

SAR TEST REPORT

Equipment Under Test	Touchpad
Model Number of Host	HSTNH-I31C
Mode of Operation	WLAN 802.11 a/b/g/n(20M)(40M) band
FCC ID	B94HHI31C
IC ID	3905A-HHI31C
Company Name	Hewlett-Packard Company
Company Address	950 W. Maude Ave, Sunnyvale, CA 94085 USA
Date of Receipt	2011.07.05
Date of Test(s)	2011.09.17 , 2011.09.28 , 2011.09.29
Date of Issue	2011.10.05

Standards:

**FCC OET 65 supplement C,
IEEE /ANSI C95.1, C95.3, IEEE 1528
RSS-102**

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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Tested by : **Chris Tsung**
Engineer

Chris Tsung

Date : **2011.10.05**

Approved by : **Kelly Tsai**
Supervisor

Kelly Tsai

Date : **2011.10.05**

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Revision Version

Report Number	Revision	Date	Memo
EN/2011/60014	00	2011.07.22	Initial creation of test report.
EN/2011/60014	01	2011.08.08	1 st modification
EN/2011/60014	02	2011.09.30	2 st modification
EN/2011/60014	03	2011.10.05	3 rd modification

This test report contains a reference to the previous version test report that it replaces.

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1. General Information

1.1 Testing Laboratory

Name	SGS Taiwan Ltd. Electronics & Communication Laboratory
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Telephone	+886-2-2299-3279
Fax	+886-2-2298-0488
Internet	http://www.tw.sgs.com

Testing Location	1F, No.8, Alley 15, Lane 120, Sec .1, NeiHu Road NeiHu District Taipei City 114, Taiwan
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1.2 Details of Applicant

Name	Hewlett-Packard Company
Address	950 W. Maude Ave, Sunnyvale, CA 94085 USA
Telephone	408-617-8903
Contact Person	Masood Abrishamcar
E-mail	masood.abrishamcar@hp.com
Website	www.hp.com

1.3 Description of EUT

EUT Name	Touchpad
Model Number	HSTNH-I31C
Marketing Name.	HP TouchPad
FCC ID	B94HHI31C

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IC ID	3905A-HHI31C		
Definition	Production unit		
Mode of Operation	WLAN 802.11 a/b/g/n(20M & 40M) band		
Duty Cycle	WLAN 802.11 a/b/g/n (20M & 40M)		
	1		
TX Frequency range (MHz)	WLAN802.11 b	WLAN802.11 g	WLAN802.11 n (20M)
	2412-2462	2412-2462	2412-2462
	WLAN802.11 n (20M) 5G	WLAN802.11 n (40M) 5G	WLAN802.11 a
	5180-5825	5190-5795	5180-5825
Channel Number (ARFCN)	WLAN802.11 b	WLAN802.11 g	WLAN802.11 n(20M)
	1-11	1-11	1-11
	WLAN802.11 n (20M) 5G	WLAN802.11 n (40M) 5G	WLAN802.11 a
	36-165	38-159	36-165
Max. SAR Measured (1g)	WLAN		
	0.897 W/kg (At WLAN802.11 n(40M)_CH159_Configuration 5)		

Note:

1. The 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.
2. The 1-g SAR for the highest output channel is less than 0.4 W/kg, where the transmission band corresponding to all channels is ≤ 200 MHz, testing for the other channels is not required.

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Conducted Power

WLAN Antenna			
EUT Mode	Frequency (MHz)	CH	AVG. Power (dBm)
WLAN802.11 b	2412	1	15.11
	2437	6	14.49
	2462	11	14.92
EUT Mode	Frequency (MHz)	CH	AVG. Power (dBm)
WLAN802.11 g	2412	1	13.23
	2437	6	14.76
	2462	11	14.41
EUT Mode	Frequency (MHz)	CH	AVG. Power (dBm)
WLAN802.11 n (20M)	2412	1	11.84
	2437	6	14.91
	2462	11	13.36
EUT Mode	Frequency (MHz)	CH	AVG. Power (dBm)
WLAN802.11 n 20M(5.2G)	5180	36	12.98
	5240	48	12.14
	5260	52	13.99
	5320	64	14.19

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EUT Mode	Frequency (MHz)	CH	AVG. Power (dBm)
WLAN802.11 n 20M(5.5G)	5500	100	14.76
	5580	116	14.66
	5600	120	14.59
	5700	140	14.94
EUT Mode	Frequency (MHz)	CH	AVG. Power (dBm)
WLAN802.11 n 20M(5.8G)	5745	149	14.58
	5785	157	14.93
	5825	165	14.82
EUT Mode	Frequency (MHz)	CH	AVG. Power (dBm)
WLAN802.11 n 40M(5.2G)	5190	38	14.97
	5230	46	14.78
	5270	54	14.38
	5310	62	15
EUT Mode	Frequency (MHz)	CH	AVG. Power (dBm)
WLAN802.11 n 40M(5.5G)	5510	102	14.71
	5590	118	13.81
	5670	134	13.94
EUT Mode	Frequency (MHz)	CH	AVG. Power (dBm)
WLAN802.11 n 40M(5.8G)	5755	151	14.46
	5795	159	14.75

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EUT Mode	Frequency (MHz)	CH	AVG. Power (dBm)
WLAN802.11 a 5.2G	5180	36	12.94
	5200	40	12.90
	5220	44	12.85
	5240	48	12.98
	5260	52	15.8
	5280	56	15.35
	5300	60	15.28
	5320	64	15.29
EUT Mode	Frequency (MHz)	CH	AVG. Power (dBm)
WLAN802.11 a 5.5G	5500	100	15.67
	5520	104	15.77
	5540	108	15.65
	5560	112	15.68
	5580	116	15.88
	5600	120	15.84
	5620	124	15.78
	5640	128	15.65
	5660	132	15.64
	5680	136	15.56
	5700	140	15.43

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EUT Mode	Frequency (MHz)	CH	AVG. Power (dBm)
WLAN802.11 a 5.8G	5745	149	15.75
	5765	153	15.65
	5785	157	15.54
	5805	161	15.45
	5825	165	16

According to **KDB248227**-SAR is not required for 802.11 g/HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels

1.4 Test Environment

Ambient Temperature : $22 \pm 2^{\circ} \text{C}$

Tissue Simulating Liquid: $22 \pm 2^{\circ} \text{C}$

1.5 Operation description

Use chipset specific software to control the EUT, and makes it transmit in maximum power. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s).

The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.

When the maximum transmitter and antenna output power are $\leq 60/f(\text{GHz})$ (mW) SAR evaluation is typically not required for FCC or TCB approval (BT power= 6.41 dBm).

We will test it with 2 configurations:

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Configuration 1: Lap-held mode. (WLAN/Main-to-user separation distance is 4.63 mm) (Appendix-Fig.3)

Configuration 2: Primary portrait mode. (WLAN/main-to-edge of screen distance is 100.42 mm. SAR test is not required) (Appendix-Fig.4)

Configuration 3: Secondary portrait mode. (WLAN/Main-to-user separation distance is 51.22 mm. SAR test is not required) (Appendix-Fig.5)

Configuration 4: Primary Landscape mode.(WLAN/main-to-edge of screen distance is 135.06 mm. SAR test is not required) (Appendix-Fig.6)

Configuration 5: Secondary landscape mode.(WLAN/ main-to-edge of screen distance is 4.84 mm) (Appendix-Fig.7)

- # For larger tablets with a display or overall diagonal dimension > 20 cm, the SAR procedures in **KDB 447498** should be used.
- # The following procedures are applicable to tablet computers with antennas installed along the tablet edges while operating in Tablet Mode.21 When the output power of an antenna is > 60/f(GHz) mW, SAR is required for both bottom face and edge exposure conditions.
- # For edge configuration: SAR is required for each antenna located within 5 cm of the tablet edge closet to the user for the applicable display orientation
- # All the test positions of device relative to body were measured placing the device in direct contact with the phantom surface, so the requirements mentioned at RSS-102 Supplementary Procedures (SPR)-001 - SAR TESTING REQUIREMENTS WITH REGARD TO BYSTANDERS FOR LAPTOP TYPE COMPUTERS WITH ANTENNAS BUILT-IN ON DISPLAY SCREEN (LAPTOP MODE/TABLET MODE) are covered.

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1.6 The SAR Measurement System

A photograph of the SAR measurement System is given in Fig. a. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY 5 professional system). A Model EX3DV4 field probe is used to determine the internal electric fields. The SAR can be obtained from the equation $SAR = \sigma (|E_i|^2) / \rho$ where σ and ρ are the conductivity and mass density of the tissue-simulant.

The DASY5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc.

The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

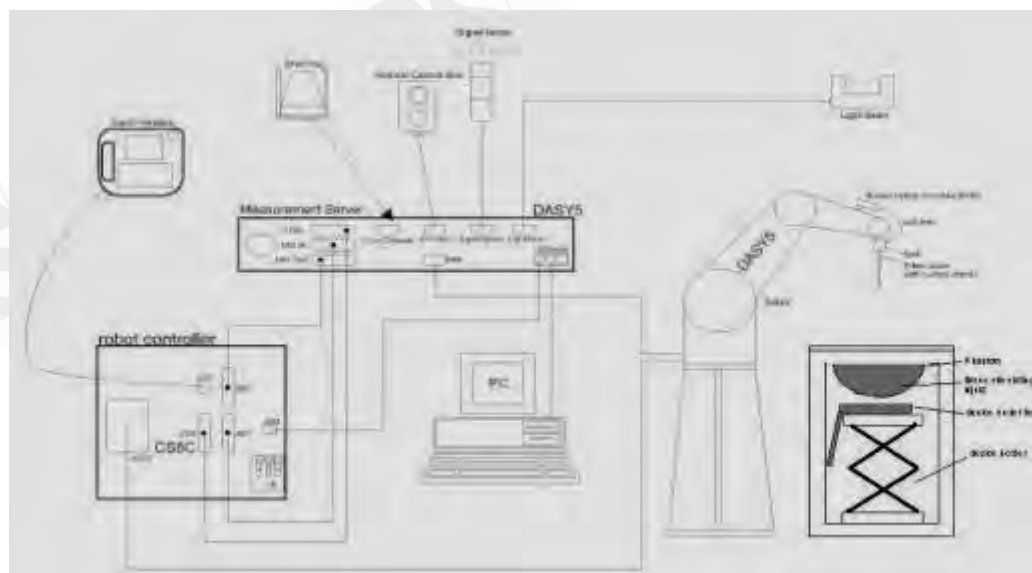


Fig.a The block diagram of SAR system

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- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
 - A computer operating Windows 2000 or Windows XP.
 - DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
 - The SAM twin phantom enabling testing left-hand and right-hand usage.
 - The device holder for handheld mobile phones.
 - Tissue simulating liquid mixed according to the given recipes.
 - Validation dipole kits allowing to validate the proper functioning of the system.

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1.7 System Components

EX3DV4 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)	
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for MSL2450/5200/5500/5800 MHZ Additional CF for other liquids and frequencies upon request	
Frequency	10 MHz to > 6 GHz, Linearity: ± 0.2 dB (30 MHz to 6 GHz)	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 μ W/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)	
Dimensions	Overall length: 337 mm (Tip: 9 mm) Tip diameter: 2.5 mm (Body: 10 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%.	

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SAM PHANTOM V4.0C

Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50361 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 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Height: 850 mm; Length: 1000 mm; Width: 500 mm	

DEVICE HOLDER

Construction	The device holder (Supporter) for Notebook is made by POM (polyoxymethylene resin) , which is non-metal and non-conductive. The height can be adjusted to fit varies kind of notebooks.	 Device Holder
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1.8 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within $\pm 5\%$ from the target SAR values. These tests were done at 2450/5200/5500/5800 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was in the range 22.1°C, the relative humidity was in the range 62% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

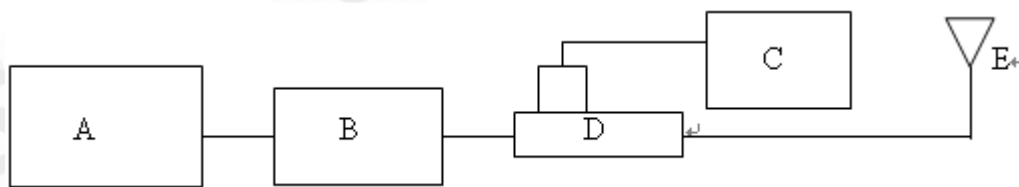


Fig.b The block diagram of system verification

- A. Agilent Model 8648D Signal Generator
- B. Mini circuits Model ZHL-42 Amplifier
- C. Agilent Model U2001B Power Sensor
- D. Agilent Model 777D Dual directional coupling
- E. Reference dipole antenna



Photograph of the dipole Antenna

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Validation Kit	Frequency Hz	Target SAR (1g) (Pin=250mW)	Measured SAR (1g)	Measured Date
D2450V2 S/N: 727	2450 MHz (Body)	12.7 mW/g	13.2 mW/g	2011-09-17
D5200V2 S/N:1040	5200 MHz (Body)	7.81 mW/g	7.71 mW/g	2011-09-28
D5500V2 S/N: 1040	5500 MHz (Body)	8.3 mW/g	8.12 mW/g	2011-09-29
D5800V2 S/N: 1040	5800 MHz (Body)	7.44 mW/g	7.23 mW/g	2011-09-29

Table 1. Results of system validation

1.9 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this body-simulant fluid were measured by using the Agilent Model 85070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with HP 8753D Network Analyzer (30 KHz-6000 MHz) by using a procedure detailed in Section V.

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The depth of the tissue simulant in the ear reference point of the phantom was 15cm±5mm during all tests. (Fig .2)

Frequency (MHz)	Tissue type	Measurement date/ Limits	Dielectric Parameters		
			ρ	σ (S/m)	Simulated Tissue Temperature(° C)
2450	Body	Measured, 2011-09-17	51.63	1.964	21.7
		Recommended Limits	48.07-53.13	1.81-2.01	20-24
5200	Body	Measured, 2011-09-28	48.722	5.27	21.7
		Recommended Limits	44.84-49.56	5.13-5.67	20-24
5500	Body	Measured, 2011-09-29	47.855	5.747	21.7
		Recommended Limits	44.27-48.93	5.49-6.07	20-24
5800	Body	Measured, 2011-09-29	46.85	6.144	21.7
		Recommended Limits	43.80-48.41	5.87-6.49	20-24

Table 2. Dielectric Parameters of Tissue Simulant Fluid

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1.10 Evaluation Procedures

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 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

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

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

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

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The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans. The routines are verified and optimized for the grid dimensions used in these cube measurements.

The measured volume of 30x30x30mm 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 the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is moved around until the highest averaged SAR is found. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

1.11 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate ("SAR") in Section 4.2 of "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," ANSI/IEEE C95.1-1992, Copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in "Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814.

