SAR Evaluation Report
for
FCC OET Bulletin 65 Supplement C
and
Industry Standard RSS-102 Issue 2

Report No.: 08-12-MAS-239-01

Client:	Belkin International , Inc.
Product:	Enhanced Wireless USB Adapter
Model:	F6D4050 v1
FCC ID:	K7SF6D4050V1
IC ID:	3623A-F6D4050V1
Manufacturer/supplier:	Belkin International , Inc.
Date test item received:	2008/12/31
Date test campaign completed:	2009/01/09
Date of issue:	2009/01/09
Test Result:	■ Compliance ☐ Not Compliance

Statement of Compliance:
The SAR values measured for the test sample are below the maximum recommended level of 1.6 W/kg averaged over any 1g tissue according to FCC OET Bulletin 65 Supplement C (Edition 01-01) and Industry Canada RSS-102 (Issue 2, 2005).

The test result only corresponds to the tested sample. It is not permitted to copy this report, in part or in full, without the permission of the test laboratory.

Total number of pages of this test report: 66 pages

Test Engineer	Checked by	Approved by
John Li	Joe Hsieh	Anson Chou

The testing described in this report has been carried out to the best of our knowledge and ability, and our responsibility is limited to the exercise of reasonable care. This certification is not intended to believe the sellers from their legal and/or contractual obligations.

Applicant Information

Client	:	Belkin International , Inc.
Address	:	501 West Walnut Street, Compton CA 90220, USA
Manufacturer	:	Belkin International , Inc.
Address	:	501 West Walnut Street, Compton CA 90220, USA
EUT	:	Enhanced Wireless USB Adapter
Trade name		Belkin
Model No.	:	F6D4050 v1
Standard Applied	:	FCC OET 65 Supplement C (Edition 01-01, June 2001) Industry Standard RSS-102 Issue 2 (November 2005) IEEE Standard 1528-2003 KDB: 447498 (12/02/2008)
Laboratory	:	CERPASS TECHNOLOGY CORP. 4F-2, No. 28, Lane 78, Xing-Ai Rd. Nei-hu, Taipei City 114 Taiwan, R.O.C.
Test Location	:	No.8, Lane 29, Wenming RD., LeShan Tsuen, GuiShan Shiang, Taoyuan County 33383, Taiwan, R.O.C.
Test Result	:	Maximum SAR Measurement 802.11b: 0.129 W/kg(1g) 802.11g: 0.037 W/kg(1g) 802.11n HT20: 0.027 W/kg(1g) 802.11n HT40: 0.027 W/kg(1g)

The Enhanced Wireless USB Adapter is in compliance with the FCC Report and Order 93-326 and Health Canada Safety Code 6, and the tests were performed according to the FCC OET65c and RSS-102 Issue 2 for uncontrolled exposure.

Table of Contents

Executive Summary

The Enhanced Wireless USB Adapter is a usb dongle from Belkin International , Inc. products operating in the 2.4GHz frequency ranges. This device contains wireless functions that are operational in IEEE 802.11b, IEEE 802.11g, IEEE 802.11n HT20 and IEEE 802.11n HT40 modes. The measurements were conducted by CERPASS and carried out with the dosimetric assessment system – DASY4.

The measurements were conducted according to FCC OET 65 Supplement C [Reference 5] for evaluating compliance with requirements of FCC Report and Order 96-326 [Reference 3] and also according to Industry Standard RSS-102 Issue 2 [Reference 8] for evaluating compliance with requirements of Health Canada Safety Code 6[Reference 9].

The frequency range of the device:

IEEE 802.11b/g/n HT20		IEEE 802.11n HT40	
CH	**MHz**	**CH**	**MHz**
01	2412	03	2422
06	2437	06	2437
11	2462	09	2452

1 General Information

1.1 Description of Equipment Under Test

EUT Type	Enhanced Wireless USB Adapter
Trade Name	Belkin
Model Name	F6D4050 v1
Hardware version	N/A
Software version	N/A
Tx Frequency	2412 ~ 2462 MHz
Rx Frequency	2412 ~ 2462 MHz
Antenna Type	Internal Type
Device Category	Portable Part
RF Exposure Environment	General Population / Uncontrolled
Crest Factor	1

1.2 Photograph of EUT

Front	Back
	

1.3 Characteristics of Device

The EUT is a 2.4 GHz Enhanced Wireless USB Adapter. It conforms to the IEEE 802.11b/g/n protocal and operates in the unlicensed ISM Band at 2.4 GHz.

RF chain	1T1R
Frequency Range	IEEE 802.11b/g, 802.11n HT20: 2412MHz~2462MHz IEEE 802.11n HT40: 2422MHz~2452MHz
Channel Spacing	IEEE 802.11b/g/n: 5MHz
Channel Number	IEEE 802.11b/g, 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7 Channels

1.4 Description of support units

The SAR evaluation was performed on the following hosts:

Host #	Description	Manufacturer	Model	Overall Dimension
1	Laptop Computer	HP	NX6320	32.8cm x 26.7cm x 3.1cm
2	Laptop Computer	ACER	TravelMate 550	31.5cm x 27.5cm x 4.3cm

Laptop computers are not available for testing the Horizontal-UP of the EUT and the remaining Vertical-Front orientation, a short and high quality USB connector cable is used for testing these other orientations.

Cable #	Description	Manufacturer	Type	Length
1	USB cable	N/A	Female to male	25cm

1.5 Environment Conditions

Item	Target	Measured
Ambient Temperature (°C)	18 ~ 25	22 ± 1
Temperature of Simulant (°C)	20 ~ 24	22 ± 1
Relative Humidity (% RH)	30 ~ 70	60 ~ 70

1.6 FCC Requirements for SAR Compliance Testing

According to the FCC order “Guidelines for Evaluating the Environmental Effects of RF Radiation”, for consumer products, the SAR limit is **1.6 W/kg** for an uncontrolled environment and **8.0 W/kg** for an occupational/controlled environment. Pursuant to the Supplement C of OET Bulletin 65 “Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields”, released on June 29, 2001 by FCC, the equipment under test should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for intended or normal operation, incorporating normal antenna operating positions, equipment undet test peak performance frequencies and positions for maximum RF power coupling.

1.6.1 RF Exposure Limits

	Whole-Body	Partial-Body	Arms and Legs
Population/Uncontrolled Environments (W/kg)	0.08	1.6	4.0
Occupational/Controlled Environments (W/kg)	0.4	8.0	20.0

Notes:

1. Population/Uncontrolled Environments: Locations where there is the exposure of individuals who have no sense or control of their exposure.
2. Occupational/Controlled Environments: Locations where there is exposure that may be incurred by people who have knowledge of the potential for exposure.
3. Whole-Body: SAR is averaged over the entire body.
4. Partial-Body: SAR is averaged over any 1g of tissue volume as defined in specification.
5. Arms and Legs: SAR is averaged over 10g of tissue volume as defined in specification.

1.7 The SAR Measurement Procudure

1.7.1 General Requirements

The test should be performance in a laboratory without influence on SAR measurements by ambient RF sources and any reflection from the environment inside. The ambient temperature should be kept in the range of 18°C to 25°C with a maximum variation within ± 2°C during the test.

1.7.2 Phantom Requirements

The phantoms used in test are simplified representations of the human head and body as a specific shaped container for the head or body simulating liquids. The physical characteristics of the phantom models should resemble the head and the body of a mobile user sice the shape is a dominant parameter for exposure. The shell of the phantom should be made of low loss and low permittivity material and the thickness tolerance should be less than 0.2 mm. In addition, the phantoms should provide simulations of both right and left hand operations.

1.7.3 Test Positions

1. The horizontal-down and horizontal-up of EUT contact to the flat phantom. (Test with Notebook Model: HP NX6320) The transmitted antenna of the EUT located under the reference point of the flat phantom. The separation distance is 5mm between the top of the EUT and the bottom of the flat phantom. The area scan size is 41 x 61 points.
2. The vertical-back and vertical-front of EUT contact to the flat phantom. (Test with Notebook Model: ACER TravelMate550) The transmitted antenna of the EUT located under the reference point of the flat phantom. The separation distance is 5mm between the top of the EUT and the bottom of the flat phantom. The area scan size is 31 x 61 points.

1.7.4 Test Procedures

The EUT (WIRELESS USB DONGLE) plugged into the notebook. Use the software to control the EUT channel and transmission power. Then record the conducted power before the testing. Place the EUT to the specific test location. After the testing, must writing down the conducted power of the EUT into the report. The SAR value was calculated via the 3D spline interpolation algorithm that has been implemented in the software of DASY4 SAR measurement system manufactured and calibrated by SPEAG.

2 Description of the Test Equipment

The measurements were performed using an automated near-field scanning system, DASY4 software, manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland. The SAR extrapolation algorithm used in all measurements on the test device was the 'worstcase extrapolation' algorithm.

2.1 Test Equipment List

Equipment	Manufacturer	Type	S/N	Calibration Expiry
Robot	Staubli	RX90B L	F03/5W16A1/A/01	(not necessary)
Robot Controller	Staubli	CS7MB	F03/5W16A1/C/01	(not necessary)
Teach Pendant	Staubli	------------	D221340061	(not necessary)
DAE4	Schmid & Partner Engineering AG	------------	629	2009-09-22
E-field Probe	Schmid & Partner Engineering AG	EX3DV4	3555	2009-09-18
Dipole Validation Kit	Schmid & Partner Engineering AG	D2450V2	764	2009-09-23
Digital Thermometer	DER EE	K-TYPE	DE-3003	2009-01-14
Directional Coupler	Amplifier Research	DC7420	310569	2009-08-13
DASY4 Software	Schmid & Partner Engineering AG	------------	Version 4.6B23	To automatically control the robot and perform the SAR measurement
SEMCAD Software	Schmid & Partner Engineering AG	------------	Version 1.8B160	Post-processing and report management
Signal Generator	Agilent	83640B	3844A01143	2009-09-18
Amplifier	Mini-Circuits	ZHL-42W	D111704-01-02	2009-01-29
Power Meter	BOONTON	4532-0102	136601	2009-05-04
Power Sensor	BOONTON	51011-EMC	32861	2009-05-04
Power Sensor	BOONTON	56518	3233	2009-05-04
S-Parameter Network Analyzer	Agilent	8753ES	MY40001340	2009-12-01
Calibration Kit	Agilent	85033C	2920A03287	(not necessary)
Dielectric Probe Kit	Agilent	85070E	MY44300101	(not necessary)

