

SAR TEST REPORT (15.247)

REPORT NO.: SA970104L02

MODEL NO.: WLI-UC-AG300N

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ISSUED: Oct. 02, 2008

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TABLE OF CONTENTS

1.	CERTIFICATION	3
2.	GENERAL INFORMATION.....	4
2.1	GENERAL DESCRIPTION OF EUT	4
2.2	GENERAL DESCRIPTION OF APPLIED STANDARDS	6
2.3	GENERAL INFORMATION OF THE SAR SYSTEM	6
2.4	GENERAL DESCRIPTION OF THE SPATIAL PEAK SAR EVALUATION.....	10
3.	DESCRIPTION OF SUPPORT UNITS	13
4.	DESCRIPTION OF TEST MODES AND CONFIGURATIONS	14
4.1.	DESCRIPTION OF ANTENNA LOCATION	14
4.2.	DESCRIPTION OF ASSESSMENT POSITION.....	15
4.3.	DESCRIPTION OF TEST MODE	16
4.4.	SUMMARY OF TEST RESULTS	17
5.	TEST RESULTS	23
5.1	TEST PROCEDURES	23
5.2	MEASURED SAR RESULTS.....	25
5.3	SAR LIMITS.....	33
5.4	RECIPES FOR TISSUE SIMULATING LIQUIDS	34
5.5	TEST EQUIPMENT FOR TISSUE PROPERTY	39
6.	SYSTEM VALIDATION	40
6.1	TEST EQUIPMENT	40
6.2	TEST PROCEDURE.....	41
6.3	VALIDATION RESULTS	43
6.4	SYSTEM VALIDATION UNCERTAINTIES (FOR 2.4GHZ).....	44
6.5	SYSTEM VALIDATION UNCERTAINTIES (FOR 5.0GHz)	45
7.	MEASUREMENT SAR PROCEDURE UNCERTAINTIES.....	46
7.1.	PROBE CALIBRATION UNCERTAINTY	46
7.2.	ISOTROPY UNCERTAINTY	47
7.3.	BOUNDARY EFFECT UNCERTAINTY	47
7.4.	PROBE LINEARITY UNCERTAINTY	48
7.5.	READOUT ELECTRONICS UNCERTAINTY	48
7.6.	RESPONSE TIME UNCERTAINTY	48
7.7.	INTEGRATION TIME UNCERTAINTY	49
7.8.	PROBE POSITIONER MECHANICAL TOLERANCE	50
7.9.	PROBE POSITIONING	50
7.10.	PHANTOM UNCERTAINTY	51
7.11.	DASY4 UNCERTAINTY BUDGET (FOR 2.4GHz)	52
7.12.	DASY4 UNCERTAINTY BUDGET (FOR 5 ~ 6GHz)	53
8.	INFORMATION ON THE TESTING LABORATORIES	54
APPENDIX A: TEST CONFIGURATIONS AND TEST DATA		
APPENDIX B: ADT SAR MEASUREMENT SYSTEM		
APPENDIX C: PHOTOGRAPHS OF SYSTEM VALIDATION		
APPENDIX D: SYSTEM CERTIFICATE & CALIBRATION		



1. CERTIFICATION

PRODUCT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter

MODEL: WLI-UC-AG300N

BRAND: Buffalo

APPLICANT: Buffalo Inc.

TESTED: Sep. 24 ~ Sep. 26, 2008

TEST SAMPLE: ENGINEERING SAMPLE

STANDARDS: FCC Part 2 (Section 2.1093)

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

RSS-102

IEEE 1528-2003

The above equipment (model: WLI-UC-AG300N) have been tested by **Advance Data Technology Corporation**, 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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TECHNICAL
ACCEPTANCE : James Fan , **DATE:** Oct. 02, 2008
Responsible for RF James Fan / Engineer

APPROVED BY : Gary Chang , **DATE:** Oct. 02, 2008
Gary Chang / Assistant Manager

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter	
MODEL NO.	WLI-UC-AG300N	
FCC ID	FDI-09102079-0	
POWER SUPPLY	5Vdc from host equipment	
CLASSIFICATION	Portable device, production unit	
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS, 64QAM, 16QAM, QPSK, BPSK for OFDM	
RADIO 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 Draft 802.11n: up to 300.0Mbps	
FREQUENCY RANGE	2.4GHz: 2400 ~ 2483.5MHz 5.0GHz: 5150 ~ 5350MHz & 5470 ~ 5725MHz & 5725 ~ 5850MHz	
NUMBER OF CHANNEL	2.4GHz: 11 for 802.11b, 802.11g, draft 802.11n (20MHz) 7 for draft 802.11n (40MHz) 5.0GHz: 5150 ~ 5350MHz: 8 for 802.11a, draft 802.11n (20MHz) 4 for draft 802.11n (40MHz) 5470 ~ 5725MHz: 11 for 802.11a, draft 802.11n (20MHz) 5 for draft 802.11n (40MHz) 5725 ~ 5850MHz: 5 for 802.11a, draft 802.11n (20MHz) 2 for draft 802.11n (40MHz)	
CHANNEL FREQUENCIES UNDER TEST AND ITS CONDUCTED OUTPUT POWER FOR 2.4GHz	802.11b	802.11g
	50.234mW / Ch1: 2412MHz 50.933mW / Ch6: 2437MHz 44.978mW / Ch11: 2462MHz	40.832mW / Ch11: 2462MHz
	DRAFT 802.11n (20MHz)	DRAFT 802.11n (40MHz)
	51.527mW / Ch11: 2462MHz	46.082mW / Ch1: 2422MHz
CHANNEL FREQUENCIES UNDER TEST AND ITS CONDUCTED OUTPUT POWER FOR 5GHz	802.11a	DRAFT 802.11n (20MHz)
	32.509mW / Ch149: 5745MHz	51.764mW / Ch157: 5785MHz
	DRAFT 802.11n (40MHz) 45.976mW / Ch159: 5795MHz	

AVERAGE SAR (1g)	2.4GHz: 0.862W/kg 5.0GHz: 0.670W/kg
ANTENNA TYPE	2.4GHz: Printed antenna with -0.3dBi gain 5.0GHz: Printed antenna with 4.0dBi gain
DATA CABLE	0.19 shielded USB cable without core
I/O PORTS	USB
ASSOCIATED DEVICES	NA

NOTE:

- The EUT is an AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter. The functions of EUT listed as below:

	REFERENCE REPORT
WLAN 802.11b/g, draft 802.11n	SA970104L02
WLAN 802.11a, draft 802.11n (5725~5850 MHz)	
WLAN 802.11a, draft 802.11n (5150~5350MHz, 5470~5725 MHz)	SA970104L02-1

- The frequency bands used in this EUT are listed as follows:

Frequency Band (MHz)	2400~2483.5	5150~5350	5470 ~ 5725	5725~5850
802.11b	√	-	-	-
802.11g	√	-	-	-
802.11a	-	√	√	√
Draft 802.11n (20MHz)	√	√	√	√
Draft 802.11n (40MHz)	√	√	√	√

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

MODULATION MODE	TX FUNCTION
802.11b	1TX
802.11g	1TX
802.11a	1TX
Draft 802.11n (20MHz)	2TX
Draft 802.11n (40MHz)	2TX

- 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 INFORMATION OF THE SAR SYSTEM

DASY4 (software 4.7 Build 53) consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY4 software defined. The DASY4 software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC.

ET3DV6 ISOTROPIC E-FIELD PROBE

CONSTRUCTION	Symmetrical design with triangular core. Built-in optical fiber for surface detection system. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., glycolether).
FREQUENCY	10MHz to 3GHz; Linearity: $\pm 0.2\text{dB}$ (30MHz to 3GHz)
DYNAMIC RANGE	5 $\mu\text{W/g}$ to > 100mW/g; Linearity: $\pm 0.2\text{dB}$
OPTICAL SURFACE DETECTION	$\pm 0.2\text{mm}$ repeatability in air and clear liquids over diffuse reflecting surfaces
DIMENSIONS	Overall length: 330mm (Tip Length: 16mm) Tip diameter: 6.8mm (Body diameter: 12mm) Distance from probe tip to dipole centers: 2.7mm
APPLICATION	General dosimetric measurements up to 3GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms (ET3DV6)

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.

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

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

$2 \pm 0.2\text{mm}$

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 ($f < 1\text{GHz}$); > 40W ($f > 1\text{GHz}$)

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.

2.4 GENERAL DESCRIPTION OF THE SPATIAL PEAK SAR EVALUATION

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

Probe parameters:	- Sensitivity	$\text{Norm}_i, a_{i0}, a_{i1}, a_{i2}$
	- 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/cm ³

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

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

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

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within -2dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1g and 10g cubes, the extrapolation distance should not be larger than 5mm.

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

3. DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK	HP	nx6215	CND5390CMP	FCC DoC Approved

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

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

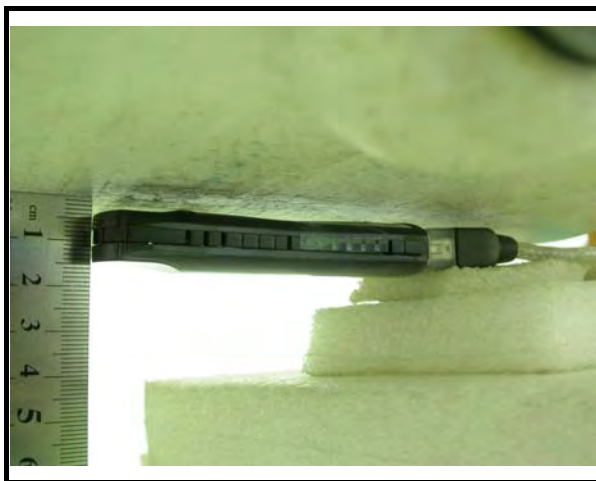
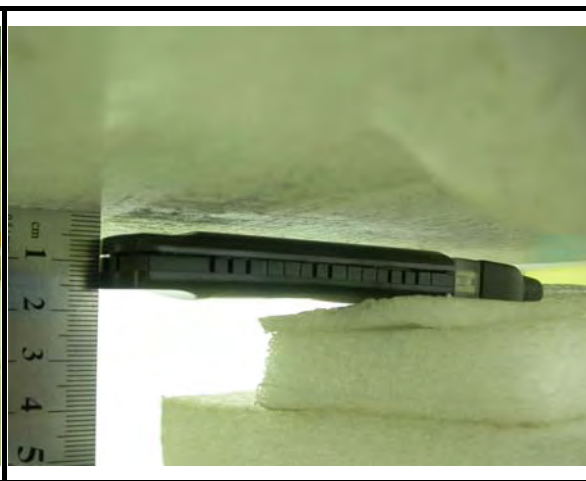


4. DESCRIPTION OF TEST MODES AND CONFIGURATIONS

4.1. DESCRIPTION OF ANTENNA LOCATION



4.2. DESCRIPTION OF ASSESSMENT POSITION

The following test configurations have been applied in this test report:

	
<p>A: Bottom Position</p> <p>The bottom of the EUT face to the phantom with 5mm-separation distance.</p>	<p>B : Front Position</p> <p>The front of the EUT face to the phantom with 5mm-separation distance.</p>
	
<p>C: Right Edge Position</p> <p>The edge of the EUT face to the phantom with 5mm-separation distance.</p>	<p>D: Left Edge Position</p> <p>The edge of the EUT face to the phantom with 5mm-separation distance.</p>

4.3. DESCRIPTION OF TEST MODE

ITEM	TEST MODE	MODULATION	ASSESSMENT POSITION	TESTED CHANNEL
1	802.11b	DBPSK	A	1, 6, 11
2	802.11g	BPSK		11
3	Draft 802.11n (20MHz)	BPSK		11
4	Draft 802.11n (40MHz)	BPSK		1
5	802.11b	DBPSK	B	6
6	802.11g	BPSK		11
7	Draft 802.11n (20MHz)	BPSK		11
8	Draft 802.11n (40MHz)	BPSK		1
9	802.11b	DBPSK	C	6
10	802.11g	BPSK		11
11	Draft 802.11n (20MHz)	BPSK		11
12	Draft 802.11n (40MHz)	BPSK		1
13	802.11b	DBPSK	D	6
14	802.11g	BPSK		11
15	Draft 802.11n (20MHz)	BPSK		11
16	Draft 802.11n (40MHz)	BPSK		1
17	802.11a	BPSK	A	149
18	Draft 802.11a (20MHz)	BPSK		157
19	Draft 802.11a (40MHz)	BPSK		159
20	802.11a	BPSK	B	149
21	Draft 802.11a (20MHz)	BPSK		157
22	Draft 802.11a (40MHz)	BPSK		159
23	802.11a	BPSK	C	149
24	Draft 802.11a (20MHz)	BPSK		157
25	Draft 802.11a (40MHz)	BPSK		159
26	802.11a	BPSK	D	149
27	Draft 802.11a (20MHz)	BPSK		157
28	Draft 802.11a (40MHz)	BPSK		159

4.4. SUMMARY OF TEST RESULTS

COMMUNICATION MODE	802.11b	802.11g	Draft 802.11n (20MHz)
TEST MODE	1	2	3
MEASURED VALUE OF 1g SAR (W/kg)			
CHANNEL	ASSESSMENT POSITION (A)		
1	0.815	-	-
6	0.862	-	-
11	0.793	0.543	0.757

COMMUNICATION MODE	Draft 802.11n (40MHz)
TEST MODE	4
MEASURED VALUE OF 1g SAR (W/kg)	
CHANNEL	ASSESSMENT POSITION (A)
1	0.687

COMMUNICATION MODE	802.11b	802.11g	Draft 802.11n (20MHz)
TEST MODE	5	6	7
MEASURED VALUE OF 1g SAR (W/kg)			
CHANNEL	ASSESSMENT POSITION (B)		
1	-	-	-
6	0.582	-	-
11	-	0.339	0.478

COMMUNICATION MODE	Draft 802.11n (40MHz)
TEST MODE	8
MEASURED VALUE OF 1g SAR (W/kg)	
CHANNEL	ASSESSMENT POSITION (B)
1	0.436

COMMUNICATION MODE	802.11b	802.11g	Draft 802.11n (20MHz)
TEST MODE	9	10	11
MEASURED VALUE OF 1g SAR (W/kg)			
CHANNEL	ASSESSMENT POSITION (C)		
1	-	-	-
6	0.492	-	-
11	-	0.326	0.401

COMMUNICATION MODE	Draft 802.11n (40MHz)
TEST MODE	12
MEASURED VALUE OF 1g SAR (W/kg)	
CHANNEL	ASSESSMENT POSITION (C)
1	0.370

COMMUNICATION MODE	802.11b	802.11g	Draft 802.11n (20MHz)
TEST MODE	13	14	15
MEASURED VALUE OF 1g SAR (W/kg)			
CHANNEL	ASSESSMENT POSITION (D)		
1	-	-	-
6	0.339	-	-
11	-	0.269	0.343

COMMUNICATION MODE	Draft 802.11n (40MHz)
TEST MODE	16
MEASURED VALUE OF 1g SAR (W/kg)	
CHANNEL	ASSESSMENT POSITION (D)
1	0.218

COMMUNICATION MODE	802.11a	Draft 802.11n (20MHz)
TEST MODE	17	18
MEASURED VALUE OF 1g SAR (W/kg)		
CHANNEL	ASSESSMENT POSITION (A)	
149	0.436	-
157	-	0.670

COMMUNICATION MODE	Draft 802.11n (40MHz)
TEST MODE	19
MEASURED VALUE OF 1g SAR (W/kg)	
CHANNEL	ASSESSMENT POSITION (A)
159	0.334

COMMUNICATION MODE	802.11a	Draft 802.11n (20MHz)
TEST MODE	20	21
MEASURED VALUE OF 1g SAR (W/kg)		
CHANNEL	ASSESSMENT POSITION (B)	
149	0.365	-
157	-	0.592

COMMUNICATION MODE	Draft 802.11n (40MHz)
TEST MODE	22
MEASURED VALUE OF 1g SAR (W/kg)	
CHANNEL	ASSESSMENT POSITION (B)
159	0.295

COMMUNICATION MODE	802.11a	Draft 802.11n (20MHz)
TEST MODE	23	24
MEASURED VALUE OF 1g SAR (W/kg)		
CHANNEL	ASSESSMENT POSITION (C)	
149	0.128	-
157	-	0.142

COMMUNICATION MODE	Draft 802.11n (40MHz)
TEST MODE	25
MEASURED VALUE OF 1g SAR (W/kg)	
CHANNEL	ASSESSMENT POSITION (C)
159	0.099

COMMUNICATION MODE	802.11a	Draft 802.11n (20MHz)
TEST MODE	26	27
MEASURED VALUE OF 1g SAR (W/kg)		
CHANNEL	ASSESSMENT POSITION (D)	
149	0.069	-
157	-	0.085

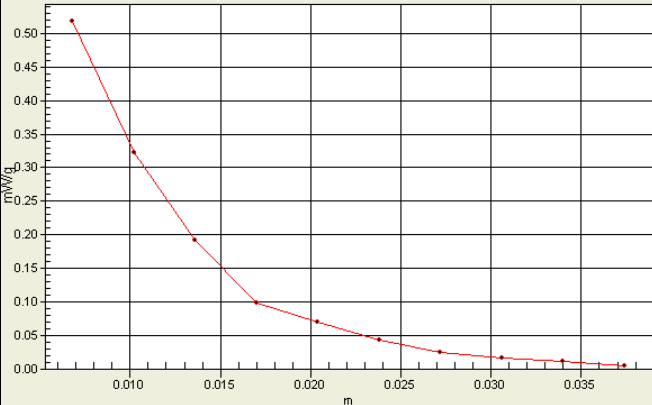
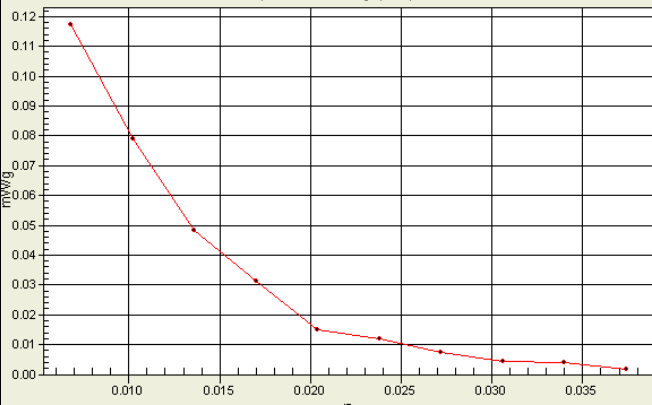
COMMUNICATION MODE	Draft 802.11n (40MHz)
TEST MODE	28
MEASURED VALUE OF 1g SAR (W/kg)	
CHANNEL	ASSESSMENT POSITION (D)
159	0.060

NOTE: The worst value has been marked by boldface.

