Deutscher Akkreditierungs Rat

DAR

No. DAT-P-114/01-01

CNAL

No. L0442

TEST REPORT

No. 2006E00876

FCCID	QISE630
Test name	Electromagnetic Field (Specific Absorption Rate)
Product	HSDPA/UMTS/EDGE/GPRS Datacard
Model	E630
Client	HUAWEI Technologies Co., Ltd.
Type of test	Non Type approval

Telecommunication Metrology Center

of Ministry of Information Industry

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TABLE OF CONTENT

Product name	HSDPA/UMTS/EDGE/GPRS/GSM Datacard	Sample Model	E630
Client	HUAWEITechnologies Co., Ltd.	Type of test	Non Type Approval
Factory	HUAWEI Technologies Co., Ltd.	Sampling arrival date	June 5th, 2006
Manufacturer	HUAWEI Technologies Co., Ltd.		
Sampling/ Sending sample	Sending sample	Sample sent by	Xie Yan
Sampling location	/	Sampling person	/
Sample quantity	1	Sample matrix	/
Series number of the Sample	/		
Manufacture date	/	Manufacture location	China, Shenzhen
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. **ANSI C95.1–1999**: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. **IEC 62209-2 (Draft):** Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the Specific Absorption Rate (SAR)in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the Body. **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. **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.		
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: June 21st, 2006**		
Note	The test results relate only to the items tested of the sample(s).		

Approved by ____________ (Lu Bingsong) **Reviewed by** ____________ (Chu Wenhua) **Tested by** ____________ (Sun Qian)

Deputy Director of the laboratory

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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	0755-28780808
Fax	\

Table 2: Manufacturer

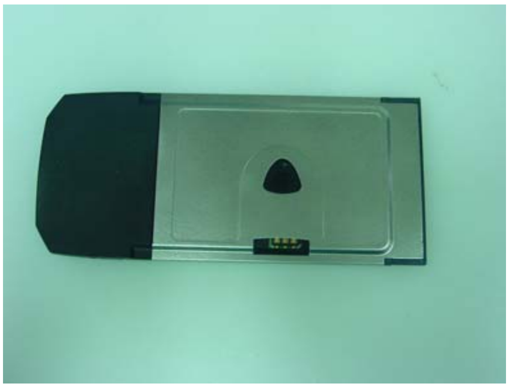
Name or Company	HUAWEI Technologies Co., Ltd.
Address/Post	Bantian, Longgang District, Shenzhen, Guangdong
City	Shenzhen
Postal Code	518129
Country	China
Telephone	0755-28780808
Fax	\

3.2 Constituents of EUT

Table 3: Constituents of Samples

Description	Model	Serial Number	Manufacturer
HSDPA/UMTS/EDGE/GPRS Datacard	E630	\	HUAWEI Technologies Co., Ltd.
External Antenna	E630	\	HUAWEI Technologies Co., Ltd.

Picture 1-a: Front side of the datacard



Picture 1-b: Back Side of the datacard

Picture 1-c: the External Antenna

Picture 1: Constituents of the sample

3.3 General Description

Equipment Under Test (EUT) are an HSDPA/UMTS/EDGE/GPRS/GSM Data Card and an external antenna. SAR is tested respectively for PCS1900MHz with 3 different Laptops for the datacard as the test assistant equipments. The EUT has GPRS function, and its GPRS class is 10.

The sample under 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

During SAR test of the EUT, it is in Traffic Mode (Channel Allocated) at Normal Voltage Condition. A communication link is set up with the test mode software, and a call is established. At the same time, the RF power is monitored by instruments. 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.

Since the datacard only has the data transfer function, but does not have the speech transfer function, the tests in the band of PCS 1900MHz are only performed in the mode of GPRS and EGPRS. The external antenna is tested also with the datacard’s mode of GPRS and EGPRS. And according to the "2 dB rule" specified in the OET Bulletin 65 (Edition 97-01) and Supplement C(Edition 01-01), **" If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tile/Ear, extended and retracted) is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s)"**.Test channels have been set first to the middle and then to low and high if necessary.

For each channel, the datacard is tested at the following 5 test positions:

- Test Position 1: The EUT is plugged in the PCMCIA slot of the portable computer. The back side of the EUT is directed to the bottom of the flat phantom. The separation distance is 1.5cm between the surface of the back side of the EUT and the bottom of the flat phantom.（Picture 2-a）
- Test Position 2: The EUT is plugged in the PCMCIA slot of the portable computer. The front side of the EUT is directed to the bottom of the flat phantom. The separation distance is 1.5cm between the surface of the front side of the EUT and the bottom of the flat phantom.（Picture 2-b）
- Test Position 3: The EUT is plugged in the PCMCIA slot of the portable computer. The flank side of the EUT is directed to the bottom of the flat phantom. The separation distance is 1.5cm between the surface of the flank side of the EUT and the bottom of the flat phantom (PCMCIA extended card needed).（Picture 2-c）
- Test Position 4: The same as Mode 3 except for testing the other side of the flank.（Picture 2-d）
- Test Position 5: The EUT is plugged in the PCMCIA slot of the portable computer. The top of the EUT is directed to the bottom of the flat phantom. The separation distance is 1.5cm

between the top of the EUT and the bottom of the flat phantom. (Picture 2-e）

The external antenna is tested at the following 5 test positions all at the middle channel:

- Test Position 1: The EUT is connected to the datacard operating at the maximum power. The back side of the EUT is directed to the bottom of the flat phantom. The separation distance is 1.5cm between the surface of the back side of the EUT and the bottom of the flat phantom.（Picture 2-f）
- Test Position 2: The EUT is connected to the datacard operating at the maximum power. The front side of the EUT is directed to the bottom of the flat phantom. The separation distance is 1.5cm between the surface of the front side of the EUT and the bottom of the flat phantom. Picture 2-g）
- Test Position 3: The EUT is connected to the datacard operating at the maximum power. The flank side of the EUT is directed to the bottom of the flat phantom. The separation distance is 1.5cm between the surface of the flank side of the EUT and the bottom of the flat phantom.（Picture 2-h）
- Test Position 4: The same as Mode 3 except for testing the other side of the flank. （Picture 2-i）
- Test Position 5:The EUT is connected to the datacard operating at the maximum power. The top of the EUT is directed to the bottom of the flat phantom. The separation distance is 1.5cm between the top of the EUT and the bottom of the flat phantom.（Picture 2-j）

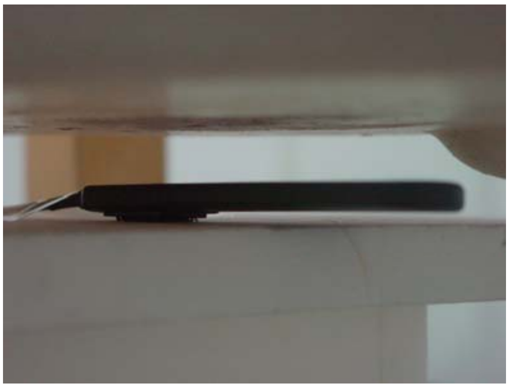
Picture 2-a: Test position 1 of the Data Card

Picture 2-b: Test position 2 of the Data Card

Picture 2-c: Test position 3 of the Data Card

Picture 2-d: Test position 4 of the Data Card

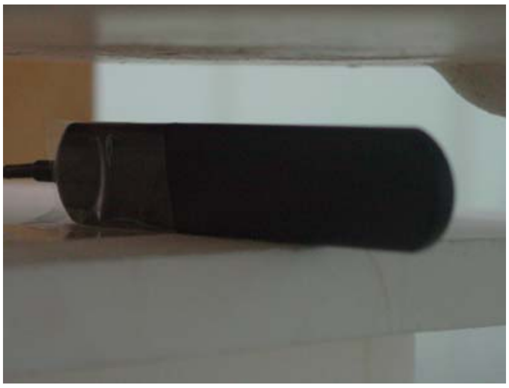
Picture 2-e: Test position 5 of the Data Card



Picture 2-f: Test position 1 of the Antenna

Picture 2-g: Test position 2 of the Antenna

Picture 2-h: Test position 3 of the Antenna



Picture 2-i: Test position 4 of the Antenna

Picture 2-j: Test position 5 of the Antenna

Picture 2: Test positions of EUTs

During the test of the datacard, three Laptops are used as the test assistant to help to setup communication, whose type are IBM X40 (See Picture 3-a and 3-b), Dell LATIDUE D600 (See Picture 3-c and 3-d), and HP compaq nc6000 ((See Picture 3-e and 3-f).