2.2 DASY4 Measurement System Diagram

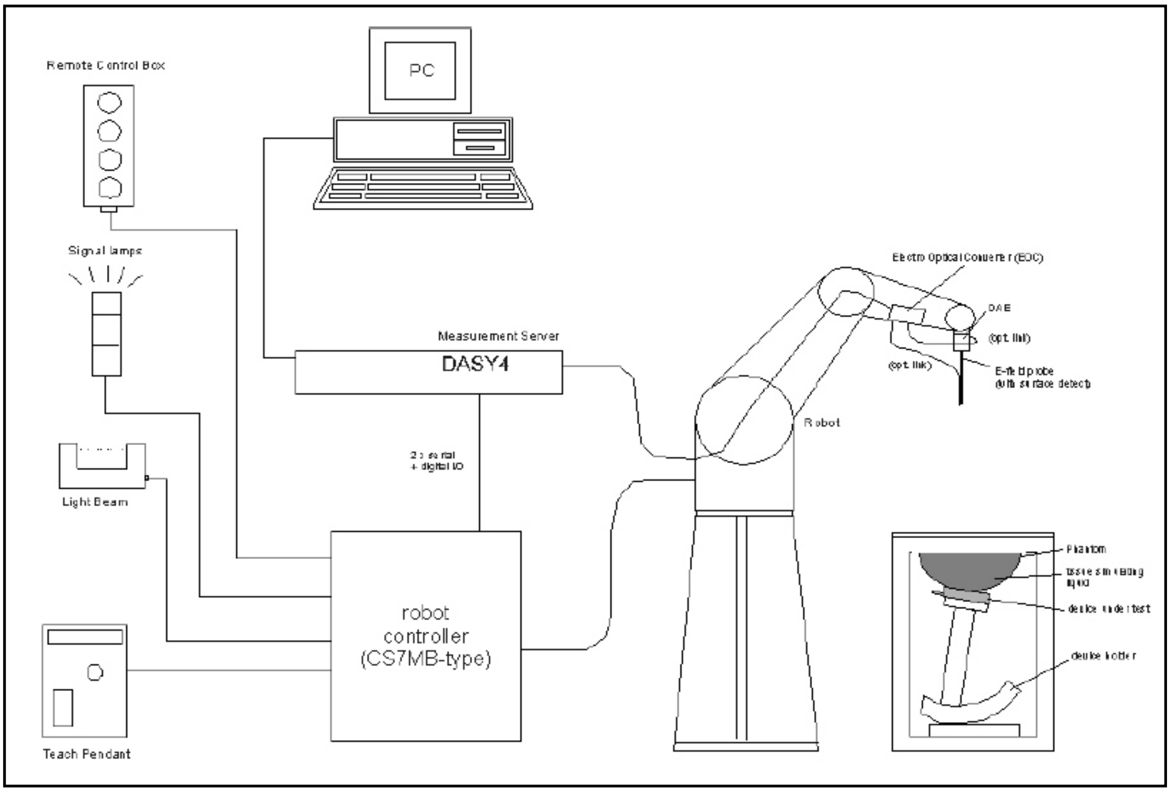


Fig. 1 The DASY4 Measurement System

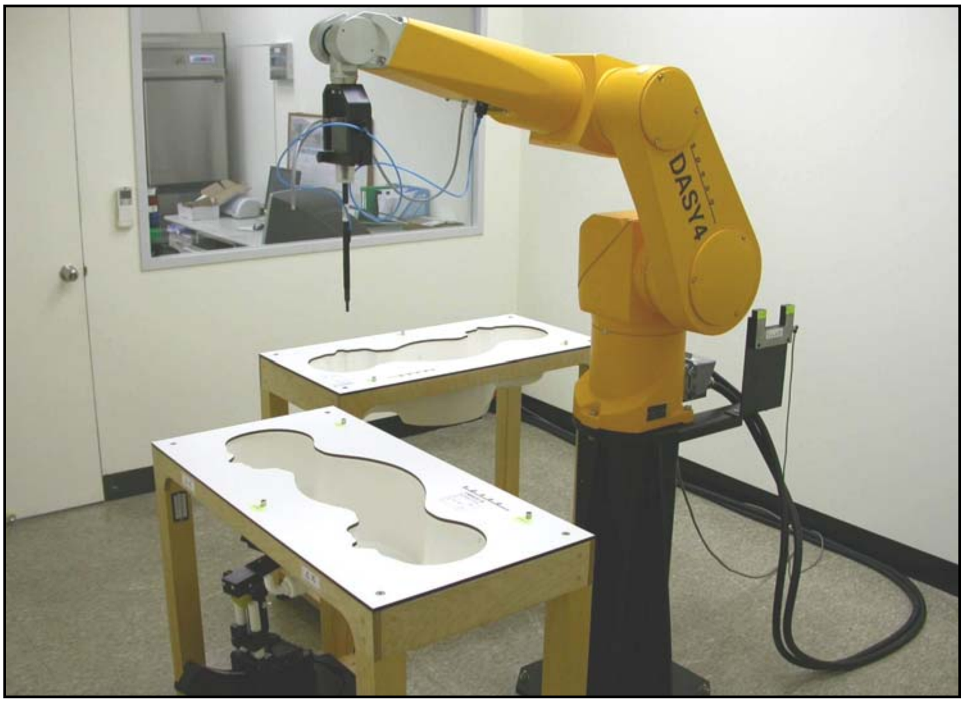


Fig. 2 The DASY4 System Photo

The DASY4 system consists of the following items:

- A fixed-on-ground high precision 6-axis robot with controller and software and an arm extension for moving the Data Acquisition Electronics (DAE) and Probe.
- A dosimetric probe, an isotropic E-field probe optimized and calibrated for usage in head or body tissue simulating liquids. Some of the probes are equipped with an optical surface detector system.
- A Data Acquisition Electronic (DAE) performing the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. DAE is powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to Electro-Optical Coupler (EOC).
- The EOC performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY4 measurement server.
- The DASY4 measurement server performing all real-time data evaluation for field measurements and surface detection, controling robot movements and handling safety operation. A computer with operating Windows 2000 is used for server.
- DASY4 software and SEMCAD data evaluation software are installed in PC.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed well according to the given recipes.
- System validation dipoles is used to validate the proper functioning of the system

2.3 DASY4 Measurement Server

Fig. 3 DASY4 Measurement Server

The DASY4 measurement server is based on a PC/104 CPU board with a 166MHz low-power pentium, 32MB chipdisk and 64MB RAM. The necessary circuits for communication with either the DAE4 (or DAE3) electronic box as well as the 16-bit AD-converter system for optical detection and digital I/O interface are contained on the DASY4 I/O-board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. The PC-operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with two expansion slots which are reserved for future applications. Please note that the expansion slots do not have a standardized pinout and therefore only the expansion cards provided by SPEAG can be inserted. Expansion cards from any other supplier could seriously damage the measurement server.

2.4 DAE (Data Acquisition Electronics)

Fig. 4 DAE Photo

Some probes are equipped with an optical multifiber line, ending at the front of the probe tip. This line is connected to the EOC box on the robot arm and provides automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. If the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases during the approach, reaches a maximum and then decreases. If the probe perpendicularly touches the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2^{nd} order fitting. The approach is stopped upon reaching the maximum.

The optical surface detection works in transparent liquids and on di_use reflecting surfaces with a repeatability of better than ±0.1mm. The distance of the maximum depends on the fiber and the surrounding media. It is typically 1.0mm to 2.0mm in tissue simulating mixtures. The distance can be measured with the surface check job (described in the reference guide).

2.5 Phantom

The phantom used for all tests i.e. for both system performance checking and device testing, was the twinheaded "SAM Twin Phantom V4.0", manufactured by SPEAG. The phantom conforms to the requirements of IEEE 1528 - 2003.

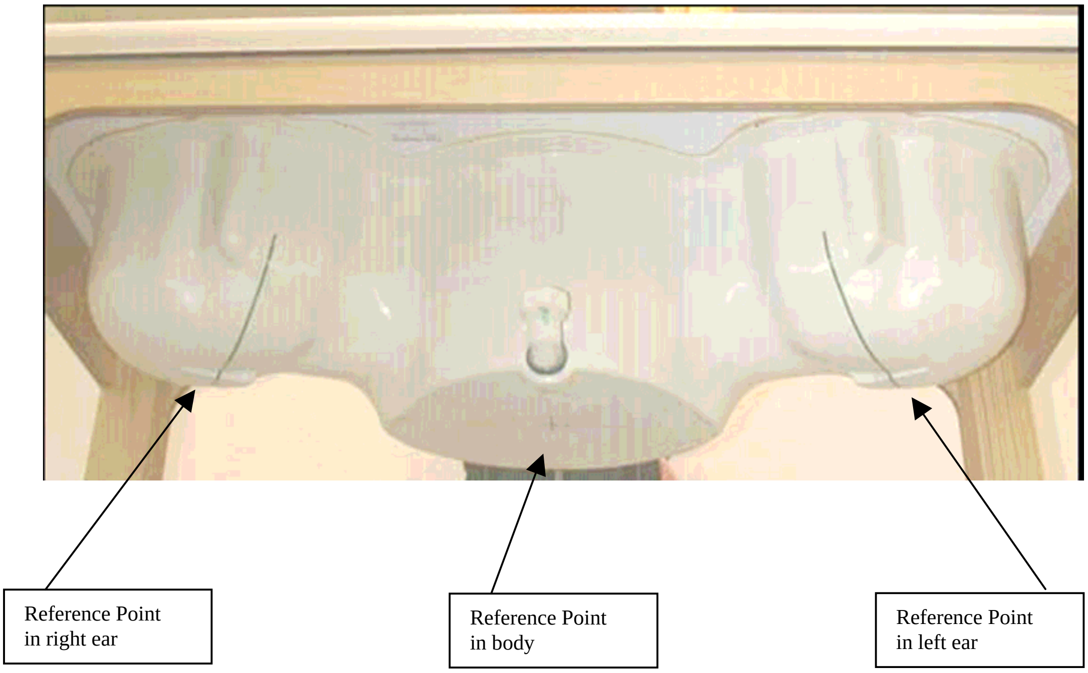


Fig. 5 SAM Twin Phantom and the definition points

2.6 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integrated part of the Dasy system.

Fig. 6 Device holder supplied by SPEAG

2.7 Specifications of Probes

The E-Field Probes ET3DV6 or EX3DV4, manufactured and calibrated annually by Schmid & Partner Engineering AG with following specification are used for the dosimetric measurements.

ET3DV6:

- Dynamic range: 5 μW/g ~ 100 mW/g
- Tip diameter: 6.8 mm
- Probe linearity: ± 0.2 dB (30MHz to 3 GHz)
- Axial isotropy: ± 0.2 dB
- Spherical isotropy: ± 0.4 dB
- Distance from probe tip to dipole centers: 2.7 mm
- Calibration range: 900MHz/1750MHz/1900MHz/ /2450MHz for head and body simulating liquids.

EX3DV4:

- Dynamic range: 10 μW/g ~ 100 mW/g
- Tip diameter: 2.5 mm
- Probe linearity: ± 0.2 dB (30MHz to 3 GHz)
- Axial isotropy: ± 0.2 dB
- Spherical isotropy: ± 0.4 dB
- Distance from probe tip to dipole centers: 1.0 mm
- Calibration range: 900MHz/1810MHz for head simulating liquid and

2.8 SAR Measurement Procedures in DASY4

Step 1 Setup a Call Connection

Establish a call in handset at the maximum power level with a base station simulator via air interface.

Step 2 Power Reference Measurement

To measure the local E-field value at a fixed location which value will be taken as a reference value for calculating a possible power drift.

Step 3 Area Scan

To measure the SAR distribution with a grid with spacing of 15 mm x 15 mm and kept with a constant distance to the inner surface of the phantom. Additional all peaks within 3 dB of the maximum SAR are searched.

Step 4 Zoom Scan

At these points (maximum number of SAR peaks is two), a cube of 32 mm x 32 mm x 30 mm is applied to and measured with 5 x 5 x 7 points. With these measured data, a peak spatial-average SAR value can be calculated by SEMCAD software.

Step 5 Power Drift Measurement

Repetition of the E-field measurement at the fixed location mentioned in Step 1 to make sure the two results differ by less than ± 0.2 dB.

2.9 Simulating Liquids

Liquid Recipes for this test report are as following:

BSL 2450MHz band (Body)

Ingredient	% by weight
Water	68.12
DGBE	31.72
Salt	0.16

2.10 System Performance Check

2.10.1 Purpose

1. To verify the simulating liquids are valid for testing.
2. To verify the performance of testing system is valid for testing.

2.10.2 System Performance Check Procedure

The DASY4 installation includes predefined files with recommended procedures for measurements and the system performance check. They are read-only document files and destined as fully defined but unmeasured masks, so the finished system performance check must be saved under a different name. The system performance check document requires the SAM Twin Phantom, so this phantom must be properly installed in your system. (User defined measurement procedures can be created by opening a new document or editing an existing document file). Before you start the system performance check, you need only to tell the system with which components (probe, medium, and device) you are performing the system performance check; the system will take care of all parameters.

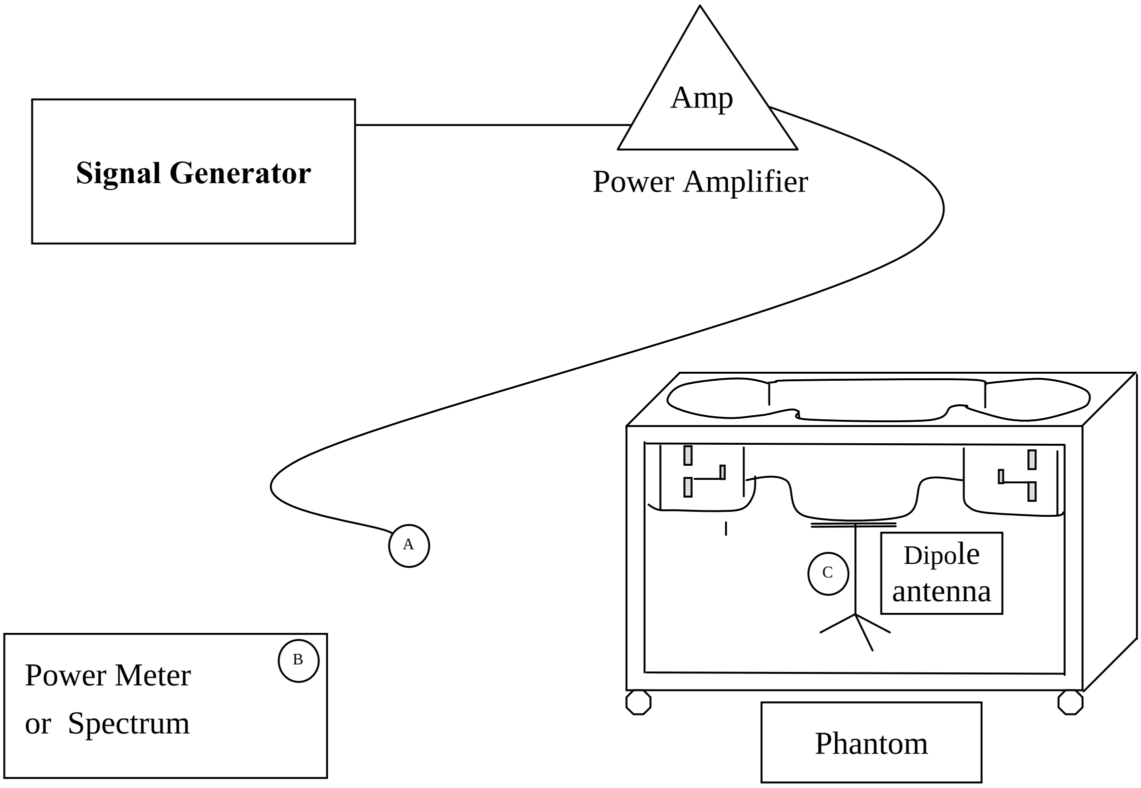
• **The Power Reference Measurement and Power Drift Measurement** jobs are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the amplifier output power. If it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

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

• **The Area Scan** job measures the SAR above the dipole on a plane parallel to the surface. It is used to locate the approximate location of the peak SAR. The proposed scan uses large grid spacing for faster measurement; due to the symmetric field, the peak detection is reliable. Schmid & Partner Engineering AG, DASY4 Manual, February 2005 16-2 System Performance Check Application Notes If a finer graphic is desired, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result.

