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CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

Report No. : SRMC2007-H024-E0014

Product Name: HSDPA/UMTS/EDGE/GPRS/GSM Express Data Card

Product Model: MF335

FCC ID: Q78-ZTEMF335

Manufacture: ZTE Corporation

Specification: FCC OET Bulletin 65 (Edition 97-01)

The State Radio Monitoring Center, Equipment Testing Division

The State Radio Spectrum Monitoring and Testing Center

No.80 Beilishi Road Xicheng District Beijing, China

Tel: 86-10-68009202 Fax: 86-10-68009205

Executive Summary

The MF335 is a HSDPA/UMTS/EDGE/GPRS/GSM express Data Card operating in the 850MHz (UMTS) and 1900MHz (GSM) frequency bands. The device has a internal integrated antenna .The system concepts used are the GSM/GPRS/EDGE 1900 (Class10) and WCDMA/HSDPA V (FDD) standards.

The objective of the measurements done by SRMC (State radio monitoring center) was the dosimetric assessment of one device in the GSM/GPRS/EDGE 1900 (Class10) and WCDMA/HSDPA V (FDD) standards. The measurements were performed in combination with three different host products (IBM 2672-AEC, DELL LATITUDE D620, SONY VGN-SZ58N). 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 "DASY5".

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. All measurements have been performed in accordance to the recommendations given by SPEAG.

The maximum SAR of the MF335 is

Mode	CH/*f*(MHz)	Power	Position	Limit (mW/g)/1g	Measured (mW/g)	Result
WCDMA V	4233/846.6	22.5dBm	direct contact	1.6	**1.29**	PASS

Checked By: [illegible] **Tested By:** 刘佳

This Test Report Is Issued By: [illegible]

Issued date: 2007.10.30

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1. General information

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio Monitoring Center.

The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

Company： The State Radio Monitoring Center, Equipment Testing Division
The State Radio Spectrum Monitoring and Testing Center
Address： No.80 Beilishi Road, Xicheng District, Beijing China
City: Beijing
Country or Region: China
Contacted person: Wang Junfeng
Tel +86 10 68009181 +86 10 68009202
Fax: +86 10 68009195 +86 10 68009205
Email: Wangjf@srrc.org.cn

1.3 Applicant's details

Company: ZTE Corporation
Address： Zhongxing Bldg, High-Tech Park, Nan Shan,ShenZhen
City: ShenZhen City, GuangDong
Country or Region: P.R.China
Grantee Code: Q78
Contacted person: Tian li
Tel: +86 029-88723944
Fax: +86 029-88723529
Email: tian.li3@zte.com.cn

1.4 Manufacturer's details

Company: ZTE Corporation
Address： Zhongxing Bldg, High-Tech Park, Nan Shan,ShenZhen
City: ShenZhen City, GuangDong
Country or Region: P.R.China
Contacted person: Tian li
Tel: +86 029-88723944
Fax: +86 029-88723529
Email: tian.li3@zte.com.cn

1.5 Application details

Date of receipt of application: 2007-9-28

Date of receipt of test samples: 2007-10-8

Date of test: 2007-10-20 to 2007-10-28

1.6 Information of Test Sample

□Name of EUT	HSDPA/UMTS/EDGE/GPRS/GSM Express Data Card
□Product Model	MF335
□Frequency range	HSDPA/UMTS:Tx:824-849MHz Rx:869-894MHz EDGE/GPRS/GSM:Tx:1850-1910MHz Rx:1930-1990MHz
□Power Level	HSDPA/UMTS:24.0dBm EDGE/GPRS/GSM:30.0dBm
□Channel spacing	200kHz
□Modulation type	GPRS/GSM:GMSK EDGE:8PSK UMTS:QPSK HSDPA:16QAM
□Power supply	3.3V
□Duplex mode	FDD
□FCC ID	Q78-ZTEMF335
□Test condition of declaration	Normal
□Antenna type	Integral
□Serial number	355617010003670

1.7 Auxiliary Equipment (AE)

AE No.	Name	Model	Manufacturer
AE 1	notebook	LATITUDE D620	DELL
AE 2	notebook	2672-AEC	IBM
AE 3	notebook	VGN-SZ58N	SONY
AE 4	PCMCI-Express ADAPTER CRAD	5490891,5397857	DUEL

1.8 Reference Specification

FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01) Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields .

IEC 62209-1-2005: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1:Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)

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

IEEE 1528–2003: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.

FCC OET SAR Measurement Procedures for 3G Devices (Rev.1 June 2006)

[DAY4]

Schmid & partner Engineering AG: DAY4 Manual. Nov.2003

2. Subject of Investigation

The MF335 is a HSDPA/UMTS/EDGE/GPRS/GSM express Data Card operating in the 850MHz and 1900MHz frequency range. The device has a internal integrated antenna .The system concepts used are the GPRS 1900 (Class10) and WCDMA V (FDD) and standards. The card provides HSDPA in WCDMA and provides EDGE in GSM1900.

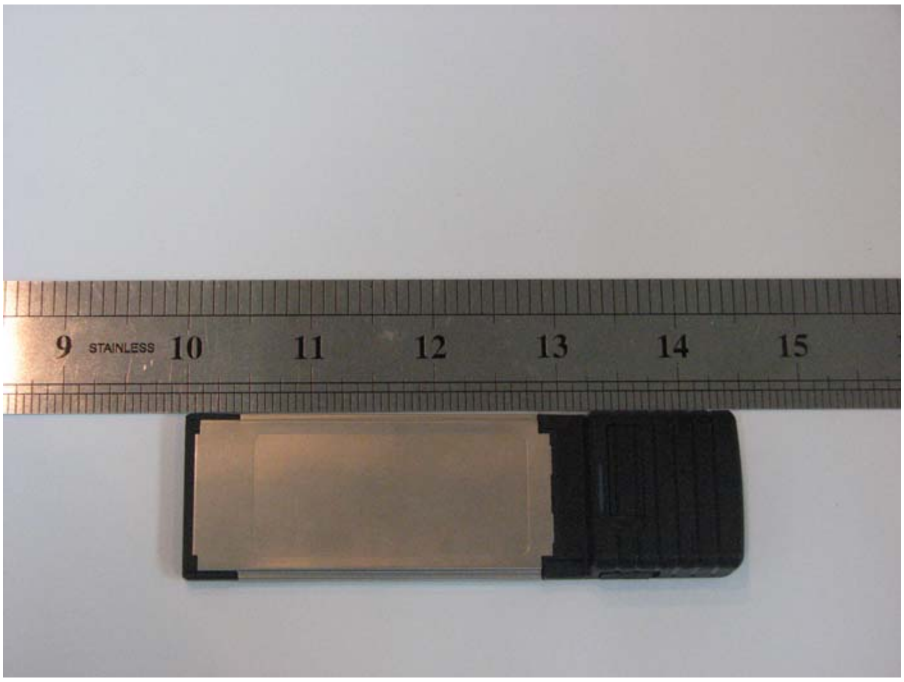


Fig 1: picture of the device under test

The objective of the measurements done by SRMC was the domestic assessment of one device in the WCDMA V (FDD) and GPRS 1900 standards . The measurements were performed in combination with three different host products (IBM 2672-AEC, DELL LATITUDE D620,SONY VGN-SZ58N). 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 domestic assessment system “DASY5”described below.

2.1 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].

2.2 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.

2.3 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 pads-The SAR is calculated from the r.m.s. electric field strength E inside the human body, the conductivity σ and the mass density p of the biological tissue:

$$SAR = \frac{\sigma E_i^2}{\rho}$$

$$SAR = c_i \left. \frac{dT}{dt} \right|_{t=0}$$

The specific absorption rate describes the initial rate of temperature rise dT/dt 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

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.

2.4 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 (SAR1g) with the shape of a cube.

Standards	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].

3.1 General Requirements

The test shall be performed using a miniature probe that is automatically positioned to measure the internal E-field distribution in a phantom model representing the human head exposed to the EM fields produced by mobile phones. From the measured E-field values, the SAR distribution and the maximum mass averaged SAR value shall be calculated.

The test shall be performed in a laboratory conforming to the following environmental conditions:

- the ambient temperature shall be in the range of 15 °C to 30°C and the variation shall not exceed 2 °C during the test;
- the mobile phone shall not interact with the local mobile networks;
- care shall be taken to avoid significant influence on SAR measurements by ambient EMsources;
- care shall be taken to avoid significant influence on SAR measurements by any reflection from the environment (such as floor, positioner, etc.).
- Validation of the system shall be done at least once a year according to the protocol defined in annex D of IEC 62209-1-2005 Standard.

3.2 Phantom specifications (shell and liquid)

Phantom requirements

The physical characteristics of the phantom model (size and shape) shall resemble the head and neck of a user since the shape is a dominant parameter for exposure. The phantom shall be made from material with dielectric properties similar to those of head tissues. To enable field scanning within it, the material shall be liquid contained in a head and neck shaped shell model. The shell model acts as a shaped container and shall be as unobtrusive as possible. The hand shall not be modeled.

The shell of the phantom shall be made of low loss and low permittivity material: *tan (δ)* ≤ 0,05 and ε ≤ 5. The thickness of the phantom is defined in the CAD files and the tolerance shall be ± 0, 2 mm in the area defined in the CAD files (where the phone touches the head).

Reference points on the phantom:

The probe positioning shall be defined in relation to three well defined points on the phantom. These points R1, R2 and R3 shall be used to calibrate the positioning system. Three other points, M for mouth, LE for left ear and/or RE for right ear (maximum acoustic coupling), shall be defined on the phantom(s) (see Figure 2). These points shall be used to allow reproducible positioning of the mobile phone in relation to the phantom.

3.3 Specifications of the SAR measurement equipment

The measurement equipment shall be calibrated as a complete system. The probe shall be calibrated together with the amplifier, measurement device and data acquisition system.

