FCC SAR TEST REPORT

Report No.:	SET2013-05816
Product:	Mobilephone
Model No.:	ToughShield
FCC ID:	OHV-R500PLUS
Applicant:	Toughshield devices ltd
Address:	2nd Floor, Belgravia House, 34-44 Circular Road, Douglas, Isle of Man. IM1 1AE
Issued by:	CCIC-SET
Lab Location:	Electronic Testing Building, Shahe Road，Xili, Nanshan District, Shenzhen, 518055, P. R. China
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Test Report

Product.....:	Toughshield
Model No. .....:	R500+
Brand Name.....:	ToughShield
FCC ID.....:	OHV-R500PLUS
Applicant.....:	Toughshield devices ltd
Applicant Address.....:	2nd Floor, Belgravia House, 34-44 Circular Road, Douglas, Isle of Man. IM1 1AE
Manufacturer.....:	Toughshield devices ltd
Manufacturer Address.....:	2nd Floor, Belgravia House, 34-44 Circular Road, Douglas, Isle of Man. IM1 1AE
Test Standards.....:	**47CFR § 2.1093-** Radiofrequency Radiation Exposure Evaluation: Portable Devices; **FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01):** Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; **ANSI C95.1–1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz; **IEEE 1528–2003:** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques;
Test Result.....:	**Pass**

Tested by .....: Mei Chun **2013-12-04**

Mei Chun, Test Engineer

Reviewed by.....: Shuangwen Zhang **2013-12-04**

Shuangwen Zhang,Senior Egineer

Approved by.....: **2013-12-04**

Wu Li'an , Manager

Contents

This Test Report consists of the following Annexes:

1. GENERAL CONDITIONS

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

1.2 This report standalone dose not constitute or imply by its own an approval of the product by the certification Bodies or competent Authorities.

1.3 This document is only valid if complete; no partial reproduction can be made without written approval of CCIC-SET

1.4 This report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of CCIC-SET and the Accreditation Bodies, if it applies.

2. Administrative Date

2.1. Identification of the Responsible Testing Laboratory

Company Name:	CCIC-SET
Department:	EMC & RF Department
Address:	Electronic Testing Building, Shahe Road, Nanshan District, ShenZhen, P. R. China
Telephone:	+86-755-26629676
Fax:	+86-755-26627238
Responsible Test Lab Managers:	Mr. Wu Li'an

2.2. Identification of the Responsible Testing Location(s)

Company Name:	CCIC-SET
Address:	Electronic Testing Building, Shahe Road, Nanshan District, Shenzhen, P. R. China

2.3. Organization Item

CCIC-SET Report No.:	SET2013-05816
CCIC-SET Project Leader:	Mr. Li Sixiong
CCIC-SET Responsible for accreditation scope:	Mr. Wu Li'an
Start of Testing:	2013-09-28
End of Testing:	2013-09-29

2.4. Identification of Applicant

Company Name:	Toughshield devices ltd
Address:	2nd Floor, Belgravia House, 34-44 Circular Road, Douglas, Isle of Man. IM1 1AE

2.5. Identification of Manufacture

Company Name:	Toughshield devices ltd
Address:	2nd Floor, Belgravia House, 34-44 Circular Road, Douglas, Isle of Man. IM1 1AE

Notes: This data is based on the information by the applicant.

3. Equipment Under Test (EUT)

3.1. Identification of the Equipment under Test

Sample Name:	ToughShield	
Type Name:	R500+	
Brand Name:	ToughShield	
General description:	Support Band	GSM850MHz/1900MHz/900MHz/2100MHz WCDMA 850MHz/ 1900MHz/2100MHz Wi-Fi 2.4GHz/ Bluetooth 2.4GHz/GPS/NFC
	Test Band	GSM 850MHz/ GSM 1900MHz WCDMA 850MHz/ WCDMA 1900MHz Wi-Fi 802.11b
	Multislot Class	GPRS:Class 12
	GPRS Class	Class B
	Development Stage	Identical Prototype
	Accessories	Power Supply
	Battery type	TWS
	Battery specification	1500mAh 3.7V
	Antenna type	IFA Antenna
	Operation mode	GSM / GPRS/WCDMA / Bluetooth / WIFI/NFC/GPS
	Modulation mode	GMSK, 8PSK,QPSK, DSSS, OFDM, GFSK/π /4-DQPSK/8-DPSK
	Max. SAR Value	Head:1.170w/kg; Body:1.178w/kg

NOTE:

a. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

b. This device supports GPRS / EGPRS operation up to class12

(max.uplin:4, max.downlink:4, total timeslots:5)

c. The EUT does not support 16QAM uplink function in HSPA+ mode.

4 Specific Absorption Rate (SAR)

4.1 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.

4.2 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 (). The equation description is as below:

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

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

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

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

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

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.

4.3 Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SATIMO. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).

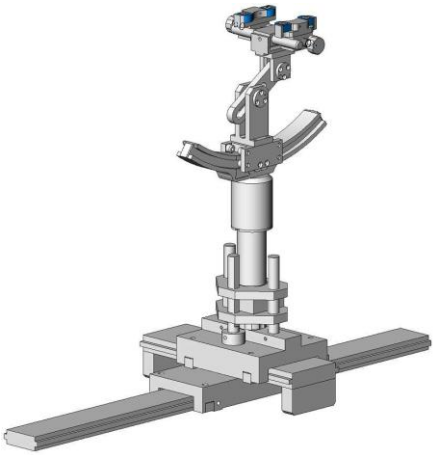
System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

SAM Twin Phantom

4.4 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SATIMO as an integral part of the COMOSAR test system.

The device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.



Device holder

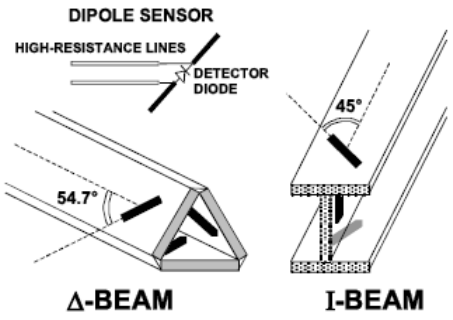
4.5 Probe Specification

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	700 MHz to 3 GHz; Linearity: ± 0.5 dB (700 MHz to 3 GHz)
Directivity	± 0.25 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	1.5 µW/g to 100 mW/g; Linearity: ± 0.5 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 5 mm (Body: 8 mm) Distance from probe tip to dipole centers: <2.7 mm
Application	General dosimetry up to 3 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones
Compatibility	COMOSAR

Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



5 OPERATIONAL CONDITIONS DURING TEST

5.1 Schematic Test Configuration

During SAR test, EUT was operating 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) was allocated to 128, 190 and 251 respectively in the case of GSM 850MHz, or to 512, 661 and 809 respectively in the case of PCS 1900MHz, or to 4132, 4183 and 4233 respectively in the case of WCDMA 850MHz, or to 9262, 9400 and 9538 respectively in the case of WCDMA 1900 MHz. The EUT was commanded to operate at maximum transmitting power.

The EUT should 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 was 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 should be lower than the output power level of the handset by at least 35 dB

5.2 SAR Measurement System

The SAR measurement system being used is the DASY4 system, the system is controlled remotely from a PC, which contains the software to control the robot and data acquisition equipment. The software also displays the data obtained from test scans.

In operation, the system first does an area (2D) scan at a fixed depth within the liquid from the inside wall of the phantom. When the maximum SAR point has been found, the system will then carry out a 3D scan centred at that point to determine volume averaged SAR level.

5.2.1 Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness Power drifts in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Table 1: Recommended Dielectric Performance of Tissue

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (Nacl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton x-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (s/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Table 2 Recommended Tissue Dielectric Parameters

Frequency (MHz)	Head Tissue		Body Tissue	
	ε_r	σ(S/m)	ε_r	σ(S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

5.2.2 Simulant liquids

For measurements against the phantom head, the “cheek” and “tilt” position on both the left hand and the right hand sides of the phantom. For body-worn measurements, the EUT was tested against flat phantom representing the user body. The EUT was put on in the belt holder. Simulant liquids that are used for testing at frequencies of GSM 850MHz, GSM

1900MHz, WCDMA 850MHz, WCDMA 1900MHz, and Wi-Fi 2.4GHz, which are made mainly of sugar, salt and water solutions may be left in the phantoms.

Table 3: Dielectric Performance of Head Tissue Simulating Liquid

Temperature: 23.2°C; Humidity: 64%;					
/	Frequency	Permittivity ε	Conductivity σ (S/m)	Deviation (%)	
Target value	835MHz	41.5	0.90	ε	σ
Validation value (September 28th, 2013)	835MHz	41.28	0.94	-0.5	4.4
Target value	1900MHz	40.0	1.40	--	--
Validation value (September 28th, 2013)	1900MHz	39.88	1.42	-0.3	1.4
Target value	2450MHz	39.2	1.80	--	--
Validation value (September 28th, 2013)	2450MHz	38.96	1.79	-0.5	-0.6

Table 4: Dielectric Performance of Body Tissue Simulating Liquid

Temperature: 23.2°C; Humidity: 64%;					
/	Frequency	Permittivity ε	Conductivity σ (S/m)	Deviation (%)	
Target value	835MHz	55.2	0.97	ε	σ
Validation value (September 29th, 2013)	835MHz	55.38	0.99	0.3	2.1
Target value	1900MHz	53.3	1.52	--	--
Validation value (September 29th, 2013)	1900MHz	53.67	1.51	0.7	-0.7
Target value	2450MHz	52.7	1.95	--	--
Validation value (September 29th, 2013)	2450MHz	52.68	1.97	-0.0	1.0

Table 5: Dielectric Performance of Tissue Simulating Liquid at test channel

Band	Channel	Frequency (MHz)	Permittivity ε		Conductivity σ (S/m)	
			Head	Body	Head	Body
GSM 850	128	824.2	41.94	0.92	55.96	0.97
	190	836.6	41.28	0.94	55.38	0.99
	251	848.8	40.92	0.95	55.12	1.01
GSM 1900	512	1850.2	41.25	1.36	54.25	1.46
	661	1880.0	40.84	1.39	53.98	1.49
	810	1909.8	39.72	1.42	53.43	1.51

WCDMA 850	4132	826.4	41.94	0.92	55.96	0.97
	4183	836.6	41.28	0.94	55.38	0.99
	4233	846.6	40.92	0.95	55.12	1.01
WCDMA 1900	9262	1852.4	41.25	1.36	54.25	1.46
	9400	1880.0	40.84	1.39	53.98	1.49
	9538	1907.6	39.72	1.42	53.43	1.51
WLAN	1	2412	39.47	1.78	52.95	1.94
	6	2437	39.12	1.79	52.70	1.97
	11	2462	38.84	1.81	52.33	2.02

According to Annex F (IEC62209-2), the delta SAR refers to the percent change in SAR relative to the percent change in dielectric properties versus the target values. A negative delta SAR would translate to a lower measured SAR value than what would be measured if using dielectric properties equal to the target values. A positive delta SAR would translate to a higher measured SAR value than what would be measured if using dielectric properties equal to the target values. SAR correction shall not be made when the delta SAR has a positive sign to provide a conservative SAR value. The SAR is only corrected when delta SAR has a negative sign. The Δ SAR were given as follow:

Table 6: Δ SAR of each band

Frequency	SAR correction formula	Δ SAR	
		Head	Body
835MHz	0.7521*Δ σ(%) - 0.2194*Δ ε(%)	>0	>0
1900MHz	0.594*Δ σ(%) - 0.1556*Δ ε(%)	>0	>0
2450MHz	0.4801*Δ σ(%) - 0.225*Δ ε(%)	>0	>0

Since each band has a positiveΔ SAR, the SAR correction is not required.

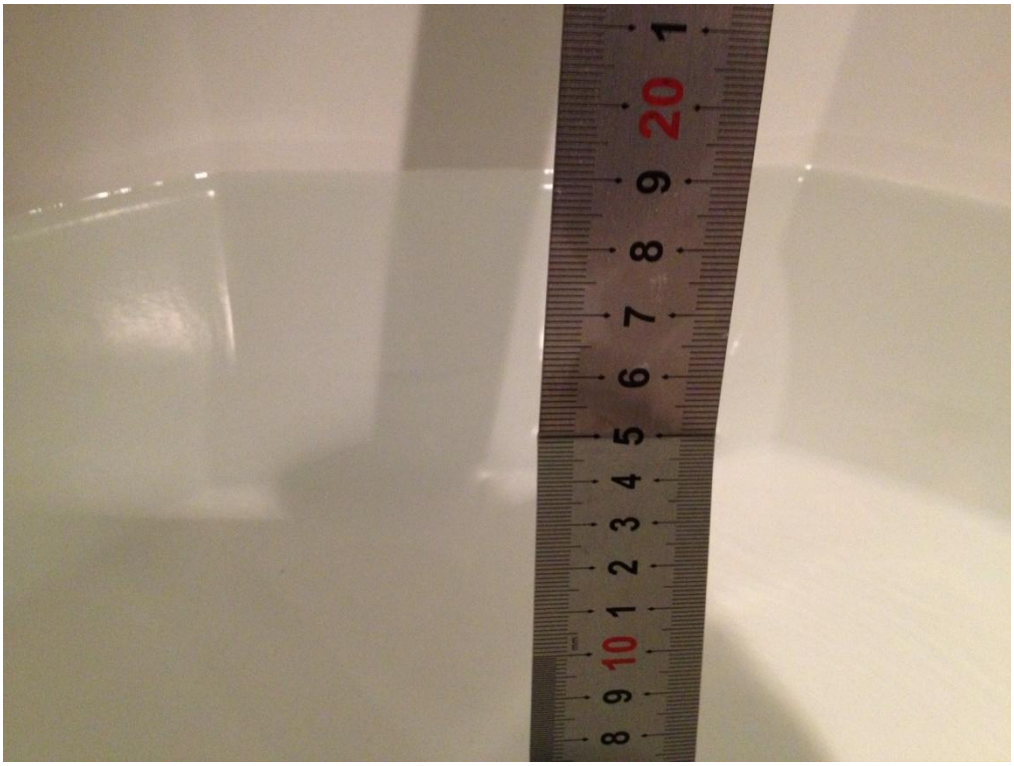


Fig. 1 Configuration of body tissue

5.3 Equipments and results of validation testing

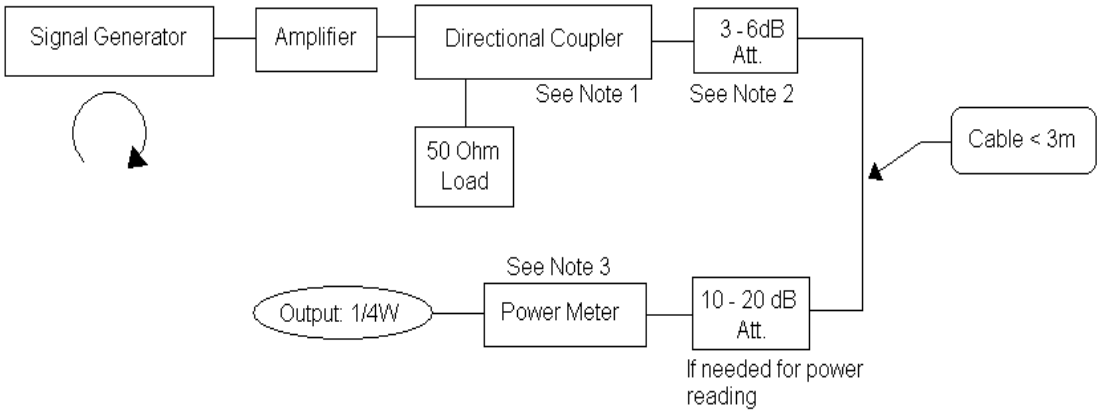
Important equipments :

Equipment description	Manufacturer/Model	Identification No.
System Simulator	E5515C	GB 47200710
SAR Probe	SATIMO	SN 09/13 EP169
Dipole	SID835	SN 09/13 DIP 0G835-217
Dipole	SID1900	SN 09/13 DIP 1G900-218
Dipole	SID2450	SN 09/13 DIP 2G450-220
Vector Network Analyzer	ZVB8	A0802530
Signal Generator	SMR27	A0304219
Amplifier	Nucletudes	143060
Power Meter	NRVS	1020.1809.02
Power Sensor	NRV-Z4	100069
Multimeter	Keithley-2000	4014020
Device Holder	SATIMO	SN 09/13 MSH80
SAM Phantom	SAM97	SN 09/13 SAM97

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

The following procedure, recommended for performing validation tests using box phantoms is based on the procedures described in the draft IEEE standard P1528. Setup

according to the setup diagram below :



With the SG and Amp and with directional coupler in place, set up the source signal at the relevant frequency and use a power meter to measure the power at the end of the SMA cable that you intend to connect to the balanced dipole. Adjust the SG to make this, say, 0.25W (24 dBm). If this level is too high to read directly with the power meter sensor, insert a calibrated attenuator (e.g. 10 or 20 dB) and make a suitable correction to the power meter reading.

Note 1: In this method, the directional coupler is used for monitoring rather than setting the exact feed power level. If, however, the directional coupler is used for power measurement, you should check the frequency range and power rating of the coupler and measure the coupling factor (referred to output) at the test frequency using a VNA.

Note 2: Remember that the use of a 3dB attenuator (as shown in Figure 8.1 of P1528) means that you need an RF amplifier of 2 times greater power for the same feed power. The other issue is the cable length. You might get up to 1dB of loss per meter of cable, so the cable length after the coupler needs to be quite short.

Note 3: For the validation testing done using CW signals, most power meters are suitable. However, if you are measuring the output of a modulated signal from either a signal generator or a handset, you must ensure that the power meter correctly reads the modulated signals.

The measured 1-gram averaged SAR values of the device against the phantom are provided in Tables 7 and Table 8. The humidity and ambient temperature of test facility were 64% and 23.2°C respectively. The body phantom were full of the body tissue simulating liquid. The EUT was supplied with full-charged battery for each measurement.

The distance between the back of the EUT and the bottom of the flat phantom is 10 mm (taking into account of the IEEE 1528 and the place of the antenna).

Table 7: Head Liquid Verification Results (1g)

Frequency	Duty cycle	Target value （W/kg）	Test value (W/kg)		Deviation (%)
			250 mW	1W	
835MHz (September 28th, 2013)	1:1	9.72	2.47	9.88	3.3
1900MHz (September 28th, 2013)	1:1	40.95	9.79	39.16	-1.4
2450MHz (September 28th, 2013)	1:1	53.33	13.16	52.64	0.5

Note: Target value was referring to the required value in the calibration certificate of reference dipole.

Note: All SAR values are normalized to 1W forward power.

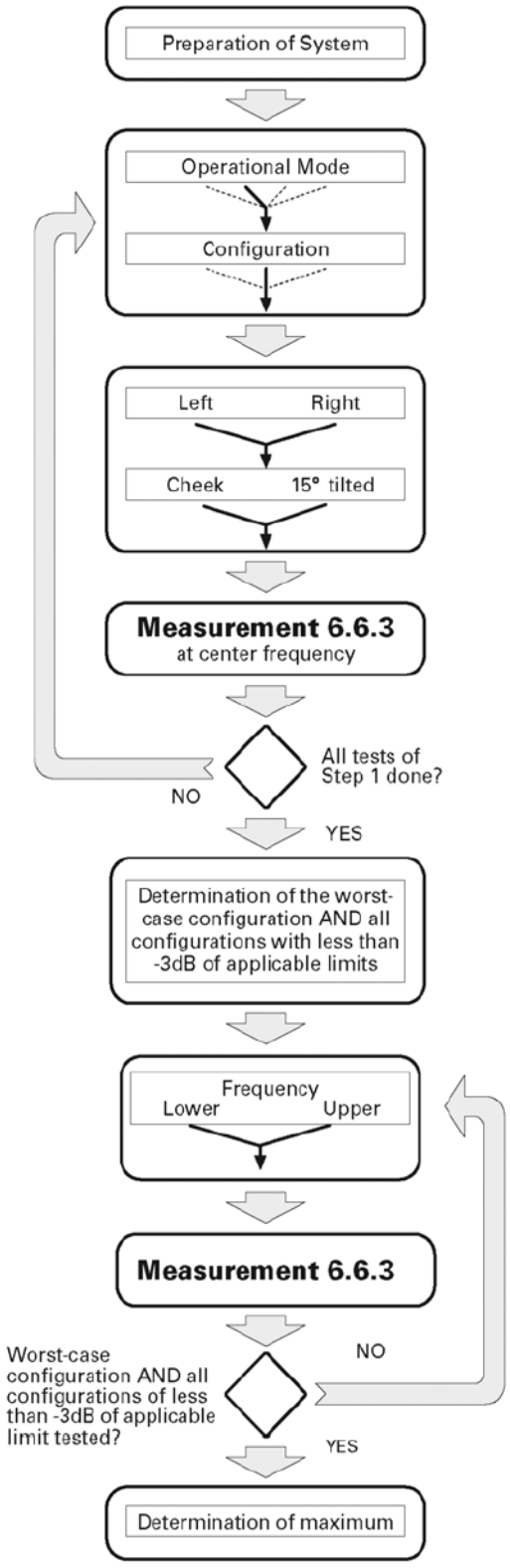
Table 8: Body Liquid Verification Results (1g)

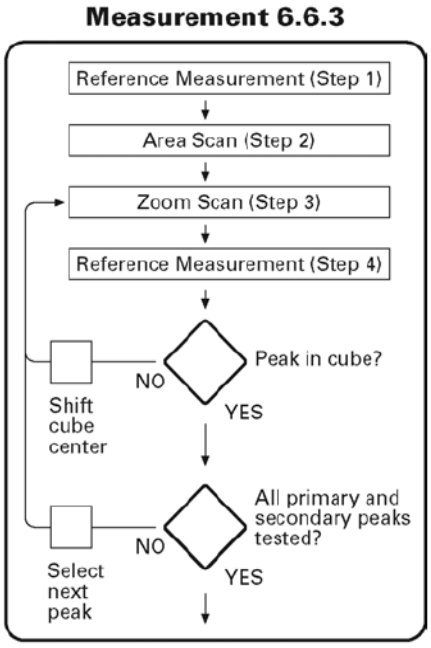
Frequency	Duty cycle	Target value （W/kg）	Test value (W/kg)		Deviation (%)
			250 mW	1W	
835MHz (September 29th, 2013)	1:1	9.92	2.43	9.72	-0.6
1900MHz (September 29th, 2013)	1:1	40.29	9.99	39.96	-0.8
2450MHz (September 29th, 2013)	1:1	51.99	13.12	52.48	0.9

*Note: All SAR values are normalized to 1W forward power.

5.4 SAR measurement procedure

The SAR test against the head phantom was carried out as follow:





Establish a call with the maximum output power with a base station simulator, the connection between the EUT and the base station simulator is established via air interface.

After an area scan has been done at a fixed distance of 8mm from the surface of the phantom on the source side, a 3D scan is set up around the location of the maximum spot SAR. First, a point within the scan area is visited by the probe and a SAR reading taken at the start of testing. At the end of testing, the probe is returned to the same point and a second reading is taken. Comparison between these start and end readings enables the power drift during measurement to be assessed.

Above is the scanning procedure flow chart and table from the IEEEp1528 standard. This is the procedure for which all compliant testing should be carried out to ensure that all variations of the device position and transmission behaviour are tested.

