TMC

SAR TEST REPORT

No. 2011EEB00024

For

WANLIDA GROUP CO.,LTD.

Tablet PC

SMB-A1011

With

Wi-Fi module: 802.11 b/g/n

Module name: WM-BN-BM-01

FCCID: SMFSMBA1011

Issued Date: 2011-01-27

Deutscher Akkreditierungs Rat

DAR

No. DGA-PL-114/09-A0

ilac-MRA

CNAS

检 测

CNAS L0442

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

Test Laboratory:

TMC Beijing, Telecommunication Metrology Center of Ministry of Industry and Information Technology
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检验报告专用章

TABLE OF CONTENT

1 Test Laboratory

1.1 Testing Location

Company Name:	TMC Shenzhen, Telecommunication Metrology Center of MIIT
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1.2 Testing Environment

Temperature:	18°C~25 °C,
Relative humidity:	30%~ 70%
Ground system resistance:	< 0.5 Ω

Ambient noise is checked and found very low and in compliance with requirement of standards.
Reflection of surrounding objects is minimized and in compliance with requirement of standards.

1.3 Project Data

Project Leader:	Zhou Yi
Test Engineer:	Zhu Zhiqiang
Testing Start Date:	January 25, 2011
Testing End Date:	January 25, 2011

1.4 Signature

朱志强

Zhu Zhiqiang

(Prepared this test report)

周镒

Zhou Yi

(Reviewed this test report)

Lu Bingsong

Deputy Director of the laboratory

(Approved this test report)

2 Client Information

2.1 Applicant Information

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Country:	China
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2.2 Manufacturer Information

Company Name:	Wanlida Group Co.,Ltd.
Address /Post:	Wanlida Industry Zone, Nanjing, Fujian, China
City:	Nanjing
Postal Code:	363601
Country:	China
Telephone:	+86-0596-7653680
Fax:	+86-0596-7662886

3 Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1 About EUT

Description:	Tablet PC with WiFi&Bluetooth module
Model Name:	SMB-A1011
Brand Name:	Malata
Frequency Band:	802.11b/g/n 2.45GHz

Picture 1: Constituents of the sample

3.2 Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	AC Adapter	MPA-630	/	Wanlida Group Co., Ltd.
AE2	Li-ion battery pack	BT-A0B1	/	YOKU Energy（Zhangzhou）Co.,Ltd.

*EUT/AE ID: is used to identify the test sample in the lab internally.

4 CHARACTERISTICS OF THE TEST

4.1 Applicable Limit Regulations

EN 50360–2001: Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.

It specifies the maximum exposure limit of **2.0 W/kg** as averaged over any 10 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

ANSI C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
47 CFR §2.1093: Radiofrequency radiation exposure evaluation: portable devices.

They specify the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

4.2 Applicable Measurement Standards

EN 62209-1–2006: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz).

IEEE 1528–2003: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.

OET Bulletin 65 (Edition 97-01) and Supplement C(Edition 01-01): Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits.

IEC 62209-2 (Edition 1.0): Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz).
KDB 447498 D01: Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies v03r02
KDB 248227:SAR Measurement Procedures for 802.11 a/b/g transmitter
KDB 616217:SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens.
KDB 616217:D03 SAR Supp Note and Netbook Laptop v01
They specify the measurement method for demonstration of compliance with the SAR limits for such equipments.

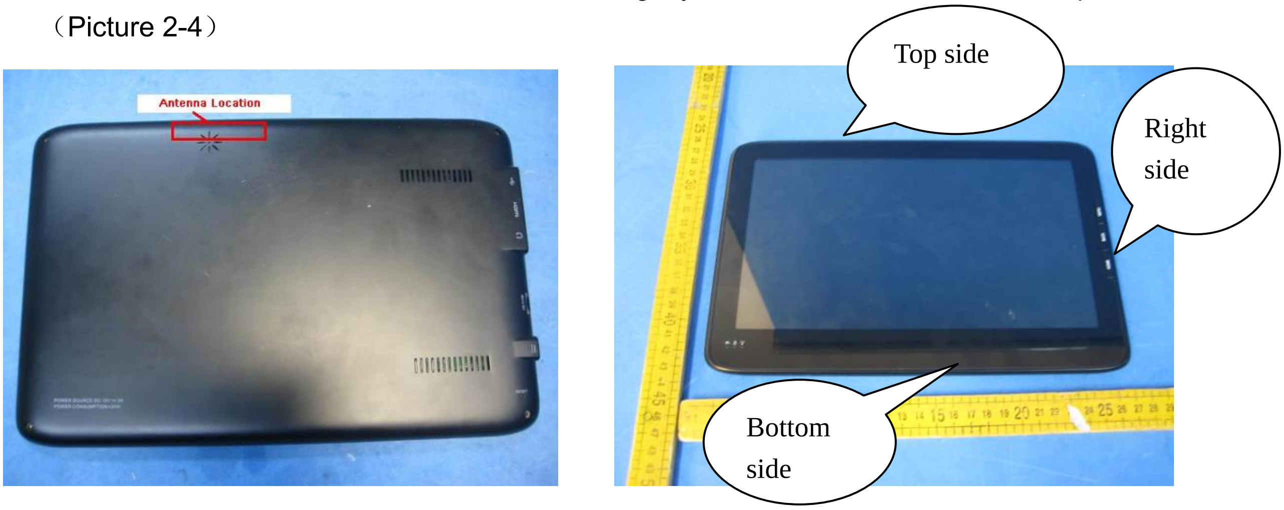
5 OPERATIONAL CONDITIONS DURING TEST

5.1 Schematic Test Configuration

5.1.1 Test positions

According to KDB 447498 4) b) ii) (2), SAR is required only for the edge with the most conservative exposure conditions. So the EUT is tested at the following 4 test positions:

- Test Position 1: The back side of the EUT is tightly touched the bottom of the flat phantom. （Picture 2-1）
- Test Position 2: The right side of the EUT is tightly touched the bottom of the flat phantom. （Picture 2-2）
- Test Position 3: The top side of the EUT is tightly touched the bottom of the flat phantom. （Picture 2-3）
- Test Position 4: The bottom side of the EUT is tightly touched the bottom of the flat phantom. （Picture 2-4）



Picture 2-a: side definition

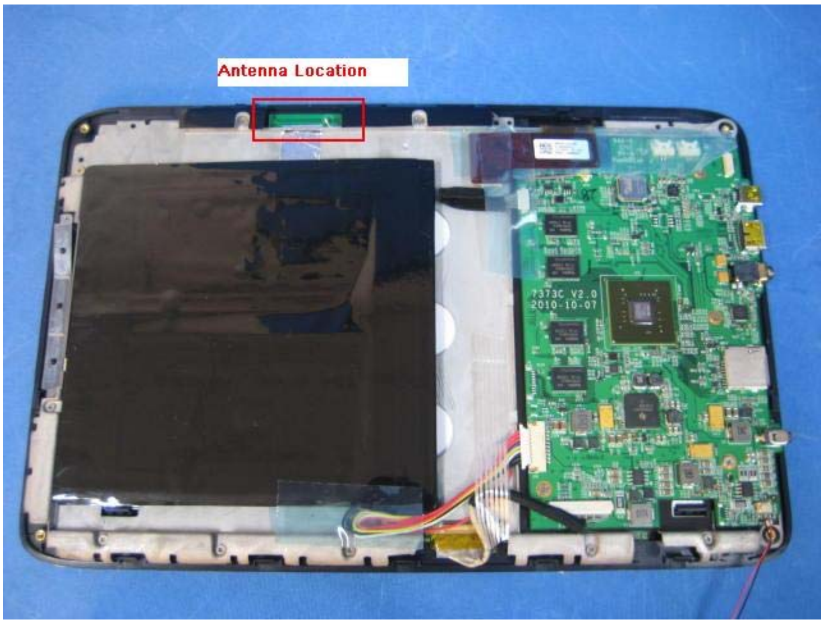
Picture 2-b: Test position 1 **Picture 2-c: Test position 2**

Picture 2-d: Test position 3

Picture 2-e: Test position 4

5.1.2 Body SAR Measurement Description

The EUT has two transmitter: WiFi 802.11b/g/n module and Bluetooth module, the wifi antenna location is as following.



Picture 3 antenna positions

Bluetooth 2.45GHz band

SAR is not required for Bluetooth since the output power is ≤ 60/$F_{(GHz)}$ mW.

The conducted power for Bluetooth is as following:

Bluetooth (dBm)

Channel/Modulation	GFSK	8DPSK
CH1	-0.95	0.45
CH40	0.53	1.82
CH79	1.16	2.38

WiFi 802.11b/g/n 2.45GHz band

SAR is not required for 802.11g channels since the output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels, and for each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 0.25dB higher than those measured at the lowest data rate. According to the following conducted power, the EUT should be tested for “802.11b 1Mbps” first, then the necessary configurations in “802.11g”,”802.11nHT20”.

A communication link is set up with the test mode software for WiFi mode test. The test mode software we used is MyWL for WM-BN-BM-01 with the version of V1.0.1 supported by company USI. For 802.11b,802.11g and 802.11n HT20, the Absolute Radio Frequency Channel Number (ARFCN) is allocated to 1, 6 and 11 respectively in the case of 2450 MHz. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode. The tests are performed for WiFi at highest output channel for all the 4 test positions and according to KDB447498 D01 1)e)i, ”When the SAR procedures require multiple channels to be tested and the 1-g SAR for the highest output channel is less than 0.8W/Kg,where the transmission band corresponding to all channels is≤100 MHz,testing for the other channels is not required.” So the test channels have been set first to the highest output channel and then others if necessary.

