
Report

Dosimetric Assessment of the Portable Device GI0301 from Option (FCC ID: NCMOGI0301E) tested in three host products

According to the FCC Requirements

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Executive Summary

The device GI0301 is a new USB card from Option operating in the 850 MHz, 900 MHz, 1800 MHz and 1900 MHz frequency range. The device has an integrated antenna and the system concepts used are the GPRS 850 (Class 12), GPRS 900 (Class 12), GPRS 1800 (Class 12), GPRS 1900 (Class 12), WCDMA I (FDD), WCDMA II (FDD) and WCDMA V (FDD) standards including HSDPA capability.

The objective of the measurements done by IMST was the dosimetric assessment of one device in body worn configuration in the GPRS 850 (Class 10), GPRS 1900 (Class 12), WCDMA II (FDD) and WCDMA V (FDD) standards including HSDPA. The measurements were performed in combination with three different host products (Dell Latitude C810, Acer TravelMate and Dell Inspiron 9100). The device was tested in lap held position with the bottom of the computer in direct contact against the flat phantom. The examinations have been carried out with the dosimetric assessment system „DASY4“.

The measurements were made according to the Supplement C to OET Bulletin 65 of the Federal Communications Commission (FCC) Guidelines [OET 65] for evaluating compliance of mobile and portable devices with FCC limits for human exposure (general population) to radiofrequency emissions. Additional information and guidelines given by the following FCC document were used: SAR Measurement Procedures for 3G Devices [3G Devices]. All measurements have been performed in accordance to the recommendations given by SPEAG.

Compliance statement



The Option GI0301 USB card (FCC ID: NCMOGI0301E) is in compliance with the Federal Communications Commission (FCC) Guidelines [OET 65] for uncontrolled exposure.

The USB card was tested for the following configurations:

Body Worn for GPRS 850 (Class 10), GPRS 1900 (Class 12), WCDMA II (FDD) and WCDMA V (FDD) in lap held position with the bottom of the computer in direct contact against the flat phantom. In addition, body SAR was also measured in HSDPA, using the highest body SAR configuration without HSDPA. The card was tested with three host products (DELL Latitude C810, Acer TravelMate and Dell Inspiron 9100).

Due to the used power reduction on GSM 850 in GPRS Class 12, the tests for this band was conducted with GPRS Class 10 to cover the worst case.

Maximum SAR_{1g} = 1.41 W/kg (WCDMA II, Channel 9400, DELL Latitude C810 Notebook)

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1 Subject of Investigation

The device GI0301 is a new USB card from Option operating in the 850 MHz, 900 MHz, 1800 MHz and 1900 MHz frequency range. The device has a integrated antenna and the system concepts used are the GPRS 850 (Class 12), GPRS 900 (Class 12), GPRS 1800 (Class 12), GPRS 1900 (Class 12), WCDMA I (FDD), WCDMA II (FDD) and WCDMA V (FDD) standards including HSDPA capability.



Fig. 1: Picture of the device under test

The objective of the measurements done by IMST was the dosimetric assessment of one device in body worn configuration in the GPRS 850 (Class 10), GPRS 1900 (Class 12), WCDMA II (FDD) and WCDMA V (FDD) standards including HSDPA. The measurements were performed in combination with three different host products (Dell Latitude C810, Acer TravelMate and Dell Inspiron 9100). The device was tested in lap held position with the bottom of the computer in direct contact against the flat phantom. The examinations have been carried out with the dosimetric assessment system „DASY4“ describes below.

2 The IEEE Standard C95.1 and the FCC Exposure Criteria

In the USA the FCC exposure criteria [OET 65] are based on the withdrawn IEEE Standard C95.1-1999 [IEEE C95.1-1999]. This version was replaced by the IEEE Standard C95.1-2005 [IEEE C95.1-2005] in October, 2005.

Both IEEE standards sets limits for human exposure to radio frequency electromagnetic fields in the frequency range 3 kHz to 300 GHz. One of the major differences in the newly revised C95.1-2005 is the change in the basic restrictions for localized exposure, from 1.6 W/kg averaged over 1 g tissue to 2.0 W/kg averaged over 10 g tissue, which is now identical to the ICNIRP guidelines [ICNIRP 1998].

2.1 Distinction Between Exposed Population, Duration of Exposure and Frequencies

The American Standard [IEEE C95.1-1999] distinguishes between controlled and uncontrolled environment. Controlled environments are locations where there is exposure that may be incurred by persons who are aware of the potential for exposure as a concomitant of employment or by other cognizant persons. Uncontrolled environments are locations where there is the exposure of individuals who have no knowledge or control of their exposure. The exposures may occur in living quarters or workplaces. For exposure in controlled environments higher field strengths are admissible. In addition the duration of exposure is considered.

Due to the influence of frequency on important parameters, as the penetration depth of the electromagnetic fields into the human body and the absorption capability of different tissues, the limits in general vary with frequency.

2.2 Distinction between Maximum Permissible Exposure and SAR Limits

The biological relevant parameter describing the effects of electromagnetic fields in the frequency range of interest is the specific absorption rate SAR (dimension: power/mass). It is a measure of the power absorbed per unit mass. The SAR may be spatially averaged over the total mass of an exposed body or its parts. The SAR is calculated from the r.m.s. electric field strength E inside the human body, the conductivity σ and the mass density ρ of the biological tissue:

$$SAR = \sigma \frac{E^2}{\rho} = c \frac{\partial T}{\partial t} \Big|_{t \rightarrow 0+} \quad (1)$$

The specific absorption rate describes the initial rate of temperature rise $\partial T / \partial t$ as a function of the specific heat capacity c of the tissue. A limitation of the specific absorption rate prevents an excessive heating of the human body by electromagnetic energy.

As it is sometimes difficult to determine the SAR directly by measurement (e.g. whole body averaged SAR), the standard specifies more readily measurable maximum permissible exposures in terms of external electric E and magnetic field strength H and power density S , derived from the SAR limits. The limits for E , H and S have been fixed so that even under worst case conditions, the limits for the specific absorption rate SAR are not exceeded.

For the relevant frequency range the maximum permissible exposure may be exceeded if the exposure can be shown by appropriate techniques to produce SAR values below the corresponding limits.

2.3 SAR Limit

In this report the comparison between the American exposure limits and the measured data is made using the spatial peak SAR; the power level of the device under test guarantees that the whole body averaged SAR is not exceeded.

Having in mind a worst case consideration, the SAR limit is valid for uncontrolled environment and mobile respectively portable transmitters. According to Table 1 the SAR values have to be averaged over a mass of 1 g (SAR_{1g}) with the shape of a cube.

Standard	Status	SAR limit [W/kg]
IEEE C95.1-1999	Replaced	1.6

Table 1: Relevant spatial peak SAR limit averaged over a mass of 1 g.

3 The FCC Measurement Procedure

The Federal Communications Commission (FCC) has published a report and order on the 1st of August 1996 [FCC 96-326], which requires routine dosimetric assessment of mobile telecommunications devices, either by laboratory measurement techniques or by computational modeling, prior to equipment authorization or use. In 2001 the Commission's Office of Engineering and Technology has released Edition 01-01 of Supplement C to OET Bulletin 65. This revised edition, which replaces Edition 97-01, provides additional guidance and information for evaluating compliance of mobile and portable devices with FCC limits for human exposure to radiofrequency emissions [OET 65].

Since the measured device was only investigated in body worn configuration the required setups and information about measurements of devices which were operating next to a person's ear (e.g handsets), were not covered within this documentation.

3.1 General Requirements

The test shall be performed in a laboratory with an environment which avoids influence on SAR measurements by ambient EM sources and any reflection from the environment itself. The ambient temperature shall be in the range of 20°C to 26°C and 30-70% humidity.

3.2 Phantom Requirements

For body-worn and other configurations a flat phantom shall be used which is comprised of material with electrical properties similar to the corresponding tissues.

3.3 Positioning of modules in Portable devices (PCMCIA Cards, USB Cards)

To use “Portable modules” in multiple notebooks, PCMCIA cards and similar integral-antenna packages has to be tested in three representative host products. According to Fig. 2 the device is tested in “lap-held” position with the bottom of the computer in direct contact against the flat phantom.

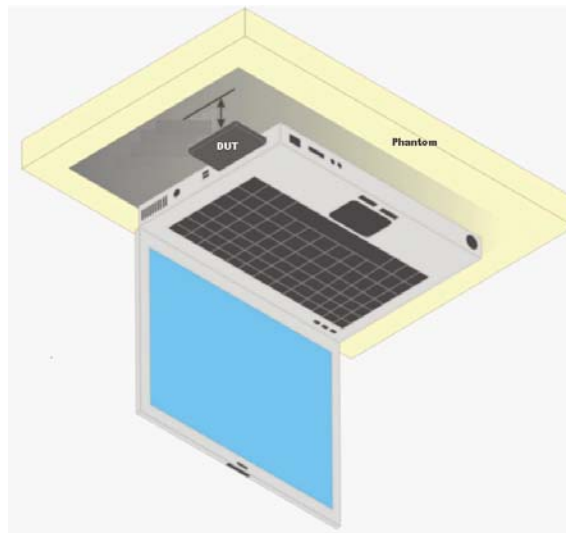


Fig. 2: Lap-held position, bottom of the computer is touching the phantom.

If the host product provides antennas within the screen antenna, the device should be measured with the screen touching the phantom as shown in Fig. 3

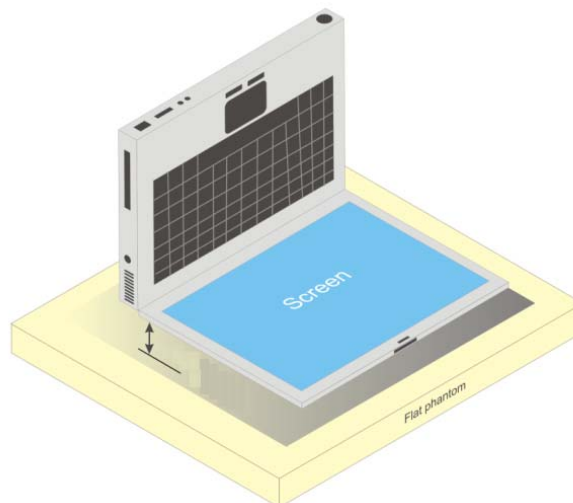


Fig. 3: Lap-held position, back of the screen is touching the phantom.

The typical measurement positions of a tablet PC are given below in Fig. 4. For measurements of antennas which are mounted within the base of the PC, the base of the device is touching the phantom. Those antennas which are mounted within the edge of the PC were measured with the edge of the device touching the phantom.

