
CONFORMANCE TEST REPORT FOR HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

Report No.: SRTC2011-H024-E0094

Product Name: CDMA 1X Digital Mobile Phone
with Bluetooth

Product Model: ZTE-C S186

Applicant: ZTE Corporation

Manufacturer: ZTE Corporation

Specification: FCC OET Bulletin 65 (Edition 97-01)
Supplement C (Edition 01-01)

FCC ID: Q78-ZTECS186

The State Radio_monitoring_center Testing Center (SRTC)

No.80 Beilishi Road Xicheng District Beijing, China

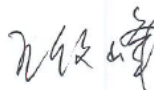
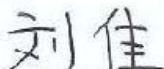
Tel: 86-10-68009202 Fax: 86-10-68009205

Executive Summary

Test report no.:	SRTC2011-H024-E0094
Product Model:	ZTE-C S186
Date of test:	2011.12.31
Date of report:	2012.1.5
Laboratory:	The State Radio_monitoring_center Testing Center (SRTC)
Test has been Carried out in accordance with:	47CFR §2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01) Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields RSS-102 Evaluation Procedure for Mobile and Portable Radio Transmitters with Respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields IEEE 1528 - 2003 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Technique
Documentation:	The documentation of the testing performed on the tested devices is archived for 5 years at SRTC

Result summary:

Mode	CH/f(MHz)	Power	position	Limit (mW/g)/1g	Measured (mW/g)	Result
800MHz SO55 RC3 full rate	777/848.3	23.40	Left hand Cheek	1.6	1.500	PASS

This Test Report Is Issued by: Mr. Song Qizhu Director of the test lab 	Checked by: Mr. Wang Junfeng Deputy director of the test lab 
Tested by: Ms. Liu Jia Test engineer 	Issued date: 2012.01.05

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1. General information

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).

The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

Company: The State Radio_monitoring_center Testing Center (SRTC)
Address: No.80 Beilishi Road, Xicheng District, Beijing China
City: Beijing
Country or Region: China
Contacted person: Wang Junfeng
Tel: +86 10 68009181 +86 10 68009202
Fax: +86 10 68009195 +86 10 68009205
Email: wangjf@srrc.org.cn / wangjunfeng@srtc.org.cn

1.3 Applicant's details

Company: ZTE Corporation
Address: ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park,
Nanshan District, 518057
City: Shenzhen
Country or Region: P.R.China
Grantee Code: Q78
Contacted person: Min Zhang
Tel: +86-021-68897541
Fax: +86-021-50801070
Email: zhang.min13@zte.com.cn

1.4 Manufacturer's details

Company: ZTE Corporation
Address: Zhongxing Bldg, Hi-Tech Park, NanShan District, 518057
City: Shenzhen
Country or Region: P.R.China
Contacted person: Li Dezi
Tel: +86-021-68895196
Fax: +86-021-50801070
Email: li.dezi@zte.com.cn

1.5 Application details

Period of test	2011.12.31
Batteries used in testing	Li-Lon/Li3708T42P3h553447/ZTE
State of sample	production unit
Device power class	23~30dBm
DTM	N/A
H/W Version	cw6B
S/W Version	STDEN_S186_RBTN02FV1.0.0B04
MEID	A0000032AF744

1.6 Maximum Results

Head Configuration

Mode	CH/f(MHz)	Power(dBm)	position	Limit (mW/g)/1g	Measured (mW/g)	Result
800MHz SO55 RC3 full rate	777/848.3	23.40	Left hand Cheek	1.6	1.500	PASS

Body Worn Configuration

Mode	CH/f(MHz)	Power(dBm)	position	Limit (mW/g)/1g	Measured (mW/g)	Result
800MHz SO55 RC3 full rate	1013/824.70	23.48	Towards ground with a headset	1.6	0.918	PASS

2. DESCRIPTION OF THE DEVICE UNDER TEST

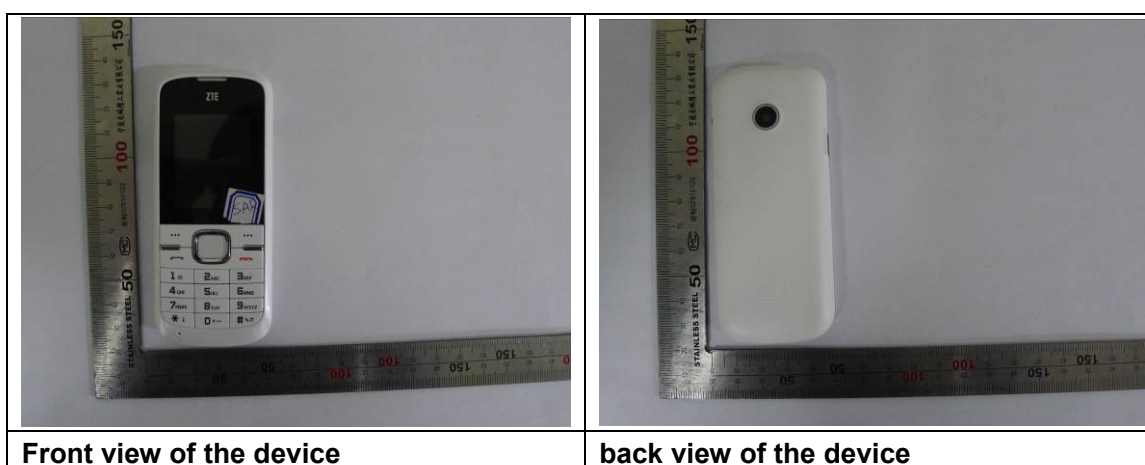
Device category	production unit
Exposure enviroment	General population/uncontrolled

Mode and bands of operation	CDMA 1x 800MHz
Modulation Mode	OQPSK
Duty Cycle	1
Transmitter Frequency Range(MHz)	Tx:824~849MHz Rx:869~894MHz

2.1 Description of the Antenna

The device has an internal antenna.

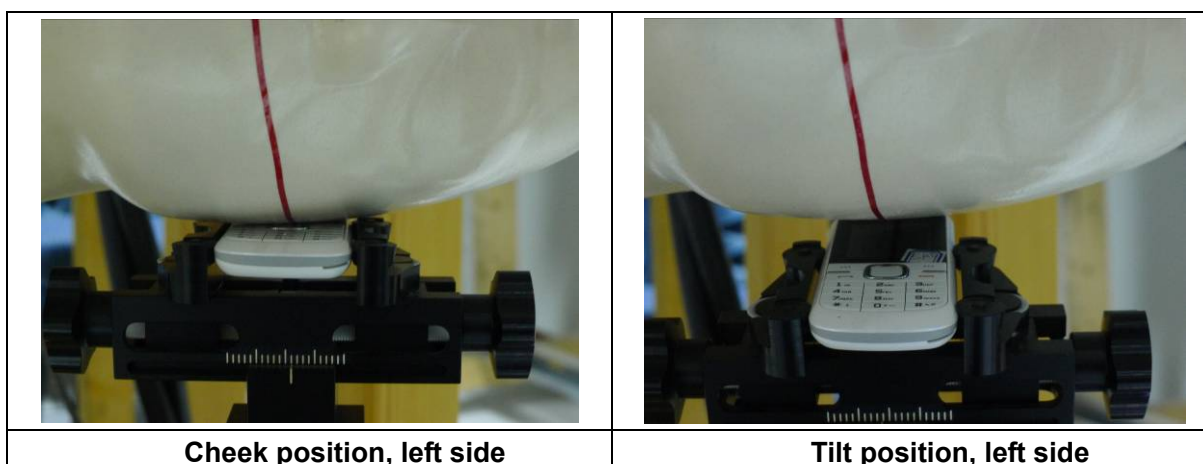
2.2 Picture of the EUT



Front view of the device

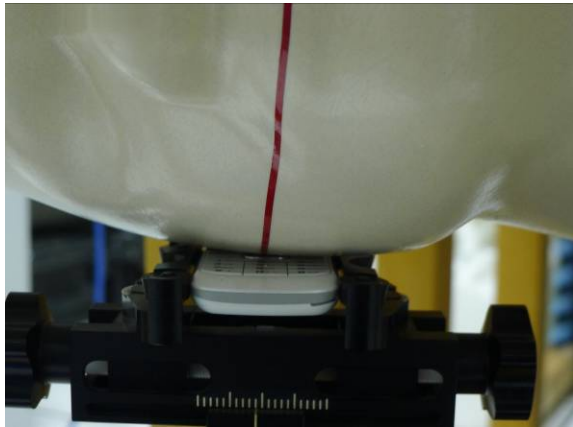
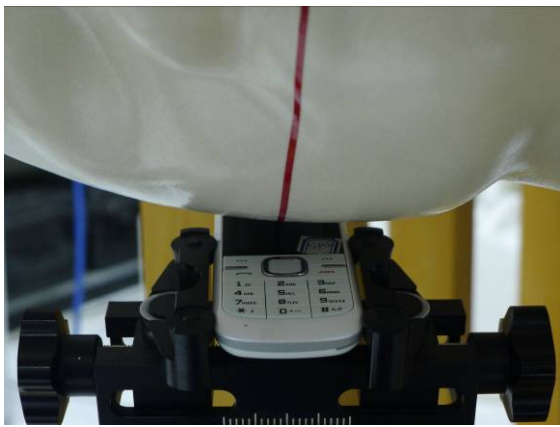
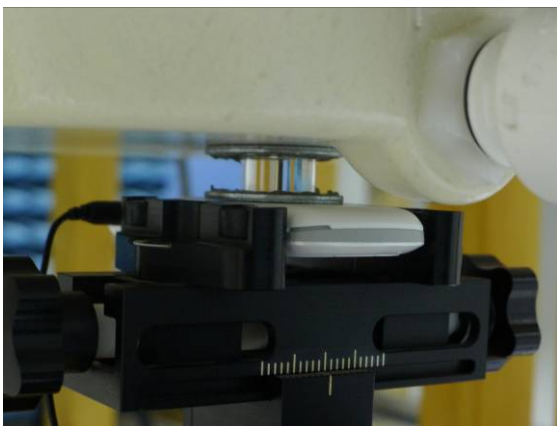
back view of the device

2.3 Test Positions for the Device under test



Cheek position, left side

Tilt position, left side

	
Cheek position, Right side	Tilt position, Right side
	
Body position	SPACER 15 mm

2.4 Picture to demonstrate the required liquid depth

the liquid depth in the used SAM phantoms



Liquid depth for SAR Measurement

2.5 Reference Specification

FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01) Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields.

IEC 62209-1-2005: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1:Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)

ANSI C95.1-1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

IEEE 1528-2003: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.

[DAY4] Schmid & partner Engineering AG: DAY4 Manual. Nov.2003

2.6 The IEEE Standard C95.1 and the FCC Exposure Criteria

In the USA the FCC exposure criteria [OET 65] are based on the withdrawn IEEE Standard C95.1-1999 [IEEE C95.1-1999]. This version was replaced by the IEEE Standard C95.1-2005 [IEEE C95.1-2005] in October, 2005.

Both IEEE standards sets limits for human exposure to radio frequency electromagnetic fields in the frequency range 3 kHz to 300 GHz. One of the major differences in the newly revised C95.1-2005 is the change in the basic restrictions for localized exposure, from 1.6 W/kg averaged over 1 g tissue to 2.0 W/kg averaged over 10 g tissue, which is now identical to the ICNIRP guidelines [ICNIRP 1998].

2.7 Distinction Between Exposed Population, Duration of Exposure and Frequencies

The American Standard [IEEE C95.1-1999] 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.

2.8 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 field strength E inside the human body, the conductivity σ and the mass density ρ of the biological tissue:

$$\begin{aligned} SAR &= \frac{\sigma E_i^2}{\rho} \\ SAR &= c_i \left. \frac{dT}{dt} \right|_{t=0} \end{aligned}$$

The specific absorption rate describes the initial rate of temperature rise dT/dt as a function of the specific heat capacity c of the tissue. A limitation of the specific absorption rate prevents 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.

For the relevant frequency range the maximum permissible exposure may be exceeded if the exposure can be shown by appropriate techniques to produce SAR values below the corresponding limits.