• **The Zoom Scan** job measures the field in a volume around the peak SAR value assessed in the previous Area Scan job (for more information see the application note on SAR evaluation). If the system performance check gives reasonable results, the SAR peak, 1 g and 10 g spatial average SAR values normalized to 1W dipole input power give reference data for comparisons. The next sections analyze the expected uncertainties of these values, as well as additional checks for further information or troubleshooting.

2.10.3 System Performance Check Setup



Note：

1. A connected to B is used to make sure whether the input power is 250mW for target frequency..
2. A connected to C is used to input the measured power to dipole antenna

2.10.4 Result of System Performance Check: Valid Result

2450MHz band - Diepole Antenna: D2450V2 (S/N: 764)

Date of Measurement And Reference Value	SAR@1g [W/kg]	Dielectric Parameters		Temperature [℃]
		ε r	σ [S/m]	
Body 2450MHz Recommended Value	12.7 ±10% [11.43 ~ 13.97]	52.7 ±10% [47.43 ~ 57.97]	1.95 ± 5% [1.8525 ~ 2.0475]	22.0 ± 2 [20 ~ 24]
2009-01-05	13.7	50.8	1.98	21.2

3 Results

3.1 Summary of Test Results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.	■
The deviations as specified in this chapter were ascertained in the course of the tests Performed.	□

3.2 Description for EUT testing position

EUT position	Horizontal-Down	Horizontal-Up	Vertical-Back	Vertical-Front
Description	Orientation 1	Orientation 2	Orientation 3	Orientation 4

3.3 Check the conducted output power of worst mode

Mode	Channel	Power (dBm)	Note
IEEE 802.11b	06	17.40	Worst
IEEE 802.11g	06	14.03	
IEEE 802.11n HT20	06	13.69	
IEEE 802.11n HT40	06	13.91	

3.4 Check the position for worst result

Frequency			USB orientation	Conducted Power (dBm)			SAR@1g [W/kg]	Power Drift (dB)	Note
Mode	CH	MHz		Before	After	Drift			
802.11b	06	2437	1	17.3	17.2	-0.1	0.110	0.154	Worse
802.11b	06	2437	2	17.3	17.1	-0.2	0.107	-0.175	
802.11b	06	2437	3	17.4	17.2	-0.2	0.036	0.132	
802.11b	06	2437	4	17.3	17.2	-0.1	0.033	0.030	

3.5 Double check the other mode result

Frequency			USB orientation	Conducted Power (dBm)			SAR@1g [W/kg]	Power Drift (dB)	Note
Mode	CH	MHz		Before	After	Drift			
802.11g	06	2437	1	13.9	13.8	-0.1	0.037	-0.136	
802.11n20	06	2437	1	13.6	13.4	-0.2	0.027	-0.120	
802.11n40	06	2437	1	13.8	13.7	-0.1	0.027	0.118	
802.11b	11	2462	1	17.3	17.2	-0.1	0.129	0.198	Largest
802.11b	01	2412	1	17.3	17.1	-0.2	0.106	0.101	

3.6 Increments distance check

Frequency			USB orientation	Conducted Power (dBm)			SAR@1g [W/kg]	Power Drift (dB)	Note
Mode	CH	MHz		Before	After	Drift			
802.11b	11	2462	1 (initial position)	17.3	17.2	-0.1	0.129	0.198	
802.11b	11	2462	1 (5mm increments)	17.3	17.2	-0.1	0.055	0.163	

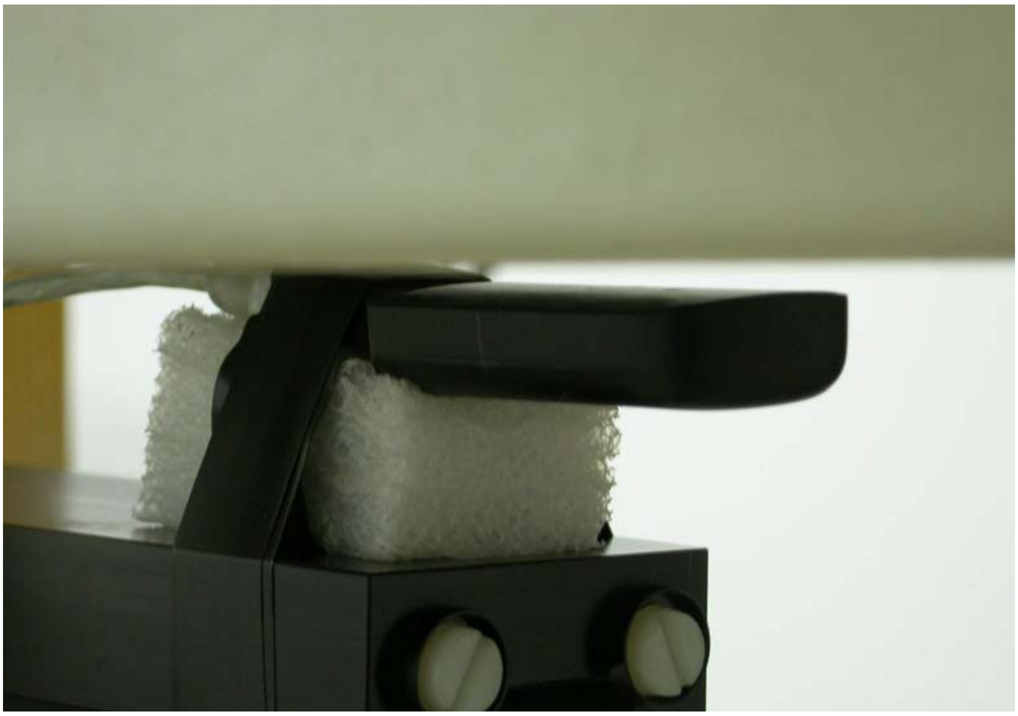
The Max Body SAR@2450MHz@1g was 0.129 W/kg, less than limitation of 1.6 W/kg.

3.7 Measurement Position

3.7.1 USB Orientation 1 of EUT Position

The horizontal-down of the EUT to the flat phantom distance 5 mm

3.7.2 USB Orientation 2 of EUT Position

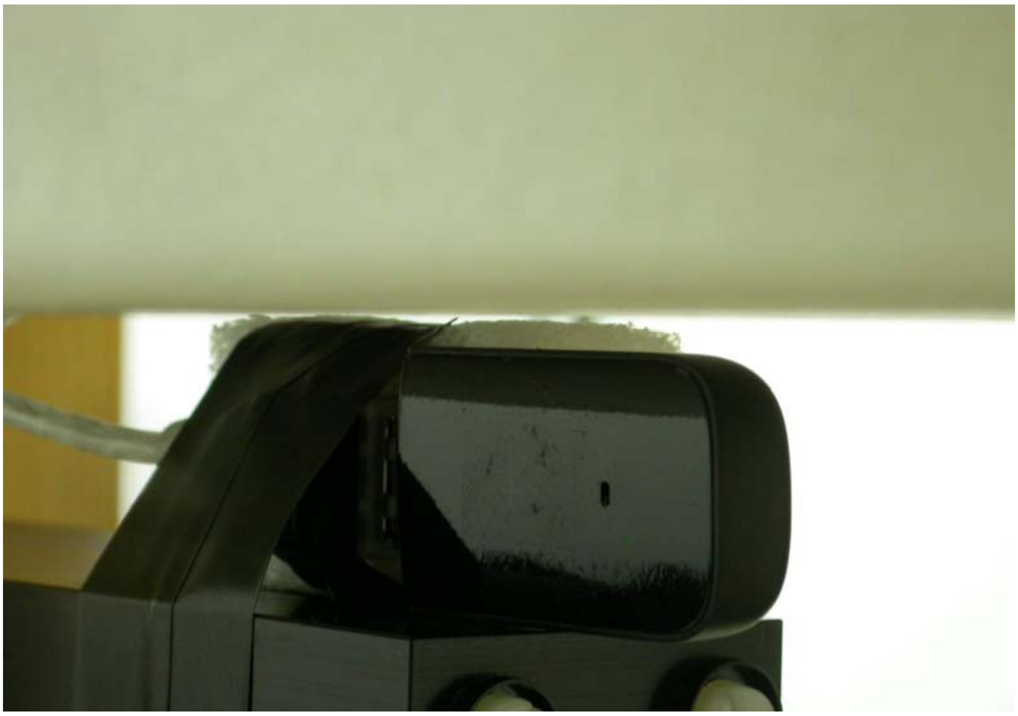


The horizontal-up of the EUT to the flat phantom distance 5 mm

3.7.3 USB Orientation 3 of EUT Position

The vertical-back of the EUT to the flat phantom distance 5 mm

3.7.4 USB Orientation 4 of EUT Position



The vertical-front of the EUT to the flat phantom distance 5 mm

4 The Description of Test Procedure for FCC

4.1 Scan Procedure

First coarse scans were used for determination of the field distribution. Next a cube scan, 5x5x7 points covering a volume of 32x32x30mm was performed around the highest E-field value to determine the averaged SAR value. Drift was determined by measuring the same point at the start of the coarse scan and again at the end of the cube scan.

4.2 SAR Averaging Methods

The maximum SAR value was averaged over a cube of tissue using interpolation and extrapolation. The interpolation, extrapolation and maximum search routines within Dasy4 are all based on the modified Quadratic Shepard's method (Robert J. Renka, "Multivariate Interpolation Of Lagre Sets Of Scattered Data", University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148).

The interpolation scheme combines a least-square fitted function method with a weighted average method. A trivariate 3-D / bivariate 2-D quadratic function is computed for each measurement point and fitted to neighbouring points by a least-square method. For the cube scan, inverse distance weighting is incorporated to fit distant points more accurately. The interpolating function is finally calculated as a weighted average of the quadratics. In the cube scan, the interpolation function is used to extrapolate the Peak SAR from the deepest measurement points to the inner surface of the phantom.

4.3 Data Storage

The DASY4 software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension .DA4. The postprocessing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., [V/m], [A/m] or [W/kg]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

4.4 Data Evaluation

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

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

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

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

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

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

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

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

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

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

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

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

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

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

with	SAR	= local specific absorption rate in mW/g
	E_{tot}	= total field strength in V/m
	σ	= conductivity in [mho/m] or [Siemens/m]
	ρ	= equivalent tissue density in g/cm^3

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

5 Measurement Uncertainty

5.1 Measurement Uncertainty I (According to IEEE 1528)

DASY4 Uncertainty Budget
According to IEEE 1528 [2]

Error Description	Uncertainty value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±5.9 %	N	1	1	1	±5.9 %	±5.9 %	∞
Axial Isotropy	±4.7 %	R	$\sqrt{3}$	0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	$\sqrt{3}$	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Linearity	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %	∞
System Detection Limits	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	$\sqrt{3}$	1	1	±1.5 %	±1.5 %	∞
RF Ambient Conditions	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.4 %	R	$\sqrt{3}$	1	1	±0.2 %	±0.2 %	∞
Probe Positioning	±2.9 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Max. SAR Eval.	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Test Sample Related								
Device Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	145
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Power Drift	±5.0 %	R	$\sqrt{3}$	1	1	±2.9 %	±2.9 %	∞
Phantom and Setup								
Phantom Uncertainty	±4.0 %	R	$\sqrt{3}$	1	1	±2.3 %	±2.3 %	∞
Liquid Conductivity (target)	±5.0 %	R	$\sqrt{3}$	0.64	0.43	±1.8 %	±1.2 %	∞
Liquid Conductivity (meas.)	±2.5 %	N	1	0.64	0.43	±1.6 %	±1.1 %	∞
Liquid Permittivity (target)	±5.0 %	R	$\sqrt{3}$	0.6	0.49	±1.7 %	±1.4 %	∞
Liquid Permittivity (meas.)	±2.5 %	N	1	0.6	0.49	±1.5 %	±1.2 %	∞
Combined Std. Uncertainty						±10.8 %	±10.6 %	330
Expanded STD Uncertainty						**±21.6 %**	**±21.1 %**	

5.2 Measurement Uncertainty II (According to IEC 62209)

DASY4 Uncertainty Budget
According to IEC 62209 [3]

Error Description	Uncertainty value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±5.9 %	N	1	1	1	±5.9 %	±5.9 %	∞
Axial Isotropy	±4.7 %	R	$\sqrt{3}$	0.7	0.7	±1.9 %	±1.9 %	∞
Spherical Isotropy	±9.6 %	R	$\sqrt{3}$	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Linearity	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %	∞
Detection Limits	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	$\sqrt{3}$	1	1	±1.5 %	±1.5 %	∞
Perturbation of the Environment	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Probe Positioner Mech. Restr.	±0.4 %	R	$\sqrt{3}$	1	1	±0.2 %	±0.2 %	∞
Probe Positioning	±2.9 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Post-Processing	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Test Sample Related								
Test Sample Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9,%	145
Device Holder Uncertainty	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Drift of Output Power	±5.0 %	R	$\sqrt{3}$	1	1	±2.9 %	±2.9 %	∞
Phantom and Setup								
Phantom Uncertainty	±4.0 %	R	$\sqrt{3}$	1	1	±2.3 %	±2.3 %	∞
Liquid Conductivity (target)	±5.0 %	R	$\sqrt{3}$	0.7	0.5	±2.0 %	±1.4 %	∞
Liquid Conductivity (meas.)	±4.3 %	R	$\sqrt{3}$	0.7	0.5	±1.7,%	±1.2 %	∞
Liquid Permittivity (target)	±5.0 %	R	$\sqrt{3}$	0.6	0.5	±1.7 %	±1.4 %	∞
Liquid Permittivity (meas.)	±4.3 %	R	$\sqrt{3}$	0.6	0.5	±1.5 %	±1.2 %	∞
Combined Std. Uncertainty						±10.5 %	±10.2 %	330
Expanded Uncertainty						**±21.0 %**	**±20.5 %**	

6 References

1. [ANSI/IEEE C95.1-1992]

Safety Levels with Respect to Human Exposure to Radio Frrequency Electromagnetic Fields, 3 kHz to 300 GHz. The Institute of Electrical and Electronics Engineers, Inc. (IEEE), 1992.

