SAR TEST REPORT (15.247)

REPORT NO.:	SA980313L03
MODEL NO.:	MC9598
RECEIVED:	Mar. 13, 2009
TESTED:	Mar. 21 ~ Mar. 27, 2009
ISSUED:	Apr. 02, 2009

APPLICANT:	Motorola, Inc.
ADDRESS:	One Motorola Plaza, Holtsville, NY 11742-1300 USA

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS:	No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan, R.O.C.
TEST LOCATION:	No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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1. CERTIFICATION

PRODUCT:	Mobile Computer
MODEL:	MC9598
BRAND:	Motorola
APPLICANT:	Motorola, Inc.
TESTED:	Mar. 21 ~ Mar. 27, 2009
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: MC9598) 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 : Peggy Chen , **DATE :** Apr. 02, 2009
Peggy Chen / Specialist

TECHNICAL ACCEPTANCE : James Fan , **DATE :** Apr. 02, 2009
Responsible for RF James Fan / Engineer

APPROVED BY : Gary Chang , **DATE :** Apr. 02, 2009
Gary Chang / Assistant Manager

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Mobile Computer	
MODEL NO.	MC9598	
FCC ID	UZ7MC9598	
POWER SUPPLY	3.7Vdc from rechargeable lithium battery 12Vdc from power 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	
FREQUENCY RANGE	**2.4GHz:** 2412MHz ~ 2462MHz **5.0GHz:** 5745 ~ 5825MHz	
NUMBER OF CHANNEL	**2.4GHz:** 11 **5.0GHz:** 5	
CHANNEL FREQUENCIES UNDER TEST AND ITS CONDUCTED OUTPUT POWER	**Main antenna**	**Aux. antenna**
	802.11b	**802.11b**
	37.497mW / Ch1: 2412MHz 37.670mW / Ch6: 2437MHz 36.244mW / Ch11: 2462MHz	40.551mW / Ch1: 2412MHz 40.926mW / Ch6: 2437MHz 40.272mW / Ch11: 2462MHz
	802.11g	**802.11g**
	60.954mW / Ch1: 2412MHz 159.956mW / Ch6: 2437MHz 54.702mW / Ch11: 2462MHz	63.387mW / Ch1: 2412MHz 178.238mW / Ch6: 2437MHz 65.013mW / Ch11: 2462MHz
	802.11a	**802.11a**
	121.060mW / Ch149: 5745MHz 106.170mW / Ch153: 5765MHz 108.143mW / Ch157: 5785MHz 103.753mW / Ch161: 5850MHz 104.954mW / Ch165: 5825MHz	128.529mW / Ch149: 5745MHz 109.901mW / Ch153: 5765MHz 122.180mW / Ch157: 5785MHz 121.060mW / Ch161: 5850MHz 113.240mW / Ch165: 5825MHz
AVERAGE SAR (1g)	2.4GHz: 0.095W/kg 5.0GHz: 0.094W/kg	

ANTENNA TYPE	**Main antenna:** 2.4GHz: PIFA antenna with 2.88dBi gain 5.0GHz: PIFA antenna with 3.52dBi gain **Aux. antenna:** 2.4GHz: PIFA antenna with 2.6dBi gain 5.0GHz: PIFA antenna with 4.0dBi gain
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Battery

NOTE:

1. The models as identified below are identical to each other except of the following options:
   - Barcode reader: 1D laser scanner / 2D Imager

BRAND	MODEL	DESCRIPTION
Motorola	MC9598	EVDO 1D Calculator Numeric
Motorola	MC9598	EVDO 2D Calculator Numeric
Motorola	MC9598	EVDO 1D Alpha Primary
Motorola	**MC9598**	**EVDO 2D Alpha Primary**
Motorola	MC9598	EVDO 1D Telephony Numeric
Motorola	MC9598	EVDO 2D Telephony Numeric
Motorola	MC9598	EVDO 1D Alpha Numeric Wide
Motorola	MC9598	EVDO 2D Alpha Numeric Wide
**the worst case had been marked by boldface.		

2. The EUT has one lithium battery listed as below:

BRAND:	MOTOROLA
MODEL:	82-111636-01
RATING:	3.7Vdc, 4800mAh, 17.7Wh

3. The EUT is a Mobile Computer. The functions of EUT listed as below:

	REFERENCE REPORT
WLAN 802.11a/b/g (15.247)	SA980313L03
WLAN 802.11a (15.407)	SA980313L03-1
Bluetooth	SA980313L03-2
CDMA 850	SA980313L03-3
CDMA 1900	

4. The following accessories are for support units only.

PRODUCT	BRAND	MODEL	P/N	DESCRIPTION
USB charging Y cable	Motorola	-	25-116365-01R	1.8m shielded cable with one core
Headset	Motorola	-	50-11300-050R	0.8m non-shielded cable with one core
Adapter	HIPRO	HP-O2040D43	-	Input: 100-240Vac, 50-60Hz, 1.5A Output: 12Vdc, 3.33A, MAX 40W Power line: AC 1.7m non-shielded cable without core DC1.8m non-shielded cable with one core
Holster	-	-	-	-

5. The EUT operates in both the 5GHz and 2.4GHz Bands and compatibility with 802.11a and 802.11b, 802.11g technology.
6. The EUT operates in the 2.4GHz/5GHz frequency spectrum with throughput of up to 54Mbps.
7. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

2.2 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 2 (2.1093)

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

RSS-102

IEEE 1528-2003

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

2.3 GENERAL INOFRMATION OF THE SAR SYSTEM

DASY5 **(Software 5.0 Build 125)** 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.

For 2.4GHz:

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 μW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μW/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.

For 5GHz:

EX3DV3 ISOTROPIC E-FIELD PROBE (FREQUENCY BAND 5 ~ 6GHz)

DIMENSIONS	Overall length: 330 mm (Tip Length: 20 mm) Tip diameter: 2.5 mm (Body diameter: 12 mm) Distance from probe tip to dipole centers: 1.0 mm
APPLICATION	General dosimetric measurements range 5 ~ 6 GHz. Fast automatic scanning in arbitrary phantoms (EX3DV3)

NOTE: The Probe parameters have been calibrated by the SPEAG. Please reference “APPENDIX D” for the Calibration Certification Report.

TWIN SAM V4.0

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

SYSTEM VALIDATION KITS:

CONSTRUCTION	Symmetrical dipole with l/4 balun enables measurement of feedpoint impedance with NWA matched for use near flat phantoms filled with brain simulating solutions. Includes distance holder and tripod adaptor
CALIBRATION	Calibrated SAR value for specified position and input power at the flat phantom in brain simulating solutions
FREQUENCY	2450MHz, 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 ε =3 and loss tangent δ =0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered. The device holder for the portable device makes up of the polyethylene foam. The dielectric parameters of material close to the dielectric parameters of the air.

DATA ACQUISITION ELECTRONICS

CONSTRUCTION

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

2.4 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:

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

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

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

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

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

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

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

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

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

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

SAR	= local specific absorption rate in mW/g
E_{tot}	= total field strength in V/m
σ	= conductivity in [mho/m] or [Siemens/m]
ρ	= equivalent tissue density in g/cm3

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

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

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

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

3. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

4. DESCRIPTION OF TEST MODES AND CONFIGURATIONS

4.1. DESCRIPTION OF TEST MODE

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

“Per KDB 248277, for each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than ¼ dB higher than those measured at the lowest data rate.”

Comparing output power of all modulations and data rates of each mode can find the lowest data rates has max output power. Therefore, EUT will set under lowest data rates to test.

“Per KDB 447498, when the SAR procedures require multiple channels to be tested and the 1-g SAR for the highest output channel is less than 0.8 W/kg and peak SAR is less than 1.6W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.”

According to test data from table of section 4.2, SAR value of highest output power channel is less than 0.8 W / kg and peak SAR is less than 1.6W/kg. Therefore, testing for other channels is not required.

ITEM	TEST MODE	MODULATION	ASSESSMENT POSTITION	TESTED CHANNEL	REMARK
1	802.11b	DBPSK	A / Cheek	6	Aux. antenna
2	802.11b	DBPSK	A / Cheek	6	Main antenna
3	802.11b	DBPSK	A / Tilt	6	Aux. antenna
4	802.11b	DBPSK	B / Cheek	6	Aux. antenna
5	802.11b	DBPSK	B / Cheek	6	Main antenna
6	802.11b	DBPSK	B / Tilt	6	Aux. antenna
7	802.11b	DBPSK	C : Body / Front (with sheath)	6	Aux. antenna
8	802.11b	DBPSK	C : Body / Front (with sheath)	6	Main antenna
9	802.11g	BPSK	A / Cheek	6	Aux. antenna
10	802.11g	BPSK	A / Cheek	6	Main antenna
11	802.11g	BPSK	A / Tilt	6	Aux. antenna
12	802.11g	BPSK	B / Cheek	6	Aux. antenna
13	802.11g	BPSK	B / Cheek	6	Main antenna
14	802.11g	BPSK	B / Tilt	6	Aux. antenna
15	802.11g	BPSK	C : Body / Front (with sheath)	6	Aux. antenna
16	802.11g	BPSK	C : Body / Front (with sheath)	6	Main antenna
17	802.11a	BPSK	A / Cheek	149	Aux. antenna
18	802.11a	BPSK	A / Cheek	149	Main antenna
19	802.11a	BPSK	A / Tilt	149	Aux. antenna
20	802.11a	BPSK	B / Cheek	149	Aux. antenna
21	802.11a	BPSK	B / Cheek	149	Main antenna
22	802.11a	BPSK	B / Tilt	149	Aux. antenna
23	802.11a	BPSK	C : Body / Front (with sheath)	149	Aux. antenna
24	802.11a	BPSK	C : Body / Front (with sheath)	149	Main antenna

NOTE: Assessment position A: Right head position, B: Left head position, C: Body position; please refer to the test set up photo.

4.2. SUMMARY OF TEST RESULTS

ITEM		1	2	3	4	5	6	7	8
TEST MODE		802.11b							
CHAN.	FREQ. (MHz)	MEASURED VALUE OF 1g SAR (W/kg)							
6	2437 (Mid.)	0.029	0.020	0.041	**0.056**	0.012	0.053	0.045	0.00961

NOTE: The worst value has been marked by boldface.

ITEM		9	10	11	12	13	14	15	16
TEST MODE		802.11g							
CHAN.	FREQ. (MHz)	MEASURED VALUE OF 1g SAR (W/kg)							
6	2437 (Mid.)	0.063	0.035	0.064	**0.095**	0.026	0.083	0.081	0.017

NOTE: The worst value has been marked by boldface.

ITEM		17	18	19	20	21	22	23	24
TEST MODE		802.11a							
CHAN.	FREQ. (MHz)	MEASURED VALUE OF 1g SAR (W/kg)							
149	5745 (High)	0.072	0.042	0.041	**0.094**	0.041	0.067	0.062	0.042

NOTE: The worst value has been marked by boldface.

5. TEST RESULTS

5.1 TEST PROCEDURES

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.

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

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

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

5.2 MEASURED SAR RESULTS

ENVIRONMENTAL CONDITION	Air Temperature：23.1°C, Liquid Temperature：22.8°C Humidity：63%RH		
TESTED BY	Dylan Chiou	DATE	Mar. 21, 2009

CHAN.	FREQ. (MHz)	TEST MODE	CONDUCTED POWER (mW)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
6	**2437 (Mid.)**	**802.11b**	40.926	40.85	-0.17	1	0.040
6	**2437 (Mid.)**	**802.11b**	37.670	37.476	-0.51	2	0.020
6	**2437 (Mid.)**	**802.11b**	40.926	40.72	-0.50	3	0.041
6	**2437 (Mid.)**	**802.11b**	40.926	40.528	-0.97	4	**0.056**
6	**2437 (Mid.)**	**802.11b**	37.670	37.329	-0.91	5	0.012
6	**2437 (Mid.)**	**802.11b**	40.926	40.085	-2.05	6	0.053

NOTE:

1. Test configuration of each mode is described in section 4.1.
2. In this testing, the limit for General Population Spatial Peak averaged over 1g, **1.6 W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

ENVIRONMENTAL CONDITION	Air Temperature : 22.8°C, Liquid Temperature : 22.6°C Humidity : 64%RH		
TESTED BY	Dylan Chiou	DATE	Mar. 23, 2009

CHAN.	FREQ. (MHz)	TEST MODE	CONDUCTED POWER (mW)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
6	2437 (Mid.)	802.11b	40.926	39.861	-2.60	7	0.045
6	2437 (Mid.)	802.11b	37.670	37.268	-1.07	8	0.00961

NOTE:

1. Test configuration of each mode is described in section 4.1.
2. In this testing, the limit for General Population Spatial Peak averaged over 1g, **1.6 W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

ENVIRONMENTAL CONDITION	Air Temperature : 23.1°C, Liquid Temperature : 22.8°C Humidity : 63%RH		
TESTED BY	Dylan Chiou	DATE	Mar. 21, 2009

CHAN.	FREQ. (MHz)	TEST MODE	CONDUCTED POWER (mW)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
6	2437 (Mid.)	802.11g	178.238	176.866	-0.77	9	0.063
6	2437 (Mid.)	802.11g	159.956	157.627	-1.46	10	0.035
6	2437 (Mid.)	802.11g	178.238	175.249	-1.68	11	0.064
6	2437 (Mid.)	802.11g	178.238	174.113	-2.31	12	**0.095**
6	2437 (Mid.)	802.11g	159.956	156.276	-2.30	13	0.026
6	2437 (Mid.)	802.11g	178.238	173.029	-2.80	14	0.083

NOTE:

1. Test configuration of each mode is described in section 4.1.
2. In this testing, the limit for General Population Spatial Peak averaged over 1g, **1.6 W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

ENVIRONMENTAL CONDITION			Air Temperature : 22.8°C, Liquid Temperature : 22.6°C Humidity : 64%RH				
TESTED BY			Dylan Chiou		DATE	Mar. 23, 2009	
CHAN.	FREQ. (MHz)	TEST MODE	CONDUCTED POWER (mW)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
6	2437 (Mid.)	802.11g	178.238	172.062	-3.47	15	0.081
6	2437 (Mid.)	802.11g	159.956	155.317	-2.90	16	0.017

NOTE:

1. Test configuration of each mode is described in section 4.1.
2. In this testing, the limit for General Population Spatial Peak averaged over 1g, **1.6 W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

ENVIRONMENTAL CONDITION	Air Temperature：22.9°C, Liquid Temperature：22.5°C Humidity：63%RH		
TESTED BY	Dylan Chiou	DATE	Mar. 25, 2009

CHAN.	FREQ. (MHz)	TEST MODE	CONDUCTED POWER (mW)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
149	5745 (Low)	802.11a	128.529	127.613	-0.71	17	0.072
149	5745 (Low)	802.11a	121.060	120.037	-0.85	18	0.042
149	5745 (Low)	802.11a	128.529	126.496	-1.58	19	0.041
149	5745 (Low)	802.11a	128.529	125.233	-2.56	20	0.094
149	5745 (Low)	802.11a	121.060	119.048	-1.66	21	0.041
149	5745 (Low)	802.11a	128.529	124.017	-3.51	22	0.067

NOTE:

1. Test configuration of each mode is described in section 4.1.
2. In this testing, the limit for General Population Spatial Peak averaged over 1g, **1.6 W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

ENVIRONMENTAL CONDITION	Air Temperature：22.7°C, Liquid Temperature：22.5°C Humidity：64%RH		
TESTED BY	Dylan Chiou	DATE	Mar. 27, 2009

CHAN.	FREQ. (MHz)	TEST MODE	CONDUCTED POWER (mW)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
149	5745 (Low)	802.11a	128.529	122.864	-4.41	23	0.062
149	5745 (Low)	802.11a	121.060	118.266	-2.31	24	0.042

NOTE:

1. Test configuration of each mode is described in section 4.1.
2. In this testing, the limit for General Population Spatial Peak averaged over 1g, **1.6 W/kg**, is applied.
3. Please see the Appendix A for the data.
4. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.

