SGS

SAR TEST REPORT

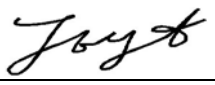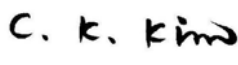|		
Equipment Under Test	:	Notebook PC
Model No.	:	LGX11
Applicant	:	LG Electronics Inc.
Address of Applicant	:	19-1, Cheongho-ri, Jinwi-myeon, Pyeongtaek-si Gyeonggi-do, 451-713, Korea
FCC ID		VV7-MBMF3507G-2
Device Category	:	Portable Device
Exposure Category	:	General Population/Uncontrolled Exposure
Date of Receipt	:	2009-01-16
Date of Test(s)	:	2009-01-22 ~ 2009-01-23
Date of Issue	:	2009-01-23
Max. SAR	:	0.056 W/kg (GPRS850), 0.062 W/kg (GPRS1900) 0.076 W/kg (WCDMA II), 0.04 W/kg (WCDMA V)

Standards:

FCC OET Bulletin 65 supplement C
IEEE 1528, 2003
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	: **Leo Kim**		**2009-01-23**
Approved by	: **Charles Kim**		**2009-01-23**

Contents

1. General Information

APPENDIX

A. Photographs of EUT & EUT's Test Setup

B. DASY4 SAR Report

C. Uncertainty Analysis

D. Calibration certificate

<div style="border:1px solid black; display:inline-block; padding:10px;">

1. General Information

</div>

1.1 Testing Laboratory

SGS Testing Korea Co., Ltd.
Wireless 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.electrolab.kr.sgs.com

1.2 Details of Manufacturer

Manufacturer   : MICRO-STAR INT'L co., LTD.
Address   : 88E QIANJIN Rd., Kunshan City Jiangsu 215300, P.R. China
Contact Person   : Jong-Dae Lee
Phone No.   : 82-31-610-5338
Fax No.   : 82-31-610-5355

1.3 Version of Report

Version Number	Date	Revision
00	2009-01-23	Initial issue

1.4 Description of EUT(s)

EUT Type	: Notebook PC
Model	: LGX11
Serial Number	: 004401700178243
Mode of Operation	: GSM850, GSM1900, WCDMA V, WCDMA II
Duty Cycle	: GPRS/EGPRS 25%, WCDMA 100%
Body worn Accessory	: None
Tx Frequency Range	: 824.2 ~ 848.8 MHz (GSM850), 1850.2 ~ 1909.8 MHz (GSM1900) 826.4 ~ 846.6 MHz (WCDMA V), 1852.4 ~ 1907.6 Mz (WCDMA II)
Conducted Max Power	: 32.8 dBm(GPRS850), 29.7 dBm(GPRS1900) 23.61 dBm(WCDMA V), 23.03 dBm(WCDMA II)
Battery Type	: DC 11.1V(Lithum-ion Battery)

1.5 Module Information

Ericsson 3G module	
Company	Ericsson AB
Module Name	F3507g
FCC ID	VV7-MBMF3507G-2

Realtek WLAN module	
Company	Realtek Semiconductor Corp.
Module Name	RTL8187SE(MS-6894)
FCC ID	TX2-RTL8187SE

MSI BT module	
Company	Micro Star International Co., Ltd.
Module Name	MS-6837D
FCC ID	14L-MS6837D1

1.6 Test Environment

Ambient temperature	:	21 ~ 22 ° C
Tissue Simulating Liquid	:	21 ~ 22 ° C
Relative Humidity	:	40 ~ 60 %

1.7 Operation Configuration

The device in GSM and WCDMA mode was controlled by using a Communication tester(CMU 200). Communication between the device and the tester was established by air link. For WLAN, the client provided a special driver and test program which can control the frequency and power of the module.. Measurements were performed at the lowest, middle and highest channels of the operating band. The EUT 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. Based on the RF Power and antenna separation distance, stand-alone BT SAR and simultaneous SAR evaluation are not required.

1.8 EVALUATION PROCEDURES

- Power Reference Measurement Procedures

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process.   The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 4 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties (for example, 2.7 mm for an ET3DV6 probe type).

- 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.

1.9 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 ($|E_i|2$)/ 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.
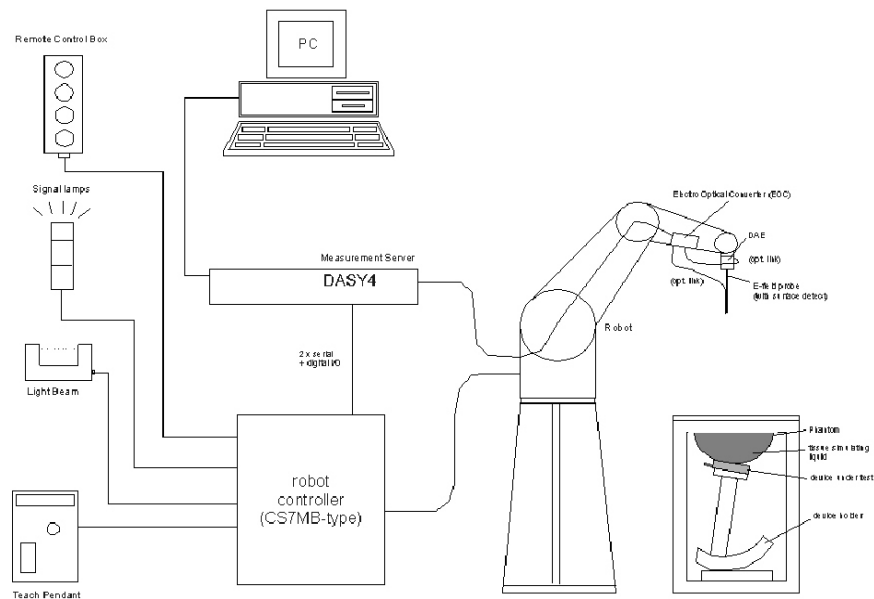
Fig a. The microwave circuit arrangement used for SAR system verification

• 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 body usage.

• The device holder for flat phantom.

• Tissue simulating liquid mixed according to the given recipes.

• Validation dipole kits allowing to validate the proper functioning of the system.

1.10 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 (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
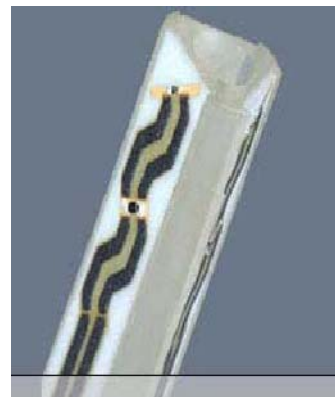
ET3DV6 E-Field Probe

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

1.11 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 835MHz and 1900MHz. The tests for EUT were conducted within 24 hours after each validation. The obtained results from the system accuracy verification are displayed in the table 1. During the tests, the ambient temperature of the laboratory was in the range 20~23 °C, the relative humidity was in the range 40~60% 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.
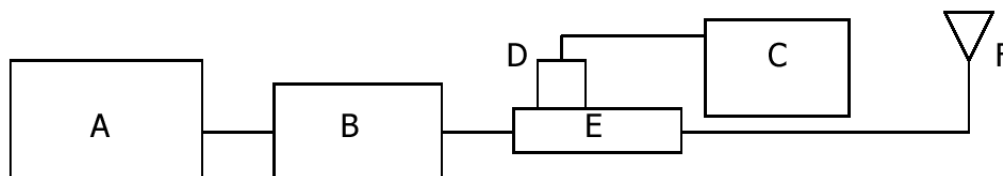
SGS

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 777D/778D Dual directional coupling
F. Reference dipole Antenna

Photo of the dipole Antenna

System Validation Results

Validation Kit	Tissue	Target SAR 1 g from Calibration Certificate (Input Power : 250 mW)	Measured SAR 1 g (Input Power : 250 mW)	Deviation (%)	Date	Liquid Temp. (°C)
D835V2 S/N: 490	835 MHz Brain	2.27 W/kg	**2.28 W/kg**	**0.44**	2009-01-22	22.3
D1900V2 S/N: 5d033	1900 MHz Brain	9.39 W/kg	**8.93 W/kg**	**-4.89**	2009-01-22	22.3

Table 1. Results system validation

Report File No. :   F690501/RF-SAR001823
Date of Issue :   2009-01-23
Page :   11 / 23

1.12 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this 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, 2009-01-22	**43.1**	**0.934**	**22.3**
		Recommended Limits	41.5	0.900	22.0
		Deviation(%)	3.86	3.78	-
	Body	Measured, 2009-01-22	**54.68**	**0.989**	**22.3**
		Recommended Limits	55.2	0.970	22.0
		Deviation(%)	-0.94	1.96	-
1900	Head	Measured, 2009-01-22	**39.5**	**1.36**	**22.3**
		Recommended Limits	40.0	1.400	22.0
		Deviation(%)	-1.25	-2.86	-
	Body	Measured, 2009-01-22	**52.26**	**1.568**	**22.3**
		Recommended Limits	53.3	1.520	22.0
		Deviation(%)	-1.95	3.16	-

The composition of the brain tissue simulating liquid

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified.   The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients	Frequency (MHz)									
(% by weight)	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride   Sugar: 98+% Pure Sucrose

Water: De-ionized, 16 MΩ+ resistivity   HEC: Hydroxyethyl Cellulose

DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]

Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

1.13 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 C95.3–2003, Copyright 2003 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
Partial Peak SAR (Partial)	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

2. Instruments List

Maunfacturer	Device	Type	Serial Number	Due date of Calibration
Stäubli	Robot	RX90BL	F03/5W05A1/A/01	N/A
Schmid& Partner Engineering AG	Dosimetric E-Field Probe	ET3DV6	1782	April 22, 2009
Schmid& Partner Engineering AG	835 MHz System Validation Dipole	D835V2	490	August 27, 2009
Schmid& Partner Engineering AG	1900 MHz System Validation Dipole	D1900V2	5d033	August 28, 2009
Schmid& Partner Engineering AG	2450 MHz System Validation Dipole	D2450V2	734	August 20, 2009
Schmid& Partner Engineering AG	Data acquisition Electronics	DAE3	567	September 24, 2009
Schmid& Partner Engineering AG	Software	DASY 4 V4.7	-	N/A
Schmid& Partner Engineering AG	Phantom	SAM Phantom V4.0	TP-1299 TP-1300	N/A
Agilent	Network Analyzer	E5070B	MY42100282	May 9, 2009
Agilent	Dielectric Probe Kit	85070D	2184	N/A
Agilent	Power Meter	E4419B	GB43311126	October 1, 2009
Agilent	Power Sensor	E9300H	MY41495308	October 14, 2009
			MY41495314	October 6, 2009
Agilent	Signal Generator	E4421B	MY43350132	October 1, 2009
Empower RF Systems	Power Amplifier	2001-BBS3Q7ECK	1032 D/C 0336	May 9, 2009
Agilent	Dual Directional Coupler	777D 778D	50128 50454	October 1, 2009
Microlab	LP Filter	LA-15N LA-30N	N/A	October 1, 2009
R&S	Mobile Test Unit	CMU 200	109495	October 2, 2009

3.Summary of Results

FCC 3G Measurement Procedures

Maximum output power is verified on the Low, Middle and High channels according to the section 5.2 of 3GPP TS 34.121 and the KDB 941225 procedure.

