

SAR TEST REPORT

Equipment Under Test	Avon TV
Model Name	EX139
Mode of Operation	GSM/GPRS band
Company Name	Motorola Mobility, Inc.
Company Address	No. 1 Wang Jing East Road, Chao Yang District Beijing, China 100102
Date of Receipt	2011.07.13
Date of Test(s)	2011.07.22-07.23 , 2011.08.17
Date of Issue	2011.08.19

Standards:

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

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.

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Tested by : Chris Tsung
Engineer



Date : 2011.08.19

Approved by : Kelly Tsai
Supervisor



Date : 2011.08.19

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Revision Version

Report Number	Revision	Date	Memo
EN/2011/70003	00	2011/08/01	Initial creation of test report.
EN/2011/70003	01	2011/08/10	1 st modification
EN/2011/70003	02	2011/08/19	2 st modification

This test report contains a reference to the previous version test report that it replaces.

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1. General Information

1.1 Testing Laboratory

SGS Taiwan Ltd. Electronics & Communication Laboratory	
134, Wu Kung Road, Wuku industrial zone	
Taipei county, Taiwan, R.O.C.	
Telephone	+886-2-2299-3279
Fax	+886-2-2298-0488
Internet	http://www.tw.sgs.com/

Testing Location	1F,No.8, Alley 15, Lane 120, Sec .1, NeiHu Road NeiHu District Taipei City 114, Taiwan
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1.2 Details of Applicant

Company Name	Motorola Mobility, Inc.
Company Address	No. 1 Wang Jing East Road, Chao Yang District Beijing, China 100102
Contact Person	Sophia Zhao
TEL	+86 10 8473 2768
E-mail	dgvj84@motorola.com
Website	http://www.motorola.com

1.3 Description of EUT

EUT Name	Avon TV
Model Name	EX139
Brand Name	Motorola
FCC ID	IHDT56MQ3

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Model Number	EX139	
IMEI code	354639030049412	
Definition	Production unit	
Mode of Operation	GSM\GPRS band	
Duty Cycle	GSM	GPRS
	1/8	1/4.1 (multi class 10)
TX Frequency range (MHz)	GSM/GPRS 850	GSM/GPRS 1900
	824.2 - 848.8	1850.2 - 1909.8
Channel Number (ARFCN)	GSM/GPRS 850	GSM/GPRS 1900
	128 - 251	512 - 810
Max. SAR Measured (1g/10g)	GSM 850	
	Head	Body
	(0.769 mW/g)/(0.478 mW/g) (At GSM 850 Left Head Cheek Position_190 channel)	(1.46 mW/g)/(0.999 mW/g) (At GPRS 850 Body_251 channel)
	GSM 1900	
	Head	Body
	(1.32 mW/g)/(0.694 mW/g) (At GSM 1900 Left Head Cheek Position_661 channe)	(0.476 mW/g)/(0.311 mW/g) (At GPRS 1900 Body_661 channel)

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. Conducted power table:

EUT Mode	Frequency (MHz)	CH	Average Power (dBm)
GSM 850	824.2	128	33.20
	836.6	190	33.20
	848.8	251	33.10

EUT Mode	Frequency (MHz)	CH	Average Power (dBm)
GSM 1900	1850.2	521	29.30
	1880.0	661	29.30
	1909.8	810	29.30

EUT Mode	Frequency (MHz)	CH	Average Power (dBm)
GPRS 850 (1Dn 2Up)	824.2	128	31.90
	836.6	190	31.80
	848.8	251	31.80

EUT Mode	Frequency (MHz)	CH	Average Power (dBm)
GPRS 1900 (1Dn 2Up)	1850.2	521	28.20
	1880.0	661	28.20
	1909.8	810	28.40

EUT Mode	Frequency (MHz)	CH	Average Power (dBm)
GPRS 850 (1Dn 1Up)	824.2	128	33.20
	836.6	190	33.20
	848.8	251	33.10

EUT Mode	Frequency (MHz)	CH	Average Power (dBm)
GPRS 1900 (1Dn 1Up)	1850.2	521	29.30
	1880.0	661	29.30
	1909.8	810	29.30

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1.4 Test Environment

Ambient Temperature : $22 \pm 2^{\circ} \text{C}$

Tissue Simulating Liquid: $22 \pm 2^{\circ} \text{C}$

1.5 Operation description

General:

1. The EUT is controlled by using a Radio Communication Tester (Agilent 8960), and the communication between the EUT and the tester is established by air link.
2. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.
3. During the SAR testing, the DASY5 system checks power drift by comparing the e-field strength of one specific location measured at the beginning with that measured at the end of the SAR testing.
4. Testing Head SAR at lowest, middle and highest channel for all bands with LET/LEC/RET/REC conditions.
5. Testing body-worn SAR by separating **1.5cm** between the back of the EUT and the flat phantom in GPRS mode.

Additional configuration(Head):

6. For highest SAR configuration in this band repeated with external Memory card inside.

Additional configuration(Body):

7. Testing body-worn SAR with Handset and with Bluetooth transmitter OFF by separating **1.5cm** between the front of the EUT and the flat phantom in GPRS mode.
8. For highest SAR configuration in this band repeated with external Memory card inside.
9. For highest SAR configuration in this band repeated with headset.

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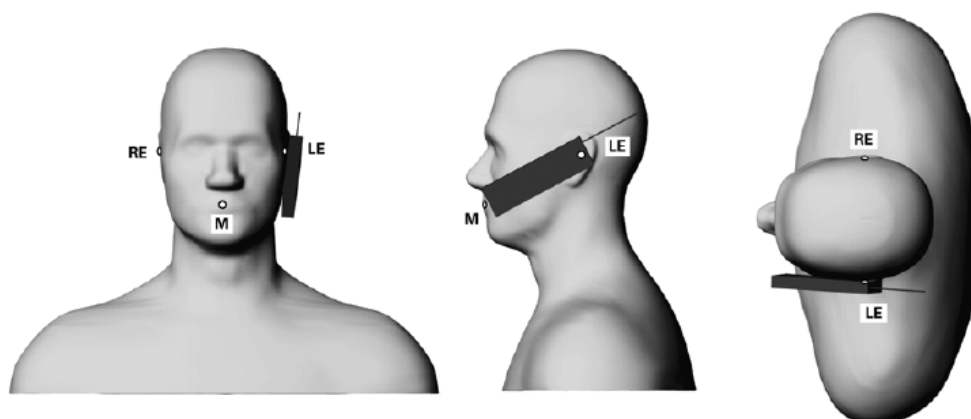
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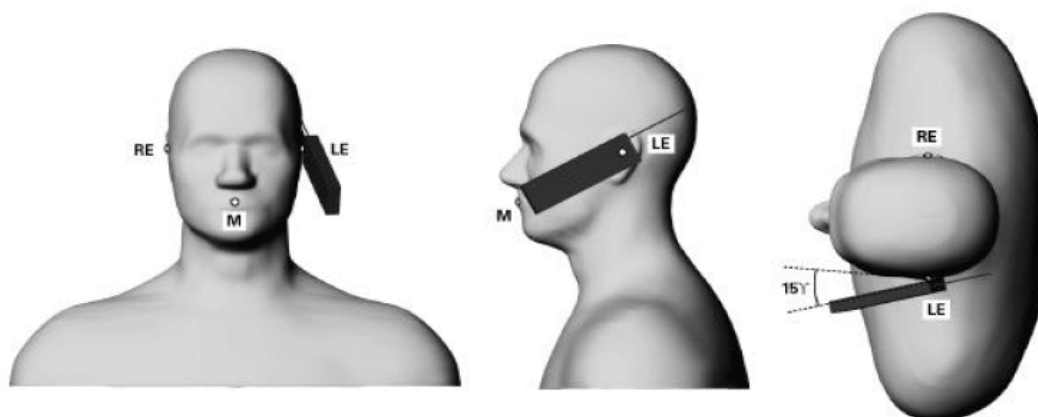
SAR evaluation considerations for handsets with multiple transmitters:

10. When the maximum transmitter and antenna output power are $\leq 60/f(\text{GHz})$ (mW)
SAR evaluation is typically not required for FCC or TCB approval
(BT power= 11.50dBm)

1.6 Positioning Procedure



Phone position 1, "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning



Phone position 2, "tilted position." The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning
Cheek/Touch Position:

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the handset was brought toward the mouth of the head phantom by pivoting against the ear reference point until any point of the mouthpiece or keypad touched the phantom.

Ear/Tilt Position:

With the phone aligned in the Cheek/Touch position, the handset was tilted away from the mouth with respect to the test device reference point by 15 degrees.

1.7 Evaluation Procedures

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

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

The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are

included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within -2 dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan,

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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 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.

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1.8 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 5 professional system). A Model EX3DV4 field probe is used to determine the internal electric fields. The SAR can be obtained from the equation $SAR = \sigma (|E_i|^2) / \rho$ where σ and ρ are the conductivity and mass density of the tissue-simulant.

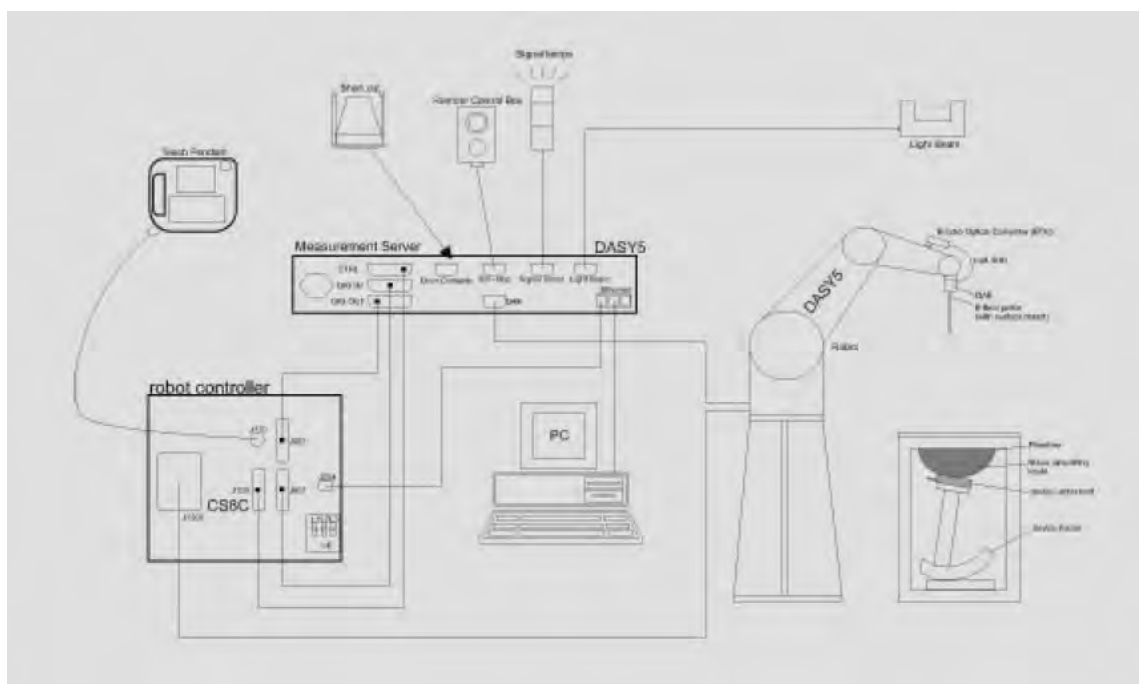


Fig.a The block diagram of SAR system

The DASY5 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 is for accommodating the data acquisition electronics (DAE).

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- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
 - A computer operating Windows 2000 or Windows XP.
 - DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
 - The SAM twin phantom enabling testing left-hand and right-hand usage.
 - The device holder for handheld mobile phones.
 - Tissue simulating liquid mixed according to the given recipes.
 - Validation dipole kits allowing to validate the proper functioning of the system.

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No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan. / 台北縣五股工業區五工路136之1號

t (886-2) 2299-3939

f (886-2) 2299-9489

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1.9 System Components

EX3DV4 E-Field Probe

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration:	Basic Broad Band Calibration in air Conversion Factors (CF) for 835/1900MHz Additional CF for other liquids and frequencies upon request	
Frequency:	10 MHz to > 4 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)	
Directivity:	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range:	10 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)	
Dimensions:	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	
Application:	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

SAM PHANTOM V4.0C

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

DEVICE HOLDER

Construction	In combination with the Twin SAM Phantom V4.0/V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).	 Device Holder
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1.10 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 +/- 5% from the target SAR values.

These tests were done at 835/1900MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1. During the tests, the ambient temperature of the laboratory was in the range 22.1°C, the relative humidity was in the range 62% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

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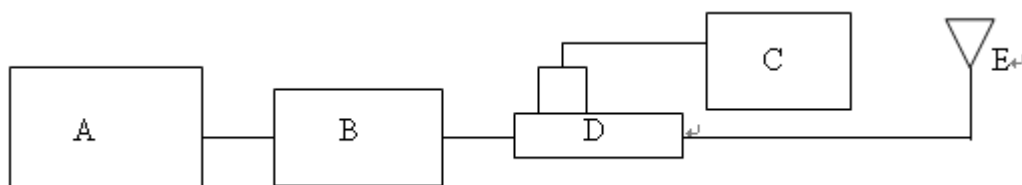


Fig.b The block diagram of system verification

- A. Agilent Model 8648D Signal Generator
- B. Mini circuits Model ZHL-42 Amplifier
- C. Agilent Model U2001B Power Sensor
- D. Agilent Model 778D Dual directional coupling
- E. Reference dipole antenna



Photograph of the dipole Antenna

Validation Kit	Frequency (MHz)	Target SAR (1g) (Pin=250mW)	Measured SAR (1g)	Measured Date
D835V2 S/N: 4d063	835 MHz (Head)	2.31 mW/g	2.38 mW/g	2011-07-22
D835V2 S/N: 4d063	835 MHz (Body)	2.43 mW/g	2.49 mW/g	2011-07-22
D1900V2 S/N: 5d027	1900 MHz (Head)	10.1 mW/g	9.62 mW/g	2011-07-23
D1900V2 S/N: 5d027	1900 MHz (Body)	9.93 mW/g	9.61 mW/g	2011-07-23
D835V2 S/N: 4d063	835 MHz (Body)	2.43 mW/g	2.47mW/g	2011-08-17

Table 1. System validation (follow manufacture target value)

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1.11 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this Head-simulant fluid were measured by using the HP Model 85070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with HP 8753D Network Analyzer (30 KHz-6000MHz) by using a procedure detailed in Section V.