5.3 SAR LIMITS

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

NOTE:

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

5.4 RECIPES FOR TISSUE SIMULATING LIQUIDS

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

The following ingredients are used：

- **WATER-** Deionized water (pure H20), resistivity _16 M - as basis for the liquid
- **SUGAR-** Refined sugar in crystals, as available in food shops - to reduce relative permittivity
- **SALT-** Pure NaCl - to increase conductivity
- **CELLULOSE-** Hydroxyethyl-cellulose, medium viscosity (75-125mPa.s, 2% in water, 20_C),

  CAS # 54290 - to increase viscosity and to keep sugar in solution
- **PRESERVATIVE-** Preventol D-7 Bayer AG, D-51368 Leverkusen, CAS # 55965-84-9 - to prevent the spread of bacteria and molds
- **DGMBE-** Diethylenglycol-monobuthyl ether (DGMBE), Fluka Chemie GmbH, CAS # 112-34-5 - to reduce relative permittivity

THE RECIPES FOR 2450MHz SIMULATING LIQUID TABLE

INGREDIENT	HEAD SIMULATING LIQUID 2450MHz (HSL-2450)	MUSCLE SIMULATING LIQUID 2450MHz (MSL-2450)
Water	45%	69.83%
DGMBE	55%	30.17%
Salt	NA	NA
Dielectric Parameters at 22℃	f= 2450MHz ε= 39.2 ± 5% σ= 1.80 ± 5% S/m	f= 2450MHz ε= 52.7 ± 5% σ= 1.95 ± 5% 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 (±1°).
4. Set water temperature in Agilent-Software (Calibration Setup).
5. Perform calibration.
6. Validate calibration with dielectric material of known properties (e.g. polished ceramic slab with >8mm thickness ε'=10.0, ε''=0.0). If measured parameters do not fit within tolerance, repeat calibration (±0.2 for ε': ±0.1 for ε'').
7. Conductivity can be calculated from ε'' by $\sigma = \omega \varepsilon_0 \varepsilon'' = \varepsilon'' f$ [GHz] / 18.
8. Measure liquid shortly after calibration. Repeat calibration every hour.
9. Stir the liquid to be measured. Take a sample (~ 50ml) with a syringe from the center of the liquid container.
10. Pour the liquid into a small glass flask. Hold the syringe at the bottom of the flask to avoid air bubbles.
11. Put the dielectric probe in the glass flask. Check that there are no air bubbles in front of the opening in the dielectric probe kit.
12. Perform measurements.
13. Adjust medium parameters in 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).

FOR 2.4GHz BAND SIMULATING LIQUID

TISSUE TYPE		HEAD		
LIQUID TYPE		HSL-2450		
SIMULATING LIQUID TEMP.		22.8		
TEST DATE		Mar. 21, 2009		
TESTED BY		Dylan Chiou		
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)
2437.0	Permitivity (ε)	39.2	41.1	4.85
2450.0		39.2	41.0	4.59
2437.0	Conductivity (σ) S/m	1.79	1.84	2.79
2450.0		1.80	1.85	2.78
Dielectric Parameters Required at 22℃		f= 2450MHz ε= 52.7 ± 5% σ= 1.95 ± 5% S/m		

TISSUE TYPE		BODY		
LIQUID TYPE		MSL-2450		
SIMULATING LIQUID TEMP.		22.6		
TEST DATE		Mar. 23, 2009		
TESTED BY		Dylan Chiou		
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)
2437.0	Permitivity (ε)	52.70	54.8	3.98
2450.0		52.70	54.7	3.80
2437.0	Conductivity (σ) S/m	1.94	1.98	2.06
2450.0		1.95	2.00	2.56
Dielectric Parameters Required at 22℃		f= 2450MHz ε= 52.7 ± 5% σ= 1.95 ± 5% S/m		

FOR WLAN 5GHz BAND SIMULATING LIQUID

TISSUE TYPE		HEAD		
LIQUID TYPE		HSL-5800		
SIMULATING LIQUID TEMP.		22.5		
TEST DATE		Mar. 25, 2009		
TESTED BY		Dylan Chiou		
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)
5745.0	Permitivity (ε)	35.4	36.0	1.69
5800.0		35.3	35.9	1.70
5745.0	Conductivity (σ) S/m	5.21	5.34	2.50
5800.0		5.27	5.41	2.66
Dielectric Parameters Required at 22℃		f= 2450MHz ε= 52.7 ± 5% σ= 1.95 ± 5% S/m		

TISSUE TYPE		BODY		
LIQUID TYPE		MSL-5800		
SIMULATING LIQUID TEMP.		22.5		
TEST DATE		Mar. 27, 2009		
TESTED BY		Dylan Chiou		
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	ERROR PERCENTAGE (%)
5745.0	Permitivity (ε)	48.30	49.60	2.69
5800.0		48.20	49.50	2.70
5745.0	Conductivity (σ) S/m	5.94	6.17	3.87
5800.0		6.00	6.26	4.33
Dielectric Parameters Required at 22℃		f= 2450MHz ε= 52.7 ± 5% σ= 1.95 ± 5% S/m		

5.5 TEST EQUIPMENT FOR TISSUE PROPERTY

ITEM	NAME	BRAND	TYPE	SERIES NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
1	Network Analyzer	Agilent	E8358A	US41480538	Nov. 27, 2008	Nov. 26, 2009
2	Dielectric Probe	Agilent	85070D	US01440176	NA	NA

NOTE:

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

6. SYSTEM VALIDATION

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

6.1 TEST EQUIPMENT

ITEM	NAME	BRAND	TYPE	SERIES NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
1	SAM Phantom	S & P	QD000 P40 CA	TP-1150	NA	NA
2	Signal Generator	Anritsu	68247B	984703	May 27, 2008	May 26, 2009
3	E-Field Probe	S & P	EX3DV3	3504	Jan. 21, 2009	Jan. 20, 2010
4	E-Field Probe	S & P	EX3DV3	3578	May 21, 2008	May 20, 2009
5	DAE	S & P	DAE	861	Sep. 22, 2008	Sep. 21, 2009
6	Robot Positioner	Staubli Unimation	NA	NA	NA	NA
7	Validation Dipole	S & P	D2450V2	737	Apr. 22, 2008	Apr. 21, 2009
8	Validation Dipole	S & P	D5GHzV2	1018	Apr. 21, 2008	Apr. 20, 2009
9	Power Meter	Agilent	E4416A	GB41291763	Sep. 28, 2008	Sep. 29, 2009
10	Power Sensor	Agilent	E9327A	US40441181	Sep. 28, 2008	Sep. 29, 2009

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

6.2 TEST PROCEDURE

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

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

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

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

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

About the validation dipole positioning uncertainty, the constant and low loss dielectric spacer is used to establish the correct distance between the top surface of the dipole and the bottom surface of the phantom, the error component introduced by the uncertainty of the distance between the liquid (i.e., phantom shell) and the validation dipole in the DASY5 system is less than ±0.1mm.

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

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

6.3 VALIDATION RESULTS

SYSTEM VALIDATION TEST OF SIMULATING LIQUID					
FREQUENCY (MHz)	**REQUIRED SAR (mW/g)**	**MEASURED SAR (mW/g)**	**DEVIATION (%)**	**SEPARATION DISTANCE**	**TESTED DATE**
HSL2450	14.00 (1g)	13.4	-4.29	10mm	Mar. 21, 2009
MSL2450	12.80 (1g)	13.2	3.12	10mm	Mar. 23, 2009
HSL5800	7.85 (1g)	8.15	3.82	10mm	Mar. 25, 2009
MSL5800	7.37 (1g)	7.02	-4.75	10mm	Mar. 27, 2009
TESTED BY	Dylan Chiou				

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

6.4 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	4.70	Rectangular	√3	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.60	Rectangular	√3	0.7	0.7	3.88	3.88	∞
Boundary effects	2.00	Rectangular	√3	1	1	1.15	1.15	∞
Linearity	4.70	Rectangular	√3	1	1	2.71	2.71	∞
System Detection Limits	1.00	Rectangular	√3	1	1	0.58	0.58	∞
Readout Electronics	0.30	Normal	1	1	1	0.30	0.30	∞
Response Time	0.80	Rectangular	√3	1	1	0.46	0.46	∞
Integration Time	2.60	Rectangular	√3	1	1	1.50	1.50	∞
RF Ambient Noise	3.00	Rectangular	√3	1	1	1.73	1.73	∞
RF Ambient Reflections	3.00	Rectangular	√3	1	1	1.73	1.73	∞
Probe Positioner	0.80	Rectangular	√3	1	1	0.46	0.46	∞
Probe Positioning	9.90	Rectangular	√3	1	1	5.72	5.72	∞
Max. SAR Eval.	4.00	Rectangular	√3	1	1	2.31	2.31	∞
Dipole Related								
Dipole Axis to Liquid Distance	2.00	Rectangular	√3	1	1	1.15	1.15	145
Input Power Drift	5.00	Rectangular	√3	1	1	2.89	2.89	∞
Phantom and Tissue parameters								
Phantom Uncertainty	4.00	Rectangular	√3	1	1	2.31	2.31	∞
Liquid Conductivity (target)	5.00	Rectangular	√3	0.64	0.43	1.85	1.24	∞
Liquid Conductivity (measurement)	4.78	Normal	1	0.64	0.43	3.06	2.06	∞
Liquid Permittivity (target)	5.00	Rectangular	√3	0.6	0.49	1.73	1.41	∞
Liquid Permittivity (measurement)	3.37	Normal	1	0.6	0.49	2.02	1.65	∞
Combined Standard Uncertainty						**12.34**	**11.95**	
Coverage Factor for 95%						**Kp=2**		
Expanded Uncertainty (K=2)						**24.68**	**23.90**	

7. MEASUREMENT SAR PROCEDURE UNCERTAINTIES

The assessment of spatial peak SAR of the hand handheld devices is according to IEEE 1528 / EN 62209-1. All testing situation shall be met below these requirements.

- The system is used by an experienced engineer who follows the manual and the guidelines taught during the training provided by SPEAG.
- The probe has been calibrated within the requested period and the stated uncertainty for the relevant frequency bands does not exceed 4.8% (k=1).
- The validation dipole has been calibrated within the requested period and the system performance check has been successful.
- The DAE unit has been calibrated within the within the requested period.
- The minimum distance between the probe sensor and inner phantom shell is selected to be between 4 and 5mm.
- The operational mode of the DUT is CW, CDMA, FDMA or TDMA (GSM, DCS, PCS, IS136 and PDC) and the measurement/integration time per point is >500 ms.
- The dielectric parameters of the liquid have been assessed using Agilent 85070D dielectric probe kit or a more accurate method.
- The dielectric parameters are within 5% of the target values.
- The DUT has been positioned as described in section 3.

7.1. PROBE CALIBRATION UNCERTAINTY

SPEAG conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528, EN 62209-1, IEC 62209, etc.) under ISO17025. The uncertainties are stated on the calibration certificate. For the most relevant frequency bands, these values do not exceed 4.8% (k=1). If evaluations of other bands are performed for which the uncertainty exceeds these values, the uncertainty tables given in the summary have to be revised accordingly.

7.2. ISOTROPY UNCERTAINTY

The axial isotropy tolerance accounts for probe rotation around its axis while the hemispherical isotropy error includes all probe orientations and field polarizations. These parameters are assessed by SPEAG during initial calibration. In 2001, SPEAG further tightened its quality controls and warrants that the maximal deviation from axial isotropy is ±0.20dB, while the maximum deviation of hemispherical isotropy is ±0.40dB, corresponding to ±4.7% and ±9.6%, respectively. A weighting factor of cp equal to 0.5 can be applied, since the axis of the probe deviates less than 30 degrees from the normal surface orientation.

7.3. BOUNDARY EFFECT UNCERTAINTY

The effect can be estimated according to the following error approximation formula

$$SAR_{tolerance}[\%] = SAR_{be}[\%] \times \frac{(d_{be} + d_{step})^2}{2d_{step}} \frac{e^{-\frac{d_{be}}{\delta/2}}}{\delta/2}$$

$$d_{be} + d_{step} < 10mm$$

The parameter d_{be} is the distance in mm between the surface and the closest measurement point used in the averaging process; d_{step} is the separation distance in mm between the first and second measurement points; δ is the minimum penetration depth in mm within the head tissue equivalent liquids (i.e., δ= 13.95mm at 3GHz); SAR_{be} is the deviation between the measured SAR value at the distance d_{be} from the boundary and the wave-guide analytical value SAR_{ref}.DASY5 applies a boundary effect compensation algorithm according to IEEE 1528, which is possible since the axis of the probe never deviates more than 30 degrees from the normal surface orientation. SAR_{be}[%] is assessed during the calibration process and SPEAG warrants that the uncertainty at distances larger than 4mm is always less than 1%.In summary, the worst case boundary effect SAR tolerance[%] for scanning distances larger than 4mm is < ± 0.8%.

7.4. PROBE LINEARITY UNCERTAINTY

Field probe linearity uncertainty includes errors from the assessment and compensation of the diode compression effects for CW and pulsed signals with known duty cycles. This error is assessed using the procedure described in IEEE 1528 / EN 62209-1. For SPEAG field probes, the measured difference between CW and pulsed signals, with pulse frequencies between 10Hz and 1kHz and duty cycles between 1 and 100, is < ±0.20dB (< ±4.7%).

7.5. READOUT ELECTRONICS UNCERTAINTY

All uncertainties related to the probe readout electronics (DAE unit), including the gain and linearity of the instrumentation amplifier, its loading effect on the probe, and accuracy of the signal conversion algorithm, have been assessed accordingly to IEEE 1528 / EN 62209-1.The combination (root-sum-square RSS method) of these components results in an overall maximum error of ±1.0%.

7.6. RESPONSE TIME UNCERTAINTY

The time response of the field probes is assessed by exposing the probe to a well-controlled electric field producing SAR larger than 2.0W/kg at the tissue medium surface. The signal response time is evaluated as the time required by the system to reach 90% of the expected final value after an on/of switch of the power source. Analytically, it can be expressed as:

$$SAR_{tolerance}[\%] = 100 \times \left(\frac{T_m}{T_m + \tau e^{-T_m/\tau} - \tau} - 1\right)$$

where Tm is 500 ms, i.e., the time between measurement samples, and $_T$ the time constant. The response time $_T$ of SPEAG's probes is <5ms. In the current implementation, DASY5 waits longer than 100 ms after having reached the grid point before starting a measurement, i.e., the response time uncertainty is negligible.

7.7. INTEGRATION TIME UNCERTAINTY

If the device under test does not emit a CW signal, the integration time applied to measure the electric field at a specific point may introduce additional uncertainties due to the discretization and can be assessed as follows

$$SAR_{tolerance}[\%] = 100 \times \sum_{allsub-frames} \frac{t_{frame}}{t_{integration}} \frac{slot_{idle}}{slot_{total}}$$

The tolerances for the different systems are given in Table 7.1, whereby the worst-case $SAR_{tolerance}$ is 2.6%.

System	$SAR_{tolerance}$ %
CW	0
CDMA*	0
WCDMA*	0
FDMA	0
IS-136	2.6
PDC	2.6
GSM/DCS/PCS	1.7
DECT	1.9
Worst-Case	2.6

TABLE 7.1

7.8. PROBE POSITIONER MECHANICAL TOLERANCE

The mechanical tolerance of the field probe positioner can introduce probe positioning uncertainties. The resulting SAR uncertainty is assessed by comparing the SAR obtained according to the specifications of the probe positioner with respect to the actual position defined by the geometric enter of the probe sensors. The tolerance is determined as:

$$SAR_{tolerance}[\%] = 100 \times \frac{d_{ph}}{\delta/2}$$

The specified repeatability of the RX robot family used in DASY5 systems is ±25µm. The absolute accuracy for short distance movements is better than ±0.1mm, i.e., the $SAR_{tolerance}$[%] is better than 1.5% (rectangular).

7.9. PROBE POSITIONING

The probe positioning procedures affect the tolerance of the separation distance between the probe tip and the phantom surface as:

$$SAR_{tolerance}[\%] = 100 \times \frac{d_{ph}}{\delta/2}$$

where d_{ph} is the maximum deviation of the distance between the probe tip and the phantom surface. The optical surface detection has a precision of better than 0.2mm, resulting in an $SAR_{tolerance}$[%] of <2.9% (rectangular distribution). Since the mechanical detection provides better accuracy, 2.9% is a worst-case figure for DASY5 system.

7.10. PHANTOM UNCERTAINTY

The SAR measurement uncertainty due to SPEAG phantom shell production tolerances has been evaluated using

$$SAR_{tolerance}[\%] \cong 100 \times \frac{2d}{a}, \qquad d << a$$

For a maximum deviation d of the inner and outer shell of the phantom from that specified in the CAD file of ±0.2mm, and a 10mm spacing a between source and tissue liquid, the calculated phantom uncertainty is ±4.0%.

