Accredited testing laboratory

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

Test report no.	**: 4-2756-01-02/07**
Type identification	**: GE0307**
Test specification	**: IEEE P1528/D1.2**
FCC-ID	**: NCMOGE0307**

Table of Contents

1 General Information

1.1 Notes

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

1.1.1 Statement of Compliance

The SAR values found for the GE0307 PCI Express Card in WCDMA band IV (AWS) are below the maximum recommended levels of 1.6 W/Kg as averaged over any 1 g tissue according to the FCC rule §2.1093, the ANSI/IEEE C 95.1:1999, the NCRP Report Number 86 for uncontrolled environment, according to the Health Canada's Safety Code 6 and the Industry Canada Radio Standards Specification RSS-102 for General Population/Uncontrolled exposure.
For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used inside notebook computers that offer at least 11 mm distance to the body. Smaller distances may not ensure compliance with FCC RF exposure guidelines.
The measurement together with the test system set-up is described in chapter 2.3 of this test report. A detailed description of the equipment under test can be found in chapter 1.5.

Test engineer:

2007-09-03	**Thomas Vogler**	Thomas Vogler
Date	Name	Signature

Technical responsibility for area of testing:

2007-09-03	**Fabien Coulet**	Coulet
Date	Name	Signature

1.2 Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Straße 6-10,
66117 Saarbruecken
Germany
Telephone: + 49 681 598 - 0
Fax: + 49 681 598 - 8475

e-mail: info@ict.cetecom.de
Internet: http://www.cetecom-ict.de

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

Test location, if different from CETECOM ICT Services GmbH

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

1.3 Details of applicant

Name: Option N.V.

Street: Gaston Geenslaan 14
Town: 3001 Leuven
Country: Belgium

Contact: Mr. Joeri Boeckx
Telephone: +32 16 317 411

1.4 Application details

Date of receipt of application:	2007-08-29
Date of receipt of test item:	2007-08-29
Start/Date of test:	2007-08-29
End of test:	
Person(s) present during the test:	Mr. Joeri Boeckx

1.5 Test item

Description of the test item: PCI Express Card
Type identification: GE0307
FCC-ID : NCMOGE0307
Serial number: EW4476F00W
Manufacturer:
Name: Option N.V.
Street: Gaston Geenslaan 14
Town: 3001 Leuven
Country: Belgium

additional information on the DUT:		
device type :	portable device	
IMEI No :	00440144056041-1	
exposure category:	uncontrolled environment / general population	
test device production information	identical prototype	
device operating configurations :		
operating mode(s)	GSM, DCS, PCS, UMTS (WCDMA/HSDPA)	
modulation	GMSK, 8-PSK; QPSK(dl), 2*BPSK/HPSK(ul)	
GPRS mobile station class :	B	
GPRS multislot class :	12	voice mode : ---
EGPRS multislot class	E2	voice mode : ---
maximum no. of timeslots in uplink:	4	
HSDPA UE-category	5	
HSUPA UE-category	8	
operating frequency range(s)	transmitter frequency range	receiver frequency range
PCS 1900 :	1850.2 MHz ~ 1909.8 MHz	1930.2 MHz ~ 1989.8 MHz
PCS 850 :	824.2 MHz ~ 848.8 MHz	869.2 MHz ~ 893.8 MHz
DCS 1800 :	1710 MHz ~ 1785 MHz	1805 MHz ~ 1880 MHz
GSM 900 :	880 MHz ~ 915 MHz	925 MHz ~ 960 MHz
UMTS 1950 (FDD I) :	1922.4 MHz ~ 1977.6 MHz	2112.4 MHz ~ 2167.6 MHz
UMTS 1700 (FDD IV) (tested) :	1712.4 MHz ~ 1752.6 MHz	2112.4 MHz ~ 2152.6 MHz
UMTS 850 (FDD V) :	826.4 MHz ~ 846.6 MHz	871.4 MHz ~ 891.6 MHz
Power class UMTS :	3, tested with maximum output power	
measured peak output power (conducted):	FDD band IV: 21.79 dBm avg.	
test channels (low – mid – high) :	1412 (FDD Band IV)	
hardware version:	4.0	
software version:	2.7.2Hd	
antenna type:	one integrated transmit antenna one external antenna for receive diversity	
accessories / body-worn configurations:	1st Laptop – Acer TravelMate 4260 series 2nd Laptop – Fujitsu Siemens Amilo Pro V3205 3rd Laptop – HP Compaq nc 6320	

1.6 Test specification(s)

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

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

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

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

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

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

1.6.1 RF exposure limits

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

Table 1: RF exposure limits

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

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

** The Spatial Average value of the SAR averaged over the whole body.

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

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

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

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.	☒
The deviations as specified in 2.5 were ascertained in the course of the tests performed.	☐

2.2 Test environment

General Environment conditions in the test area are as follows:

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

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

2.3 Measurement and test set-up

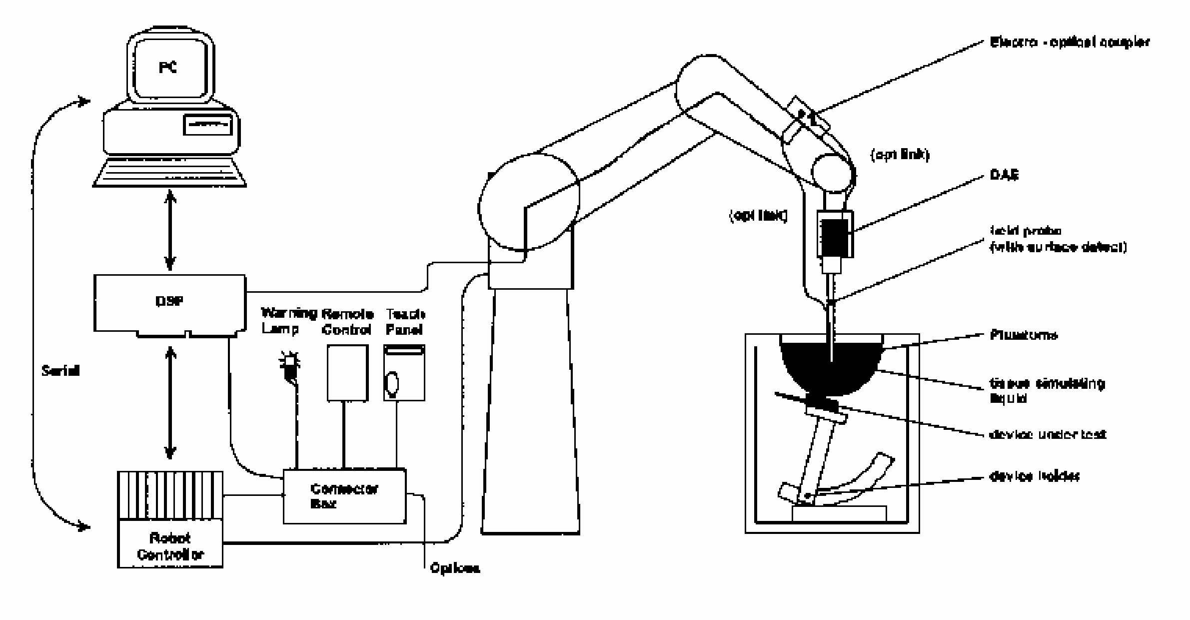
The measurement system is described in chapter 2.4.

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

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

2.4 Measurement system

2.4.1 System Description



The 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.

2.4.2 Test environment

The DASY4 measurement system is placed at the head end of a room with dimensions:
5 x 2.5 x 3 m³, the SAM phantom is placed in a distance of 75 cm from the side walls and 1.1m from the rear wall. Above the test system a 1.5 x 1.5 m² array of pyramid absorbers is installed to reduce reflections from the ceiling.
Picture 1 of the photo documentation shows a complete view of the test environment.
The system allows the measurement of SAR values larger than 0.005 mW/g.

