



# SAR TEST REPORT

**REPORT NO.:** SA990720C09

**MODEL NO.:** WLN-1513 (refer to item 2.1 for more details)

**FCC ID:** NHPWLN1513

**RECEIVED:** Jul. 20, 2010

**TESTED:** Aug. 12 ~ Aug. 13, 2010

**ISSUED:** Aug. 17, 2010

**APPLICANT:** CAMEO COMMUNICATIONS, INC.

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

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## 1. CERTIFICATION

**PRODUCT:** 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle

**MODEL:** WLN-1513 (refer to item 2.1 for more details)

**BRAND:** CAMEO (refer to item 2.1 for more details)

**APPLICANT:** CAMEO COMMUNICATIONS, INC.

**TESTED:** Aug. 12 ~ Aug. 13, 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: WLN-1513) 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** : Polly Chien , DATE : Aug. 17, 2010  
Polly Chien / Specialist

**TECHNICAL  
ACCEPTANCE** : Mason Chang , DATE : Aug. 17, 2010  
Responsible for RF Mason Chang / Engineer

**APPROVED BY** : Gary Chang , DATE : Aug. 17, 2010  
Gary Chang / Assistant Manager

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

|                              |                                                                                                                           |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>EUT</b>                   | 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle                                                                                  |
| <b>MODEL NO.</b>             | WLN-1513 (refer to NOTE for more details)                                                                                 |
| <b>FCC ID</b>                | NHPWLN1513                                                                                                                |
| <b>POWER SUPPLY</b>          | 5Vdc                                                                                                                      |
| <b>MODULATION TYPE</b>       | CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM                                                           |
| <b>MODULATION TECHNOLOGY</b> | DSSS, OFDM                                                                                                                |
| <b>TRANSFER RATE</b>         | 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 135.0Mbps |
| <b>OPERATING FREQUENCY</b>   | 2412 ~ 2462MHz                                                                                                            |
| <b>NUMBER OF CHANNEL</b>     | 11 for 802.11b, 802.11g, 802.11n (20MHz)<br>7 for 802.11n (40MHz)                                                         |
| <b>MAXIMUM SAR (1g)</b>      | 0.566W/kg                                                                                                                 |
| <b>ANTENNA TYPE</b>          | PIFA antenna with 2.0dBi gain                                                                                             |
| <b>DATA CABLE</b>            | NA                                                                                                                        |
| <b>I/O PORTS</b>             | USB                                                                                                                       |
| <b>ACCESSORY DEVICES</b>     | NA                                                                                                                        |

#### NOTE:

1. The following brand and model names are electrically identical, different brand and model names are for marketing purpose.

| BRAND    | MODEL      |
|----------|------------|
| CAMEO    | WLN-1513   |
| TRENDnet | TEW-648UBM |

2. The EUT provides one completed transmitter and one receiver.

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

3. 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.



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## 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

DASY5 (software 5.2 Build 162) 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 DASY5 software defined. The DASY5 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.

### EX3DV3 ISOTROPIC E-FIELD PROBE

|                      |                                                                                                                                                                                                            |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CONSTRUCTION</b>  | Symmetrical design with triangular core<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE)                                                |
| <b>FREQUENCY</b>     | 10 MHz to > 6 GHz<br>Linearity: $\pm 0.2$ dB (30 MHz to 6 GHz)                                                                                                                                             |
| <b>DIRECTIVITY</b>   | $\pm 0.3$ dB in HSL (rotation around probe axis)<br>$\pm 0.5$ dB in tissue material (rotation normal to probe axis)                                                                                        |
| <b>DYNAMIC RANGE</b> | 10 $\mu$ W/g to > 100 mW/g<br>Linearity: $\pm 0.2$ dB (noise: typically < 1 $\mu$ W/g)                                                                                                                     |
| <b>DIMENSIONS</b>    | 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                                                                       |
| <b>APPLICATION</b>   | 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

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CONSTRUCTION</b>    | 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. |
| <b>SHELL THICKNESS</b> | 2 ± 0.2mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>FILLING VOLUME</b>  | Approx. 25liters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>DIMENSIONS</b>      | Height: 810mm; Length: 1000mm; Width: 500mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## SYSTEM VALIDATION KITS:

|                         |                                                                                                                                                                                                                 |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CONSTRUCTION</b>     | Symmetrical dipole with 1/4 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 |
| <b>CALIBRATION</b>      | Calibrated SAR value for specified position and input power at the flat phantom in brain simulating solutions                                                                                                   |
| <b>FREQUENCY</b>        | 2450MHz                                                                                                                                                                                                         |
| <b>RETURN LOSS</b>      | > 20dB at specified validation position                                                                                                                                                                         |
| <b>POWER CAPABILITY</b> | > 100W (f < 1GHz); > 40W (f > 1GHz)                                                                                                                                                                             |
| <b>OPTIONS</b>          | 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  $\epsilon = 3$  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.



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## 2.4 TEST EQUIPMENT

### FOR SAR MEASUREMENT

| ITEM | NAME              | BRAND                | TYPE         | SERIES NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|------|-------------------|----------------------|--------------|------------|---------------------|-------------------------|
| 1    | SAM Phantom       | S & P                | QD000 P40 CA | TP-1485    | NA                  | NA                      |
| 2    | Signal Generator  | Agilent              | E8257C       | MY43320668 | Feb. 23, 2010       | Feb. 22, 2011           |
| 3    | E-Field Probe     | S & P                | EX3DV3       | 3504       | Jan. 26, 2010       | Jan. 25, 2011           |
| 4    | DAE               | S & P                | DAE 3        | 510        | Dec. 16, 2009       | Dec. 15, 2010           |
| 5    | Robot Positioner  | Staubli<br>Unimation | NA           | NA         | NA                  | NA                      |
| 6    | Validation Dipole | S & P                | D2450V2      | 737        | Feb. 19, 2010       | Feb. 18, 2011           |

**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  $\pm 2.5\%$  and  $\pm 5\%$  for measured permittivity and conductivity, respectively. However, the tolerances for the conductivity is smaller for material with large loss tangents, i.e., less than  $\pm 2.5\%$  ( $k=1$ ). It can be substantially smaller if more accurate methods are applied.

## 2.5 GENERAL DESCRIPTION OF THE SPATIAL PEAK SAR EVALUATION

The DASY5 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 <sub>i</sub> , a <sub>i0</sub> , a <sub>i1</sub> , a <sub>i2</sub> |
|                    | - Conversion factor       | ConvF <sub>i</sub>                                                      |
|                    | - Diode compression point | dcp <sub>i</sub>                                                        |
| 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 <sub>i</sub>   | =compensated signal of channel i | (i = x, y, z)    |
| U <sub>i</sub>   | =input signal of channel i       | (i = x, y, z)    |
| Cf               | =crest factor of exciting field  | (DASY parameter) |
| dcp <sub>i</sub> | =diode compression point         | (DASY parameter) |

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

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

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

|          |                                                                                         |                 |
|----------|-----------------------------------------------------------------------------------------|-----------------|
| $V_i$    | =compensated signal of channel i                                                        | $(i = x, y, z)$ |
| $Norm_i$ | =sensor sensitivity of channel i $\mu\text{V}/(\text{V}/\text{m})^2$ 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 $\text{mW}/\text{g}$                     |
| $E_{tot}$ | = total field strength in $\text{V}/\text{m}$                                |
| $\sigma$  | = conductivity in [ $\text{mho}/\text{m}$ ] or [ $\text{Siemens}/\text{m}$ ] |
| $\rho$    | = equivalent tissue density in $\text{g}/\text{cm}^3$                        |



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.



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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 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.

## 2.6 DESCRIPTION OF SUPPORT UNITS

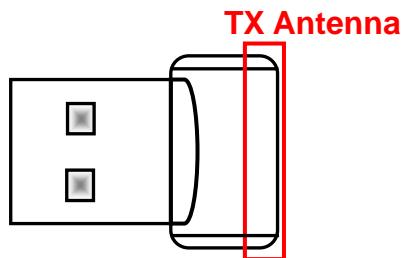
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT  | BRAND | MODEL NO. | SERIAL NO.  | FCC ID           |
|-----|----------|-------|-----------|-------------|------------------|
| 1   | NOTEBOOK | DELL  | PP18L     | 33497605792 | 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).

### 3. DESCRIPTION OF ANTENNA LOCATION



## 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 H<sub>2</sub>O), resistivity  $\geq 16$  M - as basis for the liquid
- **DGMBE-** Diethylenglycol-monobutyl ether (DGMBE), Fluka Chemie GmbH, CAS # 112-34-5 - to reduce relative permittivity

THE RECIPES FOR 2450MHz SIMULATING LIQUID TABLE

| INGREDIENT                           | BODY SIMULATING LIQUID 2450MHz (MSL-2450)                                                |
|--------------------------------------|------------------------------------------------------------------------------------------|
| Water                                | 69.83%                                                                                   |
| DGMBE                                | 30.17%                                                                                   |
| Dielectric<br>Parameters at 22<br>°C | $f = 2450\text{MHz}$<br>$\epsilon = 52.7 \pm 5\%$<br>$\sigma = 1.95 \pm 5\% \text{ S/m}$ |

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 ( $\pm 1^\circ$ ).
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  $\epsilon' = 10.0$ ,  $\epsilon'' = 0.0$ ). If measured parameters do not fit within tolerance, repeat calibration ( $\pm 0.2$  for  $\epsilon'$ :  $\pm 0.1$  for  $\epsilon''$ ).
7. Conductivity can be calculated from  $\epsilon''$  by  $\sigma = \omega \epsilon_0 \epsilon'' = \epsilon'' f [\text{GHz}] / 18$ .
8. Measure liquid shortly after calibration. Repeat calibration every hour.
9. Stir the liquid to be measured. Take a sample ( $\sim 50\text{ml}$ ) 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 DASY5 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).



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### FOR 2.4GHz BAND SIMULATING LIQUID

| LIQUID TYPE             |                                  | MSL-2450          |                      |                            |          |
|-------------------------|----------------------------------|-------------------|----------------------|----------------------------|----------|
| SIMULATING LIQUID TEMP. |                                  | 22.5              |                      |                            |          |
| TEST DATE               |                                  | Aug. 12, 2010     |                      |                            |          |
| TESTED BY               |                                  | Aaron Liang       |                      |                            |          |
| FREQ.<br>(MHz)          | LIQUID<br>PARAMETER              | STANDARD<br>VALUE | MEASUREMENT<br>VALUE | ERROR<br>PERCENTAGE<br>(%) | LIMIT(%) |
| 2412.0                  | Permitivity<br>( $\epsilon$ )    | 52.80             | 54.10                | 2.46                       | $\pm 5$  |
| 2422.0                  |                                  | 52.70             | 54.10                | 2.66                       |          |
| 2437.0                  |                                  | 52.70             | 54.00                | 2.47                       |          |
| 2450.0                  |                                  | 52.70             | 53.90                | 2.28                       |          |
| 2412.0                  | Conductivity<br>( $\sigma$ ) S/m | 1.91              | 1.99                 | 4.19                       |          |
| 2422.0                  |                                  | 1.92              | 2.00                 | 4.17                       |          |
| 2437.0                  |                                  | 1.94              | 2.02                 | 4.12                       |          |
| 2450.0                  |                                  | 1.95              | 2.04                 | 4.62                       |          |

### FOR 2.4GHz BAND SIMULATING LIQUID

| LIQUID TYPE             |                                  | MSL-2450          |                      |                            |          |
|-------------------------|----------------------------------|-------------------|----------------------|----------------------------|----------|
| SIMULATING LIQUID TEMP. |                                  | 22.7              |                      |                            |          |
| TEST DATE               |                                  | Aug. 13, 2010     |                      |                            |          |
| TESTED BY               |                                  | Aaron Liang       |                      |                            |          |
| FREQ.<br>(MHz)          | LIQUID<br>PARAMETER              | STANDARD<br>VALUE | MEASUREMENT<br>VALUE | ERROR<br>PERCENTAGE<br>(%) | LIMIT(%) |
| 2412.0                  | Permitivity<br>( $\epsilon$ )    | 52.80             | 54.00                | 2.27                       | $\pm 5$  |
| 2422.0                  |                                  | 52.70             | 54.00                | 2.47                       |          |
| 2437.0                  |                                  | 52.70             | 53.90                | 2.28                       |          |
| 2450.0                  |                                  | 52.70             | 53.80                | 2.09                       |          |
| 2412.0                  | Conductivity<br>( $\sigma$ ) S/m | 1.91              | 1.97                 | 3.14                       |          |
| 2422.0                  |                                  | 1.92              | 1.99                 | 3.65                       |          |
| 2437.0                  |                                  | 1.94              | 2.00                 | 3.09                       |          |
| 2450.0                  |                                  | 1.95              | 2.02                 | 3.59                       |          |

## 5. 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.

### 5.1 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  $\pm 0.1$  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  $\pm 0.02$  dB.
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  $\pm 0.1$  mm). 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 DASY5 system is less than  $\pm 0.1\text{mm}$ .

