
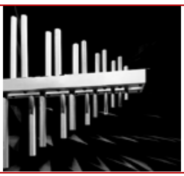
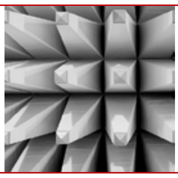

CETECOM™

CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Test Report No.: 1-2977-51-03/11

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing Laboratory

CETECOM ICT Services GmbH
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Accredited Test Laboratory:
The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025

DAkkS registration number: D-PL-12076-01-01

Applicant

Sony Ericsson Mobile Communications AB
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Manufacturer

Sony Ericsson Mobile Communications AB
Nya Vattentornet
22188 Lund/SWEDEN

Test Standard/s

IEEE 1528-2003	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR)in the Human Head from Wireless Communications Devices: Measurement Techniques
OET Bulletin 65 Supplement C	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
RSS-102 Issue 4	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	Mobile Phone
Device type:	portable device
Model name:	**AAD-3880119-BV**
S/N serial number:	CB511TQ25P / CB511TQ1Q7 (WLAN)
FCC-ID:	PY7A3880119
IC:	4170B-A3880119
IMEI-Number:	00440214-301453-2 / 00440214-301456-5 (for WLAN)
Hardware status:	AP1
Software status:	4.0.A.2.276 ETS rev 1_0_28_C
Frequency:	see technical details
Antenna:	integrated antenna
Battery option:	Li-ion battery 3.7V / 1500mAh
Accessories:	stereo headset
Test sample status:	production unit
Exposure category:	general population / uncontrolled environment

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test Report authorised:

2011-07-04 Thomas Vogler

Test performed:

2011-07-04 Oleksandr Hnatovskiy

1 Table of contents

2 General information

2.1 Notes

The test results of this test report relate exclusively to the test item specified in this test report. 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 CETECOM ICT Services GmbH.
This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2011-06-06
Date of receipt of test item:	2011-06-06
Start of test:	2011-06-06
End of test:	2011-06-15
Person(s) present during the test:	

2.3 Statement of compliance

The SAR values found for the AAD-3880119-BV Mobile Phone 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.
According to October 2010 TCB Workshop for body worn operation in WLAN hot spot mode this device has been tested with 10 mm distance to the phantom.

2.4 Technical details

Band tested for this test report	Technology	Frequency band	Lowest transmit frequency/MHz	Highest transmit frequency/MHz	Lowest receive Frequency/MHz	Highest receive Frequency/MHz	Kind of modulation	Power Class	Tested power control level	GPRS/EGPRS mobile station class	GPRS/EGPRS multislot class	(E)GPRS voice mode or DTM	Test channel low	Test channel middle	Test channel high	Maximum output power/dBm)*
☐	GSM	GSM	880.2	914.8	925.2	959.8	GMSK 8-PSK	4 E2	5	B	12	no	975	37	124	33.5
☐	GSM	DCS	1710.2	1784.8	1805.2	1879.8	GMSK 8-PSK	1 E2	0	B	12	no	512	698	885	30.8
☒	GSM	cellular	824.2	848.8	869.2	893.8	GMSK 8-PSK	4 E2	5	B	12	no	128	190	251	33.6
☒	GSM	PCS	1850.2	1909.8	1930.2	1989.8	GMSK 8-PSK	1 E2	0	B	12	no	512	661	810	30.9
☐	UMTS	FDD I	1922.4	1977.6	2112.4	2167.6	QPSK	3	max	--	--	--	9612	9750	9888	24.0
☐	UMTS	FDD VIII	882.4	912.6	927.4	957.6	QPSK	3	max	--	--	--	2712	2787	2863	24.5
☐	WLAN	ISM	2412	2472	2412	2472	CCK OFDM	--	max	--	--	--	1	7	13	16.0
☒	WLAN US	ISM	2412	2462	2412	2462	CCK OFDM	--	max	--	--	--	1	6	11	16.0
☐	BT	ISM	2412	2462	2412	2462	GFSK	3	max	--	--	--	0	39	78	6.5

)*: slotted peak power for GSM, averaged max. RMS power for UMTS, WLAN and BT.

3 Test standard/s:

Test Standard	Version	Test Standard Description
IEEE 1528-2003	2003-04	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
OET Bulletin 65 Supplement C	1997-01 2001-01	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
RSS-102 Issue 4	2010-03	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
Canada's Safety Code No. 6	99-EHD-237	Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz
IEEE Std. C95-3	1991	Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave
IEEE Std. C95-1	1999	Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields

3.1 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain and Trunk)	**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).

4 Summary of Measurement Results

☒	**No deviations from the technical specifications ascertained**
☐	Deviations from the technical specifications ascertained

5 Test Environment

Ambient temperature: 20 – 24 °C
Tissue Simulating liquid: 20 – 24 °C

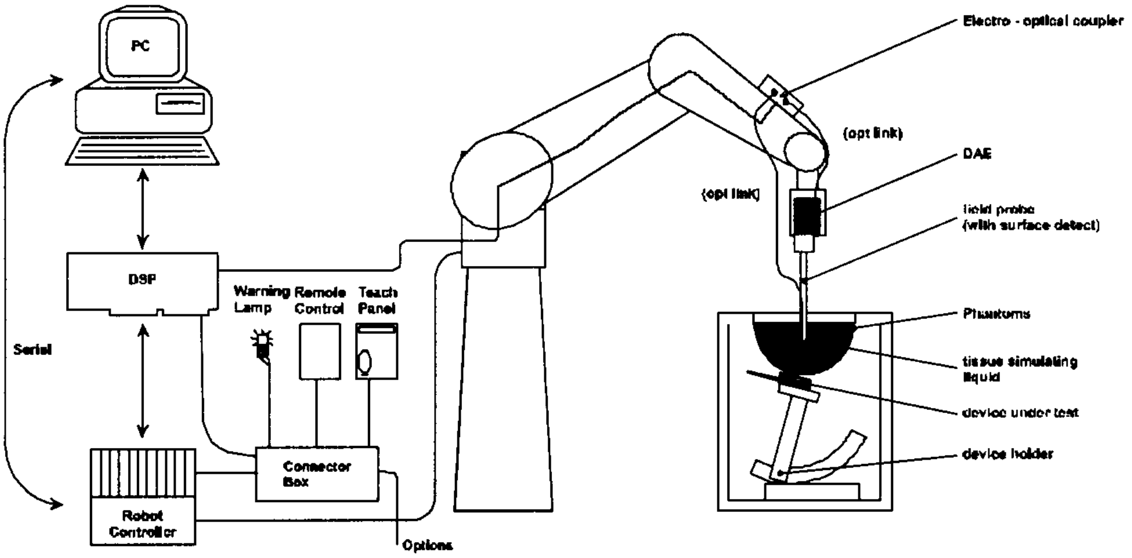
Relative humidity content: 40 – 50 %
Air pressure: not relevant for this kind of testing
Power supply: 230 V / 50 Hz

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

6 Test Set-up

6.1 Measurement system

6.1.1 System Description



- The DASY4 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 DASY4 measurement server.
- The DASY4 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
- DASY4 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.

6.1.2 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.

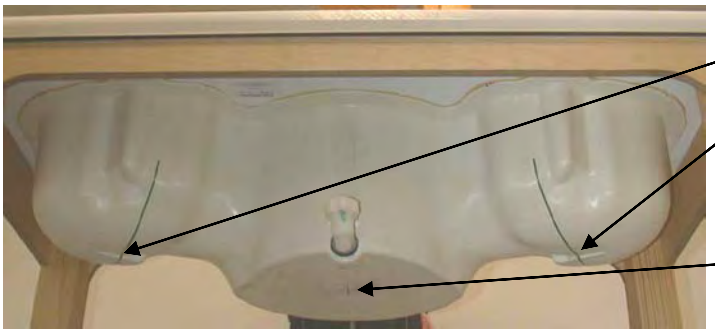
6.1.3 Probe description

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., glycolether)
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)

6.1.4 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.



6.1.5 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.

6.1.6 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 ± 0.1mm). 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 ± 30°.)

- 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 strenth 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 section 3) are shown in table form in section 7.

- 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.

6.1.7 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 compansate boundary effects on E-field probes.

6.1.8 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 [mV/(V/m)^2] for E-field Probes	(i = x, y, z)
	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/cm^3

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/cm^2
	E_{tot}	= total electric field strength in V/m
	H_{tot}	= total magnetic field strength in A/m

6.1.9 Tissue simulating liquids: dielectric properties

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

(Liquids used for tests described in section 7. are marked with ☒) :

Ingredients (% of weight)	Frequency (MHz)					
frequency band	☐ 450	☒ 835	☐ 900	☐ 1800	☒ 1900	☒ 2450
Tissue Type	Head	Head	Head	Head	Head	Head
Water	38.56	41.45	40.92	52.64	54.9	62.7
Salt (NaCl)	3.95	1.45	1.48	0.36	0.18	0.5
Sugar	56.32	56.0	56.5	0.0	0.0	0.0
HEC	0.98	1.0	1.0	0.0	0.0	0.0
Bactericide	0.19	0.1	0.1	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	36.8
DGBE	0.0	0.0	0.0	47.0	44.92	0.0

Table 2: Head tissue dielectric properties

Ingredients (% of weight)	Frequency (MHz)					
frequency band	☐ 450	☒ 835	☐ 900	☐ 1800	☒ 1900	☒ 2450
Tissue Type	Body	Body	Body	Body	Body	Body
Water	51.16	52.4	56.0	69.91	69.91	73.2
Salt (NaCl)	1.49	1.40	0.76	0.13	0.13	0.04
Sugar	46.78	45.0	41.76	0.0	0.0	0.0
HEC	0.52	1.0	1.21	0.0	0.0	0.0
Bactericide	0.05	0.1	0.27	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0
DGBE	0.0	0.0	0.0	29.96	29.96	26.7

Table 3: Body tissue dielectric properties

Salt: 99+% Pure Sodium Chloride
Sugar: 98+% Pure Sucrose
Water: De-ionized, 16MΩ+ resistivity
HEC: Hydroxyethyl Cellulose
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

Note: Due to their availability body tissue simulating liquids as defined by FCC OET Bulletin 65 Supplement C are generally used for body worn SAR testing according to European standards.

6.1.10 Tissue simulating liquids: parameters

Frequency Band	Target Head Tissue		Measured Head Tissue						Measured Date
[MHz]	Permittivity	Conductivity [S/m]	Permittivity			Conductivity [S/m]			
			low	mid	high	low	mid	high	
835	41.5	0.90	42.0	42.0	42.0	0.91	0.91	0.91	2011-06-14
900	41.5	0.97	41.2	41.2	41.2	0.98	0.98	0.98	2011-06-14
1900	40.0	1.40	39.8	39.8	39.8	1.35	1.35	1.35	2011-06-06
2450	39.2	1.80	38.3	38.3	38.3	1.85	1.85	1.85	2011-06-10

Table 4: Parameter of the head tissue simulating liquid

Frequency Band	Target Body Tissue		Measured Body Tissue						Measured Date
[MHz]	Permittivity	Conductivity [S/m]	Permittivity			Conductivity [S/m]			
			low	mid	high	low	mid	high	
835	55.2	0.97	55.6	55.6	55.6	0.95	0.95	0.95	2011-06-09
900	55.0	1.05	55.0	55.0	55.0	1.01	1.01	1.01	2011-06-09
1900	53.3	1.52	53.1	53.1	53.1	1.50	1.50	1.50	2011-06-11
2450	52.7	1.95	51.3	51.3	51.3	2.00	2.00	2.00	2011-06-15

Table 5: Parameter of the body tissue simulating liquid

Note: The dielectric properties have been measured using the contact probe method at 22°C.

6.1.11 Measurement uncertainty evaluation for SAR test

The overall combined measurement uncertainty of the measurement system is ± 10.3% (K=1).
The expanded uncertainty (k=2) is assessed to be ± 20.6%
This measurement uncertainty budget is suggested by IEEE 1528-2003 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

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

Table 6: Measurement uncertainties

6.1.12 Measurement uncertainty evaluation for system validation

The overall combined measurement uncertainty of the measurement system is ± 8.4% (K=1).
The expanded uncertainty (k=2) is assessed to be ± 16.8%
This measurement uncertainty budget is suggested by IEEE 1528-2003 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

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

Table 7: Measurement uncertainties

6.1.13 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 1528. The following table shows validation results for all frequency bands and tissue liquids used during the tests (plot(s) see annex A).

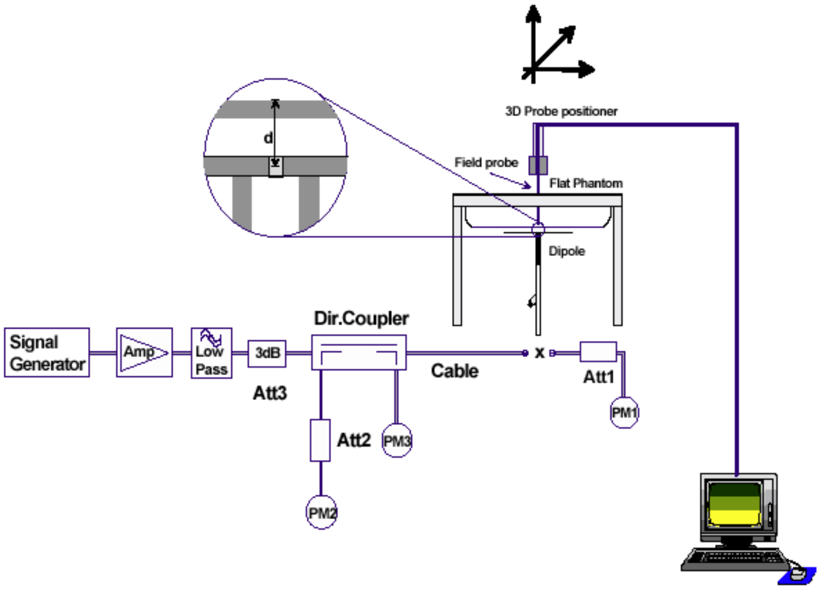
Validation Kit	Frequency	Target Peak SAR (1000 mW) (+/- 10%)	Target SAR_{1g} (1000 mW) (+/- 10%)	Measured Peak SAR (1000 mW)	Measured SAR_{1g} (1000 mW)	Measured date
D900V2 S/N: 102	**900 MHz head**	17.1 mW/g	11.2 mW/g	17.6 mW/g	11.6 mW/g	2011-06-14
D900V2 S/N: 102	**900 MHz body**	17.3 mW/g	11.3 mW/g	16.0 mW/g	11.1 mW/g	2011-06-09
D1900V2 S/N: 5d009	**1900 MHz head**	73.6 mW/g	40.0 mW/g	66.6 mW/g	39.4 mW/g	2011-06-06
D1900V2 S/N: 5d009	**1900 MHz body**	69.6 mW/g	41.8 mW/g	63.3 mW/g	38.8 mW/g	2011-06-10
D1900V2 S/N: 5d009	**1900 MHz body**	69.6 mW/g	41.8 mW/g	63.6 mW/g	38.7 mW/g	2011-06-14
D2450V2 S/N: 710	**2450 MHz head**	112.4 mW/g	51.6 mW/g	110.5 mW/g	50.4 mW/g	2011-06-10
D2450V2 S/N: 710	**2450 MHz head**	112.4 mW/g	51.6 mW/g	113.3 mW/g	55.1 mW/g	2011-06-14
D2450V2 S/N: 710	**2450 MHz body**	104.0 mW/g	54.4 mW/g	97.9 mW/g	49.3 mW/g	2011-06-15

Table 8: Results system validation

Note : 900 MHz probe/dipole calibration is valid +/-100 MHz and fully covers the 850 MHz band.

6.1.14 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.



7 Detailed Test Results
7.1 Conducted power measurements

For the measurements a Rohde & Schwarz Radio Communication Tester CMU 200 was used.
The output power was measured using an integrated RF connector and attached RF cable.
The conducted output power was also checked before and after each SAR measurement. The resulting power values were within a 0.2 dB tolerance of the values shown below.

Note: CMU200 measures GSM peak and average output power for active timeslots.
For SAR the timebased average power is relevant. The difference inbetween depends on the duty cycle of the TDMA signal :

No. of timeslots	***1***	***2***	***3***	***4***
Duty Cycle	1 : 8	1: 4	1 : 2.66	1 : 2
timebased avg. power compared to slotted avg. power	- 9 dB	- 6 dB	- 4.25 dB	- 3 dB

The signalling modes differ as follows :

mode	***coding scheme***	***modulation***
GPRS	CS1 to CS4	GMSK
EGPRS (EDGE)	MCS1 to MCS4	GMSK
EGPRS (EDGE)	MCS5 to MCS9	8PSK

Apart from modulation change (GMSK/8PSK) coding schemes differ in code rate without influence on the RF signal. Therefore one coding scheme per mode was selected for conducted power measurements.

7.1.1 Conducted power measurements GSM 850 MHz

Channel / frequency	modulation	timeslots	slotted avg. power	time based avg. power (calculated)
128 / 824.2 MHz	GMSK	1	33.5 dBm	24.5 dBm
190 / 836.6 MHz	GMSK	1	33.6 dBm	24.6 dBm
251 / 848.0 MHz	GMSK	1	33.6 dBm	24.6 dBm
128 / 824.2 MHz	GMSK	2	30.1 dBm	24.1 dBm
190 / 836.6 MHz	GMSK	2	29.9 dBm	23.9 dBm
251 / 848.0 MHz	GMSK	2	30.3 dBm	24.3 dBm
128 / 824.2 MHz	GMSK	3	28.7 dBm	24.45 dBm
190 / 836.6 MHz	GMSK	3	28.8 dBm	24.55 dBm
251 / 848.0 MHz	GMSK	3	29.1 dBm	24.85 dBm
128 / 824.2 MHz	GMSK	4	28.3 dBm	**25.3 dBm**
190 / 836.6 MHz	GMSK	4	28.4 dBm	**25.4 dBm**
251 / 848.0 MHz	GMSK	4	28.6 dBm	**25.6 dBm**
128 / 824.2 MHz	8PSK	4	22.6 dBm	19.6 dBm
190 / 836.6 MHz	8PSK	4	22.8 dBm	19.8 dBm
251 / 848.0 MHz	8PSK	4	22.8 dBm	19.8 dBm

Table 9: Test results conducted power measurement GSM 850 MHz

7.1.2 Conducted power measurements GSM 1900 MHz

Channel / frequency	modulation	timeslots	slotted avg. power	time based avg. power (calculated)
512 / 1850.2 MHz	GMSK	1	30.9 dBm	21.9 dBm
661 / 1880.0 MHz	GMSK	1	30.8 dBm	21.8 dBm
810 / 1909.8 MHz	GMSK	1	30.6 dBm	21.6 dBm
512 / 1850.2 MHz	GMSK	2	27.7 dBm	21.7 dBm
661 / 1880.0 MHz	GMSK	2	27.9 dBm	21.9 dBm
810 / 1909.8 MHz	GMSK	2	27.7 dBm	21.7 dBm
512 / 1850.2 MHz	GMSK	3	26.7 dBm	22.45 dBm
661 / 1880.0 MHz	GMSK	3	26.8 dBm	22.55 dBm
810 / 1909.8 MHz	GMSK	3	26.7 dBm	22.45 dBm
512 / 1850.2 MHz	GMSK	4	25.7 dBm	**22.7 dBm**
661 / 1880.0 MHz	GMSK	4	25.7 dBm	**22.7 dBm**
810 / 1909.8 MHz	GMSK	4	25.7 dBm	**22.7 dBm**
512 / 1850.2 MHz	8PSK	4	20.4 dBm	17.4 dBm
661 / 1880.0 MHz	8PSK	4	20.5 dBm	17.5 dBm
810 / 1909.8 MHz	8PSK	4	20.4 dBm	17.4 dBm

Table 10: Test results conducted power measurement GSM 1900 MHz

7.1.3 Justification of SAR measurements in GSM mode

SAR measurements were performed in GPRS mode with 4 active timeslots because highest time based averaged output power was calculated for that configuration.
For comparison an additional delta measurement was performed with 1 timeslot in speech mode. In EDGE mode no delta measurement was performed.

7.1.4 Conducted power measurements WLAN 2.4 GHz

Channel / frequency	modulation	bit rate	timebased avg. power
1 / 2412 MHz	CCK	1 MBit/s	16.0 dBm
6 / 2437 MHz	CCK	1 MBit/s	16.0 dBm
11 / 2462 MHz	CCK	1 MBit/s	15.8 dBm
1 / 2412 MHz	OFDM	6 MBit/s	14.9 dBm
6 / 2437 MHz	OFDM	6 MBit/s	14.8 dBm
11 / 2462 MHz	OFDM	6 MBit/s	15.0 dBm

Table 11: Test results conducted power measurement WLAN 2.4 GHz

7.1.5 Multiple Transmitter Information

The following tables list information which is relevant for the decision if a simultaneous transmit evaluation is necessary according to KDB 648474.

Important abbreviations:

SPLSR: Antenna pair SAR to Peak Location Separation Ratio $(SAR_x + SAR_y)/L_{xy}$
P_{ref} : 12 mW at 2.4 GHz
Minimum antenna separation distance between main antenna and WLAN – **81.7 mm**

a) head position

Tx No.	Communcation system and frequency band	P_{avg} (mW)	single SAR (W/kg) (see ch. 7.2)	remarks
1a	GSM 850 MHz	250	0.308	routine evaluation
1b	GSM 1900 MHz	125	1.070	routine evaluation
2a	WLAN 2450 MHz	50	0.707	routine evaluation
2b	Bluetooth 2450 MHz	4.5	:=0	$P_2 < P_{ref}$
Sum of all 1g-SAR values			n/a	

Table 12: Communication systems and SAR values in head position

antenna pair (x,y)	peak-locations spacing L_{xy} (cm)	Σ 1g-SAR (W/kg)	$SPLSR_{xy}$	sim.-Tx SAR	remarks
(1a,2a)	6.41	0.990	0.15	N	$SPLSR_{xy}$ < 0.3 and ΣSAR < 1.6 W/kg
(1b,2a)	7.07	1.656	0.23	N	ΣSAR > 1.6 W/kg but $SPLSR_{xy}$ < 0.3

Table 13: Antenna distances and SPLSR evaluation in head position

SPLSRxy = SAR-to-(peak-locations spacing) ratio = (SARx+SARy)/Lxy

Σ 1g-SAR: sum of the highest SAR of Tx No. 1 and the SAR of Tx No. 2 at the same DUT position or orientation as the highest value of Tx No. 1 i.e. not necessarily the sum of the highest SAR values of both transmitters.

b) body position

Tx No.	Communcation system and frequency band	P_{avg} (mW)	single SAR (W/kg) (see ch. 7.2)	remarks
1a	GSM 850 MHz	1000	0.950	routine evaluation
1b	GSM 1900 MHz	500	0.941	routine evaluation
2a	WLAN 2450 MHz	50	0.102	routine evaluation
2b	Bluetooth 2450 MHz	4.5	:=0	$P_2 < P_{ref}$
Sum of all 1g-SAR values			n/a	

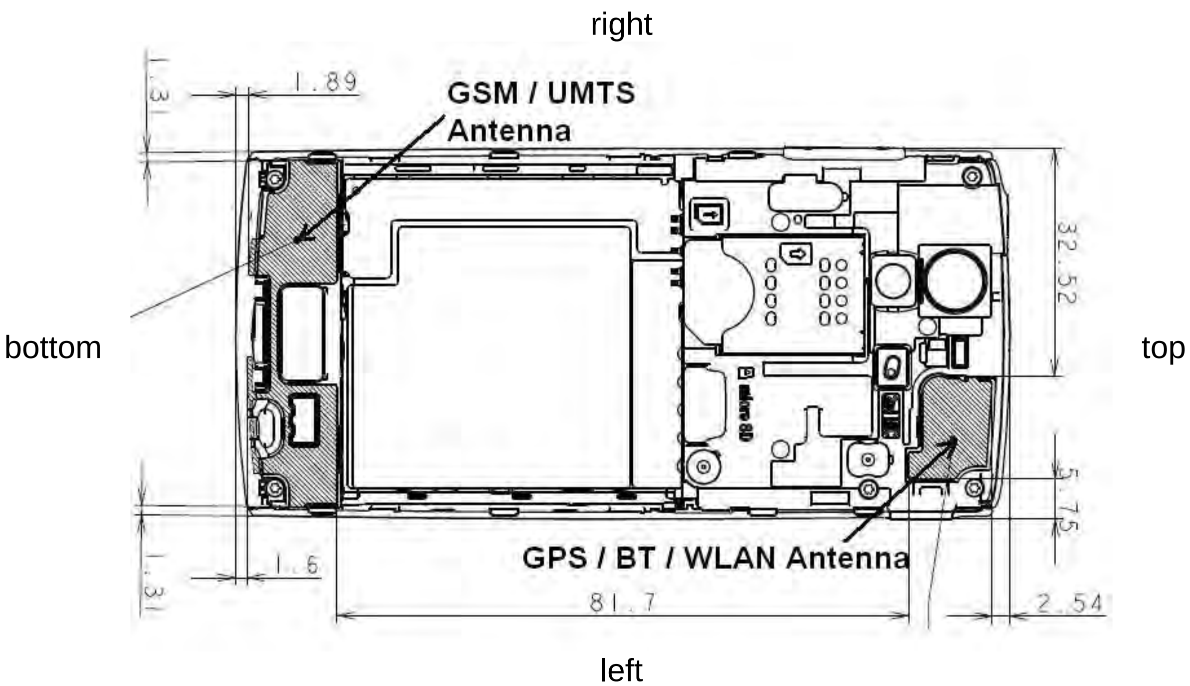
Table 14: Communication systems and SAR values in body position

antenna pair (x,y)	peak-locations spacing L_{xy} (cm)	Σ 1g-SAR (W/kg)	$SPLSR_{xy}$	sim.-Tx SAR	remarks
(1a,2a)	7.20	1.052	0.15	N	$SPLSR_{xy} < 0.3$ and $\Sigma SAR < 1.6$ W/kg
(1b,2a)	8.26	1.041	0.13	N	$SPLSR_{xy} < 0.3$ and $\Sigma SAR < 1.6$ W/kg

Table 15: Antenna distances and SPLSR evaluation in body position
SPLSRxy = SAR-to-(peak-locations spacing) ratio = (SARx+SARy)/Lxy

7.1.6 Mobile hotspot SAR measurement positions

Mobile hotspot SAR measurement positions						
mode	front	rear	left edge	right edge	top edge	bottom edge
GSM 850	yes	yes	yes	yes	no	yes
GSM 1900	yes	yes	yes	yes	no	yes
WCDMA FDD V 850	yes	yes	yes	yes	no	yes
WCDMA FDD V 1900	yes	yes	yes	yes	no	yes
WLAN 2450	yes	yes	yes	no	yes	no



The edges with less than 2.5 cm distance to the TX antennas need to be tested for hotspot SAR.

7.2 SAR test results

7.2.1 Results overview

Head SAR GSM 850 MHz (averaged over 1g tissue volume)						
Channel / frequency	Position	Left hand test result	Right hand test result	Limit	Liquid temperature left	right
128 / 824.2 MHz	cheek	0.283 W/kg	0.241 W/kg	1.6 W/kg	23.1 °C	23.1 °C
190 / 836.6 MHz	cheek	0.294 W/kg	0.263 W/kg	1.6 W/kg	23.1 °C	23.1 °C
251 / 848.8 MHz	cheek	**0.308 W/kg**	0.283 W/kg	1.6 W/kg	23.1 °C	23.1 °C
128 / 824.2 MHz	tilted 15°	0.142 W/kg	0.165 W/kg	1.6 W/kg	23.1 °C	23.1 °C
190 / 836.6 MHz	tilted 15°	0.150 W/kg	0.165 W/kg	1.6 W/kg	23.1 °C	23.1 °C
251 / 848.8 MHz	tilted 15°	0.157 W/kg	0.172 W/kg	1.6 W/kg	23.1 °C	23.1 °C

Table 16: Test results head SAR GSM 850 MHz

Body SAR GSM 850 MHz (averaged over 1g tissue volume)						
Channel / frequency	Position	Distance	test condition	Body worn test result	Limit	Liquid temperature
128 / 824.2 MHz	front	10 mm	4 time slots	0.338 W/kg	1.6 W/kg	22.5 °C
190 / 836.6 MHz	front	10 mm	4 time slots	0.481 W/kg	1.6 W/kg	22.5 °C
251 / 848.8 MHz	front	10 mm	4 time slots	0.592 W/kg	1.6 W/kg	22.5 °C
128 / 824.2 MHz	rear	10 mm	4 time slots	0.633 W/kg	1.6 W/kg	22.5 °C
190 / 836.6 MHz	rear	10 mm	4 time slots	0.866 W/kg	1.6 W/kg	22.5 °C
251 / 848.8 MHz	rear	10 mm	4 time slots	**0.950 W/kg**	1.6 W/kg	22.5 °C
190 / 836.6 MHz	left	10 mm	4 time slots	0.354 W/kg	1.6 W/kg	22.5 °C
190 / 836.6 MHz	right	10 mm	4 time slots	0.326 W/kg	1.6 W/kg	22.5 °C
190 / 836.6 MHz	bottom	10 mm	4 time slots	0.064 W/kg	1.6 W/kg	22.5 °C
251 / 848.8 MHz	rear	15 mm	1 time slot	0.333 W/kg	1.6 W/kg	22.5 °C

Table 17: Test results body SAR GSM 850 MHz

Head SAR GSM 1900 MHz (averaged over 1g tissue volume)						
Channel / frequency	Position	Left hand test result	Right hand test result	Limit	Liquid temperature left	right
512 / 1850.2 MHz	cheek	1.040 W/kg	0.592 W/kg	1.6 W/kg	23.2 °C	23.6 °C
661 / 1880.0 MHz	cheek	**1.070 W/kg**	0.607 W/kg	1.6 W/kg	23.2 °C	23.6 °C
810 / 1909.8 MHz	cheek	0.808 W/kg	0.456 W/kg	1.6 W/kg	23.2 °C	23.6 °C
512 / 1850.2 MHz	tilted 15°	0.324 W/kg	0.392 W/kg	1.6 W/kg	23.2 °C	23.6 °C
661 / 1880.0 MHz	tilted 15°	0.352 W/kg	0.420 W/kg	1.6 W/kg	23.2 °C	23.6 °C
810 / 1909.8 MHz	tilted 15°	0.288 W/kg	0.320 W/kg	1.6 W/kg	23.2 °C	23.6 °C

Table 18: Test results head SAR GSM 1900 MHz

Body SAR GSM 1900 MHz (averaged over 1g tissue volume)						
Channel / frequency	Position	Distance	test condition	Body worn test result	Limit	Liquid temperature
512 / 1850.2 MHz	front	10 mm	4 time slots	0.680 W/kg	1.6 W/kg	22.9 °C
661 / 1880.0 MHz	front	10 mm	4 time slots	0.890 W/kg	1.6 W/kg	22.9 °C
810 / 1909.8 MHz	front	10 mm	4 time slots	**0.941 W/kg**	1.6 W/kg	22.9 °C
512 / 1850.2 MHz	rear	10 mm	4 time slots	0.620 W/kg	1.6 W/kg	22.9 °C
661 / 1880.0 MHz	rear	10 mm	4 time slots	0.816 W/kg	1.6 W/kg	22.9 °C
810 / 1909.8 MHz	rear	10 mm	4 time slots	0.859 W/kg	1.6 W/kg	22.9 °C
661 / 1880.0 MHz	left	10 mm	4 time slots	0.349 W/kg	1.6 W/kg	21.9 °C
661 / 1880.0 MHz	right	10 mm	4 time slots	0.117 W/kg	1.6 W/kg	21.9 °C
661 / 1880.0 MHz	bottom	10 mm	4 time slots	0.524 W/kg	1.6 W/kg	21.9 °C
810 / 1909.8 MHz	front	15 mm	1 time slot	0.259 W/kg	1.6 W/kg	22.9 °C

Table 19: Test results body SAR GSM 1900 MHz

Head SAR WLAN 2450 MHz (averaged over 1g tissue volume)						
Channel / frequency	Position	Left hand test result	Right hand test result	Limit	Liquid temperature left	right
1 / 2412 MHz	cheek	0.586 W/kg	**0.707 W/kg**	1.6 W/kg	22.1 °C	22.1 °C
6 / 2437 MHz	cheek	0.387 W/kg	0.535 W/kg	1.6 W/kg	22.1 °C	22.1 °C
11 / 2462 MHz	cheek	0.385 W/kg	0.541 W/kg	1.6 W/kg	22.1 °C	22.1 °C
1 / 2412 MHz	tilted 15°	0.353 W/kg	0.540 W/kg	1.6 W/kg	22.1 °C	22.1 °C
6 / 2437 MHz	tilted 15°	0.268 W/kg	0.380 W/kg	1.6 W/kg	22.1 °C	22.1 °C
11 / 2462 MHz	tilted 15°	0.234 W/kg	0.376 W/kg	1.6 W/kg	22.1 °C	22.1 °C
1 / 2412 MHz	cheek OFDM 6 Mbps		0.522 W/kg	1.6 W/kg	--- °C	22.1 °C
1 / 2412 MHz	cheek OFDM 6.5 Mbps		0.511 W/kg	1.6 W/kg	--- °C	22.1 °C

Table 20: Test results head SAR WLAN 2450 MHz

Body SAR WLAN 2450 MHz (averaged over 1g tissue volume)						
Channel / frequency	Position	Distance	test condition	Body worn test result	Limit	Liquid temperature
1 / 2412 MHz	front	10 mm	CCK 1 Mbit/s	0.100 W/kg	1.6 W/kg	23.2 °C
6 / 2437 MHz	front	10 mm	CCK 1 Mbit/s	0.077 W/kg	1.6 W/kg	23.2 °C
11 / 2462 MHz	front	10 mm	CCK 1 Mbit/s	0.076 W/kg	1.6 W/kg	23.2 °C
1 / 2412 MHz	rear	10 mm	CCK 1 Mbit/s	**0.102 W/kg**	1.6 W/kg	23.2 °C
6 / 2437 MHz	rear	10 mm	CCK 1 Mbit/s	0.074 W/kg	1.6 W/kg	23.2 °C
11 / 2462 MHz	rear	10 mm	CCK 1 Mbit/s	0.066 W/kg	1.6 W/kg	23.2 °C
6 / 2437 MHz	left	10 mm	CCK 1 Mbit/s	0.069 W/kg	1.6 W/kg	23.2 °C
6 / 2437 MHz	right	10 mm	CCK 1 Mbit/s	0.021 W/kg	1.6 W/kg	23.2 °C
6 / 2437 MHz	top edge	10 mm	CCK 1 Mbit/s	0.046 W/kg	1.6 W/kg	23.2 °C
1 / 2412 MHz	rear	10 mm	OFDM 6Mbit/s	0.073 W/kg	1.6 W/kg	23.2 °C
1 / 2412 MHz	rear	10 mm	OFDM 6.5Mbit/s	0.068 W/kg	1.6 W/kg	23.2 °C

Table 21: Test results body SAR WLAN 2450 MHz

Bottom edge position is not required since the distance from the WLAN antenna to the edge is greater than 2.5cm.

Note:

The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band 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.
Per Oct 2010 TCB FCC Workshop, the edges with antennas within 2.5 cm are required to be evaluated for SAR to cover WLAN hot spot function.
Tests in body position were performed with 10 mm air gap between DUT and SAM.
The additional GSM body tests were performed at worst case with 1 time slot in uplink and 15 mm distance from DUT to the phantom in accordance with Sony Ericsson requirements.

7.2.2 General description of test procedures

The DUT is tested using a CMU 200 communications tester as controller unit to set test channels and maximum output power to the DUT, as well as for measuring the conducted peak power.
Test positions as described in the tables above are in accordance with the specified test standard.
Tests in body position were performed in that configuration, which generates the highest time based averaged output power (see conducted power results).
Tests in head position with GSM were performed in voice mode with 1 timeslot unless GPRS/EGPRS/DTM function allows parallel voice and data traffic on 2 or more timeslots (see section 2.4 for details).
WLAN was tested in 802.11b mode with 1 Mbit/s with the delta measurements in 802.11g and 802.11n modes on worst case position.

8 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

No	used	Equipment	Type	Manufacturer	Serial No.	Last Calibration	Frequency (months)
1	☒	Dosimetric E-Field Probe	ET3DV6	Schmid & Partner Engineering AG	1558	August 11, 2010	12
2	☒	Dosimetric E-Field Probe	ET3DV6	Schmid & Partner Engineering AG	1559	January 19, 2011	12
3	☒	900 MHz System Validation Dipole	D900V2	Schmid & Partner Engineering AG	102	August 16, 2010	12
4	☐	1800 MHz System Validation Dipole	D1800V2	Schmid & Partner Engineering AG	287	August 17, 2010	12
5	☒	1900 MHz System Validation Dipole	D1900V2	Schmid & Partner Engineering AG	531	August 17, 2010	12
6	☒	2450 MHz System Validation Dipole	D2450V2	Schmid & Partner Engineering AG	710	August 19, 2010	12
7	☒	Data acquisition electronics	DAE3V1	Schmid & Partner Engineering AG	413	January 13, 2011	12
8	☒	Data acquisition electronics	DAE3V1	Schmid & Partner Engineering AG	477	May 04, 2011	12
9	☒	Software	DASY 4 V4.5	Schmid & Partner Engineering AG	---	N/A	--
10	☒	Phantom	SAM	Schmid & Partner Engineering AG	---	N/A	--
11	☒	Universal Radio Communication Tester	CMU 200	Rohde & Schwarz	106826	January 12, 2011	12
12	☒	Network Analyser 300 kHz to 6 GHz	8753ES	Hewlett Packard)*	US39174436	July 6, 2010	12
13	☒	Dielectric Probe Kit	85070C	Hewlett Packard	US99360146	N/A	12
14	☒	Signal Generator	8665A	Hewlett Packard	2833A00112	January 6, 2011	12
15	☒	Amplifier	25S1G4 (25 Watt)	Amplifier Reasearch	20452	N/A	--
16	☒	Power Meter	NRP	Rohde & Schwarz	101367	January 6, 2011	12
17	☒	Power Meter Sensor	NRP Z22	Rohde & Schwarz	100227	January 6, 2011	12
18	☒	Power Meter Sensor	NRP Z22	Rohde & Schwarz	100234	January 6, 2011	12

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

9 Observations

No observations exceeding those reported with the single test cases have been made.

Annex A: System performance verification

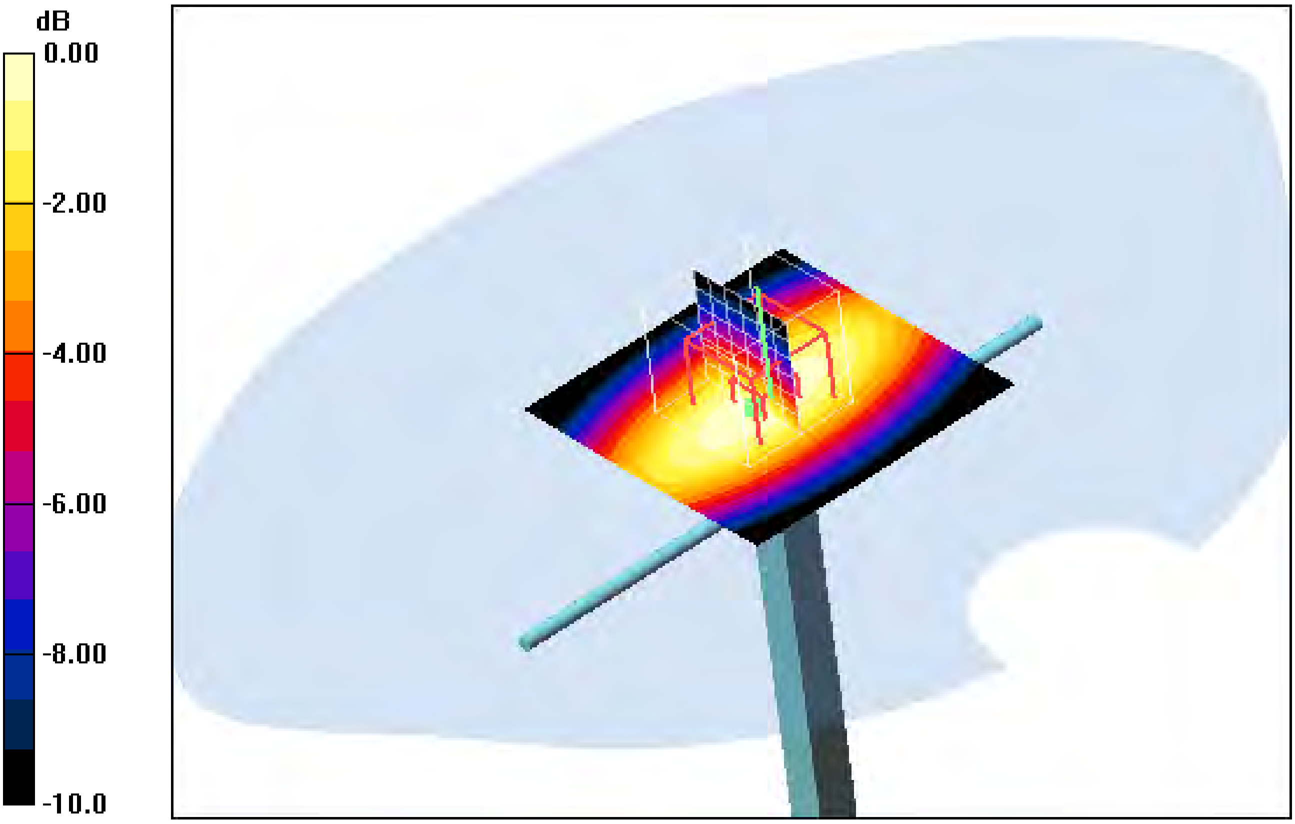
Date/Time: 14.06.2011 13:08:49Date/Time: 14.06.2011 13:12:28

SystemPerformanceCheck-D900 head 2011-06-14

DUT: Dipole 900 MHz; Type: D900V2; Serial: 102
Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: HSL850 Medium parameters used: f = 900 MHz; σ = 0.98 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.8, 5.8, 5.8); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

d=15mm, Pin=1000mW/Area Scan (51x51x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.4 mW/g

d=15mm, Pin=1000mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 118.4 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 11.6 mW/g; SAR(10 g) = 7.46 mW/g
Maximum value of SAR (measured) = 12.7 mW/g



0 dB = 12.7mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.1°C

Date/Time: 09.06.2011 12:45:41Date/Time: 09.06.2011 12:49:22

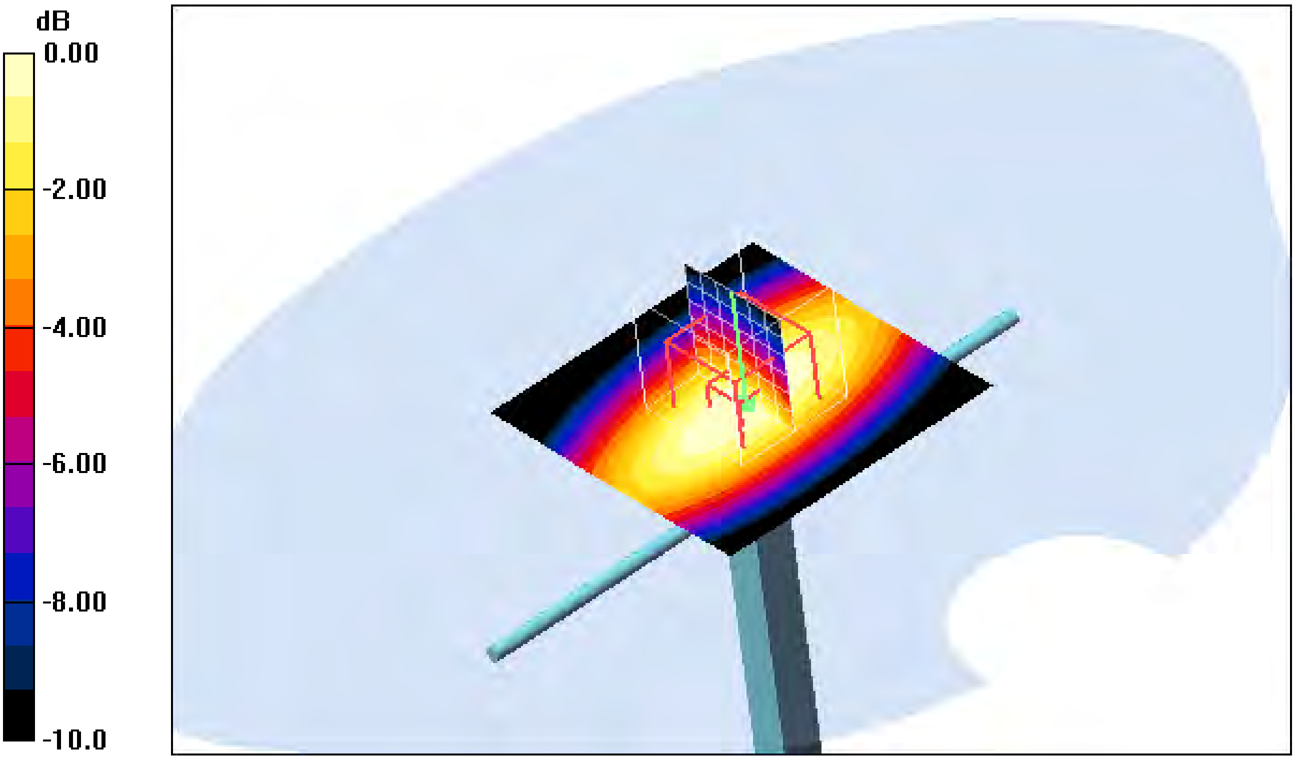
SystemPerformanceCheck-D900 body 2011-06-09

DUT: Dipole 900 MHz; Type: D900V2; Serial: 102

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: M850 Medium parameters used: f = 900 MHz; σ = 1.01 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.73, 5.73, 5.73); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

d=15mm, Pin=1000mW/Area Scan (51x51x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.0 mW/g

d=15mm, Pin=1000mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 114.1 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 16.0 W/kg
SAR(1 g) = 11.1 mW/g; SAR(10 g) = 7.2 mW/g
Maximum value of SAR (measured) = 12.1 mW/g



0 dB = 12.1mW/g

Additional information:
ambient temperature: 22.6°C; liquid temperature: 22.5°C

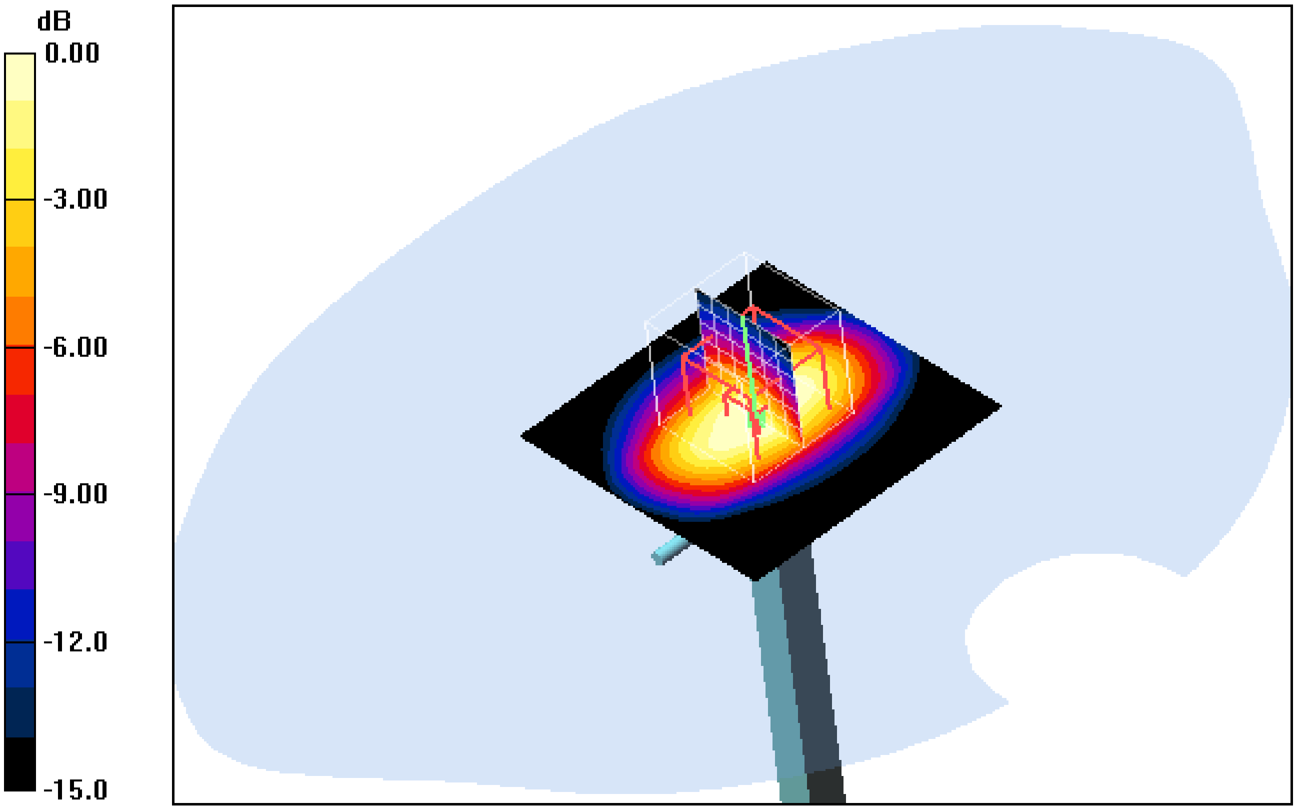
Date/Time: 06.06.2011 08:34:20Date/Time: 06.06.2011 08:37:59

SystemPerformanceCheck-D1900 head 2011-06-06

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d009
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL1900 Medium parameters used: f = 1900 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- 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 (51x51x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 52.6 mW/g

d=10mm, Pin=1000mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 191.2 V/m; Power Drift = -0.014 dB
Peak SAR (extrapolated) = 66.6 W/kg
SAR(1 g) = 39.4 mW/g; SAR(10 g) = 21.1 mW/g
Maximum value of SAR (measured) = 44.1 mW/g



0 dB = 44.1mW/g

Additional information:
ambient temperature: 23.6°C; liquid temperature: 23.6°C

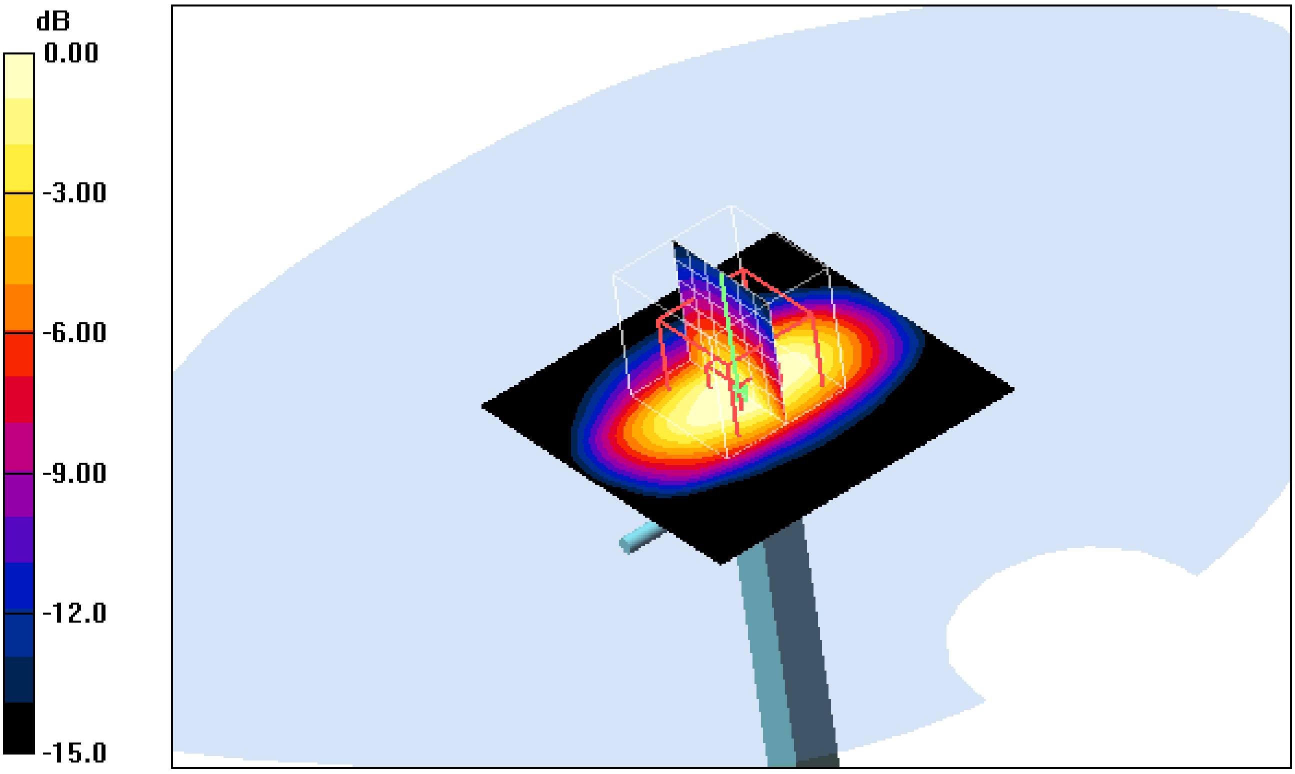
Date/Time: 10.06.2011 10:22:09Date/Time: 10.06.2011 10:25:47

SystemPerformanceCheck-D1900 body 2011-06-10

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d009
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: M1900 Medium parameters used: f = 1900 MHz; σ = 1.5 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.35, 4.35, 4.35); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- 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 (51x51x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 53.6 mW/g

d=10mm, Pin=1000mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 185.1 V/m; Power Drift = -0.049 dB
Peak SAR (extrapolated) = 63.3 W/kg
SAR(1 g) = 38.8 mW/g; SAR(10 g) = 20.9 mW/g
Maximum value of SAR (measured) = 44.4 mW/g



0 dB = 44.4mW/g

Additional information:
ambient temperature: 22.7°C; liquid temperature: 22.1°C

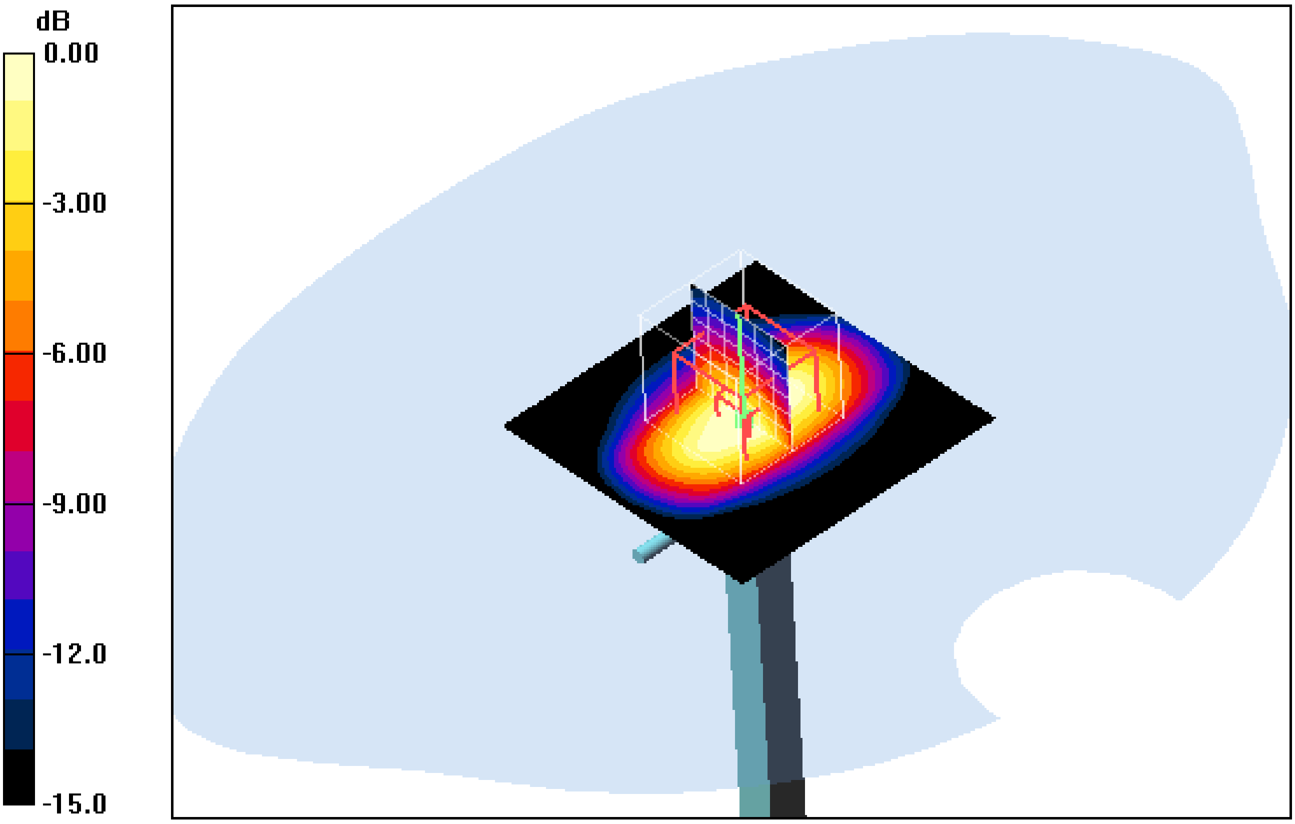
Date/Time: 14.06.2011 08:08:40Date/Time: 14.06.2011 08:12:16

SystemPerformanceCheck-D1900 body 2011-06-14

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d009
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: M1900 Medium parameters used: f = 1900 MHz; σ = 1.5 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.35, 4.35, 4.35); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- 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 (51x51x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 54.9 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 = -0.01 dB
Peak SAR (extrapolated) = 63.6 W/kg
SAR(1 g) = 38.7 mW/g; SAR(10 g) = 20.9 mW/g
Maximum value of SAR (measured) = 44.2 mW/g



0 dB = 44.2mW/g

Additional information:
ambient temperature: 22.9°C; liquid temperature: 22.9°C

Date/Time: 10.06.2011 09:11:26Date/Time: 10.06.2011 09:15:12

SystemPerformanceCheck-D2450 head 2011-06-10

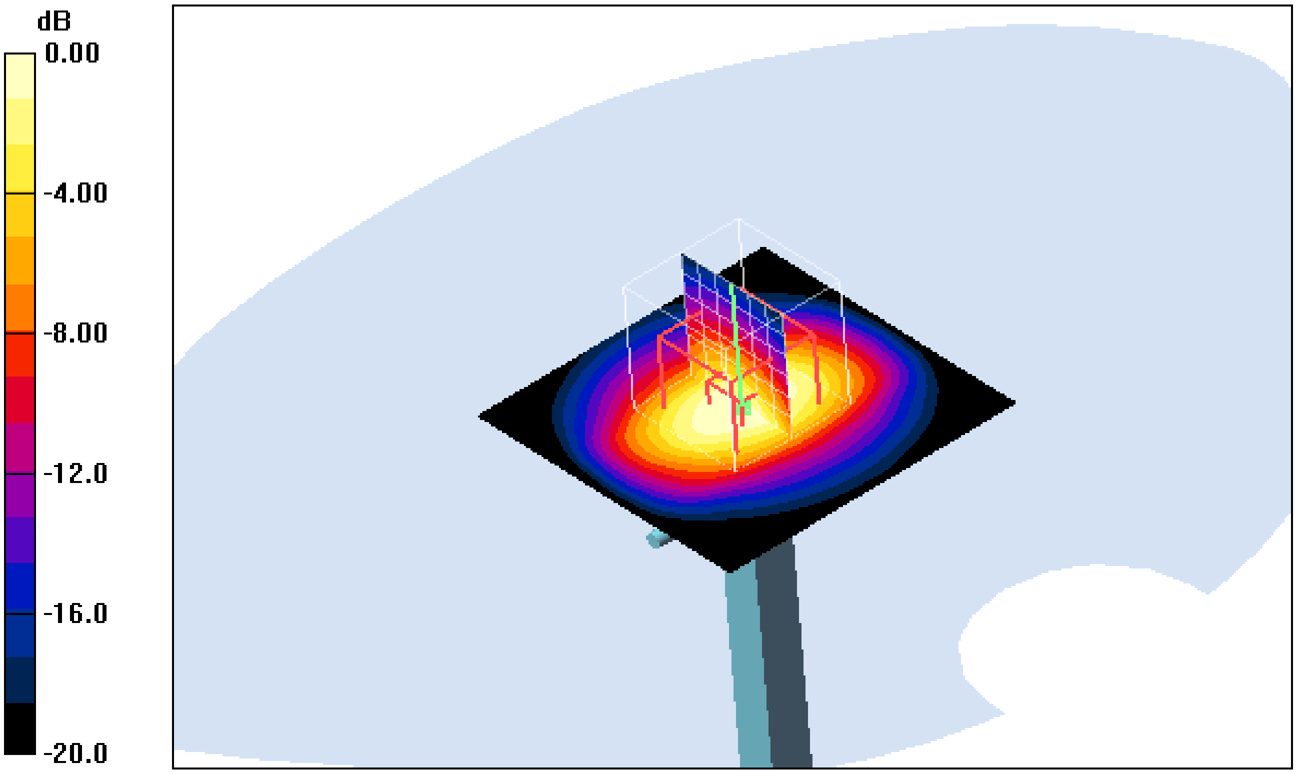
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 710
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2450 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

d=10mm, Pin=1000mW/Area Scan (51x51x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 74.3 mW/g

d=10mm, Pin=1000mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

dx=5mm, dy=5mm, dz=5mm
Reference Value = 190.7 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 110.5 W/kg
SAR(1 g) = 50.4 mW/g; SAR(10 g) = 23.8 mW/g
Maximum value of SAR (measured) = 57.4 mW/g



0 dB = 57.4mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 22.1°C

Date/Time: 14.06.2011 12:51:45Date/Time: 14.06.2011 12:55:39

SystemPerformanceCheck-D2450 head 2011-06-14

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

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

Medium: HSL2450 Medium parameters used: f = 2450 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

d=10mm, Pin=1000mW/Area Scan (51x51x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 80.2 mW/g

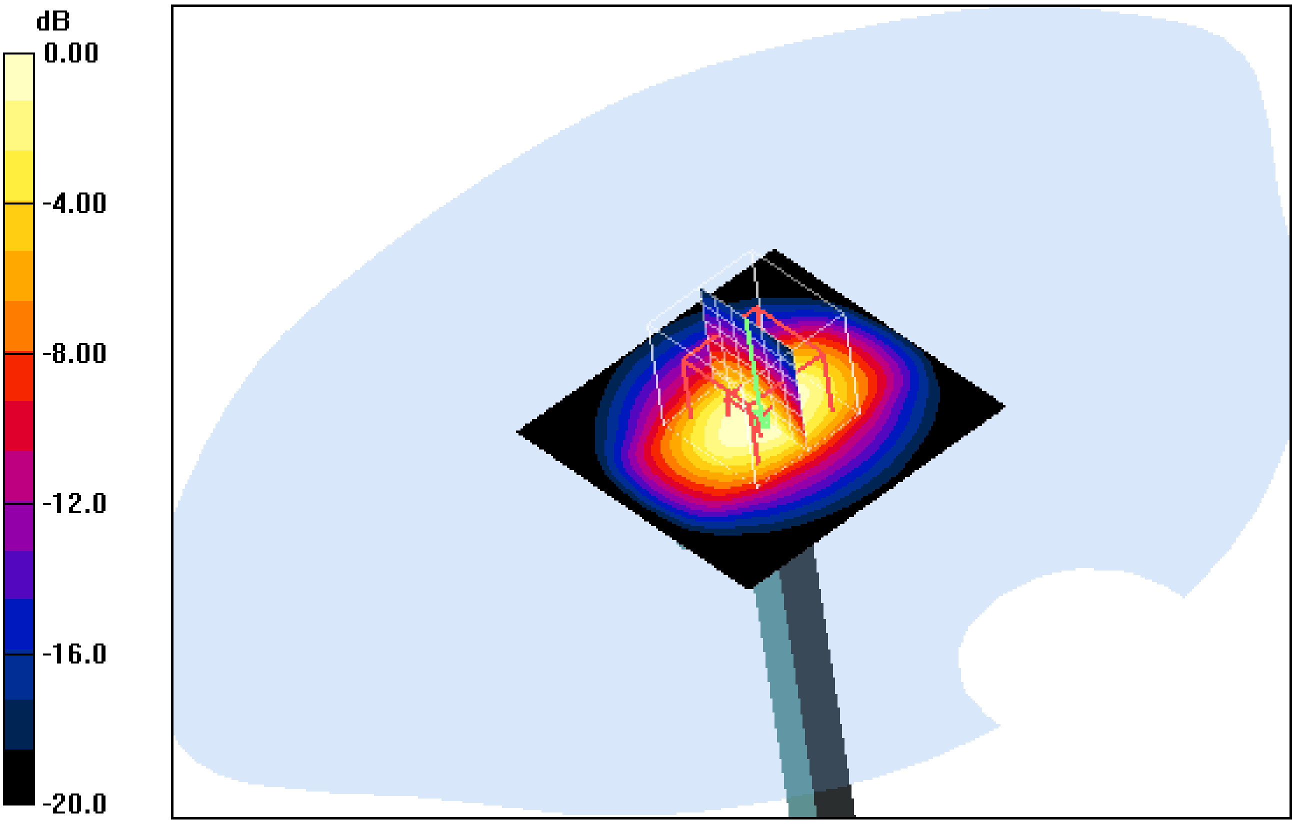
d=10mm, Pin=1000mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 193.8 V/m; Power Drift = -0.019 dB