7.11. DASY5 UNCERTAINTY BUDGET

Error Description	Tolerance (±%)	Probability Distribution	Divisor	(C_i)		Standard Uncertainty (±%)		(v_i)
				(1g)	(10g)	(1g)	(10g)	
Measurement Equipment								
Probe Calibration	6.55	Normal	1	1	1	6.55	6.55	∞
Axial Isotropy	4.70	Rectangular	√3	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.60	Rectangular	√3	0.7	0.7	3.88	3.88	∞
Boundary effects	2.00	Rectangular	√3	1	1	1.15	1.15	∞
Linearity	4.70	Rectangular	√3	1	1	2.71	2.71	∞
System Detection Limits	1.00	Rectangular	√3	1	1	0.58	0.58	∞
Readout Electronics	0.30	Normal	1	1	1	0.30	0.30	∞
Response Time	0.80	Rectangular	√3	1	1	0.46	0.46	∞
Integration Time	2.60	Rectangular	√3	1	1	1.50	1.50	∞
RF Ambient Noise	3.00	Rectangular	√3	1	1	1.73	1.73	∞
RF Ambient Reflections	3.00	Rectangular	√3	1	1	1.73	1.73	∞
Probe Positioner	0.80	Rectangular	√3	1	1	0.46	0.46	∞
Probe Positioning	9.90	Rectangular	√3	1	1	5.72	5.72	∞
Max. SAR Eval.	4.00	Rectangular	√3	1	1	2.31	2.31	∞
Test Sample Related								
Device Positioning	0.89	Normal	1	1	1	0.89	0.89	9
Device Holder	3.60	Normal	1	1	1	3.60	3.60	5
Power Drift	5.00	Rectangular	√3	1	1	2.89	2.89	∞
Phantom and Tissue parameters								
Phantom Uncertainty	4.00	Rectangular	√3	1	1	2.31	2.31	∞
Liquid Conductivity (target)	5.00	Rectangular	√3	0.64	0.43	1.85	1.24	∞
Liquid Conductivity (measurement)	4.78	Normal	1	0.64	0.43	3.06	2.06	∞
Liquid Permittivity (target)	5.00	Rectangular	√3	0.6	0.49	1.73	1.41	∞
Liquid Permittivity (measurement)	3.37	Normal	1	0.6	0.49	2.02	1.65	∞
Combined Standard Uncertainty						**12.83**	**12.46**	
Coverage Factor for 95%						**kp=2**		
Expanded Uncertainty (K=2)						**25.66**	**24.92**	

TABLE 7.2

8. 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 by the following approval agencies according to ISO/IEC 17025.

USA	FCC, NVLAP
GERMANY	TUV Rheinland
JAPAN	VCCI
NORWAY	NEMKO
CANADA	INDUSTRY CANADA, CSA
R.O.C.	TAF, BSMI, NCC
NETHERLANDS	Telefication
SINGAPORE	GOST-ASIA (MOU)
RUSSIA	CERTIS (MOU)

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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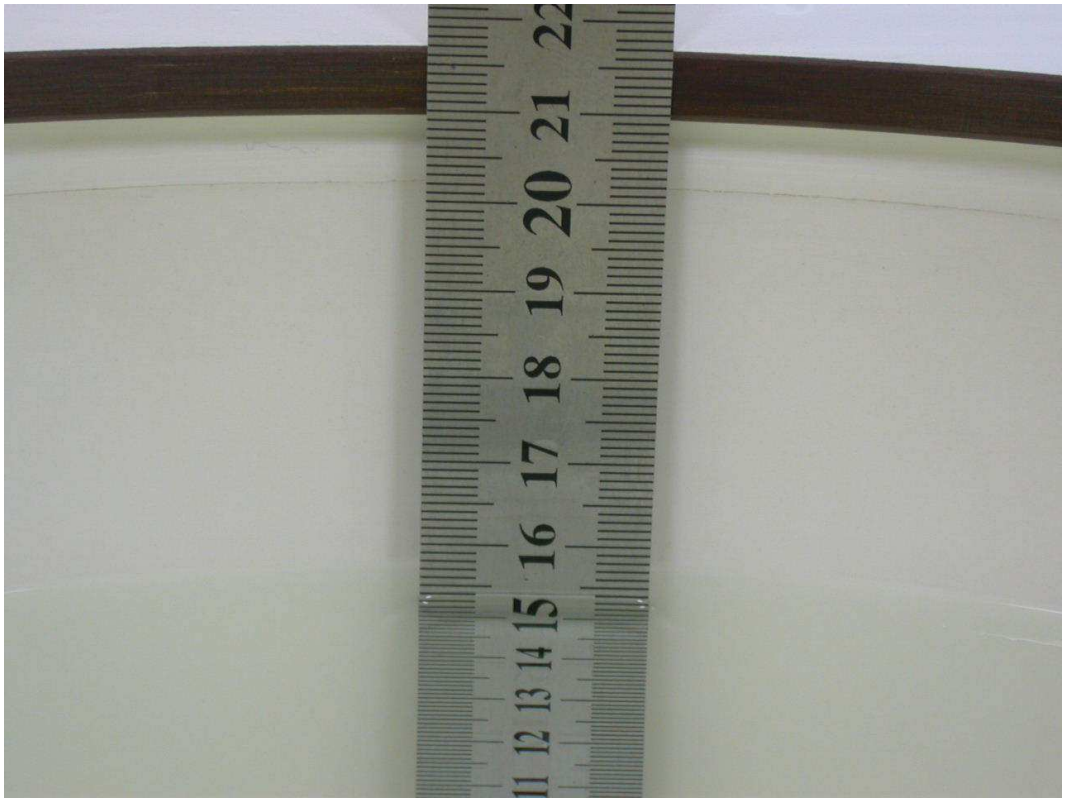
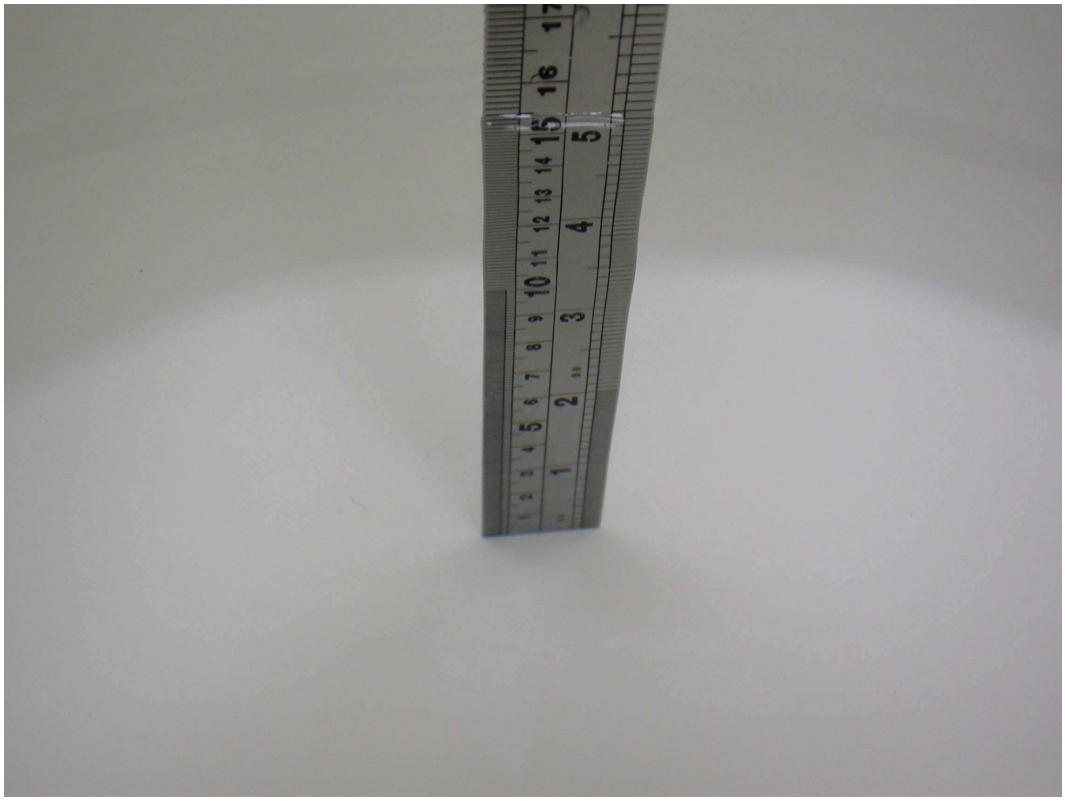
APPENDIX A: TEST DATA

Liquid Level Photo

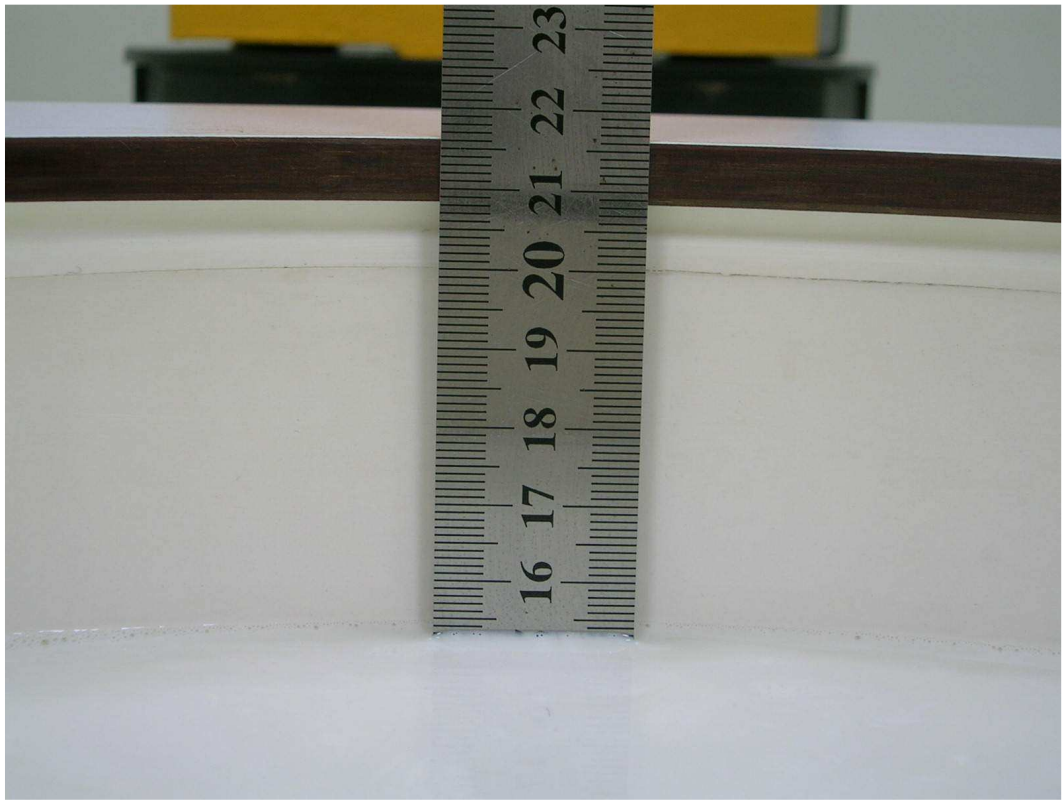
Tissue HSL2450MHz D=151mm



Tissue MSL2450MHz D=155mm



Tissue HSL5800MHz D=153mm



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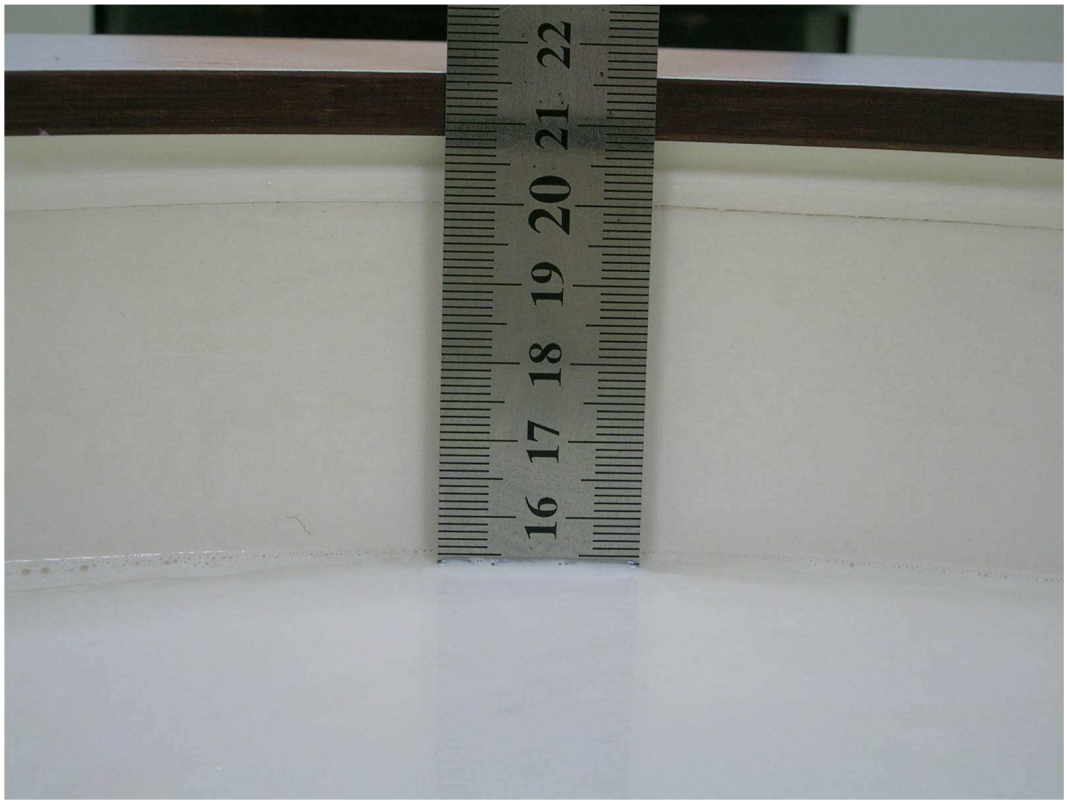


Date/Time: 2009/3/21 09:02:48

Test Laboratory: Bureau Veritas ADT

M01 Right Head Cheek 11b Ch6 ANT AUX

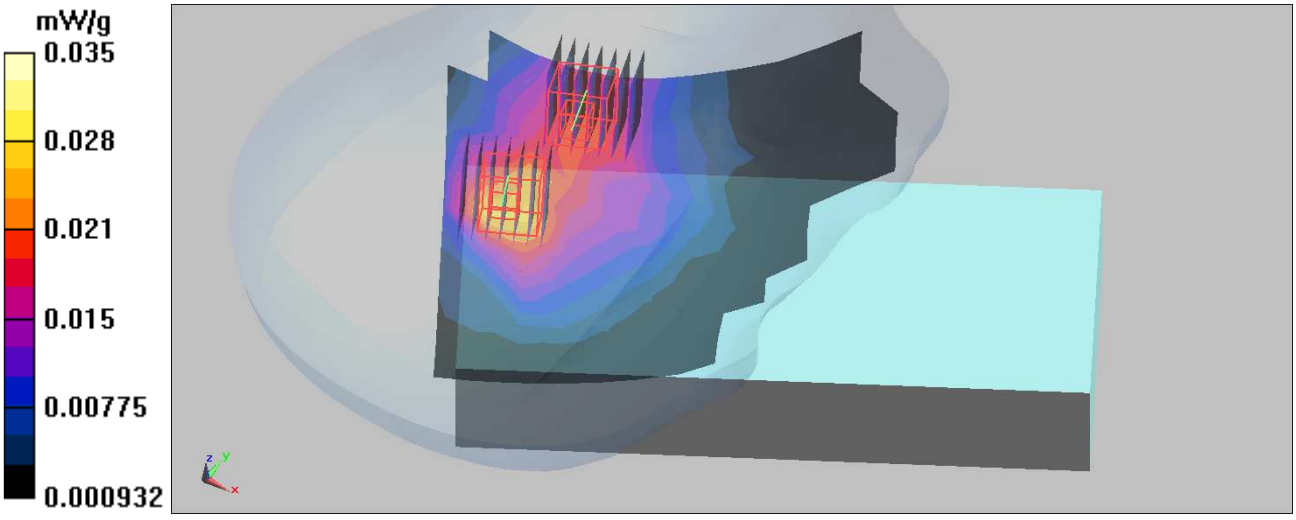
DUT: PDA ; Type: MC9598
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section ; DUT test position : Cheek ; Modulation type: BPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch position - Mid. Channel 6/Area Scan (10x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.043 mW/g

Touch position - Mid. Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4 V/m
Peak SAR (extrapolated) = 0.072 W/kg
SAR(1 g) = 0.040 mW/g; SAR(10 g) = 0.022 mW/g
Maximum value of SAR (measured) = 0.048 mW/g

Touch position - Mid. Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4 V/m
Peak SAR (extrapolated) = 0.056 W/kg
SAR(1 g) = 0.029 mW/g; SAR(10 g) = 0.017 mW/g
Maximum value of SAR (measured) = 0.035 mW/g



