Report No.:SZ13040169S01

SAR TEST REPORT

Issued to

TCT Mobile Limited

For

HSPA+ USB DONGEL

Model Name	:	One Touch X600A
Trade Name	:	Alcatel
Brand Name	:	Alcatel
FCC ID	:	RAD387
Standard	:	FCC Oet65 Supplement C Jun.2001 47CFR 2.1093 ANSI C95.1-1999 IEEE 1528-2003
MAX SAR	:	Body: 0.785 W/kg
Test date	:	2013-5-10&2013-6-5
Issue date	:	2013-6-6

by

Shenzhen MORLAB Communication Technology Co., Ltd.

Tested by Zhu Zhan	*Approved by* Zeng Dexin	*Review by* Samuel Peng
Zhu Zhan	Zeng Dexin	Samuel Peng
(Test Engineer)	*(Department Manager)*	(SAR *Manager*)
Date 2013.6.6	*Date* 2013.6.6	*Date* 2013.6.6

CTIA Authorized Test Lab LAB CODE 20081223-00 IEEE 1725 OTA OFTA 電訊管理局 ilac-MRA TAF Testing Laboratory GCF Official Observer of Global Certification Forum Bluetooth BQTF FCC Reg. No. 695796

DIRECTORY

Change History		
Issue	Date	Reason for change
1.0	May 23, 2013	First edition
2.0	Jun. 6, 2013	Add SAR evaluation for dongle tip.

1. Testing Laboratory

1.1. Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China 51810
Responsible Test Lab Manager:	Mr. Shu Luan
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

1.2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China 51810

1.3. Accreditation Certificate

Accredited Testing Laboratory:	No. CNAS L3572

1.4. List of Test Equipments

No.	Instrument	Type	Cal. Date	Cal. Due
1	PC	Dell (Pentium IV 2.4GHz, SN:X10-23533)	(n.a)	(n.a)
2	Network Emulator	Rohde&Schwarz (CMU200, SN:105894)	2012-9-26	1year
3	Voltmeter	Keithley (2000, SN:1000572)	2012-9-24	1year
4	Signal Generator	Rohde&Schwarz (SMP_02)	2012-9-24	1year
5	Amplifier	PRANA (Ap32 SV125AZ)	2012-9-24	1year
6	Power Meter	Rohde&Schwarz (NRVD, SN:101066)	2012-9-24	1year
7	Directional coupler	Giga-tronics(SN:1829112)	2012-9-24	1year
8	Probe	Satimo (SN:SN_3708_EP80)	2012-10-4	1year
9	Dielectric Probe Kit	Agilent (85033E)	2012-9-24	1year
10	Phantom	Satimo (SN:SN_36_08_SAM62)	2012-9-24	1year
11	Liquid	Satimo (Last Calibration: 2013-5-10)	N/A	N.A
12	Dipole 835MHz	Satimo (SN 36/08 DIPC 99)	2012-10-5	1year
13	Dipole 1900MHz	Satimo (SN 36/08 DIPF 102)	2012-10-5	1year

2. Technical Information

Note: the following data is based on the information by the applicant.

2.1. Identification of Applicant

Company Name:	TCT Mobile Limited
Address:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203

2.2. Identification of Manufacturer

Company Name:	TCL COMMUNICATION TECHNOLOGY HOLDINGS LIMITED
Address:	70 Huifeng 4rd, ZhongKai Hi-tech Development District, Huizhou, Guangdong 516006 P.R.China

2.3. Equipment Under Test (EUT)

Model Name:	One Touch X600A
Trade Name:	Alcatel
Brand Name:	Alcatel
Hardware Version:	V2.0
Software Version:	S1_B15001S_1110000_B10001S
Frequency Bands:	GSM 850MHz / PCS 1900MHz; WCMDA 850MHz/1900MHz;
Modulation Mode:	GSM/GPRS : GMSK; EDGE : GMSK/8PSK WCDMA/HSDPA/HSUPA/HSPA+: QPSK
Multislot Class	GPRS: Multislot Class 12; EDGE: Multislot Class 12
GPRS operation mode:	Class B
3GPP release:	Rel-7
Antenna type:	Fixed Internal Antenna
Development Stage:	Identical prototype

2.3.1. Photographs of the EUT

Please see for photographs of the EUT.

2.3.2. Identification of all used EUTs

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

EUT Identity	Hardware Version	Software Version
1#	V2.0	S1_B15001S_1110000_B10001S

2.4. Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	**47 CFR § 2. 1093**	Radiofrequency Radiation Exposure Evaluation: Portable Devices
2	**FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01)**	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
3	**ANSI C95.1-1999**	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 GHz
4	**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.
5	**KDB 447498 D1**	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies v04
6	**KDB 447498 D2**	SAR Procedures for Dongle Xmtr v02
7	**KDB 450824 D1**	SAR Probe Calibration and System Verification Considerations for Measurements at 150MHz-3GHz
8	**KDB 450824 D2**	Dipole SAR Validation Verification v01r01
9	**KDB 941225 D1**	SAR Measurement Procedures for 3G Devices

2.5. Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

2.6. Test Environment/Conditions

Normal Temperature (NT):	20 ... 25 °C
Relative Humidity:	30 ... 75 %
Air Pressure:	980 ... 1020 hPa
Test frequency:	GSM 850MHz , PCS 1900MHz
	WCDMA 850/1900MHz
Operation mode:	Call established
Power Level:	GSM 850 MHz Maximum output power(level 5)
	PCS 1900 MHz Maximum output power(level 0)
	WCDMA850/1900MHz Maximum output power(All up bits)

During SAR test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition. 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 128, 190 and 251 respectively in the case of GSM 850 MHz, or to 512, 661 and 810 respectively in the case of PCS 1900 MHz, or to 9262, 9400 and 9538 respectively in the case of WCDMA 19000, or to 4132, 4175 and 4233 respectively in the case of WCDMA 850. 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 35 dB.

3. Specific Absorption Rate (SAR)

3.1. Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

3.2. SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density. ρ). The equation description is as below:

$$SAR = \frac{d}{dt}\left(\frac{dW}{dm}\right) = \frac{d}{dt}\left(\frac{dW}{\rho dv}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be either related to the temperature elevation in tissue by

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

, where C is the specific head capacity, δ T is the temperature rise and δ t the exposure duration, or related to the electrical field in the tissue by

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

, where σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the rms electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

4. SAR Measurement Setup

4.1. The Measurement System

Comosar is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The Comosar system consists of the following items:

- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

The following figure shows the system.

The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The OpenSAR software computes the results to give a SAR value in a 1g or 10g mass.

4.2. Probe

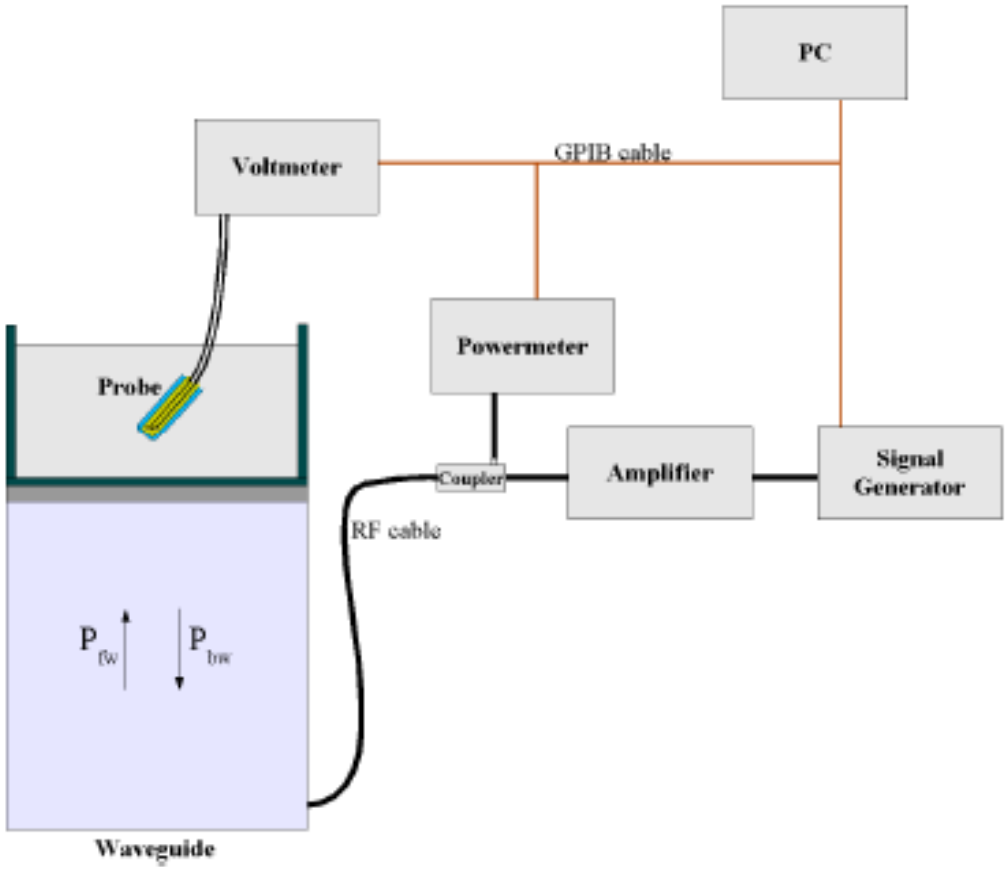
For the measurements the Specific Dosimetric E-Field Probe SN 37/08 EP80 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter : 6.5 mm
- Distance between probe tip and sensor center: 2.5mm
- Distance between sensor center and the inner phantom surface: 4 mm
  (repeatability better than +/- 1mm)

- Probe linearity: ＜0.25 dB
- Axial Isotropy: ＜0.25 dB
- Spherical Isotropy: ＜0.25 dB
- Calibration range: 835to 2500MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and suface normal line:1ess than 30°

Probe calibration is realized, in compliance with CENELEC EN 62209 and IEEE 1528 std, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 622091 annexe technique using reference guide at the five frequencies.



$$SAR = \frac{4\,(P_{fw} - P_{bw})}{ab\delta}\cos^2\left(\pi\frac{y}{a}\right)e^{-(2z/\delta)}$$

Where :
Pfw = Forward Power
Pbw = Backward Power
a and b = Waveguide dimensions
ı = Skin depth
Keithley configuration:

Rate = Medium; Filter =ON; RDGS=10; FILTER TYPE =MOVING AVERAGE; RANGE AUTO
After each calibration, a SAR measurement is performed on a validation dipole and compared with a NPL calibrated probe, to verify it.

The calibration factors, CF(N), for the 3 sensors corresponding to dipole 1, dipole 2 and dipole 3 are:

CF(N)=SAR(N)/Vlin(N) (N=1,2,3)

The linearised output voltage Vlin(N) is obtained from the displayed output voltage V(N) using

Vlin(N)=V(N)*(1+V(N)/DCP(N)) (N=1,2,3)

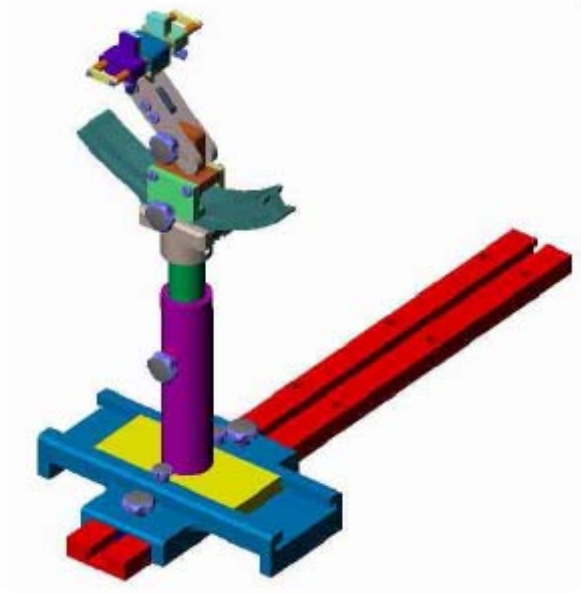
where DCP is the diode compression point in mV.

4.3. Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

4.4. Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1°.



Device holder

System Material	Permittivity	Loss Tangent
Delrin	3.7	0.005

5. Tissue Simulating Liquids

Simulant liquids that are used for testing at frequencies of 850MHz and 1900MHz, which are made mainly of sugar, salt and water solutions may be left in the phantoms. Approximately 20litres are needed for an upright head compared to about 25 litres for a horizontal bath phantom. The liquid height from the flat phantom to the liquid top surface (body SAR) is 15cm.

Gives the recipes for one liter of head and body tissue simulating liquid for frequency band 835 MHz and 1900 MHz.

Ingredients (% by weight)	Frequency Band 835MHz	Frequency Band 1900MHz
Tissue Type	Body	Body
Water	52.4	40.4
Salt(NaCl)	1.4	0.5
Sugar	45.0	58.0
HEC	1.0	1.0
Bactericide	0.1	0.1
Triton	0.0	0.0
DGBE	0.0	0.0
Acticide SPX	0.0	0.0
Dielectric Constant	56.1	54.0
Conductivity (S/m)	0.95	1.45

Recipes for Tissue Simulating Liquid

Table 1: Dielectric Performance of Body Tissue Simulating Liquid

Temperature: 22.0~23.8°C, humidity: 54~60%.			
Frequency	**Description**	**Permittivity ε**	**Conductivity σ (S/m)**
835 MHz	**Reference result per OET65**	55.2	0.97
	±5% window	52.44 to 57.96	0.9215 to 1.0185
	Reference result per probe calibration	56.1	0.95
	±5% window	53.295 to 58.905	0.905 to 0.998
	Validation value (May 10)	54.512903	0.9601032
1900 MHz	**Reference result per OET65**	53.3	1.52
	±5% window	50.635 to 55.965	1.444 to 1.596
	Reference result per probe calibration	54	1.45
	±5% window	51.3 to 56.7	1.378 to 1.523
	Validation value (May 10)	52.352141	1.486027

Note:1.The dielectric parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85033E Dielectric Probe Kit and an Agilent Network Analyzer.

2.For body-worn measurements, the device was tested against flat phantom representing the user body. Under measurement phone was put on in the phone holder.

3.Per KDB 450824 D01, tissue used during test are within 5% tolerances of probe calibration report, and also within 5% of the target dielectric parameters for OET65.
"when the actual tissue dielectric parameters are recorded for the probe calibration, the differences for ε and σ between probe calibration and routine measurements should each be ≤ 5% while satisfying the required ±5% tolerances in target dielectric parameters. "(KDB 450824 D01)

6. Uncertainty Assessment

The following table includes the uncertainty table of the IEEE 1528. The values are determined by Antennessa.

6.1. UNCERTAINTY EVALUATION FOR EUT SAR TEST

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	V i
Measurement System									
Probe calibration	E.2.1	7.0	N	1	1	1	7.00	7.00	
Axial Isotropy	E.2.2	2.5	R	√3	0.7	0.7	1.01	1.01	
Hemispherical Isotropy	E.2.2	4.0	R	√3	0.7	0.7	1.62	1.62	
Boundary effect	E.2.3	1.0	R	√3	1	1	0.58	0.58	
Linearity	E.2.4	5.0	R	√3	1	1	2.89	2.89	
System detection limits	E.2.5	1.0	R	√3	1	1	0.58	0.58	
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.02	
Reponse Time	E.2.7	3.0	R	√3	1	1	1.73	1.73	
Integration Time	E.2.8	2.0	R	√3	1	1	1.15	1.15	
RF ambient Conditions	E.6.1	3.0	R	√3	1	1	1.73	1.73	
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	√3	1	1	1.15	1.15	
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	√3	1	1	0.03	0.03	
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5.2	5.0	R	√3	1	1	2.89	2.89	
Test sample Related									
Test sample positioning	E.4.2.1	0.03	N	1	1	1	0.03	0.03	N - 1
Device Holder Uncertainty	E.4.1.1	5.00	N	1	1	1	5.00	5.00	
Output power Power drift - SAR drift measurement	6.6.2	2.74	R	√3	1	1	1.58	1.58	
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	√3	1	1	0.03	0.03	
Liquid conductivity - deviation from target value	E.3.2	4.57	R	√3	0.64	0.43	1.69	1.13	

Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	1	0.64	0.43	3.20	2.15	M
Liquid permittivity - deviation from target value	E.3.2	3.69	R	√3	0.6	0.49	1.28	1.04	
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N	1	0.6	0.49	6.00	4.90	M
Combined Standard Uncertainty			RSS				12.52	11.71	
Expanded Uncertainty (95% Confidence interval)			k				25.05	23.42	

6.2. UNCERTAINTY FOR SYSTEM PERFORMANCE CHECK

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	V i
Measurement System									
Probe calibration	E.2.1	7.0	N	1	1	1	7.00	7.00	
Axial Isotropy	E.2.2	2.5	R	√3	0.7	0.7	1.01	1.01	
Hemispherical Isotropy	E.2.2	4.0	R	√3	0.7	0.7	1.62	1.62	
Boundary effect	E.2.3	1.0	R	√3	1	1	0.58	0.58	
Linearity	E.2.4	5.0	R	√3	1	1	2.89	2.89	
System detection limits	E.2.5	1.0	R	√3	1	1	0.58	0.58	
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.02	
Reponse Time	E.2.7	3.0	R	√3	1	1	1.73	1.73	
Integration Time	E.2.8	2.0	R	√3	1	1	1.15	1.15	
RF ambient Conditions	E.6.1	3.0	R	√3	1	1	1.73	1.73	
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	√3	1	1	1.15	1.15	
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	√3	1	1	0.03	0.03	
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5.2	5.0	R	√3	1	1	2.89	2.89	
Dipole									
Dipole axis to liquid Distance	8,E.4.2	1.00	N	√3	1	1	0.58	0.58	N - 1
Input power and SAR drift measurement	8,6.6.2	2.74	R	√3	1	1	1.58	1.58	

Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	
Liquid conductivity - deviation from target value	E.3.2	4.57	R	$\sqrt{3}$	0.64	0.43	1.69	1.13	
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	1	0.64	0.43	3.20	2.15	M
Liquid permittivity - deviation from target value	E.3.2	3.69	R	$\sqrt{3}$	0.6	0.49	1.28	1.04	
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N	1	0.6	0.49	6.00	4.90	M
Combined Standard Uncertainty			RSS				11.50	10.61	
Expanded Uncertainty (95% Confidence interval)			k				23.00	21.21	

7. SAR Measurement Evaluation

7.1. System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave which comes from a signal generator at frequency 835 MHz and 1900 MHz. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom.

Equipments :

name	Type and specification
Signal generator	Rohde&Schwarz (SMP_02)
Directional coupler	Giga-tronics(SN:1829112)
Amplifier	PRANA (Ap32 SV125AZ)
Reference dipole	835MHz:SN 36/08 DIPC 99 1900MHz:SN 36/08 DIPF 102

7.2. Validation Results

Comparing to the original SAR value provided by SATIMO, the validation data should be within its specification of 10 %.

System Performance check on May 10

Frequency	835MHz(Body)	1900MHz(Body)
Target value（1g）	9.880 W/Kg	38.530 W/Kg
250 mW input power	2.368 W/Kg	9.736 W/Kg
Test value（1g）	9.472 W/Kg	38.944 W/Kg

System Performance check on Jun.5

Frequency	835MHz(Body)	1900MHz(Body)
Target value（1g）	9.880 W/Kg	38.530 W/Kg
250 mW input power	2.380 W/Kg	9.340 W/Kg
Test value（1g）	9.520 W/Kg	37.360 W/Kg

Note: System checks the specific test data please see page 76-83.

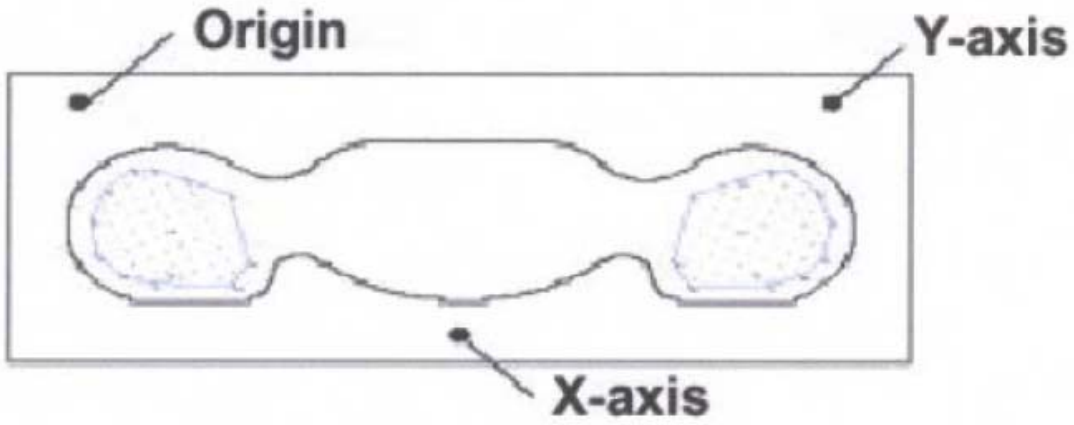
8. Operational Conditions During Test

8.1. Body-worn Configurations

The body-worn configurations shall be tested with the supplied accessories (belt-clips, holsters, etc.) attached to the device in normal use configuration.

The depth of the body tissue was 15.1cm. The distance between the back of the device and the bottom of the flat phantom is 5mm(taking into account of the IEEE 1528 and the place of the antenna)

For body-worn and other configurations a flat phantom shall be used which is comprised of material with electrical properties similar to the corresponding tissues.



SAR Measurement Points in Area Scan

8.2. Measurement procedure

The following steps are used for each test position

- Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface
- Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to16 mm and a constant distance to the inner surface of the phantom. Since the sensors can not directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
- Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8*4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

- Isotropic E-Field Probe for Dosimetric Measurerments

Construction	The E-Field Probe detection probes are composed of three orthogonal dipoles linked to special Schottky diodes with low detection thresholds. The E-Field Probe allow the measurement of electric fields in liquids.
Calibration	In human tissue simulationg liquid at 835MHz and 1880MHz (accuracy ±5%; k=1) Calibration for other liquids and frequency upon request
Frequency	30MHz to 6GHz; Linearity: ± 0.25dB
Dynamic range	0.001-100W/Kg
Dimensions	Overall Length: 330mm; Tip diameter: 5mm; Distance between diobe and probe tip < 2.7mm
Application	General dosimetry up to 6GHz Compliance tests of mobile phones, or other portable devices

8.3. Description of interpolation/extrapolation scheme

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimize measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10 grams and 1 gram requires a very fine resolution in the three dimensional scanned data array.