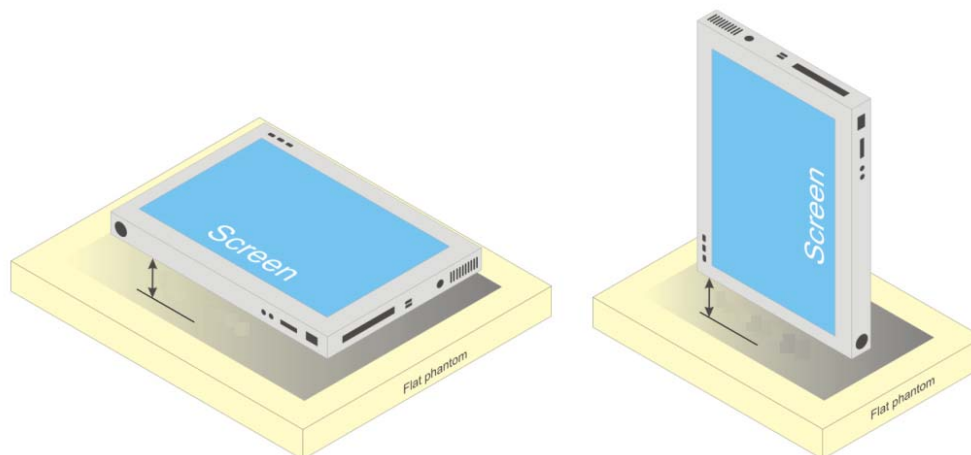


Fig. 4: Tablet PC, base and edge are touching the phantom.

3.4 Test to be Performed

For devices with retractable antenna the SAR test shall be performed with the antenna fully extended and fully retracted. Other factors that may affect the exposure shall also be tested. For example any other accessories which might have the potential to considerably increase the peak spatial-average SAR value.

The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional.

3.5 Additional information for the measurement of WCDMA (including HSDPA) devices

For measurements in WCDMA without HSDPA, the default test configuration is to establish a radio link between the DUT and a communication test set using a 12.2 kbps RMC configured in Test Loop Mode 1 and TPC bits configured to all "1". The SAR will be tested for all bands using a Rel99 call configured to transmit at maximum output power per 3GPP 34.121 [3GPP 34.121].

For devices with HSDPA SAR is not required when the maximum average output of each RF channel with HSDPA active is less than $\frac{1}{4}$ dB higher than that measured without HSDPA, using 12.2 kbps RMC or the maximum measured WCDMA SAR value without HSDPA is below 1.2 W/kg.

If the evaluation for HSDPA is necessary, SAR is measured using a Rel5 HSDPA call with an FRC together with an 12.2 kbps RMC (in H-Set 1, Sub-Test 1 according table C10.1.4 of 3GPP 34.121) with the body exposure configuration that results in the highest SAR without HSDPA.

Modes		HSDPA			
H-Set 1, Subtest		1	2	3	4
Band	Channel	Power [dBm]	Power [dBm]	Power [dBm]	Power [dBm]
WCDMA V	4132	21.5	21.6	21.4	21.5
	4183	21.3	21.3	21.4	21.4
	4233	21.9	22.2	22.2	22.1
WCDMA II	9262	21.1	21.2	21.2	21.2
	9400	20.9	20.9	21.0	22.2
	9538	21.4	21.7	21.8	20.2

Table 2: According TS 34.121 table C10.1.4 measured max power values for the used Option GI0301 delivered by 7layers, Ratingen.

As stated by the manufacturer, the UE is fully compliant with 3GPP standards defining required UMTS spreading factors.

- The DPCCH spreading factor is 256 per 3GPP TS 25.213 section 4.3.1.2.1.
- The DPDCH spreading factor is dependent on number of DPDCH channels and data rate. For a single channel the spreading factor can range from 4 to 256. For more than one DPDCH channel the spreading factor is 4. Further details are defined by 3GPP in TS 25.213 section 4.3.1.2.1.
- HS-DPCCH spreading factor is 256. Further details can be found in 3GPP TS 25.213 section 4.3.1.2.2.

4 The Measurement System

DASY is an abbreviation of „Dosimetric Assessment System“ and describes a system that is able to determine the SAR distribution inside a phantom of a human being according to different standards. The DASY4 system consists of the following items as shown in Fig: 5. Additional Fig: 6 shows the equipment, similar to the installations in other laboratories.

- High precision robot with controller
- Measurement server (for surveillance of the robot operation and signal filtering)
- Data acquisition electronics DAE (for signal amplification and filtering)
- Field probes calibrated for use in liquids
- Electro-optical converter EOC (conversion from the optical into a digital signal)
- Light beam (improving of the absolute probe positioning accuracy)
- Two SAM phantoms filled with tissue simulating liquid
- DASY4 software
- SEMCAD

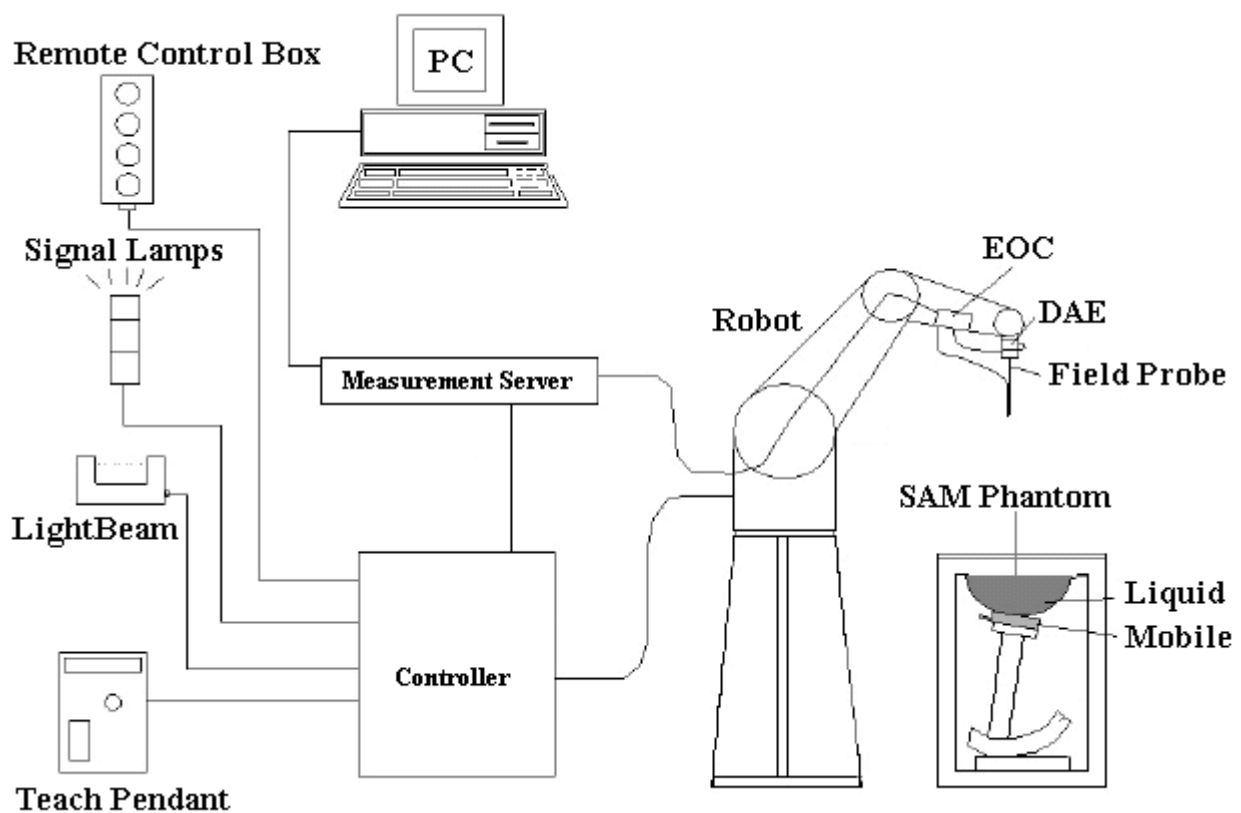


Fig. 5: The DASY4 measurement system.



Fig. 6: The measurement set-up with two SAM phantoms containing tissue simulating liquid.

The mobile phone operating at the maximum power level is placed by a non metallic device holder (delivered from Schmid & Partner) in the above described positions at a shell phantom of a human being. The distribution of the electric field strength E is measured in the tissue simulating liquid within the shell phantom. For this miniaturised field probes with high sensitivity and low field disturbance are used. Afterwards the corresponding SAR values are calculated with the known electrical conductivity σ and the mass density ρ of the tissue in the SEMCAD FDTD software. The software is able to determine the averaged SAR values (averaging region 1 g or 10 g) for compliance testing.

The measurements are done by two scans: first a coarse scan determines the region of the maximum SAR, afterwards the averaged SAR is measured in a second scan within the shape of a cube. The measurement time takes about 20 minutes.

4.1 Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM Twin Phantom V4.0) defined by the IEEE SCC-34/SC2 group and delivered by Schmid & Partner Engineering AG is used. The phantom is a fibreglass shell integrated in a wooden table. The thickness of the phantom amounts to $2 \text{ mm} \pm 0.2 \text{ mm}$. It enables the dosimetric evaluation of left and right hand phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a coverage (polyethylene), which prevents the evaporation of the liquid. The details and the Certificate of conformity can be found in Fig. 16.

4.2 Probe

For the measurements the Dosimetric E-Field Probes ET3DV6R or EX3DV4 with following specifications are used. They are manufactured and calibrated in accordance with FCC [OET 65] and IEEE [IEEE 1528-2003] recommendations annually by Schmid & Partner Engineering AG.