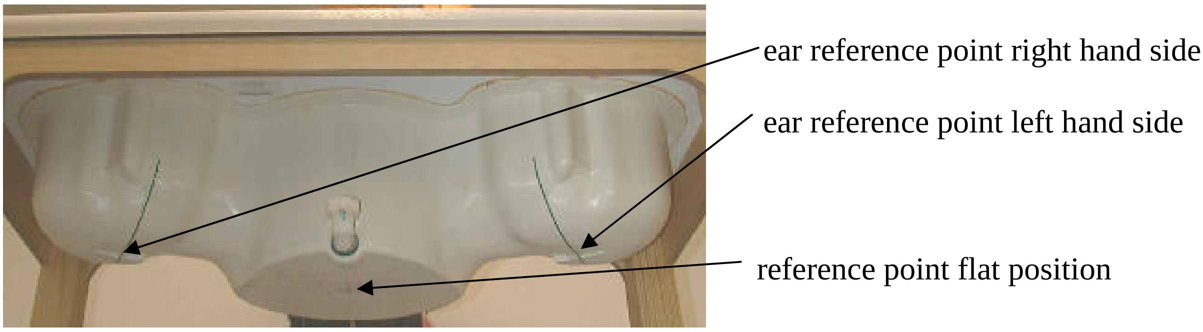
2.4.3 Probe description

Isotropic E-Field Probe ET3DV6 for Dosimetric Measurements

Technical data according to manufacturer information	
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., 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)

2.4.4 Phantom description

The used SAM Phantom meets the requirements specified in Edition 01-01 of Supplement C to OET Bulletin 65 for Specific Absorption Rate (SAR) measurements.
The phantom consists of a fibreglass shell integrated in a wooden table. It allows left-hand and right-hand head as well as body-worn measurements with a maximum liquid depth of 18 cm in head position and 22 cm in planar position (body measurements). The thickness of the Phantom shell is 2 mm +/- 0.1 mm.



2.4.5 Device holder description

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

Larger DUT’s (e.g. notebooks) cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values.
Therefore those devices are normally only tested at the flat part of the SAM.

2.4.6 Scanning procedure

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

- The „reference“ and „drift“ measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. +/- 5 %.

- The „surface check“ measurement tests the optical surface detection system of the DASY4 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 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 chapter 1.6.) are shown in table form in chapter 2.5.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2mm steps. This measurement shows the continuity of the liquid and can - depending in the field strength – also show the liquid depth. A z-axis scan of the measurement with maximum SAR value is shown in annex 2.

2.4.7 Spatial Peak SAR Evaluation

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

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting ‘Graph Evaluated’.

- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.

- All neighboring volumes are evaluated until no neighboring volume with a higher average value is found.

Extrapolation

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

Interpolation

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

Volume Averaging

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

Advanced Extrapolation

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

2.4.8 Data Storage and Evaluation

Data Storage

The DASY4 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

Data Evaluation by SEMCAD

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

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

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY4 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

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

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

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

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

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

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

2.4.9 Test equipment utilized

This table gives a complete overview of the SAR measurement equipment

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

	Manufacturer	Device	Type	Serial number	Date of last calibration)*
☒	Schmid & Partner Engineering AG	Dosimetric E-Field Probe	ET3DV6	1558	August 23, 2007
☐	Schmid & Partner Engineering AG	Dosimetric E-Field Probe	ET3DV6	1559	January 17, 2007
☐	Schmid & Partner Engineering AG	900 MHz System Validation Dipole	D900V2	102	August 23, 2007
☒	Schmid & Partner Engineering AG	1800 MHz System Validation Dipole	D1800V2	287	August 21, 2007
☐	Schmid & Partner Engineering AG	1900 MHz System Validation Dipole	D1900V2	5d009	August 21, 2007
☐	Schmid & Partner Engineering AG	2450 MHz System Validation Dipole	D2450V2	710	August 20, 2007
☒	Schmid & Partner Engineering AG	Data acquisition electronics	DAE3V1	413	January 18, 2007
☒	Schmid & Partner Engineering AG	Software	DASY 4 V4.5	---	N/A
☒	Schmid & Partner Engineering AG	Phantom	SAM	---	N/A
☒	Rohde & Schwarz	Universal Radio Communication Tester	CMU 200	106826	March 14, 2007
☒	Hewlett Packard)*	Network Analyser 300 kHz to 6 GHz	8753C	2937U00269	March 13, 2007
☒	Hewlett Packard)*	Network Analyser 300 kHz to 6 GHz	85047A	2936A00872	March 13, 2007
☒	Hewlett Packard	Dielectric Probe Kit	85070C	US99360146	N/A
☒	Hewlett Packard	Signal Generator	8665A	2833A00112	February 9, 2007
☒	Amplifier Reasearch	Amplifier	25S1G4 (25 Watt)	20452	N/A
☒	Agilent	Power Meter	438A	2804U01006	February 2, 2007
☒	Agilent	Power Meter Sensor	8482A	2703A03025	February 2, 2007

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

2.4.10 Tissue simulating liquids: dielectric properties

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

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

Ingredients (% of weight)	**Frequency (MHz)**					
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

2.4.11 Tissue simulating liquids: parameters

Used Target Frequency	**Target Body Tissue**		**Measured Body Tissue**		**Measured Date**
[MHz]	Permittivity	Conductivity [S/m]	Permittivity	Conductivity [S/m]	
1800	53.3	1.52	52.9	1.56	2007-08-29

Table 4: Parameter of the body tissue simulating liquid

Note: The dielectric properties have been measured using the contact probe method at 21.5°C.

2.4.12 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 P1528 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divisor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty 10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	± 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 5: Measurement uncertainties

2.4.13 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 P1528 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 6: Measurement uncertainties

2.4.14 System validation

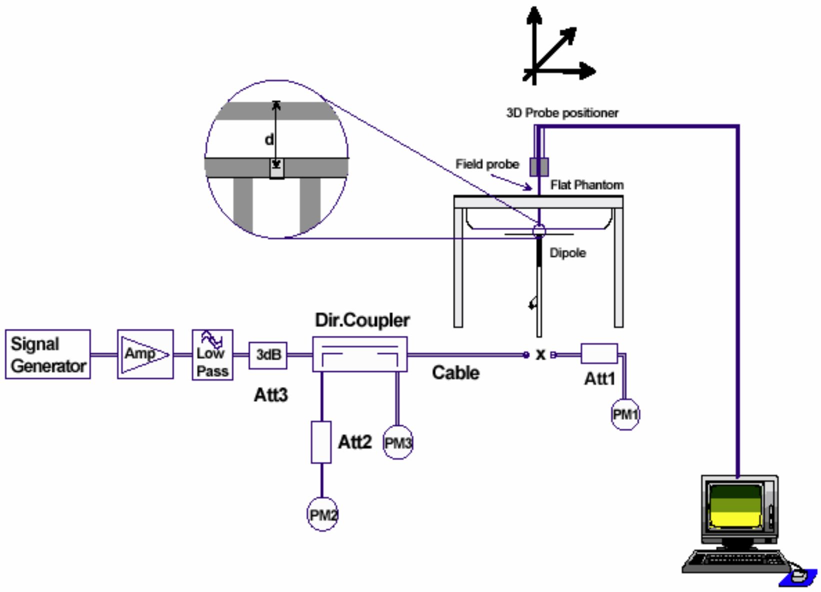
The system validation is performed for verifying the accuracy of the complete measurement system and performance of the software. The system validation is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows validation results for all frequency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

Validation Kit	Frequency	Target Peak SAR (1000 mW) (+/- 10%)	Target SAR_{1g} (1000 mW) (+/- 10%)	Measured Peak SAR	Measured SAR_{1g}	Measured date
D1800V2 S/N: 287	1800 MHz body	60.0 mW/g	38.3 mW/g	64.9 mW/g	40.0 mW/g	2007-08-29

Table 7: Results system validation

2.4.15 Validation procedure

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



2.5 Test results (Body SAR)

2.5.1 WCDMA / HSDPA / HSUPA 1700 MHz

The table contains the measured SAR values averaged over a mass of 1 g					
Channel / frequency	Position	Mode	Body worn	Limit	Liquid temperature
Acer TravelMate 4260 series					
1412 / 1732.4 MHz	underside	WCDMA	0.282 W/kg	1.6 W/kg	21.7°C
1412 / 1732.4 MHz	underside	HSDPA	not necessary	1.6 W/kg	-----
1412 / 1732.4 MHz	underside	HSUPA	not necessary	1.6 W/kg	-----
Fujitsu Siemens Amilo					
1412 / 1732.4 MHz	underside	WCDMA	0.154 W/kg	1.6 W/kg	21.5°C
1412 / 1732.4 MHz	underside	HSDPA	not necessary	1.6 W/kg	------
1412 / 1732.4 MHz	underside	HSUPA	not necessary	1.6 W/kg	------
hp Compaq nc 6320					
1412 / 1732.4 MHz	underside	WCDMA	0.186 W/kg	1.6 W/kg	21.3°C
1412 / 1732.4 MHz	underside	HSDPA	not necessary	1.6 W/kg	-------
1412 / 1732.4 MHz	underside	HSUPA	not necessary	1.6 W/kg	-------

Table 8: Test results (Body SAR 850 MHz WCDMA)

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.
SAR tests shall be performed for WCDMA, HSDPA and HSUPA. If the SAR measured in WCDMA mode is < 75% of the SAR limit or conducted output power of all HSDPA/HSUPA sub tests (see chapter 2.6) does not exceed the conducted power of WCDMA in RMC mode at 12.2 kbit/s by more than 0.25 dB, SAR tests in HSDPA/HSUPA are optional.