2. [ANSI/IEEE C95.3-1992]

Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave". The Institute of Electrical and Electronics Engineers, Inc. (IEEE), 1992.

3. [FCC Report and Order 96-326]

Federal Communications Commission, \Report and order: Guidelines for evaluating the environmental effects of radiofrequency radiation", Tech. Rep. FCC 96-326, 1996.

4. [FCC OET Bulletin 65]

Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. OET Bulletin 65 Edition 97-01, August 1997. Federal Communications Commission (FCC), Office of Engineering & Technology. (OET)

5. [FCC OET Bulletin 65 Supplement C]

Additional Information for Evaluating Compliance of Mobile and Portable Device with FCC Limits for Human Exposure to Radiofrequency Emissions. Supplement C (Edition 01-01) to OET Bulletin 65, June 2001. Federal Communications Commission (FCC), Office of Engineering & Technology. (OET)

6. [DASY 4]

Schmid & Partner Engineering AG: DASY 4 Manual, September 2005.

7. [IEEE 1528-2003]

IEEE Std 1528-2003: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wirless Communications Devices: Measurement Techniques. 1528-2003, 19th December, 2003, The Institute of Electrical and Electronics Engineers, Inc. (IEEE).

8. [RSS-102, Issue 2]

Radio Standards Specification 102, Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) sets out the requirements and measurement techniques used to evaluate radio frequency (RF) exposure compliance of radiocommunication apparatus designed to be used within the vicinity of the human body. November, 2005. Industry Canada.

9. [Health Canada Safety Code 6]

Canada's Safety Code 6: Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz (99-EHD-237)

7 Annex：Test Results of DASY4 (Refer to ANNEX)

ANNEX

Index of Annex

ANNEX A: CONSTRUCTION PHOTOS OF EUT

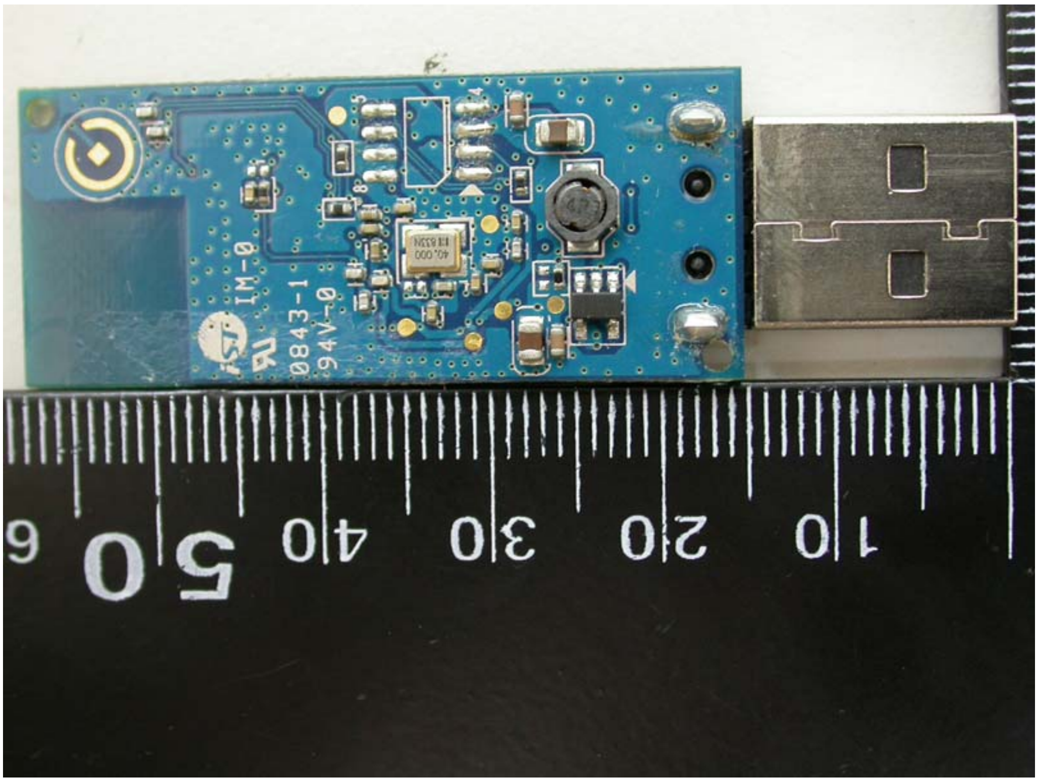
1. Outside view 1 of EUT

2. Outside view 2 of EUT

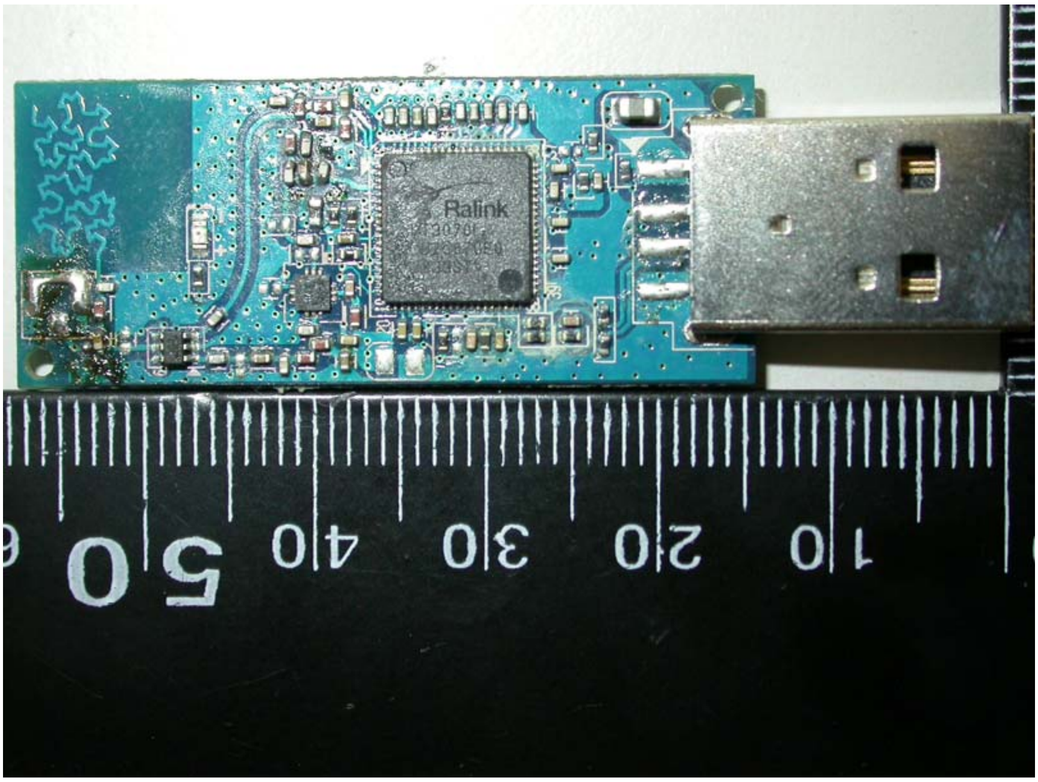
3. Inside View 1 of EUT

4. Inside View 1 of EUT

5. Front view of PCB



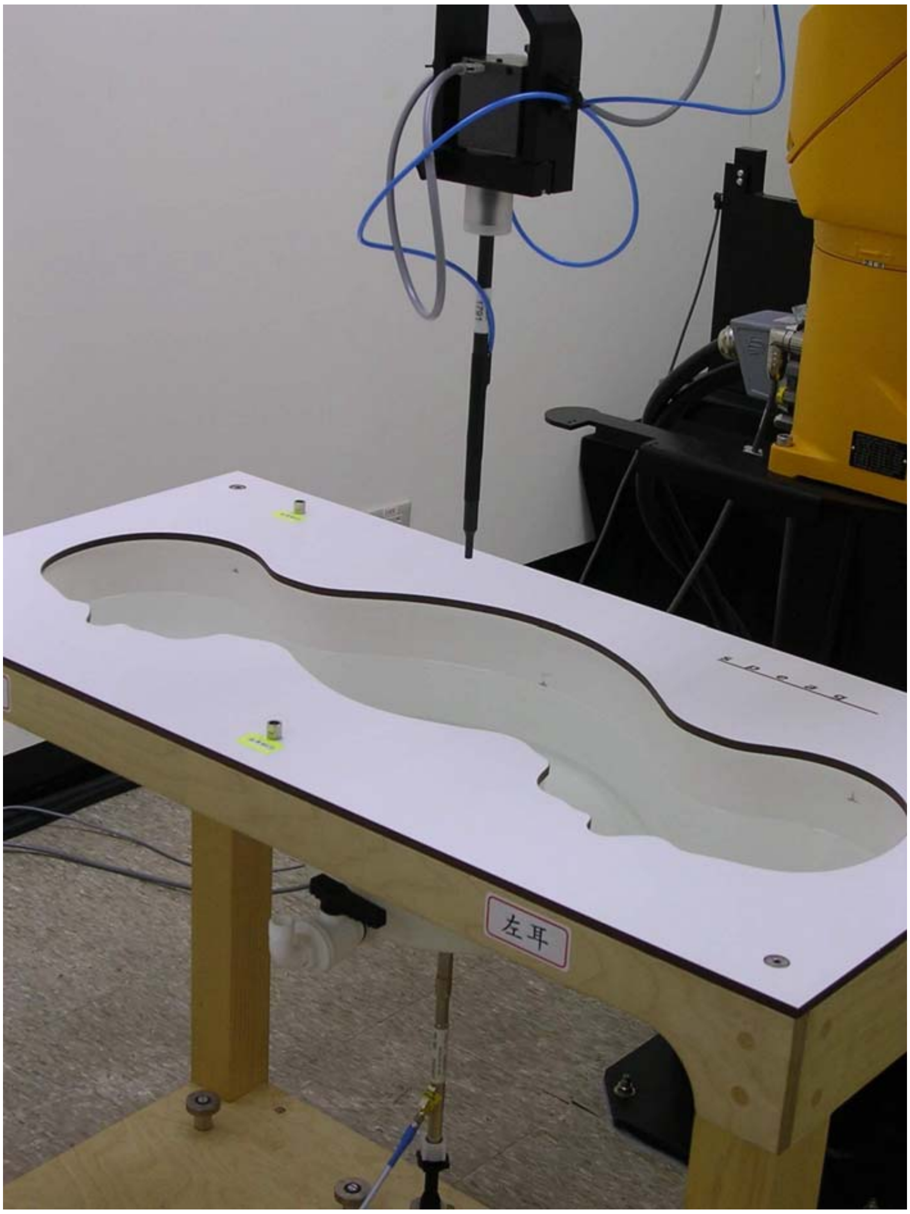
6. Rear view of PCB



ANNEX B: SAR RESULTS

System Performance Check

Body



Date/Time: 1/5/2009 9:21:08 AM

Test Laboratory: Electronics Testing Center, Taiwan

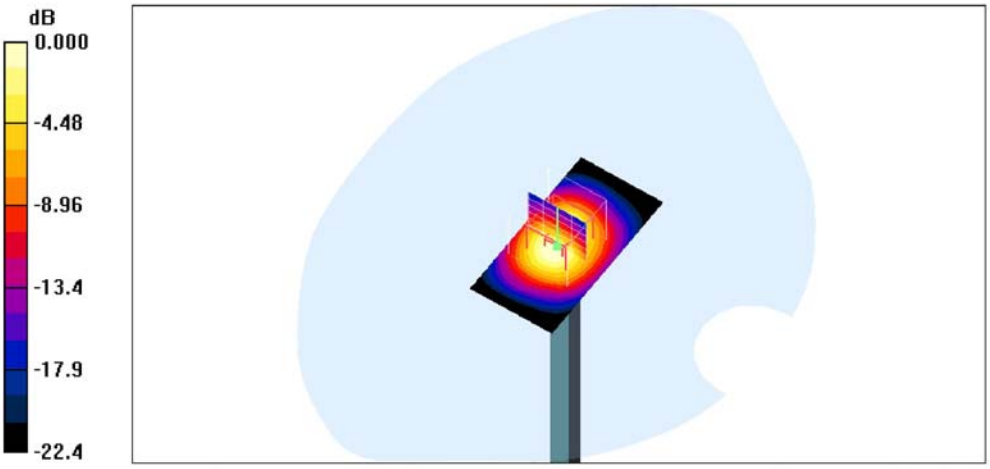
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:764

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.98 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Air temperature: 20 degC; Liquid temperature: 21.2 degC;
Phantom section: Flat Section

