SAR TEST REPORT

Equipment Under Test	Notebook
Model No.	M72XT(X=0~9)
FCC ID	U9M-M72XT
Applicant	CLEVO CO.
Address of Applicant	No.129, Hsing-Te road, Sun Chung city 241,Taipei Hsien, Taiwan, R.O.C
Date of Receipt	2008.02.15
Date of Test(s)	2008.03.24-2008.03.25
Date of Issue	2008.04.02

Standards:

FCC OET Bulletin 65 supplement C,
ANSI/IEEE C95.1 , C95.3, IEEE 1528

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

Tested by : **Ricky Huang** **Date** : **2008.03.31**
Sr. Engineer

Approved by : **Dikin Yang** **Date** : **2008.04.02**
Asst. Manager

Contents

1. General Information

1.1 Testing Laboratory

SGS Taiwan Ltd. Electronics & Communication Laboratory	
5F, No. 134, Wukung Road, Wuku industrial zone	
Taipei county, Taiwan, R.O.C.	
Telephone	+886-2-2299-3279
Fax	+886-2-2298-0488
Internet	http://www.tw.sgs.com/

1.2 Details of Applicant

Name	CLEVO CO.
Address	No.129, Hsing-Te road, Sun Chung city 241,Taipei Hsien, Taiwan, R.O.C
Country	Taiwan
Telephone	+886-2-2278-9696
Fax	+886-2-2278-4787
Contact Person	H. Y. Sung
E-mail	hysung@clevo.com.tw

1.3 Description of EUT

Product Name	Notebook	
Model Number	M72XT(X=0~9)	
Brand Name	CLEVO	
IMEI	352678011154355	
Mode of Operation	GSM,GPRS,EDGE,(900/1800/850/1900), WCDMA Bnad I	
Modulation mode	GMSK/ QPSK/8PSK/ WCDMA	
Duty Cycle	GSM	GPRS(EDGE)
	1/8	1/2
Maximum RF Conducted Power (Average)	GSM 850	PCS 1900
	31.7 dBm	28.4 dBm
TX Frequency range	GSM 850	PCS 1900
	824.2-848.8 MHz	1850.2-1909.8 MHz
Channel Number (ARFCN)	GSM 850	PCS 1900
	128-251	512-810

Power Supply	14.8Vdc re-chargeable battery or 1. 19Vdc by AC/DC power adapter 2. 18.5Vdc by AC/DC power adapter	
	Battery Model	M720SBAT-8
	Adapter Model	1.0335A1965 2.HP-OK065B13
Antenna Type	PIFA Antenna	
Antenna Gain	-7.02 ~ -3.59 dbi	
Definition	Production unit	
Max. SAR Measured (1 g)	0.280 W/kg (At GSM 1900 Channel 810 Configuration 2)	

GSM antenna

Note:

1. EGPRS mode was not measured because maximum averaged output power is more than 3 dB lower in EGPRS mode than in GPRS mode.

1.4 Test Environment

Ambient Temperature: 22.1° C
Tissue Simulating Liquid: 21.6° C
Relative Humidity: 62 %

1.5 Operation description

The EUT type is Notebook. When ues it, it will be defined as a portable device since the Notebook will place in the thigh, so SAR measurement is mandatory. The EUT is controlled by using a Communication simulate Tester (R&S CMU200), and the communication between the EUT and the tester is established by air link. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.
Value of Crest Factors are 2 for GPRS mode (multi-slot=4) and 1 for WCDMA Band I were used for SAR testing according to the nature of the EUT. The test configuration tested at the low, middle and high frequency channels. By using the program subordinated in the computer, and change into the written channel, and then test of set in highest power. Finally, we will test it by

dividing into 2 configurations:

Configuration 1: Bottom side of the Notebook is paralleled with flat phantom, open the panel with 90 degrees, bottom side is contact with flat phantom.(Appendix-Fig.3 & Fig.4)
Configuration 2: Right side of Notebook is paralleled with flat phantom,and spacing between EUT and Phantom-in contact 15mm.(Appendix-Fig.5& Fig.6)

1.6 The SAR Measurement System

A photograph of the SAR measurement System is given in Fig. a. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (Speag Dasy 4 professional system). A Model EX3DV3 3526-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= $\sigma (|Ei|^2)/ \rho$ where σ and ρ are the conductivity and mass density of the tissue-simulant.

The DASY4 system for performing compliance tests consists of the following items:

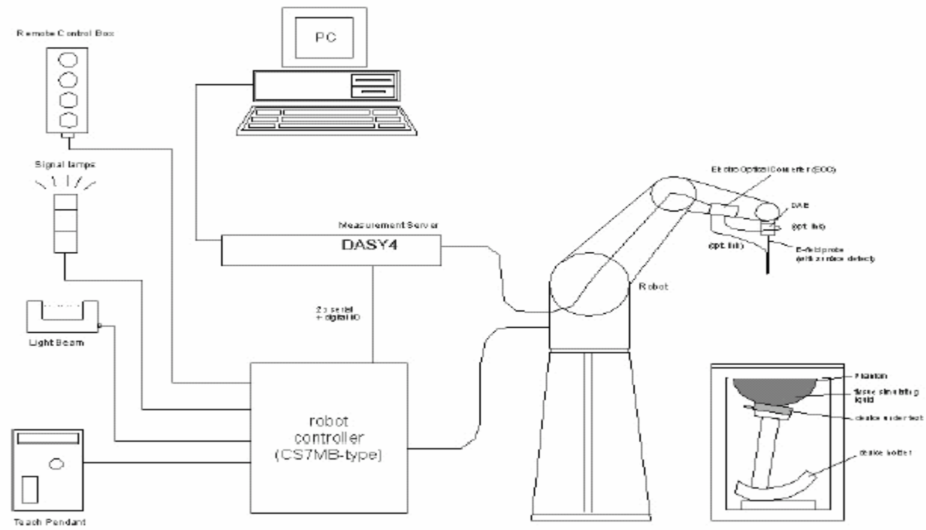


Fig. a The microwave circuit arrangement used for SAR system verification

- A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.

- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for hand-held mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

1.7 System Components

EX3DV3 E-Field Probe

<table>
<tr><td>Construction</td><td>Symmetrical design with triangular core
Built-in shielding against static charges
PEEK enclosure material (resistant to organic solvents, e.g., DGBE)</td><td rowspan="2"></td></tr>
<tr><td>Calibration</td><td>Basic Broad Band Calibration in air
Conversion Factors (CF) for HSL850/1900
Additional CF for other liquids and frequencies upon request</td></tr>
<tr><td>Frequency</td><td colspan="2">10 MHz to > 6 GHz, Linearity: ± 0.2 dB (30 MHz to 6 GHz)</td></tr>
<tr><td>Directivity</td><td colspan="2">± 0.3 dB in HSL (rotation around probe axis)
± 0.5 dB in tissue material (rotation normal to probe axis)</td></tr>
<tr><td>Dynamic Range</td><td colspan="2">10 μW/g to > 100 mW/g
Linearity: ± 0.2 dB (noise: typically < 1 μW/g)</td></tr>
<tr><td>Dimensions</td><td colspan="2">Overall length: 330 mm (Tip: 20 mm)
Tip diameter: 2.5 mm (Body: 12 mm)
Typical distance from probe tip to dipole centers: 1 mm</td></tr>
<tr><td>Application</td><td colspan="2">High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.</td></tr>
</table>

SAM PHANTOM V4.0C

Construction:	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.	
Shell Thickness:	2 ± 0.2 mm	
Filling Volume:	Approx. 25 liters	
Dimensions:	Height: 251 mm; Length: 1000 mm; Width: 500 mm	

DEVICE HOLDER

Construction	In combination with the Twin SAM Phantom V4.0/V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).	 Device Holder

1.8 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. These tests were done at 850&1900 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was in the range 22.1°C, the relative humidity was in the range 62% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

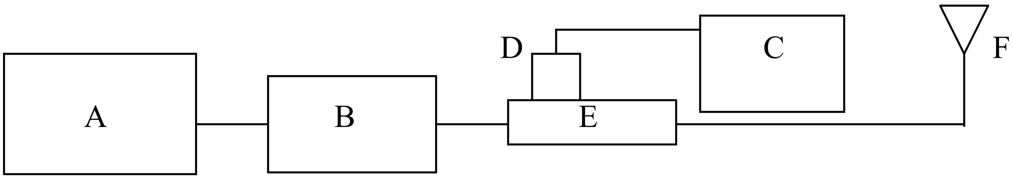
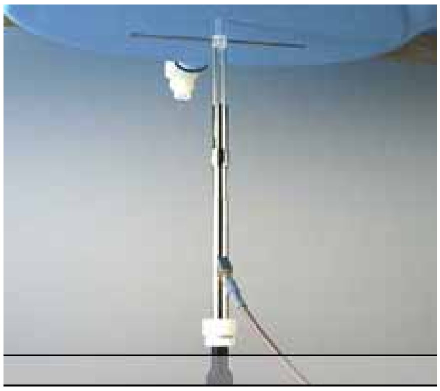


Fig.b The microwave circuit arrangement used for SAR system verification

A. Agilent Model 8648D Signal Generator
B. Mini circuits Model ZHL-42 Amplifier
C. Agilent Model E4416A Power Meter
D. Agilent Model 8481H Power Sensor
E. Agilent Model 778D Dual directional coupling
F. Reference dipole antenna



Photograph of the dipole Antenna

Validation Kit	Frequency Hz	Target SAR (1g) (Pin=250mW)	Measured SAR (1g)	Variation	Measured Date
D900V2 S/N: 168	900 MHz (Body)	2.58m W/g	2.68 m W/g	3.8%	2008-03-24
D1900V2 S/N: 5d018	1900 MHz (Body)	9.55 m W/g	9.51 m W/g	0.41%	2008-03-25

Table 1. Results system validation

1.9 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this body-simulant fluid were measured by using the HP Model 85070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with HP 8753D Network Analyzer (30 KHz-6000 MHz) by using a procedure detailed in Section V. All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurement. The depth of the tissue simulant in the ear reference point of the phantom was 15cm±5mm during all tests. (Fig .2)

Frequency (MHz)	Tissue type	Measurement date/ Limits	Dielectric Parameters		
			ρ	σ (S/m)	Simulated Tissue Temperature(° C)
900	Body	Measured, 2008.03.24	54.4	1.07	21.7