ET3DV6R:

- Dynamic range: $5\mu\text{W/g}$ to $> 100\text{mW/g}$
- Tip diameter: 6.8 mm
- Probe linearity: ± 0.2 dB (30 MHz to 3 GHz)
- Axial isotropy: ± 0.2 dB
- Spherical isotropy: ± 0.4 dB
- Distance from probe tip to dipole centers: 2.7 mm
- Calibration range: 900MHz / 1800MHz / 1900MHz / 1950 MHz / 2450MHz for head and body simulating liquid
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°

EX3DV4:

- Dynamic range: $10\mu\text{W/g}$ to $> 100\text{mW/g}$ (noise typically $< 1\mu\text{W/g}$)
- Tip diameter: 2.5 mm
- Probe linearity: ± 0.2 dB (30 MHz to 3 GHz)
- Axial isotropy: ± 0.2 dB
- Spherical isotropy: ± 0.4 dB
- Distance from probe tip to dipole centers: 1.0 mm
- Calibration range: 900MHz / 1800MHz / 1900MHz / 1950 MHz / 2450MHz for head and body simulating liquid
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°

4.3 Measurement Procedure

The following steps are used for each test position:

- Establish a call with the maximum output power with a base station simulator. The connection between the mobile phone and the base station simulator is established via air interface.
- Measurement of the local E-field value at a fixed location (P1). This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with a grid spacing of 15 mm x 15 mm and a constant distance to the inner surface of the phantom. Since the sensors can not directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With this values the area of the maximum SAR is calculated by a interpolation scheme (combination of a least-square fitted function and a weighted average method). Additional all peaks within 2 dB of the maximum SAR are searched.
- Around this points, a cube of 30 mm x 30 mm x 30 mm is assessed by measuring 7 x 7 x 7 points whereby the first two measurement points are within the required 10 mm of the surface. With these data, the peak spatial-average SAR value can be calculated within the SEMCAD software.
- The used extrapolation and interpolation routines are all based on the modified Quadratic Shepard's method [DASY4].
- Repetition of the E-field measurement at the fixed location (P1) and repetition of the whole procedure if the two results differ by more than ± 0.21 dB.

4.4 Uncertainty Assessment

Table 3 includes the worst case uncertainty budget suggested by the [IEEE 1528-2003] and determined by Schmid & Partner Engineering AG. The expanded uncertainty (K=2) is assessed to be $\pm 21.7\%$ and is valid up to 3.0 GHz.

Error Sources	Uncertainty Value	Probability Distribution	Divisor	c_i	Standard Uncertainty	v_i^2 or v_{eff}
Measurement System						
Probe calibration	$\pm 5.9 \%$	Normal	1	1	$\pm 5.9 \%$	∞
Axial isotropy	$\pm 4.7 \%$	Rectangular	$\sqrt{3}$	0.7	$\pm 1.9 \%$	∞
Hemispherical isotropy	$\pm 9.6 \%$	Rectangular	$\sqrt{3}$	0.7	$\pm 3.9 \%$	∞
Boundary effects	$\pm 1.0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 0.6 \%$	∞
Linearity	$\pm 4.7 \%$	Rectangular	$\sqrt{3}$	1	$\pm 2.7 \%$	∞
System detection limit	$\pm 1.0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 0.6 \%$	∞
Readout electronics	$\pm 1.0 \%$	Normal	1	1	$\pm 1.0 \%$	∞
Response time	$\pm 0.8 \%$	Rectangular	$\sqrt{3}$	1	$\pm 0.5 \%$	∞
Integration time	$\pm 2.6\%$	Rectangular	$\sqrt{3}$	1	$\pm 1.5 \%$	∞
RF ambient conditions	$\pm 3.0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 1.7 \%$	∞
Probe positioner	$\pm 0.4 \%$	Rectangular	$\sqrt{3}$	1	$\pm 0.2 \%$	∞
Probe positioning	$\pm 2.9 \%$	Rectangular	$\sqrt{3}$	1	$\pm 1.7 \%$	∞
Algorithm for max SAR eval.	$\pm 1.0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 0.6 \%$	∞
Test Sample Related						
Device positioning	$\pm 2.9 \%$	Normal	1	1	$\pm 2.9 \%$	145
Device holder	$\pm 3.6 \%$	Normal	1	1	$\pm 3.6 \%$	5
Power drift	$\pm 5.0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 2.9 \%$	∞
Phantom and Set-up						
Phantom uncertainty	$\pm 4.0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 2.3 \%$	∞
Liquid conductivity (target)	$\pm 5.0 \%$	Rectangular	$\sqrt{3}$	0.64	$\pm 1.8 \%$	∞
Liquid conductivity (meas.)	$\pm 2.5 \%$	Normal	1	0.64	$\pm 1.6 \%$	∞
Liquid permittivity (target)	$\pm 5.0 \%$	Rectangular	$\sqrt{3}$	0.6	$\pm 1.7 \%$	∞
Liquid permittivity (meas.)	$\pm 2.5 \%$	Normal	1	0.6	$\pm 1.5 \%$	∞
Combined Uncertainty					$\pm 10.8 \%$	

Table 3: Uncertainty budget of DASY4.

5 SAR Results

The Tables below contain the measured SAR values averaged over a mass of 1 g.

Test Position (Liquid depth 15.5 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 128 824.2 MHz 31.70 dBm	Channel 190 836.4 MHz 31.90 dBm	Channel 251 848.8 MHz 31.90 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position		0.478 (-0.073)		22.4	21.6

Table 4: Measurement results for GSM 850 (GPRS Cass 10) for the Option GI0301 in combination with the Dell Latitude C810.

Test Position” (Liquid depth 15.5 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 128 824.2 MHz 31.70 dBm	Channel 190 836.4 MHz 31.90 dBm	Channel 251 848.8 MHz 31.90 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position		0.317 (0.183)		22.4	21.6

Table 5: Measurement results for GSM 850 (GPRS Cass 10) for the Option GI0301 in combination with the Acer TravelMate.

Test Position (Liquid depth 15.5 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 128 824.2 MHz 31.70 dBm	Channel 190 836.4 MHz 31.90 dBm	Channel 251 848.8 MHz 31.90 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position		0.306 (-0.121)		22.4	21.6

Table 6: Measurement results for GSM 850 (GPRS Cass 10) for the Option GI0301 in combination with the Dell Inspiron 9100.

Test Position (Liquid depth 16.3 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 512 1850.2 MHz 28.40 dBm	Channel 661 1880.0 MHz 28.60 dBm	Channel 810 1909.6 MHz 28.60 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position	1.070 (-0.123)	1.020 (0.193)	1.130 (-0.188)	22.6	21.6

Table 7: Measurement results for GPRS 1900 (Class 12) for the Option GI0301 in combination with the Dell Latitude C810.

Test Position (Liquid depth 16.3 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 512 1850.2 MHz 28.40 dBm	Channel 661 1880.0 MHz 28.60 dBm	Channel 810 1909.6 MHz 28.60 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position		0.611 (-0.083)		22.6	21.6

Table 8: Measurement results for GPRS 1900 (Class 12) for the Option GI0301 in combination with the Acer TravelMate.

Test Position (Liquid depth 16.3 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 512 1850.2 MHz 28.40 dBm	Channel 661 1880.0 MHz 28.60 dBm	Channel 810 1909.6 MHz 28.60 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position		0.657(0.180)		22.6	21.6

Table 9: Measurement results for GPRS 1900 (Class 12) for the Option GI0301 in combination with the Dell Inspiron 9100.

Test Position (Liquid depth 15.5 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 4132 826.4 MHz 24.69 dBm	Channel 4183 836.6 MHz 25.03 dBm	Channel 4233 846.6 MHz 24.89 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position		0.227* (-0.011)		22.4	21.3

Table 10: Measurement results for WCDMA V (FDD) for the Option GI0301 in combination with the DELL Latitude C810 Notebook (* Max Cube).

Test Position (Liquid depth 15.5 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 4132 826.4 MHz 24.69 dBm	Channel 4183 836.6 MHz 25.03 dBm	Channel 4233 846.6 MHz 24.89 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position		0.143* (0.021)		22.4	21.3

Table 11: Measurement results for WCDMA V (FDD) for the Option GI0301 in combination with the Acer TravelMate.

Test Position (Liquid depth 15.5 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 4132 826.4 MHz 24.69 dBm	Channel 4183 836.6 MHz 25.03 dBm	Channel 4233 846.6 MHz 24.89 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position		0.143* (0.135)		22.4	21.3

Table 12: Measurement results for WCDMA V (FDD) for the Option GI0301 in combination with the Dell Inspiron 9100.

Test Position (Liquid depth 15.5 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 4132 826.4 MHz 21.50 dBm	Channel 4183 836.6 MHz 21.30dBm	Channel 4233 846.6 MHz 21.90 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position (HSDPA)		0.243* (-0.067)		22.4	21.3

Table 13: Measurement results for WCDMA V (FDD), HSDPA (H-Set 1, Sub-test 1) for the Option GI0301 in combination with the DELL Latitude C810 Notebook.

Test Position (Liquid depth 16.3 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 9262 1852.4 MHz 24.56 dBm	Channel 9400 1880.0 MHz 25.06 dBm	Channel 9538 1907.6 MHz 24.85 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position	1.280 (-0.049)	1.410 (0.030)	0.977 (0.001)	22.5	21.6

Table 14: Measurement results for WCDMA II (FDD) for the Option GI0301 in combination with the DELL Latitude C810 Notebook.

Test Position (Liquid depth 16.3 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 9262 1852.4 MHz 24.56 dBm	Channel 9400 1880.0 MHz 25.06 dBm	Channel 9538 1907.6 MHz 24.85 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position	1.090 (0.000)	1.080 (0.162)	0.752 (-0.125)	22.5	21.6

Table 15: Measurement results for WCDMA II (FDD) for the Option GI0301 in combination with the Acer TravelMate.

Test Position (Liquid depth 16.3 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 9262 1852.4 MHz 24.56 dBm	Channel 9400 1880.0 MHz 25.06 dBm	Channel 9538 1907.6 MHz 24.85 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position	1.350 (0.120)	1.310 (0.091)	0.882 (0.001)	22.5	21.6

Table 16: Measurement results for WCDMA II (FDD) for the Option GI0301 in combination with the Dell Inspiron 9100.

Test Position (Liquid depth 16.3 cm)	SAR _{1g} [W/kg] (Drift[dB])			Temperature	
	Channel 9262 1852.4 MHz 21.10 dBm	Channel 9400 1880.0 MHz 20.90 dBm	Channel 9538 1907.6 MHz 21.40 dBm	Ambient [° C]	Liquid [° C]
Lap Held Position (HSDPA)		1.390 (0.081)		22.5	21.6

Table 17: Measurement results for WCDMA II (FDD), HSDPA (H-Set 1, Sub-test 1) for the Option GI0301 in combination with the DELL Latitude C810 Notebook.

The “* Max Cube” labeling indicates that during the grid scanning an additional peak was found which was within 2.0 dB of the highest peak. The value of the highest cube is given in the tables above, the value from the second assessed cube is given in the SAR distribution plots (see appendix).

The above mentioned power values are “conducted” power values, they were measured on the same sample which was prepared for the FCC approval. The values were delivered by 7layers AG, Ratingen.