9. 3G MEASUREMENT PROCEDURES

9.1. Procedures Used To Establish Test Signal

The handset was placed into a simulated call using a base station simulator in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR. SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, this was configured with the base station simulator. The SAR measurement software calculates a reference point at the start and end of the test to check for power drifts. If conducted power deviations of more then 5% occurred, the tests were repeated.

9.2. SAR Measurement Conditions for WCDMA

These procedures were followed according to FCC KDB 941225, October, 2007.

9.3. Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC(transmit power control) set to all “1s”. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes) should be tabulated in the test report. All configurations that are not supported by the EUT or cannot be measured due to technical or equipment limitations should be clearly identified.

9.4. Test Procedure

When Maximum SAR for 12.2kbps RMC ≤ 75% of the SAR limit (i.e. 1.2W/Kg 1g) and maximum average output of each RF channel with HSUPA/HSDPA active is less than 1/4 dB higher than that measured without HSUPA/HSDPA using 12.2kbps RMC, according to KDB 941225D01v02, SAR is not required for this handset with HSPA capabilities.

10. Measurement Of Conducted Peak output power

1. WCDMA mode conducted output power values

Item	band	WCDMA 850			WCDMA 1900		
	ARFCN	4132	4175	4233	9262	9400	9538
	subtest	dBm			dBm		
5.2(WCDMA)	non	22.65	22.56	22.45	23.59	23.57	23.46
HSDPA	1	22.48	22.49	22.39	23.53	23.34	23.37
	2	22.47	22.47	22.35	23.52	23.33	23.33
	3	21.97	21.93	21.85	23.07	22.89	22.85
	4	21.93	21.91	21.83	23.05	22.82	22.87
HSUPA	1	22.46	22.48	22.37	23.51	23.32	23.35
	2	20.43	20.45	20.31	21.51	21.37	21.45
	3	21.48	21.49	21.34	22.53	22.31	22.41
	4	20.44	20.47	20.36	21.49	21.35	21.47
	5	22.45	22.46	22.34	23.49	23.29	23.31
HSPA+	1	22.45	22.46	22.35	23.47	23.29	23.31
Note:	The Conducted RF Output Power test of WCDMA /HSDPA /HSUPA was tested by power meter.						

2. GPRS Mode Conducted peak output power

Band	Channel	Frequency (MHz)	Output Power(dBm)			
			Slot 1	Slot 2	Slot 3	Slot 4
GSM 850	128	824.2	32.69	28.93	28.25	27.53
	190	836.6	33.21	29.49	28.20	27.45
	251	848.8	33.54	29.82	28.64	27.77
PCS 1900	512	1850.2	28.98	26.40	24.33	23.40
	661	1880.0	29.38	26.79	24.75	23.80
	810	1909.8	28.89	26.33	24.32	23.41

GPRS Time-based Average Power

Band	Channel	Frequency (MHz)	Output Power(dBm)			
			Slot 1	Slot 2	Slot 3	Slot 4
GSM 850	128	824.2	23.69	22.91	23.99	24.52
	190	836.6	24.21	23.47	23.94	24.44
	251	848.8	24.54	23.80	24.38	24.76
PCS 1900	512	1850.2	19.98	20.38	20.07	20.39
	661	1880.0	20.38	20.77	20.49	20.79
	810	1909.8	19.89	20.31	20.06	20.40

Timeslot consignations:

No. Of Slots	Slot 1	Slot 2	Slot 3	Slot 4
Slot Consignation	1Up4Down	2Up2Down	3Up2Down	4Up1Down
Duty Cycle	1:8	1:4	1:2.67	1:2
Correct Factor	-9.00dB	-6.02dB	-4.26dB	-3.01dB

3. EDGE Mode Conducted peak output power

Band	Channel	Frequency (MHz)	Output Power(dBm)			
			Slot 1	Slot 2	Slot 3	Slot 4
GSM 850	128	824.2	32.73	28.87	27.91	27.05
	190	836.6	33.25	29.43	28.46	27.58
	251	848.8	33.57	29.73	28.37	27.62
PCS 1900	512	1850.2	29.06	26.44	24.34	23.32
	661	1880.0	29.40	26.50	24.75	23.73
	810	1909.8	28.86	26.36	24.34	23.33

EDGE Time-based Average Power

Band	Channel	Frequency (MHz)	Output Power(dBm)			
			Slot 1	Slot 2	Slot 3	Slot 4
GSM 850	128	824.2	23.73	22.85	23.65	24.04
	190	836.6	24.25	23.41	24.20	24.57
	251	848.8	24.57	23.71	24.11	24.61
PCS 1900	512	1850.2	20.06	20.42	20.08	20.31
	661	1880.0	20.40	20.48	20.49	20.72
	810	1909.8	19.86	20.34	20.08	20.32

11. Test Results List

Summary of Measurement Results (GSM 850MHz Band)

Temperature: 21.0~23.8°C, humidity: 50~60%. Power Drift limit:-5%~+5% SAR Limit: 1.6W/Kg averaged over 1gram, Spatial Peak						
Phantom Configurations	Test Mode	Device Test Positions	Device Test channel	SAR (W/Kg)	Scaling Factor	Scaled SAR
Body (5mm Separation)	GPRS	Horizontal-Up	251	0.745	1.054	0.785
		Horizontal-Down	251	0.592	1.054	0.624
		Vertical-Front	251	0.395	1.054	0.416
		Vertical-Back	251	0.375	1.054	0.395
		Dongle-Tip	251	0.483	1.054	0.509
	EDGE	Horizontal-Up	251	0.662	1.091	0.722

Summary of Measurement Results (GSM 1900MHz Band)

Temperature: 21.0~23.8°C, humidity: 50~60%. Power Drift limit:-5%~+5% SAR Limit: 1.6W/Kg averaged over 1gram, Spatial Peak						
Phantom Configurations	Test Mode	Device Test Positions	Device Test channel	SAR (W/Kg)	Scaling Factor	Scaled SAR
Body (5mm Separation)	GPRS	Horizontal-Up	661	0.419	1.047	0.439
		Horizontal-Down	661	0.336	1.047	0.352
		Vertical-Front	661	0.119	1.047	0.125
		Vertical-Back	661	0.217	1.047	0.227
		Dongle-Tip	661	0.210	1.047	0.220
	EDGE	Horizontal-Up	661	0.548	1.064	0.583

GPRS&EDGE Test configuration

Band	Channel	Slots	Power level	Duty Cycle
GPRS850	High	4	5	1:2
EDGE850	High	4	5	1:2
GPRS1900	Middle	4	0	1:2
EDGE1900	Middle	4	0	1:2

Summary of Measurement Results (WCDMA Band V)

Temperature: 21.0~23.8°C, humidity: 50~60%. Power Drift limit:-5%~+5% SAR Limit: 1.6W/Kg averaged over 1gram, Spatial Peak						
Phantom Configurations	Test Mode	Device Test Positions	Device Test channel	SAR (W/Kg)	Scaling Factor	Scaled SAR
Body (5mm Separation)	12.2kbps RMC	Horizontal-Up	4132	0.662	1.084	0.718
		Horizontal-Down	4132	0.561	1.084	0.608
		Vertical-Front	4132	0.438	1.084	0.475
		Vertical-Back	4132	0.418	1.084	0.453
		Dongle-Tip	4132	0.317	1.084	0.344

Summary of Measurement Results (WCDMA Band II)

Temperature: 21.0~23.8°C, humidity: 50~60%. Power Drift limit:-5%~+5% SAR Limit: 1.6W/Kg averaged over 1gram, Spatial Peak						
Phantom Configurations	Test Mode	Device Test Positions	Device Test channel	SAR (W/Kg)	Scaling Factor	Scaled SAR
Body (5mm Separation)	12.2kbps RMC	Horizontal-Up	9262	0.683	1.099	0.751
		Horizontal-Down	9262	0.583	1.099	0.641
		Vertical-Front	9262	0.268	1.099	0.295
		Vertical-Back	9262	0.497	1.099	0.546
		Dongle-Tip	9262	0.373	1.099	0.410

Note:

1. Per KDB 447498, when the SAR procedures require multiple channels to be tested and the 1-g SAR for the highest output channel is less than 0.8 W/kg and peak SAR is less than 1.6W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

2. Maximum SAR for 12.2kbps RMC of WCDMA Band V& Band II ≤ 75% of the SAR limit (i.e. 1.2W/Kg 1g) and maximum average output of each RF channel with HSUPA/HSDPA active is less than 1/4 dB higher than that measured without HSUPA/HSDPA using 12.2kbps RMC, according to KDB 941225D01v02, SAR is not required for this handset with HSPA capabilities.

3. Per KDB 447498D02v02 ,If the antenna is within 1 cm from the tip of the dongle (the end without the USB connector), the tip of the dongle should also be tested at 5 mm perpendicular to the phantom.

4. Scaling Factor calculation

Band	Tune-up power tolerance (dBm)	SAR test channel Power (dBm)	Scaling Factor
GPRS 850	PCL = 5, PWR =27.5+-0.5(4 slots)	27.77	1.054
EDGE 850	PCL = 5, PWR =27.5+-0.5(4 slots)	27.62	1.091
GPRS 1900	PCL=0,PWR= 23.5+-0.5(4 slots)	23.80	1.047
EDGE 1900	PCL=0,PWR=23.5+-0.5(4 slots)	23.73	1.064
WCDMA 850	Max output power =22(+1/-2)	22.65	1.084
WCDMA 1900	Max output power =23(+1/-2)	23.59	1.099

5. This module supports 3GPP release R7 HSPA+ using QPSK only without 16QAM in the uplink.

Annex A Photographs of the EUT

1 EUT Horizontal-Up

2 EUT Horizontal-Down

3 EUT Vertical-Front

4 EUT Vertical-Back

5 EUT Dongle-Tip

6 Data line

Liquid Level Photo

Annex B Graph Test Results

BAND	PARAMETERS
GSM850	Measurement 1: Flat Plane with EUT on High Channel in GPRS mode **Horizontal-Up** Measurement 2: Flat Plane with EUT on High Channel in GPRS mode **Horizontal-Down** Measurement 3: Flat Plane with EUT on High Channel in GPRS mode **Vertical-Front** Measurement 4: Flat Plane with EUT on High Channel in GPRS mode **Vertical-Back** Measurement 5: Flat Plane with EUT on High Channel in GPRS mode **Dongle-Tip** Measurement 6: Flat Plane with EUT on High Channel in EDGE mode **Horizontal-Up**
GSM1900	Measurement 7: Flat Plane with EUT on Middle Channel in GPRS mode **Horizontal-Up** Measurement 8: Flat Plane with EUT on Middle Channel in GPRS mode **Horizontal-Down** Measurement 9: Flat Plane with EUT on Middle Channel in GPRS mode **Vertical-Front** Measurement 10: Flat Plane with EUT on Middle Channel in GPRS mode **Vertical-Back** Measurement 11: Flat Plane with EUT on High Channel in GPRS mode **Dongle-Tip** Measurement 12: Flat Plane with EUT on Middle Channel in EDGE mode **Horizontal-Up**
WCDMA 850	Measurement 13: Flat Plane with EUT on Low Channel in WCDMA mode **Horizontal-Up** Measurement 14: Flat Plane with EUT on Low Channel in WCDMA mode **Horizontal-Down** Measurement 15: Flat Plane with EUT on Low Channel in WCDMA mode **Vertical-Front** Measurement 16: Flat Plane with EUT on Low Channel in WCDMA mode **Vertical-Back** Measurement 17: Flat Plane with EUT on Low Channel in WCDMA mode **Dongle-Tip**
WCDMA 1900	Measurement 18: Flat Plane with EUT on Low Channel in WCDMA mode **Horizontal-Up** Measurement 19: Flat Plane with EUT on Low Channel in WCDMA mode **Horizontal-Down** Measurement 20: Flat Plane with EUT on Low Channel in WCDMA mode **Vertical-Front**

	Measurement 21: Flat Plane with EUT on Low Channel in WCDMA mode **Vertical-Back** Measurement 22: Flat Plane with EUT on Low Channel in WCDMA mode **Dongle-Tip**

MEASUREMENT 1

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 12 minutes 9 seconds

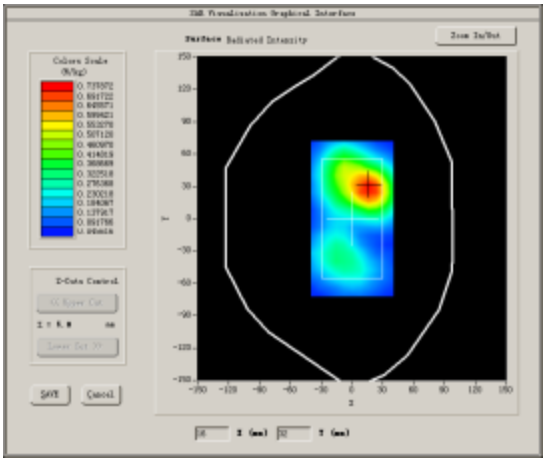
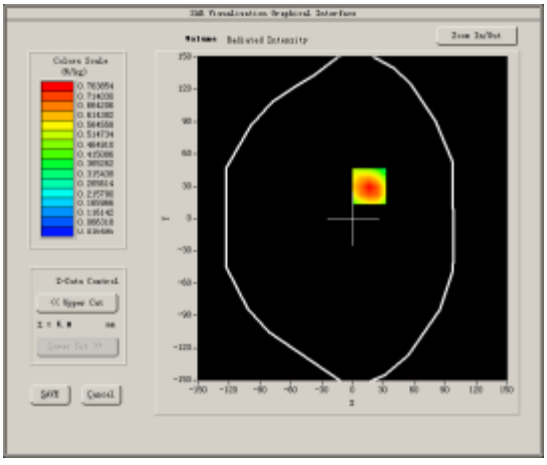
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	GSM850
Channels	High
Signal	GPRS

B. SAR Measurement Results

Higher Band SAR (Channel 251):

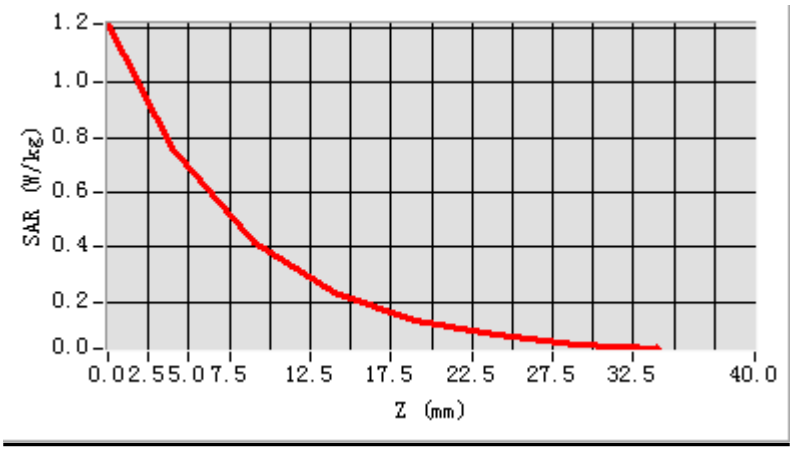
Frequency (MHz)	848.800000
Relative permittivity (real part)	54.512903
Conductivity (S/m)	0.961303
Power drift (%)	-1.870000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.9°C
ConvF:	28.479,25.214,27.196
Crest factor:	1:2

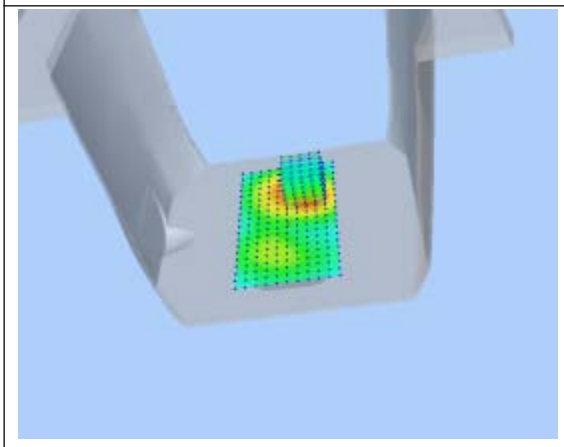
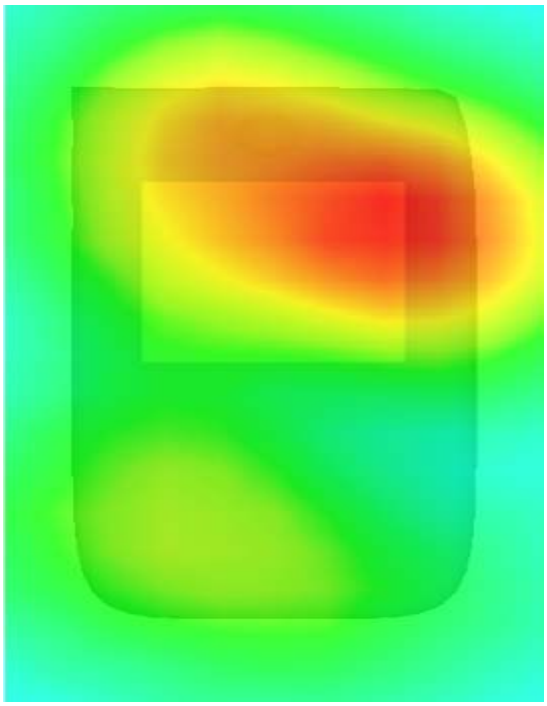
SURFACE SAR	VOLUME SAR
	

Maximum location: X=16.00, Y=30.00
SAR Peak: 1.21 W/kg

SAR 10g (W/Kg)	0.406353
SAR 1g (W/Kg)	0.745205

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 2

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 10 seconds

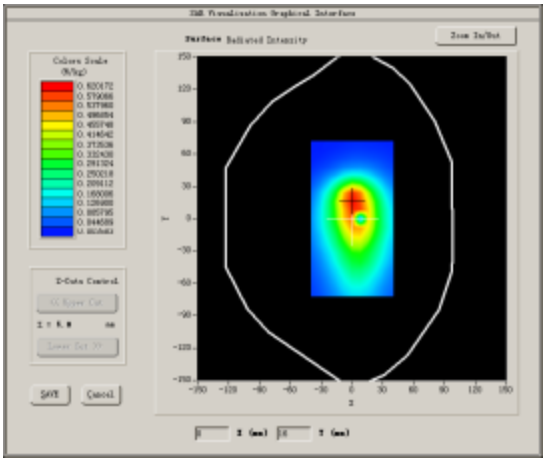
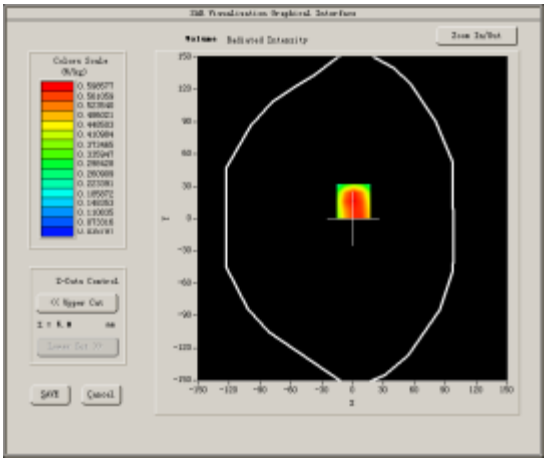
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	GSM850
Channels	High
Signal	GPRS

B. SAR Measurement Results

Higher Band SAR (Channel 251):

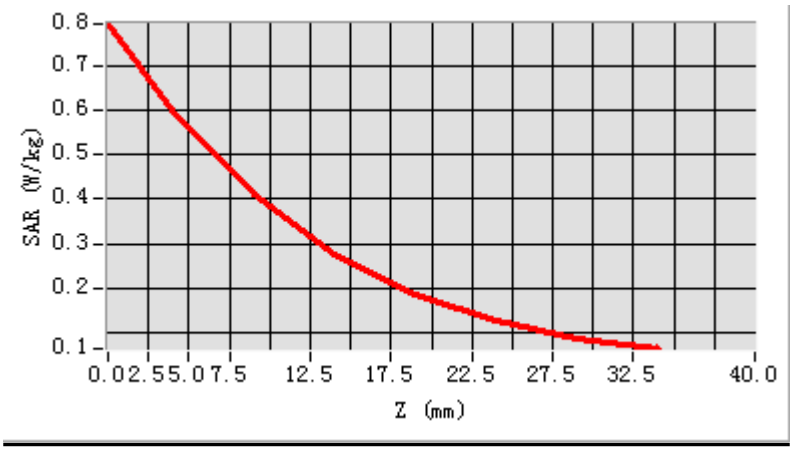
Frequency (MHz)	848.800000
Relative permittivity (real part)	54.512903
Conductivity (S/m)	0.961303
Power drift (%)	-1.720000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.9°C
ConvF:	28.479,25.214,27.196
Crest factor:	1:2