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

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

## 5.2 VALIDATION RESULTS

| SYSTEM VALIDATION TEST OF SIMULATING LIQUID |                     |                     |               |                     |               |
|---------------------------------------------|---------------------|---------------------|---------------|---------------------|---------------|
| FREQUENCY (MHz)                             | REQUIRED SAR (mW/g) | MEASURED SAR (mW/g) | DEVIATION (%) | SEPARATION DISTANCE | TESTED DATE   |
| MSL2450                                     | 13.10 (1g)          | 12.90               | -1.53         | 10mm                | Aug. 12, 2010 |
| MSL2450                                     | 13.10 (1g)          | 13.30               | 1.53          | 10mm                | Aug. 13, 2010 |

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

### 5.3 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<br>( $\pm\%$ ) | Probability<br>Distribution | Divisor    | (C <sub>i</sub> ) |       | Standard<br>Uncertainty<br>( $\pm\%$ ) |              | (v <sub>i</sub> ) |
|----------------------------------------------------|--------------------------|-----------------------------|------------|-------------------|-------|----------------------------------------|--------------|-------------------|
|                                                    |                          |                             |            | (1g)              | (10g) | (1g)                                   | (10g)        |                   |
| <b>Measurement System</b>                          |                          |                             |            |                   |       |                                        |              |                   |
| Probe Calibration                                  | 5.50                     | Normal                      | 1          | 1                 | 1     | 5.50                                   | 5.50         | $\infty$          |
| Axial Isotropy                                     | 0.25                     | Rectangular                 | $\sqrt{3}$ | 0.7               | 0.7   | 0.10                                   | 0.10         | $\infty$          |
| Hemispherical Isotropy                             | 1.30                     | Rectangular                 | $\sqrt{3}$ | 0.7               | 0.7   | 0.53                                   | 0.53         | $\infty$          |
| Boundary effects                                   | 1.00                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 0.58                                   | 0.58         | $\infty$          |
| Linearity                                          | 0.30                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 0.17                                   | 0.17         | $\infty$          |
| System Detection Limits                            | 1.00                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 0.58                                   | 0.58         | $\infty$          |
| Readout Electronics                                | 0.30                     | Normal                      | 1          | 1                 | 1     | 0.30                                   | 0.30         | $\infty$          |
| Response Time                                      | 0.80                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 0.46                                   | 0.46         | $\infty$          |
| Integration Time                                   | 2.60                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 1.50                                   | 1.50         | $\infty$          |
| RF Ambient Noise                                   | 3.00                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 1.73                                   | 1.73         | $\infty$          |
| RF Ambient Reflections                             | 3.00                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 1.73                                   | 1.73         | $\infty$          |
| Probe Positioner                                   | 0.40                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 0.23                                   | 0.23         | $\infty$          |
| Probe Positioning                                  | 2.90                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 1.67                                   | 1.67         | $\infty$          |
| Max. SAR Eval.                                     | 1.00                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 0.58                                   | 0.58         | $\infty$          |
| <b>Test sample related</b>                         |                          |                             |            |                   |       |                                        |              |                   |
| Sample positioning                                 | 1.90                     | Normal                      | 1          | 1                 | 1     | 1.90                                   | 1.90         | 4                 |
| Device holder<br>uncertainty                       | 2.80                     | Normal                      | 1          | 1                 | 1     | 2.80                                   | 2.80         | 4                 |
| Output power<br>variation-SAR drift<br>measurement | 3.62                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 2.09                                   | 2.09         | 1                 |
| <b>Dipole Related</b>                              |                          |                             |            |                   |       |                                        |              |                   |
| Dipole Axis to Liquid<br>Distance                  | 1.60                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 0.92                                   | 0.92         | 4                 |
| Input Power Drift                                  | 3.82                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 2.21                                   | 2.21         | 1                 |
| <b>Phantom and Tissue parameters</b>               |                          |                             |            |                   |       |                                        |              |                   |
| Phantom Uncertainty                                | 4.00                     | Rectangular                 | $\sqrt{3}$ | 1                 | 1     | 2.31                                   | 2.31         | $\infty$          |
| Liquid Conductivity<br>(target)                    | 5.00                     | Rectangular                 | $\sqrt{3}$ | 0.64              | 0.43  | 1.85                                   | 1.24         | $\infty$          |
| Liquid Conductivity<br>(measurement)               | 4.62                     | Normal                      | 1          | 0.64              | 0.43  | 2.96                                   | 1.99         | 9                 |
| Liquid Permittivity<br>(target)                    | 5.00                     | Rectangular                 | $\sqrt{3}$ | 0.6               | 0.49  | 1.73                                   | 1.41         | $\infty$          |
| Liquid Permittivity<br>(measurement)               | 2.66                     | Normal                      | 1          | 0.6               | 0.49  | 1.60                                   | 1.30         | 9                 |
| <b>Combined Standard Uncertainty</b>               |                          |                             |            |                   |       | <b>9.36</b>                            | <b>8.89</b>  |                   |
| <b>Coverage Factor for 95%</b>                     |                          |                             |            |                   |       | <b>Kp=2</b>                            |              |                   |
| <b>Expanded Uncertainty (K=2)</b>                  |                          |                             |            |                   |       | <b>18.72</b>                           | <b>17.78</b> |                   |

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

## 6. TEST RESULTS

### 6.1 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 DASY5 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.



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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  $\pm 0.5$ mm 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  $7 \times 7 \times 7$  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  $\pm 5\%$ .

## 6.2 CONDUCTED POWER

| TEST MODE |             |                 |                  | 802.11b |      |
|-----------|-------------|-----------------|------------------|---------|------|
| CHAN.     | FREQ. (MHz) | MODULATION TYPE | DATA RATE (Mbps) | AVG     | PEAK |
| 1         | 2412 (Low)  | DBPSK           | 1                | 16.6    | 19.0 |
| 6         | 2437 (Mid.) | DBPSK           | 1                | 15.1    | 17.5 |
| 11        | 2462 (High) | DBPSK           | 1                | 14.2    | 16.6 |

| TEST MODE |             |                 |                  | 802.11g |      |
|-----------|-------------|-----------------|------------------|---------|------|
| CHAN.     | FREQ. (MHz) | MODULATION TYPE | DATA RATE (Mbps) | AVG     | PEAK |
| 1         | 2412 (Low)  | BPSK            | 6                | 17.0    | 24.9 |
| 6         | 2437 (Mid.) | BPSK            | 6                | 17.1    | 25.0 |
| 11        | 2462 (High) | BPSK            | 6                | 16.2    | 24.1 |

| TEST MODE |             |                 |                  | 802.11n (20MHz) |      |
|-----------|-------------|-----------------|------------------|-----------------|------|
| CHAN.     | FREQ. (MHz) | MODULATION TYPE | DATA RATE (Mbps) | AVG             | PEAK |
| 1         | 2412 (Low)  | BPSK            | 6.5              | 16.9            | 24.7 |
| 6         | 2437 (Mid.) | BPSK            | 6.5              | 17.0            | 24.8 |
| 11        | 2462 (High) | BPSK            | 6.5              | 15.5            | 23.7 |

| TEST MODE |             |                 |                  | 802.11n (40MHz) |      |
|-----------|-------------|-----------------|------------------|-----------------|------|
| CHAN.     | FREQ. (MHz) | MODULATION TYPE | DATA RATE (Mbps) | AVG             | PEAK |
| 1         | 2422 (Low)  | BPSK            | 13.5             | 16.2            | 24.4 |
| 4         | 2437 (Mid.) | BPSK            | 13.5             | 16.0            | 24.2 |
| 7         | 2452 (High) | BPSK            | 13.5             | 14.2            | 23.1 |

## 6.3 DESCRIPTION OF TEST CONDITION

| TEST DATE     | TEMPERATURE(°C) |        | HUMIDITY(%RH) | TESTED BY   |
|---------------|-----------------|--------|---------------|-------------|
|               | AIMBENT         | LIQUID |               |             |
| Aug. 12, 2010 | 22.7            | 22.5   | 61            | Aaron Liang |
| Aug. 13, 2010 | 23.0            | 22.7   | 60            | Aaron Liang |



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## 6.4 MEASURED SAR RESULT

| Distance between EUT and phantom is 5mm |             |               |                 |                |               |       |
|-----------------------------------------|-------------|---------------|-----------------|----------------|---------------|-------|
| CHAN.                                   | FREQ. (MHz) | Horizontal-Up | Horizontal-Down | Vertical-Front | Vertical-Back | TIP   |
| <b>802.11b</b>                          |             |               |                 |                |               |       |
| 1                                       | 2412 (Low)  | 0.495         | 0.463           | 0.413          | 0.318         | 0.057 |
| <b>802.11g</b>                          |             |               |                 |                |               |       |
| 6                                       | 2437 (Mid.) | 0.566         | 0.529           | 0.471          | 0.364         | 0.063 |
| <b>802.11n (20MHz)</b>                  |             |               |                 |                |               |       |
| 6                                       | 2437 (Mid.) | 0.552         | 0.527           | 0.464          | 0.352         | 0.062 |
| <b>802.11n (40MHz)</b>                  |             |               |                 |                |               |       |
| 1                                       | 2422 (Low)  | 0.435         | 0.419           | 0.377          | 0.286         | 0.051 |

### NOTE:

1. In this testing, the limit for General Population Spatial Peak averaged over 1g, 1.6 W/kg, is applied.
2. Please see the Appendix A for the data.
3. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.
4. Per KDB 447498, when 1-g SAR for the highest output channel is less than 0.8 W/kg, testing for the other channels is not required.