The conducted power for WiFi is as following:

802.11b（dBm）

Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps
1	21.07	21.03	20.89	20.87
6	21.88	21.80	21.77	21.72
11	22.07	22.05	21.96	21.90

802.11g（dBm）

Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
1	18.76	18.59	18.53	18.44	18.33	18.20	18.17	18.18
6	18.70	18.60	18.55	18.39	18.32	18.32	18.24	18.22
11	19.87	19.75	19.65	19.55	19.42	19.40	19.35	19.35

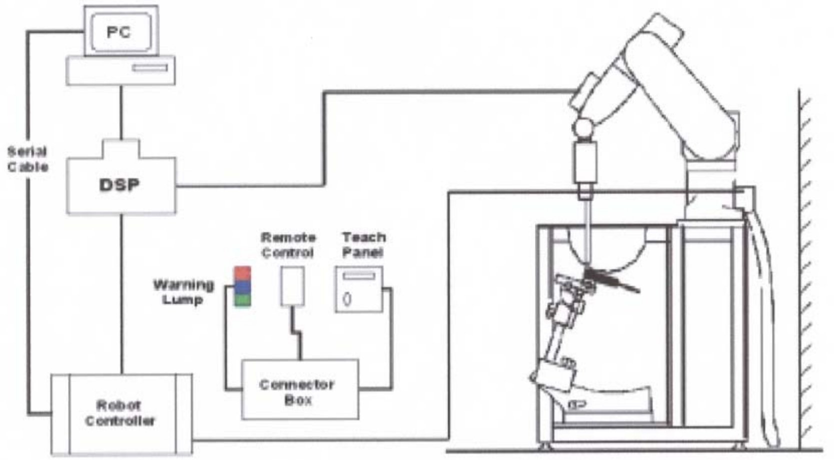
802.11n HT20（dBm）

Channel\data rate	6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
1	20.87	20.87	20.86	20.79	20.81	20.76	20.73	20.61
6	21.72	21.70	21.66	21.67	21.65	21.54	21.52	21.54
11	21.89	21.80	21.81	21.77	21.75	21.70	21.65	21.65

5.2 SAR Measurement Set-up

These measurements were performed with the automated near-field scanning system DASY5 NEO from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9m), which positions the probes with a positional repeatability of better than ± 0.02mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines (length =300mm) to the data acquisition unit.

A cell controller system contains the power supply, robot controller, teaches pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of Inter® Core™ CPU 6300 @1.86GHz,1.58GHz computer with Windows XP system and SAR Measurement Software DASY5 NEO, A/D interface card, monitor, mouse, and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.



Picture 4: SAR Lab Test Measurement Set-up

The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

5.3 Dasy5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ES3DV3 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the standard procedure with an accuracy of better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB.

Picture 5: ES3DV3 E-field Probe

ES3DV3 Probe Specification

Construction	Symmetrical design with triangular core
	Interleaved sensors
	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 900 and HSL 1810
	Additional CF for other liquids and frequencies
	upon request
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis)
	± 0.3 dB in tissue material (rotation normal to probe axis)
Dynamic Range	5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm)
	Tip diameter: 3.9 mm (Body: 12 mm)
	Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz
	Dosimetry in strong gradient fields
	Compliance tests of mobile phones

Picture6:ES3DV3 E-field probe

5.4 E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where: Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

Or

$$SAR = \frac{|E|^2 \sigma}{\rho}$$

Where:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

Picture 7: Device Holder

5.5 Other Test Equipment

5.5.1 Device Holder for Transmitters

In combination with the Generic Twin Phantom V3.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatably positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

5.5.2 Phantom

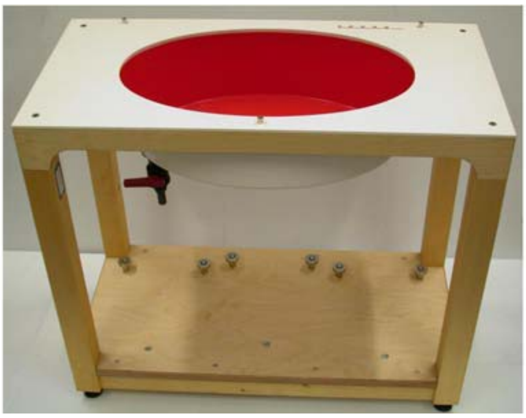
The ELI4 phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30MHz to 6GHz. ELI4 is fully compatible with the latest standard IEC 62209-2 and all known tissue simulating liquids. A cover prevents the 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 in the robot.

Shell Thickness 2±0. l mm

Filling Volume Approx. 20 liters

Dimensions 810 x l000 x 500 mm (H x L x W)

Available Special



Picture 8: ELI4 Phantom

5.6 Equivalent Tissues

The liquid used for the frequency range of 2000-3000 MHz consisted of water, Glycol monobutyl,and salt . The liquid has been previously proven to be suited for worst-case. The Table 4 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528.

Table 1: Composition of the Body Tissue Equivalent Matter

MIXTURE %	FREQUENCY 2450MHz
Water	72.60
Glycol monobutyl	27.22
Salt	0.18
Dielectric Parameters Target Value	f=2450MHz ε=52.7 σ=1.95

5.7 System Specifications

5.7.1 Robotic System Specifications

Specifications

Positioner: Stäubli Unimation Corp. Robot Model: TX90XL

Repeatability: ±0.02 mm

No. of Axis: 6

Data Acquisition Electronic (DAE) System

Cell Controller

Processor: Inter® Core™ CPU 6300

Clock Speed: 1.86GHz

Operating System: Windows XP

Data Converter

Features: Signal Amplifier, multiplexer, A/D converter, and control logic

Software: DASY5 software

Connecting Lines: Optical downlink for data and status info.
Optical uplink for commands and clock

6 TEST RESULTS

6.1 Dielectric Performance

Table 2: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 22.5 °C and relative humidity 42%. Liquid temperature during the test: 22.0°C				
/	**Measurement date**	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
Target value	/	2450 MHz	52.7	1.95
Measurement value (Average of 10 tests)	1/25/2011	2450 MHz	50.81	2.0

6.2 System Validation

Table 3: System Validation

Measurement is made at temperature 22.5 °C and relative humidity 42%,input power 250mW Liquid temperature during the test: 22.0°C Measurement Date : 2450 MHz **January 25, 2011**							
Liquid parameters	Dipole calibration Target value	**Frequency**		**Permittivity ε**		**Conductivity σ (S/m)**	
		2450 MHz		51.8		1.93	
	Actural Measurement value	2450 MHz		50.81		2.0	
Verification results	**Frequency**	**Target value (W/kg)**		**Measured value (W/kg)**		**Deviation**	
		10 g Average	**1 g Average**	**10 g Average**	**1 g Average**	**10 g Average**	**1 g Average**
	2450 MHz	5.98	12.9	5.78	12.9	-0.69%	0.16%

Note：Target values are the data of the dipole validation results, please check Annex F for the Dipole Calibration Certificate.

6.3 Summary of Measurement Results

Table 4: SAR Values (WiFi 802.11b)

Limit of SAR (W/kg)	**10 g Average**	**1 g Average**	**Power Drift (dB)**
	2.0	1.6	
Test Case(Flat Phantom)	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Test Position 1, Top frequency,1Mbps(See Figure 1)	0.157	0.359	0.166
Test Position 2, Top frequency,1Mbps (See Figure 2)	0.025	0.062	0.134
Test Position 3, Top frequency,1Mbps (See Figure 3)	0.248	0.550	0.029
Test Position 4, Top frequency,1Mbps (See Figure 4)	0.000226	0.000844	-0.104
Test Position 3, Middle frequency,1Mbps (See Figure 3)	0.236	0.522	-0.117
Test Position 3, Bottom frequency,1Mbps (See Figure 3)	0.208	0.459	0.134

Table 5: SAR Values (WiFi 802.11n HT20)

Limit of SAR (W/kg)	**10 g Average**	**1 g Average**	**Power Drift (dB)**
	2.0	1.6	
Test Case(Flat Phantom)	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Test Position 3, Top frequency, 6.5Mbps(See Figure 5)	0.161	0.356	0.122

6.4 Conclusion

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 4.2 of this report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 4.1 of this test report.

7 Measurement Uncertainty

SN	a	Type	c	d	e = f(d,k)	f	h = c x f / e	k
	Uncertainty Component		Tol. (± %)	Prob. Dist.	Div.	c_i (1 g)	1 g u_i (±%)	v_i
1	System repetivity	A	0.5	N	1	1	0.5	9
	Measurement System							
2	Probe Calibration	B	5	N	2	1	2.5	∞
3	Axial Isotropy	B	4.7	R	√3	$(1-cp)^{1/2}$	4.3	∞
4	Hemispherical Isotropy	B	9.4	R	√3	$\sqrt{c_p}$		∞
5	Boundary Effect	B	0.4	R	√3	1	0.23	∞
6	Linearity	B	4.7	R	√3	1	2.7	∞
7	System Detection Limits	B	1.0	R	√3	1	0.6	∞
8	Readout Electronics	B	1.0	N	1	1	1.0	∞

9	RF Ambient Conditions	B	3.0	R	√3	1	1.73	∞
10	Probe Positioner Mechanical Tolerance	B	0.4	R	√3	1	0.2	∞
11	Probe Positioning with respect to Phantom Shell	B	2.9	R	√3	1	1.7	∞
12	Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	√3	1	2.3	∞
	Test sample Related							
13	Test Sample Positioning	A	4.9	N	1	1	4.9	N-1
14	Device Holder Uncertainty	A	6.1	N	1	1	6.1	N-1
15	Output Power Variation - SAR drift measurement	B	5.0	R	√3	1	2.9	∞
	Phantom and Tissue Parameters							
16	Phantom Uncertainty (shape and thickness tolerances)	B	1.0	R	√3	1	0.6	∞
17	Liquid Conductivity - deviation from target values	B	5.0	R	√3	0.64	1.7	∞
18	Liquid Conductivity - measurement uncertainty	B	5.0	N	1	0.64	1.7	M
19	Liquid Permittivity - deviation from target values	B	5.0	R	√3	0.6	1.7	∞
20	Liquid Permittivity - measurement uncertainty	B	5.0	N	1	0.6	1.7	M
	Combined Standard Uncertainty			RSS			11.25	
	Expanded Uncertainty (95% CONFIDENCE INTERVAL)			K=2			22.5	

8 MAIN TEST INSTRUMENTS

Table 6: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent E5071C	MY46103759	January 17,2011	One year
02	Power meter	NRVD	101253	March 9,2010	One year
03	Power sensor	NRV-Z5	100333		
04	Signal Generator	Agilent E4438C	MY45095825	January 17,2011	One Year
05	Amplifier	VTL5400	0505	No Calibration Requested	
06	E-field Probe	SPEAG ES3DV4	3151	April 28, 2010	One year
07	DAE	SPEAG DAE4	786	November 22, 2010	One year
08	Dipole Validation Kit	SPEAG D2450V2	853	September 27, 2010	Two years

END OF REPORT BODY

ANNEX A MEASUREMENT PROCESS

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the reference point was measured and was used as a reference value for assessing the power drop.