2.9 SAR Limit

In this report the comparison between the American exposure limits and the measured data is made using the spatial peak 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 1 the SAR values have to be averaged over a mass of 1 g (SAR1g) with the shape of a cube.

Standards	Status	SAR limit [w/kg]
IEEE C95.1-1999	Replaced	1.6

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

3. The FCC Measurement Procedure

The Federal Communications Commission (FCC) has published a report and order on the 1st of August 1996 [FCC 96-326], which requires routine dosimetric assessment of mobile telecommunications devices, either by laboratory measurement techniques or by computational modeling, prior to equipment authorization or use. In 2001 the Commission's Office of Engineering and Technology has released Edition 01-01 of Supplement C to OET Bulletin 65. This revised edition, which replaces Edition 97-01, provides additional guidance and information for evaluating compliance of mobile and Portable devices with FCC limits for human exposure to radiofrequency emissions [OET 65].

3.1 General Requirements

The test shall be performed using a miniature probe that is automatically positioned to measure the internal E-field distribution in a phantom model representing the human head exposed to the EM fields produced by mobile phones. From the measured E-field values, the SAR distribution and the maximum mass averaged SAR value shall be calculated.

The test shall be performed in a laboratory conforming to the following environmental conditions:

- the ambient temperature shall be in the range of 15 °C to 30°C and the variation shall not exceed 2 °C during the test;
- the mobile phone shall not interact with the local mobile networks;
- care shall be taken to avoid significant influence on SAR measurements by ambient EM sources;
- care shall be taken to avoid significant influence on SAR measurements by any reflection from the environment (such as floor, positioner, etc.).
- Validation of the system shall be done at least once a year according to the protocol defined in annex D of IEC 62209-1-2005 Standard.

3.2 Phantom specifications (shell and liquid)

Phantom requirements

The physical characteristics of the phantom model (size and shape) shall resemble the head and neck of a user since the shape is a dominant parameter for exposure. The phantom shall be made from material with dielectric properties similar to those of head tissues. To enable field scanning within it, the material shall be liquid contained in a head and neck shaped shell model. The shell model acts as a shaped container and shall be as unobtrusive as possible. The hand shall not be modeled.

The shell of the phantom shall be made of low loss and low permittivity material: $\tan(\delta) \leq 0,05$ and $\epsilon \leq 5$. The thickness of the phantom is defined in the CAD files and the tolerance shall be $\pm 0,2$ mm in the area defined in the CAD files (where the phone touches the head).

Reference points on the phantom:

The probe positioning shall be defined in relation to three well defined points on the phantom. These points R1, R2 and R3 shall be used to calibrate the positioning system. Three other points, M for mouth, LE for left ear and/or RE for right ear (maximum acoustic coupling), shall be defined on the phantom(s) (see Figure 2). These points shall be used to allow reproducible positioning of the mobile phone in relation to the phantom.

3.3 Specifications of the SAR measurement equipment

The measurement equipment shall be calibrated as a complete system. The probe shall be calibrated together with the amplifier, measurement device and data acquisition system.

The measurement equipment shall be calibrated in each tissue equivalent liquid at the appropriate operating frequency and temperature according to the methodology defined in IEC 62209-1-2005. The minimum detection limit shall be lower than 0,02 W/kg and the maximum detection limit shall be higher than 100 W/kg. The linearity shall be within 0,5 dB over the SAR range from 0,02 to 100 W/kg. The isotropy shall be within 1 dB. Sensitivity, linearity and isotropy shall be determined in the tissue equivalent liquid. The response time shall be specified.

3.4 Scanning system specifications

The scanning system holding the probe shall be able to scan the whole exposed volume of the phantom in order to evaluate the three-dimensional SAR distribution. The mechanical structure of the scanning system shall not interfere with the SAR measurements.

The accuracy of the probe tip positioning over the measurement area shall be less than 0,2 mm. The sampling resolution shall be 1 mm or less.

3.5 Mobile phone holder specifications

The mobile phone holder shall permit the phone to be positioned according to a tolerance of 1° in the tilt angle. It shall be made of low loss and low permittivity material(s): $\tan(\delta) \leq 0,05$ and $\epsilon \leq 5$.

4. Measurement preparation

4.1 General preparation

The dielectric properties of the tissue equivalent materials shall be measured prior to the SAR measurements and at the same temperature with a tolerance of 2°C . The measured values shall comply with the values defined at the specific frequencies in IEC 62209-1-2005 6.1.1. with a tolerance of 5 % for relative permittivity and conductivity.

The phantom shell shall be filled with the tissue equivalent liquid. The depth of the tissue equivalent liquid inside the phantom and at the vertical position of the ear canal shall be at least 15 cm. The liquid shall be carefully stirred before the measurement and it shall be free of air bubbles. The coordinate system of the scanning system shall be aligned to the coordinate system of the phantom with a tolerance of 0,2 mm.

4.2 Simplified performance checking

The purpose of the simplified performance check is to verify that the system operates within its specifications, check is a simple test of repeatability to make sure that the system works correctly during the compliance test. The check shall be performed in order to detect possible drift over short time periods and other errors in the system,

The simplified performance check shall be carried out according to annex D of IEC 62209-1-2005. The simplified performance check shall be performed prior to compliance tests and the result shall be within $\pm 10\%$ of the target value. After the system validation check. The simplified performance check shall be performed at a central frequency of each transmitting band of the mobile phone.

4.3 Preparation of the mobile phone under test

The tested mobile phone shall use its internal transmitter. The battery shall be fully charged before each measurement. The output power and frequency (channel) shall be controlled by 8960(base station simulator). The phone transmits its highest output peak power level allowed by the system. , The BTS antenna shall be placed at least 50 cm from the phone. The signal emitted by

the emulator at antenna feed point shall be lower than the output level of the phone by at least 30 dB.

4.4 Position of the mobile phone in relation to the phantom

The mobile phone shall be tested in the cheek and tilted positions on left and right sides of the phantom.

Definition of the cheek position:

a) Position the device with the vertical centre line of the body of the device and the horizontal line crossing the centre of the ear piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical centre line with the reference plane containing the three ear and mouth reference points (M, RE and LE) and align the centre of the ear piece with the line RE-LE;

b) Translate the mobile phone box towards the phantom with the ear piece aligned with the line LE-RE until the phone touches the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the box until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost.

Definition of the tilted position:

a) Position the device in the Tilt position described above;

b) While maintaining the device in the reference plane described above and pivoting against the ear, move it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost.



Definition of the reference lines and points, on the phone and on the phantom and initial position

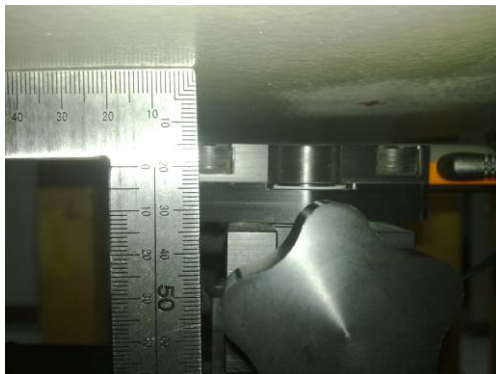
Definition of the flat position:

A separation distance of 1.5 cm between the back of the device or the front of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic

components.

Position the device under the phantom.

c) Position the device under the phantom on the condition of Flat.



Face away the phantom with the distance of 15mm

4.5 Tests to be performed

Tests shall be performed with both phone positions described in 4.4, on the left and right sides of the head and using the centre frequency of each operating band. The configuration giving rise to the maximum mass-averaged SAR shall be used to test the low-end and the high-end frequencies of the transmitting band. If the mobile phone has a retractable antenna, all of the tests described above shall be performed both with

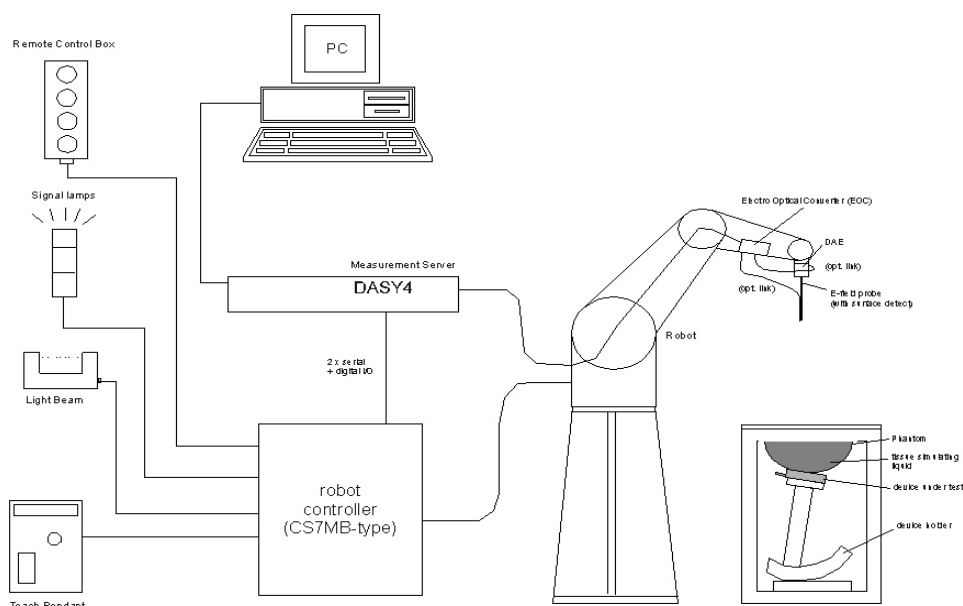
The antenna extended and with it retracted. When considering multi- mode and multi-band mobile phones, all of the above tests shall be performed in each transmitting mode/band with the corresponding maximum peak power level.

5. The Measurement system

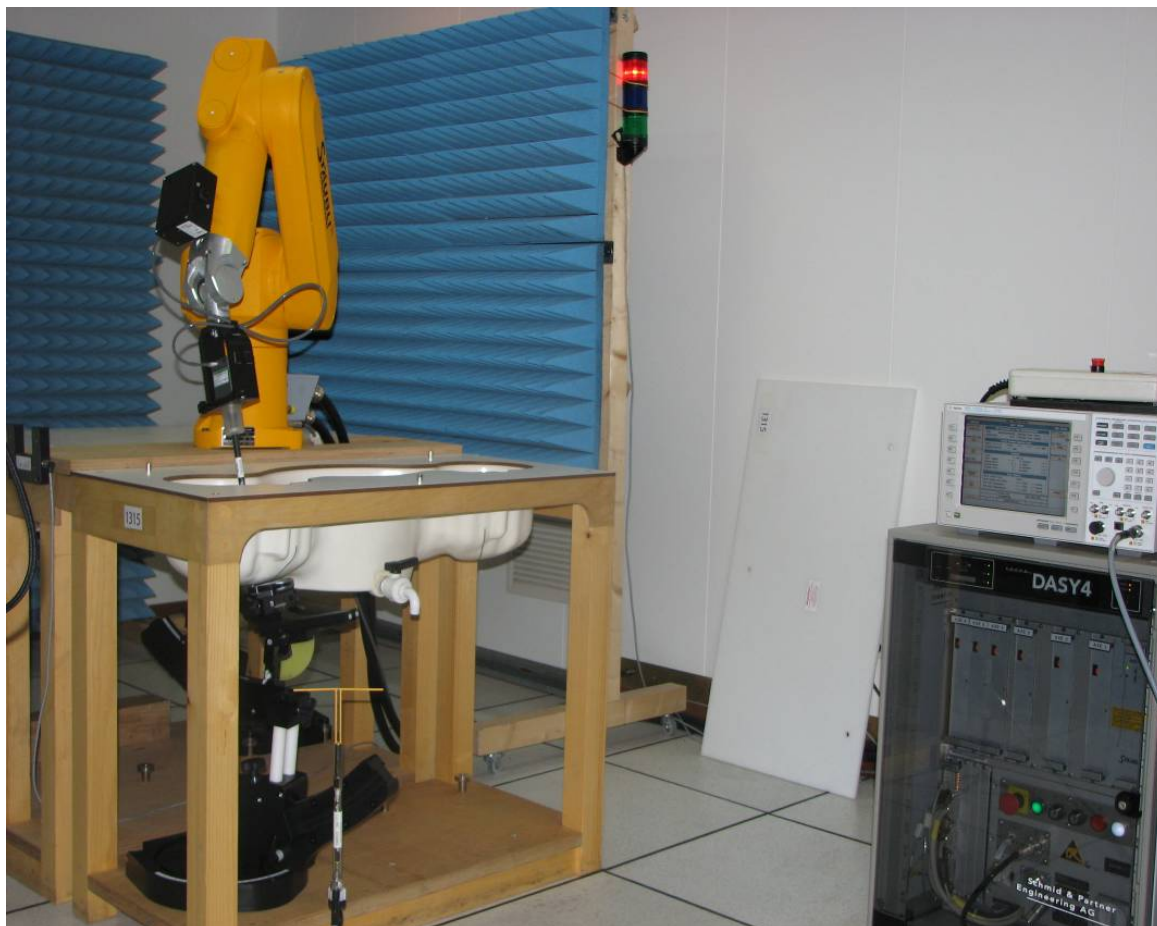
5.1 DASY4 Information

DASY4 is an abbreviation of "Dosimetric Assessment System" 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 as shown in Fig3. Fig4 shows the installation in the SRTC laboratory [DASY2004].

