FCC SAR TEST REPORT

Issued to

Group Sense Mobile-Tech Limited

For

WiFi PDA

Model Name	:	DT4005
Trade Name	:	Group Sense Mobile-Tech Limited
Brand Name	:	Xplore
FCC ID	:	VRI-B202
Standard	:	47CFR 2.1093 IEEE 1528-2013
MAX SAR	:	Body: 0.481W/Kg
Test date	:	2014-4-2 to 2014-6-6
Issue date	:	2014-6-9

by

Shenzhen Morlab Communications Technology Co., Ltd.

FL.3, Building A, FeiYang Science Park, No.8 LongChang Road,Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China 518101

Tested by	Zou Jian	***Approved by***	Zeng Dexin	***Reviewed by***	Zhu Zhan
	Zou Jian		Zeng Dexin		Zhu Zhan
	(Test Engineer)		(Chief Engineer)		(SAR Specialist)
Date	2014.6.9	***Date***	2014.6.9	***Date***	2014.6.9

DIRECTORY

Change History		
Issue	Date	Reason for change
1.0	June 9, 2014	First edition

1. TESTING LABORATORY

1.1 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 518101

1.2 Accreditation Certificate

Accredited Testing Laboratory: No. CNAS L3572

1.3 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	Aglient (8960, SN:10752)	2014-2-21	1year
3	Network Analyzer	Agilent(E5071B ,SN:MY42404762)	2013-9-26	1year
4	Voltmeter	Keithley (2000, SN:1000572)	2013-9-24	1year
5	Signal Generator	Rohde&Schwarz (SMP_02)	2013-9-24	1year
6	Power Amplifier	PRANA (Ap32 SV125AZ)	2013-9-24	1year
7	Power Meter	Agilent (E4416A, SN:MY45102093)	2013-5-07	1year
8	Power Sensor	Agilent (N8482A, SN:MY41091706)	2013-5-07	1year
9	Directional coupler	Giga-tronics(SN:1829112)	2013-9-24	1year
10	Probe	Satimo (SN:SN 37/08 EP80)	2013-9-25	1year
11	Probe 5-6GHz	Satimo (SN:SN 27/13 EPG193)	2013-9-25	1year
12	Dielectric Probe Kit	Agilent (85033E)	2013-9-24	1year
13	Phantom	Satimo (SN:SN_36_08_SAM62)	2013-9-24	1year
14	Liquid	Satimo(Last Calibration: 2014-4-2 to 2014-6-6)	N/A	N/A
15	Dipole 2450MHz	Satimo (SN 30/13 DIP2G450-263)	2013-9-25	1year
16	Waveguide 5-6GHz	Satimo (SN 41/12 WGA21)	2013-9-25	1year

2. TECHNICAL INFORMATION

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

2.1 Identification of Applicant

Company Name:	Group Sense Mobile-Tech Limited
Address:	6/F, Enterprise Place, No. 5 Science Park West Avenue, HK Science Park, Shatin, N.T., H K

2.2 Identification of Manufacturer

Company Name:	Group Sense Mobile-Tech Limited
Address:	6/F, Enterprise Place, No. 5 Science Park West Avenue, HK Science Park, Shatin, N.T., H K

2.3 Equipment Under Test (EUT)

Model Name:	DT4005
Trade Name:	Group Sense Mobile-Tech Limited
Brand Name:	Xplore
Hardware Version:	QA1
Software Version:	B202-V1.01.0044
Tx Frequency Bands:	802.11 b/g/n20: 2412-2462 MHz; 802.11a/n20: 5.180-5.320GHz,5.500-5.700GHz,5.745-5.825GHz; Bluetooth;
Uplink Modulations:	WiFi 802.11b: DSSS; WiFi 802.11a/g/n: OFDM; Bluetooth: GFSK/π/4-DQPSK/8-DPSK;
DTM:	Not support
Antenna type:	Fixed Internal Antenna
Development Stage:	Identical prototype
Hotspot function:	Not support
Voice mode:	Not support

2.3.1 Photographs of the EUT

Please refer to the External Photos for the Photos of the EUT

2.3.2 Identification of all used EUT

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#	QA1	B202-V1.01.0044

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	**IEEE 1528-2013**	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
3	**KDB 447498 D01v05r01**	General RF Exposure Guidance
4	**KDB 248227 D01v01r02**	SAR Measurement Procedures for 802.11 a/b/g Transmitters
5	**KDB 865664 D01v01r02**	SAR Measurement 100 MHz to 6 GHz
6	**KDB 865664 D02v01r01**	SAR Reporting

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.

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 Middle 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:

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

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

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\boldsymbol{\delta}\mathbf{T}}{\boldsymbol{\delta}\mathbf{t}}\right)$$

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

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

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

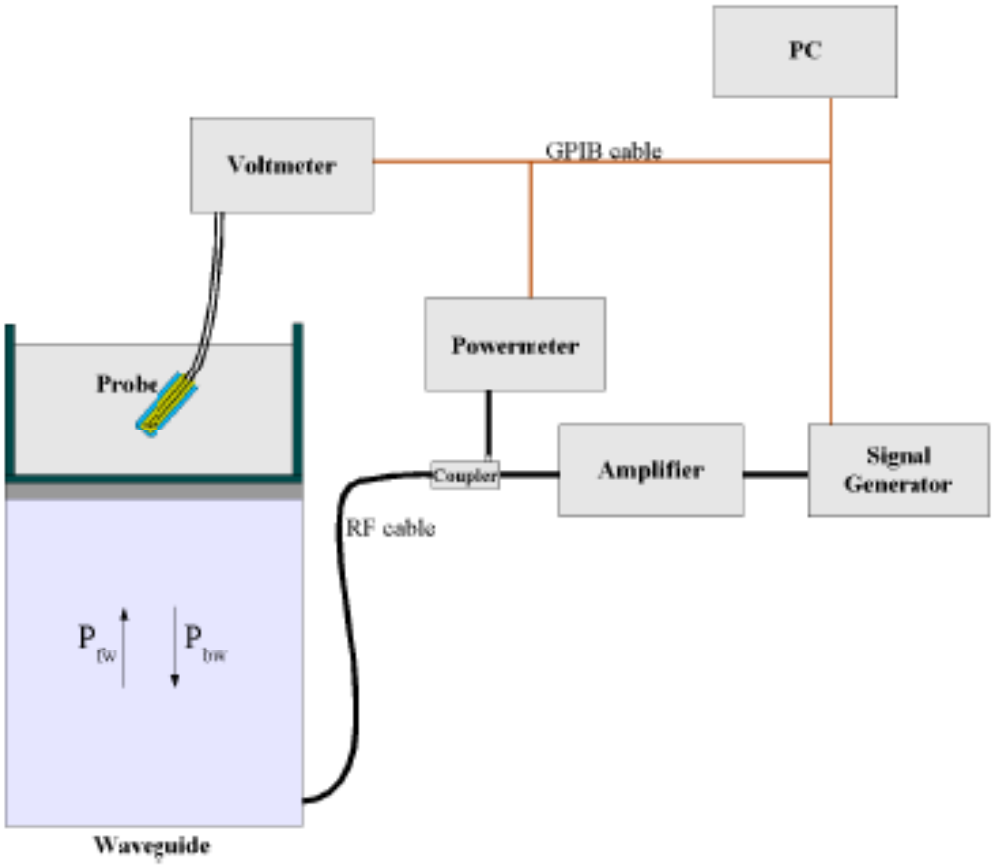
For the measurements the Specific Dosimetric E-Field Probe SN 37/08 EP80 with Following specifications is used

- 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

(repeat ability better than +/- 1mm)
- Probe linearity: <0.25 dB
- Axial Isotropy: <0.25 dB
- Spherical Isotropy: <0.25 dB
- Calibration range: 835 to 2500MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and surface normal line: less 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 62209-1 annex 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:

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

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

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

Where DCP is the diode compression point in mV.

4.3 Probe Calibration Process

4.3.1 Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. SATIMO Probe calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm^2) using an with CALISAR, Antenna proprietary calibration system.

4.3.2 Free Space Assessment Procedure

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm^2

4.3.3 Temperature Assessment Procedure

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulating head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

Where:

δt = exposure time (30 seconds),

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\delta \mathbf{T}}{\delta \mathbf{t}}\right)$$

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

δT = temperature increase due to RF exposure.

SAR is proportional to ΔT/Δt, the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

Where:

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

σ = simulated tissue conductivity,

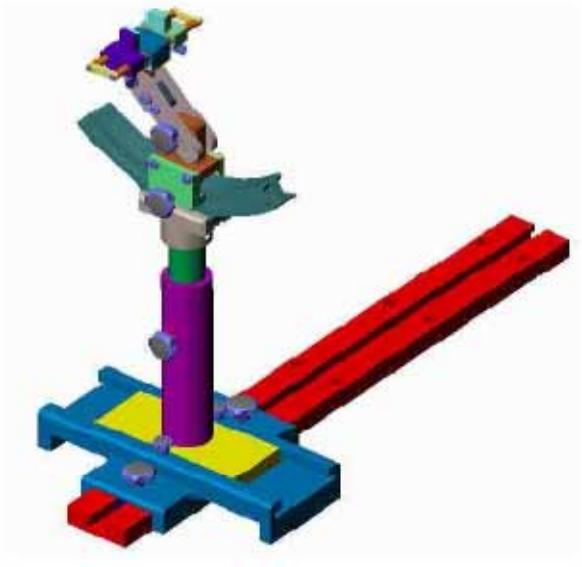
ρ = Tissue density (1.25 g/cm³ for brain tissue)

4.4 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.

4.5 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 Middle than 1°.



Device holder

System Material	Permittivity	Loss Tangent
Delrin	3.7	0.005

5. TISSUE SIMULATING LIQUIDS

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in below table.

The following table gives the recipes for tissue simulating liquids

Frequency Band (MHz)	2450	5200-5800
Tissue Type	Body	Body
Ingredients (% by weight)		
Deionised Water	73.20	78.60
Salt(NaCl)	0.10	0.00
Sugar	0.00	0.00
Tween 20	0.00	0.00
HEC	0.00	0.00
Bactericide	0.00	0.00
Triton X-100	0.00	10.70
DGBE	26.70	0.00
Diethylenglycol monohexylether	0.00	10.70
Measured dielectric parameters		
Dielectric Constant	52.70	Note
Conductivity (S/m)	1.95	

Note: Please refer to the validation results for dielectric parameters of each frequency band.

The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using an Agilent 85033E Dielectric Probe Kit and an Agilent Network Analyzer

Table 1: Dielectric Performance of Tissue Simulating Liquid (for Body)

Temperature: 22.0~23.8°C, humidity: 54~60%.						
Date	**Freq.(MHz)**	**Liquid Parameters**	**Meas.**	**Target**	**Delta(%)**	**Limit±(%)**
2014/4/2	Body 2450	Relative Permittivity(εr):	52.46	52.7	-0.46	5
		Conductivity(σ):	1.92	1.95	-1.54	5
2014/6/6	Body 5600	Relative Permittivity(εr):	48.36	48.5	-0.29	5
		Conductivity(σ):	5.73	5.77	-0.69	5
2014/6/6	Body 5800	Relative Permittivity(εr):	48.11	48.2	-0.19	5
		Conductivity(σ):	5.93	6.00	-1.17	5

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 (Applicable for frequencies 3GHz)

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 (+- %)	Vi
Measurement System									
Probe calibration	E.2.1	4.76	N	1	1	1	4.76	4.7	∞
Axial Isotropy	E.2.2	2.5	R	$\sqrt{3}$	0.7	0.7	1.01	1.0	∞
Hemispherical Isotropy	E.2.2	4.0	R	$\sqrt{3}$	0.7	0.7	1.62	1.6	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.5	∞
Linearity	E.2.4	5.0	R	$\sqrt{3}$	1	1	2.89	2.8	∞
System detection limits	E.2.5	1.0	R	$\sqrt{3}$	1	1	0.58	0.5	∞
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.0	∞
Reponse Time	E.2.7	3.0	R	$\sqrt{3}$	1	1	1.73	1.7	∞
Integration Time	E.2.8	2.0	R	$\sqrt{3}$	1	1	1.15	1.1	∞
RF ambient Conditions	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.7	∞
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	$\sqrt{3}$	1	1	1.15	1.1 5	∞
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	$\sqrt{3}$	1	1	0.03	0.0 3	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5.2	5.0	R	$\sqrt{3}$	1	1	2.89	2.8 9	∞
Test sample Related									
Test sample positioning	E.4.2. 1	0.03	N	1	1	1	0.03	0.0 3	N-1
Device Holder Uncertainty	E.4.1. 1	5.00	N	1	1	1	5.00	5.0 0	N-1
Output power Power drift -	6.6.2	4.04	R	$\sqrt{3}$	1	1	2.33	2.3	∞

SAR drift measurement								3	
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				11.55	10.67	
Expanded Uncertainty (95% Confidence interval)			K=2				23.11	21.33	

6.2 UNCERTAINTY FOR SYSTEM PERFORMANCE CHECK (Applicable for frequencies 3GHz)

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 (+-%)	Vi
Measurement System									
Probe calibration	E.2.1	4.76	N	1	1	1	4.76	4.7	∞
Axial Isotropy	E.2.2	2.5	R	$\sqrt{3}$	0.7	0.7	1.01	1.0	∞
Hemispherical Isotropy	E.2.2	4.0	R	$\sqrt{3}$	0.7	0.7	1.62	1.6	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.5	∞
Linearity	E.2.4	5.0	R	$\sqrt{3}$	1	1	2.89	2.8	∞
System detection limits	E.2.5	1.0	R	$\sqrt{3}$	1	1	0.58	0.5	∞
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.0	∞
Reponse Time	E.2.7	3.0	R	$\sqrt{3}$	1	1	1.73	1.7	∞
Integration Time	E.2.8	2.0	R	$\sqrt{3}$	1	1	1.15	1.1	∞

RF ambient Conditions	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.7	∞
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5.2	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole									
Dipole axis to liquid Distance	8,E.4.2	1.00	N	$\sqrt{3}$	1	1	0.58	0.58	∞
Input power and SAR drift measurement	8,6.6.2	4.04	R	$\sqrt{3}$	1	1	2.33	2.33	∞
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	$\sqrt{3}$	0.64	0.43	1.85	1.24	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	$\sqrt{3}$	0.6	0.49	3.46	2.83	M
Combined Standard Uncertainty			RSS				8.83	8.37	
Expanded Uncertainty (95% Confidence interval)			K=2				17.66	16.73	

6.3 UNCERTAINTY EVALUATION FOR EUT SAR TEST (Applicable for frequencies 3-6GHz)

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 (+-	Vi

								%)	
Measurement System									
Probe calibration	E.2.1	6.55	N	1	1	1	6.6	6.6	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemispherical Isotropy	E.2.2	1.3	N	1	1	1	1.3	1.3	∞
Boundary effect	E.2.3	0.4	N	1	1	1	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1	1	0.3	0.3	∞
System detection limits	E.2.5	5.1	N	1	1	1	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1	1	1.0	1.0	∞
Reponse Time	E.2.7	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
RF ambient Conditions	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
Probe positioner Mechanical Tolerance	E.6.2	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
Probe positioning with respect to Phantom Shell	E.6.3	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample Related									
Test sample positioning	E.4.2	6.0	N	1	1	1	6.0	6.0	28 7
Device Holder Uncertainty	E.4.1	3.32	R	$\sqrt{3}$	1	1	1.9	1.9	∞
Output power Power drift - SAR drift measurement	6.6.2	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Liquid conductivity - deviation from target value	E.3.2	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
Liquid conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.5	6
Liquid permittivity - deviation from target value	E.3.2	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
Liquid permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.6	0.49	2.7	2.2	6

Combined Standard Uncertainty			RSS				12.4	12	299
Expanded Uncertainty (95% Confidence interval)			K=2				24.7	24	

6.4 UNCERTAINTY FOR SYSTEM PERFORMANCE CHECK (Applicable for frequencies 3-6GHz)

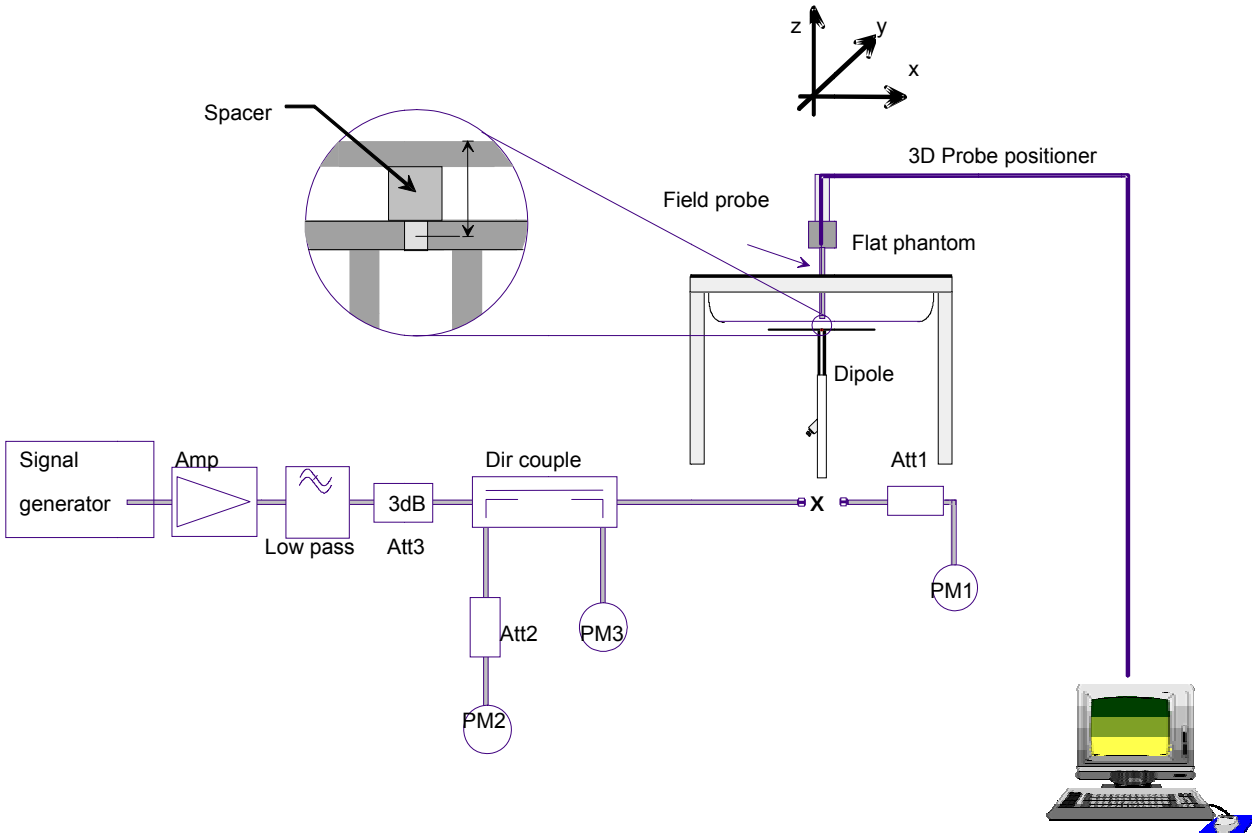
a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/ e	k
Uncertainty Component	Sec.	Tol (+- %)	Prob . Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+- %)	Vi
Measurement System									
Probe calibration	E.2.1	6.55	N	1	1	1	6.6	6.6	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemispherical Isotropy	E.2.2	1.3	N	1	1	1	1.3	1.3	∞
Boundary effect	E.2.3	0.4	N	1	1	1	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1	1	0.3	0.3	∞
System detection limits	E.2.5	5.1	N	1	1	1	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1	1	1.0	1.0	∞
Reponse Time	E.2.7	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
RF ambient Conditions	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
Probe positioner Mechanical Tolerance	E.6.2	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
Probe positioning with respect to Phantom Shell	E.6.3	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Dipole									
Dipole axis to liquid Distance	E.4.2	1.9	N	1	1	1	1.9	1.9	287
Input power and SAR drift	6.6.2	4.0	R	$\sqrt{3}$	1	1	2.9	2.3	∞

measurement									
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Liquid conductivity - deviation from target value	E.3.2	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
Liquid conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.5	6
Liquid permittivity - deviation from target value	E.3.2	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
Liquid permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.6	0.49	2.7	2.2	6
Combined Standard Uncertainty			RSS				9.36	9.2	299
Expanded Uncertainty (95% Confidence interval)			K=2				18.72	18.4	

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. 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. The system check verifies that the system operates within its specifications. It is performed daily or before every SAR measurement. The system check uses normal SAR measurements in the flat section of the phantom with a matched dipole at a specified distance. The system verification setup is shown as below.



