Deutscher Akkreditierungs Rat

No. DAT-P-114/01-01

No. L0442

TEST REPORT

No. 2006E01100-1

FCC ID	QISV710
Test name	Electromagnetic Field (Specific Absorption Rate)
Product	WCDMA/GPRS/GSM/ Mobile Phone
Model	V710
Client	HUAWEI Technologies Co., Ltd.
Type of test	Non Type Approval

Telecommunication Metrology Center

of Ministry of Information Industry

信息产业部通信计量中心 检验报告专用章

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Product Name	WCDMA/GPRS/GSM Mobile Phone	Sample Model	V710
Client	HUAWEI Technologies Co., Ltd.	Type of test	Non Type Approval
Factory	HUAWEI Technologies Co., Ltd.	Sampling arrival date	August 28th, 2006
Manufacturer	HUAWEI Technologies Co., Ltd.		
Sampling/ Sending sample	Sending sample	Sample sent by	Zhang Xinghai
Sampling location	/	Sampling person	/
Sample quantity	1	Sample matrix	/
Series number of the Sample	/		
Test basis	**EN 50360–2001:** Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones. **EN 50361–2001:** Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones. **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) **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. **ANSI C95.1–1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz **OET Bulletin 65 (Edition 97-01) and Supplement C(Edition 01-01):** Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits.		
Test conclusion	Localized Specific Absorption Rate (SAR) of this portable wireless equipment has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report. General Judgment: **Pass** (Stamp) **Date of issue: August 30th, 2006**		
Note	TX Freq. Band: 1850-1910 MHz (PCS) Max. Power: 1 Watt (PCS) Antenna Character: / The test results relate only to the items tested of the sample(s).		

Approved by (Lu Bingsong) **Deputy Director of the laboratory** **Reviewed by** (Wang Hongbo) **Tested by** (Sun Qian)

1 COMPETENCE AND WARRANTIES

Telecommunication Metrology Center of Ministry of Information Industry is a test laboratory accredited by DAR (DATech) – Deutschen Akkreditierungs Rat (Deutsche Akkreditierungsstelle Technik) for the tests indicated in the Certificate No. **DAT-P-114/01-01**.

Telecommunication Metrology Center of Ministry of Information Industry is a test laboratory competent to carry out the tests described in this test report.

Telecommunication Metrology Center of Ministry of Information Industry guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at **Telecommunication Metrology Center of Ministry of Information Industry** at the time of execution of the test.

Telecommunication Metrology Center of Ministry of Information Industry is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the items under test and the results of the test.

2 GENERAL CONDITIONS

2.1 This report only refers to the item that has undergone the test.

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3 DESCRIPTION OF EUT

3.1 Addressing Information Related to EUT

Table 1: Applicant (The Client)

Name or Company	HUAWEI Technologies Co., Ltd.
Address/Post	Bantian, Longgang District, Shenzhen, Guangdong
City	Shenzhen
Postal Code	518129
Country	China
Telephone	0755-89651014
Fax	0755-89652518

Table 2: Manufacturer

Name or Company	HUAWEI Technologies Co., Ltd.
Address/Post	Bantian, Longgang District, Shenzhen, Guangdong
City	Shenzhen
Postal Code	518129
Country	China
Telephone	0755-89651014
Fax	0755-89652518

3.2 Constituents of EUT

Table 3: Constituents of Samples

Description	Model	Serial Number	Manufacturer
Handset	V710	\	HUAWEI Technologies Co., Ltd
Lithium Battery	HBU535	FMT661400786T	SCUD(Fujian) Electronics Co., Ltd
AC/DC Adapter	TPCA-053065E	\	TECH-POWER INTERNATIONAL CO., LTD

Picture 1: Constituents of the sample (Lithium Battery is in the Handset)

3.3 General Description

Equipment Under Test (EUT) is a model of WCDMA/GPRS/GSM mobile phone with integrated antenna. It consists of Handset and normal options: Lithium Battery and AC/DC Adapter as Table 3 and Picture 1. Its GPRS class is 10. In the report of No.2006E01100, the EUT was only tested towards ground with its flip open in the body test and GPRS test. Thereby, here SAR is tested for PCS 1900MHz body test, and the test cases are: Body towards Phantom with flip open, Body towards Phantom with flip closed and an earphone, Body towards Ground with flip closed and an earphone. And also SAR is tested for PCS 1900MHz GPRS test, and the test cases are: Body towards Phantom with flip open, Body towards Phantom with flip closed, Body towards Ground with flip closed.

The sample undergoing test was selected by the Client.

Components list please refer to documents of the manufacturer

4 OPERATIONAL CONDITIONS DURING TEST

4.1 Schematic Test Configuration

A communication link is set up with a System Simulator (SS) by air link, and a call is established. The

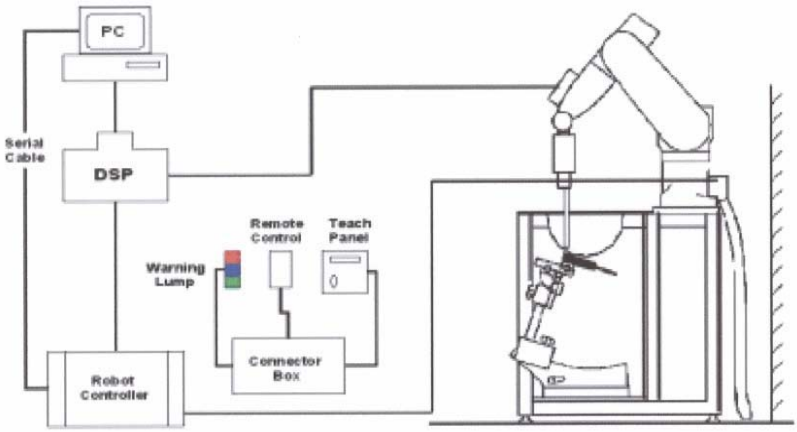
Absolute Radio Frequency Channel Number (ARFCN) is allocated to 512, 661 and 810 respectively in the case of PCS 1900 MHz. The EUT is commanded to operate at maximum transmitting power.

The EUT shall use its internal transmitter. The antenna(s), battery and accessories shall be those specified by the manufacturer. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. If a wireless link is used, the antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the handset. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the handset by at least 30 dB.

4.2 SAR Measurement Set-up

These measurements were performed with the automated near-field scanning system DASY4 Professional from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9m) which positions the probes with a positional repeatability of better than ± 0.02mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines (length =300mm) to the data acquisition unit.

A cell controller system contains the power supply, robot controller, teaches pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the Micron Pentium III 800 MHz computer with Windows 2000 system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.



Picture 2: SAR Lab Test Measurement Set-up

The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own

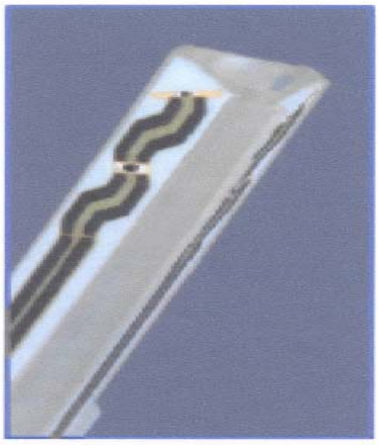
controller with a built in VME-bus computer.

4.3 Dasy4 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ET3DV6 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the standard procedure with an accuracy of better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB.

ET3DV6 Probe Specification

Construction	Symmetrical design with triangular core Built-in optical fiber *for* surface detection System(ET3DV6 only) Built-in shielding against static charges PEEK enclosure material(resistant to organic solvents, e.q., glycol)
Calibration	In air from 10 MHz to 2.5 GHz In brain and muscle simulating tissue at frequencies of 450MHz, 900MHz and 1.8GHz (accuracy±8%) Calibration for other liquids and frequencies upon request
Frequency	l 0 MHz to > 6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity	±0.2 dB in brain tissue (rotation around probe axis) ±0.4 dB in brain tissue (rotation normal probe axis)
Dynamic Range	5u W/g to > 100mW/g; Linearity: ±0.2dB
Surface Detection	±0.2 mm repeatability in air and clear liquids over diffuse reflecting surface(ET3DV6 only)
Dimensions	Overall length: 330mm Tip length: 16mm Body diameter: 12mm Tip diarneter: 6.8mm Distance from probe tip to dipole centers: 2.7mm
Application	General dosimetry up to 3GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms



Picture 3: ET3DV6 E-field Probe

Picture4:ET3DV6 E-field probe

4.4 E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free

space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$\mathbf{SAR} = \mathbf{C}\frac{\Delta T}{\Delta t}$$

Where: Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

Or

$$\mathbf{SAR} = \frac{|E|^2 \sigma}{\rho}$$

Where: σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m3).

Picture 5:Device Holder

Note: Please see Annex E to check the probe calibration certificate.

4.5 Other Test Equipment

4.5.1 Device Holder for Transmitters

In combination with the Generic Twin Phantom V3.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeat ably positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

4.5.2 Phantom

The Generic Twin Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow all predefined phantom positions and measurement grids by the complete setup of manually teaching three points in the robot.

Shell Thickness	2±0. l mm
Filling Volume	Approx. 20 liters
Dimensions	810 x l000 x 500 mm (H x L x W)
Available	Special

Picture6:Generic Twin Phantom

4.6 Equivalent Tissues

The liquid used for the frequency range of 800-2000 MHz consisted of water, sugar, salt and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 4 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and OET Bulletin 65 (Edition 97-01) and Supplement C (Edition 01-01).

Table 4. Composition of the Body Tissue Equivalent Matter

MIXTURE %	FREQUENCY 1900MHz
Water	69.91
Glycol monobutyl	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1900MHz ε=53.3 σ=1.52

4.7 System Specifications

4.7.1 Robotic System Specifications

Specifications

Positioner: Stäubli Unimation Corp. Robot Model: RX90L
Repeatability: ±0.02 mm
No. of Axis: 6

Data Acquisition Electronic (DAE) System

Cell Controller
Processor: Pentium III
Clock Speed: 800 MHz
Operating System: Windows 2000
Data Converter
Features: Signal Amplifier, multiplexer, A/D converter, and control logic
Software: DASY4 software
Connecting Lines: Optical downlink for data and status info.
Optical uplink for commands and clock

5 CHARACTERISTICS OF THE TEST

5.1 Applicable Limit Regulations

EN 50360–2001: Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.
It specifies the maximum exposure limit of **2.0 W/kg** as averaged over any 10 gram of tissue for portable devices being used within 20 mm of the user in the uncontrolled environment.

ANSI C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 mm of the user in the uncontrolled environment.

5.2 Applicable Measurement Standards

EN 50361–2001: Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.

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)

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.

OET Bulletin 65 (Edition 97-01) and Supplement C (Edition 01-01): Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits.

They specify the measurement method for demonstration of compliance with the SAR limits for such equipments.

6 LABORATORY ENVIRONMENT

Table 5: The Ambient Conditions during EMF Test

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

7 CONDUCTED OUTPUT POWER MEASUREMENT

7.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMU-200) 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. The channel power was measured with Agilent Spectrum Analyzer E4440A. These measurements were done at 3 channels, 512, 661 and 810 before SAR test and after SAR test.

7.2.2 Measurement result

Table 6: Conducted Power Measurement Results

	Conducted Power		
	Channel 512 (1850.2MHz)	**Channel 661 (1880MHz)**	**Channel 810 (1909.8MHz)**
Before Test (dBm)	30.1	29.8	29.9
After Test (dBm)	29.8	29.9	30.0

7.2.3 Power Drift

To control the output power stability during the SAR test, DASY4 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in Table 9 to Table 14 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

8 TEST RESULTS

8.1 Dielectric Performance

Table 7: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 22.5 °C and relative humidity 49%. Liquid temperature during the test: 21.4°C			
/	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
Target value	1900MHz	53.3	1.52
Measurement value (Average of 10 tests)	1900MHz	51.5	1.57

8.2 System Validation

Table 8: System Validation

Measurement is made at temperature 23.3 °C, relative humidity 47%, input power 250 mW. Liquid temperature during the test: 22.5°C					
Liquid parameters		**Frequency**	**Permittivity ε**		**Conductivity σ (S/m)**
		1900 MHz	40.27		1.45
Verification results	**Frequency**	**Target value (W/kg)**		**Measurement value (W/kg)**	
		10 g Average	**1 g Average**	**10 g Average**	**1 g Average**
	1900 MHz	5.125	9.925	5.27	9.91

Note：Target Values used are one fourth of those in IEEE Std 1528-2003 (feeding power is normalized to 1 Watt), i.e. 250 mW is used as feeding power to the validation dipole (SPEAG using).

8.3 Summary of Measurement Results (Body, 1900MHz Band)

Table 9: SAR Values (Body, Towards Phantom with Flip Open)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Body, Towards Phantom, Top frequency (See Fig.1)	0.120	0.190	0.006
Body, Towards Phantom, Mid frequency (See Fig.3)	0.104	0.163	0.128
Body, Towards Phantom, Bottom frequency (See Fig.5)	0.108	0.177	0.177

Table 10: SAR Values (Body, Towards Phantom with Flip Closed)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Body, Towards Phantom, Top frequency (See Fig.7)	0.048	0.074	-0.168
Body, Towards Phantom, Mid frequency (See Fig.9)	0.035	0.055	-0.100
Body, Towards Phantom, Bottom frequency (See Fig.11)	0.038	0.057	0.200

Table 11: SAR Values (Body, Towards Ground with Flip Closed)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Body, Towards Ground, Top frequency (See Fig.13)	0.105	0.171	-0.022
Body, Towards Ground, Mid frequency (See Fig.15)	0.074	0.120	-0.053
Body, Towards Ground, Bottom frequency (See Fig.17)	0.070	0.108	0.028

8.4 Summary of Measurement Results (Body, 1900MHz Band with GPRS)

Table 12: SAR Values (Body, Towards Phantom with Flip Open)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Body, Towards Phantom, Top frequency (See Fig.19)	0.234	0.372	0.200
Body, Towards Phantom, Mid frequency (See Fig.21)	0.220	0.399	0.057
Body, Towards Phantom, Bottom frequency (See Fig.23)	0.204	0.315	-0.033

Table 13: SAR Values (Body, Towards Phantom with Flip Closed)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Body, Towards Phantom, Top frequency (See Fig.25)	0.090	0.140	0.157
Body, Towards Phantom, Mid frequency (See Fig.27)	0.087	0.136	-0.200
Body, Towards Phantom, Bottom frequency (See Fig.29)	0.088	0.137	0.141

Table 14: SAR Values (Body, Towards Ground with Flip Closed)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Body, Towards Ground, Top frequency (See Fig.31)	0.141	0.234	-0.145
Body, Towards Ground, Mid frequency (See Fig.33)	0.175	0.295	-0.057
Body, Towards Ground, Bottom frequency (See Fig.35)	0.184	0.282	-0.012

8.5 Conclusion

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all

cases requested by the relevant standards cited in Clause 5.2 of this report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.

9 Measurement Uncertainty

SN	a	Type	c	d	e = f(d,k)	f	h = c x f / e	k
	Uncertainty Component		Tol. (± %)	Prob. Dist.	Div.	c_i (1 g)	1 g u_i (±%)	v_i
1	System repetivity	A	0.5	N	1	1	0.5	9
	Measurement System							
2	Probe Calibration	B	5	N	2	1	2.5	∞
3	Axial Isotropy	B	4.7	R	√3	$(1-cp)^{1/2}$	4.3	∞
4	Hemispherical Isotropy	B	9.4	R	√3	$\sqrt{c_p}$		∞
5	Boundary Effect	B	0.4	R	√3	1	0.23	∞
6	Linearity	B	4.7	R	√3	1	2.7	∞
7	System Detection Limits	B	1.0	R	√3	1	0.6	∞
8	Readout Electronics	B	1.0	N	1	1	1.0	∞
9	RF Ambient Conditions	B	3.0	R	√3	1	1.73	∞
10	Probe Positioner Mechanical Tolerance	B	0.4	R	√3	1	0.2	∞
11	Probe Positioning with respect to Phantom Shell	B	2.9	R	√3	1	1.7	∞
12	Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	√3	1	2.3	∞
	Test sample Related							
13	Test Sample Positioning	A	4.9	N	1	1	4.9	N-1
14	Device Holder Uncertainty	A	6.1	N	1	1	6.1	N-1
15	Output Power Variation - SAR drift measurement	B	5.0	R	√3	1	2.9	∞
	Phantom and Tissue Parameters							
16	Phantom Uncertainty (shape and thickness tolerances)	B	1.0	R	√3	1	0.6	∞
17	Liquid Conductivity - deviation from target values	B	5.0	R	√3	0.64	1.7	∞
18	Liquid Conductivity - measurement uncertainty	B	5.0	N	1	0.64	1.7	M
19	Liquid Permittivity - deviation from target values	B	5.0	R	√3	0.6	1.7	∞
20	Liquid Permittivity - measurement uncertainty	B	5.0	N	1	0.6	1.7	M
	Combined Standard Uncertainty			RSS			11.25	
	Expanded Uncertainty (95% CONFIDENCE INTERVAL)			K=2			22.5	

10 MAIN TEST INSTRUMENTS

Table 15: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	HP 8753E	US38433212	August 29,2005	One year
02	Power meter	NRVD	101253	June 20, 2006	One year
03	Power sensor	NRV-Z5	100333		
04	Power sensor	NRV-Z6	100011	September 3, 2005	One year
05	Signal Generator	E4433B	US37230472	September 5, 2005	One Year
06	Amplifier	VTL5400	0505	No Calibration Requested	
07	BTS	CMU 200	105948	August 15, 2006	One year
08	E-field Probe	SPEAG ET3DV6	1736	November 25, 2005	One year
09	DAE	SPEAG DAE3	589	October 21, 2005	One year

11 TEST PERIOD

The test is performed from August 28th, 2006 to August 29th, 2006.

12 TEST LOCATION

The test is performed at Radio Communication & Electromagnetic Compatibility Laboratory of Telecommunication Metrology Center

END OF REPORT BODY

ANNEX A MEASUREMENT PROCESS

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the reference point was measured and was used as a reference value for assessing the power drop.

Step 2: The SAR distribution at the exposed side of the phantom was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the flat phantom and the horizontal grid spacing was 10 mm x 10 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

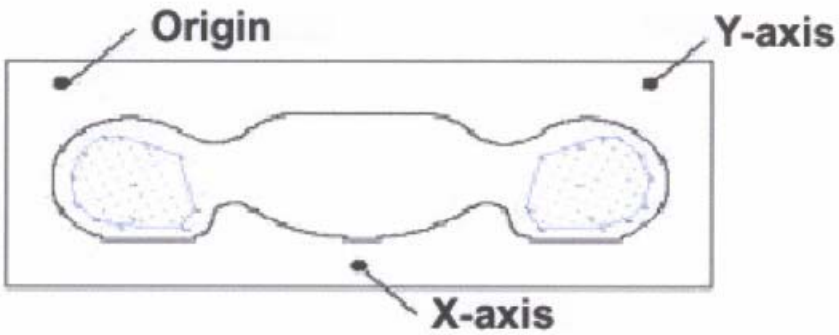
Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7 x 7x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. 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 straightforward 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.

Step 4: Re-measurement the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation is repeated.

