



Accredited testing laboratory

DAR registration number: DAT-P-176/94-D1

Test report no. : 2-4856-02-08/07-A
Type identification : TT13C4 / TT13W
Test specification : IEEE P1528/D1.2
FCC-ID : T9GTT13C4
IC-ID : 6275A-TT13C4

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1 General Information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

1.1.1 Statement of Compliance

The SAR values found for the TT13C4 / TT13W WLAN Client IEEE 802.11 a/b/g are below the maximum recommended levels of 1.6 W/Kg as averaged over any 1 g tissue according to the FCC rule §2.1093, the ANSI/IEEE C 95.1:1999, the NCRP Report Number 86 for uncontrolled environment, according to the Health Canada's Safety Code 6 and the Industry Canada Radio Standards Specification RSS-102 for General Population/Uncontrolled exposure.

For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used without any distance to the body.

The measurement together with the test system set-up is described in chapter 2.3 of this test report. A detailed description of the equipment under test can be found in chapter 1.5.

Test engineer:

2008-04-17

Oleksandr Hnatovskiy



Date

Name

Signature

Technical responsibility for area of testing:

2008-04-17

Thomas Vogler



Date

Name

Signature

1.2 Testing laboratory

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Internet: <http://www.cetecom-ict.de>

State of accreditation: The Test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025. DAR registration number: DAT-P-176/94-D1

Test location, if different from CETECOM ICT Services GmbH

Name: ---
Street: ---
Town: ---
Country: ---
Phone: ---
Fax: ---

1.3 Details of applicant

Name: ads-tec GmbH
Street: Raiffeisenstr. 14
Town: 70771 Leinfelden-Echterdingen
Country: Germany
Contact: Carsten Remmert
Telephone: +49/711/45894-286

1.4 Application details

Date of receipt of application: 2007-12-19
Date of receipt of test item: 2008-03-12
Start/Date of test: 2008-03-12
End of test: 2008-03-14

Person(s) present during the test: ---

1.5 Test item

Description of the test item: WLAN Client IEEE 802.11 a/b/g

Type identification: TT13C4 / TT13W

FCC-ID: T9GTT13C4

IC-ID: 6275A-TT13C4

Serial number: AX00256518

Manufacturer:

Name: ads-tec GmbH

Street: Raiffeisenstr. 14

Town: 70771 Leinfelden-Echterdingen

Country: Germany

additional information on the DUT:

device type :

device category : portable device

test device production information : production unit

exposure category: uncontrolled environment / general population

device operating configurations :

operating mode(s) DSSS, OFDM

operating frequency range 2.4~2.483GHz, 5.15~5.35GHz, 5.725~5.825GHz

measured peak output power see chapter 2.6.

(conducted):

antenna type : Two UFL ultra-miniature coaxial antenna connections for diversity receive at both 2.4GHz and 5GHz.

battery options : Two standard batteries Li-ion 14.4V / 36Wh

1.6 Test specification(s)

Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01)

IEEE P1528/D1.2 (April 21, 2003)

RSS-102: Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands (Issue 2 of November 2005))

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)

IEEE Std C95.3 – 1991, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave.

IEEE Std C95.1 – 1999, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.

1.6.1 RF exposure limits

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

Table 1: RF exposure limits

The limit applied in this test report is shown in **bold** letters

Notes:

- * The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time
- ** The Spatial Average value of the SAR averaged over the whole body.
- *** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.	<input checked="" type="checkbox"/>
The deviations as specified in 2.5 were ascertained in the course of the tests performed.	<input type="checkbox"/>

2.2 Test environment

General Environment conditions in the test area are as follows:

Ambient temperature: 20°C – 24°C
 Tissue simulating liquid: 20°C – 24°C
 Humidity: 40% – 50%

Exact temperature values for each test are shown in the table(s) under 2.5. and/or on the measurement plots.

2.3 Measurement and test set-up

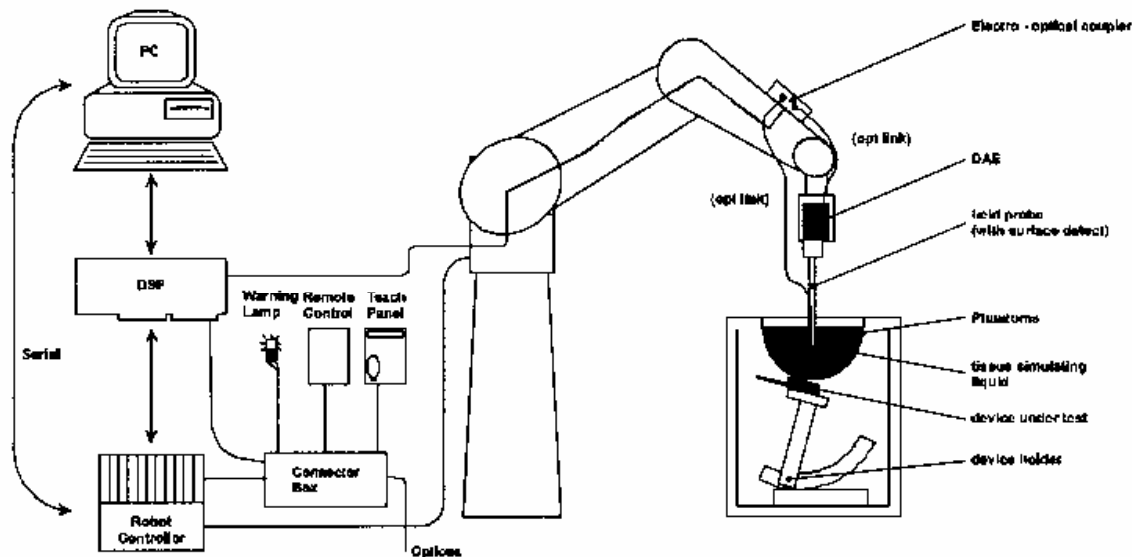
The measurement system is described in chapter 2.4.

The test setup for the system validation can be found in chapter 2.4.14.

A description of positioning and test signal control can be found in chapter 2.5 together with the test results.

2.4 Measurement system

2.4.1 System Description



The DAS4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DAS4 measurement server.
- The DAS4 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2000
- DAS4 software and SEMCAD data evaluation software.
- 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 according to the given recipes.
- System validation dipoles allowing to validate the proper functioning of the system.

2.4.2 Test environment

The DASY4 measurement system is placed at the head end of a room with dimensions: 5 x 2.5 x 3 m³, the SAM phantom is placed in a distance of 75 cm from the side walls and 1.1m from the rear wall. Above the test system a 1.5 x 1.5 m² array of pyramid absorbers is installed to reduce reflections from the ceiling.

Picture 1 of the photo documentation shows a complete view of the test environment.

The system allows the measurement of SAR values larger than 0.005 mW/g.

2.4.3 Probe description

Isotropic E-Field Probe ET3DV6 for Dosimetric Measurements

Technical data according to manufacturer information	
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycoether)
Calibration	In air from 10 MHz to 2.5 GHz In head tissue simulating liquid (HSL) at 900 (800-1000) MHz and 1.8 GHz (1700-1910 MHz) (accuracy ± 9.5%; k=2) Calibration for other liquids and frequencies upon request
Frequency	10 MHz to 3 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Optical Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces (ET3DV6 only)
Dimensions	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application	General dosimetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms (ET3DV6)

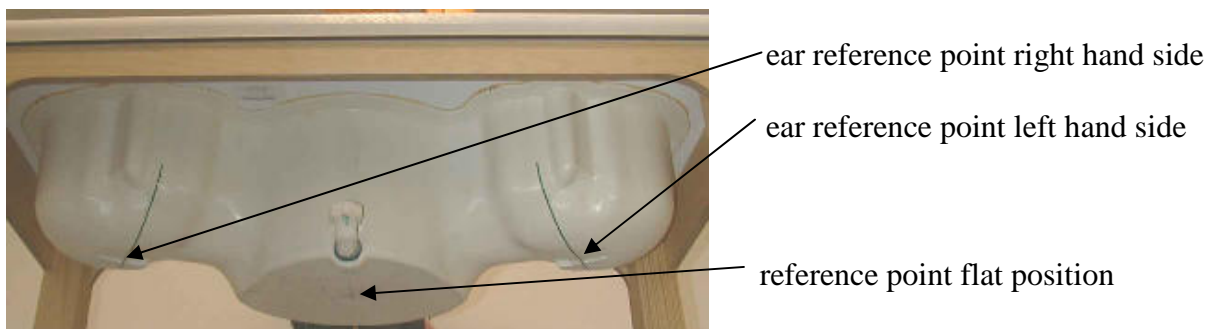
Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements

Technical data according to manufacturer information	
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycoether)
Calibration	Basic Broadband calibration in air In head tissue simulating liquid (HSL) at 900 (800-1000) MHz and 1.8 GHz (1700-1910 MHz) Calibration for other liquids and frequencies upon request
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in HSL (rotation normal to probe axis)
Dynamic range	10 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)
Dimensions	Overall length: 330 mm Tip length: 20 mm Body diameter: 12 mm Tip diameter: 2.5 mm Distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

2.4.4 Phantom description

The used SAM Phantom meets the requirements specified in Edition 01-01 of Supplement C to OET Bulletin 65 for Specific Absorption Rate (SAR) measurements.

The phantom consists of a fibreglass shell integrated in a wooden table. It allows left-hand and right-hand head as well as body-worn measurements with a maximum liquid depth of 18 cm in head position and 22 cm in planar position (body measurements). The thickness of the Phantom shell is 2 mm +/- 0.1 mm.



2.4.5 Device holder description

The DASY4 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. This device holder is used for standard mobile phones or PDA's only. If necessary an additional support of polystyrene material is used.



Larger DUT's (e.g. notebooks) cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values.

Therefore those devices are normally only tested at the flat part of the SAM.

2.4.6 Scanning procedure

The DASY4 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

- The „reference“ and „drift“ measurements 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 DUT's output power and should vary max. +/- 5 %.
- The „surface check“ measurement tests the optical surface detection system of the DASY4 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 $\pm 0.1\text{mm}$). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within $\pm 30^\circ$.)
- The „area scan“ measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The standard scan uses large grid spacing for faster measurement. Standard grid spacing for head measurements is 15 mm in x- and y- dimension. If a finer resolution is needed, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation. Results of this coarse scan are shown in annex 2.
- A „7x7x7 zoom scan“ measures the field in a volume around the 2D peak SAR value acquired in the previous „coarse“ scan. This is a fine 7x7 grid where the robot additionally moves the probe in 7 steps along the z-axis away from the bottom of the Phantom. Grid spacing for the cube measurement is 5 mm in x and y-direction and 5 mm in z-direction. DASY4 is also able to perform repeated zoom scans if more than 1 peak is found during area scan. In this document, the evaluated peak 1g and 10g averaged SAR values are shown in the 2D-graphics in annex 2. Test results relevant for the specified standard (see chapter 1.6.) are shown in table form in chapter 2.5.
- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2mm steps. This measurement shows the continuity of the liquid and can - depending in the field strength – also show the liquid depth. A z-axis scan of the measurement with maximum SAR value is shown in annex 2.

Note : In the 5 GHz range the requirements for measurements in the 3 – 6 GHz band have been taken into account. The grid spacing of the area scan is 1 cm. The cube scan consists of 8 x 8 x 8 measurement points with 4.3 x 4.3 x 3 mm grid spacing. (3 mm to the z-axis)

2.4.7 Spatial Peak SAR Evaluation

The spatial peak SAR - value for 1 and 10 g is evaluated after the Cube measurements have been done. The basis of the evaluation are the SAR values measured at the points of the fine cube grid consisting of 7 x 7 x 7 points. The algorithm that finds the maximal averaged volume is separated into three different stages.

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting 'Graph Evaluated'.
- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.
- All neighboring volumes are evaluated until no neighboring volume with a higher average value is found.

Extrapolation

The extrapolation is based on a least square algorithm [W. Gander, Computermathematik, p.168-180]. Through the points in the first 3 cm along the z-axis, polynomials of order four are calculated. These polynomials are then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from each other.

Interpolation

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computermathematik, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff].

Volume Averaging

At First the size of the cube is calculated. Then the volume is integrated with the trapezoidal algorithm. 8000 points (20x20x20) are interpolated to calculate the average.

Advanced Extrapolation

DASY4 uses the advanced extrapolation option which is able to compensate boundary effects on E-field probes.

2.4.8 Data Storage and Evaluation

Data Storage

The DASY4 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all 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 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 incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show 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.

Data Evaluation by SEMCAD

The SEMCAD software 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	Dcpi
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 DASY4 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:

$$V_i = U_i + U_i^2 \cdot cf/dcp_i$$

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:

E-field probes: $E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$

H-field probes: $H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1}f + a_{i2}f^2)/f$

with V_i = compensated signal of channel i (i = x, y, z)
 $Norm_i$ = sensor sensitivity of channel i (i = x, y, z)
 [mV/(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):

$$E_{tot} = (E_x^2 + E_y^2 + E_z^2)^{1/2}$$

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

$$SAR = (E_{tot}^2 \cdot \sigma) / (\rho \cdot 1000)$$

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/cm³

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with P_{pwe} = equivalent power density of a plane wave in mW/cm²
 E_{tot} = total electric field strength in V/m
 H_{tot} = total magnetic field strength in A/m

2.4.9 Test equipment utilized

This table gives a complete overview of the SAR measurement equipment

Devices used during the test described in chapter 2.5. are marked ☒

	Manufacturer	Device	Type	Serial number	Date of last calibration)*
☒	Schmid & Partner Engineering AG	Dosimetric E-Field Probe	ET3DV6	1558	August 23, 2007
☒	Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV4	3566	August 27, 2007
☐	Schmid & Partner Engineering AG	1900 MHz System Validation Dipole	D1900V2	5d009	August 21, 2007
☒	Schmid & Partner Engineering AG	2450 MHz System Validation Dipole	D2450V2	710	August 20, 2007
☒	Schmid & Partner Engineering AG	5 GHz System Validation Dipole	D5GHzV2	1055	April 10, 2008
☒	Schmid & Partner Engineering AG	Data acquisition electronics	DAE3V1	413	January 18, 2008
☒	Schmid & Partner Engineering AG	Software	DASY 4 V4.5	---	N/A
☒	Schmid & Partner Engineering AG	Phantom	SAM	---	N/A
☒	Rohde & Schwarz	Universal Radio Communication Tester	CMU 200	106826	March 14, 2007
☒	Hewlett Packard)*	Network Analyser 300 kHz to 6 GHz	8753C	2937U00269	March 13, 2007
☒	Hewlett Packard)*	Network Analyser 300 kHz to 6 GHz	85047A	2936A00872	March 13, 2007
☒	Hewlett Packard	Dielectric Probe Kit	85070C	US99360146	N/A
☒	Hewlett Packard	Signal Generator	8665A	2833A00112	November 12, 2007
☒	Amplifier Reasearch	Amplifier	25S1G4 (25 Watt)	20452	N/A
☒	Rohde & Schwarz	Power Meter	NRP	101367	January 9, 2008
☒	Rohde & Schwarz	Power Meter Sensor	NRP Z22	100227	January 9, 2008
☒	Rohde & Schwarz	Power Meter Sensor	NRP Z22	100234	January 9, 2008

)* : Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

CMU 200 was used for signal monitoring at 2.4 GHz.

2.4.10 Tissue simulating liquids: dielectric properties

The following materials are used for producing the tissue-equivalent materials.

(liquids used for tests described in chapter 2.5. are marked with ☒) :

Ingredients (% of weight)	Frequency (MHz)	
	☒ 2450	☒ 5000
frequency band	☒ 2450	☒ 5000
Tissue Type	Body	Body
Water	73.2	64 - 78
Salt (NaCl)	0.04	2 - 3
Sugar	0.0	0.0
HEC	0.0	0.0
Bactericide	0.0	0.0
Triton X-100	0.0	0.0
DGBE	26.7	0.0
Emulsifiers	0.0	9 - 15
Mineral Oil	0.0	11 - 18

Table 2: Body tissue dielectric properties

Salt: 99+% Pure Sodium Chloride

Water: De-ionized, 16MΩ+ resistivity

DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]

Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether

Sugar: 98+% Pure Sucrose

HEC: Hydroxyethyl Cellulose

2.4.11 Tissue simulating liquids: parameters

Used Target Frequency [MHz]	Target Body Tissue		Measured Body Tissue		Measured Date
	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	
2450	52.7	1.95	52.50	1.97	2008-03-11
5200	49.0	5.30	48.02	5.34	2008-03-13
5250	49.0	5.30	47.90	5.41	2008-03-13
5320	49.0	5.30	47.80	5.46	2008-03-13
5745	48.2	6.00	46.70	6.03	2008-03-14
5800	48.2	6.00	46.69	6.10	2008-03-14

Table 3: Parameter of the body tissue simulating liquid

Note: The dielectric properties have been measured using the contact probe method at 21°C.

