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SAR TEST REPORT

REPORT NO.: SA990809E03

MODEL NO.: MC9190

FCC ID: UZ7MC9190

RECEIVED: Aug. 09, 2010

TESTED: Aug. 24 ~ Aug. 27, 2010

ISSUED: Sep. 01, 2010

APPLICANT: Motorola Inc.

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1. CERTIFICATION

PRODUCT: Mobile Computer
MODEL: MC9190
BRAND: MOTOROLA
APPLICANT: Motorola Inc.
TESTED: Aug. 24 ~ Aug. 27, 2010
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: **FCC Part 2 (Section 2.1093)**
FCC OET Bulletin 65, Supplement C (01-01)
RSS-102 Issue 4 (2010-03)

The above equipment (model: MC9190) 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.

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APPROVED BY : Gary Chang , **DATE** : Sep. 01, 2010
Gary Chang / Assistant Manager



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

EUT	Mobile Computer
MODEL NO.	MC9190
FCC ID	UZ7MC9190
POWER SUPPLY	DC 7.4V from battery, DC 12V to cradle or DC 12V to connection adapter
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b:11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps
OPERATING FREQUENCY	802.11b & 802.11g: 2.412 ~ 2.472GHz 802.11a: 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.50 ~ 5.7GHz, 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	802.11b, 802.11g:13 802.11a: 19 (for 5180 ~ 5700MHz) 802.11a: 5 (for 5745 ~ 5825MHz)
MAXIMUM SAR (1g)	802.11b:0.068W/kg 802.11g:0.087W/kg 802.11a:0.264W/kg (for 5180 ~ 5700MHz) 802.11a:0.336W/kg (for 5745 ~ 5825MHz)
ANTENNA TYPE	Please see note
DATA CABLE	RS232 cable x 1 (Part No.: 25-62164-01R) USB cable x 1 (Part No.: 25-62166-01R)
I/O PORTS	Audio port x 1, SD slot port x 1
ASSOCIATED DEVICES	Battery x 1 (Part No.: 21-65587-03) Cable adapters (Part No.: ADP9000-100R, ADP9000-110R) Holster (Part No.: SG-MC9121112-01R) Heated boot (Part No.: SG-MC9024242-01R) Snap on Mag Stripe Reader (Part No.: MSR9001-100R) Modem Module - Dongle (Part No.: MDM9000-100R) Headsets (Part No.:50-11300-050R, RCH50)

NOTE:

- The EUT is a Mobile Computer. The test data are separated into following test reports.

	REFERENCE REPORT
WLAN (SAR Test)	SA990809E03
BT (Calculation)	SA990809E03-2



2. There are two antennas provided to this EUT, please refer to the following table:

No.	Brand	Model No.	Antenna Type	Gain (dBi)	Connector Type	Frequency range (MHz)	Cable Loss (dB)	Cable Length
1	WhaYu	Main (Tx & Rx)	PIFA	4.34 (2.4G) 5.54 (5G)	IPX	2400~2500 4900~5850	0.1	35mm
2	WhaYu	Aux (Rx only)	PIFA	3.83 (2.4G) 5.51 (5G)	IPX	2400~2500 4900~5850	0.24	85mm

3. The EUT configuration list:

	EUT_1	EUT_2	EUT_3	EUT_4	EUT_5	EUT_6
OS	WM6.5	WM6.5	WM6.5	WM6.5	WM6.5	WM6.5
CPU	806MHz	806MHz	806MHz	806MHz	806MHz	806MHz
RAM	256MB	256MB	256MB	256MB	256MB	256MB
Flash	1G	1G	1G	1G	1G	1G
Keypad	28/43/53keys	28/43/53keys	28/43/53keys	28/43/53keys	28/43/53keys	28/43/53keys
Battery	SYMBOL	SYMBOL	SYMBOL	SYMBOL	SYMBOL	SYMBOL
Scan	SE960	-	SE1524	-	-	-
Imager	-	SE4500-STD	-	SE4600-LR	SE4500-DL	SE4500-DPM
WLAN (a/b/g)	V	V	V	V	V	V
BT	V	V	V	V	V	V

**The above configurations are available also with CR (Condensation Resistant).

4. The EUT could be supplied with a Cradle, power adapter and battery as below table:

Cradle 1 (1-slot, not for sale together)	
Brand:	SYMBOL
Model No.:	CRD9000-1000
Part No.:	CRD9000-1001SR
Input power :	+12V ----- 9A
I/O Ports:	USB Port x 1 RS232 Port x 1
Associated Devices:	USB cable (Part No.:25-64396-01R) RS232 cable (Part No.:25-63852-01R) Adapter x 2 (Adapter 1: Part No.: 50-14000-148R) (Adapter 2: Part No.: PWRS-14000-148R)



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Cradle 2 (4-slot, not for sale together)	
Brand:	SYMBOL
Model No.:	CHS9000-4000C
Part No.:	CHS9000-4001CR
Input power :	+12V ----- 4A
Associated Devices:	US AC line cord (Part No.: 23844-00-00R) DC Line Cord for Four Slot Cradles (Part No.: 50-16002-029) Adapter x 2 (Adapter 3: Part No.: 50-14000-241R) (Adapter 4: Part No.: PWRS-14000-241R)
Cradle 3 (4-slot, not for sale together)	
Brand:	SYMBOL
Model No.:	CRD9000-4000E
Part No.:	CRD9000-4001ER
Input power :	+12V ----- 4A
I/O Ports:	Ethernet Port x 1
Associated Devices:	US AC line cord (Part No.: 23844-00-00R) DC Line Cord for Four Slot Cradles (Part No.: 50-16002-029) Adapter x 2 (Adapter 3: Part No.: 50-14000-241R) (Adapter 4: Part No.: PWRS-14000-241R)
Adapter 1 (not for sale together)	
Brand:	HIPRO
Model No.:	HP-O2040D43
Part No.:	50-14000-148R
Input power :	100-240V, 50-60Hz, 1.5A
Output power :	+12V ----- 3.33A DC output cable (unshielded, 1.8m with one core)
Adapter 2 (not for sale together)	
Brand:	HIPRO
Model No.:	HP-A0502R3D
Part No.:	PWRS-14000-148R
Input power :	100-240V, 50-60Hz, 2.4A
Output power :	+12V ----- 4.16A DC output cable (unshielded, 1.8m with one core)



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Adapter 3 (only for Cradle 2,3 use, not for sale together)	
Brand:	MOTOROLA
Model No.:	50-14000-241R ver1 (level IV)
Input power :	100-240V, 50-60Hz , 3A
Output power :	+12V ----- 9A DC output cable (Part No.: 25-72614-01R)
Adapter 4 (only for Cradle 2,3 use, not for sale together)	
Brand:	MOTOROLA
Model No.:	50-14000-241R ver2 (level V, p/n PWRS-14000-241R)
Input power :	100-240V, 50-60Hz, 3A
Output power :	+12V ----- 9A DC output cable (Part No.: 25-72614-01R)
Battery	
Brand:	SYMBOL
Part No.:	21-65587-03
Rating:	7.4V, 2200mAh, 16.3Wh

5. The EUT operates in both the 5GHz and 2.4GHz Bands and compatibility with 802.11a, 802.11b, 802.11g and Bluetooth technology.
6. 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 Issue 4 (2010-03)

IEEE 1528-2003

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



2.3 GENERAL INFORMATION 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 from the optical into digital electric signal of the DAE and transfers data to the PC.

EX3DV3 ISOTROPIC E-FIELD PROBE

CONSTRUCTION	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
FREQUENCY	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
DIRECTIVITY	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
DYNAMIC RANGE	10 μ W/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)
DIMENSIONS	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) 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 1/4 balun enables measurement of feedpoint impedance with NWA matched for use near flat phantoms filled with brain simulating solutions. 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 2450, 5800MHz

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 200M Ω ; 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-1043	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 Unimation	NA	NA	NA	NA
6	Validation Dipole	S & P	D2450V2	737	Feb. 19, 2010	Feb. 18, 2011
7	Validation Dipole	S & P	D5GHzV2	1018	Jan. 22, 2010	Jan. 21, 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 _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	σ
	- Density	ρ

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:

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

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:

$$\text{E-field probes: } E_i = \sqrt{\frac{V_i}{\text{Norm}_i \cdot \text{ConvF}}}$$

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

- V_i = compensated signal of channel I (i = x, y, z)
- Norm_i = sensor sensitivity of channel i $\mu\text{V}/(\text{V/m})^2$ 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
- σ = conductivity in [mho/m] or [Siemens/m]
- ρ = equivalent tissue density in g/cm³



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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 then 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

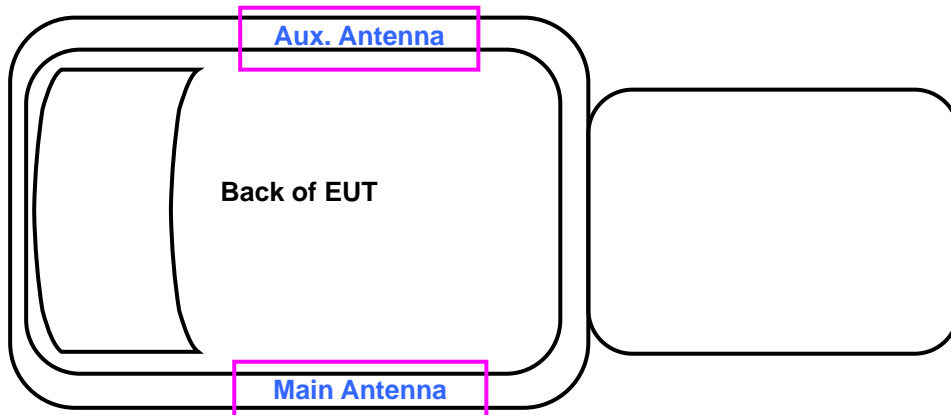
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	PART NO.	FCC ID
1	Holster	NA	NA	SG-MC9121112-01R	NA

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

NOTE: Item 1 was supplied from client.

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 liters of tissue simulation liquid.

The following ingredients are used :

- **WATER-** Deionized water (pure H₂O), 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	BODY SIMULATING LIQUID 2450MHz (MSL-2450)
Water	69.83%
DGMBE	30.17%
Dielectric Parameters at 22 °C	$f = 2450\text{MHz}$ $\epsilon = 52.7 \pm 5\%$ $\sigma = 1.95 \pm 5\% \text{ S/m}$

THE INFORMATION FOR 5GHz SIMULATING LIQUID

The 5GHz liquids was purchased from SPEAG.

Body liquid model: HSL 5800, P/N: SL AAH 5800 AA

Head liquid model: M 5800, P/N: SL AAM 580 AD

5GHz liquids contain the following ingredients:

Water 64 - 78%

Mineral Oil 11 - 18%

Emulsifiers 9 - 15%

Additives and Salt 2 - 3%

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 $>8\text{mm}$ thickness $\epsilon' = 10.0$, $\epsilon'' = 0.0$). 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 $\sigma = \omega \epsilon_0 \epsilon'' = \epsilon'' f [\text{GHz}] / 18$.
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 SIMULATING LIQUID

LIQUID TYPE		MSL-2450			
SIMULATING LIQUID TEMP.		22.8			
TEST DATE		Aug. 24, 2010			
TESTED BY		Aaron Liang			
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)	LIMIT(%)
2437.0	Permittivity (ϵ)	52.70	53.70	1.90	±5
2450.0		52.70	53.60	1.71	
2437.0	Conductivity (σ) S/m	1.94	1.96	1.03	
2450.0		1.95	1.98	1.54	

LIQUID TYPE		MSL-5800			
SIMULATING LIQUID TEMP.		22.6			
TEST DATE		Aug. 26, 2010			
TESTED BY		Aaron Liang			
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)	LIMIT(%)
5200	Permittivity (ϵ)	49.00	48.50	-1.02	±5
5220		49.00	48.30	-1.43	
5280		48.90	48.20	-1.43	
5500		48.60	47.90	-1.44	
5520		48.60	47.60	-2.06	
5785		48.20	47.30	-1.87	
5800		48.20	47.10	-2.28	
5200	Conductivity (σ) S/m	5.30	5.37	1.32	
5220		5.32	5.40	1.50	
5280		5.39	5.45	1.11	
5500		5.65	5.70	0.88	
5520		5.67	5.73	1.06	
5785		5.98	5.92	-1.00	
5800		6.00	6.05	0.83	



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LIQUID TYPE		MSL-5800			
SIMULATING LIQUID TEMP.		22.8			
TEST DATE		Aug. 27, 2010			
TESTED BY		Aaron Liang			
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)	LIMIT(%)
5200	Permittivity (ϵ)	49.00	48.60	-0.82	±5
5220		49.00	48.40	-1.22	
5280		48.90	48.30	-1.23	
5500		48.60	47.80	-1.65	
5520		48.60	47.60	-2.06	
5785		48.20	47.20	-2.07	
5800		48.20	47.00	-2.49	
5200	Conductivity (σ) S/m	5.30	5.41	2.08	
5220		5.32	5.43	2.07	
5280		5.39	5.48	1.67	
5500		5.65	5.75	1.77	
5520		5.67	5.76	1.59	
5785		5.98	5.96	-0.33	
5800		6.00	6.13	2.17	

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 ± 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 ± 0.02 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 ± 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 ± 0.1 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%.