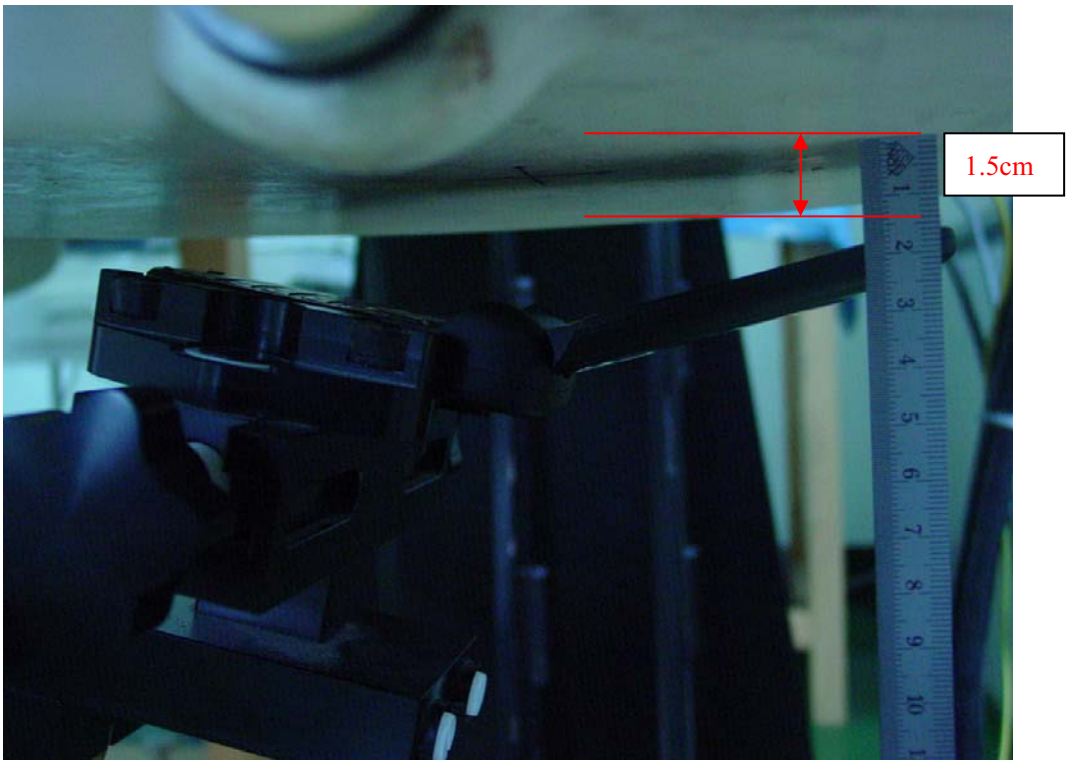


Picture A: SAR Measurement Points in Area Scan

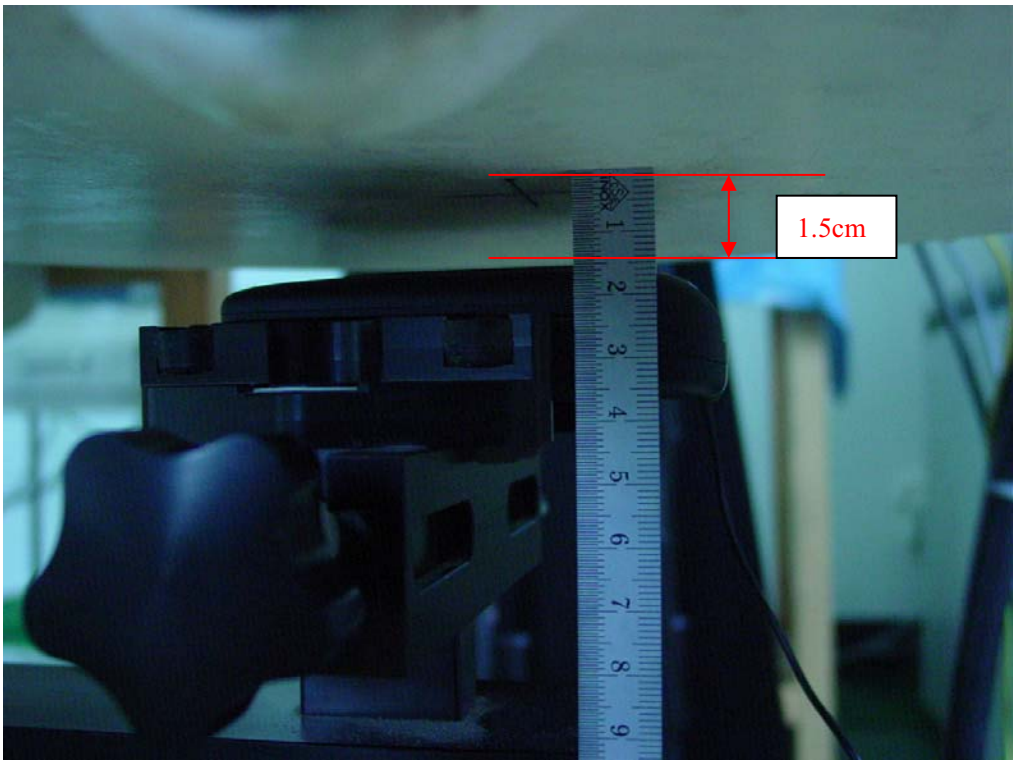
ANNEX B TEST LAYOUT

Picture B1: Specific Absorption Rate Test Layout

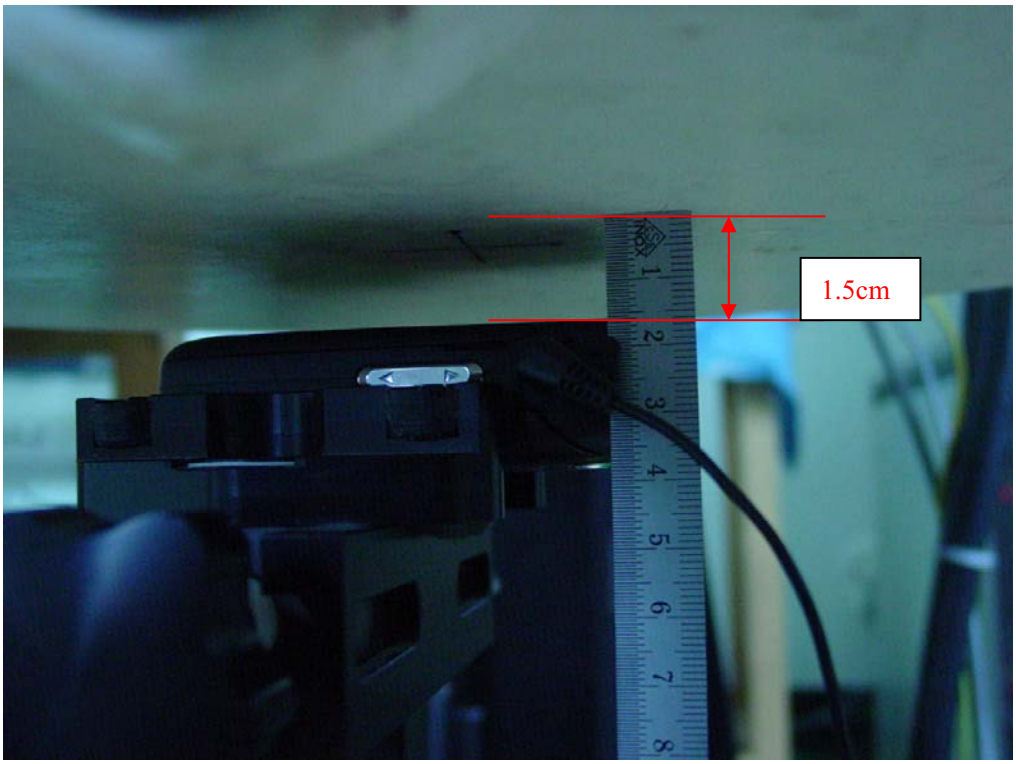
Picture B2: Liquid depth in the Flat Phantom (PCS 1900MHz)



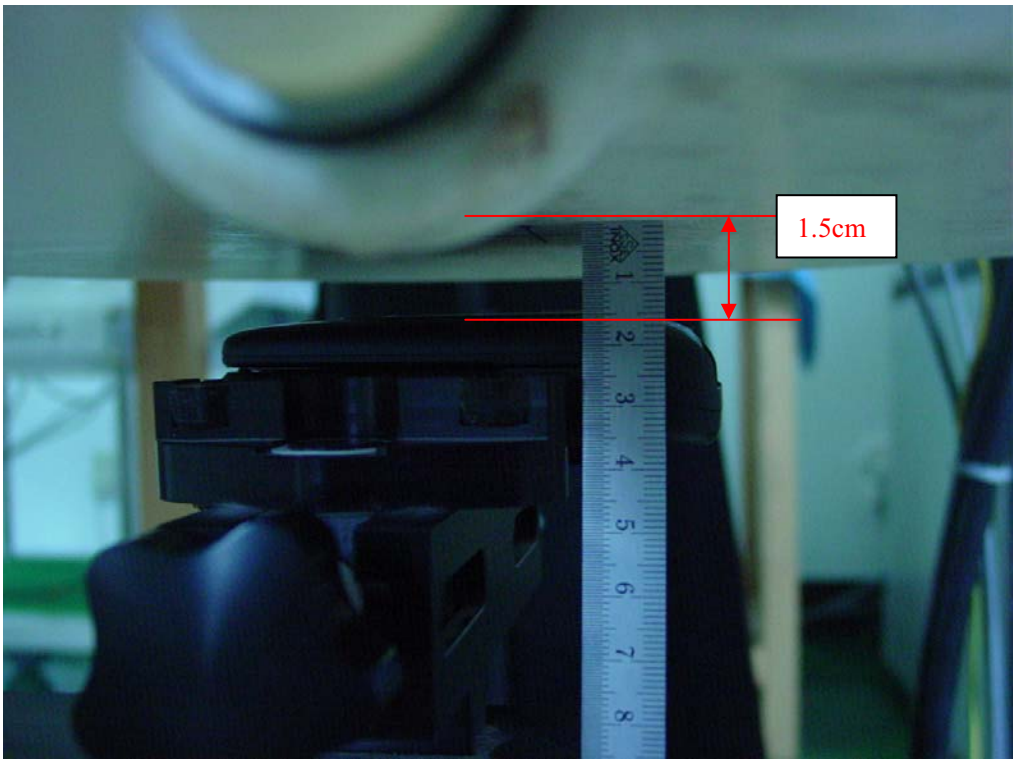
Picture B3: Body-worn Position (towards phantom with flip open, the distance from handset to the bottom of the Phantom is 1.5cm)



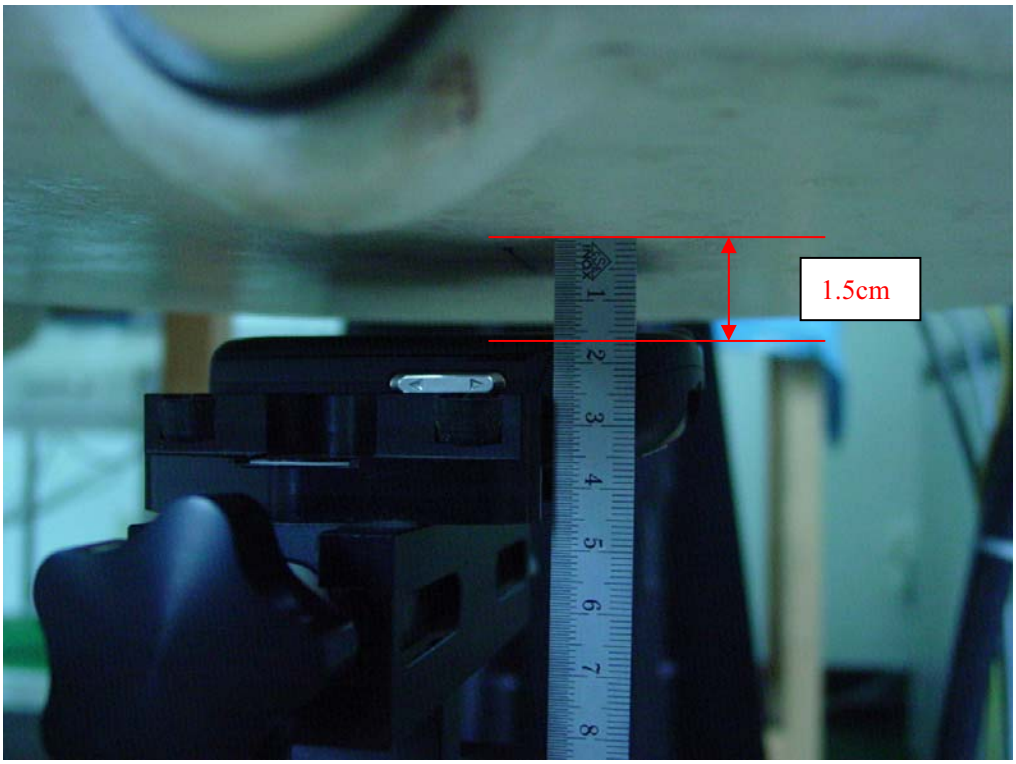
Picture B4: Body-worn Position (towards phantom with flip closed and an earphone, the distance from handset to the bottom of the Phantom is 1.5cm)



Picture B5: Body-worn Position (towards phantom with flip closed and an earphone, the distance from handset to the bottom of the Phantom is 1.5cm)



Picture B6: Body-worn Position with GPRS (towards phantom with flip closed, the distance from handset to the bottom of the Phantom is 1.5cm)



Picture B7: Body-worn Position with GPRS (towards ground with flip closed, the distance from handset to the bottom of the Phantom is 1.5cm)

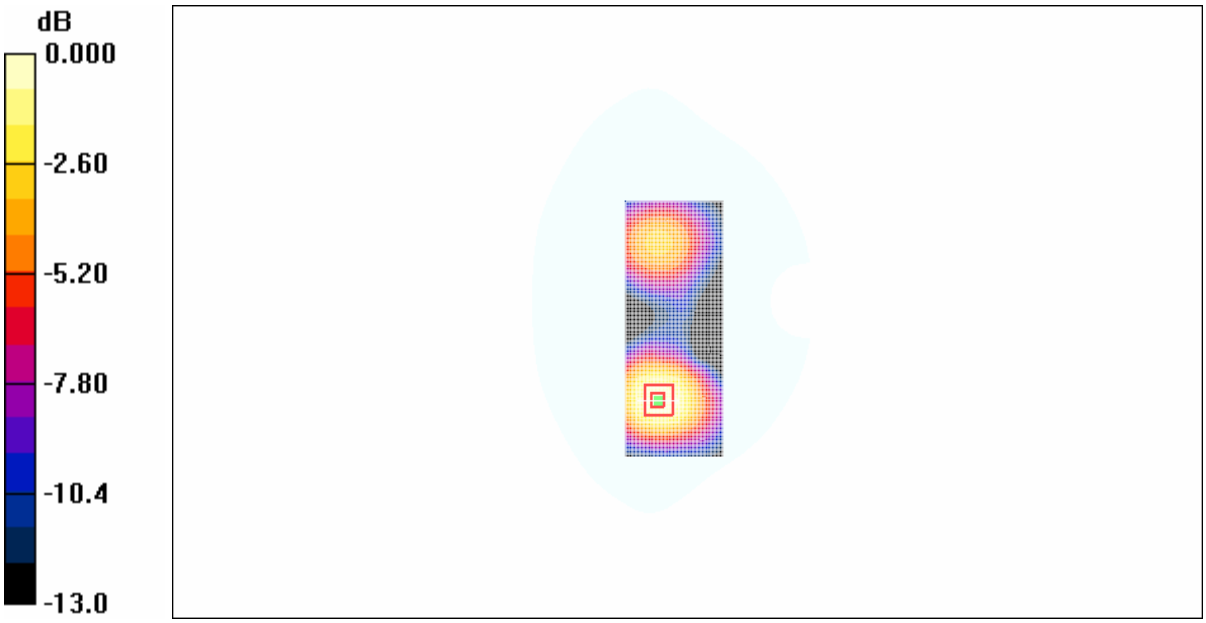
ANNEX C GRAPH RESULTS

1900 Body Towards Phantom with Flip Open, High

Date/Time: 2006-8-28 18:36:44
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:8.3
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Ground High/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.208 mW/g

Toward Ground High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.78 V/m; Power Drift = 0.006 dB
Peak SAR (extrapolated) = 0.295 W/kg
SAR(1 g) = 0.190 mW/g; SAR(10 g) = 0.120 mW/g
Maximum value of SAR (measured) = 0.205 mW/g



0 dB = 0.205mW/g

Fig. 1 PCS 1900MHz, Body, Towards Phantom with Flip Open, CH810

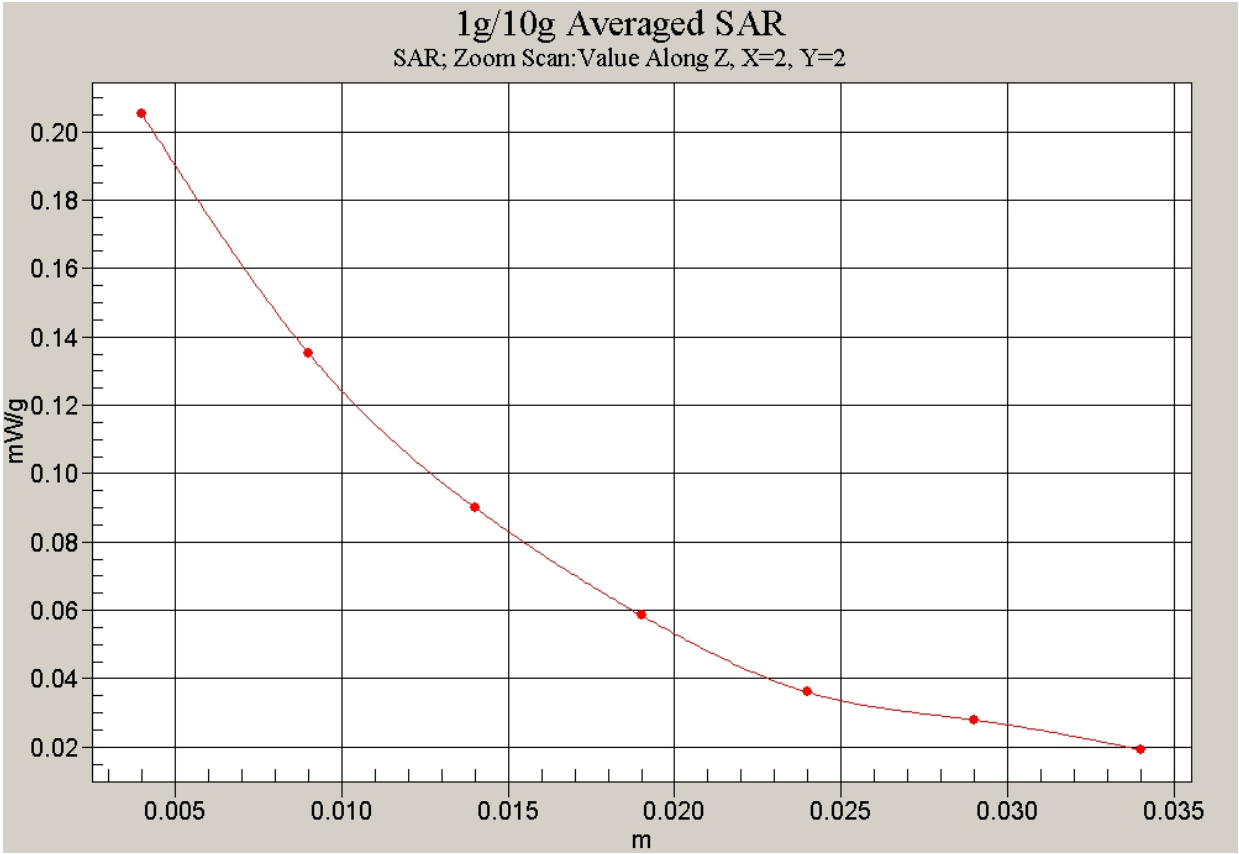


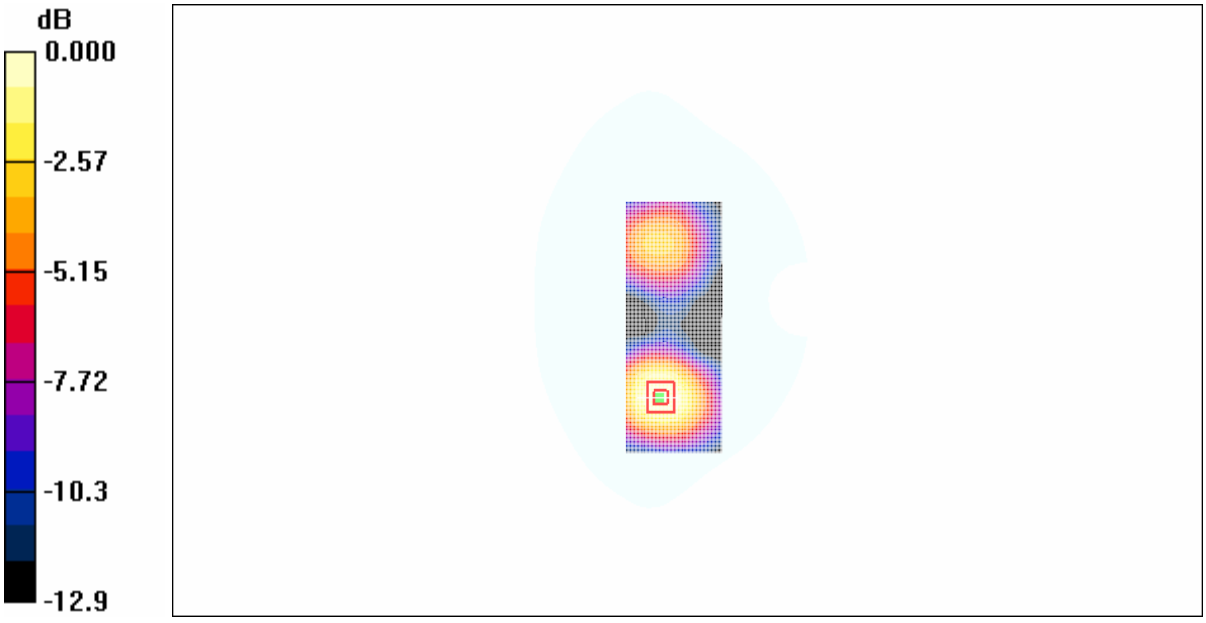
Fig. 2 Z-Scan at power reference point
(PCS 1900MHz, Body, Towards Phantom with Flip Open, CH810)

