TESTING
CNAS L2779

SAR Test Report

For Motorola FX-850C

FCC ID: U9S-FX850C

Application information:

DUT Type	Dual band GSM mobile phone
Trade Name / Mode(s)	FX-850C
FCC Classification	Licensed Portable Transmitter Held to Ear (PCE)
FCC Rule Part(s)	2.1093; FCC/OET Bulletin65 Supplement C [July 2001]
Application Type	Certification
Production Unit or Identical Prototype (47 CFR §2.908)	Identical prototype
Antenna type	external antenna
RF exposure limits	General Population / Uncontrolled

Device under test (DUT):

DUT ID	IMEI	HW Ver.	SW Ver.
MCN_XXXXX_0701L7000f01	00499901060000	P3.5	G1.0_S00.46U

Accessories of DUT

Accessories ID	Description	Type	Serial Number
MCN_XXXX_0701_L7000XYY	Charger	5V 600mA MCW4737A1-US	-

Executive Summary

The Motorola phone FX-850C (FCC ID: U9S-FX850C)is in compliance with the Federal Communications Commission (FCC) Guidelines [OET65, June 2001] for uncontrolled exposure. The tests were performed according to the FCC requirements, and no change was made to the DUT during the tests.

Issued by (Test Engineer):	Reviewed by:	Approved by:
Cai Jing		
Cai Jing, 2007-09-14	Liang Mao, 2007-09-14	Xiong Xiao Hong, 2007-09-14

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1 GENERAL INFORMATION

	Test Laboratory	Customer
Name:	Flextronics (China) Electronics Technology Co., Ltd. Flexmobile Test Laboratory	i-Sirius Co., Ltd
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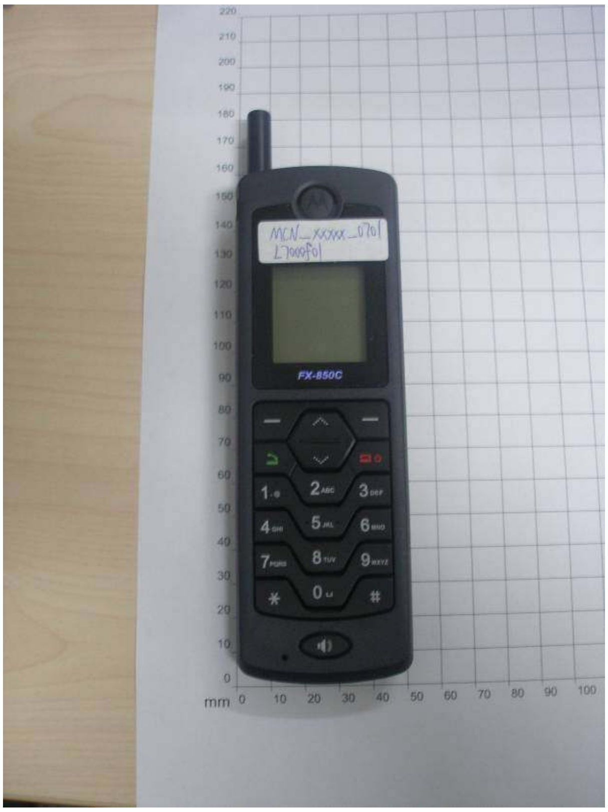
2 SUBJECT OF INVESTIGATION

Picture of the Device under test



The objective of the measurements done by FlexMobile test laboratory was the dosimetric assessment. The examinations have been carried out with the dosimetric assessment system “DASY4” described in clause 5 below.

3 STANDARD

In USA the recent FCC exposure criteria [OET 65] are based upon the IEEE Standard C95.1 [IEEE C95.1]. The IEEE standard C95.a sets limits for human exposure to radio frequency electromagnetic in the frequency range 3 kHz to 300GHz.

3.1 Distinction between exposed population, duration of exposure and frequencies

The American standard [IEEE C95.1] distinguishes between controlled and uncontrolled environment. Controlled environments are locations where there is exposure that may be incurred by persons who are aware of the potential for exposure as a concomitant of employment or by other cognizant persons. Uncontrolled environments are locations where there is the exposure of individuals who have no knowledge or control of their exposure. The exposures may occur in living quarters or workplaces. For exposure in controlled environments higher field strengths are admissible. In addition the duration of exposure is considered.

Due to the influence of frequency on important parameters, as the penetration depth of the electromagnetic fields into the human body and the absorption capability of different tissues, the limits in general vary with frequency.

3.2 Distinction between Maximum Permissible Exposure and SAR Limits

The biological relevant parameter describing the effects of electromagnetic fields in the frequency range of interest is the specific absorption rate SAR (dimension: power/mass). It is a measure of the power absorbed per unit mass. The SAR may be spatially averaged over the total mass of an exposed body or its parts. The SAR is calculated from the R.M.S. electric filed strength E inside the human body, the conductivity σ and the mass density ρ of the biological tissue:

$$SAR = \sigma \frac{E^2}{\rho} = c \left. \frac{\partial T}{\partial t} \right|_{t \to 0+}$$

The specific absorption rate describes the initial rate of temperature rise $\partial T/\partial t$ as a function of the specific heat capacity c f the tissue. A limitation of the specific absorption rate perverts an excessive heating of the human body by electromagnetic energy.

As it is sometimes difficult to determine the SAR directly by measurement (e.g. whole body averaged SAR), the standard specifies more readily measurable maximum permissible exposures in terms of external electric E and magnetic field strength H and power density S, derived from the SAR limits. The limits for E, H and S have been fixed so that even under worst case conditions, the limits for the specific absorption rate SAR are not exceeded.

3.3 SAR limit

In this report the comparison between the American exposure limits and the measured data is made using the peak spatial-average SAR; the power level of the device under test guarantees that the whole body averaged SAR is not exceeded.

Having in mind a worst case consideration, the SAR limit is valid for uncontrolled environment and mobile respectively portable transmitters. According to table below the SAR values have to be averaged over a mass of 1g (SAR_{1g}) with the shape of a cube.

Relevant peak spatial-average SAR limit averaged over a mass of 1g.

Exposure limits	SAR(mw/g)	
	General Population/Uncontrolled Environment	Occupational/Controlled Exposure Environment
Spatial Average ANSI (Averaged over the whole body)	0.08	0.4
Spatial Peak ANSI (Averaged over any 1-g of tissue)	1.6	8.0
Spatial Peak ICNIRP/ANSI (hands/wrists/feet/ankles averaged over 10-g)	4.0	20.0
Localized SAR - ICNIRP - (Head and Trunk 10-g)	2.0	10.0

4 TEST PROCEDURE

IEEE has published a recommended practice for determining the peak spatial-average specific absorption rate (SAR) in the human body due to wireless communications devices [IEEE 1528-2003] for evaluation compliance of mobile phones with IEEE Standard C95.1 [IEEE C95.1]. The standard defines protocols of the measurement of the specific absorption rate (SAR) inside a simplified model of the head of users. It applies to mobile telecommunication equipment in the frequency range from 300 MHz to 3GHz intended to be operated while held next to the ear.

4.1 General requirements

The test shall be performed in a laboratory with an environment which avoids influence on SAR measurements by ambient EM sources and any reflection from the environment itself. The ambient temperature shall be in the range of 20°C to 24°C, and humidity in the range of 30% to 70% during the test.

4.2 Phantom requirements

The phantom is a simplified representation of the human anatomy and comprised of material with electrical properties similar to the corresponding tissues. The physical characteristics of the phantom model shall resemble the head and the neck of a user since the shape is a dominant parameter for exposure.

The shell of the phantom shall be made of low permittivity material and the thickness tolerance shall be ±0.2mm. Additionally the phantom shall enable to simulate both right and left hand operation of the device under test.

For the measurements the Specific Anthropomorphic Mannequin (SAM) which meet these requirements, shall be used.

4.3 Brain & Muscle Simulating Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydroxethylcellullose (HEC) gelling agent and saline solution. Preservation with a bacteriacide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in the following table. Other head and body tissue parameters that have not bee specified in P1528 are derived from the issue dielectric parameters computed from the 4-Cole-Cole equations.

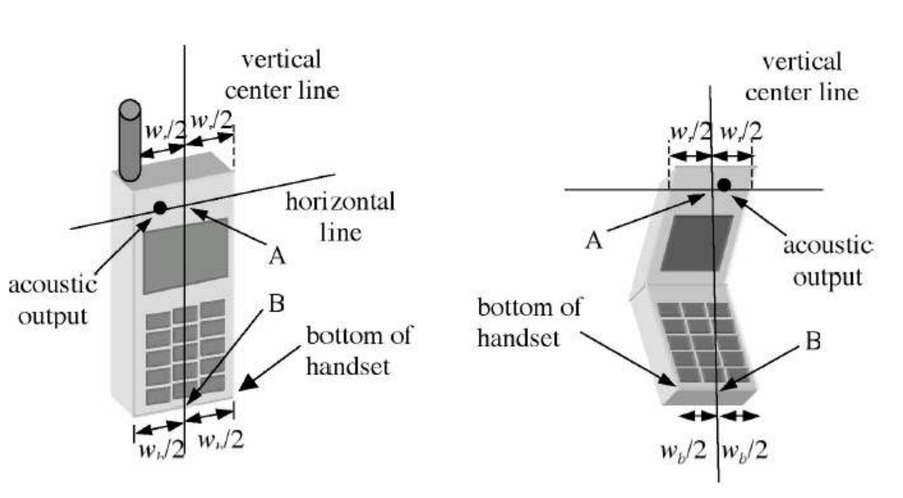
Composition of the Brain & Muscle Tissue Equivalent Matter

INGREDIENTS	SIMULATING TISSUE			
	835MHz Brain	835MHz Muscle	1900MHz Brain	1900MHz Muscle
Water	40.29	50.75	55.24	70.17
DGBE	0	0	44.45	29.44
Sugar	57.90	48.21	0	0
Salt	1.38	0.94	0.31	0.39
Cellulose	0.24	0.00	0	0
Preventol	0.18	0.10	0	0

4.4 Test positions

As it cannot be expected that the user will hold the mobile phone exactly in one well defined position, different operational conditions shall be tested, the IEEE standard requires two test positions. For an exact description helpful geometrical definitions are introduced and shown in the below figure.

There are two imaginary lines on the mobile, the vertical centerline and the horizontal line. The vertical centerline passes though two points on the front side of the handset: the midpoint of the width w_t of the handset at the level of the acoustic output (point A on the below figure), and the midpoint of the width w_b of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The two lines intersect at point A.

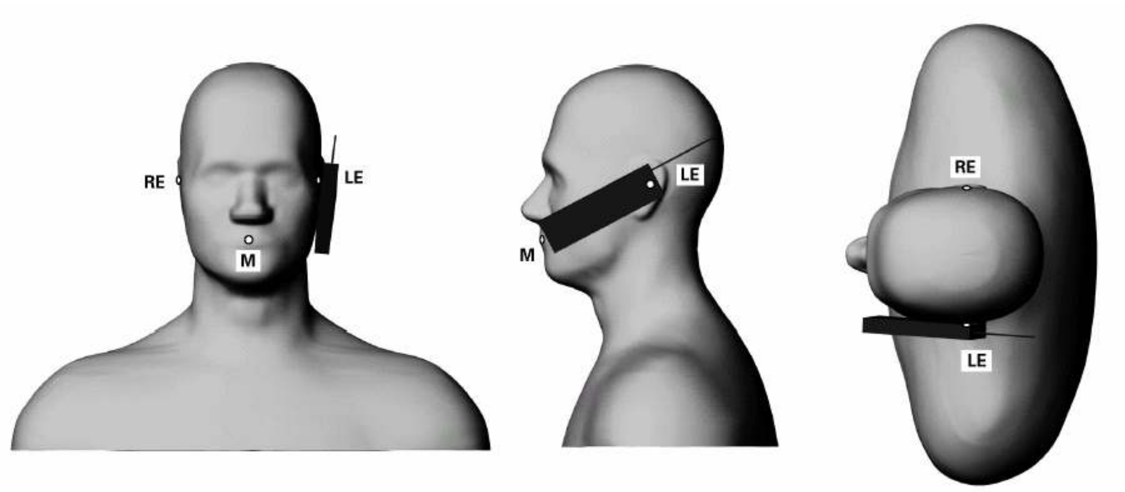


According to below the human head position is given by means of the following three reference points: auditory canal opening of both ears (RE and LE) and the center of the closed moth (M). The ear reference points are 15-17 mm above the entrance t the ear canal along the BM line (back-month), as shown in the below figure. The plane passing through the two ear canals and M is defined as the reference plane. The line NF (Neck-Front) perpendicular to the reference plane and passing through the RF (or LE) is called the reference pivoting line. Line BM is perpendicular to the NF line. With these definitions the test positions are given by:

- Cheek position:

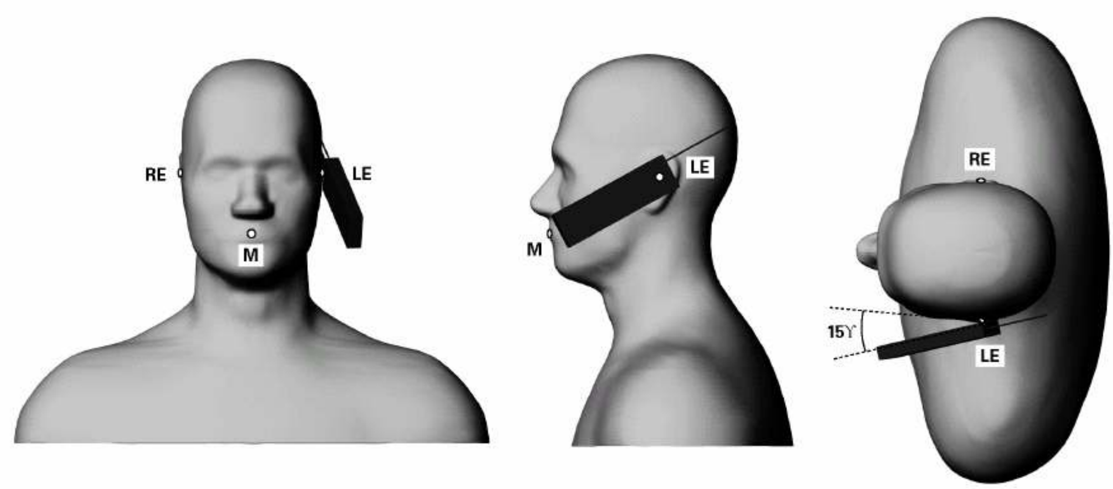
Position the handset close to the surface of phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom, such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom. Translate the handset towards the phantom along the line passing through RE and LE until the handset touches the ear. While maintaining the handset in this plane, rotate it around handset touches the ear. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to MB-NF including the line MB (called the reference plane). Rotate the phone around the vertical centerline until the phone (horizontal line) is symmetrical with respect to the line NF. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, rotate the handset about the line NF until any point any point on the handset is in contact with a phantom point below the ear.

The cheek position:



- Tilted position:

While maintaining the orientation of the phone, retract the phone parallel to the reference plane, which is far enough to enable a rotation of the phone by 15°. Rotate the phone around the horizontal line by 15°. While maintaining the orientation of the phone, move the phone parallel to the reference plane until any part of the phone touches the head. In this position, point A will be located on the line RE-LE.



4.5 Test to be performed

The SAR test shall be performed with both phone positions described above, on the left and right side of the phantom. The devices shall be measured for all modes operation when the device is next to the ear, even if the different models operate in the same frequency band. First the SAR test shall be performed using the center frequency of each available operating band and mode with the maximum peak power level. At the device position with highest SAR (check or tilted, left and right), the test is repeated at lowest and highest frequency. In addition, for all other device positions respectively configurations where the spatial peak SAR value is within 2dB of the 1.6W/kg limit, the lowest and highest frequencies should be tested.

For devices with retractable antenna all of the tests described above shall be performed with the antenna fully extended and fully retracted. Other factors that may affect the exposure should also be tested. For example, optional antennas or optional battery packs which may significantly change the volume, lengths, flip open/closed, etc. of the device, or any other accessories which might have the potential to considerably increase the peak spatial-average SAR value.

5 TEST EQUIPMENT

5.1 Location of Test Equipment

Testing was performed at FlexMobile Test Laboratory.

