SAR TEST REPORT

The following samples were submitted and identified on behalf of the client as:

Equipment Under Test	Tablet Device
Brand Name	SONY
Model No.	SGPT1211
Company Name	Sony Corporation
Company Address	1-7-1 Konan Minato-Ku,Tokyo,108-0075 Japan
Standards	FCC OET 65 supplement C,IEEE /ANSI C95.1 , C95.3, IEEE 1528
FCC ID	AK8SGPT1211
Date of Receipt	May 28, 2012
Date of Test(s)	Jun. 16, 2012 ~ Jun. 19, 2012
Date of Issue	Jul. 12, 2012

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.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan Electronic & Communication Laboratory or testing done by SGS Taiwan Electronic & Communication Laboratory in connection with distribution or use of the product described in this report must be approved by SGS Taiwan Electronic & Communication Laboratory in writing.

Signed for on the behalf of SGS

Supervisor

Ricky Huang

Ricky Huang

Date: Jul. 12, 2012

Supervisor

Nick Hsu

Nick Hsu

Date: Jul. 12, 2012

Version

Report Number	Revision	Date	Memo
ES/2012/50016	00	2012/06/25	Initial creation of test report.
ES/2012/50016	01	2012/06/28	1st modification
ES/2012/50016	02	2012/07/12	2nd modification

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

Contents

1. General Information

1.1 Testing Laboratory

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1.3 Description of EUT

EUT Name	Tablet Device			
Brand Name	SONY			
Model No.	SGPT1211			
FCC ID	AK8SGPT1211			
Mode of Operation	☒WLAN802.11 a/b/g/n (20M/40M) band			
Duty Cycle	WLAN802.11 a/b/g/n	1		
TX Frequency Range(MHz)	WLAN802.11 b/g/n(20M)	2412	—	2462
	WLAN 802.11 a 5.2G	5180	—	5320
	WLAN802.11 n (20M) 5.2G	5180	—	5320
	WLAN802.11 n (40M) 5.2G	5190	—	5310
	WLAN 802.11 a 5.5G	5500	—	5700
	WLAN802.11 n (20M) 5.5G	5500	—	5700
	WLAN802.11 n (40M) 5.5G	5510	—	5670
	WLAN 802.11 a 5.8G	5745	—	5825
	WLAN802.11 n (20M) 5.8G	5745	—	5825
	WLAN802.11 n (40M) 5.8G	5755	—	5795
Channel Number (ARFCN)	WLAN802.11 b/g/n(20M)	1	—	11
	WLAN 802.11 a 5.2G	36	—	64
	WLAN802.11 n (20M) 5.2G	36	—	64
	WLAN802.11 n (40M) 5.2G	38	—	62
	WLAN 802.11 a 5.5G	100	—	140
	WLAN802.11 n (20M) 5.5G	100	—	140
	WLAN802.11 n (40M) 5.5G	102	—	134
	WLAN 802.11 a 5.8G	149	—	165
	WLAN802.11 n (20M) 5.8G	149	—	165
	WLAN802.11 n (40M) 5.8G	151	—	159

Max. SAR Measured (1g) (Unit: mW/g)	WLAN802.11 b	0.714	☒Lap held ☐Secondary Portrait ☐Secondary Landscape 6 Channel
	WLAN802.11 g	0.747	☒Lap held ☐Secondary Portrait ☐Secondary Landscape 6 Channel
	WLAN802.11 n (20M)	0.695	☒Lap held ☐Secondary Portrait ☐Secondary Landscape 6 Channel
	WLAN 802.11 a 5.5G	0.784	☐Lap held ☐Secondary Portrait ☒Secondary Landscape 124 Channel
	WLAN802.11 n (20M) 5.5G	0.769	☐Lap held ☐Secondary Portrait ☒Secondary Landscape 120 Channel
	WLAN802.11 n (40M) 5.5G	0.919	☐Lap held ☐Secondary Portrait ☒Secondary Landscape 118 Channel
	WLAN 802.11 a 5.8G	0.465	☐Lap held ☐Secondary Portrait ☒Secondary Landscape 149 Channel

Max. SAR Measured (1g) (Unit: mW/g)	WLAN802.11 n (20M) 5.8G	0.484	☒Lap held ☐Secondary Portrait ☐Secondary Landscape 165 Channel
	WLAN802.11 n (40M) 5.8G	0.608	☒Lap held ☐Secondary Portrait ☐Secondary Landscape 151 Channel

#. WLAN802.11 b/g/n(20M) conducted power table:

WLAN802.11 b		Average Power Output (dBm)			
CH	Frequency (MHz)	Data Rate (Mbps)			
		1	2	5.5	11
1	2412	13.29	13.25	13.22	13.19
6	2437	13.16	13.13	13.10	13.08
11	2462	13.27	13.24	13.21	13.18

WLAN802.11 g		Average Power Output(dBm)							
CH	Frequency (MHz)	Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
1	2412	12.87	12.85	12.83	12.81	12.77	12.76	12.72	12.69
6	2437	13.73	13.71	13.70	13.68	13.65	13.61	13.58	13.53
11	2462	14.41	13.82	13.80	13.79	13.74	13.73	13.70	13.69

WLAN802.11 n (20M)		Average Power Output(dBm)							
CH	Frequency (MHz)	Data Rate (Mbps)							
		6.5	13	19.5	26	39	52	58.5	65
1	2412	12.20	12.17	12.15	12.11	12.09	12.04	12.01	12.00
6	2437	14.24	14.22	14.19	14.16	14.11	14.08	14.05	14.03
11	2462	14.33	14.31	14.27	14.25	14.21	14.18	14.14	14.12

802.11a 5.2G/5.5G/5.8G		Average Power Output(dBm)							
CH	Frequency (MHz)	Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
36	5180	9.12	9.1	9.06	9.05	9.01	8.98	8.94	8.91
40	5200	9.09	9.01	9.09	9.08	9.02	8.93	8.89	8.84
44	5220	7.85	7.81	7.77	7.74	7.7	7.69	7.63	7.61
48	5240	8.52	8.51	8.48	8.45	8.43	8.39	8.31	8.3
52	5260	8.98	8.94	8.92	8.87	8.85	8.83	8.79	8.75
56	5280	8.92	9.81	9.76	9.75	9.66	9.59	9.52	9.49
60	5300	8.65	8.64	8.61	8.56	8.54	8.51	8.48	8.43
64	5320	8.82	8.77	8.75	8.71	8.68	8.62	8.6	8.57
100	5500	9.2	9.19	9.17	9.13	9.1	9.07	9.05	9.02
104	5520	9.74	9.71	9.69	9.68	9.58	9.48	9.47	9.43
108	5540	9.71	9.69	9.66	9.51	9.21	9.34	9.47	9.65
112	5560	9.8	9.77	9.65	9.71	9.78	9.77	9.73	9.71
116	5580	9.84	9.81	9.78	9.74	9.73	9.71	9.7	9.65
120	5600	10.23	10.21	10.2	10.19	10.06	9.97	9.94	9.91
124	5620	10.5	10.48	10.47	10.46	10.34	10.23	10.21	10.18
128	5640	10.3	10.28	10.27	10.25	10.13	10.04	10.02	9.98
132	5660	10.17	10.14	10.13	10.12	10.05	10.04	10.03	10.08
136	5680	10.19	10.18	10.14	10.13	10.05	9.97	9.93	9.9
140	5700	9.43	9.41	9.38	9.35	9.31	9.27	9.24	9.22
149	5745	10.31	10.29	10.25	10.24	10.21	10.18	10.14	10.11
153	5765	11.01	11	10.99	10.98	10.9	10.8	10.78	10.77
157	5785	11.02	11	10.97	10.94	10.93	10.9	10.84	10.81
161	5805	10.81	10.77	10.79	10.73	10.69	10.59	10.57	10.47
165	5825	10.73	10.71	10.67	10.64	10.62	10.59	10.57	10.53

802.11n(20M) 5.2G/5.5G/5.8G		Average Power Output (dBm)							
CH	Frequency (MHz)	Data Rate (Mbps)							
		6.5	13	19.5	26	39	52	58.5	65
36	5180	9	8.97	8.94	8.93	8.88	8.85	8.83	8.81
48	5240	8.5	8.49	8.43	8.4	8.37	8.32	8.29	8.24
52	5260	8.85	8.81	8.8	8.78	8.76	8.73	8.7	8.69
64	5320	9.39	9.34	9.33	9.3	9.29	9.26	9.22	9.21
100	5500	10.46	10.41	10.38	10.36	10.31	10.29	10.27	10.22
116	5580	10.19	10.14	10.13	10.1	10.07	10.05	10.01	9.99
120	5600	10.21	10.18	10.16	10.14	10.09	10.04	10.03	10.01
140	5700	9.96	9.91	9.87	9.86	9.82	9.8	9.73	9.71
149	5745	10.23	10.22	10.17	10.13	10.10	10.06	10.05	10.01
157	5785	11.21	11.19	11.16	11.12	11.11	11.07	11.06	11.03
165	5825	11.03	11.02	11	10.96	10.95	10.93	10.9	10.88

802.11n(40M) 5.2G/5.5G/5.8G		Average Power Output (dBm)							
CH	Frequency (MHz)	Data Rate (Mbps)							
		13.5	27	40.5	54	81	108	121.5	135
38	5190	9.37	9.32	9.24	9.21	9.19	9.16	9.1	9.07
46	5230	9.28	9.22	9.19	9.1	9.07	9.06	9.03	9.01
54	5270	9.34	9.29	9.23	9.16	9.11	9.08	9.05	9.01
62	5310	9.92	9.9	9.87	9.83	9.76	9.71	9.68	9.61
102	5510	10.41	10.37	10.32	10.25	10.24	10.16	10.11	10.09
118	5590	10.53	10.49	10.46	10.41	10.35	10.33	10.28	10.21
134	5670	10.11	10.08	10.04	10.03	9.98	9.91	9.85	9.83
151	5755	10.76	10.75	10.73	10.70	10.66	10.65	10.59	10.57
159	5795	10.86	10.82	10.79	10.75	10.71	10.68	10.64	10.62

#. Bluetooth conducted power table:

Channel	Peak Power (dBm)	
	BDR	EDR
2402	-2.30	-3.21
2441	0.25	-1.15
2480	-2.21	-3.05

#. According KDB447498, KDB648474 when the maximum transmitter and antenna output power are ≦ 60/f(GHz) (mW) SAR evaluation is typically not required .

1.4 Test Environment

Ambient Temperature: 22±2° C

Tissue Simulating Liquid: 22±2° 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.

We will test it with 3 configurations:

(Test distance is 0mm)

Configuration 1: Lap-held mode.

Configuration 2: Primary Portrait mode. (Not tested, since distance of WLAN antenna to edge is 193mm , which is larger than 5cm)

Configuration 3: Secondary Portrait mode.

Configuration 4: Primary Landscape mode. (Not tested, since distance of WLAN antenna to edge is 168mm , which is larger than 5cm)

Configuration 5: Secondary Landscape mode.

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= σ ($|Ei|^2$)/ ρ 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 intissue 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.

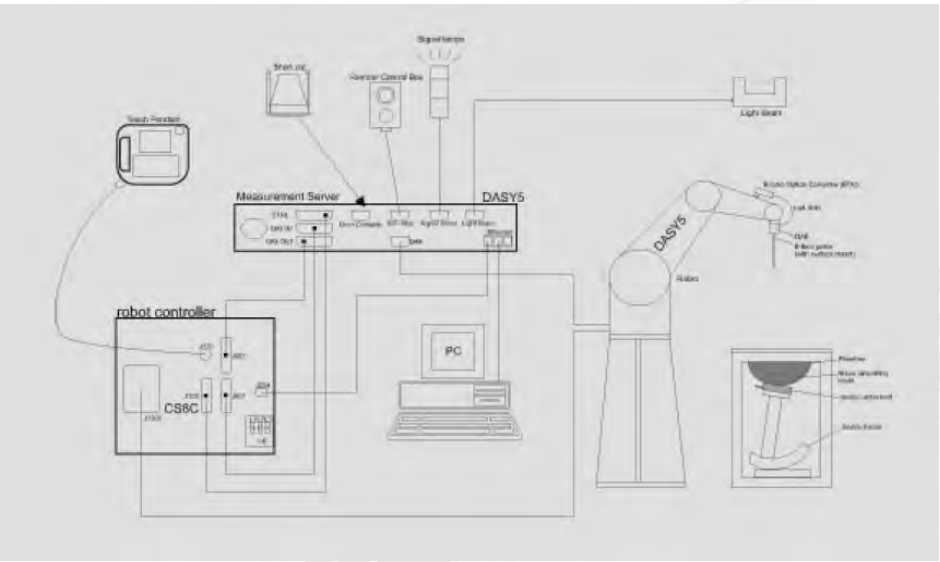


Fig.a The block diagram of SAR system

- 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.

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 HSL 2450 / 5500 / 5800 MHz Additional CF for other liquids and frequencies upon request	
Frequency	10 MHz to > 6 GHz, Linearity: ± 0.6 dB (30 MHz to 4 GHz)	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

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: 810 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

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 +/- 5% from the target SAR values. These tests were done at 2450/5500/5800 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.

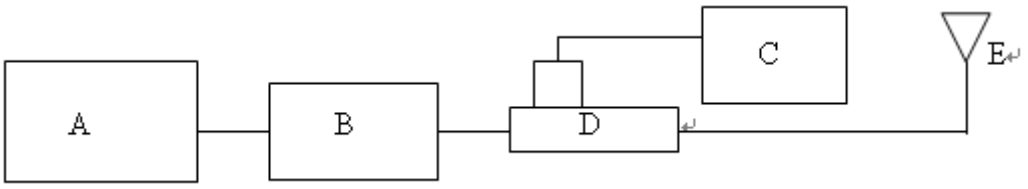


Fig.b The block diagram of system verification

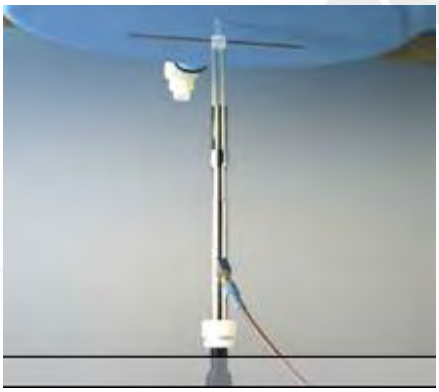
A. Signal Generator

B. Amplifier

C. Power meter

D. Dual directional coupling

E. Reference dipole antenna



Photograph of the dipole Antenna

Validation Kit	S/N	Frequency (MHz)		Target SAR (1g) (Pin=250mW) (mW/g)	Measured SAR (1g) (mW/g)	Measured Date
D2450V2	727	2450	Body	12.7	13.2	Jun.16, 2012
D5GHzV2	1023	5500	Body	7.81	7.93	Jun.17, 2012
D5GHzV2	1023	5800	Body	7.3	7.41	Jun.19, 2012

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 Network Analyzer (30 KHz-6000 MHz).

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

Frequency (MHz)	Tissue type	Dielectric Parameters		Recommended Limits	Measured	Measurement date
2450	Body	ρ	Verification	49.78-55.02	51.315	Jun.16, 2012
			CH 6		51.407	
		σ (S/m)	Verification	1.88-2.08	2.022	
			CH 6		2.018	
		Simulated Tissue Temp.(℃)		20-24	21.7	
5500	Body	ρ	Verification	46.27-51.14	49.074	Jun.17, 2012
			CH100		49.074	
			CH102		49.046	
			CH104		49.014	
			CH116		48.92	
			CH118		48.878	
			CH120		48.867	
			CH124		48.843	
			CH134		48.715	
			CH136		48.709	
			CH140		48.671	
		σ (S/m)	Verification	5.57-6.15	5.701	
			CH100		5.701	
			CH102		5.713	
			CH104		5.728	
			CH116		5.82	
			CH118		5.833	
			CH120		5.85	
			CH124		5.872	
			CH134		5.949	
			CH136		5.965	
			CH140		5.995	
		Simulated Tissue Temp.(℃)		20-24	21.7	

5800	Body	ρ	Verification	45.79-50.61	48.037	Jun.19, 2012
			CH149		48.119	
			CH151		48.09	
			CH157		48.04	
			CH159		48.026	
			CH165		47.963	
		σ (S/m)	Verification	5.97-6.59	6.198	
			CH149		6.117	
			CH151		6.136	
			CH157		6.173	
			CH159		6.193	
			CH165		6.238	
		Simulated Tissue Temp.(℃)		20-24	21.7	

Table 2. Dielectric Parameters of Tissue Simulant Fluid

The composition of the brain tissue simulating liquid:

Frequency (MHz)	Mode	Ingredient						Total amount
		DGMBE	Water	Salt	Preventol D-7	Cellulose	Sugar	
2450M	Body	301.7ml	698.3ml	—	—	—	—	1.0L(Kg)

Simulating Liquids for 5 GHz, Manufactured by SPEAG:

Ingredients	Water	Esters, Emulsifiers, Inhibitors	Sodium and Salt
(% by weight)	60-80	20-40	0-1.5

Table 3. Recipes for Tissue Simulating Liquid

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.

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 the moved around until the highest averaged SAR is found. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

1.11 Probe Calibration Procedures

For the calibration of E-field probes in lossy liquids, an electric field with an accurately known field strength must be produced within the measured liquid. For standardization purposes it would be desirable if all measurements which are necessary to assess the correct field strength would be traceable to standardized measurement procedures. In the following two different calibration techniques are summarized:

1.11.1 Transfer Calibration with Temperature Probes

In lossy liquids the specific absorption rate (SAR) is related both to the electric field (E) and the temperature gradient ($\delta T / \delta t$) in the liquid.

$$SAR = \frac{\sigma}{\rho}|E|^2 = c\frac{\delta T}{\delta t}$$

whereby σ is the conductivity, ρ the density and c the heat capacity of the liquid.