Picture 3-a: Close

Picture 3-b: Open

Picture 3-c: Close

Picture 3-d: Open

Picture 3-e: Close

Picture 3-f: Open

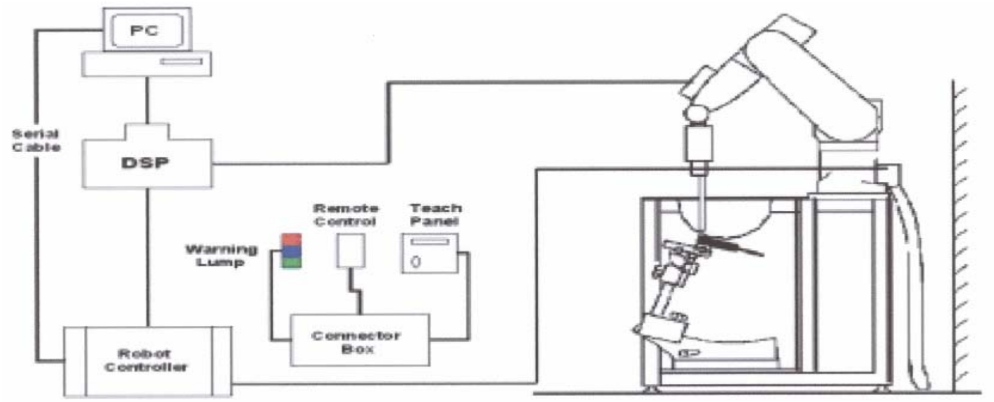
Picture 3: Three laptops as test assistants

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 Professional, 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 4: SAR Lab Test Measurement Set-up

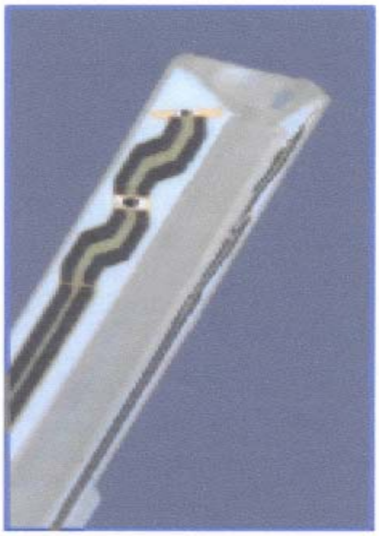
The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information 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	I 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 diameter: 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 5: ET3DV6 E-field Probe

Picvure 6: ET3DV6 E-field

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.

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

Where: Δt = Exposure time (30 seconds),

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

ΔT = Temperature increase due to RF exposure.

Or

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

Where:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

Picture 7: 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 repeatably 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 the complete setup of all predefined phantom positions and measurement grids by 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

Picture 8: 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 been previously 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.

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.

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.

IEC 62209-2 (Draft): Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR)in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the body.

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)**
1900 GPRS			
Before Test (dBm)	30.3	30.5	30.4
After Test (dBm)	30.2	30.7	30.1
1900 EGPRS			
Before Test (dBm)	26.4	26.4	26.3
After Test (dBm)	26.3	26.2	26.5

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 16 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	1900 MHz	53.3	1.52
Measurement value (Average of 10 tests)	1900 MHz	51.5	1.57

8.2 System Validation

Table 8: System Validation

Measurement is made at temperature 22.3 °C, relative humidity 49%, input power 250 mW. Liquid temperature during the test: 22.6°C					
Liquid parameters		**Frequency**	**Permittivity ε**		**Conductivity σ (S/m)**
		1900 MHz	39.2		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	5.31	10.1	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 (Datacard PCS 1900-GPRS with IBM Laptop)

Table 9: SAR Values (Datacard PCS 1900-GPRS with IBM Laptop)

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	
Flat Phantom, Test Position 1, Mid frequency (See Figure 1)	0.360	0.651	-0.200
Flat Phantom, Test Position 2, Mid frequency (See Figure 3)	0.390	0.629	-0.001
Flat Phantom, Test Position 3, Mid frequency (See Figure 5)	0.185	0.303	0.033
Flat Phantom, Test Position 4, Mid frequency (See Figure 7)	0.316	0.498	-0.072
Flat Phantom, Test Position 5, Mid frequency (See Figure 9)	0.115	0.182	0.193

8.4 Summary of Measurement Results (Datacard PCS 1900-EGPRS with IBM Laptop)

Table 10: SAR Values (Datacard PCS 1900-EGPRS with IBM Laptop)

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	
Flat Phantom, Test Position 1, Mid frequency (See Figure 11)	0.195	0.306	-0.118
Flat Phantom, Test Position 2, Mid frequency (See Figure 13)	0.165	0.267	0.019
Flat Phantom, Test Position 3, Mid frequency (See Figure 15)	0.091	0.148	0.200
Flat Phantom, Test Position 4, Mid frequency (See Figure 17)	0.133	0.209	-0.021
Flat Phantom, Test Position 5, Mid frequency (See Figure 19)	0.051	0.080	0.164

8.5 Summary of Measurement Results (Datacard PCS 1900-GPRS with DELL Laptop)

Table 11: SAR Values (Datacard PCS 1900-GPRS with DELL Laptop)

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	
Flat Phantom, Test Position 1, Mid frequency (See Figure 21)	0.555	0.871	-0.200
Flat Phantom, Test Position 2, Mid frequency (See Figure 23)	0.359	0.560	-0.104
Flat Phantom, Test Position 3, Mid frequency (See Figure 25)	0.215	0.353	0.008
Flat Phantom, Test Position 4, Mid frequency (See Figure 27)	0.195	0.304	-0.043
Flat Phantom, Test Position 5, Mid frequency (See Figure 29)	0.067	0.101	-0.049

8.6 Summary of Measurement Results (Datacard PCS 1900-EGPRS with DELL Laptop)

Table 12: SAR Values (Datacard PCS 1900-EGPRS with DELL Laptop)

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	
Flat Phantom, Test Position 1, Mid frequency (See Figure 31)	0.215	0.347	-0.133
Flat Phantom, Test Position 2, Mid frequency (See Figure 33)	0.158	0.247	0.200
Flat Phantom, Test Position 3, Mid frequency (See Figure 35)	0.085	0.141	-0.155
Flat Phantom, Test Position 4, Mid frequency (See Figure 37)	0.086	0.132	0.200
Flat Phantom, Test Position 5, Mid frequency (See Figure 39)	0.028	0.041	-0.067

8.7 Summary of Measurement Results (Datacard PCS 1900-GPRS with HP Laptop)

Table 13: SAR Values (Datacard PCS 1900-GPRS with HP Laptop)

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	
Flat Phantom, Test Position 1, Mid frequency (See Figure 41)	0.583	0.930	-0.092
Flat Phantom, Test Position 2, Mid frequency (See Figure 43)	0.420	0.666	-0.021
Flat Phantom, Test Position 3, Mid frequency (See Figure 45)	0.174	0.287	0.200
Flat Phantom, Test Position 4, Mid frequency (See Figure 47)	0.204	0.317	0.004
Flat Phantom, Test Position 5, Mid frequency (See Figure 49)	0.086	0.132	-0.056

8.8 Summary of Measurement Results (Datacard PCS 1900-EGPRS with HP Laptop)

Table 14: SAR Values (Datacard PCS 1900-EGPRS with HP Laptop)

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	
Flat Phantom, Test Position 1, Mid frequency (See Figure 51)	0.245	0.388	0.036
Flat Phantom, Test Position 2, Mid frequency (See Figure 53)	0.220	0.349	0.126
Flat Phantom, Test Position 3, Mid frequency (See Figure 55)	0.085	0.141	0.200
Flat Phantom, Test Position 4, Mid frequency (See Figure 57)	0.104	0.163	0.109
Flat Phantom, Test Position 5, Mid frequency (See Figure 59)	0.037	0.057	-0.138

8.9 Summary of Measurement Results (External Antenna PCS 1900-GPRS)

Table 15: SAR Values (External Antenna PCS1900-GPRS)

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	
Flat Phantom, Test Position 1, Mid frequency (See Figure 61)	0.583	0.930	-0.092
Flat Phantom, Test Position 2, Mid frequency (See Figure 63)	0.420	0.666	-0.021
Flat Phantom, Test Position 3, Mid frequency (See Figure 65)	0.174	0.287	0.200
Flat Phantom, Test Position 4, Mid frequency (See Figure 67)	0.204	0.317	0.004
Flat Phantom, Test Position 5, Mid frequency (See Figure 69)	0.086	0.132	-0.056

8.10 Summary of Measurement Results (External Antenna PCS 1900-EGPRS)

Table 16: SAR Values (External Antenna PCS 1900-EGPRS)

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	
Flat Phantom, Test Position 1, Mid frequency (See Figure 71)	0.245	0.388	0.036
Flat Phantom, Test Position 2, Mid frequency (See Figure 73)	0.220	0.349	0.126
Flat Phantom, Test Position 3, Mid frequency (See Figure 75)	0.085	0.141	0.200
Flat Phantom, Test Position 4, Mid frequency (See Figure 77)	0.104	0.163	0.109
Flat Phantom, Test Position 5, Mid frequency (See Figure 79)	0.037	0.057	-0.138

8.11 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	B	5.0	R	√3	0.6	1.7	∞

	values							
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 17: 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, 2005	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, 2005	One year
08	E-field Probe	SPEAG ET3DV6	1736	November 25, 2005	One year
09	DAE	SPEAG DAE3	536	July 11, 2005	One year

10 TEST PERIOD

The test is performed from June 16th, 2006 to June 19th, 2006.