Followed Mobile and Portable device RF exposure policies (Document 44798 D01) section 2) b) ii), additional SAR requirement was evaluated. And here is the measured result of peak SAR value.

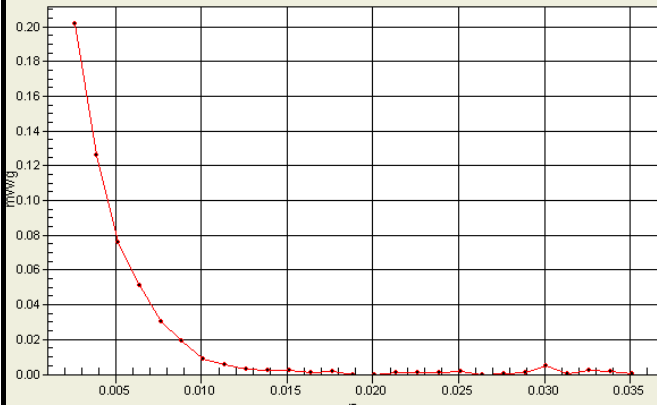
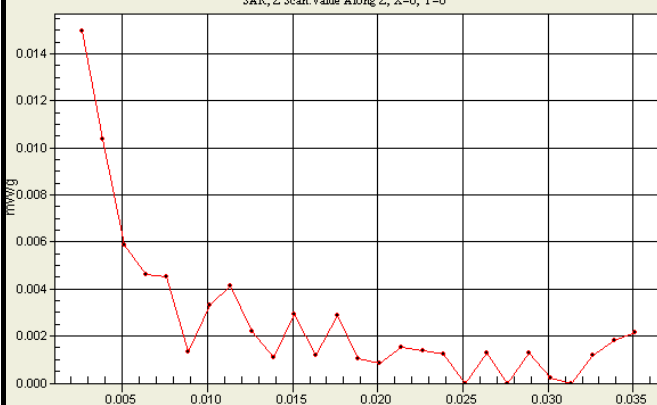
Communication Mode: 802.11b

Frequency: 2437MHz

TEST POSITION	SAR VALUE (mW/g)	PLOT
INITIAL POSITION	0.520	<p>SAR(x,y,z,f)</p> <p>SAR; Z Scan: Value Along Z, X=0, Y=0</p> 
5mm INCREMENTS FROM INITIAL POSITION	0.118	<p>SAR(x,y,z,f)</p> <p>SAR; Z Scan: Value Along Z, X=0, Y=0</p> 

THE WORST POSITION FROM EVALUATED RESULT: Initial position.

Communication Mode: 802.11a Draft 802.11n (20MHz)
Frequency: 5785MHz

TEST POSITION	SAR VALUE (mW/g)	PLOT
INITIAL POSITION	0.202	<p>SAR(x,y,z,f0) SAR, Z Scan: Value Along Z, X=0, Y=0</p> 
5mm INCREMENTS FROM INITIAL POSITION	0.015	<p>SAR(x,y,z,f0) SAR, Z Scan: Value Along Z, X=0, Y=0</p> 

THE WORST POSITION FROM EVALUATED RESULT: Initial position.

5. TEST RESULTS

5.1 TEST PROCEDURES

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

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

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

In the zoom scan, the distance between the measurement point at the probe sensor location (geometric center behind the probe tip) and the phantom surface is 4.0mm and maintained at a constant distance of ± 1.0 mm during a zoom scan to determine peak SAR locations. The distance is 4mm 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 9mm separation distance. The cube size is 7 x 7 x 7 points consist 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 4mm 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 $\pm 5\%$.

5.2 MEASURED SAR RESULTS

FOR 2.4GHz BAND

ENVIRONMENTAL CONDITION		Air Temperature : 23.1°C, Liquid Temperature : 22.3°C Humidity : 61%RH					
TESTED BY		Sam Onn			DATE		Sep. 24, 2008
CHAN.	FREQ. (MHz)	TEST MODE	CONDUCTED POWER (mW)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
1	2412 (Low)	802.11b	50.234	49.918	-0.63	1	0.815
6	2437 (Mid.)	802.11b	50.933	50.571	-0.71	1	0.862
11	2462 (High)	802.11b	44.978	44.600	-0.84	1	0.793
11	2462 (High)	802.11g	40.832	40.387	-1.09	2	0.543
11	2462 (High)	DRAFT 802.11n (20MHz)	51.527	50.862	-1.29	3	0.757
1	2422 (Low)	DRAFT 802.11n (40MHz)	46.082	45.455	-1.36	4	0.687

NOTE:

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

FOR 2.4GHz BAND

ENVIRONMENTAL CONDITION			Air Temperature : 23.1°C, Liquid Temperature : 22.3°C Humidity : 61%RH				
TESTED BY			Sam Onn		DATE		Sep. 24, 2008
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	50.933	50.205	-1.43	5	0.582
6	2462 (High)	802.11g	40.832	40.224	-1.49	6	0.339
11	2462 (High)	DRAFT 802.11n (20MHz)	51.527	50.739	-1.53	7	0.478
1	2422 (Low)	DRAFT 802.11n (40MHz)	46.082	45.354	-1.58	8	0.436

NOTE:

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

FOR 2.4GHz BAND

ENVIRONMENTAL CONDITION		Air Temperature : 23.1°C, Liquid Temperature : 22.3°C Humidity : 61%RH					
TESTED BY		Sam Onn			DATE		Sep. 24, 2008
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	50.933	50.042	-1.75	9	0.492
11	2462 (High)	802.11g	40.832	40.093	-1.81	10	0.326
11	2462 (High)	DRAFT 802.11n (20MHz)	51.527	50.538	-1.92	11	0.401
1	2422 (Low)	DRAFT 802.11n (40MHz)	46.082	45.137	-2.05	12	0.370

NOTE:

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

FOR 2.4GHz BAND

ENVIRONMENTAL CONDITION			Air Temperature : 23.1°C, Liquid Temperature : 22.3°C Humidity : 61%RH				
TESTED BY			Sam Onn		DATE		Sep. 24, 2008
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	50.933	50.449	-0.95	13	0.339
11	2462 (High)	802.11g	40.832	40.407	-1.04	14	0.269
11	2462 (High)	DRAFT 802.11n (20MHz)	51.527	50.945	-1.13	15	0.343
1	2422 (Low)	DRAFT 802.11n (40MHz)	46.082	45.520	-1.22	16	0.218

NOTE:

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

FOR 5.0GHz BAND

ENVIRONMENTAL CONDITION			Air Temperature : 23.8°C, Liquid Temperature : 22.7°C Humidity : 60%RH				
TESTED BY			Sam Onn		DATE		Sep. 25, 2008
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	32.509	31.810	-2.15	17	0.436
157	5785 (Mid.)	DRAFT 802.11n (20MHz)	51.764	50.589	-2.27	18	0.670
159	5795 (Low)	DRAFT 802.11n (40MHz)	45.976	45.383	-1.29	19	0.334

NOTE:

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

FOR 5.0GHz BAND

ENVIRONMENTAL CONDITION			Air Temperature : 23.8°C, Liquid Temperature : 22.7°C Humidity : 60%RH				
TESTED BY			Sam Onn		DATE		Sep. 25, 2008
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	32.509	32.008	-1.54	20	0.365
157	5785 (Mid.)	DRAFT 802.11n (20MHz)	51.764	50.703	-2.05	21	0.592
159	5795 (Low)	DRAFT 802.11n (40MHz)	45.976	44.845	-2.46	22	0.295
149	5745 (Low)	802.11a	32.509	32.034	-1.46	23	0.128

NOTE:

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

FOR 5.0GHz BAND

ENVIRONMENTAL CONDITION			Air Temperature : 23.2°C, Liquid Temperature : 22.5°C Humidity : 61%RH				
TESTED BY			Sam Onn		DATE		Sep. 26, 2008
CHAN.	FREQ. (MHz)	TEST MODE	CONDUCTED POWER (mW)		POWER DRIFT (%)	DEVICE TEST POSITION MODE	MEASURED 1g SAR (W/kg)
			BEGIN TEST	AFTER TEST			
157	5785 (Mid.)	DRAFT 802.11n (20MHz)	51.764	50.822	-1.82	24	0.142
159	5795 (Low)	DRAFT 802.11n (40MHz)	45.976	44.932	-2.27	25	0.099

NOTE:

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

FOR 5.0GHz BAND

ENVIRONMENTAL CONDITION			Air Temperature : 23.2°C, Liquid Temperature : 22.5°C Humidity : 61%RH				
TESTED BY			Sam Onn		DATE		Sep. 26, 2008
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	32.509	32.064	-1.37	26	0.069
157	5785 (Mid.)	DRAFT 802.11n (20MHz)	51.764	50.894	-1.68	27	0.085
159	5795 (Low)	DRAFT 802.11n (40MHz)	45.976	45.089	-1.93	28	0.060

NOTE:

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

5.3 SAR LIMITS

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

NOTE:

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

5.4 RECIPES FOR TISSUE SIMULATING LIQUIDS

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

The following ingredients are used :

- **WATER-** Deionized water (pure H₂O), 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°C	f= 2450MHz $\epsilon = 39.2 \pm 5\%$ $\sigma = 1.80 \pm 5\%$ S/m	f= 2450MHz $\epsilon = 52.7 \pm 5\%$ $\sigma = 1.95 \pm 5\%$ 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 ($\pm 1^\circ$).
4. Set water temperature in Agilent-Software (Calibration Setup).
5. Perform calibration.
6. Validate calibration with dielectric material of known properties (e.g. polished ceramic slab with >8mm thickness $\epsilon' = 10.0$, $\epsilon'' = 0.0$). If measured parameters do not fit within tolerance, repeat calibration (± 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 (~ 50ml) with a syringe from the center of the liquid container.
10. Pour the liquid into a small glass flask. Hold the syringe at the bottom of the flask to avoid air bubbles.
11. Put the dielectric probe in the glass flask. Check that there are no air bubbles in front of the opening in the dielectric probe kit.
12. Perform measurements.
13. Adjust medium parameters in DASY4 for the frequencies necessary for the measurements ('Setup Config', select medium (e.g. Brain 900MHz) and press 'Option'-button.
14. Select the current medium for the frequency of the validation (e.g. Setup Medium Brain 900MHz).

FOR 2.4GHz BAND SIMULATING LIQUID

LIQUID TYPE		HSL-2450		MSL-2450	
SIMULATING LIQUID TEMP.		NA		22.3	
TEST DATE		NA		Sep. 24, 2008	
TESTED BY		NA		Sam Onn	
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	STANDARD VALUE	MEASUREMENT VALUE
2412.0	Permittivity (ϵ)	NA	NA	52.80	52.90
2422.0		NA	NA	52.70	52.90
2437.0		NA	NA	52.70	52.80
2450.0		NA	NA	52.70	52.70
2452.0		NA	NA	52.70	52.70
2462.0		NA	NA	52.70	52.60
2412.0	Conductivity (σ) S/m	NA	NA	1.91	1.91
2422.0		NA	NA	1.92	1.92
2437.0		NA	NA	1.94	1.94
2450.0		NA	NA	1.95	1.95
2452.0		NA	NA	1.95	1.95
2462.0		NA	NA	1.97	1.96
Dielectric Parameters Required at 22°C		f= 2450MHz ε= 39.2 ± 5% σ= 1.80 ± 5% S/m		f= 2450MHz ε= 52.7 ± 5% σ= 1.95 ± 5% S/m	

FOR WLAN 5GHz BAND SIMULATING LIQUID

LIQUID TYPE		HSL-5800		MSL-5800	
SIMULATING LIQUID TEMP.		NA		22.7	
TEST DATE		NA		Sep. 25, 2008	
TESTED BY		NA		Sam Onn	
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	STANDARD VALUE	MEASUREMENT VALUE
5745	Permittivity (ϵ)	NA	NA	48.30	47.90
5755		NA	NA	48.30	47.90
5785		NA	NA	48.20	47.80
5795		NA	NA	48.20	47.80
5800		NA	NA	48.20	47.80
5825		NA	NA	48.20	47.80
5745	Conductivity (σ) S/m	NA	NA	5.94	6.03
5755		NA	NA	5.95	6.05
5785		NA	NA	5.98	6.09
5795		NA	NA	5.99	6.11
5800		NA	NA	6.00	6.12
5825		NA	NA	6.03	6.16
Dielectric Parameters Required at 22°C					

FOR WLAN 5GHz BAND SIMULATING LIQUID

LIQUID TYPE		HSL-5800		MSL-5800	
SIMULATING LIQUID TEMP.		NA		22.5	
TEST DATE		NA		Sep. 26, 2008	
TESTED BY		NA		Sam Onn	
FREQ. (MHz)	LIQUID PARAMETER	STANDARD VALUE	MEASUREMENT VALUE	STANDARD VALUE	MEASUREMENT VALUE
5745	Permittivity (ε)	NA	NA	48.30	48.70
5755		NA	NA	48.30	48.60
5785		NA	NA	48.20	48.60
5795		NA	NA	48.20	48.60
5800		NA	NA	48.20	48.60
5825		NA	NA	48.20	48.60
5745	Conductivity (σ) S/m	NA	NA	5.94	6.07
5755		NA	NA	5.95	6.09
5785		NA	NA	5.98	6.13
5795		NA	NA	5.99	6.15
5800		NA	NA	6.00	6.16
5825		NA	NA	6.03	6.20
Dielectric Parameters Required at 22°C					

5.5 TEST EQUIPMENT FOR TISSUE PROPERTY

ITEM	NAME	BAND	TYPE	SERIES NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
1	Network Analyzer	Agilent	E8358A	US41480538	Nov. 12, 2007	Nov. 11, 2008
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.

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	BAND	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	ET3DV6	1790	Nov. 20, 2007	Nov. 19, 2008
4	E-Field Probe	Speaq	EX3DV3	3506	Mar. 21, 2008	Mar. 20, 2009
5	DAE	S & P	DAE	579	Mar. 13, 2008	Mar. 12, 2009
6	Robot Positioner	Staubli Unimation	NA	NA	NA	NA
7	Validation Dipole	S & P	D2450V2	737	Apr. 22, 2008	Apr. 21, 2009
			D5GHzV2	1018	Apr. 22, 2008	Apr. 21, 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.

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.

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. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within $\pm 30^\circ$.) However, varying breaking indices of different liquid compositions might also influence the distance. If the indicated difference varies from the actual setting, the probe parameter "optical surface

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.

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

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

6.3 VALIDATION RESULTS

2450MHz SYSTEM VALIDATION TEST IN THE MUSCLE SIMULATING LIQUID					
TEST FREQUENCY (MHz)	REQUIRED SAR (mW/g)	MEASURED SAR (mW/g)	DEVIATION (%)	SEPARATION DISTANCE	TEST DATE
MSL2450	12.80 (1g)	13.00	1.56	10mm	Sep. 24, 2008
MSL5800	7.37 (1g)	7.21	-2.17	10mm	Sep. 25, 2008
MSL5800	7.37 (1g)	7.18	-2.58	10mm	Sep. 26, 2008
TESTED BY	Sam Onn				

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

6.4 SYSTEM VALIDATION UNCERTAINTIES (FOR 2.4GHZ)

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	4.8	Normal	1	1	1	4.8	4.8	∞
Axial Isotropy	4.7	Rectangular	√3	1	1	2.7	2.7	∞
Hemispherical Isotropy	0	Rectangular	√3	1	1	0	0	∞
Boundary effect	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Linearity	4.7	Rectangular	√3	1	1	2.7	2.7	∞
System Detection Limit	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Readout Electronics	1.0	Normal	1	1	1	1.0	1.0	∞
Response Time	0	Rectangular	√3	1	1	0	0	∞
Integration Time	0	Rectangular	√3	1	1	0	0	∞
RF Ambient Conditions	3.0	Rectangular	√3	1	1	1.7	1.7	∞
Probe Positioner	0.4	Rectangular	√3	1	1	0.2	0.2	∞
Probe positioning	2.9	Rectangular	√3	1	1	1.7	1.7	∞
Algorithms for Max. SAR Evaluation	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Dipole								
Dipole Axis to Liquid Distance	2.0	Rectangular	√3	1	1	1.2	1.2	∞
Input power and SAR drift measurement	4.7	Rectangular	√3	1	1	2.7	2.7	∞
Phantom and Tissue Parameters								
Phantom Uncertainty	4.0	Rectangular	√3	1	1	2.3	2.3	∞
Liquid Conductivity (target)	5.0	Rectangular	√3	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	2.5	Normal	1	0.64	0.43	1.6	1.1	∞
Liquid Permittivity (target)	5.0	Rectangular	√3	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	2.5	Normal	1	0.6	0.49	1.5	1.2	∞
Combined Standard Uncertainty						8.4	8.1	∞
Coverage Factor for 95%						kp=2		
Expanded Uncertainty (K=2)						16.8	16.2	

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

6.5 SYSTEM VALIDATION UNCERTAINTIES (FOR 5.0GHz)

Error Description	Tolerance (±%)	Probability Distribution	Divisor	(C _i)		Standard Uncertainty (±%)		(v _i)
				(1g)	(10g)	(1g)	(10g)	
Measurement System								
Probe Calibration	6.6	Normal	1	1	1	4.8	6.6	∞
Axial Isotropy	4.7	Rectangular	√3	1	1	2.7	2.7	∞
Hemispherical Isotropy	0.0	Rectangular	√3	1	1	0.0	0.0	∞
Boundary effect	2.0	Rectangular	√3	1	1	1.2	1.2	∞
Linearity	4.7	Rectangular	√3	1	1	2.7	2.7	∞
System Detection Limit	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Readout Electronics	1.0	Normal	1	1	1	1.0	1.0	∞
Response Time	0.0	Rectangular	√3	1	1	0.0	0.0	∞
Integration Time	0.0	Rectangular	√3	1	1	0.0	0.0	∞
RF Ambient Conditions	3.0	Rectangular	√3	1	1	1.7	1.7	∞
Probe Positioner	0.8	Rectangular	√3	1	1	0.5	0.5	∞
Probe positioning	5.7	Normal	1	1	1	5.7	5.7	∞
Algorithms for Max. SAR Evaluation	4.0	Rectangular	√3	1	1	2.3	2.3	∞
Dipole								
Dipole Axis to Liquid Distance	2.0	Rectangular	√3	1	1	1.2	1.2	∞
Input power and SAR drift measurement	4.7	Rectangular	√3	1	1	2.7	2.7	∞
Phantom and Tissue Parameters								
Phantom Uncertainty	4.0	Rectangular	√3	1	1	2.3	2.3	∞
Liquid Conductivity (target)	5.0	Rectangular	√3	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	2.5	Normal	1	0.64	0.43	1.6	1.1	∞
Liquid Permittivity (target)	5.0	Rectangular	√3	0.60	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	2.5	Normal	1	0.60	0.49	1.5	1.2	∞
Combined Standard Uncertainty						11.3	11.1	∞
Coverage Factor for 95%						kp=2		
Expanded Uncertainty (K=2)						22.6	22.1	

Table 6.1

NOTE: 1. Table 6.1 Uncertainty of the system performance check in the 5-6GHz range. Probe calibration error reflects uncertainty of the EX3DV3 probe conversion factor at Calibration Frequency.
2. About the system validation uncertainty assessment, please reference the section 7.

