TEST REPORT

Equipment Under Test	:	PDA(CDMA835)
Model No.	:	MC3000
FCC ID	:	S3Q-MC3000
Applicant	:	InnoTeletek, Inc.
Address of Applicant	:	461-25, Jeonmin-dong, Yuseong-gu, Daejeong, 305-811, South Korea
Date of Receipt	:	2005-03-24
Date of Test(s)	:	2005-03-24
Date of Issue	:	2005-04-01

Standards:

FCC OET Bulletin 65 supplement C,

ANSI/IEEE C95.1, C95.3

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

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Testing Korea Co., Ltd. or testing done by SGS Testing Korea Co., Ltd. in connection with distribution or use of the product described in this report must be approved by SGS Testing Korea Co., Ltd. in writing.

Tested by	:	**Elvin Lee**		**2005-04-01**
Approved by	:	**Albert Lim**		**2005-04-01**

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APPENDIX

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2. Uncertainty Analysis
3. Photographs of EUT & EUT's Test Setup
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1. General Information

1.1 Testing Laboratory

SGS Testing Korea Co., Ltd.
Radio Div. 2FL, 18-34, Sanbon-dong, Gunpo-Si, Gyeonggi-do Korea 435-040
Telephone : +82 +31 428 5700
FAX : +82 +31 427 2371
Homepage : www.sgstesting.co.kr

1.2 Details of Applicant

Name : **InnoTeletek, Inc.**
Address : 461-25, Jeonmin-dong, Yuseong-gu, Daejeong, 305-811, South Korea

1.3 Description of EUT(s)

EUT Type	PDA(CDMA835)
Model	MC3000
Mode of Operation	CDMA835
Modulation Mode	OQPSK
Maximum RF Conducted Power	24.20 dBm
Tx Frequency Range	824.73 ~ 848.19 MHz
Antenna Type	External
Battery Type	3.8VDC Lithium-Ion(2000mAh)
Exposure Environment	Uncontrolled exposure
Max. SAR Measured	0.394 mW/g

1.4 Test Environment

Ambient temperature	:	22.2 ° C
Tissue Simulating Liquid	:	22.1 ° C
Relative Humidity	:	62 %

1.5 Operation Configuration

The device was controlled by using a Mobile Test Unit (E5515C). Communication between the device and the tester was established by air link. Measurements were performed on the lowest, middle and highest channels of the operating band. The phone was set to maximum power level during all tests and at the beginning of each test the battery was fully charged.

The DASY4 system measures power drift during SAR testing by comparing e-field in the same location at the beginning and at the end of measurement.

1.6 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.

1.7 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 ET3DV6 1782 E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ 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:

- A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimeter 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.

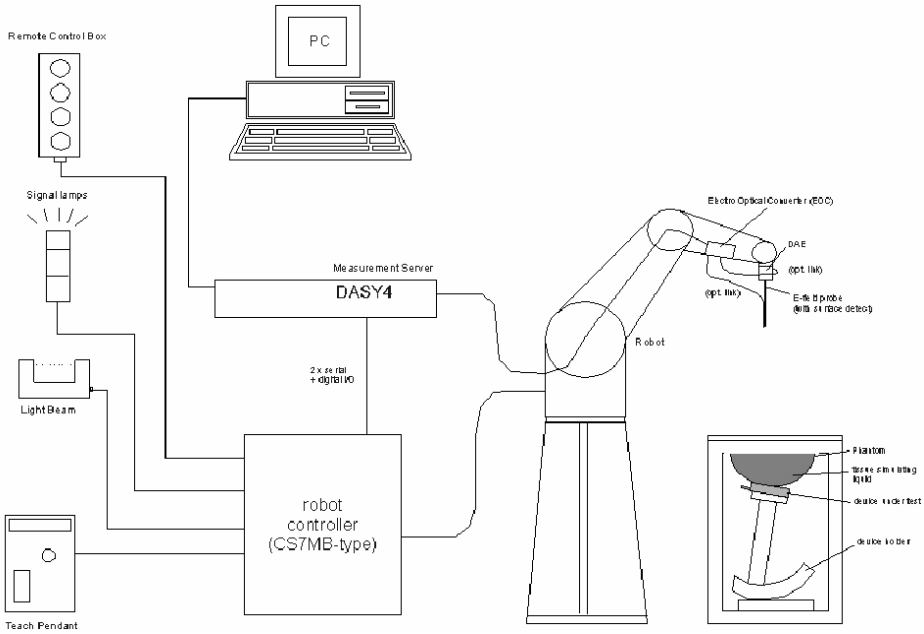


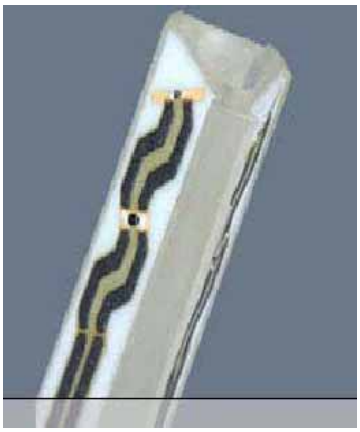
Fig a. The microwave circuit arrangement used for SAR system verification

- 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 handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

1.8 System Components

ET3DV6 E-Field Probe

Construction	:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. glycol).
Calibration	:	In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy ± 8%)
Frequency	:	10 MHz to >6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity	:	±0.2 dB in brain tissue (rotation around probe axis) ±0.4 dB in brain tissue (rotation normal to probe axis)
Dynamic Range	:	5 μW/g to >100 mW/g; Linearity: ±0.2 dB
Srfce. Detect	:	±0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions	:	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application	:	General dosimetry up to 3 GHz Compliance tests of mobile phone


ET3DV6 E-Field Probe

NOTE:

1. The Probe parameters have been calibrated by the SPEAG. Please reference “APPENDIX D” for the Calibration Certification Report.

SAM Phantom

Construction: **The SAM Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. 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 the 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 in the robot**

SAM Phantom

Shell Thickness: 2.0 ± 0.1 mm

Filling Volume: Approx. 25 liters

DEVICE HOLDER

Construction In combination with the Twin SAM PhantomV4.0/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

1.9 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 835 MHz. The tests were conducted on the same days as the measurement of the EUT. 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 22.2 °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.

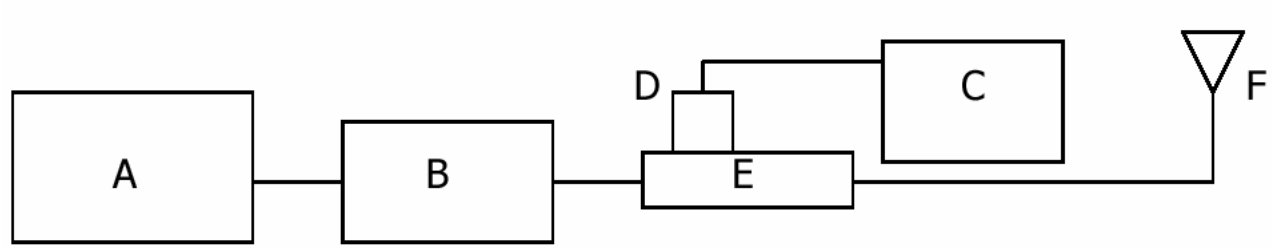


Fig b. The microwave circuit arrangement used for SAR system verification

A. Agilent Model E4421B Signal Generator
B. EMPOWER Model 2001-BBS3Q7ECK Amplifier
C. Agilent Model E4419B Power Meter
D. Agilent Model 9300H Power Sensor
E. Agilent Model 778D Dual directional coupling
F. Reference dipole Antenna

Photo of the 835 MHz dipole Antenna

Validation Kit	Frequency	Target SAR 1g (1 W)	Target SAR 10g (1 W)	Measured SAR 1g (1 W)	Measured SAR 10g (1 W)	Measured Date
DT3DV6 S/N:1782	835 MHz	9.5 mW/g	6.2 mW/g	9.68 mW/g	6.32 mW/g	2005-3-24

Table 1. Results system validation

1.10 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this body-simulant fluid were measured by using the Agilent Model 85070D Dielectric Probe (rates frequence band 200 MHz to 20 GHz) in conjunction with Agilent E5070B Network Analyzer(300 KHz-3000 MHz) by using a procedure detailed in Section V.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			Permittivity	Conductivity	Simulated Tissue Temp(℃)
835	Head	Measured, 2005-03-24	42.2	0.892	22.1
		Recommended Limits	41.5	0.90	22.0

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			Permittivity	Conductivity	Simulated Tissue Temp(℃)
835	Body	Measured, 2005-03-25	54.05	0.939	22.1
		Recommended Limits	55.2	0.97	22.0

The composition of the brain tissue simulating liquid for 835 MHz is:

Ingredient	835 MHz(Head)	835MHz(Body)
DGMBE	-	-
Water	532.98 g	631.68 g
Salt	18.3 g	11.72 g
Preventol D-7	2.4 g	1.2 g
Cellulose	3.2 g	600 g
Sugar	766.0 g	-
Total amount	1 l	1 l

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 Populaion	Controlled Environment Occupational
Partial Peak SAR (Brain)	1.60 m W/g	8.00 m W/g
Partial Average SAR (Whole Body)	0.08 m W/g	0.40 m W/g
Partial 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. Instruments List

Maunfacturer	Device	Type	Serial Number	Date of last Calibration
Schmid& Partner Engineering AG	Dosimetric E-Field Probe	ET3DV6	1782	April 28, 2004
Schmid& Partner Engineering AG	835 MHz System Validation Dipole	D835V2	490	July 22, 2003
Schmid& Partner Engineering AG	Data acquisition Electronics	DAE3	567	April 30, 2004
Schmid& Partner Engineering AG	Software	DASY 4 V4.5 Build 19	---	N/A
Schmid& Partner Engineering AG	Phantom	SAM Phantom	---	N/A
Agilent	Network Analyzer	E5070B	MY42100282	November 21, 2004
Agilent	Dielectric Probe Kit	85070D	2184	N/A

3.Summary of Results

CDMA 835 MHz (Head)

Right Head						
Channel	Frequency	Position	Conducted Output Power(dBm)	1 g SAR (W/kg)	Amb.. Temp.(° C)	Liquid Temp.(° C)
382	836.46	Contact	24.13	0.316	22.2	22.1
		Tilt(15°)	24.13	0.297	22.2	22.1

Left Head						
Channel	Frequency	Position	Conducted Output Power(dBm)	1 g SAR (W/kg)	Amb.. Temp.(° C)	Liquid Temp.(° C)
382	836.46	Contact	24.13	0.343	22.2	22.1
		Tilt(15°)	24.13	0.394	22.2	22.1

Left Head						
Channel	Frequency	Position	Conducted Output Power(dBm)	1 g SAR (W/kg)	Amb.. Temp.(° C)	Liquid Temp.(° C)
1014	824.73	Tilt(15°)	24.20	0.378	22.2	22.1
773	848.19		24.17	0.330	22.2	22.1

Note : The maximum SAR was detected at Left Head Tilt position of middle channel. After finding the maximum SAR position, the SAR of Low and High channel was measured at the peak position of middle channel.