Peak SAR (extrapolated) = 113.3 W/kg

SAR(1 g) = 55.1 mW/g; SAR(10 g) = 25.8 mW/g

Maximum value of SAR (measured) = 62.6 mW/g



0 dB = 62.6mW/g

Additional information:

ambient temperature: 23.3°C; liquid temperature: 22.2°C

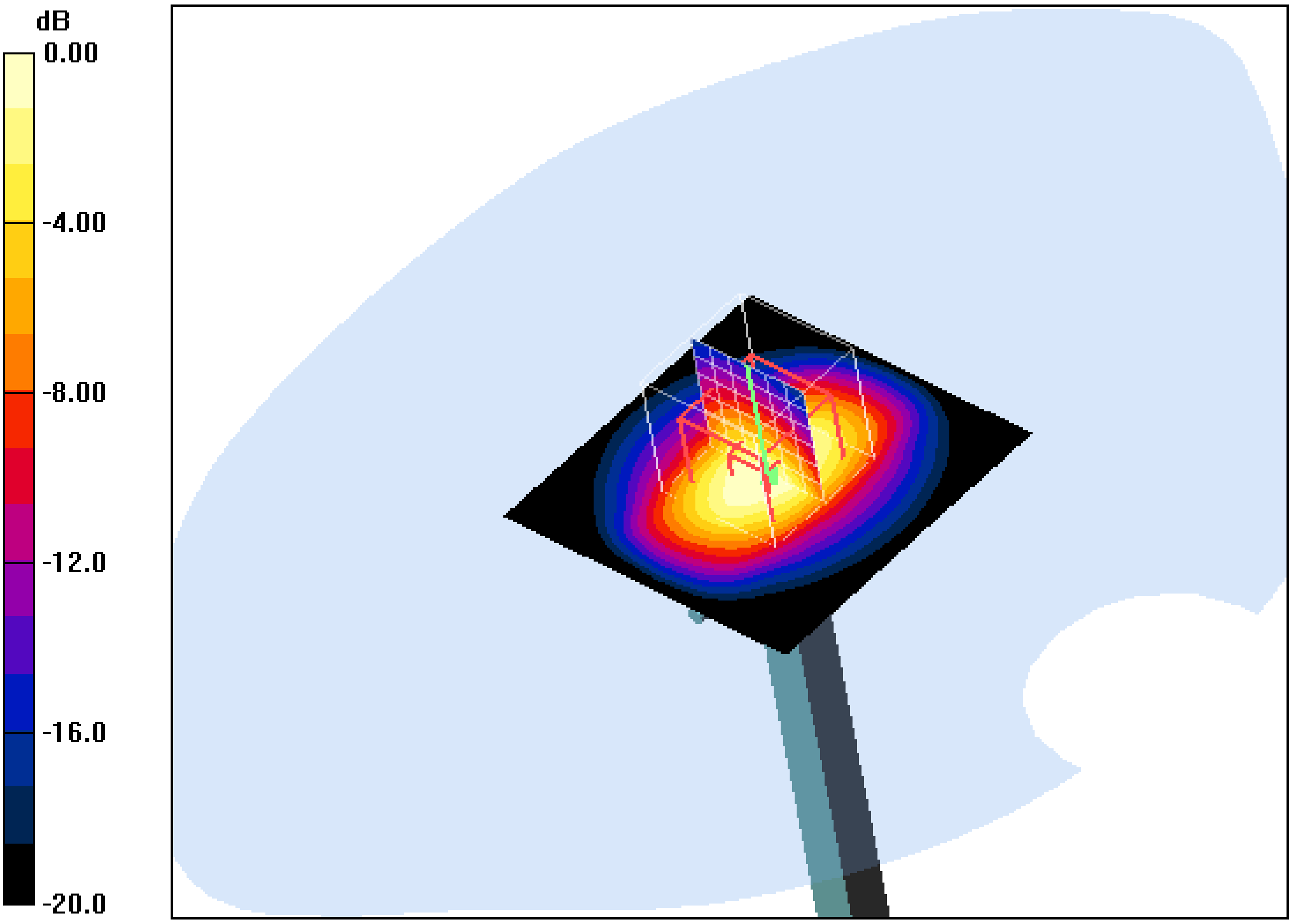
Date/Time: 15.06.2011 08:40:00Date/Time: 15.06.2011 08:43:56

SystemPerformanceCheck-D2450 body 2011-06-15

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 MHz; σ = 2 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(3.91, 3.91, 3.91); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

d=10mm, Pin=1000mW/Area Scan (51x51x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 76.4 mW/g

d=10mm, Pin=1000mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 185.8 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 97.9 W/kg
SAR(1 g) = 49.3 mW/g; SAR(10 g) = 24.1 mW/g
Maximum value of SAR (measured) = 57.4 mW/g



0 dB = 57.4mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.2°C

Annex A.1: GSM 850MHz head

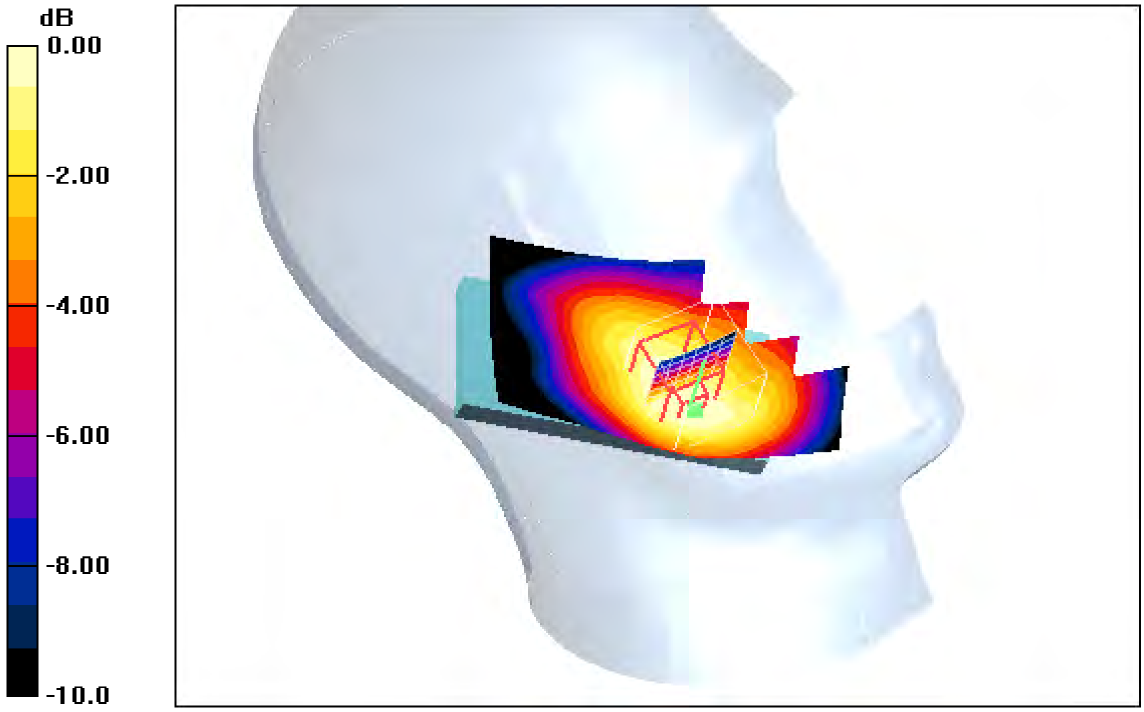
Date/Time: 14.06.2011 13:35:31Date/Time: 14.06.2011 13:44:14

IEEE1528_OET65-LeftHandSide-GSM850

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8
Medium: HSL850 Medium parameters used: f = 824.2 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.92, 5.92, 5.92); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.307 mW/g

Touch position - Low/Zoom Scan (7x7x7) (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.2 V/m; Power Drift = -0.097 dB
Peak SAR (extrapolated) = 0.420 W/kg
SAR(1 g) = 0.283 mW/g; SAR(10 g) = 0.191 mW/g
Maximum value of SAR (measured) = 0.297 mW/g



0 dB = 0.297mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.1°C

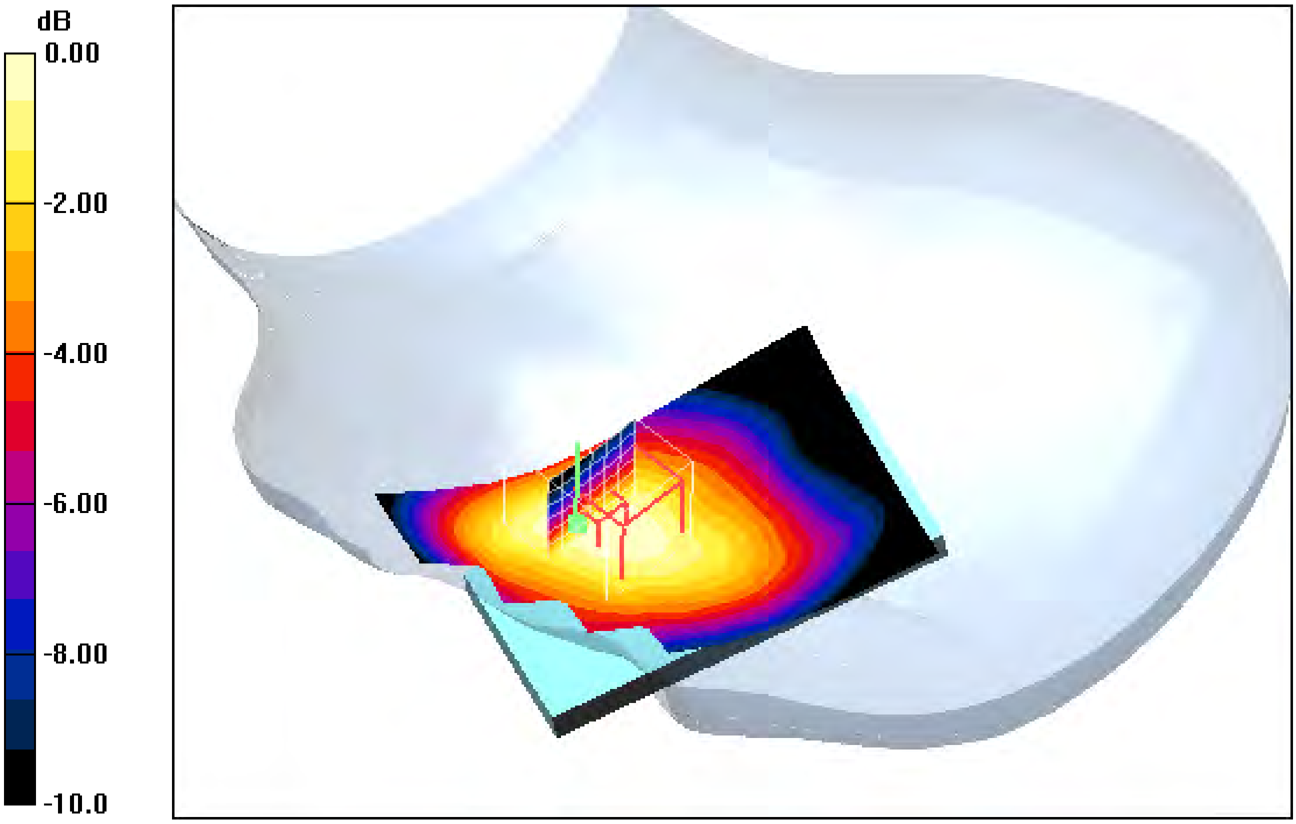
Date/Time: 14.06.2011 14:02:01Date/Time: 14.06.2011 14:07:49

IEEE1528_OET65-LeftHandSide-GSM850

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8
Medium: HSL850 Medium parameters used: f = 836.6 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.92, 5.92, 5.92); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.314 mW/g

Touch position - Middle/Zoom Scan (7x7x7) (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.6 V/m; Power Drift = -0.067 dB
Peak SAR (extrapolated) = 0.442 W/kg
SAR(1 g) = 0.294 mW/g; SAR(10 g) = 0.197 mW/g
Maximum value of SAR (measured) = 0.309 mW/g



0 dB = 0.309mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.1°C

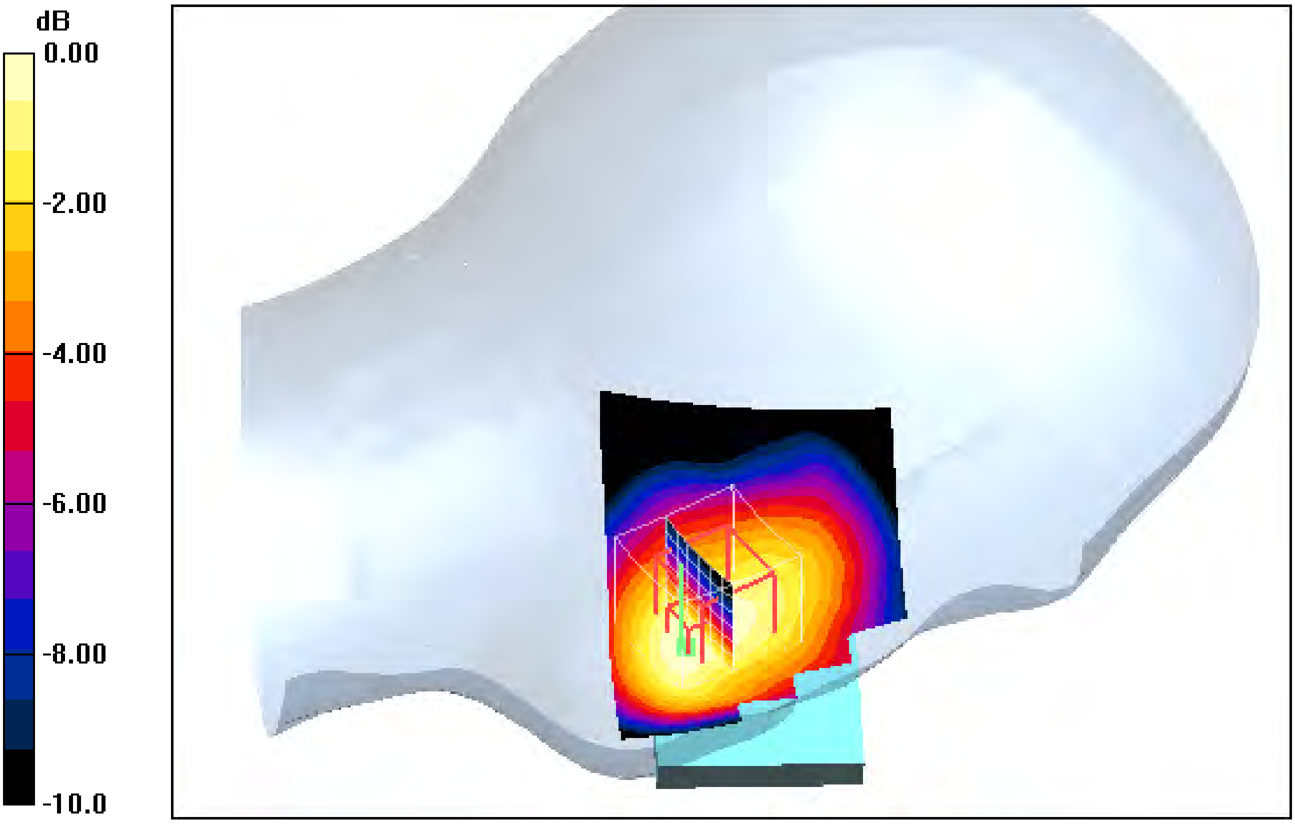
Date/Time: 14.06.2011 14:26:12Date/Time: 14.06.2011 14:31:59

IEEE1528_OET65-LeftHandSide-GSM850

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8
Medium: HSL850 Medium parameters used: f = 848.8 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.92, 5.92, 5.92); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.329 mW/g

Touch position - High/Zoom Scan (7x7x7) (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.1 V/m; Power Drift = -0.043 dB
Peak SAR (extrapolated) = 0.473 W/kg
SAR(1 g) = 0.308 mW/g; SAR(10 g) = 0.204 mW/g
Maximum value of SAR (measured) = 0.325 mW/g



0 dB = 0.325mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.1°C

Date/Time: 14.06.2011 15:28:21Date/Time: 14.06.2011 15:47:51

IEEE1528_OET65-LeftHandSide-GSM850

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8
Medium: HSL850 Medium parameters used: f = 824.2 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.92, 5.92, 5.92); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.155 mW/g

Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.0 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 0.179 W/kg
SAR(1 g) = 0.142 mW/g; SAR(10 g) = 0.106 mW/g
Maximum value of SAR (measured) = 0.149 mW/g

0 dB = 0.149mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.1°C

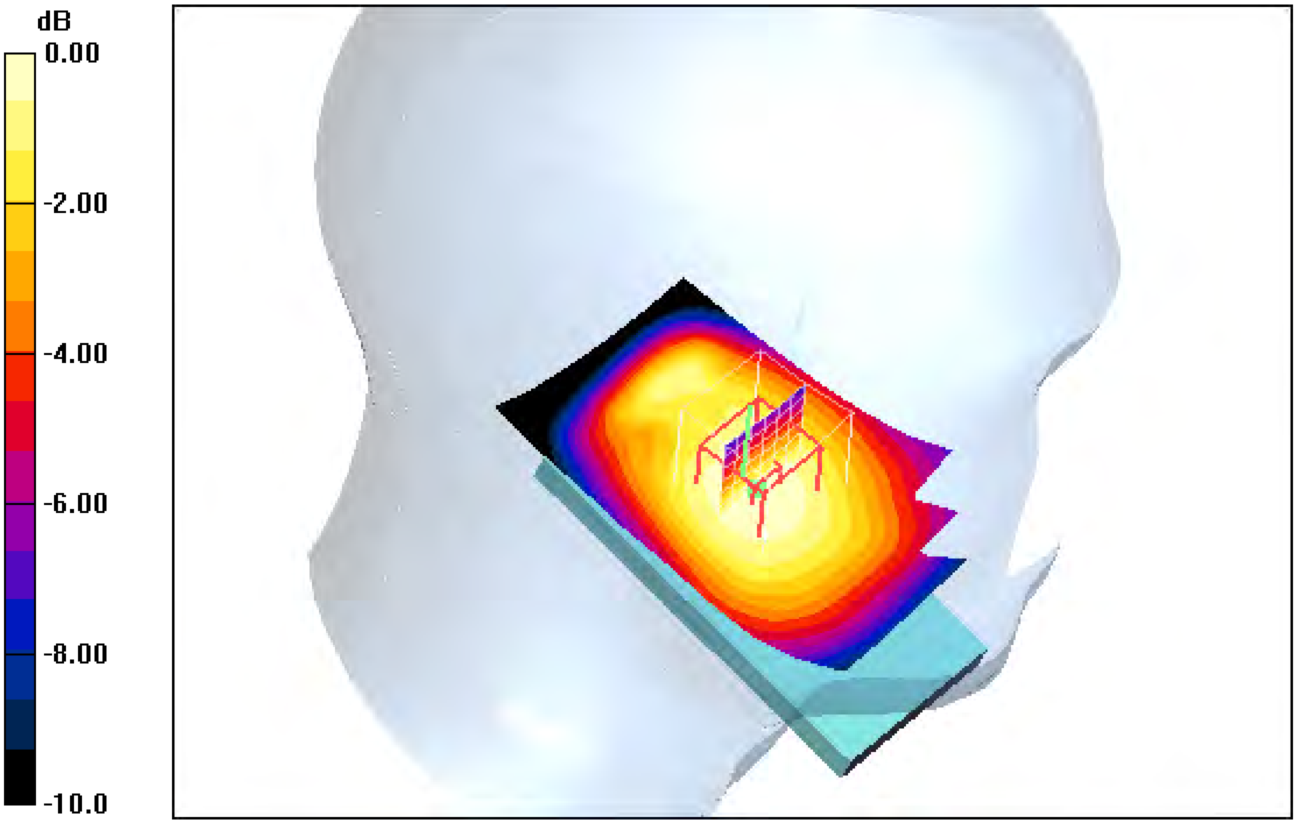
Date/Time: 14.06.2011 15:08:02Date/Time: 14.06.2011 15:13:55

IEEE1528_OET65-LeftHandSide-GSM850

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8
Medium: HSL850 Medium parameters used: f = 836.6 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.92, 5.92, 5.92); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.158 mW/g

Tilt position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.2 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.192 W/kg
SAR(1 g) = 0.150 mW/g; SAR(10 g) = 0.111 mW/g
Maximum value of SAR (measured) = 0.158 mW/g



0 dB = 0.158mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.1°C

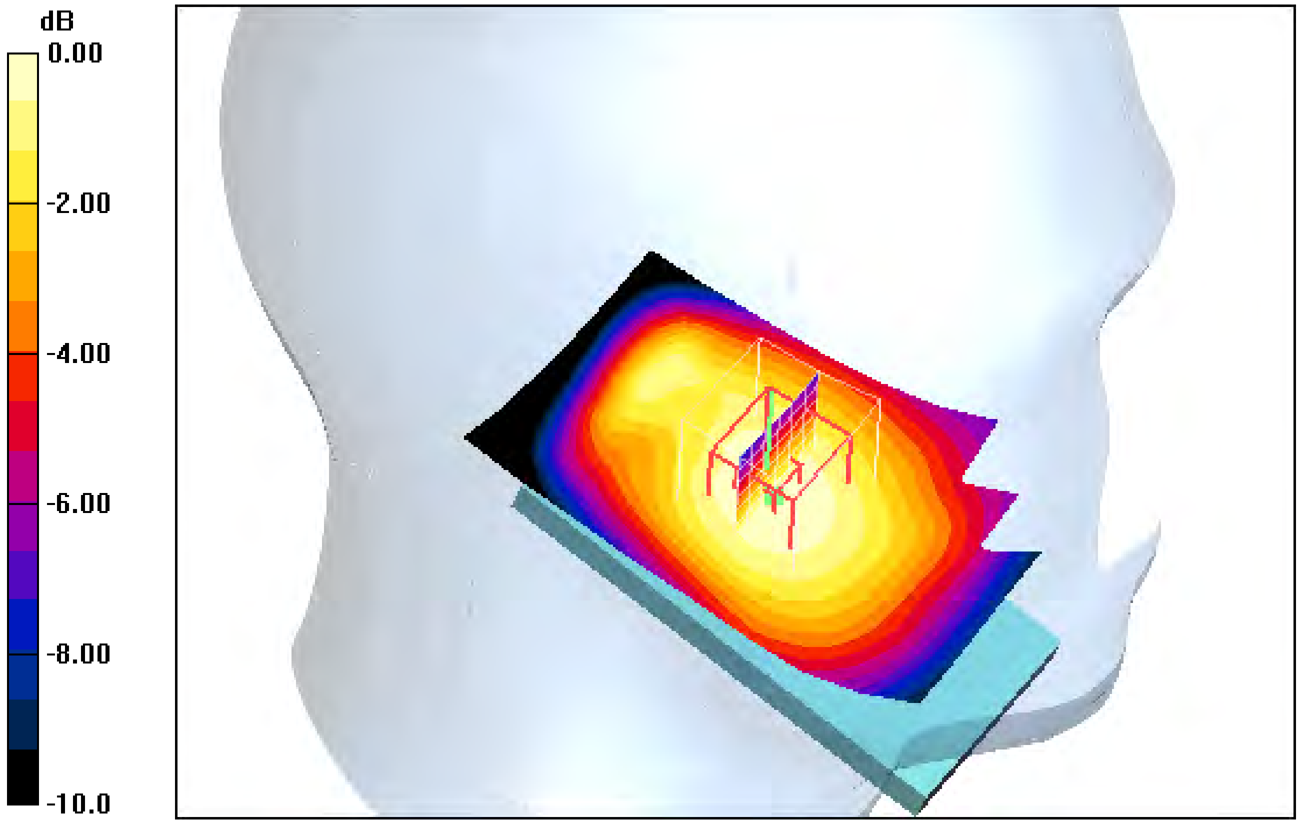
Date/Time: 14.06.2011 14:48:52Date/Time: 14.06.2011 14:54:46

IEEE1528_OET65-LeftHandSide-GSM850

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8
Medium: HSL850 Medium parameters used: f = 848.8 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.92, 5.92, 5.92); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.165 mW/g

Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.7 V/m; Power Drift = -0.068 dB
Peak SAR (extrapolated) = 0.199 W/kg
SAR(1 g) = 0.157 mW/g; SAR(10 g) = 0.116 mW/g
Maximum value of SAR (measured) = 0.165 mW/g



0 dB = 0.165mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.1°C

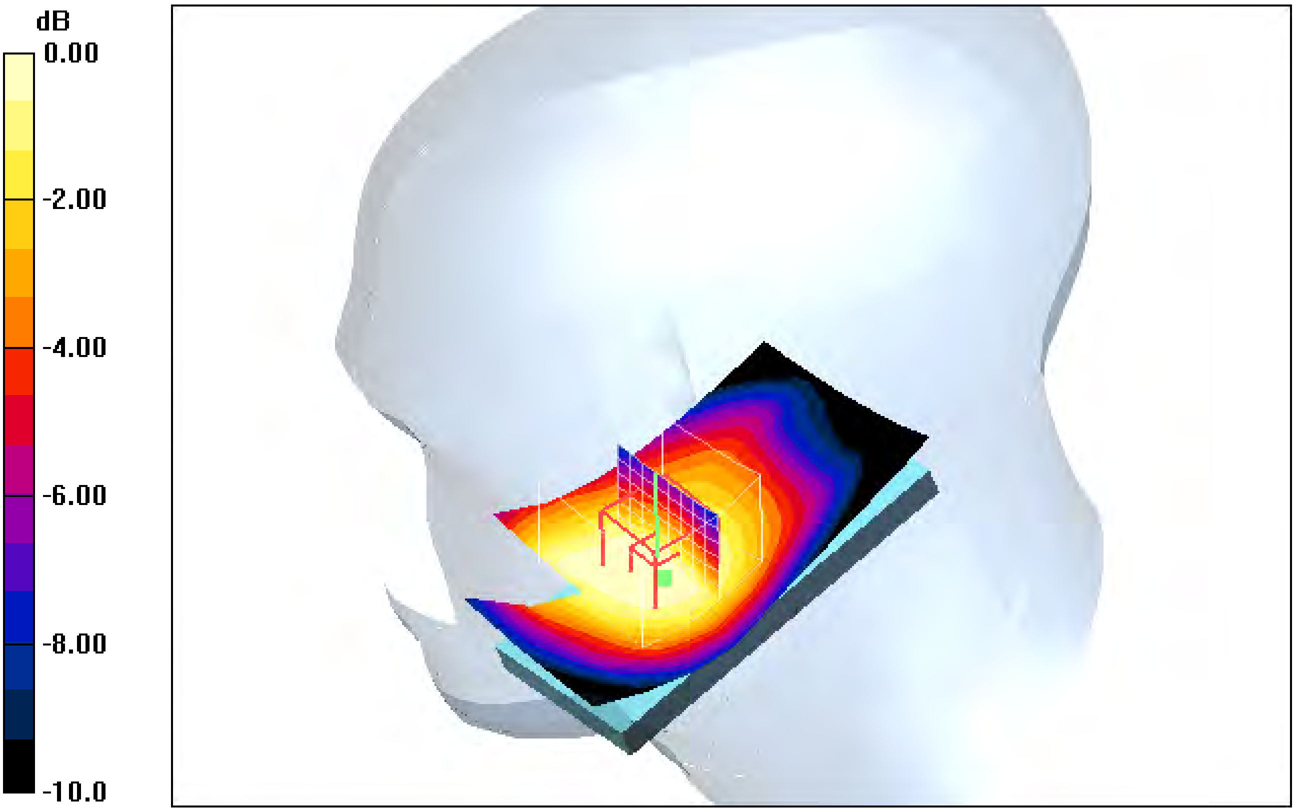
Date/Time: 14.06.2011 17:59:14Date/Time: 14.06.2011 18:08:21

IEEE1528_OET65-RightHandSide-GSM850

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8
Medium: HSL850 Medium parameters used: f = 824.2 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.92, 5.92, 5.92); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.260 mW/g

Touch position - Low/Zoom Scan (7x7x7) (9x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.2 V/m; Power Drift = -0.098 dB
Peak SAR (extrapolated) = 0.303 W/kg
SAR(1 g) = 0.241 mW/g; SAR(10 g) = 0.179 mW/g
Maximum value of SAR (measured) = 0.252 mW/g



0 dB = 0.252mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.1°C

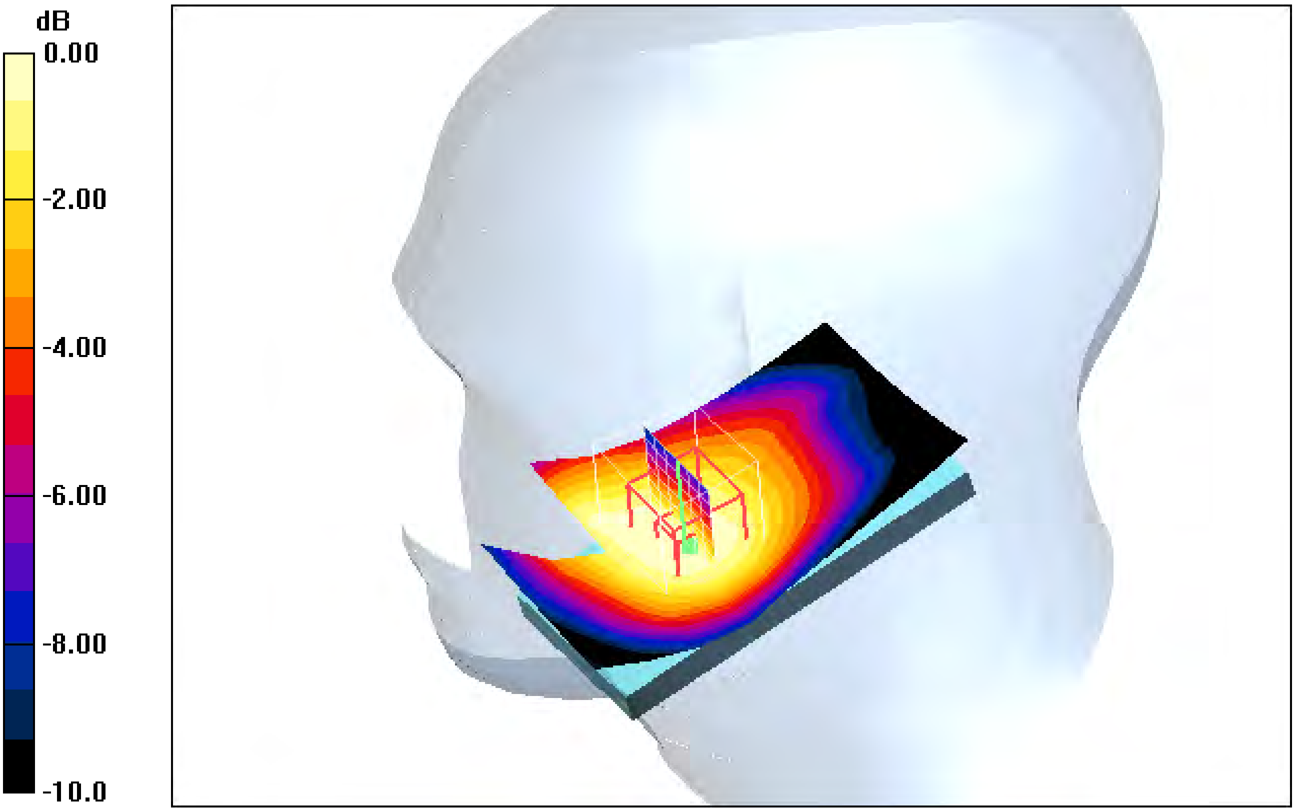
Date/Time: 14.06.2011 17:36:37Date/Time: 14.06.2011 17:44:08

IEEE1528_OET65-RightHandSide-GSM850

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8
Medium: HSL850 Medium parameters used: f = 836.6 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.92, 5.92, 5.92); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.282 mW/g

Touch position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.9 V/m; Power Drift = -0.033 dB
Peak SAR (extrapolated) = 0.334 W/kg
SAR(1 g) = 0.263 mW/g; SAR(10 g) = 0.193 mW/g
Maximum value of SAR (measured) = 0.280 mW/g



0 dB = 0.280mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.1°C

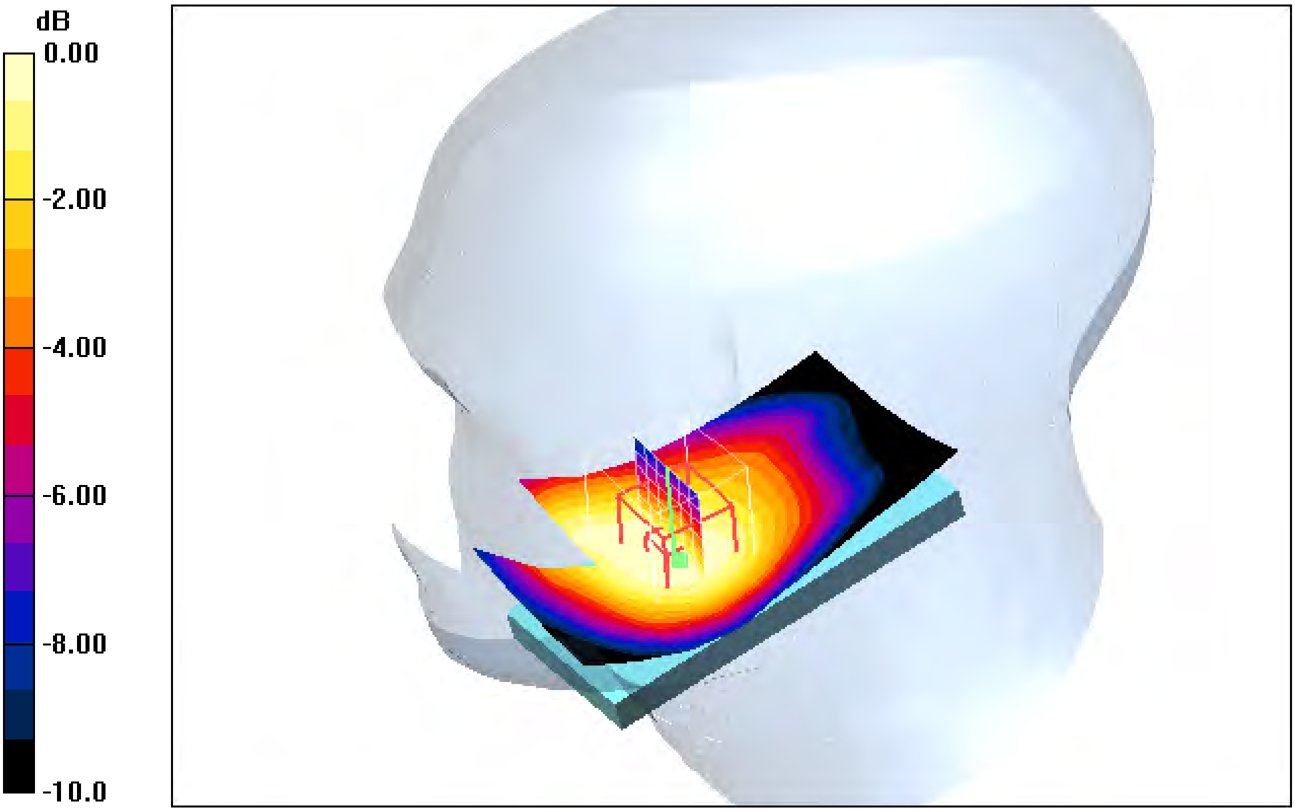
Date/Time: 14.06.2011 17:14:14Date/Time: 14.06.2011 17:21:20

IEEE1528_OET65-RightHandSide-GSM850

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8
Medium: HSL850 Medium parameters used: f = 848.8 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.92, 5.92, 5.92); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.308 mW/g

Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.6 V/m; Power Drift = -0.077 dB
Peak SAR (extrapolated) = 0.360 W/kg
SAR(1 g) = 0.283 mW/g; SAR(10 g) = 0.208 mW/g
Maximum value of SAR (measured) = 0.299 mW/g



0 dB = 0.299mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.1°C

Date/Time: 14.06.2011 16:05:44Date/Time: 14.06.2011 16:12:59

IEEE1528_OET65-RightHandSide-GSM850

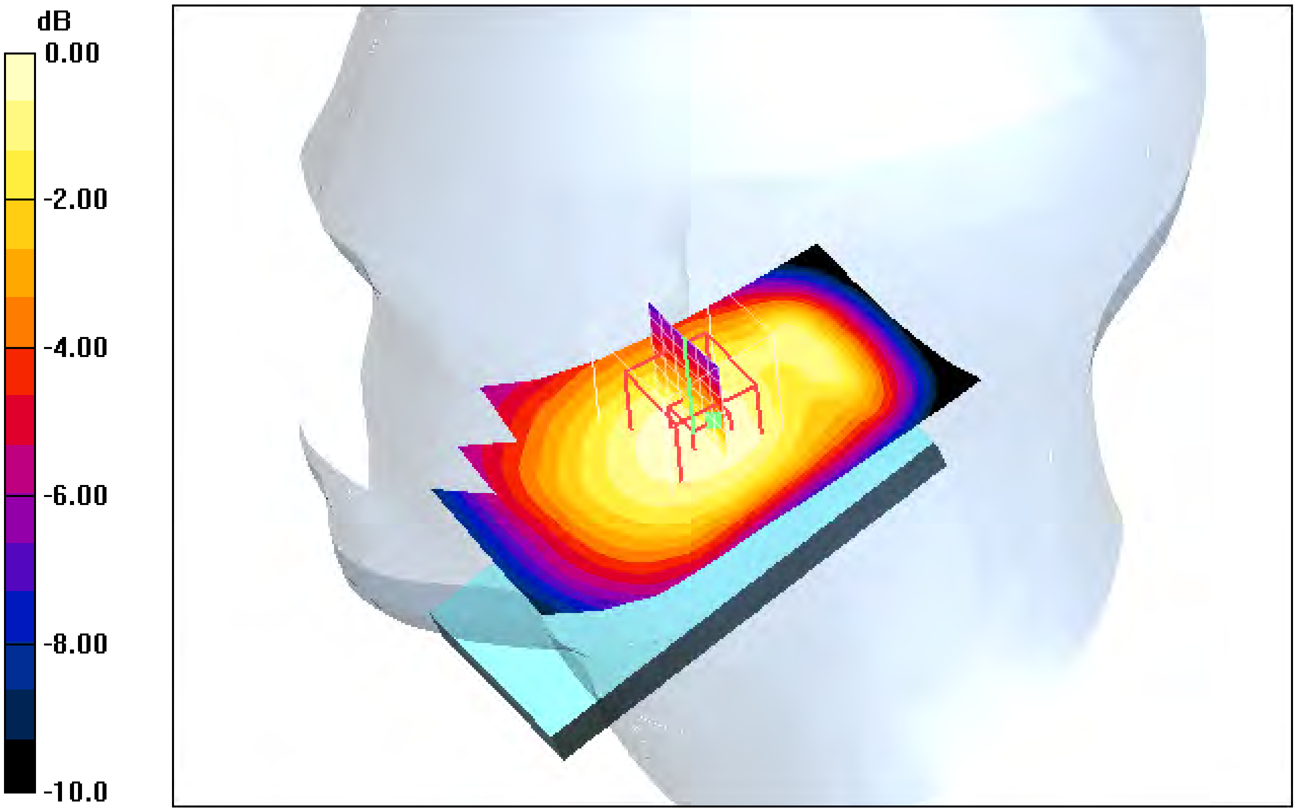
DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8
Medium: HSL850 Medium parameters used: f = 824.2 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.92, 5.92, 5.92); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.175 mW/g

Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.2 V/m; Power Drift = -0.155 dB
Peak SAR (extrapolated) = 0.211 W/kg
SAR(1 g) = 0.165 mW/g; SAR(10 g) = 0.123 mW/g
Maximum value of SAR (measured) = 0.174 mW/g



0 dB = 0.174mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.1°C

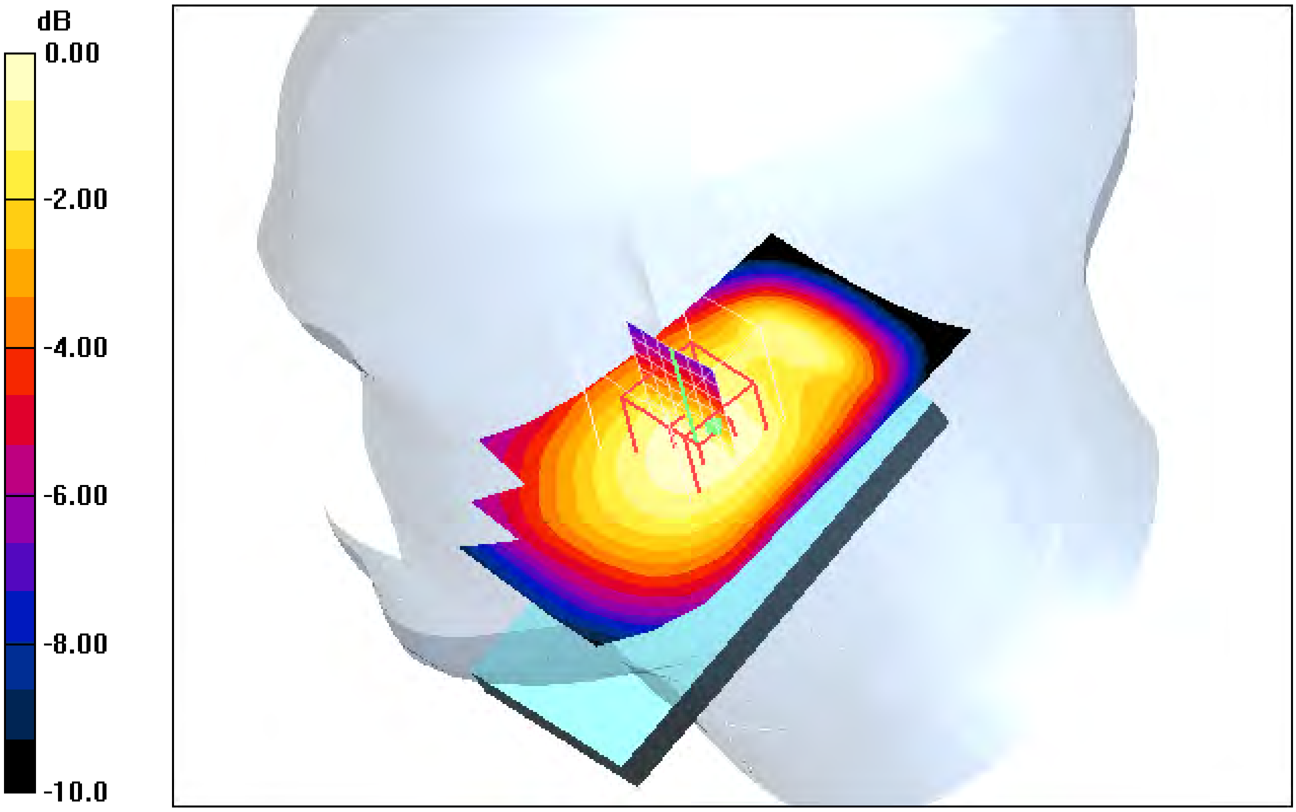
Date/Time: 14.06.2011 16:26:11Date/Time: 14.06.2011 16:39:12

IEEE1528_OET65-RightHandSide-GSM850

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8
Medium: HSL850 Medium parameters used: f = 836.6 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.92, 5.92, 5.92); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.174 mW/g

Tilt position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.1 V/m; Power Drift = -0.035 dB
Peak SAR (extrapolated) = 0.211 W/kg
SAR(1 g) = 0.165 mW/g; SAR(10 g) = 0.123 mW/g
Maximum value of SAR (measured) = 0.175 mW/g



0 dB = 0.175mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 23.1°C

Date/Time: 14.06.2011 16:52:31Date/Time: 14.06.2011 16:58:21

IEEE1528_OET65-RightHandSide-GSM850

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8

Medium: HSL850 Medium parameters used: f = 848.8 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(5.92, 5.92, 5.92); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.180 mW/g

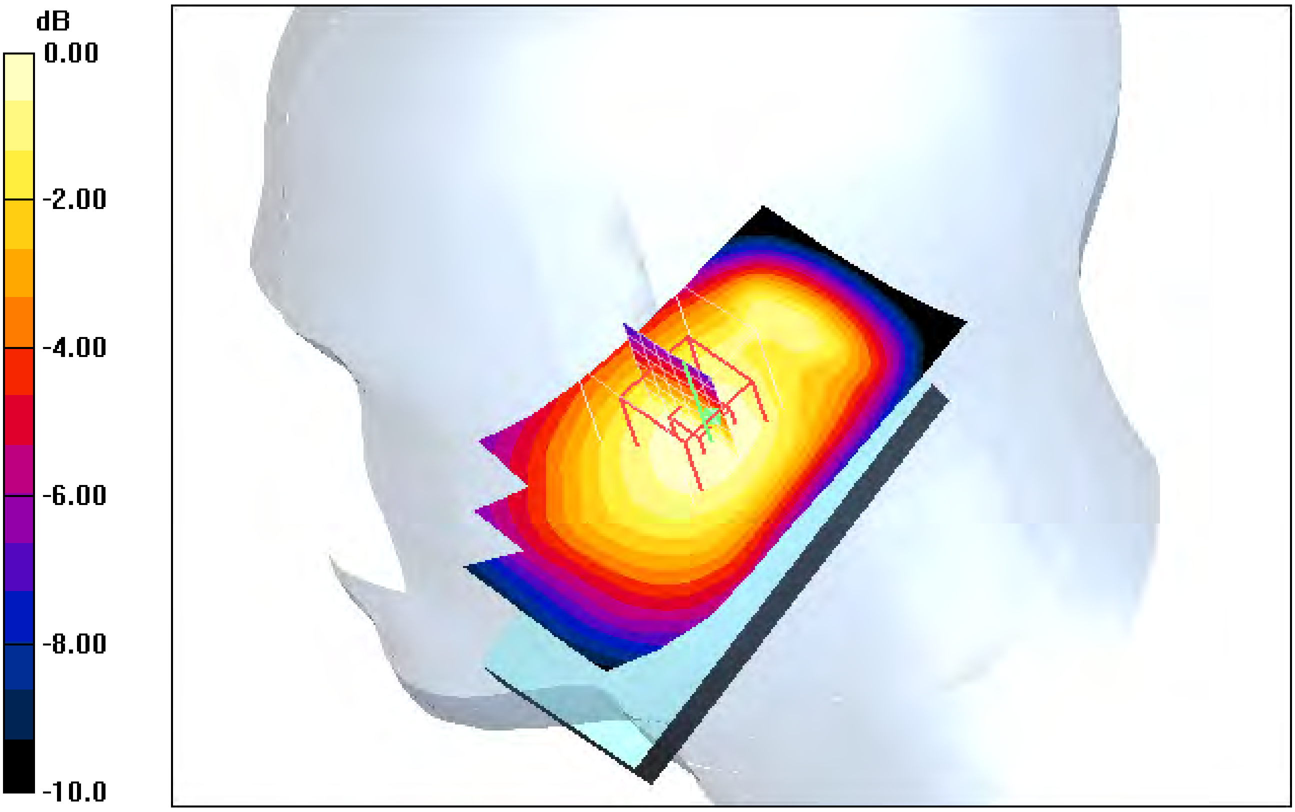
Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.5 V/m; Power Drift = -0.042 dB

Peak SAR (extrapolated) = 0.217 W/kg

SAR(1 g) = 0.172 mW/g; SAR(10 g) = 0.128 mW/g

Maximum value of SAR (measured) = 0.181 mW/g



0 dB = 0.181mW/g

Additional information:

ambient temperature: 23.5°C; liquid temperature: 23.1°C

Annex A.2: GSM 850MHz body

Date/Time: 09.06.2011 12:14:29Date/Time: 09.06.2011 12:20:01

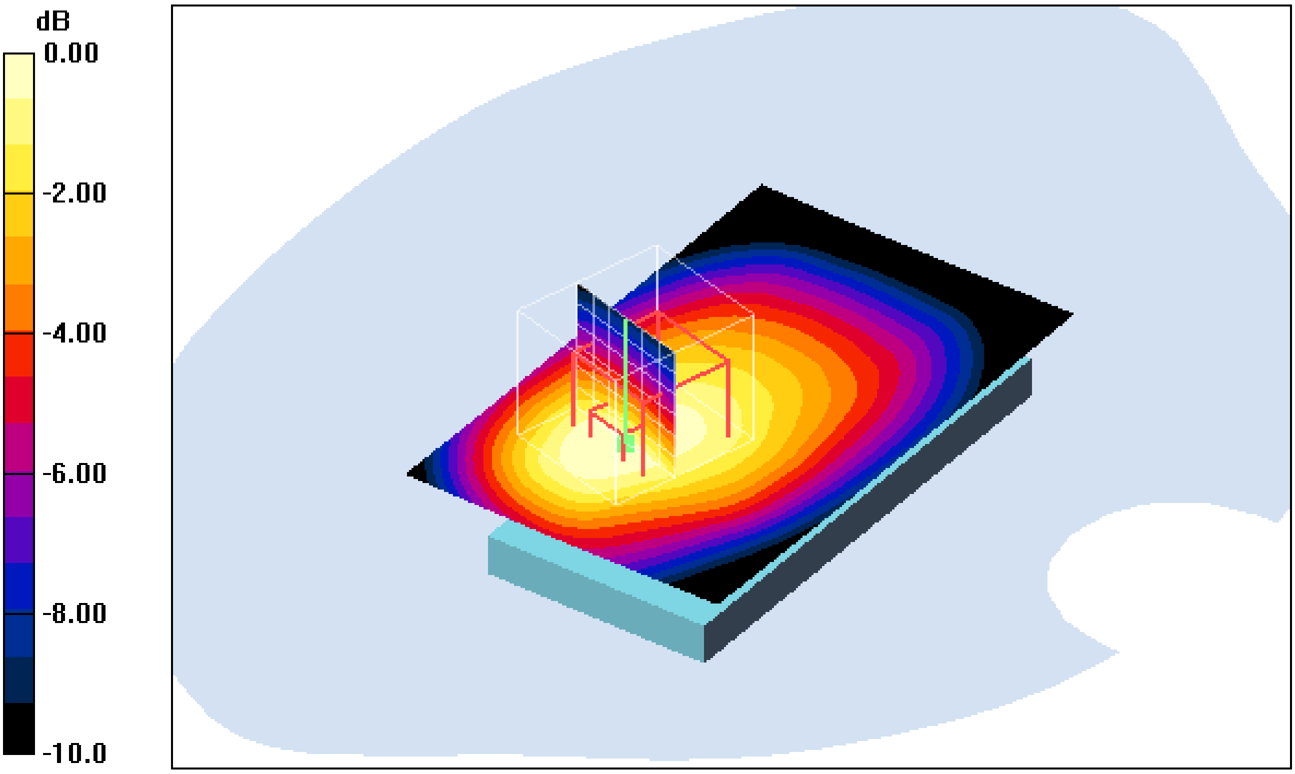
IEEE1528_OET65-Body-GSM850 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: PCS 850 GPRS 4TS; Frequency: 824.2 MHz; Duty Cycle: 1:2
Medium: M850 Medium parameters used: f = 824.2 MHz; σ = 0.95 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.85, 5.85, 5.85); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Front position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.363 mW/g

Front position - Low/Zoom Scan (7x7x7) (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.0 V/m; Power Drift = -0.055 dB
Peak SAR (extrapolated) = 0.489 W/kg
SAR(1 g) = 0.338 mW/g; SAR(10 g) = 0.231 mW/g
Maximum value of SAR (measured) = 0.363 mW/g



0 dB = 0.363mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.6°C; liquid temperature: 22.5°C

Date/Time: 09.06.2011 11:29:56Date/Time: 09.06.2011 11:36:48

IEEE1528_OET65-Body-GSM850 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

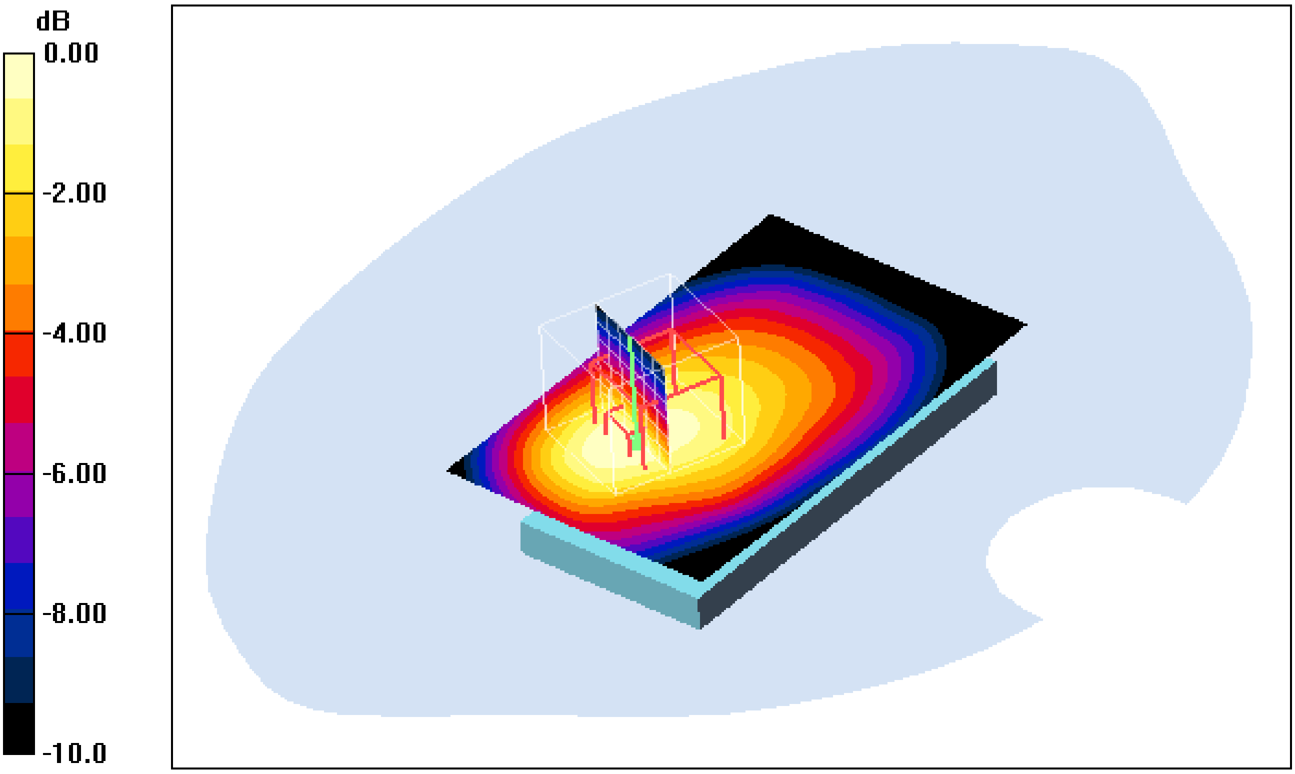
Communication System: PCS 850 GPRS 4TS; Frequency: 836.6 MHz; Duty Cycle: 1:2
Medium: M850 Medium parameters used: f = 836.6 MHz; σ = 0.95 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.85, 5.85, 5.85); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Front position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.507 mW/g

Front position - Middle/Zoom Scan (7x7x7) (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.8 V/m; Power Drift = -0.055 dB
Peak SAR (extrapolated) = 0.722 W/kg
SAR(1 g) = 0.481 mW/g; SAR(10 g) = 0.329 mW/g
Maximum value of SAR (measured) = 0.519 mW/g



0 dB = 0.519mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.6°C; liquid temperature: 22.5°C

Date/Time: 09.06.2011 11:52:26Date/Time: 09.06.2011 11:58:37

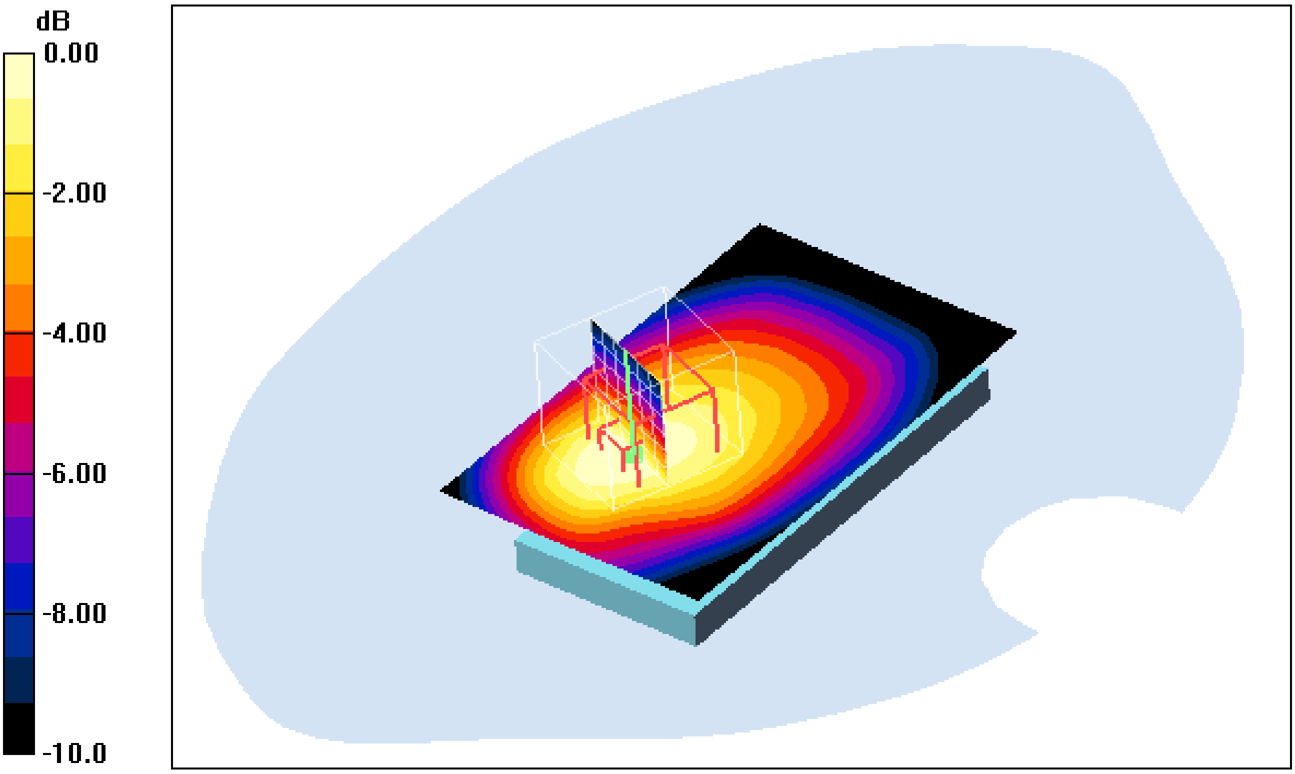
IEEE1528_OET65-Body-GSM850 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: PCS 850 GPRS 4TS; Frequency: 848.8 MHz; Duty Cycle: 1:2
Medium: M850 Medium parameters used: f = 848.8 MHz; σ = 0.95 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.85, 5.85, 5.85); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Front position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.631 mW/g

Front position - High/Zoom Scan (7x7x7) (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 26.3 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.883 W/kg
SAR(1 g) = 0.592 mW/g; SAR(10 g) = 0.405 mW/g
Maximum value of SAR (measured) = 0.641 mW/g



0 dB = 0.641mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.6°C; liquid temperature: 22.5°C

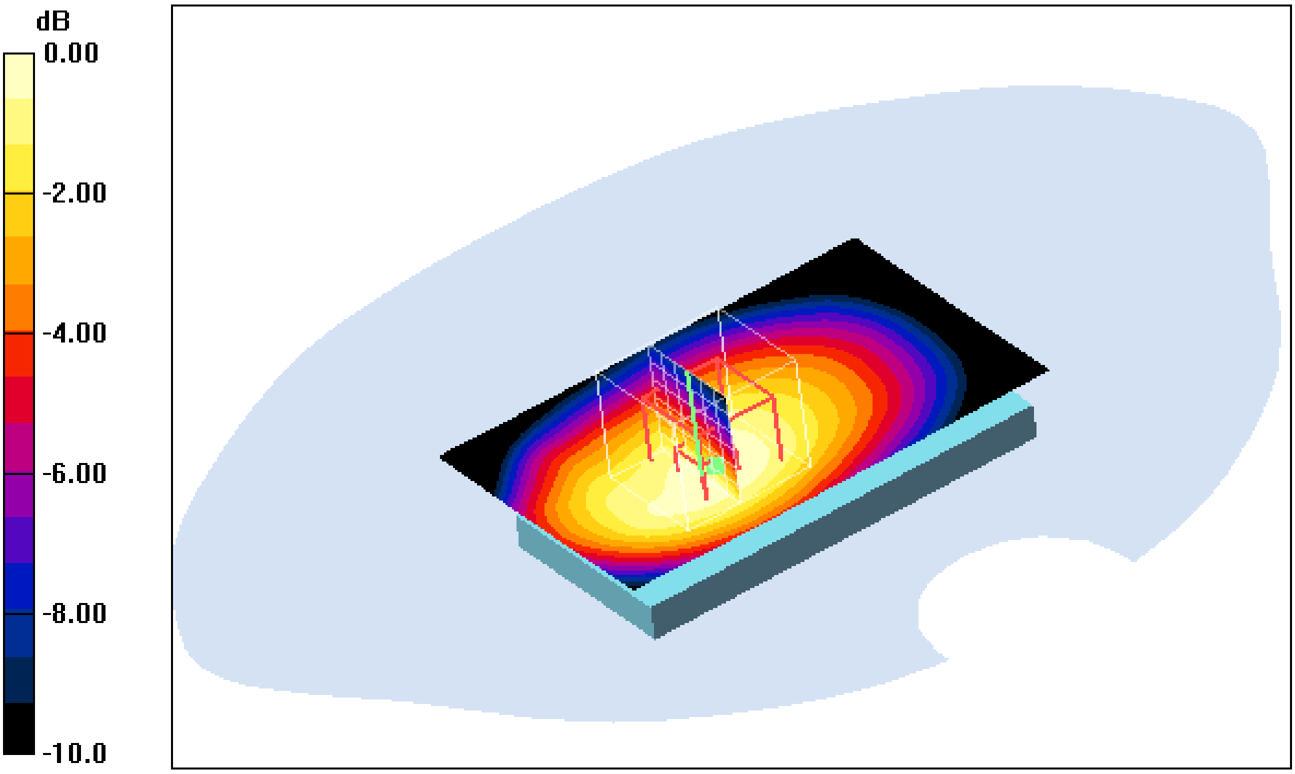
Date/Time: 09.06.2011 14:54:59Date/Time: 09.06.2011 15:02:01

IEEE1528_OET65-Body-GSM850 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: PCS 850 GPRS 4TS; Frequency: 824.2 MHz; Duty Cycle: 1:2
Medium: M850 Medium parameters used: f = 824.2 MHz; σ = 0.95 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.85, 5.85, 5.85); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.677 mW/g

Rear position - Low/Zoom Scan (7x7x7) (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.5 V/m; Power Drift = -0.106 dB
Peak SAR (extrapolated) = 0.890 W/kg
SAR(1 g) = 0.633 mW/g; SAR(10 g) = 0.442 mW/g
Maximum value of SAR (measured) = 0.674 mW/g



0 dB = 0.674mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.6°C; liquid temperature: 22.5°C