Band	Channel	Frequency(MHz)	Conducted Power(dBm)	
			1 Tx Slot	2 Tx Slot
GPRS850	128	824.2	32.8	32.8
	189	836.4	32.6	32.6
	251	848.8	32.6	32.6
EGPRS850	128	824.2	27.9	27.9
	189	836.4	27.6	27.6
	251	848.8	27.6	27.6

Notes : Body SAR evaluation was conducted in 2 Tx Slot.

Band	Channel	Frequency(MHz)	Conducted Power(dBm)	
			1 Tx Slot	2 Tx Slot
GPRS1900	512	1850.2	29.2	29.2
	661	1880.0	29.7	29.7
	810	1909.8	29.1	29.1
EGPRS1900	512	1850.2	26.3	26.3
	661	1880.0	26.8	26.8
	810	1909.8	26.1	26.1

Notes : Body SAR evaluation was conducted in 2 Tx Slot.

Band	Mode	Channel	Frequency(MHz)	Conducted Power(dBm)	
WCDMA II (RMC/12.2 kbps)	RMC	9262	1852.4	**22.95**	
	RMC	9400	1880.0	**22.35**	
	RMC	9538	1907.6	**22.59**	
WCDMA II (HSDPA Active)	Sub-test 1	9262	1852.4	**23.03**	
		9400	1880.0	**22.83**	
		9538	1907.6	**23.12**	
	Sub-test 2	9262	1852.4	22.72	
		9400	1880.0	22.53	
		9538	1907.6	22.87	
	Sub-test 3	9262	1852.4	22.43	
		9400	1880.0	22.31	
		9538	1907.6	22.38	
	Sub-test 4	9262	1852.4	22.51	
		9400	1880.0	22.46	
		9538	1907.6	22.50	
		βc	βd	ΔACK, ΔNACK, ΔCQI	AGV
	Sub-test 1	2	15	8	-
	Sub-test 2	12	15	8	-
	Sub-test 3	15	8	8	-
	Sub-test 4	15	4	8	-
WCMA II (HSUPA)	Sub-test 1	9262	1852.4	**22.74**	
		9400	1880.0	**22.67**	
		9538	1907.6	**22.75**	
	Sub-test 2	9262	1852.4	22.05	
		9400	1880.0	22.09	
		9538	1907.6	21.87	
	Sub-test 3	9262	1852.4	21.89	
		9400	1880.0	22.09	
		9538	1907.6	22.17	
	Sub-test 4	9262	1852.4	22.35	
		9400	1880.0	22.39	
		9538	1907.6	22.29	
	Sub-test 5	9262	1852.4	22.63	
		9400	1880.0	22.34	
		9538	1907.6	22.71	
		βc	βd	ΔACK, ΔNACK, ΔCQI	AGV
	Sub-test 1	11	15	8	20
	Sub-test 2	6	15	8	12
	Sub-test 3	15	15	8	15
	Sub-test 4	2	15	8	17
	Sub-test 5	15	15	8	21

Module manufacturer statement on MPR implementation:

The MPR implementation in this device is a result of the ongoing development of the Ericsson F3507G module.

During this development the crest compensation and power turn down mechanisms were optimized throughout a number of iterations. In early releases the relatively high output power in HSPA mode was reported and fixed. This fix involves changes in the crest compensation and hardware compensation files.

At no point were the results outside of the requirements of 3GPP TS34.121. Therefore the patch to fix this issue is

scheduled to be included in all firmware releases from R2A due later this year.

Notes :Body SAR evaluation for HSDPA and HSUPA was conducted in Sub-test 1.

Band	Mode	Channel	Frequency(MHz)	Conducted Power(dBm)	
WCDMA V (RMC/12.2kbps)	RMC	4132	826.4	**23.09**	
	RMC	4180	836.0	**23.61**	
	RMC	4233	846.6	**23.39**	
WCDMA V (HSDPA Active)	Sub-test 1	4132	826.4	**23.28**	
		4180	836.0	**23.60**	
		4233	846.6	**23.17**	
	Sub-test 2	4132	826.4	22.56	
		4180	836.0	22.83	
		4233	846.6	22.65	
	Sub-test 3	4132	826.4	22.57	
		4180	836.0	22.87	
		4233	846.6	22.53	
	Sub-test 4	4132	826.4	22.66	
		4180	836.0	22.87	
		4233	846.6	22.57	
		ßc	ßd	ΔACK, ΔNACK, ΔCQI	AGV
	Sub-test 1	2	15	8	-
	Sub-test 2	12	15	8	-
	Sub-test 3	15	8	8	-
	Sub-test 4	15	4	8	-
WCMA V (HSUPA)	Sub-test 1	4132	826.4	**22.99**	
		4180	836.0	**23.16**	
		4233	846.6	**23.07**	
	Sub-test 2	4132	826.4	21.42	
		4180	836.0	21.85	
		4233	846.6	21.22	
	Sub-test 3	4132	826.4	21.84	
		4180	836.0	21.82	
		4233	846.6	21.65	
	Sub-test 4	4132	826.4	21.87	
		4180	836.0	21.74	
		4233	846.6	21.77	
	Sub-test 5	4132	826.4	22.83	
		4180	836.0	22.93	
		4233	846.6	22.71	
		ßc	ßd	ΔACK, ΔNACK, ΔCQI	AGV
	Sub-test 1	11	15	8	20
	Sub-test 2	6	15	8	12
	Sub-test 3	15	15	8	15
	Sub-test 4	2	15	8	17
	Sub-test 5	15	15	8	21

Module manufacturer statement on MPR implementation:

The MPR implementation in this device is a result of the ongoing development of the Ericsson F3507G module.

During this development the crest compensation and power turn down mechanisms were optimized throughout a

number of iterations. In early releases the relatively high output power in HSPA mode was reported and fixed. This

fix involves changes in the crest compensation and hardware compensation files.

At no point were the results outside of the requirements of 3GPP TS34.121. Therefore the patch to fix this issue is

scheduled to be included in all firmware releases from R2A due later this year.

Notes : Body SAR evaluation for HSDPA and HSUPA was conducted in Sub-test 1.

GSM850 Body SAR

Ambient Temperature (°C)	22.3
Liquid Temperature (°C)	22.3
Date	2009-01-22

Test Mode	EUT Position	Traffic Channel		Power Drift(dB)	1 g SAR (W/kg)	1 g SAR Limits (W/kg)
		Frequency (MHz)	Channel			
GPRS	Bottom of Base	824.2	128	0.121	**0.056**	1.6
	Bottom of Base	836.4	189	0.094	0.056	
	Bottom of Base	848.8	251	0.015	0.051	
EGPRS	Bottom of Base	824.4	128	0.101	0.035	

GSM1900 Body SAR

Ambient Temperature (°C)	22.3
Liquid Temperature (°C)	22.3
Date	2009-01-22

Test Mode	EUT Position	Traffic Channel		Power Drift(dB)	1 g SAR (W/kg)	1 g SAR Limits (W/kg)
		Frequency (MHz)	Channel			
GPRS	Bottom of Base	1850.2	512	0.022	0.061	1.6
	Bottom of Base	1880.0	661	0.075	0.051	
	Bottom of Base	1909.8	810	0.107	**0.062**	
EGPRS	Bottom of Base	1909.8	810	0.112	0.059	

![SGS]

Ambient Temperature (°C)	22.3
Liquid Temperature (°C)	22.3
Date	2009-01-22

WCDMA V Body SAR

Test Mode	EUT Position	Traffic Channel		Power Drift(dB)	1 g SAR (W/kg)	1 g SAR Limits (W/kg)
		Frequency (MHz)	Channel			
RMC	Bottom of Base	826.4	4132	0.104	0.038	
	Bottom of Base	836.0	4180	0.075	**0.04**	
	Bottom of Base	846.6	4233	0.111	0.039	1.6
HSDPA Active	Bottom of Base	836.0	4180	0.239	0.037	
HSUPA	Bottom of Base	836.0	4180	0.116	0.038	

Ambient Temperature (°C)	22.3
Liquid Temperature (°C)	22.3
Date	2009-01-22

WCDMA II Body SAR

Test Mode	EUT Position	Traffic Channel		Power Drift(dB)	1 g SAR (W/kg)	1 g SAR Limits (W/kg)
		Frequency (MHz)	Channel			
RMC	Bottom of Base	1852.4	9262	-0.026	0.051	1.6
	Bottom of Base	1880.0	9400	-0.150	**0.076**	
	Bottom of Base	1907.6	9538	0.028	0.064	
HSDPA Active	Bottom of Base	1880.0	9400	-0.159	0.074	
HSUPA	Bottom of Base	1880.0	9400	-0.137	0.071	

Appendix

List

Appendix A	Photographs	- EUT - Test Setup
Appendix B	DASY4 Report (Plots of the SAR Measurements)	- 850, 1900 MHz Validation Test - GSM850 Test - GSM1900 Test
Appendix C	Uncertainty Analysis	
Appendix D	Calibration Certificate	- PROBE - DAE - DIPOLE

Appendix A

EUT Photographs

Top View of EUT

Bottom View of EUT

Right Side View of EUT

Left Side View of EUT

Front Side View of EUT

Rear Side View of EUT

Antenna Separation Distance of EUT
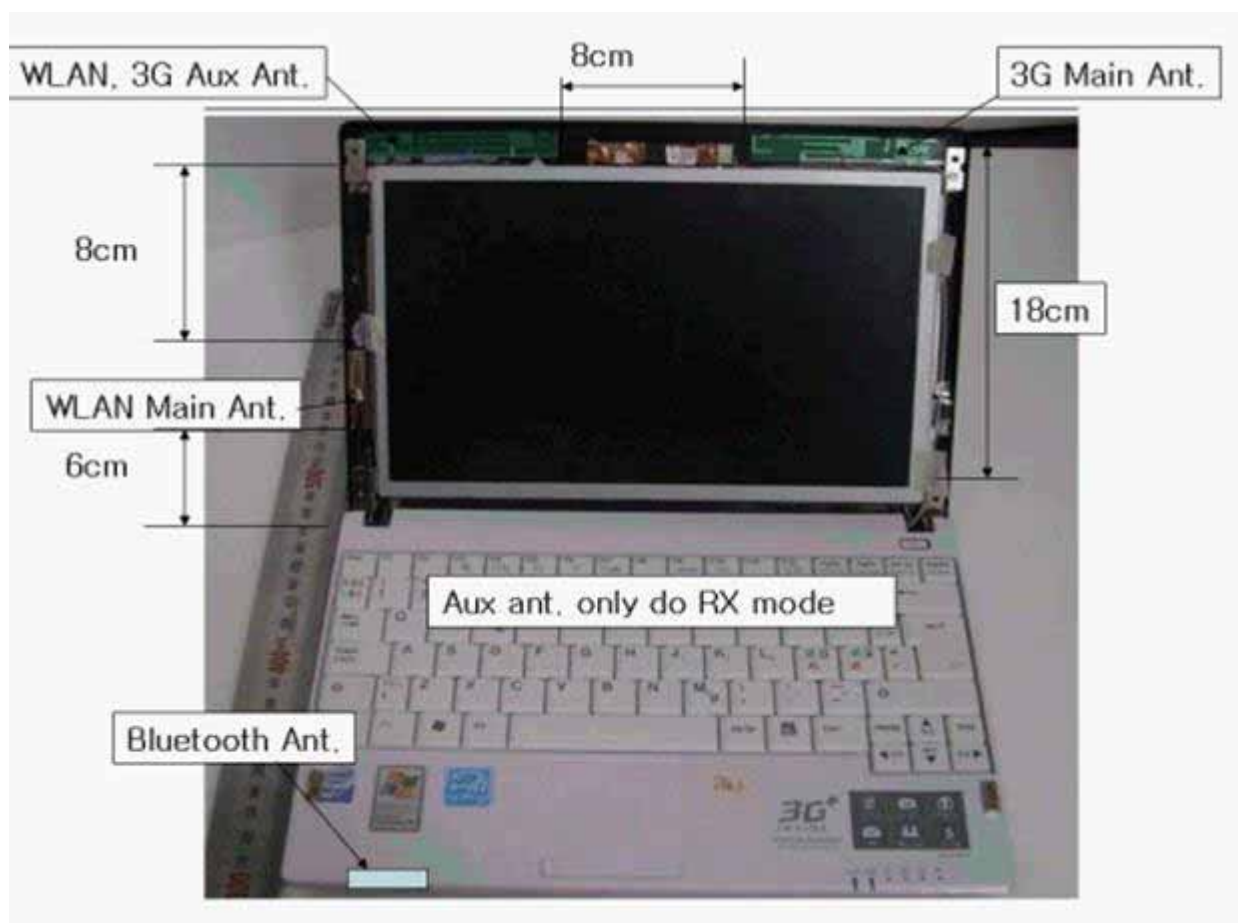
Test Setup Photographs