The measurement equipment shall be calibrated in each tissue equivalent liquid at the appropriate operating frequency and temperature according to the methodology defined in IEC 62209-1-2005 .The minimum detection limit shall be lower than 0,02 W/kg and the maximum detection limit shall be higher than 100 W/kg. The linearity shall be within 0,5 dB over the SAR range from 0,02 to 100 W/kg. The isotropy shall be within 1 dB. Sensitivity, linearity and isotropy shall be determined in the tissue equivalent liquid. The response time shall be specified. .

3.4 Scanning system specifications

The scanning system holding the probe shall be able to scan the whole exposed volume of the phantom in order to evaluate the three-dimensional SAR distribution. The mechanical structure of the scanning system shall not interfere with the SAR measurements.

The accuracy of the probe tip positioning over the measurement area shall be less than 0,2 mm. The sampling resolution shall be 1 mm or less.

3.5 Mobile phone holder specifications

The mobile phone holder shall permit the phone to be positioned according to a tolerance of 1° in the tilt angle. It shall be made of low loss and low permittivity material(s): *tan (δ)* ≤ 0, 05 and ε≤ 5.

4. Measurement preparation

4.1 General preparation

The dielectric properties of the tissue equivalent materials shall be measured prior to the SAR measurements and at the same temperature with a tolerance of 2° C. The measured values shall comply with the values defined at the specific frequencies in IEC 62209-1-2005 6.1.1. with a tolerance of 5 % for relative permittivity and conductivity.

The phantom shell shall be filled with the tissue equivalent liquid. The depth of the tissue equivalent liquid inside the phantom and at the vertical position of the ear canal shall be at least 15 cm. The liquid shall be carefully stirred before the measurement and it shall be free of air bubbles. The coordinate system of the scanning system shall be aligned to the coordinate system of the phantom with a tolerance of 0, 2 mm.

4.2Simplified performance checking

The purpose of the simplified performance check is to verify that the system operates within its specifications, check is a simple test of repeatability to make sure that the system works correctly during the compliance test. The check shall be performed in order to detect possible drift over short time periods and other errors in the system,

The simplified performance check shall be carried out according to annex

D of IEC 62209-1-2005. The simplified performance check shall be performed prior to compliance tests and the result shall be within ± 10 % of the target value. After the system validation check. The simplified performance check shall be performed at a central frequency of each transmitting band of the mobile phone.

4.3 Preparation of the mobile phone under test

The tested mobile phone shall use its internal transmitter. The battery shall be fully charged before each measurement .The output power and frequency (channel) shall be controlled by 8960(base station simulator). FM335 transmit its highest output peak power level allowed by the system. , The BTS antenna shall be placed at least 50 cm from the phone. The signal emitted by the emulator at antenna feed point shall be lower than the output level of the phone by at least 30 dB.

4.4 Position of the mobile phone in relation to the phantom

The mobile phone shall be tested in the cheek and tilted positions on left and right sides of the phantom.

Definition of the cheek position:

a) Position the device with the vertical centre line of the body of the device and the horizontal line crossing the centre of the ear piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical centre line with the reference plane containing the three ear and mouth reference points (M, RE and LE) and align the centre of the ear piece with the line RE-LE;
b) Translate the mobile phone box towards the phantom with the ear piece aligned with the line LE-RE until the phone touches the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the box until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost.

Definition of the tilted position:

a) Position the device in the Tilt position described above;
b) While maintaining the device in the reference plane described above and pivoting against the ear, move it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost. (see Figure 2)

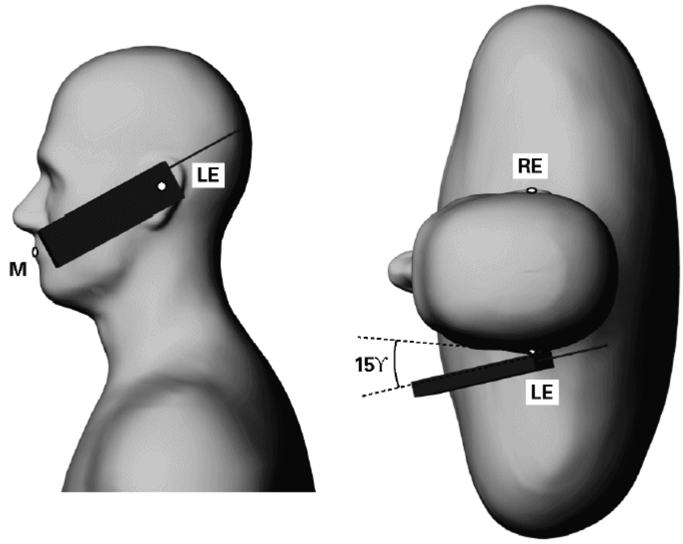


Fig 2 - The tilted position.

4.5Tests to be performed

The test procedure is according to FCC “SAR Measurement Procedures for 3G Devices”, June 2006.

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, optional antennas or optional battery packs which may significantly change the volume, lengths, flip open/closed, etc. of the device, or 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 or each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channel is optional.

For handsets with HSDPA body SAR is not required when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC. Otherwise, SAR is measured for HSDPA, using FRC, with the body exposure configuration that results the highest SAR in 12.2 RMC for that RF channel.

For measurement in WCDMA without HSDPA or HSUPA, the default test configuration is to establish a radio link between the DUT and a communication test set using a 12.2kbps RMC configured test loop mode1. The SAR will be tested for all bands using a Rel99 call configured to transmit at maximum output power per 3GPP 34.121. The Rel99 parameters are summarized in the following table.

Mode	Loop back Mode	Rel99 RMC	HSDPA FRC	βc/βd	Power Class 3 limit
Rel99	Test Mode1	12.2kbps RMC	---	8/15	24dBm (+1.7/-3.7dB)
Rel5 HSDPA	Test Mode1	12.2kbps RMC	H-Set1	9/15	24dBm (+1.7/-3.7dB)

In addition, SAR is also measured using a Rel5 HSDPA call with a FRC, together with a 12.2kbps RMC, using the highest body SAR configuration 12.2kbps RMC without HSDPA. Maximum output power is verified according to 3GPP 34.121 and SAR must be measured according to these maximum output conditions.

4.6 Additional information for Modules in Portable devices

To use “Portable modules” in multiple notebooks, cards and similar integralantenna packages has to be tested in three representative host products. According to Fig. 3 the device is tested in “lap-held” position with the bottom of the computer in direct contact against the flat phantom.

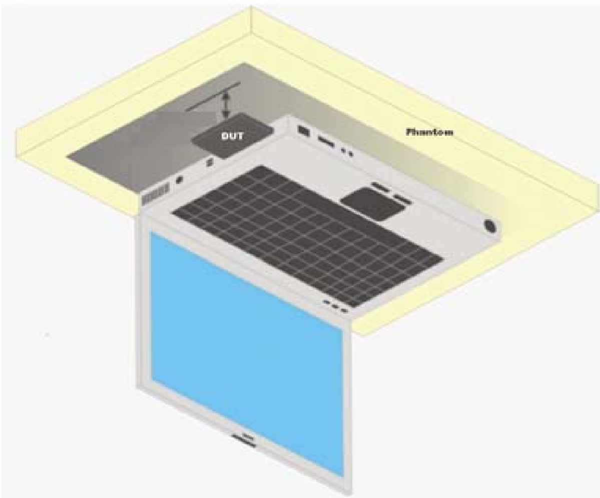


Fig. 3 Lap-held position, bottom of the computer is touching the phantom

5 The Measurement system

5.1 DASY5 Information

DASY5is 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 DASY5 system consists of the following items as shown in Fig3. Fig4 shows the installation in the SRMC laboratory [DASY2004].

- High precision robot with controller
- Measurement server(for surveillance of the robot operation and signal filtering)
- Data acquisition electronics DAE (for signal amplification and altering)
- 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
- DASY5 software
- SEMCAD