The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The power meter PM1 measures the forward power at the location of the system check dipole connector. The signal generator is adjusted for the desired forward power (250 mW is used for 700 MHz to 3 GHz,100 mW is used for 3.5 GHz to 6 GHz) at the dipole connector and the power meter PM2 is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2.

7.2 Validation Results

After system check testing, the SAR result will be normalized to 1W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10 %.

Frequency	2450MHz
Target value 1W (1g)	56.09 W/Kg
Test value 1g (250 mW input power)	12.908 W/Kg (4.2)
Normalized to 1W value(1g)	51.632 W/Kg

Frequency	5600MHz(B)	5800MHz
Target value 1W (1g)	189.290 W/Kg	201.620 W/Kg
Test value 1g (100 mW input power)	18.785 W/Kg (6.6)	21.426 W/Kg (6.6)
Normalized to 1W value(1g)	187.850 W/Kg	214.260 W/Kg

Note: System checks the specific test data please see page 71~76.

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.

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.

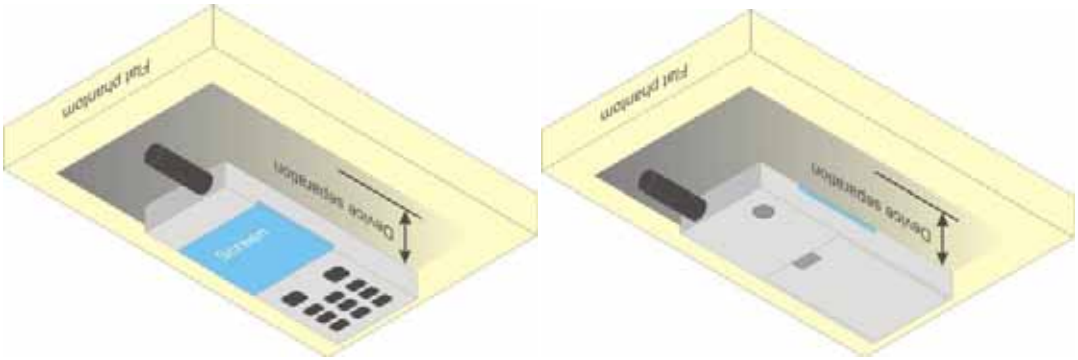


Illustration for Body Worn Position

8.2 Measurement procedure

The Following steps are used for each test position

1. 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.
2. Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
3. 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 cannot 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.
4. 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.

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. MEASUREMENT OF CONDUCTED OUTPUT POWER

9.1 WIFI (2.4GHz BAND)

Required Test Channels per KDB 248227 D01

Mode	Band	GHz	Channel	"Default Test Channels"	
				802.11b	802.11g
802.11b/g	2.4GHz	2.412	1#	√	*
		2.437	6	√	*
		2.462	11#	√	*

Notes:

√ = "default test channels"

*= possible 802.11a channels with maximum average output > the "default test channels"

= when output power is reduced for channel 1 and/or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested

Measured Results

Band (GHz)	Mode	Channel	Frequency (MHz)	Output Power(dBm)
2.4	802.11b (DSSS)	1	2412	15.75
		6	2437	15.77
		11	2462	15.30
	802.11g (OFDM)	1	2412	14.73
		6	2437	14.79
		11	2462	14.48
	802.11n20 (OFDM)	1	2412	13.55
		6	2437	13.60
		11	2462	13.25

Note: Per KDB 248227, SAR is not required for 802.11g/ HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

9.2 WIFI (5G BANDS)

Required Test Channels per KDB 248227 D01

Mode		Band	GHz	Channel	"Default Test Channels" 802.11	
802.11a	UNII (15.407)	5.2GHz	5.18	36	√	
			5.20	40		*
			5.22	44		*
			5.24	48	√	
		5.3GHz	5.26	52	√	
			5.28	56		*
			5.30	60		*
			5.32	64	√	
		5.5GHz	5.500	100		*
			5.520	104	√	
			5.540	108		*
			5.560	112		*
			5.580	116	√	
			5.600	120		*
			5.620	124	√	
			5.640	128		*
			5.66	132		*
			5.680	136	√	
			5.700	140		*
	DTS (15.247)	5.8GHz	5.745	149	√	
			5.765	153		*
			5.785	157	√	
			5.805	161		*
			5.825	165	√	

√ = "default test channels"

*= possible 802.11a channels with maximum average output > the "default test channels"

= when output power is reduced for channel 1 and/or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested

Measured Results

Band (GHz)	Mode	Channel	Frequency (MHz)	Output Power(dBm)
5.2 (UNII)	802.11a	36	5180	7.12
		40	5200	7.04
		44	5220	6.84
		48	5240	6.55
	802.11n20	36	5180	7.77
		40	5200	7.65
		44	5220	7.49
		48	5240	7.23
5.3 (UNII)	802.11a	52	5260	6.18
		56	5280	5.84
		60	5300	5.63
		64	5320	5.67
	802.11n20	52	5260	6.78
		56	5280	6.47
		60	5300	6.28
		64	5320	6.33
5.5 (UNII)	802.11a	100	5500	8.08
		104	5520	7.96
		108	5540	7.82
		112	5560	7.93
		116	5580	8.14
		132	5660	7.24
		136	5680	7.13
		140	5700	7.19
	802.11n20	100	5500	8.98
		104	5520	8.88
		108	5540	8.72
		112	5560	8.78
		116	5580	9.07
		132	5660	8.13
		136	5680	7.98
		140	5700	7.93
5.8 (UNII)	802.11a	149	5745	8.43
		153	5765	8.04
		157	5785	7.71
		161	5805	7.55
		165	5825	7.80

	802.11n20	149	5745	9.40
		153	5765	9.07
		157	5785	8.73
		161	5805	8.67
		165	5825	8.81

Note:

Per KDB 248227, SAR is required for 802.11n HT20 channels when the maximum average output power is more than 1/4 dB higher than that measured on the corresponding 802.11a channels.

9.3 Bluetooth

Band	Channel	Frequency (MHz)	Output Power(dBm)		
			GFSK	π/4-DQPSK	8-DPSK
BT	0	2402	10.53	10.17	10.55
	39	2441	10.88	10.86	10.84
	78	2480	10.53	10.46	10.46

10. STANDALONE SAR TEST EXCLUSION CONSIDERATIONS

1. EUT antenna position

2. Antennas < 50mm to adjacent edges

Band	Frequency (MHz)	Output Power(tune-up)		Min. Test Separation Distances (mm)						Calculated Threshold Value					
		dBm	mW	Rear	Front	Edge A	Edge B	Edge C	Edge D	Rear	Front	Edge A	Edge B	Edge C	Edge D
802.11b	2437	16.0	39.80	5	13	7	14	>50	>50	12.4 **Y**	4.8 **Y**	8.9 **Y**	4.4 **Y**	>50	>50
802.11a	5180	7.5	5.62	5	13	7	14	>50	>50	2.6 **N**	1.0 **N**	1.8 **N**	0.9 **N**	>50	>50
802.11n20		8.0	6.31	5	13	7	14	>50	>50	2.9 **N**	1.1 **N**	2.1 **N**	1.0 **N**	>50	>50
802.11a	5260	6.5	4.47	5	13	7	14	>50	>50	2.1 **N**	0.8 **N**	1.8 **N**	0.7 **N**	>50	>50
802.11n20		7.0	5.01	5	13	7	14	>50	>50	2.3 **N**	0.9 **N**	1.6 **N**	0.8 **N**	>50	>50
802.11a	5580	8.5	7.08	5	13	7	14	>50	>50	3.4 **Y**	1.3 **N**	2.4 **N**	1.2 **N**	>50	>50
802.11n20		9.5	8.91	5	13	7	14	>50	>50	4.3 **Y**	1.6 **N**	3.1 **Y**	1.5 **N**	>50	>50
802.11a	5745	8.5	7.08	5	13	7	14	>50	>50	3.4 **Y**	1.3 **N**	2.4 **Y**	1.2 **N**	>50	>50
802.11n20		9.5	8.91	5	13	7	14	>50	>50	4.3 **Y**	1.6 **N**	3.1 **Y**	1.5 **N**	>50	>50
Bluetooth	2441	11	12.59	5	13	7	14	>50	>50	3.9 **Y**	1.5 **N**	2.8 **N**	1.4 **N**	>50	>50

Note:

1. Y=Testing is required; N=Testing is not required.
2. According to KDB 447498D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] · [√f(GHz)] ≤ 3.0 for 1-g SAR,
   if the Calculated Threshold Value is <3, then SAR testing is not required.

3. Antennas > 50mm to adjacent edges

Band	Frequency (MHz)	Output Power(tune-up)		Min. Test Separation Distances (mm)						Calculated Threshold Value					
		dBm	mW	Rear	Front	Edge A	Edge B	Edge C	Edge D	Rear	Front	Edge A	Edge B	Edge C	Edge D
802.11b	2437	16.0	39.80	<50	<50	<50	<50	58	110	<50	<50	<50	<50	119.8 N	639.8 N
802.11a	5180	7.5	5.62	<50	<50	<50	<50	58	110	<50	<50	<50	<50	85.62 N	6.536 N
802.11n20		8.0	6.31	<50	<50	<50	<50	58	110	<50	<50	<50	<50	86.31 N	606.3 N
802.11a	5260	6.5	4.47	<50	<50	<50	<50	58	110	<50	<50	<50	<50	84.47 N	604.5 N
802.11n20		7.0	5.01	<50	<50	<50	<50	58	110	<50	<50	<50	<50	85.01 N	605.0 N
802.11a	5580	8.5	7.08	<50	<50	<50	<50	58	110	<50	<50	<50	<50	87.08 N	607.1 N
802.11n20		9.5	8.91	<50	<50	<50	<50	58	110	<50	<50	<50	<50	88.91 N	608.9 N
802.11a	5745	8.5	7.08	<50	<50	<50	<50	58	110	<50	<50	<50	<50	87.08 N	607.1 N
802.11n20		9.5	8.91	<50	<50	<50	<50	58	110	<50	<50	<50	<50	88.91 N	608.9 N
Bluetooth	2441	11	12.59	<50	<50	<50	<50	58	110	<50	<50	<50	<50	92.59 N	612.6 N

Note:

1. Y=Testing is required; N=Testing is not required.
2. According to KDB 447498D01, if the calculated Power threshold is less than the output power then SAR testing is required.

11. TEST RESULTS LIST

Summary of Measurement Results (WLAN 802.11b Band)

Temperature: 21.0~23.8°C, humidity: 54~60%.					
Phantom Configurations	Device Test Positions	Device Test channel	SAR(W/Kg), 1g Peak	Scaling Factor	Scaled SAR (W/Kg), 1g
Body (5mm Separation)	Back upward	6	0.456	1.054	0.481
	Front upward		0.021		0.022
	Edge A		0.030		0.032
	Edge B		0.063		0.066

Summary of Measurement Results (Bluetooth)

Temperature: 21.0~23.8°C, humidity: 54~60%.					
Phantom Configurations	Device Test Positions	Device Test channel	SAR(W/Kg), 1g Peak	Scaling Factor	Scaled SAR (W/Kg), 1g
Body (5mm Separation)	Back upward	39 GFSK	0.218	1.028	0.224
	Edge A		0.066		0.068

Summary of Measurement Results (WLAN 802.11a-5.5GHz Band)

Temperature: 21.0~23.8°C, humidity: 54~60%.					
Phantom Configurations	Device Test Positions	Device Test channel	SAR(W/Kg), 1g Peak	Scaling Factor	Scaled SAR (W/Kg), 1g
Body (5mm Separation)	Back upward	104	0.106	1.132	0.120
		116	0.138	1.086	0.150
		136	0.089	1.371	0.122
	Edge A	116	0.055	116	0.060

Summary of Measurement Results (WLAN 802.11n-5.5GHz Band)

Temperature: 21.0~23.8°C, humidity: 54~60%.					
Phantom Configurations	Device Test Positions	Device Test channel	SAR(W/Kg), 1g Peak	Scaling Factor	Scaled SAR (W/Kg), 1g
Body (5mm Separation)	Back upward	116	0.154	1.104	0.170
	Edge A		0.061		0.067

Summary of Measurement Results (WLAN 802.11a-5.8GHz Band)

Temperature: 21.0~23.8°C, humidity: 54~60%.					
Phantom Configurations	Device Test Positions	Device Test channel	SAR(W/Kg), 1g Peak	Scaling Factor	Scaled SAR (W/Kg), 1g
Body (5mm Separation)	Back upward	149	0.180	1.016	0.183
		157	0.092	1.200	0.110
		165	0.100	1.175	0.118
	Edge A	149	0.076	149	0.077

Summary of Measurement Results (WLAN 802.11n-5.8GHz Band)

Temperature: 21.0~23.8°C, humidity: 54~60%.					
Phantom Configurations	Device Test Positions	Device Test channel	SAR(W/Kg), 1g Peak	Scaling Factor	Scaled SAR (W/Kg), 1g
Body (5mm Separation)	Back upward	149	0.210	1.023	0.215
	Edge A		0.096		0.098

Note:

1. 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 v05r01)

≤ 0.8 W/kg and transmission band ≤ 100 MHz
≤ 0.6 W/kg and, 100 MHz < transmission bandwidth ≤ 200 MHz
≤ 0.4 W/kg and transmission band > 200 MHz

2. BT & WiFi SAR test is conducted according to section 10 stand-alone SAR evaluation of this report.

3. During 802.11 testing, engineering testing software installed on the EUT can provide continuous transmitting RF signal. The RF signal utilized in SAR measurement has almost 100% duty cycle, and its crest factor is 1.

4. IEEE Std 1528-2013 requires the middle channel to be tested first. This generally applies to wireless devices that are designed to operate in technologies with tight tolerances for maximum output power variations across channels in the band. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

5. 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.

6. Scaling Factor calculation

Band	Tune-up power tolerance(dBm)	SAR test channel Power (dBm)	Scaling Factor
802.11b	Max output power =15.5+-0.5	15.77	1.054
Bluetooth	Max output power =10.5+-0.5	10.88	1.028
802.11a(5.5G)	Max output power =8+-0.5	7.96	1.132
		8.14	1.086
		7.13	1.371
802.11a(5.8G)	Max output power =8+-0.5	8.43	1.016
		7.71	1.200
		7.80	1.175
802.11n(5.5G)	Max output power =9+-0.5	9.07	1.104
802.11n(5.8G)	Max output power =9+-0.5	9.40	1.023

7. The NFC function operates at 13.56MHz, the power threshold of SAR evaluation is 474mW(Per KDB 447498 D01v05r02 Appendix C), the NFC operates at relatively much lower power; The NFC function is not active when carrying on the body. So SAR evaluation is not need for NFC function.

8. Simultaneous SAR

	Simultaneous transmission conditions			
#	802.11a/n	802.11b/g/n	BT	Sum of WiFi&BT
1	×		×	×
2		×	×	Note 1
3	×	×		Note 2

Note: 1. Simultaneous Transmission SAR evaluation is not required for BT and WiFi802.11b/g/n, because the software mechanism have been incorporated to guarantee that the WiFi802.11b/g/n and Bluetooth transmitters would not simultaneously operate.

2. Simultaneous Transmission SAR evaluation is not required for WiFi802.11a/n (5GHz) and WiFi802.11b/g/n (2.4GHz), because the software mechanism have been incorporated to guarantee that the WiFi802.11a/n (5GHz) and WiFi802.11b/g/n (2.4GHz) transmitters would not simultaneously operate.

Applicable Multiple Scenario Evaluation

Test Position	Bluetooth SAR(W/Kg)	WiFi 802.11a/n SARMax(W/Kg)	Σ1-g SARMax(W/Kg)
Body SAR	0.224	0.215	0.439

Simultaneous Transmission SAR evaluation is not required for Wifi802.11a/n and BT, because the sum of 1g SARMax is **0.439**W/Kg < 1.6W/Kg for Wifi802.11a/n and BT.
(According to KDB 447498D01v05r01, the sum of the Highest *reported* SAR of each antenna does not exceed the limit, simultaneous transmission SAR evaluation is not required.)

ANNEX A GRAPH TEST RESULTS

BAND	PARAMETERS
802.11b (2450)	Measurement 1: Flat Plane with Body device position on Middle Channel in DSSS mode Measurement 2: Flat Plane with Body device position on Middle Channel in DSSS mode Measurement 3: Flat Plane with Body device position on Middle Channel in DSSS mode Measurement 4: Flat Plane with Body device position on Middle Channel in DSSS mode.
Bluetooth	Measurement 5: Flat Plane with Body device position on Middle Channel in GFSK mode Measurement 6: Flat Plane with Body device position on Middle Channel in GFSK mode
802.11a (5G)	Measurement 7: Flat Plane with Body device position on Low Channel in OFDM mode Measurement 8: Flat Plane with Body device position on Middle Channel in OFDM mode Measurement 9: Flat Plane with Body device position on High Channel in OFDM mode Measurement 10: Flat Plane with Body device position on Middle Channel in OFDM mode Measurement 11: Flat Plane with Body device position on Low Channel in OFDM mode Measurement 12: Flat Plane with Body device position on Middle Channel in OFDM mode Measurement 13: Flat Plane with Body device position on High Channel in OFDM mode Measurement 14: Flat Plane with Body device position on Low Channel in OFDM mode.
802.11n (5G)	Measurement 15: Flat Plane with Body device position on Middle Channel in OFDM mode Measurement 16: Flat Plane with Body device position on Middle Channel in OFDM mode Measurement 17: Flat Plane with Body device position on Low Channel in OFDM mode Measurement 18: Flat Plane with Body device position on Low Channel in OFDM mode.