- High precision robot with controller
- Measurement server(for surveillance of the robot operation and signal filtering)
- Data acquisition electronics DAE (for signal amplification and altering)
- Field probes calibrated for use in liquids
- Electro-optical converter EOC (conversion from the optical into a digital signal)
- Light beam (improving of the absolute probe positioning accuracy)
- Two SAM phantoms filled with tissue simulating liquid
- DASY4 software
- SEMCAD



The DASY4 measurement system



The measurement set-up with two SAM phantoms containing tissue simulating liquid

5.2 Test Equipments:

Test Equipment	Serial Number	Calibration interval	Calibration expiry
DAE4	725	1 year	2012.10.18
Dosimetric E-field Probe ES3DV4	3708	1 year	2012.10.26
Dipole Validation Kit, D900V2	171	2 years	2012.06.11
DASY4 software Version	4.7	N/A	N/A

Note: the Dipole Calibration interval is 24 months

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration interval	Calibration expiry
Signal Generator	E4428C	MY45280865	1year	2012.08.20
Amplifier	5S1G4	0323472	N/A	N/A
Power meter	E4417A	MY45101004	1year	2012.08.20
Power Sensor	E9300B	MY41496001	1year	2012.08.20
Power Sensor	E9300B	MY41496003	1year	2012.08.20
Call Tester	8960	GB43194054	1year	2012.08.20
Network Analyzer	8714ET	US40372083	1year	2012.08.20
Dielectric Probe Kit	85070D	US33030365	N/A	N/A

Table 1. Test Equipments lists

5.3 Isotropic E-field Probe Type ES3DV4

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Calibration certificate in Appendix C
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Optical Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions	Overall length: 337 mm (Tip: 9 mm) Tip diameter: 2.5 mm (Body: 10mm) Distance from probe tip to dipole centers: 2.0 mm
Dynamic Range	5 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones

5.4 Uncertainty Assessment

DASY4 Uncertainty Budget								
Error description	Uncertainty value	Prob . Dist.	Div.	(c_i) 1g	(c_i) 10g	Std.Unc (1g).	Std.Unc. (10g)	(v_i) V_{eff}
Measurement system								
Probe calibration	±5.9%	N	1	1	1	±5.9%	±5.9%	∞
Axial isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary effects	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System detection limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF ambient noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF ambient reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe positioner	±0.4%	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe positioning	±2.9%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Max.SAR Eval.	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom uncertainty	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid conductivity(target)	±5.0%	R	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
Liquid conductivity(meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid conductivity(target)	±5.0%	R	$\sqrt{3}$	0.6	0.49	±1.7%	±1.4%	∞
Liquid onductivity(means.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined std. Uncertainty						±10.9%	±10.7%	387
Expanded STD Uncertainty						±21.9%	±21.4%	

Uncertainty assessment

6. Test Results

6.1 Test Environment:

Ambient temperature (° C)	21.0 to 23.0
Ambient humidity (RH %)	30 to 45

6.2 Test Method and Procedure

a) Measure the local SAR at a test point within 10 mm of the inner surface of the phantom. The test point shall also be close to the ear;

b) verify that the measured SAR at the point used in item 1 is stable after 3 minutes within $\pm 5\%$ in order to ensure that there is no drift due to the mobile phone electronics;

c) Measure the SAR distribution within the phantom. The spatial grid step shall be less than 20 mm. If surface scanning is used, then the distance between the geometrical centre of the probe detectors and the inner surface of the phantom shall be constant within $\pm 0,5$ mm and less than 8 mm. If volume scanning is performed, then the scanning volume shall be as close as possible to the inner surface of the phantom (less than 8 mm), the grid step shall be 5 mm or less, the grid shall extend to a depth of 25 mm and then go directly to item 6;

d) From the scanned SAR distribution, identify the position of the maximum SAR value, as well as the positions of any local maxima with SAR values of more than 50 % of the maximum value;

e) Measure SAR with a grid step less than 5 mm in a volume with a minimum size of 30 mm by 30 mm and 25 mm in depth. Separate grids shall be centred on each of the local SAR maxima;

f) Use interpolation and extrapolation procedures defined in annex C of IEC 62209-1-2005 to determine the local SAR values at the spatial resolution needed for mass averaging;

g) Repeat the SAR measurement at the initial test point used in item 1. If the two results differ by more than $\pm 5\%$ from the final value obtained in item 2, the measurements shall be repeated with a fully charged battery or the actual drift shall be included in the uncertainty evaluation.

Tests shall be performed with both phone positions of cheek and tilted, on the left and right sides of the head and using the centre frequency of each operating band. Then the configuration giving rise to the maximum mass-averaged SAR shall be used to test the low-end and the high-end frequencies of the transmitting band. If the mobile phone has a retractable antenna, all of the tests described above shall be performed both with the antenna extended and with it retracted. When considering multi- mode and multi-band mobile phones, all of the above tests shall be performed in each

transmitting mode/band with the corresponding maximum peak power level.

Head SAR Measurements

SAR for head exposure configurations was measured in RC3 with the EUT configured to transmit at full rate using Loopback Service Option SO55. SAR for RC1 was not required when the maximum average output of each channel was less than $\frac{1}{4}$ dB higher than that measured in RC3. Otherwise, SAR was measured on the maximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3.

Body SAR Measurements

SAR for body exposure configurations was measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + SCHn) was not required when the maximum average output of each RF channel was less than $\frac{1}{4}$ dB higher than that measured with FCH only. Otherwise, SAR was measured on the maximum output channel (FCH + SCHn) with FCH at full rate and SCH0 enabled at 9600 bps using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels were enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts.

Body SAR in RC1 was not required when the maximum average output of each channel was less than $\frac{1}{4}$ dB higher than that measured in RC3. Otherwise, SAR was measured on the maximum output channel in RC1; with Loopback Service Option SO55, at full rate, using the body exposure configuration that resulted in the highest SAR for that channel in RC3.

Handsets with Ev-Do

For handsets with Ev-Do capabilities, when the maximum average output of each channel in Rev. 0 is less than $\frac{1}{4}$ dB higher than that measured in RC3 (1x RTT), body SAR for Ev-Do is not required. Otherwise, SAR for Rev. 0 is measured on the maximum output channel, at 153.6 kbps using the body exposure configuration that results in the highest SAR for that channel in RC3. SAR for Rev. A is not required when the maximum average output of each channel is less than that measured in Rev. 0 or less than $\frac{1}{4}$ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel for Rev. A using a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations. A Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in

all slots should be configured in the downlink for both Rev. 0 and Rev. A.

Note: All the procedures described above were followed according to FCC" SAR Measurement Procedure for 3G Devices, June 2006"

6.3 Test Configuration

The test shall be performed in the shield room.

6.4 Test Results

BT and GSM are simultaneous transmission, The distance of BT's antenna and GSM's antenna is d_{xy} , $d_{xy} > 5\text{cm}$, $P_{bt} \leq 24\text{mW}$, no stand-alone SAR, BT SAR is considered zero in the 1-g SAR summing process to determine simultaneous transmission SAR.

Mode: CDMA 835

$f_L(\text{MHz})=824.70\text{MHz}$ $f_M(\text{MHz})=836.52\text{MHz}$ $f_H(\text{MHz})= 848.31\text{MHz}$

SAR Values (Head, 835MHz Band SO55 RC3 FULL RATE)

Limit of SAR (W/kg)		1 g Average
		1.6
Test Case		Measurement Result (mW/g)
		1 g Average
Left hand, Touch cheek ,	f_L	1.390
Left hand, Touch cheek,	f_M	1.460
Left hand, Touch cheek ,	f_H	1.500
Left hand, Tilt 15 Degree,	f_L	0.716
Left hand, Tilt 15 Degree,	f_M	0.865
Left hand, Tilt 15 Degree,	f_H	0.752
Right hand, Touch cheek ,	f_L	1.270
Right hand, Touch cheek,	f_M	1.380
Right hand, Touch cheek	f_H	1.330
Right hand, Tilt 15 Degree,	f_L	0.637
Right hand, Tilt 15 Degree,	f_M	0.876
Right hand, Tilt 15 Degree,	f_H	0.698

So, the maximum SAR is

Phantom Configuration	Device Test Position	SAR(mW/g)		
		$f_L(\text{MHz})$	$f_M(\text{MHz})$	$f_H(\text{MHz})$
Left Side/ SO55 RC3	cheek	----	----	1.500

Mode: CDMA 835

f_L (MHz)=824.70MHz f_M (MHz)=836.52MHz f_H (MHz)= 848.31MHz

SAR Values (Body, 835MHz Band SO55 RC3 FULL RATE)

Limit of SAR (W/kg)	1 g Average
	1.6
Test Case	Measurement Result (mW/g)
	1 g Average
Towards phantom with a headset /SO55 RC3, 15mm spacer f_M	0.768
Towards ground with a headset /SO55 RC3, 15mm spacer f_L	0.918
Towards ground with a headset /SO55 RC3, 15mm spacer f_M	0.787
Towards ground with a headset /SO55 RC3, 15mm spacer f_H	0.594

So, the maximum SAR is

Phantom Configuration	Device Test Position	SAR(mW/g)		
		f_L (MHz)	f_M (MHz)	f_H (MHz)
Towards ground/ SO55 RC3	15mm spacer	0.918	---	---

7. Conducted output power measurement

7.1 Summary

During the process of testing, the EUT was controlled via Agilent Digital Radio Communication tester (8960) to ensure the maximum power transmission and proper modulation. This result contains conducted output power and ERP for the EUT. In all cases, the measured peak output power should be greater and within 5% than EMI measurement.

7.2 Conducted power

7.2.1 Measurement Methods

The EUT was set up for the maximum output power.

Duty cycle: 1:1(100%)

Test communication setup meet as followings:

Communication standard between mobile station and base station simulator	3GPP2 C.S0011-B
Radio configuration	RC3(supporting CDMA 1X)
Date Rate	9600bps
Service Options	SO55(Loop back mode)
Multiplex Options	The mobile station does not support this service

Base station Simulator: 8960

Test Parameter setup for maximum RF output power according to section 4.4.5 of 3GPP2 C.S0011-B:

Parameter	Units	Value
I_{or}	dBm/1.23 MHz	-104
$\frac{Pilot E_c}{I_{or}}$	dB	-7
$\frac{Traffic E_c}{I_{or}}$	dB	-7.4

Parameter	Units	Value
I_{or}	dBm/1.23 MHz	-86
$\frac{Pilot E_c}{I_{or}}$	dB	-7
$\frac{Traffic E_c}{I_{or}}$	dB	-7.4

7.2.2 Measurement result

CDMA835:

Mode: SO55 RC1 Full rate

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
824.70	1013	23.40
836.52	384	23.44
848.31	777	23.31

Mode: SO55 RC3 Full rate

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
824.70	1013	23.48
836.52	384	23.56
848.31	777	23.40

Mode: SO32 RC3 FCH-SCH

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
824.70	1013	23.45
836.52	384	23.53
848.31	777	23.38

Mode: SO32 RC3 FCH+SCH

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
824.70	1013	23.42
836.52	384	23.57
848.31	777	23.39

*RC Configuration tested at “all up” power control bit.
The mobile station does not support data mode.