For body-worn measurement, the EUT was tested under two position: face upward and back upward.

5.5 Transmitting antenna information

There are four antennas (GSM antenna, WCDMA antenna, BT/Wi-Fi antenna and GPS antenna) inside the EUT, the former three antennas are the transmitting source, and they are a type of IFA antenna.

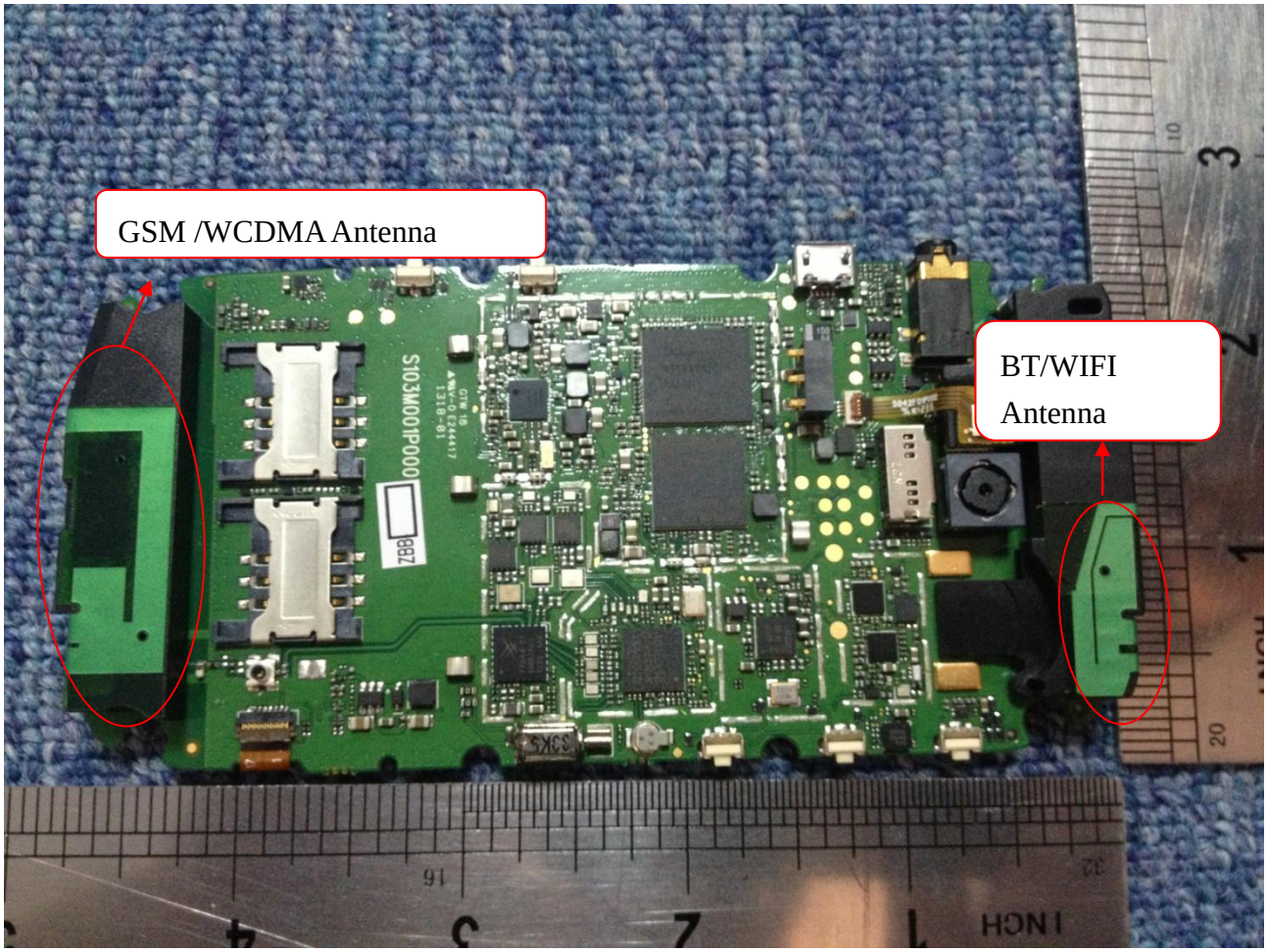
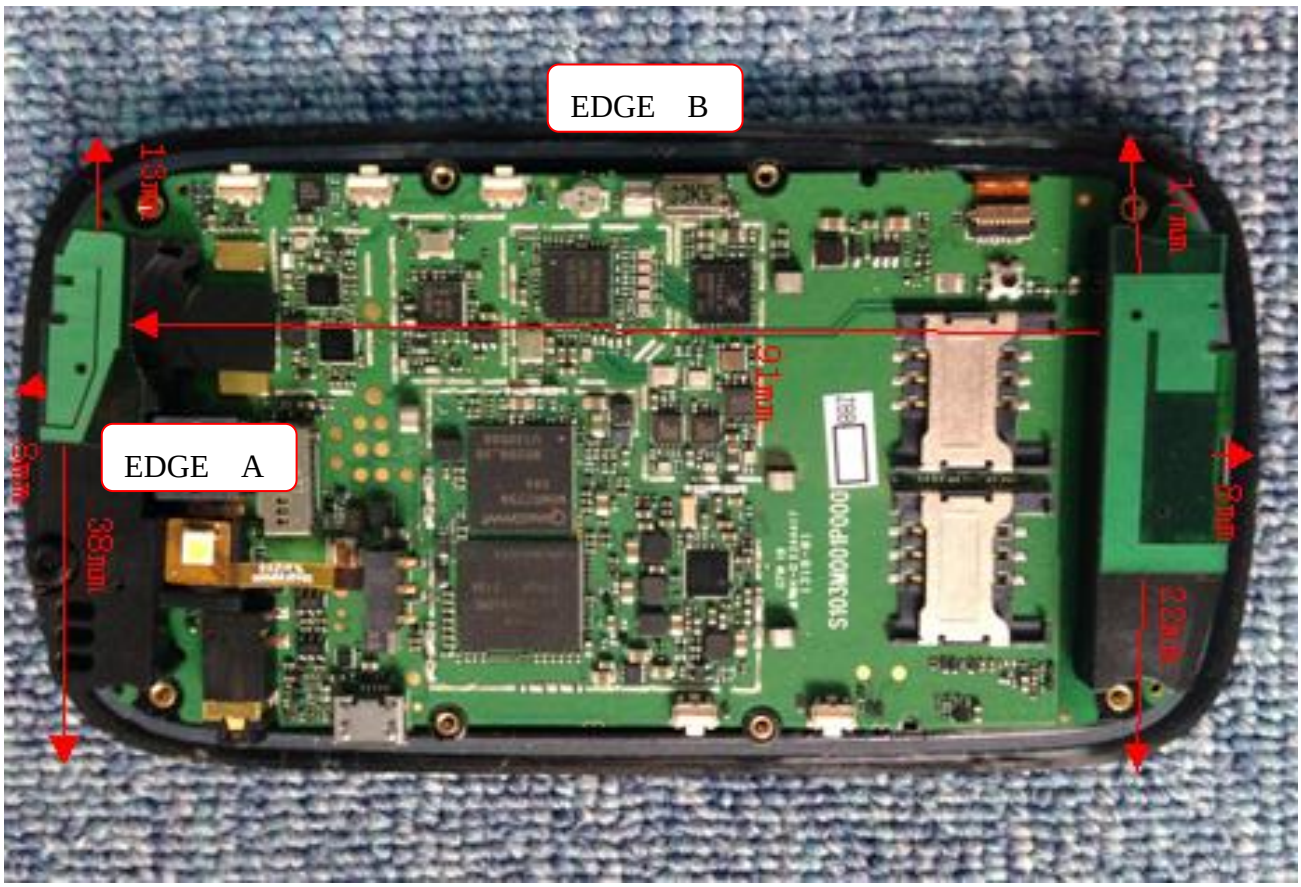


Fig. 3 Position of the antennas


EDGE B
EDGE A
19mm
91mm
38mm
8mm
2.0mm

6 CHARACTERISTICS OF THE TEST

6.1 Applicable Limit Regulations

47CFR § 2.1093- Radiofrequency Radiation Exposure Evaluation: Portable Devices;

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

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

RSS-102–2010: Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

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 cm of the user in the uncontrolled environment.

6.2 Applicable Measurement Standards

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this is in accordance with the following standards:

FCC 47 CFR Part2 (2.1093)
ANSI/IEEE C95.1-1992
IEEE 1528-2003
IC RSS 102 Issue 4
FCC KDB 447498 D01 v05r01 General RF Exposure Guidance v05r01
FCC KDB 648474 D04 v01r01 SAR Evaluation Considerations for Wireless Handsets
FCC KDB 248227 D01 v01r02 SAR Measurement Procedures-802.11a/b/g Transmitters
FCC KDB 865664 D01 v01r01 SAR Measurement 100MHz to 6GHz
FCC KDB 865664 D02 v01r01 SAR Reporting
FCC KDB 941225 D01 SAR test for 3G devices v02
FCC KDB 941225 D02 HSPA and 1x Advanced v02r02
FCC KDB 941225 D03 v01 Recommended SAR Test Reduction Procedures for GSM/GPRS/EDGE
FCC KDB 941225 D04 v01 Evaluating SAR for GSM/(E)GPRS Dual Transfer Mode

7 LABORATORY ENVIRONMENT

7.1 The Ambient Conditions during SAR Test

Temperature	Min. = 15 ° C, Max. = 30 ° C
Atmospheric pressure	Min.=86 kPa, Max.=106 kPa
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.	

7.2 Test Configuration

For WWAN SAR testing, the device was controlled by using a base station emulator. Communication between the device and the emulator was established by air link. The distance between the EUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30dB smaller than output power of EUT.

During WLAN SAR testing EUT is configured with the WLAN continuous TX tool, and the transmission duty factor was monitored on the spectrum analyzer with zero-span setting

Duty factor observed as below:

WLAN 2.4GHz 802.11b, 1Mbps:97.5%

For WLAN SAR testing, WLAN engineering testing software installed on the EUT can provide continuous transmitting RF signal.

8.Conducted RF Output Power

8.1 GSM Conducted Power

Band		Burst Average Power (dBm)			Frame-Average Power (dBm)		
GSM850	TX Channel	128	189	251	128	189	251
	Frequency(MHz)	824.2	836.6	848.8	824.2	836.6	848.8
	GSM (GMSK, 1 Tx slot)	32.75	32.87	32.83	23.72	23.84	23.80
	GPRS(GMSK, 1 Tx slot)	26.44	26.29	26.55	17.41	17.26	17.52
	GPRS(GMSK, 2 Tx slot)	27.36	27.25	27.55	21.34	21.23	21.53
	GPRS(GMSK, 3 Tx slot)	29.27	29.17	29.48	25.01	24.91	25.22
	GPRS(GMSK, 4 Tx slot)	32.15	32.34	32.28	29.14	29.33	29.27
	EDGE(8PSK, 1 Tx slot)	26.49	26.34	26.63	17.46	17.31	17.60
	EDGE(8PSK, 2 Tx slot)	27.45	27.61	27.35	21.43	21.59	21.33
	EDGE(8PSK, 3 Tx slot)	29.35	29.56	29.44	25.09	25.30	25.18
	EDGE(8PSK, 4 Tx slot)	32.72	32.90	32.85	29.71	29.89	29.84
GSM1900	TX Channel	512	661	810	512	661	810
	Frequency(MHz)	1850.2	1880.0	1909.8	1850.2	1880.0	1909.8
	GSM (GMSK, 1 Tx slot)	28.85	28.85	28.44	19.82	19.82	19.41
	GPRS(GMSK, 1 Tx slot)	23.24	26.32	26.43	14.21	17.29	17.4
	GPRS(GMSK, 2 Tx slot)	24.27	27.25	27.36	18.25	21.23	21.34
	GPRS(GMSK, 3 Tx slot)	25.13	25.27	25.18	20.87	21.01	20.92
	GPRS(GMSK, 4 Tx slot)	27.75	27.75	27.52	24.74	24.74	24.51
	EDGE(8PSK, 1 Tx slot)	23.24	26.32	26.43	14.21	17.29	17.4
	EDGE(8PSK, 2 Tx slot)	25.27	25.25	25.36	19.25	19.23	19.34

	EDGE(8PSK, 3 Tx slot)CS5	27.13	27.27	27.18	22.87	23.01	22.92
	EDGE(8PSK, 4 Tx slot)CS5	29.11	29.18	28.87	26.10	26.17	25.86

Note:

1. Per KDB 447498 D01 v05r01, the maximum output power channel is used for SAR testing and for further SAR test reduction.

Timeslot consignations:

No. Of Slots	Slot 1	Slot 2	Slot 3	Slot 4
Slot Consignation	1Up4Down	2Up3Down	3Up2Down	4Up1Down
Duty Cycle	1:8	1:4	1:2.67	1:2
Correct Factor	-9.03dB	-6.02dB	-4.26dB	-3.01dB

8.2 WCDMA Conducted peak output Power

Item	band	WCDMA 850			WCDMA 1900		
	ARFCN	4132	4183	4233	9262	9400	9538
	subtest	dBm			dBm		
5.2(WCDMA)	non	23.62	23.69	23.62	23.32	23.40	23.35
HSDPA	1	23.58	23.63	23.61	23.08	23.13	23.12
	2	23.53	23.61	23.57	23.23	23.25	23.21
	3	23.07	23.15	23.13	23.09	23.15	23.05
	4	23.04	23.12	23.11	23.05	23.12	23.10
HSUPA	1	23.57	23.61	23.55	23.21	23.22	23.12
	2	22.66	22.72	22.67	21.49	21.54	21.45
	3	23.58	23.60	23.66	22.53	22.56	22.49
	4	22.63	22.71	22.63	21.49	21.53	21.52
	5	23.55	23.61	23.60	23.39	23.51	23.41

HSPA+	1	23.55	23.59	23.52	23.49	23.50	23.49
Note:	The Conducted RF Output Power test of WCDMA /HSDPA /HSUPA /HSPA+ was tested by power meter.						

Note:

1. WCDMA SAR was tested under PMC 12.2kbps with HSPA Inactive per KDB Publication 941225 D01.HSPA SAR was not requires since the average output power of the HSPA subtests was not more than 0.25dB higher than the RMC level and SAR was less than 1.2W/kg.
2. It is expected by the manufacturer that MPR for some HSPA subtests may be up to 2dB more than specified by 3GPP,but also as low as 0dB according to the chipset implementation in this model.

8.3 WLAN 2.4GHz Band Conducted Power

Channel	Frequency (MHz)	WIFI Output Power(dBm)		
		802.11b	802.11g	802.11n-20
CH 01	2412	14.24	13.39	13.28
CH 06	2437	14.32	13.47	13.39
CH 11	2462	14.22	13.35	13.27

Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at lowest data rate
3. Per KDB 248227 D01 v01r02, 11g and 11n-HT20 output power is less than 1/4dB higher than 11b mode. Thus the SAR can be excluded.

Bluetooth Conducted Power

Channel	Frequency (MHz)	BT Output Power(dBm)		
		GFSK	π /4-DQPSK	8-DPSK
CH 0	2402	1.23	0.42	0.42
CH 39	2441	0.40	-0.52	-0.22
CH 78	2480	0.41	-0.59	-0.27

Note:

1. Per KDB 447498 D01v05r01, the 1-g and 10-g SAR test exclusion thrssholds for 100MHz to 6GHz at test separation distances ≤ 50mm are determined by:[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] • [$\sqrt{f}$ (GHz)] ≤3.0 for 1-g SAR and ≤7.5 for 10-g extremity SAR

   (1) f(GHz) is the RF channel transmit frequency in GHz

   (2) Power and distance are round to the nearest mW and mm before calculation

   (3) The result is rounded to one decimal place for comparison

   (4) If the test separation diatance(antenna-user) is < 5mm, 5mm is used for excluded SAR calculation

Bluetooth Max Power (dBm)	mW	Test Distance (mm)	Frequency(Ghz)	Exclusion Thresholds
2	1.585	5	2.4	0.491

2. Per KDB 447498 D01v05r01 exclusion thresholds is 0.491<3, RF exposure evaluation is not required.

SAR DATA SUMMARY

General Note:

1. Per KDB 447498 D01v05r01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power(mW)/EUT RF power(mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle , the measured SAR is scaled-up by the duty cycle scaling factor which is equal to “1/(duty cycle)”
   c. For WWAN: Reported SAR(W/kg)=Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For WLAN: Reported SAR(W/kg)=Measured SAR(W/kg)*Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v05r01, for each exposure position, if the highest output channel reported SAR≤0.8W/kg, other channels SAR testing is not necessary.
3. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to “1/(duty cycle)”
4. Body-worn SAR testing was performed at 10mm separation, and this distance is determined by the handset manufacturer that there will be body-worn accessories with the required minimum separation.
5. Per KDB 648474 D04v01r01,when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤1.2W/kg, SAR testing with a headset connected to the handset is not required.

6. Scaling Factor calculation

Operation Mode	Channel	Max. Output Power(dBm)	Tune up Power in tolerance(dBm)	Scaling Factor
GSM 850	128	32.75	32±1	1.059
	189	32.87	32±1	1.030
	251	32.83	32±1	1.040
GPRS 850	189	32.34	32±1	1.164
EDGE 850	189	32.90	32±1	1.023
GSM 1900	512	28.85	28±1	1.035
	661	28.85	28±1	1.035
	880	28.44	28±1	1.138
GPRS1900	512	27.75	27±1	1.059
	661	27.75	27±1	1.059
	810	27.52	27±1	1.117
EDGE1900	512	29.11	29±1	1.227
	661	29.18	29±1	1.208
	810	28.87	29±1	1.030
WCDMA850	4132	23.62	23±1	1.091
	4182	23.69	23±1	1.074
	4233	23.62	23±1	1.091
WCDMA1900	9262	23.32	23±1	1.169
	9400	23.40	23±1	1.148
	9538	23.35	23±1	1.161
802.11b	2437	14.32	14±1	1.169
Bluetooth	0	1.23	1±1	1.194

Simultaneous SAR

Description of Simultaneous Transmit Capabilities			
No.	Transmitter Combinations	Scenario Supported or not	Supported for Mobile Hotspot or not
1	GSM(Voice)+GSM(Data)	No	No
2	WCDMA(Voice)+WCDMA(Data)	Yes	No
3	GSM(Voice)+ WCDMA(Data)	No	No
4	WCDMA(Voice)+GSM(Data)	No	No
5	GSM(Voice)+ WCDMA(Voice)	No	No
6	GSM(Voice)+Wifi(/BT)	Yes	No
7	WCDMA(Voice) +Wifi(/BT)	Yes	No
8	WCDMA(Voice)+WCDMA(Data)+ Wifi(/BT)	Yes	No
9	GSM(Data)+wifi	Yes	No
10	WCDMA(Data) +wifi	Yes	No

Not applicable	Applicable	Head	Body-worn	Hotspot
1,3,4,5	2,6,7,8,9.10	2,6,7,8	2,6,7,8	-

Note :

1. This device does not support hotspot mode.

2. EUT system architecture support simultaneous voice and data(except on WCDMA), multiple voice channels, or multiple data channels during a single session on the cellular net work.

3. WCDMA supports voice and data transmission simultaneously.

4. Simultaneous Transmission SAR evaluation is not required for BT and WiFi, because the software mechanism have been incorporated to gurantee that the WLAN and Bluetooth transmitters would not simultaneously operate.

5. For Scenario No.2,7.8,10 , WCDMA and WiFi is tested separately, the WCDMA mode is test with 12.2kbps RMC and TPC set to all “1”, if maximum SAR for 12.2kbps RMC is≤75% of the SAR limit(i.e. 1.2W/kg 1g) and maximum average output of each RF channel with HSDPA/HSUPA active is less than 1/4 dB Middle than that measured without HSDPA/HSUPA using 12.2kbps RMC, according to KDB 941224 D01v02, SAR is not required for this handset with HSPA capabilities.

Applicable Multiple Scenario Evaluation

Test Position	WCDMA&GSM SAR Max.(W/Kg)	Wifi SAR Max.(W/Kg)	Bluetooth Max.(W/Kg)	∑1-gSARMAX.(W/Kg)	
				BT&Main Ant	Wifi&Main Ant
Head SAR	1.170	0.026	0.065	1.235	1.196
Body SAR	1.178	0.103	0.033	1.211	1.281

Simultaneous Transmission SAR evaluation is not required for Wifi and WCDMA&GSM, because the sum of 1g SAR Max is 1.281W/Kg<1.6 W/Kg for Wifi and WCDMA&GSM.
Simultaneous Transmission SAR evaluation is not required for BT and WCDMA&GSM, because the sum of 1g SAR Max is 1.211W/Kg<1.6 W/Kg for BT and WCDMA&GSM.
(According to KDB 447498D01v05,the sum of the Highest reported SAR of each antenna does not exceed the limit, simultaneous transmission SAR evaluation is not required.)

9 TEST RESULTS

9.1 Summary of Power Measurement Results

According the description above, the measurements against the head phantom were executed on the operation mode: GSM 850 MHz/1900MHz,GPRS 850 MHz /1900MHz, WCDMA850MHz and WCDMA1900MHz,,while the tests against the body-worn were carried out on the operation mode: GSM 850 MHz/1900MHz, GPRS 850 MHz /1900MHz, EDGE850 MHz /1900MHz, WCDMA850MHz and WCDMA1900MHz,WIFI 802.11b..