Date/Time: 2009/3/21 09:38:40

Test Laboratory: Bureau Veritas ADT

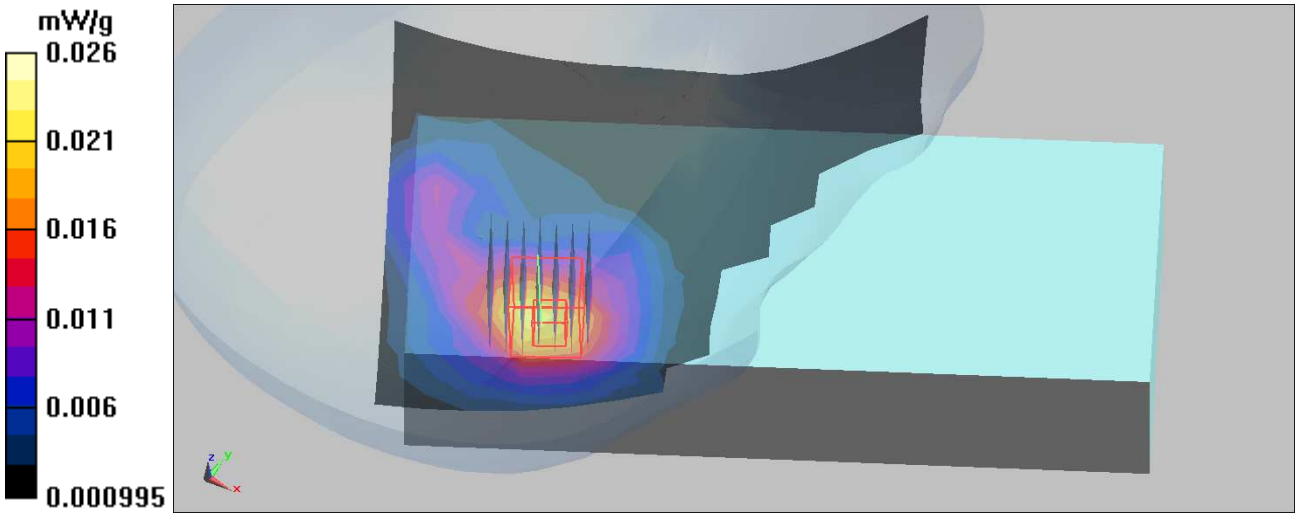
M02 Right Head Cheek 11b Ch6 ANT MAIN

DUT: PDA ; Type: MC9598
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section ; DUT test position : Cheek ; Modulation type:BPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch position - Mid. Channel 6/Area Scan (10x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.023 mW/g

Touch position - Mid. Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.77 V/m
Peak SAR (extrapolated) = 0.040 W/kg
SAR(1 g) = 0.020 mW/g; SAR(10 g) = 0.012 mW/g
Maximum value of SAR (measured) = 0.026 mW/g



Date/Time: 2009/3/21 10:07:23

Test Laboratory: Bureau Veritas ADT

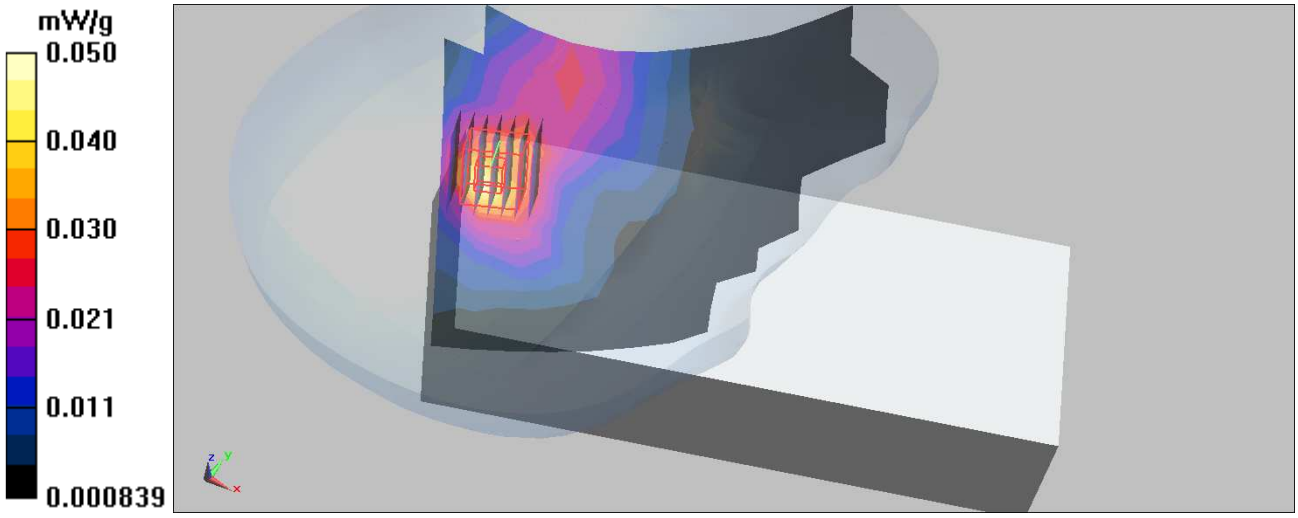
M03 Right Head Tilt 11b Ch6 ANT AUX

DUT: PDA ; Type: MC95968
Communication System: 802.11b ; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section ; DUT test position : Tilt ; Modulation type: DBPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Tilt position - Mid. Channel 6/Area Scan (10x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.050 mW/g

Tilt position - Mid. Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.69 V/m
Peak SAR (extrapolated) = 0.074 W/kg
SAR(1 g) = 0.041 mW/g; SAR(10 g) = 0.022 mW/g



Date/Time: 2009/3/21 10:38:27

Test Laboratory: Bureau Veritas ADT

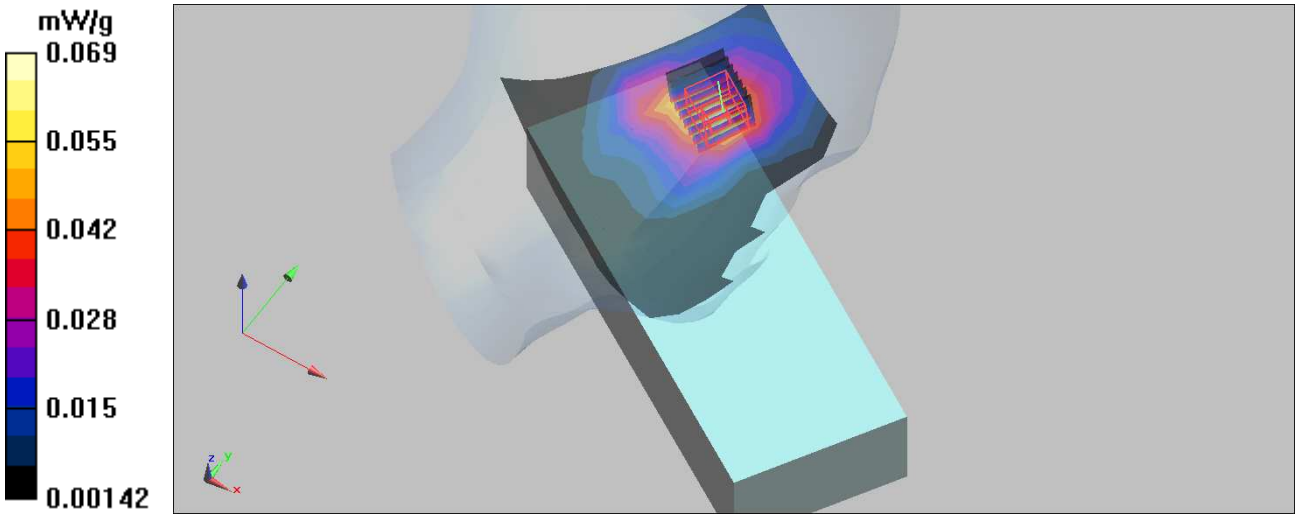
M04 Left Head Cheek 11b Ch6 ANT AUX

DUT: PDA ; Type: MC 9596
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Left Section ; DUT test position :Cheek ; Modulation type: DBPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch position - Mid Channel 6/Area Scan (10x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.071 mW/g

Touch position - Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.15 V/m
Peak SAR (extrapolated) = 0.107 W/kg
SAR(1 g) = 0.056 mW/g; SAR(10 g) = 0.031 mW/g
Maximum value of SAR (measured) = 0.069 mW/g



Date/Time: 2009/3/21 11:13:06

Test Laboratory: Bureau Veritas ADT

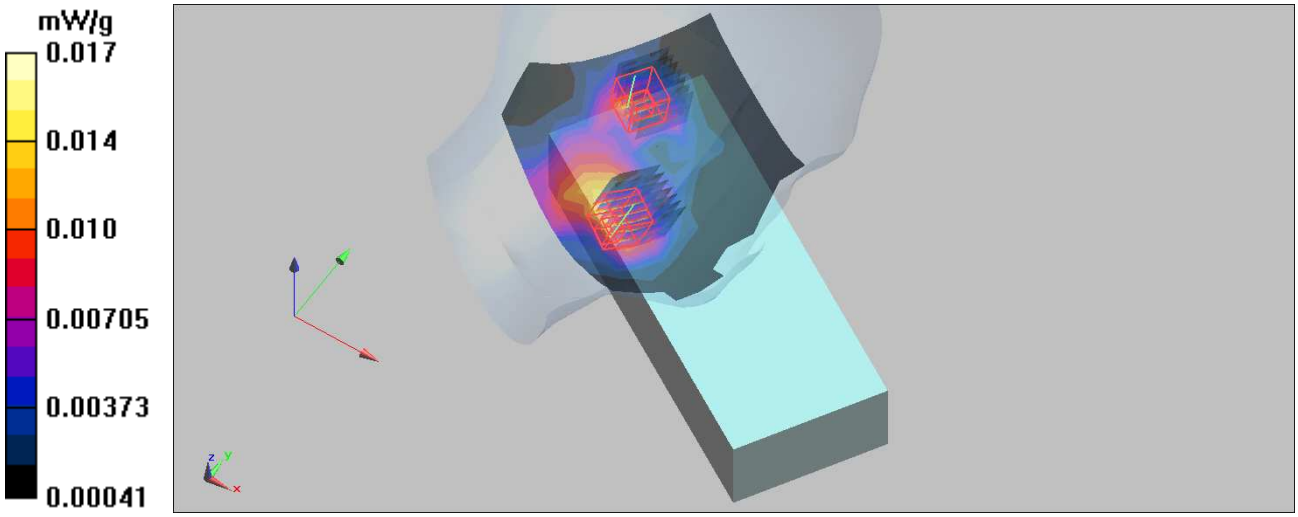
M05 Left Head Cheek 11b Ch6 ANT MAIN

DUT: PDA ; Type: MC 9598
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Left Section ; DUT test position : Cheek ; Modulation type: DBPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch position - Mid Channel 6/Area Scan (10x19x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.015 mW/g

Touch position - Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.31 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 0.023 W/kg
SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.00653 mW/g
Touch position - Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.31 V/m
Peak SAR (extrapolated) = 0.027 W/kg
SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.007 mW/g
Maximum value of SAR (measured) = 0.017 mW/g



Date/Time: 2009/3/21 11:48:10

Test Laboratory: Bureau Veritas ADT

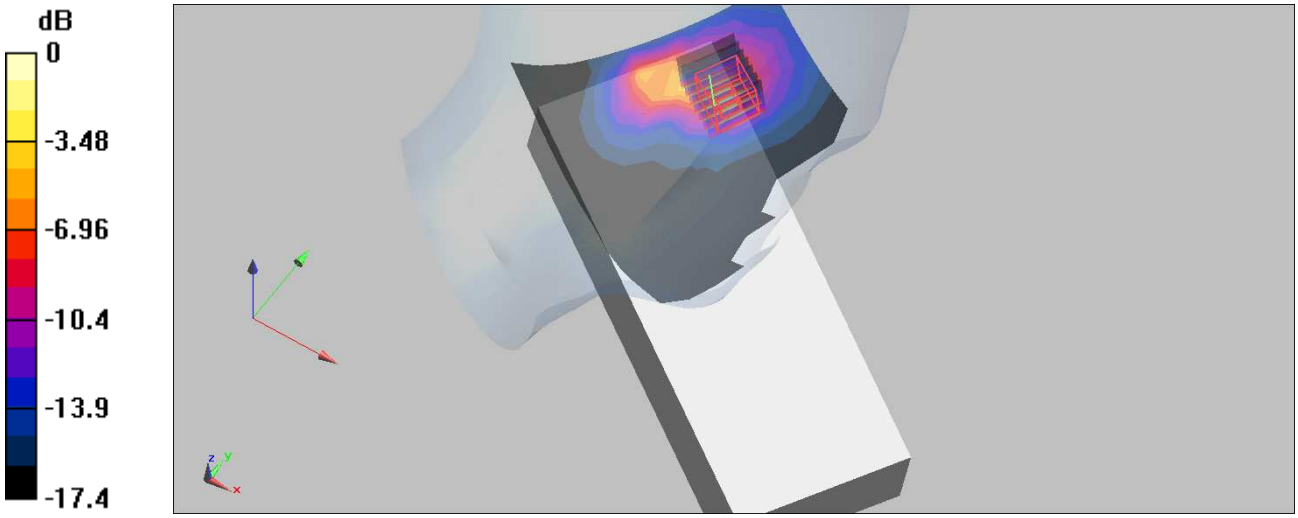
M06 Left Head Tilt 11b Ch6 ANT AUX

DUT: PDA ; Type: MC 9598
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Left Section ; DUT test position : Tilt ; Modulation type: DBPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Tilt position - Mid Channel 6/Area Scan (10x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.053 mW/g

Tilt position - Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.63 V/m
Peak SAR (extrapolated) = 0.098 W/kg
SAR(1 g) = 0.053 mW/g; SAR(10 g) = 0.028 mW/g
Maximum value of SAR (measured) = 0.066 mW/g



Date/Time: 2009/3/23 09:27:28

Test Laboratory: Bureau Veritas ADT

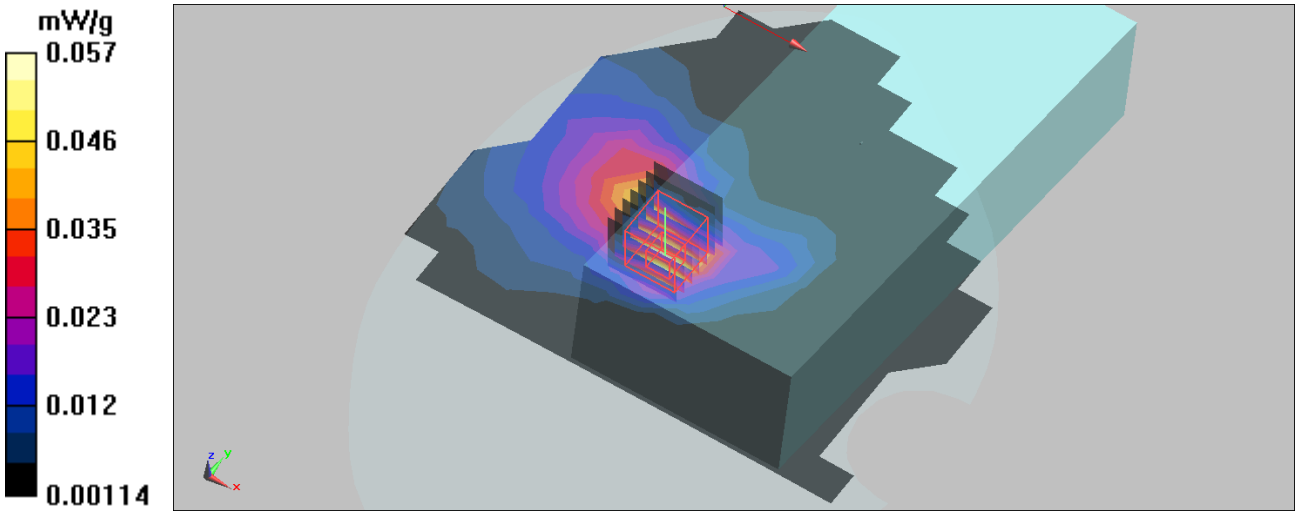
M07 Body Front 11b Ch6 ANT AUX

DUT: PDA ; Type: MC 9598
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; σ = 1.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 0 mm (The tip side of the EUT to the Phantom)

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.53, 7.53, 7.53) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2008/9/22
- Phantom: SAM with CRP ; Type: SAM ; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125 ; SEMCAD X Version 13.4 Build 125

Mid Channel 6/Area Scan (17x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.050 mW/g

Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.92 V/m
Peak SAR (extrapolated) = 0.086 W/kg
SAR(1 g) = 0.045 mW/g; SAR(10 g) = 0.023 mW/g
Maximum value of SAR (measured) = 0.057 mW/g