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SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

- (1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube).
- (2) Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.
- (3) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.(Table .4)

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Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR (Brain)	1.60 m W/g	8.00 m W/g
Spatial Average SAR (Whole Body)	0.08 m W/g	0.40 m W/g
Spatial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 m W/g	20.00 m W/g

Table .3 RF exposure limits

Notes:

1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

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2. Summary of Results

WLAN802.11 b

Configuration 1: Lap-held mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
2450MHz	1	2412	15.11 dBm	0.207	22.1	21.7
Configuration 5: Secondary landscape mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
2450MHz	1	2412	15.11 dBm	0.211	22.1	21.7

WLAN802.11 a 5.2G

Configuration 1: Lap-held mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
5200MHz	52	5260	15.8 dBm	0.103	22.1	21.7
Configuration 5: Secondary landscape mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
5200MHz	36	5180	12.94 dBm	0.235	22.1	21.7
	48	5240	12.98 dBm	0.275	22.1	21.7
	52	5260	15.8 dBm	0.473	22.1	21.7
	64	5320	15.29 dBm	0.505	22.1	21.7

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WLAN802.11 n (20M) 5.2G

Configuration 1: Lap-held mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[° C]	Liquid Temp[° C]
5200MHz	64	5320	14.19 dBm	0.097	22.1	21.7
Configuration 5: Secondary landscape mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[° C]	Liquid Temp[° C]
5200MHz	36	5180	12.98 dBm	0.185	22.1	21.7
	48	5240	12.14 dBm	0.277	22.1	21.7
	52	5260	13.99 dBm	0.257	22.1	21.7
	64	5320	14.19 dBm	0.455	22.1	21.7

WLAN802.11 n (40M) 5.2G

Configuration 1: Lap-held mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[° C]	Liquid Temp[° C]
5200MHz	62	5310	15.00 dBm	0.084	22.1	21.7
Configuration 5: Secondary landscape mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[° C]	Liquid Temp[° C]
5200MHz	38	5190	14.97 dBm	0.371	22.1	21.7
	46	5230	14.78 dBm	0.356	22.1	21.7
	54	5270	14.38 dBm	0.344	22.1	21.7
	62	5310	15 dBm	0.415	22.1	21.7

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WLAN802.11 a 5.5G

Configuration 1: Lap-held mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[° C]	Liquid Temp[° C]
5500MHz	116	5580	15.88 dBm	0.203	22.1	21.7
Configuration 5: Secondary landscape mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[° C]	Liquid Temp[° C]
5500MHz	104	5520	15.77 dBm	0.763	22.1	21.7
	116	5580	15.88 dBm	0.598	22.1	21.7
	124	5620	15.78 dBm	0.642	22.1	21.7
	136	5680	15.56 dBm	0.791	22.1	21.7

WLAN802.11 n (20M) 5.5G

Configuration 1: Lap-held mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[° C]	Liquid Temp[° C]
5500MHz	140	5700	14.94 dBm	0.243	22.1	21.7
Configuration 5: Secondary landscape mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[° C]	Liquid Temp[° C]
5500MHz	100	5500	14.76 dBm	0.464	22.1	21.7
	116	5580	14.66 dBm	0.577	22.1	21.7
	120	5600	14.59 dBm	0.619	22.1	21.7
	140	5700	14.94 dBm	0.617	22.1	21.7

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WLAN802.11 n (40M) 5.5G

Configuration 1: Lap-held mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
5500MHz	102	5510	14.71 dBm	0.178	22.1	21.7
Configuration 5: Secondary landscape mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
5500MHz	102	5510	14.71 dBm	0.499	22.1	21.7
	118	5590	13.81 dBm	0.399	22.1	21.7
	134	5670	13.94 dBm	0.484	22.1	21.7

WLAN802.11 a 5.8G

Configuration 1: Lap-held mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
5800MHz	165	5825	16.00 dBm	0.297	22.1	21.7
Configuration 5: Secondary landscape mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
5800MHz	165	5825	16.00 dBm	0.762	22.1	21.7

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WLAN802.11 n (20M) 5.8G

Configuration 1: Lap-held mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
5800MHz	157	5785	14.93 dBm	0.261	22.1	21.7
Configuration 5: Secondary landscape mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
5800MHz	157	5785	14.93dBm	0.731	22.1	21.7

WLAN802.11 n(40M) 5.8G

Configuration 1: Lap-held mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
5800MHz	159	5795	14.75 dBm	0.250	22.1	21.7
Configuration 5: Secondary landscape mode						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
5800MHz	151	5755	14.46 dBm	0.700	22.1	21.7
	159	5795	14.75 dBm	0.897	22.1	21.7

Note: The SAR measurement results with transmitter at maximum output power.

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3. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV4	3770	Apr.19.2011
Schmid & Partner Engineering AG	2450/5200/5500/5800 MHz System Validation Dipole	D2450V2	727	Apr.19.2011
		D5GHzV2	1023	Jan.19.2011
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	856	May.18.2011
Schmid & Partner Engineering AG	Software	DASY 5 V5.0 Build125	N/A	Calibration not required
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration not required
HP	Network Analyzer	8753D	3410A05547	Mar.16.2011
HP	Dielectric Probe Kit	85070D	US01440168	Calibration not required
Agilent	Dual-directional coupler	777D	50114	Aug.18.2011
Agilent	RF Signal Generator	8648D	3847M00432	Jun.01.2011
Agilent	Power Sensor	U2001B	MY48100169	Apr.28.2011

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4. Measurements

Date: 2011-09-17

Configuration 1_WLAN802.11b_CH1

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2412 MHz

Medium parameters used: $f = 2412$ MHz; $\sigma = 1.909$ mho/m; $\epsilon_r = 51.781$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (71x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.303 mW/g

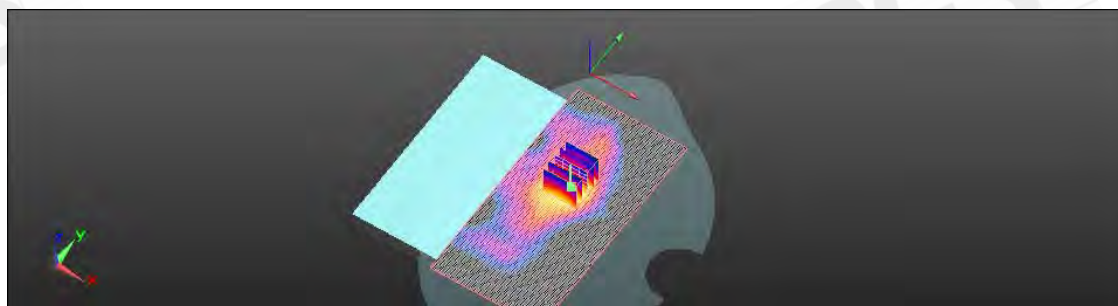
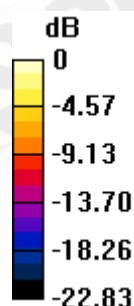
Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.116 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.436 W/kg

SAR(1 g) = 0.207 mW/g; SAR(10 g) = 0.101 mW/g

Maximum value of SAR (measured) = 0.304 mW/g



0 dB = 0.300mW/g

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Date: 2011-09-17

Configuration 5_WLAN802.11b_CH1

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2412 MHz

Medium parameters used: $f = 2412$ MHz; $\sigma = 1.909$ mho/m; $\epsilon_r = 51.781$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.359 mW/g

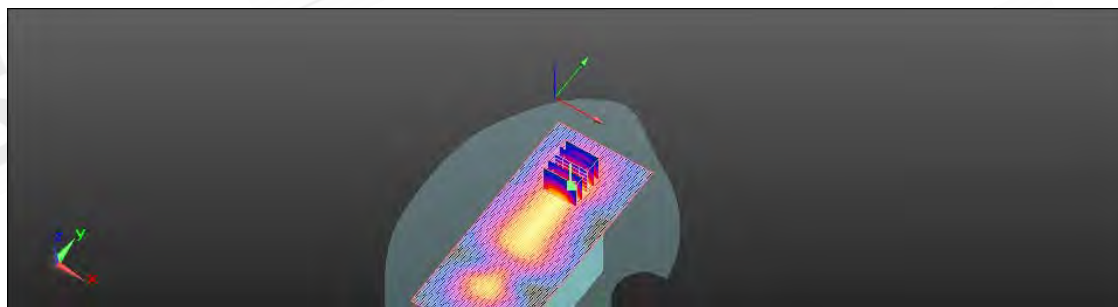
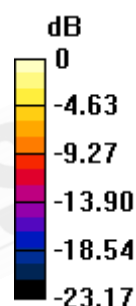
Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.053 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.473 W/kg

SAR(1 g) = 0.211 mW/g; SAR(10 g) = 0.092 mW/g

Maximum value of SAR (measured) = 0.355 mW/g



0 dB = 0.360mW/g

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Date: 2011-09-28

Configuration 1_WLAN802.11a5.2G_CH52

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5260 MHz

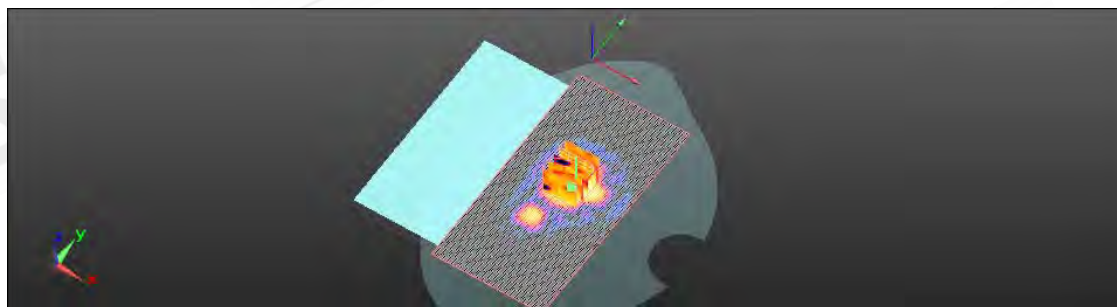
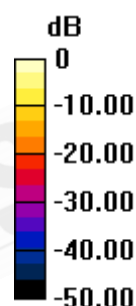
Medium parameters used: $f = 5260 \text{ MHz}$; $\sigma = 5.393 \text{ mho/m}$; $\epsilon_r = 48.596$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.12, 4.12, 4.12); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (71x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (interpolated) = 0.249 mW/g **Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0:** Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$ Reference Value = 3.341 V/m ; Power Drift = 0.14 dB Peak SAR (extrapolated) = 0.271 W/kg **SAR(1 g) = 0.103 mW/g ; SAR(10 g) = 0.046 mW/g** Maximum value of SAR (measured) = 0.190 mW/g 0 dB = 0.190mW/g

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Date: 2011-09-28

Configuration 5_WLAN802.11a 5.2G_CH36

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5180 MHz

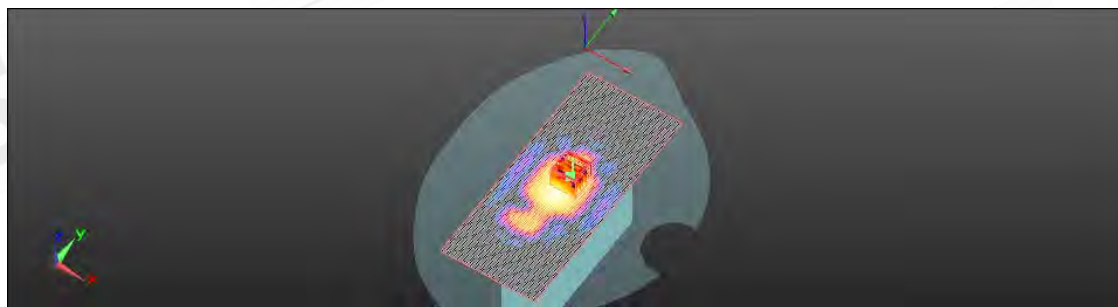
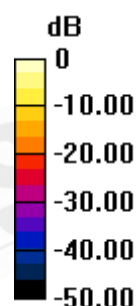
Medium parameters used: $f = 5180 \text{ MHz}$; $\sigma = 5.244 \text{ mho/m}$; $\epsilon_r = 48.764$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.42, 4.42, 4.42); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (interpolated) = 0.634 mW/g **Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0:** Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$ Reference Value = 5.864 V/m ; Power Drift = 0.09 dB Peak SAR (extrapolated) = 0.994 W/kg **SAR(1 g) = 0.235 mW/g ; SAR(10 g) = 0.062 mW/g** Maximum value of SAR (measured) = 0.505 mW/g  $0 \text{ dB} = 0.510\text{mW/g}$

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Date: 2011-09-28

Configuration 5_WLAN802.11a 5.2G_CH48

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5240 MHz

Medium parameters used: $f = 5240$ MHz; $\sigma = 5.357$ mho/m; $\epsilon_r = 48.643$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.42, 4.42, 4.42); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.731 mW/g

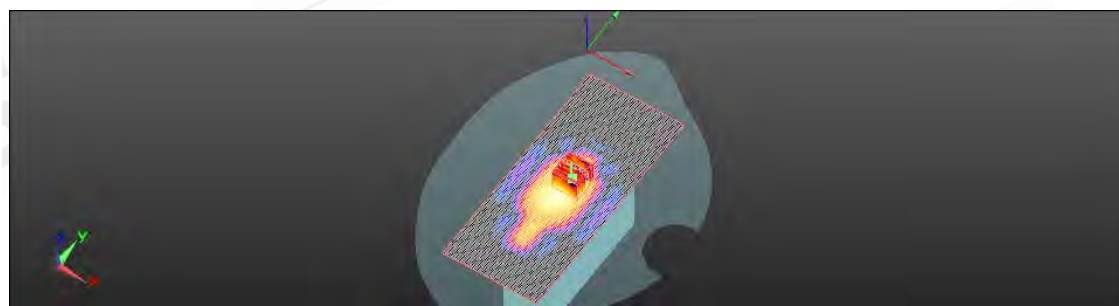
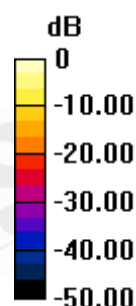
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.111 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 1.210 W/kg

SAR(1 g) = 0.275 mW/g; SAR(10 g) = 0.071 mW/g

Maximum value of SAR (measured) = 0.596 mW/g



0 dB = 0.600mW/g

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Date: 2011-09-28

Configuration 5_WLAN802.11a 5.2G_CH52

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5260 MHz

Medium parameters used: $f = 5260$ MHz; $\sigma = 5.393$ mho/m; $\epsilon_r = 48.596$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.12, 4.12, 4.12); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.250 mW/g

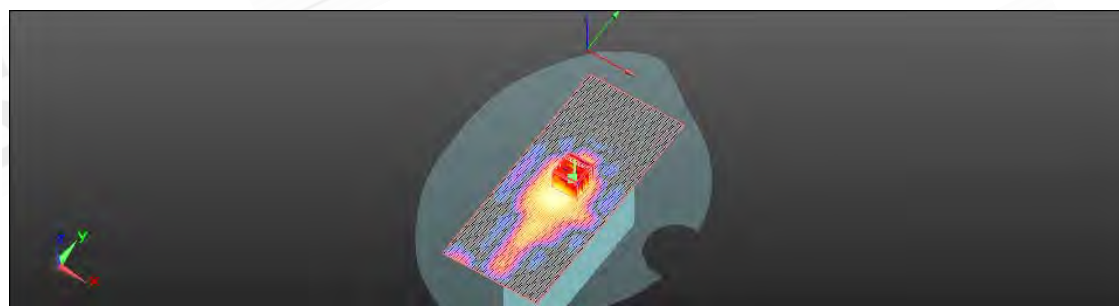
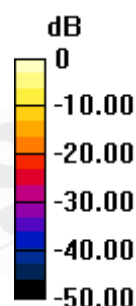
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 7.793 V/m; Power Drift = 0.20 dB

Peak SAR (extrapolated) = 2.099 W/kg

SAR(1 g) = 0.473 mW/g; SAR(10 g) = 0.122 mW/g

Maximum value of SAR (measured) = 1.040 mW/g



0 dB = 1.040mW/g

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Date: 2011-09-28

Configuration 5_WLAN802.11a 5.2G_CH64

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5320 MHz

Medium parameters used: $f = 5320$ MHz; $\sigma = 5.499$ mho/m; $\epsilon_r = 48.447$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.12, 4.12, 4.12); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.342 mW/g

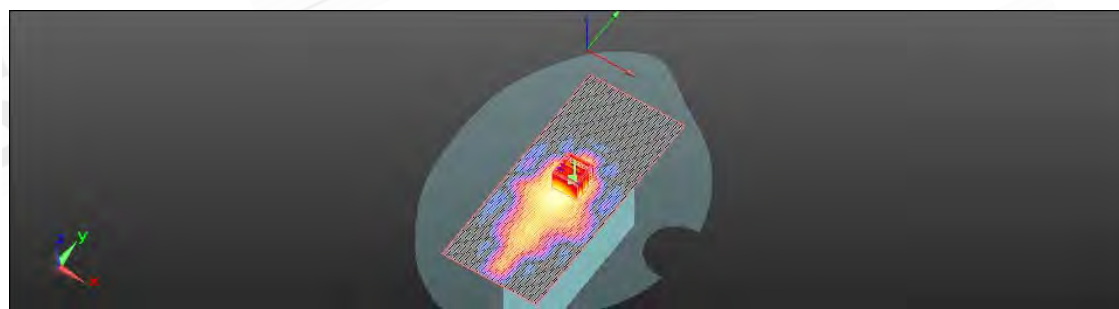
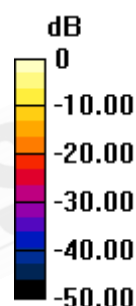
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 7.624 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 2.269 W/kg