Table 10: SAR Values of GSM 850MHz Band

Temperature: 23.0~23.5°C, humidity: 62~64%.					
Test Positions			Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)	
				SAR(W/Kg1g Peak)	Scaled SAR(W/Kg),1g
Right Side of Head	Cheek		128/824.2	0.622	0.659
			190/836.6	**0.641**	0.660
			251/848.8	0.634	0.659
	Tilt 15 degrees		128/824.2	0.421	0.446
			190/836.6	0.445	0.459
			251/848.8	0.436	0.453
Left Side of Head	Cheek		128/824.2	0.524	0.555
			190/836.6	0.556	0.573
			251/848.8	0.542	0.564
	Tilt 15 degrees		190/836.6	0.375	0.397
	GSM	Face Upward	189/836.6	0.391	0.403
		Back Upward	128/824.2	0.782	0.828
			190/836.6	**0.807**	0.832
			190/836.6 repeated result	**0.793**	0.817
			251/848.8	0.762	0.792
	GPRS	Face Upward	190/836.6	0.369	0.430
		Back Upward	190/836.6	0.303	0.353
	EDGE	Face Upward	190/836.6	0.297	0.304
		Back Upward	190/836.6	0.218	0.223

Table 11: SAR Values of GSM1900 MHz Band

Temperature: 23.0~23.5°C, humidity: 62~64%.					
Test Positions			Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)	
				SAR(W/Kg1g Peak)	Scaled SAR(W/Kg),1g
Right Side of Head	Cheek		661/1880.0	0.332	0.344
	Tilt 15 degrees		661/1880.0	0.092	0.095
Left Side of Head	Cheek		661/1880.0	**0.392**	0.406
	Tilt 15 degrees		661/1880.0	0.145	0.150
Body (10mm Separation)	GSM	Face Upward	661/1880.0	0.372	0.385
		Back Upward	512/1850.2	0.477	0.494
			661/1880.0	0.485	0.502
			810/1909.8	0.425	0.483
	GPRS	Face Upward	661/1880.0	0.329	0.348
		Back Upward	512/1850.2	0.497	0.526
			661/1880.0	**0.506**	0.536
			810/1909.8	0.452	0.505
	EDGE	Face Upward	661/1880.0	0.312	0.377
		Back Upward	512/1850.2	0.425	0.522
			661/1880.0	0.437	0.528
			810/1909.8	0.393	0.405

Table 12: SAR Values of WCDMA850

Temperature: 23.0~23.5°C, humidity: 62~64%.				
Test Positions		Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)	
			SAR(W/Kg1g Peak)	Scaled SAR(W/Kg),1g
Right Side of Head	Cheek	4132/826.4	0.987	1.077
		4183/836.6	**1.089**	1.170
		4183/836.6 repeated result	**0.993**	1.066
		4233/846.6	0.986	1.076
	Tilt 15 degrees	4132/826.4	0.834	0.910
		4183/836.6	0.852	0.915
		4183/836.6 repeated result	0.837	0.899
		4233/846.6	0.832	0.908
Left Side of Head	Cheek	4132/826.4	0.924	1.008
		4183/836.6	0.936	1.005
		4183/836.6 repeated result	0.928	0.997
		4233/846.6	0.915	0.999
	Tilt 15 degrees	4132/826.4	0.562	0.613
		4183/836.6	0.579	0.622
		4233/846.6	0.563	0.614
Body (10mm Separation)	Face upward	4182/836.6	0.372	0.400
	Back upward	4132/826.4	0.487	0.532
		4183/836.6	**0.508**	0.546
		4233/846.6	0.485	0.529

Table 13: SAR Values of WCDMA1900

Temperature: 23.0~23.5°C, humidity: 62~64%.				
Test Positions		Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)	
			SAR(W/Kg1g Peak)	Scaled SAR(W/Kg),1g
Right Side of Head	Cheek	9262/1852.4	0.587	0.686
		9400/1880.0	0.628	0.721
		9538/1907.6	0.592	0.688
	Tilt 15 degrees	9400/1880.0	0.236	0.271
Left Side of Head	Cheek	9262/1852.4	0.968	1.132
		9400/1880.0	**1.013**	1.163
		9400/1880.0 repeated result	**0.991**	1.138
		9538/1907.6	0.972	1.129
	Tilt 15 degrees	9400/1880.0	0.384	0.441
Body (10mm Separation)	Face upward	9262/1852.4	0527	0.616
		9400/1880.0	0.560	0.643
		9538/1907.6	0.534	0.620
	Back Upward	9262/1852.4	0.965	1.129
		9400/1880.0	**1.026**	1.178
		9400/1880.0 repeated result	**0.978**	1.123
		9538/1907.6	0.942	1.094

Table 14:SAR Values of Wi-Fi 802.11b

Temperature: 23.0~23.5°C, humidity: 62~64%.				
Test Positions		Channel /Frequency (MHz)	SAR(W/Kg), 1.6 (1g average)	
			SAR(W/Kg1g Peak)	Scaled SAR(W/Kg),1g
Right Side of Head	Cheek	6/2437	**0.022**	0.026
	Tilt 15 degrees	6/2437	0.011	0.013
Left Side of Head	Cheek	6/2437	0.008	0.009
	Tilt 15 degrees	6/2437	0.004	0.005
802.11b(10mm Separation)	Face Upward	6/2437	0.023	0.027
	Back Upward	6/2437	**0.088**	0.103
	Edge A	6/2437	0.045	0.053
	Edge B	6/2437	0.034	0.040

Note:

a) According to KDB 941225 D01, since the maximum average output of each RF channel with HSDPA/HSUPA active is less than that measured without HSDPA/HSUPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is less 1.2 W/kg, the measurement against HSDPA and HSUPA were ignored in this report.

b) When the 1-g SAR for the mid-band channel or the channel with the Highest output power satisfy the following conditions, testing of the other channels in the band is not required.(Per KDB 447498 D01 General RF Exposure Guidance v05)

• ≤ 0.8 W/kg, when the transmission band is ≤ 100 MHz
• ≤ 0.6 W/kg, when the transmission band is between 100 MHz and 200 MHz
• ≤ 0.4 W/kg, when the transmission band is ≥ 200 MHz

8.3 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 6 of this report. Maximum localized SAR is **below** exposure limits specified in the relevant standards.

10 Measurement Uncertainty

No.	Uncertainty Component	Type	Uncertainty Value (%)	Probability Distribution	k	ci	Standard Uncertainty (%) ui(%)	Degree of freedom Veff or vi
	Measurement System							
1	—Probe Calibration	B	7	N	3	1	3.5	∞
2	—Axial isotropy	B	4.7	R	$\sqrt{3}$	0.5	4.3	∞
3	—Hemispherical Isotropy	B	9.4	R	$\sqrt{3}$	0.5	4.3	∞
4	—Boundary Effect	B	11.0	R	$\sqrt{3}$	1	6.4	∞
5	—Linearity	B	4.7	R	$\sqrt{3}$	1	2.7	∞
6	—System Detection Limits	B	1.0	R	$\sqrt{3}$	1	0.6	∞
7	—Readout Electronics	B	1.0	N	3	1	1.00	∞
8	—Response Time	B	0.00	R	$\sqrt{3}$	1	0.00	∞
9	—Integration Time	B	0.00	R	$\sqrt{3}$	1	0.00	∞
10	—RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.73	∞
11	—Probe Position Mechanical tolerance	B	0.4	R	$\sqrt{3}$	1	0.2	∞
12	—Probe Position with respect to Phantom Shell	B	2.9	R	$\sqrt{3}$	1	1.7	∞
13	—Extrapolation, Interpolation and Integration Algorithms for Max. SAR evaluation	B	3.9	R	$\sqrt{3}$	1	2.3	∞
	Uncertainties of the DUT							
14	—Position of the DUT	A	4.8	N	3	1	4.8	5
15	—Holder of the DUT	A	7.1	N	3	1	7.1	5

16	—Output Power Variation –SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.9	∞
	Phantom and Tissue Parameters							
17	—Phantom Uncertainty(shape and thickness tolerances)	B	1.0	R	$\sqrt{3}$	1	0.6	∞
18	—Liquid Conductivity Target –tolerance	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
19	—Liquid Conductivity –measurement Uncertainty)	B	0.23	N	3	1	0.23	9
20	—Liquid Permittivity Target tolerance	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
21	—Liquid Permittivity –measurement uncertainty	B	0.46	N	3	1	0.46	∞
Combined Standard Uncertainty				RSS			12.92	44.15
Expanded uncertainty (Confidence interval of 95 %)				K=2			25.84	

11 MAIN TEST INSTRUMENTS

No	EQUIPMENT	TYPE	Series No.	Due Date
1	System Simulator	E5515C	GB 47200710	2014/02/23
2	SAR Probe	SATIMO	SN 09/13 EP169	2014/04/04
3	Dipole	SID835	SN 09/13 DIP 0G835-217	2014/04/04
4	Dipole	SID1900	SN 09/13 DIP 1G900-218	2014/04/04
5	Dipole	SID2450	SN 09/13 DIP 2G450-220	2014/04/04
6	Vector Network Analyzer	ZVB8	A0802530	2014/06/13
7	Signal Generator	SMR27	A0304219	2014/06/10
8	Amplifier	Nucletudes	143060	2014/04/05
9	Power Meter	NRVS	1020.1809.02	2014/06/13
10	Power Sensor	NRV-Z4	100069	2014/06/10
11	Multimeter	Keithley-2000	4014020	2014/01/29
12	Device Holder	SATIMO	SN 09/13 MSH80	2014/04/04
13	SAM Phantom	SAM97	SN 09/13 SAM97	2014/04/04

ANNEX A

of

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2013-05816

Brighter wireless Technology(Beijing) Company Limited

ToughShield

Type Name: R500+

Hardware Version： S103M001P000

Software Version： R500+_VER_2.0_01010_20130820

Accreditation Certificate

This Annex consists of 2 pages

Date of Report: 2013-12-4

China National Accreditation Service for Conformity Assessment

LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L1659)

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

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is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) *for the competence of testing and calibration.*

The scope of accreditation is detailed in the attached appendices bearing the same registration number as above. The appendices form an integral part of this certificate.

Date of Issue: 2012-09-29

Date of Expiry: 2015-09-28

Date of Initial Accreditation: 1999-08-03

Date of Update: 2012-09-29

Signed on behalf of China National Accreditation Service for Conformity Assessment