2.4.12 Measurement uncertainty evaluation for SAR test < 3 GHz

The overall combined measurement uncertainty of the measurement system is $\pm 10,3\%$ ($K=1$).

The expanded uncertainty ($k=2$) is assessed to be $\pm 20.6\%$

This measurement uncertainty budget is suggested by IEEE P1528 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divisor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty 10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	$\pm 4.8\%$	Normal	1	1	1	$\pm 4.8\%$	$\pm 4.8\%$	∞
Axial isotropy	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 1.9\%$	$\pm 1.9\%$	∞
Hemispherical isotropy	$\pm 9.6\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 3.9\%$	$\pm 3.9\%$	∞
Spatial resolution	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.0\%$	$\pm 0.0\%$	∞
Boundary effects	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Probe linearity	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
System detection limits	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Readout electronics	$\pm 1.0\%$	Normal	1	1	1	$\pm 1.0\%$	$\pm 1.0\%$	∞
Response time	$\pm 0.8\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.5\%$	$\pm 0.5\%$	∞
Integration time	$\pm 2.6\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.5\%$	$\pm 1.5\%$	∞
RF ambient conditions	$\pm 3.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Probe positioner	$\pm 0.4\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.2\%$	$\pm 0.2\%$	∞
Probe positioning	$\pm 2.9\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Max. SAR evaluation	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Test Sample Related								
Device positioning	$\pm 2.9\%$	Normal	1	1	1	$\pm 2.9\%$	$\pm 2.9\%$	145
Device holder uncertainty	$\pm 3.6\%$	Normal	1	1	1	$\pm 3.6\%$	$\pm 3.6\%$	5
Power drift	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.9\%$	$\pm 2.9\%$	∞
Phantom and Set-up								
Phantom uncertainty	$\pm 4.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.3\%$	$\pm 2.3\%$	∞
Liquid conductivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.64	0.43	$\pm 1.8\%$	$\pm 1.2\%$	∞
Liquid conductivity (meas.)	$\pm 2.5\%$	Normal	1	0.64	0.43	$\pm 1.6\%$	$\pm 1.1\%$	∞
Liquid permittivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.6	0.49	$\pm 1.7\%$	$\pm 1.4\%$	∞
Liquid permittivity (meas.)	$\pm 2.5\%$	Normal	1	0.6	0.49	$\pm 1.5\%$	$\pm 1.2\%$	∞
Combined Uncertainty						$\pm 10.3\%$	$\pm 10.0\%$	330
Expanded Std. Uncertainty						$\pm 20.6\%$	$\pm 20.1\%$	

Table 4: Measurement uncertainties < 3 GHz

2.4.13 Measurement uncertainty evaluation for system validation < 3 GHz

The overall combined measurement uncertainty of the measurement system is $\pm 8.4\%$ ($K=1$).

The expanded uncertainty ($k=2$) is assessed to be $\pm 16.8\%$

This measurement uncertainty budget is suggested by IEEE P1528 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divisor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty 10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	$\pm 4.8\%$	Normal	1	1	1	$\pm 4.8\%$	$\pm 4.8\%$	∞
Axial isotropy	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 1.9\%$	$\pm 1.9\%$	∞
Hemispherical isotropy	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 0.0\%$	$\pm 3.9\%$	∞
Boundary effects	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Probe linearity	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
System detection limits	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Readout electronics	$\pm 1.0\%$	Normal	1	1	1	$\pm 1.0\%$	$\pm 1.0\%$	∞
Response time	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.0\%$	$\pm 0.0\%$	∞
Integration time	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.0\%$	$\pm 0.0\%$	∞
RF ambient conditions	$\pm 3.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Probe positioner	$\pm 0.4\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.2\%$	$\pm 0.2\%$	∞
Probe positioning	$\pm 2.9\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Max. SAR evaluation	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Test Sample Related								
Dipole axis to liquid distance	$\pm 2.0\%$	Normal	1	1	1	$\pm 1.2\%$	$\pm 1.2\%$	∞
Power drift	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
Phantom and Set-up								
Phantom uncertainty	$\pm 4.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.3\%$	$\pm 2.3\%$	∞
Liquid conductivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.64	0.43	$\pm 1.8\%$	$\pm 1.2\%$	∞
Liquid conductivity (meas.)	$\pm 2.5\%$	Normal	1	0.64	0.43	$\pm 1.6\%$	$\pm 1.1\%$	∞
Liquid permittivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.6	0.49	$\pm 1.7\%$	$\pm 1.4\%$	∞
Liquid permittivity (meas.)	$\pm 2.5\%$	Normal	1	0.6	0.49	$\pm 1.5\%$	$\pm 1.2\%$	∞
Combined Uncertainty						$\pm 8.4\%$	$\pm 8.1\%$	
Expanded Std. Uncertainty						$\pm 16.8\%$	$\pm 16.2\%$	

Table 5: Measurement uncertainties for validation < 3 GHz

2.4.14 Measurement uncertainty evaluation for SAR test > 3 GHz

The overall combined measurement uncertainty of the measurement system is $\pm 11,5\%$ ($K=1$).

The expanded uncertainty ($k=2$) is assessed to be $\pm 23.0\%$

This measurement uncertainty budget is suggested by IEEE P1528 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divisor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty 10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	$\pm 6.3\%$	Normal	1	1	1	$\pm 6.3\%$	$\pm 6.3\%$	∞
Axial isotropy	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 1.9\%$	$\pm 1.9\%$	∞
Hemispherical isotropy	$\pm 9.6\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 3.9\%$	$\pm 3.9\%$	∞
Spatial resolution	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.0\%$	$\pm 0.0\%$	∞
Boundary effects	$\pm 2.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.2\%$	$\pm 1.2\%$	∞
Probe linearity	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
System detection limits	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Readout electronics	$\pm 1.0\%$	Normal	1	1	1	$\pm 1.0\%$	$\pm 1.0\%$	∞
Response time	$\pm 0.8\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.5\%$	$\pm 0.5\%$	∞
Integration time	$\pm 2.6\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.5\%$	$\pm 1.5\%$	∞
RF ambient conditions	$\pm 3.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Probe positioner	$\pm 0.8\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.4\%$	$\pm 0.4\%$	∞
Probe positioning	$\pm 5.8\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 3.4\%$	$\pm 3.4\%$	∞
Max. SAR evaluation	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Test Sample Related								
Device positioning	$\pm 2.9\%$	Normal	1	1	1	$\pm 2.9\%$	$\pm 2.9\%$	145
Device holder uncertainty	$\pm 3.6\%$	Normal	1	1	1	$\pm 3.6\%$	$\pm 3.6\%$	5
Power drift	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.9\%$	$\pm 2.9\%$	∞
Phantom and Set-up								
Phantom uncertainty	$\pm 4.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.3\%$	$\pm 2.3\%$	∞
Liquid conductivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.64	0.43	$\pm 1.8\%$	$\pm 1.2\%$	∞
Liquid conductivity (meas.)	$\pm 2.5\%$	Normal	1	0.64	0.43	$\pm 1.6\%$	$\pm 1.1\%$	∞
Liquid permittivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.6	0.49	$\pm 1.7\%$	$\pm 1.4\%$	∞
Liquid permittivity (meas.)	$\pm 2.5\%$	Normal	1	0.6	0.49	$\pm 1.5\%$	$\pm 1.2\%$	∞
Combined Uncertainty						$\pm 11.5\%$	$\pm 11.2\%$	330
Expanded Std. Uncertainty						$\pm 23.0\%$	$\pm 22.5\%$	

Table 6: Measurement uncertainties > 3 GHz

2.4.15 Measurement uncertainty evaluation for system validation > 3 GHz

The overall combined measurement uncertainty of the measurement system is $\pm 9.9\%$ (K=1).

The expanded uncertainty (k=2) is assessed to be $\pm 19.7\%$

This measurement uncertainty budget is suggested by IEEE P1528 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divisor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty 10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	$\pm 6.3\%$	Normal	1	1	1	$\pm 6.3\%$	$\pm 6.3\%$	∞
Axial isotropy	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 1.9\%$	$\pm 1.9\%$	∞
Hemispherical isotropy	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 0.0\%$	$\pm 3.9\%$	∞
Boundary effects	$\pm 2.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.2\%$	$\pm 1.2\%$	∞
Probe linearity	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
System detection limits	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Readout electronics	$\pm 1.0\%$	Normal	1	1	1	$\pm 1.0\%$	$\pm 1.0\%$	∞
Response time	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.0\%$	$\pm 0.0\%$	∞
Integration time	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.0\%$	$\pm 0.0\%$	∞
RF ambient conditions	$\pm 3.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Probe positioner	$\pm 0.8\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.4\%$	$\pm 0.4\%$	∞
Probe positioning	$\pm 5.8\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 3.4\%$	$\pm 3.4\%$	∞
Max. SAR evaluation	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Test Sample Related								
Dipole axis to liquid distance	$\pm 2.0\%$	Normal	1	1	1	$\pm 1.2\%$	$\pm 1.2\%$	∞
Power drift	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
Phantom and Set-up								
Phantom uncertainty	$\pm 4.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.3\%$	$\pm 2.3\%$	∞
Liquid conductivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.64	0.43	$\pm 1.8\%$	$\pm 1.2\%$	∞
Liquid conductivity (meas.)	$\pm 2.5\%$	Normal	1	0.64	0.43	$\pm 1.6\%$	$\pm 1.1\%$	∞
Liquid permittivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.6	0.49	$\pm 1.7\%$	$\pm 1.4\%$	∞
Liquid permittivity (meas.)	$\pm 2.5\%$	Normal	1	0.6	0.49	$\pm 1.5\%$	$\pm 1.2\%$	∞
Combined Uncertainty						$\pm 9.9\%$	$\pm 9.6\%$	
Expanded Std. Uncertainty						$\pm 19.7\%$	$\pm 19.2\%$	

Table 7: Measurement uncertainties for validation > 3GHz

2.4.16 System validation

The system validation is performed for verifying the accuracy of the complete measurement system and performance of the software. The system validation is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows validation results for all frequency bands and tissue liquids used during the tests of the test item described in chapter 1.5. (graphic plot(s) see annex 1).

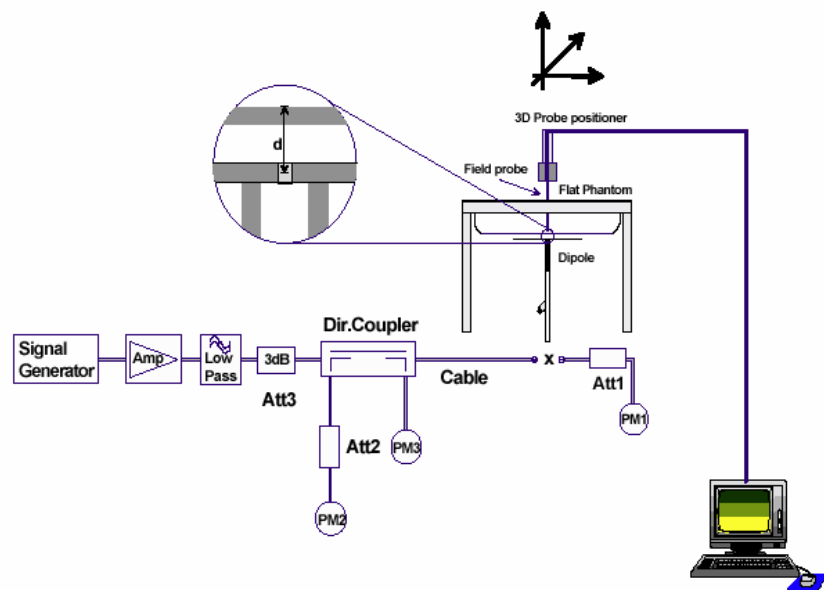
Validation Kit	Frequency	Target Peak SAR (1000 mW) (+/- 10%)	Target SAR_{1g} (1000 mW) (+/- 10%)	Measured Peak SAR	Measured SAR_{1g}	Measured date
D2450V2 S/N: 710	2450 MHz body	107.6 mW/g	52.4 mW/g	117.4 mW/g	54.6 mW/g	2008-03-11
D5GHzV2 S/N: 1055	5.2 GHz body	293 mW/g	78.9 mW/g	298 mW/g	79.0 mW/g	2008-03-13
D5GHzV2 S/N: 1055	5.8 GHz body	307 mW/g	73.8 mW/g	321 mW/g	73.0 mW/g	2008-03-14

Table 8: Results system validation

2.4.17 Validation procedure

The validation is performed by using a validation dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 1000 mW. To adjust this power a power meter is used. The power sensor is connected to the cable before the validation to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the validation to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

Validation results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system.



2.5 Test results (Body SAR)

The table contains the measured SAR values averaged over a mass of 1 g						
Channel / frequency	Position	Antenna	Mode	SAR value	Limit	Liquid temperature
1 / 2412 MHz	underside	A	DSSS	0.098 W/kg	1.6 W/kg	21.0 °C
1 / 2412 MHz	underside	B	DSSS	0.393 W/kg	1.6 W/kg	21.0 °C
6 / 2437 MHz	underside	B	DSSS	0.412 W/kg	1.6 W/kg	21.0 °C
11 / 2462 MHz	underside	B	DSSS	0.337 W/kg	1.6 W/kg	21.0 °C
1 / 2412 MHz	edge	B	DSSS	0.102 W/kg	1.6 W/kg	21.1 °C

Table 9: Test results WLAN 2450 MHz (Body SAR)

The table contains the measured SAR values averaged over a mass of 1 g						
Channel / frequency	Position	Antenna	Mode	SAR value	Limit	Liquid temperature
36 / 5180 MHz	underside	A	OFDM	0.030 W/kg	1.6 W/kg	21.5 °C
36 / 5180 MHz	underside	B	OFDM	0.584 W/kg	1.6 W/kg	21.5 °C
48 / 5240 MHz	underside	B	OFDM	0.612 W/kg	1.6 W/kg	21.4 °C

Table 10: Test results WLAN 5.2 GHz (Body SAR)

The table contains the measured SAR values averaged over a mass of 1 g						
Channel / frequency	Position	Antenna	Mode	SAR value	Limit	Liquid temperature
52 / 5260 MHz	underside	A	OFDM	0.077 W/kg	1.6 W/kg	21.3 °C
52 / 5260 MHz	underside	B	OFDM	0.965 W/kg	1.6 W/kg	21.5 °C
64 / 5320 MHz	underside	B	OFDM	1.020 W/kg	1.6 W/kg	21.4 °C

Table 11: Test results WLAN 5.3 GHz (Body SAR)

The table contains the measured SAR values averaged over a mass of 1 g						
Channel/frequency	Position	Antenna	Mode	SAR value	Limit	Liquid temp.
149 / 5745 MHz	underside	B	OFDM	1.080 W/kg	1.6 W/kg	21.3 °C
149 / 5745 MHz	underside	A	OFDM	0.178 W/kg	1.6 W/kg	21.4 °C
157 / 5785 MHz	underside	B	OFDM	1.310 W/kg	1.6 W/kg	21.5 °C
165 / 5825 MHz	underside	B	OFDM	1.550 W/kg	1.6 W/kg	21.2 °C
165 / 5825 MHz	edge	B	OFDM	0.450 W/kg	1.6 W/kg	21.5 °C

Table 12: Test results WLAN 5.8 GHz (Body SAR)

Note: The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at maximum output channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional. Test channels in 5 GHz bands were determined by conducted power measurements according to FCC rules.