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The depth of the tissue simulant iin the flat section of the phantom was 15cm±5mm during all tests. (Appendix Fig .2)

Frequency (MHz)	Tissue type	Measurement date/ Limits	Dielectric Parameters		
			ρ	σ (S/m)	Simulated Tissue Temperature(° C)
835	Head	Measured, 2011-07-22	42.243	0.903	21.7
		Recommended Limits	38.38-42.42	0.84-0.92	20-24
835	Body	Measured, 2011-07-22	53.775	1.01	21.7
		Recommended Limits	51.21-56.60	0.95-1.05	20-24
1900	Head	Measured, 2011-07-23	39.184	1.412	21.7
		Recommended Limits	36.96-40.85	1.34-1.48	20-24
1900	Body	Measured, 2011-07-23	51.436	1.521	21.7
		Recommended Limits	48.55-53.66	1.44-1.60	20-24
835	Body	Measured, 2011-08-17	53.775	1.01	21.7
		Recommended Limits	51.21-56.60	0.95-1.05	20-24

Table 2. Dielectric Parameters of Tissue Simulant Fluid

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The composition of the brain tissue simulating liquid:

Ingredient	835MHz (Head)	835MHz (Body)	1900MHz (Head)	1900MHz (Body)
DGMBE	X	X	444.52 g	300.67g
Water	532.98 g	631.68 g	552.42 g	716.56 g
Salt	18.3 g	11.72 g	3.06 g	4.0 g
Preventol D-7	2.4 g	1.2 g	X	X
Cellulose	3.2 g	X	X	X
Sugar	766.0 g	600 g	X	X
Total amount	1 L (1.0kg)	1 L (1.0kg)	1 L (1.0kg)	1 L (1.0kg)

Table 3. Recipes for tissue simulating liquid

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台灣檢驗科技股份有限公司

t (886-2) 2299-3939

f (886-2) 2299-9489

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1.12 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (“SAR”) in Section 4.2 of “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,” ANSI/IEEE C95.1–1992, Copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017.

These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in “Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields,” NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter.

Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

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

(2) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube).

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台灣檢驗科技股份有限公司

t (886-2) 2299-3939

f (886-2) 2299-9489

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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 .6)

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

Table 4. RF exposure limits

Notes:

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

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t (886-2) 2299-3939

f (886-2) 2299-9489

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2. Summary of Results

GSM 850 MHZ

Right Head (Cheek Position)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g / 10g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	190	836.6	33.20dBm	0.683 / 0.488	22.1	21.7
Left Head (Cheek Position)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g / 10g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	33.20dBm	0.569 / 0.359	22.1	21.7
	190	836.6	33.20dBm	0.769 / 0.478	22.1	21.7
	251	848.8	32.10dBm	0.704 / 0.438	22.1	21.7
Right Head (15° Tilt Position)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g / 10g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	190	836.6	33.20dBm	0.402 / 0.300	22.1	21.7
Left Head (15° Tilt Position)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g / 10g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	190	836.6	33.20dBm	0.391 / 0.290	22.1	21.7

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Body worn (testing in GPRS mode) (multi class 10_2 up 1 down)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g/10g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	31.9dBm	1.05 / 0.723	22.1	21.7
	190	836.6	31.8dBm	1.35 / 0.922	22.1	21.7
	251	848.8	31.8dBm	1.46 / 0.999	22.1	21.7
Body worn (testing in GPRS mode) (multi class 8_1 up 1 down)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g/10g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	251	848.8	31.8dBm	0.743 / 0.508	22.1	21.7
Body worn (testing in GPRS mode)_repeated for EUT front to phantom						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g/10g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	251	848.8	31.8dBm	0.850 / 0.595	22.1	21.7
Body worn (testing in GPRS mode)_repeated with Memory card						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g/10g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	251	848.8	31.8dBm	1.3 / 0.894	22.1	21.7
Body worn (testing in GPRS mode)_repeated with headset						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g/10g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	251	848.8	31.8dBm	0.940 / 0.613	22.1	21.7

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GSM 1900 MHZ

Right Head (Cheek Position)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g/10g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	512	1850.2	29.30dBm	0.751 / 0.431	22.1	21.7
	661	1880.0	29.30dBm	1.13 / 0.632	22.1	21.7
	810	1909.8	29.30dBm	0.806 / 0.462	22.1	21.7
Left Head (Cheek Position)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g/10g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	512	1850.2	29.30dBm	1.22 / 0.643	22.1	21.7
	661	1880.0	29.30dBm	1.32 / 0.694	22.1	21.7
	810	1909.8	29.30dBm	1.2 / 0.636	22.1	21.7
Left Head (Cheek Position) repeated with Memory card						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g/10g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	661	1880.0	29.30dBm	1.29 / 0.681	22.1	21.7
Right Head (15° Tilt Position)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g/10g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	661	1880.0	29.30dBm	0.398 / 0.247	22.1	21.7
Left Head (15° Tilt Position)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g/10g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	661	1880.0	29.30dBm	0.373 / 0.237	22.1	21.7
Body worn (testing in GPRS mode) (multi class 10_2 up 1 down)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g/10g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	661	1880.0	28.20dBm	0.476 / 0.311	22.1	21.7
Body worn (testing in GPRS mode) (multi class 8_1 up 1 down)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g/10g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	661	1880.0	28.20dBm	0.245 / 0.161	22.1	21.7

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3. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV4	3703	Jan.24.2011
Schmid & Partner Engineering AG	835/1900 MHz System Validation Dipole	D835V2	4d063	May.25.2011
		D1900V2	5d027	Apr.19.2011
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	856	May.18.2011
Schmid & Partner Engineering AG	Software	DASY 5 V5.0 Build125	N/A	Calibration not required
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration not required
HP	Network Analyzer	8753D	3410A05547	Mar.16.2011
Agilent	Dielectric Probe Kit	85070D	US01440168	Calibration not required
Agilent	Dual-directional coupler	778D	50313	Aug.25.2010
Agilent	RF Signal Generator	8648D	3847M00432	Jun.01.2011
Agilent	Power Sensor	U2001B	MY48100169	Apr.28.2011
Agilent	Radio Communication Test	E5515C	GB44051912	Jul.27.2010

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4. Measurements

Date: 7/22/2011

RE Cheek_CH190

Communication System: Generic GSM; Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 0.905$ mho/m; $\epsilon_r = 42.218$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.83, 8.83, 8.83); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/RE Cheek/Area Scan (61x101x1): Measurement grid:

$dx=15$ mm, $dy=15$ mm

Maximum value of SAR (interpolated) = 0.737 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

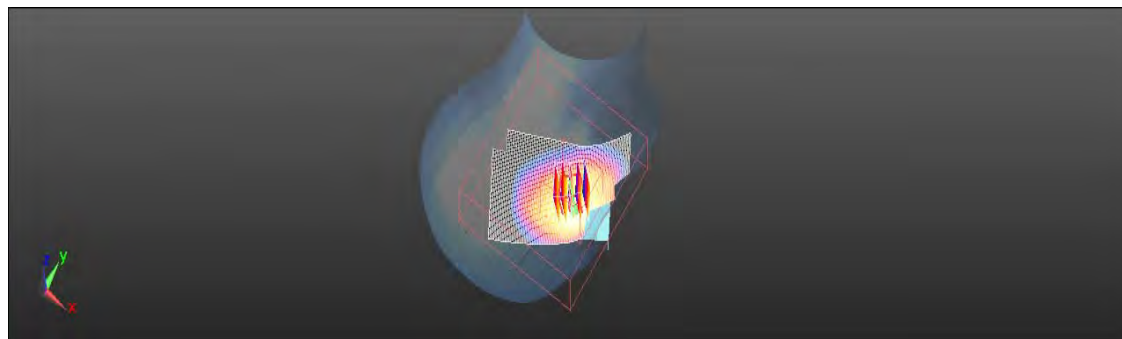
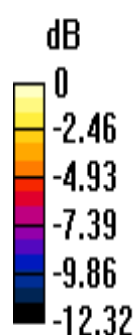
$dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 11.360 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.953 W/kg

SAR(1 g) = 0.683 mW/g; SAR(10 g) = 0.488 mW/g

Maximum value of SAR (measured) = 0.724 mW/g



0 dB = 0.720mW/g

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SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan. / 台北縣五股工業區五工路136之1號

t (886-2) 2299-3939

f (886-2) 2299-9489

www.sgs.com.tw

Date: 7/22/2011

LE Cheek_CH128

Communication System: Generic GSM; Frequency: 824.2 MHz

Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.891$ mho/m; $\epsilon_r = 42.379$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.83, 8.83, 8.83); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.588 mW/g

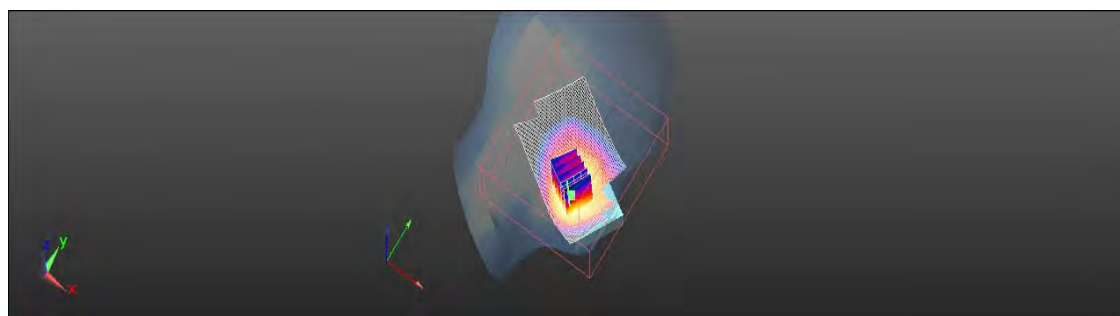
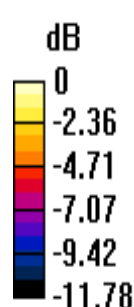
Configuration/LE Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.776 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 0.934 W/kg

SAR(1 g) = 0.569 mW/g; SAR(10 g) = 0.359 mW/g

Maximum value of SAR (measured) = 0.594 mW/g



0 dB = 0.590mW/g

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Date: 7/22/2011

LE Cheek_CH190

Communication System: Generic GSM; Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 0.905$ mho/m; $\epsilon_r = 42.218$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.83, 8.83, 8.83); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.800 mW/g

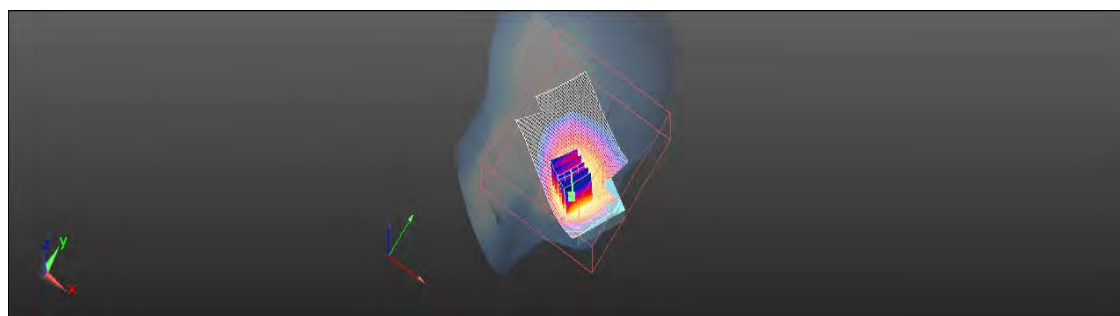
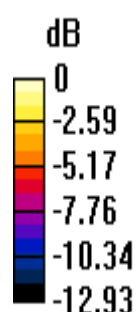
Configuration/LE Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.153 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 1.261 W/kg

SAR(1 g) = 0.769 mW/g; SAR(10 g) = 0.478 mW/g

Maximum value of SAR (measured) = 0.844 mW/g



0 dB = 0.840mW/g

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Date: 7/22/2011

LE Cheek_CH251

Communication System: Generic GSM; Frequency: 848.6 MHz

Medium parameters used: $f = 849$ MHz; $\sigma = 0.916$ mho/m; $\epsilon_r = 42.053$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.83, 8.83, 8.83); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.730 mW/g

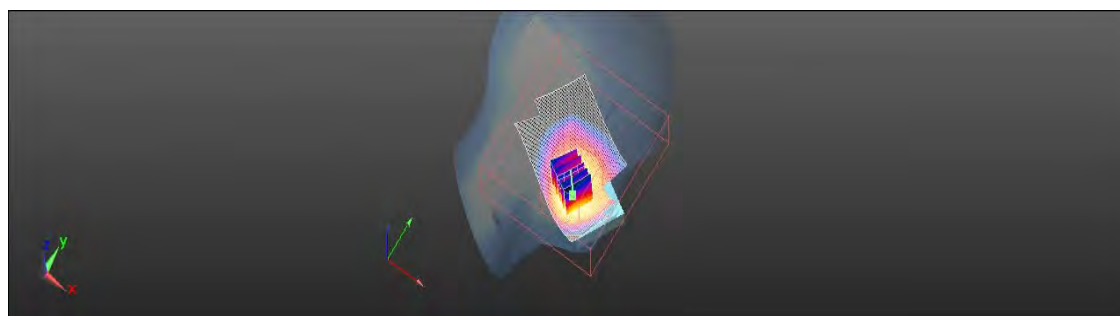
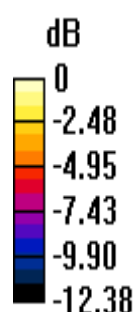
Configuration/LE Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.050 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 1.163 W/kg

SAR(1 g) = 0.704 mW/g; SAR(10 g) = 0.438 mW/g

Maximum value of SAR (measured) = 0.752 mW/g



0 dB = 0.750mW/g

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Date: 7/22/2011

RE Tilt_CH190

Communication System: Generic GSM; Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 0.905$ mho/m; $\epsilon_r = 42.218$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.83, 8.83, 8.83); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/RE Tilt/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.433 mW/g

Configuration/RE Tilt/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

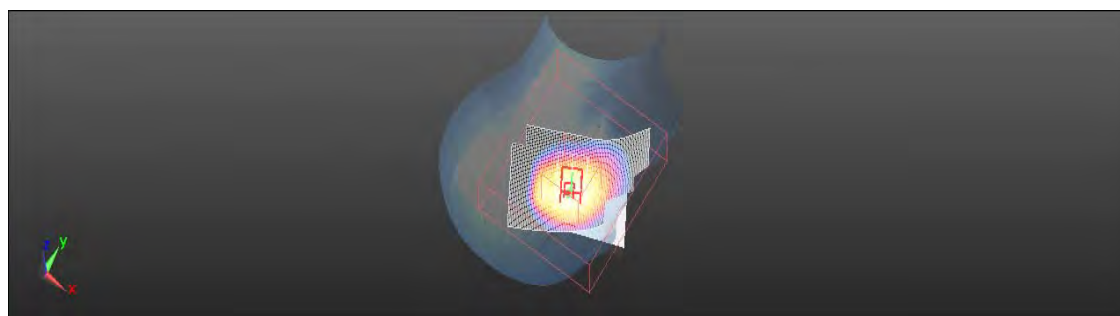
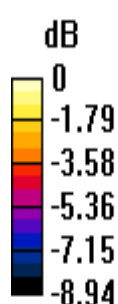
dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.052 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.507 W/kg

SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.300 mW/g

Maximum value of SAR (measured) = 0.424 mW/g



0 dB = 0.420mW/g

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SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan. / 台北縣五股工業區五工路136之1號

t (886-2) 2299-3939

f (886-2) 2299-9489

www.sgs.com.tw

Date: 7/22/2011

LE Tilt_CH190

Communication System: Generic GSM; Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 0.905$ mho/m; $\epsilon_r = 42.218$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.83, 8.83, 8.83); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/LE Tilt/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.413 mW/g