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No.CNAS AL 2

0005210

ANNEX B

of

CCIC-SET

CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2013-05816

Brighter wireless Technology(Beijing) Company Limited

ToughShield

Type Name: R500+

Hardware Version： S103M001P000

Software Version： R500+_VER_2.0_01010_20130820

TEST LAYOUT

This Annex consists of 4 pages

Date of Report: 2013-12-4

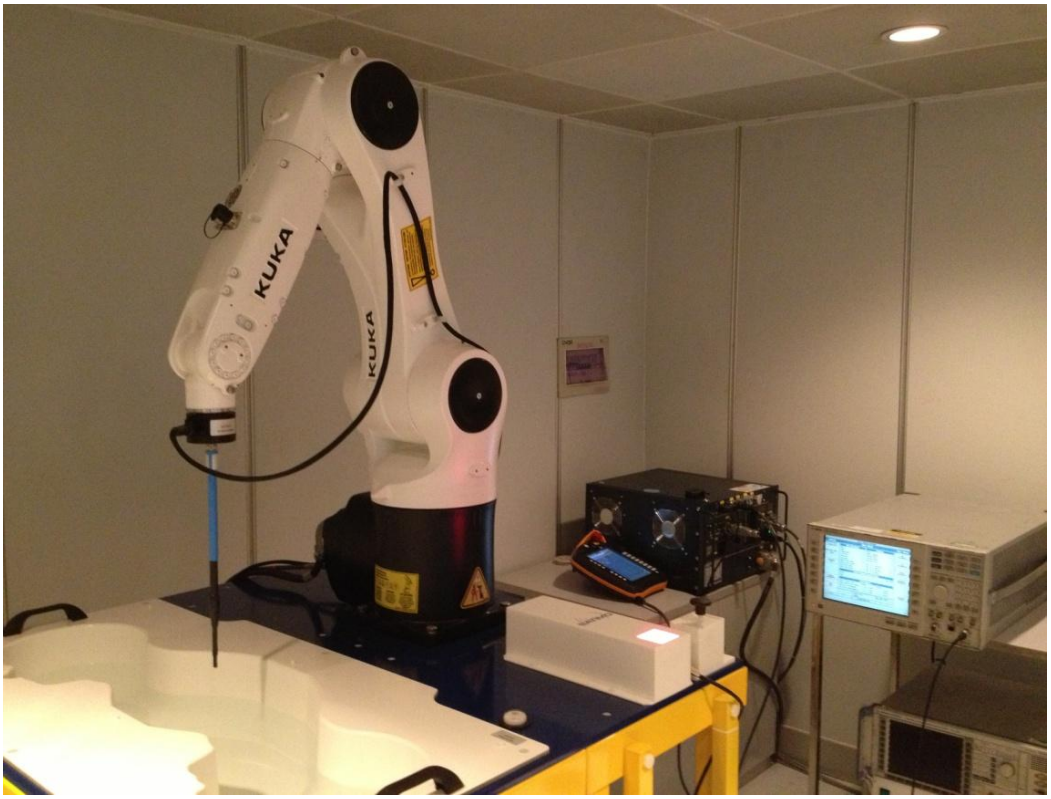


Fig.1 COMO SAR Test System

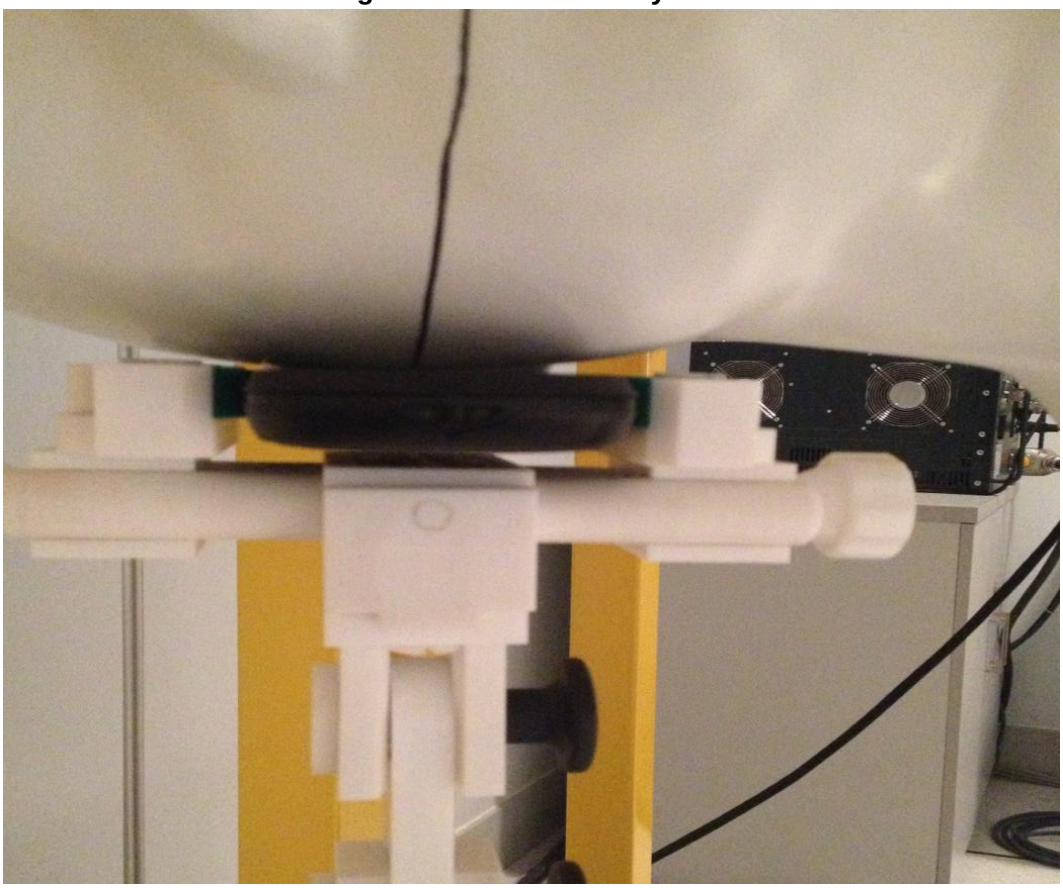


Fig.2 Right_Cheek

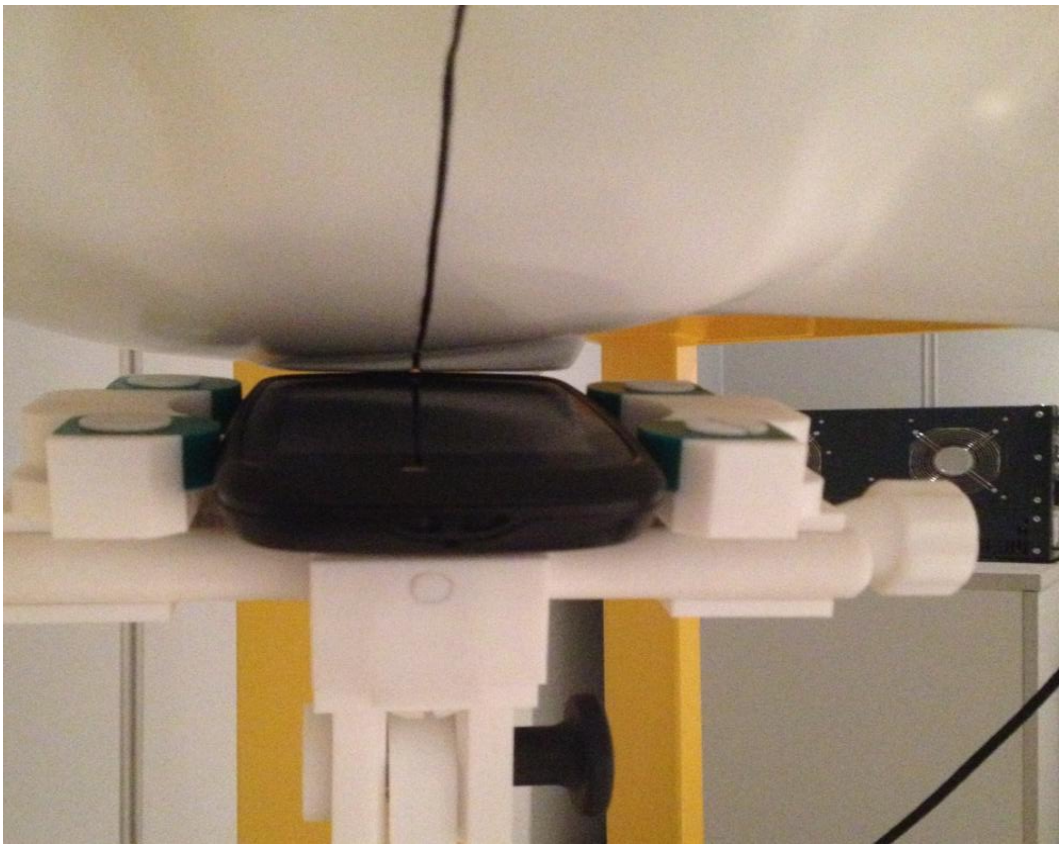


Fig.3 Right_Tilt

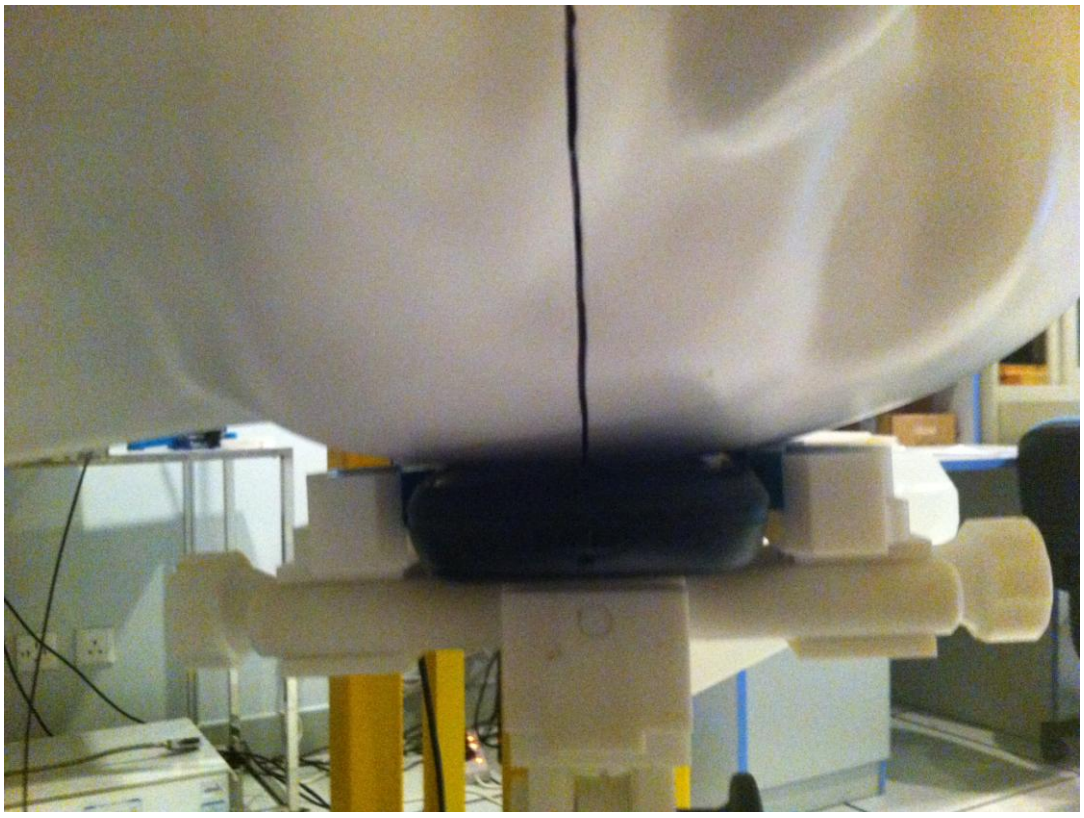


Fig.4 Left Cheek

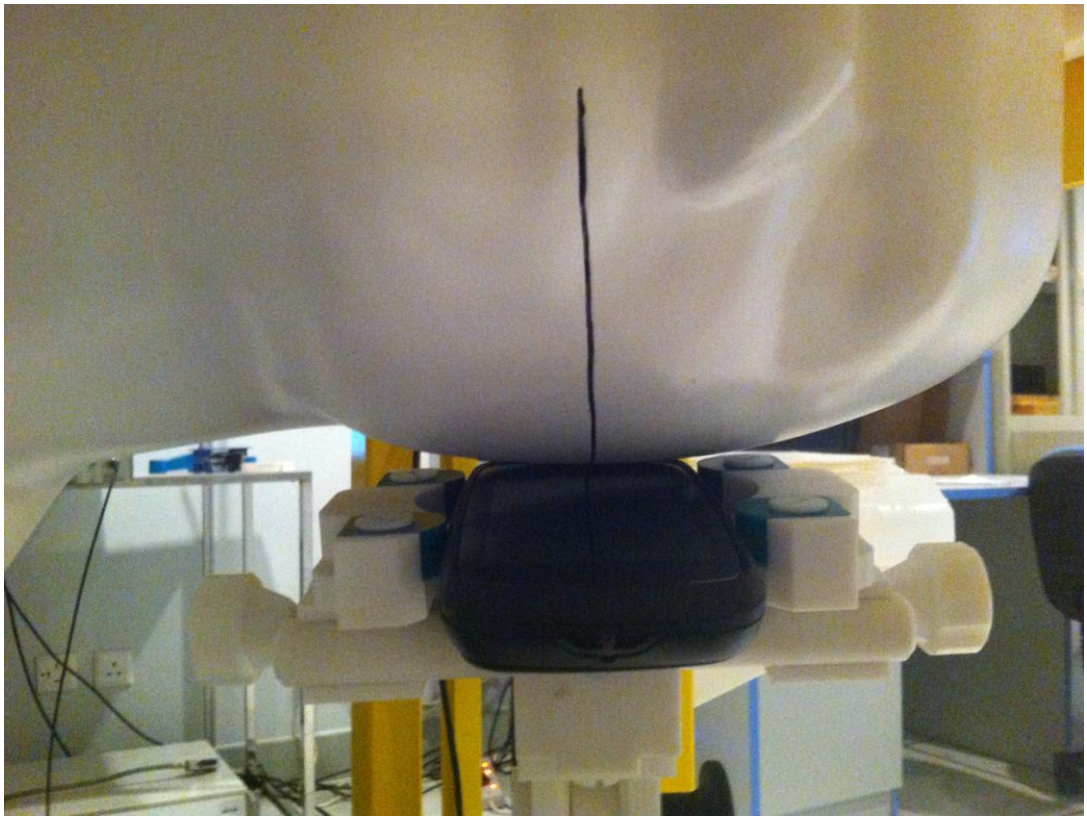


Fig.5 Left Tilt

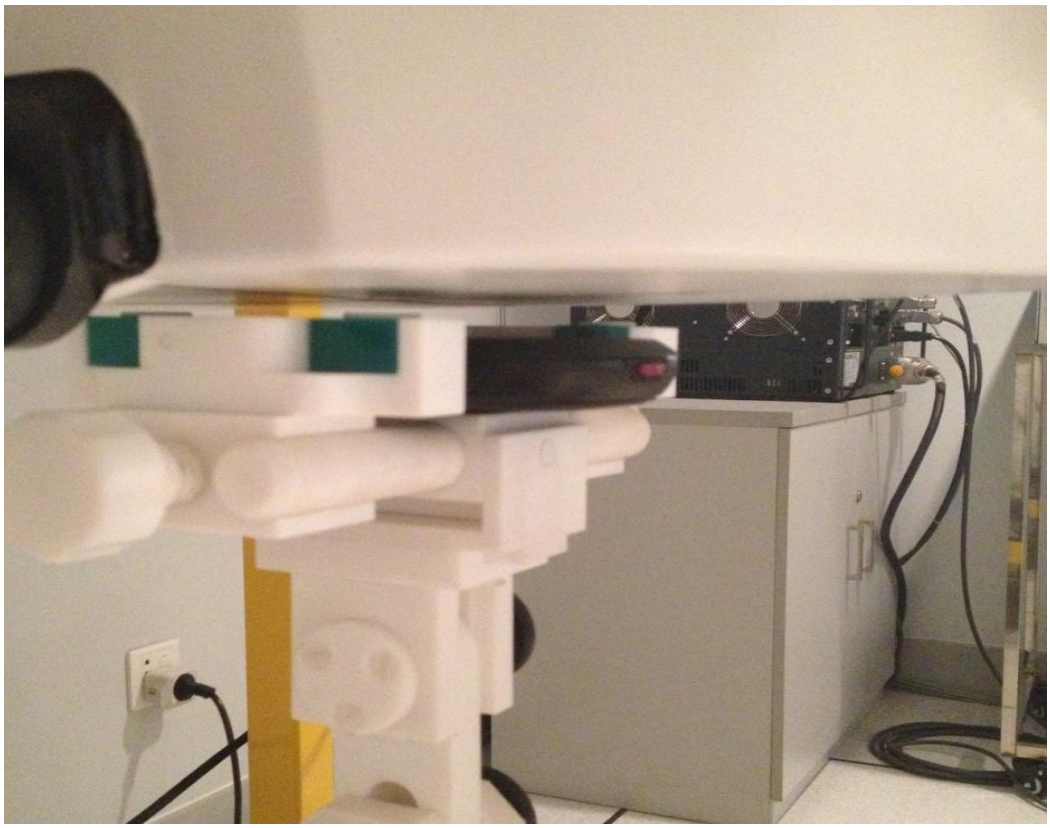


Fig.6 Body Face Upward

Fig.7 Body Back Upward

Fig.8 Edge A

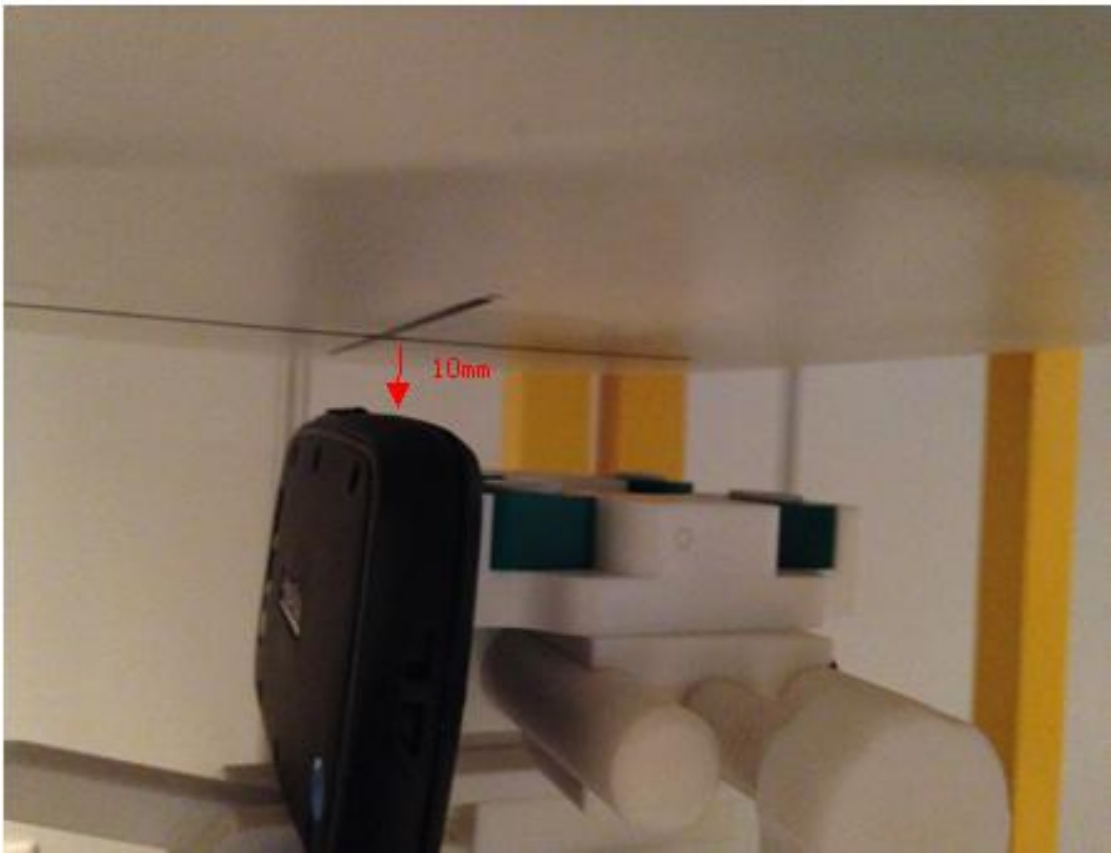


Fig.9 Edge B

ANNEX C

of

CCIC-SET

CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2013-05816

ToughShield

Type Name: R500+

Hardware Version: S103M001P000

Software Version: R500+_VER_2.0_01010_20130820

Sample Photographs

This Annex consists of 5 pages

Date of Report: 2013-12-4

1. Appearance

Appearance and size (obverse)

Appearance and size (reverse)

ANNEX D

of

CCIC-SET

CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2013-05816

ToughShield

Type Name: R500+

Hardware Version: S103M001P000

Software Version: R500+_VER_2.0_01010_20130820

System Performance Check Data and Highest SAR Plots

This Annex consists of 33 pages

Date of Report: 2013-12-4

System Performance Check (Head, 835MHz)

Type: Phone measurement (Complete)

Area scan resolution: dx=8mm,dy=8mm

Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 28/9/2013

Measurement duration: 12 minutes 57 seconds

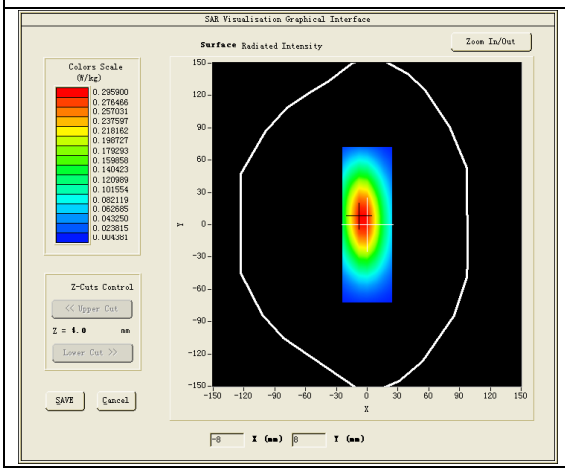
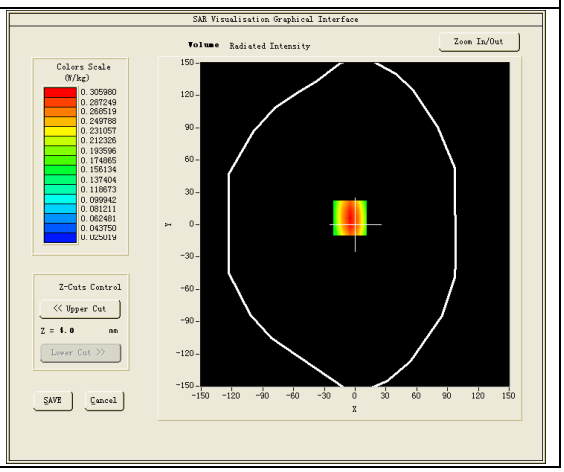
A. Experimental conditions.

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

B. SAR Measurement Results

Band SAR

Frequency (MHz)	835.000000
Relative permittivity (real part)	41.28
Relative permittivity	15.07
Conductivity (S/m)	0.94
Power drift (%)	-0.160000
Ambient Temperature:	23.2 ℃
Liquid Temperature:	23.5 ℃
Duty factor:	1:1
ConvF:	5.52

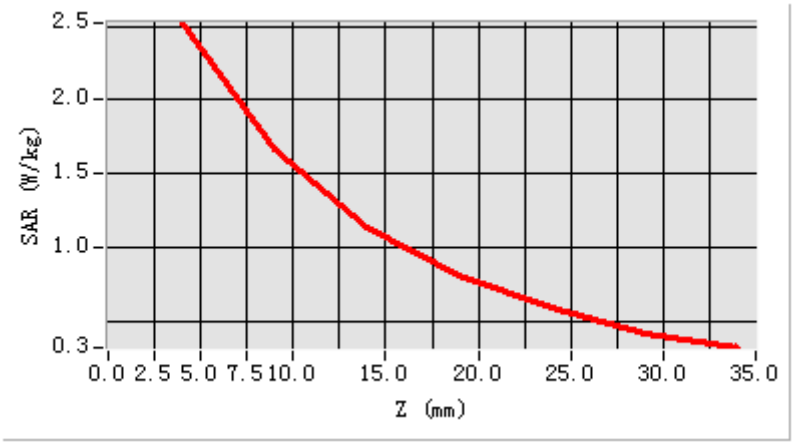
SURFACE SAR	VOLUME SAR
	

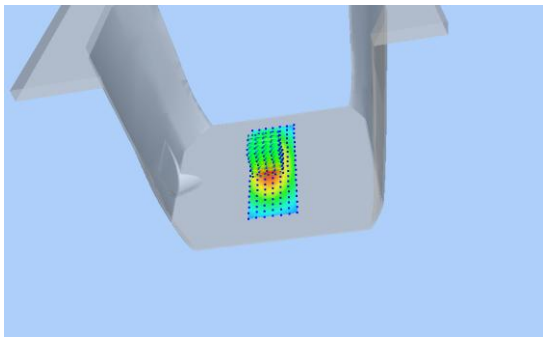
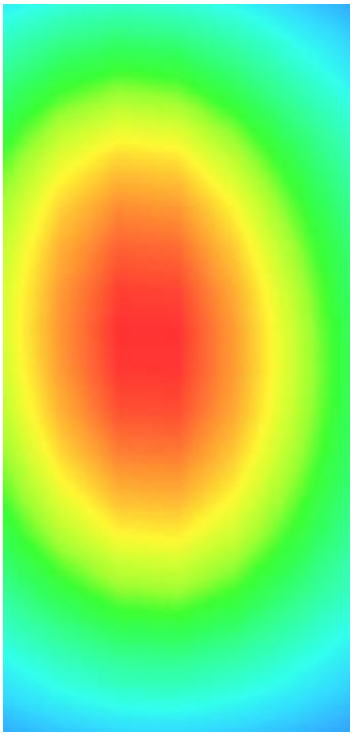
Maximum location: X=-5.00, Y=6.00

SAR 10g (W/Kg)	1.801556
SAR 1g (W/Kg)	2.469344

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	2.5212	1.6625	1.1452	0.8068	0.5876	0.4154



3D sceen shot	Hot spot position
	

System Performance Check (Head, 1900MHz)

Type: Phone measurement (Complete)

Area scan resolution: dx=8mm,dy=8mm

Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 28/9/2013

Measurement duration: 14 minutes 51 seconds

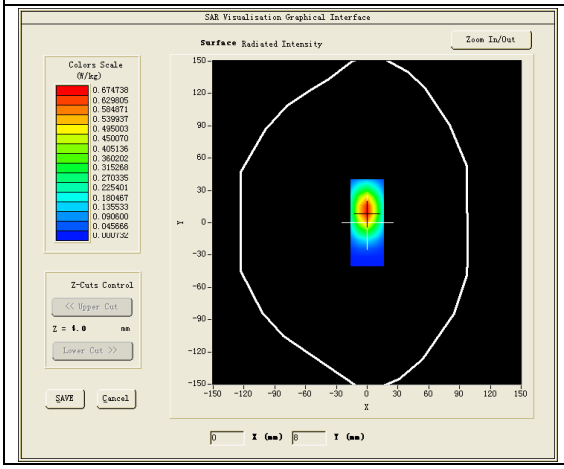
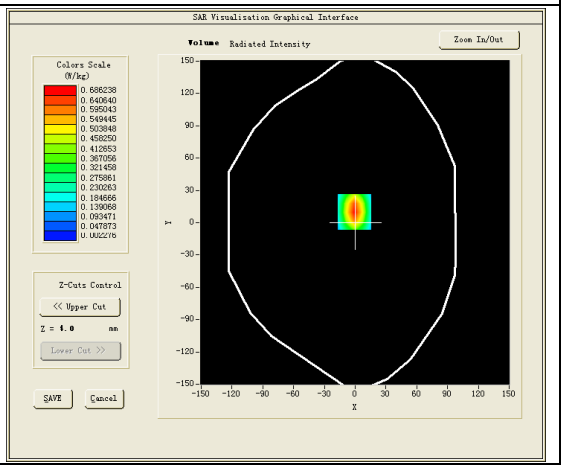
A. Experimental conditions.

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

B. SAR Measurement Results

Band SAR

Frequency (MHz)	1900.000000
Relative permittivity (real part)	39.88
Relative permittivity	15.07
Conductivity (S/m)	1.42
Power drift (%)	-0.420000
Ambient Temperature:	22.3℃
Liquid Temperature:	22.6℃
Duty factor:	1:1
ConvF:	5.48

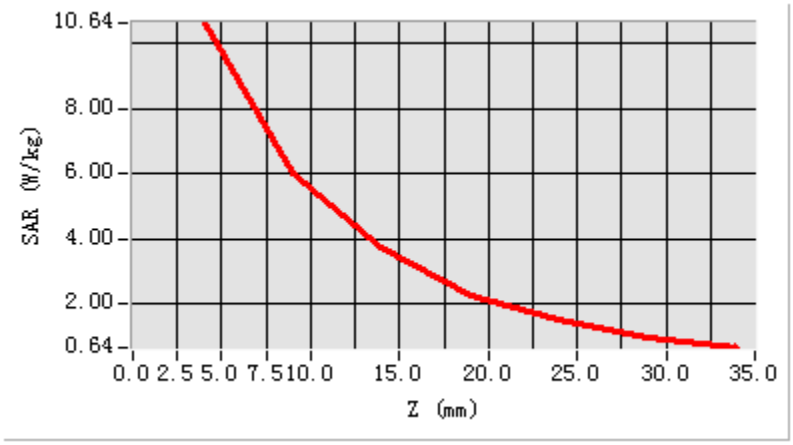
SURFACE SAR	**VOLUME SAR**
	

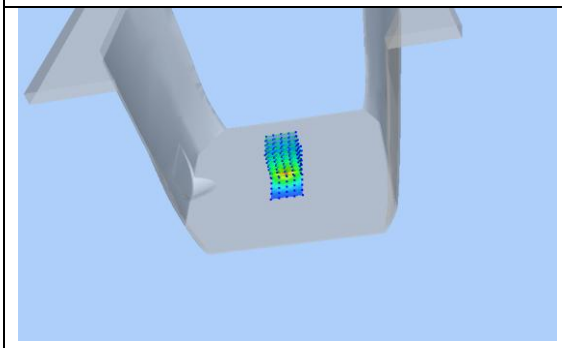
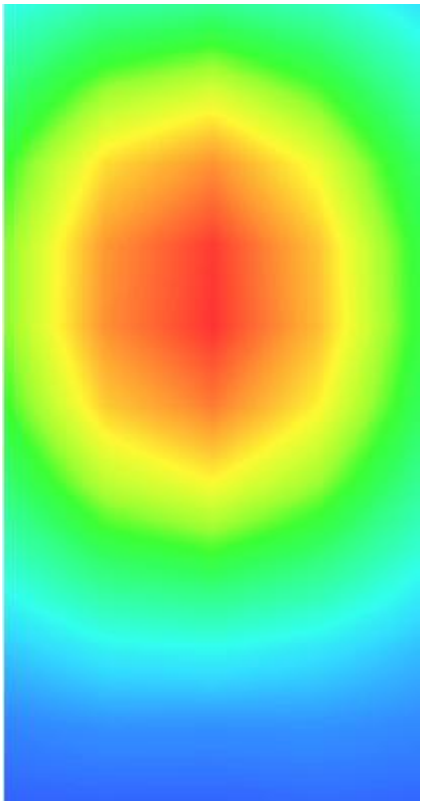
Maximum location: X=0.00, Y=8.00

SAR 10g (W/Kg)	5.156024
SAR 1g (W/Kg)	9.789668

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	10.6419	6.0043	3.7297	2.2606	1.5119	0.9792



3D sceen shot	Hot spot position
	

System Performance Check (Head, 2450MHz)

Type: Phone measurement (Complete)

Area scan resolution: dx=8mm,dy=8mm

Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 28/9/2013

Measurement duration: 15 minutes 24 seconds

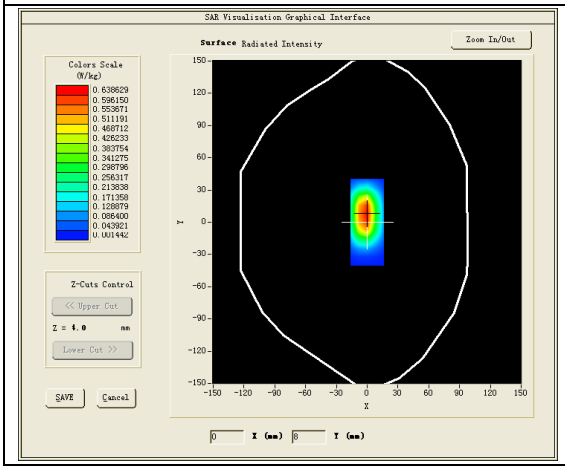
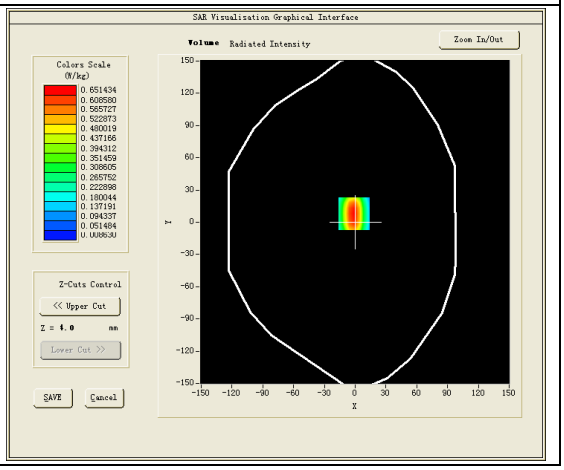
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Dipole
Band	2450MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	2450.000000
Relative permittivity (real part)	38.96
Relative permittivity	13.19
Conductivity (S/m)	1.79
Power Drift (%)	0.160000
Ambient Temperature:	22.2 ℃
Liquid Temperature:	22.6 ℃
Duty factor:	1:1
ConvF:	4.80

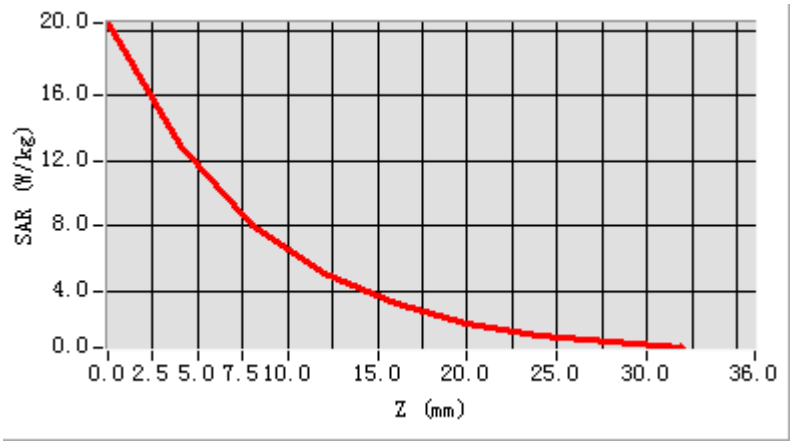
SURFACE SAR	VOLUME SAR
	

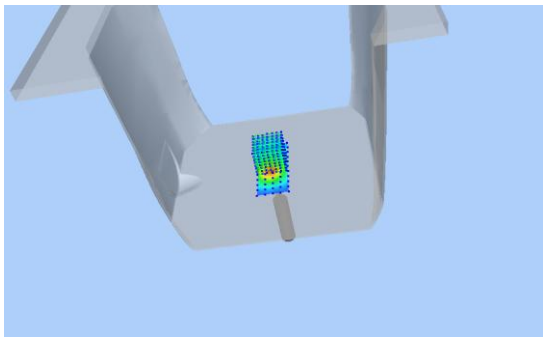
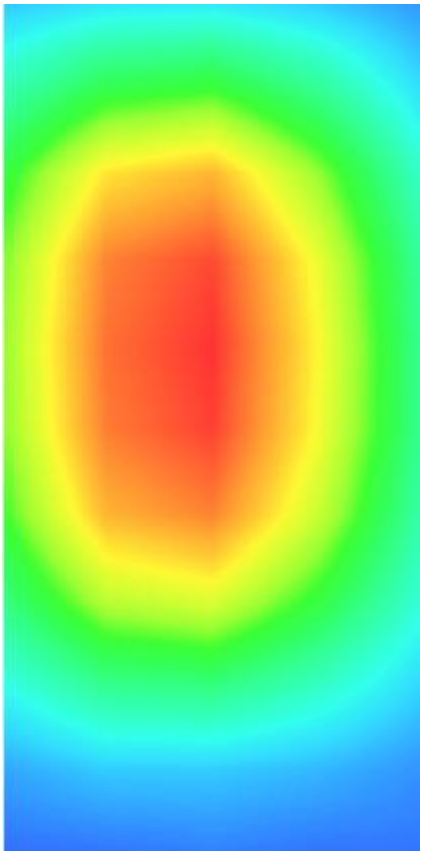
Maximum location: X=0.00, Y=8.00

SAR 10g (W/Kg)	5.914682
SAR 1g (W/Kg)	13.160218

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	20.3890	13.160218	3.8625	0. 8019	0.2333



3D sceen shot	Hot spot position
	

System Performance Check (Body, 835MHz)

Type: Phone measurement (Complete)

Area scan resolution: dx=8mm,dy=8mm

Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 29/9/2013

Measurement duration: 13 minutes 12 seconds

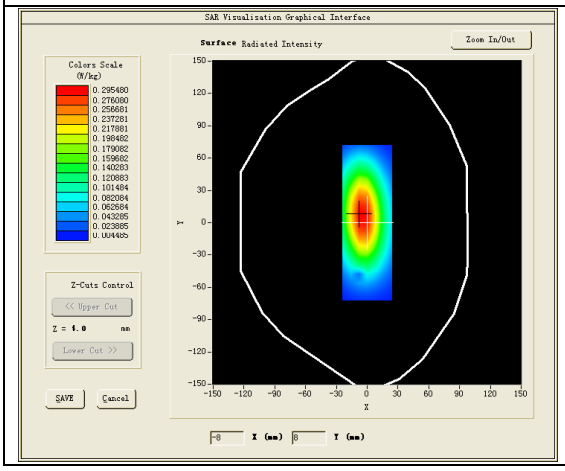
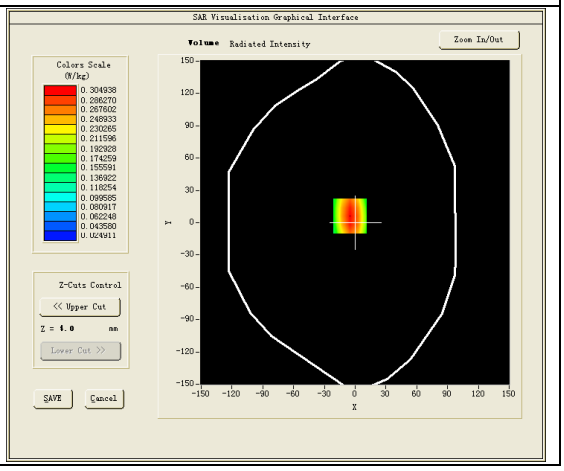
A. Experimental conditions.