2.5.1 Description of test positions and setup during SAR evaluation

The device was tested with the underside touching the SAM phantom. A delta test was performed for Antenna B at the lower edge of the display to respect the use of the device in an arm-held position with this edge touching the body. The PC is not able to turn the display view so testing on further edges was not necessary. A control software allowed channel and power settings at 100% duty cycle.

2.6 Test results (conducted power measurement)

For the measurements a Rhode & Schwarz FSU was used (see FCC Part 15.247 and 15.407 test report) prior to the SAR measurements to determine the required test channels. The output power was measured using an integrated RF connector. The table shows measured peak power or peak transmit power (*).

WLAN 2.4 GHz		
Channel / frequency	OFDM	DSSS
1 / 2412 MHz	21.3 dBm	23.2 dBm
6 / 2437 MHz	20.9 dBm	23.6 dBm
11 / 2462 MHz	21.3 dBm	23.5 dBm
WLAN 5.2 GHz		
Channel / frequency	OFDM)*	
36 / 5180MHz	14.9 dBm	
40 / 5200MHz	14.9 dBm	
44 / 5220MHz	14.6 dBm	
48 / 5240MHz	14.7 dBm	
WLAN 5.3 GHz		
Channel / frequency	OFDM)*	
52 / 5260MHz	20.2 dBm	
56 / 5280MHz	20.2 dBm	
60 / 5300MHz	19.5 dBm	
64 / 5320MHz	19.7 dBm	
WLAN 5.8 GHz		
Channel / frequency	OFDM	
149 / 5745MHz	20.7 dBm	
153 / 5765MHz	20.2 dBm	
157 / 5785MHz	20.2 dBm	
161 / 5805MHz	20.2 dBm	
165 / 5825MHz	20.4 dBm	

Table 13: Test results conducted peak power measurement

Annex 1 System performance verification

Date/Time: 2008-03-11 13:12:30 Date/Time: 2008-03-11 13:16:44

System Performance Check-D2450 body 2008-03-11

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 710

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

Medium: M2450 Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 52.5$; $\rho = 1000 \text{ kg/m}^3$

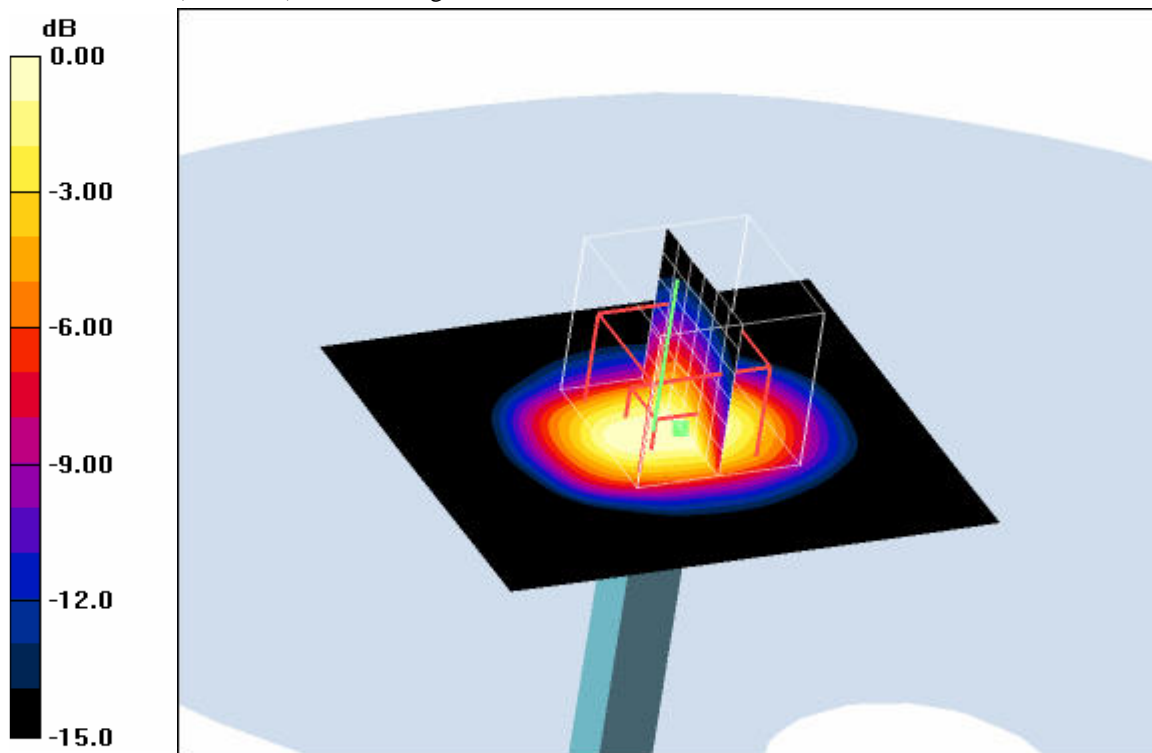
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(3.92, 3.92, 3.92); Calibrated: 2007-08-23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

d=10mm, Pin=1000mW/Area Scan (51x61x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 74.7 mW/g

d=10mm, Pin=1000mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 187.1 V/m; Power Drift = -0.043 dB
 Peak SAR (extrapolated) = 117.4 W/kg
SAR(1 g) = 54.6 mW/g; SAR(10 g) = 25.4 mW/g
 Maximum value of SAR (measured) = 60.8 mW/g



Additional information:

position or distance of DUT to SAM (if not standard head positions) :
 ambient temperature: 22.0°C; liquid temperature: 21.0°C

Date/Time: 2008-03-13 09:34:50 Date/Time: 2008-03-13 09:42:35

System Performance Check-D5200

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1055

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: M5500 Medium parameters used: $f = 5200$ MHz; $\sigma = 5.34$ mho/m; $\epsilon_r = 48$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.95, 3.95, 3.95); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

d=10mm, Pin=100mW/Area Scan (81x71x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 17.4 mW/g

d=10mm, Pin=100mW/Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid: dx=4.3mm,

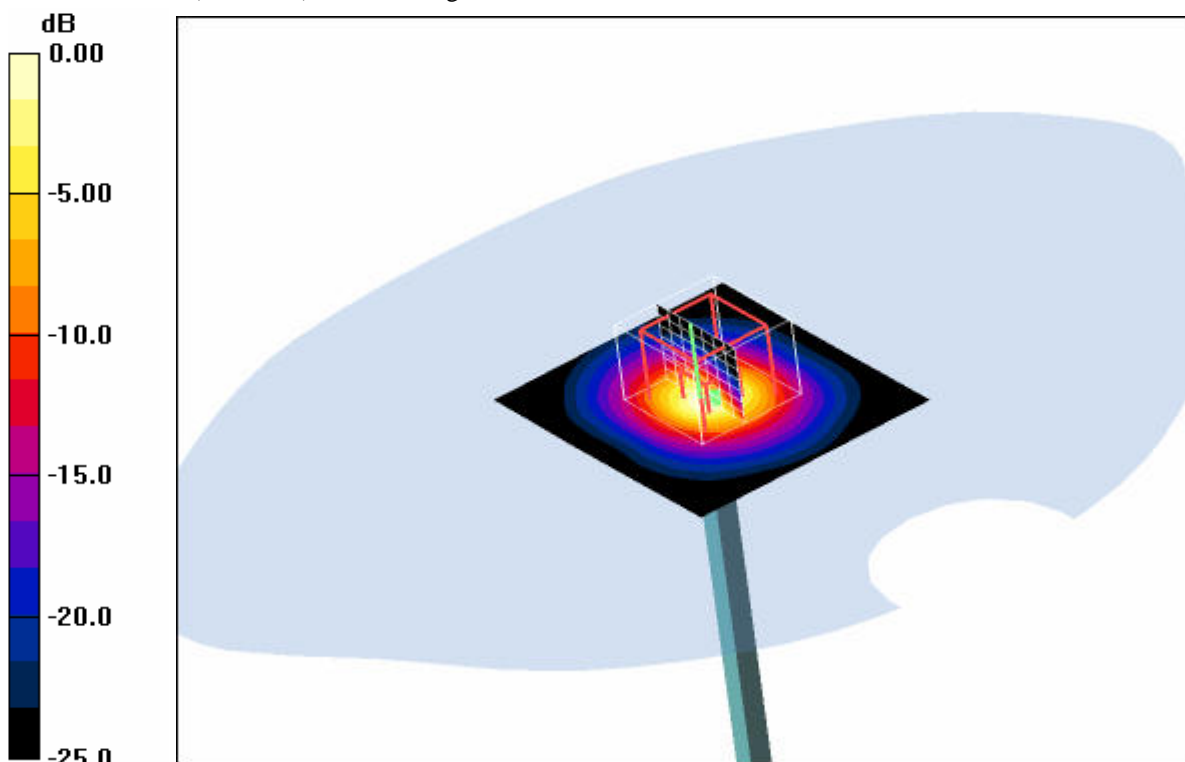
dy=4.3mm, dz=3mm

Reference Value = 41.1 V/m; Power Drift = 0.041 dB

Peak SAR (extrapolated) = 29.8 W/kg

SAR(1 g) = 7.9 mW/g; SAR(10 g) = 2.21 mW/g

Maximum value of SAR (measured) = 15.4 mW/g



0 dB = 15.4mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) :

ambient temperature: 21.8°C; liquid temperature: 21.1°C

Date/Time: 2008-03-14 08:10:08 Date/Time: 2008-03-14 08:17:00

System Performance Check-D5800

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1055

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: M5500 Medium parameters used: $f = 5800 \text{ MHz}$; $\sigma = 6.1 \text{ mho/m}$; $\epsilon_r = 46.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.85, 3.85, 3.85); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

d=10mm, Pin=100mW/Area Scan (81x71x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 16.8 mW/g

d=10mm, Pin=100mW/Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid: dx=4.3mm,

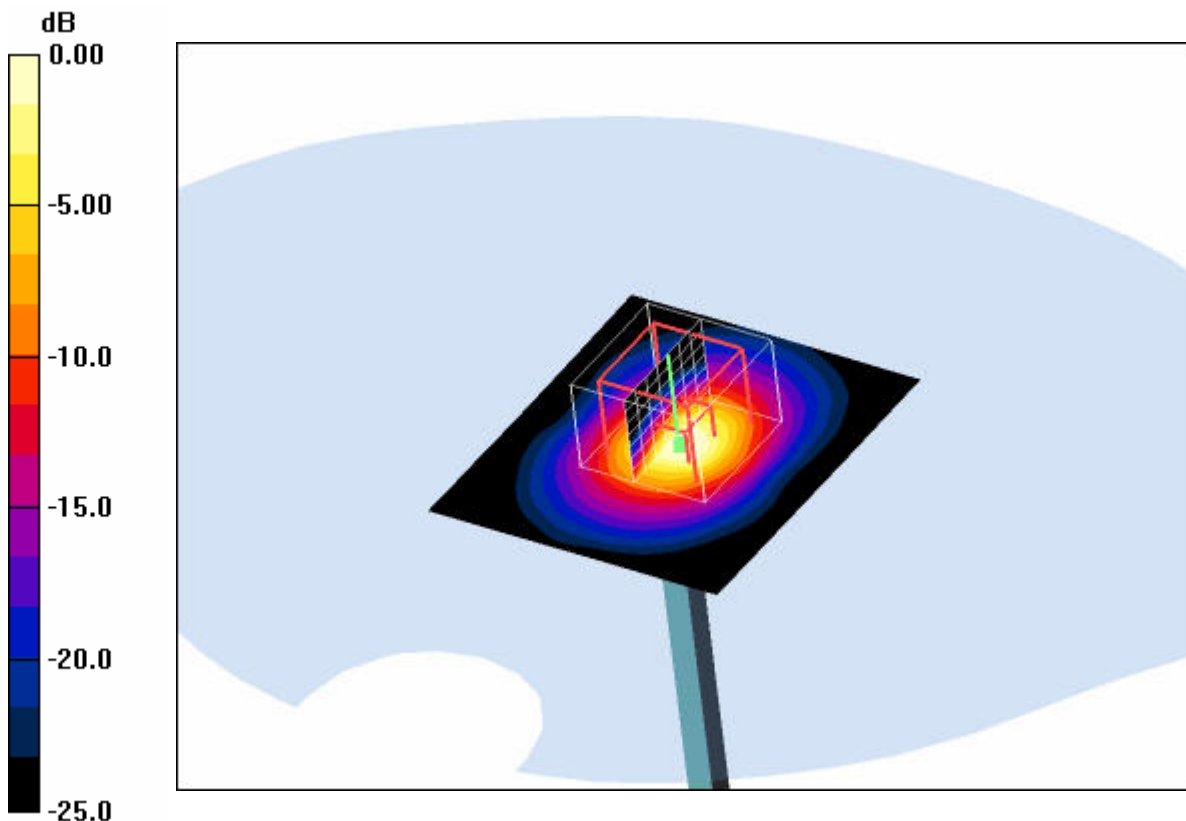
dy=4.3mm, dz=3mm

Reference Value = 35.4 V/m; Power Drift = -0.061 dB

Peak SAR (extrapolated) = 32.1 W/kg

SAR(1 g) = 7.3 mW/g; SAR(10 g) = 1.97 mW/g

Maximum value of SAR (measured) = 14.6 mW/g



0 dB = 14.6mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) :

ambient temperature: 21.9°C; liquid temperature: 21.0°C

Annex 2 Measurement results (printout from DASY TM)

Remark: results of conducted power measurements: see chapter 2.5/2.6 (if applicable)

Annex 2.1 WLAN 2450 MHz body

Date/Time: 2008-03-11 14:13:33 Date/Time: 2008-03-11 14:23:51
 Date/Time: 2008-03-11 14:35:48 Date/Time: 2008-03-11 14:47:34

P1528_OET65_EN50392-Body-WLAN2450 antenna A

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 2450 US; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used (interpolated): $f = 2412 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 52.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(3.92, 3.92, 3.92); Calibrated: 2007-08-23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - Low/Area Scan (81x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.092 mW/g

Underside position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 7.17 V/m; Power Drift = 0.187 dB

Peak SAR (extrapolated) = 0.165 W/kg

SAR(1 g) = 0.087 mW/g; SAR(10 g) = 0.050 mW/g

Maximum value of SAR (measured) = 0.092 mW/g

Underside position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 7.17 V/m; Power Drift = 0.187 dB

Peak SAR (extrapolated) = 0.196 W/kg

SAR(1 g) = 0.098 mW/g; SAR(10 g) = 0.053 mW/g

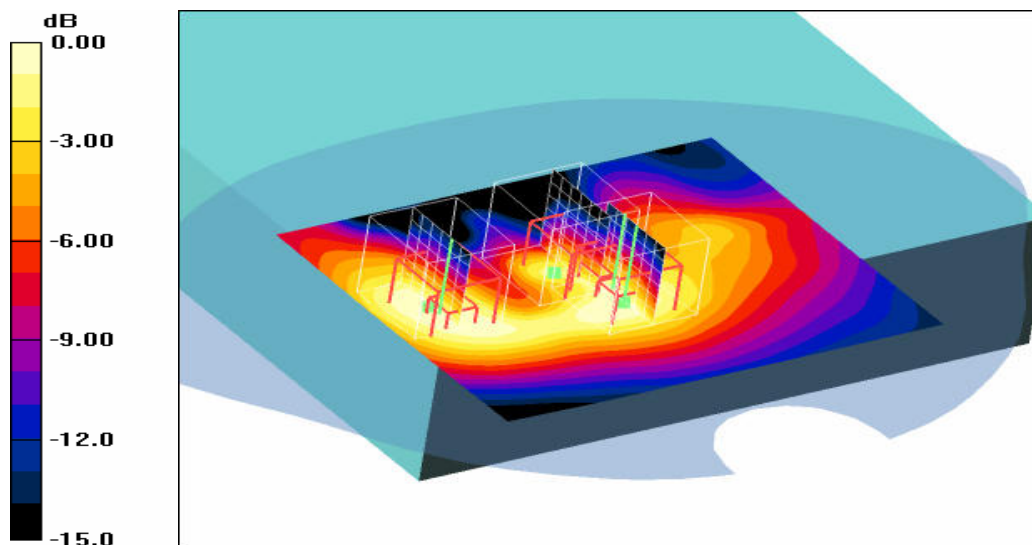
Maximum value of SAR (measured) = 0.105 mW/g