CDMA 835 MHz (Body)

Body (EUT front)					
Channel	Frequency	Conducted Output Power(dBm)	1 g SAR (W/kg)	Amb.. Temp.(° C)	Liquid Temp.(° C)
1014	824.73	24.20	0.122	22.2	22.1
382	836.46	24.13	0.113	22.2	22.1
773	848.19	24.17	0.094	22.2	22.1

Body (EUT rear)					
Channel	Frequency	Conducted Output Power(dBm)	1 g SAR (W/kg)	Amb.. Temp.(° C)	Liquid Temp.(° C)
1014	824.73	24.20	0.285	22.2	22.1
382	836.46	24.13	0.244	22.2	22.1
773	848.19	24.17	0.213	22.2	22.1

Appendix

List

Appendix A	DASY4 Report (Measurement Plots)	
Appendix B	Uncertainty Analysis	
Appendix C	Photographs	-Validation Test - EUT - Test Setup
Appendix D	Calibration Certificate	- PROBE - DAE - DIPOLE

DASY4 Report(Measurement Plots)

Date/Time: 2005-03-24 11:59:05

Test Laboratory: SGS Testing Korea

Validation

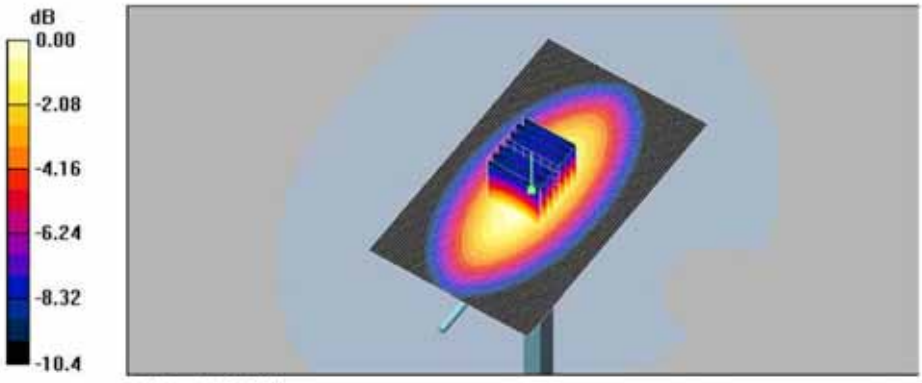
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:490

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used: f = 835 MHz; s = 0.892 mho/m; e_r = 42.2; ? = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.45, 6.45, 6.45); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Validation Test/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.63 mW/g

Validation Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.3 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.58 mW/g
Maximum value of SAR (measured) = 2.62 mW/g



0 dB = 2.62mW/g

Date/Time: 2005-03-24 2:52:32

Test Laboratory: SGS Testing Korea

Head_right

DUT: MC3000; Type: CDMA terminal; Serial: H1MC3000A503180001

Communication System: CDMA 835MHz; Frequency: 836.46 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 836.46 MHz; s = 0.893 mho/m; e_r = 42.2; ? = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.45, 6.45, 6.45); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

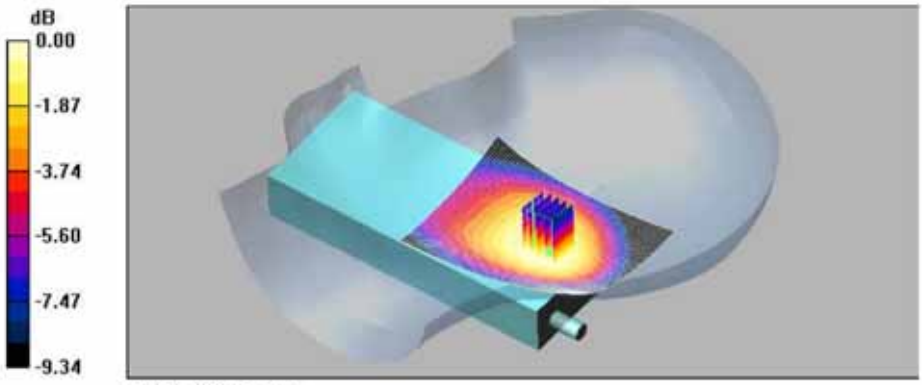
Right_Contact_Mid/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.334 mW/g

Right_Contact_Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.2 V/m; Power Drift = -0.099 dB
Peak SAR (extrapolated) = 0.410 W/kg
SAR(1 g) = 0.316 mW/g; SAR(10 g) = n.a.

Info: Interpolated medium parameters used for SAR evaluation!

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.
Maximum value of SAR (measured) = 0.337 mW/g



0 dB = 0.337mW/g

Date/Time: 2005-03-24 3:36:57

Test Laboratory: SGS Testing Korea

Head_right

DUT: MC3000; Type: CDMA terminal; Serial: H1MC3000A503180001

Communication System: CDMA 835MHz; Frequency: 836.46 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 836.46 MHz; s = 0.893 mho/m; e_r = 42.2; ? = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.45, 6.45, 6.45); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

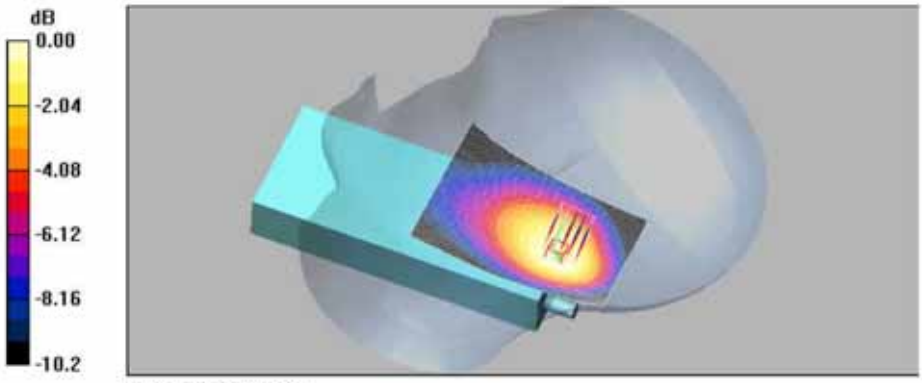
Right_tilt_mid/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.337 mW/g

Right_tilt_mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.6 V/m; Power Drift = -0.134 dB
Peak SAR (extrapolated) = 0.414 W/kg
SAR(1 g) = 0.297 mW/g; SAR(10 g) = n.a.

Info: Interpolated medium parameters used for SAR evaluation!

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.
Maximum value of SAR (measured) = 0.318 mW/g



0 dB = 0.318mW/g

Date/Time: 2005-03-24 6:22:16

Test Laboratory: SGS Testing Korea

Head_left

DUT: MC3000; Type: CDMA terminal; Serial: H1MC3000A503180001

Communication System: CDMA 835MHz; Frequency: 836.46 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 836.46 MHz; s = 0.893 mho/m; e_r = 42.2; ? = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.45, 6.45, 6.45); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

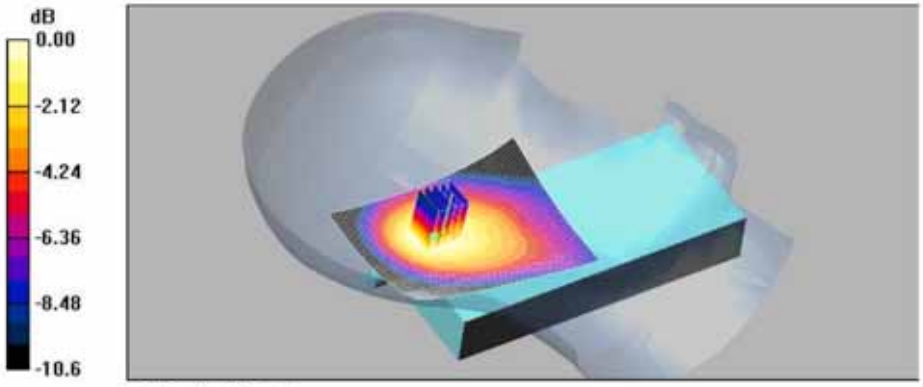
Left _contact_mid/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.380 mW/g

Left _contact_mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.6 V/m; Power Drift = -0.146 dB
Peak SAR (extrapolated) = 0.499 W/kg
SAR(1 g) = 0.343 mW/g; SAR(10 g) = n.a.

Info: Interpolated medium parameters used for SAR evaluation!

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.
Maximum value of SAR (measured) = 0.372 mW/g



0 dB = 0.372mW/g

Date/Time: 2005-03-24 6:43:54

Test Laboratory: SGS Testing Korea

Head_left

DUT: MC3000; Type: CDMA terminal; Serial: H1MC3000A503180001

Communication System: CDMA 835MHz; Frequency: 836.46 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 836.46 MHz; s = 0.893 mho/m; e_r = 42.2; ? = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.45, 6.45, 6.45); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

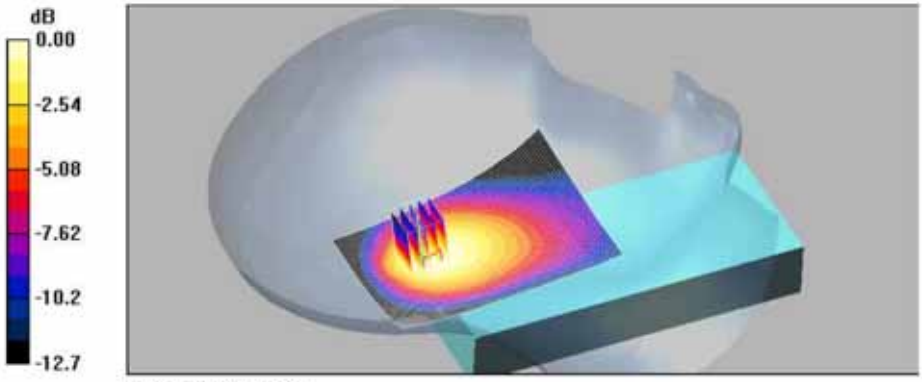
Left_tilt_mid/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.482 mW/g

Left_tilt_mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.4 V/m; Power Drift = 0.048 dB
Peak SAR (extrapolated) = 0.699 W/kg
SAR(1 g) = 0.394 mW/g; SAR(10 g) = n.a.

Info: Interpolated medium parameters used for SAR evaluation!

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.
Maximum value of SAR (measured) = 0.429 mW/g



0 dB = 0.429mW/g

Date/Time: 2005-03-24 7:06:21

Test Laboratory: SGS Testing Korea

Head_left

DUT: MC3000; Type: CDMA terminal; Serial: H1MC3000A503180001

Communication System: CDMA 835MHz; Frequency: 824.73 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 824.73 MHz; s = 0.882 mho/m; e_r = 42.3; ? = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.45, 6.45, 6.45); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

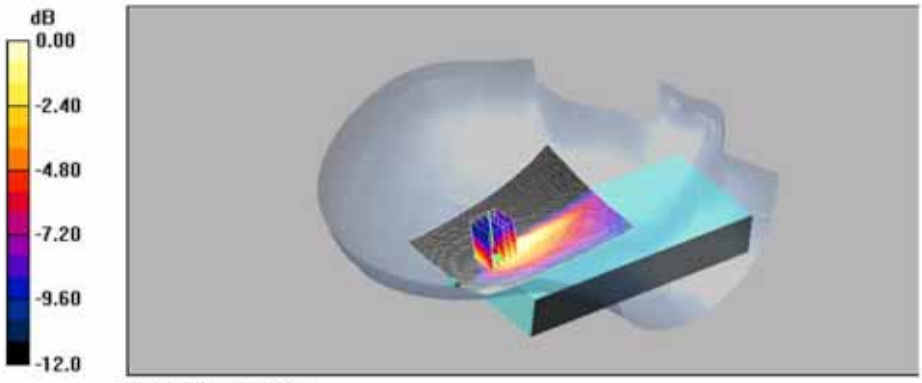
Left _tilt_low/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.752 mW/g

Left _tilt_low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.9 V/m; Power Drift = -0.013 dB
Peak SAR (extrapolated) = 0.606 W/kg
SAR(1 g) = 0.378 mW/g; SAR(10 g) = n.a.

Info: Interpolated medium parameters used for SAR evaluation!

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.
Maximum value of SAR (measured) = 0.442 mW/g



0 dB = 0.442mW/g

Date/Time: 2005-03-24 7:23:49

Test Laboratory: SGS Testing Korea

Head_left

DUT: MC3000; Type: CDMA terminal; Serial: H1MC3000A503180001

Communication System: CDMA 835MHz; Frequency: 848.19 MHz;Duty Cycle: 1:1
Medium: HSL 835MHz Medium parameters used (interpolated): f = 848.19 MHz; s = 0.905 mho/m; e_r = 42; ? = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.45, 6.45, 6.45); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

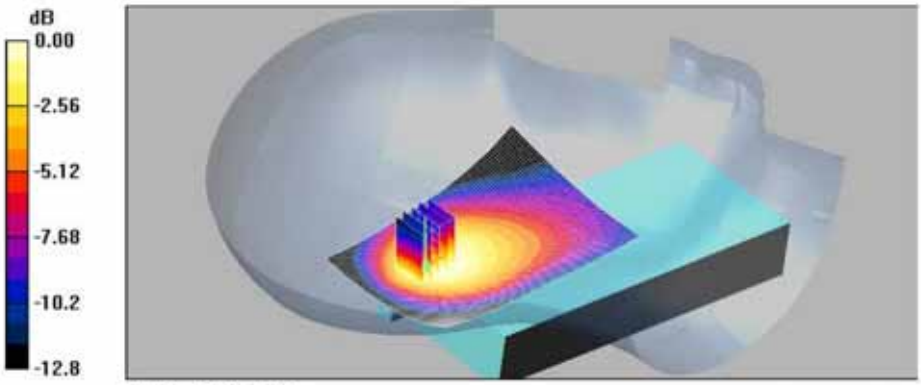
Left _tilt_High/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.396 mW/g

Left _tilt_High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.2 V/m; Power Drift = -0.179 dB
Peak SAR (extrapolated) = 0.596 W/kg
SAR(1 g) = 0.330 mW/g; SAR(10 g) = n.a.