		Recommended Limits	52.3-58.0	0.92-1.10	20-24
1900	Body	Measured, 2008.03.25	55	1.58	21.6
		Recommended Limits	50.6-56.0	1.38-1.60	20-24

Table 2. Dielectric Parameters of Tissue Simulant Fluid

Band 850(Body) Frequency (MHz)	Channel	Target	Permittivity Measurement Date	Variation	Target	Conductivity Measurement Date	Variation
Low(824.2)	128	55.2	56.3	1.99%	0.97	0.951	1.95%
Mid(836.6)	190		56.1	1.63%		0.962	0.82%
High(848.8)	251		56	1.44%		0.975	0.51%

Table 4. Dielectric Parameters of Tissue Simulant Fluid (follow P1528 target value)

The composition of the brain tissue simulating liquid for 900 & 1900 MHz is:

Ingredient	900Mhz(Body)	1900Mhz(Body)
DGMBE	X	300.67
Water	632.68	716.56
Sale	11.72	4.0
Preventol D-7	1.2	X
Cellulose	X	X
Sugar	600 g	X
Total amount	1 L (1.0kg)	1 L (1.0kg)

Table 3. Recipes for tissue simulating liquid

1.10 EVALUATION PROCEDURES

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan.
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. The generation of a high-resolution mesh within the measured volume
4. The interpolation of all measured values from the measurement grid to the high-resolution grid
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. The calculation of the averaged SAR within masses of 1g and 10g.
   The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away

from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within –2 dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5mm.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans. The routines are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 30x30x30mm contains about 30g of tissue. The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is the moved around until the highest averaged SAR is found. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

1.11 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (‘‘SAR’’) in Section 4.2 of ‘‘IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,’’ ANSI/IEEE C95.1–1992, Copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in ‘‘Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields,’’ NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

(1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube). Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

(2) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.(Table .4)

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

Table .4 RF exposure limits

Notes:

1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

2.Summary of Results

GSM 850 MHZ- testing in GPRS mode (uplink solt=4)

Configuration 1: Bottom side of the Notebook is paralleled with flat phantom, open the panel with 90 degrees, bottom side is contact with flat phantom.

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850 MHz	128	824.2	31.7dbm	0.026	22.1	21.7
	190	836.6	31.6dbm	0.025	22.1	21.7
	251	848.8	31.5dbm	0.028	22.1	21.7

Configuration 2: Right side of Notebook is paralleled with flat phantom,and spacing between EUT and Phantom-in contact 15mm.

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850 MHz	128	824.2	31.7dbm	0.111	22.1	21.7
	190	836.6	31.6dbm	0.105	22.1	21.7
	251	848.8	31.5dbm	0.102	22.1	21.7

PCS 1900 MHZ- testing in GPRS mode (uplink solt=4)

Configuration 1: Bottom side of the Notebook is paralleled with flat phantom, open the panel with 90 degrees, bottom side is contact with flat phantom.

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900 MHz	512	1850.2	28.2dbm	0.069	22.1	21.7
	661	1880.0	28.2dbm	0.092	22.1	21.7
	810	1909.8	28.4dbm	0.102	22.1	21.7

Configuration 2: Right side of Notebook is paralleled with flat phantom,and spacing between EUT and Phantom-in contact 15mm.

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900 MHz	512	1850.2	28.2dbm	0.161	22.1	21.7
	661	1880.0	28.2dbm	0.229	22.1	21.7
	810	1909.8	28.4dbm	0.280	22.1	21.7

Note:

SAR measurement results with transmitter at maximum output power.

3. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV3	3526	Aug.29.2007
Schmid & Partner Engineering AG	900/1900 MHz System Validation Dipole	D900V2 D1900V2	168 5d018	Apr.17.2007 Apr.23.2007
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	547	Oct.01.2007
Schmid & Partner Engineering AG	Software	DASY 4 V4.7 Build 55	N/A	Calibration isn't necessary
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration isn't necessary
Agilent	Network Analyzer	8753D	3410A05547	Nov.15.2007
Agilent	Dielectric Probe Kit	85070D	US01440168	Calibration isn't necessary
Agilent	Dual-directional coupler	778D	50313	Aug.21.2007
Agilent	RF Signal Generator	8648D	3847M00432	May.22.2007
Agilent	Power Sensor	8481H	MY41091361	Jun.04.2007
R&S	Radio Communication Test	CMU200	113505	Aug.24.2007

4.Measurements

Configuration 1_CH128 Date/Time: 2008/3/24 02:31:28

DUT: M72XT; Type: GSM; IMEI: 352678011154355

Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:2
Medium: Muscle 850 MHz Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.951 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

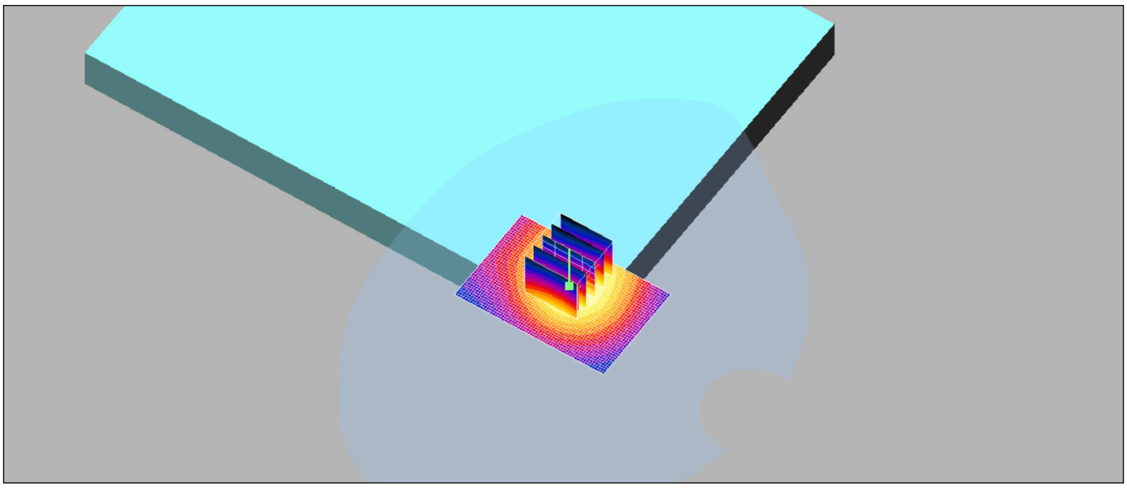
DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

BODY/Area Scan (61x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.027 mW/g

BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.36 V/m; Power Drift = -0.035 dB
Peak SAR (extrapolated) = 0.040 W/kg

SAR(1 g) = 0.026 mW/g; SAR(10 g) = 0.016 mW/g
Maximum value of SAR (measured) = 0.028 mW/g



0 dB = 0.028mW/g

Configuration 1_CH190

DUT: M72XT; Type: GSM; IMEI: 352678011154355

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2
Medium: Muscle 850 MHz Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.962 mho/m; ε_r = 56.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

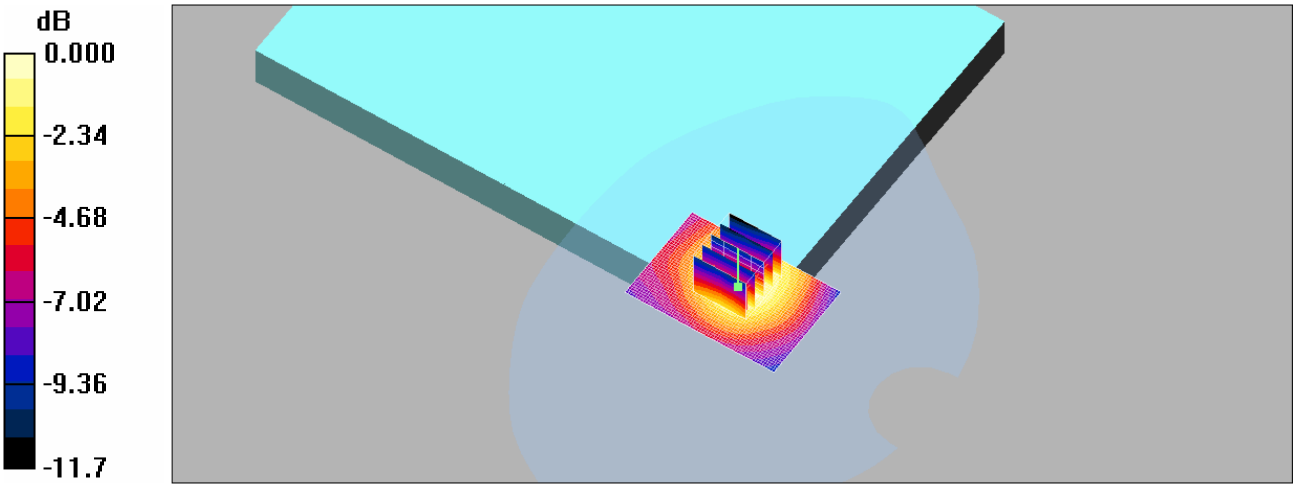
DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

BODY/Area Scan (61x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.026 mW/g

BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.27 V/m; Power Drift = -0.018 dB
Peak SAR (extrapolated) = 0.039 W/kg

SAR(1 g) = 0.025 mW/g; SAR(10 g) = 0.016 mW/g
Maximum value of SAR (measured) = 0.027 mW/g



0 dB = 0.027mW/g

Configuration 1_CH251

DUT: M72XT; Type: GSM; IMEI: 352678011154355

Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:2
Medium: Muscle 850 MHz Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.975 mho/m; ε_r = 56; ρ = 1000 kg/m^3
Phantom section: Flat Section