11 TEST LOCATION

The test is performed at Radio Communication & Electromagnetic Compatibility Laboratory of Telecommunication Metrology Center of Ministry of Information Industry of The People's Republic of China

END OF REPORT BODY

ANNEX A： MEASUREMENT PROCESS

The evaluation was performed with the following procedure:

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.

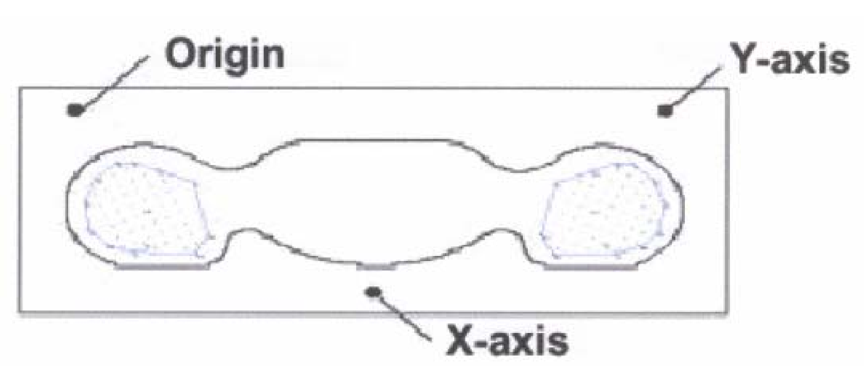
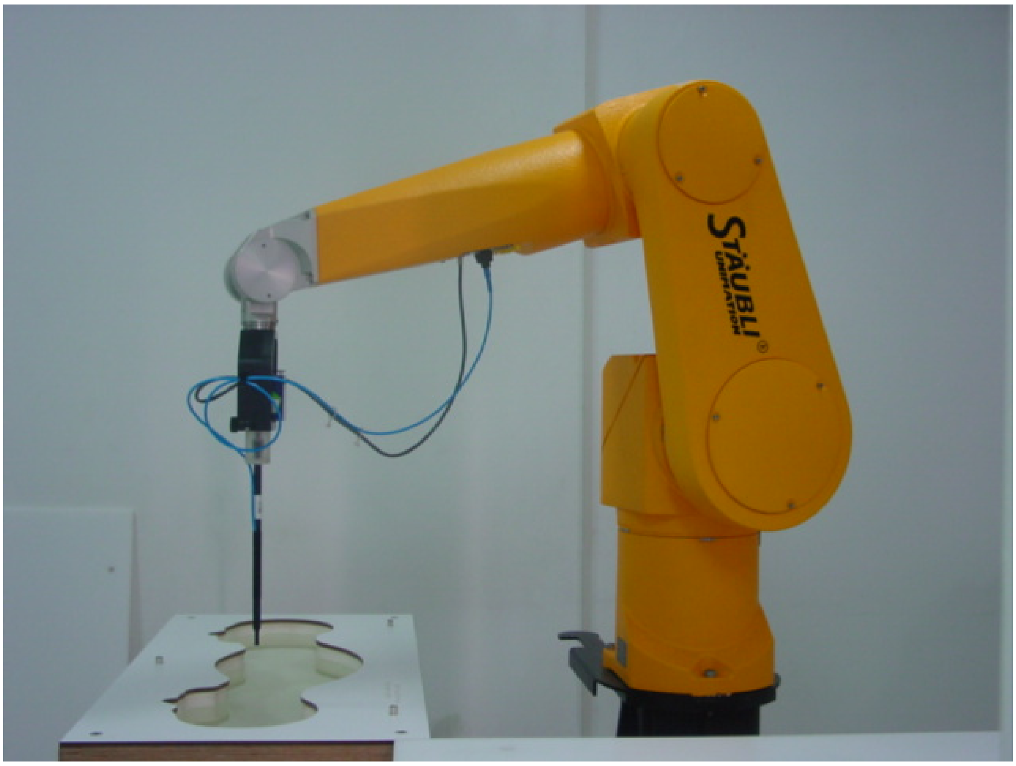


Figure A: SAR Measurement Points in Area Scan

ANNEX B: TEST LAYOUT



Picture B1: Specific Absorption Rate Test Layout

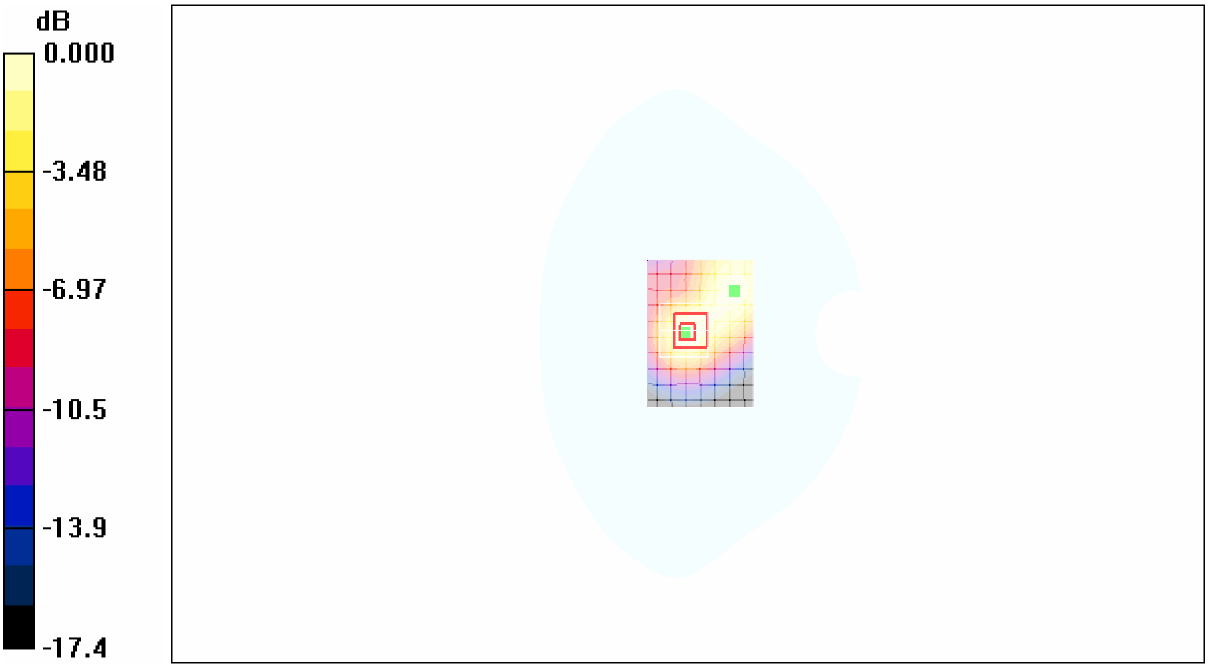
Picture B2 Liquid depth in the Flat Phantom (PCS1900MHz)

ANNEX C: GRAPH RESULTS

1900 GPRS Test Position 1 with IBM Laptop
Electronics: DAE3 Sn536
Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Test Position 1/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.748 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.7 V/m; Power Drift = -0.200 dB
Peak SAR (extrapolated) = 1.19 W/kg
SAR(1 g) = 0.651 mW/g; SAR(10 g) = 0.360 mW/g
Maximum value of SAR (measured) = 0.703 mW/g