1900 Body Towards Phantom with Flip Open, Middle

Date/Time: 2006-8-28 18:50:48
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8.3
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Ground Middle/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.182 mW/g

Toward Ground Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.59 V/m; Power Drift = 0.128 dB
Peak SAR (extrapolated) = 0.264 W/kg
SAR(1 g) = 0.163 mW/g; SAR(10 g) = 0.104 mW/g
Maximum value of SAR (measured) = 0.173 mW/g



0 dB = 0.173mW/g

Fig. 3 PCS 1900MHz, Body, Towards Phantom with Flip Open, CH661

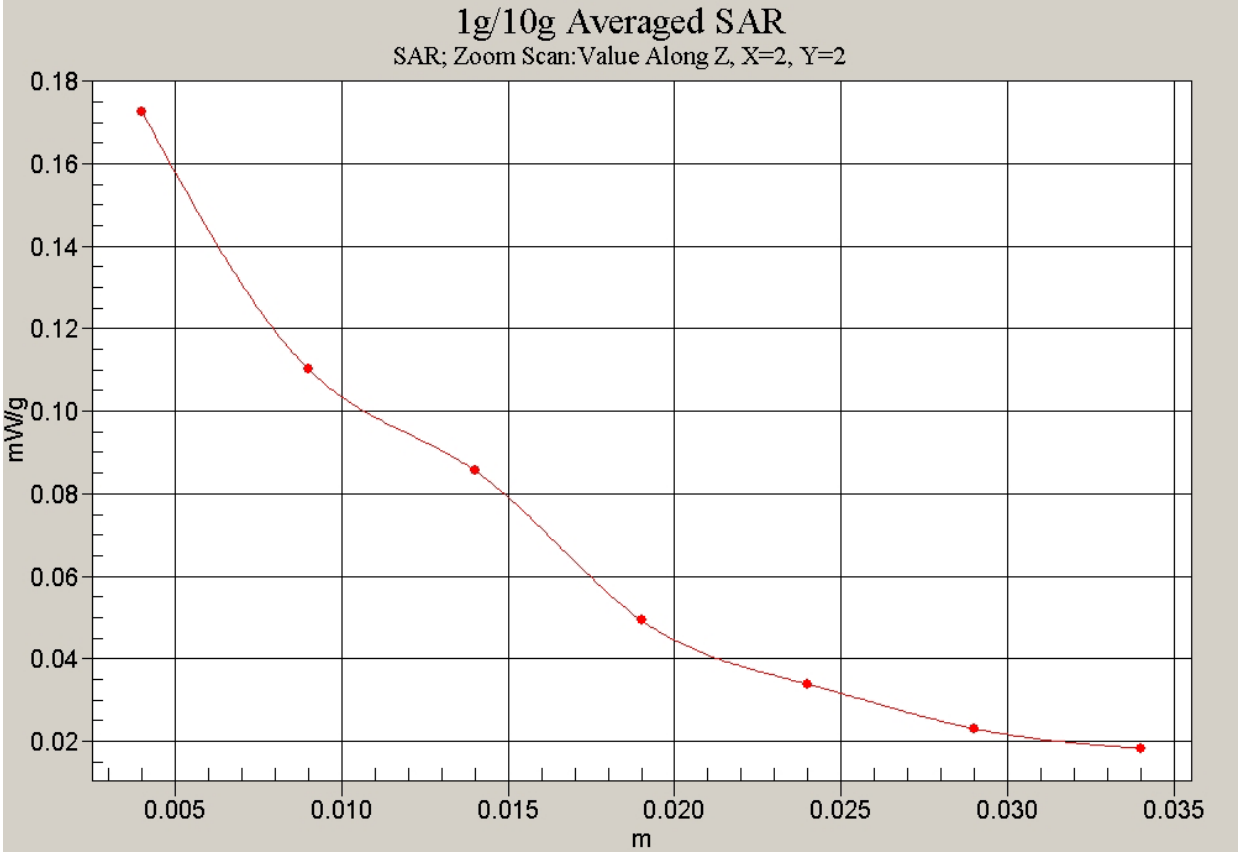


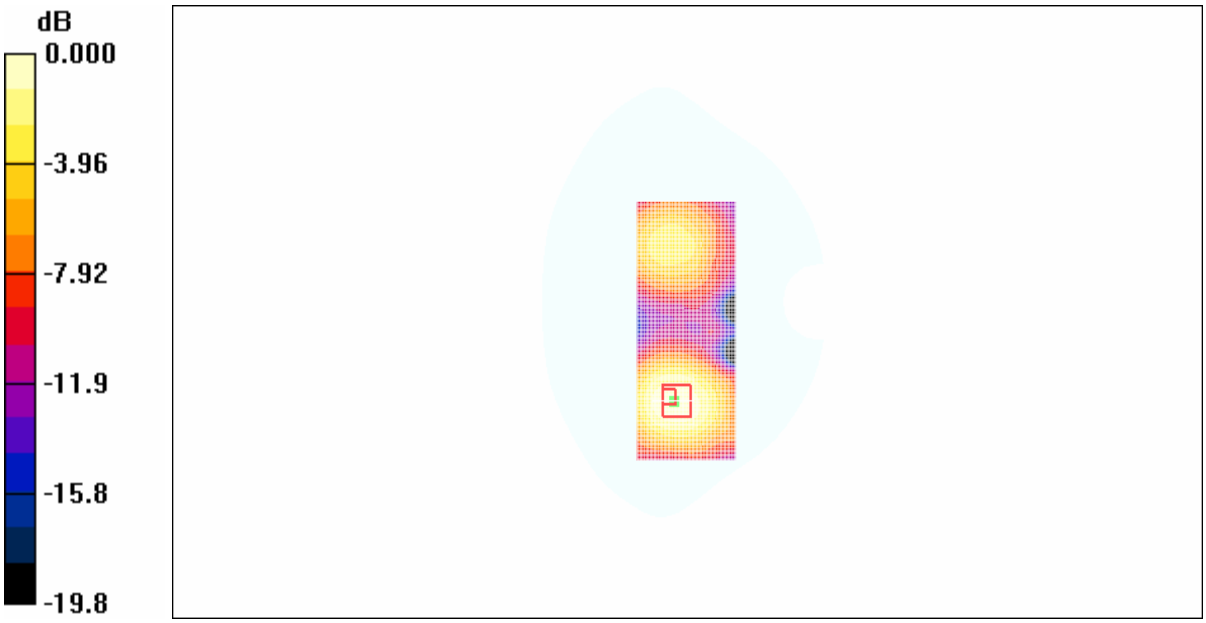
Fig. 4 Z-Scan at power reference point
(PCS 1900MHz, Body, Towards Phantom with Flip Open, CH661)

1900 Body Towards Phantom with Flip Open, Low

Date/Time: 2006-8-28 19:06:28
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz Frequency: 1850.2 MHz Duty Cycle: 1:8.3
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Ground Low/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.177 mW/g

Toward Ground Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.86 V/m; Power Drift = 0.200 dB
Peak SAR (extrapolated) = 0.353 W/kg
SAR(1 g) = 0.177 mW/g; SAR(10 g) = 0.108 mW/g
Maximum value of SAR (measured) = 0.174 mW/g



0 dB = 0.174mW/g

Fig. 5 PCS 1900MHz, Body, Towards Phantom with Flip Open, CH512

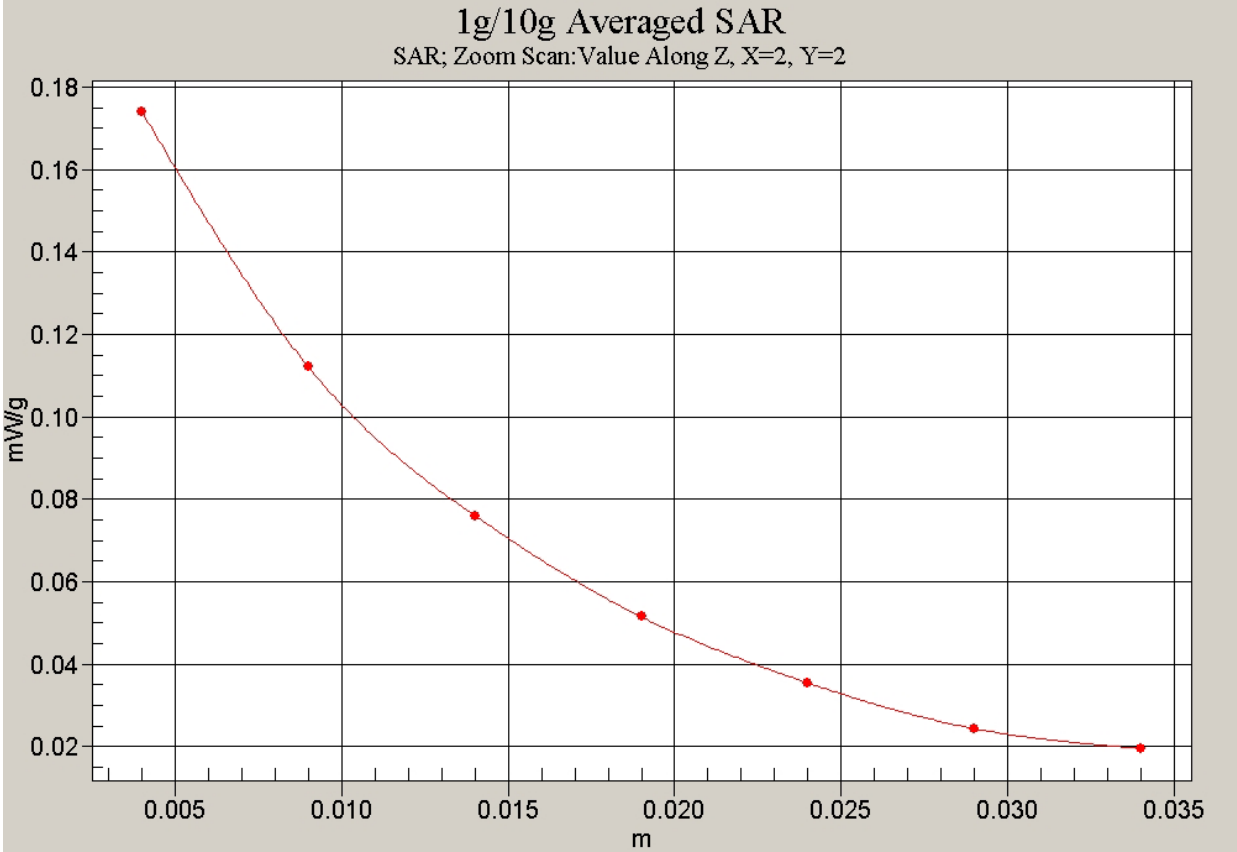


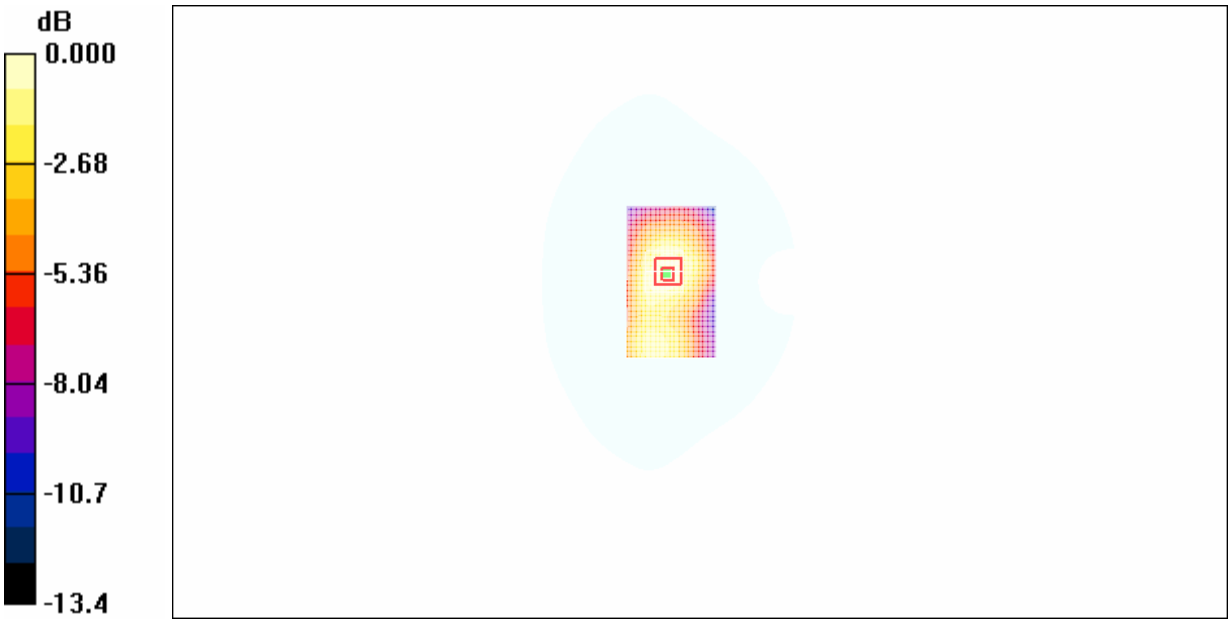
Fig. 6 Z-Scan at power reference point
(PCS 1900MHz, Body, Towards Phantom with Flip Open, CH512)

1900 Body Towards Phantom with Flip Closed, High

Date/Time: 2006-8-28 19:38:37
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:8.3
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Phantom High/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.081 mW/g

Toward Phantom High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.35 V/m; Power Drift = -0.168 dB
Peak SAR (extrapolated) = 0.125 W/kg
SAR(1 g) = 0.074 mW/g; SAR(10 g) = 0.048 mW/g
Maximum value of SAR (measured) = 0.078 mW/g



0 dB = 0.078mW/g

Fig. 7 PCS 1900MHz, Body, Towards Phantom with Flip Closed, CH810

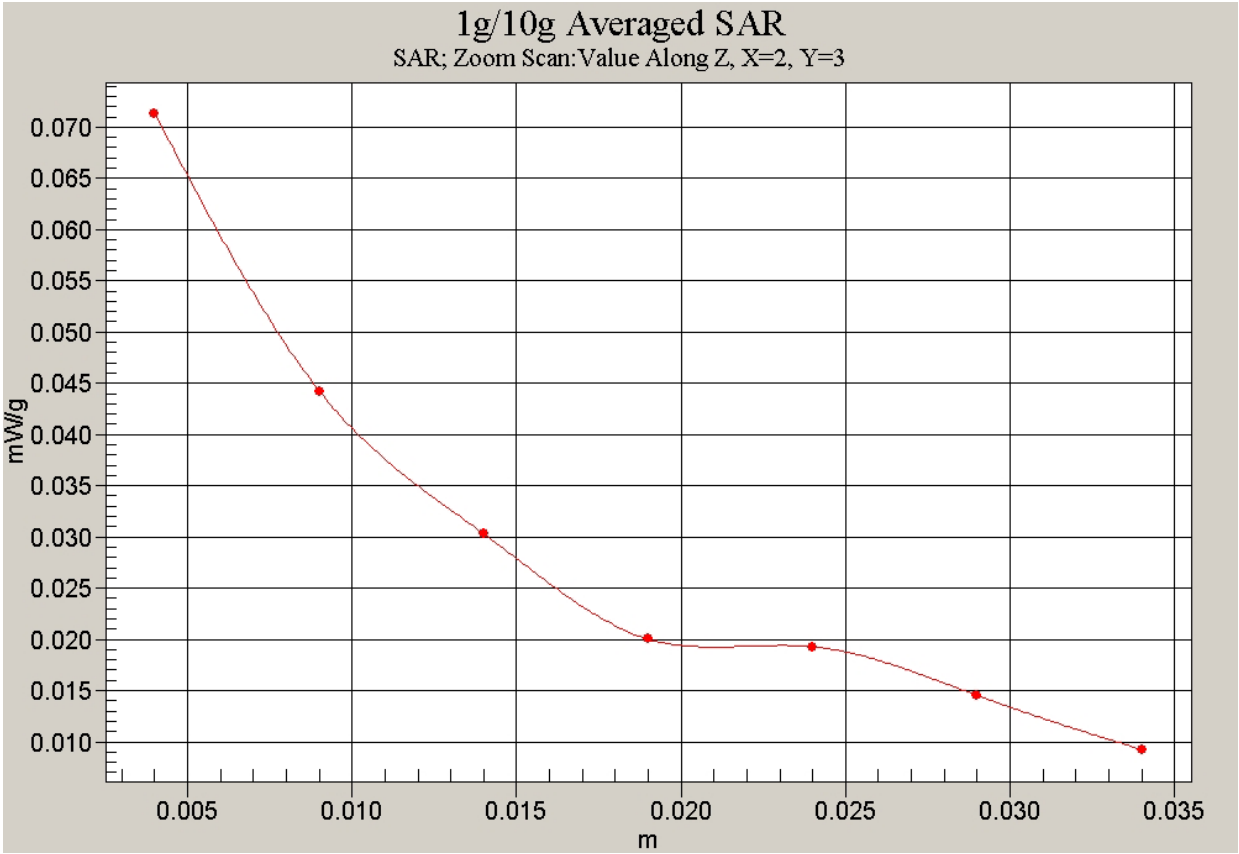


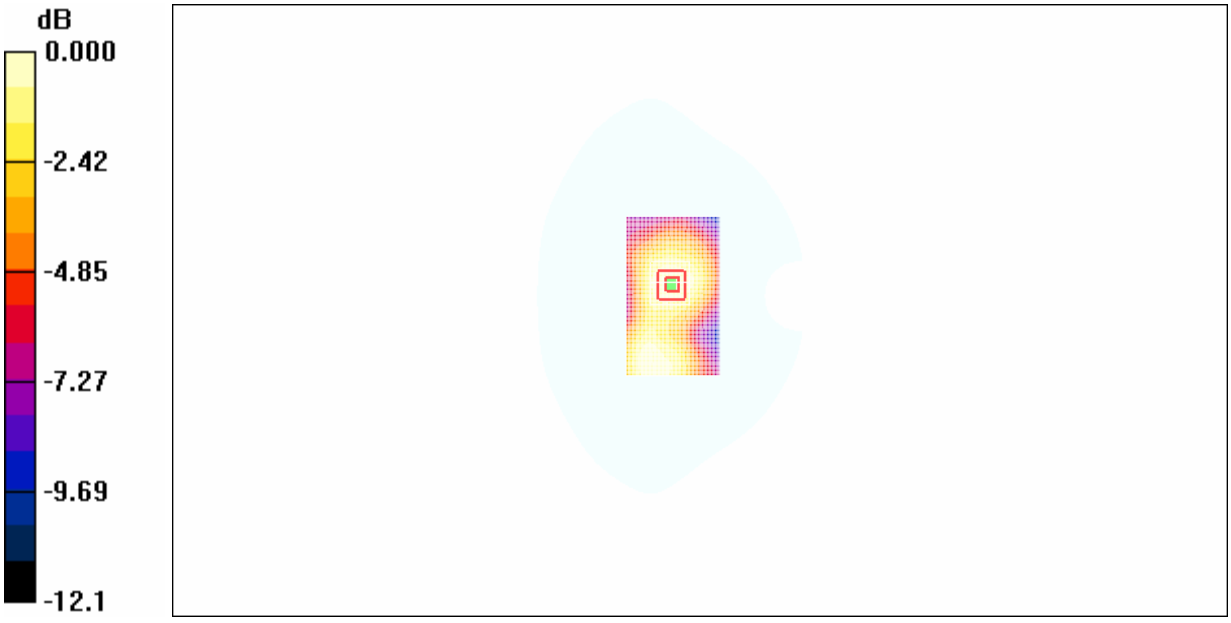
Fig. 8 Z-Scan at power reference point
(PCS 1900MHz, Body, Towards Phantom with Flip Closed, CH810)

1900 Body Towards Phantom with Flip Closed, Middle

Date/Time: 2006-8-28 19:54:24
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8.3
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Phantom Middle/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.060 mW/g

Toward Phantom Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.25 V/m; Power Drift = -0.100 dB
Peak SAR (extrapolated) = 0.091 W/kg
SAR(1 g) = 0.055 mW/g; SAR(10 g) = 0.035 mW/g
Maximum value of SAR (measured) = 0.057 mW/g