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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)	13.30	1.53	10mm	Aug. 24, 2010
MSL5200	8.14 (1g)	8.34	2.46	10mm	Aug. 26, 2010
MSL5500	8.71 (1g)	8.86	1.72	10mm	Aug. 26, 2010
MSL5800	7.54 (1g)	7.70	2.12	10mm	Aug. 26, 2010
MSL5200	8.14 (1g)	8.24	1.23	10mm	Aug. 27, 2010
MSL5500	8.71 (1g)	8.96	2.87	10mm	Aug. 27, 2010
MSL5800	7.54 (1g)	7.63	1.19	10mm	Aug. 27, 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 (±%)	Probability Distribution	Divisor	(C _i)		Standard Uncertainty (±%)		(v _i)
				(1g)	(10g)	(1g)	(10g)	
Measurement System								
Probe Calibration	6.55	Normal	1	1	1	6.55	6.55	∞
Axial Isotropy	0.25	Rectangular	√3	0.7	0.7	0.10	0.10	∞
Hemispherical Isotropy	1.30	Rectangular	√3	0.7	0.7	0.53	0.53	∞
Boundary effects	1.00	Rectangular	√3	1	1	0.58	0.58	∞
Linearity	0.30	Rectangular	√3	1	1	0.17	0.17	∞
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	9
RF Ambient Reflections	3.00	Rectangular	√3	1	1	1.73	1.73	9
Probe Positioner	0.40	Rectangular	√3	1	1	0.23	0.23	∞
Probe Positioning	2.90	Rectangular	√3	1	1	1.67	1.67	∞
Max. SAR Eval.	1.00	Rectangular	√3	1	1	0.58	0.58	∞
Test sample related								
Sample positioning	1.90	Normal	1	1	1	1.90	1.90	4
Device holder uncertainty	2.80	Normal	1	1	1	2.80	2.80	4
Output power variation-SAR drift measurement	4.62	Rectangular	√3	1	1	2.67	2.67	1
Dipole Related								
Dipole Axis to Liquid Distance	1.60	Rectangular	√3	1	1	0.92	0.92	4
Input Power Drift	3.94	Rectangular	√3	1	1	2.28	2.28	1
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)	2.17	Normal	1	0.64	0.43	1.39	0.93	9
Liquid Permittivity (target)	5.00	Rectangular	√3	0.6	0.49	1.73	1.41	∞
Liquid Permittivity (measurement)	2.70	Normal	1	0.6	0.49	1.62	1.32	9
Combined Standard Uncertainty						9.83	9.58	
Coverage Factor for 95%						Kp=2		
Expanded Uncertainty (K=2)						19.65	19.16	

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 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 2mm and maintained at a constant distance of $\pm 0.5\text{mm}$ during a zoom scan to determine peak SAR locations. The distance is 2mm 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 7mm 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 2mm 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	AVG (dBm)	PEAK (dBm)
1	2412	DBPSK	13.4	16.1
6	2437	DBPSK	13.5	16.2
11	2462	DBPSK	13.3	16.0

TEST MODE			802.11g	
CHAN.	FREQ. (MHz)	MODULATION TYPE	AVG (dBm)	PEAK (dBm)
1	2412	BPSK	11.2	20.4
6	2437	BPSK	15.2	21.7
11	2462	BPSK	11.1	20.2

TEST MODE			802.11a	
CHAN.	FREQ. (MHz)	MODULATION TYPE	AVG (dBm)	CHANNEL POWER (dBm)
36	5180	BPSK	12.3	12.4
40	5200	BPSK	14.0	14.1
44	5220	BPSK	14.2	14.4
48	5240	BPSK	12.7	12.9
52	5260	BPSK	14.1	14.2
56	5280	BPSK	14.4	14.6
60	5300	BPSK	14.3	14.4
64	5320	BPSK	11.4	11.6
100	5500	BPSK	11.7	11.8
104	5520	BPSK	13.6	13.9
116	5580	BPSK	13.0	13.56
136	5680	BPSK	13.1	13.31
140	5700	BPSK	7.0	7.1

TEST MODE			802.11a	
CHAN.	FREQ. (MHz)	MODULATION TYPE	AVG (dBm)	PEAK (dBm)
149	5745	BPSK	14.6	21.1
157	5785	BPSK	14.7	21.2
165	5825	BPSK	14.1	20.7



6.3 DESCRIPTION OF TEST CONDITION

TEST DATE	TEMPERATURE(°C)		HUMIDITY(%RH)	TESTED BY
	AIMBENT	LIQUID		
Aug. 24, 2010	23.0	22.8	60	Aaron Liang
Aug. 26, 2010	22.8	22.6	61	Aaron Liang
Aug. 27, 2010	23.0	22.8	60	Aaron Liang

6.4 MEASURED SAR RESULT

SAR (1g)			
Worst configuration: Keypad 3 (53 keys) + Scanner 4 (SE4600-LR) Test distance between EUT and phantom : 0 mm			
BODY / MSL			
CHANNEL	L-Side (main antenna) (W/Kg)	R-Side (main antenna) (W/Kg)	Front-Side (main antenna) (W/Kg)
11b CH6 2437MHz	0.00624	0.068	0.00727
11g CH6 2437MHz	0.00894	0.087	0.00915

SAR (1g)			
Worst configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) Test distance between EUT and phantom : 0 mm			
BODY / MSL			
CHANNEL	L-Side (main antenna) (W/Kg)	R-Side (main antenna) (W/Kg)	Front-Side (main antenna) (W/Kg)
CH44 5220MHz	0.0240	0.196	0.011
CH56 5280MHz	0.0351	0.264	0.013
CH104 5520MHz	0.0561	0.243	0.025
CH 157 5785MHz	0.0391	0.336	0.029

NOTE:

- In this testing, the limit for General Population Spatial Peak averaged over 1g, 1.6 W/kg, is applied.
- Please see the Appendix A for the data.
- The variation of the EUT conducted power measured before and after SAR testing should not over 5%.
- For 2412~2462, 5180~5240, 5260~5320 and 5745~5825MHz band:
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.
- For 5500~5700MHz band:
Per KDB 447498, when 1-g SAR for the highest output channel is less than 0.4 W/kg, testing for the other channels is not required.



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6.5 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. 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.

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APPENDIX A: TEST DATA

Liquid Level Photo

Tissue MSL2450MHz D=150mm



Tissue MSL5800MHz D=151mm



Tissue MSL5800MHz D=152mm



Test Laboratory: Bureau Veritas ADT

M01 L-side_11b-Ch6

Test configuration: Keypad 3 (53 keys) + Scanner 4 (SE4600-LR) + Main antenna

DUT: Mobile Computer ; Type: MC9190

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; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Separation distance : 0 mm (The Right 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: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Mid Channel 6/Area Scan (17x12x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.00816 mW/g

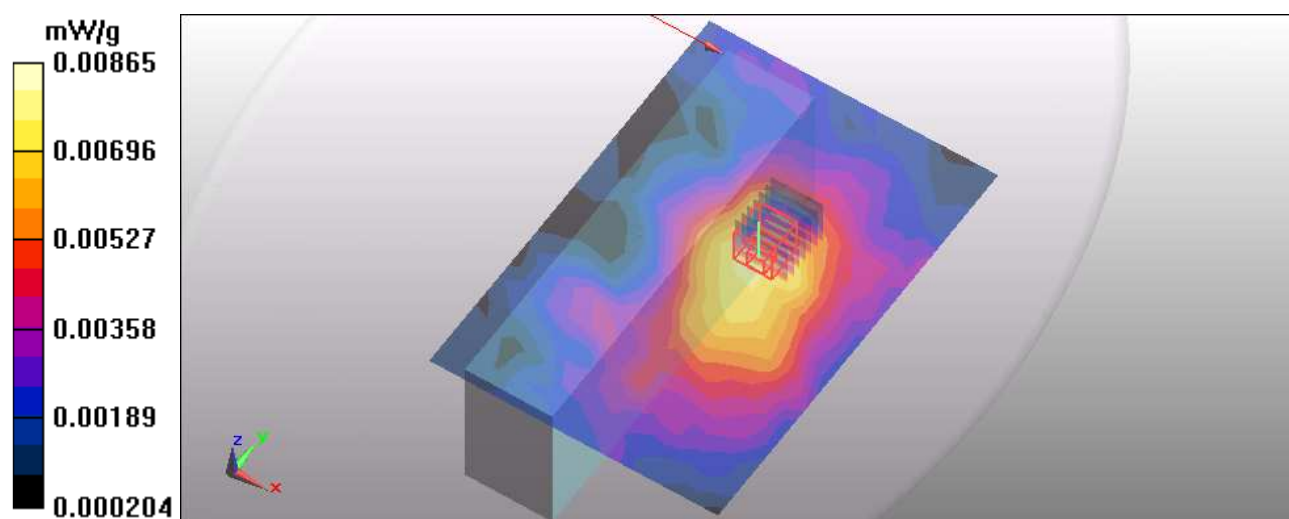
Mid Channel 6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0.801 V/m; Power Drift = 0.188 dB

Peak SAR (extrapolated) = 0.011 W/kg

SAR(1 g) = **0.00624** mW/g; SAR(10 g) = **0.00394** mW/g

Maximum value of SAR (measured) = 0.00865 mW/g



Test Laboratory: Bureau Veritas ADT

M02 L-side_11g-Ch6

Test configuration: Keypad 3 (53 keys) + Scanner 4 (SE4600-LR) + Main antenna

DUT: Mobile Computer ; Type: MC9190

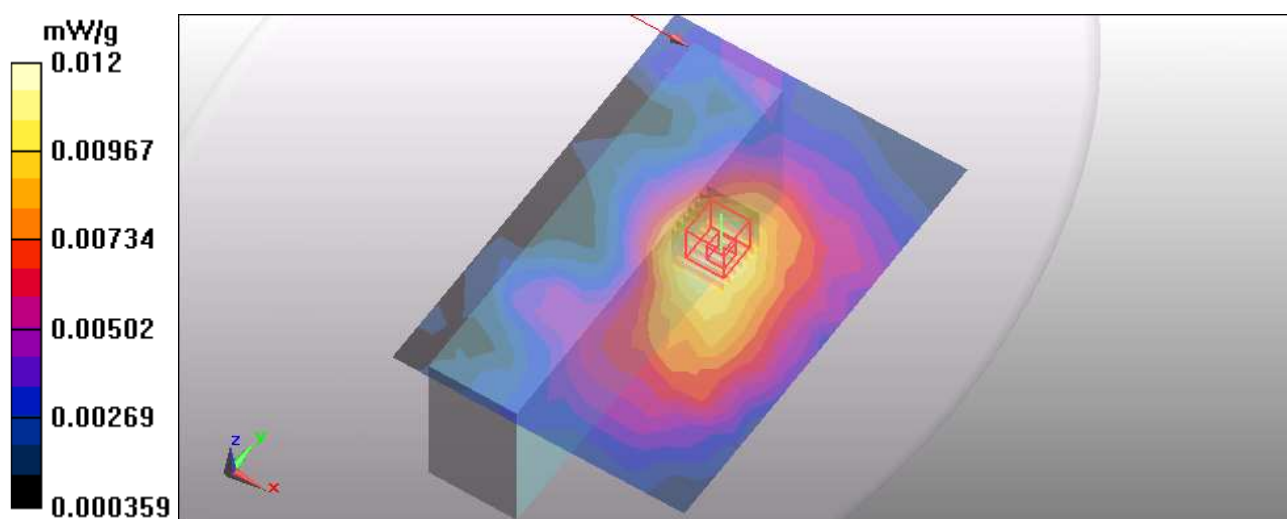
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL2450 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.96$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Separation distance : 0 mm (The Right side of the EUT 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: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Mid Channel 6 /Area Scan (17x12x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (measured) = 0.012 mW/g

Mid Channel 6 /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 0.989 V/m; Power Drift = 0.147 dB
 Peak SAR (extrapolated) = 0.016 W/kg
 SAR(1 g) = **0.00894 mW/g**; SAR(10 g) = **0.00558 mW/g**