For SAR test, the maximum power output is very important and essential; it is identical under the measurement uncertainty. It is proper to use typical Test Mode 3 (FW RC3, RVS RC3, SO55) as the worst case for SAR test.
Under the loop back mode between mobile station and 8960, the transmitter continuously emits with maximum power more strong than voice mode, so the SAR test was done with loop back mode.

8. System validation

8.1 Tissue Recipes

The following recipe(s) were used for Head and Body tissue stimulant(s):

835MHz band

Ingredient	Head (% by weight)	Body (% by weight)
Water	40.29	50.75
Sugar	57.90	48.21
Nacl	1.38	0.94
Cellulose	0.24	0
Preventol	0.18	0.10

8.2 Material Parameters

For the measurement of the following parameters the HP 85070D dielectric probe kit is used, representing the open-ended coaxial probe measurement procedure. Liquid temperature during the test: 22.3° C.

Head		ϵ_r	σ [S/m]	Temperature	
				Ambient [°C]	Liquid [°C]
835MHz	Recommended Value	41.5±2.1	0.9±0.045	15-30	-
	Measured Value	41.5	0.89	24.0	22.3

Body		ϵ_r	σ [S/m]	Temperature	
				Ambient [°C]	Liquid [°C]
835MHz	Recommended Value	55.2±2.76	0.97±0.0485	15-30	---
	Measured Value	53.7	0.99	24.0	22.3

Parameters of the head tissue simulating liquids

8.3 Setup for System Performance Check

(see also Chapter 15 System Performance Check of DAY 4 System handbook)

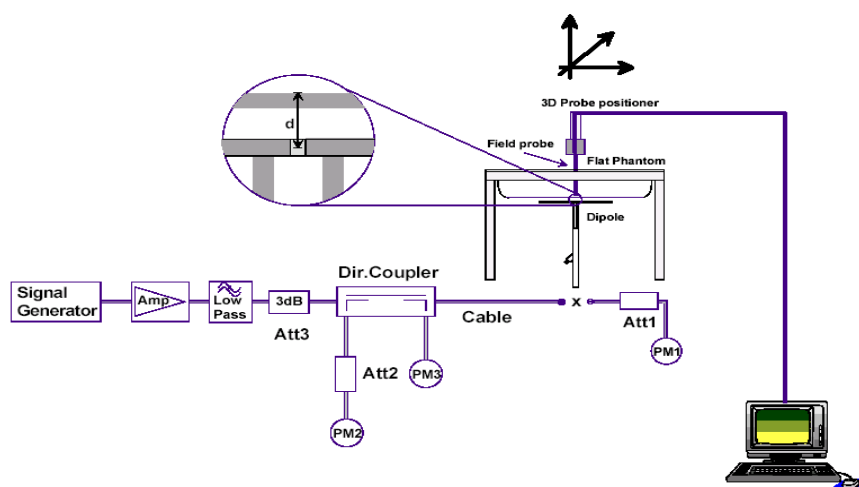


Fig5.Setup for system performance Check

First the power meter PM1 is connected to the cable and it measures the forward power at the location of the dipole connector (X). The signal generator is adjusted for the desired forward power at the dipole connector (taking into account the (Att1) value) and the power meter PM2 is read at that level. Then after connecting the cable to the dipole, the signal generator is readjusted for the same reading at the power meter PM2. If the signal generator does not allow a setting in 0,01 dB steps, the remaining difference at PM2 must be taken into consideration. PM3 records the reflected power from the dipole and ensures that the value is not changed from the previous value. The reflected power should be 20 dB below the forwarded power.

8.4 Simplified Performance Checking

The simplified performance check was realized using the dipole validation kits. The input power of the dipole antennas were 250mW (cw signal) and they were placed under the flat part of the SAM phantom. The results are listed in the Table 8 .The target values were adopted from the IEEE1528. Table 7 includes the uncertainty assessment for the system performance checking which was suggested by the IEC 62209-1-2005 and determined by Schmid & Partner Engineering AG. The expanded uncertainty is assessed to be $\pm 21.9\%$. Measurement is made at temperature 24°C , relative humidity 34.5%, Liquid temperature during the test: 22.3°C . System validation date: 2011.12.31

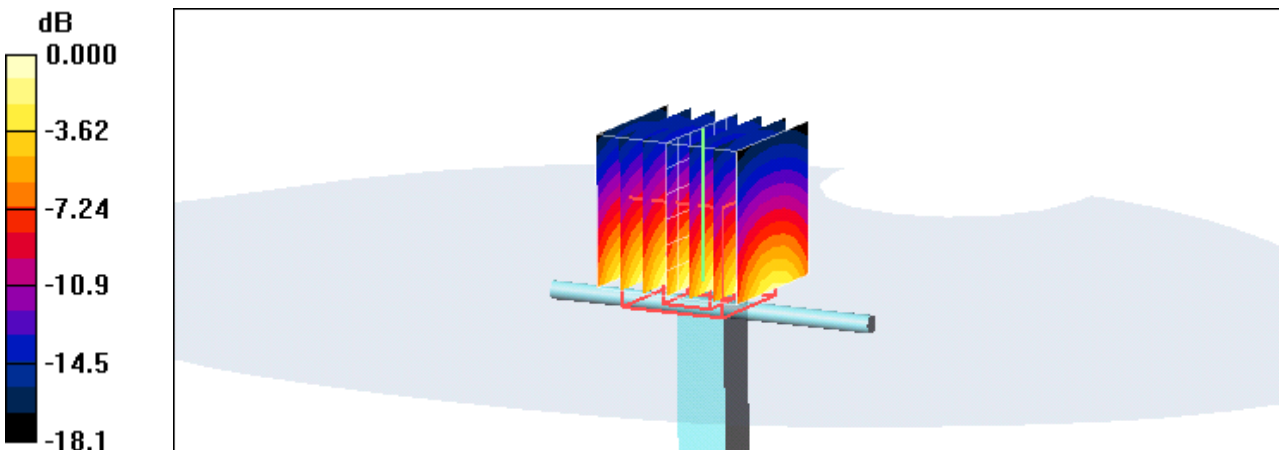
System checking,head tissue simulant

		SAR _{1g} [w/kg]	ϵ_r	σ [S/m]	Temperature	
					Ambient[°C]	Liquid[°C]
900MHz	Target Value	10.8	42±2.1	0.99±0.05	15-30	---
	Measured Value	10.9	40.7	0.95	24.0	22.3

All SAR values are normalized to 1W forward power

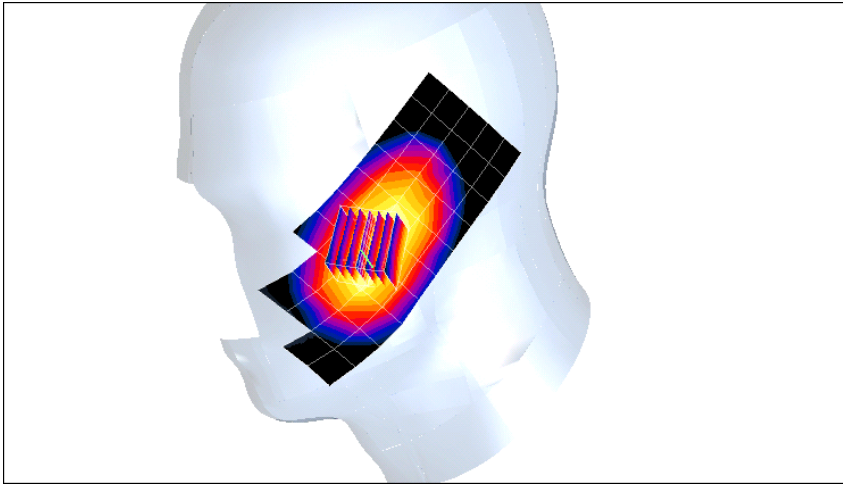
Validation results, 900 MHz

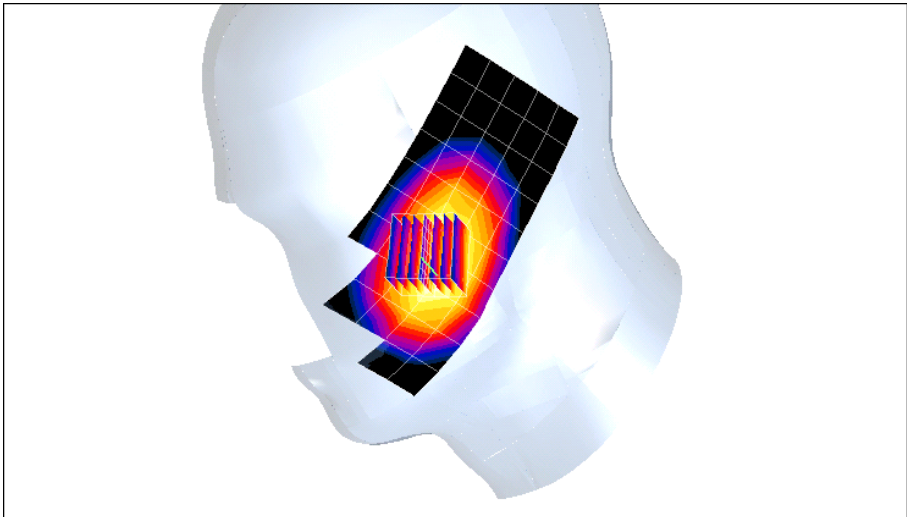
APPENDIX A:SYSTEM CHECKING SCANS

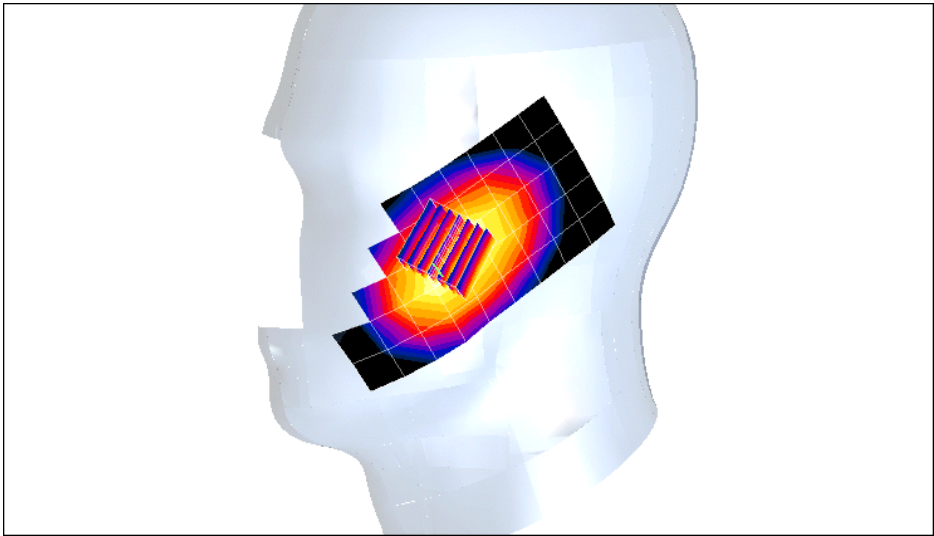
SYSTEM CHECKING SCANS	900MHz
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:171 Medium parameters used (interpolated): $f = 900 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 40.7$; $\rho = 1000 \text{ kg/m}^3$ DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 56.3V/m; Power Drift = -0.047 dB Peak SAR (extrapolated) = 4.08 W/kg SAR(1 g) = 2.72 mW/g; SAR(10 g) = 1.62 mW/g Maximum value of SAR (measured) = 2.9 mW/g	
 0 dB = 2.9 mW/g	