Appendix B

Test Plot - DASY4 Report

835 MHz Validation Test

Date/Time: 2009-01-22 3:14:24

Test Laboratory: SGS Testing Korea
File Name: Validation_850 MHz.da4

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:490
Program Name: Validation_850 MHz

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: $f = 835$ MHz; $\sigma = 0.934$ mho/m; $\varepsilon_r = 43.1$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(6.5, 6.5, 6.5); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Validation_850 MHz/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.48 mW/g

Validation_850 MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.9 V/m; Power Drift = -0.109 dB
Peak SAR (extrapolated) = 3.30 W/kg
SAR(1 g) = 2.28 mW/g; SAR(10 g) = 1.5 mW/g
Maximum value of SAR (measured) = 2.46 mW/g

dB
0.000
-1.90
-3.80
-5.70
-7.60
-9.50

0 dB = 2.46mW/g

Report File No. :   F690501/RF-SAR001823
Date of Issue :   2009-01-23
Page :   30 / 76
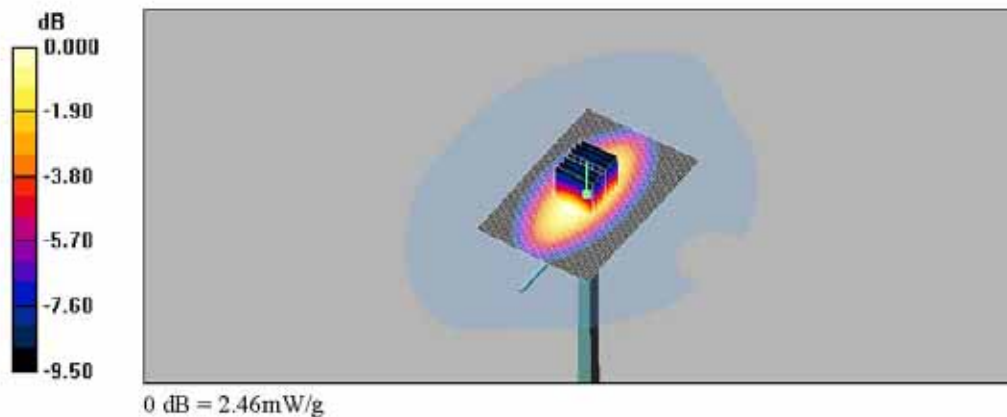
1900 MHz Validation Test

Date/Time: 2009-01-22 9:21:30

Test Laboratory: SGS Testing Korea
File Name: Validation_1900 MHz.da4

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d033
Program Name: Validation 1900 MHz

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1900$ MHz; $\sigma = 1.36$ mho/m; $\varepsilon_r = 39.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.35, 5.35, 5.35); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Validation 1900 MHz/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 10.1 mW/g

Validation 1900 MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.1 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 8.93 mW/g; SAR(10 g) = 4.68 mW/g
Maximum value of SAR (measured) = 10.1 mW/g
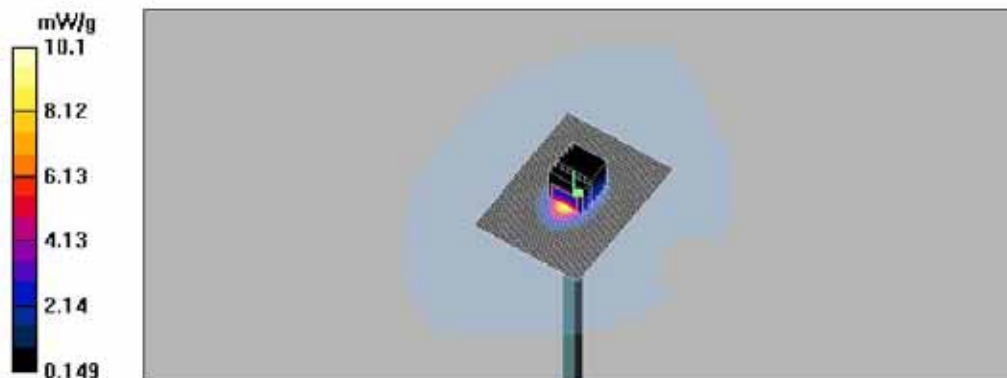
GSM 850 Body SAR Test

Date/Time: 2009-01-22 3:27:53

Test Laboratory: SGS Testing Korea
File Name: GSM850.da4

DUT: LGX11; Type: Notebook PC; Serial: N/A
Program Name: GSM 850 MHz

Communication System: GSM850; Frequency: 824.2 MHz; Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.981$ mho/m; $\varepsilon_r = 54.8$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.9, 5.9, 5.9); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body_Low/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.063 mW/g

Body_Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.85 V/m; Power Drift = 0.121 dB
Peak SAR (extrapolated) = 0.065 W/kg
SAR(1 g) = 0.056 mW/g; SAR(10 g) = 0.040 mW/g
Maximum value of SAR (measured) = 0.063 mW/g

Date/Time: 2009-01-22 3:55:18

Test Laboratory: SGS Testing Korea
File Name: GSM850.da4

DUT: LGX11; Type: Notebook PC; Serial: N/A
Program Name: GSM 850 MHz

Communication System: GSM850; Frequency: 836.4 MHz;Duty Cycle: 1:4.15
Medium parameters used: $f = 836.5$ MHz; $\sigma = 0.99$ mho/m; $\varepsilon_r = 54.7$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.9, 5.9, 5.9); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body_Mid/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.062 mW/g

Body_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.62 V/m; Power Drift = 0.094 dB
Peak SAR (extrapolated) = 0.075 W/kg
SAR(1 g) = 0.056 mW/g; SAR(10 g) = 0.038 mW/g
Maximum value of SAR (measured) = 0.060 mW/g
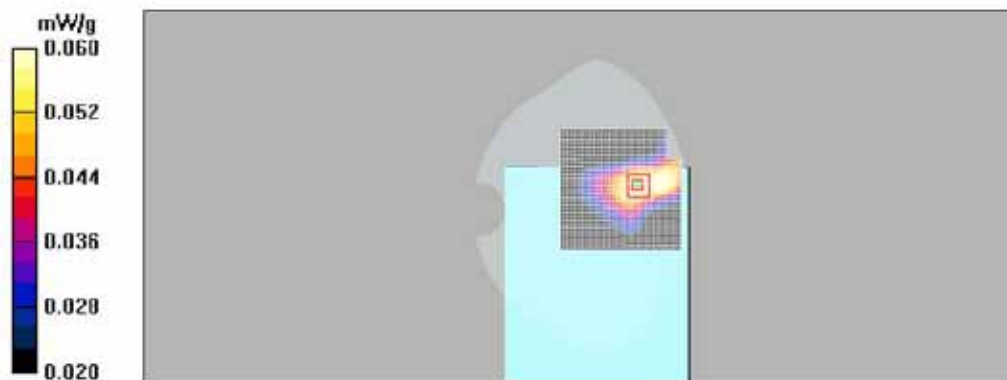
Date/Time: 2009-01-22 4:20:21

Test Laboratory: SGS Testing Korea
File Name: GSM850.da4

DUT: LGX11; Type: Notebook PC; Serial: N/A
Program Name: GSM 850 MHz

Communication System: GSM850; Frequency: 848.8 MHz; Duty Cycle: 1:4.15
Medium parameters used: f = 849 MHz; σ = 0.999 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.9, 5.9, 5.9); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body_High/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.054 mW/g

Body_High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.78 V/m; Power Drift = 0.015 dB
Peak SAR (extrapolated) = 0.078 W/kg
SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.036 mW/g
Maximum value of SAR (measured) = 0.054 mW/g

Date/Time: 2009-01-22 4:42:44

Test Laboratory: SGS Testing Korea
File Name: GSM850.da4

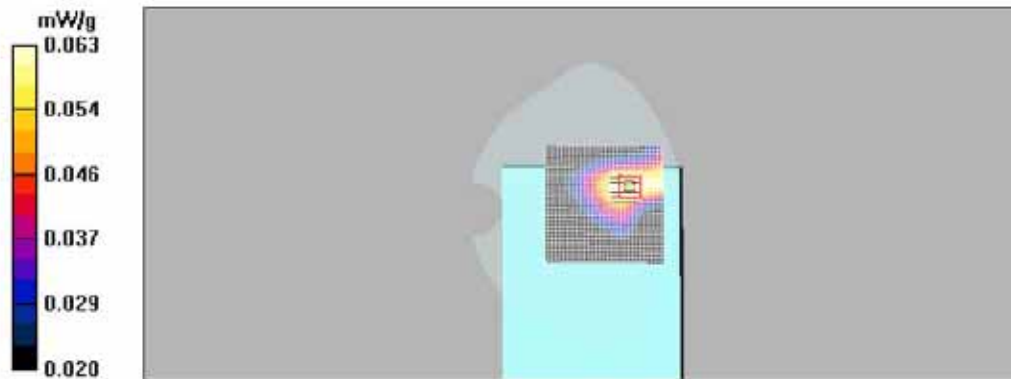**DUT: LGX11; Type: Notebook PC; Serial: N/A**
Program Name: GSM 850 MHz

Communication System: GSM850; Frequency: 824.2 MHz;Duty Cycle: 1:4.15
Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.981$ mho/m; $\varepsilon_r = 54.8$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.9, 5.9, 5.9); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

EGPRS_Body_Low/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.036 mW/g

EGPRS_Body_Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.61 V/m; Power Drift = 0.101 dB
Peak SAR (extrapolated) = 0.049 W/kg
SAR(1 g) = 0.035 mW/g; SAR(10 g) = 0.027 mW/g
Maximum value of SAR (measured) = 0.038 mW/g