Underside position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 2: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 7.17 V/m; Power Drift = 0.187 dB

Peak SAR (extrapolated) = 0.171 W/kg

SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.035 mW/g



0 dB = 0.092mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance
 ambient temperature: 22.0°C; liquid temperature: 21.0°C

Date/Time: 2008-03-11 16:34:50 Date/Time: 2008-03-11 16:45:25

P1528_OET65_EN50392-Body-WLAN2450 antenna B

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 2450 US; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used (interpolated): $f = 2412 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 52.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(3.92, 3.92, 3.92); Calibrated: 2007-08-23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - Low B/Area Scan (81x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.422 mW/g

Underside position - Low B/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

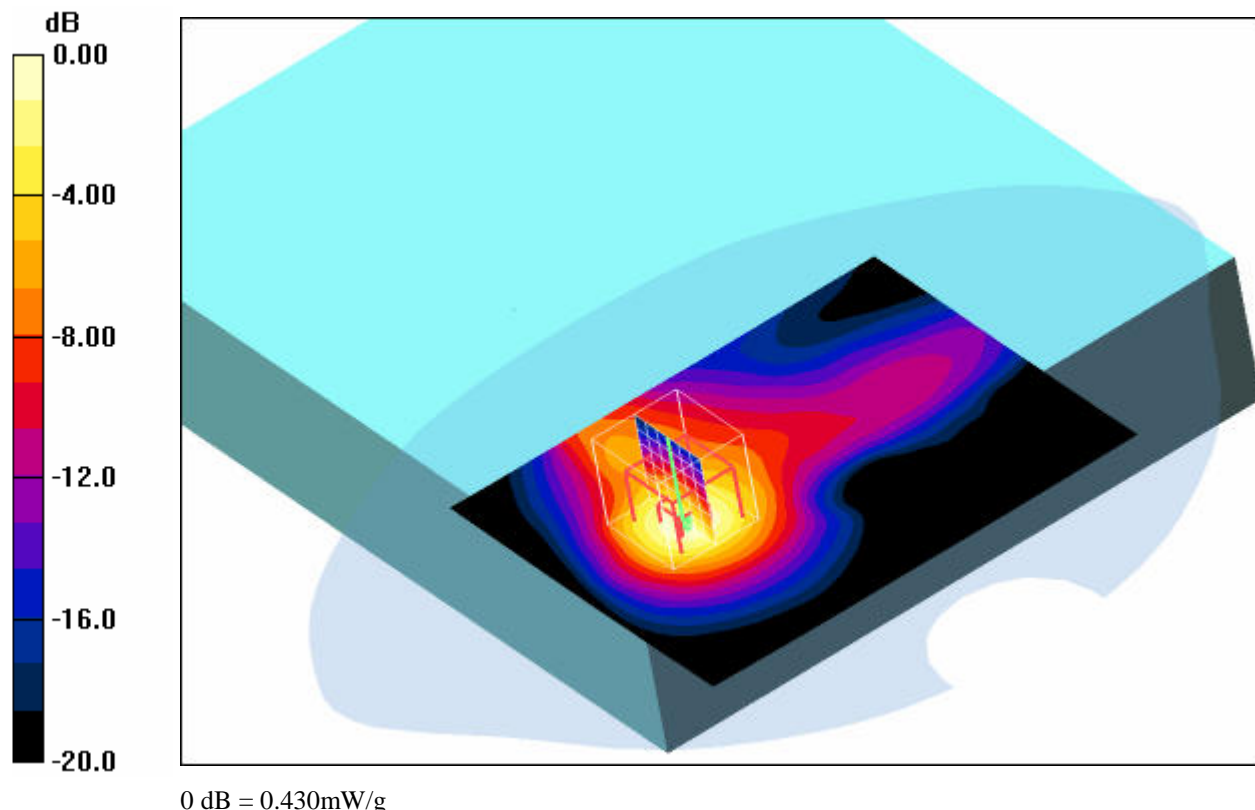
$dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.3 V/m; Power Drift = 0.014 dB

Peak SAR (extrapolated) = 0.830 W/kg

SAR(1 g) = 0.393 mW/g; SAR(10 g) = 0.194 mW/g

Maximum value of SAR (measured) = 0.430 mW/g



Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance
 ambient temperature: 22.0°C; liquid temperature: 21.0°C

Date/Time: 2008-03-11 17:08:03 Date/Time: 2008-03-11 17:18:29

P1528_OET65_EN50392-Body-WLAN2450 antenna B

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 2450 US; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used (interpolated): $f = 2437 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 52.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(3.92, 3.92, 3.92); Calibrated: 2007-08-23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - Middle/Area Scan (81x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.447 mW/g

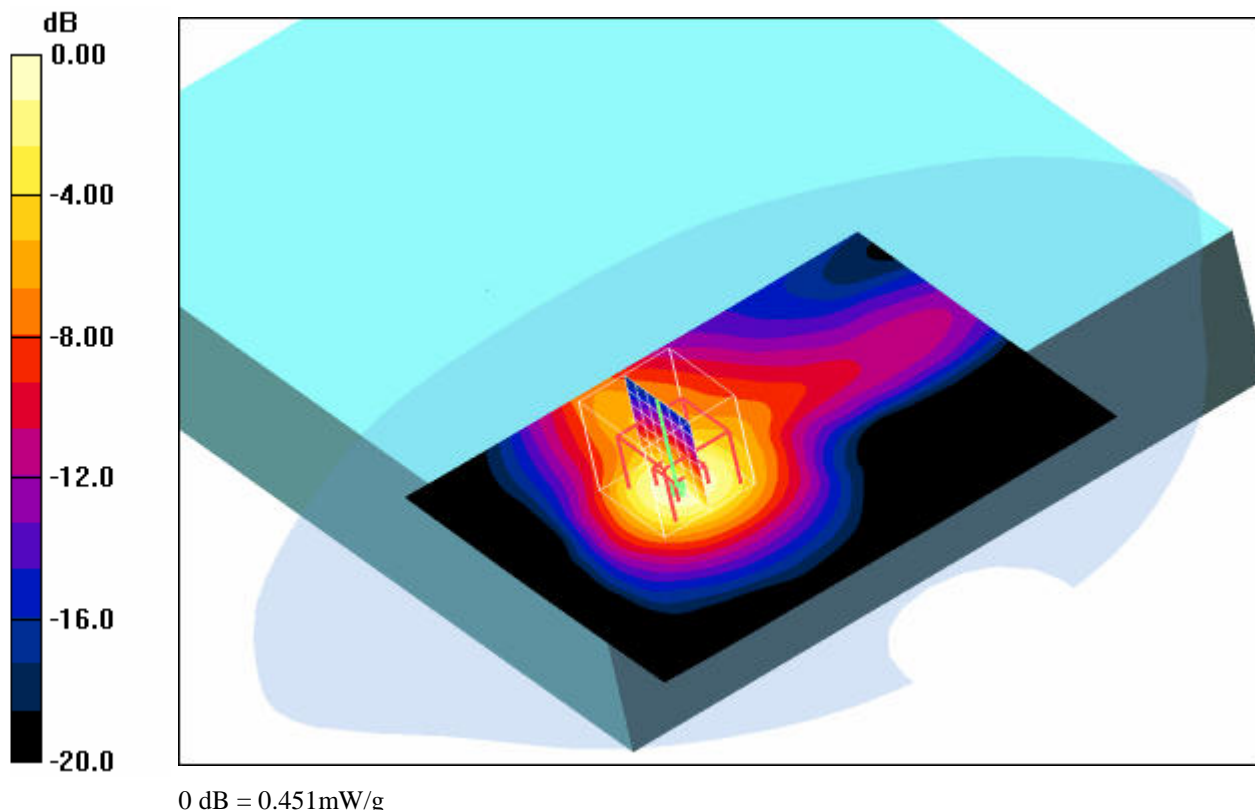
Underside position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 13.4 V/m; Power Drift = -0.022 dB

Peak SAR (extrapolated) = 0.884 W/kg

SAR(1 g) = 0.412 mW/g; SAR(10 g) = 0.204 mW/g

Maximum value of SAR (measured) = 0.451 mW/g



Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance
 ambient temperature: 22.1°C; liquid temperature: 21.0°C

Date/Time: 2008-03-11 17:36:57 Date/Time: 2008-03-11 17:47:23

P1528_OET65_EN50392-Body-WLAN2450 antenna B

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 2450 US; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used (interpolated): $f = 2462 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 52.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(3.92, 3.92, 3.92); Calibrated: 2007-08-23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - High/Area Scan (81x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.377 mW/g

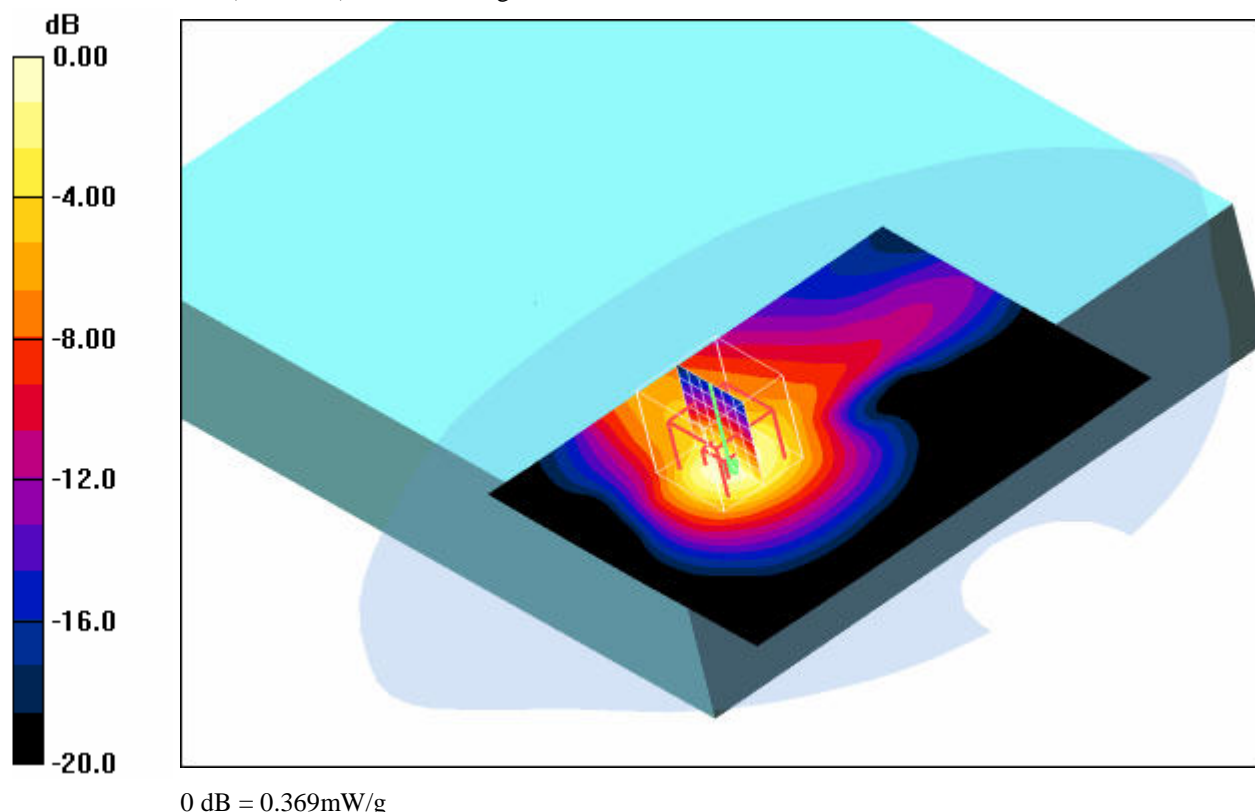
Underside position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.8 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 0.718 W/kg

SAR(1 g) = 0.337 mW/g; SAR(10 g) = 0.167 mW/g

Maximum value of SAR (measured) = 0.369 mW/g



Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance

ambient temperature: 22.1°C; liquid temperature: 21.0°C

Date/Time: 2008-03-11 18:27:02 Date/Time: 2008-03-11 18:37:37 Date/Time: 2008-03-11 18:49:24

P1528_OET65_EN50392-Body-WLAN2450 antenna B

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 2450 US; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used (interpolated): $f = 2412 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 52.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

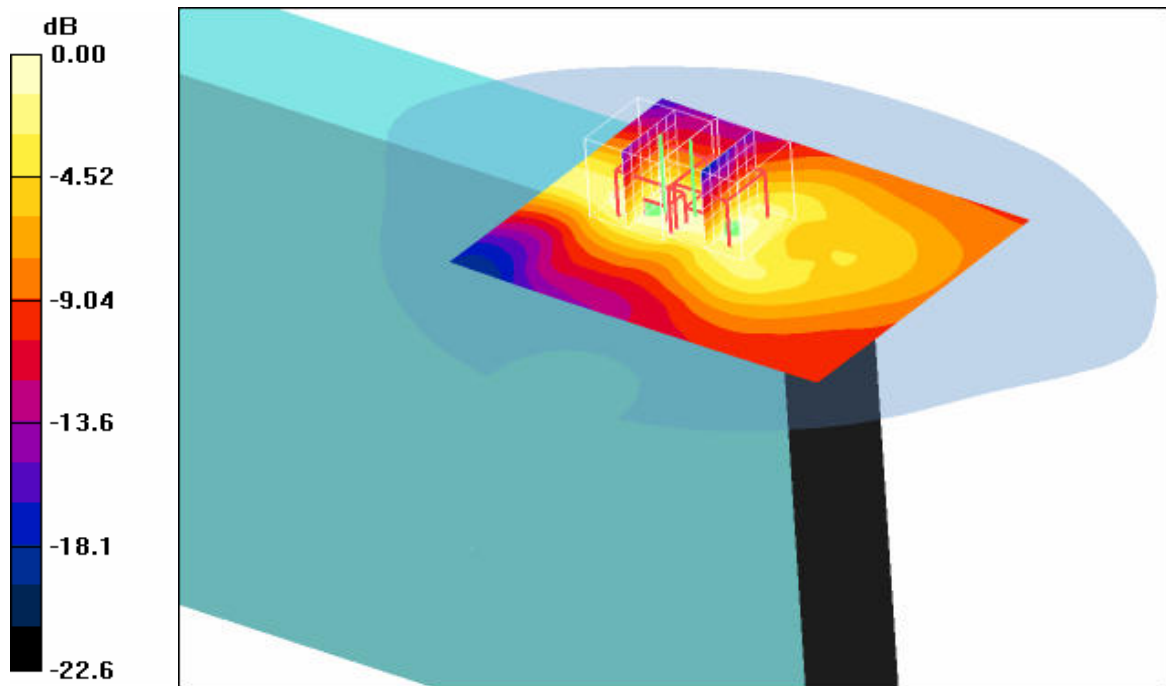
DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(3.92, 3.92, 3.92); Calibrated: 2007-08-23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Edge position - Low/Area Scan (81x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
 Maximum value of SAR (interpolated) = 0.107 mW/g

Edge position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
 Reference Value = 7.63 V/m; Power Drift = 0.130 dB
 Peak SAR (extrapolated) = 0.203 W/kg
SAR(1 g) = 0.102 mW/g; SAR(10 g) = 0.057 mW/g
 Maximum value of SAR (measured) = 0.110 mW/g

Edge position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
 Reference Value = 7.63 V/m; Power Drift = 0.130 dB
 Peak SAR (extrapolated) = 0.198 W/kg
SAR(1 g) = 0.092 mW/g; SAR(10 g) = 0.050 mW/g
 Maximum value of SAR (measured) = 0.104 mW/g



0 dB = 0.104mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance
 ambient temperature: 22.0°C; liquid temperature: 21.1°C

Annex 2.2 WLAN 5.2 GHz body

Date/Time: 2008-03-13 10:19:53 Date/Time: 2008-03-13 10:36:02 Date/Time: 2008-03-13 10:52:16

P1528_OET65_EN50392-Body-WLAN-5200 antenna A

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 5200; Frequency: 5180 MHz; Duty Cycle: 1:1

Medium: M5200 Medium parameters used: $f = 5180 \text{ MHz}$; $\sigma = 5.34 \text{ mho/m}$; $\epsilon_r = 48$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.95, 3.95, 3.95); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - Low A/Area Scan (101x141x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 0.060 mW/g