Info: Interpolated medium parameters used for SAR evaluation!

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.
Maximum value of SAR (measured) = 0.356 mW/g



0 dB = 0.356mW/g

Date/Time: 2005-03-25 11:04:37

Test Laboratory: SGS Testing Korea

Body_LCD face

DUT: MC3000; Type: CDMA terminal; Serial: H1MC3000A503180001

Communication System: CDMA 835MHz; Frequency: 824.73 MHz;Duty Cycle: 1:1
Medium: M835 Medium parameters used (interpolated): f = 824.73 MHz; s = 0.928 mho/m; e_r = 54.1; ? = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.14, 6.14, 6.14); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

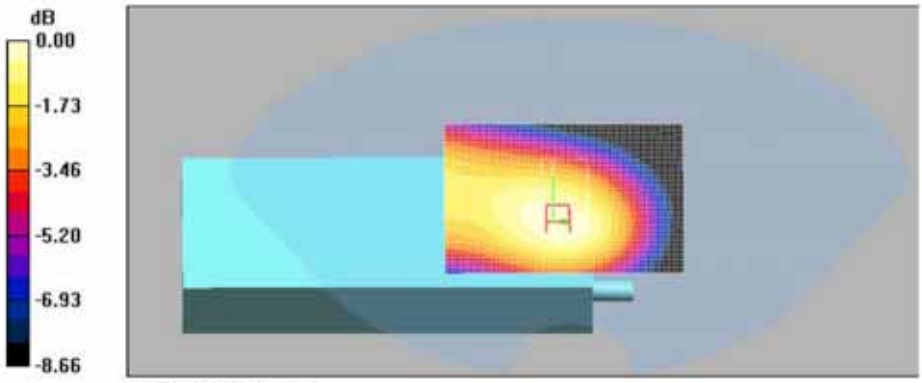
LCD face_Low/Area Scan (61x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.127 mW/g

LCD face_Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.6 V/m; Power Drift = -0.043 dB
Peak SAR (extrapolated) = 0.162 W/kg
SAR(1 g) = 0.122 mW/g; SAR(10 g) = n.a.

Info: Interpolated medium parameters used for SAR evaluation!

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.
Maximum value of SAR (measured) = 0.129 mW/g



0 dB = 0.129mW/g

Date/Time: 2005-03-25 11:24:17

Test Laboratory: SGS Testing Korea

Body_LCD face

DUT: MC3000; Type: CDMA terminal; Serial: H1MC3000A503180001

Communication System: CDMA 835MHz; Frequency: 836.46 MHz;Duty Cycle: 1:1
Medium: M835 Medium parameters used (interpolated): f = 836.46 MHz; s = 0.939 mho/m; e_r = 54; ? = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.14, 6.14, 6.14); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

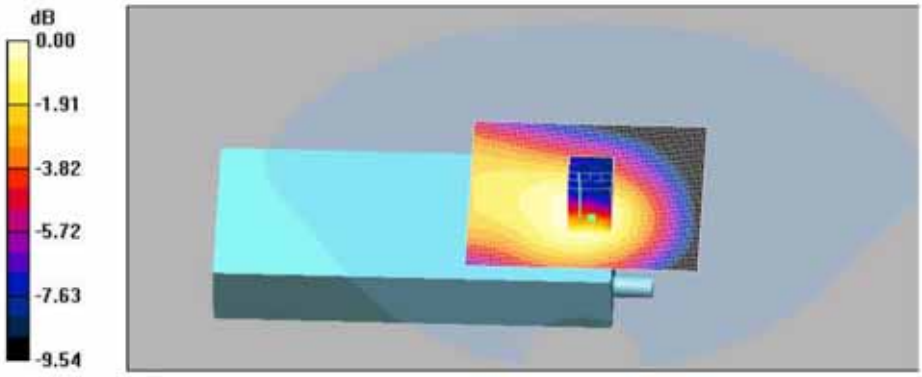
LCD face_Mid/Area Scan (61x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.121 mW/g

LCD face_Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.98 V/m; Power Drift = 0.131 dB
Peak SAR (extrapolated) = 0.166 W/kg
SAR(1 g) = 0.113 mW/g; SAR(10 g) = n.a.

Info: Interpolated medium parameters used for SAR evaluation!

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.
Maximum value of SAR (measured) = 0.123 mW/g



0 dB = 0.123mW/g

Date/Time: 2005-03-25 11:41:34

Test Laboratory: SGS Testing Korea

Body_LCD

DUT: MC3000; Type: CDMA terminal; Serial: H1MC3000A503180001

Communication System: CDMA 835MHz; Frequency: 848.19 MHz;Duty Cycle: 1:1
Medium: M835 Medium parameters used (interpolated): f = 848.19 MHz; s = 0.954 mho/m; e_r = 53.9; ? = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.14, 6.14, 6.14); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

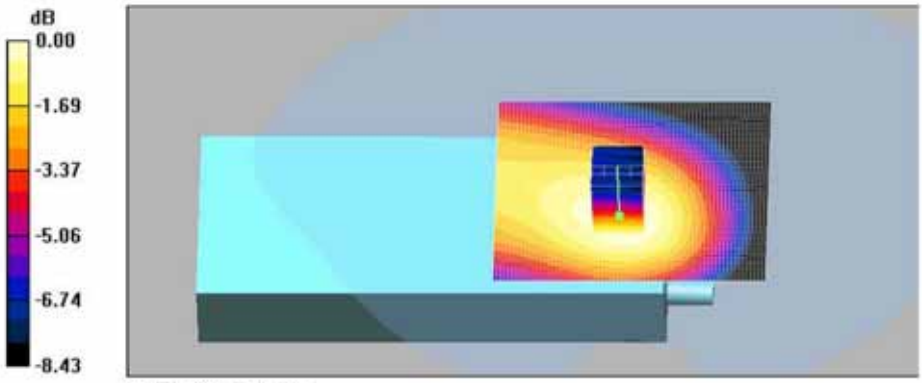
LCD face_High/Area Scan (61x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.100 mW/g

LCD face_High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.42 V/m; Power Drift = -0.107 dB
Peak SAR (extrapolated) = 0.122 W/kg
SAR(1 g) = 0.094 mW/g; SAR(10 g) = n.a.

Info: Interpolated medium parameters used for SAR evaluation!

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.
Maximum value of SAR (measured) = 0.099 mW/g



0 dB = 0.099mW/g

Date/Time: 2005-03-25 7:25:31

Test Laboratory: SGS Testing Korea

Body_Rear

DUT: MC3000; Type: CDMA terminal; Serial: H1MC3000A503180001

Communication System: CDMA 835MHz; Frequency: 824.73 MHz;Duty Cycle: 1:1
Medium: M835 Medium parameters used (interpolated): f = 824.73 MHz; s = 0.928 mho/m; e_r = 54.1; ? = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.14, 6.14, 6.14); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

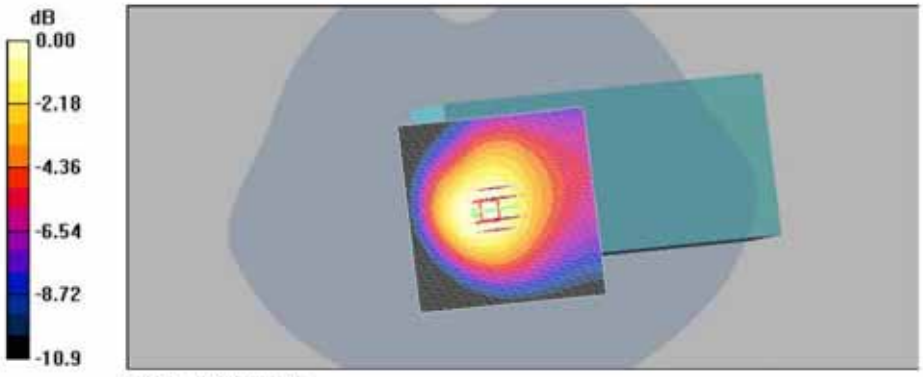
Rear_Low/Area Scan (61x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.314 mW/g

Rear_Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.7 V/m; Power Drift = -0.129 dB
Peak SAR (extrapolated) = 0.417 W/kg
SAR(1 g) = 0.285 mW/g; SAR(10 g) = n.a.

Info: Interpolated medium parameters used for SAR evaluation!

Warning: Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.
Maximum value of SAR (measured) = 0.308 mW/g



0 dB = 0.308mW/g

Date/Time: 2005-03-25 9:47:37

Test Laboratory: SGS Testing Korea

Body_Rear

DUT: MC3000; Type: CDMA terminal; Serial: H1MC3000A503180001

Communication System: CDMA 835MHz; Frequency: 836.46 MHz;Duty Cycle: 1:1
Medium: M835 Medium parameters used (interpolated): f = 836.46 MHz; s = 0.939 mho/m; e_r = 54; ? = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.14, 6.14, 6.14); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

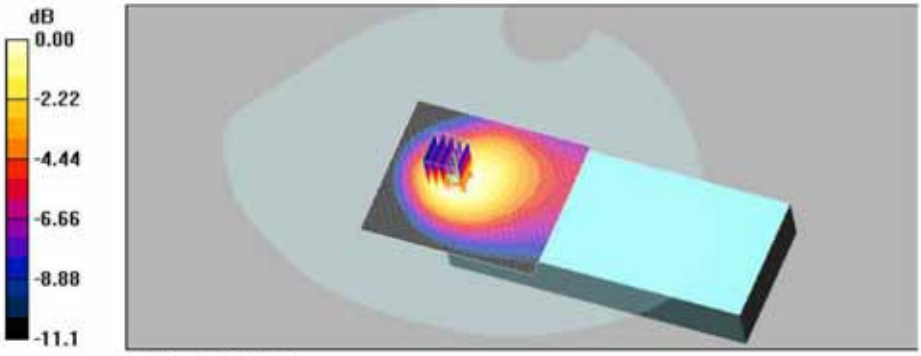
Rear_Middle/Area Scan (61x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.270 mW/g

Rear_Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.7 V/m; Power Drift = -0.159 dB
Peak SAR (extrapolated) = 0.356 W/kg
SAR(1 g) = 0.244 mW/g; SAR(10 g) = n.a.

Info: Interpolated medium parameters used for SAR evaluation!

Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.
Maximum value of SAR (measured) = 0.262 mW/g



0 dB = 0.262mW/g

Date/Time: 2005-03-25 10:04:45

Test Laboratory: SGS Testing Korea

Body_Rear

DUT: MC3000; Type: CDMA terminal; Serial: H1MC3000A503180001

Communication System: CDMA 835MHz; Frequency: 848.19 MHz;Duty Cycle: 1:1
Medium: M835 Medium parameters used (interpolated): f = 848.19 MHz; s = 0.954 mho/m; e_r = 53.9; ? = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.14, 6.14, 6.14); Calibrated: 2004-04-28
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2004-04-30
- Phantom: SAM MIC #2000-93 with CRP_835MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

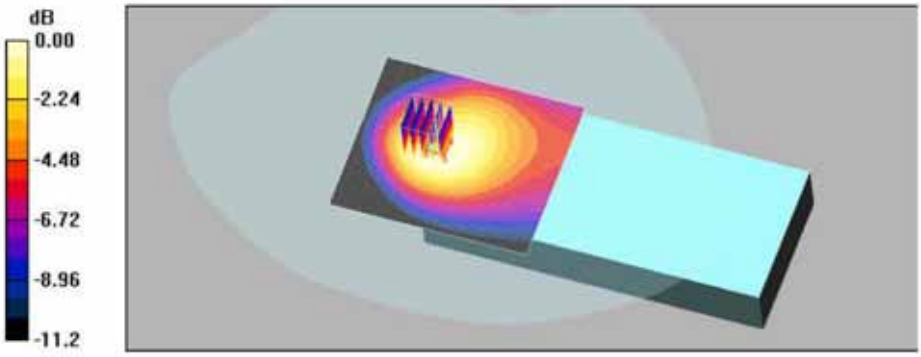
Rear_High/Area Scan (61x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (interpolated) = 0.245 mW/g

Rear_High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.5 V/m; Power Drift = -0.131 dB
Peak SAR (extrapolated) = 0.313 W/kg
SAR(1 g) = 0.213 mW/g; SAR(10 g) = n.a.

