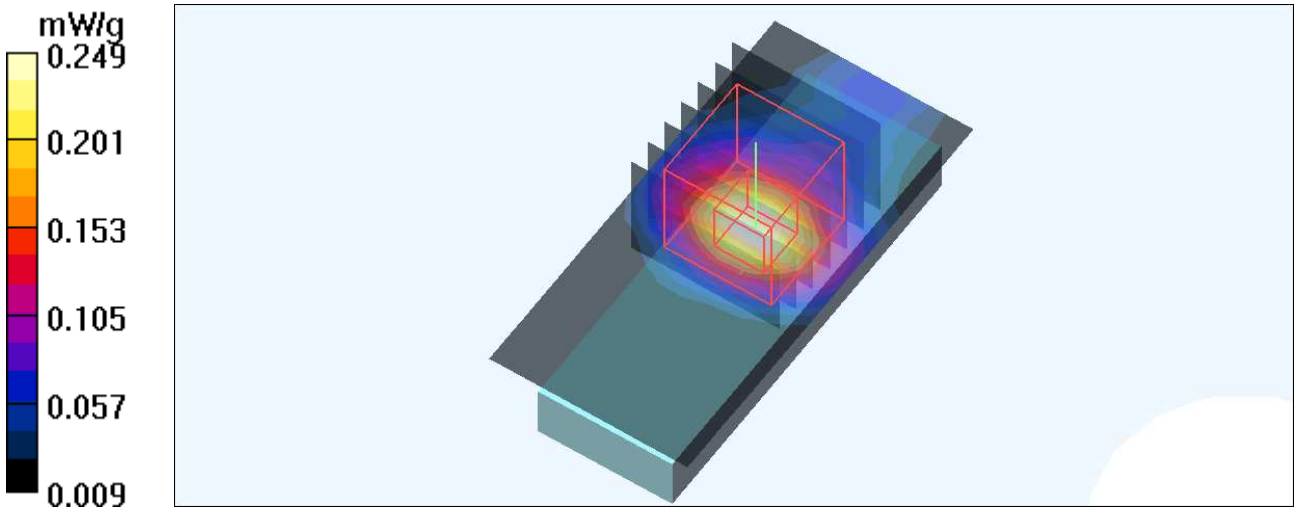
## M11-Horizontal-Down -11N-20M-Ch1

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11n 20MHz ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2412 MHz; $\sigma$ = 1.95 mho/m; $\varepsilon_r$ = 54.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Down side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 1/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.249 mW/g

**Mid Channel 1/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 13.3 V/m; Power Drift = -0.164 dB
Peak SAR (extrapolated) = 0.403 W/kg
**SAR(1 g) = 0.194 mW/g; SAR(10 g) = 0.096 mW/g**
Maximum value of SAR (measured) = 0.256 mW/g



Date/Time: 2010/3/12 23:02:01

Test Laboratory: Bureau Veritas ADT

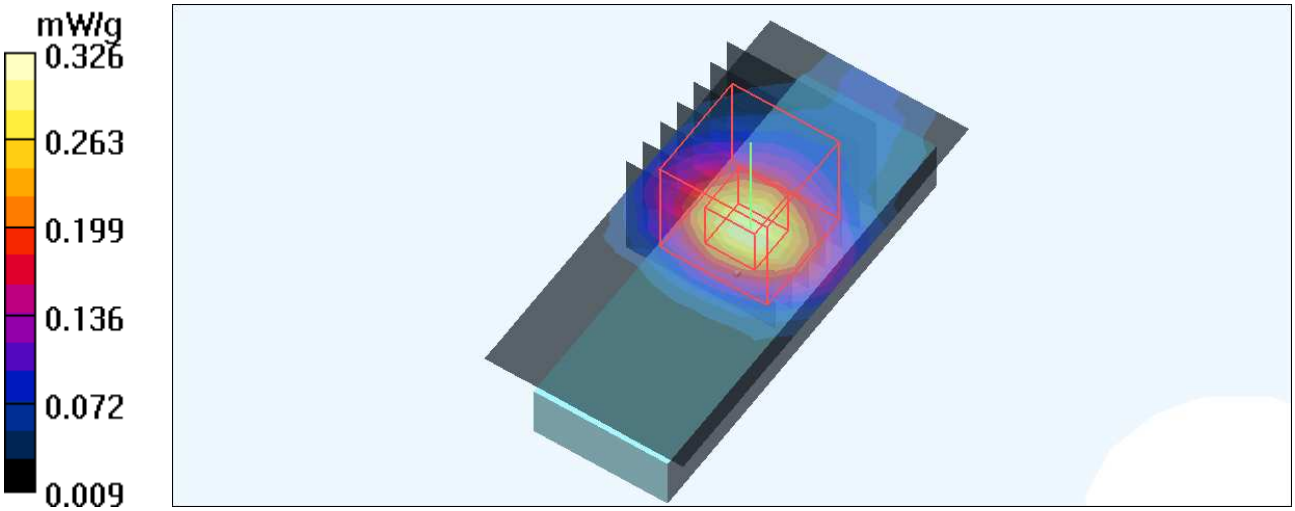
## M12-Horizontal-Down -11N-40M-Ch4

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11n 40MHz ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.97 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Down side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 4/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.326 mW/g

**Mid Channel 4/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 13.8 V/m; Power Drift = -0.162 dB
Peak SAR (extrapolated) = 0.517 W/kg
**SAR(1 g) = 0.248 mW/g; SAR(10 g) = 0.119 mW/g**