0 dB = 0.057mW/g

Fig. 9 PCS 1900MHz, Body, Towards Phantom with Flip Closed, CH661

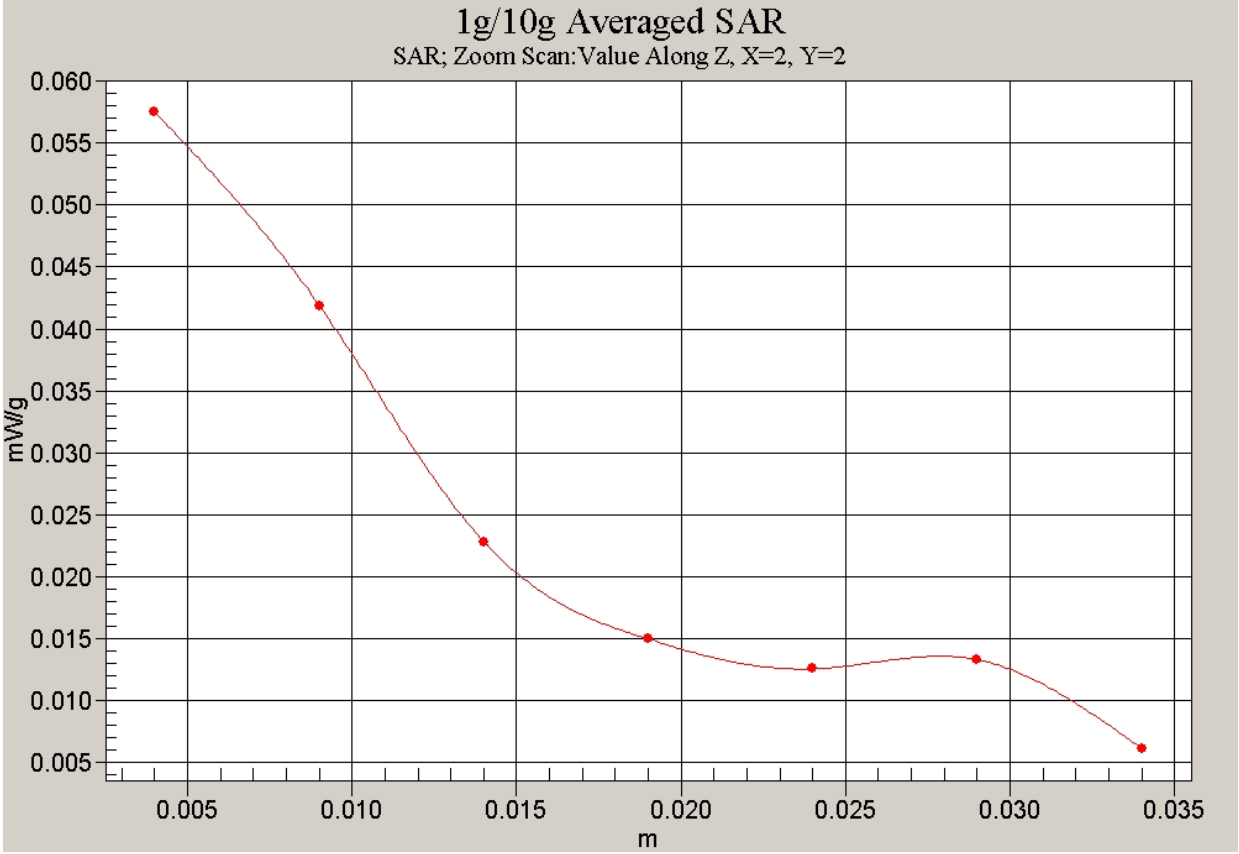


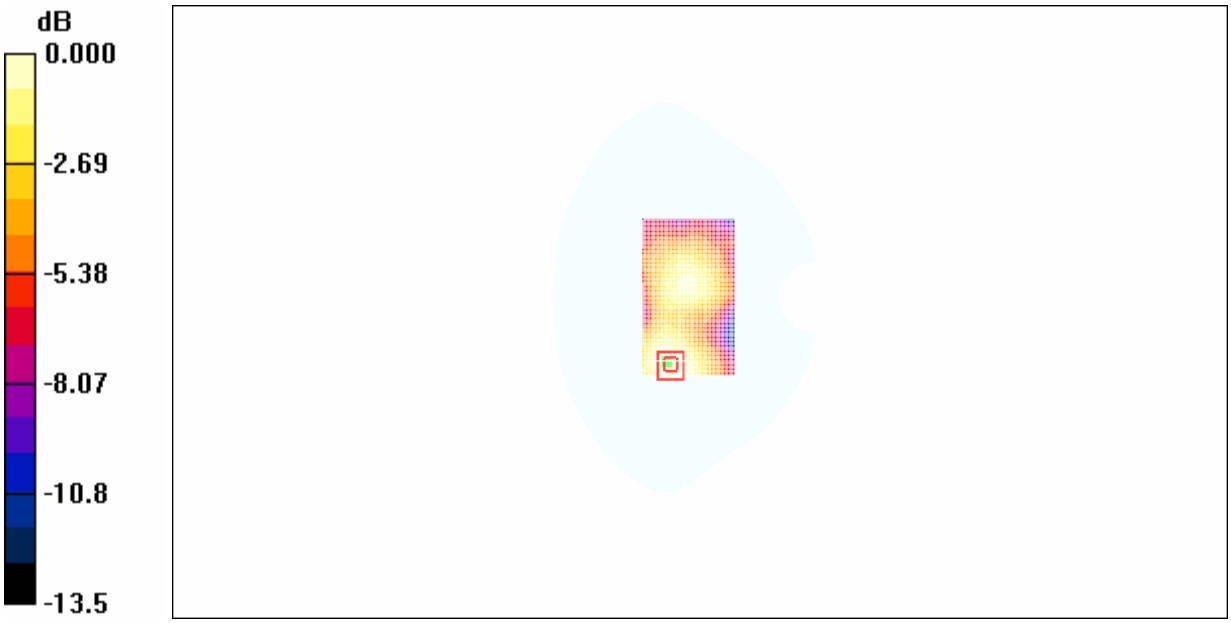
Fig. 10 Z-Scan at power reference point
(PCS 1900MHz, Body, Towards Phantom with Flip Closed, CH661)

1900 Body Towards Phantom with Flip Closed, Low

Date/Time: 2006-8-28 20:11:19
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz Frequency: 1850.2 MHz Duty Cycle: 1:8.3
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Phantom Low/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.063 mW/g

Toward Phantom Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.48 V/m; Power Drift = 0.200 dB
Peak SAR (extrapolated) = 0.093 W/kg
SAR(1 g) = 0.057 mW/g; SAR(10 g) = 0.038 mW/g
Maximum value of SAR (measured) = 0.060 mW/g



0 dB = 0.060mW/g

Fig. 11 PCS 1900MHz, Body, Towards Phantom with Flip Closed, CH512

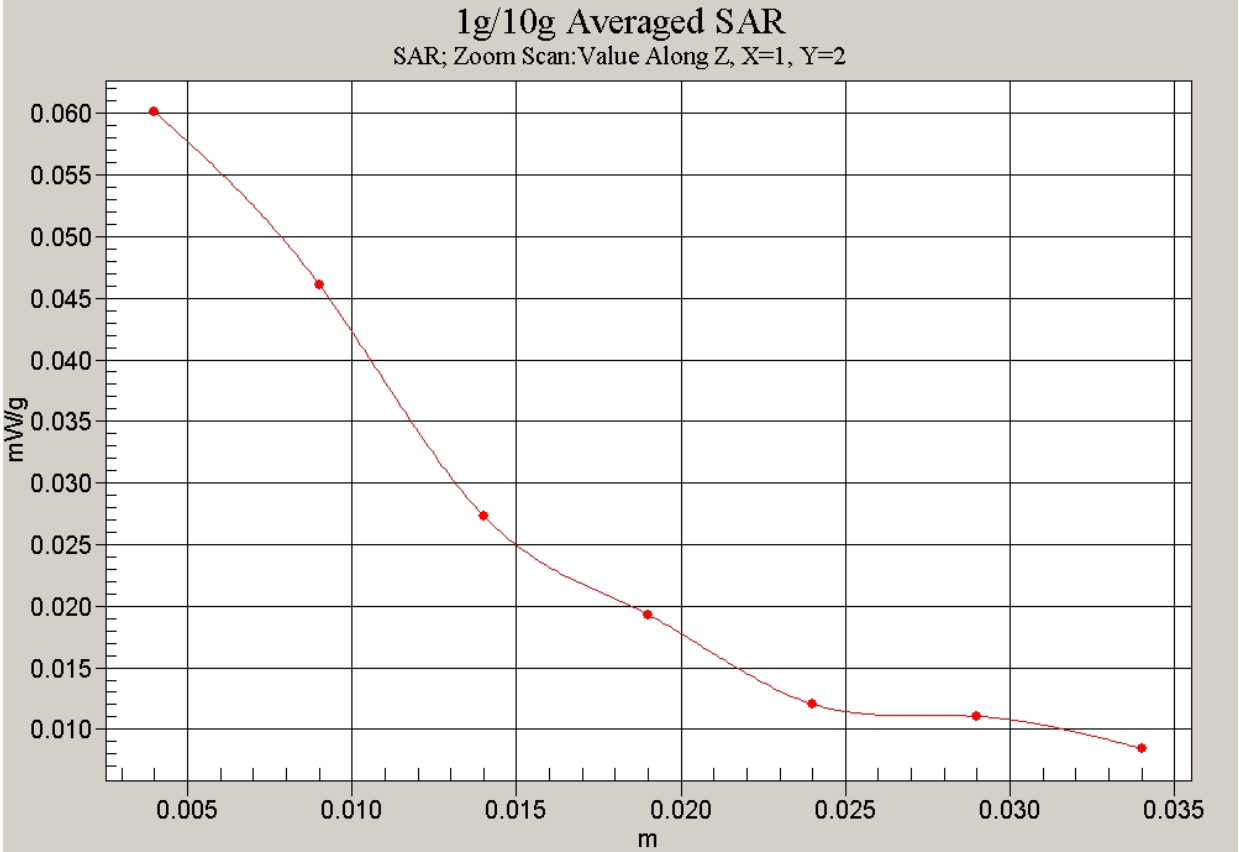


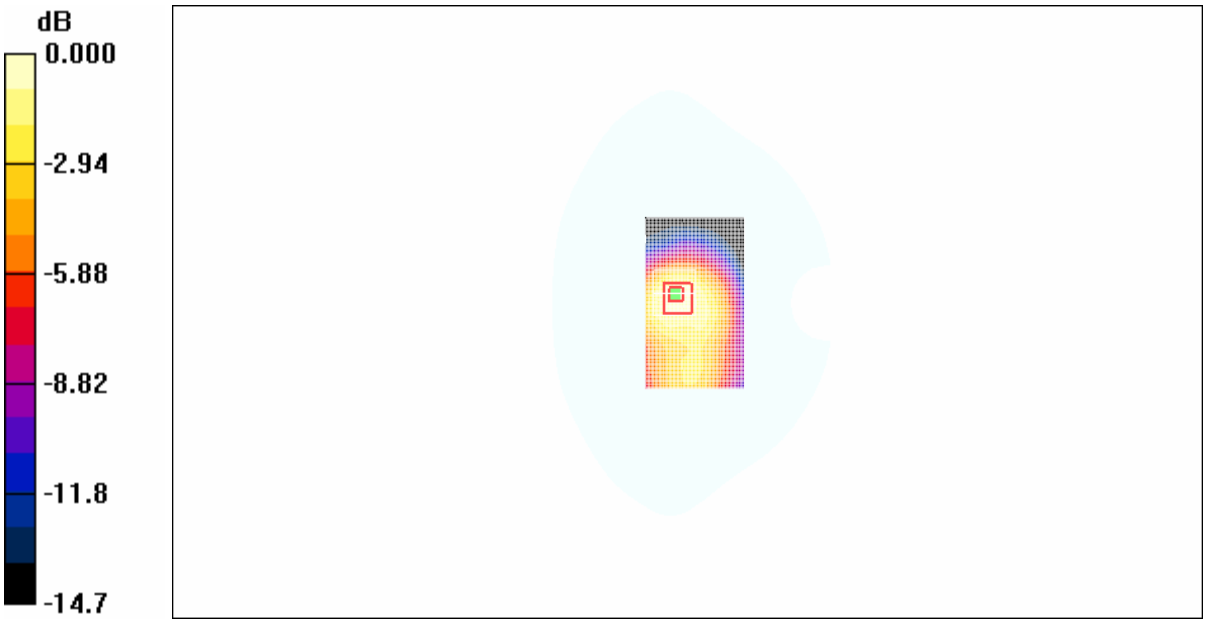
Fig. 12 Z-Scan at power reference point
(PCS 1900MHz, Body, Towards Phantom with Flip Closed, CH512)

1900 Body Towards Ground with Flip Closed, High

Date/Time: 2006-8-28 20:55:27
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:8.3
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Ground High/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.185 mW/g

Toward Ground High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.2 V/m; Power Drift = -0.022 dB
Peak SAR (extrapolated) = 0.277 W/kg
SAR(1 g) = 0.171 mW/g; SAR(10 g) = 0.105 mW/g
Maximum value of SAR (measured) = 0.185 mW/g



0 dB = 0.185mW/g

Fig. 13 PCS 1900MHz, Body, Towards Ground with Flip Closed, CH810

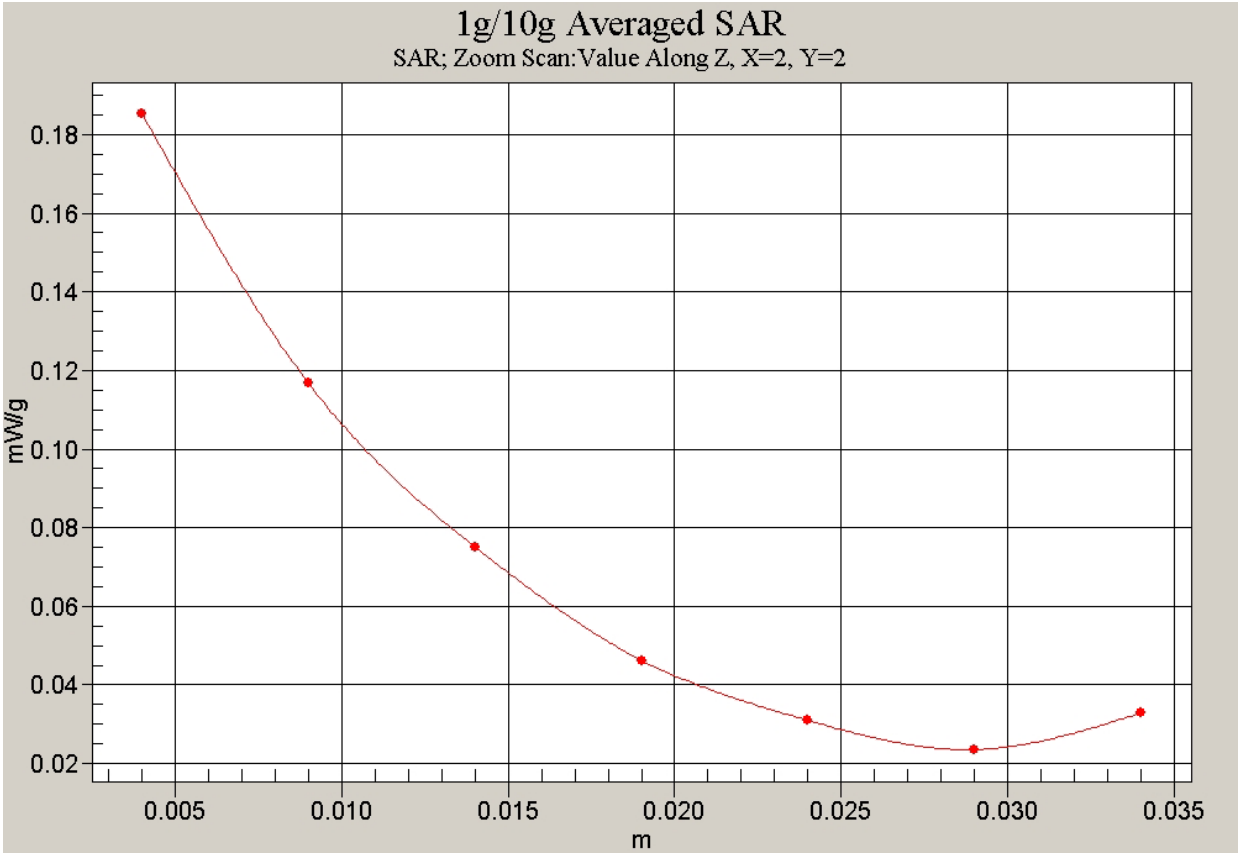


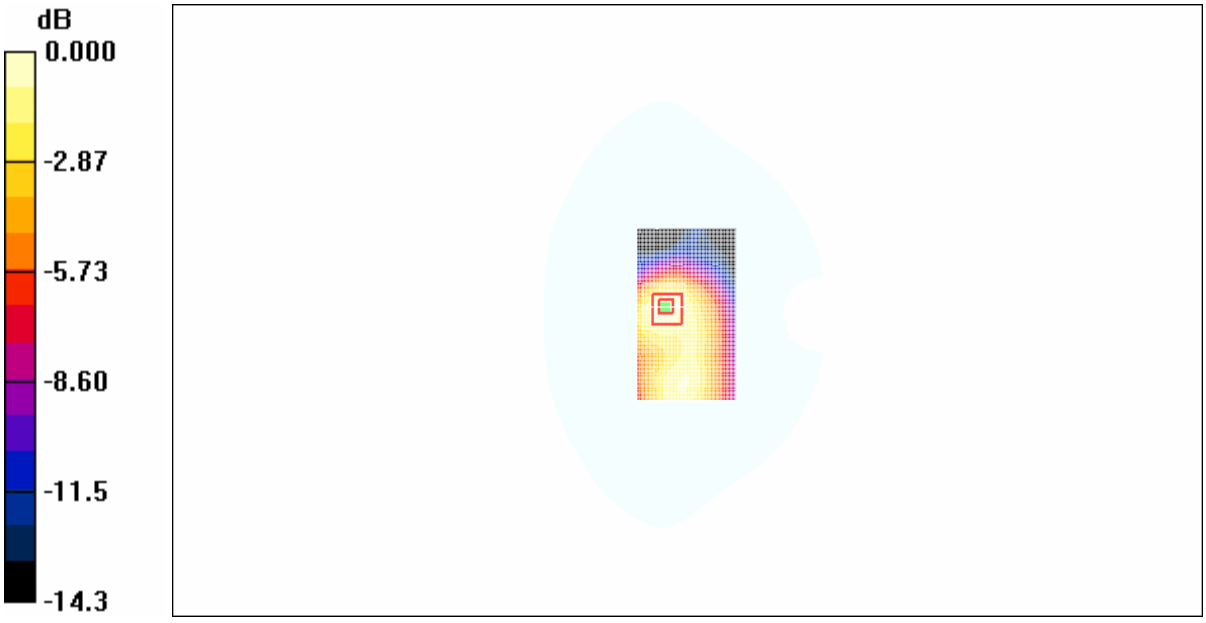
Fig. 14 Z-Scan at power reference point
(PCS 1900MHz, Body, Towards Ground with Flip Closed, CH810)

1900 Body Towards Ground with Flip Closed, Middle

Date/Time: 2006-8-28 20:42:10
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8.3
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Ground Middle/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.129 mW/g

Toward Ground Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.33 V/m; Power Drift = -0.053 dB
Peak SAR (extrapolated) = 0.207 W/kg
SAR(1 g) = 0.120 mW/g; SAR(10 g) = 0.074 mW/g
Maximum value of SAR (measured) = 0.130 mW/g