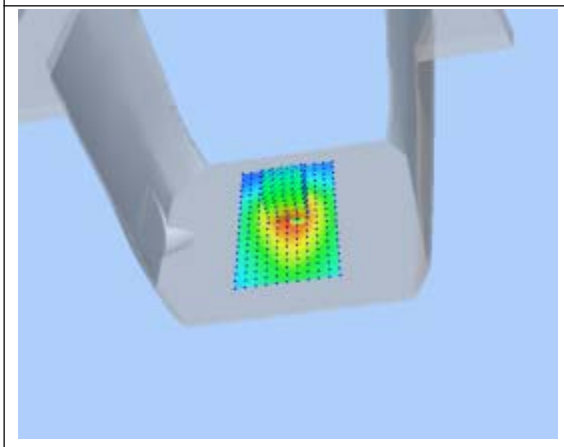
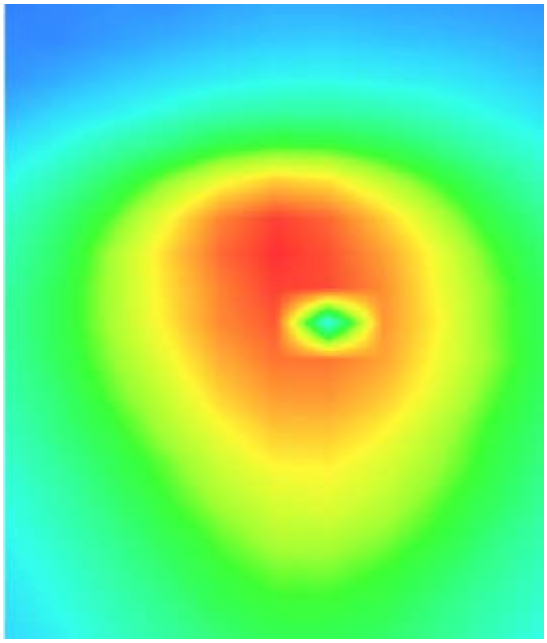
SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=16.00
SAR Peak: 0.92 W/kg

SAR 10g (W/Kg)	0.365124
SAR 1g (W/Kg)	0.596692

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 3

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 9 seconds

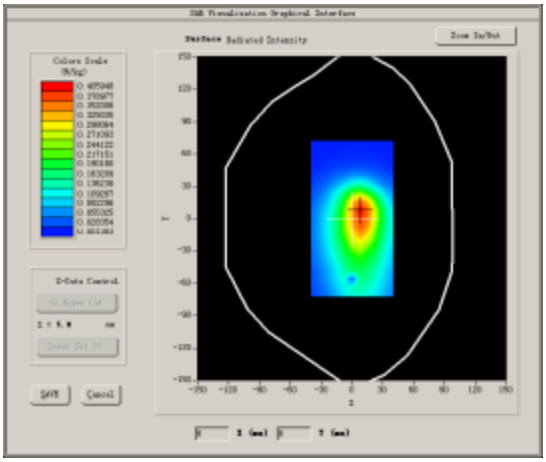
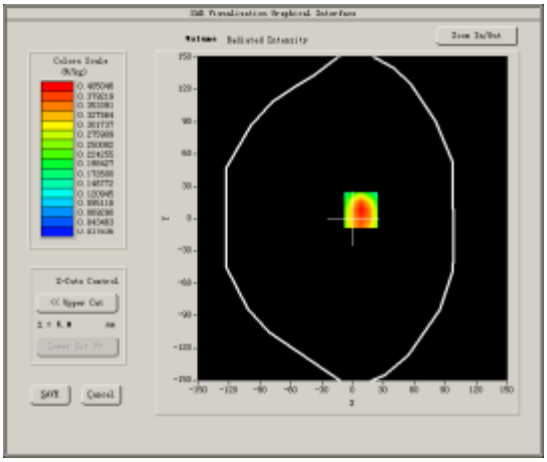
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	GSM850
Channels	High
Signal	GPRS

B. SAR Measurement Results

Higher Band SAR (Channel 251):

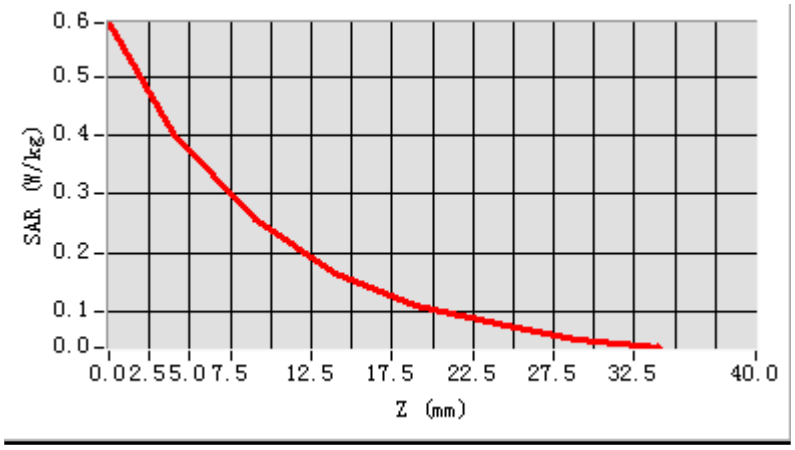
Frequency (MHz)	848.800000
Relative permittivity (real part)	54.512903
Conductivity (S/m)	0.961303
Power drift (%)	-1.000000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.9°C
ConvF:	28.479,25.214,27.196
Crest factor:	1:2

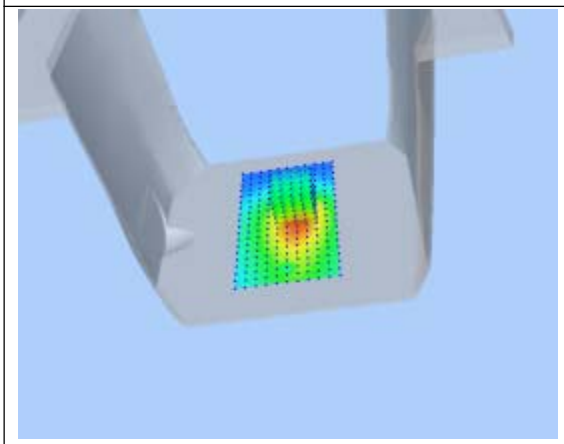
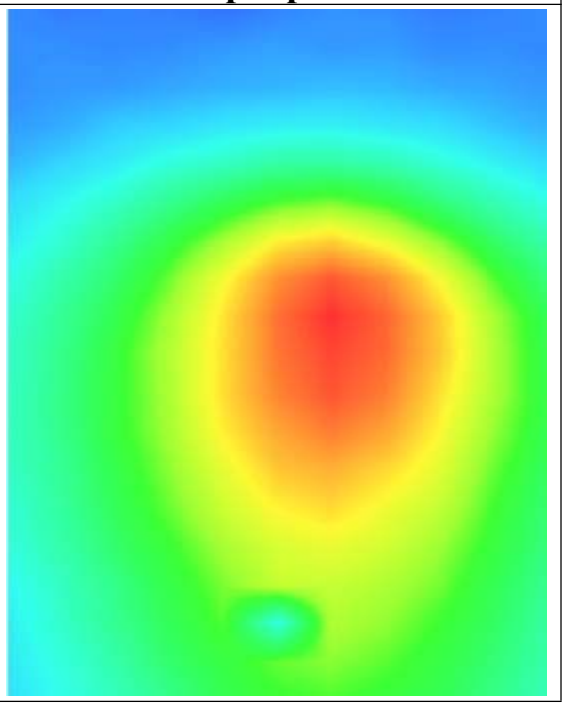
SURFACE SAR	VOLUME SAR
	

Maximum location: X=8.00, Y=8.00
SAR Peak: 0.70 W/kg

SAR 10g (W/Kg)	0.232470
SAR 1g (W/Kg)	0.395203

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 4

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 9 seconds

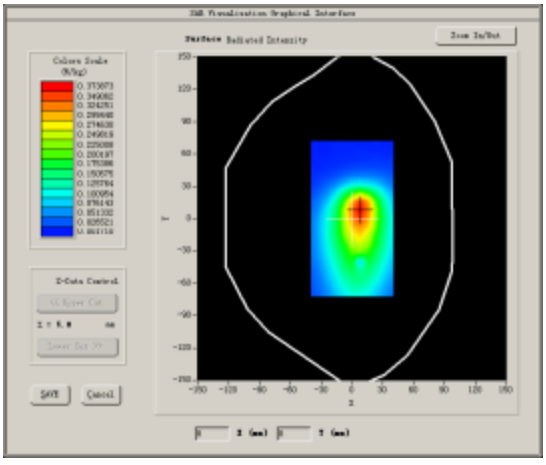
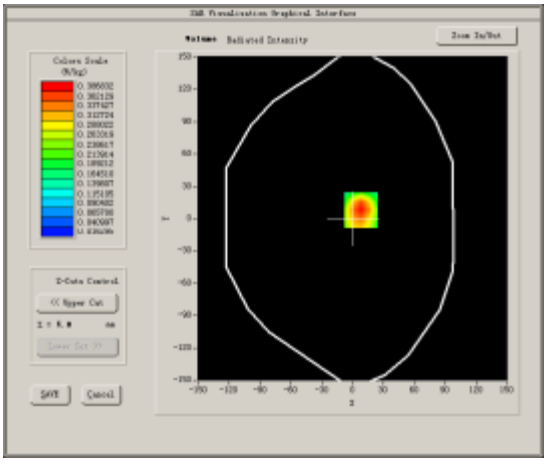
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	GSM850
Channels	High
Signal	GPRS

B. SAR Measurement Results

Higher Band SAR (Channel 251):

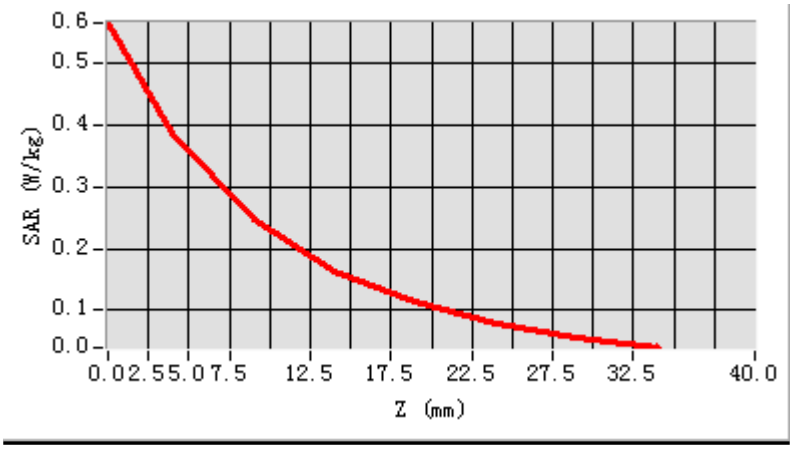
Frequency (MHz)	848.800000
Relative permittivity (real part)	54.512903
Conductivity (S/m)	0.961303
Power drift (%)	-0.460000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.9°C
ConvF:	28.479,25.214,27.196
Crest factor:	1:2

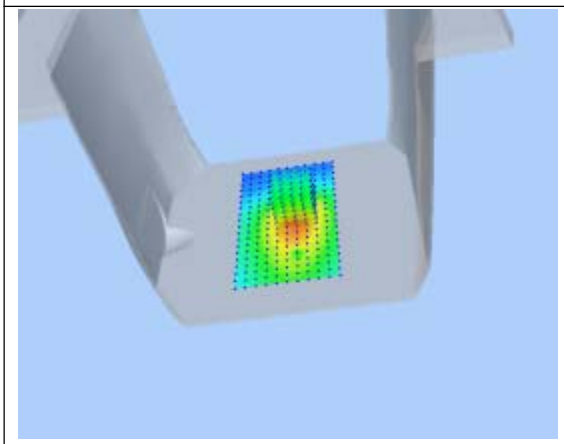
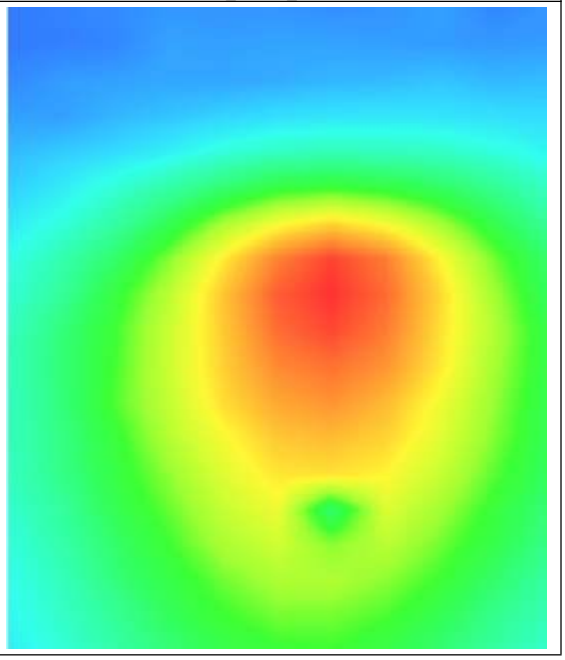
SURFACE SAR	VOLUME SAR
	

Maximum location: X=8.00, Y=8.00
SAR Peak: 0.59 W/kg

SAR 10g (W/Kg)	0.225140
SAR 1g (W/Kg)	0.375165

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 5

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.6.5
Measurement duration: 13 minutes 9 seconds

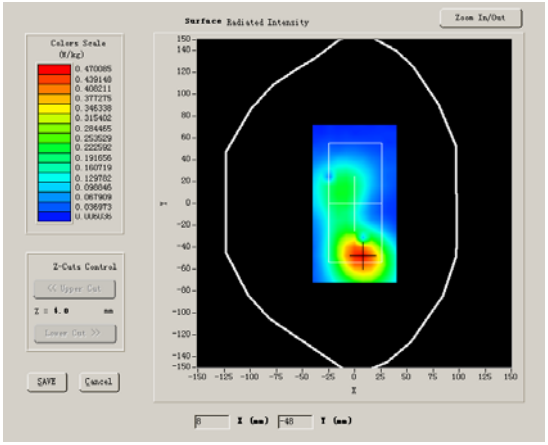
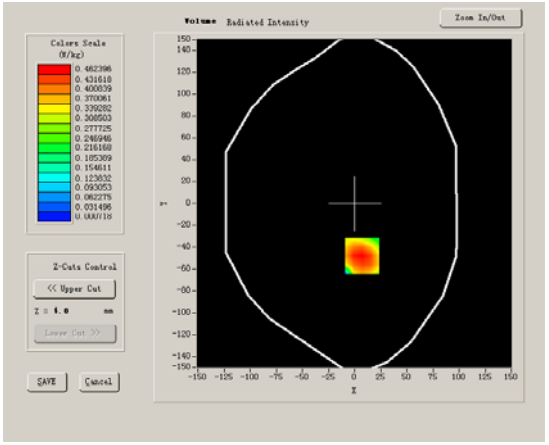
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	GSM850
Channels	High
Signal	GPRS

B. SAR Measurement Results

Higher Band SAR (Channel 251):

Frequency (MHz)	848.800000
Relative permittivity (real part)	54.512903
Conductivity (S/m)	0.961303
Power drift (%)	-1.050000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.9°C
ConvF:	28.479,25.214,27.196
Crest factor:	1:2

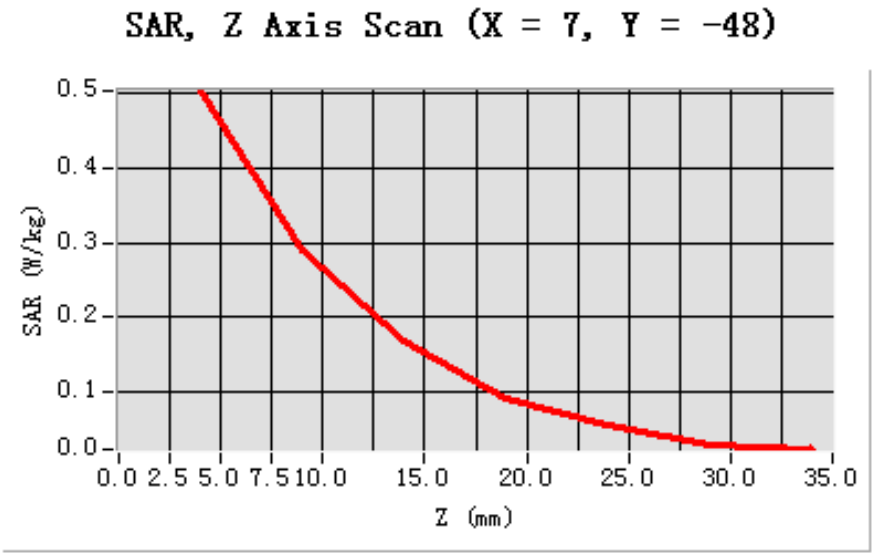
SURFACE SAR	VOLUME SAR
	

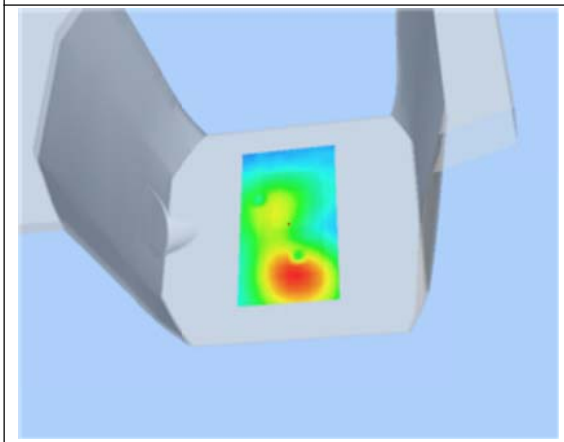
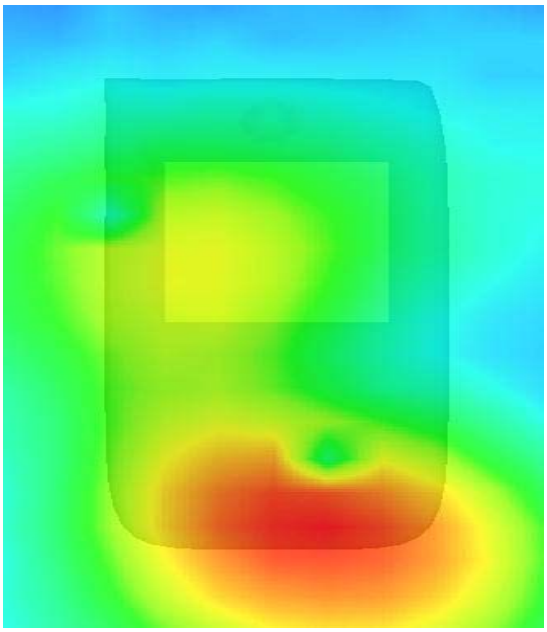
Maximum location: X=7.00, Y=-48.00

SAR 10g (W/Kg)	0.277035
SAR 1g (W/Kg)	0.483120

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.5035	0.2901	0.1675	0.0915	0.0545	0.0286



3D sceen shot	Hot spot position
	

MEASUREMENT 6

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 11 seconds

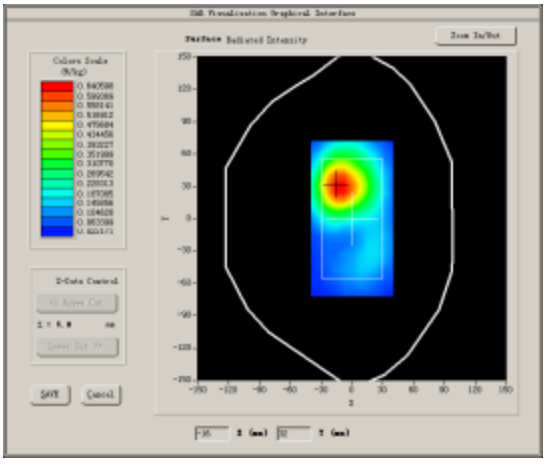
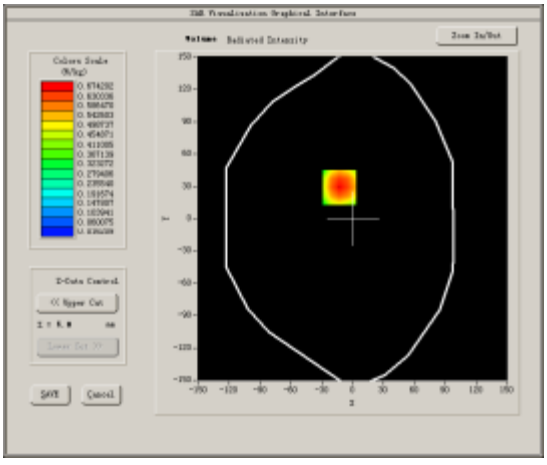
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	GSM850
Channels	Middle
Signal	EDGE

B. SAR Measurement Results

Middle Band SAR (Channel 190):

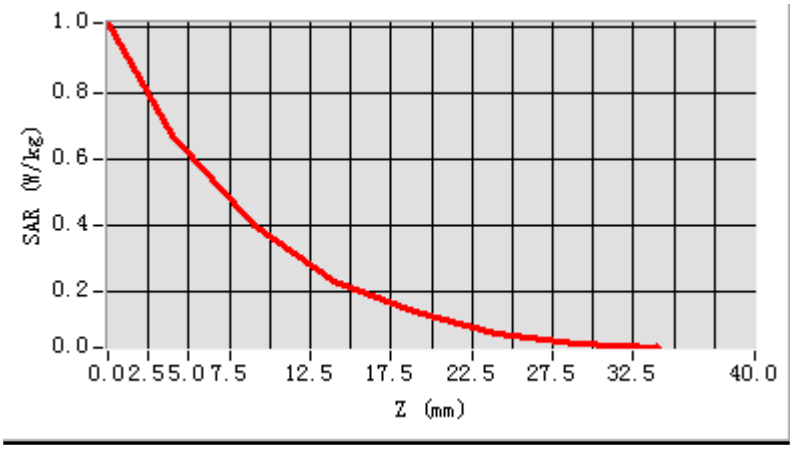
Frequency (MHz)	836.600000
Relative permittivity (real part)	54.512903
Conductivity (S/m)	0.961303
Power drift (%)	-0.170000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.9°C
ConvF:	28.479,25.214,27.196
Crest factor:	1:2