7. MEASUREMENT SAR PROCEDURE UNCERTAINTIES

The assessment of spatial peak SAR of the hand held devices is according to IEEE 1528. 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 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 $\pm 0.20\text{dB}$, while the maximum deviation of hemispherical isotropy is $\pm 0.40\text{dB}$, corresponding to $\pm 4.7\%$ and $\pm 9.6\%$, respectively. A weighting factor of c_p 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

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

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

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., $\delta = 13.95\text{mm}$ 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} . DASY4 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 $< \pm 0.8\%$.

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. 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 $< \pm 0.20\text{dB}$ ($< \pm 4.7\%$).

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. The combination (root-sum-square RSS method) of these components results in an overall maximum error of $\pm 1.0\%$.

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:

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

where T_m is 500 ms, i.e., the time between measurement samples, and τ the time constant. The response time τ of SPEAG's probes is $< 5\text{ms}$. In the current implementation, DASY4 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

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

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 center 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 DASY4 systems is $\pm 25\mu\text{m}$. The absolute accuracy for short distance movements is better than $\pm 0.1\text{mm}$, 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 DASY4 system.

7.10. PHANTOM UNCERTAINTY

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

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

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

7.11.DASY4 UNCERTAINTY BUDGET (FOR 2.4GHz)

Error Description	Tolerance (±%)	Probability Distribution	Divisor	(C _i)		Standard Uncertainty (±%)		(v _i)
				(1g)	(10g)	(1g)	(10g)	
Measurement Equipment								
Probe Calibration	4.8	Normal	1	1	1	4.8	4.8	∞
Axial Isotropy	4.7	Rectangular	√3	1	1	1.9	1.9	∞
Hemispherical Isotropy	9.6	Rectangular	√3	1	1	3.9	3.9	∞
Boundary effect	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Linearity	4.7	Rectangular	√3	1	1	2.7	2.7	∞
System Detection Limit	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Readout Electronics	1.0	Normal	1	1	1	1.0	1.0	∞
Response Time	0.8	Normal	1	1	1	0.8	0.8	∞
Integration Time	2.6	Normal	1	1	1	2.6	2.6	∞
Noise	0.0	Normal	1	0	0	0	0	∞
Mechanical Constraints								
Scanning System	0.4	Rectangular	√3	1	1	0.2	0.2	∞
Phantom Shell	4.0	Rectangular	√3	1	1	2.3	2.3	∞
Probe Positioning	2.9	Rectangular	√3	1	1	1.7	1.7	∞
Device Positioning	2.9	Normal	1	1	1	2.9	2.9	875
Physical Parameters								
Liquid Conductivity (target)	5.0	Rectangular	√3	0.7	0.5	2	1.4	∞
Liquid Conductivity (measurement)	4.3	Rectangular	√3	0.7	0.5	1.7	1.2	∞
Liquid Permittivity (target)	5.0	Rectangular	√3	0.6	0.5	1.7	1.4	∞
Liquid Permittivity (measurement)	4.3	Rectangular	√3	0.6	0.5	1.5	1.2	∞
Power Drift	5	Rectangular	√3	1	1	2.9	2.9	∞
RF Ambient Conditions	3.0	Rectangular	√3	1	1	1.7	1.7	∞
Post-Processing								
Extrapolation and Integration	1	Rectangular	√3	1	1	0.6	0.6	∞
Combined Standard Uncertainty						9.9	9.7	
Coverage Factor for 95%						kp=2		
Expanded Uncertainty (K=2)						19.9	19.3	

TABLE 7.2

The table 7.2: Worst-Case uncertainty budget for DASY4 assessed according to IEEE 1528. The budget is valid for the frequency range 300MHz ~ 3GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller.

7.12.DASY4 UNCERTAINTY BUDGET (FOR 5 ~ 6GHz)

Error Description	Tolerance (±%)	Probability Distribution	Divisor	(C _i)		Standard Uncertainty (±%)		(v _i)
				(1g)	(10g)	(1g)	(10g)	
Measurement System								
Probe Calibration	6.8	Normal	1	1	1	6.8	6.8	∞
Axial Isotropy	4.7	Rectangular	√3	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	0.7	3.9	3.9	∞
Boundary effect	2.0	Rectangular	√3	1	1	1.2	1.2	∞
Linearity	4.7	Rectangular	√3	1	1	2.7	2.7	∞
System Detection Limit	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Readout Electronics	1.0	Normal	1	1	1	1.0	1.0	∞
Response Time	0.8	Rectangular	√3	1	1	0.5	0.5	∞
Integration Time	2.6	Rectangular	√3	1	1	1.5	1.5	∞
RF Ambient Conditions	3.0	Rectangular	√3	1	1	1.7	1.7	∞
Probe Positioner	0.8	Rectangular	√3	1	1	0.5	0.5	∞
Probe positioning	5.7	Normal	1	1	1	5.7	5.7	∞
Algorithms for Max. SAR Evaluation	4.0	Rectangular	√3	1	1	2.3	2.3	∞
Test EUT Related								
Device Positioning	2.9	Normal	1	1	1	2.9	2.9	145
Device Holder	3.6	Normal	1	1	1	3.6	3.6	5
Power Drift	5.0	Rectangular	√3	1	1	2.9	2.9	∞
Phantom and Tissue Parameters								
Phantom Uncertainty	4.0	Rectangular	√3	1	1	2.3	2.3	∞
Liquid Conductivity (target)	5.0	Rectangular	√3	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	2.5	Normal	1	0.64	0.43	1.6	1.1	∞
Liquid Permittivity (target)	5.0	Rectangular	√3	0.60	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	2.5	Normal	1	0.60	0.49	1.5	1.2	∞
Combined Standard Uncertainty						12.8	12.7	330
Expanded STD Uncertainty						25.7	25.3	

TABLE 7.3

The table 7.3: Worst-Case uncertainty budget for DASY4 valid for the frequency range 5 ~ 6 GHz. Probe calibration error reflects uncertainty of the narrow-bandwidth EX3DV3 probe conversion factor (±50 MHz).

8. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., 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, UL, A2LA
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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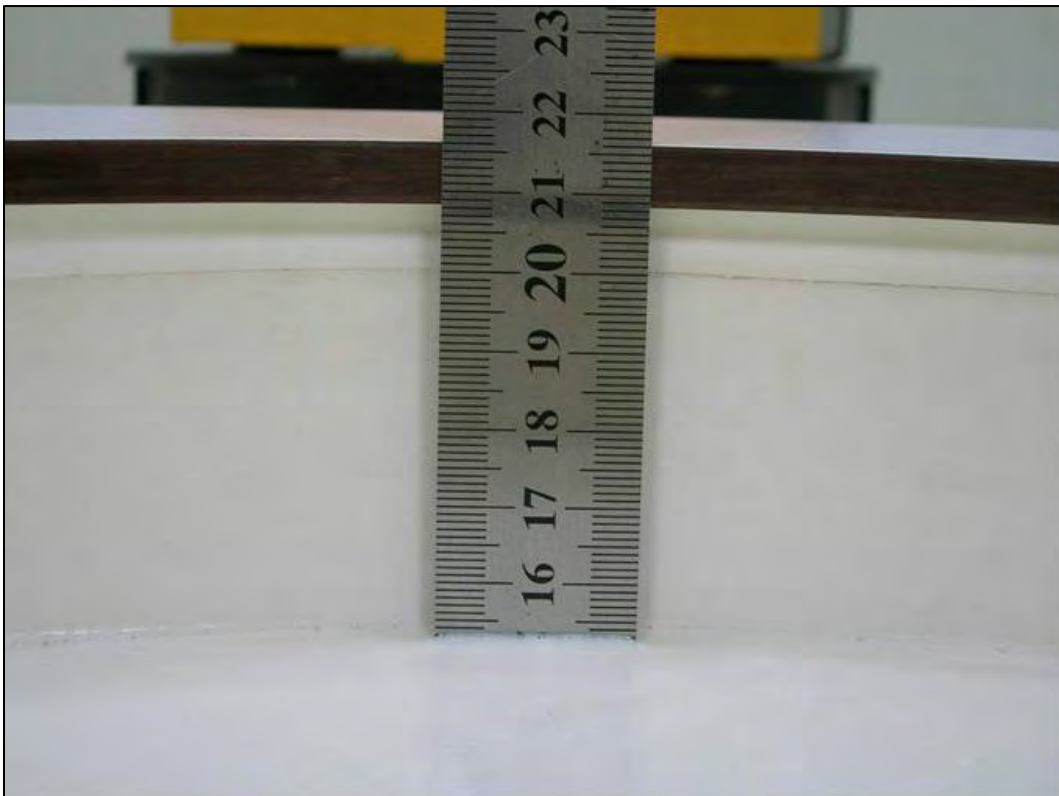
APPENDIX A: TEST DATA

Liquid Level Photo

MSL 2450MHz D=152mm



MSL 5800MHz D=153mm



Date/Time: 2008/9/24 09:25:59

Test Laboratory: Advance Data Technology

11b-Ch1-M01

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2412 MHz

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

Medium: MSL2450 Medium parameters used: $f = 2412$ MHz; $\sigma = 1.91$ mho/m; $\epsilon_r = 52.9$; $\rho = 1000$ kg/m³ ; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Low Channel 1/Area Scan (4x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.835 mW/g

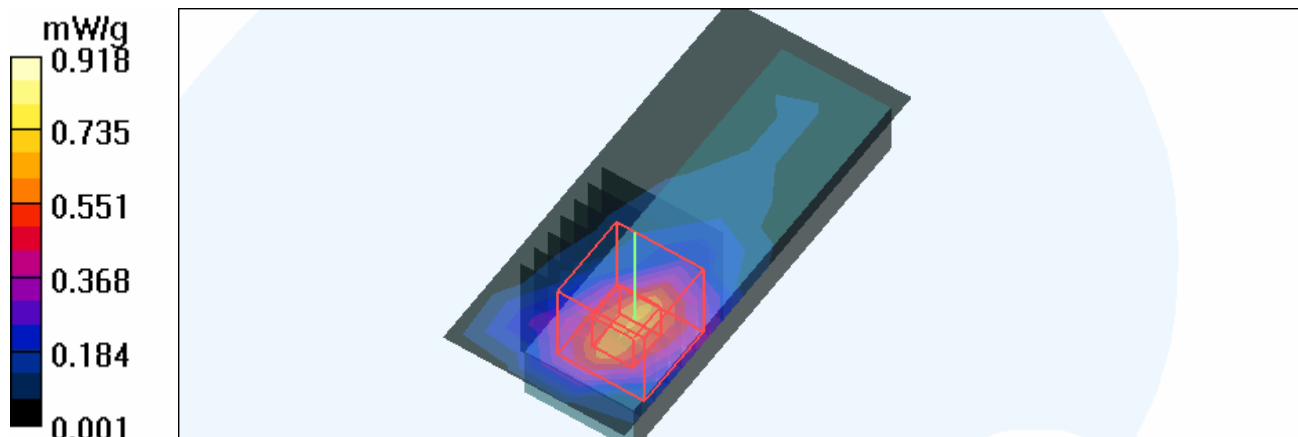
Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.7 V/m

Peak SAR (extrapolated) = 2.00 W/kg

SAR(1 g) = 0.815 mW/g; SAR(10 g) = 0.330 mW/g

Maximum value of SAR (measured) = 0.918 mW/g



Date/Time: 2008/9/24 09:42:02

Test Laboratory: Advance Data Technology

11b-Ch6-M01

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2437 MHz

Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK

Medium: MSL2450 Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.94 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000$

kg/m^3 ; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.844 mW/g

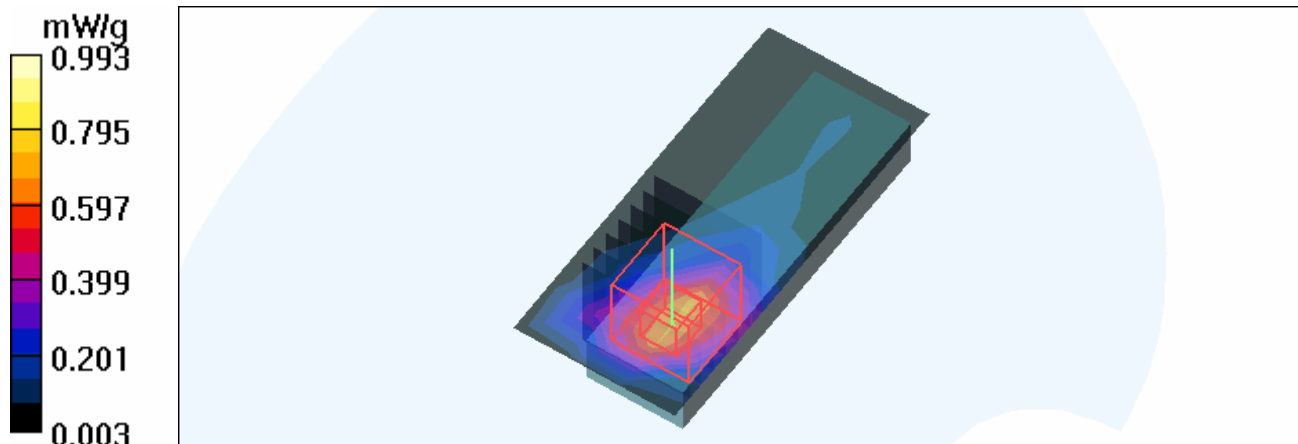
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

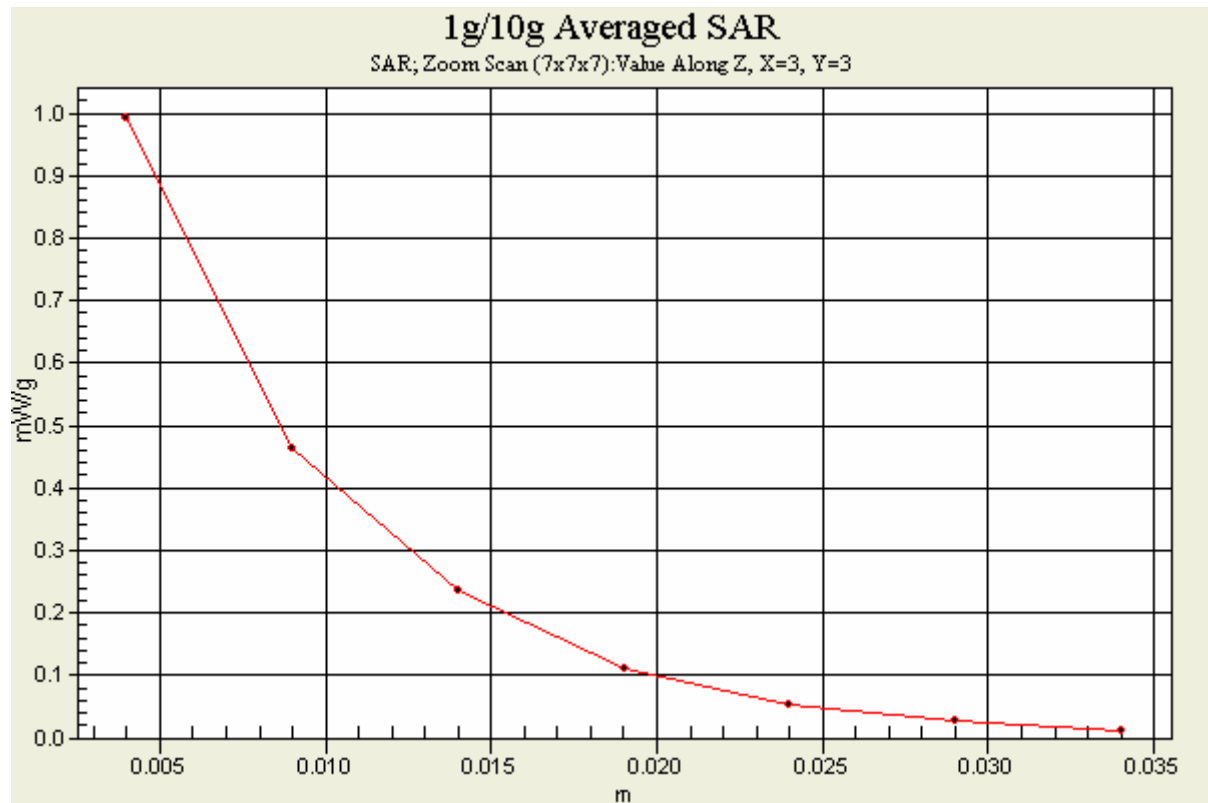
Reference Value = 18.1 V/m

Peak SAR (extrapolated) = 2.13 W/kg

SAR(1 g) = 0.862 mW/g; SAR(10 g) = 0.354 mW/g

Maximum value of SAR (measured) = 0.993 mW/g





Date/Time: 2008/9/24 09:59:38

Test Laboratory: Advance Data Technology

11b-Ch11-M01

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2462 MHz

Communication System: 802.11b ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK

Medium: MSL2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 1.96 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000$

kg/m^3 ; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 11/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.830 mW/g

