

SAR TEST REPORT

Issued to

cellsafe & panasales PTY LTD

For

universal chip for S6 & S6 edge

Model Name : S6-001
Trade Name : cellsafe
Brand Name : cellsafe
Standard : EN 50360: 2001+A2:2012
EN 62209-2: 2010
Test date : 2015-8-11
Issue date : 2015-8-17



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Change History		
Issue	Date	Reason for change
1.0	2015.8.17	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	Agilent(8960, SN:10752)	2014-9-26	1year
3	Voltmeter	Keithley (2000, SN:1000572)	2014-9-24	1year
4	Synthesizer	Rohde&Schwarz (SML_03, SN:101868)	2014-9-24	1year
5	Amplifier	Nucl udes (ALB216, SN:10800)	2014-9-24	1year
6	Power Meter	Rohde&Schwarz (NRVD, SN:101066)	2014-9-24	1year
7	Probe	Satimo (SN 37/08 EP80)	2014-10-4	1year
8	Phantom	Satimo (SN_36_08_SAM62)	2014-9-24	1year
9	Liquid	Satimo (Last Calibration:2013-9-29)	NA	NA
10	Dipole 1800MHz	Satimo (SN 36/08 DIPF 101)	2014-10-5	1year
11	Dipole 2450MHz	Satimo (SN 36/08 DIPF 103)	2014-10-5	1year

2. TECHNICAL INFORMATION

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

2.1 Identification of Applicant

Company Name:	cellsafe & panasales PTY LTD
Address:	N/A

2.2 Identification of Manufacturer

Company Name:	Shenzhen xinjida technology co.,ltd
Address:	weiyecheng industrial xintian village guanlan town baoan shenzhen China

2.3 Equipment Under Test (EUT)

Model Name:	S6-001
Trade Name:	cellsafe
Brand Name:	cellsafe

2.3.1 Photographs of the EUT

Please see for photographs of the EUT.

2.4 Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	EN 50360: 2001+A2:2012	Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from GSM Mobile phones.
2	EN 62209-2: 2010	Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR) in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the body.

2.5 Test Environment/Conditions

Normal Temperature (NT):	20 ... 25 °C
Relative Humidity:	30 ... 75 %
Air Pressure:	980 ... 1020 hPa
Test frequency:	WCDMA Band 1/8 LTE Band 1/2
Operation mode:	Call established
Power Level:	WCDMA Band 1/8 Max output power LTE Band 1/2 Max output power

During SAR test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition. A communication link is set up with a System Simulator (SS) by air link, and a call is established. The EUT is commanded to operate at maximum transmitting power.

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

The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the handset by at least 35 dB.

3. SPECIFIC ABSORPTION RATE (SAR)

3.1 Introduction

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

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

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

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

$$\text{SAR} = c \left(\frac{\delta T}{\delta t} \right)$$

Where c is the specific heat capacity, δT is the temperature rise and δt the exposure duration, or related to the electrical field in the tissue by

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

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

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

4. SAR MEASUREMENT SETUP

4.1 The Measurement System

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

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

The following figure shows the system.



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

4.2 Probe

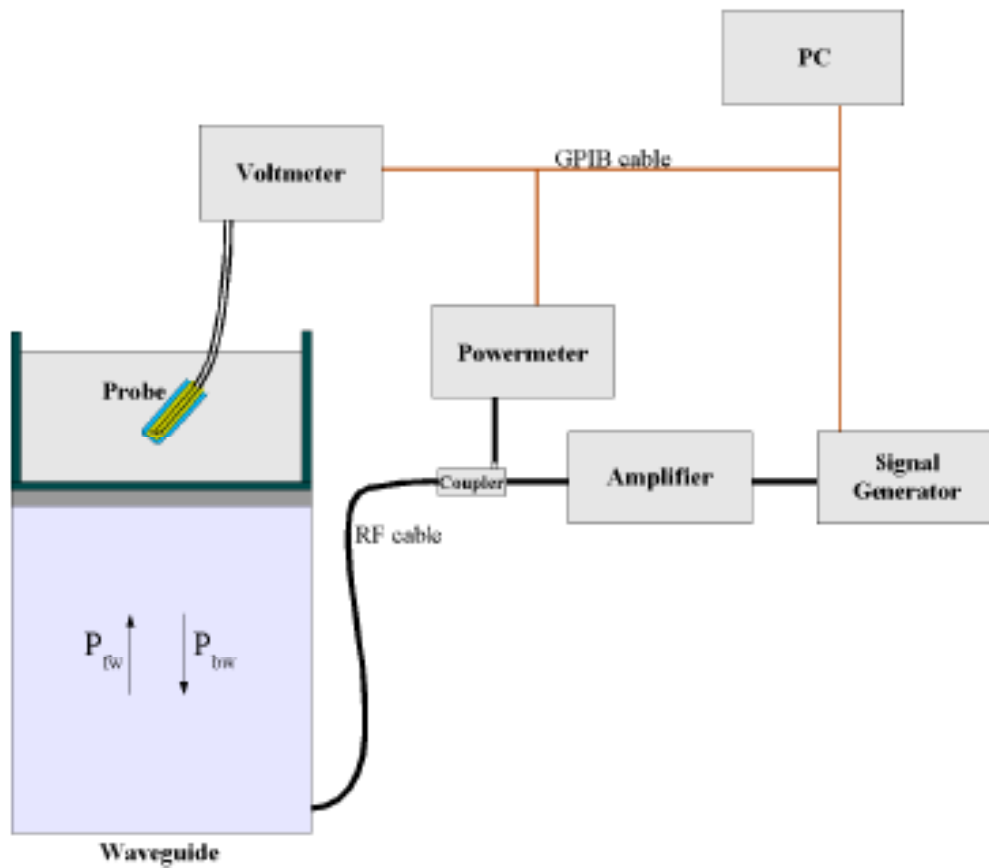
For the measurements the Specific Dosimetric E-Field Probe SN 37/08 EP80 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter : 6.5 mm
- Distance between probe tip and sensor center: 2.5mm

- Distance between sensor center and the inner phantom surface: 4 mm
(repeatability better than +/- 1mm)
- Probe linearity: <0.25 dB
- Axial Isotropy: <0.25 dB
- Spherical Isotropy: <0.25 dB
- Calibration range: 835to 2500MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and surface normal line: less than 30°

Probe calibration is realized, in compliance with CENELEC EN 62209 and IEEE 1528 std, with CALISAR, Antenna proprietary calibration system. The calibration is performed with the EN 622091 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 :

P_{fw} = Forward Power

P_{bw} = Backward Power

a and b = Waveguide dimensions

l = 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:

$$CF(N)=SAR(N)/V_{lin}(N) \quad (N=1,2,3)$$

The linearised output voltage $V_{lin}(N)$ is obtained from the displayed output voltage $V(N)$ using

$$V_{lin}(N)=V(N)*(1+V(N)/DCP(N)) \quad (N=1,2,3)$$

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/cm²) 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/cm².