To control the output power stability during the SAR test the used DASY4 system calculates the power drift by measuring the e-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in the above tables labeled as: (Drift[dB]). This ensures that the power drift during one measurement is within 5%. Please note that we add the measured “power drift” values from the DASY4 system since the used CMU 200 delivers only 1 usable position after decimal point and therefore only one power level is listed in the above tables.

6 Evaluation

In Fig. 7 - 10 the head phantom SAR results for GPRS 850, GPRS 1900, WCDMA V (FDD) and WCDMA II (FDD) given in Table 4 - 17 are summarized and compared to the limit.

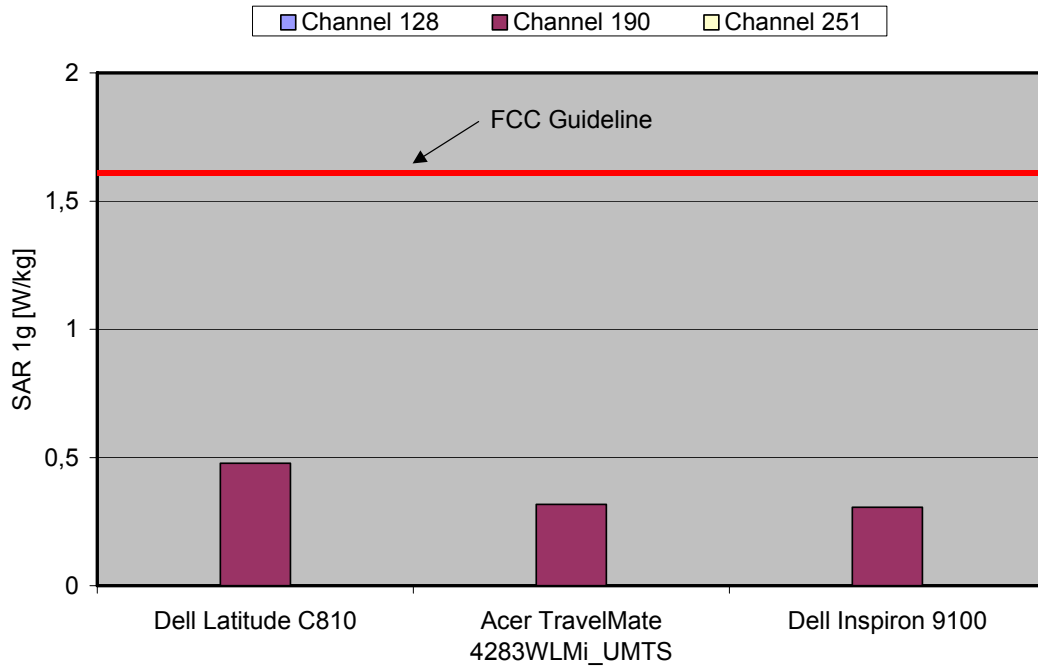


Fig. 7: The measured SAR values for the Option GI0301 for GPRS 850 (Class 10) in comparison to the FCC exposure limit.

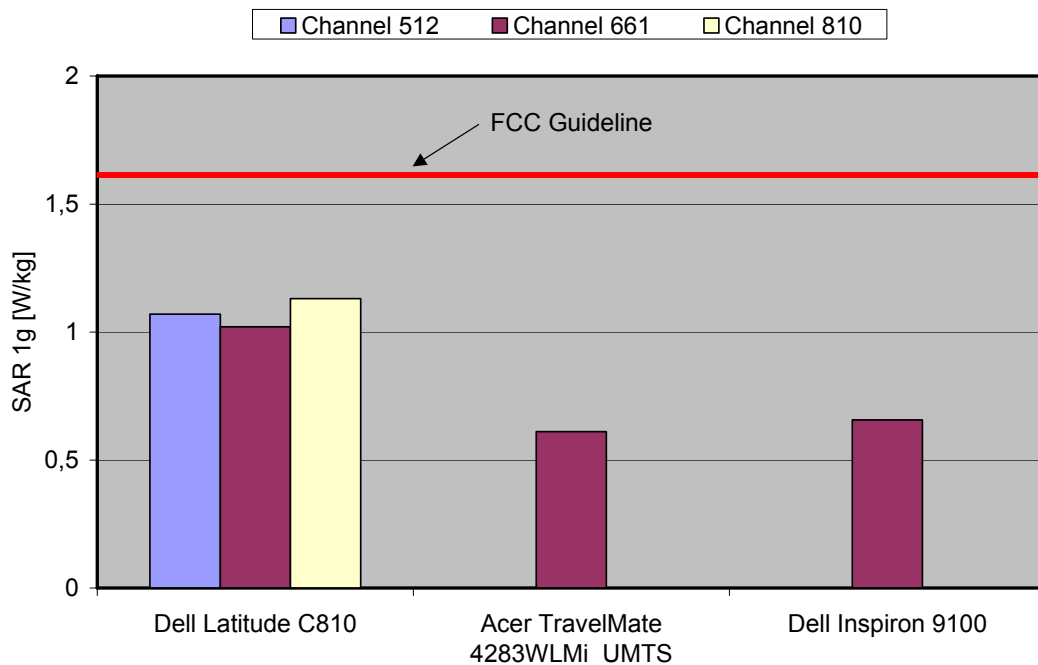


Fig. 8: The measured SAR values for the Option GI0301 for GPRS 1900 (Class 12) in comparison to the FCC exposure limit.

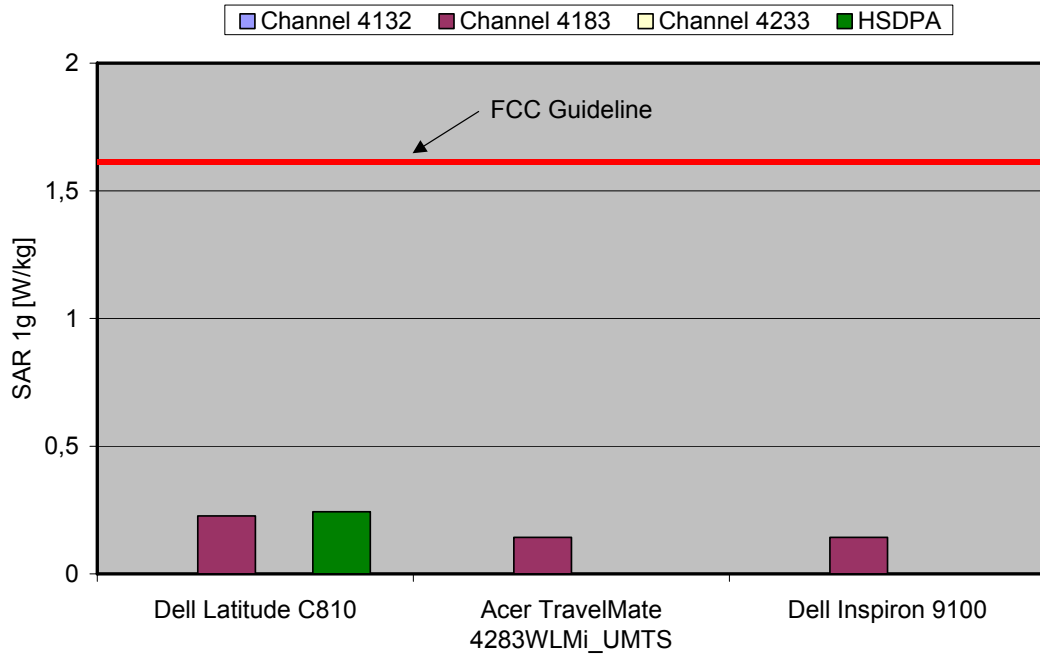


Fig. 9: The measured SAR values for the Option GI0301 for WCDMA V (FDD) in comparison to the FCC exposure limit.

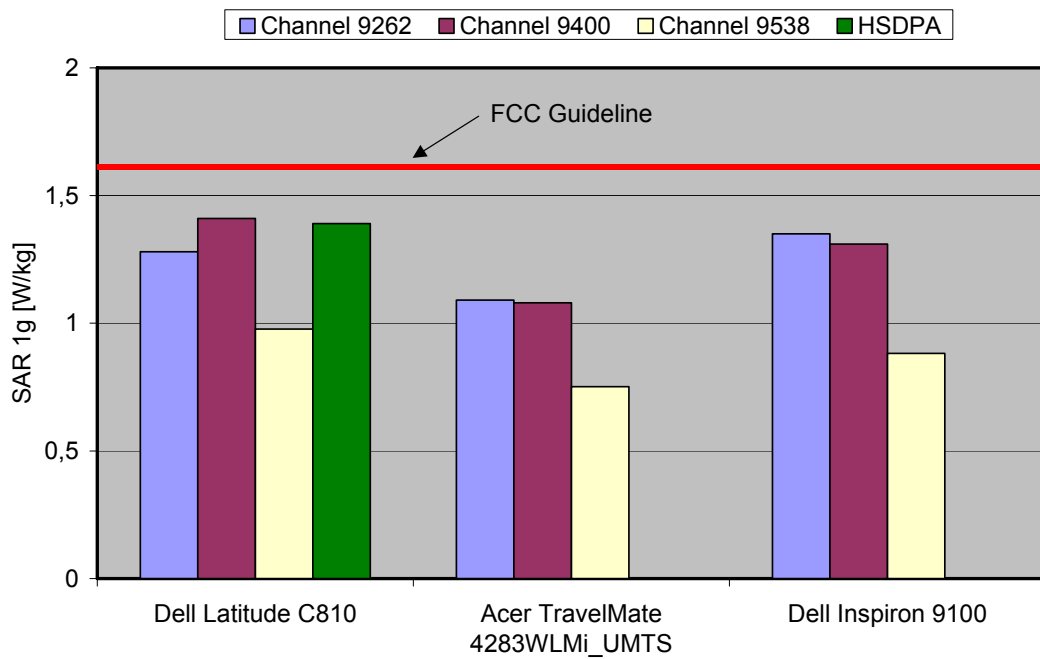


Fig. 10: The measured SAR values for the Option GI0301 for WCDMA II (FDD) in comparison to the FCC exposure limit.

The Option GI0301 PCMCIA card (FCC ID: NCMOGI0301E) is in compliance with the Federal Communications Commission (FCC) Guidelines [OET 65] for uncontrolled exposure.

The USB card was tested for the following configurations:

Body Worn for GPRS 850 (Class 10), GPRS 1900 (Class 12), WCDMA II (FDD) and WCDMA V (FDD) in lap held position with the bottom of the computer in direct contact against the flat phantom. In addition, body SAR was also measured in HSDPA, using the highest body SAR configuration without HSDPA. The card was tested with three host products (DELL Latitude C810, Acer TravelMate and Dell Inspiron 9100).