0 dB = 0.703mW/g

Fig. 1 PCS 1900-GPRS CH661 Test Position 1

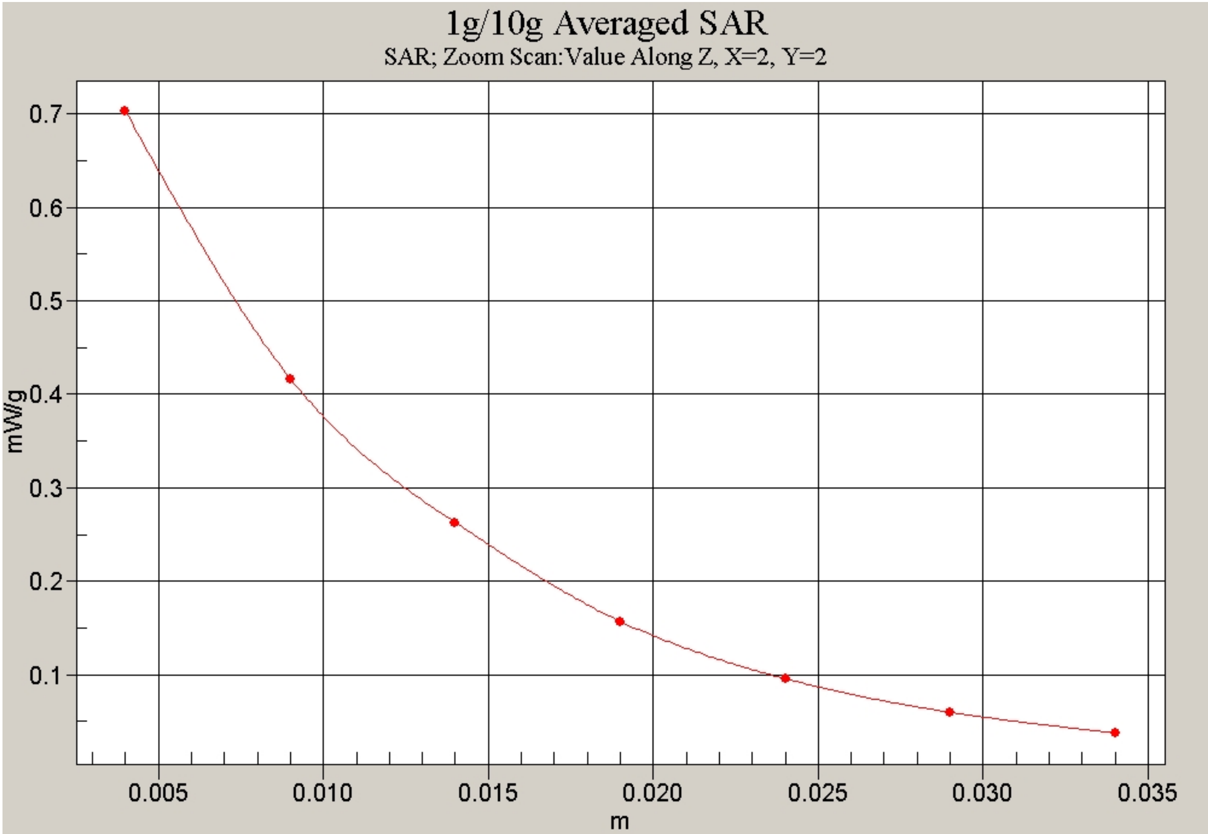


Fig.2 Z-Scan at power reference point (PCS 1900-GPRS CH661 Test Position 1)

1900 GPRS Test Position 2 with IBM Laptop

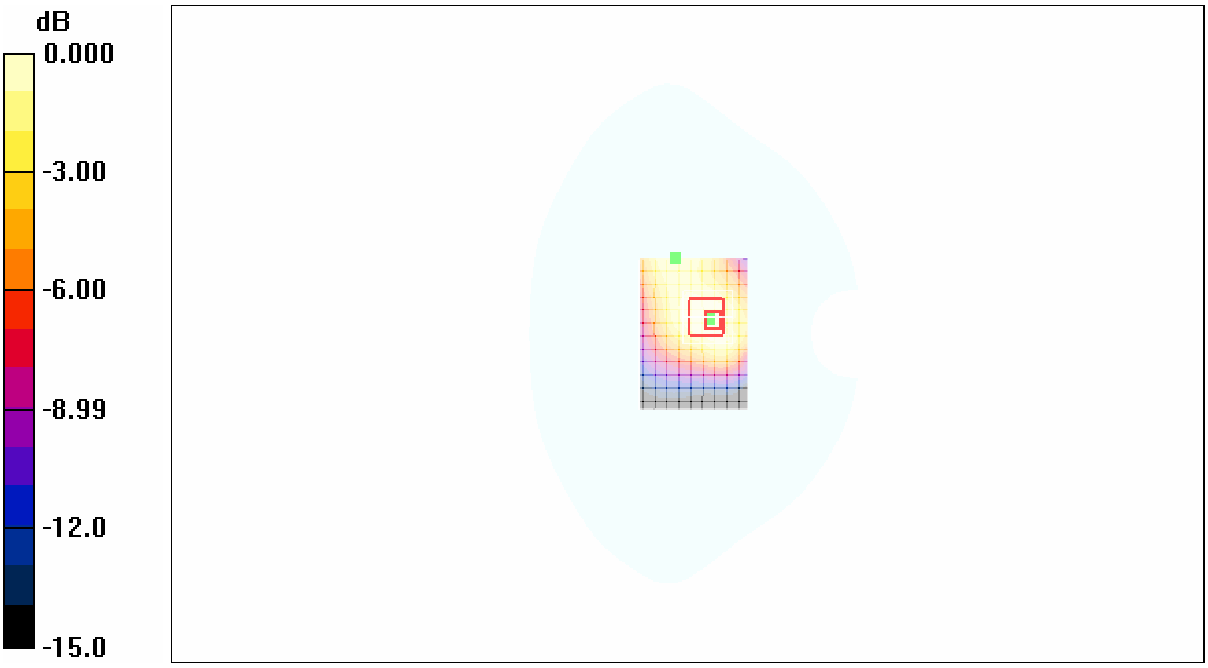
Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Test Position 2/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.691 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.7 V/m; Power Drift = -0.001 dB
Peak SAR (extrapolated) = 1.07 W/kg
SAR(1 g) = 0.629 mW/g; SAR(10 g) = 0.390 mW/g
Maximum value of SAR (measured) = 0.668 mW/g



0 dB = 0.668mW/g

Fig.3 PCS 1900-GPRS CH661 Test Position 2

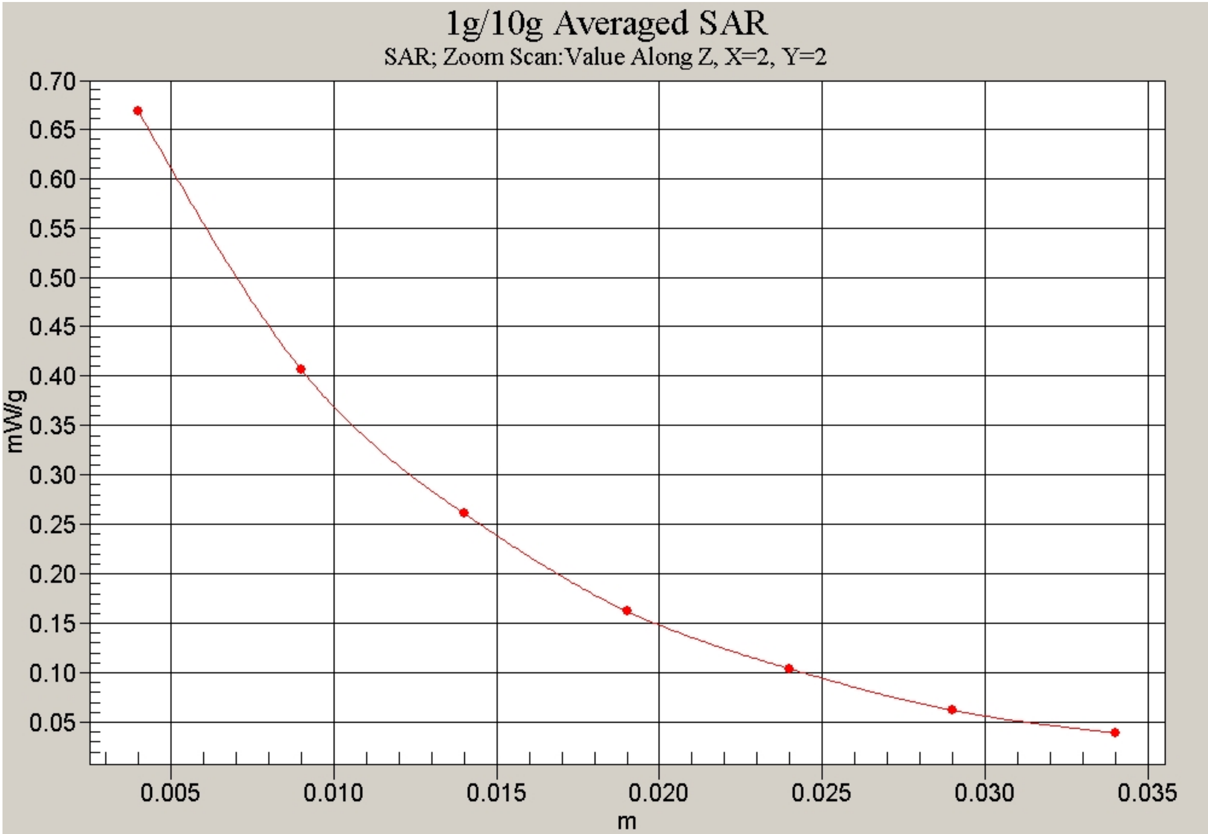


Fig.4 Z-Scan at power reference point (PCS 1900-GPRS CH661 Test Position 2)