Step 2: The SAR distribution at the exposed side of the phantom was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the flat phantom and the horizontal grid spacing was 10 mm x 10 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

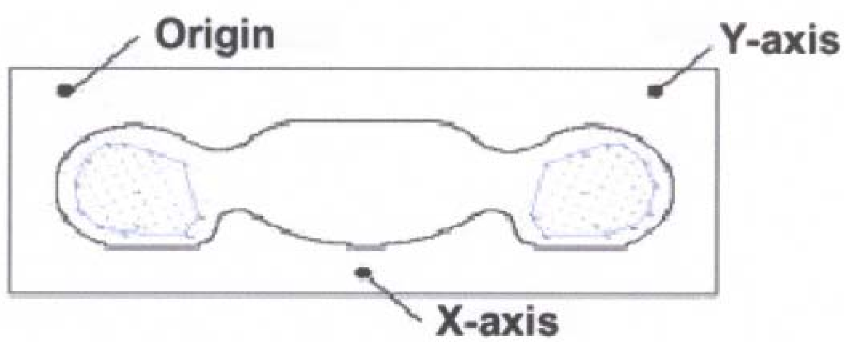
Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7 x 7x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

b. The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot"-condition (in x ~ y and z-directions). The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

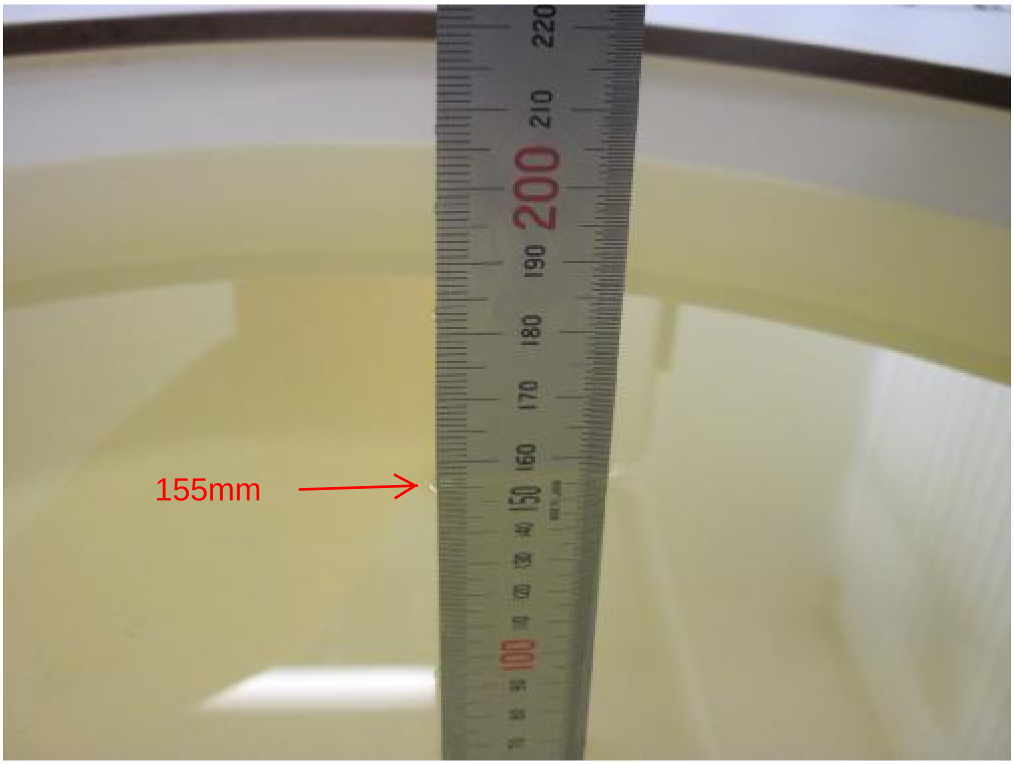
Step 4: Re-measurement the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation is repeated.



Picture A: SAR Measurement Points in Area Scan

ANNEX B TEST LAYOUT

Picture B1: Specific Absorption Rate Test Layout



Picture B2 Liquid depth in the Flat Phantom (2450MHz)

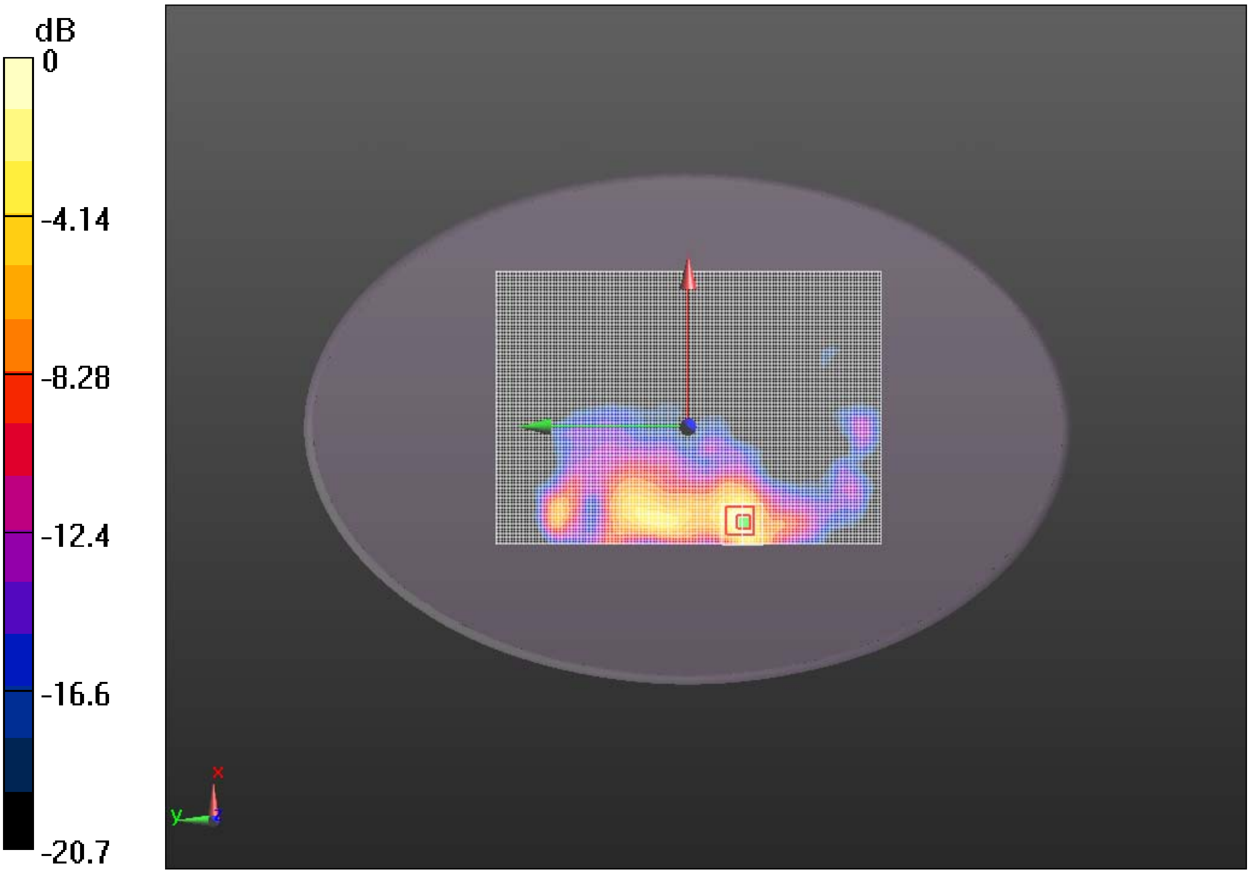
ANNEX C GRAPH RESULTS

WiFi 802.11b_Test Position 1_Channle Top_1Mbps

Date/Time: 1/25/2011 2:51:22 PM,
Electronics: DAE4 Sn786;Medium: Body 2450
Medium parameters used: f = 2462 MHz; σ = 2.02 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Ambient Temperature:22.5℃ Liqiud Temperature: 22.0℃
Communication System: WiFi 802.11 b Frequency: 2462 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(3.72, 3.72, 3.72)

Test position 1_Channel High/Area Scan (141x201x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.469 mW/g

Test position 1_Channel High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.6 V/m; Power Drift =0.166 dB
Peak SAR (extrapolated) = 0.887 W/kg
SAR(1 g) = 0.359 mW/g; SAR(10 g) = 0.157 mW/g
Maximum value of SAR (measured) = 0.421 mW/g



0 dB = 0.421mW/g

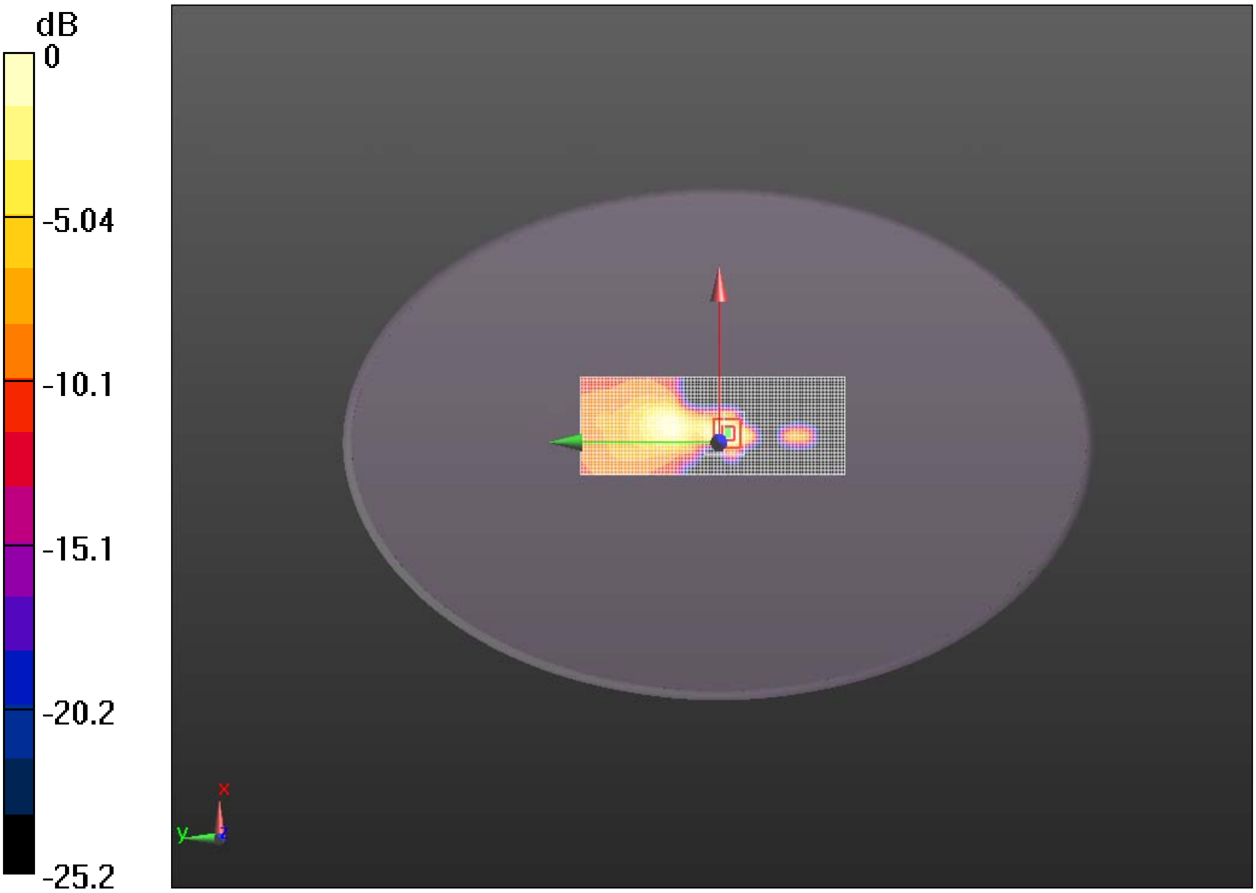
Fig.1 2450MHz CH11 Test Position 1-WiFi 802.11b 1Mbps