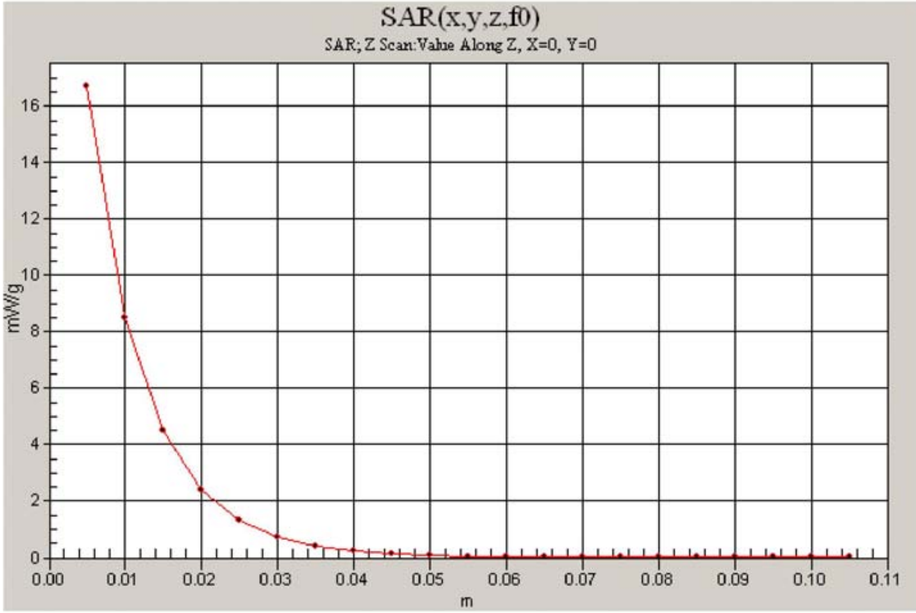
DASY4 Configuration:
- Probe: EX3DV4 - SN3555; ConvF(6.17, 6.17, 6.17); Calibrated: 9/19/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn629; Calibrated: 9/23/2008
- Phantom: SAM 12-2; Type: SAM4.0; Serial: TP-1347
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

SPC/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 87.1 V/m; Power Drift = -0.080 dB
Peak SAR (extrapolated) = 28.1 W/kg
SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.28 mW/g
Maximum value of SAR (measured) = 15.6 mW/g

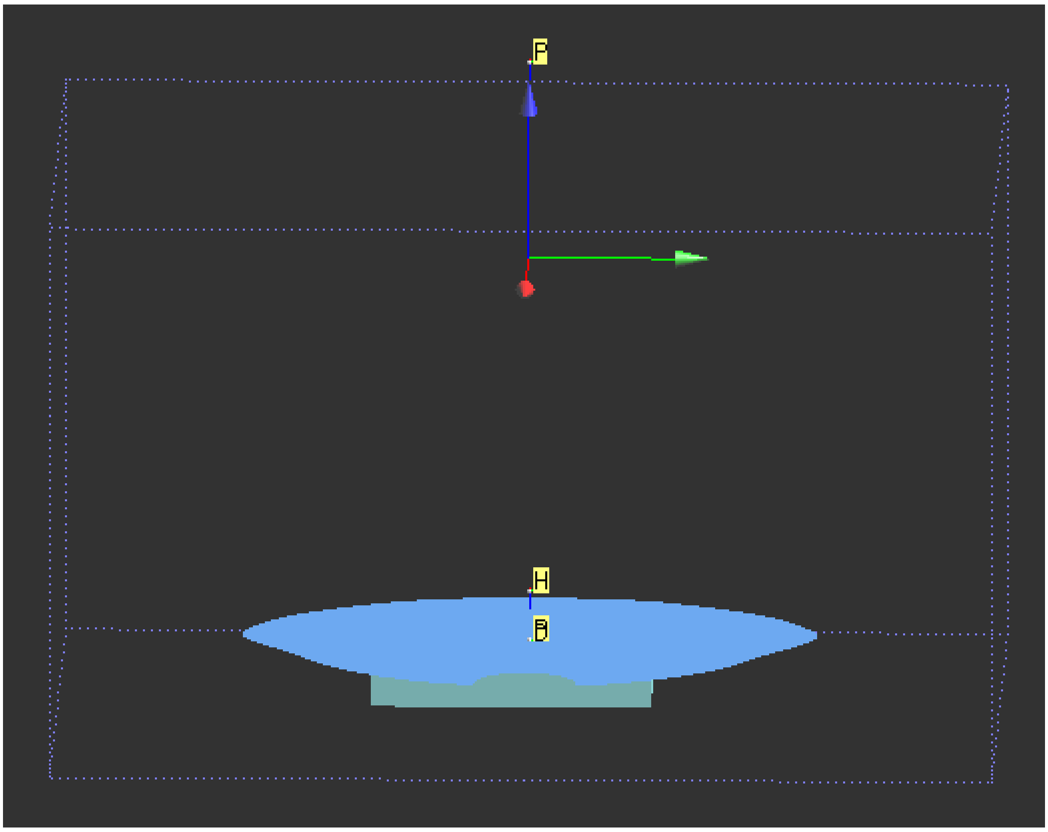
SPC/Area Scan (31x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 16.7 mW/g



0 dB = 15.6mW/g


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
0
2
4
6
8
10
12
14
16
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
m

Body



Orientation 1

Date/Time: 1/5/2009 10:12:14 AM

Test Laboratory: Electronics Testing Center, Taiwan

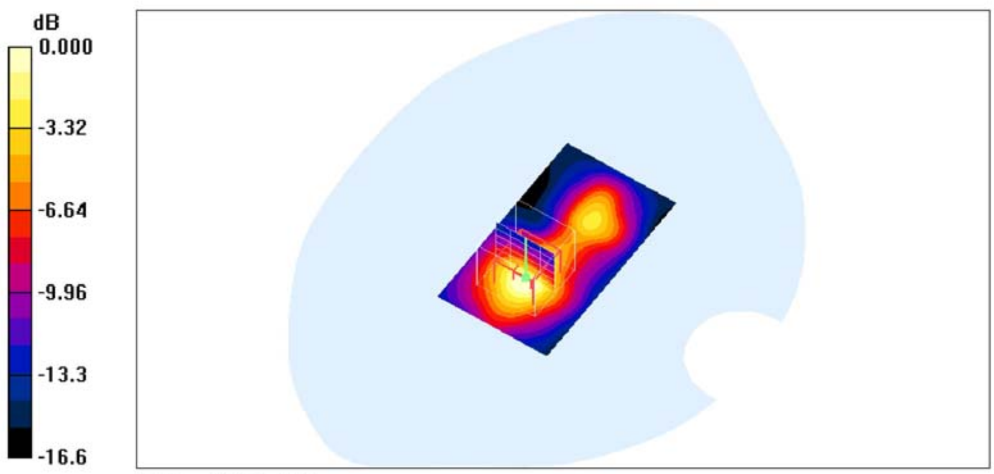
DUT: USB dongle; Type: F6D4050; Serial: N/A

Communication System: IEEE 802.11b/g/n; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.96 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Air temperature: 20 degC; Liquid temperature: 21.2 degC;
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3555; ConvF(6.17, 6.17, 6.17); Calibrated: 9/19/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn629; Calibrated: 9/23/2008
- Phantom: SAM 12-2; Type: SAM4.0; Serial: TP-1347
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

802.11b_CH06_orientation 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.88 V/m; Power Drift = 0.154 dB
Peak SAR (extrapolated) = 0.212 W/kg
SAR(1 g) = 0.110 mW/g; SAR(10 g) = 0.053 mW/g
Maximum value of SAR (measured) = 0.124 mW/g

802.11b_CH06_orientation 1/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.132 mW/g



0 dB = 0.124mW/g

Orientation 1

Date/Time: 1/5/2009 10:36:24 AM

Test Laboratory: Electronics Testing Center, Taiwan

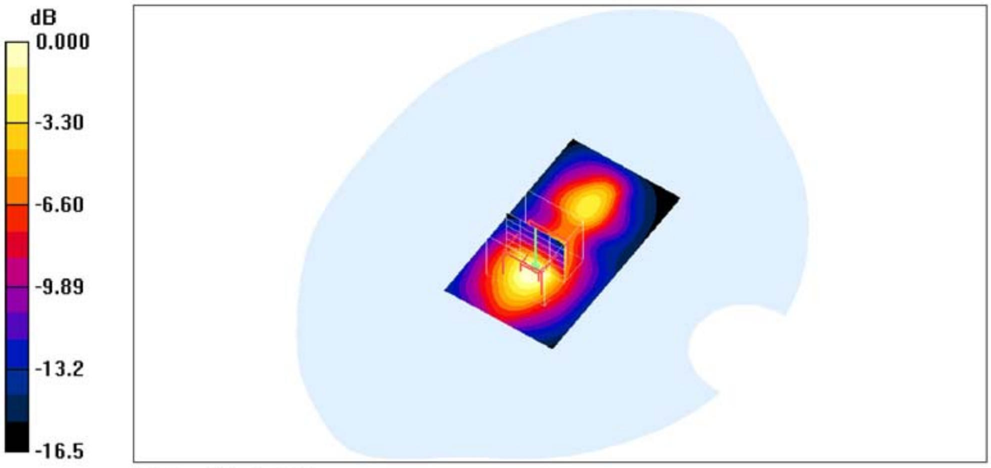
DUT: USB dongle; Type: F6D4050; Serial: N/A

Communication System: IEEE 802.11b/g/n; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.96 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Air temperature: 20 degC; Liquid temperature: 21.2 degC;
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3555; ConvF(6.17, 6.17, 6.17); Calibrated: 9/19/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn629; Calibrated: 9/23/2008
- Phantom: SAM 12-2; Type: SAM4.0; Serial: TP-1347
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

802.11b_CH06_orientation 2/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.134 mW/g

802.11b_CH06_orientation 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.94 V/m; Power Drift = -0.175 dB
Peak SAR (extrapolated) = 0.204 W/kg
SAR(1 g) = 0.107 mW/g; SAR(10 g) = 0.052 mW/g
Maximum value of SAR (measured) = 0.120 mW/g



0 dB = 0.134mW/g

Orientation 1

Date/Time: 1/5/2009 11:45:58 AM

Test Laboratory: Electronics Testing Center, Taiwan

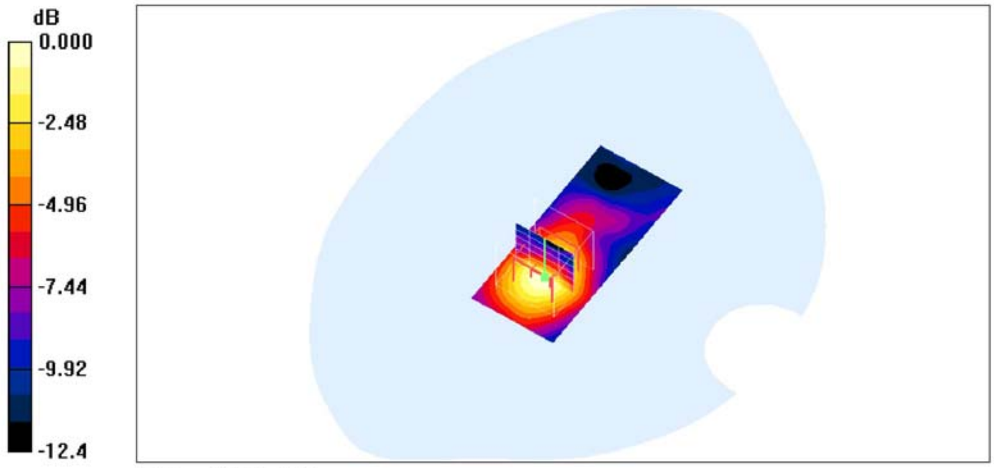
DUT: USB dongle; Type: F6D4050; Serial: N/A

Communication System: IEEE 802.11b/g/n; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.96 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Air temperature: 20 degC; Liquid temperature: 21.2 degC;
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3555; ConvF(6.17, 6.17, 6.17); Calibrated: 9/19/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn629; Calibrated: 9/23/2008
- Phantom: SAM 12-2; Type: SAM4.0; Serial: TP-1347
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

802.11b_CH06_orientation 3/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.23 V/m; Power Drift = 0.132 dB
Peak SAR (extrapolated) = 0.061 W/kg
SAR(1 g) = 0.036 mW/g; SAR(10 g) = 0.020 mW/g
Maximum value of SAR (measured) = 0.040 mW/g

802.11b_CH06_orientation 3/Area Scan (31x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.044 mW/g



0 dB = 0.044mW/g

Orientation 1

Date/Time: 1/5/2009 12:06:25 PM

Test Laboratory: Electronics Testing Center, Taiwan

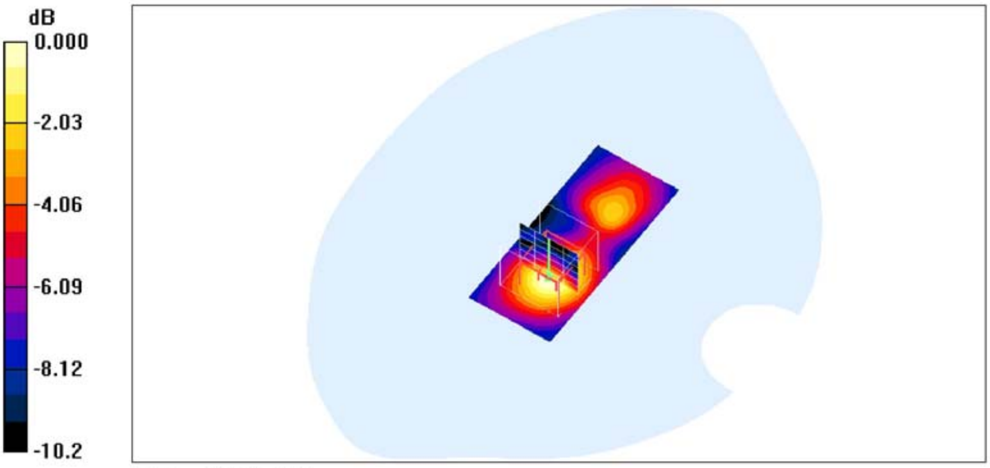
DUT: USB dongle; Type: F6D4050; Serial: N/A