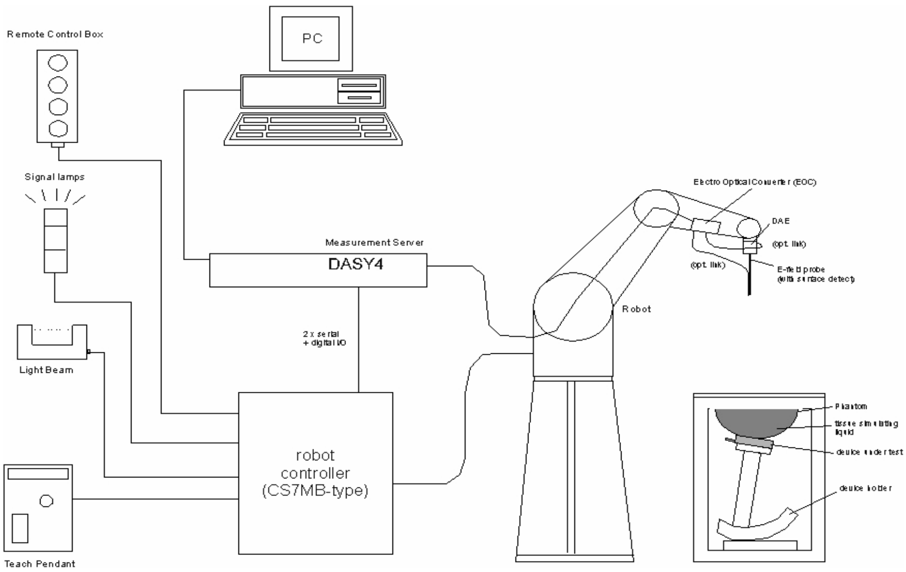


Fig4. The DASY5 measurement system

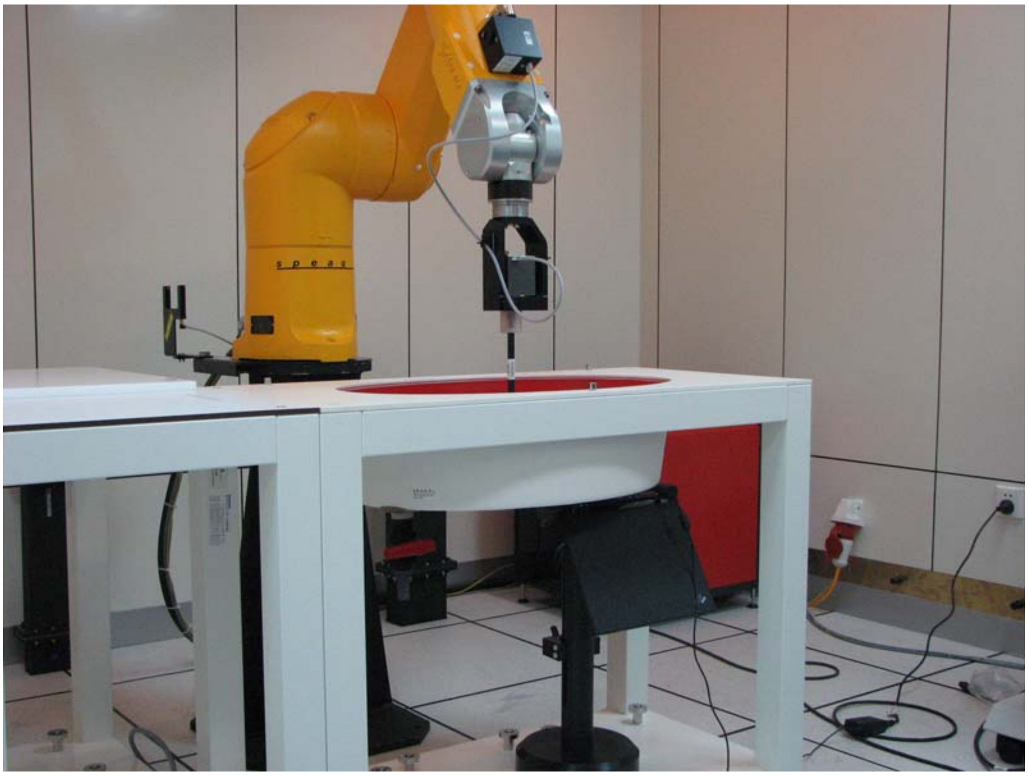


Fig 5. The measurement set-up with ELI 4.0 phantom containing tissue simulating liquid.

5.2Test Equipments:

Name		Serial Number	Cal. Data
DASY5 SYSTEM			
Software Version	5.0	N/A	N/A
Dosimetric E-Field probe	ES3DV3	3127	2007.1
Data Acquisition Electronics	DAE4	725	2007.2.26
Phantom	SAM	1267	N/A
Phantom	SAM	1315	N/A
Phantom	SAM	ELI 4.0	N/A
Performance checking			
System Validation Dipole	D900V2	171	2006.3
System Validation Dipole	D1800V2	2d084	2006.3
RF source	ESG-D2000A	US36260147	2007.3
RF Amplifier	5S1G4	301305	N/A
Power Meter	NRVS	8363331050	2007.8
Power Meter probe	NRV-Z55	834558/008	2007.8
Power Meter probe	N1922A	US44510189	2007.8
Power Meter	N1911A	GB45100295	2007.8
Attenuator	2	BM0059	2007.8
Attenuator	2	BM6452	2007.8
Attenuator	2	BM8993	2007.8
Directional Coupler	778D-012	13733	2007.8
Material Measurement			
Network Analyzer	8714ET	US40372083	2007.8
Dielectric Probe Kit	85070D	US33030365	N/A
General			
Radio Tester	8960	GB43194054	2007.8
Call Tester	CMU200	100313	2007.8

Note: The Dipole antenna Calibration interval is defined as 24 months

Table 2. Test Equipments lists

5.3 Uncertainty Assessment

DASY5 Uncertainty Budget According to IEC 62209-1 [3]								
Error description	Uncertainty value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std.Unc (1g).	Std.Unc. (10g)	(v_i) V_{eff}
Measurement system								
Probe calibration	±5.9%	N	1	1	1	±5.9%	±5.9%	∞
Axial isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary effects	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System detection limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF ambient noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF ambient reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe positioner	±0.4%	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe positioning	±2.9%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Max.SAR Eval.	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom uncertainty	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid conductivity(target)	±5.0%	R	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
Liquid conductivity(meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid conductivity(target)	±5.0%	R	$\sqrt{3}$	0.6	0.49	±1.7%	±1.4%	∞
Liquid onductivity(means.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined std. Uncertainty						±10.9%	±10.7%	387
Expanded STD Uncertainty						**±21.9%**	**±21.4%**	

Table 3. Uncertainty assessment

6. Test Results

6.1Test Environment:

Ambient Temperature: 24.0℃ Relative Humidity: 34.5%Atmosphere: 101.0kPa

6.2Test Method and Procedure

• 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 [DASY5].

• 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 ± 0.22dB.

6.3Test Configuration

The test shall be performed in the shield room.

Please refer to chapter 7.8; 7.9 of this test report for photo of this test setup.

6.4Test Results

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

Test Position (liquid depth 15.5cm)	SAR1g [W/kg]		
	Channel 4132 826.4MHz	Channel 4183 836.6MHz	Channel 4233 846.6MHz
Lap Held Position		0.423	

Table 4: Measurement results for WCDMA V (FDD) for MF335 in combination with the DELL LATITUDE D620 Notebook.

Test Position (liquid depth 15.5cm)	SAR1g [W/kg]		
	Channel 4132 826.4MHz	Channel 4183 836.6MHz	Channel 4233 846.6MHz
Lap Held Position		0.293	

Table 5: Measurement results for WCDMA V (FDD) in HSDPA for MF335 in combination with the DELL LATITUDE D620 Notebook.

Test Position (liquid depth 15.5cm)	SAR1g [W/kg]		
	Channel 4132 826.4MHz	Channel 4183 836.6MHz	Channel 4233 846.6MHz
Lap Held Position		0.790	

Table 6: Measurement results for WCDMA V (FDD) for MF335 in combination with the IBM 2672-AEC Notebook.

Test Position (liquid depth 15.5cm)	SAR1g [W/kg]		
	Channel 4132 826.4MHz	Channel 4183 836.6MHz	Channel 4233 846.6MHz
Lap Held Position		0.489	

Table 7: Measurement results for WCDMA V (FDD) in HSDPA for MF335 in combination with the IBM 2672-AEC Notebook.

Test Position (liquid depth 15.5cm)	SAR1g [W/kg]		
	Channel 4132 826.4MHz	Channel 4183 836.6MHz	Channel 4233 846.6MHz
Lap Held Position	1.110	0.912	**1.290**

Table 8: Measurement results for WCDMA V (FDD) for MF335 in combination with the SONY VGN-SZ58N Notebook.

Test Position (liquid depth 15.5cm)	SAR1g [W/kg]		
	Channel 4132 826.4MHz	Channel 4183 836.6MHz	Channel 4233 846.6MHz
Lap Held Position	0.909	1.15	0.966

Table 9: Measurement results for WCDMA V (FDD) in HSDPA for MF335 in combination with the SONY VGN-SZ58N Notebook.

Test Position (liquid depth 15.5cm)	SAR1g [W/kg]		
	Channel 512 1850.2MHz	Channel 661 1880.0MHz	Channel 810 1909.8MHz
Lap Held Position		0.195	

Table 10: Measurement results for GPRS+GSM 1900 (Class 10) for MF335 in combination with the DELL LATITUDE D620 Notebook.

Test Position (liquid depth 15.5cm)	SAR1g [W/kg]		
	Channel 512 1850.2MHz	Channel 661 1880.0MHz	Channel 810 1909.8MHz
Lap Held Position		0.386	

Table 11: Measurement results for GPRS+GSM 1900 (Class 10) for MF335 in combination with the IBM 2672-AEC Notebook.

Test Position (liquid depth 15.5cm)	SAR1g [W/kg]		
	Channel 512 1850.2MHz	Channel 661 1880.0MHz	Channel 810 1909.8MHz
Lap Held Position		0.323	

Table 12: Measurement results for GPRS+GSM 1900 (Class 10) for MF335 in combination with the SONY VGN-SZ58N Notebook.

Test Position (liquid depth 15.5cm)	SAR1g [W/kg]		
	Channel 512 1850.2MHz	Channel 661 1880.0MHz	Channel 810 1909.8MHz
Lap Held Position		0.334	

Table 13: Measurement results for EDGE 1900 for MF335 in combination with the SONY VGN-SZ58N Notebook.

Test Position (liquid depth 15.5cm)	SAR1g [W/kg]		
	Channel 512 1850.2MHz	Channel 661 1880.0MHz	Channel 810 1909.8MHz
Lap Held Position		0.175	

Table 14: Measurement results for EDGE 1900 for MF335 in combination with the IBM 2672-AEC Notebook.

Test Position (liquid depth 15.5cm)	SAR1g [W/kg]		
	Channel 512 1850.2MHz	Channel 661 1880.0MHz	Channel 810 1909.8MHz
Lap Held Position		0.085	

Table 15: Measurement results for EDGE 1900 for MF335 in combination with the DELL LATITUDE D620 Notebook.