WiFi 802.11b_Test Position 2_Channle Top_1Mbps

Date/Time: 1/25/2011 10:43:03 AM,
Electronics: DAE4 Sn786
Medium: Body 2450
Medium parameters used: f = 2462 MHz; σ = 2.02 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Ambient Temperature:22.5℃ Liqiud Temperature: 22.0℃
Communication System: WiFi 802.11 b Frequency: 2462 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(3.72, 3.72, 3.72)

Test position 2_Channel High/Area Scan (51x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.094 mW/g

Test position 2_Channel High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.21 V/m; Power Drift = 0.134 dB
Peak SAR (extrapolated) = 0.143 W/kg
SAR(1 g) = 0.062 mW/g; SAR(10 g) = 0.025 mW/g
Maximum value of SAR (measured) = 0.070 mW/g



0 dB = 0.070mW/g

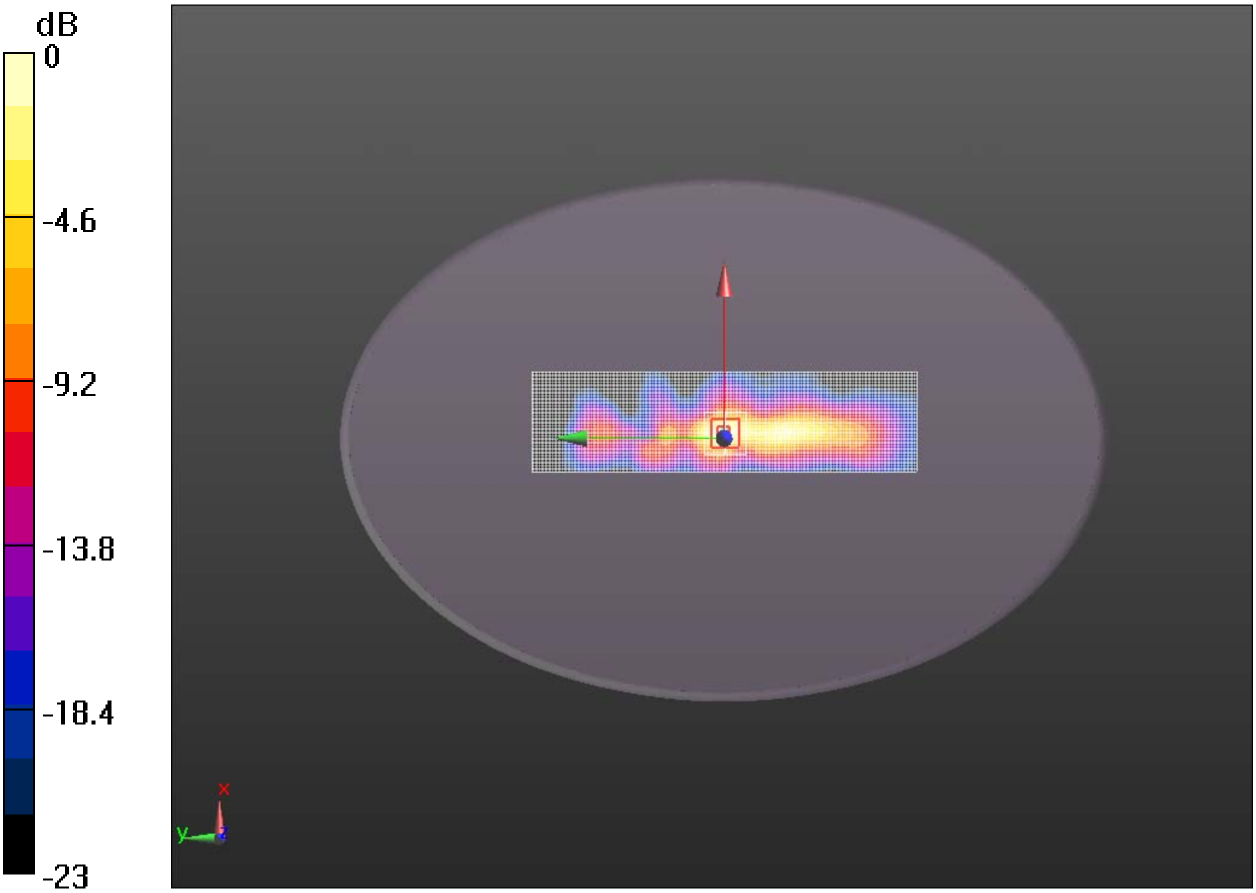
Fig.2 2450MHz CH11 Test Position 2-WiFi 802.11b 1Mbps

WiFi 802.11b_Test Position 3_Channle Top_1Mbps

Date/Time: 1/25/2011 11:12:47 AM,
Electronics: DAE4 Sn786
Medium: Body 2450
Medium parameters used: f = 2462 MHz; σ = 2.02 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Ambient Temperature:22.5℃ Liqiud Temperature: 22.0℃
Communication System: WiFi 802.11 b Frequency: 2462 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(3.72, 3.72, 3.72)

Test position 3_Channel High/Area Scan (51x201x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.657 mW/g

Test position 3_Channel High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.3 V/m; Power Drift = 0.029 dB
Peak SAR (extrapolated) = 1.15 W/kg
SAR(1 g) = 0.550 mW/g; SAR(10 g) = 0.248 mW/g
Maximum value of SAR (measured) = 0.644 mW/g



0 dB = 0.644mW/g

Fig.3 2450MHz CH11 Test Position 3-WiFi 802.11b 1Mbps

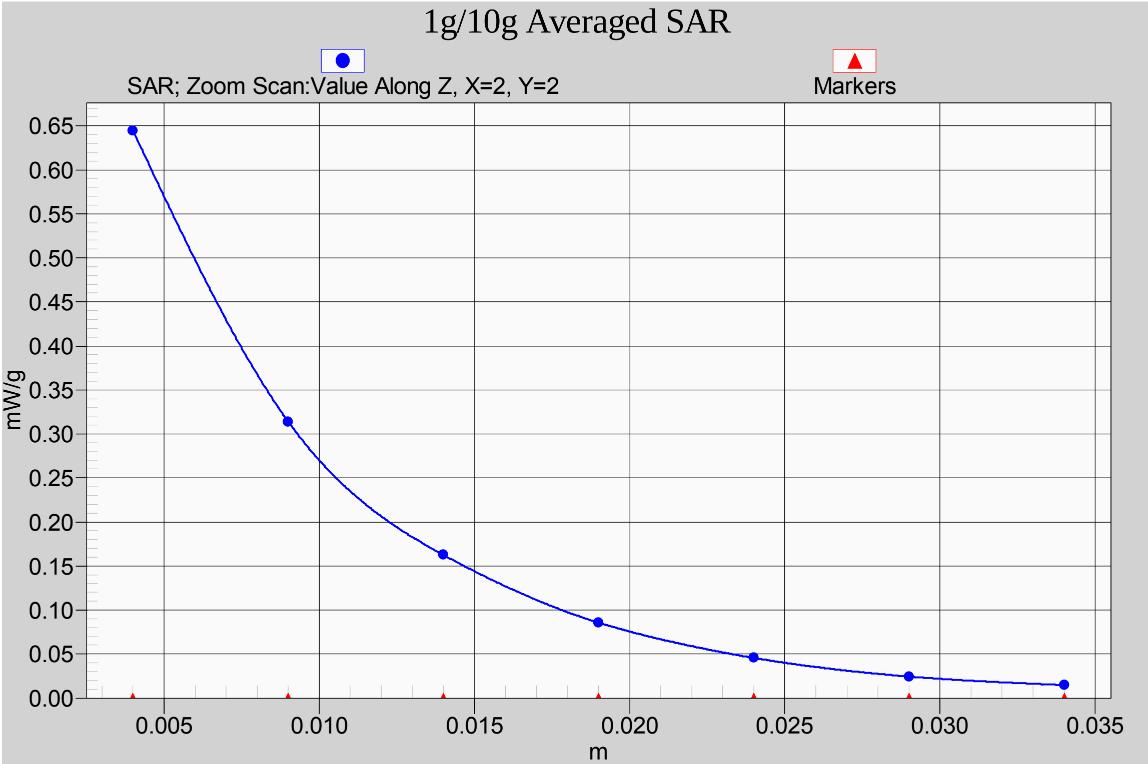


Fig. 3-1 Z-Scan at power reference point (2450 MHz CH11)