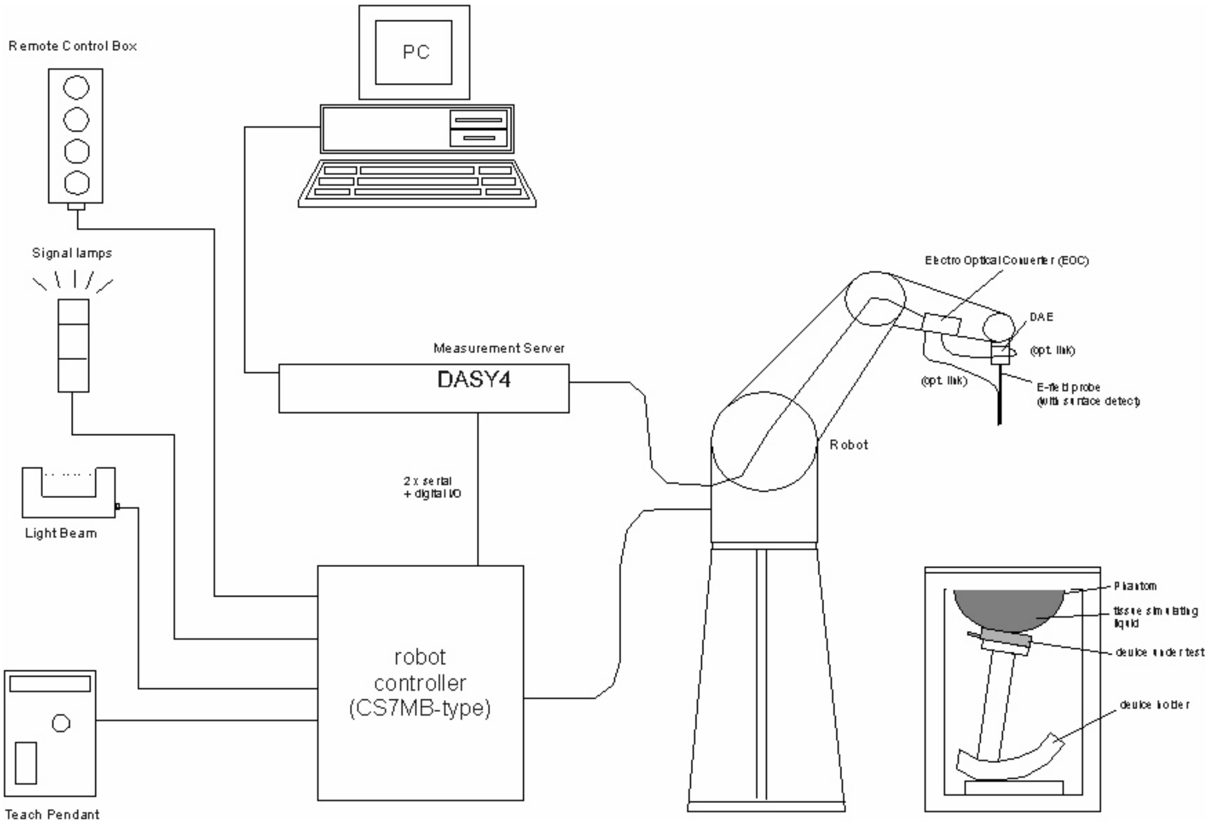
5.1.1 Test Equipment List

DASY is an abbreviation of "**D**osimetric **A**ssessment **Sy**stem" and describes a system that is able to determine the SAR distribution inside a phantom of a human being according to different standards. The DASY4 system consists of the following items:

TYPE	ITEM	S/N	CALIBRATION DATE	DUE DATE
CMU200	Wireless Communication Test Set	109172	2007-03-12	2008-03-12
ES3DV3	probe	3109	2006-05-24	2007-11-24
SD000D04BC	DAE4	685	2006-11-15	2007-11-15
D900V2	dipole	1d032	2006-05-16	2007-11-16
D2450V2	dipole	787	2006-05-19	2007-11-19
D1900V2	dipole	5d072	2006-05-22	2007-11-22
D835V2	dipole	4d038	2006-05-23	2007-11-23
D1800V2	dipole	2d126	2006-05-18	2007-11-18
NRVD	Power Meter	835843/014	2006-12-4	2007-12-4
SME03	Signal Generator	100029	2006-12-11	2007-12-11
NRV-Z4	Power Sensor	100381	2006-09-28	2007-09-28
NRV-Z4	Power Sensor	100382	2006-09-28	2007-09-28
NRV-Z2	Power Sensor	100211	2006-09-28	2007-09-28
8491B	Attenuator	MY39262528	NA	NA
8491B	Attenuator	MY39262663	NA	NA
8491B	Attenuator	MY39262640	NA	NA
8491B	Attenuator	MY39262638	NA	NA
778D	Dual directional coupler	20040	NA	NA
E3640A	DC Power Supply	MY40008487	2007-08-14	2008-08-13
85070E	Probe kit	MY44300214	N.A.	N.A.
E5071B	Network Analyzer	MY42404001	2007-06-18	2008-06-17

5.1.2 Test System Setup

Tests are performed in setup according to the scheme below:



5.2 Measurement Procedure

The following steps are used for each test position:

1. The SAR measurement was taken at a selected spatial reference point to monitor power variations during testing. This fixed location point was measured and used as a reference value.

2. The SAR distribution at the exposed side of the head was measured at a distance of 3.9mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm x 15mm.

3. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

a. The data at the surface was extrapolated, since the center of the dipoles is 2.7mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated

through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

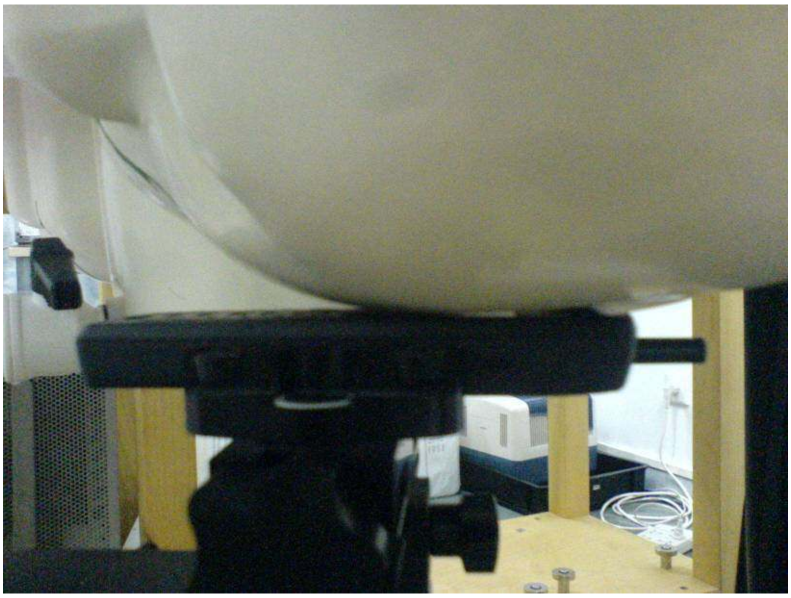
b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

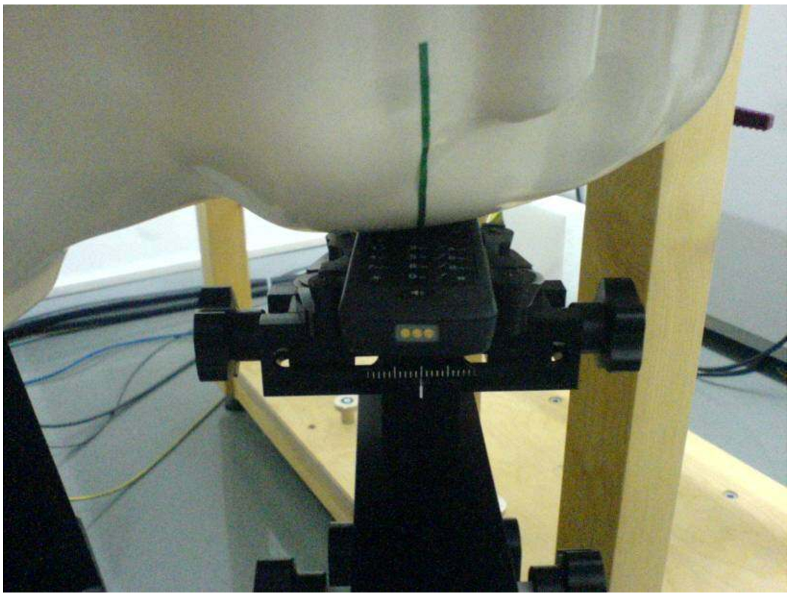
c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as procedure #1, was remeasured. If the value changed by more than 5%, the evaluation is repeated.

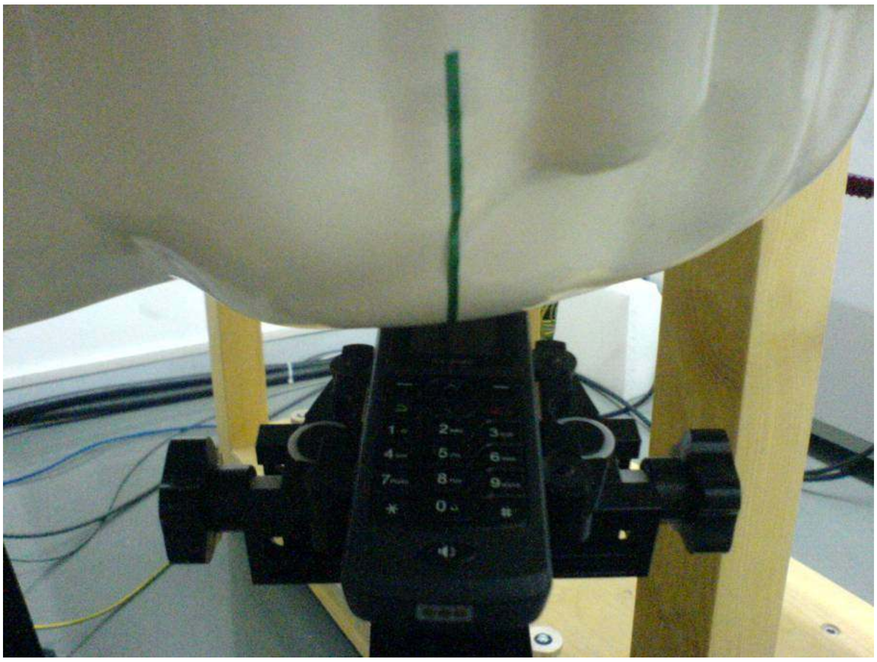
5.3 Test positions for device under test

Head SAR touch position:

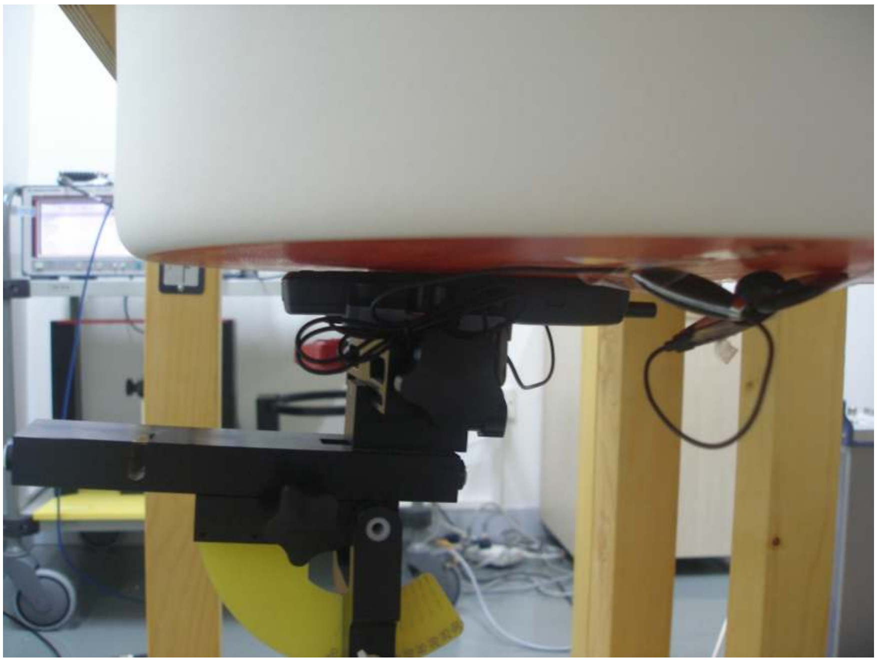




Head SAR tilt position:



Body SAR front position:



Body SAR back position

5.4 Test environment

	Ambient humidity (%)	Ambient temperature (°C)	Liquid temperature (°C)
standard	30~~70	20~~24	20~~24
Date: 2007-08-03	55	23	22.4
Date: 2007-08-07	52	23	21.5
Date: 2007-09-13	56	22	22.0
Date: 2007-09-14	60	21.5	21.3

5.5 Liquid parameters

Prior to conducting SAR measurements, the relative permittivity ε_r, and the conductivity σ , of the tissue simulating liquids were measured with the Dielectric Probe Kit These values of the tissue simulate are shown in the table below. The recommended limits for maximum permittivity and minimum conductivity are also shown.

Date: 2007-08-03

Frequency	Tissue Type	Type	Dielectric Parameters	
			permittivity	conductivity
835	Head	Target	41.5	0.90
		±5% window	39.425~43.975	0.855~0.945
		Measured	42.1	0.879

Date: 2007-08-07

Frequency	Tissue Type	Type	Dielectric Parameters	
			permittivity	conductivity
1900	Head	Target	40.00	1.40
		±5% window	38.000~42.000	1.330~1.470
		Measured	38.35	1.44

Date: 2007-09-13

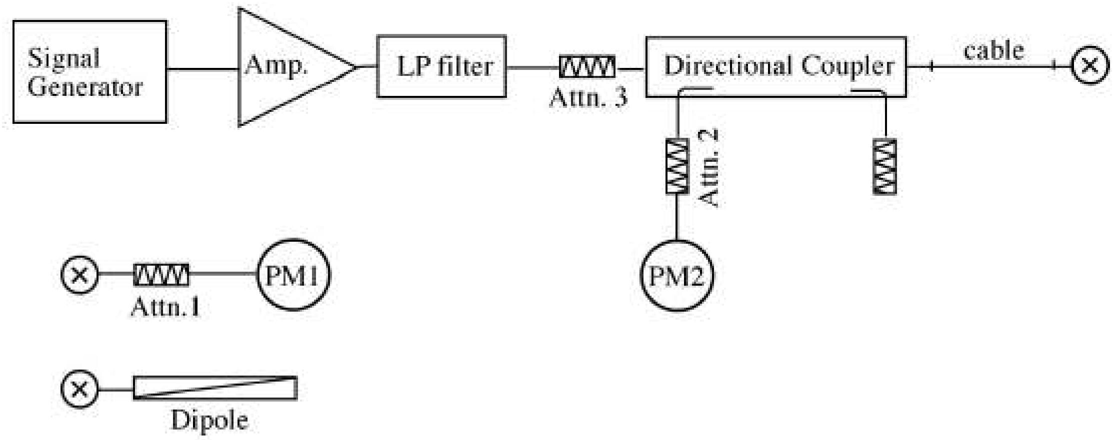
Frequency	Tissue Type	Type	Dielectric Parameters	
			permittivity	conductivity
835	Body	Target	55.2	0.97
		±5% window	52.440~57.960	0.922~1.019
		Measured	55.5	0.994

Date: 2007-09-14

Frequency	Tissue Type	Type	Dielectric Parameters	
			permittivity	conductivity
1900	Body	Target	53.3	1.52
		±5% window	50.635~55.965	1.444~1.596
		Measured	53.41	1.595

5.6 System performance check

A system check measurement was made following the determination of the dielectric parameters of the tissue simulating liquids using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. For power setup, please see the following pictures:



The figure shows the recommended setup. The PM1 (incl. Att1) measures the forward power at the location of the system performance check dipole connector. The signal generator is adjusted for the desired forward power at the dipole connector and the power meter PM2 is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2. The system checking results are given in the table below. Please see Annex B for detailed report.Please see Annex B for detailed report.

Date:	Tissue	Input Power (mW)	Targeted SAR_{1g} (mW/g)	Measured SAR_{1g} (mW/g)	Deviation (%) (<±10%)
2007-08-03	835Mhz Head	250	2.32	2.52	8.6
2007-08-07	1900Mhz Head	250	9.5	10.2	7.4
2007-09-13	835Mhz Body	250	2.43	2.56	5.3
2007-09-14	1900Mhz Body	250	10.3	10.9	5.8

6 SAR RESULTS AND EVALUATION

6.1 Measurement Result

Test procedures used are according to FCC/OET Bulletin 65, Supp.C[July2001].

Liquid tissue depth is 15.1±0.1 cm.

The Device (FCC ID U9S-FX850C) has the 600mAH model 611A020000F as the only battery option. This battery was used to do all of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery.

The device should be tested on the left and right side of the head phantom in the "Cheek/Touch" and "Ear/Tilt" positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tile/Ear, extended and retracted) is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

Please be notified that according to the declaration from customer (the declaration should be sent to FCC with this report), the belt clip of the device is pure plastic without any metal in it. In the body SAR test part, instead of the belt clip, 0mm space between the phantom and the device is used.

The phone has an earphone slot, but no earphone is supplied in the standard packet. So a representative earphone is used in the body SAR test, the picture of the earphone is shown below.

Measured conductive power

GSM850	Channel	128	190	251
	Conductive power (dBm)	32.5	32.6	32.8
GSM1900	Channel	512	661	810
	Conductive power (dBm)	29.4	29.4	29.5

The tables below contain the measured Head SAR values averaged over a mass of {1g}

Phantom configuration	Test position	SAR_{1g} [W/kg] / Power Drift[dB]		
		Channel 128[low] 824.20 MHz	Channel 190[Mid] 836.60 MHz	Channel 251 [high] 848.80 MHz
Left side of Head	Cheek	-	0.994 / -0.188	-
	Tilted	-	0.448/ -0.017	-
Right side of Head	Cheek	1.07/ 0.109	1.07/ -0.036	**1.15/ 0.019 ***
	Tilted	-	0.535/ -0.040	-

*Maximum 1g SAR result specified in annex A,
File Name: Moto FX-850c_GSM850_RC_#00499901060000_070803.da4

The tables below contain the measured Head SAR values averaged over a mass of {1g}

Phantom configuration	Test position	SAR_{1g} [W/kg] / Power Drift[dB]		
		Channel 512[low] 1850.2 MHz	Channel 661[Mid] 1880.0 MHz	Channel 810 [high] 1909.8 MHz
Left side of Head	Cheek		0.639/ 0.028	-
	Tilted		0.692/ 0.023	-
Right side of Head	Cheek	-	0.923/ -0.127	-
	Tilted	**1.03/ -0.015 ***	0.944/ 0.003	0.949/ 0.008

*Maximum 1g SAR result specified in annex A
File Name: Moto FX-850c_PCS1900_RT_#00499901060000_070807.da4

The tables below contain the measured Body SAR values averaged over a mass of {1g}

DUT configuration	Test position	SAR_{1g} [W/kg] / Power Drift[dB]		
		Channel 128[low] 824.20 MHz	Channel 190[Mid] 836.60 MHz	Channel 251 [high] 848.80 MHz
Front side	0mm	0.997 / 0.0166	1.07 / -0.181	**1.21 / 0.0481 ***
Back side	0mm	-	0.869 / 0.0754	-

*Maximum 1g SAR result specified in annex A
File Name: Moto FX-850c_GSM850_FB_#00499901060000_070913_touch.da4

The tables below contain the measured Body SAR values averaged over a mass of {1g}

DUT configuration	Test position	SAR_{1g} [W/kg] / Power Drift[dB]		
		Channel 512[low] 1850.2 MHz	Channel 661[Mid] 1880.0 MHz	Channel 810 [high] 1909.8 MHz
Front side	0mm	**1.42 / -0.0218 ***	1.15 / -0.0556	1.15 / 0.00333
Back side	0mm	-	0.806 / -0.0619	-

*Maximum 1g SAR result specified in annex A
File Name: Moto FX-850c_PCS1900_FB_#00499901060000_070914_touch.da4

6.2 Summary and comparison to the limit

All test results are passed the uncontrolled SAR limit of 1.6W/kg.

