SAR TEST REPORT

REPORT NO.: SA110315C19-1

MODEL NO.: PCDH5072HS, EC5072

FCC ID: QISEC5072

RECEIVED: Mar. 08, 2011

TESTED: Mar. 16, 2011

ISSUED: Mar. 23, 2011

APPLICANT: Huawei Technologies Co., Ltd.

ADDRESS: Administration Building, Huawei Base, Bantian, Longgang District, Shenzhen 518129 P.R.C.

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

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan, R.O.C.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	N/A	Mar. 23, 2011

1. CERTIFICATION

PRODUCT:	3G/4G Dual Mode Wireless Router
MODEL NO.:	PCDH5072HS, EC5072
BRAND:	Sprint, Huawei
APPLICANT:	Huawei Technologies Co., Ltd.
TESTED:	Mar. 16, 2011
TEST SAMPLE:	Engineering Sample
STANDARDS:	**FCC Part 2 (Section 2.1093)** **FCC OET Bulletin 65, Supplement C (01-01)** **RSS-102 Issue 4 (2010-03)** **615223 D01 802 16e WiMax SARGuidance v01** **October 2010 TCB workshop RF Exposure Procedures Update**

The above equipment (model: PCDH5072HS) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ , DATE : Mar. 23, 2011
Pettie Chen / Specialist

APPROVED BY : _____ , DATE : Mar. 23, 2011
Gary Chang / Assistant Manager

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

EUT	3G/4G Dual Mode Wireless Router	
MODEL NO.	PCDH5072HS, EC5072	
FCC ID	QISEC5072	
POWER SUPPLY	5.0Vdc (adapter) 3.7Vdc (battery)	
CODED TYPE/MODULATION/ CODING RATE	**UL**	QPSK: 1/2, 3/4
		16QAM: 1/2, 3/4
	DL	QPSK: 1/2, 3/4
		16QAM: 1/2, 3/4
		64QAM: 1/2, 2/3, 3/4, 5/6
MULTIPLE ACCESS METHOD	TDMA	
MODULATION TECHNOLOGY	OFDMA	
DUPLEX METHOD	TDD	
TX / RX FUNCTION	1TX / 2RX , supports TX diversity	
MIMO FUNCTION	Not supported	
OPERATING FREQUENCY	2498.5MHz to 2687.5Mz	
CHANNEL BANDWIDTH	5MHz, 10MHz	
AVERAGE SAR (1g)	0.715W/kg	
ANTENNA TYPE	Monopole antenna with 0dBi	
DATA CABLE	1.12m USB cable without core	
I/O PORTS	Refer to user' manual	
ACCESSORY DEVICES	Adapter, Battery	
MAX DL :UL ratio	29:18	

NOTE:

1. The EUT is a 3G/4G Dual Mode Wireless Router. The test data are separated into following test reports.

	REFERENCE REPORT
WLAN 802.11b/g, 802.11n	SA110315C19
WiMax	SA110315C19-1
EVDO 850, EVDO1900	SA110315C19-2

2. The EUT has two brand names and two model name which are identical to each other in all aspects except for the following table:

BRAND	MODEL	DESCRIPTION
Sprint	PCDH5072HS	Only brand names and models are differences
Huawei	EC5072	

3. The EUT was powered by the following adapter and battery.

Adapter	
Brand:	HUAWEI
Model:	HW-050100U1W
Input:	100-240Vac, 50/60Hz, 0.2A max
Output:	5.0Vdc, 1A

Battery	
Brand:	Huawei
Model:	BTR5072B
Rating:	3.7Vdc, 2200mAh

4. The above EUT information is declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

1.2 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 2 (2.1093)

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

RSS-102 Issue 4 (2010-03)

IEEE 1528-2003

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

1.3 GENERAL INOFRMATION OF THE SAR SYSTEM

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

EX3DV4 ISOTROPIC E-FIELD PROBE

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

NOTE

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

TWIN SAM V4.0

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

SYSTEM VALIDATION KITS:

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

DEVICE HOLDER FOR SAM TWIN PHANTOM

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

DATA ACQUISITION ELECTRONICS

CONSTRUCTION

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

1.4 TEST EQUIPMENT

FOR SAR MEASURENENT

ITEM	NAME	BRAND	TYPE	SERIES NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
1	SAM Phantom	S & P	QD000 P40 CA	TP-1202	NA	NA
2	Signal Generator	Anritsu	68247B	984703	May 31, 2010	May 30, 2011
3	E-Field Probe	S & P	EX3DV4	3590	Feb. 25, 2011	Feb. 24, 2012
4	DAE	S & P	DAE 3	579	Sep. 20, 2010	Sep. 19, 2011
5	Robot Positioner	Staubli Unimation	NA	NA	NA	NA
6	Validation Dipole	S & P	D2600V2	1003	Jan. 27, 2011	Jan. 26, 2012

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

FOR TISSUE PROPERTY

ITEM	NAME	BRAND	TYPE	SERIES NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
1	Network Analyzer	Agilent	E5071C	MY46104190	Apr. 06, 2010	Apr. 05, 2011
2	Dielectric Probe	Agilent	85070D	US01440176	NA	NA

NOTE:

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

1.5 GENERAL DESCRIPTION OF THE SPATIAL PEAK SAR EVALUATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

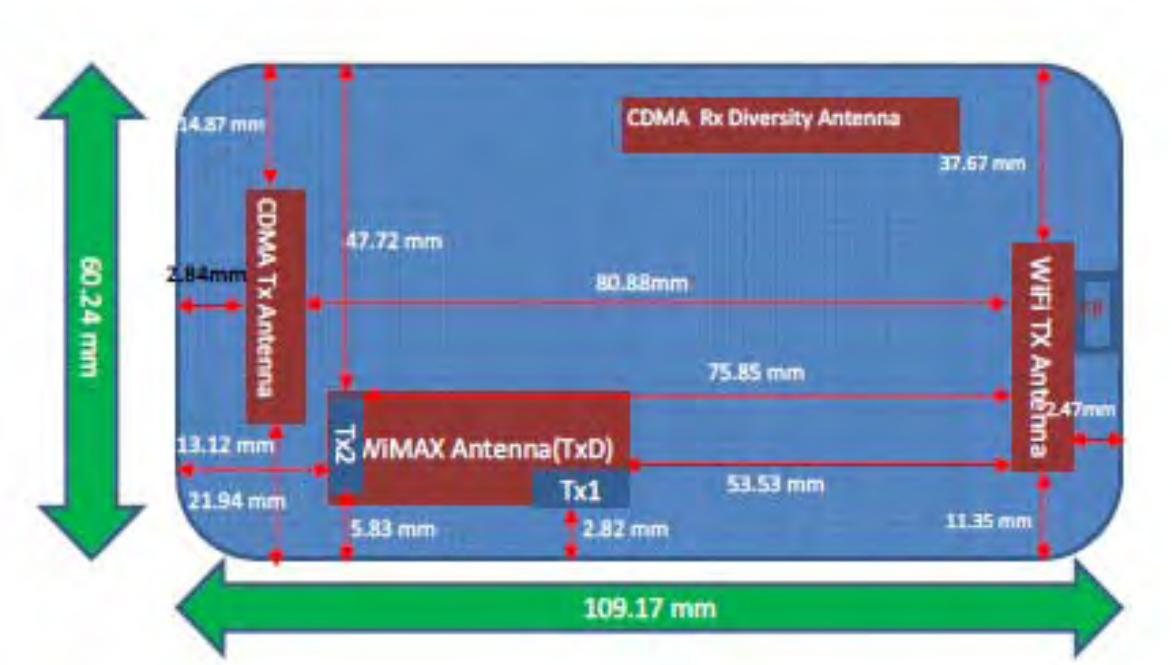
The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration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

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

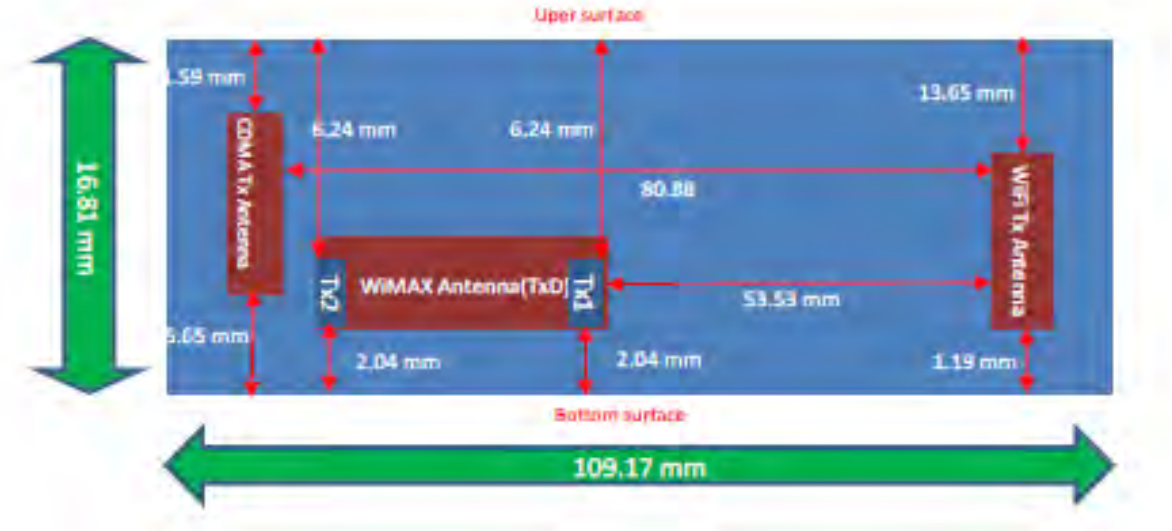
3. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

4. DESCRIPTION OF ANTENNA LOCATION



Front view



Side view

Per October 2010 TCB workshop RF Exposure Procedures Update, test SAR at 1 cm from the top & bottom surfaces and also from side edges with a transmitting antenna ≤ 2.5 cm from an edge

5. RECIPES FOR TISSUE SIMULATING LIQUIDS

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

The following ingredients are used：

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

THE RECIPES FOR 2600MHz SIMULATING LIQUID TABLE

Ingredient	Muscle Simulating Liquid 2600MHz (MSL-2600)
Water	69.83%
DGMBE	30.17%
Salt	NA
Dielectric Parameters at 22℃	f= 2600MHz ε= 52.5 ± 5% σ= 2.16 ± 5% S/m

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

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

FOR SIMULATING LIQUID

LIQUID TYPE		MSL-2600			
SIMULATING LIQUID TEMP.		21.3			
TEST DATE		Mar. 16, 2011			
TESTED BY		Van Lin			
FREQ. (MHz)	**LIQUID PARAMETER**	**STANDARD VALUE**	**MEASUREMENT VALUE**	**ERROR PERCENTAGE (%)**	**LIMIT(%)**
2498.5	Permitivity (ε)	52.64	54.26	3.08	±5
2501.0		52.64	54.22	3.00	
2593.0		52.52	53.86	2.55	
2600.0		52.51	53.82	2.49	
2685.0		52.40	53.66	2.40	
2687.5		52.40	53.60	2.29	
2498.5	Conductivity (σ) S/m	2.02	2.06	1.98	
2501.0		2.02	2.06	1.98	
2593.0		2.15	2.18	1.40	
2600.0		2.16	2.19	1.39	
2685.0		2.28	2.32	1.75	
2687.5		2.29	2.32	1.31	

6. SYSTEM VALIDATION

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

6.1. TEST PROCEDURE

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

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

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

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

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

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

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

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

6.2. VALIDATION RESULTS

SYSTEM VALIDATION TEST OF SIMULATING LIQUID					
FREQUENCY (MHz)	**REQUIRED SAR (mW/g)**	**MEASURED SAR (mW/g)**	**DEVIATION (%)**	**SEPARATION DISTANCE**	**TESTED DATE**
MSL 2600	14.4 (1g)	14.5	0.69	10mm	Mar. 16, 2011

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

6.3. SYSTEM VALIDATION UNCERTAINTIES

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

Error Description	Tolerance (±%)	Probability Distribution	Divisor	(C_i)		Standard Uncertainty (±%)		(v_i)
				(1g)	(10g)	(1g)	(10g)	
Measurement System								
Probe Calibration	5.50	Normal	1	1	1	5.50	5.50	∞
Axial Isotropy	0.25	Rectangular	√3	0.7	0.7	0.10	0.10	∞
Hemispherical Isotropy	1.30	Rectangular	√3	0.7	0.7	0.53	0.53	∞
Boundary effects	1.00	Rectangular	√3	1	1	0.58	0.58	∞
Linearity	0.30	Rectangular	√3	1	1	0.17	0.17	∞
System Detection Limits	1.00	Rectangular	√3	1	1	0.58	0.58	∞
Readout Electronics	0.30	Normal	1	1	1	0.30	0.30	∞
Response Time	0.80	Rectangular	√3	1	1	0.46	0.46	∞
Integration Time	2.60	Rectangular	√3	1	1	1.50	1.50	∞
RF Ambient Noise	3.00	Rectangular	√3	1	1	1.73	1.73	9
RF Ambient Reflections	3.00	Rectangular	√3	1	1	1.73	1.73	9
Probe Positioner	0.40	Rectangular	√3	1	1	0.23	0.23	∞
Probe Positioning	2.90	Rectangular	√3	1	1	1.67	1.67	∞
Max. SAR Eval.	1.00	Rectangular	√3	1	1	0.58	0.58	∞
Test sample related								
Sample positioning	1.90	Normal	1	1	1	1.90	1.90	4
Device holder uncertainty	2.80	Normal	1	1	1	2.80	2.80	4
Output power variation-SAR drift measurement	4.50	Rectangular	√3	1	1	2.60	2.60	1
Dipole Related								
Dipole Axis to Liquid Distance	1.60	Rectangular	√3	1	1	0.92	0.92	4
Input Power Drift	1.13	Rectangular	√3	1	1	0.66	0.66	1
Phantom and Tissue parameters								
Phantom Uncertainty	4.00	Rectangular	√3	1	1	2.31	2.31	∞
Liquid Conductivity (target)	5.00	Rectangular	√3	0.64	0.43	1.85	1.24	∞
Liquid Conductivity (measurement)	1.98	Normal	1	0.64	0.43	1.27	0.85	9
Liquid Permittivity (target)	5.00	Rectangular	√3	0.6	0.49	1.73	1.41	∞
Liquid Permittivity (measurement)	3.08	Normal	1	0.6	0.49	1.85	1.51	9
Combined Standard Uncertainty						**8.90**	**8.62**	
Coverage Factor for 95%						**Kp=2**		
Expanded Uncertainty (K=2)						**17.80**	**17.24**	

7. 802.16e/WiMax DEVICE AND SYSTEM OPERATING PARAMETERS

Description	Parameter	Comment
FCC ID	QISEC5072	Identify all related FCC ID
Radio Service	Part 27 subpart M	Rule parts
Transmit Frequency Range (MHz)	2496MHz-2690MHz	System parameter
System/Channel Bandwidth (MHz)	5MHz / 10MHz	System parameter
System Profile	5MHz / 10MHz	Defined by WiMAX Forum
Modulation Schemes	QPSK1/2, QPSK3/4 16QAM1/2, 16QAM3/4	Identify all applicable UL modulations
Sampling Factor	28/25	System parameter
Sampling Frequency (MHz)	11.2MHz (10MHz) / 5.6MHz (5MHz)	(Fs)
Sample Time (ns)	89ns (10MHz) / 178ns (5MHz)	(1/Fs)
FFT Size (NFFT)	1024 (10MHz) / 512 (5MHz)	(NFFT)
Sub-Carrier Spacing (kHz)	10.94kHz	(Δf)
Useful Symbol time (μs)	91.43μs	(Tb=1/Δf)
Guard Time (μs)	11.43μs	(Ts=Tb+Tg)
Frame Size (ms)	5ms	System parameter
TTG + RTG (μs or number of symbols)	165.8us	Idle time, system parameter
Number of DL OFDMA Symbols per Frame	Max:29	Identify the allowed & maximum symbols, including both traffic & control symbols
Number of UL OFDMA Symbols per Frame	Max:18	
DL:UL Symbol Ratio	Max 29:18	For determining UL duty factor
Power Class (dBm)	Power class 1 QPSK: 23.5dBm +/- 1 dB 16QAM: 21.5dBm +/- 1 dB	Identify power class and tolerance
Wave1 / Wave2	Wave2: 1Tx * 2Rx (Tx diversity) 2 antennas	Describe antenna diversity info and MIMO requirements separately
	Antenna 1(Main) is for Tx/Rx, Antenna 2(Aux.) is for Tx/Rx	
UL Zone Types (FUSC, PUSC, OFUSC, OPUSC, AMC, TUSC1, TUSC2)	PUSC only. UL AMC is not used in the current profile.	Describe separately the symbol and sub-carrier/sub-channel structures applicable to each zone type

<table>
<tr><td rowspan="2">Maximum Number of UL Sub-Carriers</td><td>10 MHz BW</td><td>5 MHz BW</td><td rowspan="10">Identify the allowed and tested/to be tested parameters; include separate</td></tr>
<tr><td>Null Sub-Carriers =184
Pilot Sub-Carriers =280
Data Sub-Carriers =560</td><td>Null Sub-Carriers =104
Pilot Sub-Carriers =136
Data Sub-Carrier =272</td></tr>
<tr><td rowspan="5">UL Burst Maximum Average Power</td><td>Antenna 1</td><td>Antenna 2</td></tr>
<tr><td colspan="2">24.5dBm / QPSK/10MHz</td></tr>
<tr><td colspan="2">22.5dBm / 16QAM/10MHz</td></tr>
<tr><td colspan="2">24.5dBm / QPSK/5MHz</td></tr>
<tr><td colspan="2">22.5dBm / 16QAM/5MHz</td></tr>
<tr><td>Number and type of UL Control Symbols</td><td colspan="2">Total: 10.
1 for preamble
6 for DL control overhead
3 for UL control overhead</td></tr>
<tr><td rowspan="5">UL Control Symbol Maximum Average Power</td><td>Average Power</td><td>Calculation</td></tr>
<tr><td>40.26 mW
for 10MHz / QPSK</td><td>281.84 mW x 5/35</td></tr>
<tr><td>25.40 mW
for 10MHz / 16QAM</td><td>177.83 mW x 5/35</td></tr>
<tr><td>82.89 mW
for 5MHz / QPSK</td><td>281.84 mW x 5/17</td></tr>
<tr><td>52.30 mW
for 5MHz / 16QAM</td><td>177.83 mW x 5/17</td></tr>
<tr><td>UL Burst Peak-to-Average Power Ratio (PAR)</td><td colspan="2">With DL:UL ratio=29:18,
PAR is between 7.55~8.94dB.</td><td>Identify the expected range and measured/tested PAR; explain separately the methods used / to be used to address SAR probe calibration and measurement error issues</td></tr>
<tr><td>Frame Averaged UL Transmission Duty Factor</td><td colspan="2">The duty cycle is 15/48=0.3125</td><td>Show calculation separately and explain how the applicable CF (crest factor) used / to be use in the SAR measurements is derived and how the control symbols are accounted for</td></tr>
</table>

8. WIMAX/802.16e DEVICE SPECIFICATION

8.1. WIMAX ZONE TYPES

The device transmits using PUSC zone type only. 5 and 10MHz bandwidth are supported for the EUT. For the 10 MHz bandwidth, it has 35 sub-channels structured from 1024 subcarriers; 184 are used as spare/safeguard subcarriers, leaving 840 available for transmission. From this, 560 subcarriers for data transmission with 280 subcarriers intended for pilot use. For the 5 MHz bandwidth, it contains 17 sub-channels using 512 subcarriers; 104 subcarriers as spare/safeguard subcarriers, 272 for data transmission, and 136 for pilot.

8.2. POWER MEASUREMENT

Set the transmitter under transmission condition continuously at specific mode with maximum output. The power meter was used to read the response of the power sensor. Record the power level and PK to AV ratio.
The maximum conducted output power is measured for the uplink burst at DL:UL ratio=29:18 that is measured for the uplink bursts through triggering and gating.

An Anritus wideband power meter was used for measuring this item. The power was taken during the burst-on period (exclude 3 control symbols) by means of triggering and gating function.

The measured results are as below table:

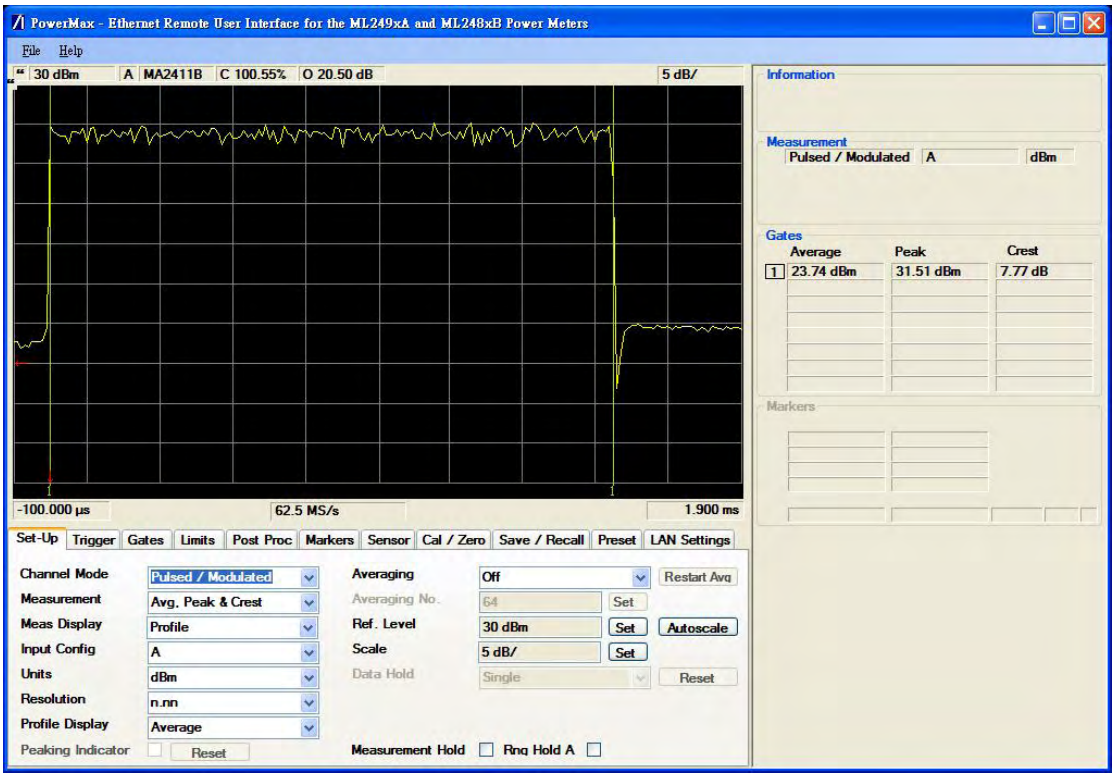
Chain 0 output power for WiMAX antenna 1

Channel BW	UL zone type / DL/UL Ratio	Channel Frequency (MHz)	Conducted Power (dBm)		Peak to Average ratio (dB)	UL modulation
			AV	PK		
5MHz	PUSC / 29:18	2498.5	23.94	31.63	7.69	QPSK
			22.39	31.12	8.73	16QAM
		2593	23.74	31.51	7.77	QPSK
			22.46	31.08	8.62	16QAM
		2687.5	23.61	31.39	7.78	QPSK
			22.43	30.91	8.48	16QAM
10MHz	PUSC / 29:18	2501	23.18	31.41	8.23	QPSK
			22.48	31.25	8.77	16QAM
		2593	23.14	31.25	8.11	QPSK
			22.46	31.08	8.62	16QAM
		2685	23.04	31.08	8.05	QPSK
			22.43	30.92	8.49	16QAM

Test plots of conducted power and PAR ratio for middle channel

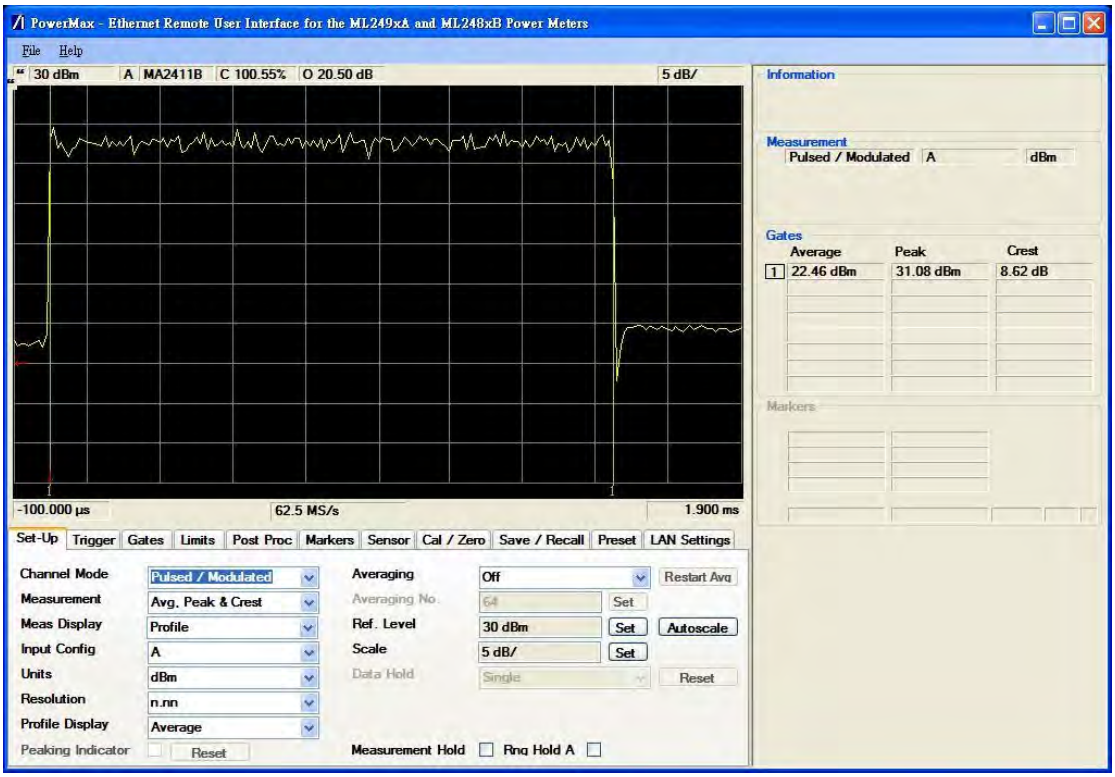
Bandwidth 5MHz / Modulation : QPSK

2593MHz



Bandwidth 5MHz / Modulation : 16QAM

2593MHz

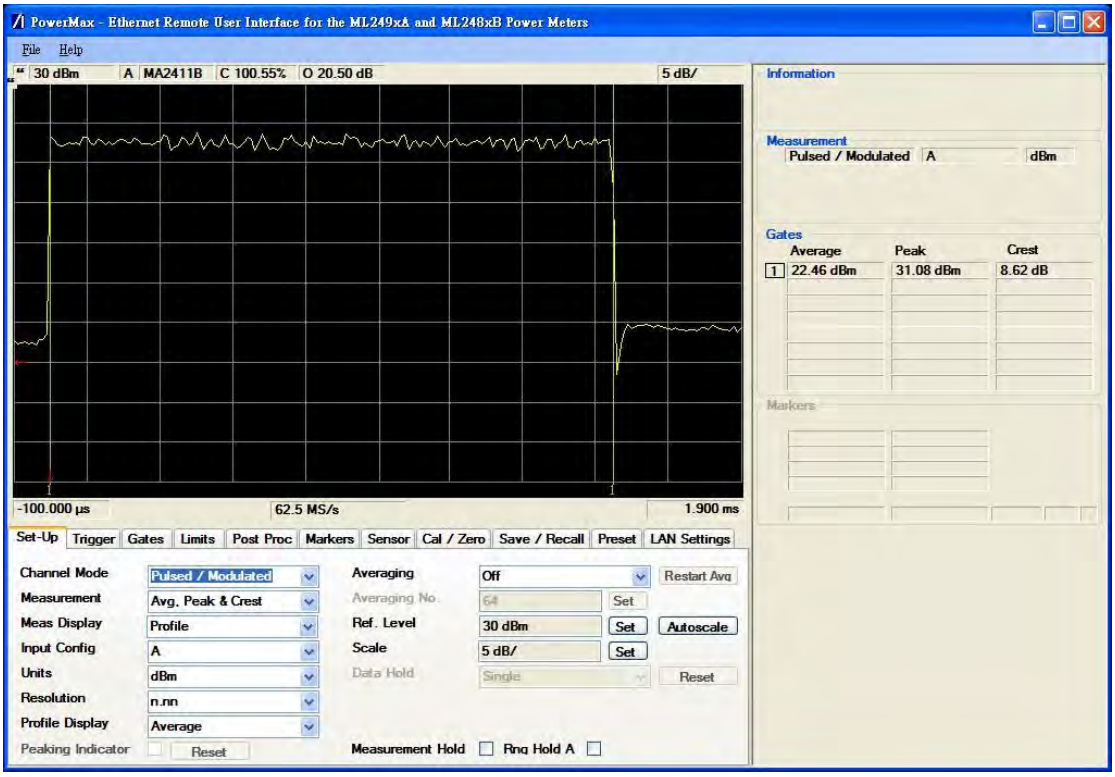


Bandwidth 10MHz / Modulation : QPSK

2593MHz

Bandwidth 10MHz / Modulation : 16QAM

2593MHz



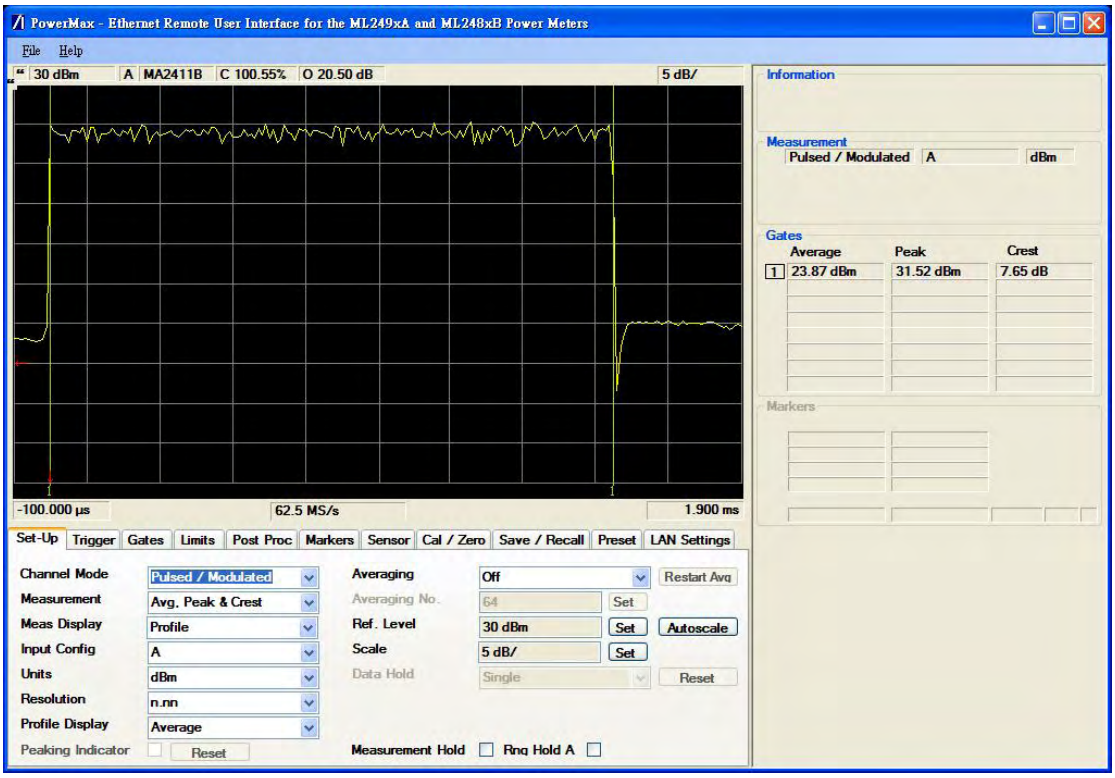
Chain 1 output power for WiMAX antenna 2