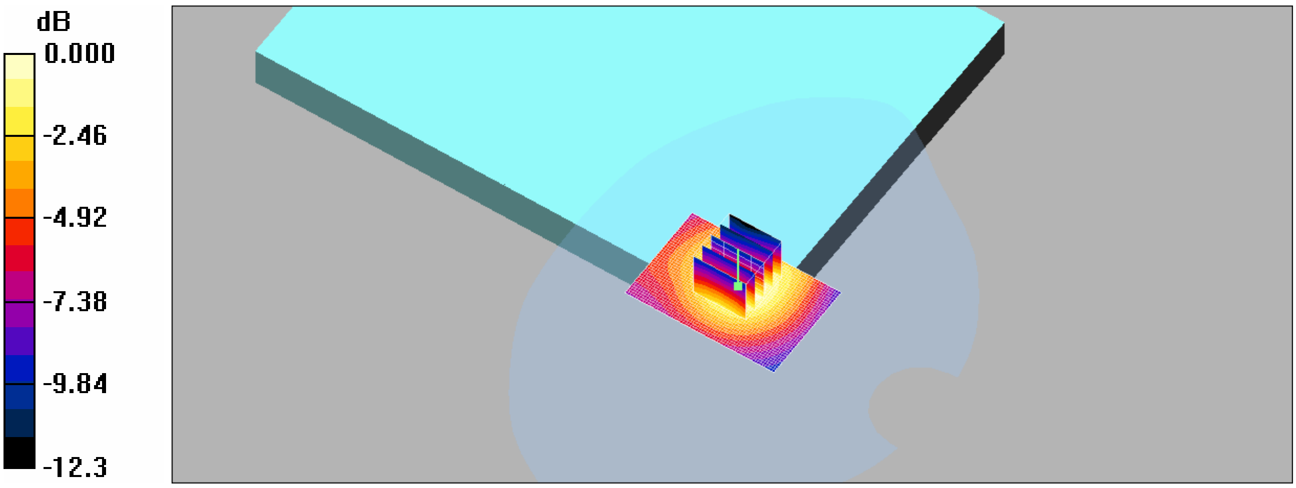
DASY4 Configuration:

- Probe: EX3DV3 - SN3526 ; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

BODY/Area Scan (61x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.030 mW/g

BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.43 V/m; Power Drift = 0.009 dB
Peak SAR (extrapolated) = 0.046 W/kg

SAR(1 g) = 0.028 mW/g; SAR(10 g) = 0.018 mW/g
Maximum value of SAR (measured) = 0.030 mW/g



0 dB = 0.030mW/g

Date/Time: 2008/3/24 04:38:09

Configuration 2_CH128

DUT: M72XT; Type: GSM; IMEI: 352678011154355

Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:2
Medium: Muscle 850 MHz Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.951 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

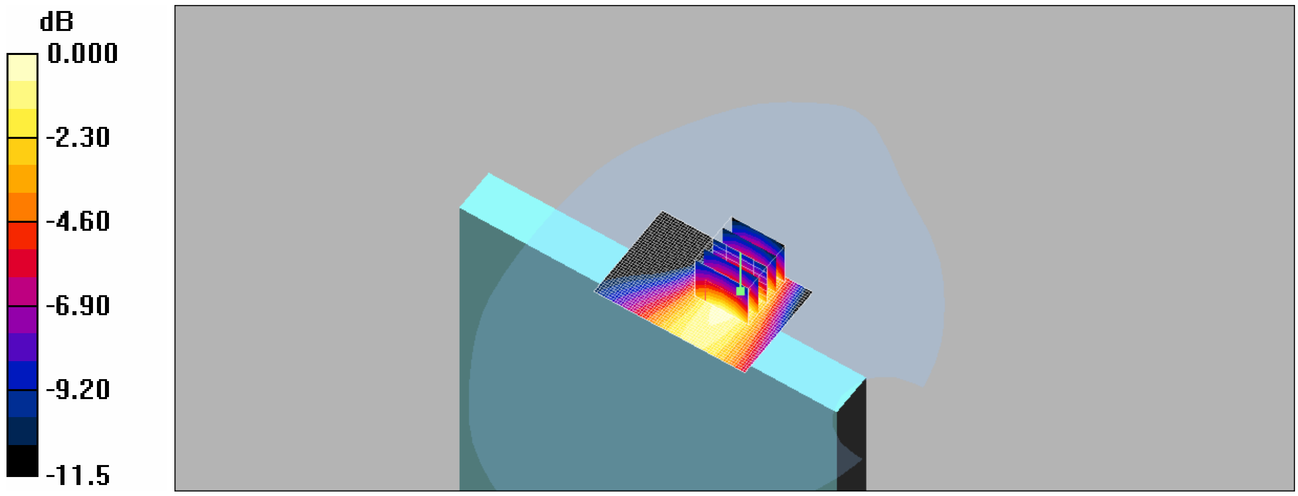
DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated:2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

BODY/Area Scan (61x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.124 mW/g

BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.4 V/m; Power Drift = 0.023 dB
Peak SAR (extrapolated) = 0.165 W/kg

SAR(1 g) = 0.111 mW/g; SAR(10 g) = 0.072 mW/g
Maximum value of SAR (measured) = 0.120 mW/g



0 dB = 0.120mW/g

Date/Time: 2008/3/24 05:22:23

Configuration 2_CH190

DUT: M72XT; Type: GSM; IMEI: 352678011154355

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2
Medium: Muscle 850 MHz Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.962 mho/m; ε_r = 56.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

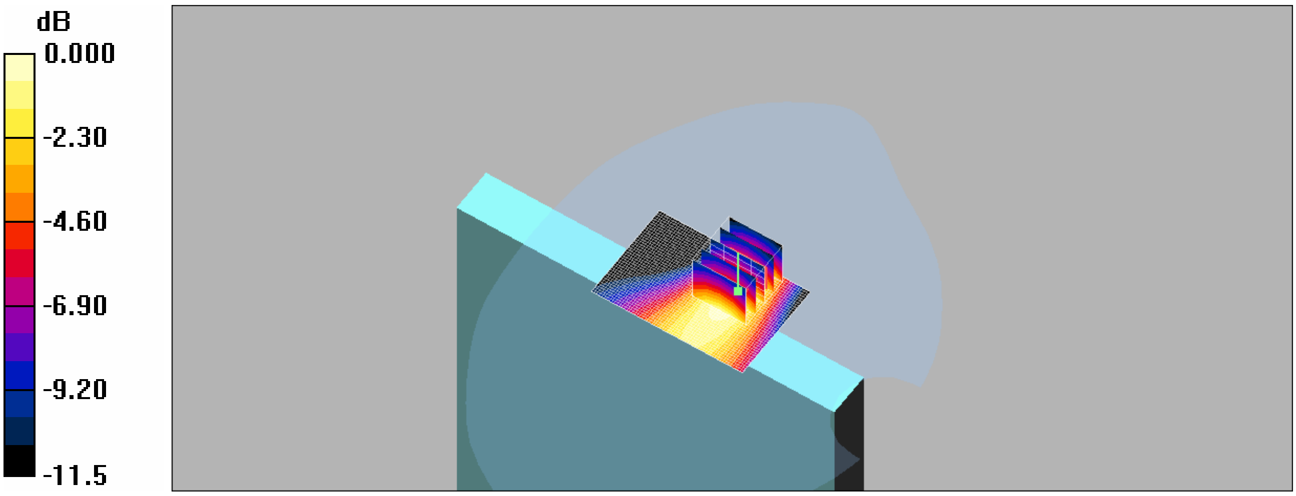
DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated:2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

BODY/Area Scan (61x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.118 mW/g

BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.94 V/m; Power Drift = -0.062 dB
Peak SAR (extrapolated) = 0.155 W/kg

SAR(1 g) = 0.105 mW/g; SAR(10 g) = 0.067 mW/g
Maximum value of SAR (measured) = 0.113 mW/g



0 dB = 0.113mW/g

Date/Time: 2008/3/24 06:19:58

Configuration 2_CH251

DUT: M72XT; Type: GSM; IMEI: 352678011154355

Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:2
Medium: Muscle 850 MHz Medium parameters used (interpolated): f = 848.8 MHz; $\sigma = 0.975$ mho/m; $\varepsilon_r = 56$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

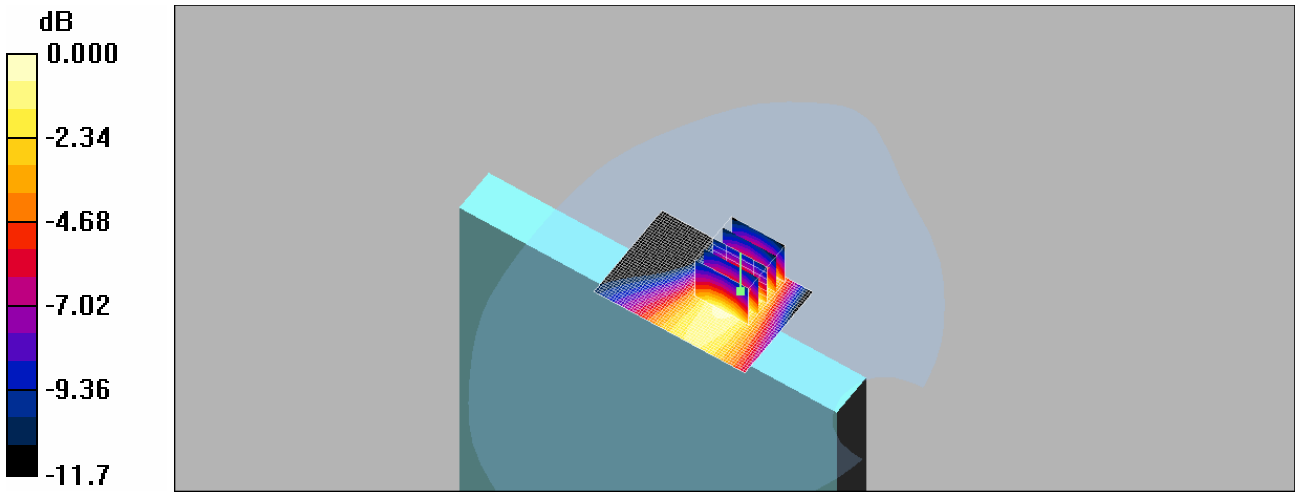
DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated:2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

BODY/Area Scan (61x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.113 mW/g

BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.64 V/m; Power Drift = 0.029 dB
Peak SAR (extrapolated) = 0.153 W/kg

SAR(1 g) = 0.102 mW/g; SAR(10 g) = 0.065 mW/g
Maximum value of SAR (measured) = 0.110 mW/g



0 dB = 0.110mW/g

Date/Time: 2008/3/25 03:42:22

Configuration 1_CH512

DUT: M72XT; Type: GSM; IMEI: 352678011154355

Communication System: GSM1900; Frequency: 1850.2 MHz;Duty Cycle: 1:2
Medium: M1800 & 1900 Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.53 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section