Due to the used power reduction on GSM 850 in GPRS Class 12, the tests for this band was conducted with GPRS Class 10 to cover the worst case.

7 Appendix

7.1 Administrative Data

Contact: IMST GmbH
 Carl-Friedrich-Gauß-Str. 2
 D-47475 Kamp-Lintfort, Germany
 Tel.: +49- 2842-981 373, Fax: +49- 2842-981 399
 email: hennes@imst.de

Date of measurement: July 26, 2007 – July 31, 2007

Date of validation: 835 MHz (GSM 850): July 26, 2007
 835 MHz (WCDMA V): July 27, 2007
 1900 MHz (GSM 1900): July 30, 2007
 1900 MHz (WCDMA II): July 31, 2007

Data stored: 7layers_6620_653

7.2 Device under Test and Test Conditions

MTE: Option GI0301 (USB card), with FCC ID NCMOGI0301. As stated by Option, the used card (FCC ID NCMOGI0301) is physical identical to FCC ID:NCMOGI0301E, identical prototype

Date of receipt: July 26, 2007

IMEI: 004401440497382

FCC ID: NCMOGI0301E

Equipment class: Portable device

Power supply: Host Device

Antenna: Antenna Type: integrated

Supported standards: GSM 850, GSM 900, GSM 1800, GSM 1900, WCDMA I (FDD), WCDMA II (FDD), WCDMA V (FDD)

Operational Mode Class: B (GPRS and GSM, but not simultaneously)

GPRS Multislot Class: 12 (4 down, 4 up, 5 active)

Used uplink slots: 3 (GSM 850, GSM 900, GPRS Class 10)
 4 (GSM 1800, GSM 1900, GPRS Class 12)

Modulation: GPRS: GMSK; WCDMA (FDD): QPSK

Power Class: GSM 850: 4, tested with power level 5
 GSM 900: 4, tested with power level 5
 GSM 1800: 1, tested with power level 0
 GSM 1900: 1, tested with power level 0
 WCDMA I (FDD): tested with max. allow. UE Power of 33dBm
 WCDMA II (FDD): tested with max. allow. UE Power of 33dBm
 WCDMA V (FDD): tested with max. allow. UE Power of 33dBm

RF exposure environment: General Population/Uncontrolled

Measured Standards: GPRS 850, GPRS 1900, WCDMA II, WCDMA V

Method to establish a call: GPRS 850, GPRS 1900 WCDMA II,V: Basestation simulator, using the air interface

Used host products: Dell Latitude C810, Acer TravelMate, Dell Inspiron 9100
 Used Phantom: SAM Twin Phantom V4.0, as defined by the IEEE SCC-34/SC2 group and delivered by Schmid & Partner Engineering AG

Option GI0301	TX Range [MHz]	RX Range [MHz]	Used Channels* [low, middle, high]	Used Crest Factor
GSM 850	824.2 – 848.8	869.2 – 893.8	128, 190 , 251	4
GSM 1900	1850.2 –1909.8	1930.2 – 1989.8	512, 661, 810	2
WCDMA II (FDD)	1852.4 – 1907.6	1932.4 – 1987.6	9262, 9400, 9538	1
WCDMA V (FDD)	826.4 – 846.6	871.4 – 891.6	4132, 4183, 4233	1
WCDMA (HSDPA)	H-Set 1, Sub-Test 1 according table C10.1.4 of 3GPP 34.121			1

Table 18: Measured standards, Option GI0301 (*: The lowest and highest channels were only measured when the SAR of the middle channel is > 0.8 W/kg).

7.3 Tissue Recipes

The following recipes are provided in percentage by weight.

835 MHz, Body:	52.40 %	De-Ionized Water
	01.50 %	Salt
	45.00 %	Sugar
	00.10 %	Preventol D7
	01.00 %	Hydroxyetyl-Cellulose
1900 MHz, Body:	29.68%	Diethylenglykol-monobutylether
	70.00%	De-Ionized Water
	0.32%	Salt

7.4 Material Parameters

For the measurement of the following parameters the HP 85070B dielectric probe kit is used, representing the open-ended coaxial probe measurement procedure. The measured values should be within $\pm 5\%$ of the recommended values given by the FCC.

Frequency		ϵ_r	σ [S/m]
835 MHz Body July 26, 2007 (Validation GSM 850)	Recommended Value	55.20 ± 2.70	0.97 ± 0.10
	Measured Value	53.40	0.99
835 MHz Body July 27, 2007 (Validation WCDMA V)	Recommended Value	55.20 ± 2.70	0.97 ± 0.10
	Measured Value	54.20	1.00
1900 MHz Body July 30, 2007 (Validation GSM 1900)	Recommended Value	53.30 ± 2.65	1.52 ± 0.15
	Measured Value	52.30	1.51
1900 MHz Body July 31, 2007 (Validation WCDMA II)	Recommended Value	53.30 ± 2.65	1.52 ± 0.15
	Measured Value	51.80	1.48

Table 19: Parameters of the tissue simulating liquid.

7.5 Simplified Performance Checking

The simplified performance check was realized using the dipole validation kits. The input power of the dipole antennas were 250 mW and they were placed under the flat part of the SAM phantoms. The target and measured results are listed in the Table 20 - 21 and shown in Fig. 11 - 14. The target values were adopted from the manufactures calibration certificates.

Available Dipoles		SAR_{1g} [W/kg]	ϵ_r	σ [S/m]
D835V2, SN #437	Target Values Body	2.55	54.10	1.00
D1900V2, SN #535		9.59	51.80	1.54
D1900V2, SN #5d051		9.86	52.70	1.56

Table 20: Dipole target results.

Used Dipoles		SAR_{1g} [W/kg]	ϵ_r	σ [S/m]
835 MHz, SN: 437 July 26, 2007 (Validation GSM 850)	Measured Values Body	2.37	53.40	0.99
835 MHz, SN: 437 July 27, 2007 (Validation WCDMA V)		2.45	54.20	1.00
1900 MHz, SN: 535 July 30, 2007 (Validation GSM 1900)		9.52	52.30	1.51
1900 MHz, SN: 535 July 31, 2007 (Validation WCDMA II)		9.62	51.80	1.48

Table 21: Measured dipole validation results.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: [260707_b_1669.da4](#)

DUT: Dipole 835 MHz SN437; Type: D835V2; Serial: D835V2 - SN:437
 Program Name: System Performance Check at 835 MHz

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 835$ MHz; $\sigma = 0.99$ mho/m; $\epsilon_r = 53.4$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6R - SN1669; ConvF(6.22, 6.22, 6.22); Calibrated: 15.02.2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 09.02.2007
- Phantom: SAM Sugar 1059; Type: Speag; Serial: 1059
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=10mm, Pin=250mW/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.60 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.5 V/m; Power Drift = -0.166 dB

Peak SAR (extrapolated) = 3.48 W/kg

SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.54 mW/g

Maximum value of SAR (measured) = 2.56 mW/g

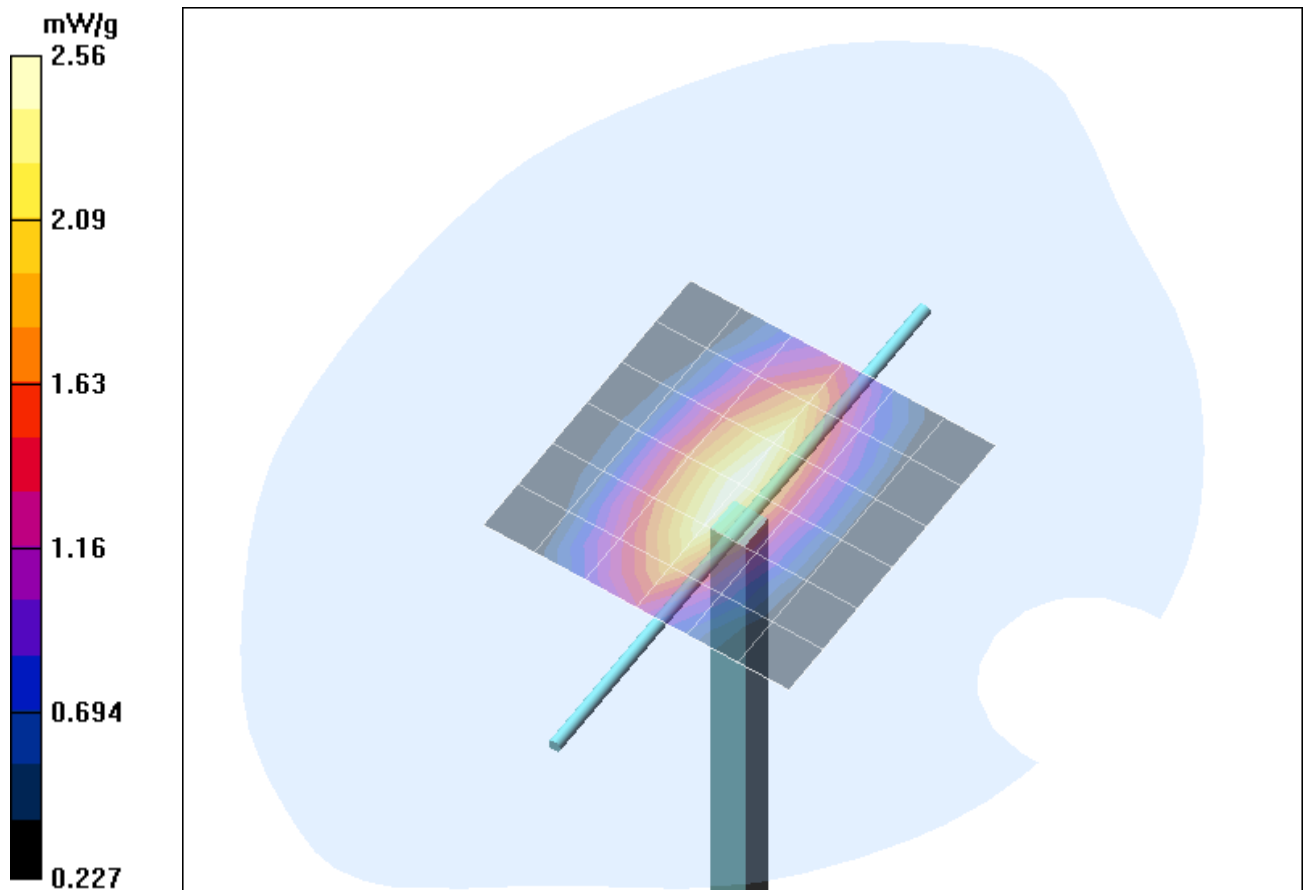


Fig. 11: Validation measurement 835 MHz Body (GSM 850, July 26, 2007), coarse grid.
 Ambient Temperature: 22.3°C, Liquid Temperature: 21.6°C.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: [270707_b_1669.da4](#)