Channel BW	UL zone type / DL/UL Ratio	Channel Frequency (MHz)	Conducted Power (dBm)		Peak to Average ratio (dB)	UL modulation
			AV	PK		
5MHz	PUSC / 29:18	2498.5	24.20	31.74	7.55	QPSK
			22.40	31.27	8.87	16QAM
		2593	23.87	31.52	7.65	QPSK
			22.41	31.15	8.74	16QAM
		2687.5	23.68	31.43	7.75	QPSK
			22.41	30.95	8.54	16QAM
10MHz	PUSC / 29:18	2501	23.44	31.56	8.12	QPSK
			22.41	31.35	8.94	16QAM
		2593	23.33	31.35	8.02	QPSK
			22.47	31.12	8.65	16QAM
		2685	23.16	31.26	8.10	QPSK
			22.46	31.00	8.54	16QAM

Test plots of conducted power and PAR ratio for middle channel

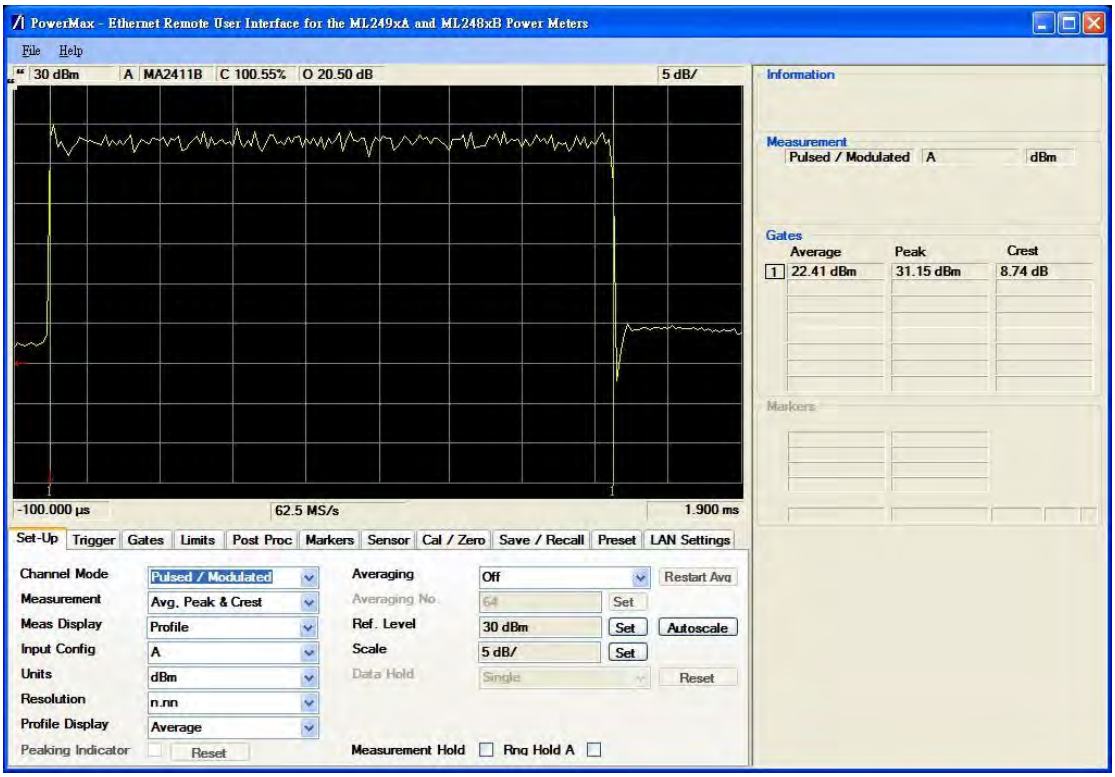
Bandwidth 5MHz / Modulation : QPSK

2593MHz



Bandwidth 5MHz / Modulation : 16QAM

2593MHz

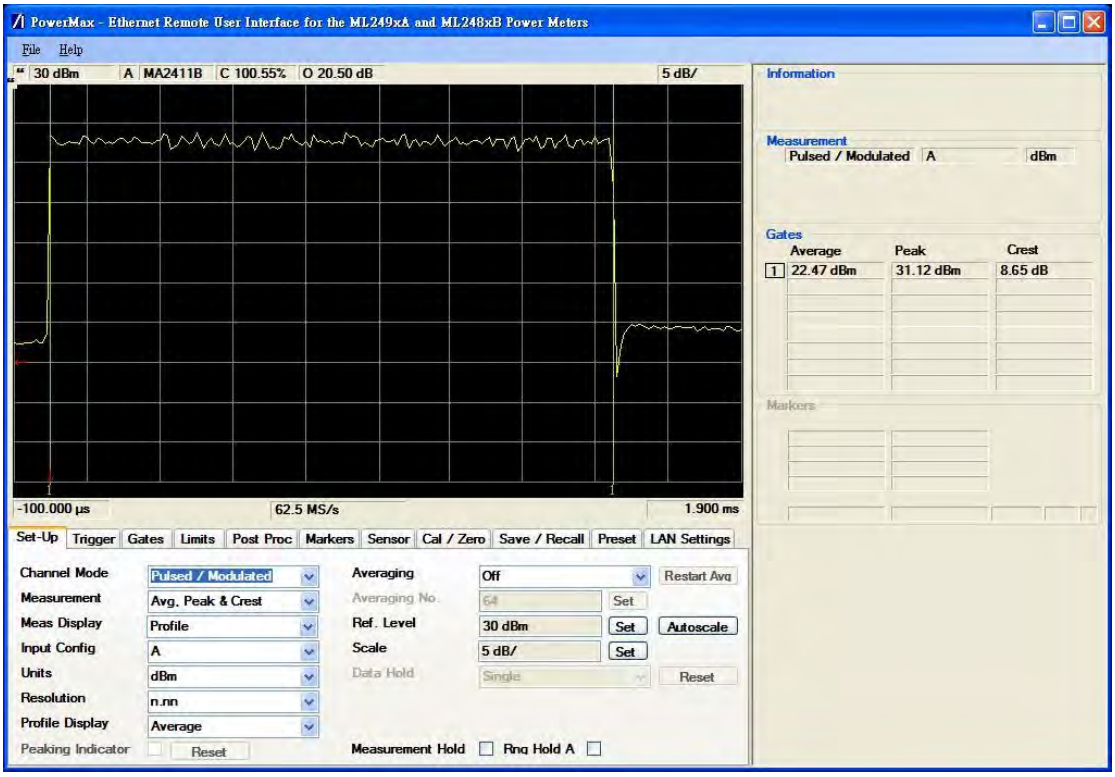


Bandwidth 10MHz / Modulation : QPSK

2593MHz

Bandwidth 10MHz / Modulation : 16QAM

2593MHz



8.3. DUTY FACTOR

Maximum DL/UL symbol ratio for the EUT is 29:18.
The transmitter maximum DL/UL symbol ratio is 29:18 with 15 traffic symbols transmitting at the max. power and three control symbols are not activate in the SAR measurement,
The duty cycle = 15/48 =0.3125
Duty Factor = 1/(duty cycle)=3.2

The SAR measurement is compensated using factors is as the below list:

Channel BW	UL zone type	DL/UL Ratio	UL duty cycle	*cf factor*	UL modulation
5MHz	PUSC	29/18	31.25%	*3.2*	QPSK 16QAM
10MHz	PUSC	29/18	31.25%	*3.2*	QPSK 16QAM

Test plot of Duty cycle

WiMAX antenna 1

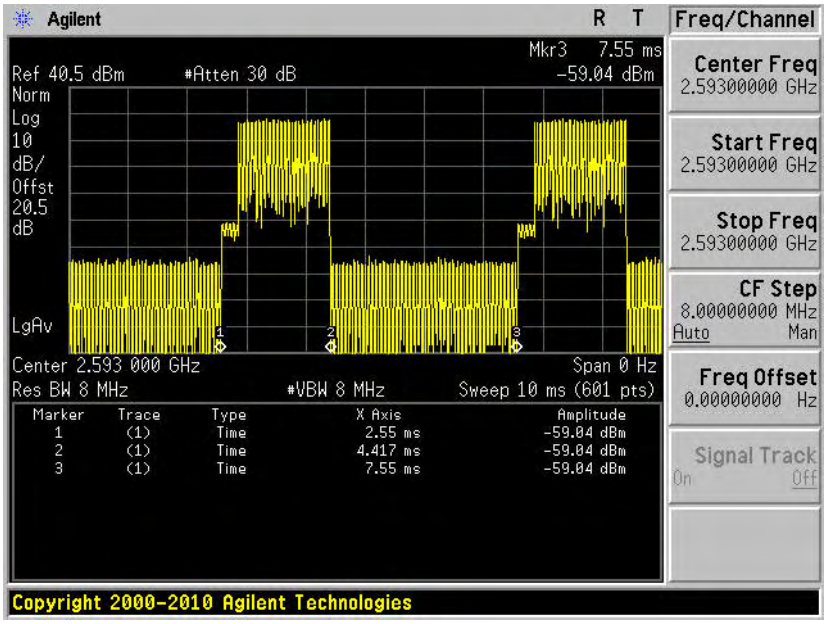
Bandwidth 5MHz / Modulation : QPSK

2 plots are measured for duty cycle to each condition shown on above summary table

Plot 1 is used to get the burst length of test signal.

Burst length = Mark 3 – Mark 1=7.55ms-2.55ms=5ms

Plot 1

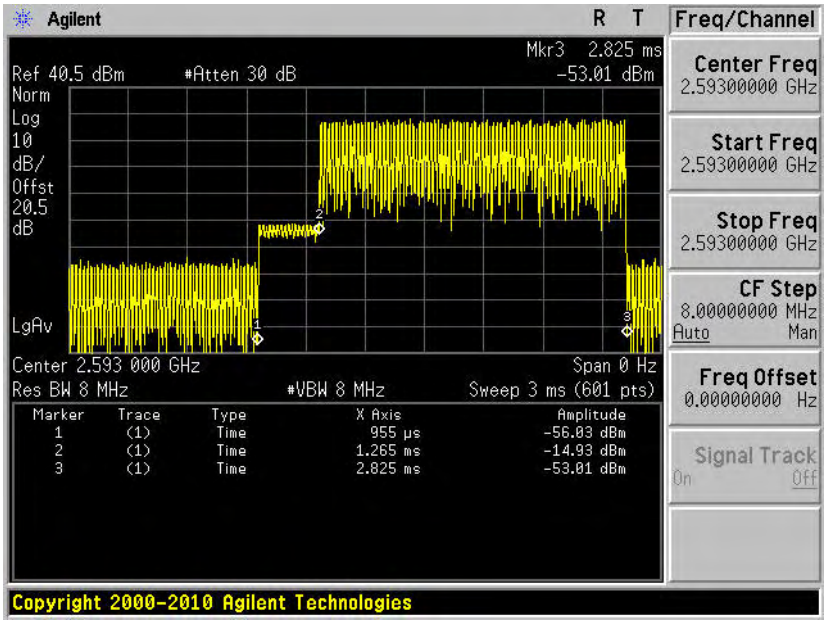


Plot 2 is used to get the UL time of test signal.

Mark 2 – Mark1 = First 3 symbols UL time=1265us-955us=310us

Mark 3 – Mark 2 =15 symbols UL time =2.825ms-1.265ms=1.56ms

Plot 2



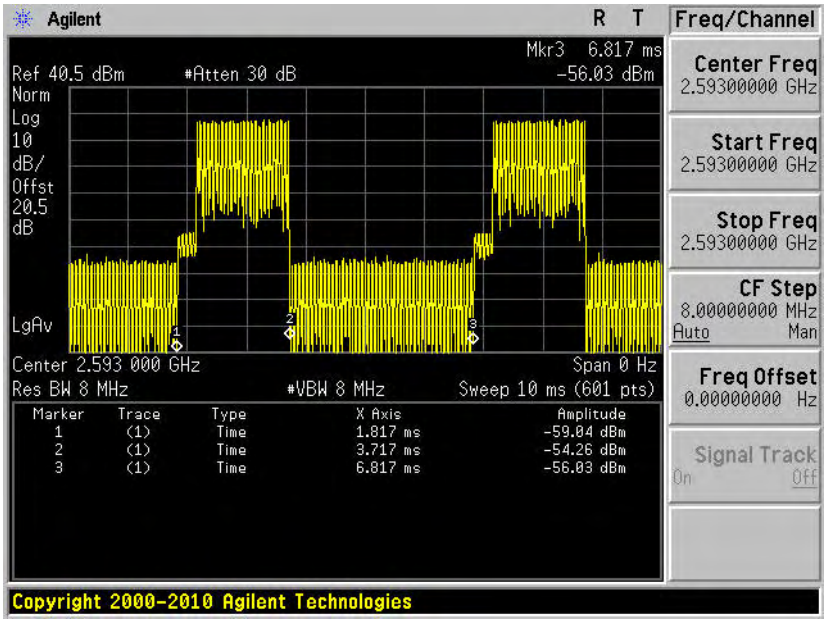
Bandwidth 5MHz / Modulation : 16QAM

2 plots are measured for duty cycle to each condition shown on above summary table

Plot 1 is used to get the burst length of test signal.

Burst length = Mark 3 – Mark 1=6.817ms-1.817ms=5ms

Plot 1

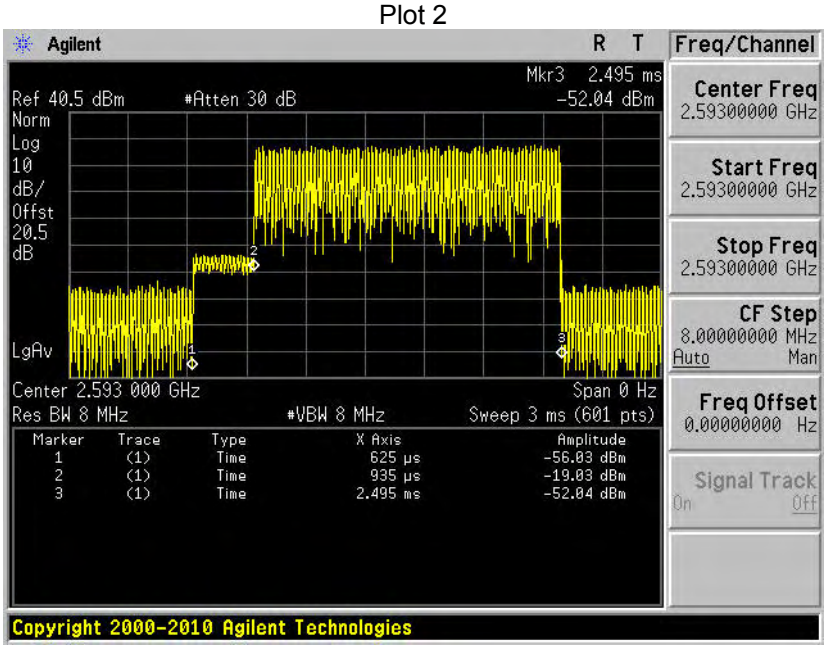


Plot 2 is used to get the UL time of test signal.

Mark 2 – Mark1 = First 3 symbols UL time=935us-625us=310us

Mark 3 – Mark 2 =15 symbols UL time =2.495ms-0.935ms=1.56ms

Plot 2



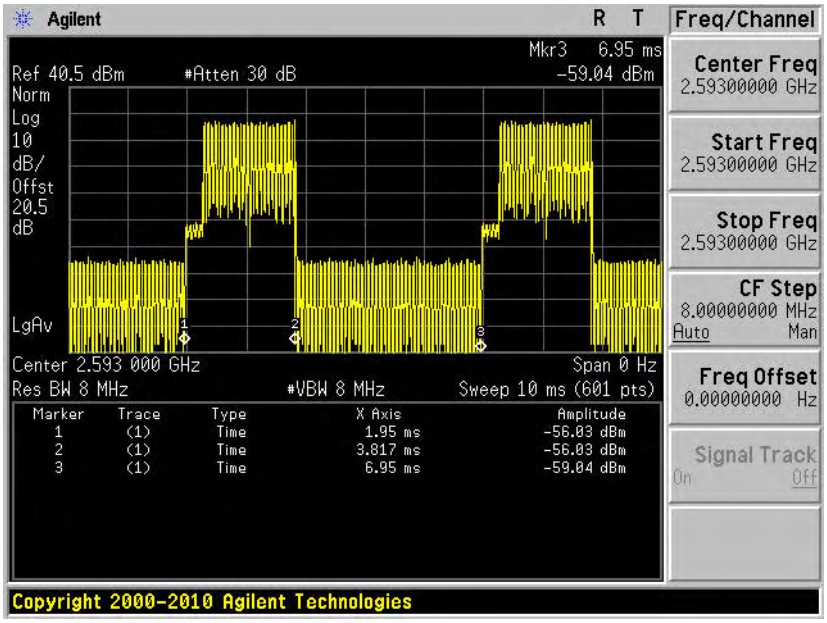
Bandwidth 10MHz / Modulation : QPSK

2 plots are measured for duty cycle to each condition shown on above summary table

Plot 1 is used to get the burst length of test signal.

Burst length = Mark 3 – Mark 1=6.95ms-1.95ms=5ms

Plot 1

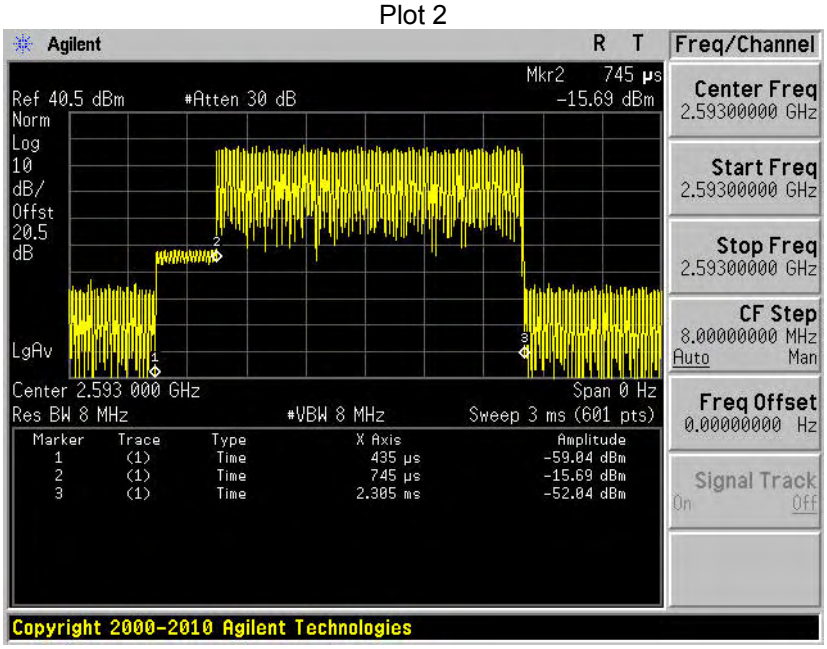


Plot 2 is used to get the UL time of test signal.

Mark 2 – Mark1 = First 3 symbols UL time=745us-435us=310us

Mark 3 – Mark 2 =15 symbols UL time =2.305ms-0.745ms=1.56ms

Plot 2



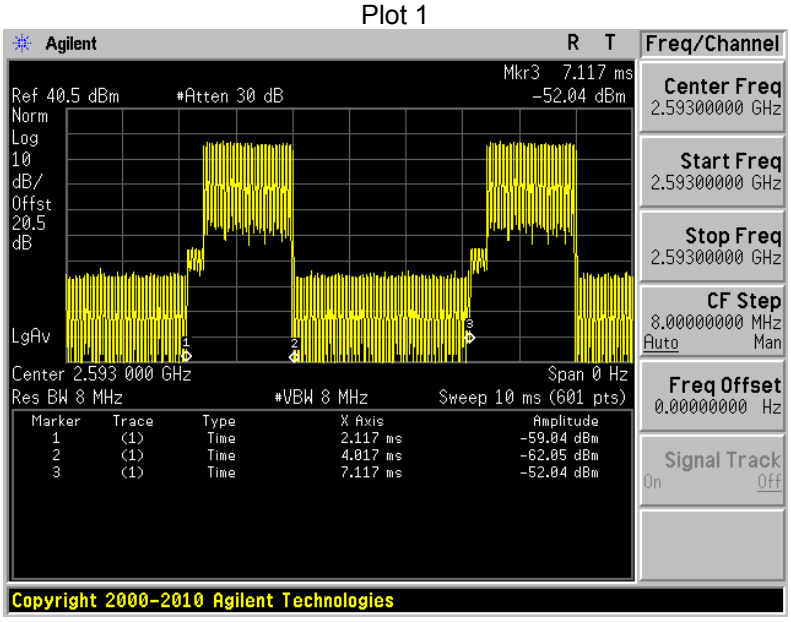
Bandwidth 5MHz / Modulation : 16QAM

2 plots are measured for duty cycle to each condition shown on above summary table

Plot 1 is used to get the burst length of test signal.

Burst length = Mark 3 – Mark 1=7.117ms-2.117ms=5ms

Plot 1

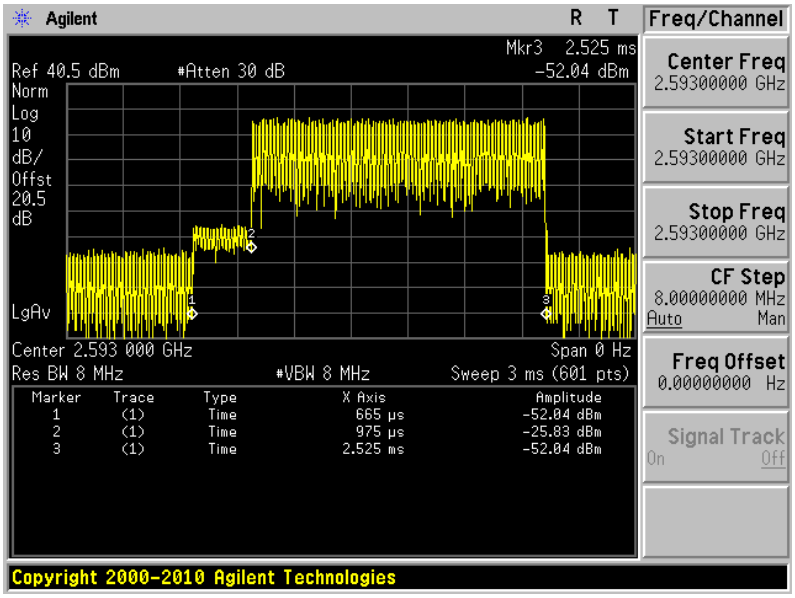


Plot 2 is used to get the UL time of test signal.