WiFi 802.11b_Test Position 4_Channle Top_1Mbps

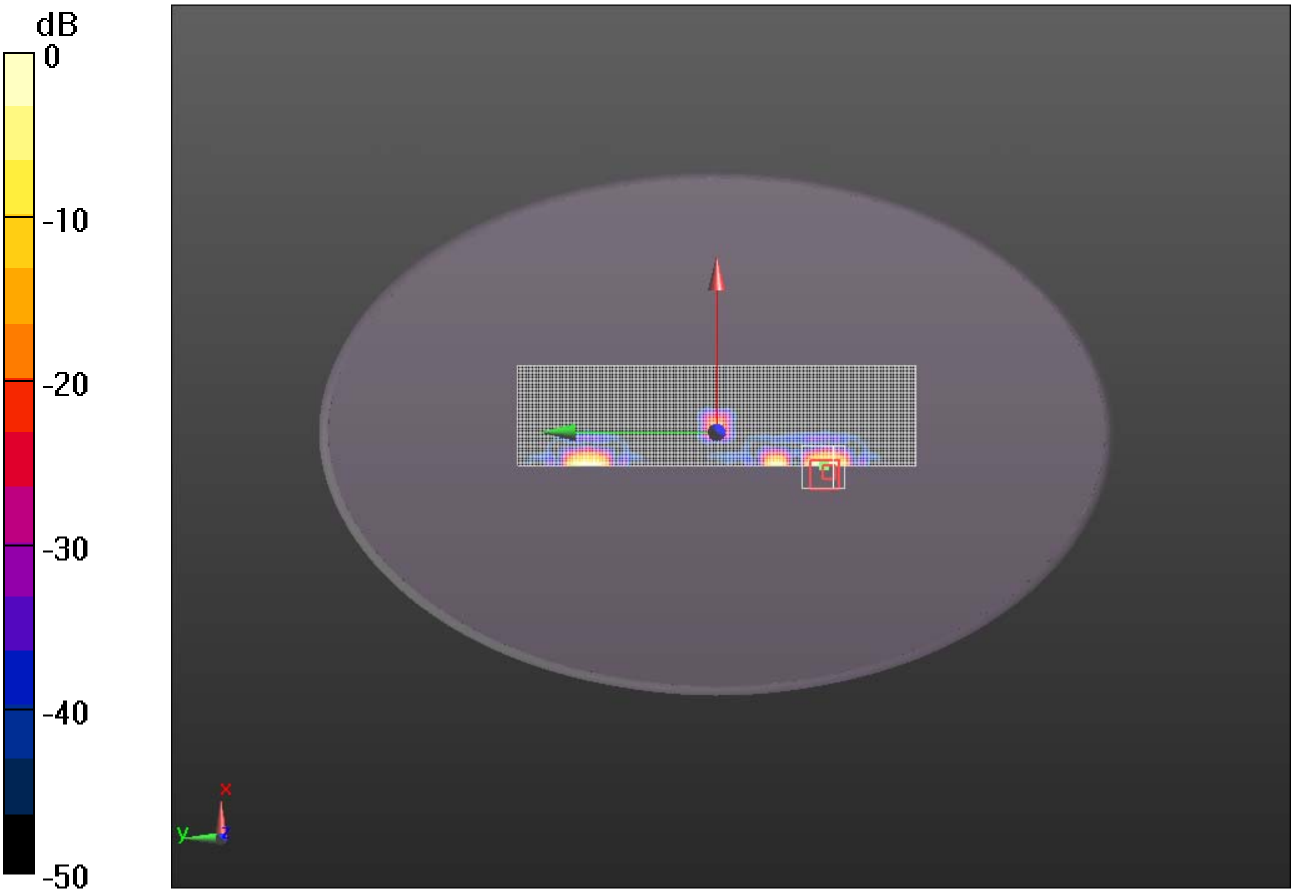
Date/Time: 1/25/2011 1:51:38 PM,
Electronics: DAE4 Sn786
Medium: Body 2450
Medium parameters used: f = 2462 MHz; σ = 2.02 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Ambient Temperature:22.5℃ Liqiud Temperature: 22.0℃
Communication System: WiFi 802.11 b Frequency: 2462 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(3.72, 3.72, 3.72)

Test position 4_Channel High/Area Scan (51x201x1): Measurement grid:

dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.00302 mW/g

Test position 4_Channel High/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.916 V/m; Power Drift = -0.104 dB
Peak SAR (extrapolated) = 0.00454 W/kg
SAR(1 g) = 0.000844 mW/g; SAR(10 g) = 0.000226 mW/g
Maximum value of SAR (measured) = 0.00211 mW/g



0 dB = 0.00211mW/g

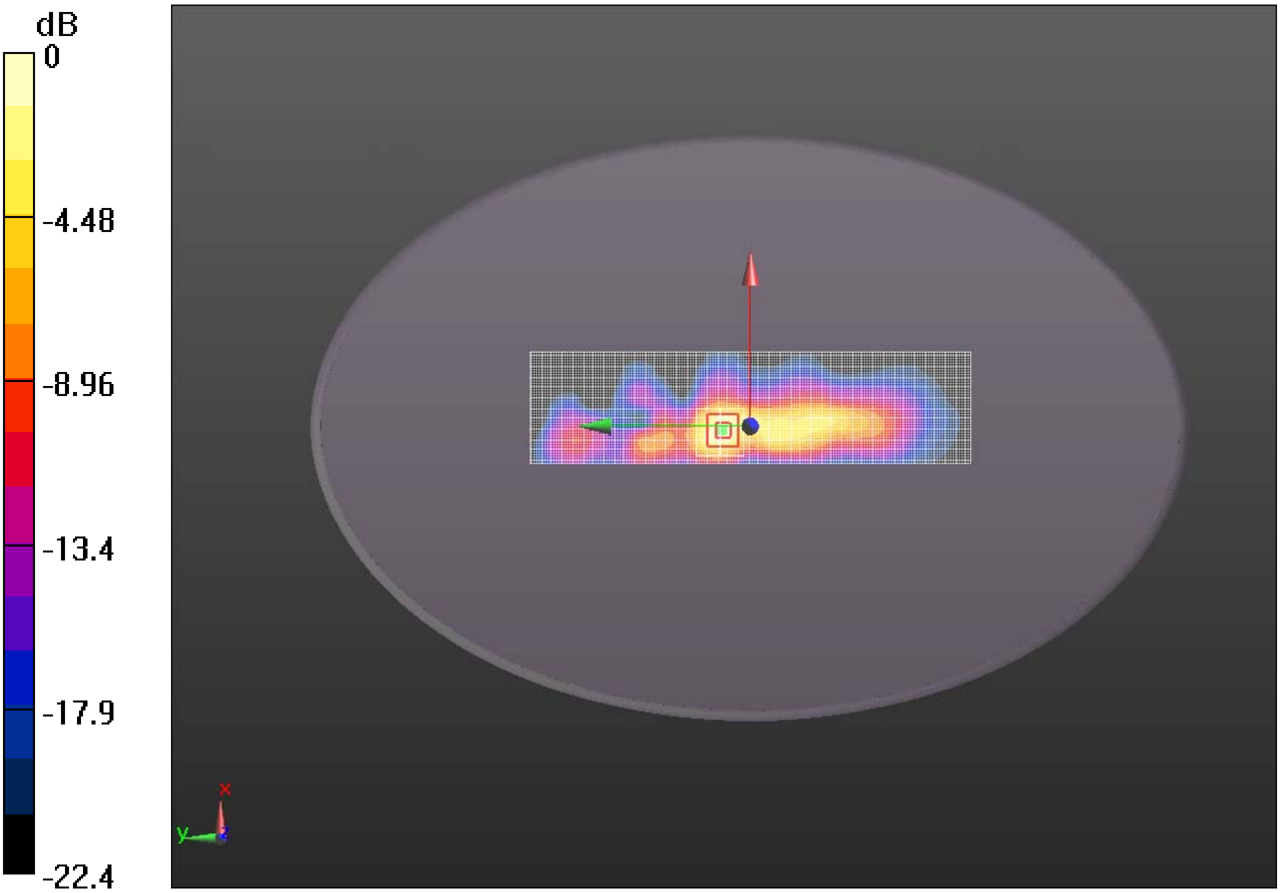
Fig.4 2450MHz CH11 Test Position 4-WiFi 802.11b 1Mbps

WiFi 802.11b_Test Position 3_Channle Middle_1Mbps

Date/Time: 1/25/2011 4:14:10 PM,
Electronics: DAE4 Sn786;Medium: Body 2450
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.99 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Ambient Temperature:22.5℃ Liqiud Temperature: 22.0℃
Communication System: WiFi 802.11 b Frequency: 2437 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(3.72, 3.72, 3.72)

Test position 3_Channel Middle/Area Scan (51x201x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.559 mW/g

Test position 3_Channel Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.8 V/m; Power Drift = -0.117 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.522 mW/g; SAR(10 g) = 0.236 mW/g
Maximum value of SAR (measured) = 0.605 mW/g