0 dB = 0.130mW/g

Fig. 15 PCS 1900MHz, Body, Towards Ground with Flip Closed, CH661

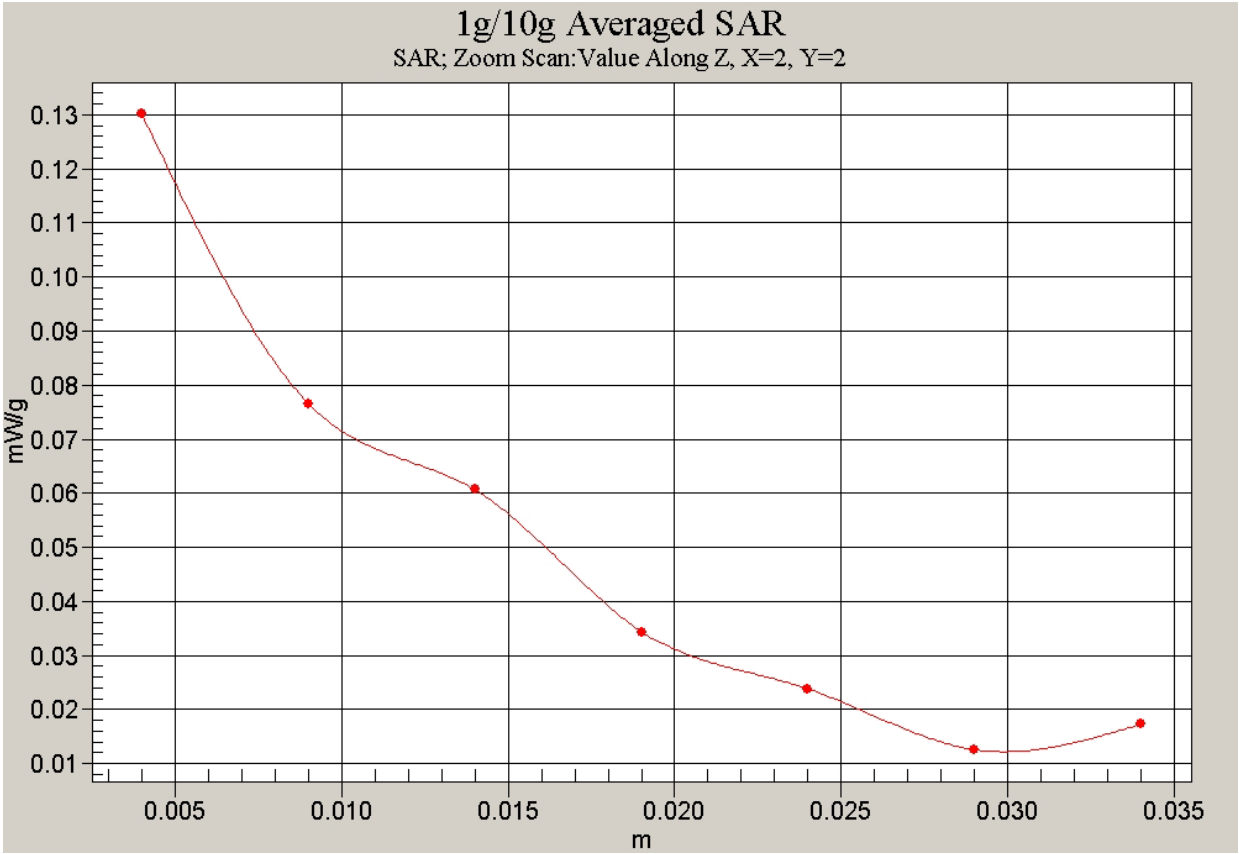


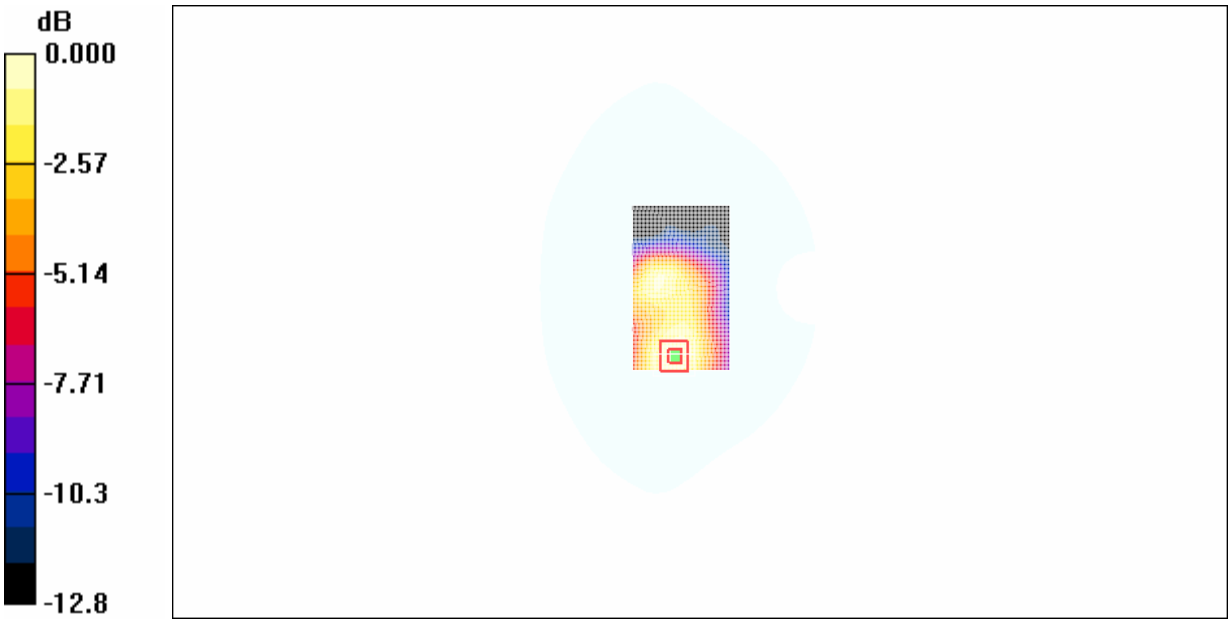
Fig. 16 Z-Scan at power reference point
(PCS 1900MHz, Body, Towards Ground with Flip Closed, CH661)

1900 Body Towards Ground with Flip Closed, Low

Date/Time: 2006-8-28 20:28:08
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz Frequency: 1850.2 MHz Duty Cycle: 1:8.3
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Ground Low/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.119 mW/g

Toward Ground Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.21 V/m; Power Drift = 0.028 dB
Peak SAR (extrapolated) = 0.159 W/kg
SAR(1 g) = 0.108 mW/g; SAR(10 g) = 0.070 mW/g
Maximum value of SAR (measured) = 0.117 mW/g



0 dB = 0.117mW/g

Fig. 17 PCS 1900MHz, Body, Towards Ground with Flip Closed, CH512

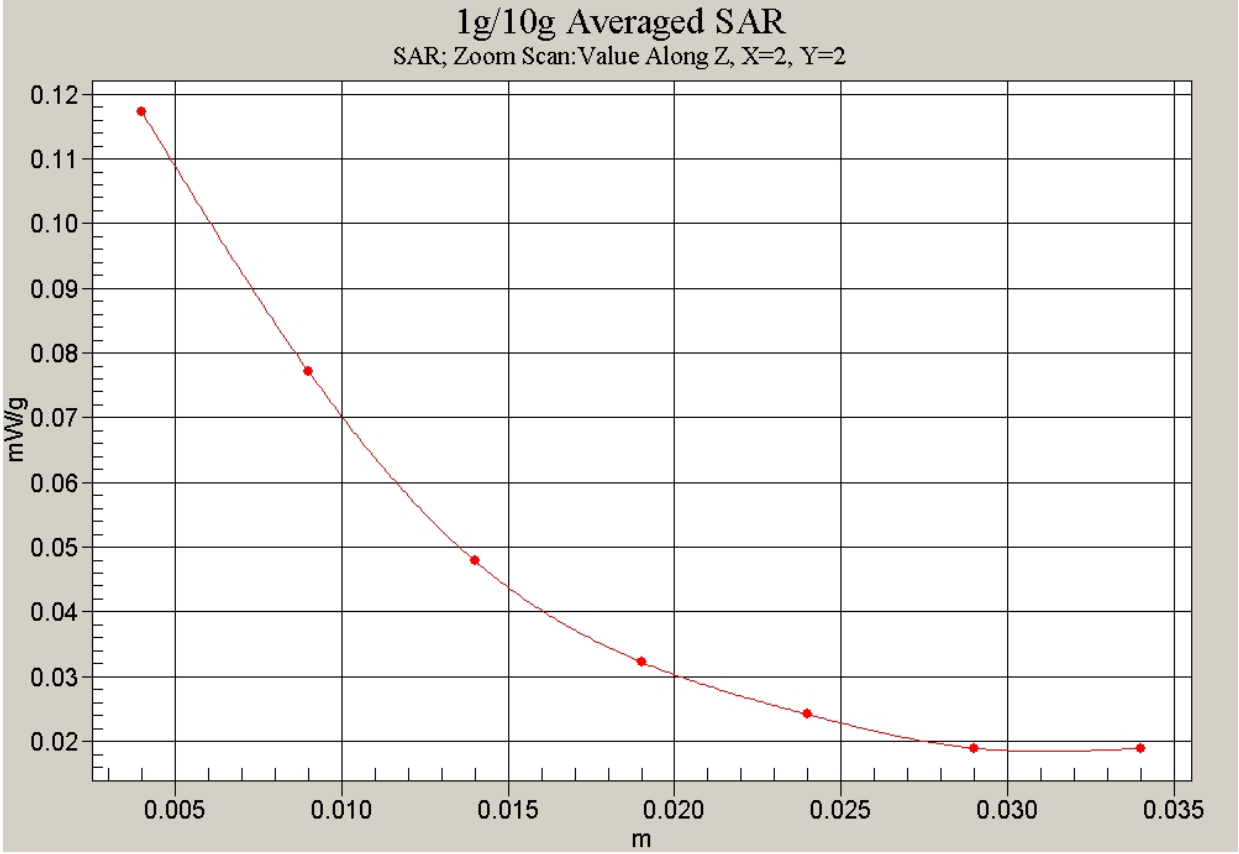


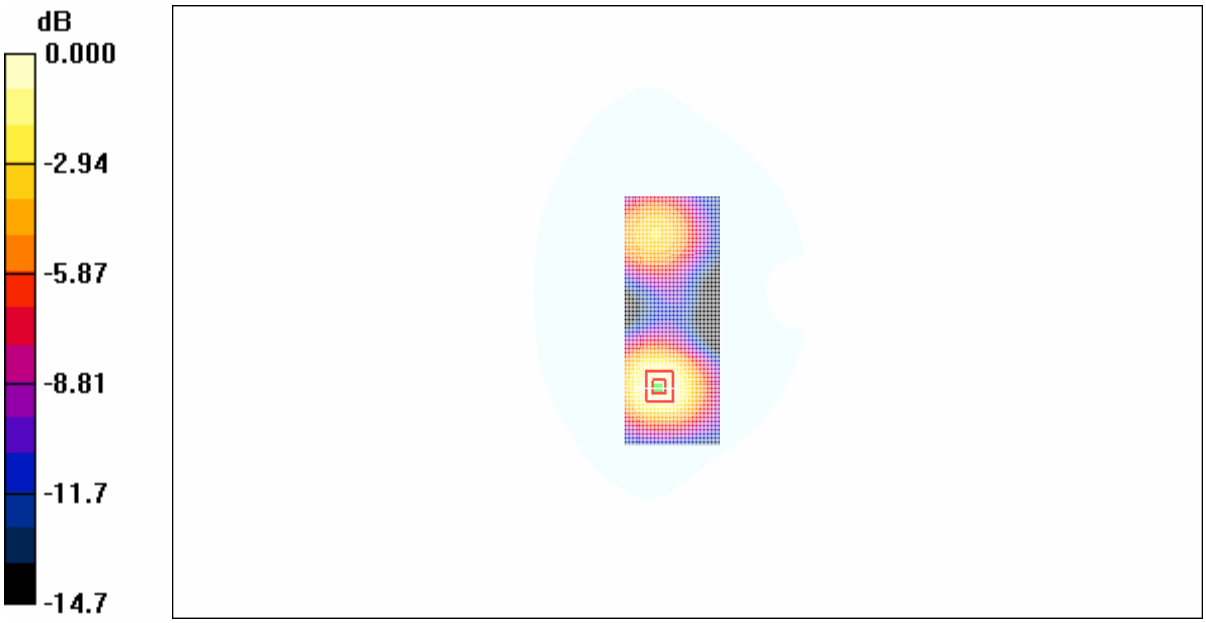
Fig. 18 Z-Scan at power reference point
(PCS 1900MHz, Body, Towards Ground with Flip Closed, CH512)

1900 Body with GPRS Towards Phantom with Flip Open, High

Date/Time: 2006-8-28 17:07:12
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz GPRS Frequency: 1909.8 MHz Duty Cycle: 1:4
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Ground High/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.408 mW/g

Toward Ground High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.08 V/m; Power Drift = 0.200 dB
Peak SAR (extrapolated) = 0.606 W/kg
SAR(1 g) = 0.372 mW/g; SAR(10 g) = 0.234 mW/g
Maximum value of SAR (measured) = 0.395 mW/g



0 dB = 0.395mW/g

Fig. 19 PCS 1900MHz, Body with GPRS, Towards Phantom with Flip Open, CH810

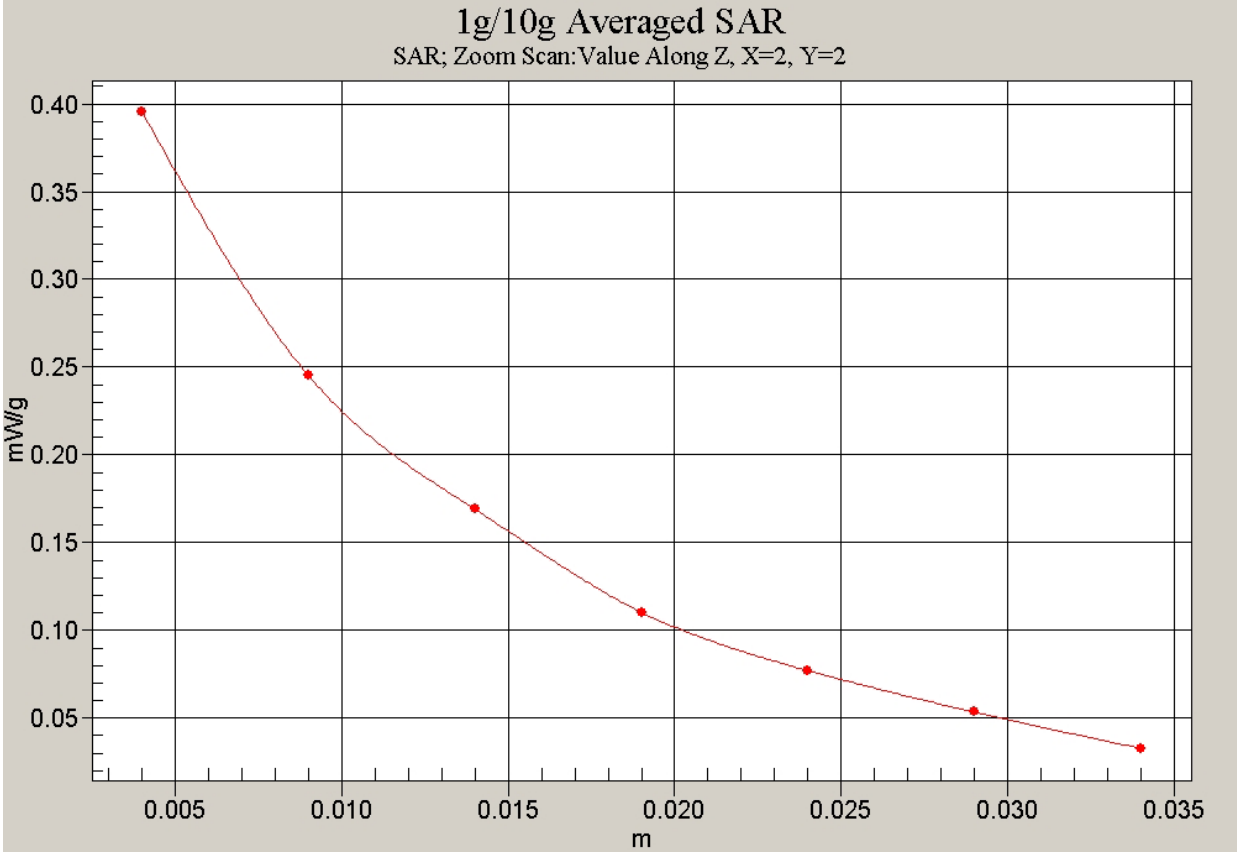


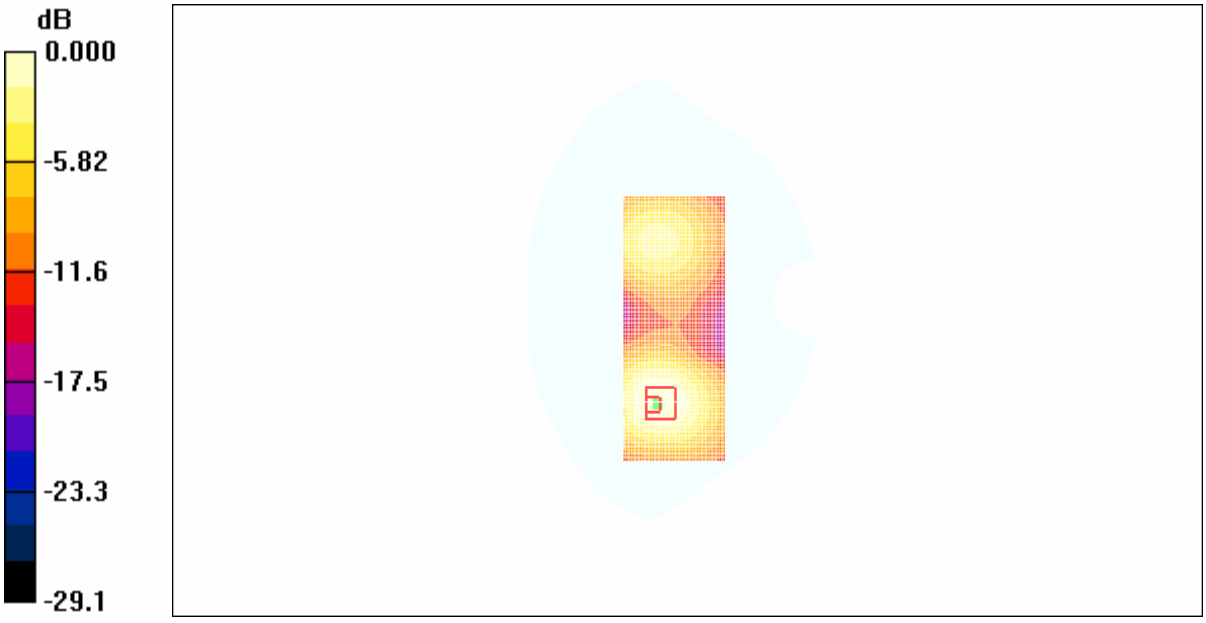
Fig. 20 Z-Scan at power reference point
(PCS 1900MHz, Body with GPRS, Towards Phantom with Flip Open, CH810)

1900 Body with GPRS Towards Phantom with Flip Open, Middle

Date/Time: 2006-8-28 17:52:07
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Ground Middle/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.345 mW/g

Toward Ground Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.92 V/m; Power Drift = 0.057 dB
Peak SAR (extrapolated) = 0.886 W/kg
SAR(1 g) = 0.399 mW/g; SAR(10 g) = 0.220 mW/g
Maximum value of SAR (measured) = 0.339 mW/g