Mark 2 – Mark1 = First 3 symbols UL time=975us-665us=310us

Mark 3 – Mark 2 =15 symbols UL time =2.525ms-0.975ms=1.55ms

Plot 2

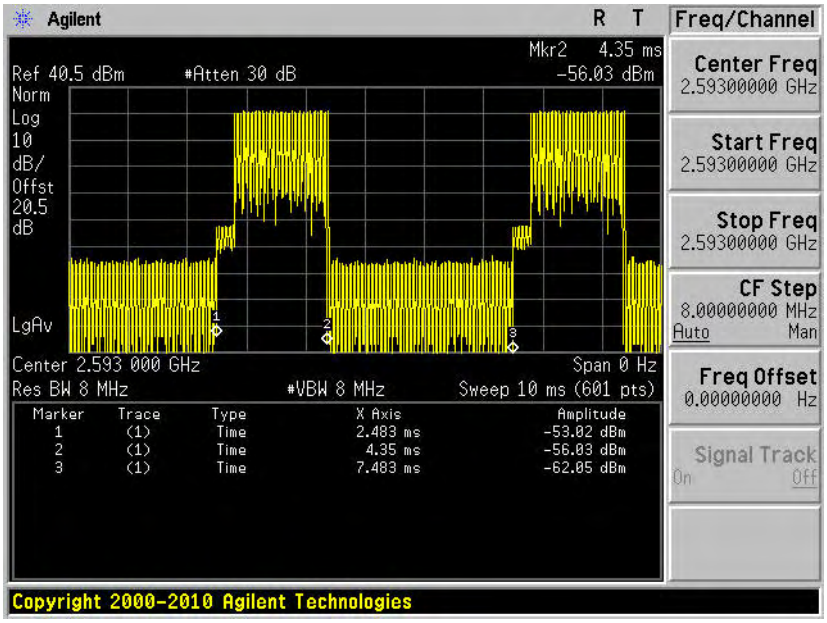


WiMAX antenna 2

Bandwidth 5MHz / Modulation : QPSK

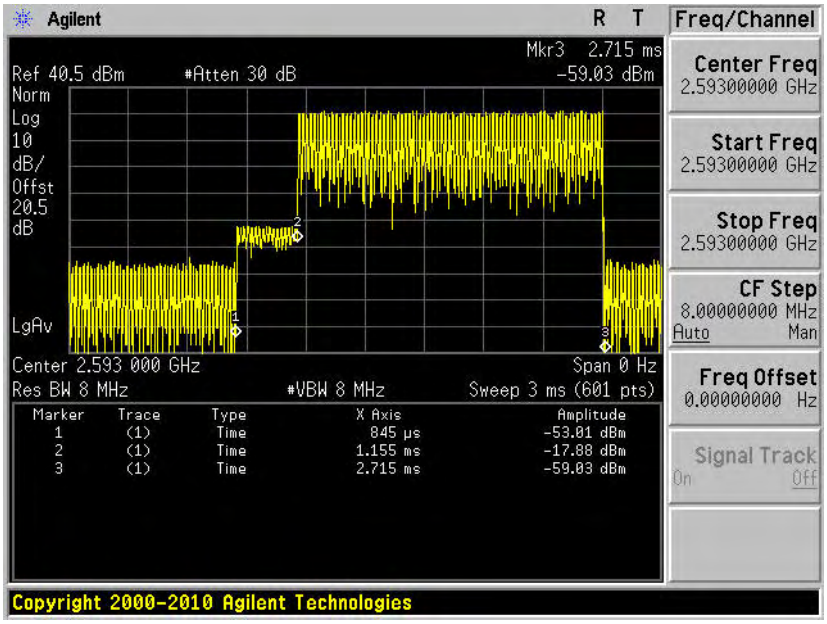
2 plots are measured for duty cycle to each condition shown on above summary table
Plot 1 is used to get the burst length of test signal.
Burst length = Mark 3 – Mark 1=7.483ms-2.483ms=5ms

Plot 1



Plot 2 is used to get the UL time of test signal.
Mark 2 – Mark1 = First 3 symbols UL time=1155us-845us=310us
Mark 3 – Mark 2 =15 symbols UL time =2.715ms-1.155ms=1.56ms

Plot 2



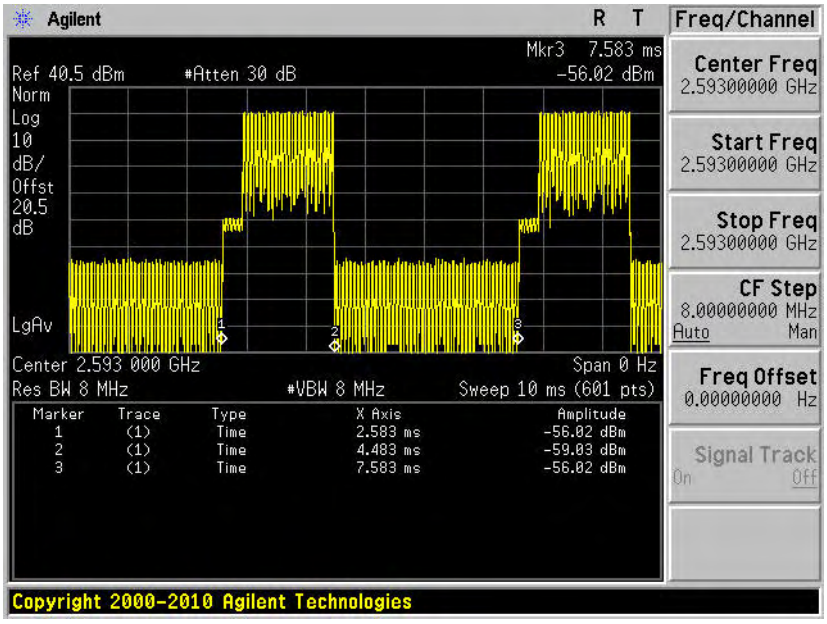
Bandwidth 5MHz / Modulation : 16QAM

2 plots are measured for duty cycle to each condition shown on above summary table

Plot 1 is used to get the burst length of test signal.

Burst length = Mark 3 – Mark 1=7.583ms-2.583ms=5ms

Plot 1

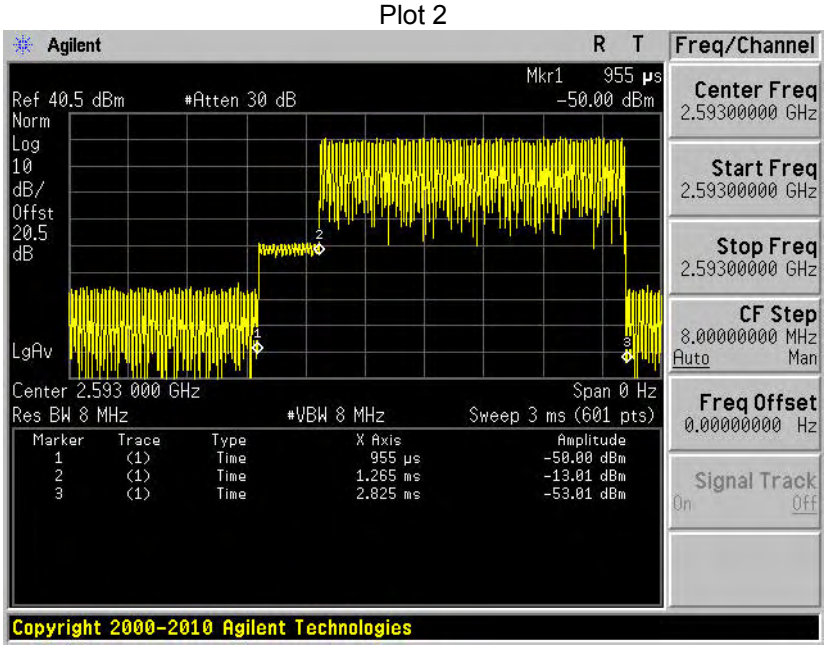


Plot 2 is used to get the UL time of test signal.

Mark 2 – Mark1 = First 3 symbols UL time=1265us-955us=310us

Mark 3 – Mark 2 =15 symbols UL time =2.825ms-1.265ms=1.56ms

Plot 2



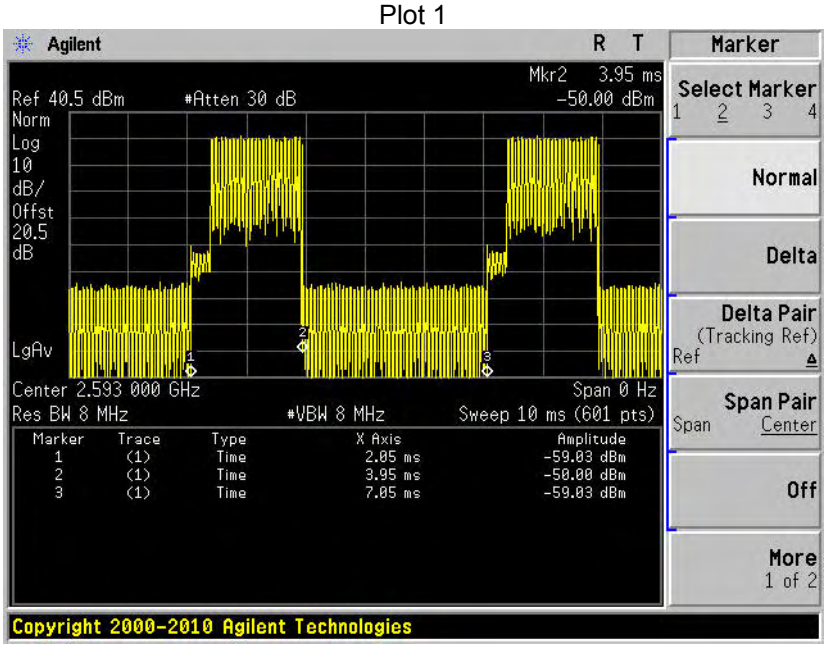
Bandwidth 10MHz / Modulation : QPSK

2 plots are measured for duty cycle to each condition shown on above summary table

Plot 1 is used to get the burst length of test signal.

Burst length = Mark 3 – Mark 1=7.05ms-2.05ms=5ms

Plot 1

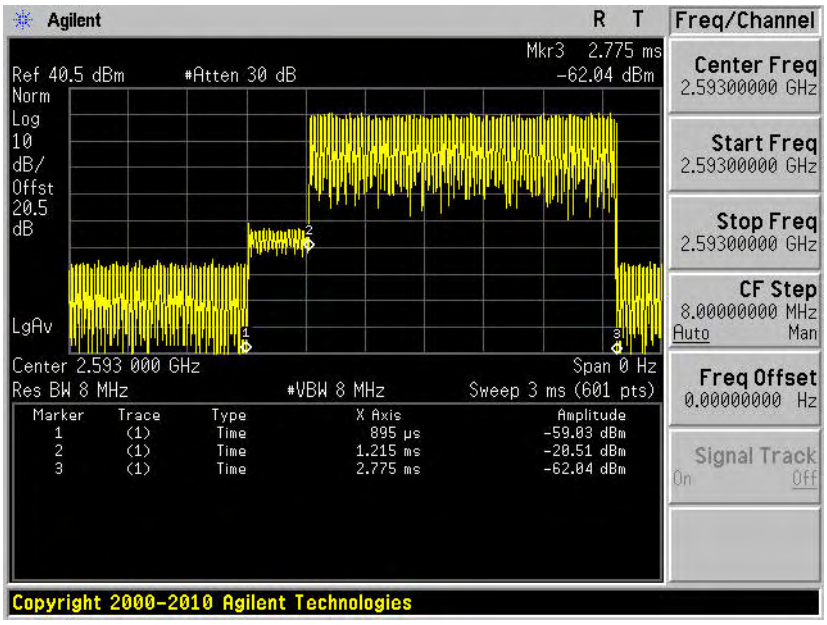


Plot 2 is used to get the UL time of test signal.

Mark 2 – Mark1 = First 3 symbols UL time=1215us-895us=320us

Mark 3 – Mark 2 =15 symbols UL time =2.775ms-1.215ms=1.56ms

Plot 2



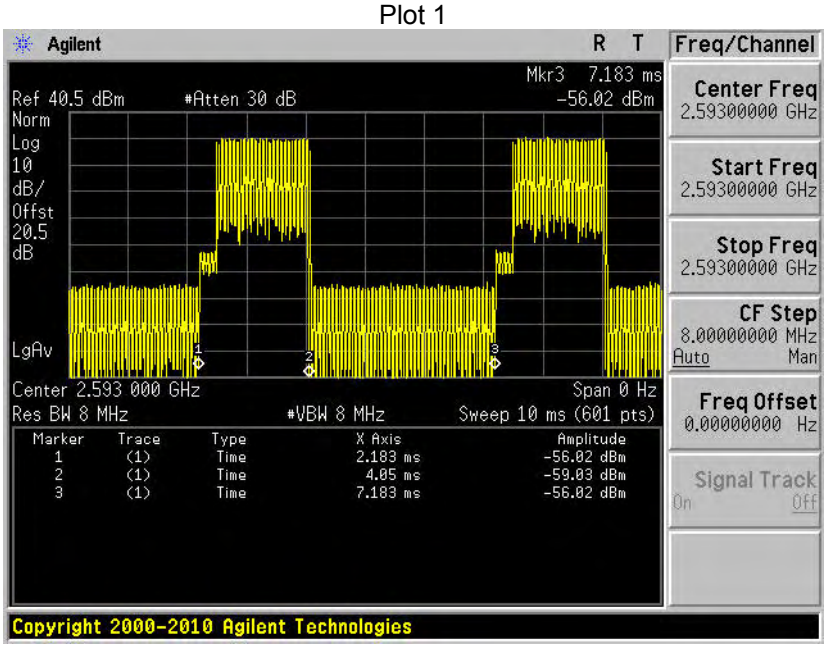
Bandwidth 5MHz / Modulation : 16QAM

2 plots are measured for duty cycle to each condition shown on above summary table

Plot 1 is used to get the burst length of test signal.

Burst length = Mark 3 – Mark 1=7.183ms-2.183ms=5ms

Plot 1

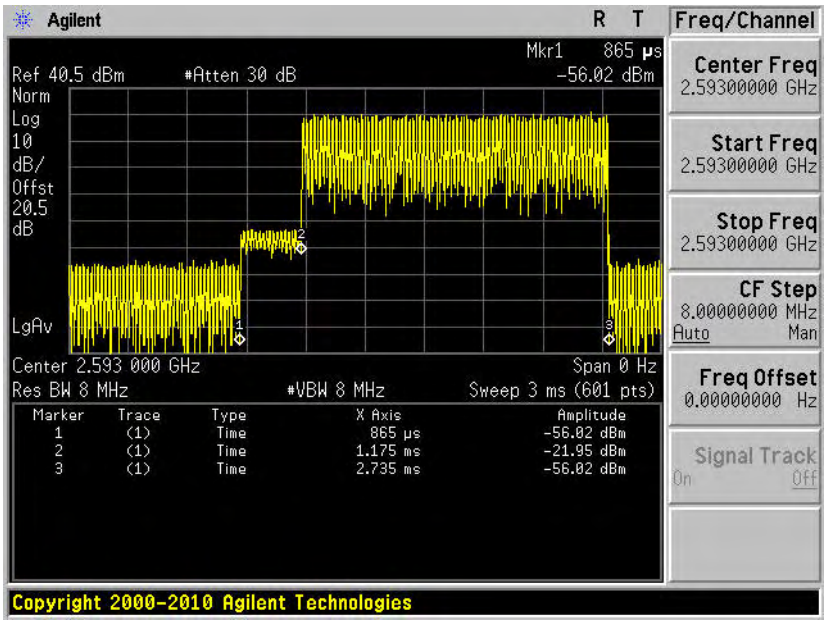


Plot 2 is used to get the UL time of test signal.

Mark 2 – Mark1 = First 3 symbols UL time=1175us-865us=310us

Mark 3 – Mark 2 =15 symbols UL time =2.735ms-1.175ms=1.56ms

Plot 2



8.4. SCALING FACTOR

Step-by-step control symbols Power and scaling parameters are as the following calculation:

a. Maximum Rated Output Power (MROP) is provided by applicant.

Maximum Rated Output Power (MROP) **Used to Calculate the Scaling Factor**		
Mode	**Antenna 1**	**Antenna 2**
10MHz/QPSK	24.5dBm / 281.84 mW	24.5dBm / 281.84 mW
10MHz/16QAM	22.5dBm / 177.83 mW	22.5dBm / 177.83 mW
5MHz/QPSK	24.5dBm / 281.84 mW	24.5dBm / 281.84 mW
5MHz/16QAM	22.5dBm / 177.83 mW	22.5dBm / 177.83 mW

b. For 10MHz Channel BW: The control channels may occupy up to 5 slots during normal operation. A slot is a sub-channel with the duration of 3 symbols. There are a total of 35 slots in the 10 MHz channel configuration. A maximum of two simultaneous CQICH reports are possible, which can occupy up to 2 slots. A maximum of three slots can be used for HARQ ACK/NAK by the five possible DL HARQ bursts in the previous DL frame. The 5 ACK/NAK bits each occupies ½ a slot. These 5 slots correspond to 5/35 of the total number of uplink slots.

Antenna 1 or 2	Calculation
40.26 mW for 10MHz / QPSK	281.84 mW x 5/35
25.40 mW for 10 MHZ / 16QAM	177.83 mW x 5/35

c. For 5 MHz Channel BW: The control channels may occupy up to 5 slots during normal operation. A slot is a sub-channel with the duration of 3 symbols. There are a total of 17 slots in 5 MHz channel configuration. A maximum of two simultaneous CQICH reports are possible, which can occupy up to 2 slots. A maximum of three slots can be used for HARQ ACK/NAK by the five possible DL HARQ bursts in the previous DL frame. The 5 ACK/NAK bits each occupies ½ a slot. These 5 slots correspond to 5/17 of the total number of uplink slots.

Antenna 1 or 2	Calculation
82.89 mW for 5MHz / QPSK	281.84 mW x 5/17
52.30 mW for 5MHz / 16QAM	177.83 mW x 5/17

d. The target output power for DL:UL ratio of 29:18 is calculated as the following:
Target output power = **(CCP x 3)+ (MROP x 15)**

Modulation	Channel Bandwidth	29:18 DL:UL Ratio Power/mW	TX antenna
QPSK	10 MHz	(40.26 x 3)+(281.84 x 15)= 4267.84	**1 or 2**
16QAM	10 MHz	(25.40 x 3)+(177.83 x 15)= 2692.82	
QPSK	5 MHz	(82.89 x 3)+(281.84 x 15)=4310.47	
16QAM	5 MHz	(52.3 x 3)+(177.83 x 15)=2719.72	

Duty-Factor Scaling to DL:UL Ratio of 29:18

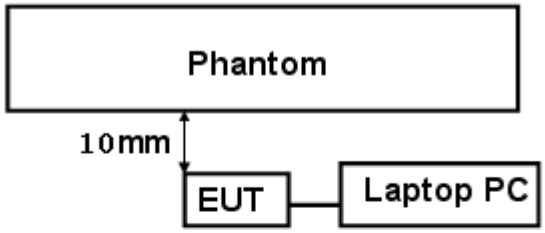
Scaling Factor = ((CCP x 3)+ (MROP x 15))/ (Actual OP x 15)

Freq./MHz	Measured Power (mW)	Number of Traffic Symbols	29:18 Traffic Symbol Power (Actual OP x 15) (mW)	29:18 Rated Power ((CCP x 3)+ (MROP x 15)) (mW)	Scaling Factor (rated power/traffic power)
10MHz / QPSK / antenna 1					
2501	207.97	15	3119.55	4267.84	1.37
2593	206.06	15	3090.94	4267.84	1.38
2685	201.37	15	3020.59	4267.84	1.41
10MHz / 16QAM / antenna 1					
2501	177.01	15	2655.16	2692.82	1.01
2593	176.20	15	2642.96	2692.82	1.02
2685	174.98	15	2624.77	2692.82	1.03
5MHz / QPSK / antenna 1					
2498.5	247.74	15	3716.13	4310.47	1.16
2593	236.59	15	3548.88	4310.47	1.21
2687.5	229.61	15	3444.22	4310.47	1.25
5MHz / 16QAM / antenna 1					
2498.5	173.38	15	2600.71	2719.72	1.05
2593	176.20	15	2642.96	2719.72	1.03
2687.5	174.98	15	2624.77	2719.72	1.04

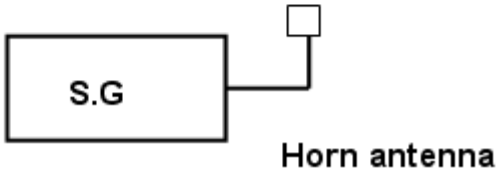
Freq./MHz	Measured Power (mW)	Number of Traffic Symbols	29:18 Traffic Symbol Power (Actual OP x 15) (mW)	29:18 Rated Power ((CCP x 3)+ (MROP x 15)) (mW)	Scaling Factor (rated power/traffic power)
10MHz / QPSK / antenna 2					
2501	220.80	15	3312.01	4267.84	1.29
2593	215.28	15	3229.17	4267.84	1.32
2685	207.01	15	3105.21	4267.84	1.37
10MHz / 16QAM / antenna 2					
2501	174.18	15	2612.71	2692.82	1.03
2593	176.60	15	2649.06	2692.82	1.02
2685	176.20	15	2642.96	2692.82	1.02
5MHz / QPSK / antenna 2					
2498.5	263.03	15	3945.40	4310.47	1.09
2593	243.78	15	3656.72	4310.47	1.18
2687.5	233.35	15	3500.19	4310.47	1.23
5MHz / 16QAM / antenna 2					
2498.5	173.78	15	2606.70	2719.72	1.04
2593	174.18	15	2612.71	2719.72	1.04
2687.5	174.18	15	2612.71	2719.72	1.04

9. TEST SETUP

The test set-up is shown in the following picture.



Linking up through air interface



On the network side, there is a vector signal generator as below:

Agilent E4438C ESG with below options:
N7613A: Signal Studio for 802.16-2004 WiMAX
N7615B: Signal studio for 802.16 WiMAX

Software is loaded into the E4438C ESG that produces an output signal that looks like a 29:18 WiMAX frame, the EUT detects the “network” and begins to transmit based on the commands from the ESG signal and the measurements are then taken on the EUT.

10. TEST RESULTS

10.1. TEST PROCEDURES

Use the software to control the EUT channel and transmission power. Then record the conducted power before the testing. Place the EUT to the specific test location. After the testing, must writing down the conducted power of the EUT into the report. The SAR value was calculated via the 3D spline interpolation algorithm that has been implemented in the software of 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 was performed for SAR value averaged over 1g and 10g spatial volumes.

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

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

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

10.2. DESCRIPTION OF TEST CONDITION

TEST DATE	TEMPERATURE(°C)		HUMIDITY(%RH)	TESTED BY
	AIMBENT	LIQUID		
Mar. 16, 2011	22.7	21.3	59	Van Lin

10.3. MEASURED SAR RESULTS

For 5MHz

Bandwidth	5MHz			Modulation			QPSK 1/2			TX antenna			Antenna 1
SAR (W/kg)	Bottom			Left Edge			Top			Front Edge			
Channel	Meas.	Scaling Factor	Scaled	Meas.	Scaling Factor	Scaled	Meas.	Scaling Factor	Scaled	Meas.	Scaling Factor	Scaled	
Low	0.525	1.16	0.609	0.135	1.16	0.157	0.402	1.16	0.466	0.243	1.16	0.282	
Middle	0.526	1.21	0.636	*			0.491	1.21	0.594	*			
High	0.337	1.25	0.421	*			0.397	1.25	0.496	*			

Bandwidth	5MHz			Modulation			QPSK 1/2			TX antenna			Antenna 2
SAR (W/kg)	Bottom			Left Edge			Top			Front Edge			
Channel	Meas.	Scaling Factor	Scaled	Meas.	Scaling Factor	Scaled	Meas.	Scaling Factor	Scaled	Meas.	Scaling Factor	Scaled	
Low	0.523	1.09	0.570	0.178	1.09	0.194	0.453	1.09	0.494	0.246	1.09	0.268	
Middle	0.557	1.18	0.657	*			0.602	1.18	0.710	*			
High	0.395	1.23	0.486	*			0.313	1.23	0.385	*			

For 10MHz

Bandwidth	10MHz			Modulation			QPSK 1/2			TX antenna			Antenna 1
SAR (W/kg)	Bottom			Left Edge			Top			Front Edge			
Channel	Meas.	Scaling Factor	Scaled	Meas.	Scaling Factor	Scaled	Meas.	Scaling Factor	Scaled	Meas.	Scaling Factor	Scaled	
Low	0.431	1.37	0.590	0.057	1.37	0.078	0.333	1.37	0.456	0.196	1.37	0.269	
Middle	0.464	1.38	0.640	*			0.438	1.38	0.604	*			
High	0.298	1.41	0.420	*			0.379	1.41	0.534	*			

Bandwidth	10MHz			Modulation			QPSK 1/2			TX antenna			Antenna 2
SAR (W/kg)	Bottom			Left Edge			Top			Front Edge			
Channel	Meas.	Scaling Factor	Scaled	Meas.	Scaling Factor	Scaled	Meas.	Scaling Factor	Scaled	Meas.	Scaling Factor	Scaled	
Low	0.378	1.29	0.488	0.170	1.29	0.219	0.379	1.29	0.489	0.204	1.29	0.263	
Middle	0.485	1.32	0.640	*			0.542	1.32	0.715	*			
High	0.300	1.37	0.411	*			0.291	1.37	0.399	*			

NOTE:

1. In this testing, the limit for General Population Spatial Peak averaged over 1g, **1.6 W/kg**, is applied.
2. Please see the Appendix A for the data.
3. The variation of the EUT conducted power measured before and after SAR testing should not over 5%.
4. When scaled SAR is less than 0.4W/kg, SAR of other channels under the same configuration will be reduced.
5. Use the lowest coding rate for each modulation is mentioned on TCB workshop April, 2010 RF Exposure Procedures Update. Therefore only coding rate 1/2 is tested
6. 16QAM maximum output power is ≤ ¼ dB higher than QPSK and QPSK SAR is < 0.8 W/kg, so SAR for 16QAM is not required. This reduction condition is mentioned on TCB workshop Oct, 2010 RF Exposure Procedures Update

10.4. NO SIMULTANEOUS SAR JUSTIFICATION

This product contains 3 RF transmitters (WiMAX, WWAN and WiFi).

Simultaneous transmission is supported for the product. But not all transmitters can work at the same time**.** Simultaneous Transmission Configurations are as below.

Simultaneous Transmission Configurations

1	WiFi antenna + WiMAX antenna 1
2	WiFi antenna + WiMAX antenna 2
3	WiFi antenna + WWAN CDMA 2000

Σ of the highest measured 1-g SAR (W/kg)

Configuration	SAR of Wi-Fi	SAR of WiMAX antenna 1	Sum
1	0.00341	0.64	0.64341

Configuration	SAR of Wi-Fi	SAR of WiMAX antenna 2	Sum
2	0.00341	0.715	0.71841

Configuration	SAR of Wi-Fi	SAR of CDMA	Sum
3	0.00341	0.813	0.81641

Antenna separation

	Wi-Fi	WiMAX ant 1	WiMAX ant 2
Wi-Fi		5.353	7.585
WiMAX ant 1	5.353		2.232
WiMAX ant 2	7.585	2.232	

NOTE: WiMAX and WWAN can not work at the same time.

Conclusion:

1) Antenna separation distance for each transmission simultaneous pair is > 5cm
2) Sum of SAR is < 1.6 W/ kg

Accordingly, simultaneous Transmission SAR is not required for this device

10.5.POWER DRIFT TABLE

Test Mode	Test Position	Communication Mode	Test Channel	Power (dBm)		Power drift (%)	Tx Ant.
				Begin	After		
1	Bottom 10mm	WiMax_5M	L	23.94	23.81	-2.95	1
		WiMax_5M	M	23.74	23.60	-3.17	1
		WiMax_5M	H	23.61	23.46	-3.39	1
2	Left Edge 10mm	WiMax_5M	L	23.94	23.78	-3.62	1
3	Top 10mm	WiMax_5M	L	23.94	23.77	-3.84	1
		WiMax_5M	M	23.74	23.56	-4.06	1
		WiMax_5M	H	23.61	23.42	-4.28	1
4	Front edge 10mm	WiMax_5M	L	23.94	23.74	-4.50	1
5	Bottom 10mm	WiMax_10M	L	23.18	23.10	-1.83	1
		WiMax_10M	M	23.14	23.05	-2.05	1
		WiMax_10M	H	23.04	22.94	-2.28	1
6	Left Edge 10mm	WiMax_10M	L	23.18	23.07	-2.50	1
7	Top 10mm	WiMax_10M	L	23.18	23.06	-2.73	1
		WiMax_10M	M	23.14	23.01	-2.95	1
		WiMax_10M	H	23.04	22.90	-3.17	1
8	Front edge 10mm	WiMax_10M	L	23.18	23.03	-3.39	1
9	Bottom 10mm	WiMax_5M	L	24.2	24.04	-3.62	2
		WiMax_5M	M	23.87	23.70	-3.84	2
		WiMax_5M	H	23.68	23.50	-4.06	2
10	Left Edge 10mm	WiMax_5M	L	24.2	24.01	-4.28	2
11	Top 10mm	WiMax_5M	L	24.2	24.00	-4.50	2
		WiMax_5M	M	23.87	23.84	-0.69	2
		WiMax_5M	H	23.68	23.64	-0.92	2
12	Front edge 10mm	WiMax_5M	L	24.2	24.15	-1.14	2
13	Bottom 10mm	WiMax_10M	L	23.44	23.38	-1.37	2
		WiMax_10M	M	23.33	23.26	-1.60	2
		WiMax_10M	H	23.16	23.08	-1.83	2
14	Left Edge 10mm	WiMax_10M	L	23.44	23.35	-2.05	2
15	Top 10mm	WiMax_10M	L	23.44	23.34	-2.28	2
		WiMax_10M	M	23.33	23.21	-2.73	2
		WiMax_10M	H	23.16	23.03	-2.95	2
16	Front edge 10mm	WiMax_10M	L	23.44	23.30	-3.17	2

11. 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.