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),

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

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

δT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T/\Delta t$, 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:

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

σ = simulated tissue conductivity,

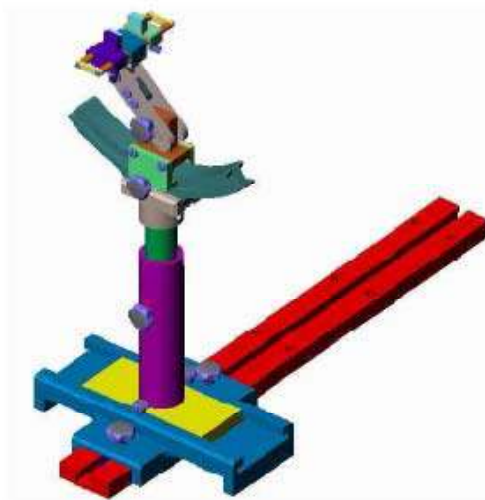
ρ = Tissue density (1.25 g/cm³ for brain tissue)

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 lower 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.

Ingredients (% by weight)	Frequency Band	Frequency Band
	835MHz	1800-2000MHz
Water	41.45	55.36
Salt(NaCl)	1.49	0.35
Sugar	46.78	30.45
HEC	0.52	0.0
Bactericide	0.05	0.0
Diethyenglycol monohexylether	0.0	0.0
Triton X-100	0.0	0.0
DGBE	0.0	13.84
Acticide SPX	42.54	0.0
Dielectric Constant	0.91	41.00
Conductivity (S/m)	41.45	1.38

Recipes for Tissue Simulating Liquid



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 Human Tissue Simulating Liquid

Temperature: 23.0~23.8°C, humidity: 54~60%.			
/	Frequency	Permittivity ϵ	Conductivity σ (S/m)
Target value	835 MHZ	41.5	0.90
Validation value (Aug. 11)	835 MHZ	41.675999	0.894409
Target value	1900 MHZ	40	1.40
Validation value (Aug. 11)	1900 MHZ	38.509998	1.436111

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 HANDSET SAR TEST

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/ e	k
Uncertainty Component	Sec.	Tol (+-%)	Prob Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	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	∞
Response 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 Algorithms 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

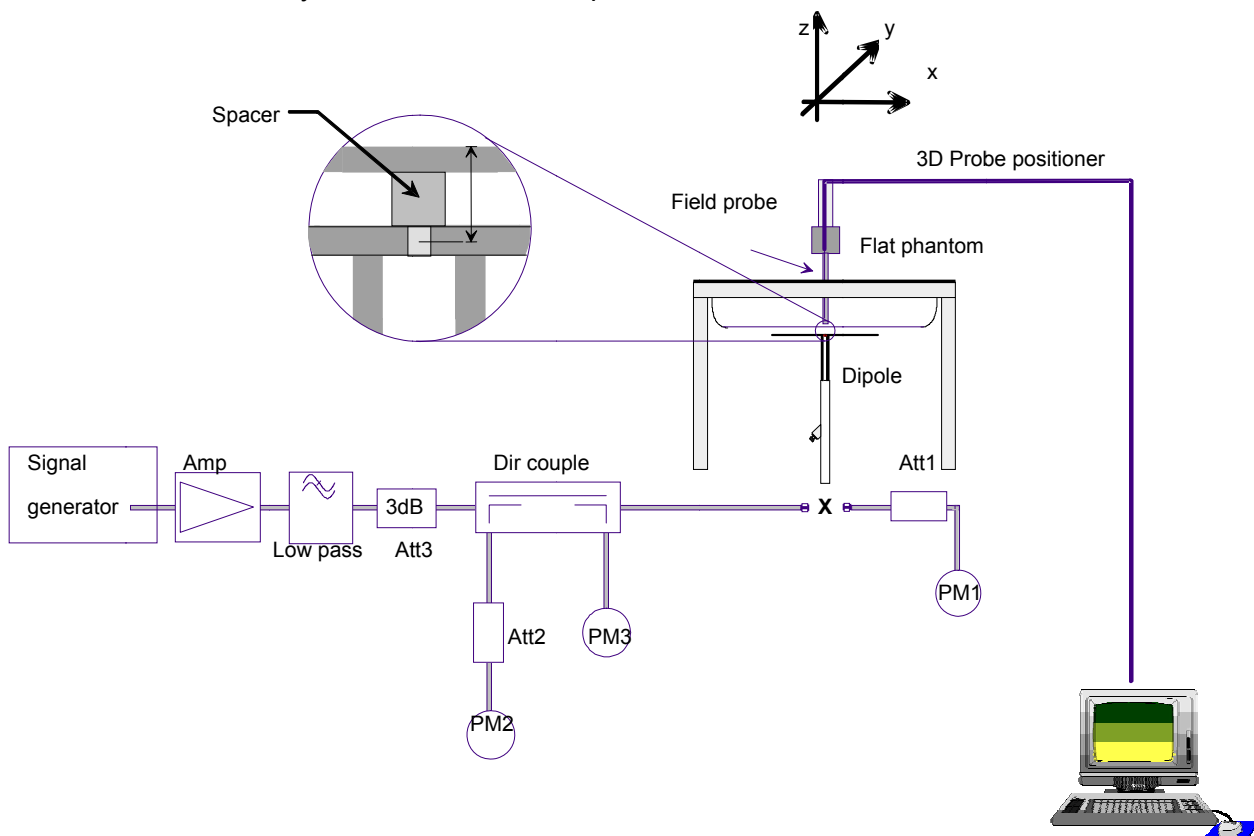
a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/ e	k
Uncertainty Component	Sec.	Tol (+-%)	Prob Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System									
Probe calibration	E.2.1	4.76	N	1	1	1	4.76	4.7	∞
Axial Isotropy	E.2.2	2.5	R	$\sqrt{3}$	0.7	0.7	1.01	1.0	∞
Hemispherical Isotropy	E.2.2	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	∞
Response 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 Algorithms 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	1.69	∞
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	$\sqrt{3}$	0.64	0.43	1.85	1.85	M
Liquid permittivity - deviation from target value	E.3.2	3.69	R	$\sqrt{3}$	0.6	0.49	1.28	1.28	∞
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N	$\sqrt{3}$	0.6	0.49	3.46	3.46	M
Combined Standard Uncertainty			RSS				8.83	8.83	
Expanded Uncertainty (95% Confidence interval)			K=2				17.66	17.66	

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	835MHz	1900MHz
Target value(10g)	6.2 W/Kg	19.13 W/Kg
250 mW input power Test value(10g)	1.539 W/Kg	4.845 W/Kg
Normalized to 1W value(10g)	6.156 W/Kg	19.380 W/Kg

8. OPERATIONAL CONDITIONS DURING TEST

8.1 Information on the testing

The mobile phone antenna and battery are those specified by the manufacturer. The battery is fully charged before each measurement. The output power and frequency are controlled using a base station simulator. The mobile phone is set to transmit at its highest output peak power level.