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: 2014.4.2

Measurement duration: 9 minutes 43 seconds

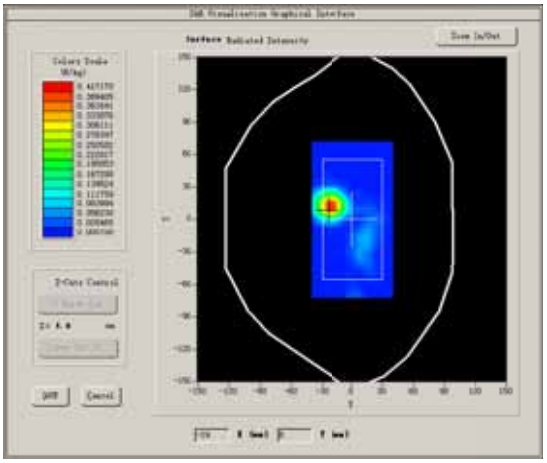
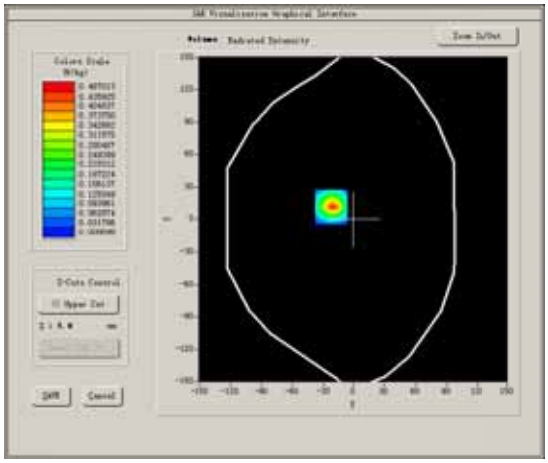
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11b
Channels	Middle
Signal	DSSS

B. SAR Measurement Results

Middle Band SAR (Channel 6)

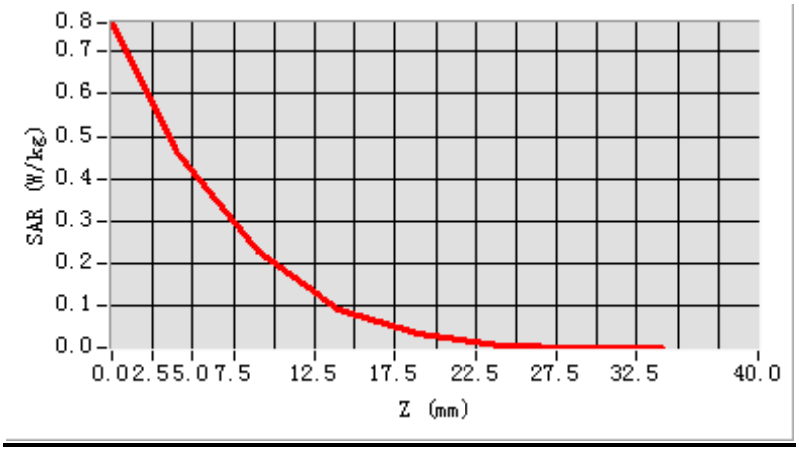
Frequency (MHz)	2437.000000
Relative permittivity (real part)	52.462734
Conductivity (S/m)	1.924067
Power drift (%)	-1.850000
Ambient Temperature:	22.9°C
Liquid Temperature:	22.1°C
ConvF:	4.96
Crest factor:	1:1

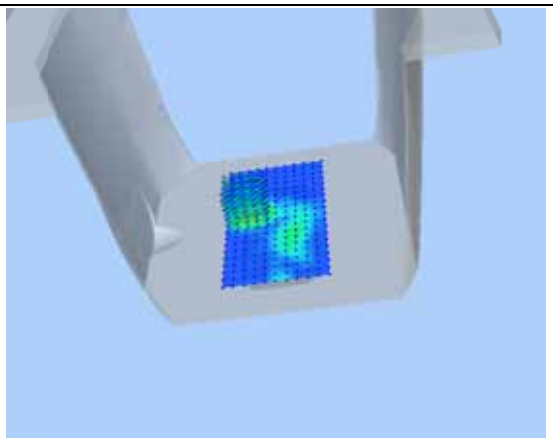
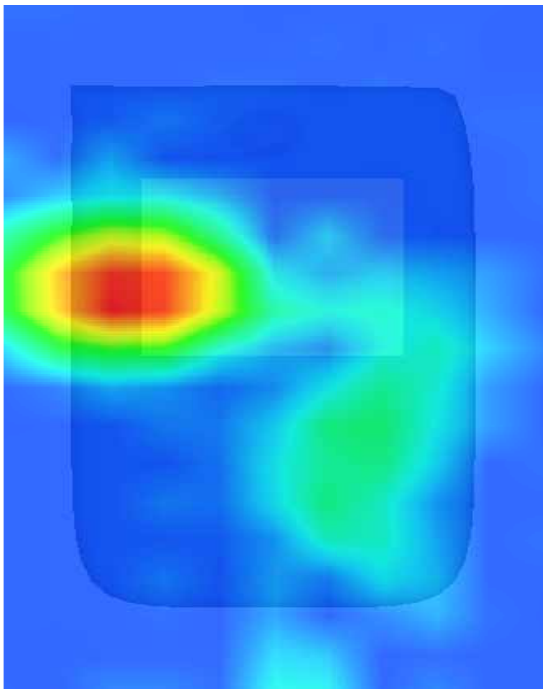
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-22.00, Y=11.00
SAR Peak: 0.84 W/kg

SAR 10g (W/Kg)	0.181844
SAR 1g (W/Kg)	0.455569

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: 2014.4.2

Measurement duration: 9 minutes 31 seconds

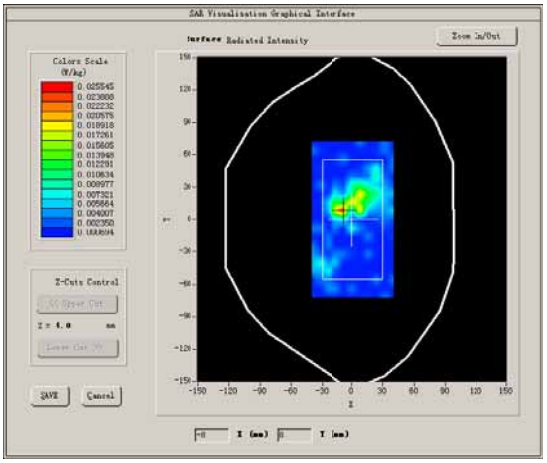
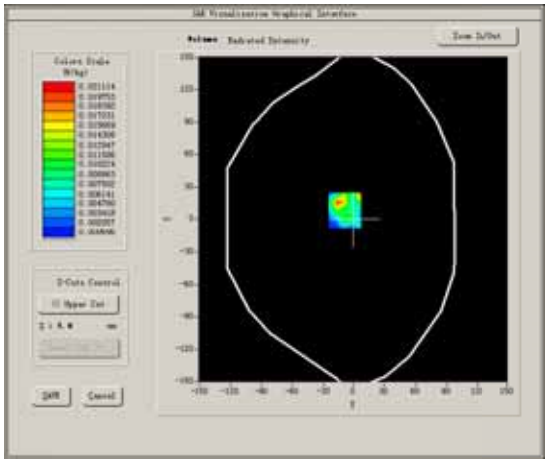
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11b
Channels	Middle
Signal	DSSS

B. SAR Measurement Results

Middle Band SAR (Channel 6)

Frequency (MHz)	2437.000000
Relative permittivity (real part)	52.462734
Conductivity (S/m)	1.924067
Power drift (%)	-1.640000
Ambient Temperature:	22.9°C
Liquid Temperature:	22.1°C
ConvF:	4.96
Crest factor:	1:1

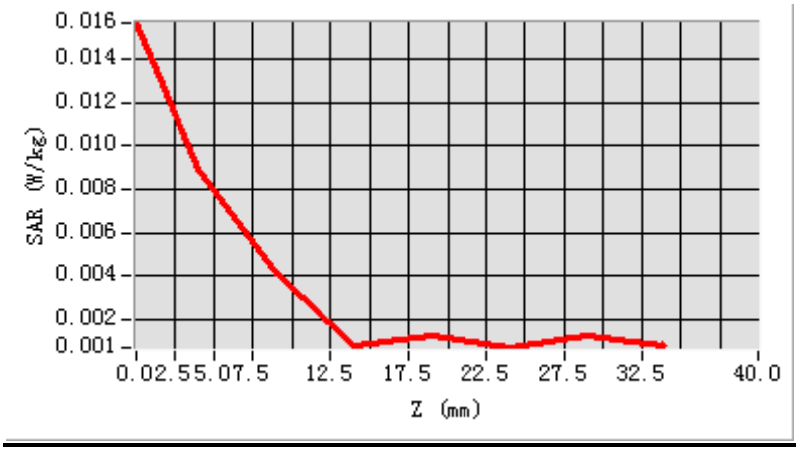
SURFACE SAR	VOLUME SAR
	

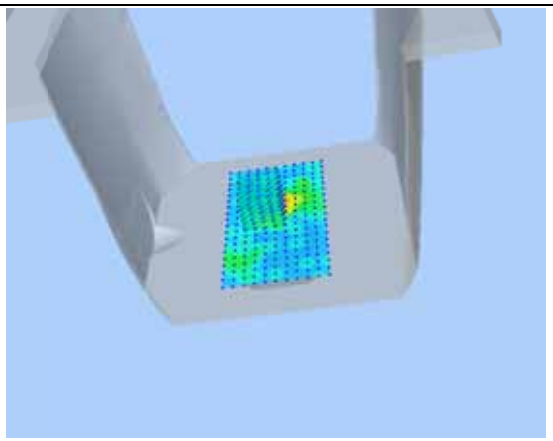
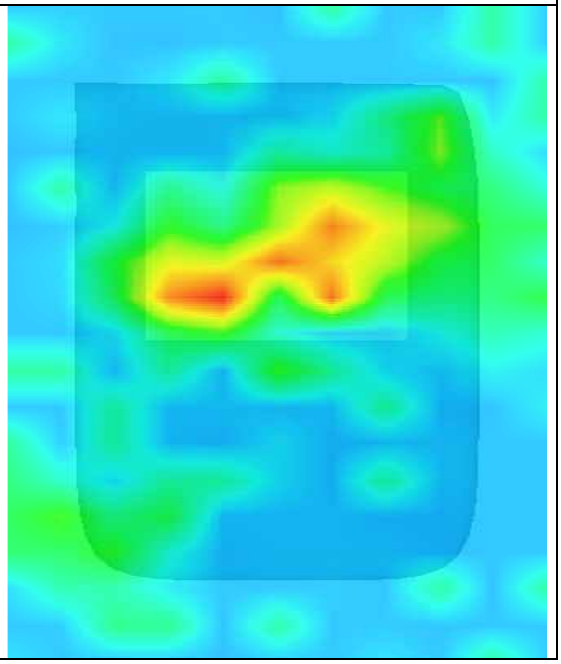
Maximum location: X=-9.00, Y=8.00

SAR Peak: 0.06 W/kg

SAR 10g (W/Kg)	0.006850
SAR 1g (W/Kg)	0.021478

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: 2014.4.2

Measurement duration: 9 minutes 41 seconds

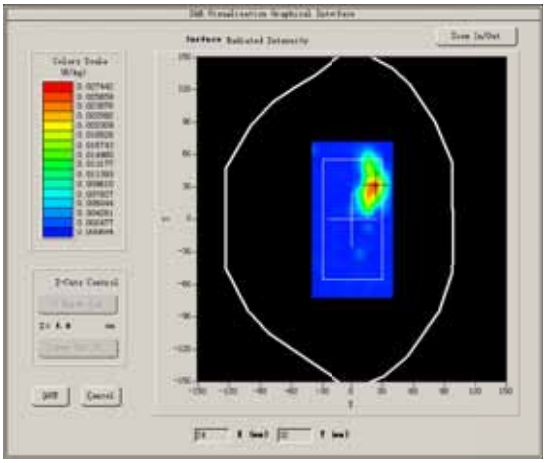
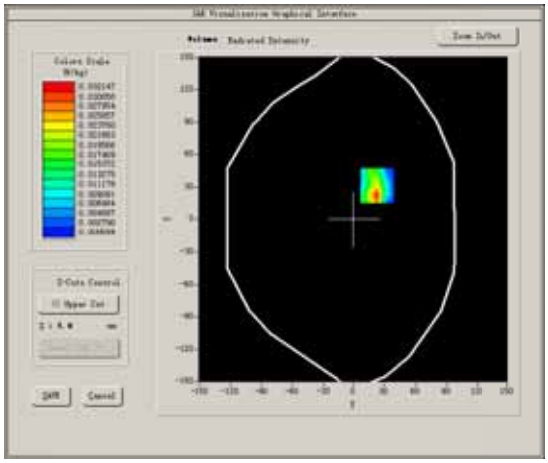
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11b
Channels	Middle
Signal	DSSS

B. SAR Measurement Results

Middle Band SAR (Channel 6)

Frequency (MHz)	2437.000000
Relative permittivity (real part)	52.462734
Conductivity (S/m)	1.924067
Power drift (%)	1.190000
Ambient Temperature:	22.9°C
Liquid Temperature:	22.1°C
ConvF:	4.96
Crest factor:	1:1

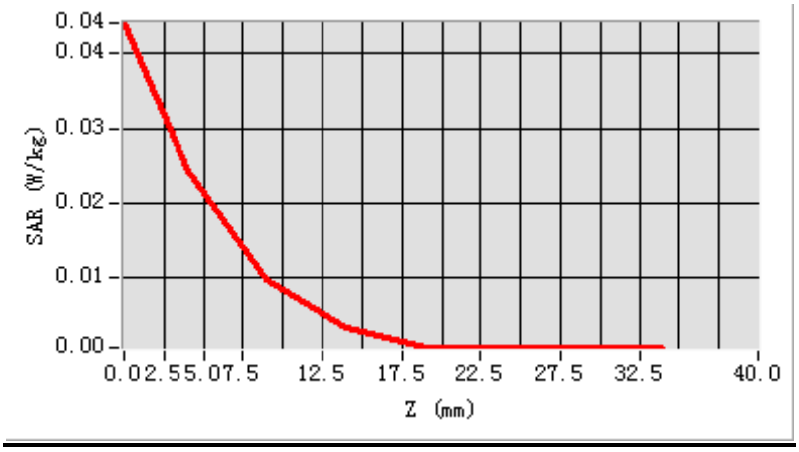
SURFACE SAR	VOLUME SAR
	

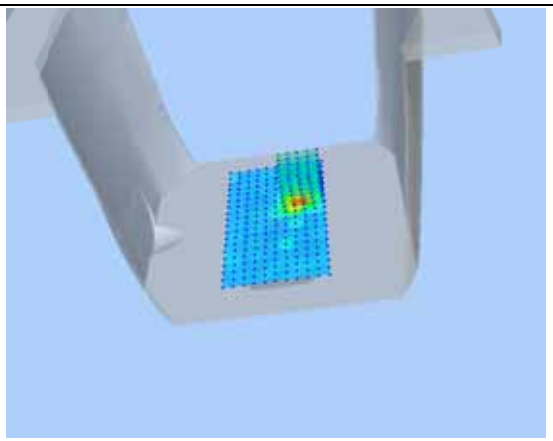
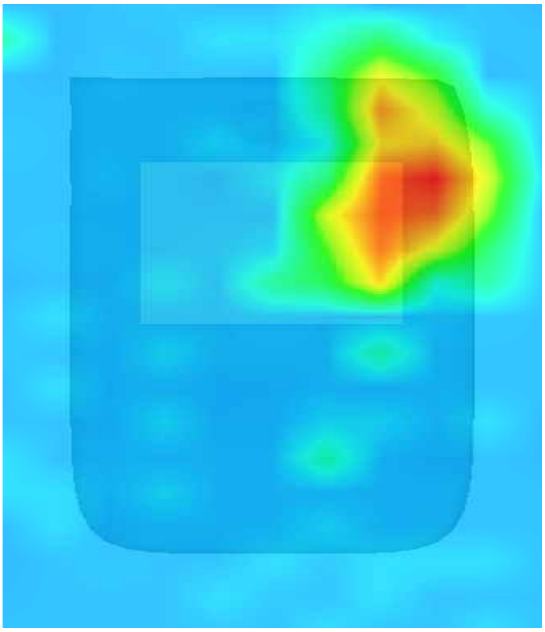
Maximum location: X=23.00, Y=31.00

SAR Peak: 0.06 W/kg

SAR 10g (W/Kg)	0.011266
SAR 1g (W/Kg)	0.029777

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: 2014.4.2

Measurement duration: 9 minutes 38 seconds

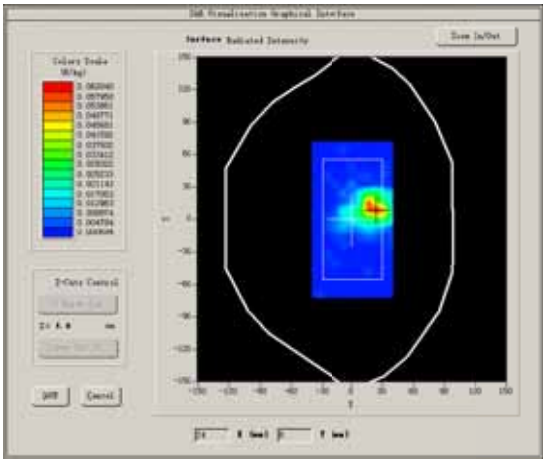
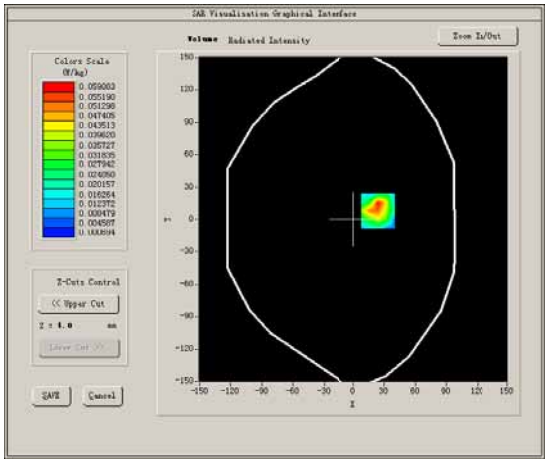
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11b
Channels	Middle
Signal	DSSS

B. SAR Measurement Results

Middle Band SAR (Channel 6)