Underside position - Low A/Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$,

$dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 2.31 V/m; Power Drift = 0.181 dB

Peak SAR (extrapolated) = 0.122 W/kg

SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.012 mW/g

Maximum value of SAR (measured) = 0.043 mW/g

Underside position - Low A/Zoom Scan (8x8x8) (8x8x8)/Cube 1: Measurement grid: $dx=4.3\text{mm}$,

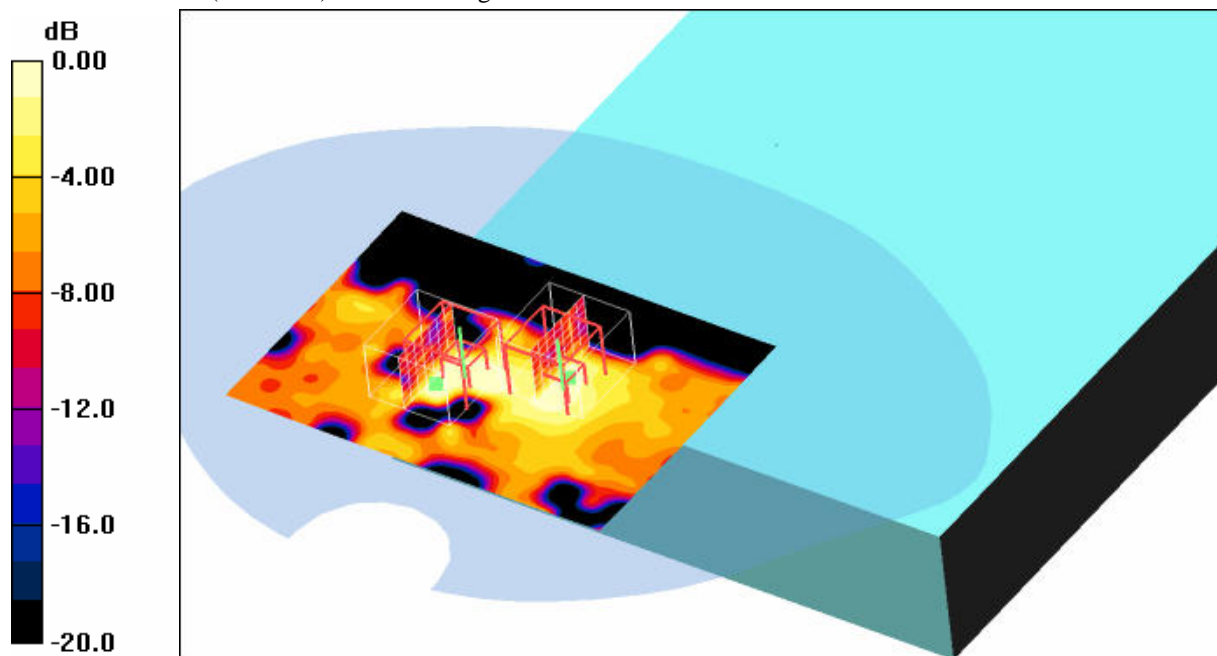
$dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 2.31 V/m; Power Drift = 0.181 dB

Peak SAR (extrapolated) = 0.067 W/kg

SAR(1 g) = 0.027 mW/g; SAR(10 g) = 0.011 mW/g

Maximum value of SAR (measured) = 0.038 mW/g



0 dB = 0.038mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance

ambient temperature: 21.5°C; liquid temperature: 21.5°C

Date/Time: 2008-03-13 11:10:10 Date/Time: 2008-03-13 11:22:56

P1528_OET65_EN50392-Body-WLAN-5200 antenna B

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 5200; Frequency: 5180 MHz; Duty Cycle: 1:1

Medium: M5200 Medium parameters used: $f = 5180 \text{ MHz}$; $\sigma = 5.34 \text{ mho/m}$; $\epsilon_r = 48$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.95, 3.95, 3.95); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - Low B/Area Scan (101x101x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 1.14 mW/g

Underside position - Low B/Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$,

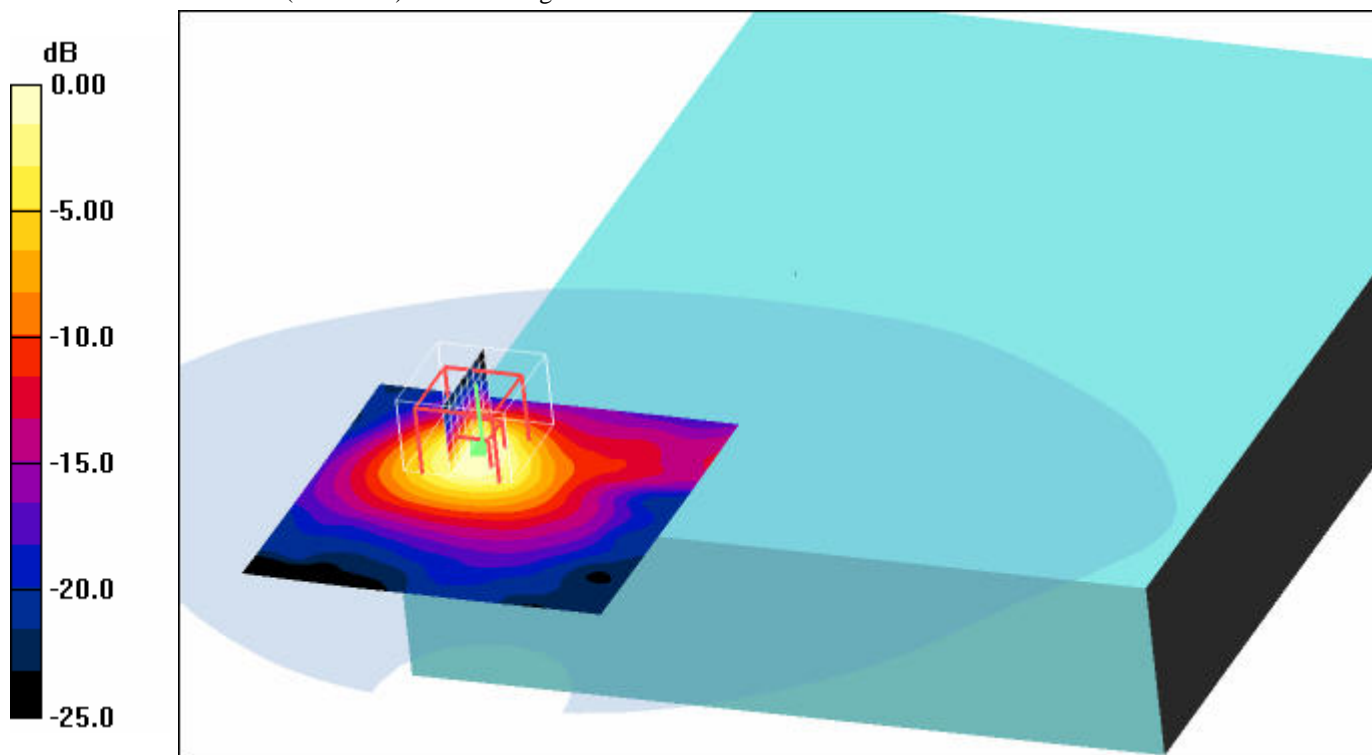
$dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 3.10 V/m; Power Drift = -0.191 dB

Peak SAR (extrapolated) = 1.88 W/kg

SAR(1 g) = 0.584 mW/g; SAR(10 g) = 0.218 mW/g

Maximum value of SAR (measured) = 1.08 mW/g



Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance

ambient temperature: 21.5°C; liquid temperature: 21.5°C

Date/Time: 2008-03-13 11:41:40 Date/Time: 2008-03-13 11:54:54

P1528_OET65_EN50392-Body-WLAN-5200 antenna B

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 5200; Frequency: 5240 MHz; Duty Cycle: 1:1

Medium: M5200 Medium parameters used: $f = 5240 \text{ MHz}$; $\sigma = 5.41 \text{ mho/m}$; $\epsilon_r = 47.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.95, 3.95, 3.95); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - Middle B/Area Scan (101x101x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 1.20 mW/g

Underside position - Middle B/Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid:

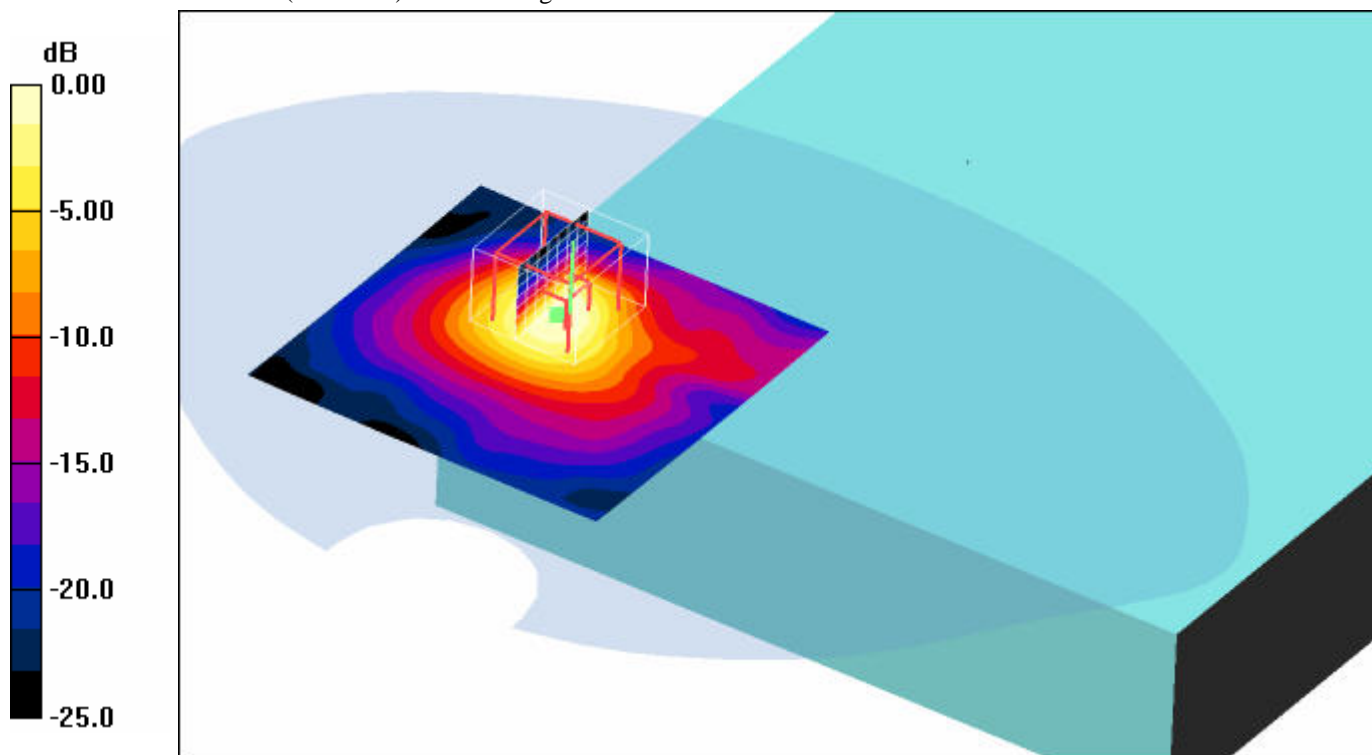
$dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 16.8 V/m; Power Drift = 0.081 dB

Peak SAR (extrapolated) = 1.99 W/kg

SAR(1 g) = 0.612 mW/g; SAR(10 g) = 0.230 mW/g

Maximum value of SAR (measured) = 1.10 mW/g



0 dB = 1.10mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance

ambient temperature: 21.6°C; liquid temperature: 21.4°C

Annex 2.3 WLAN 5.3 GHz body

Date/Time: 2008-03-13 12:17:44 Date/Time: 2008-03-13 12:33:44 Date/Time: 2008-03-13 12:50:01

P1528_OET65_EN50392-Body-WLAN5300 antenna A

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 5200; Frequency: 5260 MHz; Duty Cycle: 1:1

Medium: M5200 Medium parameters used: $f = 5260$ MHz; $\sigma = 5.41$ mho/m; $\epsilon_r = 47.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.95, 3.95, 3.95); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - Middle A/Area Scan (101x141x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.173 mW/g

Underside position - Middle A/Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid:

dx=4.3mm, dy=4.3mm, dz=3mm

Reference Value = 1.81 V/m; Power Drift = 0.138 dB

Peak SAR (extrapolated) = 0.347 W/kg

SAR(1 g) = 0.077 mW/g; SAR(10 g) = 0.031 mW/g

Maximum value of SAR (measured) = 0.143 mW/g

Underside position - Middle A/Zoom Scan (8x8x8) (8x8x8)/Cube 1: Measurement grid:

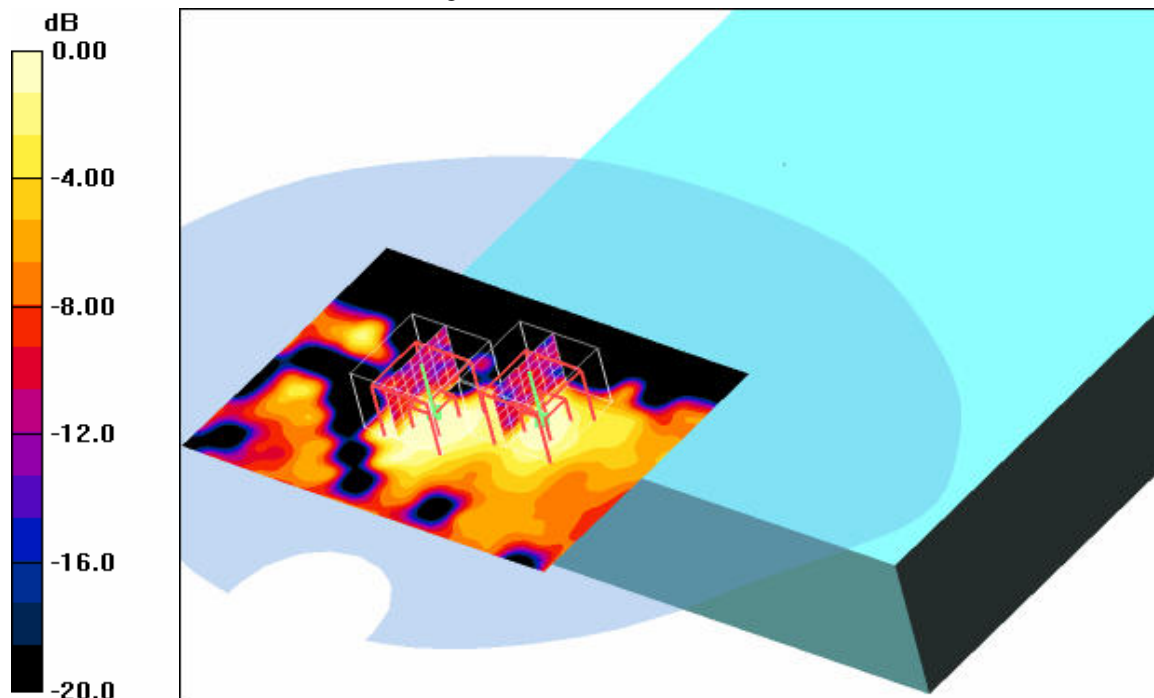
dx=4.3mm, dy=4.3mm, dz=3mm

Reference Value = 1.81 V/m; Power Drift = 0.138 dB

Peak SAR (extrapolated) = 0.201 W/kg

SAR(1 g) = 0.062 mW/g; SAR(10 g) = 0.024 mW/g

Maximum value of SAR (measured) = 0.119 mW/g



0 dB = 0.119mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance

ambient temperature: 22.0°C; liquid temperature: 21.3°C

Date/Time: 2008-03-13 13:14:09 Date/Time: 2008-03-13 13:26:30

P1528_OET65_EN50392-Body-WLAN5300 antenna B

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 5200; Frequency: 5260 MHz; Duty Cycle: 1:1

Medium: M5200 Medium parameters used: $f = 5260 \text{ MHz}$; $\sigma = 5.41 \text{ mho/m}$; $\epsilon_r = 47.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.95, 3.95, 3.95); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - Middle B/Area Scan (101x101x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 1.82 mW/g