The mobile phone is test in the “cheek” and “tilted” positions on the left and right sides of the phantom. The mobile phone is placed with the vertical centre line of the body of the mobile phone and the horizontal line crossing the centre of the earpiece in a plane parallel to the sagittal plane of the phantom.

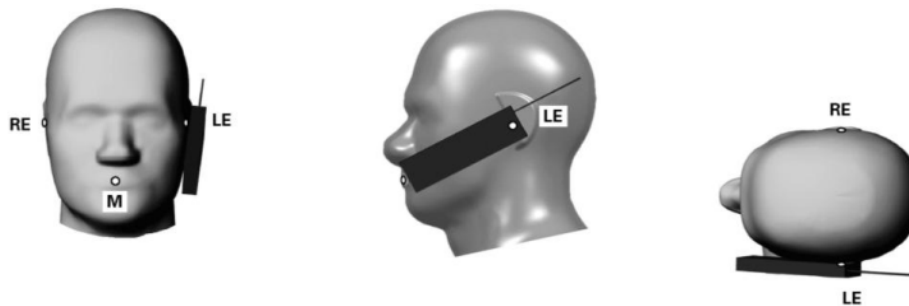


Illustration for Cheek Position

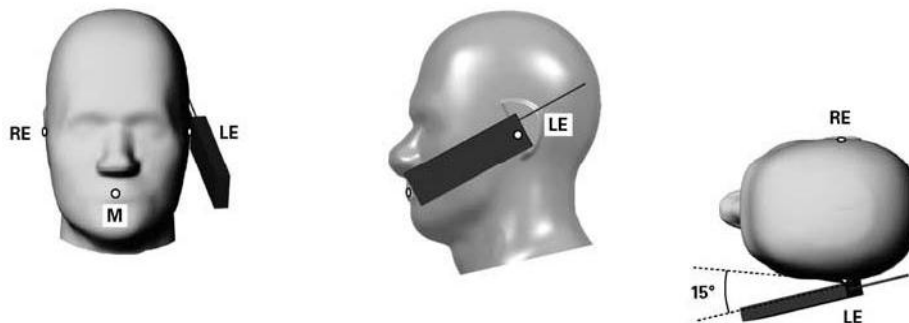


Illustration for Tilted Position

Description of the “cheek” position:

The mobile phone is well placed in the reference plane and the earpiece is in contact with the ear. Then the mobile phone is moved until any point on the front side get in contact with the cheek of the phantom or until contact with the ear is lost.

8.2 Measurement procedure

The following steps are used for each test position

- Establish a call with the maximum output power with a base station simulator. The connection

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

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. TEST RESULTS LIST

Test result for S6

Temperature: 21.0~23.8°C, humidity: 54~60%.					
Phantom Configurations	Device Test Positions	Frequency Band	Channel	Accessory to be tested with S6	SAR(W/Kg)
					10g
Right Side Of Head	Cheek/Touch	LTE Band2	18700	N/A	0.281
				S6-001	0.064
		LTE Band8	21650	N/A	0.324
				S6-001	0.051
		WCDMA Band1	9750	N/A	0.367
				S6-001	0.059
		WCDMA Band8	2787	N/A	0.408
				S6-001	0.047

Test result for S6 edge

Temperature: 21.0~23.8°C, humidity: 54~60%.					
Phantom Configurations	Device Test Positions	Frequency Band	Channel	Accessory to be tested with S6 edge	SAR(W/Kg)
					10g
Right Side Of Head	Cheek/Touch	LTE Band2	18700	N/A	0.116
				S6-001	0.031
		LTE Band8	21650	N/A	0.293
				S6-001	0.045
		WCDMA Band1	9750	N/A	0.158
				S6-001	0.028
		WCDMA Band8	2787	N/A	0.292
				S6-001	0.034

ANNEX A PHOTOGRAPHS OF THE EUT

1. EUT Right Head Touch/Cheek Position(Galaxy S6 edge)



2. ETU Right Head Touch/Cheek Position(Galaxy S6)



3. ETU view-S6 edge



4. EUT view-S6



Liquid Level Photo



MEASUREMENT 1

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 7 seconds

A. Experimental conditions.

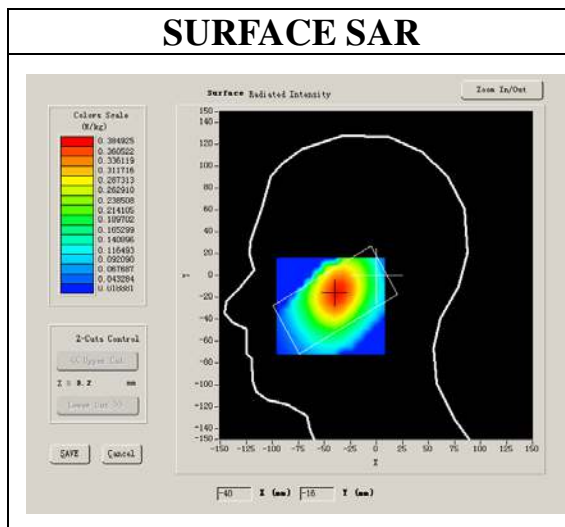
Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	LTE Band2
Channels	Middle
Signal	QPSK

B. SAR Measurement Results

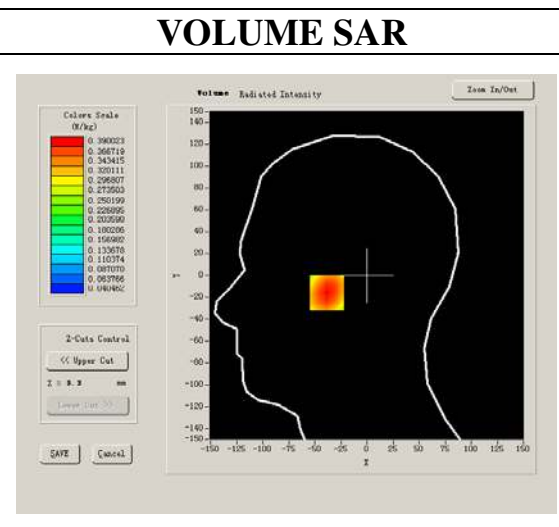
Middle Band SAR (Channel 18700):