7 REFERENCE DOCUMENT

The DUT has been tested at Flextronics Mobile Test Laboratory according to the reference documents given below.

[1] Federal Communications Commission: Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields, Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01), FCC, 2001.
[2] IEEE Std C95.1-1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, Inst. of Electrical and Electronics Engineer, Inc., 1999.
[3] IEEE Std 1528-2003: IEEE Recommended Practice for Determining the Peak Spatial-Average Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques. 1528-2003, December 19, 2003.the Institute of Electrical and Electronics Engineers.

[4] Schmid & Partner Engineering AG, DASY4 Manual, February 2004 17-5

APPENDIX A: DETAILED MEASUREMENT REPORT

File Name: Moto FX-850c_GSM850_RC_#00499901060000_070803.da4

DUT: moto FX-850c; IMEI:00499901060000 ; Position: Cheek

Communication System: GSM850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): f = 848.8 MHz; $\sigma = 0.89$ mho/m; $\varepsilon_r = 42$; $\rho = 1000$ kg/m^3
Ambient humidity:55%; Ambient temperature: 23 ℃; Liquid temperature: 22.4 ℃
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(5.85, 5.85, 5.85); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-11-15
- Phantom: SAM with Right; Type: QD 000 P40 CA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

high/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.19 mW/g

high/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.2 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.823 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.21 mW/g

0 dB = 1.21mW/g

File Name: Moto FX-850c_PCS1900_RT_#00499901060000_070807.da4

DUT: moto FX-850c; IMEI:00499901060000; Position: Tilt

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.39 mho/m; ε_r = 38.5; ρ = 1000 kg/m^3
Ambient humidity:52%; Ambient temperature: 23 ℃; Liquid temperature: 21.5 ℃
Phantom section: Right Section

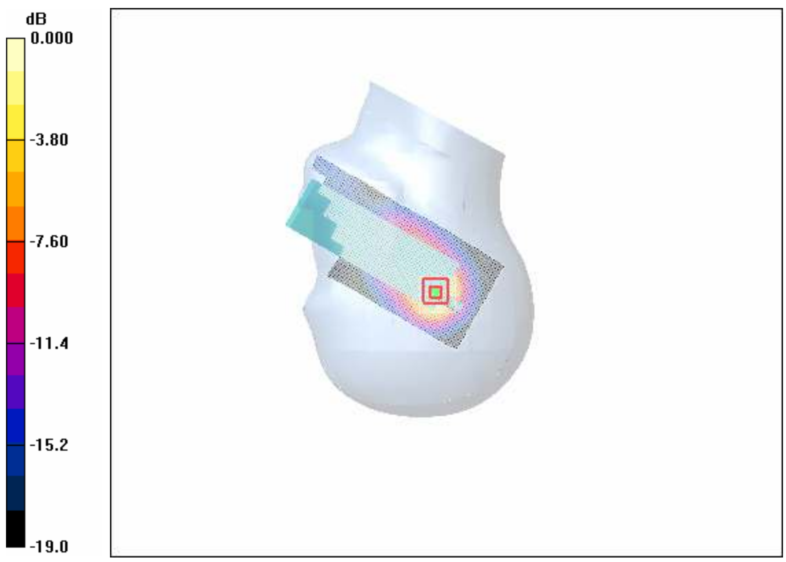
DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(4.85, 4.85, 4.85); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-11-15
- Phantom: SAM with Front; Type: QD 000 P40 CA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

low/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.27 mW/g

low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.7 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 1.74 W/kg
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.570 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.13 mW/g



0 dB = 1.13mW/g

File Name: Moto FX-850c_GSM850_FB_#00499901060000_070913_touch.da4

DUT: moto FX-850c; IMEI:00499901060000 ; Position: Front

Communication System: GSM850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 848.8 MHz; σ = 1.01 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3 ;
Medium Notes: Ambient humidity:56%; Ambient temperature: 22 ^{o}C; Liquid temperature: 22 ^{o}C;
Phantom section: Flat Section ;Phantom: Flat Phantom ELI4.0;Type: QDOVA001B

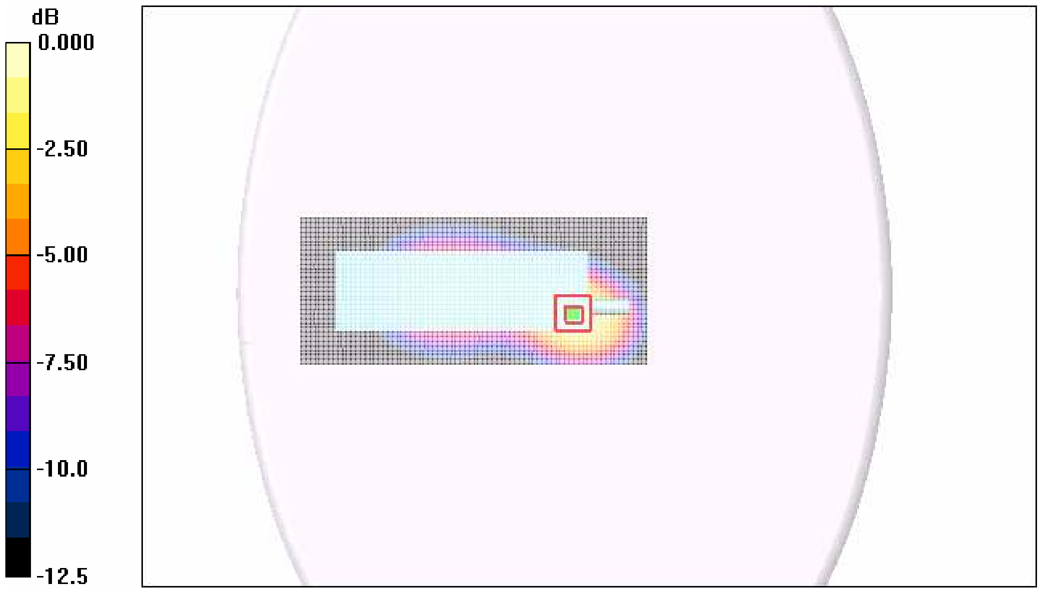
DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(5.82, 5.82, 5.82); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-4-3
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001B;

high/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.33 mW/g

high/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.0 V/m; Power Drift = 0.048 dB
Peak SAR (extrapolated) = 1.91 W/kg
SAR(1 g) = 1.21 mW/g; SAR(10 g) = 0.748 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.31 mW/g



0 dB = 1.31mW/g

File Name: Moto FX-850c_PCS1900_FB_#00499901060000_070914_touch.da4

DUT: moto FX-850c; IMEI:00499901060000 ; Position: Front

Communication System: PCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.55 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3 ;
Medium Notes: Ambient humidity:60%; Ambient temperature: 21.5 ^{o}C; Liquid temperature: 21.3 ^{o}C;
Phantom section: Flat Section ;Phantom: Flat Phantom ELI4.0;Type: QDOVA001BA

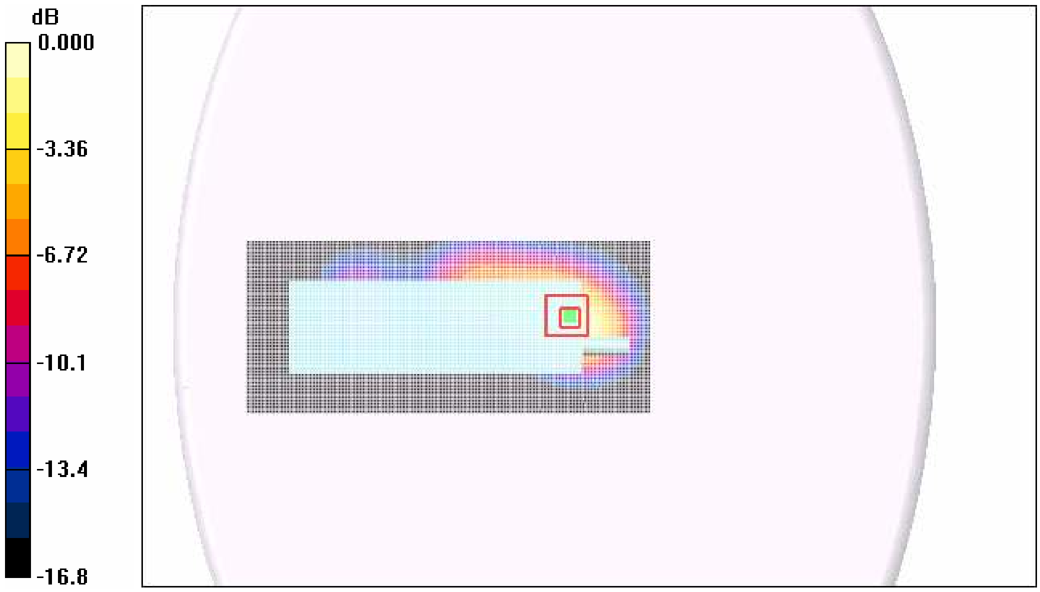
DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(4.44, 4.44, 4.44); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-4-3
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

low/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.65 mW/g

low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.7 V/m; Power Drift = -0.022 dB
Peak SAR (extrapolated) = 2.34 W/kg
SAR(1 g) = 1.42 mW/g; SAR(10 g) = 0.811 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.57 mW/g



0 dB = 1.57mW/g

APPENDIX B: SYSTEM PERFORMANCE CHECK REPORT

File Name: SystemPerformanceCheck-D835Mhz-070803.da4

DUT: Dipole 835 MHz;

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

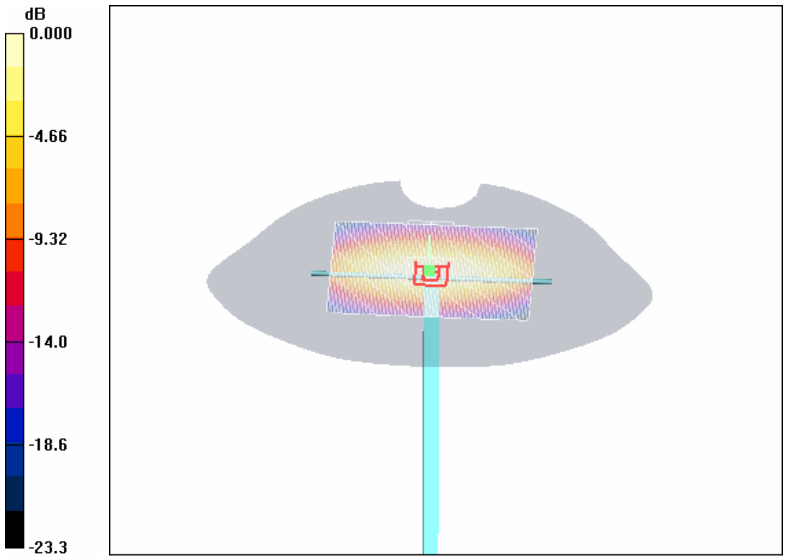
Medium parameters used (interpolated): f = 835 MHz; σ = 0.878 mho/m; ε_r = 42.2; ρ = 1000 kg/m^3
Ambient humidity:55%; Ambient temperature: 23 ℃; Liquid temperature: 22.4 ℃
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(5.85, 5.85, 5.85); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-11-15
- Phantom: SAM with Right; Type: QD 000 P40 CA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.032 dB
Peak SAR (extrapolated) = 3.76 W/kg
SAR(1 g) = 2.52 mW/g; SAR(10 g) = 1.65 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.73 mW/g

Unnamed procedure/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 2.69 mW/g



0 dB = 2.69mW/g

File Name: SystemPerformanceCheck-D1900MHz-070807.da4

DUT: Dipole 1900 MHz;

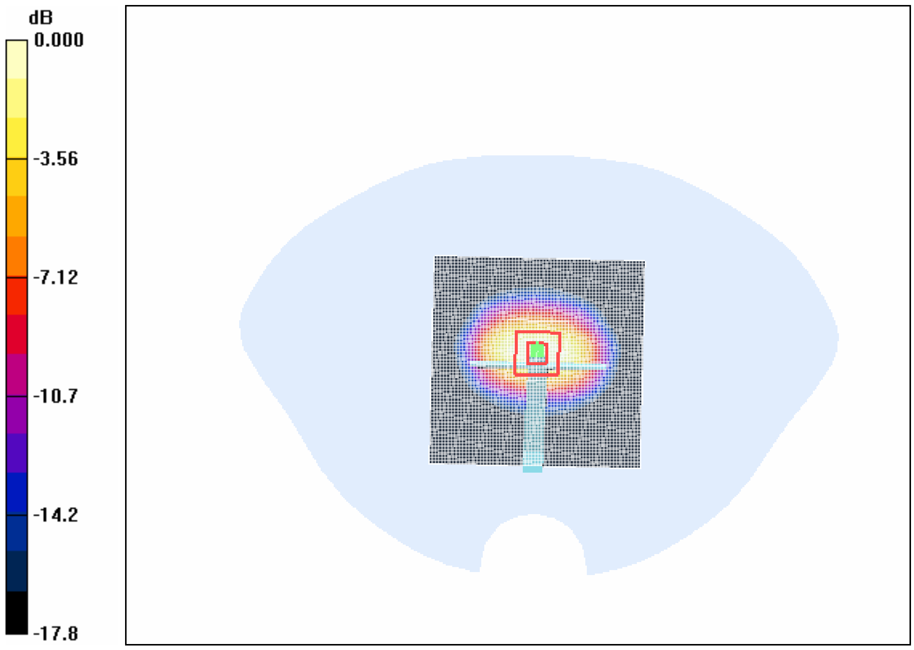
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.44 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3
Ambient humidity:52%; Ambient temperature: 23 ^{o}C; Liquid temperature: 21.5 ^{o}C
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(4.85, 4.85, 4.85); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-11-15
- Phantom: SAM with Front; Type: QD 000 P40 CA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

Unnamed procedure/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.3 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 83.7 V/m; Power Drift = -0.040 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.31 mW/g
Maximum value of SAR (measured) = 11.6 mW/g



0 dB = 11.6mW/g

File Name: SystemPerformanceCheck-D835Mhz-070913.da4

DUT: Dipole 835 MHz;

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.994 mho/m; ε_r = 55.5; ρ = 1000 kg/m^3 ;
Medium Notes: Ambient humidity:56%; Ambient temperature: 22^{o}C; Liquid temperature: 22^{o}C
Phantom section: Flat Section ;Phantom: Flat Phantom ELI4.0;Type: QDOVA001BA

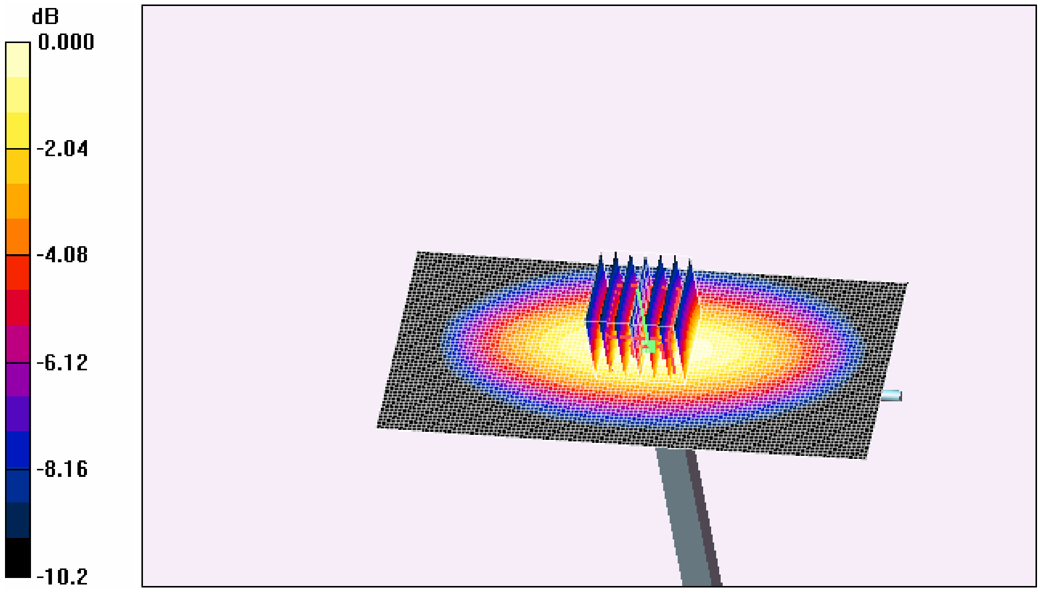
DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(5.82, 5.82, 5.82); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-4-3
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Unnamed procedure/Area Scan (51x111x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 2.76 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.4 V/m; Power Drift = -0.080 dB
Peak SAR (extrapolated) = 3.74 W/kg
SAR(1 g) = 2.56 mW/g; SAR(10 g) = 1.68 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.76 mW/g