Communication System: IEEE 802.11b/g/n; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.96 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Air temperature: 20 degC; Liquid temperature: 21.2 degC;
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3555; ConvF(6.17, 6.17, 6.17); Calibrated: 9/19/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn629; Calibrated: 9/23/2008
- Phantom: SAM 12-2; Type: SAM4.0; Serial: TP-1347
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

802.11b_CH06_orientation 4/Area Scan (31x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.040 mW/g

802.11b_CH06_orientation 4/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.36 V/m; Power Drift = 0.030 dB
Peak SAR (extrapolated) = 0.070 W/kg
SAR(1 g) = 0.033 mW/g; SAR(10 g) = 0.018 mW/g
Maximum value of SAR (measured) = 0.035 mW/g



0 dB = 0.040mW/g

Orientation 1

Date/Time: 1/5/2009 12:46:18 PM

Test Laboratory: Electronics Testing Center, Taiwan

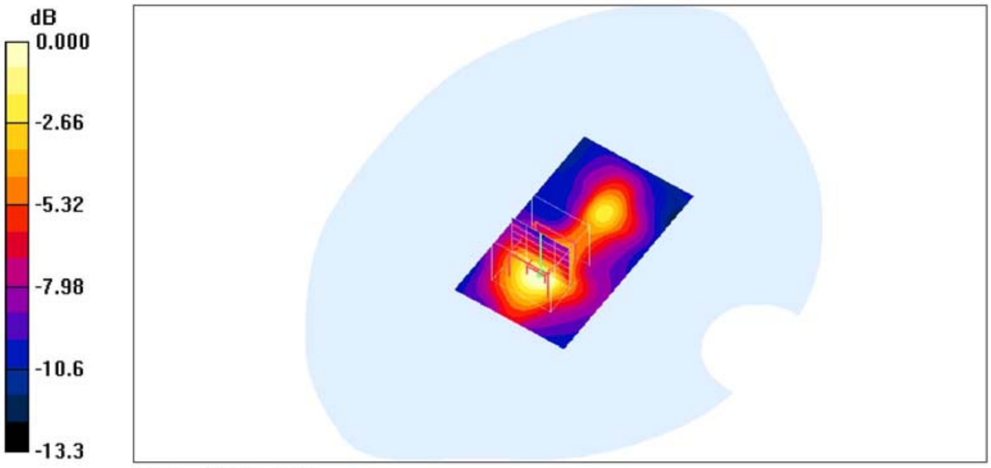
DUT: USB dongle; Type: F6D4050; Serial: N/A

Communication System: IEEE 802.11b/g/n; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.96 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Air temperature: 20 degC; Liquid temperature: 21.2 degC;
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3555; ConvF(6.17, 6.17, 6.17); Calibrated: 9/19/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn629; Calibrated: 9/23/2008
- Phantom: SAM 12-2; Type: SAM4.0; Serial: TP-1347
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

802.11g_CH06_orientation 1/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.047 mW/g

802.11g_CH06_orientation 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.79 V/m; Power Drift = -0.136 dB
Peak SAR (extrapolated) = 0.061 W/kg
SAR(1 g) = 0.037 mW/g; SAR(10 g) = 0.020 mW/g
Maximum value of SAR (measured) = 0.042 mW/g



0 dB = 0.042mW/g

Orientation 1

Date/Time: 1/5/2009 1:02:29 PM

Test Laboratory: Electronics Testing Center, Taiwan

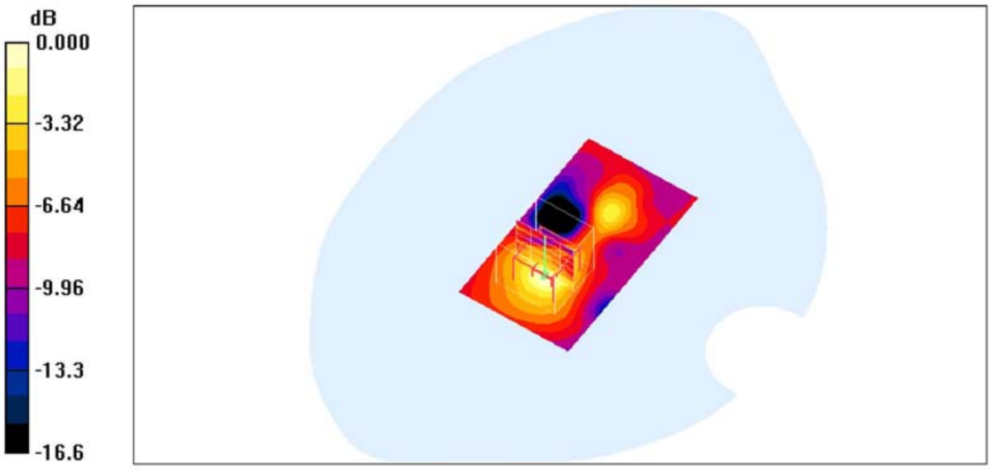
DUT: USB dongle; Type: F6D4050; Serial: N/A

Communication System: IEEE 802.11b/g/n; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.96 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Air temperature: 20 degC; Liquid temperature: 21.2 degC;
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3555; ConvF(6.17, 6.17, 6.17); Calibrated: 9/19/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn629; Calibrated: 9/23/2008
- Phantom: SAM 12-2; Type: SAM4.0; Serial: TP-1347
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

802.11n20_CH06_orientation 1/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.029 mW/g

802.11n20_CH06_orientation 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.80 V/m; Power Drift = -0.120 dB
Peak SAR (extrapolated) = 0.046 W/kg
SAR(1 g) = 0.027 mW/g; SAR(10 g) = 0.015 mW/g
Maximum value of SAR (measured) = 0.031 mW/g



0 dB = 0.031mW/g

Orientation 1

Date/Time: 1/5/2009 1:24:55 PM

Test Laboratory: Electronics Testing Center, Taiwan

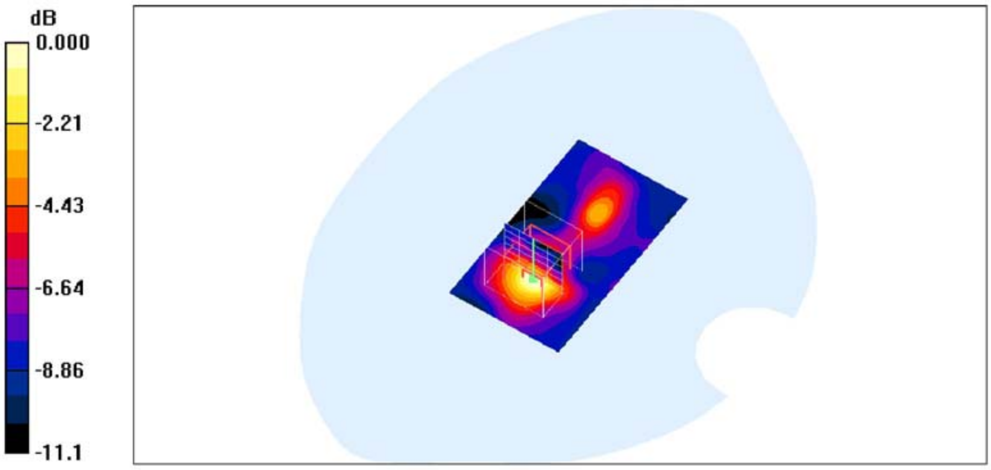
DUT: USB dongle; Type: F6D4050; Serial: N/A

Communication System: IEEE 802.11b/g/n; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.96 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Air temperature: 20 degC; Liquid temperature: 21.2 degC;
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3555; ConvF(6.17, 6.17, 6.17); Calibrated: 9/19/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn629; Calibrated: 9/23/2008
- Phantom: SAM 12-2; Type: SAM4.0; Serial: TP-1347
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

802.11n40_CH06_orientation 1/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.030 mW/g

802.11n40_CH06_orientation 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.73 V/m; Power Drift = 0.118 dB
Peak SAR (extrapolated) = 0.048 W/kg
SAR(1 g) = 0.027 mW/g; SAR(10 g) = 0.014 mW/g
Maximum value of SAR (measured) = 0.031 mW/g



0 dB = 0.030mW/g

Orientation 1

Date/Time: 1/5/2009 2:43:09 PM

Test Laboratory: Electronics Testing Center, Taiwan

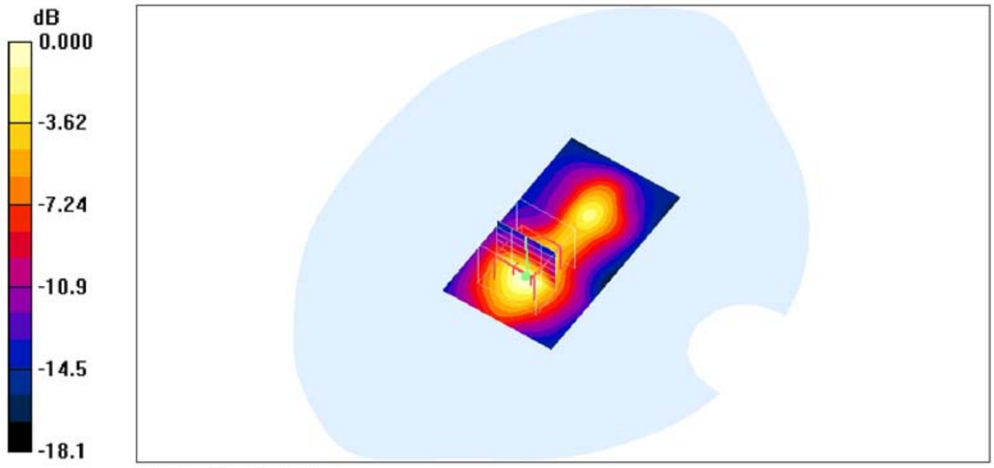
DUT: USB dongle; Type: F6D4050; Serial: N/A

Communication System: IEEE 802.11b/g/n; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; σ = 1.99 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Air temperature: 20 degC; Liquid temperature: 21.2 degC;
Phantom section: Flat Section

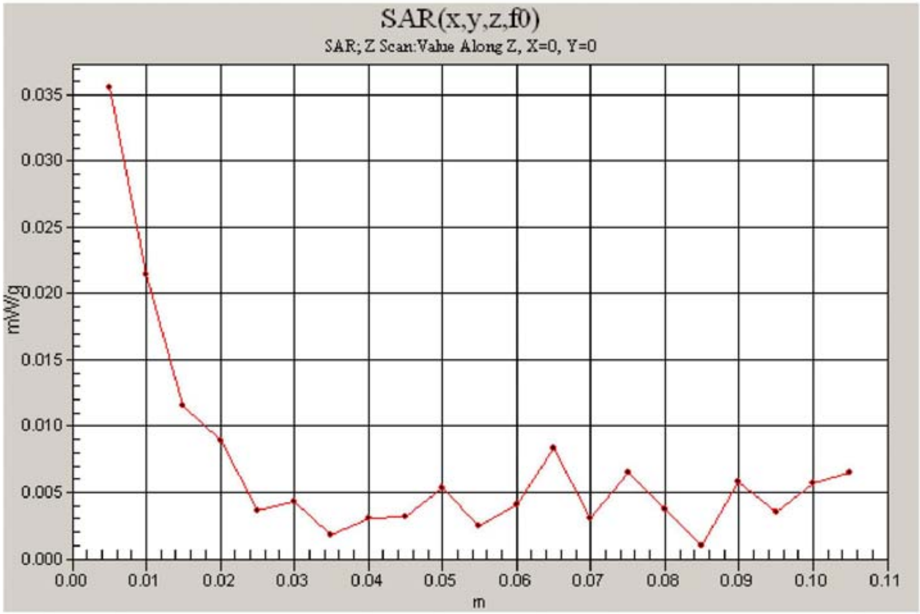
DASY4 Configuration:
- Probe: EX3DV4 - SN3555; ConvF(6.17, 6.17, 6.17); Calibrated: 9/19/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn629; Calibrated: 9/23/2008
- Phantom: SAM 12-2; Type: SAM4.0; Serial: TP-1347
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

802.11b_CH11_orientation 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.95 V/m; Power Drift = 0.198 dB
Peak SAR (extrapolated) = 0.259 W/kg
SAR(1 g) = 0.129 mW/g; SAR(10 g) = 0.062 mW/g
Maximum value of SAR (measured) = 0.144 mW/g

802.11b_CH11_orientation 1/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.151 mW/g



0 dB = 0.144mW/g


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
m

Orientation 1

Date/Time: 1/5/2009 3:03:29 PM

Test Laboratory: Electronics Testing Center, Taiwan

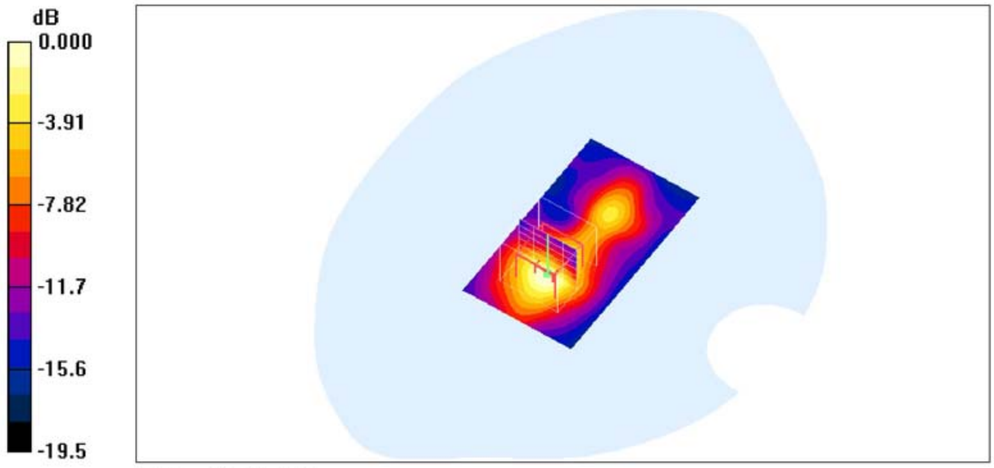
DUT: USB dongle; Type: F6D4050; Serial: N/A