2.5.2 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. Conducted output power was measured using an integrated RF connector and attached RF cable.

The DUT was tested in 3-host-configuration with notebooks offering Express card slots and the following separation distance between DUT and phantom when touching the phantom with the underside.

Acer TravelMate 4260 : 11 mm (one Express card slot below PCMCIA slot)
Fujitsu-Siemens Amilo Pro V3205 : 14 mm (combined slot above DVD-ROM drive)
hp Compaq nc 6320 : 17 mm (combined upper slot, lower slot PCMCIA only)

In WCDMA mode the device was tested with RMC at 12.2 kbit/s and transmit power control setting ‘all bits up’ to have the device transmit at maximum output power.
Conducted Measurements in HSDPA mode were performed with an FRC using QPSK and H-set 1. Conducted measurements with HSUPA were performed using the CMU200 with engineering software Version V4.50.a11 installed, allowing correct signalling of all HSUPA sub tests according to standard 3GPP 34.121.

In HSDPA mode the device was tested using the following category settings :

HS-DSCH category	No. of HARQ processes	min. inter-TTI interval	Max. HS-DSCH transport block bits	data rate
8	4	1	14411	7.21 Mbit/s

In HSUPA mode the device was tested using the following category settings :

E-DCH category	max. E-DCH codes transmitted	E-DCH TTI	Max. E-DCH transport block bits	data rate
5	2	10 ms	20000	2 Mbit/s

The following code channels were active during the test :

- DPCCH with spreading factor 256
- DPDCH with spreading factor 256
- HS-DPCCH with spreading factor 256
- number of E-DPDCH$_n$ varying according to HSUPA sub tests described in chapter 2.6.1.

For details about the required settings of gain factors for HSDPA and HSUPA see chapter 2.6.1.

2.6 Test results (conducted power measurement)

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 measured before and after each SAR measurement. The resulting power values were within a 0.2 dB tolerance of the values shown below.

WCDMA 1700 (RMC 12.2 kBit/s)		
Channel / frequency	Max. RMS	Peak
1312 / 1712.4 MHz	**22.15 dBm**	25.68 dBm
1412 / 1732.4 MHz	**21.79 dBm**	25.33 dBm
1513 / 1752.6 MHz	**21.91 dBm**	25.55 dBm

Table 9: Test results conducted peak power measurement WCDMA

WCDMA + HSDPA 1700			
Channel / frequency	sub-test	Max. RMS	Peak
1312 / 1712.4 MHz	1	**21.69 dBm**	25.23 dBm
1412 / 1732.4 MHz	1	**21.41 dBm**	25.01 dBm
1513 / 1752.6 MHz	1	**21.65 dBm**	25.29 dBm
1312 / 1712.4 MHz	2	21.60 dBm	25.41 dBm
1412 / 1732.4 MHz	2	21.40 dBm	25.46 dBm
1513 / 1752.6 MHz	2	21.57 dBm	25.46 dBm
1312 / 1712.4 MHz	3	21.68 dBm	25.87 dBm
1412 / 1732.4 MHz	3	21.36 dBm	25.44 dBm
1513 / 1752.6 MHz	3	21.63 dBm	25.94 dBm
1312 / 1712.4 MHz	4	21.60 dBm	25.39 dBm
1412 / 1732.4 MHz	4	21.32 dBm	25.05 dBm
1513 / 1752.6 MHz	4	21.60 dBm	25.41 dBm

Table 10: Test results conducted peak power measurement WCDMA + HSDPA

WCDMA + HSDPA + HSUPA 1700			
Channel / frequency	Sub-test	Max. RMS	Peak
1312 / 1712.4 MHz	1	20.66 dBm	26.40 dBm
1412 / 1732.4 MHz	1	20.55 dBm	26.15 dBm
1513 / 1752.6 MHz	1	20.48 dBm	26.30 dBm
1312 / 1712.4 MHz	2	19.09 dBm	26.15 dBm
1412 / 1732.4 MHz	2	18.80 dBm	25.82 dBm
1513 / 1752.6 MHz	2	19.11 dBm	26.12 dBm
1312 / 1712.4 MHz	3	19.52 dBm	26.08 dBm
1412 / 1732.4 MHz	3	18.86 dBm	25.42 dBm
1513 / 1752.6 MHz	3	18.97 dBm	25.56 dBm
1312 / 1712.4 MHz	4	19.56 dBm	25.99 dBm
1412 / 1732.4 MHz	4	19.21 dBm	25.80 dBm
1513 / 1752.6 MHz	4	19.54 dBm	26.12 dBm
1312 / 1712.4 MHz	5	**20.76 dBm**	26.25 dBm
1412 / 1732.4 MHz	5	**20.50 dBm**	25.89 dBm
1513 / 1752.6 MHz	5	**20.82 dBm**	26.42 dBm

Table 11: Test results conducted peak power measurement WCDMA + HSDPA + HSUPA

Remark : values in bold letters represent the subtest with maximum output power, which was compared to the standard WCDMA set-up to decide which modes need to be tested for SAR.

2.6.1 Test set-up requirements according to 3GPP 34.121

The following HSDPA sub-tests are defined by 3GPP 34.121 (table C.10.1.4)

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	CM(dB) (2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 (3)	15/15 (3)	64	12/15 (3)	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note 1: Δ_{ACK}, Δ_{NACK}, Δ_{CQI} = 8 $\Longleftrightarrow$ $A_{hs} = \beta_{hs}/\beta_c = 30/15 \Longleftrightarrow \beta_{hs} = 30/15 * \beta_c$
Note 2 : CM = 1 for β_c/β_d = 12/15, β_{hs}/β_c = 24/15
Note 3 : For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to β_c = 11/15 and β_d = 15/15

Table 12: Subtests for UMTS Release 5 HSDPA

They were tested using the following settings for HSDPA FRC + H-Set 1 QPSK (see table C.8.1.1 of 3GPP 34.121

Parameter	Value
Nominal average inf. bit rate	534 kbit/s
Inter-TTI Distance	3 TTI's
Number of HARQ Processes	2 Processes
Information Bit Payload	3202 Bits
MAC-d PDU size	336 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	4800 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	9600 SMLs
Coding Rate	0.67
Number of Physical Channel Codes	5

Table 13: settings of required H-Set 1 QPSK in HSDPA mode

The following HSUPA sub-tests are defined by 3GPP 34.121 (table C.11.1.3)

Sub-test	β_c	β_d	β_d **(SF)**	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ec} **(SF)**	β_{ed} **(code)**	**CM(2) (dB)**	**MPR (dB)**	**AG(4) Index**	**E-TFCI**
1	11/15(3)	15/15(3)	64	11/15(3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15(4)	15/15(4)	64	15/15(4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK}, Δ_{CQI} = 8 $\Longleftrightarrow$ $A_{hs} = \beta_{hs}/\beta_c$ = 30/15 $\Longleftrightarrow$ β_{hs} = 30/15 * β_c

Note 2 : CM = 1 for β_c/β_d = 12/15, β_{hs}/β_c = 24/15. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference

Note 3 : For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to β_c = 10/15 and β_d = 15/15

Note 4 : For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to β_c = 14/15 and β_d = 15/15

Note 5 : Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g

Note 6 : β_{ed} can not be set directly; it is set by Absolute Grant Value

Table 14: Subtests for UMTS Release 6 HSUPA

Some HSUPA sub test settings of parameters defined in the table above cannot be set directly. Instead $\Delta_{E\text{-}DPCCH}$, Reference E-TFCI and Reference E-TFCI Power Offset were set according to table 5.2B.2 of 3GPP 34.121, and CMU200 operating manual instructions of firmware V4x50.a11 were followed to reach a test condition with maximum output power and one E-TFCI.