1900 GPRS Test Position 3 with IBM Laptop

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Test Position 3/Area Scan (81x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.333 mW/g

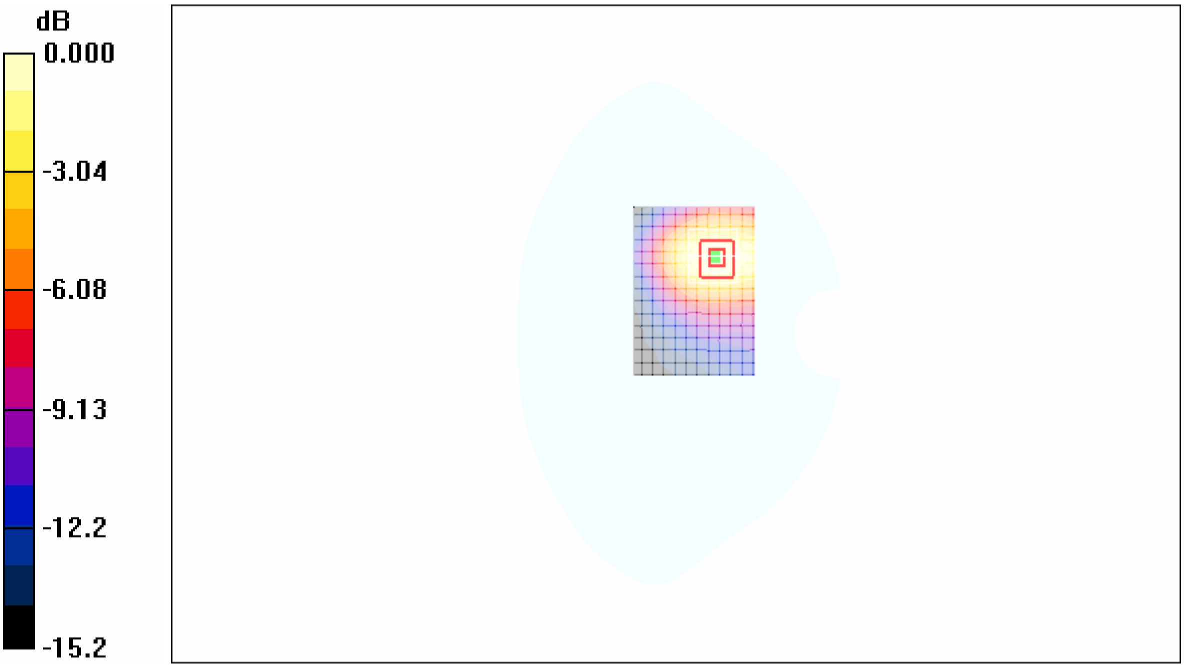
Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.88 V/m; Power Drift = 0.033 dB

Peak SAR (extrapolated) = 0.496 W/kg

SAR(1 g) = 0.303 mW/g; SAR(10 g) = 0.185 mW/g

Maximum value of SAR (measured) = 0.324 mW/g



0 dB = 0.324mW/g

Fig. 5 PCS 1900-GPRS CH661 Test Position 3

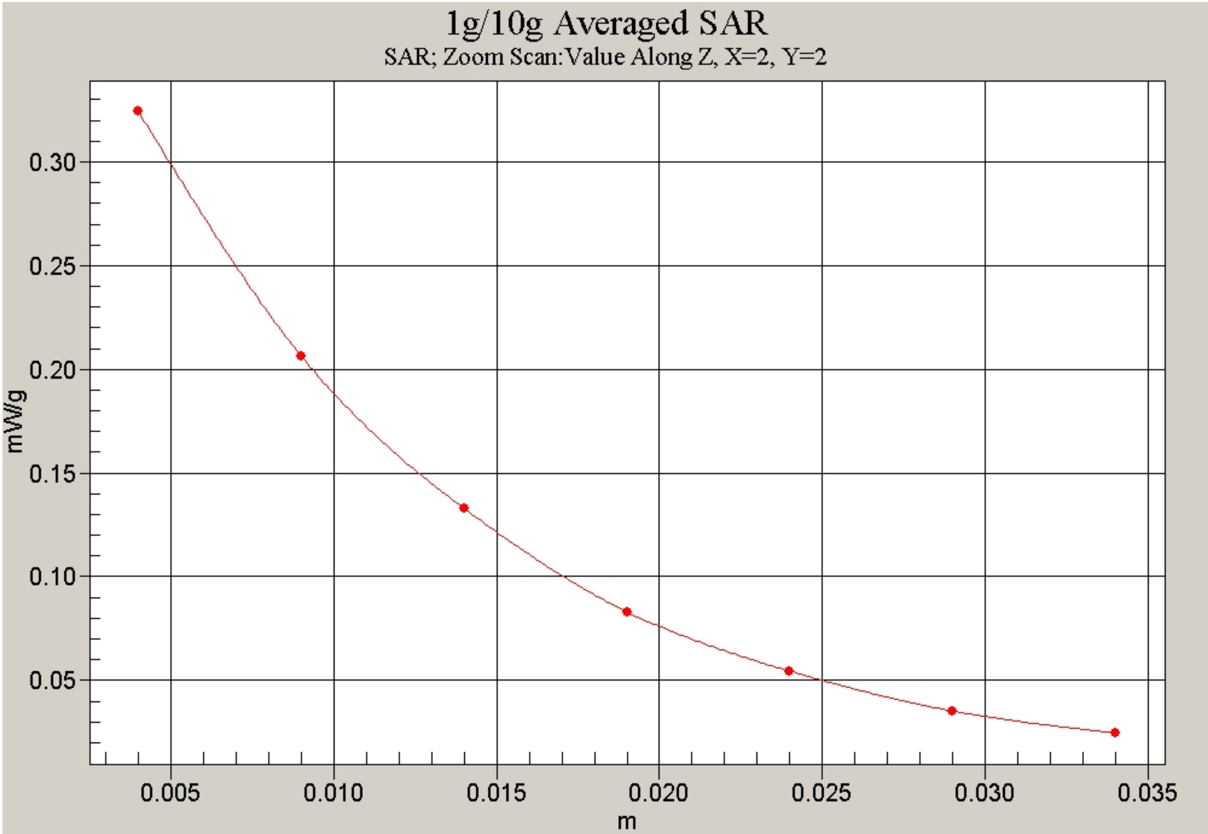


Fig.6 Z-Scan at power reference point (PCS 1900-GPRS CH661 Test Position 3)

1900 GPRS Test Position 4 with IBM Laptop

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Test Position 4/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.553 mW/g

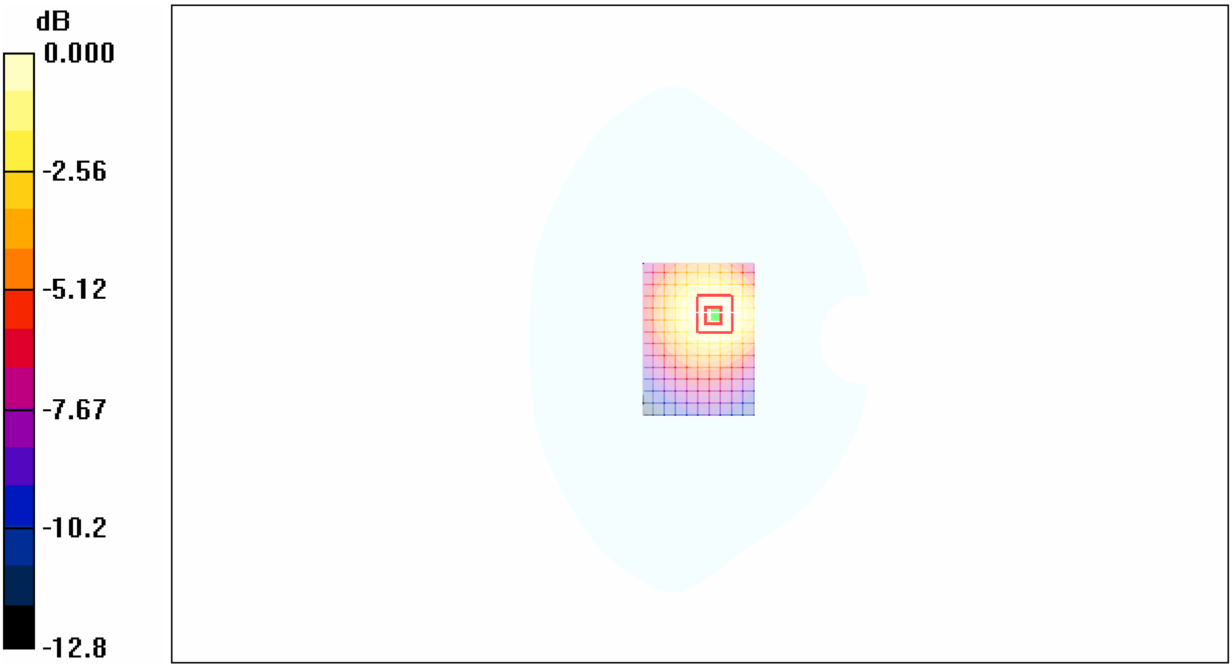
Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.7 V/m; Power Drift = -0.072 dB