0 dB = 0.339mW/g

Fig. 21 PCS 1900MHz, Body with GPRS, Towards Phantom with Flip Open, CH661

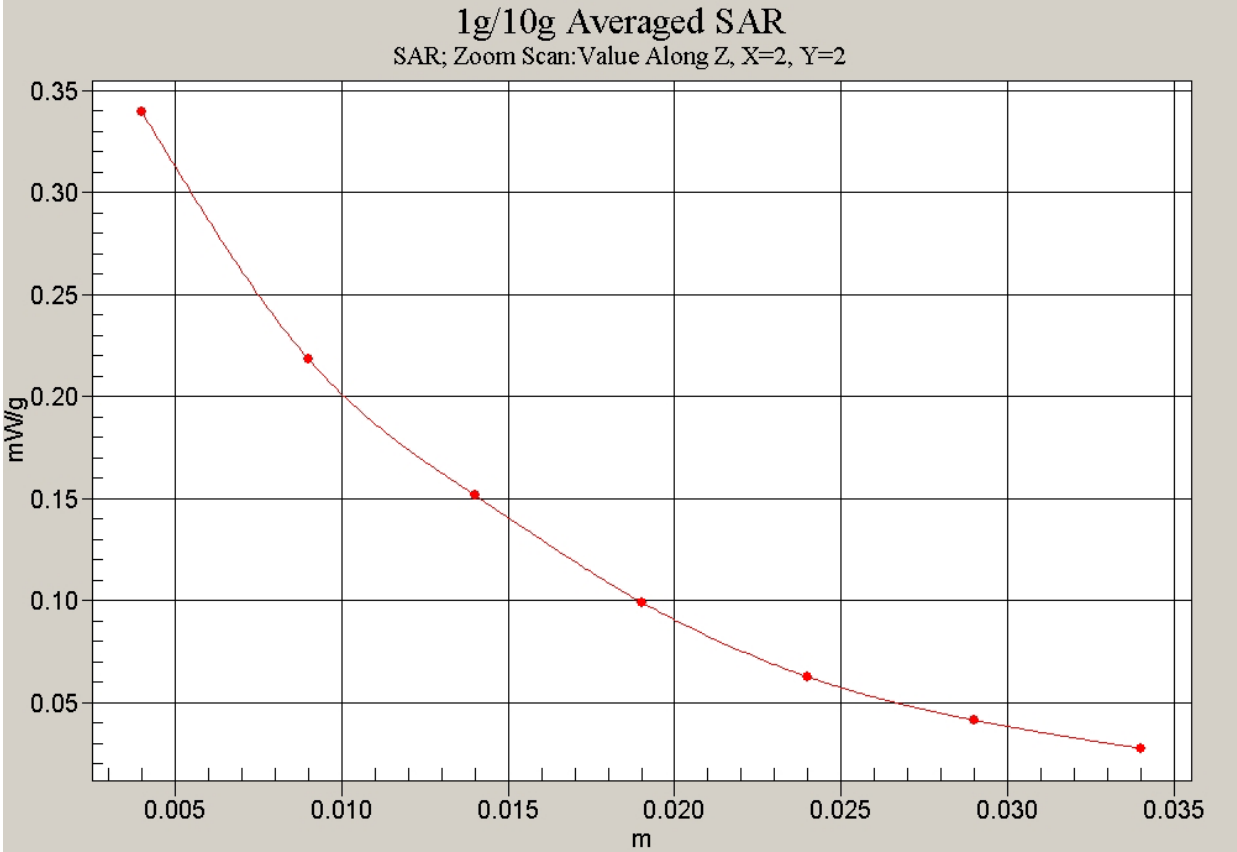


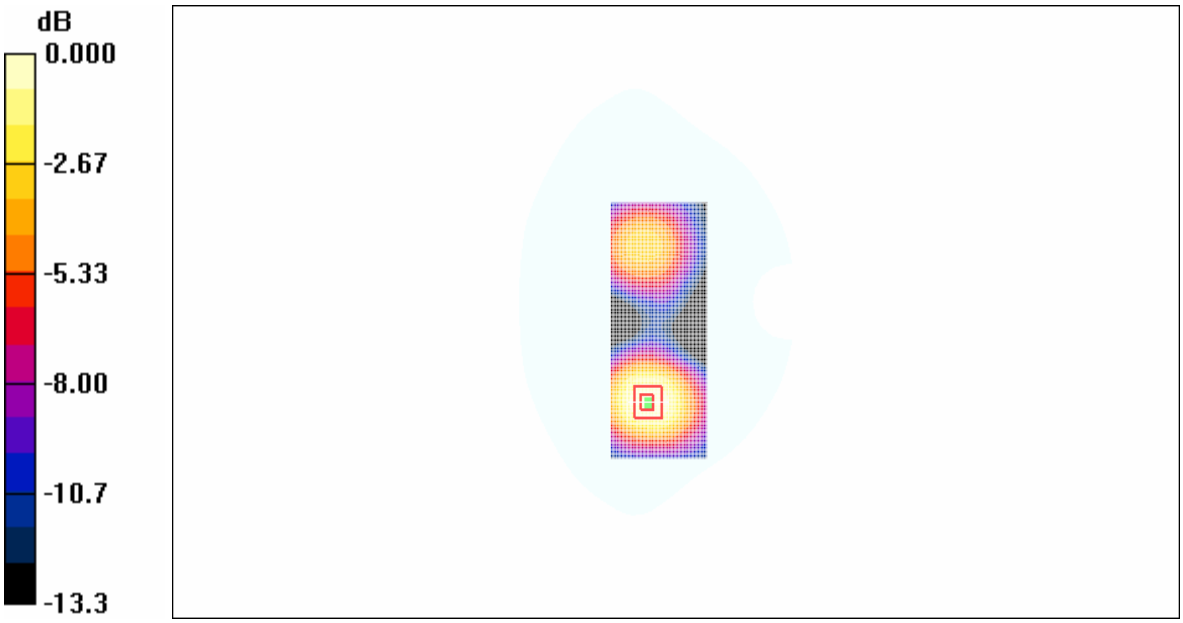
Fig. 22 Z-Scan at power reference point
(PCS 1900MHz, Body with GPRS, Towards Phantom with Flip Open, CH661)

1900 Body Towards with GPRS Phantom with Flip Open, Low

Date/Time: 2006-8-28 18:07:56
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz GPRS Frequency: 1850.2 MHz Duty Cycle: 1:4
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Ground Low/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.347 mW/g

Toward Ground Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.10 V/m; Power Drift = -0.033 dB
Peak SAR (extrapolated) = 0.483 W/kg
SAR(1 g) = 0.315 mW/g; SAR(10 g) = 0.204 mW/g
Maximum value of SAR (measured) = 0.338 mW/g



0 dB = 0.338mW/g

Fig. 23 PCS 1900MHz, Body with GPRS, Towards Phantom with Flip Open, CH512

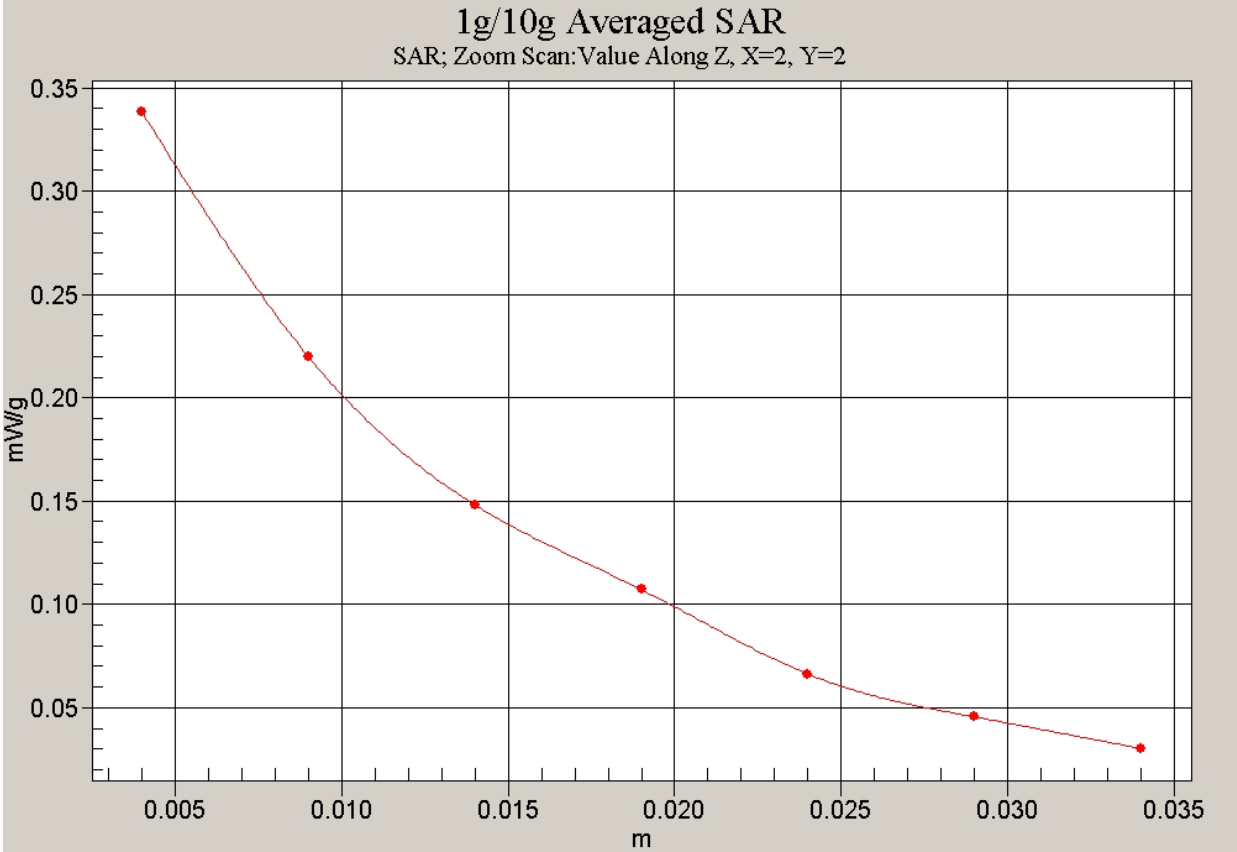


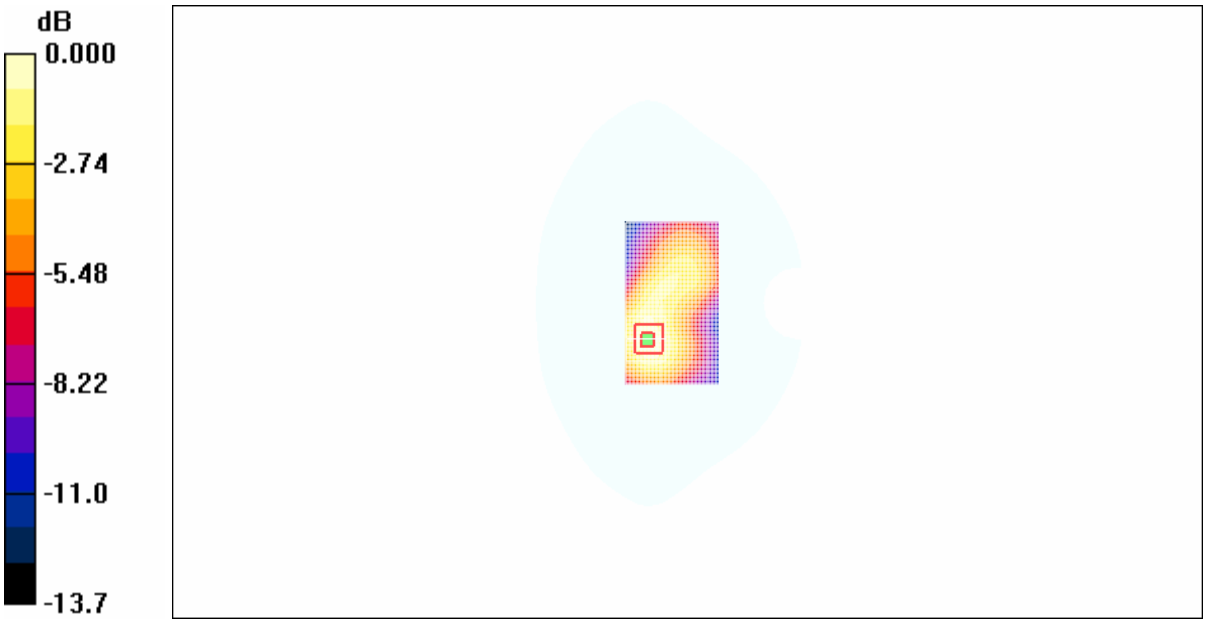
Fig. 24 Z-Scan at power reference point
(PCS 1900MHz, Body with GPRS, Towards Phantom with Flip Open, CH512)

1900 Body with GPRS Towards Phantom with Flip Closed, High

Date/Time: 2006-8-29 8:54:12
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz GPRS Frequency: 1909.8 MHz Duty Cycle: 1:4
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Phantom High/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.150 mW/g

Toward Phantom High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.94 V/m; Power Drift = 0.157 dB
Peak SAR (extrapolated) = 0.226 W/kg
SAR(1 g) = 0.140 mW/g; SAR(10 g) = 0.090 mW/g
Maximum value of SAR (measured) = 0.150 mW/g



0 dB = 0.150mW/g

Fig. 25 PCS 1900MHz, Body with GPRS, Towards Phantom with Flip Closed, CH810

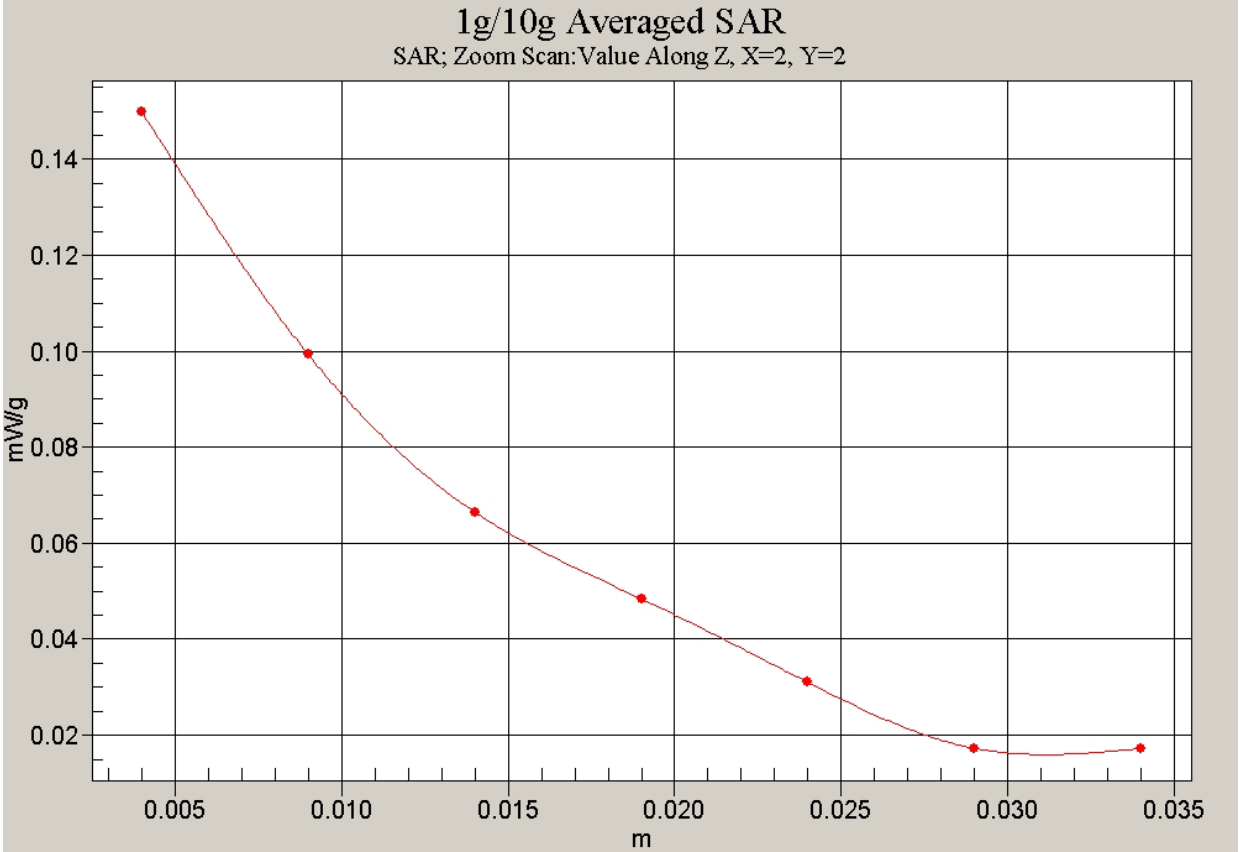


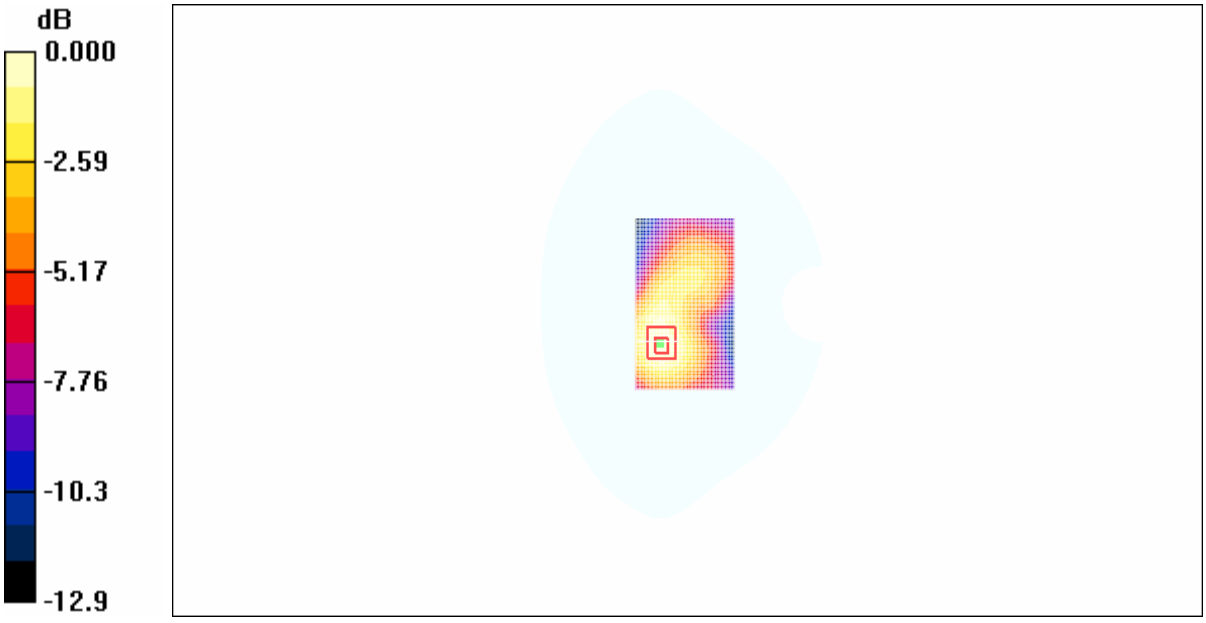
Fig. 26 Z-Scan at power reference point
(PCS 1900MHz, Body, Towards Phantom with Flip Closed, CH810)

1900 Body with GPRS Towards Phantom with Flip Closed, Middle

Date/Time: 2006-8-29 8:35:57
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Phantom Middle/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.148 mW/g

Toward Phantom Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.49 V/m; Power Drift = -0.200 dB
Peak SAR (extrapolated) = 0.220 W/kg
SAR(1 g) = 0.136 mW/g; SAR(10 g) = 0.087 mW/g
Maximum value of SAR (measured) = 0.143 mW/g



0 dB = 0.143mW/g

Fig. 27 PCS 1900MHz, Body with GPRS, Towards Phantom with Flip Closed, CH661

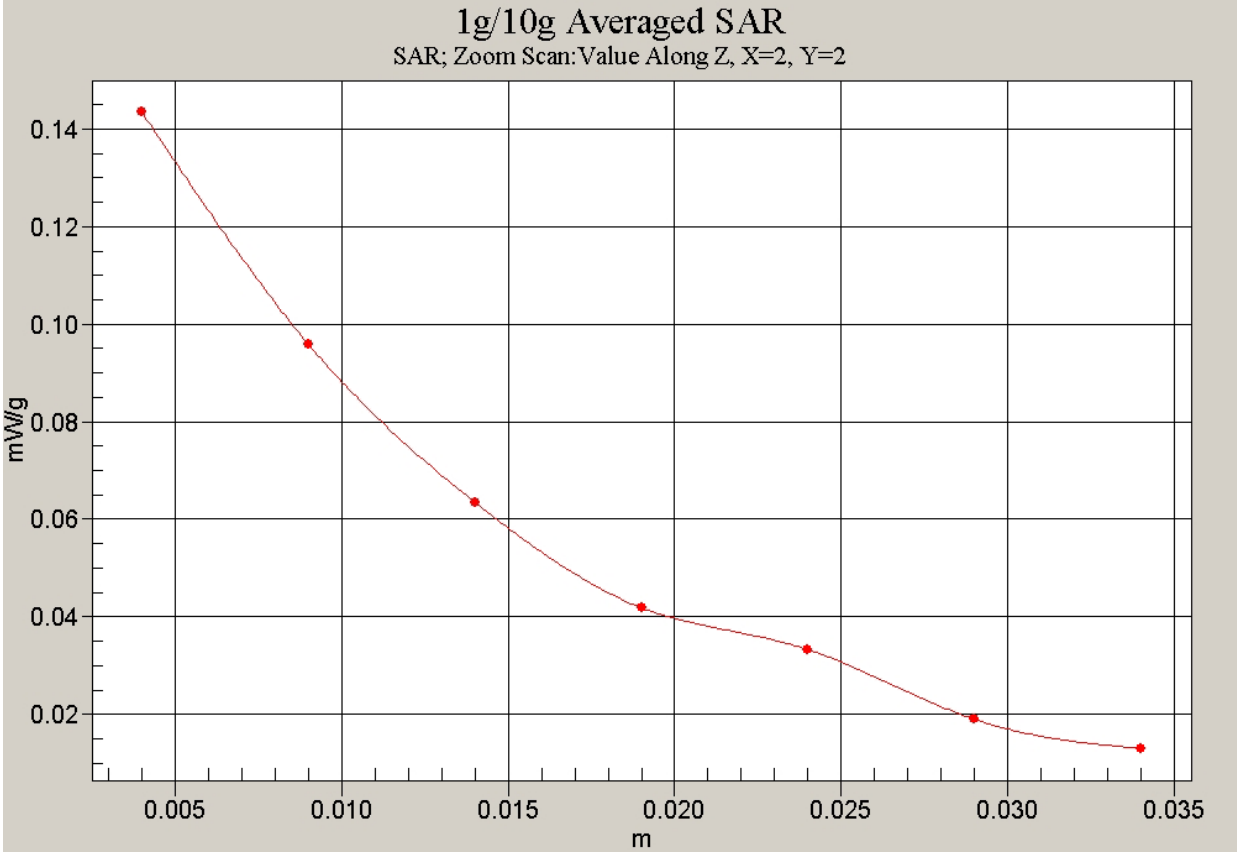


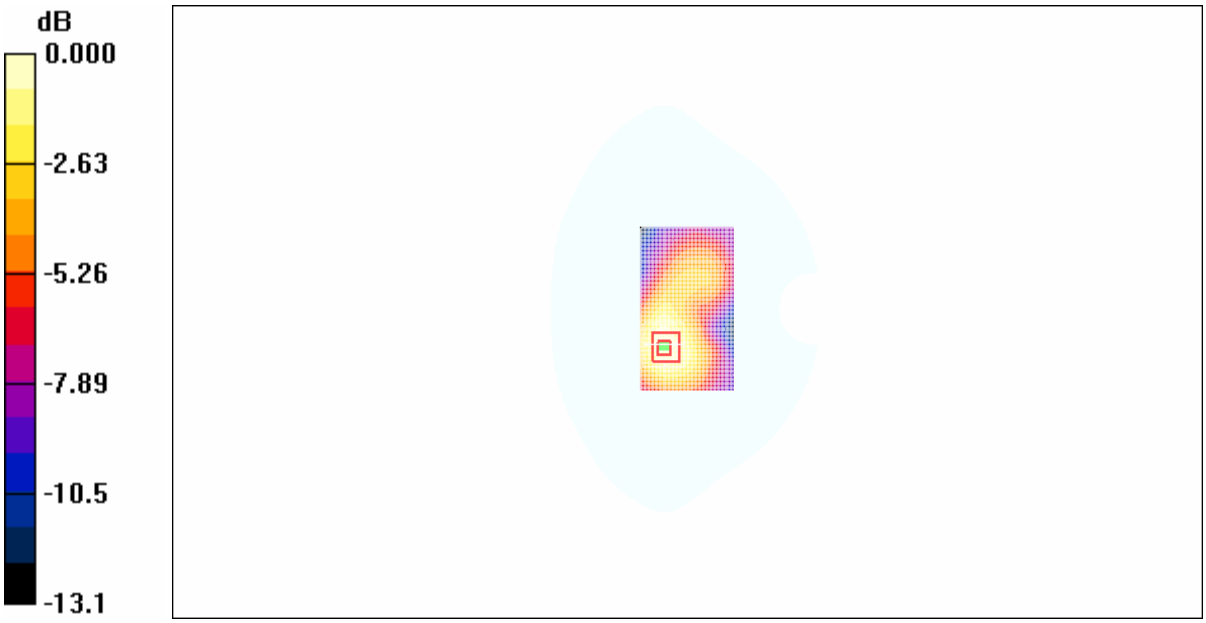
Fig. 28 Z-Scan at power reference point
(PCS 1900MHz, Body with GPRS, Towards Phantom with Flip Closed, CH661)