Underside position - Middle B/Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid:

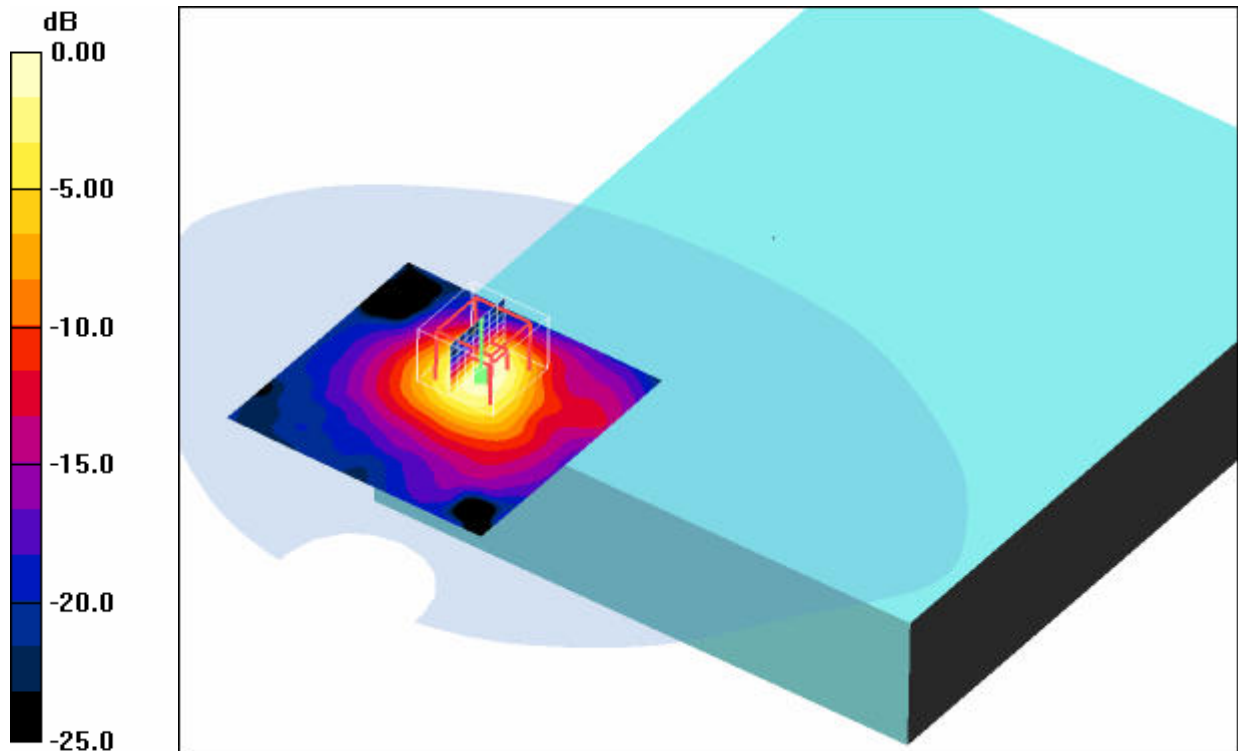
$dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 3.96 V/m; Power Drift = -0.144 dB

Peak SAR (extrapolated) = 3.21 W/kg

SAR(1 g) = 0.965 mW/g; SAR(10 g) = 0.365 mW/g

Maximum value of SAR (measured) = 1.75 mW/g



0 dB = 1.75mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance

ambient temperature: 22.1°C; liquid temperature: 21.5°C

Date/Time: 2008-03-13 13:52:50 Date/Time: 2008-03-13 14:04:42

P1528_OET65_EN50392-Body-WLAN5300 antenna B

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 5200; Frequency: 5320 MHz; Duty Cycle: 1:1

Medium: M5200 Medium parameters used: $f = 5320 \text{ MHz}$; $\sigma = 5.46 \text{ mho/m}$; $\epsilon_r = 47.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.95, 3.95, 3.95); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - Low B/Area Scan (101x101x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 1.97 mW/g

Underside position - Low B/Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$,

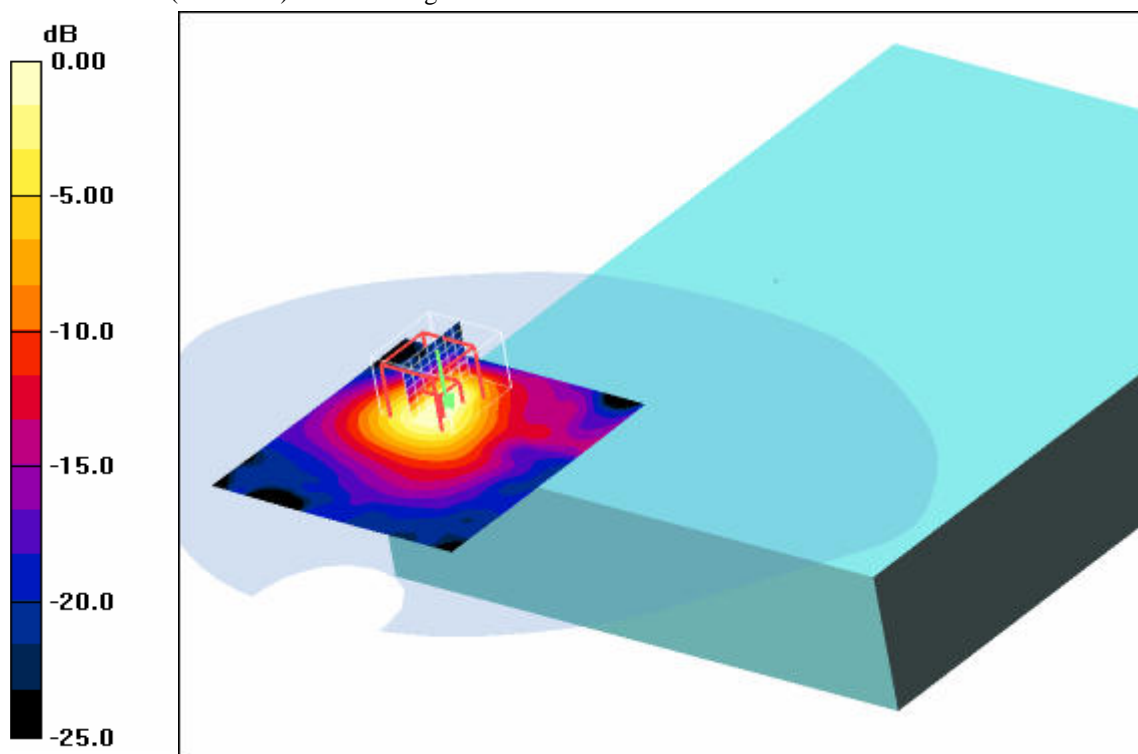
$dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 14.0 V/m; Power Drift = 0.037 dB

Peak SAR (extrapolated) = 3.36 W/kg

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.382 mW/g

Maximum value of SAR (measured) = 1.87 mW/g



0 dB = 1.87mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance

ambient temperature: 22.0°C; liquid temperature: 21.4°C

Annex 2.4 WLAN 5.8 GHz body

Date/Time: 2008-03-14 11:19:30 Date/Time: 2008-03-14 11:36:30

P1528_OET65_EN50392-Body-WLAN-5800 antenna A

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 5800; Frequency: 5745 MHz; Duty Cycle: 1:1

Medium: M5800 Medium parameters used: $f = 5785$ MHz; $\sigma = 6.1$ mho/m; $\epsilon_r = 46.7$; $\rho = 1000$ kg/m³

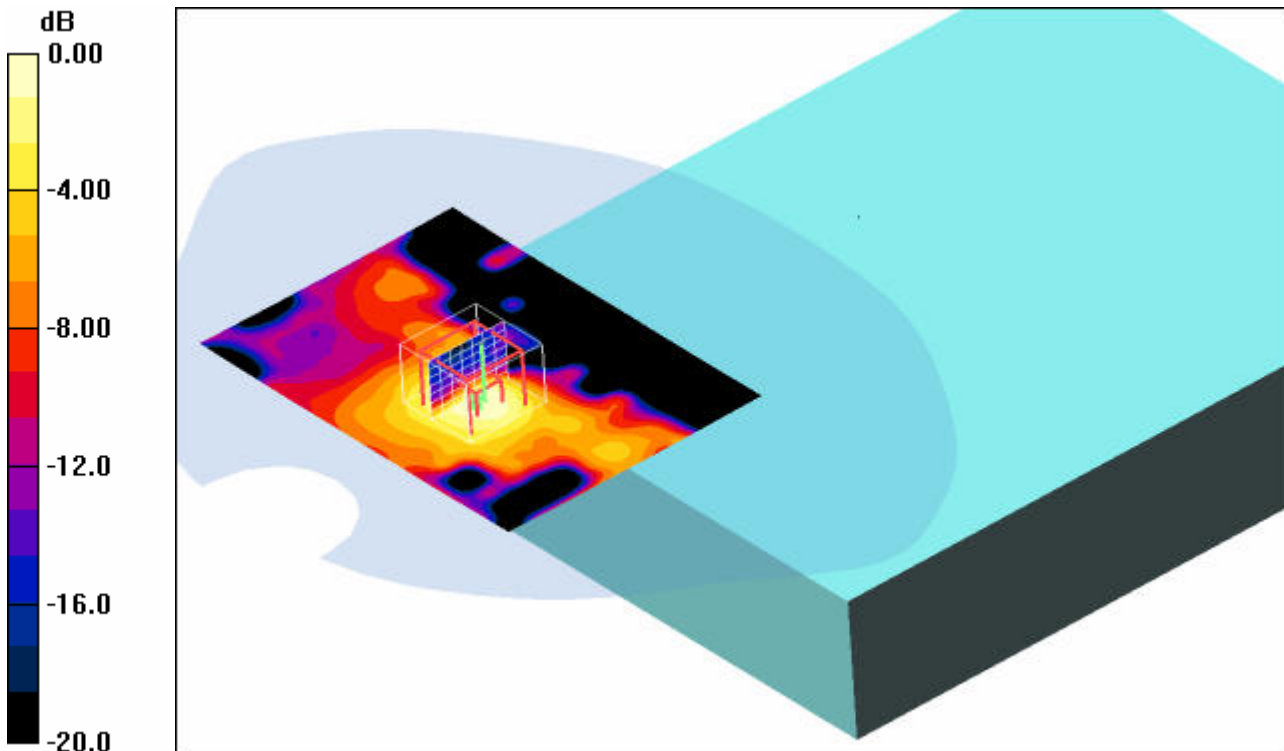
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.85, 3.85, 3.85); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - Low A/Area Scan (101x141x1): Measurement grid: dx=10mm, dy=10mm
 Maximum value of SAR (interpolated) = 0.371 mW/g

Underside position - Low A/Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
 Reference Value = 5.48 V/m; Power Drift = 0.178 dB
 Peak SAR (extrapolated) = 0.599 W/kg
SAR(1 g) = 0.178 mW/g; SAR(10 g) = 0.072 mW/g
 Maximum value of SAR (measured) = 0.358 mW/g



0 dB = 0.358mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance
 ambient temperature: 22.2°C; liquid temperature: 21.4°C

Date/Time: 2008-03-14 11:57:21 Date/Time: 2008-03-14 12:09:13

P1528_OET65_EN50392-Body-WLAN-5800 antenna B

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 5800; Frequency: 5785 MHz; Duty Cycle: 1:1

Medium: M5800 Medium parameters used: $f = 5785 \text{ MHz}$; $\sigma = 6.1 \text{ mho/m}$; $\epsilon_r = 46.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.85, 3.85, 3.85); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - Middle B/Area Scan (101x101x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 2.76 mW/g

Underside position - Middle B/Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid:

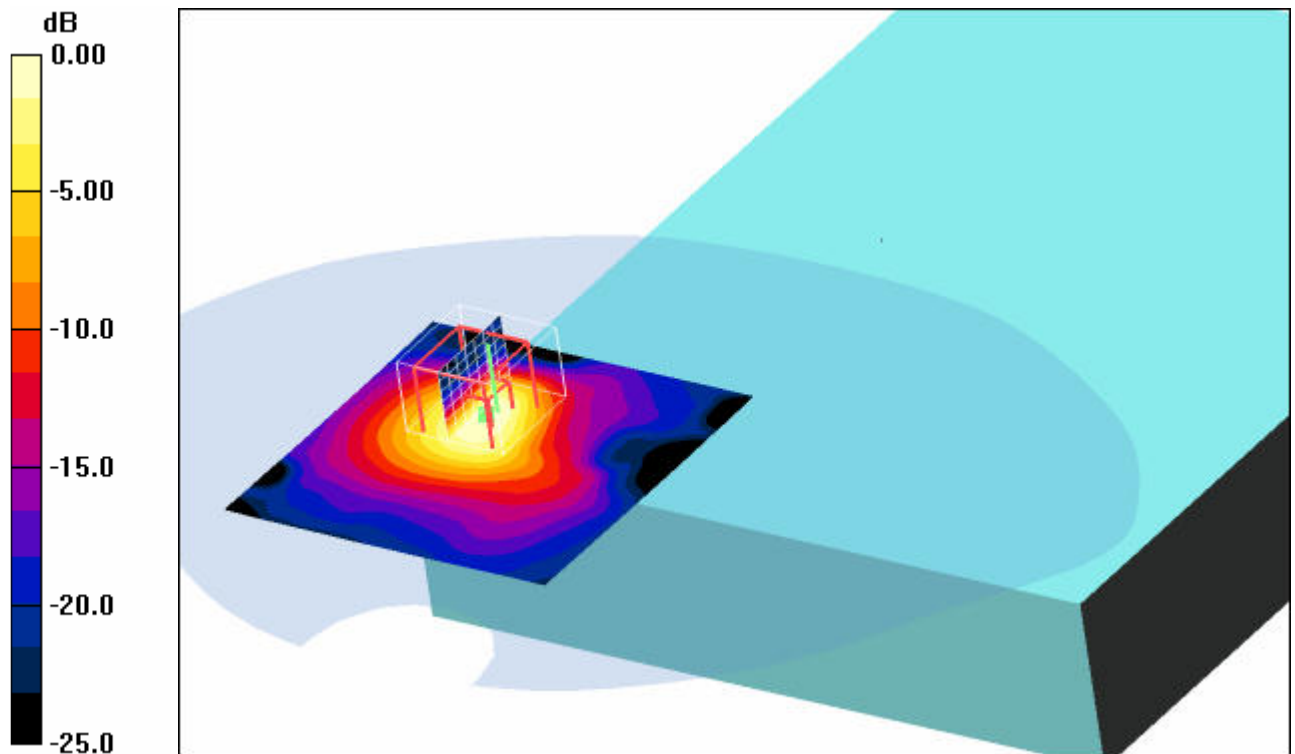
$dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 14.6 V/m; Power Drift = -0.023 dB

Peak SAR (extrapolated) = 5.01 W/kg

SAR(1 g) = 1.31 mW/g; SAR(10 g) = 0.484 mW/g

Maximum value of SAR (measured) = 2.45 mW/g



0 dB = 2.45mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance

ambient temperature: 22.1°C; liquid temperature: 21.5°C

Date/Time: 2008-03-14 12:32:39 Date/Time: 2008-03-14 12:44:32

P1528_OET65_EN50392-Body-WLAN-5800 antenna B

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 5800; Frequency: 5745 MHz; Duty Cycle: 1:1

Medium: M5800 Medium parameters used: $f = 5745 \text{ MHz}$; $\sigma = 6.03 \text{ mho/m}$; $\epsilon_r = 46.7$; $\rho = 1000 \text{ kg/m}^3$