Date/Time: 2009/3/23 10:18:14

Test Laboratory: Bureau Veritas ADT

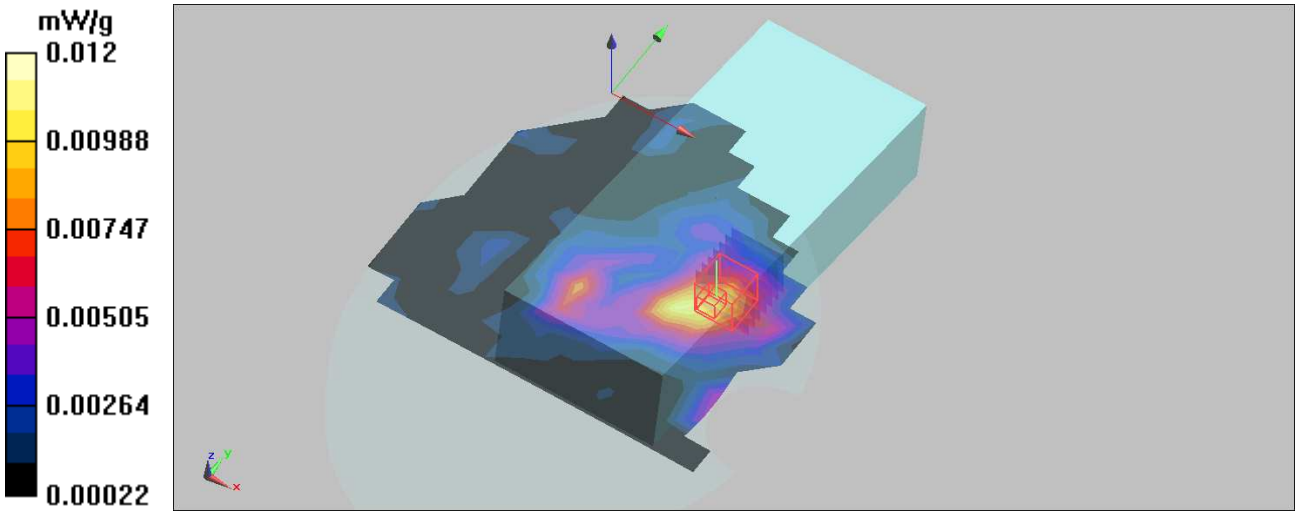
M08 Body Front 11b Ch6 ANT MAIN

DUT: PDA ; Type: MC 9596
Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; σ = 1.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 0 mm (The tip side of the EUT to the Phantom)

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.53, 7.53, 7.53) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2008/9/22
- Phantom: SAM with CRP ; Type: SAM ; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125 ; SEMCAD X Version 13.4 Build 125

Mid Channel 6/Area Scan (17x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.011 mW/g

Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.72 V/m; Power Drift = 1.01 dB
Peak SAR (extrapolated) = 0.020 W/kg
SAR(1 g) = 0.00961 mW/g; SAR(10 g) = 0.00518 mW/g
Maximum value of SAR (measured) = 0.012 mW/g



Date/Time: 2009/3/21 12:31:16

Test Laboratory: Bureau Veritas ADT

M09 Right Head Cheek 11g Ch6 ANT AUX

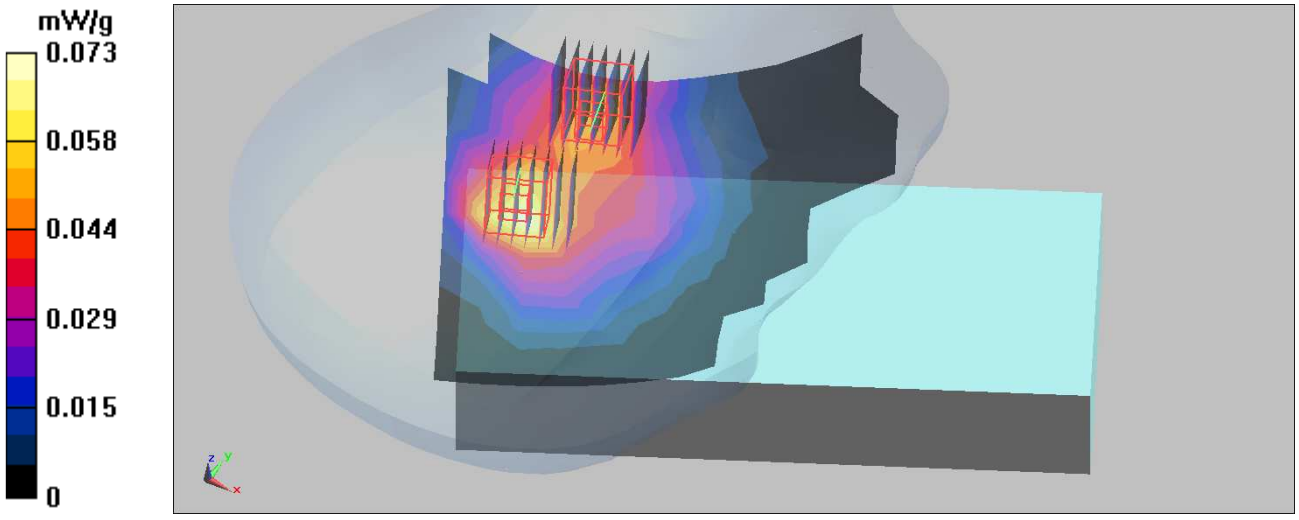
DUT: PDA ; Type: MC9598
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section ; DUT test position : Cheek ; Modulation type: BPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch position - Mid. Channel 6/Area Scan (10x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.073 mW/g

Touch position - Mid. Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.48 V/m
Peak SAR (extrapolated) = 0.114 W/kg
SAR(1 g) = 0.063 mW/g; SAR(10 g) = 0.035 mW/g
Maximum value of SAR (measured) = 0.078 mW/g

Touch position - Mid. Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.48 V/m
Peak SAR (extrapolated) = 0.089 W/kg
SAR(1 g) = 0.045 mW/g; SAR(10 g) = 0.026 mW/g
Maximum value of SAR (measured) = 0.055 mW/g



Date/Time: 2009/3/21 01:15:22

Test Laboratory: Bureau Veritas ADT

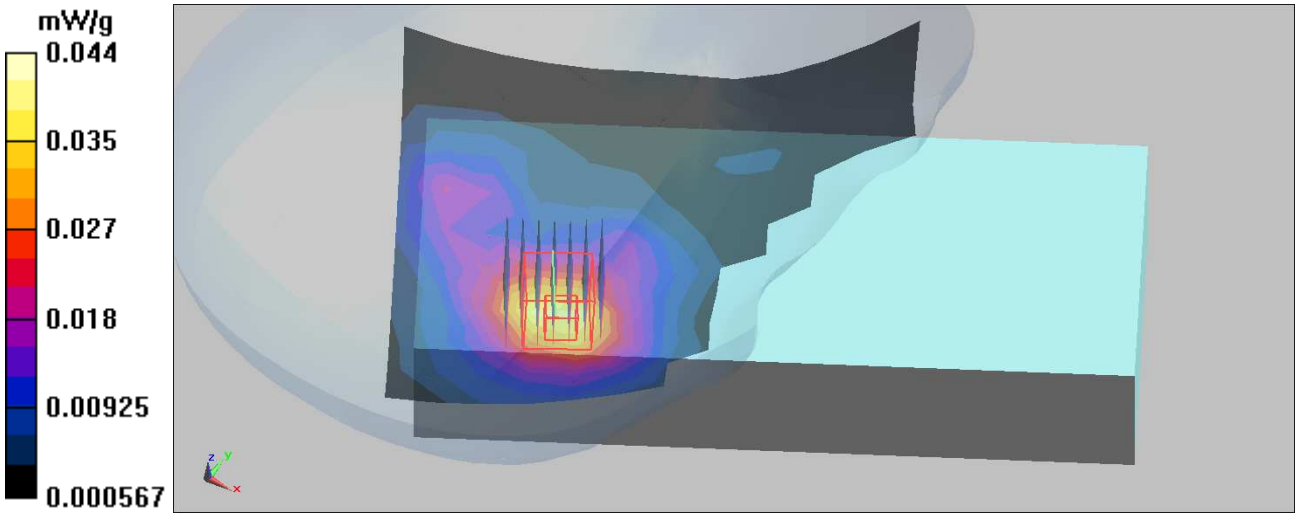
M10 Right Head Cheek 11g Ch6 ANT MAIN

DUT: PDA ; Type: MC9598
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section ; DUT test position : Cheek ; Modulation type: BPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch position - Mid. Channel 6/Area Scan (10x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.039 mW/g

Touch position - Mid. Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.71 V/m
Peak SAR (extrapolated) = 0.068 W/kg
SAR(1 g) = 0.035 mW/g; SAR(10 g) = 0.020 mW/g
Maximum value of SAR (measured) = 0.044 mW/g



Date/Time: 2009/3/21 01:46:28

Test Laboratory: Bureau Veritas ADT

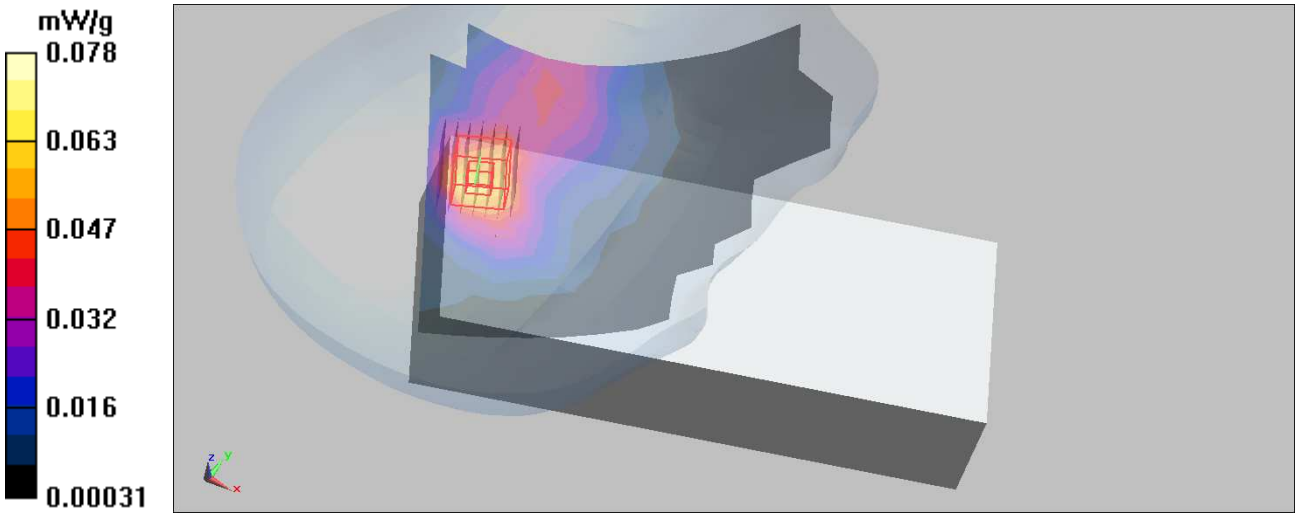
M11 Right Head Tilt 11g Ch6 ANT AUX

DUT: PDA ; Type: MC9598
Communication System: 802.11g ; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section ; DUT test position : Tilt ; Modulation type: BPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Tilt position - Mid. Channel 6/Area Scan (10x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.069 mW/g

Tilt position - Mid. Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.5 V/m
Peak SAR (extrapolated) = 0.115 W/kg
SAR(1 g) = 0.064 mW/g; SAR(10 g) = 0.034 mW/g
Maximum value of SAR (measured) = 0.078 mW/g



Date/Time: 2009/3/21 02:21:49

Test Laboratory: Bureau Veritas ADT

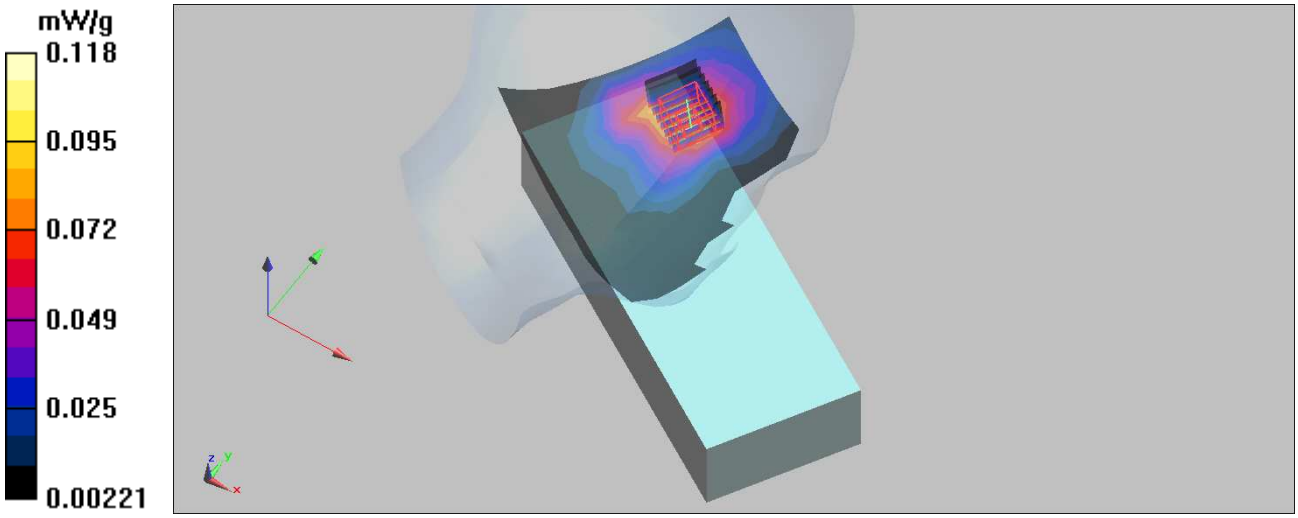
M12 Left Head Cheek 11g Ch6 ANT AUX

DUT: PDA ; Type: MC 9598
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Left Section ; DUT test position : Cheek ; Modulation type: BPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.2 Build 87

Touch position - Mid Channel 6/Area Scan (10x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.118 mW/g

Touch position - Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.39 V/m
Peak SAR (extrapolated) = 0.183 W/kg
SAR(1 g) = 0.095 mW/g; SAR(10 g) = 0.052 mW/g



Date/Time: 2009/3/21 02:57:32

Test Laboratory: Bureau Veritas ADT

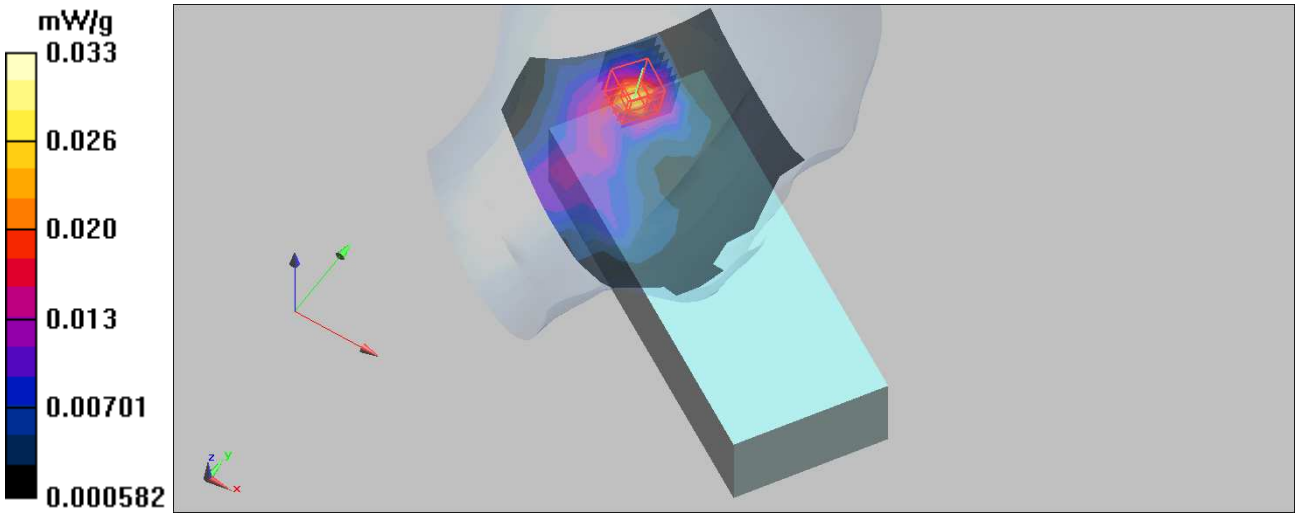
M13 Left Head Cheek 11g Ch6 ANT MAIN

DUT: PDA ; Type: MC 9596
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Left Section ; DUT test position : Cheek ; Modulation type: BPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch position - Mid Channel 6/Area Scan (10x19x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.030 mW/g