12. SAR ERROR CONSIDERATION

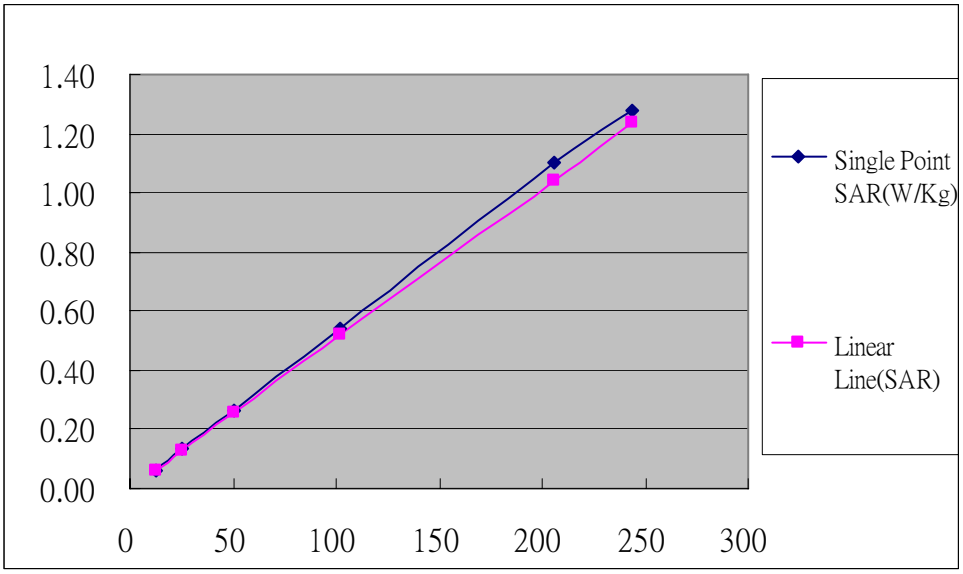
In order to estimate the measurement error due to PAR issues, the configuration with the highest SAR in each channel bandwidth and frequency band is measured at various power level. Test conditions are as below

Test position: Top 10mm
TX antenna: Antenna 2
Test frequency: 2593MHz for 5MHz bandwidth
2593MHz for 10MHz bandwidth
Modulation: QPSK 1/2

By tuning different power on this EUT and measuring the relative SAR to verify the high PAR of OFDM/OFDMA is as below:

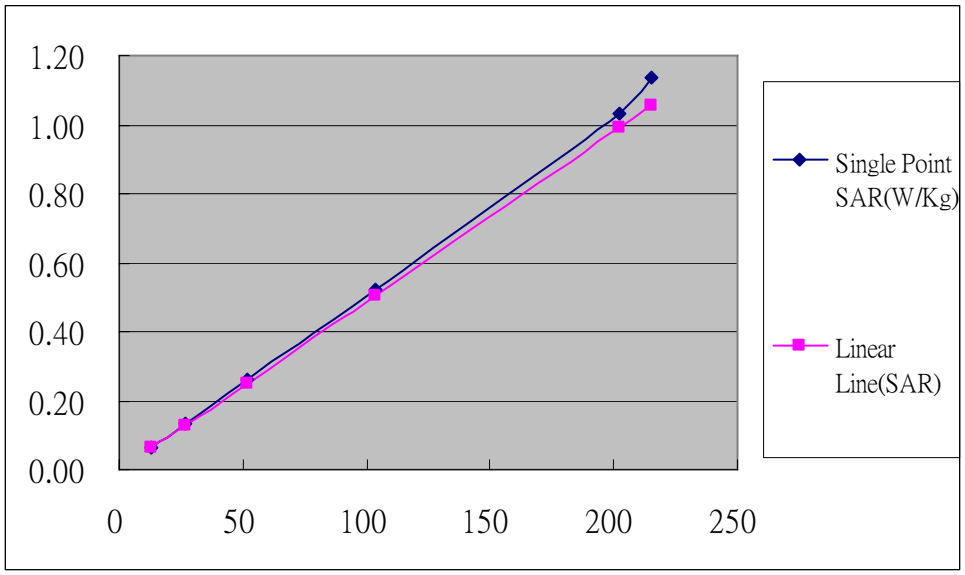
5MHz / QPSK 1/2

SAR (W/kg)	Power (mW)	12.62	25.47	50.33	102.40	205.47	243.78
5MHz	Point SAR	0.064	0.136	0.261	0.542	1.100	1.278
	Linear line	0.064	0.129	0.255	0.519	1.042	1.236
	Deviation(%)	0.00	5.43	2.35	4.43	5.57	3.40



10MHz / QPSK 1/2

SAR (W/kg)	Power (mW)	12.89	26.43	51.42	103.56	202.45	215.28
10MHz	Point SAR	0.063	0.131	0.260	0.524	1.034	1.134
	Linear line	0.063	0.129	0.251	0.506	0.989	1.052
	Deviation(%)	0.00	1.55	3.59	3.56	4.55	7.79



13. INFORMATION ON THE TESTING LABORATORIES

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

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

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

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

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

Web Site: www.adt.com.tw

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

---END---

APPENDIX A: TEST DATA

Product Name: 3G/4G Dual Mode Wireless Router ; Model Number: EC5072

Liquid Level Photo

Tissue 2600MHz D=150mm

Date/Time: 2011/3/16 14:42:05

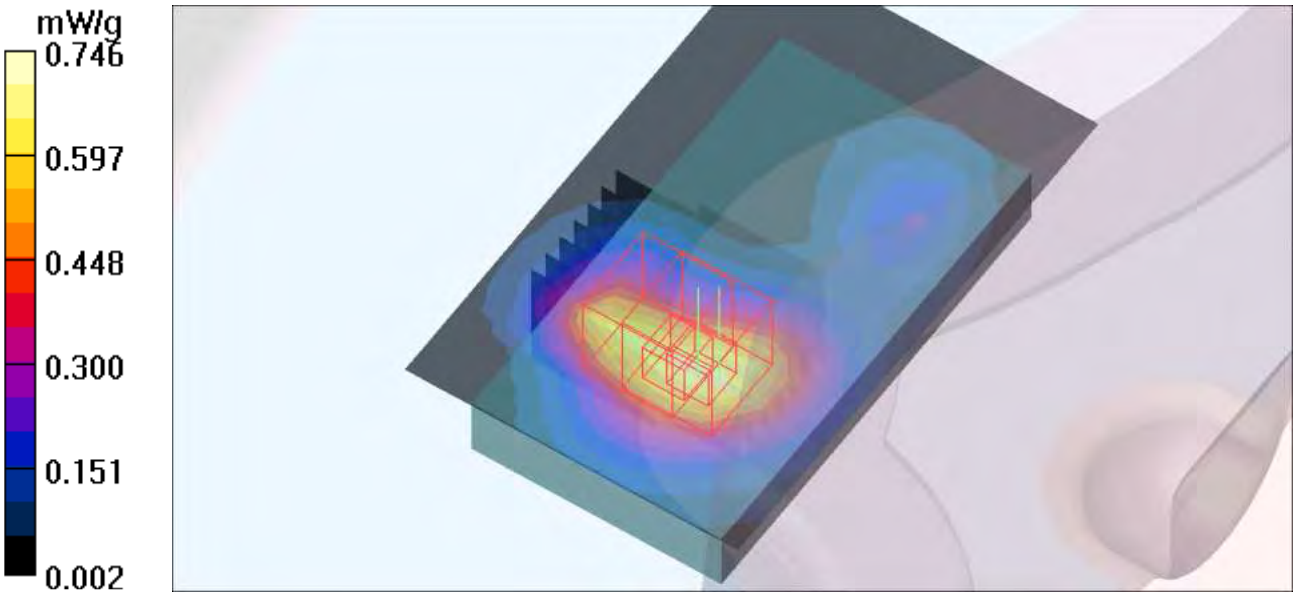
M01-Wimax 5M-Ch0 / Ant 1

Communication System: Wimax_2.6GHz 5M ; Frequency: 2498.5 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2498.5 MHz; σ = 2.06 mho/m; εr = 54.26; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The bottom side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.91, 7.91, 7.91); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.682 mW/g
Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.52 V/m; Power Drift = -0.070 dB
Peak SAR (extrapolated) = 0.984 W/kg
SAR(1 g) = 0.525 mW/g; SAR(10 g) = 0.282 mW/g
Maximum value of SAR (measured) = 0.737 mW/g
Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.52 V/m; Power Drift = -0.070 dB
Peak SAR (extrapolated) = 0.997 W/kg
SAR(1 g) = 0.521 mW/g; SAR(10 g) = 0.268 mW/g
Maximum value of SAR (measured) = 0.746 mW/g



Date/Time: 2011/3/16 15:22:53

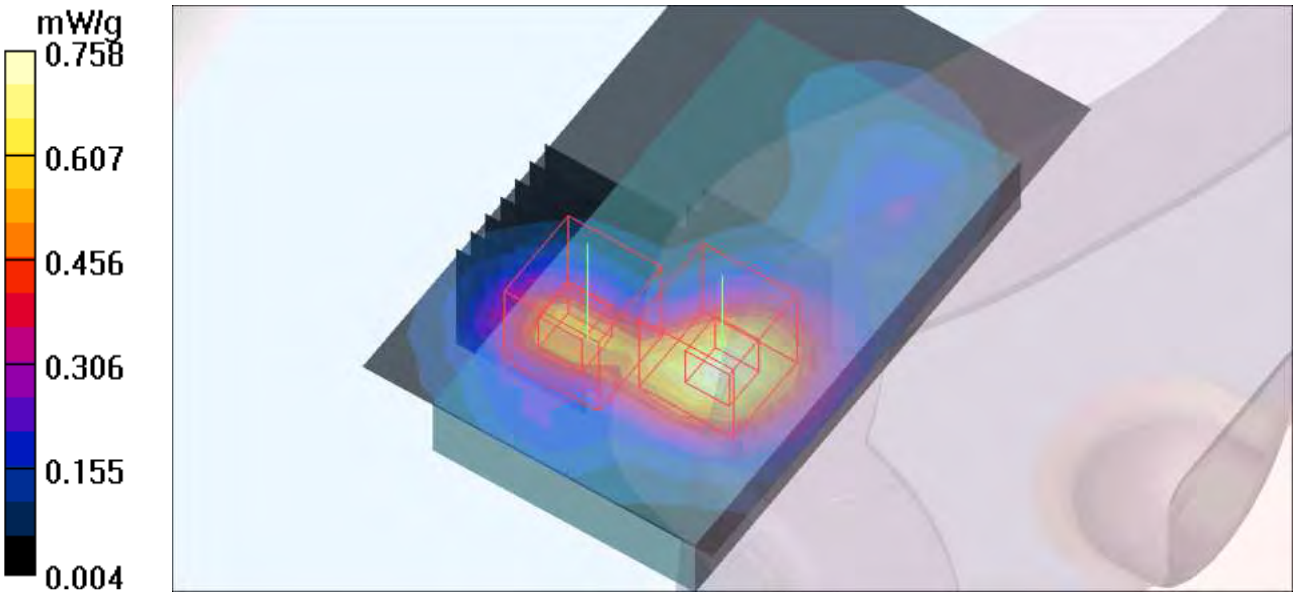
M01-Wimax 5M-Ch378 / Ant 1

Communication System: Wimax_2.6GHz 5M ; Frequency: 2593 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2593 MHz; σ = 2.18 mho/m; εr = 53.86; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The bottom side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Mid Channel 378/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.751 mW/g
Body Position - Mid Channel 378/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.66 V/m; Power Drift = 0.157 dB
Peak SAR (extrapolated) = 1.01 W/kg
SAR(1 g) = 0.526 mW/g; SAR(10 g) = 0.272 mW/g
Maximum value of SAR (measured) = 0.758 mW/g
Body Position - Mid Channel 378/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.66 V/m; Power Drift = 0.157 dB
Peak SAR (extrapolated) = 0.818 W/kg
SAR(1 g) = 0.399 mW/g; SAR(10 g) = 0.188 mW/g
Maximum value of SAR (measured) = 0.600 mW/g



Date/Time: 2011/3/16 16:02:32

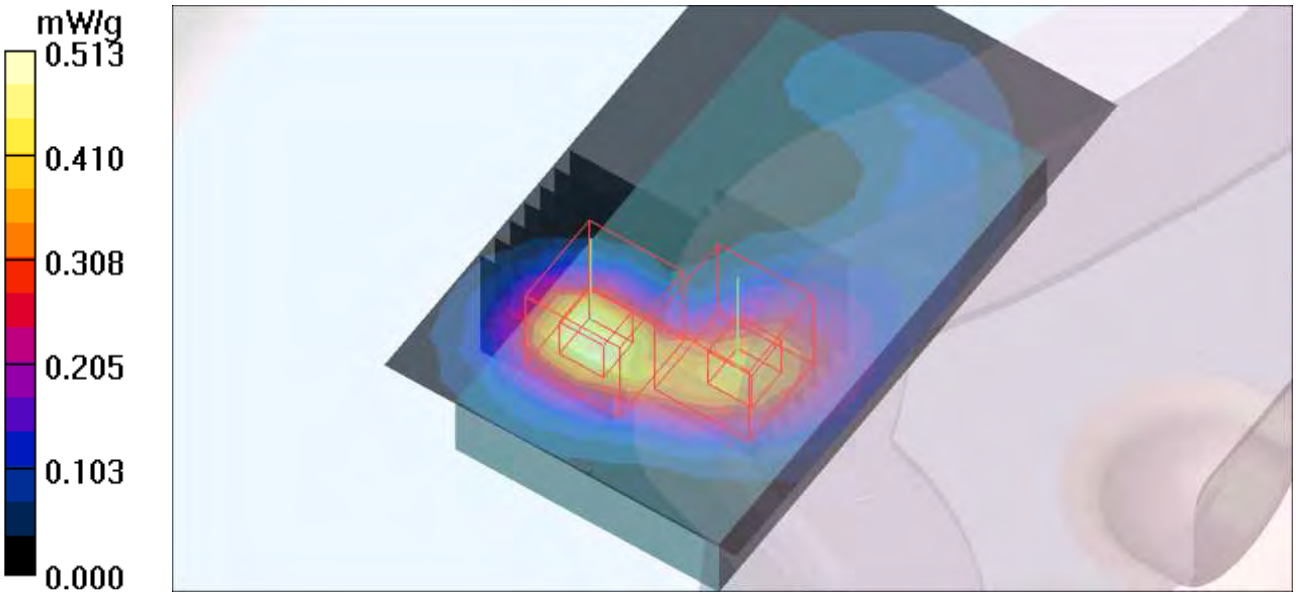
M01-Wimax 5M-Ch756 / Ant 1

Communication System: Wimax_2.6GHz 5M ; Frequency: 2687.5 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2687.5 MHz; σ = 2.32 mho/m; εr = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The bottom side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - High Channel 756/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.488 mW/g
Body Position - High Channel 756/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.10 V/m; Power Drift = -0.120 dB
Peak SAR (extrapolated) = 0.715 W/kg
SAR(1 g) = 0.337 mW/g; SAR(10 g) = 0.157 mW/g
Maximum value of SAR (measured) = 0.513 mW/g
Body Position - High Channel 756/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.10 V/m; Power Drift = -0.120 dB
Peak SAR (extrapolated) = 0.556 W/kg
SAR(1 g) = 0.277 mW/g; SAR(10 g) = 0.141 mW/g
Maximum value of SAR (measured) = 0.408 mW/g



Date/Time: 2011/3/16 22:47:33

M02-Wimax 5M-Ch0 / Ant 1

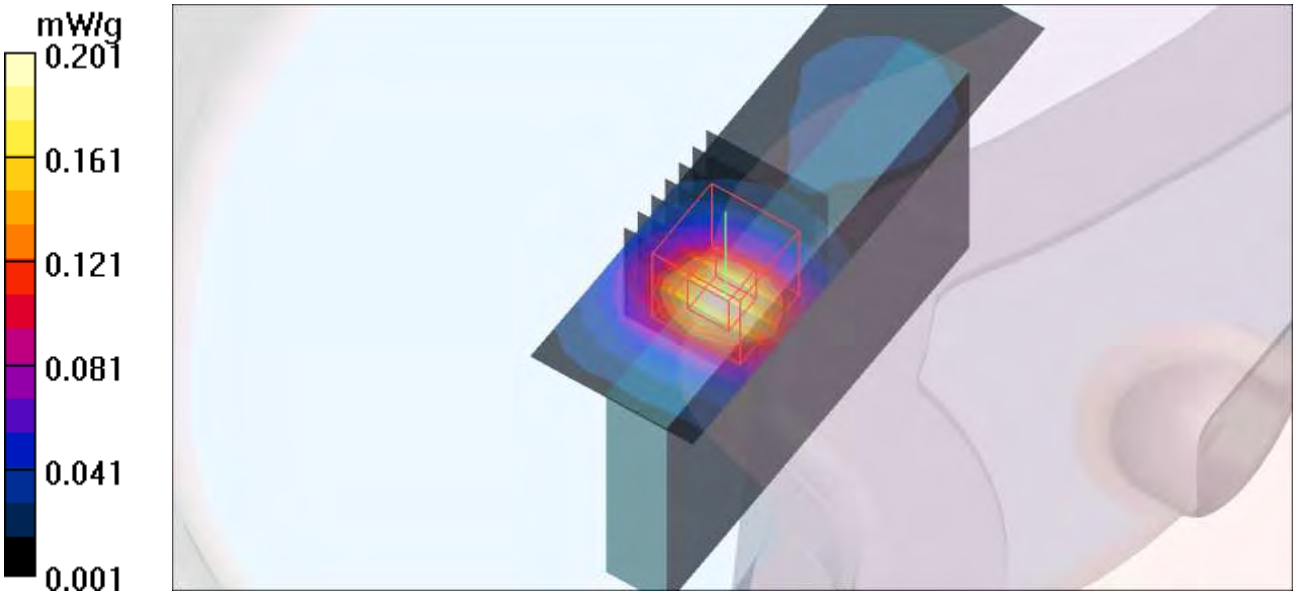
Communication System: Wimax_2.6GHz 5M ; Frequency: 2498.5 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2498.5 MHz; σ = 2.06 mho/m; εr = 54.26; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The left edge side the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.91, 7.91, 7.91); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (6x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.199 mW/g

Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.68 V/m; Power Drift = 0.159 dB
Peak SAR (extrapolated) = 0.275 W/kg
SAR(1 g) = 0.135 mW/g; SAR(10 g) = 0.064 mW/g
Maximum value of SAR (measured) = 0.201 mW/g



Date/Time: 2011/3/16 05:59:30

M03-Wimax 5M-Ch0 / Ant 1

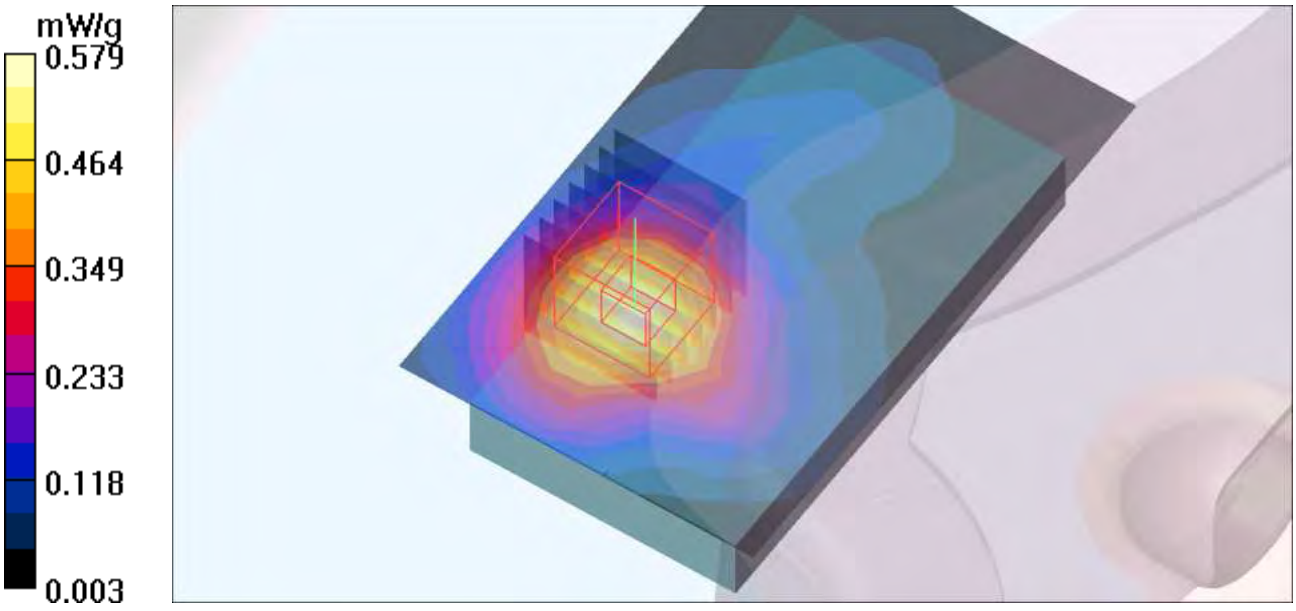
Communication System: Wimax_2.6GHz 5M ; Frequency: 2498.5 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2498.5 MHz; σ = 2.06 mho/m; εr = 54.26; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The top side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.91, 7.91, 7.91); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.558 mW/g

Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.03 V/m; Power Drift = -0.111 dB
Peak SAR (extrapolated) = 0.787 W/kg
SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.217 mW/g
Maximum value of SAR (measured) = 0.579 mW/g



Date/Time: 2011/3/16 06:30:18

M03-Wimax 5M-Ch378 / Ant 1

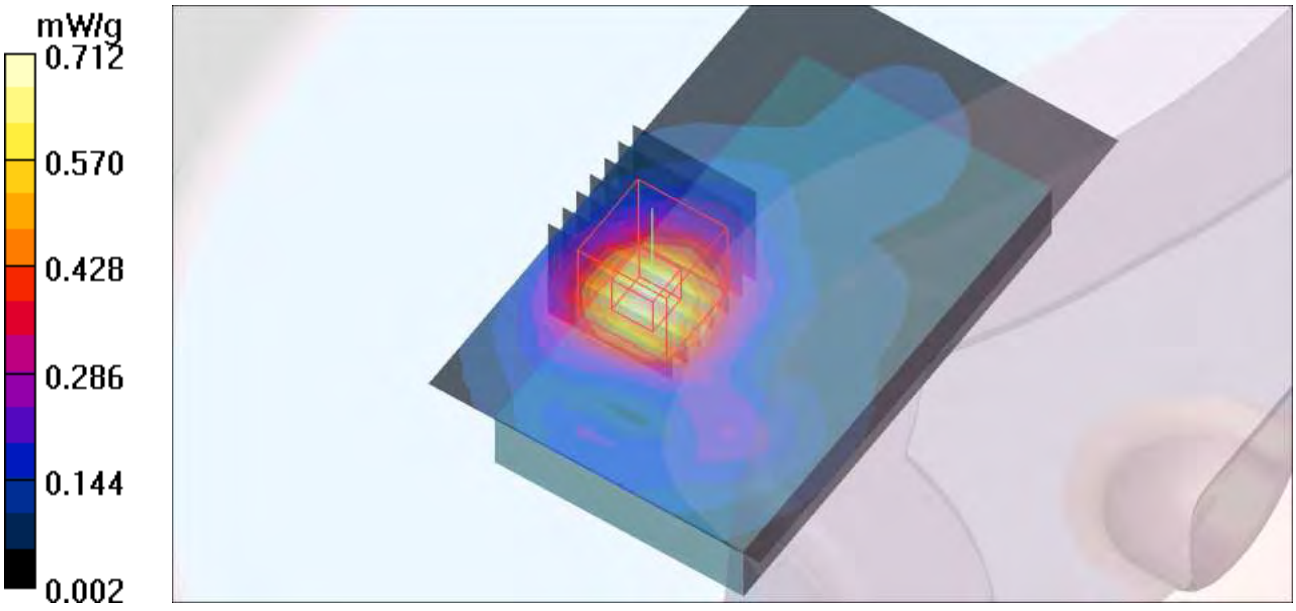
Communication System: Wimax_2.6GHz 5M ; Frequency: 2593 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2593 MHz; σ = 2.18 mho/m; εr = 53.86; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The top side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Mid Channel 378/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.705 mW/g

Body Position - Mid Channel 378/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.06 V/m; Power Drift = 0.114 dB
Peak SAR (extrapolated) = 0.970 W/kg
SAR(1 g) = 0.491 mW/g; SAR(10 g) = 0.251 mW/g
Maximum value of SAR (measured) = 0.712 mW/g



Date/Time: 2011/3/16 07:02:14

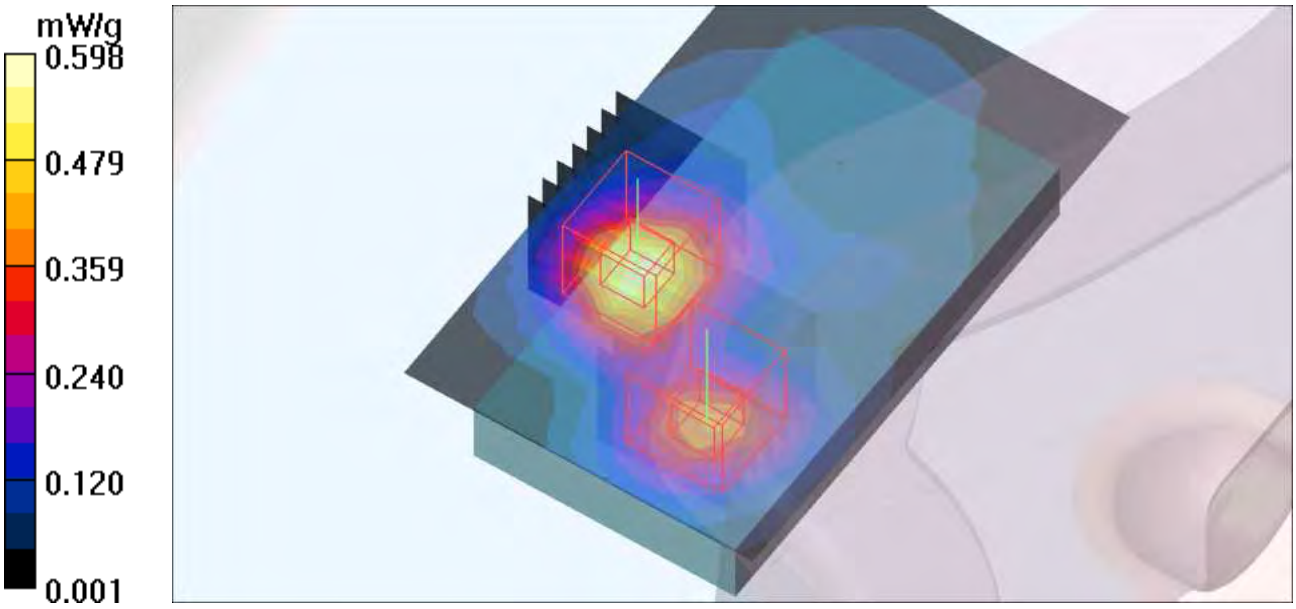
M03-Wimax 5M-Ch756 / Ant 1

Communication System: Wimax_2.6GHz 5M ; Frequency: 2687.5 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2687.5 MHz; σ = 2.32 mho/m; εr = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The top side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - High Channel 756/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.577 mW/g
Body Position - High Channel 756/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.56 V/m; Power Drift = 0.174 dB
Peak SAR (extrapolated) = 0.828 W/kg
SAR(1 g) = 0.397 mW/g; SAR(10 g) = 0.190 mW/g
Maximum value of SAR (measured) = 0.598 mW/g
Body Position - High Channel 756/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.56 V/m; Power Drift = 0.174 dB
Peak SAR (extrapolated) = 0.617 W/kg
SAR(1 g) = 0.286 mW/g; SAR(10 g) = 0.136 mW/g
Maximum value of SAR (measured) = 0.438 mW/g