Frequency (MHz)	2437.000000
Relative permittivity (real part)	52.462734
Conductivity (S/m)	1.924067
Power drift (%)	-3.150000
Ambient Temperature:	22.9°C
Liquid Temperature:	22.1°C
ConvF:	4.96
Crest factor:	1:1

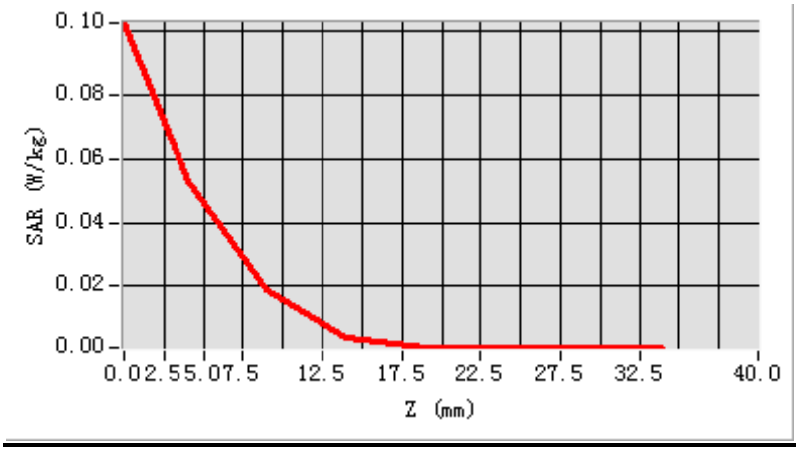
SURFACE SAR	VOLUME SAR
	

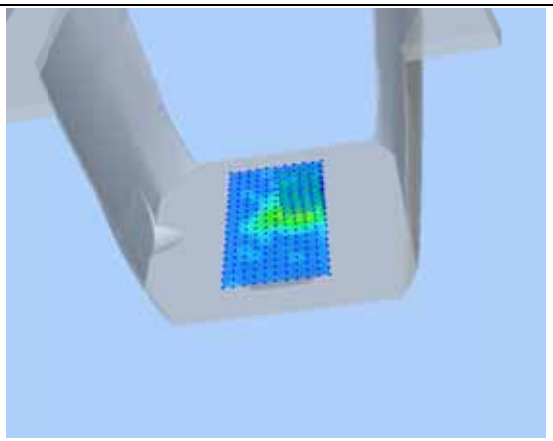
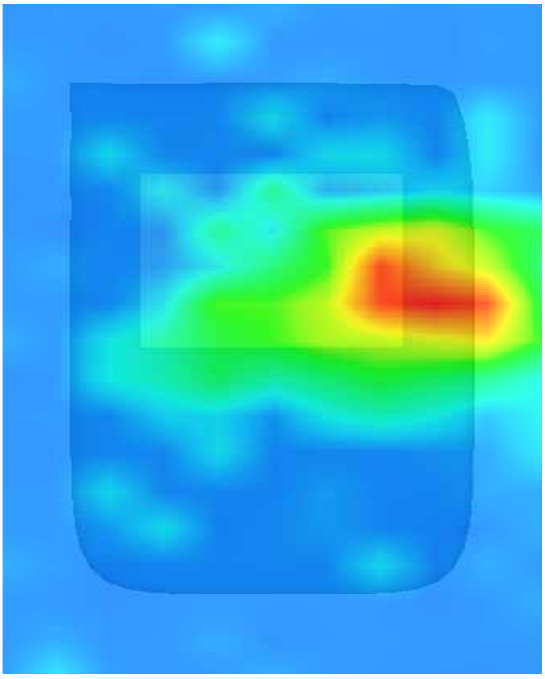
Maximum location: X=24.00, Y=8.00

SAR Peak: 0.17 W/kg

SAR 10g (W/Kg)	0.021936
SAR 1g (W/Kg)	0.062788

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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.4.2

Measurement duration: 8 minutes 15 seconds

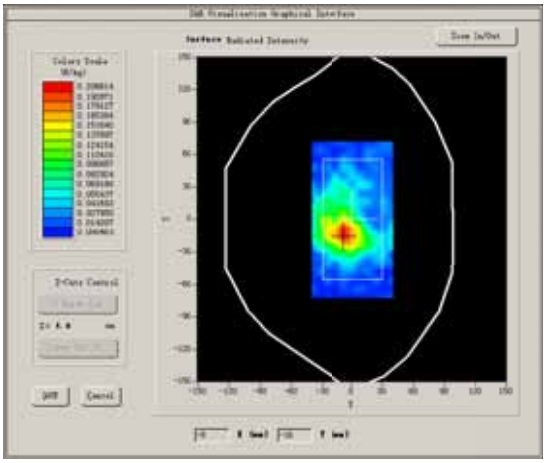
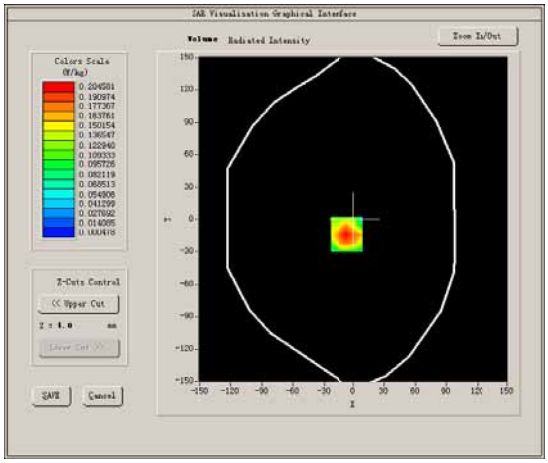
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	Bluetooth
Channels	Middle
Signal	GFSK

B. SAR Measurement Results

Middle Band SAR (Channel 39):

Frequency (MHz)	2441.000000
Relative permittivity (real part)	52.462734
Conductivity (S/m)	1.924067
Power drift (%)	-2.770000
Ambient Temperature:	22.3°C
Liquid Temperature:	21.5°C
ConvF:	4.96
Crest factor:	1:1

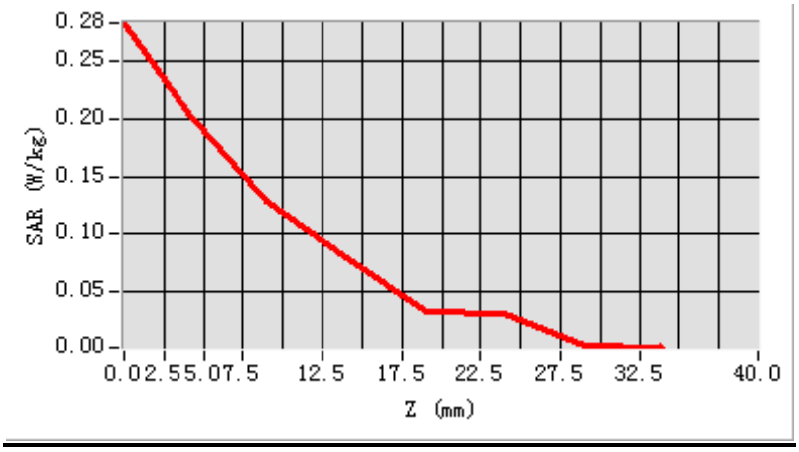
SURFACE SAR	VOLUME SAR
	

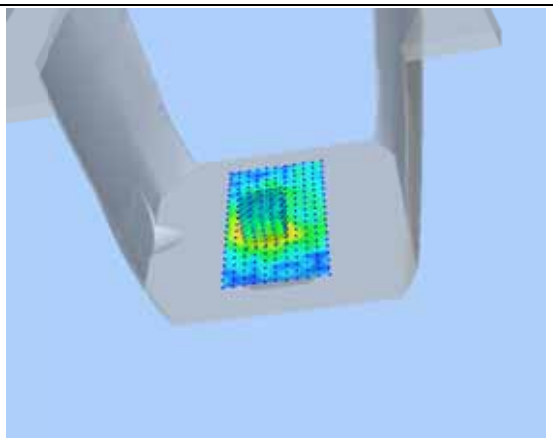
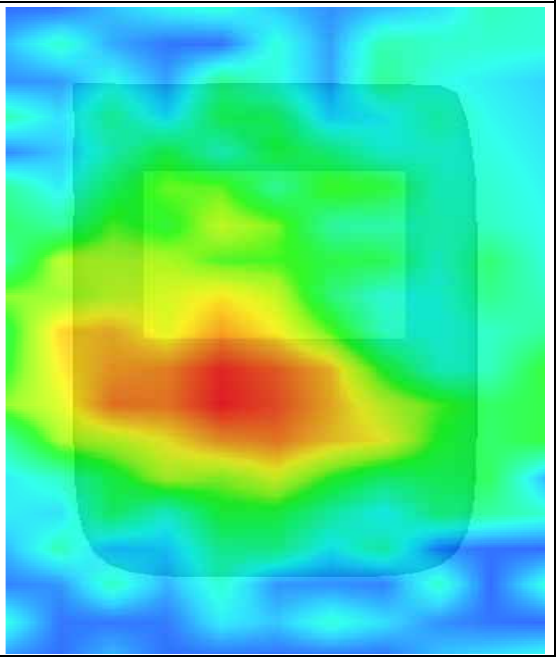
Maximum location: X=-7.00, Y=-14.00

SAR Peak: 0.40 W/kg

SAR 10g (W/Kg)	0.109352
SAR 1g (W/Kg)	0.217539

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 6

Type: Phone measurement (Complete)

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

Zoom scan resolution: dx=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.4.2

Measurement duration: 9 minutes 31 seconds

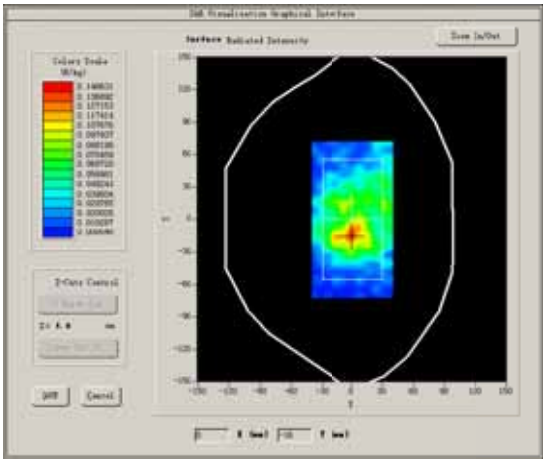
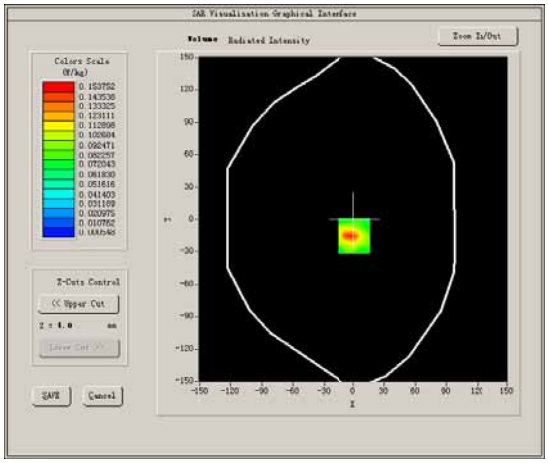
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	Bluetooth
Channels	Middle
Signal	GFSK

B. SAR Measurement Results

Middle Band SAR (Channel 39)

Frequency (MHz)	2441.000000
Relative permittivity (real part)	52.462734
Conductivity (S/m)	1.924067
Power drift (%)	-1.460000
Ambient Temperature:	22.3°C
Liquid Temperature:	21.5°C
ConvF:	4.96
Crest factor:	1:1

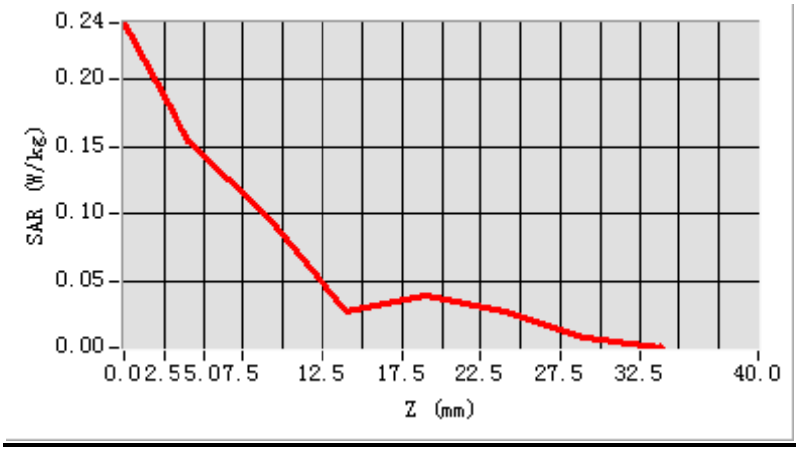
SURFACE SAR	VOLUME SAR
	

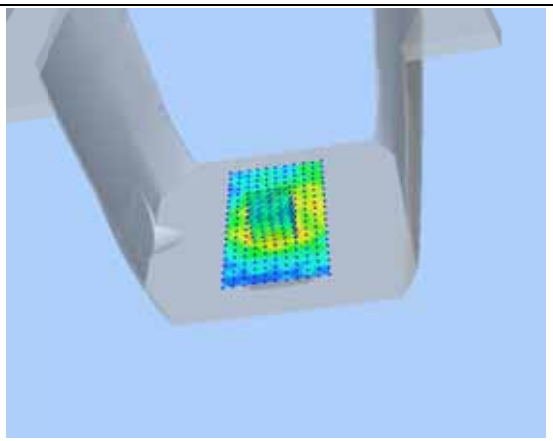
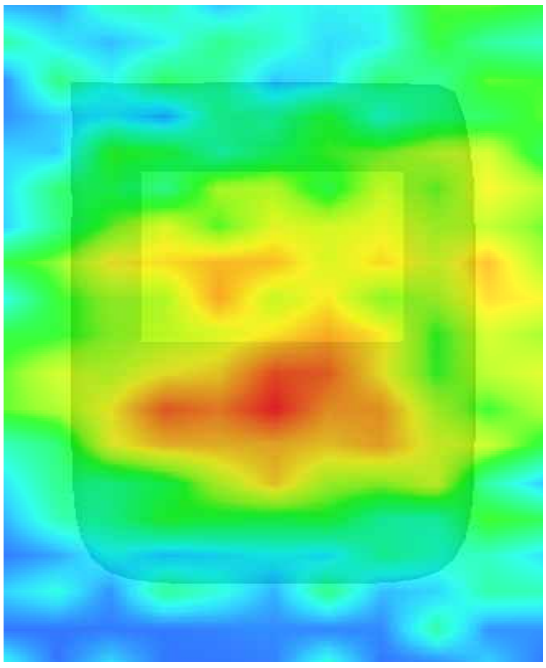
Maximum location: X=0.00, Y=-15.00

SAR Peak: 0.25 W/kg

SAR 10g (W/Kg)	0.048498
SAR 1g (W/Kg)	0.066049

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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 9 minutes 34 seconds

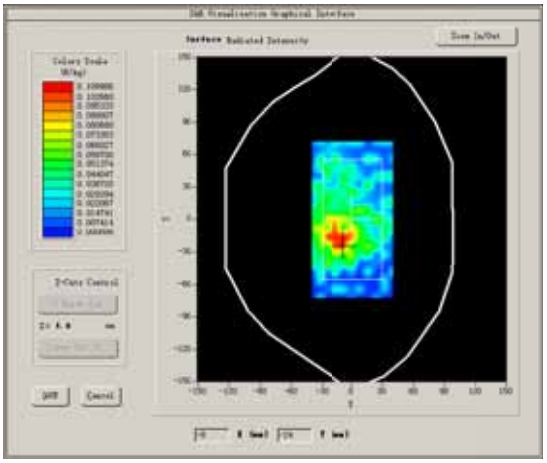
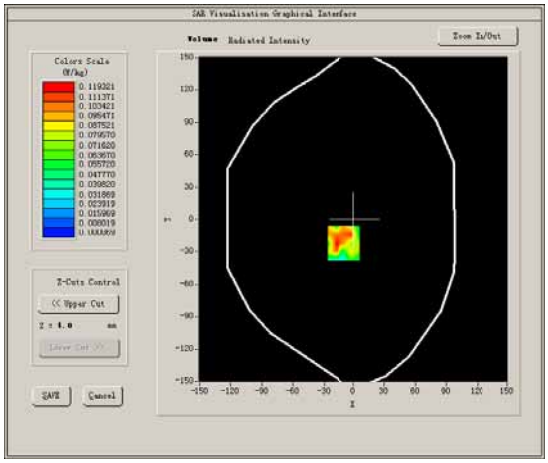
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11a
Channels	Low
Signal	OFDM

B. SAR Measurement Results

Low Band SAR (Channel 104)

Frequency (MHz)	5520.000000
Relative permittivity (real part)	48.362715
Conductivity (S/m)	5.728342
Power drift (%)	2.390000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	26.30
Crest factor:	1:1

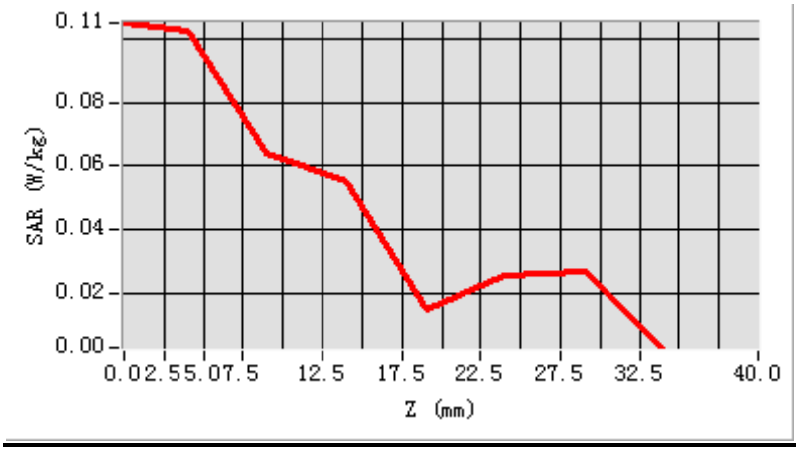
SURFACE SAR	VOLUME SAR
	

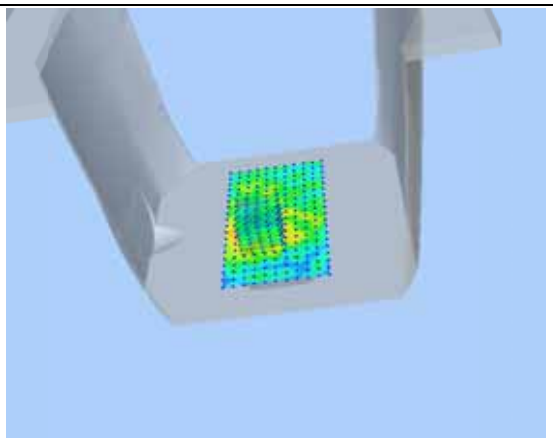
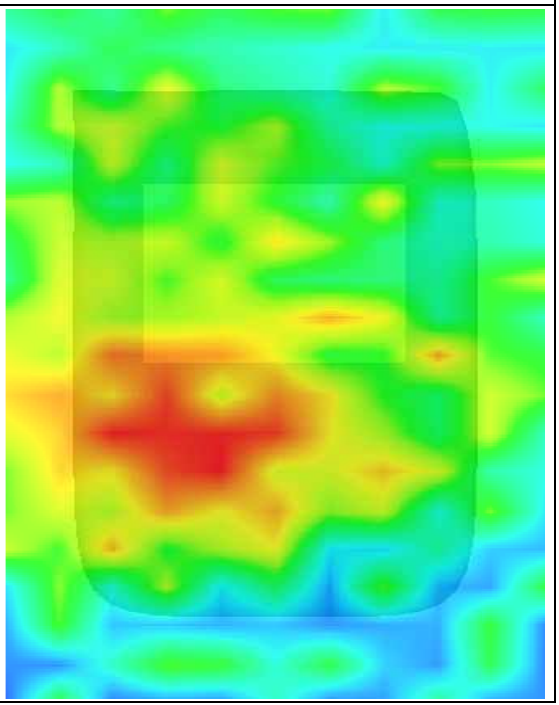
Maximum location: X=-10.00, Y=-22.00