SAR(1 g) = 0.505 mW/g; SAR(10 g) = 0.127 mW/g

Maximum value of SAR (measured) = 1.119 mW/g



0 dB = 1.120mW/g

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Date: 2011-09-28

Configuration 1_WLAN802.11n(20M)5.2G_CH64

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5320 MHz

Medium parameters used: $f = 5320 \text{ MHz}$; $\sigma = 5.499 \text{ mho/m}$; $\epsilon_r = 48.447$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.12, 4.12, 4.12); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (71x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.263 mW/g

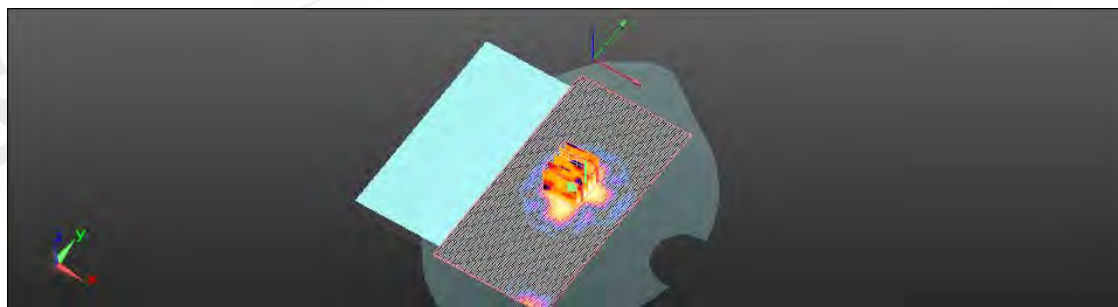
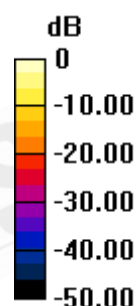
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 3.181 V/m ; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.262 W/kg

SAR(1 g) = 0.097 mW/g ; SAR(10 g) = 0.039 mW/g

Maximum value of SAR (measured) = 0.189 mW/g



0 dB = 0.190 mW/g

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Date: 2011-09-28

Configuration 5_WLAN802.11n(20M)5.2G_CH36

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5180 MHz

Medium parameters used: $f = 5180$ MHz; $\sigma = 5.244$ mho/m; $\epsilon_r = 48.764$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.42, 4.42, 4.42); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

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

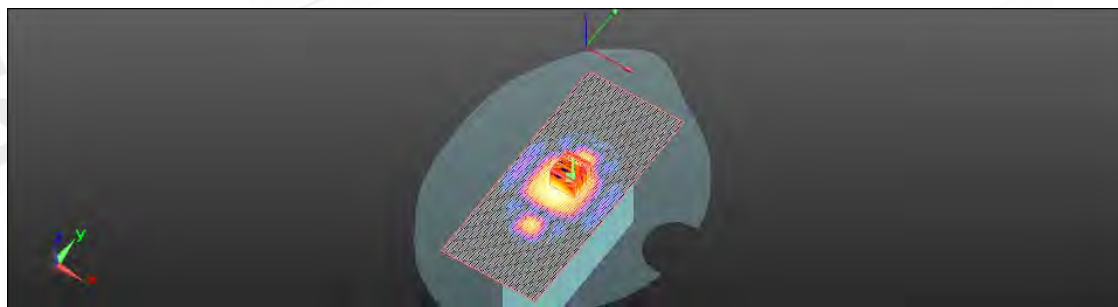
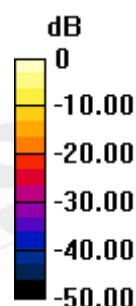
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 4.982 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.817 W/kg

SAR(1 g) = 0.185 mW/g; SAR(10 g) = 0.048 mW/g

Maximum value of SAR (measured) = 0.413 mW/g



0 dB = 0.410mW/g

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Date: 2011-09-28

Configuration 5_WLAN802.11n(20M)5.2G_CH48

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5240 MHz

Medium parameters used: $f = 5240$ MHz; $\sigma = 5.357$ mho/m; $\epsilon_r = 48.643$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.42, 4.42, 4.42); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.706 mW/g

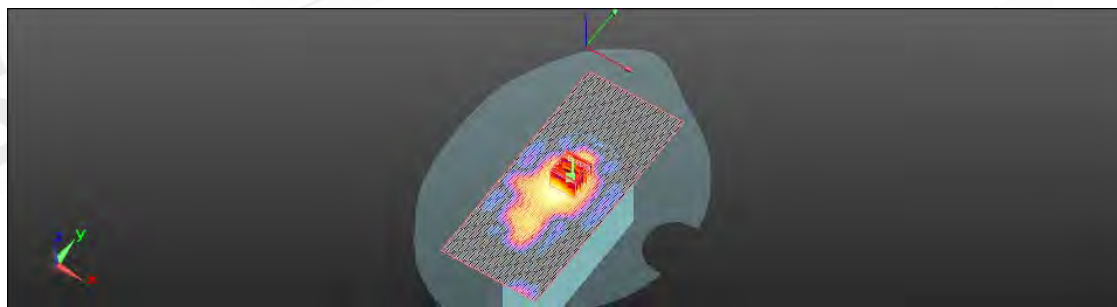
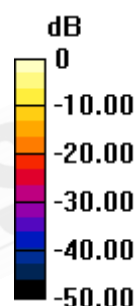
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 5.799 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 1.322 W/kg

SAR(1 g) = 0.277 mW/g; SAR(10 g) = 0.069 mW/g

Maximum value of SAR (measured) = 0.653 mW/g



0 dB = 0.650mW/g

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Date: 2011-09-28

Configuration 5_WLAN802.11n(20M)5.2G_CH52

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5260 MHz

Medium parameters used: $f = 5260 \text{ MHz}$; $\sigma = 5.393 \text{ mho/m}$; $\epsilon_r = 48.596$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.12, 4.12, 4.12); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

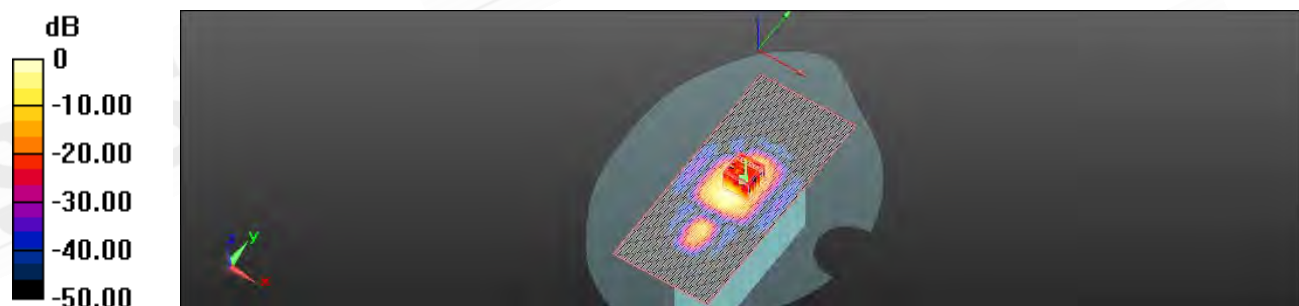
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 5.490 V/m ; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 1.112 W/kg

SAR(1 g) = 0.257 mW/g ; SAR(10 g) = 0.062 mW/g

Maximum value of SAR (measured) = 0.590 mW/g



0 dB = 0.590mW/g

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Date: 2011-09-28

Configuration 5_WLAN802.11n(20M)5.2G_CH64

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5320 MHz

Medium parameters used: $f = 5320$ MHz; $\sigma = 5.499$ mho/m; $\epsilon_r = 48.447$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.12, 4.12, 4.12); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.091 mW/g

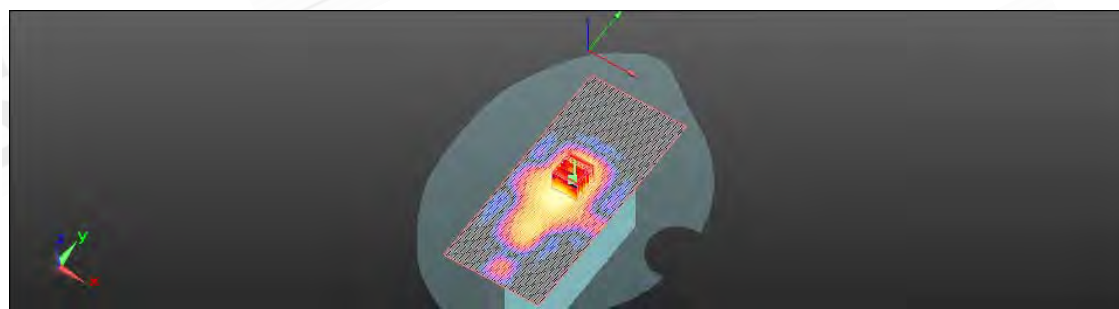
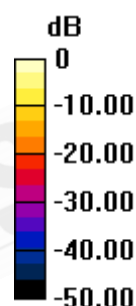
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 7.351 V/m; Power Drift = -0.23 dB

Peak SAR (extrapolated) = 2.026 W/kg

SAR(1 g) = 0.455 mW/g; SAR(10 g) = 0.115 mW/g

Maximum value of SAR (measured) = 0.966 mW/g



0 dB = 0.970mW/g

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Date: 2011-09-28

Configuration 1_WLAN802.11n(40M)5.2G_CH62

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5310 MHz

Medium parameters used: $f = 5310$ MHz; $\sigma = 5.479$ mho/m; $\epsilon_r = 48.467$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.12, 4.12, 4.12); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (71x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.231 mW/g

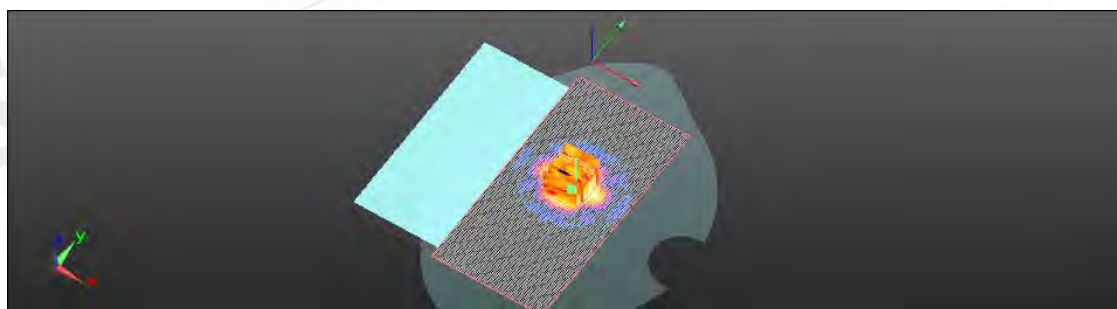
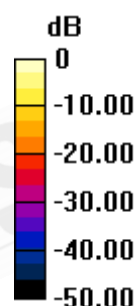
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 3.051 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.228 W/kg

SAR(1 g) = 0.084 mW/g; SAR(10 g) = 0.031 mW/g

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



0 dB = 0.140mW/g

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Date: 2011-09-28

Configuration 5_WLAN802.11n(40M)5.2G_CH38

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5190 MHz

Medium parameters used: $f = 5190$ MHz; $\sigma = 5.257$ mho/m; $\epsilon_r = 48.743$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.42, 4.42, 4.42); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.853 mW/g

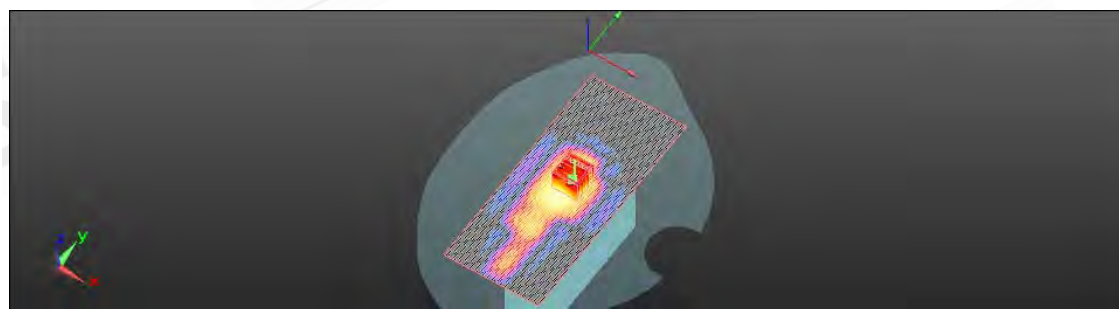
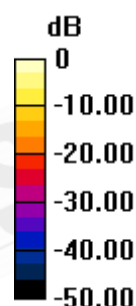
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 7.102 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.614 W/kg

SAR(1 g) = 0.371 mW/g; SAR(10 g) = 0.098 mW/g

Maximum value of SAR (measured) = 0.819 mW/g



0 dB = 0.820mW/g

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Date: 2011-09-28

Configuration 5_WLAN802.11n(40M)5.2G_CH46

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5230 MHz

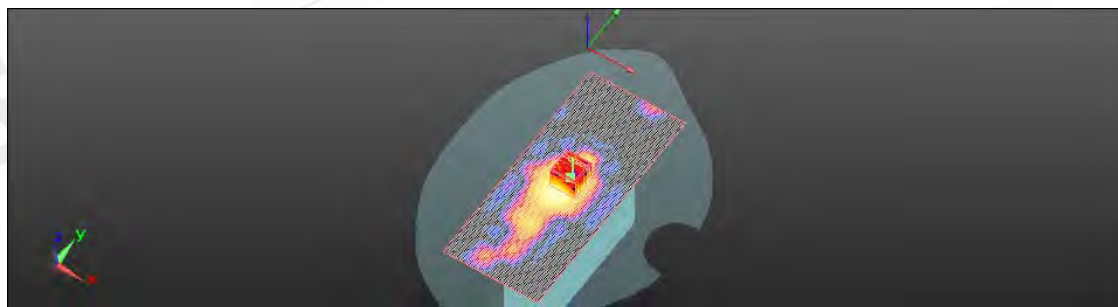
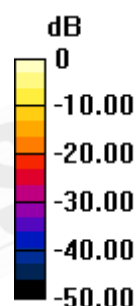
Medium parameters used: $f = 5230 \text{ MHz}$; $\sigma = 5.322 \text{ mho/m}$; $\epsilon_r = 48.665$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.42, 4.42, 4.42); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (interpolated) = 0.865 mW/g **Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0:** Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$ Reference Value = 6.471 V/m ; Power Drift = 0.14 dB Peak SAR (extrapolated) = 1.619 W/kg **SAR(1 g) = 0.356 mW/g ; SAR(10 g) = 0.093 mW/g** Maximum value of SAR (measured) = 0.792 mW/g 0 dB = 0.790mW/g

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Date: 2011-09-28

Configuration 5_WLAN802.11n(40M)5.2G_CH54

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5270 MHz

Medium parameters used: $f = 5270$ MHz; $\sigma = 5.408$ mho/m; $\epsilon_r = 48.56$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.12, 4.12, 4.12); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.723 mW/g

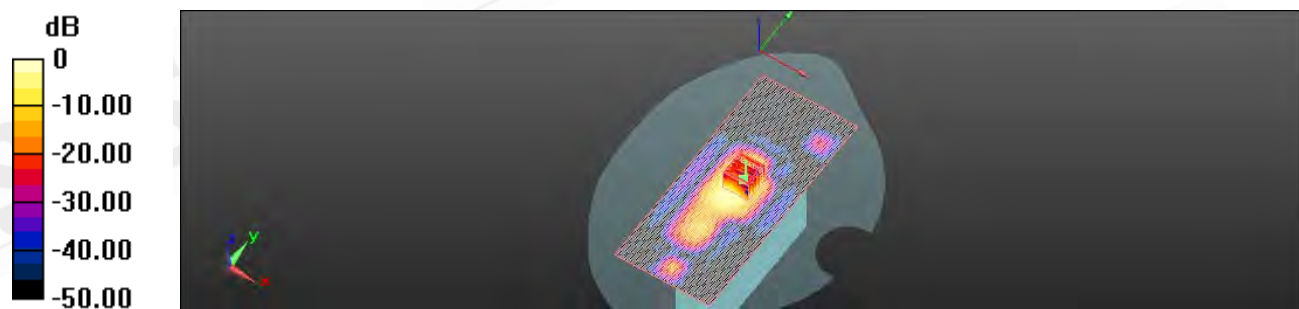
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.050 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 1.475 W/kg