0 dB = 0.605mW/g

Fig.5 2450MHz CH6 Test Position 3-WiFi 802.11b 1Mbps

WiFi 802.11b_Test Position 3_Channle Bottom_1Mbps

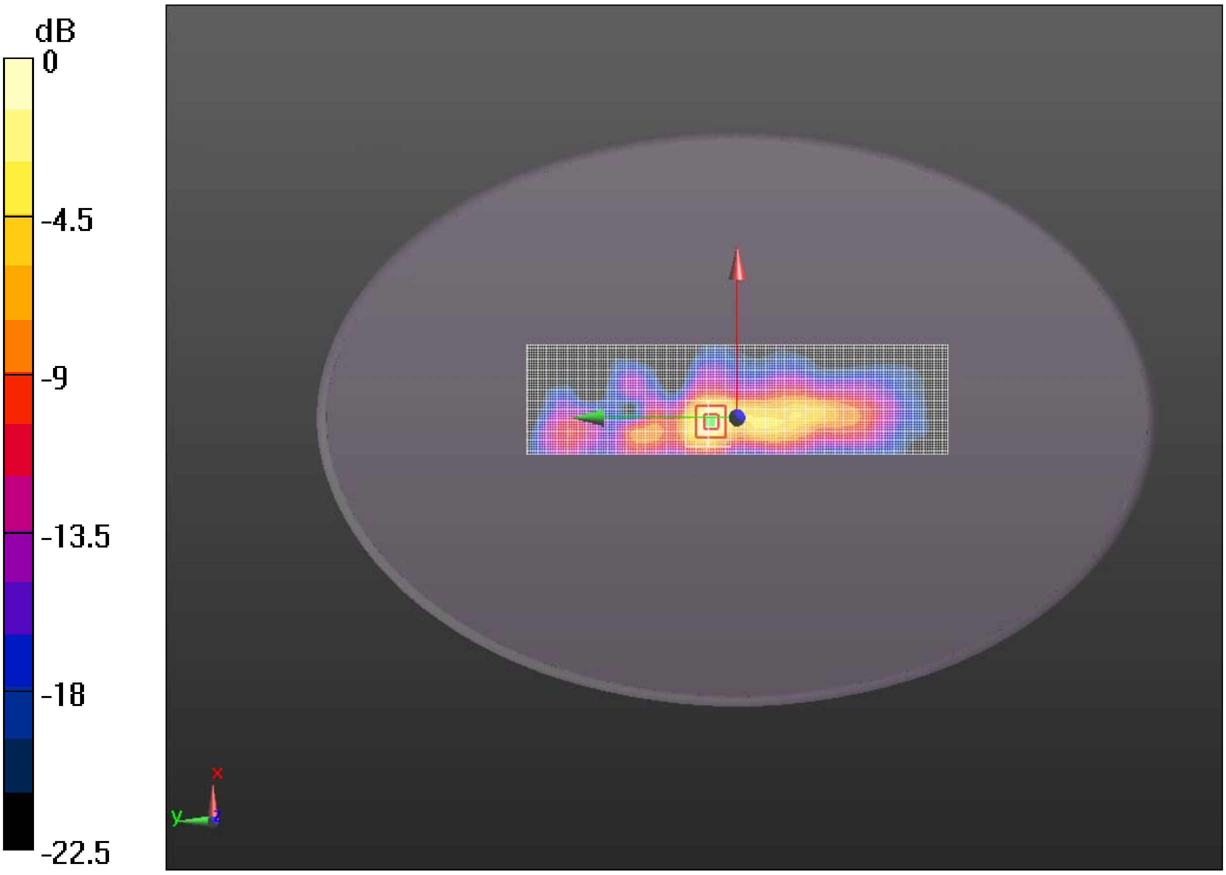
Date/Time: 1/25/2011 4:38:36 PM,
Electronics: DAE4 Sn786;
Medium: Body 2450
Medium parameters used: f = 2412 MHz; σ = 1.95 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3
Ambient Temperature:22.5℃ Liqiud Temperature: 22.0℃
Communication System: WiFi 802.11 b Frequency: 2412 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(3.72, 3.72, 3.72)

Test position 3_Channel Low/Area Scan (51x201x1): Measurement grid:

dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.476 mW/g

Test position 3_Channel Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.9 V/m; Power Drift = 0.134 dB
Peak SAR (extrapolated) = 0.963 W/kg
SAR(1 g) = 0.459 mW/g; SAR(10 g) = 0.208 mW/g
Maximum value of SAR (measured) = 0.530 mW/g



0 dB = 0.530mW/g

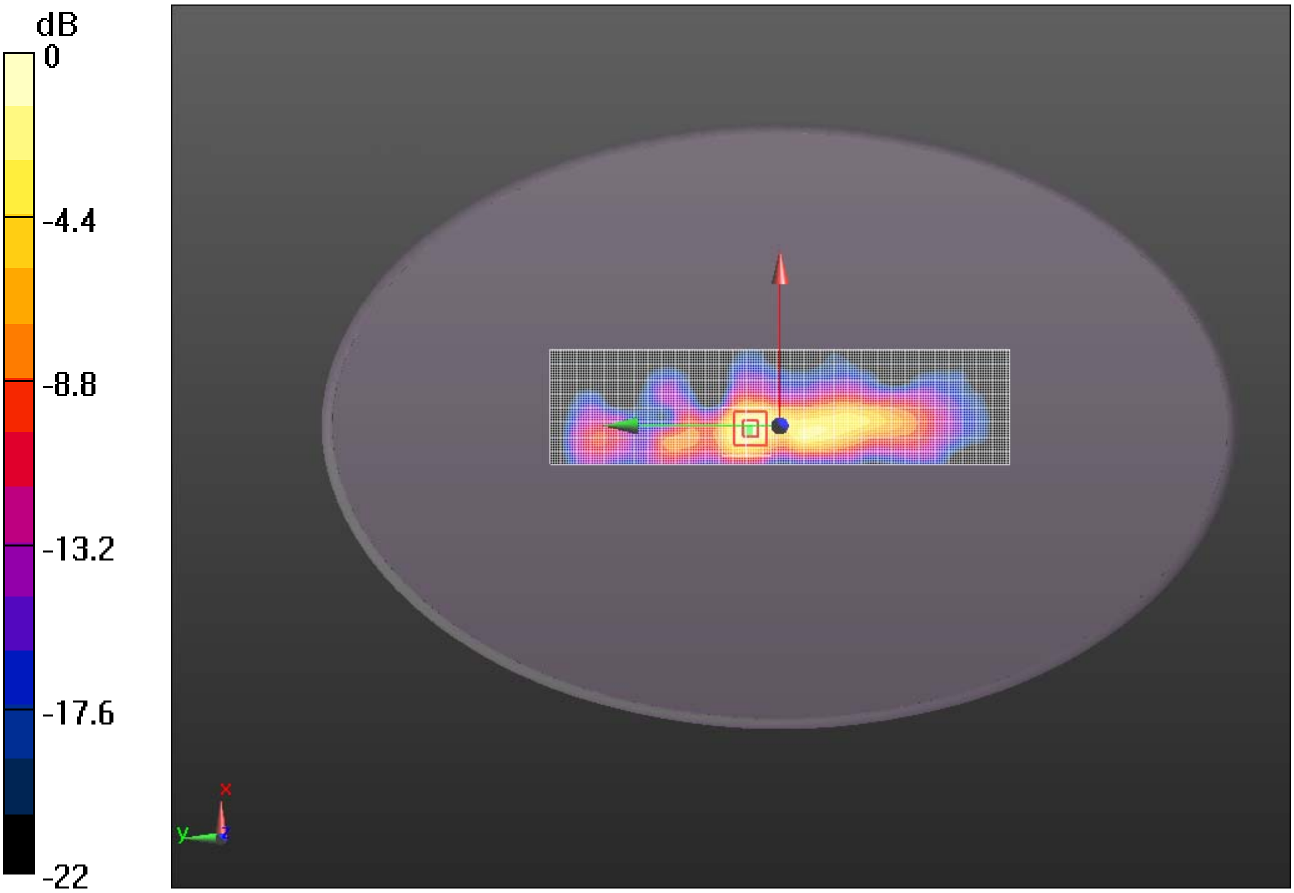
Fig.6 2450MHz CH1 Test Position 3-WiFi 802.11b 1Mbps

WiFi 802.11n HT20_Test Position 3_Channle Top_6.5Mbps

Date/Time: 1/25/2011 5:05:56 PM,
Electronics: DAE4 Sn786
Medium: Body 2450
Medium parameters used: f = 2462 MHz; σ = 2.02 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Ambient Temperature:22.5℃ Liqiud Temperature: 22.0℃
Communication System: WiFi 802.11 nHT20 Frequency: 2462 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(3.72, 3.72, 3.72)

Test position 3_Channel High/Area Scan (51x201x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.368 mW/g

Test position 3_Channel High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.71 V/m; Power Drift = 0.122 dB
Peak SAR (extrapolated) = 0.757 W/kg
SAR(1 g) = 0.356 mW/g; SAR(10 g) = 0.161 mW/g
Maximum value of SAR (measured) = 0.405 mW/g



0 dB = 0.405mW/g

Fig.7 2450MHz CH11 Test Position 3-WiFi 802.11n HT20 6.5Mbps

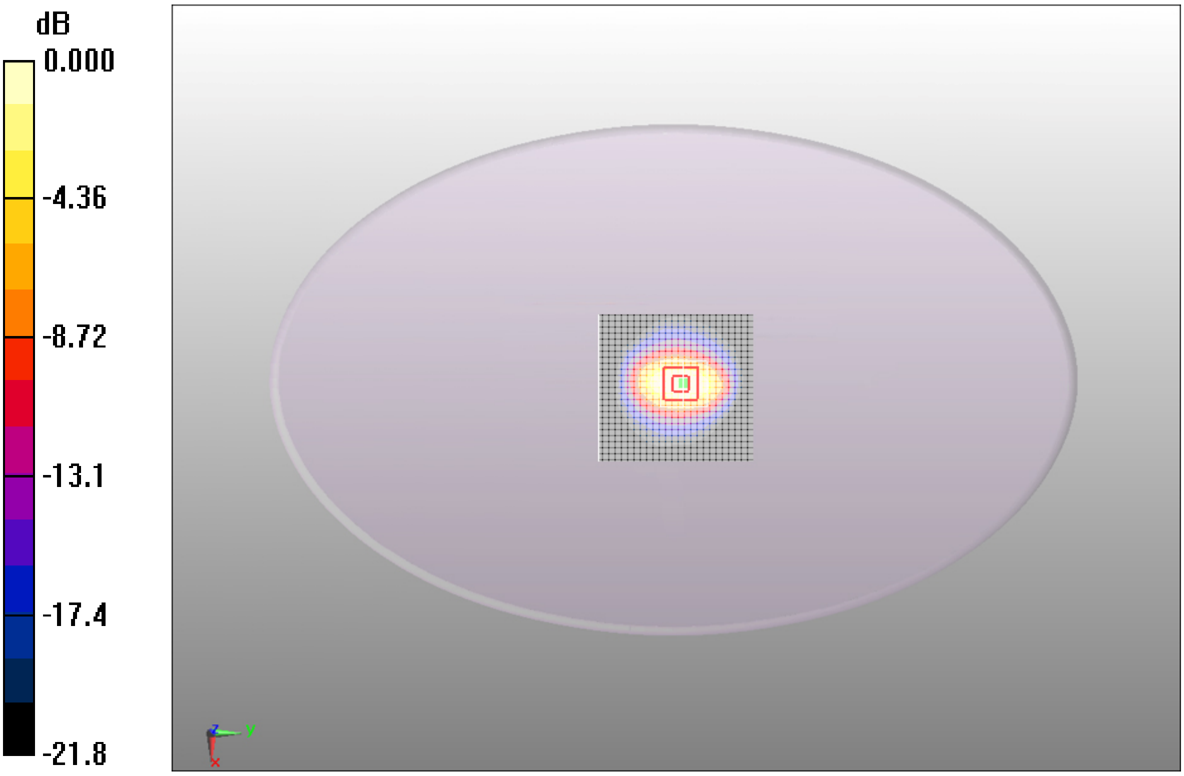
ANNEX D SYSTEM VALIDATION RESULTS

2450MHz

Date/Time: 1/25/2011 10:22:31 AM
Electronics: DAE4 Sn786
Medium: 2450 Body
Medium parameters used: σ = 2.0 mho/m; ε r = 50.81; ρ = 1000 kg/m3
Ambient Temperature:22.5℃ Liqiud Temperature: 22.0℃
Communication System: CW Frequency: 2450 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(3.72, 3.72, 3.72)