Test Laboratory: Bureau Veritas ADT

M03 R-side_11b-Ch6

Test configuration: Keypad 3 (53 keys) + Scanner 4 (SE4600-LR) + Main antenna**DUT: Mobile Computer ; Type: MC9190**

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; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Separation distance : 0 mm (The Right 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: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Mid Channel 6/Area Scan (17x7x1): Measurement grid: dx=15mm, dy=15mm

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

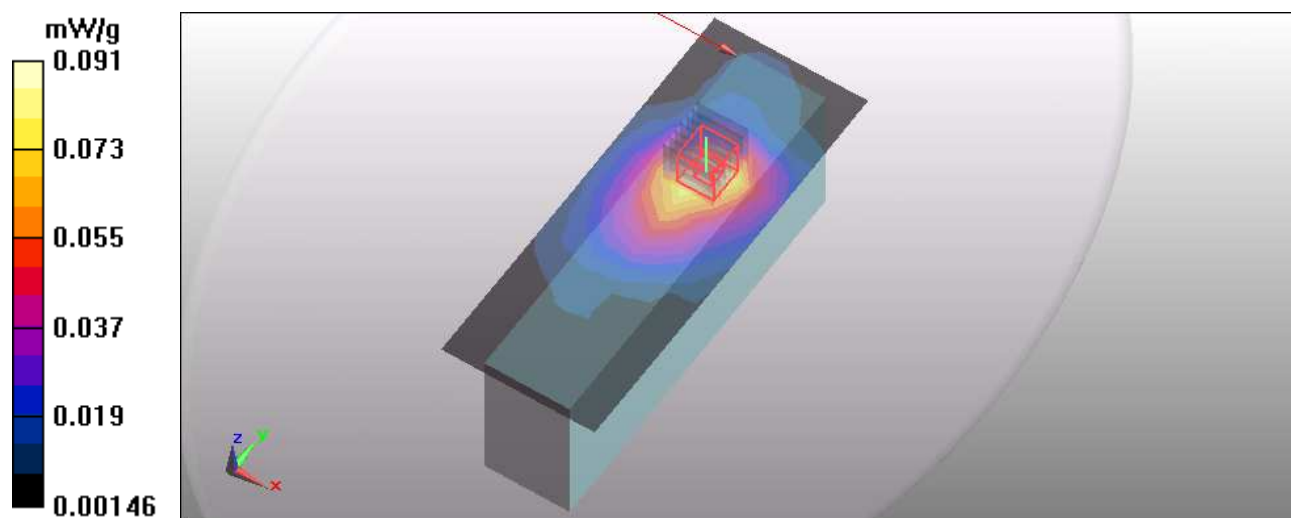
Mid Channel 6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.62 V/m; Power Drift = 0.153 dB

Peak SAR (extrapolated) = 0.122 W/kg

SAR(1 g) = **0.068** mW/g; SAR(10 g) = **0.040** mW/g

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



Test Laboratory: Bureau Veritas ADT

M04 R-side_11g-Ch6

Test configuration: Keypad 3 (53 keys) + Scanner 4 (SE4600-LR) + Main antenna

DUT: Mobile Computer ; Type: MC9190

Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL2450 Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.96 \text{ mho/m}$; $\epsilon_r = 53.7$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section ; Separation distance : 0 mm (The Right 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: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Mid Channel 6 /Area Scan (17x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.116 mW/g

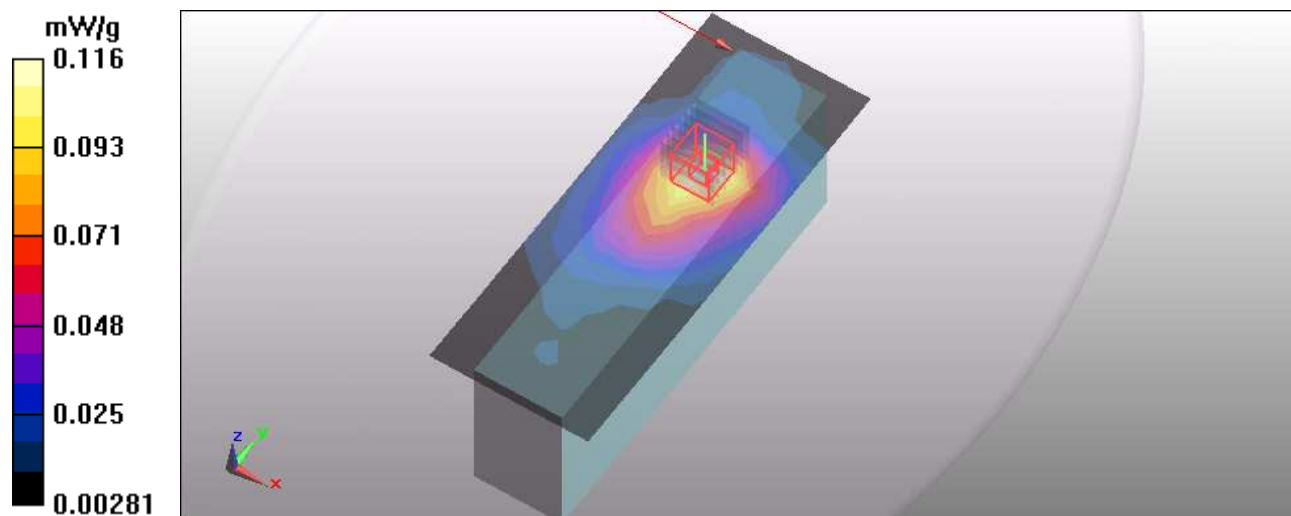
Mid Channel 6 /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.55 V/m; Power Drift = 0.076 dB

Peak SAR (extrapolated) = 0.156 W/kg

SAR(1 g) = **0.087 mW/g**; SAR(10 g) = **0.051 mW/g**

Maximum value of SAR (measured) = 0.120 mW/g



Test Laboratory: Bureau Veritas ADT

M05 Front-side_11b-Ch6

Test configuration: Keypad 3 (53 keys) + Scanner 4 (SE4600-LR) + Main antenna

DUT: Mobile Computer ; Type: MC9190

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; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Separation distance : 0 mm (The 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: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Mid Channel 6/Area Scan (17x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.015 mW/g

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

Reference Value = 0.637 V/m; Power Drift = 0.102 dB

Peak SAR (extrapolated) = 0.019 W/kg

SAR(1 g) = 0.00727 mW/g; SAR(10 g) = 0.00365 mW/g

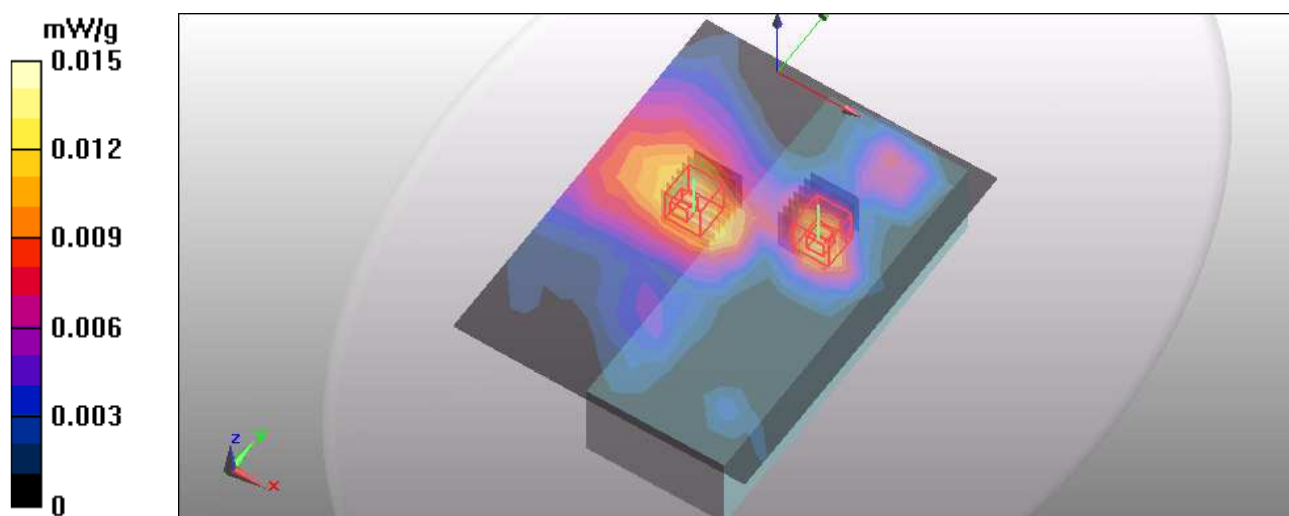
Maximum value of SAR (measured) = 0.011 mW/g

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

Reference Value = 0.637 V/m; Power Drift = 0.102 dB

Peak SAR (extrapolated) = 0.015 W/kg

SAR(1 g) = 0.00718 mW/g; SAR(10 g) = 0.00351 mW/g



Test Laboratory: Bureau Veritas ADT

M06 Front-side_11g-Ch6

Test configuration: Keypad 3 (53 keys) + Scanner 4 (SE4600-LR) + Main antenna

DUT: Mobile Computer ; Type: MC9190

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; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Separation distance : 0 mm (The 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: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Mid Channel 6/Area Scan (14x11x1): Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 0.807 V/m; Power Drift = 0.146 dB

Peak SAR (extrapolated) = 0.016 W/kg

SAR(1 g) = **0.00915** mW/g; SAR(10 g) = **0.00532** mW/g

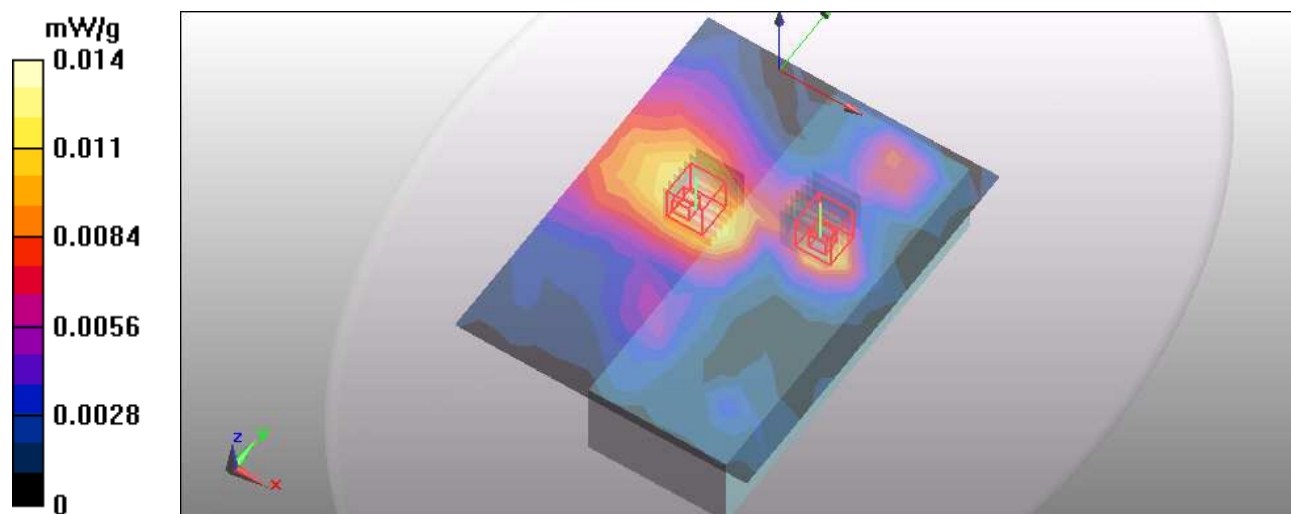
Maximum value of SAR (measured) = 0.013 mW/g

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

Reference Value = 0.807 V/m; Power Drift = 0.146 dB

Peak SAR (extrapolated) = 0.014 W/kg

SAR(1 g) = **0.00912** mW/g; SAR(10 g) = **0.00527** mW/g



Test Laboratory: Bureau Veritas ADT

M07 L-side_11a-Ch44

Test configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) + Main antenna

DUT: Mobile Computer ; Type: MC9190

Communication System: 802.11a ; Frequency: 5220 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used: $f = 5220 \text{ MHz}$; $\sigma = 5.4 \text{ mho/m}$; $\epsilon_r = 48.3$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section ; Separation distance : 0 mm (The Left side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(4.45, 4.45, 4.45); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Low Channel 44/Area Scan (14x10x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.040 mW/g

Low Channel 44/Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 1.51 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 0.078 W/kg