Configuration/LE Tilt/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

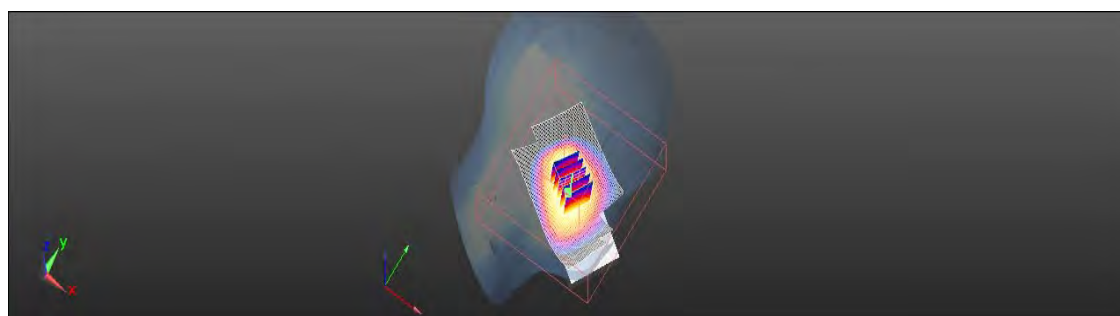
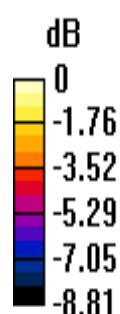
dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.519 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.497 W/kg

SAR(1 g) = 0.391 mW/g; SAR(10 g) = 0.290 mW/g

Maximum value of SAR (measured) = 0.413 mW/g



0 dB = 0.410mW/g

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Date: 7/22/2011

Body_CH128

Communication System: GPRS(Class 10); Frequency: 824.2 MHz

Medium parameters used: $f = 824.2$ MHz; $\sigma = 0.998$ mho/m; $\epsilon_r = 53.881$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.124 mW/g

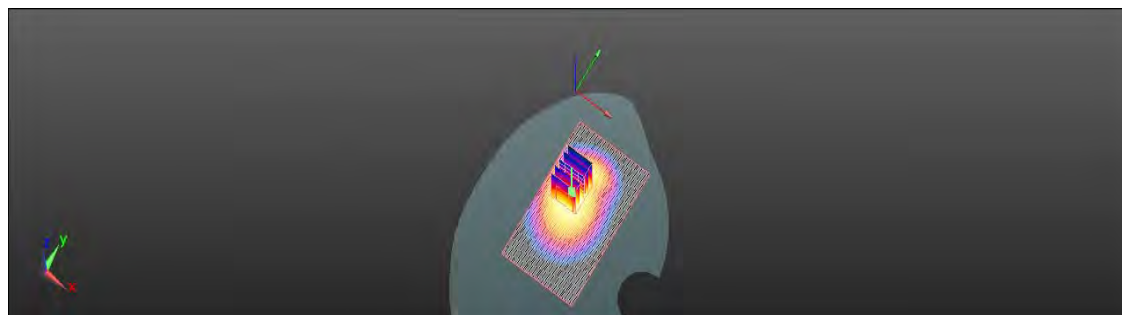
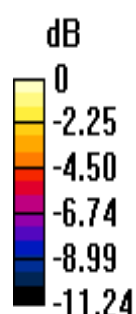
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.131 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.485 W/kg

SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.723 mW/g

Maximum value of SAR (measured) = 1.129 mW/g



0 dB = 1.130mW/g

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Date: 7/22/2011

Body_CH190

Communication System: GPRS(Class 10); Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 1.012$ mho/m; $\epsilon_r = 53.757$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.448 mW/g

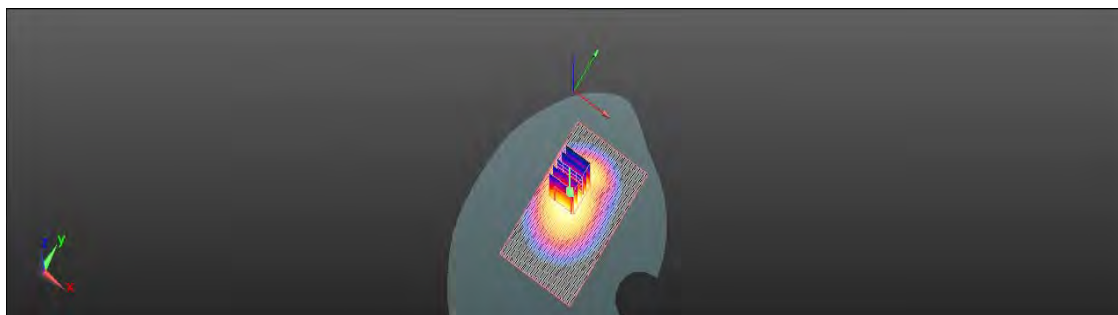
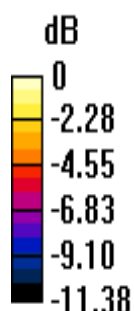
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 24.091 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.909 W/kg

SAR(1 g) = 1.35 mW/g; SAR(10 g) = 0.922 mW/g

Maximum value of SAR (measured) = 1.438 mW/g



0 dB = 1.440mW/g

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Date: 7/22/2011

Body_CH251

Communication System: GPRS(Class 10); Frequency: 848.8 MHz

Medium parameters used: $f = 849$ MHz; $\sigma = 1.012$ mho/m; $\epsilon_r = 53.646$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.618 mW/g

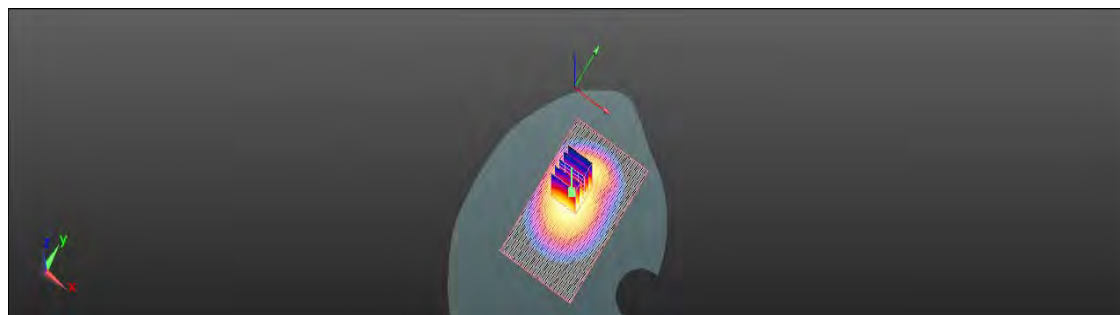
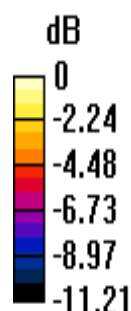
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.982 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 2.037 W/kg

SAR(1 g) = 1.46 mW/g; SAR(10 g) = 0.999 mW/g

Maximum value of SAR (measured) = 1.563 mW/g



0 dB = 1.560mW/g

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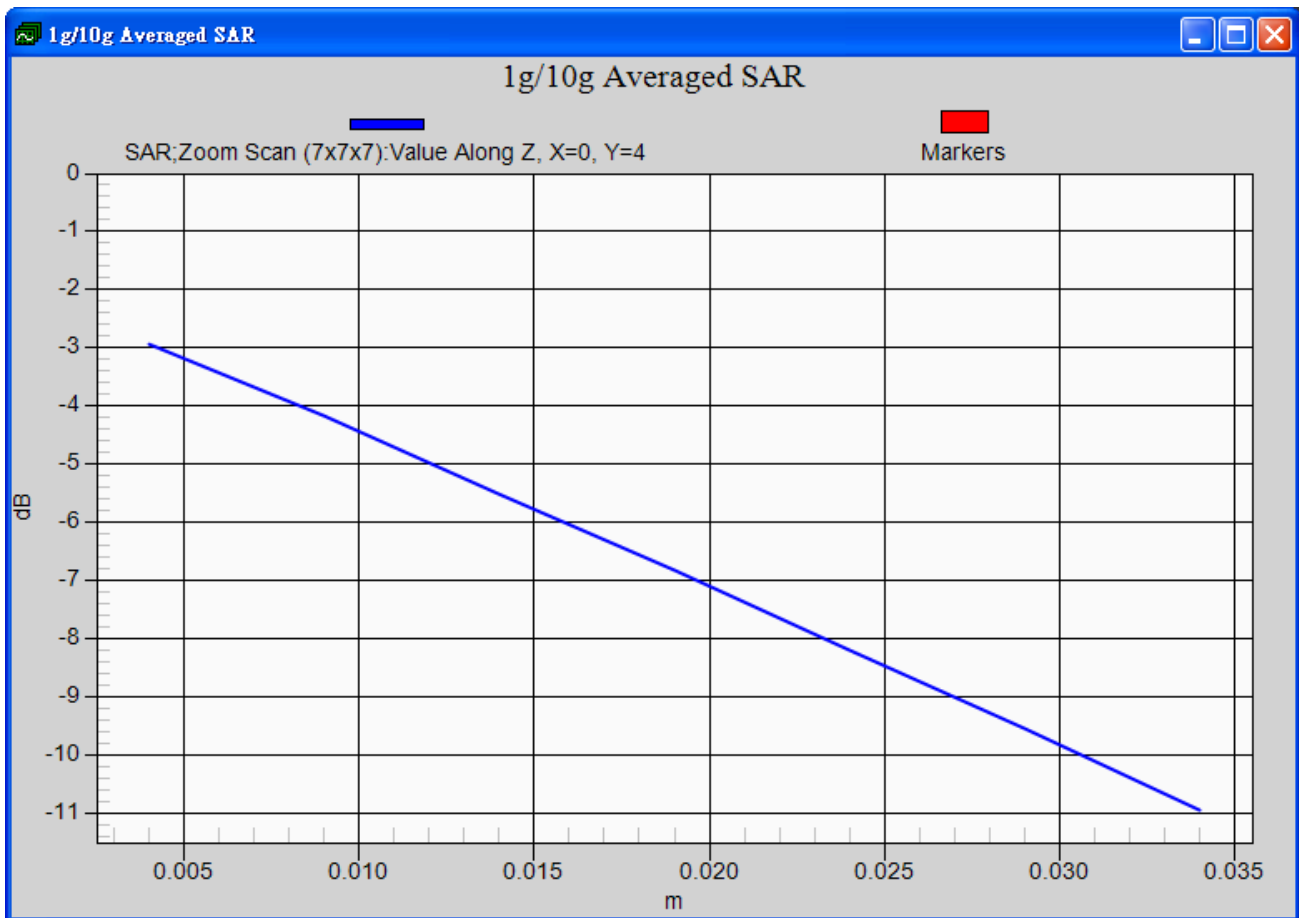
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No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan. / 台北縣五股工業區五工路136之1號

t (886-2) 2299-3939

f (886-2) 2299-9489

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Date: 7/22/2011

Body_CH251_class 8

Communication System: GPRS Class 8; Frequency: 848.8 MHz

Medium parameters used: $f = 849$ MHz; $\sigma = 1.012$ mho/m; $\epsilon_r = 53.646$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.804 mW/g

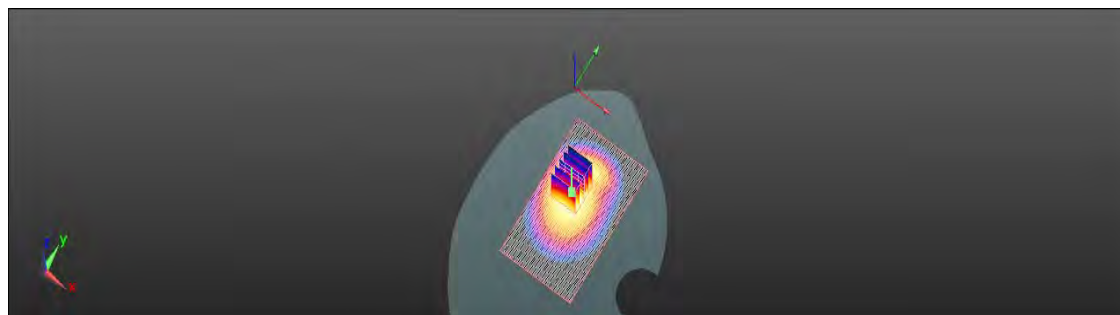
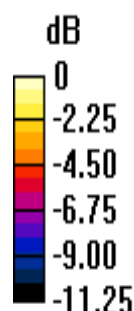
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.207 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 1.051 W/kg

SAR(1 g) = 0.743 mW/g; SAR(10 g) = 0.508 mW/g

Maximum value of SAR (measured) = 0.796 mW/g



0 dB = 0.800mW/g

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t (886-2) 2299-3939

f (886-2) 2299-9489

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Date: 7/22/2011

Body_CH251_repeated for EUT front to phantom

Communication System: GPRS(Class 10); Frequency: 848.8 MHz

Medium parameters used: $f = 849$ MHz; $\sigma = 1.012$ mho/m; $\epsilon_r = 53.646$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.933 mW/g

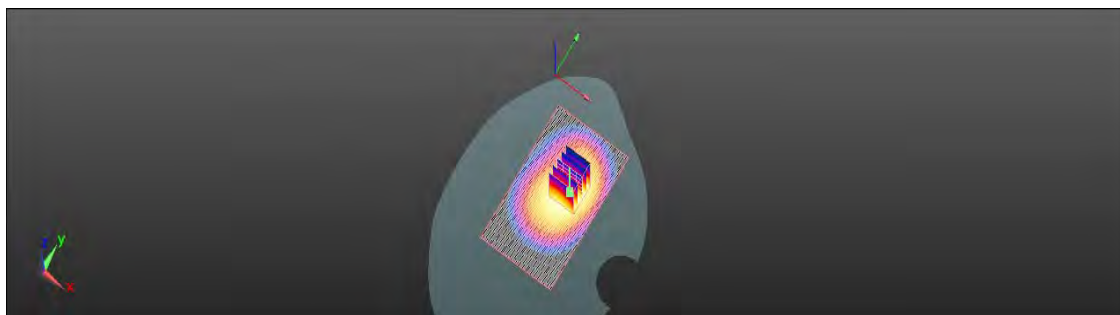
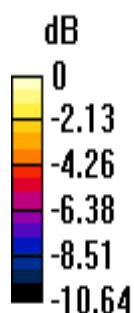
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.533 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 1.166 W/kg

SAR(1 g) = 0.850 mW/g; SAR(10 g) = 0.595 mW/g

Maximum value of SAR (measured) = 0.908 mW/g



0 dB = 0.910mW/g

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f (886-2) 2299-9489

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Date: 7/22/2011

Body_CH251_repeated with Memory card

Communication System: GPRS(Class 10); Frequency: 848.8 MHz

Medium parameters used: $f = 849$ MHz; $\sigma = 1.012$ mho/m; $\epsilon_r = 53.646$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.426 mW/g

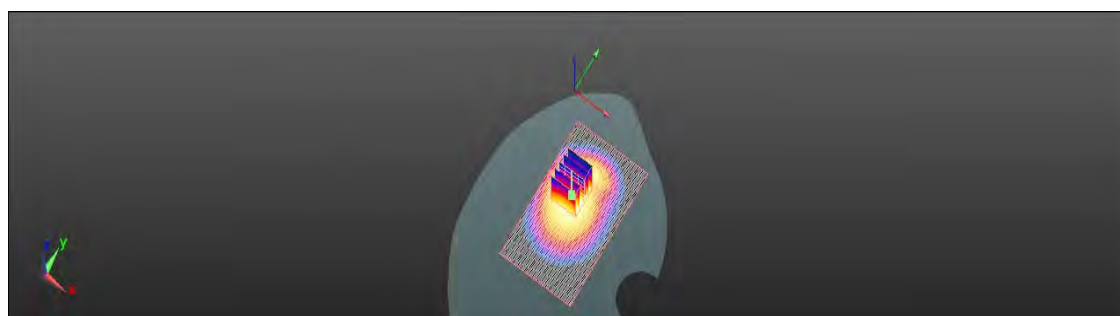
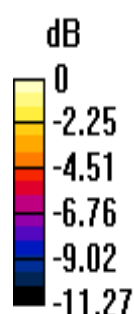
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 24.384 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 1.811 W/kg