System Validation/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 13.9 mW/g

System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.1 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 18.8 W/kg
SAR(1 g) = 12.8 mW/g; SAR(10 g) = 5.78 mW/g
Maximum value of SAR (measured) = 14.1 mW/g



0 dB = 14.1mW/g

Fig.8 validation 2450MHz 250Mw

ANNEX E PROBE CALIBRATION CERTIFICATE

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

Client Telecommunication Metrology Center of MIIT

Certificate No: ES3DV3-3151_Apr10

CALIBRATION CERTIFICATE

Object	**ES3DV3-SN: 3151**
Calibration procedure(s)	**QA CAL-01.v6** **Calibration procedure for dosimetric E-field probes**
Calibration date:	**April 28, 2010**
Condition of the calibrated item	**In Tolerance**

This calibration certify 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 at an environment temperature (22±3)°C and humidity<70%

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID#	Cal Data (Calibrated by, Certification NO.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-May-09 (METAS, NO. 251-00388)	May-10
Power sensor E4412A	MY41495277	5-May-09 (METAS, NO. 251-00388)	May-10
Reference 3 dB Attenuator	SN:S5054 (3c)	10-Aug-09 (METAS, NO. 251-00403)	Aug-10
Reference 20 dB Attenuator	SN:S5086 (20b)	3-May-09 (METAS, NO. 251-00389)	May-10
Reference 30 dB Attenuator	SN:S5129 (30b)	10-Aug-09 (METAS, NO. 251-00404)	Aug-10
DAE4	SN:617	10-Jun-09 (SPEAG, NO.DAE4-907_Jun09)	Jun-10
Reference Probe ES3DV2	SN: 3013	11-Jan-10 (SPEAG, NO. ES3-3013_Jan10)	Jan-11

Secondary Standards	ID#	Check Data (in house)	Scheduled Calibration
RF generator HP8648C	US3642U01700	4-Aug-99(SPEAG, in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01(SPEAG, in house check Nov-09)	In house check: Nov-10

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

Issued: April 28, 2010

This calibration certificate shall not be reported 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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The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect 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 (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *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 ES3DV3

SN: 3151

Manufactured: June 12, 2007

Calibrated: April 28, 2010

Calibrated for DASY4 System

DASY – Parameters of Probe: ES3DV3 SN:3151

Sensitivity in Free Space[A] Diode Compression[B]

NormX	1.18±10.1%	$\mu V/(V/m)^2$	DCP X	93mV
NormY	1.25±10.1%	$\mu V/(V/m)^2$	DCP Y	96mV
NormZ	1.21±10.1%	$\mu V/(V/m)^2$	DCP Z	94mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)
Please see Page 8

Boundary Effect

TSL 900MHz Typical SAR gradient: 5% per mm

Sensor Center to Phantom Surface Distance		3.0 mm	4.0 mm
SARbe[%]	Without Correction Algorithm	10.9	6.7
SARbe[%]	With Correction Algorithm	1.0	0.5

TSL 1810MHz Typical SAR gradient: 10% per mm

Sensor Center to Phantom Surface Distance		3.0 mm	4.0 mm
SARbe[%]	Without Correction Algorithm	10.3	5.5
SARbe[%]	With Correction Algorithm	0.8	0.7

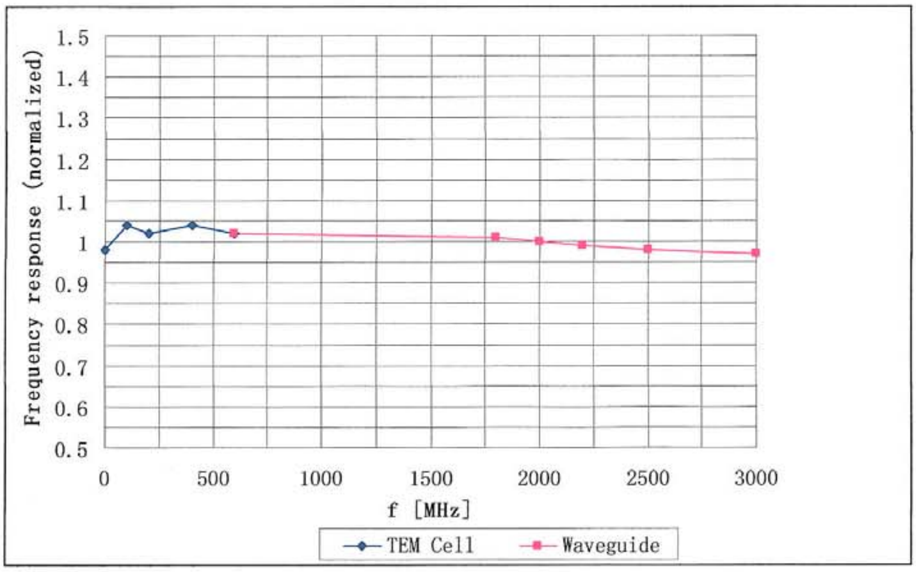
Sensor Offset

Probe Tip to Sensor Center 2.0 mm

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2,which for a normal distributio 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 Page 8).
[B] Numerical linearization parameter: uncertainty not required.

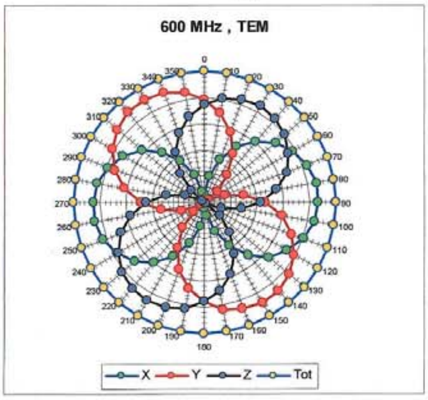
Frequency Response of E-Field

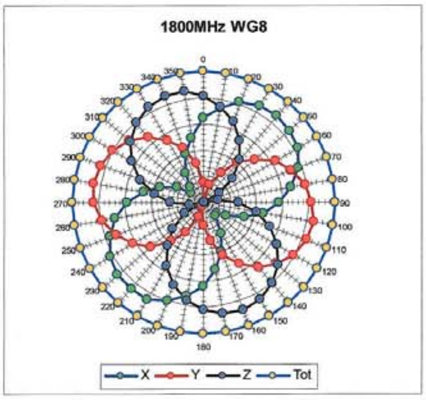


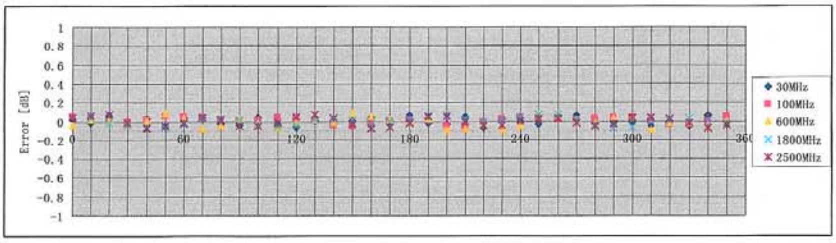
Uncertainty of Frequency Response of E-field: ±6.3% (k=2)

ES3DV3 SN: 3151 April 28, 2010

Receiving Pattern (Φ), θ =0°

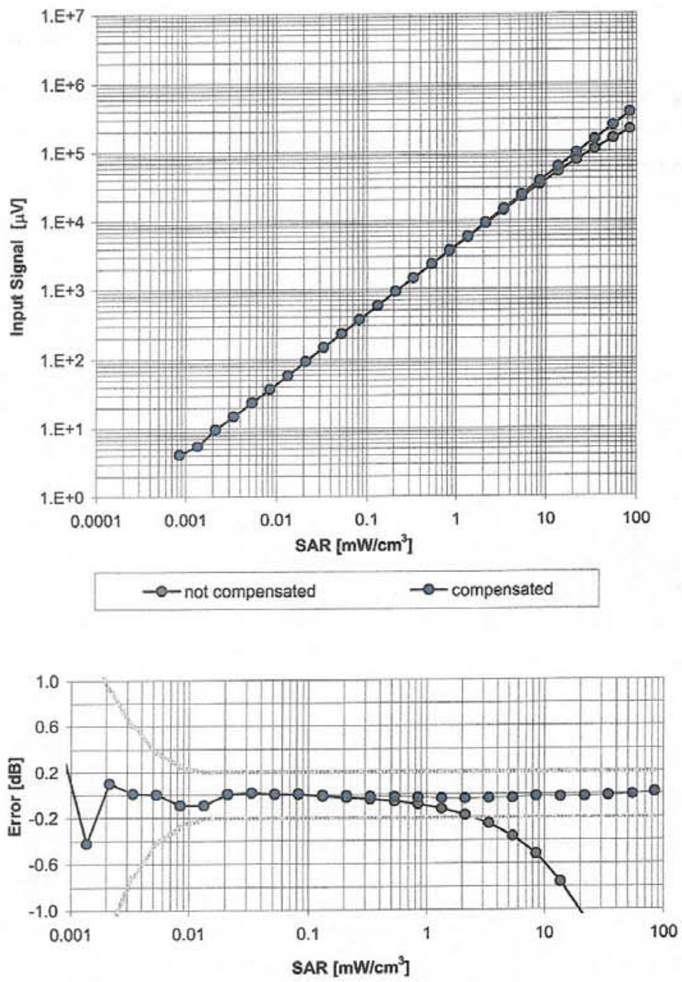






Uncertainty of Axial Isotropy Assessment: ±0.5% (k=2)