Date/Time: 09.06.2011 14:31:58Date/Time: 09.06.2011 14:40:22

IEEE1528_OET65-Body-GSM850 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

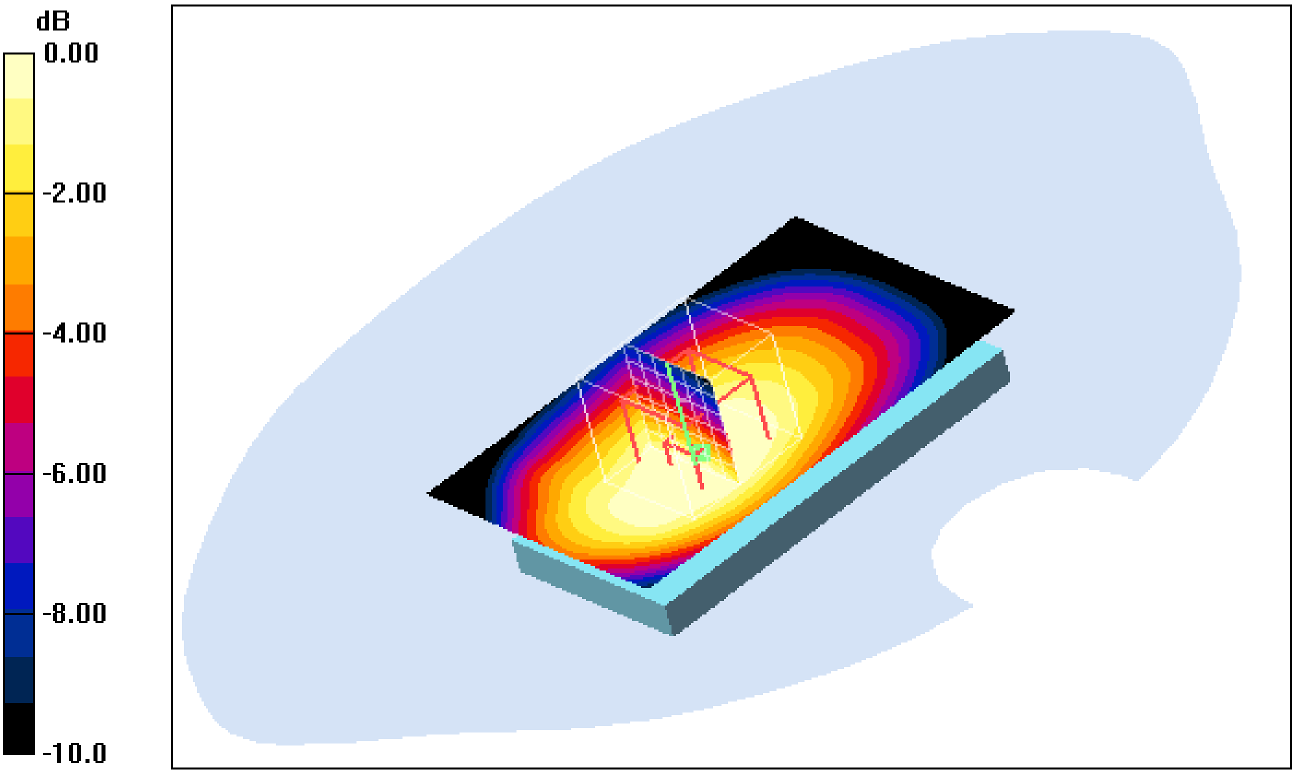
Communication System: PCS 850 GPRS 4TS; Frequency: 836.6 MHz; Duty Cycle: 1:2
Medium: M850 Medium parameters used: f = 836.6 MHz; σ = 0.95 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.85, 5.85, 5.85); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.07 mW/g

Rear position - Middle/Zoom Scan (7x7x7) (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 33.5 V/m; Power Drift = -0.130 dB
Peak SAR (extrapolated) = 1.22 W/kg
SAR(1 g) = 0.866 mW/g; SAR(10 g) = 0.604 mW/g
Maximum value of SAR (measured) = 0.922 mW/g



0 dB = 0.922mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.6°C; liquid temperature: 22.5°C

Date/Time: 09.06.2011 15:17:50Date/Time: 09.06.2011 15:23:29

IEEE1528_OET65-Body-GSM850 GPRS 4TS

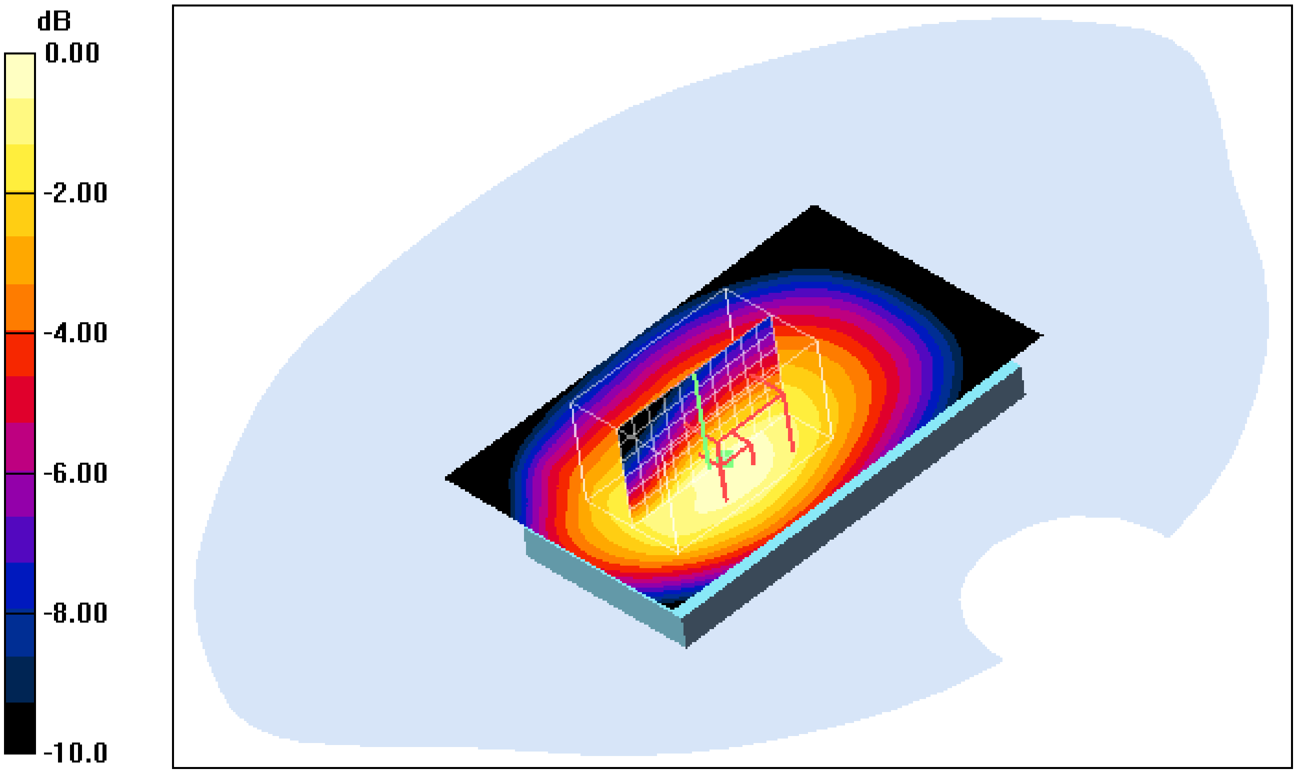
DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: PCS 850 GPRS 4TS; Frequency: 848.8 MHz; Duty Cycle: 1:2
Medium: M850 Medium parameters used: f = 848.8 MHz; σ = 0.95 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.85, 5.85, 5.85); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.992 mW/g

Rear position - High/Zoom Scan (7x7x7) (7x11x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 33.7 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.35 W/kg
SAR(1 g) = 0.950 mW/g; SAR(10 g) = 0.664 mW/g
Maximum value of SAR (measured) = 1.01 mW/g



0 dB = 1.01mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.6°C; liquid temperature: 22.5°C

Date/Time: 09.06.2011 13:27:33Date/Time: 09.06.2011 13:33:22

IEEE1528_OET65-Body-GSM850 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

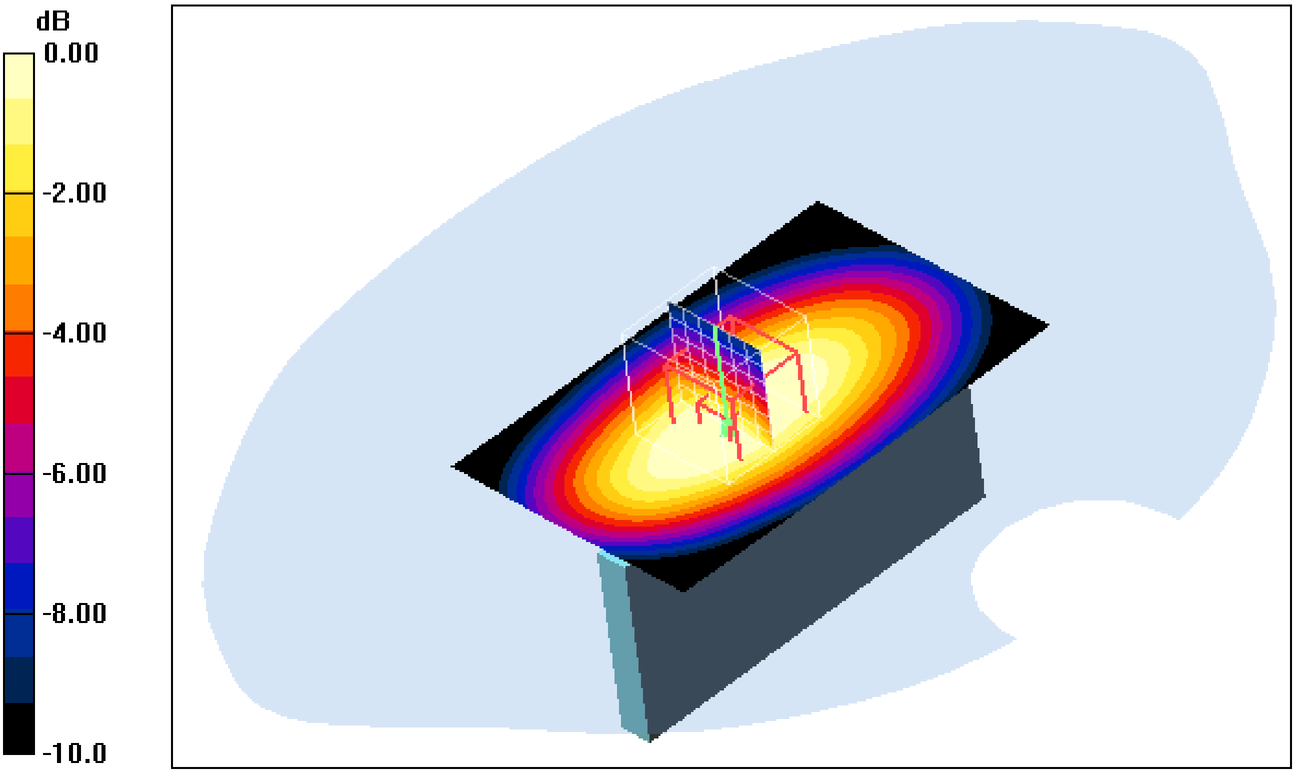
Communication System: PCS 850 GPRS 4TS; Frequency: 836.6 MHz; Duty Cycle: 1:2
Medium: M850 Medium parameters used: f = 836.6 MHz; σ = 0.95 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.85, 5.85, 5.85); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Edge left position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.446 mW/g

Edge left position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.2 V/m; Power Drift = -0.158 dB
Peak SAR (extrapolated) = 0.517 W/kg
SAR(1 g) = 0.354 mW/g; SAR(10 g) = 0.239 mW/g
Maximum value of SAR (measured) = 0.382 mW/g



0 dB = 0.382mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.6°C; liquid temperature: 22.5°C

Date/Time: 09.06.2011 13:47:26Date/Time: 09.06.2011 13:53:16

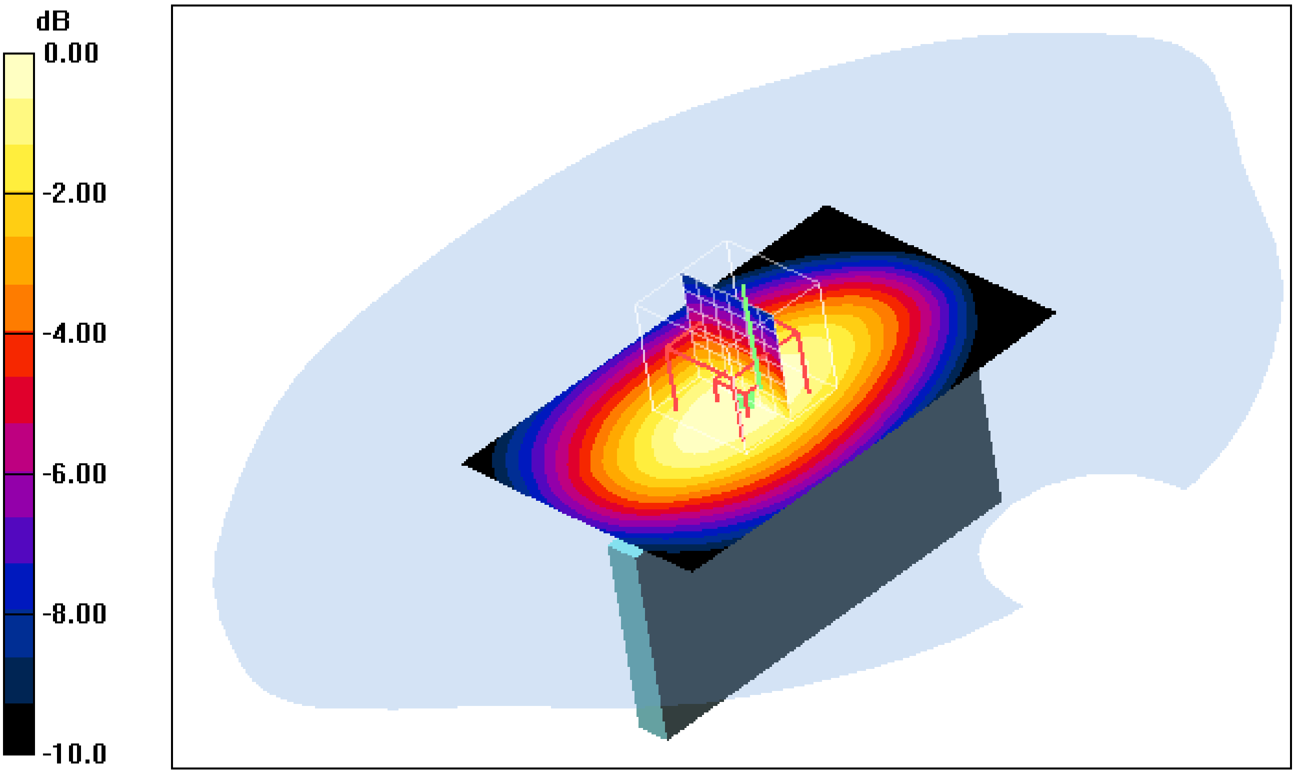
IEEE1528_OET65-Body-GSM850 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: PCS 850 GPRS 4TS; Frequency: 836.6 MHz; Duty Cycle: 1:2
Medium: M850 Medium parameters used: f = 836.6 MHz; σ = 0.95 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.85, 5.85, 5.85); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Edge right position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.357 mW/g

Edge right position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.0 V/m; Power Drift = -0.107 dB
Peak SAR (extrapolated) = 0.462 W/kg
SAR(1 g) = 0.326 mW/g; SAR(10 g) = 0.226 mW/g
Maximum value of SAR (measured) = 0.348 mW/g



0 dB = 0.348mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.6°C; liquid temperature: 22.5°C

Date/Time: 09.06.2011 14:07:15Date/Time: 09.06.2011 14:12:35

IEEE1528_OET65-Body-GSM850 GPRS 4TS

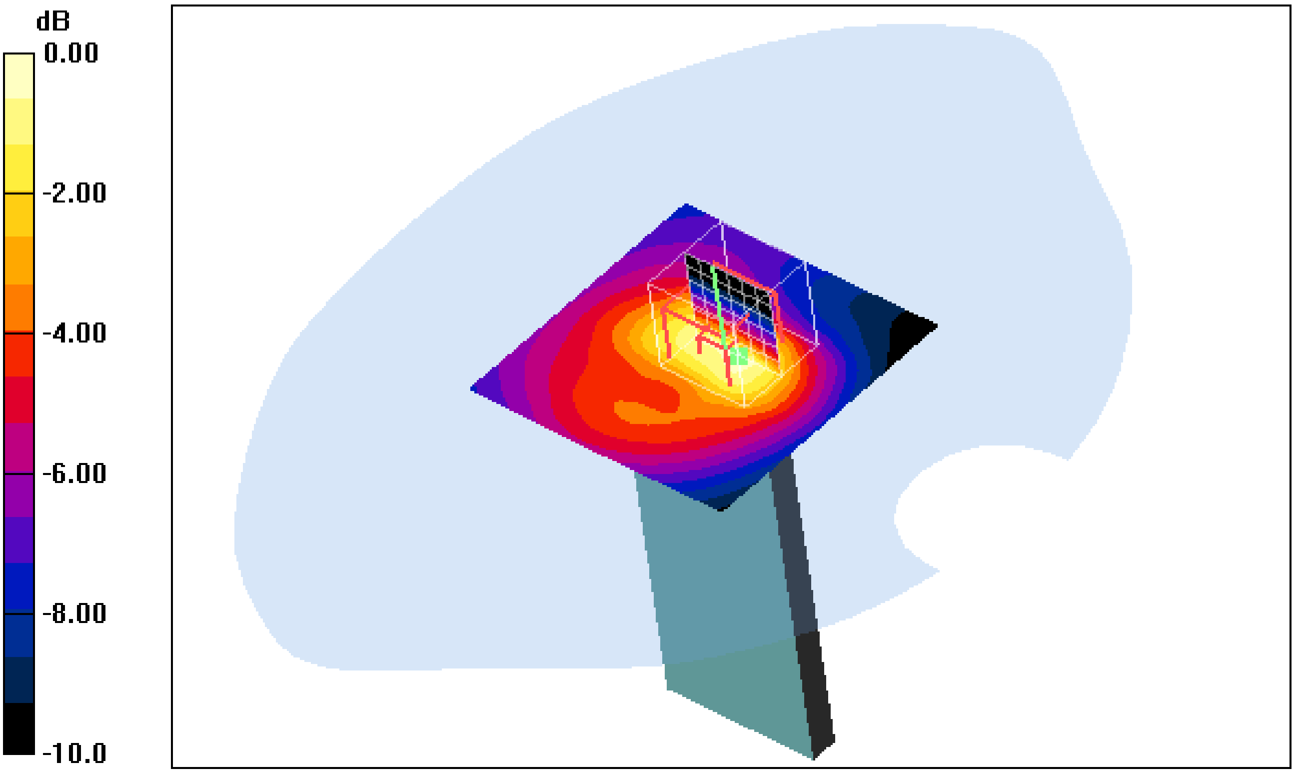
DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: PCS 850 GPRS 4TS; Frequency: 836.6 MHz; Duty Cycle: 1:2
Medium: M850 Medium parameters used: f = 836.6 MHz; σ = 0.95 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.85, 5.85, 5.85); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Edge bottom position - Middle/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.098 mW/g

Edge bottom position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.54 V/m; Power Drift = -0.012 dB
Peak SAR (extrapolated) = 0.195 W/kg
SAR(1 g) = 0.094 mW/g; SAR(10 g) = 0.051 mW/g
Maximum value of SAR (measured) = 0.102 mW/g



0 dB = 0.102mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.6°C; liquid temperature: 22.5°C

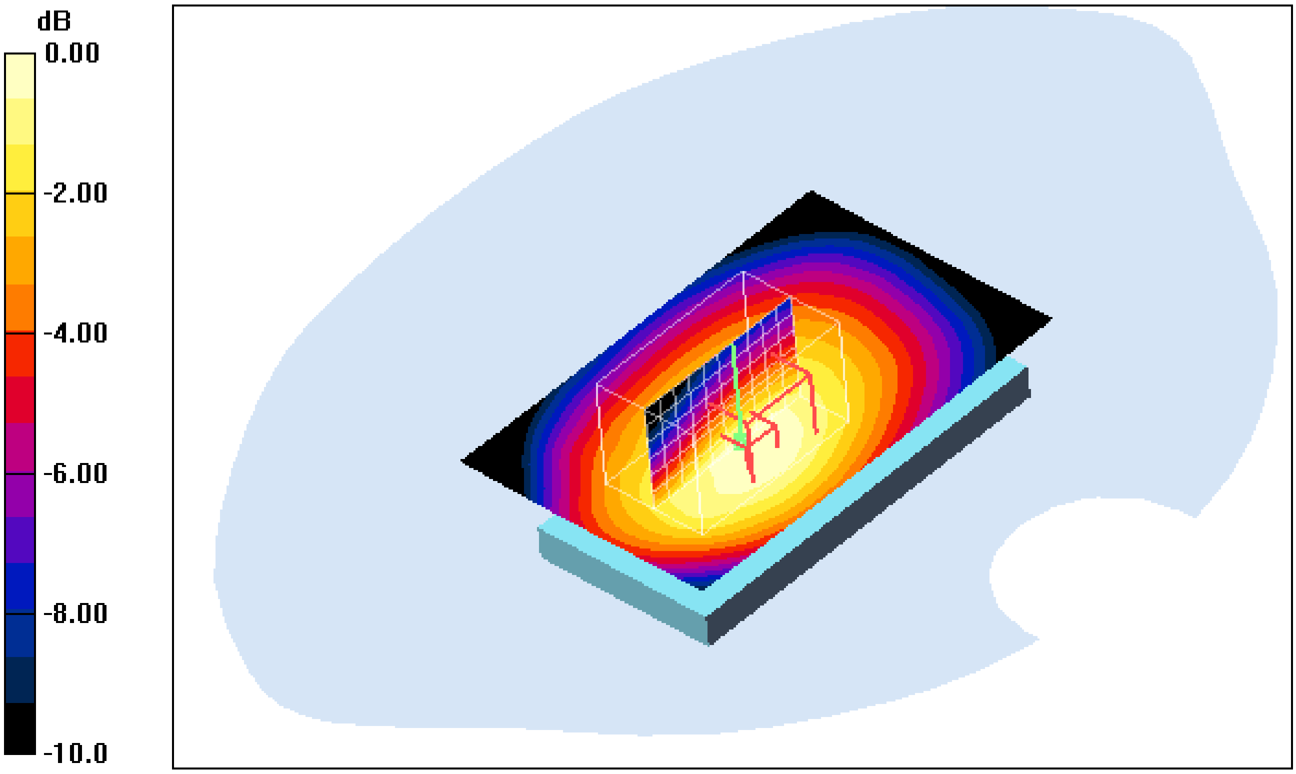
Date/Time: 09.06.2011 15:47:38Date/Time: 09.06.2011 15:53:05

IEEE1528_OET65-Body-GSM850 1TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8
Medium: M850 Medium parameters used: f = 848.8 MHz; σ = 0.95 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(5.85, 5.85, 5.85); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.357 mW/g

Rear position - High/Zoom Scan (7x7x7) (7x11x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.0 V/m; Power Drift = -0.039 dB
Peak SAR (extrapolated) = 0.463 W/kg
SAR(1 g) = 0.333 mW/g; SAR(10 g) = 0.234 mW/g
Maximum value of SAR (measured) = 0.355 mW/g



0 dB = 0.355mW/g

Additional information:
position or distance of DUT to SAM: 15 mm
ambient temperature: 22.6°C; liquid temperature: 22.5°C

Annex A.3: GSM 1900MHz head

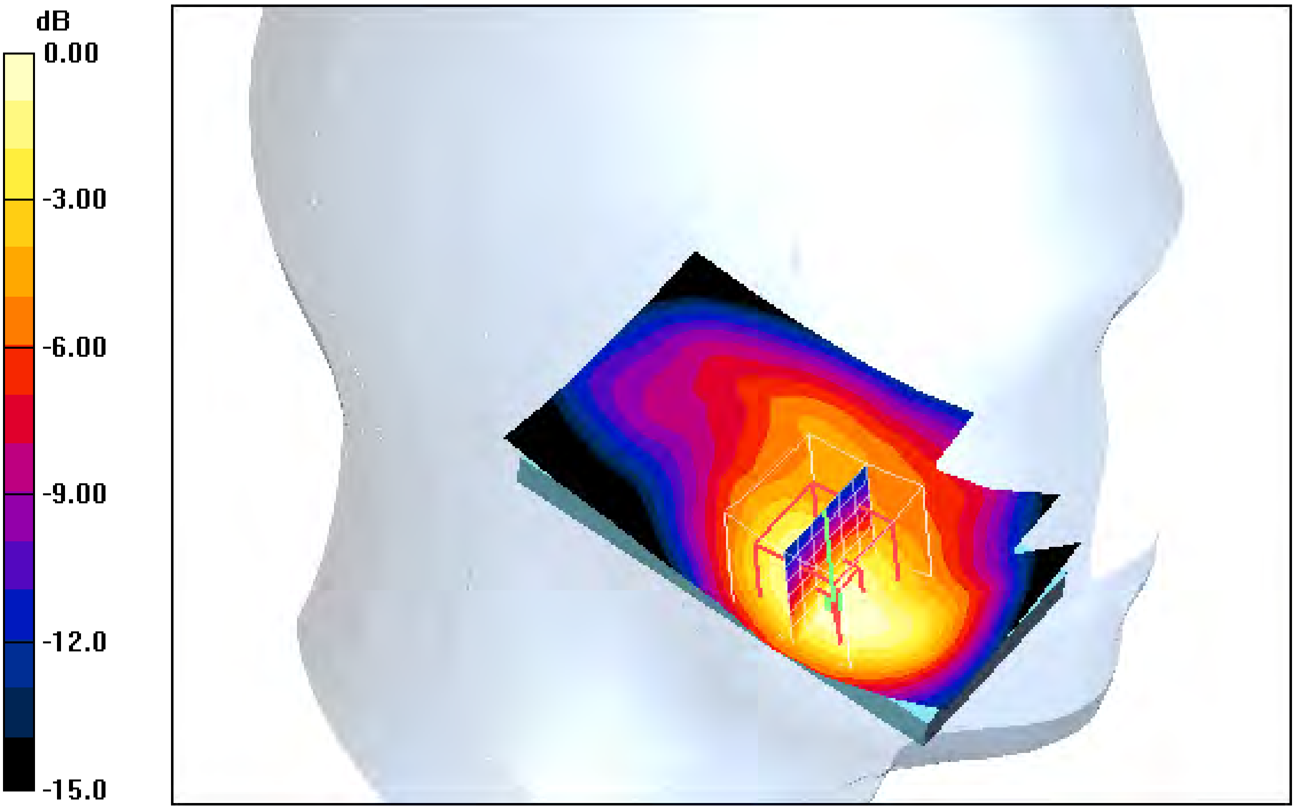
Date/Time: 06.06.2011 13:53:20Date/Time: 06.06.2011 13:59:09

IEEE1528_OET65-LeftHandSide-GSM1900

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8
Medium: HSL1900 Medium parameters used: f = 1850.2 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.18 mW/g

Touch position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 29.5 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 1.60 W/kg
SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.606 mW/g
Maximum value of SAR (measured) = 1.15 mW/g



0 dB = 1.15mW/g

Additional information:
ambient temperature: 23.4°C; liquid temperature: 23.2°C

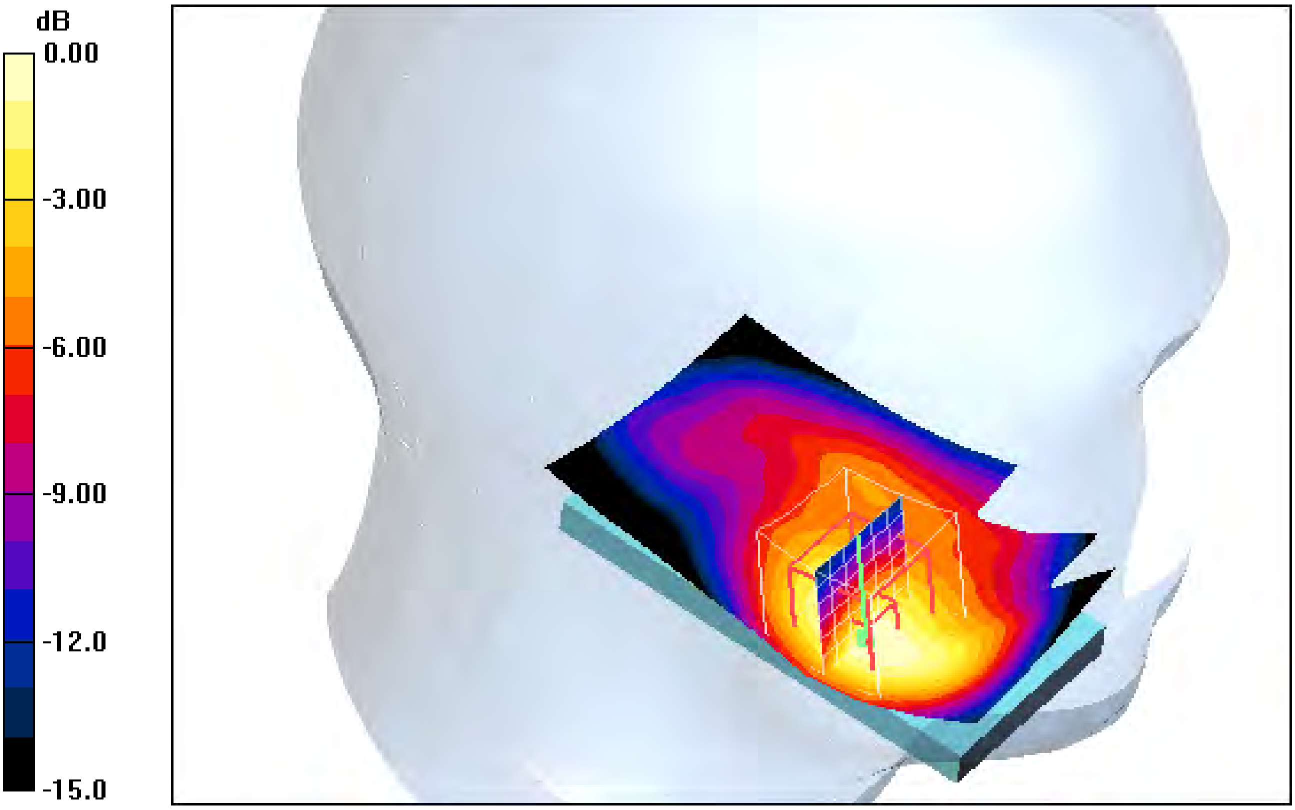
Date/Time: 06.06.2011 14:16:28Date/Time: 06.06.2011 14:22:18

IEEE1528_OET65-LeftHandSide-GSM1900

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.21 mW/g

Touch position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 30.0 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 1.66 W/kg
SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.621 mW/g
Maximum value of SAR (measured) = 1.20 mW/g



0 dB = 1.20mW/g

Additional information:
ambient temperature: 23.4°C; liquid temperature: 23.2°C

Date/Time: 06.06.2011 14:36:54Date/Time: 06.06.2011 14:42:46

IEEE1528_OET65-LeftHandSide-GSM1900

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

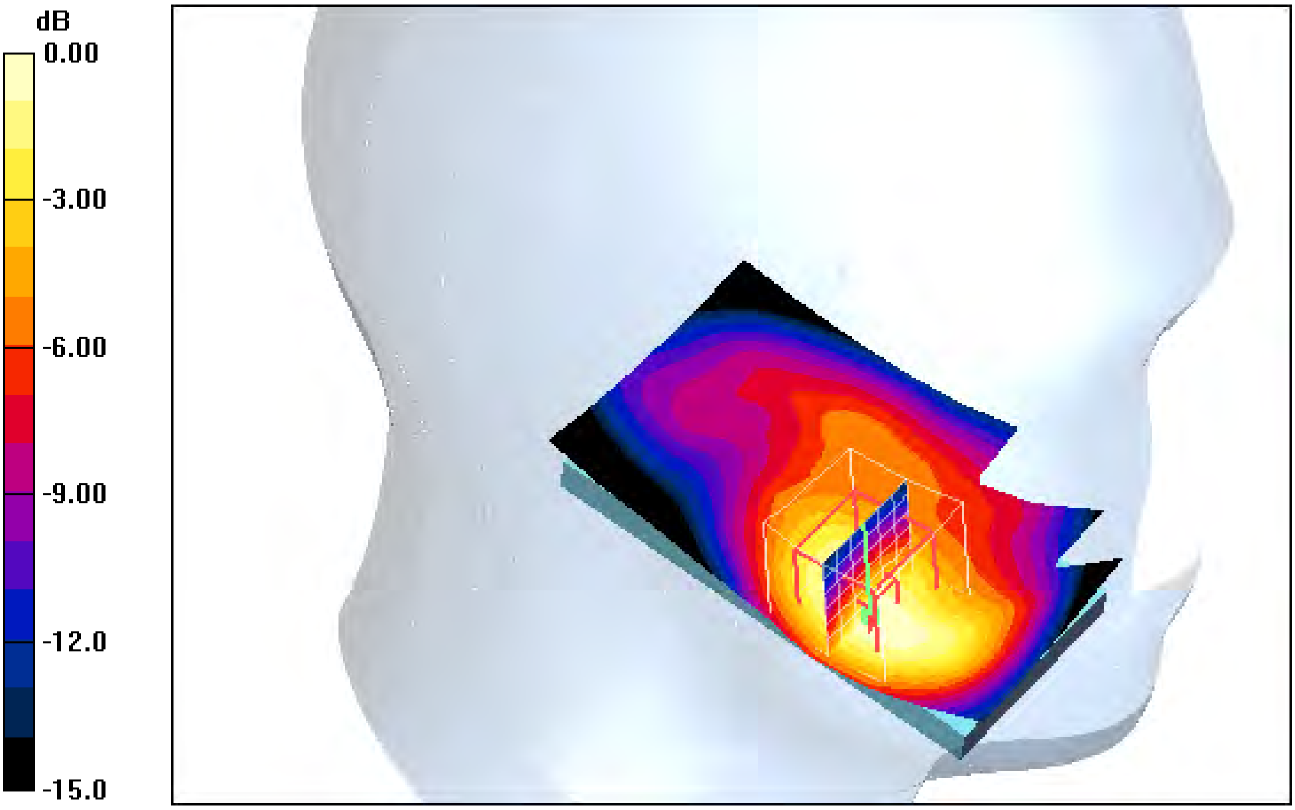
Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8
Medium: HSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.923 mW/g

Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 26.3 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.27 W/kg
SAR(1 g) = 0.808 mW/g; SAR(10 g) = 0.463 mW/g
Maximum value of SAR (measured) = 0.899 mW/g



0 dB = 0.899mW/g

Additional information:
ambient temperature: 23.4°C; liquid temperature: 23.2°C

Date/Time: 06.06.2011 13:33:05Date/Time: 06.06.2011 13:38:57

IEEE1528_OET65-LeftHandSide-GSM1900

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

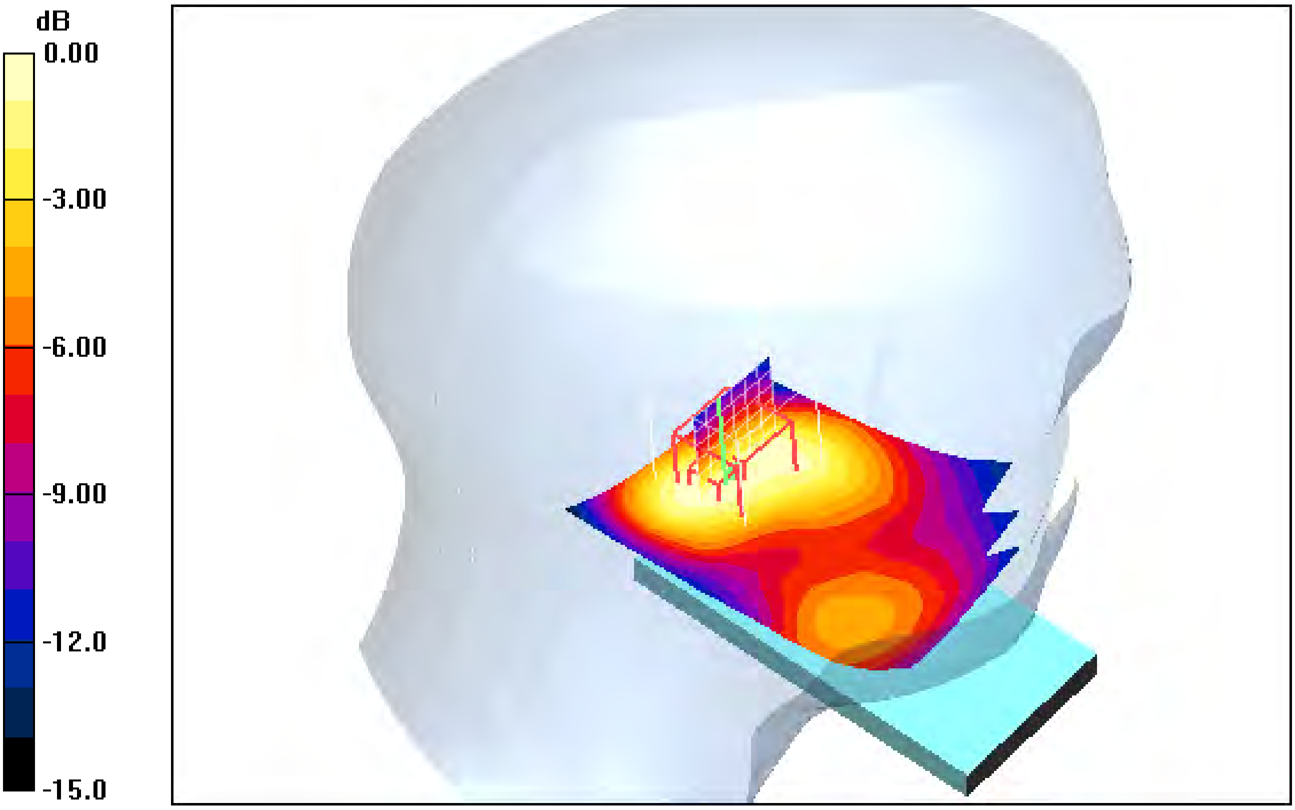
Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8
Medium: HSL1900 Medium parameters used: f = 1850.2 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.399 mW/g

Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.6 V/m; Power Drift = 0.038 dB
Peak SAR (extrapolated) = 0.479 W/kg
SAR(1 g) = 0.324 mW/g; SAR(10 g) = 0.202 mW/g
Maximum value of SAR (measured) = 0.351 mW/g



0 dB = 0.351mW/g

Additional information:
ambient temperature: 23.4°C; liquid temperature: 23.2°C

Date/Time: 06.06.2011 13:14:21Date/Time: 06.06.2011 13:20:13

IEEE1528_OET65-LeftHandSide-GSM1900

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8

Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.427 mW/g

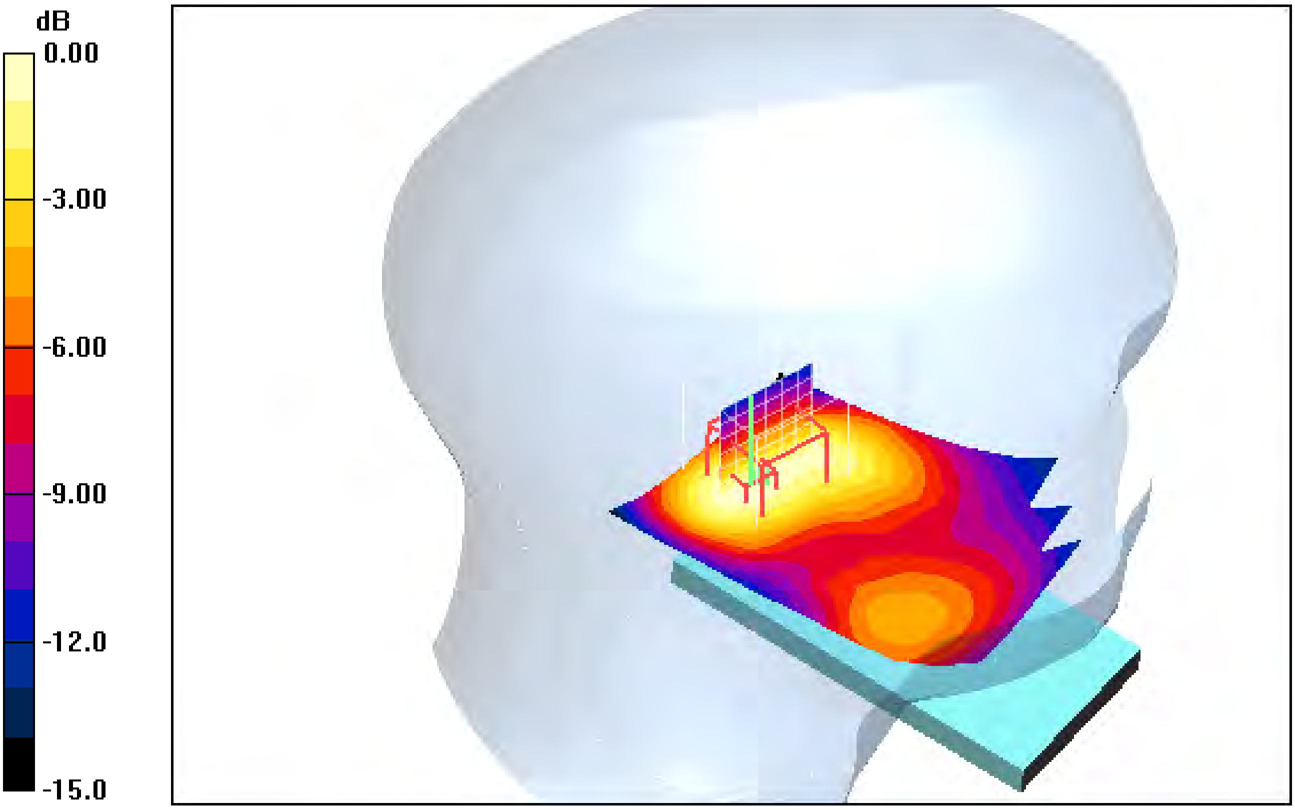
Tilt position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 17.6 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.529 W/kg

SAR(1 g) = 0.352 mW/g; SAR(10 g) = 0.214 mW/g

Maximum value of SAR (measured) = 0.390 mW/g



0 dB = 0.390mW/g

Additional information:

ambient temperature: 23.4°C; liquid temperature: 23.2°C

Date/Time: 06.06.2011 12:55:17Date/Time: 06.06.2011 13:01:08

IEEE1528_OET65-LeftHandSide-GSM1900

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8

Medium: HSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.344 mW/g

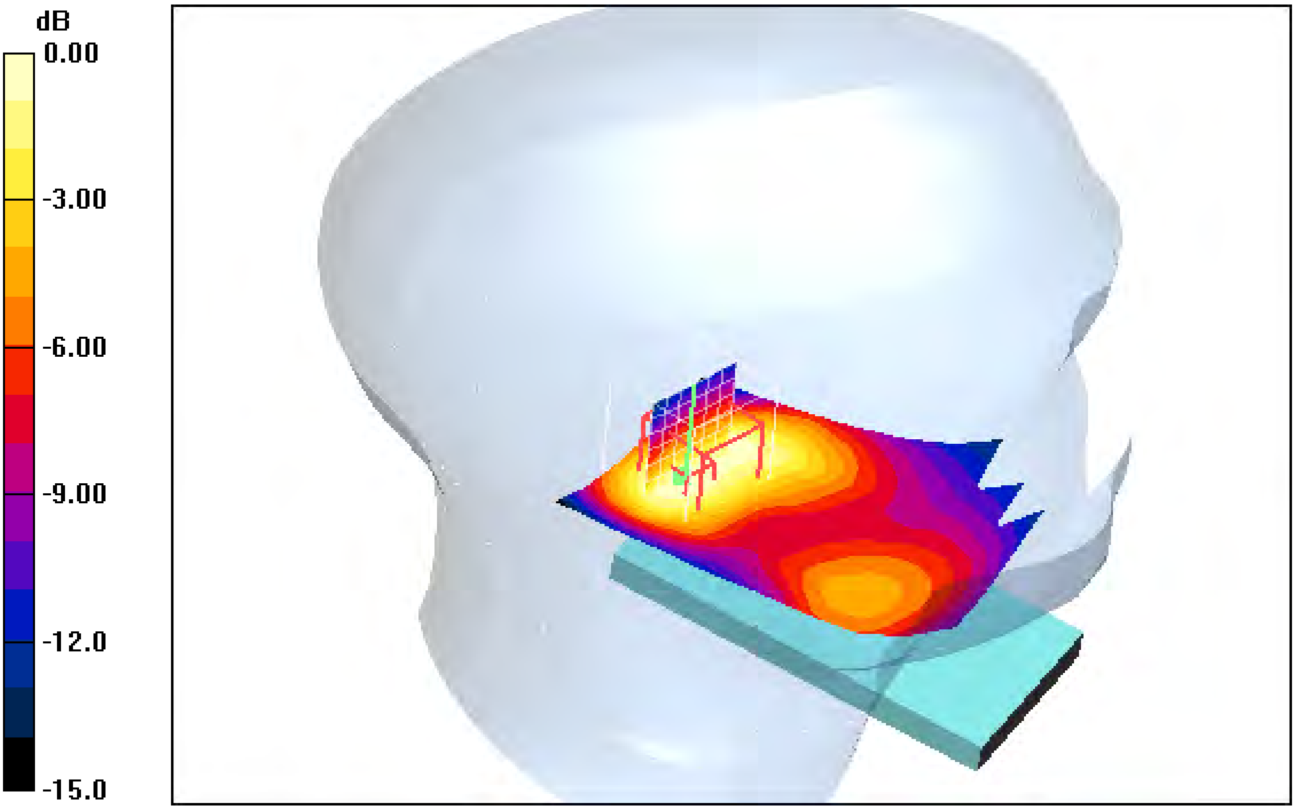
Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.1 V/m; Power Drift = -0.062 dB

Peak SAR (extrapolated) = 0.439 W/kg

SAR(1 g) = 0.288 mW/g; SAR(10 g) = 0.171 mW/g

Maximum value of SAR (measured) = 0.319 mW/g



0 dB = 0.319mW/g

Additional information:

ambient temperature: 23.4°C; liquid temperature: 23.2°C

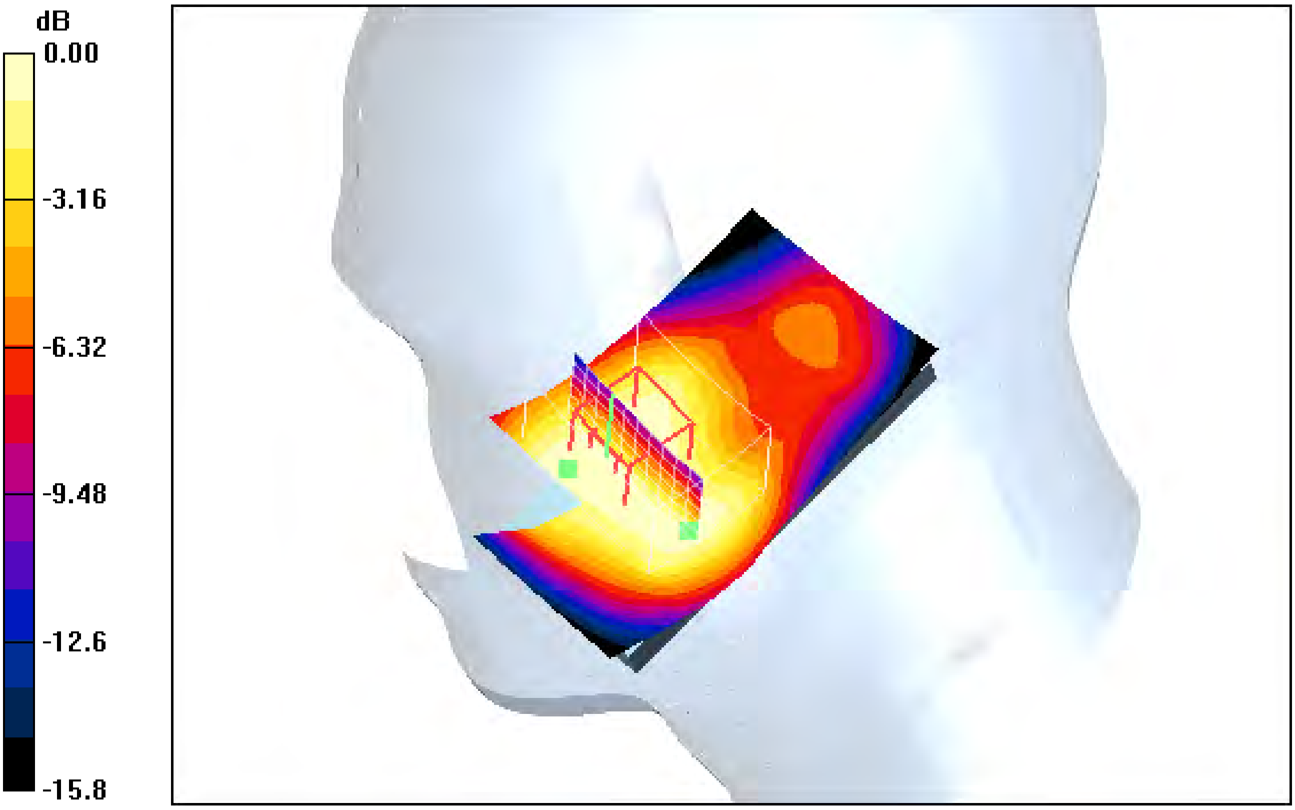
Date/Time: 06.06.2011 09:30:27Date/Time: 06.06.2011 09:38:50

IEEE1528_OET65-RightHandSide-GSM1900

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8
Medium: HSL1900 Medium parameters used: f = 1850.2 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.662 mW/g

Touch position - Low/Zoom Scan (7x7x7) (11x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.1 V/m; Power Drift = -0.017 dB
Peak SAR (extrapolated) = 0.814 W/kg
SAR(1 g) = 0.592 mW/g; SAR(10 g) = 0.397 mW/g
Maximum value of SAR (measured) = 0.640 mW/g



0 dB = 0.640mW/g

Additional information:
ambient temperature: 23.6°C; liquid temperature: 23.6°C

Date/Time: 06.06.2011 10:03:38Date/Time: 06.06.2011 10:14:27

IEEE1528_OET65-RightHandSide-GSM1900

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8

Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.669 mW/g

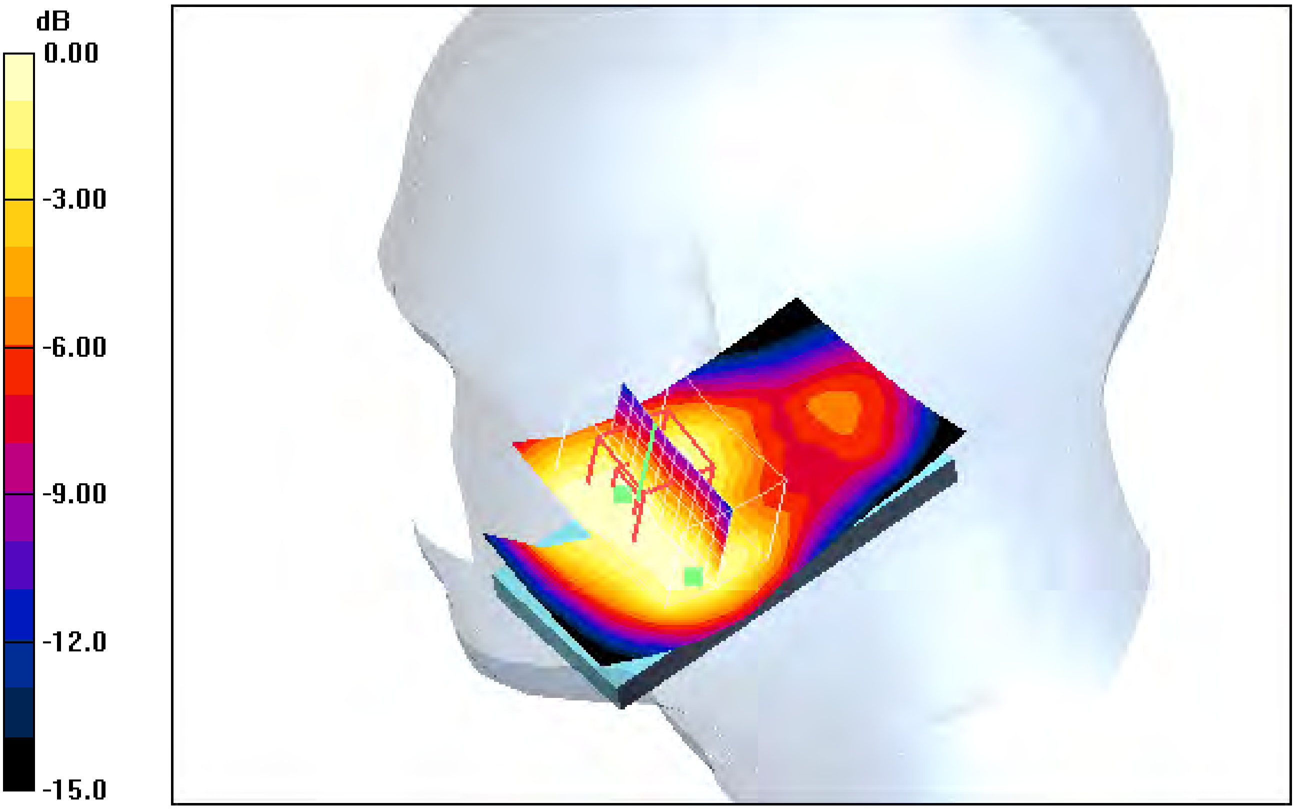
Touch position - Middle/Zoom Scan (7x7x7) (11x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22.1 V/m; Power Drift = -0.033 dB

Peak SAR (extrapolated) = 0.838 W/kg

SAR(1 g) = 0.607 mW/g; SAR(10 g) = 0.402 mW/g

Maximum value of SAR (measured) = 0.646 mW/g



0 dB = 0.646mW/g

Additional information:

ambient temperature: 23.6°C; liquid temperature: 23.6°C

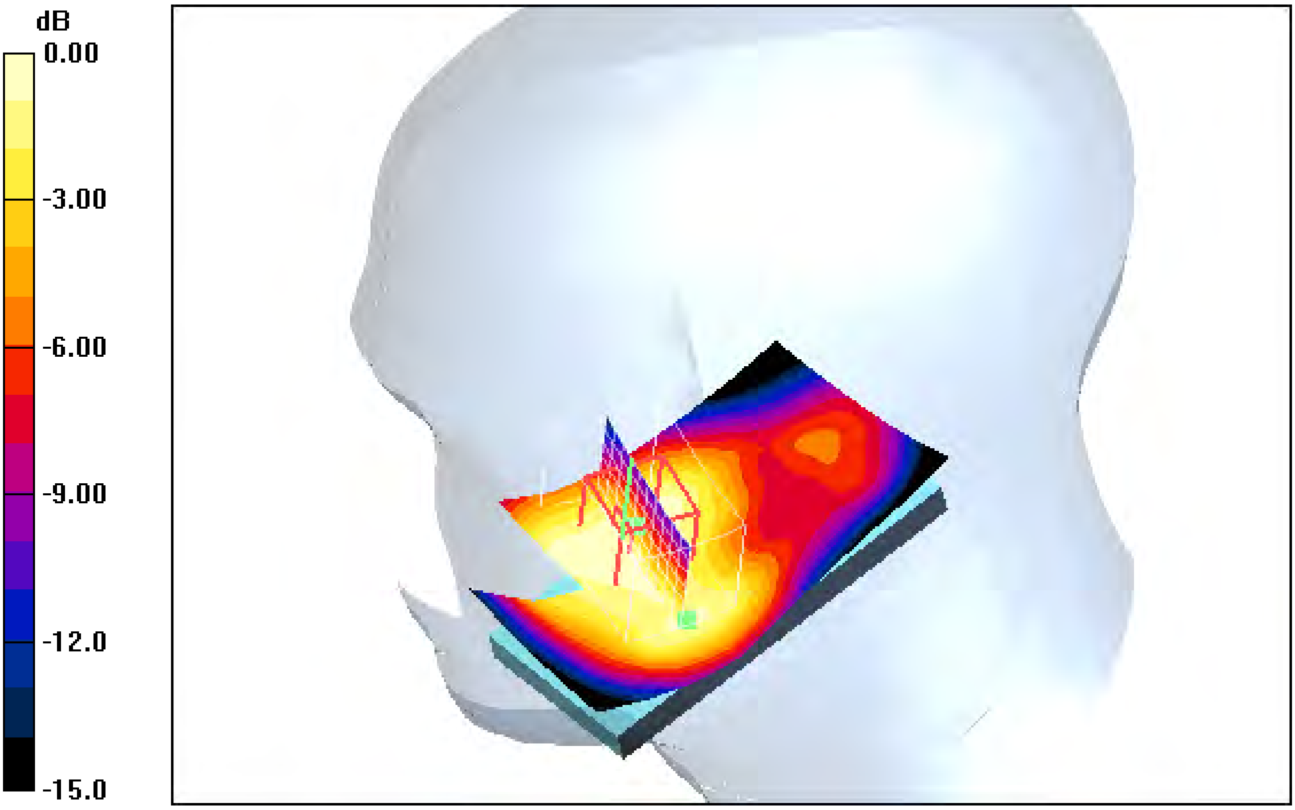
Date/Time: 06.06.2011 10:42:20Date/Time: 06.06.2011 10:51:33

IEEE1528_OET65-RightHandSide-GSM1900

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8
Medium: HSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.498 mW/g

Touch position - High/Zoom Scan (7x7x7) (11x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.9 V/m; Power Drift = 0.029 dB
Peak SAR (extrapolated) = 0.662 W/kg
SAR(1 g) = 0.456 mW/g; SAR(10 g) = 0.298 mW/g
Maximum value of SAR (measured) = 0.498 mW/g



0 dB = 0.498mW/g

Additional information:
ambient temperature: 23.6°C; liquid temperature: 23.6°C

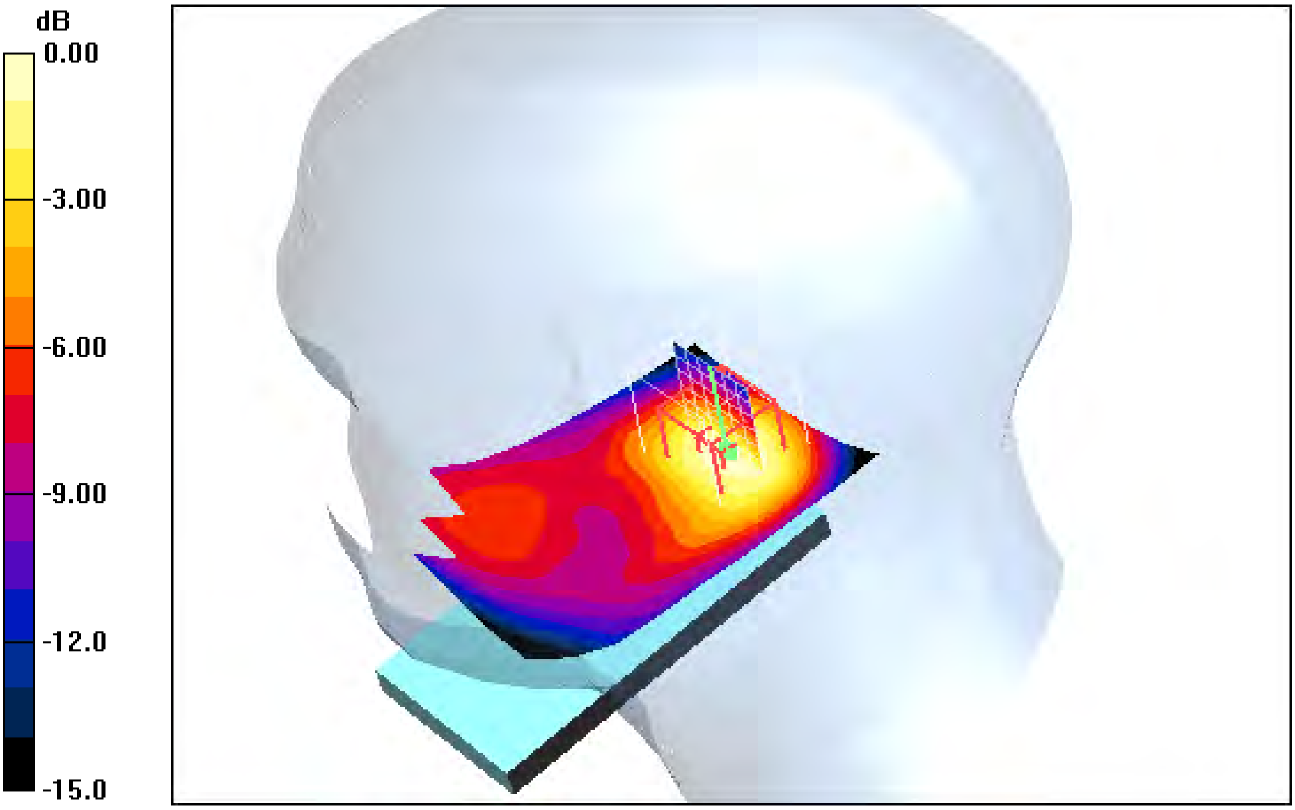
Date/Time: 06.06.2011 11:54:43Date/Time: 06.06.2011 12:00:37

IEEE1528_OET65-RightHandSide-GSM1900

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8
Medium: HSL1900 Medium parameters used: f = 1850.2 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.466 mW/g

Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.6 V/m; Power Drift = -0.042 dB
Peak SAR (extrapolated) = 0.571 W/kg
SAR(1 g) = 0.392 mW/g; SAR(10 g) = 0.232 mW/g
Maximum value of SAR (measured) = 0.437 mW/g



0 dB = 0.437mW/g

Additional information:
ambient temperature: 23.6°C; liquid temperature: 23.6°C

Date/Time: 06.06.2011 12:14:07Date/Time: 06.06.2011 12:20:01

IEEE1528_OET65-RightHandSide-GSM1900

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8

Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.493 mW/g

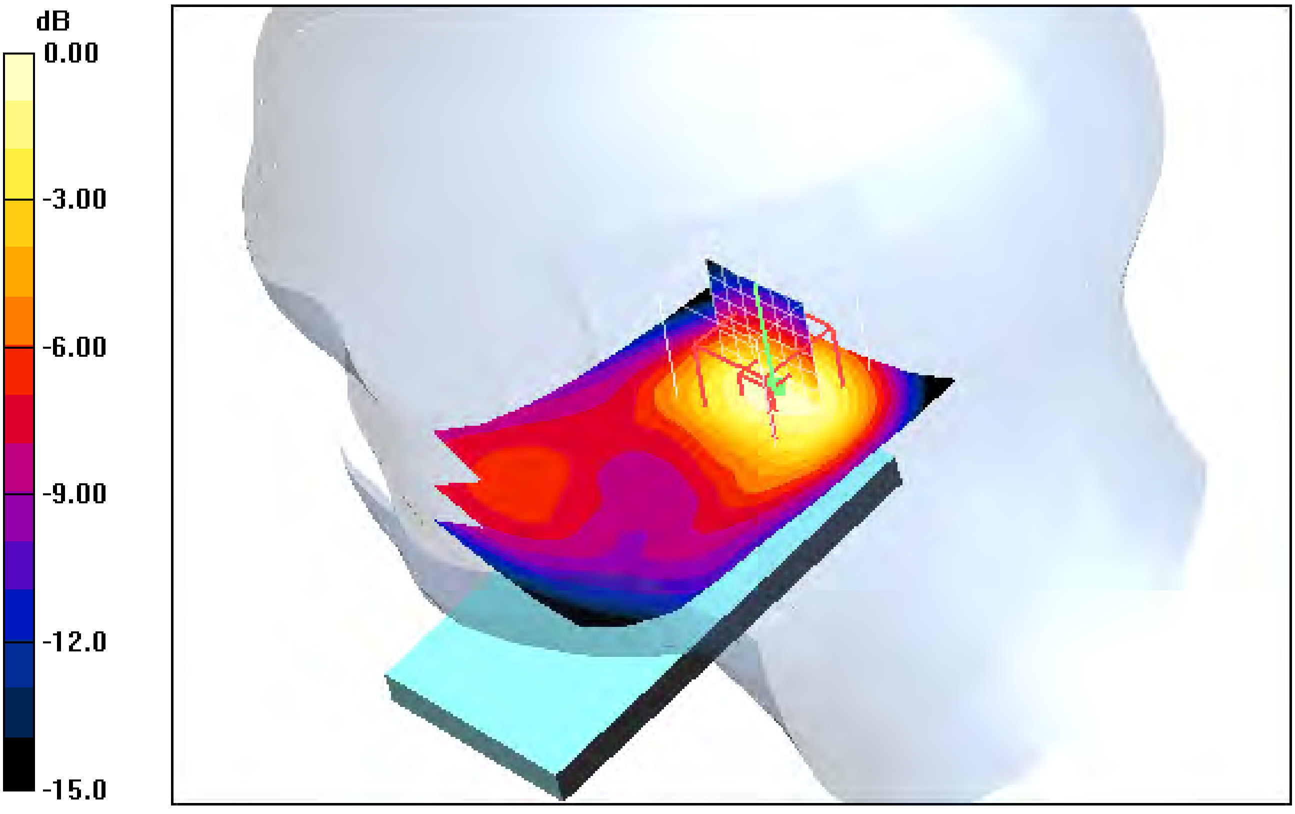
Tilt position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.3 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 0.619 W/kg

SAR(1 g) = 0.420 mW/g; SAR(10 g) = 0.247 mW/g

Maximum value of SAR (measured) = 0.471 mW/g



0 dB = 0.471mW/g

Additional information:

ambient temperature: 23.6°C; liquid temperature: 23.6°C

Date/Time: 06.06.2011 12:33:53Date/Time: 06.06.2011 12:39:48

IEEE1528_OET65-RightHandSide-GSM1900

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8

Medium: HSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.35 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(4.76, 4.76, 4.76); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.371 mW/g