Hence, the electric field in lossy liquid can be measured indirectly by measuring the temperature gradient in the liquid. Non-disturbing temperature probes (optical probes or thermistor probes with resistive lines) with high spatial resolution (<1-2 mm) and fast reaction time (<1 s) are available and can be easily calibrated with high precision [1]. The setup and the exciting source have no influence on the calibration; only the relative positioning uncertainties of the standard temperature probe and the E-field probe to be calibrated must be considered. However, several problems limit the available accuracy of probe calibrations with temperature probes:

- The temperature gradient is not directly measurable but must be evaluated from temperature measurements at different time steps. Special precaution is necessary to avoid measurement errors caused by temperature gradients due to energy equalizing effects or convection currents in the liquid. Such effects cannot be completely avoided, as the measured field itself destroys the thermal equilibrium in

the liquid. With a careful setup these errors can be kept small.

- The measured volume around the temperature probe is not well defined. It is difficult to calculate the energy transfer from a surrounding gradient temperature field into the probe. These effects must be considered, since temperature probes are calibrated in liquid with homogeneous temperatures. There is no traceable standard for temperature rise measurements.
- The calibration depends on the assessment of the specific density, the heat capacity and the conductivity of the medium. While the specific density and heat capacity can be measured accurately with standardized procedures (~ 2% for c; much better for ρ) , there is no standard for the measurement of the conductivity. Depending on the method and liquid, the error can well exceed ±5%.
- Temperature rise measurements are not very sensitive and therefore are often performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

Considering these problems, the possible accuracy of the calibration of E-field probes with temperature gradient measurements in a carefully designed setup is about ±10% (RSS) [2]. Recently, a setup which is a combination of the waveguide techniques and the thermal measurements was presented in [3]. The estimated uncertainty of the setup is ±5% (RSS) when the same liquid is used for the calibration and for actual measurements and ±7-9% (RSS) when not, which is in good agreement with the estimates given in [2].

1.11.2 Calibration with Analytical Fields

In this method a technical setup is used in which the field can be calculated analytically from measurements of other physical magnitudes (e.g., input power). This corresponds to the standard field method for probe calibration in air; however, there is no standard defined for fields in lossy liquids.

When using calculated fields in lossy liquids for probe calibration, several points must be considered in the assessment of the uncertainty:

- The setup must enable accurate determination of the incident power.
- The accuracy of the calculated field strength will depend on the assessment of the dielectric parameters of the liquid.
- Due to the small wavelength in liquids with high permittivity, even small setups might be above the resonant cutoff frequencies. The field distribution in the setup must be carefully checked for conformity with the theoretical field distribution.

References

[1] N. Kuster, Q. Balzano, and J.C. Lin, Eds., *Mobile Communications Safety*, Chapman & Hall, London, 1997.

[2] K. Meier, M. Burkhardt, T. Schmid, and N. Kuster, \Broadband calibration of E-field probes in lossy media", *IEEE Transactions on Microwave Theory and Techniques*, vol. 44, no. 10, pp. 1954{1962, Oct. 1996.

[3] K. Jokela, P. Hyysalo, and L. Puranen, \Calibration of specific absorption rate (SAR) probes in waveguide at 900 MHz", *IEEE Transactions on Instrumentation and Measurements*, vol. 47, no. 2, pp. 432{438, Apr. 1998.

1.12 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. 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.)

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 4. 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.

2. Summary of Results

WLAN802.11 b/g/n(20M)

Band	EUT Position	Test Configuration	Averaged SAR over 1g (W/kg)			SAR Limit 1g (W/kg)
			CH 1 2412 MHz	CH 6 2437 MHz	CH 11 2462 MHz	
WLAN 802.11 b	Body Worn	Lap held	—	0.714	—	1.6
		Secondary Portrait	—	0.043	—	1.6
		Secondary Landscape	—	0.414	—	1.6
WLAN 802.11 g	Body Worn	Lap held	—	0.747	—	1.6
		Secondary Portrait	—	0.047	—	1.6
		Secondary Landscape	—	0.436	—	1.6
WLAN 802.11 n (20M)	Body Worn	Lap held	—	0.695	—	1.6
		Secondary Portrait	—	0.046	—	1.6
		Secondary Landscape	—	0.394	—	1.6

According to KDB447498 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.

WLAN802.11 a 5.5G

Band	EUT Position	Test Configuration	Averaged SAR over 1g (W/kg)				SAR Limit 1g (W/kg)
			CH 104	CH 116	CH 124	CH 136	
			5520 MHz	5580 MHz	5620 MHz	5680 MHz	
WLAN a 5.5G	Body Worn	Lap held	0.571	0.663	0.641	0.681	1.6
		Secondary Portrait	—	—	0.029	—	1.6
		Secondary Landscape	0.752	0.775	0.784	0.668	1.6

WLAN802.11 n (20M) 5.5G

Band	EUT Position	Test Configuration	Averaged SAR over 1g (W/kg)				SAR Limit 1g (W/kg)
			CH 100	CH 116	CH 120	CH 140	
			5500 MHz	5580 MHz	5600 MHz	5700 MHz	
WLAN n (20M) 5.5G	Body Worn	Lap held	0.659	0.678	0.737	0.534	1.6
		Secondary Portrait	0.03	—	—	—	1.6
		Secondary Landscape	0.738	0.754	0.769	0.497	1.6

WLAN802.11 n (40M) 5.5G

Band	EUT Position	Test Configuration	Averaged SAR over 1g (W/kg)			SAR Limit 1g (W/kg)
			CH 102	CH 118	CH 134	
			5510 MHz	5590 MHz	5670 MHz	
WLAN n (40M) 5.5G	Body Worn	Lap held	0.607	0.653	0.573	1.6
		Secondary Portrait	—	0.034	—	1.6
		Secondary Landscape	0.872	0.919	0.738	1.6

WLAN802.11 a / n (20M) 5.8G

Band	EUT Position	Test Configuration	Averaged SAR over 1g (W/kg)			SAR Limit 1g (W/kg)
			CH 149	CH 157	CH 165	
			5745 MHz	5785 MHz	5825 MHz	
WLAN a 5.8G	Body Worn	Lap held	0.43	0.435	0.4	1.6
		Secondary Portrait	—	0.013	—	1.6
		Secondary Landscape	0.465	0.458	0.395	1.6
WLAN n (20M) 5.8G	Body Worn	Lap held	0.413	0.422	0.484	1.6
		Secondary Portrait	—	0.014	—	1.6
		Secondary Landscape	0.455	0.45	0.37	1.6

WLAN802.11 n (40M) 5.8G

Band	EUT Position	Test Configuration	Averaged SAR over 1g (W/kg)		SAR Limit 1g (W/kg)
			CH 151	CH 159	
			5755 MHz	5795 MHz	
WLAN n (40M) 5.8G	Body Worn	Lap held	0.608	0.507	1.6
		Secondary Portrait	—	0.014	1.6
		Secondary Landscape	0.533	0.406	1.6

According to KDB447498 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.

3. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration	Date of next calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV4	3831	Jan.04,2012	Jan.03,2013
Schmid & Partner Engineering AG	2450/5000MHz System Validation Dipole	D2450V2 D5GHzV2	727 1023	Apr.25,2012 Jan.19,2012	Apr.24,2013 Jan.18,2013
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	547	Jun.01,2012	May31,2013
Schmid & Partner Engineering AG	Software	DASY 52 V52.8	N/A	Calibration not required	Calibration not required
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration not required	Calibration not required
HP	Network Analyzer	8753D	3410A05547	Mar.15,2012	Mar.14,2013
Agilent	Dielectric Probe Kit	85070D	US01440168	Calibration not required	Calibration not required
Agilent	Dual-directional coupler	772D 777D	MY46151242 50114	Jul.07,2011 Aug.18,2011	Jul.06,2012 Aug.17,2012
Agilent	RF Signal Generator	N5181A	MY50141235	Jan.06,2012	Jan.05,2013
Agilent	USB Power Sensor	U2001B	MY48100169	May12,2012	May11,2013
Power Sensor	Anritsu	ML2495A	1005007	Feb.08,2012	Feb.07,2014
Power Meter	Anritsu	MA2411B	917032	Feb.08,2012	Feb.07,2014
Spectrum Analyzer	Agilent	E4446A	MY51100003	Apr.15,2011	Apr.14,2013
Spectrum Analyzer	Agilent	E4440A	MY45304525	Mar.17,2012	Mar.16,2014

4. Measurements

Date: 2012/6/16

Lap_held_WLAN802.11 b_CH6

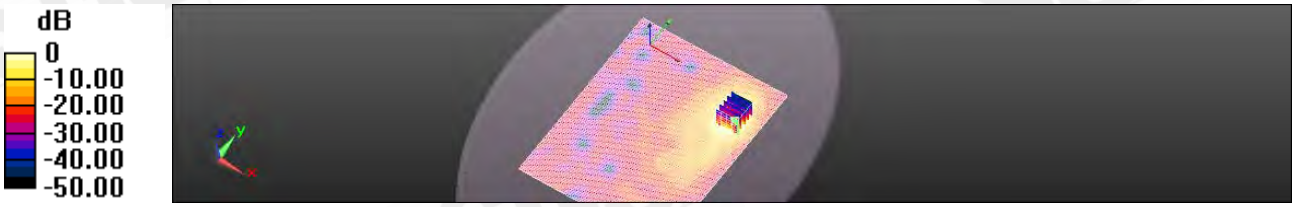
Communication System: WLAN(2.45G); Communication System Band: WLAN802.11 b_FCC; Frequency: 2437 MHz;
Medium parameters used: f = 2437 MHz; σ = 2.018 mho/m; ε_r = 51.407; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(6.82, 6.82, 6.82); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.914 mW/g

Configuration/BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.752 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 1.747 mW/g
SAR(1 g) = 0.714 mW/g; SAR(10 g) = 0.306 mW/g
Maximum value of SAR (measured) = 0.815 mW/g



0 dB = 0.914 mW/g = -0.78 dB mW/g

Date: 2012/6/16

Secondary Portrait_WLAN802.11 b_CH6

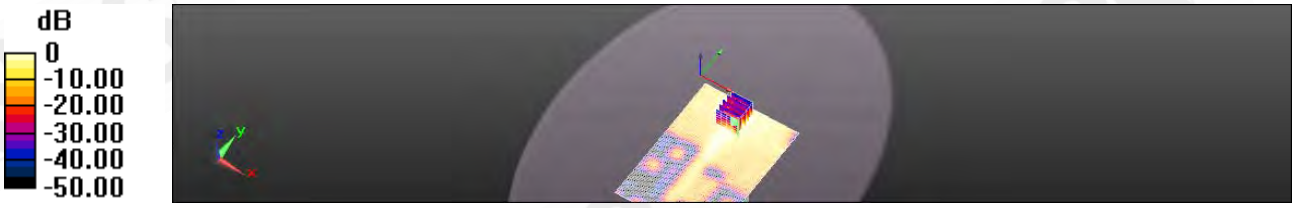
Communication System: WLAN(2.45G); Communication System Band: WLAN802.11 b_FCC; Frequency: 2437 MHz;
Medium parameters used: f = 2437 MHz; σ = 2.018 mho/m; ε_r = 51.407; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(6.82, 6.82, 6.82); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (91x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0615 mW/g

Configuration/BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.588 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.086 mW/g
SAR(1 g) = 0.043 mW/g; SAR(10 g) = 0.023 mW/g
Maximum value of SAR (measured) = 0.0640 mW/g



0 dB = 0.0615 mW/g = -24.23 dB mW/g

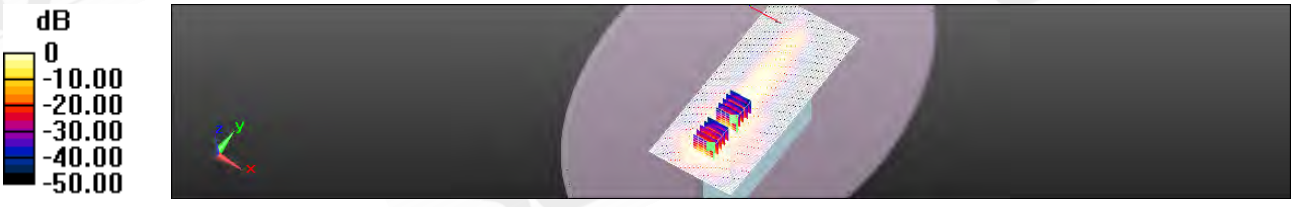
Date: 2012/6/16

Secondary Landscape_WLAN802.11 b_CH6

Communication System: WLAN(2.45G); Communication System Band: WLAN802.11 b_FCC; Frequency: 2437 MHz;
Medium parameters used: f = 2437 MHz; σ = 2.018 mho/m; ε_r = 51.407; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(6.82, 6.82, 6.82); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.624 mW/g
Configuration/BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.545 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.841 mW/g
SAR(1 g) = 0.414 mW/g; SAR(10 g) = 0.180 mW/g
Maximum value of SAR (measured) = 0.626 mW/g
Configuration/BODY/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.545 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.761 mW/g
SAR(1 g) = 0.348 mW/g; SAR(10 g) = 0.160 mW/g
Maximum value of SAR (measured) = 0.569 mW/g



0 dB = 0.624 mW/g = -4.10 dB mW/g

Lap_held_WLAN802.11 g_CH6

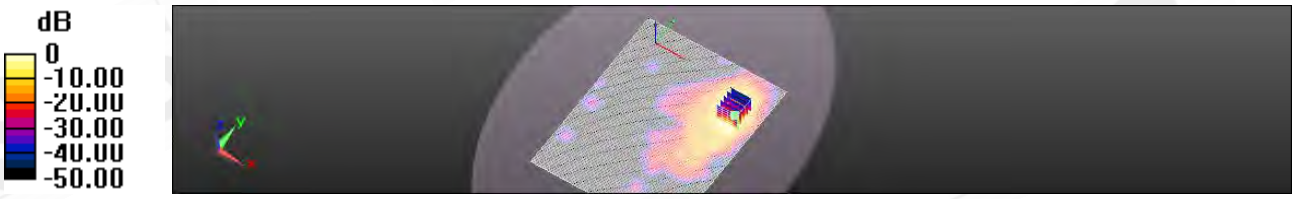
Communication System: WLAN(2.45G); Communication System Band: WLAN802.11 g_FCC; Frequency: 2437 MHz;
Medium parameters used: f = 2437 MHz; σ = 2.018 mho/m; ε_r = 51.407; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(6.82, 6.82, 6.82); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.21 mW/g

Configuration/BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.949 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.857 mW/g
SAR(1 g) = 0.747 mW/g; SAR(10 g) = 0.313 mW/g
Maximum value of SAR (measured) = 1.15 mW/g



0 dB = 1.21 mW/g = 1.67 dB mW/g

Date: 2012/6/16

Secondary Portrait_WLAN802.11 g_CH6

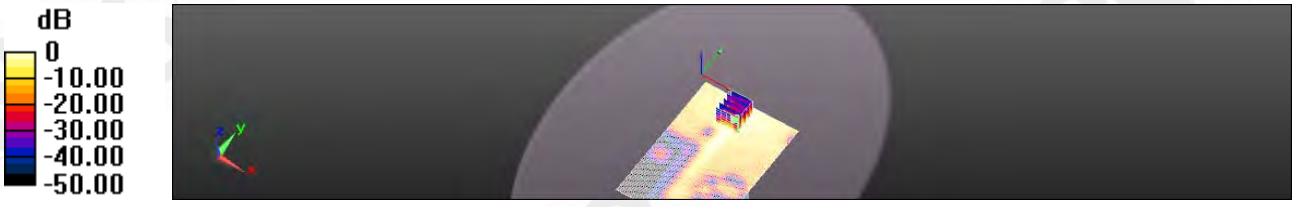
Communication System: WLAN(2.45G); Communication System Band: WLAN802.11 g_FCC; Frequency: 2437 MHz;
Medium parameters used: f = 2437 MHz; σ = 2.018 mho/m; ε_r = 51.407; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(6.82, 6.82, 6.82); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (91x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0680 mW/g

Configuration/BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.708 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.093 mW/g
SAR(1 g) = 0.047 mW/g; SAR(10 g) = 0.025 mW/g
Maximum value of SAR (measured) = 0.0695 mW/g



0 dB = 0.0680 mW/g = -23.35 dB mW/g

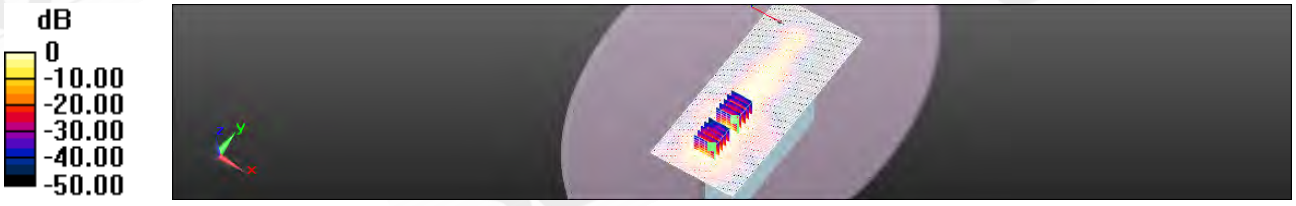
Date: 2012/6/16

Secondary Landscape_WLAN802.11 g_CH6

Communication System: WLAN(2.45G); Communication System Band: WLAN802.11 g_FCC; Frequency: 2437 MHz;
Medium parameters used: f = 2437 MHz; σ = 2.018 mho/m; ε_r = 51.407; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(6.82, 6.82, 6.82); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.648 mW/g
Configuration/BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.166 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.890 mW/g
SAR(1 g) = 0.436 mW/g; SAR(10 g) = 0.189 mW/g
Maximum value of SAR (measured) = 0.662 mW/g
Configuration/BODY/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.166 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.794 mW/g
SAR(1 g) = 0.366 mW/g; SAR(10 g) = 0.168 mW/g
Maximum value of SAR (measured) = 0.597 mW/g