SAR(1 g) = 0.024 mW/g; SAR(10 g) = 0.00949 mW/g

Maximum value of SAR (measured) = 0.043 mW/g

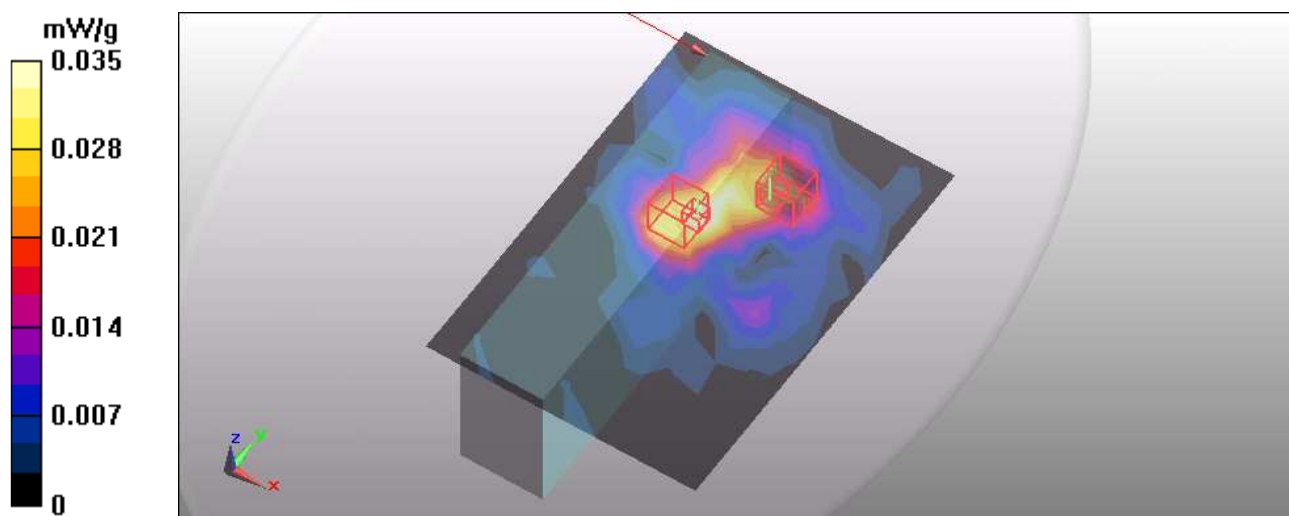
Low Channel 44/Zoom Scan (7x7x9)/Cube 1: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 1.51 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 0.076 W/kg

SAR(1 g) = 0.017 mW/g; SAR(10 g) = 0.00607 mW/g

Maximum value of SAR (measured) = 0.035 mW/g



Test Laboratory: Bureau Veritas ADT

M08 L-side_11a-Ch56

Test configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) + Main antenna**DUT: Mobile Computer ; Type: MC9190**

Communication System: 802.11a ; Frequency: 5280 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL5800 Medium parameters used: $f = 5280$ MHz; $\sigma = 5.45$ mho/m; $\epsilon_r = 48.2$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Separation distance : 0 mm (The Left side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(4.18, 4.18, 4.18); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Low Channel 56/Area Scan (14x10x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.057 mW/g

Low Channel 56/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 1.63 V/m; Power Drift = 0.105 dB

Peak SAR (extrapolated) = 0.112 W/kg

SAR(1 g) = **0.0351** mW/g; SAR(10 g) = **0.016** mW/g

Maximum value of SAR (measured) = 0.061 mW/g

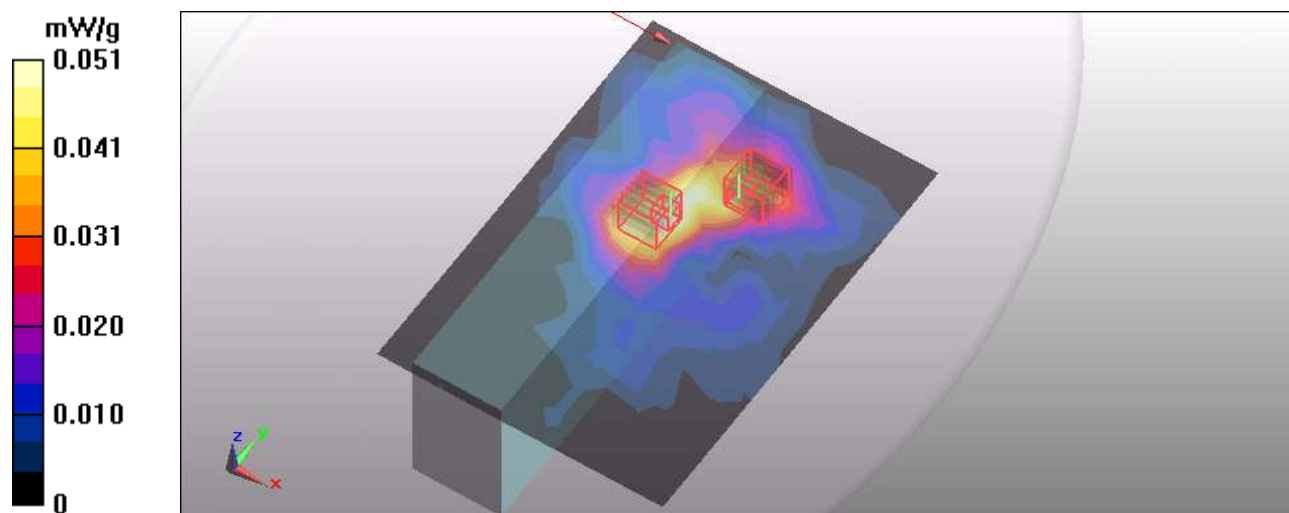
Low Channel 56/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 1.63 V/m; Power Drift = 0.105 dB

Peak SAR (extrapolated) = 0.130 W/kg

SAR(1 g) = **0.028** mW/g; SAR(10 g) = **0.011** mW/g

Maximum value of SAR (measured) = 0.051 mW/g



Test Laboratory: Bureau Veritas ADT

M09 L-side_11a-Ch104

Test configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) + Main antenna

DUT: Mobile Computer ; Type: MC9190

Communication System: 802.11a ; Frequency: 5520 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used: $f = 5520$ MHz; $\sigma = 5.73$ mho/m; $\epsilon_r = 47.6$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Separation distance : 0 mm (The Left side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.91, 3.91, 3.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: xxxx
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Mid Channel 104/Area Scan (14x10x1): Measurement grid: dx=10mm, dy=10mm

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

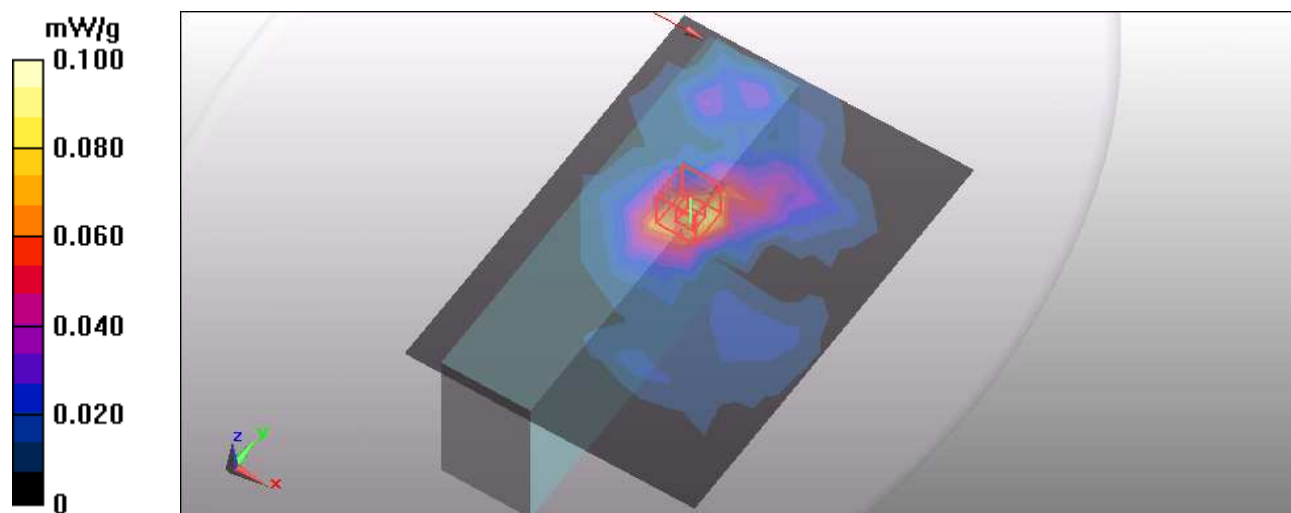
Mid Channel 104/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 2.23 V/m; Power Drift = 0.173 dB

Peak SAR (extrapolated) = 0.185 W/kg

SAR(1 g) = 0.0561 mW/g; SAR(10 g) = 0.025 mW/g

Maximum value of SAR (measured) = 0.100 mW/g



Test Laboratory: Bureau Veritas ADT

M10 L-side_11a-Ch157

Test configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) + Main antenna

DUT: Mobile Computer ; Type: MC9190

Communication System: 802.11a ; Frequency: 5785 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used: $f = 5785$ MHz; $\sigma = 5.92$ mho/m; $\epsilon_r = 47.3$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section ; Separation distance : 0 mm (The Left side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Mid Channel 157/Area Scan (14x10x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.068 mW/g

Mid Channel 157/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 1.52 V/m; Power Drift = 0.196 dB

Peak SAR (extrapolated) = 0.270 W/kg

SAR(1 g) = 0.0391 mW/g; SAR(10 g) = 0.016 mW/g

Maximum value of SAR (measured) = 0.079 mW/g

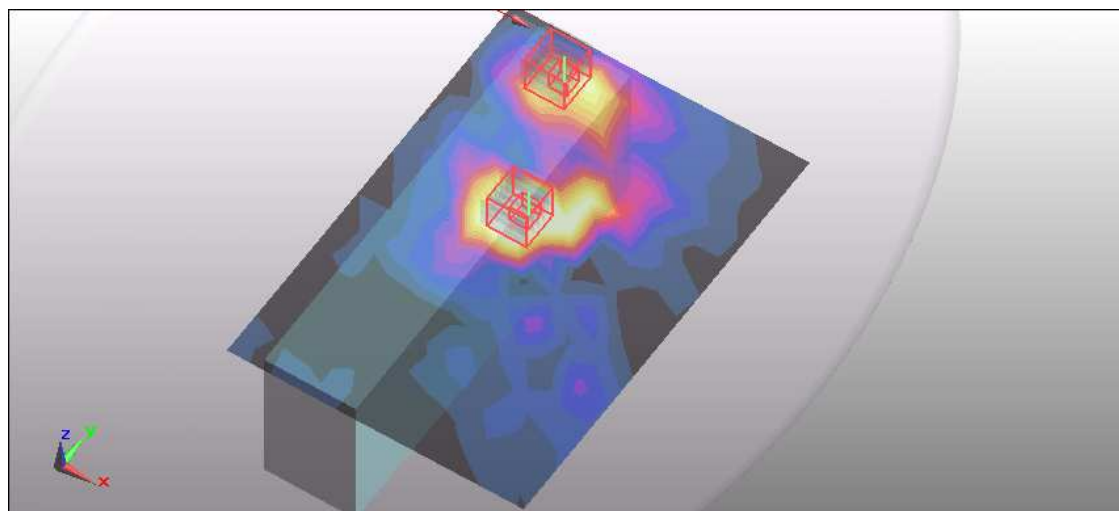
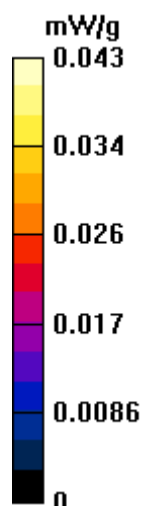
Mid Channel 157/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 1.52 V/m; Power Drift = 0.196 dB

Peak SAR (extrapolated) = 0.115 W/kg

SAR(1 g) = 0.024 mW/g; SAR(10 g) = 0.00968 mW/g

Maximum value of SAR (measured) = 0.043 mW/g



Test Laboratory: Bureau Veritas ADT

M11 R-side_11a-Ch44

Test configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) + Main antenna**DUT: Mobile Computer ; Type: MC9190**

Communication System: 802.11a ; Frequency: 5220 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL5800 Medium parameters used: $f = 5220$ MHz; $\sigma = 5.43$ mho/m; $\epsilon_r = 48.4$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Separation distance : 0 mm (The Right side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(4.45, 4.45, 4.45); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Low Channel 44/Area Scan (17x6x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.306 mW/g