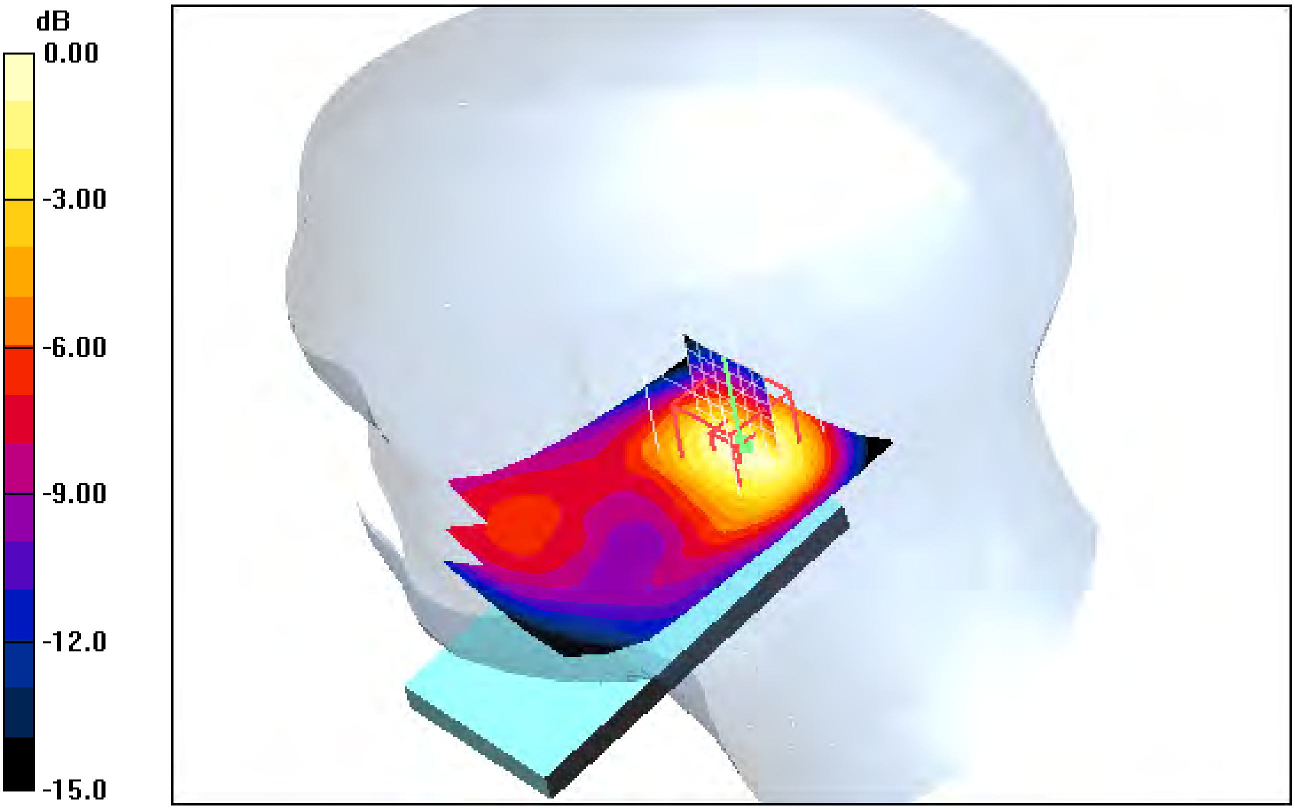
Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.1 V/m; Power Drift = -0.030 dB

Peak SAR (extrapolated) = 0.479 W/kg

SAR(1 g) = 0.320 mW/g; SAR(10 g) = 0.185 mW/g

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



0 dB = 0.359mW/g

Additional information:

ambient temperature: 23.6°C; liquid temperature: 23.6°C

Annex A.4: GSM 1900MHz body

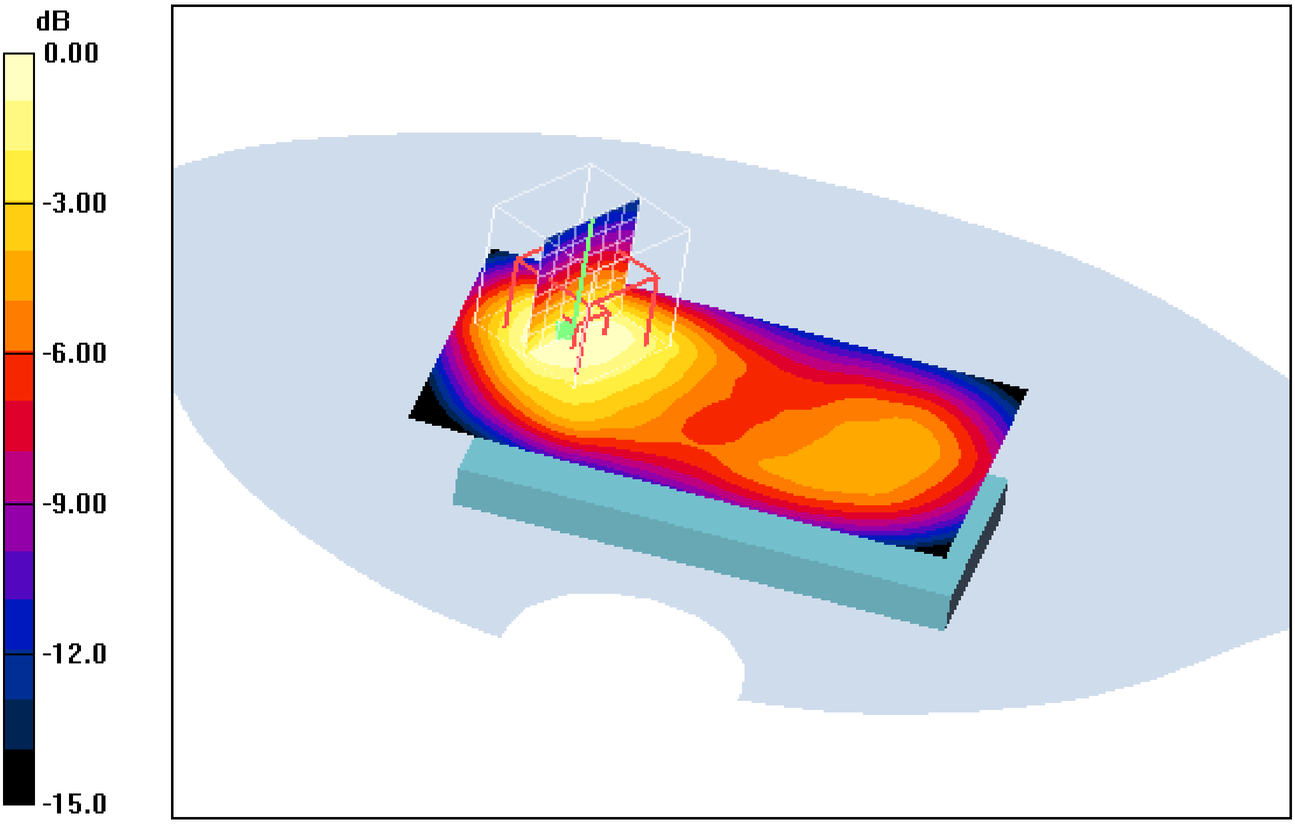
Date/Time: 14.06.2011 09:32:41Date/Time: 14.06.2011 09:40:58

IEEE1528_OET65-Body-GSM1900 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: PCS 1900 GPRS 4TS; Frequency: 1850.2 MHz; Duty Cycle: 1:2
Medium: M1900 Medium parameters used: f = 1850.2 MHz; σ = 1.5 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.35, 4.35, 4.35); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Front position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.852 mW/g

Front position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.7 V/m; Power Drift = -0.112 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.680 mW/g; SAR(10 g) = 0.394 mW/g
Maximum value of SAR (measured) = 0.754 mW/g



0 dB = 0.754mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.9°C; liquid temperature: 22.9°C

Date/Time: 14.06.2011 09:55:20Date/Time: 14.06.2011 10:00:54

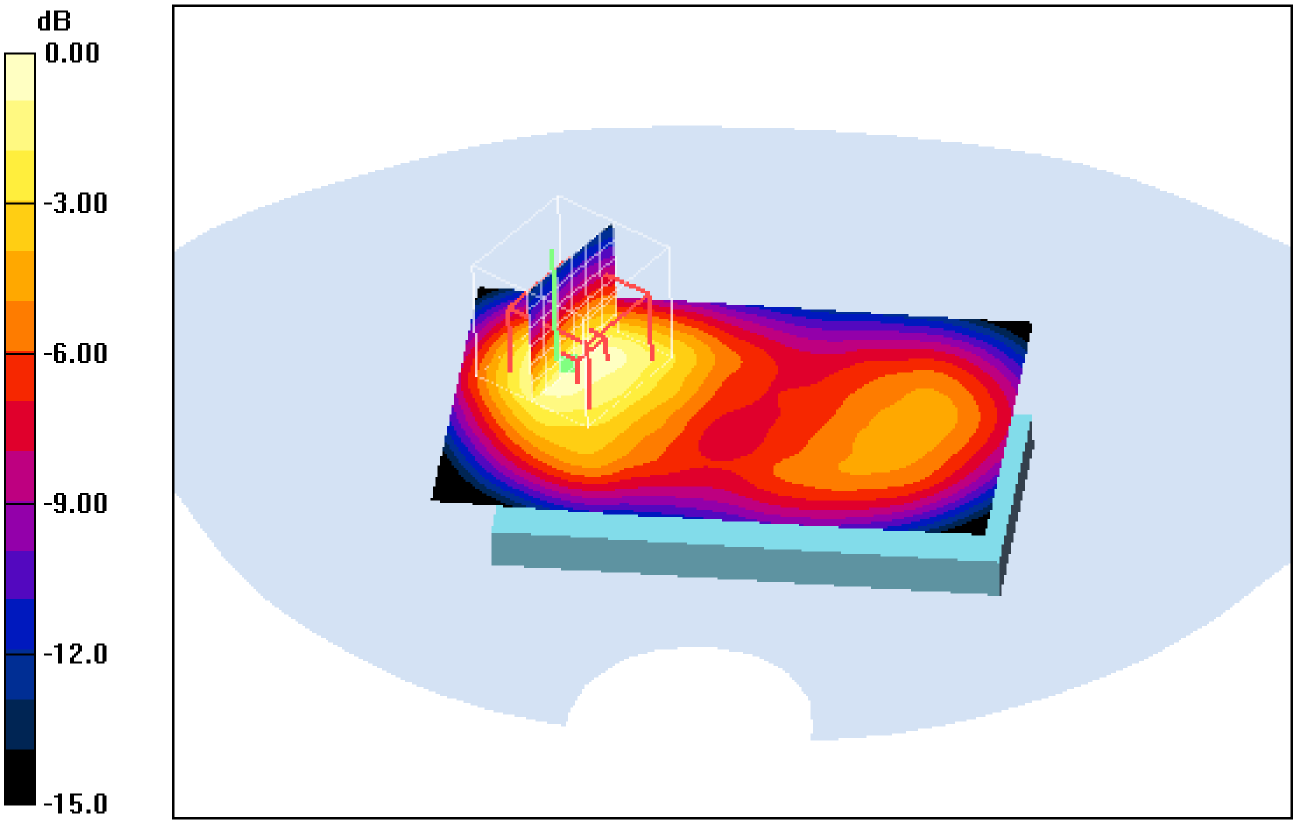
IEEE1528_OET65-Body-GSM1900 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: PCS 1900 GPRS 4TS; Frequency: 1880 MHz; Duty Cycle: 1:2
Medium: M1900 Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.35, 4.35, 4.35); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Front position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.00 mW/g

Front position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 25.0 V/m; Power Drift = -0.073 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 0.890 mW/g; SAR(10 g) = 0.508 mW/g
Maximum value of SAR (measured) = 1.00 mW/g



0 dB = 1.00mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.9°C; liquid temperature: 22.9°C

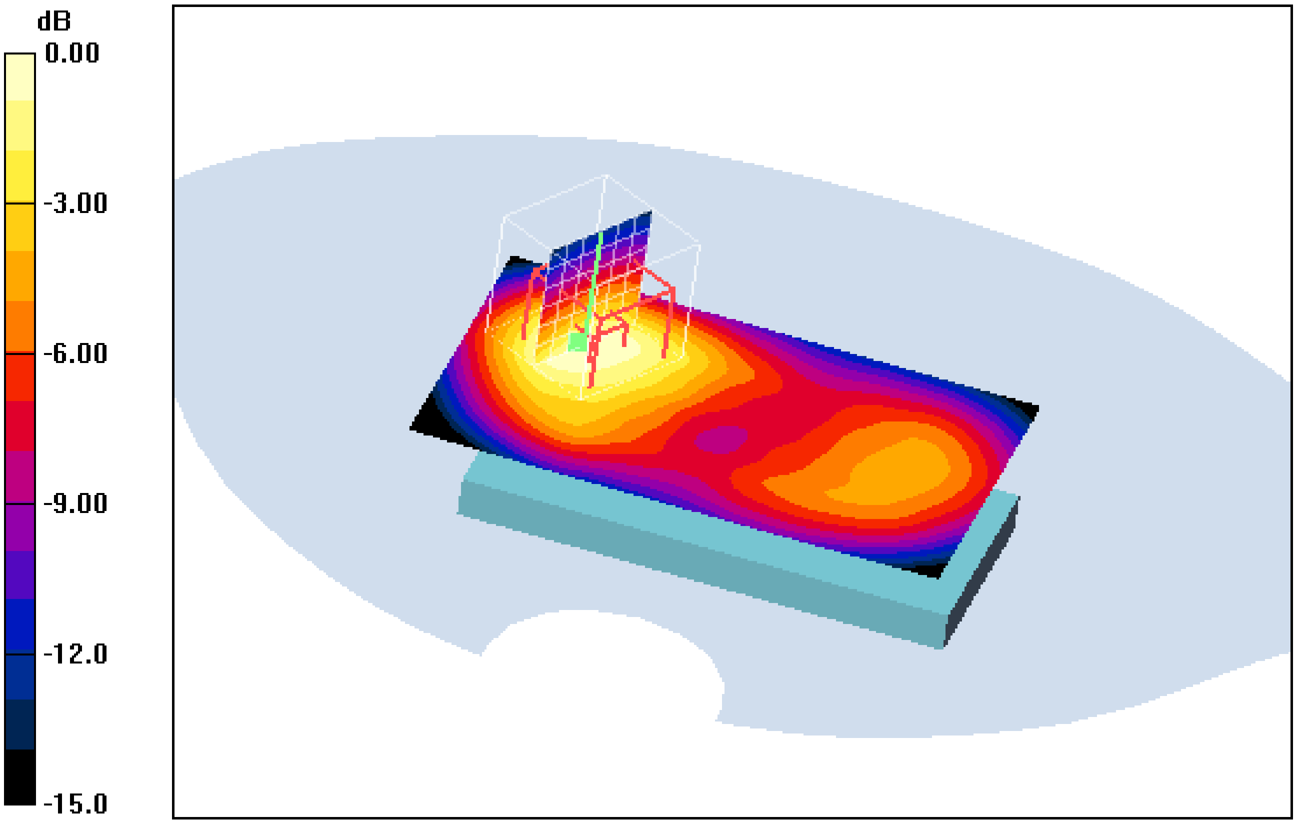
Date/Time: 14.06.2011 10:14:15Date/Time: 14.06.2011 10:19:48

IEEE1528_OET65-Body-GSM1900 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: PCS 1900 GPRS 4TS; Frequency: 1909.8 MHz; Duty Cycle: 1:2
Medium: M1900 Medium parameters used: f = 1909.8 MHz; σ = 1.5 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.35, 4.35, 4.35); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Front position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.07 mW/g

Front position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 26.0 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.56 W/kg
SAR(1 g) = 0.941 mW/g; SAR(10 g) = 0.539 mW/g
Maximum value of SAR (measured) = 1.05 mW/g



0 dB = 1.05mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.9°C; liquid temperature: 22.9°C

Date/Time: 14.06.2011 10:35:03Date/Time: 14.06.2011 10:41:26

IEEE1528_OET65-Body-GSM1900 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

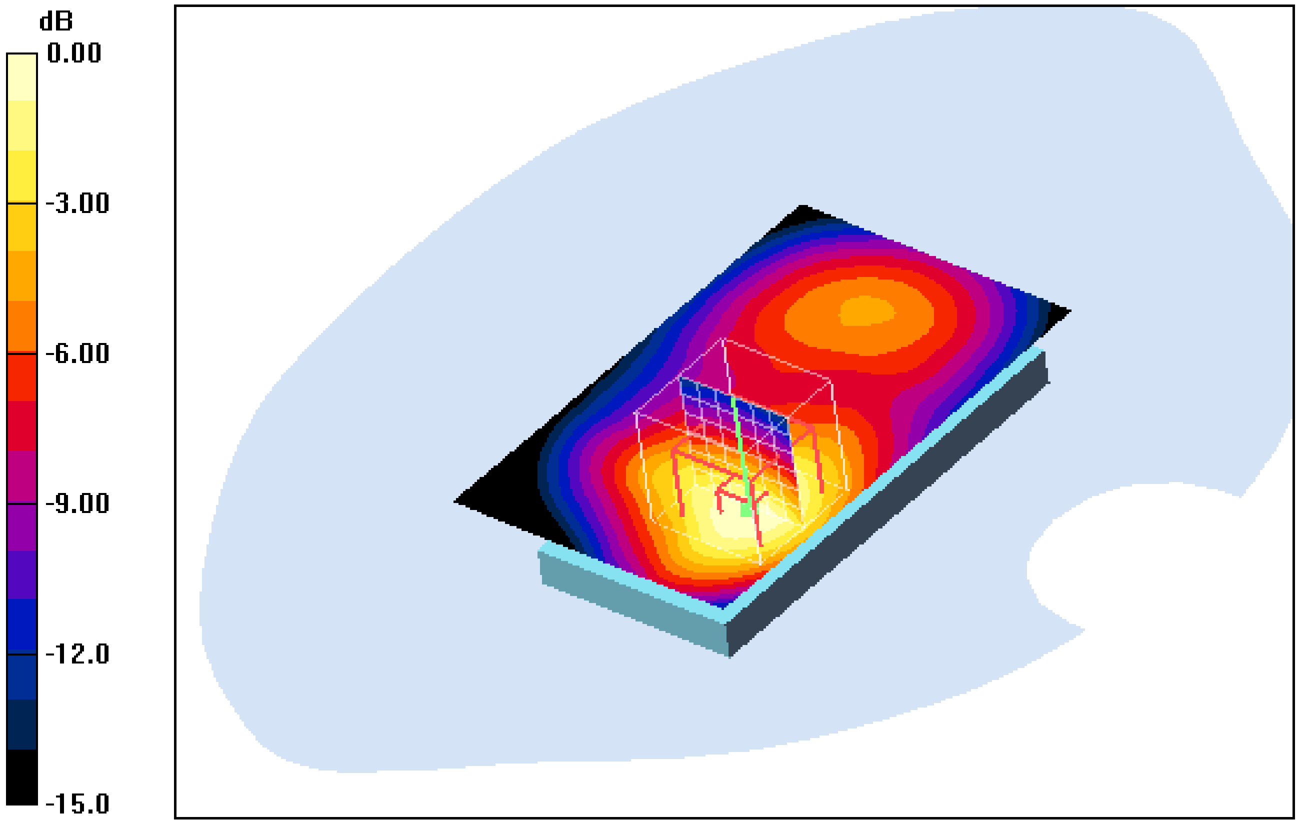
Communication System: PCS 1900 GPRS 4TS; Frequency: 1850.2 MHz; Duty Cycle: 1:2
Medium: M1900 Medium parameters used: f = 1850.2 MHz; σ = 1.5 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.35, 4.35, 4.35); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.743 mW/g

Rear position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.6 V/m; Power Drift = -0.067 dB
Peak SAR (extrapolated) = 0.927 W/kg
SAR(1 g) = 0.620 mW/g; SAR(10 g) = 0.364 mW/g
Maximum value of SAR (measured) = 0.697 mW/g



0 dB = 0.697mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.9°C; liquid temperature: 22.9°C

Date/Time: 14.06.2011 10:55:17Date/Time: 14.06.2011 11:00:54

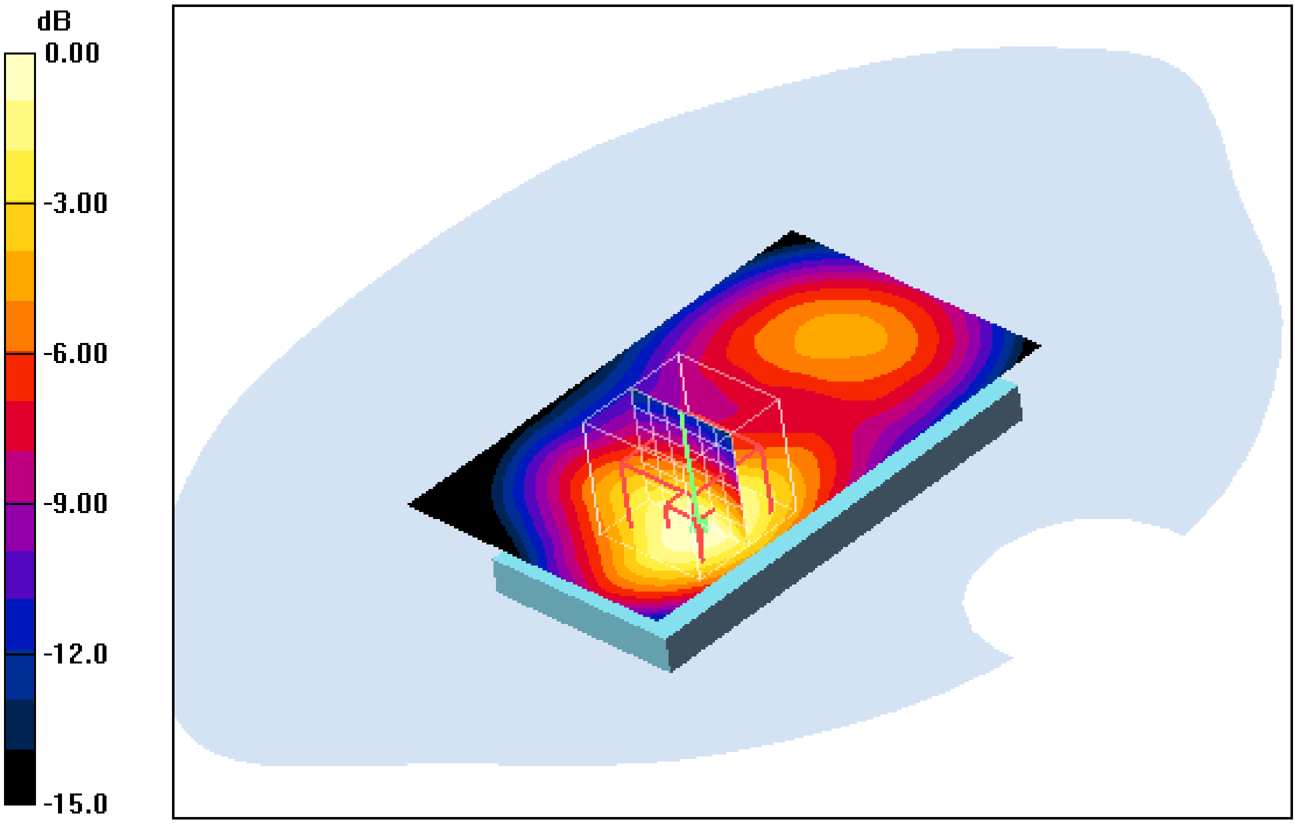
IEEE1528_OET65-Body-GSM1900 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: PCS 1900 GPRS 4TS; Frequency: 1880 MHz; Duty Cycle: 1:2
Medium: M1900 Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.35, 4.35, 4.35); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.948 mW/g

Rear position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 26.9 V/m; Power Drift = 0.014 dB
Peak SAR (extrapolated) = 1.22 W/kg
SAR(1 g) = 0.816 mW/g; SAR(10 g) = 0.478 mW/g
Maximum value of SAR (measured) = 0.904 mW/g



0 dB = 0.904mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.9°C; liquid temperature: 22.9°C

Date/Time: 14.06.2011 11:15:07Date/Time: 14.06.2011 11:20:43

IEEE1528_OET65-Body-GSM1900 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

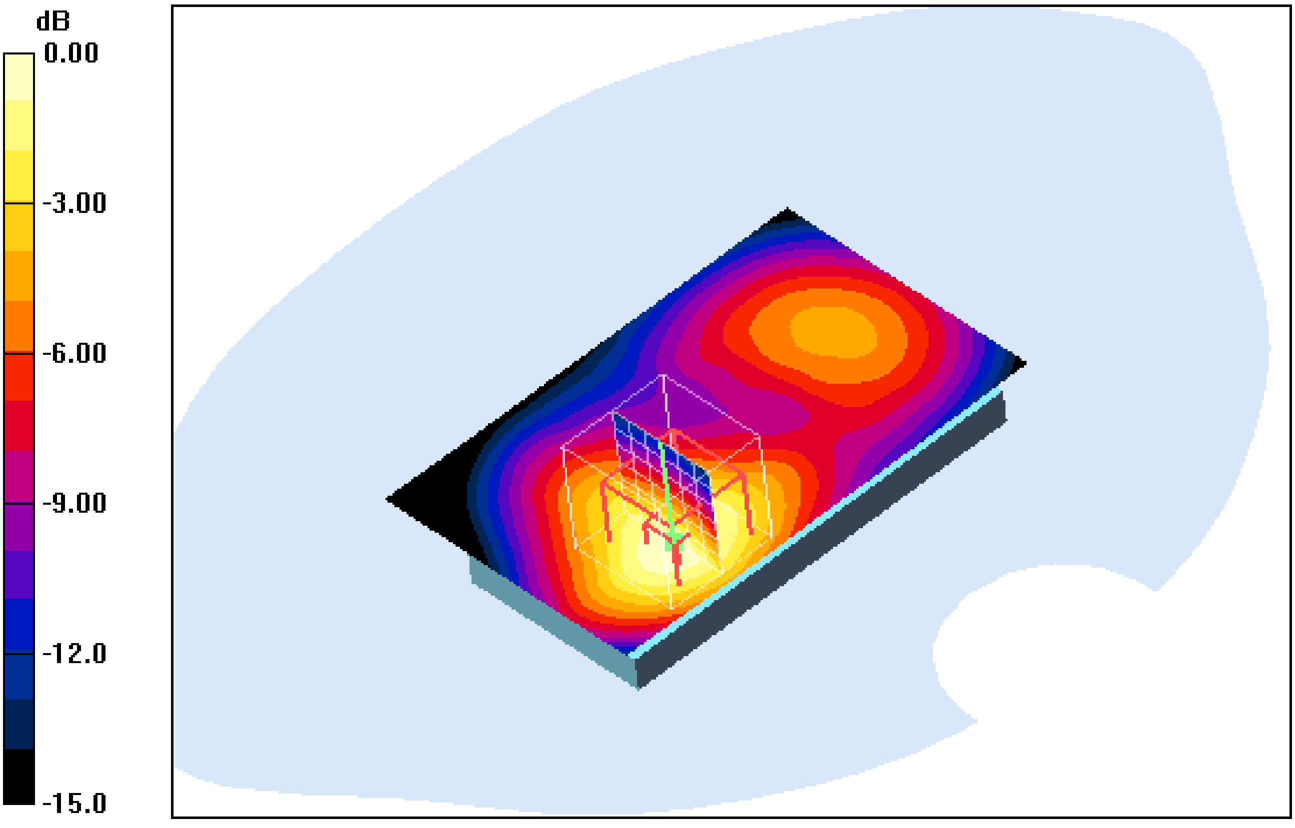
Communication System: PCS 1900 GPRS 4TS; Frequency: 1909.8 MHz; Duty Cycle: 1:2
Medium: M1900 Medium parameters used: f = 1909.8 MHz; σ = 1.5 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.35, 4.35, 4.35); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.989 mW/g

Rear position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27.5 V/m; Power Drift = -0.046 dB
Peak SAR (extrapolated) = 1.31 W/kg
SAR(1 g) = 0.859 mW/g; SAR(10 g) = 0.502 mW/g
Maximum value of SAR (measured) = 0.957 mW/g



0 dB = 0.957mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.9°C; liquid temperature: 22.9°C

Date/Time: 10.06.2011 11:18:24Date/Time: 10.06.2011 11:24:08

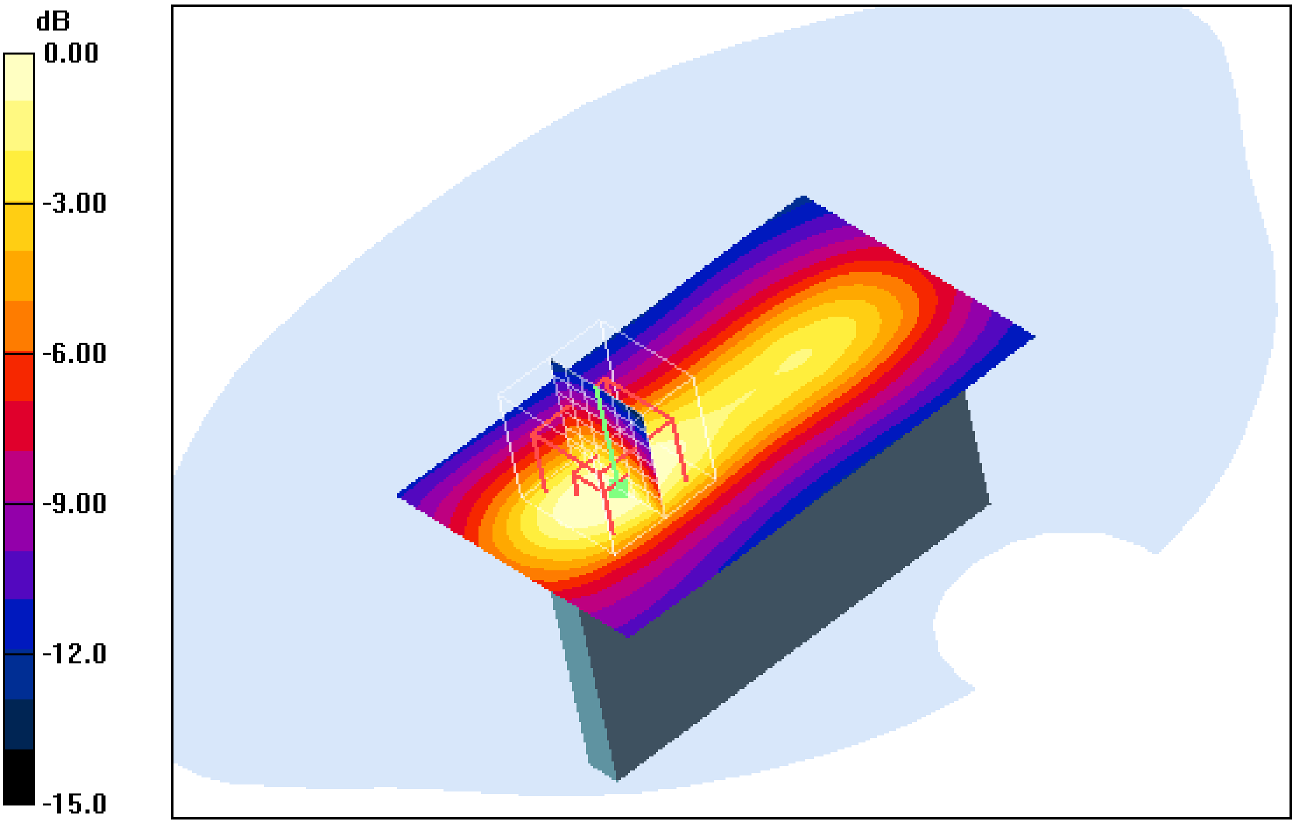
IEEE1528_OET65-Body-GSM1900 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: PCS 1900 GPRS 4TS; Frequency: 1880 MHz; Duty Cycle: 1:2
Medium: M1900 Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.35, 4.35, 4.35); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Edge left position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.444 mW/g

Edge left position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.6 V/m; Power Drift = -0.129 dB
Peak SAR (extrapolated) = 0.529 W/kg
SAR(1 g) = 0.349 mW/g; SAR(10 g) = 0.203 mW/g
Maximum value of SAR (measured) = 0.383 mW/g



0 dB = 0.383mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.7°C; liquid temperature: 21.9°C

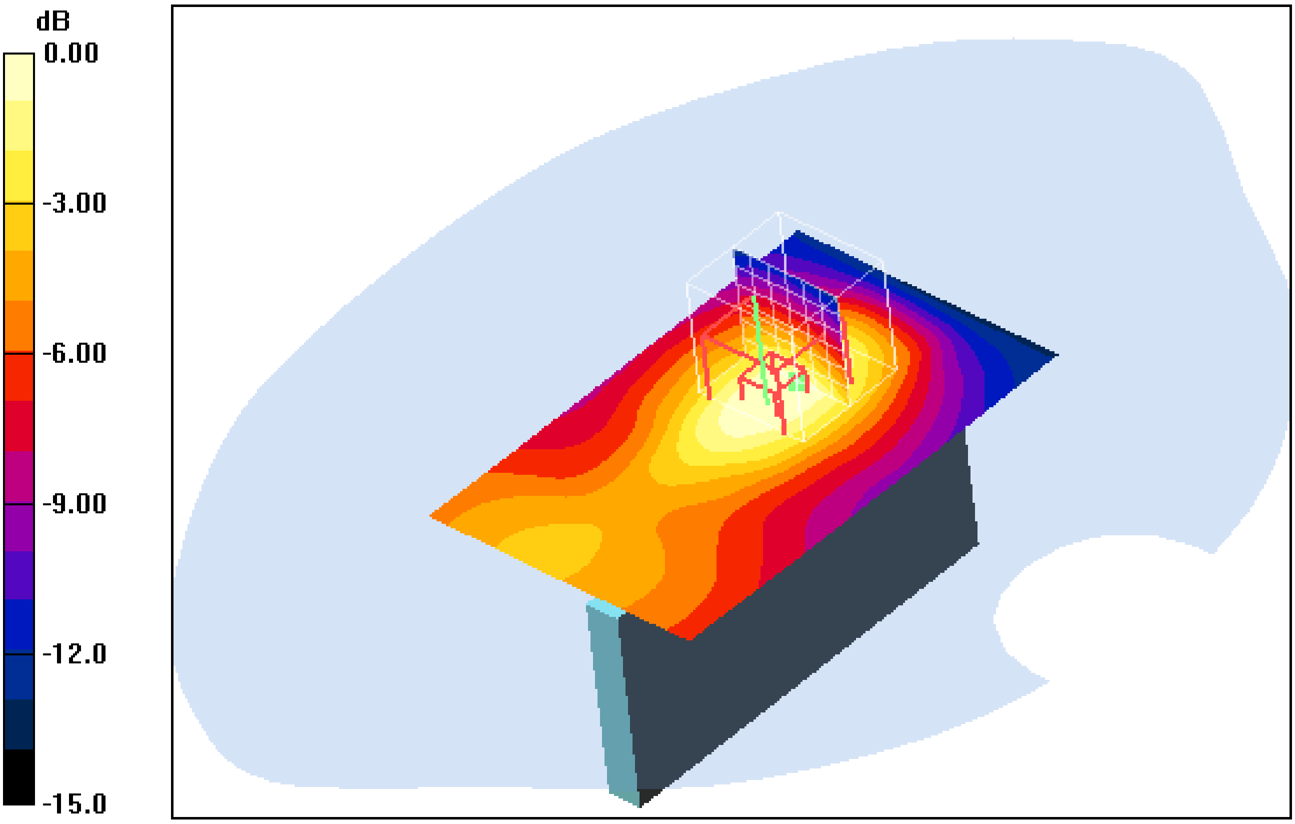
Date/Time: 10.06.2011 11:37:20Date/Time: 10.06.2011 11:43:08

IEEE1528_OET65-Body-GSM1900 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: PCS 1900 GPRS 4TS; Frequency: 1880 MHz; Duty Cycle: 1:2
Medium: M1900 Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.35, 4.35, 4.35); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Edge right position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.134 mW/g

Edge right position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.94 V/m; Power Drift = -0.111 dB
Peak SAR (extrapolated) = 0.187 W/kg
SAR(1 g) = 0.117 mW/g; SAR(10 g) = 0.071 mW/g
Maximum value of SAR (measured) = 0.128 mW/g



0 dB = 0.128mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.7°C; liquid temperature: 21.9°C

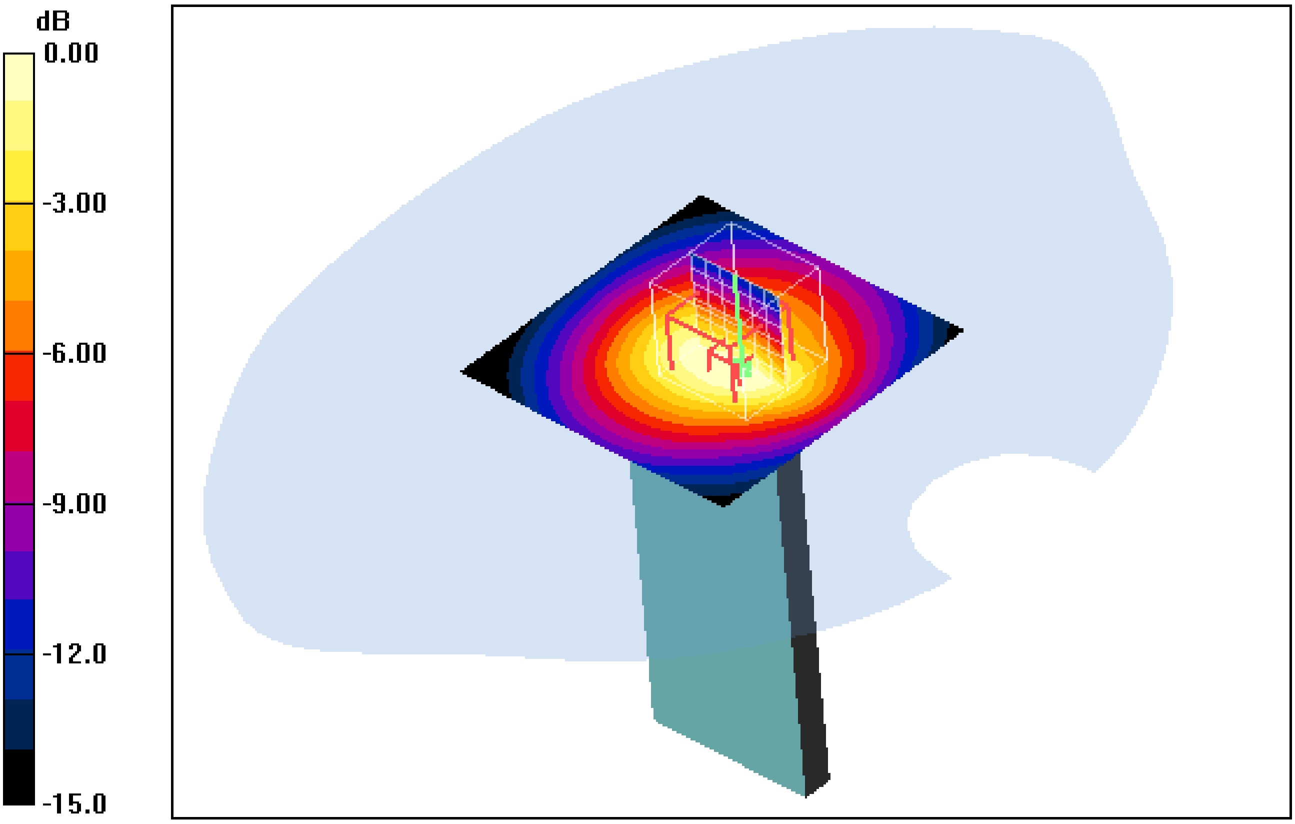
Date/Time: 10.06.2011 10:46:17Date/Time: 10.06.2011 10:58:08

IEEE1528_OET65-Body-GSM1900 GPRS 4TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P
Communication System: PCS 1900 GPRS 4TS; Frequency: 1880 MHz; Duty Cycle: 1:2
Medium: M1900 Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.35, 4.35, 4.35); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Edge bottom position - Middle/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.664 mW/g

Edge bottom position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.1 V/m; Power Drift = -0.132 dB
Peak SAR (extrapolated) = 0.821 W/kg
SAR(1 g) = 0.524 mW/g; SAR(10 g) = 0.306 mW/g
Maximum value of SAR (measured) = 0.586 mW/g



0 dB = 0.586mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 22.7°C; liquid temperature: 21.9°C

Date/Time: 14.06.2011 11:37:24Date/Time: 14.06.2011 11:42:51

IEEE1528_OET65-Body-GSM1900 1TS

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ25P

Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8

Medium: M1900 Medium parameters used: f = 1909.8 MHz; σ = 1.5 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1558; ConvF(4.35, 4.35, 4.35); Calibrated: 11.08.2010
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 13.01.2011
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Front position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.281 mW/g

Front position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

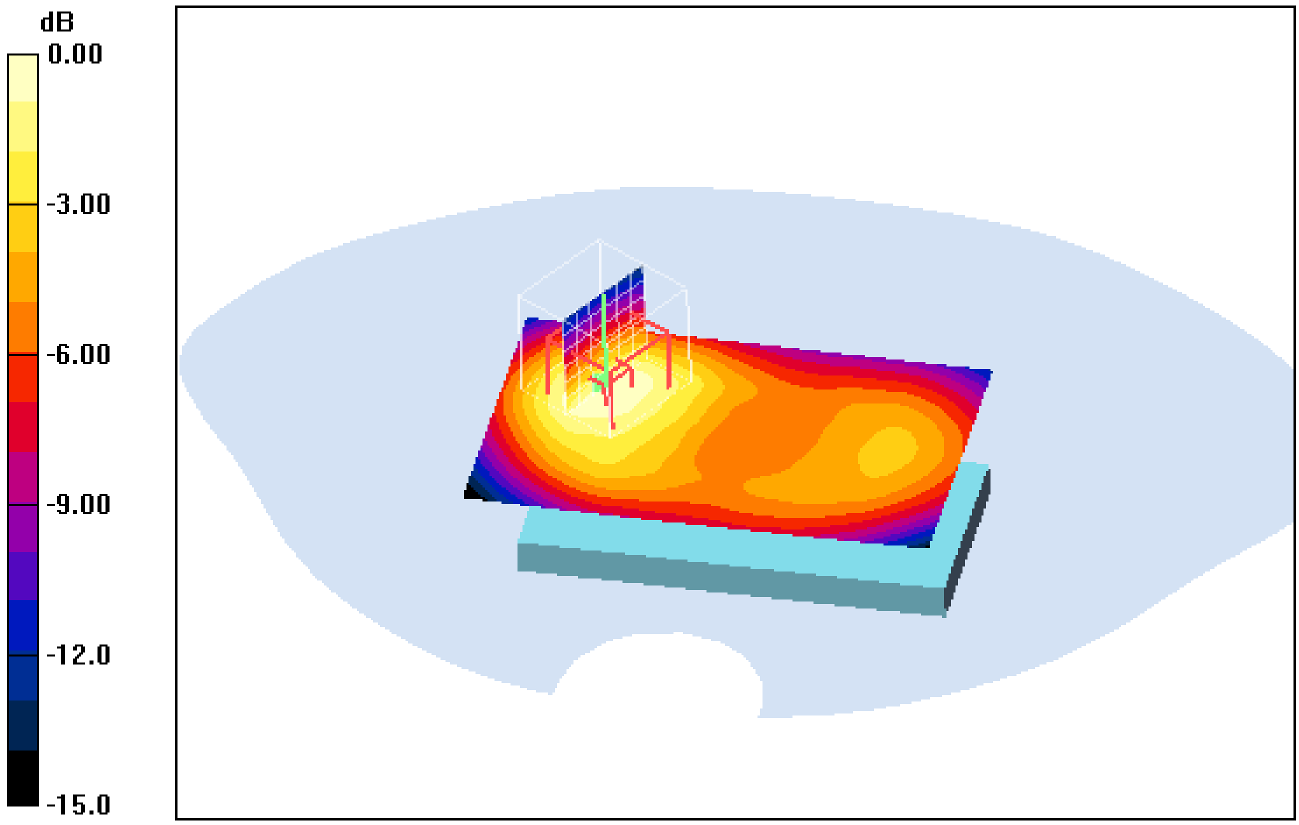
dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.0 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 0.411 W/kg

SAR(1 g) = 0.259 mW/g; SAR(10 g) = 0.156 mW/g

Maximum value of SAR (measured) = 0.286 mW/g



0 dB = 0.286mW/g

Additional information:

position or distance of DUT to SAM: 15 mm

ambient temperature: 22.9°C; liquid temperature: 22.9°C

Annex A.5: WLAN 2450MHz head

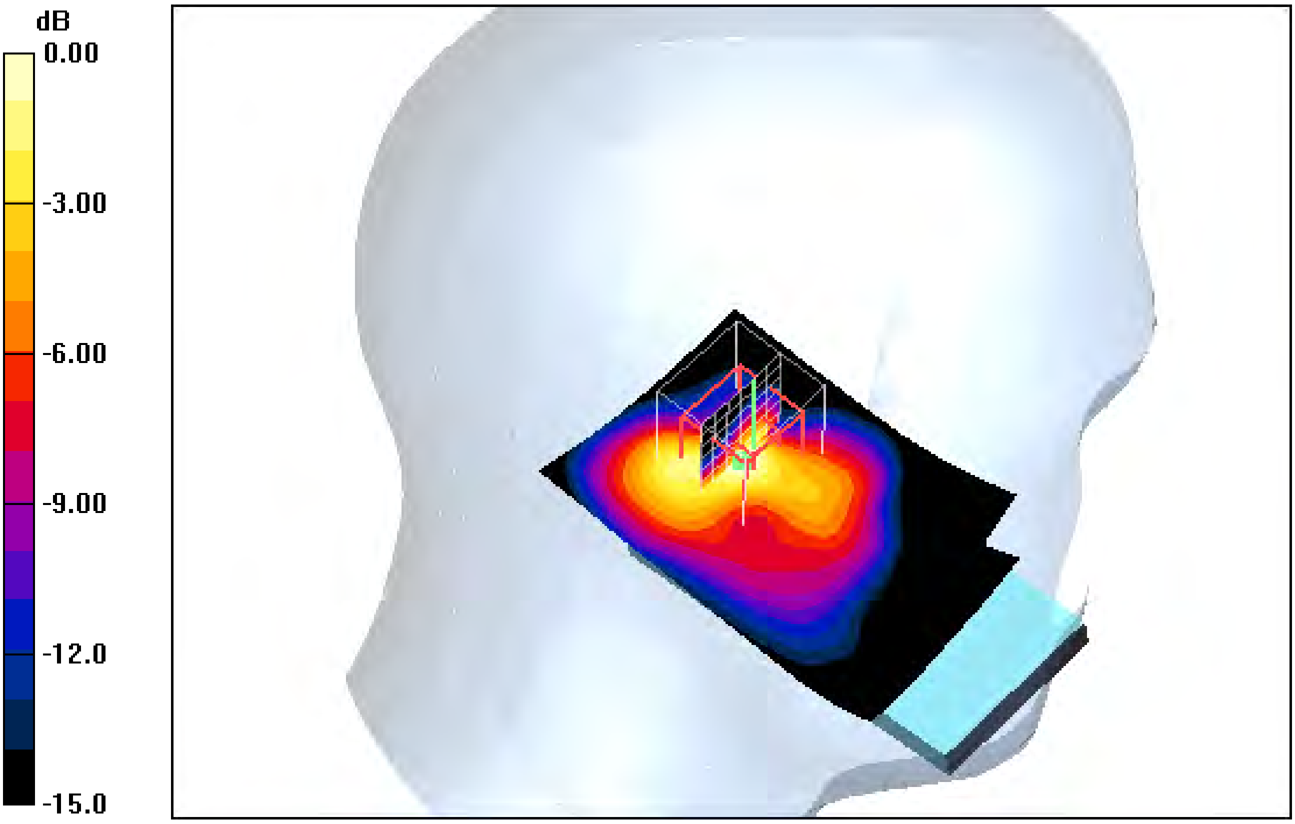
Date/Time: 10.06.2011 15:23:13Date/Time: 10.06.2011 15:31:48

IEEE1528_OET65_EN62209-LeftHandSide-WLAN2450

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used (interpolated): f = 2412 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.773 mW/g

Touch position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.5 V/m; Power Drift = 0.060 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.586 mW/g; SAR(10 g) = 0.256 mW/g
Maximum value of SAR (measured) = 0.727 mW/g



0 dB = 0.727mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 22.1°C

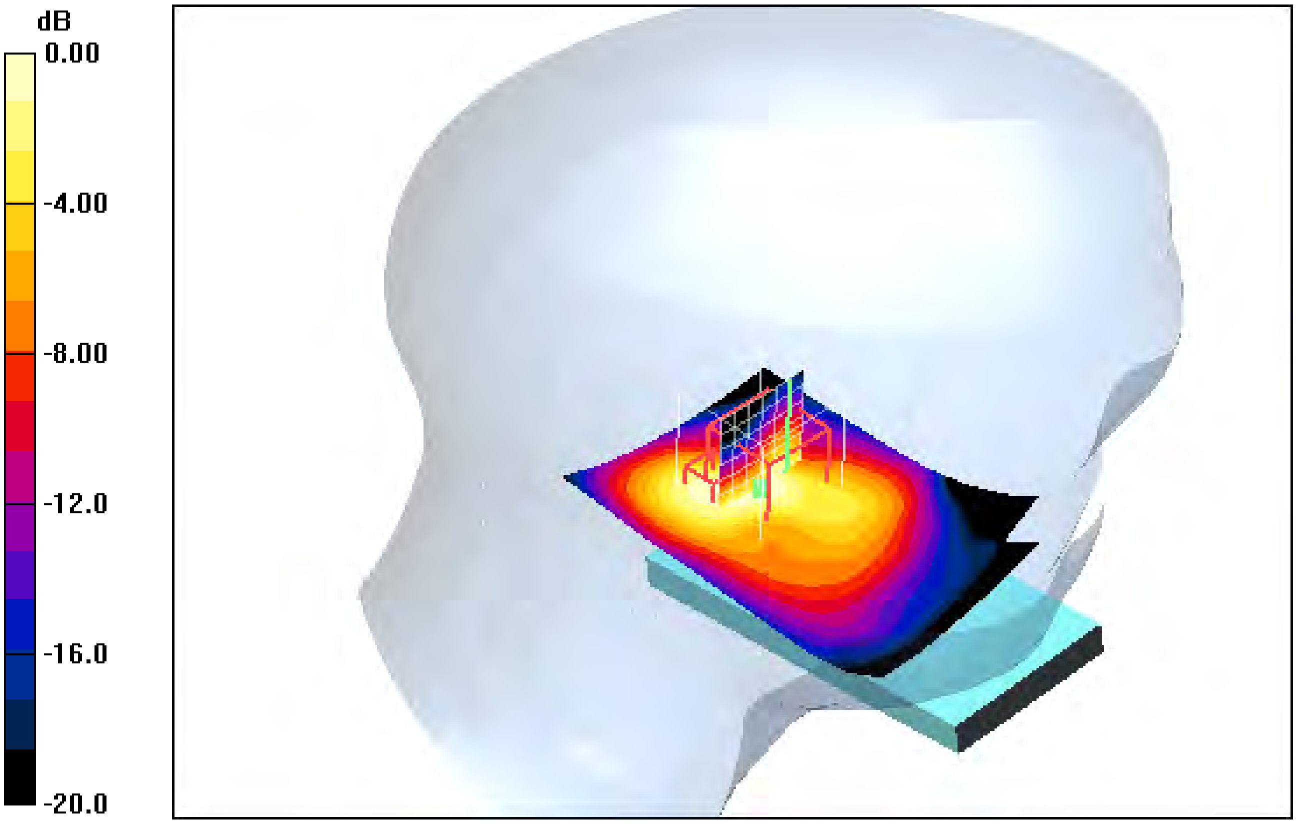
Date/Time: 10.06.2011 15:52:06Date/Time: 10.06.2011 15:57:57

IEEE1528_OET65_EN62209-LeftHandSide-WLAN2450

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used (interpolated): f = 2437 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.438 mW/g

Touch position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.1 V/m; Power Drift = 0.031 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.387 mW/g; SAR(10 g) = 0.174 mW/g
Maximum value of SAR (measured) = 0.452 mW/g



0 dB = 0.452mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 22.1°C

Date/Time: 14.06.2011 10:56:20Date/Time: 14.06.2011 11:05:52

IEEE1528_OET65_EN62209-LeftHandSide-WLAN2450

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7

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

Medium: HSL2450 Medium parameters used (interpolated): f = 2462 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.483 mW/g

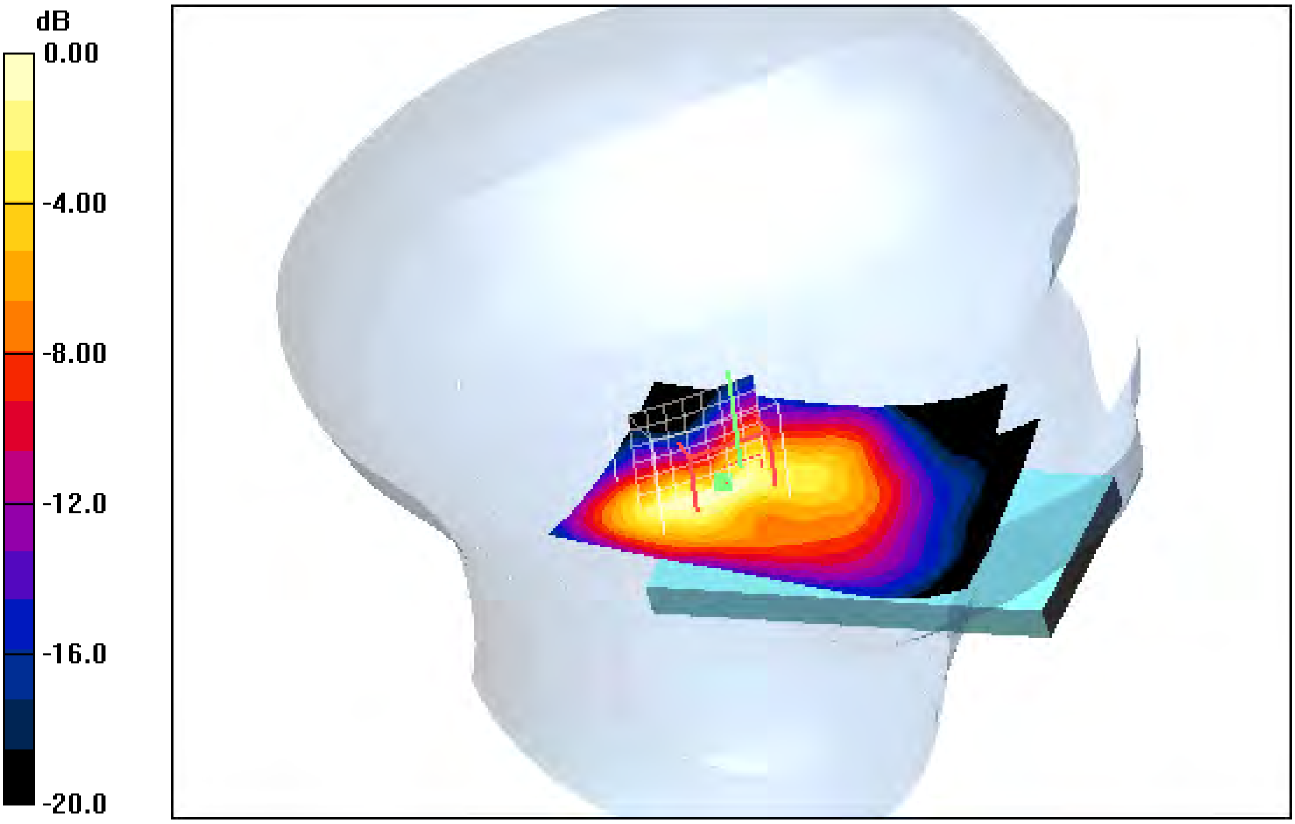
Touch position - High/Zoom Scan (7x7x7) (8x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.7 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.385 mW/g; SAR(10 g) = 0.165 mW/g

Maximum value of SAR (measured) = 0.479 mW/g



0 dB = 0.479mW/g

Additional information:

ambient temperature: 23.5°C; liquid temperature: 22.1°C

Date/Time: 10.06.2011 15:00:55Date/Time: 10.06.2011 15:06:36

IEEE1528_OET65_EN62209-LeftHandSide-WLAN2450

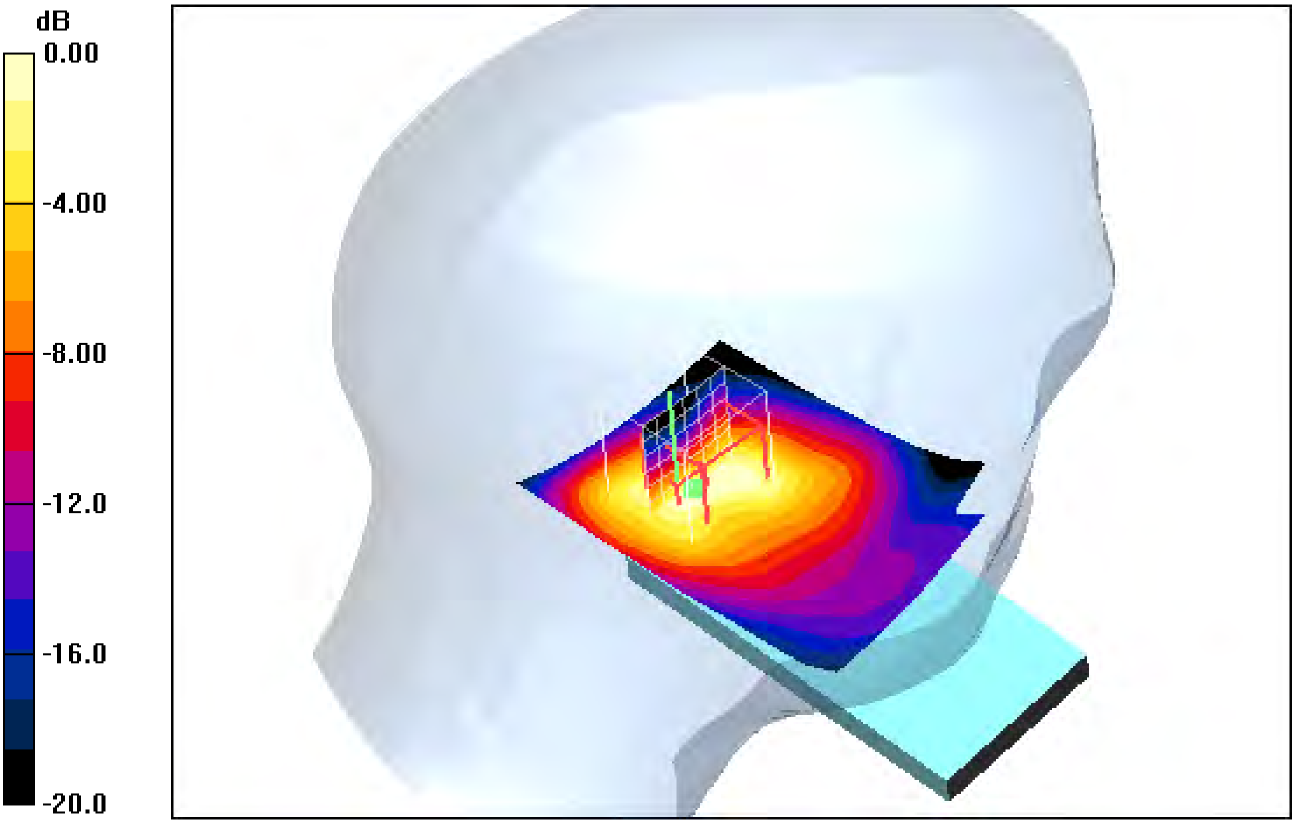
DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used (interpolated): f = 2412 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.426 mW/g

Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.9 V/m; Power Drift = -0.036 dB
Peak SAR (extrapolated) = 0.898 W/kg
SAR(1 g) = 0.353 mW/g; SAR(10 g) = 0.158 mW/g
Maximum value of SAR (measured) = 0.397 mW/g



0 dB = 0.397mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 22.1°C

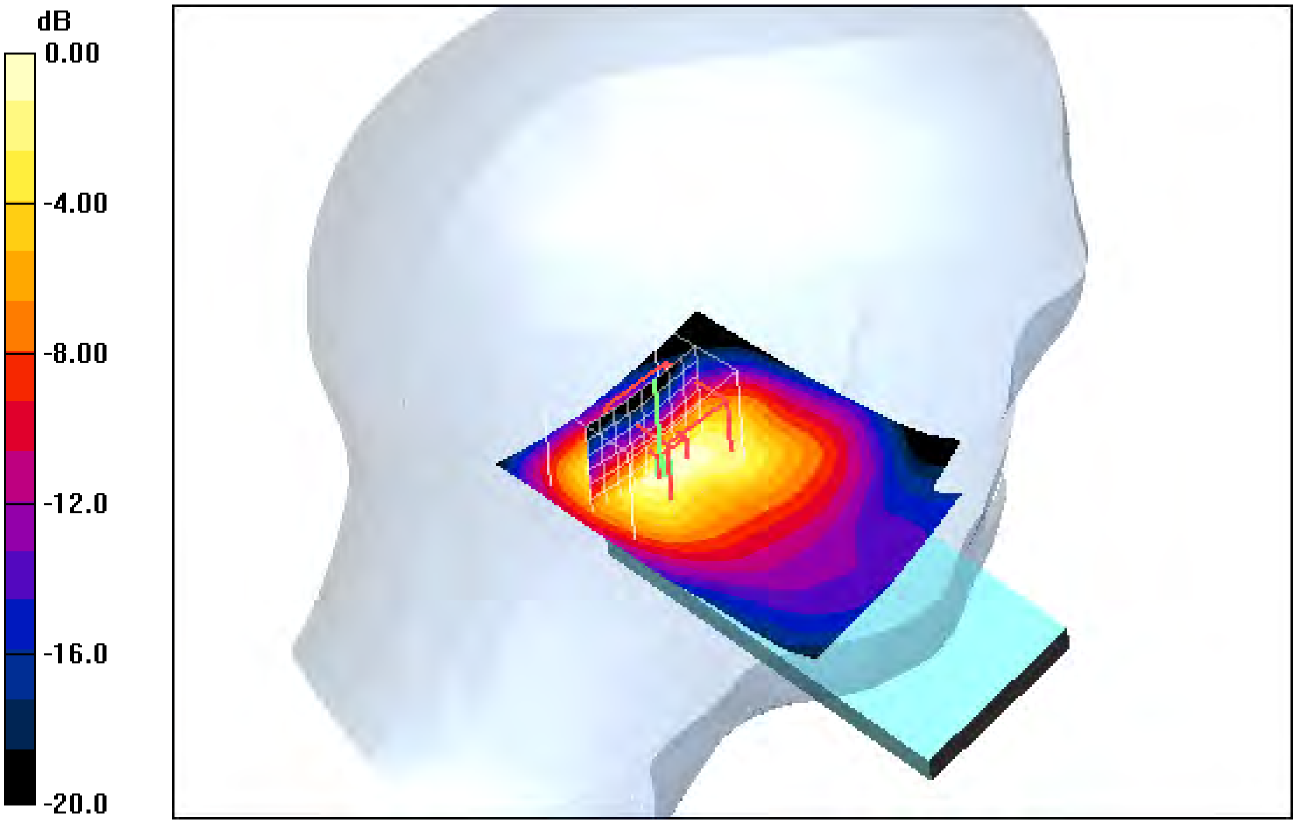
Date/Time: 10.06.2011 16:14:13Date/Time: 10.06.2011 16:20:50

IEEE1528_OET65_EN62209-LeftHandSide-WLAN2450

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used (interpolated): f = 2437 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.305 mW/g

Tilt position - Middle/Zoom Scan (7x7x7) (9x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.5 V/m; Power Drift = 0.054 dB
Peak SAR (extrapolated) = 0.694 W/kg
SAR(1 g) = 0.268 mW/g; SAR(10 g) = 0.114 mW/g
Maximum value of SAR (measured) = 0.297 mW/g