Date/Time: 2010/3/15 04:02:52

Test Laboratory: Bureau Veritas ADT

## M13-Vertical-back-11b-Ch6-ANT0

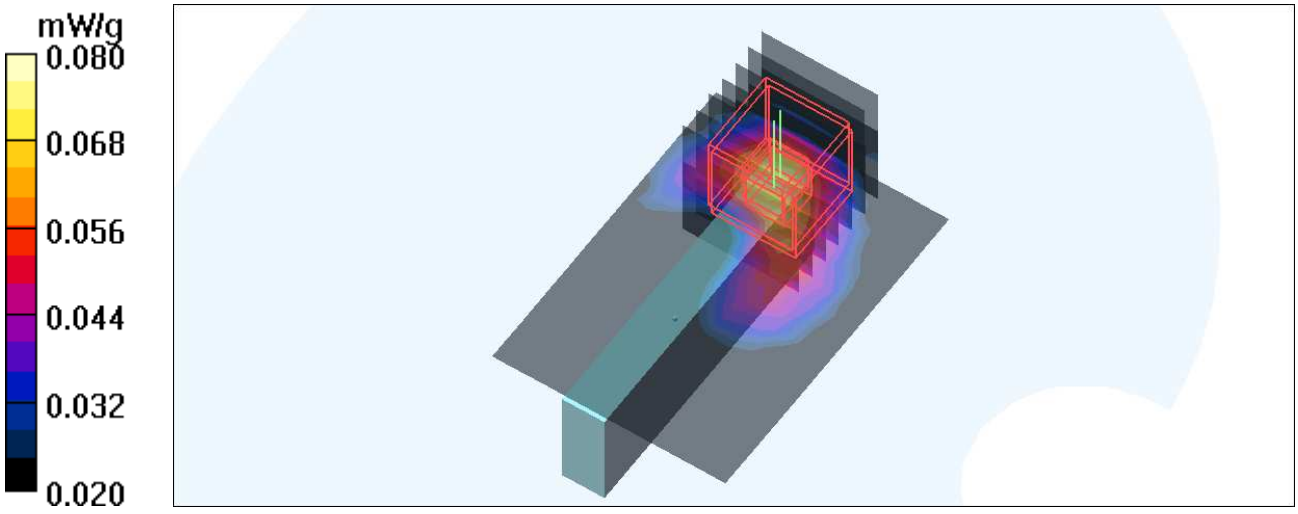
**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical-Back side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (13x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.080 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 5.90 V/m; Power Drift = -0.112 dB
Peak SAR (extrapolated) = 0.125 W/kg
**SAR(1 g) = 0.063 mW/g; SAR(10 g) = 0.035 mW/g**

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 5.90 V/m; Power Drift = -0.112 dB
Peak SAR (extrapolated) = 0.121 W/kg
**SAR(1 g) = 0.061 mW/g; SAR(10 g) = 0.034 mW/g**
Maximum value of SAR (measured) = 0.077 mW/g



Date/Time: 2010/3/15 05:01:33

Test Laboratory: Bureau Veritas ADT

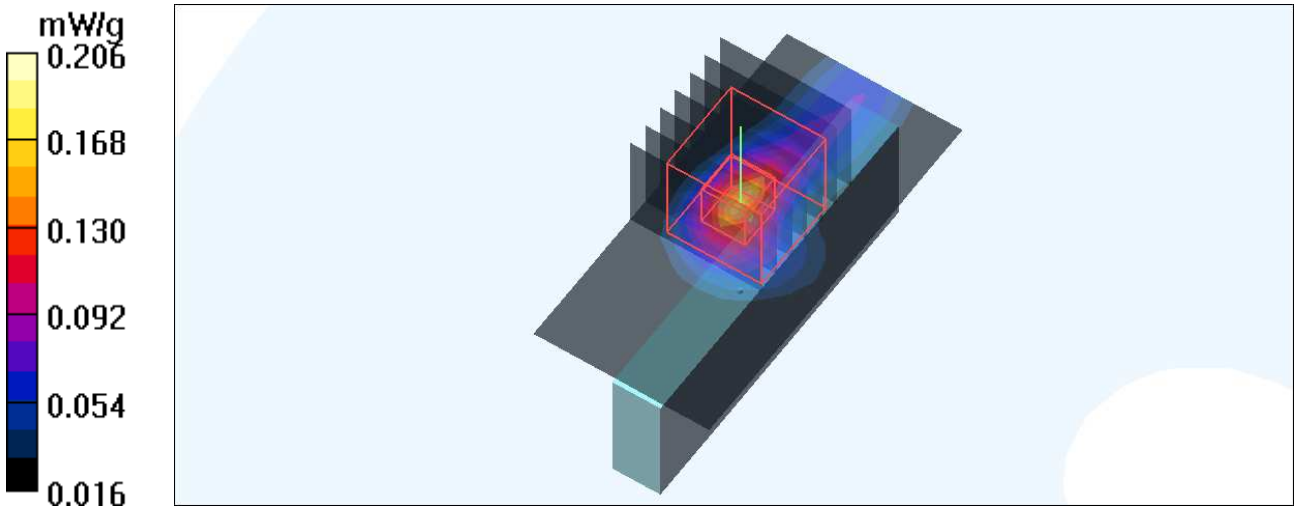
## M14-Vertical-back-11b-Ch6-ANT1

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical-Back side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.206 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 10.0 V/m; Power Drift = -0.117 dB
Peak SAR (extrapolated) = 0.349 W/kg
**SAR(1 g) = 0.152 mW/g; SAR(10 g) = 0.070 mW/g**
Maximum value of SAR (measured) = 0.209 mW/g