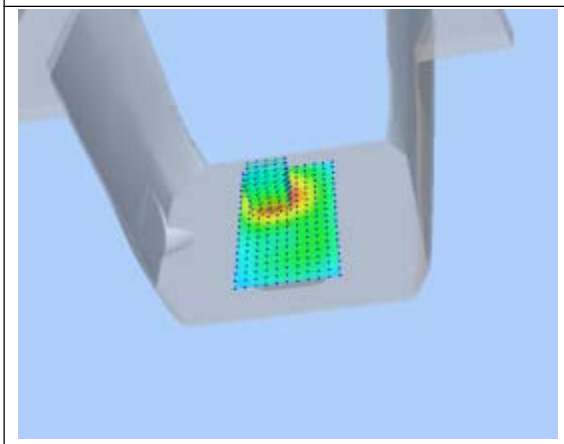
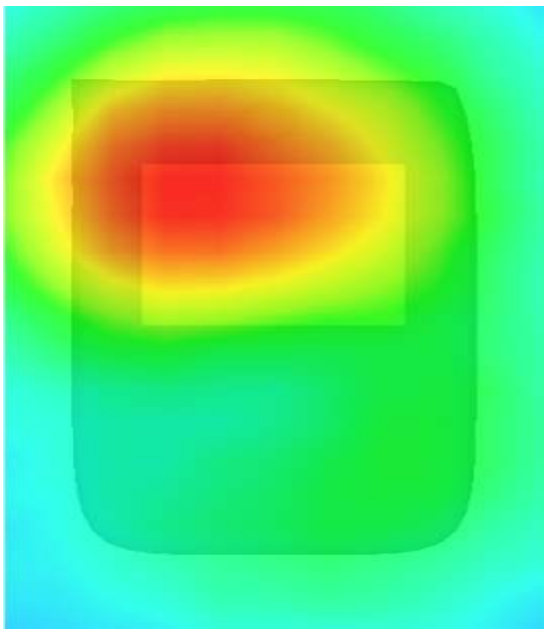
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-13.00, Y=29.00
SAR Peak: 1.01 W/kg

SAR 10g (W/Kg)	0.377724
SAR 1g (W/Kg)	0.662001

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 7

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 11 seconds

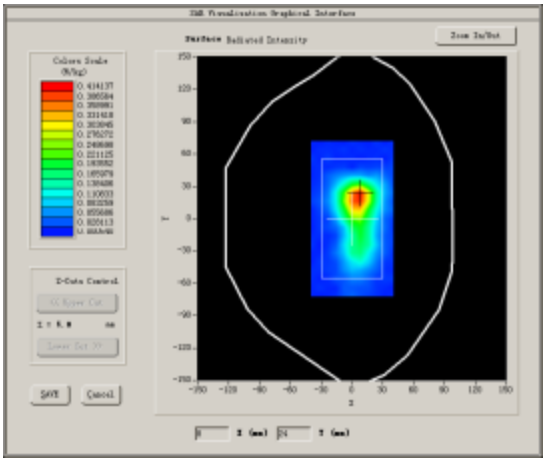
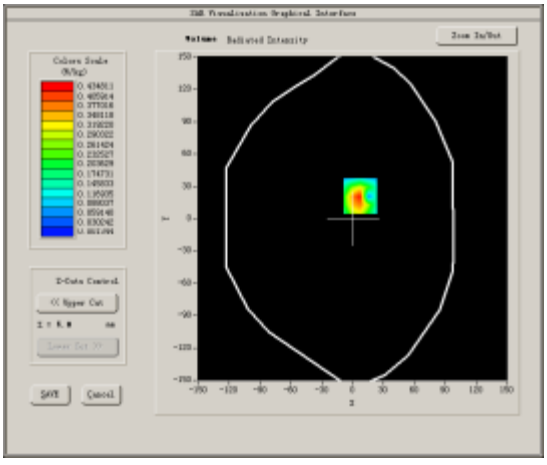
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	GSM1900
Channels	Middle
Signal	GPRS

B. SAR Measurement Results

Middle Band SAR (Channel 661):

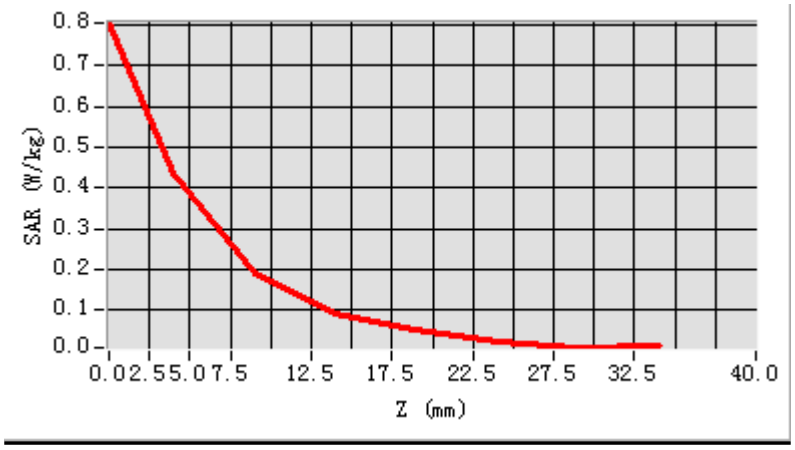
Frequency (MHz)	1880.000000
Relative permittivity (real part)	52.352141
Conductivity (S/m)	1.486027
Power drift (%)	-0.800000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:2

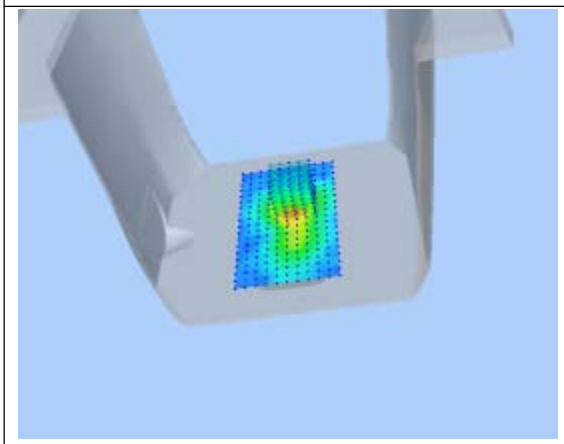
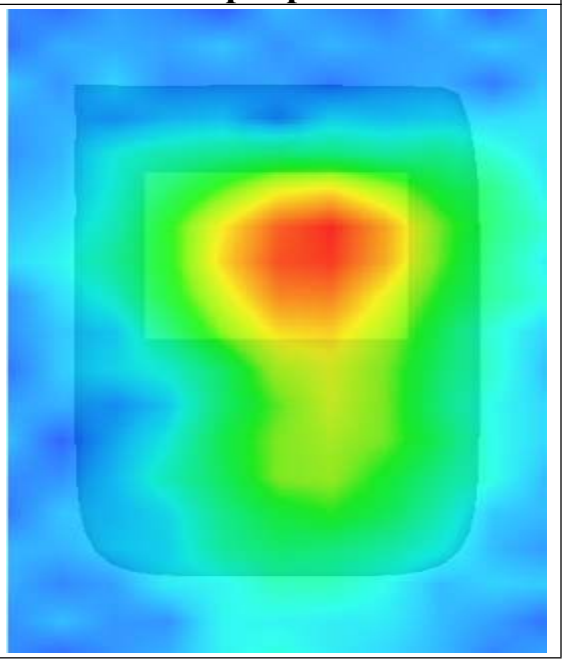
SURFACE SAR	VOLUME SAR
	

Maximum location: X=7.00, Y=21.00
SAR Peak: 0.87 W/kg

SAR 10g (W/Kg)	0.180602
SAR 1g (W/Kg)	0.418870

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 8

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 7 seconds

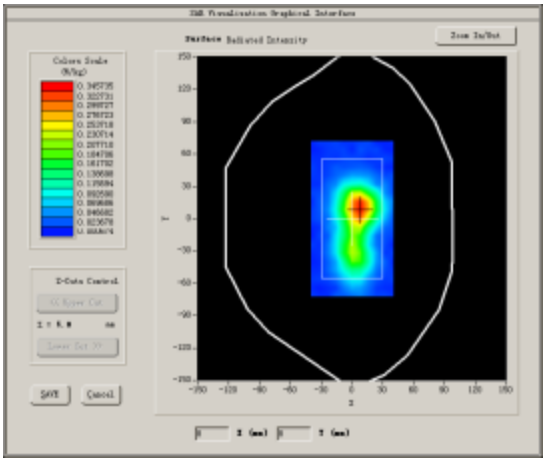
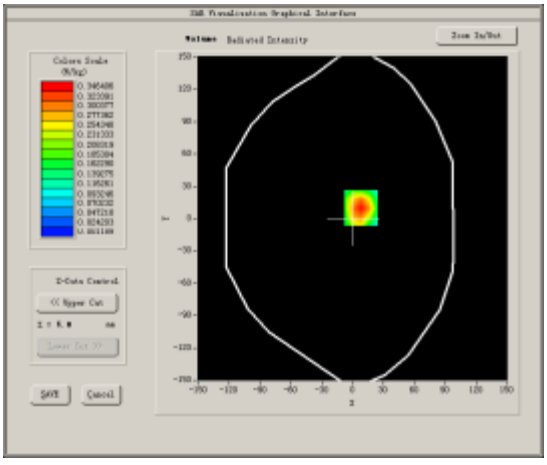
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	GSM1900
Channels	Middle
Signal	GPRS

B. SAR Measurement Results

Middle Band SAR (Channel 661):

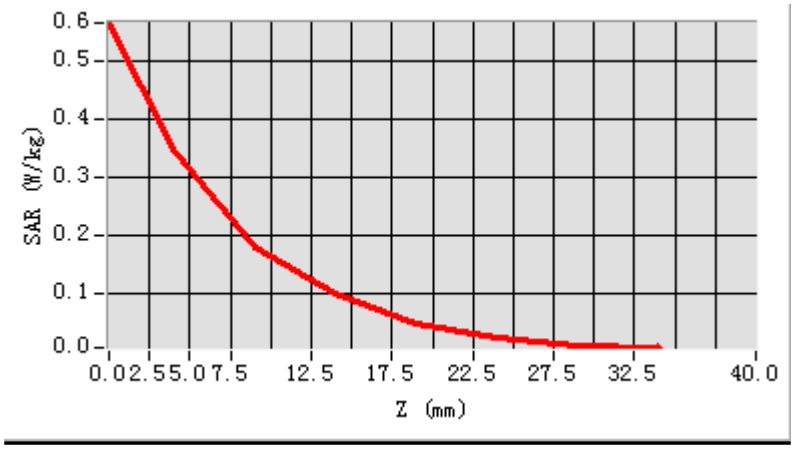
Frequency (MHz)	1880.000000
Relative permittivity (real part)	52.352141
Conductivity (S/m)	1.486027
Power drift (%)	-1.610000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:2

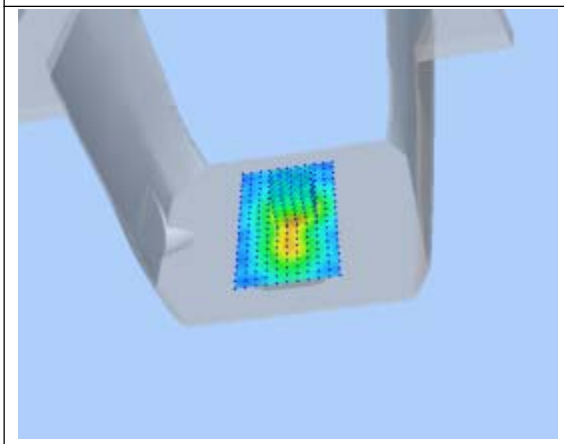
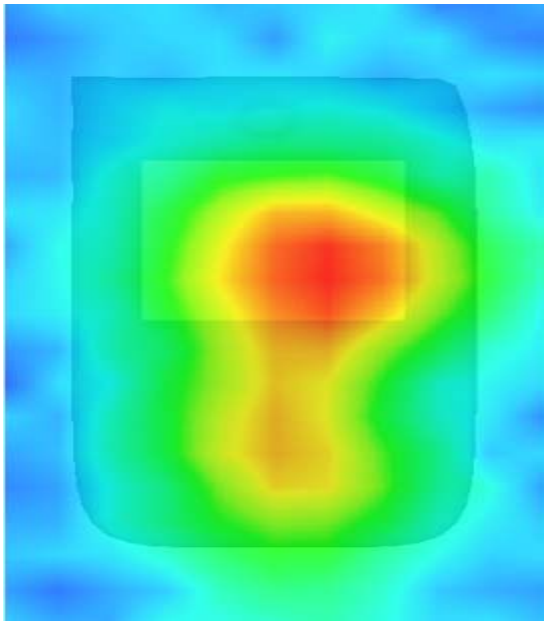
SURFACE SAR	VOLUME SAR
	

Maximum location: X=8.00, Y=10.00
SAR Peak: 0.57 W/kg

SAR 10g (W/Kg)	0.167395
SAR 1g (W/Kg)	0.336065

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 9

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 7 seconds

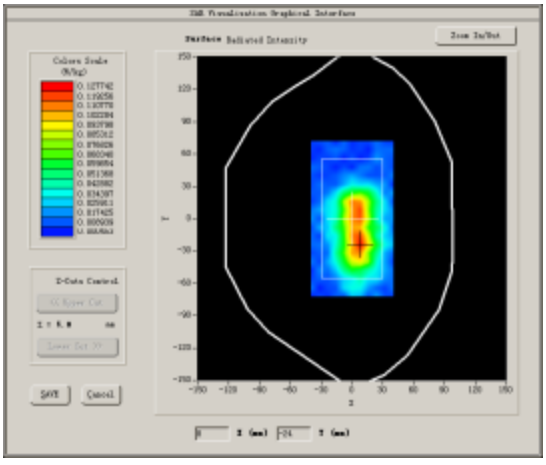
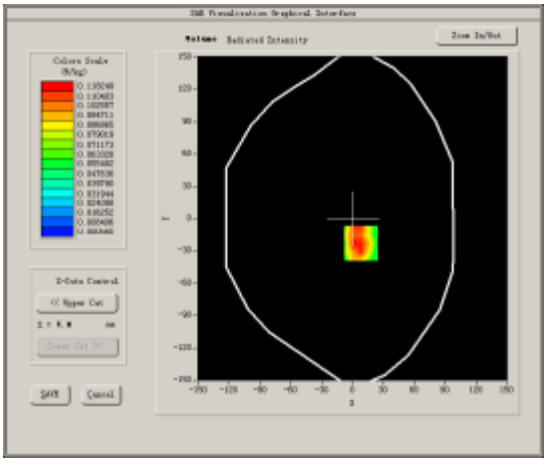
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	GSM1900
Channels	Middle
Signal	GPRS

B. SAR Measurement Results

Middle Band SAR (Channel 661):

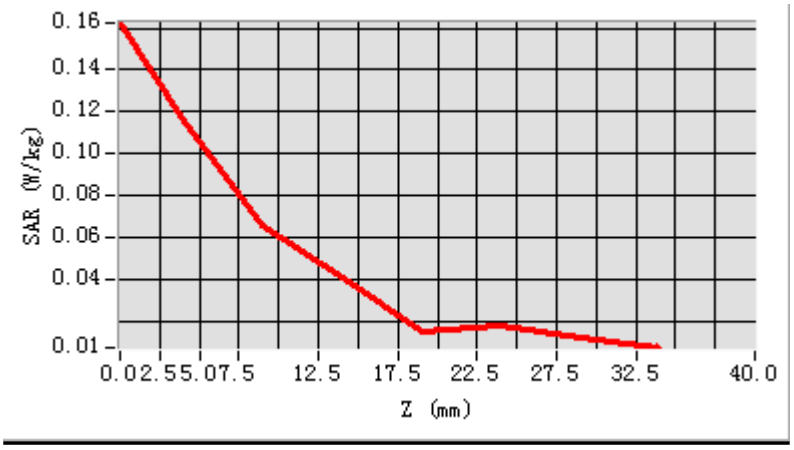
Frequency (MHz)	1880.000000
Relative permittivity (real part)	52.352141
Conductivity (S/m)	1.486027
Power drift (%)	-0.080000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:2

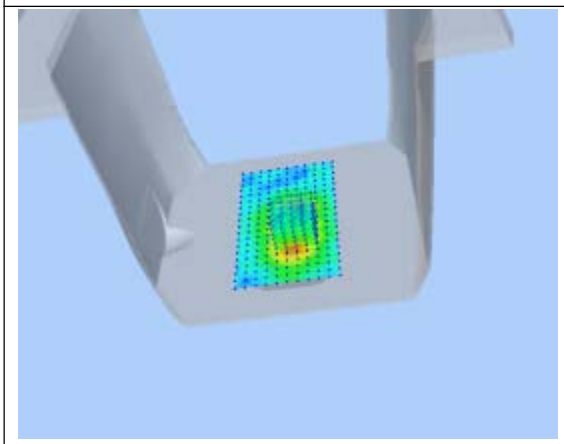
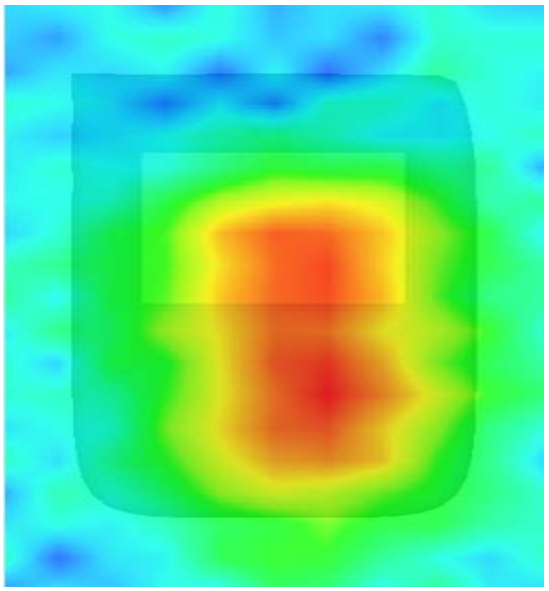
SURFACE SAR	VOLUME SAR
	

Maximum location: X=8.00, Y=-23.00
SAR Peak: 0.22 W/kg

SAR 10g (W/Kg)	0.061068
SAR 1g (W/Kg)	0.119075

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 10

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 7 seconds

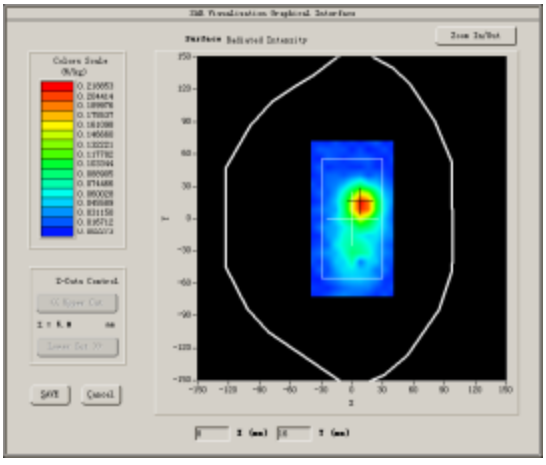
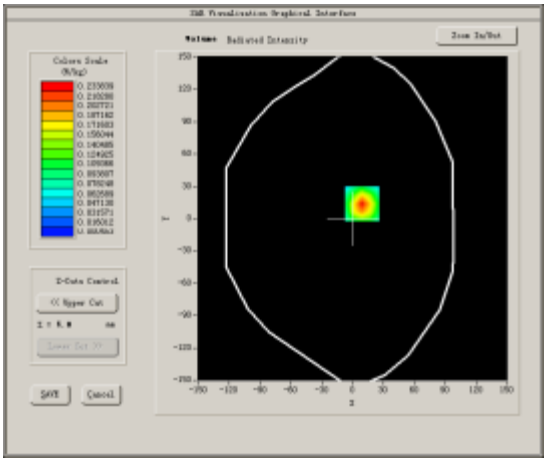
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	GSM1900
Channels	Middle
Signal	GPRS

B. SAR Measurement Results

Middle Band SAR (Channel 661):

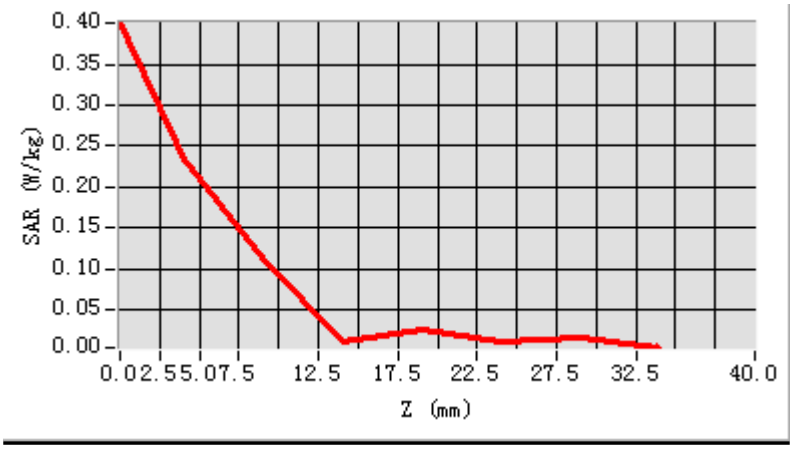
Frequency (MHz)	1880.000000
Relative permittivity (real part)	52.352141
Conductivity (S/m)	1.486027
Power drift (%)	-0.480000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:2

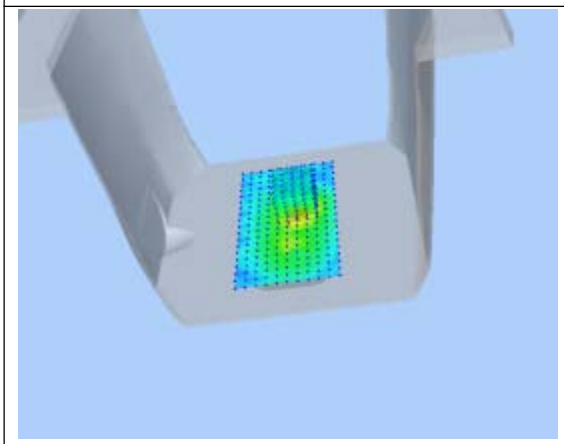
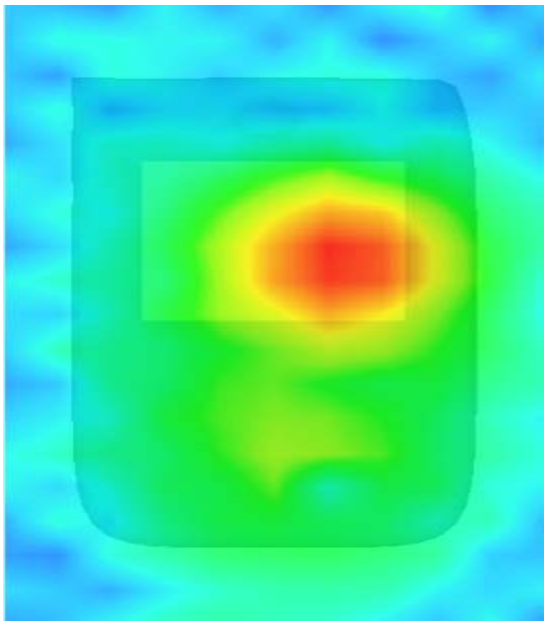
SURFACE SAR	VOLUME SAR
	