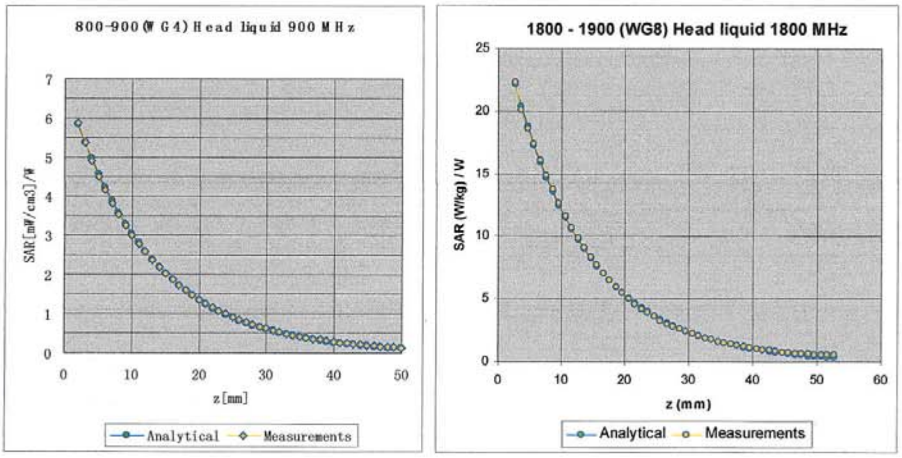
Dynamic Range f(SAR_{head})
(Waveguide: WG8, f = 1800 MHz)



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

ES3DV3 SN: 3151 April 28, 2010

Conversion Factor Assessment

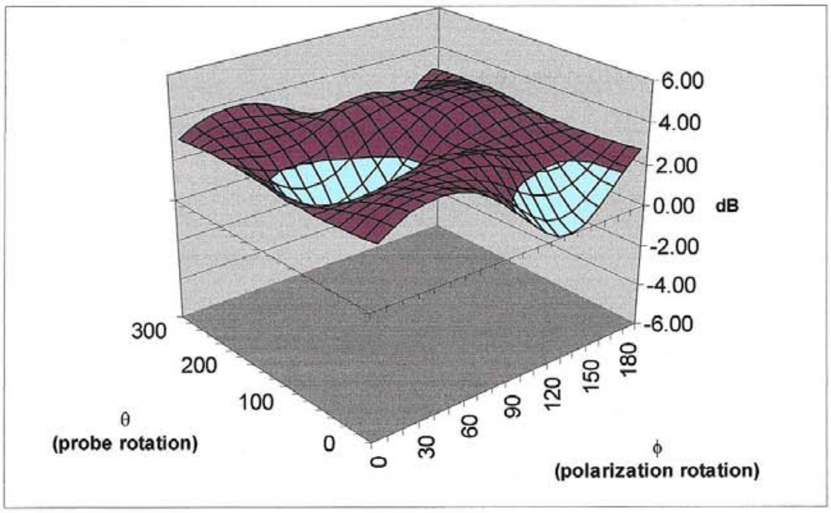


f[MHz]	Validity[MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
450	±50 /±100	Head	43.5±5%	0.87±5%	0.82	1.44	7.42	±13.3% (k=2)
900	±50 /±100	Head	41.5±5%	0.97±5%	0.80	1.29	6.23	±11.0% (k=2)
1810	±50 /±100	Head	40.0±5%	1.40±5%	0.61	1.57	5.08	±11.0% (k=2)
1900	±50 /±100	Head	40.0±5%	1.40±5%	0.63	1.44	4.98	±11.0% (k=2)
2100	±50 /±100	Head	39.8±5%	1.49±5%	0.66	1.34	4.58	±11.0% (k=2)
900	±50 /±100	Body	55.0±5%	1.05±5%	0.99	1.06	6.02	±11.0% (k=2)
1810	±50 /±100	Body	53.3±5%	1.52±5%	0.75	1.34	4.87	±11.0% (k=2)
1900	±50 /±100	Body	53.3±5%	1.52±5%	0.62	1.47	4.73	±11.0% (k=2)
2100	±50 /±100	Body	53.5±5%	1.57±5%	0.68	1.34	4.35	±11.0% (k=2)
2450	±50 /±100	Body	52.7±5%	1.95±5%	0.60	1.40	3.72	±11.0% (k=2)

[C] The validity of ±100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Deviation from Isotropy

Error (φ , θ), f = 900 MHz



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

ANNEX F DIPOLE CALIBRATION CERTIFICATE

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

S Schweizerischer Kalibrierdienst
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S Servizio svizzero di taratura
Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Client: TMC (Auden)

Certificate No: D2450V2-853_Sep10

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 853
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	September 27, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: September 29, 2010

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

ilac-MRA

SWISS CALIBRATION

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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.

Measurement Conditions

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 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	39.0 ± 6 %	1.74 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.1 mW / g
SAR normalized	normalized to 1W	52.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**53.2 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.16 mW / g
SAR normalized	normalized to 1W	24.6 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.8 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	52.5 ± 6 %	1.95 mho/m ± 6 %
Body TSL temperature during test	(21.6 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.9 mW / g
SAR normalized	normalized to 1W	51.6 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**51.5 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.98 mW / g
SAR normalized	normalized to 1W	23.9 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**23.9 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.6 Ω + 2.8 jΩ
Return Loss	- 25.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.4 Ω + 4.4 jΩ
Return Loss	- 27.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.164 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 10, 2009

DASY5 Validation Report for Head TSL

Date/Time: 24.09.2010 14:10:17

Test Laboratory: SPEAG, Zurich, Switzerland

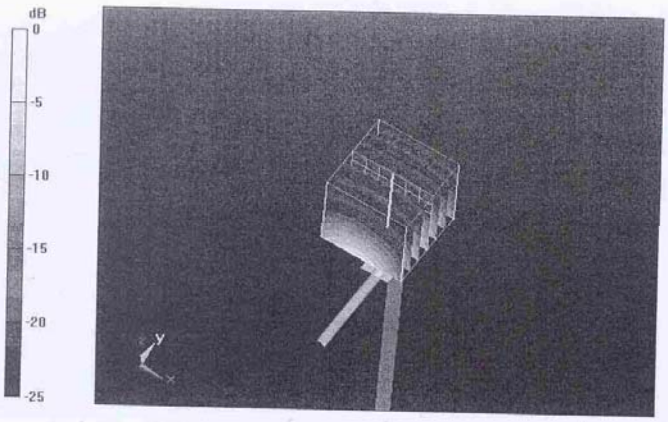
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:853

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 2450 MHz; $\sigma = 1.74$ mho/m; $\varepsilon_r = 39$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

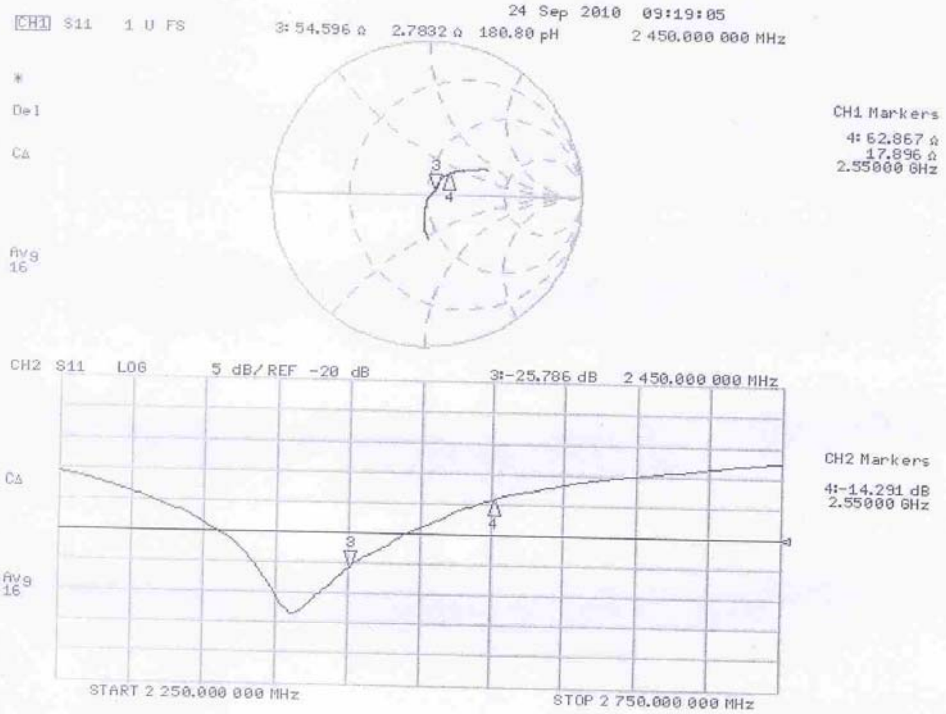
- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW/d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.7 V/m; Power Drift = 0.028 dB
Peak SAR (extrapolated) = 26.7 W/kg
SAR(1 g) = 13.1 mW/g; SAR(10 g) = 6.16 mW/g
Maximum value of SAR (measured) = 16.7 mW/g



0 dB = 16.7mW/g

Impedance Measurement Plot for Head TSL



Validation Report for Body

Date/Time: 27.09.2010 13:39:49

Test Laboratory: SPEAG, Zurich, Switzerland

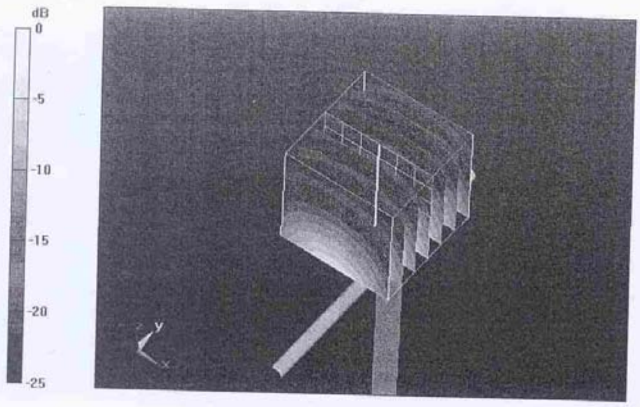
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:853

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 2450 MHz; $\sigma = 1.95$ mho/m; $\varepsilon_r = 52.6$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.31, 4.31, 4.31); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.7 V/m; Power Drift = 0.045 dB
Peak SAR (extrapolated) = 27 W/kg
SAR(1 g) = 12.9 mW/g; SAR(10 g) = 5.98 mW/g
Maximum value of SAR (measured) = 16.9 mW/g



0 dB = 16.9mW/g

Impedance Measurement Plot for Body TSL