SAR(1 g) = 1.3 mW/g; SAR(10 g) = 0.894 mW/g

Maximum value of SAR (measured) = 1.391 mW/g



0 dB = 1.390mW/g

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t (886-2) 2299-3939

f (886-2) 2299-9489

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Date: 8/17/2011

Body_CH251_repeated with headset

Communication System: GPRS(Class 10); Frequency: 848.8 MHz

Medium parameters used: $f = 849 \text{ MHz}$; $\sigma = 1.012 \text{ mho/m}$; $\epsilon_r = 53.646$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 4/19/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 1.073 mW/g

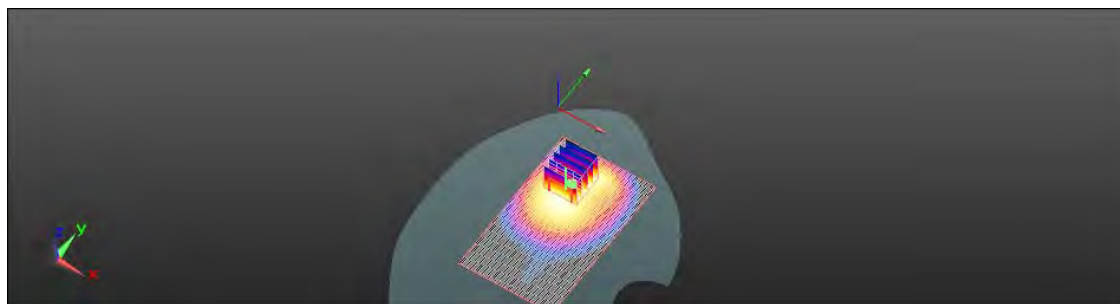
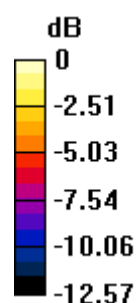
Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 11.023 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 1.481 W/kg

SAR(1 g) = 0.940 mW/g; SAR(10 g) = 0.613 mW/g

Maximum value of SAR (measured) = 1.028 mW/g



0 dB = 1.030mW/g

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t (886-2) 2299-3939

f (886-2) 2299-9489

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Date: 7/23/2011

RE Cheek_CH512

Communication System: Generic GSM; Frequency: 1850.2 MHz

Medium parameters used: $f = 1850.2$ MHz; $\sigma = 1.365$ mho/m; $\epsilon_r = 39.324$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.67, 7.67, 7.67); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/RE Cheek/Area Scan (61x101x1): Measurement grid:

dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.782 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

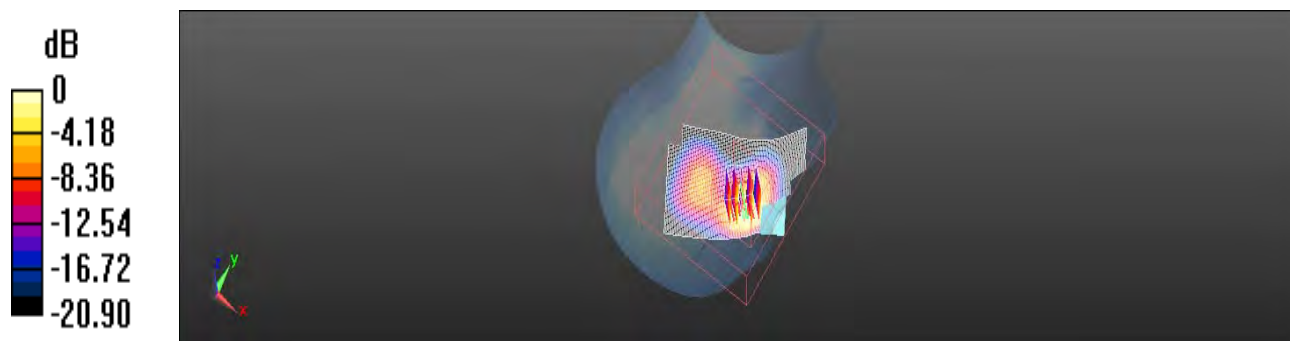
dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.555 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 1.202 W/kg

SAR(1 g) = 0.751 mW/g; SAR(10 g) = 0.431 mW/g

Maximum value of SAR (measured) = 0.796 mW/g



0 dB = 0.800mW/g

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Date: 7/23/2011

RE Cheek_CH661

Communication System: Generic GSM; Frequency: 1880 MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.392$ mho/m; $\epsilon_r = 39.206$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.67, 7.67, 7.67); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/RE Cheek/Area Scan (61x101x1): Measurement grid:

$dx=15$ mm, $dy=15$ mm

Maximum value of SAR (interpolated) = 1.221 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

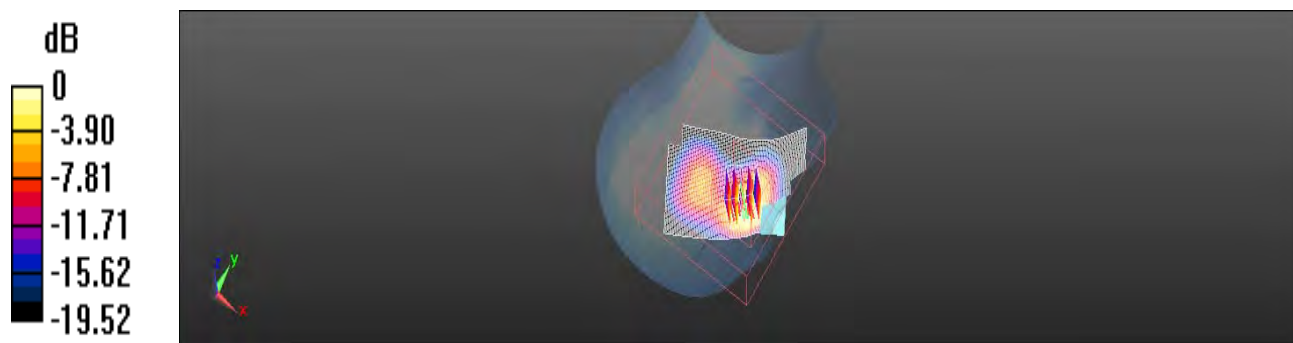
$dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 14.475 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 1.887 W/kg

SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.632 mW/g

Maximum value of SAR (measured) = 1.251 mW/g



0 dB = 1.250mW/g

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Date: 7/23/2011

RE Cheek_CH810

Communication System: Generic GSM; Frequency: 1909.8 MHz

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.421$ mho/m; $\epsilon_r = 39.171$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.67, 7.67, 7.67); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/RE Cheek/Area Scan (61x101x1): Measurement grid:

$dx=15$ mm, $dy=15$ mm

Maximum value of SAR (interpolated) = 0.873 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

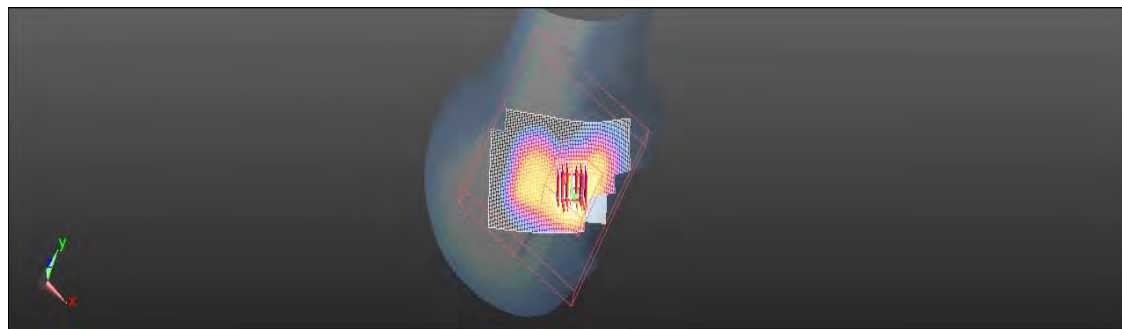
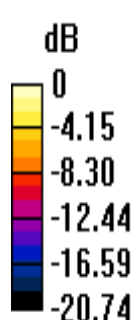
$dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 11.051 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.305 W/kg

SAR(1 g) = 0.806 mW/g; SAR(10 g) = 0.462 mW/g

Maximum value of SAR (measured) = 0.856 mW/g



0 dB = 0.860mW/g

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Date: 7/23/2011

LE Cheek_CH512

Communication System: Generic GSM; Frequency: 1850.2 MHz

Medium parameters used: $f = 1850.2$ MHz; $\sigma = 1.365$ mho/m; $\epsilon_r = 39.324$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.67, 7.67, 7.67); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.281 mW/g

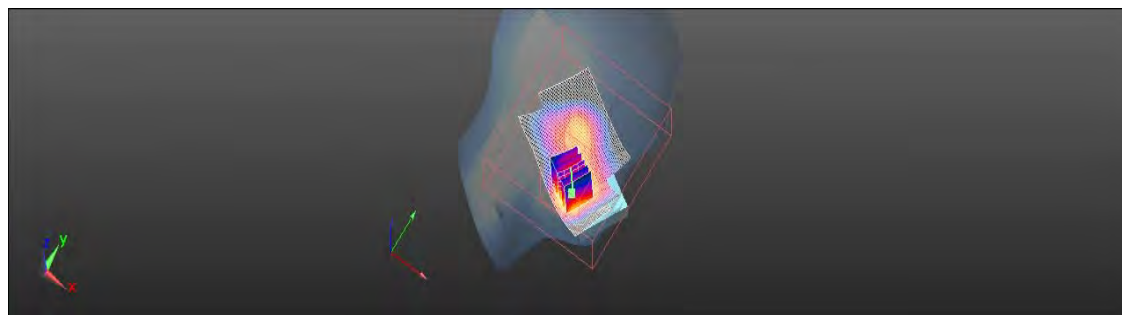
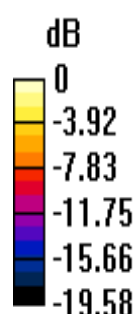
Configuration/LE Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.393 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 2.116 W/kg

SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.643 mW/g

Maximum value of SAR (measured) = 1.387 mW/g



0 dB = 1.390mW/g

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Date: 7/23/2011

LE Cheek_CH661

Communication System: Generic GSM; Frequency: 1880 MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.392$ mho/m; $\epsilon_r = 39.206$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.67, 7.67, 7.67); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.387 mW/g

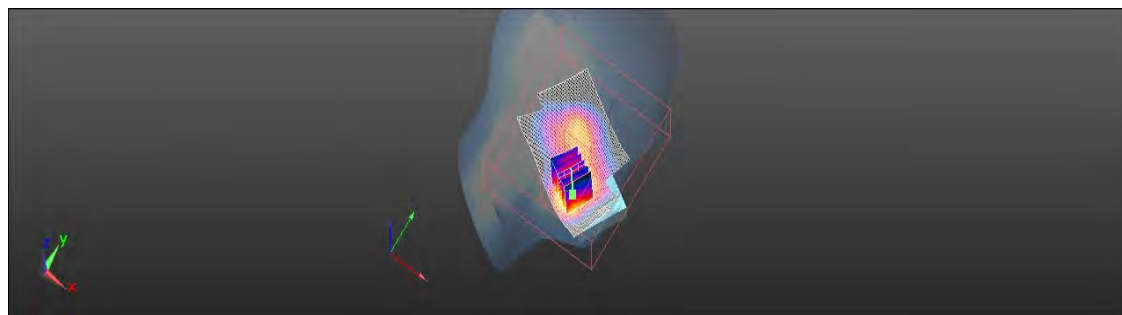
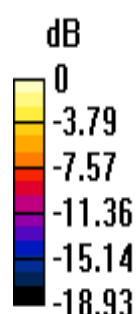
Configuration/LE Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.307 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 2.335 W/kg

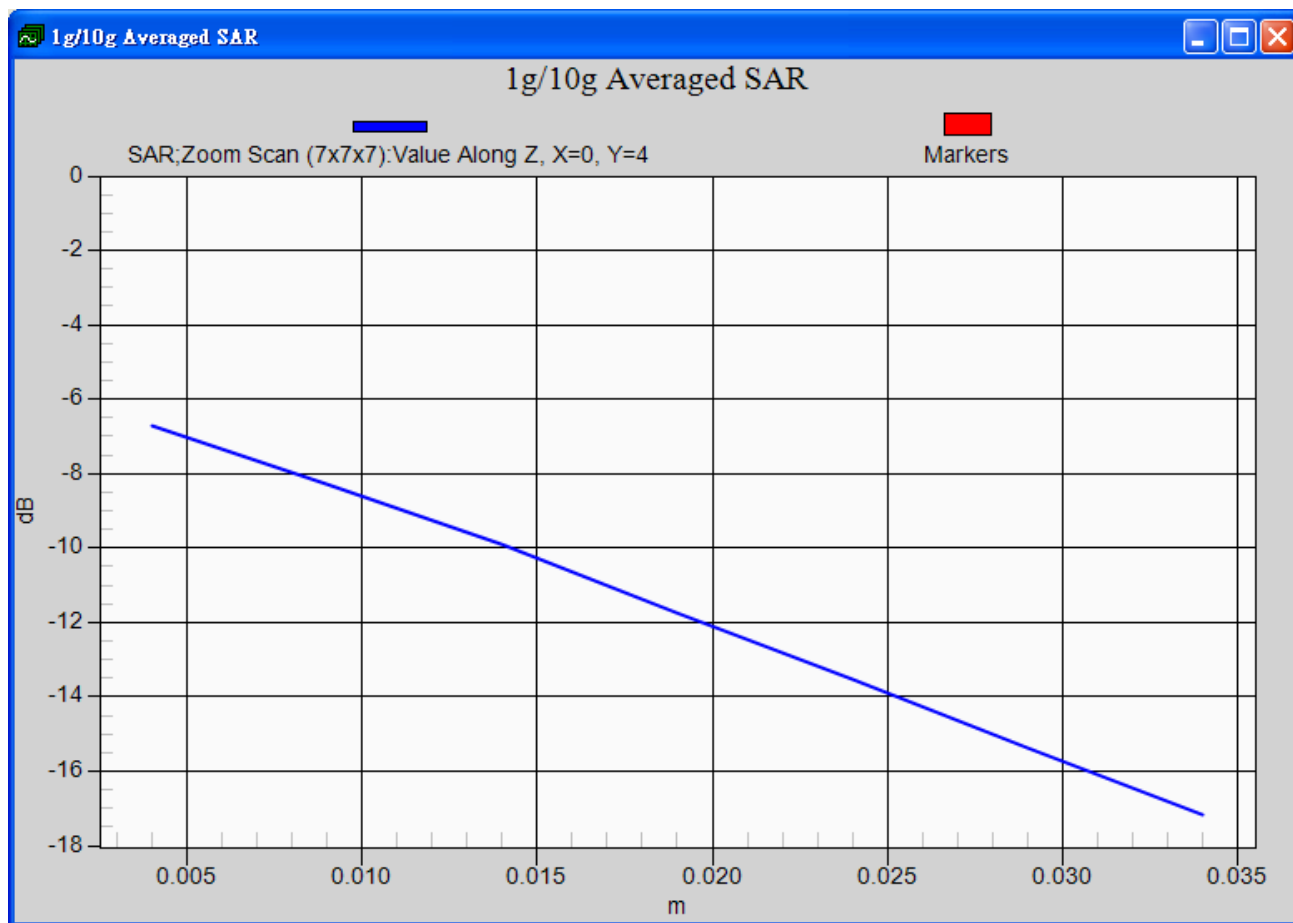
SAR(1 g) = 1.32 mW/g; SAR(10 g) = 0.694 mW/g