SAR Peak: 0.20 W/kg

SAR 10g (W/Kg)	0.055493
SAR 1g (W/Kg)	0.106063

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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 9 minutes 30 seconds

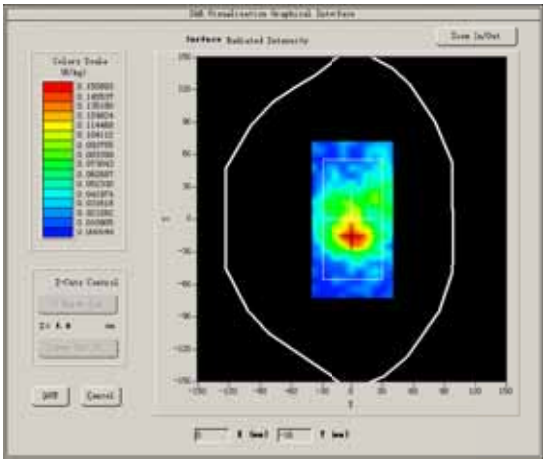
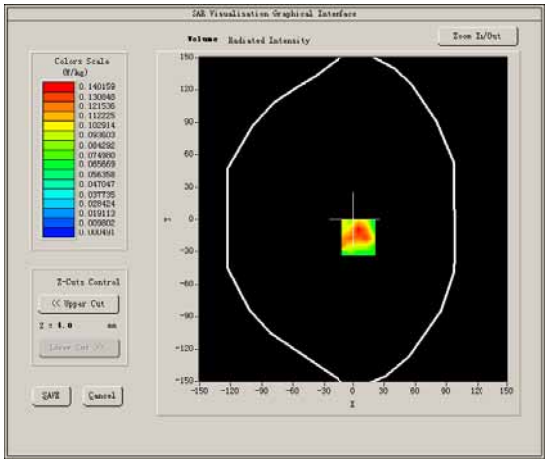
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11a
Channels	Middle
Signal	OFDM

B. SAR Measurement Results

Middle Band SAR (Channel 116)

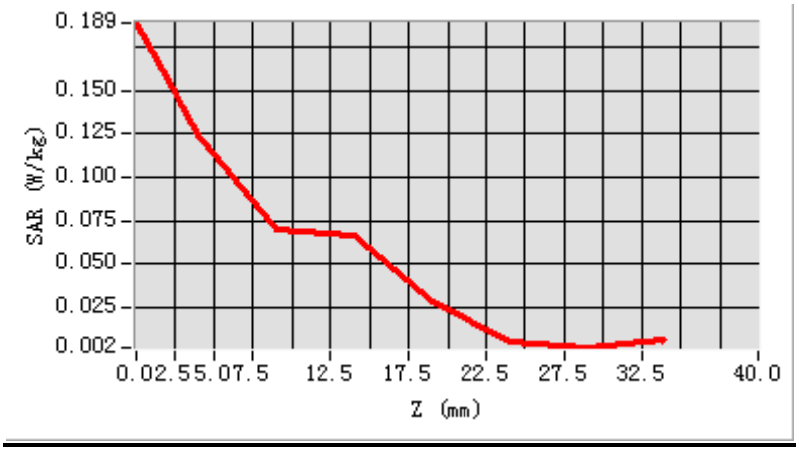
Frequency (MHz)	5580.000000
Relative permittivity (real part)	48.362715
Conductivity (S/m)	5.728342
Power drift (%)	-1.520000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	26.30
Crest factor:	1:1

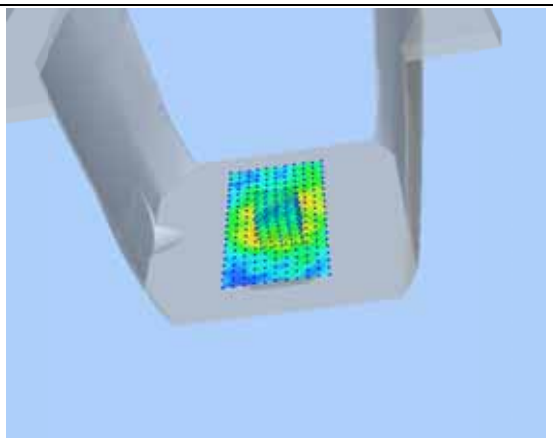
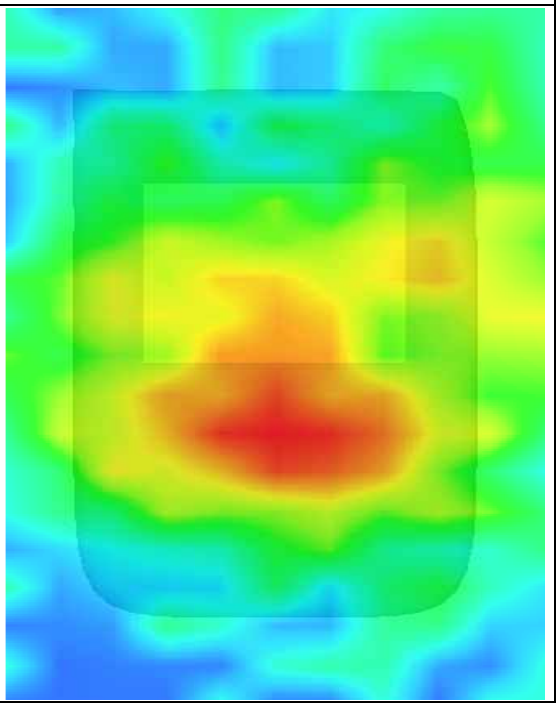
SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=-17.00
SAR Peak: 0.22 W/kg

SAR 10g (W/Kg)	0.076945
SAR 1g (W/Kg)	0.138167

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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 9 minutes 37 seconds

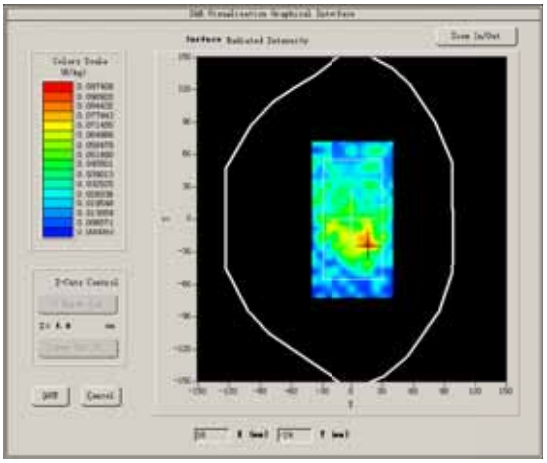
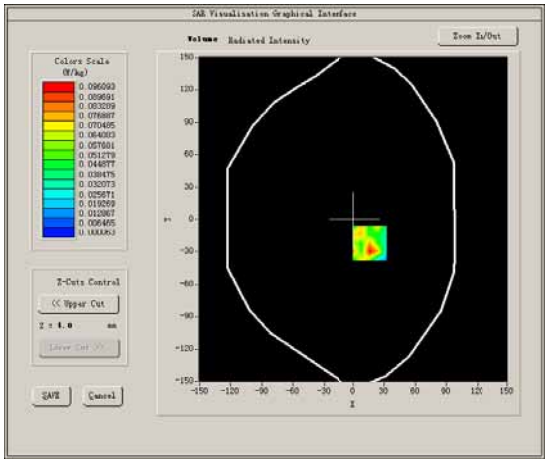
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11a
Channels	High
Signal	OFDM

B. SAR Measurement Results

High Band SAR (Channel 136)

Frequency (MHz)	5680.000000
Relative permittivity (real part)	48.362715
Conductivity (S/m)	5.728342
Power drift (%)	-3.630000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	26.30
Crest factor:	1:1

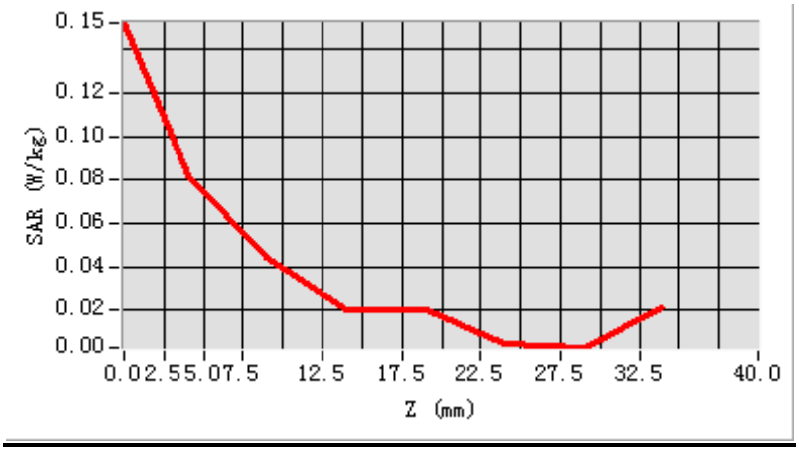
SURFACE SAR	VOLUME SAR
	

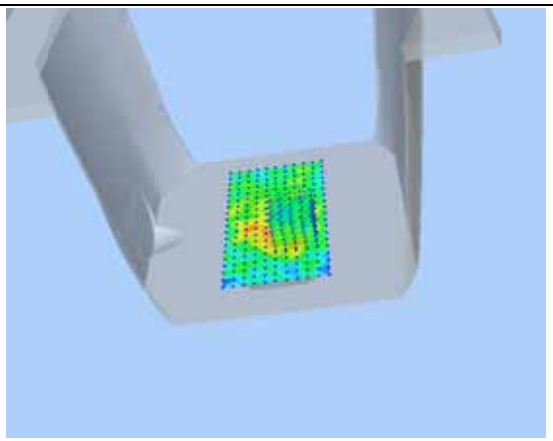
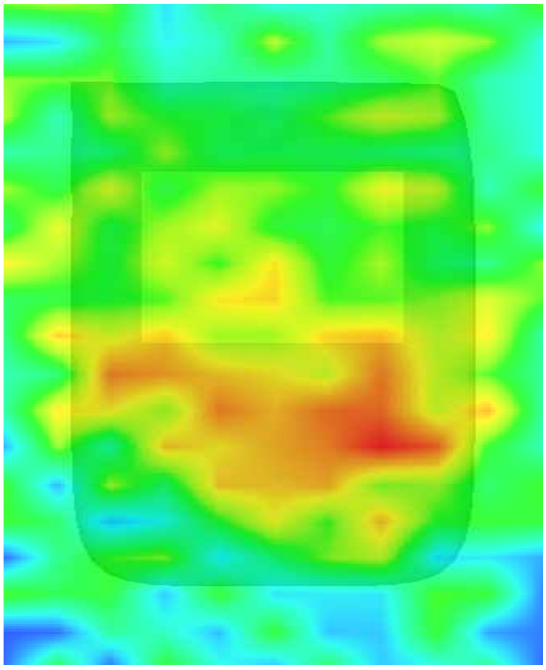
Maximum location: X=16.00, Y=-22.00

SAR Peak: 0.16 W/kg

SAR 10g (W/Kg)	0.049065
SAR 1g (W/Kg)	0.089352

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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 9 minutes 28 seconds

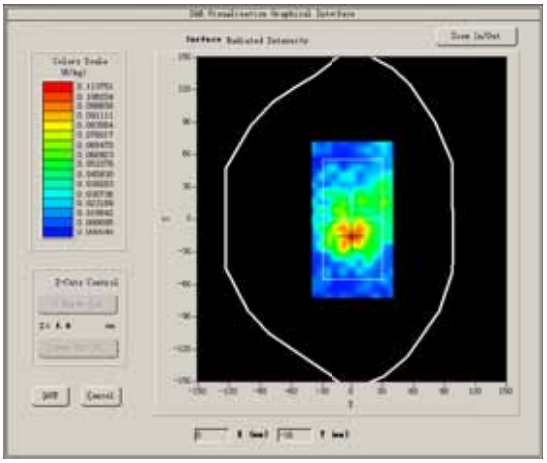
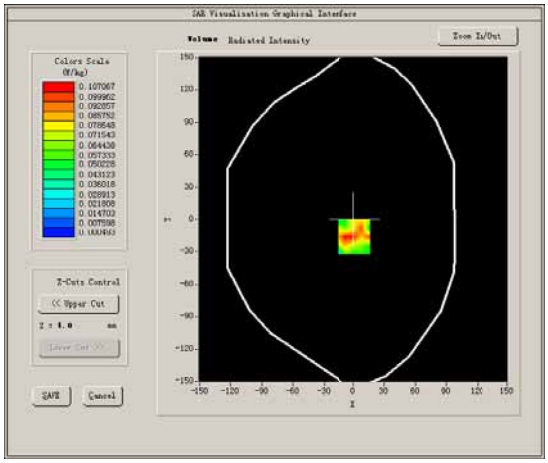
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11a
Channels	Middle
Signal	OFDM

B. SAR Measurement Results

Middle Band SAR (Channel 116)

Frequency (MHz)	5580.000000
Relative permittivity (real part)	48.362715
Conductivity (S/m)	5.728342
Power drift (%)	2.340000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	26.30
Crest factor:	1:1

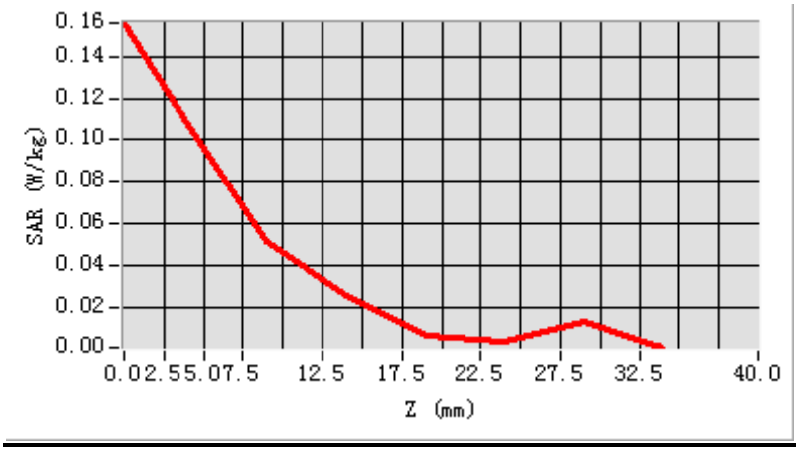
SURFACE SAR	VOLUME SAR
	

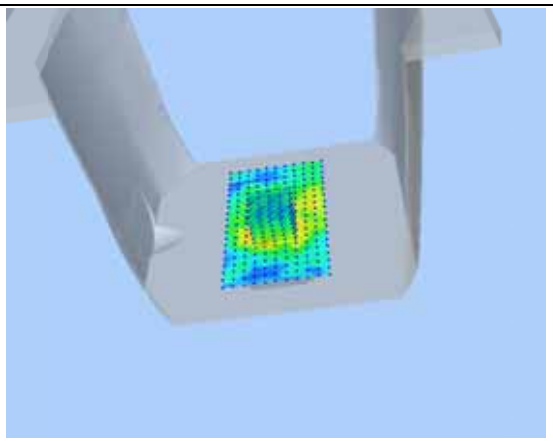
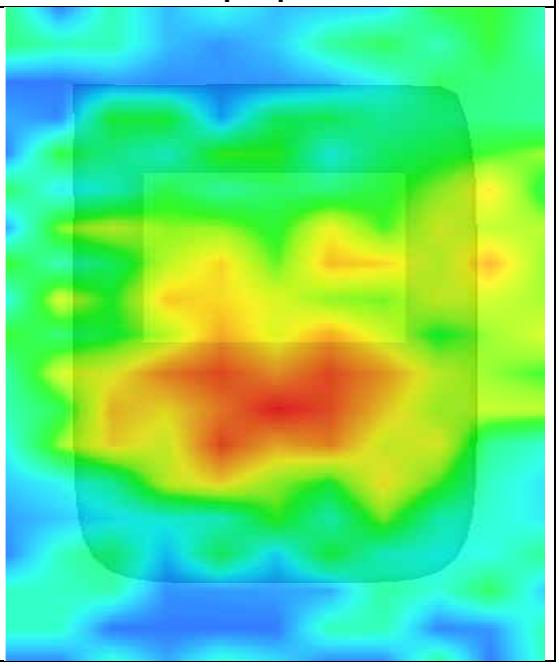
Maximum location: X=0.00, Y=-16.00

SAR Peak: 0.18 W/kg

SAR 10g (W/Kg)	0.034759
SAR 1g (W/Kg)	0.055014

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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 9 minutes 30 seconds

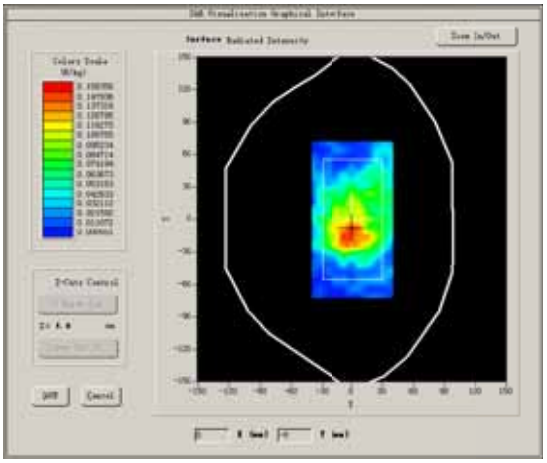
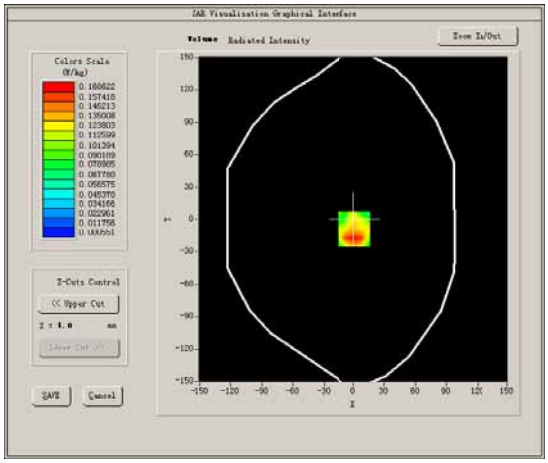
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11a
Channels	Low
Signal	OFDM