0 dB = 0.648 mW/g = -3.76 dB mW/g

Lap_held_WLAN802.11 n(20M)_CH6

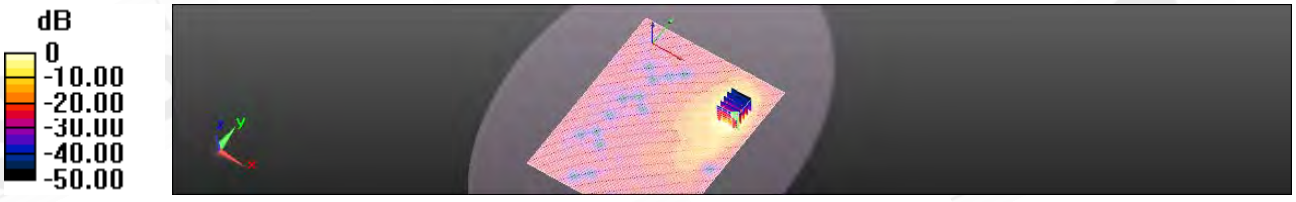
Communication System: WLAN(2.45G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 2437 MHz;
Medium parameters used: f = 2437 MHz; σ = 2.018 mho/m; ε_r = 51.407; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(6.82, 6.82, 6.82); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.18 mW/g

Configuration/BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.987 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.655 mW/g
SAR(1 g) = 0.695 mW/g; SAR(10 g) = 0.295 mW/g
Maximum value of SAR (measured) = 0.976 mW/g



0 dB = 1.18 mW/g = 1.45 dB mW/g

Date: 2012/6/16

Secondary Portrait_WLAN802.11 n(20M)_CH6

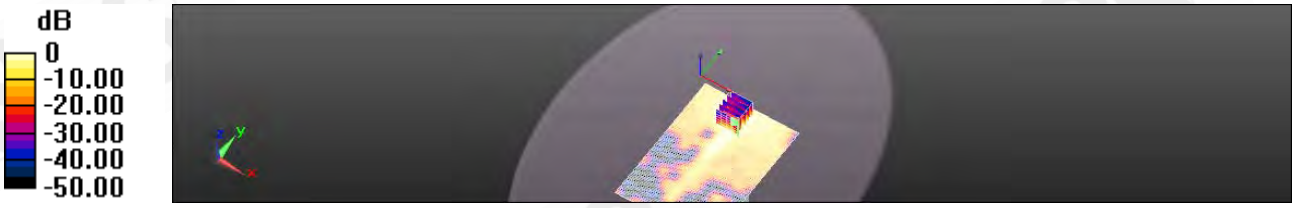
Communication System: WLAN(2.45G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 2437 MHz;
Medium parameters used: f = 2437 MHz; σ = 2.018 mho/m; ε_r = 51.407; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(6.82, 6.82, 6.82); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (91x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0679 mW/g

Configuration/BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.694 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.094 mW/g
SAR(1 g) = 0.046 mW/g; SAR(10 g) = 0.024 mW/g
Maximum value of SAR (measured) = 0.0695 mW/g



0 dB = 0.0679 mW/g = -23.36 dB mW/g

Date: 2012/6/16

Secondary Landscape_WLAN802.11 n(20M)_CH6

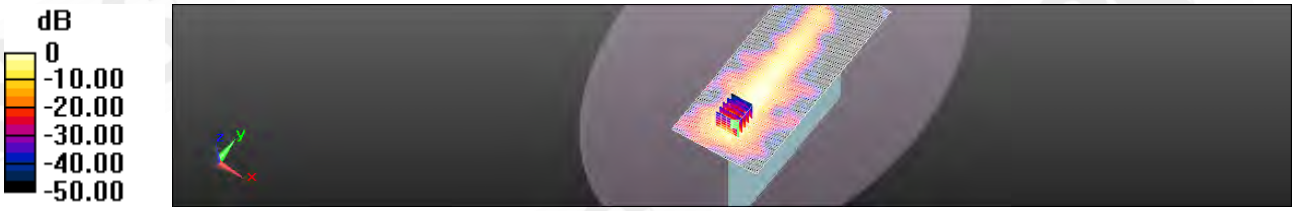
Communication System: WLAN(2.45G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 2437 MHz;
Medium parameters used: f = 2437 MHz; σ = 2.018 mho/m; ε_r = 51.407; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(6.82, 6.82, 6.82); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.551 mW/g

Configuration/BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.453 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.801 mW/g
SAR(1 g) = 0.394 mW/g; SAR(10 g) = 0.169 mW/g
Maximum value of SAR (measured) = 0.595 mW/g



0 dB = 0.551 mW/g = -5.17 dB mW/g

Date: 2012/6/17

Lap_held_WLAN802.11 a 5.5G_CH104

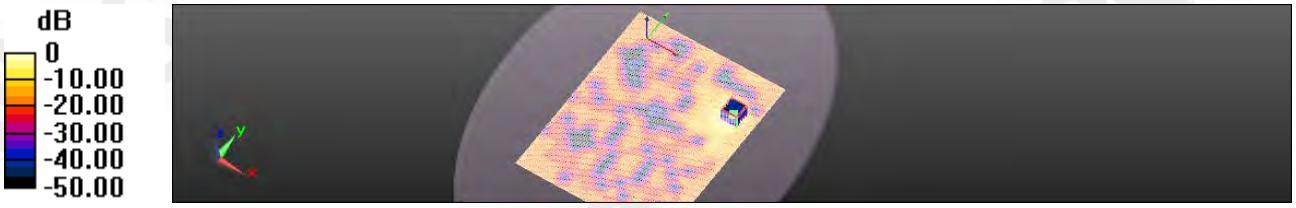
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5520 MHz;
Medium parameters used: f = 5520 MHz; σ = 5.728 mho/m; ε_r = 49.014; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.27 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.889 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 2.339 mW/g
SAR(1 g) = 0.571 mW/g; SAR(10 g) = 0.187 mW/g
Maximum value of SAR (measured) = 1.23 mW/g



0 dB = 1.27 mW/g = 2.09 dB mW/g

Date: 2012/6/17

Lap_held_WLAN802.11 a 5.5G_CH116

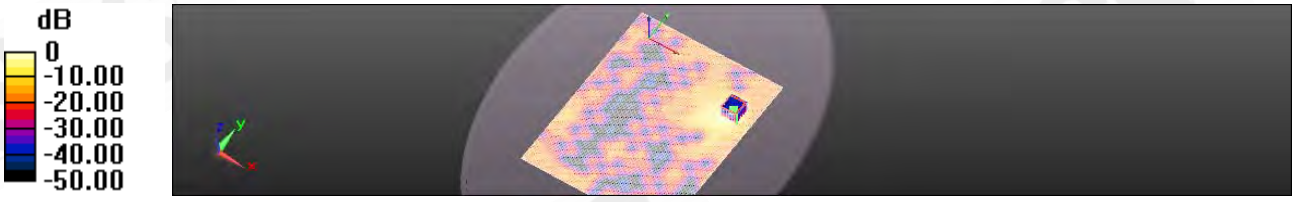
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5580 MHz;
Medium parameters used: f = 5580 MHz; σ = 5.82 mho/m; ε_r = 48.92; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.37 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.419 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 2.920 mW/g
SAR(1 g) = 0.663 mW/g; SAR(10 g) = 0.202 mW/g
Maximum value of SAR (measured) = 1.41 mW/g



0 dB = 1.37 mW/g = 2.73 dB mW/g

Date: 2012/6/17

Lap_held_WLAN802.11 a 5.5G_CH124

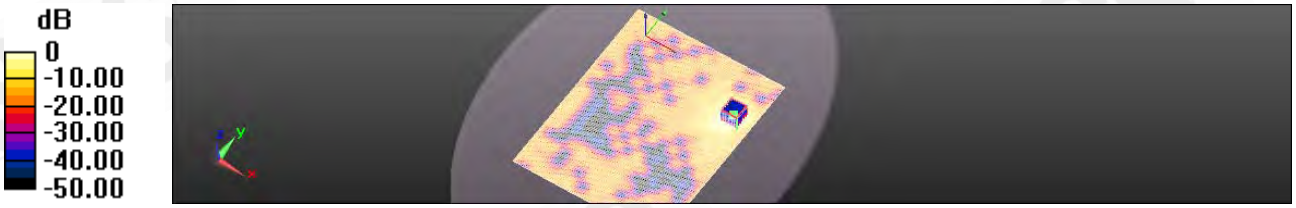
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5620 MHz;
Medium parameters used: f = 5620 MHz; σ = 5.872 mho/m; ε_r = 48.843; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.753 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.846 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 2.768 mW/g
SAR(1 g) = 0.641 mW/g; SAR(10 g) = 0.201 mW/g
Maximum value of SAR (measured) = 1.28 mW/g



0 dB = 0.753 mW/g = -2.47 dB mW/g

Date: 2012/6/17

Lap_held_WLAN802.11 a 5.5G_CH136

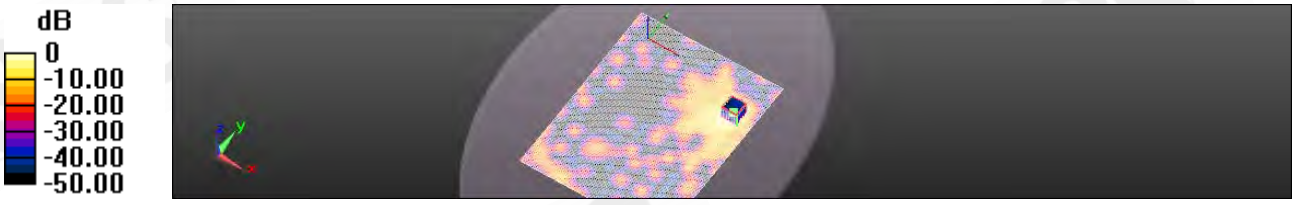
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5680 MHz;
Medium parameters used: f = 5680 MHz; σ = 5.965 mho/m; ε_r = 48.709; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.31 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.091 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 3.033 mW/g
SAR(1 g) = 0.681 mW/g; SAR(10 g) = 0.208 mW/g
Maximum value of SAR (measured) = 1.47 mW/g



0 dB = 1.31 mW/g = 2.35 dB mW/g

Date: 2012/6/17

Secondary Portrait_WLAN802.11 a 5.5G_CH124

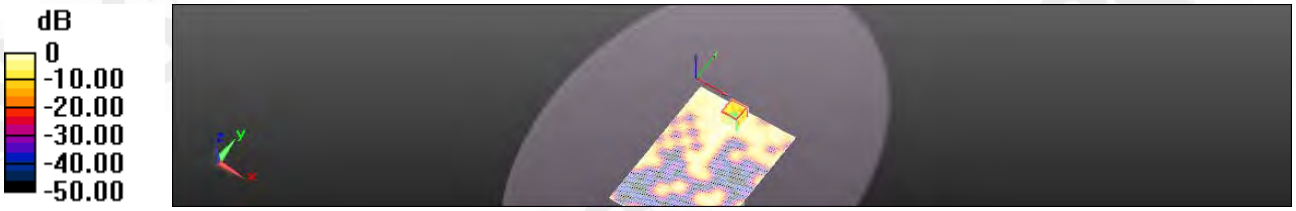
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC;
Frequency: 5620 MHz;
Medium parameters used: f = 5620 MHz; σ = 5.872 mho/m; ε_r = 48.843; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (91x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0451 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 0.871 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.101 mW/g
SAR(1 g) = 0.029 mW/g; SAR(10 g) = 0.011 mW/g
Maximum value of SAR (measured) = 0.0622 mW/g



0 dB = 0.0451 mW/g = -26.92 dB mW/g

Date: 2012/6/17

Secondary Landscape_WLAN802.11 a 5.5G_CH104

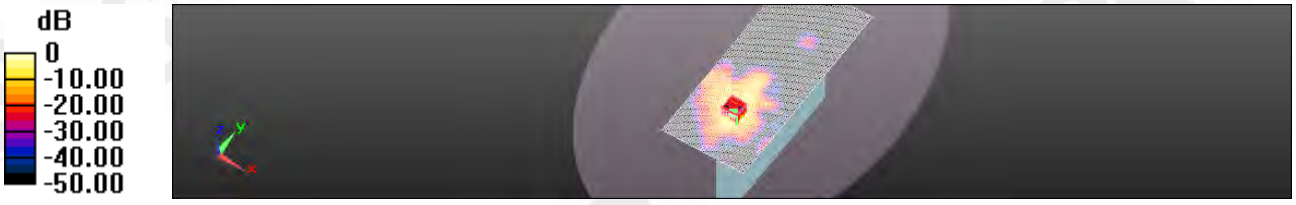
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5520 MHz;
Medium parameters used: f = 5520 MHz; σ = 5.728 mho/m; ε_r = 49.014; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.54 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.715 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 2.686 mW/g
SAR(1 g) = 0.752 mW/g; SAR(10 g) = 0.218 mW/g
Maximum value of SAR (measured) = 1.54 mW/g



0 dB = 1.54 mW/g = 3.74 dB mW/g

Date: 2012/6/17

Secondary Landscape_WLAN802.11 a 5.5G_CH116

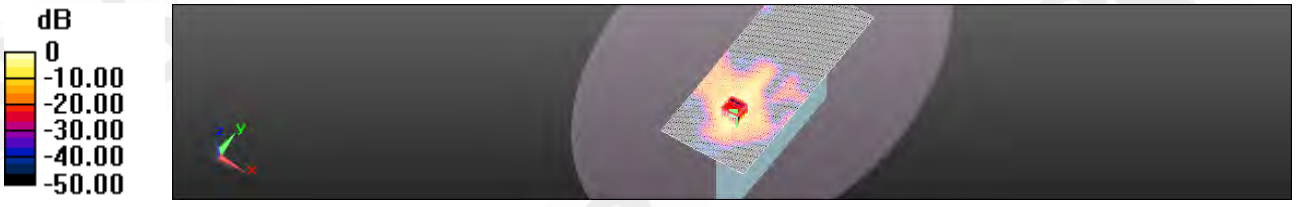
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5580 MHz;
Medium parameters used: f = 5580 MHz; σ = 5.82 mho/m; ε_r = 48.92; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.62 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.895 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 2.813 mW/g
SAR(1 g) = 0.775 mW/g; SAR(10 g) = 0.224 mW/g
Maximum value of SAR (measured) = 1.61 mW/g



0 dB = 1.62 mW/g = 4.17 dB mW/g

Date: 2012/6/17

Secondary Landscape_WLAN802.11 a 5.5G_CH124

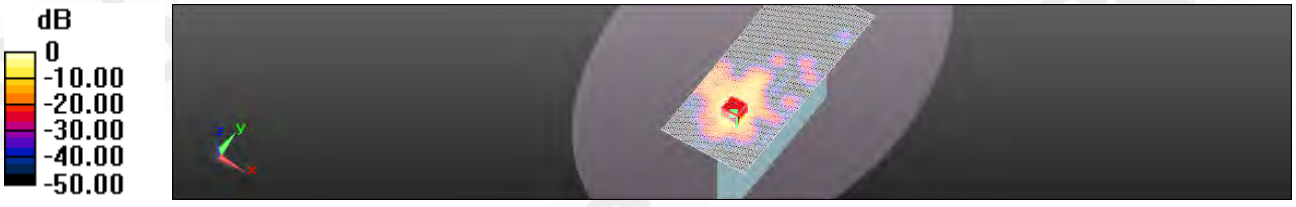
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5620 MHz;
Medium parameters used: f = 5620 MHz; σ = 5.872 mho/m; ε_r = 48.843; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.62 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.971 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 2.881 mW/g
SAR(1 g) = 0.784 mW/g; SAR(10 g) = 0.225 mW/g
Maximum value of SAR (measured) = 1.62 mW/g



0 dB = 1.62 mW/g = 4.17 dB mW/g

Date: 2012/6/17

Secondary Landscape_WLAN802.11 a 5.5G_CH136

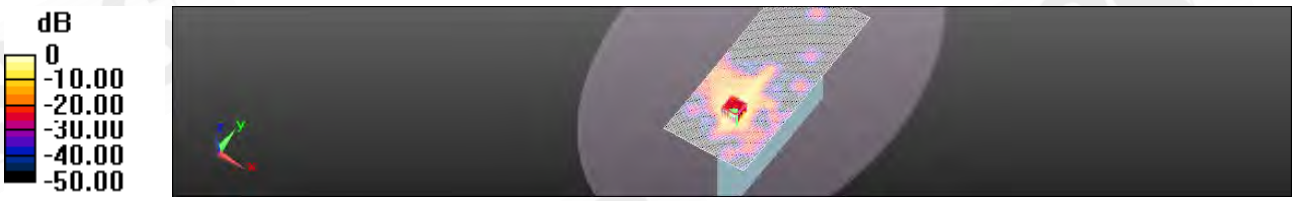
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5680 MHz;
Medium parameters used: f = 5680 MHz; σ = 5.965 mho/m; ε_r = 48.709; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.64 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.336 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 2.452 mW/g
SAR(1 g) = 0.668 mW/g; SAR(10 g) = 0.189 mW/g
Maximum value of SAR (measured) = 1.37 mW/g



0 dB = 1.64 mW/g = 4.30 dB mW/g

Date: 2012/6/17

Lap_held_WLAN802.11 n(20M) 5.5G_CH100

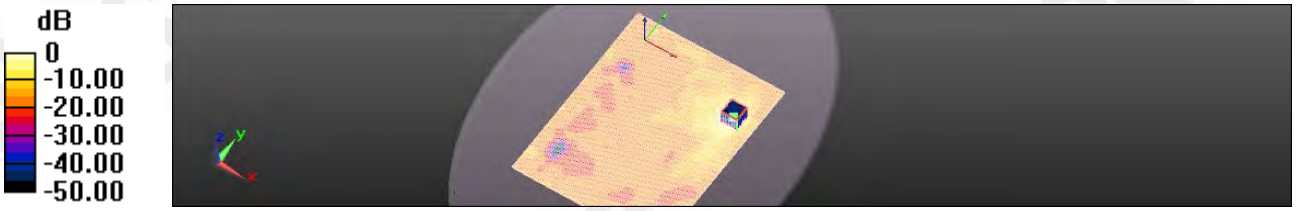
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5500 MHz;
Medium parameters used: f = 5500 MHz; σ = 5.701 mho/m; ε_r = 49.074; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.27 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.645 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 2.639 mW/g
SAR(1 g) = 0.659 mW/g; SAR(10 g) = 0.208 mW/g
Maximum value of SAR (measured) = 1.34 mW/g