Maximum value of SAR (measured) = 1.475 mW/g



0 dB = 1.470mW/g

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台灣檢驗科技股份有限公司

No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan. / 台北縣五股工業區五工路136之1號

t (886-2) 2299-3939

f (886-2) 2299-9489

www.sgs.com.tw

Date: 7/23/2011

LE Cheek_CH810

Communication System: Generic GSM; Frequency: 1909.8 MHz

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.421$ mho/m; $\epsilon_r = 39.171$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.67, 7.67, 7.67); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.283 mW/g

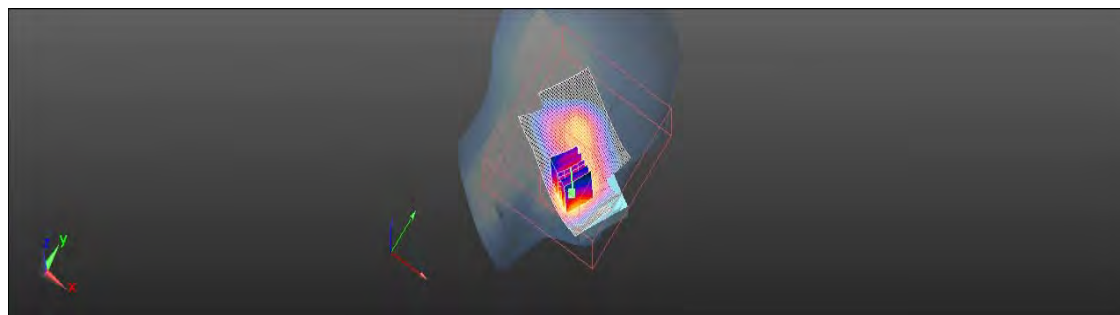
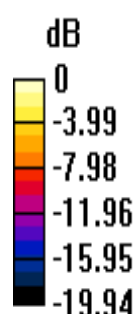
Configuration/LE Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.674 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 2.117 W/kg

SAR(1 g) = 1.2 mW/g; SAR(10 g) = 0.636 mW/g

Maximum value of SAR (measured) = 1.358 mW/g



0 dB = 1.360mW/g

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Date: 7/23/2011

LE Cheek_CH661_repeated with Memory card

Communication System: Generic GSM; Frequency: 1880 MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.392$ mho/m; $\epsilon_r = 39.206$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.67, 7.67, 7.67); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.362 mW/g

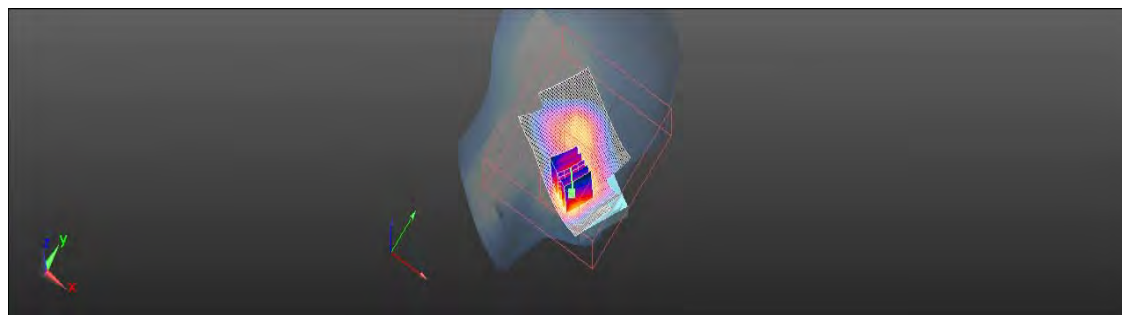
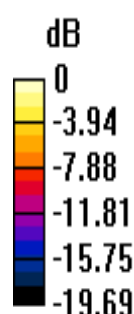
Configuration/LE Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.940 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 2.268 W/kg

SAR(1 g) = 1.29 mW/g; SAR(10 g) = 0.681 mW/g

Maximum value of SAR (measured) = 1.463 mW/g



0 dB = 1.460mW/g

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Date: 7/23/2011

RE Tilt_CH661

Communication System: Generic GSM; Frequency: 1880 MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.392$ mho/m; $\epsilon_r = 39.206$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.67, 7.67, 7.67); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/RE Tilt/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.452 mW/g

Configuration/RE Tilt/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

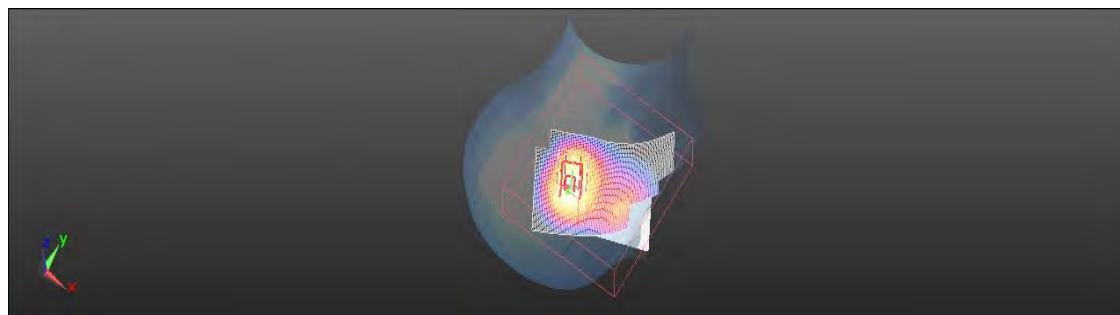
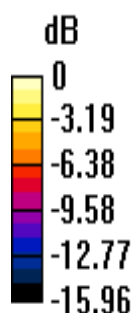
dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.629 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.592 W/kg

SAR(1 g) = 0.398 mW/g; SAR(10 g) = 0.247 mW/g

Maximum value of SAR (measured) = 0.427 mW/g



0 dB = 0.430mW/g

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SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan. / 台北縣五股工業區五工路136之1號

t (886-2) 2299-3939

f (886-2) 2299-9489

www.sgs.com.tw

Date: 7/23/2011

LE Tilt_CH661

Communication System: Generic GSM; Frequency: 1880 MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.392$ mho/m; $\epsilon_r = 39.206$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.67, 7.67, 7.67); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/LE Tilt/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.456 mW/g

Configuration/LE Tilt/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

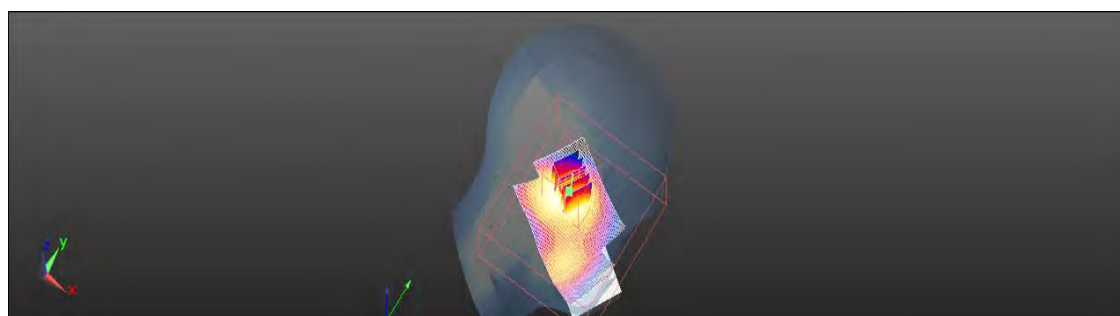
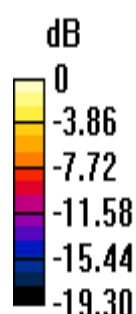
dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.003 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.546 W/kg

SAR(1 g) = 0.373 mW/g; SAR(10 g) = 0.237 mW/g

Maximum value of SAR (measured) = 0.396 mW/g



0 dB = 0.400mW/g

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Date: 7/23/2011

Body_CH661

Communication System: GPRS(Class 10); Frequency: 1880 MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.497$ mho/m; $\epsilon_r = 51.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.543 mW/g

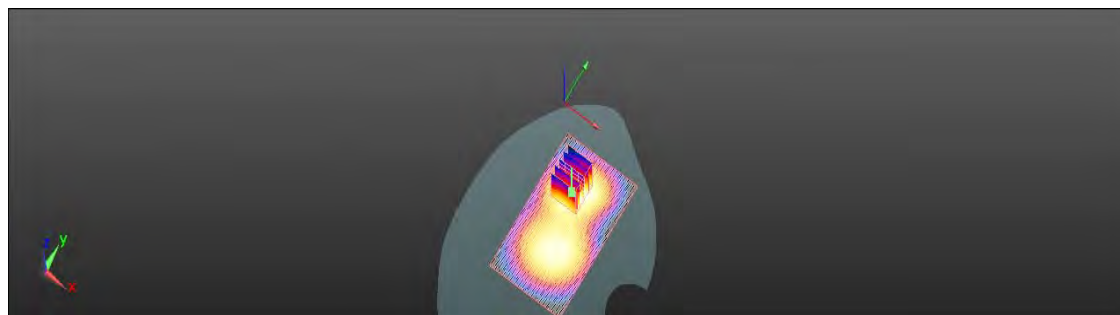
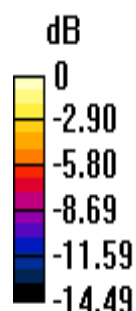
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.208 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 0.681 W/kg

SAR(1 g) = 0.476 mW/g; SAR(10 g) = 0.311 mW/g

Maximum value of SAR (measured) = 0.509 mW/g



0 dB = 0.510mW/g

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Date: 7/23/2011

Body_CH661_class 8

Communication System: GPRS Class 8; Frequency: 1880 MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.497$ mho/m; $\epsilon_r = 51.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.279 mW/g

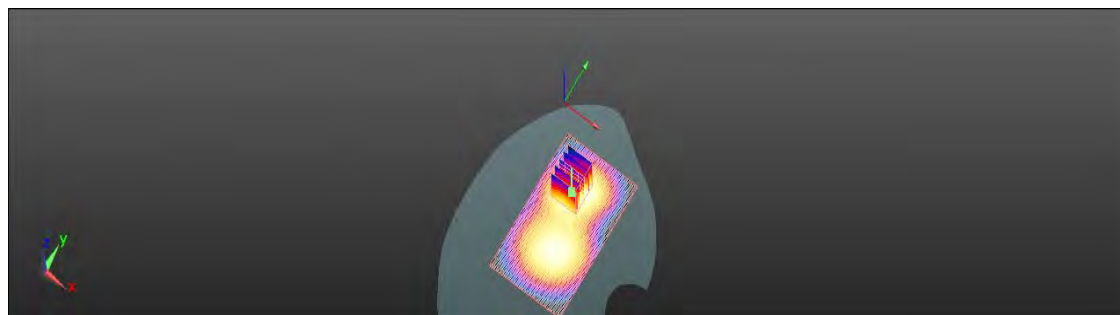
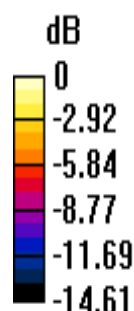
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.828 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.354 W/kg

SAR(1 g) = 0.245 mW/g; SAR(10 g) = 0.161 mW/g

Maximum value of SAR (measured) = 0.262 mW/g



0 dB = 0.260mW/g

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5. System Verification

Date: 7/22/2011

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.903 \text{ mho/m}$; $\epsilon_r = 42.243$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.83, 8.83, 8.83); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration /d=15mm, Pin=250mW, dist=4mm: Measurement grid:

dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.578 mW/g

Configuration /d=15mm, Pin=250mW, dist=4mm: Measurement grid:

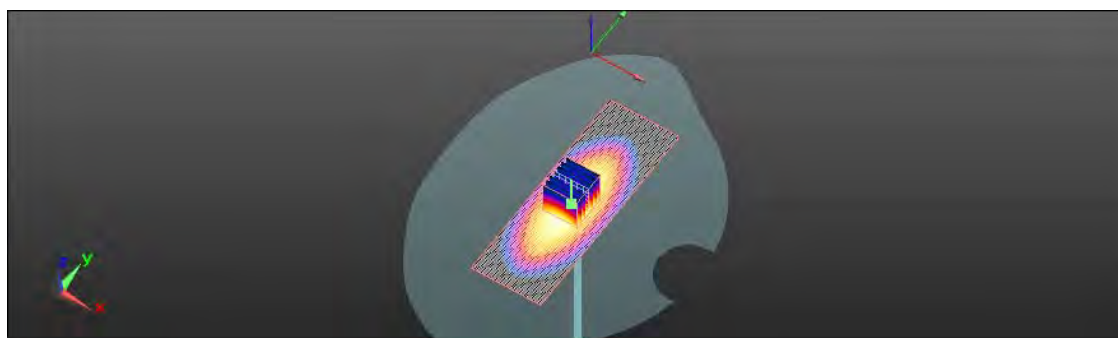
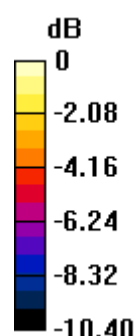
dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.977 V/m; Power Drift = -0.0097 dB

Peak SAR (extrapolated) = 3.586 W/kg

SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.56 mW/g

Maximum value of SAR (measured) = 2.575 mW/g



0 dB = 2.580mW/g

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Date: 7/22/2011

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 53.775$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(8.85, 8.85, 8.85); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration / d=15mm, Pin=250mW, dist=4mm: Measurement grid:

dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.691 mW/g

Configuration / d=15mm, Pin=250mW, dist=4mm: Measurement grid:

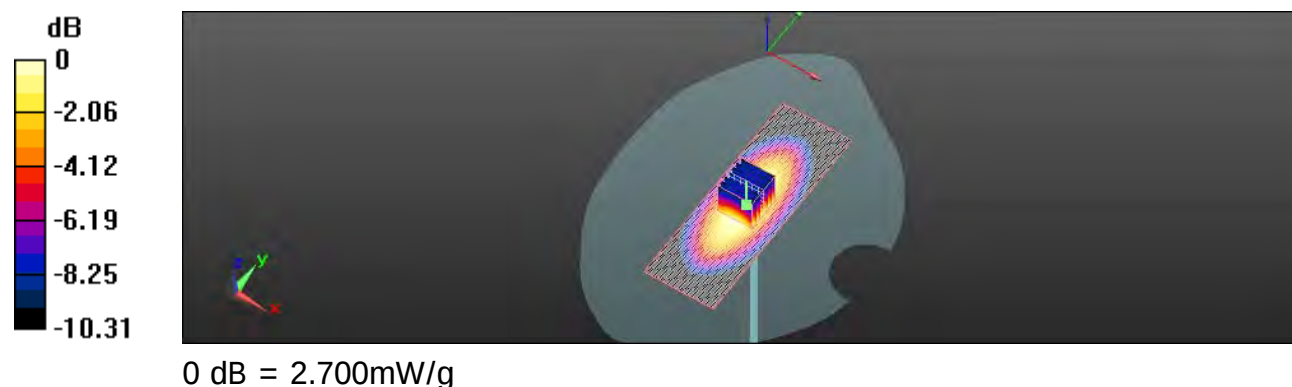
dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.199 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.705 W/kg