Maximum location: X=9.00, Y=14.00
SAR Peak: 0.40 W/kg

SAR 10g (W/Kg)	0.101543
SAR 1g (W/Kg)	0.216860

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 11

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.6.5
Measurement duration: 13 minutes 7 seconds

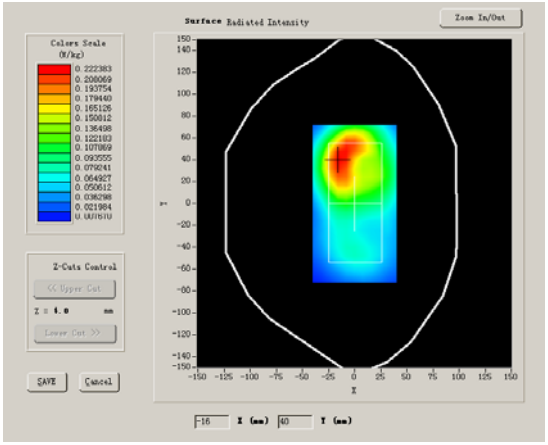
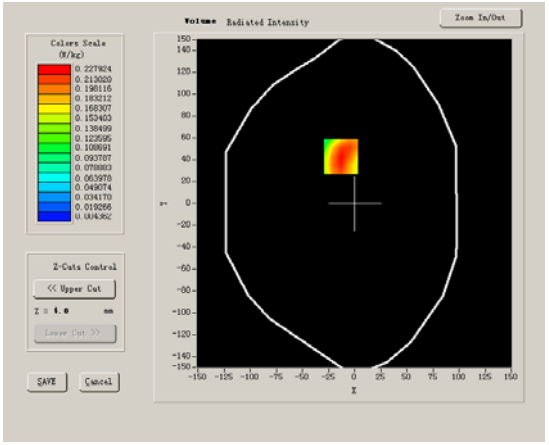
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	GSM1900
Channels	Middle
Signal	GPRS

B. SAR Measurement Results

Middle Band SAR (Channel 661):

Frequency (MHz)	1880.000000
Relative permittivity (real part)	52.352141
Conductivity (S/m)	1.486027
Power drift (%)	-0.710000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:2

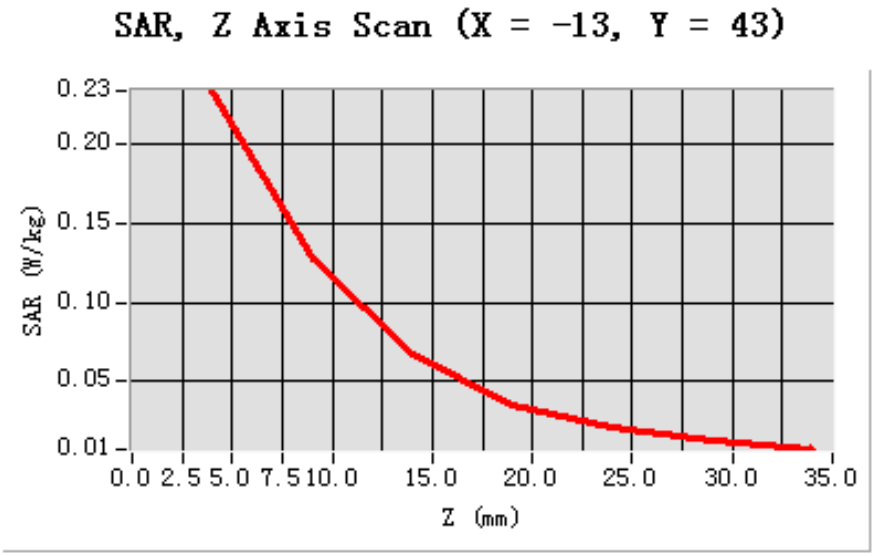
SURFACE SAR	VOLUME SAR
	

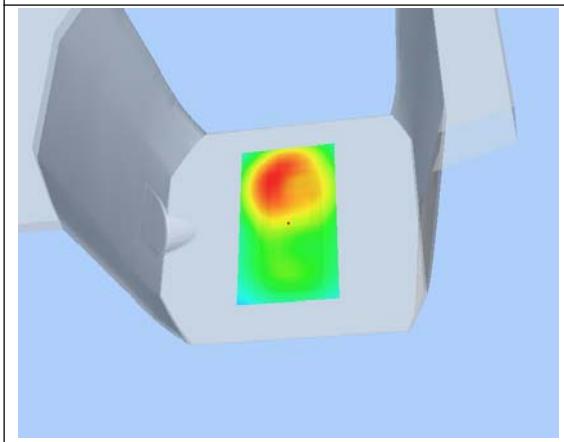
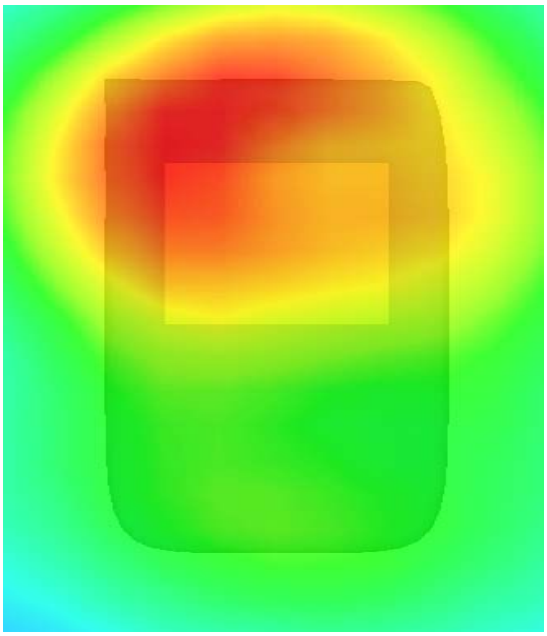
Maximum location: X=-13.00, Y=43.00

SAR 10g (W/Kg)	0.128250
SAR 1g (W/Kg)	0.209872

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.2332	0.1275	0.0668	0.0356	0.0207	0.0126



3D sceen shot	Hot spot position
	

MEASUREMENT 12

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 11 seconds

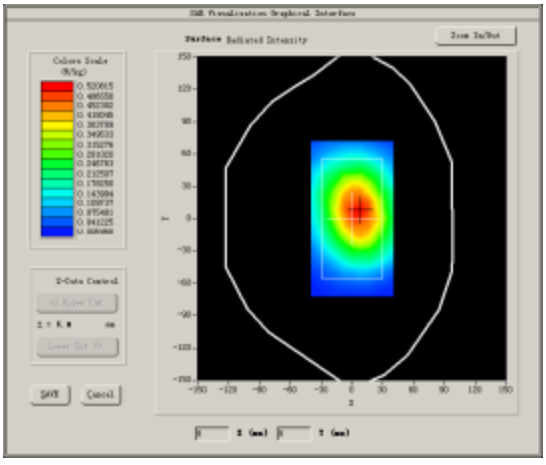
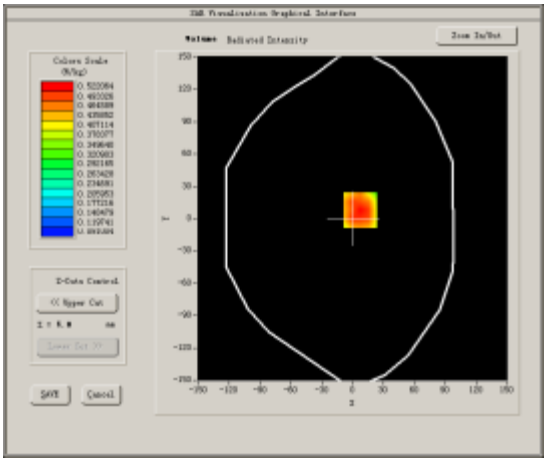
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	GSM1900
Channels	Middle
Signal	EDGE

B. SAR Measurement Results

Middle Band SAR (Channel 661):

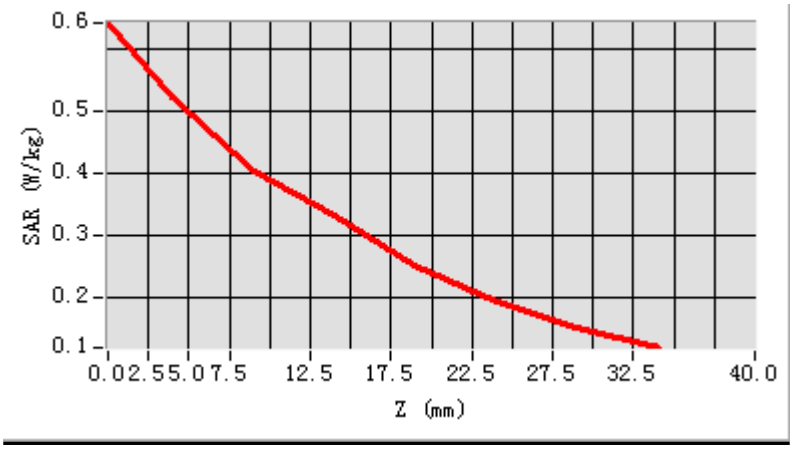
Frequency (MHz)	1880.000000
Relative permittivity (real part)	52.352141
Conductivity (S/m)	1.486027
Power drift (%)	-0.800000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:2

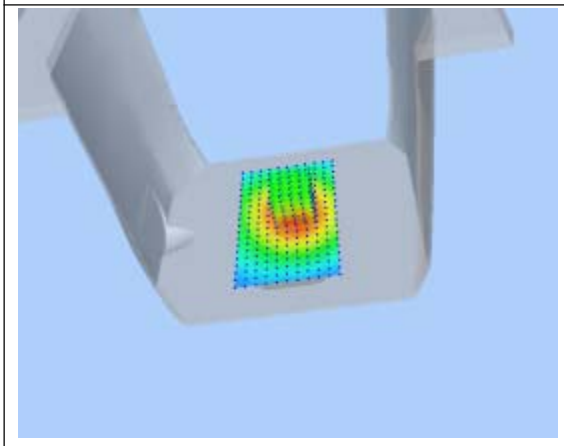
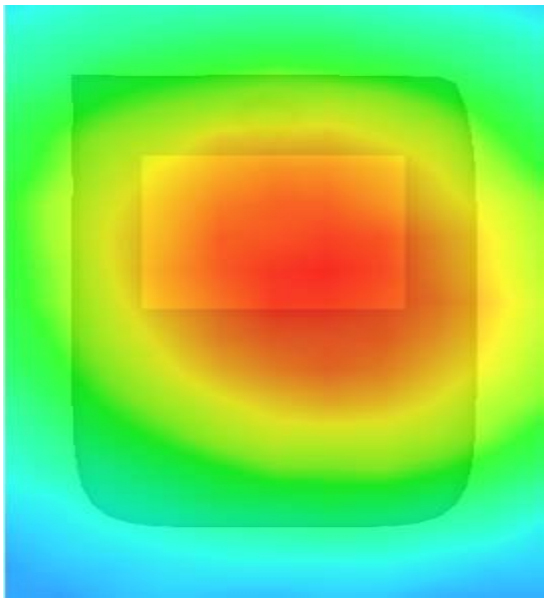
SURFACE SAR	VOLUME SAR
	

Maximum location: X=7.00, Y=8.00
SAR Peak: 0.72 W/kg

SAR 10g (W/Kg)	0.400291
SAR 1g (W/Kg)	0.547876

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 13

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 9 seconds

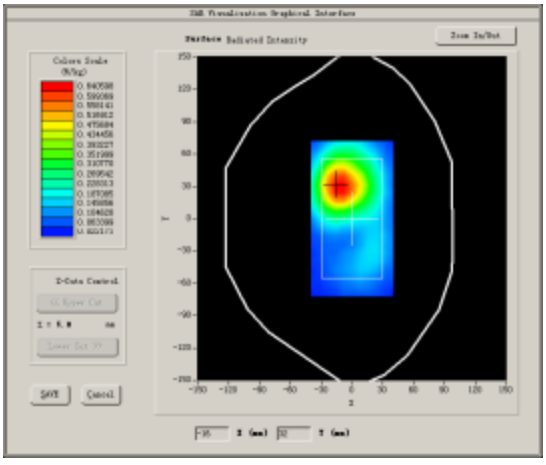
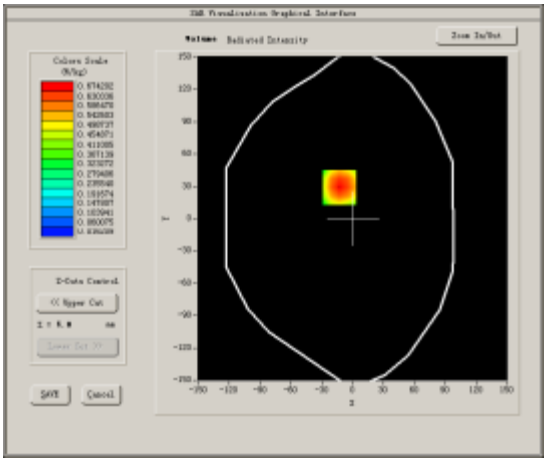
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	WCDMA850
Channels	Low
Signal	CDMA

B. SAR Measurement Results

Lower Band SAR (Channel 4132):

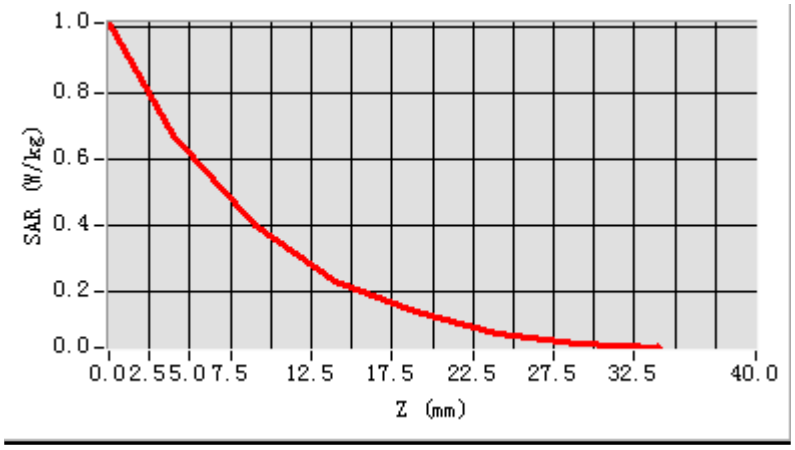
Frequency (MHz)	826.400000
Relative permittivity (real part)	54.512903
Conductivity (S/m)	0.961303
Power drift (%)	-0.920000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	28.479,25.214,27.196
Crest factor:	1:1

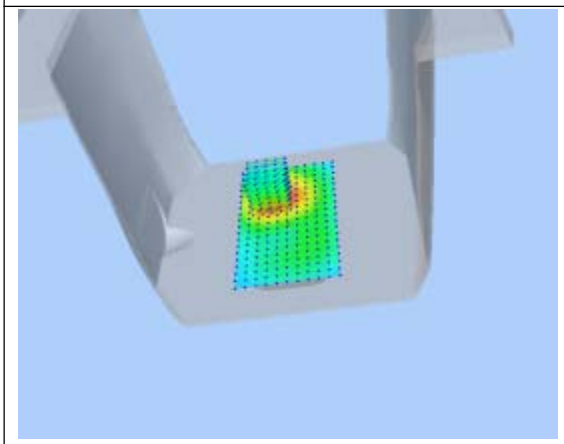
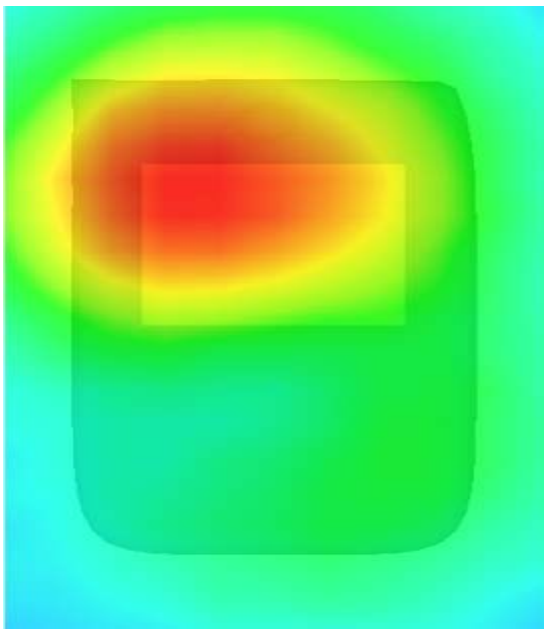
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-13.00, Y=29.00
SAR Peak: 1.01 W/kg

SAR 10g (W/Kg)	0.377724
SAR 1g (W/Kg)	0.662001

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 14

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 7 seconds

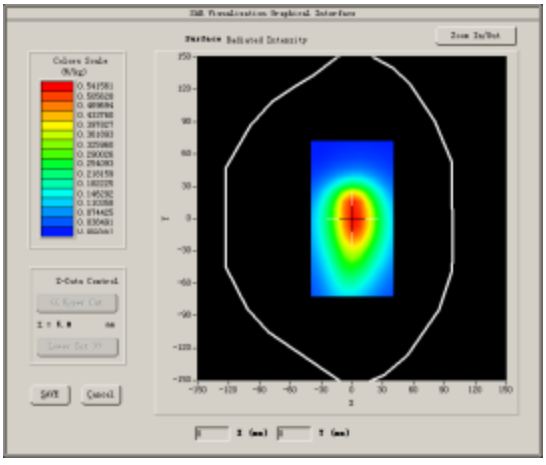
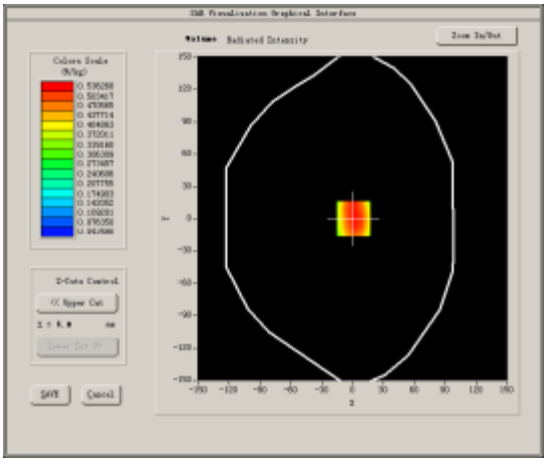
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	WCDMA850
Channels	Low
Signal	CDMA

B. SAR Measurement Results

Lower Band SAR (Channel 4132):

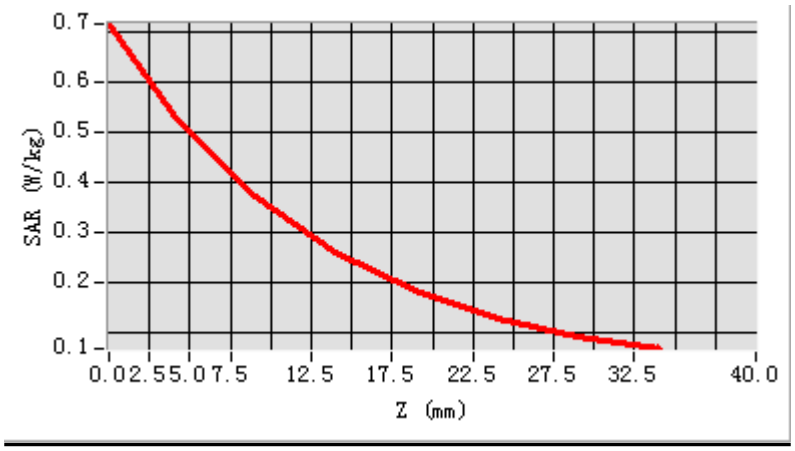
Frequency (MHz)	826.400000
Relative permittivity (real part)	54.512903
Conductivity (S/m)	0.961303
Power drift (%)	-1.070000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	28.479,25.214,27.196
Crest factor:	1:1

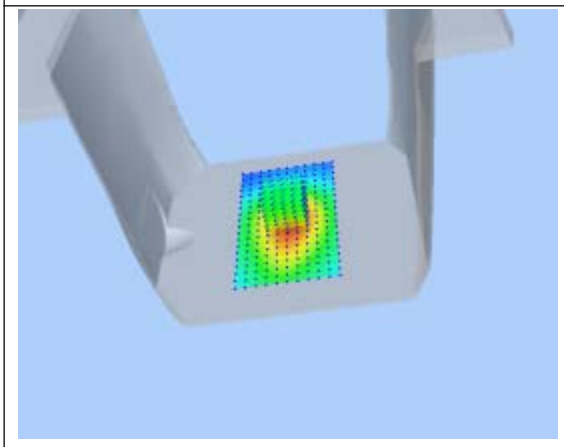
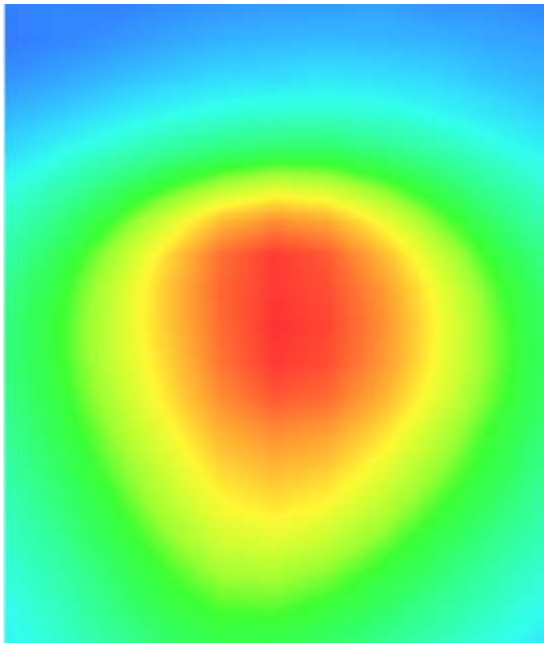
SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=0.00
SAR Peak: 0.82 W/kg