Annex 1 System performance verification

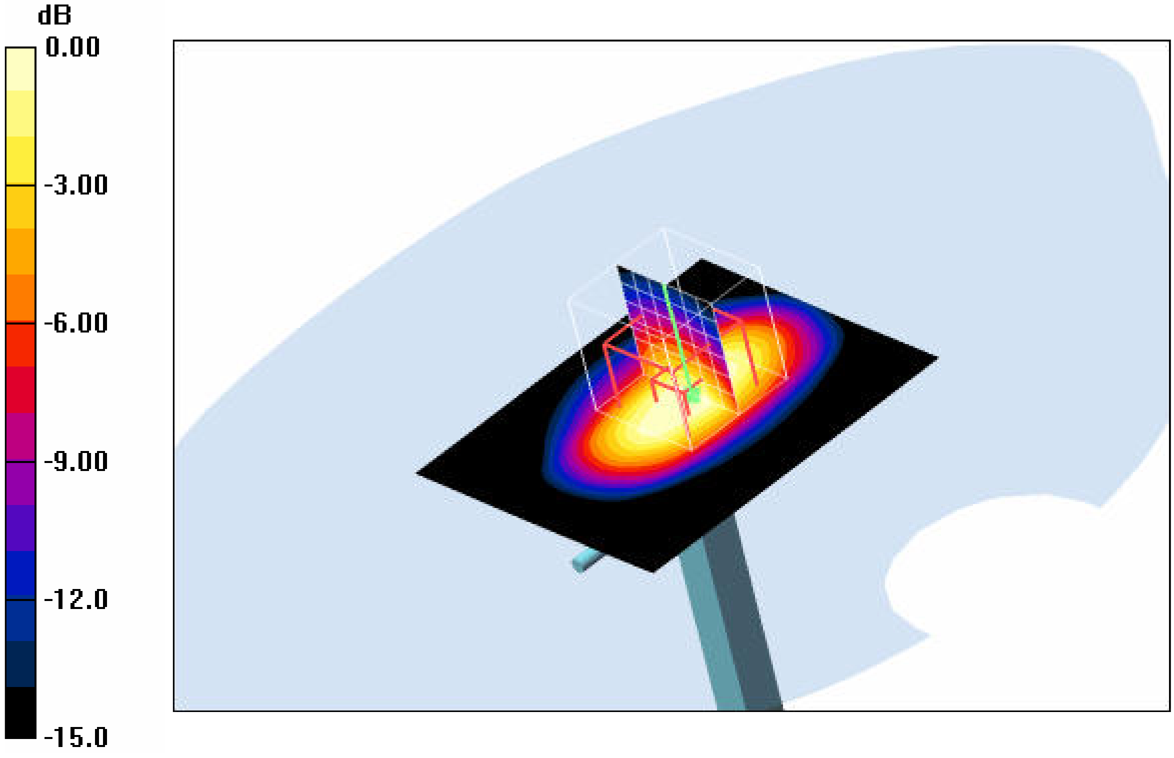
Date/Time: 2007-08-29 15:45:50Date/Time: 2007-08-29 15:50:05

SystemPerformanceCheck-D1800 body 2007-08-29

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: 287
Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium: M1800 Medium parameters used: f = 1800 MHz; σ = 1.56 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.68, 4.68, 4.68); Calibrated: 2007-08-23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2007-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

d=10mm, Pin=1000mW/Area Scan (51x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 52.5 mW/g

d=10mm, Pin=1000mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 173.6 V/m; Power Drift = -0.029 dB
Peak SAR (extrapolated) = 64.9 W/kg
SAR(1 g) = 40 mW/g; SAR(10 g) = 21.3 mW/g
Maximum value of SAR (measured) = 45.1 mW/g



0 dB = 45.1mW/g

Additional information:
position or distance of DUT to SAM (if not standard head positions) :
ambient temperature: 23.1°C; liquid temperature: 21.1°C

Annex 2 Measurement results (printout from DASY TM)

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

Annex 2.1 WCDMA 1700 MHz (AWS)

Date/Time: 2007-08-29 17:29:19Date/Time: 2007-08-29 17:35:26Date/Time: 2007-08-29 17:47:00

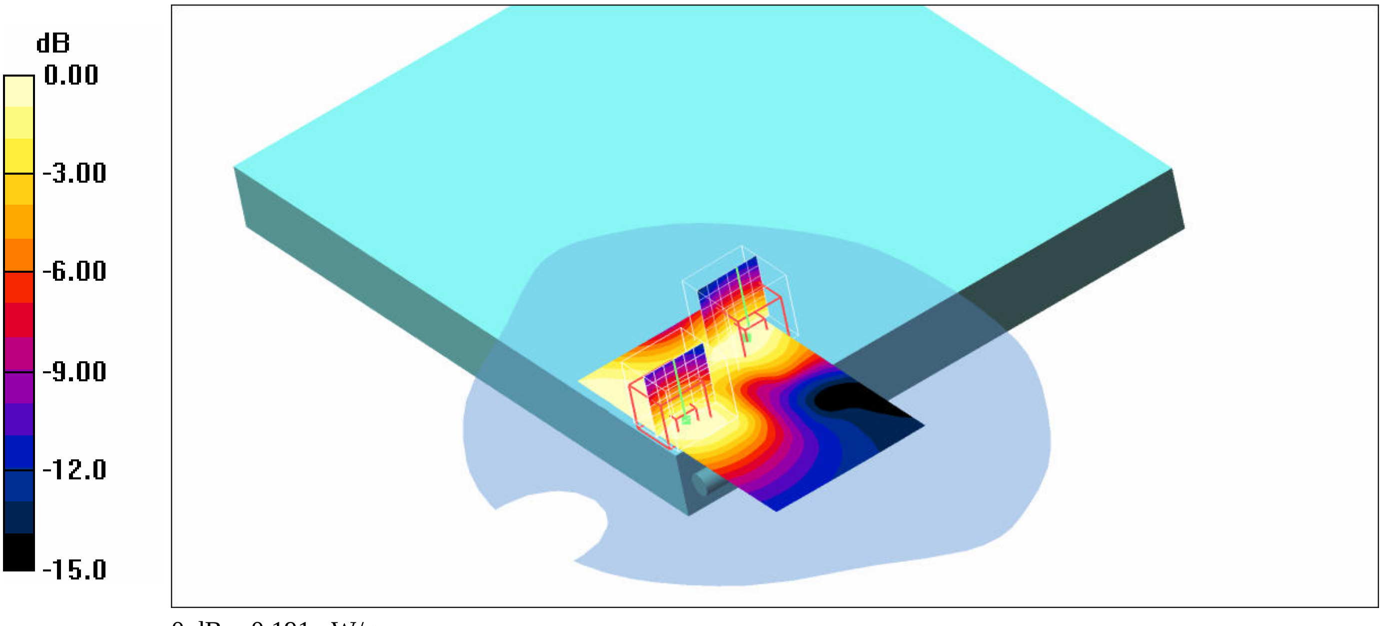
P1528_OET65-Body-WCDMA1700

DUT: Option; Type: GT307 + hp Compaq nc 6320; Serial: 00440144056041-1
Communication System: WCDMA 1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium: M1800 Medium parameters used (interpolated): f = 1732.4 MHz; σ = 1.56 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.68, 4.68, 4.68); Calibrated: 2007-08-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2007-01-18
- 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 (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.202 mW/g

Rear position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.72 V/m; Power Drift = 0.109 dB
Peak SAR (extrapolated) = 0.278 W/kg
SAR(1 g) = 0.186 mW/g; SAR(10 g) = 0.122 mW/g
Maximum value of SAR (measured) = 0.202 mW/g

Rear position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.72 V/m; Power Drift = 0.109 dB
Peak SAR (extrapolated) = 0.273 W/kg
SAR(1 g) = 0.172 mW/g; SAR(10 g) = 0.105 mW/g
Maximum value of SAR (measured) = 0.191 mW/g



0 dB = 0.191mW/g

Additional information:
position or distance of DUT to SAM (if not standard head positions) : 14 mm distance from card to phantom
ambient temperature: 23.3°C; liquid temperature: 21.3°C

Date/Time: 2007-08-29 18:14:58Date/Time: 2007-08-29 18:21:07Date/Time: 2007-08-29 18:32:48