Frequency (MHz)	1880.000000
Relative permittivity (real part)	41.868901
Conductivity (S/m)	1.437192
Power drift (%)	-1.500000
Ambient Temperature:	22.6°C
Liquid Temperature:	22.7°C
ConvF:	40.136,34.843,38.721
Crest factor:	1:1

SURFACE SAR



VOLUME SAR



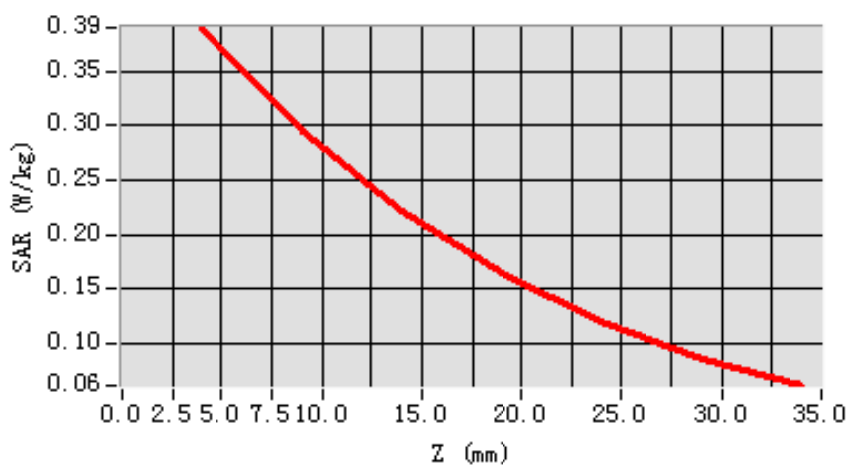
Maximum location: X=-38.00, Y=-16.00

SAR 10g (W/Kg)	0.281316
SAR 1g (W/Kg)	0.375690

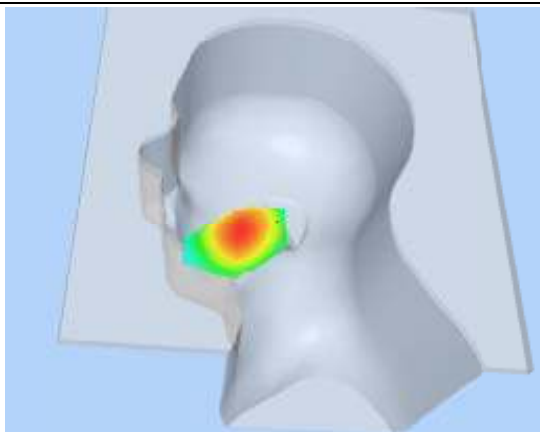
Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.3900	0.2950	0.2226	0.1644	0.1202	0.0854

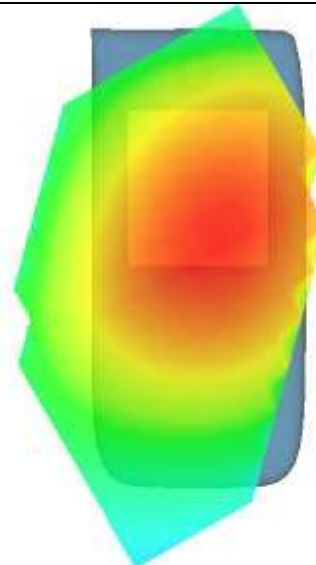
SAR, Z Axis Scan (X = -38, Y = -16)



3D scene shot



Hot spot position



MEASUREMENT 2

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 8 seconds

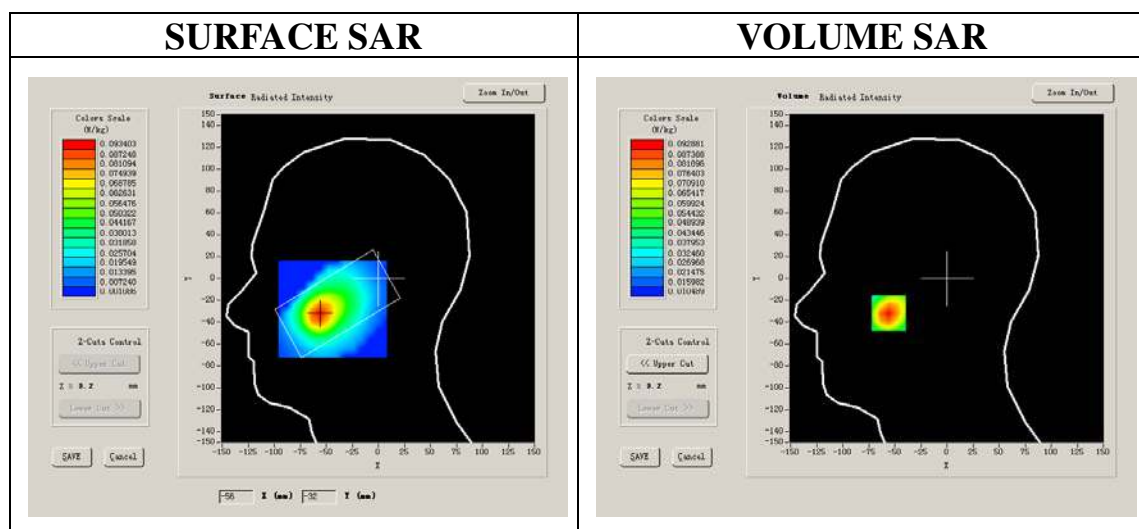
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	LTE Band2
Channels	Middle
Signal	QPSK

B. SAR Measurement Results

Middle Band SAR (Channel 18700):

Frequency (MHz)	1880.000000
Relative permittivity (real part)	41.868901
Relative permittivity	1.437192
Conductivity (S/m)	1.720014
Power drift (%)	1.280000
Ambient Temperature:	22.6°C
Liquid Temperature:	22.7°C
ConvF:	40.136,34.843,38.721
Crest factor:	1:1