SAR 10g (W/Kg)	0.372845
SAR 1g (W/Kg)	0.561037

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 15

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 15 seconds

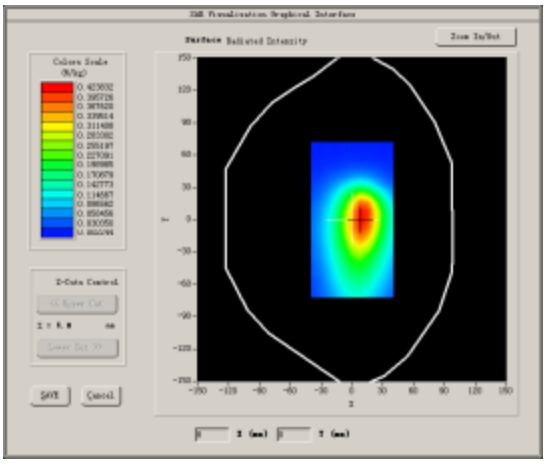
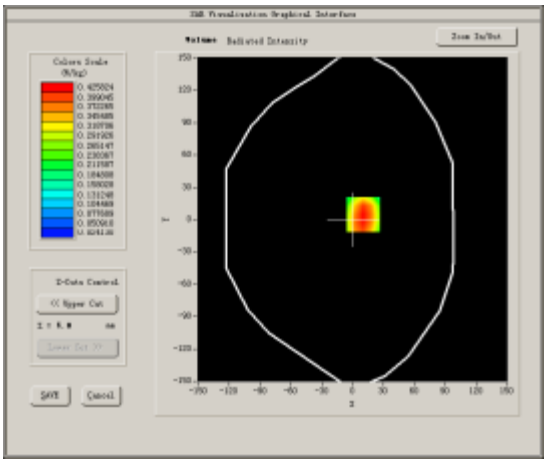
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	WCDMA850
Channels	Low
Signal	CDMA

B. SAR Measurement Results

Lower Band SAR (Channel 4132):

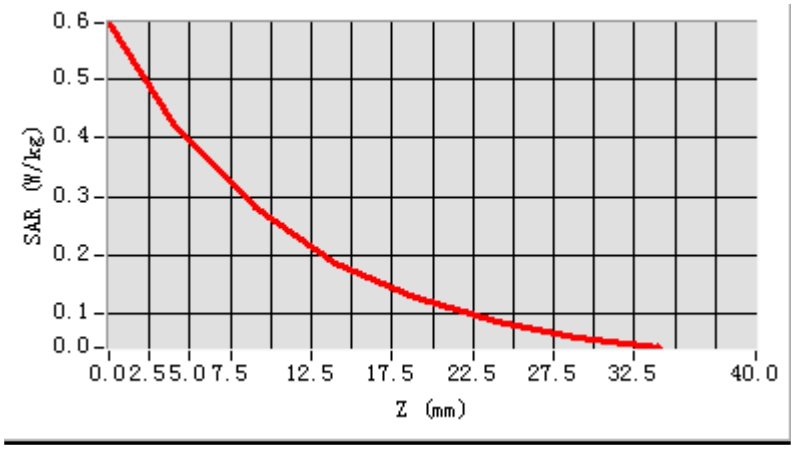
Frequency (MHz)	826.400000
Relative permittivity (real part)	54.512903
Conductivity (S/m)	0.961303
Power drift (%)	-0.390000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	28.479,25.214,27.196
Crest factor:	1:1

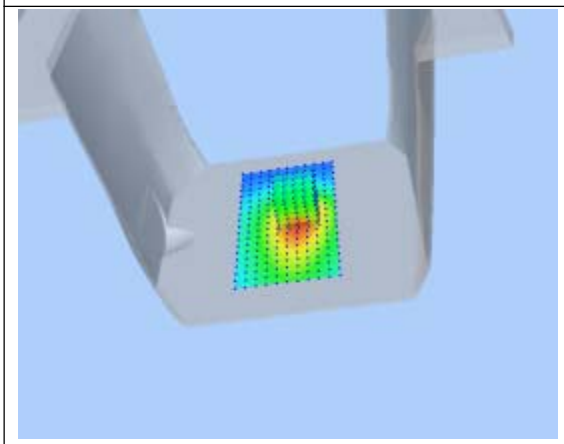
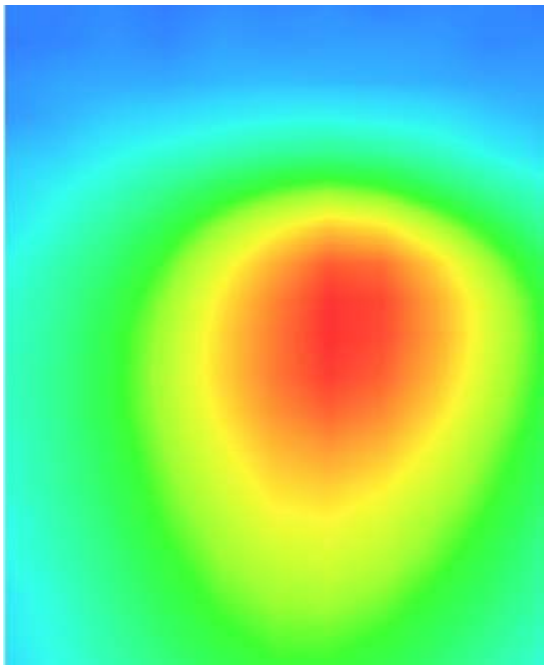
SURFACE SAR	VOLUME SAR
	

Maximum location: X=10.00, Y=5.00
SAR Peak: 0.65 W/kg

SAR 10g (W/Kg)	0.277102
SAR 1g (W/Kg)	0.438248

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 16

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 4 seconds

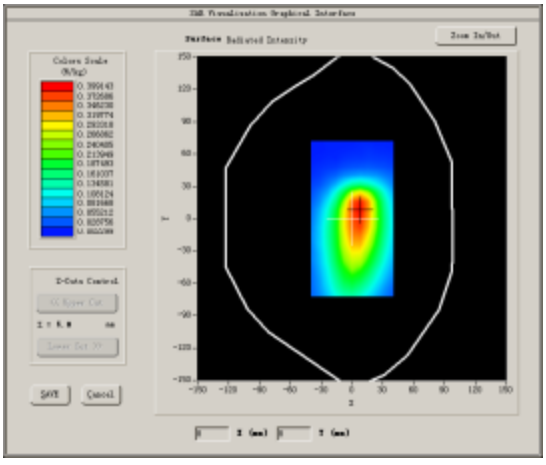
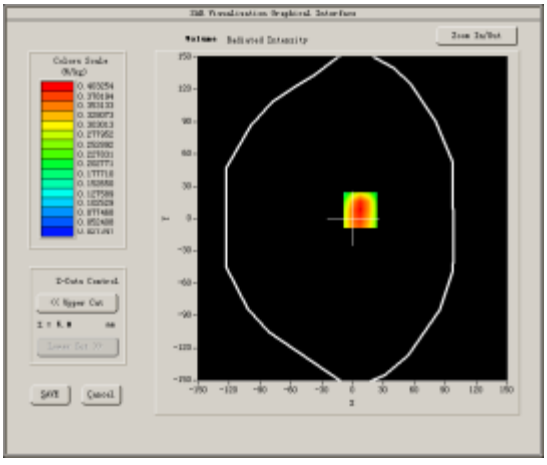
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	WCDMA850
Channels	Low
Signal	CDMA

B. SAR Measurement Results

Lower Band SAR (Channel 4132):

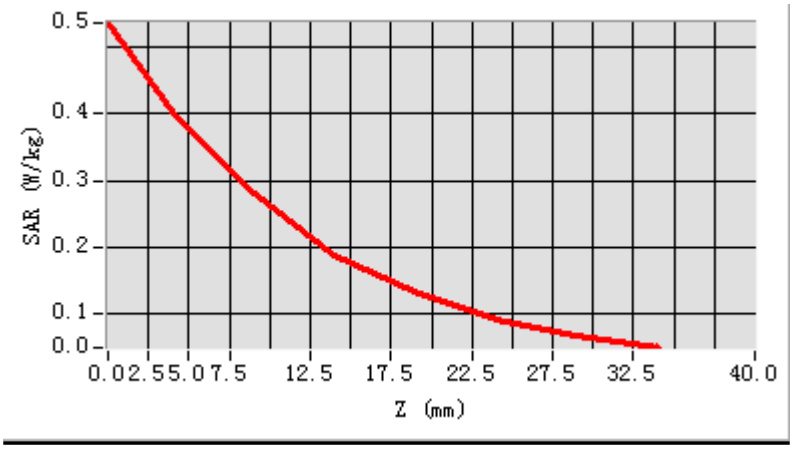
Frequency (MHz)	826.400000
Relative permittivity (real part)	54.512903
Conductivity (S/m)	0.961303
Power drift (%)	-0.420000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	28.479,25.214,27.196
Crest factor:	1:1

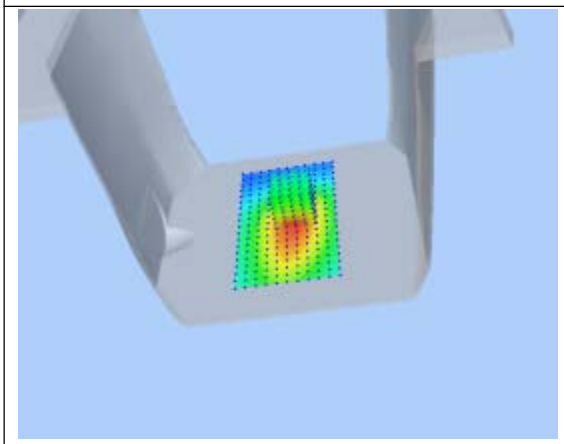
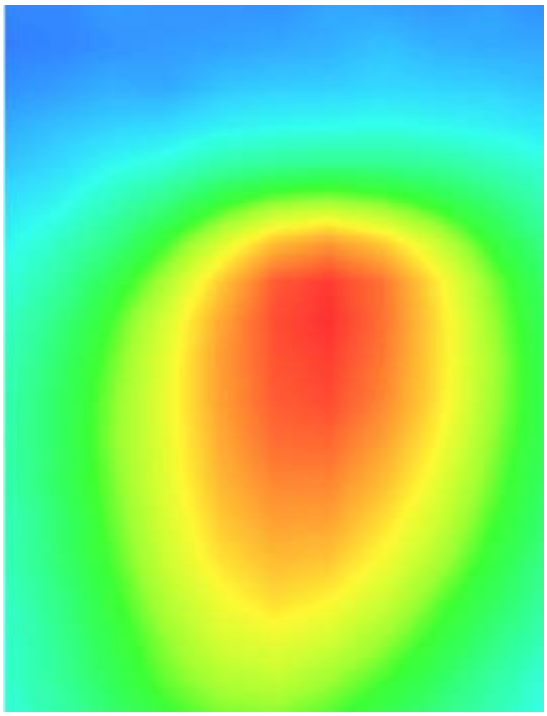
SURFACE SAR	VOLUME SAR
	

Maximum location: X=7.00, Y=8.00
SAR Peak: 0.62 W/kg

SAR 10g (W/Kg)	0.270555
SAR 1g (W/Kg)	0.417556

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 17

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=5mm, dy=5mm, dz=5mm
Date of measurement: 2013.6.5
Measurement duration: 13 minutes 4 seconds

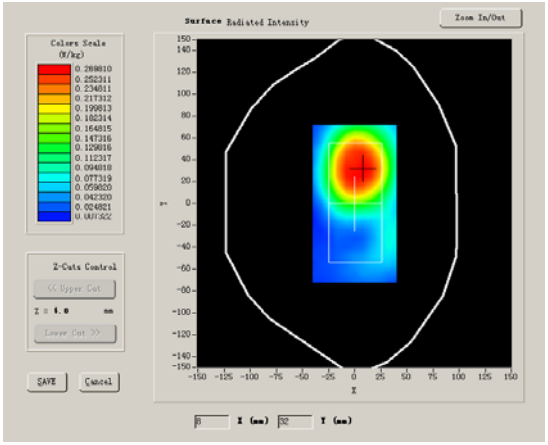
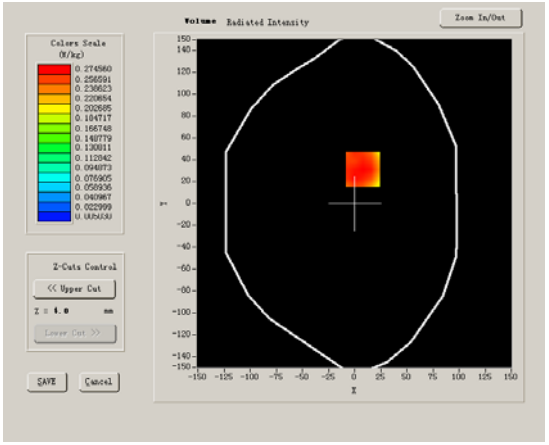
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	Body
Band	WCDMA850
Channels	Low
Signal	CDMA

B. SAR Measurement Results

Lower Band SAR (Channel 4132):

Frequency (MHz)	826.400000
Relative permittivity (real part)	54.512903
Conductivity (S/m)	0.961303
Power drift (%)	-0.250000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	28.479,25.214,27.196
Crest factor:	1:1

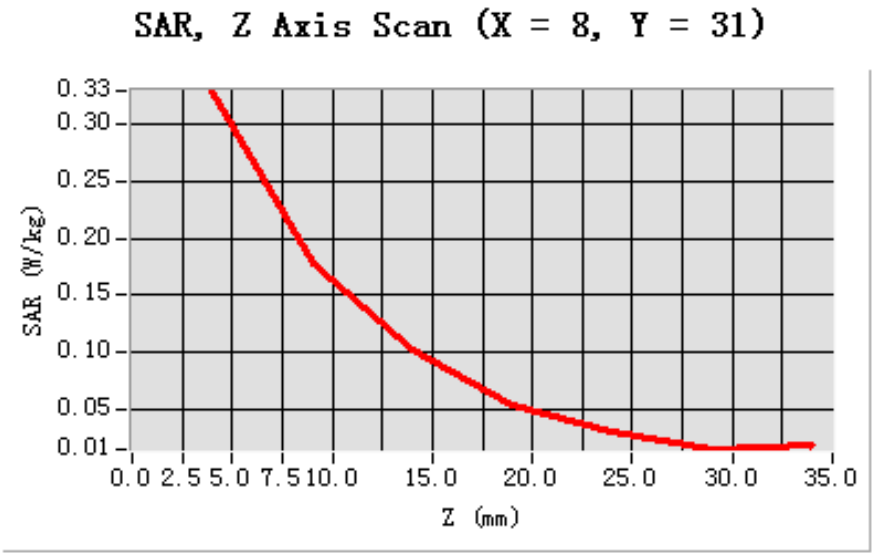
SURFACE SAR	VOLUME SAR
	

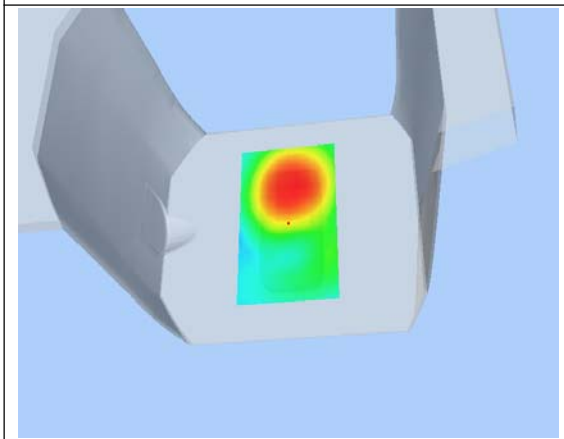
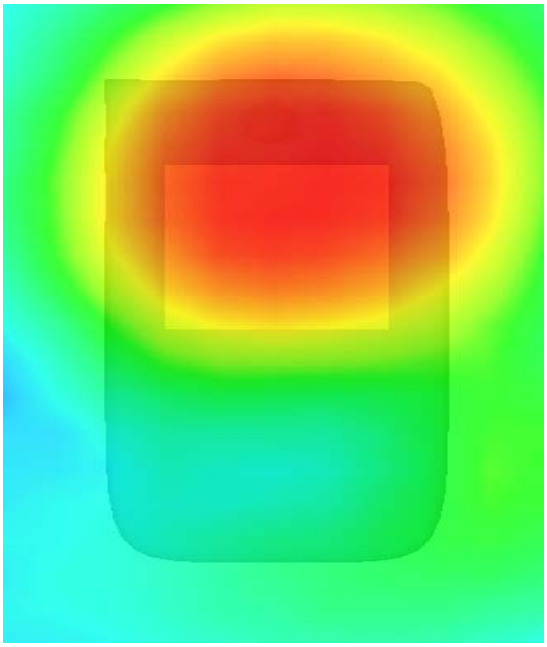
Maximum location: X=8.00, Y=31.00

SAR 10g (W/Kg)	0.186238
SAR 1g (W/Kg)	0.317047

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.3295	0.1776	0.1013	0.0530	0.0300	0.0143



3D sceen shot	Hot spot position
	

MEASUREMENT 18

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 9 minutes 7 seconds

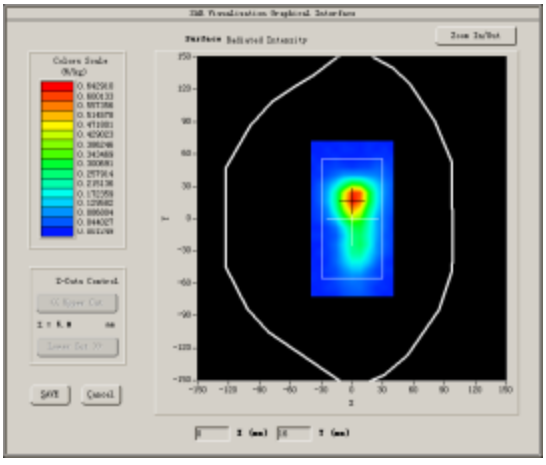
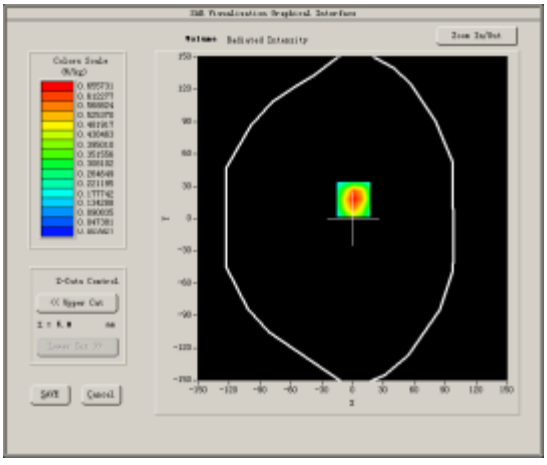
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	WCDMA1900
Channels	Low
Signal	CDMA

B. SAR Measurement Results

Lower Band SAR (Channel 9262):

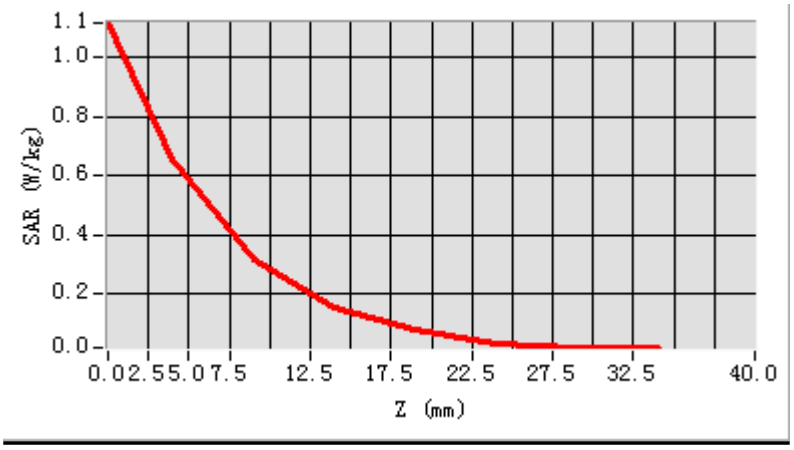
Frequency (MHz)	1852.400000
Relative permittivity (real part)	52.352141
Conductivity (S/m)	1.486027
Power drift (%)	-0.360000
Ambient Temperature:	22.7°C
Liquid Temperature:	22.3°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:1