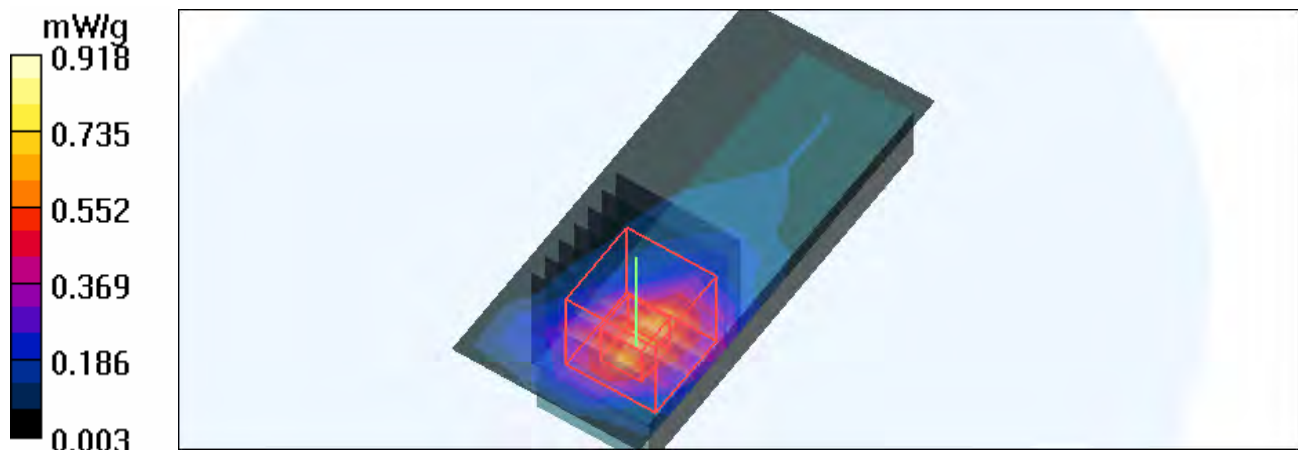
High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.0 V/m

Peak SAR (extrapolated) = 2.11 W/kg

SAR(1 g) = 0.793 mW/g; SAR(10 g) = 0.330 mW/g

Maximum value of SAR (measured) = 0.918 mW/g



Date/Time: 2008/9/24 10:17:38

Test Laboratory: Advance Data Technology

11g-Ch11-M02

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2462 MHz

Communication System: 802.11g ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used: $f = 2462$ MHz; $\sigma = 1.96$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³ ; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 11/Area Scan (4x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.603 mW/g

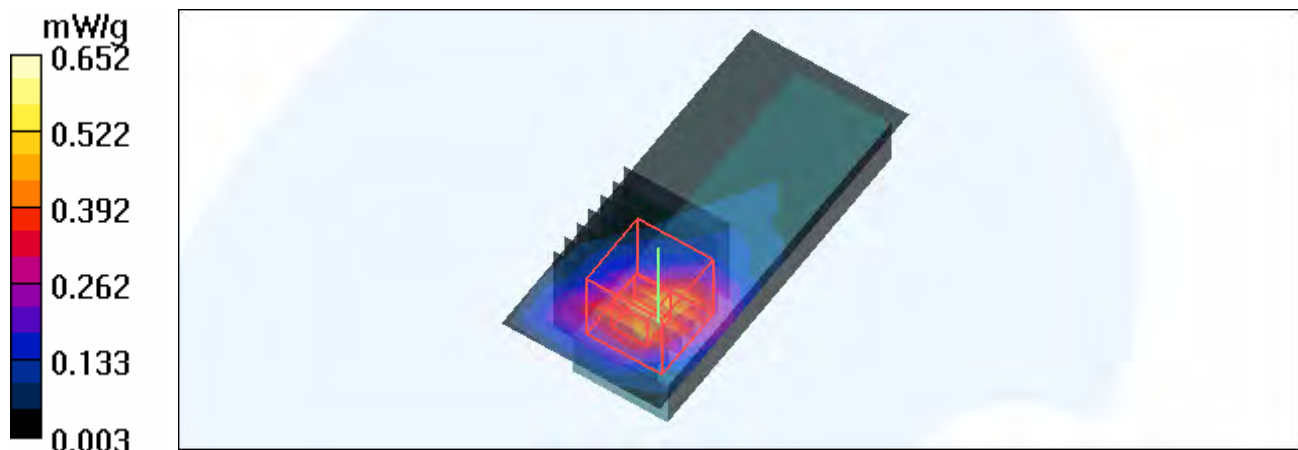
High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.3 V/m

Peak SAR (extrapolated) = 1.44 W/kg

SAR(1 g) = 0.543 mW/g; SAR(10 g) = 0.219 mW/g

Maximum value of SAR (measured) = 0.652 mW/g



Date/Time: 2008/9/24 10:34:27

Test Laboratory: Advance Data Technology

11n 20M-Ch11-M03

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2462 MHz

Communication System: 2.4G 11n span20 ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 1.96 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 11/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.787 mW/g

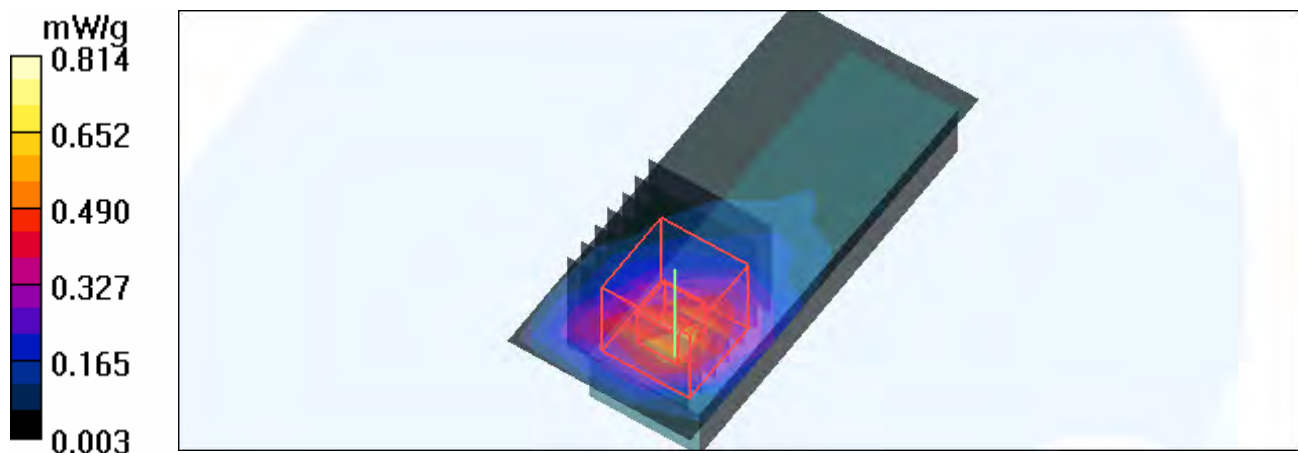
High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.1 V/m

Peak SAR (extrapolated) = 2.03 W/kg

SAR(1 g) = 0.757 mW/g; SAR(10 g) = 0.276 mW/g

Maximum value of SAR (measured) = 0.814 mW/g



Date/Time: 2008/9/24 10:52:58

Test Laboratory: Advance Data Technology

11n 40M-Ch1-M04

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2422 MHz

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

Medium: MSL2450 Medium parameters used: $f = 2422 \text{ MHz}$; $\sigma = 1.92 \text{ mho/m}$; $\epsilon_r = 52.9$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Low Channel 1/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.732 mW/g

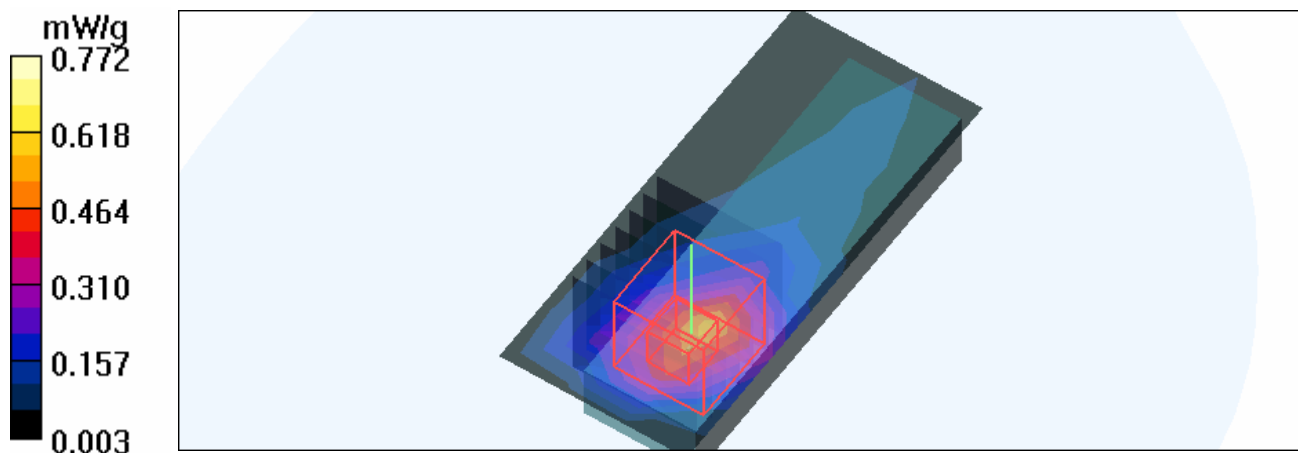
Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 15.9 V/m

Peak SAR (extrapolated) = 1.64 W/kg

SAR(1 g) = 0.687 mW/g; SAR(10 g) = 0.279 mW/g

Maximum value of SAR (measured) = 0.772 mW/g



Date/Time: 2008/9/24 11:12:34

Test Laboratory: Advance Data Technology

11b-Ch6-M05

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2437 MHz

Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.94 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.553 mW/g

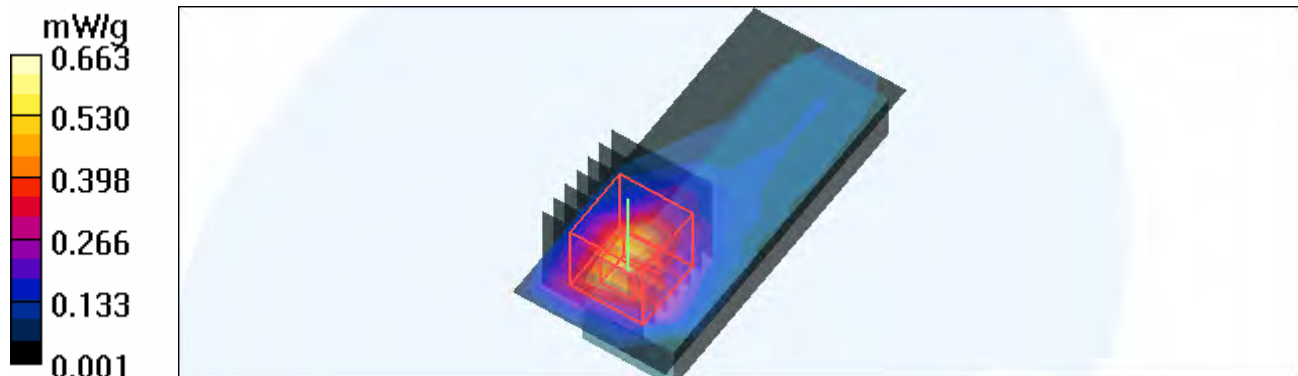
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.5 V/m

Peak SAR (extrapolated) = 1.34 W/kg

SAR(1 g) = 0.582 mW/g; SAR(10 g) = 0.249 mW/g

Maximum value of SAR (measured) = 0.663 mW/g



Date/Time: 2008/9/24 11:29:25

Test Laboratory: Advance Data Technology

11g-Ch11-M06

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2462 MHz

Communication System: 802.11g ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 1.96 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm
 Phantom section: Flat Section ; Separation distance : 5 mm (The front side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 11/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.329 mW/g

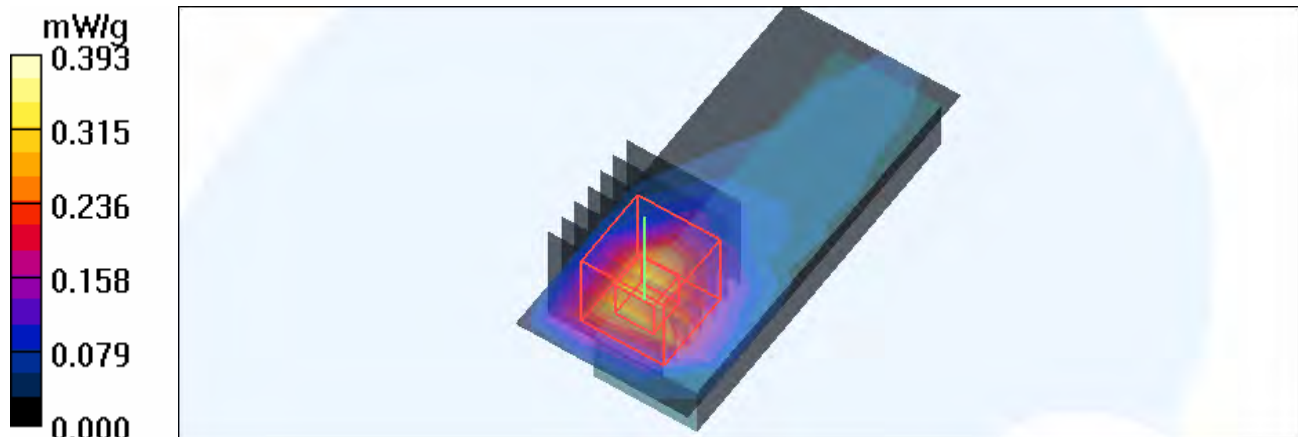
High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 11.9 V/m

Peak SAR (extrapolated) = 0.794 W/kg

SAR(1 g) = 0.339 mW/g; SAR(10 g) = 0.146 mW/g

Maximum value of SAR (measured) = 0.393 mW/g



Date/Time: 2008/9/24 11:47:46

Test Laboratory: Advance Data Technology

11n 20M-Ch11-M07

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2462 MHz

Communication System: 2.4G 11n span20 ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 1.96 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 11/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.458 mW/g

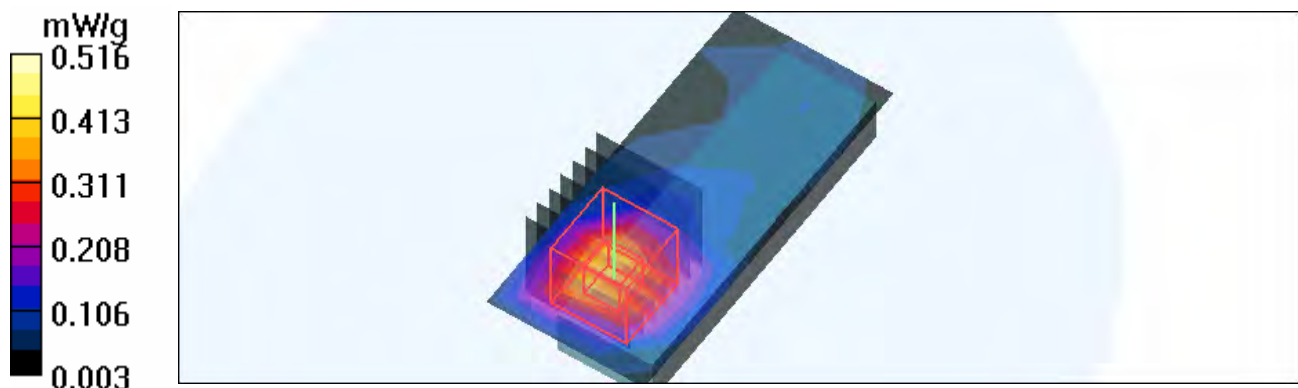
High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.8 V/m

Peak SAR (extrapolated) = 1.60 W/kg

SAR(1 g) = 0.478 mW/g; SAR(10 g) = 0.203 mW/g

Maximum value of SAR (measured) = 0.516 mW/g



Date/Time: 2008/9/24 12:05:06

Test Laboratory: Advance Data Technology

11n 40M-Ch1-M08

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2422 MHz

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

Medium: MSL2450 Medium parameters used: $f = 2422 \text{ MHz}$; $\sigma = 1.92 \text{ mho/m}$; $\epsilon_r = 52.9$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Low Channel 1/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.438 mW/g

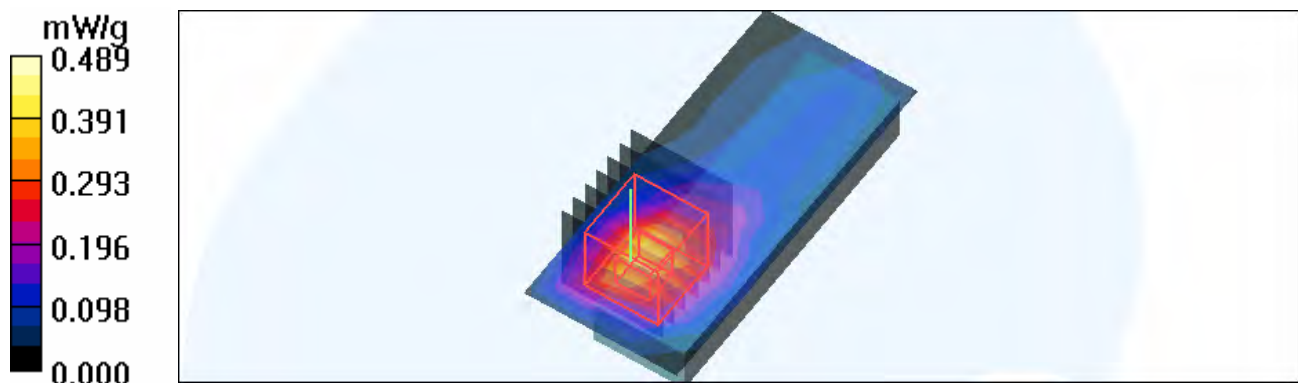
Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 13.7 V/m

Peak SAR (extrapolated) = 1.03 W/kg

SAR(1 g) = 0.436 mW/g; SAR(10 g) = 0.191 mW/g

Maximum value of SAR (measured) = 0.489 mW/g



Date/Time: 2008/9/24 13:32:59

Test Laboratory: Advance Data Technology

11b-Ch6-M09

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2437 MHz

Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.94$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³ ; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (4x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.463 mW/g