Touch position - Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.98 V/m
Peak SAR (extrapolated) = 0.048 W/kg
SAR(1 g) = 0.026 mW/g; SAR(10 g) = 0.014 mW/g
Maximum value of SAR (measured) = 0.033 mW/g



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Test Laboratory: Bureau Veritas ADT

M14 Left Head Tilt 11g Ch6 ANT AUX

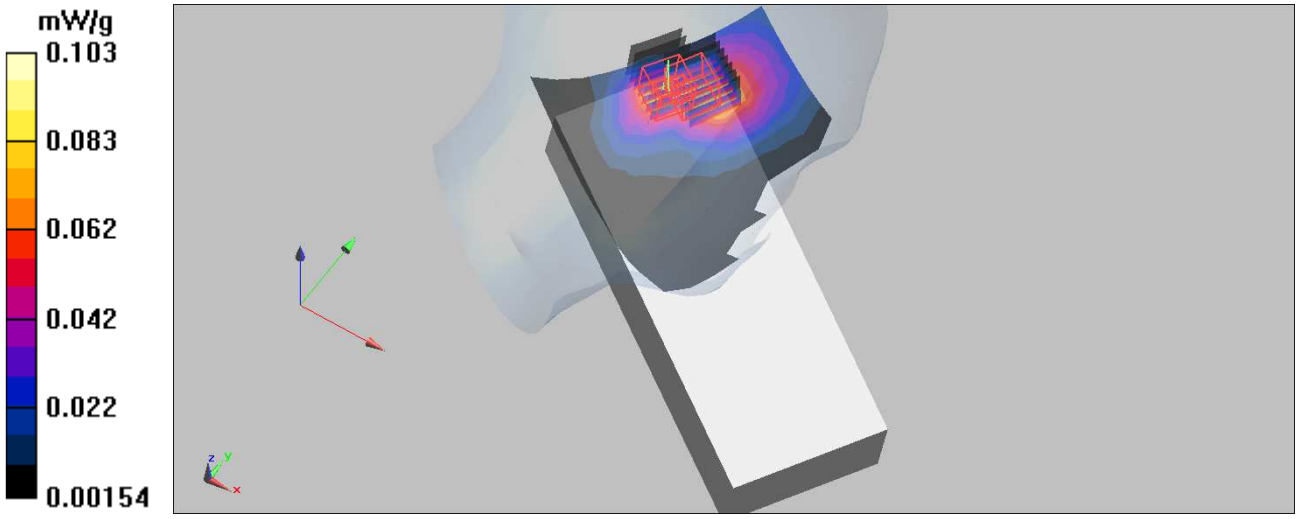
DUT: PDA ; Type: MC 9598
Communication System: 802.11g ; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Left Section ; DUT test position : Tilt ; Modulation type: BPSK

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Tilt position - Mid Channel 6/Area Scan (10x18x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.083 mW/g

Tilt position - Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.42 V/m; Power Drift = 0.844 dB
Peak SAR (extrapolated) = 0.153 W/kg
SAR(1 g) = 0.083 mW/g; SAR(10 g) = 0.043 mW/g
Maximum value of SAR (measured) = 0.102 mW/g

Tilt position - Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.42 V/m
Peak SAR (extrapolated) = 0.150 W/kg
SAR(1 g) = 0.075 mW/g; SAR(10 g) = 0.041 mW/g
Maximum value of SAR (measured) = 0.103 mW/g



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Test Laboratory: Bureau Veritas ADT

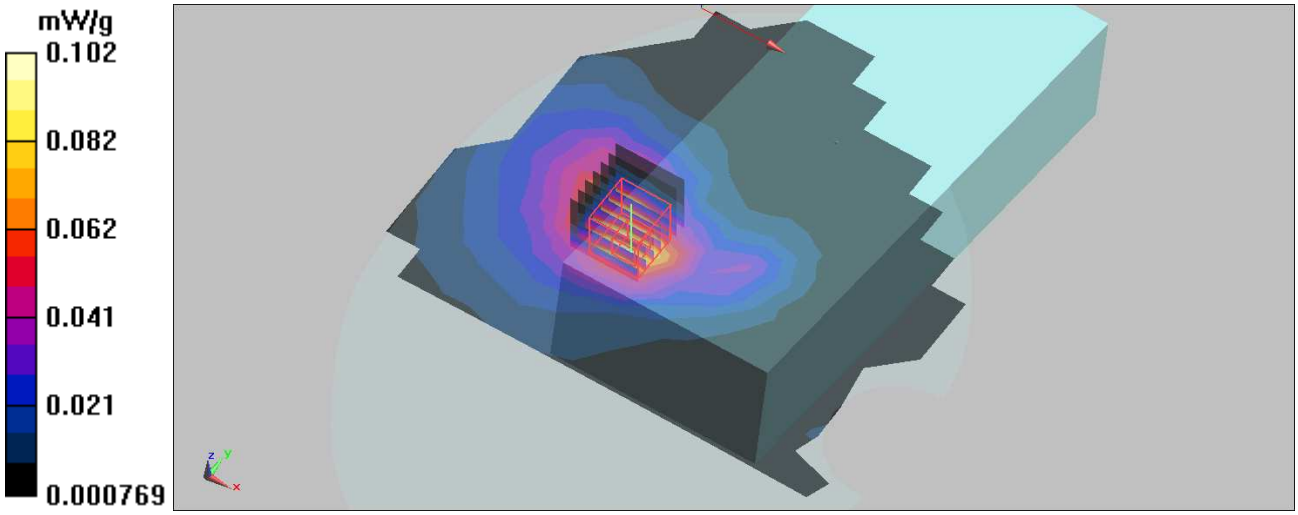
M15 Body Front 11g Ch6 ANT AUX

DUT: PDA ; Type: MC 9598
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; σ = 1.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 0 mm (The tip side of the EUT to the Phantom)

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.53, 7.53, 7.53) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2008/9/22
- Phantom: SAM with CRP ; Type: SAM ; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125 ; SEMCAD X Version 13.4 Build 125

Mid Channel 6/Area Scan (17x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.100 mW/g

Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.42 V/m
Peak SAR (extrapolated) = 0.156 W/kg
SAR(1 g) = 0.081 mW/g; SAR(10 g) = 0.042 mW/g
Maximum value of SAR (measured) = 0.102 mW/g



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Test Laboratory: Bureau Veritas ADT

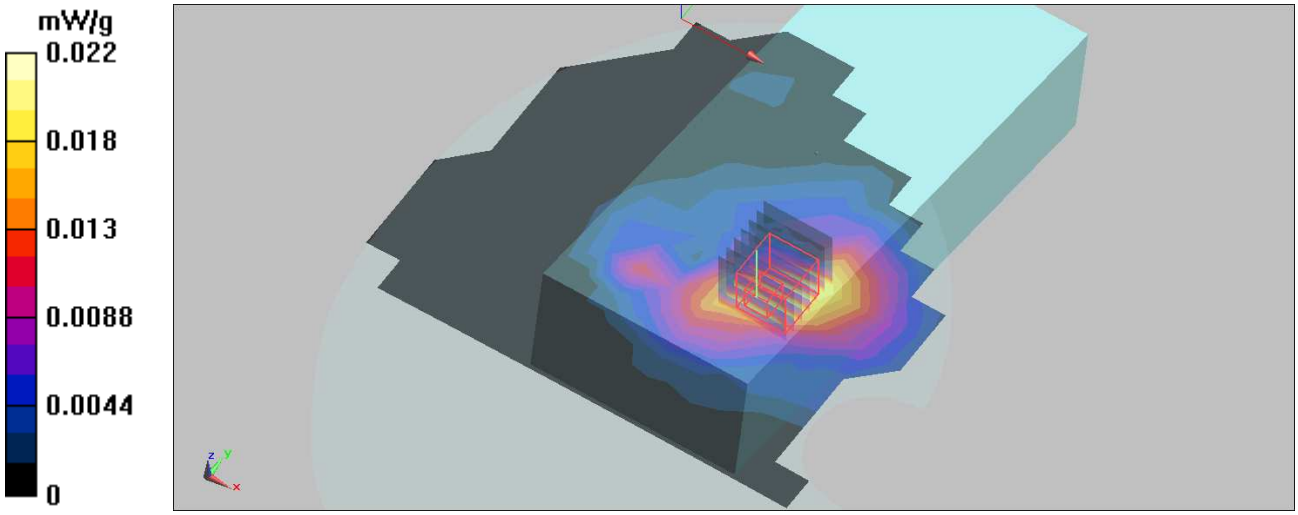
M16 Body Front 11g Ch6 ANT MAIN

DUT: PDA ; Type: MC 9596
Communication System: 802.11g ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL2450 Medium parameters used: f = 2437 MHz; σ = 1.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 0 mm (The tip side of the EUT to the Phantom)

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.53, 7.53, 7.53) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2008/9/22
- Phantom: SAM with CRP ; Type: SAM ; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125 ; SEMCAD X Version 13.4 Build 125

Mid Channel 6/Area Scan (17x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.021 mW/g

Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.67 V/m
Peak SAR (extrapolated) = 0.034 W/kg
SAR(1 g) = 0.017 mW/g; SAR(10 g) = 0.00934 mW/g
Maximum value of SAR (measured) = 0.022 mW/g



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Test Laboratory: Bureau Veritas ADT

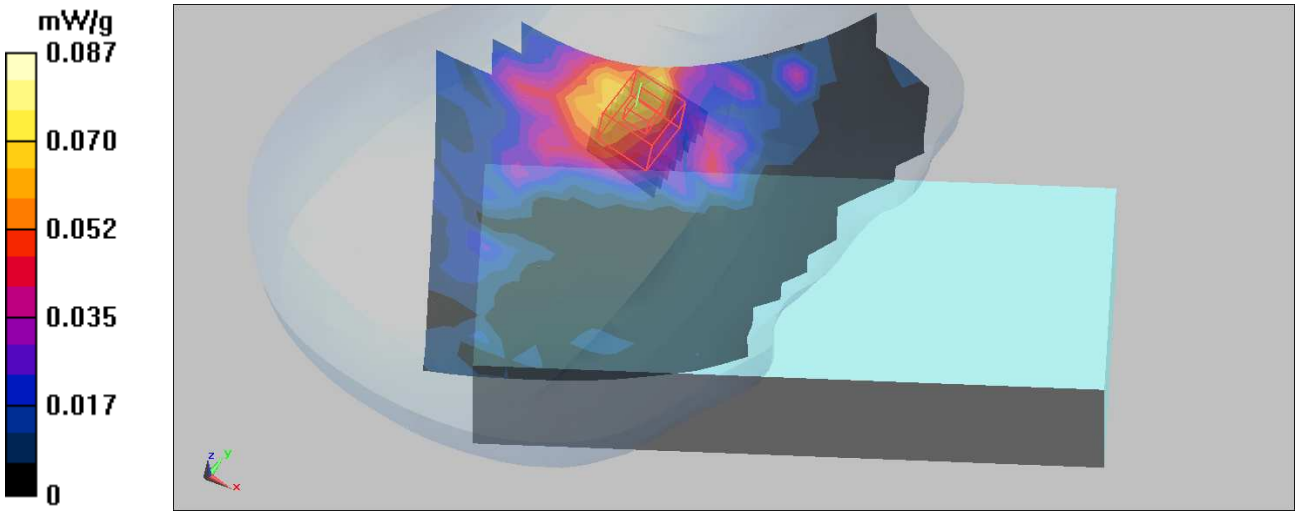
M17 Right Head Cheek 11a Ch149 ANT AUX

DUT: PDA ; Type: MC 9598
Communication System: 802.11a ; Frequency: 5745 MHz ; Duty Cycle: 1:1
Medium: HSL5800 Medium parameters used: f = 5745 MHz; σ = 5.34 mho/m; ε_r = 36; ρ = 1000 kg/m^3
Phantom section: Right Section ; DUT test position : Cheek ; Modulation type: BPSK

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(4.22, 4.22, 4.22) ; Calibrated: 2008/5/20
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch Position - High Channel 149/Area Scan (16x27x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.087 mW/g

Touch Position - High Channel 149/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 0.938 V/m
Peak SAR (extrapolated) = 0.219 W/kg
SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.037 mW/g
Maximum value of SAR (measured) = 0.096 mW/g



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Test Laboratory: Bureau Veritas ADT

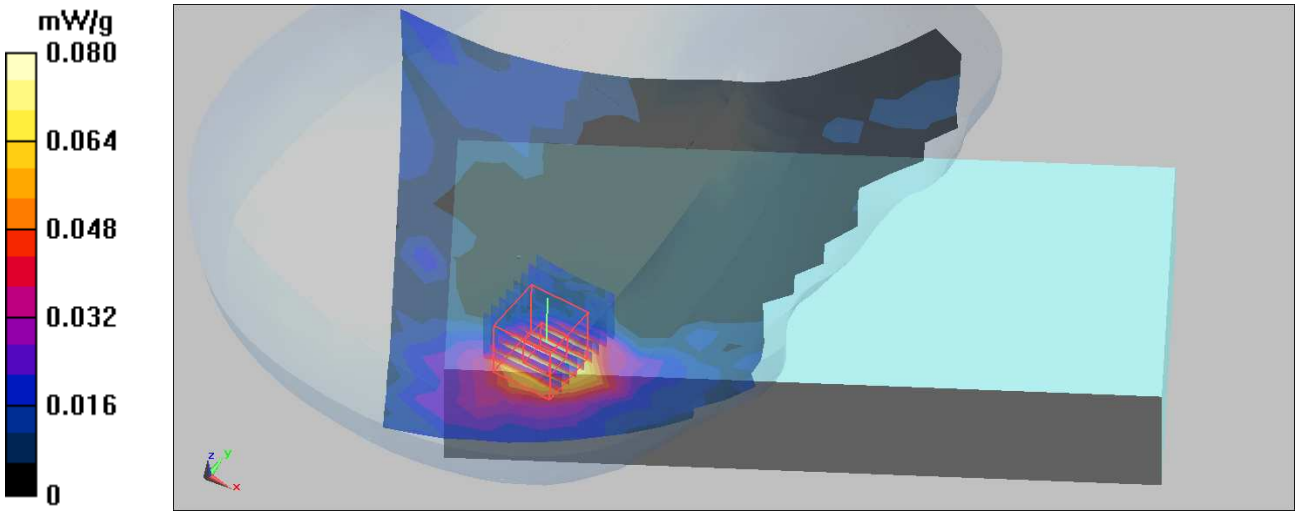
M18 Right Head Cheek 11a Ch149 ANT MAIN

DUT: PDA ; Type: MC 9598
Communication System: 802.11a ; Frequency: 5745 MHz ; Duty Cycle: 1:1
Medium: HSL5800 Medium parameters used: f = 5745 MHz; σ = 5.34 mho/m; ε_r = 36; ρ = 1000 kg/m^3
Phantom section: Right Section ; DUT test position : Cheek ; Modulation type: BPSK

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(4.22, 4.22, 4.22) ; Calibrated: 2008/5/20
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Touch Position - High Channel 149/Area Scan (15x27x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.080 mW/g

Touch Position - High Channel 149/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 0.155 V/m
Peak SAR (extrapolated) = 0.222 W/kg
SAR(1 g) = 0.042 mW/g; SAR(10 g) = 0.016 mW/g
Maximum value of SAR (measured) = 0.067 mW/g



Date/Time: 2009/3/25 11:27:23

Test Laboratory: Bureau Veritas ADT

M19 Right Head Tilt 11a Ch149 ANT AUX

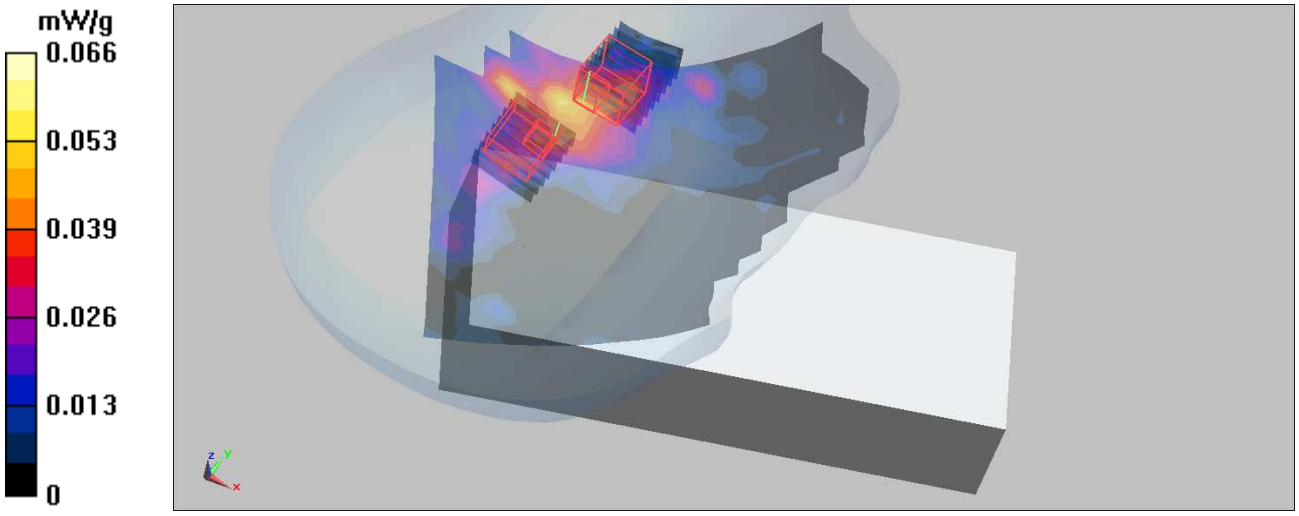
DUT: PDA ; Type: MC 9598
Communication System: 802.11a ; Frequency: 5745 MHz; Duty Cycle: 1:1
Medium: HSL5800 Medium parameters used: f = 5745 MHz; σ = 5.34 mho/m; ε_r = 36; ρ = 1000 kg/m^3
Phantom section: Right Section ; DUT test position : Tilt ; Modulation type: BPSK