0 dB = 2.76mW/g

File Name: SystemPerformanceCheck-Body-D1900MHz-070914.da4

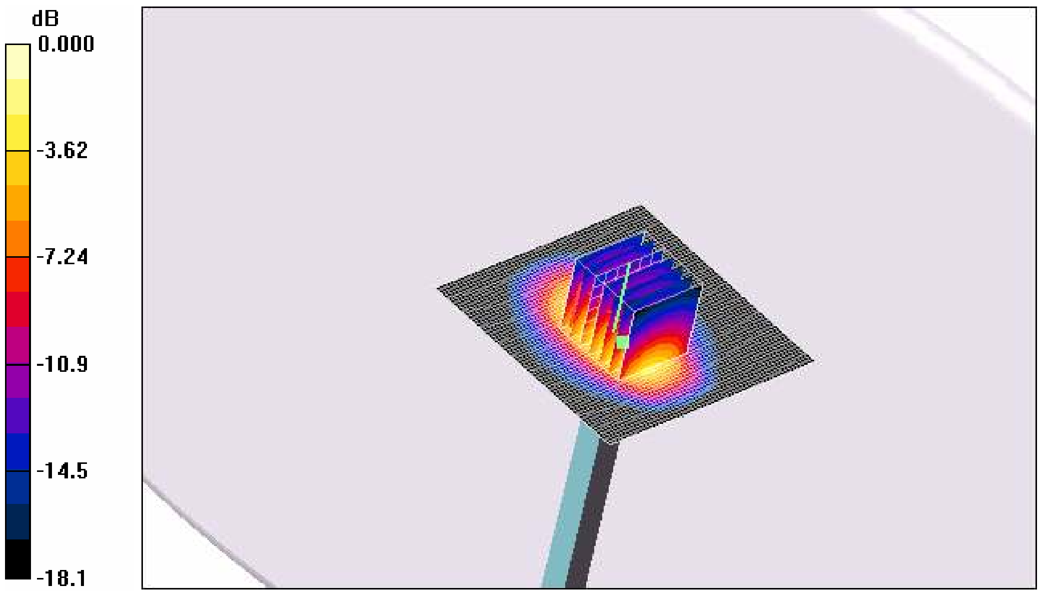
DUT: Dipole 1900 MHz;

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.59 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3 ;
Medium Notes: Ambient humidity:60%; Ambient temperature: 21.5; Liquid temperature: 21.3;
Phantom section: Flat Section ;Phantom: Flat Phantom ELI4.0;Type: QDOVA001BA

DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(4.44, 4.44, 4.44); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-4-3
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Unnamed procedure/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 13.7 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 80.9 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 19.0 W/kg
SAR(1 g) = 10.9 mW/g; SAR(10 g) = 5.7 mW/g
Maximum value of SAR (measured) = 12.4 mW/g



0 dB = 12.4mW/g

APPENDIX C: DIPOLE CERTIFICATION

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

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Swiss Calibration Service

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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: Flextronics (MTT)

Certificate No: D835V2-4d038_May06

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d038
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	May 23, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference 10 dB Attenuator	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference Probe ET3DV6	SN 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
DAE4	SN 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov-06

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

Issued: May 24, 2006

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

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Flextronics (MTT)**

Certificate No: **D1900V2-5d072_May06**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d072
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	May 22, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference 10 dB Attenuator	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference Probe ET3DV6	SN: 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
DAE4	SN: 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

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

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	M. Meili
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 24, 2006

APPENDIX D: PROBE CERTIFICATION

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

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Accreditation No.: SCS 108

Client **Flextronics CN (MTT)**

Certificate No: ES3-3109_May06

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3109
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	May 24, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	2-Feb-06 (SPEAG, No. DAE4-654_Feb06)	Feb-07

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

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

Issued: May 26, 2006

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

Certificate No: ES3-3109_May06 Page 1 of 9

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

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

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

Probe ES3DV3

SN:3109

Manufactured: September 20, 2005
Calibrated: May 24, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ES3DV3 SN:3109 May 24, 2006

DASY - Parameters of Probe: ES3DV3 SN:3109

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

NormX	**1.23** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**95** mV
NormY	**1.30** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**95** mV
NormZ	**1.28** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**95** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	5.7	2.6
SAR_{be} [%]	With Correction Algorithm	0.0	0.2

TSL 1750 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	4.0	1.8
SAR_{be} [%]	With Correction Algorithm	0.1	0.1

Sensor Offset

Probe Tip to Sensor Center **2.0** mm

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

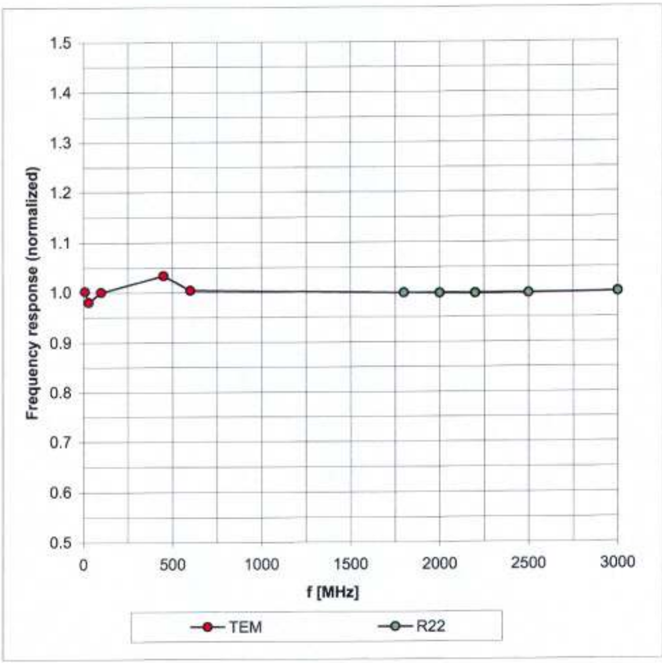
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).
[B] Numerical linearization parameter: uncertainty not required.

Certificate No: ES3-3109_May06 Page 4 of 9

ES3DV3 SN:3109 May 24, 2006

Frequency Response of E-Field

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

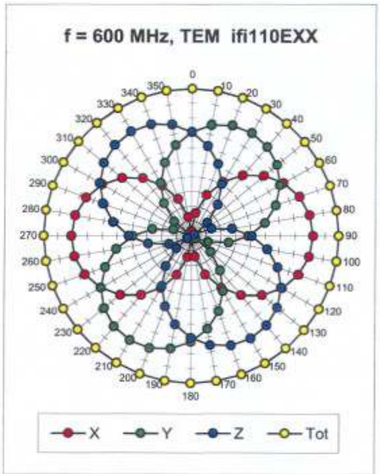


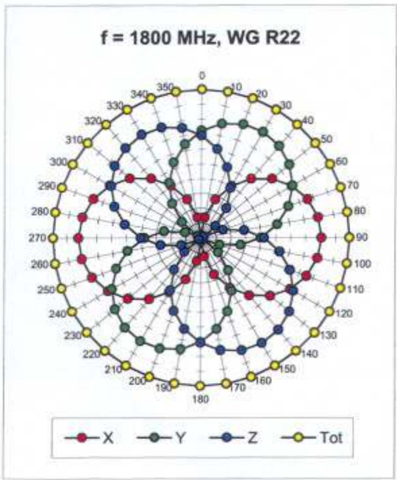
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

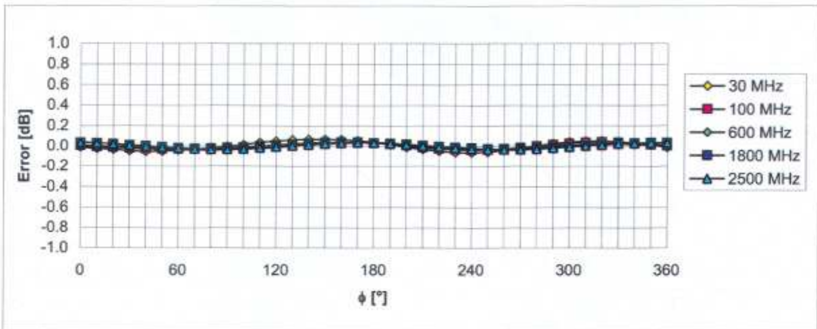
Certificate No: ES3-3109_May06 Page 5 of 9

ES3DV3 SN:3109 May 24, 2006

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







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

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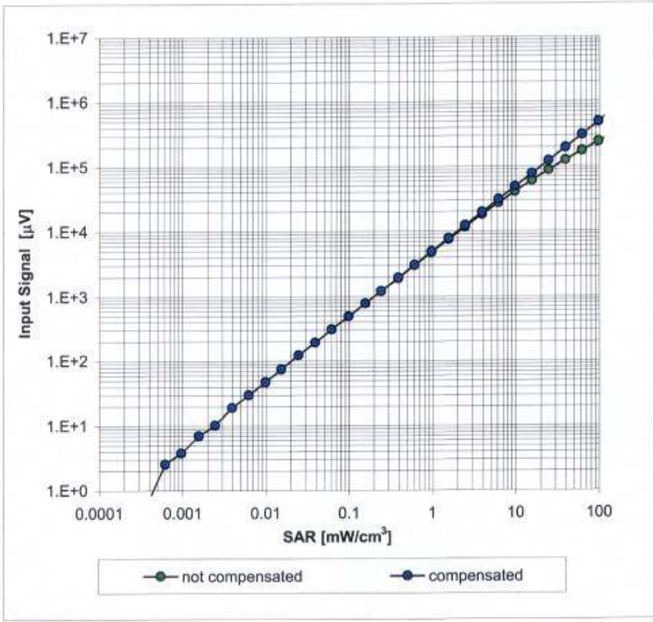
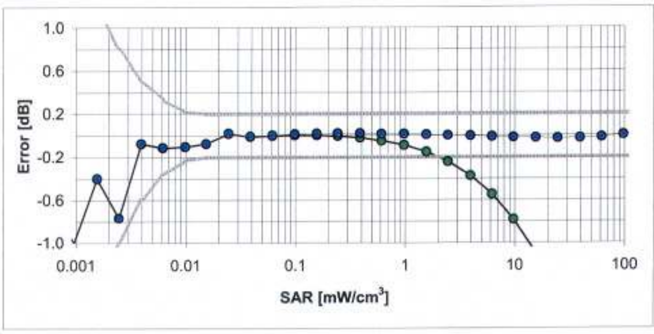
ES3DV3 SN:3109 May 24, 2006

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)





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

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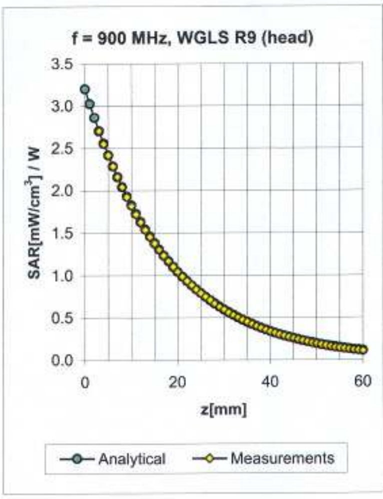
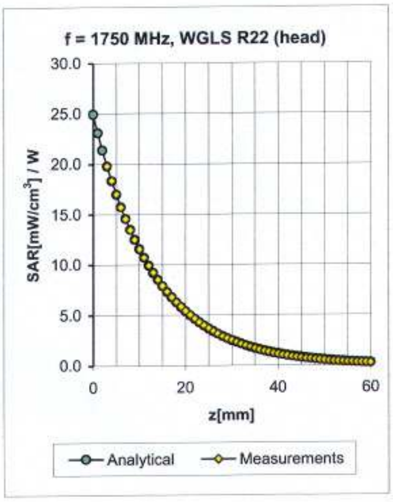
ES3DV3 SN:3109 May 24, 2006

Conversion Factor Assessment





f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.36	1.56	5.85 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.42	1.46	5.72 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.33	2.44	5.02 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.29	2.48	4.85 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.51	1.66	4.33 ± 11.8% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.43	1.47	5.82 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.47	1.41	5.66 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.26	2.89	4.61 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.31	2.51	4.44 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.64	1.42	4.08 ± 11.8% (k=2)

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

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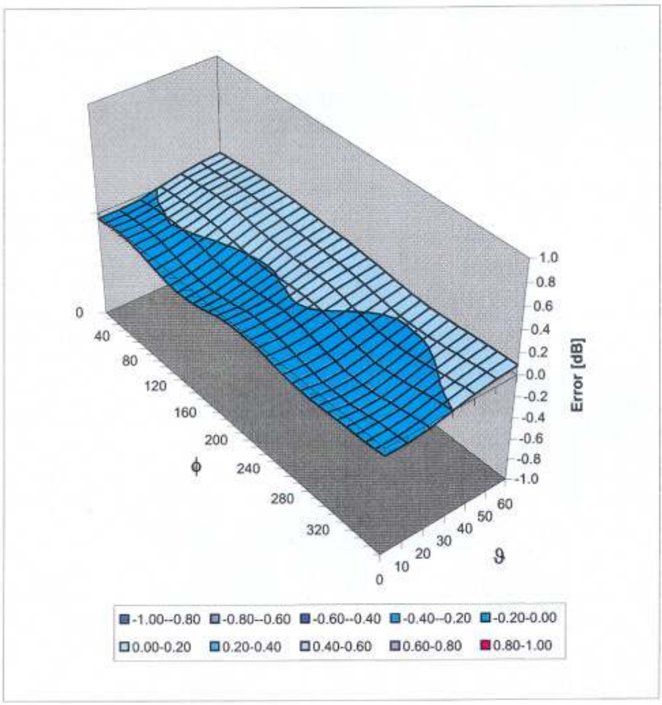
ES3DV3 SN:3109

May 24, 2006

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: ES3-3109_May06

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APPENDIX E: PHANTOM CONFORMITY

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 CA
Series No	TP-1150 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen 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 units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas; 6mm +/- 0.2mm at ERP	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
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	DEGMBE based simulating liquids	Pre-series, First article, Samples

Standards
[1] CENELEC EN 50361
[2] IEEE Std 1528-200x Draft CD 1.1 (Dec 02)
[3] IEC 62209/CD (Nov 02)
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity
Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 5.5.2003

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

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	Oval Flat Phantom ELI 4.0
Type No	QD OVA 001 B
Series No	1003 and higher
Manufacturer	SPEAG Zeughausstrasse 43 CH-8004 Zürich Switzerland

Tests
Complete tests were made on the prototype units QD OVA 001 AA 1001, QD OVA 001 AB 1002, pre-series units QD OVA 001 BA 1003-1005 as well as on the series units QD OVA 001 BB, 1006 ff.

Test	Requirement	Details	Units tested
Dimensions	Compliant with the standard IEC 62209 – 2 [1] requirements	Dimensions of bottom for 300 MHz – 6 GHz: longitudinal = 600 mm (max. dimension) width= 400 mm (min dimension) depth= 190 mm Shape: ellipse	Prototypes, Samples
Material thickness	Compliant with the standard IEC 62209 – 2 [1] requirements	Bottom plate: 2.0mm +/- 0.2mm	Prototypes, All items
Material parameters	Dielectric parameters for required frequencies	300 MHz – 6 GHz Rel. permittivity = 4 +/-1, Loss tangent ≤ 0.05	Material sample
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	Equivalent phantoms, Material sample
Sagging	Compliant with the requirements according to the standard. 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] IEC 62209 – 2, Draft Version 0.9, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation and Procedures
Part 2: Procedure to determine the Specific Absorption Rate (SAR) for ... including accessories and multiple transmitters", December 2004

Conformity
Based on the sample tests above, we certify that this item is in compliance with the standard [1].

Date 07.07.2005

Signature / Stamp
s p e a g
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Doc No 881 – QD OVA 001 B - C Page 1 (1)

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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 CA
Series No	TP-1150 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen 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 units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas; 6mm +/- 0.2mm at ERP	First article, Samples
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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	DEGMBE based simulating liquids	Pre-series, First article, Samples

Standards
[1] CENELEC EN 50361
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(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity
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Date 5.5.2003

Signature / Stamp

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Doc No 881 – QD 000 P40 CA – C Page 1 (1)

APPENDIX F: UNCERTAINTY BUDGET

It includes the uncertainty budget suggested by the [IEEE P1528] and determined by Schmid & Partner Engineering AG. **The expanded uncertainty (K=2) is assessed to be ±20.6%**.

Error Sources	Uncertainty Value	Probability Distribution	Divisor	C_i	Standard Uncertainty	V_i
Probe calibration	±4.8%	Normal	1	1	±4.8%	∝
Axial isotropy	±4.7%	Rectangular	$\sqrt{3}$	0.7	±1.9%	∝
Hemispherical isotropy	±9.6%	Rectangular	$\sqrt{3}$	0.7	±3.9%	∝
Boundary effects	±1.0%	Rectangular	$\sqrt{3}$	1	±0.6%	∝
Linearity	±4.7%	Rectangular	$\sqrt{3}$	1	±2.7%	∝
System detection limit	±1.0%	Rectangular	$\sqrt{3}$	1	±0.6%	∝
Readout electronics	±1.0%	Normal	1	1	±1.0%	∝
Response time	±0.8%	Rectangular	$\sqrt{3}$	1	±0.5%	∝
Integration time	±2.6%	Rectangular	$\sqrt{3}$	1	±1.5%	∝
RF ambient conditions	±3.0%	Rectangular	$\sqrt{3}$	1	±1.7%	∝
Probe positioner	±0.4%	Rectangular	$\sqrt{3}$	1	±0.2%	∝
Probe positioning	±2.9%	Rectangular	$\sqrt{3}$	1	±1.7%	∝
Algorithms for max SAR eval.	±1.0%	Rectangular	$\sqrt{3}$	1	±0.6%	∝
Test Sample Related						
Device positioning	±2.9%	Rectangular	$\sqrt{3}$	1	±2.9%	145
Device holder	±3.6%	Normal	1	1	±3.6%	5
Power drift	±5.0%	Rectangular	$\sqrt{3}$	1	±2.9%	∝
Phantom and set-up			$\sqrt{3}$			
Phantom uncertainty	±4.0%	Rectangular	$\sqrt{3}$	1	±2.3%	∝
Liquid conductivity (target)	±5.0%	Rectangular	$\sqrt{3}$	0.64	±1.8%	∝
Liquid conductivity (meas.)	±2.5%	Normal	1	0.64	±1.6%	∝
Liquid permittivity (target)	±5.0%	Rectangular	$\sqrt{3}$	0.6	±1.7%	∝
Liquid permittivity (meas.)	±2.5%	Normal	1	0.6	±1.5%	∝
Combined Uncertainty					±10.3%	

------------------------------END OF THIS REPORT----------------------------

TESTING
CNAS L2779

SAR Test Report

For Motorola FX-850C

FCC ID: U9S-FX850C

Application information:

DUT Type	Dual band GSM mobile phone
Trade Name / Mode(s)	FX-850C
FCC Classification	Licensed Portable Transmitter Held to Ear (PCE)
FCC Rule Part(s)	2.1093; FCC/OET Bulletin65 Supplement C [July 2001]
Application Type	Certification
Production Unit or Identical Prototype (47 CFR §2.908)	Identical prototype
Antenna type	external antenna
RF exposure limits	General Population / Uncontrolled

Device under test (DUT):

DUT ID	IMEI	HW Ver.	SW Ver.
MCN_XXXXX_0701L7000f01	00499901060000	P3.5	G1.0_S00.46U

Accessories of DUT

Accessories ID	Description	Type	Serial Number
MCN_XXXX_0701_L7000XYY	Charger	5V 600mA MCW4737A1-US	-

Executive Summary

The Motorola phone FX-850C (FCC ID: U9S-FX850C)is in compliance with the Federal Communications Commission (FCC) Guidelines [OET65, June 2001] for uncontrolled exposure. The tests were performed according to the FCC requirements, and no change was made to the DUT during the tests.