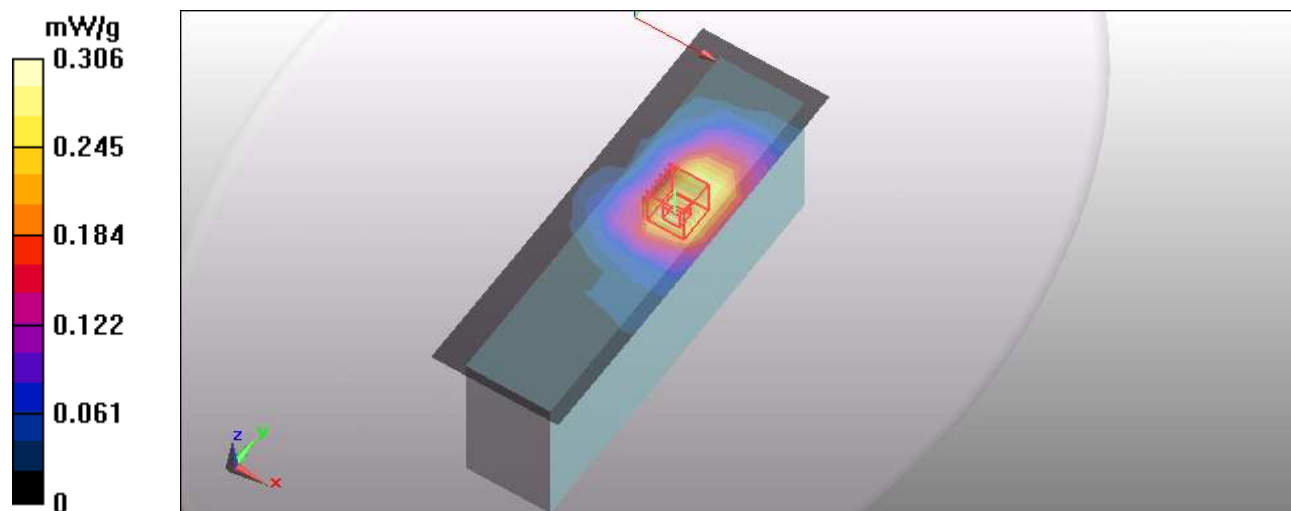
Low Channel 44/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 5.14 V/m; Power Drift = 0.177 dB

Peak SAR (extrapolated) = 0.570 W/kg

SAR(1 g) = **0.196** mW/g; SAR(10 g) = 0.088 mW/g

Maximum value of SAR (measured) = 0.335 mW/g



Test Laboratory: Bureau Veritas ADT

M12 R-side_11a-Ch56

Test configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) + Main antenna

DUT: Mobile Computer ; Type: MC9190

Communication System: 802.11a ; Frequency: 5280 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used: $f = 5280 \text{ MHz}$; $\sigma = 5.48 \text{ mho/m}$; $\epsilon_r = 48.3$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section ; Separation distance : 0 mm (The Right side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(4.18, 4.18, 4.18); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Mid Channel 56/Area Scan (17x6x1): Measurement grid: dx=10mm, dy=10mm

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

Mid Channel 56/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 5.6 V/m; Power Drift = -0.098 dB

Peak SAR (extrapolated) = 0.804 W/kg

SAR(1 g) = 0.264 mW/g; SAR(10 g) = 0.115 mW/g

Maximum value of SAR (measured) = 0.462 mW/g

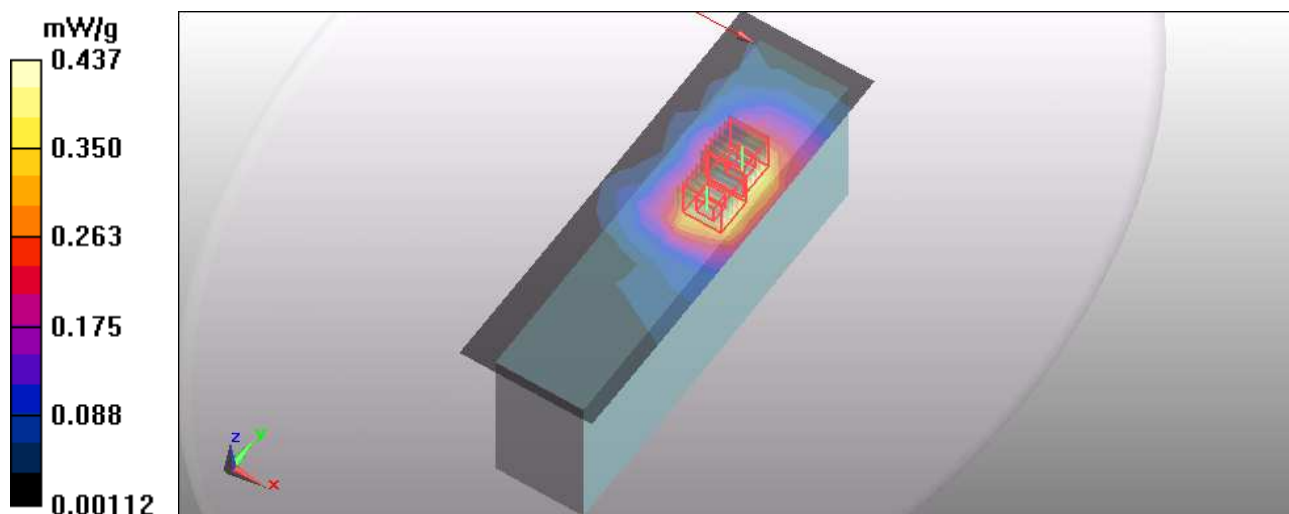
Mid Channel 56/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 5.6 V/m; Power Drift = -0.098 dB

Peak SAR (extrapolated) = 0.707 W/kg

SAR(1 g) = 0.252 mW/g; SAR(10 g) = 0.110 mW/g

Maximum value of SAR (measured) = 0.430 mW/g



Test Laboratory: Bureau Veritas ADT

M13 R-side_11a-Ch104

Test configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) + Main antenna

DUT: Mobile Computer ; Type: MC9190

Communication System: 802.11a ; Frequency: 5520 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used: $f = 5520 \text{ MHz}$; $\sigma = 5.76 \text{ mho/m}$; $\epsilon_r = 47.6$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section ; Separation distance : 0 mm (The Right side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.91, 3.91, 3.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Mid Channel 104/Area Scan (17x6x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$
 Maximum value of SAR (measured) = 0.413 mW/g

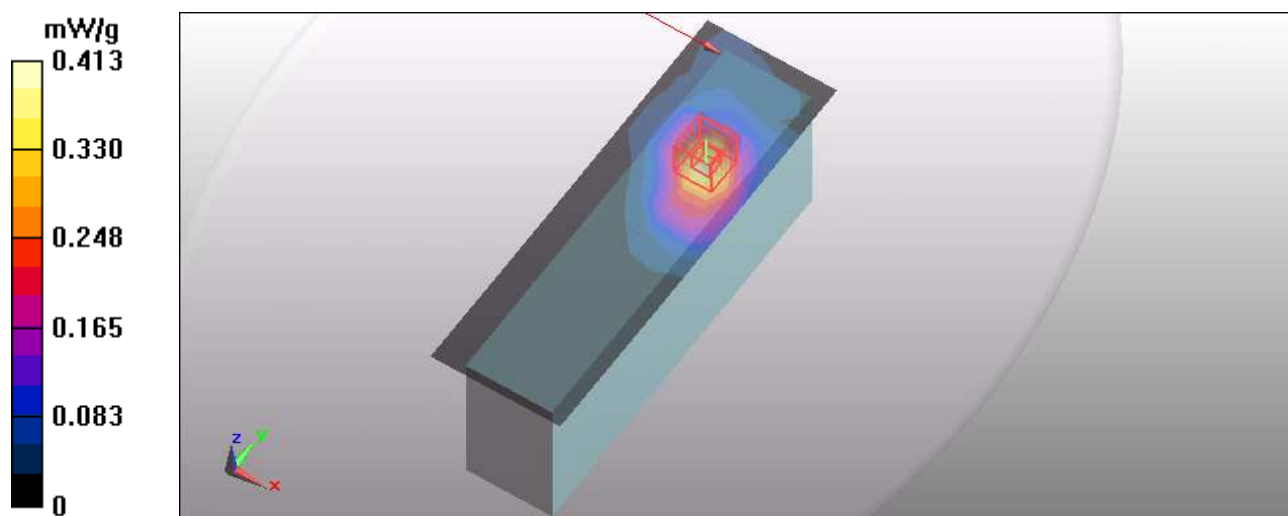
Mid Channel 104/Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$,
 $dz=2.5\text{mm}$

Reference Value = 2.91 V/m; Power Drift = 0.0032 dB

Peak SAR (extrapolated) = 0.734 W/kg

SAR(1 g) = 0.243 mW/g; SAR(10 g) = 0.103 mW/g

Maximum value of SAR (measured) = 0.428 mW/g



Test Laboratory: Bureau Veritas ADT

M14 R-side_11a-Ch157

Test configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) + Main antenna**DUT: Mobile Computer ; Type: MC9190**

Communication System: 802.11a ; Frequency: 5785 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL5800 Medium parameters used: $f = 5785$ MHz; $\sigma = 5.96$ mho/m; $\epsilon_r = 47.2$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Separation distance : 0 mm (The Right side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Mid Channel 157/Area Scan (17x6x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.612 mW/g

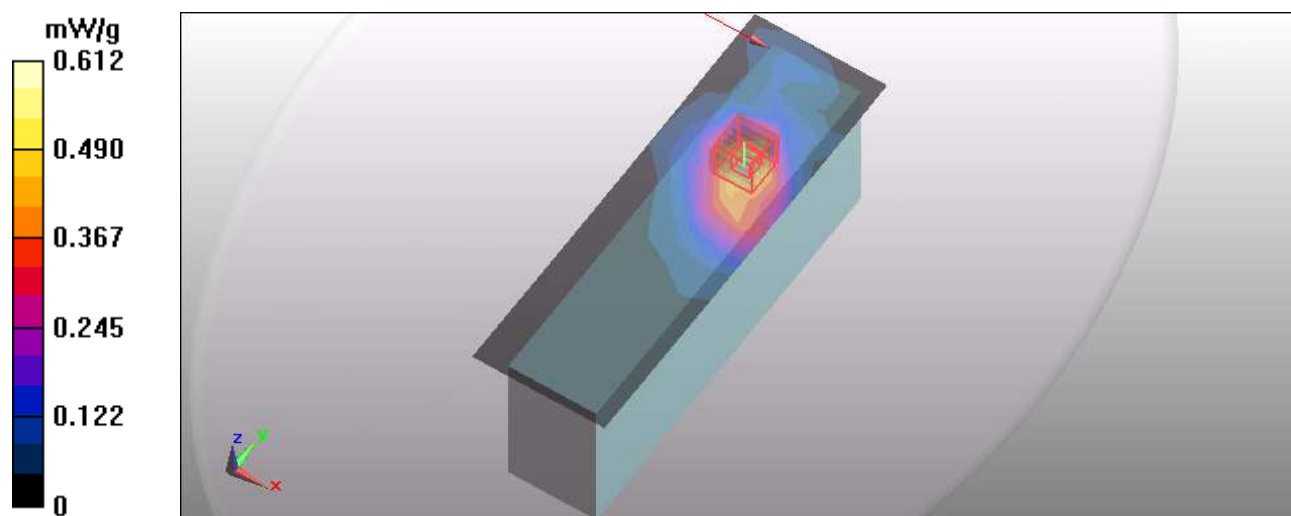
Mid Channel 157/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm,
dz=2.5mm

Reference Value = 3.53 V/m; Power Drift = 0.051 dB

Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.336 mW/g; SAR(10 g) = 0.144 mW/g

Maximum value of SAR (measured) = 0.609 mW/g



Test Laboratory: Bureau Veritas ADT

M15 Front side 11a-Ch44

Test configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) + Main antenna

DUT: Mobile Computer ; Type: MC9190

Communication System: 802.11a ; Frequency: 5220 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used: $f = 5220 \text{ MHz}$; $\sigma = 5.43 \text{ mho/m}$; $\epsilon_r = 48.4$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section ; Separation distance : 0 mm (The Front side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(4.45, 4.45, 4.45); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Low Channel 44/Area Scan (14x9x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.017 mW/g

Low Channel 44/Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 0.195 V/m; Power Drift = 0.165 dB