0 dB = 1.27 mW/g = 2.08 dB mW/g

Date: 2012/6/17

Lap_held_WLAN802.11 n(20M) 5.5G_CH116

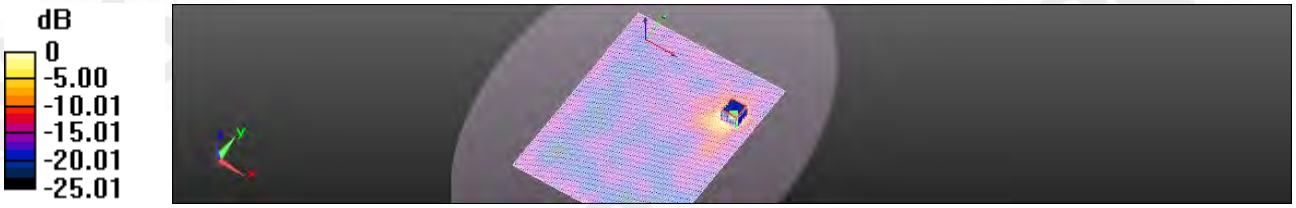
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5580 MHz;
Medium parameters used: f = 5580 MHz; σ = 5.82 mho/m; ε_r = 48.92; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.25 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.976 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 2.871 mW/g
SAR(1 g) = 0.678 mW/g; SAR(10 g) = 0.218 mW/g
Maximum value of SAR (measured) = 1.39 mW/g



0 dB = 1.25 mW/g = 1.96 dB mW/g

Date: 2012/6/17

Lap_held_WLAN802.11 n(20M) 5.5G_CH120

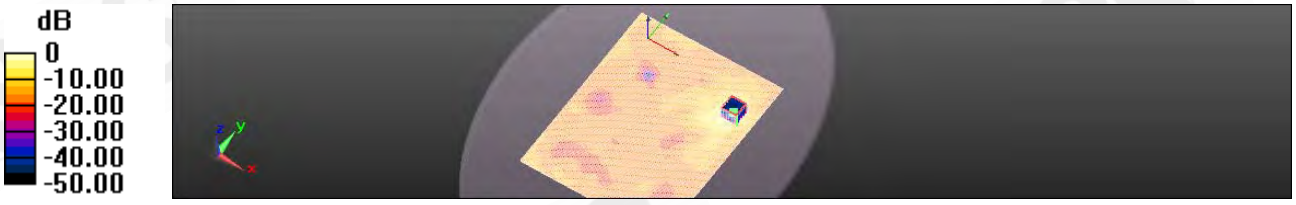
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5600 MHz;
Medium parameters used: f = 5600 MHz; σ = 5.85 mho/m; ε_r = 48.867; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.48 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.420 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 3.119 mW/g
SAR(1 g) = 0.737 mW/g; SAR(10 g) = 0.235 mW/g
Maximum value of SAR (measured) = 1.53 mW/g



0 dB = 1.48 mW/g = 3.42 dB mW/g

Date: 2012/6/17

Lap_held_WLAN802.11 n(20M) 5.5G_CH140

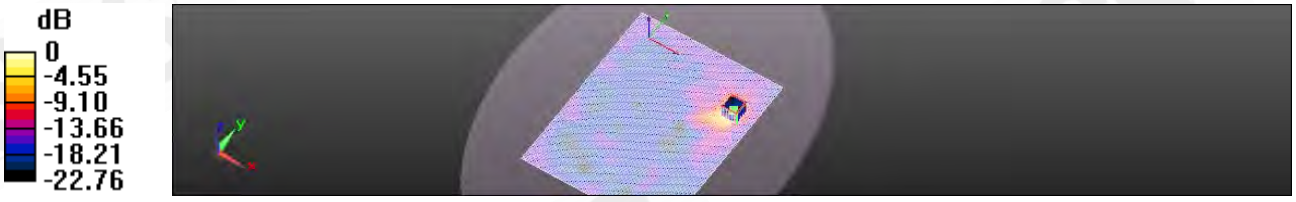
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5700 MHz;
Medium parameters used: f = 5700 MHz; σ = 5.995 mho/m; ε_r = 48.671; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.08 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.925 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 2.467 mW/g
SAR(1 g) = 0.534 mW/g; SAR(10 g) = 0.170 mW/g
Maximum value of SAR (measured) = 1.13 mW/g



0 dB = 1.08 mW/g = 0.70 dB mW/g

Date: 2012/6/17

Secondary Portrait_WLAN802.11 n(20M) 5.5G_CH100

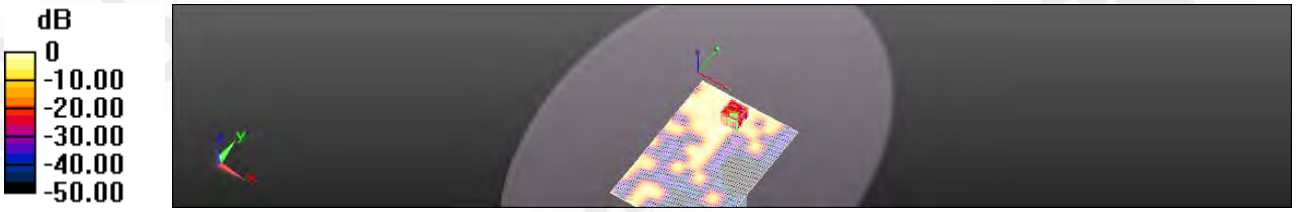
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5500 MHz;
Medium parameters used: f = 5500 MHz; σ = 5.701 mho/m; ε_r = 49.074; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (91x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0532 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.715 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.088 mW/g
SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.011 mW/g
Maximum value of SAR (measured) = 0.0602 mW/g



0 dB = 0.0532 mW/g = -25.49 dB mW/g

Date: 2012/6/17

Secondary Landscape_WLAN802.11 n(20M) 5.5G_CH100

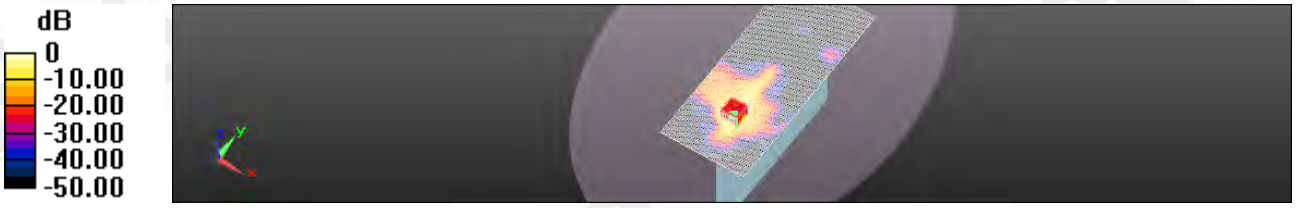
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5500 MHz;
Medium parameters used: f = 5500 MHz; σ = 5.701 mho/m; ε_r = 49.074; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.59 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 4.176 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 2.648 mW/g
SAR(1 g) = 0.738 mW/g; SAR(10 g) = 0.214 mW/g
Maximum value of SAR (measured) = 1.50 mW/g



0 dB = 1.59 mW/g = 4.04 dB mW/g

Date: 2012/6/17

Secondary Landscape_WLAN802.11 n(20M) 5.5G_CH116

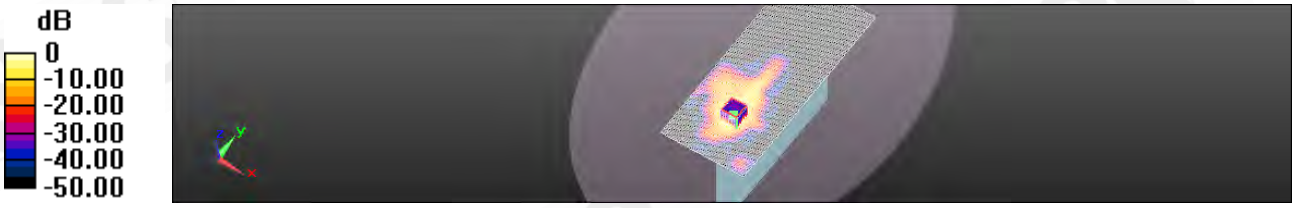
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5580 MHz;
Medium parameters used: f = 5580 MHz; σ = 5.82 mho/m; ε_r = 48.92; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.54 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.980 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 2.800 mW/g
SAR(1 g) = 0.754 mW/g; SAR(10 g) = 0.214 mW/g
Maximum value of SAR (measured) = 1.59 mW/g



0 dB = 1.54 mW/g = 3.72 dB mW/g

Date: 2012/6/17

Secondary Landscape_WLAN802.11 n(20M) 5.5G_CH120

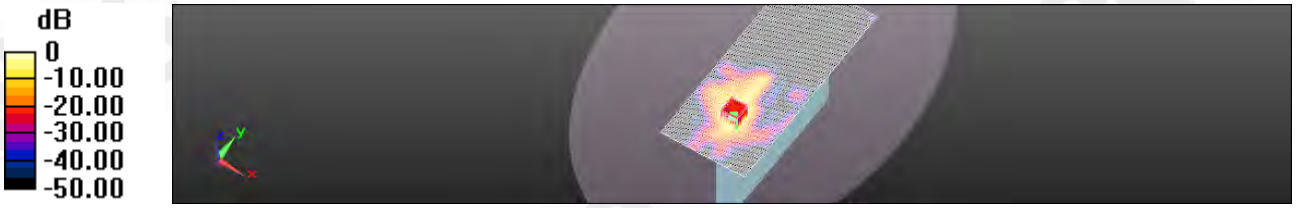
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5600 MHz;
Medium parameters used: f = 5600 MHz; σ = 5.85 mho/m; ε_r = 48.867; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.77 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.552 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 2.853 mW/g
SAR(1 g) = 0.769 mW/g; SAR(10 g) = 0.220 mW/g
Maximum value of SAR (measured) = 1.61 mW/g



0 dB = 1.77 mW/g = 4.95 dB mW/g

Date: 2012/6/17

Secondary Landscape_WLAN802.11 n(20M) 5.5G_CH140

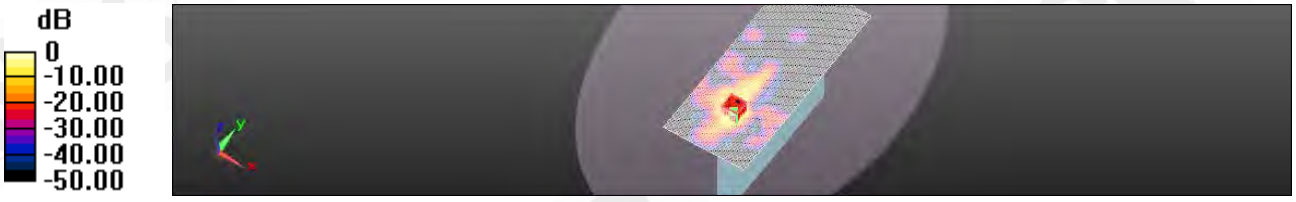
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5700 MHz;
Medium parameters used: f = 5700 MHz; σ = 5.995 mho/m; ε_r = 48.671; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.19 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.488 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 1.961 mW/g
SAR(1 g) = 0.497 mW/g; SAR(10 g) = 0.142 mW/g
Maximum value of SAR (measured) = 1.06 mW/g



0 dB = 1.19 mW/g = 1.53 dB mW/g

Date: 2012/6/17

Lap_held_WLAN802.11 n(40M) 5.5G_CH102

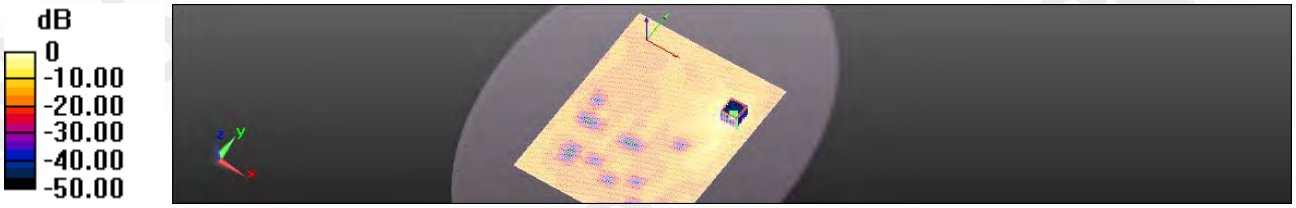
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(40)_FCC; Frequency: 5510 MHz;
Medium parameters used: f = 5510 MHz; σ = 5.713 mho/m; ε_r = 49.046; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.988 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 4.529 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 2.502 mW/g
SAR(1 g) = 0.607 mW/g; SAR(10 g) = 0.194 mW/g
Maximum value of SAR (measured) = 1.26 mW/g



0 dB = 0.988 mW/g = -0.11 dB mW/g

Date: 2012/6/17

Lap_held_WLAN802.11 n(40M) 5.5G_CH118

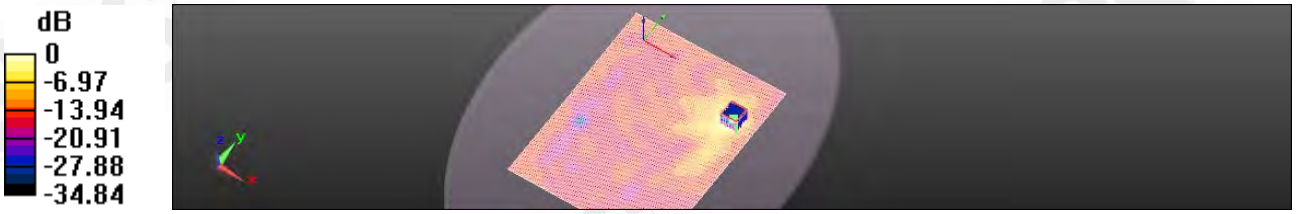
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(40)_FCC; Frequency: 5590 MHz;
Medium parameters used: f = 5590 MHz; σ = 5.833 mho/m; ε_r = 48.878; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.13 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.083 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 2.666 mW/g
SAR(1 g) = 0.653 mW/g; SAR(10 g) = 0.212 mW/g
Maximum value of SAR (measured) = 1.37 mW/g



0 dB = 1.13 mW/g = 1.07 dB mW/g

Date: 2012/6/17

Lap_held_WLAN802.11 n(40M) 5.5G_CH134

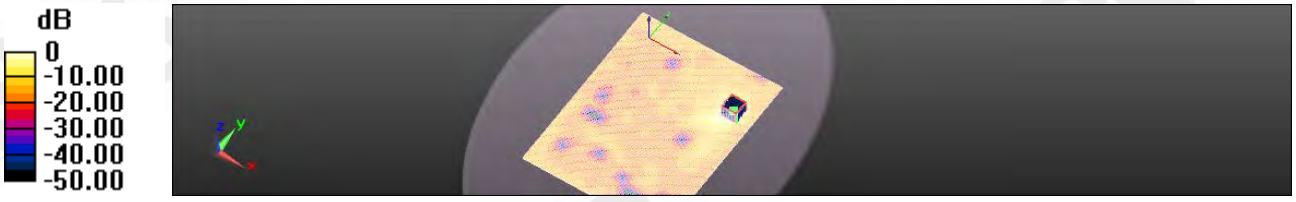
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(40)_FCC; Frequency: 5670 MHz;
Medium parameters used: f = 5670 MHz; σ = 5.949 mho/m; ε_r = 48.715; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.985 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.194 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.157 mW/g
SAR(1 g) = 0.573 mW/g; SAR(10 g) = 0.179 mW/g
Maximum value of SAR (measured) = 1.27 mW/g



0 dB = 0.985 mW/g = -0.13 dB mW/g

Date: 2012/6/17

Secondary Portrait_WLAN802.11 n(40M) 5.5G_CH118

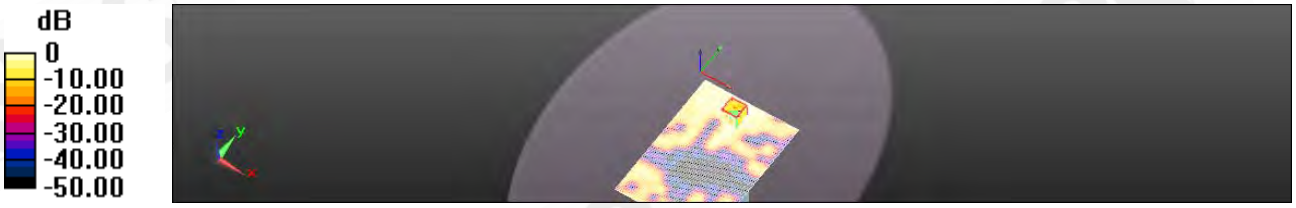
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(40)_FCC; Frequency: 5590 MHz;
Medium parameters used: f = 5590 MHz; σ = 5.833 mho/m; ε_r = 48.878; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (91x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0583 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.428 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.115 mW/g
SAR(1 g) = 0.034 mW/g; SAR(10 g) = 0.013 mW/g
Maximum value of SAR (measured) = 0.0711 mW/g