SAR(1 g) = 0.344 mW/g; SAR(10 g) = 0.088 mW/g

Maximum value of SAR (measured) = 0.757 mW/g



0 dB = 0.760mW/g

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Date: 2011-09-28

Configuration 5_WLAN802.11n(40M)5.2G_CH62

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5310 MHz

Medium parameters used: $f = 5310 \text{ MHz}$; $\sigma = 5.479 \text{ mho/m}$; $\epsilon_r = 48.467$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.12, 4.12, 4.12); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.977 mW/g

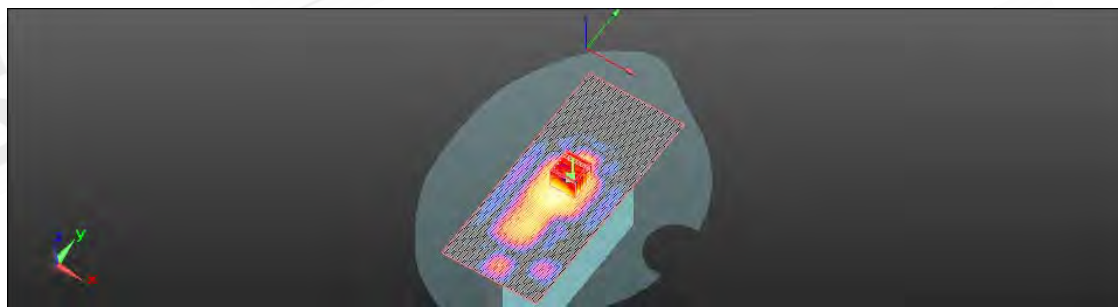
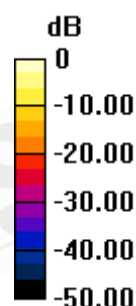
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 6.738 V/m ; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.898 W/kg

SAR(1 g) = 0.415 mW/g ; SAR(10 g) = 0.102 mW/g

Maximum value of SAR (measured) = 0.921 mW/g



0 dB = 0.920mW/g

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Date: 2011-09-29

Configuration 1_WLAN802.11a5.5G_CH116

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5580 MHz

Medium parameters used: $f = 5580 \text{ MHz}$; $\sigma = 5.841 \text{ mho/m}$; $\epsilon_r = 47.663$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (71x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.405 mW/g

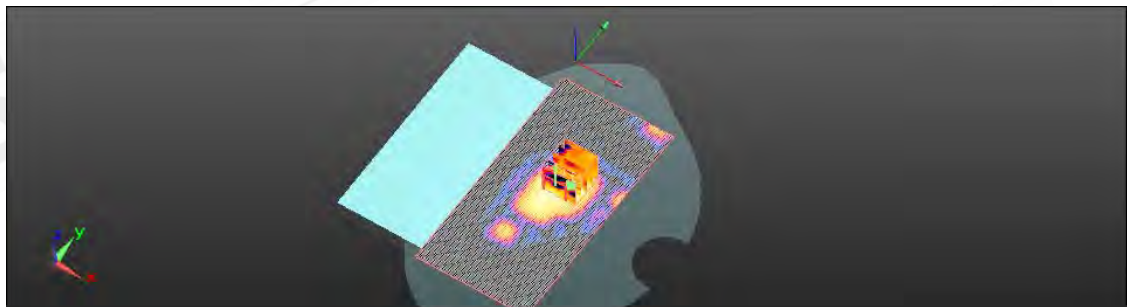
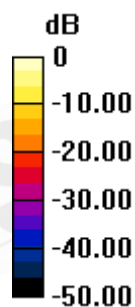
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 3.794 V/m ; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.612 W/kg

SAR(1 g) = 0.203 mW/g ; SAR(10 g) = 0.064 mW/g

Maximum value of SAR (measured) = 0.318 mW/g



0 dB = 0.320mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11a 5.5G_CH104

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5520 MHz

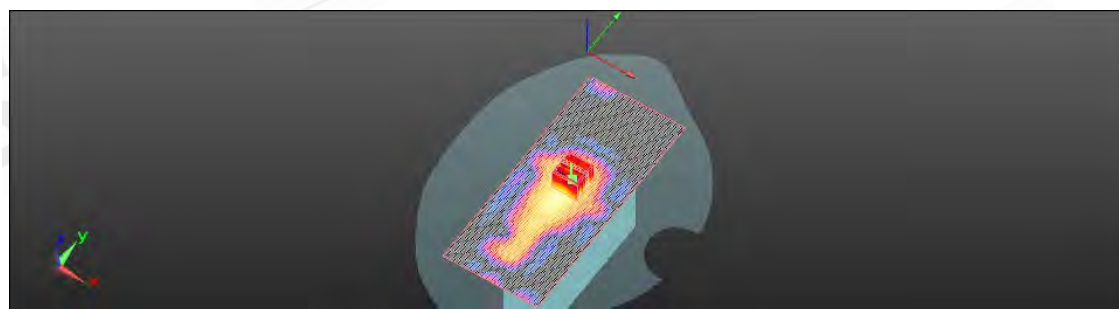
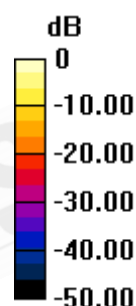
Medium parameters used: $f = 5520 \text{ MHz}$; $\sigma = 5.771 \text{ mho/m}$; $\epsilon_r = 47.783$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (interpolated) = 1.825 mW/g **Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0:** Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$ Reference Value = 7.954 V/m ; Power Drift = 0.03 dB Peak SAR (extrapolated) = 3.502 W/kg **SAR(1 g) = 0.763 mW/g ; SAR(10 g) = 0.188 mW/g** Maximum value of SAR (measured) = 1.723 mW/g 0 dB = 1.720mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11a 5.5G_CH116

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5580 MHz

Medium parameters used: $f = 5580 \text{ MHz}$; $\sigma = 5.841 \text{ mho/m}$; $\epsilon_r = 47.663$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 1.408 mW/g

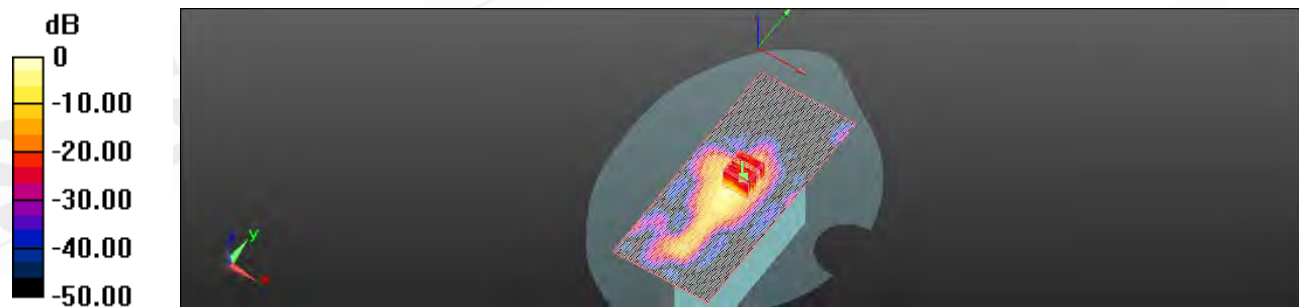
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 6.867 V/m ; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 2.720 W/kg

SAR(1 g) = 0.598 mW/g ; SAR(10 g) = 0.139 mW/g

Maximum value of SAR (measured) = 1.345 mW/g



0 dB = 1.350mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11a 5.5G_CH124

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5620 MHz

Medium parameters used: $f = 5620$ MHz; $\sigma = 5.878$ mho/m; $\epsilon_r = 47.544$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.614 mW/g

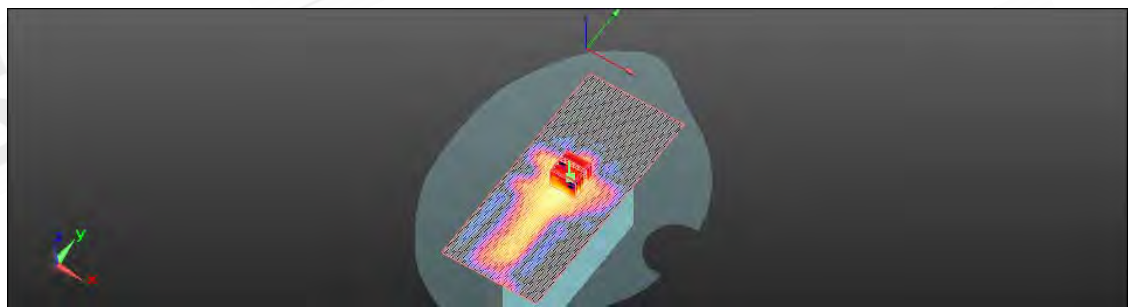
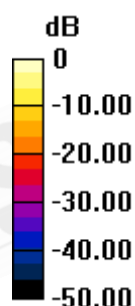
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.771 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 3.012 W/kg

SAR(1 g) = 0.642 mW/g; SAR(10 g) = 0.151 mW/g

Maximum value of SAR (measured) = 1.406 mW/g



0 dB = 1.410mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11a 5.5G_CH136

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5680 MHz

Medium parameters used: $f = 5680$ MHz; $\sigma = 5.981$ mho/m; $\epsilon_r = 47.233$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.997 mW/g

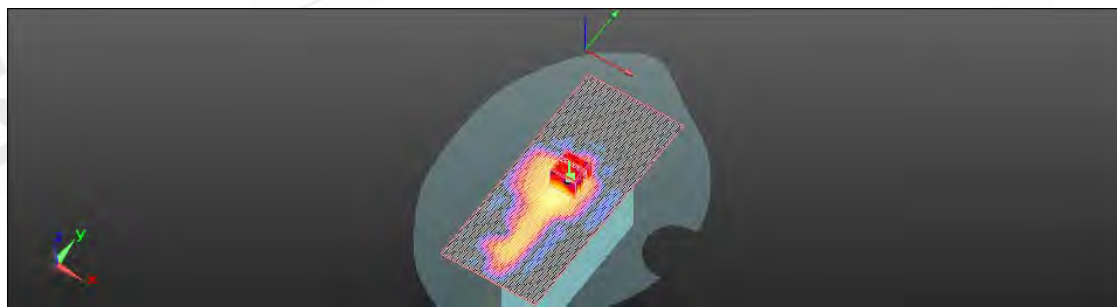
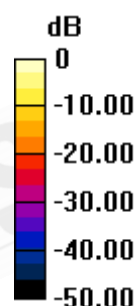
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.656 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 3.804 W/kg

SAR(1 g) = 0.791 mW/g; SAR(10 g) = 0.184 mW/g

Maximum value of SAR (measured) = 1.851 mW/g



0 dB = 1.850mW/g

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Date: 2011-09-29

Configuration 1_WLAN802.11n(20M)5.5G_CH140

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5700 MHz

Medium parameters used: $f = 5700 \text{ MHz}$; $\sigma = 6.027 \text{ mho/m}$; $\epsilon_r = 47.298$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (71x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

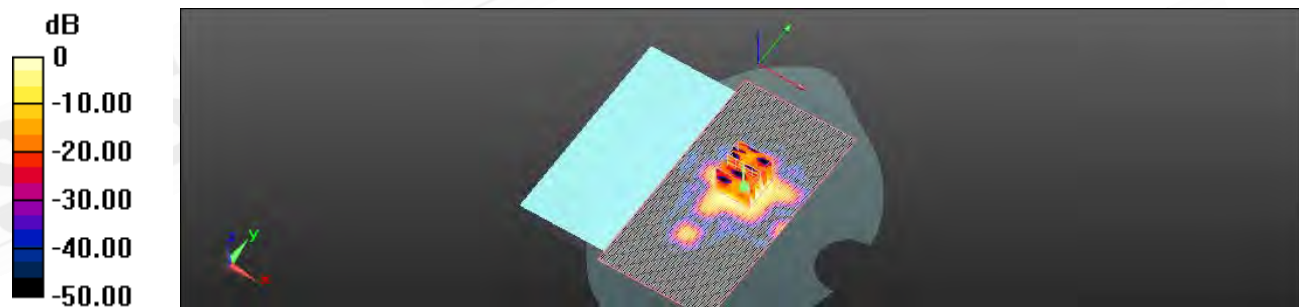
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 3.984 V/m ; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.429 W/kg

SAR(1 g) = 0.243 mW/g ; SAR(10 g) = 0.082 mW/g

Maximum value of SAR (measured) = 0.417 mW/g



0 dB = 0.420mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11n(20M)5.5G_CH100

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5500 MHz

Medium parameters used: $f = 5500$ MHz; $\sigma = 5.747$ mho/m; $\epsilon_r = 47.855$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.054 mW/g

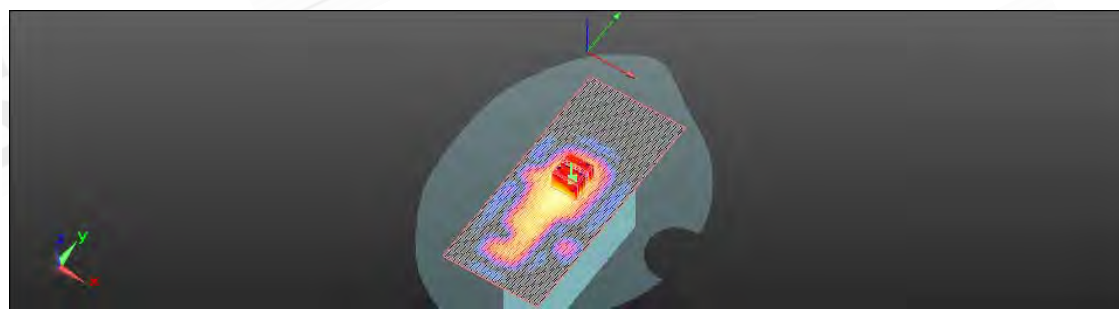
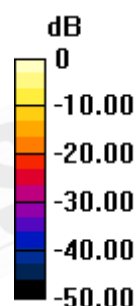
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 5.986 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 2.169 W/kg

SAR(1 g) = 0.464 mW/g; SAR(10 g) = 0.109 mW/g

Maximum value of SAR (measured) = 1.058 mW/g



0 dB = 1.060mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11n(20M)5.5G_CH116

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5580 MHz

Medium parameters used: $f = 5580$ MHz; $\sigma = 5.841$ mho/m; $\epsilon_r = 47.663$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.186 mW/g

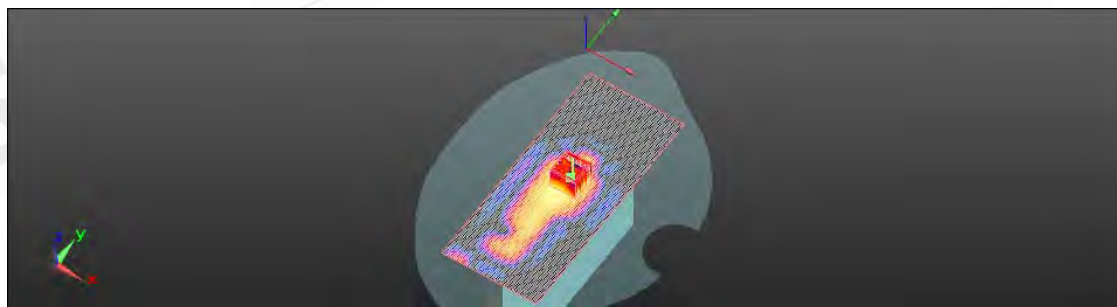
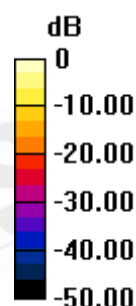
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.047 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 2.628 W/kg

SAR(1 g) = 0.577 mW/g; SAR(10 g) = 0.128 mW/g

Maximum value of SAR (measured) = 1.347 mW/g



0 dB = 1.350mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11n(20M)5.5G_CH120