## 6.5 POWER DRIFT TABLE

| Test Mode | Test Position   | Communication Mode | Test Channel | Test Frequency | Power (dBm) |       | Power drift (%) |
|-----------|-----------------|--------------------|--------------|----------------|-------------|-------|-----------------|
|           |                 |                    |              |                | Begin       | After |                 |
| 1         | Horizontal up   | 802.11b            | 1            | 2412           | 16.6        | 16.51 | -2.05           |
| 2         |                 | 802.11g            | 6            | 2437           | 17.1        | 17.02 | -1.83           |
| 3         |                 | 802.11n (20MHz)    | 6            | 2437           | 17.0        | 16.94 | -1.37           |
| 4         |                 | 802.11n (40MHz)    | 1            | 2422           | 16.2        | 16.09 | -2.50           |
| 5         | Horizontal Down | 802.11b            | 1            | 2412           | 16.6        | 16.48 | -2.73           |
| 6         |                 | 802.11g            | 6            | 2437           | 17.1        | 17.03 | -1.60           |
| 7         |                 | 802.11n (20MHz)    | 6            | 2437           | 17.0        | 16.93 | -1.60           |
| 8         |                 | 802.11n (40MHz)    | 1            | 2422           | 16.2        | 16.07 | -2.95           |
| 9         | Vertical front  | 802.11b            | 1            | 2412           | 16.6        | 16.46 | -3.17           |
| 10        |                 | 802.11g            | 6            | 2437           | 17.1        | 16.97 | -2.95           |
| 11        |                 | 802.11n (20MHz)    | 6            | 2437           | 17.0        | 16.95 | -1.14           |
| 12        |                 | 802.11n (40MHz)    | 1            | 2422           | 16.2        | 16.14 | -1.37           |
| 13        | Vertical back   | 802.11b            | 1            | 2412           | 16.6        | 16.49 | -2.50           |
| 14        |                 | 802.11g            | 6            | 2437           | 17.1        | 17.04 | -1.37           |
| 15        |                 | 802.11n (20MHz)    | 6            | 2437           | 17.0        | 16.93 | -1.60           |
| 16        |                 | 802.11n (40MHz)    | 1            | 2422           | 16.2        | 16.15 | -1.14           |
| 17        | Tip             | 802.11b            | 1            | 2412           | 16.6        | 16.51 | -2.05           |
| 18        |                 | 802.11g            | 6            | 2437           | 17.1        | 17.02 | -1.83           |
| 19        |                 | 802.11n (20MHz)    | 6            | 2437           | 17.0        | 16.88 | -2.73           |
| 20        |                 | 802.11n (40MHz)    | 1            | 2422           | 16.2        | 16.04 | -3.62           |

## 6.6 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: This limits accord to 47 CFR 2.1093 – Safety Limit.



## 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](http://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](http://www.adt.com.tw)

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

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## APPENDIX A: TEST DATA

### Liquid Level Photo

Tissue MSL2450MHz D=152mm



Tissue MSL2450MHz D=151mm



Test Laboratory: Bureau Veritas ADT

## M01- Horizontal up -11b

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11b ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK  
 Medium: MSL2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.99 \text{ mho/m}$ ;  $\epsilon_r = 54.1$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal up side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Low Channel 1/Area Scan (7x8x1):** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$

Maximum value of SAR (measured) = 0.904 mW/g

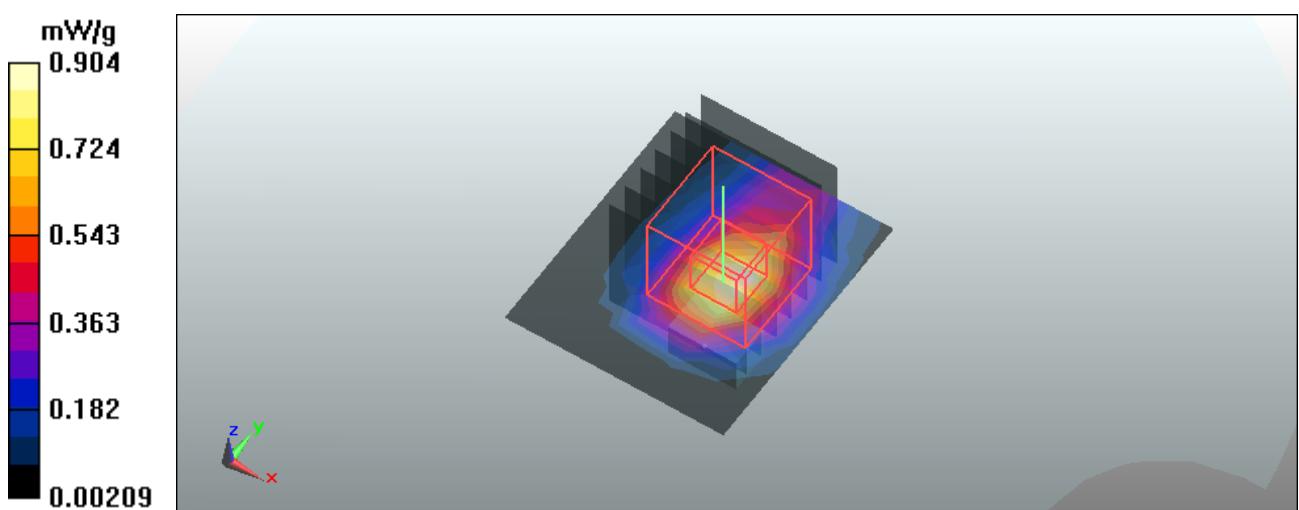
**Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 22 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 1.03 W/kg

**SAR(1 g) = 0.495 mW/g; SAR(10 g) = 0.224 mW/g**

Maximum value of SAR (measured) = 0.747 mW/g



Test Laboratory: Bureau Veritas ADT

## M02- Horizontal up -11g

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK  
 Medium: MSL2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 2.02$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal up side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Mid Channel 6/Area Scan (7x8x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.826 mW/g

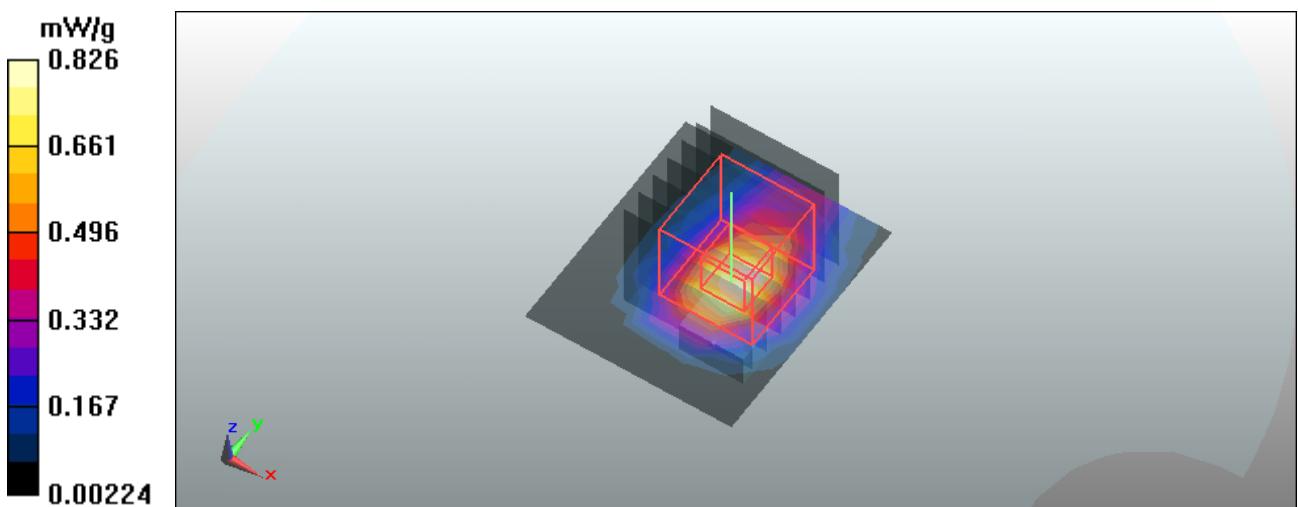
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

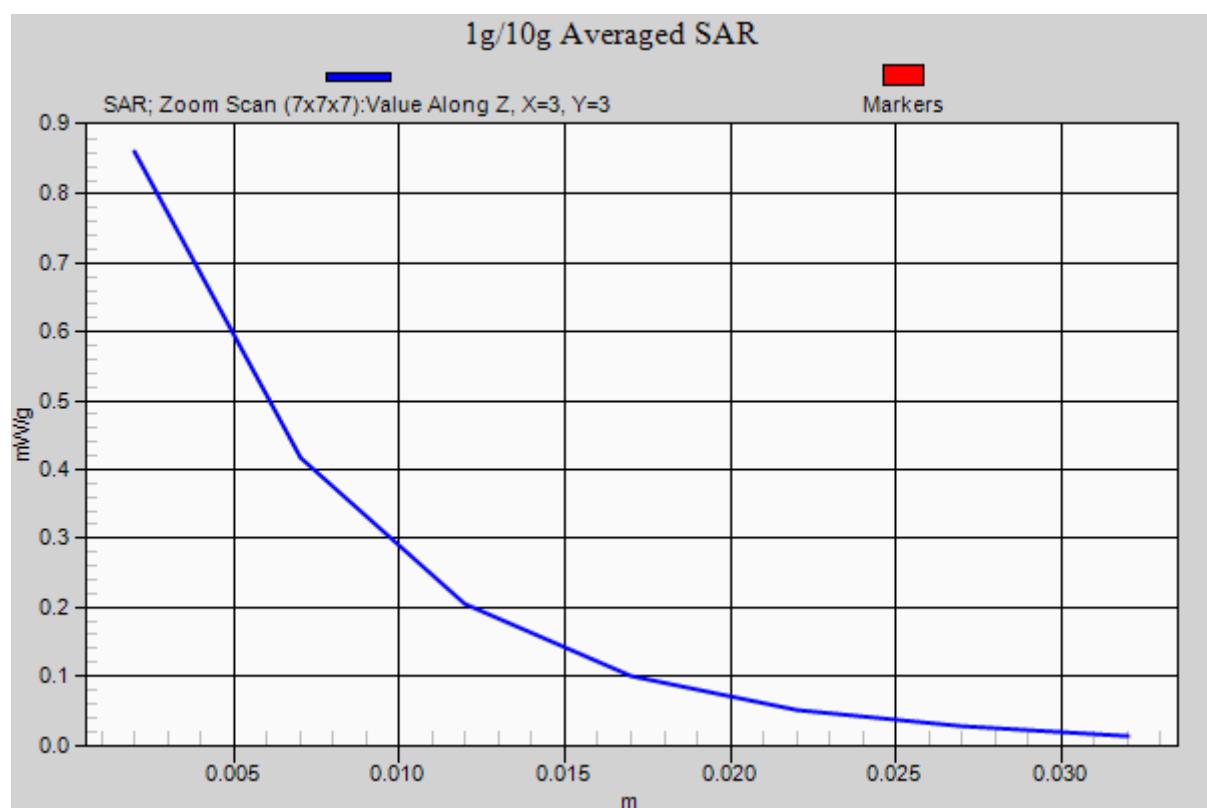
Reference Value = 18.8 V/m; Power Drift = -0.133 dB

Peak SAR (extrapolated) = 1.18 W/kg

**SAR(1 g) = 0.566 mW/g; SAR(10 g) = 0.254 mW/g**

Maximum value of SAR (measured) = 0.862 mW/g





Test Laboratory: Bureau Veritas ADT

## M03-Horizontal up -11n-20M

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11n 20MHz ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 2.02$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal up side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Mid Channel 6/Area Scan (7x8x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.811 mW/g