Peak SAR (extrapolated) = 0.789 W/kg

SAR(1 g) = 0.498 mW/g; SAR(10 g) = 0.316 mW/g

Maximum value of SAR (measured) = 0.527 mW/g



0 dB = 0.527mW/g

Fig. 7 PCS 1900-GPRS CH661 Test Position 4

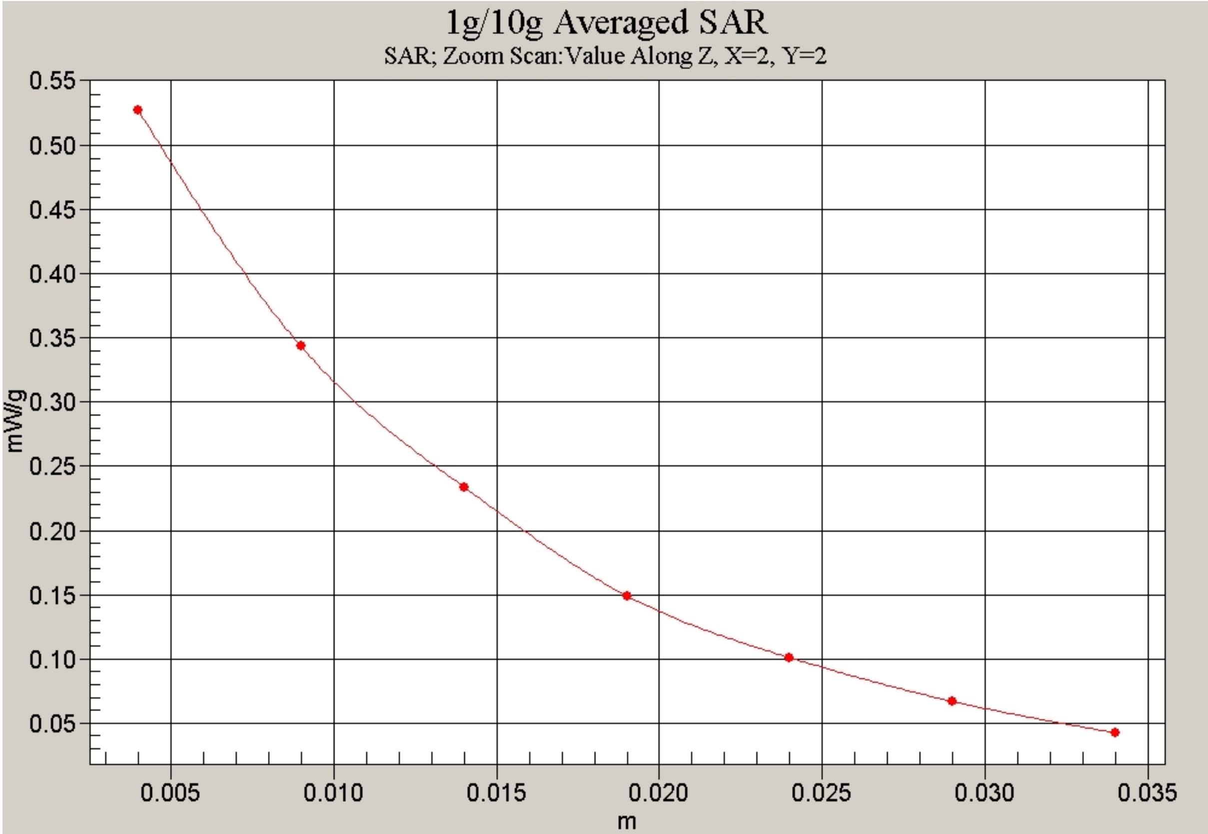
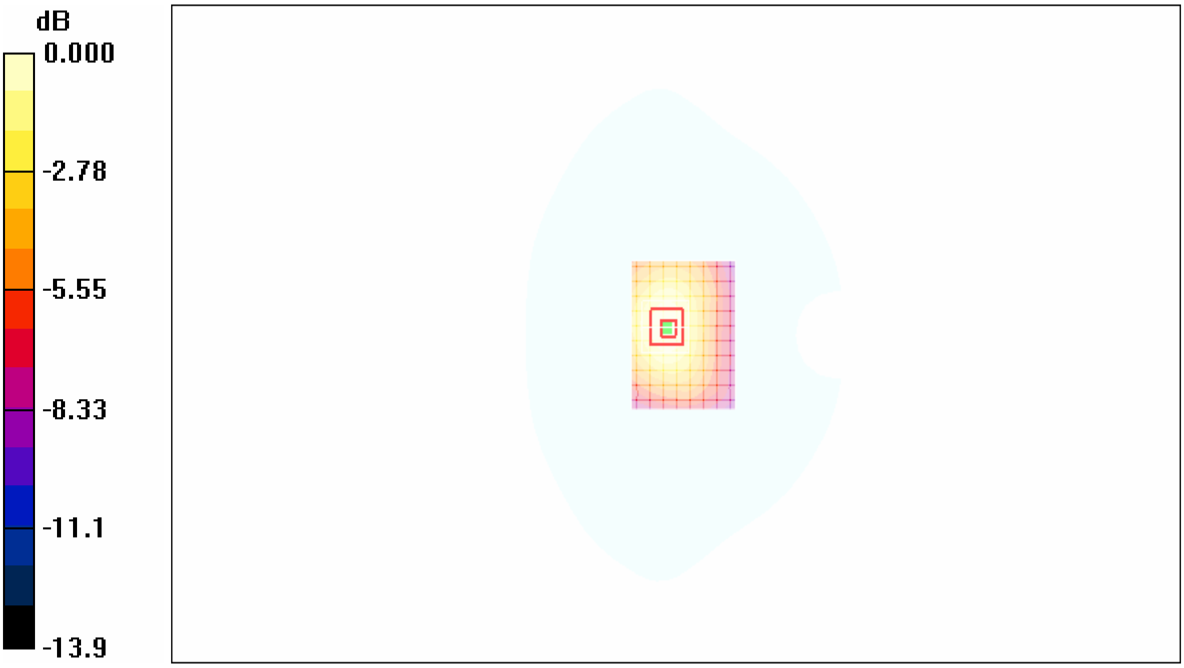


Fig.8 Z-Scan at power reference point (PCS 1900-GPRS CH661 Test Position 4)

1900 GPRS Test Position 5 with IBM Laptop
Electronics: DAE3 Sn536
Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Test Position 5/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.192 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.4 V/m; Power Drift = 0.193 dB
Peak SAR (extrapolated) = 0.303 W/kg
SAR(1 g) = 0.182 mW/g; SAR(10 g) = 0.115 mW/g
Maximum value of SAR (measured) = 0.194 mW/g