Date/Time: 2010/3/15 05:30:38

Test Laboratory: Bureau Veritas ADT

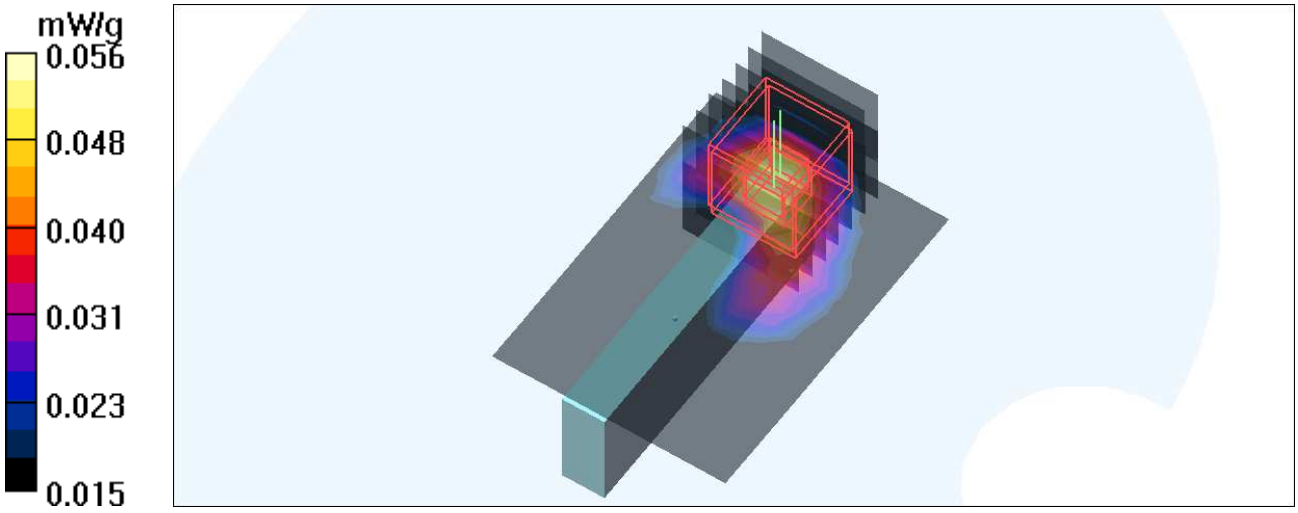
## M15-Vertical-back-11g-Ch6-ANT0

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical-Back side of the EUT to the Phantom)
DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (13x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.056 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 5.24 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.091 W/kg
**SAR(1 g) = 0.046 mW/g; SAR(10 g) = 0.026 mW/g**
Maximum value of SAR (measured) = 0.058 mW/g

**Mid Channel 6 2/Zoom Scan (7x7x9)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 5.24 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.090 W/kg
**SAR(1 g) = 0.045 mW/g; SAR(10 g) = 0.025 mW/g**
Maximum value of SAR (measured) = 0.057 mW/g



Date/Time: 2010/3/15 06:31:26

Test Laboratory: Bureau Veritas ADT

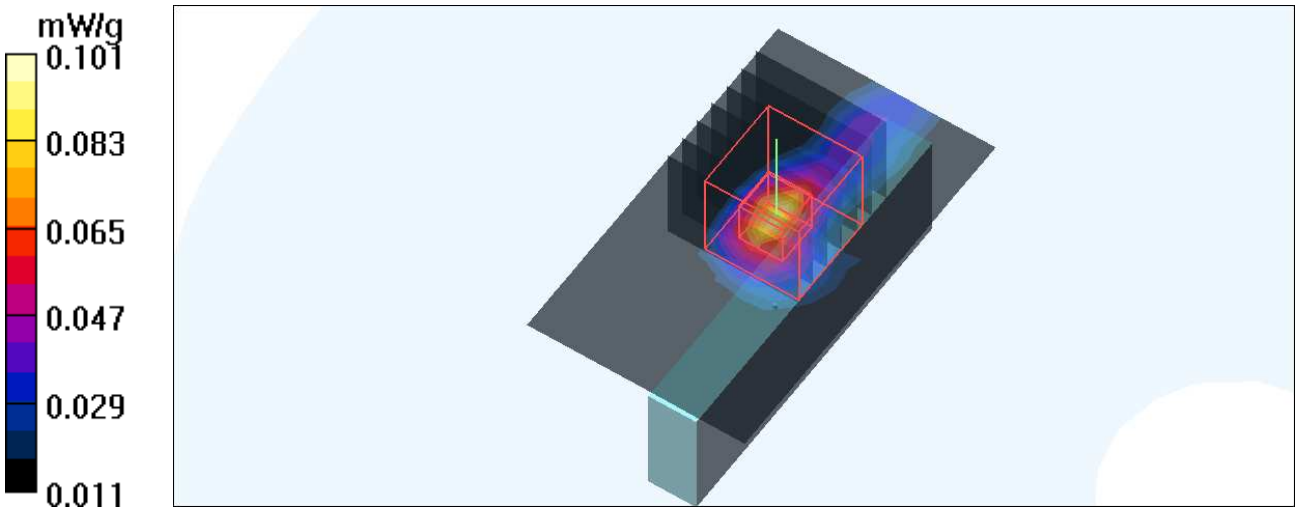
## M16-Vertical-back-11g-Ch6-ANT0

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical-Back side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (11x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.101 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 6.40 V/m; Power Drift = -0.087 dB
Peak SAR (extrapolated) = 0.159 W/kg
**SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.037 mW/g**
Maximum value of SAR (measured) = 0.097 mW/g