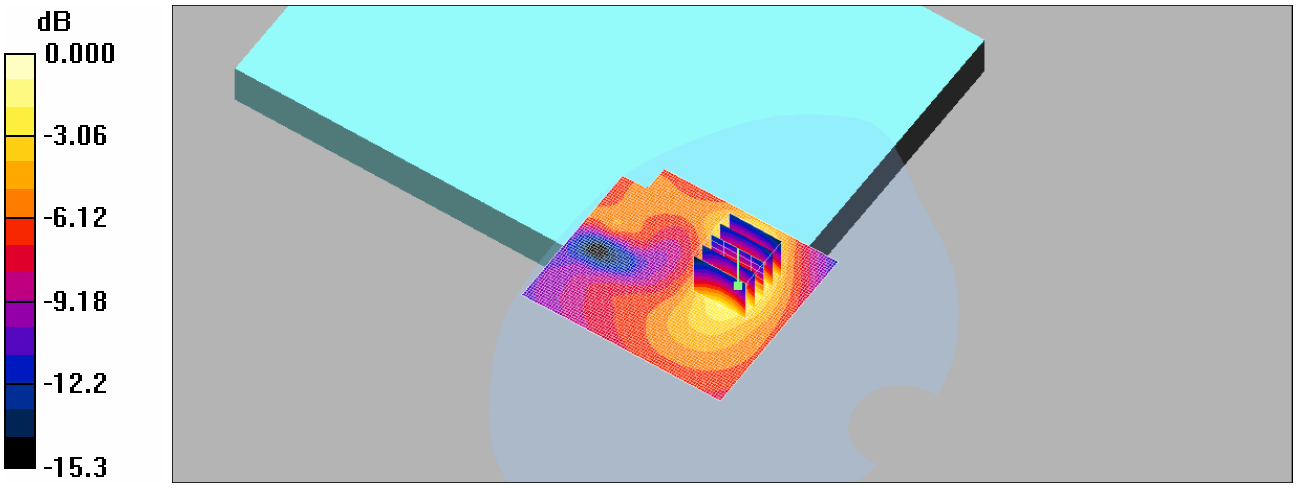
DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04,9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

BODY/Area Scan (81x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.080 mW/g

BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.25 V/m; Power Drift = 0.059 dB
Peak SAR (extrapolated) = 0.107 W/kg

SAR(1 g) = 0.069 mW/g; SAR(10 g) = 0.041 mW/g
Maximum value of SAR (measured) = 0.075 mW/g



0 dB = 0.075mW/g

Date/Time: 2008/3/25 04:38:56

Configuration 1_CH661

DUT: M72XT; Type: GSM; IMEI: 352678011154355

Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:2
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section

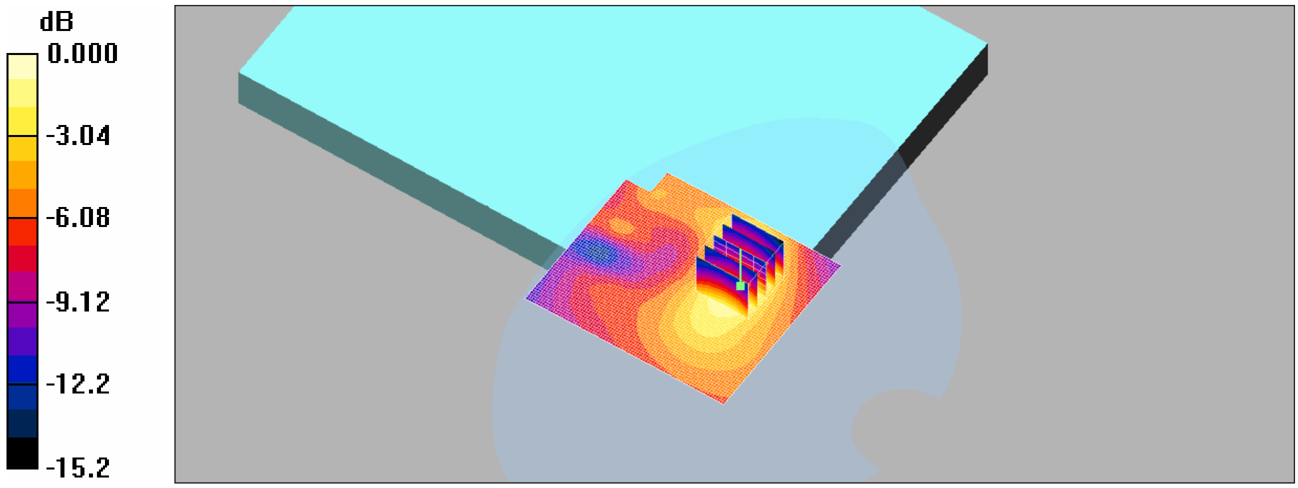
DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04,9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

BODY/Area Scan (81x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.103 mW/g

BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.35 V/m; Power Drift = -0.089 dB
Peak SAR (extrapolated) = 0.144 W/kg

SAR(1 g) = 0.092 mW/g; SAR(10 g) = 0.055 mW/g
Maximum value of SAR (measured) = 0.099 mW/g



0 dB = 0.099mW/g

Date/Time: 2008/3/25 05:16:02

Configuration 1_CH810

DUT: M72XT; Type: GSM; IMEI: 352678011154355

Communication System: GSM1900; Frequency: 1909.8 MHz;Duty Cycle: 1:2
Medium: M1800 & 1900 Medium parameters used: f = 1910 MHz; σ = 1.6 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section

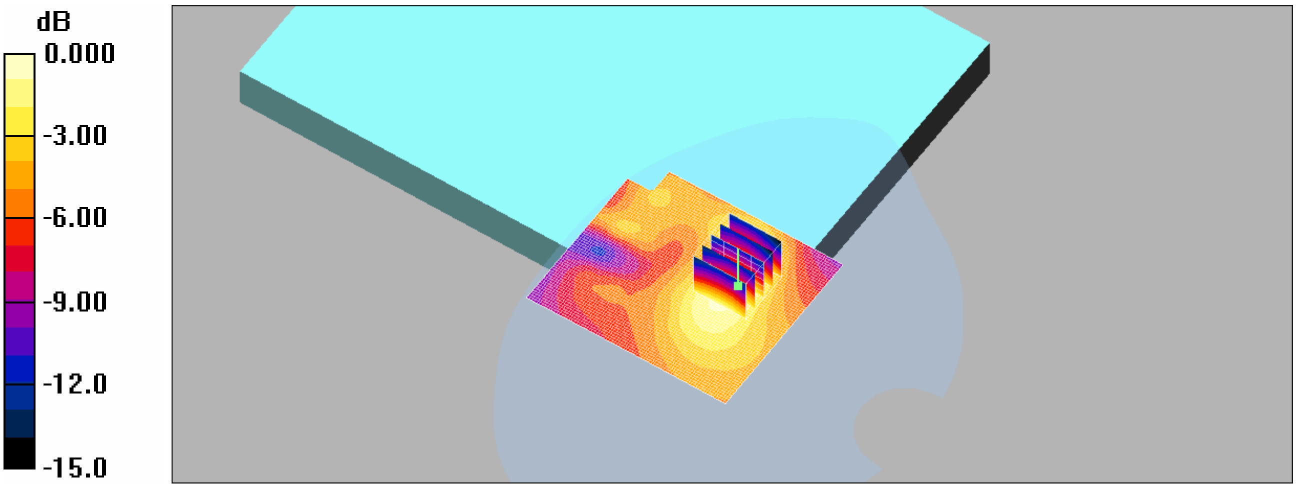
DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04,9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

BODY/Area Scan (81x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.109 mW/g

BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.18 V/m; Power Drift = 0.059 dB
Peak SAR (extrapolated) = 0.158 W/kg

SAR(1 g) = 0.102 mW/g; SAR(10 g) = 0.062 mW/g
Maximum value of SAR (measured) = 0.111 mW/g



0 dB = 0.111mW/g

Configuration 2_CH512

DUT: M72XT; Type: GSM; IMEI: 352678011154355

Communication System: GSM1900; Frequency: 1850.2 MHz;Duty Cycle: 1:2
Medium: M1800 & 1900 Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.53 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section

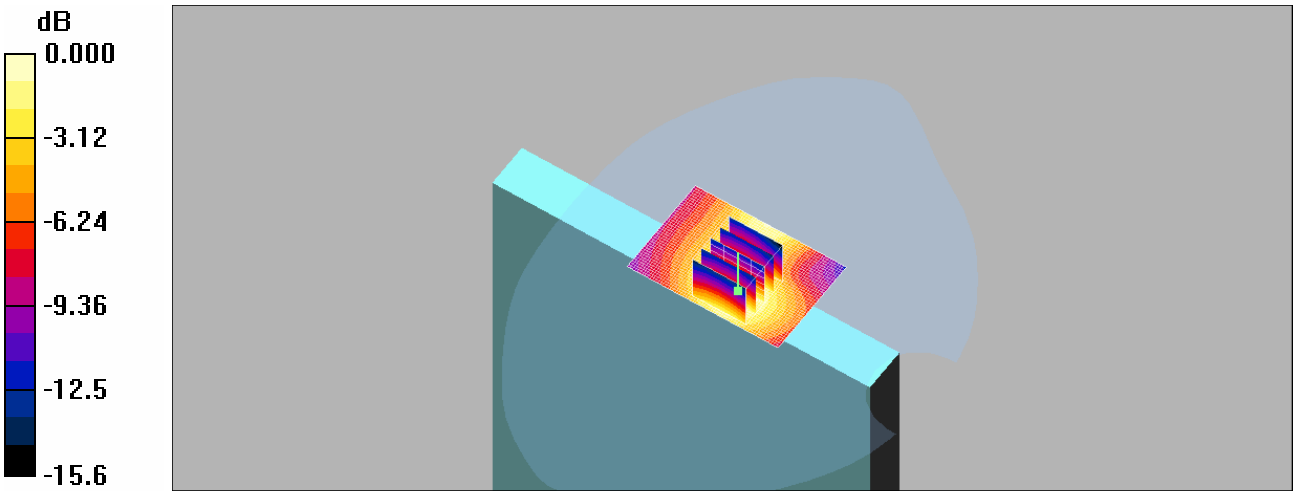
DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04,9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated:2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

BODY/Area Scan (61x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.179 mW/g

BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.4 V/m; Power Drift = 0.000 dB
Peak SAR (extrapolated) = 0.255 W/kg

SAR(1 g) = 0.161 mW/g; SAR(10 g) = 0.098 mW/g
Maximum value of SAR (measured) = 0.175 mW/g



0 dB = 0.175mW/g

Configuration 2_CH661

DUT: M72XT; Type: GSM; IMEI: 352678011154355

Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:2
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section

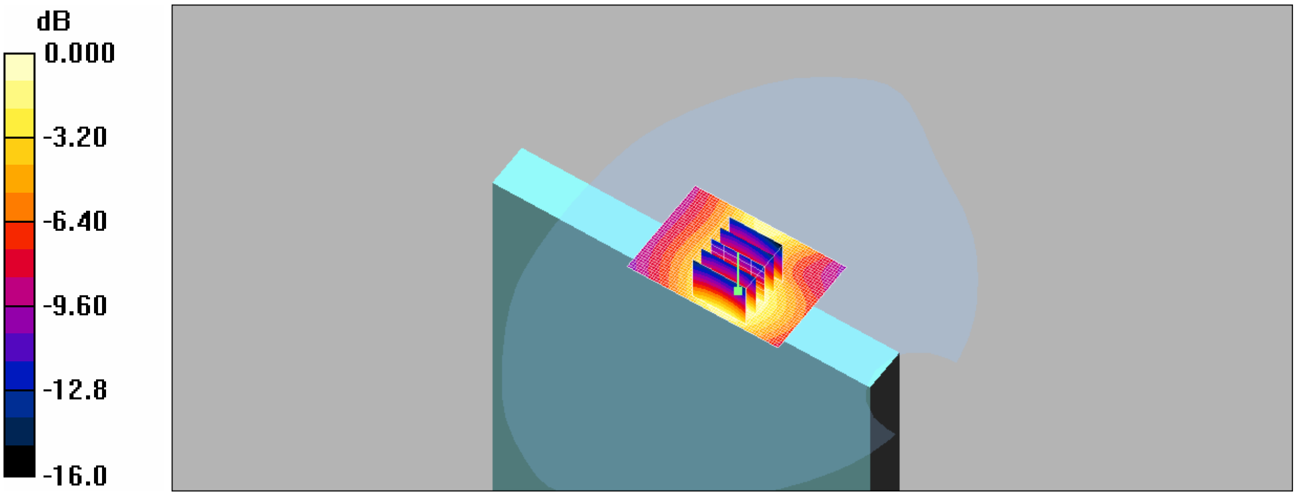
DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04,9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated:2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

BODY/Area Scan (61x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.258 mW/g

BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.3 V/m; Power Drift = -0.053 dB
Peak SAR (extrapolated) = 0.365 W/kg

SAR(1 g) = 0.229 mW/g; SAR(10 g) = 0.137 mW/g
Maximum value of SAR (measured) = 0.248 mW/g



0 dB = 0.248mW/g

Configuration 2_CH810

DUT: M72XT; Type: GSM; IMEI: 352678011154355

Communication System: GSM1900; Frequency: 1909.8 MHz;Duty Cycle: 1:2
Medium: M1800 & 1900 Medium parameters used: f = 1910 MHz; σ = 1.6 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section

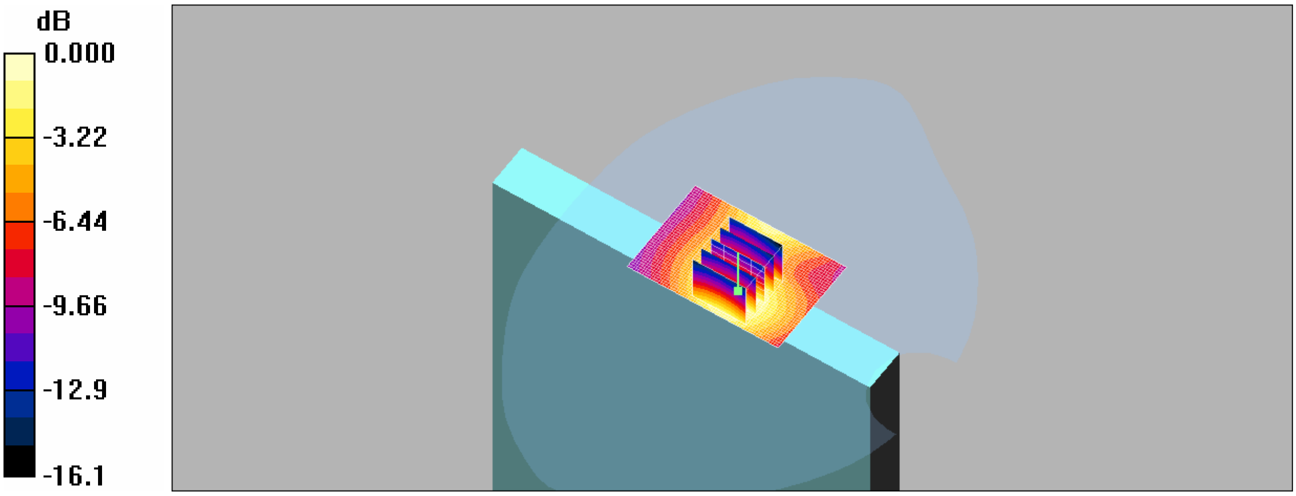
DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04,9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated:2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

BODY/Area Scan (61x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.316 mW/g

BODY/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.5 V/m; Power Drift = -0.036 dB
Peak SAR (extrapolated) = 0.453 W/kg

SAR(1 g) = 0.280 mW/g; SAR(10 g) = 0.167 mW/g
Maximum value of SAR (measured) = 0.303 mW/g



0 dB = 0.303mW/g


1g/10g Averaged SAR
0.026, -4.217
1g/10g Averaged SAR
SAR; Zoom Scan:Value Along Z, X=0, Y=4
dB
m
-5
-6
-7
-8
-9
-10
-11
-12
-13
-14
-15
-16
0.005
0.010
0.015
0.020
0.025
0.030
0.035

5.SAR System Performance Verification

Date/Time: 2007/3/24 01:28:51

DUT: Dipole 900 MHz; Type: D900V2; Serial: SN:168

Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium: Muscle 900 MHz Medium parameters used: f = 900 MHz; σ = 1.07 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

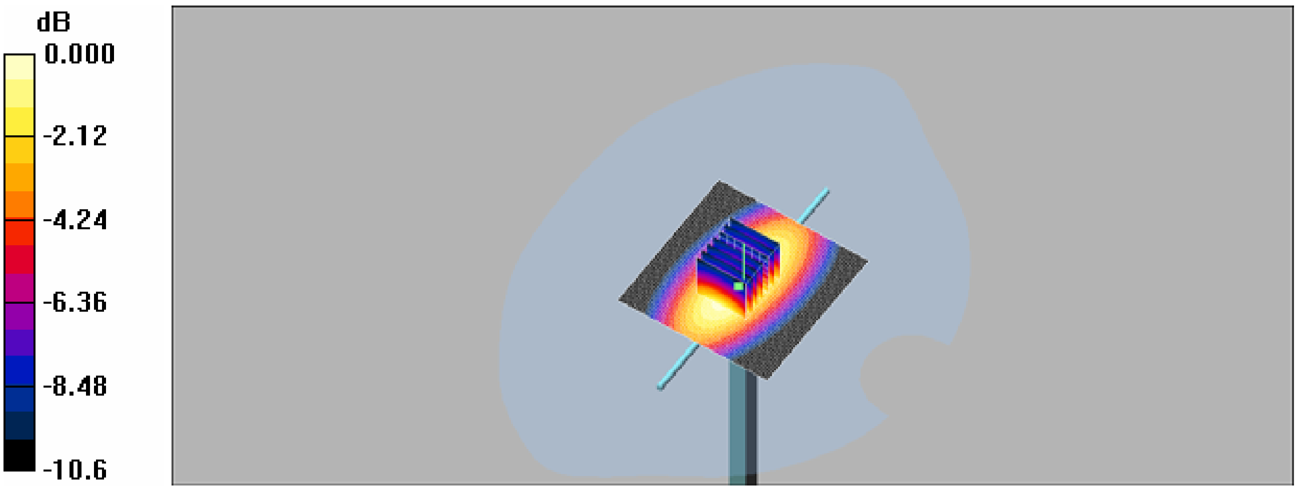
DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93,10.93, 10.93);Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated:2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.01 mW/g

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.0 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 4.17 W/kg

SAR(1 g) = 2.68 mW/g; SAR(10 g) = 1.72 mW/g
Maximum value of SAR (measured) = 3.00 mW/g



0 dB = 3.00mW/g

DUT: Dipole 1900 MHz; Type: D1900V2; Serial:5d018

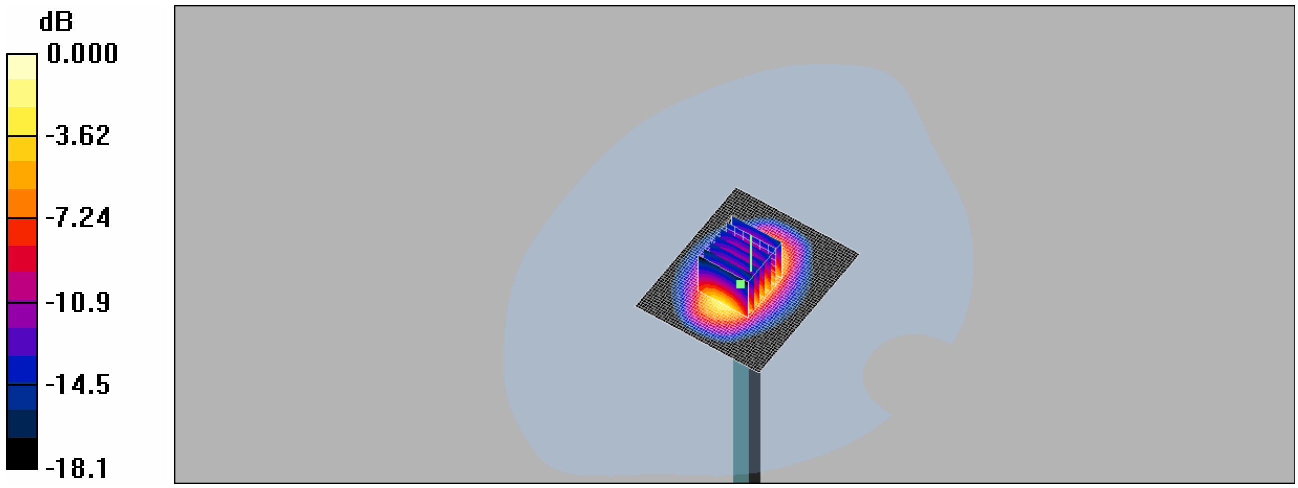
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: Head 1900MHz Medium parameters used: f = 1900 MHz; σ = 1.58 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2008/1/24
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Pin=250mW/Area Scan (51x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.9 mW/g