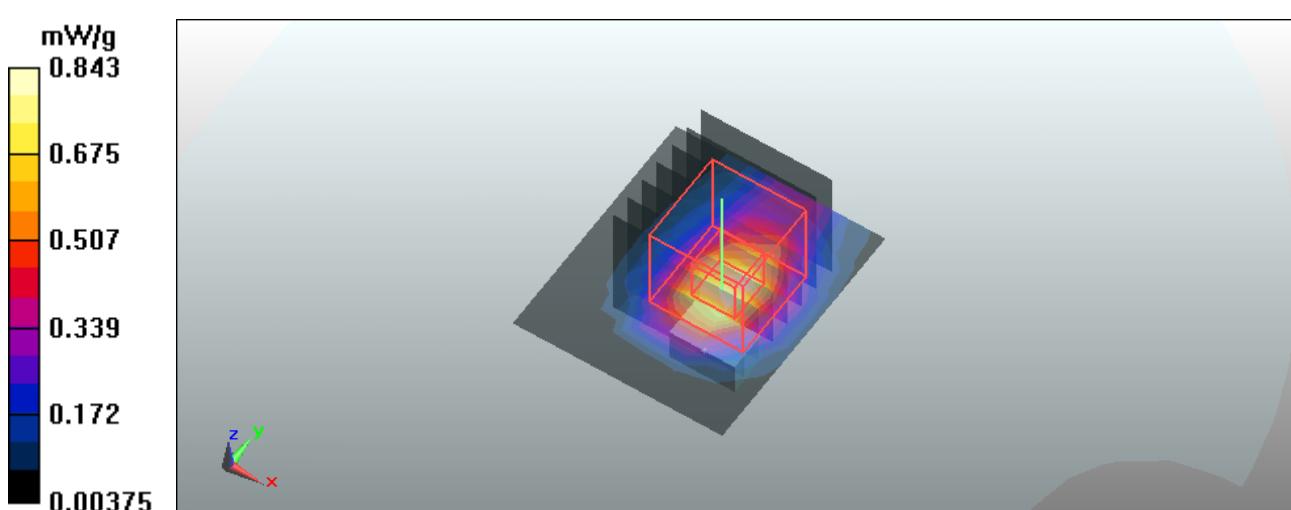
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.1 V/m; Power Drift = -0.110 dB

Peak SAR (extrapolated) = 1.16 W/kg

**SAR(1 g) = 0.552 mW/g; SAR(10 g) = 0.249 mW/g**

Maximum value of SAR (measured) = 0.843 mW/g



Test Laboratory: Bureau Veritas ADT

## M04-Horizontal up -11n-40M

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11n 40MHz ; Frequency: 2422 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used:  $f = 2422$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 54.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal up side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Low Channel 1/Area Scan (7x8x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.628 mW/g

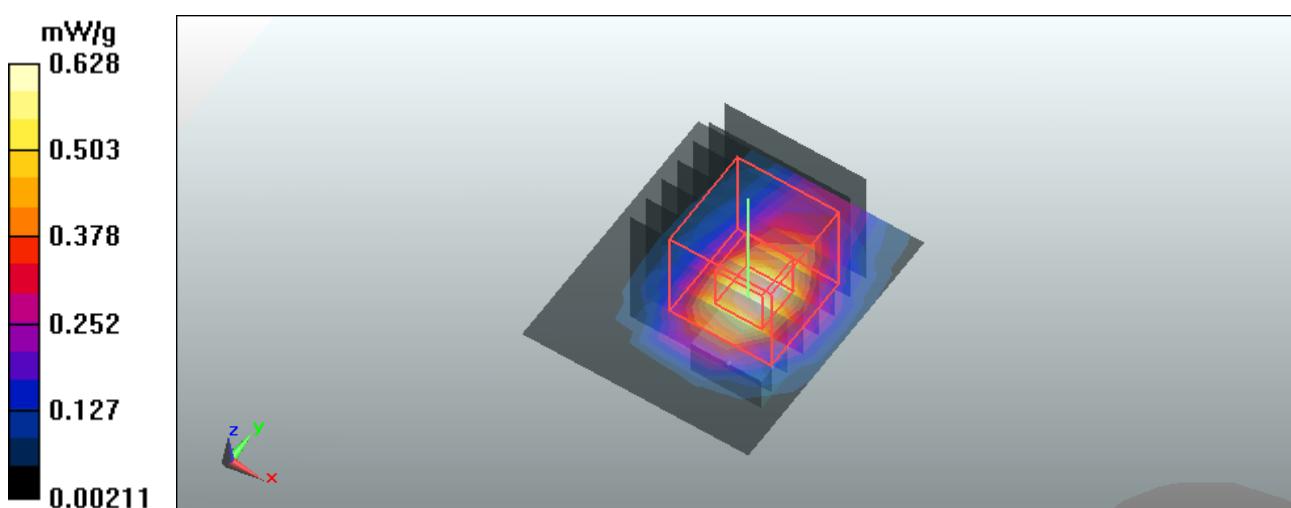
**Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.4 V/m; Power Drift = -0.152 dB

Peak SAR (extrapolated) = 0.899 W/kg

**SAR(1 g) = 0.435 mW/g; SAR(10 g) = 0.196 mW/g**

Maximum value of SAR (measured) = 0.659 mW/g



Test Laboratory: Bureau Veritas ADT

## M05-Horizontal down-11b

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11b ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK  
 Medium: MSL2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.99 \text{ mho/m}$ ;  $\epsilon_r = 54.1$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal down side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Low Channel 1/Area Scan (7x8x1):** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$

Maximum value of SAR (measured) = 0.734 mW/g

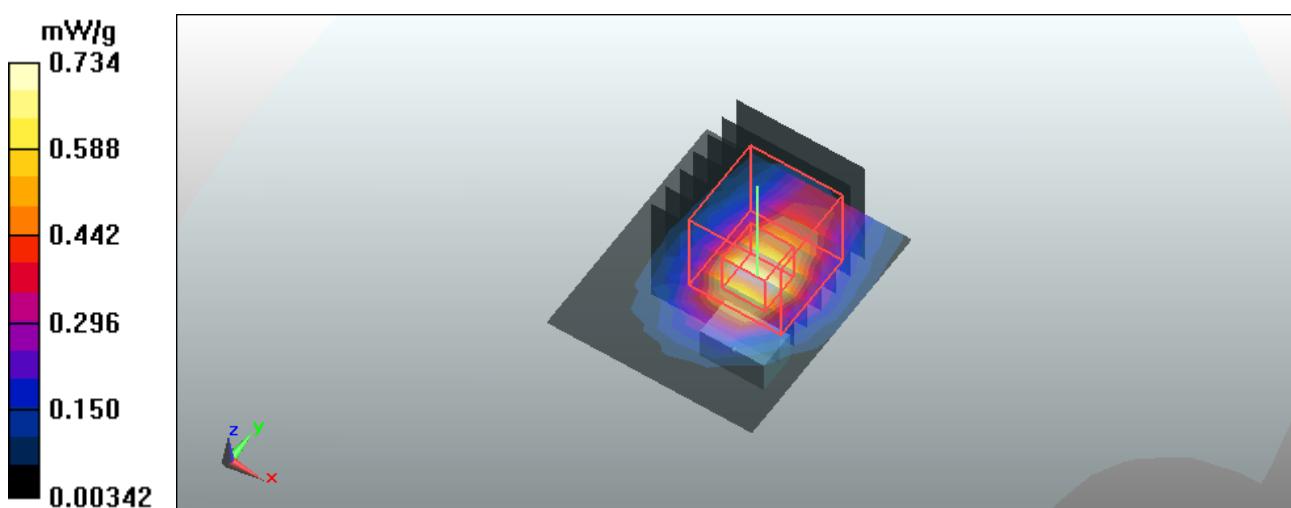
**Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 16.2 V/m; Power Drift = -0.155 dB

Peak SAR (extrapolated) = 0.957 W/kg

**SAR(1 g) = 0.463 mW/g; SAR(10 g) = 0.207 mW/g**

Maximum value of SAR (measured) = 0.711 mW/g



Test Laboratory: Bureau Veritas ADT

## M06- Horizontal down -11g

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

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

Medium: MSL2450 Medium parameters used:  $f = 2437 \text{ MHz}$ ;  $\sigma = 2.02 \text{ mho/m}$ ;  $\epsilon_r = 54$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal down side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Mid Channel 6/Area Scan (7x8x1):** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$

Maximum value of SAR (measured) = 0.754 mW/g

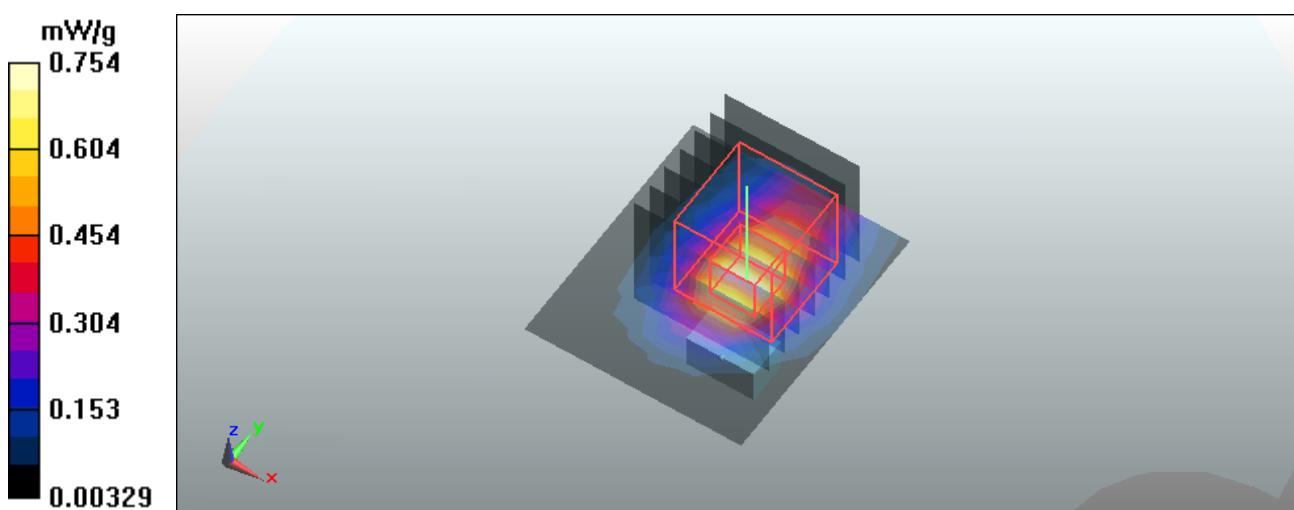
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 15.3 V/m; Power Drift = -0.126 dB

Peak SAR (extrapolated) = 1.11 W/kg

**SAR(1 g) = 0.529 mW/g; SAR(10 g) = 0.234 mW/g**

Maximum value of SAR (measured) = 0.816 mW/g



Test Laboratory: Bureau Veritas ADT

## M07-Horizontal down -11n-20M

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11n 20MHz ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 2.02$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal down side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Mid Channel 6/Area Scan (7x8x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.748 mW/g