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

B. SAR Measurement Results

Band SAR

Frequency (MHz)	835.000000
Relative permittivity (real part)	55.38
Relative permittivity	21.72
Conductivity (S/m)	0.99
Power drift (%)	0.120000
Ambient Temperature:	23.2 ℃
Liquid Temperature:	23.5 ℃
Crest factor:	1:1
ConvF:	5.67

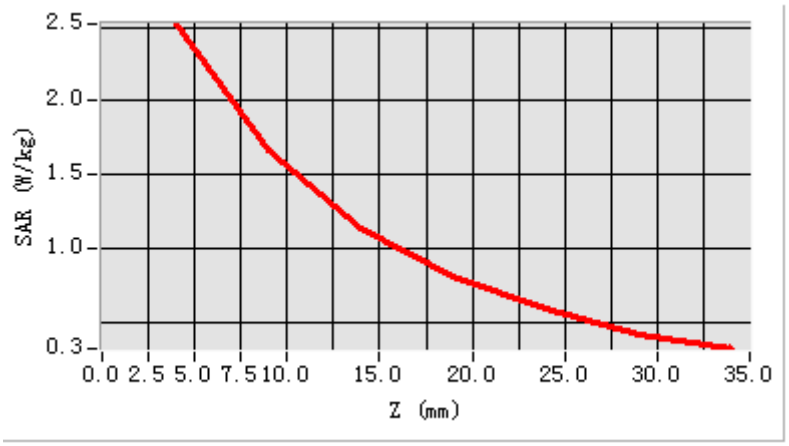
SURFACE SAR	VOLUME SAR
	

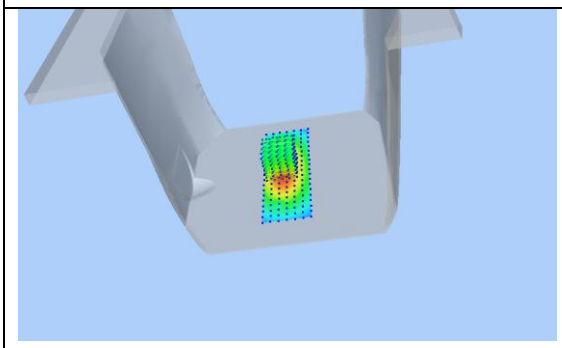
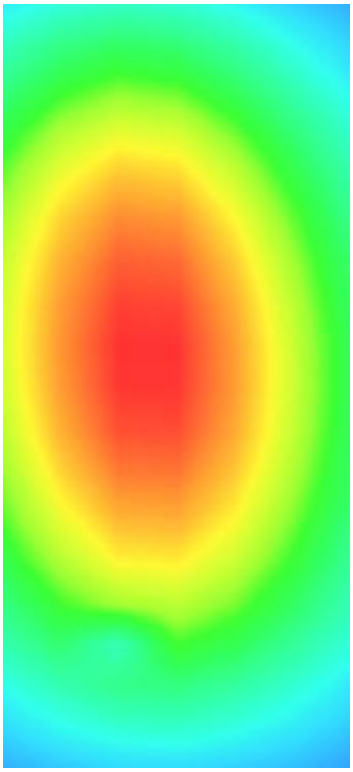
Maximum location: X=-8.00, Y=8.00

SAR 10g (W/Kg)	1.743219
SAR 1g (W/Kg)	2.430218

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 (Body, 1900MHz)

Type: Phone measurement (Complete)

Area scan resolution: dx=8mm,dy=8mm

Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 29/9/2013

Measurement duration: 14 minutes 12 seconds

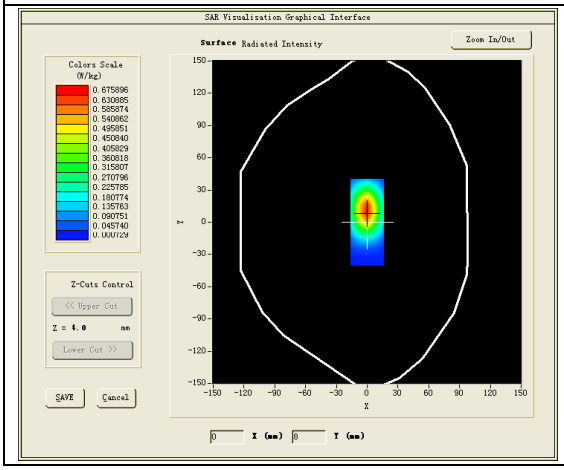
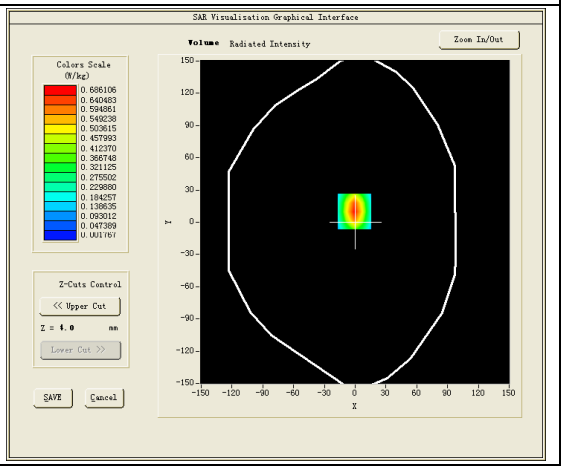
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Dipole
Band	1900MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	1900.000000
Relative permittivity (real part)	53.67
Relative permittivity	13.02
Conductivity (S/m)	1.51
Power Drift (%)	0.220000
Ambient Temperature:	22.0 ℃
Liquid Temperature:	21.8 ℃
Crest factor:	1:1
ConvF:	5.64

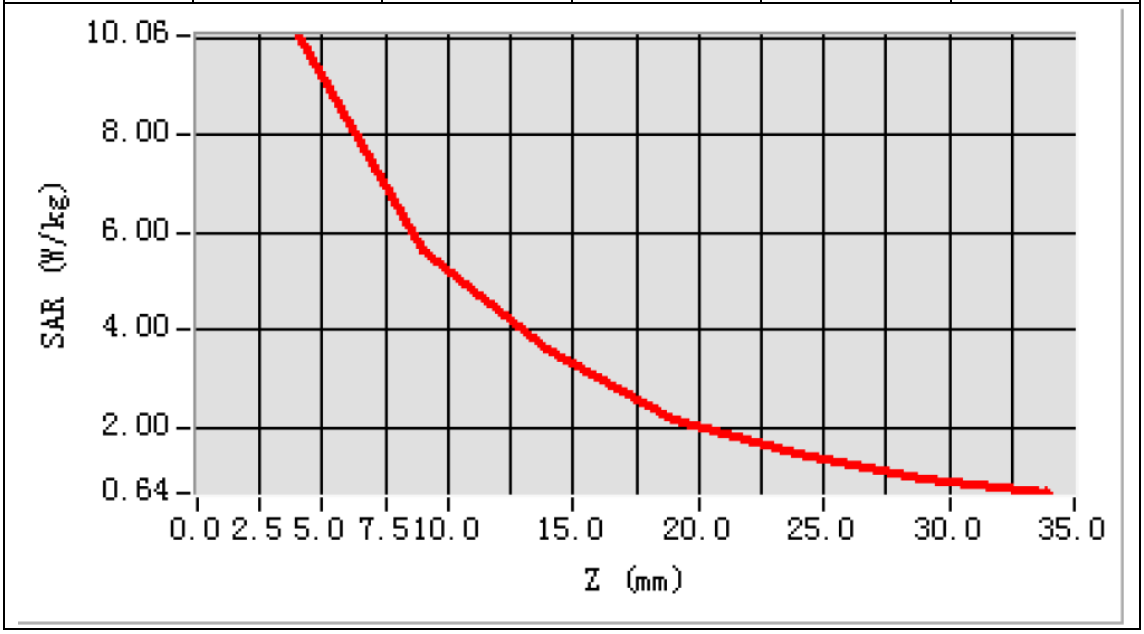
SURFACE SAR	VOLUME SAR
	

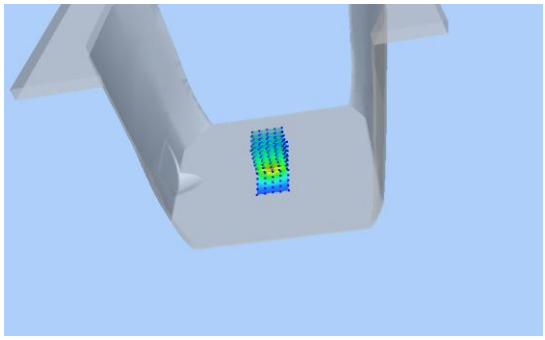
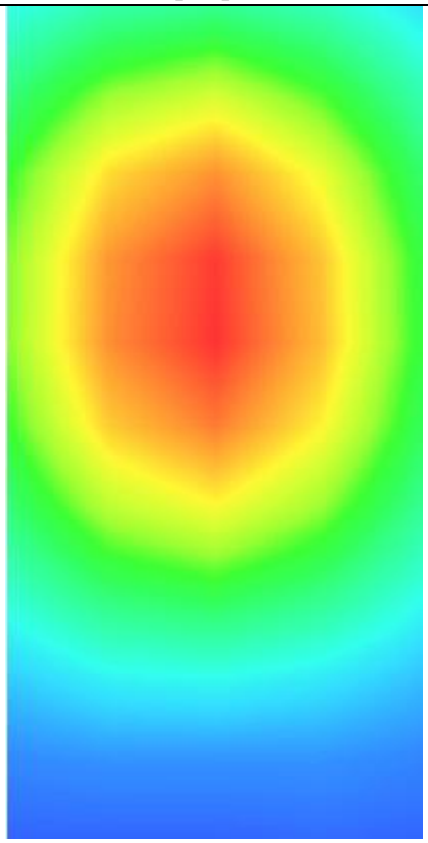
Maximum location: X=0.00, Y=8.00

SAR 10g (W/Kg)	5.201543
SAR 1g (W/Kg)	9.986241

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0000	10.0613	5.7282	3. 6529	2.0314



3D sceen shot	Hot spot position
	

System Performance Check (Body, 2450MHz)

Type: Phone measurement (Complete)

Area scan resolution: dx=8mm,dy=8mm

Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 29/9/2013

Measurement duration: 13 minutes 21 seconds

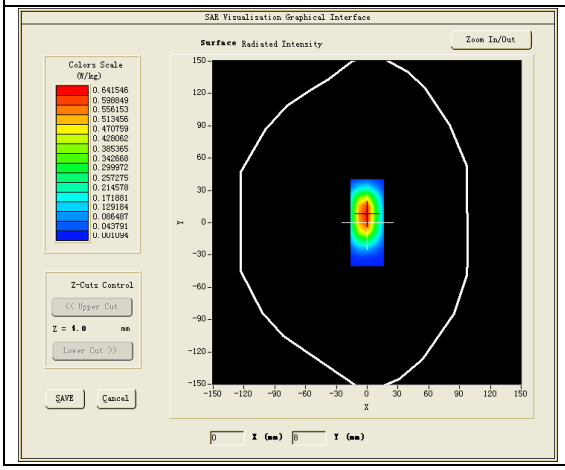
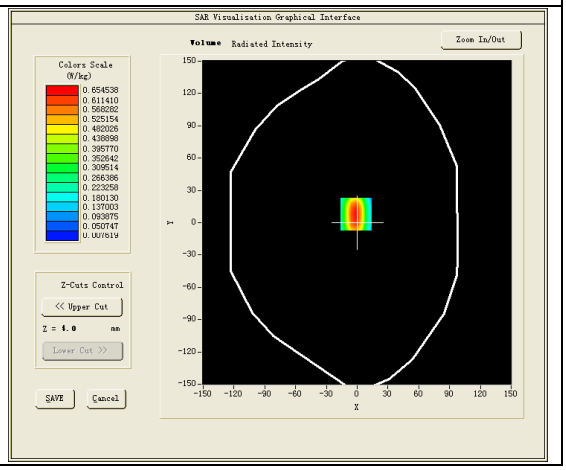
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Dipole
Band	2450MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	2450.000000
Relative permittivity (real part)	52.68
Relative permittivity	13.02
Conductivity (S/m)	1.97
Power Drift (%)	-0.070000
Crest factor:	1:1
ConvF:	4.90

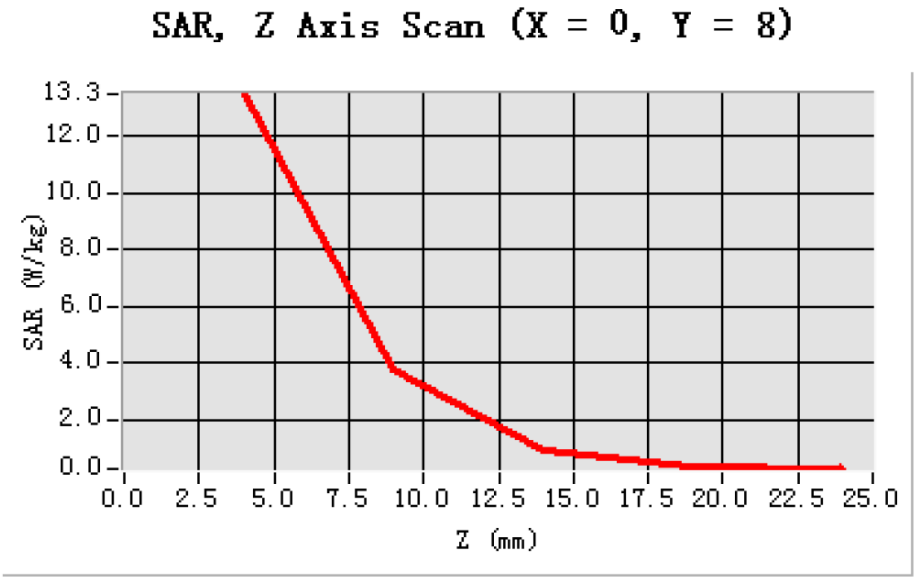
SURFACE SAR	VOLUME SAR
	

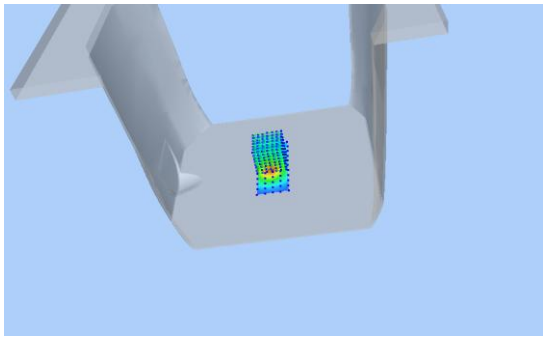
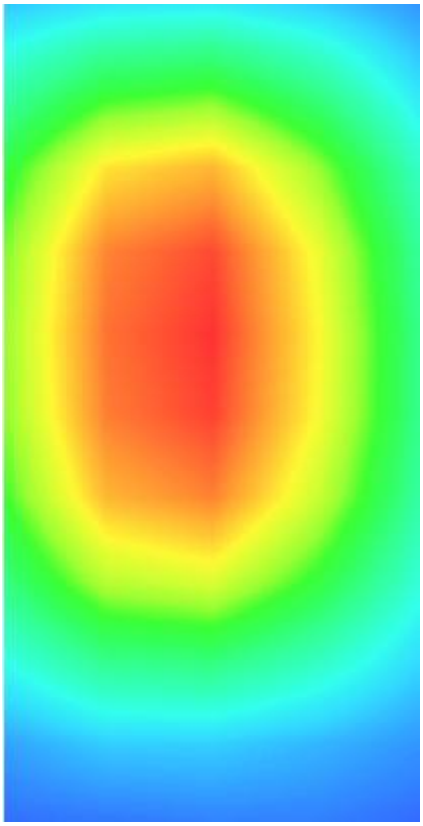
Maximum location: X=0.00, Y=8.00

SAR 10g (W/Kg)	5.951243
SAR 1g (W/Kg)	13.119628

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0000	13.3122	3.8625	0. 8019	0.2333



3D sceen shot	Hot spot position
	

GSM850,Right Cheek, Middle

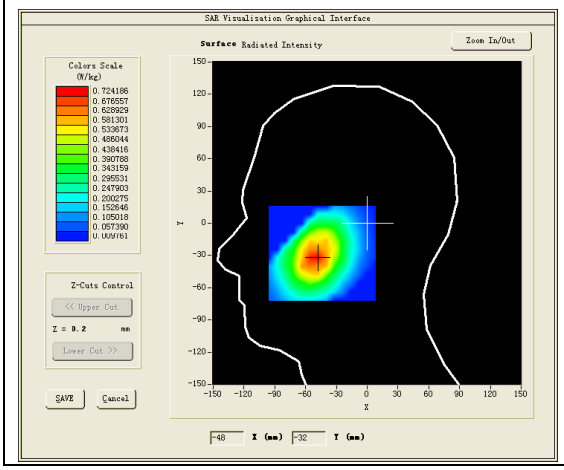
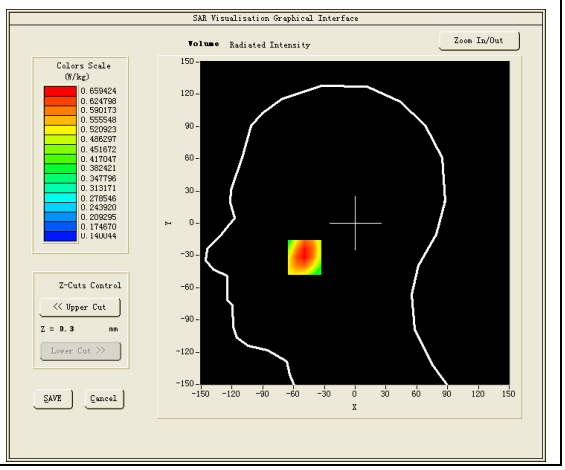
Type: Phone measurement (Very fast, 11 points in the volume)
Date of measurement: 28/9/2013
Measurement duration: 5 minutes 13 seconds
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Right head
Device Position	Cheek
Band	GSM850
Channels	190
Signal	GSM (Crest factor: 1:8)

B. SAR Measurement Results

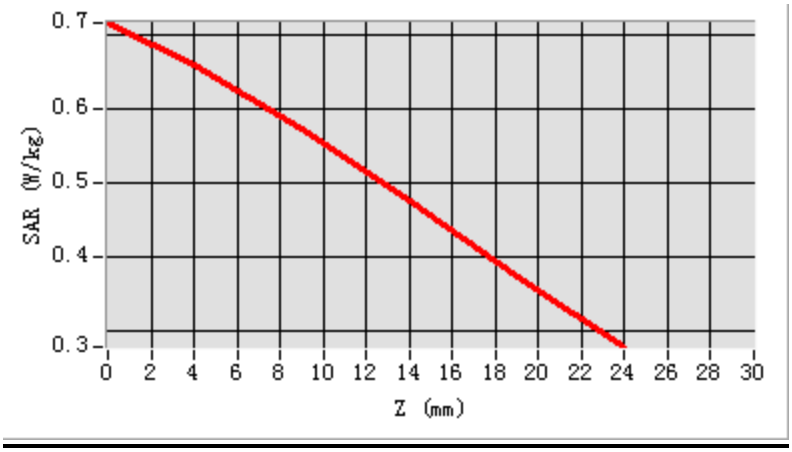
Frequency (MHz)	836.6
Relative permittivity (real part)	41.28
Relative permittivity (imaginary part)	15.07
Conductivity (S/m)	0.94
Variation (%)	-1.220000
ConvF:	5.52

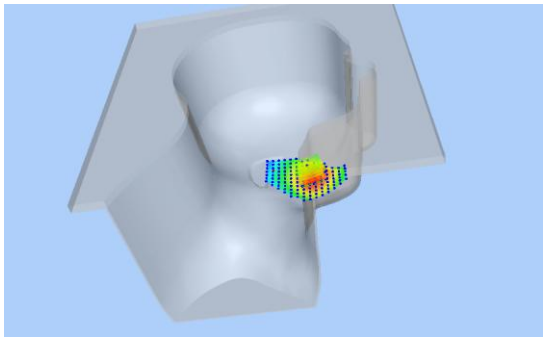
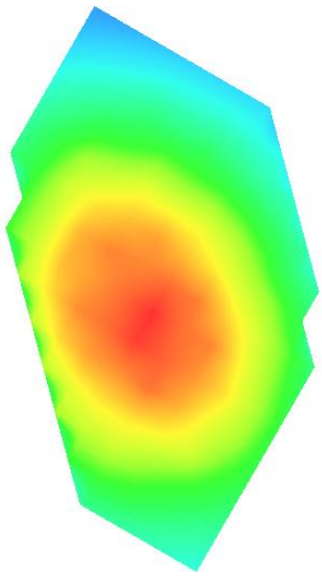
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-49.00, Y=-32.00