Issued by (Test Engineer):	Reviewed by:	Approved by:
Cai Jing		
Cai Jing, 2007-09-14	Liang Mao, 2007-09-14	Xiong Xiao Hong, 2007-09-14

CNAS L2779

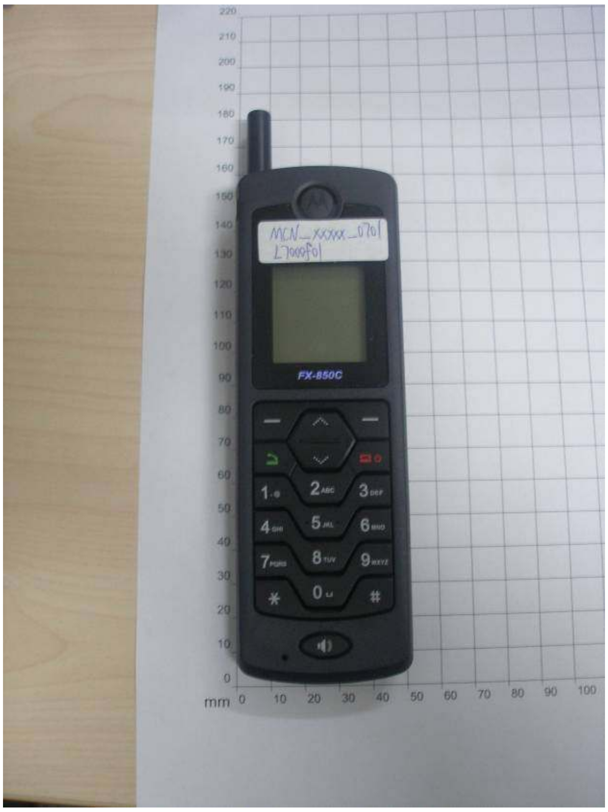
Table of Contents

1 GENERAL INFORMATION

	Test Laboratory	Customer
Name:	Flextronics (China) Electronics Technology Co., Ltd. Flexmobile Test Laboratory	i-Sirius Co., Ltd
Address:	Huaxia Technology Building, 8 Zhongguangcun Software Park, No. 8, Dongbeiwang West Street, Haidian District, Beijing, P.R.China 100094	3rd fl, Sam Young B/D, 106-2, Banpo-Dong, Seocho-Gu, Seoul, Korea
Contact Person:	Liang Mao	Steve Bae
Telephone:	86 10 5875 5000	82 234800900
Fax:	86 10 5875 4915	-
E-mail:	labinfo@cn.flextronics.com	Steve.bae@i-sirius.co.kr

2 SUBJECT OF INVESTIGATION

Picture of the Device under test



The objective of the measurements done by FlexMobile test laboratory was the dosimetric assessment. The examinations have been carried out with the dosimetric assessment system “DASY4” described in clause 5 below.

3 STANDARD

In USA the recent FCC exposure criteria [OET 65] are based upon the IEEE Standard C95.1 [IEEE C95.1]. The IEEE standard C95.a sets limits for human exposure to radio frequency electromagnetic in the frequency range 3 kHz to 300GHz.

3.1 Distinction between exposed population, duration of exposure and frequencies

The American standard [IEEE C95.1] distinguishes between controlled and uncontrolled environment. Controlled environments are locations where there is exposure that may be incurred by persons who are aware of the potential for exposure as a concomitant of employment or by other cognizant persons. Uncontrolled environments are locations where there is the exposure of individuals who have no knowledge or control of their exposure. The exposures may occur in living quarters or workplaces. For exposure in controlled environments higher field strengths are admissible. In addition the duration of exposure is considered.

Due to the influence of frequency on important parameters, as the penetration depth of the electromagnetic fields into the human body and the absorption capability of different tissues, the limits in general vary with frequency.

3.2 Distinction between Maximum Permissible Exposure and SAR Limits

The biological relevant parameter describing the effects of electromagnetic fields in the frequency range of interest is the specific absorption rate SAR (dimension: power/mass). It is a measure of the power absorbed per unit mass. The SAR may be spatially averaged over the total mass of an exposed body or its parts. The SAR is calculated from the R.M.S. electric filed strength E inside the human body, the conductivity σ and the mass density ρ of the biological tissue:

$$SAR = \sigma \frac{E^2}{\rho} = c \left. \frac{\partial T}{\partial t} \right|_{t \to 0+}$$

The specific absorption rate describes the initial rate of temperature rise $\partial T/\partial t$ as a function of the specific heat capacity c f the tissue. A limitation of the specific absorption rate perverts an excessive heating of the human body by electromagnetic energy.

As it is sometimes difficult to determine the SAR directly by measurement (e.g. whole body averaged SAR), the standard specifies more readily measurable maximum permissible exposures in terms of external electric E and magnetic field strength H and power density S, derived from the SAR limits. The limits for E, H and S have been fixed so that even under worst case conditions, the limits for the specific absorption rate SAR are not exceeded.

3.3 SAR limit

In this report the comparison between the American exposure limits and the measured data is made using the peak spatial-average SAR; the power level of the device under test guarantees that the whole body averaged SAR is not exceeded.

Having in mind a worst case consideration, the SAR limit is valid for uncontrolled environment and mobile respectively portable transmitters. According to table below the SAR values have to be averaged over a mass of 1g (SAR_{1g}) with the shape of a cube.

Relevant peak spatial-average SAR limit averaged over a mass of 1g.

Exposure limits	SAR(mw/g)	
	General Population/Uncontrolled Environment	Occupational/Controlled Exposure Environment
Spatial Average ANSI (Averaged over the whole body)	0.08	0.4
Spatial Peak ANSI (Averaged over any 1-g of tissue)	1.6	8.0
Spatial Peak ICNIRP/ANSI (hands/wrists/feet/ankles averaged over 10-g)	4.0	20.0
Localized SAR - ICNIRP - (Head and Trunk 10-g)	2.0	10.0

4 TEST PROCEDURE

IEEE has published a recommended practice for determining the peak spatial-average specific absorption rate (SAR) in the human body due to wireless communications devices [IEEE 1528-2003] for evaluation compliance of mobile phones with IEEE Standard C95.1 [IEEE C95.1]. The standard defines protocols of the measurement of the specific absorption rate (SAR) inside a simplified model of the head of users. It applies to mobile telecommunication equipment in the frequency range from 300 MHz to 3GHz intended to be operated while held next to the ear.

4.1 General requirements

The test shall be performed in a laboratory with an environment which avoids influence on SAR measurements by ambient EM sources and any reflection from the environment itself. The ambient temperature shall be in the range of 20°C to 24°C, and humidity in the range of 30% to 70% during the test.

4.2 Phantom requirements

The phantom is a simplified representation of the human anatomy and comprised of material with electrical properties similar to the corresponding tissues. The physical characteristics of the phantom model shall resemble the head and the neck of a user since the shape is a dominant parameter for exposure.

The shell of the phantom shall be made of low permittivity material and the thickness tolerance shall be ±0.2mm. Additionally the phantom shall enable to simulate both right and left hand operation of the device under test.

For the measurements the Specific Anthropomorphic Mannequin (SAM) which meet these requirements, shall be used.

4.3 Brain & Muscle Simulating Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydroxethylcellullose (HEC) gelling agent and saline solution. Preservation with a bacteriacide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in the following table. Other head and body tissue parameters that have not bee specified in P1528 are derived from the issue dielectric parameters computed from the 4-Cole-Cole equations.

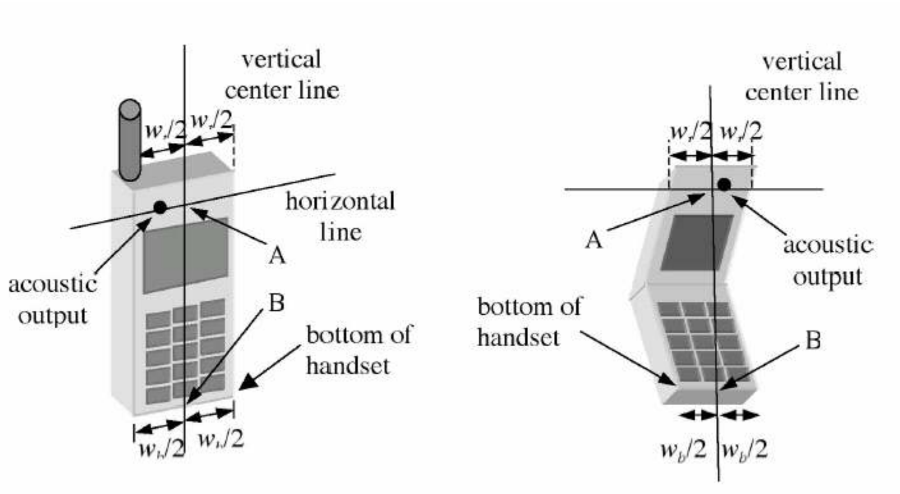
Composition of the Brain & Muscle Tissue Equivalent Matter

INGREDIENTS	SIMULATING TISSUE			
	835MHz Brain	835MHz Muscle	1900MHz Brain	1900MHz Muscle
Water	40.29	50.75	55.24	70.17
DGBE	0	0	44.45	29.44
Sugar	57.90	48.21	0	0
Salt	1.38	0.94	0.31	0.39
Cellulose	0.24	0.00	0	0
Preventol	0.18	0.10	0	0

4.4 Test positions

As it cannot be expected that the user will hold the mobile phone exactly in one well defined position, different operational conditions shall be tested, the IEEE standard requires two test positions. For an exact description helpful geometrical definitions are introduced and shown in the below figure.

There are two imaginary lines on the mobile, the vertical centerline and the horizontal line. The vertical centerline passes though two points on the front side of the handset: the midpoint of the width w_t of the handset at the level of the acoustic output (point A on the below figure), and the midpoint of the width w_b of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The two lines intersect at point A.

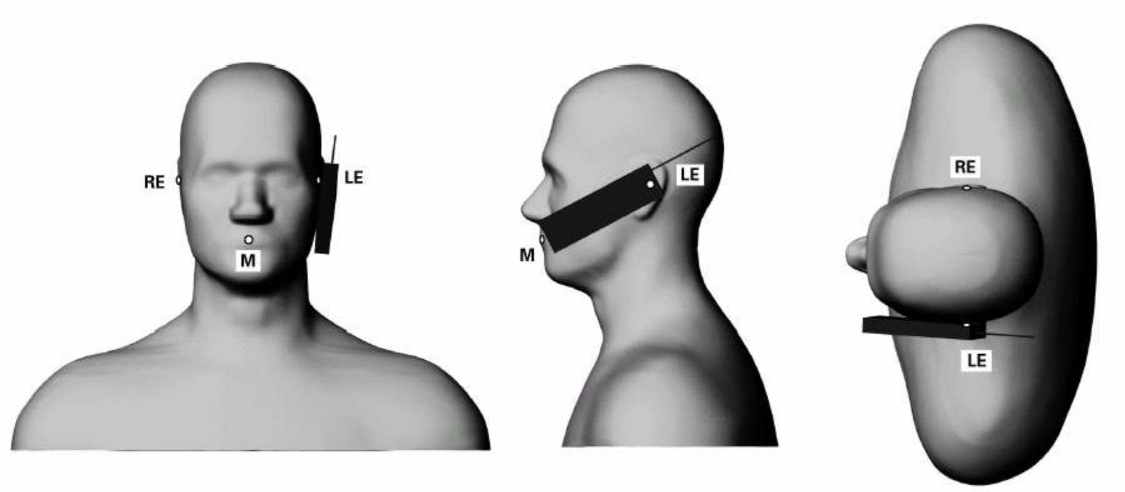


According to below the human head position is given by means of the following three reference points: auditory canal opening of both ears (RE and LE) and the center of the closed moth (M). The ear reference points are 15-17 mm above the entrance t the ear canal along the BM line (back-month), as shown in the below figure. The plane passing through the two ear canals and M is defined as the reference plane. The line NF (Neck-Front) perpendicular to the reference plane and passing through the RF (or LE) is called the reference pivoting line. Line BM is perpendicular to the NF line. With these definitions the test positions are given by:

- Cheek position:

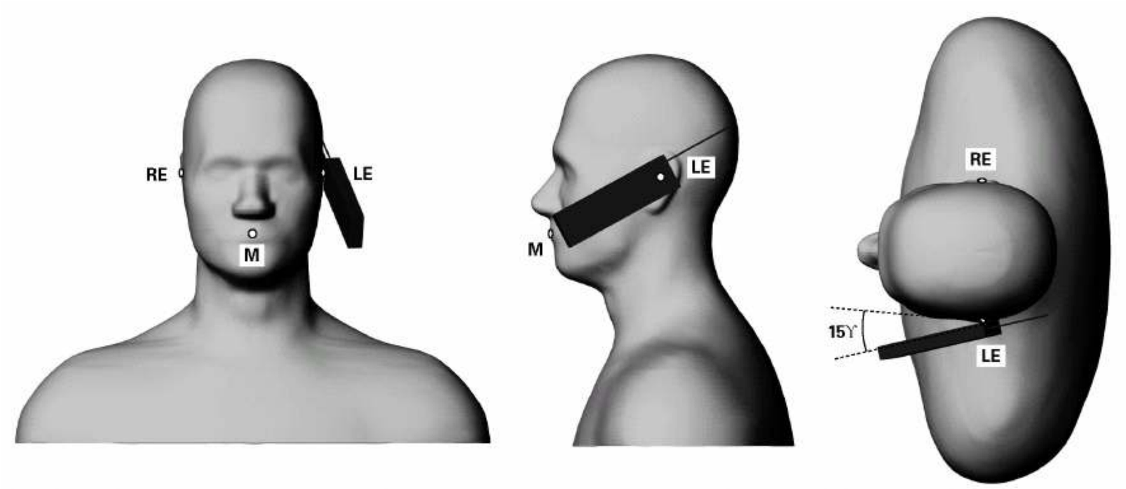
Position the handset close to the surface of phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom, such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom. Translate the handset towards the phantom along the line passing through RE and LE until the handset touches the ear. While maintaining the handset in this plane, rotate it around handset touches the ear. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to MB-NF including the line MB (called the reference plane). Rotate the phone around the vertical centerline until the phone (horizontal line) is symmetrical with respect to the line NF. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, rotate the handset about the line NF until any point any point on the handset is in contact with a phantom point below the ear.

The cheek position:



- Tilted position:

While maintaining the orientation of the phone, retract the phone parallel to the reference plane, which is far enough to enable a rotation of the phone by 15°. Rotate the phone around the horizontal line by 15°. While maintaining the orientation of the phone, move the phone parallel to the reference plane until any part of the phone touches the head. In this position, point A will be located on the line RE-LE.



4.5 Test to be performed

The SAR test shall be performed with both phone positions described above, on the left and right side of the phantom. The devices shall be measured for all modes operation when the device is next to the ear, even if the different models operate in the same frequency band. First the SAR test shall be performed using the center frequency of each available operating band and mode with the maximum peak power level. At the device position with highest SAR (check or tilted, left and right), the test is repeated at lowest and highest frequency. In addition, for all other device positions respectively configurations where the spatial peak SAR value is within 2dB of the 1.6W/kg limit, the lowest and highest frequencies should be tested.

For devices with retractable antenna all of the tests described above shall be performed with the antenna fully extended and fully retracted. Other factors that may affect the exposure should also be tested. For example, optional antennas or optional battery packs which may significantly change the volume, lengths, flip open/closed, etc. of the device, or any other accessories which might have the potential to considerably increase the peak spatial-average SAR value.

5 TEST EQUIPMENT

5.1 Location of Test Equipment

Testing was performed at FlexMobile Test Laboratory.