Info: Interpolated medium parameters used for SAR evaluation!

Maximum averaged SAR over 10 g is located on the boundary of the measurement cube. This cube might not incorporate the absolute averaged SAR. Please consider a refinement of the Area Scan measurement.
Maximum value of SAR (measured) = 0.229 mW/g



0 dB = 0.229mW/g

Uncertainty Analysis

Error Description	Uncertainty value ±%	Probability distribution	Divisor	c_i 1g	Standard unc. (1g)	v_i or v_{eff}
Measurement System						
Probe Calibration	± 4.8	normal	1	1	± 4.8	∞
Axial Isotropy	± 4.7	rectangular	√3	$(1-c_p)^{1/2}$	± 1.9	∞
Hemispherical Isotropy	± 9.6	rectangular	√3	$(c_p)^{1/2}$	± 3.9	∞
Boundary effects	± 1.0	rectangular	√3	1	± 0.6	∞
Linearity	± 4.7	rectangular	√3	1	± 2.7	∞
System Detection limits	± 1.0	rectangular	√3	1	± 0.6	∞
Readout Electronics	± 1.0	normal	1	1	± 1.0	∞
Response time	± 0.8	rectangular	√3	1	± 0.5	∞
Integration time	± 2.6	rectangular	√3	1	± 1.5	∞
RF Ambient Conditions	± 3.0	rectangular	√3	1	± 1.7	∞
Probe Positioner Mechanical Tolerance	± 0.4	rectangular	√3	1	± 0.2	∞
Probe Positioning with respect to Phantom Shell	± 2.9	rectangular	√3	1	± 1.7	∞
Extrapolation, Interpolation and Integration Algorithms for Max. SAR Evaluation	± 1.0	rectangular	√3	1	± 0.6	∞
Test Sample Related						
Test Sample Positioning	± 2.9	normal	1	1	± 2.9	145
Device Holder Uncertainty	± 3.6	normal	1	1	± 3.6	5
Output Power Variation – SAR drift measurement	± 5.0	rectangular	√3	1	± 2.9	∞
Phantom and Tissue Parameters						
Phantom Uncertainty (shape and thickness tolerances)	± 4.0	rectangular	√3	1	± 2.3	∞
Liquid conductivity Target - tolerance	± 5.0	rectangular	√3	0.64	± 1.8	∞
Liquid conductivity – measurement uncertainty	± 2.5	normal	1	0.64	± 1.6	∞
Liquid permittivity Target - tolerance	± 5.0	rectangular	√3	0.6	± 1.7	∞
Liquid permittivity – measurement uncertainty	± 2.5	normal	1	0.6	± 1.5	∞
Combined Standard Uncertainty					± 10.3	330
Coverage Factor for 95%		**k = 2**				
Expanded Standard Uncertainty					**± 20.6**	