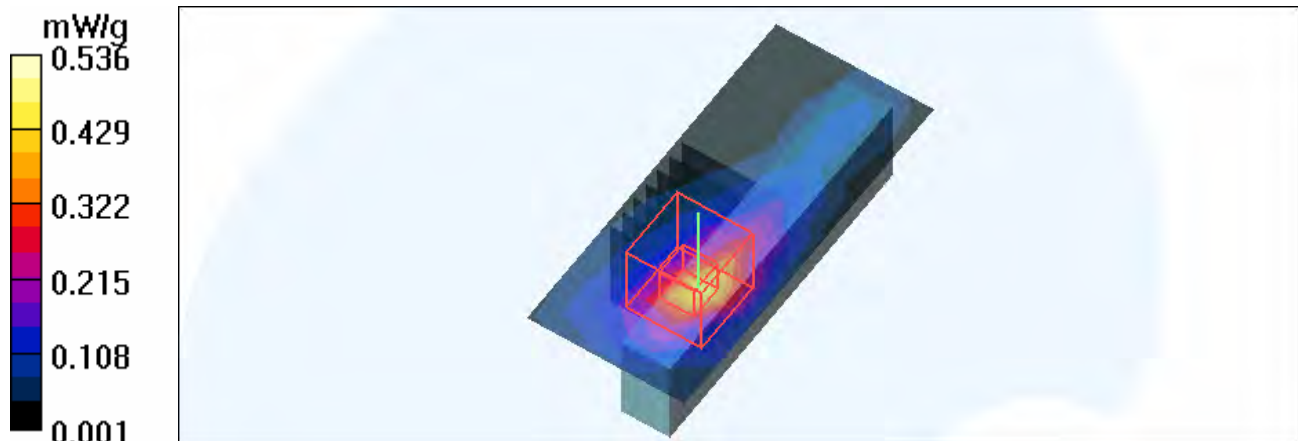
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.2 V/m

Peak SAR (extrapolated) = 1.57 W/kg

SAR(1 g) = 0.492 mW/g; SAR(10 g) = 0.190 mW/g

Maximum value of SAR (measured) = 0.536 mW/g



Date/Time: 2008/9/24 13:48:30

Test Laboratory: Advance Data Technology

11g-Ch11-M10

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2462 MHz

Communication System: 802.11g ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 1.96 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm
 Phantom section: Flat Section ; Separation distance : 5 mm (The edge side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 11/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.309 mW/g

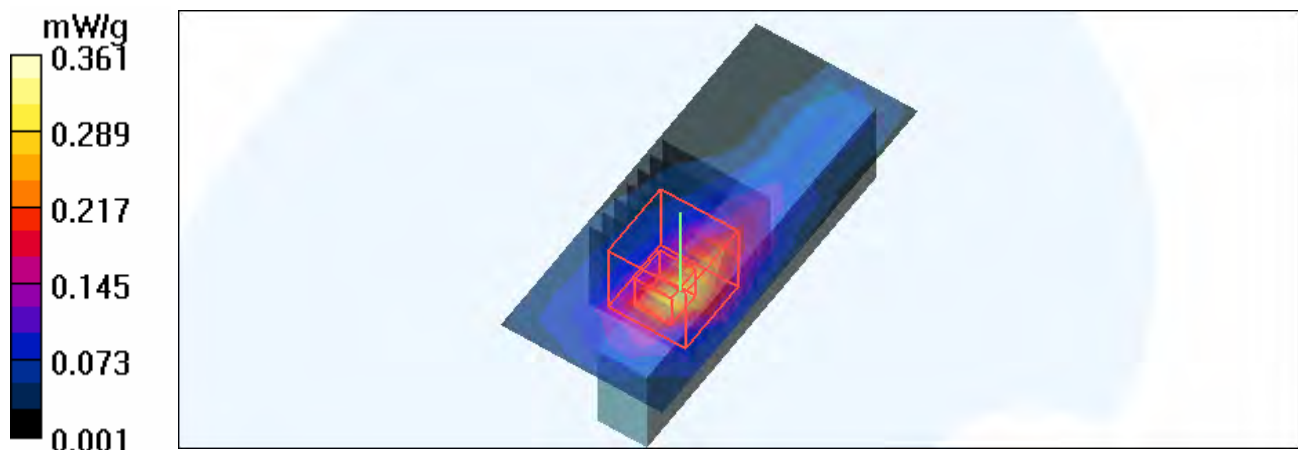
High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 13.2 V/m

Peak SAR (extrapolated) = 0.986 W/kg

SAR(1 g) = 0.326 mW/g; SAR(10 g) = 0.126 mW/g

Maximum value of SAR (measured) = 0.361 mW/g



Date/Time: 2008/9/24 14:05:54

Test Laboratory: Advance Data Technology

11n 20M-Ch11-M11

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2462 MHz

Communication System: 2.4G 11n span20 ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 1.96 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 11/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.395 mW/g

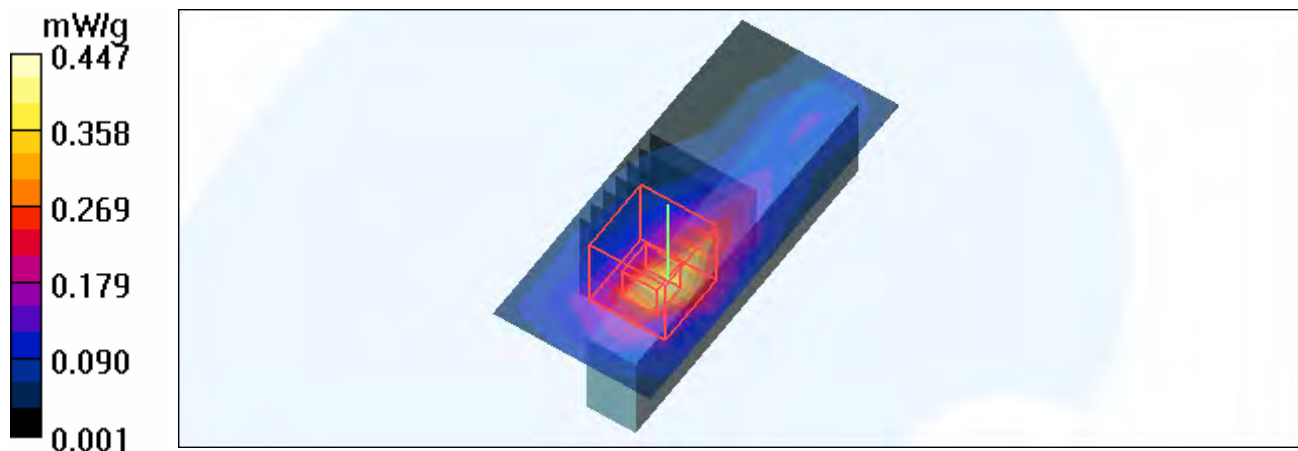
High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 15.3 V/m

Peak SAR (extrapolated) = 1.18 W/kg

SAR(1 g) = 0.401 mW/g; SAR(10 g) = 0.163 mW/g

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



Date/Time: 2008/9/24 14:23:03

Test Laboratory: Advance Data Technology

11n 40M-Ch1-M12

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2422 MHz

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

Medium: MSL2450 Medium parameters used: $f = 2422 \text{ MHz}$; $\sigma = 1.92 \text{ mho/m}$; $\epsilon_r = 52.9$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Low Channel 1/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.383 mW/g

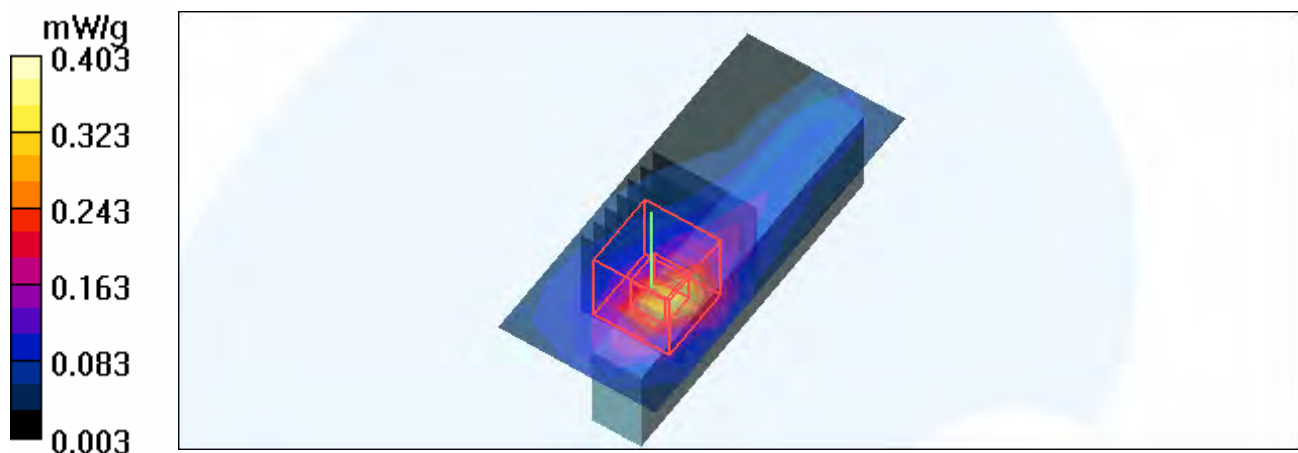
Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.9 V/m

Peak SAR (extrapolated) = 0.937 W/kg

SAR(1 g) = 0.370 mW/g; SAR(10 g) = 0.154 mW/g

Maximum value of SAR (measured) = 0.403 mW/g



Date/Time: 2008/9/24 14:44:00

Test Laboratory: Advance Data Technology

11b-Ch6-M13

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2437 MHz

Communication System: 802.11b ; Frequency: 2437 MHz ; Duty Cycle: 1:1 ; Modulation type: DBPSK
Medium: MSL2450 Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.94 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 6/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.281 mW/g

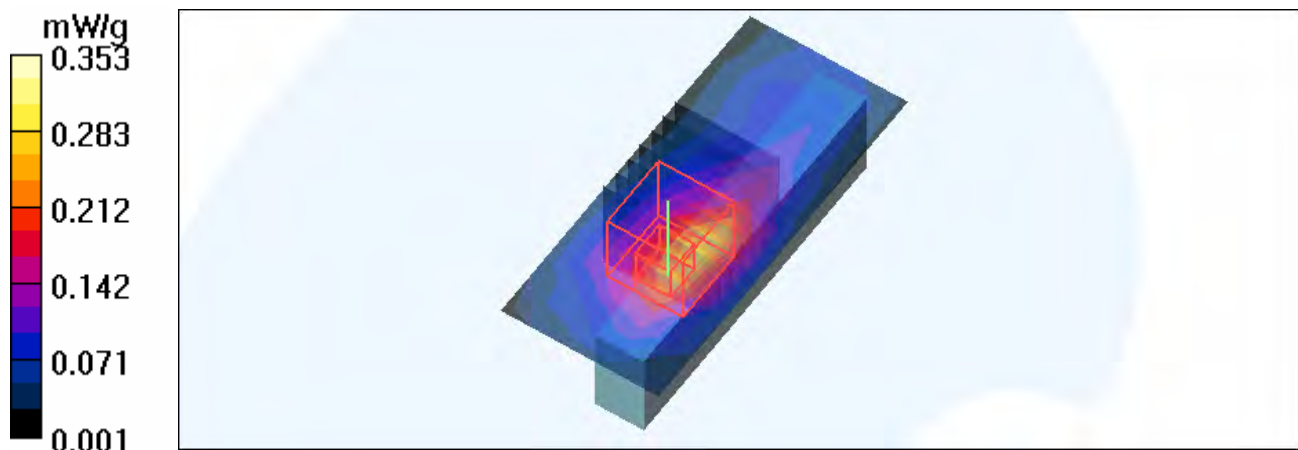
Mid Channel 6/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.1 V/m

Peak SAR (extrapolated) = 1.05 W/kg

SAR(1 g) = 0.339 mW/g; SAR(10 g) = 0.138 mW/g

Maximum value of SAR (measured) = 0.353 mW/g



Date/Time: 2008/9/24 15:01:00

Test Laboratory: Advance Data Technology

11g-Ch11-M14

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2462 MHz

Communication System: 802.11g ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 1.96 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm
 Phantom section: Flat Section ; Separation distance : 5 mm (The edge side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 11/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.243 mW/g

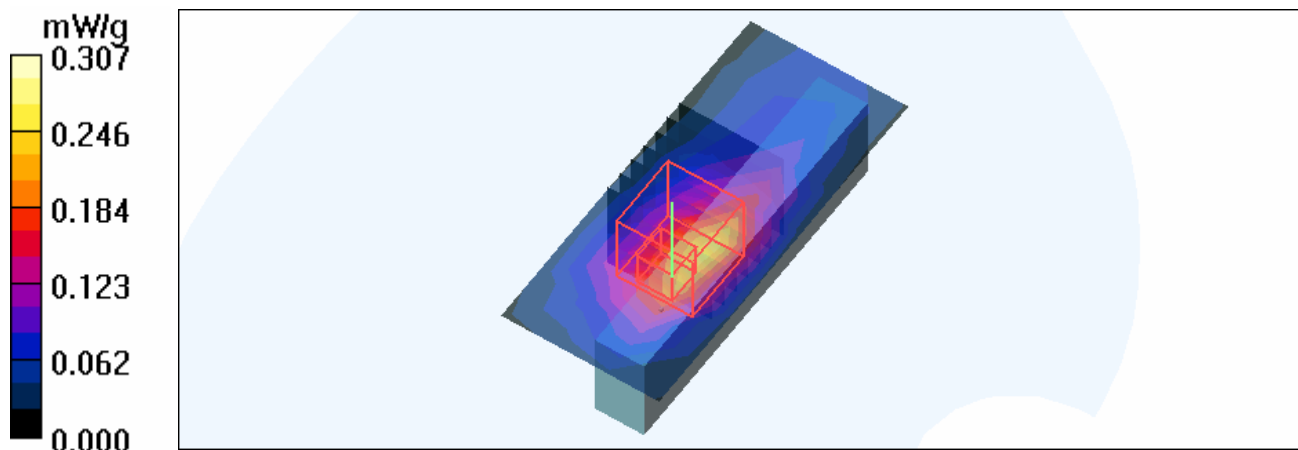
High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 8.48 V/m

Peak SAR (extrapolated) = 0.680 W/kg

SAR(1 g) = 0.269 mW/g; SAR(10 g) = 0.114 mW/g

Maximum value of SAR (measured) = 0.307 mW/g



Date/Time: 2008/9/24 15:18:22

Test Laboratory: Advance Data Technology

11n 20M-Ch11-M15

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2462 MHz

Communication System: 2.4G 11n span20 ; Frequency: 2462 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 1.96 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 11/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.323 mW/g

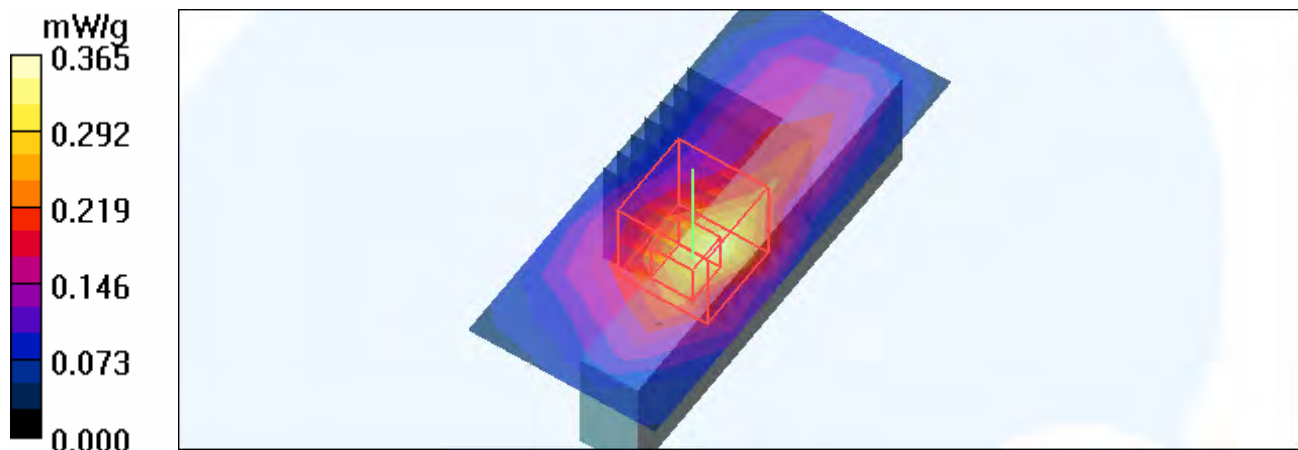
High Channel 11/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 10.2 V/m

Peak SAR (extrapolated) = 0.934 W/kg

SAR(1 g) = 0.343 mW/g; SAR(10 g) = 0.136 mW/g

Maximum value of SAR (measured) = 0.365 mW/g



Date/Time: 2008/9/24 15:48:56

Test Laboratory: Advance Data Technology

11n 40M-Ch1-M16

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 2422 MHz

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

Medium: MSL2450 Medium parameters used: $f = 2422 \text{ MHz}$; $\sigma = 1.92 \text{ mho/m}$; $\epsilon_r = 52.9$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 152 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Low Channel 1/Area Scan (4x8x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.213 mW/g

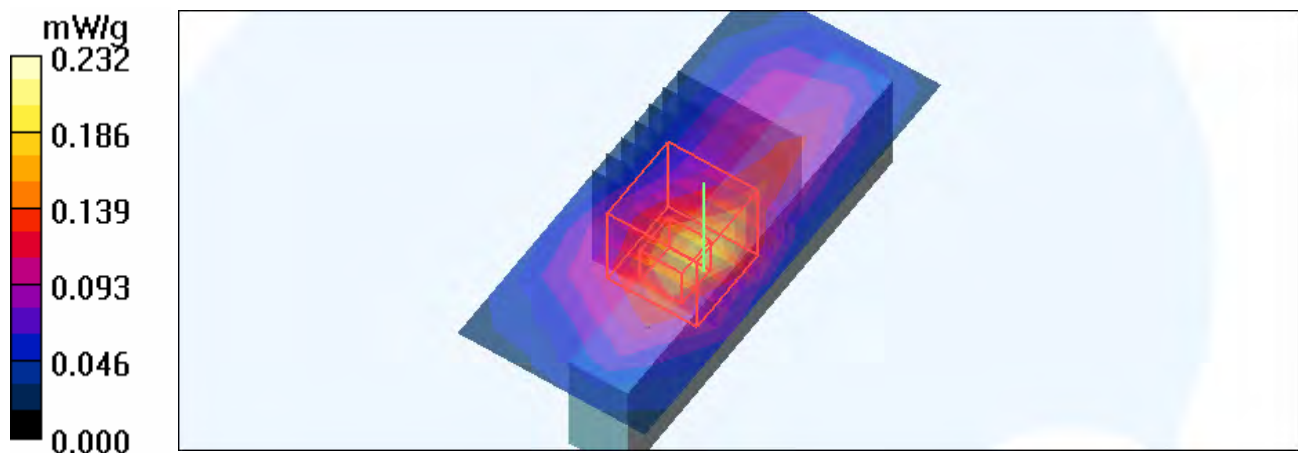
Low Channel 1/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 9.24 V/m