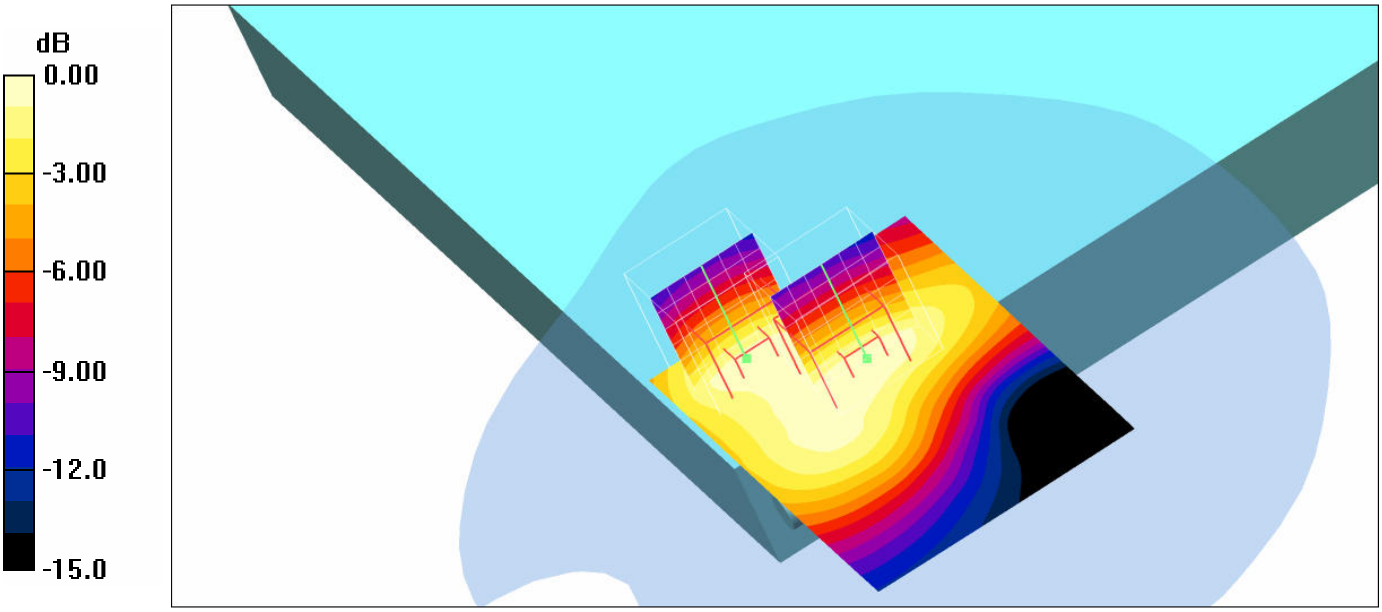
P1528_OET65-Body-WCDMA1700

DUT: Option; Type: GT307 + Fujitsu Siemens Amilo ; Serial: 00440144056041-1
Communication System: WCDMA 1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium: M1800 Medium parameters used (interpolated): f = 1732.4 MHz; σ = 1.56 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.68, 4.68, 4.68); Calibrated: 2007-08-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2007-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - Middle 2/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.164 mW/g

Rear position - Middle 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.12 V/m; Power Drift = 0.053 dB
Peak SAR (extrapolated) = 0.228 W/kg
SAR(1 g) = 0.154 mW/g; SAR(10 g) = 0.099 mW/g
Maximum value of SAR (measured) = 0.168 mW/g

Rear position - Middle 2/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.12 V/m; Power Drift = 0.053 dB
Peak SAR (extrapolated) = 0.213 W/kg
SAR(1 g) = 0.144 mW/g; SAR(10 g) = 0.092 mW/g
Maximum value of SAR (measured) = 0.155 mW/g



0 dB = 0.155mW/g

Additional information:
position or distance of DUT to SAM (if not standard head positions) : 17 mm distance from card to phantom
ambient temperature: 23.4°C; liquid temperature: 21.5°C

Date/Time: 2007-08-29 19:00:25Date/Time: 2007-08-29 19:06:39Date/Time: 2007-08-29 19:18:15

P1528_OET65-Body-WCDMA1700

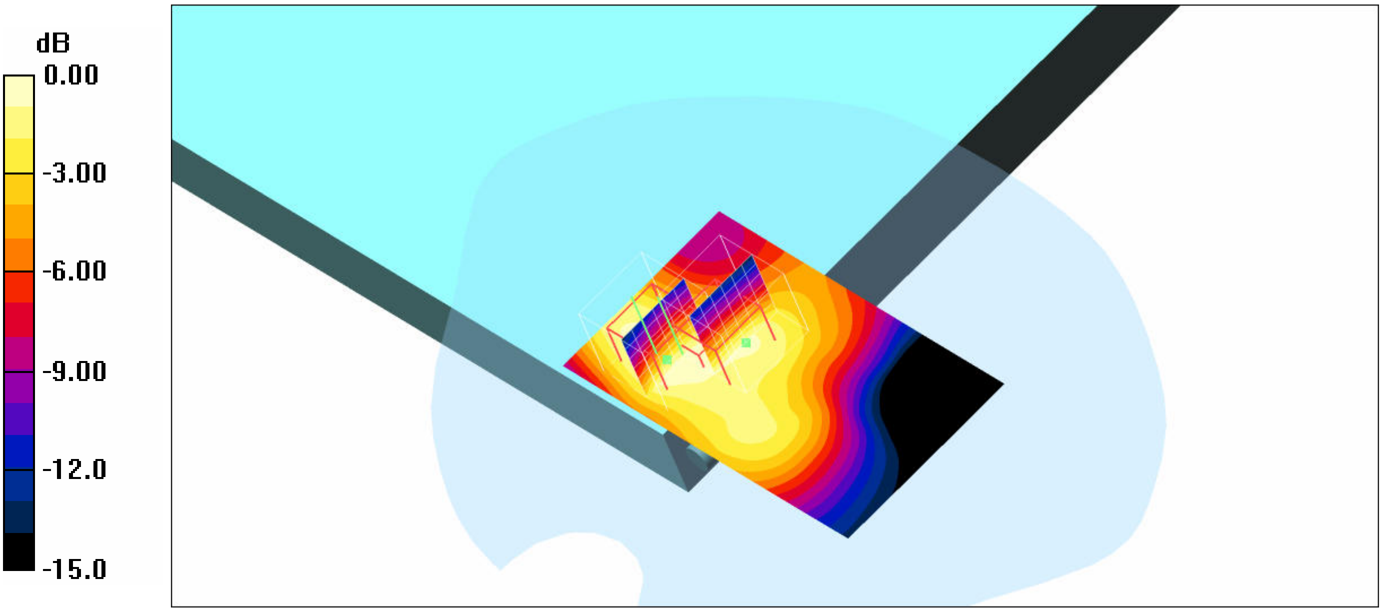
DUT: Option; Type: GT307 + Acer TravelMate; Serial: 00440144056041-1

Communication System: WCDMA 1700; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium: M1800 Medium parameters used (interpolated): f = 1732.4 MHz; σ = 1.56 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:
- Probe: ET3DV6 - SN1558; ConvF(4.68, 4.68, 4.68); Calibrated: 2007-08-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn413; Calibrated: 2007-01-18
- Phantom: SAM 12; Type: SAM; Serial: 1043
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Rear position - Middle 3/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.305 mW/g

Rear position - Middle 3/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.2 V/m; Power Drift = 0.078 dB
Peak SAR (extrapolated) = 0.441 W/kg
SAR(1 g) = 0.282 mW/g; SAR(10 g) = 0.173 mW/g
Maximum value of SAR (measured) = 0.306 mW/g

Rear position - Middle 3/Zoom Scan (7x7x7) (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.2 V/m; Power Drift = 0.078 dB
Peak SAR (extrapolated) = 0.379 W/kg
SAR(1 g) = 0.236 mW/g; SAR(10 g) = 0.149 mW/g
Maximum value of SAR (measured) = 0.284 mW/g



0 dB = 0.284mW/g

Additional information:
position or distance of DUT to SAM (if not standard head positions) : 11 mm distance from card to phantom
ambient temperature: 23.5°C; liquid temperature: 21.7°C