7. Appendix

7.1 Administrative Data

Date of measurement: 850MHz, 1900MHz: Oct.20. 2007

Data stored: SRMC2007-H024-E0014

7.2 Device under Test and Test Conditions

Model: MF335

Date of receipt: Oct.20. 2007

IMEI: 355617010003670

Equipment class: Portable device

Power Class: HSDPA/UMTS:24.0dBm EDGE/GPRS/GSM:30.0dBm

RF exposure environment: General Population

Power supply: Host Device

Measurement Standards: GPRS 1900, WCDMA V

Method to establish a call: GPRS 1900, WCDMA V: Base station simulator, using the air interface

Modulation: GPRS/GSM:GMSK ,EDGE:8PSK,UMTS:QPSK,HSDPA:16QAM
TX range: WCDMA V: 826.4 – 846.6(MHz) GPRS1900: 1850.2 –1909.8 (MHz)
RX range: WCDMA V: 871.4 – 891.6(MHz) GPRS1900: 1930.2 – 1989.8 (MHz)
Used TX Channels: 4132, 4183, 4233
Used TX Channels: 512, 661, 810 (refer to the table 14)

WCDMA MODE:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
826.4	4132	23.0
836.4	4182	22.9
846.6	4233	22.5

HSDPA MODE:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
826.4	4132	22.7
836.4	4182	22.6
846.6	4233	22.2

GSM/GPRS MODE:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1850.2	512	28.9
1880.0	661	29.3
1909.8	810	29.5

EDGE MODE:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1850.2	512	24.9
1880.0	661	25.3
1909.8	810	25.4

Table14. Frequency and Measured power of EUT's Tx channels

Used Phantom: SAM flat Phantom ELI 4.0, as defined by IEC 62209-1-2005 and delivered by Schmid&Parb1er Engineering AG.

7.3 Tissue Recipes

Body Tissue Simulant

The following recipes are provided in percentage by weight.

850MHz:

50.75% de-ionised water
48.21% sugar
0.94% salt
0.1 Preventol

1900MHz:

70.17% de-ionised water
29.44% DGBE
0.39 % Salt

7.4 Material Parameters

For the measurement of the following parameters the HP 85070D dielectric probe kit is used, representing the open-ended coaxial probe measurement procedure.

Body		**εr**	**σ[S/m]**	**Temperature**	
				Ambient [℃]	**Liquid [℃]**
835MHz	Recommended Value	55.2±2.7	0.97±0.10	15-30	-
	Measured Value	53.7	1.00	24.0	22.3
1900MHz	Recommended Value	53.3±2.7	1.52±0.15	15-30	-
	Measured Value	51.5	1.55	24.0	22.3

Table15: Parameters of the head tissue simulating liquids

7.5Setup for System Performance Check

(see also Chapter 15 System Performance Check of DAY 4 System handbook)

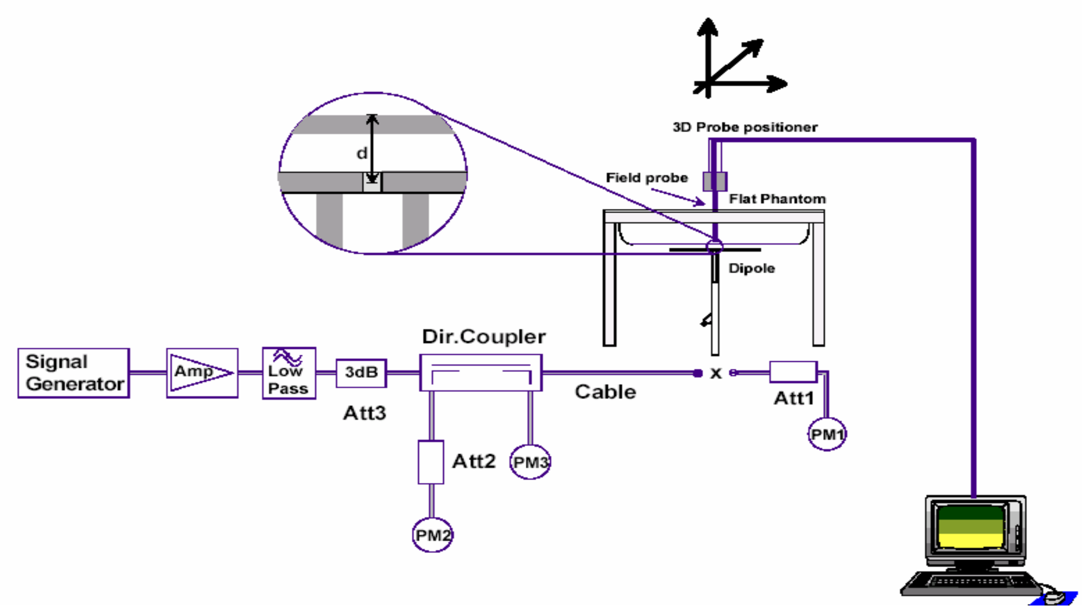


Fig6.Setup for system performance Check

First the power meter PM1 is connected to the cable and it measures the forward power at the location of the dipole connector (X). The signal generator is adjusted for the desired forward power at the dipole connector (taking into account the (Att1) value) and the power meter PM2 is read at that level. Then after connecting the cable to the dipole, the signal generator is readjusted for the same reading at the power meter PM2. If the signal generator does not allow a setting in 0,01 dB steps, the remaining difference at PM2 must be taken into consideration. PM3 records the reflected power from the dipole and ensures that the value is not changed from the previous value. The reflected power should be 20 dB below the forwarded power.

Error description	ToL.	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std.Unc (1g).	Std.Unc. (10g)	(v_i) V_{eff}
Measurement system								
Probe calibration	±5.9%	N	1	1	1	±5.9%	±5.9%	∞
Axial isotropy	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
Hemispherical isotropy	±9.6%	R	$\sqrt{3}$	0	0	0	0	∞
Boundary effects	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System detection limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response time	0	R	$\sqrt{3}$	1	1	0	0	∞
Integration time	0	R	$\sqrt{3}$	1	1	0	0	∞
RF ambient noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF ambient reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe positioner	±0.4%	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe positioning	±2.9%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Algorithms for Max.SAR Eval.	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Dipole								
Dipole Axis to Liquid Distance	±2.0%	R	$\sqrt{3}$	1	1	±1.2%	±1.2%	∞
Input power and SAR drift meas.	±4.7%	N	1	1	1	±2.7%	±2.7%	∞
Phantom and Tissue Param								
Phantom uncertainty	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid conductivity(target)	±5.0%	R	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
Liquid conductivity(meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid conductivity(target)	±5.0%	R	$\sqrt{3}$	0.6	0.49	±1.7%	±1.4%	∞
Liquid conductivity (means.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined std. Uncertainty						±9.2%	±8.9%	∞
Coverage Factor for 95%		$k_p = 2$						
Expanded STD Uncertainty						**±18.4%**	**±17.8%**	

Table 16:Uncertainty Budget for the system performance check

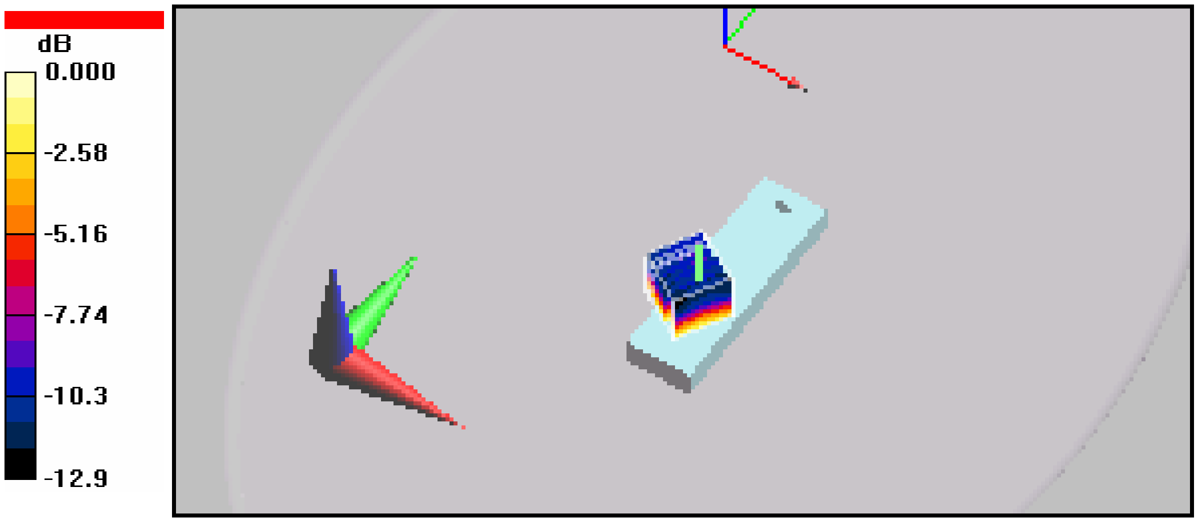
7.6Test Results

DELL LATITUDE D620	Body worn	836.6 MHz

WCDMA - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.7 V/m; Power Drift = -0.191 dB
Peak SAR (extrapolated) = 0.522 W/kg
SAR(1 g) = 0.423 mW/g; SAR(10 g) = 0.301 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.451 mW/g



0 dB = 0.451 mW/g

DELL LATITUDE D620	Body worn	836.6 MHz

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

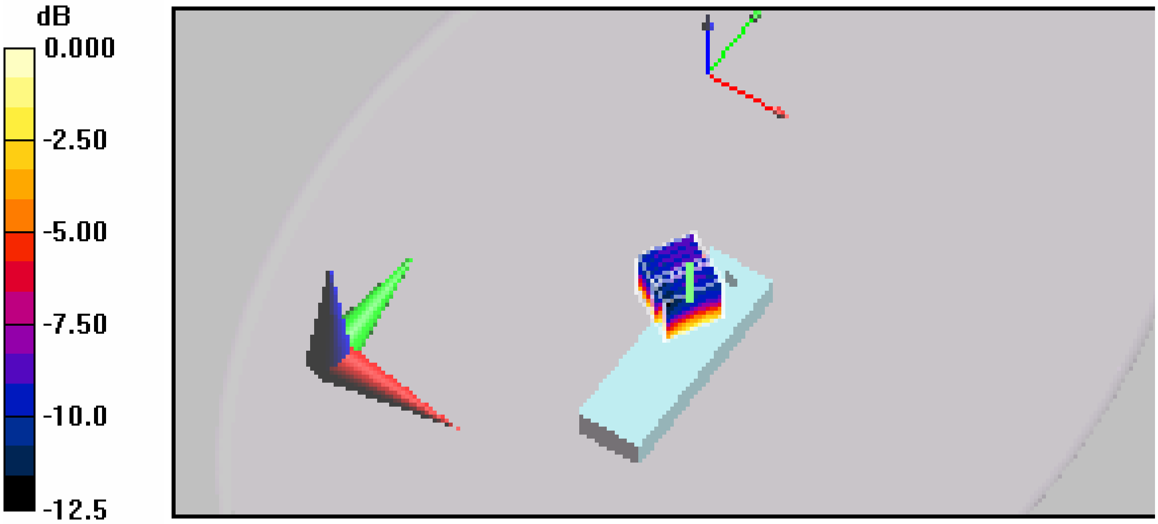
Reference Value = 17.7 V/m; Power Drift =- 0.211 dB