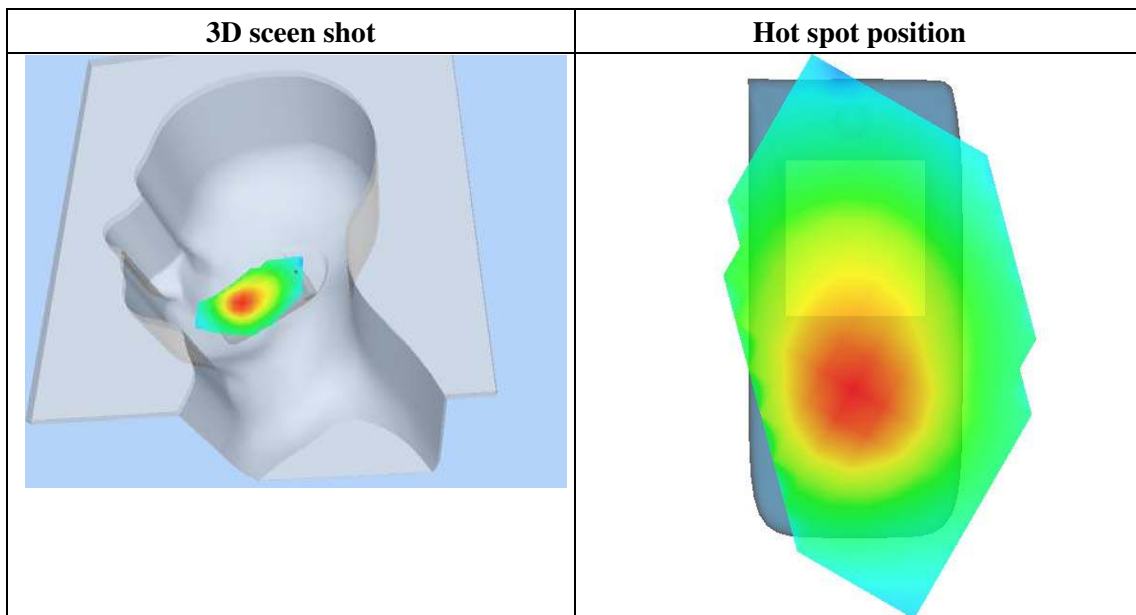
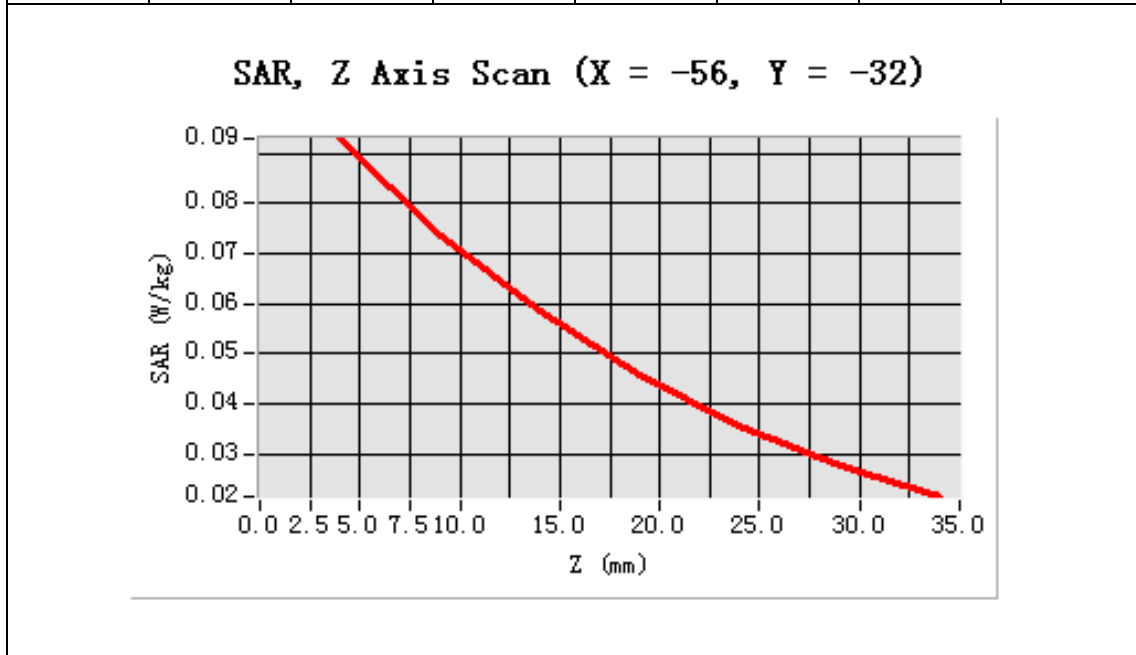


Maximum location: X=-56.00, Y=-32.00

SAR 10g (W/Kg)	0.063550
SAR 1g (W/Kg)	0.088471

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.0929	0.0737	0.0583	0.0458	0.0356	0.0274



MEASUREMENT 3

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 5 seconds

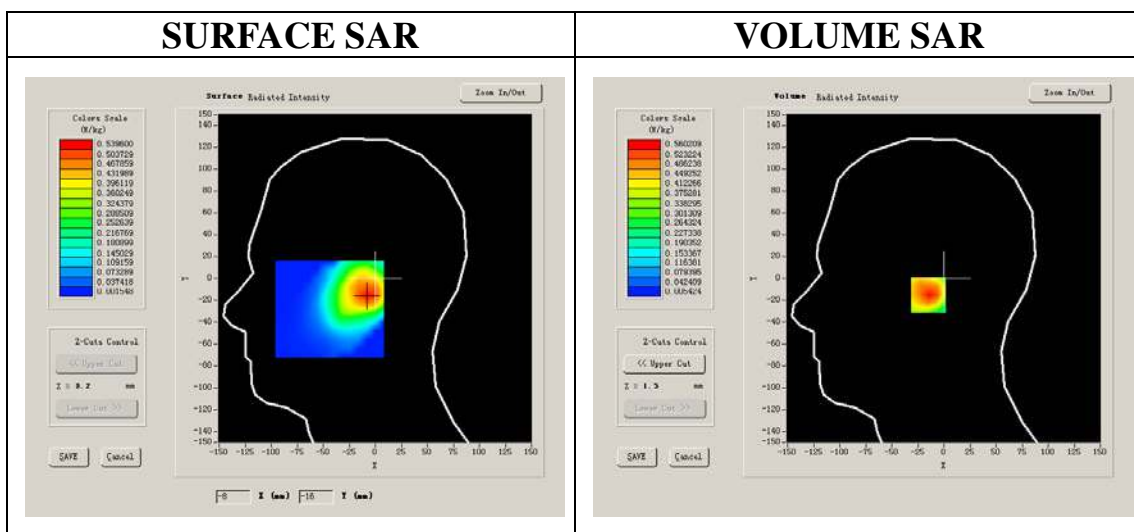
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	LTE Band8
Channels	Middle
Signal	QPSK

B. SAR Measurement Results

Middle Band SAR (Channel 21650):

Frequency (MHz)	900.000000
Relative permittivity (real part)	42.024192
Conductivity (S/m)	0.913467
Power drift (%)	0.250000
Ambient Temperature:	22.6°C
Liquid Temperature:	22.7°C
ConvF:	28.479,25.214,27.19
Crest factor:	1:1