Date/Time: 2010/3/15 07:32:06

Test Laboratory: Bureau Veritas ADT

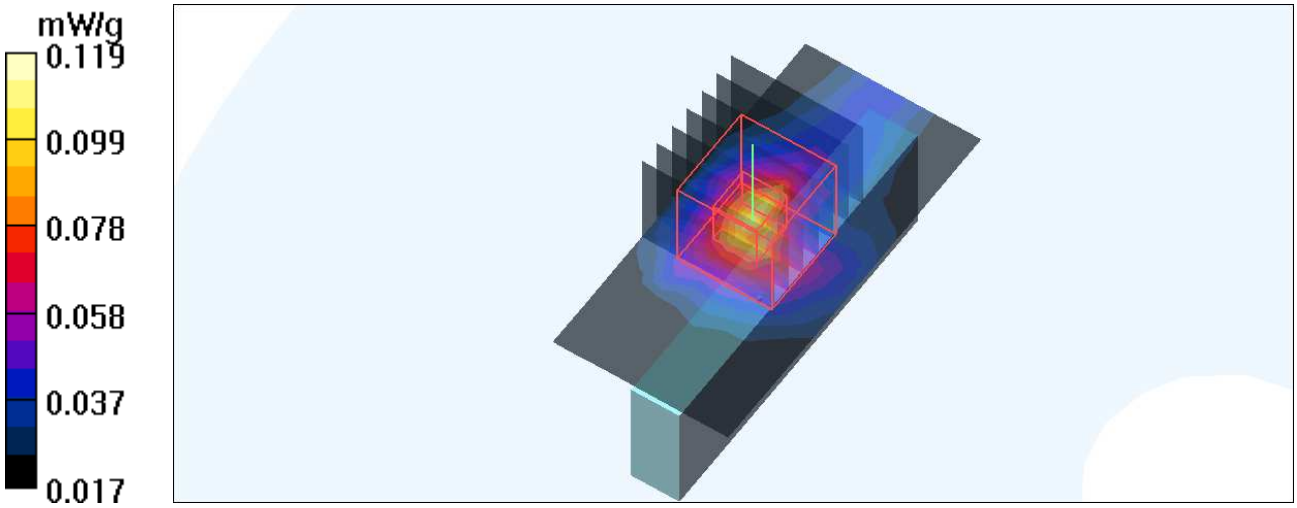
## M17-Vertical-back-11N-20M-Ch1

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11n 20MHz ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2412 MHz; $\sigma$ = 1.94 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical-Back side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 1/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.119 mW/g

**Mid Channel 1/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 7.15 V/m; Power Drift = -0.102 dB
Peak SAR (extrapolated) = 0.197 W/kg
**SAR(1 g) = 0.087 mW/g; SAR(10 g) = 0.045 mW/g**
Maximum value of SAR (measured) = 0.115 mW/g



Date/Time: 2010/3/15 08:31:33

Test Laboratory: Bureau Veritas ADT

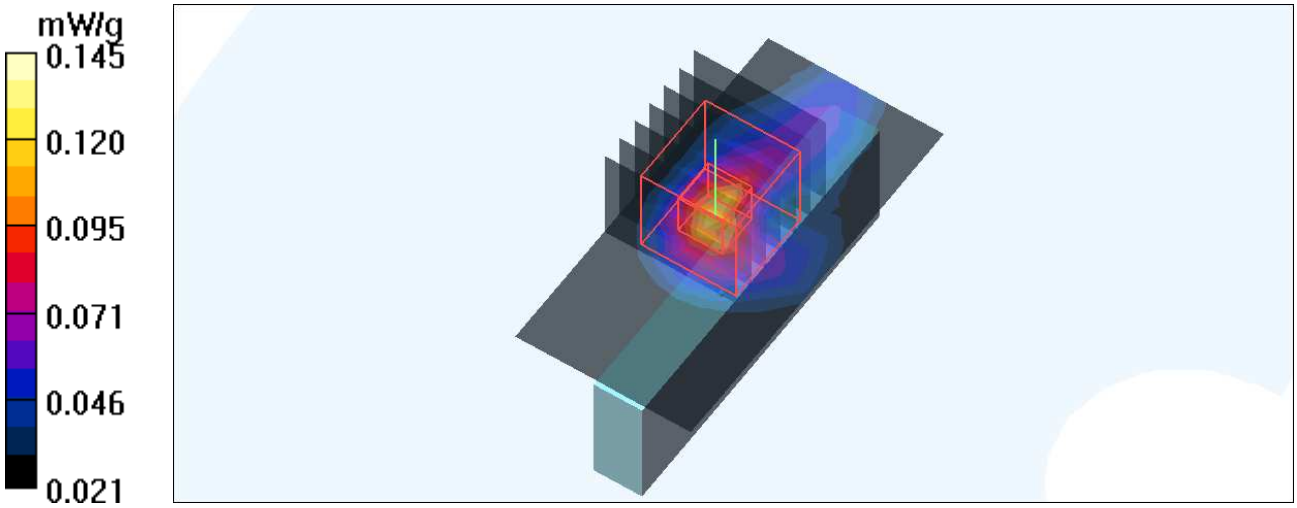
## M18-Vertical-back-11N-40M-Ch4

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11n 40MHz ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical-Back side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 4/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.145 mW/g

**Mid Channel 4/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 8.50 V/m; Power Drift = -0.189 dB
Peak SAR (extrapolated) = 0.247 W/kg
**SAR(1 g) = 0.108 mW/g; SAR(10 g) = 0.055 mW/g**
Maximum value of SAR (measured) = 0.144 mW/g



Date/Time: 2010/3/15 09:32:59

Test Laboratory: Bureau Veritas ADT

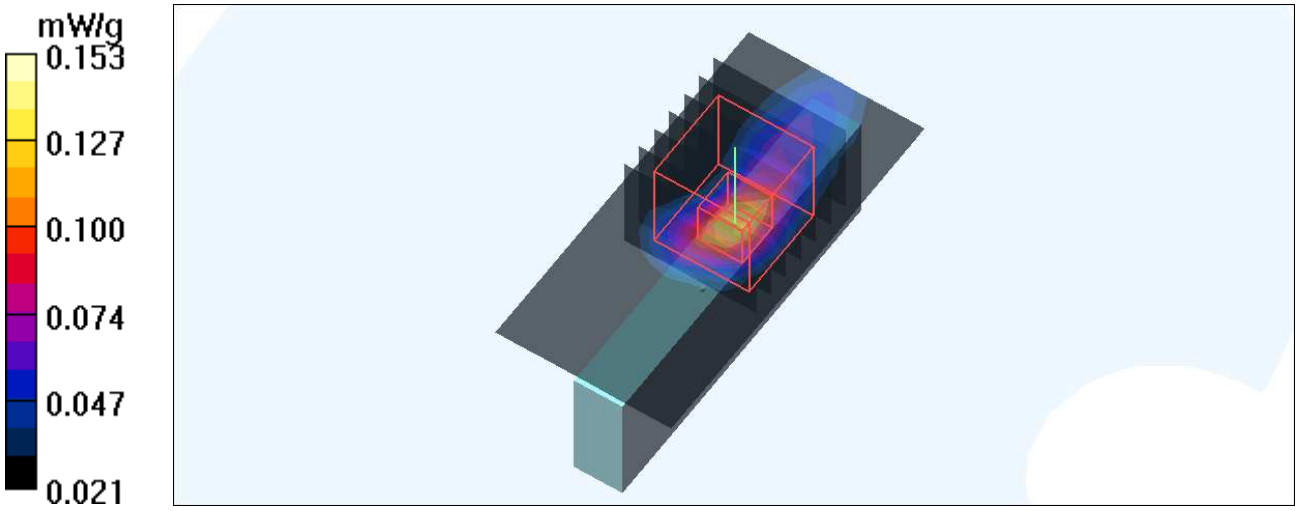
## M19-Vertical-front-11b-Ch6-ANT0

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical-Front side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.153 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 7.99 V/m; Power Drift = -0.189 dB
Peak SAR (extrapolated) = 0.249 W/kg
**SAR(1 g) = 0.119 mW/g; SAR(10 g) = 0.061 mW/g**
Maximum value of SAR (measured) = 0.157 mW/g