Validation Test

EUT

View of EUT

Rear View of EUT

Left View of EUT

Right View of Product

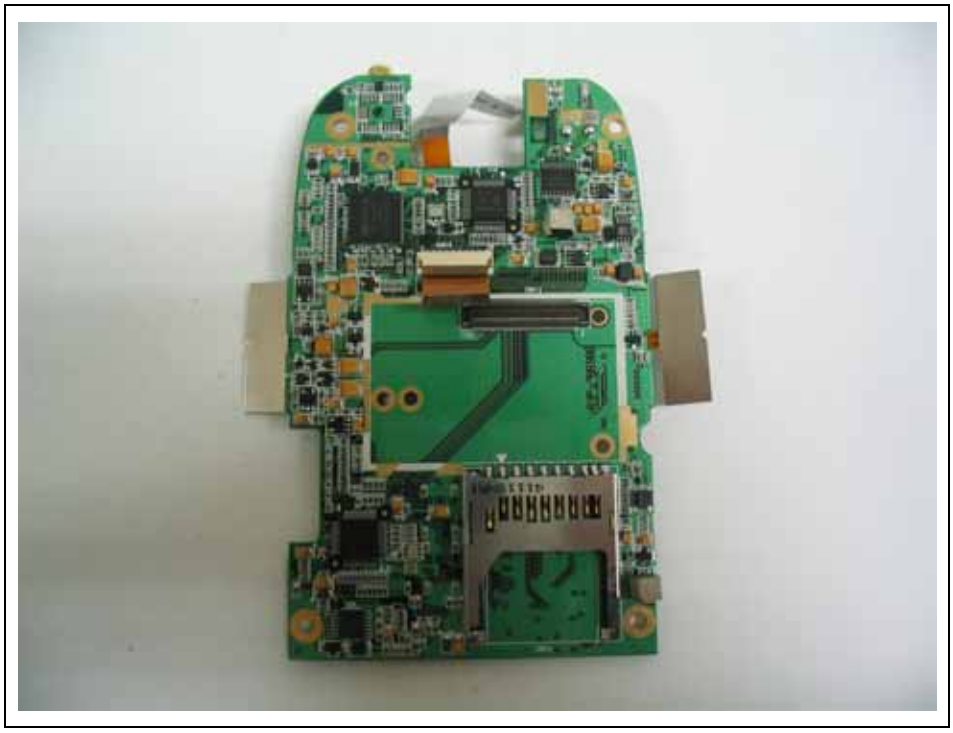
Top View of EUT

Bottom View of EUT

Inner View of EUT

Inner View of EUT

Inner View of EUT



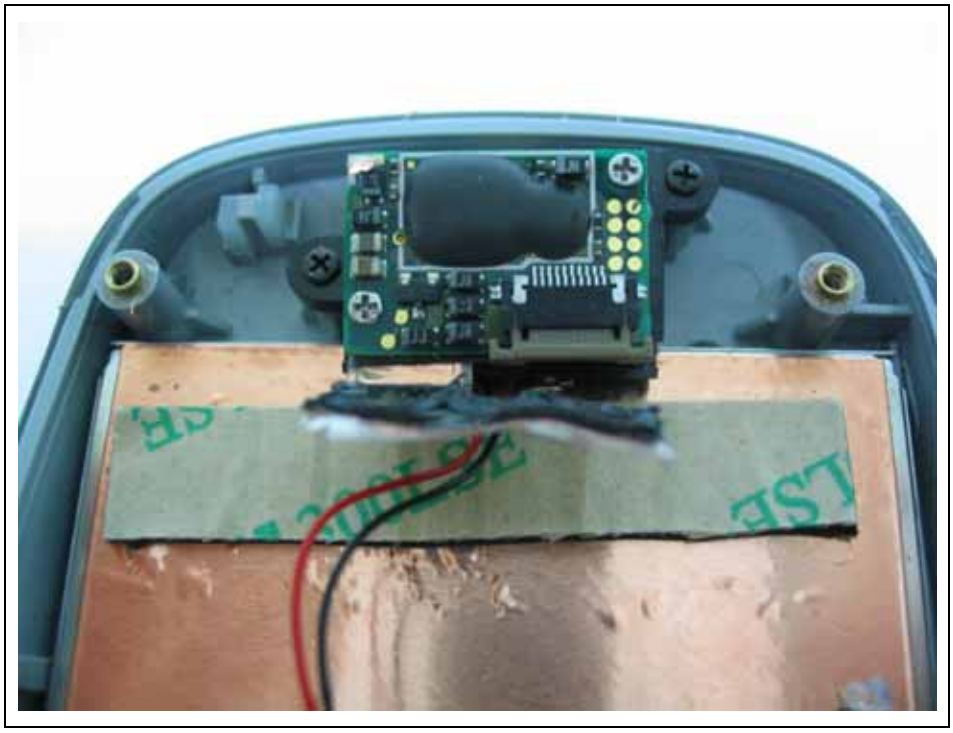
Inner View of EUT

Inner View of EUT

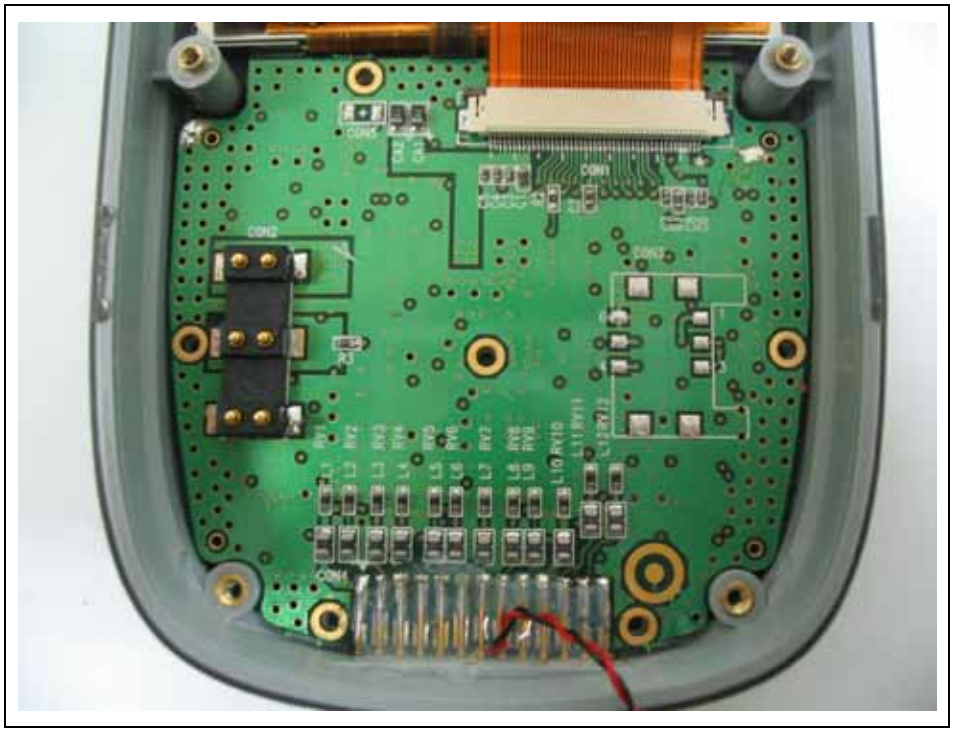
Inner View of EUT

Inner View of EUT

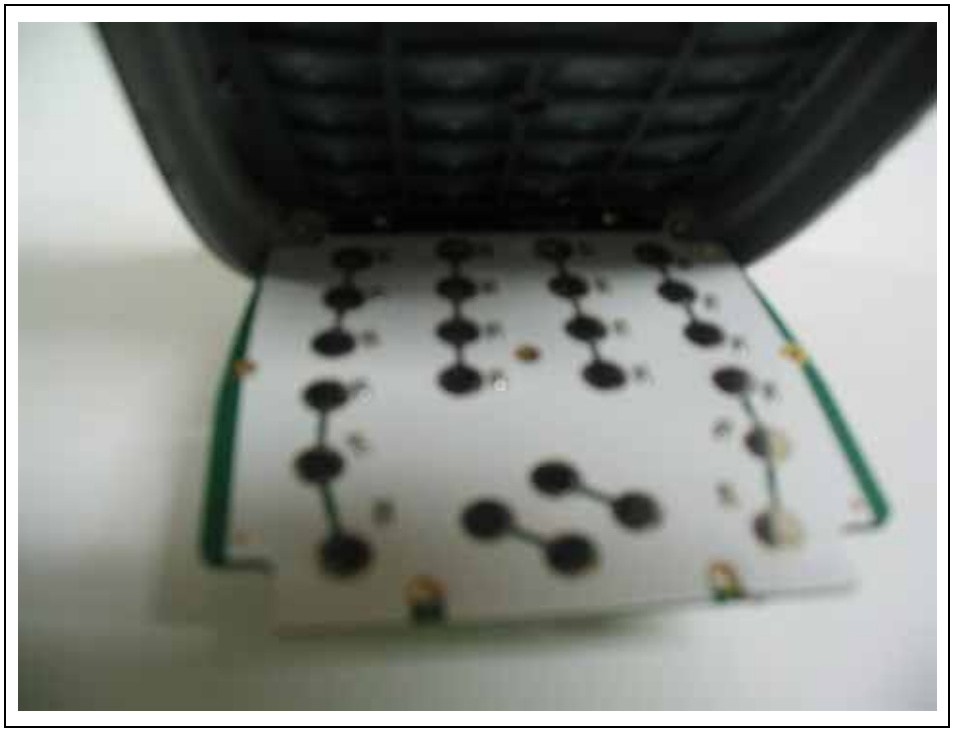
Inner View of EUT



Inner View of EUT

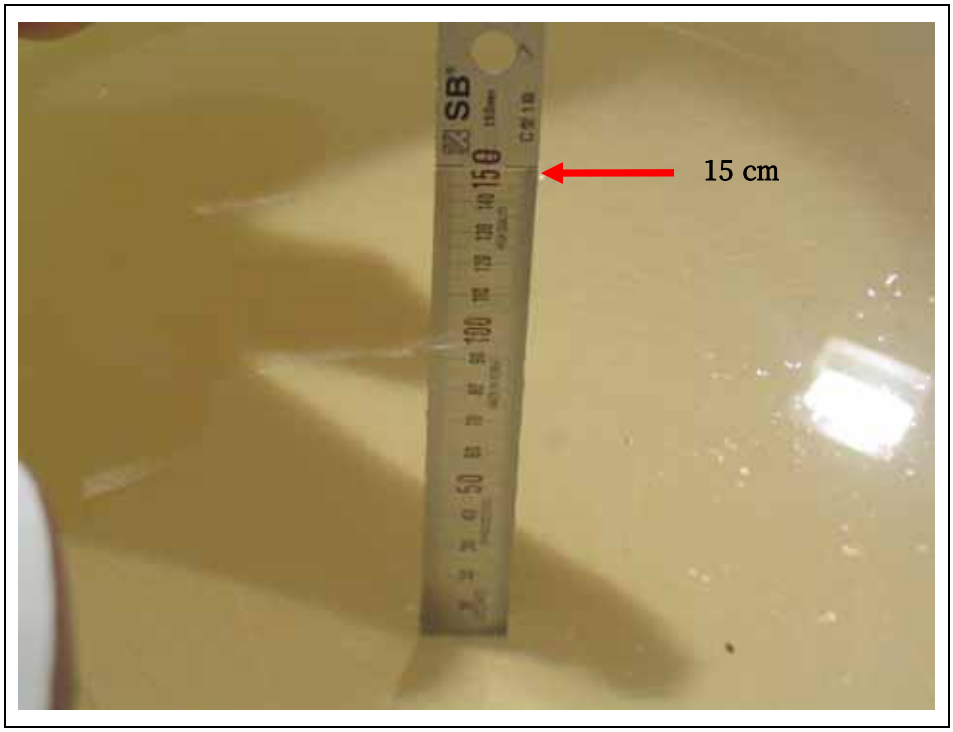


Inner View of EUT

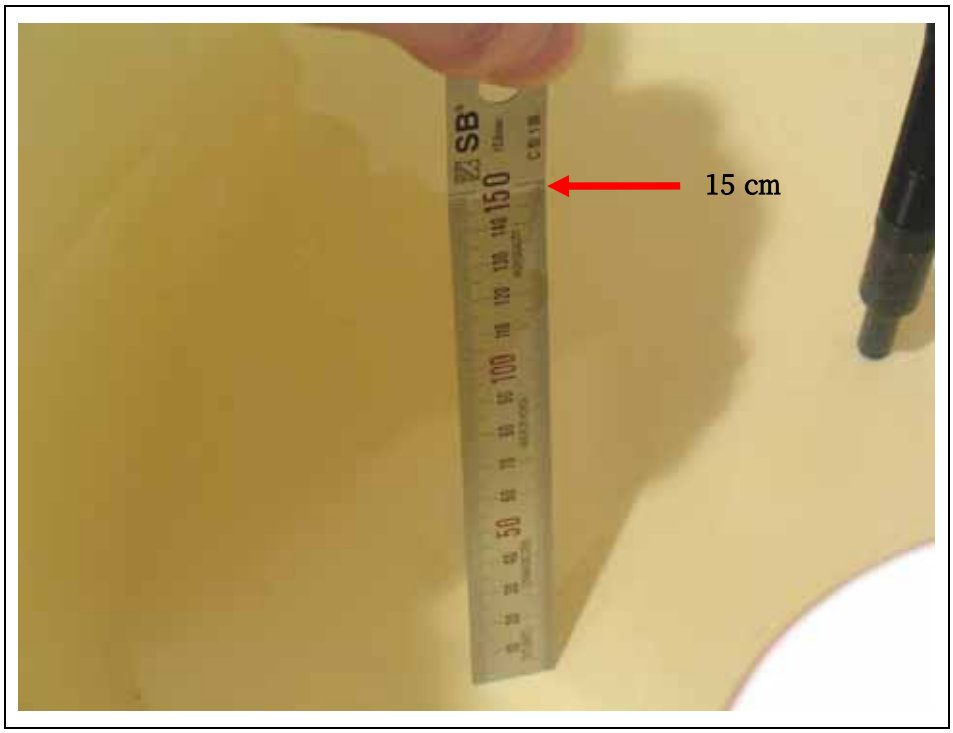


Test Setup

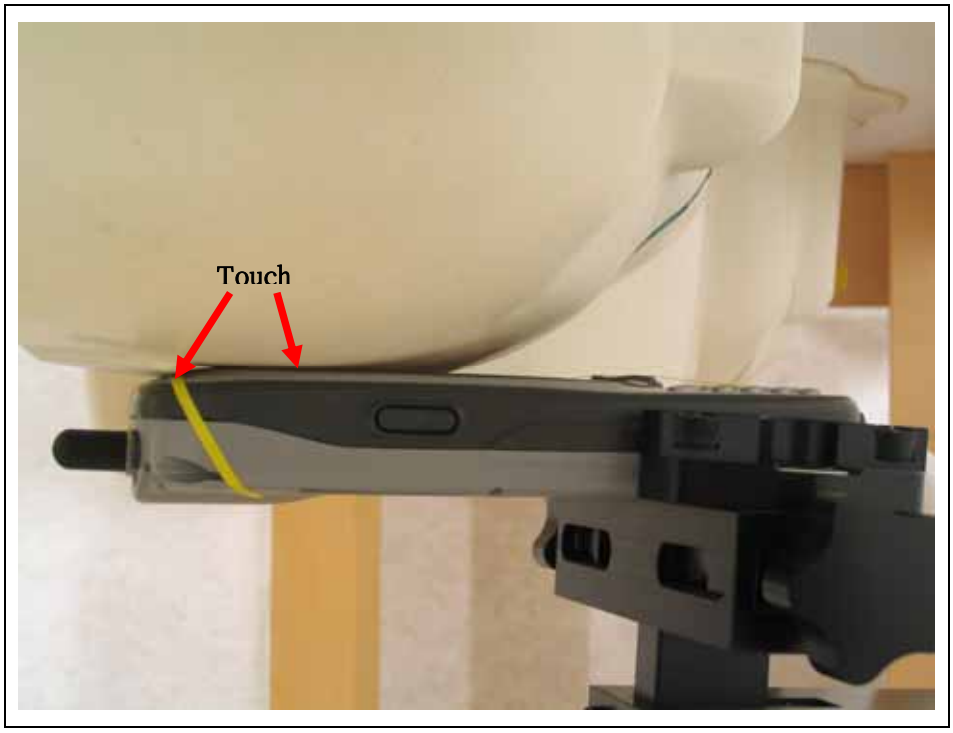
Photograph of the Tissue Simulant Fluidliquid depth 15cm for head



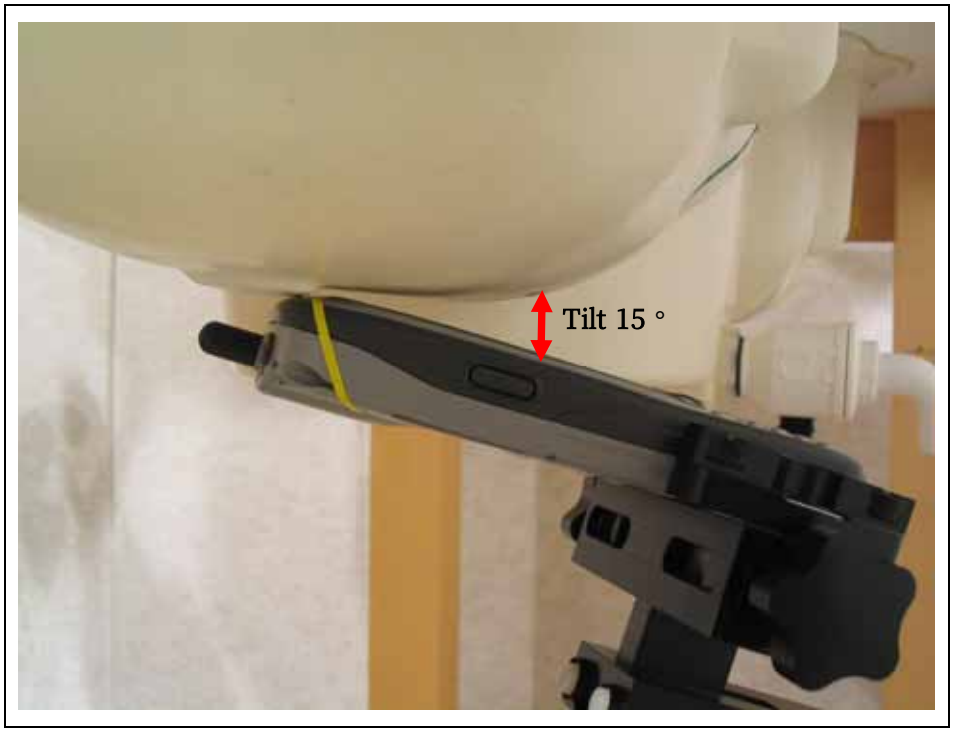
Photograph of the Tissue Simulant Fluidliquid depth 15cm for Body