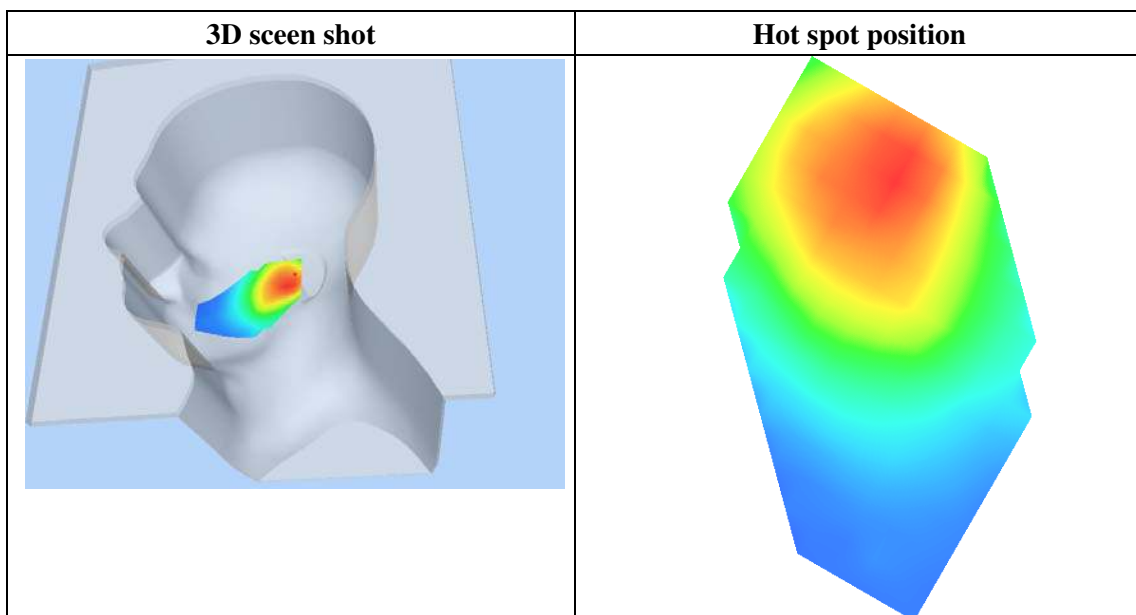
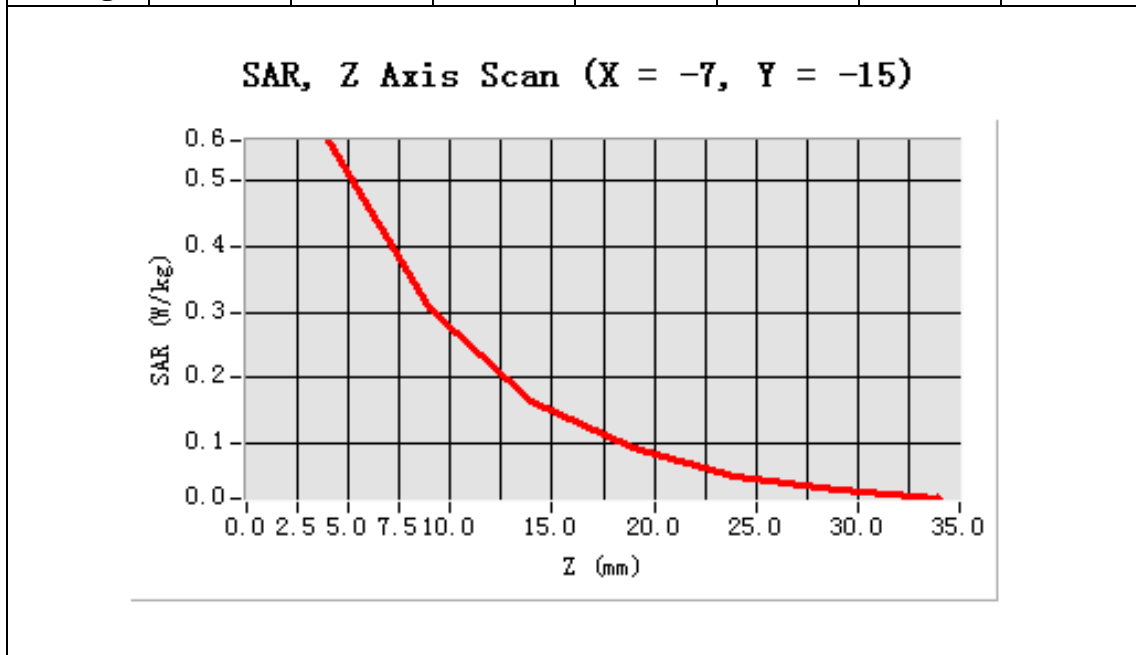


Maximum location: X=-7.00, Y=-15.00

SAR 10g (W/Kg)	0.324229
SAR 1g (W/Kg)	0.535667

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.5602	0.3063	0.1651	0.0937	0.0516	0.0294



MEASUREMENT 4

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 5 seconds

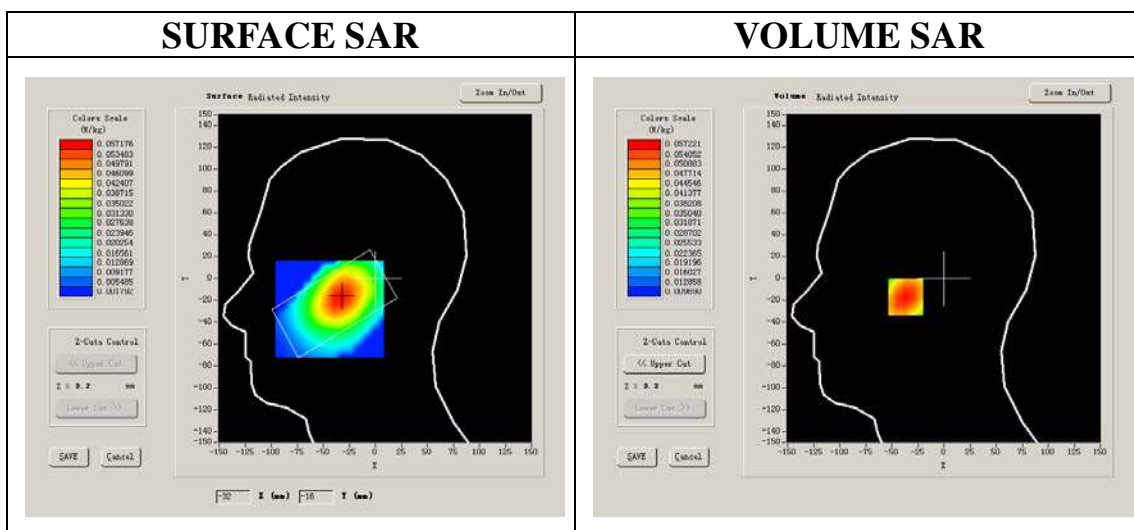
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	LTE Band8
Channels	Middle
Signal	QPSK

B. SAR Measurement Results

Middle Band SAR (Channel 21650):