0 dB = 0.194mW/g

Fig.9 PCS 1900-GPRS CH661 Test Position 5

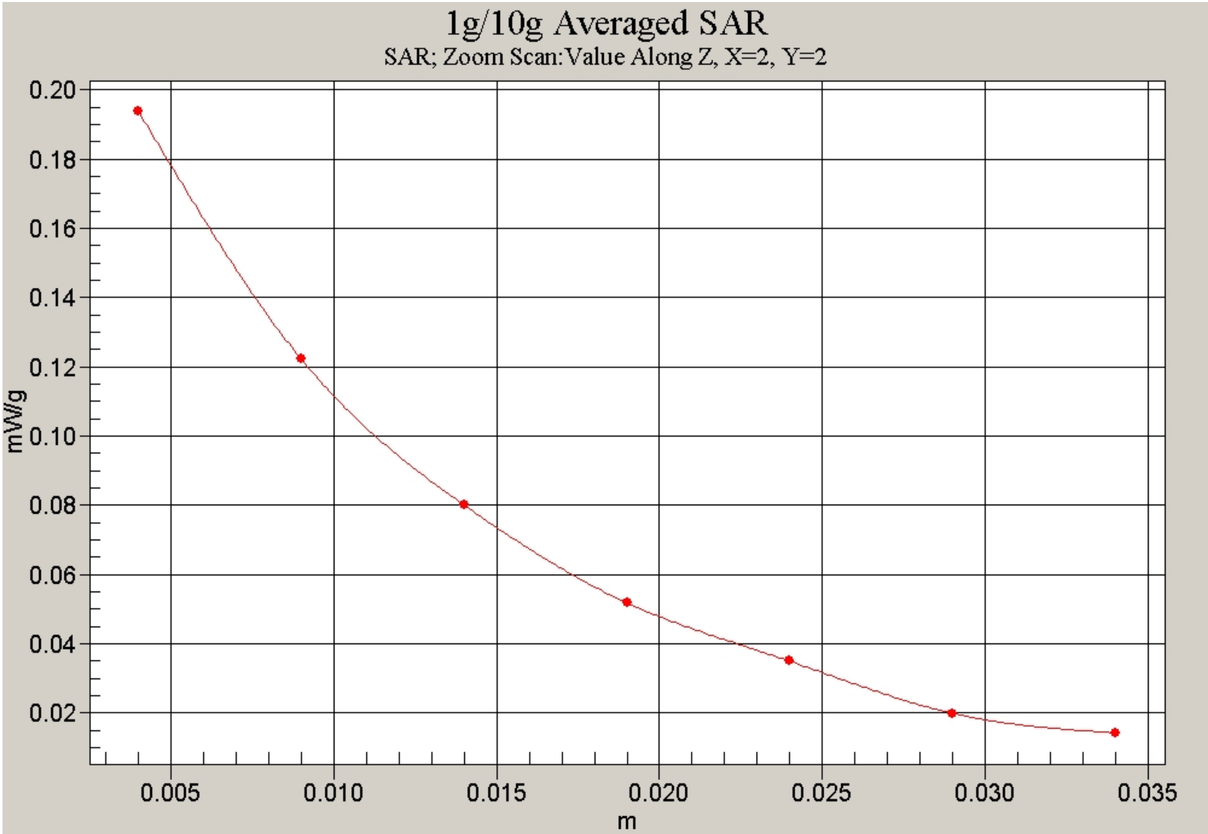


Fig.10 Z-Scan at power reference point (PCS 1900-GPRS CH661 Test Position 5)

1900 EGPRS Test Position 1 with IBM Laptop

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Test Position 1/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.328 mW/g

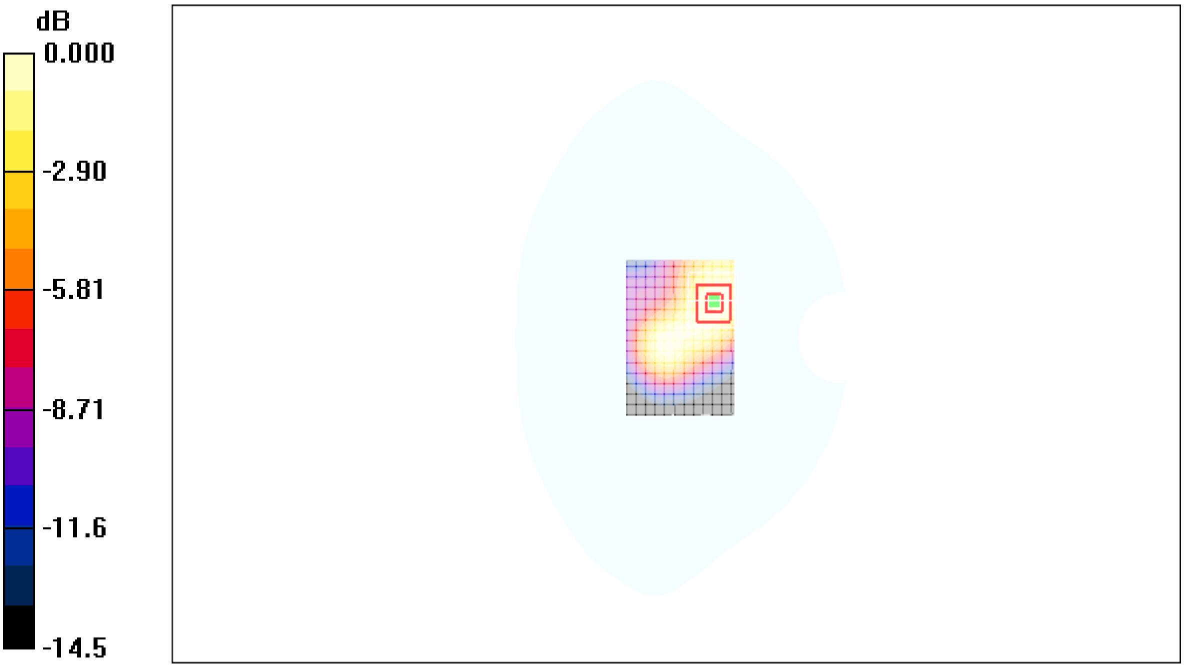
Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.1 V/m; Power Drift = -0.118 dB

Peak SAR (extrapolated) = 0.462 W/kg

SAR(1 g) = 0.306 mW/g; SAR(10 g) = 0.195 mW/g

Maximum value of SAR (measured) = 0.328 mW/g



0 dB = 0.328mW/g

Fig. 11 PCS 1900-EGPRS CH661 Test Position 1

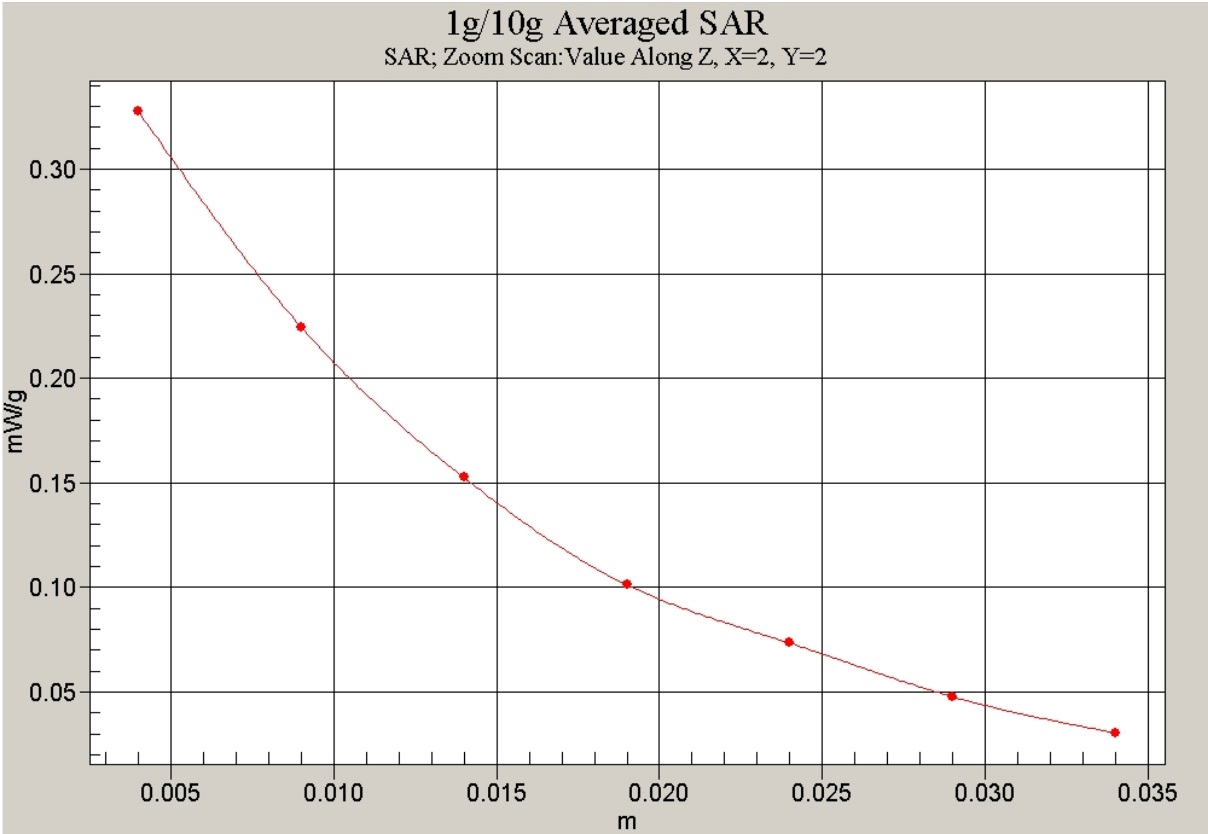
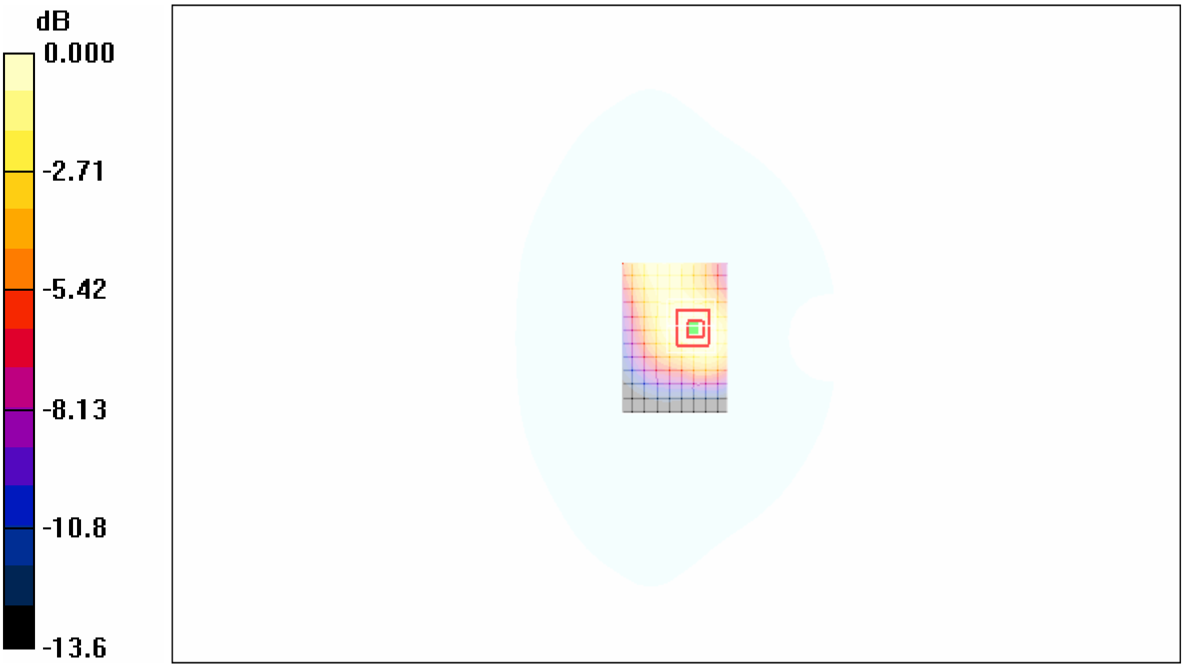