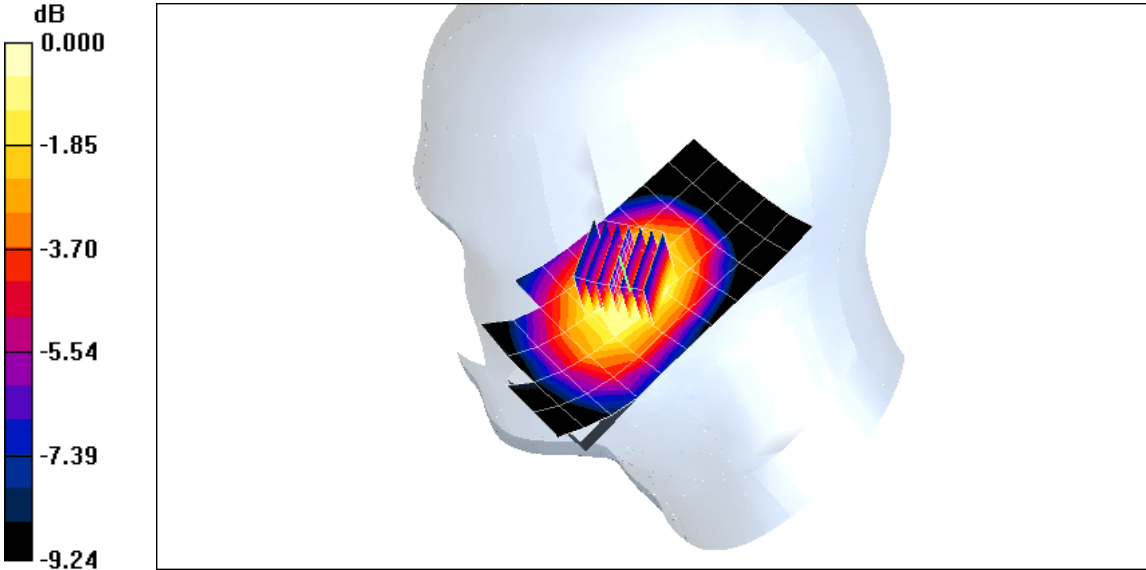
APPENDIX B: MEASUREMENT SCANS

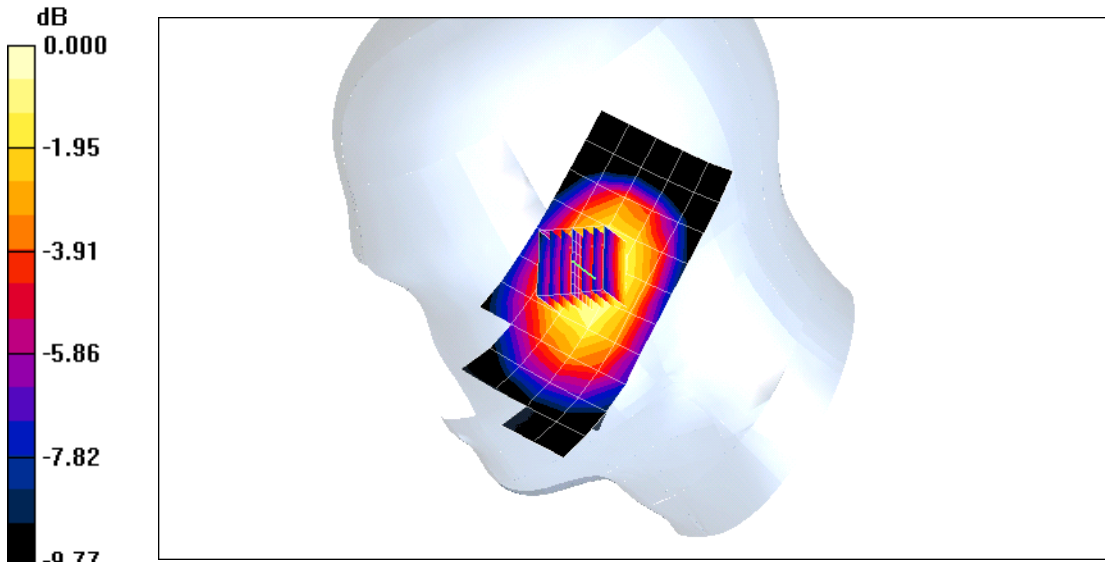
835MHz head

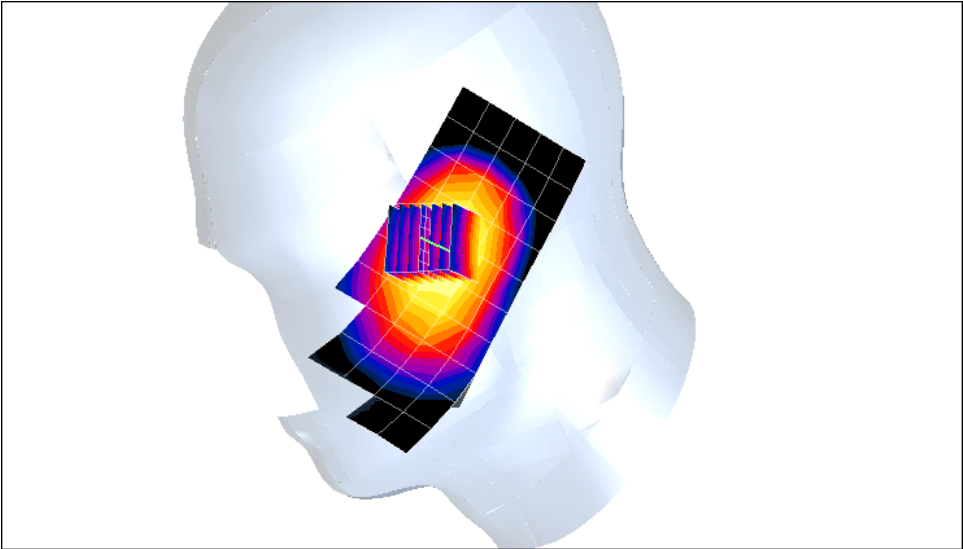
Right Side	Cheek	824.7MHz
Communication System: cdma 835; Frequency: 824.7 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 824.7 \text{ MHz}$; $\sigma = 0.887 \text{ mho/m}$; $\epsilon_r = 43.3$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Right Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Touch position - Low/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 1.31 mW/g Touch position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 19.6 V/m; Power Drift = 0.165 dB Peak SAR (extrapolated) = 1.76 W/kg SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.870 mW/g Maximum value of SAR (measured) = 1.37 mW/g dB 0.000 -2.22 -4.44 -6.66 -8.88 -11.1  0 dB = 1.37mW/g		

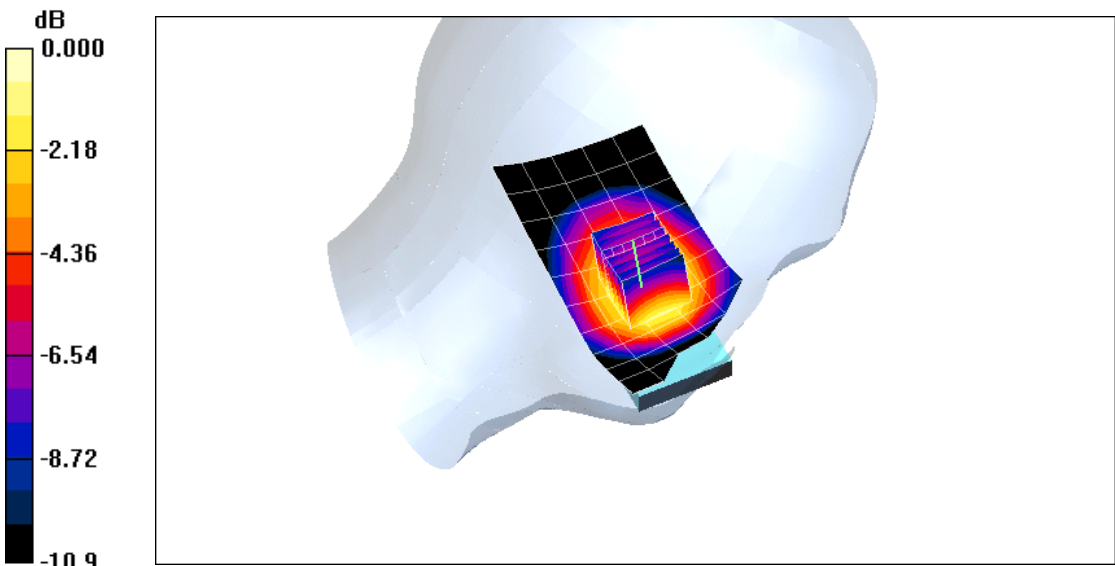
Right Side	Cheek	836.52MHz
Communication System: cdma 835; Frequency: 836.52 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 836.52 \text{ MHz}$; $\sigma = 0.899 \text{ mho/m}$; $\epsilon_r = 43.1$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Right Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Touch position - Middle/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 1.48 mW/g Touch position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 12.3 V/m; Power Drift = 0.068 dB Peak SAR (extrapolated) = 1.92 W/kg SAR(1 g) = 1.38 mW/g; SAR(10 g) = 0.962 mW/g Maximum value of SAR (measured) = 1.46 mW/g dB 0.000 -2.14 -4.28 -6.42 -8.56 -10.7  0 dB = 1.46mW/g		

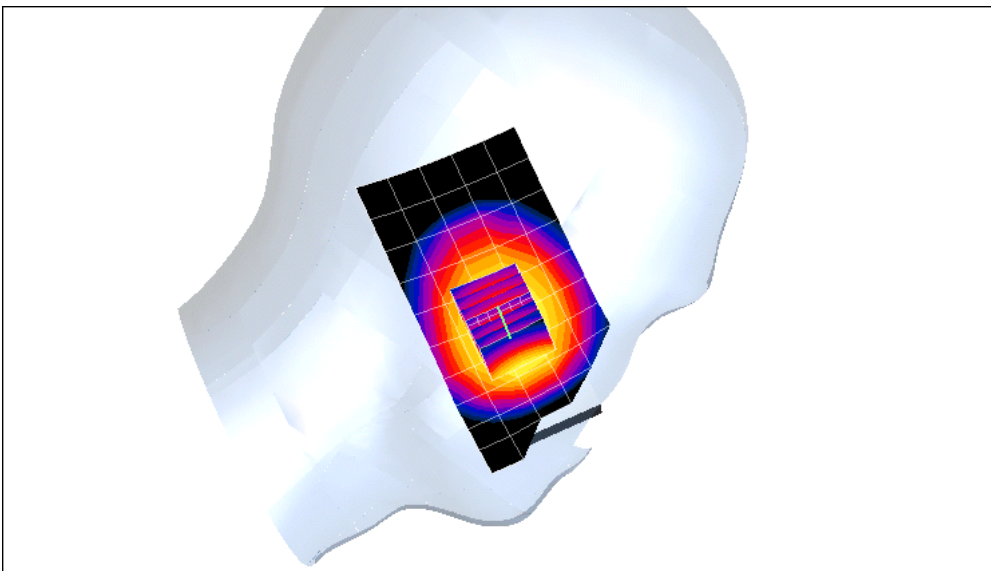
Right Side	Cheek	848.3MHz
Communication System: cdma 835; Frequency: 848.3 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 848.3 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 43$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Right Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Touch position - High/Area Scan (6x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 1.38 mW/g Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 18.8 V/m; Power Drift = -0.066 dB Peak SAR (extrapolated) = 1.86 W/kg SAR(1 g) = 1.33 mW/g; SAR(10 g) = 0.922 mW/g Maximum value of SAR (measured) = 1.47 mW/g dB 0.000 -2.12 -4.24 -6.36 -8.48 -10.6  0 dB = 1.47mW/g		