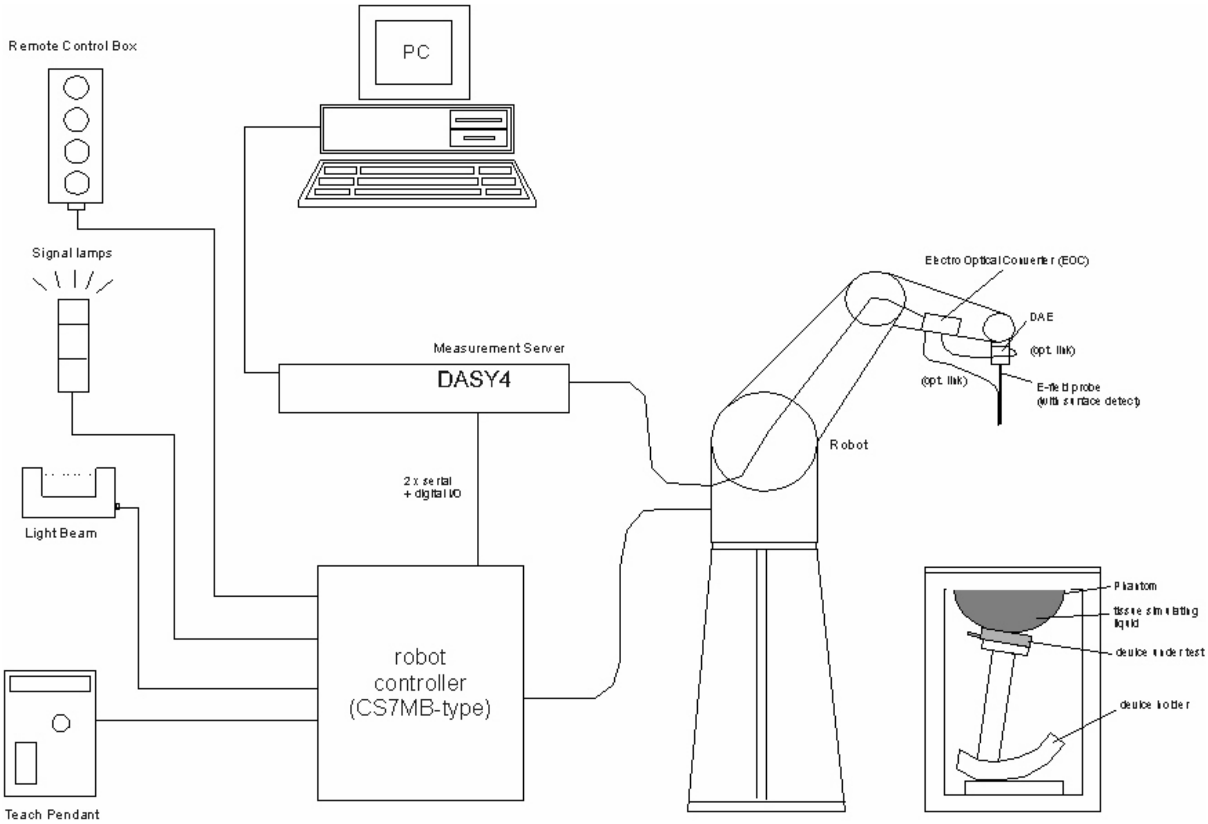
5.1.1 Test Equipment List

DASY is an abbreviation of "**D**osimetric **A**ssessment **Sy**stem" and describes a system that is able to determine the SAR distribution inside a phantom of a human being according to different standards. The DASY4 system consists of the following items:

TYPE	ITEM	S/N	CALIBRATION DATE	DUE DATE
CMU200	Wireless Communication Test Set	109172	2007-03-12	2008-03-12
ES3DV3	probe	3109	2006-05-24	2007-11-24
SD000D04BC	DAE4	685	2006-11-15	2007-11-15
D900V2	dipole	1d032	2006-05-16	2007-11-16
D2450V2	dipole	787	2006-05-19	2007-11-19
D1900V2	dipole	5d072	2006-05-22	2007-11-22
D835V2	dipole	4d038	2006-05-23	2007-11-23
D1800V2	dipole	2d126	2006-05-18	2007-11-18
NRVD	Power Meter	835843/014	2006-12-4	2007-12-4
SME03	Signal Generator	100029	2006-12-11	2007-12-11
NRV-Z4	Power Sensor	100381	2006-09-28	2007-09-28
NRV-Z4	Power Sensor	100382	2006-09-28	2007-09-28
NRV-Z2	Power Sensor	100211	2006-09-28	2007-09-28
8491B	Attenuator	MY39262528	NA	NA
8491B	Attenuator	MY39262663	NA	NA
8491B	Attenuator	MY39262640	NA	NA
8491B	Attenuator	MY39262638	NA	NA
778D	Dual directional coupler	20040	NA	NA
E3640A	DC Power Supply	MY40008487	2007-08-14	2008-08-13
85070E	Probe kit	MY44300214	N.A.	N.A.
E5071B	Network Analyzer	MY42404001	2007-06-18	2008-06-17

5.1.2 Test System Setup

Tests are performed in setup according to the scheme below:



5.2 Measurement Procedure

The following steps are used for each test position:

1. The SAR measurement was taken at a selected spatial reference point to monitor power variations during testing. This fixed location point was measured and used as a reference value.

2. The SAR distribution at the exposed side of the head was measured at a distance of 3.9mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm x 15mm.

3. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

a. The data at the surface was extrapolated, since the center of the dipoles is 2.7mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated

through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

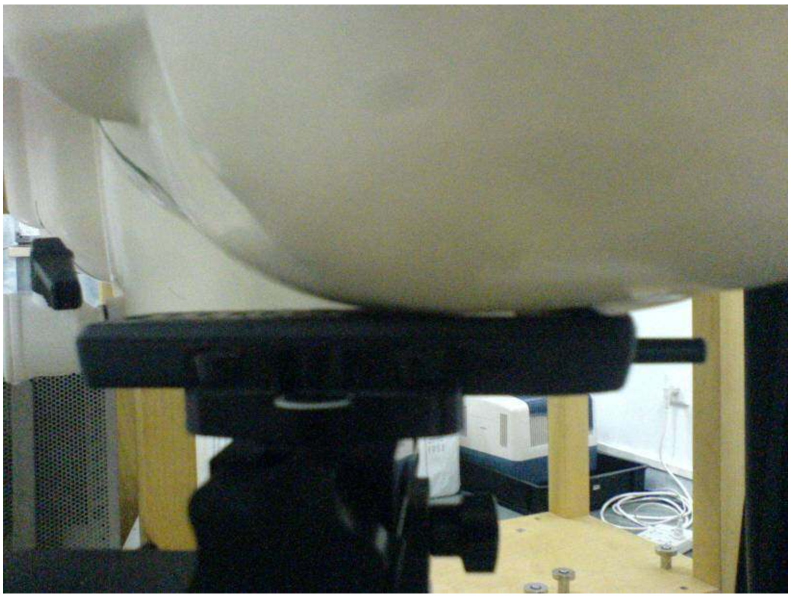
b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions). The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

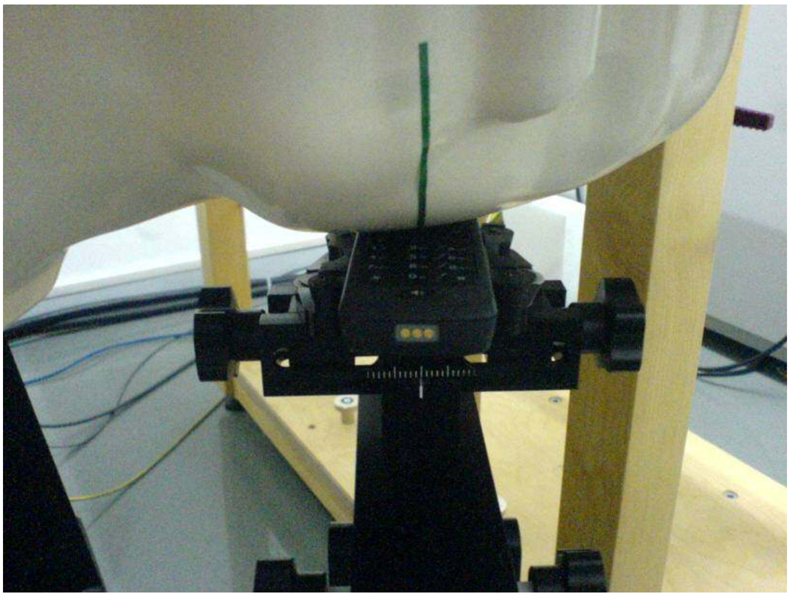
c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as procedure #1, was remeasured. If the value changed by more than 5%, the evaluation is repeated.

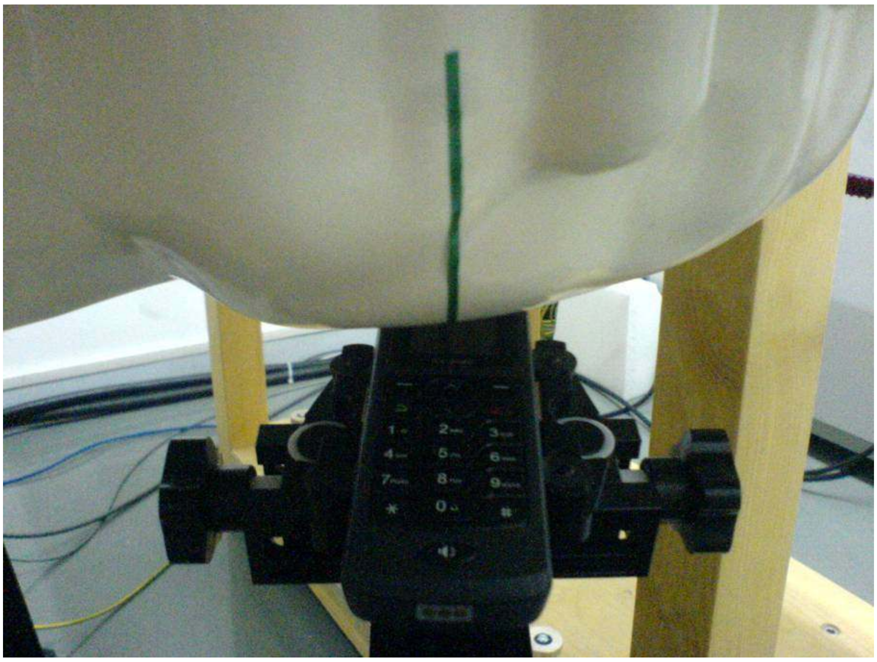
5.3 Test positions for device under test

Head SAR touch position:

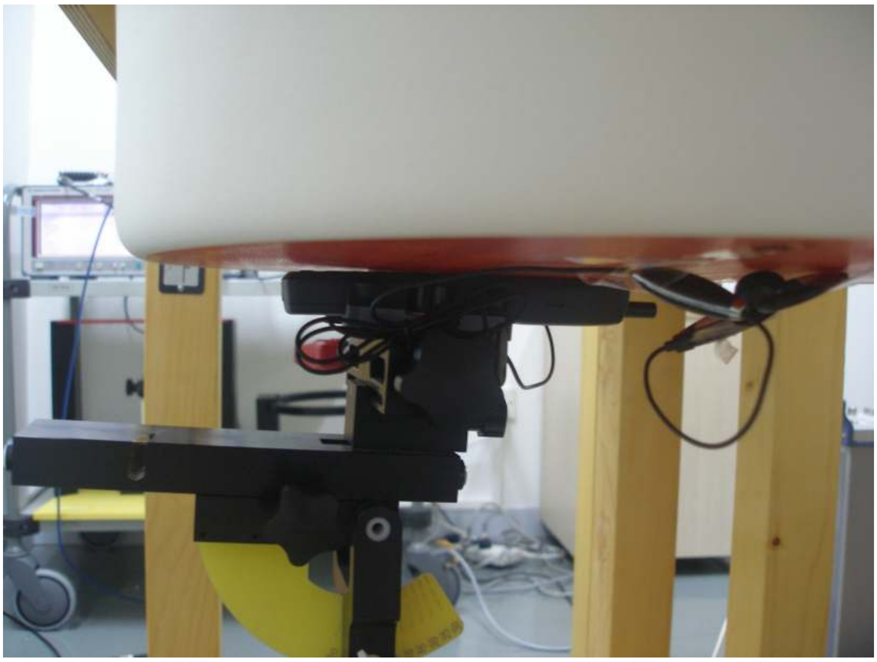




Head SAR tilt position:



Body SAR front position:



Body SAR back position

5.4 Test environment

	Ambient humidity (%)	Ambient temperature (°C)	Liquid temperature (°C)
standard	30~~70	20~~24	20~~24
Date: 2007-08-03	55	23	22.4
Date: 2007-08-07	52	23	21.5
Date: 2007-09-13	56	22	22.0
Date: 2007-09-14	60	21.5	21.3

5.5 Liquid parameters

Prior to conducting SAR measurements, the relative permittivity ε_r, and the conductivity σ , of the tissue simulating liquids were measured with the Dielectric Probe Kit These values of the tissue simulate are shown in the table below. The recommended limits for maximum permittivity and minimum conductivity are also shown.

Date: 2007-08-03

Frequency	Tissue Type	Type	Dielectric Parameters	
			permittivity	conductivity
835	Head	Target	41.5	0.90
		±5% window	39.425~43.975	0.855~0.945
		Measured	42.1	0.879

Date: 2007-08-07

Frequency	Tissue Type	Type	Dielectric Parameters	
			permittivity	conductivity
1900	Head	Target	40.00	1.40
		±5% window	38.000~42.000	1.330~1.470
		Measured	38.35	1.44

Date: 2007-09-13

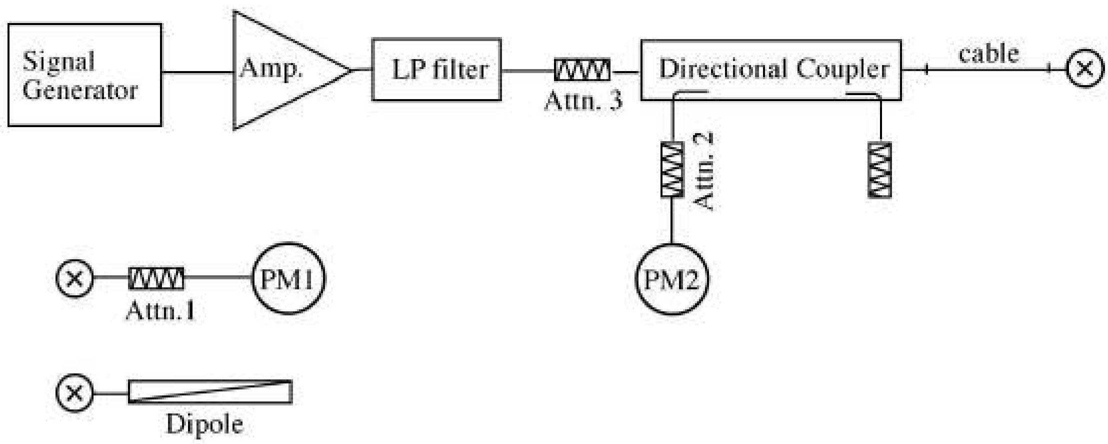
Frequency	Tissue Type	Type	Dielectric Parameters	
			permittivity	conductivity
835	Body	Target	55.2	0.97
		±5% window	52.440~57.960	0.922~1.019
		Measured	55.5	0.994

Date: 2007-09-14

Frequency	Tissue Type	Type	Dielectric Parameters	
			permittivity	conductivity
1900	Body	Target	53.3	1.52
		±5% window	50.635~55.965	1.444~1.596
		Measured	53.41	1.595

5.6 System performance check

A system check measurement was made following the determination of the dielectric parameters of the tissue simulating liquids using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. For power setup, please see the following pictures:



The figure shows the recommended setup. The PM1 (incl. Att1) measures the forward power at the location of the system performance check dipole connector. The signal generator is adjusted for the desired forward power at the dipole connector and the power meter PM2 is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2. The system checking results are given in the table below. Please see Annex B for detailed report.Please see Annex B for detailed report.

Date:	Tissue	Input Power (mW)	Targeted SAR_{1g} (mW/g)	Measured SAR_{1g} (mW/g)	Deviation (%) (<±10%)
2007-08-03	835Mhz Head	250	2.32	2.52	8.6
2007-08-07	1900Mhz Head	250	9.5	10.2	7.4
2007-09-13	835Mhz Body	250	2.43	2.56	5.3
2007-09-14	1900Mhz Body	250	10.3	10.9	5.8

6 SAR RESULTS AND EVALUATION

6.1 Measurement Result

Test procedures used are according to FCC/OET Bulletin 65, Supp.C[July2001].

Liquid tissue depth is 15.1±0.1 cm.

The Device (FCC ID U9S-FX850C) has the 600mAH model 611A020000F as the only battery option. This battery was used to do all of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery.

The device should be tested on the left and right side of the head phantom in the "Cheek/Touch" and "Ear/Tilt" positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tile/Ear, extended and retracted) is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

Please be notified that according to the declaration from customer (the declaration should be sent to FCC with this report), the belt clip of the device is pure plastic without any metal in it. In the body SAR test part, instead of the belt clip, 0mm space between the phantom and the device is used.

The phone has an earphone slot, but no earphone is supplied in the standard packet. So a representative earphone is used in the body SAR test, the picture of the earphone is shown below.

Measured conductive power

GSM850	Channel	128	190	251
	Conductive power (dBm)	32.5	32.6	32.8
GSM1900	Channel	512	661	810
	Conductive power (dBm)	29.4	29.4	29.5

The tables below contain the measured Head SAR values averaged over a mass of {1g}

Phantom configuration	Test position	SAR_{1g} [W/kg] / Power Drift[dB]		
		Channel 128[low] 824.20 MHz	Channel 190[Mid] 836.60 MHz	Channel 251 [high] 848.80 MHz
Left side of Head	Cheek	-	0.994 / -0.188	-
	Tilted	-	0.448/ -0.017	-
Right side of Head	Cheek	1.07/ 0.109	1.07/ -0.036	**1.15/ 0.019 ***
	Tilted	-	0.535/ -0.040	-

*Maximum 1g SAR result specified in annex A,
File Name: Moto FX-850c_GSM850_RC_#00499901060000_070803.da4

The tables below contain the measured Head SAR values averaged over a mass of {1g}

Phantom configuration	Test position	SAR_{1g} [W/kg] / Power Drift[dB]		
		Channel 512[low] 1850.2 MHz	Channel 661[Mid] 1880.0 MHz	Channel 810 [high] 1909.8 MHz
Left side of Head	Cheek		0.639/ 0.028	-
	Tilted		0.692/ 0.023	-
Right side of Head	Cheek	-	0.923/ -0.127	-
	Tilted	**1.03/ -0.015 ***	0.944/ 0.003	0.949/ 0.008

*Maximum 1g SAR result specified in annex A
File Name: Moto FX-850c_PCS1900_RT_#00499901060000_070807.da4

The tables below contain the measured Body SAR values averaged over a mass of {1g}

DUT configuration	Test position	SAR_{1g} [W/kg] / Power Drift[dB]		
		Channel 128[low] 824.20 MHz	Channel 190[Mid] 836.60 MHz	Channel 251 [high] 848.80 MHz
Front side	0mm	0.997 / 0.0166	1.07 / -0.181	**1.21 / 0.0481 ***
Back side	0mm	-	0.869 / 0.0754	-

*Maximum 1g SAR result specified in annex A
File Name: Moto FX-850c_GSM850_FB_#00499901060000_070913_touch.da4

The tables below contain the measured Body SAR values averaged over a mass of {1g}

DUT configuration	Test position	SAR_{1g} [W/kg] / Power Drift[dB]		
		Channel 512[low] 1850.2 MHz	Channel 661[Mid] 1880.0 MHz	Channel 810 [high] 1909.8 MHz
Front side	0mm	**1.42 / -0.0218 ***	1.15 / -0.0556	1.15 / 0.00333
Back side	0mm	-	0.806 / -0.0619	-

*Maximum 1g SAR result specified in annex A
File Name: Moto FX-850c_PCS1900_FB_#00499901060000_070914_touch.da4

6.2 Summary and comparison to the limit

All test results are passed the uncontrolled SAR limit of 1.6W/kg.