B. SAR Measurement Results

Low Band SAR (Channel 149)

Frequency (MHz)	5745.000000
Relative permittivity (real part)	48.108624
Conductivity (S/m)	5.931825
Power drift (%)	1.730000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	26.47
Crest factor:	1:1

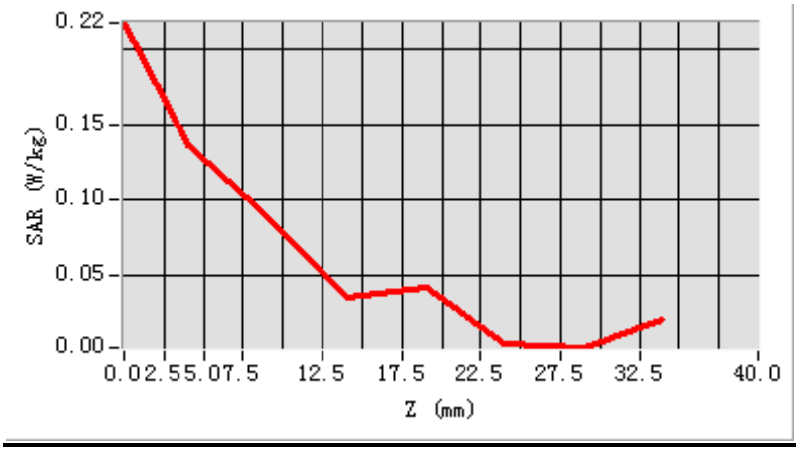
SURFACE SAR	VOLUME SAR
	

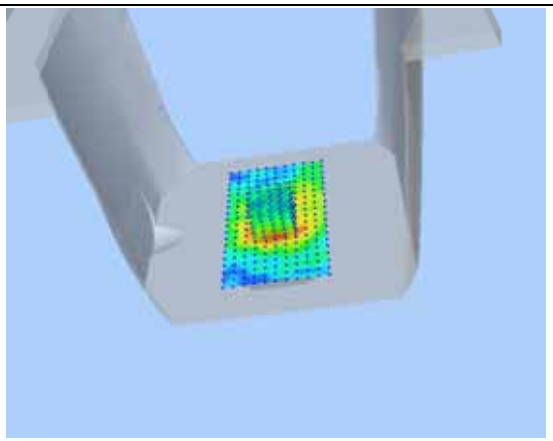
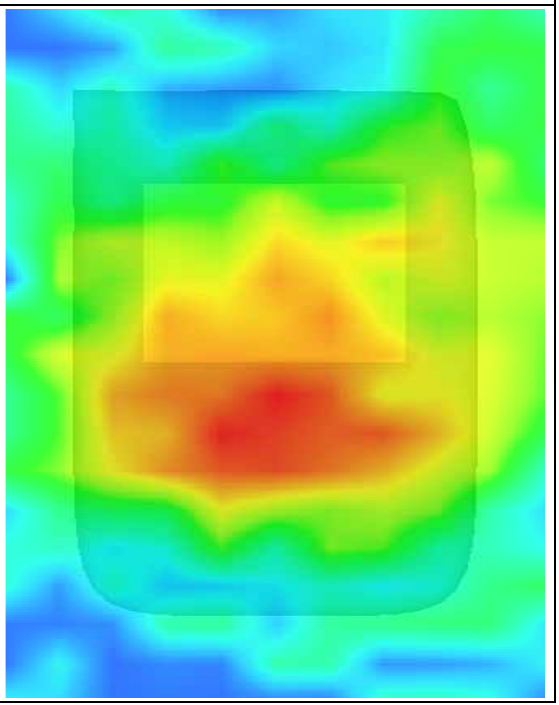
Maximum location: X=0.00, Y=-9.00

SAR Peak: 0.38 W/kg

SAR 10g (W/Kg)	0.088586
SAR 1g (W/Kg)	0.180392

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 12

Type: Phone measurement (Complete)

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

Zoom scan resolution: dx=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 9 minutes 35 seconds

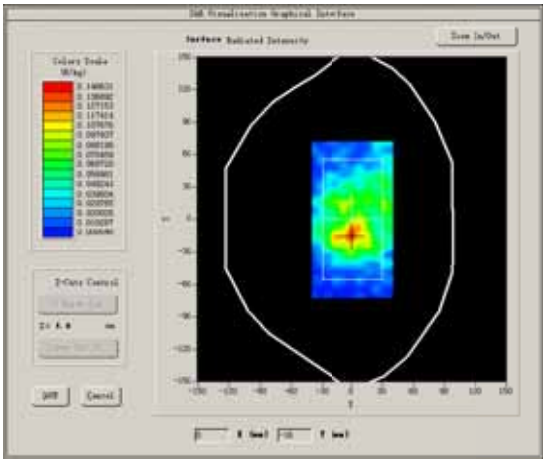
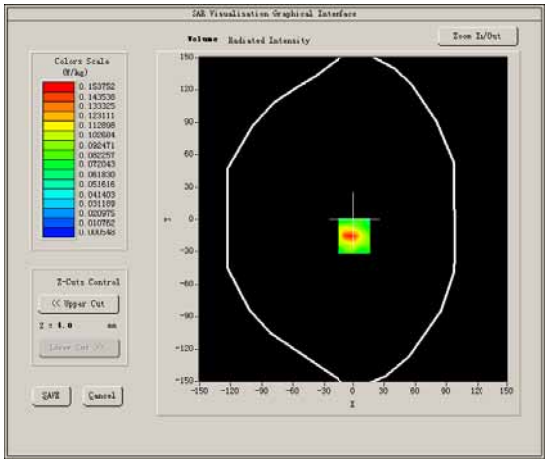
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11a
Channels	Middle
Signal	OFDM

B. SAR Measurement Results

Middle Band SAR (Channel 157)

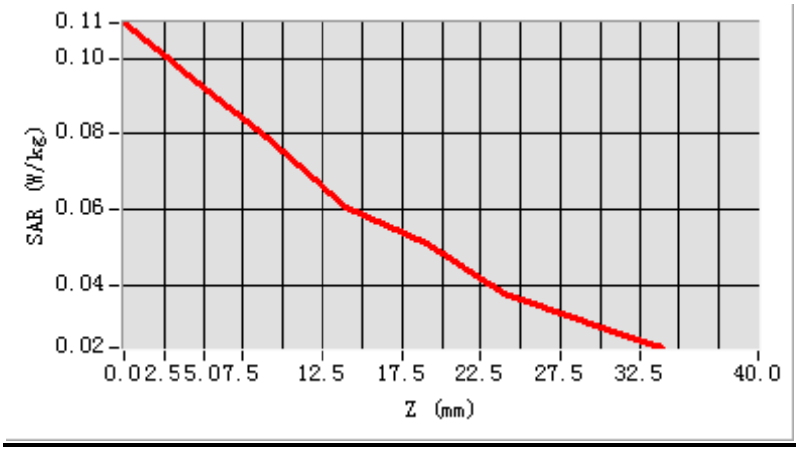
Frequency (MHz)	5785.000000
Relative permittivity (real part)	48.108624
Conductivity (S/m)	5.931825
Power drift (%)	-0.480000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	26.47
Crest factor:	1:1

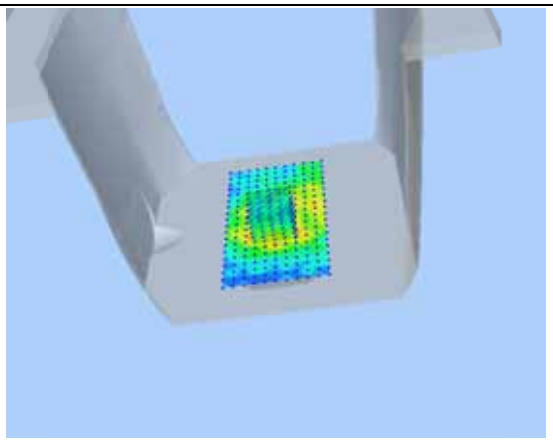
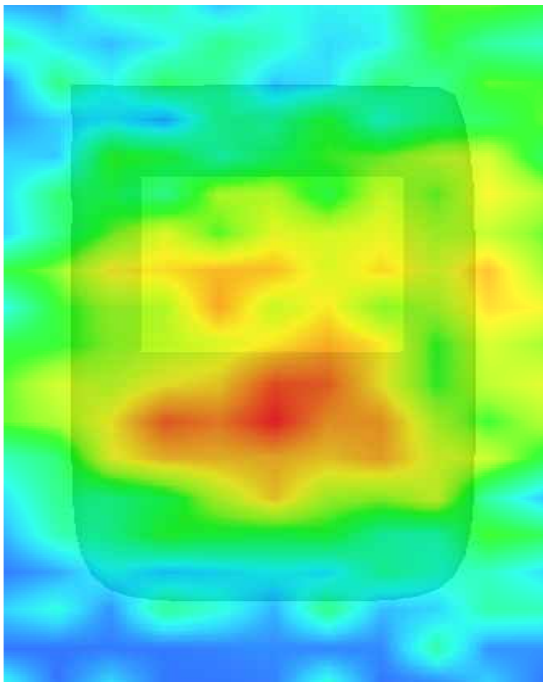
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-3.00, Y=23.00
SAR Peak: 0.13 W/kg

SAR 10g (W/Kg)	0.076964
SAR 1g (W/Kg)	0.092223

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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 9 minutes 33 seconds

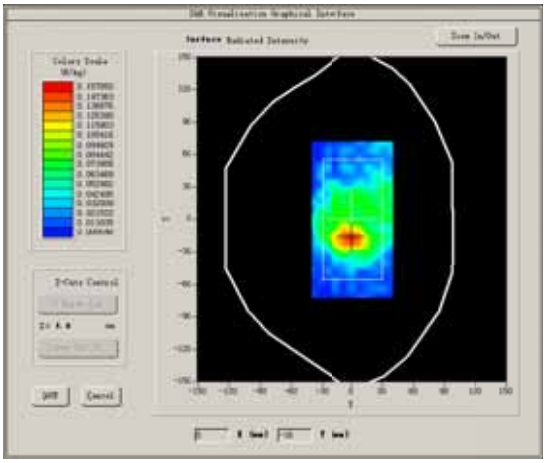
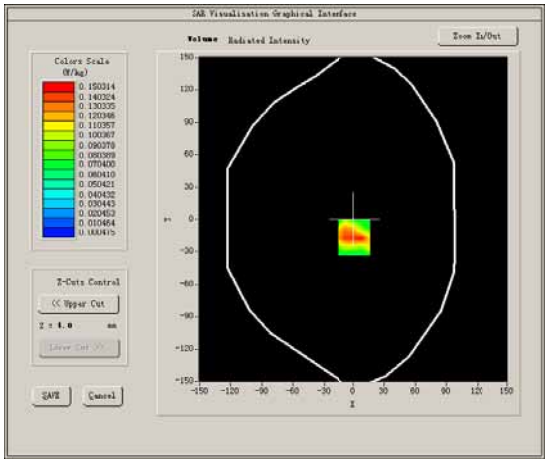
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11a
Channels	High
Signal	OFDM

B. SAR Measurement Results

High Band SAR (Channel 165)

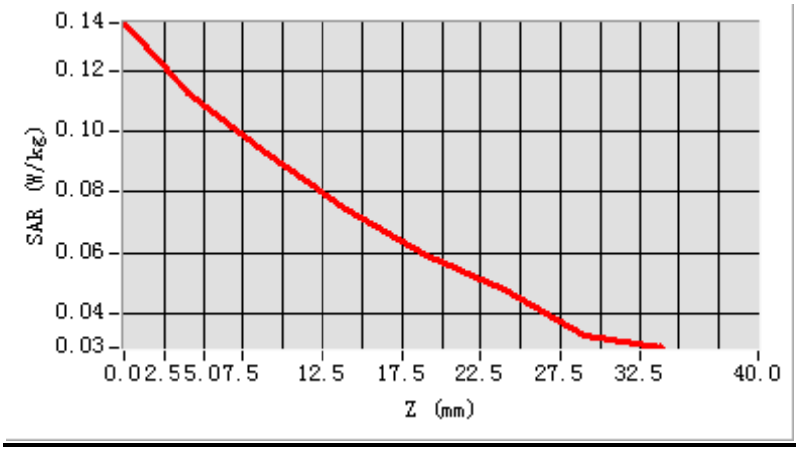
Frequency (MHz)	5825.000000
Relative permittivity (real part)	48.108624
Conductivity (S/m)	5.931825
Power drift (%)	0.630000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	26.47
Crest factor:	1:1

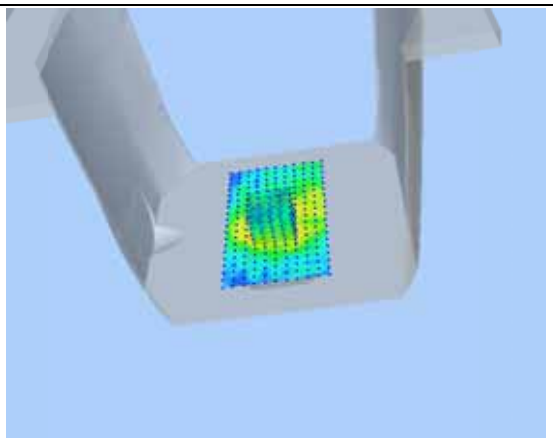
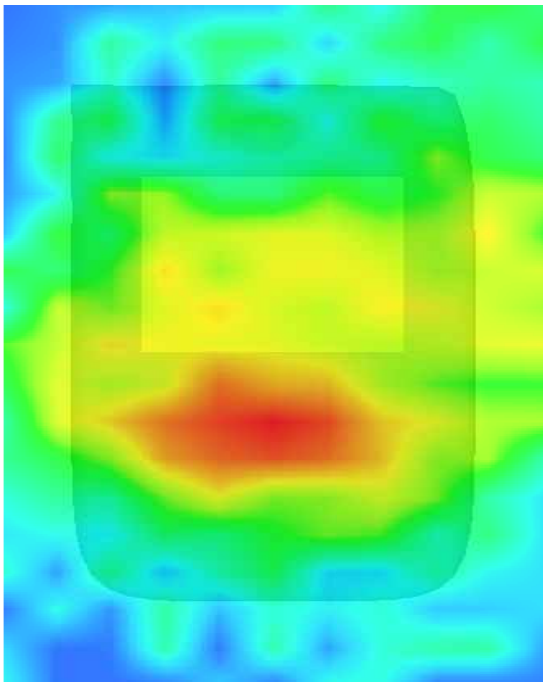
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-1.00, Y=24.00
SAR Peak: 0.15 W/kg

SAR 10g (W/Kg)	0.091696
SAR 1g (W/Kg)	0.100324

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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 9 minutes 10 seconds

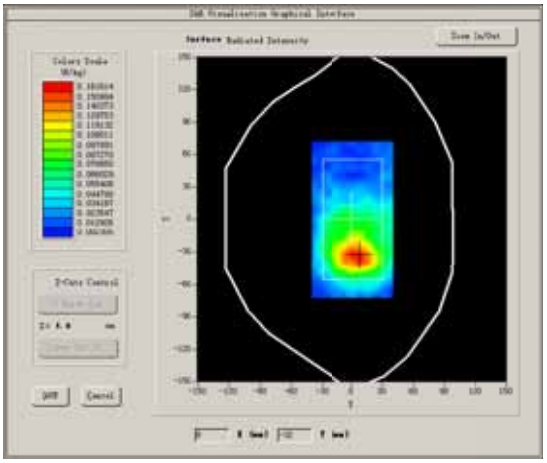
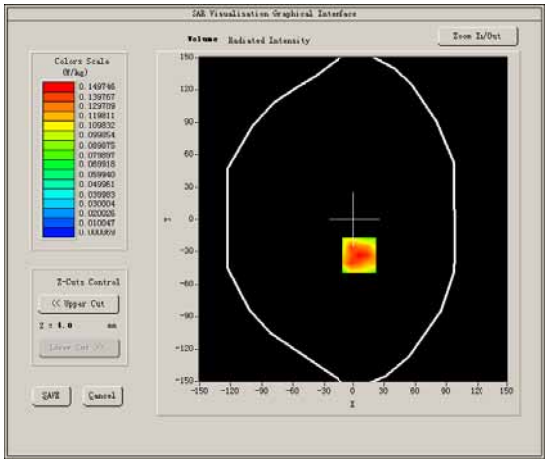
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11a
Channels	Low
Signal	OFDM

B. SAR Measurement Results

Low Band SAR (Channel 149)

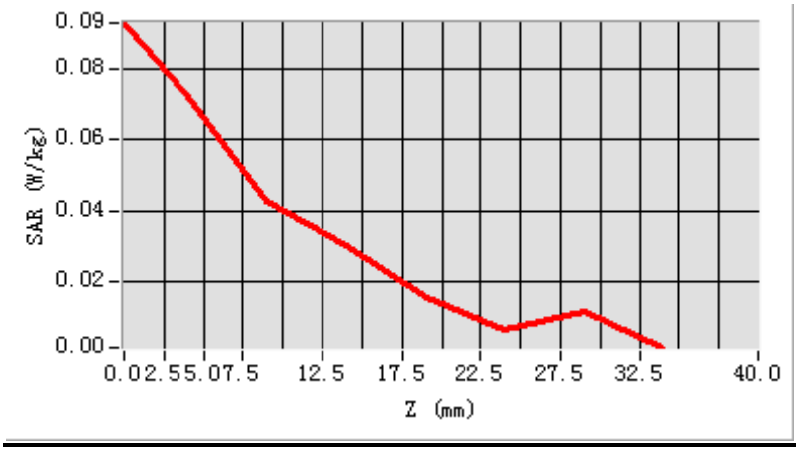
Frequency (MHz)	5745.000000
Relative permittivity (real part)	48.108624
Conductivity (S/m)	5.931825
Power drift (%)	-1.520000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	26.47
Crest factor:	1:1