0 dB = 0.0583 mW/g = -24.68 dB mW/g

Date: 2012/6/17

Secondary Landscape_WLAN802.11 n(40M) 5.5G_CH102

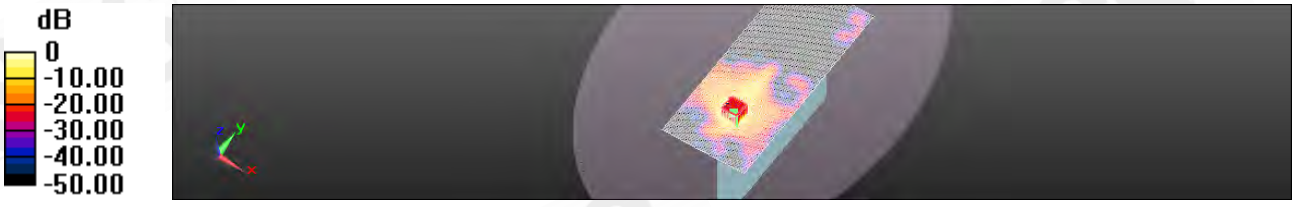
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(40)_FCC; Frequency: 5510 MHz;
Medium parameters used: f = 5510 MHz; σ = 5.713 mho/m; ε_r = 49.046; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.77 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 4.267 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 3.037 mW/g
SAR(1 g) = 0.872 mW/g; SAR(10 g) = 0.251 mW/g
Maximum value of SAR (measured) = 1.79 mW/g



0 dB = 1.77 mW/g = 4.98 dB mW/g

Date: 2012/6/17

Secondary Landscape_WLAN802.11 n(40M) 5.5G_CH118

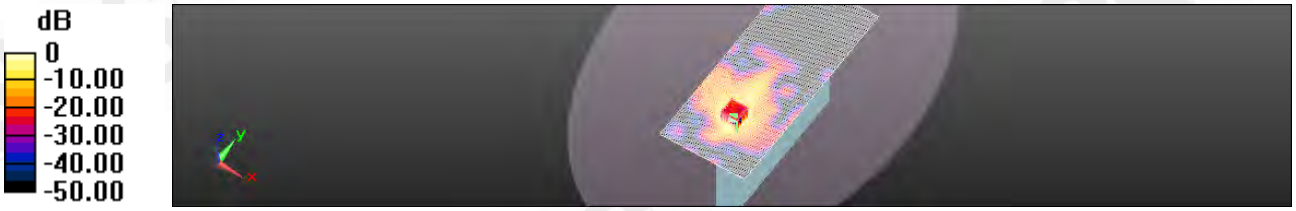
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(40)_FCC; Frequency: 5590 MHz;
Medium parameters used: f = 5590 MHz; σ = 5.833 mho/m; ε_r = 48.878; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

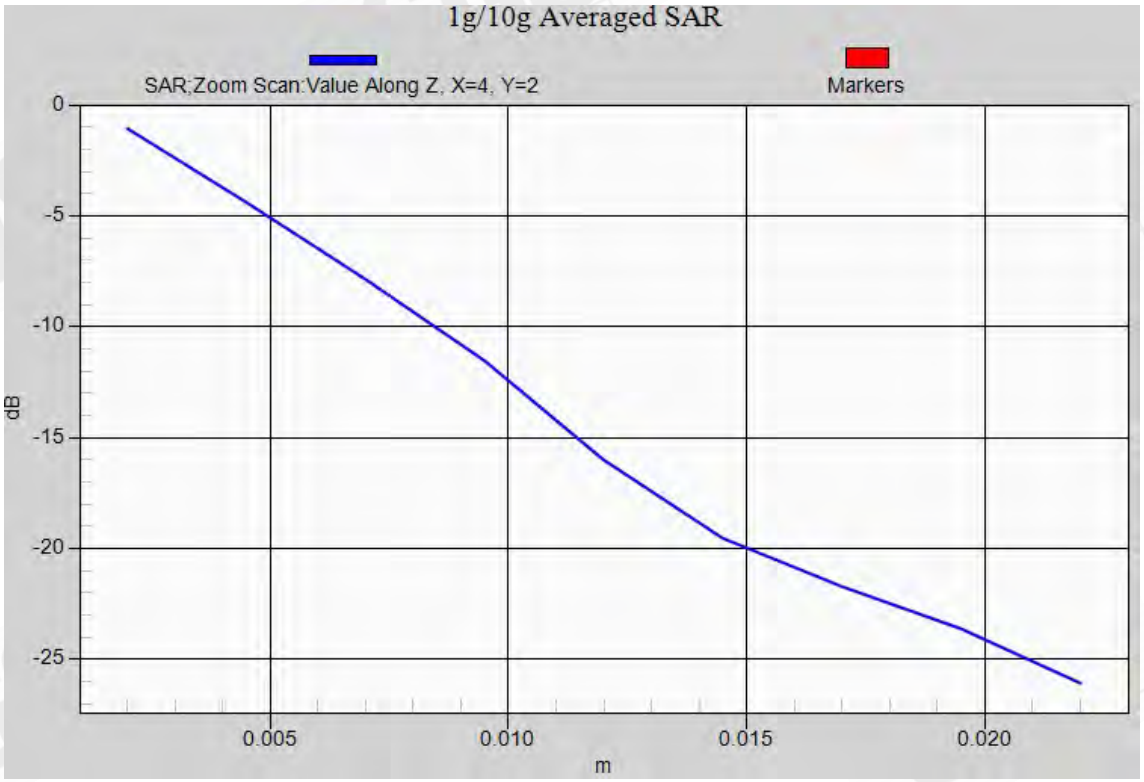
- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.93 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 4.386 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 3.306 mW/g
SAR(1 g) = 0.919 mW/g; SAR(10 g) = 0.271 mW/g
Maximum value of SAR (measured) = 1.89 mW/g



0 dB = 1.93 mW/g = 5.70 dB mW/g



Secondary Landscape_WLAN802.11 n(40M) 5.5G_CH134

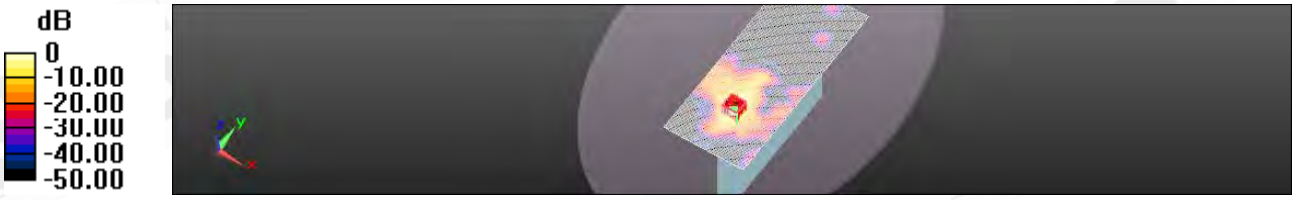
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(40)_FCC; Frequency: 5670 MHz;
Medium parameters used: f = 5670 MHz; σ = 5.949 mho/m; ε_r = 48.715; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.54 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.680 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 2.760 mW/g
SAR(1 g) = 0.738 mW/g; SAR(10 g) = 0.211 mW/g
Maximum value of SAR (measured) = 1.54 mW/g



0 dB = 1.54 mW/g = 3.77 dB mW/g

Date: 2012/6/19

Lap_held_WLAN802.11 a 5.8G_CH149

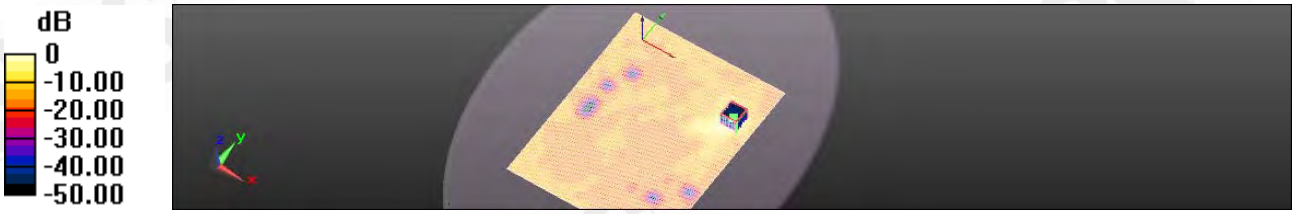
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5745 MHz;
Medium parameters used: f = 5745 MHz; σ = 6.117 mho/m; ε_r = 48.119; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.831 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.651 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.946 mW/g
SAR(1 g) = 0.430 mW/g; SAR(10 g) = 0.137 mW/g
Maximum value of SAR (measured) = 0.910 mW/g



0 dB = 0.831 mW/g = -1.61 dB mW/g

Date: 2012/6/19

Lap_held_WLAN802.11 a 5.8G_CH157

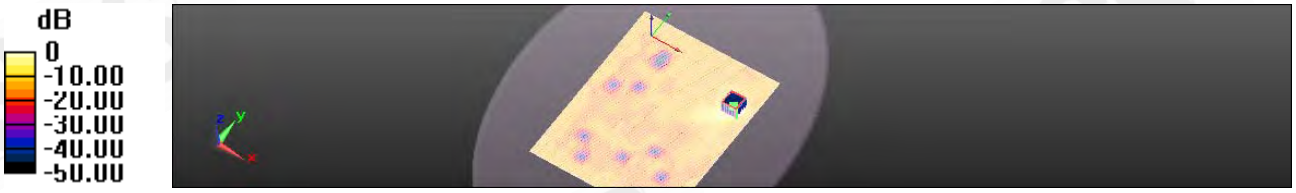
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5785 MHz;
Medium parameters used: f = 5785 MHz; σ = 6.173 mho/m; ε_r = 48.04; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.810 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.742 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 1.946 mW/g
SAR(1 g) = 0.435 mW/g; SAR(10 g) = 0.139 mW/g
Maximum value of SAR (measured) = 0.907 mW/g



0 dB = 0.810 mW/g = -1.83 dB mW/g

Date: 2012/6/19

Lap_held_WLAN802.11 a 5.8G_CH165

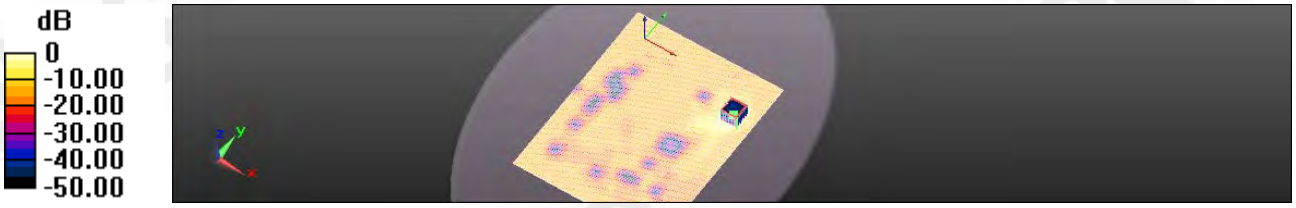
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC;
Frequency: 5825 MHz;
Medium parameters used: f = 5825 MHz; σ = 6.238 mho/m; ε_r = 47.963; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.731 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.050 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 1.855 mW/g
SAR(1 g) = 0.400 mW/g; SAR(10 g) = 0.129 mW/g
Maximum value of SAR (measured) = 0.826 mW/g



0 dB = 0.731 mW/g = -2.72 dB mW/g

Date: 2012/6/19

Secondary Portrait_WLAN802.11 a 5.8G_CH157

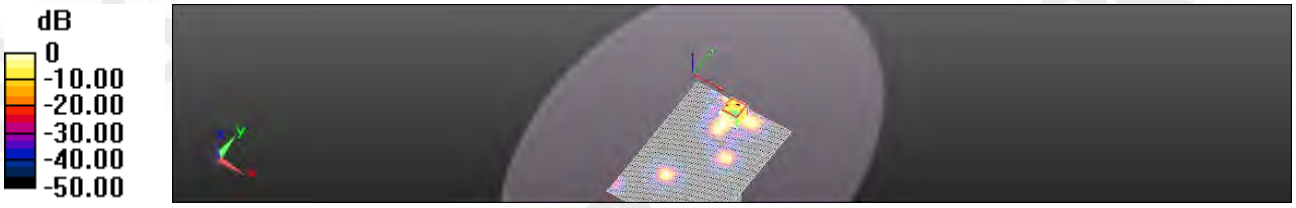
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5785 MHz;
Medium parameters used: f = 5785 MHz; σ = 6.173 mho/m; ε_r = 48.04; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (91x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0282 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.353 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.107 mW/g
SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00421 mW/g
Maximum value of SAR (measured) = 0.0270 mW/g



0 dB = 0.0282 mW/g = -30.98 dB mW/g

Date: 2012/6/19

Secondary Landscape_WLAN802.11 a 5.8G_CH149

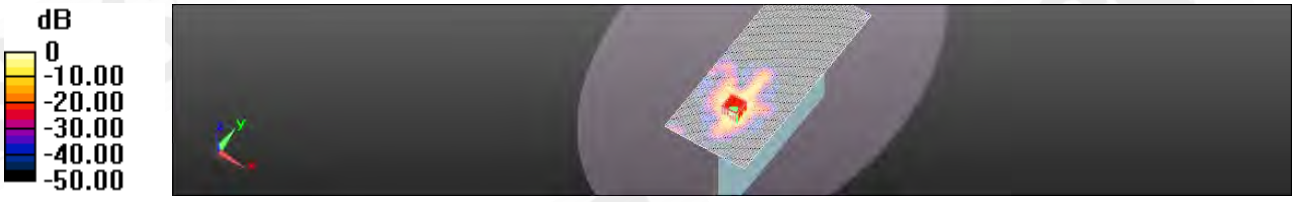
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5745 MHz;
Medium parameters used: f = 5745 MHz; σ = 6.117 mho/m; ε_r = 48.119; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.19 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.262 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.874 mW/g
SAR(1 g) = 0.465 mW/g; SAR(10 g) = 0.131 mW/g
Maximum value of SAR (measured) = 0.992 mW/g



0 dB = 1.19 mW/g = 1.52 dB mW/g

Date: 2012/6/19

Secondary Landscape_WLAN802.11 a 5.8G_CH157

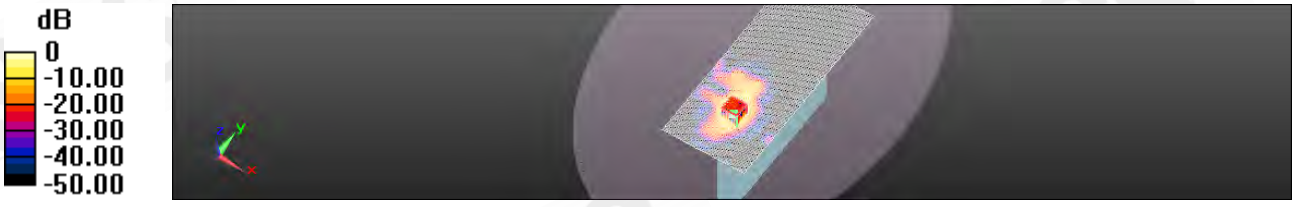
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5785 MHz;
Medium parameters used: f = 5785 MHz; σ = 6.173 mho/m; ε_r = 48.04; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.10 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.379 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 1.756 mW/g
SAR(1 g) = 0.458 mW/g; SAR(10 g) = 0.133 mW/g
Maximum value of SAR (measured) = 0.967 mW/g



0 dB = 1.10 mW/g = 0.86 dB mW/g

Date: 2012/6/19

Secondary Landscape_WLAN802.11 a 5.8G_CH165

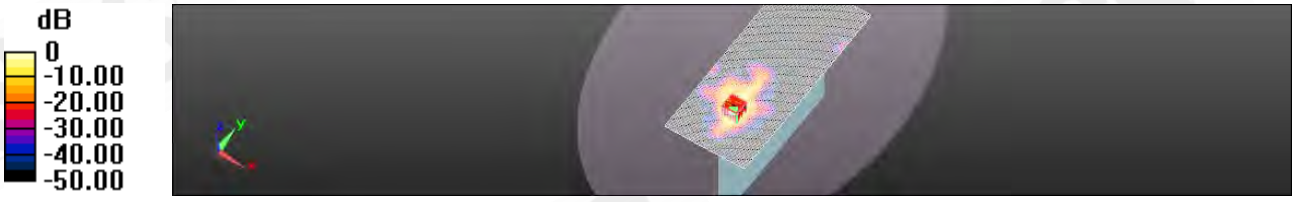
Communication System: WLAN(5G); Communication System Band: WLAN802.11 a_FCC; Frequency: 5825 MHz;
Medium parameters used: f = 5825 MHz; σ = 6.238 mho/m; ε_r = 47.963; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.00 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.091 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 1.549 mW/g
SAR(1 g) = 0.395 mW/g; SAR(10 g) = 0.113 mW/g
Maximum value of SAR (measured) = 0.881 mW/g



0 dB = 1.00 mW/g = 0.02 dB mW/g

Date: 2012/6/19

Lap_held_WLAN802.11 n(20M) 5.8G_CH149

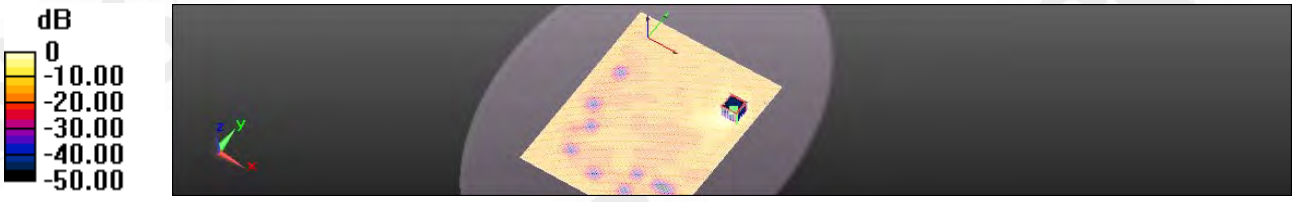
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5745 MHz;
Medium parameters used: f = 5745 MHz; σ = 6.117 mho/m; ε_r = 48.119; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.748 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.216 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 1.849 mW/g
SAR(1 g) = 0.413 mW/g; SAR(10 g) = 0.132 mW/g
Maximum value of SAR (measured) = 0.870 mW/g