Peak SAR (extrapolated) = 0.371 W/kg

SAR(1 g) = 0.293 mW/g; SAR(10 g) = 0.201 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.320 mW/g

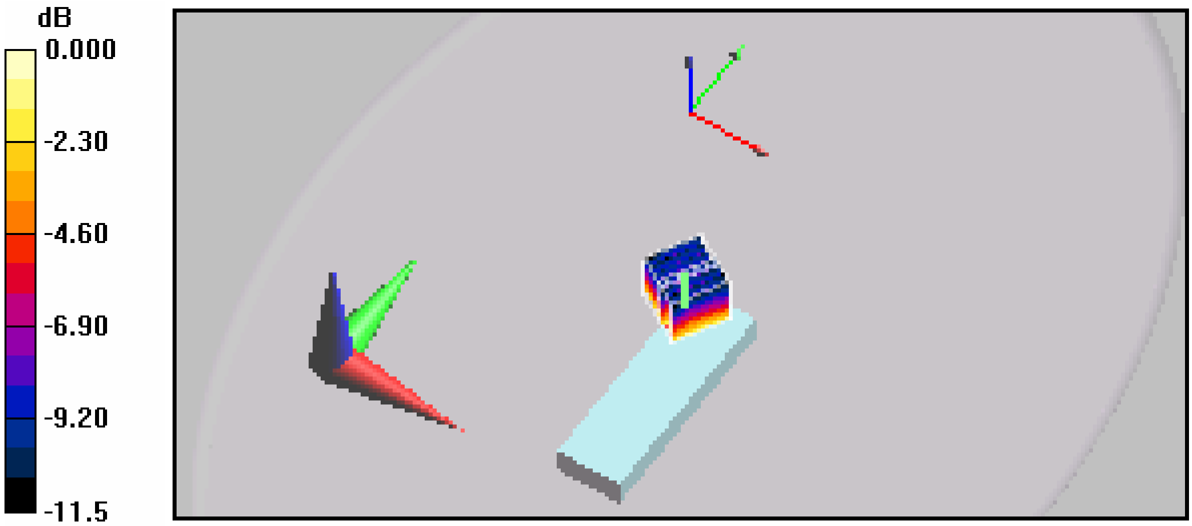


0 dB = 0.320mW/g

DELL LATITUDE D620	Body worn	1880 MHz

GPRS+GSM Towards ground - Middle/Zoom Scan (7x7x7)
(7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.65V/m; Power Drift = 0.142 dB
Peak SAR (extrapolated) = 0.323 W/kg
SAR(1 g) = 0.195 mW/g; SAR(10 g) = 0.118 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.212 mW/g

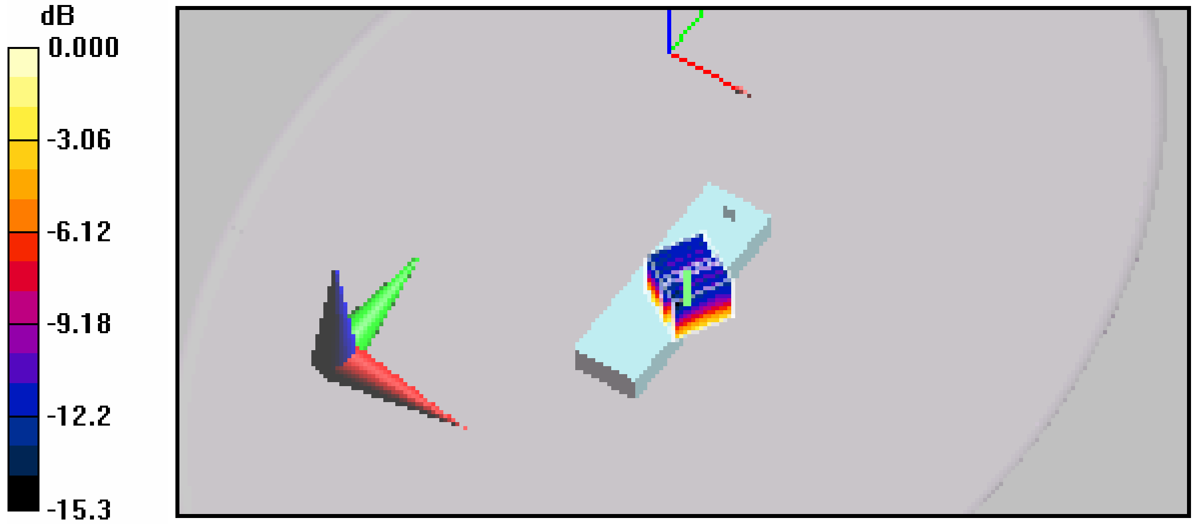


0 dB = 0.212mW/g

IBM 2672-AEC	Body worn	836.6 MHz

WCDMA - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.1V/m; Power Drift = 0.200 dB
Peak SAR (extrapolated) = 0.97 W/kg
SAR(1 g) = 0.790 mW/g; SAR(10 g) = 0.614 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.760 mW/g



0 dB = 0.760mW/g

IBM 2672-AEC	Body worn	836.6 MHz

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

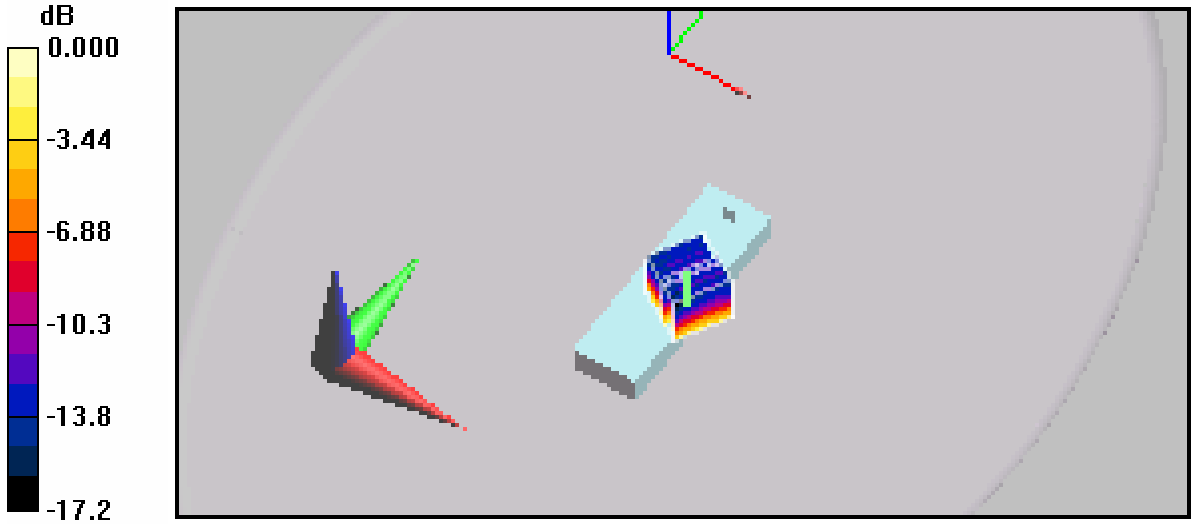
Reference Value = 23.9 V/m; Power Drift = 0.204 dB

Peak SAR (extrapolated) = 0.87 W/kg

SAR(1 g) = 0.489 mW/g; SAR(10 g) = 0.312 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.490 mW/g



0 dB = 0.490 mW/g

IBM 2672-AEC	Body worn	1880 MHz

GPRS+GSM Towards ground - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

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

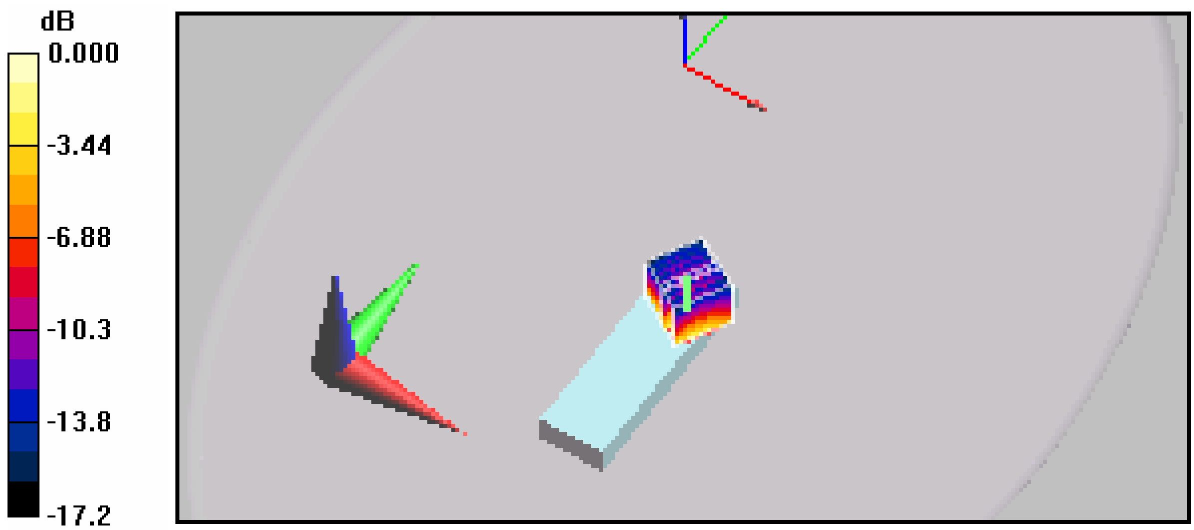
Reference Value = 13.5 V/m; Power Drift = -0.027 dB