0 dB = 0.297mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 22.1°C

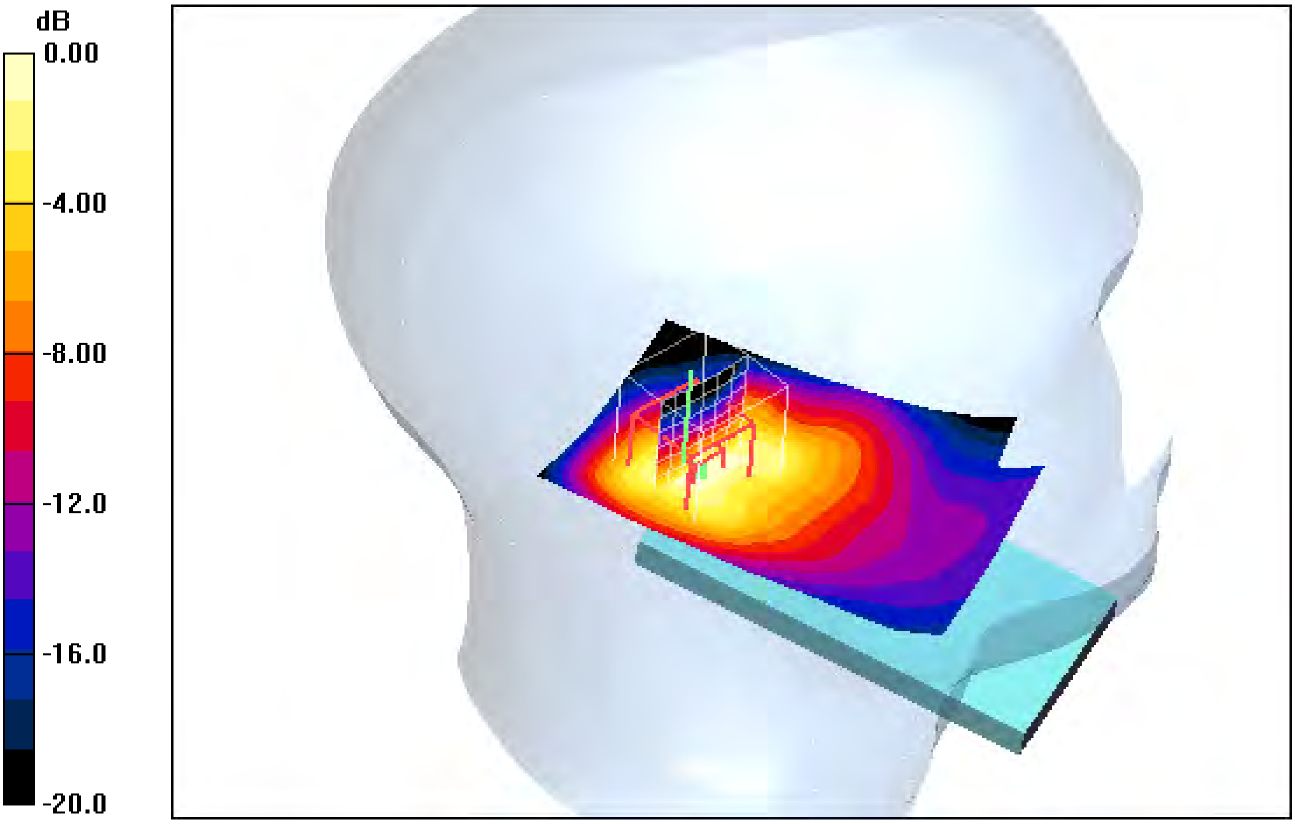
Date/Time: 14.06.2011 10:31:47Date/Time: 14.06.2011 10:40:34

IEEE1528_OET65_EN62209-LeftHandSide-WLAN2450

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used (interpolated): f = 2462 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Left Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.276 mW/g

Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.8 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.609 W/kg
SAR(1 g) = 0.234 mW/g; SAR(10 g) = 0.099 mW/g
Maximum value of SAR (measured) = 0.266 mW/g



0 dB = 0.266mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 22.1°C

Date/Time: 10.06.2011 14:13:31Date/Time: 10.06.2011 14:20:33

IEEE1528_OET65_EN62209-RightHandSide-WLAN2450

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7

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

Medium: HSL2450 Medium parameters used (interpolated): f = 2412 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.787 mW/g

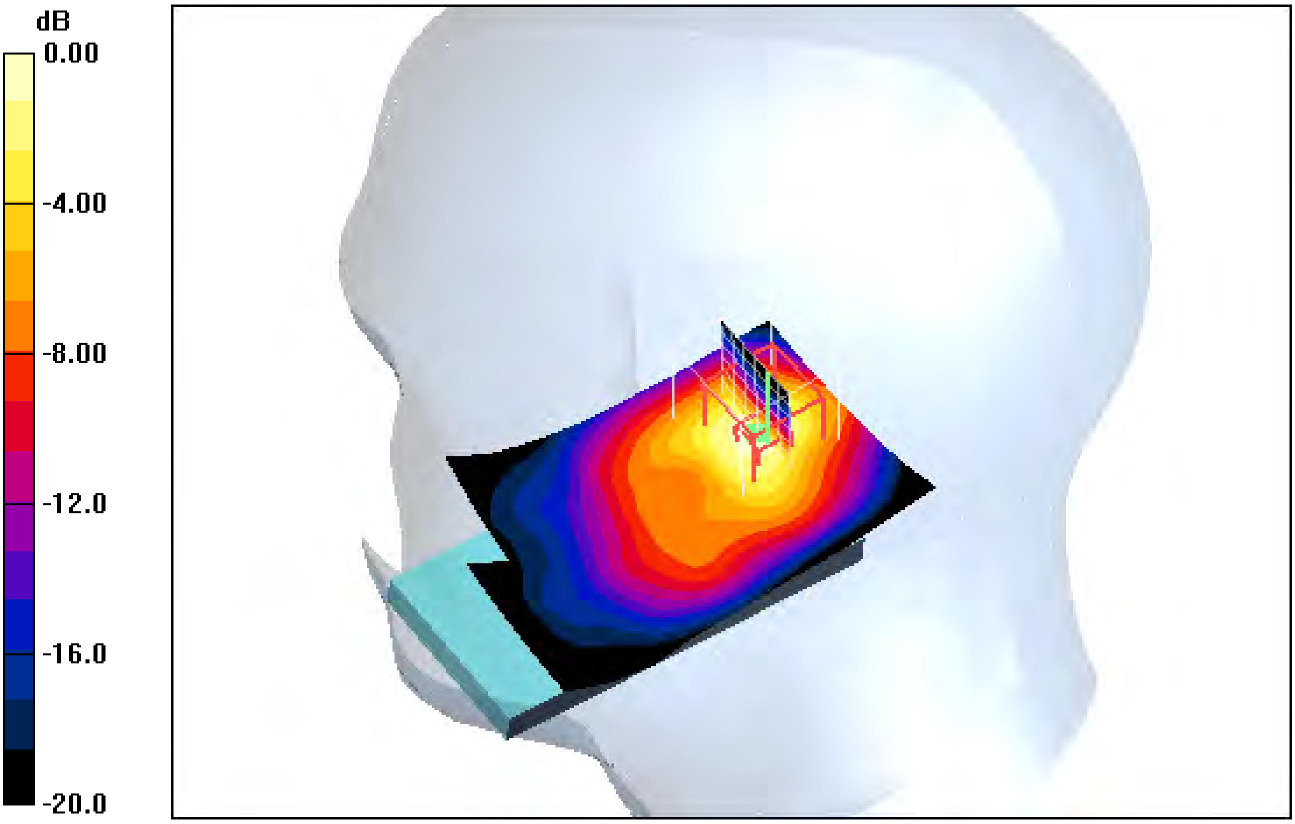
Touch position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.5 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 1.96 W/kg

SAR(1 g) = 0.707 mW/g; SAR(10 g) = 0.288 mW/g

Maximum value of SAR (measured) = 0.858 mW/g



0 dB = 0.858mW/g

Additional information:

ambient temperature: 23.5°C; liquid temperature: 22.1°C

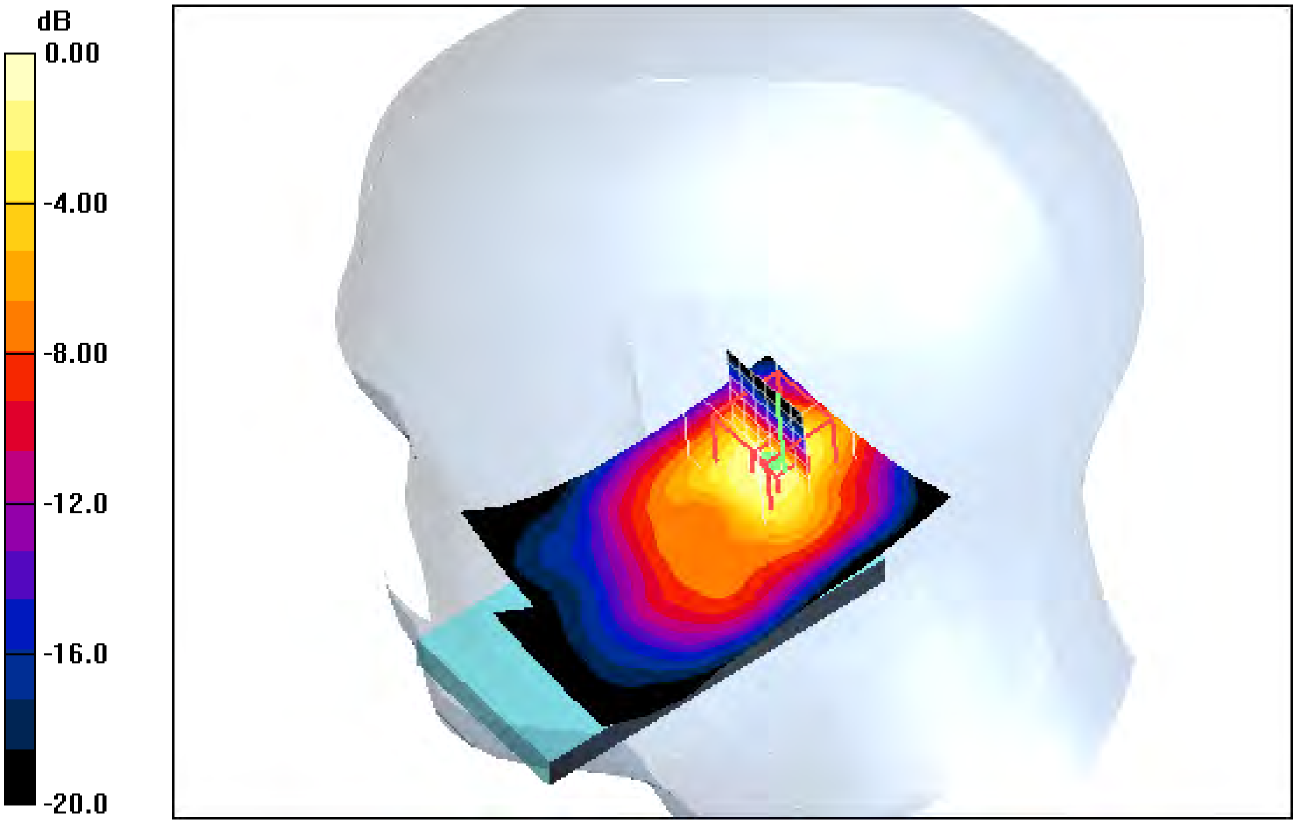
Date/Time: 10.06.2011 17:06:49Date/Time: 10.06.2011 17:13:23

IEEE1528_OET65_EN62209-RightHandSide-WLAN2450

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used (interpolated): f = 2437 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.554 mW/g

Touch position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.4 V/m; Power Drift = 0.021 dB
Peak SAR (extrapolated) = 1.49 W/kg
SAR(1 g) = 0.535 mW/g; SAR(10 g) = 0.215 mW/g
Maximum value of SAR (measured) = 0.632 mW/g



0 dB = 0.632mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 22.1°C

Date/Time: 14.06.2011 09:22:14Date/Time: 14.06.2011 09:29:21

IEEE1528_OET65_EN62209-RightHandSide-WLAN2450

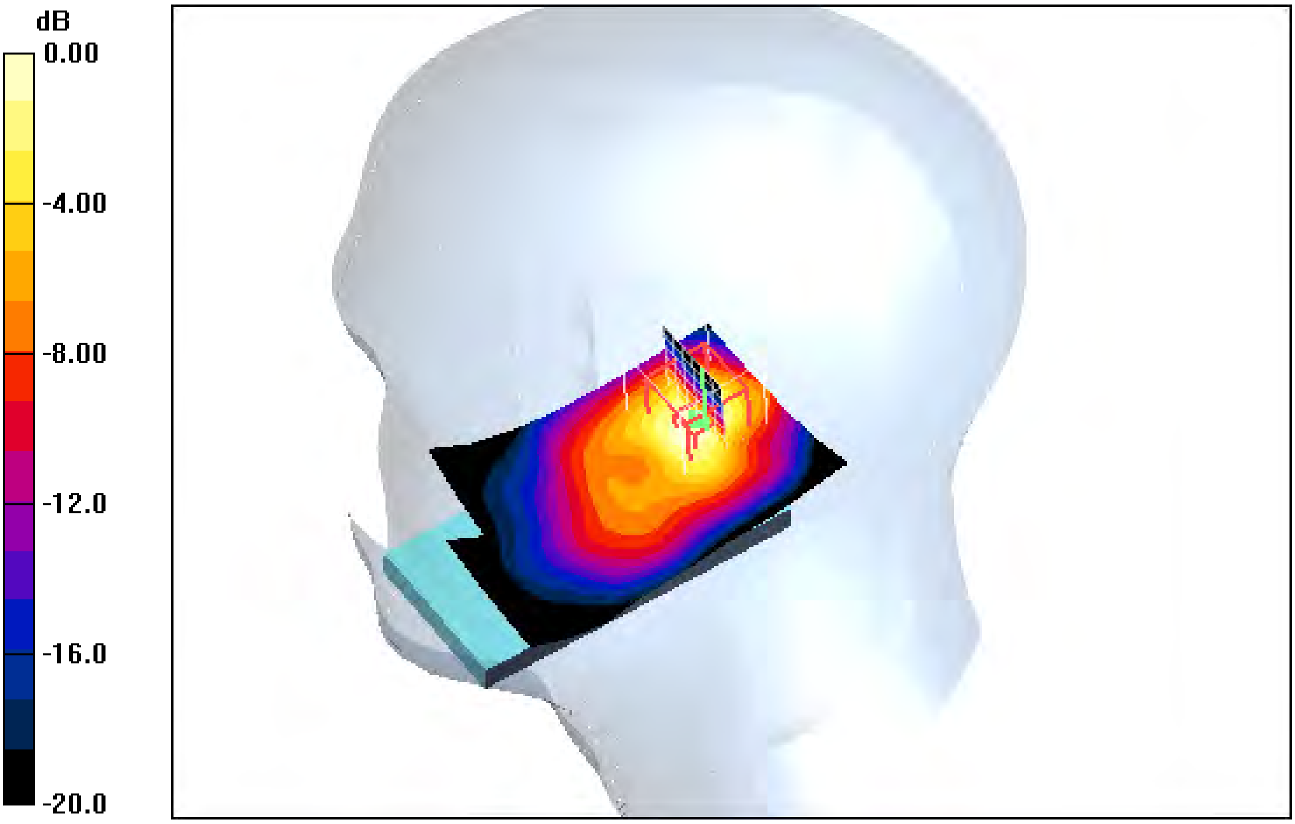
DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used (interpolated): f = 2462 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.593 mW/g

Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.1 V/m; Power Drift = -0.017 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 0.541 mW/g; SAR(10 g) = 0.218 mW/g
Maximum value of SAR (measured) = 0.623 mW/g



0 dB = 0.623mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 22.1°C

Date/Time: 10.06.2011 14:37:12Date/Time: 10.06.2011 14:43:56

IEEE1528_OET65_EN62209-RightHandSide-WLAN2450

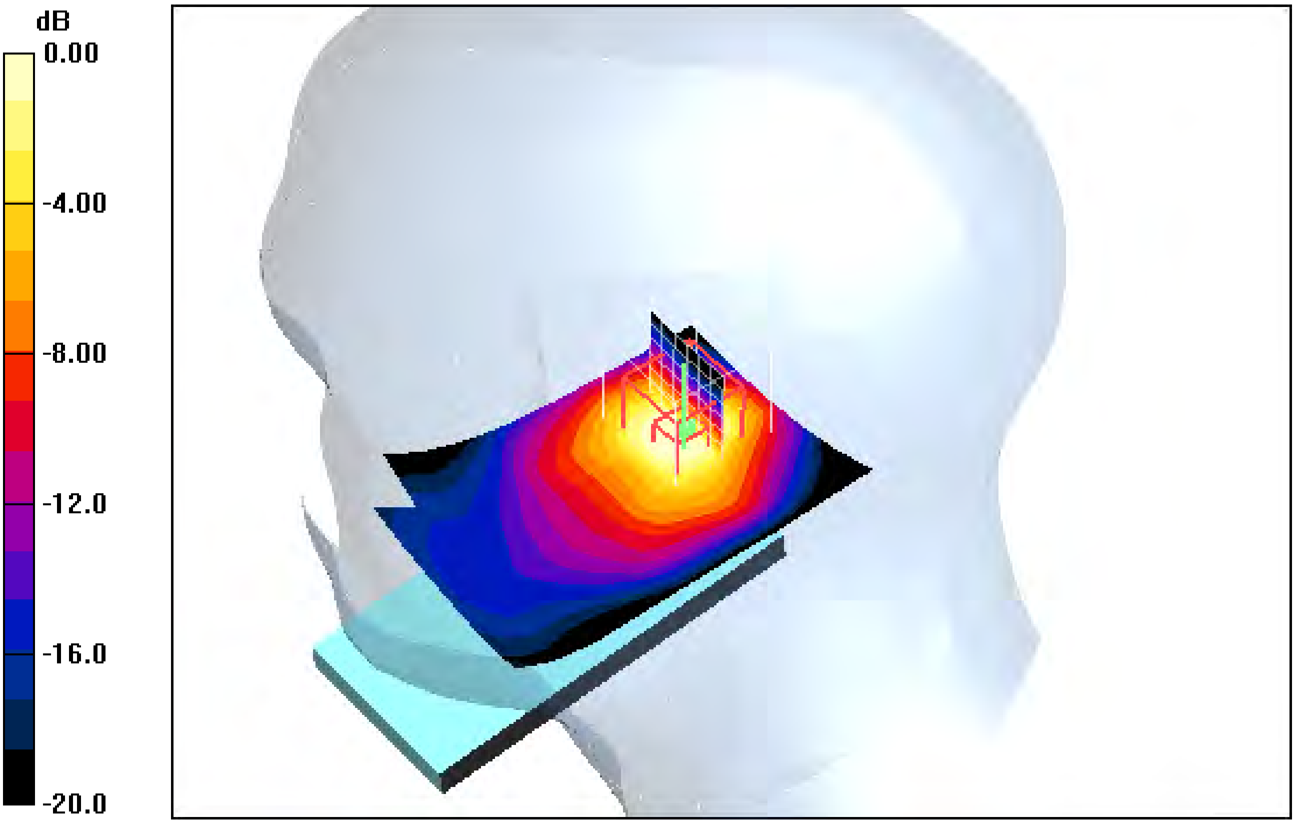
DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used (interpolated): f = 2412 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.785 mW/g

Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.4 V/m; Power Drift = 0.066 dB
Peak SAR (extrapolated) = 1.41 W/kg
SAR(1 g) = 0.540 mW/g; SAR(10 g) = 0.243 mW/g
Maximum value of SAR (measured) = 0.633 mW/g



0 dB = 0.633mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 22.1°C

Date/Time: 10.06.2011 16:45:50Date/Time: 10.06.2011 16:52:25

IEEE1528_OET65_EN62209-RightHandSide-WLAN2450

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7

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

Medium: HSL2450 Medium parameters used (interpolated): f = 2437 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.561 mW/g

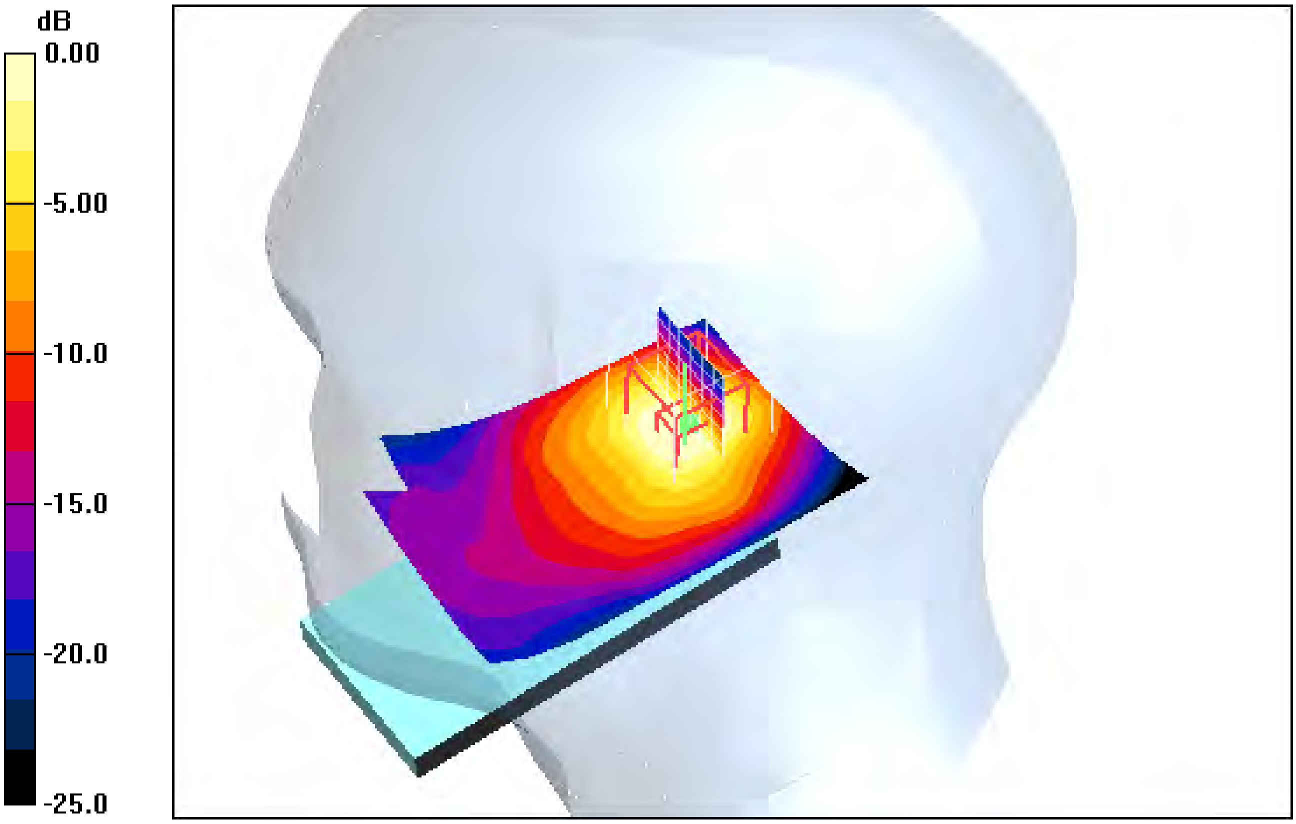
Tilt position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.2 V/m; Power Drift = -0.028 dB

Peak SAR (extrapolated) = 0.992 W/kg

SAR(1 g) = 0.380 mW/g; SAR(10 g) = 0.174 mW/g

Maximum value of SAR (measured) = 0.427 mW/g



0 dB = 0.427mW/g

Additional information:

ambient temperature: 23.5°C; liquid temperature: 22.1°C

Date/Time: 14.06.2011 09:45:17Date/Time: 14.06.2011 09:52:05

IEEE1528_OET65_EN62209-RightHandSide-WLAN2450

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7

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

Medium: HSL2450 Medium parameters used (interpolated): f = 2462 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Tilt position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.586 mW/g

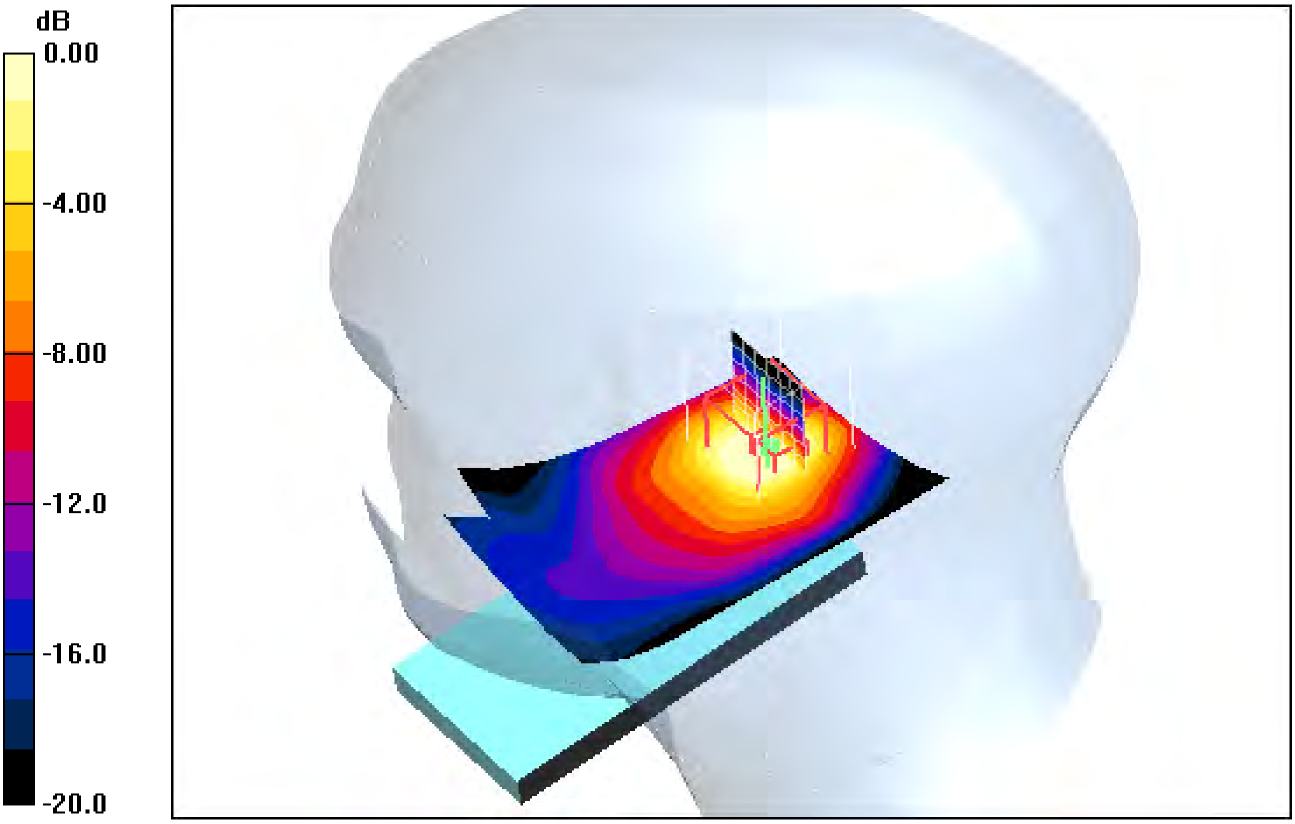
Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.7 V/m; Power Drift = 0.042 dB

Peak SAR (extrapolated) = 0.957 W/kg

SAR(1 g) = 0.376 mW/g; SAR(10 g) = 0.173 mW/g

Maximum value of SAR (measured) = 0.423 mW/g



0 dB = 0.423mW/g

Additional information:

ambient temperature: 23.5°C; liquid temperature: 22.1°C

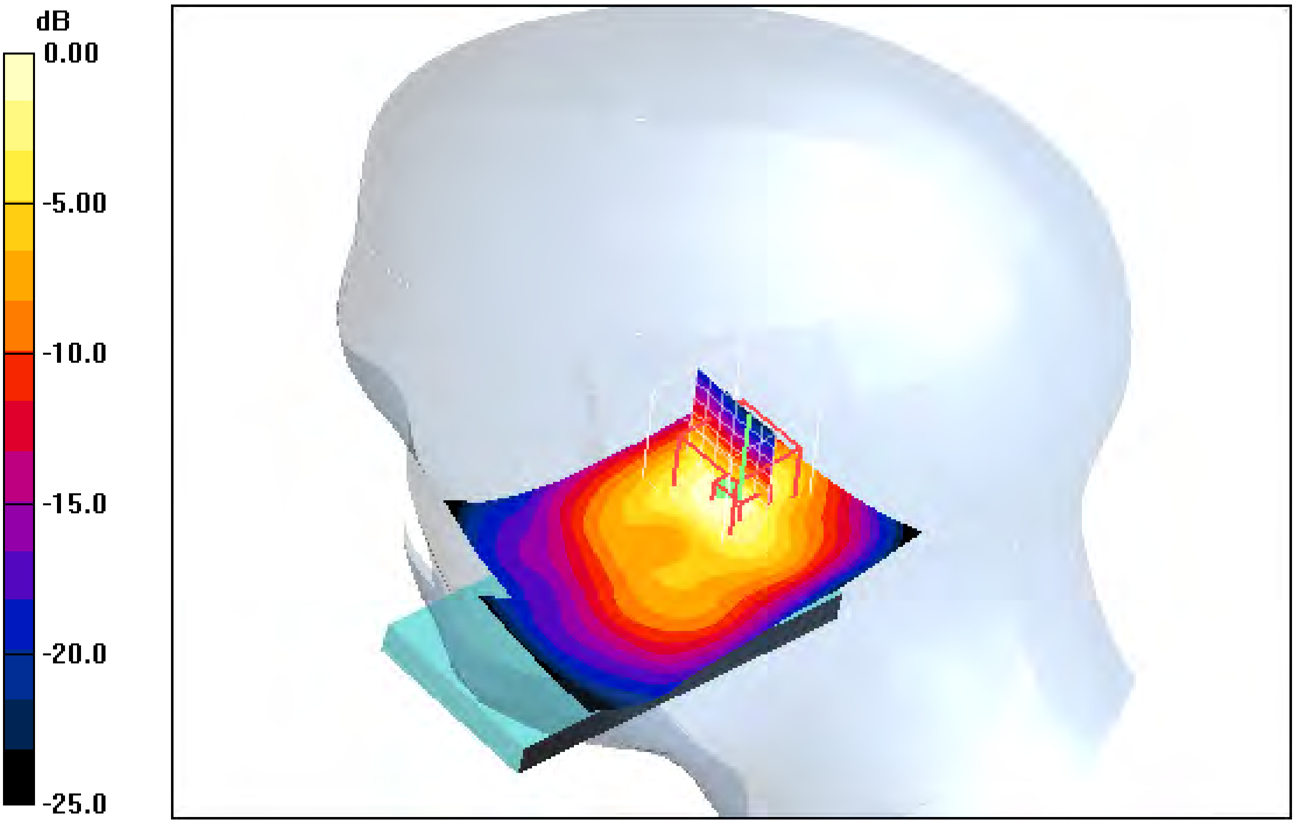
Date/Time: 14.06.2011 11:56:02Date/Time: 14.06.2011 12:02:48

IEEE1528_OET65_EN62209-RightHandSide-WLAN2450

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used (interpolated): f = 2412 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3
Phantom section: Right Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Low 6Mbps/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.580 mW/g

Touch position - Low 6Mbps/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.1 V/m; Power Drift = -0.053 dB
Peak SAR (extrapolated) = 1.46 W/kg
SAR(1 g) = 0.522 mW/g; SAR(10 g) = 0.210 mW/g
Maximum value of SAR (measured) = 0.596 mW/g



0 dB = 0.596mW/g

Additional information:
ambient temperature: 23.5°C; liquid temperature: 22.1°C

Date/Time: 14.06.2011 12:22:31Date/Time: 14.06.2011 12:29:37

IEEE1528_OET65_EN62209-RightHandSide-WLAN2450

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7

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

Medium: HSL2450 Medium parameters used (interpolated): f = 2412 MHz; σ = 1.85 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1559; ConvF(4.38, 4.38, 4.38); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 146

Touch position - Low 6.5Mbps/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.563 mW/g

Touch position - Low 6.5Mbps/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

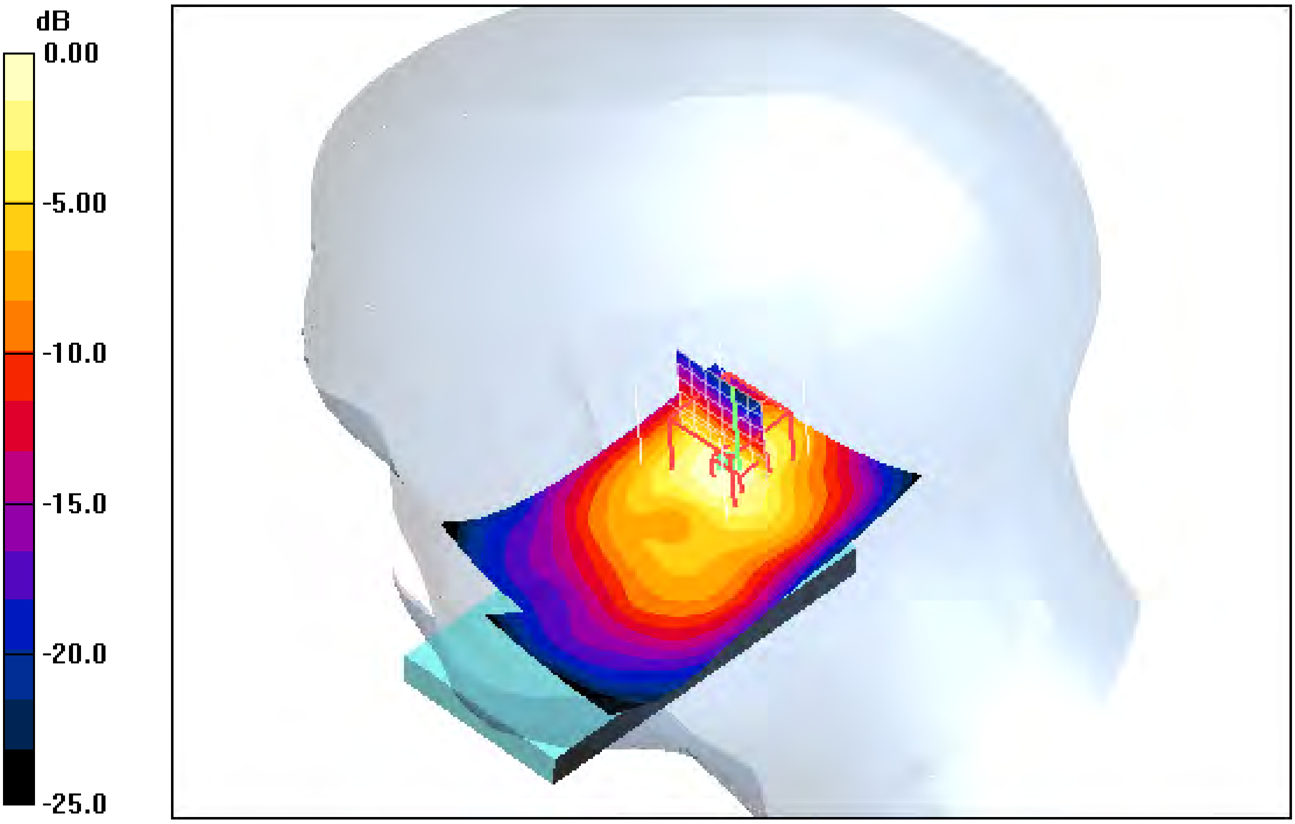
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.7 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.41 W/kg

SAR(1 g) = 0.511 mW/g; SAR(10 g) = 0.207 mW/g

Maximum value of SAR (measured) = 0.584 mW/g



0 dB = 0.584mW/g

Additional information:

ambient temperature: 23.5°C; liquid temperature: 22.1°C

Annex A.6: WLAN 2450MHz body

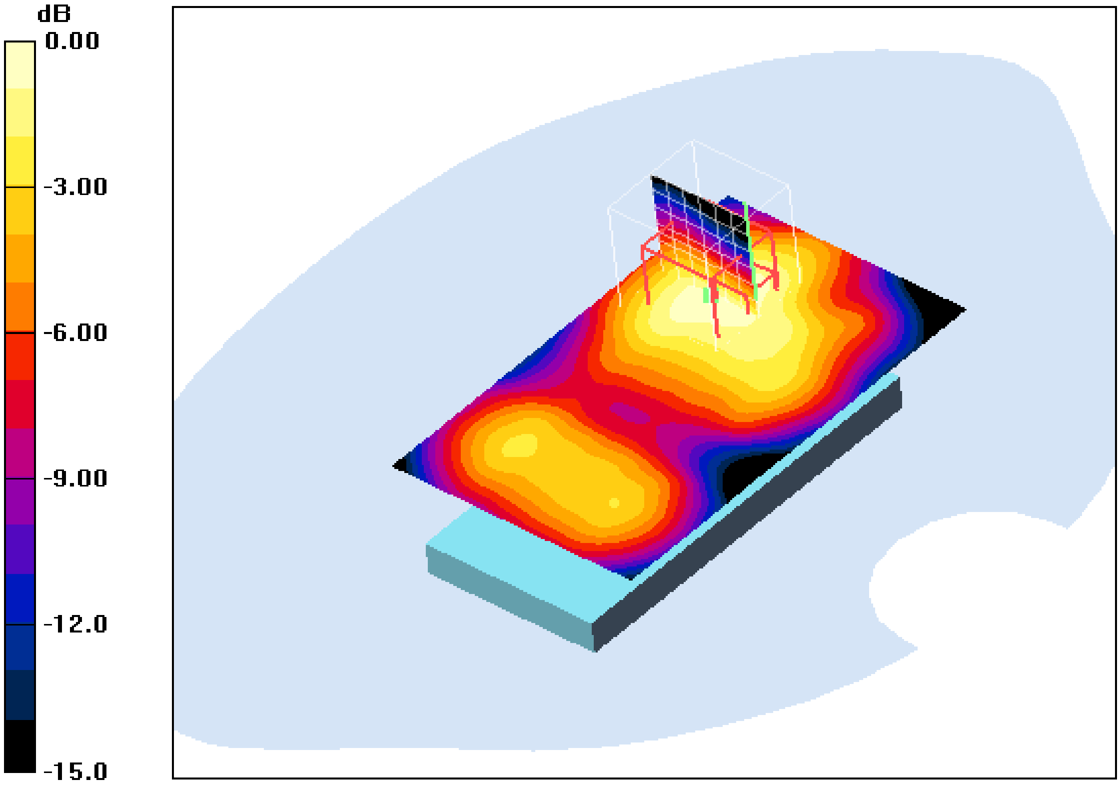
Date/Time: 15.06.2011 13:03:31Date/Time: 15.06.2011 13:09:01

IEEE1528_OET65_EN62209-2-Body-WLAN

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2412 MHz; σ = 2 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(3.91, 3.91, 3.91); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Front position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.109 mW/g

Front position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.82 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.203 W/kg
SAR(1 g) = 0.100 mW/g; SAR(10 g) = 0.055 mW/g
Maximum value of SAR (measured) = 0.113 mW/g



0 dB = 0.113mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 23.5°C; liquid temperature: 23.2°C

Date/Time: 15.06.2011 12:20:04Date/Time: 15.06.2011 12:29:19

IEEE1528_OET65_EN62209-2-Body-WLAN

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7

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

Medium: M2450 Medium parameters used (interpolated): f = 2437 MHz; σ = 2 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1559; ConvF(3.91, 3.91, 3.91); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Front position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.082 mW/g

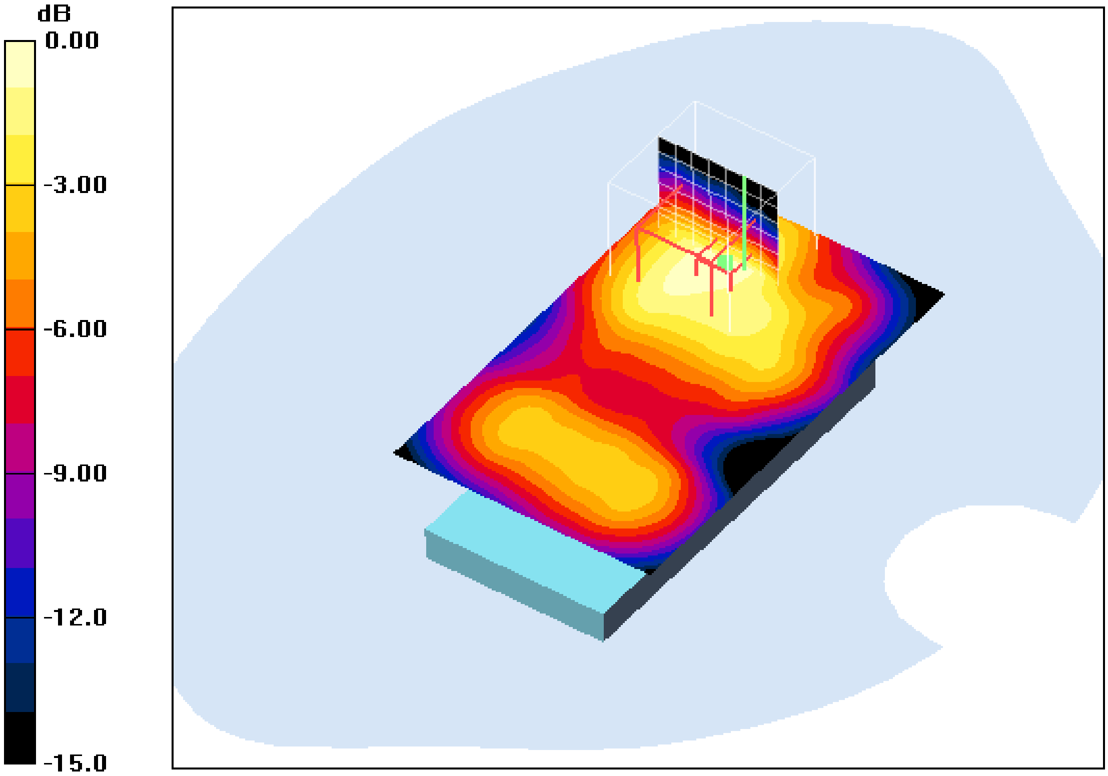
Front position - Middle/Zoom Scan (7x7x7) (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.61 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 0.158 W/kg

SAR(1 g) = 0.077 mW/g; SAR(10 g) = 0.042 mW/g

Maximum value of SAR (measured) = 0.088 mW/g



0 dB = 0.088mW/g

Additional information:

position or distance of DUT to SAM: 10 mm

ambient temperature: 23.5°C; liquid temperature: 23.2°C

Date/Time: 15.06.2011 14:54:49Date/Time: 15.06.2011 15:03:49

IEEE1528_OET65_EN62209-2-Body-WLAN

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7

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

Medium: M2450 Medium parameters used (interpolated): f = 2462 MHz; σ = 2 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1559; ConvF(3.91, 3.91, 3.91); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Front position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.082 mW/g

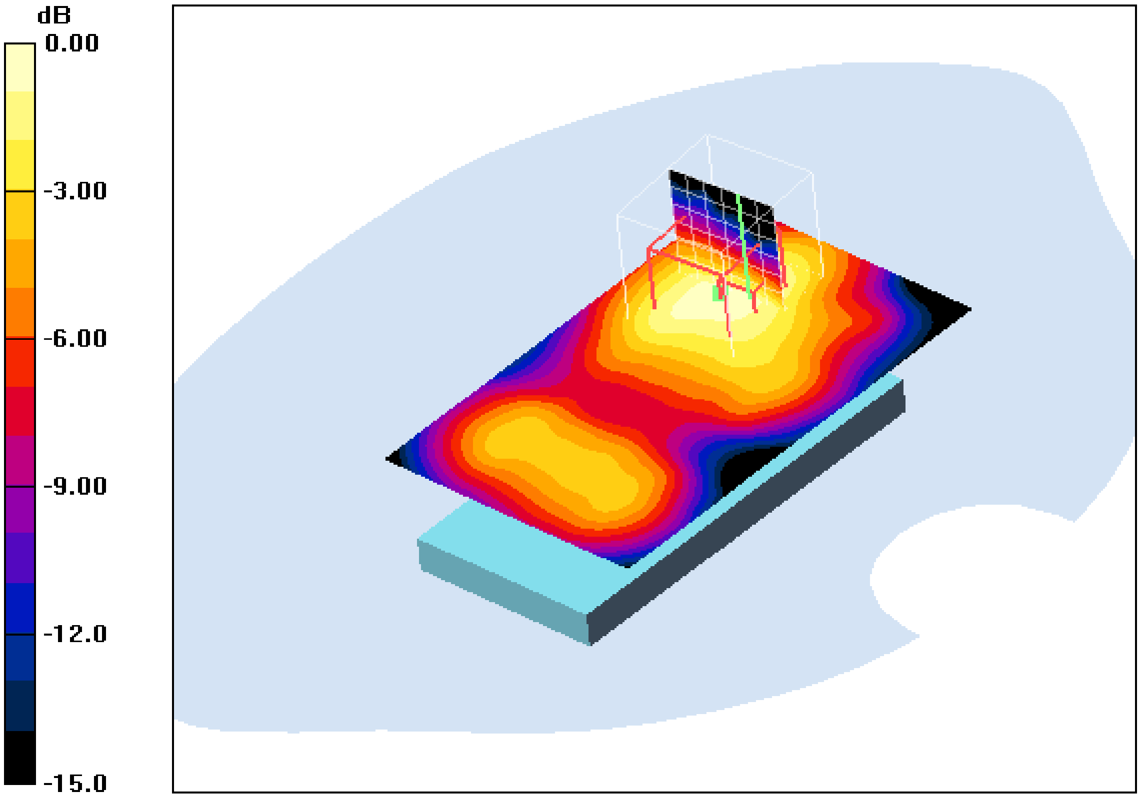
Front position - High/Zoom Scan (7x7x7) (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.78 V/m; Power Drift = -0.035 dB

Peak SAR (extrapolated) = 0.157 W/kg

SAR(1 g) = 0.076 mW/g; SAR(10 g) = 0.041 mW/g

Maximum value of SAR (measured) = 0.087 mW/g



0 dB = 0.087mW/g

Additional information:

position or distance of DUT to SAM: 10 mm

ambient temperature: 23.5°C; liquid temperature: 23.2°C

Date/Time: 15.06.2011 13:24:26Date/Time: 15.06.2011 13:33:02

IEEE1528_OET65_EN62209-2-Body-WLAN

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7

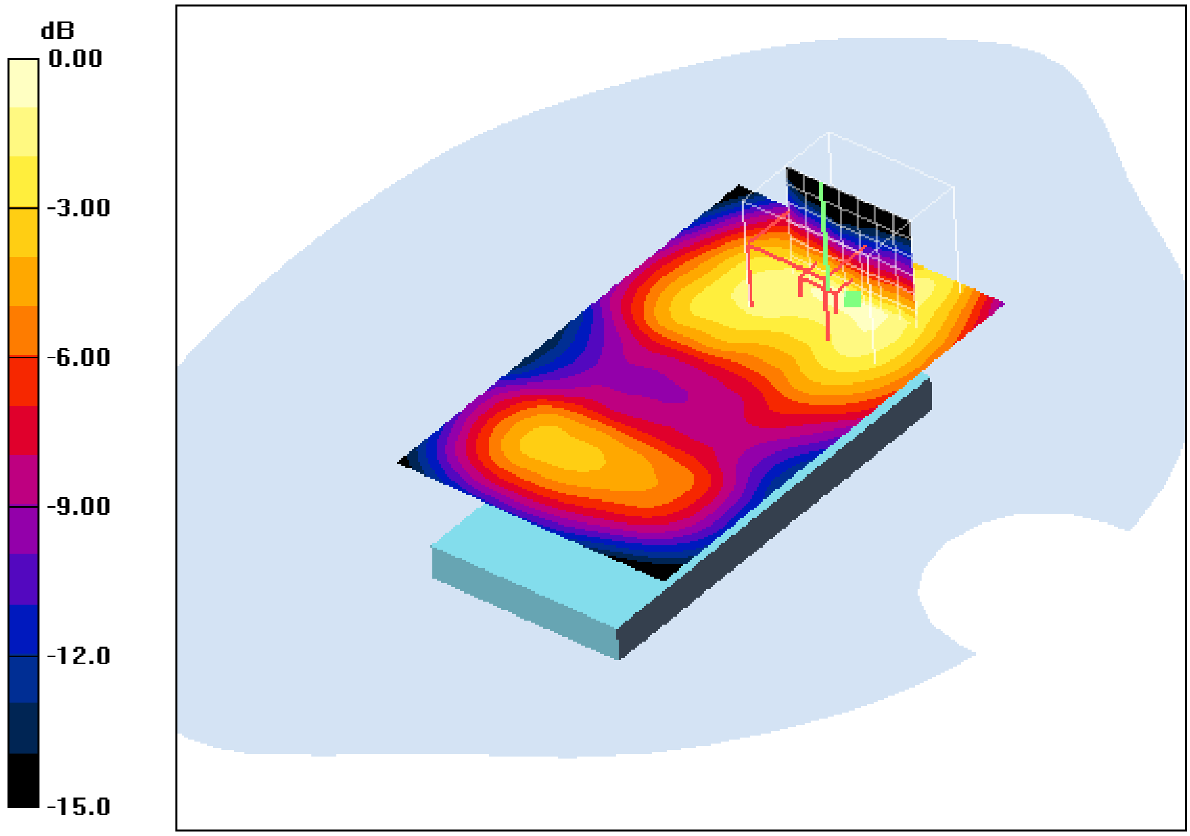
Communication System: WLAN 2450 US; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2412 MHz; σ = 2 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(3.91, 3.91, 3.91); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - Low/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.104 mW/g

Rear position - Low/Zoom Scan (7x7x7) (8x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.84 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 0.209 W/kg
SAR(1 g) = 0.102 mW/g; SAR(10 g) = 0.052 mW/g
Maximum value of SAR (measured) = 0.115 mW/g



0 dB = 0.115mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 23.5°C; liquid temperature: 23.2°C

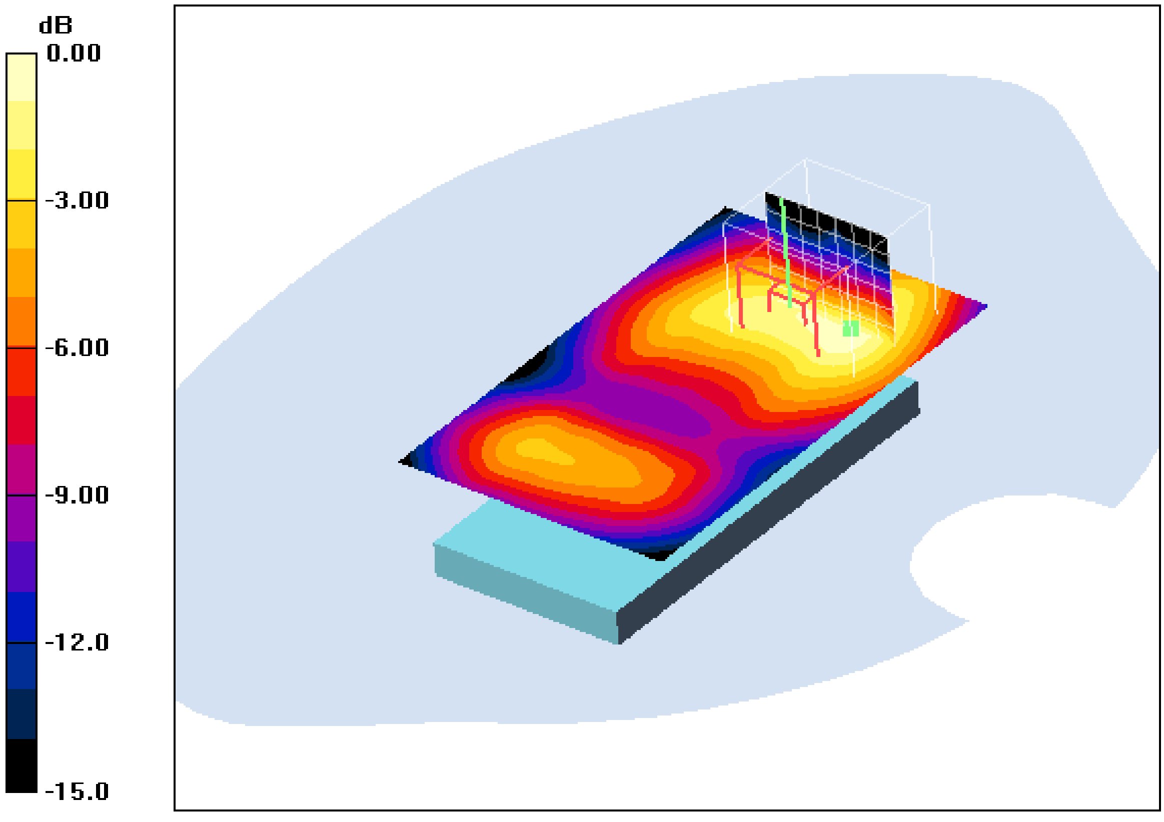
Date/Time: 15.06.2011 11:55:46Date/Time: 15.06.2011 12:02:57

IEEE1528_OET65_EN62209-2-Body-WLAN

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2437 MHz; σ = 2 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(3.91, 3.91, 3.91); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.078 mW/g

Rear position - Middle/Zoom Scan (7x7x7) (8x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.19 V/m; Power Drift = 0.035 dB
Peak SAR (extrapolated) = 0.148 W/kg
SAR(1 g) = 0.074 mW/g; SAR(10 g) = 0.038 mW/g
Maximum value of SAR (measured) = 0.082 mW/g



0 dB = 0.082mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 23.5°C; liquid temperature: 23.2°C

Date/Time: 15.06.2011 14:19:03Date/Time: 15.06.2011 14:28:23

IEEE1528_OET65_EN62209-2-Body-WLAN

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7

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

Medium: M2450 Medium parameters used (interpolated): f = 2462 MHz; σ = 2 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1559; ConvF(3.91, 3.91, 3.91); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - High/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.083 mW/g

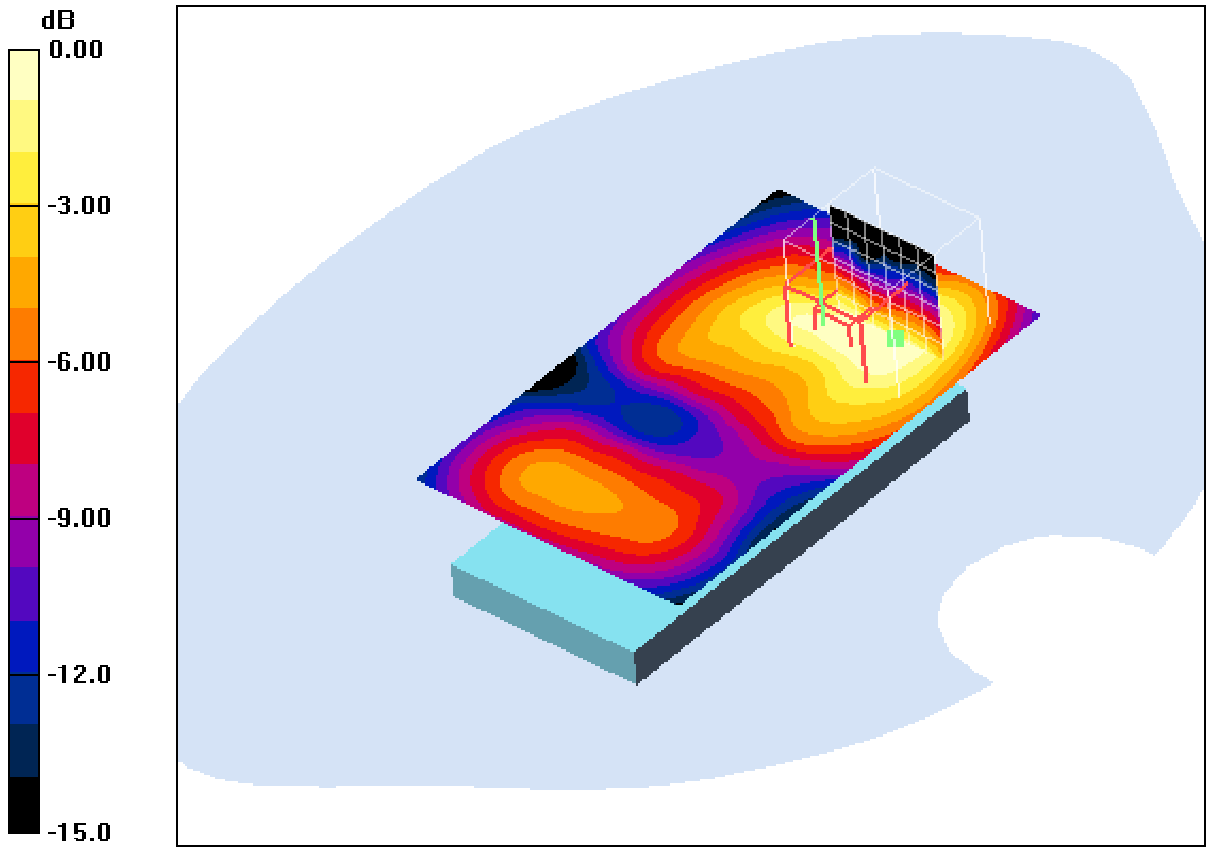
Rear position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.31 V/m; Power Drift = 0.132 dB

Peak SAR (extrapolated) = 0.132 W/kg

SAR(1 g) = 0.066 mW/g; SAR(10 g) = 0.034 mW/g

Maximum value of SAR (measured) = 0.075 mW/g



0 dB = 0.075mW/g

Additional information:

position or distance of DUT to SAM: 10 mm

ambient temperature: 23.5°C; liquid temperature: 23.2°C

Date/Time: 15.06.2011 16:43:58Date/Time: 15.06.2011 16:49:43Date/Time: 15.06.2011 17:01:39

IEEE1528_OET65_EN62209-2-Body-WLAN

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7

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

Medium: M2450 Medium parameters used (interpolated): f = 2437 MHz; σ = 2 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1559; ConvF(3.91, 3.91, 3.91); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Edge left position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.076 mW/g

Edge left position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.46 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 0.119 W/kg

SAR(1 g) = 0.069 mW/g; SAR(10 g) = 0.038 mW/g

Maximum value of SAR (measured) = 0.077 mW/g

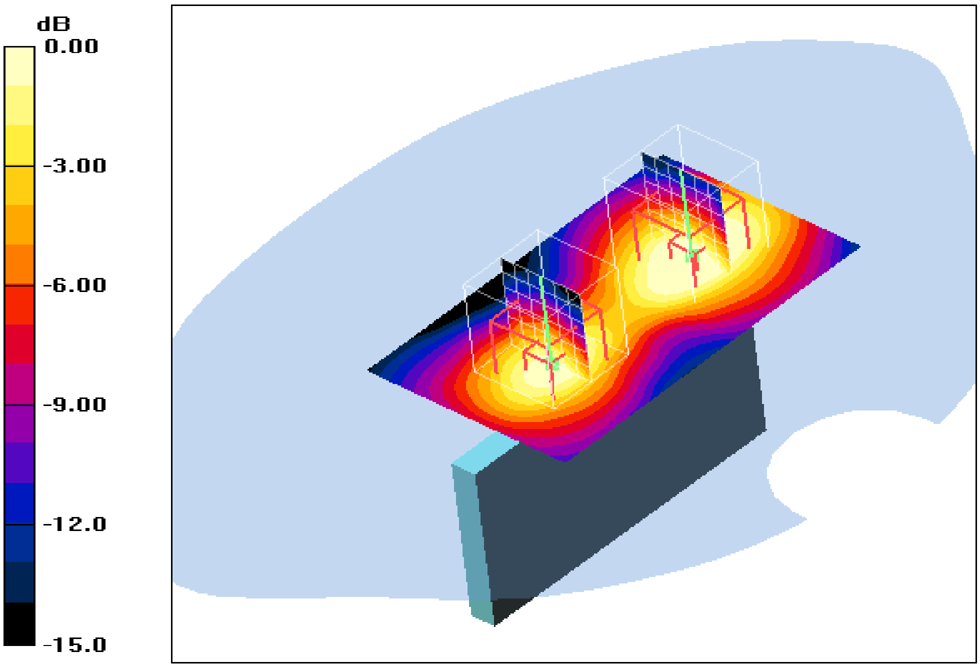
Edge left position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.46 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 0.082 W/kg

SAR(1 g) = 0.050 mW/g; SAR(10 g) = 0.027 mW/g

Maximum value of SAR (measured) = 0.056 mW/g



0 dB = 0.056mW/g

Additional information:

position or distance of DUT to SAM: 10 mm

ambient temperature: 23.5°C; liquid temperature: 23.2°C

Date/Time: 15.06.2011 16:11:56Date/Time: 15.06.2011 16:17:32Date/Time: 15.06.2011 16:29:49

IEEE1528_OET65_EN62209-2-Body-WLAN

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7

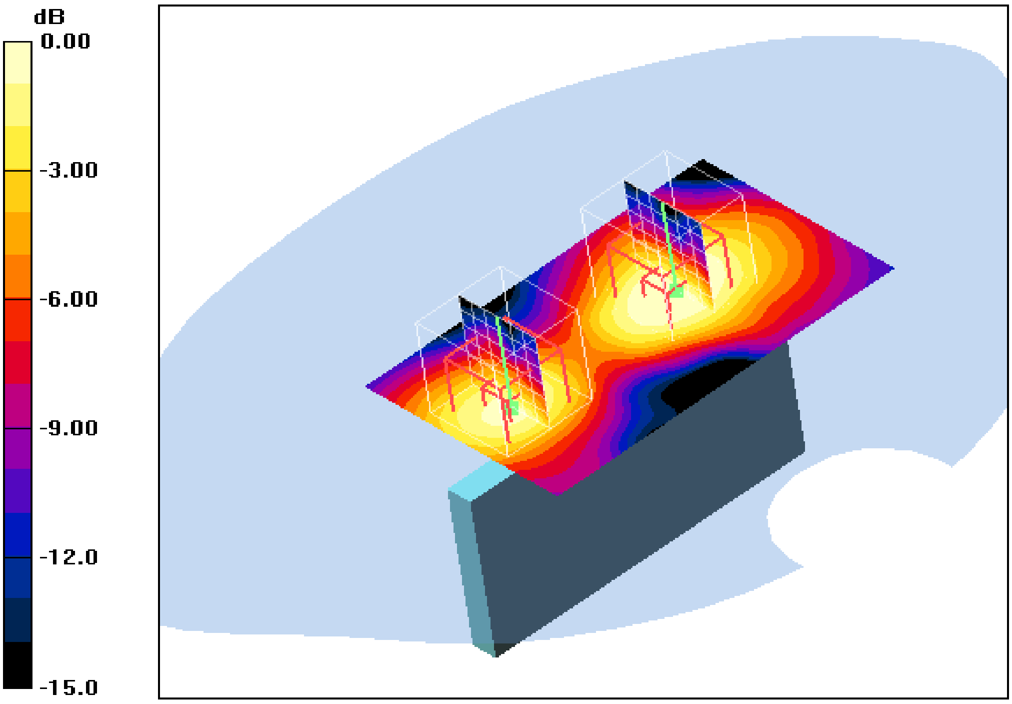
Communication System: WLAN 2450 US; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2437 MHz; σ = 2 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:

- Probe: ET3DV6 - SN1559; ConvF(3.91, 3.91, 3.91); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Edge right position - Middle/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.024 mW/g

Edge right position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.56 V/m; Power Drift = -0.033 dB
Peak SAR (extrapolated) = 0.036 W/kg
SAR(1 g) = 0.021 mW/g; SAR(10 g) = 0.012 mW/g
Maximum value of SAR (measured) = 0.023 mW/g

Edge right position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.56 V/m; Power Drift = -0.033 dB
Peak SAR (extrapolated) = 0.031 W/kg
SAR(1 g) = 0.018 mW/g; SAR(10 g) = 0.00952 mW/g
Maximum value of SAR (measured) = 0.020 mW/g



0 dB = 0.020mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 23.5°C; liquid temperature: 23.2°C

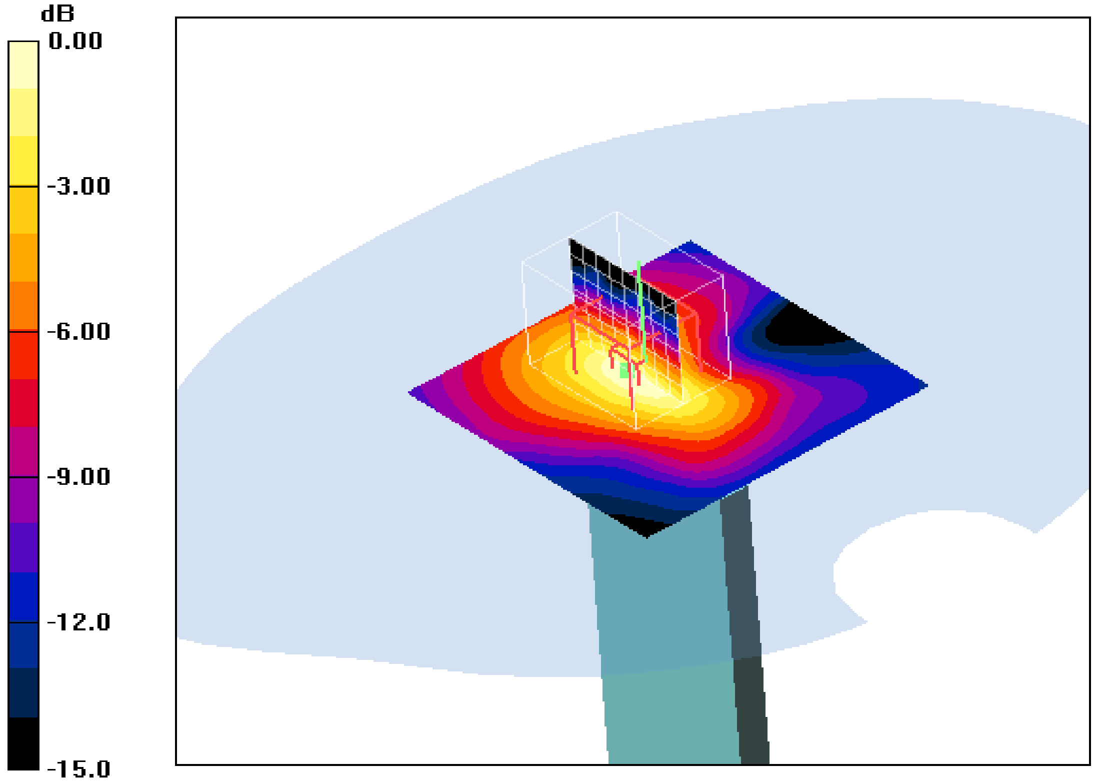
Date/Time: 15.06.2011 17:33:25Date/Time: 15.06.2011 17:51:09