SAR(1 g) = 2.49 mW/g; SAR(10 g) = 1.63 mW/g

Maximum value of SAR (measured) = 2.699 mW/g



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Date: 7/23/2011

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.412$ mho/m; $\epsilon_r = 39.184$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.67, 7.67, 7.67); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration / d=10mm, Pin=250mW, dist=4mm: Measurement grid:

dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 11.665 mW/g

Configuration / d=10mm, Pin=250mW, dist=4mm: Measurement grid:

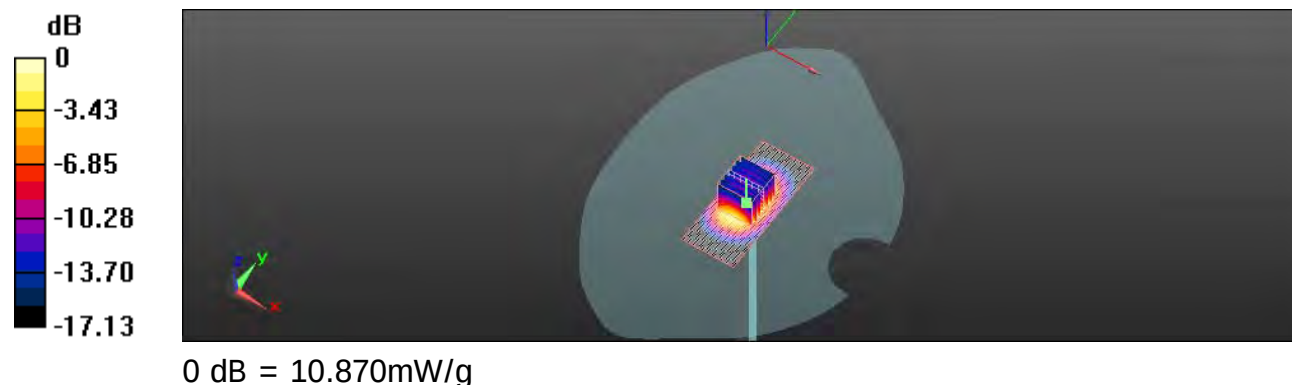
dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.346 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 17.558 W/kg

SAR(1 g) = 9.62 mW/g; SAR(10 g) = 5.03 mW/g

Maximum value of SAR (measured) = 10.871 mW/g



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Date: 7/23/2011

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.521$ mho/m; $\epsilon_r = 51.436$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3703; ConvF(7.04, 7.04, 7.04); Calibrated: 1/24/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration / d=10mm, Pin=250mW, dist=4mm: Measurement grid:

dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 11.852 mW/g

Configuration / d=10mm, Pin=250mW, dist=4mm: Measurement grid:

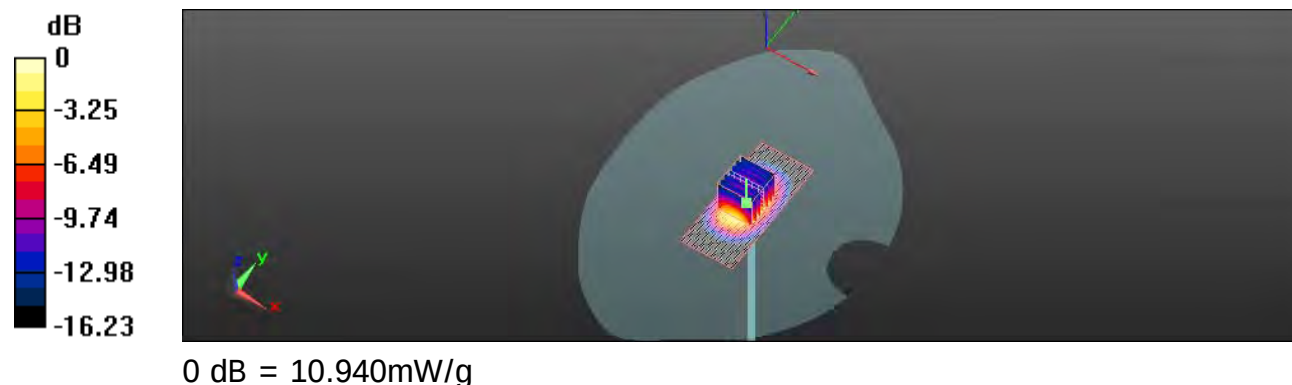
dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.617 V/m; Power Drift = -0.0064 dB

Peak SAR (extrapolated) = 16.560 W/kg

SAR(1 g) = 9.61 mW/g; SAR(10 g) = 5.12 mW/g

Maximum value of SAR (measured) = 10.935 mW/g



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Date: 8/17/2011

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 53.775$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 4/19/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM;
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Configuration /d=15mm, Pin=250mW, dist=4mm: Measurement grid:

$dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 2.648 mW/g

Configuration /d=15mm, Pin=250mW, dist=4mm: Measurement grid:

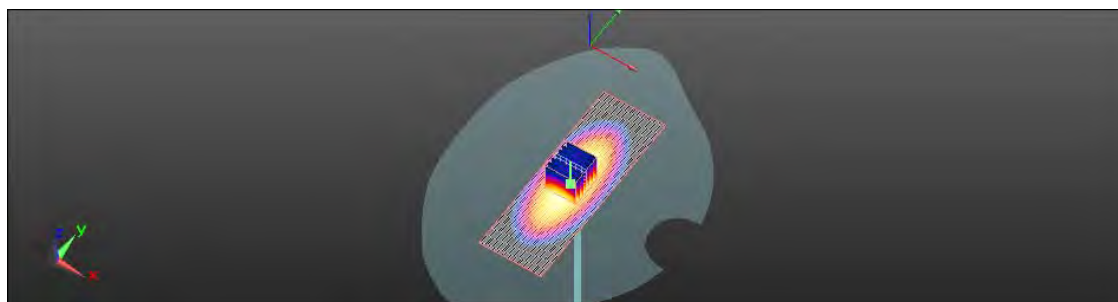
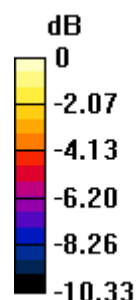
$dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 51.865 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 3.680 W/kg

SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.62 mW/g

Maximum value of SAR (measured) = 2.677 mW/g



0 dB = 2.680mW/g

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6. DAE & Probe Calibration certificate

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



S Schweizerischer Kalibrierdienst
S Service suisse d'étalonnage
C 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-TW (Auden)**

Certificate No: **DAE4-856_May11**

CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BJ - SN: 856**

Calibration procedure(s) **QA CAL-06.v23**
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: **May 18, 2011**

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
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

Calibrated by: **Name** Dominique Steffen **Function** Technician **Signature** 

Approved by: **Name** Fin Bornholt **Function** R&D Director **Signature** 

Issued: May 18, 2011

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

Certificate No: DAE4-856_May11

Page 1 of 5

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



S Schweizerischer Kalibrierdienst
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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-TW (Auden)**

Certificate No: **EX3-3703_Jan11**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3703**

Calibration procedure(s) **QA CAL-01.v7, QA CAL-14.v3, QA CAL-23.v4 and QA CAL-25.v3
Calibration procedure for dosimetric E-field probes**

Calibration date: **January 24, 2011**

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-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Fin Bomholt	R&D Director	

Issued: January 25, 2011

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Certificate No: **EX3-3703_Jan11**

Page 1 of 11

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



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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
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., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- 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
- 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:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- Ax,y,z; Bx,y,z; Cx,y,z; VRx,y,z**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ 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 NORM_{x,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.

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EX3DV4 SN:3703

January 24, 2011

Probe EX3DV4

SN:3703

Manufactured:	July 21, 2009
Last calibrated:	December 30, 2009
Recalibrated:	January 24, 2011

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: EX3-3703_Jan11

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EX3DV4 SN:3703

January 24, 2011

DASY/EASY - Parameters of Probe: EX3DV4 SN:3703

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$) ^A	0.52	0.52	0.54	± 10.1%
DCP (mV) ^B	98.8	94.8	99.6	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	154.8	± 3.1 %
			Y	0.00	0.00	1.00	118.0	
			Z	0.00	0.00	1.00	156.4	

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 E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter; uncertainty not required.

^E Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

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EX3DV4 SN:3703

January 24, 2011

DASY/EASY - Parameters of Probe: EX3DV4 SN:3703

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] ^C	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	41.9 ± 5%	0.89 ± 5%	9.21	9.21	9.21	0.73	0.65 ± 11.0%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	8.83	8.83	8.83	0.79	0.61 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	8.78	8.78	8.78	0.73	0.63 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	8.02	8.02	8.02	0.50	0.71 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	7.67	7.67	7.67	0.39	0.82 ± 11.0%
2000	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	7.63	7.63	7.63	0.35	0.86 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	7.00	7.00	7.00	0.32	0.91 ± 11.0%
2600	± 50 / ± 100	39.0 ± 5%	1.96 ± 5%	6.75	6.75	6.75	0.30	1.02 ± 11.0%

^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.

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EX3DV4 SN:3703

January 24, 2011

DASY/EASY - Parameters of Probe: EX3DV4 SN:3703

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^C	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	55.5 ± 5%	0.96 ± 5%	9.06	9.06	9.06	0.57	0.73 ± 11.0%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	8.85	8.85	8.85	0.46	0.83 ± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	8.74	8.74	8.74	0.45	0.83 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	7.26	7.26	7.26	0.58	0.70 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	7.04	7.04	7.04	0.44	0.82 ± 11.0%
2000	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	7.13	7.13	7.13	0.61	0.70 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	6.82	6.82	6.82	0.41	0.82 ± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	6.78	6.78	6.78	0.33	0.89 ± 11.0%
5200	± 50 / ± 100	49.0 ± 5%	5.30 ± 5%	4.00	4.00	4.00	0.50	1.95 ± 13.1%
5300	± 50 / ± 100	48.9 ± 5%	5.42 ± 5%	3.73	3.73	3.73	0.55	1.95 ± 13.1%
5600	± 50 / ± 100	48.5 ± 5%	5.77 ± 5%	3.42	3.42	3.42	0.65	1.95 ± 13.1%
5800	± 50 / ± 100	48.2 ± 5%	6.00 ± 5%	3.67	3.67	3.67	0.65	1.95 ± 13.1%

^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.

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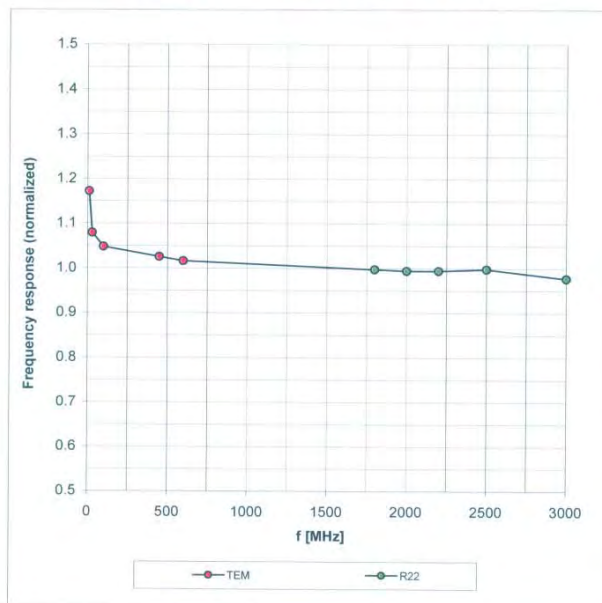
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Frequency Response of E-Field

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

Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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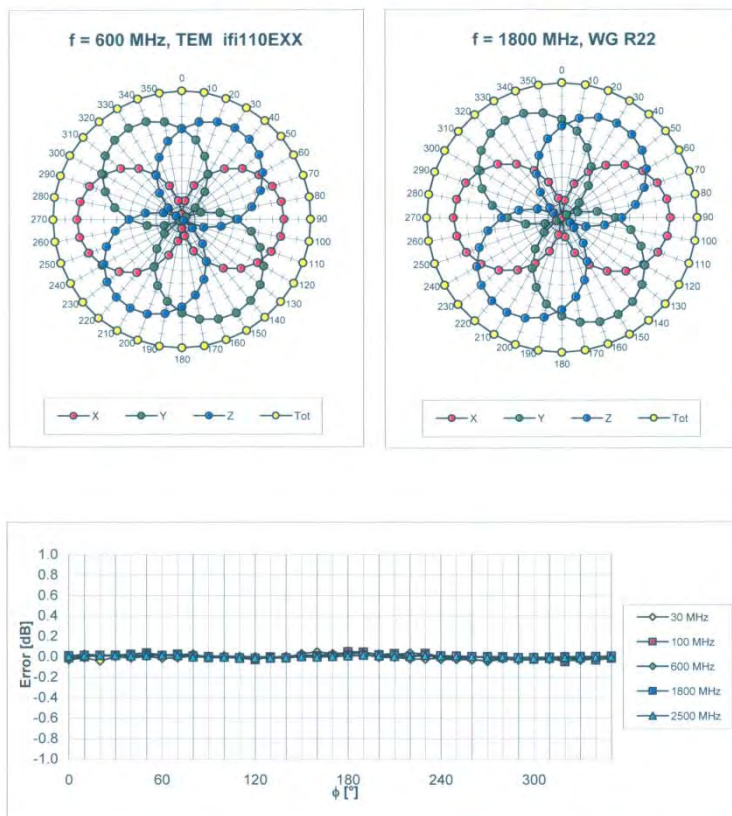
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EX3DV4 SN:3703

January 24, 2011

Receiving Pattern (ϕ), $\vartheta = 0^\circ$



Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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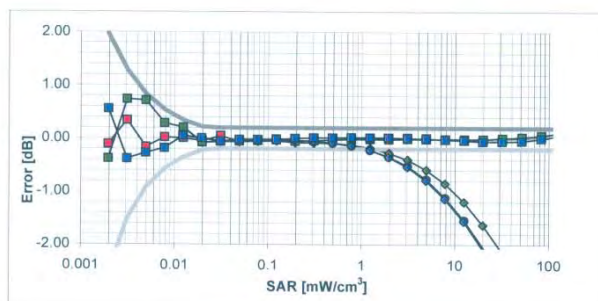
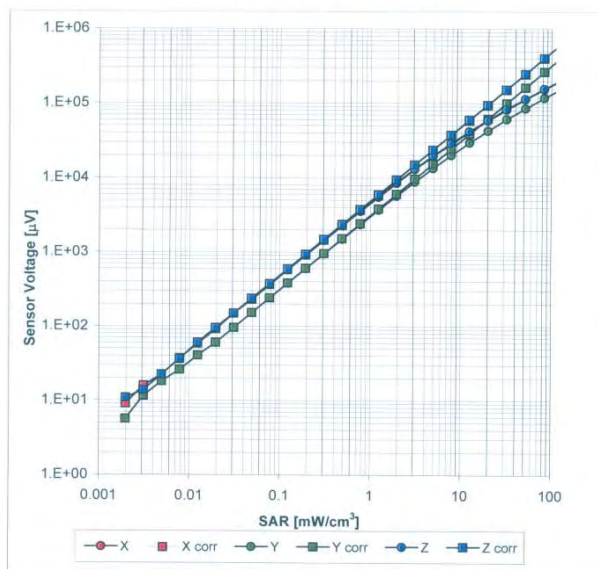
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January 24, 2011