Communication System: IEEE 802.11b/g/n; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.93 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3
Air temperature: 20 degC; Liquid temperature: 21.2 degC;
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3555; ConvF(6.17, 6.17, 6.17); Calibrated: 9/19/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn629; Calibrated: 9/23/2008
- Phantom: SAM 12-2; Type: SAM4.0; Serial: TP-1347
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

802.11b_CH01_orientation 1/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.122 mW/g

802.11b_CH01_orientation 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.16 V/m; Power Drift = 0.101 dB
Peak SAR (extrapolated) = 0.206 W/kg
SAR(1 g) = 0.106 mW/g; SAR(10 g) = 0.050 mW/g
Maximum value of SAR (measured) = 0.119 mW/g



0 dB = 0.119mW/g

Orientation 1

Date/Time: 1/5/2009 3:55:50 PM

Test Laboratory: Electronics Testing Center, Taiwan

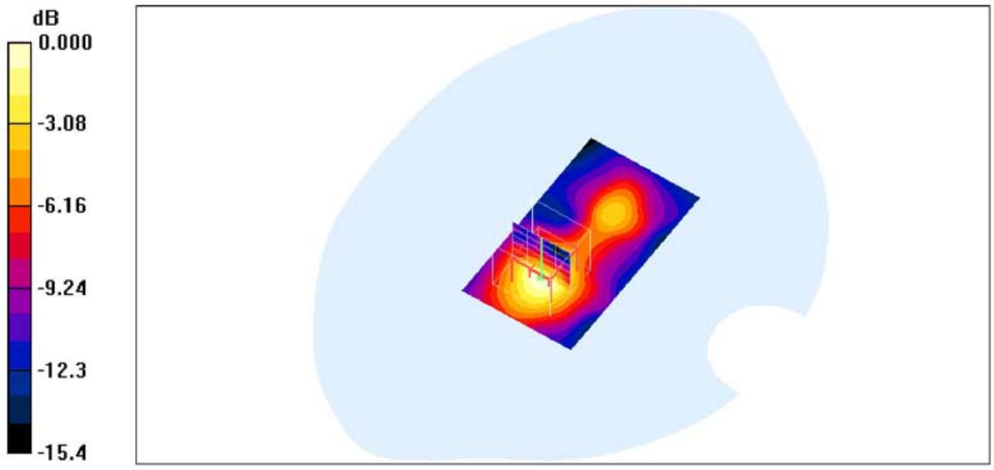
DUT: USB dongle; Type: F6D4050; Serial: N/A

Communication System: IEEE 802.11b/g/n; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; σ = 1.99 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Air temperature: 20 degC; Liquid temperature: 21.2 degC;
Phantom section: Flat Section

DASY4 Configuration:
- Probe: EX3DV4 - SN3555; ConvF(6.17, 6.17, 6.17); Calibrated: 9/19/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn629; Calibrated: 9/23/2008
- Phantom: SAM 12-2; Type: SAM4.0; Serial: TP-1347
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

802.11b_CH11_orientation 1_10mm/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.066 mW/g

802.11b_CH11_orientation 1_10mm/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.30 V/m; Power Drift = 0.163 dB
Peak SAR (extrapolated) = 0.102 W/kg
SAR(1 g) = 0.055 mW/g; SAR(10 g) = 0.029 mW/g
Maximum value of SAR (measured) = 0.061 mW/g



0 dB = 0.066mW/g

ANNEX C: DIPOLE CERTIFICATE

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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**

Client **ETC (Auden)**

Certificate No: **D2450V2-764_Sep08**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 764
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	September 24, 2008
Condition of the calibrated item	In Tolerance

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 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	04-Oct-07 (No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: S5086 (20g)	01-Jul-08 (No. 217-00864)	Jul-09
Type-N mismatch combination	SN: 5047.2 / 06327	01-Jul-08 (No. 217-00867)	Jul-09
Reference Probe ES3DV2	SN: 3025	28-Apr-08 (No. ES3-3025_Apr08)	Apr-09
DAE4	SN: 601	14-Mar-08 (No. DAE4-601_Mar08)	Mar-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-07)	In house check: Oct-08

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

Issued: September 25, 2008

Certificate No: D2450V2-764_Sep08 Page 1 of 9

Calibration Laboratory of
Schmid & Partner
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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	V5.0
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	39.8 ± 6 %	1.80 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 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	13.3 mW / g
SAR normalized	normalized to 1W	53.2 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**53.6 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.19 mW / g
SAR normalized	normalized to 1W	24.8 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**24.9 mW /g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.7 ± 6 %	1.97 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.7 mW / g
SAR normalized	normalized to 1W	50.8 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**49.5 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.83 mW / g
SAR normalized	normalized to 1W	23.3 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**22.9 mW /g ± 16.5 % (k=2)**

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Certificate No: D2450V2-764_Sep08 Page 4 of 9

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.3 Ω + 0.5 jΩ
Return Loss	- 32.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.8 Ω + 3.5 jΩ
Return Loss	- 27.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.151 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	April 10, 2004

DASY5 Validation Report for Head TSL

Date/Time: 24.09.2008 12:28:28

Test Laboratory: SPEAG, Zurich, Switzerland

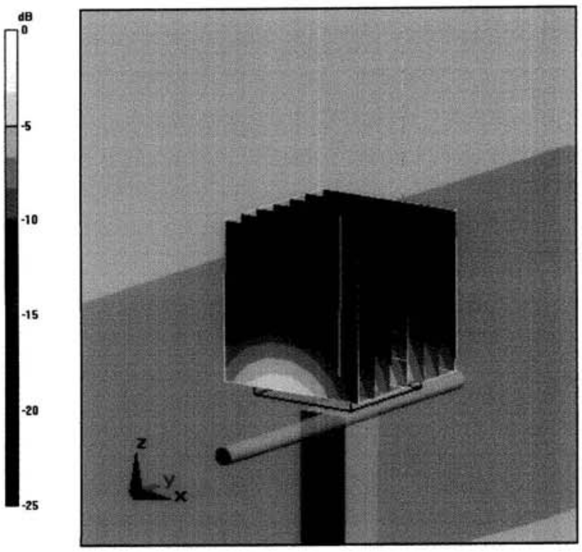
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN764

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL U10 BB
Medium parameters used: f = 2450 MHz; σ = 1.8 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

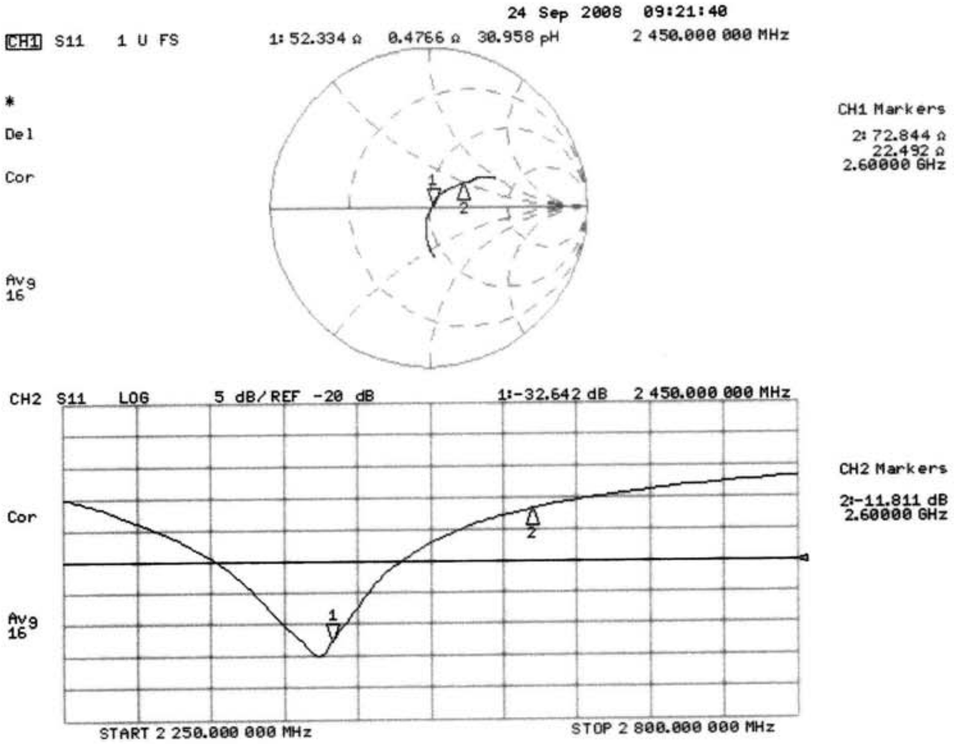
- Probe: ES3DV2 - SN3025; ConvF(4.4, 4.4, 4.4); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.2 V/m; Power Drift = 0.014 dB
Peak SAR (extrapolated) = 27.6 W/kg
SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.19 mW/g
Maximum value of SAR (measured) = 15.8 mW/g



0 dB = 15.8mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 18.09.2008 13:33:00

Test Laboratory: SPEAG, Zurich, Switzerland

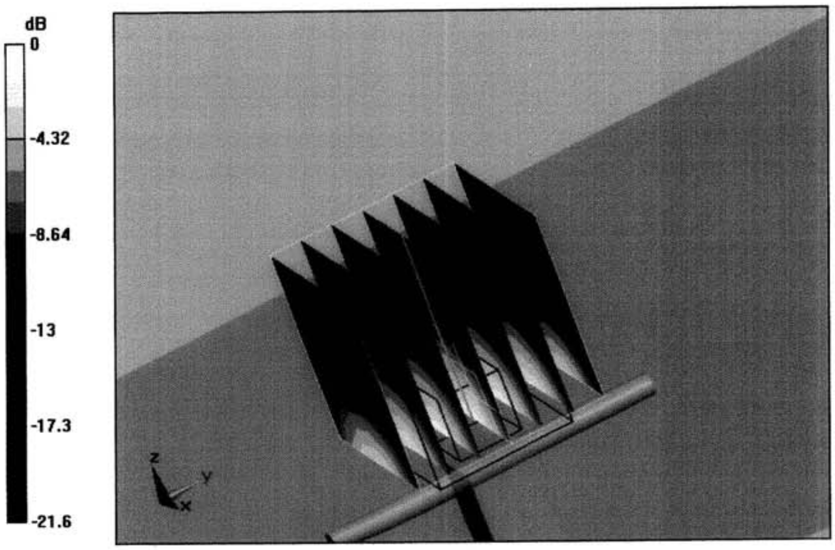
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:764

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: MSL U10 BB
Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.07, 4.07, 4.07); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

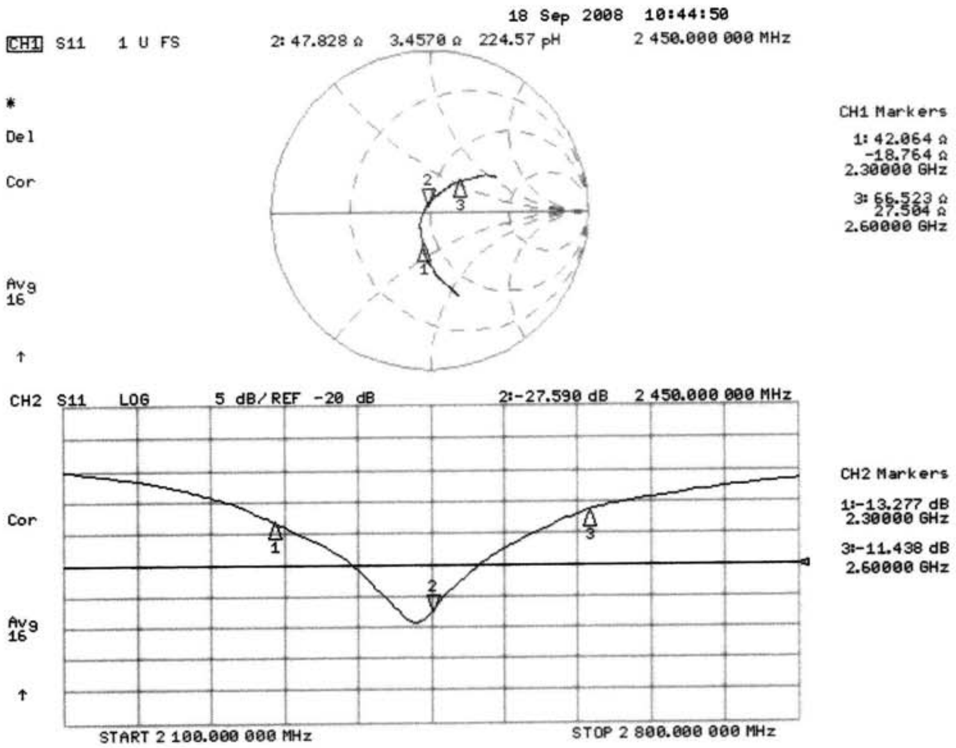
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.8 V/m; Power Drift = 0.029 dB
Peak SAR (extrapolated) = 26.4 W/kg
SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.83 mW/g
Maximum value of SAR (measured) = 15.7 mW/g



0 dB = 15.7mW/g

Certificate No: D2450V2-764_Sep08 Page 8 of 9

Impedance Measurement Plot for Body TSL



Certificate No: D2450V2-764_Sep08 Page 9 of 9

ANNEX D: PROBE CERTIFICATE

Calibration Laboratory of
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Accreditation No.: SCS 108

Client ETC (Auden)

Certificate No: EX3-3555_Sep08

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3555
Calibration procedure(s)	QA CAL-01.v6, QA CAL-14.v3 and QA CAL-23.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	September 19, 2008
Condition of the calibrated item	In Tolerance

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 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	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-07)	In house check: Oct-08

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

Issued: September 20, 2008

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

Certificate No: EX3-3555_Sep08 Page 1 of 9

Calibration Laboratory of
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
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 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 ≤ 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:3555

Manufactured:	July 13, 2004
Last calibrated:	September 27, 2007
Recalibrated:	September 19, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

EX3DV4 SN:3555 September 19, 2008

DASY - Parameters of Probe: EX3DV4 SN:3555

Sensitivity in Free Space[A]

NormX	**0.40** ± 10.1%	$\mu V/(V/m)^2$
NormY	**0.41** ± 10.1%	$\mu V/(V/m)^2$
NormZ	**0.40** ± 10.1%	$\mu V/(V/m)^2$

Diode Compression[B]

DCP X	**95** mV
DCP Y	**103** mV
DCP Z	**93** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	10.4	6.0
SAR_{be} [%]	With Correction Algorithm	0.8	0.5

TSL **1750 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	8.6	4.6
SAR_{be} [%]	With Correction Algorithm	0.6	0.1

Sensor Offset

Probe Tip to Sensor Center **1.0** 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 distribution corresponds to a coverage probability of approximately 95%.