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Test Laboratory: Bureau Veritas ADT

## M20-Vertical-front-11b-Ch6-ANT1

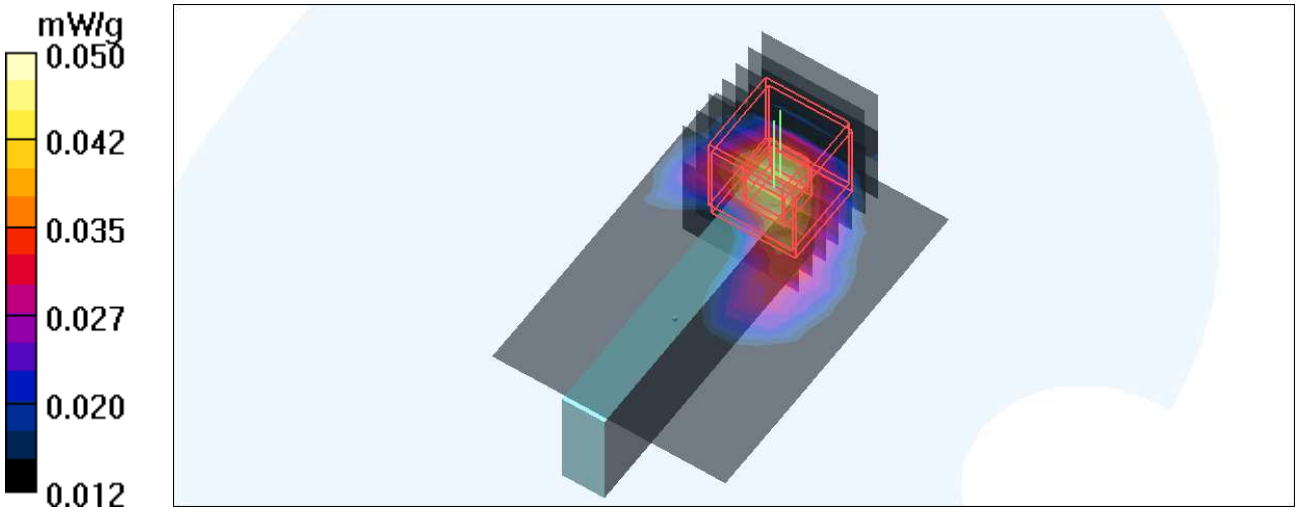
**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical-Front side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (13x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.050 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 3.08 V/m; Power Drift = -0.192 dB
Peak SAR (extrapolated) = 0.082 W/kg
**SAR(1 g) = 0.043 mW/g; SAR(10 g) = 0.029 mW/g**
Maximum value of SAR (measured) = 0.056 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 3.08 V/m; Power Drift = -0.192 dB
Peak SAR (extrapolated) = 0.089 W/kg
**SAR(1 g) = 0.042 mW/g; SAR(10 g) = 0.027 mW/g**
Maximum value of SAR (measured) = 0.053 mW/g



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Test Laboratory: Bureau Veritas ADT

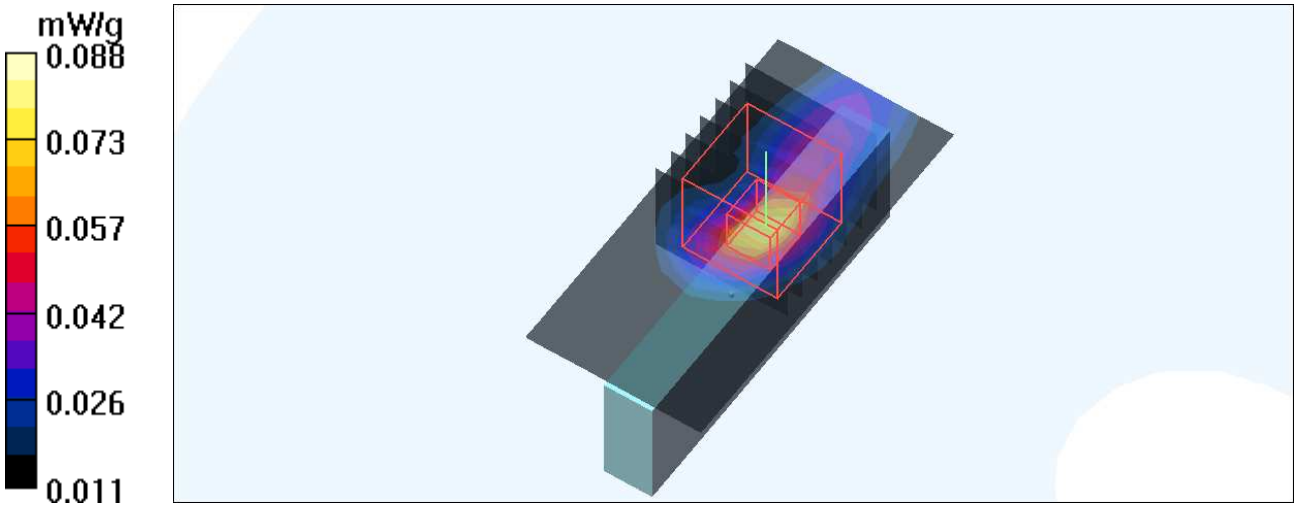
## M21-Vertical-front-11g-Ch6-ANT0

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical-Front side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.088 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 9.80 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.152 W/kg
**SAR(1 g) = 0.068 mW/g; SAR(10 g) = 0.034 mW/g**
Maximum value of SAR (measured) = 0.090 mW/g