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f = 900 \text{ MHz}$)



Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

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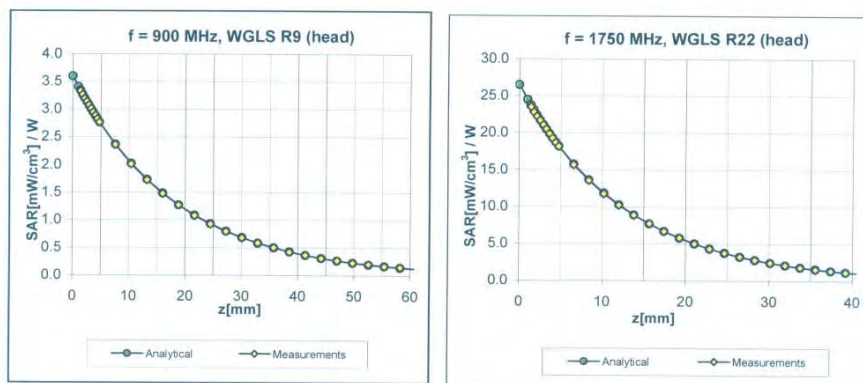
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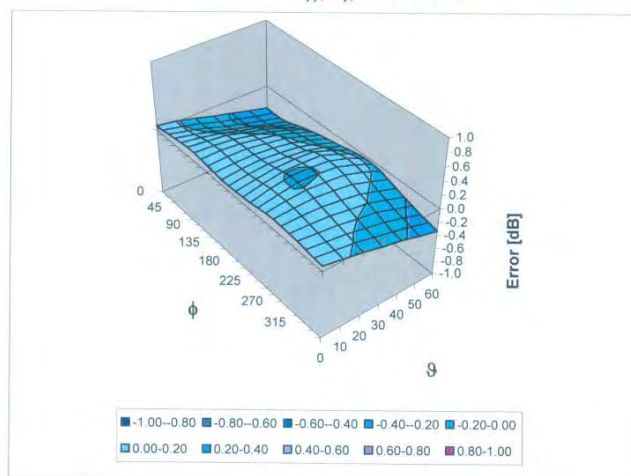
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Conversion Factor Assessment



Deviation from Isotropy in HSL

Error (ϕ , θ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

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EX3DV4 SN:3703

January 24, 2011

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

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**Calibration Laboratory of
Schmid & Partner
Engineering AG**
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Accreditation No.: SCS 108

Client **SGS-TW (Auden)**

Certificate No: EX3-3770_Apr11

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3770**

Calibration procedure(s) **QA CAL-01.v7, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v3
Calibration procedure for dosimetric E-field probes**

Calibration date: **April 19, 2011**

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41495277	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	23-Apr-10 (No. DAE4-654_Apr10)	Apr-11
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name Katja Pokovic	Function Technical Manager	Signature
Approved by:	Fin Bomholt	R&D Director	

Issued: April 19, 2011

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

Certificate No: EX3-3770_Apr11

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**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)

Accreditation No.: SCS 108

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
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., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- 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
- 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:

- NORM_{x,y,z}**: Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,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.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}** are numerical linearization parameters in dB assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media.
- VR**: VR is the validity range of the calibration related to the average diode voltage or DAE voltage in mV.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ 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 NORM_{x,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.

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t (886-2) 2299-3939

f (886-2) 2299-9489

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EX3DV4 – SN:3770

April 19, 2011

Probe EX3DV4

SN:3770

Manufactured: July 6, 2010
Calibrated: April 19, 2011

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

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f (886-2) 2299-9489

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EX3DV4- SN:3770

April 19, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.32	0.62	0.40	$\pm 10.1 \%$
DCP (mV) ^B	106.6	98.3	102.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	120.8	$\pm 2.7 \%$
			Y	0.00	0.00	1.00	134.3	
			Z	0.00	0.00	1.00	133.5	

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 Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

EX3DV4- SN:3770

April 19, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770**Calibration Parameter Determined in Head Tissue Simulating Media**

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.58	9.58	9.58	0.80	0.70	± 12.0 %
835	41.5	0.90	9.25	9.25	9.25	0.80	0.67	± 12.0 %
900	41.5	0.97	9.06	9.06	9.06	0.76	0.71	± 12.0 %
1750	40.1	1.37	7.97	7.97	7.97	0.80	0.61	± 12.0 %
1900	40.0	1.40	7.78	7.78	7.78	0.71	0.62	± 12.0 %
2000	40.0	1.40	7.79	7.79	7.79	0.75	0.58	± 12.0 %
2450	39.2	1.80	6.99	6.99	6.99	0.80	0.56	± 12.0 %
2600	39.0	1.96	6.95	6.95	6.95	0.66	0.62	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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EX3DV4-SN:3770

April 19, 2011

DASY/EASY - Parameters of Probe: EX3DV4- SN:3770

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.42	9.42	9.42	0.73	0.72	± 12.0 %
835	55.2	0.97	9.30	9.30	9.30	0.72	0.72	± 12.0 %
900	55.0	1.05	9.12	9.12	9.12	0.73	0.75	± 12.0 %
1750	53.4	1.49	7.84	7.84	7.84	0.80	0.68	± 12.0 %
1900	53.3	1.52	7.51	7.51	7.51	0.80	0.62	± 12.0 %
2000	53.3	1.52	7.44	7.44	7.44	0.80	0.66	± 12.0 %
2450	52.7	1.95	6.96	6.96	6.96	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.78	6.78	6.78	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.42	4.42	4.42	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.12	4.12	4.12	0.52	1.90	± 13.1 %
5600	48.5	5.77	3.54	3.54	3.54	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.80	3.80	3.80	0.60	1.90	± 13.1 %

^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^f At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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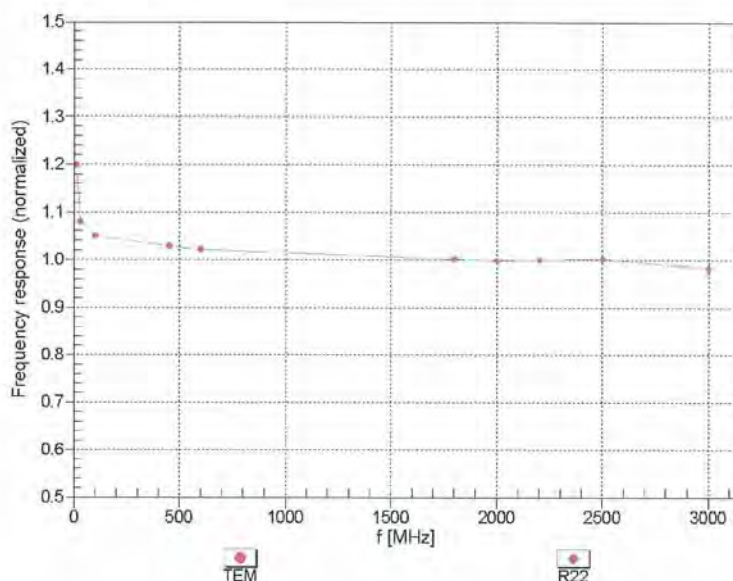
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April 19, 2011

Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

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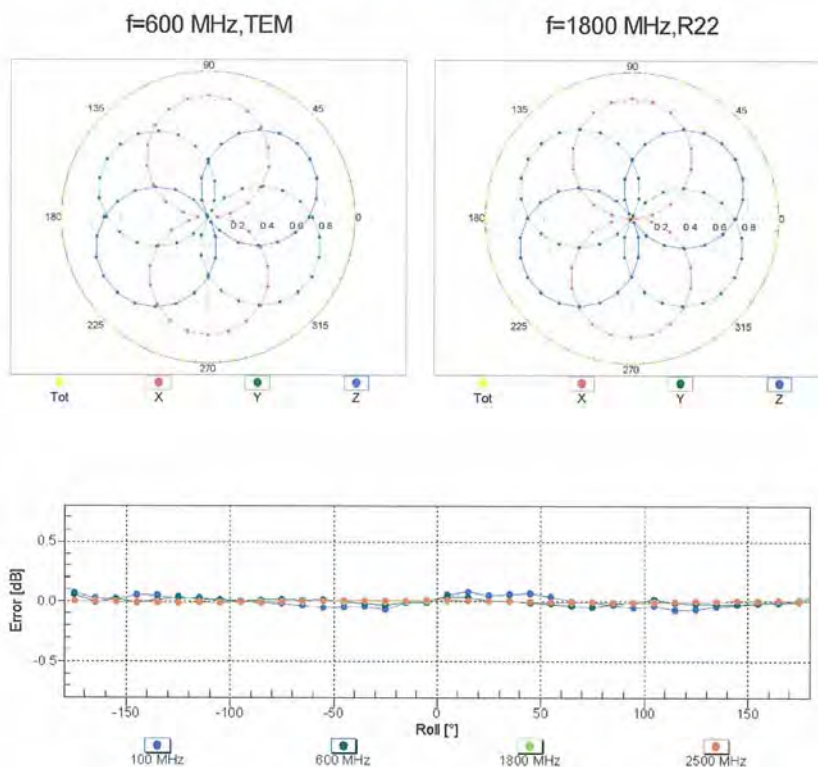
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April 19, 2011

Receiving Pattern (ϕ), $\theta = 0^\circ$



Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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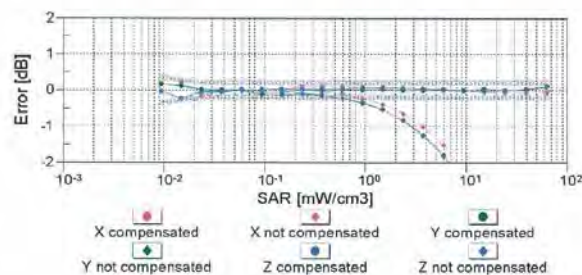
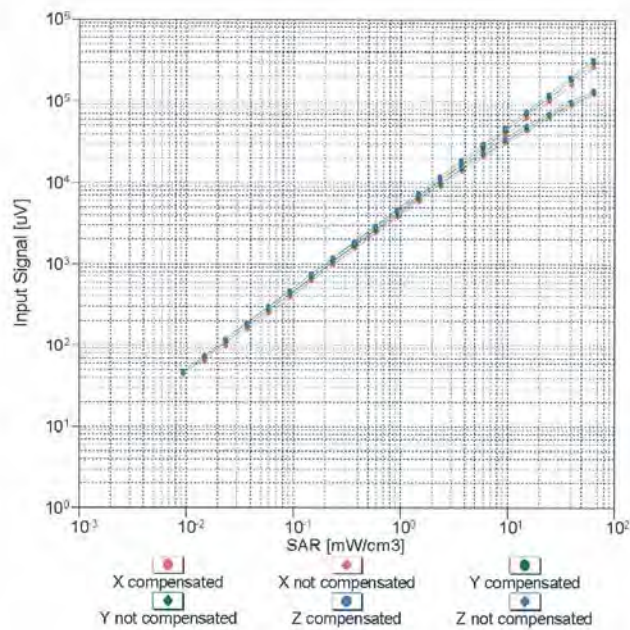
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April 19, 2011

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f = 900 \text{ MHz}$)



Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

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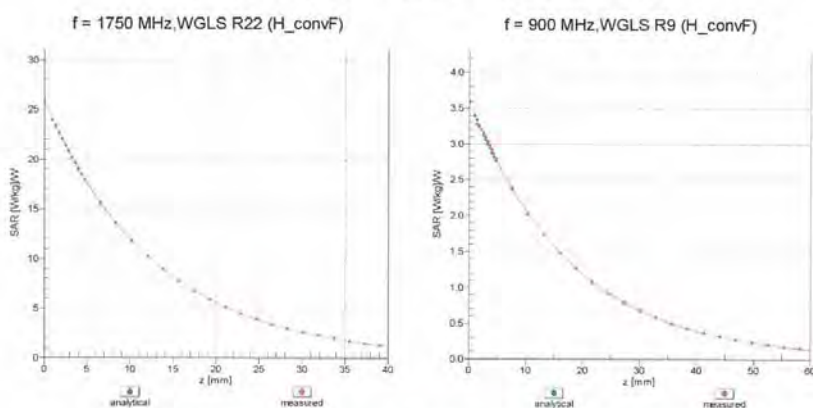
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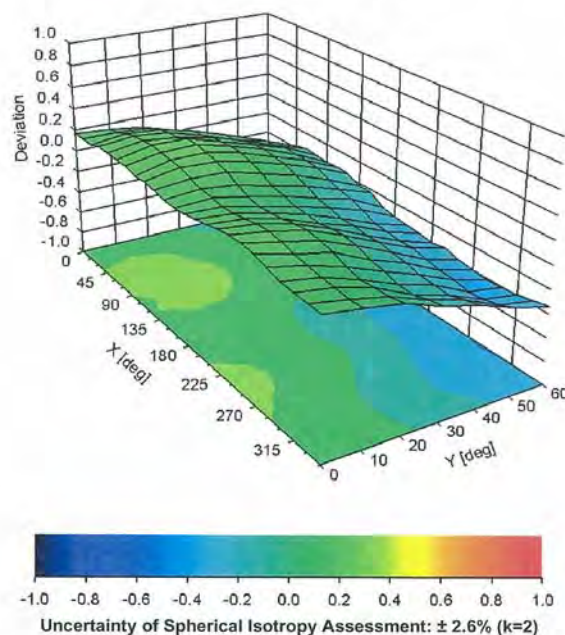
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April 19, 2011

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, θ), $f = 900 \text{ MHz}$



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EX3DV4- SN:3770

April 19, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

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7. Uncertainty Budget

DASY5 Uncertainty Budget
According to IEEE 1528 [1]

Error Description	Uncertainty value	Prob. Dist.	Div.	(c_1) 1g	(c_1) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(c_2) v_{eff}
Measurement System								
Probe Calibration	±5.9%	N	1	1	1	±5.9%	±5.9%	∞
Axial Isotropy	±4.7%	R	√3	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	√3	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	√3	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	√3	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	√3	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	√3	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	√3	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.4%	R	√3	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	√3	1	1	±1.7%	±1.7%	∞
Max. SAR Eval.	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	√3	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom Uncertainty	±4.0%	R	√3	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (target)	±5.0%	R	√3	0.64	0.43	±1.8%	±1.2%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid Permittivity (target)	±5.0%	R	√3	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined Std. Uncertainty						±10.9%	±10.7%	357
Expanded STD Uncertainty						±21.0%	±21.4%	

Table 19.6: Worst-Case uncertainty budget for DASY5 assessed according to IEEE 1528 [1]. The budget is valid for the frequency range 300 MHz - 3 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller.

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8. Phantom description

Schmid & Partner Engineering AG

s p e a g

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

Certificate of Conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No.	QD 000 P40 C
Series No.	TP-1150 and higher
Manufacturer	SPEAG Zeughausstrasse 43 CH-8004 Zurich Switzerland

Tests

The series production process used allows the limitation to test of first articles. Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series items (called samples) or are tested at each item.