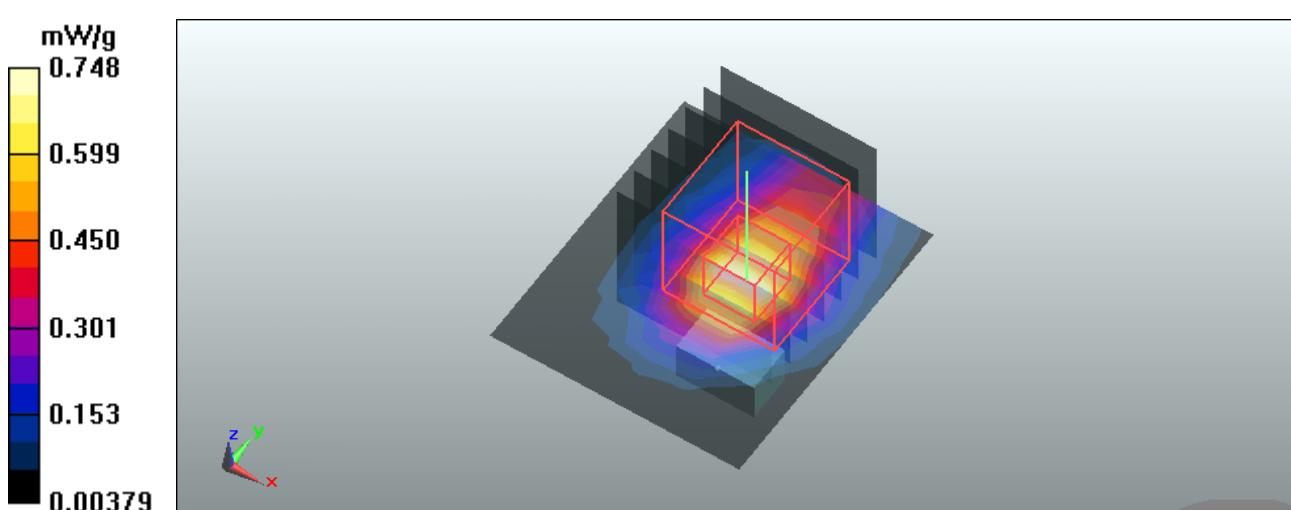
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.6 V/m; Power Drift = -0.103 dB

Peak SAR (extrapolated) = 1.1 W/kg

**SAR(1 g) = 0.527 mW/g; SAR(10 g) = 0.233 mW/g**

Maximum value of SAR (measured) = 0.813 mW/g



Test Laboratory: Bureau Veritas ADT

## M08-Horizontal down -11n-40M

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11n 40MHz ; Frequency: 2422 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used:  $f = 2422$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 54.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Separation distance : 5 mm (The Horizontal down side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Low Channel 1/Area Scan (7x8x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.592 mW/g

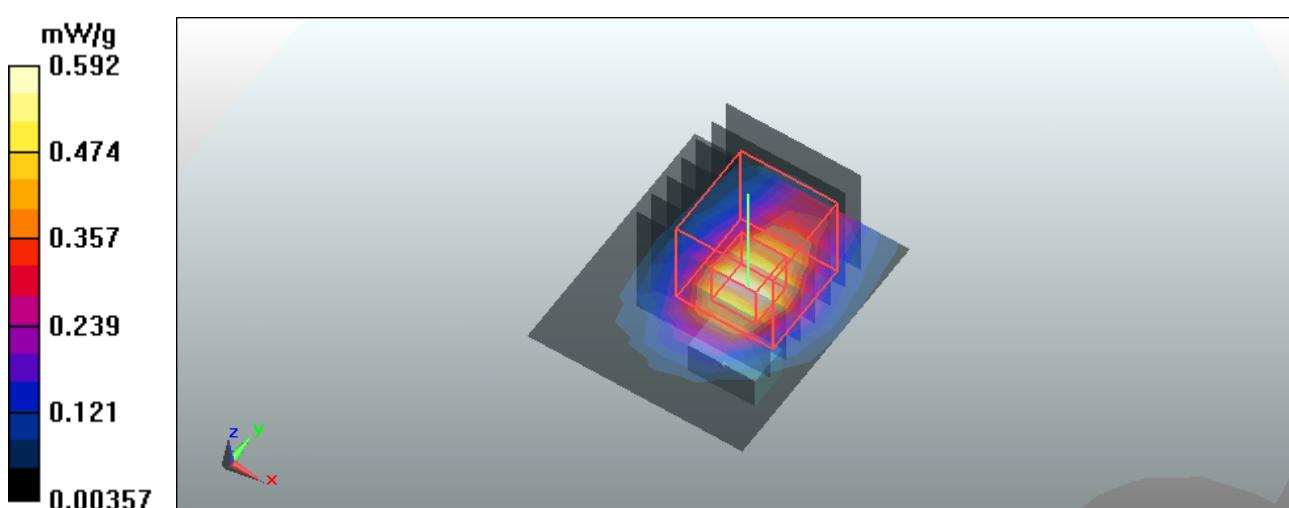
**Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.6 V/m; Power Drift = -0.154 dB

Peak SAR (extrapolated) = 0.872 W/kg

**SAR(1 g) = 0.419 mW/g; SAR(10 g) = 0.187 mW/g**

Maximum value of SAR (measured) = 0.644 mW/g



Test Laboratory: Bureau Veritas ADT

## M09-Vertical front-11b

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11b ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK  
 Medium: MSL2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.99 \text{ mho/m}$ ;  $\epsilon_r = 54.1$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical front side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Low Channel 1/Area Scan (6x8x1):** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$

Maximum value of SAR (measured) = 0.581 mW/g

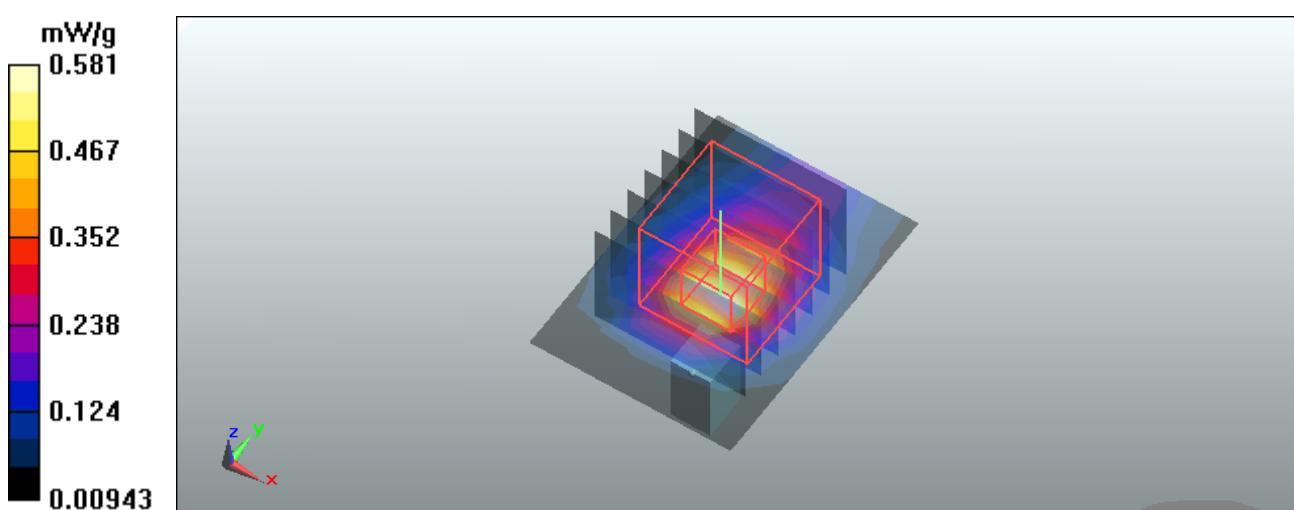
**Low Channel 1/Zoom Scan (7x7x7) (7x7x9)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=3\text{mm}$

Reference Value = 12.1 V/m; Power Drift = -0.030 dB

Peak SAR (extrapolated) = 0.895 W/kg

**SAR(1 g) = 0.413 mW/g; SAR(10 g) = 0.178 mW/g**

Maximum value of SAR (measured) = 0.655 mW/g



Test Laboratory: Bureau Veritas ADT

## M10-Vertical front -11g

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK  
 Medium: MSL2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 2.02$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical front side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Mid Channel 6/Area Scan (6x8x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.656 mW/g

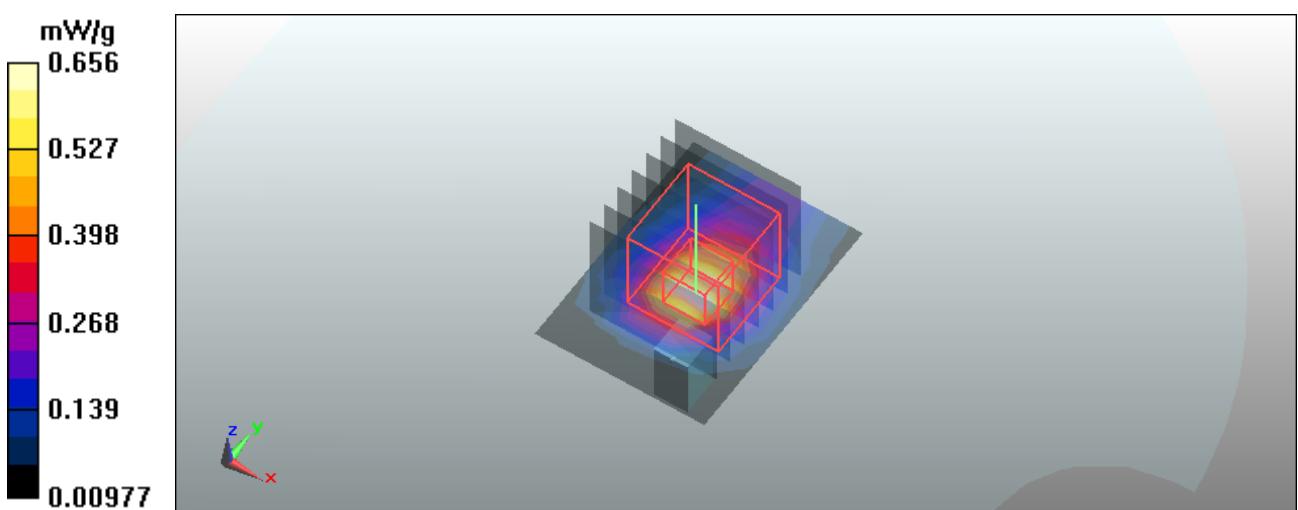
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.7 V/m; Power Drift = -0.0454 dB

Peak SAR (extrapolated) = 1.02 W/kg

**SAR(1 g) = 0.471 mW/g; SAR(10 g) = 0.202 mW/g**

Maximum value of SAR (measured) = 0.745 mW/g



Test Laboratory: Bureau Veritas ADT

## M11-Vertical front -11n-20M

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11n 20MHz ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 2.02$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical front side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Mid Channel 6/Area Scan (6x8x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.648 mW/g

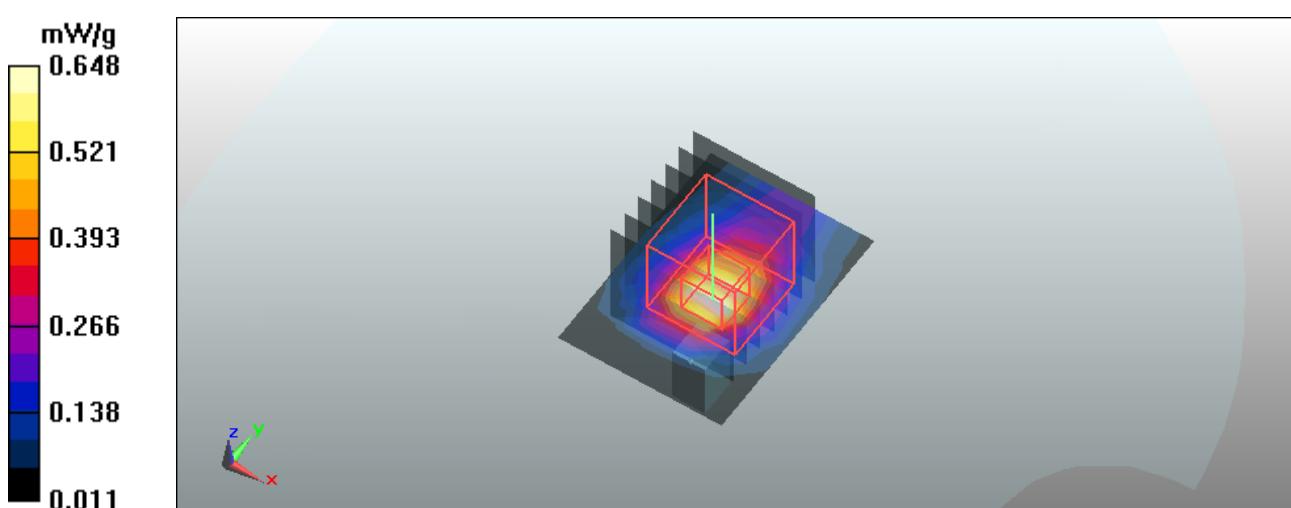
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.1 V/m; Power Drift = -0.136 dB