Right Head_Contact



Right Head_Tilt



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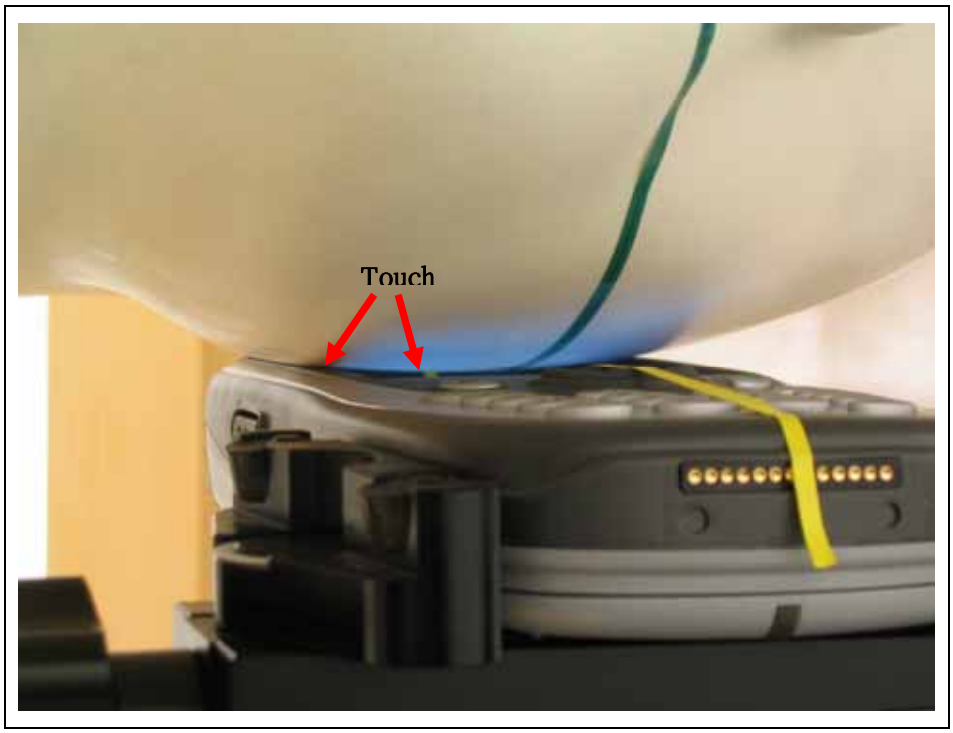
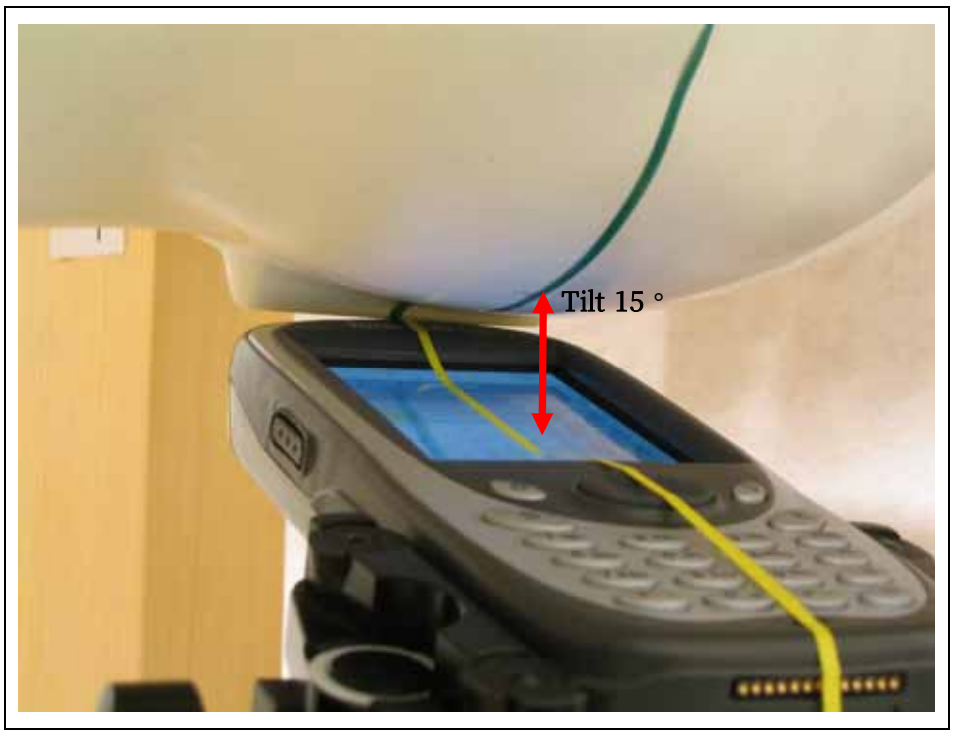
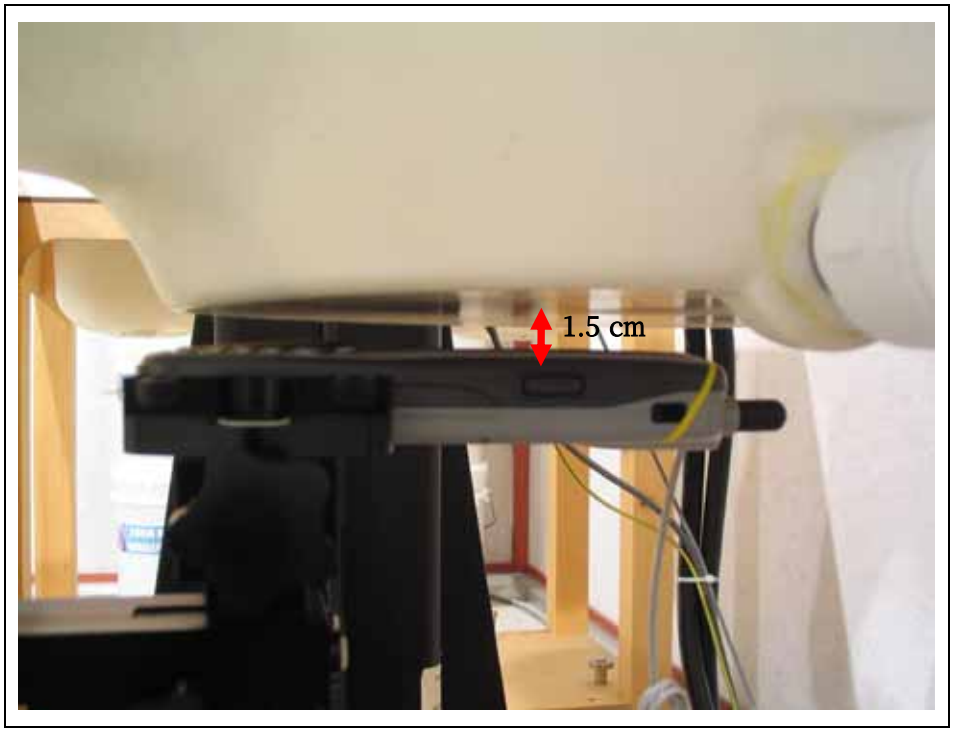


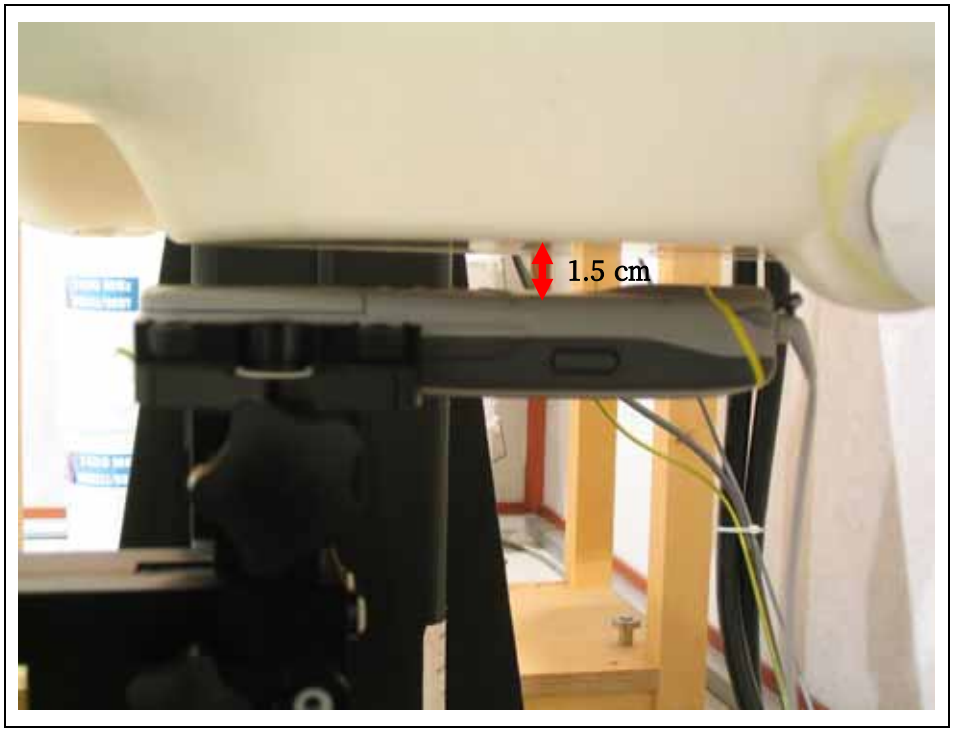
Left Head_Tilt



Body_LCD



Body_Rear



Probe Calibration Certificate

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

Client **SGS KES (Dymstec)**

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1782
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	April 28, 2004
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

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 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E442	GB37480704	6-Nov-03 (METAS, No. 252-0254)	Nov-04
Power sensor HP 8481A	US37292783	6-Nov-03 (METAS, No. 252-0254)	Nov-04
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-03)	In house check: Oct 05

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	F. Bomholt
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: April 28, 2004

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Probe ET3DV6

SN:1782

Manufactured:	April 15, 2003
Last calibrated:	July 28, 2003
Recalibrated:	April 28, 2004

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Appendix D – Calibration Certificate

ET3DV6 SN:1782 April 28, 2004

DASY - Parameters of Probe: ET3DV6 SN:1782

Sensitivity in Free Space

NormX	2.03 $\mu V/(V/m)^2$
NormY	1.72 $\mu V/(V/m)^2$
NormZ	1.89 $\mu V/(V/m)^2$

Diode Compression[A]

DCP X	94	mV
DCP Y	94	mV
DCP Z	94	mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Plese see Page 7.

Boundary Effect

Head **900 MHz** **Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR_{be} [%]	Without Correction Algorithm	8.0	4.0
SAR_{be} [%]	With Correction Algorithm	0.0	0.1

Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR_{be} [%]	Without Correction Algorithm	12.7	8.5
SAR_{be} [%]	With Correction Algorithm	0.2	0.1

Sensor Offset

Probe Tip to Sensor Center	2.7 mm
Optical Surface Detection	**in tolerance**

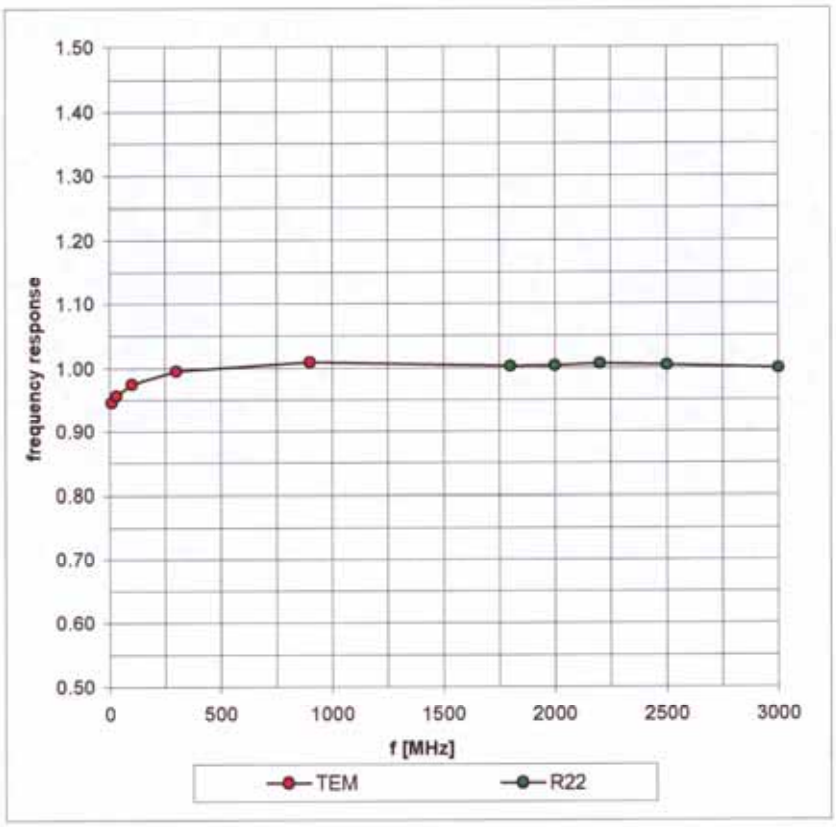
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] numerical linearization parameter: uncertainty not required