Frequency (MHz)	900.000000
Relative permittivity (real part)	42.024192
Conductivity (S/m)	0.913467
Power drift (%)	-0.420000
Ambient Temperature:	22.6°C
Liquid Temperature:	22.7°C
ConvF:	28.479,25.214,27.19
Crest factor:	1:1



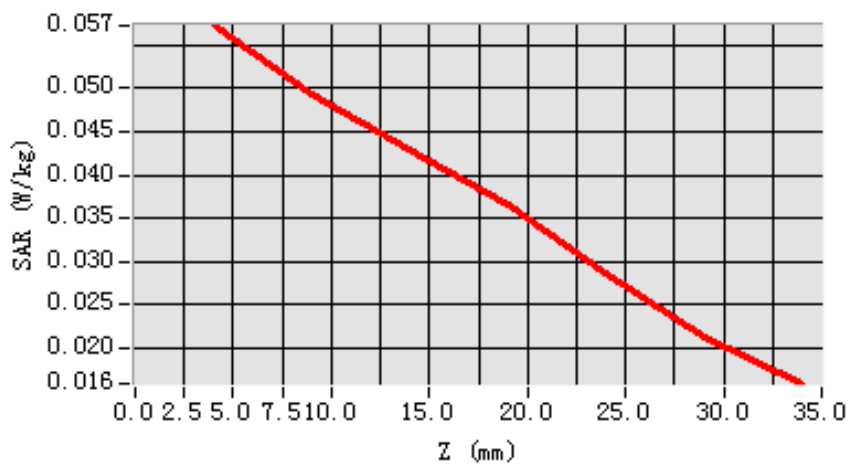
Maximum location: X=-33.00, Y=-17.00

SAR 10g (W/Kg)	0.050816
SAR 1g (W/Kg)	0.056329

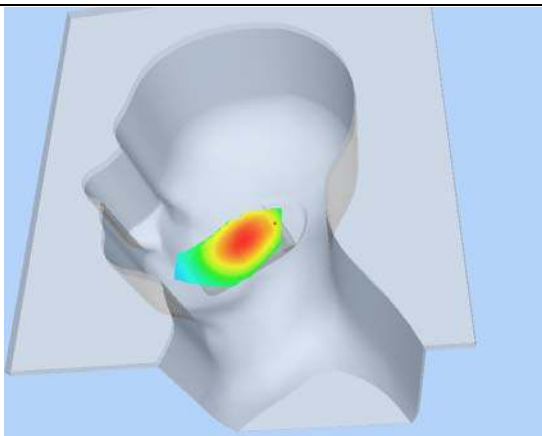
Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.0572	0.0494	0.0430	0.0367	0.0286	0.0212

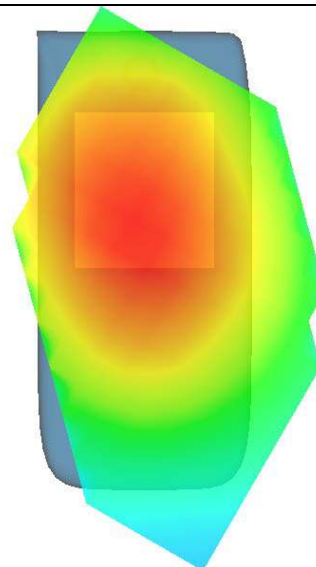
SAR, Z Axis Scan (X = -33, Y = -17)



3D scen shot



Hot spot position



MEASUREMENT 5

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 10 seconds

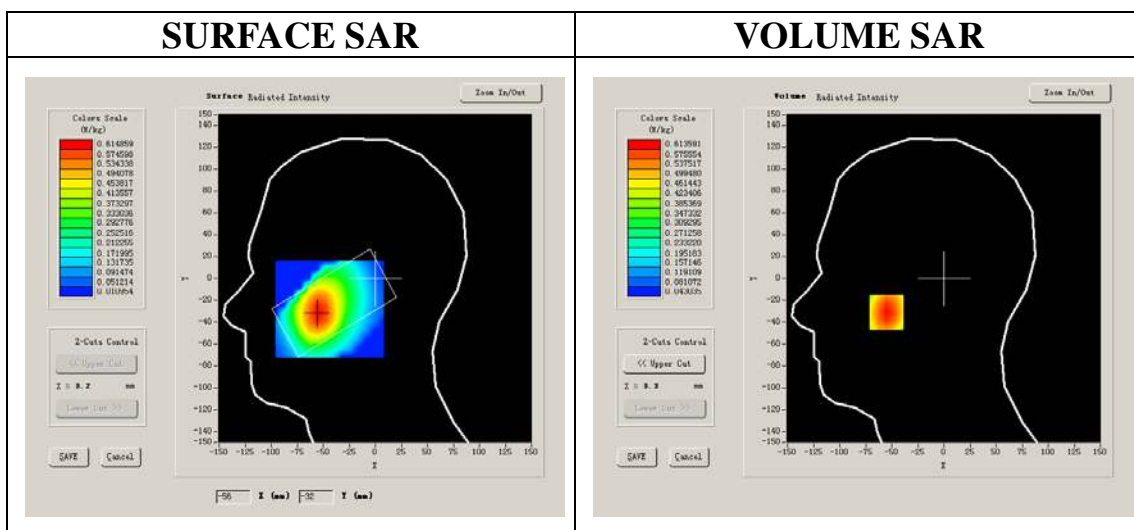
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	WCDMA Band1
Channels	Middle
Signal	CDMA

B. SAR Measurement Results

Middle Band SAR (Channel 9750)

Frequency (MHz)	1950.000000
Relative permittivity (real part)	41.868901
Conductivity (S/m)	1.437192
Power drift (%)	-1.150000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	39.772,33.946,37.835
Crest factor:	1:1