Peak SAR (extrapolated) = 0.110 W/kg

SAR(1 g) = 0.011 mW/g; SAR(10 g) = 0.00566 mW/g

Maximum value of SAR (measured) = 0.019 mW/g

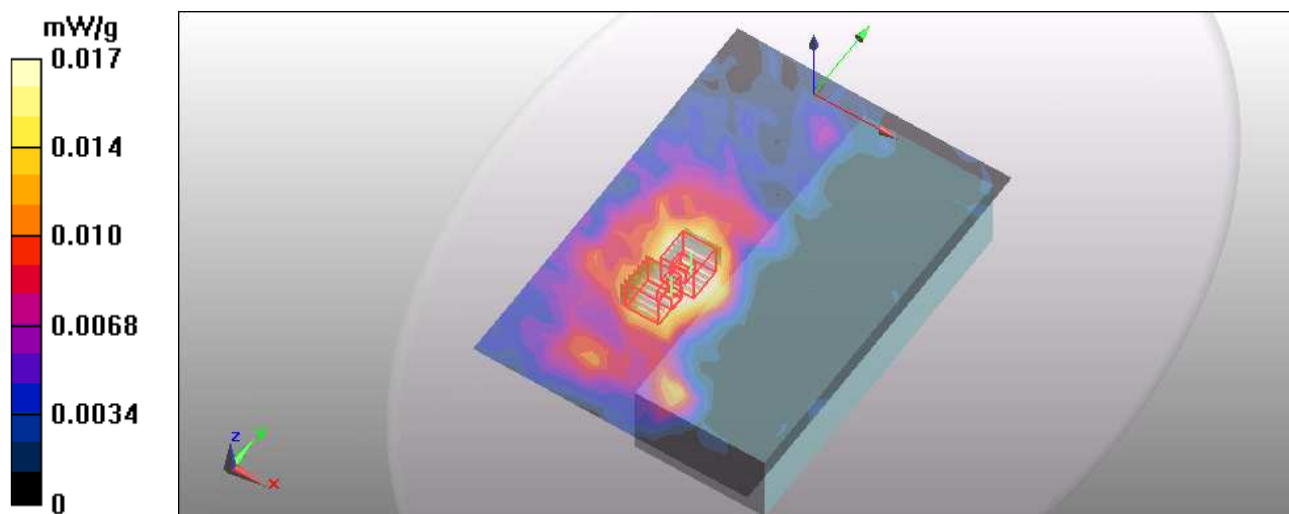
Low Channel 44/Zoom Scan (7x7x9)/Cube 1: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 0.195 V/m; Power Drift = 0.165 dB

Peak SAR (extrapolated) = 0.012 W/kg

SAR(1 g) = 0.00177 mW/g; SAR(10 g) = 0.000751 mW/g

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



Test Laboratory: Bureau Veritas ADT

M16 Front side 11a-Ch56

Test configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) + Main antenna

DUT: Mobile Computer ; Type: MC9190

Communication System: 802.11a ; Frequency: 5280 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL5800 Medium parameters used: $f = 5280$ MHz; $\sigma = 5.48$ mho/m; $\epsilon_r = 48.3$; $\rho = 1000$ kg/m³
Phantom section: Flat Section ; Separation distance : 0 mm (The Front side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(4.18, 4.18, 4.18); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Low Channel 56/Area Scan (14x9x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.020 mW/g

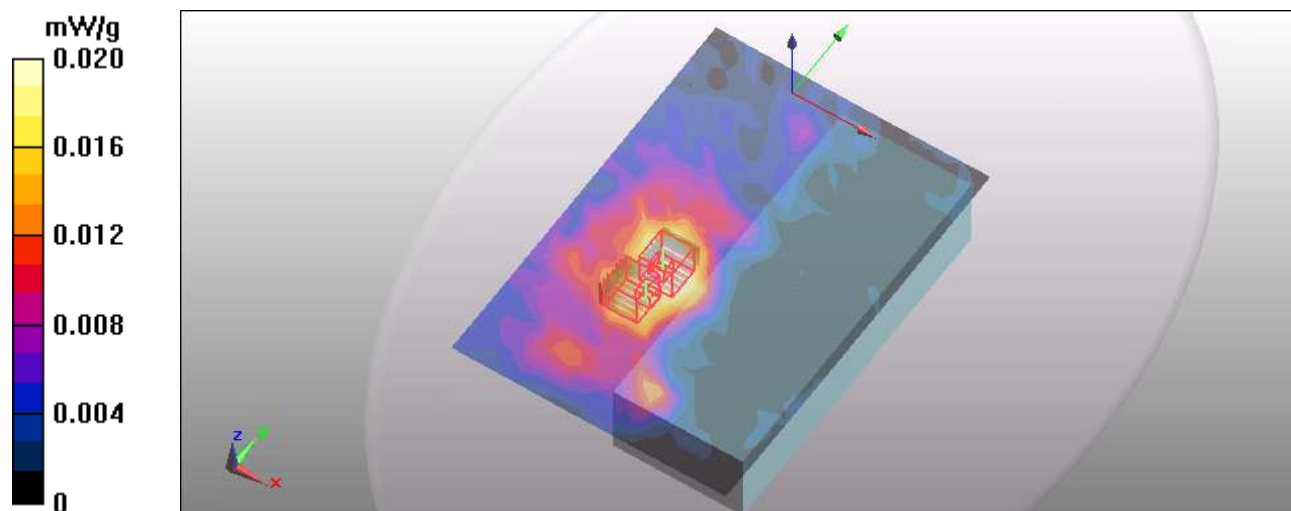
Low Channel 56/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 0.254 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.130 W/kg

SAR(1 g) = **0.013** mW/g; SAR(10 g) = **0.00637** mW/g

Maximum value of SAR (measured) = 0.021 mW/g



Test Laboratory: Bureau Veritas ADT

M17 Front side 11a-Ch104

Test configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) + Main antenna

DUT: Mobile Computer ; Type: MC9190

Communication System: 802.11a ; Frequency: 5520 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used: $f = 5520 \text{ MHz}$; $\sigma = 5.76 \text{ mho/m}$; $\epsilon_r = 47.6$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section ; Separation distance : 0 mm (The Front side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.91, 3.91, 3.91); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Mid Channel 104/Area Scan (14x9x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.040 mW/g

Mid Channel 104/Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 0.222 V/m; Power Drift = 0.179 dB

Peak SAR (extrapolated) = 0.072 W/kg

SAR(1 g) = 0.018 mW/g; SAR(10 g) = 0.00829 mW/g

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

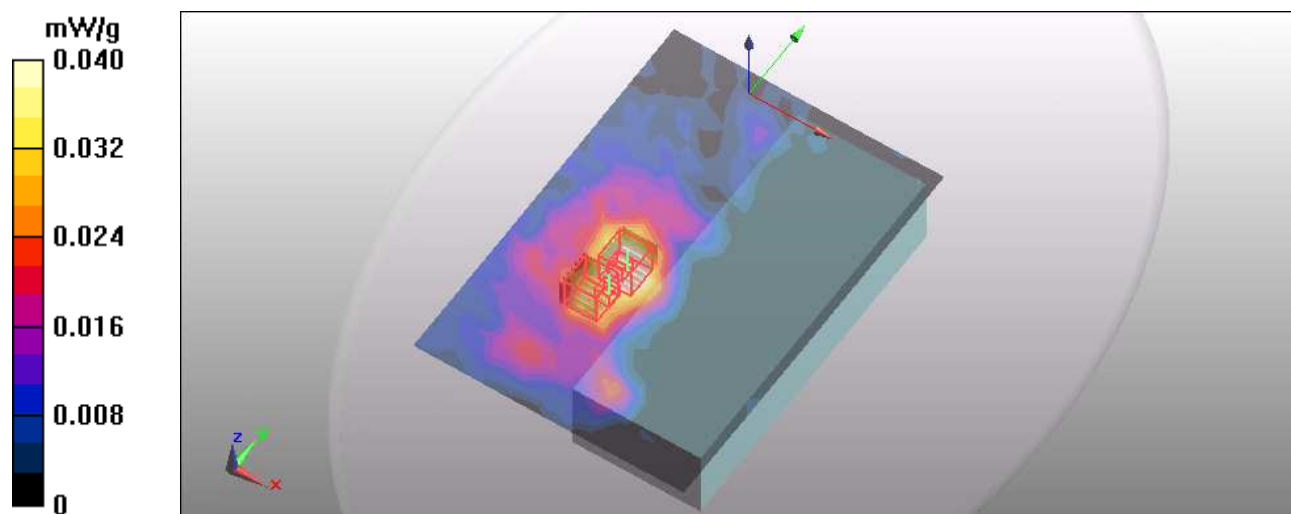
Mid Channel 104/Zoom Scan (7x7x9)/Cube 1: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 0.222 V/m; Power Drift = 0.179 dB

Peak SAR (extrapolated) = 0.083 W/kg

SAR(1 g) = 0.025 mW/g; SAR(10 g) = 0.011 mW/g

Maximum value of SAR (measured) = 0.048 mW/g



Test Laboratory: Bureau Veritas ADT

M18 Front side 11a-Ch157

Test configuration: Keypad 3 (53 keys) + Scanner 2 (SE4500-STD) + Main antenna

DUT: Mobile Computer ; Type: MC9190

Communication System: 802.11a ; Frequency: 5785 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used: $f = 5785 \text{ MHz}$; $\sigma = 5.96 \text{ mho/m}$; $\epsilon_r = 47.2$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section ; Separation distance : 0 mm (The Front side of the EUT to the Phantom)

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95); Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

Low Channel 157/Area Scan (27x19x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.050 mW/g

Low Channel 157/Zoom Scan (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 0.674 V/m; Power Drift = -0.129 dB

Peak SAR (extrapolated) = 0.102 W/kg

SAR(1 g) = 0.029 mW/g; SAR(10 g) = 0.014 mW/g

Maximum value of SAR (measured) = 0.054 mW/g

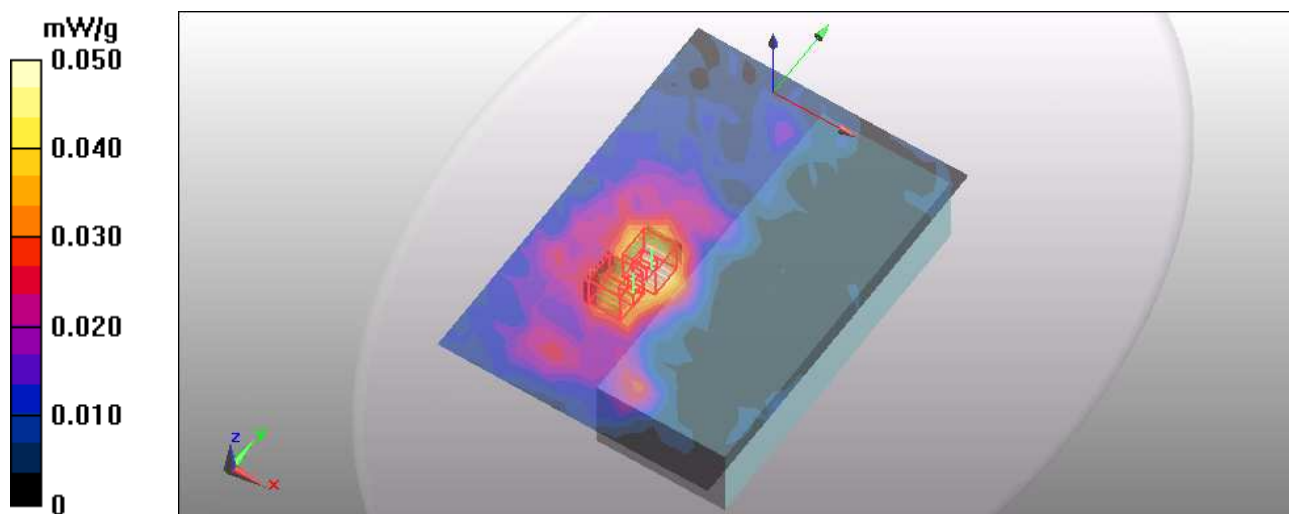
Low Channel 157/Zoom Scan (7x7x9)/Cube 1: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 0.674 V/m; Power Drift = -0.129 dB

Peak SAR (extrapolated) = 0.079 W/kg

SAR(1 g) = 0.024 mW/g; SAR(10 g) = 0.010 mW/g

Maximum value of SAR (measured) = 0.043 mW/g



Test Laboratory: Bureau Veritas ADT

System Check-MSL 2450

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; $\sigma = 1.98$ mho/m; $\epsilon_r = 53.6$; $\rho = 1000$ kg/m³ ; Liquid level : 150 mm

Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 23 degrees ; Liquid temp. : 22.8 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: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- 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 (5x7x1): Measurement grid:
 dx=15mm, dy=15mm

Maximum value of SAR (measured) = 17.3 mW/g

d=10mm, Pin=250 mW, dist=3.0mm (EX-Probe)/Zoom Scan (7x7x7)/Cube 0:

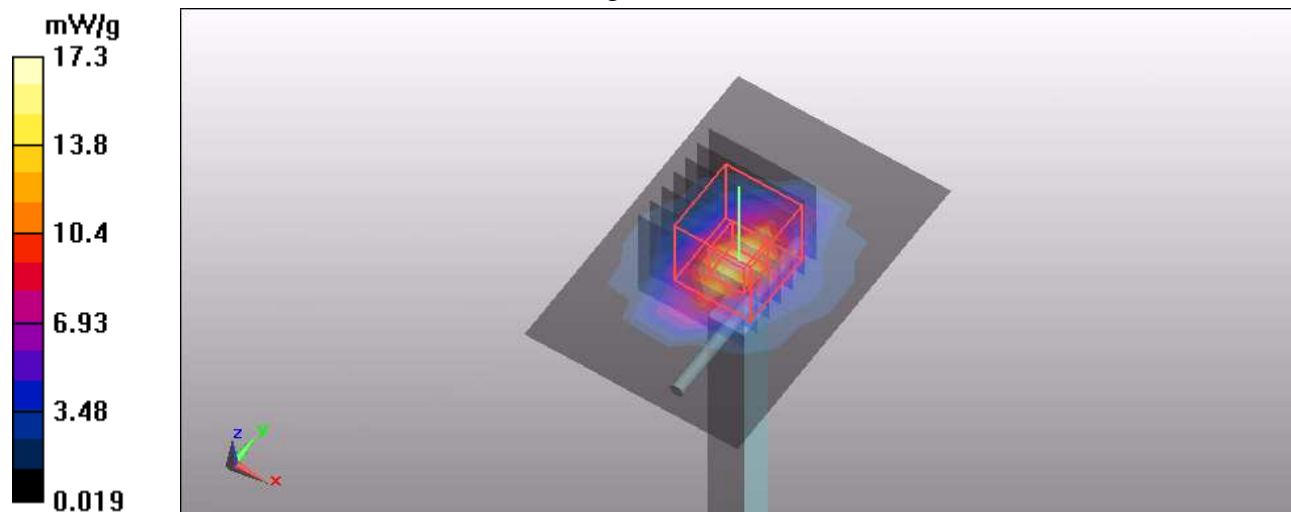
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 89.2 V/m; Power Drift = -0.168 dB

Peak SAR (extrapolated) = 27.2 W/kg

SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.12 mW/g

Maximum value of SAR (measured) = 17.5 mW/g



Test Laboratory: Bureau Veritas ADT

System Check-D5GHz- MSL 5200

DUT: Dipole D5GHzV2 ; Type: D5GHzV2 ; Serial: 1018 ; Test Frequency: 5200 MHz

Communication System: CW-5GHz ; Frequency: 5200 MHz; Duty Cycle: 1:1; Modulation type: CW
 Medium: MSL5800; Medium parameters used: $f = 5200$ MHz; $\sigma = 5.37$ mho/m; $\epsilon_r = 48.5$; $\rho = 1000$ kg/m³ ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 22.8 degrees ; Liquid temp. : 22.6 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(4.45, 4.45, 4.45) ; Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

D=10mm, Pin=250mW, f=5200 MHz/Area Scan (10x10x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 13.1 mW/g

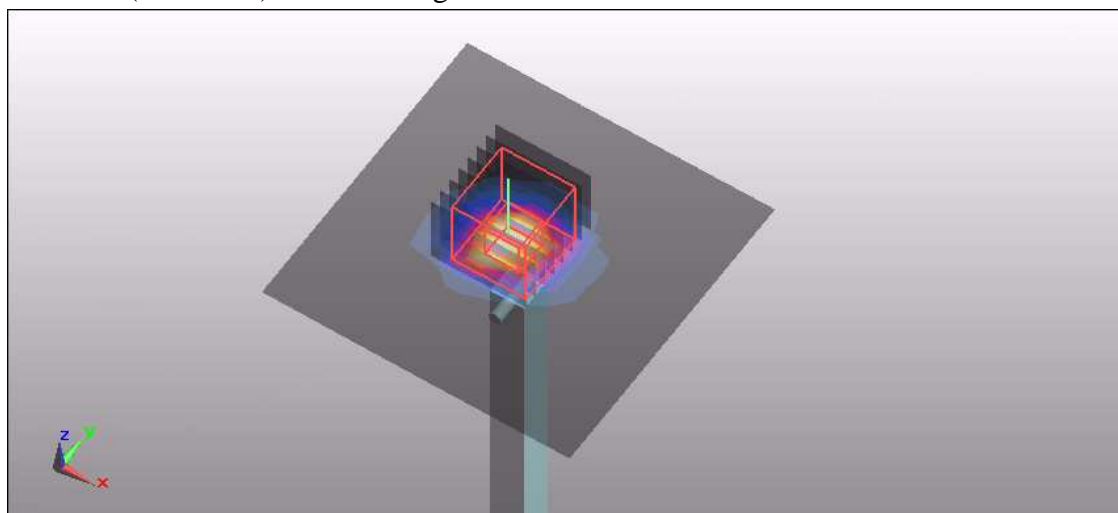
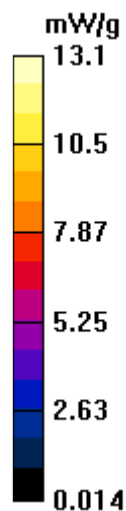
D=10mm, Pin=250mW, f=5200 MHz/Zoom Scan (4x4x2.5mm), dist=2mm (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 69.4 V/m; Power Drift = 0.045 dB

Peak SAR (extrapolated) = 32 W/kg

SAR(1 g) = 8.34 mW/g; SAR(10 g) = 2.37 mW/g

Maximum value of SAR (measured) = 16.1 mW/g



Test Laboratory: Bureau Veritas ADT

System Check-D5GHz- MSL 5500

DUT: Dipole D5GHzV2 ; Type: D5GHzV2 ; Serial: 1018 ; Test Frequency: 5500 MHz

Communication System: CW-5GHz ; Frequency: 5500 MHz; Duty Cycle: 1:1; Modulation type: CW
 Medium: MSL5800; Medium parameters used: $f = 5500$ MHz; $\sigma = 5.7$ mho/m; $\epsilon_r = 47.9$; $\rho = 1000$ kg/m³ ;
 Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 22.8 degrees ; Liquid temp. : 22.6 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.91, 3.91, 3.91) ; Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

D=10mm, Pin=250mW, f=5500 MHz/Area Scan (10x10x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 13.9 mW/g

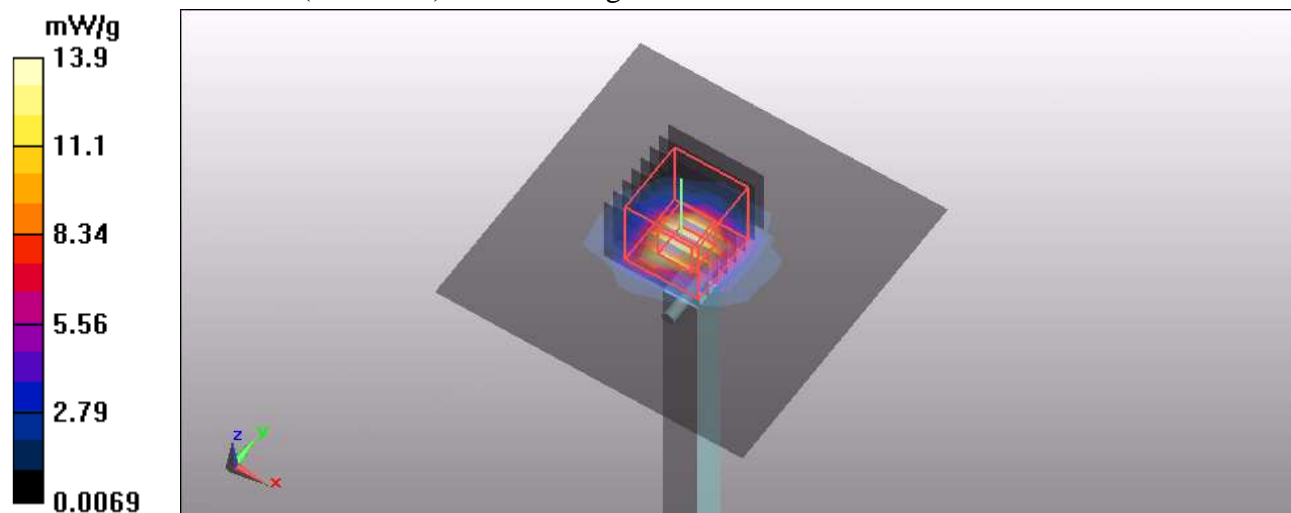
D=10mm, Pin=250mW, f=5500 MHz/Zoom Scan (4x4x2.5mm), dist=2mm (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 69.6 V/m; Power Drift = 0.087 dB

Peak SAR (extrapolated) = 33.7 W/kg

SAR(1 g) = **8.86 mW/g**; SAR(10 g) = 2.49 mW/g

Maximum value of SAR (measured) = 17.2 mW/g



Test Laboratory: Bureau Veritas ADT

System Check-D5GHz- MSL 5800

DUT: Dipole D5GHzV2 ; Type: D5GHzV2 ; Serial: 1018 ; Test Frequency: 5800 MHz

Communication System: CW-5GHz ; Frequency: 5800 MHz; Duty Cycle: 1:1; Modulation type: CW
 Medium: MSL5800; Medium parameters used: $f = 5800$ MHz; $\sigma = 6.05$ mho/m; $\epsilon_r = 47.1$; $\rho = 1000$ kg/m³ ; Liquid level : 151 mm

Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 22.8 degrees ; Liquid temp. : 22.6 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95) ; Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

D=10mm, Pin=250mW, f=5800 MHz/Area Scan (10x10x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 12.4 mW/g

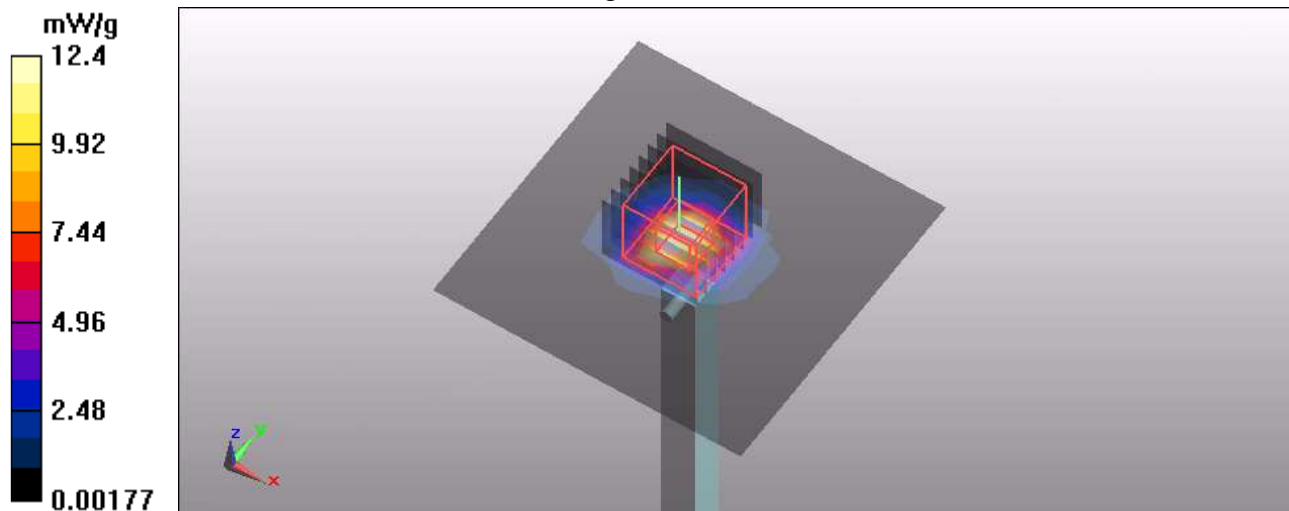
D=10mm, Pin=250mW, f=5800 MHz/Zoom Scan (4x4x2.5mm), dist=2mm (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 66.1 V/m; Power Drift = 0.0018 dB