Annex 3 Photo documentation

Photo 1: Measurement System DASY 4

Photo 2: DUT - top view

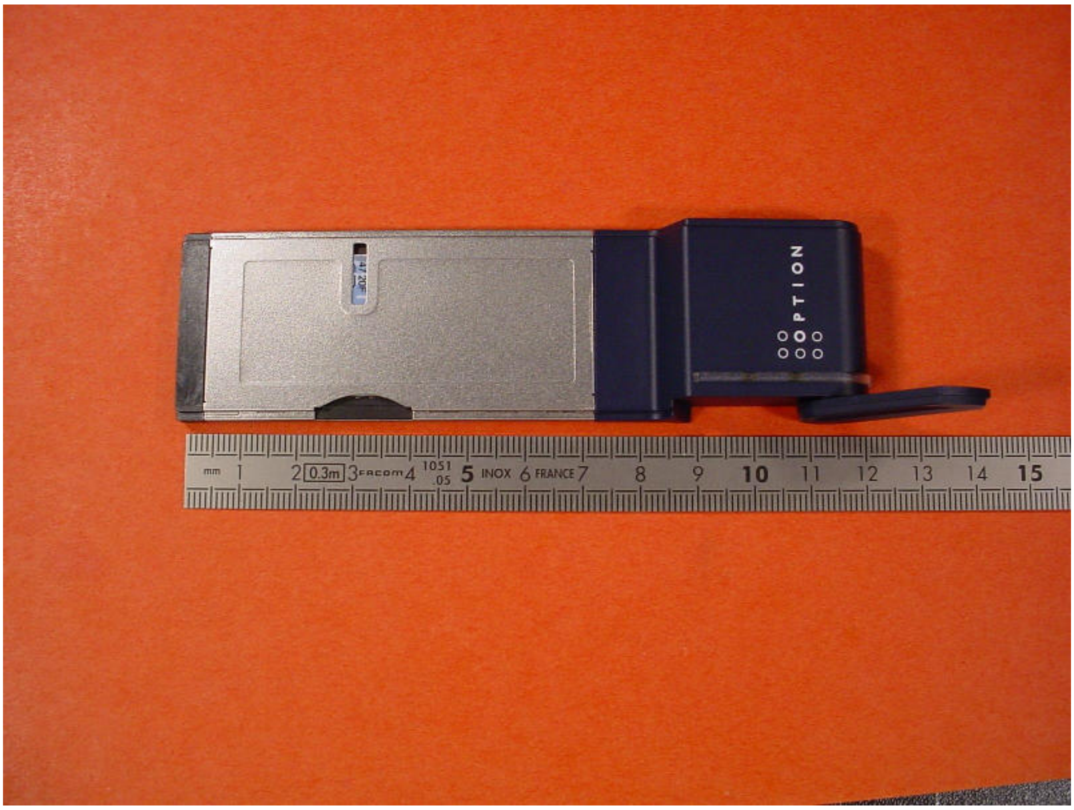


Photo 3: DUT - side view

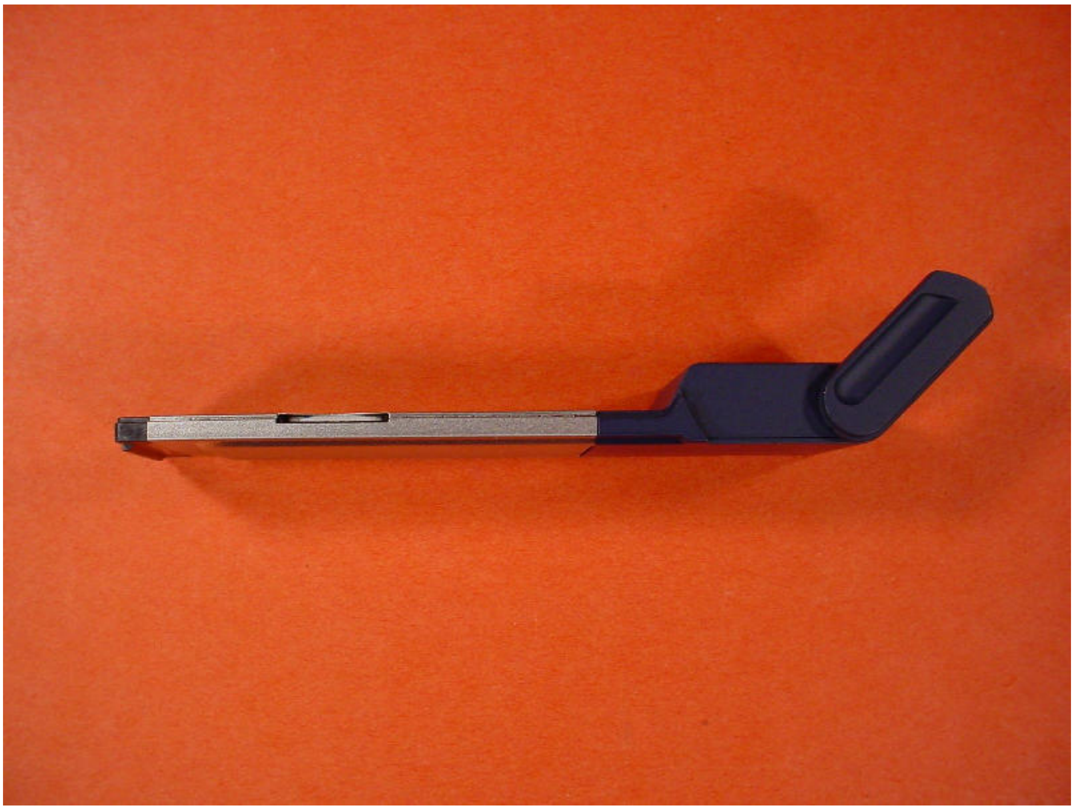


Photo 4: DUT in notebook host hp Compaq nc 6320

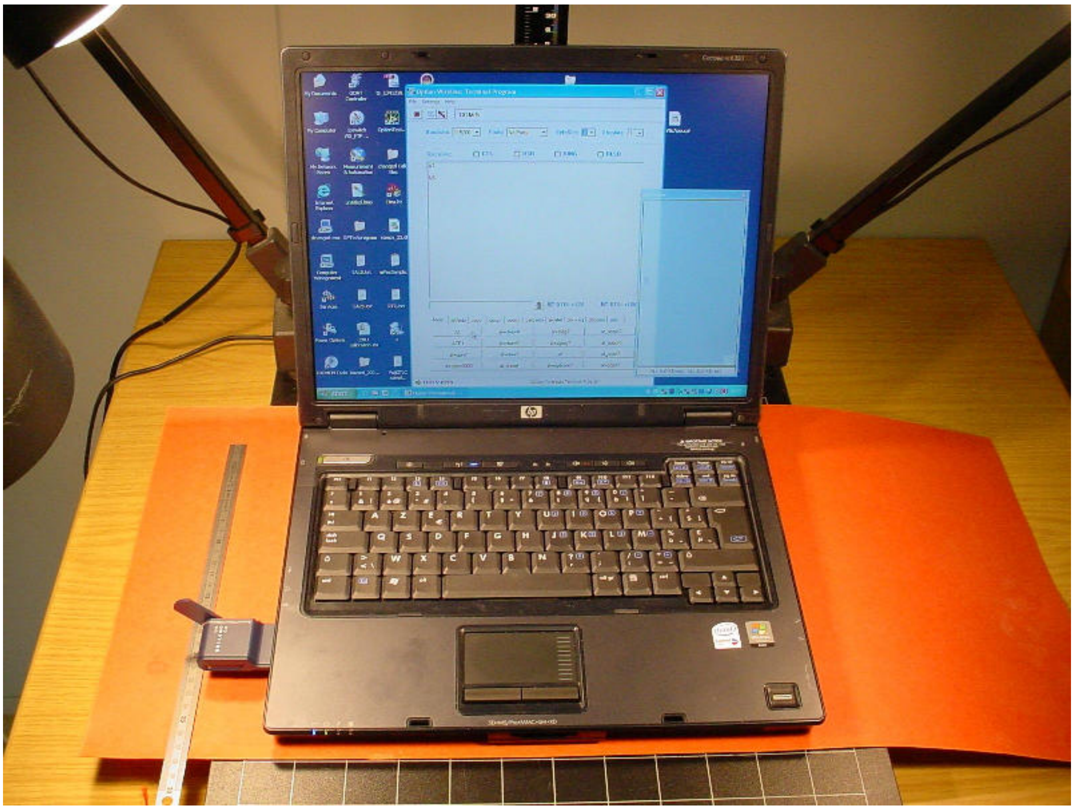


Photo 5: DUT in notebook host hp Compaq nc 6320 (distance to underside 14 mm)