Peak SAR (extrapolated) = 1 W/kg

**SAR(1 g) = 0.464 mW/g; SAR(10 g) = 0.200 mW/g**

Maximum value of SAR (measured) = 0.730 mW/g



Test Laboratory: Bureau Veritas ADT

## M12-Vertical front -11n-40M

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11n 40MHz ; Frequency: 2422 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used:  $f = 2422$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 54.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical front side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Low Channel 1/Area Scan (6x8x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.528 mW/g

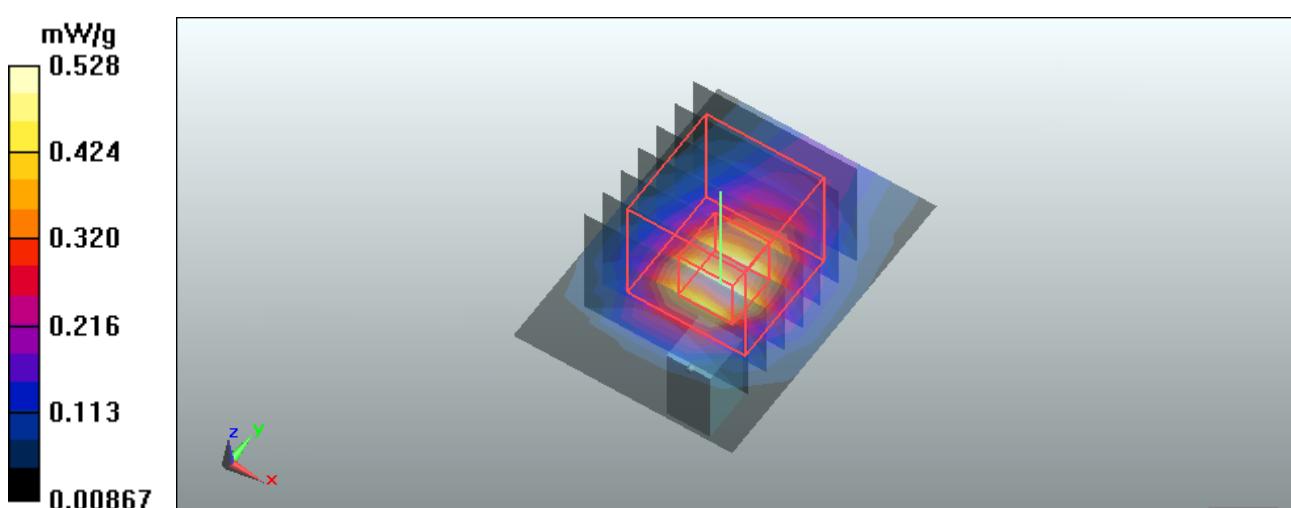
**Low Channel 1/Zoom Scan (7x7x7) (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 11.9 V/m; Power Drift = -0.115 dB

Peak SAR (extrapolated) = 0.817 W/kg

**SAR(1 g) = 0.377 mW/g; SAR(10 g) = 0.163 mW/g**

Maximum value of SAR (measured) = 0.594 mW/g



Test Laboratory: Bureau Veritas ADT

## M13-Vertical back -11b

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11b ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK  
 Medium: MSL2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.97 \text{ mho/m}$ ;  $\epsilon_r = 54$ ;  $\rho = 1000 \text{ kg/m}^3$   
 Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical back side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Low Channel 1/Area Scan (6x8x1):** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$

Maximum value of SAR (measured) = 0.447 mW/g

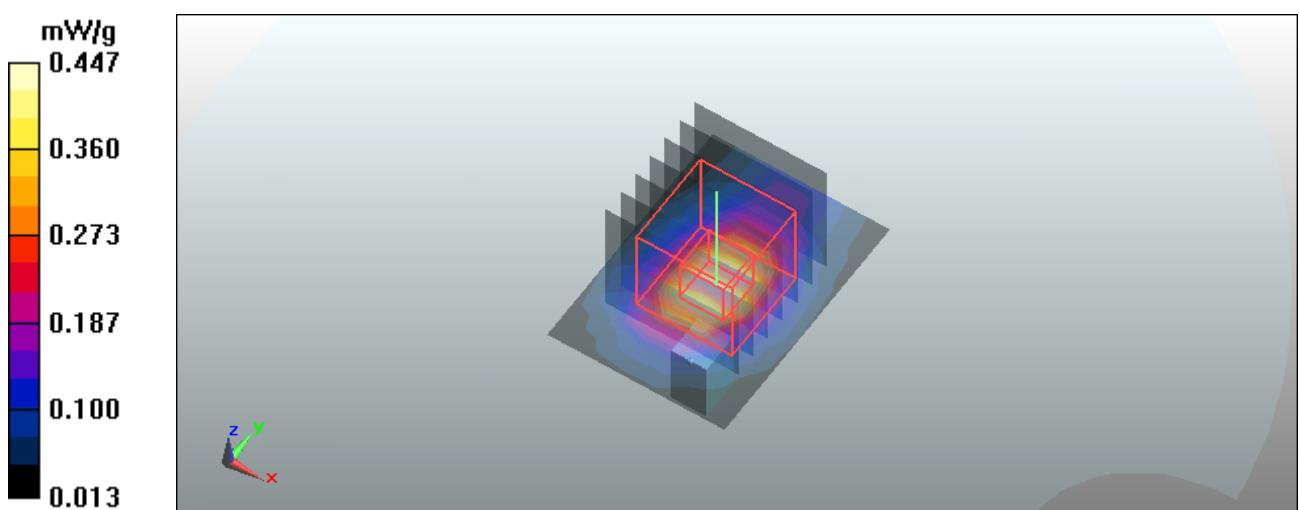
**Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 13.1 V/m; Power Drift = -0.190 dB

Peak SAR (extrapolated) = 0.71 W/kg

**SAR(1 g) = 0.318 mW/g; SAR(10 g) = 0.138 mW/g**

Maximum value of SAR (measured) = 0.505 mW/g



Test Laboratory: Bureau Veritas ADT

## M14-Vertical back -11g

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

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

Medium: MSL2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 53.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical back side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Mid Channel 6/Area Scan (6x8x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.562 mW/g

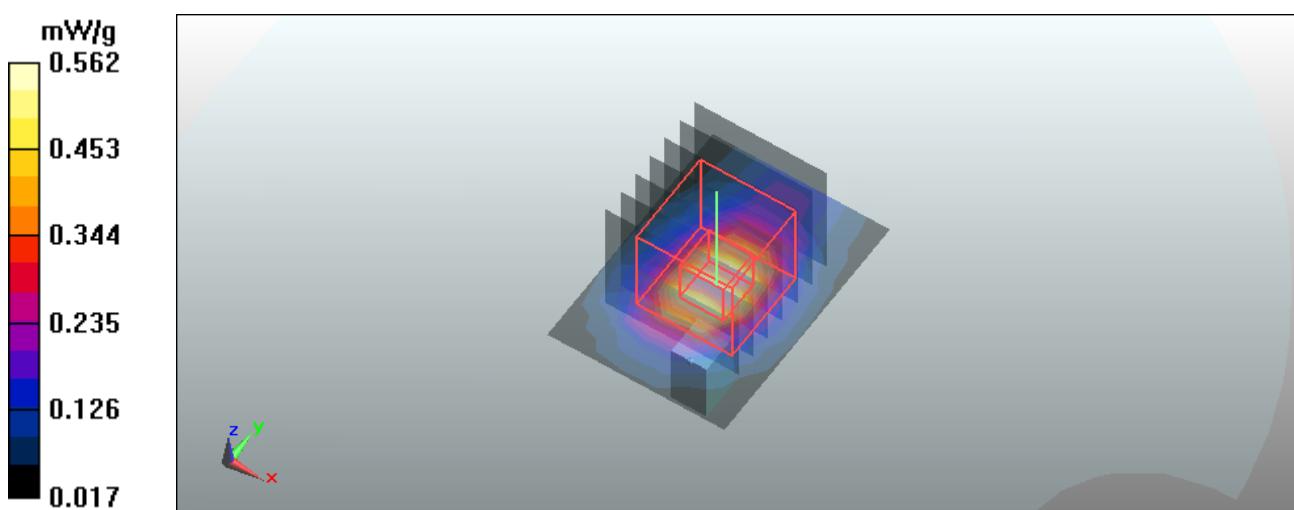
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.5 V/m; Power Drift = -0.147 dB

Peak SAR (extrapolated) = 0.816 W/kg

**SAR(1 g) = 0.364 mW/g; SAR(10 g) = 0.157 mW/g**

Maximum value of SAR (measured) = 0.582 mW/g



Test Laboratory: Bureau Veritas ADT

## M15-Vertical back -11n-20M

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11n 20MHz ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 53.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical back side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Mid Channel 6/Area Scan (6x8x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.478 mW/g

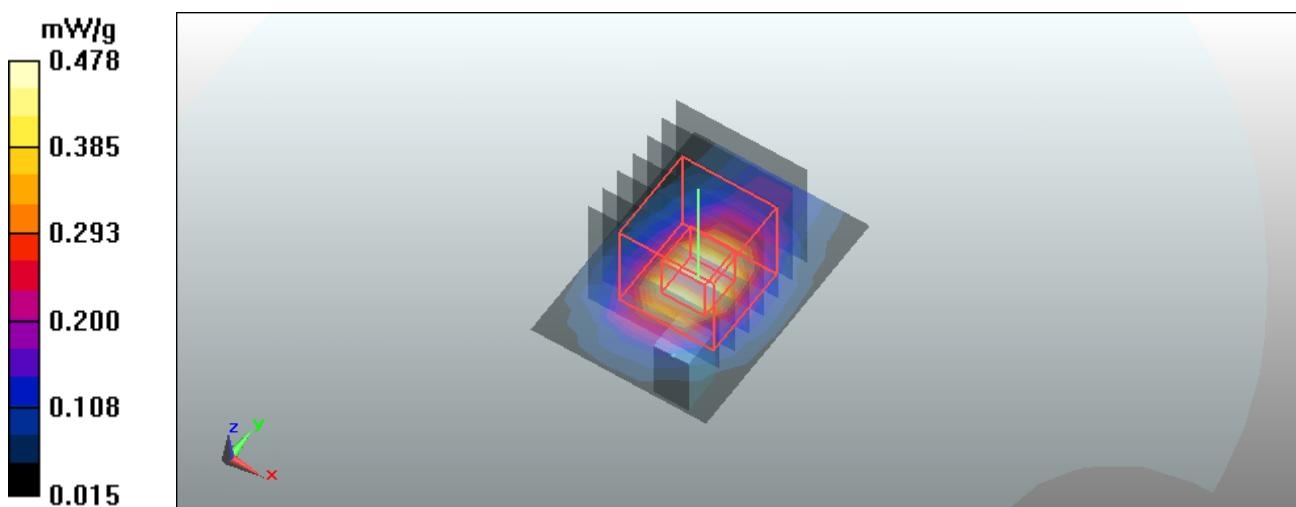
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.5 V/m; Power Drift = -0.163 dB