Peak SAR (extrapolated) = 31.4 W/kg

SAR(1 g) = 7.7 mW/g; SAR(10 g) = 2.17 mW/g

Maximum value of SAR (measured) = 15.1 mW/g



Test Laboratory: Bureau Veritas ADT

System Check-D5GHz- MSL 5200

DUT: Dipole D5GHzV2 ; Type: D5GHzV2 ; Serial: 1018 ; Test Frequency: 5200 MHz

Communication System: CW-5GHz ; Frequency: 5200 MHz; Duty Cycle: 1:1; Modulation type: CW
 Medium: MSL5800; Medium parameters used: $f = 5200$ MHz; $\sigma = 5.41$ mho/m; $\epsilon_r = 48.6$; $\rho = 1000$ kg/m³ ; 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. : 22.8 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(4.45, 4.45, 4.45) ; Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

D=10mm, Pin=250mW, f=5200 MHz/Area Scan (10x10x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 12.9 mW/g

D=10mm, Pin=250mW, f=5200 MHz/Zoom Scan (4x4x2.5mm), dist=2mm

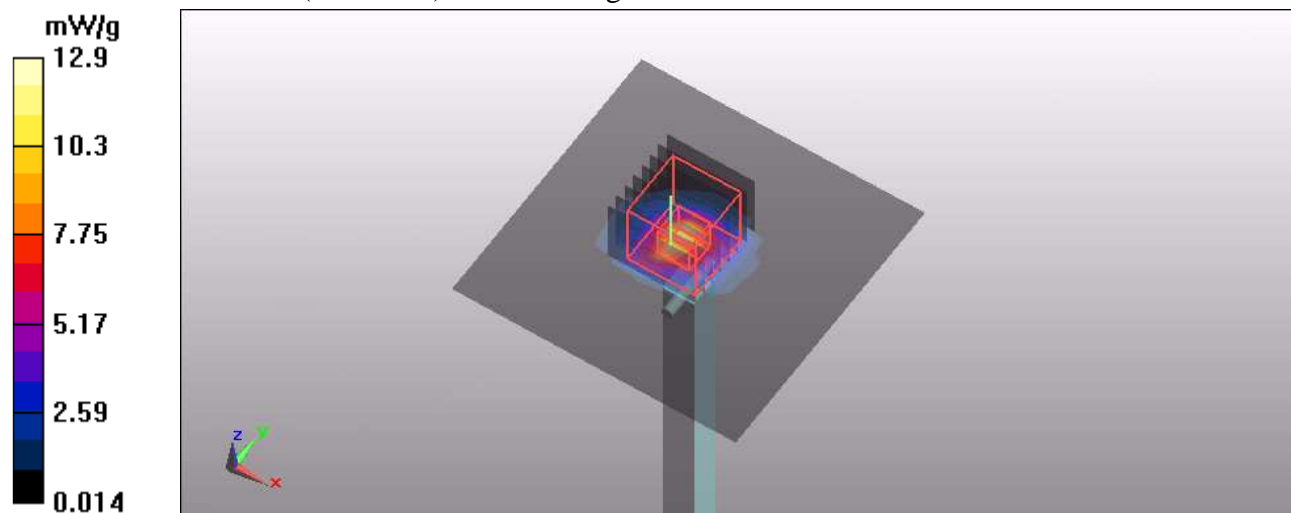
(8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 69.4 V/m; Power Drift = 0.052 dB

Peak SAR (extrapolated) = 31.6 W/kg

SAR(1 g) = **8.24 mW/g**; SAR(10 g) = 2.34 mW/g

Maximum value of SAR (measured) = 15.9 mW/g



Test Laboratory: Bureau Veritas ADT

System Check-D5GHz- MSL 5500

DUT: Dipole D5GHzV2 ; Type: D5GHzV2 ; Serial: 1018 ; Test Frequency: 5500 MHz

Communication System: CW-5GHz ; Frequency: 5500 MHz; Duty Cycle: 1:1; Modulation type: CW
 Medium: MSL5800; Medium parameters used: $f = 5500$ MHz; $\sigma = 5.75$ mho/m; $\epsilon_r = 47.8$; $\rho = 1000$ kg/m³ ; 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. : 22.8 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.91, 3.91, 3.91) ; Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

D=10mm, Pin=250mW, f=5500 MHz/Area Scan (10x10x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 14.1 mW/g

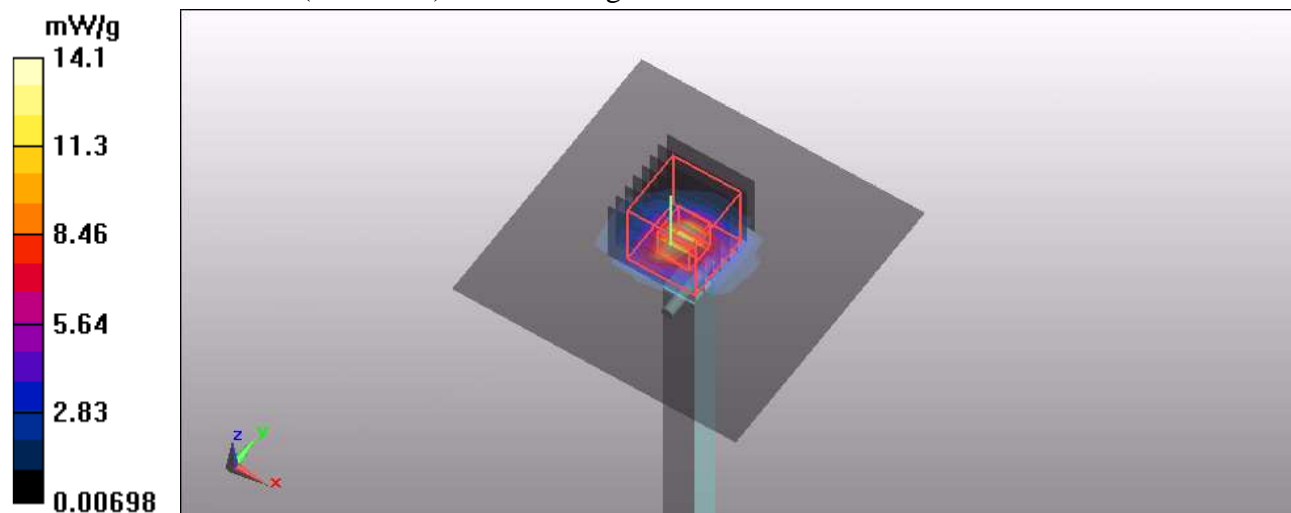
D=10mm, Pin=250mW, f=5500 MHz/Zoom Scan (4x4x2.5mm), dist=2mm (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 69.6 V/m; Power Drift = 0.063 dB

Peak SAR (extrapolated) = 34.1 W/kg

SAR(1 g) = **8.96 mW/g**; SAR(10 g) = **2.52 mW/g**

Maximum value of SAR (measured) = 17.4 mW/g



Test Laboratory: Bureau Veritas ADT

System Check-D5GHz- MSL 5800

DUT: Dipole D5GHzV2 ; Type: D5GHzV2 ; Serial: 1018 ; Test Frequency: 5800 MHz

Communication System: CW-5GHz ; Frequency: 5800 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: MSL5800; Medium parameters used: $f = 5800$ MHz; $\sigma = 6.13$ mho/m; $\epsilon_r = 47$; $\rho = 1000$ kg/m³ ;
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. : 22.8 degrees

DASY5 Configuration:

- Probe: EX3DV3 - SN3504; ConvF(3.95, 3.95, 3.95) ; Calibrated: 2010/1/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn510; Calibrated: 2009/12/16
- Phantom: ELI 4.0; Type: QDOVA001BB; Serial: 1043
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 61

D=10mm, Pin=250mW, f=5800 MHz/Area Scan (10x10x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 12.3 mW/g

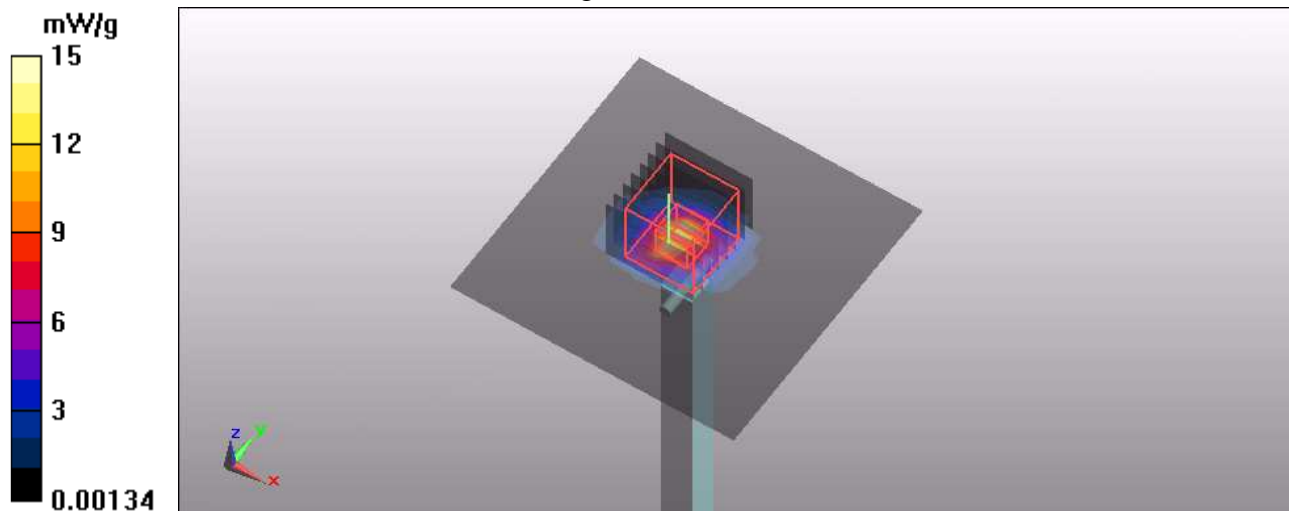
D=10mm, Pin=250mW, f=5800 MHz/Zoom Scan (4x4x2.5mm), dist=2mm (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 66.1 V/m; Power Drift = 0.0049 dB

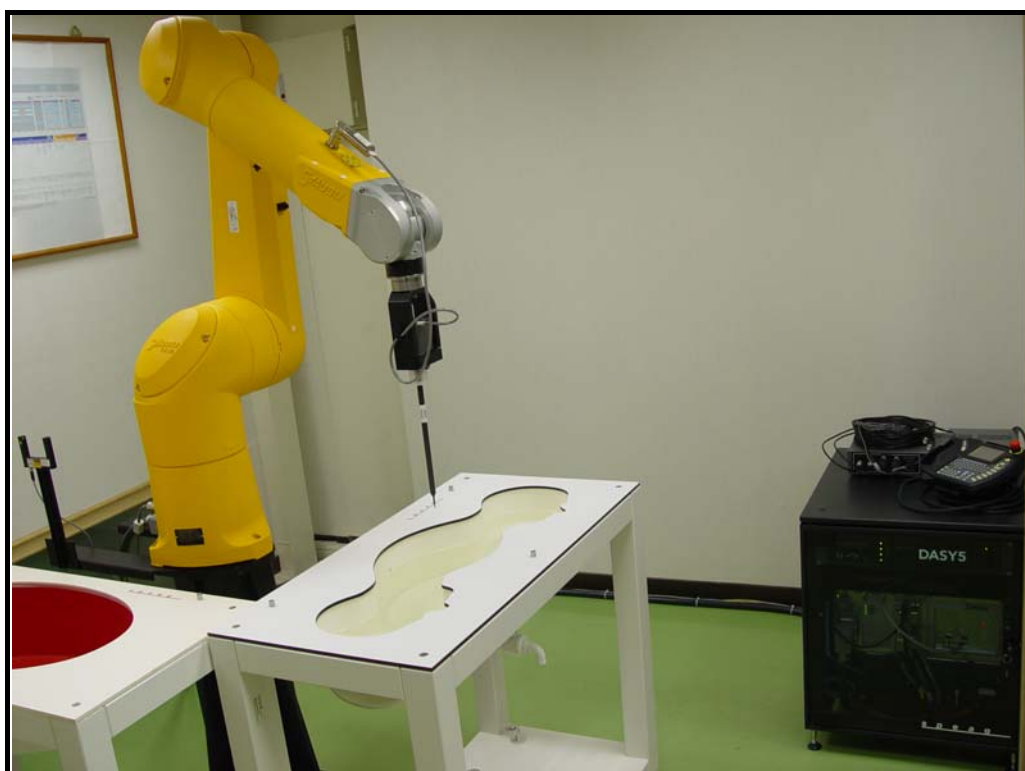
Peak SAR (extrapolated) = 31.1 W/kg

SAR(1 g) = **7.63** mW/g; SAR(10 g) = **2.15** mW/g

Maximum value of SAR (measured) = 15 mW/g



APPENDIX B: BV ADT SAR MEASUREMENT SYSTEM



APPENDIX C: PHOTOGRAPHS OF SYSTEM VALIDATION