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M04-Wimax 5M-Ch0 / Ant 1

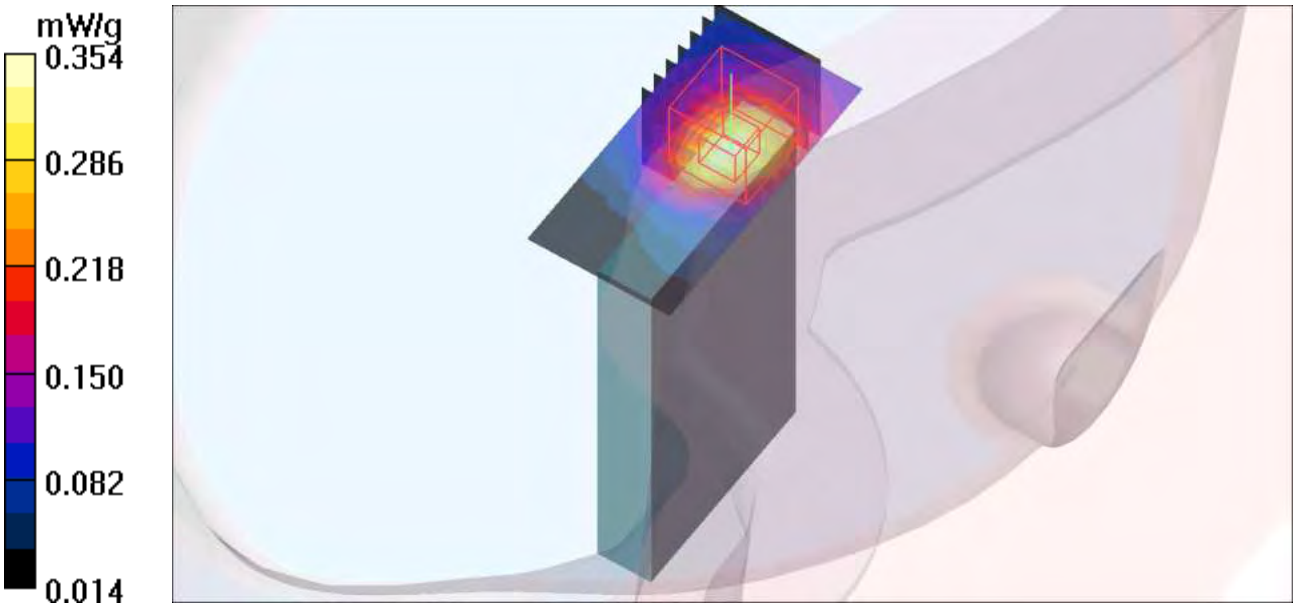
Communication System: Wimax_2.6GHz 5M ; Frequency: 2498.5 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2498.5 MHz; σ = 2.06 mho/m; εr = 54.26; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The front edge side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.91, 7.91, 7.91); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (6x11x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.354 mW/g

Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.2 V/m; Power Drift = 0.076 dB
Peak SAR (extrapolated) = 0.467 W/kg
SAR(1 g) = 0.243 mW/g; SAR(10 g) = 0.123 mW/g
Maximum value of SAR (measured) = 0.352 mW/g



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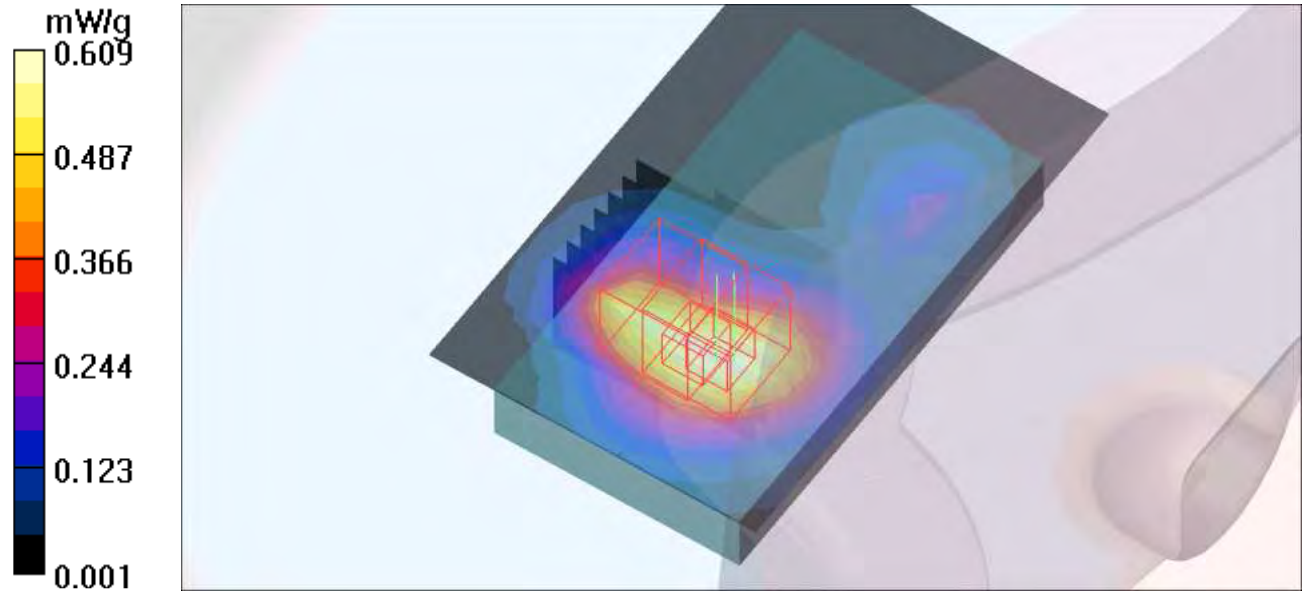
M05-Wimax 10M-Ch0 / Ant 1

Communication System: Wimax_2.6GHz 10M ; Frequency: 2501 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2501 MHz; σ = 2.06 mho/m; εr = 54.22; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The bottom side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.609 mW/g
Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.68 V/m; Power Drift = 0.166 dB
Peak SAR (extrapolated) = 0.792 W/kg
SAR(1 g) = 0.431 mW/g; SAR(10 g) = 0.233 mW/g
Maximum value of SAR (measured) = 0.602 mW/g
Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.68 V/m; Power Drift = 0.166 dB
Peak SAR (extrapolated) = 0.797 W/kg
SAR(1 g) = 0.422 mW/g; SAR(10 g) = 0.214 mW/g



Date/Time: 2011/3/16 19:06:20

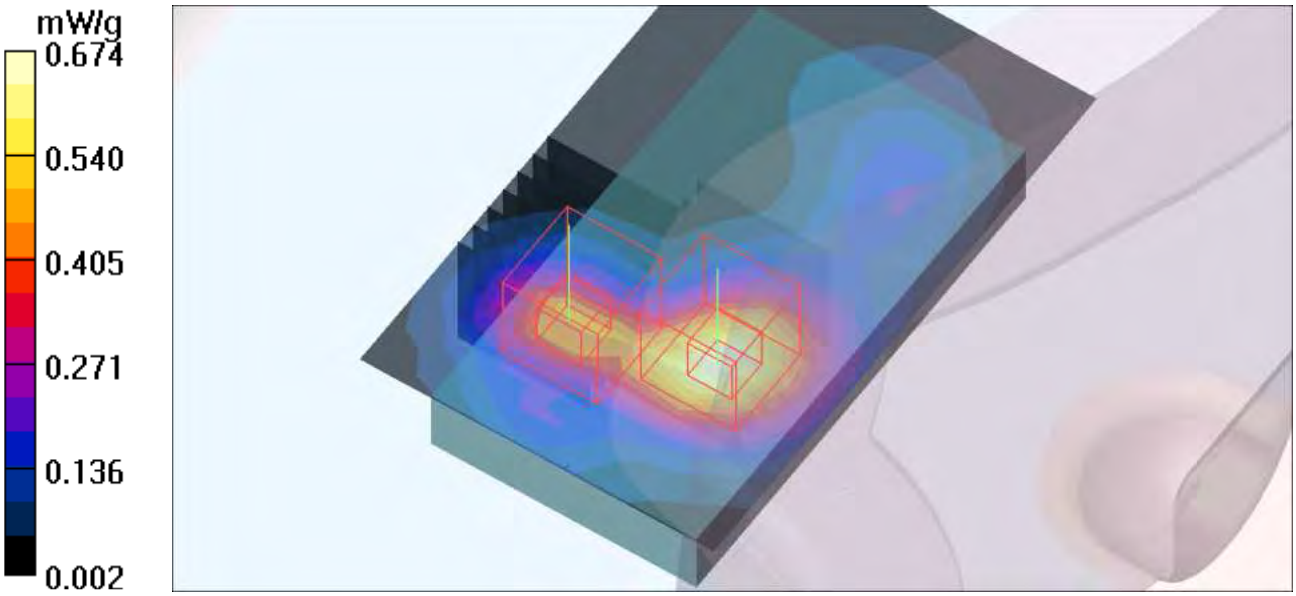
M05-Wimax 10M-Ch368 / Ant 1

Communication System: Wimax_2.6GHz 10M ; Frequency: 2593 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2593 MHz; σ = 2.18 mho/m; εr = 53.86; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The bottom side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Mid Channel 368/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.674 mW/g
Body Position - Mid Channel 368/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.41 V/m; Power Drift = -0.062 dB
Peak SAR (extrapolated) = 0.895 W/kg
SAR(1 g) = 0.464 mW/g; SAR(10 g) = 0.238 mW/g
Maximum value of SAR (measured) = 0.669 mW/g
Body Position - Mid Channel 368/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.41 V/m; Power Drift = -0.062 dB
Peak SAR (extrapolated) = 0.716 W/kg
SAR(1 g) = 0.339 mW/g; SAR(10 g) = 0.159 mW/g
Maximum value of SAR (measured) = 0.522 mW/g



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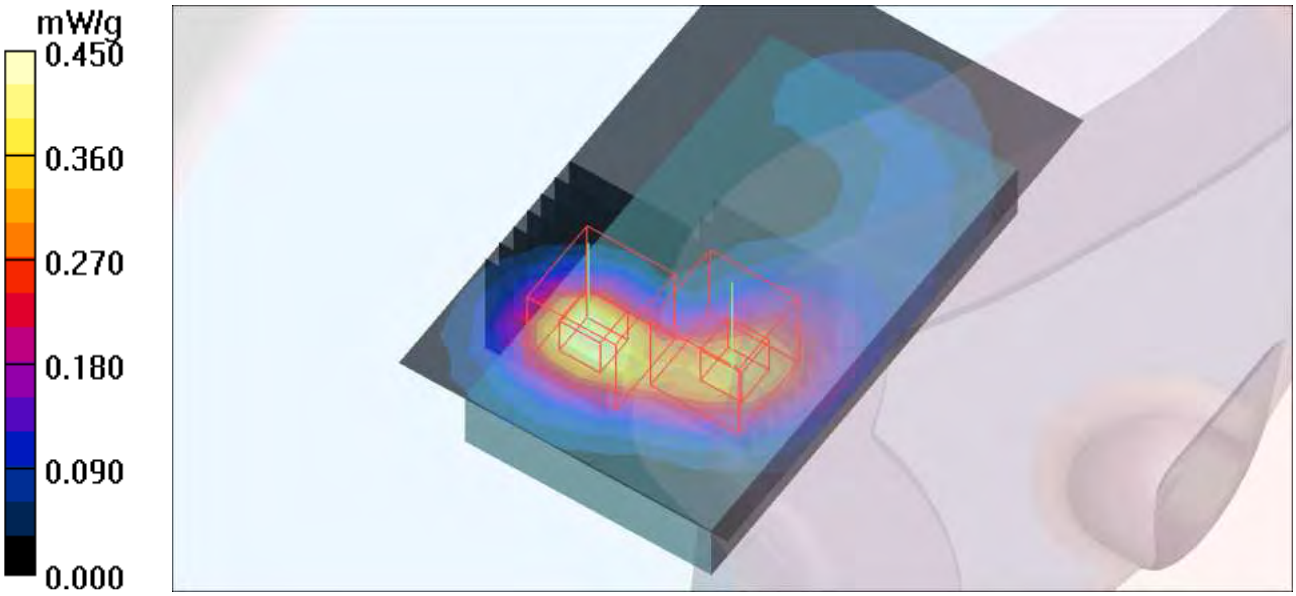
M05-Wimax 10M-Ch736 / Ant 1

Communication System: Wimax_2.6GHz 10M ; Frequency: 2685 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2685 MHz; σ = 2.32 mho/m; εr = 53.66; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The bottom side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - High Channel 736/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.427 mW/g
Body Position - High Channel 736/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.81 V/m; Power Drift = -0.108 dB
Peak SAR (extrapolated) = 0.628 W/kg
SAR(1 g) = 0.298 mW/g; SAR(10 g) = 0.138 mW/g
Maximum value of SAR (measured) = 0.450 mW/g
Body Position - High Channel 736/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.81 V/m; Power Drift = -0.108 dB
Peak SAR (extrapolated) = 0.485 W/kg
SAR(1 g) = 0.243 mW/g; SAR(10 g) = 0.124 mW/g
Maximum value of SAR (measured) = 0.359 mW/g



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M06-Wimax 10M-Ch0 / Ant 1

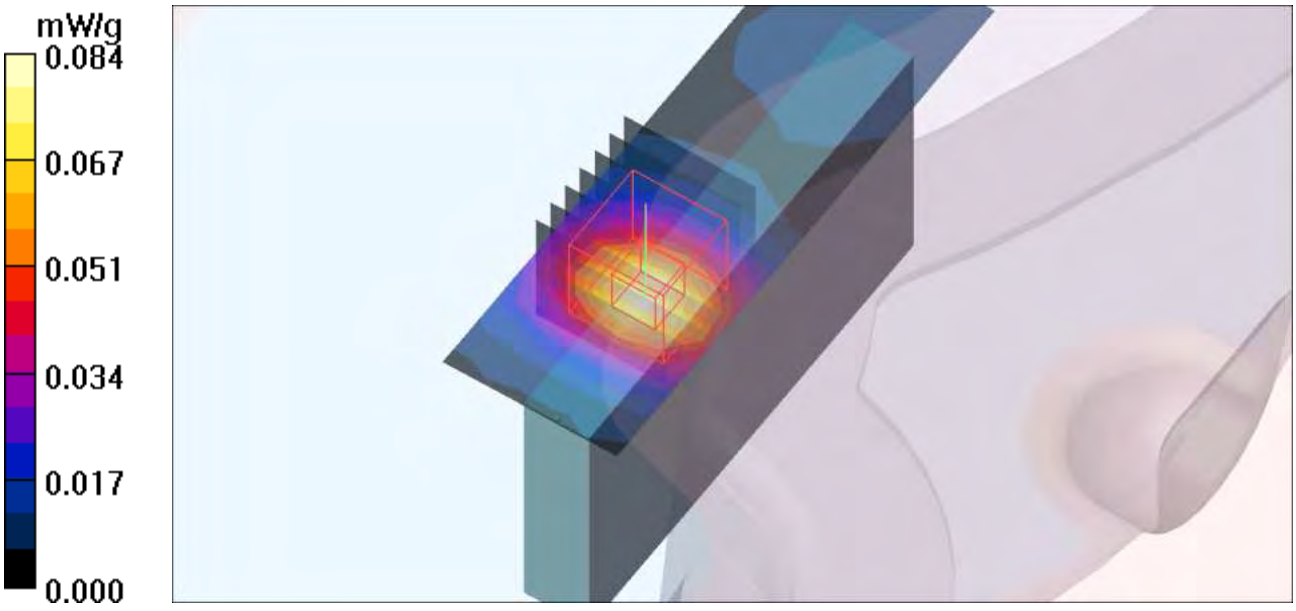
Communication System: Wimax_2.6GHz 10M ; Frequency: 2501 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2501 MHz; σ = 2.06 mho/m; ε_r = 54.22; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The left edge side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (6x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.081 mW/g

Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.27 V/m; Power Drift = -0.173 dB
Peak SAR (extrapolated) = 0.117 W/kg
SAR(1 g) = 0.057 mW/g; SAR(10 g) = 0.028 mW/g
Maximum value of SAR (measured) = 0.084 mW/g



Date/Time: 2011/3/16 10:02:42

M07-Wimax 10M-Ch0 / Ant 1

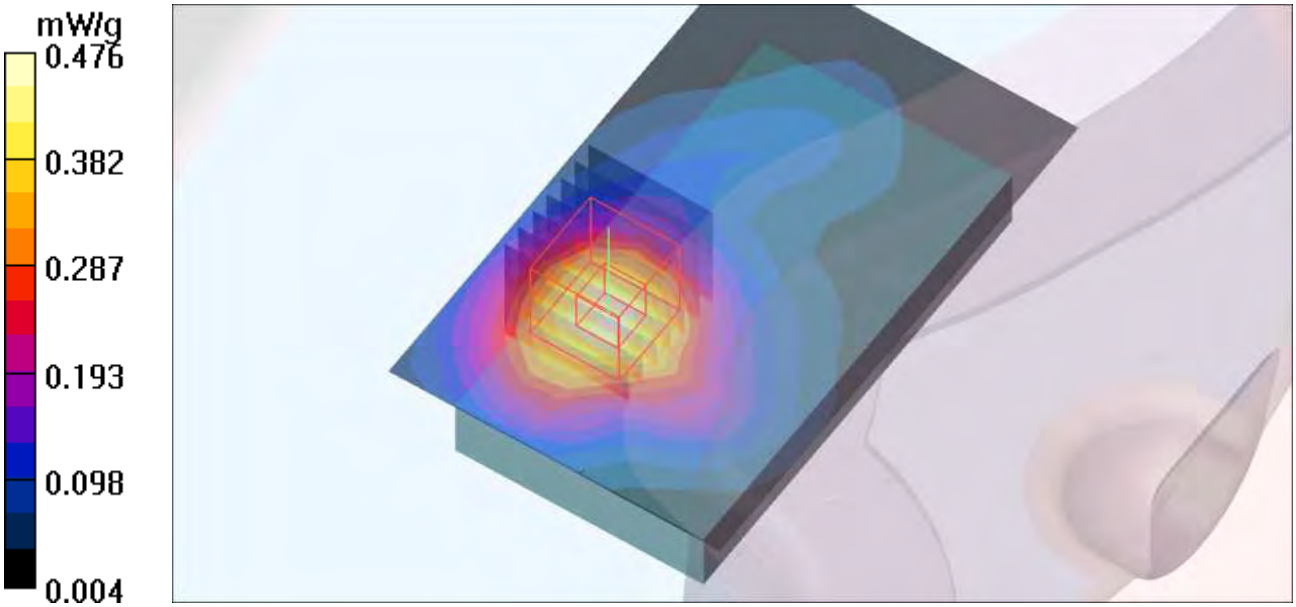
Communication System: Wimax_2.6GHz 10M ; Frequency: 2501 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2501 MHz; σ = 2.06 mho/m; εr = 54.22; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The top side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.454 mW/g

Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.00 V/m; Power Drift = 0.179 dB
Peak SAR (extrapolated) = 0.637 W/kg
SAR(1 g) = 0.333 mW/g; SAR(10 g) = 0.180 mW/g
Maximum value of SAR (measured) = 0.476 mW/g



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M07-Wimax 10M-Ch368 / Ant 1

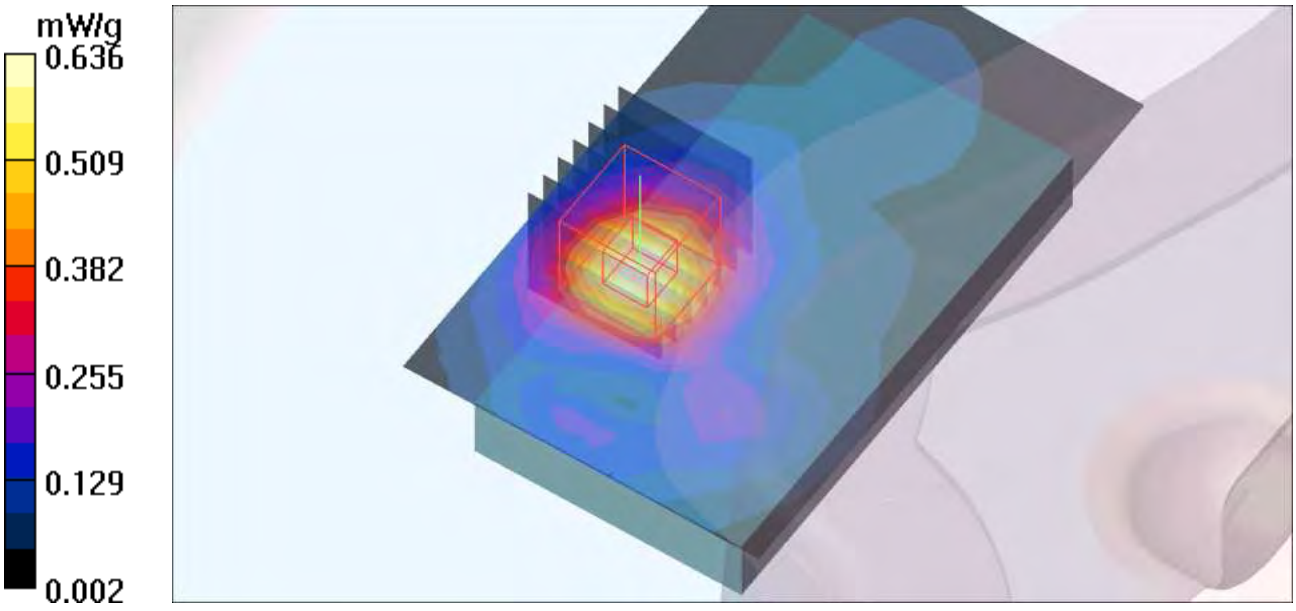
Communication System: Wimax_2.6GHz 10M ; Frequency: 2593 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2593 MHz; σ = 2.18 mho/m; ε_r = 53.86; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The top side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Mid Channel 368/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.636 mW/g

Body Position - Mid Channel 368/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.64 V/m; Power Drift = 0.118 dB
Peak SAR (extrapolated) = 0.862 W/kg
SAR(1 g) = 0.438 mW/g; SAR(10 g) = 0.223 mW/g



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M07-Wimax 10M-Ch736 / Ant 1

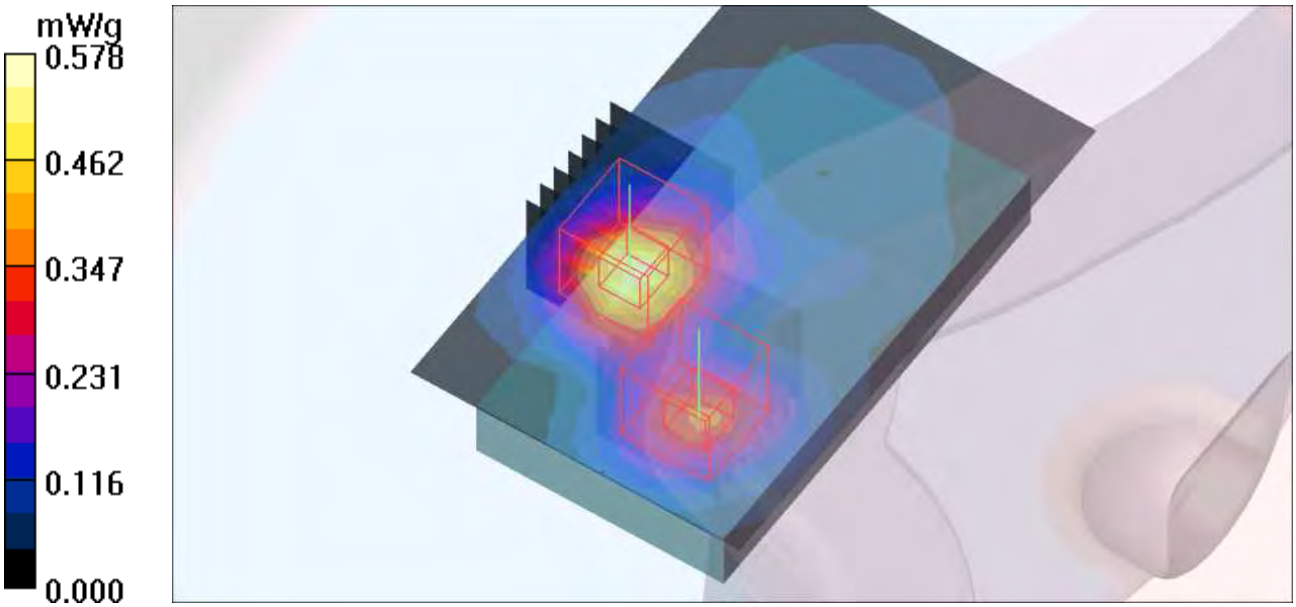
Communication System: Wimax_2.6GHz 10M ; Frequency: 2685 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2685 MHz; σ = 2.32 mho/m; εr = 53.66; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The top side of the EUT to the Phantom)
DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - High Channel 736/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.554 mW/g

Body Position - High Channel 736/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.43 V/m; Power Drift = 0.114 dB
Peak SAR (extrapolated) = 0.802 W/kg
SAR(1 g) = 0.379 mW/g; SAR(10 g) = 0.182 mW/g
Maximum value of SAR (measured) = 0.578 mW/g

Body Position - High Channel 736/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.43 V/m; Power Drift = 0.114 dB
Peak SAR (extrapolated) = 0.544 W/kg
SAR(1 g) = 0.254 mW/g; SAR(10 g) = 0.121 mW/g
Maximum value of SAR (measured) = 0.388 mW/g



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M08-Wimax 10M-Ch0 / Ant 1

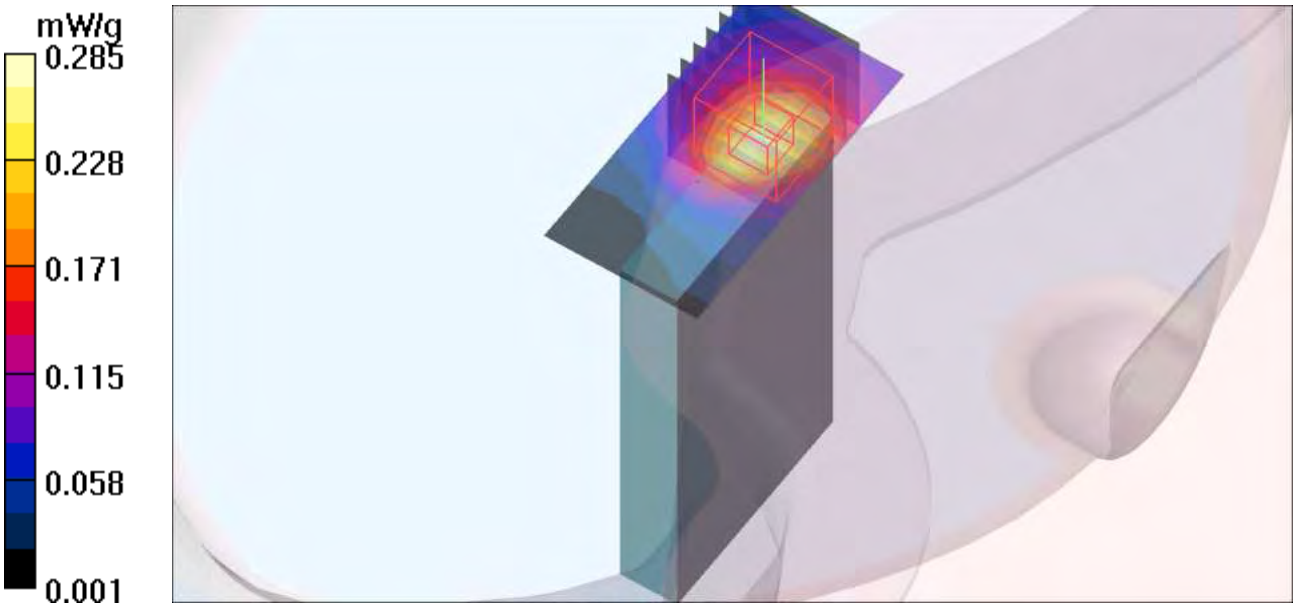
Communication System: Wimax_2.6GHz 10M ; Frequency: 2501 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2501 MHz; σ = 2.06 mho/m; ε_r = 54.22; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The front edge side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (6x11x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.282 mW/g

Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.0 V/m; Power Drift = 0.005 dB
Peak SAR (extrapolated) = 0.377 W/kg
SAR(1 g) = 0.196 mW/g; SAR(10 g) = 0.098 mW/g
Maximum value of SAR (measured) = 0.285 mW/g