Peak SAR (extrapolated) = 0.785 W/kg

**SAR(1 g) = 0.352 mW/g; SAR(10 g) = 0.152 mW/g**

Maximum value of SAR (measured) = 0.561 mW/g



Test Laboratory: Bureau Veritas ADT

## M16-Vertical back -11n-40M

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11n 40MHz ; Frequency: 2422 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used:  $f = 2422$  MHz;  $\sigma = 1.99$  mho/m;  $\epsilon_r = 54.$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Separation distance : 5 mm (The Vertical back side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Low Channel 1/Area Scan (6x8x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.389 mW/g

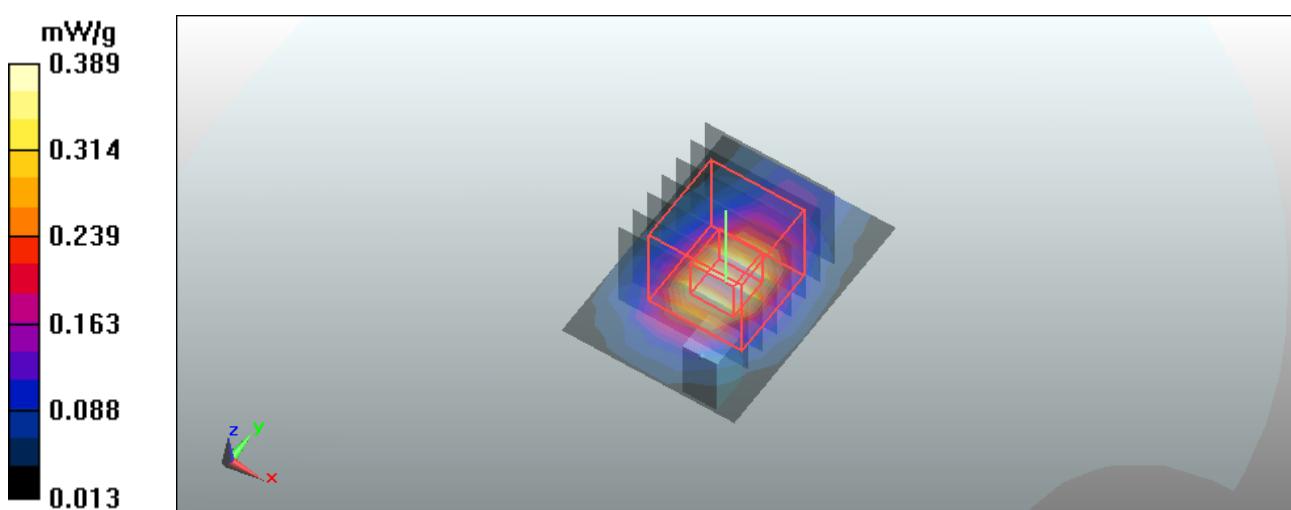
**Low Channel 1/Zoom Scan (7x7x7) (7x7x9)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 10.18 V/m; Power Drift = -0.108 dB

Peak SAR (extrapolated) = 0.639 W/kg

**SAR(1 g) = 0.286 mW/g; SAR(10 g) = 0.124 mW/g**

Maximum value of SAR (measured) = 0.457 mW/g



Test Laboratory: Bureau Veritas ADT

## M17-Tip-11b

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11b ; Frequency: 2412 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK

Medium: MSL2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.97 \text{ mho/m}$ ;  $\epsilon_r = 54$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Separation distance : 5 mm (The Tip side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Low Channel 1/Area Scan (7x7x1):** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$

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

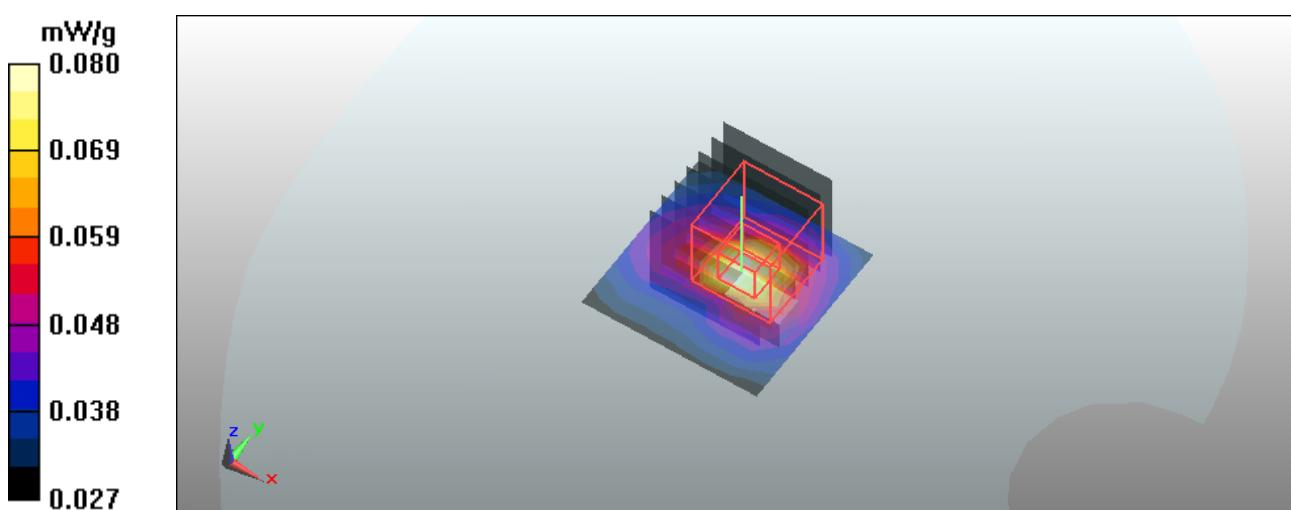
**Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 6.42 V/m; Power Drift = -0.182 dB

Peak SAR (extrapolated) = 0.142 W/kg

**SAR(1 g) = 0.057 mW/g; SAR(10 g) = 0.027 mW/g**

Maximum value of SAR (measured) = 0.095 mW/g



Test Laboratory: Bureau Veritas ADT

## M18-Tip-11g

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

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

Medium: MSL2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 53.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Separation distance : 5 mm (The Tip side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Mid Channel 6/Area Scan (7x7x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.092 mW/g

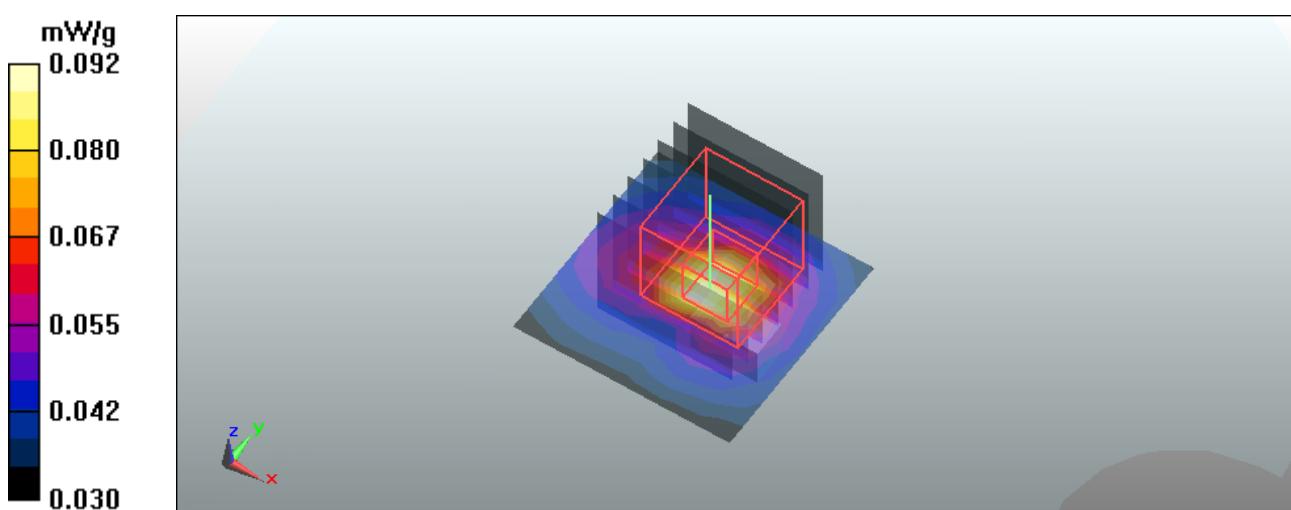
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.78 V/m; Power Drift = -0.013 dB

Peak SAR (extrapolated) = 0.157 W/kg

**SAR(1 g) = 0.063 mW/g; SAR(10 g) = 0.030 mW/g**

Maximum value of SAR (measured) = 0.106 mW/g



Test Laboratory: Bureau Veritas ADT

## M19-Tip-11n-20M

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11n 20MHz ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 53.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section ; Separation distance : 5 mm (The Tip side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Mid Channel 6/Area Scan (7x7x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.091 mW/g

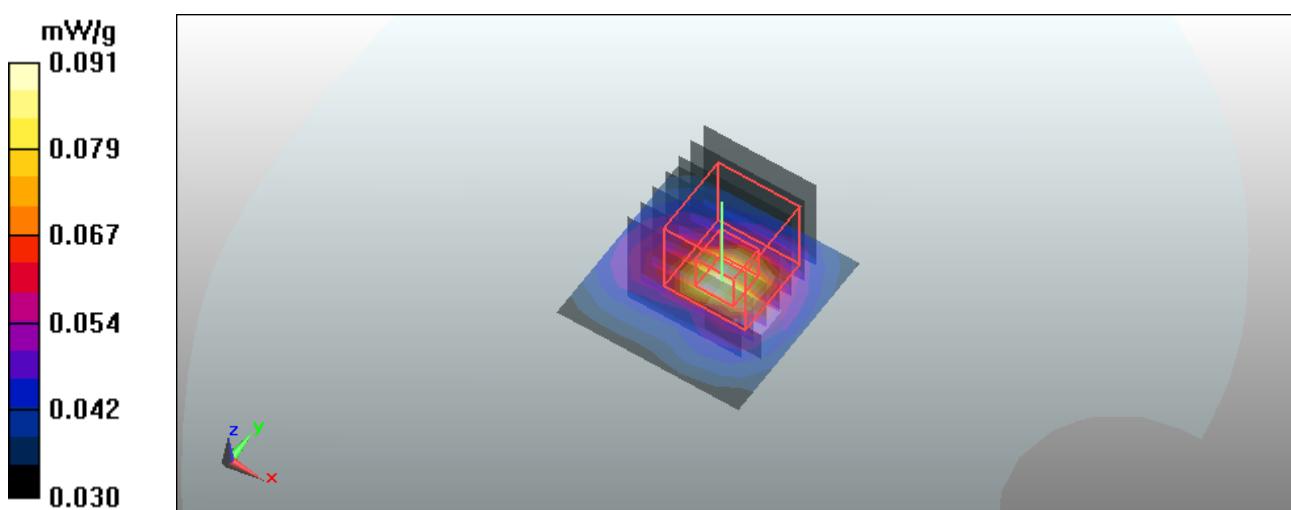
**Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.76 V/m; Power Drift = - 0.0441 dB

Peak SAR (extrapolated) = 0.158 W/kg

**SAR(1 g) = 0.062 mW/g; SAR(10 g) = 0.029 mW/g**

Maximum value of SAR (measured) = 0.106 mW/g



Test Laboratory: Bureau Veritas ADT

## M20-Tip-11n-40M

**DUT: 802.11n 150Mbps 1x1 WLAN Tiny USB Dongle ; Type: WLN-1513**

Communication System: 802.11n 40MHz ; Frequency: 2422 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used:  $f = 2422$  MHz;  $\sigma = 1.99$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section ; Separation distance : 5 mm (The Tip side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**Low Channel 3/Area Scan (7x7x1):** Measurement grid: dx=8mm, dy=8mm