0 dB = 0.748 mW/g = -2.52 dB mW/g

Date: 2012/6/19

Lap_held_WLAN802.11 n(20M) 5.8G_CH157

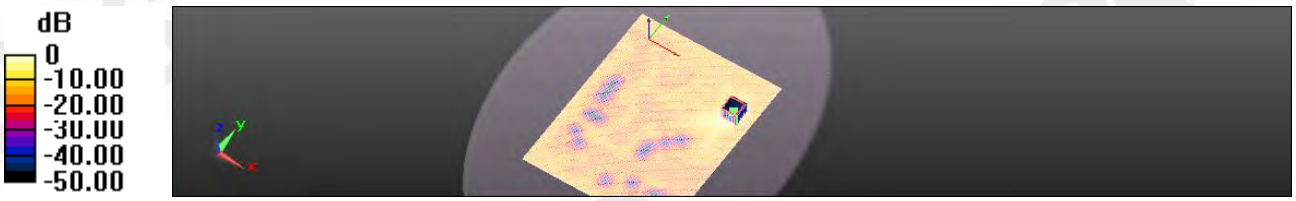
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5785 MHz;
Medium parameters used: f = 5785 MHz; σ = 6.173 mho/m; ε_r = 48.04; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.776 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.772 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 1.941 mW/g
SAR(1 g) = 0.422 mW/g; SAR(10 g) = 0.129 mW/g
Maximum value of SAR (measured) = 0.901 mW/g



0 dB = 0.776 mW/g = -2.20 dB mW/g

Date: 2012/6/19

Lap_held_WLAN802.11 n(20M) 5.8G_CH165

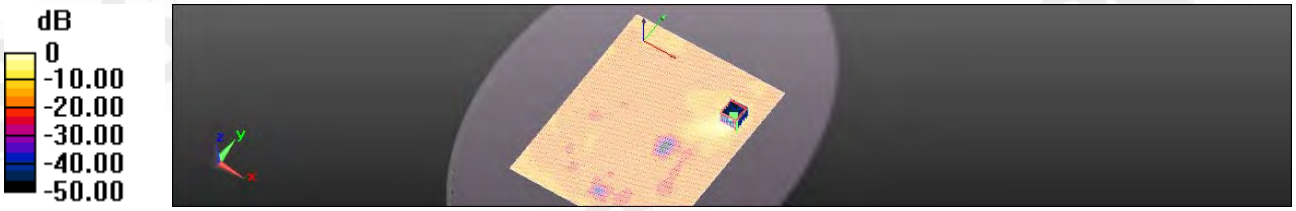
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5825 MHz;
Medium parameters used: f = 5825 MHz; σ = 6.238 mho/m; ε_r = 47.963; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.04 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.371 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 2.435 mW/g
SAR(1 g) = 0.484 mW/g; SAR(10 g) = 0.144 mW/g
Maximum value of SAR (measured) = 1.01 mW/g



0 dB = 1.04 mW/g = 0.38 dB mW/g

Date: 2012/6/19

Secondary Portrait_WLAN802.11 n(20M) 5.8G_CH157

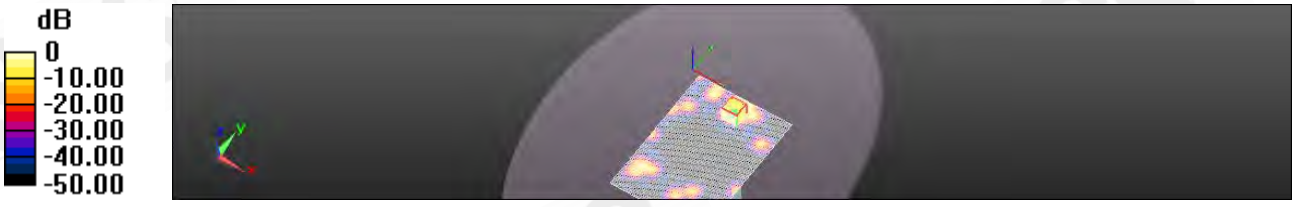
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5785 MHz;
Medium parameters used: f = 5785 MHz; σ = 6.173 mho/m; ε_r = 48.04; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (91x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0756 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.053 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.100 mW/g
SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.00587 mW/g
Maximum value of SAR (measured) = 0.0268 mW/g



0 dB = 0.0756 mW/g = -22.43 dB mW/g

Date: 2012/6/19

Secondary Landscape_WLAN802.11 n(20M) 5.8G_CH149

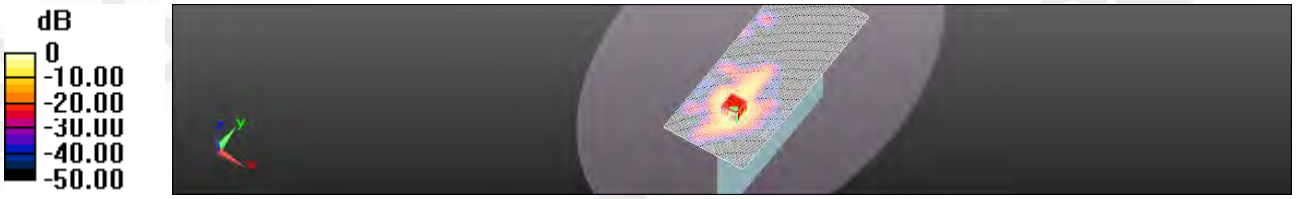
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5745 MHz;
Medium parameters used: f = 5745 MHz; σ = 6.117 mho/m; ε_r = 48.119; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.05 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.544 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 1.821 mW/g
SAR(1 g) = 0.455 mW/g; SAR(10 g) = 0.137 mW/g
Maximum value of SAR (measured) = 0.968 mW/g



0 dB = 1.05 mW/g = 0.41 dB mW/g

Date: 2012/6/19

Secondary Landscape_WLAN802.11 n(20M) 5.8G_CH157

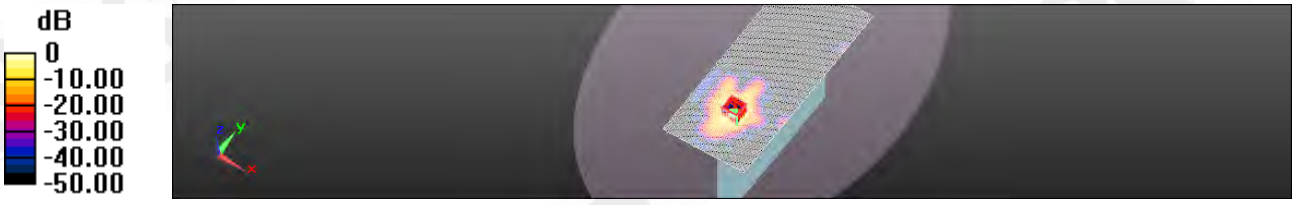
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5785 MHz;
Medium parameters used: f = 5785 MHz; σ = 6.173 mho/m; ε_r = 48.04; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.981 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.625 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 1.787 mW/g
SAR(1 g) = 0.450 mW/g; SAR(10 g) = 0.131 mW/g
Maximum value of SAR (measured) = 0.987 mW/g



0 dB = 0.981 mW/g = -0.17 dB mW/g

Date: 2012/6/19

Secondary Landscape_WLAN802.11 n(20M) 5.8G_CH165

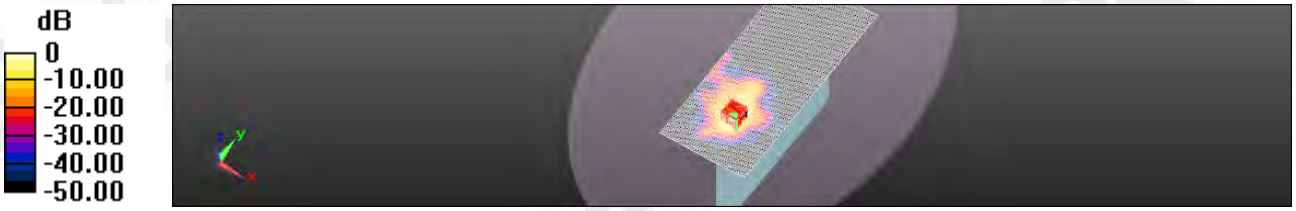
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(20M)_FCC; Frequency: 5825 MHz;
Medium parameters used: f = 5825 MHz; σ = 6.238 mho/m; ε_r = 47.963; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.873 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.947 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 1.534 mW/g
SAR(1 g) = 0.370 mW/g; SAR(10 g) = 0.102 mW/g
Maximum value of SAR (measured) = 0.803 mW/g



0 dB = 0.873 mW/g = -1.18 dB mW/g

Date: 2012/6/19

Lap_held_WLAN802.11 n(40M) 5.8G_CH151

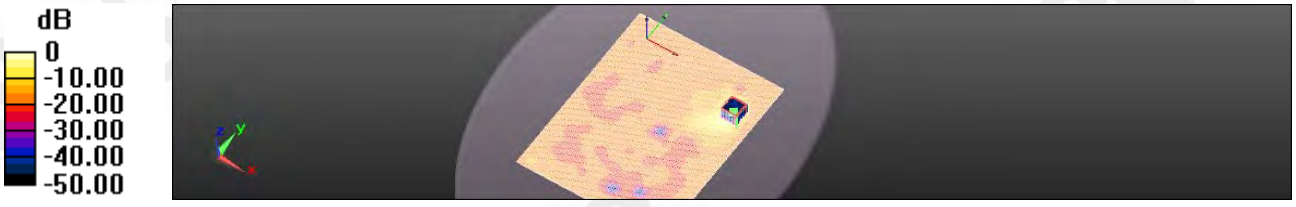
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(40)_FCC; Frequency: 5755 MHz;
Medium parameters used: f = 5755 MHz; σ = 6.136 mho/m; ε_r = 48.09; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.31 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.743 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 2.922 mW/g
SAR(1 g) = 0.608 mW/g; SAR(10 g) = 0.177 mW/g
Maximum value of SAR (measured) = 1.26 mW/g



0 dB = 1.31 mW/g = 2.33 dB mW/g

Date: 2012/6/19

Lap_held_WLAN802.11 n(40M) 5.8G_CH159

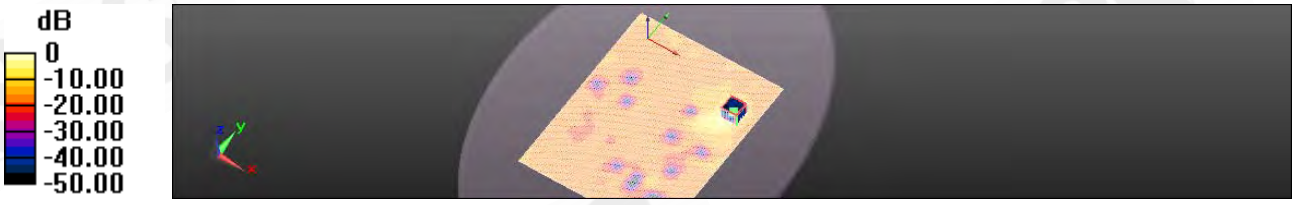
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(40)_FCC; Frequency: 5795 MHz;
Medium parameters used: f = 5795 MHz; σ = 6.193 mho/m; ε_r = 48.026; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (141x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.08 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.739 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 2.437 mW/g
SAR(1 g) = 0.507 mW/g; SAR(10 g) = 0.148 mW/g
Maximum value of SAR (measured) = 1.03 mW/g



0 dB = 1.08 mW/g = 0.70 dB mW/g

Date: 2012/6/19

Secondary Portrait_WLAN802.11 n(40M) 5.8G_CH159

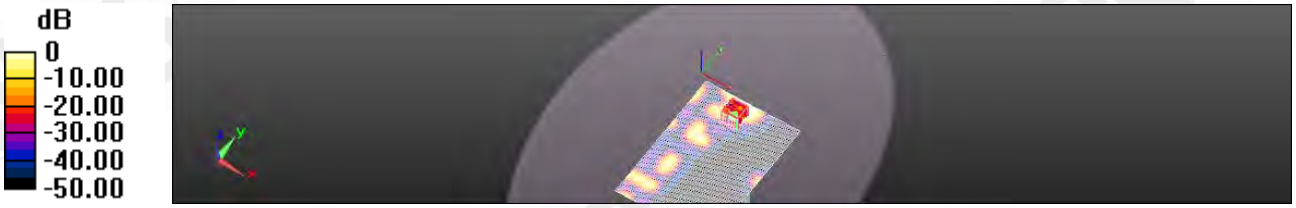
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(40)_FCC; Frequency: 5795 MHz;
Medium parameters used: f = 5795 MHz; σ = 6.193 mho/m; ε_r = 48.026; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (91x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0361 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 0.793 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.051 mW/g
SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.00582 mW/g
Maximum value of SAR (measured) = 0.0242 mW/g



0 dB = 0.0361 mW/g = -28.84 dB mW/g

Date: 2012/6/19

Secondary Landscape_WLAN802.11 n(40M) 5.8G_CH151

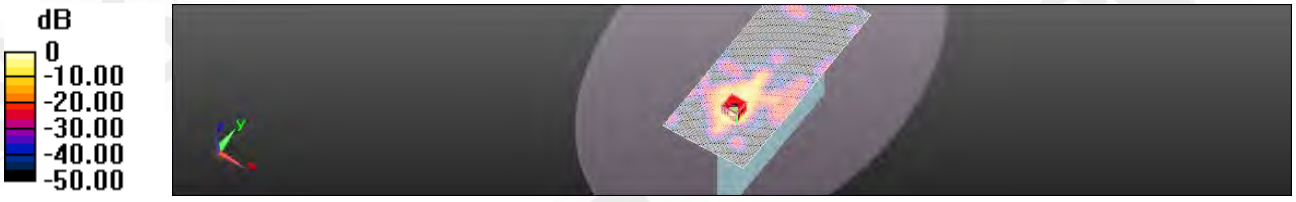
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(40)_FCC; Frequency: 5755 MHz;
Medium parameters used: f = 5755 MHz; σ = 6.136 mho/m; ε_r = 48.09; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.33 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.879 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 2.140 mW/g
SAR(1 g) = 0.533 mW/g; SAR(10 g) = 0.148 mW/g
Maximum value of SAR (measured) = 1.15 mW/g



0 dB = 1.33 mW/g = 2.49 dB mW/g

Date: 2012/6/19

Secondary Landscape_WLAN802.11 n(40M) 5.8G_CH159

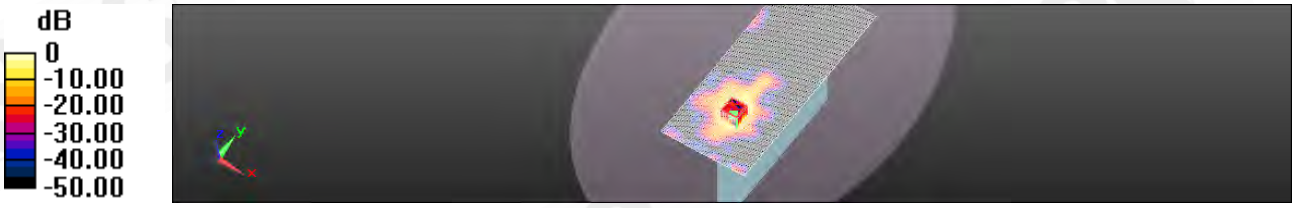
Communication System: WLAN(5G); Communication System Band: WLAN802.11 n(40)_FCC; Frequency: 5795 MHz;
Medium parameters used: f = 5795 MHz; σ = 6.193 mho/m; ε_r = 48.026; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/BODY/Area Scan (81x191x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.905 mW/g

Configuration/BODY/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.614 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.642 mW/g
SAR(1 g) = 0.406 mW/g; SAR(10 g) = 0.115 mW/g
Maximum value of SAR (measured) = 0.871 mW/g



0 dB = 0.905 mW/g = -0.87 dB mW/g

5. SAR System Performance Verification

Date: 2012/6/16

DUT: Dipole 2450 MHz;

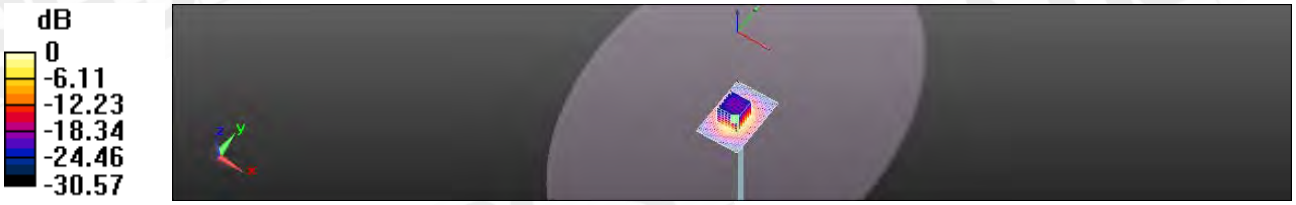
Communication System: CW; Communication System Band: D2450 (2450.0 MHz);
Frequency: 2450 MHz;
Medium parameters used: f = 2450 MHz; σ = 2.022 mho/m; ε_r = 51.315; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(6.82, 6.82, 6.82); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/Pin=250mW/Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 16.9 mW/g

Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.894 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 27.638 mW/g
SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.08 mW/g
Maximum value of SAR (measured) = 16.4 mW/g



0 dB = 16.9 mW/g = 24.55 dB mW/g

Date: 2012/6/17

DUT: Dipole D5.5GHz;

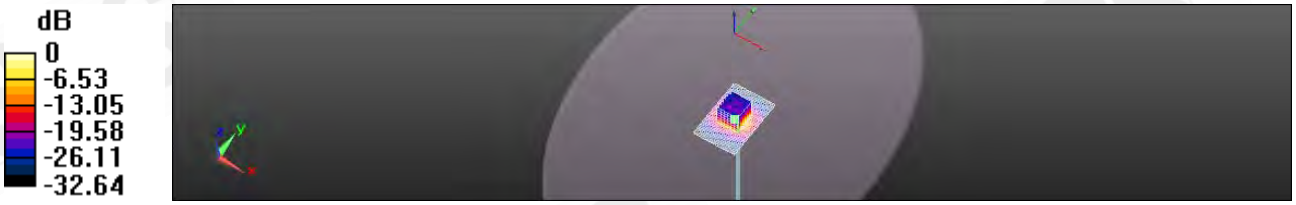
Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5500 MHz;
Medium parameters used: f = 5500 MHz; σ = 5.701 mho/m; ε_r = 49.074; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.3, 3.3, 3.3); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/Pin=250mW/Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 17.5 mW/g

Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 42.765 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 37.076 mW/g
SAR(1 g) = 7.93 mW/g; SAR(10 g) = 2.12 mW/g
Maximum value of SAR (measured) = 17.7 mW/g



0 dB = 17.5 mW/g = 24.88 dB mW/g

Date: 2012/6/19

DUT: Dipole D5.8GHz;

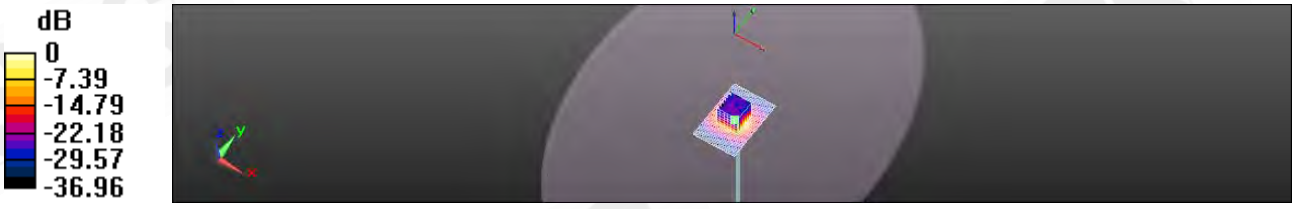
Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5800 MHz;
Medium parameters used: f = 5800 MHz; σ = 6.198 mho/m; ε_r = 48.037; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(3.77, 3.77, 3.77); Calibrated: 2012/1/4;
- Sensor-Surface: 2mm (Mechanical Surface Detection),
- Electronics: DAE4 Sn547; Calibrated: 2012/6/1
- Phantom: Body; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Configuration/Pin=250mW/Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 16.6 mW/g

Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.195 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 37.160 mW/g
SAR(1 g) = 7.41 mW/g; SAR(10 g) = 2.09 mW/g
Maximum value of SAR (measured) = 16.7 mW/g



0 dB = 16.6 mW/g = 24.42 dB mW/g

6. DAE & Probe Calibration Certificate

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Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: DAE4-547_Jun12

CALIBRATION CERTIFICATE

Object DAE4 - SD 000 D04 BJ - SN: 547

Calibration procedure(s) QA CAL-06.v24
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: June 01, 2012

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-11 (No:11450)	Sep-12
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V2.1	SE UWS 053 AA 1001	05-Jan-12 (in house check)	In house check: Jan-13

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

Issued: June 1, 2012

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

Certificate No: DAE4-547_Jun12 Page 1 of 5

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Glossary

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

Methods Applied and Interpretation of Parameters

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

DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

Calibration Factors	X	Y	Z
High Range	403.991 ± 0.1% (k=2)	404.021 ± 0.1% (k=2)	404.165 ± 0.1% (k=2)
Low Range	3.95833 ± 0.7% (k=2)	3.96044 ± 0.7% (k=2)	3.97334 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	188.5 ° ± 1 °

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Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199998.35	2.97	0.00
Channel X	+ Input	20003.01	3.40	0.02
Channel X	- Input	-19999.79	1.72	-0.01
Channel Y	+ Input	199995.78	0.56	0.00
Channel Y	+ Input	19997.80	-1.85	-0.01
Channel Y	- Input	-20002.86	-1.29	0.01
Channel Z	+ Input	199994.37	-1.29	-0.00
Channel Z	+ Input	19999.89	0.33	0.00
Channel Z	- Input	-20004.55	-3.05	0.02

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2000.42	0.22	0.01
Channel X	+ Input	200.58	0.05	0.03
Channel X	- Input	-200.36	-0.95	0.47
Channel Y	+ Input	2000.13	0.09	0.00
Channel Y	+ Input	200.21	-0.28	-0.14
Channel Y	- Input	-200.21	-0.72	0.36
Channel Z	+ Input	2000.48	0.50	0.02
Channel Z	+ Input	200.00	-0.35	-0.18
Channel Z	- Input	-200.24	-0.72	0.36

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	2.44	0.42
	- 200	-1.09	-2.58
Channel Y	200	-12.58	-13.15
	- 200	12.53	12.88
Channel Z	200	20.17	19.90
	- 200	-20.96	-21.63

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	2.91	-1.28
Channel Y	200	9.12	-	4.48
Channel Z	200	5.56	7.61	-

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4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	16136	15101
Channel Y	16450	16073
Channel Z	15981	16890

5. Input Offset Measurement

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

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	1.92	0.96	3.04	0.39
Channel Y	-0.95	-1.86	0.27	0.40
Channel Z	-2.66	-3.84	-1.65	0.45

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

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Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: EX3-3831_Jan12

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3831

Calibration procedure(s): QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: January 4, 2012

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	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-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: January 5, 2012

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z: A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3831

Manufactured: September 6, 2011
Calibrated: January 4, 2012

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.44	0.41	0.43	± 10.1 %
DCP (mV)[B]	101.7	101.4	99.5	

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	111.7	±3.0 %
			Y	0.00	0.00	1.00	96.2	
			Z	0.00	0.00	1.00	106.7	

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

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.32	9.32	9.32	0.44	0.84	± 12.0 %
835	41.5	0.90	8.82	8.82	8.82	0.19	1.48	± 12.0 %
900	41.5	0.97	8.71	8.71	8.71	0.22	1.38	± 12.0 %
1750	40.1	1.37	8.03	8.03	8.03	0.39	0.81	± 12.0 %
1900	40.0	1.40	7.76	7.76	7.76	0.44	0.77	± 12.0 %
2000	40.0	1.40	7.65	7.65	7.65	0.61	0.63	± 12.0 %
2300	39.5	1.67	7.44	7.44	7.44	0.41	0.83	± 12.0 %
2450	39.2	1.80	6.84	6.84	6.84	0.49	0.73	± 12.0 %
2600	39.0	1.96	6.67	6.67	6.67	0.33	0.96	± 12.0 %
5200	36.0	4.66	4.64	4.64	4.64	0.42	1.80	± 13.1 %
5300	35.9	4.76	4.37	4.37	4.37	0.44	1.80	± 13.1 %
5600	35.5	5.07	4.10	4.10	4.10	0.48	1.80	± 13.1 %
5800	35.3	5.27	4.12	4.12	4.12	0.45	1.80	± 13.1 %

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

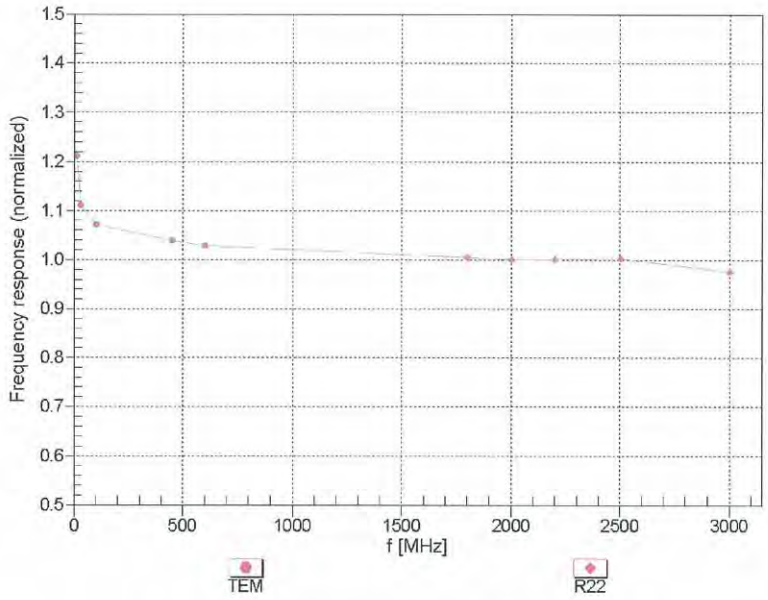
Calibration Parameter Determined in Body Tissue Simulating Media

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	9.24	9.24	9.24	0.23	1.25	± 12.0 %
835	55.2	0.97	9.02	9.02	9.02	0.28	1.13	± 12.0 %
900	55.0	1.05	8.93	8.93	8.93	0.25	1.28	± 12.0 %
1750	53.4	1.49	7.67	7.67	7.67	0.38	0.87	± 12.0 %
1900	53.3	1.52	7.25	7.25	7.25	0.57	0.70	± 12.0 %
2000	53.3	1.52	7.31	7.31	7.31	0.27	1.09	± 12.0 %
2300	52.9	1.81	7.26	7.26	7.26	0.71	0.66	± 12.0 %
2450	52.7	1.95	6.82	6.82	6.82	0.74	0.62	± 12.0 %
2600	52.5	2.16	6.63	6.63	6.63	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.12	4.12	4.12	0.50	1.90	± 13.1 %
5300	48.9	5.42	3.92	3.92	3.92	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.30	3.30	3.30	0.65	1.90	± 13.1 %
5800	48.2	6.00	3.77	3.77	3.77	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 ± 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.

EX3DV4– SN:3831 January 4, 2012

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



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

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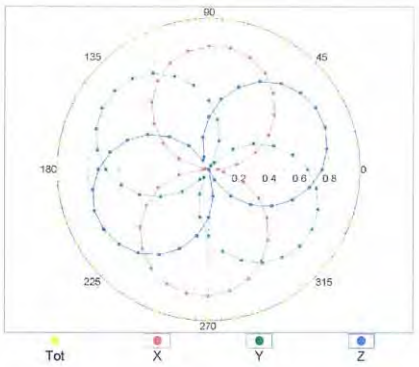
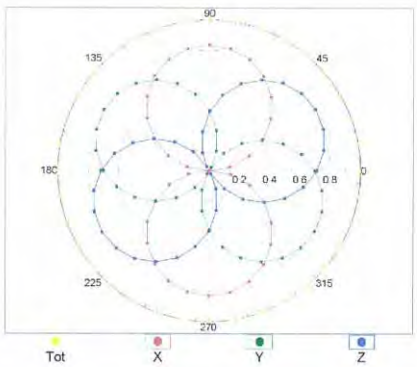
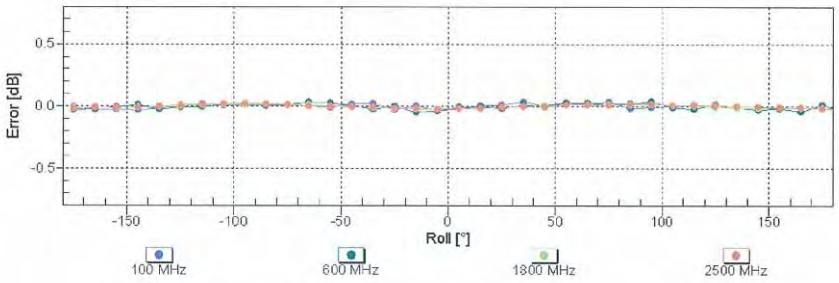
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

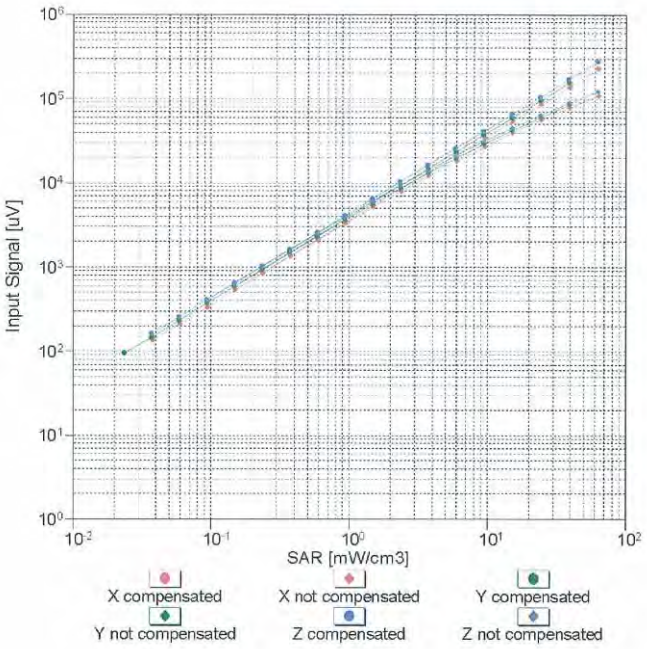


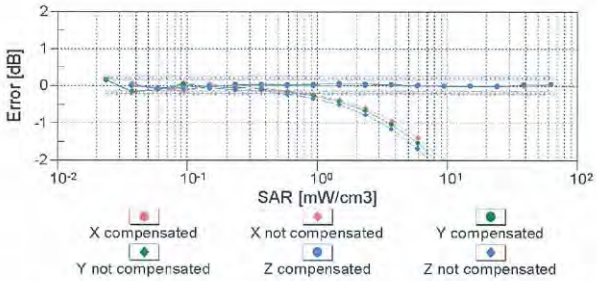


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

EX3DV4– SN:3831 January 4, 2012

Dynamic Range f(SAR$_{head}$)
(TEM cell , f = 900 MHz)



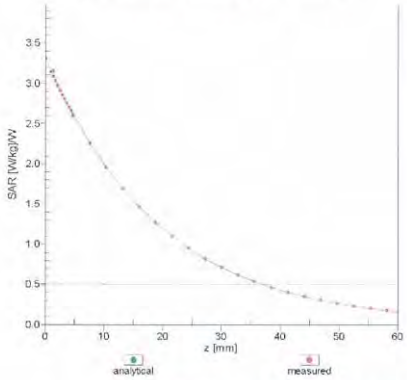


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

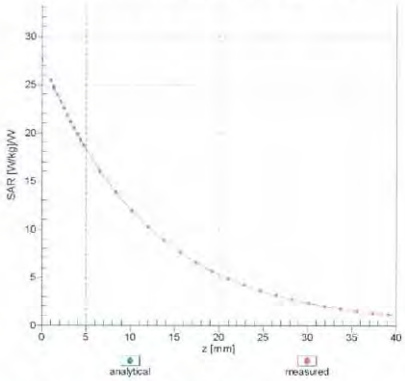
EX3DV4– SN:3831 January 4, 2012

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

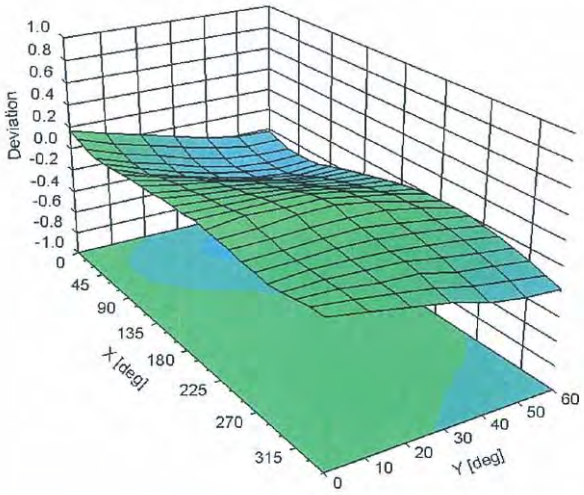


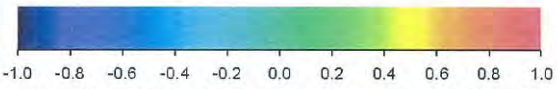
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

Certificate No: EX3-3831_Jan12 Page 10 of 11

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

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

7. Uncertainty Budget

Measurement Uncertainty evaluation template for DUT SAR test
IEEE 1528

A	c	D	e	f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty %	Probability Distributioi n	Div	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertaint y	vi, or Veff
Measurement system								
Probe calibration(under 2.6Ghz)	6.00%	N	1	1	1	6.00%	6.00%	∞
Isotropy , Axial	3.50%	R	√3	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1	1	5.54%	5.54%	∞
Boundary Effect	1.00%	R	√3	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom shell	2.90%	R	√3	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1	1	0.58%	0.58%	∞
Test Sample related								
Test sample positioning	2.90%	N	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1	1	2.89%	2.89%	∞
Phantom and Setup								
Phantom Uncertainty	4.00%	R	√3	1	1	2.31%	2.31%	∞
Liquid conductivity(meas.) Max at 1900 band	4.60%	N	1	0.64	0.43	2.94%	1.98%	M
Liquid permitivity(meas.) Max at 835 band	2.17%	N	1	0.6	0.49	1.30%	1.06%	M
Combined standard uncertainty		RSS				11.72%	11.49%	
Expant uncertainty (95% confidence interval), K=2						23.44%	22.98%	

Measurement Uncertainty evaluation template for DUT SAR test
IEEE 1528

A	c	D	e	f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty %	Probability Distributioi n	Div	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertaint y	vi, or Veff
Measurement system								
Probe calibration(under 6Ghz)	6.55%	N	1	1	1	6.55%	6.55%	∞
Isotropy , Axial	3.50%	R	√3	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1	1	5.54%	5.54%	∞
Boundary Effect	1.00%	R	√3	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom shell	2.90%	R	√3	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1	1	0.58%	0.58%	∞
Test Sample related								
Test sample positioning	2.90%	N	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1	1	2.89%	2.89%	∞
Phantom and Setup								
Phantom Uncertainty	4.00%	R	√3	1	1	2.31%	2.31%	∞
Liquid conductivity(meas.) Max at 1900 band	4.60%	N	1	0.64	0.43	2.94%	1.98%	M
Liquid permitivity(meas.) Max at 835 band	2.17%	N	1	0.6	0.49	1.30%	1.06%	M
Combined standard uncertainty		RSS				12.01%	11.79%	
Expant uncertainty (95% confidence interval), K=2						24.02%	23.57%	

8. Phantom Description

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info@speag.com, http://www.speag.com

s p e a g

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 Zürich 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 DUT below	Prototypes, Sample testing