SAR 10g (W/Kg)	0.491489
SAR 1g (W/Kg)	0.640625

Z axis scan



3D screen shot	Hot spot position
	

GSM 850,Back,Middle

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 29/9/2013

Measurement duration: 7 minutes 14 seconds

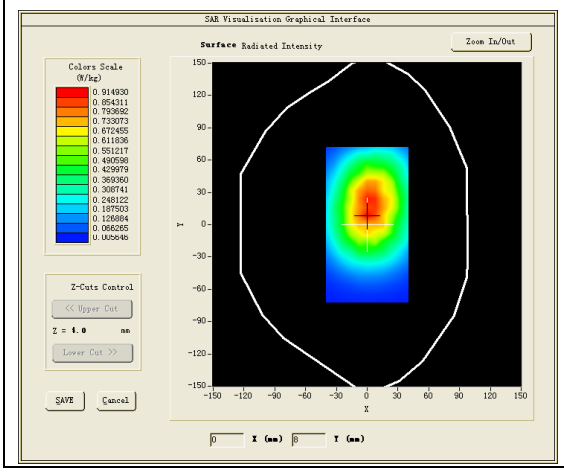
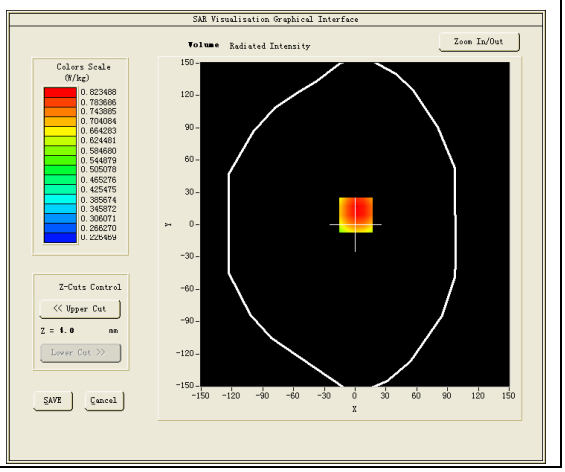
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Validation plane
Device Position	Body
Band	GSM850
Channels	190
Signal	GSM(Crest factor: 1:8)

B. SAR Measurement Results

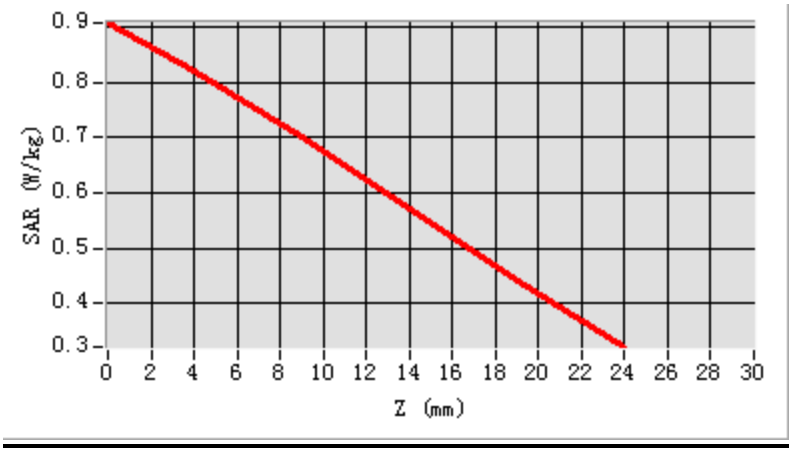
Frequency (MHz)	836.6
Relative permittivity (real part)	55.38
Relative permittivity (imaginary	21.72
Conductivity (S/m)	0.99
Variation (%)	-4.520000
ConvF:	5.67

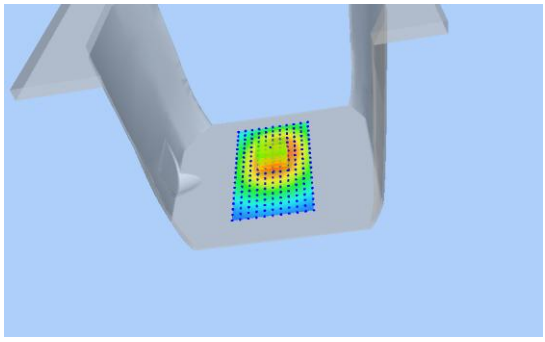
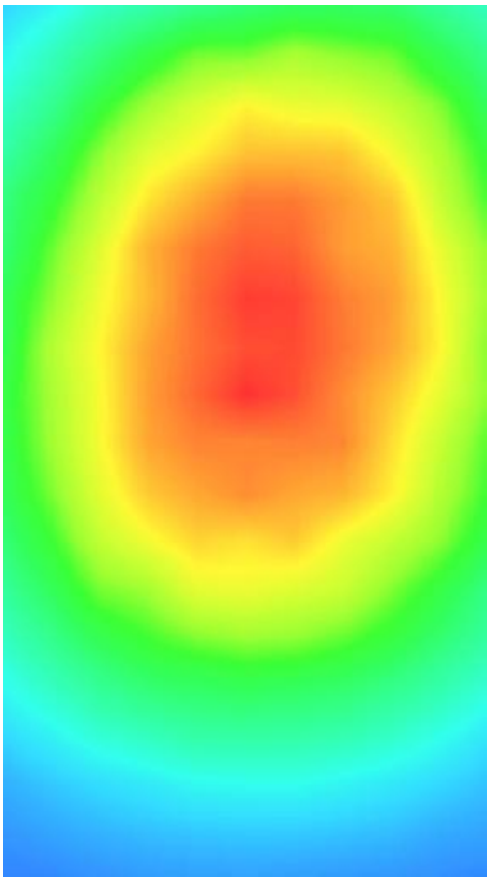
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=1.00, Y=9.00

SAR 10g (W/Kg)	0.624141
SAR 1g (W/Kg)	0.806834

Z axis scan



3D screen shot	Hot spot position
	

GSM 850,Back,Middle, repeated test result

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 29/9/2013

Measurement duration: 7 minutes 14 seconds

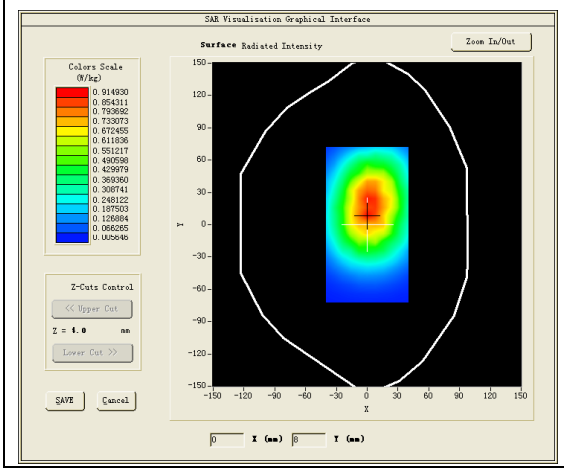
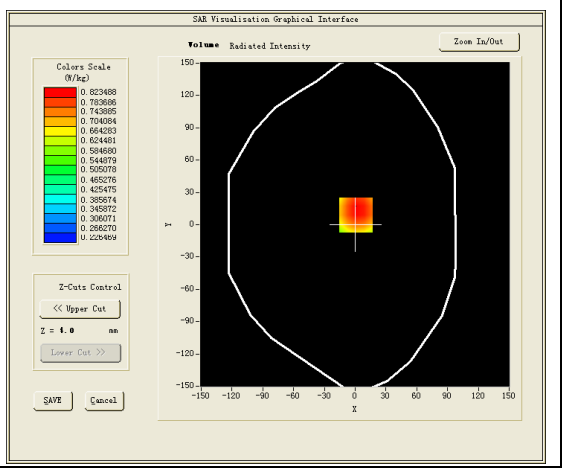
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Validation plane
Device Position	Body
Band	GSM850
Channels	190
Signal	GSM(Crest factor: 1:8)

B. SAR Measurement Results

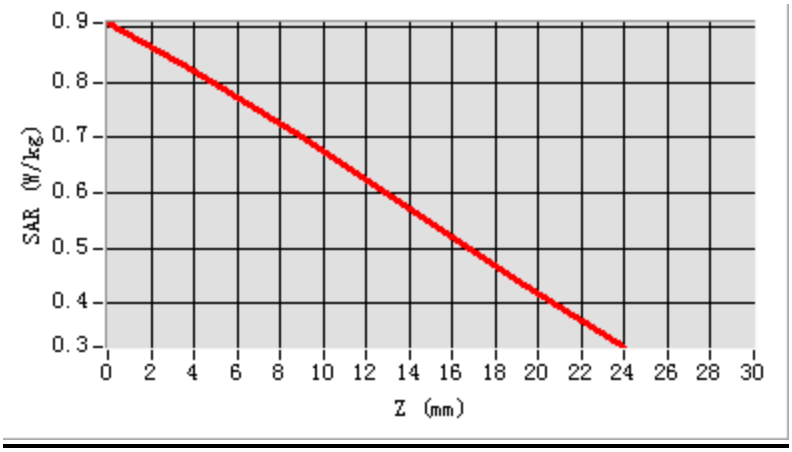
Frequency (MHz)	836.6
Relative permittivity (real part)	55.38
Relative permittivity (imaginary	21.72
Conductivity (S/m)	0.99
Variation (%)	-3.220000
ConvF:	5.67

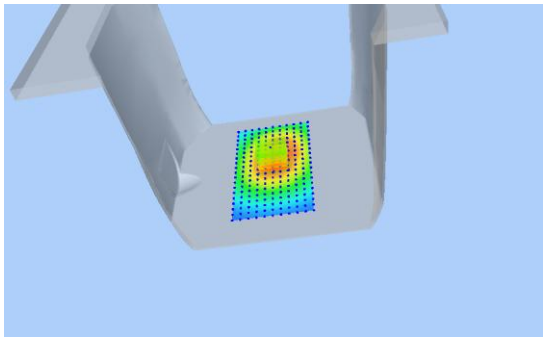
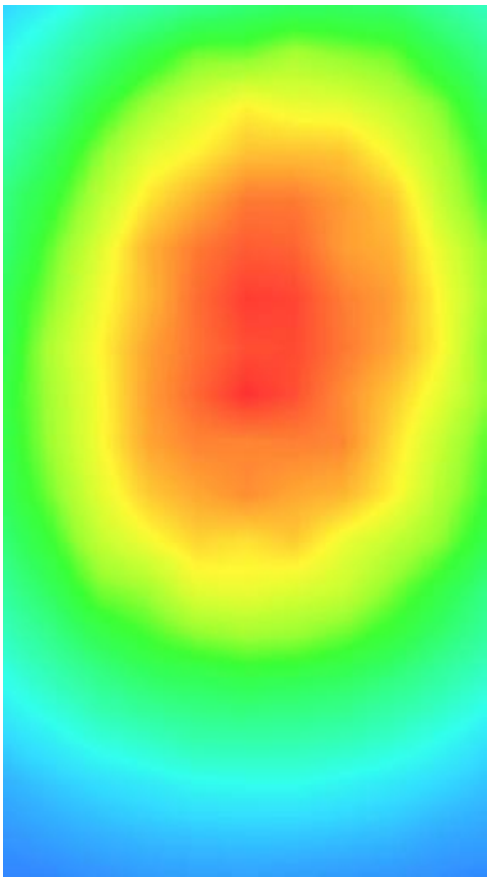
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=1.00, Y=9.00

SAR 10g (W/Kg)	0.615214
SAR 1g (W/Kg)	0.793426

Z axis scan



3D screen shot	Hot spot position
	

GSM1900,Left Cheek, Middle

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 28/9/2013

Measurement duration: 5 minutes 21 seconds

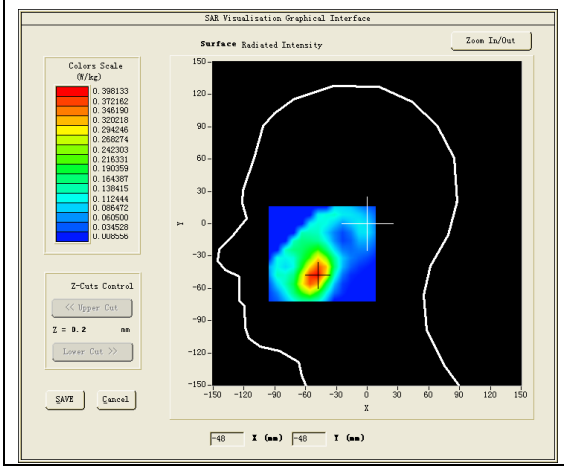
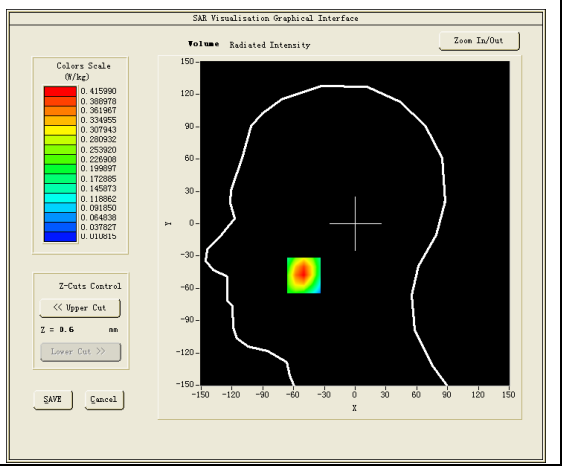
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Left head
Device Position	Cheek
Band	GSM1900
Channels	661
Signal	GSM (Crest factor: 1:8)

B. SAR Measurement Results

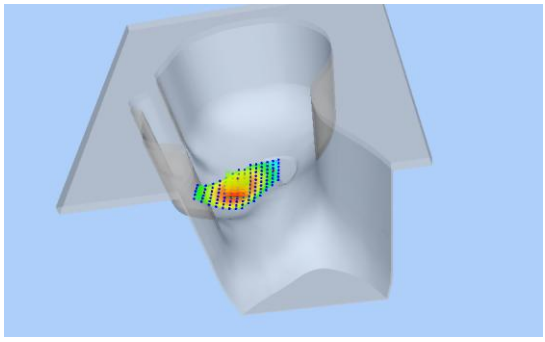
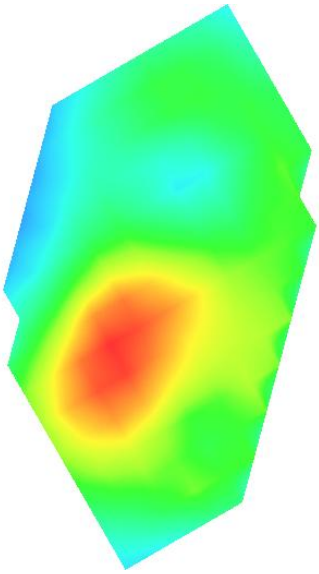
Frequency (MHz)	1880.0
Relative permittivity (real part)	39.88
Relative permittivity (imaginary part)	15.07
Conductivity (S/m)	1.42
Variation (%)	--
ConvF:	5.48

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-50.00, Y=-48.00

SAR 10g (W/Kg)	0.230463
SAR 1g (W/Kg)	0.391782

Z axis scan

3D screen shot	Hot spot position
	

GPRS 1900, Back, Middle

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 29/9/2013

Measurement duration: 10 minutes 24 seconds

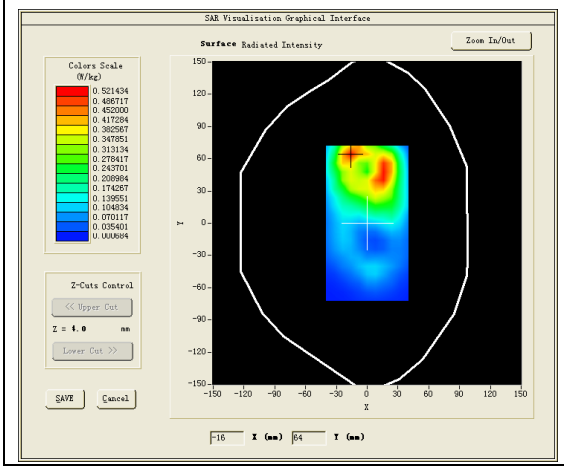
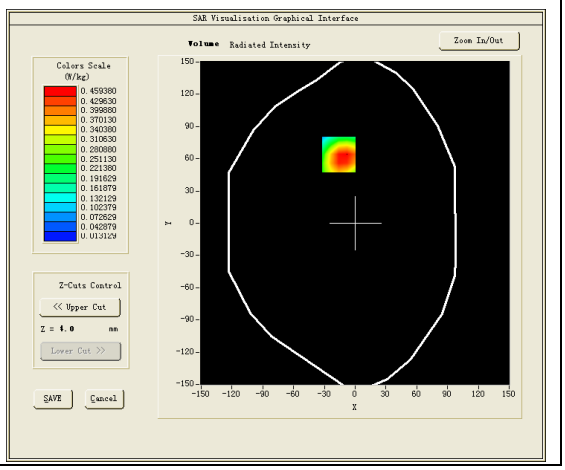
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Validation plane
Device Position	Body
Band	CUSTOM (GPRS1900_4Tx)
Channels	661
Signal	GPRS (Crest factor:1:2)

B. SAR Measurement Results

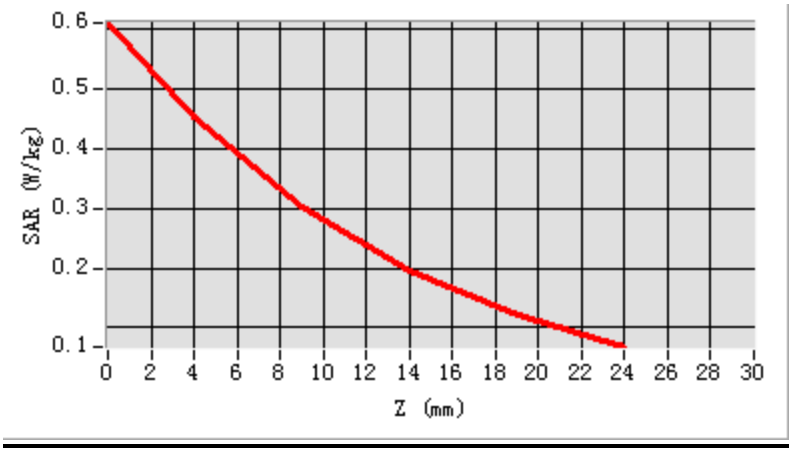
Frequency (MHz)	1880.0
Relative permittivity (real part)	53.67
Relative permittivity (imaginary part)	13.02
Conductivity (S/m)	1.51
Variation (%)	--
ConvF:	5.64

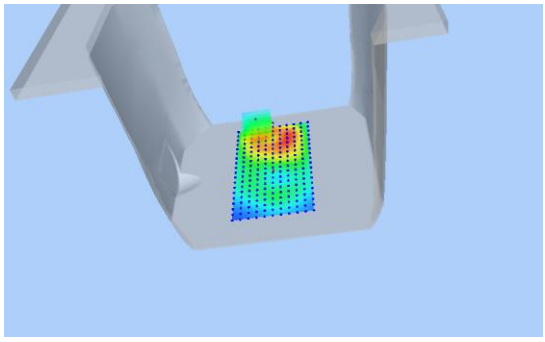
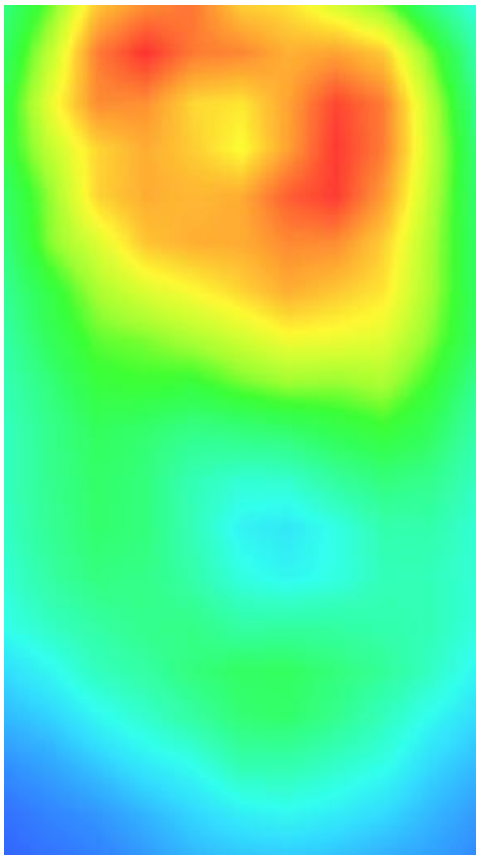
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-16.00, Y=64.00

SAR 10g (W/Kg)	0.290903
SAR 1g (W/Kg)	0.506327

Z axis scan



3D screen shot	Hot spot position
	

WCDMA850,Right Cheek, Middle

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 28/9/2013

Measurement duration: 5 minutes 20 seconds

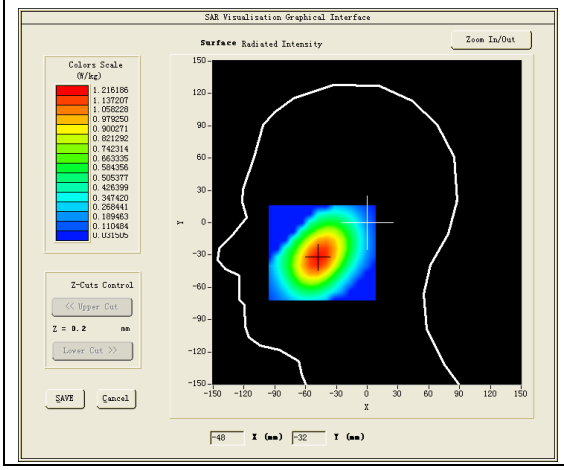
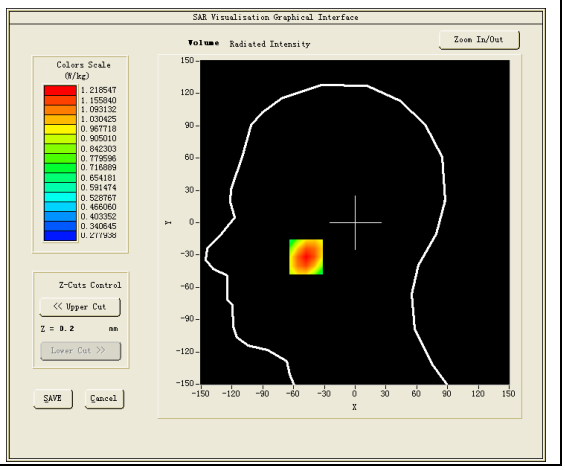
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Right head
Device Position	Cheek
Band	Band5_WCDMA850
Channels	4183
Signal	WCDMA (Crest factor: 1:1)

B. SAR Measurement Results

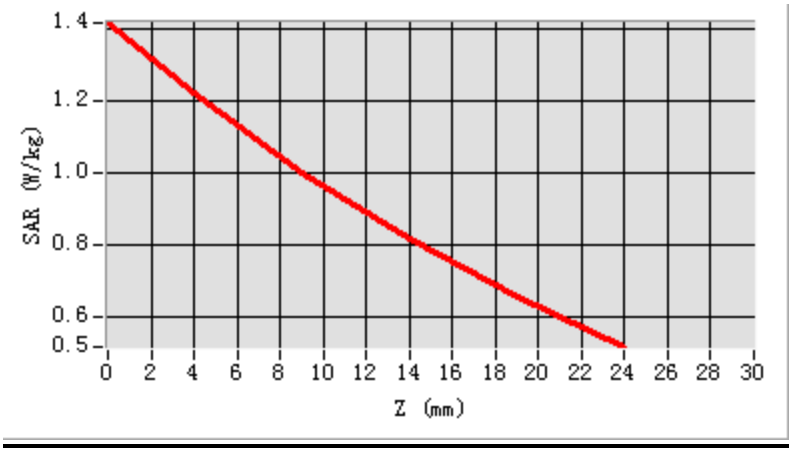
Frequency (MHz)	836.6
Relative permittivity (real part)	41.28
Relative permittivity (imaginary part)	15.07
Conductivity (S/m)	0.94
Variation (%)	-1.980000
ConvF:	5.52