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5600 MHz

Medium parameters used: $f = 5600$ MHz; $\sigma = 5.867$ mho/m; $\epsilon_r = 47.506$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.326 mW/g

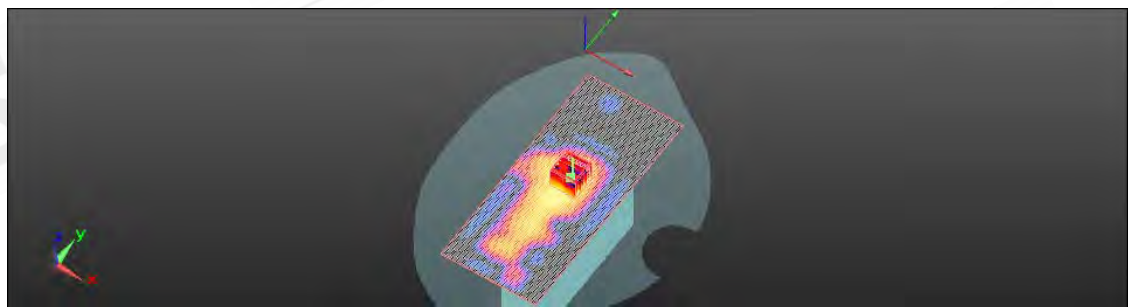
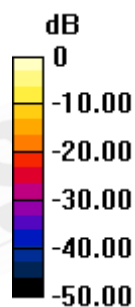
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 6.327 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 2.876 W/kg

SAR(1 g) = 0.619 mW/g; SAR(10 g) = 0.142 mW/g

Maximum value of SAR (measured) = 1.413 mW/g



0 dB = 1.410mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11n(20M)5.5G_CH140

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5700 MHz

Medium parameters used: $f = 5700$ MHz; $\sigma = 6.027$ mho/m; $\epsilon_r = 47.298$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.448 mW/g

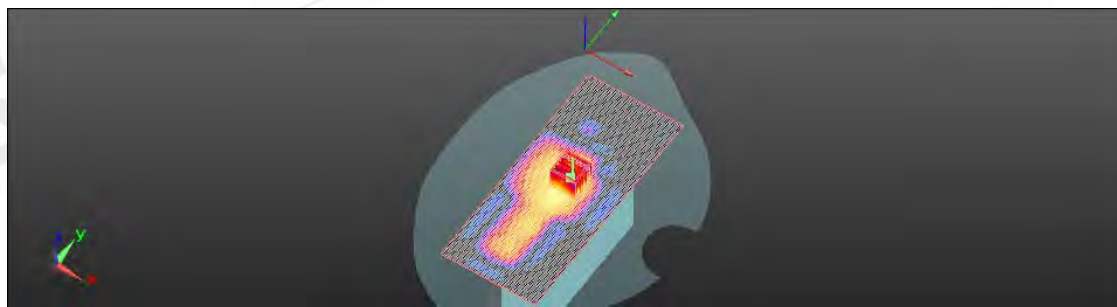
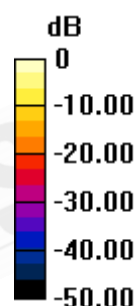
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 5.773 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 3.053 W/kg

SAR(1 g) = 0.617 mW/g; SAR(10 g) = 0.133 mW/g

Maximum value of SAR (measured) = 1.409 mW/g



0 dB = 1.410mW/g

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Date: 2011-09-29

Configuration 1_WLAN802.11n(40M)5.5G_CH102

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5510 MHz

Medium parameters used: $f = 5510$ MHz; $\sigma = 5.759$ mho/m; $\epsilon_r = 47.819$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (71x141x1): Measurement grid: dx=15mm, dy=15mm

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

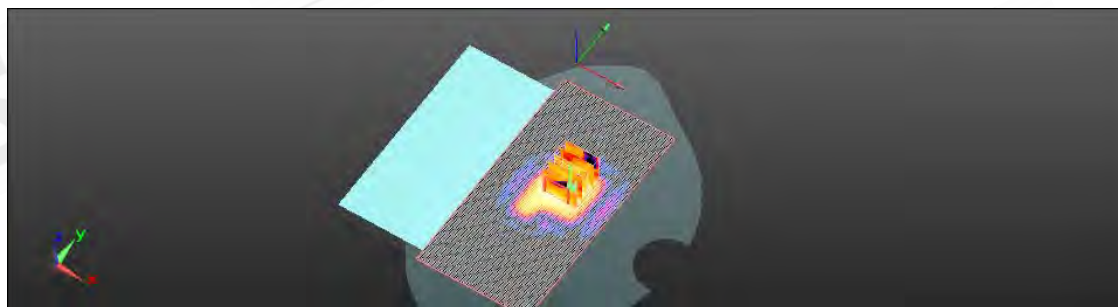
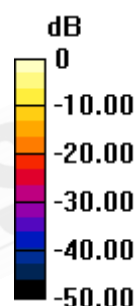
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 3.412 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.521 W/kg

SAR(1 g) = 0.178 mW/g; SAR(10 g) = 0.054 mW/g

Maximum value of SAR (measured) = 0.242 mW/g



0 dB = 0.240mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11n(40M)5.5G_CH102

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5510 MHz

Medium parameters used: $f = 5510$ MHz; $\sigma = 5.759$ mho/m; $\epsilon_r = 47.819$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.081 mW/g

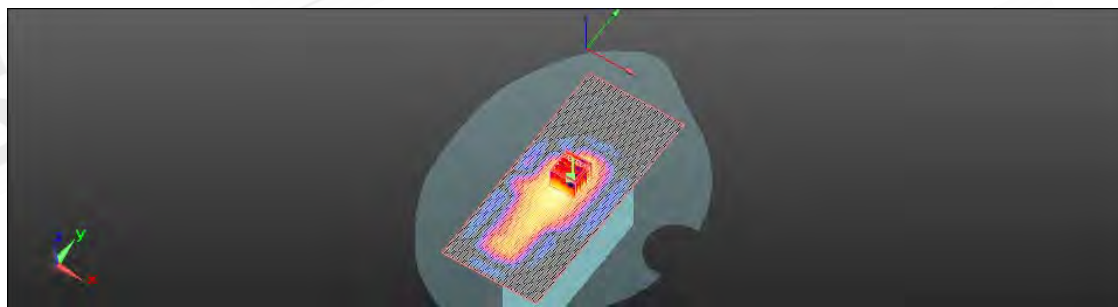
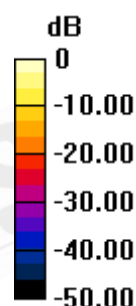
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 5.992 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 2.300 W/kg

SAR(1 g) = 0.499 mW/g; SAR(10 g) = 0.112 mW/g

Maximum value of SAR (measured) = 1.149 mW/g



0 dB = 1.150mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11n(40M)5.5G_CH118

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5590 MHz

Medium parameters used: $f = 5590$ MHz; $\sigma = 5.854$ mho/m; $\epsilon_r = 47.584$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.901 mW/g

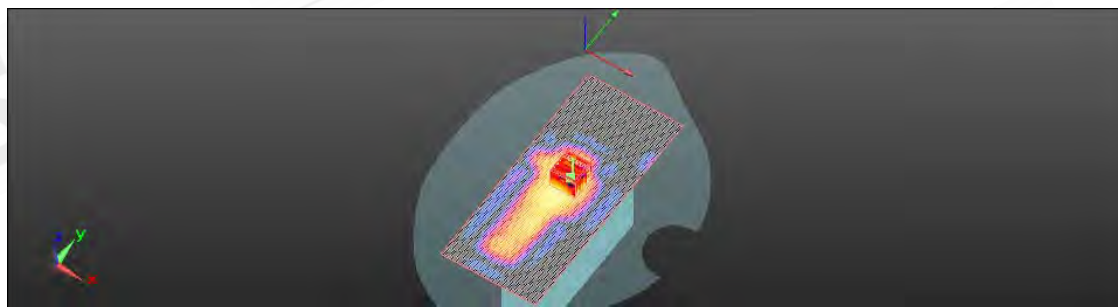
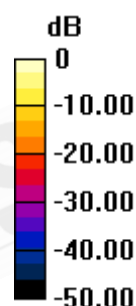
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 5.214 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 1.874 W/kg

SAR(1 g) = 0.399 mW/g; SAR(10 g) = 0.093 mW/g

Maximum value of SAR (measured) = 0.901 mW/g



0 dB = 0.900mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11n(40M)5.5G_CH134

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5670 MHz

Medium parameters used: $f = 5670$ MHz; $\sigma = 5.972$ mho/m; $\epsilon_r = 47.283$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.089 mW/g

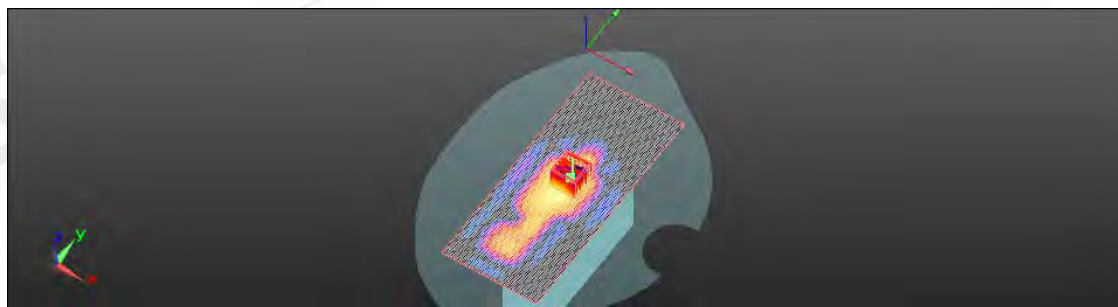
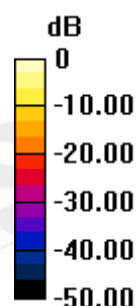
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 5.278 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 2.340 W/kg

SAR(1 g) = 0.484 mW/g; SAR(10 g) = 0.103 mW/g

Maximum value of SAR (measured) = 1.149 mW/g



0 dB = 1.150mW/g

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Date: 2011-09-29

Configuration 1_WLAN802.11a5.8G_CH165

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5825 MHz

Medium parameters used: $f = 5825$ MHz; $\sigma = 6.172$ mho/m; $\epsilon_r = 46.743$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.8, 3.8, 3.8); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (71x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.512 mW/g

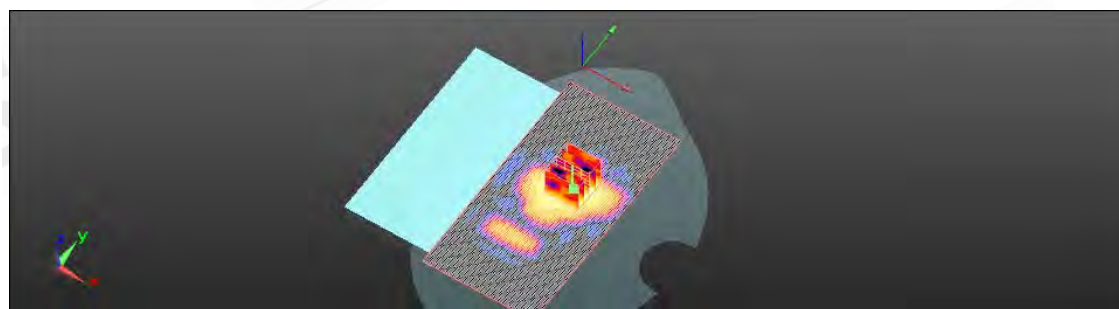
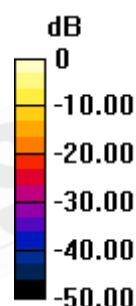
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 4.116 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 1.376 W/kg

SAR(1 g) = 0.297 mW/g; SAR(10 g) = 0.104 mW/g

Maximum value of SAR (measured) = 0.619 mW/g



0 dB = 0.620mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11a 5.8G_CH165

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5825 MHz

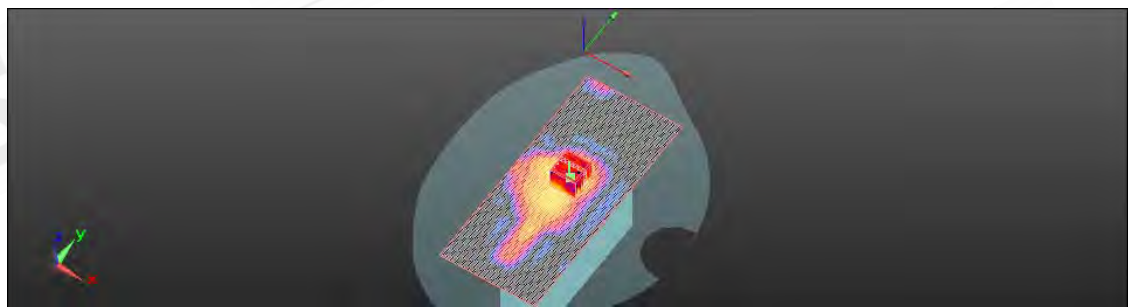
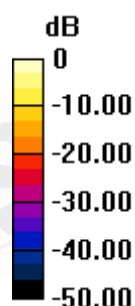
Medium parameters used: $f = 5825 \text{ MHz}$; $\sigma = 6.172 \text{ mho/m}$; $\epsilon_r = 46.743$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.8, 3.8, 3.8); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (interpolated) = 1.583 mW/g **Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0:** Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$ Reference Value = 4.226 V/m ; Power Drift = -0.20 dB Peak SAR (extrapolated) = 3.790 W/kg **SAR(1 g) = 0.762 mW/g ; SAR(10 g) = 0.163 mW/g** Maximum value of SAR (measured) = 1.759 mW/g 0 dB = 1.760mW/g

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Date: 2011-09-29

Configuration 1_WLAN802.11n(20M)5.8G_CH157

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5785 MHz

Medium parameters used: $f = 5785$ MHz; $\sigma = 6.121$ mho/m; $\epsilon_r = 46.945$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.8, 3.8, 3.8); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (71x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.482 mW/g

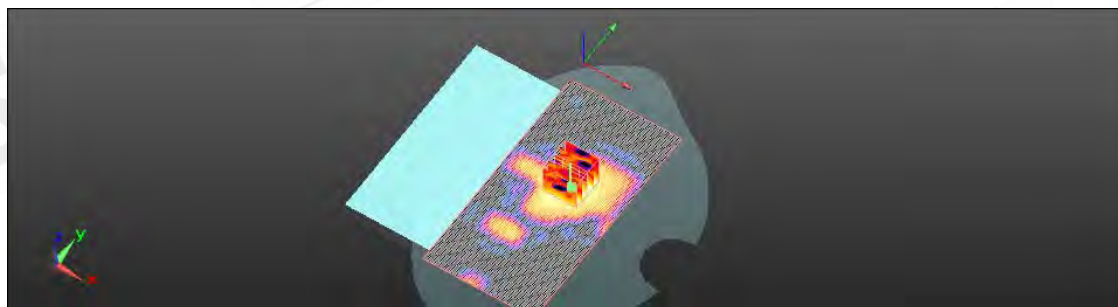
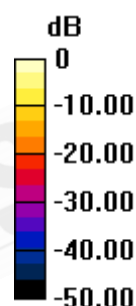
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 4.015 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 1.127 W/kg

SAR(1 g) = 0.261 mW/g; SAR(10 g) = 0.091 mW/g

Maximum value of SAR (measured) = 0.571 mW/g



0 dB = 0.570mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11n(20M)5.8G_CH157

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5785 MHz

Medium parameters used: $f = 5785 \text{ MHz}$; $\sigma = 6.121 \text{ mho/m}$; $\epsilon_r = 46.945$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.8, 3.8, 3.8); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 1.519 mW/g