7 REFERENCE DOCUMENT

The DUT has been tested at Flextronics Mobile Test Laboratory according to the reference documents given below.

[1] Federal Communications Commission: Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields, Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01), FCC, 2001.
[2] IEEE Std C95.1-1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, Inst. of Electrical and Electronics Engineer, Inc., 1999.
[3] IEEE Std 1528-2003: IEEE Recommended Practice for Determining the Peak Spatial-Average Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques. 1528-2003, December 19, 2003.the Institute of Electrical and Electronics Engineers.

[4] Schmid & Partner Engineering AG, DASY4 Manual, February 2004 17-5

APPENDIX A: DETAILED MEASUREMENT REPORT

File Name: Moto FX-850c_GSM850_RC_#00499901060000_070803.da4

DUT: moto FX-850c; IMEI:00499901060000 ; Position: Cheek

Communication System: GSM850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.89 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Ambient humidity:55%; Ambient temperature: 23 ℃; Liquid temperature: 22.4 ℃
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(5.85, 5.85, 5.85); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-11-15
- Phantom: SAM with Right; Type: QD 000 P40 CA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

high/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.19 mW/g

high/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.2 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.823 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.21 mW/g

0 dB = 1.21mW/g

File Name: Moto FX-850c_PCS1900_RT_#00499901060000_070807.da4

DUT: moto FX-850c; IMEI:00499901060000; Position: Tilt

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.39 mho/m; ε_r = 38.5; ρ = 1000 kg/m^3
Ambient humidity:52%; Ambient temperature: 23 ℃; Liquid temperature: 21.5 ℃
Phantom section: Right Section

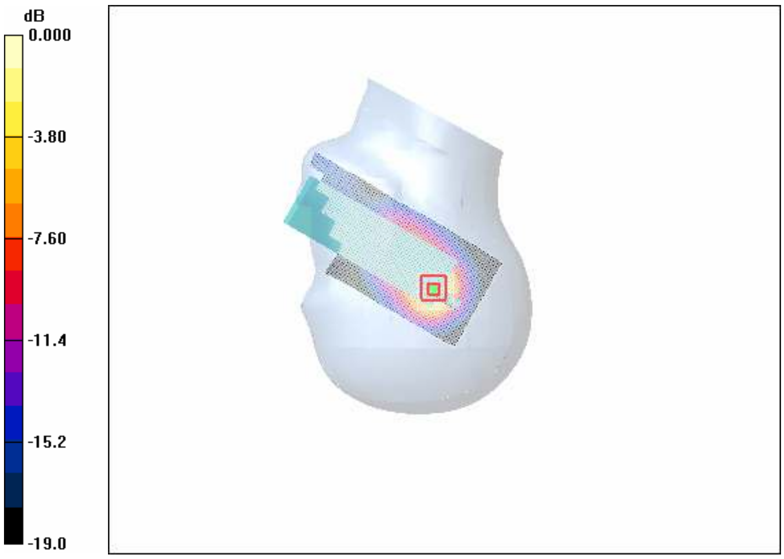
DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(4.85, 4.85, 4.85); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-11-15
- Phantom: SAM with Front; Type: QD 000 P40 CA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

low/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.27 mW/g

low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.7 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 1.74 W/kg
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.570 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.13 mW/g



0 dB = 1.13mW/g

File Name: Moto FX-850c_GSM850_FB_#00499901060000_070913_touch.da4

DUT: moto FX-850c; IMEI:00499901060000 ; Position: Front

Communication System: GSM850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 848.8 MHz; σ = 1.01 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3 ;
Medium Notes: Ambient humidity:56%; Ambient temperature: 22 ^{o}C; Liquid temperature: 22 ^{o}C;
Phantom section: Flat Section ;Phantom: Flat Phantom ELI4.0;Type: QDOVA001B

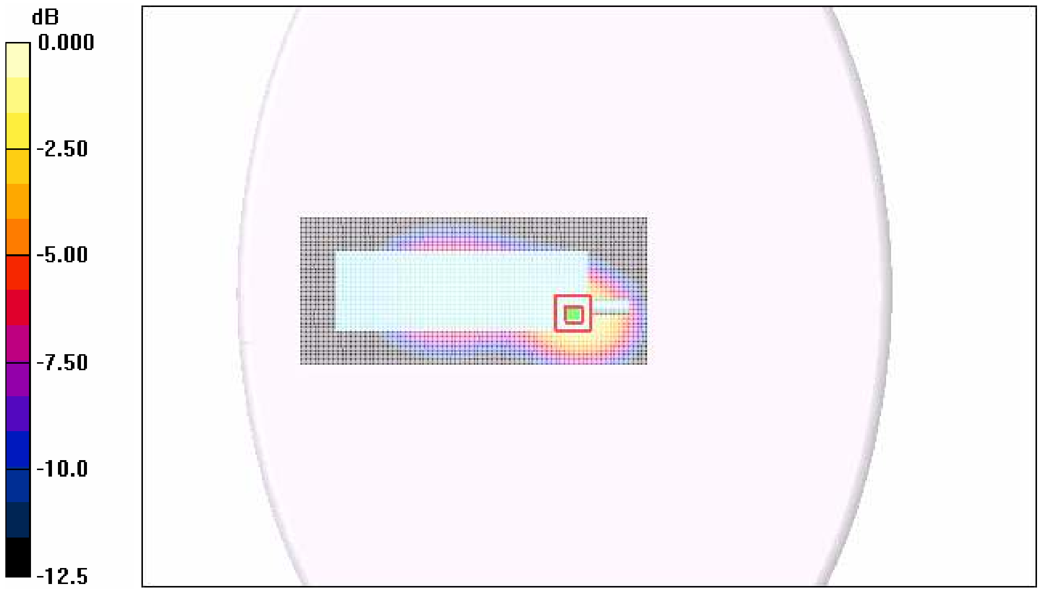
DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(5.82, 5.82, 5.82); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-4-3
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001B;

high/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.33 mW/g

high/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.0 V/m; Power Drift = 0.048 dB
Peak SAR (extrapolated) = 1.91 W/kg
SAR(1 g) = 1.21 mW/g; SAR(10 g) = 0.748 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.31 mW/g



0 dB = 1.31mW/g

File Name: Moto FX-850c_PCS1900_FB_#00499901060000_070914_touch.da4

DUT: moto FX-850c; IMEI:00499901060000 ; Position: Front

Communication System: PCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.55 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3 ;
Medium Notes: Ambient humidity:60%; Ambient temperature: 21.5 ^{o}C; Liquid temperature: 21.3 ^{o}C;
Phantom section: Flat Section ;Phantom: Flat Phantom ELI4.0;Type: QDOVA001BA

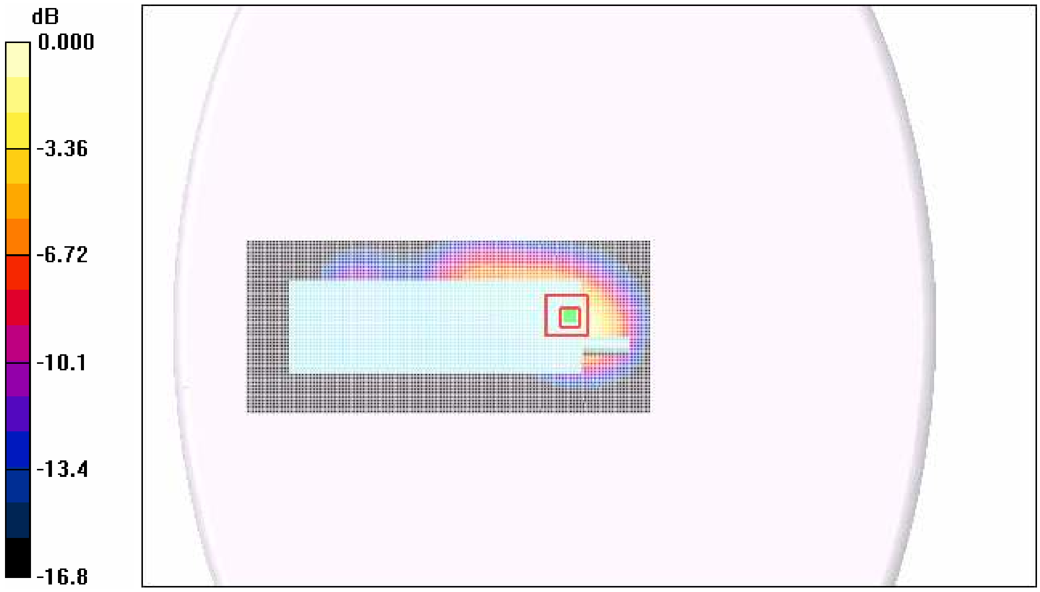
DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(4.44, 4.44, 4.44); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-4-3
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

low/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.65 mW/g

low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.7 V/m; Power Drift = -0.022 dB
Peak SAR (extrapolated) = 2.34 W/kg
SAR(1 g) = 1.42 mW/g; SAR(10 g) = 0.811 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.57 mW/g



0 dB = 1.57mW/g

APPENDIX B: SYSTEM PERFORMANCE CHECK REPORT

File Name: SystemPerformanceCheck-D835Mhz-070803.da4

DUT: Dipole 835 MHz;

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

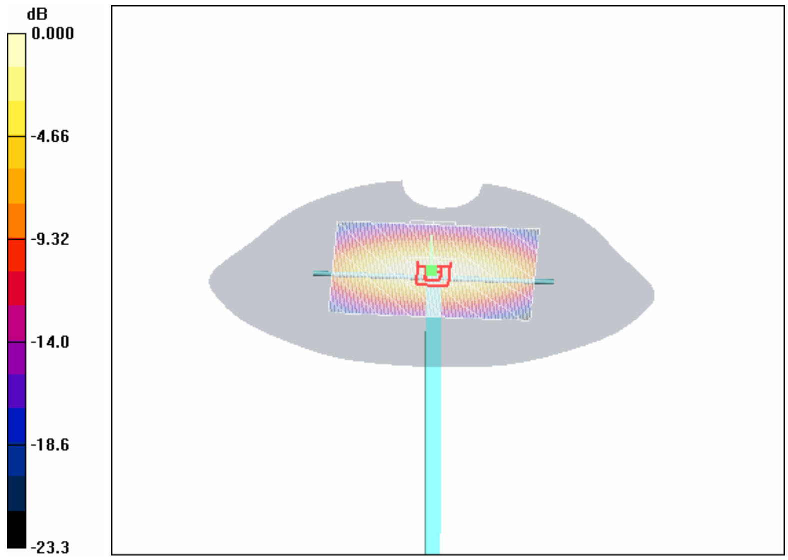
Medium parameters used (interpolated): f = 835 MHz; σ = 0.878 mho/m; ε_r = 42.2; ρ = 1000 kg/m^3
Ambient humidity:55%; Ambient temperature: 23 ℃; Liquid temperature: 22.4 ℃
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(5.85, 5.85, 5.85); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-11-15
- Phantom: SAM with Right; Type: QD 000 P40 CA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.032 dB
Peak SAR (extrapolated) = 3.76 W/kg
SAR(1 g) = 2.52 mW/g; SAR(10 g) = 1.65 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.73 mW/g

Unnamed procedure/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 2.69 mW/g



0 dB = 2.69mW/g

File Name: SystemPerformanceCheck-D1900MHz-070807.da4

DUT: Dipole 1900 MHz;

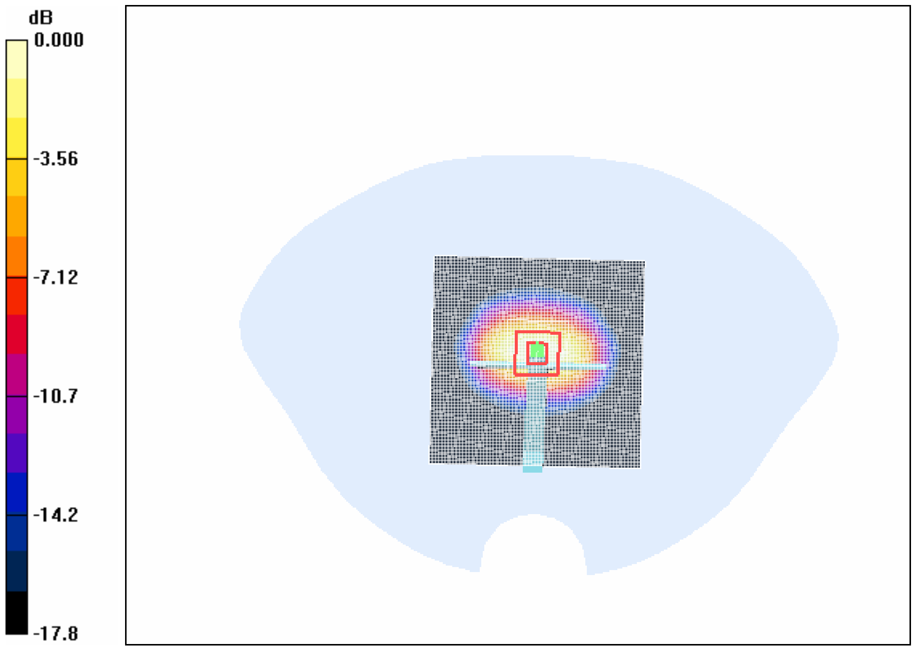
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.44 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3
Ambient humidity:52%; Ambient temperature: 23 ^{o}C; Liquid temperature: 21.5 ^{o}C
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(4.85, 4.85, 4.85); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-11-15
- Phantom: SAM with Front; Type: QD 000 P40 CA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

Unnamed procedure/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.3 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 83.7 V/m; Power Drift = -0.040 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.31 mW/g
Maximum value of SAR (measured) = 11.6 mW/g



0 dB = 11.6mW/g

File Name: SystemPerformanceCheck-D835Mhz-070913.da4

DUT: Dipole 835 MHz;

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.994 mho/m; ε_r = 55.5; ρ = 1000 kg/m^3 ;
Medium Notes: Ambient humidity:56%; Ambient temperature: 22^{o}C; Liquid temperature: 22^{o}C
Phantom section: Flat Section ;Phantom: Flat Phantom ELI4.0;Type: QDOVA001BA

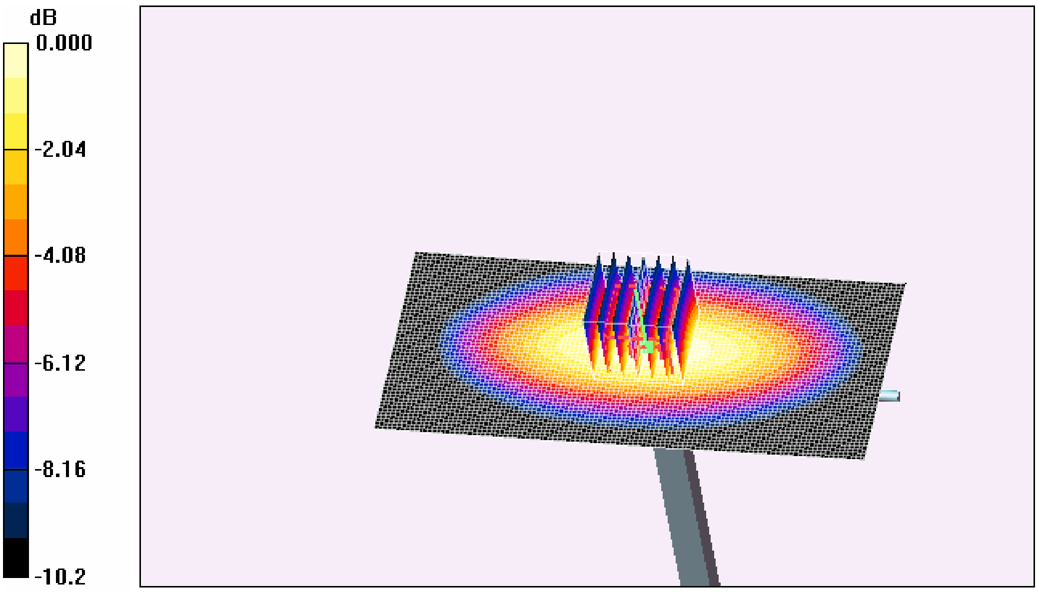
DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(5.82, 5.82, 5.82); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-4-3
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Unnamed procedure/Area Scan (51x111x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 2.76 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.4 V/m; Power Drift = -0.080 dB
Peak SAR (extrapolated) = 3.74 W/kg
SAR(1 g) = 2.56 mW/g; SAR(10 g) = 1.68 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.76 mW/g