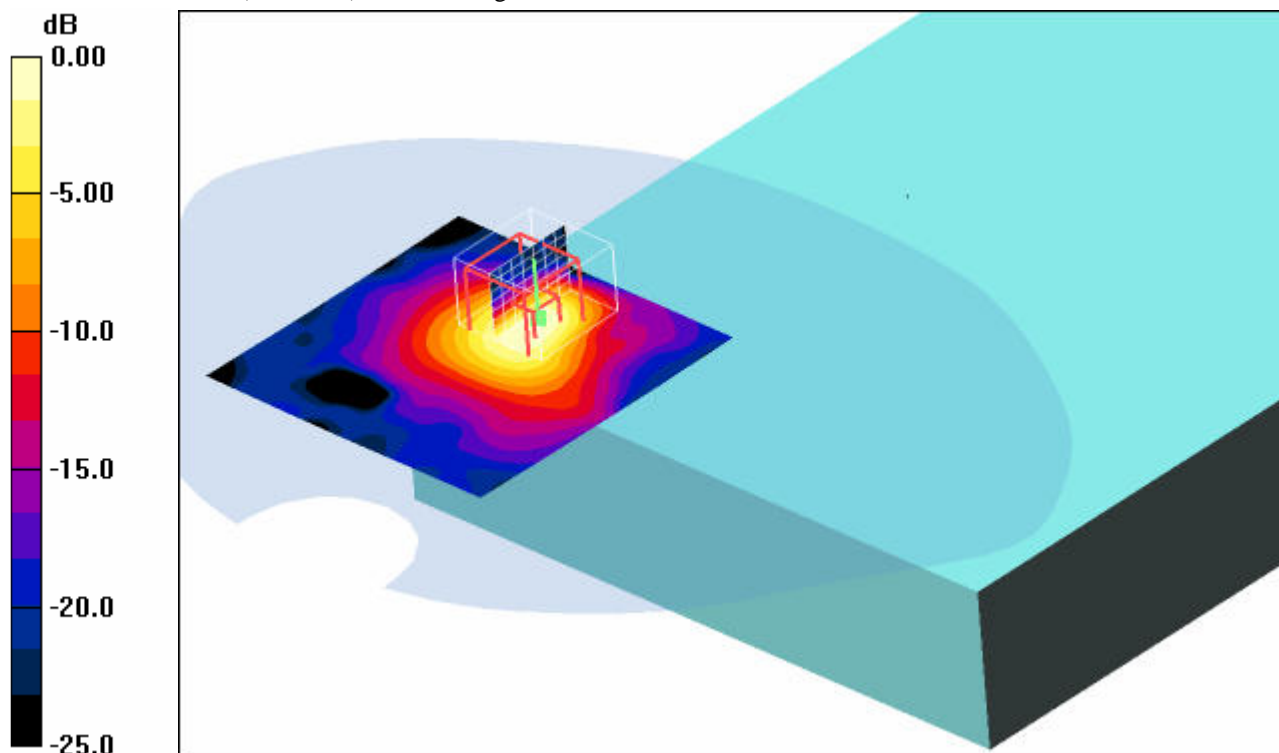
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.85, 3.85, 3.85); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - Low B /Area Scan (101x101x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$
 Maximum value of SAR (interpolated) = 2.09 mW/g

Underside position - Low B /Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$
 Reference Value = 12.9 V/m; Power Drift = 0.053 dB
 Peak SAR (extrapolated) = 4.05 W/kg
SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.399 mW/g
 Maximum value of SAR (measured) = 2.05 mW/g



0 dB = 2.05mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance
 ambient temperature: 22.1°C; liquid temperature: 21.3°C

Date/Time: 2008-03-14 13:41:18 Date/Time: 2008-03-14 13:53:15

P1528_OET65_EN50392-Body-WLAN-5800 antenna B

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 5800; Frequency: 5825 MHz; Duty Cycle: 1:1

Medium: M5800 Medium parameters used: $f = 5825 \text{ MHz}$; $\sigma = 6.1 \text{ mho/m}$; $\epsilon_r = 46.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.85, 3.85, 3.85); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Underside position - High B /Area Scan (101x101x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 3.26 mW/g

Underside position - High B /Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$,

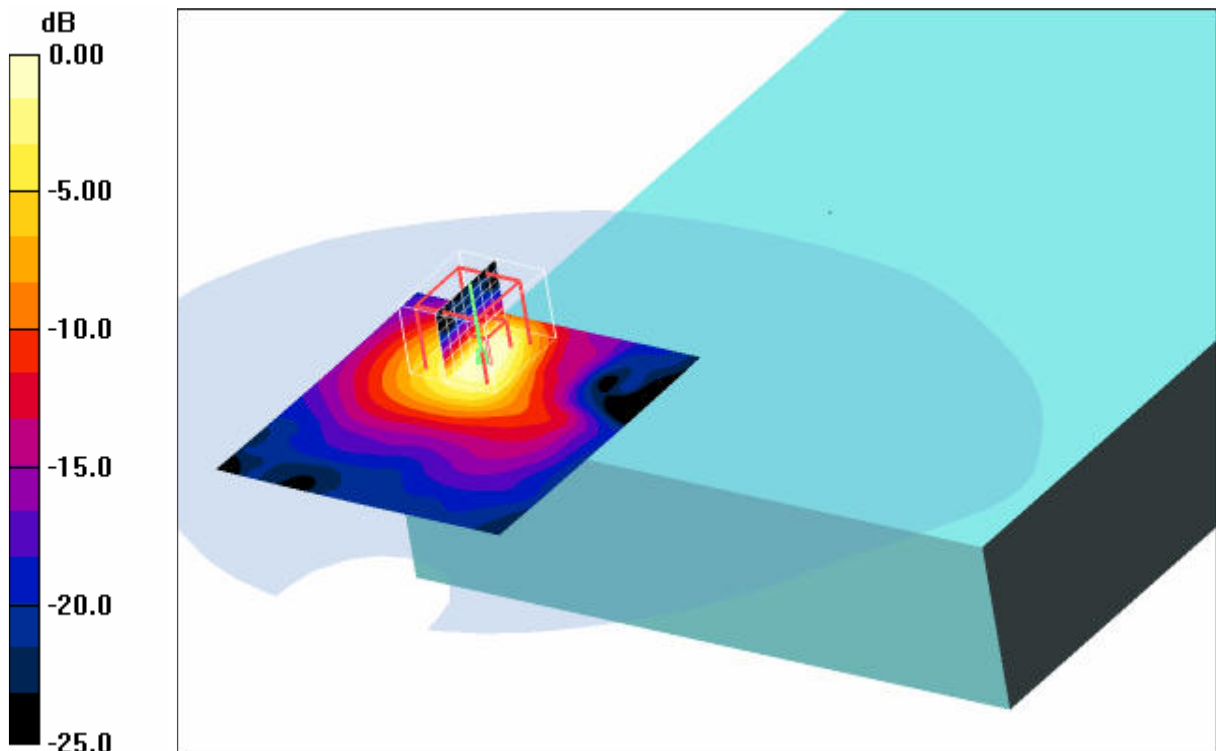
$dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 16.1 V/m; Power Drift = -0.139 dB

Peak SAR (extrapolated) = 5.95 W/kg

SAR(1 g) = 1.55 mW/g; SAR(10 g) = 0.575 mW/g

Maximum value of SAR (measured) = 2.91 mW/g



0 dB = 2.91mW/g

Additional information:

position or distance of DUT to SAM (if not standard head positions) : without any distance

ambient temperature: 22.3°C; liquid temperature: 21.2°C

Date/Time: 2008-03-14 15:45:07 Date/Time: 2008-03-14 16:02:15 Date/Time: 2008-03-14 16:18:37

P1528_OET65_EN50392-Body-WLAN-5800 antenna B

DUT: ads-tec; Type: TT13C4; Serial: AX00256518

Communication System: WLAN 5800; Frequency: 5825 MHz; Duty Cycle: 1:1

Medium: M5800 Medium parameters used: $f = 5825 \text{ MHz}$; $\sigma = 6.1 \text{ mho/m}$; $\epsilon_r = 46.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3566; ConvF(3.85, 3.85, 3.85); Calibrated: 2007-08-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2008-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Edge position - High B /Area Scan (111x131x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 0.866 mW/g

Edge position - High B /Zoom Scan (8x8x8) (8x8x8)/Cube 0: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 8.62 V/m; Power Drift = -0.035 dB

Peak SAR (extrapolated) = 1.71 W/kg

SAR(1 g) = 0.450 mW/g; SAR(10 g) = 0.175 mW/g

Maximum value of SAR (measured) = 0.842 mW/g

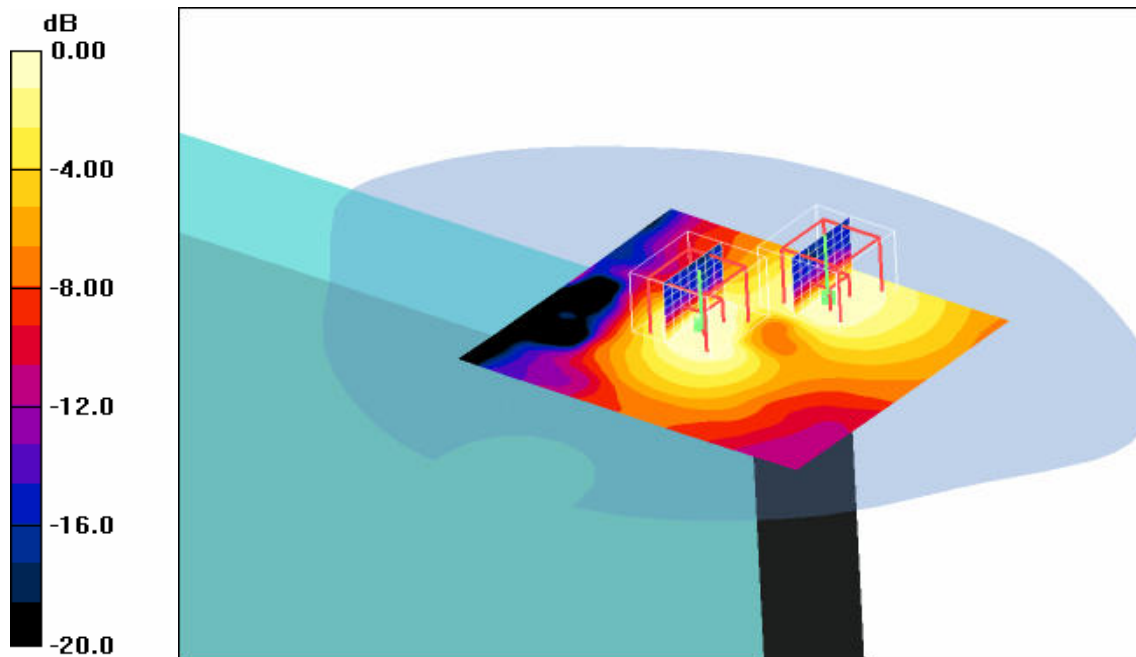
Edge position - High B /Zoom Scan (8x8x8) (8x8x8)/Cube 1: Measurement grid: $dx=4.3\text{mm}$, $dy=4.3\text{mm}$, $dz=3\text{mm}$

Reference Value = 8.62 V/m; Power Drift = -0.035 dB

Peak SAR (extrapolated) = 1.18 W/kg

SAR(1 g) = 0.311 mW/g; SAR(10 g) = 0.141 mW/g

Maximum value of SAR (measured) = 0.559 mW/g



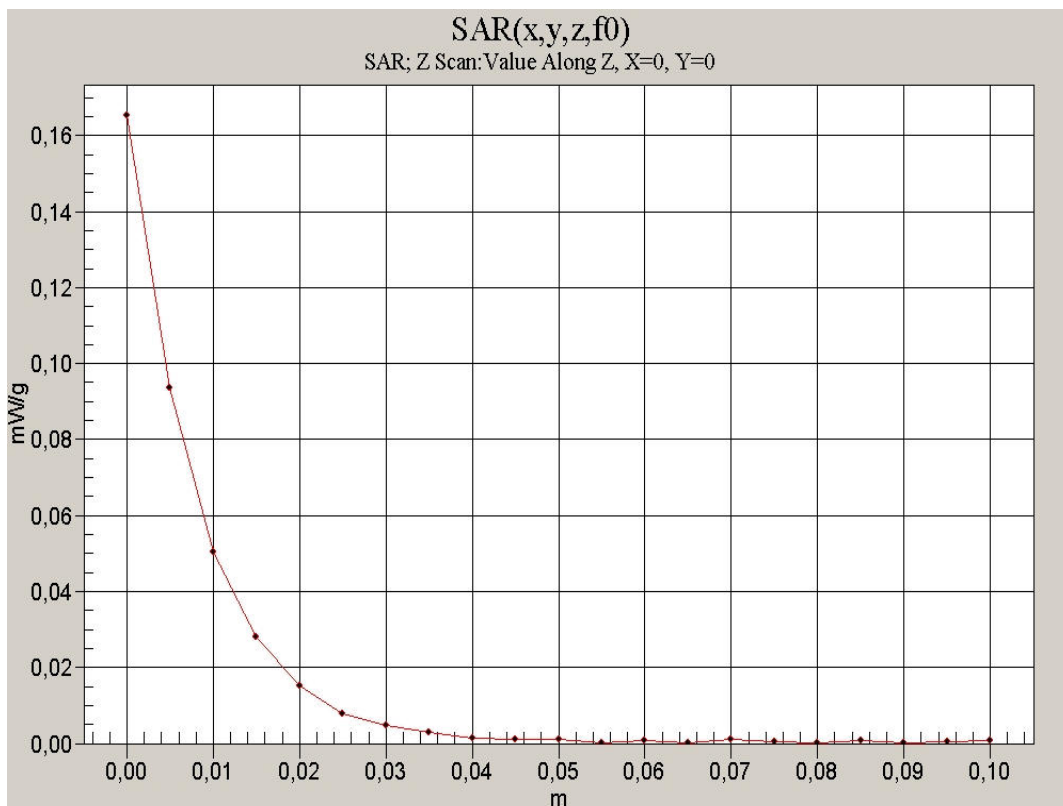
0 dB = 0.559mW/g

Additional information:

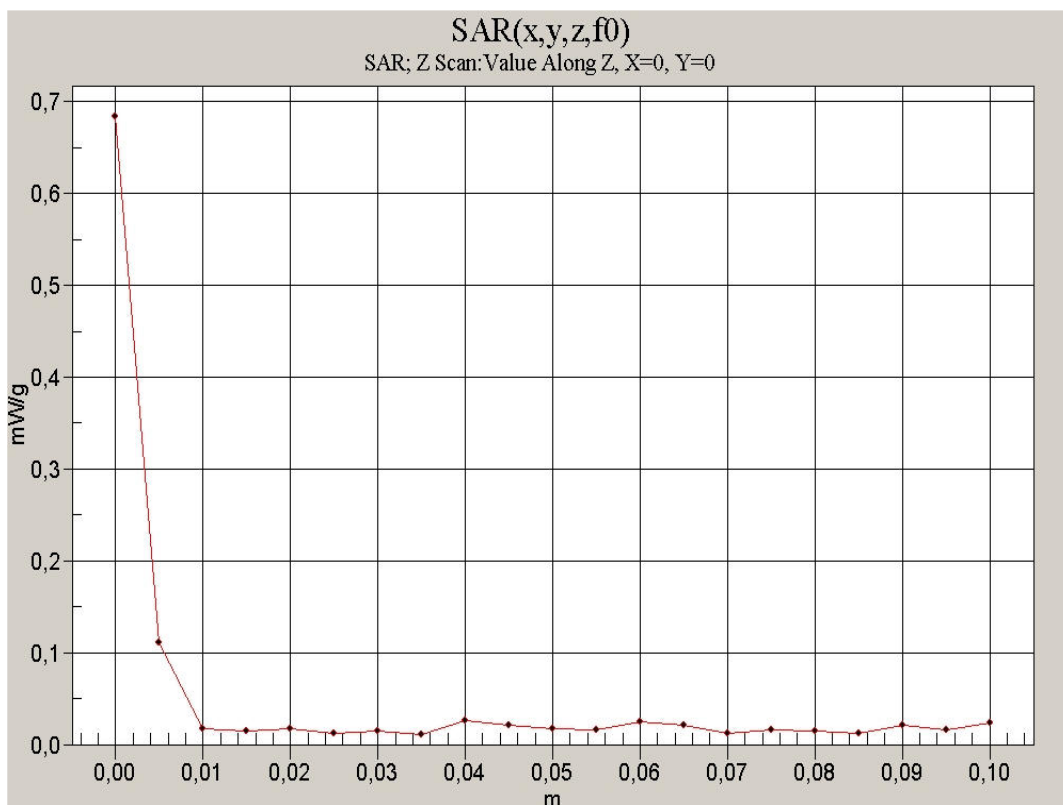
position or distance of DUT to SAM (if not standard head positions) : without any distance