IEEE1528_OET65_EN62209-2-Body-WLAN

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2437 MHz; σ = 2 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(3.91, 3.91, 3.91); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Edge top position - Middle/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.049 mW/g

Edge top position - Middle/Zoom Scan (7x7x7) (9x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.50 V/m; Power Drift = 0.154 dB
Peak SAR (extrapolated) = 0.089 W/kg
SAR(1 g) = 0.046 mW/g; SAR(10 g) = 0.023 mW/g
Maximum value of SAR (measured) = 0.051 mW/g



0 dB = 0.051mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 23.5°C; liquid temperature: 23.2°C

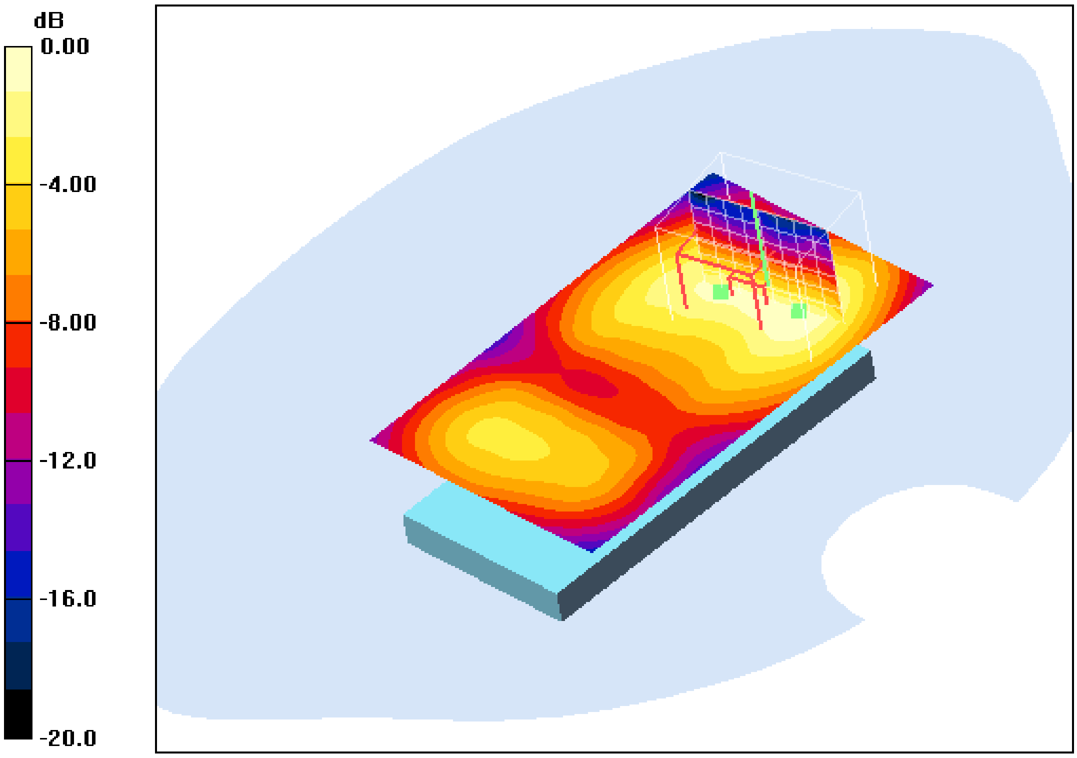
Date/Time: 16.06.2011 08:39:58Date/Time: 16.06.2011 08:48:16

IEEE1528_OET65_EN62209-2-Body-WLAN

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7
Communication System: WLAN 2450 US; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2412 MHz; σ = 2 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1559; ConvF(3.91, 3.91, 3.91); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - Low 6Mbps/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.080 mW/g

Rear position - Low 6Mbps/Zoom Scan (7x7x7) (9x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.45 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 0.149 W/kg
SAR(1 g) = 0.073 mW/g; SAR(10 g) = 0.038 mW/g
Maximum value of SAR (measured) = 0.082 mW/g



0 dB = 0.082mW/g

Additional information:
position or distance of DUT to SAM: 10 mm
ambient temperature: 23.5°C; liquid temperature: 23.2°C

Date/Time: 16.06.2011 09:13:07Date/Time: 16.06.2011 09:22:01

IEEE1528_OET65_EN62209-2-Body-WLAN

DUT: Sony Ericsson; Type: AAD-3880119-BV; Serial: CB511TQ1Q7

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

Medium: M2450 Medium parameters used (interpolated): f = 2412 MHz; σ = 2 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1559; ConvF(3.91, 3.91, 3.91); Calibrated: 19.01.2011
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn477; Calibrated: 04.05.2011
- Phantom: SAM left; Type: SAM; Serial: 1041
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - Low 6.5Mbps/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.072 mW/g

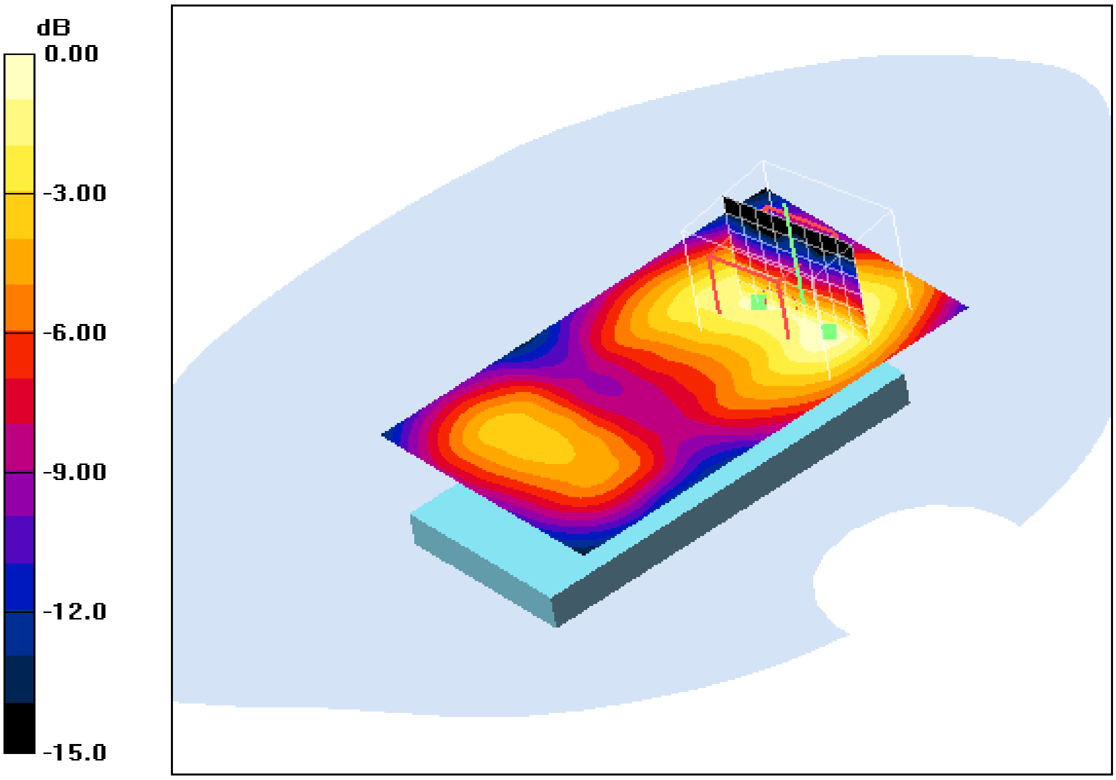
Rear position - Low 6.5Mbps/Zoom Scan (7x7x7) (9x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.65 V/m; Power Drift = 0.062 dB

Peak SAR (extrapolated) = 0.137 W/kg

SAR(1 g) = 0.068 mW/g; SAR(10 g) = 0.035 mW/g

Maximum value of SAR (measured) = 0.075 mW/g



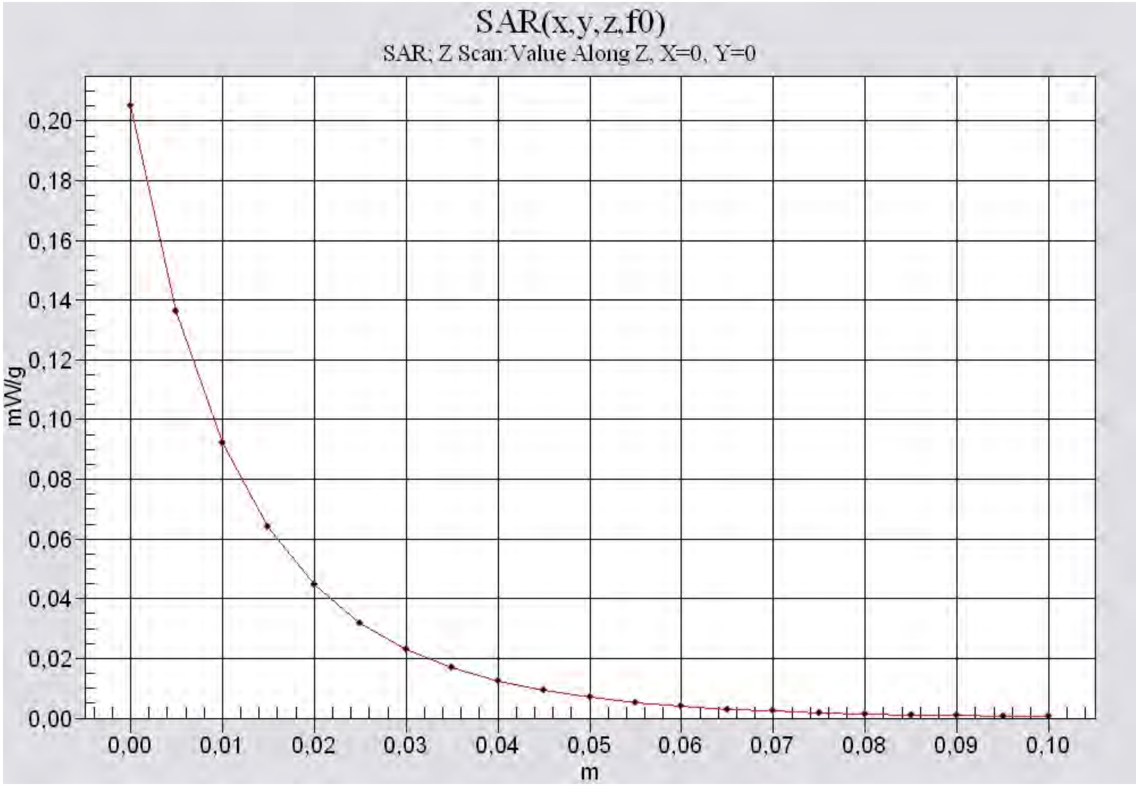
0 dB = 0.075mW/g

Additional information:

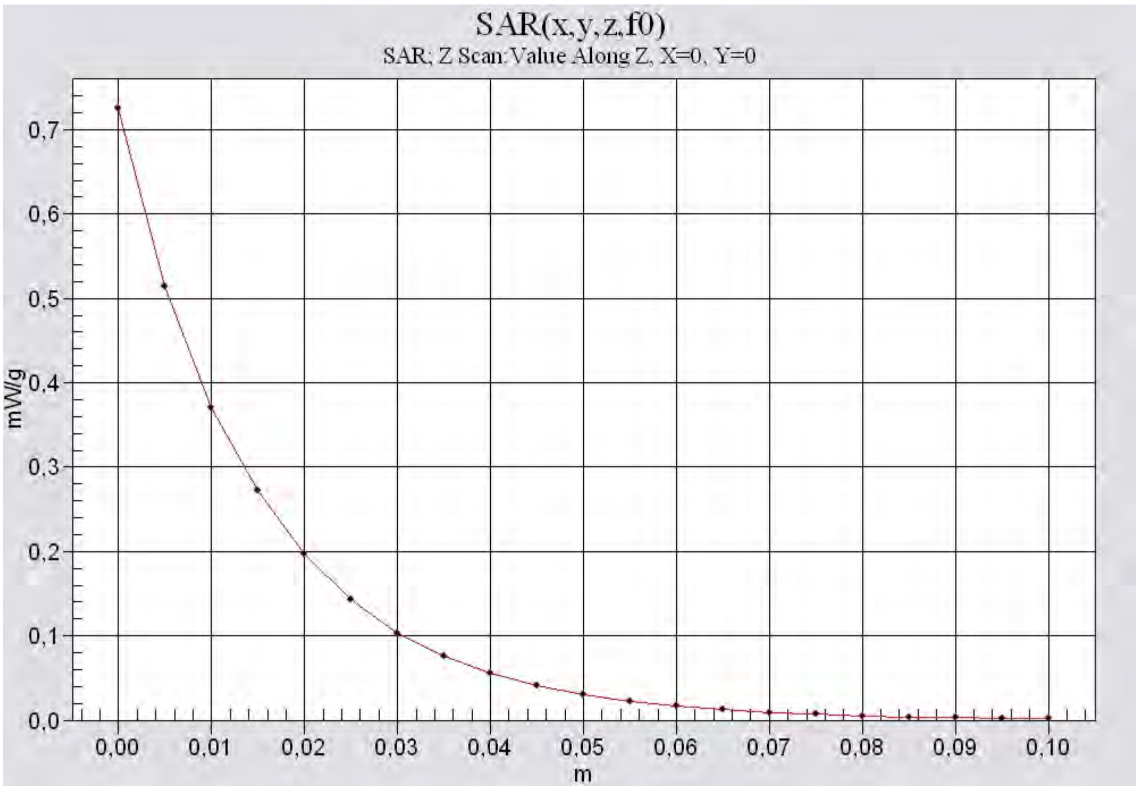
position or distance of DUT to SAM: 10 mm

ambient temperature: 23.5°C; liquid temperature: 23.2°C

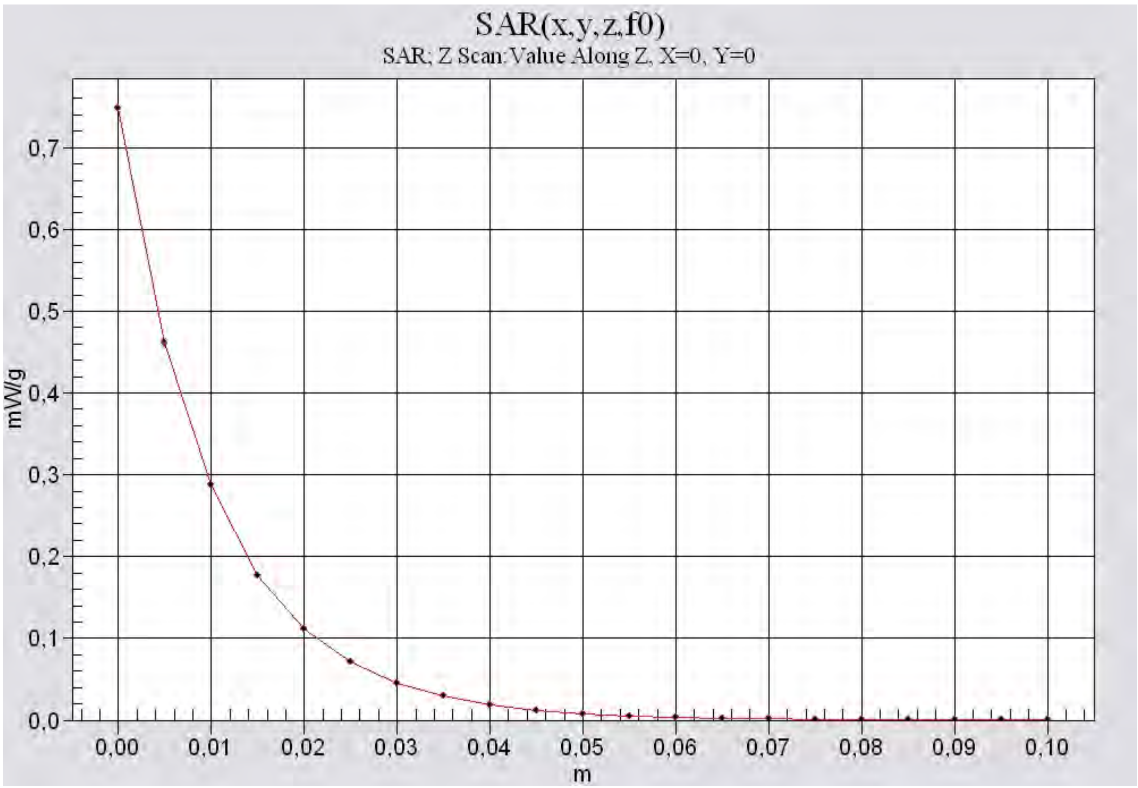
Annex A.7: Z-axis scan



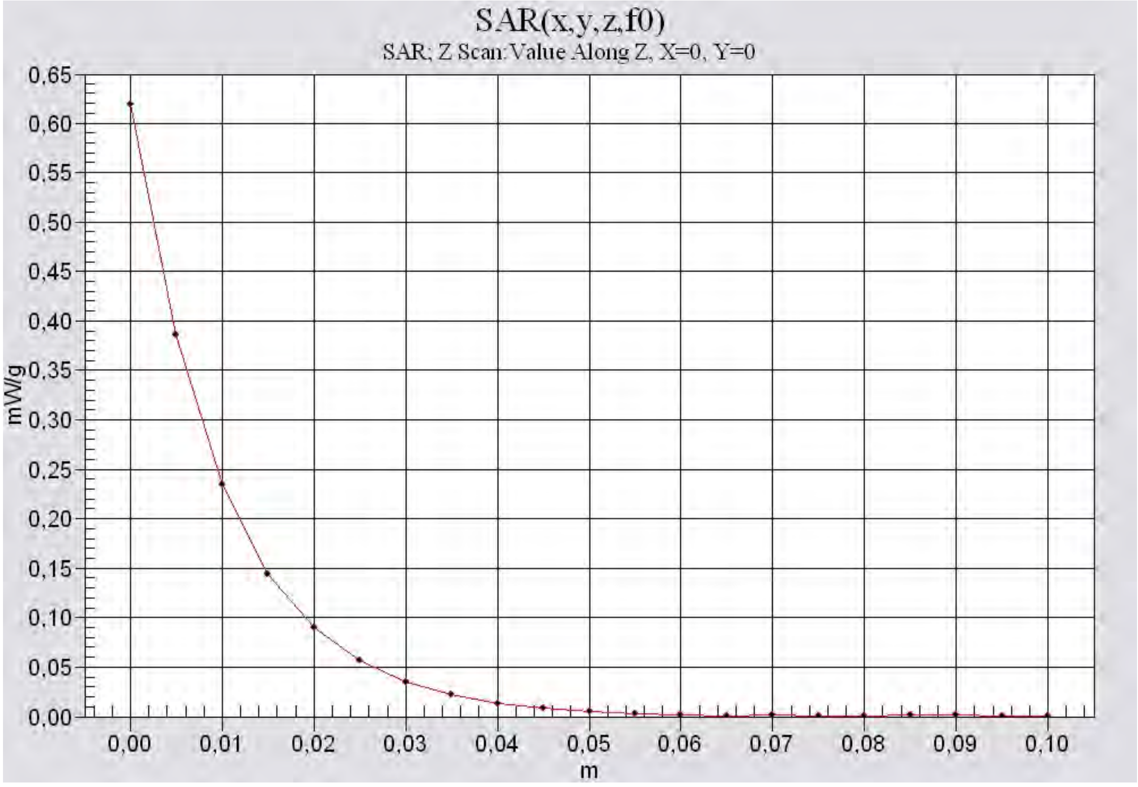
850 head



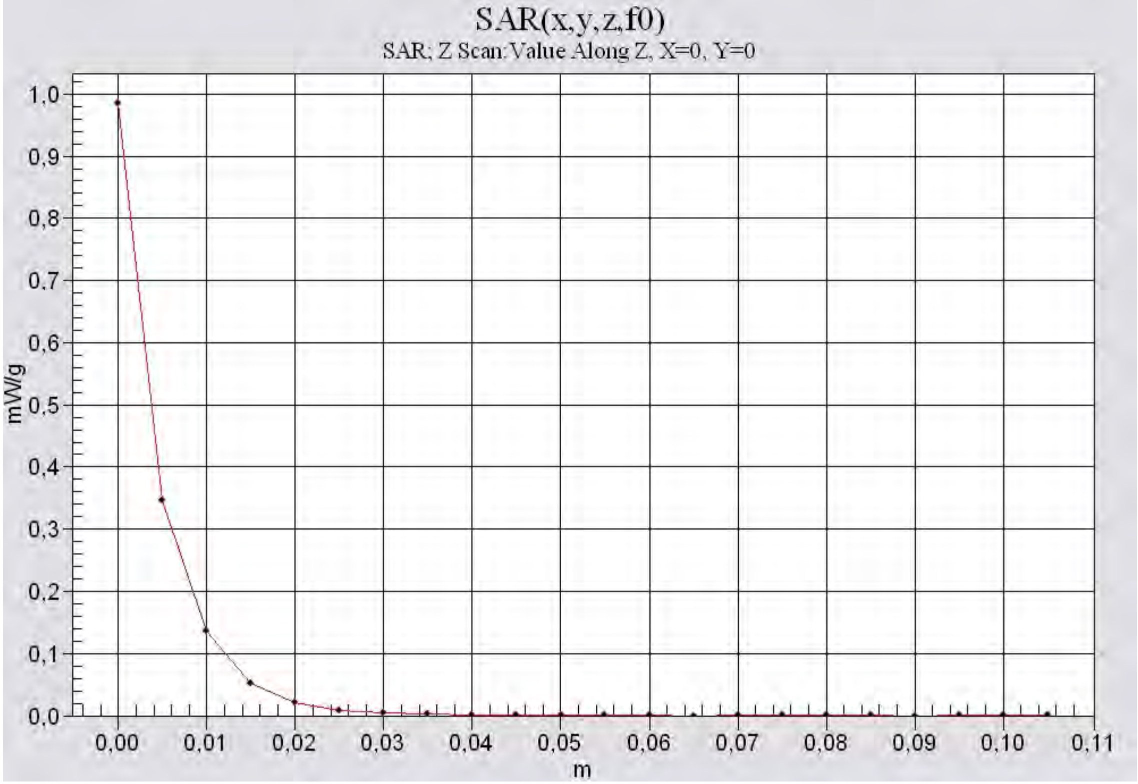
850 body



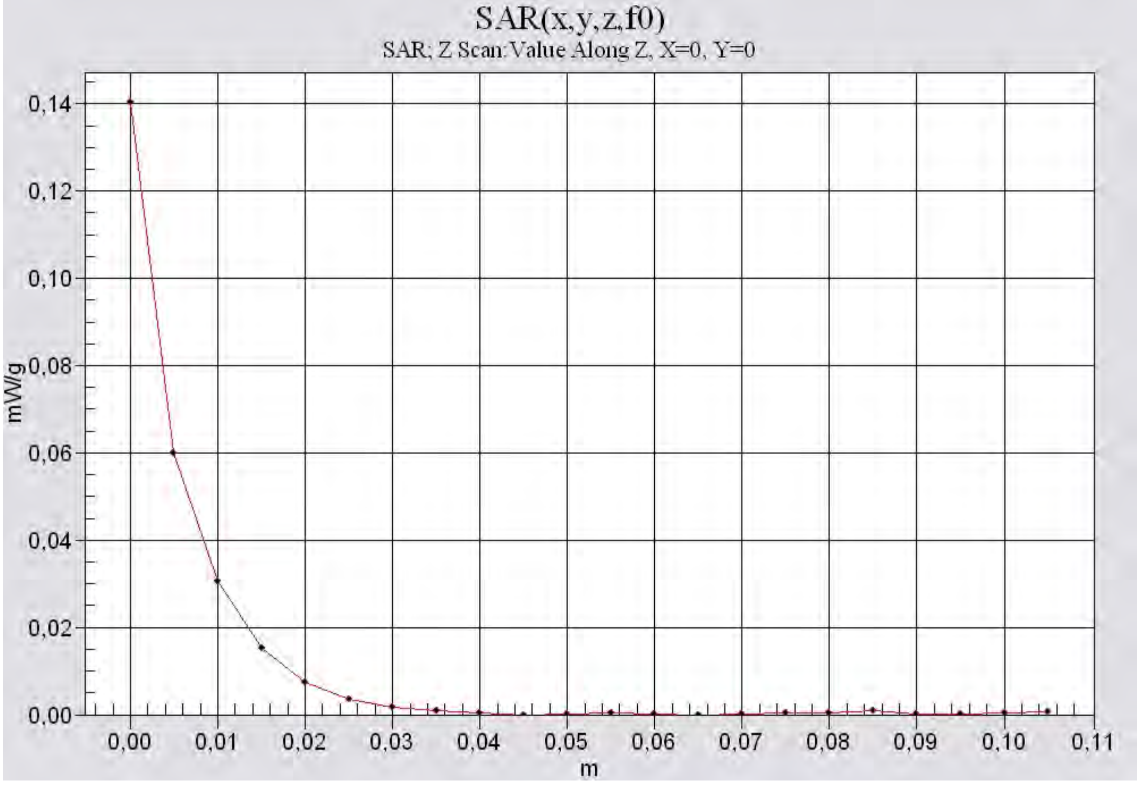
1900 head



1900 body



2450 head



2450 body

Annex A.8: Liquid depth

Photo 1: Liquid depth 850 MHz head simulating liquid

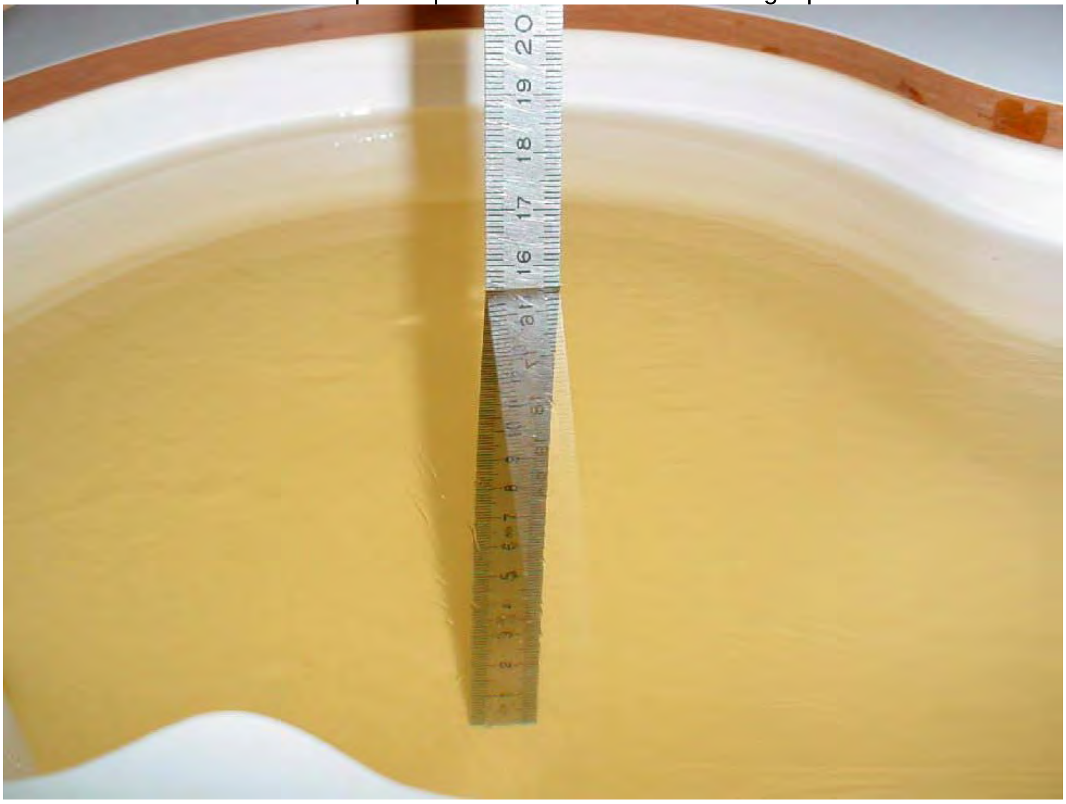


Photo 2: Liquid depth 850 MHz body simulating liquid

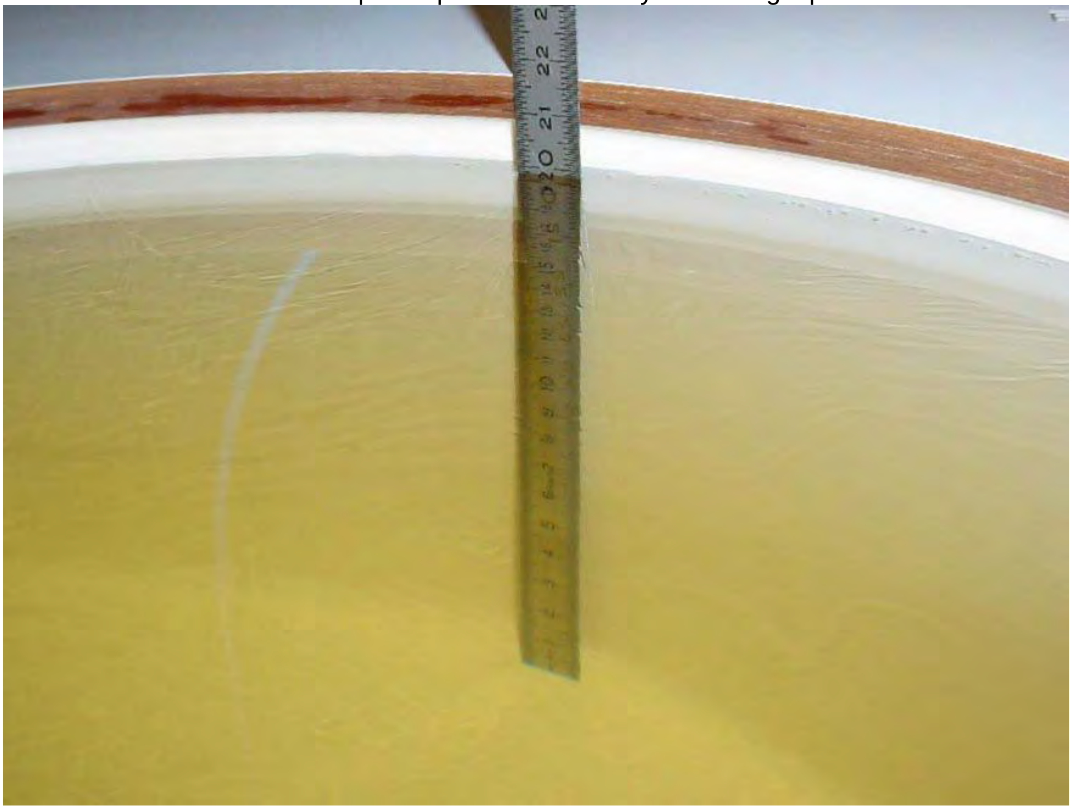


Photo 3: Liquid depth 1900MHz head simulating liquid

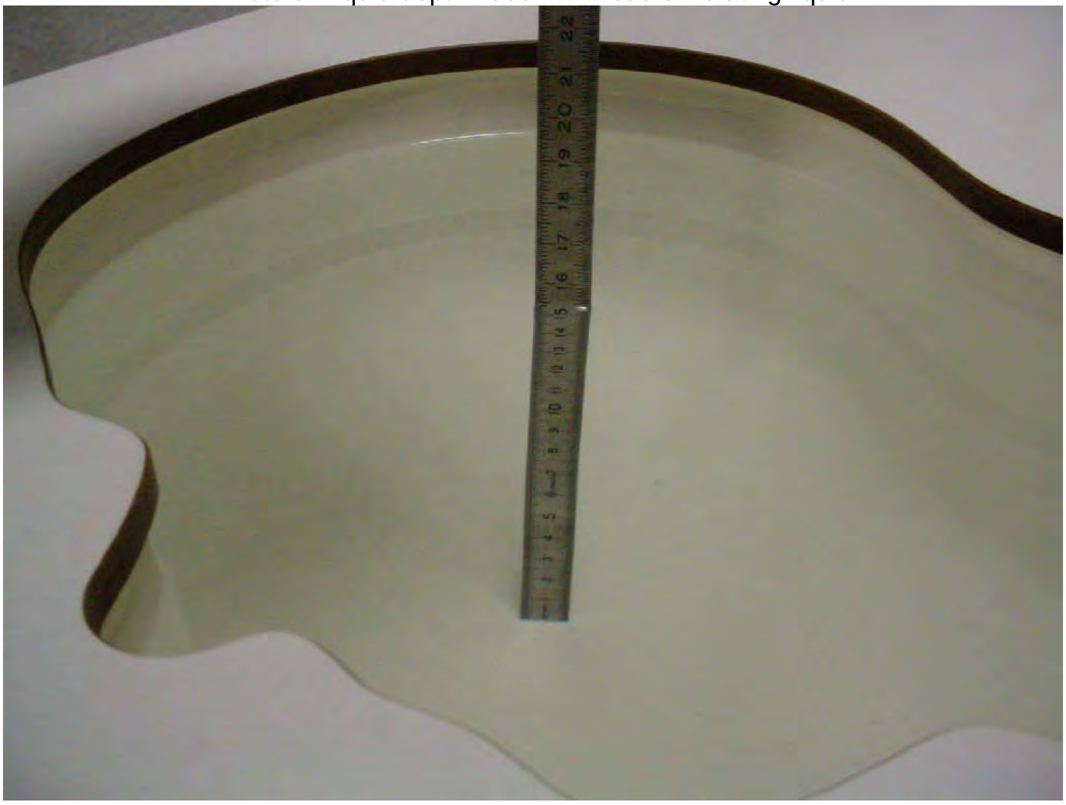


Photo 4: Liquid depth 1900 MHz body simulating liquid

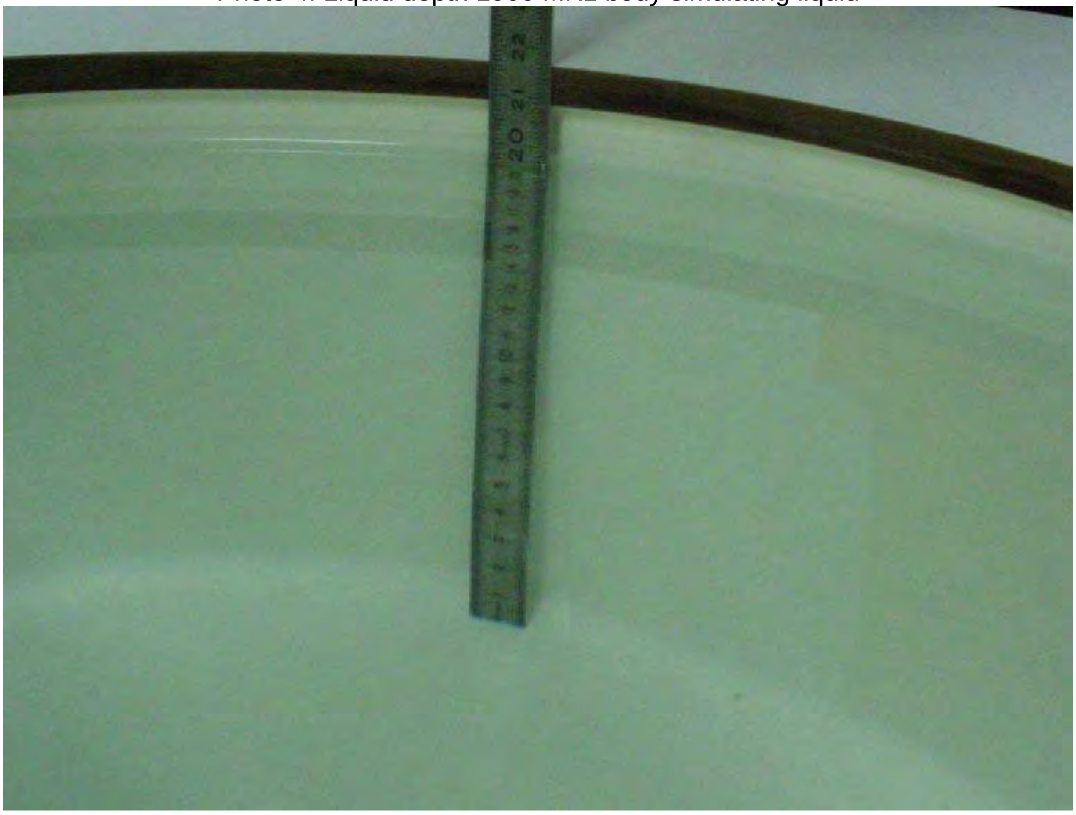


Photo 5: Liquid depth 2450MHz head simulating liquid

Photo 6: Liquid depth 2450 MHz body simulating liquid

Annex B: Photo documentation

Photo 1: Measurement System DASY 4

Photo 2: DUT - front view

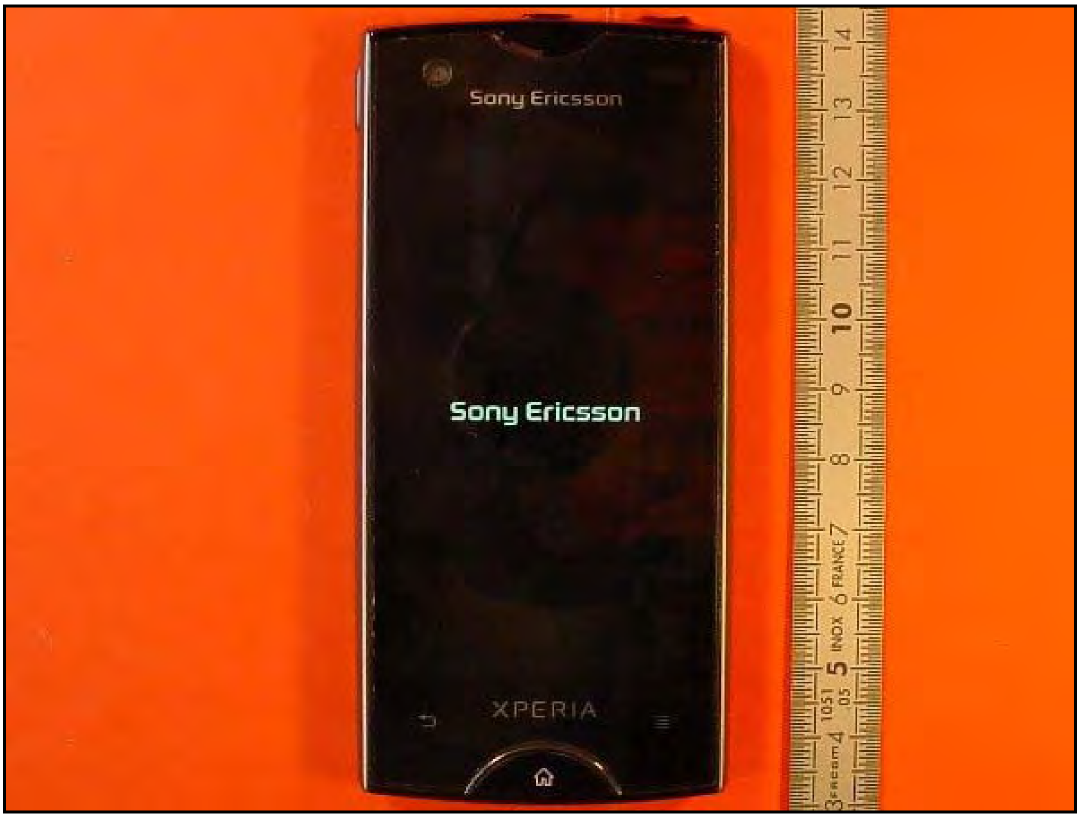


Photo 3: DUT - rear view

Photo 4: DUT - left side view

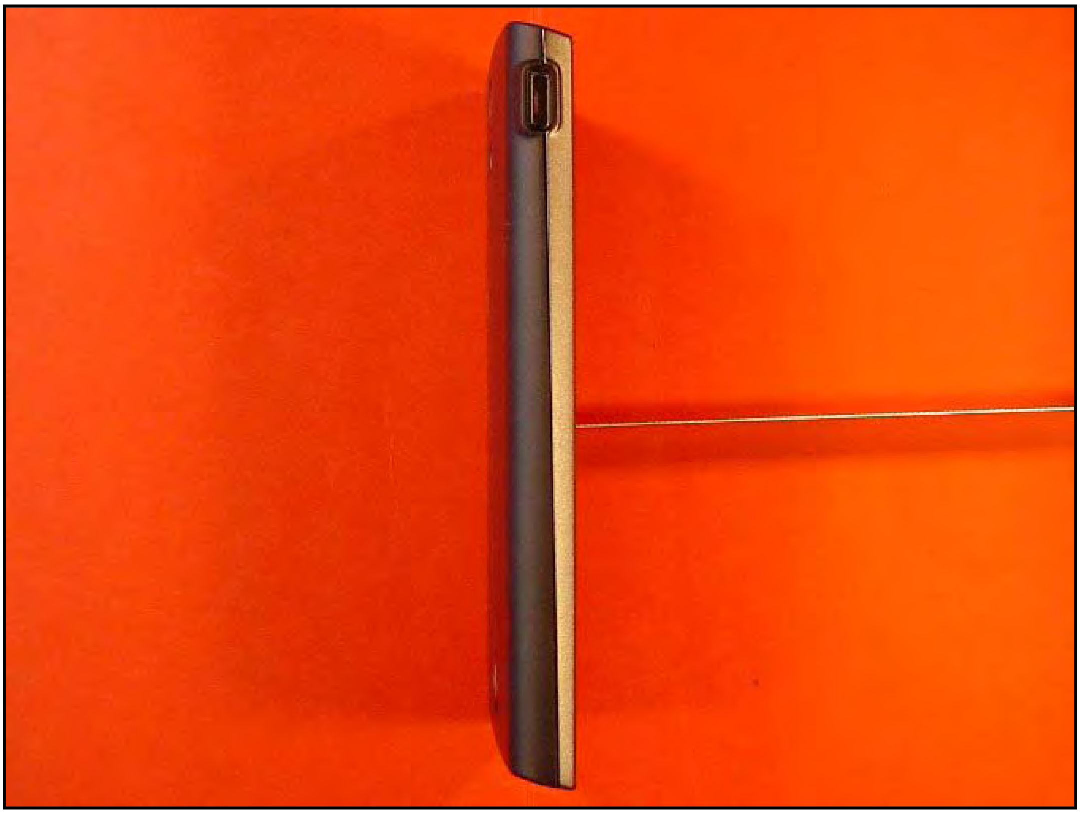


Photo 5: DUT - rear view (open)

Photo 6: DUT - rear view (open) without battery

Photo 7: DUT - label

Photo 8: The battery

Photo 9: Test position left hand touched

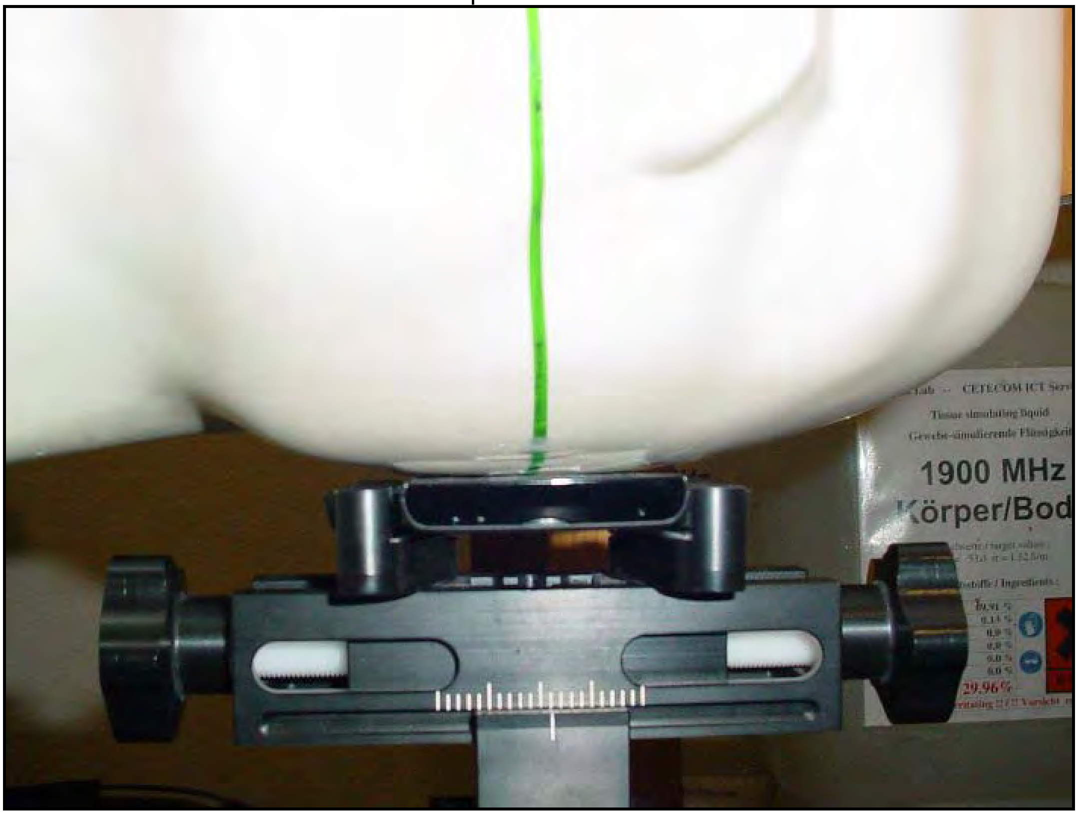


Photo 10: Test position left hand touched

Photo 11: Test position left hand touched

Photo 12: Test position left hand tilted 15°

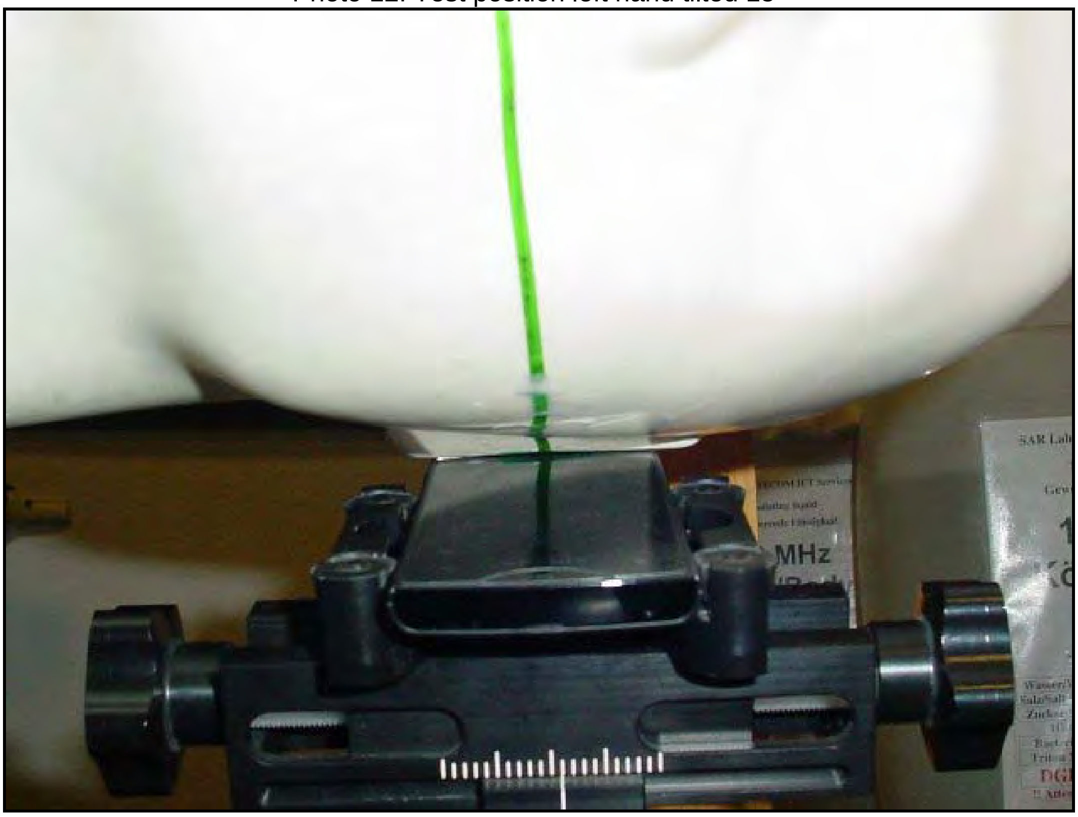


Photo 13: Test position left hand tilted 15°

Photo 14: Test position right hand touched

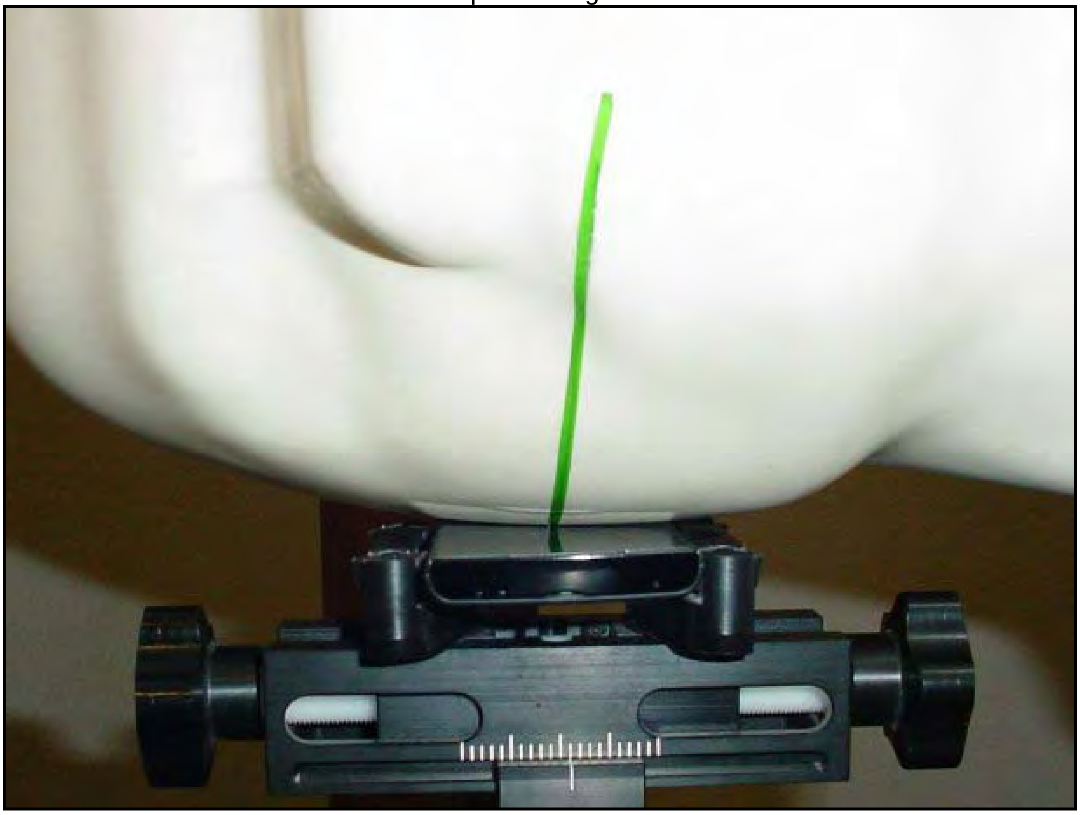


Photo 15: Test position right hand touched

Photo 16: Test position right hand touched

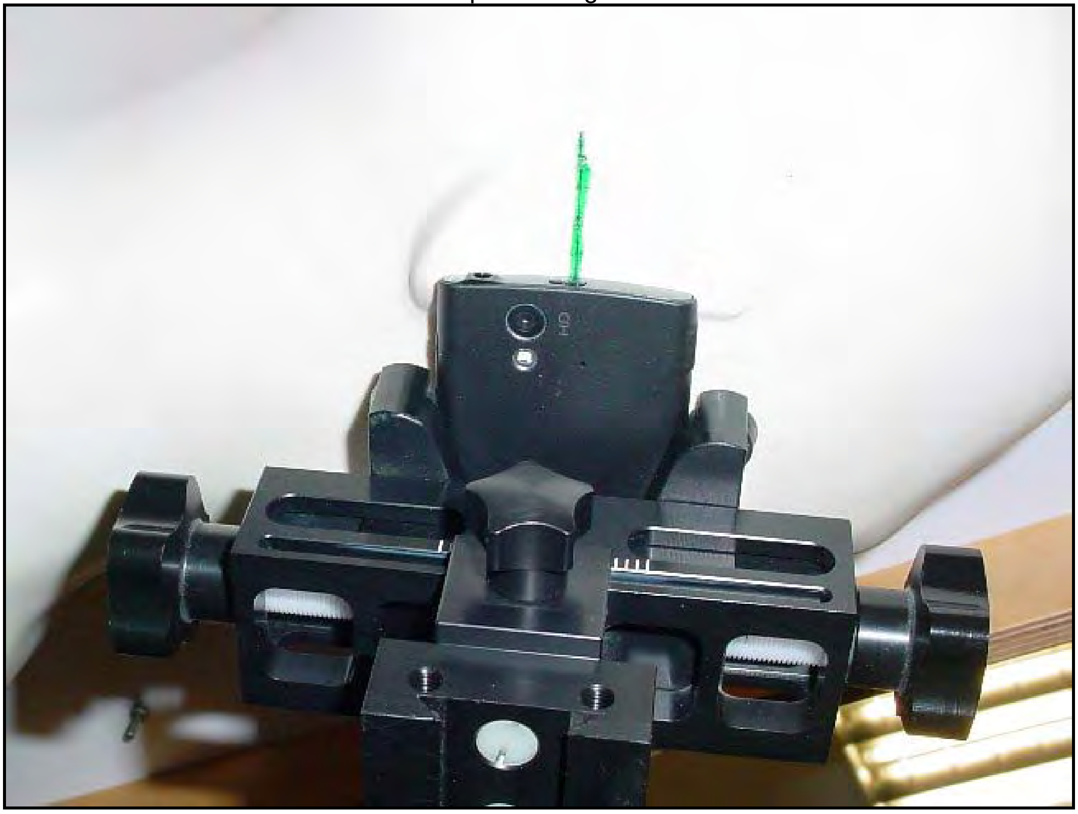


Photo 17: Test position right hand tilted 15°

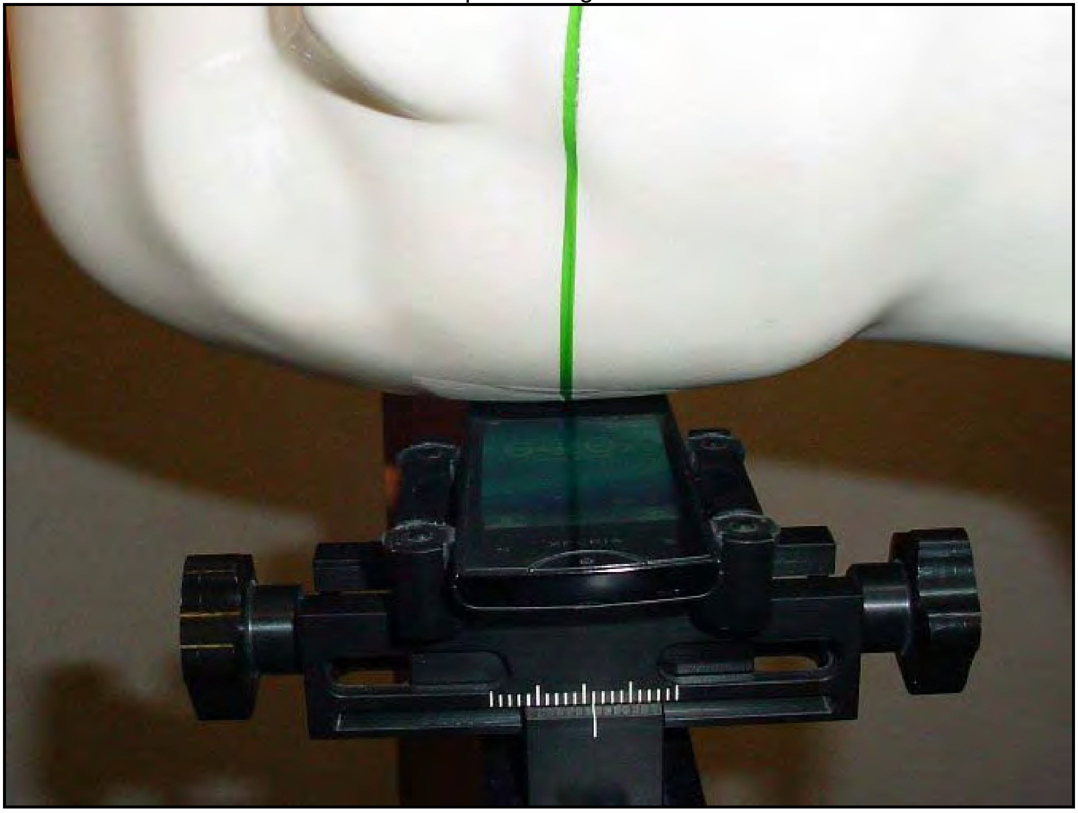


Photo 18: Test position right hand tilted 15°

Photo 19: Test position body worn front side with 10mm distance

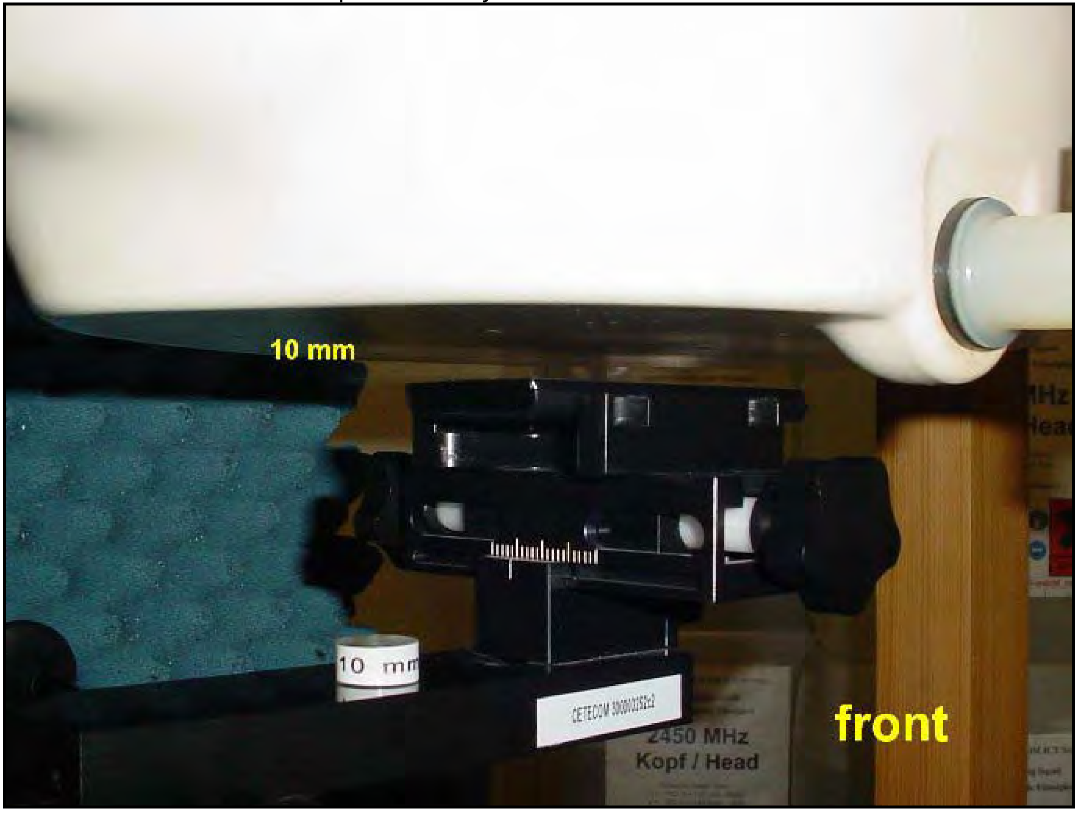


Photo 20: Test position body worn left edge side with 10mm distance

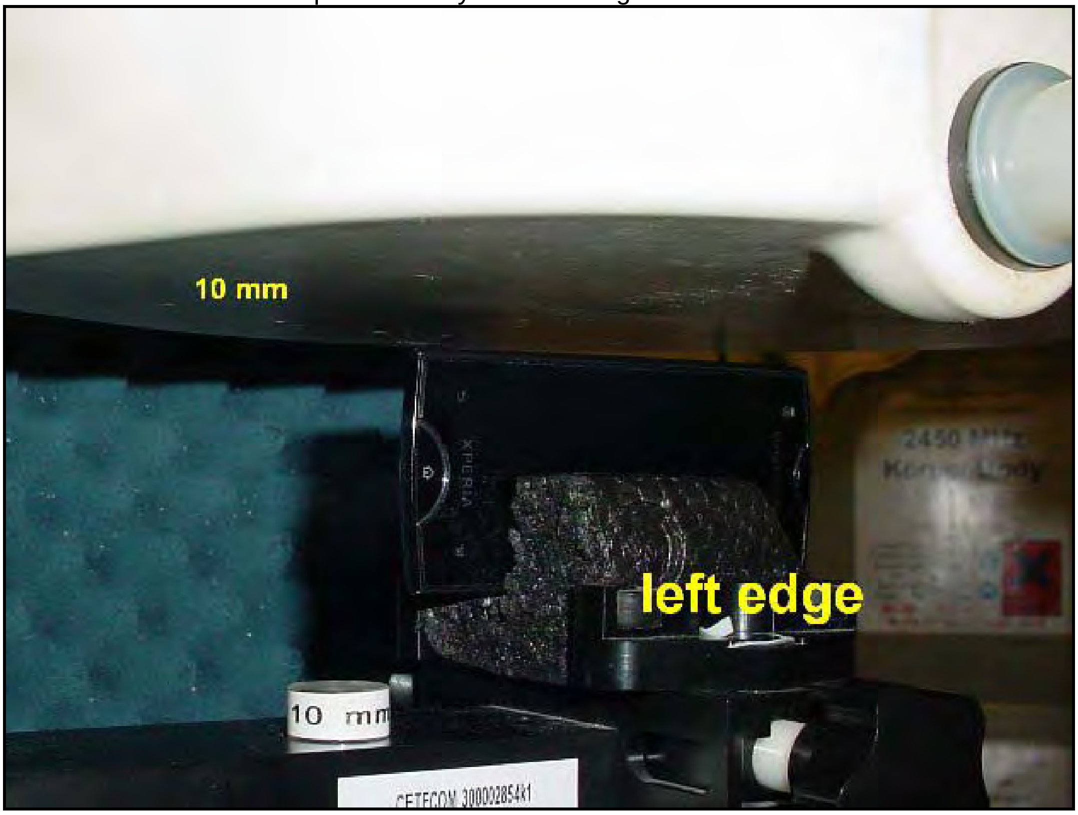


Photo 21: Test position body worn right edge side with 10mm distance

Photo 22: Test position body worn bottom edge side with 10mm distance

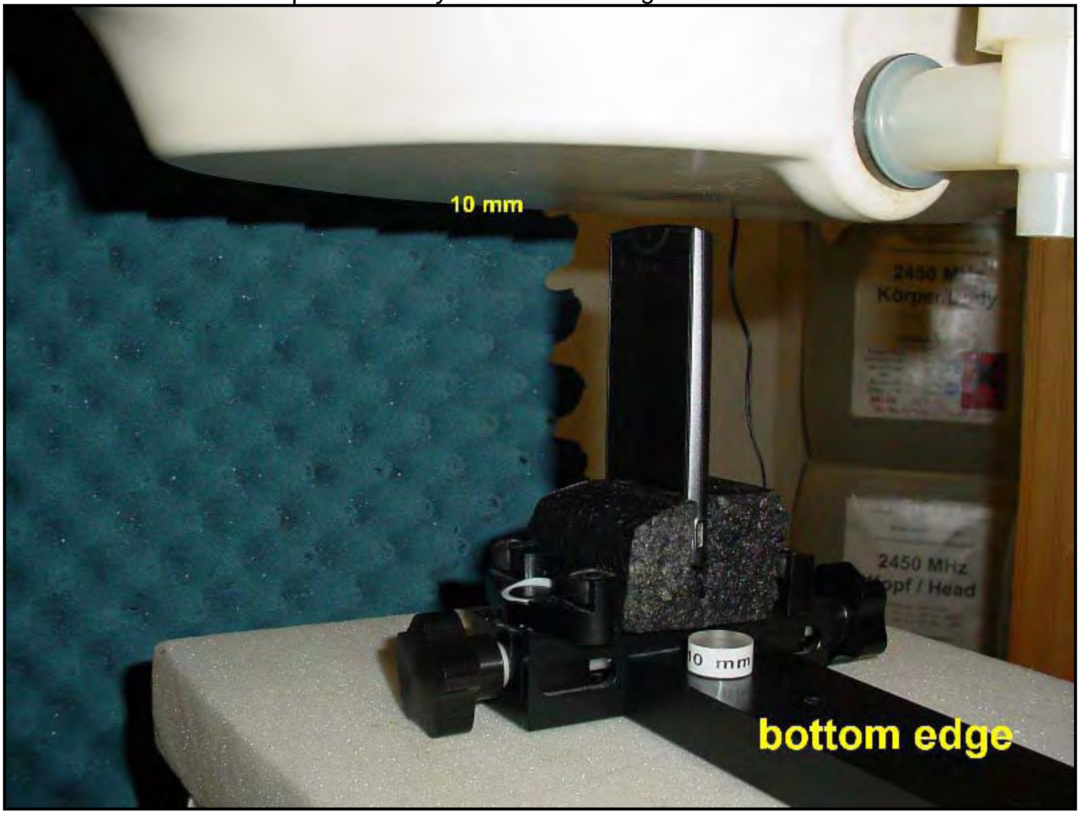


Photo 23: Test position body worn top edge side with 10mm distance

Photo 24: Test position body worn rear side with 10mm distance

Photo 25: Test position body worn front side with 15mm distance

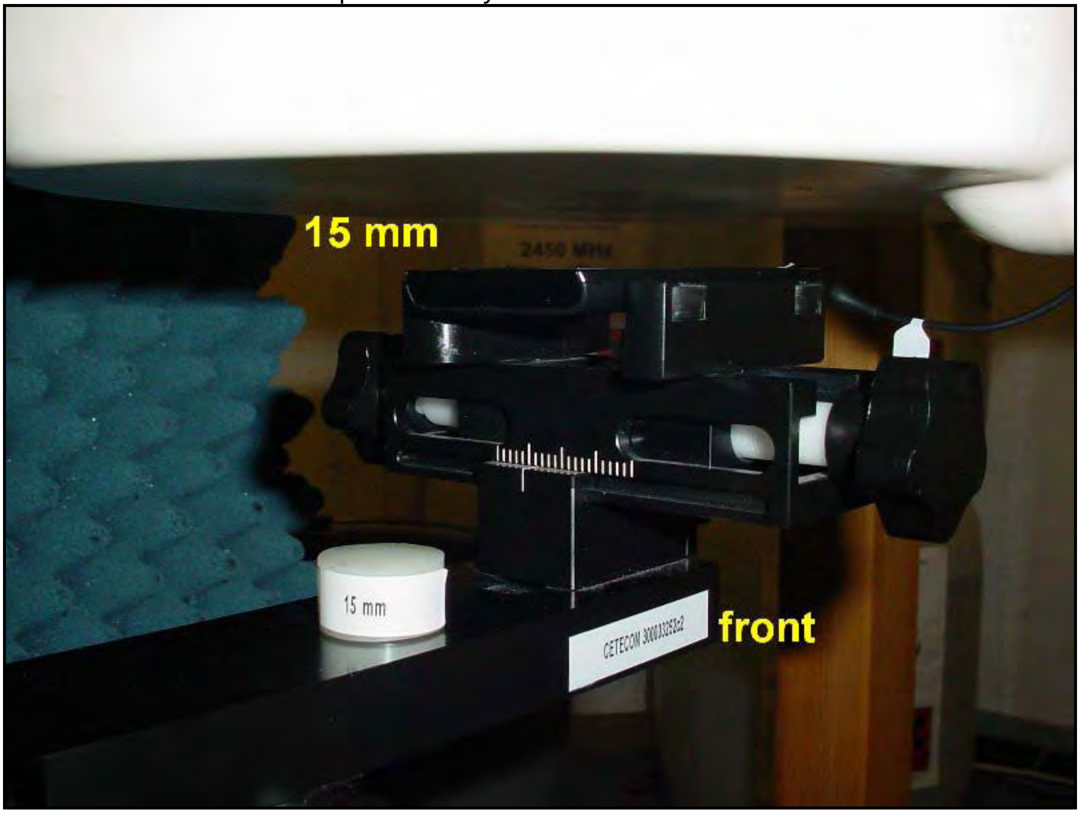
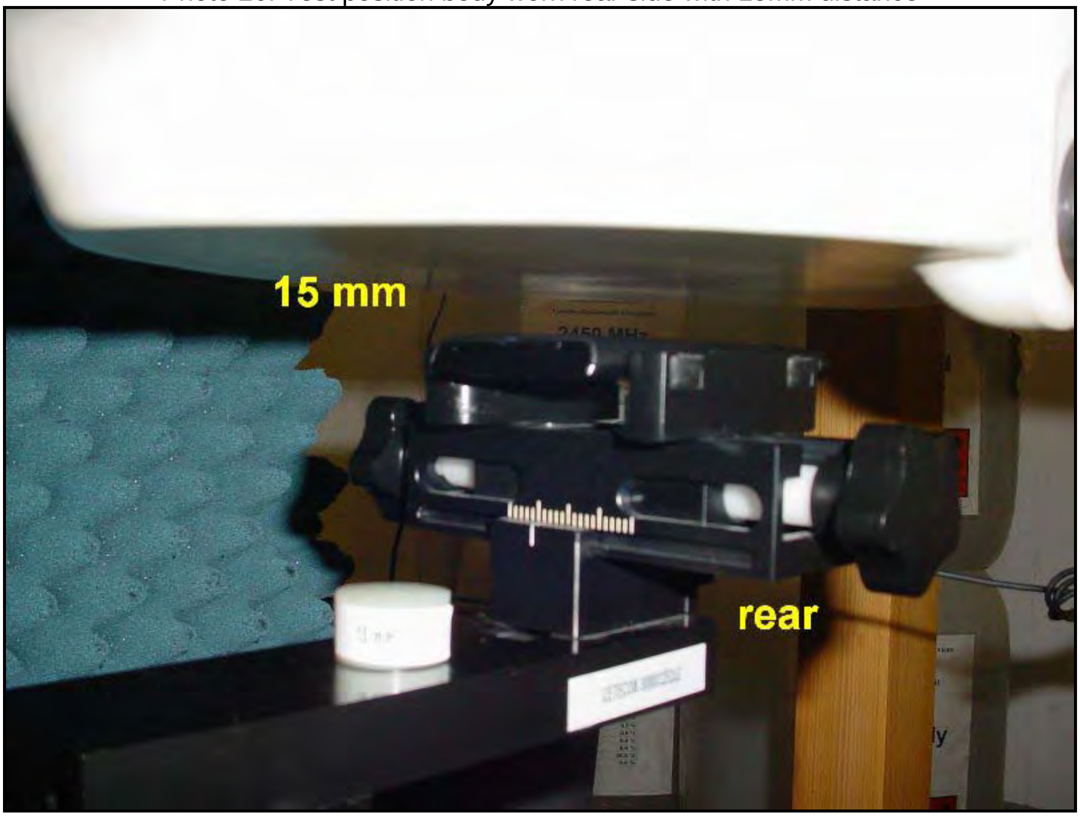