DUT: Dipole 835 MHz SN437; Type: D835V2; Serial: D835V2 - SN:437
 Program Name: System Performance Check at 835 MHz

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 835$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 54.2$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6R - SN1669; ConvF(6.22, 6.22, 6.22); Calibrated: 15.02.2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 09.02.2007
- Phantom: SAM Sugar 1059; Type: Speag; Serial: 1059
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=10mm, Pin=250mW/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.61 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.2 V/m; Power Drift = 0.036 dB

Peak SAR (extrapolated) = 3.62 W/kg

SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.59 mW/g

Maximum value of SAR (measured) = 2.66 mW/g

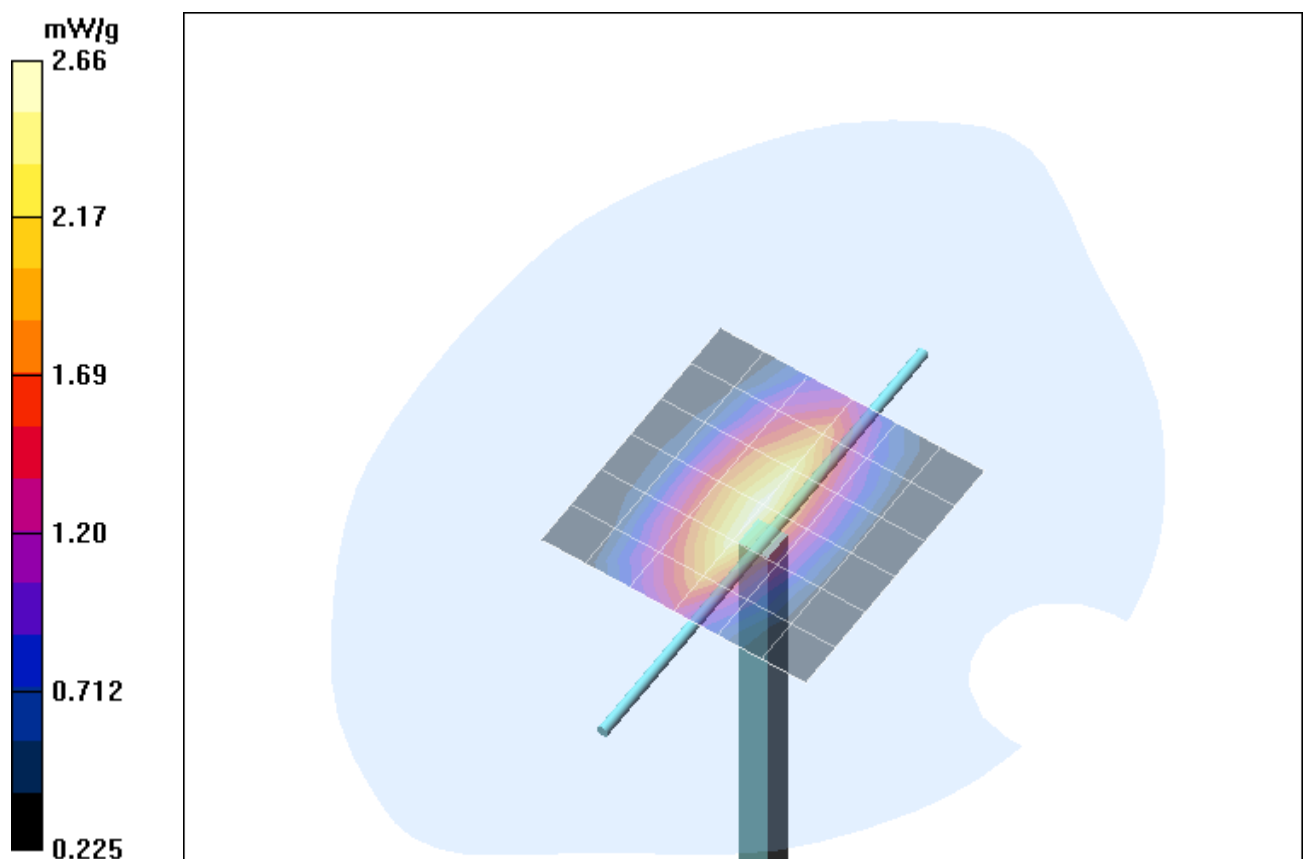


Fig. 12: Validation measurement 835 MHz Body (WCDMA V, July 27, 2007), coarse grid. Ambient Temperature: 22.5°C, Liquid Temperature: 21.3°C.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: [300707_b_1669.da4](#)

DUT: Dipole 1900 MHz SN: 535; Type: D1900V2; Serial: D1900V2 - SN535
Program Name: System Performance Check at 1900 MHz

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6R - SN1669; ConvF(4.49, 4.49, 4.49); Calibrated: 15.02.2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 09.02.2007
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=10mm, Pin=250mW/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 10.6 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 89.6 V/m; Power Drift = -0.057 dB

Peak SAR (extrapolated) = 16.3 W/kg

SAR(1 g) = 9.52 mW/g; SAR(10 g) = 5.02 mW/g

Maximum value of SAR (measured) = 10.8 mW/g

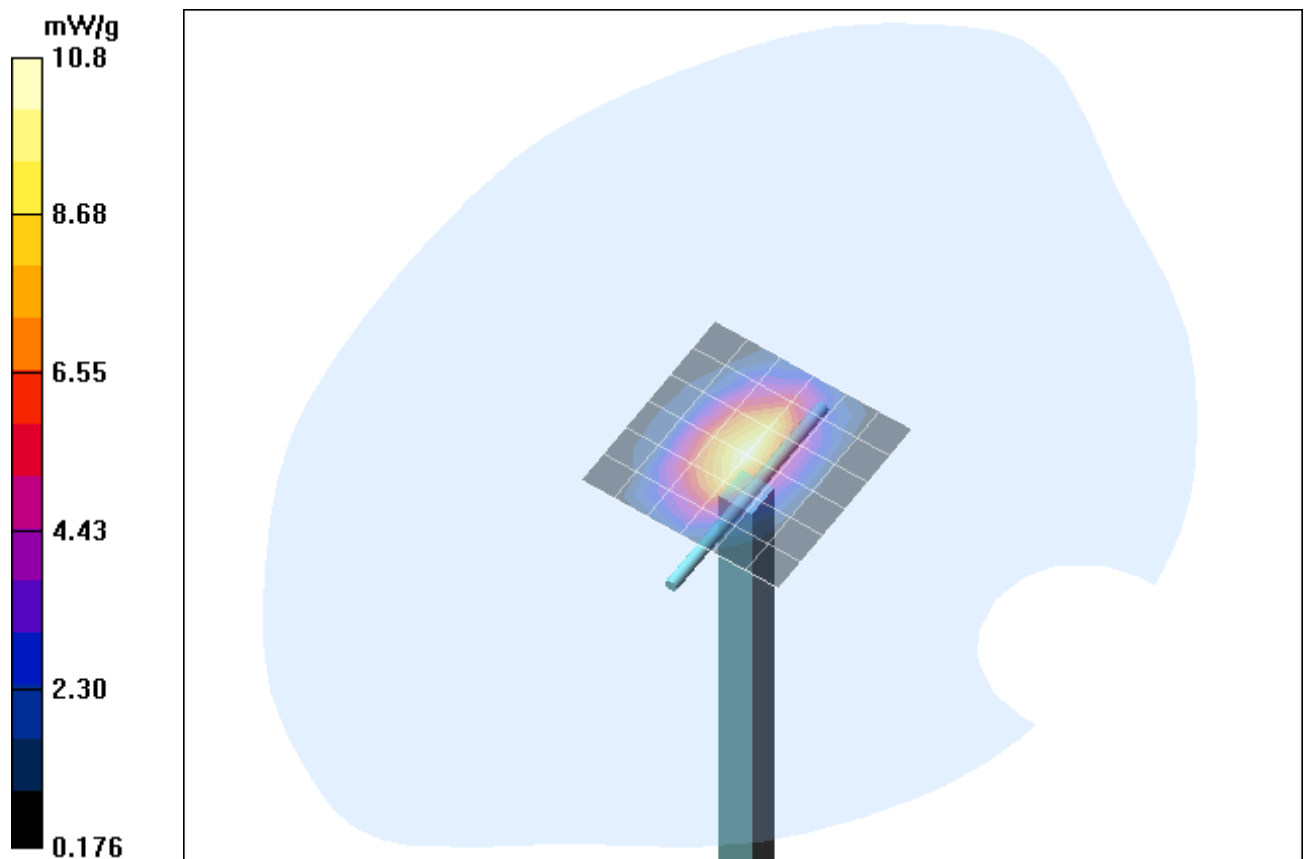


Fig. 13: Validation measurement 1900 MHz Body (GSM 1900, July 30, 2007), coarse grid. Ambient Temperature: 22.6°C, Liquid Temperature: 21.6°C.