0 dB = 2.76mW/g

File Name: SystemPerformanceCheck-Body-D1900MHz-070914.da4

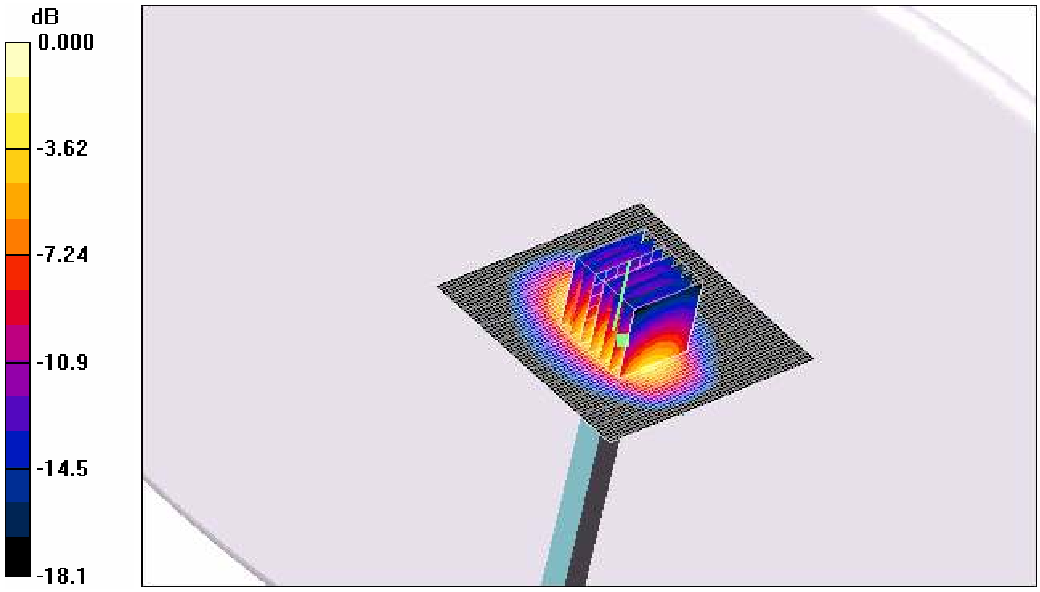
DUT: Dipole 1900 MHz;

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.59 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3 ;
Medium Notes: Ambient humidity:60%; Ambient temperature: 21.5; Liquid temperature: 21.3;
Phantom section: Flat Section ;Phantom: Flat Phantom ELI4.0;Type: QDOVA001BA

DASY4 Configuration:
- Probe: ES3DV3 - SN3109; ConvF(4.44, 4.44, 4.44); Calibrated: 2006-5-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn685; Calibrated: 2006-4-3
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

Unnamed procedure/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 13.7 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 80.9 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 19.0 W/kg
SAR(1 g) = 10.9 mW/g; SAR(10 g) = 5.7 mW/g
Maximum value of SAR (measured) = 12.4 mW/g



0 dB = 12.4mW/g

APPENDIX C: DIPOLE CERTIFICATION

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

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

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

Accreditation No.: **SCS 108**

Client **Flextronics (MTT)**

Certificate No: **D835V2-4d038_May06**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d038
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	May 23, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference 10 dB Attenuator	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference Probe ET3DV6	SN 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
DAE4	SN 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

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

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

Issued: May 24, 2006

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

Certificate No: D835V2-4d038_May06 Page 1 of 9

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

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Accredited by the Swiss Federal Office of Metrology and Accreditation
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Flextronics (MTT)**

Certificate No: **D1900V2-5d072_May06**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d072
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	May 22, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference 10 dB Attenuator	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference Probe ET3DV6	SN: 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
DAE4	SN: 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

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

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	M. Meili
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 24, 2006

APPENDIX D: PROBE CERTIFICATION

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

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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 **Flextronics CN (MTT)**

Certificate No: **ES3-3109_May06**

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3109
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	May 24, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	2-Feb-06 (SPEAG, No. DAE4-654_Feb06)	Feb-07

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

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

Issued: May 26, 2006

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

Certificate No: ES3-3109_May06 Page 1 of 9

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

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

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

Probe ES3DV3

SN:3109

Manufactured: September 20, 2005
Calibrated: May 24, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ES3DV3 SN:3109 May 24, 2006

DASY - Parameters of Probe: ES3DV3 SN:3109

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

NormX	**1.23** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**95** mV
NormY	**1.30** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**95** mV
NormZ	**1.28** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**95** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	5.7	2.6
SAR_{be} [%]	With Correction Algorithm	0.0	0.2

TSL 1750 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	4.0	1.8
SAR_{be} [%]	With Correction Algorithm	0.1	0.1

Sensor Offset

Probe Tip to Sensor Center **2.0** mm

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

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

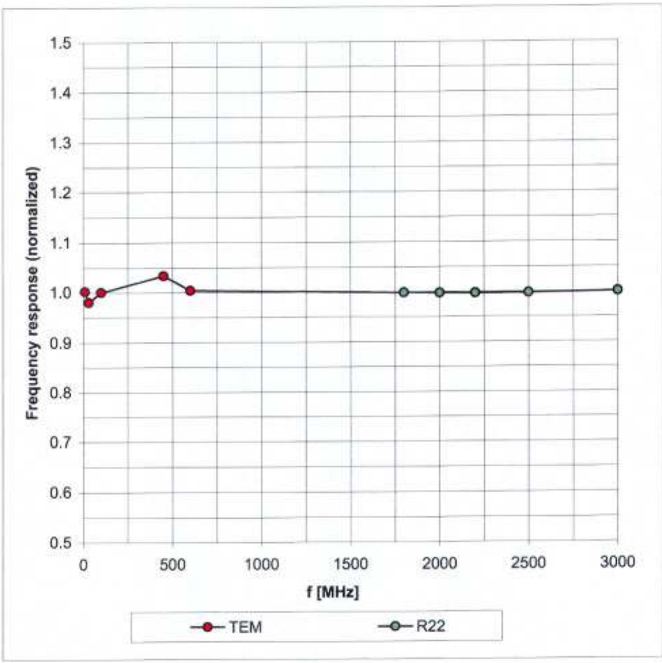
[B] Numerical linearization parameter: uncertainty not required.

ES3DV3 SN:3109

May 24, 2006

Frequency Response of E-Field

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



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

Certificate No: ES3-3109_May06

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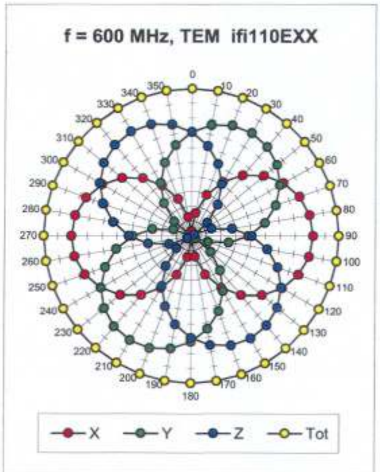
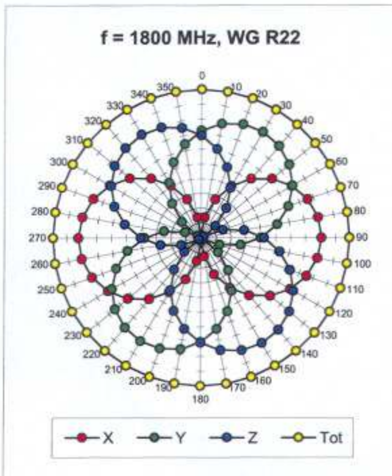
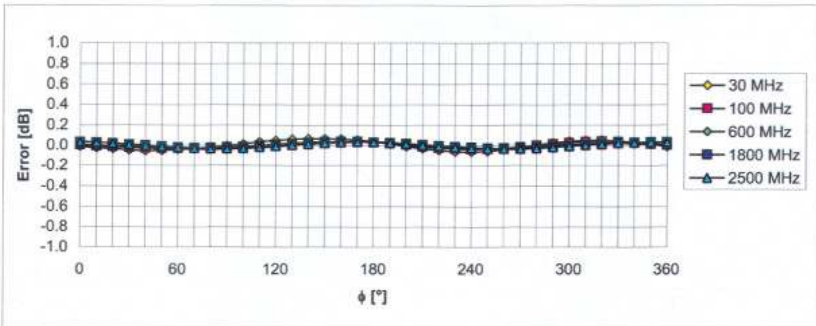
ES3DV3 SN:3109 May 24, 2006

Receiving Pattern (ϕ), ϑ = 0°





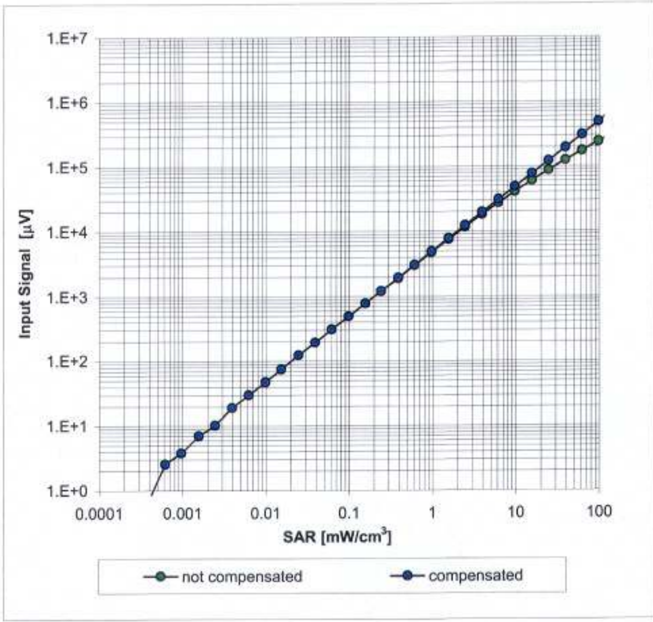


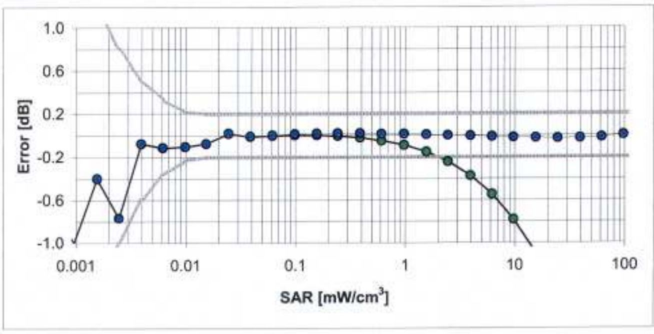
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ES3DV3 SN:3109 May 24, 2006

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)





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

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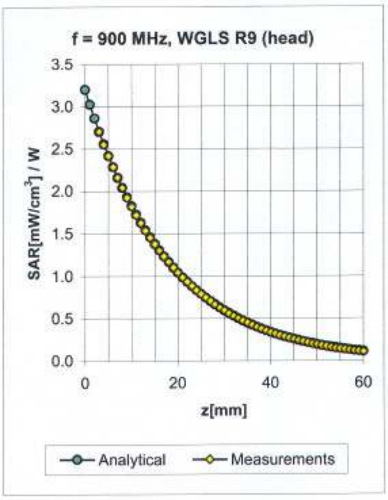
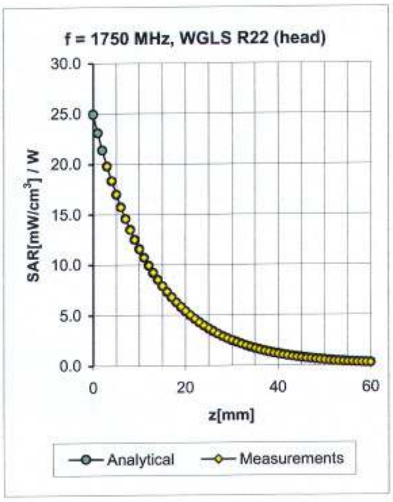
ES3DV3 SN:3109 May 24, 2006

Conversion Factor Assessment





f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.36	1.56	5.85 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.42	1.46	5.72 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.33	2.44	5.02 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.29	2.48	4.85 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.51	1.66	4.33 ± 11.8% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.43	1.47	5.82 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.47	1.41	5.66 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.26	2.89	4.61 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.31	2.51	4.44 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.64	1.42	4.08 ± 11.8% (k=2)

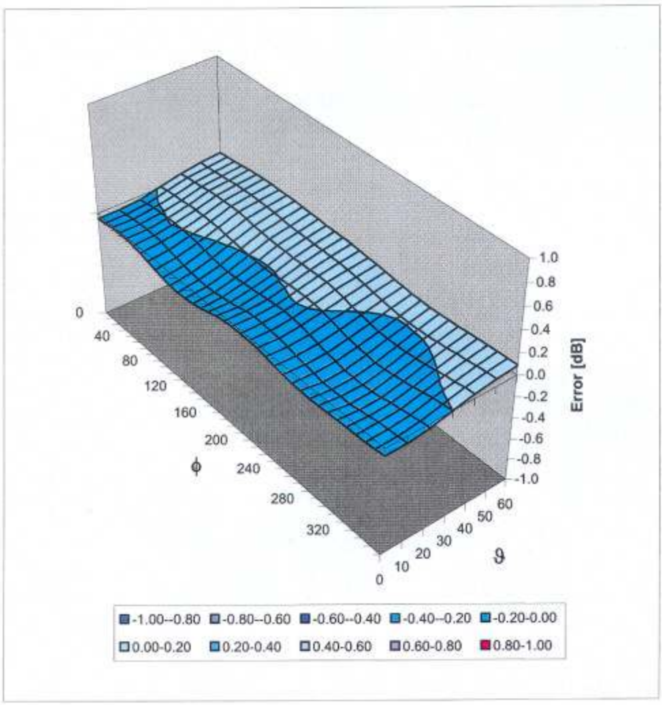
[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Certificate No: ES3-3109_May06 Page 8 of 9

ES3DV3 SN:3109 May 24, 2006

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: ES3-3109_May06 Page 9 of 9

APPENDIX E: PHANTOM CONFORMITY

Schmid & Partner Engineering AG — s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
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info@speag.com, http://www.speag.com

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 CA
Series No	TP-1150 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen 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 units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas; 6mm +/- 0.2mm at ERP	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
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	DEGMBE based simulating liquids	Pre-series, First article, Samples

Standards

[1] CENELEC EN 50361
[2] IEEE Std 1528-200x Draft CD 1.1 (Dec 02)
[3] IEC 62209/CD (Nov 02)
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 5.5.2003

Signature / Stamp

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

Doc No 881 – QD 000 P40 CA – C Page 1 (1)

Schmid & Partner Engineering AG

s p e a g

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Certificate of Conformity / First Article Inspection

Item	Oval Flat Phantom ELI 4.0
Type No	QD OVA 001 B
Series No	1003 and higher
Manufacturer	SPEAG Zeughausstrasse 43 CH-8004 Zürich Switzerland

Tests
Complete tests were made on the prototype units QD OVA 001 AA 1001, QD OVA 001 AB 1002, pre-series units QD OVA 001 BA 1003-1005 as well as on the series units QD OVA 001 BB, 1006 ff.

Test	Requirement	Details	Units tested
Dimensions	Compliant with the standard IEC 62209 – 2 [1] requirements	Dimensions of bottom for 300 MHz – 6 GHz: longitudinal = 600 mm (max. dimension) width= 400 mm (min dimension) depth= 190 mm Shape: ellipse	Prototypes, Samples
Material thickness	Compliant with the standard IEC 62209 – 2 [1] requirements	Bottom plate: 2.0mm +/- 0.2mm	Prototypes, All items
Material parameters	Dielectric parameters for required frequencies	300 MHz – 6 GHz Rel. permittivity = 4 +/-1, Loss tangent ≤ 0.05	Material sample
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	Equivalent phantoms, Material sample
Sagging	Compliant with the requirements according to the standard. 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] IEC 62209 – 2, Draft Version 0.9, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation and Procedures
Part 2: Procedure to determine the Specific Absorption Rate (SAR) for ... including accessories and multiple transmitters", December 2004

Conformity
Based on the sample tests above, we certify that this item is in compliance with the standard [1].

Date 07.07.2005

Signature / Stamp

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Schmid & Partner Engineering AG   s p e a g

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Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 CA
Series No	TP-1150 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen 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 units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas; 6mm +/- 0.2mm at ERP	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
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	DEGMBE based simulating liquids	Pre-series, First article, Samples

Standards
[1] CENELEC EN 50361
[2] IEEE Std 1528-200x Draft CD 1.1 (Dec 02)
[3] IEC 62209/CD (Nov 02)
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity
Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 5.5.2003

Signature / Stamp

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APPENDIX F: UNCERTAINTY BUDGET

It includes the uncertainty budget suggested by the [IEEE P1528] and determined by Schmid & Partner Engineering AG. **The expanded uncertainty (K=2) is assessed to be ±20.6%**.

Error Sources	Uncertainty Value	Probability Distribution	Divisor	C_i	Standard Uncertainty	V_i
Probe calibration	±4.8%	Normal	1	1	±4.8%	∝
Axial isotropy	±4.7%	Rectangular	$\sqrt{3}$	0.7	±1.9%	∝
Hemispherical isotropy	±9.6%	Rectangular	$\sqrt{3}$	0.7	±3.9%	∝
Boundary effects	±1.0%	Rectangular	$\sqrt{3}$	1	±0.6%	∝
Linearity	±4.7%	Rectangular	$\sqrt{3}$	1	±2.7%	∝
System detection limit	±1.0%	Rectangular	$\sqrt{3}$	1	±0.6%	∝
Readout electronics	±1.0%	Normal	1	1	±1.0%	∝
Response time	±0.8%	Rectangular	$\sqrt{3}$	1	±0.5%	∝
Integration time	±2.6%	Rectangular	$\sqrt{3}$	1	±1.5%	∝
RF ambient conditions	±3.0%	Rectangular	$\sqrt{3}$	1	±1.7%	∝
Probe positioner	±0.4%	Rectangular	$\sqrt{3}$	1	±0.2%	∝
Probe positioning	±2.9%	Rectangular	$\sqrt{3}$	1	±1.7%	∝
Algorithms for max SAR eval.	±1.0%	Rectangular	$\sqrt{3}$	1	±0.6%	∝
Test Sample Related						
Device positioning	±2.9%	Rectangular	$\sqrt{3}$	1	±2.9%	145
Device holder	±3.6%	Normal	1	1	±3.6%	5
Power drift	±5.0%	Rectangular	$\sqrt{3}$	1	±2.9%	∝
Phantom and set-up			$\sqrt{3}$			
Phantom uncertainty	±4.0%	Rectangular	$\sqrt{3}$	1	±2.3%	∝
Liquid conductivity (target)	±5.0%	Rectangular	$\sqrt{3}$	0.64	±1.8%	∝
Liquid conductivity (meas.)	±2.5%	Normal	1	0.64	±1.6%	∝
Liquid permittivity (target)	±5.0%	Rectangular	$\sqrt{3}$	0.6	±1.7%	∝
Liquid permittivity (meas.)	±2.5%	Normal	1	0.6	±1.5%	∝
Combined Uncertainty					±10.3%	

------------------------------END OF THIS REPORT----------------------------