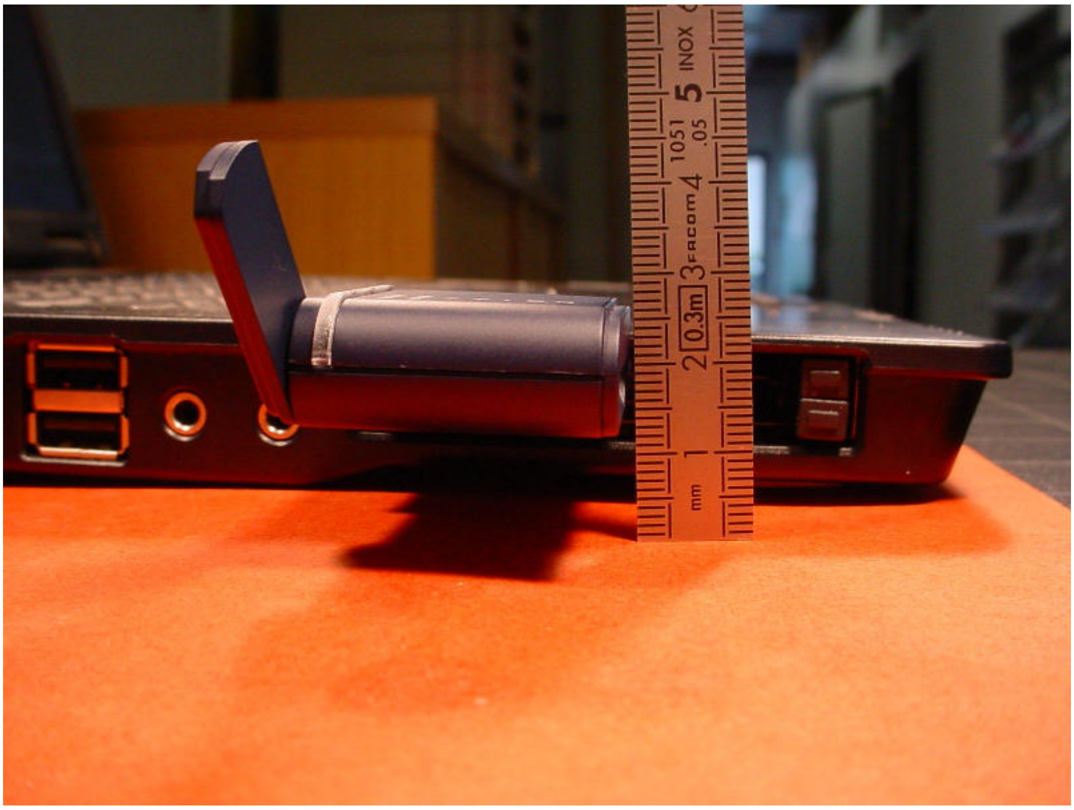


Photo 6: DUT in notebook host Acer TravelMate 4260 series

Photo 7: DUT in notebook host Acer TravelMate 4260 series (distance to underside 11 mm)

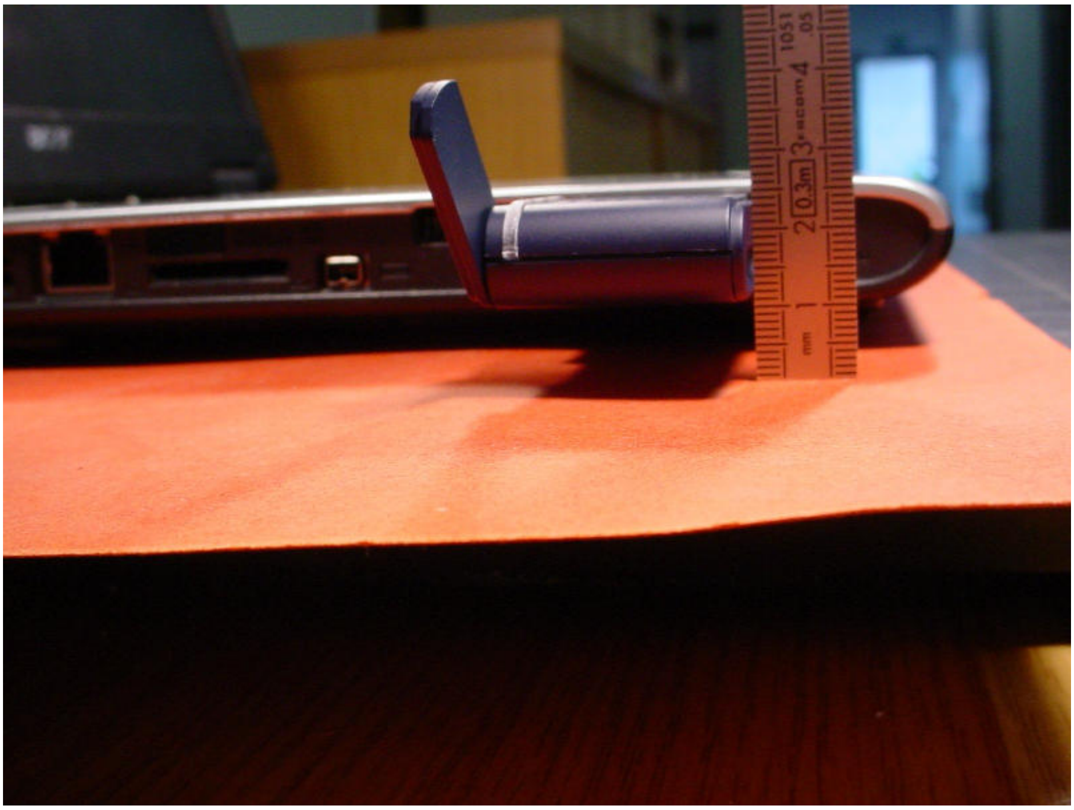


Photo 8: DUT in notebook host Fujitsu-Siemens Amilo

Photo 9: DUT in notebook host Fujitsu-Siemens Amilo (distance to underside 17 mm)