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(4.22, 4.22, 4.22) ; Calibrated: 2008/5/20
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Tilt Position - Mid Channel 149/Area Scan (15x27x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.066 mW/g

Tilt Position - Mid Channel 149/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 0.208 V/m
Peak SAR (extrapolated) = 0.117 W/kg
SAR(1 g) = 0.039 mW/g; SAR(10 g) = 0.017 mW/g
Maximum value of SAR (measured) = 0.060 mW/g

Tilt Position - Mid Channel 149/Zoom Scan (8x8x8)/Cube 1: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 0.208 V/m
Peak SAR (extrapolated) = 0.336 W/kg
SAR(1 g) = 0.041 mW/g; SAR(10 g) = 0.014 mW/g
Maximum value of SAR (measured) = 0.044 mW/g



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Test Laboratory: Bureau Veritas ADT

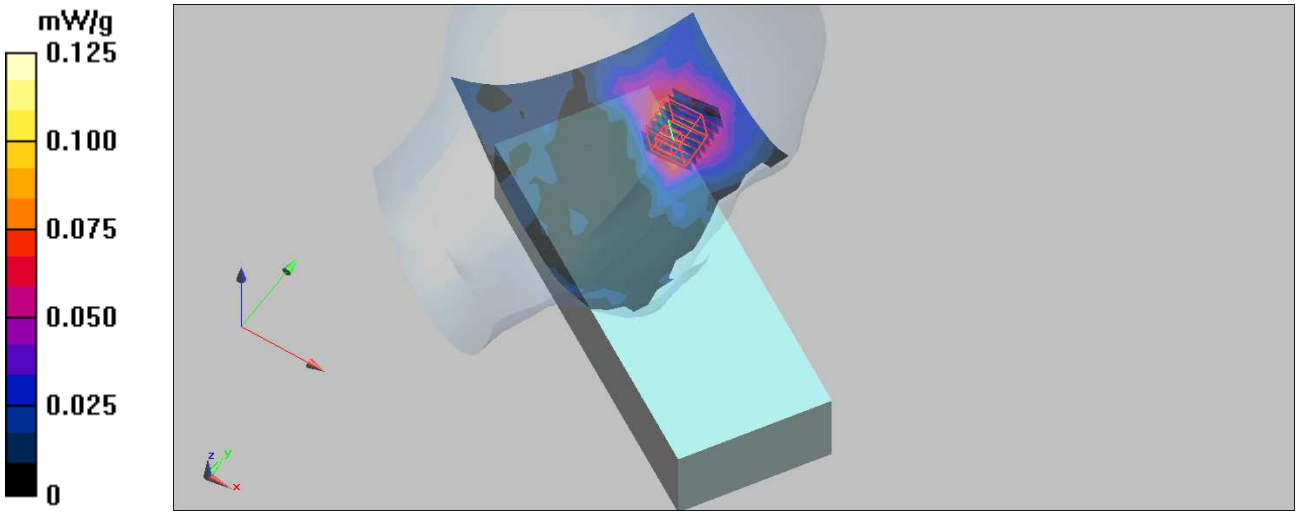
M20 Left Head Cheek 11a Ch149 ANT AUX

DUT: PDA ; Type: MC 9598
Communication System: 802.11a ; Frequency: 5745 MHz ; Duty Cycle: 1:1
Medium: HSL5800 Medium parameters used: f = 5745 MHz; σ = 5.34 mho/m; ε_r = 36; ρ = 1000 kg/m^3
Phantom section: Left Section ; DUT test position : Cheek ; Modulation type: BPSK

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(4.22, 4.22, 4.22) ; Calibrated: 2008/5/20
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Cheek Position - Mid Channel 149/Area Scan (15x27x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.125 mW/g

Cheek Position - Mid Channel 149/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 1.16 V/m
Peak SAR (extrapolated) = 0.345 W/kg
SAR(1 g) = 0.094 mW/g; SAR(10 g) = 0.046 mW/g
Maximum value of SAR (measured) = 0.130 mW/g



Date/Time: 2009/3/25 05:57:21

Test Laboratory: Bureau Veritas ADT

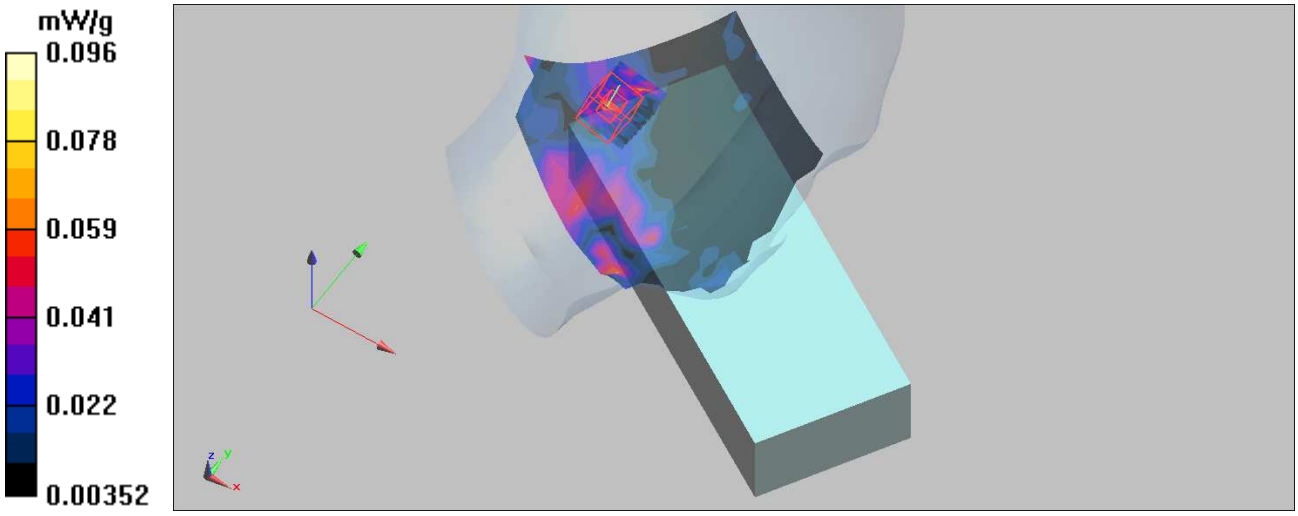
M21 Left Head Cheek 11a Ch149 ANT MAIN

DUT: PDA ; Type: MC 9598
Communication System: 802.11a ; Frequency: 5745 MHz ; Duty Cycle: 1:1
Medium: HSL5800 Medium parameters used: f = 5745 MHz; σ = 5.34 mho/m; ε_r = 36; ρ = 1000 kg/m^3
Phantom section: Left Section ; DUT test position : Cheek ; Modulation type: BPSK

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(4.22, 4.22, 4.22) ; Calibrated: 2008/5/20
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Cheek Position - Mid Channel 149/Area Scan (15x27x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.059 mW/g

Cheek Position - Mid Channel 149/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 0.273 V/m
Peak SAR (extrapolated) = 0.168 W/kg
SAR(1 g) = 0.041 mW/g; SAR(10 g) = 0.028 mW/g
Maximum value of SAR (measured) = 0.096 mW/g



Date/Time: 2009/3/25 09:10:19

Test Laboratory: Bureau Veritas ADT

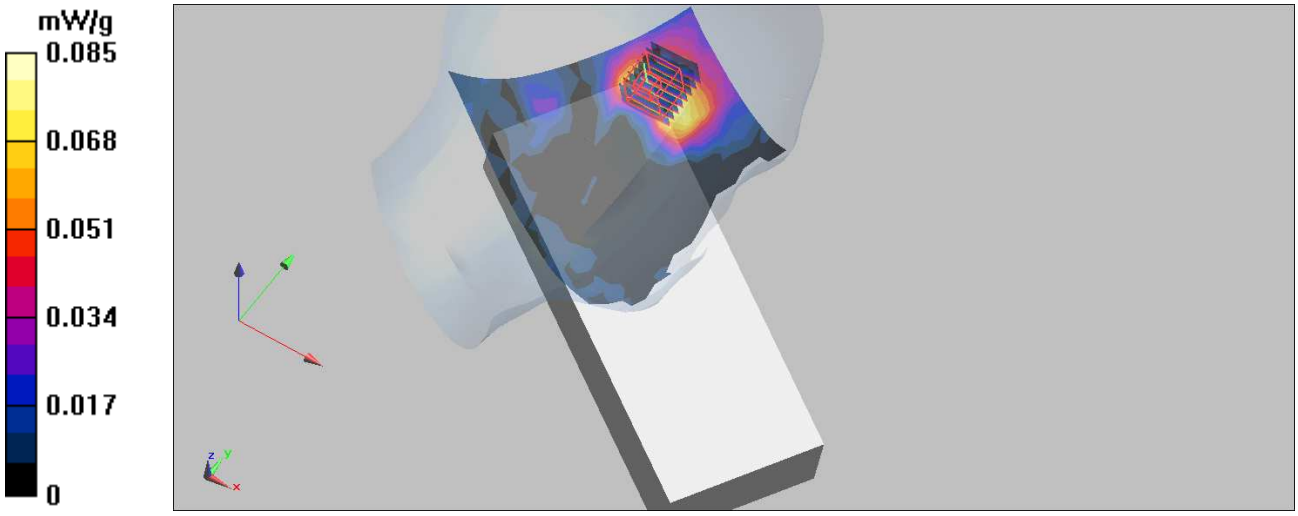
M22 Left Head Tilt 11a Ch149 ANT AUX

DUT: PDA ; Type: MC 9598
Communication System: 802.11a ; Frequency: 5745 MHz; Duty Cycle: 1:1
Medium: HSL5800 Medium parameters used: f = 5745 MHz; σ = 5.34 mho/m; ε_r = 36; ρ = 1000 kg/m^3
Phantom section: Left Section ; DUT test position : Tilt ; Modulation type: BPSK

DASY4 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(4.22, 4.22, 4.22) ; Calibrated: 2008/5/20
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

Tilt Position - Mid Channel 149/Area Scan (15x27x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.085 mW/g

Tilt Position - Mid Channel 149/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 1.37 V/m
Peak SAR (extrapolated) = 0.218 W/kg
SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.032 mW/g
Maximum value of SAR (measured) = 0.091 mW/g



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Test Laboratory: Bureau Veritas ADT

M23 Body Front-11a Ch149 ANT AUX

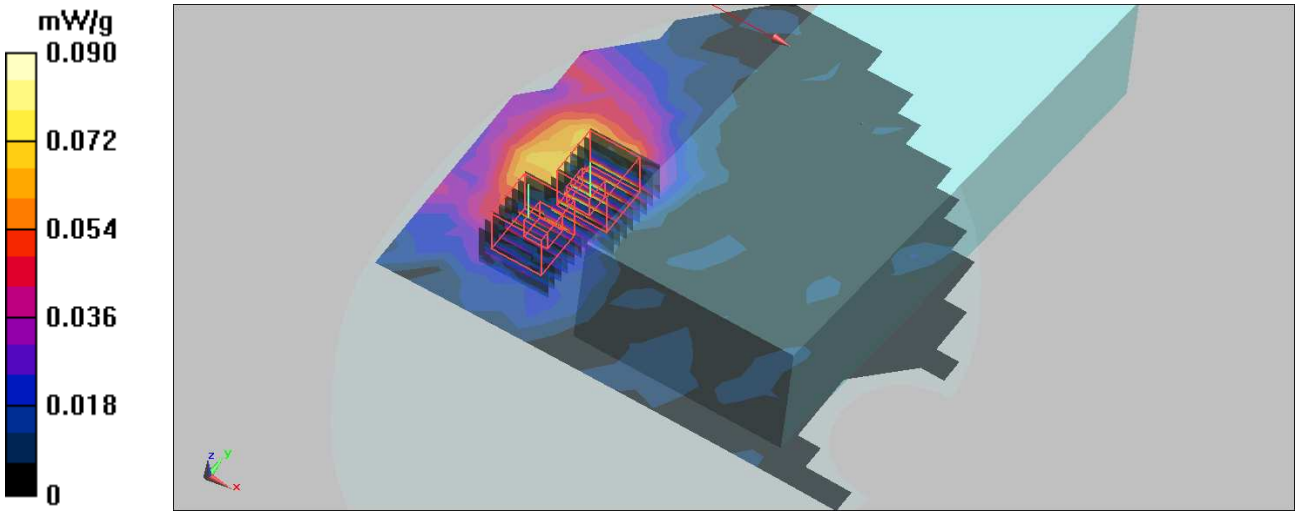
DUT: PDA ; Type: MC 9598
Communication System: 802.11a ; Frequency: 5745 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL5800 Medium parameters used: f = 5745 MHz; σ = 6.17 mho/m; ε_r = 49.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 0 mm (The tip side of the EUT to the Phantom)

DASY5 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(3.92, 3.92, 3.92) ; Calibrated: 2008/5/20
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2008/9/22
- Phantom: SAM with CRP ; Type: SAM ; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125 ; SEMCAD X Version 13.4 Build 125

High Channel 149/Area Scan (25x21x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.082 mW/g

High Channel 149/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 0.666 V/m
Peak SAR (extrapolated) = 0.488 W/kg
SAR(1 g) = 0.062 mW/g; SAR(10 g) = 0.024 mW/g
Maximum value of SAR (measured) = 0.069 mW/g

High Channel 149/Zoom Scan (8x8x8)/Cube 1: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 0.666 V/m
Peak SAR (extrapolated) = 0.206 W/kg
SAR(1 g) = 0.057 mW/g; SAR(10 g) = 0.023 mW/g
Maximum value of SAR (measured) = 0.090 mW/g



Date/Time: 2009/3/27 11:59:31

Test Laboratory: Bureau Veritas ADT

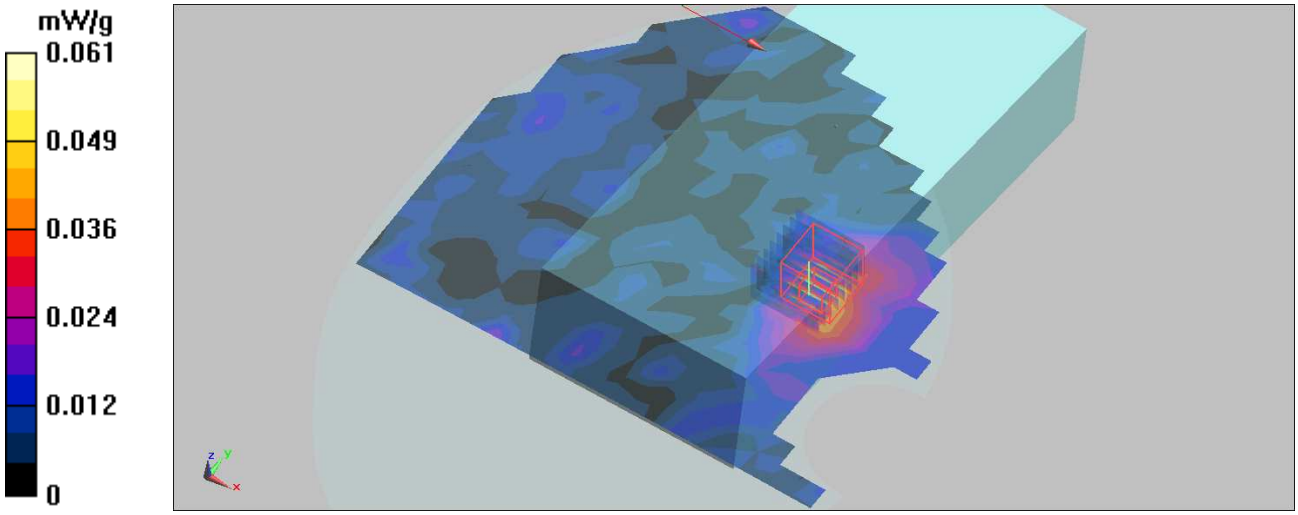
M24 Body Front-11a Ch149 ANT MAIN

DUT: PDA ; Type: MC 9598
Communication System: 802.11a ; Frequency: 5745 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL5800 Medium parameters used: f = 5745 MHz; σ = 6.17 mho/m; ε_r = 49.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 0 mm (The tip side of the EUT to the Phantom)