Fig.12 Z-Scan at power reference point (PCS 1900-EGPRS CH661 Test Position 1)

1900 EGPRS Test Position 2 with IBM Laptop
Electronics: DAE3 Sn536
Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4
Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Test Position 2/Area Scan (71x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.287 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.7 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 0.454 W/kg
SAR(1 g) = 0.267 mW/g; SAR(10 g) = 0.165 mW/g
Maximum value of SAR (measured) = 0.285 mW/g



0 dB = 0.285mW/g

Fig.13 PCS 1900-EGPRS CH661 Test Position 2

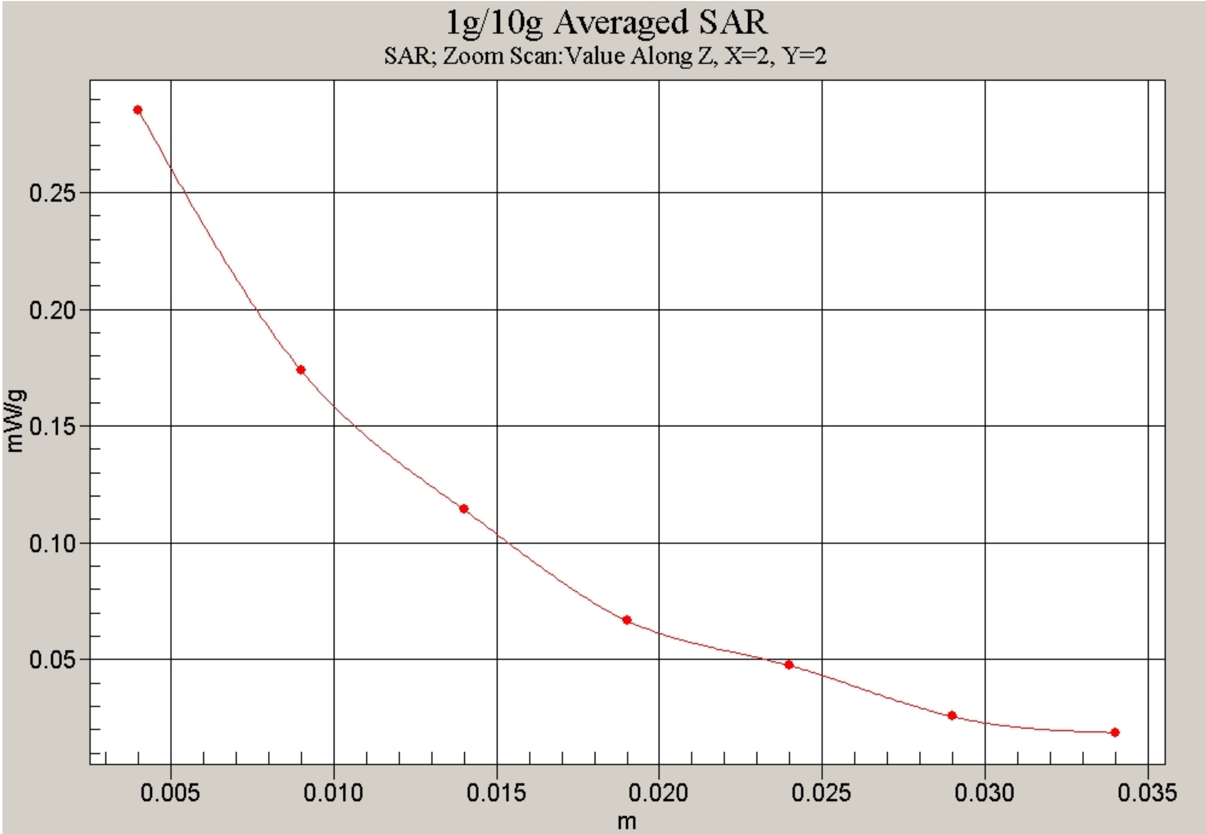


Fig.14 Z-Scan at power reference point (PCS 1900-EGPRS CH661 Test Position 2)

1900 EGPRS Test Position 3 with IBM Laptop

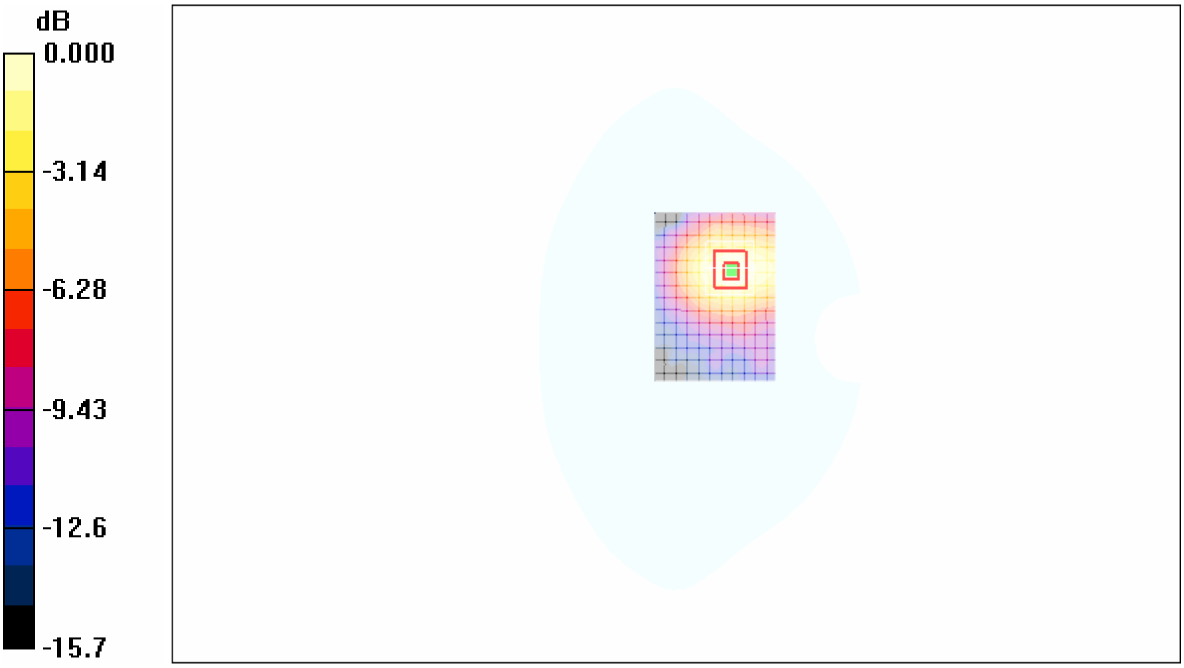
Electronics: DAE3 Sn536

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ET3DV6 - SN1736 ConvF(4.88, 4.88, 4.88)

Test Position 3/Area Scan (81x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.159 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.99 V/m; Power Drift = 0.200 dB
Peak SAR (extrapolated) = 0.240 W/kg
SAR(1 g) = 0.148 mW/g; SAR(10 g) = 0.091 mW/g
Maximum value of SAR (measured) = 0.158 mW/g



0 dB = 0.158mW/g

Fig.15 PCS 1900-EGPRS CH661 Test Position 3