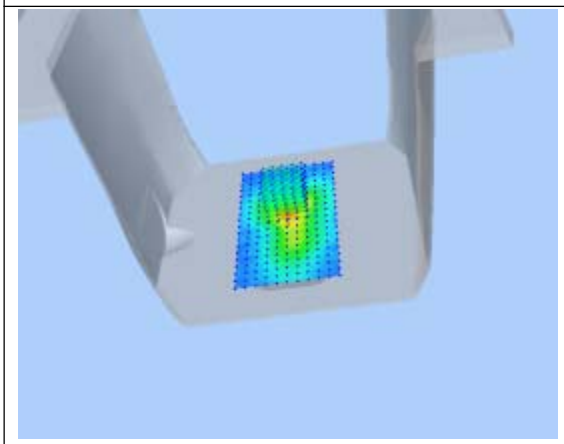
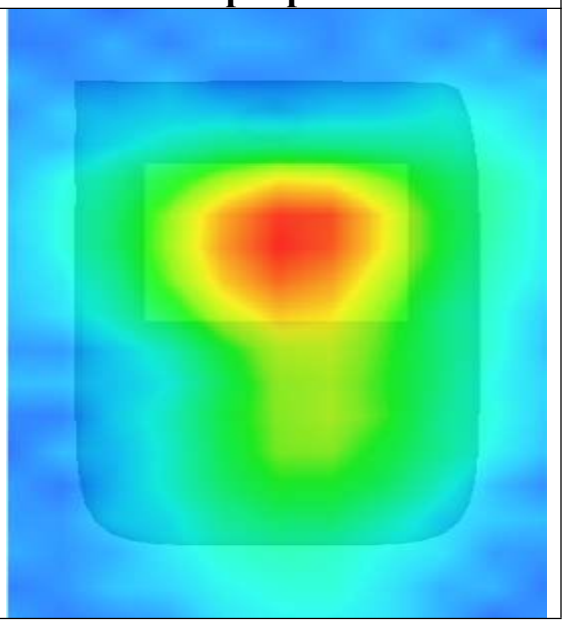
SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=18.00
SAR Peak: 1.27 W/kg

SAR 10g (W/Kg)	0.320865
SAR 1g (W/Kg)	0.683323

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 19

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 9 minutes 14 seconds

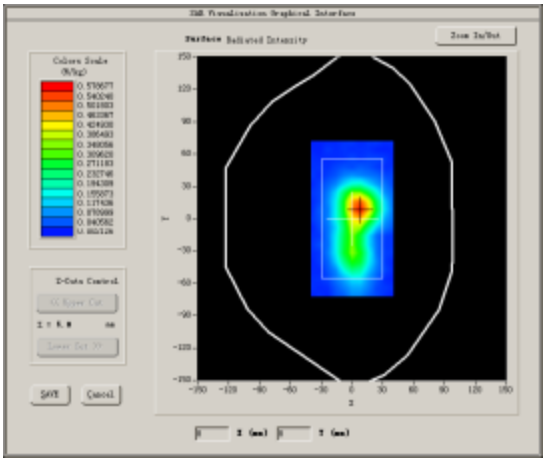
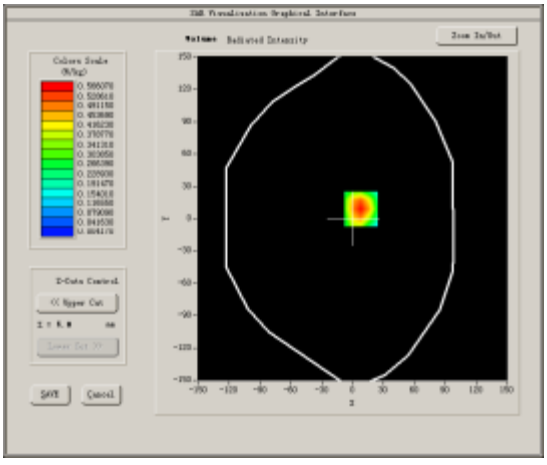
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	WCDMA1900
Channels	Low
Signal	CDMA

B. SAR Measurement Results

Lower Band SAR (Channel 9262):

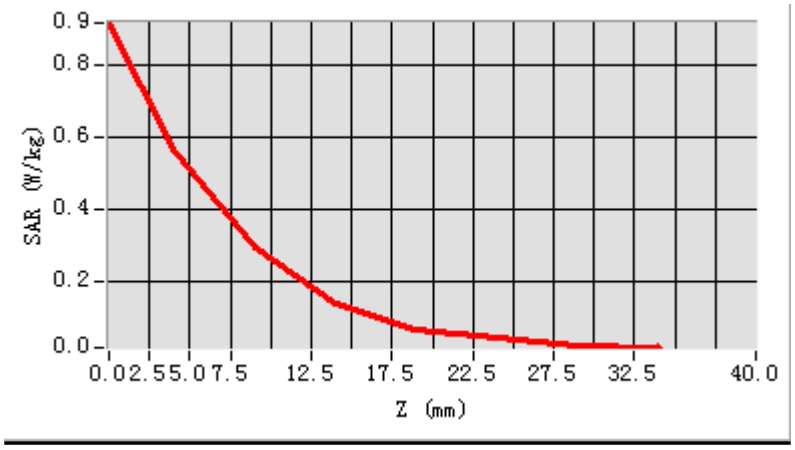
Frequency (MHz)	1852.400000
Relative permittivity (real part)	52.352141
Conductivity (S/m)	1.486027
Power drift (%)	-0.080000
Ambient Temperature:	22.7°C
Liquid Temperature:	22.3°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:1

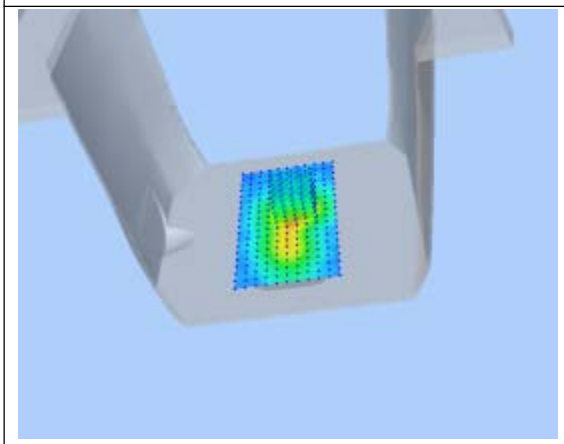
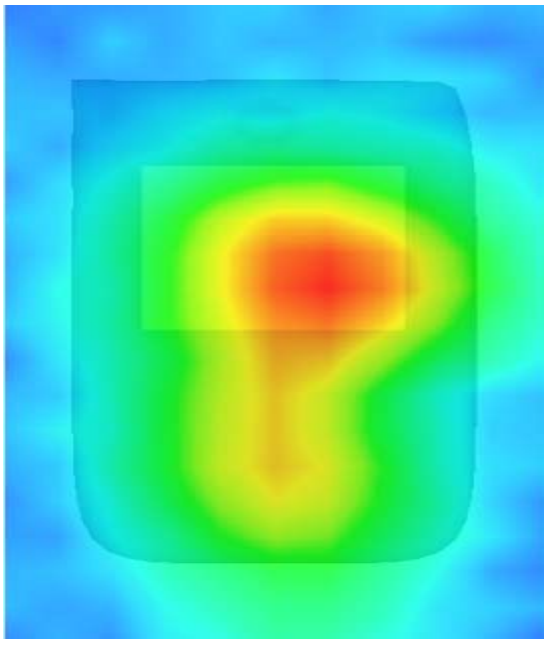
SURFACE SAR	VOLUME SAR
	

Maximum location: X=8.00, Y=9.00
SAR Peak: 1.01 W/kg

SAR 10g (W/Kg)	0.291563
SAR 1g (W/Kg)	0.582711

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 20

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 9 minutes 14 seconds

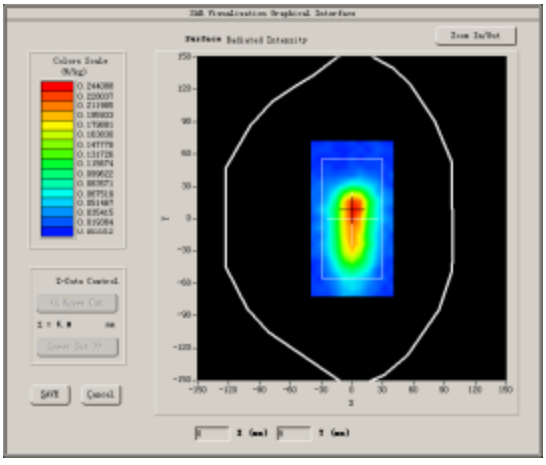
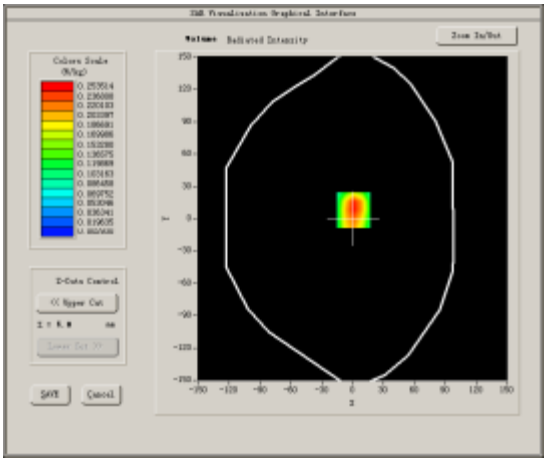
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	WCDMA1900
Channels	Low
Signal	CDMA

B. SAR Measurement Results

Lower Band SAR (Channel 9262):

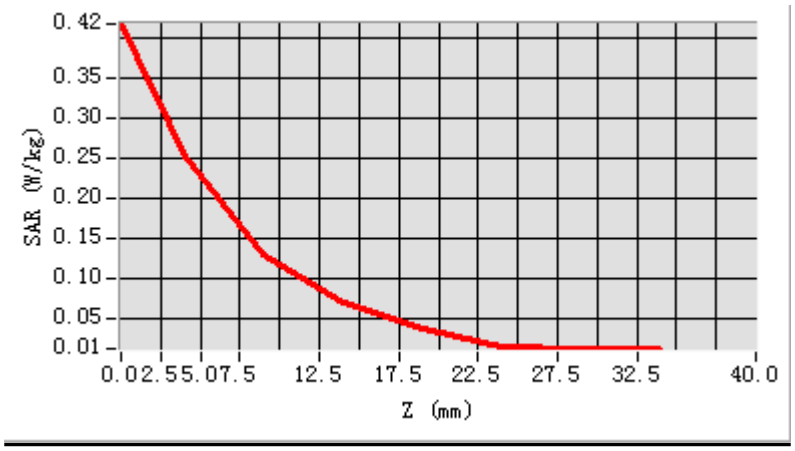
Frequency (MHz)	1852.400000
Relative permittivity (real part)	52.352141
Conductivity (S/m)	1.486027
Power drift (%)	-0.320000
Ambient Temperature:	22.7°C
Liquid Temperature:	22.3°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:1

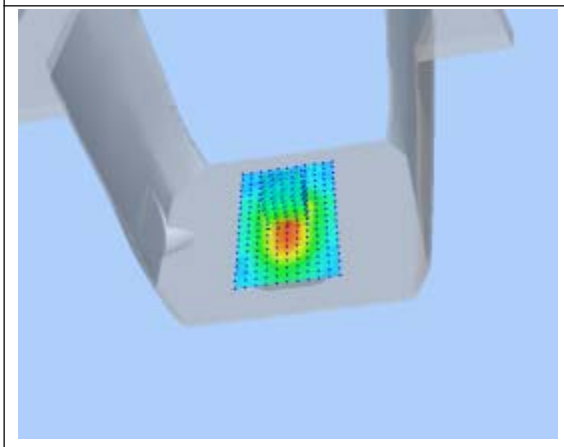
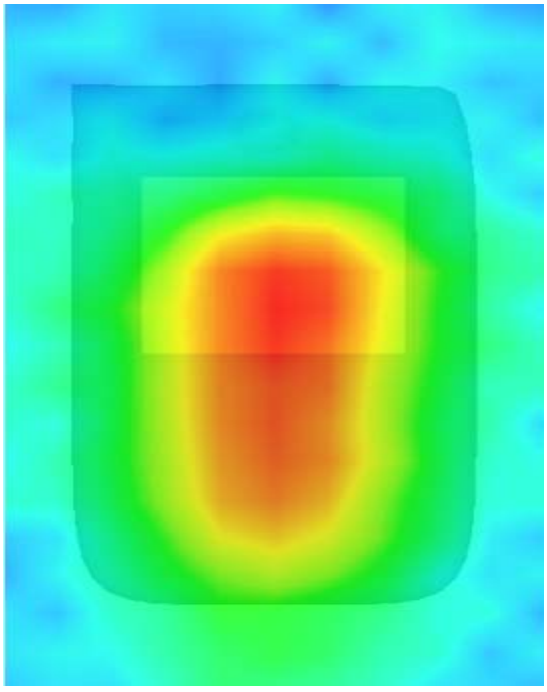
SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=8.00
SAR Peak: 0.49 W/kg

SAR 10g (W/Kg)	0.132062
SAR 1g (W/Kg)	0.268121

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 21

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 9 minutes 14 seconds

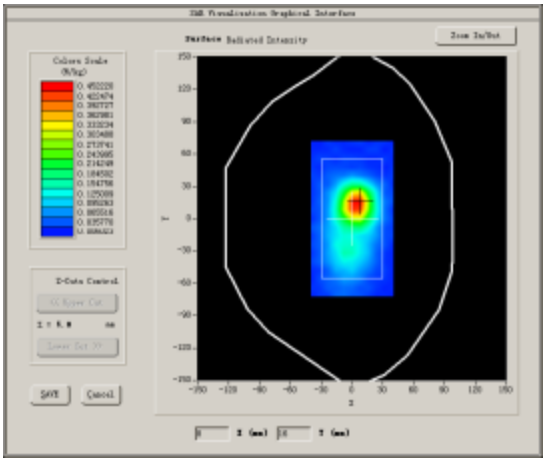
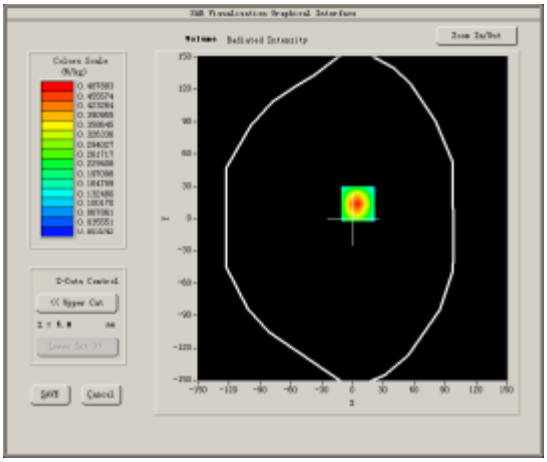
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	WCDMA1900
Channels	Low
Signal	CDMA

B. SAR Measurement Results

Lower Band SAR (Channel 9262):

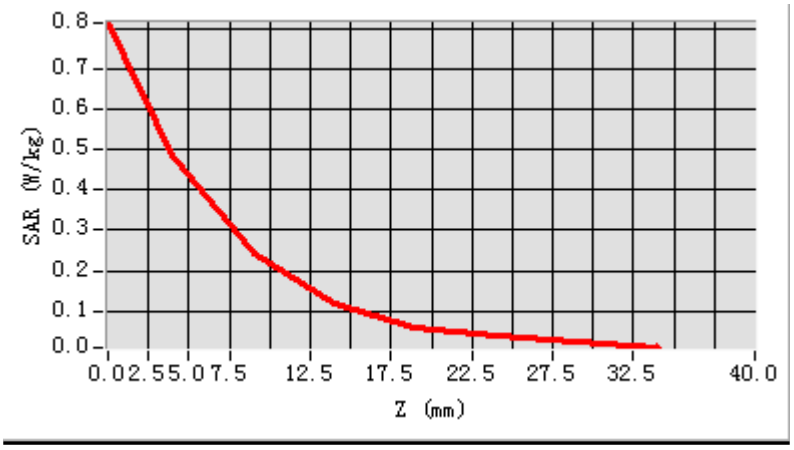
Frequency (MHz)	1852.400000
Relative permittivity (real part)	52.352141
Conductivity (S/m)	1.486027
Power drift (%)	-0.710000
Ambient Temperature:	22.7°C
Liquid Temperature:	22.3°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:1

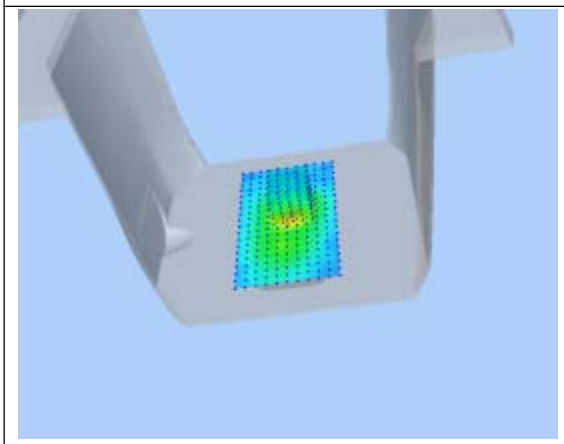
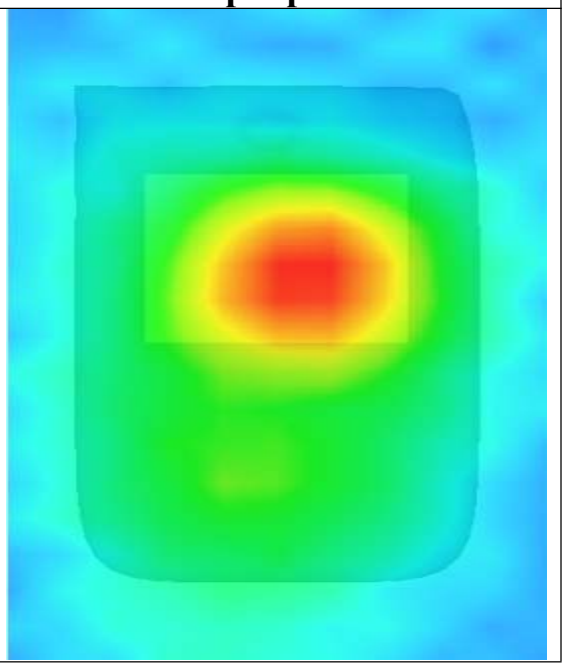
SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=14.00
SAR Peak: 0.88 W/kg

SAR 10g (W/Kg)	0.237877
SAR 1g (W/Kg)	0.496540

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 22

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2013.6.5
Measurement duration: 9 minutes 14 seconds

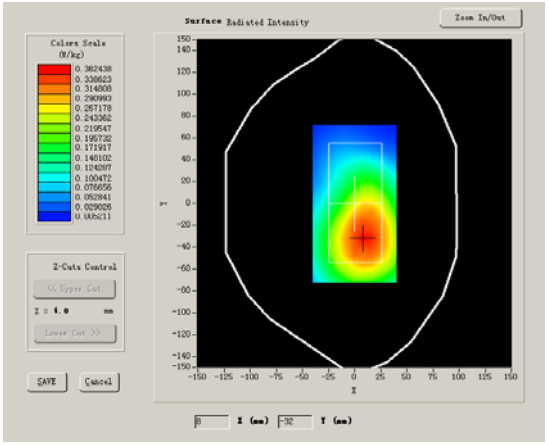
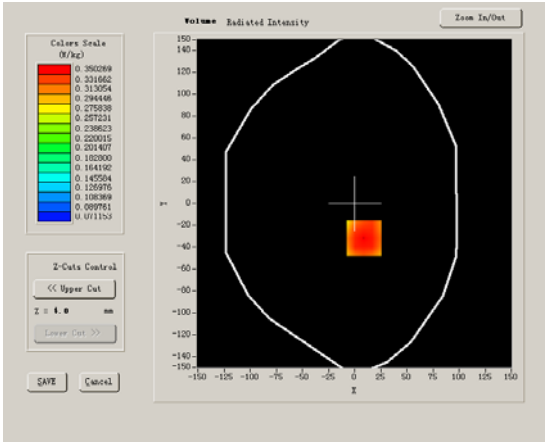
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	WCDMA1900
Channels	Low
Signal	CDMA

B. SAR Measurement Results

Lower Band SAR (Channel 9262):

Frequency (MHz)	1852.400000
Relative permittivity (real part)	52.352141
Conductivity (S/m)	1.486027
Power drift (%)	-0.650000
Ambient Temperature:	22.7°C
Liquid Temperature:	22.3°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:1

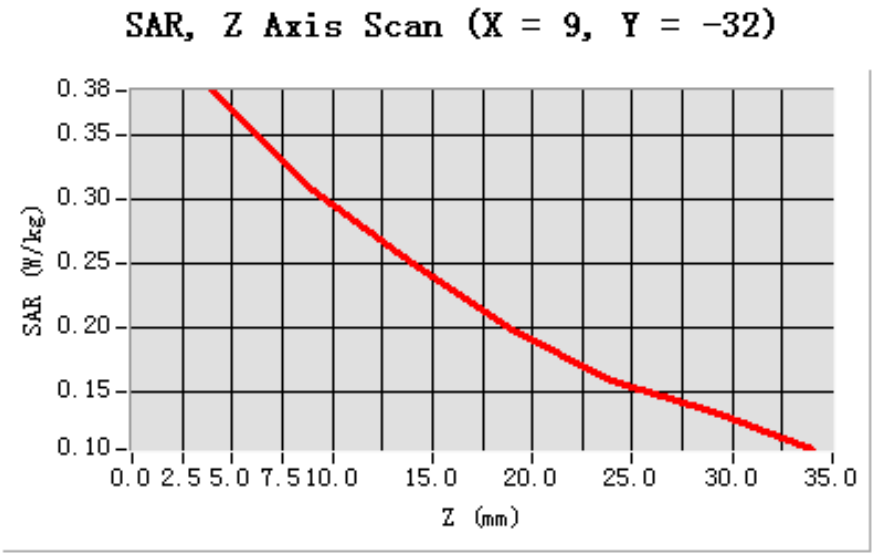
SURFACE SAR	VOLUME SAR
	

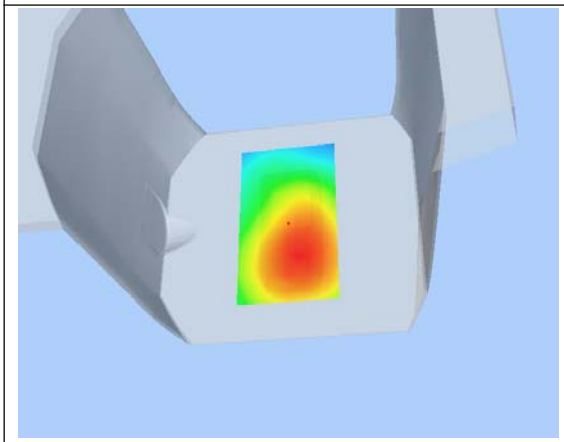
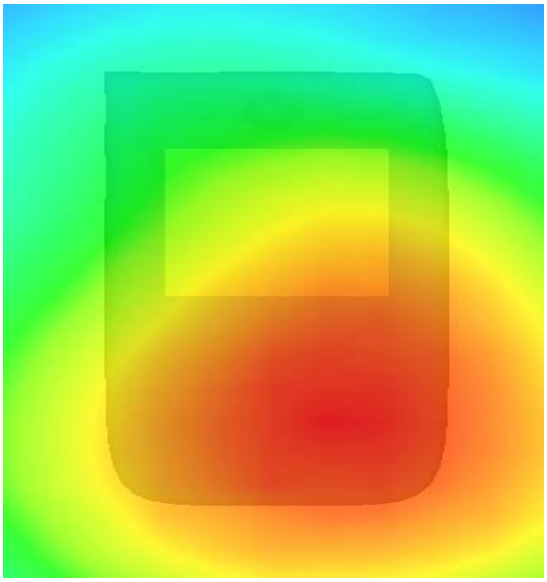
Maximum location: X=9.00, Y=-32.00