Test Laboratory: IMST GmbH, DASY Blue (I); File Name: [310707_b_1669.da4](#)

DUT: Dipole 1900 MHz SN: 535; Type: D1900V2; Serial: D1900V2 - SN535
 Program Name: System Performance Check at 1900 MHz

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.48$ mho/m; $\epsilon_r = 51.8$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6R - SN1669; ConvF(4.49, 4.49, 4.49); Calibrated: 15.02.2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn335; Calibrated: 09.02.2007
- Phantom: SAM Glycol 1176; Type: Speag; Serial: 1176
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=10mm, Pin=250mW/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 10.1 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.1 V/m; Power Drift = 0.067 dB

Peak SAR (extrapolated) = 16.1 W/kg

SAR(1 g) = 9.62 mW/g; SAR(10 g) = 5.14 mW/g

Maximum value of SAR (measured) = 10.9 mW/g

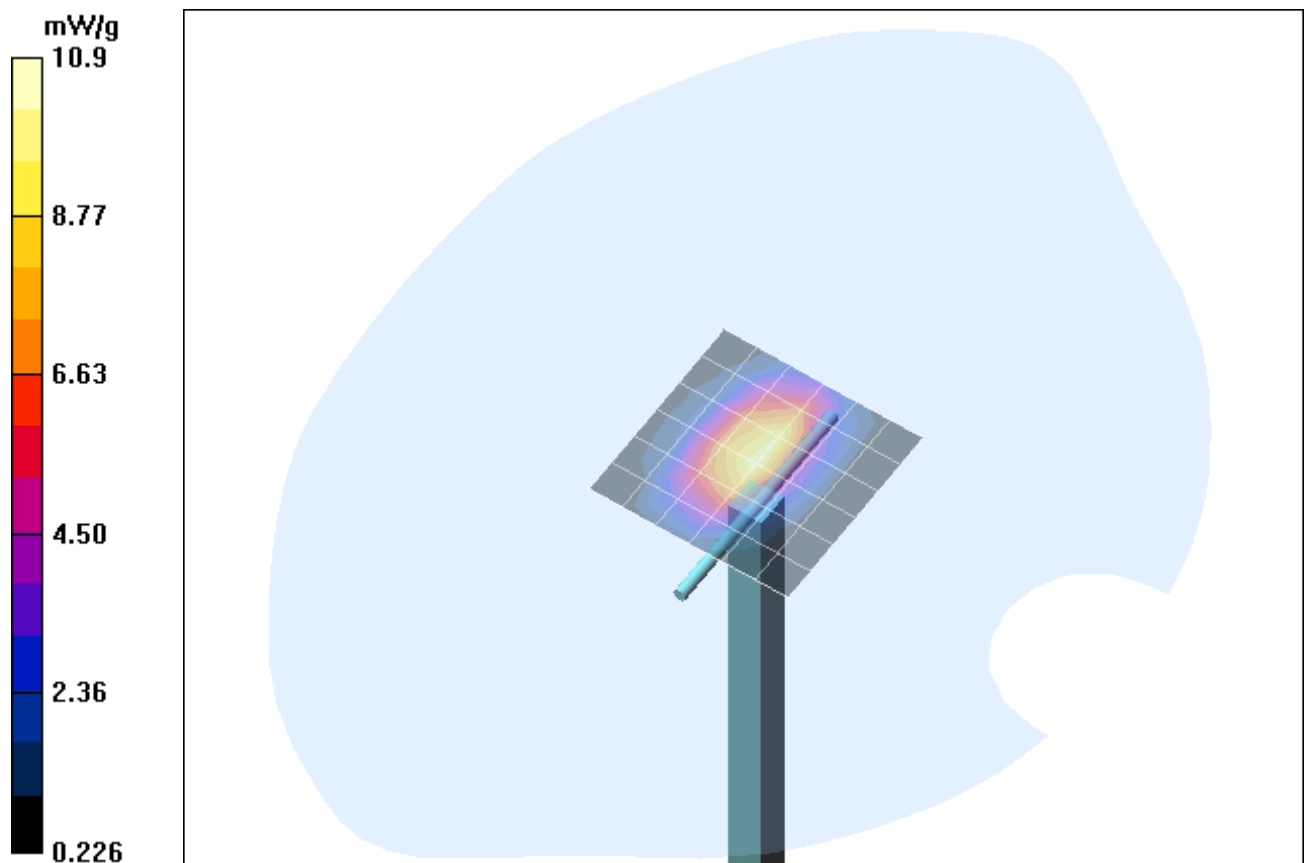


Fig. 14: Validation measurement 1900 MHz Body (WCDMA II, July 31, 2007), coarse grid. Ambient Temperature: 22.6°C, Liquid Temperature: 21.7°C.

Error Sources	Uncertainty Value	Probability Distribution	Divis or	c_i	Standard Uncertainty	v_i^2 or v_{eff}
Measurement System						
Probe calibration	$\pm 4.8 \%$	Normal	1	1	$\pm 4.8 \%$	∞
Axial isotropy	$\pm 4.7 \%$	Rectangular	$\sqrt{3}$	1	$\pm 2.7 \%$	∞
Hemispherical isotropy	$\pm 0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 0 \%$	∞
Boundary effects	$\pm 1.0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 0.6 \%$	∞
Linearity	$\pm 4.7 \%$	Rectangular	$\sqrt{3}$	1	$\pm 2.7 \%$	∞
System detection limit	$\pm 1.0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 0.6 \%$	∞
Readout electronics	$\pm 1.0 \%$	Normal	1	1	$\pm 1.0 \%$	∞
Response time	$\pm 0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 0 \%$	∞
Integration time	$\pm 0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 0 \%$	∞
RF ambient conditions	$\pm 3.0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 1.7 \%$	∞
Probe positioner	$\pm 0.4 \%$	Rectangular	$\sqrt{3}$	1	$\pm 0.2 \%$	∞
Probe positioning	$\pm 2.9 \%$	Rectangular	$\sqrt{3}$	1	$\pm 1.7 \%$	∞
Algorithms for max SAR eval.	$\pm 1.0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 0.6 \%$	∞
Dipole						
Dipole Axis to Liquid Distance	$\pm 2.0 \%$	Rectangular	1	1	$\pm 1.2 \%$	∞
Input power and SAR drift mea.	$\pm 4.7 \%$	Rectangular	$\sqrt{3}$	1	$\pm 2.7 \%$	∞
Phantom and Set-up						
Phantom uncertainty	$\pm 4.0 \%$	Rectangular	$\sqrt{3}$	1	$\pm 2.3 \%$	∞
Liquid conductivity (target)	$\pm 5.0 \%$	Rectangular	$\sqrt{3}$	0.64	$\pm 1.8 \%$	∞
Liquid conductivity (meas.)	$\pm 2.5 \%$	Normal	1	0.64	$\pm 1.6 \%$	∞
Liquid permittivity (target)	$\pm 5.0 \%$	Rectangular	$\sqrt{3}$	0.6	$\pm 1.7 \%$	∞
Liquid permittivity (meas.)	$\pm 2.5 \%$	Normal	1	0.6	$\pm 1.5 \%$	∞
Combined Uncertainty					$\pm 8.4 \%$	

Table 22: Uncertainty budget for the system performance check.

7.6 Environment

To comply with the required noise level (less than 12 mW/kg) periodically measurements without a DUT were conducted. Humidity: $37\% \pm 5\%$

7.7 Test Equipment

Test Equipment	Model	Serial Number	Last Calibration	Next Calibration
DASY4 Systems				
Software Versions DASY4	V4.7	N/A	N/A	N/A
Software Versions SEMCAD	V1.8	N/A	N/A	N/A
Dosimetric E-Field Probe	ET3DV6	1579	01/2007	01/2008
Dosimetric E-Field Probe	ET3DV6	1669	02/2007	02/2008
Dosimetric E-Field Probe	EX3DV4	3536	09/2006	09/2007
Data Acquisition Electronics	DAE 3	335	02/2007	02/2008
Data Acquisition Electronics	DAE 4	631	07/2006	07/2007
Phantom	SAM	1059	N/A	N/A
Phantom	SAM	1176	N/A	N/A
Phantom	SAM	1340	N/A	N/A
Phantom	SAM	1341	N/A	N/A
Dipoles				
Validation Dipole	D835V2	437	12/2006	12/2007
Validation Dipole	D1900V2	535	12/2006	12/2007
Validation Dipole	D1900V2	5d051	08/2006	08/2008
Material Measurement				
Network Analyzer	HP8753D	3410A06555	12/2006	12/2007
Dielectric Probe Kit	HP85070B	US33020263	N/A	N/A

Table 23: SAR equipment.

Test Equipment	Model	Serial Number	Last Calibration	Next Calibration
Power Meters				
Power Meter, Agilent	E4416A	GB41050414	12/2006	12/2008
Power Meter, Agilent	E4417A	GB41050441	12/2006	12/2008
Power Meter, Anritsu	ML2487A	6K00002319	12/2005	12/2007
Power Meter, Anritsu	ML2488A	6K00002078	12/2005	12/2007
Power Sensors				
Power Sensor, Agilent	E9301H	US40010212	12/2006	12/2008
Power Sensor, Agilent	E9301A	MY41495584	12/2006	12/2008
Power Sensor, Anritsu	MA2481B	031600	12/2005	12/2007
Power Sensor, Anritsu	MA2490A	031565	12/2005	12/2007
RF Sources				
Network Analyzer	HP8753D	3410A06555	12/2006	12/2007
Rohde & Schwarz	SME300	100142	N/A	N/A
Amplifiers				
Mini Circuits	ZHL-42	D012296	N/A	N/A
Mini Circuits	ZHL-42	D031104#01	N/A	N/A
Mini Circuits	ZVE-8G	D031004	N/A	N/A
Radio Tester				
Rohde & Schwarz	CMU200	835305/050	01/2007	01/2008
Willtek	4202S	0813151	N/A	N/A
Anritsu	8815 A	6200518401	N/A	N/A

Table 24: Test equipment, General.

7.8 Certificates of conformity

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Certificate of conformity

Item	Dosimetric Assessment System DASY4
Type No	SD 000 401A, SD 000 402A
Software Version No	4.5
Manufacturer / Origin	Schmid & Partner Engineering AG Zeughausstrasse 43, CH-8004 Zürich, Switzerland

References

- [1] 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, December 2003
- [2] EN 50361:2001, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz – 3 GHz)", July 2001
- [3] IEC 62209 – 1, "Specific Absorption Rate (SAR) in the frequency range of 300 MHz to 3 GHz – Measurement Procedure, Part 1: Hand-held mobile wireless communication devices", February 2005
- [4] IEC 62209 – 2, Draft Version 0.9, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation and Procedures
Part 2: Procedure to determine the Specific Absorption Rate (SAR) for ... including accessories and multiple transmitters", December 2004
- [5] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 01-01
- [6] ANSI-PC63.19-2001, Draft 3.6, "American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids", April 2005

Conformity

We certify that this system is designed to be fully compliant with the standards [1 – 6] for RF emission tests of wireless devices.

Uncertainty

The uncertainty of the measurements with this system was evaluated according to the above standards and is documented in the applicable chapters of the DASY4 system handbook.

The uncertainty values represent current state of methodology and are subject to changes. They are applicable to all laboratories using DASY4 provided the following requirements are met (responsibility of the system end user):

- 1) the system is used by an experienced engineer who follows the manual and the guidelines taught during the training provided by SPEAG,
- 2) the probe and validation dipoles have been calibrated for the relevant frequency bands and media within the requested period,
- 3) the DAE has been calibrated within the requested period,
- 4) the "minimum distance" between probe sensor and inner phantom shell and the radiation source is selected properly,
- 5) the system performance check has been successful,
- 6) the operational mode of the DUT is CW, CDMA, FDMA or TDMA (GSM, DCS, PCS, IS136, PDC) and the measurement/integration time per point is ≥ 500 ms,
- 7) the dielectric parameters of the liquid are conformant with the standard requirement,
- 8) the DUT has been positioned as described in the manual.
- 9) the uncertainty values from the calibration certificates, and the laboratory and measurement equipment dependent uncertainties, are updated by end user accordingly.