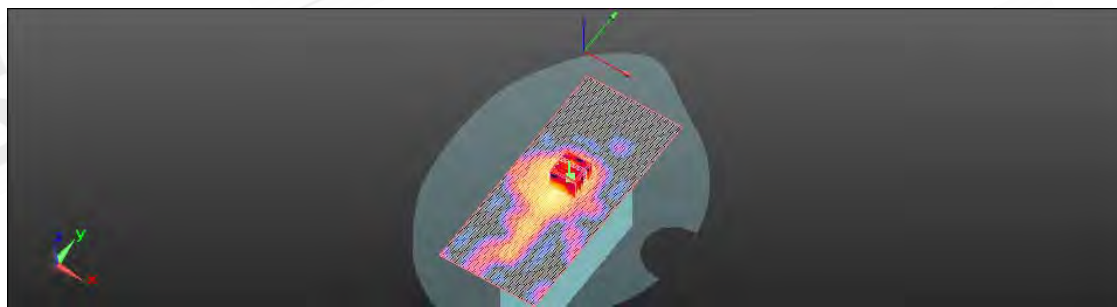
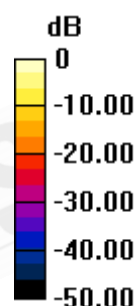
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 4.556 V/m; Power Drift = 0.20 dB

Peak SAR (extrapolated) = 3.623 W/kg

SAR(1 g) = 0.731 mW/g; SAR(10 g) = 0.159 mW/g

Maximum value of SAR (measured) = 1.709 mW/g



0 dB = 1.710mW/g

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Date: 2011-09-29

Configuration 1_WLAN802.11n(40M)5.8G_CH159

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5795 MHz

Medium parameters used: $f = 5795 \text{ MHz}$; $\sigma = 6.137 \text{ mho/m}$; $\epsilon_r = 46.882$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.8, 3.8, 3.8); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (71x141x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.454 mW/g

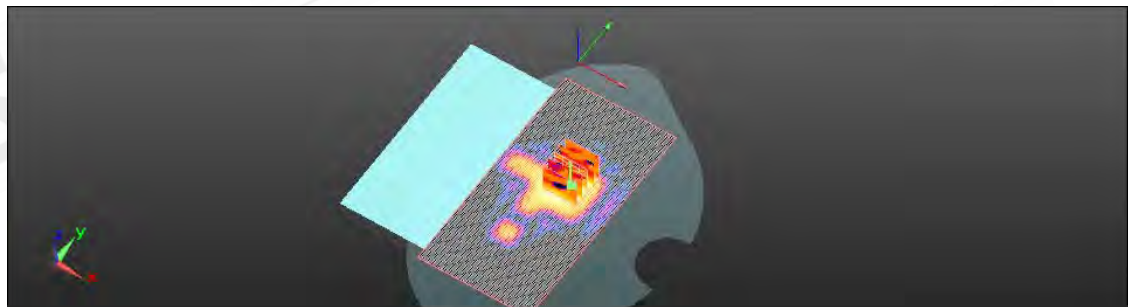
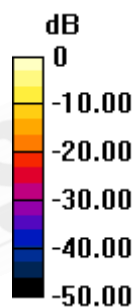
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 4.064 V/m ; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.982 W/kg

SAR(1 g) = 0.250 mW/g ; SAR(10 g) = 0.087 mW/g

Maximum value of SAR (measured) = 0.522 mW/g



0 dB = 0.520mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11n(40M)5.8G_CH151

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5755 MHz

Medium parameters used: $f = 5755$ MHz; $\sigma = 6.084$ mho/m; $\epsilon_r = 47.006$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.8, 3.8, 3.8); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.474 mW/g

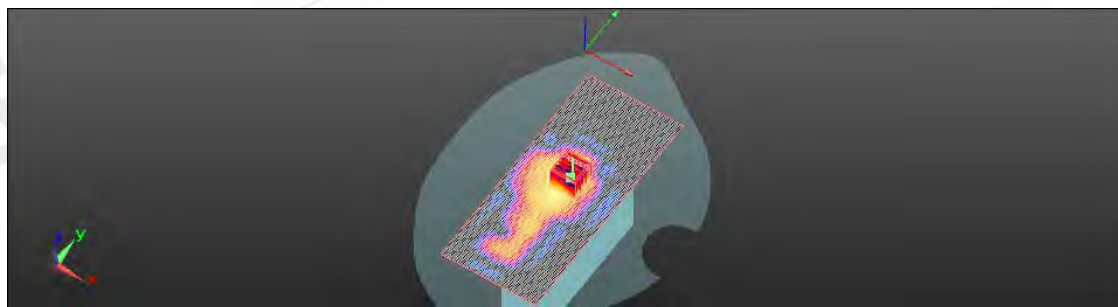
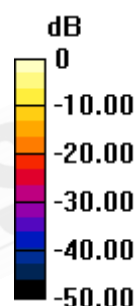
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 4.817 V/m; Power Drift = 0.21 dB

Peak SAR (extrapolated) = 3.422 W/kg

SAR(1 g) = 0.700 mW/g; SAR(10 g) = 0.145 mW/g

Maximum value of SAR (measured) = 1.643 mW/g



0 dB = 1.640mW/g

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Date: 2011-09-29

Configuration 5_WLAN802.11n(40M)5.8G_CH159

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5795 MHz

Medium parameters used: $f = 5795$ MHz; $\sigma = 6.137$ mho/m; $\epsilon_r = 46.882$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.8, 3.8, 3.8); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.048 mW/g

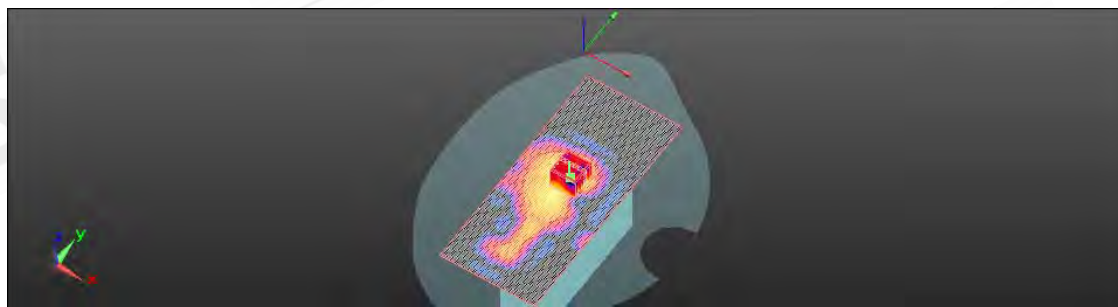
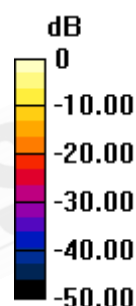
Configuration/Body/Zoom Scan (7x7x7) (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 5.068 V/m; Power Drift = -0.20 dB

Peak SAR (extrapolated) = 4.400 W/kg

SAR(1 g) = 0.897 mW/g; SAR(10 g) = 0.193 mW/g

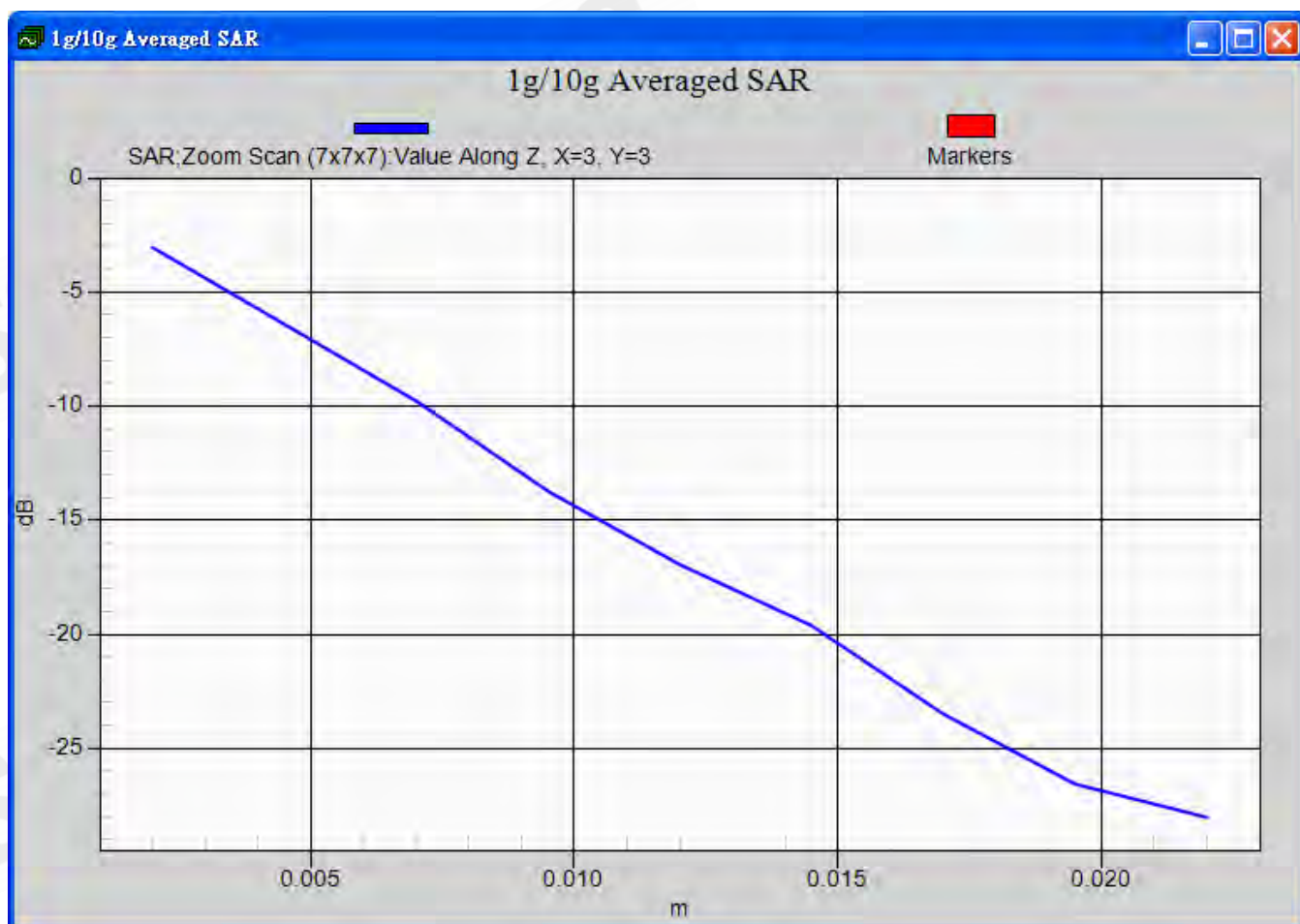
Maximum value of SAR (measured) = 2.068 mW/g



0 dB = 2.070mW/g

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5. SAR System Performance Verification

Date: 2011-09-17

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.964$ mho/m; $\epsilon_r = 51.63$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration / d=10mm, Pin=250mW, dist=2mm: Measurement grid:

dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 16.194 mW/g

Configuration / d=10mm, Pin=250mW, dist=2mm: Measurement grid:

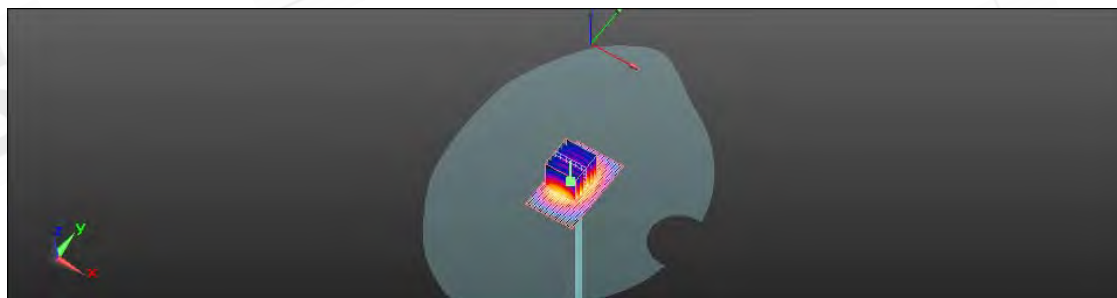
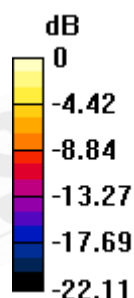
dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.781 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 29.035 W/kg

SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.08 mW/g

Maximum value of SAR (measured) = 15.244 mW/g



0 dB = 15.240mW/g

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Date: 2011-09-28

Communication System: CW; Frequency: 5200 MHz

Medium parameters used: $f = 5200 \text{ MHz}$; $\sigma = 5.27 \text{ mho/m}$; $\epsilon_r = 48.722$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.12, 4.12, 4.12); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration /d=10mm, Pin=100mW, dist=2mm: Measurement grid:

dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 9.872 mW/g

Configuration /d=10mm, Pin=100mW, dist=2mm: Measurement grid:

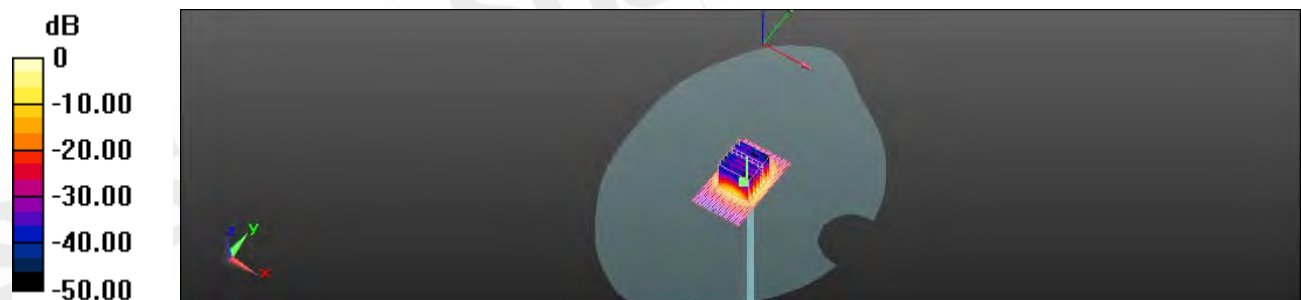
dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 51.319 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 29.302 W/kg

SAR(1 g) = 7.71 mW/g; SAR(10 g) = 2.67 mW/g

Maximum value of SAR (measured) = 8.224 mW/g



0 dB = 8.220mW/g

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Date: 2011-09-29

Communication System: CW; Frequency: 5500 MHz

Medium parameters used: $f = 5500 \text{ MHz}$; $\sigma = 5.747 \text{ mho/m}$; $\epsilon_r = 47.855$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.54, 3.54, 3.54); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration /d=10mm, Pin=100mW, dist=2mm: Measurement grid:

$dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 11.532 mW/g

Configuration /d=10mm, Pin=100mW, dist=2mm: Measurement grid:

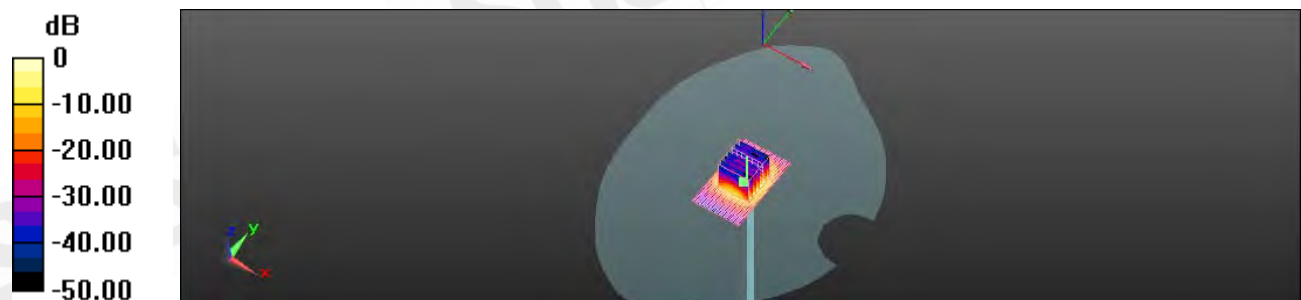
$dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 49.310 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 31.647 W/kg

SAR(1 g) = 8.12 mW/g; SAR(10 g) = 2.63 mW/g

Maximum value of SAR (measured) = 9.312 mW/g



0 dB = 9.310mW/g

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Date: 2011-09-29

Communication System: CW; Frequency: 5800 MHz

Medium parameters used: $f = 5800 \text{ MHz}$; $\sigma = 6.144 \text{ mho/m}$; $\epsilon_r = 46.85$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.8, 3.8, 3.8); Calibrated: 2011-04-19
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2011-05-18
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration /d=10mm, Pin=100mW, dist=2mm: Measurement grid:

$dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 13.245 mW/g

Configuration /d=10mm, Pin=100mW, dist=2mm: Measurement grid:

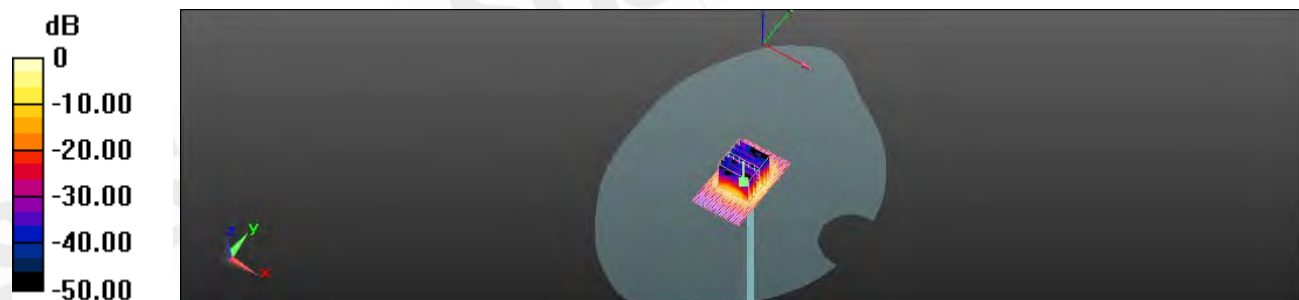
$dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2.5\text{mm}$

Reference Value = 47.524 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 31.876 W/kg

SAR(1 g) = 7.23 mW/g; SAR(10 g) = 2.39 mW/g

Maximum value of SAR (measured) = 8.733 mW/g



0 dB = 8.730mW/g

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6. DAE & Probe Calibration certificate

Calibration Laboratory of
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Engineering AG
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: DAE4-856_May11

CALIBRATION CERTIFICATE

Object DAE4 - SD 000 D04 BJ - SN: 856

Calibration procedure(s) QA CAL-06.v23
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: May 18, 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 $(22 \pm 3)^{\circ}\text{C}$ 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	28-Sep-10 (No:10376)	Sep-11
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

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

Issued: May 18, 2011

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Certificate No: DAE4-856_May11

Page 1 of 5

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Accreditation No.: SCS 108

Client **SGS-TW (Auden)**

Certificate No: **EX3-3770_Apr11**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3770**

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: **April 19, 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	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41495277	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
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:	Fin Bornholt	R&D Director	
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Issued: April 19, 2011			

Certificate No: EX3-3770_Apr11

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Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,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., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- 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**: Ax,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 NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Certificate No: EX3-3770_Apr11

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EX3DV4 – SN:3770

April 19, 2011

Probe EX3DV4

SN:3770

Manufactured: July 6, 2010
Calibrated: April 19, 2011

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

Certificate No: EX3-3770_Apr11

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EX3DV4- SN:3770

April 19, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770**Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.32	0.62	0.40	$\pm 10.1 \%$
DCP (mV) ^B	106.6	98.3	102.8	

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	120.8	$\pm 2.7 \%$
			Y	0.00	0.00	1.00	134.3	
			Z	0.00	0.00	1.00	133.5	

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.

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EX3DV4-SN:3770

April 19, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770**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)	Unc. (k=2)
750	41.9	0.89	9.58	9.58	9.58	0.80	0.70	± 12.0 %
835	41.5	0.90	9.25	9.25	9.25	0.80	0.67	± 12.0 %
900	41.5	0.97	9.06	9.06	9.06	0.76	0.71	± 12.0 %
1750	40.1	1.37	7.97	7.97	7.97	0.80	0.61	± 12.0 %
1900	40.0	1.40	7.78	7.78	7.78	0.71	0.62	± 12.0 %
2000	40.0	1.40	7.79	7.79	7.79	0.75	0.58	± 12.0 %
2450	39.2	1.80	6.99	6.99	6.99	0.80	0.56	± 12.0 %
2600	39.0	1.96	6.95	6.95	6.95	0.66	0.62	± 12.0 %

^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.

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EX3DV4- SN:3770

April 19, 2011

DASY/EASY - Parameters of Probe: EX3DV4- SN:3770**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)
750	55.5	0.96	9.42	9.42	9.42	0.73	0.72	± 12.0 %
835	55.2	0.97	9.30	9.30	9.30	0.72	0.72	± 12.0 %
900	55.0	1.05	9.12	9.12	9.12	0.73	0.75	± 12.0 %
1750	53.4	1.49	7.84	7.84	7.84	0.80	0.68	± 12.0 %
1900	53.3	1.52	7.51	7.51	7.51	0.80	0.62	± 12.0 %
2000	53.3	1.52	7.44	7.44	7.44	0.80	0.66	± 12.0 %
2450	52.7	1.95	6.96	6.96	6.96	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.78	6.78	6.78	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.42	4.42	4.42	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.12	4.12	4.12	0.52	1.90	± 13.1 %
5600	48.5	5.77	3.54	3.54	3.54	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.80	3.80	3.80	0.60	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 $\pm 10\%$ 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 $\pm 5\%$. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

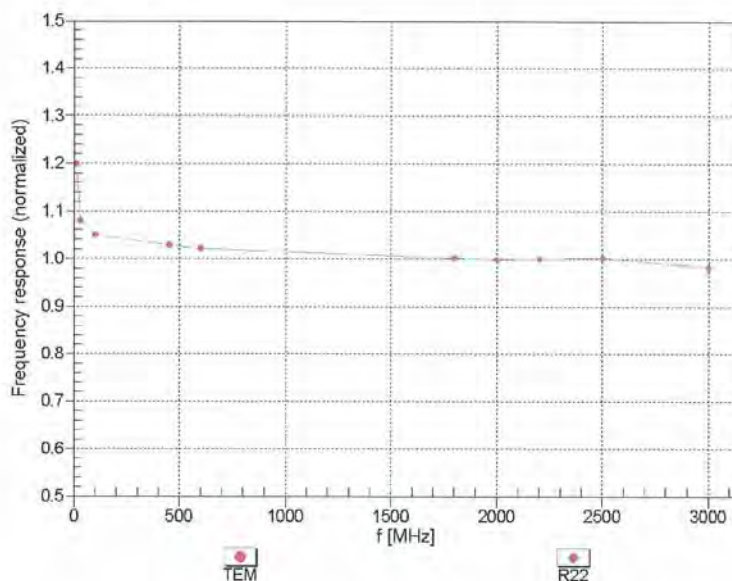
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EX3DV4- SN:3770

April 19, 2011

Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



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

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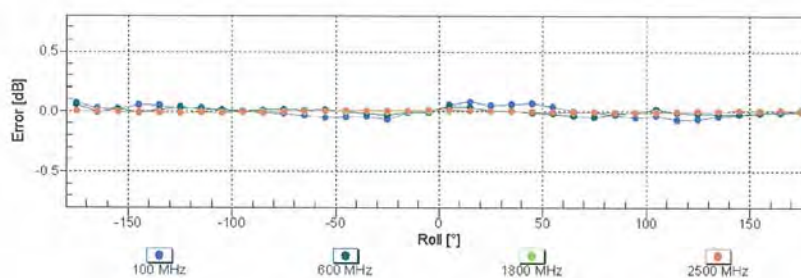
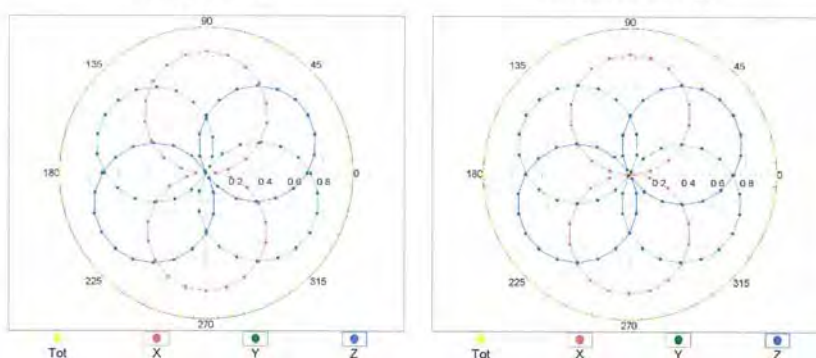
EX3DV4-SN:3770

April 19, 2011

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz, TEM

f=1800 MHz, R22



Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Certificate No: EX3-3770_Apr11

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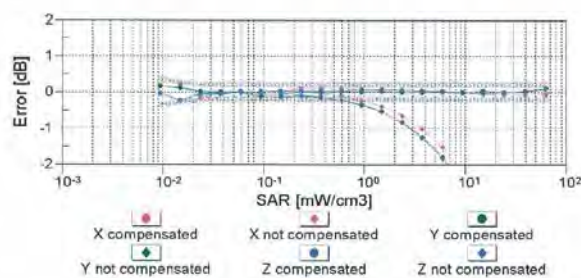
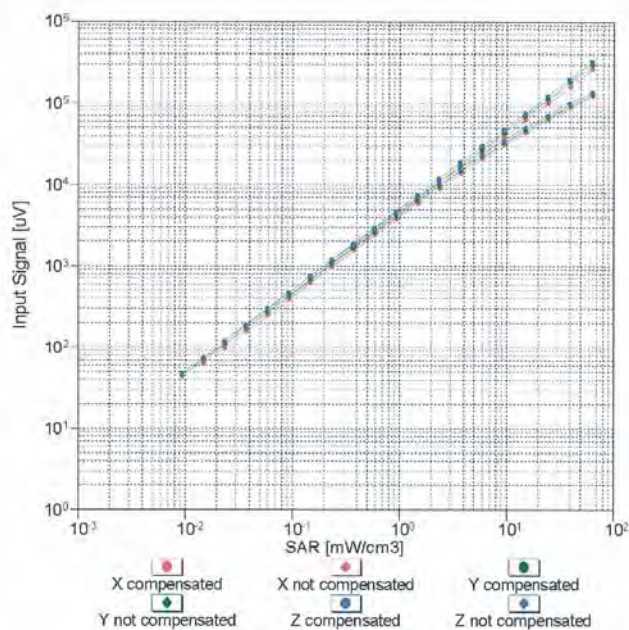
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EX3DV4- SN:3770

April 19, 2011

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



Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

Certificate No: EX3-3770_Apr11

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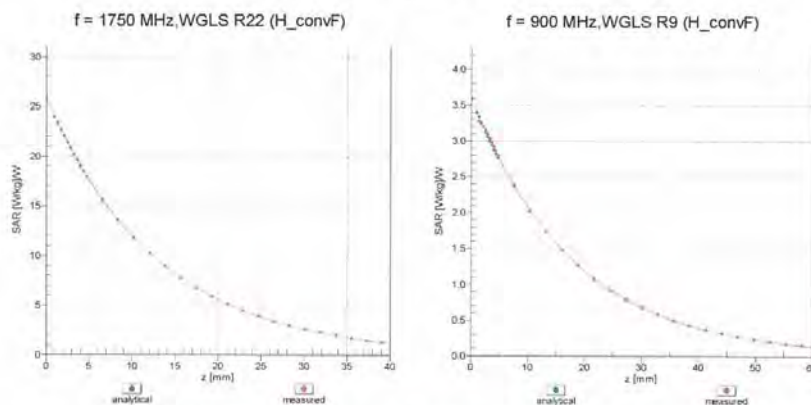
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EX3DV4-SN:3770

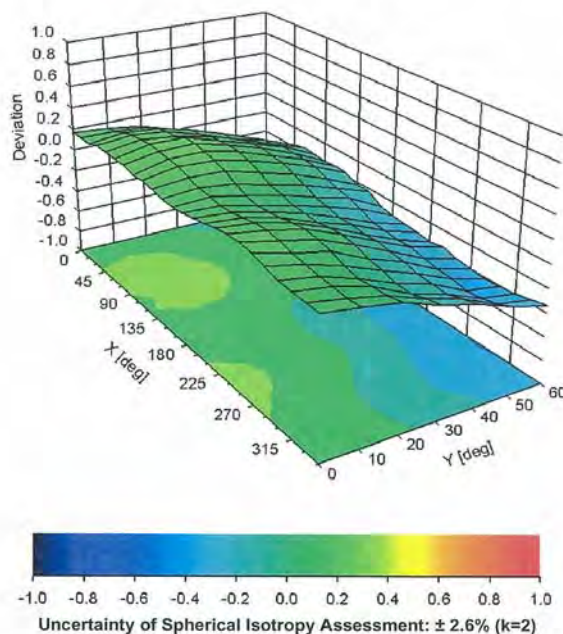
April 19, 2011

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900$ MHz



Certificate No: EX3-3770_Apr11

Page 10 of 11

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EX3DV4- SN:3770

April 19, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770**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

Certificate No: EX3-3770_Apr11

Page 11 of 11

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7. Uncertainty Budget

DASY5 Uncertainty Budget
According to IEEE 1528 [1]

Error Description	Uncertainty value	Prob. Dist.	Div.	(c_1) 1g	(c_2) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(c_3) v_{eff}
Measurement System								
Probe Calibration	$\pm 5.9\%$	N	1	1	1	$\pm 5.9\%$	$\pm 5.9\%$	∞
Axial Isotropy	$\pm 4.7\%$	R	$\sqrt{3}$	0.7	0.7	$\pm 1.9\%$	$\pm 1.9\%$	∞
Hemispherical Isotropy	$\pm 9.6\%$	R	$\sqrt{3}$	0.7	0.7	$\pm 3.9\%$	$\pm 3.9\%$	∞
Boundary Effects	$\pm 1.0\%$	R	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Linearity	$\pm 4.7\%$	R	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
System Detection Limits	$\pm 1.0\%$	R	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Readout Electronics	$\pm 0.3\%$	N	1	1	1	$\pm 0.3\%$	$\pm 0.3\%$	∞
Response Time	$\pm 0.8\%$	R	$\sqrt{3}$	1	1	$\pm 0.5\%$	$\pm 0.5\%$	∞
Integration Time	$\pm 2.6\%$	R	$\sqrt{3}$	1	1	$\pm 1.5\%$	$\pm 1.5\%$	∞
RF Ambient Noise	$\pm 3.0\%$	R	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
RF Ambient Reflections	$\pm 3.0\%$	R	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Probe Positioner	$\pm 0.4\%$	R	$\sqrt{3}$	1	1	$\pm 0.2\%$	$\pm 0.2\%$	∞
Probe Positioning	$\pm 2.9\%$	R	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Max. SAR Eval.	$\pm 1.0\%$	R	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Test Sample Related								
Device Positioning	$\pm 2.9\%$	N	1	1	1	$\pm 2.9\%$	$\pm 2.9\%$	145
Device Holder	$\pm 3.6\%$	N	1	1	1	$\pm 3.6\%$	$\pm 3.6\%$	5
Power Drift	$\pm 5.0\%$	R	$\sqrt{3}$	1	1	$\pm 2.9\%$	$\pm 2.9\%$	∞
Phantom and Setup								
Phantom Uncertainty	$\pm 4.0\%$	R	$\sqrt{3}$	1	1	$\pm 2.3\%$	$\pm 2.3\%$	∞
Liquid Conductivity (target)	$\pm 5.0\%$	R	$\sqrt{3}$	0.64	0.43	$\pm 1.8\%$	$\pm 1.2\%$	∞
Liquid Conductivity (meas.)	$\pm 2.5\%$	N	1	0.64	0.43	$\pm 1.6\%$	$\pm 1.1\%$	∞
Liquid Permittivity (target)	$\pm 5.0\%$	R	$\sqrt{3}$	0.6	0.49	$\pm 1.7\%$	$\pm 1.4\%$	∞
Liquid Permittivity (meas.)	$\pm 2.5\%$	N	1	0.6	0.49	$\pm 1.5\%$	$\pm 1.2\%$	∞
Combined Std. Uncertainty						$\pm 10.9\%$	$\pm 10.7\%$	387
Expanded STD Uncertainty						$\pm 21.0\%$	$\pm 21.4\%$	

Table 19.6: Worst-Case uncertainty budget for DASY5 assessed according to IEEE 1528 [1]. The budget is valid for the frequency range 300 MHz - 3 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller.