Peak SAR (extrapolated) = 0.572 W/kg

SAR(1 g) = 0.218 mW/g; SAR(10 g) = 0.105 mW/g

Maximum value of SAR (measured) = 0.232 mW/g



Date/Time: 2008/9/25 05:22:27

Test Laboratory: Advance Data Technology

11a-Ch149-M11-M17

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 5745 MHz

Communication System: 802.11a ; Frequency: 5745 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used: $f = 5745 \text{ MHz}$; $\sigma = 6.03 \text{ mho/m}$; $\epsilon_r = 47.9$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 153 mm
 Phantom section: Flat Section ; Separation distance : 5 mm (The bottom side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.8 degrees ; Liquid temp. : 22.7 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 149/Area Scan (6x12x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.499 mW/g

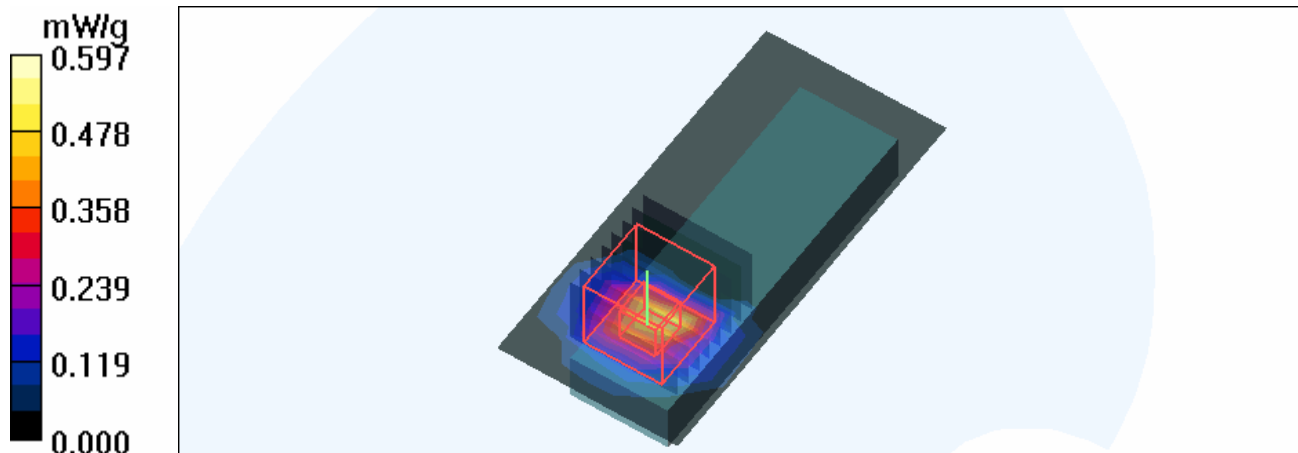
Mid Channel 149/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 9.73 V/m

Peak SAR (extrapolated) = 2.59 W/kg

SAR(1 g) = 0.436 mW/g; SAR(10 g) = 0.132 mW/g

Maximum value of SAR (measured) = 0.597 mW/g



Date/Time: 2008/9/25 09:17:31

Test Laboratory: Advance Data Technology

11an 20M-Ch157-M18

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 5785 MHz

Communication System: 11n 5G span20 ; Frequency: 5785 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5785 \text{ MHz}$; $\sigma = 6.09 \text{ mho/m}$; $\epsilon_r = 47.8$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 153 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.8 degrees ; Liquid temp. : 22.7 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 157/Area Scan (6x12x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.633 mW/g

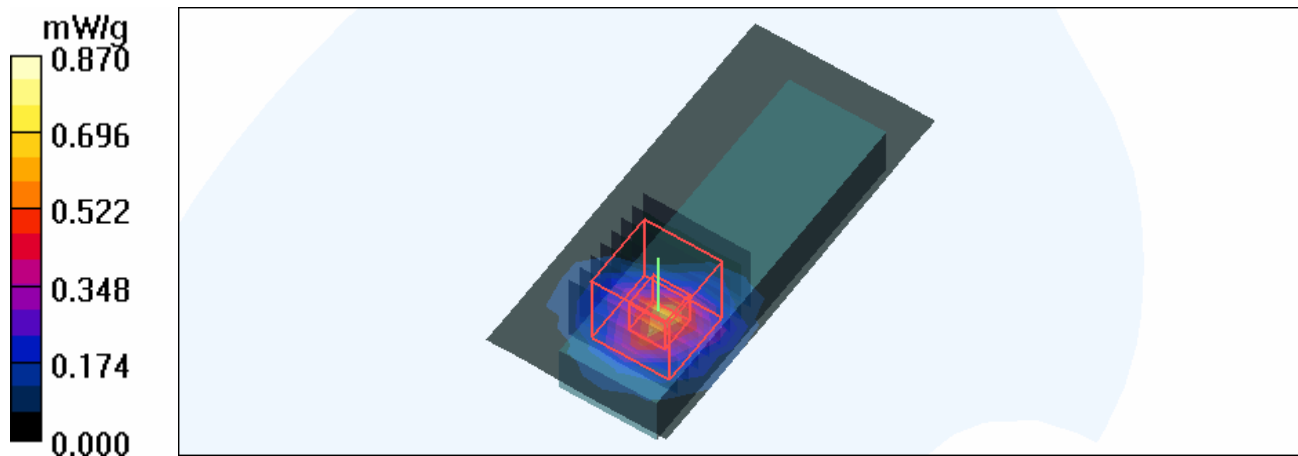
Mid Channel 157/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

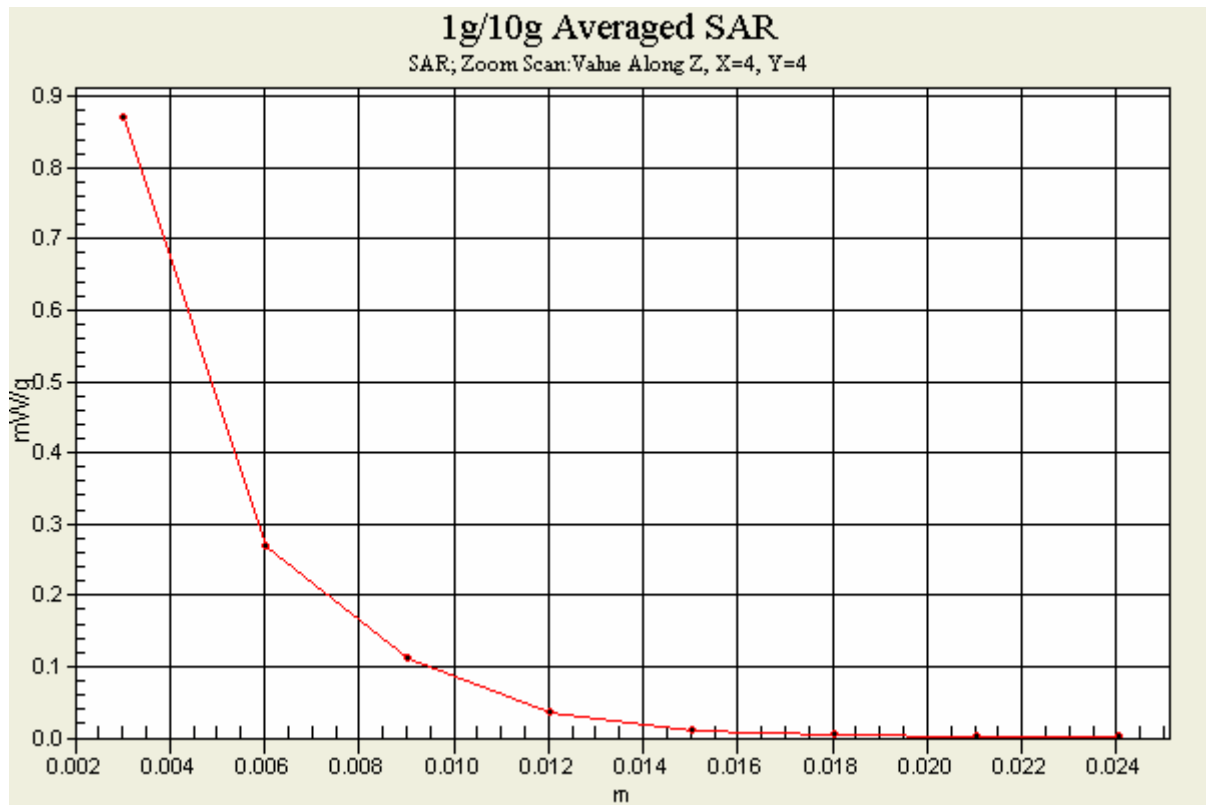
Reference Value = 11.6 V/m

Peak SAR (extrapolated) = 4.71 W/kg

SAR(1 g) = 0.670 mW/g; SAR(10 g) = 0.195 mW/g

Maximum value of SAR (measured) = 0.870 mW/g





Date/Time: 2008/9/25 11:41:37

Test Laboratory: Advance Data Technology

11an 40M-Ch159-M19

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 5795 MHz

Communication System: 11n 5G span40 ; Frequency: 5795 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5795 \text{ MHz}$; $\sigma = 6.11 \text{ mho/m}$; $\epsilon_r = 47.8$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 153 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.8 degrees ; Liquid temp. : 22.7 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 159/Area Scan (6x12x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.383 mW/g

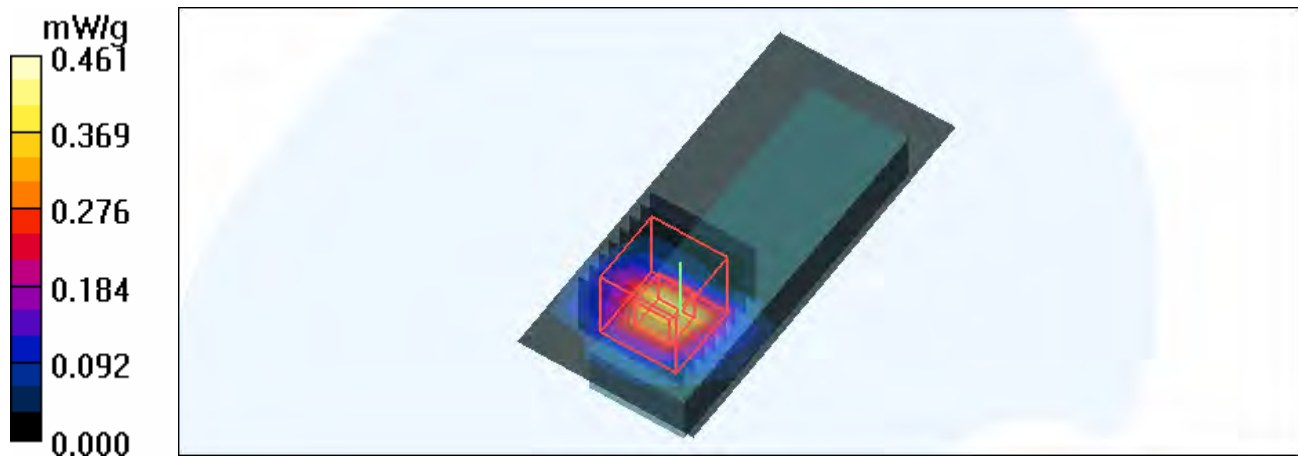
High Channel 159/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 8.55 V/m

Peak SAR (extrapolated) = 1.59 W/kg

SAR(1 g) = 0.334 mW/g; SAR(10 g) = 0.103 mW/g

Maximum value of SAR (measured) = 0.461 mW/g



Date/Time: 2008/9/25 15:31:57

Test Laboratory: Advance Data Technology

11a-Ch149-M20

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 5745 MHz

Communication System: 802.11a ; Frequency: 5745 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
Medium: MSL5800 Medium parameters used: $f = 5745 \text{ MHz}$; $\sigma = 6.03 \text{ mho/m}$; $\epsilon_r = 47.9$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 153 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.8 degrees ; Liquid temp. : 22.7 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 149/Area Scan (6x12x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.679 mW/g

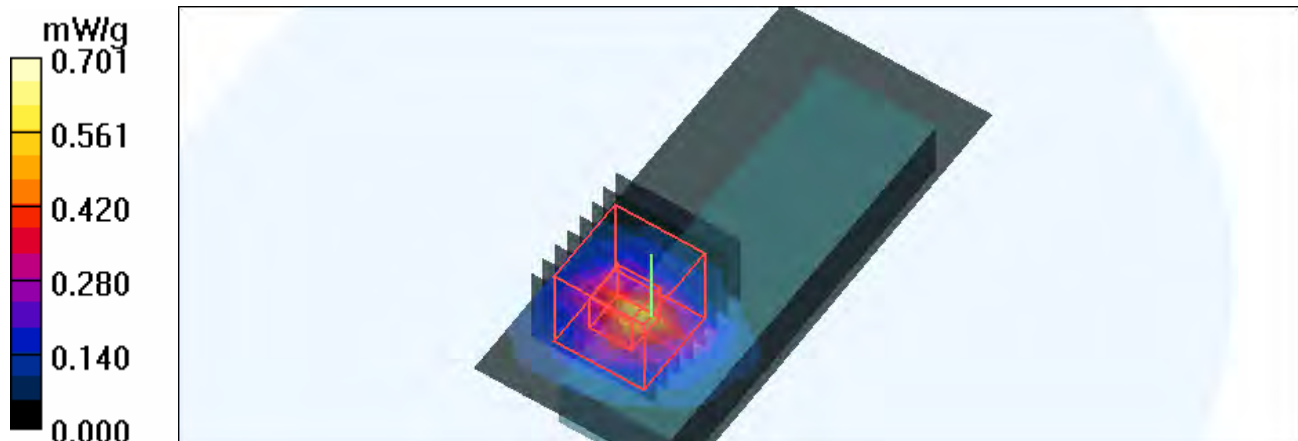
Mid Channel 149/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 9.84 V/m

Peak SAR (extrapolated) = 1.49 W/kg

SAR(1 g) = 0.365 mW/g; SAR(10 g) = 0.122 mW/g

Maximum value of SAR (measured) = 0.701 mW/g



Date/Time: 2008/9/25 19:39:52

Test Laboratory: Advance Data Technology

11an 20M-Ch157-M21

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 5785 MHz

Communication System: 11n 5G span20 ; Frequency: 5785 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5785 \text{ MHz}$; $\sigma = 6.09 \text{ mho/m}$; $\epsilon_r = 47.8$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 153 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.8 degrees ; Liquid temp. : 22.7 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 157/Area Scan (6x12x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.627 mW/g

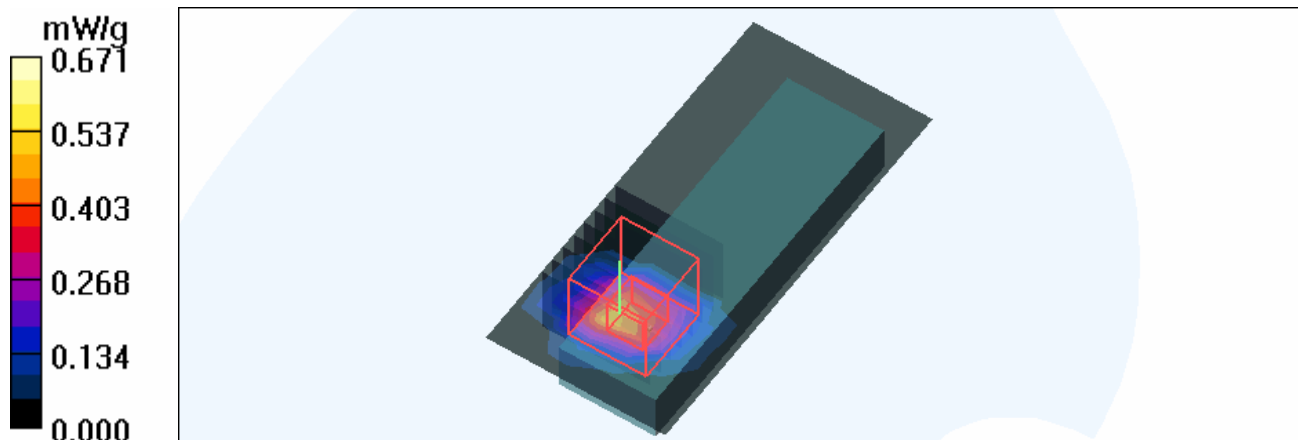
Mid Channel 157/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 14.5 V/m

Peak SAR (extrapolated) = 3.14 W/kg

SAR(1 g) = 0.592 mW/g; SAR(10 g) = 0.196 mW/g

Maximum value of SAR (measured) = 0.671 mW/g



Date/Time: 2008/9/25 22:08:23

Test Laboratory: Advance Data Technology

11an 40M-Ch159-M22

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 5795 MHz

Communication System: 11n 5G span40 ; Frequency: 5795 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5795$ MHz; $\sigma = 6.11$ mho/m; $\epsilon_r = 47.8$; $\rho = 1000$ kg/m³ ; Liquid level : 153 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.8 degrees ; Liquid temp. : 22.7 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 159/Area Scan (6x12x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.352 mW/g

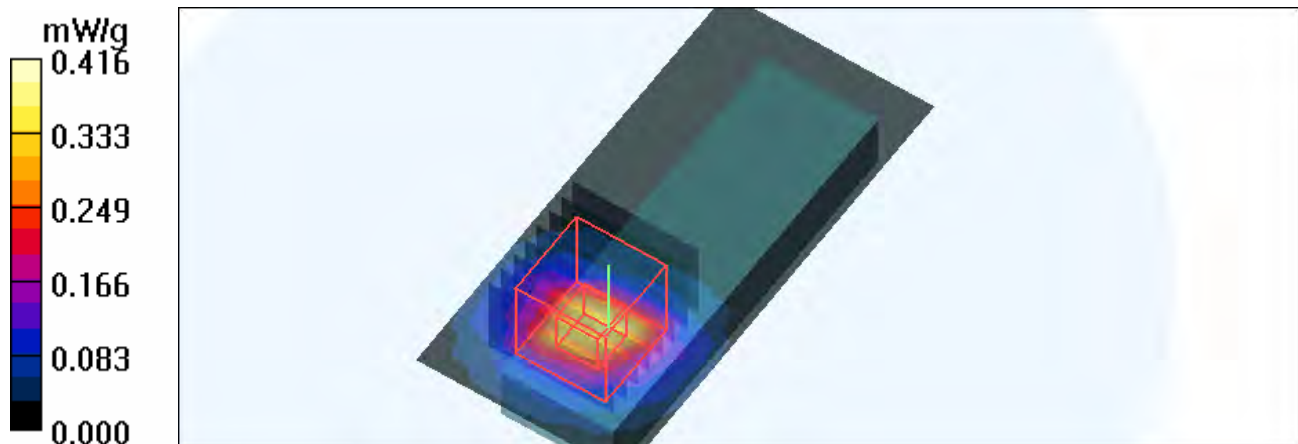
High Channel 159/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm

Reference Value = 6.87 V/m

Peak SAR (extrapolated) = 1.10 W/kg

SAR(1 g) = 0.295 mW/g; SAR(10 g) = 0.100 mW/g

Maximum value of SAR (measured) = 0.416 mW/g



Date/Time: 2008/9/25 23:49:01

Test Laboratory: Advance Data Technology

11a-Ch149-M23

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 5745 MHz

Communication System: 802.11a ; Frequency: 5745 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used: $f = 5745 \text{ MHz}$; $\sigma = 6.03 \text{ mho/m}$; $\epsilon_r = 47.9$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 153 mm
 Phantom section: Flat Section ; Separation distance : 5 mm (The edge side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.8 degrees ; Liquid temp. : 22.7 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 149/Area Scan (6x12x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.171 mW/g

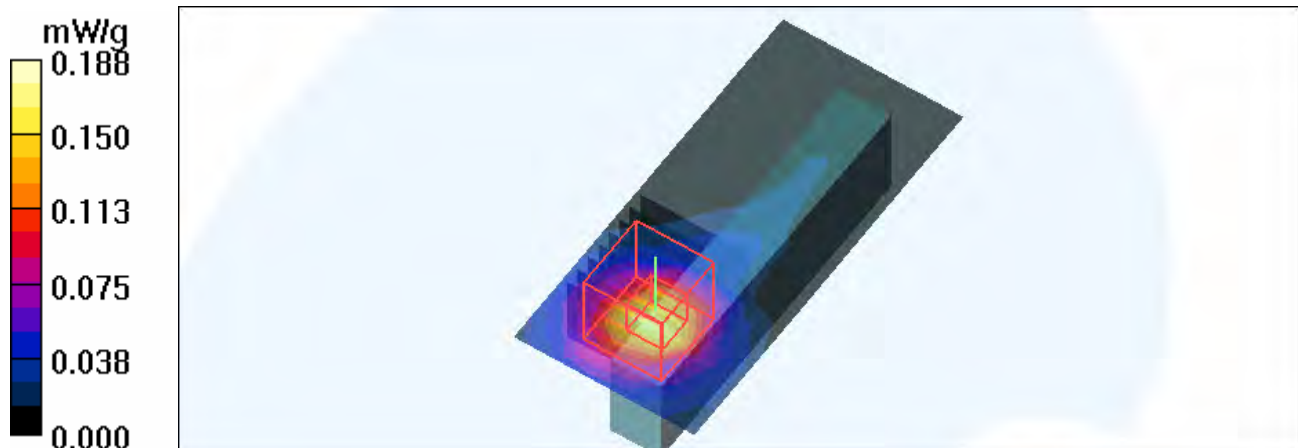
Mid Channel 149/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 3.94 V/m

Peak SAR (extrapolated) = 0.451 W/kg

SAR(1 g) = 0.128 mW/g; SAR(10 g) = 0.044 mW/g

Maximum value of SAR (measured) = 0.188 mW/g



Date/Time: 2008/9/26 03:17:53

Test Laboratory: Advance Data Technology

11an 20M-Ch157-M24

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 5785 MHz

Communication System: 11n 5G span20 ; Frequency: 5785 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5785 \text{ MHz}$; $\sigma = 6.13 \text{ mho/m}$; $\epsilon_r = 48.6$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 153 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.2 degrees ; Liquid temp. : 22.5 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 157/Area Scan (6x12x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.193 mW/g

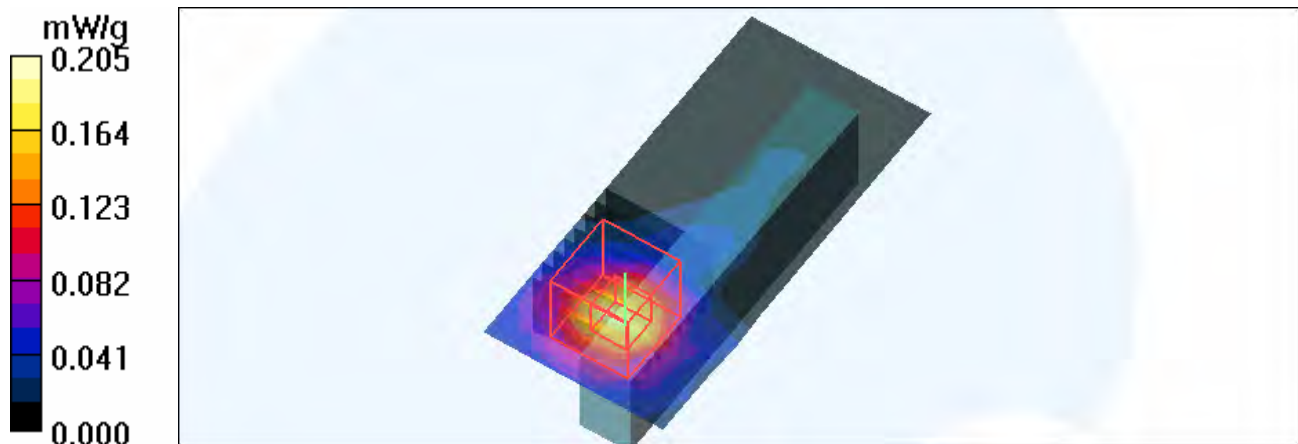
Mid Channel 157/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 6.42 V/m

Peak SAR (extrapolated) = 0.499 W/kg

SAR(1 g) = 0.142 mW/g; SAR(10 g) = 0.050 mW/g

Maximum value of SAR (measured) = 0.205 mW/g



Date/Time: 2008/9/26 04:31:34

Test Laboratory: Advance Data Technology

11an 40M-Ch159-M25

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 5795 MHz

Communication System: 11n 5G span40 ; Frequency: 5795 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5795 \text{ MHz}$; $\sigma = 6.15 \text{ mho/m}$; $\epsilon_r = 48.6$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 153 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.2 degrees ; Liquid temp. : 22.5 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 159/Area Scan (6x12x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.138 mW/g

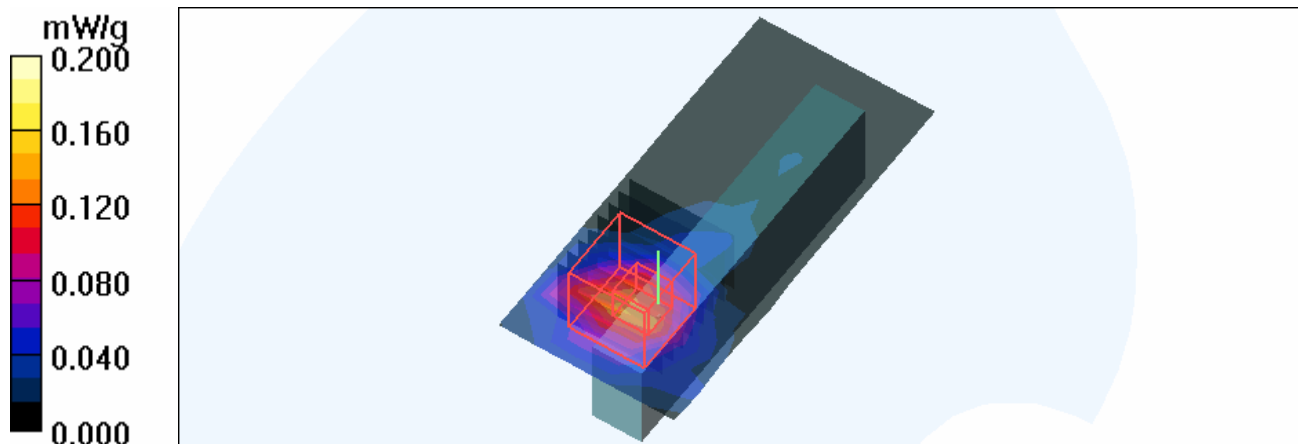
High Channel 159/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 4.08 V/m

Peak SAR (extrapolated) = 0.371 W/kg

SAR(1 g) = 0.099 mW/g; SAR(10 g) = 0.036 mW/g

Maximum value of SAR (measured) = 0.200 mW/g



Date/Time: 2008/9/26 06:08:41

Test Laboratory: Advance Data Technology

11a-Ch149-M26

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 5745 MHz

Communication System: 802.11a ; Frequency: 5745 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK
 Medium: MSL5800 Medium parameters used: $f = 5745 \text{ MHz}$; $\sigma = 6.07 \text{ mho/m}$; $\epsilon_r = 48.7$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 153 mm
 Phantom section: Flat Section ; Separation distance : 5 mm (The edge side of the EUT to the Phantom)
 Antenna type : Printed Antenna ; Air temp. : 23.2 degrees ; Liquid temp. : 22.5 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 149/Area Scan (6x12x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.088 mW/g

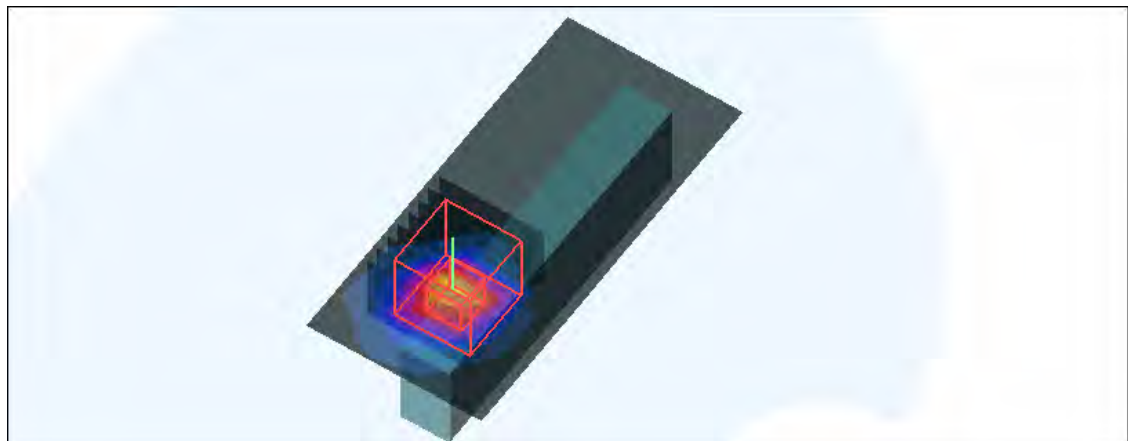
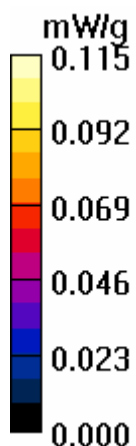
Mid Channel 149/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 4.81 V/m

Peak SAR (extrapolated) = 0.321 W/kg

SAR(1 g) = 0.069 mW/g; SAR(10 g) = 0.021 mW/g

Maximum value of SAR (measured) = 0.115 mW/g



Date/Time: 2008/9/26 07:48:06

Test Laboratory: Advance Data Technology

11an 20M-Ch157-M27

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 5785 MHz

Communication System: 11n 5G span20 ; Frequency: 5785 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5785 \text{ MHz}$; $\sigma = 6.13 \text{ mho/m}$; $\epsilon_r = 48.6$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 153 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.2 degrees ; Liquid temp. : 22.5 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

Mid Channel 157/Area Scan (6x12x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.102 mW/g

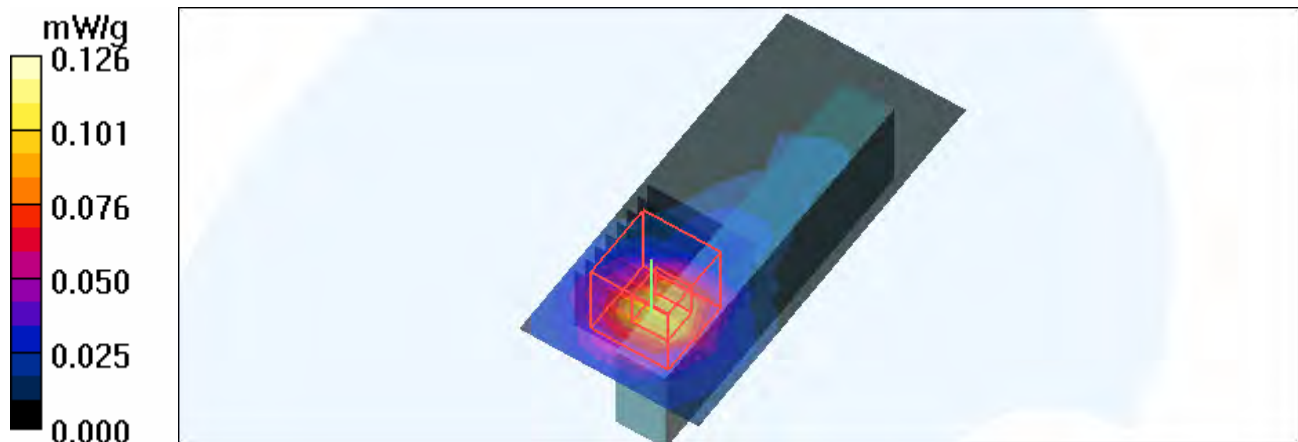
Mid Channel 157/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 4.36 V/m

Peak SAR (extrapolated) = 0.321 W/kg

SAR(1 g) = 0.085 mW/g; SAR(10 g) = 0.030 mW/g

Maximum value of SAR (measured) = 0.126 mW/g



Date/Time: 2008/9/26 09:47:23

Test Laboratory: Advance Data Technology

11an 40M-Ch159-M28

DUT: AirStation Wireless-N Dualband NFINITI Keychain USB2.0 Adapter ; Type: WLI-UC-AG300N ; Test Frequency: 5795 MHz

Communication System: 11n 5G span40 ; Frequency: 5795 MHz ; Duty Cycle: 1:1 ; Modulation type: BPSK

Medium: MSL5800 Medium parameters used: $f = 5795 \text{ MHz}$; $\sigma = 6.15 \text{ mho/m}$; $\epsilon_r = 48.6$; $\rho = 1000 \text{ kg/m}^3$; Liquid level : 153 mm

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

Antenna type : Printed Antenna ; Air temp. : 23.2 degrees ; Liquid temp. : 22.5 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12 ; Type: SAM V4.0 ; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53 ; Postprocessing SW: SEMCAD, V1.8 Build 172

High Channel 159/Area Scan (6x12x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.096 mW/g

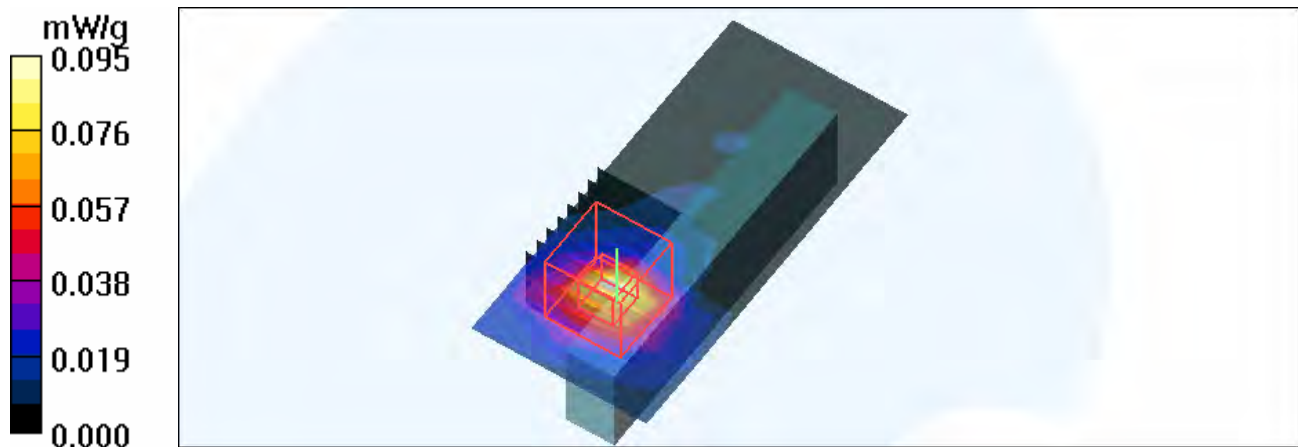
High Channel 159/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 4.29 V/m

Peak SAR (extrapolated) = 0.227 W/kg

SAR(1 g) = 0.060 mW/g; SAR(10 g) = 0.021 mW/g

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



Date/Time: 2008/9/24 08:33:13

Test Laboratory: Advance Data Technology

System Validation Check-MSL 2450MHz

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; $\sigma = 1.95$ mho/m; $\epsilon_r = 52.7$; $\rho = 1000$ kg/m³ ; Liquid level : 152 mm
 Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 23.1 degrees ; Liquid temp. : 22.3 degrees

DASY4 Configuration:

- Probe: ET3DV6 - SN1790 ; ConvF(4.16, 4.16, 4.16) ; Calibrated: 2007/11/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=10mm, Pin=250mW/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (measured) = 15.0 mW/g

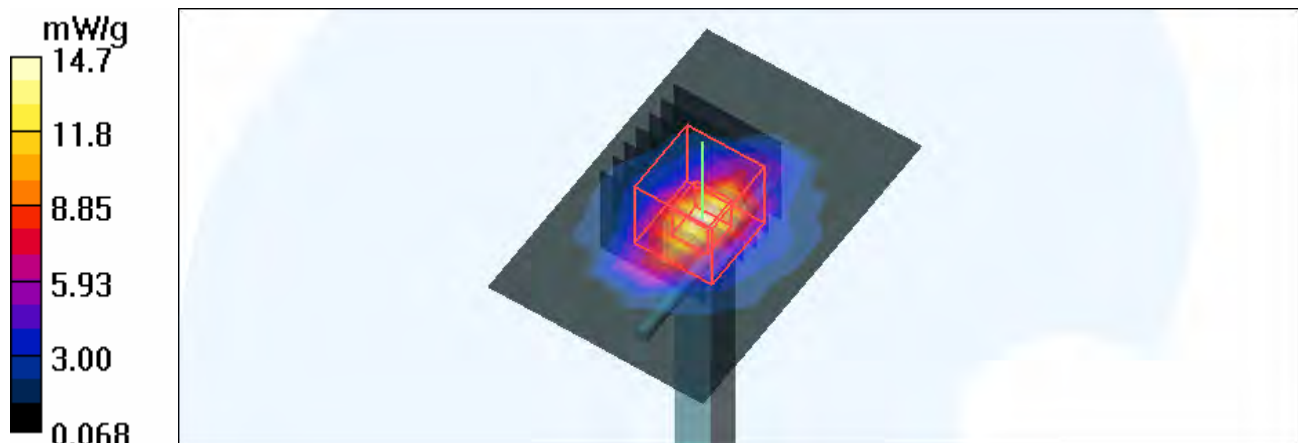
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 89.0 V/m; Power Drift = -0.088 dB