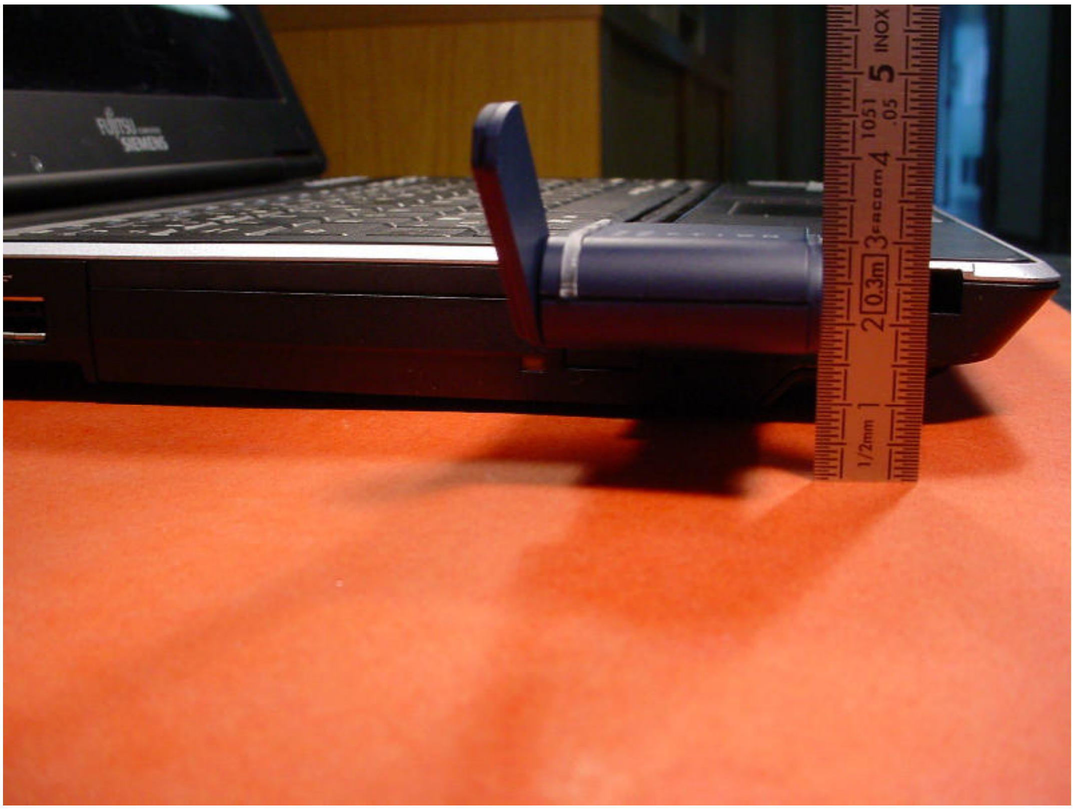


Photo 10: test position underside with hp Compaq nc 6320

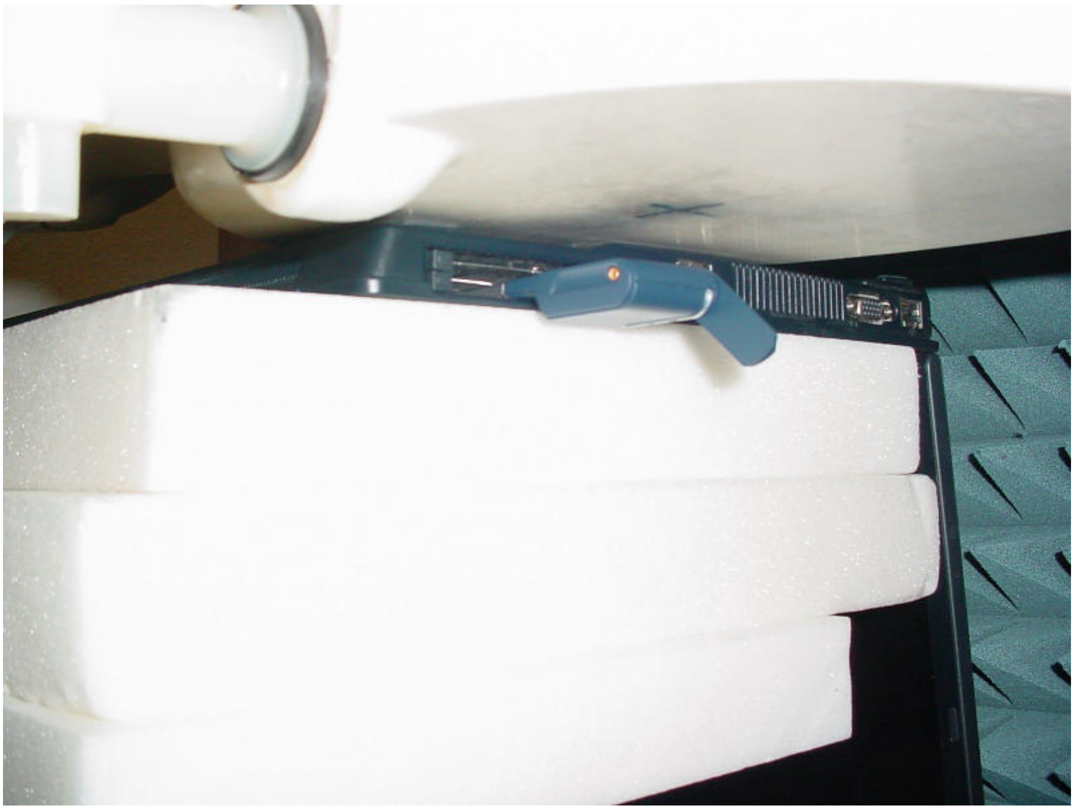


Photo 11: test position underside with hp Compaq nc 6320

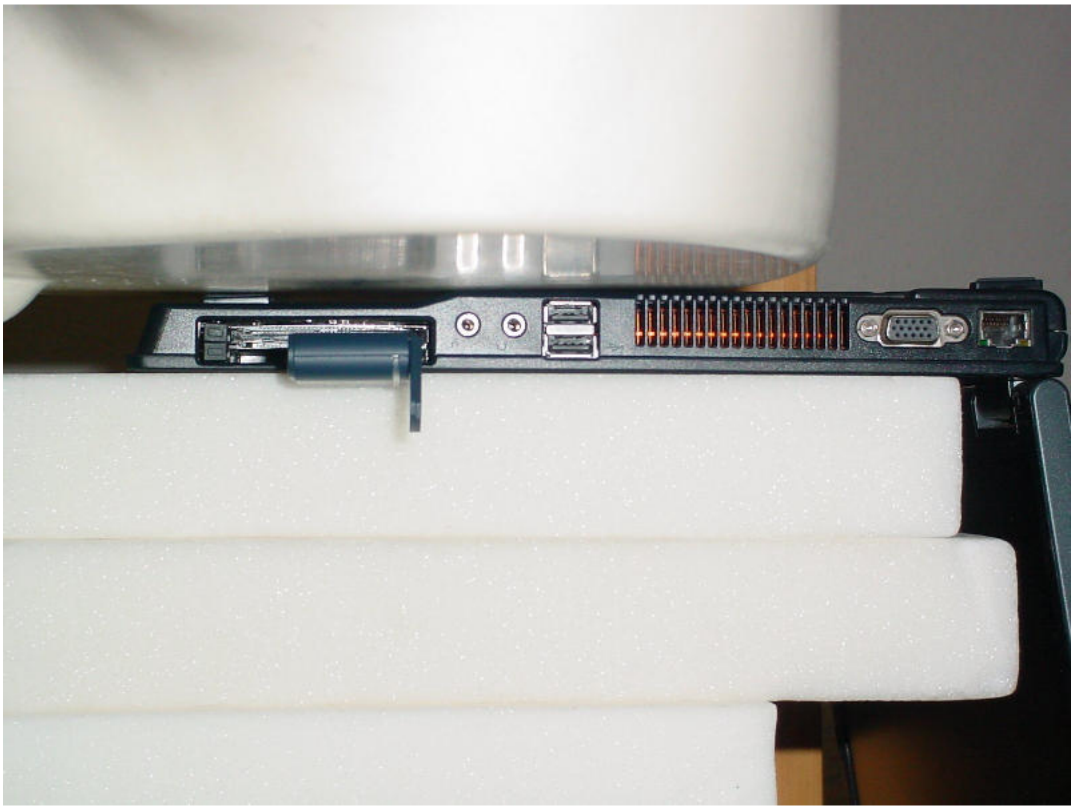


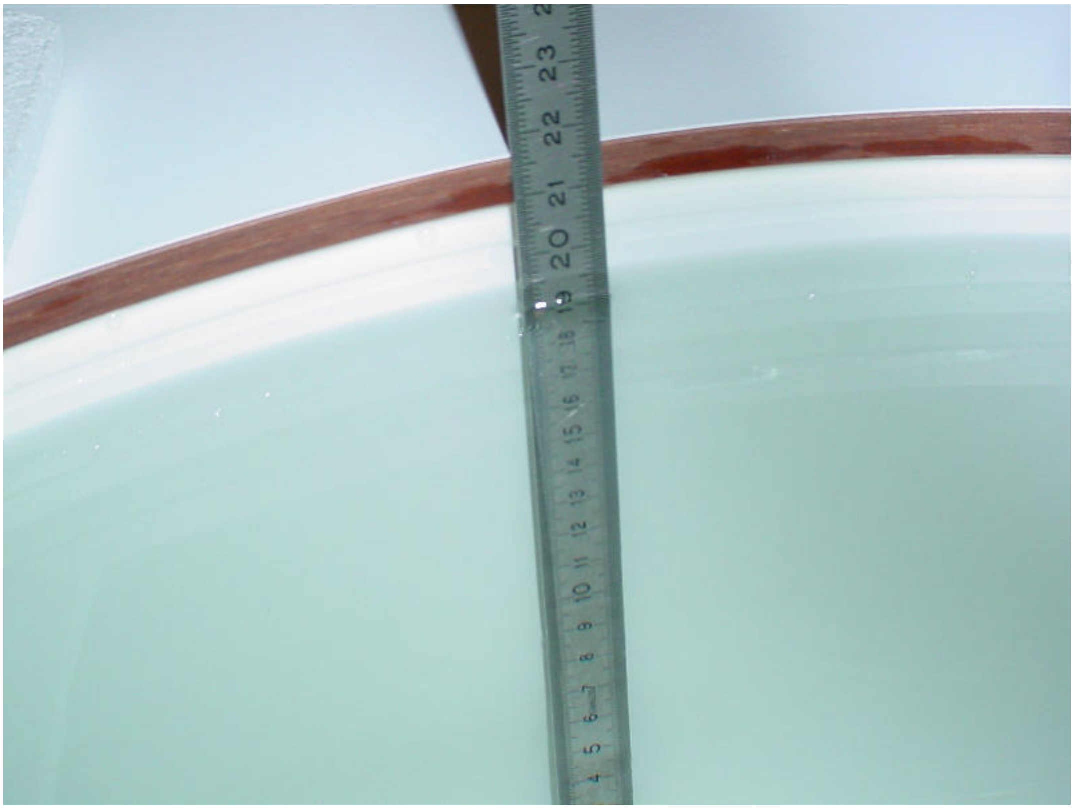
Photo 12: test position underside with Fujitsu Siemens Amilo

Photo 13: test position underside with Fujitsu Siemens Amilo

Photo 14: test position underside with Acer TravelMate

Photo 15: test position underside with Acer TravelMate

Photo 16: liquid depth 1800 MHz body tissue simulation liquid



Annex 4 Calibration parameters

Calibration parameters are described in the additional document :

Appendix to test report no. 4-2756-01-02/07'
Calibration data, Phantom certificate
and detail information of the DASY4 System