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.0 V/m; Power Drift = -0.045 dB
Peak SAR (extrapolated) = 17.4 W/kg
SAR(1 g) = 9.51 mW/g; SAR(10 g) = 4.99 mW/g
Maximum value of SAR (measured) = 10.6 mW/g



0 dB = 10.6mW/g

6.Appendix

6.1. Photographs of Test Setup

Fig.1 Photograph of the SAR measurement System

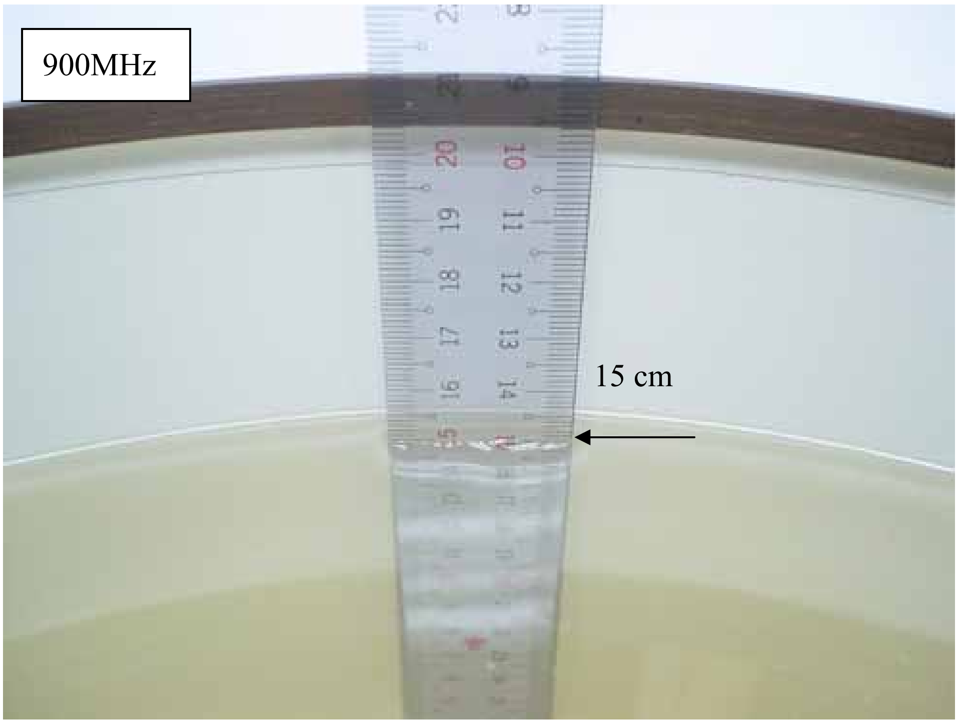


Fig.2.1 Photograph of the Tissue Simulant liquid depth 15cm for Flat position

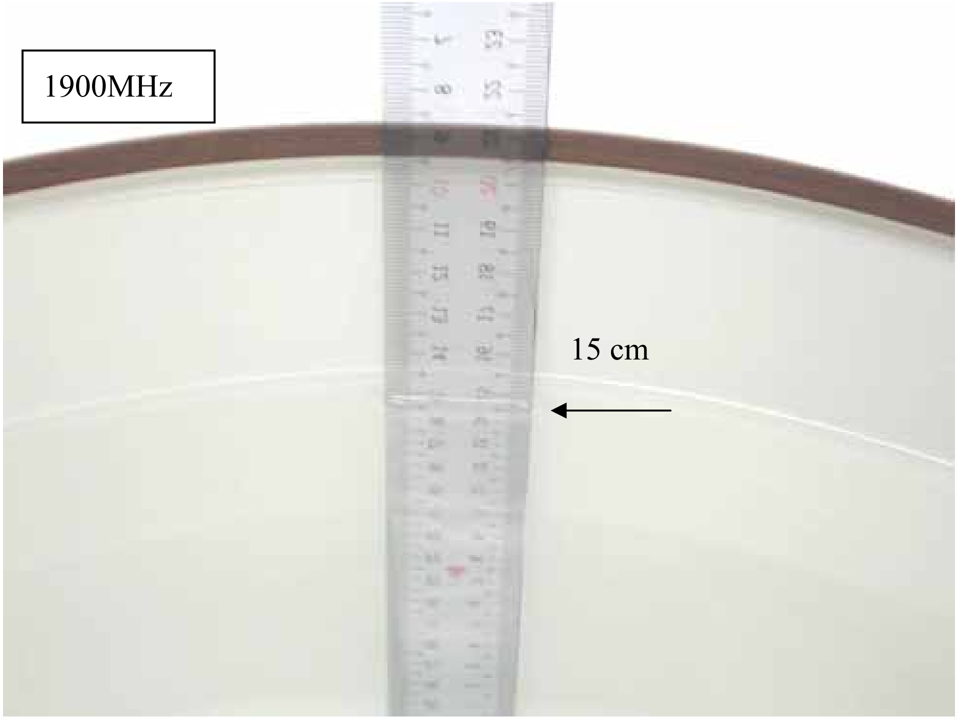


Fig.2.2 Photograph of the Tissue Simulant liquid depth 15cm for Flat position

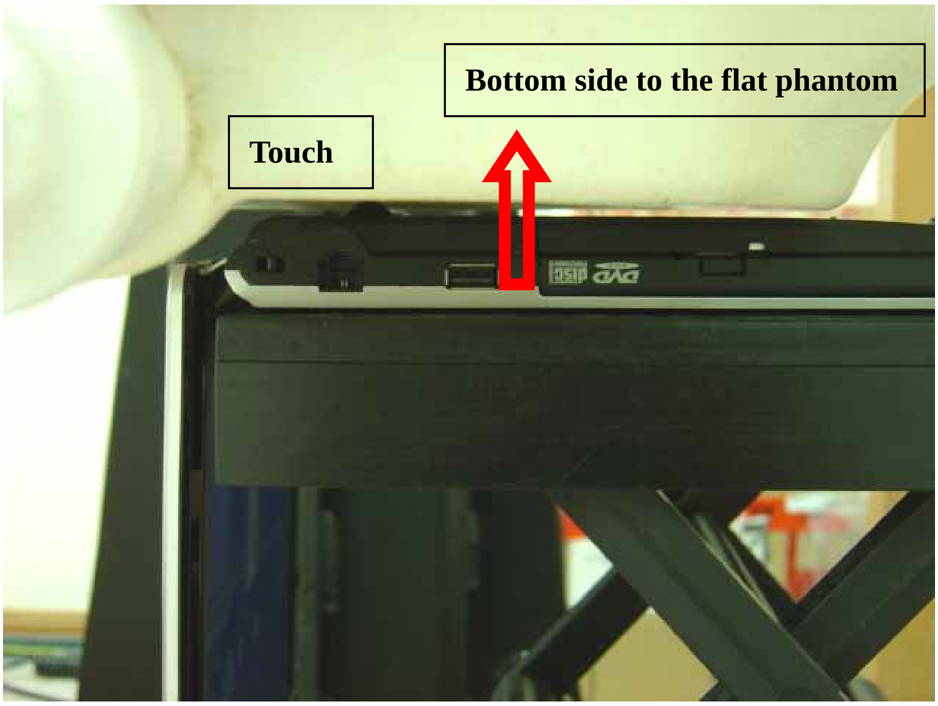


Fig.3 Bottom side of the Notebook is paralleled with flat phantom, open the panel with 90 degrees, bottom side is contact with flat phantom.

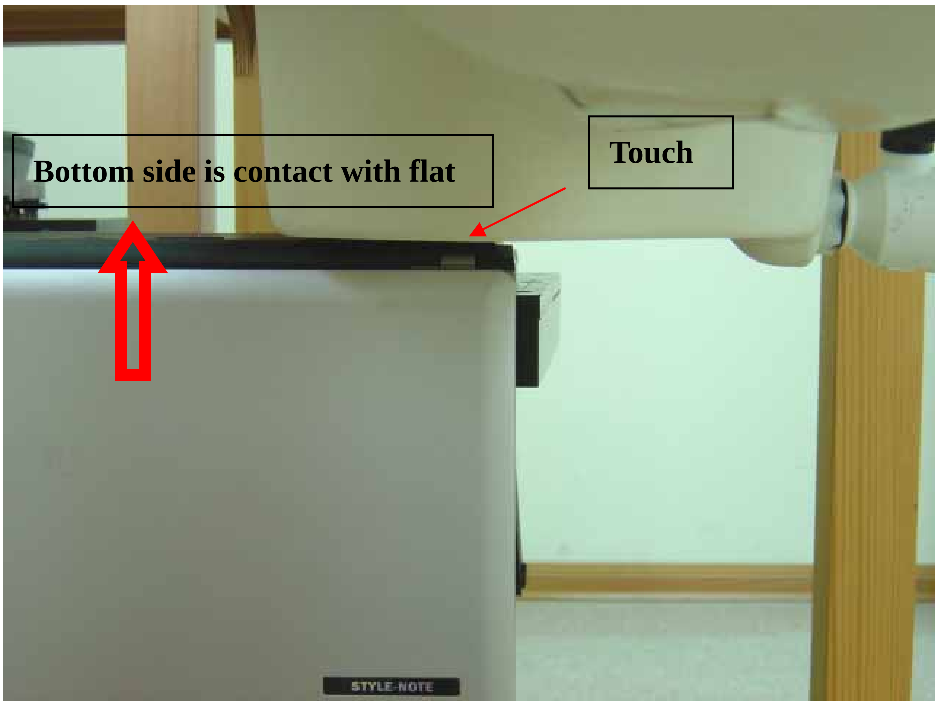


Fig.4 Bottom side of the Notebook is paralleled with flat phantom, open the panel with 90 degrees, bottom side is contact with flat phantom.