GSM1900 Body SAR Test

Date/Time: 2009-01-22 9:43:37

Test Laboratory: SGS Testing Korea
File Name: PCS1900.da4

DUT: LGX11; Type: Notebook PC; Serial: N/A
Program Name: PCS 1900 MHz

Communication System: PCS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.15
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.56 mho/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.16, 5.16, 5.16); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body_Low/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.066 mW/g

Body_Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.71 V/m; Power Drift = 0.022 dB
Peak SAR (extrapolated) = 0.091 W/kg
SAR(1 g) = 0.061 mW/g; SAR(10 g) = 0.038 mW/g
Maximum value of SAR (measured) = 0.066 mW/g

Date/Time: 2009-01-22 10:06:19

Test Laboratory: SGS Testing Korea
File Name: PCS1900.da4

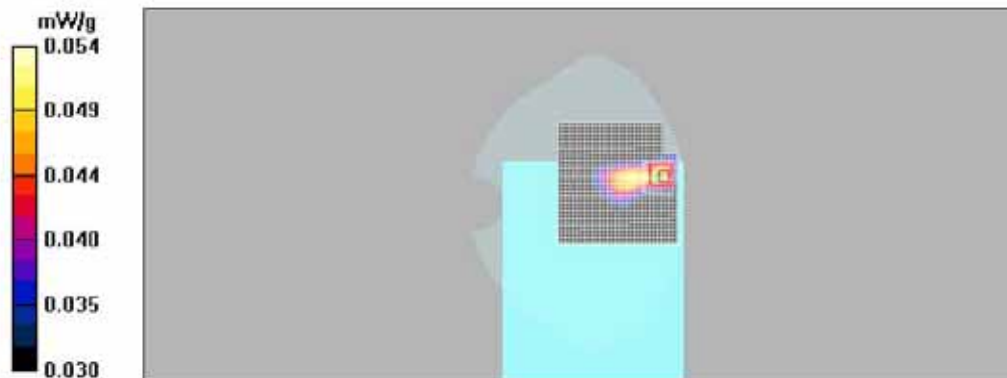**DUT: LGX11; Type: Notebook PC; Serial: N/A**
Program Name: PCS 1900 MHz

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.16, 5.16, 5.16); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body_Mid/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.057 mW/g

Body_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.15 V/m; Power Drift = 0.011 dB
Peak SAR (extrapolated) = 0.075 W/kg
SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.028 mW/g
Maximum value of SAR (measured) = 0.057 mW/g

Date/Time: 2009-01-22 10:30:11

Test Laboratory: SGS Testing Korea
File Name: PCS1900.da4

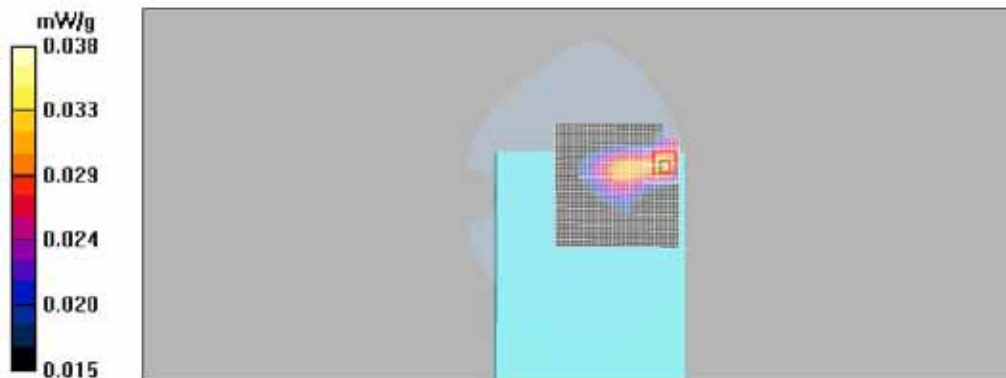**DUT: LGX11; Type: Notebook PC; Serial: N/A**
Program Name: PCS 1900 MHz

Communication System: PCS 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 1910 MHz; σ = 1.58 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.16, 5.16, 5.16); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body_High/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.068 mW/g

Body_High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.89 V/m; Power Drift = 0.107 dB
Peak SAR (extrapolated) = 0.088 W/kg
SAR(1 g) = 0.062 mW/g; SAR(10 g) = 0.042 mW/g
Maximum value of SAR (measured) = 0.068 mW/g
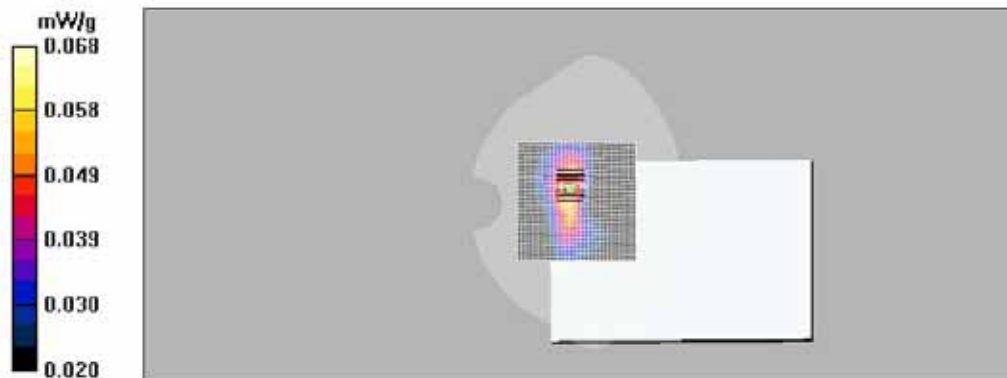
Date/Time: 2009-01-22 10:52:43

Test Laboratory: SGS Testing Korea
File Name: PCS1900.da4

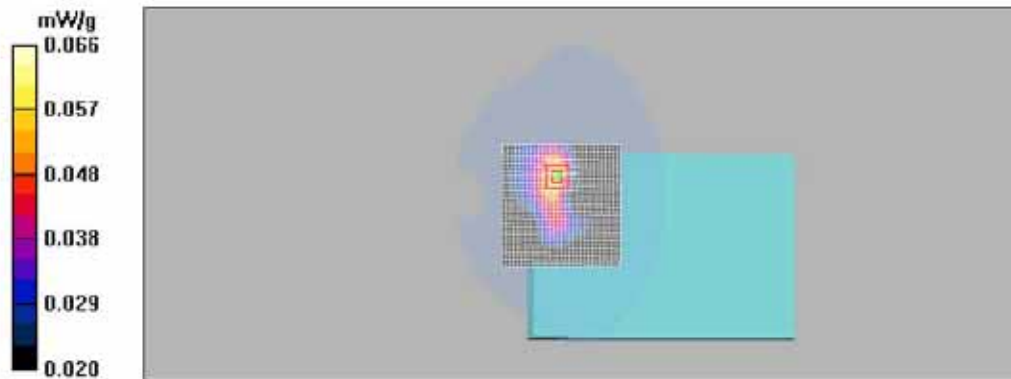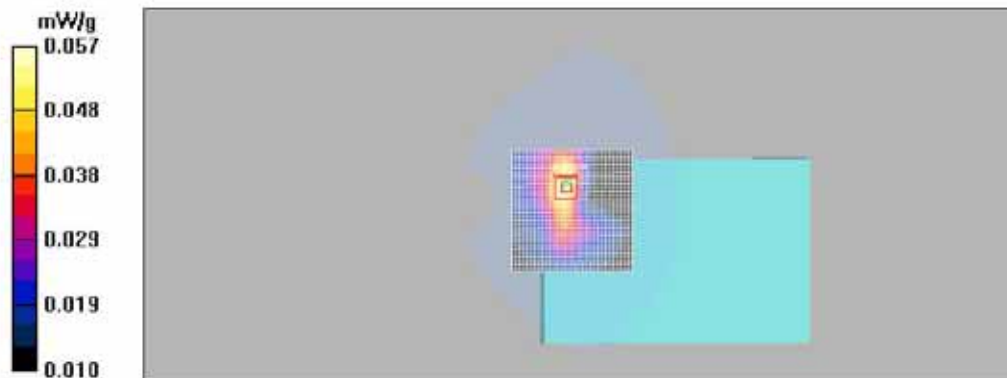**DUT: LGX11; Type: Notebook PC; Serial: N/A**
Program Name: PCS 1900 MHz

Communication System: PCS 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:4.15
Medium parameters used: f = 1910 MHz; σ = 1.58 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.16, 5.16, 5.16); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

EGPRS_Body_High/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.067 mW/g

EGPRS_Body_High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.89 V/m; Power Drift = 0.112 dB
Peak SAR (extrapolated) = 0.098 W/kg
SAR(1 g) = 0.059 mW/g; SAR(10 g) = 0.035 mW/g
Maximum value of SAR (measured) = 0.065 mW/g

WCDMA V Body SAR Test

Date/Time: 2009-01-22 5:15:09

Test Laboratory: SGS Testing Korea
File Name: WCDMA V.da4

DUT: LGX11; Type: Notebook PC; Serial: N/A
Program Name: WCDMA V

Communication System: WCDMA V - PC; Frequency: 826.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 826.5 MHz; σ = 0.983 mho/m; ε_r = 54.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.9, 5.9, 5.9); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body_Low/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.040 mW/g

Body_Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.41 V/m; Power Drift = 0.104 dB
Peak SAR (extrapolated) = 0.045 W/kg
SAR(1 g) = 0.038 mW/g; SAR(10 g) = 0.029 mW/g
Maximum value of SAR (measured) = 0.041 mW/g

Date/Time: 2009-01-22 5:37:22

Test Laboratory: SGS Testing Korea
File Name: WCDMA V.da4

DUT: LGX11; Type: Notebook PC; Serial: N/A
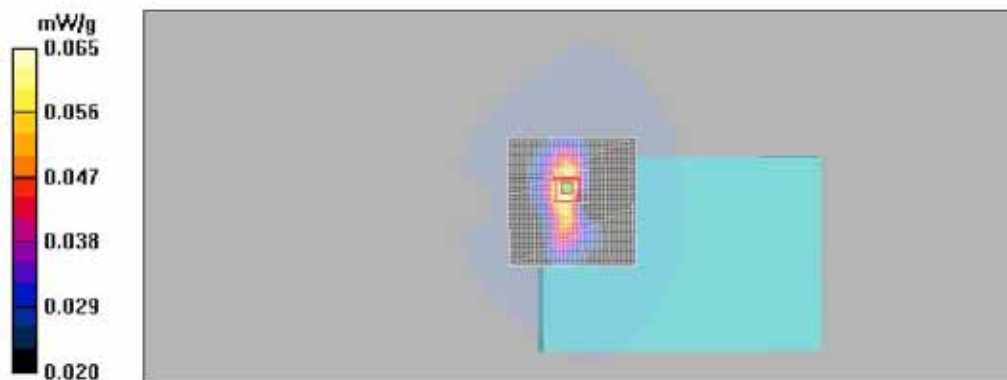**Program Name: WCDMA V**

Communication System: WCDMA V - PC; Frequency: 836 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 836$ MHz; $\sigma = 0.989$ mho/m; $\varepsilon_r = 54.7$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.9, 5.9, 5.9); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body_Mid/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.044 mW/g