Maximum value of SAR (measured) = 0.074 mW/g

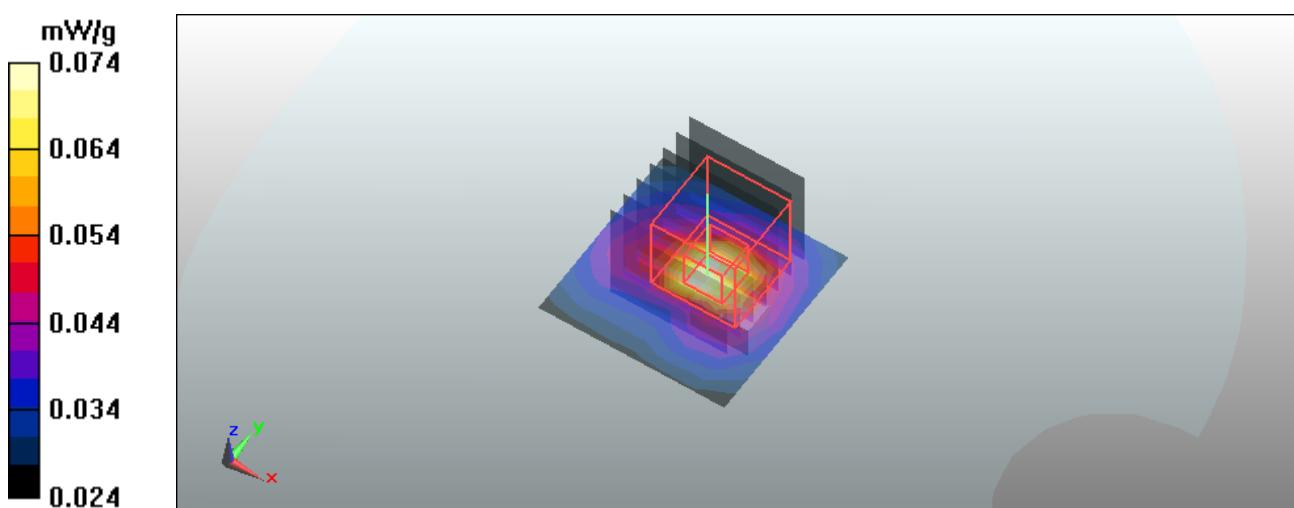
**Low Channel 3/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.12 V/m; Power Drift = -0.091 dB

Peak SAR (extrapolated) = 0.130 W/kg

**SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.024 mW/g**

Maximum value of SAR (measured) = 0.086 mW/g



Test Laboratory: Bureau Veritas ADT

## System Performance Check-MSL2450 8-12

**DUT: Dipole 2450 MHz ; Type: D2450V2 ; Serial: 737 ; Test Frequency: 2450 MHz**

Communication System: CW ; Frequency: 2450 MHz; Duty Cycle: 1:1; Modulation type: CW

Medium: MSL2450; Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.04$  mho/m;  $\epsilon_r = 53.9$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 152mm

Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 22.7 degrees ; Liquid temp. : 22.5 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Area Scan (7x7x1):** Measurement grid:

dx=15mm, dy=15mm

Maximum value of SAR (measured) = 16.9 mW/g

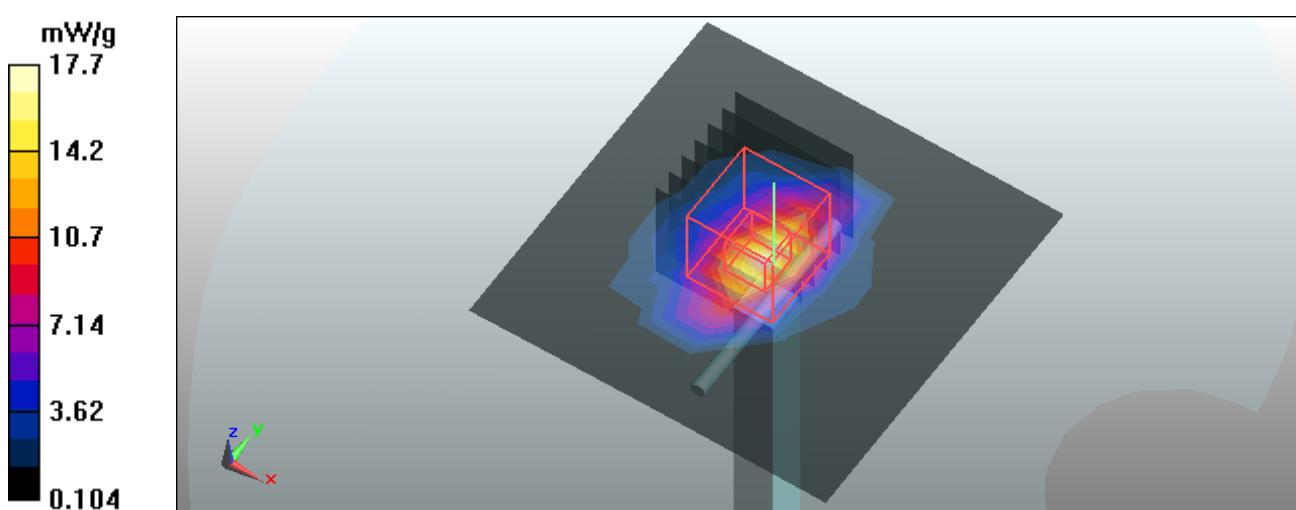
**d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Zoom Scan(7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.5 V/m; Power Drift = -0.105 dB

Peak SAR (extrapolated) = 29.2 W/kg

**SAR(1 g) = 12.9 mW/g; SAR(10 g) = 5.92 mW/g**

Maximum value of SAR (measured) = 17.7 mW/g



Test Laboratory: Bureau Veritas ADT

## System Performance Check-MSL2450 8-13

**DUT: Dipole 2450 MHz ; Type: D2450V2 ; Serial: 737 ; Test Frequency: 2450 MHz**

Communication System: CW ; Frequency: 2450 MHz; Duty Cycle: 1:1; Modulation type: CW

Medium: MSL2450; Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.02$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup> ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 23 degrees ; Liquid temp. : 22.7 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(7.91, 7.91, 7.91); Calibrated: 2010/1/26
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

**d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Area Scan (7x7x1):** Measurement grid:

dx=15mm, dy=15mm

Maximum value of SAR (measured) = 17.7 mW/g

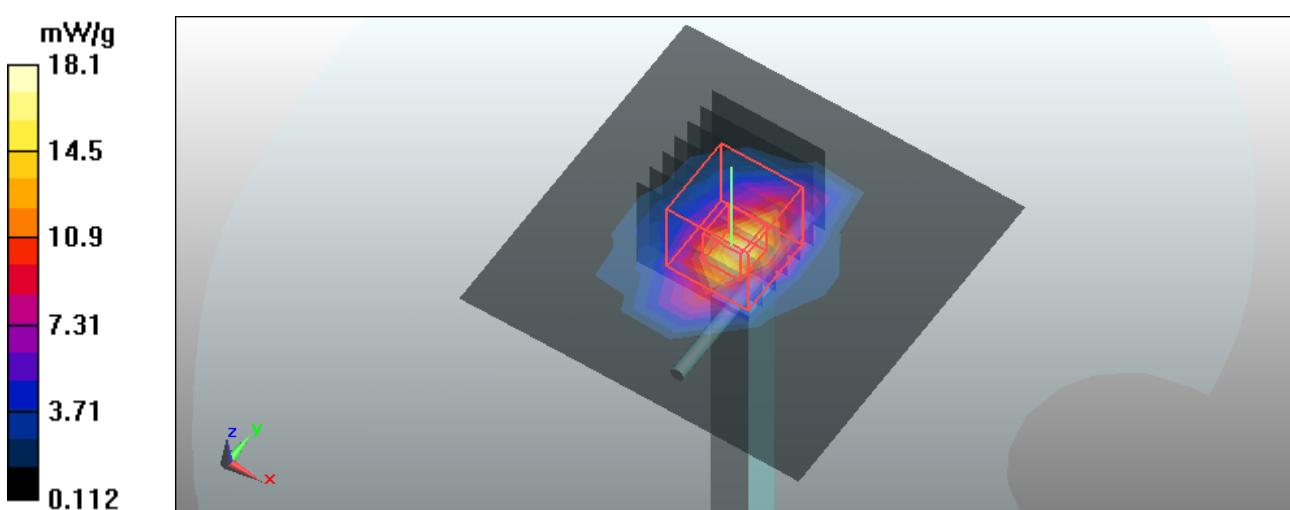
**d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Zoom Scan(7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.6 V/m; Power Drift = -0.163 dB

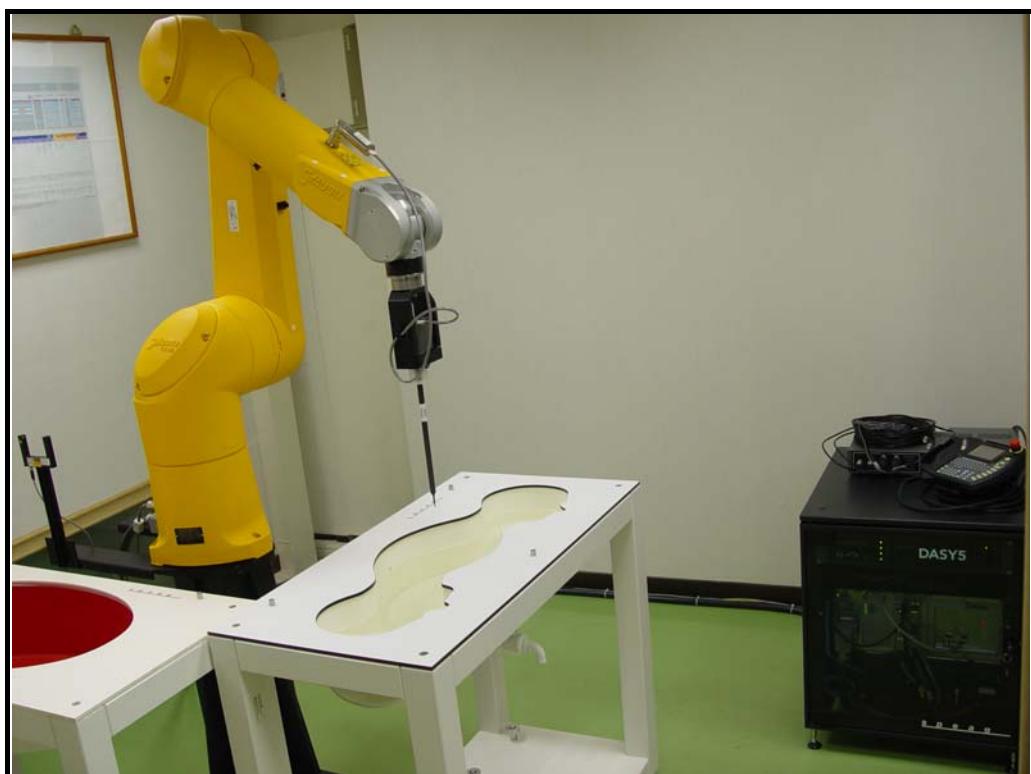
Peak SAR (extrapolated) = 30.2 W/kg

**SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.08 mW/g**

Maximum value of SAR (measured) = 18.1 mW/g



## APPENDIX B: BV ADT SAR MEASUREMENT SYSTEM



## APPENDIX C: PHOTOGRAPHS OF SYSTEM VALIDATION