Standards
[1] CENELEC EN 50361
[2] IEEE Std 1528-2003
[3] IEC 62209 Part I
[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

Signature / Stamp

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

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_Apr12

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 727
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 25, 2012

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	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: April 25, 2012

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

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

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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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 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 ± 0.2) °C	39.6 ± 6 %	1.81 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	12.8 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**51.2 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.95 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**23.8 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.4 ± 6 %	1.98 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**50.4 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.92 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**23.6 mW / g ± 16.5 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.6 Ω + 2.8 jΩ
Return Loss	- 27.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.3 Ω + 3.9 jΩ
Return Loss	- 27.8 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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 09, 2003

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司 | No.134, Wu Kung Road, Wuku Industrial Zone, Taipei County, Taiwan / 台北縣五股工業區五工路 134 號
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DASY5 Validation Report for Head TSL

Date: 25.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

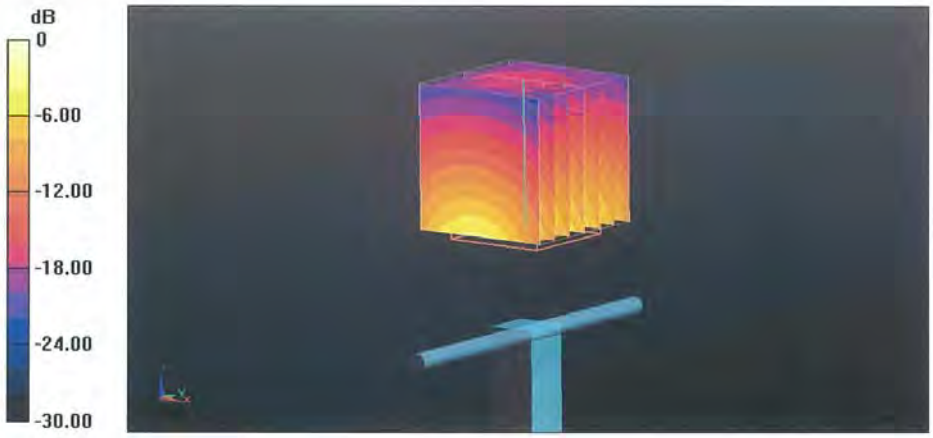
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.81 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

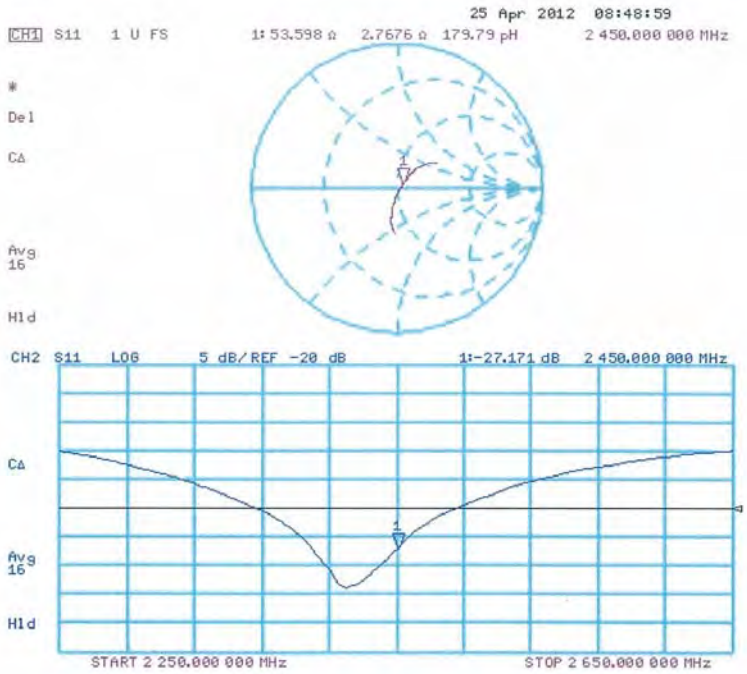
- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.712 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 26.388 mW/g
SAR(1 g) = 12.8 mW/g; SAR(10 g) = 5.95 mW/g
Maximum value of SAR (measured) = 16.4 mW/g



0 dB = 16.4 mW/g = 24.30 dB mW/g

Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 25.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

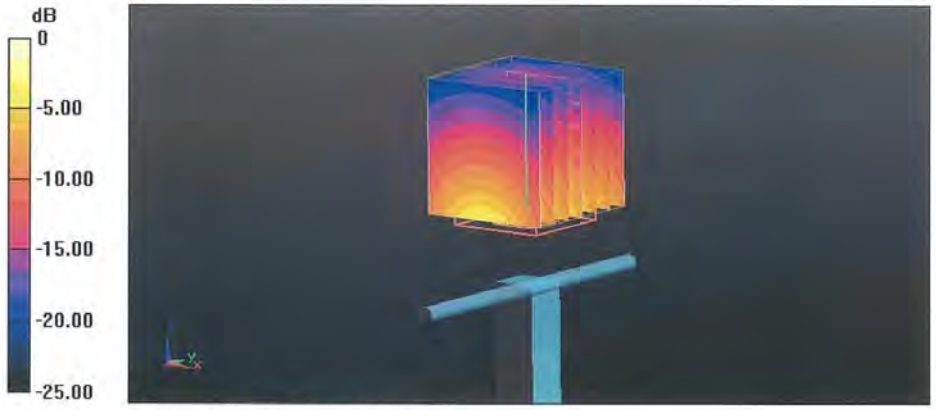
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.98 mho/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.136 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 25.811 mW/g
SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.92 mW/g
Maximum value of SAR (measured) = 16.7 mW/g



0 dB = 16.7 mW/g = 24.45 dB mW/g

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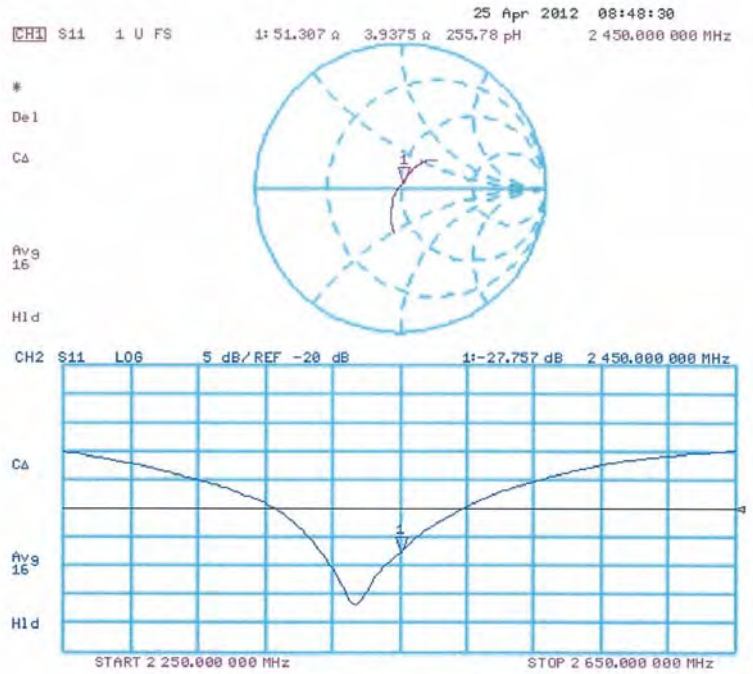
Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: D5GHzV2-1023_Jan12

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, 2012

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	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
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 EX3DV4	SN: 3503	30-Dec-11 (No. EX3-3503_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: January 20, 2012

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

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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:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5500 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	36.3 ± 6 %	4.60 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.98 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**79.9 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**22.8 mW /g ± 16.5 % (k=2)**

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.8 ± 6 %	4.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.45 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**84.5 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.40 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.0 mW / g ± 16.5 % (k=2)**

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Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.3 ± 6 %	5.22 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.95 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**79.5 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.26 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**22.6 mW / g ± 16.5 % (k=2)**

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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 ± 0.2) °C	49.2 ± 6 %	5.46 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °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	7.22 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**72.3 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.03 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.4 mW / g ± 17.6 % (k=2)**

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	48.7 ± 6 %	5.86 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.81 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**78.2 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.17 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.7 mW / g ± 17.6 % (k=2)**

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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	48.2 ± 6 %	6.28 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °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	7.30 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**73.1 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.02 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.2 mW / g ± 17.6 % (k=2)**

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Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.2 Ω - 7.4 jΩ
Return Loss	- 22.5 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	52.4 Ω - 0.9 jΩ
Return Loss	- 32.2 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	56.1 Ω + 0.0 jΩ
Return Loss	- 24.9 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	50.9 Ω - 5.2 jΩ
Return Loss	- 25.7 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	52.3 Ω + 0.2 jΩ
Return Loss	- 32.9 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	52.4 Ω - 6.5 jΩ
Return Loss	- 23.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.198 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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

DASY5 Validation Report for Head TSL

Date: 19.01.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.6 mho/m; ε_r = 36.3; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 4.9 mho/m; ε_r = 35.8; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.22 mho/m; ε_r = 35.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

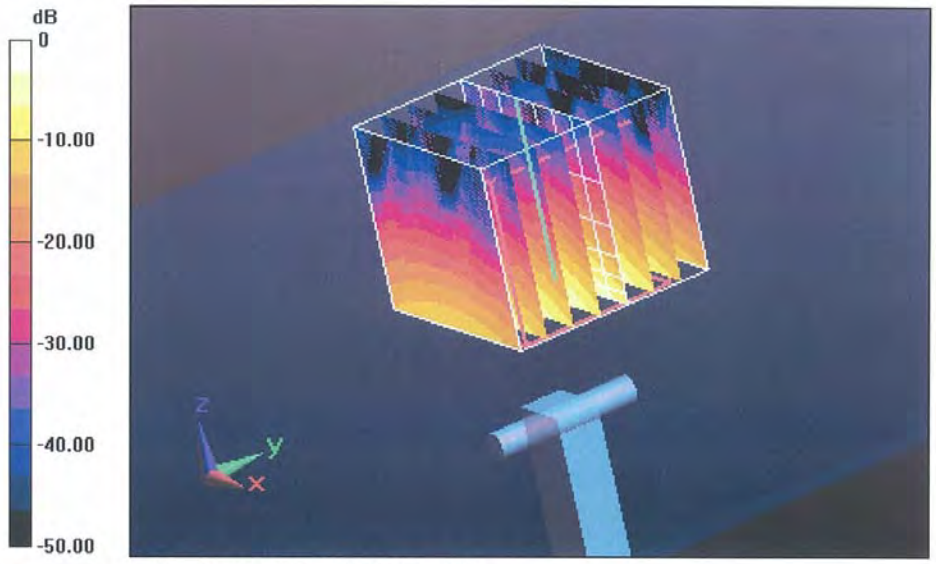
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81, 4.81); Calibrated: 30.12.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.814 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 29.7440
SAR(1 g) = 7.98 mW/g; SAR(10 g) = 2.28 mW/g
Maximum value of SAR (measured) = 18.473 mW/g

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.894 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 33.6120
SAR(1 g) = 8.45 mW/g; SAR(10 g) = 2.4 mW/g
Maximum value of SAR (measured) = 20.122 mW/g

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 60.857 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 33.4260
SAR(1 g) = 7.95 mW/g; SAR(10 g) = 2.26 mW/g
Maximum value of SAR (measured) = 19.432 mW/g



0 dB = 19.430mW/g = 25.77 dB mW/g

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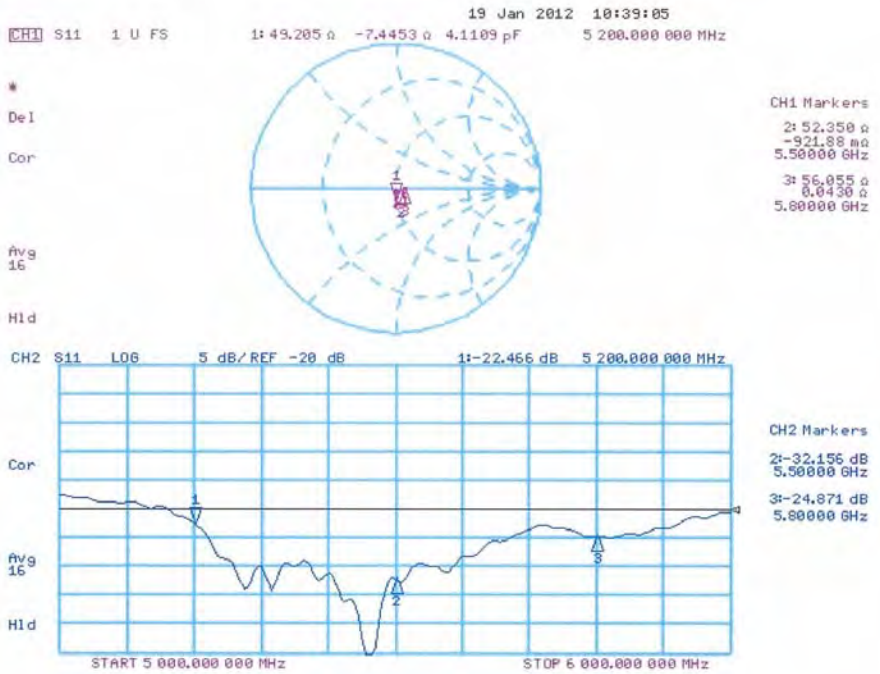
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 18.01.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.46 mho/m; ε_r = 49.2; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 5.86 mho/m; ε_r = 48.7; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 6.28 mho/m; ε_r = 48.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

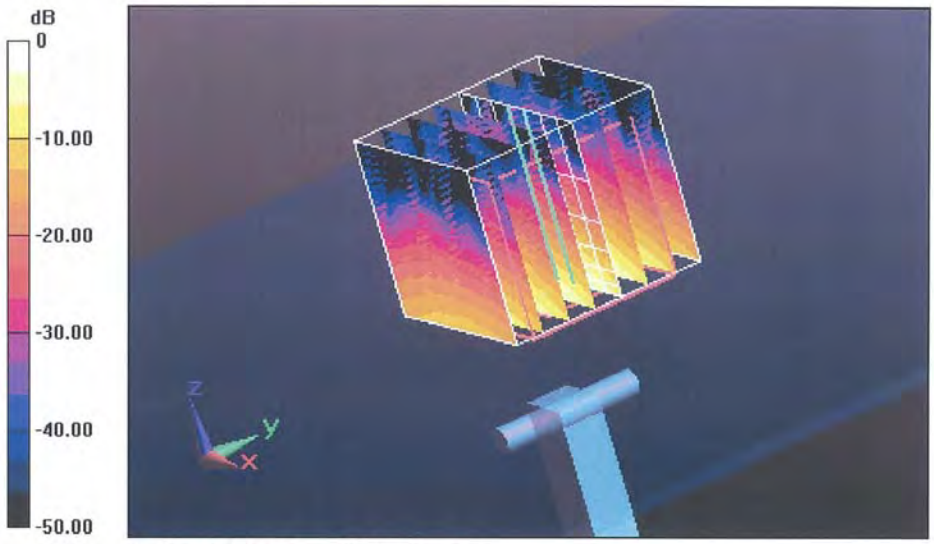
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91), ConvF(4.43, 4.43, 4.43), ConvF(4.38, 4.38, 4.38); Calibrated: 30.12.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 56.490 V/m; Power Drift = -0.0024 dB
Peak SAR (extrapolated) = 28.2170
SAR(1 g) = 7.22 mW/g; SAR(10 g) = 2.03 mW/g
Maximum value of SAR (measured) = 16.833 mW/g

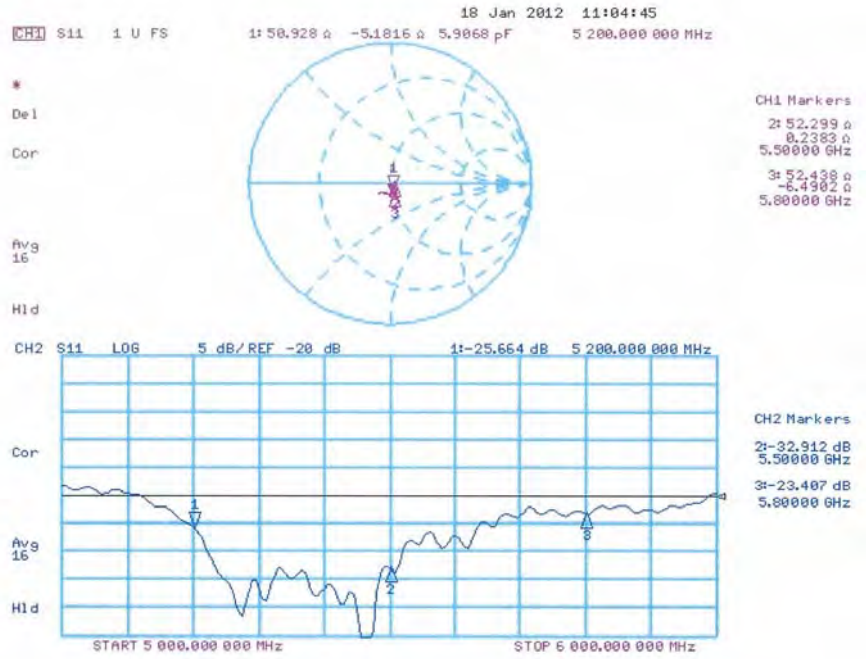
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 57.075 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 33.4060
SAR(1 g) = 7.81 mW/g; SAR(10 g) = 2.17 mW/g
Maximum value of SAR (measured) = 18.867 mW/g

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 53.714 V/m; Power Drift = 0.0063 dB
Peak SAR (extrapolated) = 34.0450
SAR(1 g) = 7.3 mW/g; SAR(10 g) = 2.02 mW/g
Maximum value of SAR (measured) = 18.209 mW/g



0 dB = 18.210mW/g = 25.21 dB mW/g

Impedance Measurement Plot for Body TSL



End of 1st part of report