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Test Laboratory: Bureau Veritas ADT

## M22-Vertical-front-11g-Ch6-ANT1

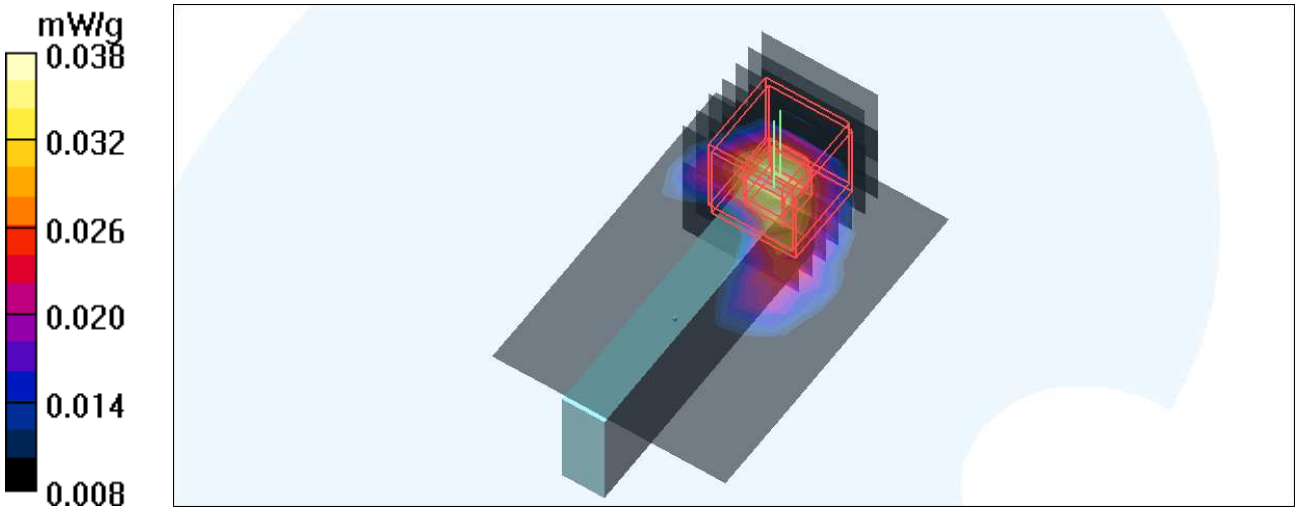
**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical-Front side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (13x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.038 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 3.46 V/m; Power Drift = -0.164 dB
Peak SAR (extrapolated) = 0.068 W/kg
**SAR(1 g) = 0.032 mW/g; SAR(10 g) = 0.020 mW/g**
Maximum value of SAR (measured) = 0.039 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 3.46 V/m; Power Drift = -0.164 dB
Peak SAR (extrapolated) = 0.061 W/kg
**SAR(1 g) = 0.031 mW/g; SAR(10 g) = 0.018 mW/g**



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Test Laboratory: Bureau Veritas ADT

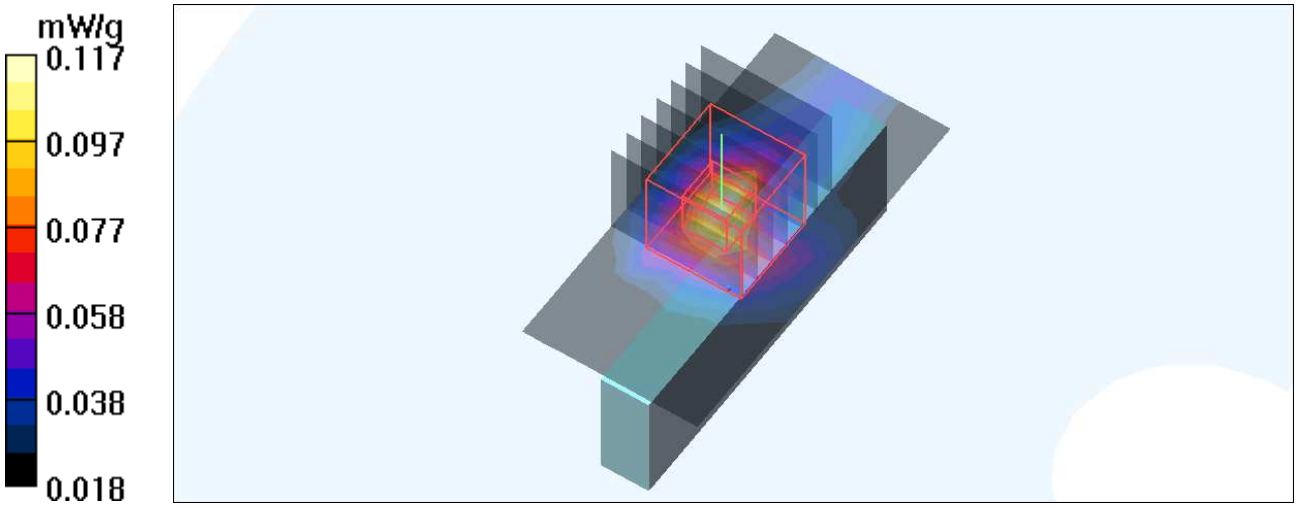
## M23-Vertical-front-11N-20M-Ch1

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11n 20MHz ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2412 MHz; $\sigma$ = 1.94 mho/m; $\varepsilon_r$ = 54.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical-Front side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.117 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 7.93 V/m; Power Drift = -0.159 dB
Peak SAR (extrapolated) = 0.187 W/kg
**SAR(1 g) = 0.090 mW/g; SAR(10 g) = 0.049 mW/g**
Maximum value of SAR (measured) = 0.119 mW/g



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Test Laboratory: Bureau Veritas ADT