1900 Body with GPRS Towards Phantom with Flip Closed, Low

Date/Time: 2006-8-29 8:18:02
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz GPRS Frequency: 1850.2 MHz Duty Cycle: 1:4
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Phantom Low/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.146 mW/g

Toward Phantom Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.87 V/m; Power Drift = 0.141 dB
Peak SAR (extrapolated) = 0.207 W/kg
SAR(1 g) = 0.137 mW/g; SAR(10 g) = 0.088 mW/g
Maximum value of SAR (measured) = 0.146 mW/g



0 dB = 0.146mW/g

Fig. 29 PCS 1900MHz, Body with GPRS, Towards Phantom with Flip Closed, CH512

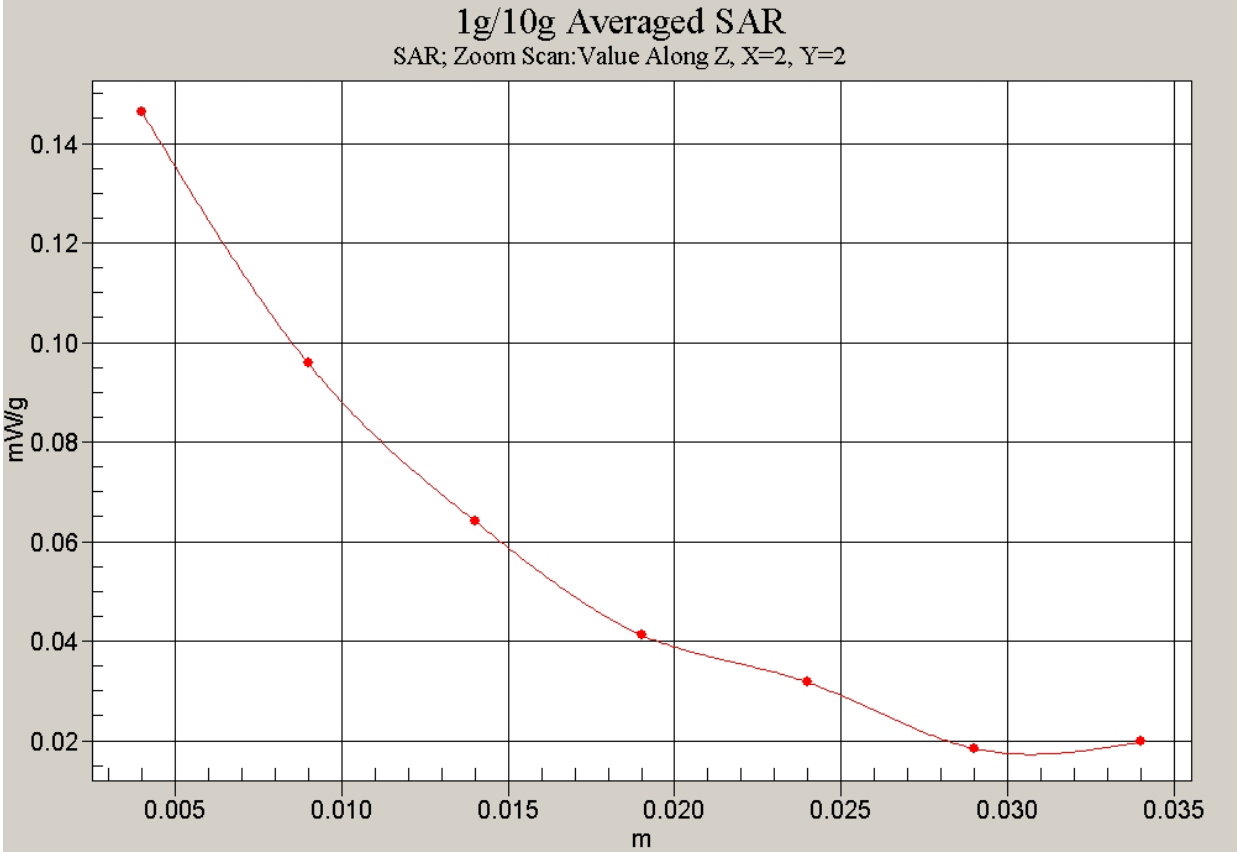


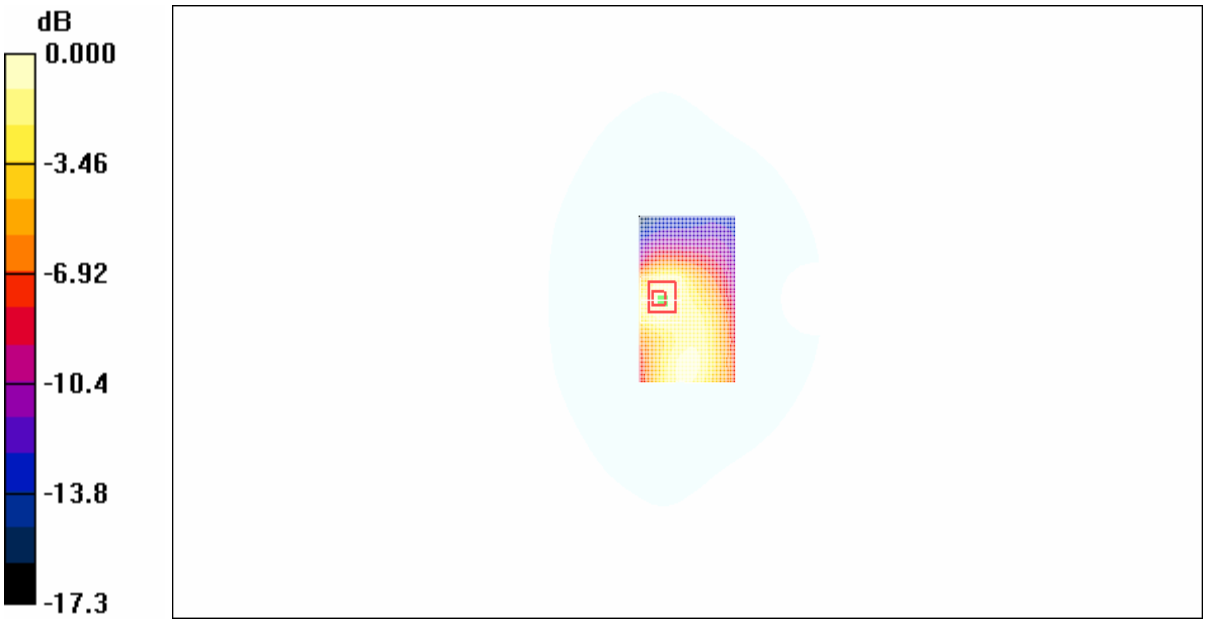
Fig. 30 Z-Scan at power reference point
(PCS 1900MHz, Body with GPRS, Towards Phantom with Flip Closed, CH512)

1900 Body with GPRS Towards Ground with Flip Closed, High

Date/Time: 2006-8-28 21:20:26
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz GPRS Frequency: 1909.8 MHz Duty Cycle: 1:4
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Ground High/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.265 mW/g

Toward Ground High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.7 V/m; Power Drift = -0.145 dB
Peak SAR (extrapolated) = 0.391 W/kg
SAR(1 g) = 0.234 mW/g; SAR(10 g) = 0.141 mW/g
Maximum value of SAR (measured) = 0.251 mW/g



0 dB = 0.251mW/g

Fig. 31 PCS 1900MHz, Body with GPRS, Towards Ground with Flip Closed, CH810

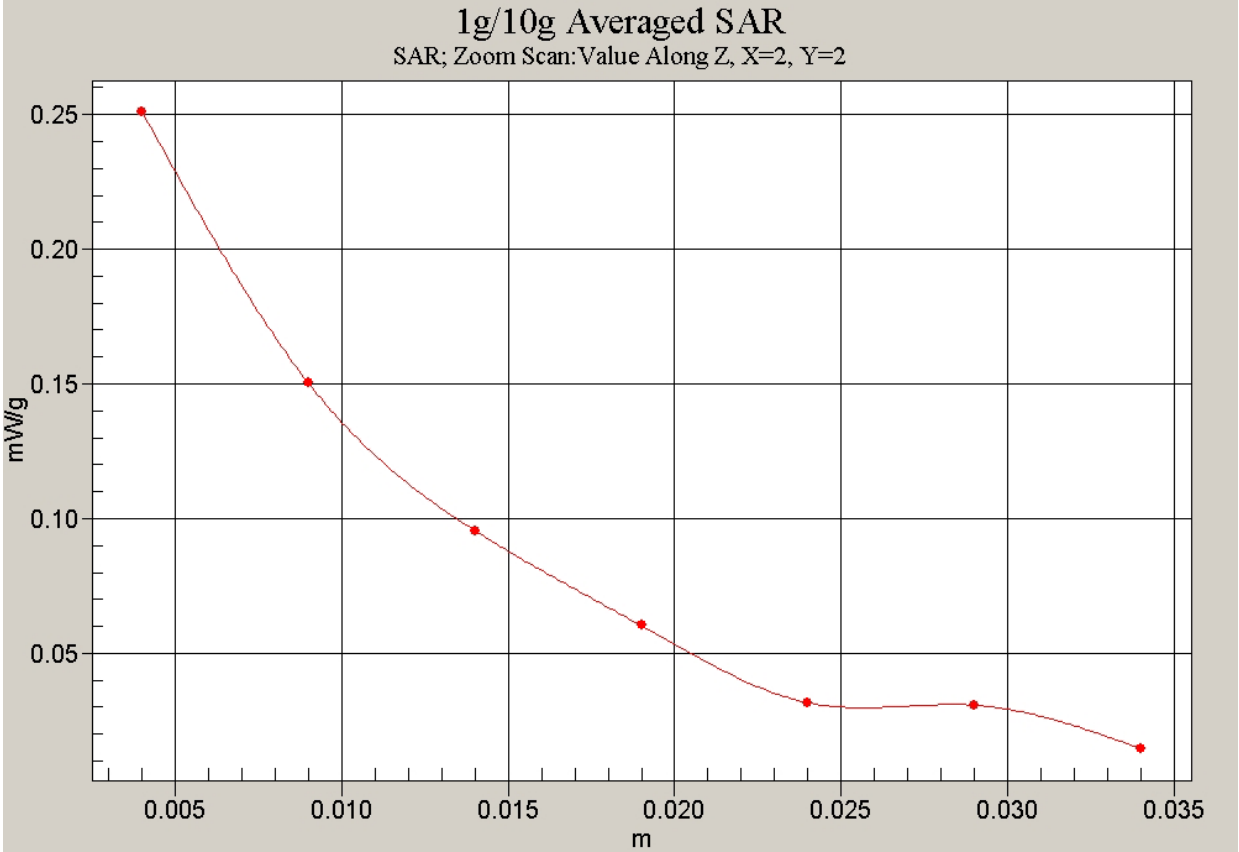


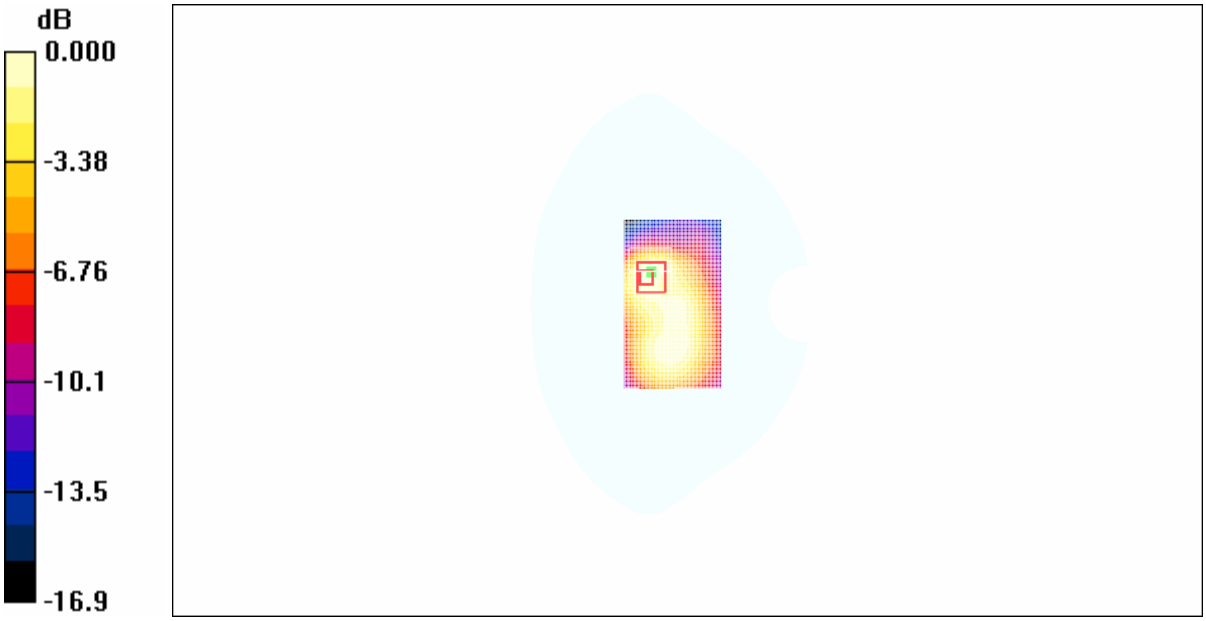
Fig. 32 Z-Scan at power reference point
(PCS 1900MHz, Body with GPRS, Towards Ground with Flip Closed, CH810)

1900 Body with GPRS Towards Ground with Flip Closed, Middle

Date/Time: 2006-8-29 7:41:59
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Ground Middle/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.360 mW/g

Toward Ground Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.8 V/m; Power Drift = -0.057 dB
Peak SAR (extrapolated) = 0.520 W/kg
SAR(1 g) = 0.295 mW/g; SAR(10 g) = 0.175 mW/g
Maximum value of SAR (measured) = 0.311 mW/g



0 dB = 0.311mW/g

Fig. 33 PCS 1900MHz, Body with GPRS, Towards Ground with Flip Closed, CH661

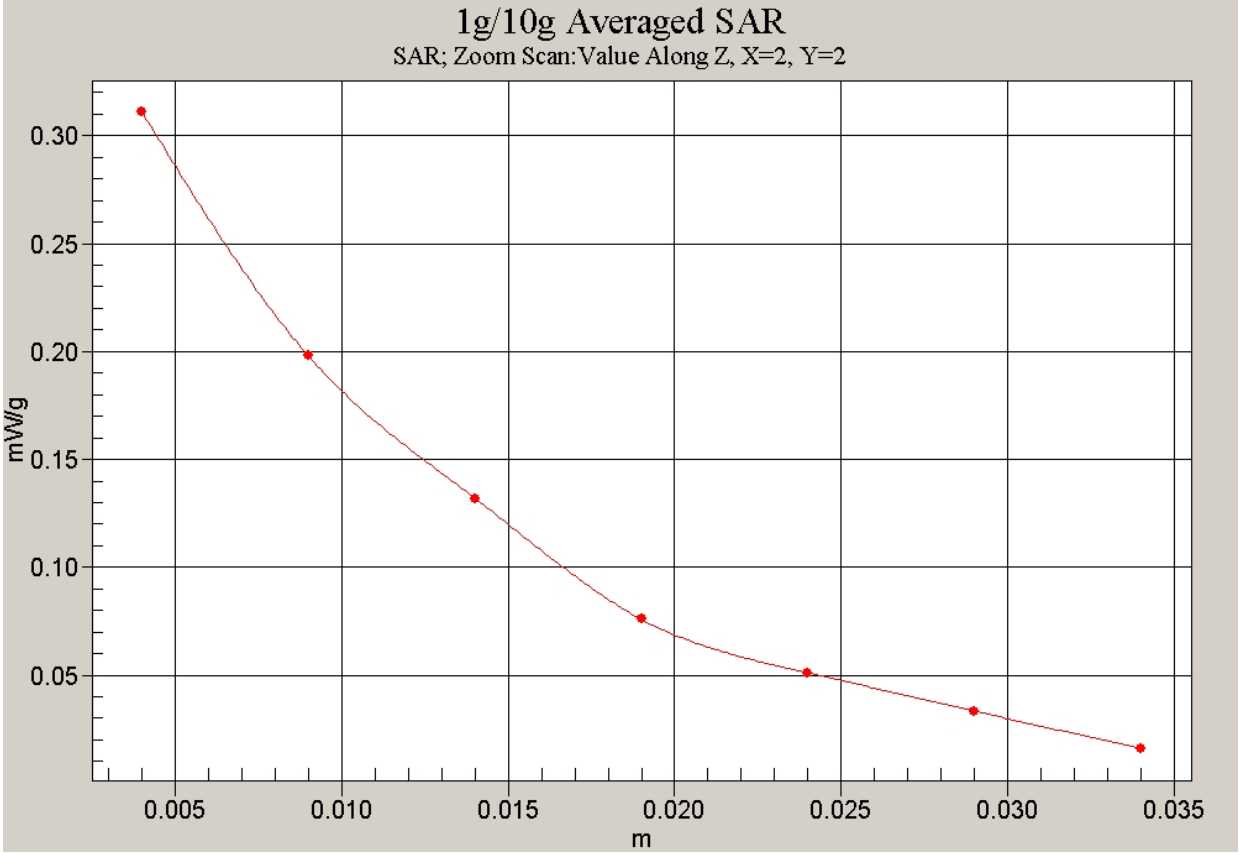


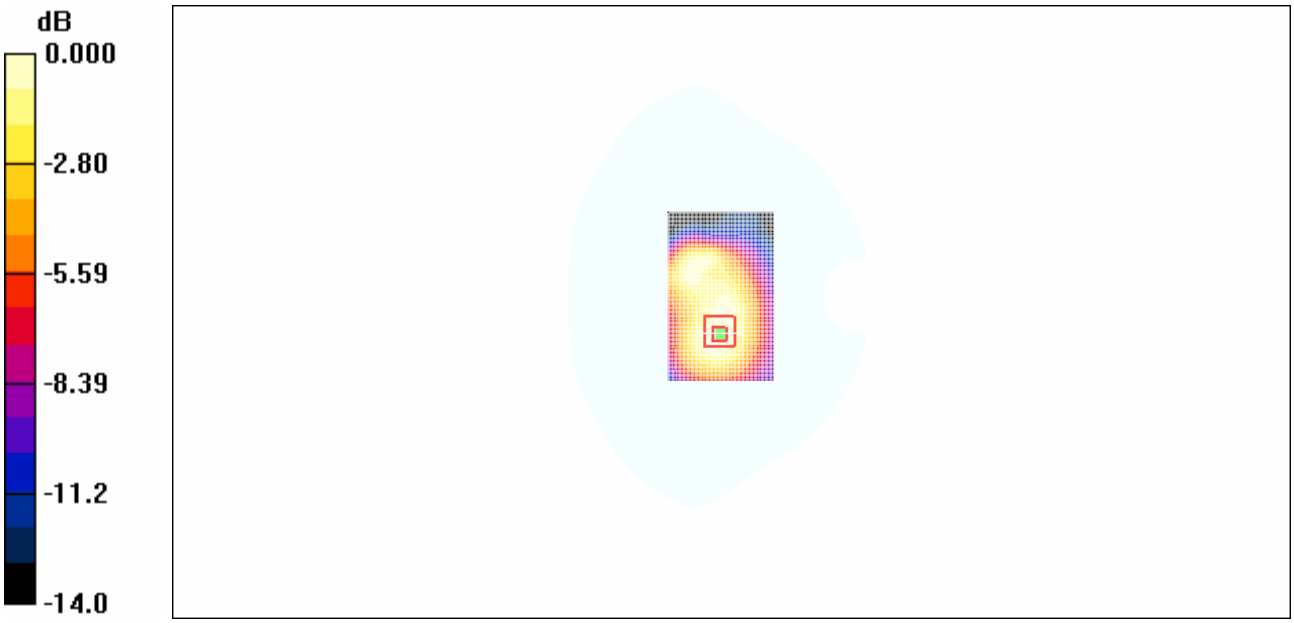
Fig. 34 Z-Scan at power reference point
(PCS 1900MHz, Body with GPRS, Towards Ground with Flip Closed, CH661)