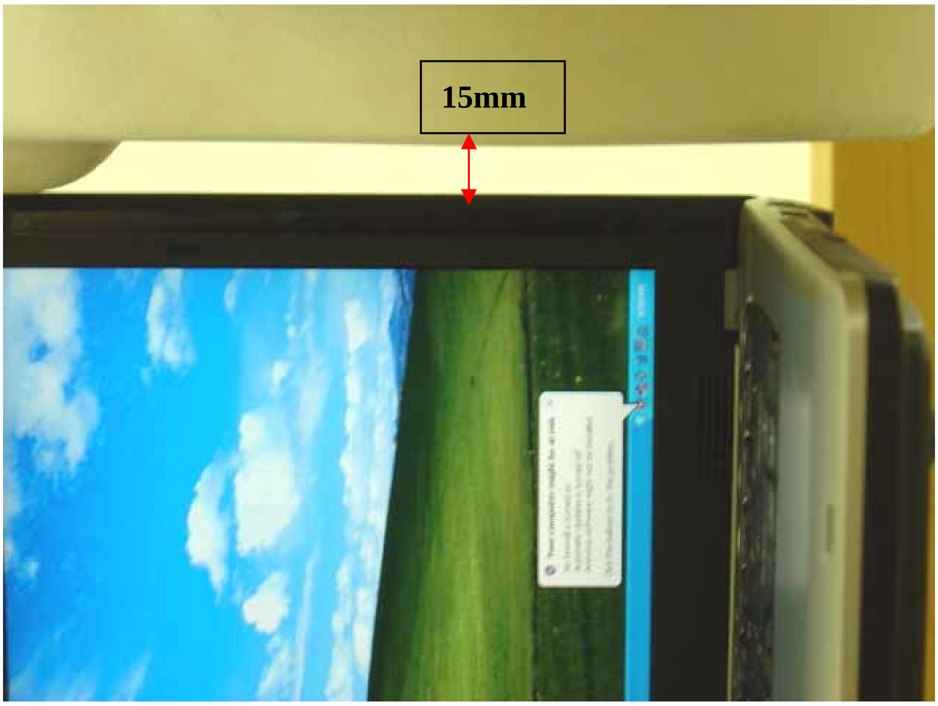


Fig.5 Right side of Notebook is paralleled with flat phantom, and spacing between EUT and Phantom-in contact 15mm.

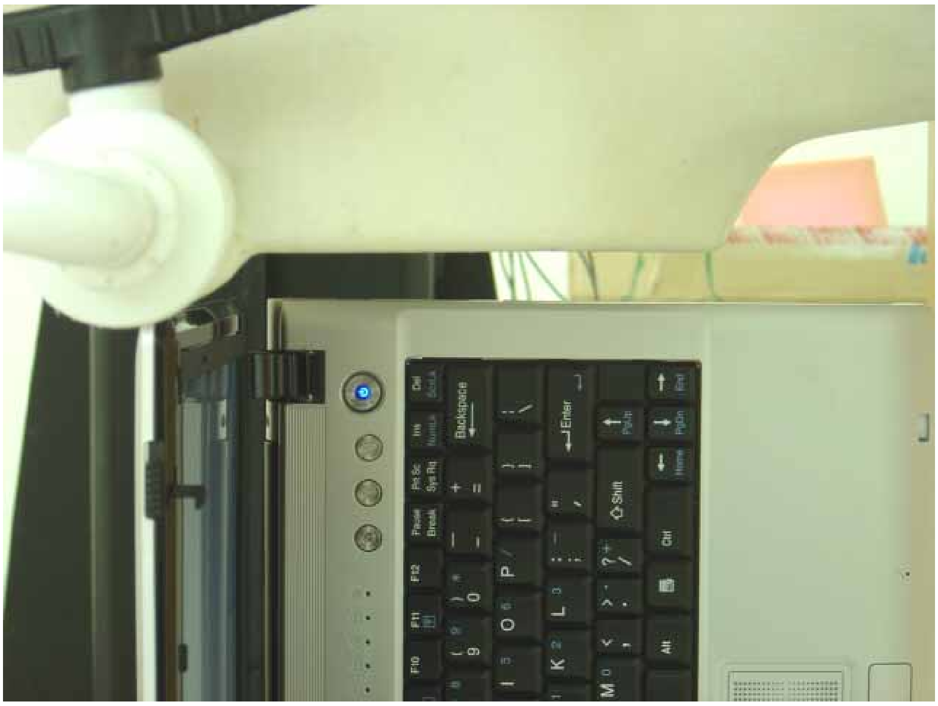


Fig.6 Right side of Notebook is paralleled with flat phantom, and spacing between EUT and Phantom-in contact 15mm.

6.2 Photographs of the EUT

Fig.7 Front view of EUT

Fig.8 Back view of EUT

Fig.9 Left Side of EUT

Fig.10 Right Side of EUT

Fig.11 Fold up of EUT

6.3 Photographs of the Accessories of EUT

Fig.12 Notebook charger_(Model:0335A1965)

Fig.13 Notebook charger_(Model: HP-OK065B13)

6.4 DAE & Probe Calibration certificate

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

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

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **SGS (Auden)**

Certificate No: DAE4-547_Oct07

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BA - SN: 547
Calibration procedure(s)	QA CAL-06.v12 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	October 1, 2007
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	13-Oct-06 (Elcal AG, No: 5492)	Oct-07
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-06 (Elcal AG, No: 5478)	Oct-07
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	25-Jun-07 (SPEAG, in house check)	In house check Jun-08

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bomholt	R&D Director	

Issued: October 1, 2007

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

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

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

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **SGS (Auden)**

Certificate No: **EX3-3526_Aug07**

CALIBRATION CERTIFICATE

Object	EX3DV3 - SN:3526
Calibration procedure(s)	QA CAL-01.v6 Calibration procedure for dosimetric E-field probes
Calibration date:	August 29, 2007
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (METAS, No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (METAS, No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	[signature]
Approved by:	Niels Kuster	Quality Manager	[signature]

Issued: August 29, 2007

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

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Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe EX3DV3

SN:3526

Manufactured:	March 19, 2004
Last calibrated:	August 25, 2006
Recalibrated:	August 29, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV3 SN:3526

Sensitivity in Free Space[A]

NormX	**0.991** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**97** mV
NormY	**0.807** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**96** mV
NormZ	**0.876** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**97** mV

Diode Compression[B]

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	1.5	0.5
SAR_{be} [%]	With Correction Algorithm	0.3	0.4

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	3.0	1.5
SAR_{be} [%]	With Correction Algorithm	0.2	0.1

Sensor Offset

Probe Tip to Sensor Center **1.0** mm

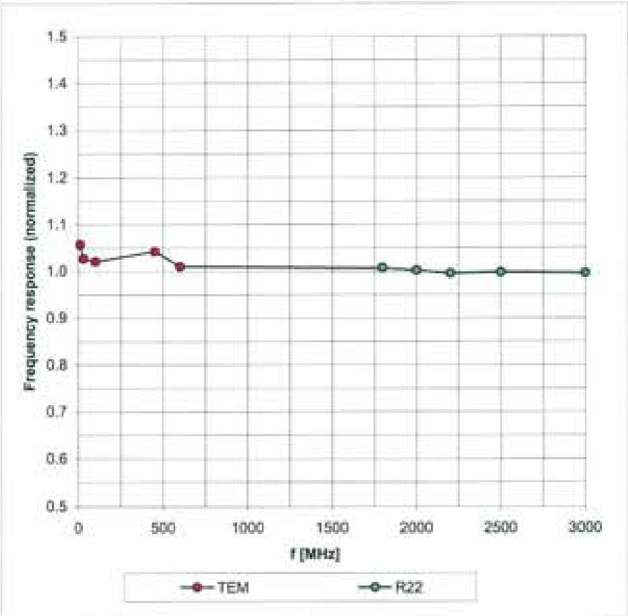
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

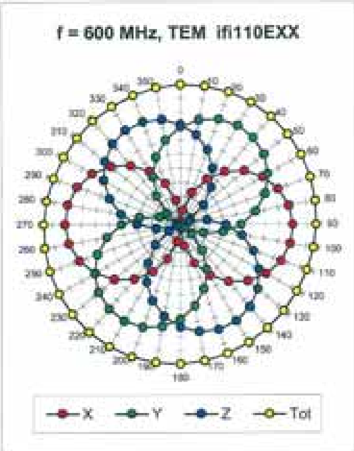
Frequency Response of E-Field

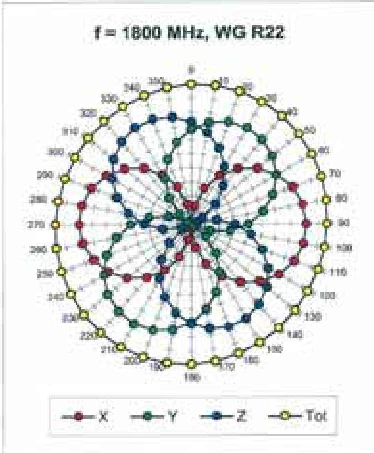
(TEM-Cell:ifi110 EXX, Waveguide: R22)