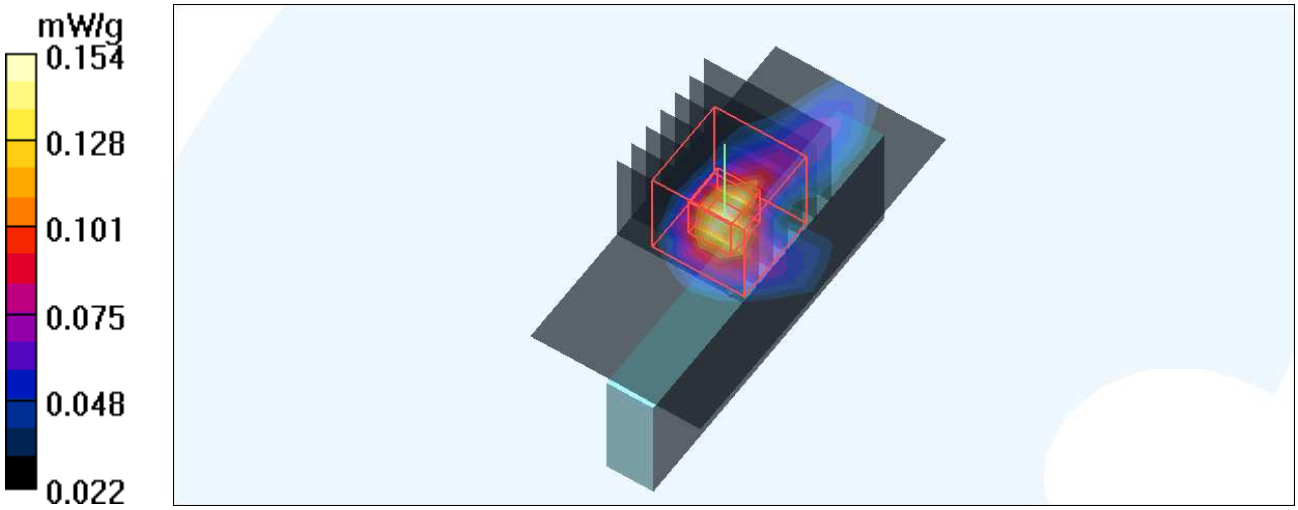
## M24-Vertical-front-11N-40M-Ch4

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11n 40MHz ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical-Front side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 6/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.154 mW/g

**Mid Channel 6/Zoom Scan (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 10.2 V/m; Power Drift = -0.139 dB
Peak SAR (extrapolated) = 0.257 W/kg
**SAR(1 g) = 0.120 mW/g; SAR(10 g) = 0.064 mW/g**
Maximum value of SAR (measured) = 0.157 mW/g



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Test Laboratory: Bureau Veritas ADT

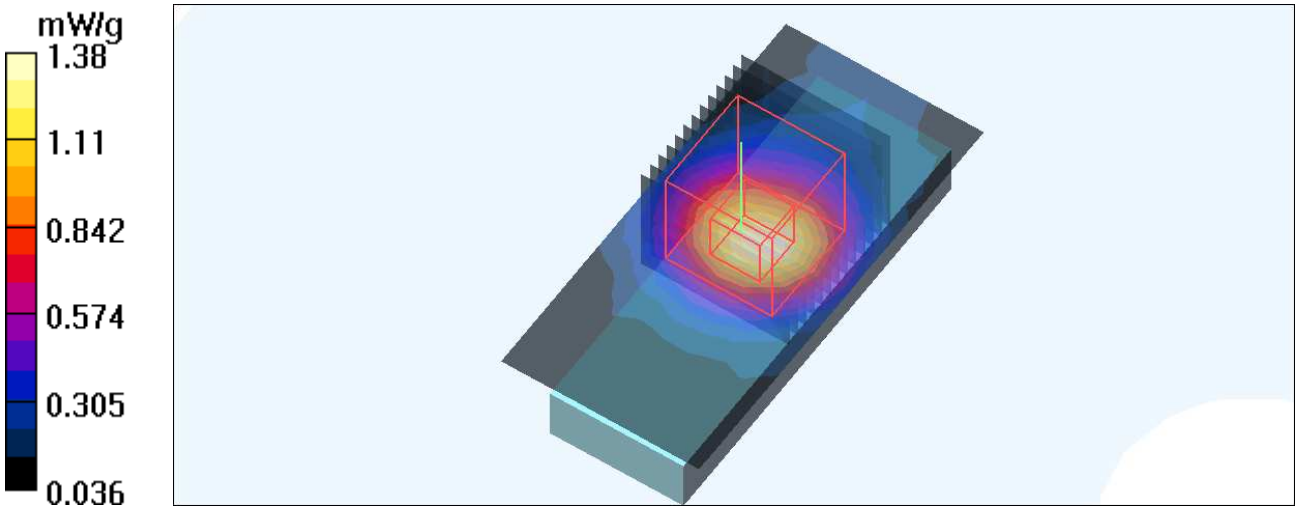
## M25-Step Size minmum- Horizontal-Up -11N-40M-Ch4

**DUT: Ubee 11N 2*2 USB dongle ; Type: PWU1100**
Communication System: 802.11n 40MHz ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.96 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal-Up side of the EUT to the Phantom)

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**Mid Channel 4/Area Scan (9x18x1):** Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 1.38 mW/g

**Mid Channel 4/Zoom Scan (13x13x11)/Cube 0:** Measurement grid: dx=2.5mm, dy=2.5mm, dz=2.5mm
Reference Value = 23.4 V/m; Power Drift = -0.129 dB
Peak SAR (extrapolated) = 1.63 W/kg
**SAR(1 g) = 0.779 mW/g; SAR(10 g) = 0.385 mW/g**
Maximum value of SAR (measured) = 1.03 mW/g



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Test Laboratory: Bureau Veritas ADT