Date/Time: 2011/3/16 16:48:12

M09-Wimax 5M-Ch0 / Ant 2

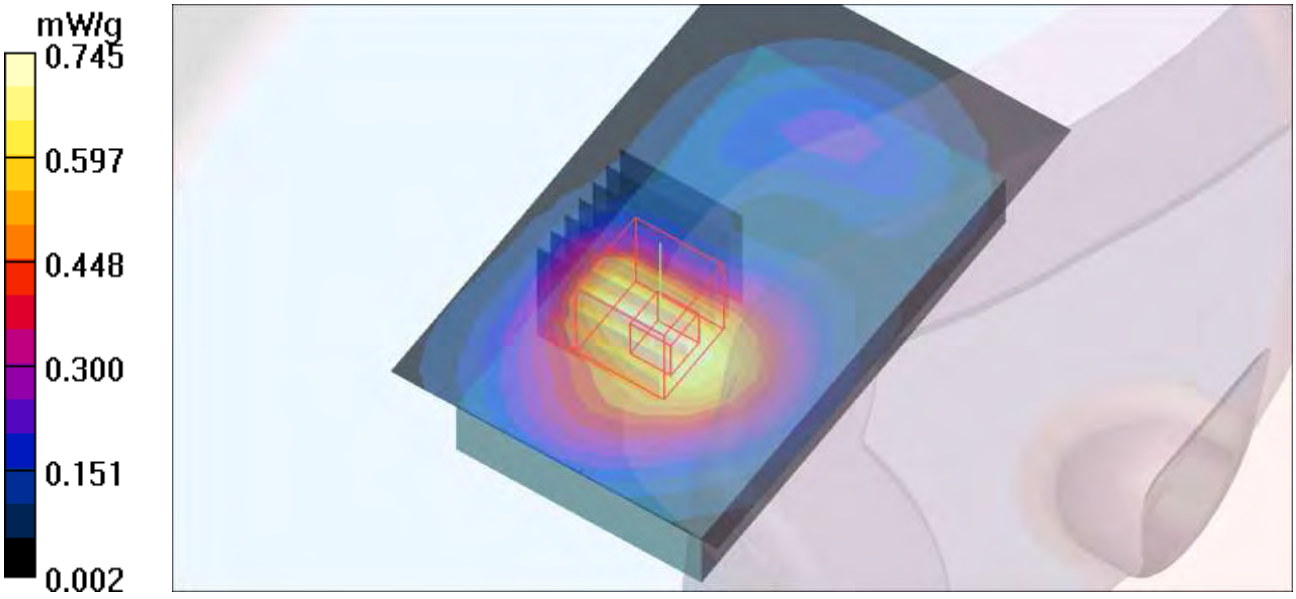
Communication System: Wimax_2.6GHz 5M ; Frequency: 2498.5 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2498.5 MHz; σ = 2.06 mho/m; εr = 54.26; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The bottom side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.91, 7.91, 7.91); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.738 mW/g

Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.49 V/m; Power Drift = 0.032 dB
Peak SAR (extrapolated) = 1.01 W/kg
SAR(1 g) = 0.523 mW/g; SAR(10 g) = 0.284 mW/g
Maximum value of SAR (measured) = 0.745 mW/g



Date/Time: 2011/3/16 17:16:48

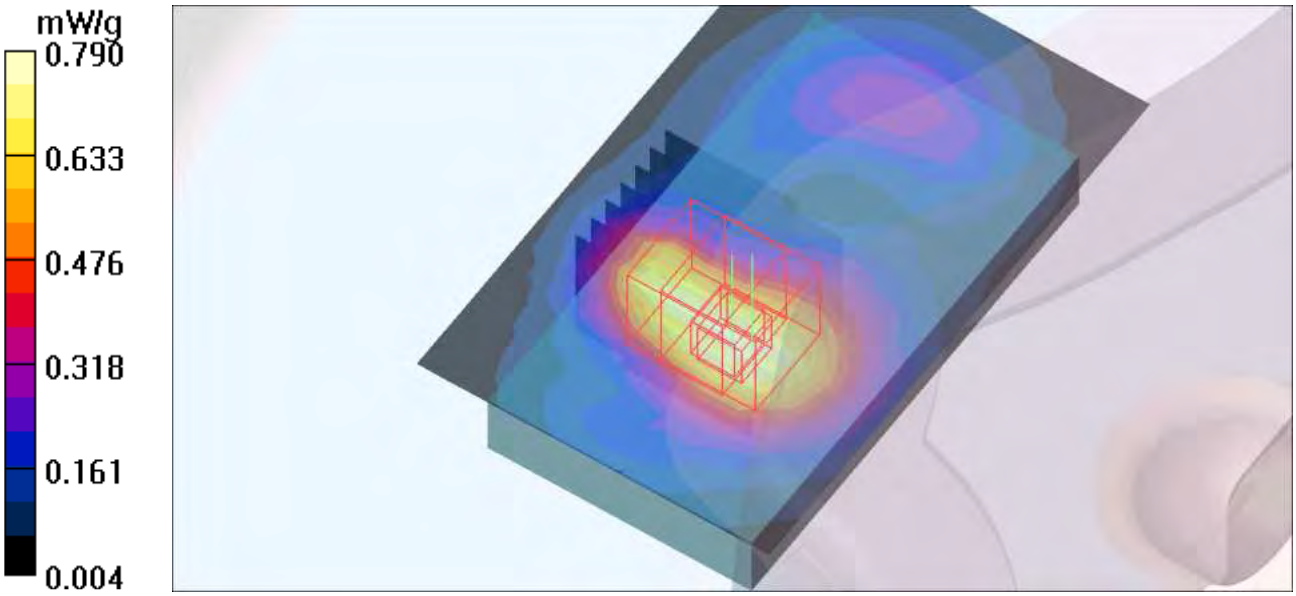
M09-Wimax 5M-Ch378 / Ant 2

Communication System: Wimax_2.6GHz 5M ; Frequency: 2593 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2593 MHz; σ = 2.18 mho/m; εr = 53.86; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The bottom side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Mid Channel 378/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.775 mW/g
Body Position - Mid Channel 378/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.01 V/m; Power Drift = 0.066 dB
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.555 mW/g; SAR(10 g) = 0.284 mW/g
Maximum value of SAR (measured) = 0.790 mW/g
Body Position - Mid Channel 378/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.01 V/m; Power Drift = 0.066 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.557 mW/g; SAR(10 g) = 0.295 mW/g
Maximum value of SAR (measured) = 0.797 mW/g



Date/Time: 2011/3/16 17:56:46

M09-Wimax 5M-Ch756 / Ant 2

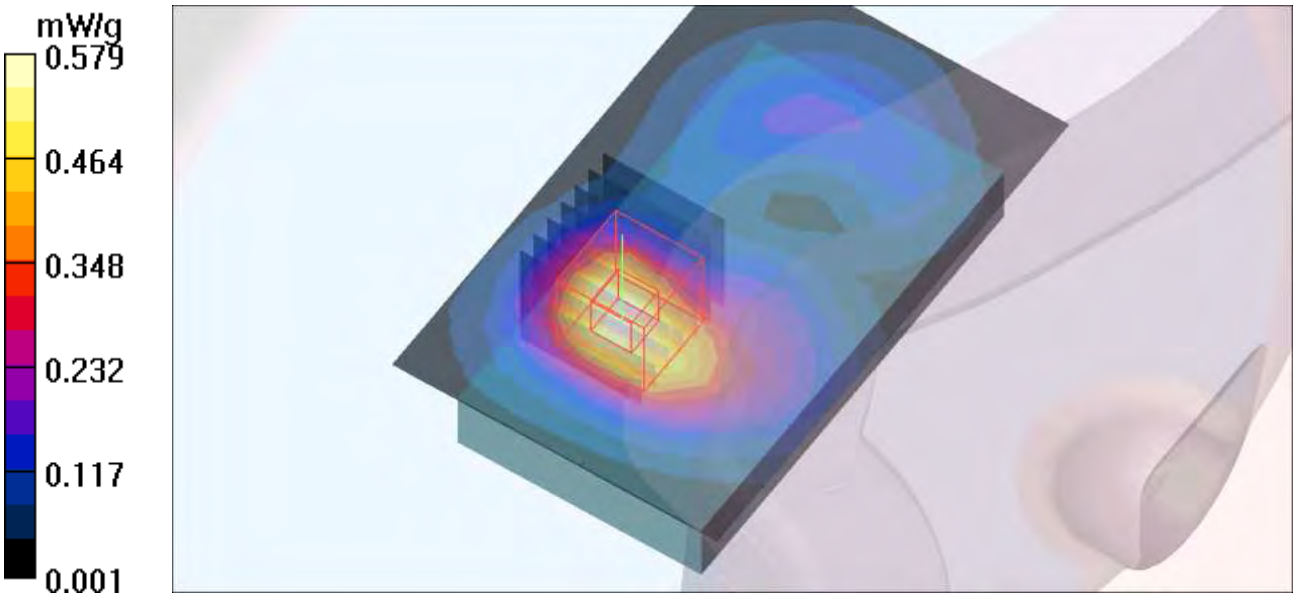
Communication System: Wimax_2.6GHz 5M ; Frequency: 2687.5 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2687.5 MHz; σ = 2.32 mho/m; εr = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The bottom side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - High Channel 756/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.575 mW/g

Body Position - High Channel 756/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.58 V/m; Power Drift = 0.044 dB
Peak SAR (extrapolated) = 0.817 W/kg
SAR(1 g) = 0.395 mW/g; SAR(10 g) = 0.201 mW/g
Maximum value of SAR (measured) = 0.579 mW/g



Date/Time: 2011/3/16 23:10:06

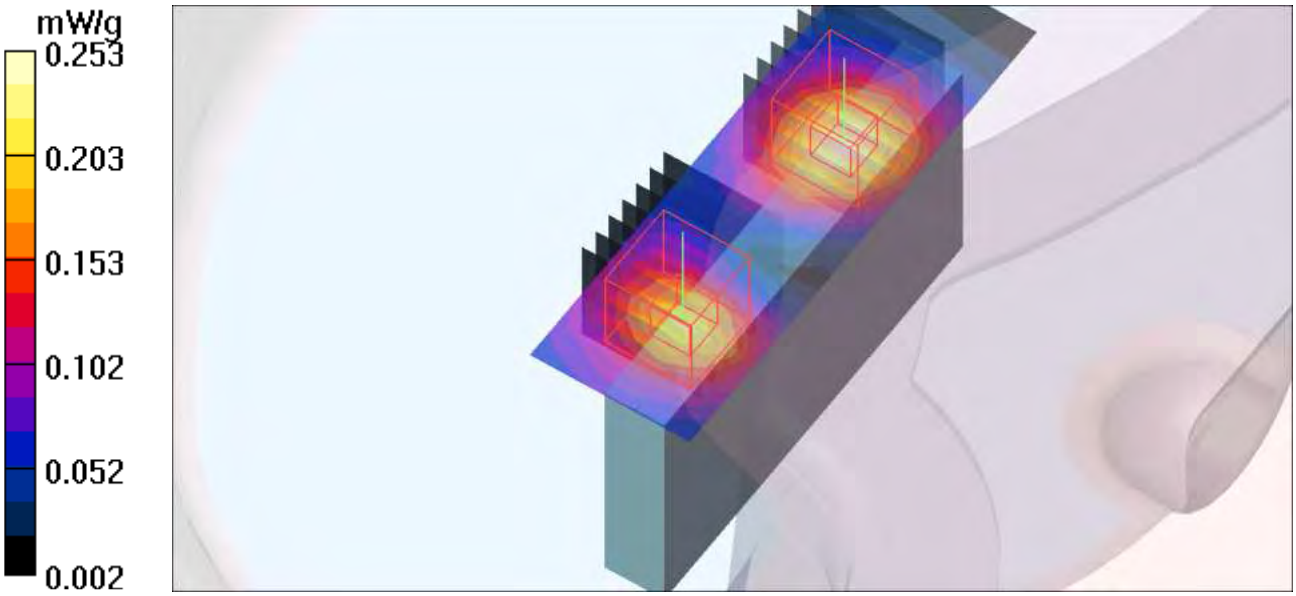
M10-Wimax 5M-Ch0 / Ant 2

Communication System: Wimax_2.6GHz 5M ; Frequency: 2498.5 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2498.5 MHz; σ = 2.06 mho/m; εr = 54.26; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The left edge side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.91, 7.91, 7.91); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (6x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.248 mW/g
Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.02 V/m; Power Drift = 0.130 dB
Peak SAR (extrapolated) = 0.334 W/kg
SAR(1 g) = 0.178 mW/g; SAR(10 g) = 0.094 mW/g
Maximum value of SAR (measured) = 0.253 mW/g
Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.02 V/m; Power Drift = 0.130 dB
Peak SAR (extrapolated) = 0.289 W/kg
SAR(1 g) = 0.148 mW/g; SAR(10 g) = 0.075 mW/g
Maximum value of SAR (measured) = 0.214 mW/g



Date/Time: 2011/3/16 08:23:58

M11-Wimax 5M-Ch0 / Ant 2

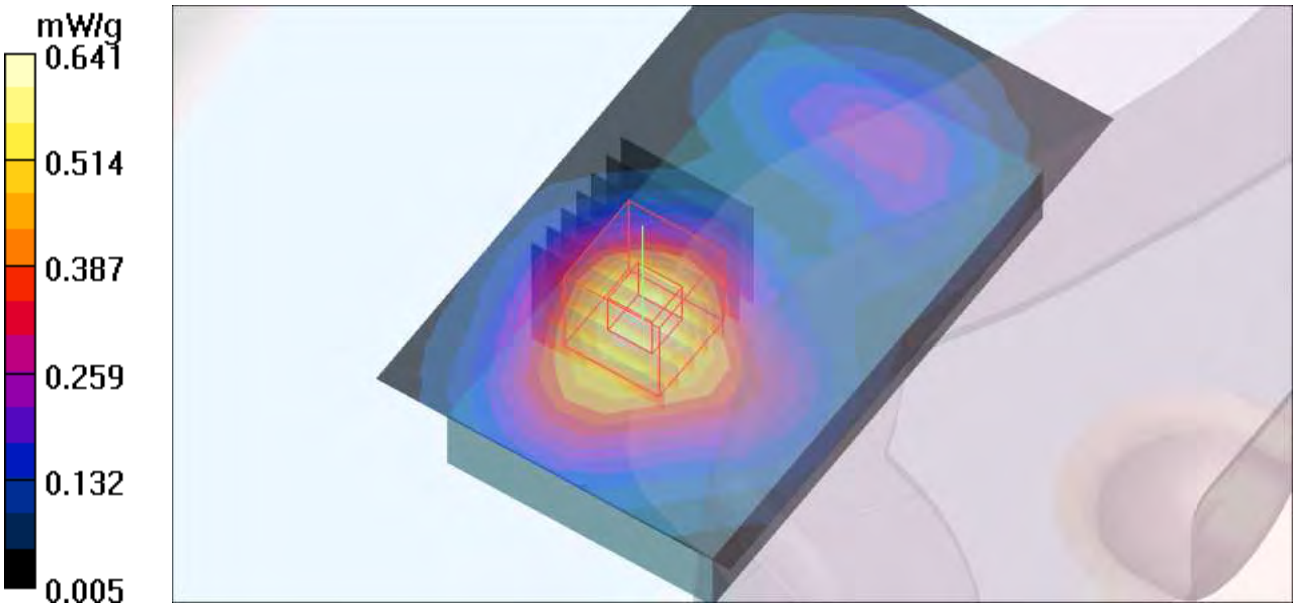
Communication System: Wimax_2.6GHz 5M ; Frequency: 2498.5 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2498.5 MHz; σ = 2.06 mho/m; εr = 54.26; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The top side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.91, 7.91, 7.91); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.613 mW/g

Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.52 V/m; Power Drift = 0.164 dB
Peak SAR (extrapolated) = 0.853 W/kg
SAR(1 g) = 0.453 mW/g; SAR(10 g) = 0.248 mW/g
Maximum value of SAR (measured) = 0.641 mW/g



Date/Time: 2011/3/16 08:52:56

M11-Wimax 5M-Ch378 / Ant 2

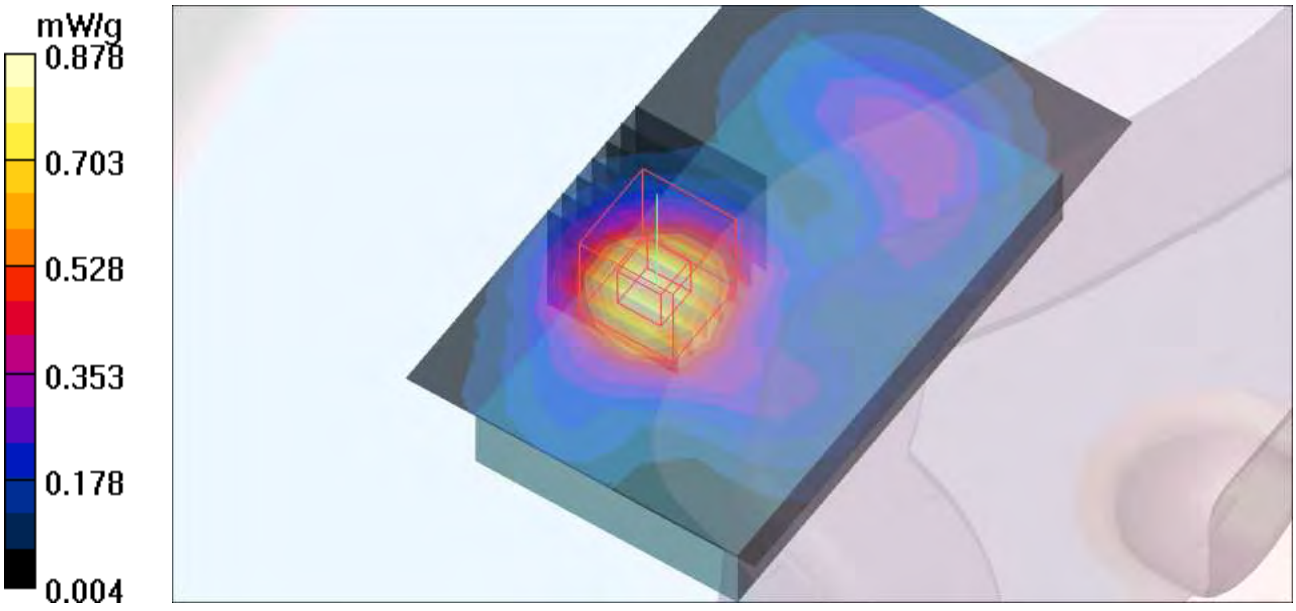
Communication System: Wimax_2.6GHz 5M ; Frequency: 2593 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2593 MHz; σ = 2.18 mho/m; εr = 53.86; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The top side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Mid Channel 378/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.842 mW/g

Body Position - Mid Channel 378/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.3 V/m; Power Drift = 0.119 dB
Peak SAR (extrapolated) = 1.18 W/kg
SAR(1 g) = 0.602 mW/g; SAR(10 g) = 0.308 mW/g
Maximum value of SAR (measured) = 0.878 mW/g



Date/Time: 2011/3/16 09:21:45

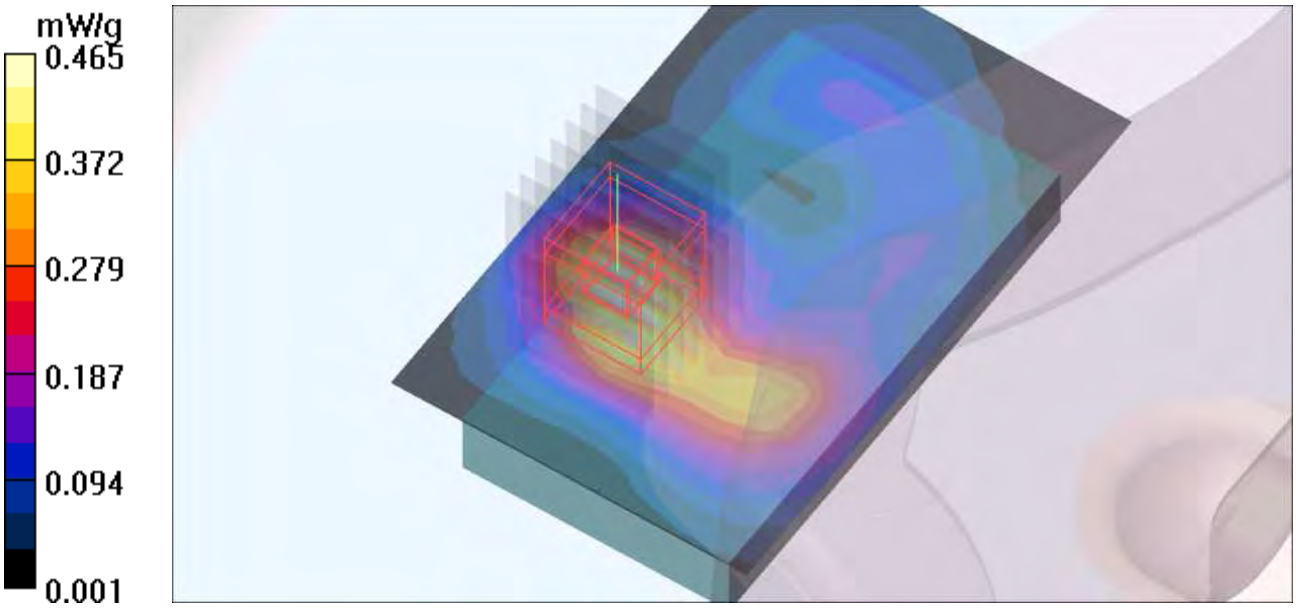
M11-Wimax 5M-Ch756 / Ant 2

Communication System: Wimax_2.6GHz 5M ; Frequency: 2687.5 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2687.5 MHz; σ = 2.32 mho/m; εr = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The top side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - High Channel 756/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.437 mW/g
Body Position - High Channel 756/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.20 V/m; Power Drift = 0.089 dB
Peak SAR (extrapolated) = 0.641 W/kg
SAR(1 g) = 0.313 mW/g; SAR(10 g) = 0.160 mW/g
Maximum value of SAR (measured) = 0.464 mW/g
Body Position - High Channel 756/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.20 V/m; Power Drift = 0.089 dB
Peak SAR (extrapolated) = 0.639 W/kg
SAR(1 g) = 0.312 mW/g; SAR(10 g) = 0.159 mW/g
Maximum value of SAR (measured) = 0.465 mW/g



Date/Time: 2011/3/16 04:54:43

M12-Wimax 5M-Ch0 / Ant 2

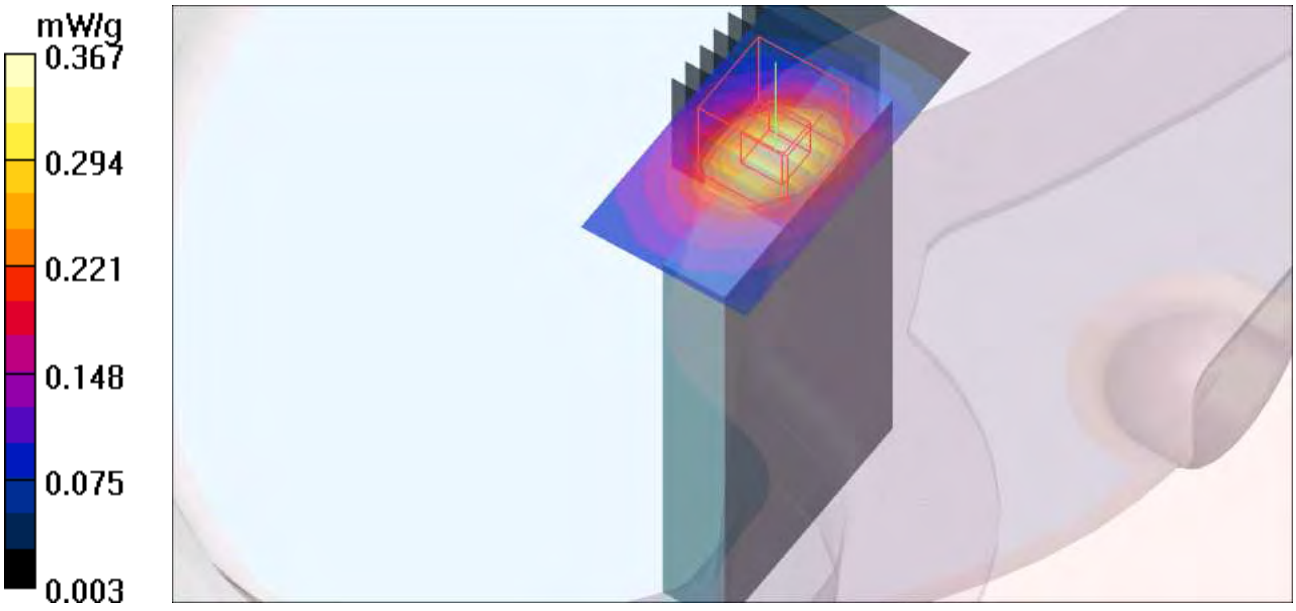
Communication System: Wimax_2.6GHz 5M ; Frequency: 2498.5 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2498.5 MHz; σ = 2.06 mho/m; εr = 54.26; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The front edge side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.91, 7.91, 7.91); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (6x11x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.359 mW/g

Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.3 V/m; Power Drift = -0.093 dB
Peak SAR (extrapolated) = 0.491 W/kg
SAR(1 g) = 0.246 mW/g; SAR(10 g) = 0.123 mW/g
Maximum value of SAR (measured) = 0.367 mW/g



Date/Time: 2011/3/16 20:26:49

M13-Wimax 10M-Ch0 / Ant 2

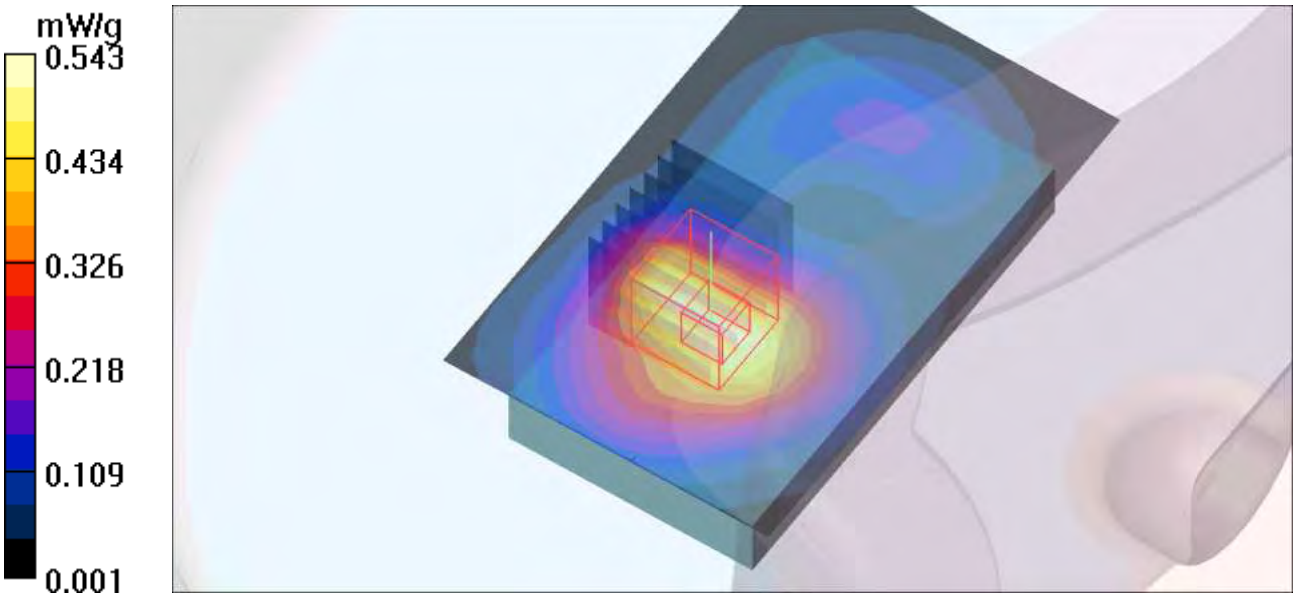
Communication System: Wimax_2.6GHz 10M ; Frequency: 2501 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2501 MHz; σ = 2.06 mho/m; ε_r = 54.22; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The bottom side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.538 mW/g

Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.37 V/m; Power Drift = 0.021 dB
Peak SAR (extrapolated) = 0.744 W/kg
SAR(1 g) = 0.378 mW/g; SAR(10 g) = 0.206 mW/g
Maximum value of SAR (measured) = 0.543 mW/g



Date/Time: 2011/3/16 20:55:53

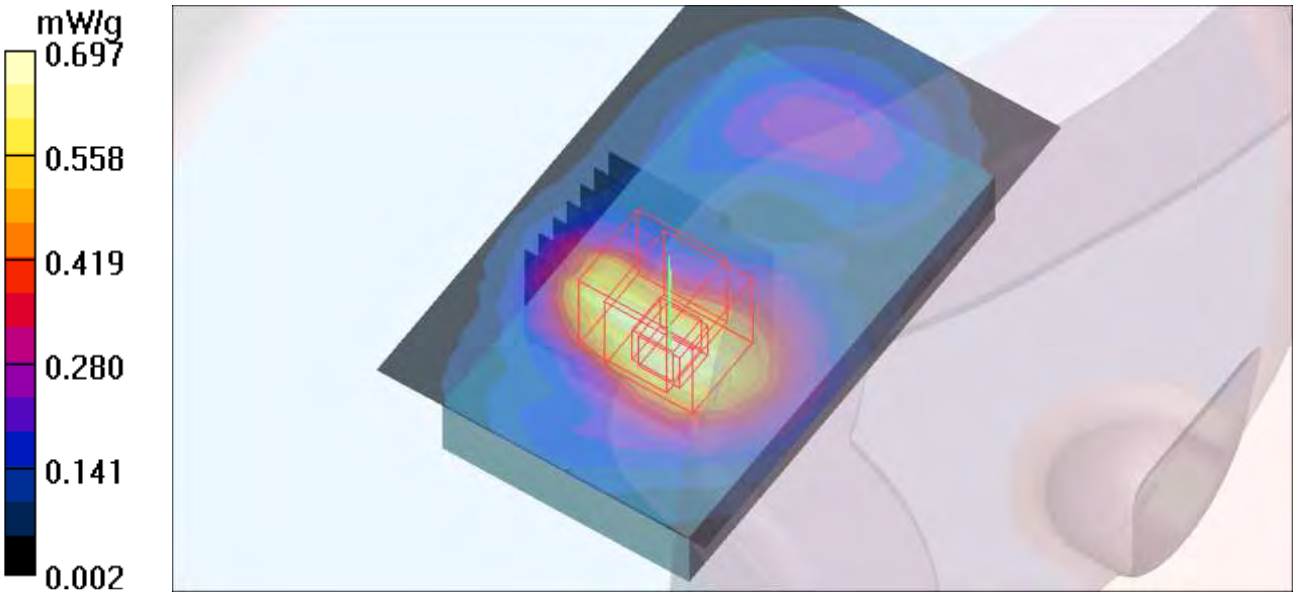
M13-Wimax 10M-Ch368 / Ant 2

Communication System: Wimax_2.6GHz 10M ; Frequency: 2593 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2593 MHz; σ = 2.18 mho/m; εr = 53.86; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The bottom side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Mid Channel 368/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.673 mW/g
Body Position - Mid Channel 368/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.26 V/m; Power Drift = 0.134 dB
Peak SAR (extrapolated) = 0.929 W/kg
SAR(1 g) = 0.485 mW/g; SAR(10 g) = 0.258 mW/g
Maximum value of SAR (measured) = 0.697 mW/g
Body Position - Mid Channel 368/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.26 V/m; Power Drift = 0.134 dB
Peak SAR (extrapolated) = 0.924 W/kg
SAR(1 g) = 0.479 mW/g; SAR(10 g) = 0.246 mW/g
Maximum value of SAR (measured) = 0.684 mW/g



Date/Time: 2011/3/16 21:36:15

M13-Wimax 10M-Ch736 / Ant 2

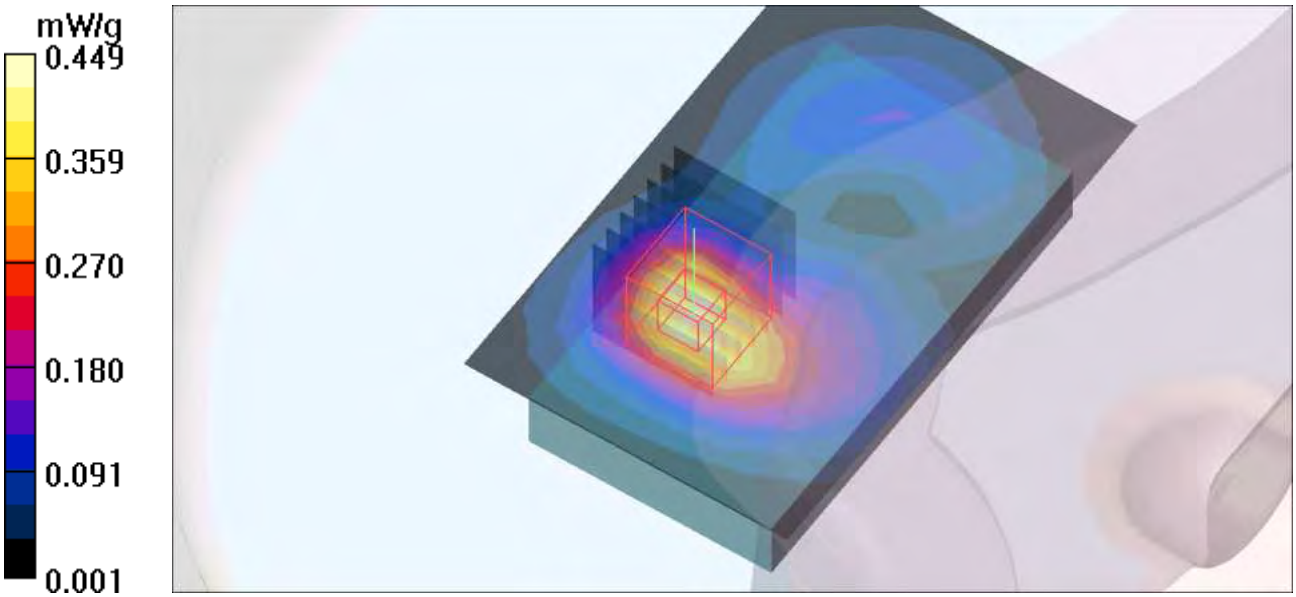
Communication System: Wimax_2.6GHz 10M ; Frequency: 2685 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2685 MHz; σ = 2.32 mho/m; εr = 53.66; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The bottom side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - High Channel 736/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.434 mW/g

Body Position - High Channel 736/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.69 V/m; Power Drift = 0.015 dB
Peak SAR (extrapolated) = 0.628 W/kg
SAR(1 g) = 0.300 mW/g; SAR(10 g) = 0.152 mW/g
Maximum value of SAR (measured) = 0.449 mW/g



Date/Time: 2011/3/16 22:13:39

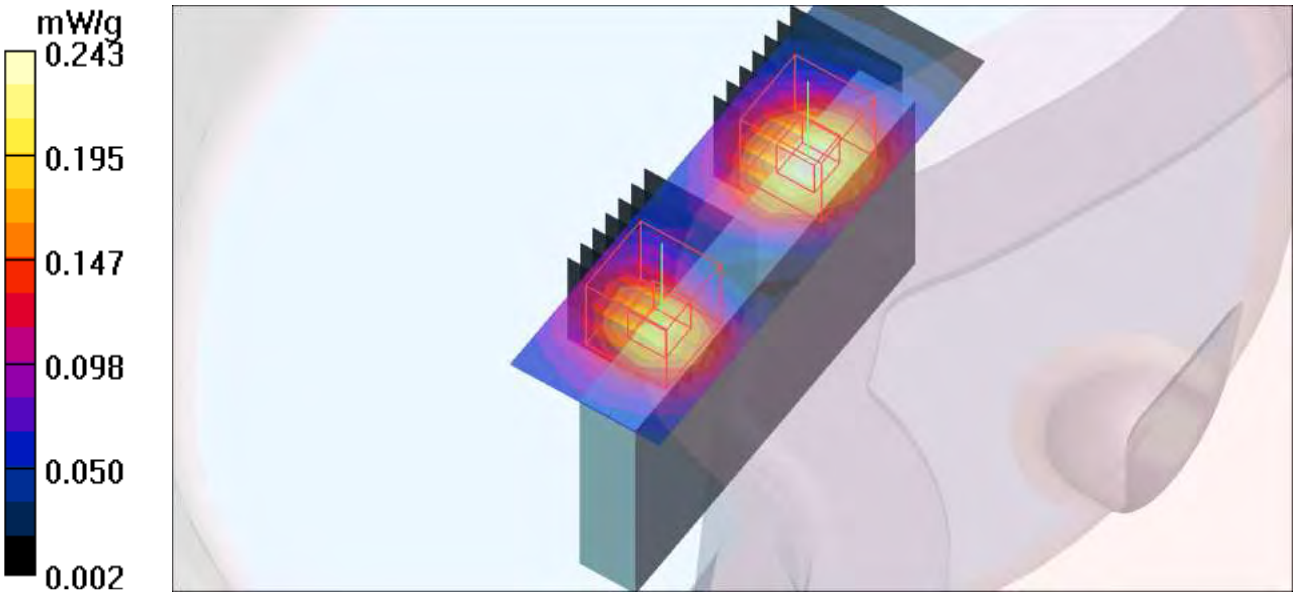
M14-Wimax 10M-Ch0 / Ant 2

Communication System: Wimax_2.6GHz 10M ; Frequency: 2501 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2501 MHz; σ = 2.06 mho/m; εr = 54.22; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The left edge side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (6x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.239 mW/g
Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.79 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 0.319 W/kg
SAR(1 g) = 0.170 mW/g; SAR(10 g) = 0.090 mW/g
Maximum value of SAR (measured) = 0.243 mW/g
Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.79 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 0.290 W/kg
SAR(1 g) = 0.149 mW/g; SAR(10 g) = 0.075 mW/g
Maximum value of SAR (measured) = 0.217 mW/g



Date/Time: 2011/3/16 11:42:20

M15-Wimax 10M-Ch0 / Ant 2

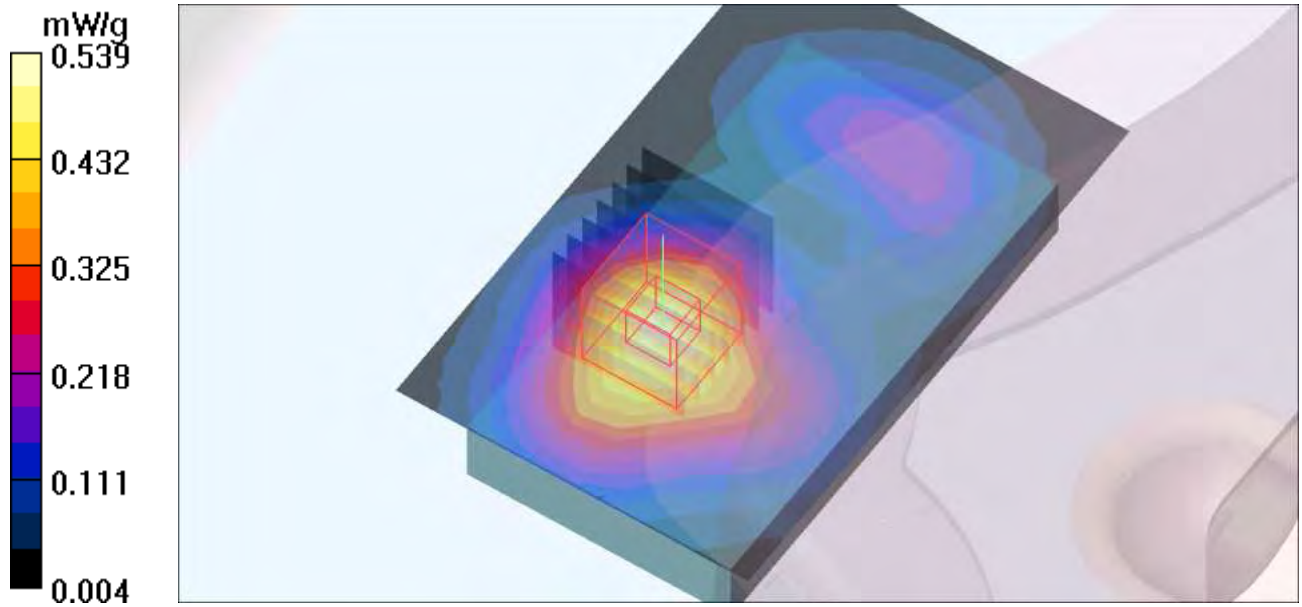
Communication System: Wimax_2.6GHz 10M ; Frequency: 2501 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2501 MHz; σ = 2.06 mho/m; εr = 54.22; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The top side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.534 mW/g

Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.23 V/m; Power Drift = -0.030 dB
Peak SAR (extrapolated) = 0.712 W/kg
SAR(1 g) = 0.379 mW/g; SAR(10 g) = 0.207 mW/g
Maximum value of SAR (measured) = 0.539 mW/g



Date/Time: 2011/3/16 12:11:59

M15-Wimax 10M-Ch368 / Ant 2

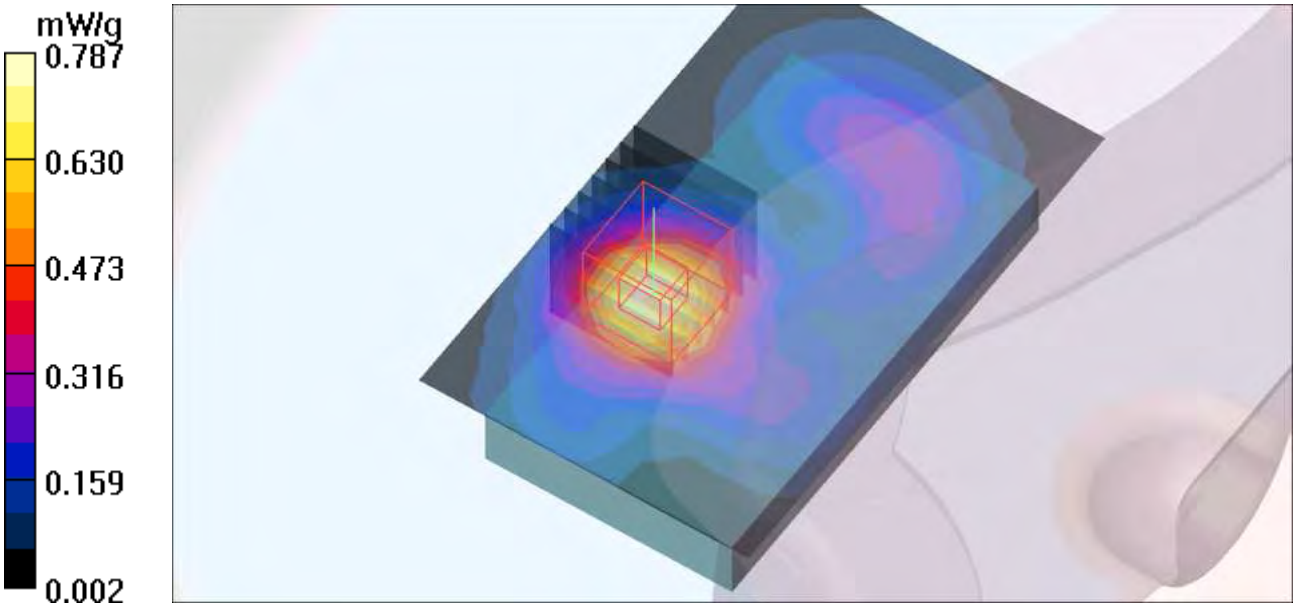
Communication System: Wimax_2.6GHz 10M ; Frequency: 2593 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2593 MHz; σ = 2.18 mho/m; εr = 53.86; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The top side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Mid Channel 368/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.747 mW/g

Body Position - Mid Channel 368/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.9 V/m; Power Drift = 0.037 dB
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.542 mW/g; SAR(10 g) = 0.278 mW/g
Maximum value of SAR (measured) = 0.787 mW/g



Date/Time: 2011/3/16 12:41:47

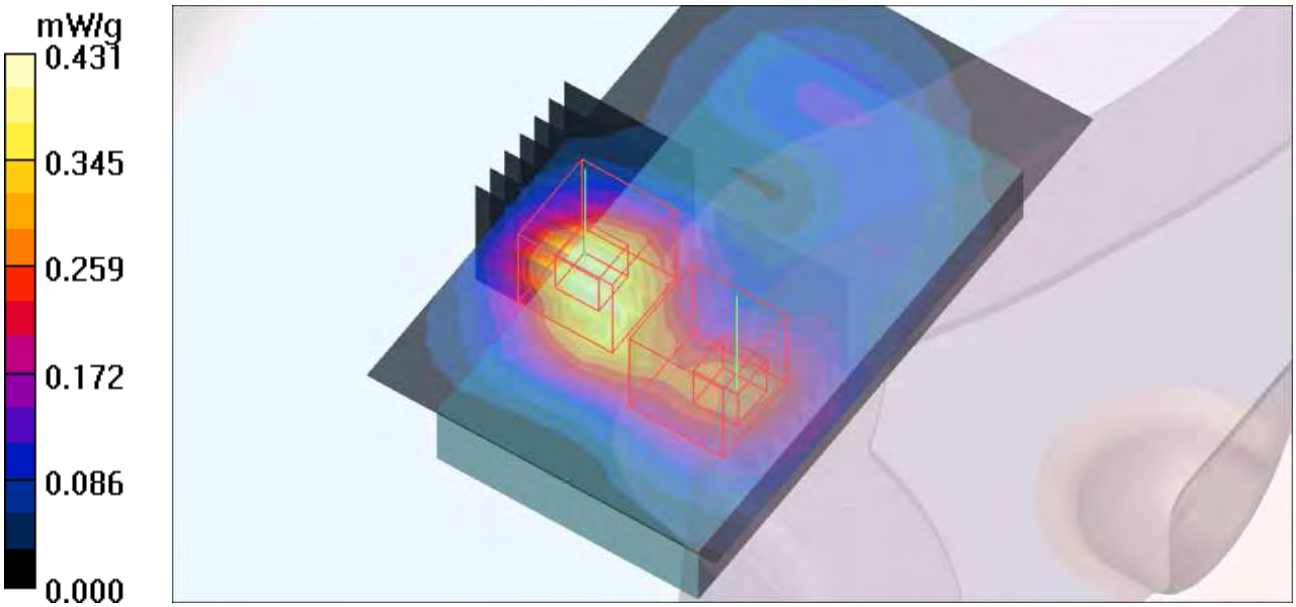
M15-Wimax 10M-Ch736 / Ant 2

Communication System: Wimax_2.6GHz 10M ; Frequency: 2685 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2685 MHz; σ = 2.32 mho/m; εr = 53.66; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The top side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - High Channel 736/Area Scan (11x17x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.409 mW/g
Body Position - High Channel 736/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.80 V/m; Power Drift = 0.094 dB
Peak SAR (extrapolated) = 0.598 W/kg
SAR(1 g) = 0.291 mW/g; SAR(10 g) = 0.147 mW/g
Maximum value of SAR (measured) = 0.431 mW/g
Body Position - High Channel 736/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.80 V/m; Power Drift = 0.094 dB
Peak SAR (extrapolated) = 0.428 W/kg
SAR(1 g) = 0.199 mW/g; SAR(10 g) = 0.101 mW/g
Maximum value of SAR (measured) = 0.303 mW/g



Date/Time: 2011/3/16 13:54:34

M16-Wimax 10M-Ch0 / Ant 2

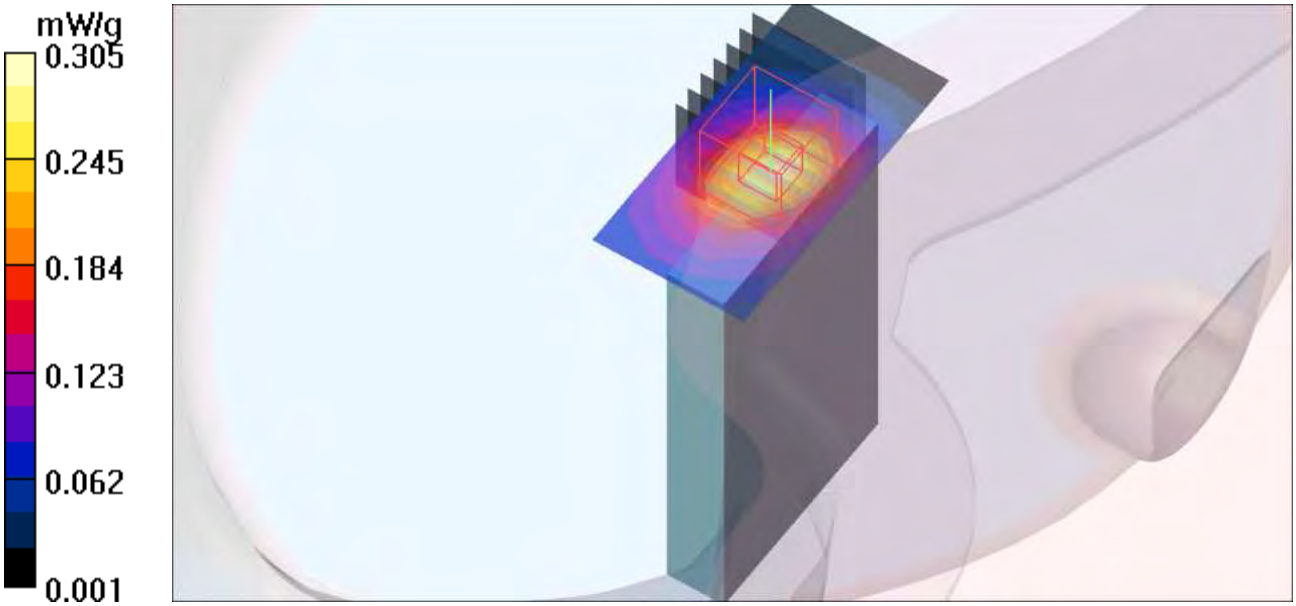
Communication System: Wimax_2.6GHz 10M ; Frequency: 2501 MHz ; Duty Cycle: 1:3.24 ; Modulation type: QPSK
Medium: MSL2600 Medium parameters used: f = 2501 MHz; σ = 2.06 mho/m; εr = 54.22; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Separation distance : 10 mm (The front edge side of the EUT to the Phantom)

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body Position - Low Channel 0/Area Scan (6x11x1): Measurement grid: dx=8mm, dy=8mm
Maximum value of SAR (measured) = 0.300 mW/g

Body Position - Low Channel 0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.2 V/m; Power Drift = -0.092 dB
Peak SAR (extrapolated) = 0.409 W/kg
SAR(1 g) = 0.204 mW/g; SAR(10 g) = 0.101 mW/g
Maximum value of SAR (measured) = 0.305 mW/g



Date/Time: 2011/3/16 02:33:46

SystemPerformanceCheck-D2600V2-MSL2600 MHz

DUT: Dipole 2600 MHz D2600V2 ; Type: D2600V2 ; Serial: D2600V2 - SN:1003 ; Test Frequency: 2600 MHz

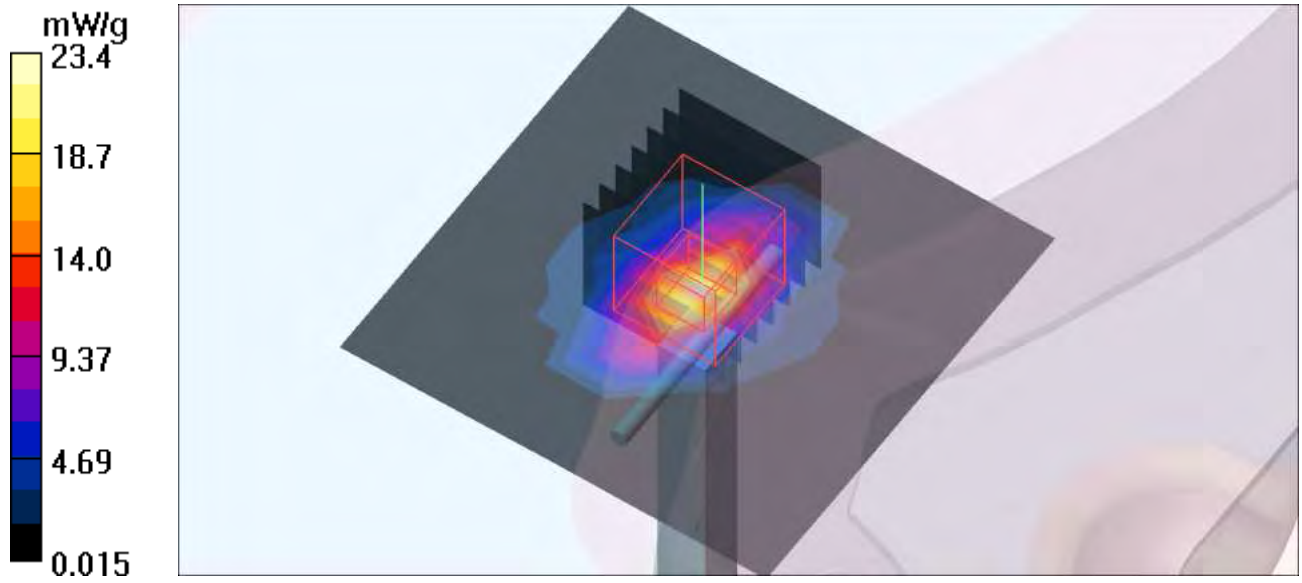
Communication System: CW ; Frequency: 2600 MHz; Duty Cycle: 1:1; Modulation type: CW
Medium: MSL2600;Medium parameters used: f = 2600 MHz; σ = 2.19 mho/m; ε_r = 53.82; ρ = 1000 kg/m^3 ; Liquid level : 150 mm
Phantom section: Flat Section ; Separation distance : 10 mm (The feet point of the dipole to the Phantom)Air temp. : 22.7 degrees ; Liquid temp. : 21.3 degrees

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/2/25
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2010/9/20
- Phantom: SAM Twin Phantom V4.0; Type: QD 000 P40 CA; Serial: TP 1202
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

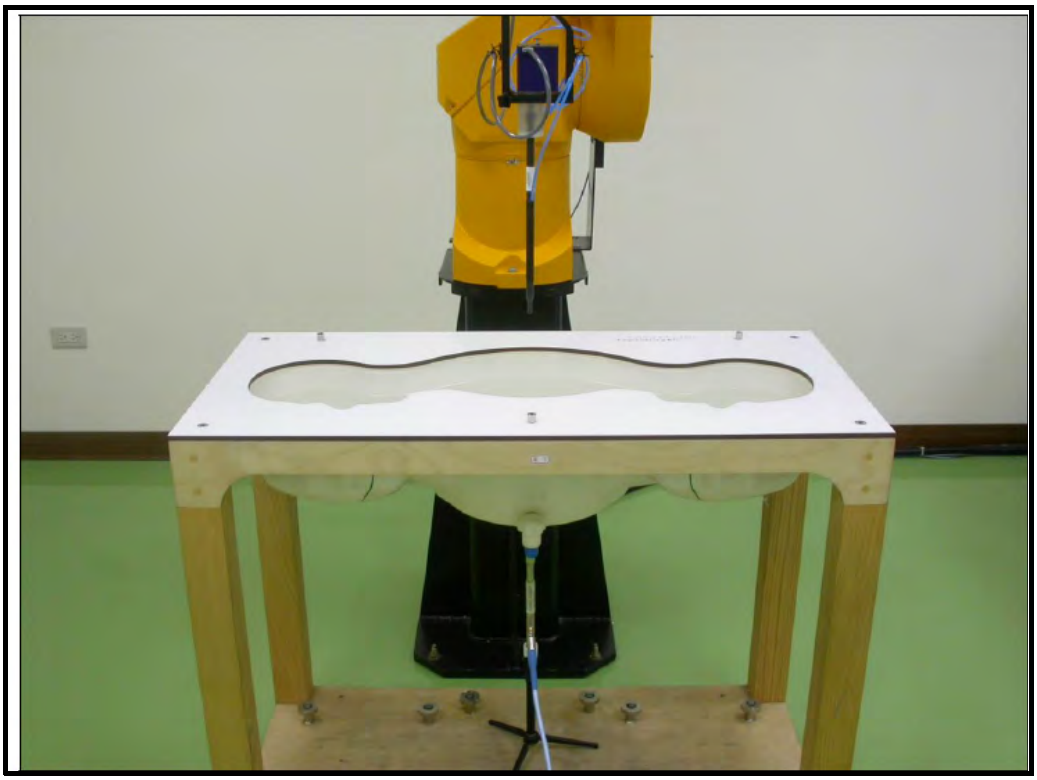
d=10mm, Pin=250mW/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 23.4 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 106.2 V/m; Power Drift = -0.049 dB
Peak SAR (extrapolated) = 32.2 W/kg
SAR(1 g) = 14.5 mW/g; SAR(10 g) = 6.23 mW/g
Maximum value of SAR (measured) = 23.0 mW/g