Test	Requirement	Details	Units tested
Dimensions	Compliant with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness of shell	Compliant with the requirements according to the standards	2mm +/- 0.2mm in flat and specific areas of head section	First article, Samples, TP-1314 ff.
Material thickness at ERP	Compliant with the requirements according to the standards	8mm +/- 0.2mm at ERP	First article, All items
Material parameters	Dielectric parameters for required frequencies	300 MHz – 6 GHz: Relative permittivity < 5, Loss tangent < 0.05	Material samples
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe technical Note for material compatibility.	DEGMBE based simulating liquids	Pre-series, First article, Material samples
Sagging	Compliant with the requirements according to the standards. Sagging of the flat section when filled with tissue simulating liquid.	< 1% typical < 0.8% if filled with 155mm of HSL900 and without DUT below	Prototypes, Sample testing

Standards

- [1] CENELEC EN 50381
- [2] IEEE Std 1528-2003
- [3] IEC 62209 Part I
- [4] FCC OET Bulletin 65, Supplement C, Edition 01-01
- (*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

Conformity

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

Date 07.07.2005

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Signature / Stamp

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

Doc No 881 – QD 000 P40 C – F

Page 1 (1)

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台灣檢驗科技股份有限公司

t (886-2) 2299-3939

f (886-2) 2299-9489

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9. System Validation from Original equipment supplier

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

Client SGS-TW (Auden)

Certificate No: D835V2-4d063_May11

CALIBRATION CERTIFICATE

Object D835V2 - SN: 4d063

Calibration procedure(s) QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: May 25, 2011

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 EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by: Claudio Leubler Laboratory Technician

Approved by: Katja Pokovic Technical Manager

Issued: May 25, 2011

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

Certificate No: D835V2-4d063_May11

Page 1 of 8

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



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

Calibration is Performed According to the Following Standards:

- 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
- 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
- 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:

- DASY4/5 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.

Certificate No: D835V2-4d063_May11

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No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan. / 台北縣五股工業區五工路136之1號

t (886-2) 2299-3939

f (886-2) 2299-9489

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Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 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 $\pm$ 0.2) °C	40.4 $\pm$ 6 %	0.88 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.31 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.34 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.52 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.13 mW / g $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.9 $\pm$ 6 %	1.00 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.45 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.27 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.4 Ω - 1.5 $\mu\Omega$
Return Loss	- 28.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω - 4.1 $\mu\Omega$
Return Loss	- 27.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.426 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	November 27, 2006

DASY5 Validation Report for Head TSL

Date: 25.05.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d063

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL900

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.88 \text{ mho/m}$; $\epsilon_r = 40.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Cube 0:

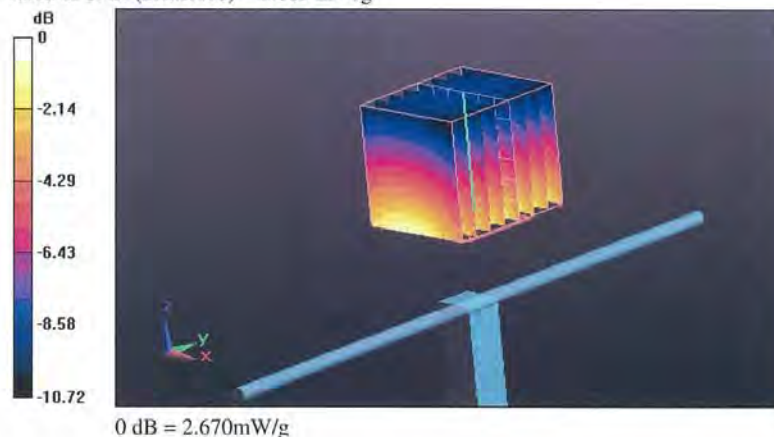
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 56.554 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 3.427 W/kg

SAR(1 g) = 2.31 mW/g; SAR(10 g) = 1.52 mW/g

Maximum value of SAR (measured) = 2.669 mW/g



Certificate No: D835V2-4d063_May11

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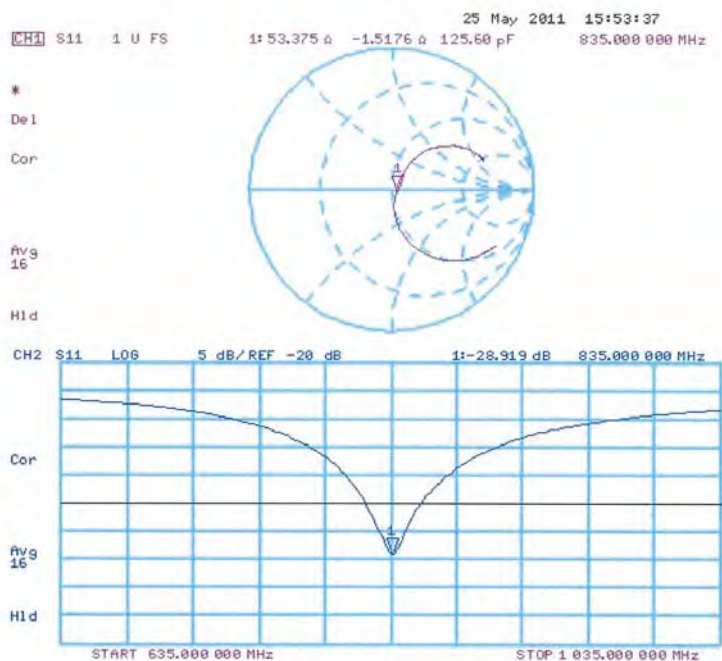
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f (886-2) 2299-9489

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Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 25.05.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d063

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: MSL900

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1 \text{ mho/m}$; $\epsilon_r = 53.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Cube 0:

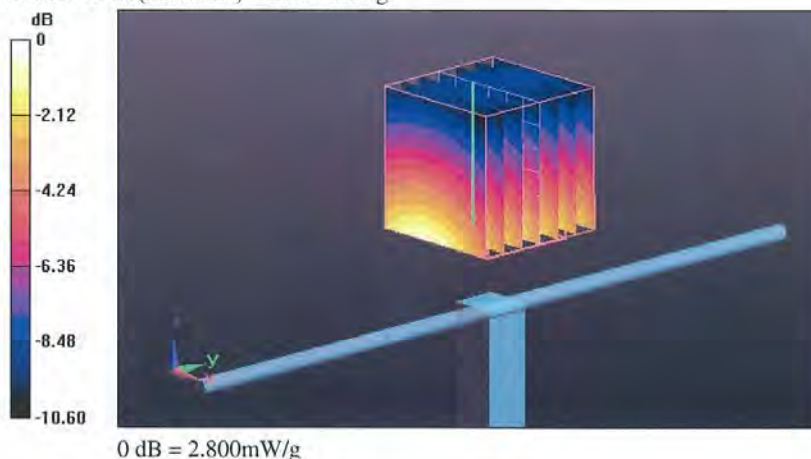
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.297 V/m; Power Drift = 0.06 dB

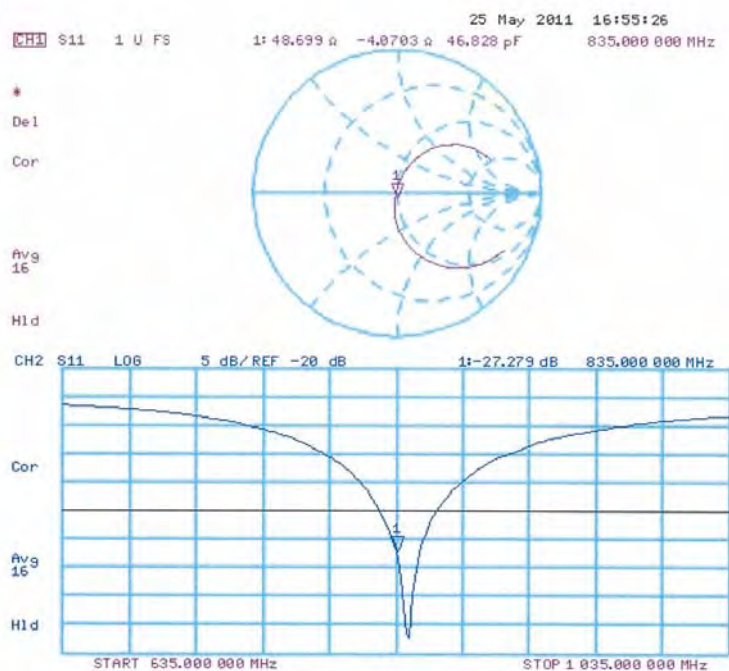
Peak SAR (extrapolated) = 3.530 W/kg

SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.6 mW/g

Maximum value of SAR (measured) = 2.804 mW/g



Impedance Measurement Plot for Body TSL



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



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Accreditation No.: **SCS 108**

Client **SGS TW (Auden)**

Certificate No: **D1900V2-5d027_Apr11**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d027**

Calibration procedure(s) **QA CAL-05.v8**
Calibration procedure for dipole validation kits

Calibration date: **April 19, 2011**

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 EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Issued: April 19, 2011

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Certificate No: D1900V2-5d027_Apr11

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



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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:

- 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
- 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
- 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:

- DASY4/5 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	DASY5	V52.6.2
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 $\pm$ 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 $\pm$ 0.2) °C	38.9 $\pm$ 6 %	1.41 mho/m $\pm$ 6 %
Head TSL temperature during test	(21.0 $\pm$ 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	40.1 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.9 mW / g $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.1 ± 6 %	1.52 mho/m ± 6 %
Body TSL temperature during test	(21.8 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.93 mW / g
SAR normalized	normalized to 1W	39.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	39.4 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.18 mW / g
SAR normalized	normalized to 1W	20.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.6 mW / g ± 16.5 % (k=2)

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$51.8 \Omega + 6.4 j\Omega$
Return Loss	- 23.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$48.1 \Omega + 6.6 j\Omega$
Return Loss	- 23.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.194 ns
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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	December 17, 2002

DASY5 Validation Report for Head TSL

Date/Time: 18.04.2011 15:27:22

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d027

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL U12 BB

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2829)

Pin=250 mW, Cube 0:

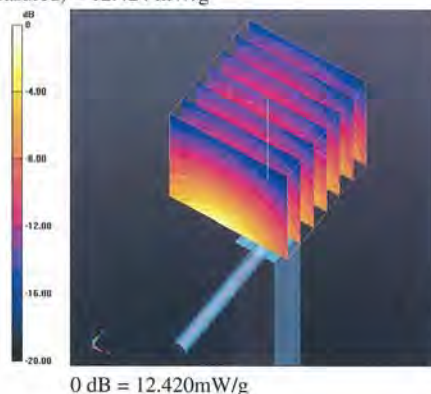
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.235 V/m; Power Drift = 0.05 dB

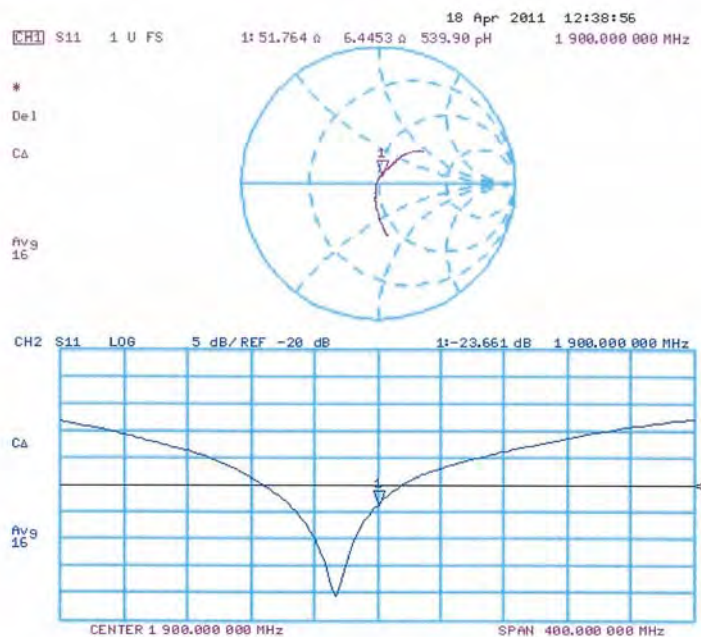
Peak SAR (extrapolated) = 18.650 W/kg

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.26 mW/g

Maximum value of SAR (measured) = 12.424 mW/g



Impedance Measurement Plot for Head TSL



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SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan. / 台北縣五股工業區五工路136之1號

t (886-2) 2299-3939

f (886-2) 2299-9489

www.sgs.com.tw

DASY5 Validation Report for Body TSL

Date/Time: 19.04.2011 12:53:51

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d027

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: MSL U12 BB

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 51.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2829)

Pin=250 mW, Cube 0:

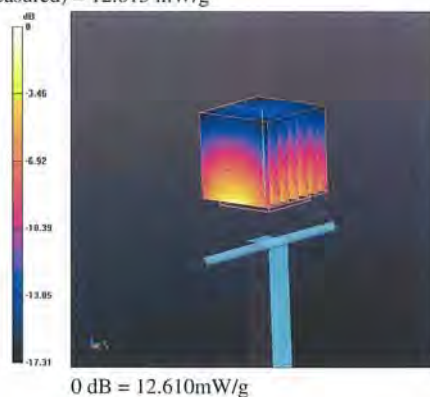
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.170 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.156 W/kg

SAR(1 g) = 9.93 mW/g; SAR(10 g) = 5.18 mW/g

Maximum value of SAR (measured) = 12.615 mW/g



Certificate No: D1900V2-5d027_Apr11

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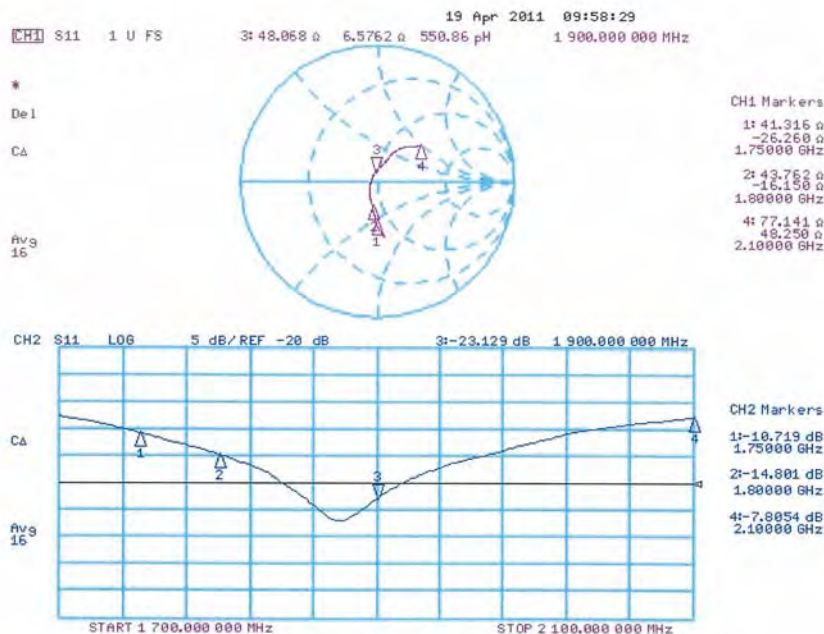
No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan. / 台北縣五股工業區五工路136之1號

t (886-2) 2299-3939

f (886-2) 2299-9489

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Impedance Measurement Plot for Body TSL



End of 1st part of report

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