Body_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.21 V/m; Power Drift = 0.075 dB
Peak SAR (extrapolated) = 0.06 W/kg
SAR(1 g) = 0.04 mW/g; SAR(10 g) = 0.031 mW/g
Maximum value of SAR (measured) = 0.044 mW/g
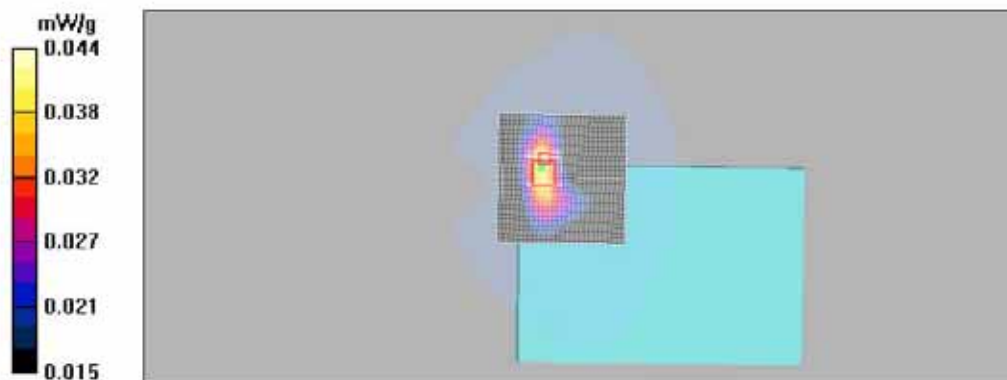
Date/Time: 2009-01-22 5:58:36

Test Laboratory: SGS Testing Korea
File Name: WCDMA V.da4

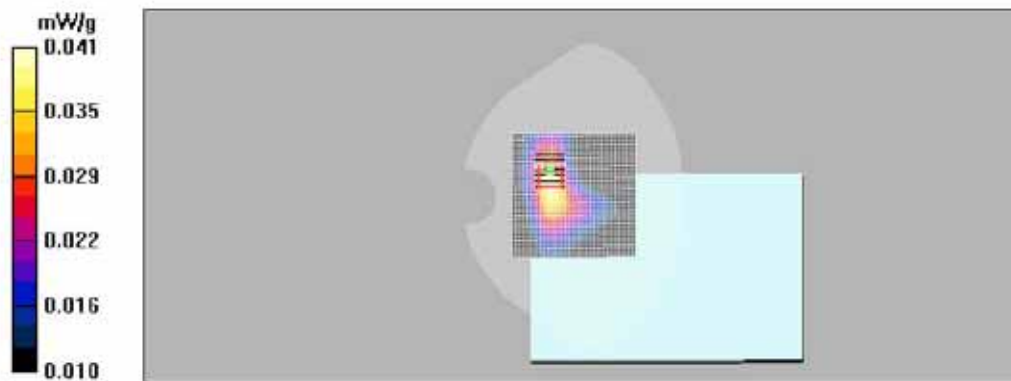**DUT: LGX11; Type: Notebook PC; Serial: N/A**
Program Name: WCDMA V

Communication System: WCDMA V - PC; Frequency: 846.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 846.6$ MHz; $\sigma = 0.997$ mho/m; $\varepsilon_r = 54.6$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.9, 5.9, 5.9); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body_High/Area Scan (71x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.043 mW/g

Body_High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.31 V/m; Power Drift = 0.111 dB
Peak SAR (extrapolated) = 0.054 W/kg
SAR(1 g) = 0.039 mW/g; SAR(10 g) = 0.029 mW/g
Maximum value of SAR (measured) = 0.043 mW/g
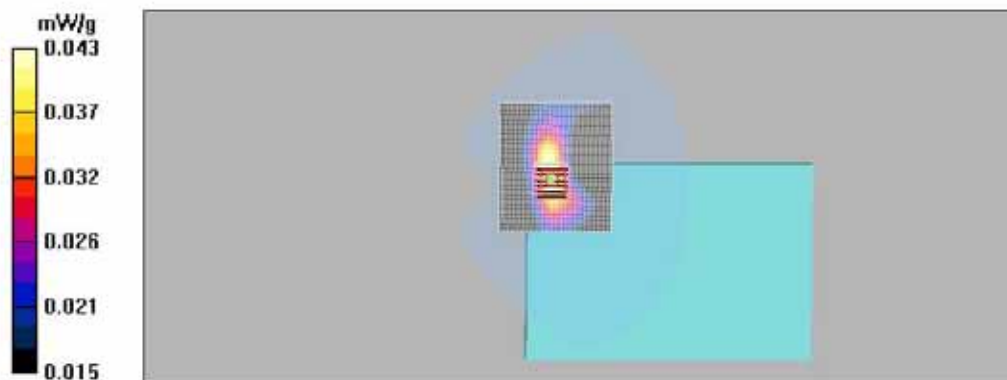
Date/Time: 2009-01-22 7:10:04

Test Laboratory: SGS Testing Korea
File Name: WCDMA V.da4

DUT: LGX11; Type: Notebook PC; Serial: N/A
Program Name: WCDMA V

Communication System: WCDMA V - PC; Frequency: 836 MHz; Duty Cycle: 1:1
Medium parameters used: f = 836 MHz; σ = 0.989 mho/m; ε_r = 54.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.9, 5.9, 5.9); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

HSDPA_Body_Mid/Area Scan (71x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.041 mW/g

HSDPA_Body_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.70 V/m; Power Drift = 0.239 dB
Peak SAR (extrapolated) = 0.051 W/kg
SAR(1 g) = 0.037 mW/g; SAR(10 g) = 0.025 mW/g
Maximum value of SAR (measured) = 0.039 mW/g

Date/Time: 2009-01-22 6:45:18

Test Laboratory: SGS Testing Korea
File Name: WCDMA V.da4

DUT: LGX11; Type: Notebook PC; Serial: N/A
Program Name: WCDMA V

Communication System: WCDMA V - PC; Frequency: 836 MHz;Duty Cycle: 1:1
Medium parameters used: f = 836 MHz; σ = 0.989 mho/m; ε_r = 54.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.9, 5.9, 5.9); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP_900MHz; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

HSUPA_Body_Mid/Area Scan (71x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.041 mW/g

HSUPA_Body_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.23 V/m; Power Drift = 0.116 dB
Peak SAR (extrapolated) = 0.057 W/kg
SAR(1 g) = 0.038 mW/g; SAR(10 g) = 0.029 mW/g
Maximum value of SAR (measured) = 0.041 mW/g

WCDMA II Body SAR Test

Date/Time: 2009-01-22 11:31:04

Test Laboratory: SGS Testing Korea
File Name: WCDMA II.da4

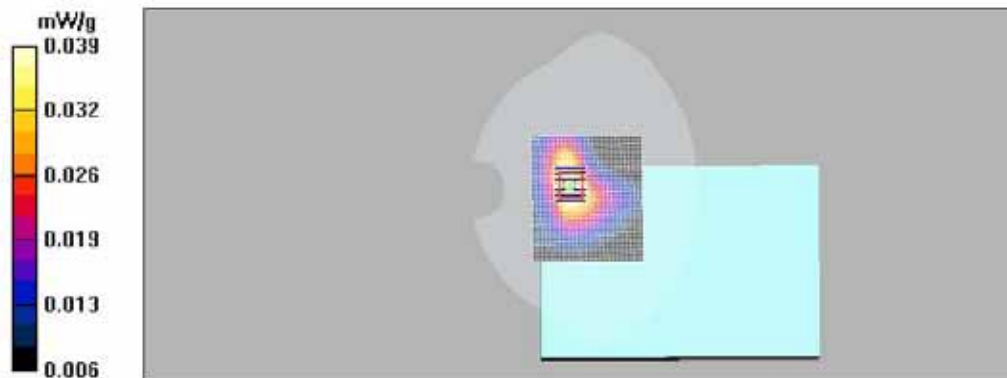DUT: LGX11; Type: Notebook PC; Serial: N/A
Program Name: WCDMA II

Communication System: W-CDMA II; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1852.5 MHz; σ = 1.56 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.16, 5.16, 5.16); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body_Low/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.055 mW/g

Body_Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.22 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 0.072 W/kg
SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.032 mW/g
Maximum value of SAR (measured) = 0.055 mW/g

Date/Time: 2009-01-22 11:57:27

Test Laboratory: SGS Testing Korea
File Name: WCDMA II.da4

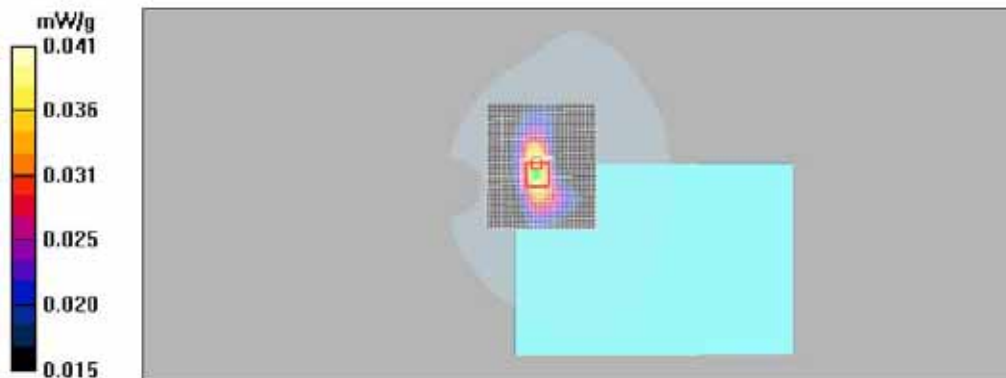**DUT: LGX11; Type: Notebook PC; Serial: N/A**
Program Name: WCDMA II

Communication System: W-CDMA II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.16, 5.16, 5.16); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body_Mid/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.084 mW/g

Body_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.87 V/m; Power Drift = -0.150 dB
Peak SAR (extrapolated) = 0.106 W/kg
SAR(1 g) = 0.076 mW/g; SAR(10 g) = 0.061 mW/g
Maximum value of SAR (measured) = 0.080 mW/g

Date/Time: 2009-01-23 12:25:51

Test Laboratory: SGS Testing Korea
File Name: WCDMA II.da4

DUT: LGX11; Type: Notebook PC; Serial: N/A
Program Name: WCDMA II

Communication System: W-CDMA II; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 1907.6$ MHz; $\sigma = 1.57$ mho/m; $\varepsilon_r = 52.1$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.16, 5.16, 5.16); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Body_High/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.071 mW/g

Body_High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.06 V/m; Power Drift = 0.028 dB
Peak SAR (extrapolated) = 0.079 W/kg
SAR(1 g) = 0.064 mW/g; SAR(10 g) = 0.043 mW/g.
Maximum value of SAR (measured) = 0.072 mW/g
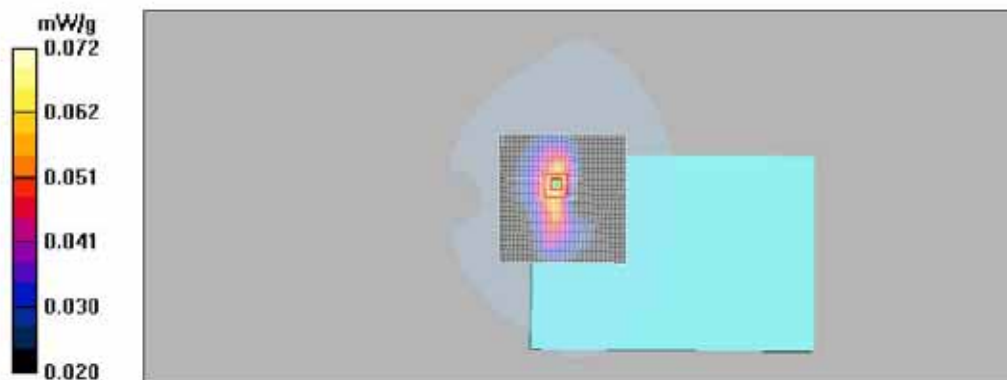
Date/Time: 2009-01-23 1:31:09