Date 31.5.2005

Signature / Stamp

s p e a g

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info@speag.com, http://www.speag.com

Fig. 15: Certificate of conformity for the used DASY4 system

Schmid & Partner Engineering AG

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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

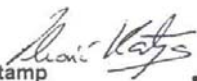
- [1] CENELEC EN 50361
- [2] IEEE P1528-200x draft 6.5
- [3] IEC PT 62209 draft 0.9
- (*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

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



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Fig. 16: Certificate of conformity for the used SAM phantom

7.9 Pictures of the device under test

Fig. 17 – 22 show the device under test.



Fig. 17: Front view of the DELL Latitude C810 Notebook



Fig. 18: Side view of the DELL Latitude C810 Notebook



Fig. 19: Front view of the Acer TravelMate.



Fig. 20: Side view of the Acer TravelMate.



Fig. 21: Front view of the Dell Inspiron 9100.



Fig. 22: Side view of the Dell Inspiron 9100.

7.10 Test Positions for the Device under Test

Fig. 23 – Fig. 25 shown the test positions for the SAR measurements.

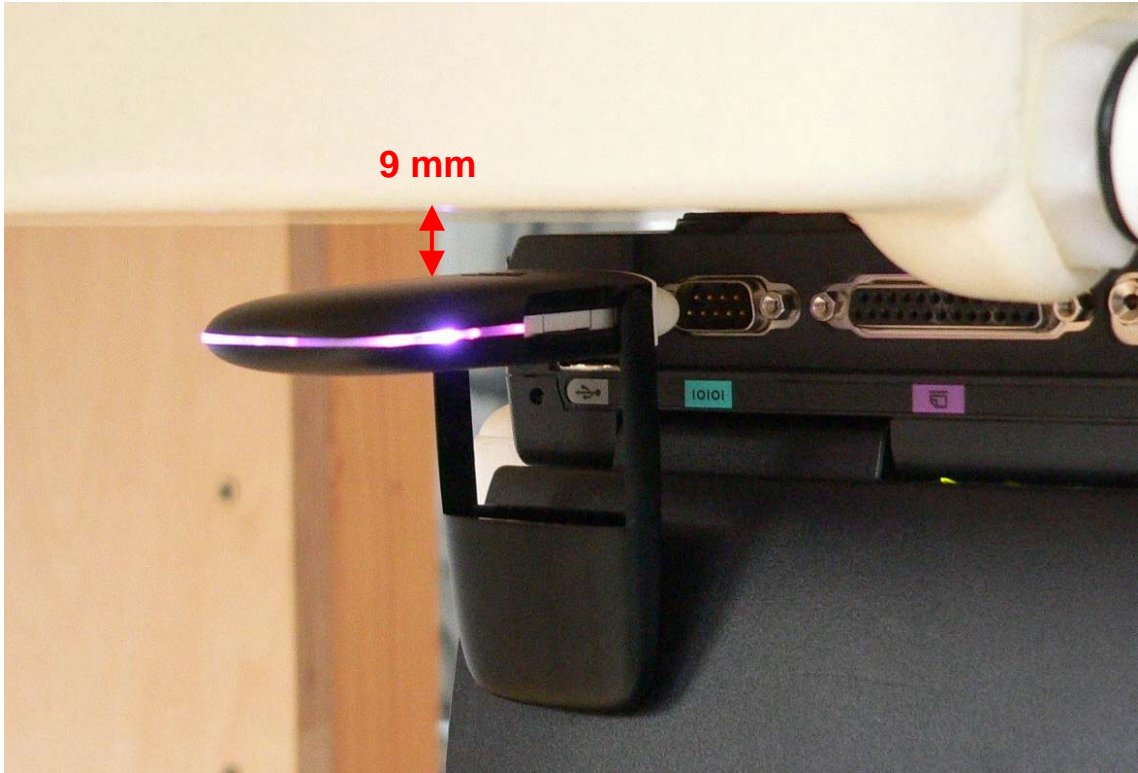


Fig. 23: Lap Held Position with the DELL Latitude C810 Notebook.

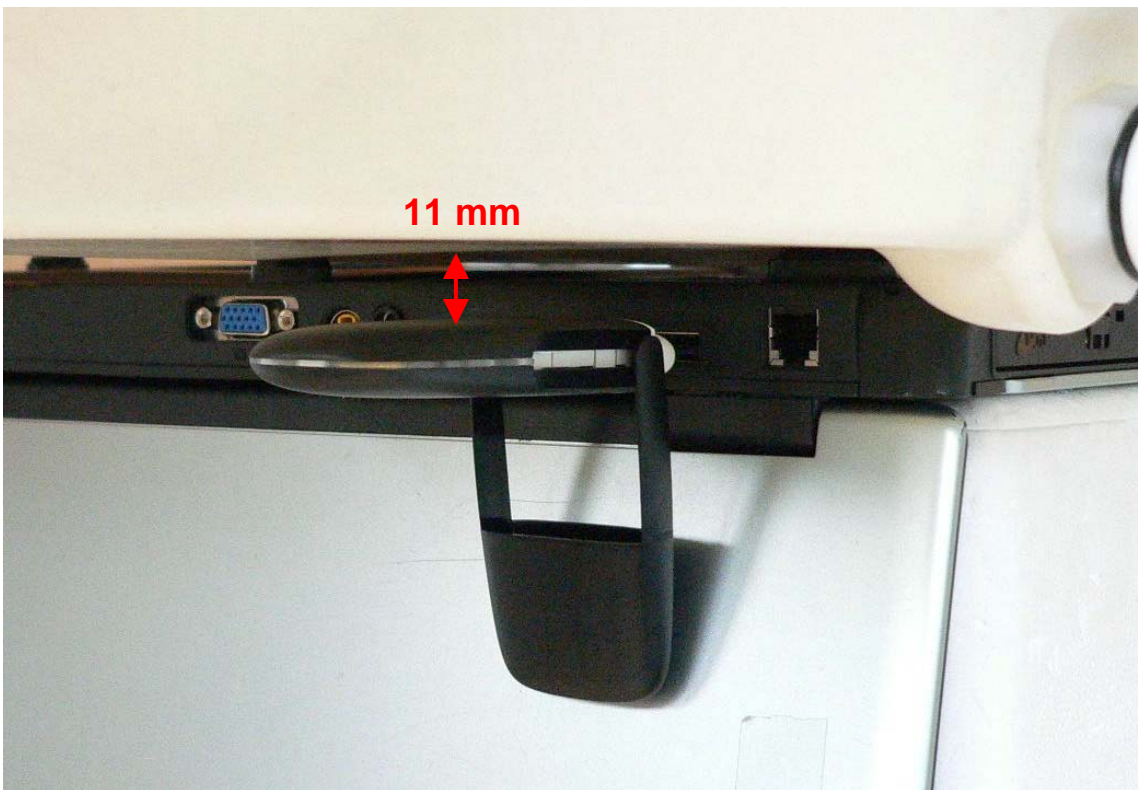


Fig. 24: Lap Held Position with the Acer TravelMate.

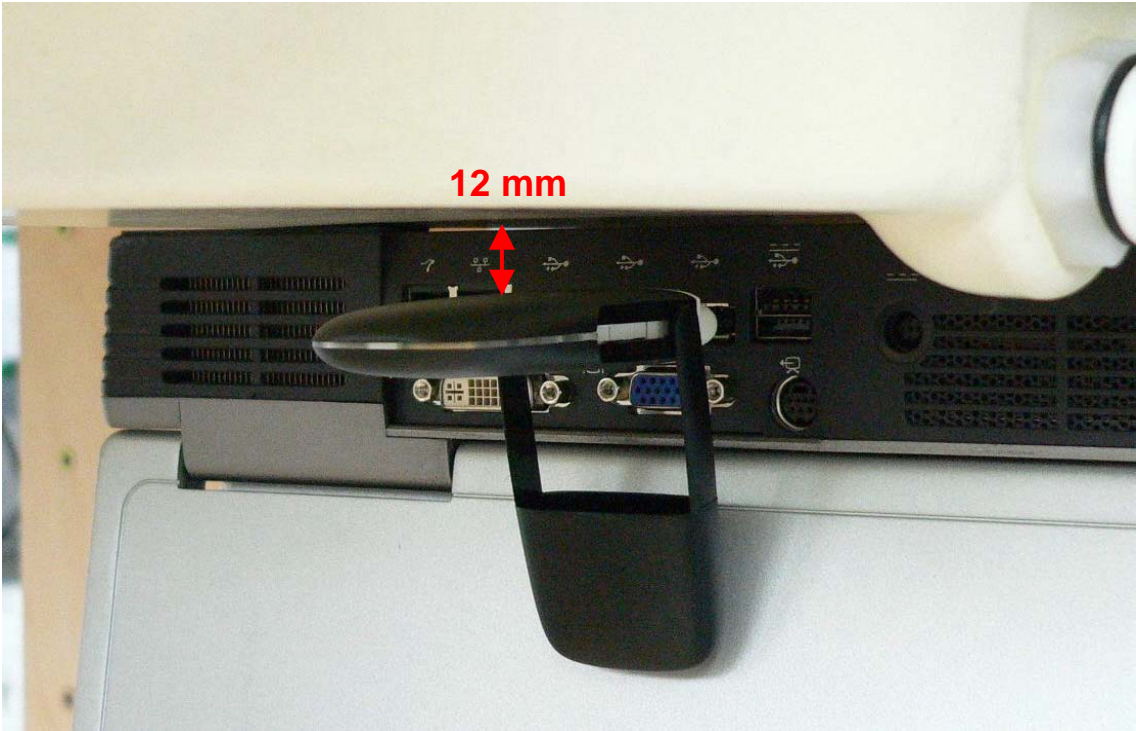


Fig. 25: Lap Held Position with the Dell Inspiron 9100.

7.11 Pictures to demonstrate the required liquid depth

Fig. 26 - 27 show the liquid depth in the used SAM phantom.



Fig. 26: Liquid depth for GPRS 850 and WCDMA V Body measurements.



Fig. 27: Liquid depth for GPRS 1900 and WCDMA II Body measurements.

8 References

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