APPENDIX B: BV 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. Bomholt

Schmid & Partner Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

Voleaire Kuga

D2: DOSIMETRIC E-FIELD PROBE

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **BV ADT (Auden)**

Certificate No: EX3-3590_Feb11

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3590

Calibration procedure(s): QA CAL-01.v7, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v3
Calibration procedure for dosimetric E-field probes

Calibration date: February 25, 2011

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 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	01-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	01-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	01-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	23-Apr-10 (No. DAE4-654_Apr10)	Apr-11
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: February 25, 2011

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
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:

a) 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
b) 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:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,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*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z* are numerical linearization parameters in dB assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media.
- *VR:* VR is the validity range of the calibration related to the average diode voltage or DAE voltage in mV.
- *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 *NORMx,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 EX3DV4

SN:3590

Manufactured: March 23, 2009
Calibrated: February 25, 2011

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3590

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.51	0.48	0.51	± 10.1 %
DCP (mV)[B]	94.6	95.5	92.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	119.0	±2.7 %
			Y	0.00	0.00	1.00	141.4	
			Z	0.00	0.00	1.00	115.0	

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 E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3590

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	41.5	0.90	10.21	10.21	10.21	0.56	0.68	± 12.0 %
1640	40.3	1.29	9.25	9.25	9.25	0.68	0.60	± 12.0 %
1750	40.1	1.37	9.03	9.03	9.03	0.79	0.58	± 12.0 %
1950	40.0	1.40	8.45	8.45	8.45	0.55	0.66	± 12.0 %
2300	39.5	1.67	8.14	8.14	8.14	0.40	0.80	± 12.0 %
2450	39.2	1.80	7.73	7.73	7.73	0.29	1.00	± 12.0 %
2600	39.0	1.96	7.53	7.53	7.53	0.28	1.06	± 12.0 %
3500	37.9	2.91	7.55	7.55	7.55	0.36	1.03	± 13.1 %
5200	36.0	4.66	5.51	5.51	5.51	0.30	1.80	± 13.1 %
5300	35.9	4.76	5.17	5.17	5.17	0.30	1.80	± 13.1 %
5500	35.6	4.96	5.00	5.00	5.00	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.52	4.52	4.52	0.50	1.80	± 13.1 %
5800	35.3	5.27	4.53	4.53	4.53	0.50	1.80	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: EX3DV4- SN:3590

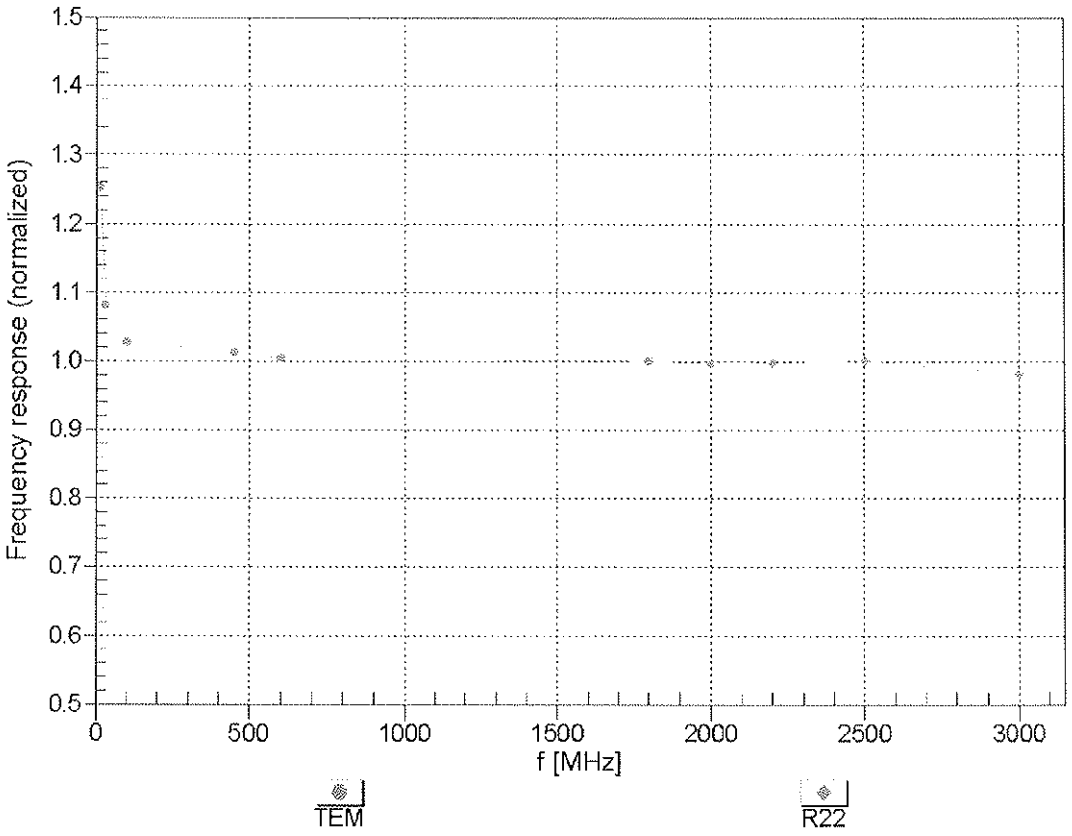
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	55.2	0.97	10.32	10.32	10.32	0.38	0.82	± 12.0 %
1640	53.8	1.40	9.72	9.72	9.72	0.51	0.79	± 12.0 %
1750	53.4	1.49	8.77	8.77	8.77	0.37	0.92	± 12.0 %
1950	53.3	1.52	8.49	8.49	8.49	0.60	0.67	± 12.0 %
2300	52.9	1.81	8.08	8.08	8.08	0.30	1.00	± 12.0 %
2450	52.7	1.95	7.91	7.91	7.91	0.42	0.82	± 12.0 %
2600	52.5	2.16	7.78	7.78	7.78	0.25	1.17	± 12.0 %
3500	51.3	3.31	7.14	7.14	7.14	0.43	0.96	± 13.1 %
5200	49.0	5.30	4.81	4.81	4.81	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.56	4.56	4.56	0.50	1.90	± 13.1 %
5500	48.6	5.65	4.32	4.32	4.32	0.50	1.90	± 13.1 %
5600	48.5	5.77	4.01	4.01	4.01	0.60	1.90	± 13.1 %
5800	48.2	6.00	4.55	4.55	4.55	0.50	1.90	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

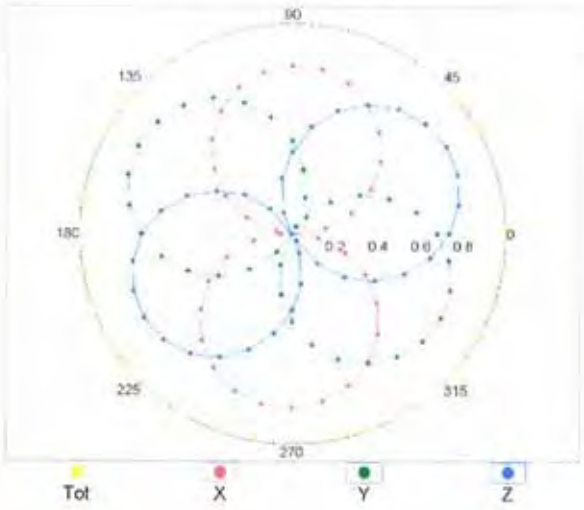
(TEM-Cell:ifi110 EXX, Waveguide: R22)



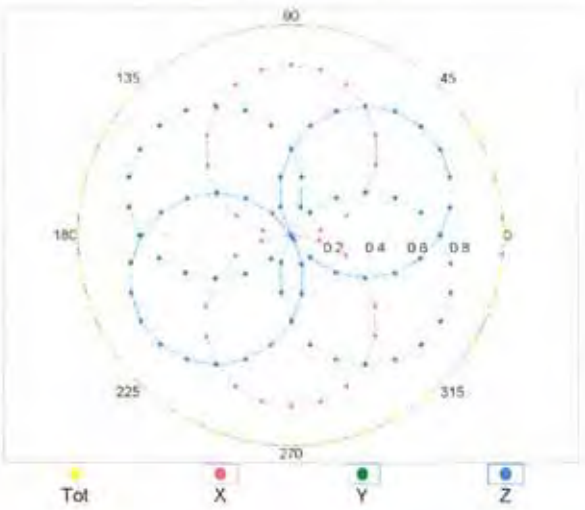
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

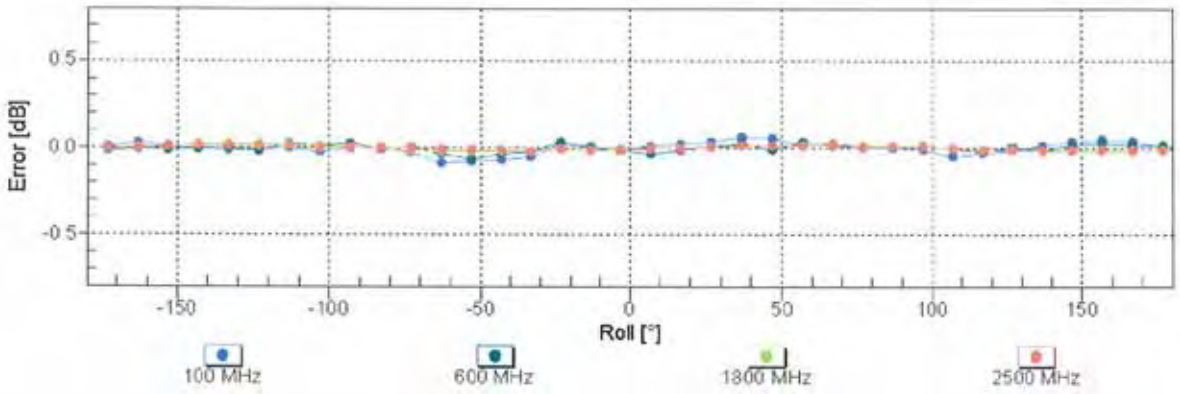
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



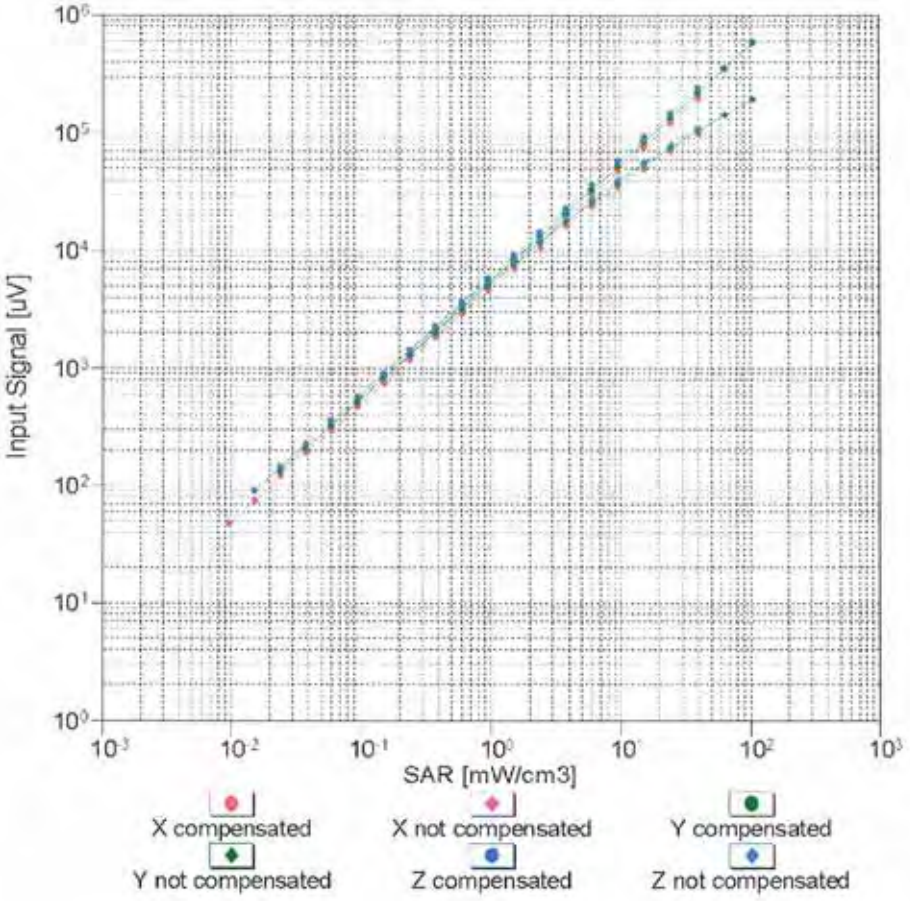
f=1800 MHz,R22

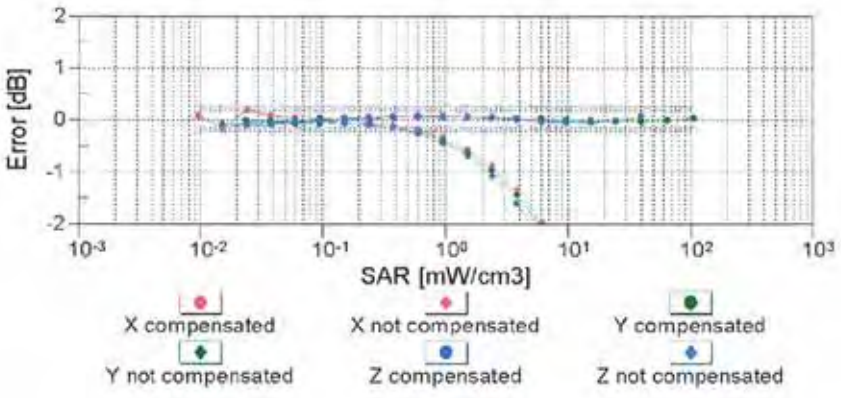




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

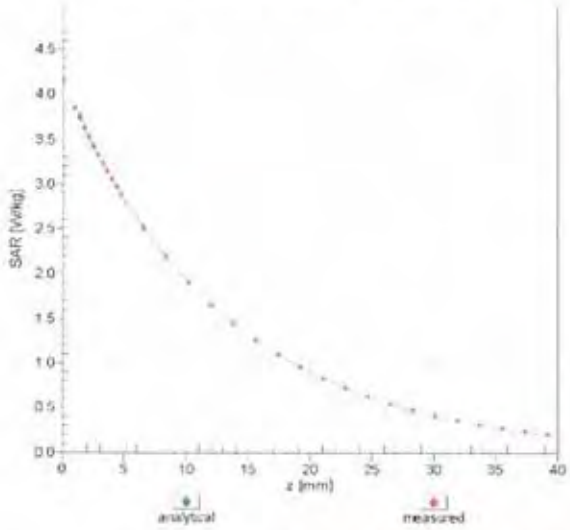




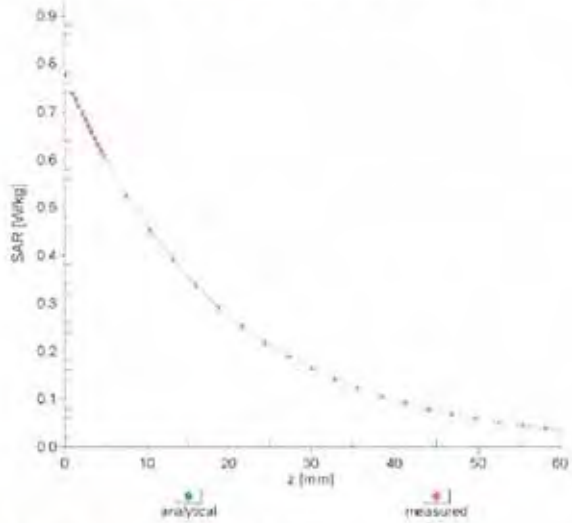
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 1750 MHz,WGLS R22 (H_convF)

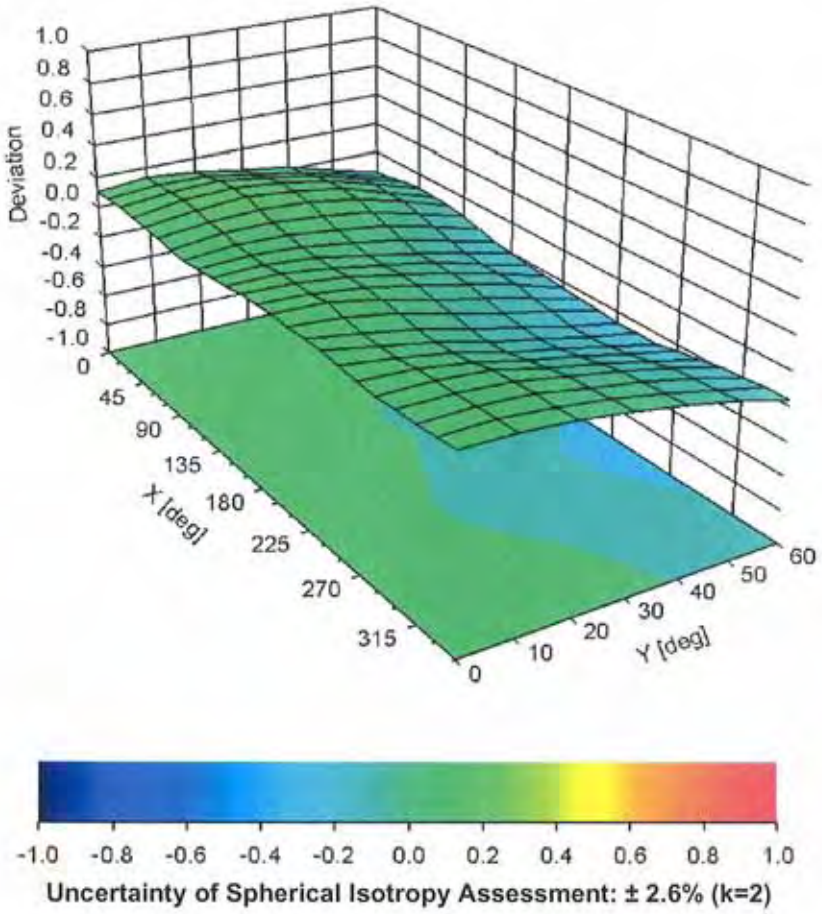


f = 835 MHz,WGLS R9 (H_convF)



Deviation from Isotropy in Air

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3590

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

D3: DAE

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

IMPORTANT NOTICE

USAGE OF THE DAE 3

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE3 unit is connected to a fragile 3-pin battery connector. Customer is responsible to apply outmost caution not to bend or damage the connector when changing batteries.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration the customer shall remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, Customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:
Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:
Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:
To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

Schmid & Partner Engineering

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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Client BV-ADT (Auden)

Certificate No: DAE3-579_Sep10

CALIBRATION CERTIFICATE

Object: DAE3 - SD 000 D03 AA - SN: 579

Calibration procedure(s): QA CAL-06.v22
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: September 20, 2010

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 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	1-Oct-09 (No: 9055)	Oct-10
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bomholt	R&D Director	

Issued: September 20, 2010

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1μV ,	full range =	-100...+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.327 ± 0.1% (k=2)	404.379 ± 0.1% (k=2)	404.160 ± 0.1% (k=2)
Low Range	3.98675 ± 0.7% (k=2)	3.99301 ± 0.7% (k=2)	3.94834 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	358.0 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200003.9	0.96	0.00
Channel X	+ Input	20003.19	3.09	0.02
Channel X	- Input	-19994.55	4.75	-0.02
Channel Y	+ Input	199992.4	-0.09	-0.00
Channel Y	+ Input	19999.51	0.41	0.00
Channel Y	- Input	-19997.22	3.18	-0.02
Channel Z	+ Input	200002.0	0.91	0.00
Channel Z	+ Input	20001.93	2.03	0.01
Channel Z	- Input	-19997.58	2.82	-0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2000.0	0.02	0.00
Channel X	+ Input	199.82	0.12	0.06
Channel X	- Input	-200.46	-0.56	0.28
Channel Y	+ Input	2000.3	0.47	0.02
Channel Y	+ Input	199.12	-0.78	-0.39
Channel Y	- Input	-201.36	-1.16	0.58
Channel Z	+ Input	1999.9	-0.07	-0.00
Channel Z	+ Input	199.18	-0.72	-0.36
Channel Z	- Input	-201.47	-1.47	0.73

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	7.07	5.75
	- 200	-4.60	-6.25
Channel Y	200	9.48	9.62
	- 200	-10.39	-10.96
Channel Z	200	8.79	8.42
	- 200	-9.64	-9.80

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	0.03	0.35
Channel Y	200	1.14	-	2.31
Channel Z	200	2.01	0.80	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16343	16314
Channel Y	16194	16427
Channel Z	15816	16265

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	-0.70	-1.94	0.80	0.49
Channel Y	-1.55	-2.12	-0.66	0.27
Channel Z	0.57	-0.11	5.61	0.62

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	–0.01	-8	-9

D4: SYSTEM VALIDATION DIPOLE

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **B.V. ADT (Auden)**

Certificate No: D2600V2_1003_Jan11

CALIBRATION CERTIFICATE

Object	D2600V2 - SN: 1003
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits
Calibration date:	January 27, 2011

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 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 27, 2011

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) 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
b) 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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.9 ± 6 %	2.03 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 0.2) °C	-------	-------

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	15.0 mW / g
SAR normalized	normalized to 1W	60.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**58.9 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.57 mW / g
SAR normalized	normalized to 1W	26.3 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**26.1 mW / g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.3 ± 6 %	2.10 mho/m ± 6 %
Body TSL temperature during test	(20.8 ± 0.2) °C	-------	------

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	condition	
SAR measured	250 mW input power	14.4 mW / g
SAR normalized	normalized to 1W	57.6 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**58.1 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.41 mW / g
SAR normalized	normalized to 1W	25.6 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**25.7 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.5 Ω - 0.4 jΩ
Return Loss	- 44.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.2 Ω + 0.0 jΩ
Return Loss	- 28.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.147 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 23, 2006

DASY5 Validation Report for Head TSL

Date/Time: 27.01.2011 15:40:46

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1003

Communication System: CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: HSL BB1.9
Medium parameters used: f = 2600 MHz; σ = 2.04 mho/m; ε_r = 38.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

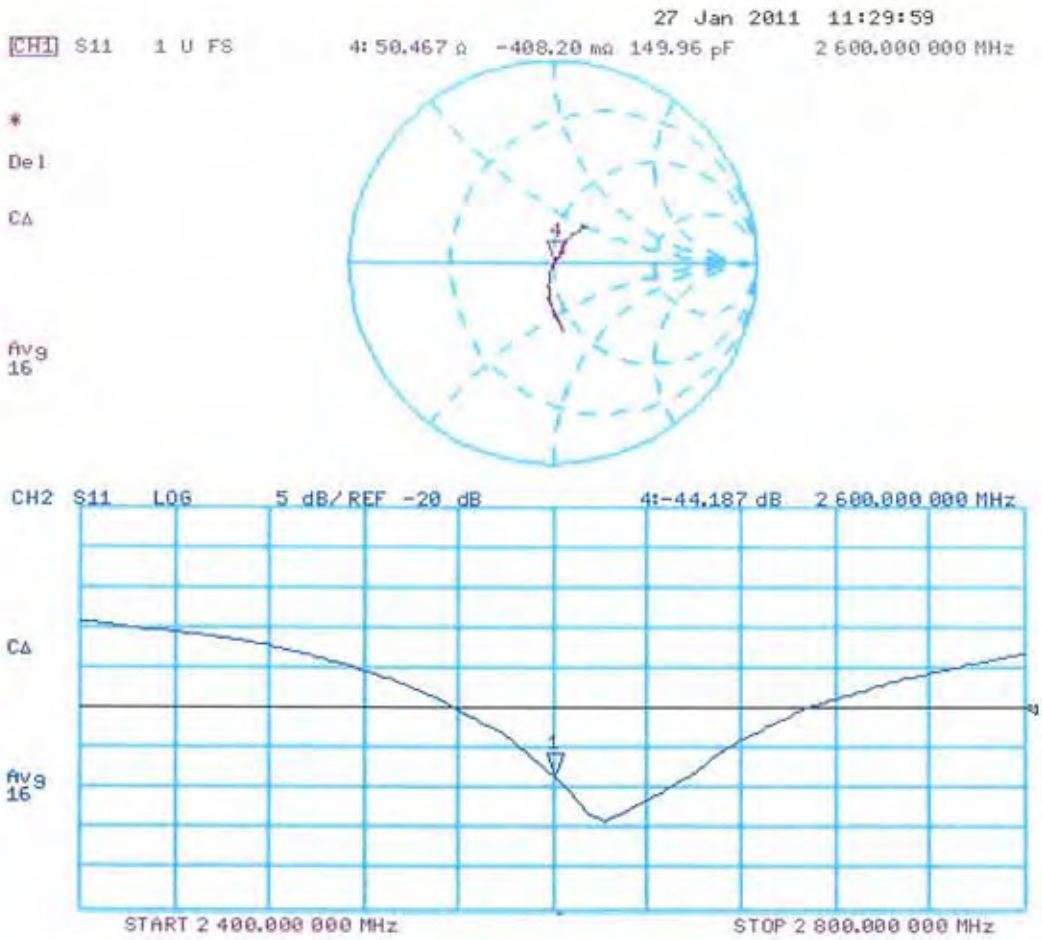
DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.47, 4.47, 4.47); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

Pin=250 mW/d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.3 V/m; Power Drift = 0.00081 dB
Peak SAR (extrapolated) = 32.976 W/kg
SAR(1 g) = 15 mW/g; SAR(10 g) = 6.57 mW/g
Maximum value of SAR (measured) = 19.719 mW/g

0 dB = 19.720mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 05.01.2011 14:25:38

Test Laboratory: SPEAG, Zurich, Switzerland

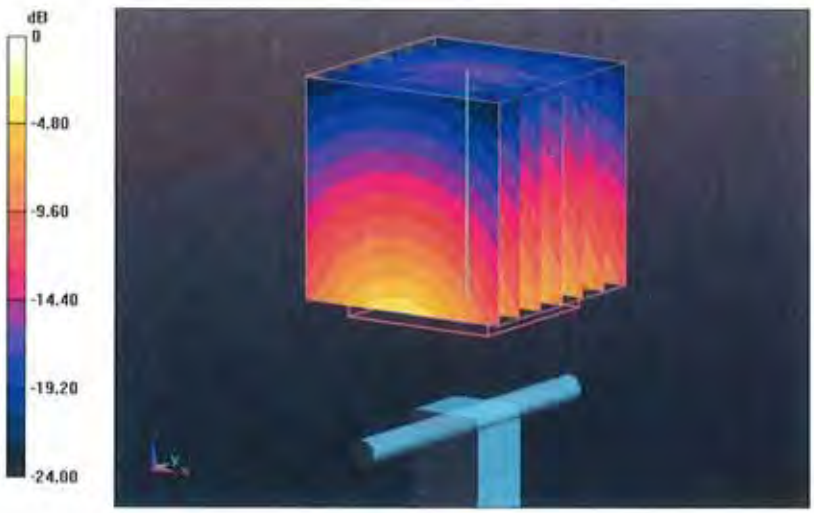
DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1003

Communication System: CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 2600 MHz; σ = 2.12 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.18, 4.18, 4.18); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

Pin=250 mW/d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.717 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 31.466 W/kg
SAR(1 g) = 14.4 mW/g; SAR(10 g) = 6.41 mW/g
Maximum value of SAR (measured) = 19.133 mW/g



0 dB = 19.130mW/g

Impedance Measurement Plot for Body TSL