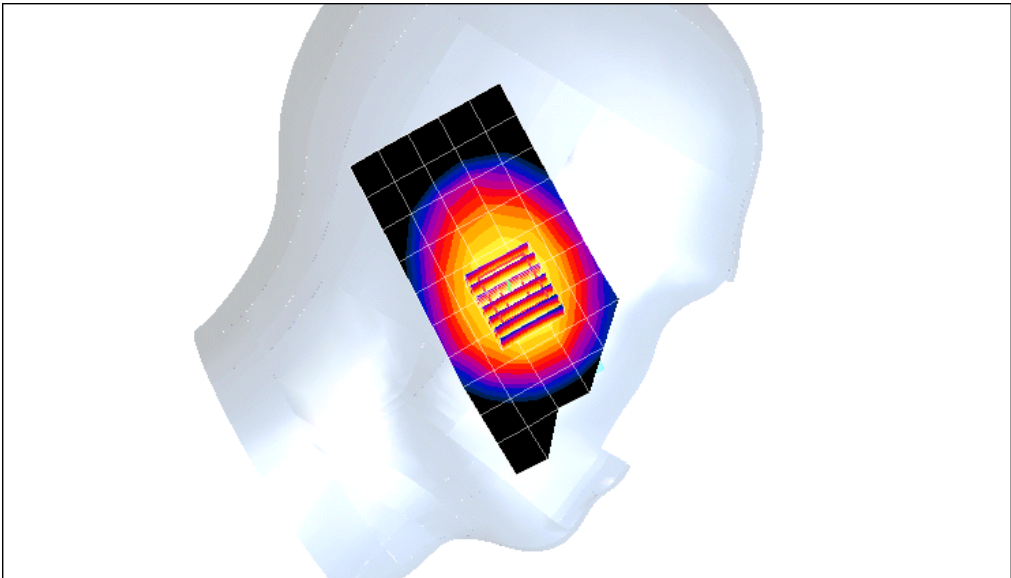
Right Side	Tilt	824.7MHz
Communication System: cdma 835; Frequency: 824.7 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 824.7 \text{ MHz}$; $\sigma = 0.887 \text{ mho/m}$; $\epsilon_r = 43.3$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Right Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Tilt position - Low/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.643 mW/g Tilt position - Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 17.6 V/m; Power Drift = -0.015 dB Peak SAR (extrapolated) = 0.840 W/kg SAR(1 g) = 0.637 mW/g; SAR(10 g) = 0.461 mW/g Maximum value of SAR (measured) = 0.678 mW/g  0 dB = 0.678mW/g		

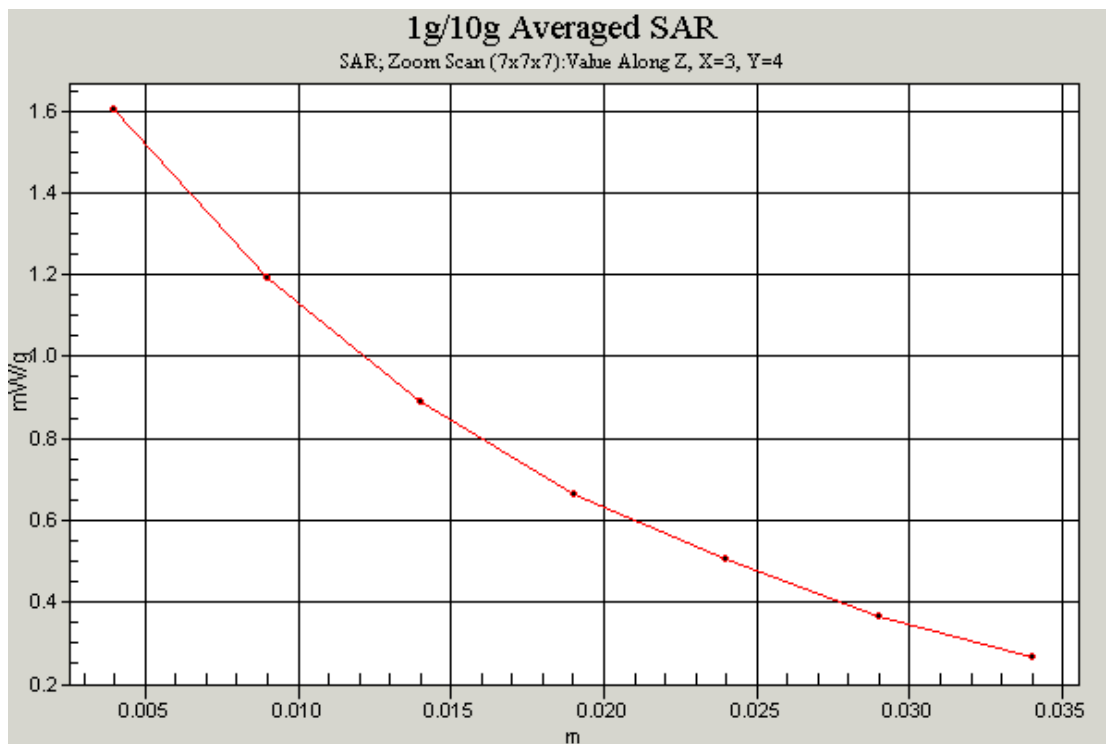
Right Side	Tilt	836.52MHz
Communication System: cdma 835; Frequency: 836.52 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 836.52 \text{ MHz}$; $\sigma = 0.899 \text{ mho/m}$; $\epsilon_r = 43.1$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Right Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Tilt position - Middle/Area Scan (6x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 0.852 mW/g Tilt position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 21.8 V/m; Power Drift = -0.104 dB Peak SAR (extrapolated) = 1.18 W/kg SAR(1 g) = 0.876 mW/g; SAR(10 g) = 0.626 mW/g Maximum value of SAR (measured) = 0.937 mW/g  0 dB = 0.937mW/g		

Right Side	Tilt	848.3MHz
Communication System: cdma 835; Frequency: 848.3 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 848.3 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 43$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Right Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Tilt position - High/Area Scan (6x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 0.719 mW/g Tilt position - High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 19.3 V/m; Power Drift = -0.092 dB Peak SAR (extrapolated) = 0.930 W/kg SAR(1 g) = 0.698 mW/g; SAR(10 g) = 0.501 mW/g Maximum value of SAR (measured) = 0.747 mW/g dB 0.000 -1.94 -3.88 -5.83 -7.77 -9.71  0 dB = 0.747mW/g		

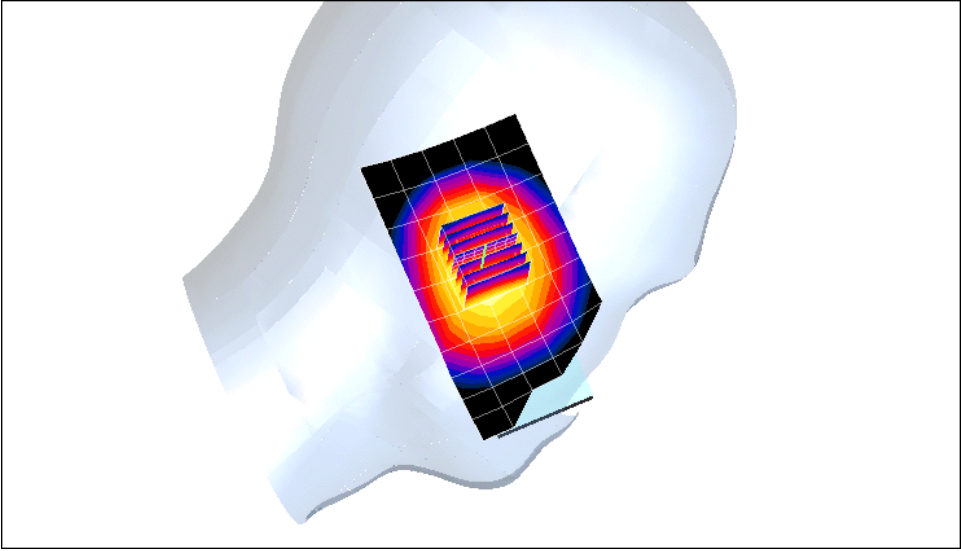
Left Side	Cheek	824.7 MHz
Communication System: cdma 835; Frequency: 824.7 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 824.7 \text{ MHz}$; $\sigma = 0.887 \text{ mho/m}$; $\epsilon_r = 43.3$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Left Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Touch position - Low/Area Scan (6x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 1.36 mW/g Touch position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 19.0 V/m; Power Drift = 0.032 dB Peak SAR (extrapolated) = 1.83 W/kg SAR(1 g) = 1.39 mW/g; SAR(10 g) = 0.973 mW/g Maximum value of SAR (measured) = 1.44 mW/g  0 dB = 1.44mW/g		

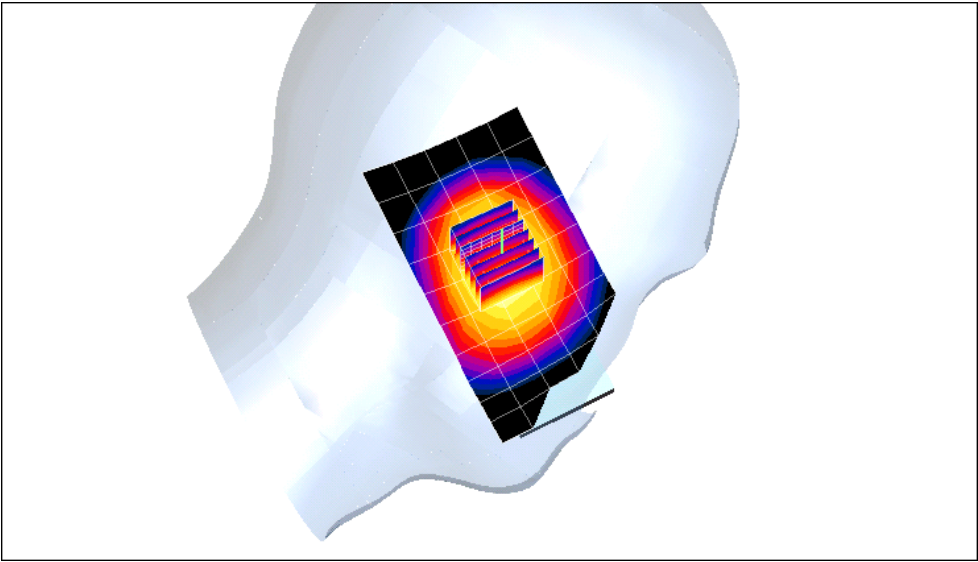
Left Side	Cheek	836.52MHz
Communication System: cdma 835; Frequency: 836.52 MHz; Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 836.52 \text{ MHz}$; $\sigma = 0.899 \text{ mho/m}$; $\epsilon_r = 43.1$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Left Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Touch position - Middle /Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 1.41 mW/g Touch position - Middle /Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 19.2 V/m; Power Drift = -0.199 dB Peak SAR (extrapolated) = 2.01 W/kg SAR(1 g) = 1.46 mW/g; SAR(10 g) = 1.02 mW/g Maximum value of SAR (measured) = 1.54 mW/g dB 0.000 -2.30 -4.60 -6.90 -9.20 -11.5  0 dB = 1.54mW/g		

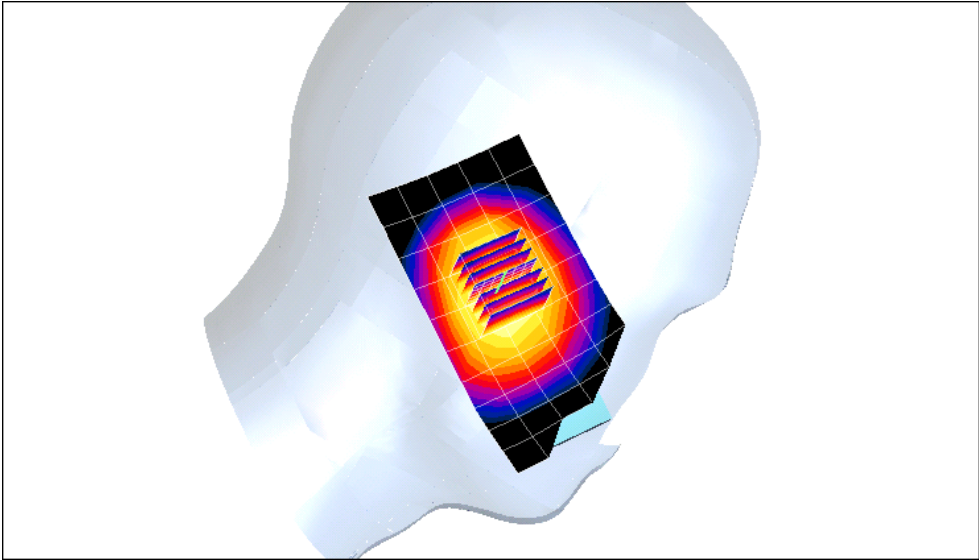
Left Side	Cheek	848.3 MHz
Communication System: cdma 835; Frequency: 848.3 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 848.3 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 43$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Left Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Touch position - High/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 1.38 mW/g Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 18.1 V/m; Power Drift = -0.028 dB Peak SAR (extrapolated) = 2.02 W/kg SAR(1 g) = 1.5 mW/g; SAR(10 g) = 1.04 mW/g Maximum value of SAR (measured) = 1.60 mW/g dB 0.000 -2.43 -4.86 -7.29 -9.71 -12.1  0 dB = 1.60mW/g		