Peak SAR (extrapolated) = 0.585 W/kg

SAR(1 g) = 0.386 mW/g; SAR(10 g) = 0.233 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.419 mW/g



0 dB = 0.419 mW/g

SONY VGN-SZ58N	Body worn	836.6 MHz

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

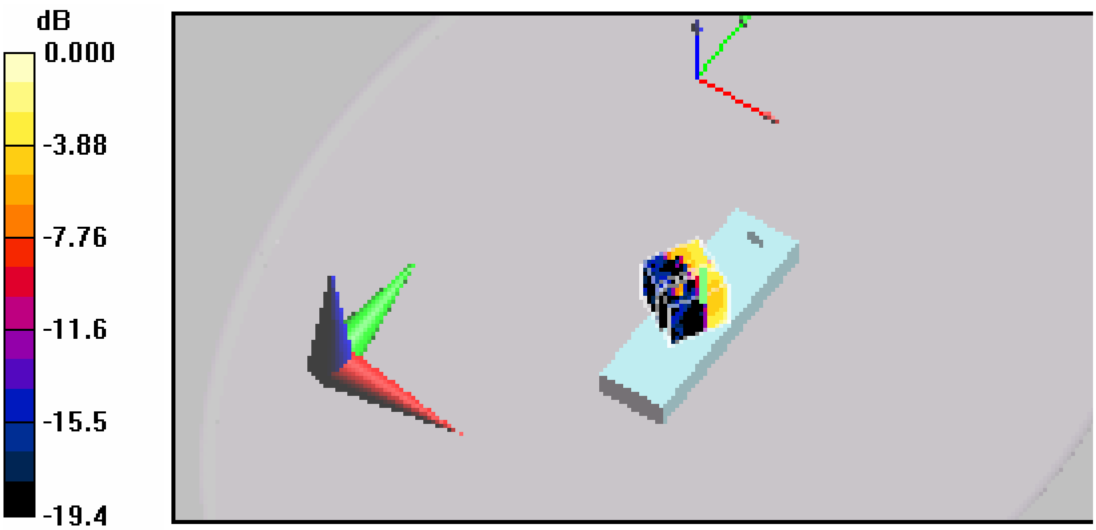
Reference Value = 34.5 V/m; Power Drift = 0.112 dB

Peak SAR (extrapolated) = 1.55 W/kg

SAR(1 g) = 0.912 mW/g; SAR(10 g) = 0.327 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.09 mW/g

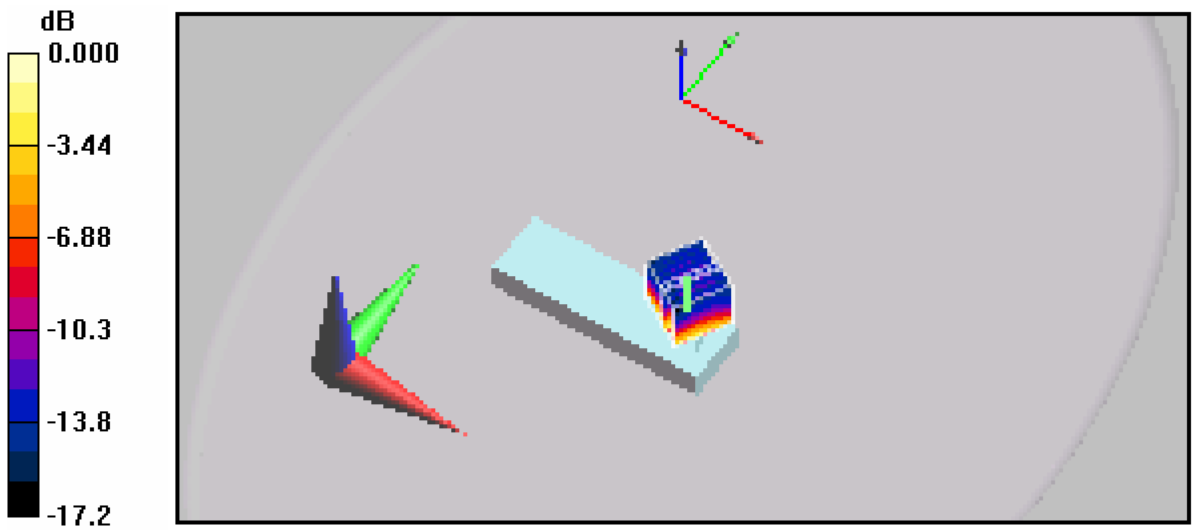


0 dB =1.09mW/g

SONY VGN-SZ58N	Body worn	**826.4 MHz**

WCDMA - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 35.3 V/m; Power Drift = 0.017 dB
Peak SAR (extrapolated) = 1.44 W/kg
SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.738 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.22 mW/g

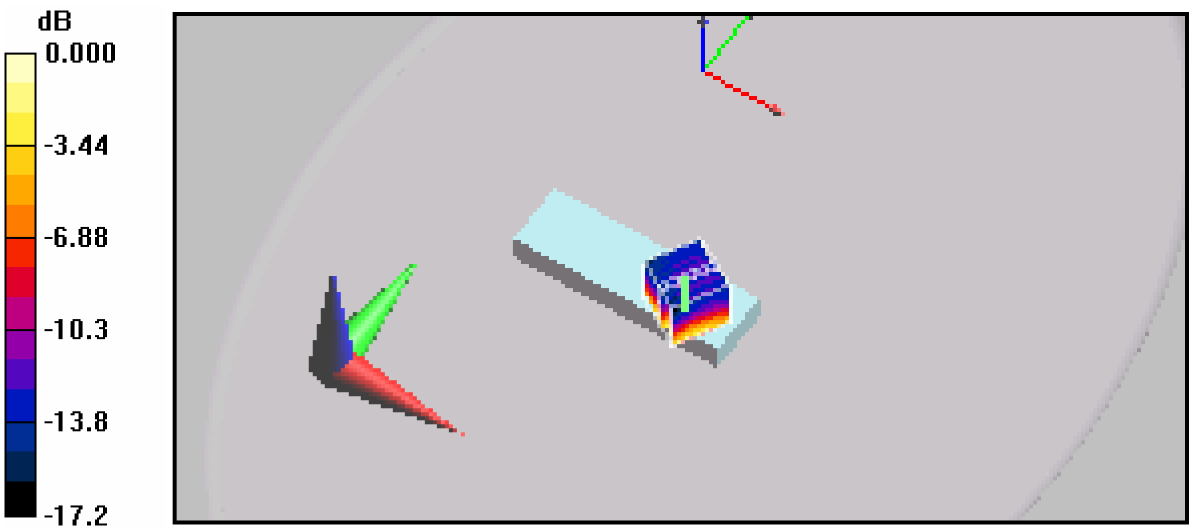


0 dB = 1.22 mW/g

SONY VGN-SZ58N	Body worn	**846.6 MHz**

WCDMA - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.8 V/m; Power Drift = 0.155 dB
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 1.29 mW/g; SAR(10 g) = 0.850 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.39 mW/g



0 dB = 1.39 mW/g

SONY VGN-SZ58N	Body worn	**836.4 MHz**

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

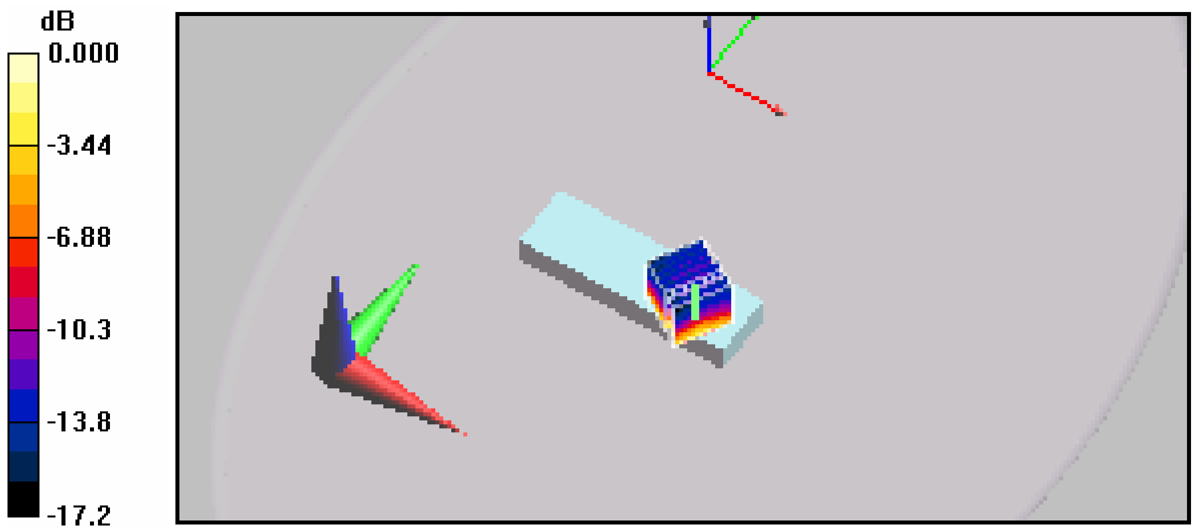
Reference Value = 32.2 V/m; Power Drift = -0.00706 dB

Peak SAR (extrapolated) = 1.49 W/kg

SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.757 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.25 mW/g