ambient temperature: 22.5°C; liquid temperature: 21.5°C

Annex 2.5 Z-axis scans



Z-axis scans 2450 MHz body



Z-axis scans 5 GHz body

Annex 3 Photo documentation

Photo 1: Measurement System DASY 4

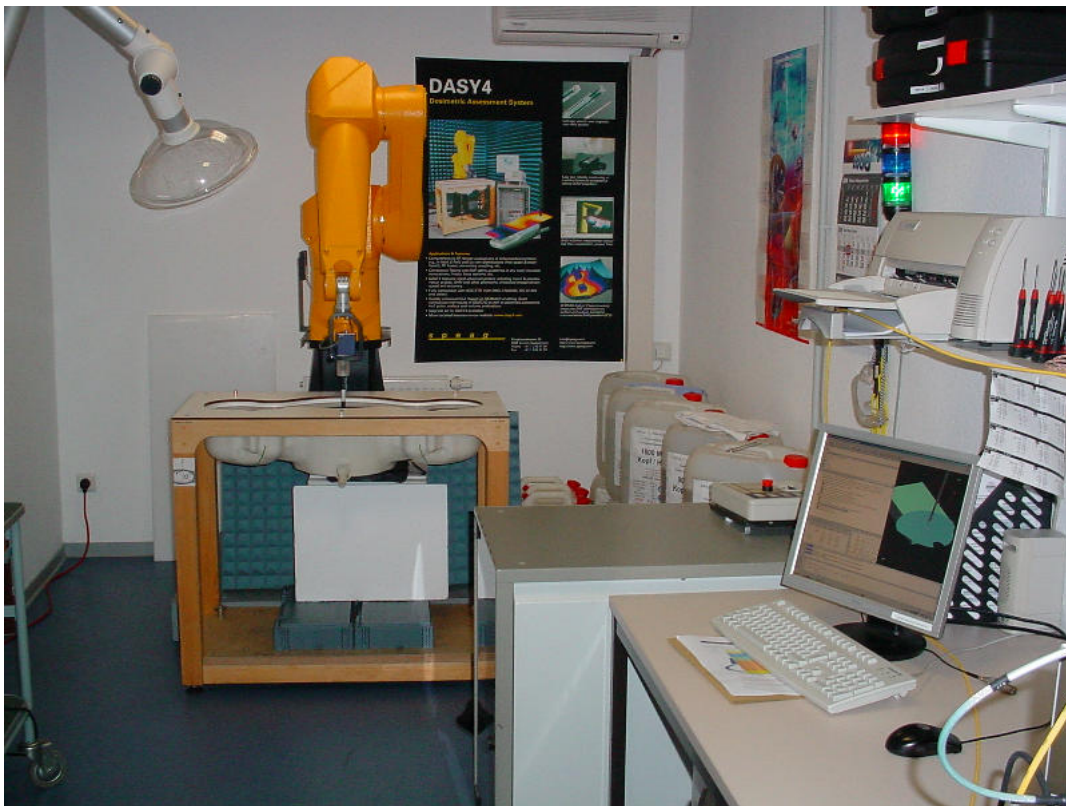


Photo 2: DUT - top view



Photo 3: DUT - side view



Photo 4: DUT - rear view



Photo 5: DUT - rear view (label)

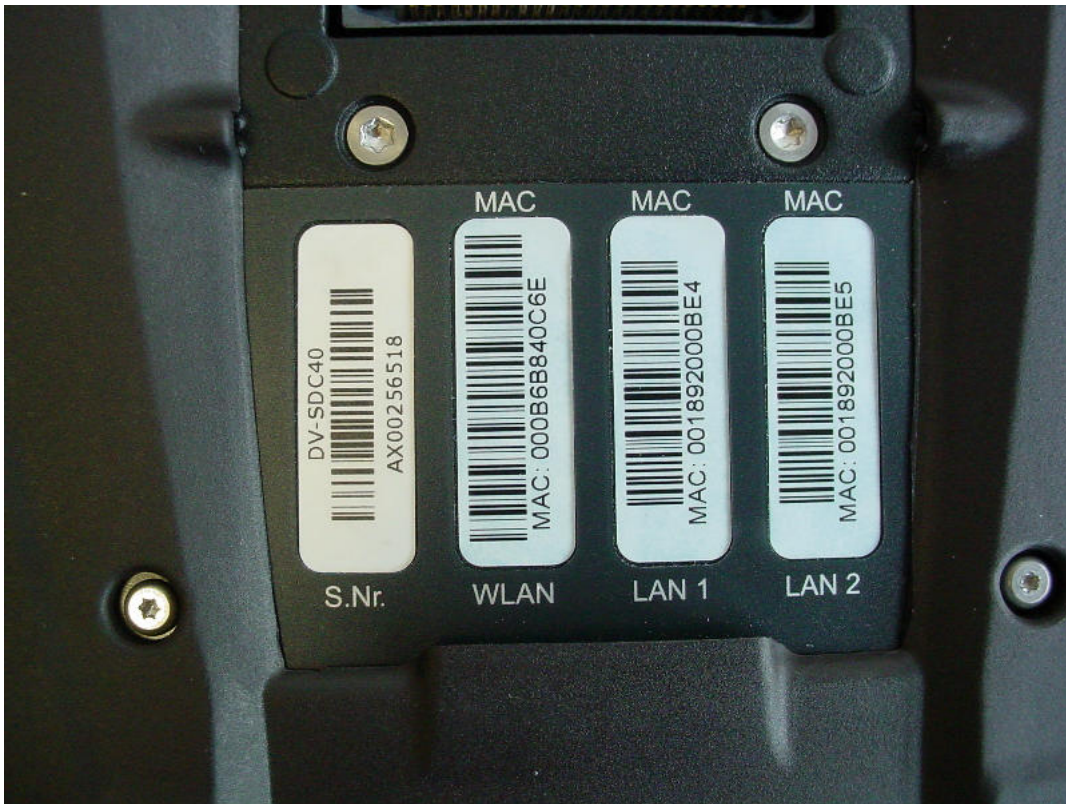


Photo 6: DUT - rear view and batteries



Photo 7: batteries

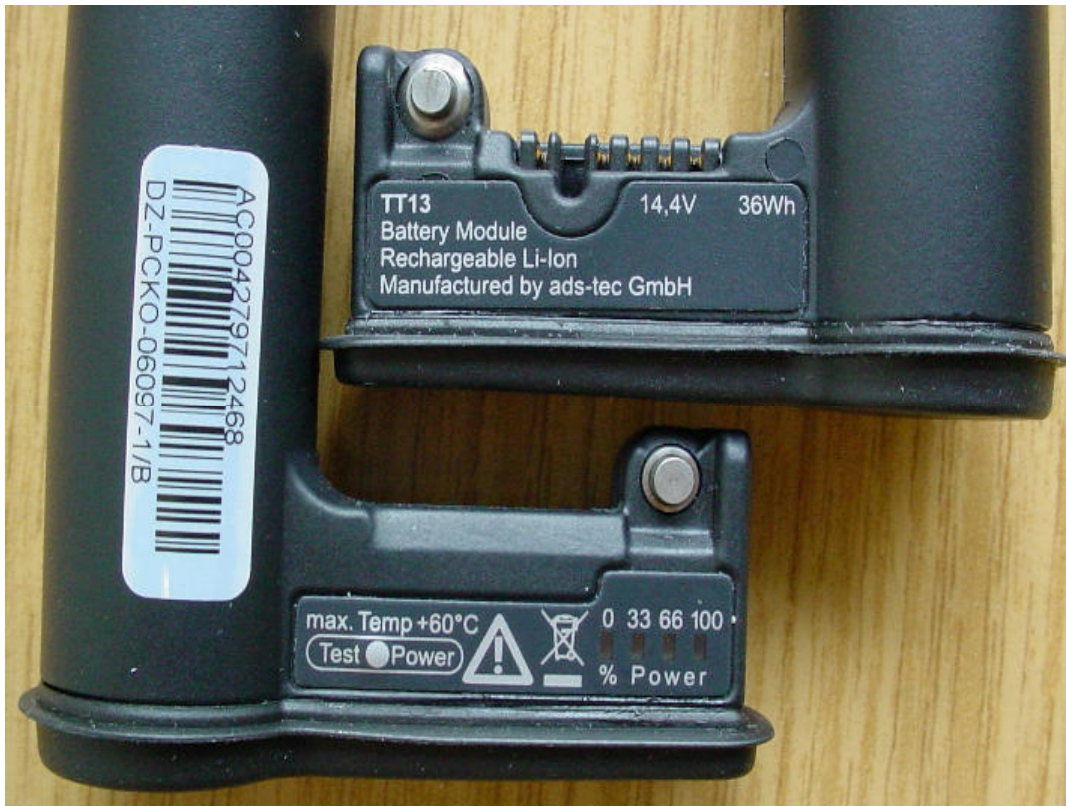


Photo 8: Test position underside without any distance (antenna A)

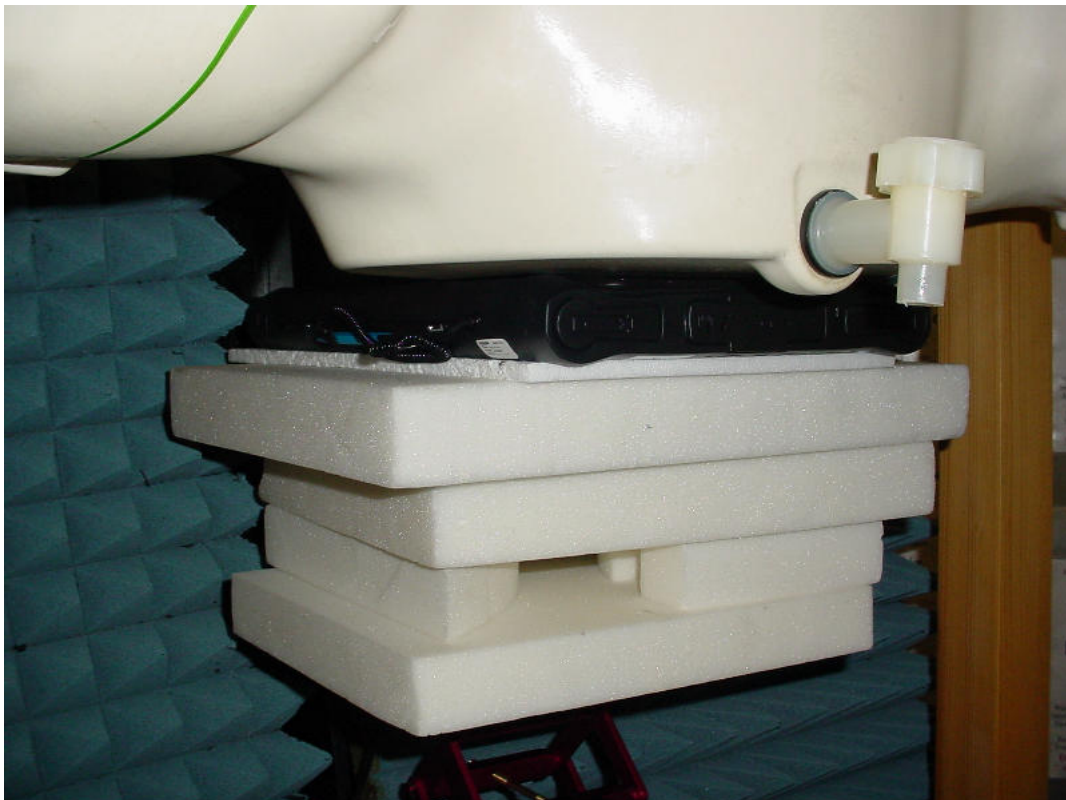


Photo 9: Test position underside without any distance (antenna A)



Photo 10: Test position underside without any distance (antenna B)



Photo 11: Test position underside without any distance (antenna B)



Photo 12: Test position front edge without any distance (antenna B)

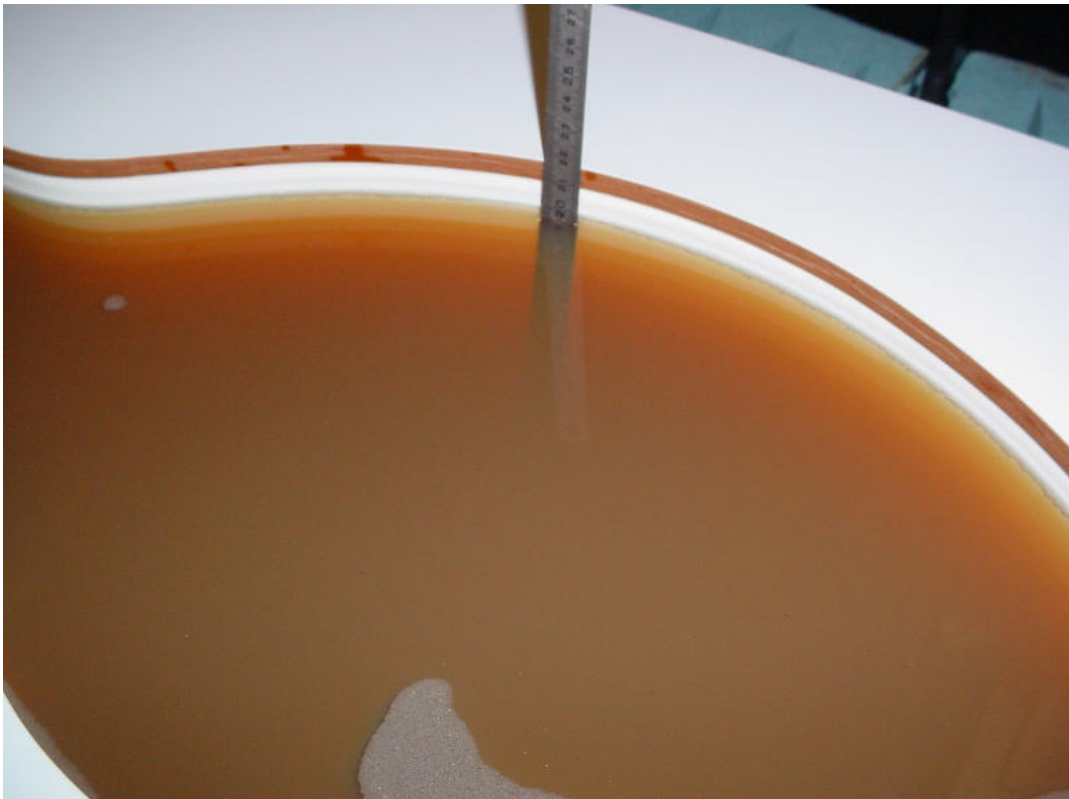


Annex 3.1 Liquid depth

Photo 13: Liquid depth 2450 MHz body simulating liquid



Photo 14: Liquid depth 5 GHz body simulating liquid



Annex 4 RF Technical Brief Cover Sheet acc. to RSS-102

- 1. COMPANY NUMBER: 6275A**
- 2. MODEL NUMBER: TT13C4**
- 3. MANUFACTURER: ads-tec GmbH**
- 4. TYPE OF EVALUATION:**

SAR Evaluation: Body-worn Device

- **Multiple transmitters: Yes No**
- **Evaluated against exposure limits: General Public Use Controlled Use**
- **Duty cycle used in evaluation: 100%**
- **Standard used for evaluation: RSS-102 Issue 2 (2005-11)**
- **SAR value: 1.55W/kg. Measured Computed Calculated**

Annex 4.1 Declaration of RF Exposure Compliance

ATTESTATION: I attest that the information provided in Annex 4 is correct; that a Technical Brief was prepared and the information it contains is correct; that the device evaluation was performed or supervised by me; that applicable measurement methods and evaluation methodologies have been followed and that the device meets the SAR and/or RF exposure limits of RSS-102.

Signature:



Date: 2008-04-17

NAME : Thomas Vogler

TITLE : Dipl.-Ing. (FH)

COMPANY : CETECOM ICT Services GmbH

Annex 5 Calibration parameters

Calibration parameters are described in the additional document :

**Appendix to test report no. 2-4856-02-08/07-A ‘
Calibration data, Phantom certificate
and detail information of the DASY4 System**