1900 Body with GPRS Towards Ground with Flip Closed, Low

Date/Time: 2006-8-29 8:00:02
Electronics: DAE3 Sn589
Medium: Body 1900
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: GSM 1900MHz GPRS Frequency: 1850.2 MHz Duty Cycle: 1:4
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Toward Ground Low/Area Scan (51x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.312 mW/g

Toward Ground Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.4 V/m; Power Drift = -0.012 dB
Peak SAR (extrapolated) = 0.429 W/kg
SAR(1 g) = 0.282 mW/g; SAR(10 g) = 0.184 mW/g
Maximum value of SAR (measured) = 0.302 mW/g



0 dB = 0.302mW/g

Fig. 35 PCS 1900MHz, Body with GPRS, Towards Ground with Flip Closed, CH512

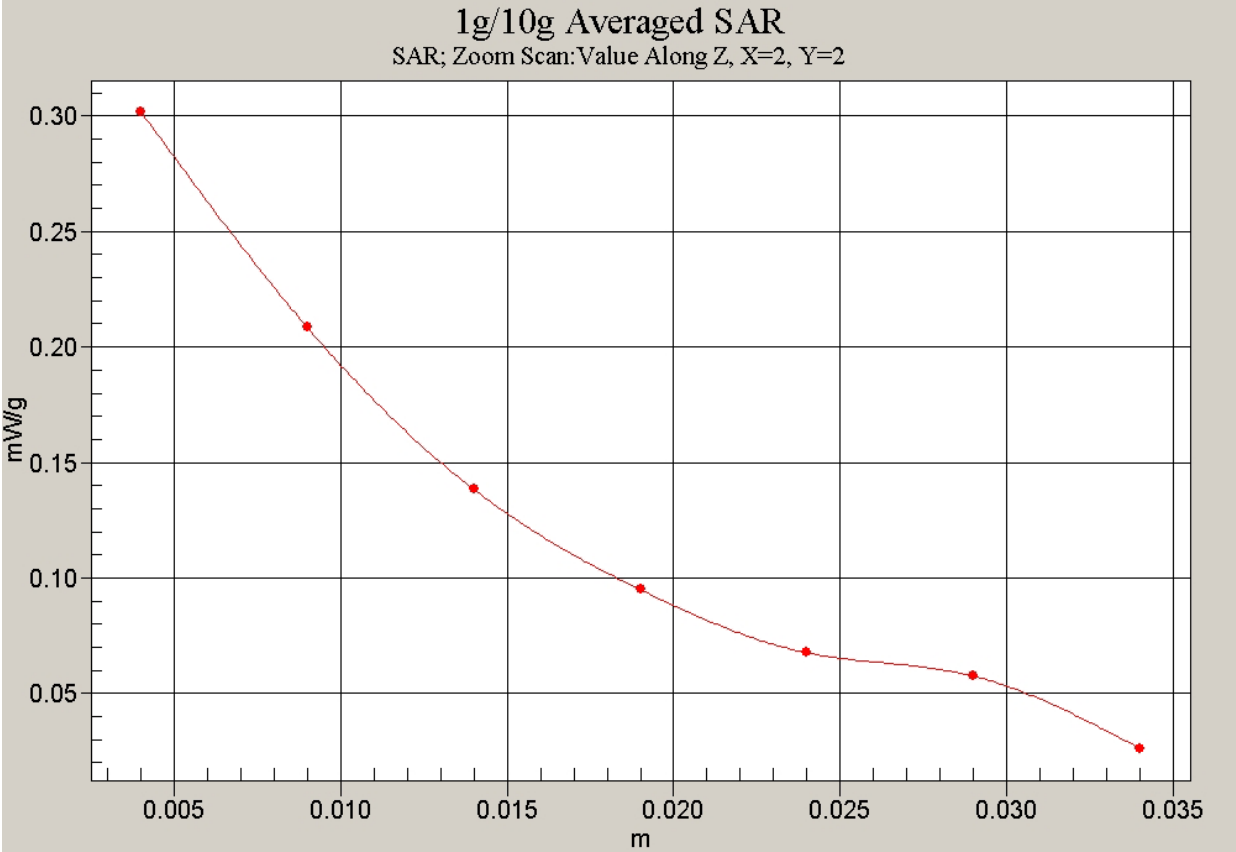


Fig. 36 Z-Scan at power reference point
(PCS 1900MHz, Body with GPRS, Towards Ground with Flip Closed, CH512)

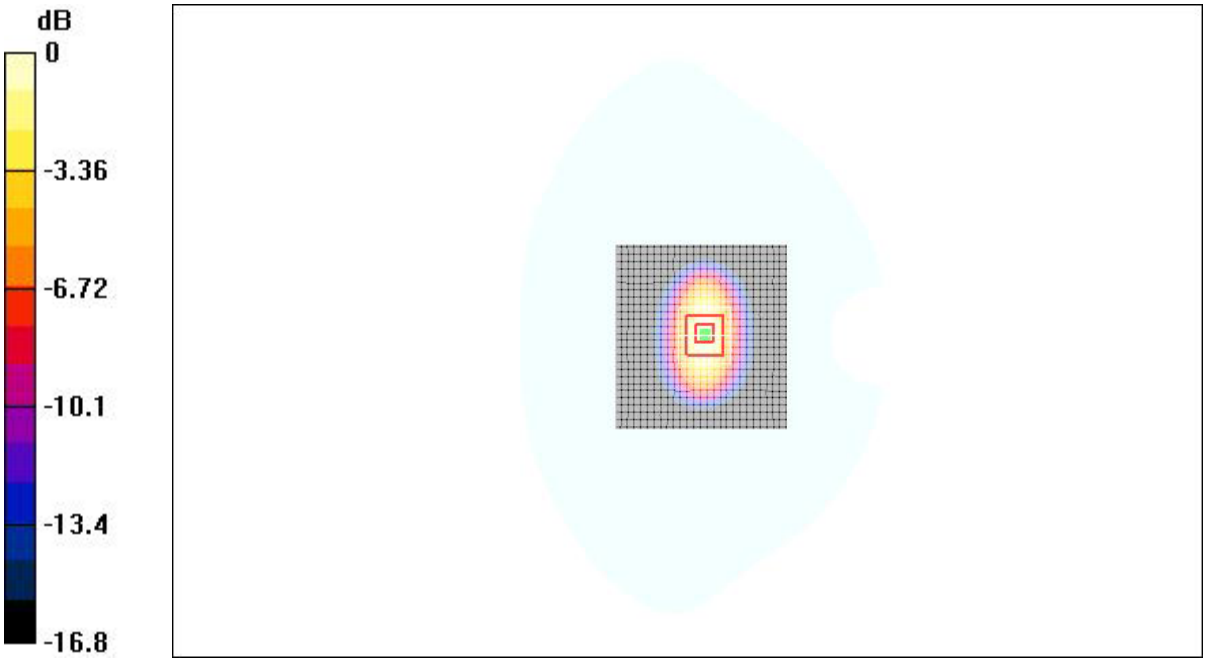
ANNEX D SYSTEM VALIDATION RESULTS

1900MHzDAE589Probe1736

Date/Time: 2006-8-20 8:39:02
Electronics: DAE3 Sn589
Medium: 1900 Head
Medium parameters used: f = 1900 MHz; σ = 1.45 mho/m; ε_r = 40.27; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liqiud Temperature: 22.5^{o}C
Communication System: CW Frequency: 1900 MHz Duty Cycle: 1:1
Probe: ET3DV6 - SN1736 ConvF(5.4, 5.4, 5.4)

System Validation/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 11.2 mW/g

System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.1 V/m; Power Drift = 0.1 dB
Peak SAR (extrapolated) = 16.9 W/kg
SAR(1 g) = 9.91 mW/g; SAR(10 g) = 5.27 mW/g
Maximum value of SAR (measured) = 11.3 mW/g



0 dB = 11.3mW/g

Fig.39 validation 1900MHz 250mW

ANNEX E PROBE CALIBRATION CERTIFICATE

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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 TMC-Auden

Certificate No: ET3-1736_Nov05

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1736
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	November 25, 2005
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	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference Probe ES3DV2	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
DAE4	SN: 3013	7-Jan-05 (SPEAG, No. ES3-3013_Jan05)	Jan-06
Reference Probe ES3DV2	SN: 907	21-Jun-05 (SPEAG, No. DAE4-907_Jun05)	Jun-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Laboratory Technician	N. Vetterli
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 25, 2005

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

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

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

Accreditation No.: **SCS 108**

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

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 ET3DV6

SN:1736

Manufactured:	September 27, 2002
Last calibrated:	July 14, 2005
Recalibrated:	November 25, 2005

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1736 **November 25, 2005**

DASY - Parameters of Probe: ET3DV6 SN:1736

Sensitivity in Free Space[A]			Diode Compression[B]	
NormX	**1.97** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**93** mV
NormY	**1.75** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**93** mV
NormZ	**1.97** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**93** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	9.6	5.0
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

TSL **1810 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	13.2	8.8
SAR_{be} [%]	With Correction Algorithm	0.6	0.1

Sensor Offset

Probe Tip to Sensor Center **2.7** mm

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

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

[B] Numerical linearization parameter: uncertainty not required.

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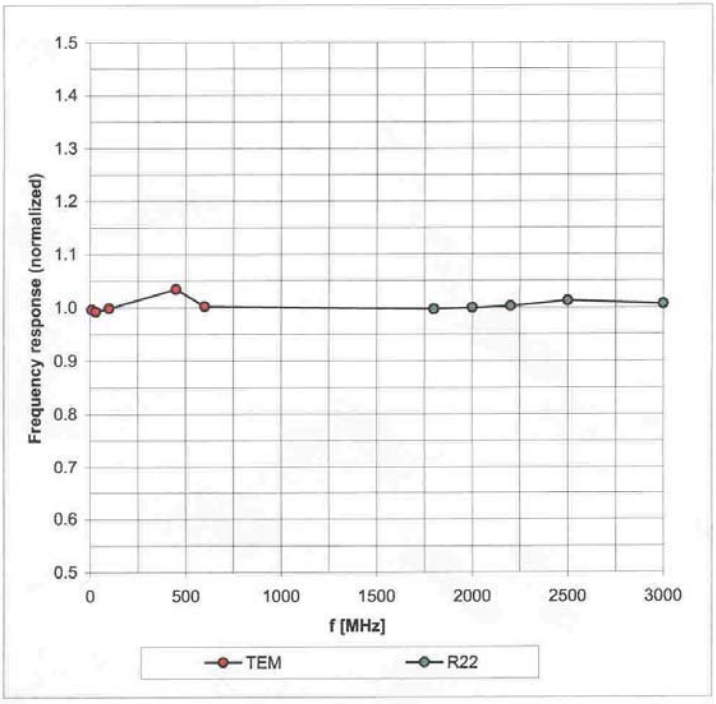
Frequency Response of E-Field

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



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

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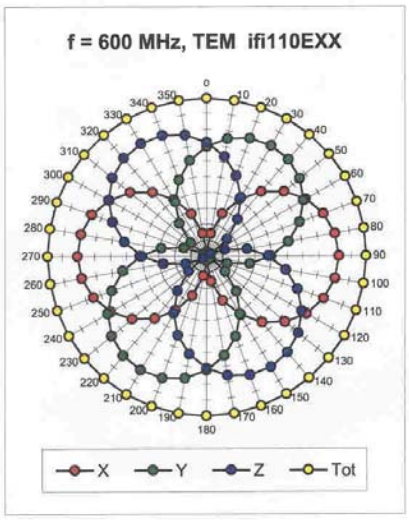
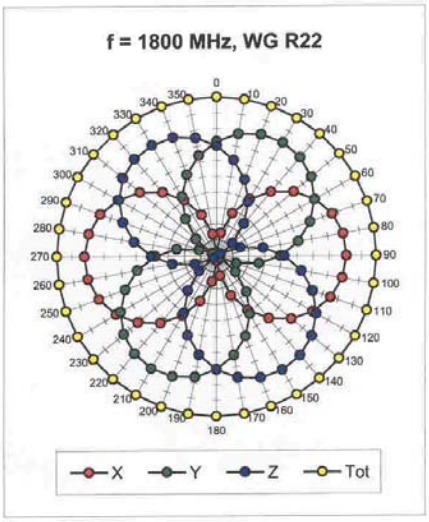
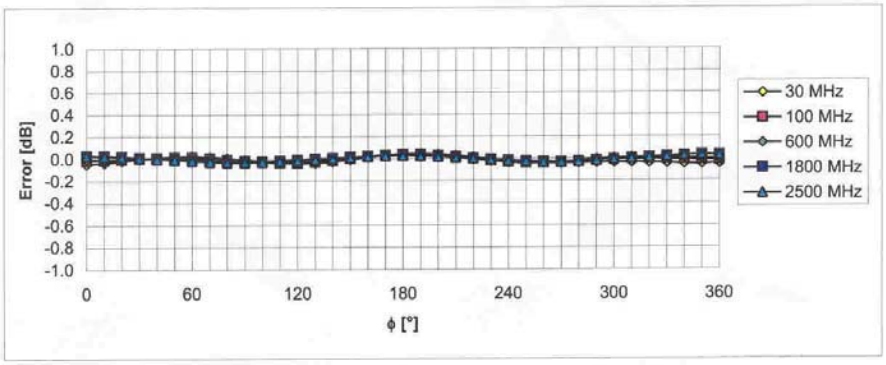
Receiving Pattern (ϕ), ϑ = 0°







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

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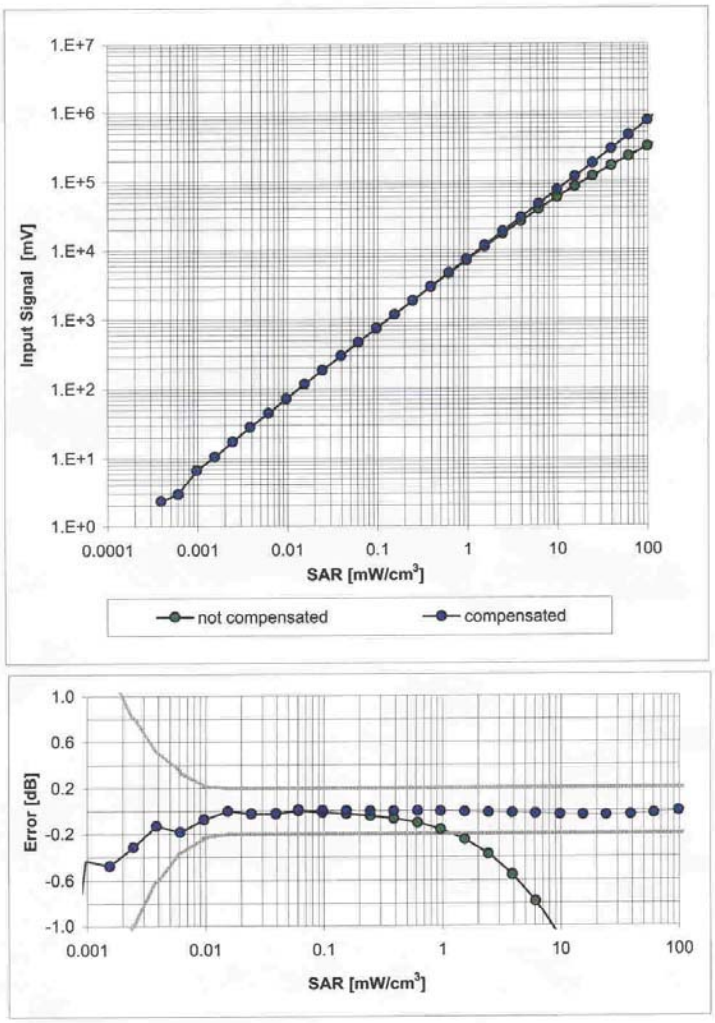
Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)



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

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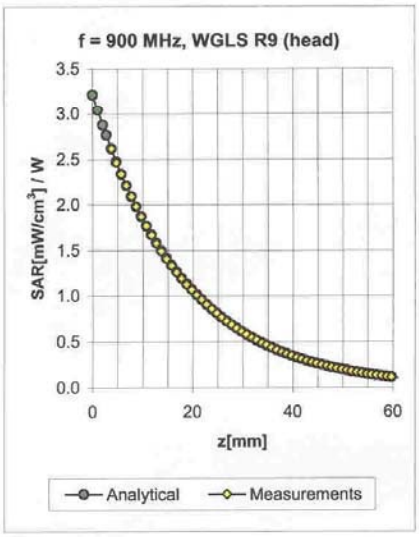
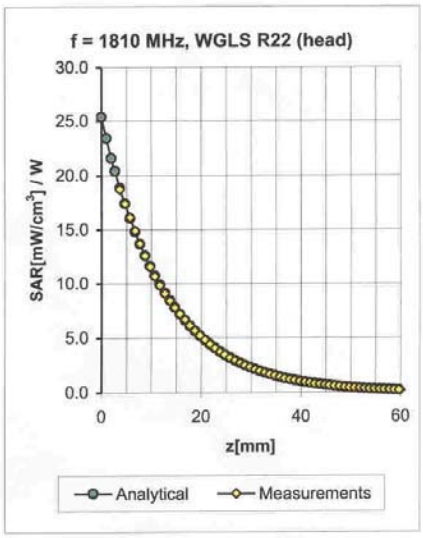
Conversion Factor Assessment





f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.56	1.85	6.51 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.57	2.47	5.40 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.62	2.29	4.67 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.12	1.61	7.74 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.47	2.15	6.45 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.53	2.78	4.88 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.65	2.11	4.35 ± 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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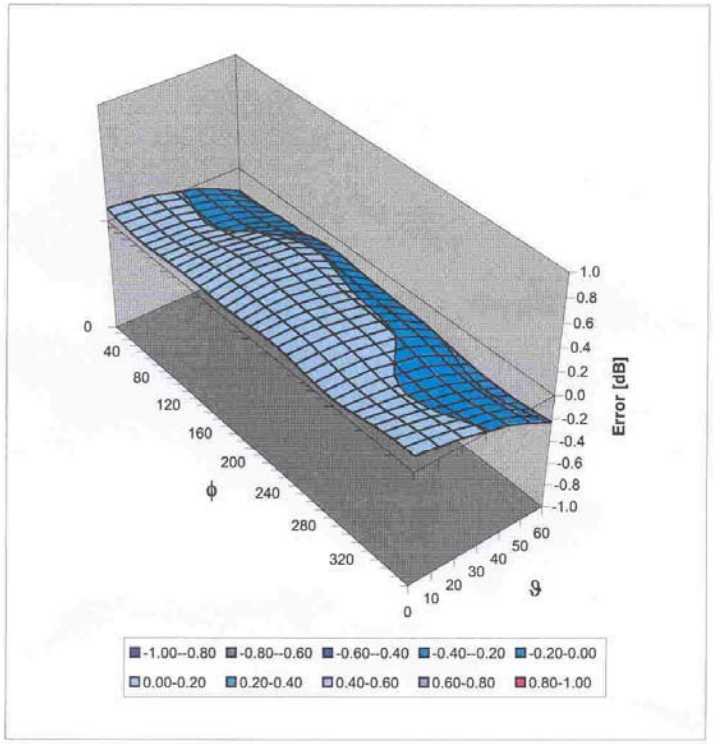
Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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