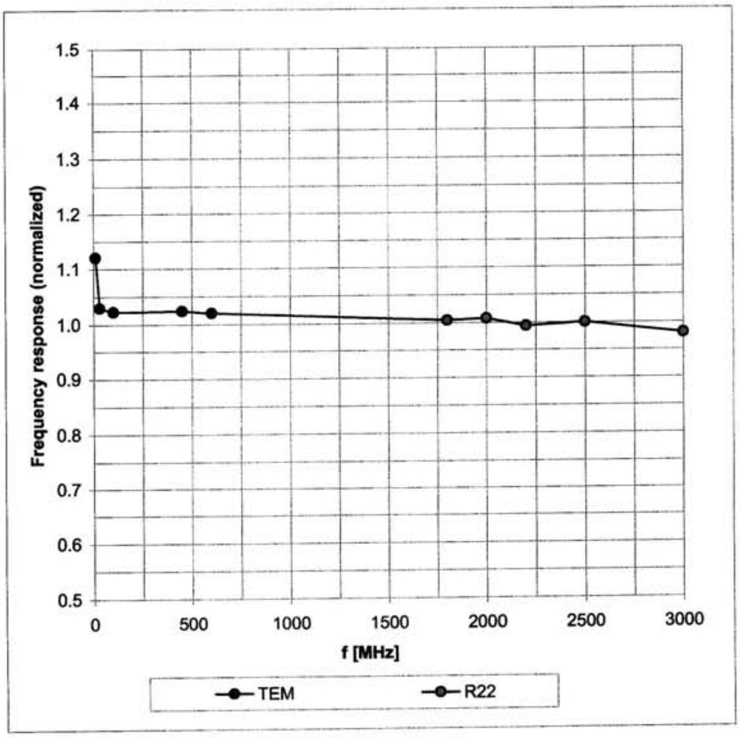
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

EX3DV4 SN:3555 September 19, 2008

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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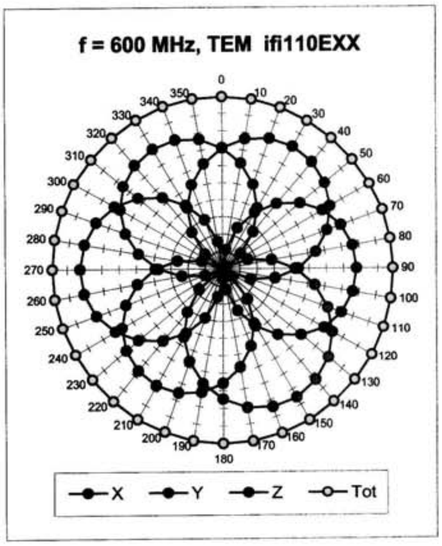
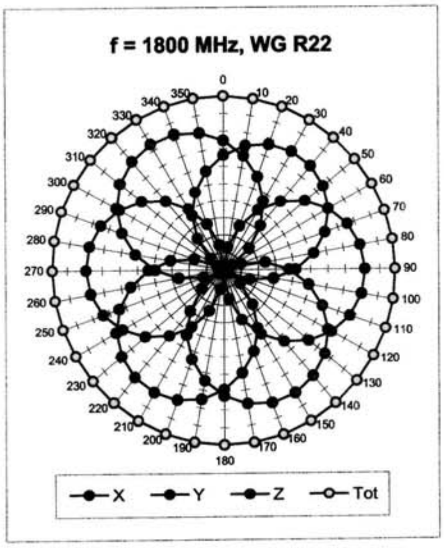
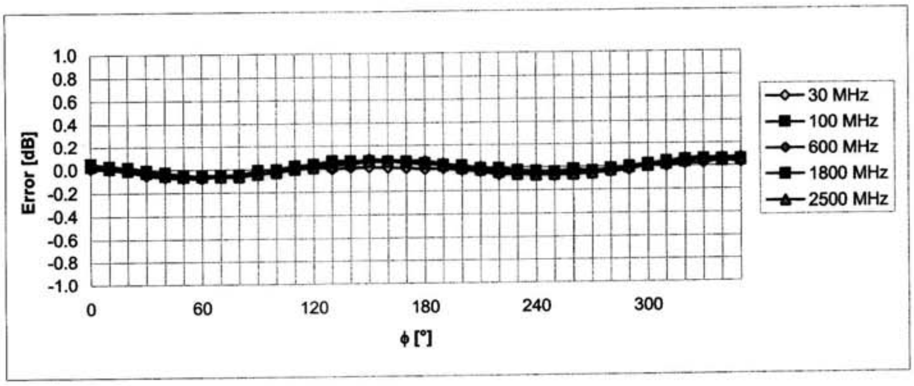
Receiving Pattern (ϕ), $\vartheta = 0°$







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

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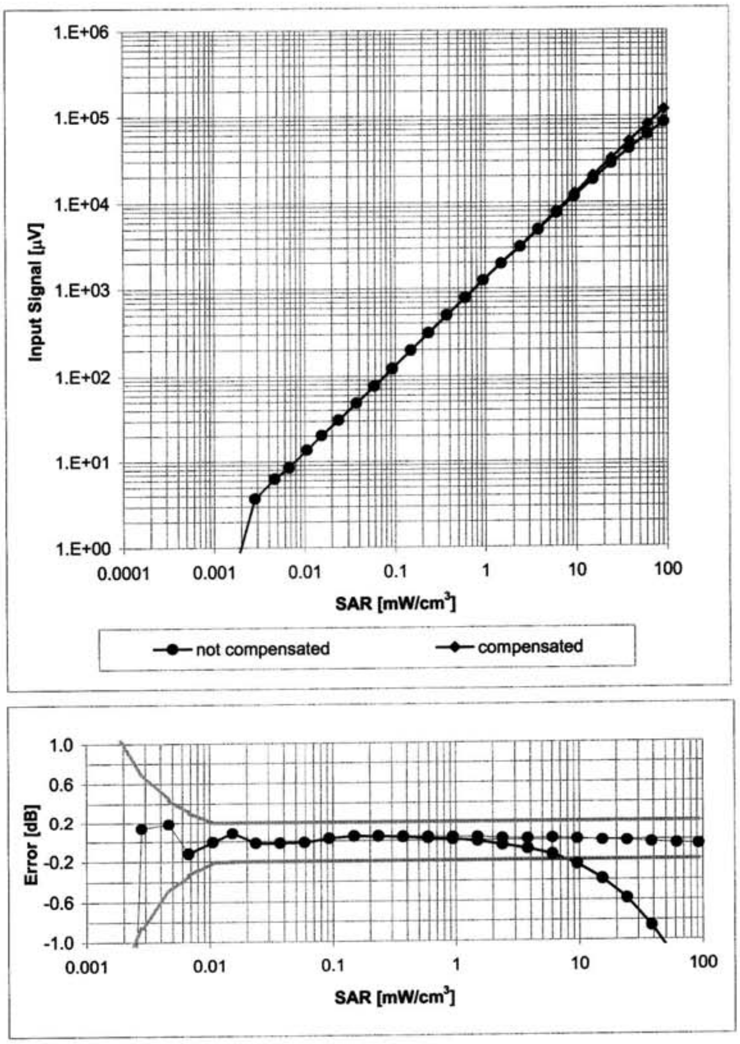
Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)



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

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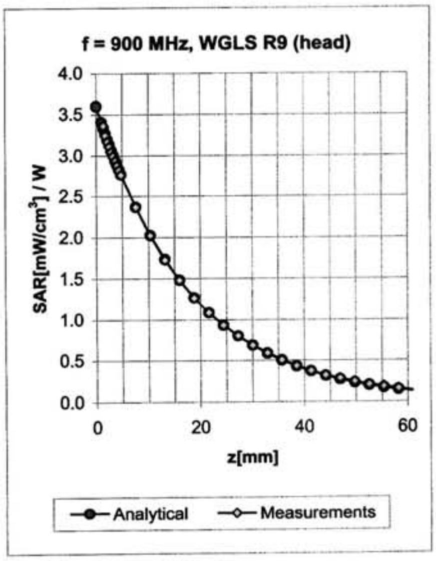
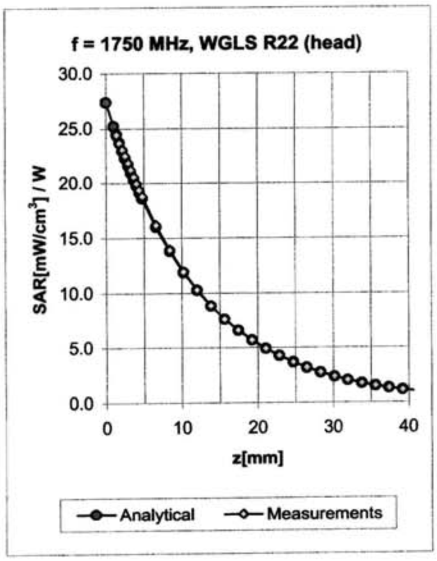
Conversion Factor Assessment



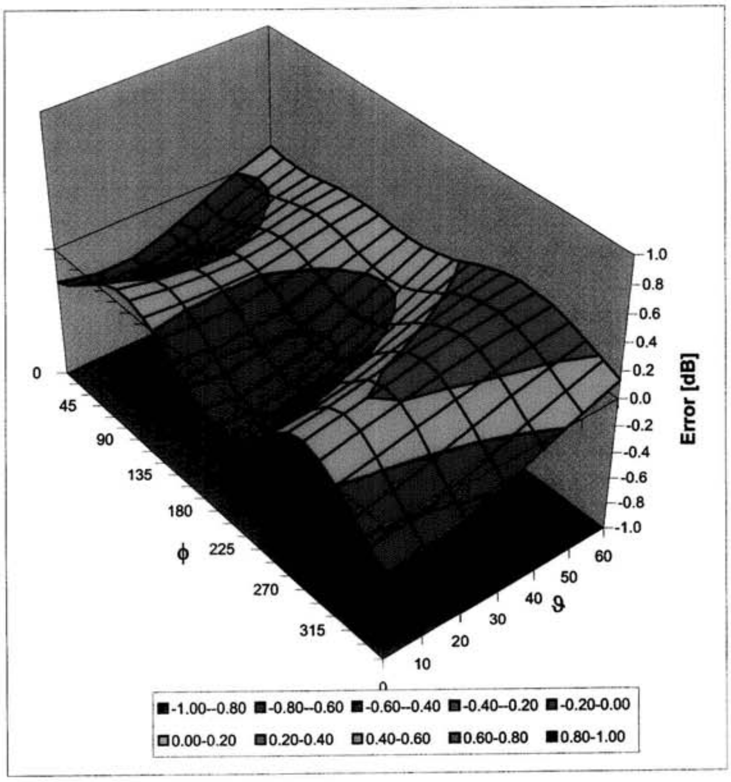


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty	
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.29	1.13	8.03	± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.39	0.79	7.03	± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.66	0.62	6.68	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.47	0.72	6.40	± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.30	1.17	8.01	± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.38	0.85	6.87	± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.32	0.92	6.70	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.34	1.00	6.17	± 11.0% (k=2)
5200	± 50 / ± 100	Body	49.0 ± 5%	5.30 ± 5%	0.48	1.70	4.08	± 13.1% (k=2)
5500	± 50 / ± 100	Body	48.6 ± 5%	5.65 ± 5%	0.48	1.70	3.86	± 13.1% (k=2)
5800	± 50 / ± 100	Body	48.2 ± 5%	6.00 ± 5%	0.48	1.70	3.82	± 13.1% (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 in HSL

Error (ϕ, ϑ), f = 900 MHz



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