Peak SAR (extrapolated) = 28.8 W/kg

SAR(1 g) = 13 mW/g; SAR(10 g) = 5.92 mW/g

Maximum value of SAR (measured) = 14.7 mW/g



Date/Time: 2008/9/25 01:19:06

Test Laboratory: Advance Data Technology

System Validation Check-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; $\sigma = 6.12$ mho/m; $\epsilon_r = 47.8$; $\rho = 1000$ kg/m³ ; Liquid level : 153 mm
 Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 23.8 degrees ; Liquid temp. : 22.7 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

f=5800, d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
 Maximum value of SAR (measured) = 6.71 mW/g

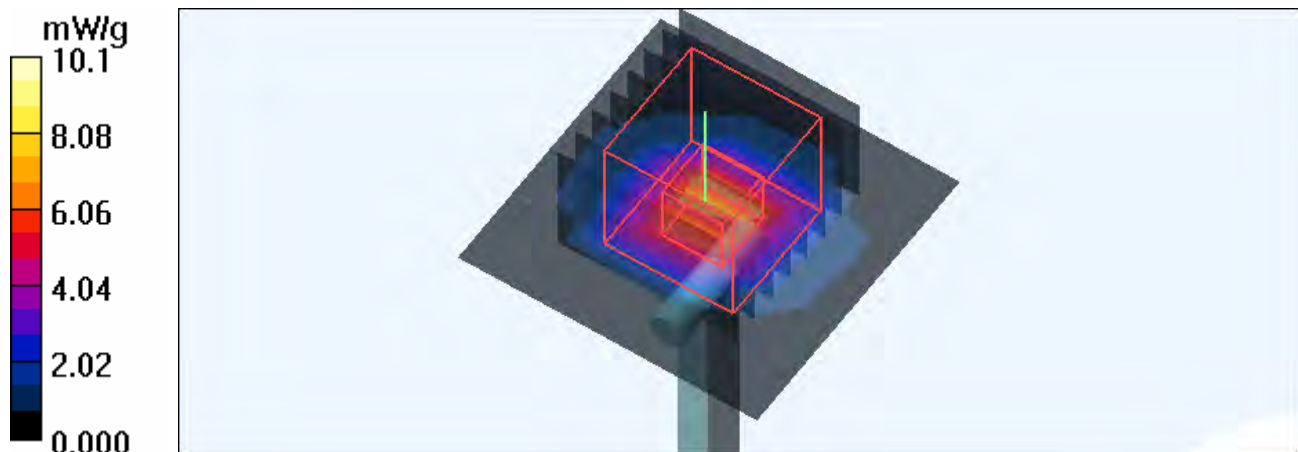
f=5800, d=10mm, Pin=100mW/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm

Reference Value = 44.1 V/m; Power Drift = -0.036 dB

Peak SAR (extrapolated) = 34.2 W/kg

SAR(1 g) = 7.21 mW/g; SAR(10 g) = 1.98 mW/g

Maximum value of SAR (measured) = 10.1 mW/g



Date/Time: 2008/9/26 01:10:35

Test Laboratory: Advance Data Technology

System Validation Check-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; $\sigma = 6.16$ mho/m; $\epsilon_r = 48.6$; $\rho = 1000$ kg/m³ ; Liquid level : 153 mm
 Phantom section: Flat Section ; Separation distance : 10 mm (The feetpoint of the dipole to the Phantom) Air temp. : 23.2 degrees ; Liquid temp. : 22.5 degrees

DASY4 Configuration:

- Probe: EX3DV3 - SN3506 ; ConvF(3.75, 3.75, 3.75) ; Calibrated: 2008/3/21
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579 ; Calibrated: 2008/3/13
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

f=5800, d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
 Maximum value of SAR (measured) = 6.24 mW/g

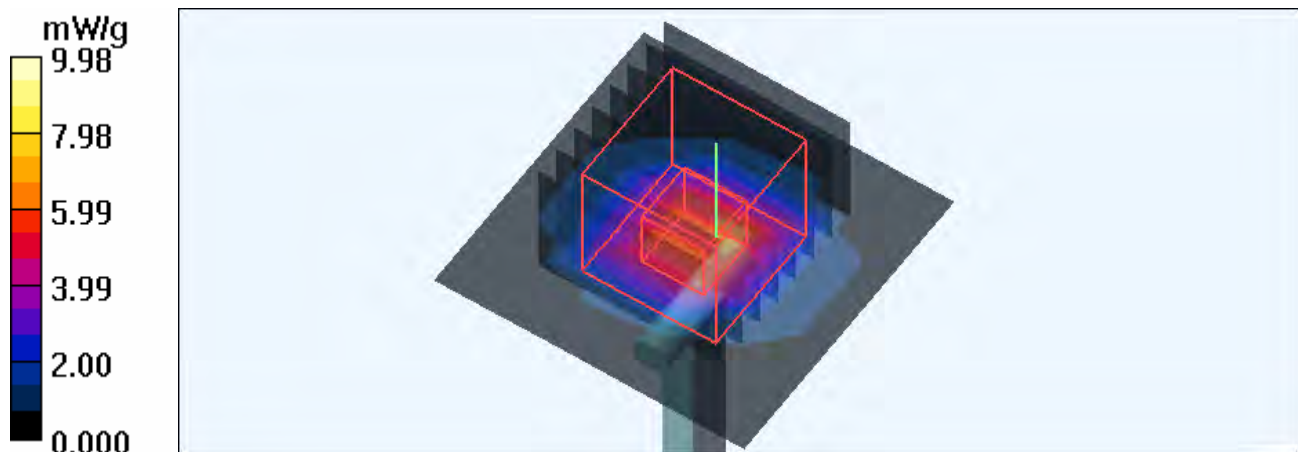
f=5800, d=10mm, Pin=100mW/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm

Reference Value = 43.3 V/m; Power Drift = -0.082 dB

Peak SAR (extrapolated) = 34.7 W/kg

SAR(1 g) = 7.18 mW/g; SAR(10 g) = 1.95 mW/g

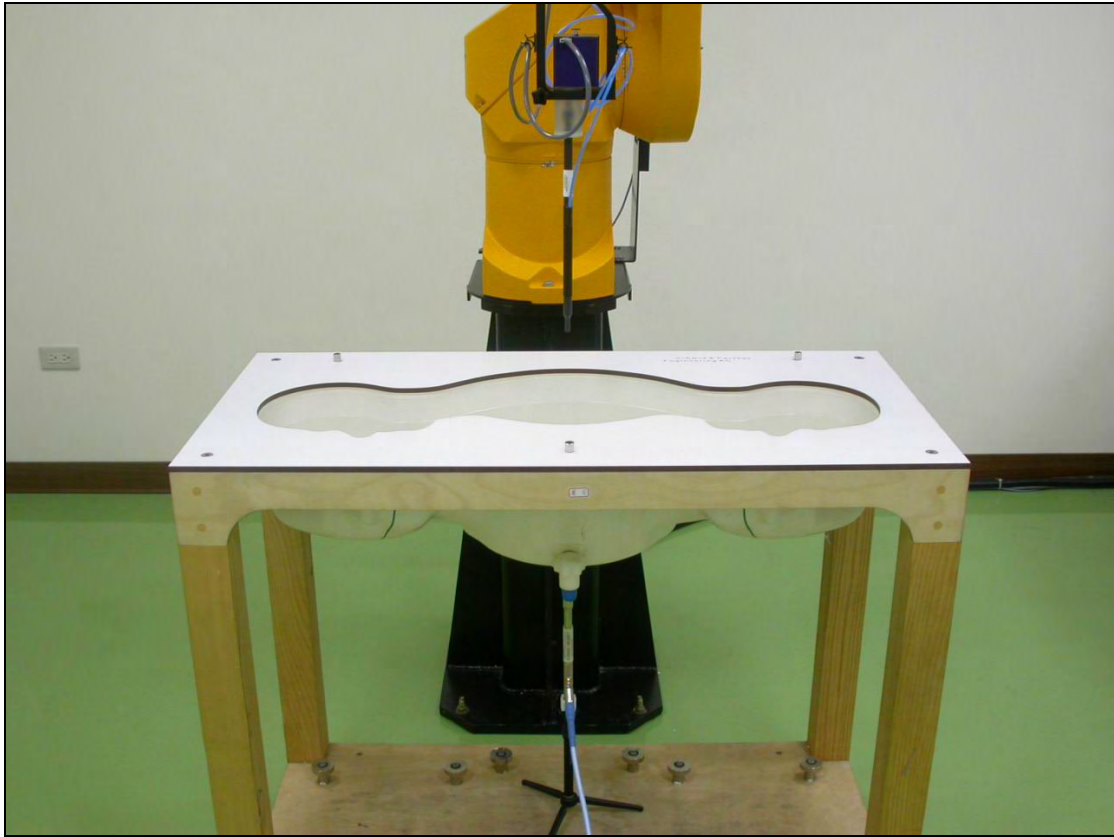
Maximum value of SAR (measured) = 9.98 mW/g



APPENDIX B: ADT SAR MEASUREMENT SYSTEM



APPENDIX C: PHOTOGRAPHS OF SYSTEM VALIDATION





APPENDIX D: SYSTEM CERTIFICATE & CALIBRATION

D1: SAM PHANTOM

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 CA
Series No	TP-1150 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles. Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

- [1] CENELEC EN 50361
- [2] IEEE P1528-200x draft 6.5
- [3] IEC PT 62209 draft 0.9

(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 28.02.2002

Signature / Stamp

F. Bombault

**Schmid & Partner
Engineering AG**

Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

Thomas Kofe



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Client

ADT (Auden)

Certificate No: **ET3-1790_Nov07**

CALIBRATION CERTIFICATE

Object

ET3DV6 - SN 1790

Calibration procedure(s)

**QA CAL-01 v6
Calibration procedure for dosimetric E-field probes**

Calibration date:

November 20, 2007

Condition of the calibrated item

In Tolerance

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (METAS, No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (METAS, No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

Calibrated by:

Katja Pokovic

Function

Technical Manager

Signature

Approved by:

Niels Kuster

Quality Manager

Issued: November 20, 2007

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}:** Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}:** DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters:** Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy):** in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset:** The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1790

Manufactured:	May 28, 2003
Last calibrated:	November 23, 2006
Recalibrated:	November 20, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1790**Sensitivity in Free Space^A****Diode Compression^B**

NormX	2.10 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	92 mV
NormY	2.11 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	92 mV
NormZ	1.77 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	92 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect**TSL 900 MHz Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	6.2	3.3
SAR _{be} [%]	With Correction Algorithm	0.8	0.5

TSL 1750 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	12.2	8.1
SAR _{be} [%]	With Correction Algorithm	0.9	0.0

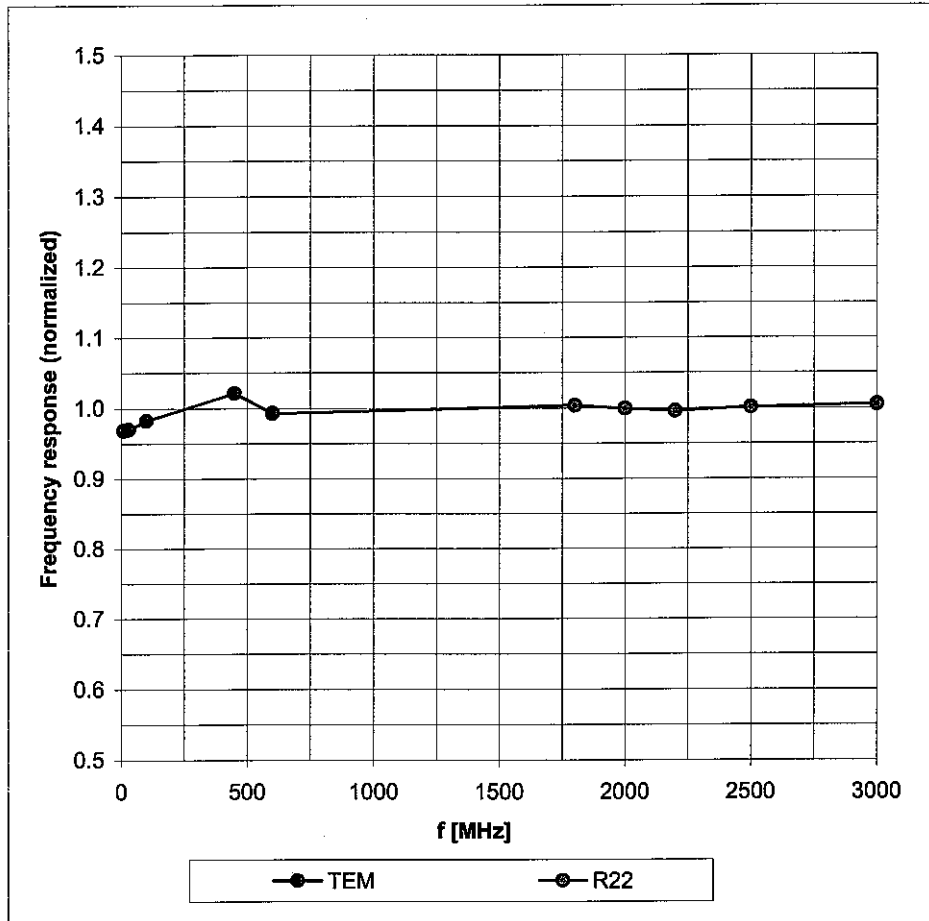
Sensor OffsetProbe Tip to Sensor Center **2.7 mm**

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

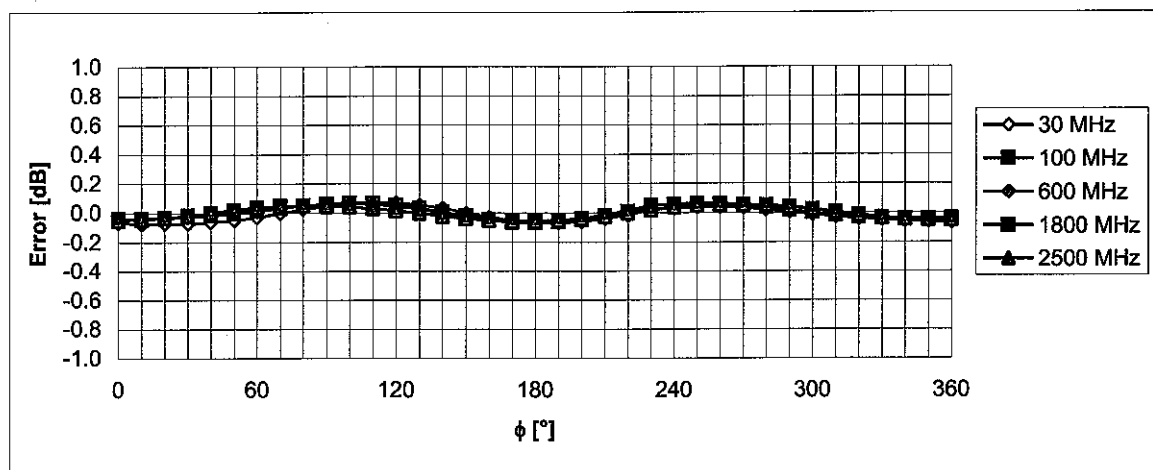
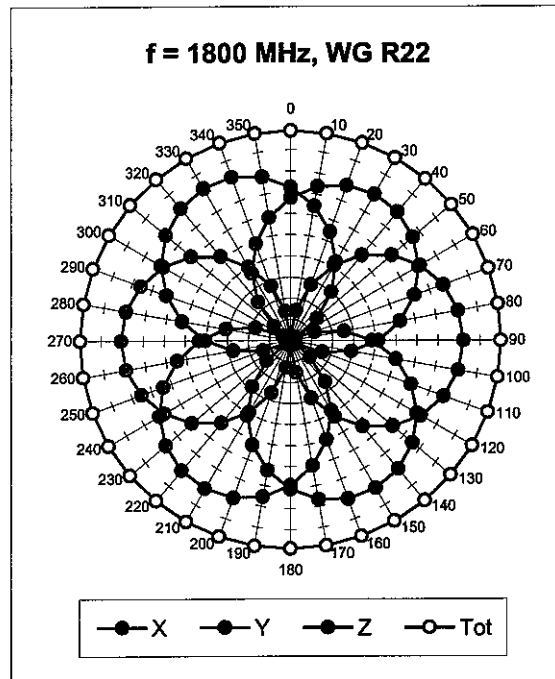
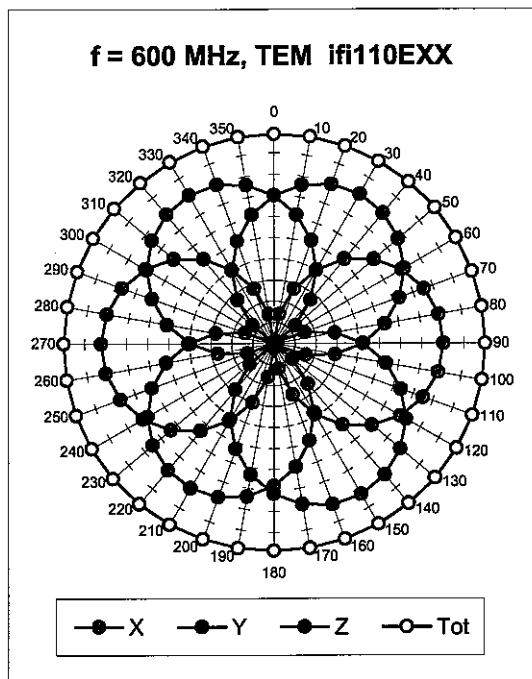
^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).^B Numerical linearization parameter: uncertainty not required.

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$ Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)