Test Laboratory: SGS Testing Korea
File Name: WCDMA II.da4

DUT: LGX11; Type: Notebook PC; Serial: N/A
Program Name: WCDMA II
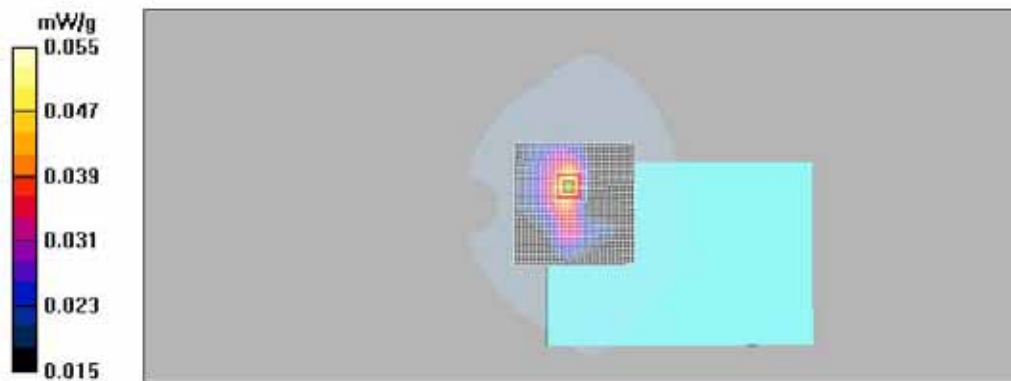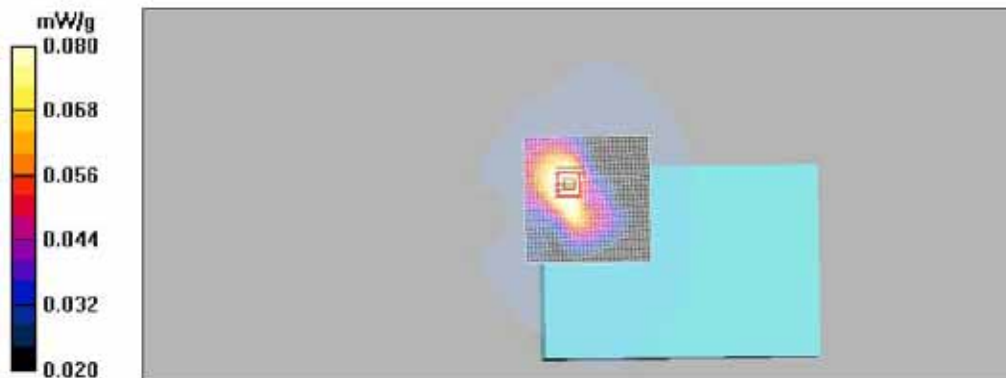
Communication System: W-CDMA II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.16, 5.16, 5.16); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

HSDPA_Body_Mid/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.089 mW/g

HSDPA_Body_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.15 V/m; Power Drift = -0.159 dB
Peak SAR (extrapolated) = 0.098 W/kg
SAR(1 g) = 0.074 mW/g; SAR(10 g) = 0.053 mW/g
Maximum value of SAR (measured) = 0.088 mW/g
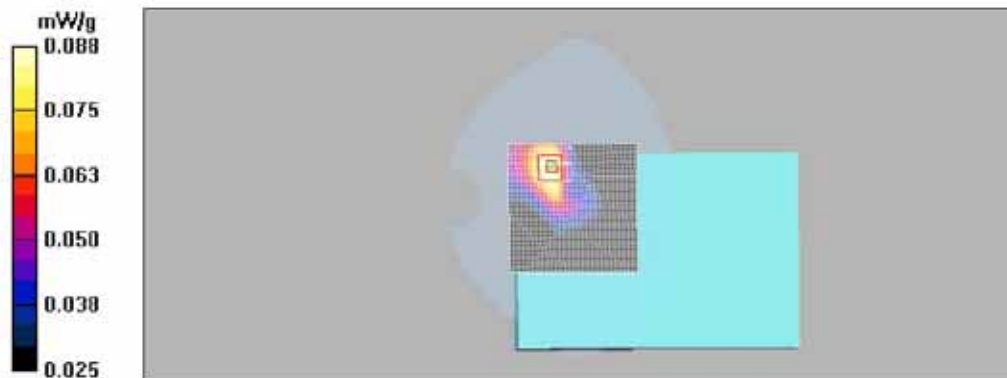
Date/Time: 2009-01-23 12:48:19

Test Laboratory: SGS Testing Korea
File Name: WCDMA II.da4

DUT: LGX11; Type: Notebook PC; Serial: N/A
Program Name: WCDMA II

Communication System: W-CDMA II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1782; ConvF(5.16, 5.16, 5.16); Calibrated: 2008-04-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2008-09-24
- Phantom: SAM MIC #2000-93 with CRP; Type: SAM MIC #2000-93; Serial: TP-1299
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

HSUPA_Body_Mid/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
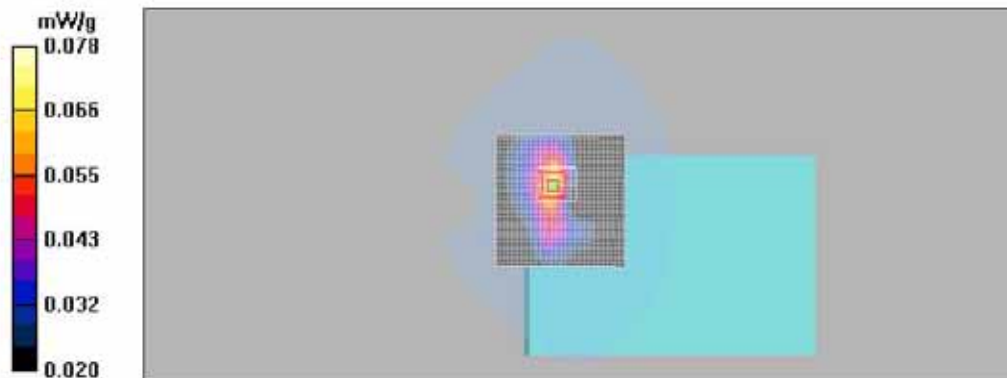Maximum value of SAR (interpolated) = 0.077 mW/g

HSUPA_Body_Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.11 V/m; Power Drift = -0.137 dB
Peak SAR (extrapolated) = 0.094 W/kg
SAR(1 g) = 0.071 mW/g; SAR(10 g) = 0.052 mW/g
Maximum value of SAR (measured) = 0.078 mW/g

Appendix C

Uncertainty Analysis

Uncertainty of SAR equipments for measurement

Items	Uncertainty value %	Probability Distribution	Divisor	ci 1 1g	Standard unc (1g)	vi or Veff
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%	∞
Mech. constrains of robot	0.4	rectangular	√ 3	1	0.2%	∞
Probe positioning	2.9	rectangular	√ 3	1	1.7%	∞
Extrap. and integration	1.0	rectangular	√ 3	1	0.6%	∞

Uncertainty of measurements

Test Sample Related						
Device positioning	2.9	normal	1	1	2.9%	145
Device holder uncertainty	3.6	normal	1	1	3.6%	5
Power drift	5.0	rectangular	√ 3	1	2.9%	∞
Phantom and Setup						
Phantom uncertainty	4.0	rectangular	√ 3	1	2.3%	∞
Liquid conductivity(target)	5.0	rectangular	√ 3	0.64	1.8%	∞
Liquid conductivity(meas.)	5.0	normal	1	0.64	3.2%	∞
Liquid permittivity(target)	5.0	rectangular	√ 3	0.6	1.7%	∞
Liquid permittivity(meas.)	5.0	normal	1	0.6	3.0%	∞

Uncertainty of SAR system

Combined Standard Uncertainty				10.6%	
Expanded Standard Uncertainty(k=2)				20.6%	

Appendix D

Calibration Certificate

  - PROBE

  - DAE

  - 835 MHz, 1900 MHz DIPOLE

- PROBE Calibration Certificate

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

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

Accredited by the Swiss Accreditation Service (SAS)
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 (Dymstec)**

Certificate No: **ET3-1782_Apr08**

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1782
Calibration procedure(s)	QA CAL-01.v6, QA CAL12.v5 and QA CAL-23.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	April 22, 2008
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 (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 660	3-Sep-07 (No. DAE4-660_Sep07)	Sep-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-07)	In house check: Oct-08

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

Issued: April 22, 2008

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

Certificate No: ET3-1782_Apr08   Page 1 of 9

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 Accreditation Service (SAS)
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
ConvF	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.

ET3DV6 SN:1782

April 22, 2008

Probe ET3DV6

SN:1782

Manufactured: April 15, 2003
Last calibrated: April 23, 2007
Recalibrated: April 22, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1782   April 22, 2008

DASY - Parameters of Probe: ET3DV6 SN:1782

Sensitivity in Free Space[A]   Diode Compression[B]

NormX	2.02 ± 10.1%	$\mu V/(V/m)^2$	DCP X	89 mV
NormY	1.72 ± 10.1%	$\mu V/(V/m)^2$	DCP Y	93 mV
NormZ	1.79 ± 10.1%	$\mu V/(V/m)^2$	DCP Z	94 mV

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		3.7 mm	4.7 mm
SAR_{be} [%]	Without Correction Algorithm	10.2	5.7
SAR_{be} [%]	With Correction Algorithm	0.7	0.8

TSL   1810 MHz   Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR_{be} [%]	Without Correction Algorithm	13.1	7.9
SAR_{be} [%]	With Correction Algorithm	0.9	0.5

Sensor Offset

Probe Tip to Sensor Center   **2.7** 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.