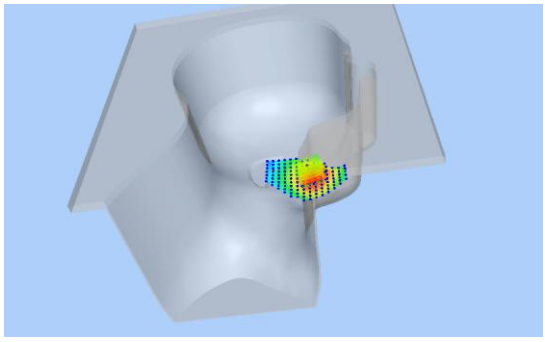
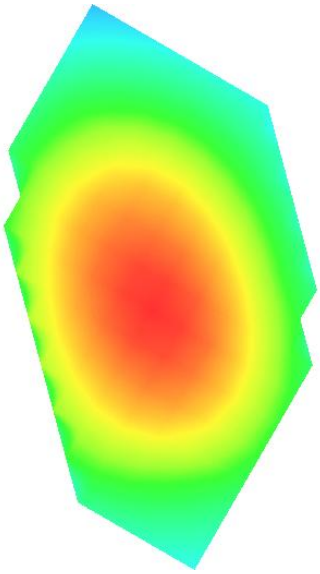
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-48.00, Y=-32.00

SAR 10g (W/Kg)	0.886088
SAR 1g (W/Kg)	1.089416

Z axis scan



3D screen shot	Hot spot position
	

WCDMA850,Right Cheek, Middle, repeated test result

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 28/9/2013

Measurement duration: 5 minutes 20 seconds

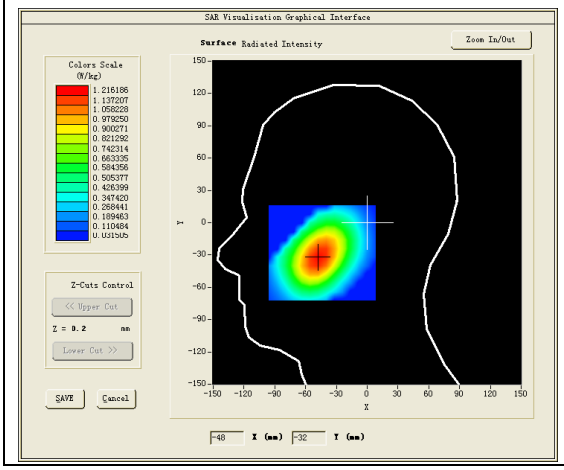
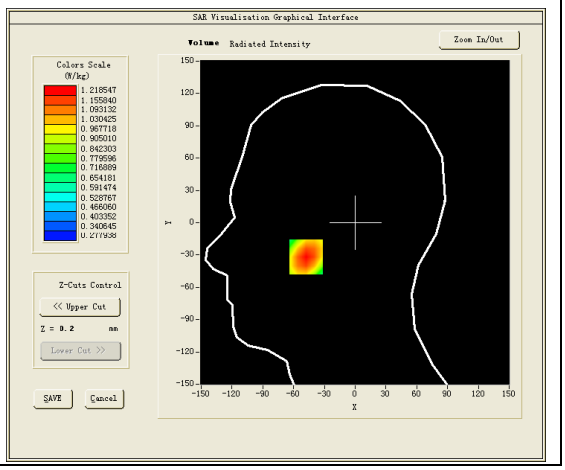
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Right head
Device Position	Cheek
Band	Band5_WCDMA850
Channels	4183
Signal	WCDMA (Crest factor: 1:1)

B. SAR Measurement Results

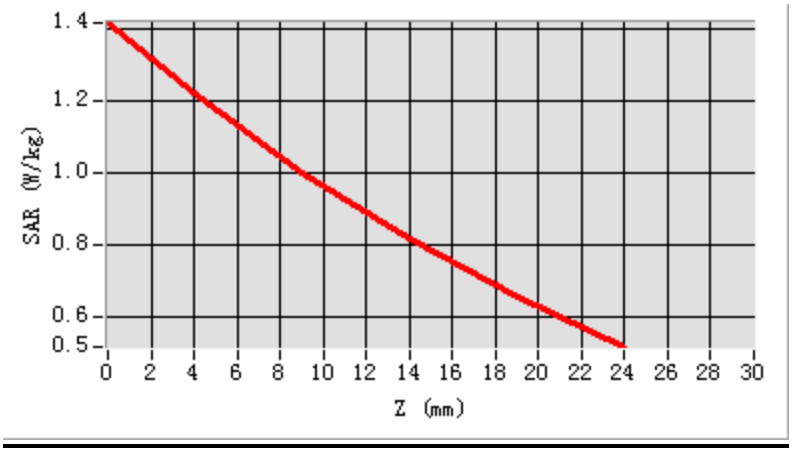
Frequency (MHz)	836.6
Relative permittivity (real part)	41.28
Relative permittivity (imaginary part)	15.07
Conductivity (S/m)	0.94
Variation (%)	-1.280000
ConvF:	5.52

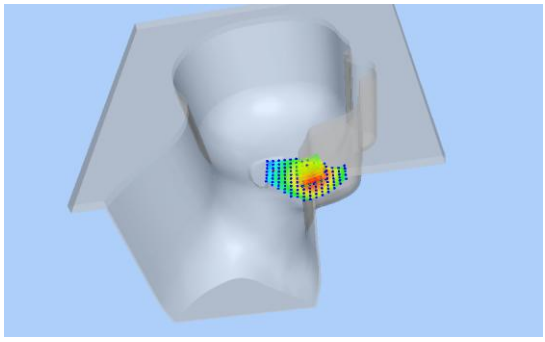
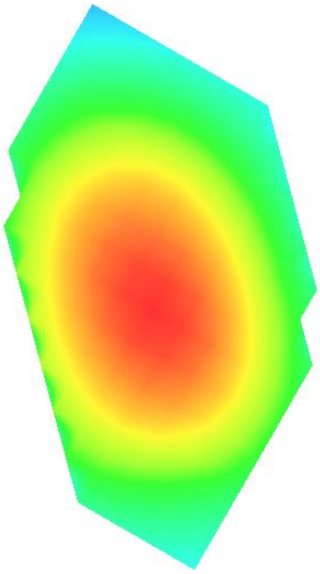
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-48.00, Y=-32.00

SAR 10g (W/Kg)	0.6786218
SAR 1g (W/Kg)	0.993253

Z axis scan



3D screen shot	Hot spot position
	

WCDMA850,BACK,Middle

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 29/9/2013

Measurement duration: 7 minutes 26 seconds

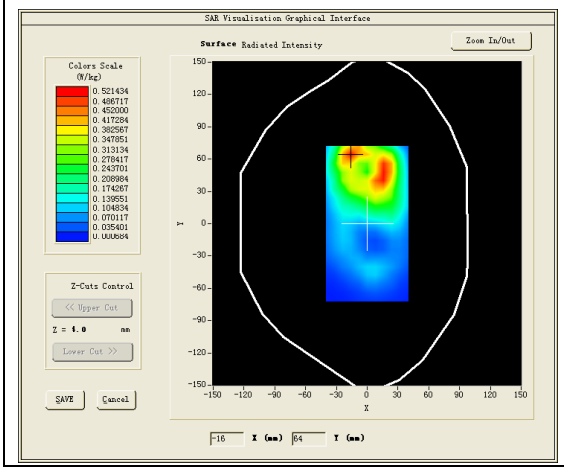
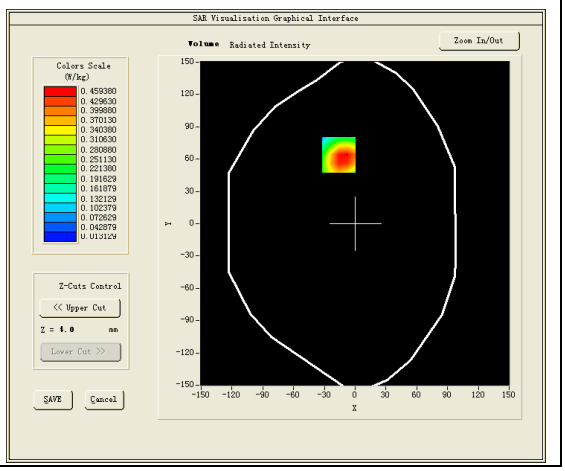
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Validation plane
Device Position	Body
Band	Band5_WCDMA850
Channels	4183
Signal	WCDMA (Crest factor: 1:1)

B. SAR Measurement Results

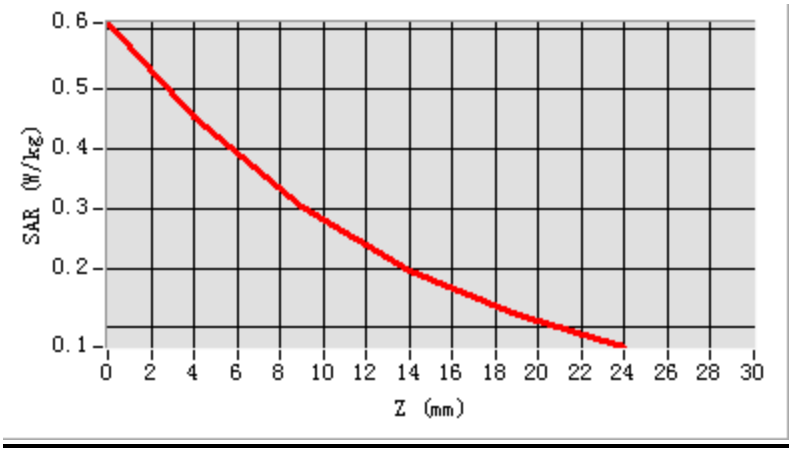
Frequency (MHz)	836.6
Relative permittivity (real part)	55.38
Relative permittivity (imaginary part)	21.72
Conductivity (S/m)	0.99
Variation (%)	-2.080000
ConvF:	5.67

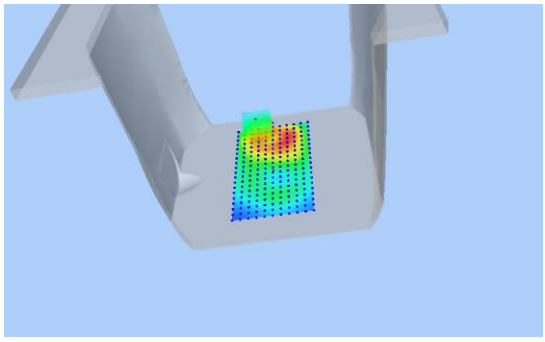
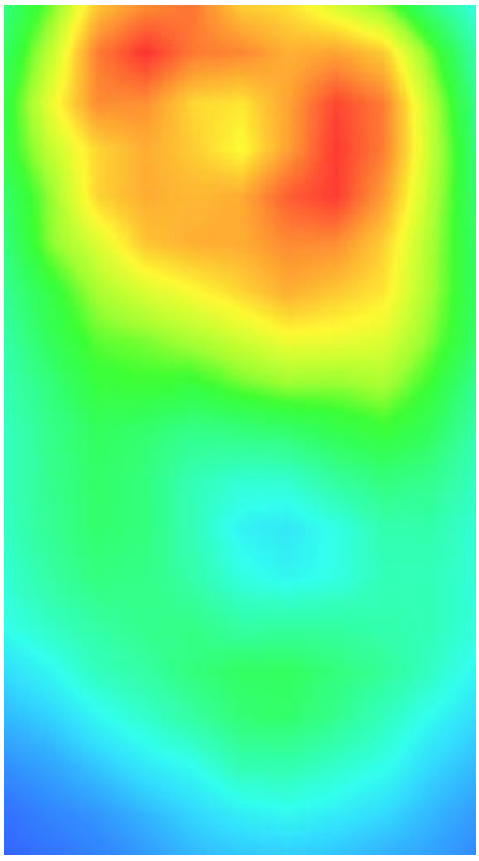
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-16.00, Y=64.00

SAR 10g (W/Kg)	0.2934722
SAR 1g (W/Kg)	0.5084312

Z axis scan



3D screen shot	Hot spot position
	

WCDMA1900,Left Cheek, Middle

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 28/9/2013

Measurement duration: 5 minutes 22 seconds

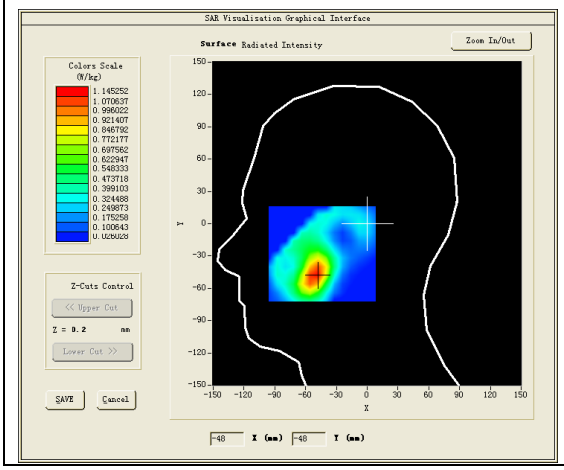
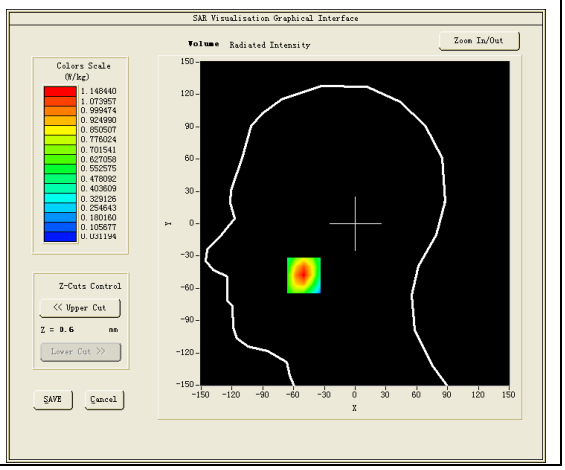
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Left head
Device Position	Cheek
Band	Band2_WCDMA1900
Channels	9400
Signal	WCDMA (Crest factor: 1:1)

B. SAR Measurement Results

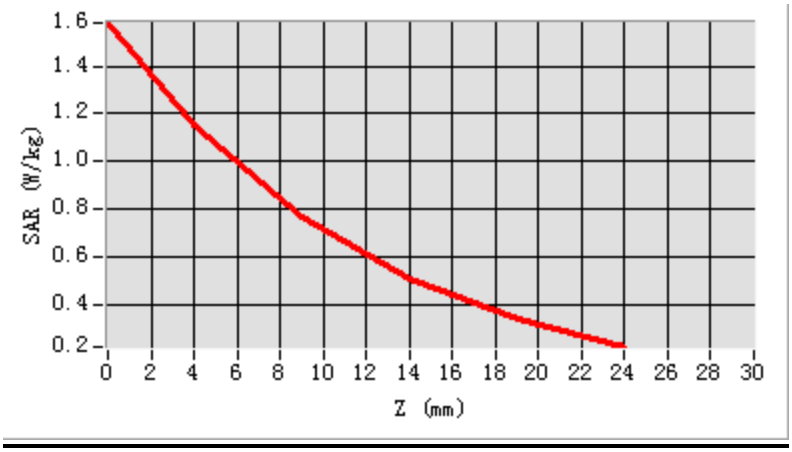
Frequency (MHz)	1880.0
Relative permittivity (real part)	39.88
Relative permittivity (imaginary part)	15.07
Conductivity (S/m)	1.42
Variation (%)	-1.560000
ConvF:	5.48

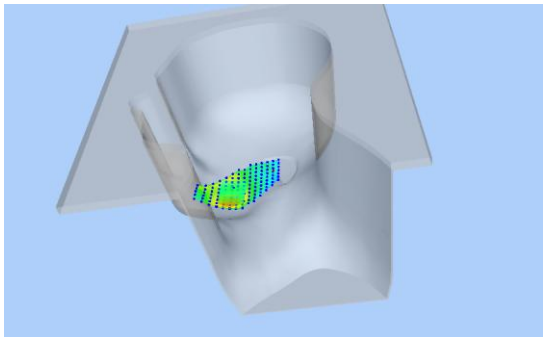
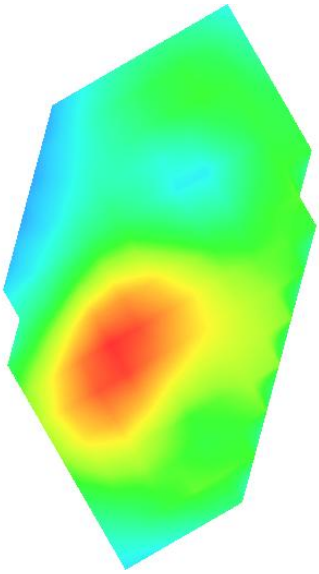
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-50.00, Y=-48.00

SAR 10g (W/Kg)	0.633370
SAR 1g (W/Kg)	1.013329

Z axis scan



3D screen shot	Hot spot position
	

WCDMA1900,Left Cheek, Middle, repeated test result

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 28/9/2013

Measurement duration: 5 minutes 22 seconds

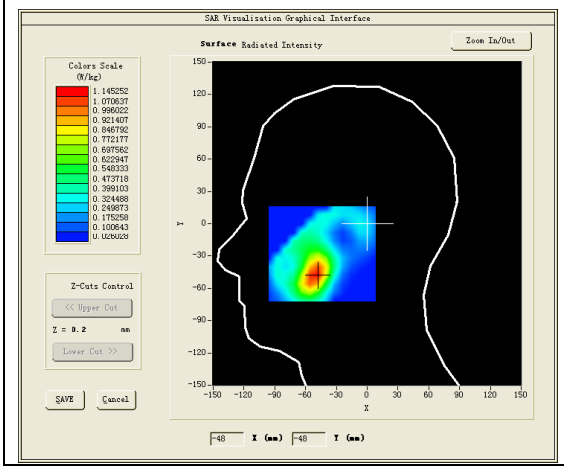
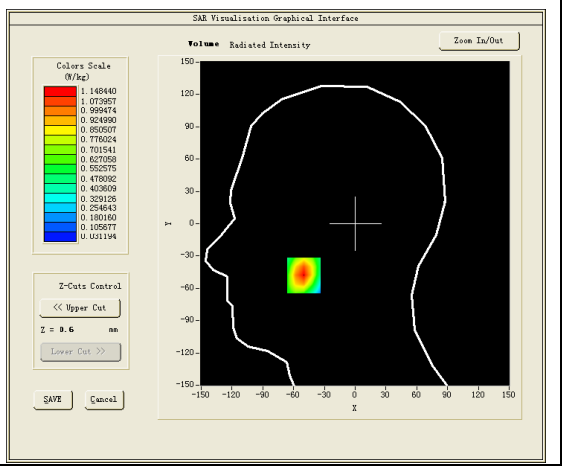
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Left head
Device Position	Cheek
Band	Band2_WCDMA1900
Channels	9400
Signal	WCDMA (Crest factor: 1:1)

B. SAR Measurement Results

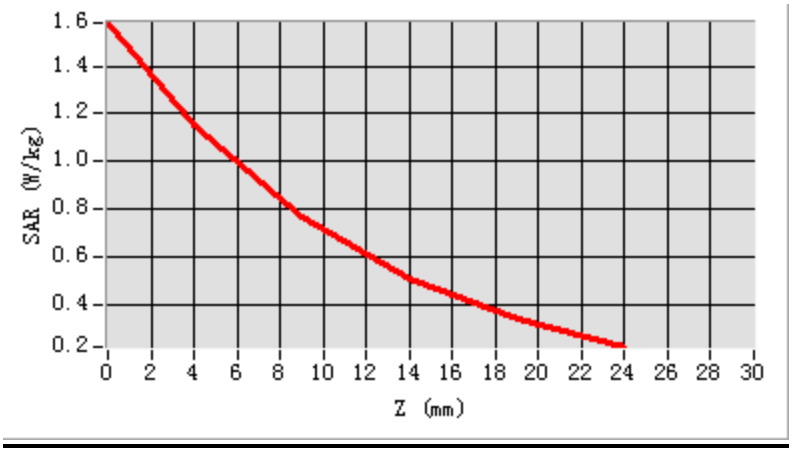
Frequency (MHz)	1880.0
Relative permittivity (real part)	39.88
Relative permittivity (imaginary part)	15.07
Conductivity (S/m)	1.42
Variation (%)	-1.540000
ConvF:	5.48

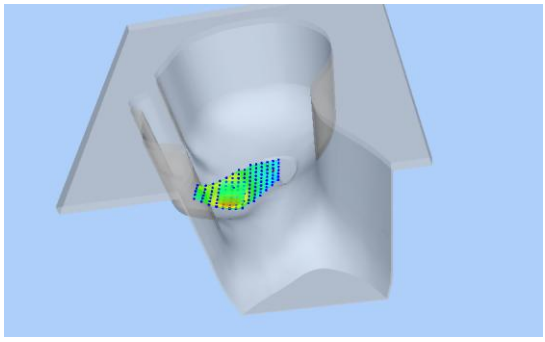
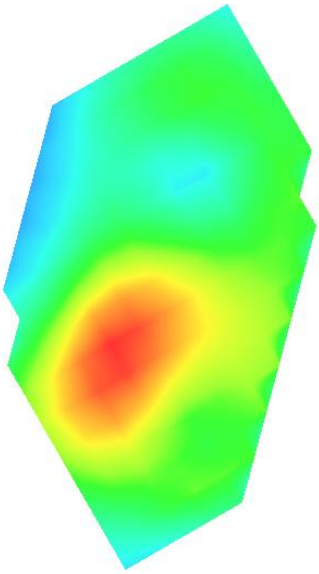
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-50.00, Y=-48.00

SAR 10g (W/Kg)	0.611310
SAR 1g (W/Kg)	0.991434

Z axis scan



3D screen shot	Hot spot position
	

WCDMA1900, Back, Middle

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 29/9/2013

Measurement duration: 7 minutes 15 seconds

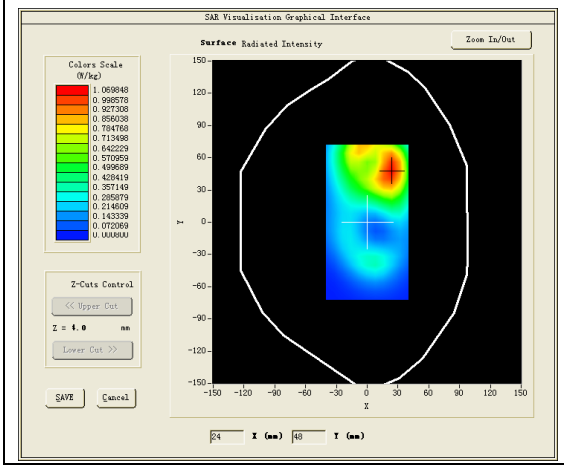
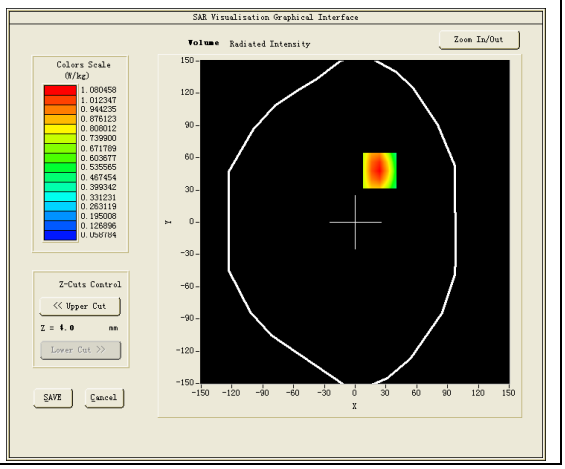
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Validation plane
Device Position	Body
Band	Band2_WCDMA1900
Channels	9400
Signal	WCDMA (Crest factor: 1:1)