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8. Phantom Description

Schmid & Partner Engineering AG **s p e a g**

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Certificate of Conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 C
Series No	TP-1150 and higher
Manufacturer	SPEAG Zeughausstrasse 43 CH-8004 Zurich 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 items (called samples) or are tested at each item.

Test	Requirement	Details	Units tested
Dimensions	Compliant with the geometry according to the CAD model	IT'IS CAD File (*)	First article, Samples
Material thickness of shell	Compliant with the requirements according to the standards	2mm +/- 0.2mm in flat and specific areas of head section	First article, Samples, TP-1314 ff.
Material thickness at ERP	Compliant with the requirements according to the standards	6mm +/- 0.2mm at ERP	First article, All items
Material parameters	Dielectric parameters for required frequencies	300 MHz – 6 GHz: Relative permittivity < 5, Loss tangent < 0.05	Material samples
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe technical Note for material compatibility	DEGMBE based simulating liquids	Pre-series, First article, Material samples
Sagging	Compliant with the requirements according to the standards. Sagging of the flat section when filled with tissue simulating liquid.	< 1% typical < 0.8% if filled with 155mm of HSL900 and without OUT below	Prototypes, Sample testing

Standards
[1] CENELEC EN 50351
[2] IEEE Std 1528-2003
[3] IEC 62209 Part 1
[4] FCC OET Bulletin 65, Supplement C, Edition 01-01
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

Conformity
Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standards [1] to [4].

Date 07.07.2005 **s p e a g**

Signature / Stamp Schmid & Partner Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Doc No: SE1 - QD 000 P40 C - 3 Page 1 (1)

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9. System Validation from Original equipment supplier

**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 **SGS TW (Auden)**

Certificate No: D2450V2- 727_Apr11

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 727**

Calibration procedure(s) **QA CAL-05.v8
Calibration procedure for dipole validation kits**

Calibration date: **April 19, 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 $(22 \pm 3)^{\circ}\text{C}$ 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-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
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

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 19, 2011.

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

Certificate No: D2450V2-727_Apr11

Page 1 of 9

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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**

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.

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Measurement Conditions

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

DASY Version	DASY5	V52.6.2
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	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.7 $\pm$ 6 %	1.72 mho/m $\pm$ 6 %
Head TSL temperature during test	(21.0 $\pm$ 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	13.7 mW / g
SAR normalized	normalized to 1W	54.8 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	55.8 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.39 mW / g
SAR normalized	normalized to 1W	25.6 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.7 mW / g $\pm$ 16.5 % (k=2)

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Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.6 ± 6 %	1.91 mho/m ± 6 %
Body TSL temperature during test	(21.5 ± 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	12.7 mW / g
SAR normalized	normalized to 1W	50.8 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	50.8 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.84 mW / g
SAR normalized	normalized to 1W	23.4 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	23.3 mW / g ± 16.5 % (k=2)

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$54.3 \Omega + 2.0 j\Omega$
Return Loss	- 26.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$49.9 \Omega + 3.7 j\Omega$
Return Loss	- 28.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 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	January 9, 2003

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DASY5 Validation Report for Head TSL

Date/Time: 18.04.2011 16:55:19

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:727

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

Medium: HSL U12 BB

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.74$ mho/m; $\epsilon_r = 38.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); 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, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2829)

Pin=250 mW, Cube 0:

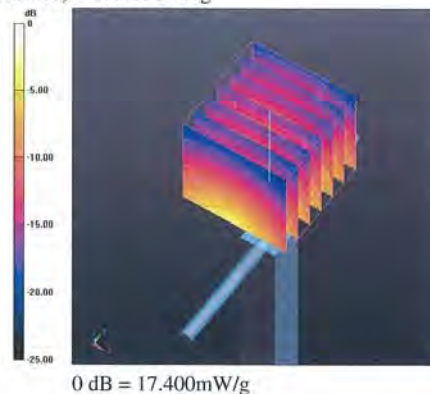
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 103.6 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 27.919 W/kg

SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.39 mW/g

Maximum value of SAR (measured) = 17.401 mW/g



Certificate No: D2450V2-727_Apr11

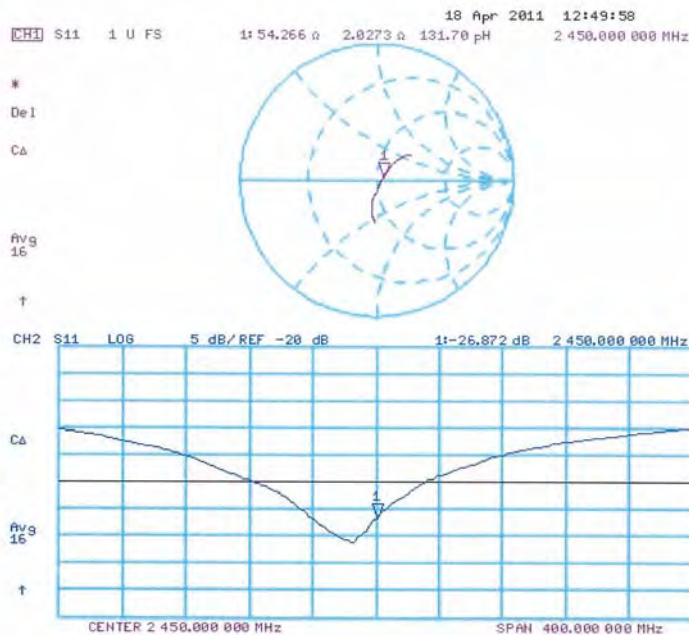
Page 6 of 9

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Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date/Time: 19.04.2011 14:37:11

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:727

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

Medium: MSL U12 BB

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.91$ mho/m; $\epsilon_r = 50.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.31, 4.31, 4.31); 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, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2829)

Pin=250 mW, Cube 0:

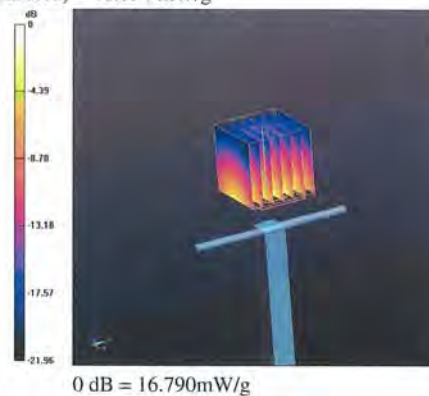
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.949 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 26.888 W/kg

SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.84 mW/g

Maximum value of SAR (measured) = 16.794 mW/g

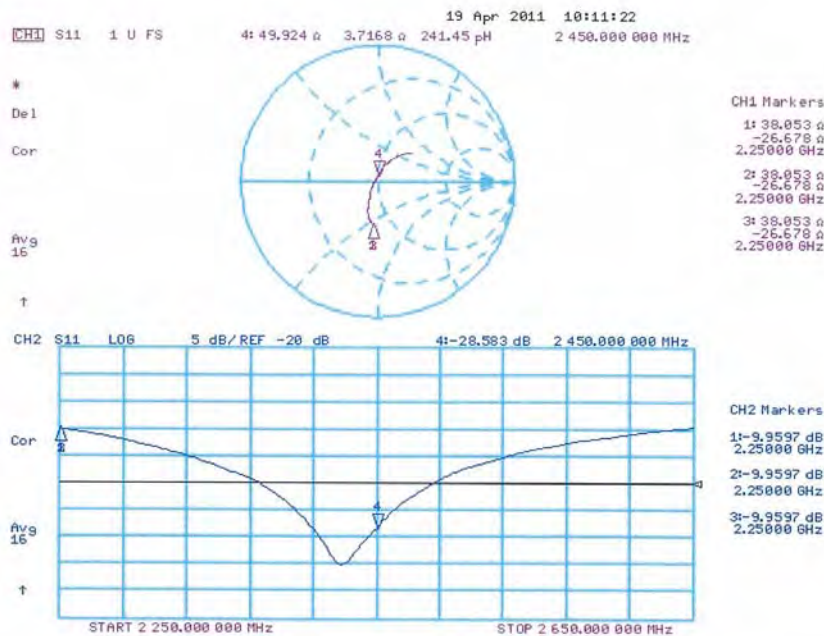


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Impedance Measurement Plot for Body TSL



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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **SGS-TW (Auden)**

Certificate No: **D5GHzV2-1023_Jan11**

CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1023**

Calibration procedure(s) **QA CAL-22.v1
Calibration procedure for dipole validation kits between 3-6 GHz**

Calibration date: **January 19, 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-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
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 EX3DV4	SN: 3503	05-Mar-10 (No. EX3-3503_Mar10)	Mar-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

Calibrated by:	Name Dimce Iliev	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature

Issued: January 20, 2011

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

Certificate No: D5GHzV2-1023_Jan11

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Accreditation No.: **SCS 108**

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:

- IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
- 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:

- 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.

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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
Area Scan resolution	dx, dy = 10 mm	
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 2.0 mm	
Frequency	5200 MHz $\pm$ 1 MHz 5500 MHz $\pm$ 1 MHz 5800 MHz $\pm$ 1 MHz	

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	47.2 $\pm$ 6 %	5.37 mho/m $\pm$ 6 %
Body TSL temperature during test	(21.5 $\pm$ 0.2) °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	condition	
SAR measured	100 mW input power	7.81 mW / g
SAR normalized	normalized to 1W	78.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	77.5 mW / g $\pm$ 19.9 % (k=2)
SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.16 mW / g
SAR normalized	normalized to 1W	21.6 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.4 mW / g $\pm$ 19.5 % (k=2)

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Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.6 ± 6 %	5.75 mho/m ± 6 %
Body TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	condition	
SAR measured	100 mW input power	8.30 mW / g
SAR normalized	normalized to 1W	83.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	82.3 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.29 mW / g
SAR normalized	normalized to 1W	22.9 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	22.7 mW / g ± 19.5 % (k=2)

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.1 ± 6 %	6.14 mho/m ± 6 %
Body TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	condition	
SAR measured	100 mW input power	7.44 mW / g
SAR normalized	normalized to 1W	74.4 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	73.8 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.03 mW / g
SAR normalized	normalized to 1W	20.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.1 mW / g ± 19.5 % (k=2)

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Appendix

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	49.6 Ω - 6.5 j Ω
Return Loss	-23.7 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	50.4 Ω - 0.1 j Ω
Return Loss	-47.3 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	54.9 Ω + 2.5 j Ω
Return Loss	-25.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.203 ns
----------------------------------	----------

After long term use with 40 W 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	February 05, 2004

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DASY5 Validation Report for Body TSL

Date/Time: 19.01.2011 12:49:54

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHz; Serial: D5GHzV2 - SN:1023

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: MSL 5000 MHz

Medium parameters used: $f = 5200 \text{ MHz}$; $\sigma = 5.4 \text{ mho/m}$; $\epsilon_r = 47.2$; $\rho = 1000 \text{ kg/m}^3$;
Medium parameters used: $f = 5500 \text{ MHz}$; $\sigma = 5.78 \text{ mho/m}$; $\epsilon_r = 46.6$; $\rho = 1000 \text{ kg/m}^3$;
Medium parameters used: $f = 5800 \text{ MHz}$; $\sigma = 6.18 \text{ mho/m}$; $\epsilon_r = 46.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.88, 4.88, 4.88), ConvF(4.37, 4.37, 4.37), ConvF(4.57, 4.57, 4.57); Calibrated: 05.03.2010
- Sensor-Surface: 2mm (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=100mW/d=10mm, f=5200 MHz/Zoom Scan (4x4x2mm), dist=2mm (8x8x6)/Cube 0:Measurement
grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 60.119 V/m; Power Drift = 0.0056 dB

Peak SAR (extrapolated) = 31.296 W/kg

SAR(1 g) = 7.81 mW/g; SAR(10 g) = 2.16 mW/g

Maximum value of SAR (measured) = 15.660 mW/g

Pin=100mW/d=10mm, f=5500 MHz/Zoom Scan (4x4x2mm), dist=2mm (8x8x6)/Cube 0:Measurement
grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 60.423 V/m; Power Drift = 0.0054 dB

Peak SAR (extrapolated) = 35.162 W/kg

SAR(1 g) = 8.3 mW/g; SAR(10 g) = 2.29 mW/g

Maximum value of SAR (measured) = 16.764 mW/g

Pin=100mW/d=10mm, f=5800 MHz/Zoom Scan (4x4x2mm), dist=2mm (8x8x6)/Cube 0:Measurement
grid: dx=4mm, dy=4mm, dz=4mm

Reference Value = 55.250 V/m; Power Drift = 0.0063 dB

Peak SAR (extrapolated) = 35.996 W/kg

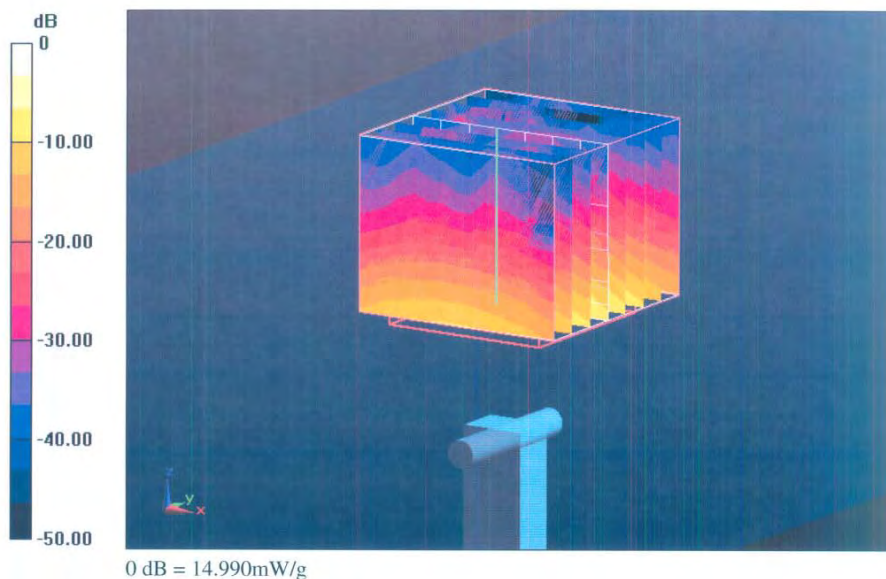
SAR(1 g) = 7.44 mW/g; SAR(10 g) = 2.03 mW/g

Maximum value of SAR (measured) = 14.991 mW/g

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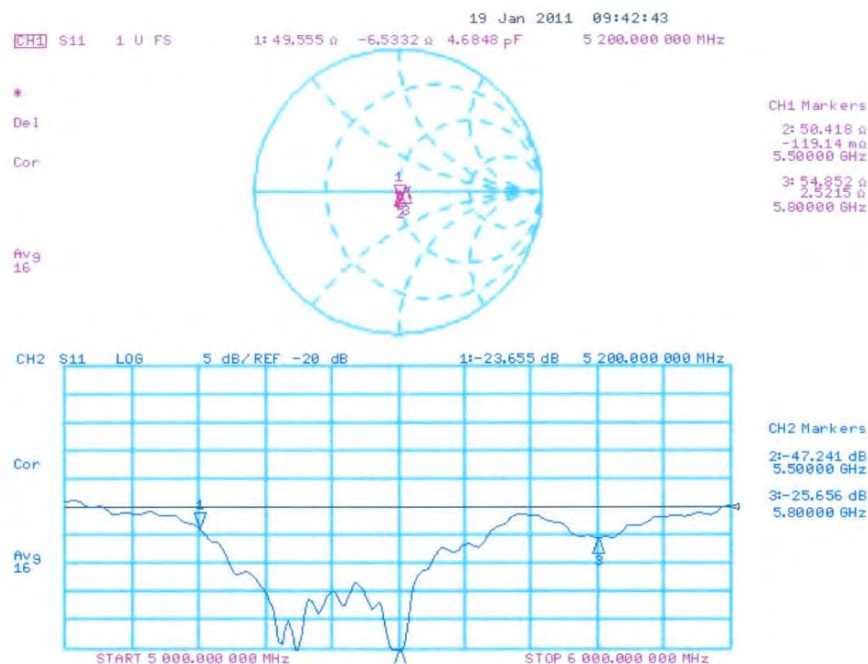
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Impedance Measurement Plot for Body TSL

End of 1st part of report

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