Photo 26: Test position body worn rear side with 15mm distance



Annex C: RF Technical Brief Cover Sheet acc. to RSS-102 Annex A

1. COMPANY NUMBER: 4170B

2. MODEL NUMBER: A3880119

3. MANUFACTURER: **Sony Ericsson Mobile Communications AB**

4. TYPE OF EVALUATION:

(a) SAR Evaluation: Device used in the Vicinity of the Human Head

- Multiple transmitters: Yes ☒ No ☐
- Evaluated against exposure limits: General Public Use ☒ Controlled Use ☐
- Duty cycle used in evaluation: 12.5 %
- Standard used for evaluation: RSS-102 Issue 4 (2010-03)
- SAR value: **1.070 W/kg**. Measured ☒ Computed ☐ Calculated ☐

(b) SAR Evaluation: Body-worn Device

- Multiple transmitters: Yes ☒ No ☐
- Evaluated against exposure limits: General Public Use ☒ Controlled Use ☐
- Duty cycle used in evaluation: 50 %
- Standard used for evaluation: RSS-102 Issue 4 (2010-03)
- SAR value: **0.950 W/kg**. Measured ☒ Computed ☐ Calculated ☐

Annex C.9: Declaration of RF Exposure Compliance

ATTESTATION: I attest that the information provided in Annex C: 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: Thomas Vog Date: **2011-07-04**

NAME : **Thomas Vogler**

TITLE : Dipl.-Ing. (FH)

COMPANY : CETECOM ICT Services GmbH

Annex D: Calibration parameters

Calibration parameters are described in the additional document :

Appendix to test report no. 1-2977-51-03/11
Calibration data, Phantom certificate
and detail information of the DASY4 System

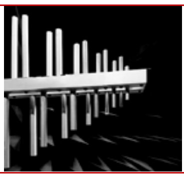
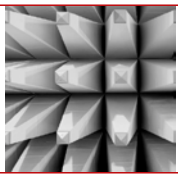
Annex E: Document History

Version	Applied Changes	Date of Release
	Initial Release	2011-07-04

Annex F: Further Information

Glossary

DUT - Device under Test
EUT - Equipment under Test
FCC - Federal Communication Commission
FCC ID - Company Identifier at FCC
HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
N/A - not applicable
SAR - Specific Absorption Rate
S/N - Serial Number
SW - Software

CETECOM™

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consulting - testing - certification

Deutscher Akkreditierungs Rat DAR

TEST REPORT

Test Report No.: 1-2977-51-03/11

Testing Laboratory

CETECOM ICT Services GmbH
Untertürkheimer Straße 6 – 10
66117 Saarbrücken/Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

Accredited Test Laboratory:
The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025

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

Appendix with Calibration data, Phantom certificate and system validation information

1 Table of contents

2 Calibration report "Probe ET3DV6"

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Client **Cetecom**

Certificate No: **ET3-1558_Aug10**

CALIBRATION CERTIFICATE

Object: ET3DV6 - SN:1558

Calibration procedure(s): QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2
Calibration procedure for dosimetric E-field probes

Calibration date: August 11, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

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

Issued: August 14, 2010

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

Certificate No: ET3-1558_Aug10 Page 1 of 11

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
C Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ET3DV6

SN:1558

Manufactured:	September 16, 2003
Last calibrated:	August 21, 2009
Recalibrated:	August 11, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1558 August 11, 2010

DASY/EASY - Parameters of Probe: ET3DV6 SN:1558

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.99	1.90	1.75	± 10.1%
DCP (mV)[B]	93.6	94.8	91.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

[E] Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ET3DV6 SN:1558

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	41.9 ± 5%	0.89 ± 5%	6.26	6.26	6.26	0.53	2.00 ± 11.0%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	5.92	5.92	5.92	0.42	2.28 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	5.80	5.80	5.80	0.38	2.46 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	5.03	5.03	5.03	0.50	2.75 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.76	4.76	4.76	0.62	2.43 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.14	4.14	4.14	0.99	1.74 ± 11.0%

[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.

ET3DV6 SN:1558 August 11, 2010

DASY/EASY - Parameters of Probe: ET3DV6 SN:1558

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth	Unc (k=2)
750	± 50 / ± 100	55.5 ± 5%	0.96 ± 5%	5.95	5.95	5.95	0.44	2.23	± 11.0%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	5.85	5.85	5.85	0.41	2.35	± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	5.73	5.73	5.73	0.36	2.77	± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	4.61	4.61	4.61	0.61	2.92	± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.35	4.35	4.35	0.81	2.52	± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.03	4.03	4.03	0.99	1.79	± 11.0%

[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.

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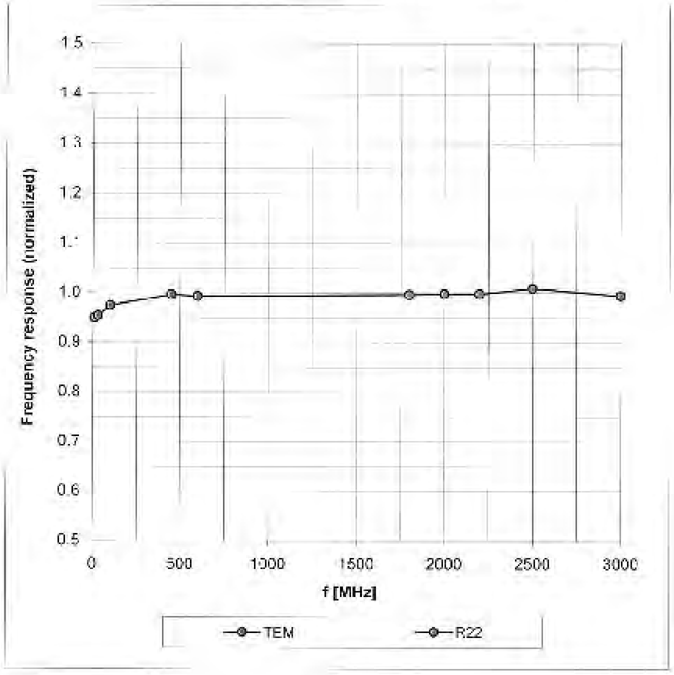
ET3DV6 SN:1558 August 11, 2010

Frequency Response of E-Field

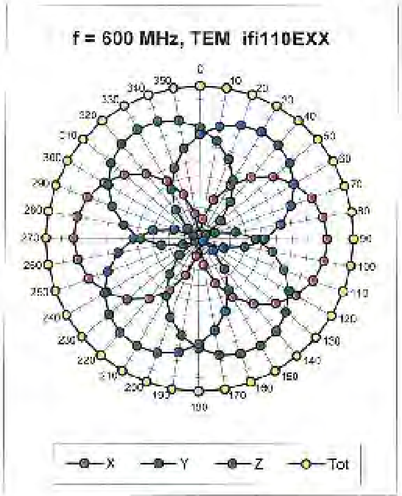
(TEM-Cell:ifi110 EXX, Waveguide: R22)

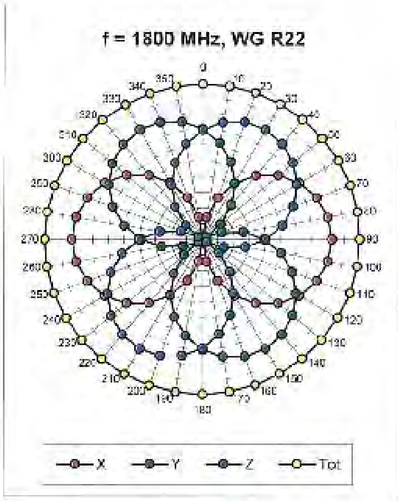


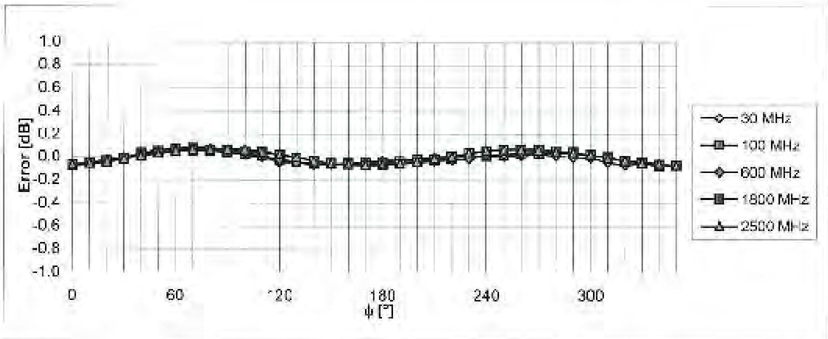
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ET3DV6 SN:1558 August 11, 2010

Receiving Pattern (φ), ϑ = 0°







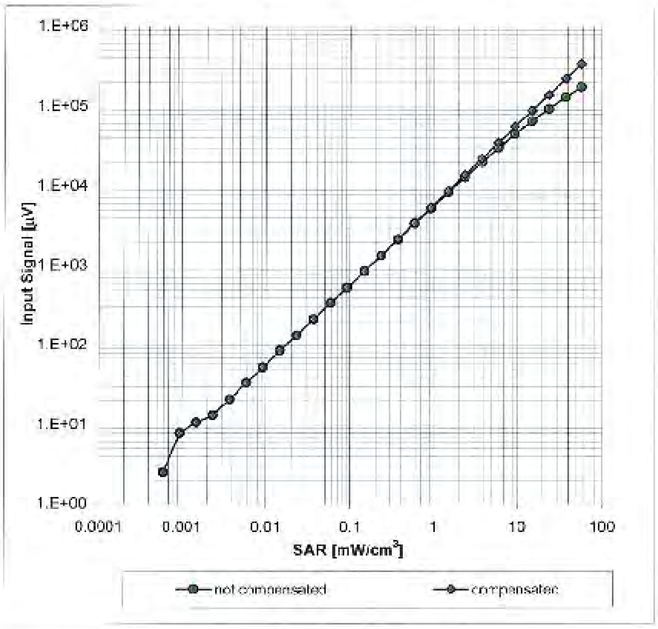
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

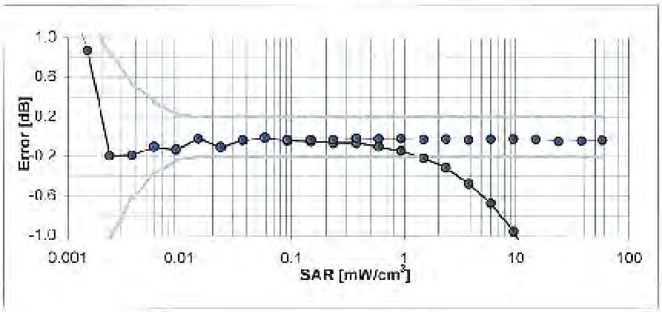
Certificate No: ET3-1558_Aug10 Page 8 of 11

ET3DV6 SN:1558 August 11, 2010

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)



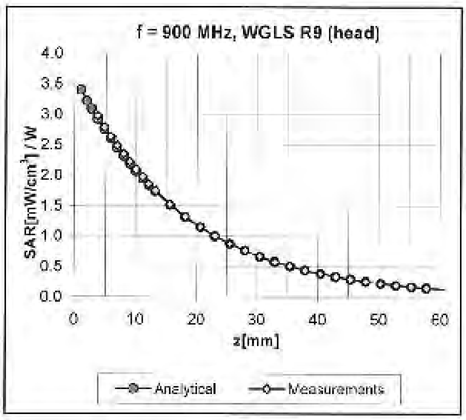


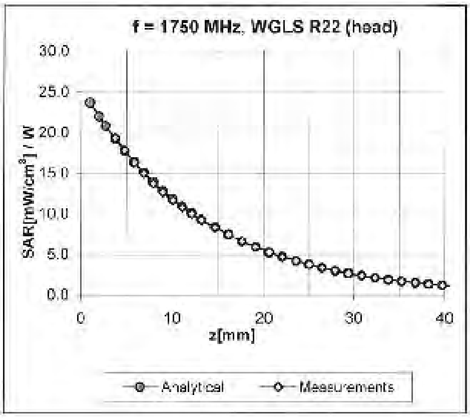
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: ET3-1558_Aug10 Page 9 of 11

ET3DV6 SN:1558 August 11, 2010

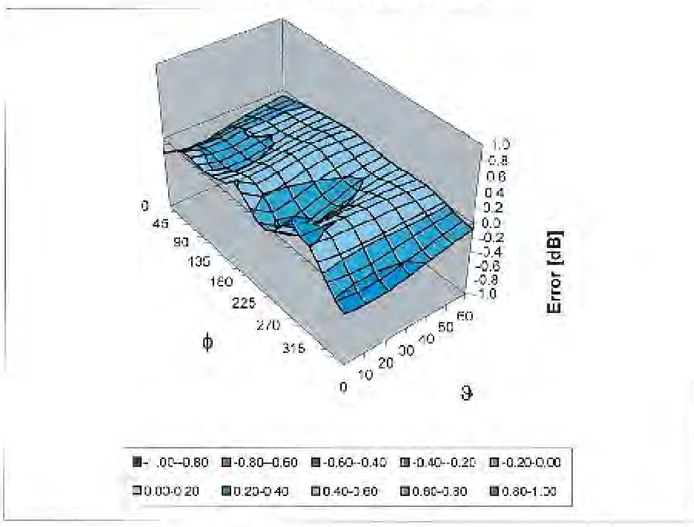
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: ET3-1558_Aug10 Page 10 of 11

ET3DV6 SN:1558 August 11, 2010

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

3 Calibration report "Probe ET3DV6"

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Client **Cetecom**

Certificate No: **ET3-1559_Jan11**

CALIBRATION CERTIFICATE

Object: ET3DV6 - SN:1559

Calibration procedure(s): QA CAL-01.v7, QA CAL-12.v6, QA CAL-23.v4 and QA CAL-25.v3
Calibration procedure for dosimetric E-field probes

Calibration date: January 19, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: January 20, 2011

Certificate No: ET3-1559_Jan11 Page 1 of 11

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

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S Swiss Calibration Service

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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ET3DV6

SN:1559

Manufactured:	December 1, 2000
Last calibrated:	January 20, 2010
Recalibrated:	January 19, 2011

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1559 January 19, 2011

DASY/EASY - Parameters of Probe: ET3DV6 SN:1559

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μV/(V/m)^2)[A]	1.79	1.59	1.64	± 10.1%
DCP (mV)[B]	96.9	97.6	96.3	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	132.1	± 2.9 %
			Y	0.00	0.00	1.00	137.8	
			Z	0.00	0.00	1.00	128.3	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

[E] Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

Certificate No: ET3-1559_Jan11 Page 4 of 11

ET3DV6 SN:1559 January 19, 2011

DASY/EASY - Parameters of Probe: ET3DV6 SN:1559

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth	Unc (k=2)
450	± 50 / ± 100	43.5 ± 5%	0.87 ± 5%	7.39	7.39	7.39	0.18	2.07	± 13.3%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.33	6.33	6.33	0.25	3.00	± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	6.20	6.20	6.20	0.26	3.00	± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	5.28	5.28	5.28	0.79	1.69	± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.02	5.02	5.02	0.79	1.60	± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.38	4.38	4.38	0.79	2.02	± 11.0%

[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.

DASY/EASY - Parameters of Probe: ET3DV6 SN:1559

Calibration Parameter Determined in Body Tissue Simulating Media

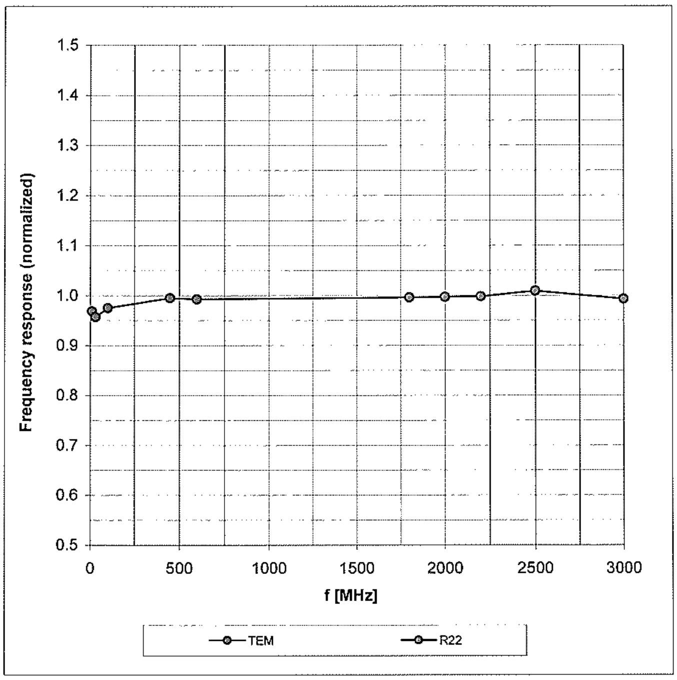
f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth	Unc (k=2)
450	± 50 / ± 100	56.7 ± 5%	0.94 ± 5%	7.73	7.73	7.73	0.12	2.07	± 13.3%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	6.22	6.22	6.22	0.25	2.98	± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	6.10	6.10	6.10	0.29	2.87	± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	4.68	4.68	4.68	0.79	2.39	± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.40	4.40	4.40	0.79	2.32	± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	3.91	3.91	3.91	0.70	3.00	± 11.0%

[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.

ET3DV6 SN:1559 January 19, 2011

Frequency Response of E-Field

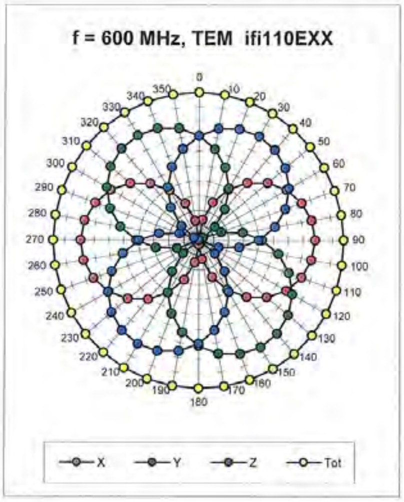
(TEM-Cell:ifi110 EXX, Waveguide: R22)

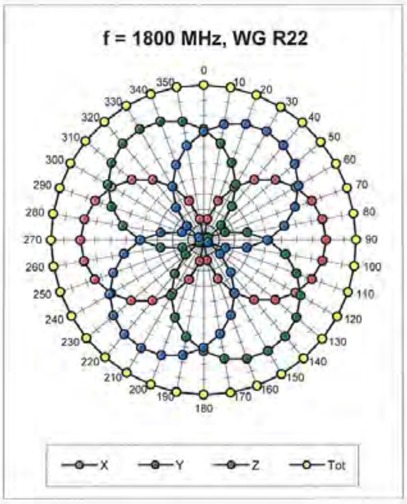


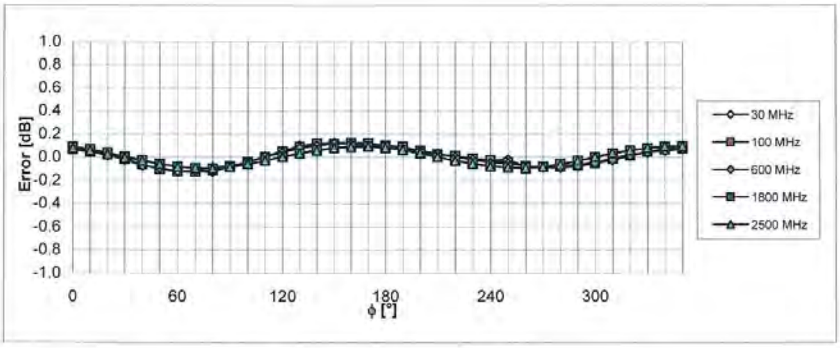
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ET3DV6 SN:1559 January 19, 2011

Receiving Pattern (ϕ), ϑ = 0°



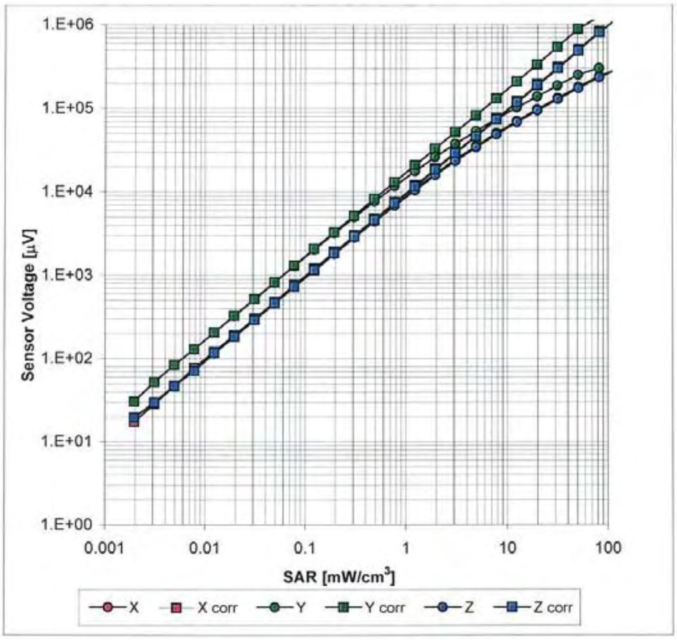


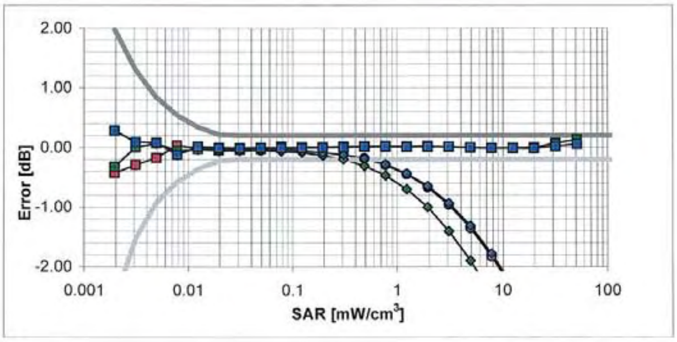


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

(TEM cell, f = 900 MHz)

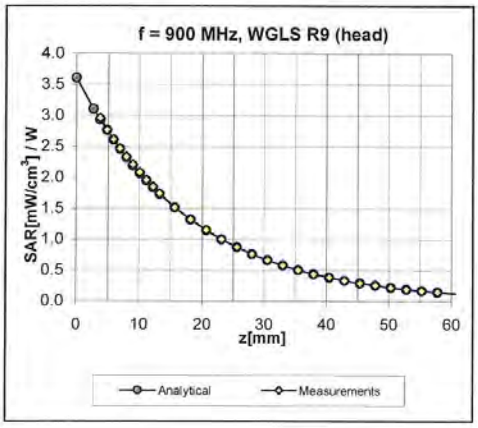


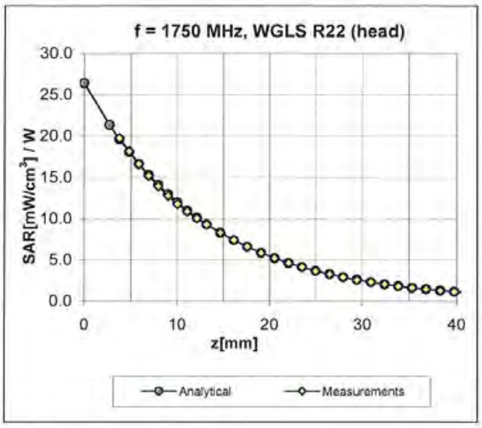


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ET3DV6 SN:1559 January 19, 2011

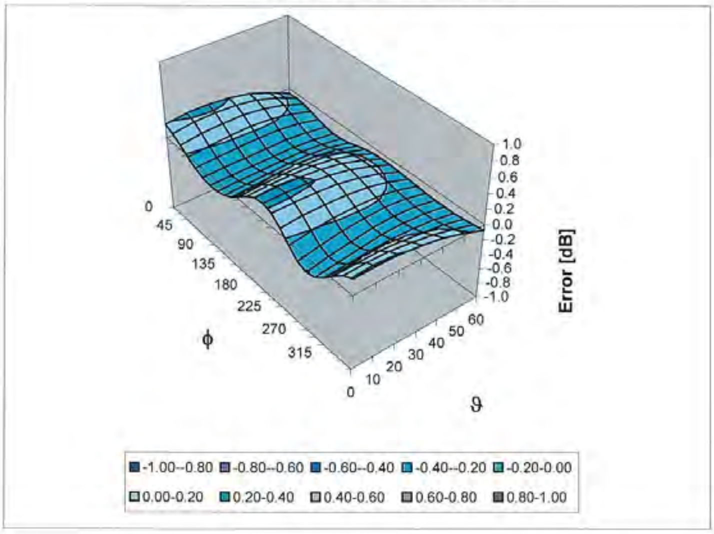
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	3.7 mm

4 Calibration report "900 MHz System validation dipole"

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Accreditation No.: **SCS 108**

Client **Cetecom**

Certificate No: **D900V2-102_Aug10**

CALIBRATION CERTIFICATE

Object: D900V2 - SN: 102

Calibration procedure(s): QA CAL-05.v7
Calibration procedure for dipole validation kits

Calibration date: August 16, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: August 19, 2010

Certificate No: D900V2-102_Aug10 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
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.2 °C	41.5	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.2 ± 6 %	0.97 mho/m ± 6 %
Head TSL temperature during test	(21.9 ± 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	2.80 mW / g
SAR normalized	normalized to 1W	11.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**11.2 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.79 mW / g
SAR normalized	normalized to 1W	7.16 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**7.15 mW /g ± 16.5 % (k=2)**

Certificate No: D900V2-102_Aug10 Page 3 of 9

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	1.07 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	2.88 mW / g
SAR normalized	normalized to 1W	11.5 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**11.3 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.85 mW / g
SAR normalized	normalized to 1W	7.40 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**7.31 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.9 Ω - 4.5 jΩ
Return Loss	- 26.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω - 6.1 jΩ
Return Loss	- 22.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.393 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 24, 2001

DASY5 Validation Report for Head TSL

Date/Time: 09.08.2010 15:19:24

Test Laboratory: SPEAG, Zurich, Switzerland

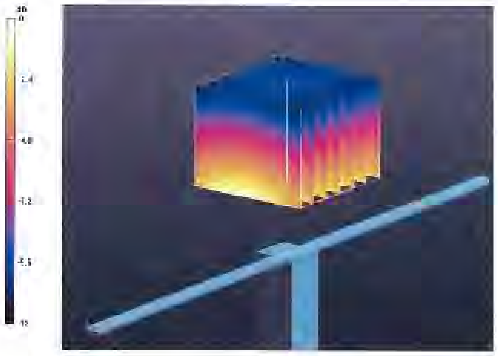
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:102

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: HSL900
Medium parameters used: f = 900 MHz; σ = 0.97 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.88, 5.88, 5.88); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

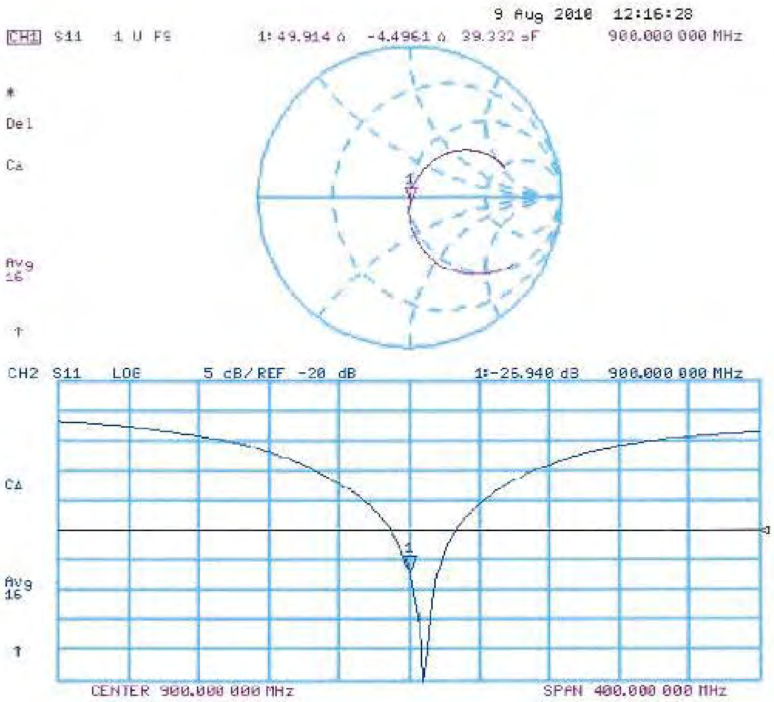
Head/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe) 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.1 V/m; Power Drift = 0.00742 dB
Peak SAR (extrapolated) = 4.27 W/kg
SAR(1 g) = 2.8 mW/g; SAR(10 g) = 1.79 mW/g
Maximum value of SAR (measured) = 3.3 mW/g



0 dB = 3.3mW/g

Certificate No: D900V2-102_Aug10 Page 6 of 9

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body

Date/Time: 16.08.2010 13:40:10

Test Laboratory: SPEAG, Zurich, Switzerland

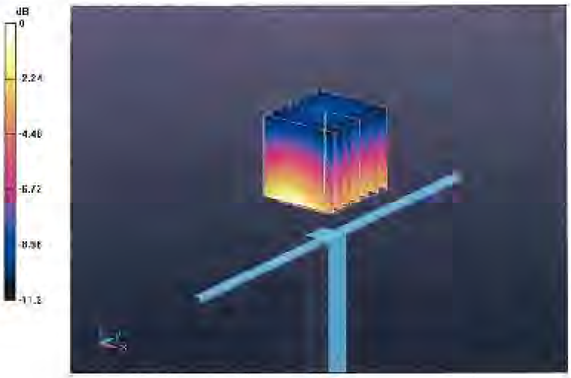
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:102

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: M900
Medium parameters used: f = 900 MHz; σ = 1.07 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.81, 5.81, 5.81); Calibrated: 30.04.2010
- Sensor Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

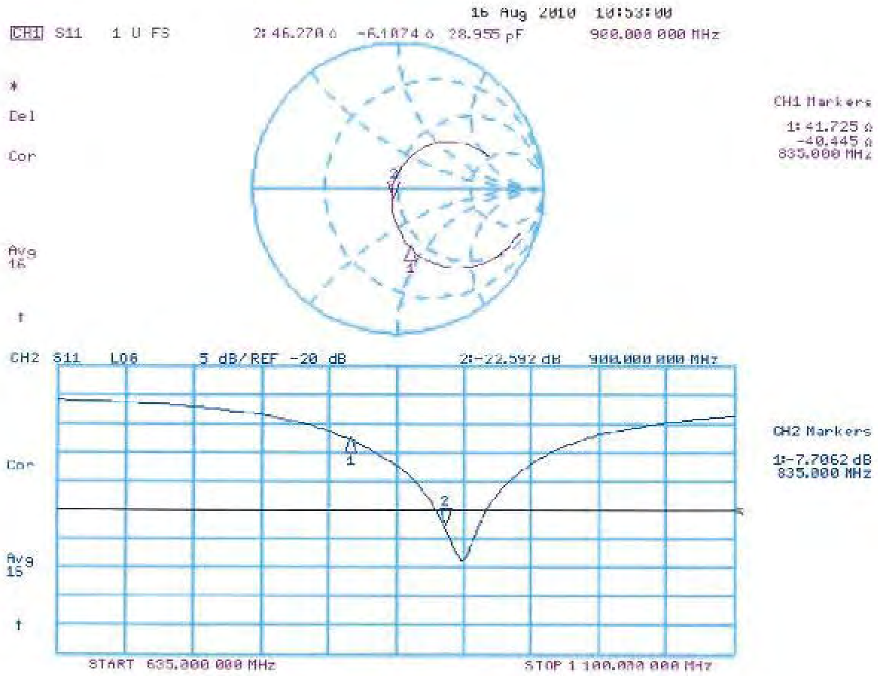
Body/d=15mm, Pin250 mW, dist=3.0mm (ES-Probe) 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.6 V/m; Power Drift = 0.034 dB
Peak SAR (extrapolated) = 4.33 W/kg
SAR(1 g) = 2.88 mW/g; SAR(10 g) = 1.85 mW/g
Maximum value of SAR (measured) = 3.34 mW/g



0 dB = 3.34mW/g

Certificate No: D900V2-102_Aug10 Page 8 of 9

Impedance Measurement Plot for Body TSL



Certificate No: D900V2-102_Aug10 Page 9 of 9

5 Calibration report “1900 MHz System validation dipole”

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

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Accreditation No.: **SCS 108**

Client: Cetecom

Certificate No: D1900V2-5d009_Aug10

CALIBRATION CERTIFICATE

Object: D1900V2 - SN: 5d009

Calibration procedure(s): QA CAL-05.v7
Calibration procedure for dipole validation kits

Calibration date: August 17, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: August 18, 2010

Certificate No: D1900V2-5d009_Aug10 Page 1 of 9

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

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

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.3 ± 6 %	1.45 mho/m ± 6 %
Head TSL temperature during test	(22.1 ± 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	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**40.0 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.9 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.9 ± 6 %	1.53 mho/m ± 6 %
Body TSL temperature during test	(21.9 ± 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	10.5 mW / g
SAR normalized	normalized to 1W	42.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**41.8 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.68 mW / g
SAR normalized	normalized to 1W	22.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**22.6 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.3 Ω + 2.4 jΩ
Return Loss	- 32.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.1 Ω + 3.0 jΩ
Return Loss	- 27.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.161 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	February 22, 2002

DASY5 Validation Report for Head TSL

Date/Time: 10.08.2010 13:43:32

Test Laboratory: SPEAG, Zurich, Switzerland

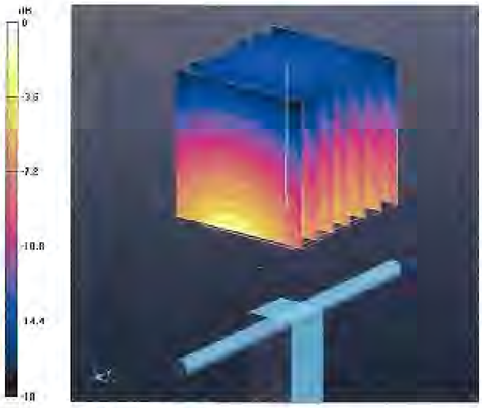
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d009

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 1900 MHz; σ = 1.43 mho/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

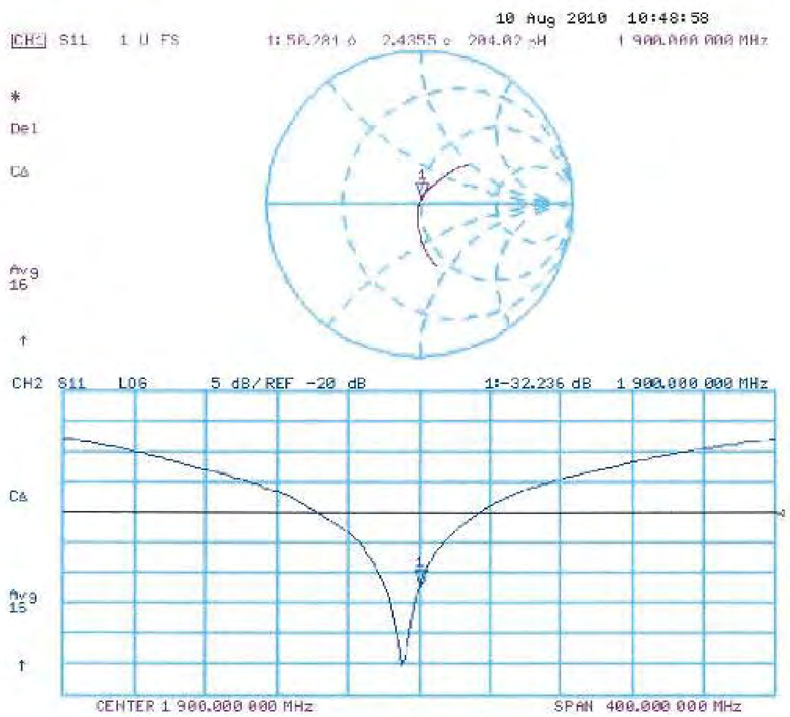
Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.3 V/m; Power Drift = 0.027 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.26 mW/g
Maximum value of SAR (measured) = 12.6 mW/g



0 dB = 12.6mW/g

Certificate No: D1900V2-5d009_Aug10 Page 6 of 9

Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-5d009_Aug10 Page 7 of 9

DASY5 Validation Report for Body

Date/Time: 17.08.2010 15:54:28

Test Laboratory: SPEAG, Zurich, Switzerland

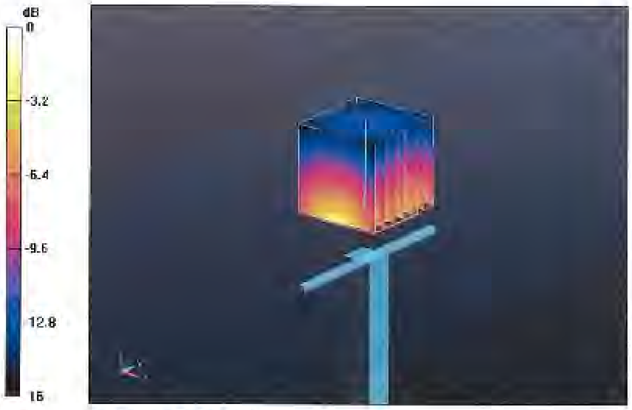
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d009

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL U11 BB
Medium parameters used: f = 1900 MHz; σ = 1.53 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

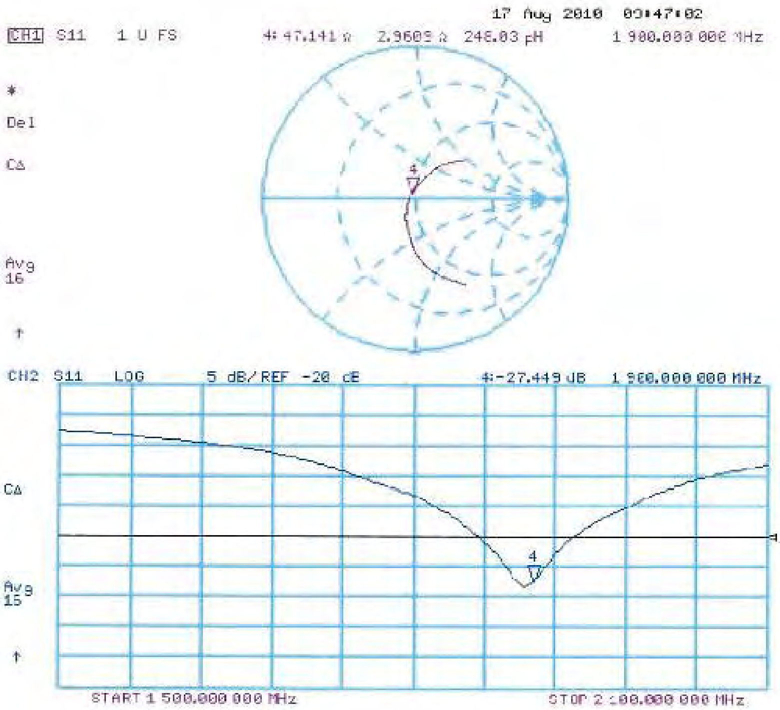
Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.2 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 17.4 W/kg
SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.68 mW/g
Maximum value of SAR (measured) = 13.3 mW/g



0 dB = 13.3mW/g

Certificate No: D1900V2-5d009_Aug10 Page 8 of 9

Impedance Measurement Plot for Body TSL



Certificate No: D1900V2-5d009_Aug10 Page 9 of 9

6 Calibration report "2450 MHz System validation dipole"

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

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Accreditation No.: **SCS 108**

Client: Cetecom

Certificate No: D2450V2-710_Aug10

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 710
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	August 19, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

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

Issued: August 19, 2010

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Certificate No: D2450V2-710_Aug10 Page 1 of 9

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003

b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.2 ± 6 %	1.77 mho/m ± 6 %
Head TSL temperature during test	(22.6 ± 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	12.8 mW / g
SAR normalized	normalized to 1W	51.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**51.6 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.03 mW / g
SAR normalized	normalized to 1W	24.1 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.2 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.3 ± 6 %	1.95 mho/m ± 6 %
Body TSL temperature during test	(22.5 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.6 mW / g
SAR normalized	normalized to 1W	54.4 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**54.4 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.47 mW / g
SAR normalized	normalized to 1W	25.9 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**25.9 mW / g ± 16.5 % (k=2)**

Certificate No: D2450V2-710_Aug10 Page 4 of 9

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.0 Ω - 0.4 jΩ
Return Loss	- 30.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω + 1.3 jΩ
Return Loss	- 34.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.129 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	July 05, 2002

DASY5 Validation Report for Head TSL

Date/Time: 11.08.2010 13:11:39

Test Laboratory: SPEAG, Zurich, Switzerland

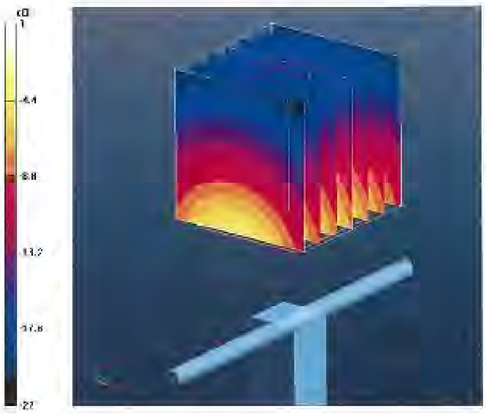
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:710

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 2450 MHz; σ = 1.77 mho/m; ε_r = 39.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

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

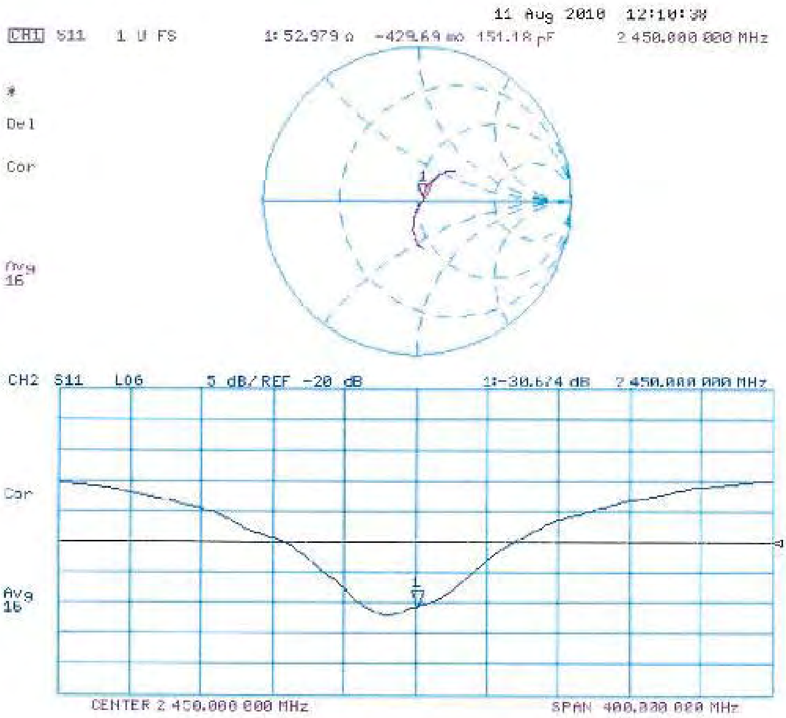
Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.3 V/m; Power Drift = 0.035 dB
Peak SAR (extrapolated) = 26 W/kg
SAR(1 g) = 12.8 mW/g; SAR(10 g) = 6.03 mW/g
Maximum value of SAR (measured) = 16.5 mW/g



0 dB = 16.5mW/g

Certificate No: D2450V2-710_Aug10 Page 6 of 9

Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-710_Aug10 Page 7 of 9

DASY5 Validation Report for Body

Date/Time: 19.08.2010 10:18:08

Test Laboratory: SPEAG, Zurich, Switzerland

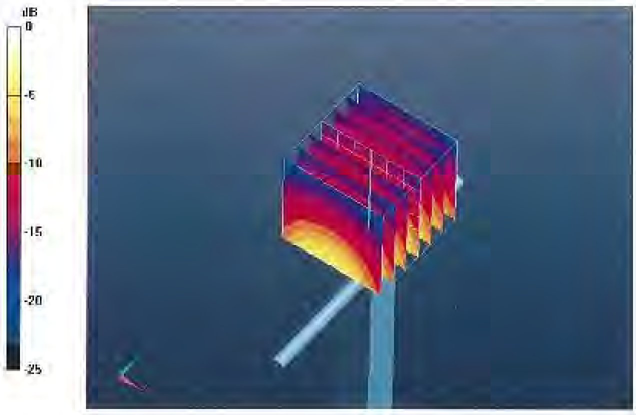
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:710

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: MSL U11 BB
Medium parameters used: f = 2450 MHz; σ = 1.94 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

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

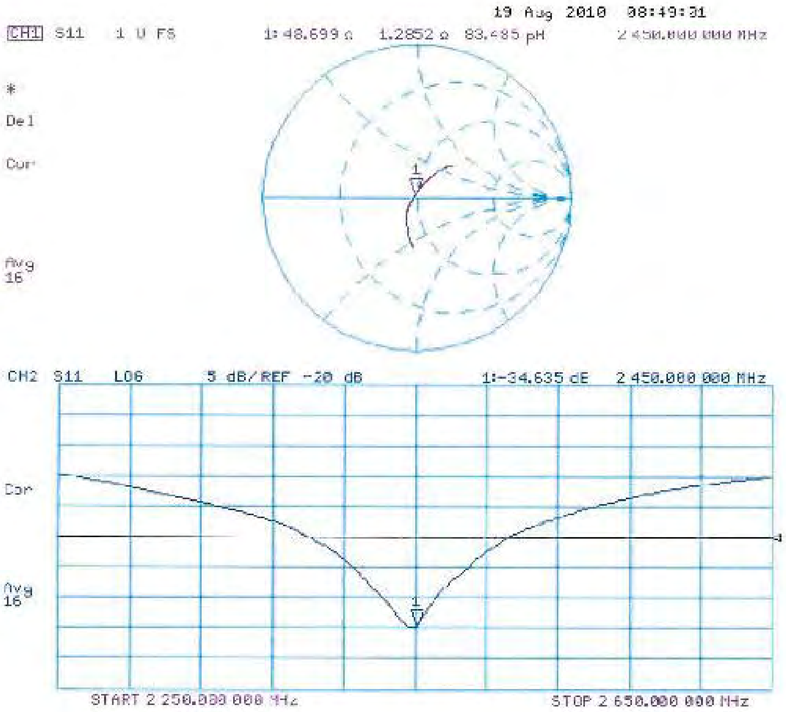
Pin250 mW/d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.5 V/m; Power Drift = -0.00803 dB
Peak SAR (extrapolated) = 28.1 W/kg
SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.47 mW/g
Maximum value of SAR (measured) = 17.9 mW/g



0 dB = 17.9mW/g

Certificate No: D2450V2-710_Aug10 Page 8 of 9

Impedance Measurement Plot for Body TSL



Certificate No: D2450V2-710_Aug10 Page 9 of 9

7 Calibration certificate of Data Acquisition Unit (DAE)

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

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

Accreditation No.: SCS 108

Client Cetecom

Certificate No: DAE3-413_Jan11

CALIBRATION CERTIFICATE

Object	DAE3 - SD 000 D03 AA - SN: 413
Calibration procedure(s)	QA CAL-06.v22 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	January 13, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

	Name	Function	Signature
Calibrated by:	Andrea Guntli	Technician	
Approved by:	Fin Bomholt	R&D Director	i.V.

Issued: January 13, 2011

Certificate No: DAE3-413_Jan11 Page 1 of 5

8 Calibration certificate of Data Acquisition Unit (DAE)

Calibration Laboratory of
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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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

Accreditation No.: SCS 108

Client Cetecom

Certificate No: DAE3-477_May11

CALIBRATION CERTIFICATE

Object	DAE3 - SD 000 D03 AA - SN: 477
Calibration procedure(s)	QA CAL-06.v22 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	May 4, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	[signature]
Approved by:	Fin Bomholt	R&D Director	i.V. [signature]

Issued: May 4, 2011

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

Certificate No: DAE3-477_May11 Page 1 of 5

9 Certificate of "SAM Twin Phantom V4.0/V4.0C"

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 18.11.2001

Signature / Stamp

Schmid & Partner
Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

Doc No 881 – QD 000 P40 BA – B Page 1 (1)

10 Application Note System Performance Check

10.1 Purpose of system performance check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check is performed prior to any usage of the system in order to guarantee reproducible results.
The measurement of the Specific Absorption Rate (SAR) is a complicated task and the result depends on the proper functioning of many components and the correct settings of many parameters. Faulty results due to drift, failures or incorrect parameters might not be recognized, since they often look similar in distribution to the correct ones. The Dosimetric Assessment System DASY4 incorporates a system performance check procedure to test the proper functioning of the system. The system performance check uses normal SAR measurements in a simplified setup (the flat section of the SAM Twin Phantom) with a well characterized source (a matched dipole at a specified distance). This setup was selected to give a high sensitivity to all parameters that might fail or vary over time (e.g., probe, liquid parameters, and software settings) and a low sensitivity to external effects inherent in the system (e.g., positioning uncertainty of the device holder). The system performance check does not replace the calibration of the components. The accuracy of the system performance check is not sufficient for calibration purposes. It is possible to calculate the field quite accurately in this simple setup; however, due to the open field situation some factors (e.g., laboratory reflections) cannot be accounted for. Calibrations in the flat phantom are possible with transfer calibration methods, using either temperature probes or calibrated E-field probes. The system performance check also does not test the system performance for arbitrary field situations encountered during real measurements of mobile phones. These checks are performed at SPEAG by testing the components under various conditions (e.g., spherical isotropy measurements in liquid, linearity measurements, temperature variations, etc.), the results of which are used for an error estimation of the system. The system performance check will indicate situations where the system uncertainty is exceeded due to drift or failure.

10.2 System Performance check procedure

Preparation

The conductivity should be measured before the validation and the measured liquid parameters must be entered in the software. If the measured values differ from targeted values in the dipole document, the liquid composition should be adjusted. If the validation is performed with slightly different (measured) liquid parameters, the expected SAR will also be different. See the application note about SAR sensitivities for an estimate of possible SAR deviations. Note that the liquid parameters are temperature dependent with approximately – 0.5% decrease in permittivity and + 1% increase in conductivity for a temperature decrease of 1° C. The dipole must be placed beneath the flat phantom section of the Generic Twin Phantom with the correct distance holder in place. The distance holder should touch the phantom surface with a light pressure at the reference marking (little hole) and be oriented parallel to the long side of the phantom. Accurate positioning is not necessary, since the system will search for the peak SAR location, except that the dipole arms should be parallel to the surface. The device holder for mobile phones can be left in place but should be rotated away from the dipole. The forward power into the dipole at the dipole SMA connector should be determined as accurately as possible. See section 4 for a description of the recommended setup to measure the dipole input power. The actual dipole input power level can be between 20mW and several watts. The result can later be normalized to any power level. It is strongly recommended to note the actually used power level in the „comment"-window of the measurement file; otherwise you loose this crucial information for later reference.

System Performance Check

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, so you must save the finished validation under a different name. The validation document requires the Generic Twin Phantom, so this phantom must be properly installed in your system. (You can create your own measurement procedures by opening a new document or editing an existing document file). Before you start the validation, you just have to tell the system with which components (probe, medium, and device) you are performing the validation; the system will take care of all parameters. After the validation, which will take about 20 minutes, the results of each task are displayed in the document window. Selecting all measured tasks and opening the predefined "validation" graphic format displays all necessary information for validation. A description of the different measurement tasks in the predefined document is given below, together with the information that can be deduced from their results:

- 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 amplifier output power. If it is too high (above ± 0.1dB) the validation should be repeated; some amplifiers have very high drift during warm-up. A stable amplifier gives drift results in the DASY4 system below ± 0.02 dB.
- 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 ± 0.1mm). In that case it is better to abort the validation and stir the liquid. 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 ± 30°.) However, varying breaking indices of different liquid compositions might also influence the distance. If the indicated difference varies from the actual setting, the probe parameter „optical surface distance" should be changed in the probe settings (see manual). For more information see the application note about SAR evaluation.
- The „area scan" measures the SAR above the 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 proposed scan uses large grid spacing for faster measurement; due to the symmetric field the peak detection is reliable. 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 (for more information see the application note on SAR evaluation).

If the validation measurements give reasonable results, the peak 1g and 10g spatial SAR values averaged between the two cubes and normalized to 1W dipole input power give the reference data for comparisons. The next section analyzes the expected uncertainties of these values. Section 6 describes some additional checks for further information or troubleshooting.

10.3 Uncertainty Budget

Please note that in the following Tables, the tolerance of the following uncertainty components depends on the actual equipment and setup at the user location and need to be either assessed or verified on-site by the end user of the DASY4 system:

- RF ambient conditions
- Dipole Axis to Liquid Distance
- Input power and SAR drift measurement
- Liquid permittivity - measurement uncertainty
- Liquid conductivity - measurement uncertainty

Note: All errors are given in percent of SAR, so 0.1 dB corresponds to 2.3%. The field error would be half of that. The liquid parameter assessment give the targeted values from the dipole document. All errors are given in percent of SAR, so 0.1dB corresponds to 2.3%. The field error would be half of that.

System validation

In the table below, the system validation uncertainty with respect to the analytically assessed SAR value of a dipole source as given in the P1528 standard is given. This uncertainty is smaller than the expected uncertainty for mobile phone measurements due to the simplified setup and the symmetric field distribution.

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

Performance check repeatability

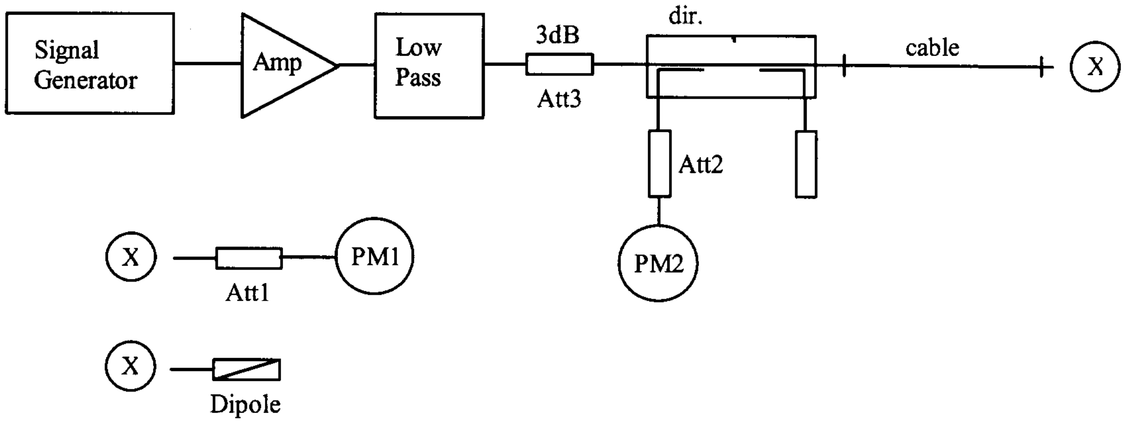
The repeatability check of the validation is insensitive to external effects and gives an indication of the variations in the DASY4 measurement system, provided that the same power reading setup is used for all validations. The repeatability estimate is given in the following table:

Error Sources	Uncertainty Value	Probability Distribution	Divi-sor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty 10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	± 4.8%	Normal	1	1	1	0	0	∞
Axial isotropy	± 4.7%	Rectangular	√3	0.7	0.7	0	0	∞
Hemispherical isotropy	± 0.0%	Rectangular	√3	0.7	0.7	0	0	∞
Boundary effects	± 1.0%	Rectangular	√3	1	1	0	0	∞
Probe linearity	± 4.7%	Rectangular	√3	1	1	0	0	∞
System detection limits	± 1.0%	Rectangular	√3	1	1	0	0	∞
Readout electronics	± 1.0%	Normal	1	1	1	0	0	∞
Response time	± 0.0%	Rectangular	√3	1	1	0	0	∞
Integration time	± 0.0%	Rectangular	√3	1	1	0	0	∞
RF ambient conditions	± 3.0%	Rectangular	√3	1	1	0	0	∞
Probe positioner	± 0.4%	Rectangular	√3	1	1	0	0	∞
Probe positioning	± 2.9%	Rectangular	√3	1	1	0	0	∞
Max. SAR evaluation	± 1.0%	Rectangular	√3	1	1	0	0	∞
Test Sample Related								
Dipole axis to liquid distance	± 2.0%	Normal	1	1	1	± 1.2%	± 1.2%	∞
Power drift	± 4.7%	Rectangular	√3	1	1	± 2.7%	± 2.7%	∞
Phantom and Set-up								
Phantom uncertainty	± 4.0%	Rectangular	√3	1	1	± 2.3%	± 2.3%	∞
Liquid conductivity (target)	± 5.0%	Rectangular	√3	0.64	0.43	± 1.8%	± 1.2%	∞
Liquid conductivity (meas.)	± 2.5%	Normal	1	0.64	0.43	± 1.6%	± 1.1%	∞
Liquid permittivity (target)	± 5.0%	Rectangular	√3	0.6	0.49	± 1.7%	± 1.4%	∞
Liquid permittivity (meas.)	± 2.5%	Normal	1	0.6	0.49	± 1.5%	± 1.2%	∞
Combined Uncertainty						± 5.3%	± 4.9%	
Expanded Std. Uncertainty						± 10.6%	± 9.7%	

The expected repeatability deviation is low. Excessive drift (e.g., drift in liquid parameters), partial system failures or incorrect parameter settings (e.g., wrong probe or device settings) will lead to unexpectedly high repeatability deviations. The repeatability gives an indication that the system operates within its initial specifications. Excessive drift, system failure and operator errors are easily detected.