B. SAR Measurement Results

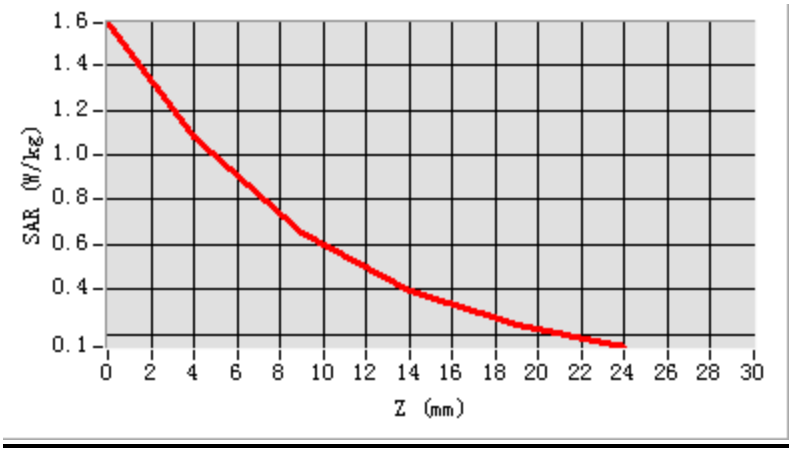
Frequency (MHz)	1880.0
Relative permittivity (real part)	53.67
Relative permittivity (imaginary part)	13.02
Conductivity (S/m)	1.51
Variation (%)	-1.630000
ConvF:	5.64

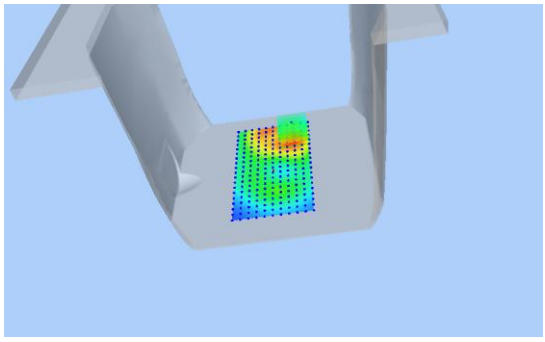
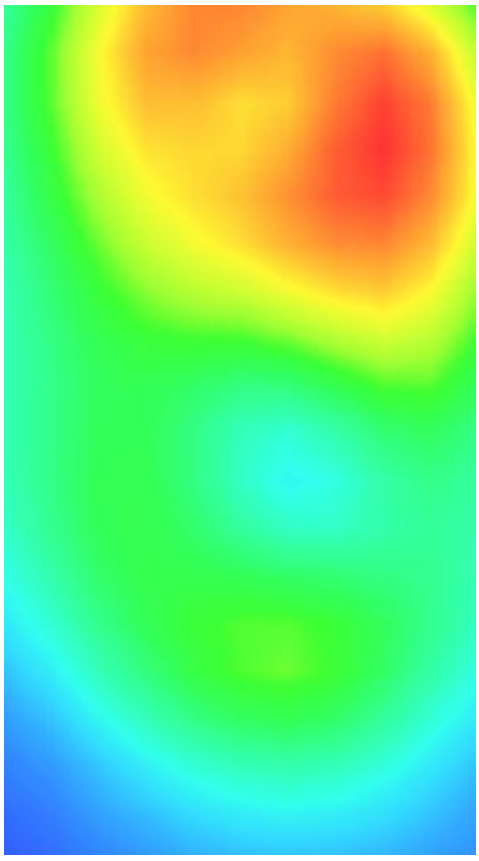
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=24.00, Y=48.00

SAR 10g (W/Kg)	0.602300
SAR 1g (W/Kg)	1.026342

Z axis scan



3D screen shot	Hot spot position
	

WCDMA1900, Back, Middle, repeated test result

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 29/9/2013

Measurement duration: 7 minutes 15 seconds

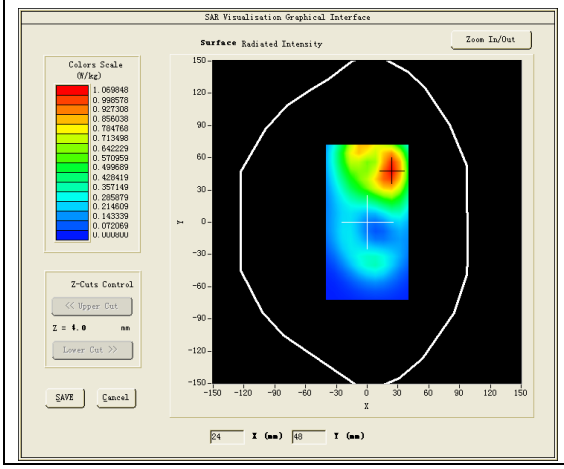
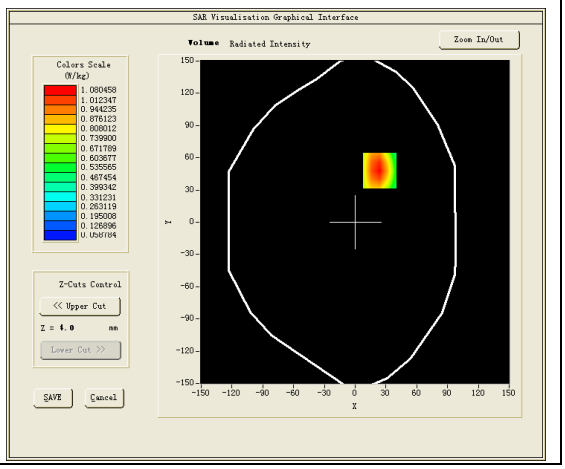
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Validation plane
Device Position	Body
Band	Band2_WCDMA1900
Channels	9400
Signal	WCDMA (Crest factor: 1:1)

B. SAR Measurement Results

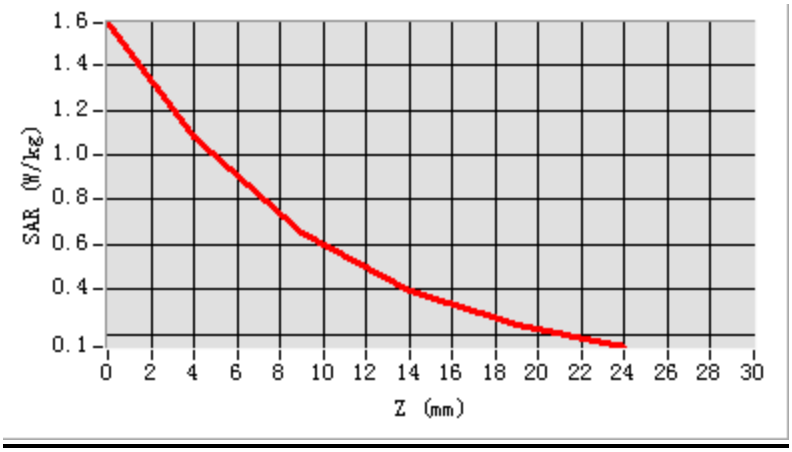
Frequency (MHz)	1880.0
Relative permittivity (real part)	53.67
Relative permittivity (imaginary part)	13.02
Conductivity (S/m)	1.51
Variation (%)	-1.460000
ConvF:	5.64

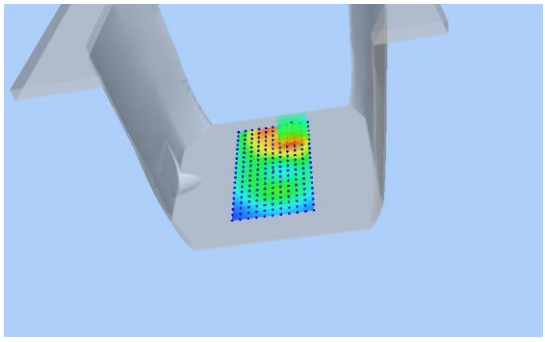
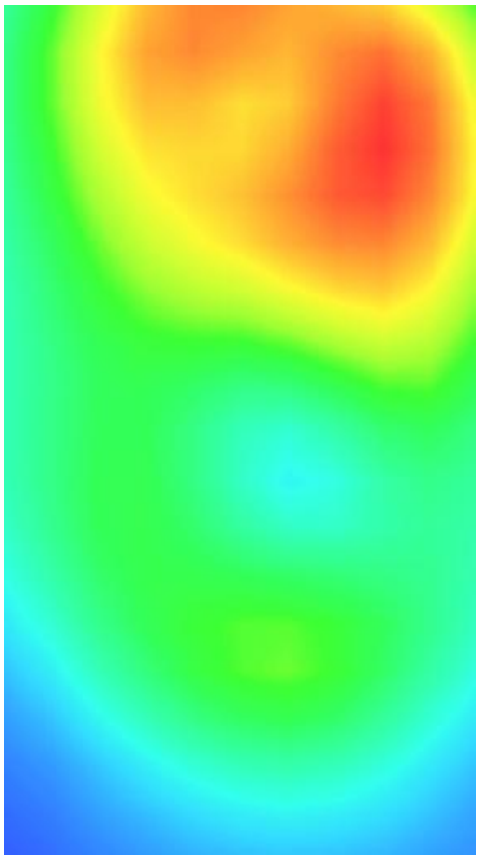
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=24.00, Y=48.00

SAR 10g (W/Kg)	0.601112
SAR 1g (W/Kg)	0.978427

Z axis scan



3D screen shot	Hot spot position
	

Wi-Fi 802.11b , Right Cheek, Middle

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 28/9/2013

Measurement duration: 7 minutes 21 seconds

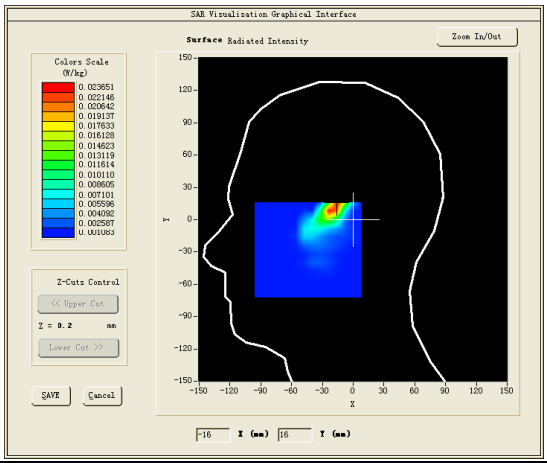
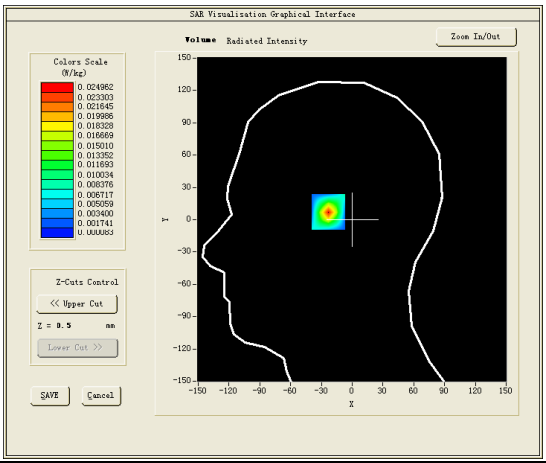
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11b ISM
Channels	6
Signal	DSSS (Crest factor: 1:1)

B. SAR Measurement Results

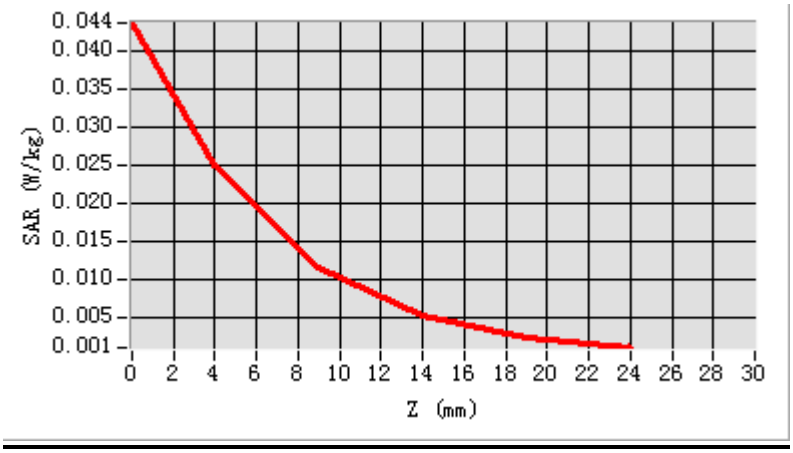
Frequency (MHz)	2437
Relative permittivity (real part)	38.96
Relative permittivity (imaginary part)	13.19
Conductivity (S/m)	1.79
Variation (%)	0.080000
ConvF:	4.80

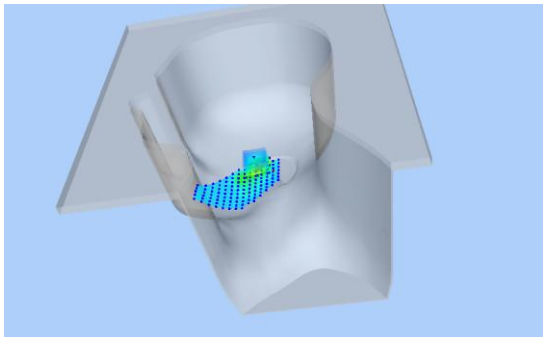
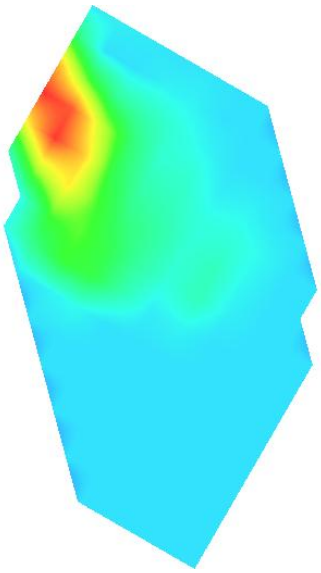
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-21.00, Y=8.00

SAR 10g (W/Kg)	0.008742
SAR 1g (W/Kg)	0.021768

Z axis scan



3D screen shot	Hot spot position
	

Wi-Fi 802.11b , Back, Middle

Type: Phone measurement (Very fast, 11 points in the volume)

Date of measurement: 29/9/2013

Measurement duration: 7 minutes 21 seconds

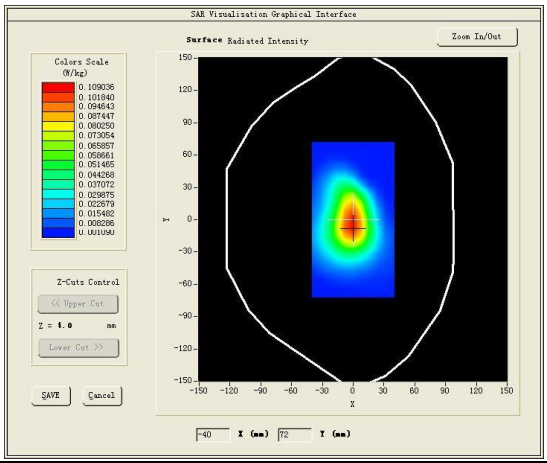
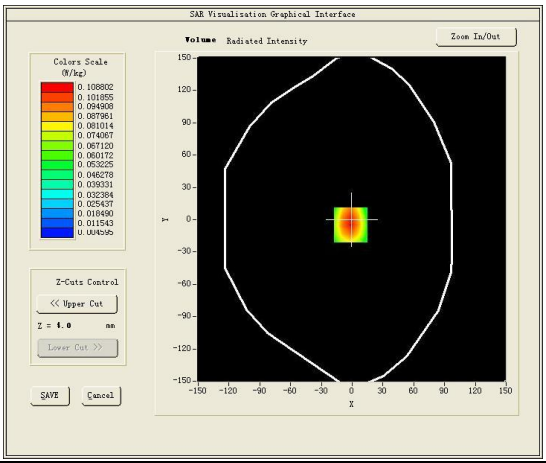
Mobile Phone IMEI number: --

A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Very fast
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11b ISM
Channels	6
Signal	DSSS (Crest factor: 1:1)

B. SAR Measurement Results

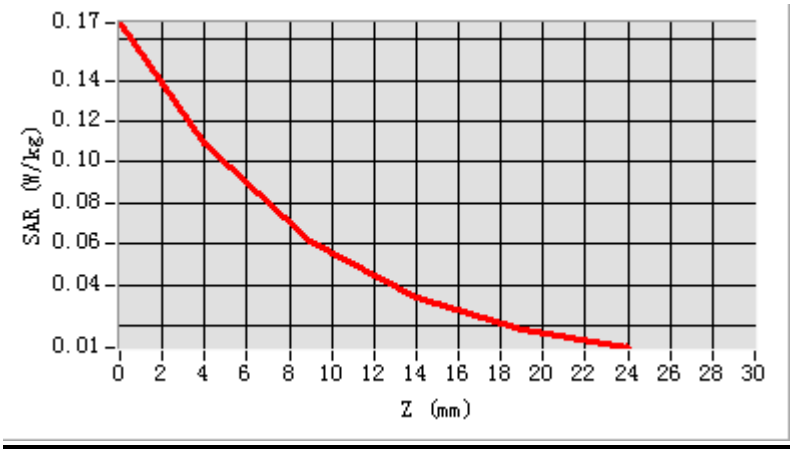
Frequency (MHz)	2437
Relative permittivity (real part)	52.68
Relative permittivity (imaginary part)	13.02
Conductivity (S/m)	1.97
Variation (%)	0.080000
ConvF:	4.90

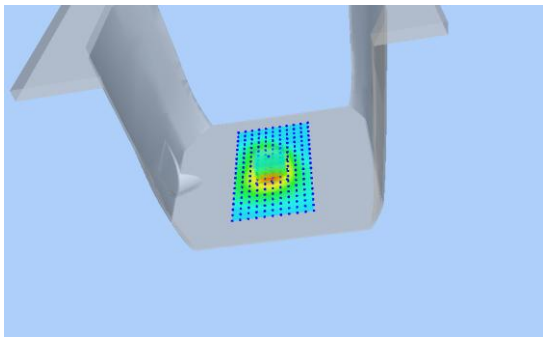
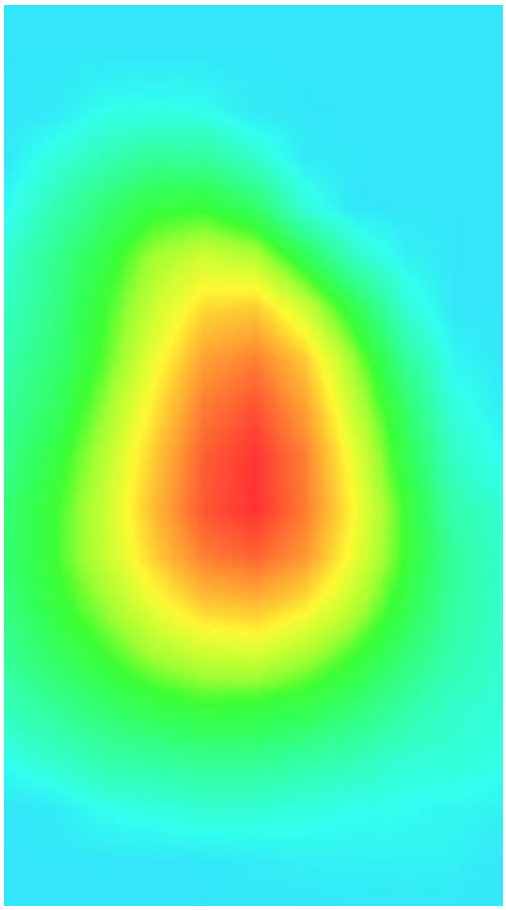
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-1.00, Y=-5.00

SAR 10g (W/Kg)	0.0467625
SAR 1g (W/Kg)	0.087869

Z axis scan



3D screen shot	Hot spot position
	

ANNEX E

of

CCIC-SET

CONFORMANCE TEST REPORT FOR

HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS

SET2013-05816

Mobilephone

Type Name: R500+

Hardware Version： S103M001P000

Software Version： R500+_VER_2.0_01010_20130820

Calibration Certificate of Probe and Dipoles

This Annex consists of 42 pages

Date of Report：2013-12-4

Probe Calibration Ceriticate

COMOSAR E-Field Probe Calibration Report

Ref : ACR.96.2.13.SATU.A

CCIC SOUTHERN ELECTRONIC PRODUCT TESTING (SHENZHEN) CO.,LTD

ELECTRONIC TESTING BUILDING,SHAHE ROAD, XILI. TOWN SHENZHEN,P.R.CHINA

SATIMO COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: SN 09/13 EP169

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144

ACCREDITED
Calibration CERT #2246.02

04/05/13

Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed in SATIMO USA using the CALISAR / CALIBAIR test bench, for use with a SATIMO COMOSAR system only. All calibration results are traceable to national metrology institutions.

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	4/5/2013	
Checked by :	Jérôme LUC	Product Manager	4/5/2013	
Approved by :	Kim RUTKOWSKI	Quality Manager	4/5/2013	

	Customer Name
Distribution :	Shenzhen EMC-united Co., Ltd

Issue	Date	Modifications
A	4/5/2013	Initial release

TABLE OF CONTENTS

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	Satimo
Model	SSE5
Serial Number	SN 09/13 EP169
Product Condition (new / used)	new
Frequency Range of Probe	0.7 GHz-3GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.223 MΩ Dipole 2: R2=0.233 MΩ Dipole 3: R3=0.222 MΩ

A yearly calibration interval is recommended.

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

Satimo's COMOSAR E field Probes are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards.

Figure 1 – *Satimo COMOSAR Dosimetric E field Dipole*

Probe Length	330 mm
Length of Individual Dipoles	4.5 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	5 mm
Distance between dipoles / probe extremity	2.7 mm

3 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their affect. All calibrations / measurements performed meet the fore mentioned standards.

3.1 LINEARITY

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01W/kg to 100W/kg.

3.2 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards.

3.3 LOWER DETECTION LIMIT

The lower detection limit was assessed using the same measurement set up as used for the linearity measurement. The required lower detection limit is 10 mW/kg.

3.4 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 - 360 degrees in 15 degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

3.5 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty associated with an E-field probe calibration using the waveguide technique. All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

Uncertainty analysis of the probe calibration in waveguide					
ERROR SOURCES	Uncertainty value (%)	Probability Distribution	Divisor	ci	Standard Uncertainty (%)
Incident or forward power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Reflected power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Liquid conductivity	5.00%	Rectangular	$\sqrt{3}$	1	2.887%
Liquid permittivity	4.00%	Rectangular	$\sqrt{3}$	1	2.309%
Field homogeneity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Field probe positioning	5.00%	Rectangular	$\sqrt{3}$	1	2.887%
Field probe linearity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%