Certificate No: ET3-1782_Apr08   Page 4 of 9

ET3DV6 SN:1782　　　　　　　　　　　　　　　　April 22, 2008

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)
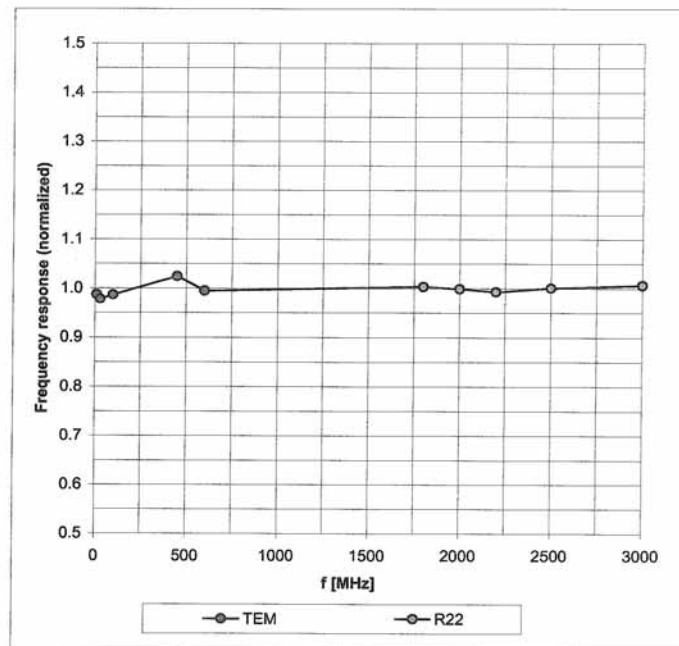
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ET3DV6 SN:1782   April 22, 2008

Receiving Pattern (φ), ϑ = 0°

f = 600 MHz, TEM ifi110EXX

f = 1800 MHz, WG R22
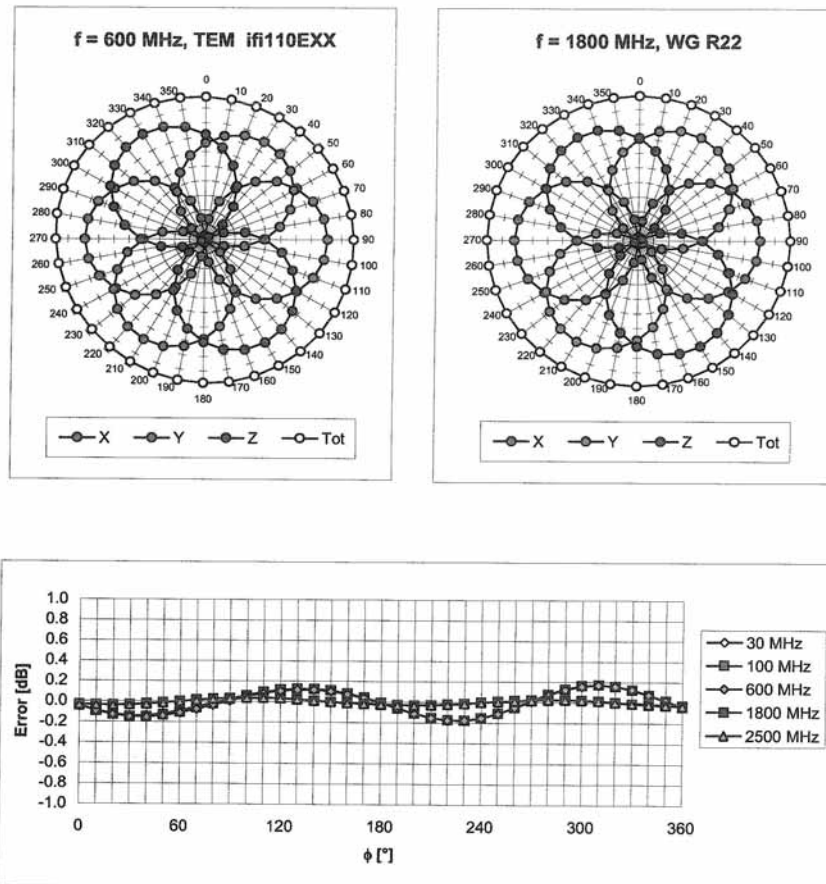
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Certificate No: ET3-1782_Apr08   Page 6 of 9

ET3DV6 SN:1782   April 22, 2008

Dynamic Range f(SAR_{head})
(Waveguide R22, f = 1800 MHz)
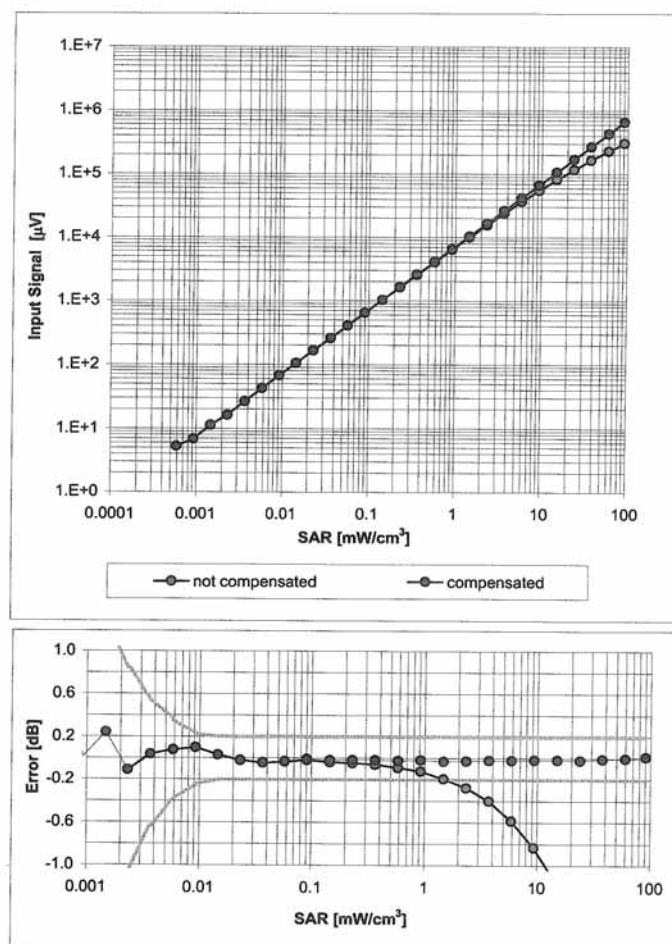
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: ET3-1782_Apr08   Page 7 of 9

ET3DV6 SN:1782   April 22, 2008

Conversion Factor Assessment

f = 900 MHz, WGLS R9 (head)

f = 1810 MHz, WGLS R22 (head)
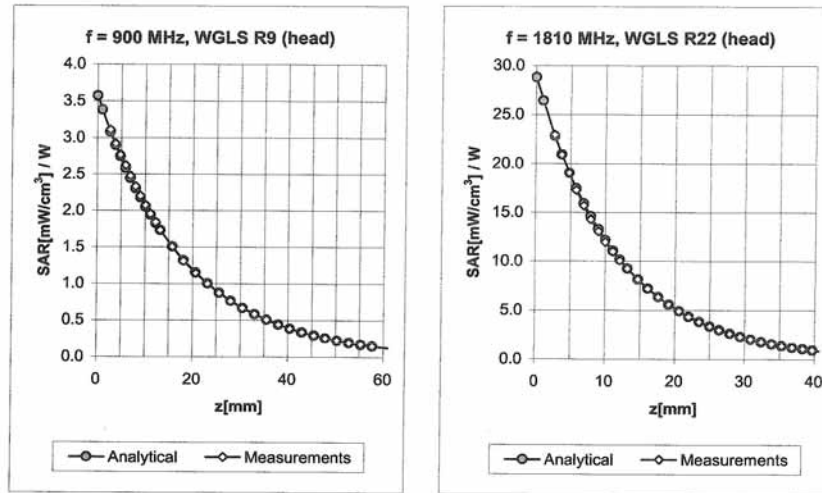
f [MHz]	Validity [MHz]c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.36	1.84	7.22	± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.97	1.57	6.50	± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.55	2.40	5.35	± 11.0% (k=2)
2000	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.75	1.80	5.10	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.95	1.39	4.65	± 11.0% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.30	1.85	7.61	± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.95	1.65	5.90	± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.72	1.97	5.16	± 11.0% (k=2)
2000	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.95	1.51	4.63	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.78	1.67	4.06	± 11.0% (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.

ET3DV6 SN:1782   April 22, 2008

Deviation from Isotropy in HSL
Error (φ, ϑ), f = 900 MHz

■ -1.00--0.80 ■ -0.80--0.60 ■ -0.60--0.40 □ -0.40--0.20 □ -0.20-0.00
□ 0.00-0.20 ■ 0.20-0.40 □ 0.40-0.60 □ 0.60-0.80 ■ 0.80-1.00
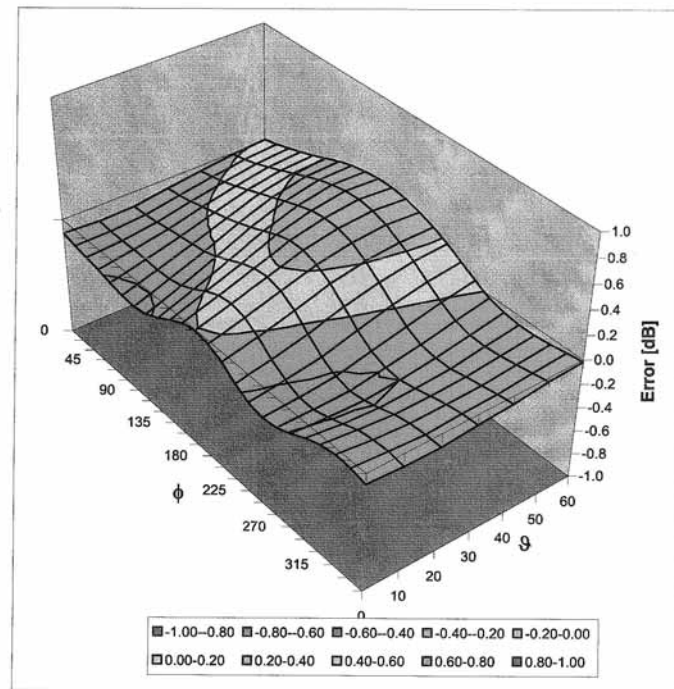
Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

SGS

-DAE Calibration Certificate

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

ilac-MRA   SWISS CALIBRATION

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

Accredited by the Swiss Accreditation Service (SAS)
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 (Dymstec)**

Certificate No: **DAE3-567_Sep08**

CALIBRATION CERTIFICATE

Object	DAE3 - SD 000 D03 AA - SN: 567
Calibration procedure(s)	QA CAL-06.v12 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	September 24, 2008
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 (Certificate No.)	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	04-Oct-07 (No: 6467)	Oct-08
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-07 (No: 6465)	Oct-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	06-Jun-08 (in house check)	In house check: Jun-09

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

Issued: September 24, 2008

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

Certificate No: DAE3-567_Sep08   Page 1 of 5

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

ilac-MRA

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

Accredited by the Swiss Accreditation Service (SAS)
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

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.

- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.

- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.

    - *DC Voltage Measurement Linearity*: Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.

    - *Common mode sensitivity*: Influence of a positive or negative common mode voltage on the differential measurement.

    - *Channel separation*: Influence of a voltage on the neighbor channels not subject to an input voltage.

    - *AD Converter Values with inputs shorted*: Values on the internal AD converter corresponding to zero input voltage

    - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.

    - *Input Offset Current*: Typical value for information; Maximum channel input offset current, not considering the input resistance.

    - *Input resistance*: DAE input resistance at the connector, during internal auto-zeroing and during measurement.

    - *Low Battery Alarm Voltage*: Typical value for information. Below this voltage, a battery alarm signal is generated.

    - *Power consumption*: Typical value for information. Supply currents in various operating modes.