10.4 Power set-up for validation

The uncertainty of the dipole input power is a significant contribution to the absolute uncertainty and the expected deviation in interlaboratory comparisons. The values in Section 2 for a typical and a sophisticated setup are just average values. Refer to the manual of the power meter and the detector head for the evaluation of the uncertainty in your system. The uncertainty also depends on the source matching and the general setup. Below follows the description of a recommended setup and procedures to increase the accuracy of the power reading:



The figure shows the recommended setup. The PM1 (incl. Att1) measures the forward power at the location of the validation dipole connector. The signal generator is adjusted for the desired forward power at the dipole connector and the power meter PM2 is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2. If the signal generator does not allow a setting in 0.01dB steps, the remaining difference at PM2 must be noted and considered in the normalization of the validation results. The requirements for the components are:

- The signal generator and amplifier should be stable (after warm-up). The forward power to the dipole should be above 10mW to avoid the influence of measurement noise. If the signal generator can deliver 15dBm or more, an amplifier is not necessary. Some high power amplifiers should not be operated at a level far below their maximum output power level (e.g. a 100W power amplifier operated at 250mW output can be quite noisy). An attenuator between the signal generator and amplifier is recommended to protect the amplifier input.
- The low pass filter after the amplifier reduces the effect of harmonics and noise from the amplifier. For most amplifiers in normal operation the filter is not necessary.
- The attenuator after the amplifier improves the source matching and the accuracy of the power head. (See power meter manual.) It can also be used also to make the amplifier operate at its optimal output level for noise and stability. In a setup without directional coupler, this attenuator should be at least 10dB.
- The directional coupler (recommended ³ 20dB) is used to monitor the forward power and adjust the signal generator output for constant forward power. A medium quality coupler is sufficient because the loads (dipole and power head) are well matched. (If the setup is used for reflective loads, a high quality coupler with respect to directivity and output matching is necessary to avoid additional errors.)
- The power meter PM2 should have a low drift and a resolution of 0.01dBm, but otherwise its accuracy has no impact on the power setting. Calibration is not required.
- The cable between the coupler and dipole must be of high quality, without large attenuation and phase changes when it is moved. Otherwise, the power meter head PM1 should be brought to the location of the dipole for measuring.
- The power meter PM1 and attenuator Att1 must be high quality components. They should be calibrated, preferably together. The attenuator (³10dB) improves the accuracy of the power reading. (Some higher power heads come with a built-in calibrated attenuator.) The exact attenuation of the attenuator at the frequency used must be known; many attenuators are up to 0.2dB off from the specified value.

- Use the same power level for the power setup with power meter PM1 as for the actual measurement to avoid linearity and range switching errors in the power meter PM2. If the validation is performed at various power levels, do the power setting procedure at each level.
- The dipole must be connected directly to the cable at location “X”. If the power meter has a different connector system, use high quality couplers. Preferably, use the couplers at the attenuator Att1 and calibrate the attenuator with the coupler.
- Always remember: We are measuring power, so 1% is equivalent to 0.04dB.

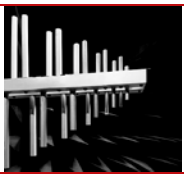
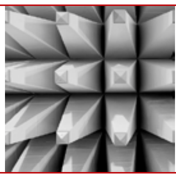
10.5 Laboratory reflection

In near-field situations, the absorption is predominantly caused by induction effects from the magnetic near-field. The absorption from reflected fields in the laboratory is negligible. On the other hand, the magnetic field around the dipole depends on the currents and therefore on the feed point impedance. The feed point impedance of the dipole is mainly determined from the proximity of the absorbing phantom, but reflections in the laboratory can change the impedance slightly. A 1% increase in the real part of the feed point impedance will produce approximately a 1% decrease in the SAR for the same forward power. The possible influence of laboratory reflections should be investigated during installation. The validation setup is suitable for this check, since the validation is sensitive to laboratory reflections. The same tests can be performed with a mobile phone, but most phones are less sensitive to reflections due to the shorter distance to the phantom. The fastest way to check for reflection effects is to position the probe in the phantom above the feed point and start a continuous field measurement in the DASY4 multi-meter window. Placing absorbers in front of possible reflectors (e.g. on the ground near the dipole or in front of a metallic robot socket) will reveal their influence immediately. A 10dB absorber (e.g. ferrite tiles or flat absorber mats) is probably sufficient, as the influence of the reflections is small anyway. If you place the absorber too near the dipole, the absorber itself will interact with the reactive near-field. Instead of measuring the SAR, it is also possible to monitor the dipole impedance with a network analyzer for reflection effects. The network analyzer must be calibrated at the SMA connector and the electrical delay (two times the forward delay in the dipole document) must be set in the NWA for comparisons with the reflection data in the dipole document. If the absorber has a significant influence on the results, the absorber should be left in place for validation or measurements. The reference data in the dipole document are produced in a low reflection environment.

10.6 Additional system checks

While the validation gives a good check of the DASY4 system components, it does not include all parameters necessary for real phone measurements (e.g. device modulation or device positioning). For system validation (repeatability) or comparisons between laboratories a reference device can be useful. This can be any mobile phone with a stable output power (preferably a device whose output power can be set through the keyboard). For comparisons, the same device should be sent around, since the SAR variations between samples can be large. Several measurement possibilities in the DASY software allow additional tests of the performance of the DASY system and components. These tests can be useful to localize component failures:

- The validation can be performed at different power levels to check the noise level or the correct compensation of the diode compression in the probe.
- If a pulsed signal with high peak power levels is fed to the dipole, the performance of the diode compression compensation can be tested. The correct crest factor parameter in the DASY software must be set (see manual). The system should give the same SAR output for the same averaged input power.
- The probe isotropy can be checked with a 1D-probe rotation scan above the feed point. The automatic probe alignment procedure must be passed through for accurate probe rotation movements (optional DASY4 feature with a robot-mounted light beam unit). Otherwise the probe tip might move on a small circle during rotation, producing some additional isotropy errors in gradient fields.

CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Test Report No.: 1-2977-51-03/11

Testing Laboratory

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Accredited Test Laboratory:
The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025

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

Appendix with Calibration data, Phantom certificate and system validation information

1 Table of contents

2 Calibration report "Probe ET3DV6"

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Client **Cetecom**

Certificate No: **ET3-1558_Aug10**

CALIBRATION CERTIFICATE

Object: ET3DV6 - SN:1558

Calibration procedure(s): QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2
Calibration procedure for dosimetric E-field probes

Calibration date: August 11, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

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

Issued: August 14, 2010

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

Certificate No: ET3-1558_Aug10 Page 1 of 11

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003

b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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

Certificate No: ET3-1558_Aug10 Page 2 of 11

Probe ET3DV6

SN:1558

Manufactured:	September 16, 2003
Last calibrated:	August 21, 2009
Recalibrated:	August 11, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1558 August 11, 2010

DASY/EASY - Parameters of Probe: ET3DV6 SN:1558

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.99	1.90	1.75	± 10.1%
DCP (mV)[B]	93.6	94.8	91.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

[E] Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

Certificate No: ET3-1558_Aug10 Page 4 of 11

ET3DV6 SN:1558 August 11, 2010

DASY/EASY - Parameters of Probe: ET3DV6 SN:1558

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	41.9 ± 5%	0.89 ± 5%	6.26	6.26	6.26	0.53	2.00 ± 11.0%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	5.92	5.92	5.92	0.42	2.28 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	5.80	5.80	5.80	0.38	2.46 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	5.03	5.03	5.03	0.50	2.75 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.76	4.76	4.76	0.62	2.43 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.14	4.14	4.14	0.99	1.74 ± 11.0%

[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.

ET3DV6 SN:1558 August 11, 2010

DASY/EASY - Parameters of Probe: ET3DV6 SN:1558

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	55.5 ± 5%	0.96 ± 5%	5.95	5.95	5.95	0.44	2.23 ± 11.0%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	5.85	5.85	5.85	0.41	2.35 ± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	5.73	5.73	5.73	0.36	2.77 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	4.61	4.61	4.61	0.61	2.92 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.35	4.35	4.35	0.81	2.52 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.03	4.03	4.03	0.99	1.79 ± 11.0%

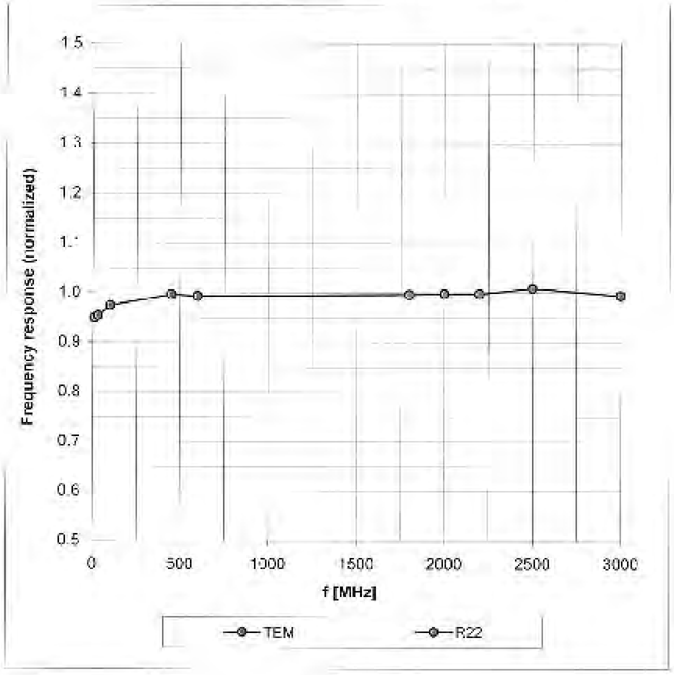
[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Certificate No: ET3-1558_Aug10 Page 6 of 11

ET3DV6 SN:1558 August 11, 2010

Frequency Response of E-Field

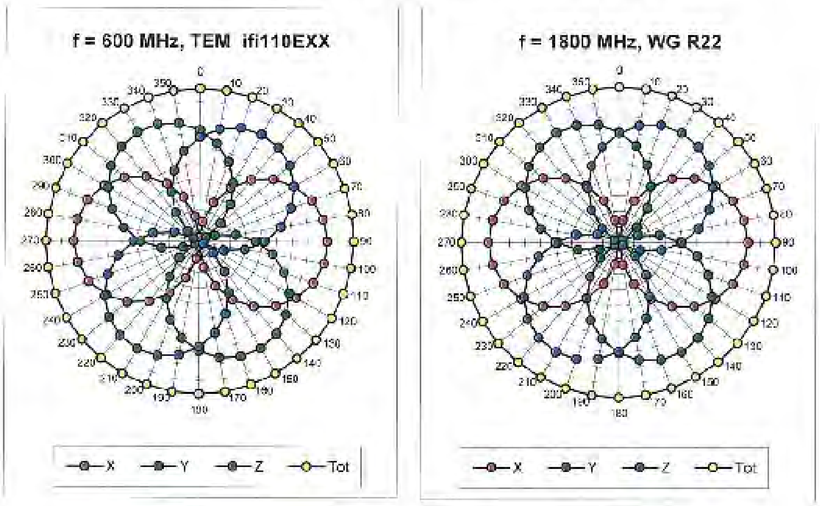
(TEM-Cell:ifi110 EXX, Waveguide: R22)

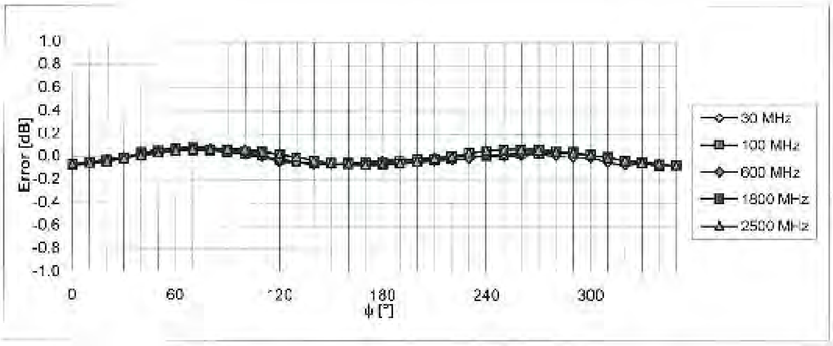


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Certificate No: ET3-1558_Aug10 Page 7 of 11

Receiving Pattern (ϕ), ϑ = 0°



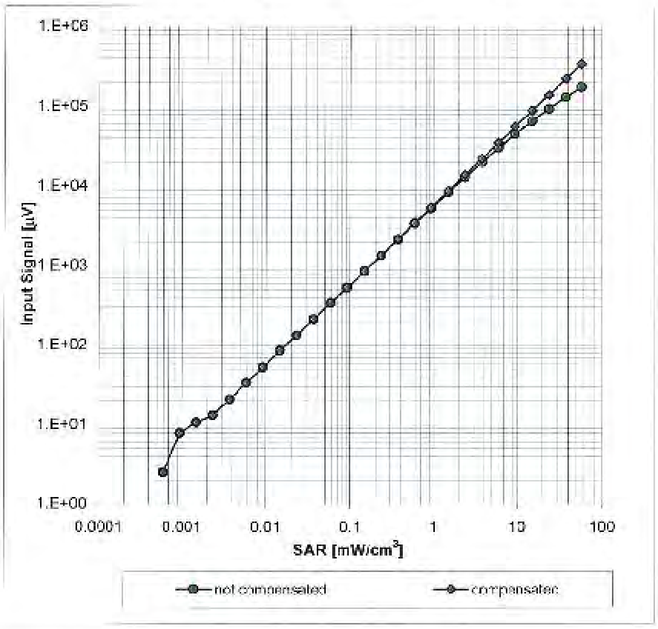


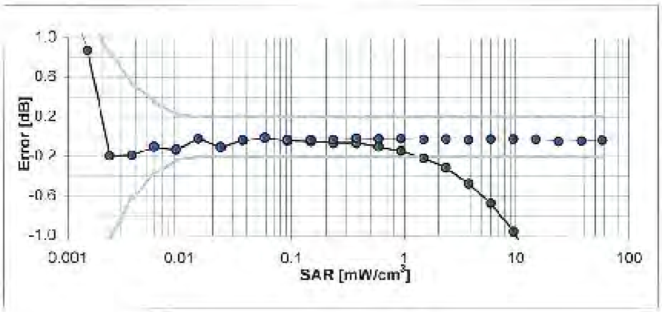
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ET3DV6 SN:1558 August 11, 2010

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)

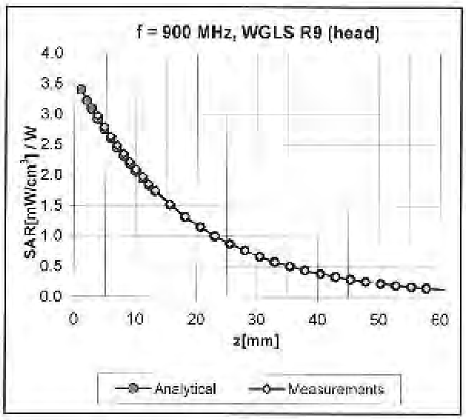


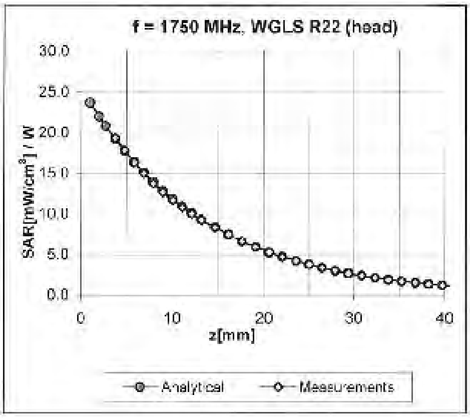


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ET3DV6 SN:1558 August 11, 2010

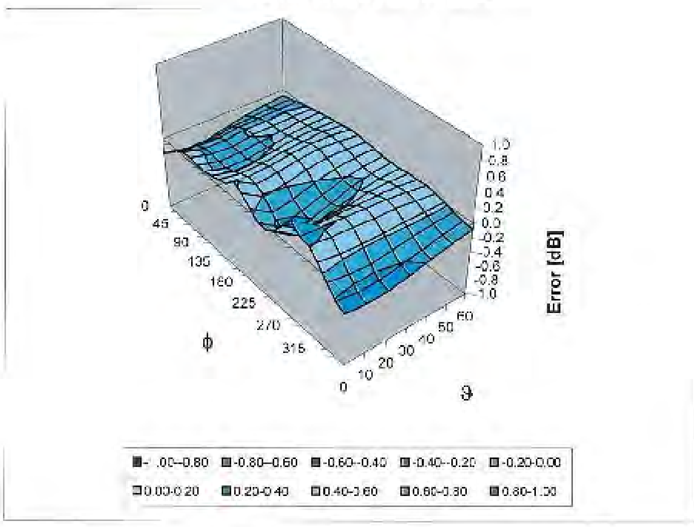
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: ET3-1558_Aug10 Page 10 of 11

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

3 Calibration report "Probe ET3DV6"

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

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Accreditation No.: SCS 108

Client **Cetecom**

Certificate No: **ET3-1559_Jan11**

CALIBRATION CERTIFICATE

Object: ET3DV6 - SN:1559

Calibration procedure(s): QA CAL-01.v7, QA CAL-12.v6, QA CAL-23.v4 and QA CAL-25.v3
Calibration procedure for dosimetric E-field probes

Calibration date: January 19, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: January 20, 2011

Certificate No: ET3-1559_Jan11 Page 1 of 11

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

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003

b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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

Probe ET3DV6

SN:1559

Manufactured:	December 1, 2000
Last calibrated:	January 20, 2010
Recalibrated:	January 19, 2011

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1559 January 19, 2011

DASY/EASY - Parameters of Probe: ET3DV6 SN:1559

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m)^2)[A]	1.79	1.59	1.64	± 10.1%
DCP (mV)[B]	96.9	97.6	96.3	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	132.1	± 2.9 %
			Y	0.00	0.00	1.00	137.8	
			Z	0.00	0.00	1.00	128.3	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

[E] Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

Certificate No: ET3-1559_Jan11 Page 4 of 11

ET3DV6 SN:1559 January 19, 2011

DASY/EASY - Parameters of Probe: ET3DV6 SN:1559

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth	Unc (k=2)
450	± 50 / ± 100	43.5 ± 5%	0.87 ± 5%	7.39	7.39	7.39	0.18	2.07	± 13.3%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.33	6.33	6.33	0.25	3.00	± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	6.20	6.20	6.20	0.26	3.00	± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	5.28	5.28	5.28	0.79	1.69	± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.02	5.02	5.02	0.79	1.60	± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.38	4.38	4.38	0.79	2.02	± 11.0%

[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.

ET3DV6 SN:1559 January 19, 2011

DASY/EASY - Parameters of Probe: ET3DV6 SN:1559

Calibration Parameter Determined in Body Tissue Simulating Media

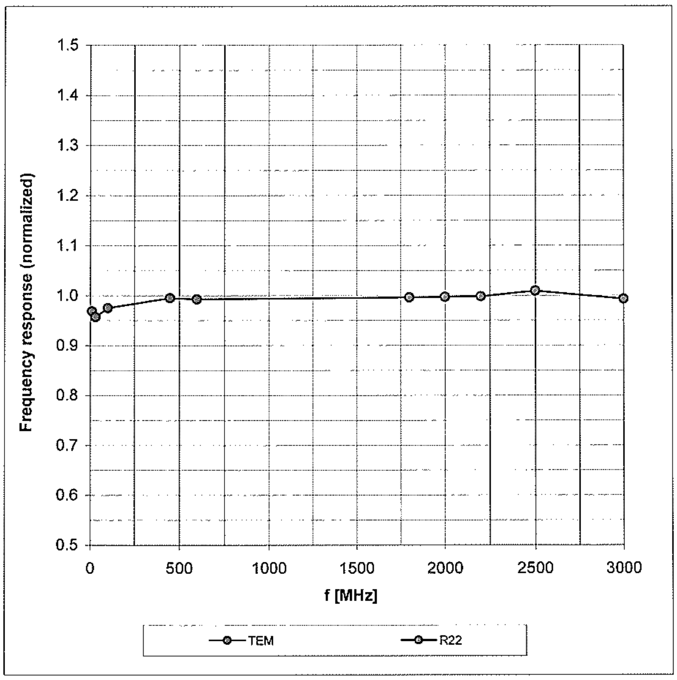
f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth	Unc (k=2)
450	± 50 / ± 100	56.7 ± 5%	0.94 ± 5%	7.73	7.73	7.73	0.12	2.07	± 13.3%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	6.22	6.22	6.22	0.25	2.98	± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	6.10	6.10	6.10	0.29	2.87	± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	4.68	4.68	4.68	0.79	2.39	± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.40	4.40	4.40	0.79	2.32	± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	3.91	3.91	3.91	0.70	3.00	± 11.0%

[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.

ET3DV6 SN:1559 January 19, 2011

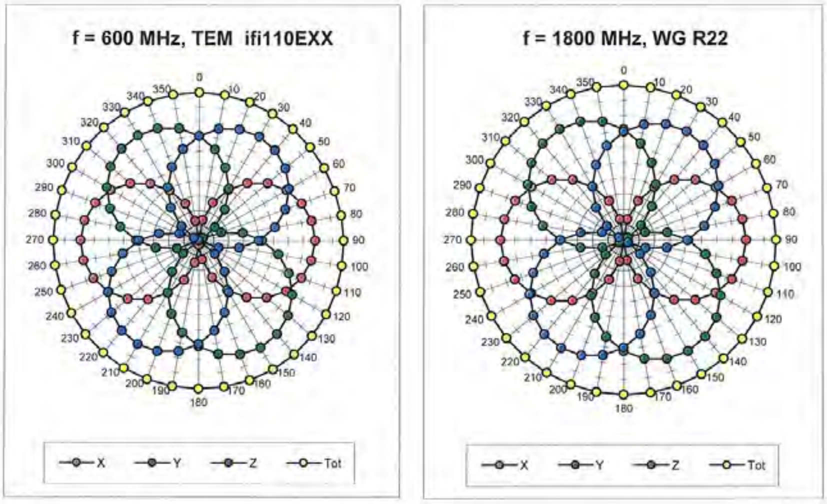
Frequency Response of E-Field

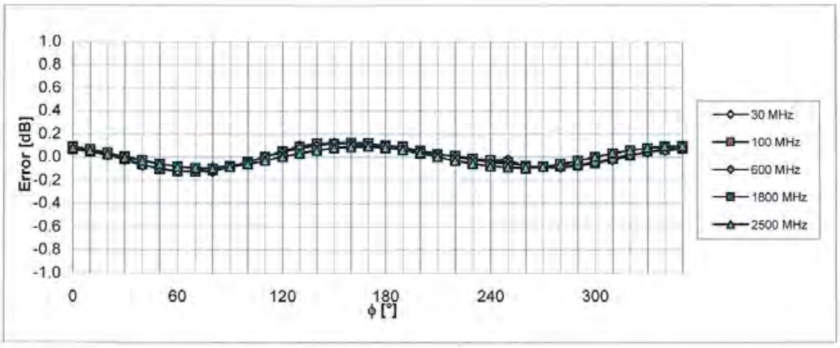
(TEM-Cell:ifi110 EXX, Waveguide: R22)



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

Receiving Pattern (φ), ϑ = 0°



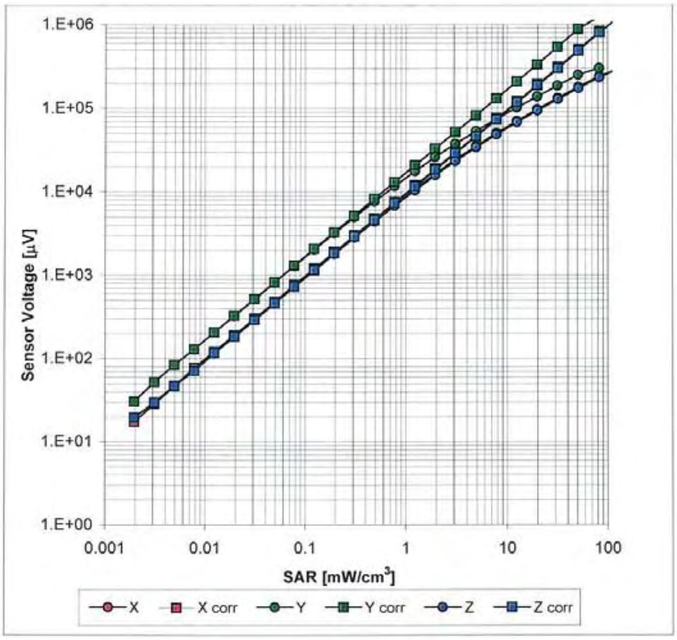


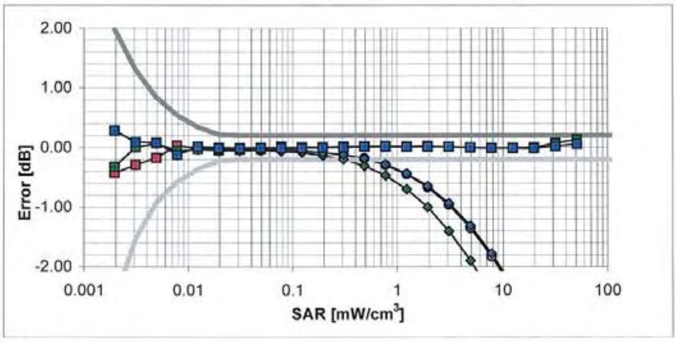
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ET3DV6 SN:1559 January 19, 2011

Dynamic Range f(SAR_{head})

(TEM cell, f = 900 MHz)



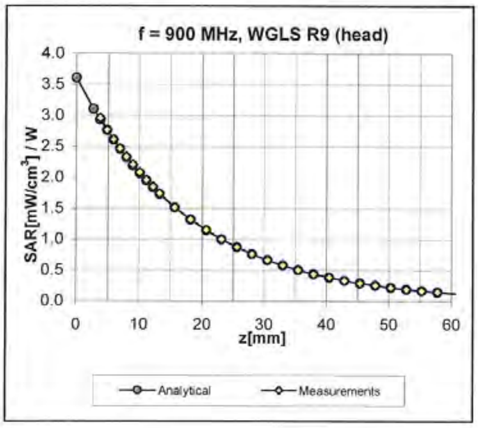


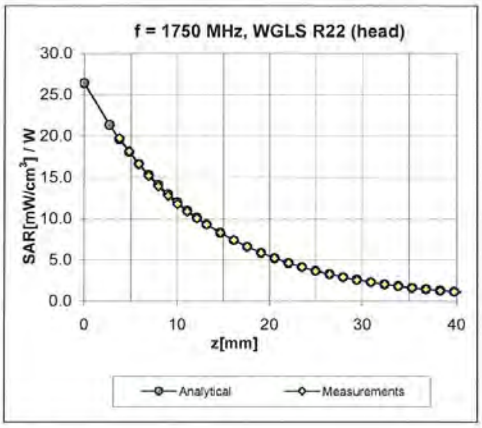
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: ET3-1559_Jan11 Page 9 of 11

ET3DV6 SN:1559 January 19, 2011

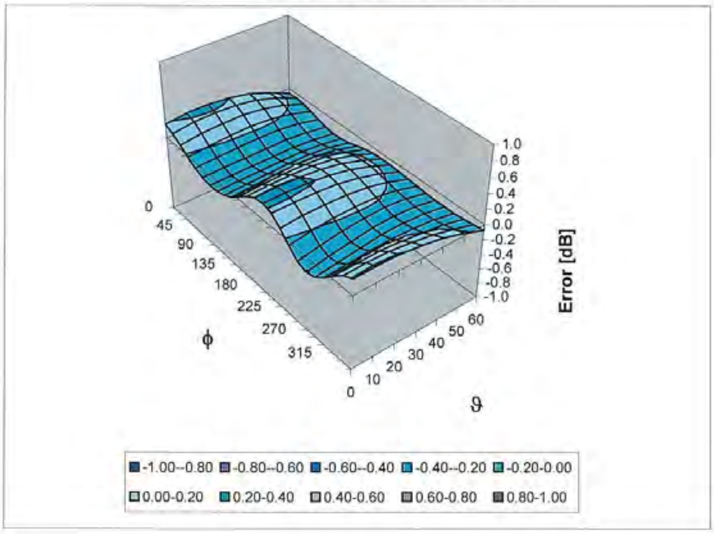
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: ET3-1559_Jan11 Page 10 of 11

ET3DV6 SN:1559 January 19, 2011

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	3.7 mm

4 Calibration report "900 MHz System validation dipole"

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

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Accreditation No.: **SCS 108**

Client **Cetecom**

Certificate No: **D900V2-102_Aug10**

CALIBRATION CERTIFICATE

Object	D900V2 - SN: 102
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	August 16, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: August 19, 2010

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

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.2 °C	41.5	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.2 ± 6 %	0.97 mho/m ± 6 %
Head TSL temperature during test	(21.9 ± 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	2.80 mW / g
SAR normalized	normalized to 1W	11.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**11.2 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.79 mW / g
SAR normalized	normalized to 1W	7.16 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**7.15 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	1.07 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	2.88 mW / g
SAR normalized	normalized to 1W	11.5 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**11.3 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.85 mW / g
SAR normalized	normalized to 1W	7.40 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**7.31 mW / g ± 16.5 % (k=2)**

Certificate No: D900V2-102_Aug10 Page 4 of 9

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.9 Ω - 4.5 jΩ
Return Loss	- 26.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω - 6.1 jΩ
Return Loss	- 22.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.393 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 24, 2001

Certificate No: D900V2-102_Aug10 Page 5 of 9

DASY5 Validation Report for Head TSL

Date/Time: 09.08.2010 15:19:24

Test Laboratory: SPEAG, Zurich, Switzerland

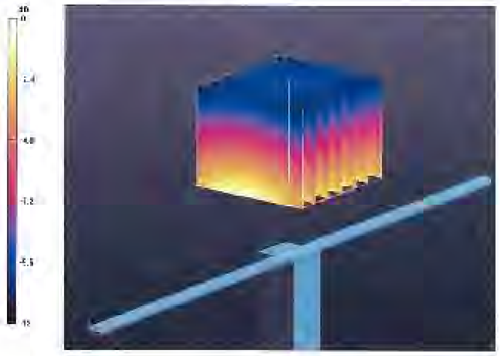
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:102

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: HSL900
Medium parameters used: f = 900 MHz; σ = 0.97 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.88, 5.88, 5.88); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

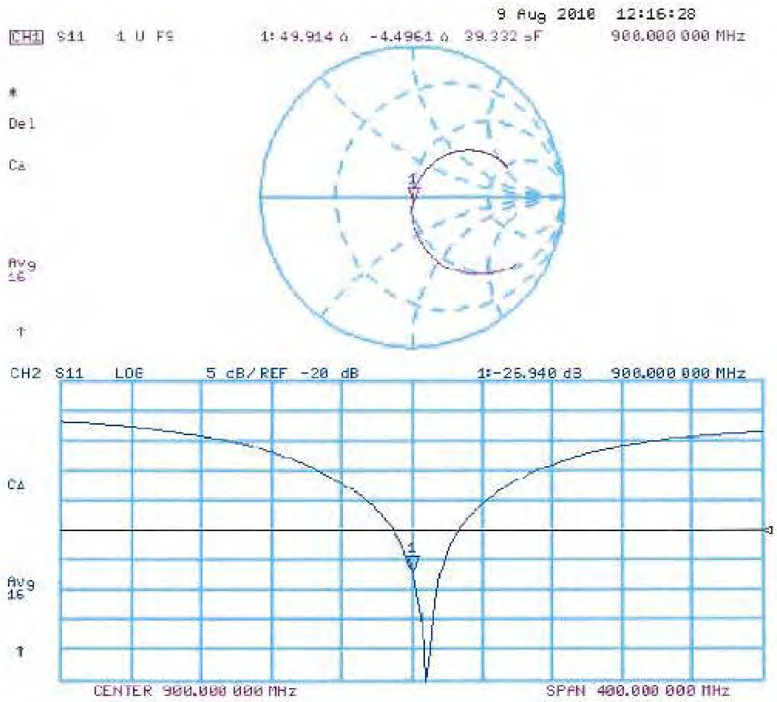
Head/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe) 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.1 V/m; Power Drift = 0.00742 dB
Peak SAR (extrapolated) = 4.27 W/kg
SAR(1 g) = 2.8 mW/g; SAR(10 g) = 1.79 mW/g
Maximum value of SAR (measured) = 3.3 mW/g



0 dB = 3.3mW/g

Certificate No: D900V2-102_Aug10 Page 6 of 9

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body

Date/Time: 16.08.2010 13:40:10

Test Laboratory: SPEAG, Zurich, Switzerland

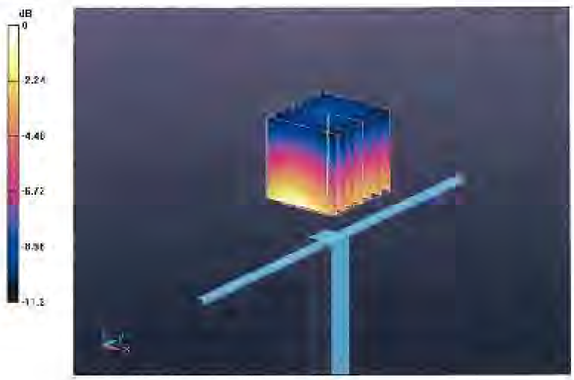
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:102

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: M900
Medium parameters used: f = 900 MHz; σ = 1.07 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.81, 5.81, 5.81); Calibrated: 30.04.2010
- Sensor Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

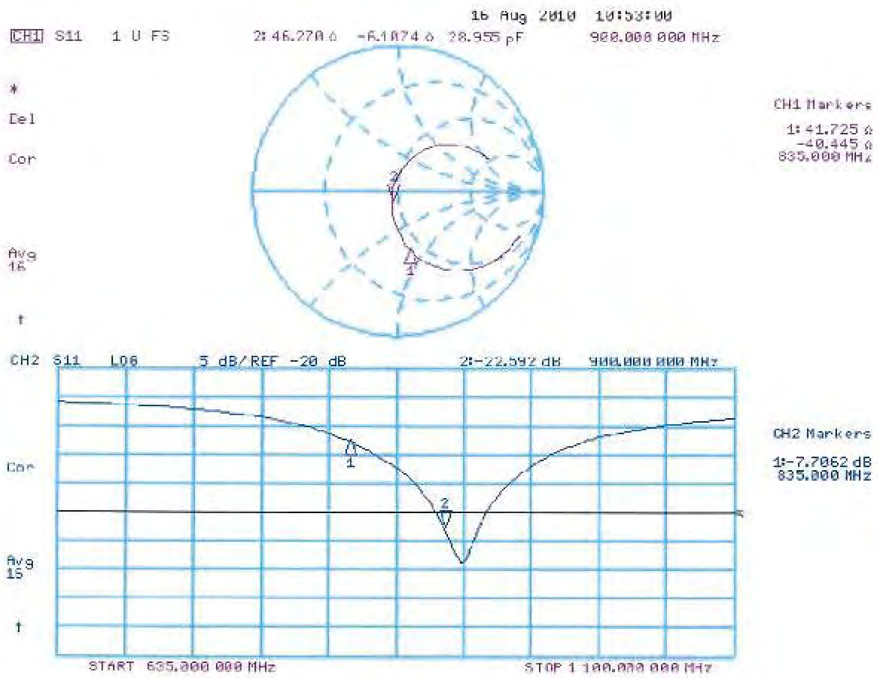
Body/d=15mm, Pin250 mW, dist=3.0mm (ES-Probe) 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.6 V/m; Power Drift = 0.034 dB
Peak SAR (extrapolated) = 4.33 W/kg
SAR(1 g) = 2.88 mW/g; SAR(10 g) = 1.85 mW/g
Maximum value of SAR (measured) = 3.34 mW/g



0 dB = 3.34mW/g

Certificate No: D900V2-102_Aug10 Page 8 of 9

Impedance Measurement Plot for Body TSL



Certificate No: D900V2-102_Aug10 Page 9 of 9

5 Calibration report “1900 MHz System validation dipole”

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

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client: Cetecom

Certificate No: D1900V2-5d009_Aug10

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d009
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	August 17, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: August 18, 2010

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Certificate No: D1900V2-5d009_Aug10 Page 1 of 9

Calibration Laboratory of
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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003

b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.3 ± 6 %	1.45 mho/m ± 6 %
Head TSL temperature during test	(22.1 ± 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	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**40.0 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.9 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.9 ± 6 %	1.53 mho/m ± 6 %
Body TSL temperature during test	(21.9 ± 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	10.5 mW / g
SAR normalized	normalized to 1W	42.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**41.8 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.68 mW / g
SAR normalized	normalized to 1W	22.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**22.6 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.3 Ω + 2.4 jΩ
Return Loss	- 32.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.1 Ω + 3.0 jΩ
Return Loss	- 27.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.161 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	February 22, 2002

DASY5 Validation Report for Head TSL

Date/Time: 10.08.2010 13:43:32

Test Laboratory: SPEAG, Zurich, Switzerland

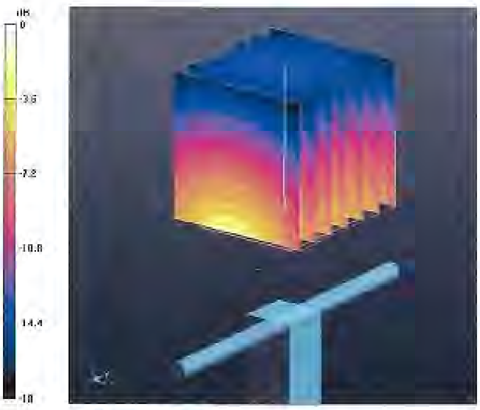
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d009

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 1900 MHz; σ = 1.43 mho/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

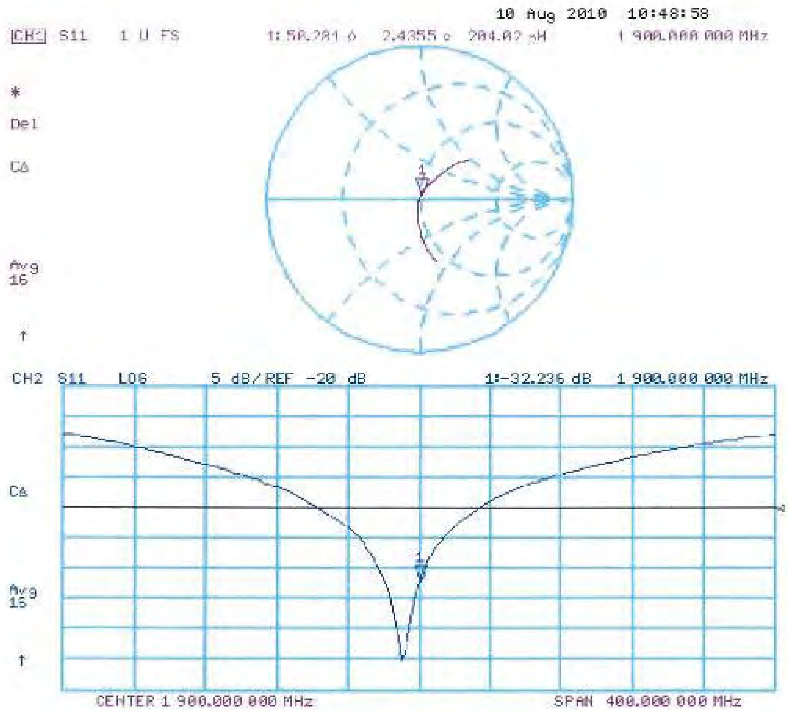
Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.3 V/m; Power Drift = 0.027 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.26 mW/g
Maximum value of SAR (measured) = 12.6 mW/g



0 dB = 12.6mW/g

Certificate No: D1900V2-5d009_Aug10 Page 6 of 9

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body

Date/Time: 17.08.2010 15:54:28

Test Laboratory: SPEAG, Zurich, Switzerland

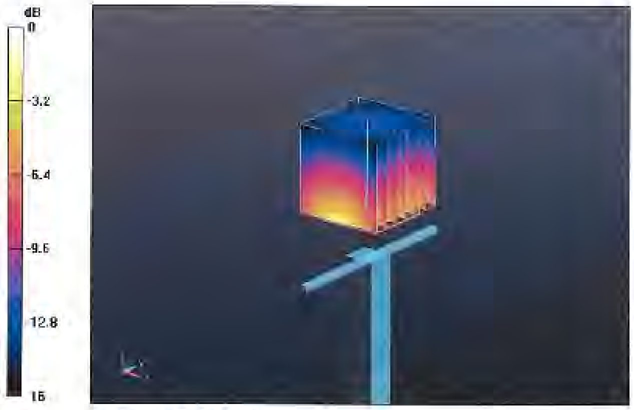
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d009

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL U11 BB
Medium parameters used: f = 1900 MHz; σ = 1.53 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

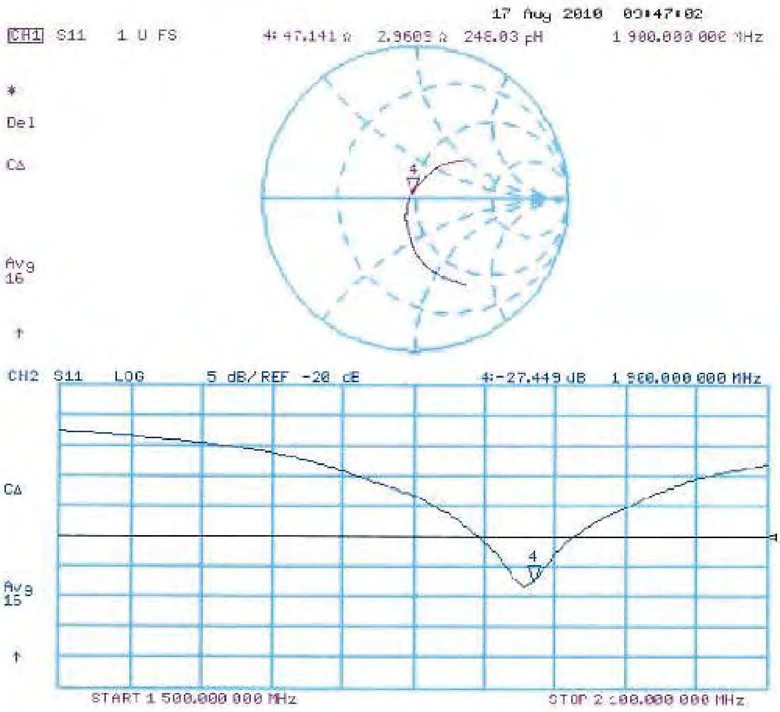
Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.2 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 17.4 W/kg
SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.68 mW/g
Maximum value of SAR (measured) = 13.3 mW/g



0 dB = 13.3mW/g

Certificate No: D1900V2-5d009_Aug10 Page 8 of 9

Impedance Measurement Plot for Body TSL



Certificate No: D1900V2-5d009_Aug10 Page 9 of 9

6 Calibration report “2450 MHz System validation dipole”

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

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Accreditation No.: **SCS 108**

Client Cetecom

Certificate No: D2450V2-710_Aug10

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 710
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	August 19, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

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

Issued: August 19, 2010

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Certificate No: D2450V2-710_Aug10 Page 1 of 9

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.2 ± 6 %	1.77 mho/m ± 6 %
Head TSL temperature during test	(22.6 ± 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	12.8 mW / g
SAR normalized	normalized to 1W	51.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**51.6 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.03 mW / g
SAR normalized	normalized to 1W	24.1 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.2 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.3 ± 6 %	1.95 mho/m ± 6 %
Body TSL temperature during test	(22.5 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.6 mW / g
SAR normalized	normalized to 1W	54.4 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**54.4 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.47 mW / g
SAR normalized	normalized to 1W	25.9 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**25.9 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.0 Ω - 0.4 jΩ
Return Loss	- 30.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω + 1.3 jΩ
Return Loss	- 34.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.129 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	July 05, 2002

DASY5 Validation Report for Head TSL

Date/Time: 11.08.2010 13:11:39

Test Laboratory: SPEAG, Zurich, Switzerland

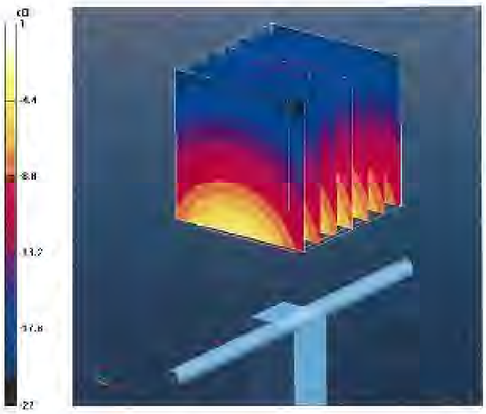
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:710

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 2450 MHz; σ = 1.77 mho/m; ε_r = 39.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

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

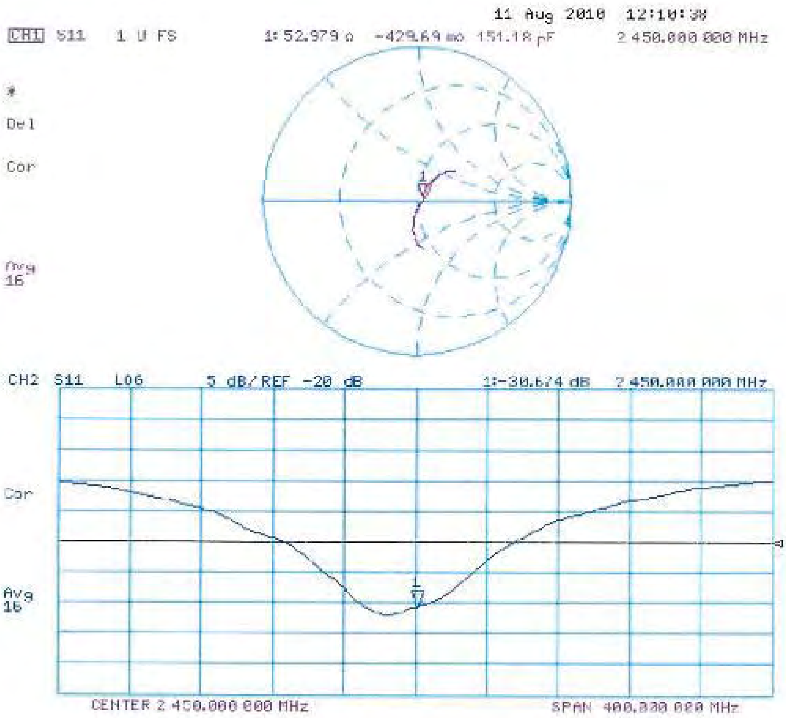
Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.3 V/m; Power Drift = 0.035 dB
Peak SAR (extrapolated) = 26 W/kg
SAR(1 g) = 12.8 mW/g; SAR(10 g) = 6.03 mW/g
Maximum value of SAR (measured) = 16.5 mW/g



0 dB = 16.5mW/g

Certificate No: D2450V2-710_Aug10 Page 6 of 9

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body

Date/Time: 19.08.2010 10:18:08

Test Laboratory: SPEAG, Zurich, Switzerland

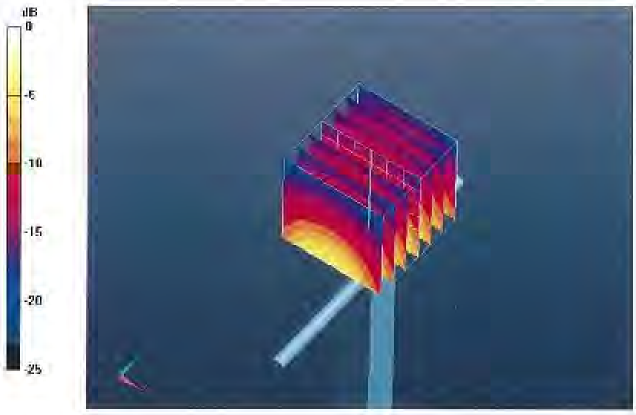
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:710

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: MSL U11 BB
Medium parameters used: f = 2450 MHz; σ = 1.94 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

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

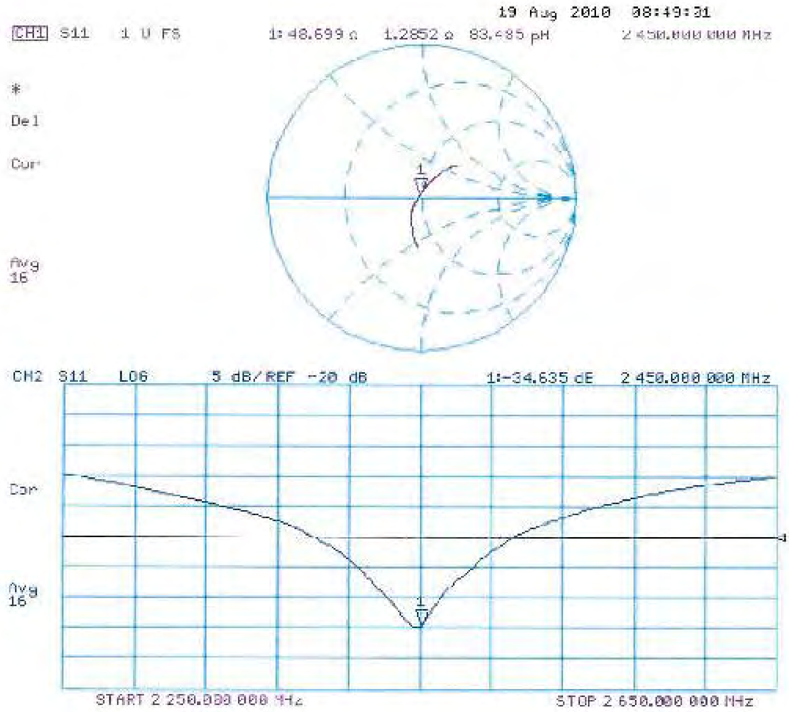
Pin250 mW/d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.5 V/m; Power Drift = -0.00803 dB
Peak SAR (extrapolated) = 28.1 W/kg
SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.47 mW/g
Maximum value of SAR (measured) = 17.9 mW/g



0 dB = 17.9mW/g

Certificate No: D2450V2-710_Aug10 Page 8 of 9

Impedance Measurement Plot for Body TSL



Certificate No: D2450V2-710_Aug10 Page 9 of 9

7 Calibration certificate of Data Acquisition Unit (DAE)

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Client **Cetecom**

Certificate No: **DAE3-413_Jan11**

CALIBRATION CERTIFICATE

Object	DAE3 - SD 000 D03 AA - SN: 413
Calibration procedure(s)	QA CAL-06.v22 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	January 13, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

	Name	Function	Signature
Calibrated by:	Andrea Guntli	Technician	[signature]
Approved by:	Fin Bomholt	R&D Director	i.V. [signature]

Issued: January 13, 2011

8 Calibration certificate of Data Acquisition Unit (DAE)

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: SCS 108

Client Cetecom

Certificate No: DAE3-477_May11

CALIBRATION CERTIFICATE

Object: DAE3 - SD 000 D03 AA - SN: 477

Calibration procedure(s): QA CAL-06.v22
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: May 4, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	[signature]
Approved by:	Fin Bomholt	R&D Director	i.V. [signature]

Issued: May 4, 2011

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

Certificate No: DAE3-477_May11 Page 1 of 5

9 Certificate of "SAM Twin Phantom V4.0/V4.0C"

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 18.11.2001

Signature / Stamp

Schmid & Partner
Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

Doc No 881 – QD 000 P40 BA – B Page 1 (1)

10 Application Note System Performance Check

10.1 Purpose of system performance check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check is performed prior to any usage of the system in order to guarantee reproducible results.
The measurement of the Specific Absorption Rate (SAR) is a complicated task and the result depends on the proper functioning of many components and the correct settings of many parameters. Faulty results due to drift, failures or incorrect parameters might not be recognized, since they often look similar in distribution to the correct ones. The Dosimetric Assessment System DASY4 incorporates a system performance check procedure to test the proper functioning of the system. The system performance check uses normal SAR measurements in a simplified setup (the flat section of the SAM Twin Phantom) with a well characterized source (a matched dipole at a specified distance). This setup was selected to give a high sensitivity to all parameters that might fail or vary over time (e.g., probe, liquid parameters, and software settings) and a low sensitivity to external effects inherent in the system (e.g., positioning uncertainty of the device holder). The system performance check does not replace the calibration of the components. The accuracy of the system performance check is not sufficient for calibration purposes. It is possible to calculate the field quite accurately in this simple setup; however, due to the open field situation some factors (e.g., laboratory reflections) cannot be accounted for. Calibrations in the flat phantom are possible with transfer calibration methods, using either temperature probes or calibrated E-field probes. The system performance check also does not test the system performance for arbitrary field situations encountered during real measurements of mobile phones. These checks are performed at SPEAG by testing the components under various conditions (e.g., spherical isotropy measurements in liquid, linearity measurements, temperature variations, etc.), the results of which are used for an error estimation of the system. The system performance check will indicate situations where the system uncertainty is exceeded due to drift or failure.

10.2 System Performance check procedure

Preparation

The conductivity should be measured before the validation and the measured liquid parameters must be entered in the software. If the measured values differ from targeted values in the dipole document, the liquid composition should be adjusted. If the validation is performed with slightly different (measured) liquid parameters, the expected SAR will also be different. See the application note about SAR sensitivities for an estimate of possible SAR deviations. Note that the liquid parameters are temperature dependent with approximately – 0.5% decrease in permittivity and + 1% increase in conductivity for a temperature decrease of 1° C. The dipole must be placed beneath the flat phantom section of the Generic Twin Phantom with the correct distance holder in place. The distance holder should touch the phantom surface with a light pressure at the reference marking (little hole) and be oriented parallel to the long side of the phantom. Accurate positioning is not necessary, since the system will search for the peak SAR location, except that the dipole arms should be parallel to the surface. The device holder for mobile phones can be left in place but should be rotated away from the dipole. The forward power into the dipole at the dipole SMA connector should be determined as accurately as possible. See section 4 for a description of the recommended setup to measure the dipole input power. The actual dipole input power level can be between 20mW and several watts. The result can later be normalized to any power level. It is strongly recommended to note the actually used power level in the „comment"-window of the measurement file; otherwise you loose this crucial information for later reference.

System Performance Check

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, so you must save the finished validation under a different name. The validation document requires the Generic Twin Phantom, so this phantom must be properly installed in your system. (You can create your own measurement procedures by opening a new document or editing an existing document file). Before you start the validation, you just have to tell the system with which components (probe, medium, and device) you are performing the validation; the system will take care of all parameters. After the validation, which will take about 20 minutes, the results of each task are displayed in the document window. Selecting all measured tasks and opening the predefined "validation" graphic format displays all necessary information for validation. A description of the different measurement tasks in the predefined document is given below, together with the information that can be deduced from their results:

- 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 amplifier output power. If it is too high (above ± 0.1dB) the validation should be repeated; some amplifiers have very high drift during warm-up. A stable amplifier gives drift results in the DASY4 system below ± 0.02 dB.
- 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 ± 0.1mm). In that case it is better to abort the validation and stir the liquid. 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 ± 30°.) However, varying breaking indices of different liquid compositions might also influence the distance. If the indicated difference varies from the actual setting, the probe parameter „optical surface distance" should be changed in the probe settings (see manual). For more information see the application note about SAR evaluation.
- The „area scan" measures the SAR above the 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 proposed scan uses large grid spacing for faster measurement; due to the symmetric field the peak detection is reliable. 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 (for more information see the application note on SAR evaluation).

If the validation measurements give reasonable results, the peak 1g and 10g spatial SAR values averaged between the two cubes and normalized to 1W dipole input power give the reference data for comparisons. The next section analyzes the expected uncertainties of these values. Section 6 describes some additional checks for further information or troubleshooting.

10.3 Uncertainty Budget

Please note that in the following Tables, the tolerance of the following uncertainty components depends on the actual equipment and setup at the user location and need to be either assessed or verified on-site by the end user of the DASY4 system:

- RF ambient conditions
- Dipole Axis to Liquid Distance
- Input power and SAR drift measurement
- Liquid permittivity - measurement uncertainty
- Liquid conductivity - measurement uncertainty

Note: All errors are given in percent of SAR, so 0.1 dB corresponds to 2.3%. The field error would be half of that. The liquid parameter assessment give the targeted values from the dipole document. All errors are given in percent of SAR, so 0.1dB corresponds to 2.3%. The field error would be half of that.

System validation

In the table below, the system validation uncertainty with respect to the analytically assessed SAR value of a dipole source as given in the P1528 standard is given. This uncertainty is smaller than the expected uncertainty for mobile phone measurements due to the simplified setup and the symmetric field distribution.

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

Performance check repeatability

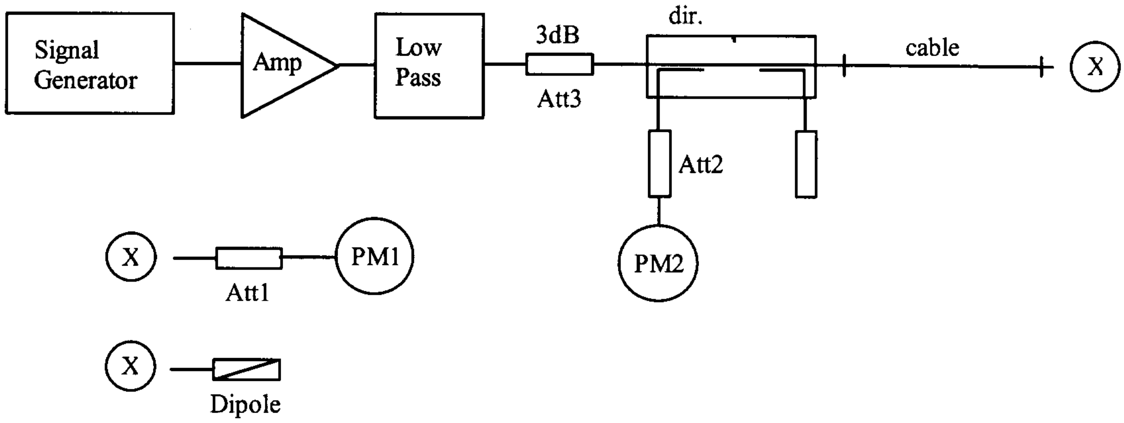
The repeatability check of the validation is insensitive to external effects and gives an indication of the variations in the DASY4 measurement system, provided that the same power reading setup is used for all validations. The repeatability estimate is given in the following table:

Error Sources	Uncertainty Value	Probability Distribution	Divi-sor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty 10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	± 4.8%	Normal	1	1	1	0	0	∞
Axial isotropy	± 4.7%	Rectangular	√3	0.7	0.7	0	0	∞
Hemispherical isotropy	± 0.0%	Rectangular	√3	0.7	0.7	0	0	∞
Boundary effects	± 1.0%	Rectangular	√3	1	1	0	0	∞
Probe linearity	± 4.7%	Rectangular	√3	1	1	0	0	∞
System detection limits	± 1.0%	Rectangular	√3	1	1	0	0	∞
Readout electronics	± 1.0%	Normal	1	1	1	0	0	∞
Response time	± 0.0%	Rectangular	√3	1	1	0	0	∞
Integration time	± 0.0%	Rectangular	√3	1	1	0	0	∞
RF ambient conditions	± 3.0%	Rectangular	√3	1	1	0	0	∞
Probe positioner	± 0.4%	Rectangular	√3	1	1	0	0	∞
Probe positioning	± 2.9%	Rectangular	√3	1	1	0	0	∞
Max. SAR evaluation	± 1.0%	Rectangular	√3	1	1	0	0	∞
Test Sample Related								
Dipole axis to liquid distance	± 2.0%	Normal	1	1	1	± 1.2%	± 1.2%	∞
Power drift	± 4.7%	Rectangular	√3	1	1	± 2.7%	± 2.7%	∞
Phantom and Set-up								
Phantom uncertainty	± 4.0%	Rectangular	√3	1	1	± 2.3%	± 2.3%	∞
Liquid conductivity (target)	± 5.0%	Rectangular	√3	0.64	0.43	± 1.8%	± 1.2%	∞
Liquid conductivity (meas.)	± 2.5%	Normal	1	0.64	0.43	± 1.6%	± 1.1%	∞
Liquid permittivity (target)	± 5.0%	Rectangular	√3	0.6	0.49	± 1.7%	± 1.4%	∞
Liquid permittivity (meas.)	± 2.5%	Normal	1	0.6	0.49	± 1.5%	± 1.2%	∞
Combined Uncertainty						± 5.3%	± 4.9%	
Expanded Std. Uncertainty						± 10.6%	± 9.7%	

The expected repeatability deviation is low. Excessive drift (e.g., drift in liquid parameters), partial system failures or incorrect parameter settings (e.g., wrong probe or device settings) will lead to unexpectedly high repeatability deviations. The repeatability gives an indication that the system operates within its initial specifications. Excessive drift, system failure and operator errors are easily detected.

10.4 Power set-up for validation

The uncertainty of the dipole input power is a significant contribution to the absolute uncertainty and the expected deviation in interlaboratory comparisons. The values in Section 2 for a typical and a sophisticated setup are just average values. Refer to the manual of the power meter and the detector head for the evaluation of the uncertainty in your system. The uncertainty also depends on the source matching and the general setup. Below follows the description of a recommended setup and procedures to increase the accuracy of the power reading:



The figure shows the recommended setup. The PM1 (incl. Att1) measures the forward power at the location of the validation dipole connector. The signal generator is adjusted for the desired forward power at the dipole connector and the power meter PM2 is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2. If the signal generator does not allow a setting in 0.01dB steps, the remaining difference at PM2 must be noted and considered in the normalization of the validation results. The requirements for the components are:

- The signal generator and amplifier should be stable (after warm-up). The forward power to the dipole should be above 10mW to avoid the influence of measurement noise. If the signal generator can deliver 15dBm or more, an amplifier is not necessary. Some high power amplifiers should not be operated at a level far below their maximum output power level (e.g. a 100W power amplifier operated at 250mW output can be quite noisy). An attenuator between the signal generator and amplifier is recommended to protect the amplifier input.
- The low pass filter after the amplifier reduces the effect of harmonics and noise from the amplifier. For most amplifiers in normal operation the filter is not necessary.
- The attenuator after the amplifier improves the source matching and the accuracy of the power head. (See power meter manual.) It can also be used also to make the amplifier operate at its optimal output level for noise and stability. In a setup without directional coupler, this attenuator should be at least 10dB.
- The directional coupler (recommended ^{3} 20dB) is used to monitor the forward power and adjust the signal generator output for constant forward power. A medium quality coupler is sufficient because the loads (dipole and power head) are well matched. (If the setup is used for reflective loads, a high quality coupler with respect to directivity and output matching is necessary to avoid additional errors.)
- The power meter PM2 should have a low drift and a resolution of 0.01dBm, but otherwise its accuracy has no impact on the power setting. Calibration is not required.
- The cable between the coupler and dipole must be of high quality, without large attenuation and phase changes when it is moved. Otherwise, the power meter head PM1 should be brought to the location of the dipole for measuring.
- The power meter PM1 and attenuator Att1 must be high quality components. They should be calibrated, preferably together. The attenuator (^{3}10dB) improves the accuracy of the power reading. (Some higher power heads come with a built-in calibrated attenuator.) The exact attenuation of the attenuator at the frequency used must be known; many attenuators are up to 0.2dB off from the specified value.

- Use the same power level for the power setup with power meter PM1 as for the actual measurement to avoid linearity and range switching errors in the power meter PM2. If the validation is performed at various power levels, do the power setting procedure at each level.
- The dipole must be connected directly to the cable at location “X”. If the power meter has a different connector system, use high quality couplers. Preferably, use the couplers at the attenuator Att1 and calibrate the attenuator with the coupler.
- Always remember: We are measuring power, so 1% is equivalent to 0.04dB.

10.5 Laboratory reflection

In near-field situations, the absorption is predominantly caused by induction effects from the magnetic near-field. The absorption from reflected fields in the laboratory is negligible. On the other hand, the magnetic field around the dipole depends on the currents and therefore on the feed point impedance. The feed point impedance of the dipole is mainly determined from the proximity of the absorbing phantom, but reflections in the laboratory can change the impedance slightly. A 1% increase in the real part of the feed point impedance will produce approximately a 1% decrease in the SAR for the same forward power. The possible influence of laboratory reflections should be investigated during installation. The validation setup is suitable for this check, since the validation is sensitive to laboratory reflections. The same tests can be performed with a mobile phone, but most phones are less sensitive to reflections due to the shorter distance to the phantom. The fastest way to check for reflection effects is to position the probe in the phantom above the feed point and start a continuous field measurement in the DASY4 multi-meter window. Placing absorbers in front of possible reflectors (e.g. on the ground near the dipole or in front of a metallic robot socket) will reveal their influence immediately. A 10dB absorber (e.g. ferrite tiles or flat absorber mats) is probably sufficient, as the influence of the reflections is small anyway. If you place the absorber too near the dipole, the absorber itself will interact with the reactive near-field. Instead of measuring the SAR, it is also possible to monitor the dipole impedance with a network analyzer for reflection effects. The network analyzer must be calibrated at the SMA connector and the electrical delay (two times the forward delay in the dipole document) must be set in the NWA for comparisons with the reflection data in the dipole document. If the absorber has a significant influence on the results, the absorber should be left in place for validation or measurements. The reference data in the dipole document are produced in a low reflection environment.

10.6 Additional system checks

While the validation gives a good check of the DASY4 system components, it does not include all parameters necessary for real phone measurements (e.g. device modulation or device positioning). For system validation (repeatability) or comparisons between laboratories a reference device can be useful. This can be any mobile phone with a stable output power (preferably a device whose output power can be set through the keyboard). For comparisons, the same device should be sent around, since the SAR variations between samples can be large. Several measurement possibilities in the DASY software allow additional tests of the performance of the DASY system and components. These tests can be useful to localize component failures:

- The validation can be performed at different power levels to check the noise level or the correct compensation of the diode compression in the probe.
- If a pulsed signal with high peak power levels is fed to the dipole, the performance of the diode compression compensation can be tested. The correct crest factor parameter in the DASY software must be set (see manual). The system should give the same SAR output for the same averaged input power.
- The probe isotropy can be checked with a 1D-probe rotation scan above the feed point. The automatic probe alignment procedure must be passed through for accurate probe rotation movements (optional DASY4 feature with a robot-mounted light beam unit). Otherwise the probe tip might move on a small circle during rotation, producing some additional isotropy errors in gradient fields.