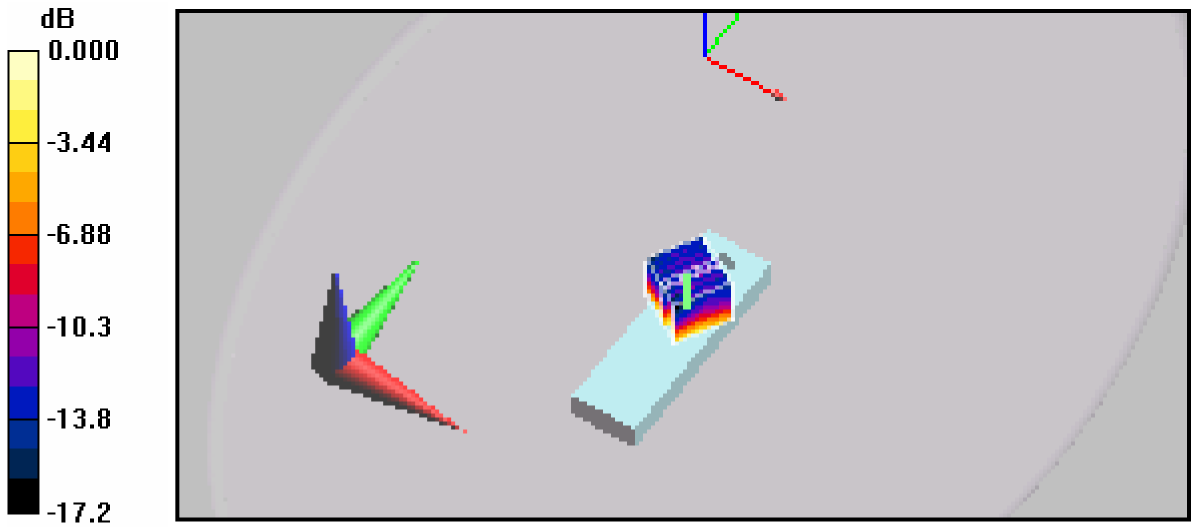


0 dB = 1.25 mW/g

SONY VGN-SZ58N	Body worn	**826.4 MHz**

HSDPA - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 25 V/m; Power Drift = 0.001 dB
Peak SAR (extrapolated) = 0.9 W/kg
SAR(1 g) = 0.909 mW/g; SAR(10 g) = 0.602 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.94 mW/g



0 dB = 0.94 mW/g

SONY VGN-SZ58N	Body worn	**846.6 MHz**

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

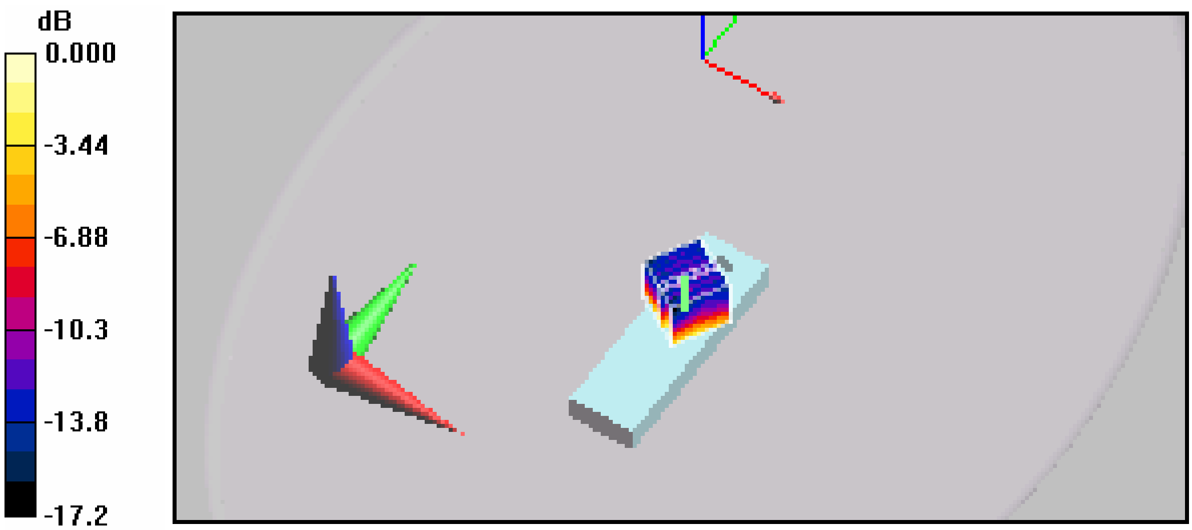
Reference Value = 26 V/m; Power Drift = 0.033 dB

Peak SAR (extrapolated) = 1.3 W/kg

SAR(1 g) = 0.966 mW/g; SAR(10 g) = 0.639 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

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



0 dB = 1.08 mW/g

SONY VGN-SZ58N	Body worn	**1880 MHz**

GPRS+GSM Towards ground - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

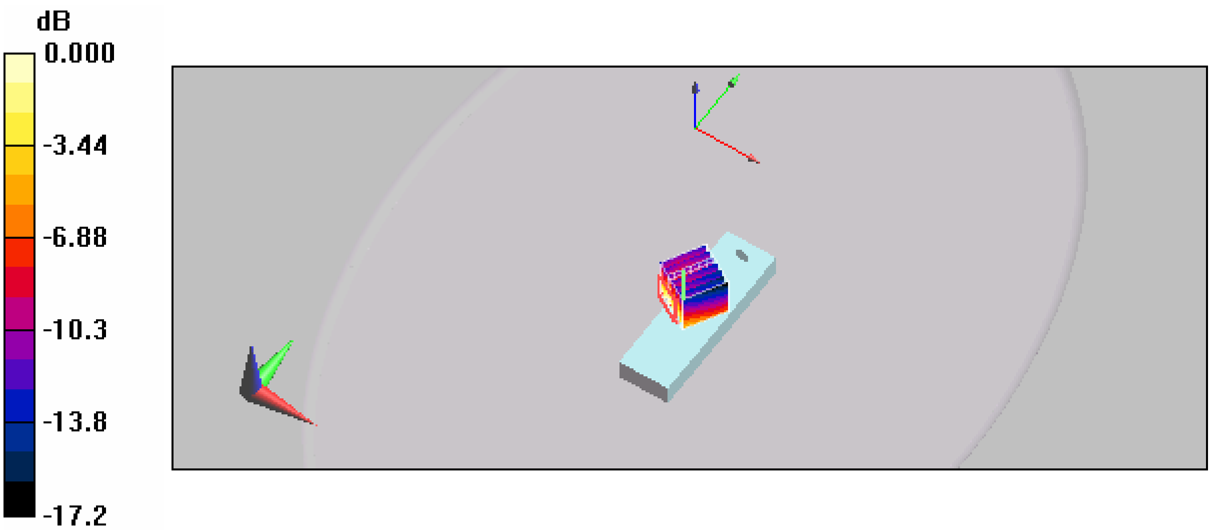
Reference Value = 14 V/m; Power Drift = -0.137 dB

Peak SAR (extrapolated) = 0.510 W/kg

SAR(1 g) = 0.323 mW/g; SAR(10 g) = 0.194 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.357 mW/g



0 dB = 0.357 mW/g

SONY VGN-SZ58N	Body worn	**1880 MHz**

EGPRS Towards ground -Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

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

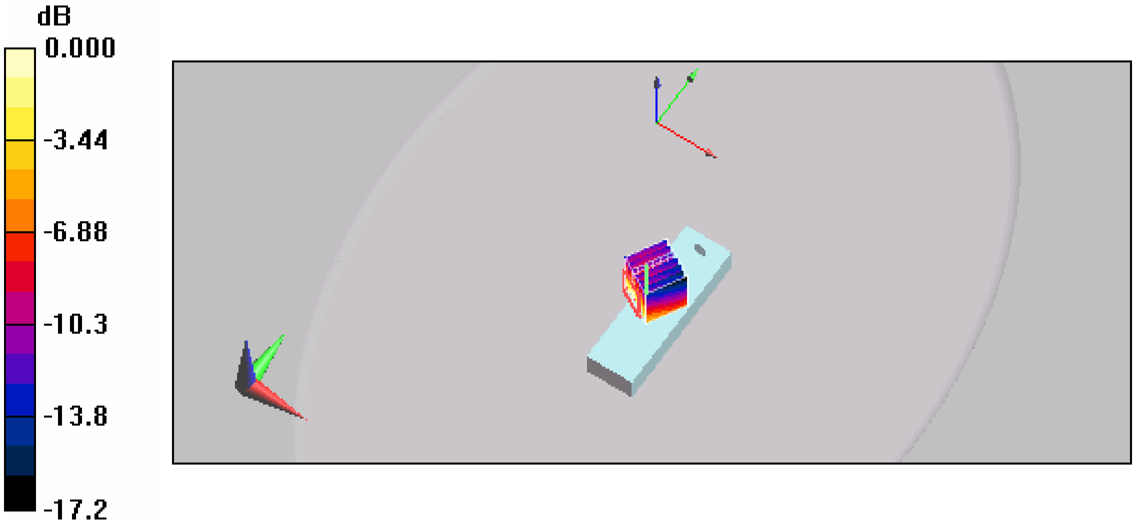
Reference Value = 14.2 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 0.537 W/kg

SAR(1 g) = 0.334 mW/g; SAR(10 g) = 0.204 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.362 mW/g