SAR 10g (W/Kg)	0.287823
SAR 1g (W/Kg)	0.373443

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.3845	0.3067	0.2497	0.1975	0.1580	0.1332



3D sceen shot	Hot spot position
	

System Performance Check Data(Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 27 seconds

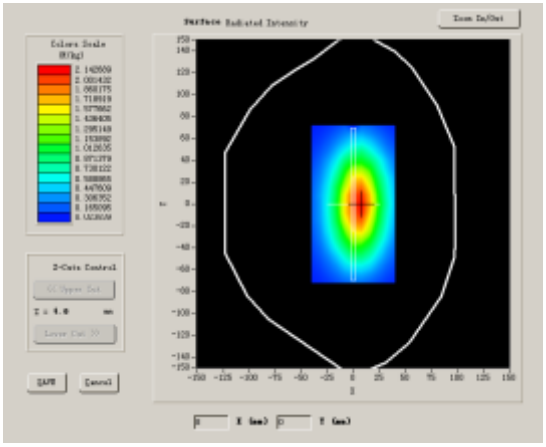
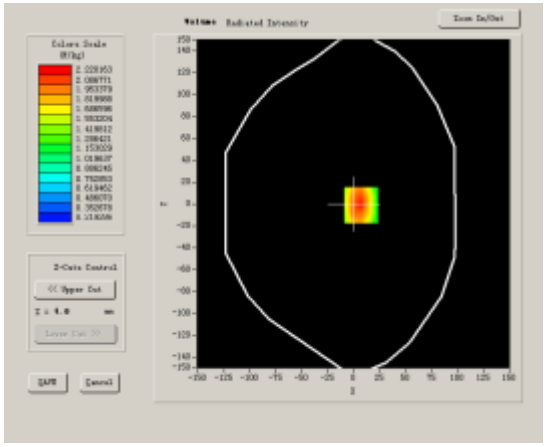
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	
Band	835MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	835.000000
Relative permittivity (real part)	54.512903
Conductivity (S/m)	0.961303
Power drift (%)	-0.170000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	28.559,25.681,27.588
Crest factor:	1:1

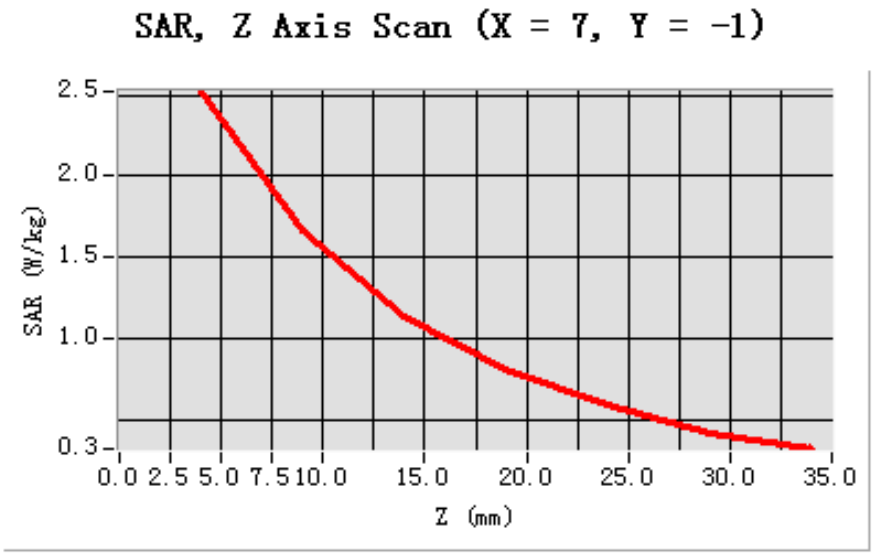
SURFACE SAR	VOLUME SAR
	

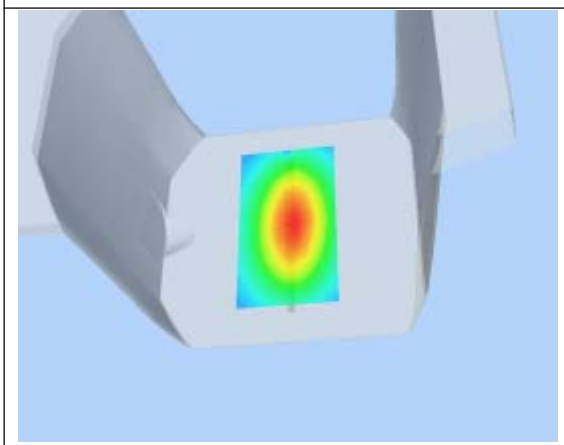
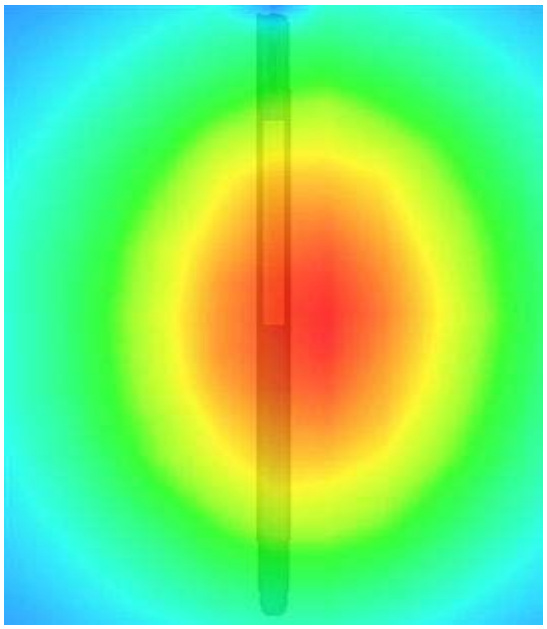
Maximum location: X=7.00, Y=-1.00

SAR 10g (W/Kg)	1.539476
SAR 1g (W/Kg)	2.367979

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	2.5209	1.6629	1.1437	0.8075	0.5889	0.4143



3D sceen shot	Hot spot position
	

System Performance Check Data(Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2013.5.10
Measurement duration: 13 minutes 26 seconds

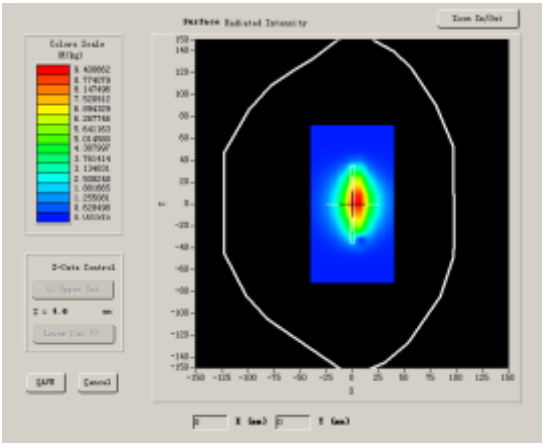
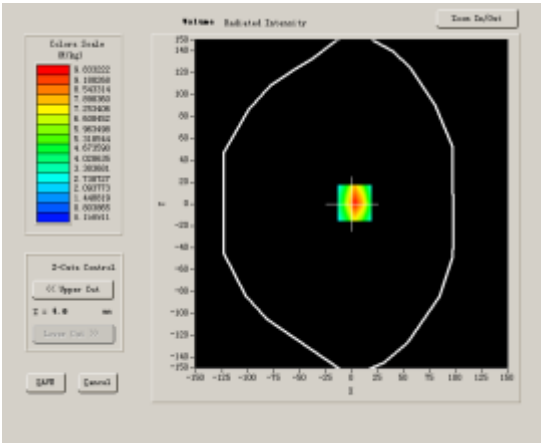
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	
Band	1900MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	1900.000000
Relative permittivity (real part)	52.352141
Conductivity (S/m)	1.486027
Power drift (%)	-0.030000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:1

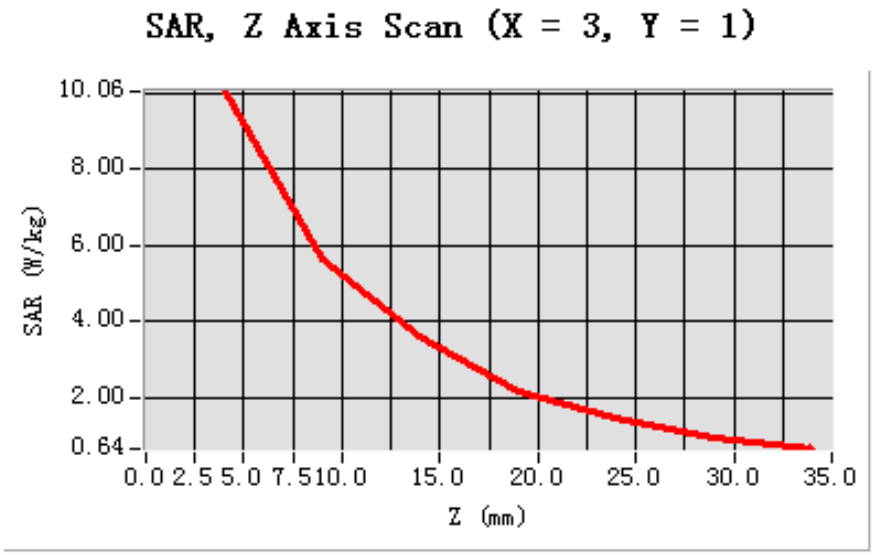
SURFACE SAR	VOLUME SAR
	

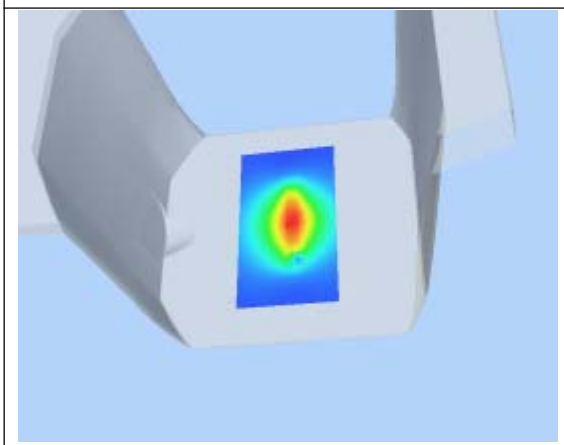
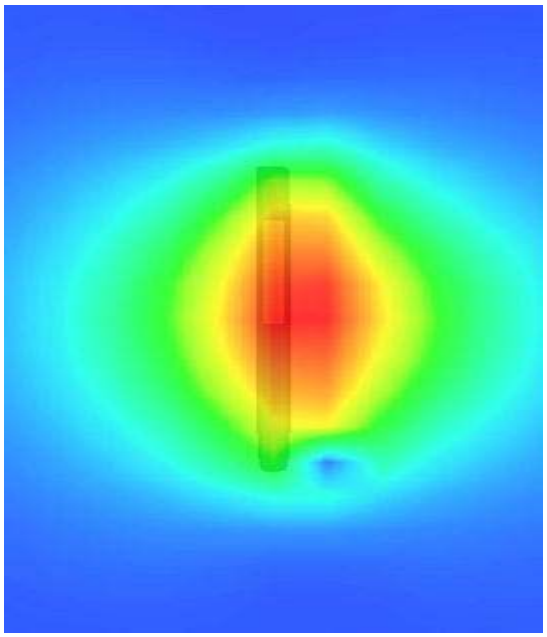
Maximum location: X=3.00, Y=1.00

SAR 10g (W/Kg)	4.981611
SAR 1g (W/Kg)	9.736177

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	10.0621	5.6445	3.6226	2.1642	1.4521	0.9078



3D sceen shot	Hot spot position
	

System Performance Check Data(Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2013.6.5
Measurement duration: 13 minutes 27 seconds

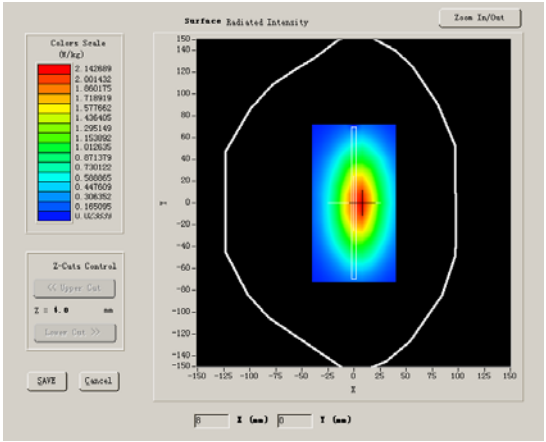
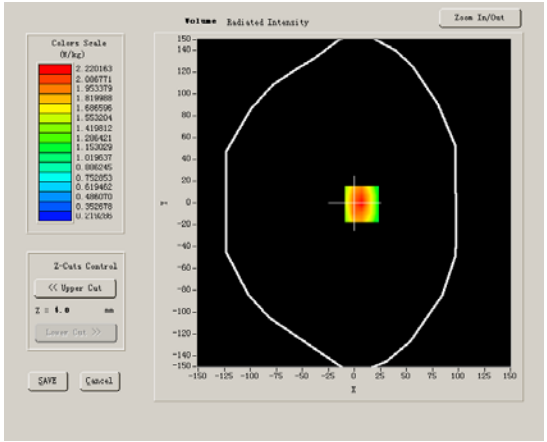
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	
Band	835MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	835.000000
Relative permittivity (real part)	54.321721
Conductivity (S/m)	0.943636
Power drift (%)	-0.170000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	28.559,25.681,27.588
Crest factor:	1:1

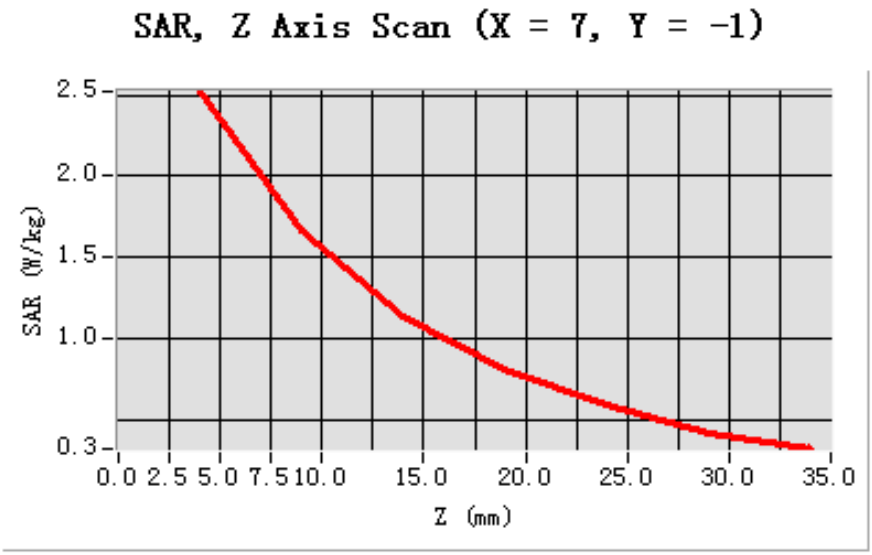
SURFACE SAR	VOLUME SAR
	

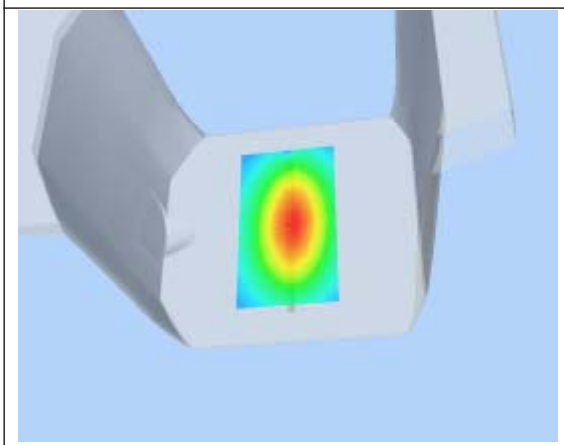
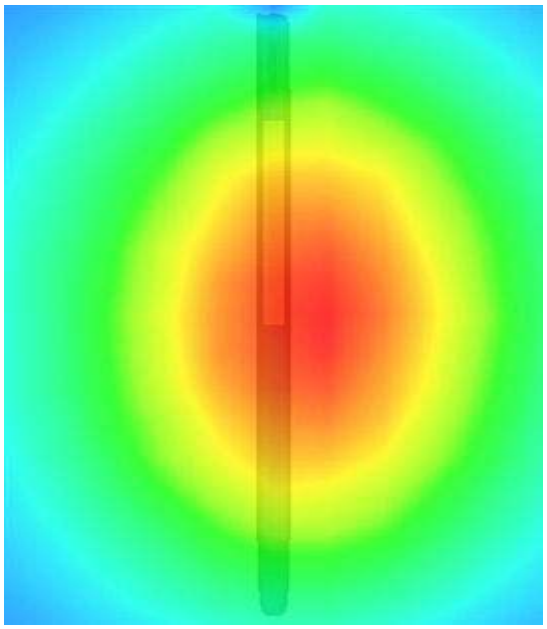
Maximum location: X=7.00, Y=-1.00

SAR 10g (W/Kg)	1.497122
SAR 1g (W/Kg)	2.379818

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	2.5209	1.6629	1.1437	0.8075	0.5889	0.4143



3D sceen shot	Hot spot position
	

System Performance Check Data(Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2013.6.5
Measurement duration: 13 minutes 26 seconds

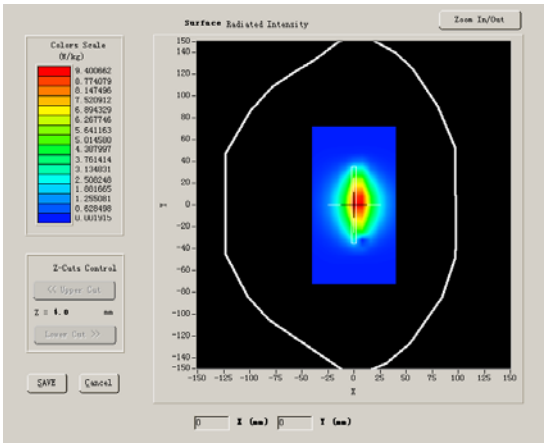
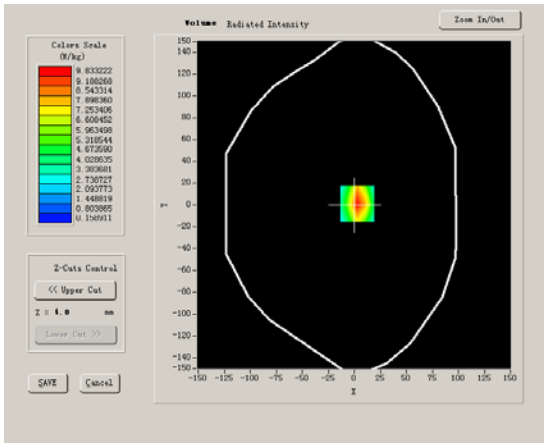
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat Plane
Device Position	
Band	1900MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	1900.000000
Relative permittivity (real part)	52.145621
Conductivity (S/m)	1.492018
Power drift (%)	-0.030000
Ambient Temperature:	23.2°C
Liquid Temperature:	22.6°C
ConvF:	40.625,34.773,38.535
Crest factor:	1:1

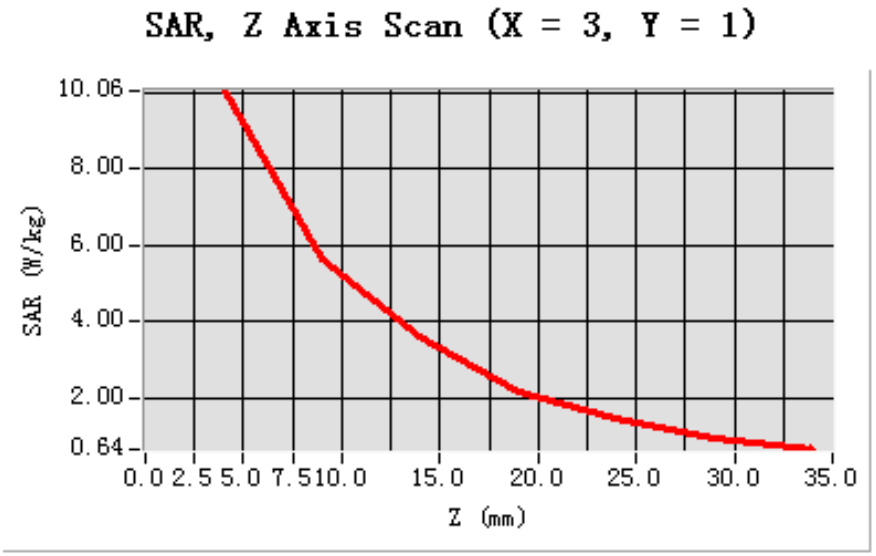
SURFACE SAR	VOLUME SAR
	

Maximum location: X=3.00, Y=1.00

SAR 10g (W/Kg)	4.981611
SAR 1g (W/Kg)	9.340177

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	10.0621	5.6445	3.6226	2.1642	1.4521	0.9078



3D sceen shot	Hot spot position