## System Validation Check-MSL 2450MHz 3-12

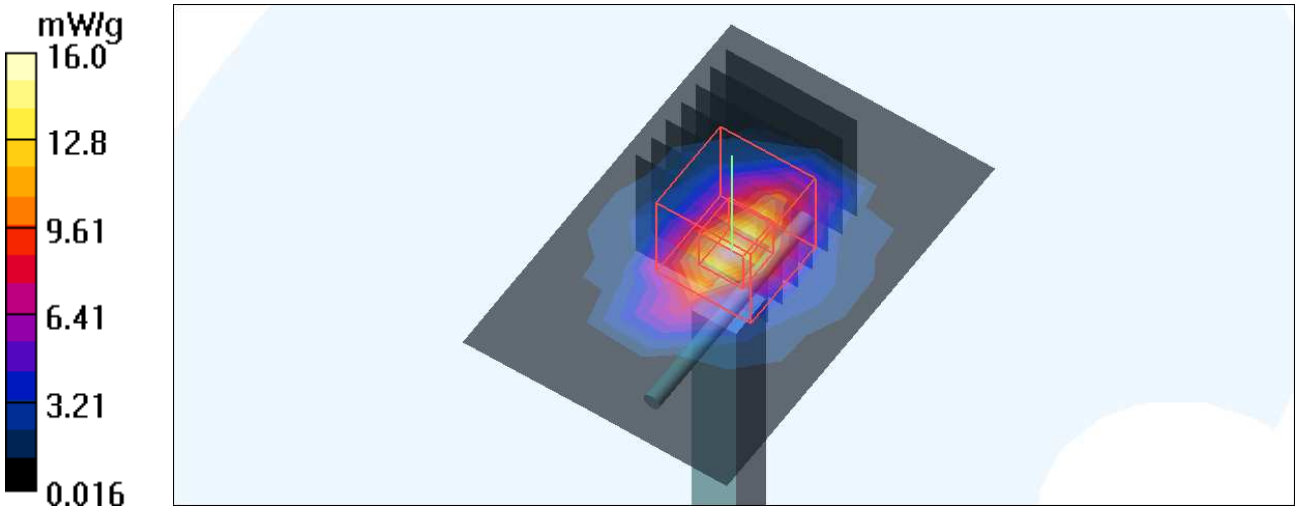
**DUT: Dipole 2450 MHz ; Type: D2450V2 ; Serial: 716 ; Test Frequency: 2450 MHz**

Communication System: CW ; Frequency: 2450 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: MSL2450;Medium parameters used: f = 2450 MHz; $\sigma$ = 1.99 mho/m; $\varepsilon_r$ = 54.4; $\rho$ = 1000 kg/m$^3$ ; Liquid level : 152 mm
Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom)Air temp. : 23 degrees ; Liquid temp. : 22.5 degrees

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**d=10mm, Pin=250mW/Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 16.0 mW/g

**d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.3 V/m; Power Drift = -0.183 dB
Peak SAR (extrapolated) = 29.1 W/kg
**SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.52 mW/g**
Maximum value of SAR (measured) = 15.8 mW/g



Date/Time: 2010/3/15 03:00:18

Test Laboratory: Bureau Veritas ADT

## System Validation Check-MSL 2450MHz 3-15

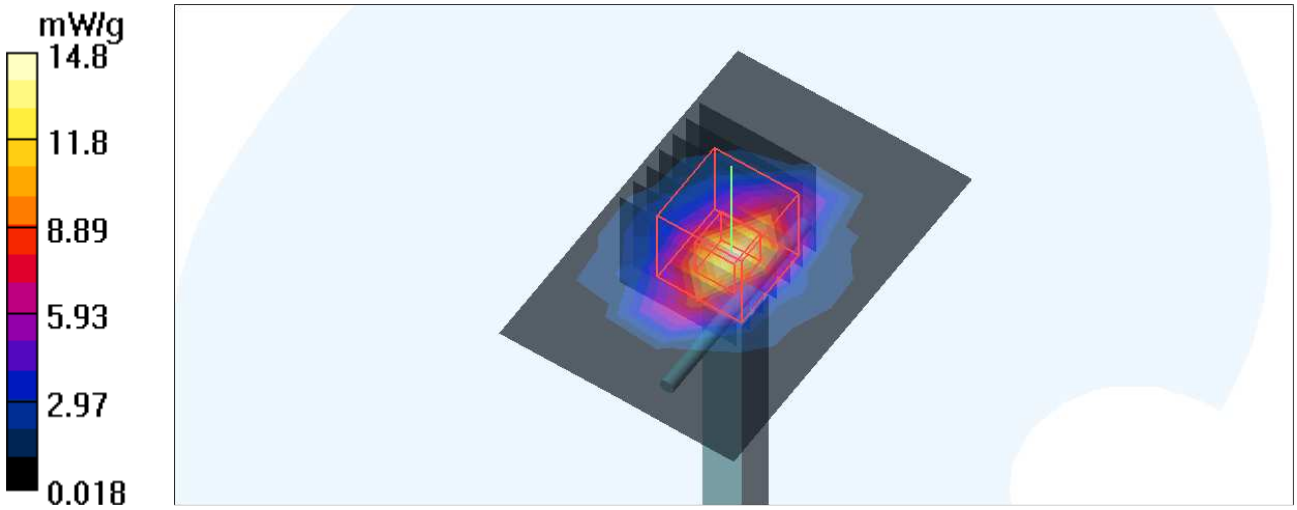
**DUT: Dipole 2450 MHz ; Type: D2450V2 ; Serial: 716 ; Test Frequency: 2450 MHz**

Communication System: CW ; Frequency: 2450 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: MSL2450;Medium parameters used: f = 2450 MHz; $\sigma$ = 1.97 mho/m; $\varepsilon_r$ = 54.3; $\rho$ = 1000 kg/m$^3$ ; Liquid level : 151 mm
Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom)Air temp. : 23.2 degrees ; Liquid temp. : 22.7 degrees

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(6.62, 6.62, 6.62) ; Calibrated: 2009/6/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2010/1/22
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80 ; Postprocessing SW: SEMCAD, V1.8 Build 186

**d=10mm, Pin=250mW/Area Scan (5x7x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 14.8 mW/g

**d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.8 V/m; Power Drift = -0.082 dB
Peak SAR (extrapolated) = 27.2 W/kg
**SAR(1 g) = 13 mW/g; SAR(10 g) = 6.11 mW/g**
Maximum value of SAR (measured) = 14.7 mW/g



# APPENDIX B: BV ADT SAR MEASUREMENT SYSTEM

# APPENDIX C: PHOTOGRAPHS OF SYSTEM VALIDATION