DASY5 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(3.92, 3.92, 3.92) ; Calibrated: 2008/5/20
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861 ; Calibrated: 2008/9/22
- Phantom: SAM with CRP ; Type: SAM ; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125 ; SEMCAD X Version 13.4 Build 125

High Channel 149/Area Scan (25x21x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.061 mW/g

High Channel 149/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 0.575 V/m
Peak SAR (extrapolated) = 0.182 W/kg
SAR(1 g) = 0.042 mW/g; SAR(10 g) = 0.017 mW/g
Maximum value of SAR (measured) = 0.065 mW/g



Date/Time: 2009/3/21 00:26:02

Test Laboratory: Bureau Veritas ADT

System validation-HSL2450

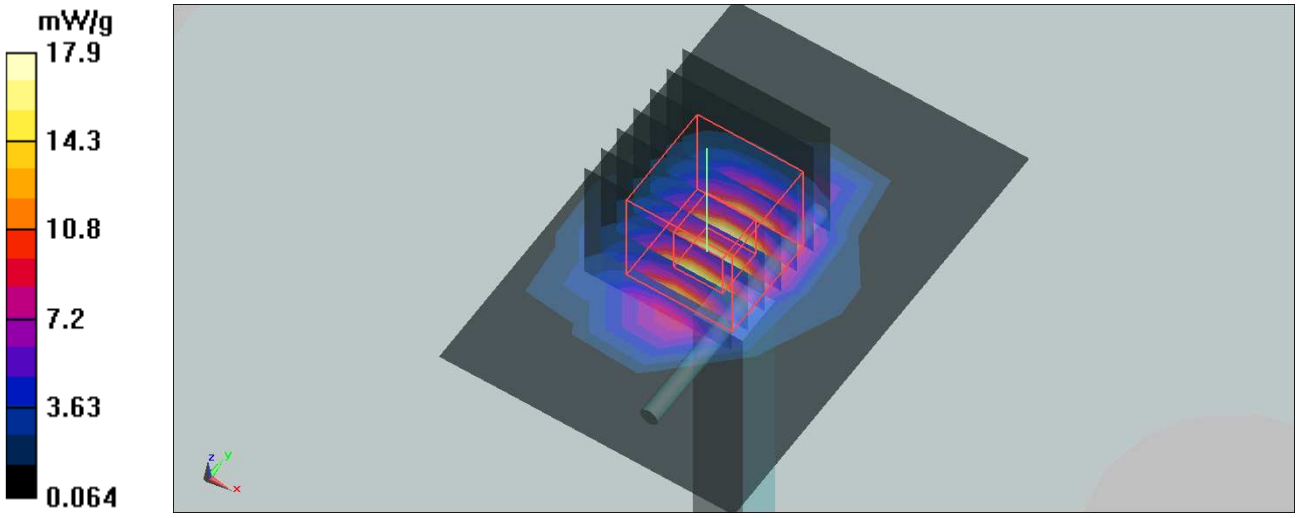
DUT: Dipole 2450 MHz ; Type: D2450V2 ; Serial: 737 ; Test Frequency: 2450 MHz

Communication System: CW ; Frequency: 2450 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: HSL2450;Medium parameters used: f = 2450 MHz; σ = 1.85 mho/m; ε_r = 41; ρ = 1000 kg/m^3 ;
Liquid level : 151 mm
Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom)Air temp. : 23.1 degrees ; Liquid temp. : 22.8 degrees

DASY5 Configuration:
- Probe: EX3DV3 - SN3504 ; ConvF(7.67, 7.67, 7.67) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

d=10mm, Pin=250mW/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 16.5 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.9 V/m; Power Drift = 0.041 dB
Peak SAR (extrapolated) = 30.2 W/kg
SAR(1 g) = 13.4 mW/g; SAR(10 g) = 5.95 mW/g
Maximum value of SAR (measured) = 17.9 mW/g



Date/Time: 2009/3/23 00:30:56

Test Laboratory: Bureau Veritas ADT

System validation-MSL2450

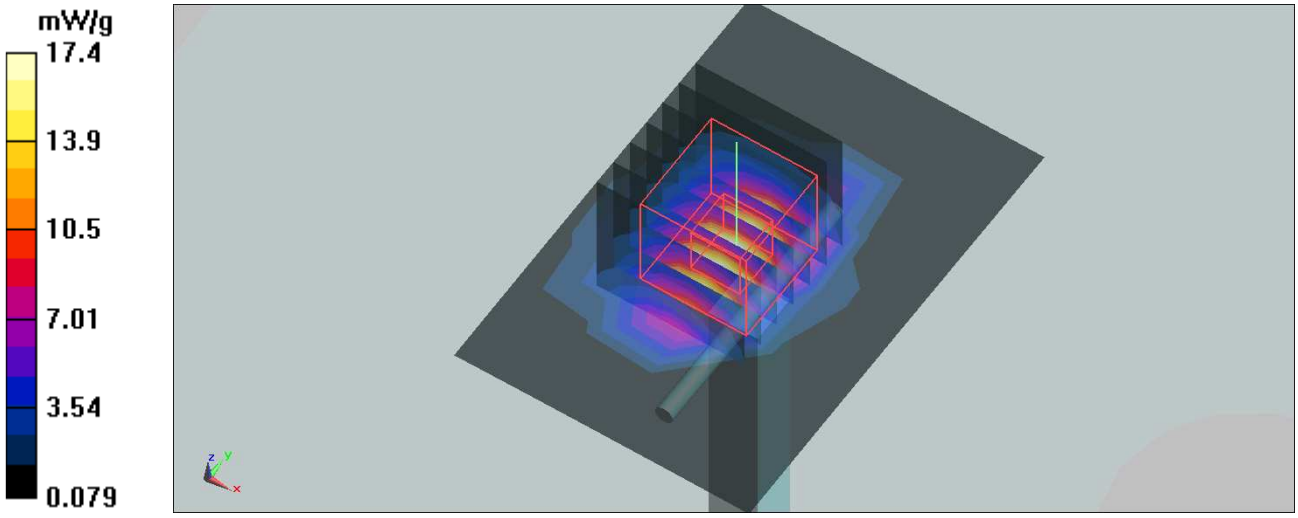
DUT: Dipole 2450 MHz ; Type: D2450V2 ; Serial: 737 ; Test Frequency: 2450 MHz

Communication System: CW ; Frequency: 2450 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: MSL2450;Medium parameters used: f = 2450 MHz; σ = 2 mho/m; ε_r = 54.7; ρ = 1000 kg/m^3 ;
Liquid level : 155 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(7.53, 7.53, 7.53) ; Calibrated: 2009/1/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

d=10mm, Pin=250mW/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 15.9 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.9 V/m; Power Drift = -0.051 dB
Peak SAR (extrapolated) = 27.9 W/kg
SAR(1 g) = 13.2 mW/g; SAR(10 g) = 5.99 mW/g
Maximum value of SAR (measured) = 17.4 mW/g



Date/Time: 2009/3/25 01:16:09

Test Laboratory: Advance Data Technology

System validation HSL 5GHz

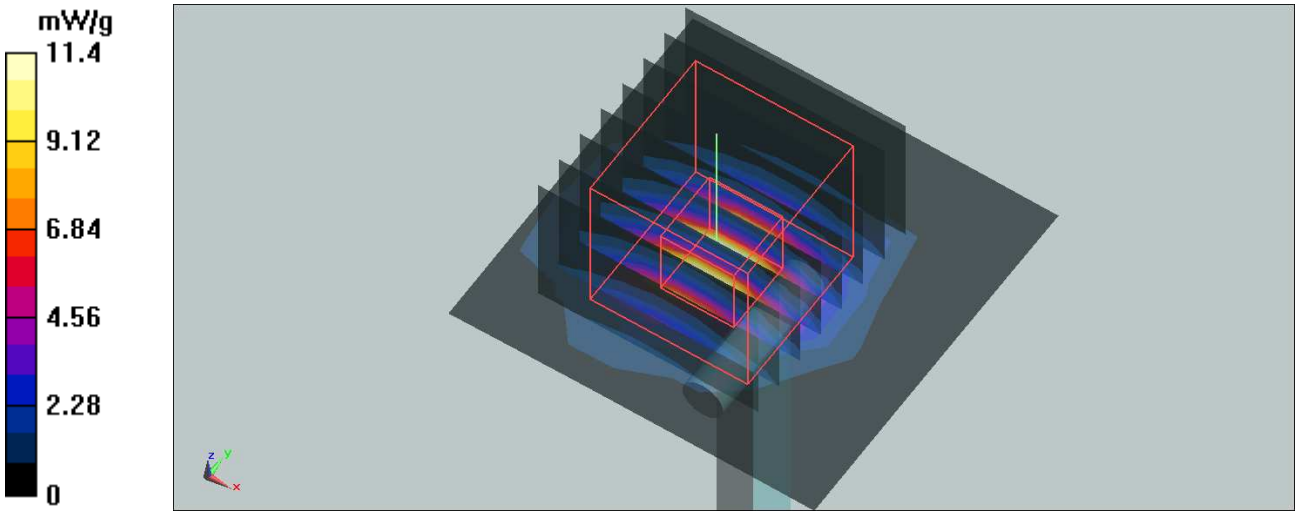
DUT: Dipole 5 GHz ; Type: D5GHzV2 ; Serial: 1018 ; Test Frequency: 5800 MHz

Communication System: CW ; Frequency: 5800 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: HSL5800;Medium parameters used: f = 5800 MHz; σ = 5.41 mho/m; ε_r = 35.9; ρ = 1000 kg/m^3
Liquid level : 153 mm
Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom)
Air temp. : 22.9 degrees ; Liquid temp. : 22.5 degrees

DASY5 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(4.22, 4.22, 4.22) ; Calibrated: 2008/5/20
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

f=5800, d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 10.8 mW/g

f=5800, d=10mm, Pin=100mW/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 45.8 V/m; Power Drift = 0.152 dB
Peak SAR (extrapolated) = 35.8 W/kg
SAR(1 g) = 8.15 mW/g; SAR(10 g) = 2.28 mW/g
Maximum value of SAR (measured) = 11.4 mW/g



Date/Time: 2009/3/27 01:10:32

Test Laboratory: Advance Data Technology

System validation MSL 5GHz

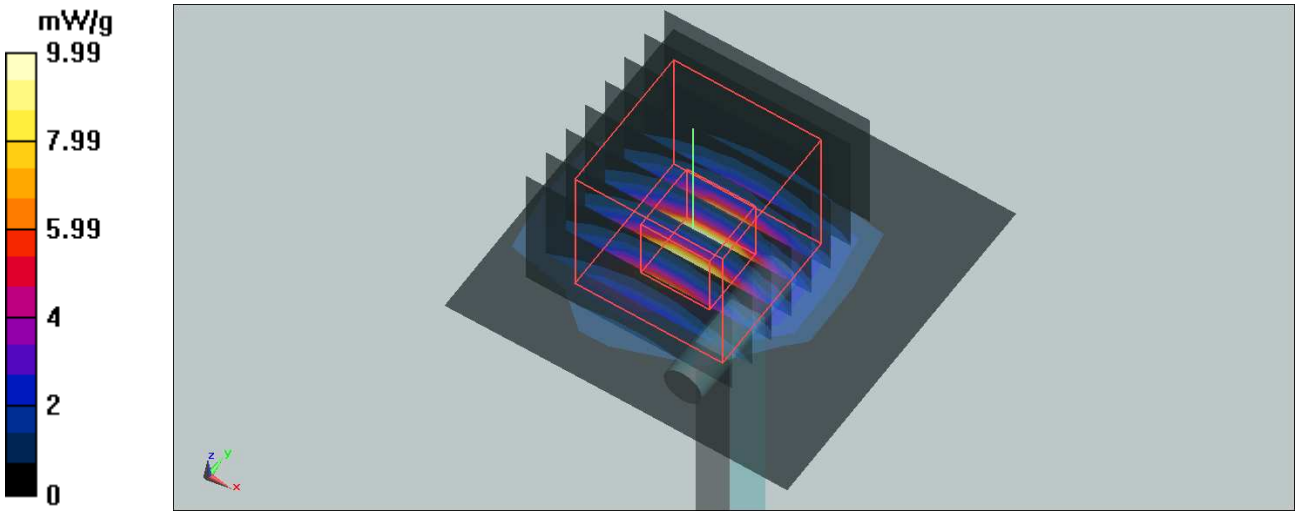
DUT: Dipole 5 GHz ; Type: D5GHzV2 ; Serial: 1018 ; Test Frequency: 5800 MHz

Communication System: CW ; Frequency: 5800 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: MSL5800;Medium parameters used: f = 5800 MHz; σ = 6.26 mho/m; ε_r = 49.5; ρ = 1000 kg/m^3
Liquid level : 154 mm
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

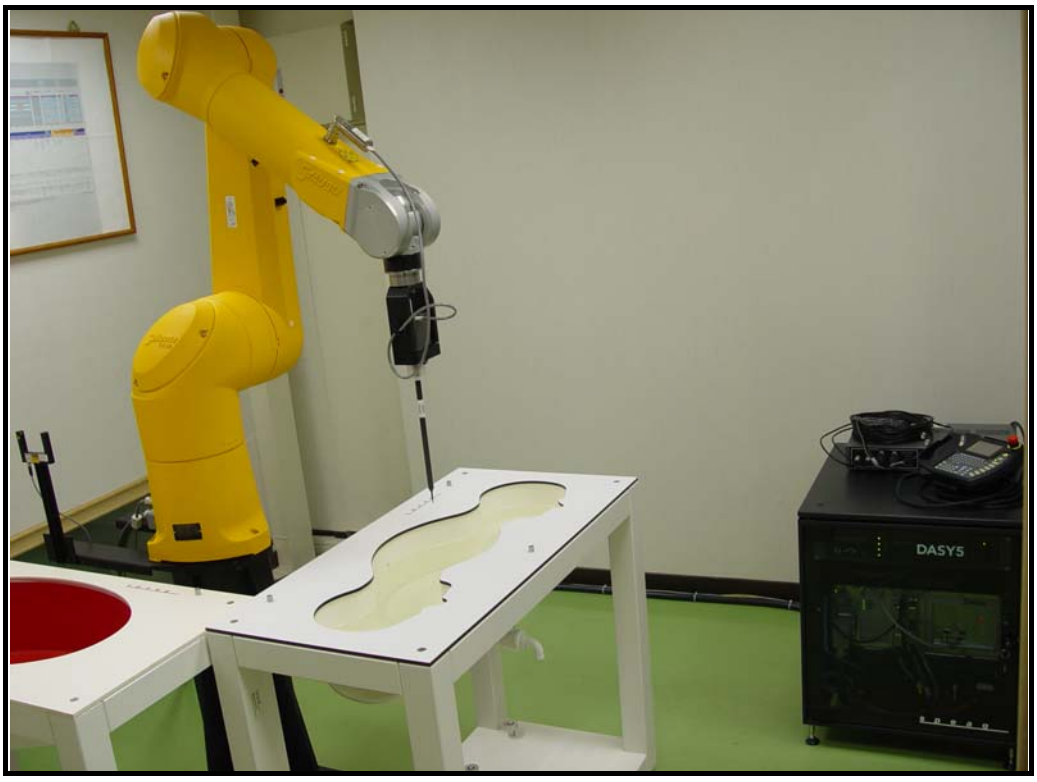
DASY5 Configuration:
- Probe: EX3DV4 - SN3578 ; ConvF(3.92, 3.92, 3.92) ; Calibrated: 2008/5/20
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2008/9/22
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1485
- Measurement SW: DASY5, V5.0 Build 125; SEMCAD X Version 13.4 Build 125

f=5800, d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 8.88 mW/g

f=5800, d=10mm, Pin=100mW/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 39.3 V/m; Power Drift = 0.092 dB
Peak SAR (extrapolated) = 29 W/kg
SAR(1 g) = 7.02 mW/g; SAR(10 g) = 1.95 mW/g
Maximum value of SAR (measured) = 9.99 mW/g



APPENDIX B: BV ADT SAR MEASUREMENT SYSTEM



APPENDIX C: PHOTOGRAPHS OF SYSTEM VALIDATION