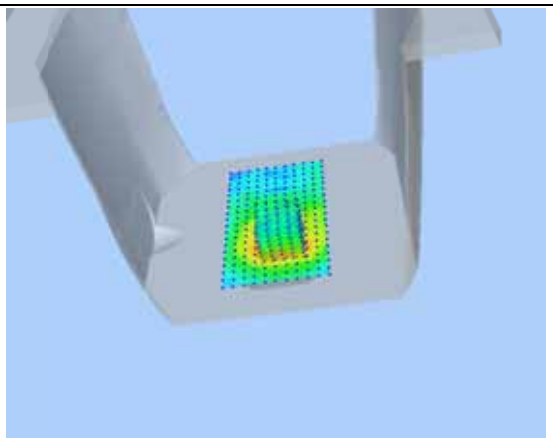
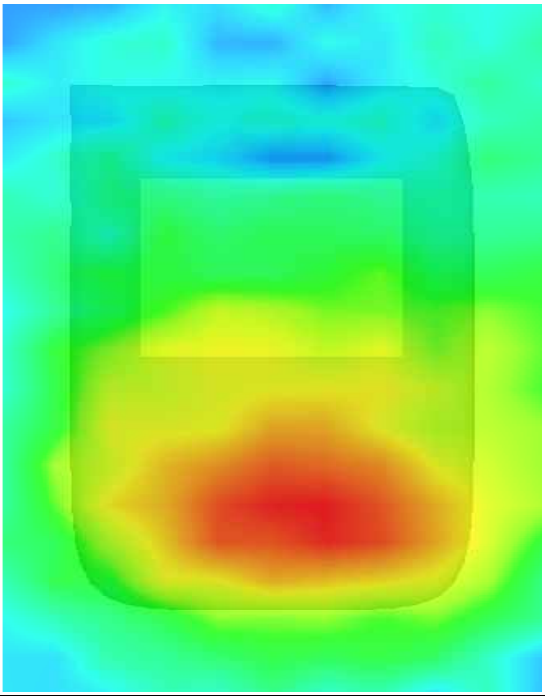
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-57.00, Y=-72.00
SAR Peak: 0.14 W/kg

SAR 10g (W/Kg)	0.040024
SAR 1g (W/Kg)	0.075552

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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 9 minutes 30 seconds

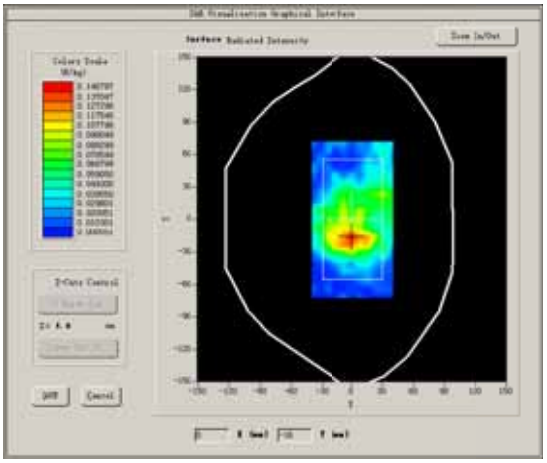
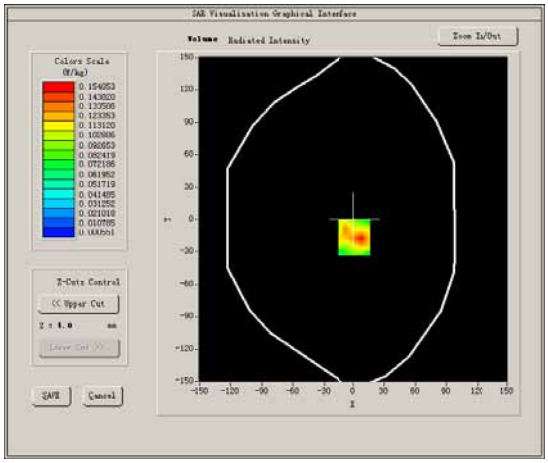
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11n
Channels	Middle
Signal	OFDM

B. SAR Measurement Results

Middle Band SAR (Channel 116)

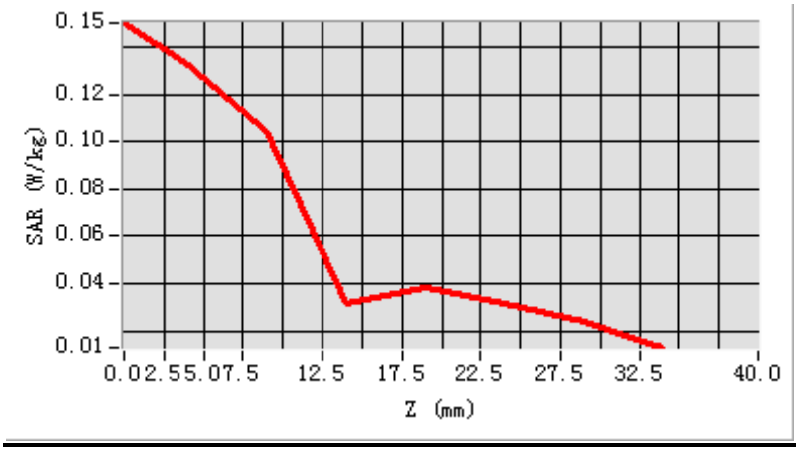
Frequency (MHz)	5580.000000
Relative permittivity (real part)	48.362715
Conductivity (S/m)	5.728342
Power drift (%)	-3.340000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	26.30
Crest factor:	1:1

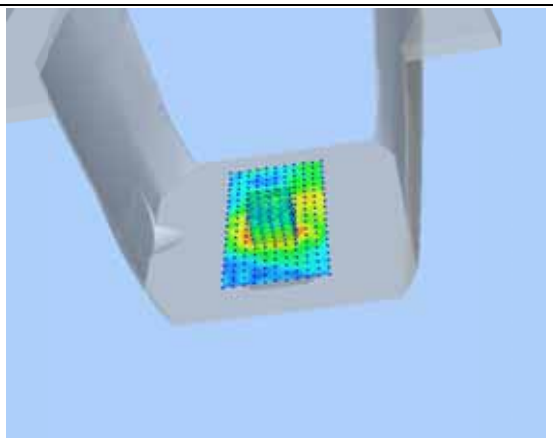
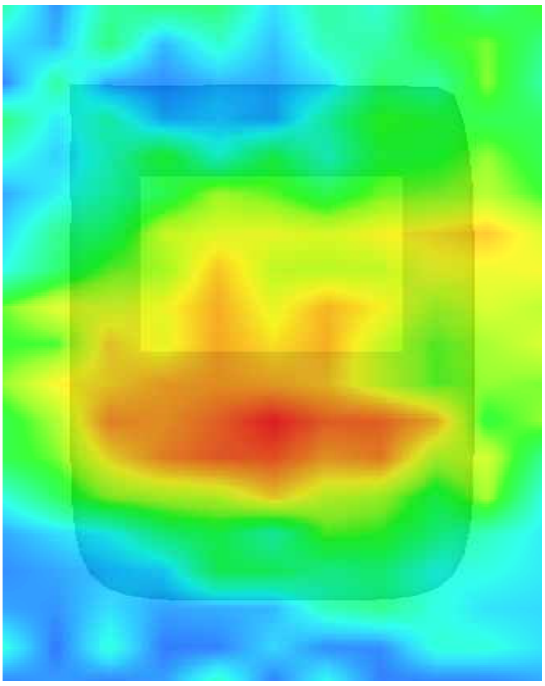
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-17.00
SAR Peak: 0.33 W/kg

SAR 10g (W/Kg)	0.079478
SAR 1g (W/Kg)	0.153941

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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 9 minutes 30 seconds

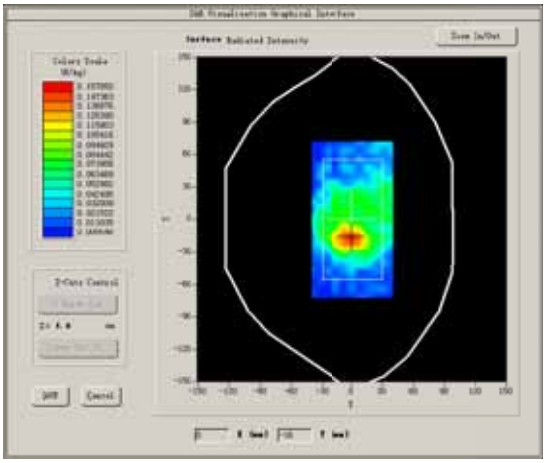
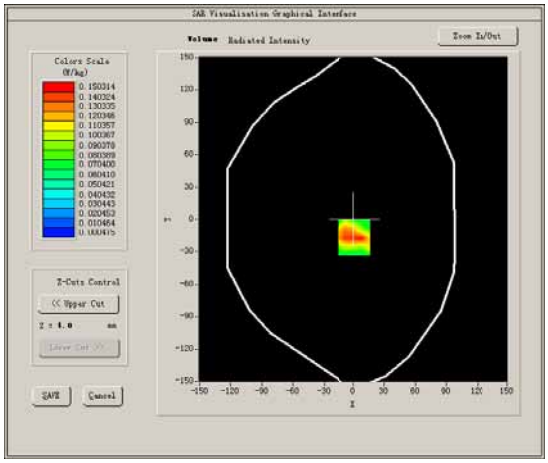
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11n
Channels	Middle
Signal	OFDM

B. SAR Measurement Results

Middle Band SAR (Channel 116)

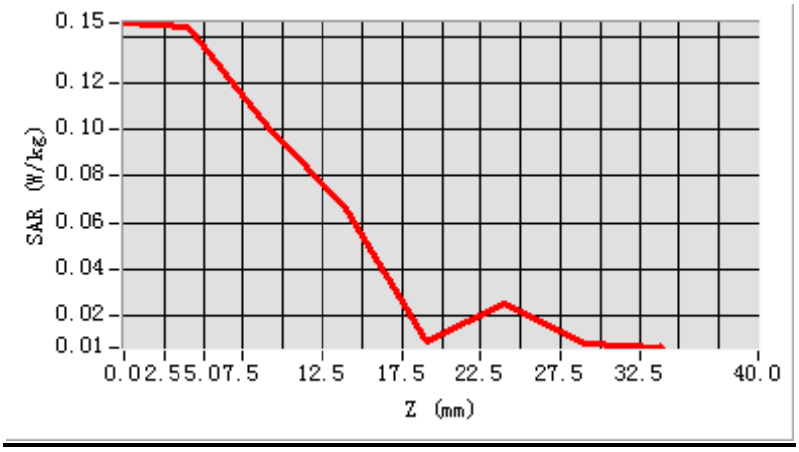
Frequency (MHz)	5580.000000
Relative permittivity (real part)	48.362715
Conductivity (S/m)	5.728342
Power drift (%)	2.540000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	26.30
Crest factor:	1:1

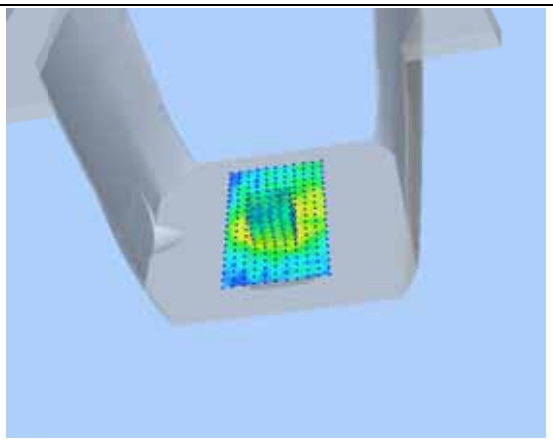
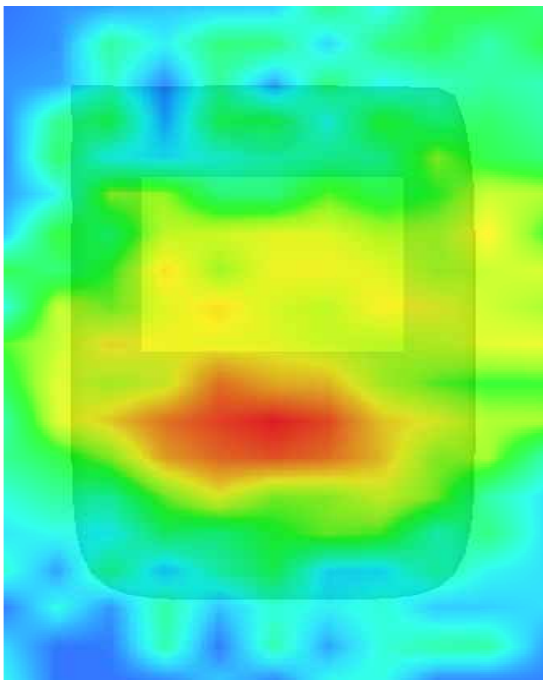
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-17.00
SAR Peak: 0.15 W/kg

SAR 10g (W/Kg)	0.040992
SAR 1g (W/Kg)	0.061115

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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 9 minutes 28 seconds

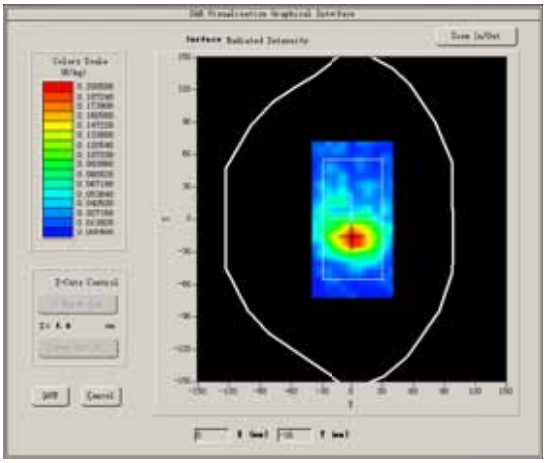
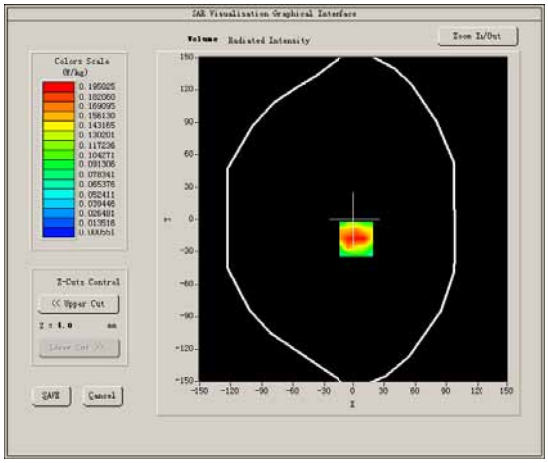
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11n
Channels	Low
Signal	OFDM

B. SAR Measurement Results

Low Band SAR (Channel 149)

Frequency (MHz)	5745.000000
Relative permittivity (real part)	48.108624
Conductivity (S/m)	5.931825
Power drift (%)	-2.450000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	26.47
Crest factor:	1:1

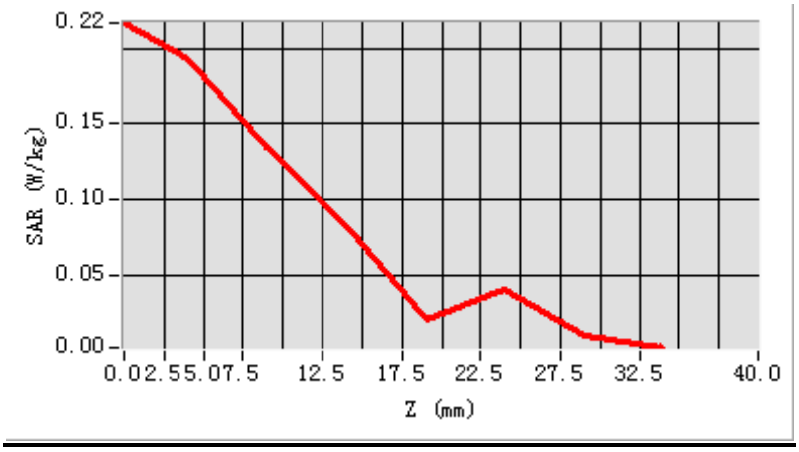
SURFACE SAR	VOLUME SAR
	

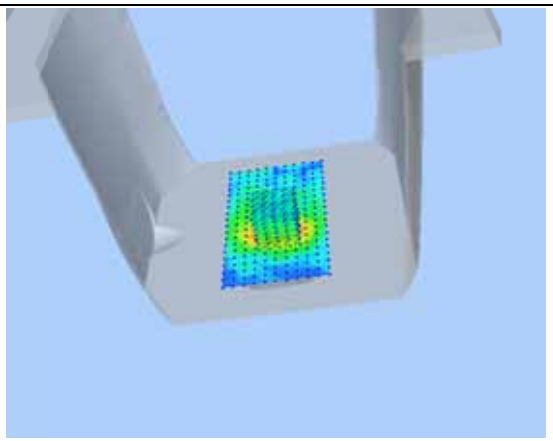
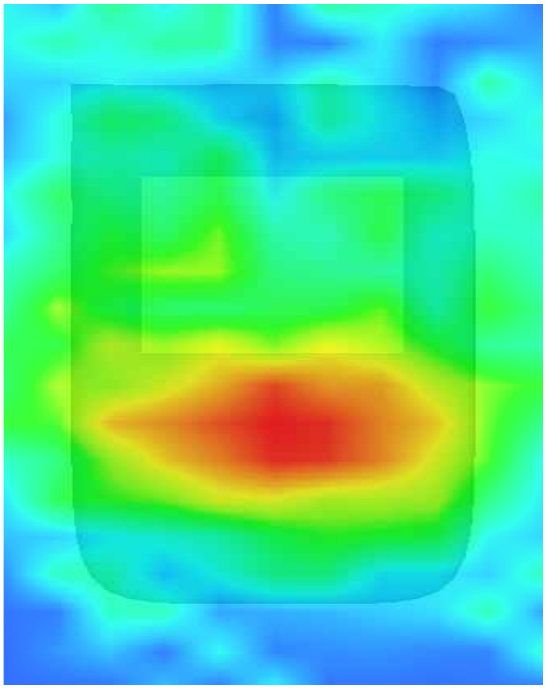
Maximum location: X=3.00, Y=-18.00

SAR Peak: 0.39 W/kg

SAR 10g (W/Kg)	0.107134
SAR 1g (W/Kg)	0.210270

Z axis scan



3D screen shot	Hot spot position
	

MEASUREMENT 18

Type: Phone measurement (Complete)

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

Zoom scan resolution: dx=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 9 minutes 31 seconds