ET3DV6 SN:1782 April 28, 2004

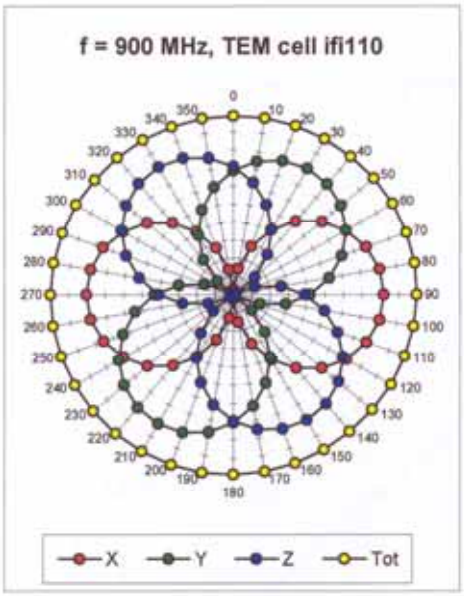
Frequency Response of E-Field

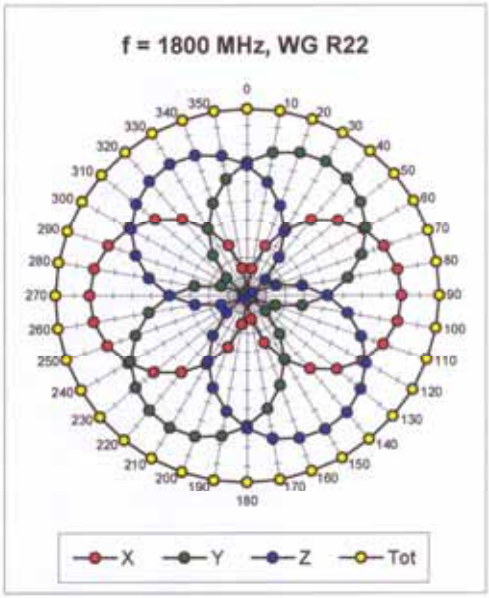
(TEM-Cell:ifi110, Waveguide R22)

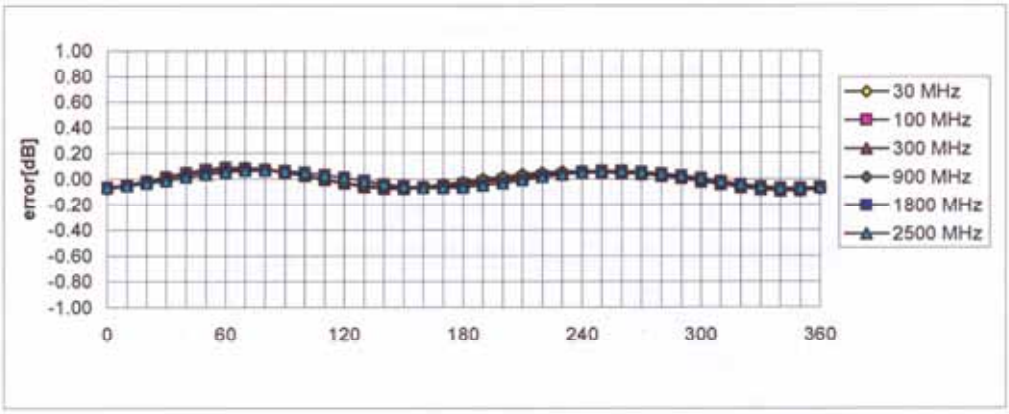


ET3DV6 SN:1782 April 28, 2004

Receiving Pattern (ϕ) , θ = 0°





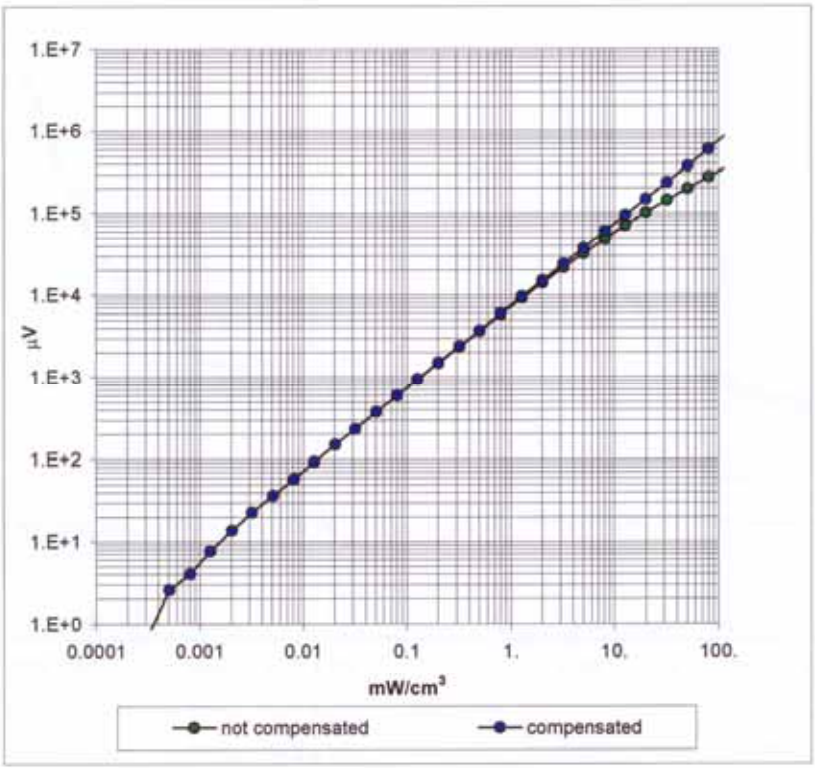


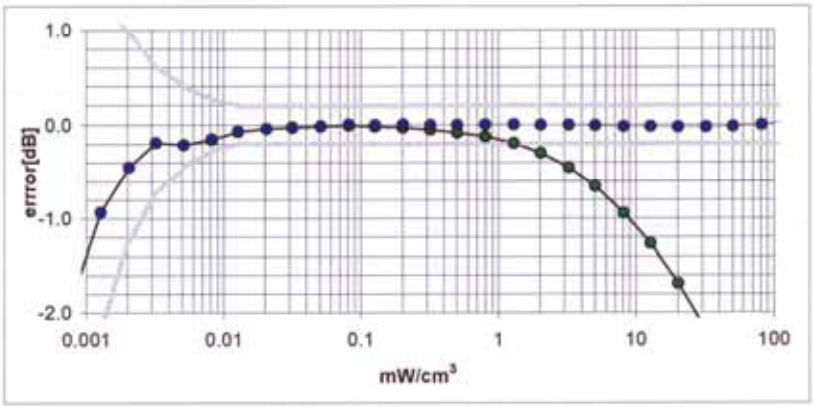
Axial Isotropy Error < ± 0.2 dB

ET3DV6 SN:1782 April 28, 2004

Dynamic Range f(SAR_{head})

(Waveguide R22)



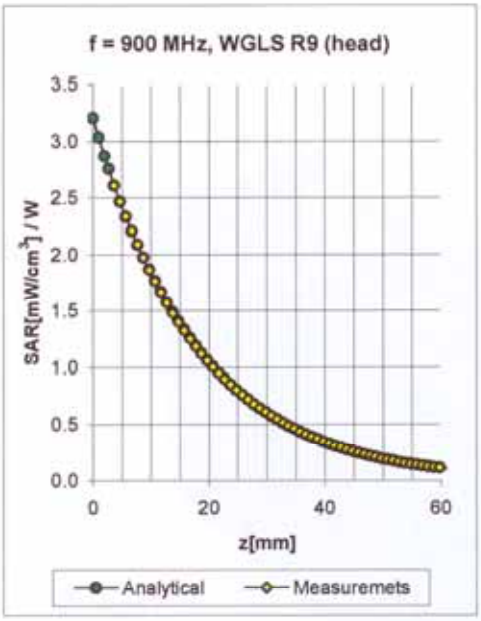


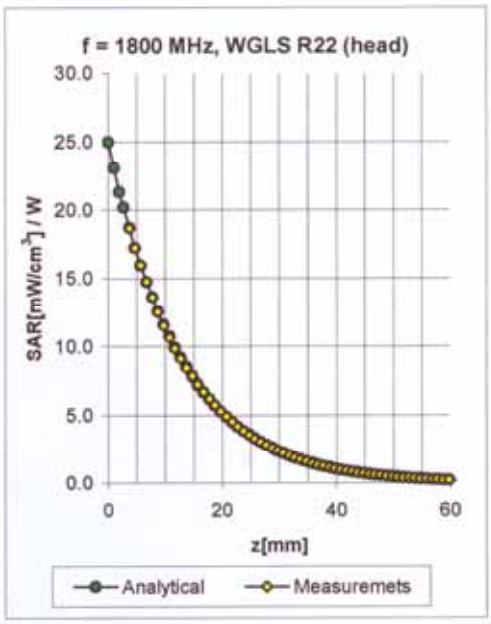
Probe Linearity < ± 0.2 dB

Appendix D – Calibration Certificate

ET3DV6 SN:1782 **April 28, 2004**

Conversion Factor Assessment





f [MHz]	Validity [MHz][B]	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	800-1000	Head	41.5 ± 5%	0.97 ± 5%	0.76	1.59	6.45 ± 11.3% (k=2)
1800	1710-1910	Head	40.0 ± 5%	1.40 ± 5%	0.47	2.62	5.07 ± 11.7% (k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	0.89	1.98	4.36 ± 9.7% (k=2)
835	785-885	Body	55.2 ± 5%	0.97 ± 5%	0.46	2.19	6.14 ± 9.7% (k=2)
900	850-950	Body	55.0 ± 5%	1.05 ± 5%	0.44	2.31	5.93 ± 9.7% (k=2)
1800	1710-1890	Body	53.3 ± 5%	1.52 ± 5%	0.52	2.80	4.55 ± 10.9% (k=2)
1900	1805-1995	Body	53.3 ± 5%	1.52 ± 5%	0.56	2.86	4.40 ± 11.1% (k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	1.01	1.71	4.22 ± 9.7% (k=2)

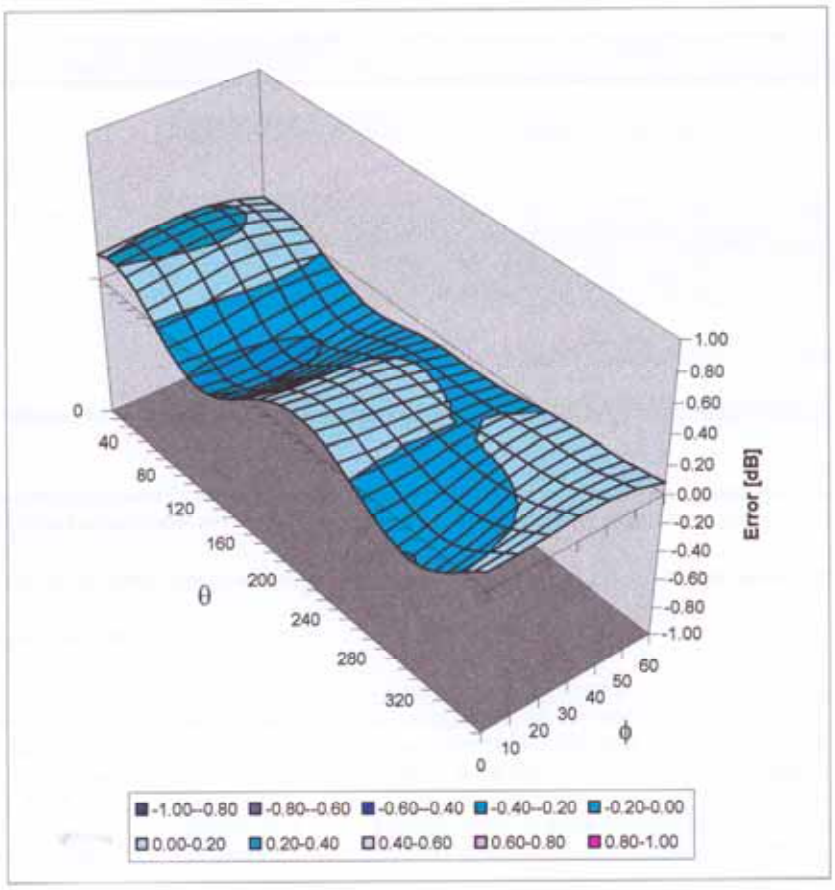
[B] The total standard uncertainty is calculated as root-sum-square of standard uncertainty of the Conversion Factor at calibration frequency and the standard uncertainty for the indicated frequency band.