Z-Scan at power reference point (848.3 MHz CH777)

Left Side	Tilt	824.7 MHz
Communication System: cdma 835; Frequency: 824.7 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 824.7 \text{ MHz}$; $\sigma = 0.887 \text{ mho/m}$; $\epsilon_r = 43.3$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Left Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Tilt position - Low/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.731 mW/g Tilt position - Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 22.2 V/m; Power Drift = -0.048 dB Peak SAR (extrapolated) = 0.958 W/kg SAR(1 g) = 0.716 mW/g; SAR(10 g) = 0.514 mW/g Maximum value of SAR (measured) = 0.761 mW/g dB 0.000 -1.94 -3.88 -5.82 -7.76 -9.70  0 dB = 0.761mW/g		

Left Side	Tilt	836.52 MHz
Communication System: cdma 835; Frequency: 836.52 MHz; Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 836.52 \text{ MHz}$; $\sigma = 0.899 \text{ mho/m}$; $\epsilon_r = 43.1$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Left Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Tilt position - Middle/Area Scan (6x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 0.896 mW/g Tilt position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 23.4 V/m; Power Drift = 0.088 dB Peak SAR (extrapolated) = 1.20 W/kg SAR(1 g) = 0.865 mW/g; SAR(10 g) = 0.618 mW/g Maximum value of SAR (measured) = 0.933 mW/g dB 0.000 -2.00 -4.00 -6.00 -8.00 -10.0  0 dB = 0.933mW/g		

Left Side	Tilt	848.3 MHz
Communication System: cdma 835; Frequency: 848.3 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 848.3 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 43$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Left Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.68, 8.68, 8.68); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Tilt position - High/Area Scan (6x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 0.806 mW/g Tilt position - High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 22.8 V/m; Power Drift = -0.029 dB Peak SAR (extrapolated) = 1.00 W/kg SAR(1 g) = 0.752 mW/g; SAR(10 g) = 0.539 mW/g. Maximum value of SAR (measured) = 0.797 mW/g dB 0.000 -1.95 -3.89 -5.84 -7.78 -9.73  0 dB = 0.797 mW/g		

835MHz flat

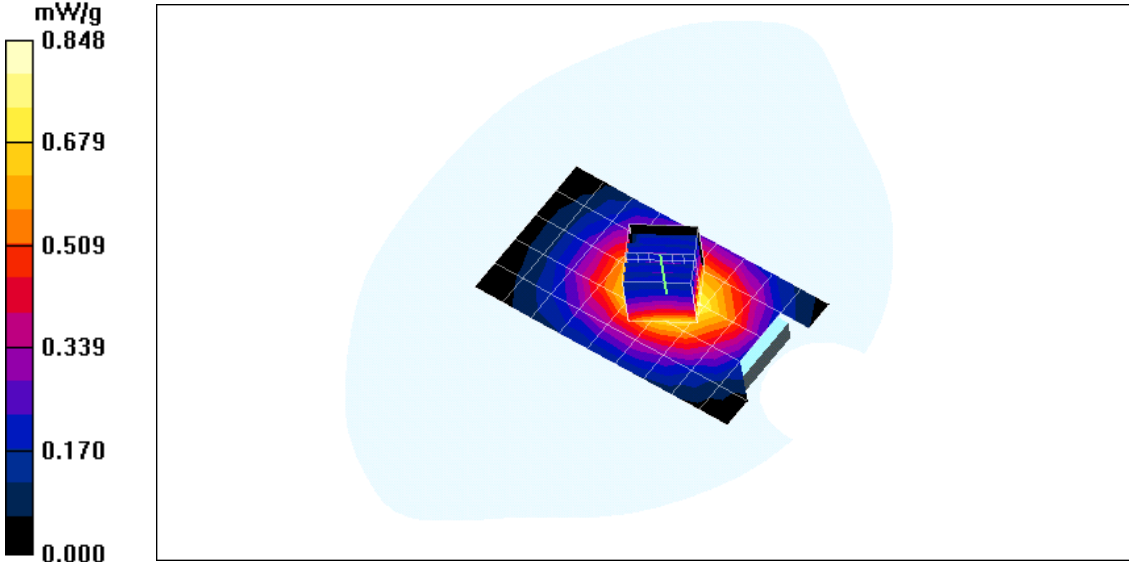
The State Radio_monitoring_center Testing Center (SRTC)

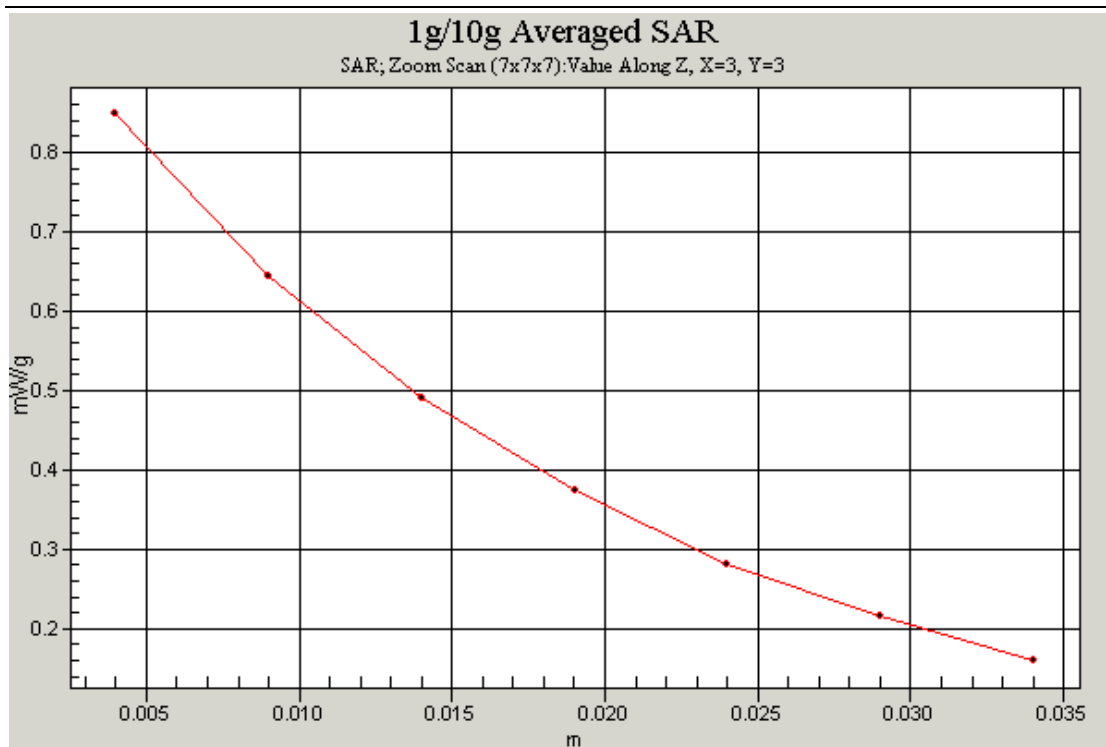
Tel: 86-10-68009202 68009203

Fax: 86-10-68009195 68009205

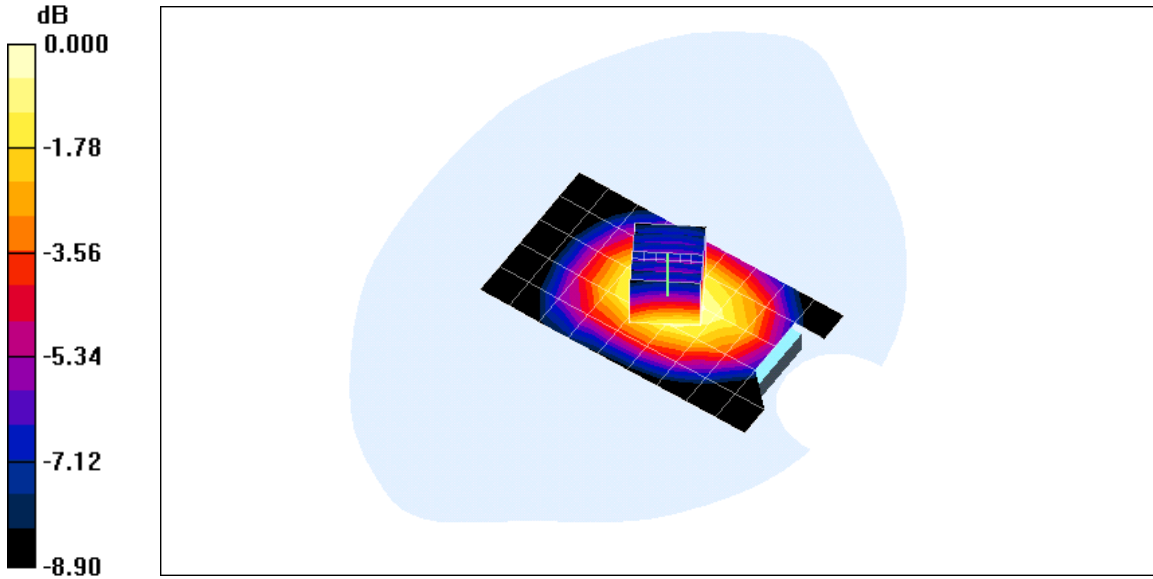
Page number: 40 of 56

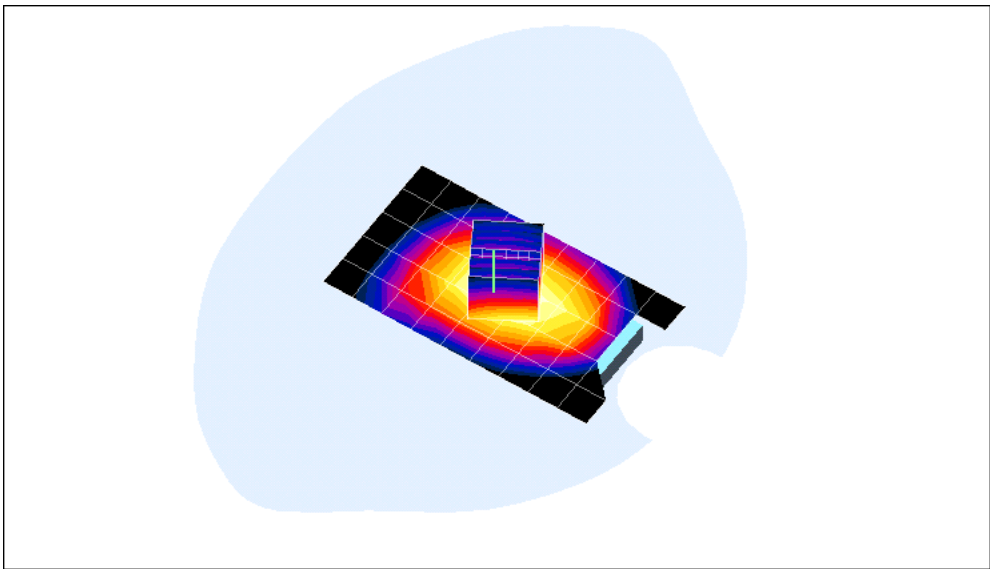
Copyright © SRTC

FLAT	Towards ground	824.70MHz
Communication System: cdma 835; Frequency: 824.7 MHz;Duty Cycle: 1:1 Medium parameters used: $f = 825 \text{ MHz}$; $\sigma = 0.954 \text{ mho/m}$; $\epsilon_r = 54.9$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.94, 8.94, 8.94); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 towards ground- Low/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.841 mW/g towards ground- Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 27.2 V/m; Power Drift = -0.069 dB Peak SAR (extrapolated) = 1.75 W/kg SAR(1 g) = 0.918 mW/g; SAR(10 g) = 0.622 mW/g Maximum value of SAR (measured) = 0.848 mW/g  0 dB = 0.848mW/g		