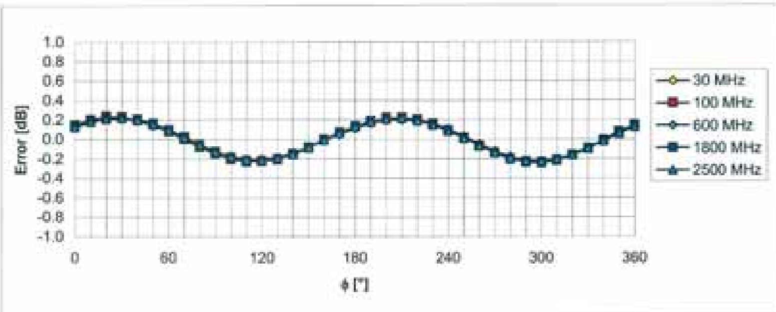


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), $\vartheta = 0°$



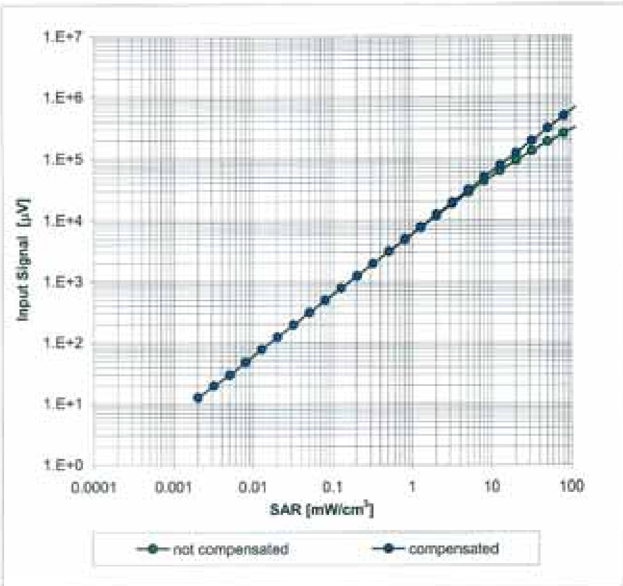


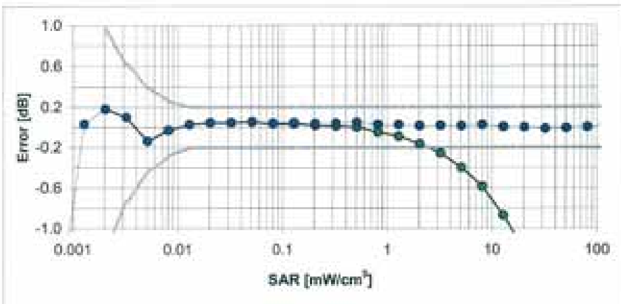


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

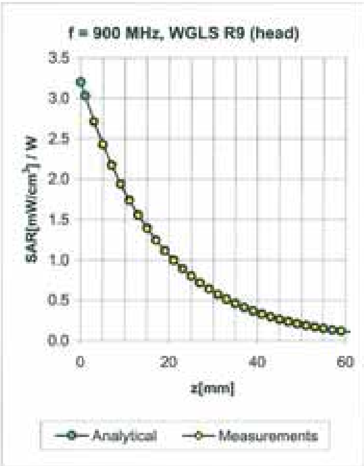
(Waveguide R22, f = 1800 MHz)

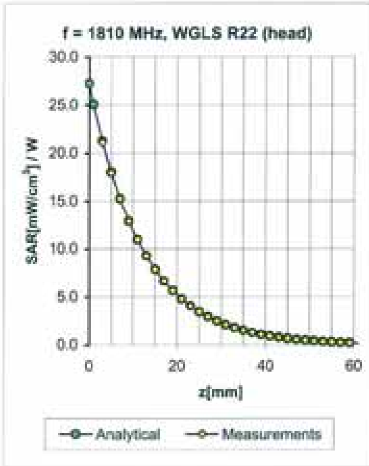




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



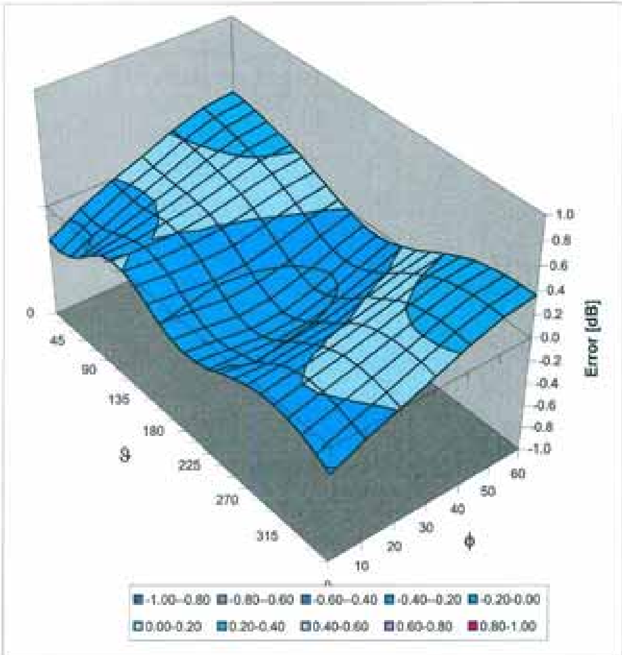


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.50	0.80	11.48	± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.15	1.32	9.30	± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.22	1.01	8.91	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.34	1.00	8.42	± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.50	0.80	10.93	± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.16	1.28	9.04	± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.15	1.43	8.67	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.38	1.00	8.08	± 11.8% (k=2)

[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

6.5 Uncertainty Analysis

DASY4 Uncertainty Budget
According to IEEE P1528 [1]

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	±4.8 %	N	1	1	1	±4.8 %	±4.8 %	∞
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	±1.0 %	N	1	1	1	±1.0 %	±1.0 %	∞
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 Conditions	±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 %	875
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 Permittivity (target)	±5.0 %	R	$\sqrt{3}$	0.6	0.49	±1.7 %	±1.4 %	∞
Liquid Permittivity (meas.)	±2.5 %	N	1	0.6	0.49	±1.5 %	±1.2 %	∞
Combined Std. Uncertainty						±10.3 %	±10.0 %	331
Expanded STD Uncertainty						**±20.6 %**	**±20.1 %**	

6.6 Phantom Description

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 / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 C
Series No	TP-1150 and higher
Manufacturer	SPEAG Zeughausstrasse 43 CH-8004 Zürich 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 items (called samples) or are tested at each item.

Test	Requirement	Details	Units tested
Dimensions	Compliant with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness of shell	Compliant with the requirements according to the standards	2mm +/- 0.2mm in flat and specific areas of head section	First article, Samples, TP-1314 ff.
Material thickness at ERP	Compliant with the requirements according to the standards	6mm +/- 0.2mm at ERP	First article, All items
Material parameters	Dielectric parameters for required frequencies	300 MHz – 6 GHz: Relative permittivity < 5, Loss tangent < 0.05	Material samples
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe technical Note for material compatibility.	DEGMBE based simulating liquids	Pre-series, First article, Material samples
Sagging	Compliant with the requirements according to the standards. Sagging of the flat section when filled with tissue simulating liquid.	< 1% typical < 0.8% if filled with 155mm of HSL900 and without DUT below	Prototypes, Sample testing

Standards

[1] CENELEC EN 50361
[2] IEEE Std 1528-2003
[3] IEC 62209 Part I
[4] FCC OET Bulletin 65, Supplement C, Edition 01-01
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standards [1] to [4].

Date 07.07.2005

Signature / Stamp

s p e a g
Schmid & Partner Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

6.7 System Validation from Original equipment supplier

DASY4 Validation Report for Body TSL

Date/Time: 17.04.2007 16:56:18

Test Laboratory: SPEAG, Zurich, Switzerland

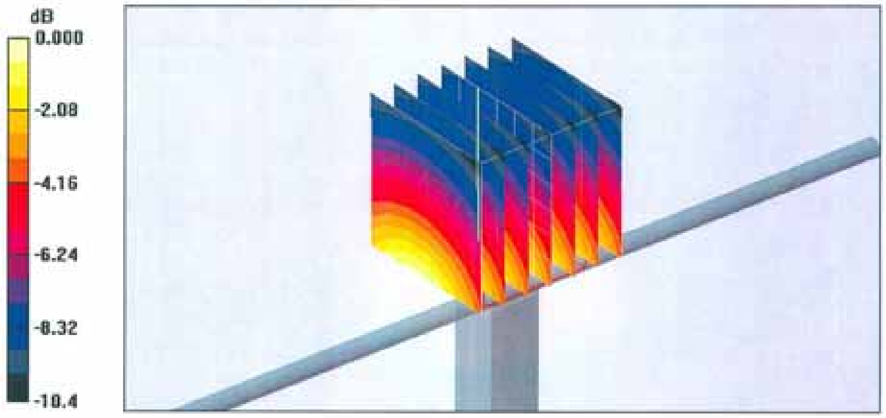
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:168

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: MSL U10BB;
Medium parameters used: f = 900 MHz; σ = 1.01 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(5.8, 5.8, 5.8); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin=250mW/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.8 V/m; Power Drift = 0.032 dB
Peak SAR (extrapolated) = 3.58 W/kg
SAR(1 g) = 2.58 mW/g; SAR(10 g) = 1.71 mW/g
Maximum value of SAR (measured) = 2.77 mW/g



0 dB = 2.77mW/g

DASY4 Validation Report for Body TSL

Date/Time: 23.04.2007 16:11:04

Test Laboratory: SPEAG, Zurich, Switzerland

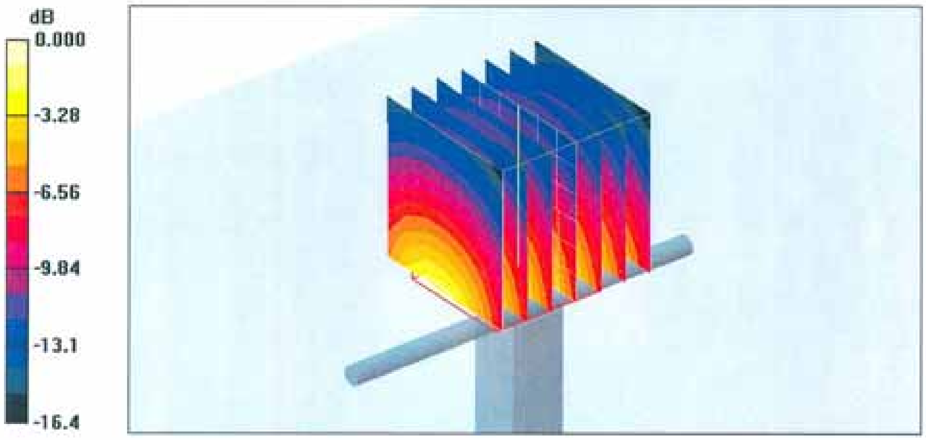
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d018

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL U10 BB;
Medium parameters used: f = 1900 MHz; σ = 1.58 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.43, 4.43, 4.43); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.3 V/m; Power Drift = 0.032 dB
Peak SAR (extrapolated) = 15.7 W/kg
SAR(1 g) = 9.55 mW/g; SAR(10 g) = 5.17 mW/g
Maximum value of SAR (measured) = 10.7 mW/g



0 dB = 10.7mW/g

Certificate No: D1900V2-5d018_Apr07 Page 8 of 9

End of Report