Appendix D – Calibration Certificate

ET3DV6 SN:1782 April 28, 2004

Deviation from Isotropy in HSL

Error (θ,ϕ), f = 900 MHz



Spherical Isotropy Error < ± 0.4 dB

Appendix D – Calibration Certificate

Schmid & Partner Engineering AG

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Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1782**
Place of Assessment:	**Zurich**
Date of Assessment:	**May 1, 2004**
Probe Calibration Date:	**April 28, 2004**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:

Schmid & Partner Engineering AG

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

Dosimetric E-Field Probe ET3DV6 SN:1782

Conversion factor (± standard deviation)

450 MHz	ConvF	**7.6 ± 8%**	ε_r = **43.5 ± 5%** σ = **0.87 ± 5% mho/m** (head tissue)
450 MHz	ConvF	**7.4 ± 8%**	ε_r = **56.7 ± 5%** σ = **0.94 ± 5% mho/m** (body tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also Section 4.7 of the DASY4 Manual.

Schmid & Partner Engineering AG

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Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1782**
Place of Assessment:	**Zurich**
Date of Assessment:	**May 21, 2004**
Probe Calibration Date:	**April 28, 2004**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:

Schmid & Partner Engineering AG

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

Dosimetric E-Field Probe ET3DV6 SN:1782

Conversion factor (± standard deviation)

75 MHz (65-85 MHz)	ConvF	**8.6 ± 8%**	ε_r = **70.0 ± 5%** σ = **0.70 ± 5% mho/m** (body tissue)
150 MHz (100-200 MHz)	ConvF	**8.9 ± 8%**	ε_r = **52.3 ± 5%** σ = **0.76 ± 5% mho/m** (head tissue)
150 MHz (100-200 MHz)	ConvF	**8.5 ± 8%**	ε_r = **61.9 ± 5%** σ = **0.80 ± 5% mho/m** (body tissue)
1950 MHz (1900-2000 MHz)	ConvF	**4.8 ± 8%**	ε_r = **40.0± 5%** σ = **1.40 ± 5% mho/m** (head tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also Section 4.7 of the DASY4 Manual.

Schmid & Partner Engineering AG

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Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1782**
Place of Assessment:	**Zurich**
Date of Assessment:	**June 14, 2004**
Probe Calibration Date:	**April 28, 2004**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:

Appendix D – Calibration Certificate

Schmid & Partner Engineering AG

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Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ET3DV6 SN:1782

Conversion factor (± standard deviation)

300 MHz (250-350 MHz)	ConvF	**7.4 ± 8%**	ε_r = **58.2 ± 5%** σ = **0.92 ± 5% mho/m** (body tissue)
300 MHz (250-350 MHz)	ConvF	**7.6 ± 8%**	ε_r = **45.3 ± 5%** σ = **0.87 ± 5% mho/m** (head tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also Section 4.7 of the DASY4 Manual.

DAE Calibration Certificate

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

Client **SGS KES (Dymstec)**

CALIBRATION CERTIFICATE

Object(s)	DAE3 - SD 000 D03 AA - SN: 567
Calibration procedure(s)	QA CAL-06.v7 Calibration procedure for the data acquisition unit (DAE)
Calibration date:	30.04.2004
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03	Sep-04

	Name	Function	Signature
Calibrated by:	Eric Hainfeld	Technician	
Approved by:	Fin Bomholt	R&D Director	F. Bomholt

Date issued: 30.04.2004

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Certificate No.: 680-SD000D03AA-567-040430 Page 1 of 3

1. DC Voltage Measurement

A/D - Converter Resolution nominal
High Range: 1LSB = 6.1μV , full range = -100...+300 mV
Low Range: 1LSB = 61nV , full range = -1.....+3mV
DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.815	404.585	404.666
Low Range	3.95105	3.95178	3.94236
Connector Angle to be used	in DASY System	83 °	

High Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	200000	200000	0.00
Channel X	+ Input	20000	19998.36	-0.01
Channel X	- Input	20000	-19996.24	-0.02
Channel Y	+ Input	200000	200000.1	0.00
Channel Y	+ Input	20000	19997.34	-0.01
Channel Y	- Input	20000	-19994.76	-0.03
Channel Z	+ Input	200000	199999.7	0.00
Channel Z	+ Input	20000	19995.08	-0.02
Channel Z	- Input	20000	-19995.66	-0.02

Low Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	2000	2000	0.00
Channel X	+ Input	200	199.41	-0.30
Channel X	- Input	200	-200.38	0.19
Channel Y	+ Input	2000	2000.1	0.00
Channel Y	+ Input	200	198.84	-0.58
Channel Y	- Input	200	-201.23	0.61
Channel Z	+ Input	2000	2000	0.00
Channel Z	+ Input	200	199.06	-0.47
Channel Z	- Input	200	-201.56	0.78

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Reading (μV)	Low Range Reading (μV)
Channel X	200	2.82	2.30
	- 200	-0.12	-0.99
Channel Y	200	0.18	-0.05
	- 200	-1.64	-1.75
Channel Z	200	3.51	4.59
	- 200	-6.09	-6.64

Appendix D – Calibration Certificate

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	-	3.51	0.44
Channel Y	200	2.07	-	4.53
Channel Z	200	-0.98	1.54	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16381	16315
Channel Y	16208	16160
Channel Z	15912	15782

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (µV)	min. Offset (µV)	max. Offset (µV)	Std. Deviation (µV)
Channel X	0.36	-0.68	1.66	0.50
Channel Y	-1.49	-2.46	-0.11	0.38
Channel Z	-0.47	-1.74	0.63	0.42

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2001	201.9
Channel Y	0.2001	201.6
Channel Z	0.2000	200.0

8. Low Battery Alarm Voltage

typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption

typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.0	+6	+14
Supply (- Vcc)	–0.01	-8	-9

Dipole Antenna Calibration Certificate

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

Client SGS (Dymstec)

CALIBRATION CERTIFICATE

Object(s)	D835V2 - SN:490
Calibration procedure(s)	QA CAL-05.v2 Calibration procedure for dipole validation kits
Calibration date:	June 19, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check: Mar-05
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
Power sensor HP 8481A	US37292783	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Power meter EPM E442	GB37480704	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: June 19, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

880-KP0301061-A

Page 1 (1)

Schmid & Partner Engineering AG

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

DASY

Dipole Validation Kit

Type: D835V2

Serial: 490

Manufactured: May 19, 2003
Calibrated: June 19, 2003

1. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with **head simulating solution** of the following electrical parameters at 835 MHz:

Relative Dielectricity	**40.3**	± 5%
Conductivity	**0.87 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.7 at 835 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15mm from dipole center to the solution surface. The included distance spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.
The dipole input power (forward power) was 250 mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue:	**9.60 mW/g** ± 16.8 % (k=2)[1]
averaged over 10 cm^3 (10 g) of tissue:	**6.24 mW/g** ± 16.2 % (k=2)[1]

[1] validation uncertainty

3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.376 ns**	(one direction)
Transmission factor:	**0.998**	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance spacer was in place during impedance measurements.

Feedpoint impedance at 835 MHz:	Re{Z} = **49.6 Ω**
	Im {Z} = **-2.8 Ω**
Return Loss at 835 MHz	**-30.9 dB**

4. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

5. Design

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

6. Power Test

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

Date/Time: 06/19/03 12:09:49

Test Laboratory: SPEAG, Zurich, Switzerland
File Name: SN490_SN1507_HSL835_190603.da4

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN490
Program: Dipole Calibration

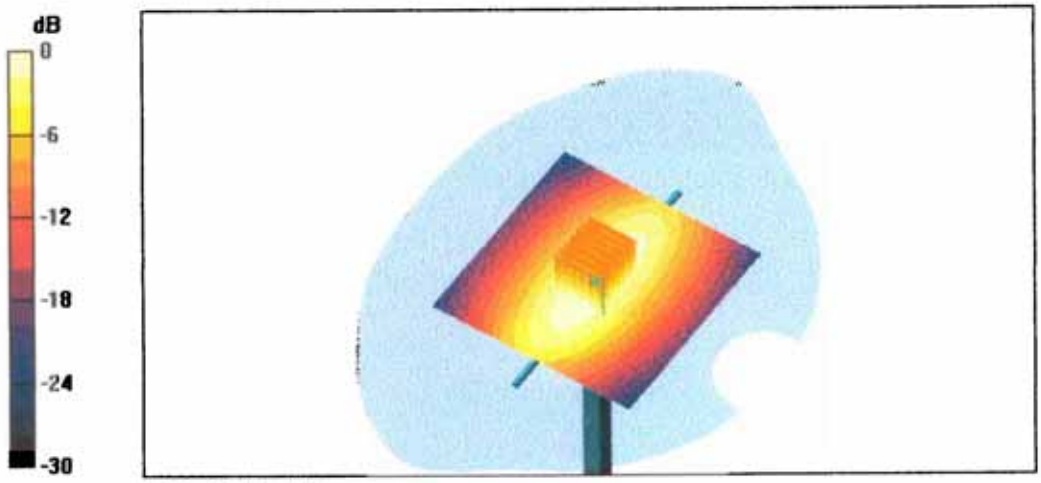
Communication System: CW-835; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL 835 MHz (σ = 0.87 mho/m, ε_r = 40.26, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.7, 6.7, 6.7); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- *Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115*

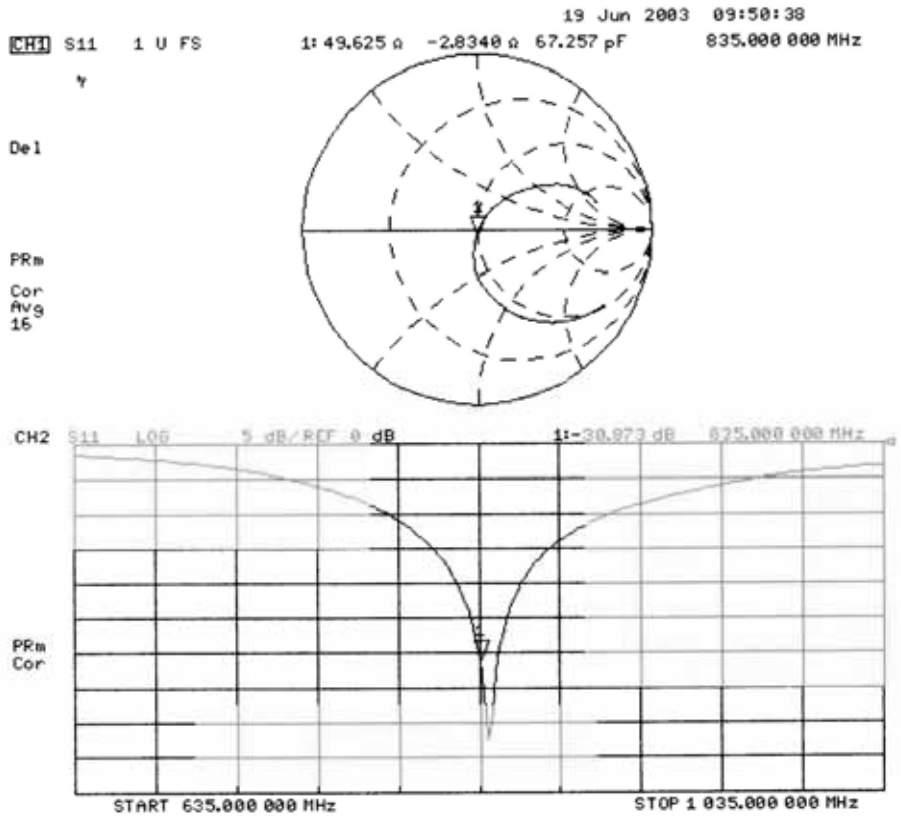
Pin = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 56.3 V/m
Power Drift = 0.04 dB
Maximum value of SAR = 2.55 mW/g

Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 3.5 W/kg
SAR(1 g) = 2.4 mW/g; SAR(10 g) = 1.56 mW/g
Reference Value = 56.3 V/m
Power Drift = 0.04 dB
Maximum value of SAR = 2.57 mW/g



0 dB = 2.57mW/g

490


19 Jun 2003 09:50:38
CH1 S11 1 U FS
1: 49.625 Ω -2.8340 Ω 67.257 pF 835.000 000 MHz
Del
PRm
Cor
Avg
16
CH2 S11 LOG 5 dB/ REF 0 dB 1:-30.973 dB 635.000 000 MHz
PRm
Cor
START 635.000 000 MHz
STOP 1 035.000 000 MHz