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	404.676 ± 0.1% (k=2)	404.415 ± 0.1% (k=2)	404.505 ± 0.1% (k=2)
Low Range	3.95084 ± 0.7% (k=2)	3.95932 ± 0.7% (k=2)	3.95189 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	85 ° ± 1 °

Report File No. :   F690501/RF-SAR001823
Date of Issue :   2009-01-23
Page :   63 / 76

Appendix

1. DC Voltage Linearity

High Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	200000	200000.4	0.00
Channel X	+ Input	20000	20004.42	0.02
Channel X	- Input	20000	-19999.98	0.00
Channel Y	+ Input	200000	200000	0.00
Channel Y	+ Input	20000	20003.82	0.02
Channel Y	- Input	20000	-20001.54	0.01
Channel Z	+ Input	200000	200000.2	0.00
Channel Z	+ Input	20000	20001.02	0.01
Channel Z	- Input	20000	-20001.77	0.01

Low Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	2000	2000.1	0.00
Channel X	+ Input	200	200.08	0.04
Channel X	- Input	200	-200.46	0.23
Channel Y	+ Input	2000	2000.1	0.00
Channel Y	+ Input	200	199.44	-0.28
Channel Y	- Input	200	-200.67	0.33
Channel Z	+ Input	2000	1999.9	0.00
Channel Z	+ Input	200	198.93	-0.53
Channel Z	- Input	200	-201.01	0.50

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	4.45	3.07
	- 200	-1.97	-3.12
Channel Y	200	0.63	0.75
	- 200	-1.46	-2.02
Channel Z	200	5.71	5.24
	- 200	-6.82	-7.33

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	-	1.58	0.47
Channel Y	200	0.86	-	2.06
Channel Z	200	-2.64	0.26	-

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	16354	16104
Channel Y	16145	17163
Channel Z	15912	15586

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	-0.07	-1.16	0.99	0.42
Channel Y	-0.59	-1.54	0.25	0.31
Channel Z	-0.69	-1.63	0.02	0.32

6. Input Offset Current

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

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2001	201.2
Channel Y	0.2001	200.7
Channel Z	0.2001	199.3

8. Low Battery Alarm Voltage (verified during pre test)

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

9. Power Consumption (verified during pre test)

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

- 835 MHz Dipole Calibration Certificate

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

ilac-MRA

SWISS CALIBRATION

S   Schweizerischer Kalibrierdienst
C   Service suisse d'étalonnage
C   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 KES (Dymstec)**	Certificate No: **D835V2-490_Aug07**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 490
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	August 27, 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 EPM-442A	GB37480704	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Power sensor HP 8481A	US37292783	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Reference 20 dB Attenuator	SN: 5086 (20g)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference 10 dB Attenuator	SN: 5047.2 (10r)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference Probe ET3DV6 (HF)	SN 1507	19-Oct-06 (SPEAG, No. ET3-1507_Oct06)	Oct-07
DAE4	SN 601	30-Jan-07 (SPEAG, No. DAE4-601_Jan07)	Jan-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	*[signature]*
Approved by:	Katja Pokovic	Technical Manager	*[signature]*

Issued: August 29, 2007

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

SGS

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

ilac-MRA

SWISS CALIBRATION

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**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

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

c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.

- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.

- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.

- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.

- *SAR measured:* SAR measured at the stated antenna input power.

- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.

- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.3 ± 6 %	0.88 mho/m ± 6 %
Head TSL temperature during test	(22.8 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.27 mW / g
SAR normalized	normalized to 1W	9.08 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	9.05 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.49 mW / g
SAR normalized	normalized to 1W	5.96 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	5.93 mW / g ± 16.5 % (k=2)

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.9 Ω - 4.0 jΩ
Return Loss	- 27.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.380 ns

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

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.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 19, 2003

SGS

DASY4 Validation Report for Head TSL

Date/Time: 27.08.2007 13:05:22

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL 900 MHz;
Medium parameters used: f = 835 MHz; σ = 0.881 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(6.09, 6.09, 6.09); 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 = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.4 V/m; Power Drift = -0.041 dB
Peak SAR (extrapolated) = 3.26 W/kg
SAR(1 g) = 2.27 mW/g; SAR(10 g) = 1.49 mW/g
Maximum value of SAR (measured) = 2.45 mW/g
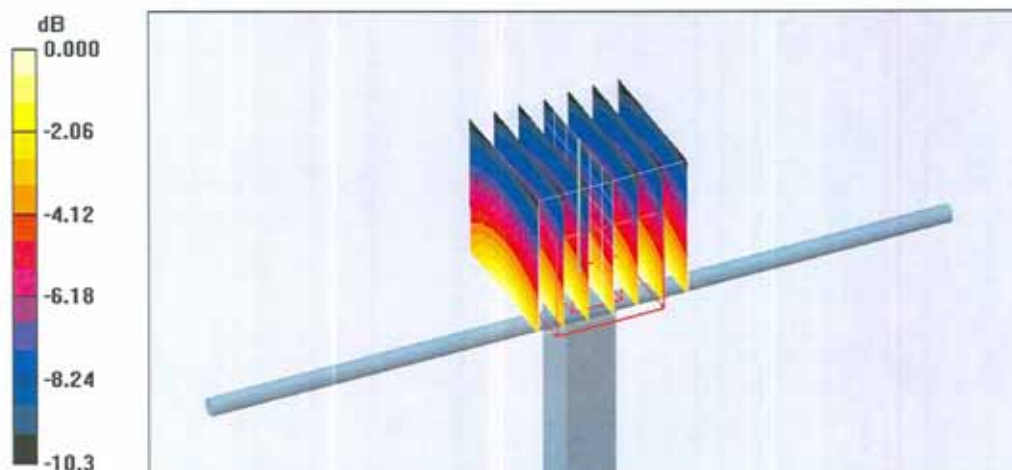
0 dB = 2.45mW/g

Impedance Measurement Plot for Head TSL

27 Aug 2007   11:56:17

CH1 S11   1 U FS   1: 50.932 Ω   -3.9727 Ω 47.979 pF   835.000 000 MHz

Del

CA

Avg
16

↑

CH2 S11   LOG   5 dB/ REF -20 dB   1:-27.863 dB   835.000 000 MHz

CA

Avg
16

↑

CENTER 835.000 000 MHz   SPAN 400.000 000 MHz

- 1900 MHz Dipole Calibration Certificate

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

ilac-MRA

SWISS CALIBRATION

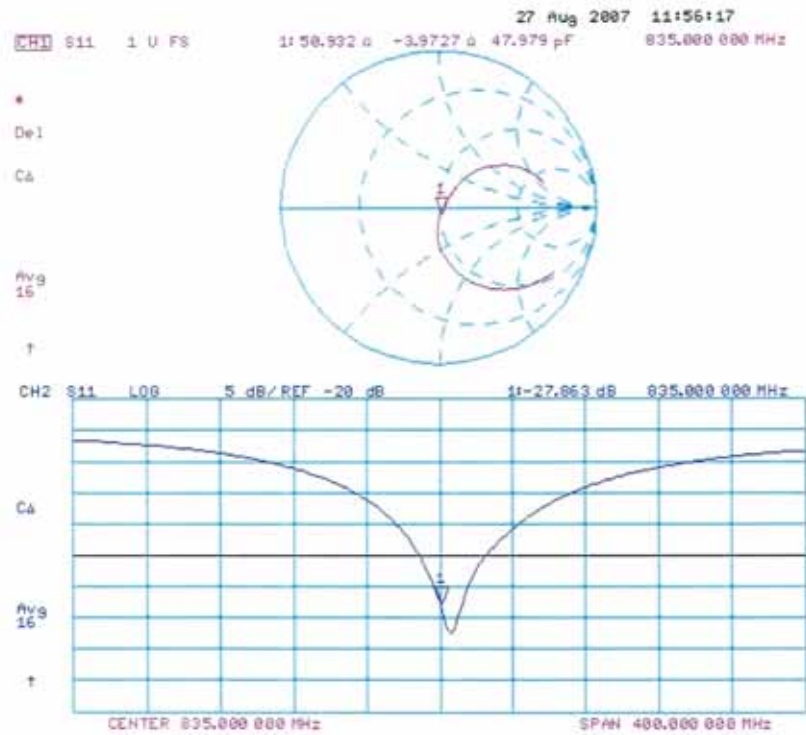S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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 KES (Dymstec)**

Certificate No: **D1900V2-5d033_Aug07**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d033
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	August 28, 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 EPM-442A	GB37480704	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Power sensor HP 8481A	US37292783	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Reference 20 dB Attenuator	SN: 5086 (20g)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference 10 dB Attenuator	SN: 5047.2 (10r)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference Probe ET3DV6	SN: 1507	19-Oct-06 (SPEAG, No. ET3-1507_Oct06)	Oct-07
Reference Probe ES3DV3	SN: 3025	19-Oct-06 (SPEAG, No. ES3-3025_Oct06)	Oct-07
DAE4	SN 601	30-Jan-07 (SPEAG, No. DAE4-601_Jan07)	Jan-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	Marcel Fehr	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 29, 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

ilac-MRA

SWISS CALIBRATION

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**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:
d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:
- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.3 ± 6 %	1.47 mho/m ± 6 %
Head TSL temperature during test	(21.3 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	condition	
SAR measured	250 mW input power	9.39 mW / g
SAR normalized	normalized to 1W	37.6 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**36.3 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.93 mW / g
SAR normalized	normalized to 1W	19.7 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**19.4 mW / g ± 16.5 % (k=2)**

---

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.8 Ω + 4.7 jΩ
Return Loss	- 24.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.205 ns

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

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.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 17, 2003

SGS

DASY4 Validation Report for Head TSL

Date/Time: 28.08.2007 14:28:53

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d033

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL U10 BB;
Medium parameters used: f = 1900 MHz; σ = 1.47 mho/m; ε_r = 39.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.97, 4.97, 4.97); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

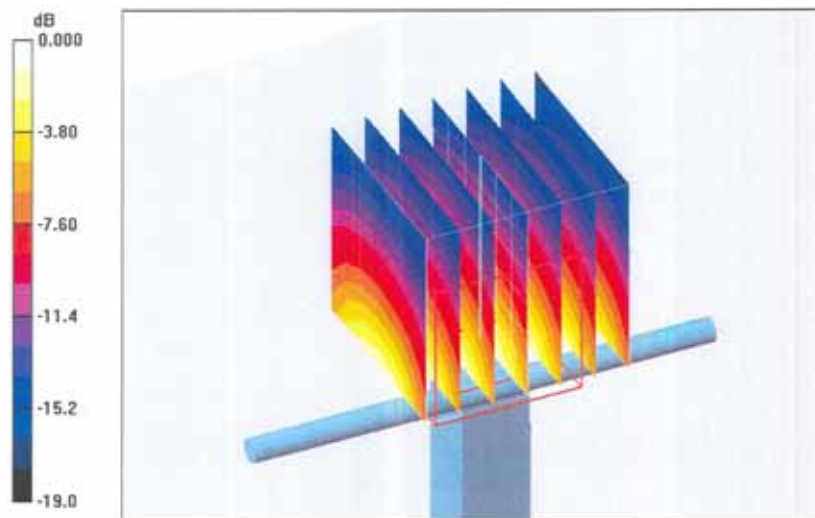### Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.7 V/m; Power Drift = 0.006 dB
Peak SAR (extrapolated) = 16.1 W/kg
SAR(1 g) = 9.39 mW/g; SAR(10 g) = 4.93 mW/g
Maximum value of SAR (measured) = 10.7 mW/g

0 dB = 10.7mW/g

Impedance Measurement Plot for Head TSL