Z-Scan at power reference point (824.70 MHz CH1013)

FLAT	Towards ground	836.52 MHz
Communication System: cdma 835; Frequency: 836.52 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 836.52 \text{ MHz}$; $\sigma = 0.97 \text{ mho/m}$; $\epsilon_r = 54.6$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.94, 8.94, 8.94); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Towards ground-middle/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.811 mW/g Towards ground-middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 27.6 V/m; Power Drift = -0.017 dB Peak SAR (extrapolated) = 1.05 W/kg SAR(1 g) = 0.787 mW/g; SAR(10 g) = 0.569 mW/g Maximum value of SAR (measured) = 0.829 mW/g  0 dB = 0.829mW/g		

FLAT	Towards ground	848.31 MHz
Communication System: cdma 835; Frequency: 848.3 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 848.3 \text{ MHz}$; $\sigma = 0.98 \text{ mho/m}$; $\epsilon_r = 54.5$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.94, 8.94, 8.94); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 towards ground-high/Area Scan (6x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 0.599 mW/g towards ground-high/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 24.5 V/m; Power Drift = -0.012 dB Peak SAR (extrapolated) = 0.782 W/kg SAR(1 g) = 0.594 mW/g; SAR(10 g) = 0.433 mW/g Maximum value of SAR (measured) = 0.621 mW/g dB 0.000 -1.77 -3.54 -5.31 -7.08 -8.85  0 dB = 0.621mW/g		

FLAT	Towards phantom	836.52 MHz
Communication System: cdma 835; Frequency: 836.52 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 836.52 \text{ MHz}$; $\sigma = 0.97 \text{ mho/m}$; $\epsilon_r = 54.6$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section DASY4 Configuration: - Probe: EX3DV4 - SN3708; ConvF(8.94, 8.94, 8.94); Calibrated: 10/26/2011 - Sensor-Surface: 4mm (Mechanical Surface Detection) - Electronics: DAE4 Sn725; Calibrated: 10/18/2011 - Phantom: SAM 1560; Type: SAM; Serial: 1560 - Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186 Towards phantom-middle/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.795 mW/g Towards phantom-middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 26.7 V/m; Power Drift = -0.041 dB Peak SAR (extrapolated) = 1.03 W/kg SAR(1 g) = 0.768 mW/g; SAR(10 g) = 0.556 mW/g Maximum value of SAR (measured) = 0.809 mW/g 0 dB = 0.809mW/g		

APPENDIX C: RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)

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



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

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **SRTC (PTT)**

Certificate No: **EX3-3708_Oct11**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3708**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-12.v7, QA CAL-14.v3, QA CAL-23.v4,
QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **October 26, 2011**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name	Function	Signature
	Jeton Kastrati	Laboratory Technician	
Approved by:	Name	Function	Signature
	Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			Issued: November 28, 2011

Certificate No: EX3-3708_Oct11

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



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

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}:** Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}:** DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR:** PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}:** A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters:** Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy):** in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset:** The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

EX3DV4 – SN:3708

October 26, 2011

Probe EX3DV4

SN:3708

Manufactured: July 21, 2009
Calibrated: October 26, 2011

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

Certificate No: EX3-3708_Oct11

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EX3DV4-- SN:3708

October 26, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3708

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.49	0.44	0.55	$\pm 10.1\%$
DCP (mV) ^B	98.2	101.7	96.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	111.0	$\pm 3.0\%$
			Y	0.00	0.00	1.00	107.9	
			Z	0.00	0.00	1.00	121.6	

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

^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

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

EX3DV4- SN:3708

October 26, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3708

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	9.64	9.64	9.64	0.12	1.00	± 13.4 %
900	41.5	0.97	8.68	8.68	8.68	0.73	0.70	± 12.0 %
1750	40.1	1.37	8.04	8.04	8.04	0.80	0.63	± 12.0 %
2000	40.0	1.40	7.72	7.72	7.72	0.80	0.61	± 12.0 %
2450	39.2	1.80	6.84	6.84	6.84	0.80	0.61	± 12.0 %
5200	36.0	4.66	4.92	4.92	4.92	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.43	4.43	4.43	0.50	1.80	± 13.1 %

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

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

EX3DV4-- SN:3708

October 26, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3708

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	10.21	10.21	10.21	0.04	1.00	± 13.4 %
900	55.0	1.05	8.94	8.94	8.94	0.80	0.66	± 12.0 %
1750	53.4	1.49	7.46	7.46	7.46	0.80	0.65	± 12.0 %
2000	53.3	1.52	7.41	7.41	7.41	0.80	0.62	± 12.0 %
2450	52.7	1.95	6.98	6.98	6.98	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.25	4.25	4.25	0.50	1.95	± 13.1 %
5800	48.2	6.00	3.94	3.94	3.94	0.60	1.95	± 13.1 %

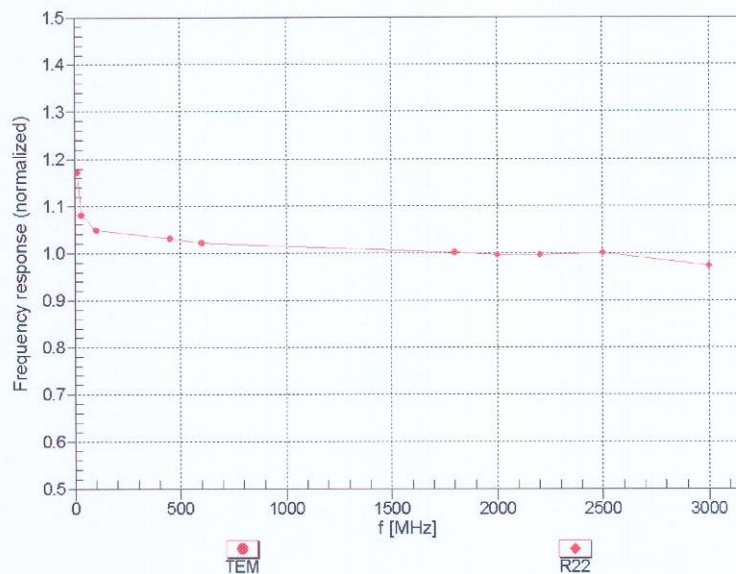
^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

EX3DV4-- SN:3708

October 26, 2011

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



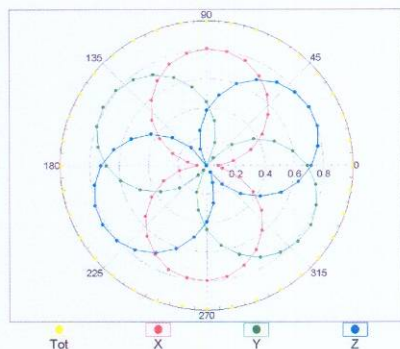
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

EX3DV4- SN:3708

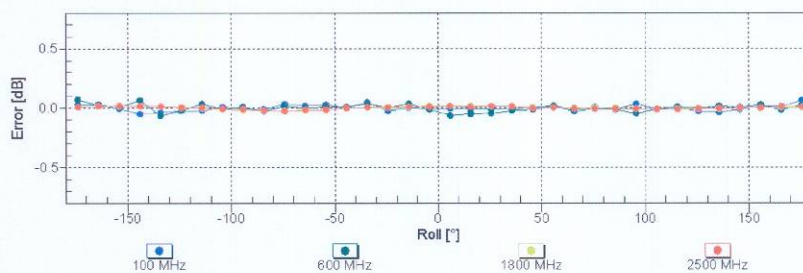
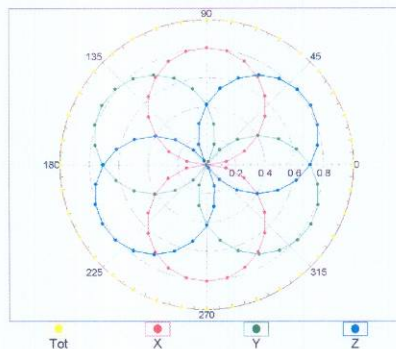
October 26, 2011

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

f=600 MHz,TEM



f=1800 MHz,R22



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

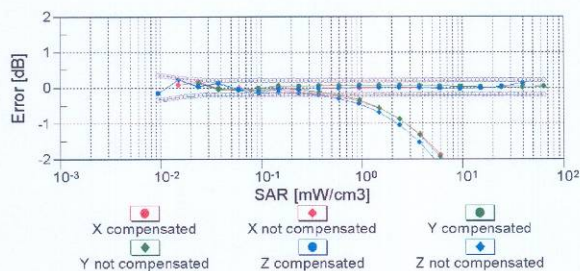
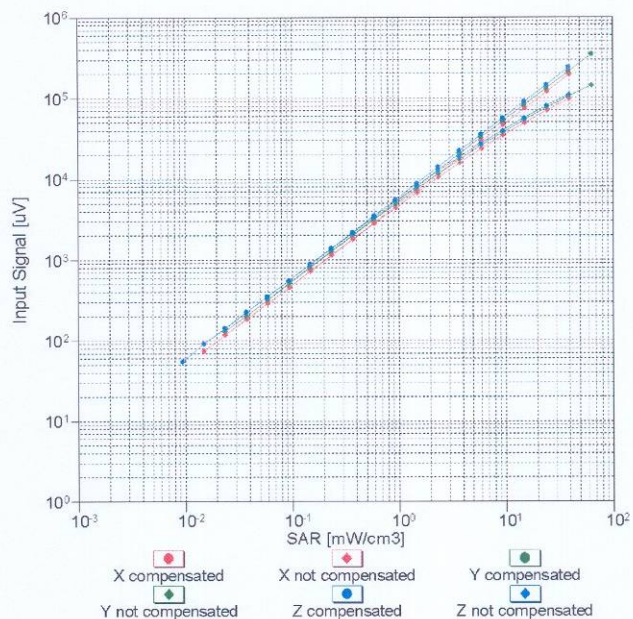
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Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f = 900 \text{ MHz}$)



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

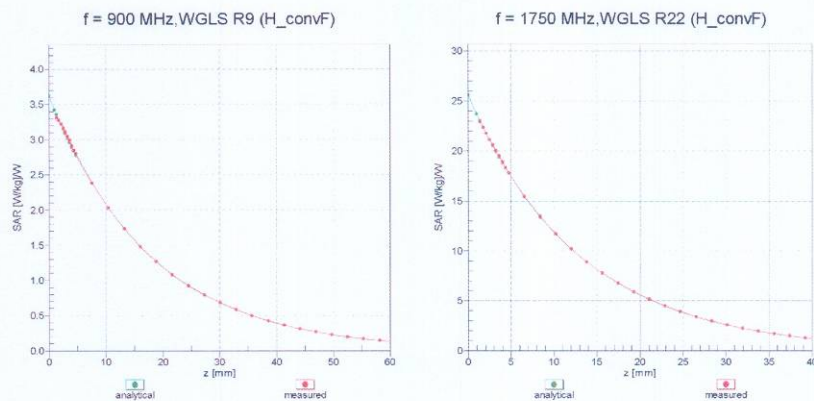
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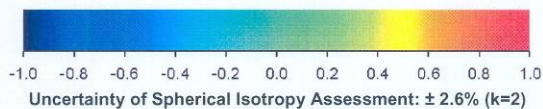
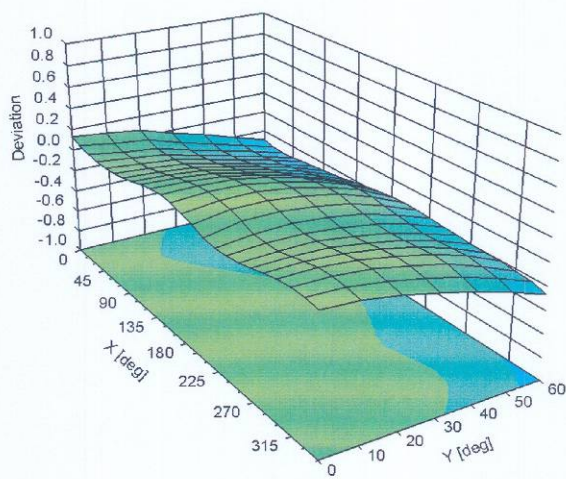
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Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), f = 900 MHz



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

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3708

Other Probe Parameters

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