0 dB = 0.362 mW/g

IBM 2672-AEC	Body worn	**1880 MHz**

EGPRS Towards ground -Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

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

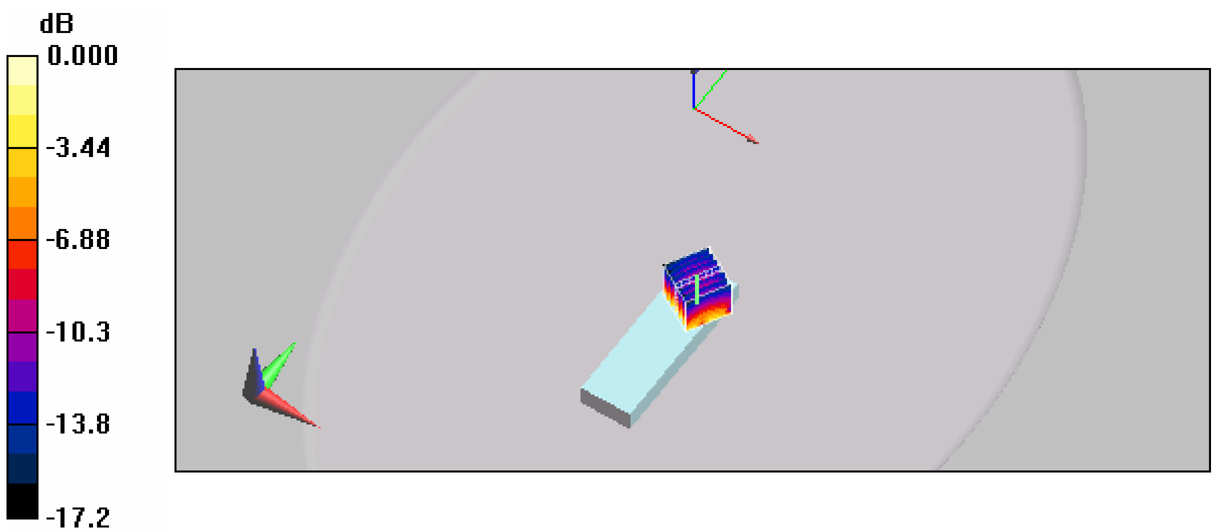
Reference Value = 9.46 V/m; Power Drift = -0.002 dB

Peak SAR (extrapolated) = 0.268 W/kg

SAR(1 g) = 0.175 mW/g; SAR(10 g) = 0.105 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.193 mW/g



0 dB = 0.193mW/g

DELL LATITUDE D620	Body worn	**1880 MHz**

EGPRS Towards ground -Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

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

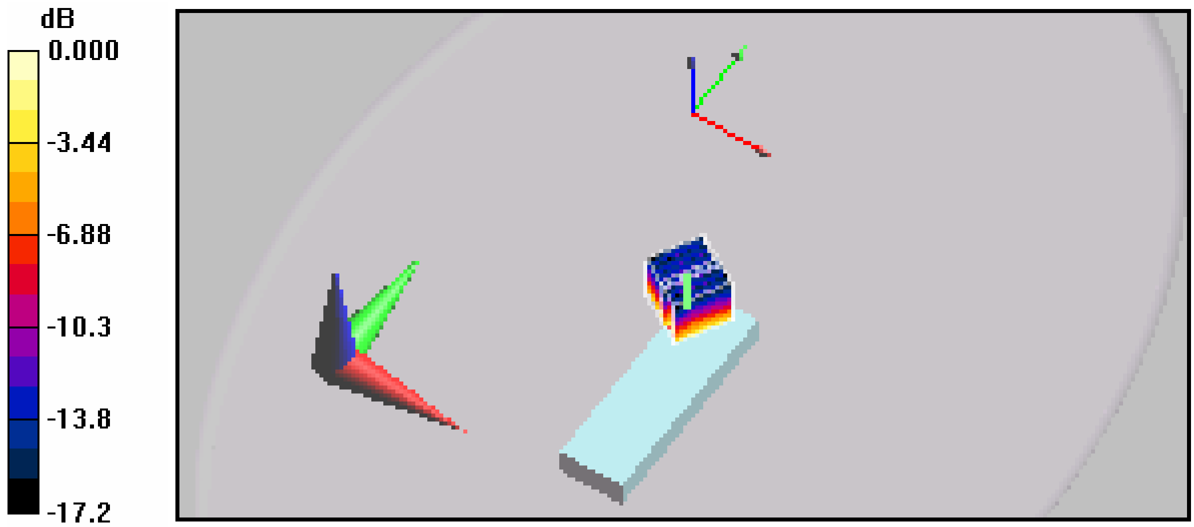
Reference Value = 6.50V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 0.123 W/kg

SAR(1 g) = 0.085 mW/g; SAR(10 g) = 0.018 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.122 mW/g



0 dB = 0.122mW/g

7.7 Pictures of the device under test

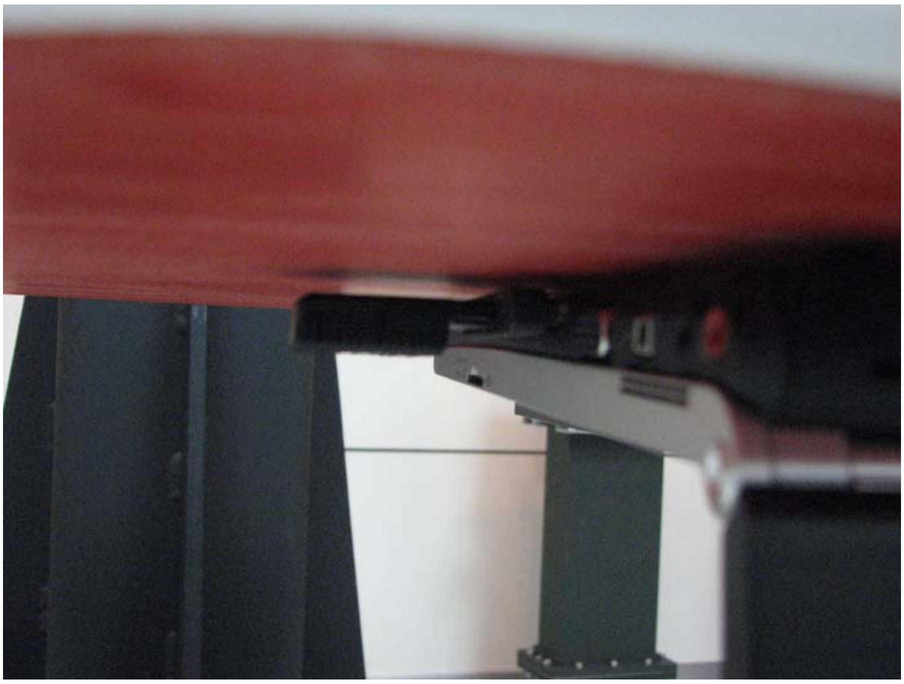
Front view of the IBM 2672-AEC

Front view of the SONY VGN-SZ58N

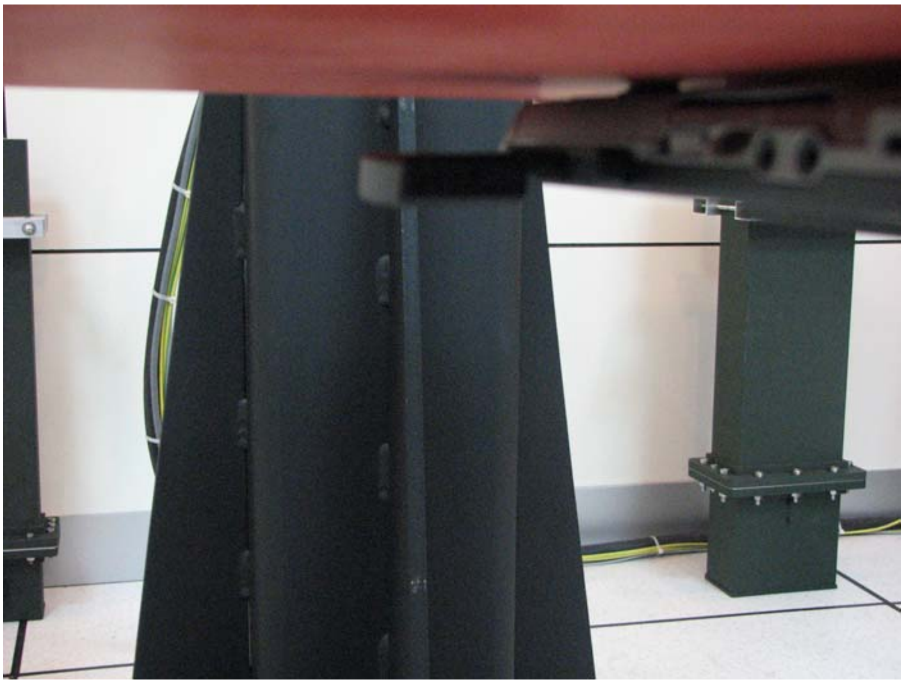
Front view of the DELL LATITUDE D620

7.8 Test Positions for the Device under test

Lap Held Position with the IBM 2672-AEC Notebook



Lap Held Position with the SONY VGN-SZ58N Notebook



Lap Held Position with the DELL LATITUDE D620 Notebook

7.9 Picture to demonstrate the required liquid depth

the liquid depth in the used SAM phantoms

Liquid depth for SAR Measurement

7.10 Simplified Performance Checking

The simplified performance check was realized using the dipole validation kits. The input power of the dipole antennas were 250mW (cw signal) and they were placed under the flat part of the SAM phantom. The results are listed in the Table 17 ， Table 18.The target values were adopted from calibration certificate attached of the dipole. Table 16 includes the uncertainty assessment for the system performance checking which was suggested by the IEC 62209-1-2005 and determined by Schmid & Partner Engineering AG. The expanded uncertainty is assessed to be ± 21.9%.

		SAR_{1g} [w/kg]	ε_r	σ[S/m]	Temperature	
					Ambient[℃]	Liquid[℃]
835MHz	Target Value	2.74	55.2±2.7	0.97±0.10	15-30	-
	Measured Value	2.5	53.9	1.00	24.0	22.3

Table17: Validation results, 835 MHz

		SAR_{1g} [w/kg]	ε_r	σ[S/m]	Temperature	
					Ambient[℃]	Liquid[℃]
1900MHz	Target Value	9.85	53.3±2.7	1.52±0.15	15-30	-
	Measured Value	9.9	51.8	1.56	24.0	22.3

Table 18: Validation results, 1900 MHz