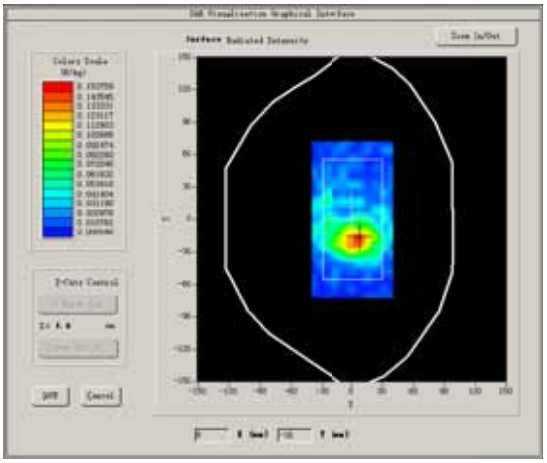
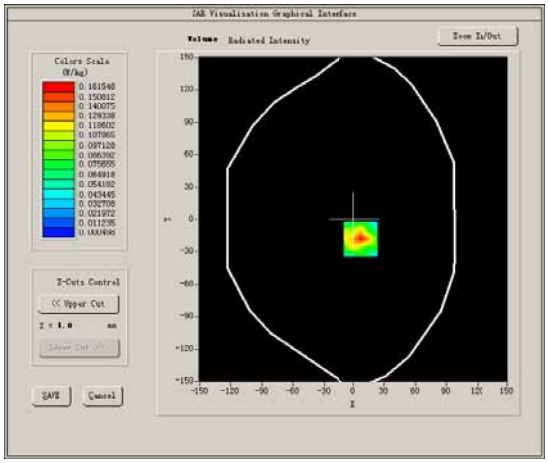
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Body
Band	802.11n
Channels	Low
Signal	OFDM

B. SAR Measurement Results

Low Band SAR (Channel 149)

Frequency (MHz)	5745.000000
Relative permittivity (real part)	48.108624
Conductivity (S/m)	5.931825
Power drift (%)	1.540000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	26.47
Crest factor:	1:1

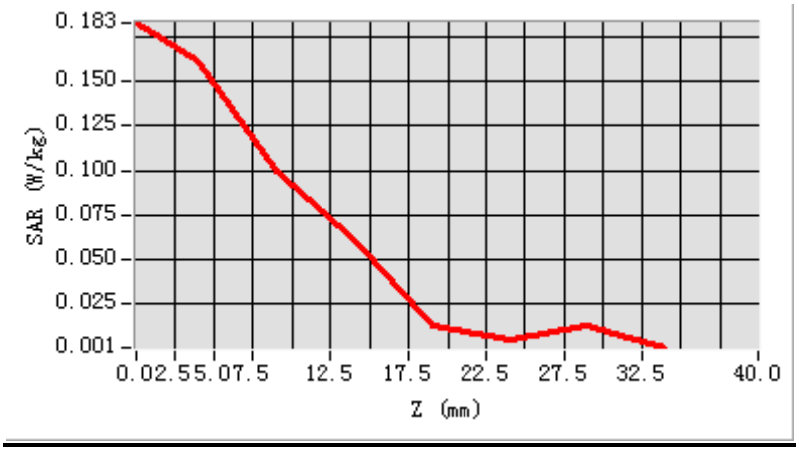
SURFACE SAR	VOLUME SAR
	

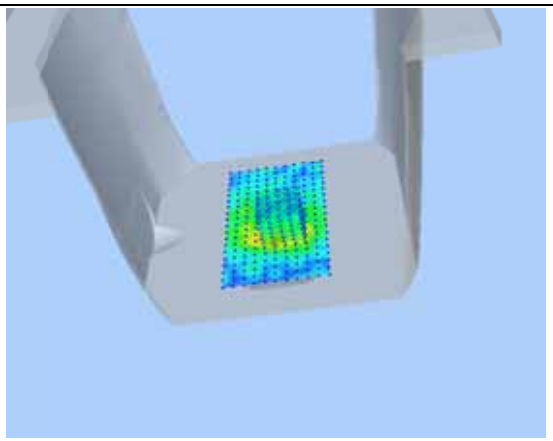
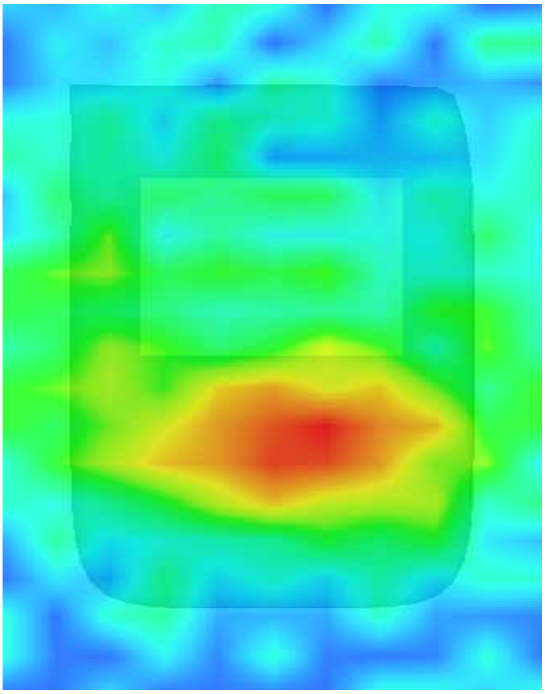
Maximum location: X=7.00, Y=-18.00

SAR Peak: 0.27 W/kg

SAR 10g (W/Kg)	0.053464
SAR 1g (W/Kg)	0.096391

Z axis scan



3D screen shot	Hot spot position
	

System Performance Check Data(Body)

Type: Phone measurement (Complete)

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

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

Date of measurement: 2014.4.2

Measurement duration: 13 minutes 27 seconds

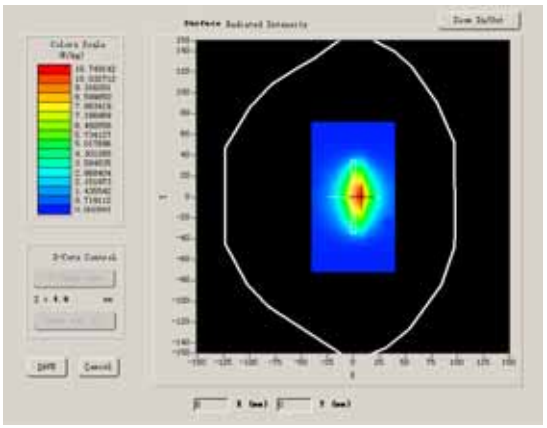
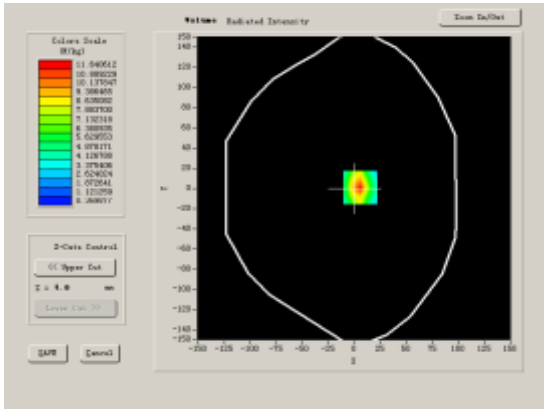
A. Experimental conditions.

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

B. SAR Measurement Results

Band SAR

Frequency (MHz)	2450.000000
Relative permittivity (real part)	52.462734
Conductivity (S/m)	1.924067
Power Drift (%)	-1.380000
Ambient Temperature:	22.9°C
Liquid Temperature:	22.1°C
ConvF:	4.96
Crest factor:	1:1

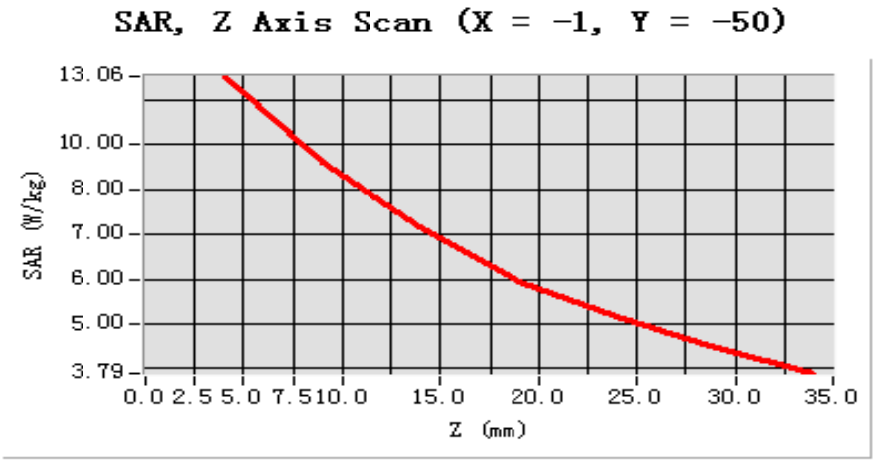
SURFACE SAR	VOLUME SAR
	

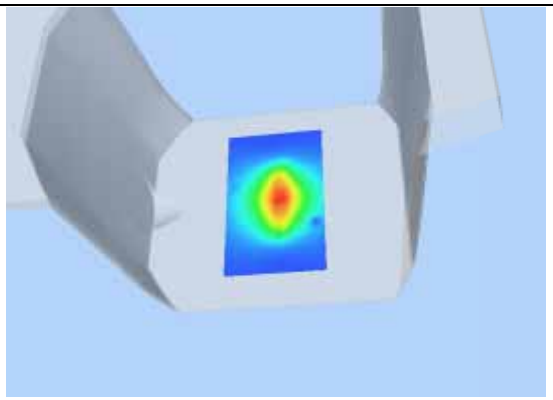
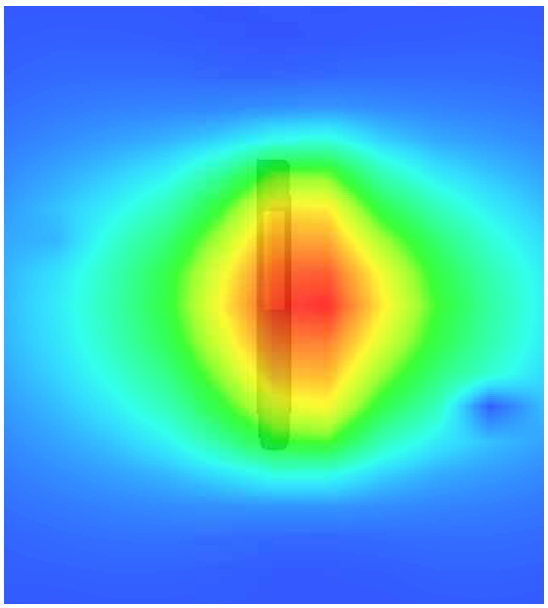
Maximum location: X=-1.00, Y=-50.00

SAR 10g (W/Kg)	7. 826317
SAR 1g (W/Kg)	12.908315

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0000	13.1279	6.8312	3. 5991	1.3473



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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 13 minutes 27 seconds

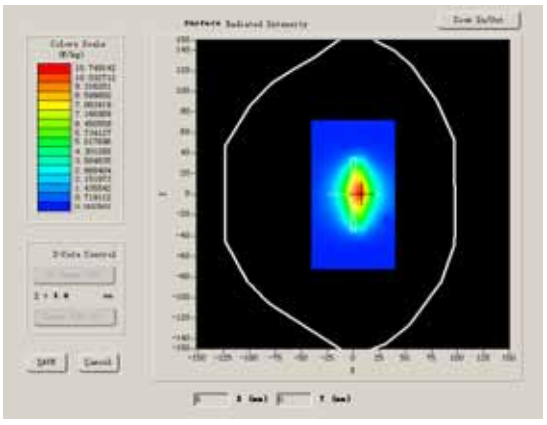
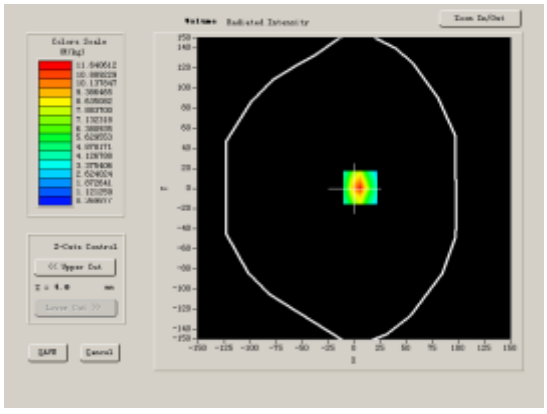
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	
Band	5600MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	5600.000000
Relative permittivity (real part)	48.362715
Conductivity (S/m)	5.728342
Power Drift (%)	-1.080000
Ambient Temperature:	22.9°C
Liquid Temperature:	22.1°C
ConvF:	26.30
Crest factor:	1:1

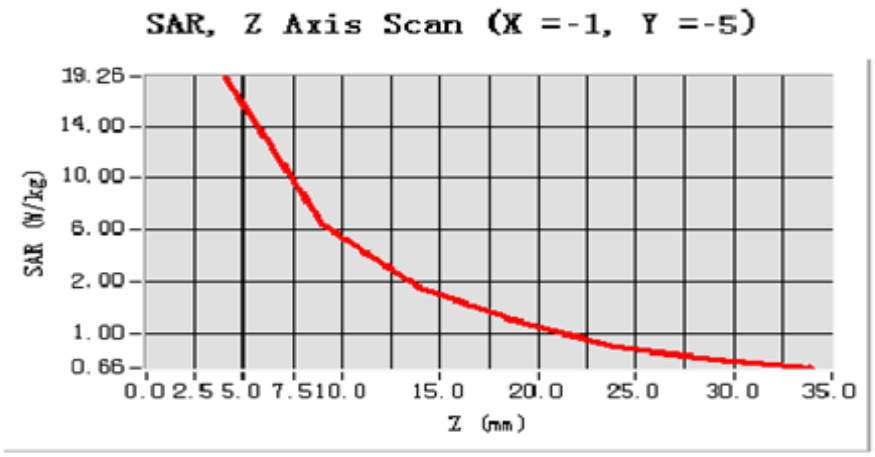
SURFACE SAR	VOLUME SAR
	

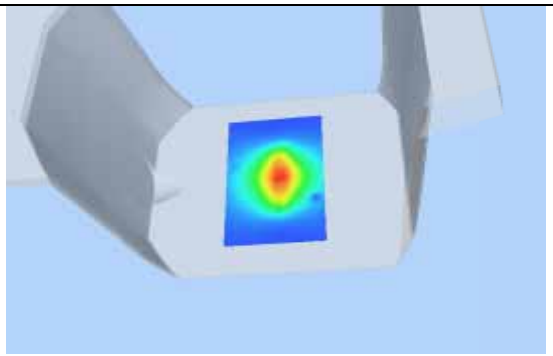
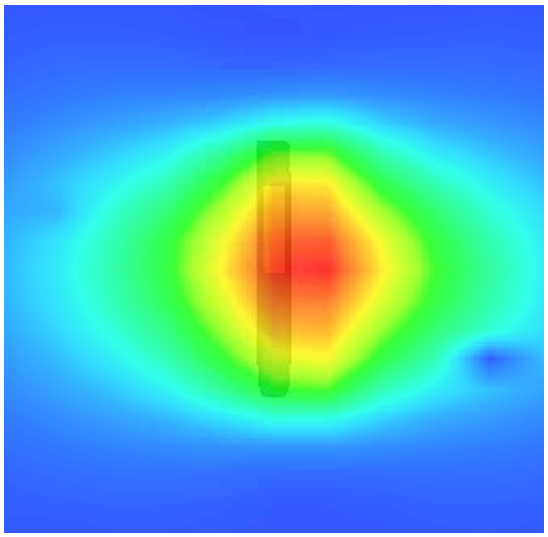
Maximum location: X=-1.00, Y=-5.00

SAR 10g (W/Kg)	6.481069
SAR 1g (W/Kg)	18.784912

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.0000	19.7251	6.4281	1.6274	0.7624



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=4mm, dy=4mm, dz=2mm

Date of measurement: 2014.6.6

Measurement duration: 13 minutes 27 seconds

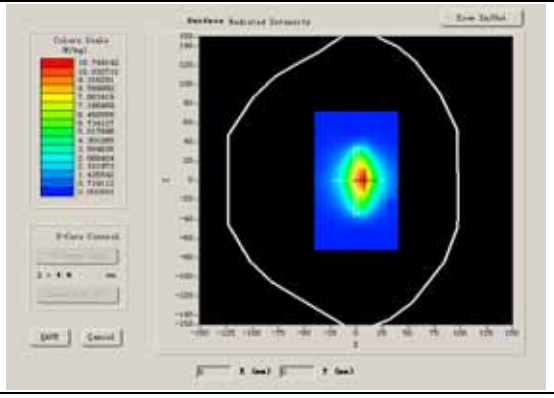
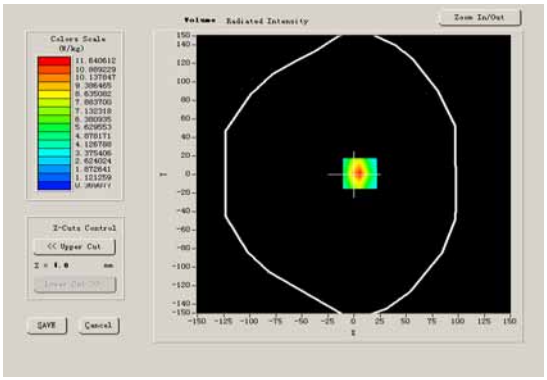
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	
Band	5800MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	5800.000000
Relative permittivity (real part)	48.108624
Conductivity (S/m)	5.931825
Power Drift (%)	-0.850000
Ambient Temperature:	22.9°C
Liquid Temperature:	22.1°C
ConvF:	26.47
Crest factor:	1:1

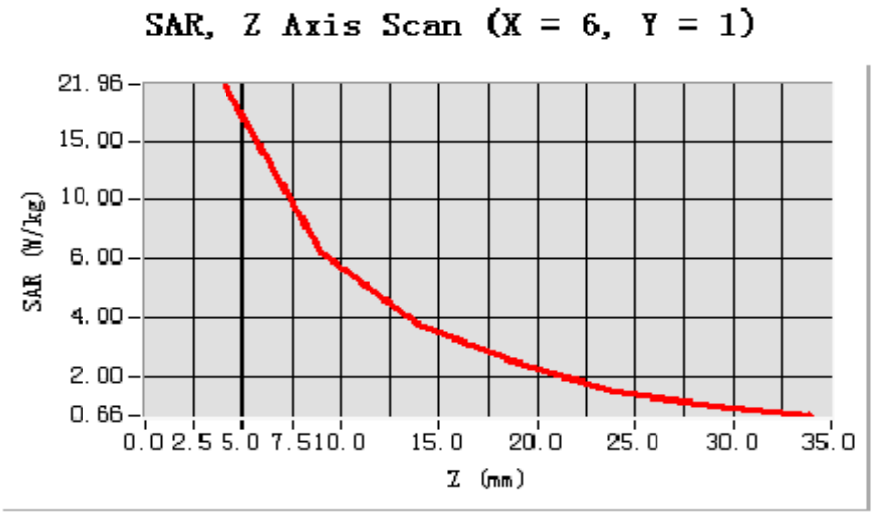
SURFACE SAR	VOLUME SAR
	

Maximum location: X=6.00, Y=1.00

SAR 10g (W/Kg)	6.742542
SAR 1g (W/Kg)	21.426011

Z Axis Scan

Z (mm)	0.00	4.00	8.00	13.00	21.00
SAR (W/Kg)	0.0000	22.6127	6.8974	4.0518	0.9571



3D sceen shot	Hot spot position