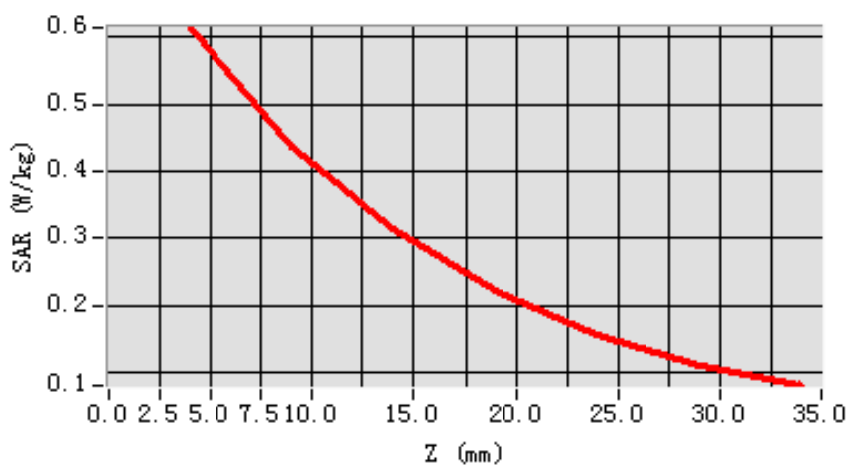
Maximum location: X=-55.00, Y=-31.00

SAR 10g (W/Kg)	0.367004
SAR 1g (W/Kg)	0.588915

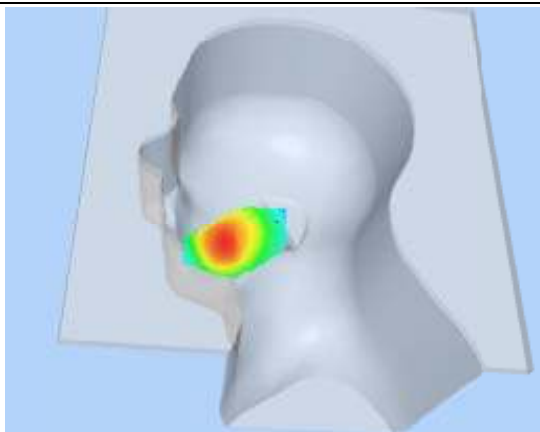
Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.6136	0.4371	0.3140	0.2231	0.1574	0.1113

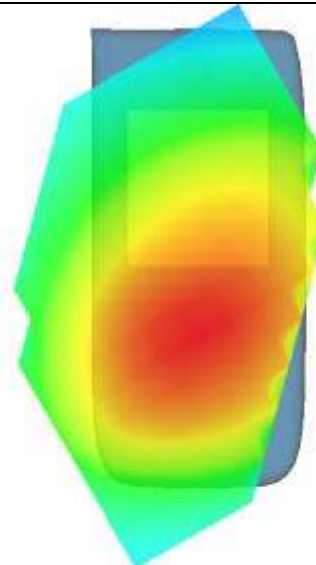
SAR, Z Axis Scan (X = -55, Y = -31)



3D scene shot



Hot spot position



MEASUREMENT 6

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 10 seconds

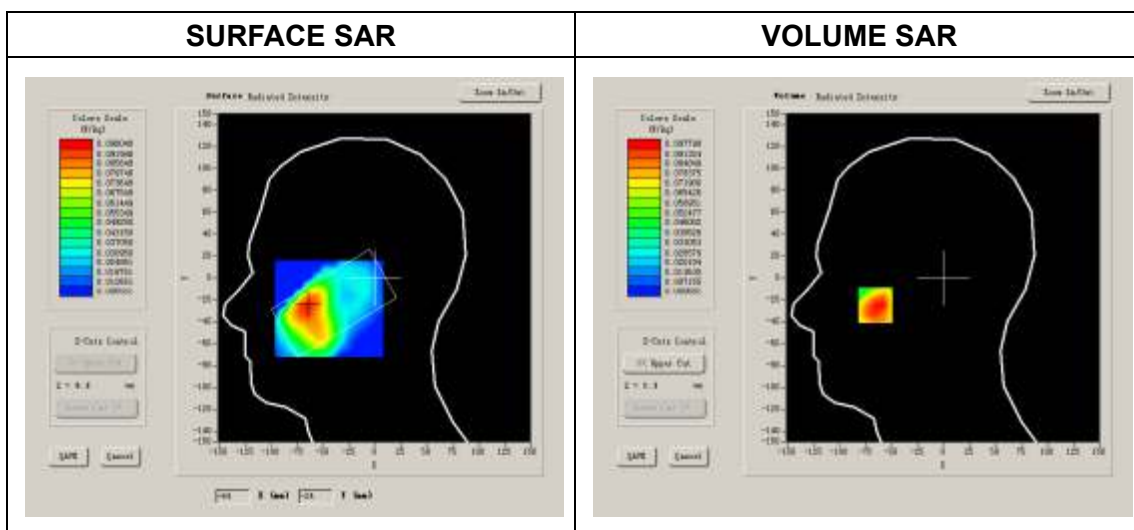
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	WCDMA Band1
Channels	Middle
Signal	CDMA

B. SAR Measurement Results

Middle Band SAR (Channel 9750)

Frequency (MHz)	1950.000000
Relative permittivity (real part)	41.868901
Conductivity (S/m)	1.437192
Power drift (%)	-1.210000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	39.772,33.946,37.835
Crest factor:	1:1



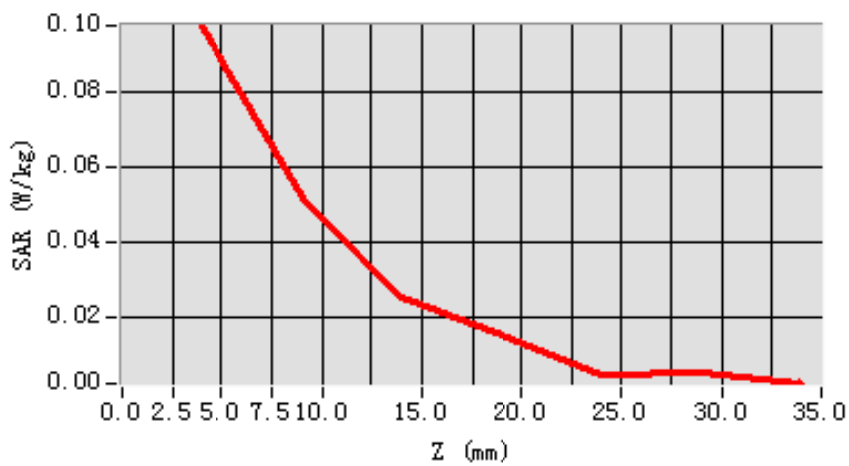
Maximum location: X=-65.00, Y=-25.00

SAR 10g (W/Kg)	0.059051
SAR 1g (W/Kg)	0.095141

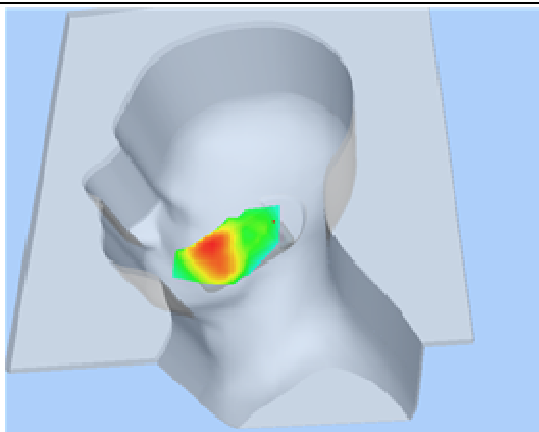
Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.0974	0.0518	0.0253	0.0152	0.0049	0.0052

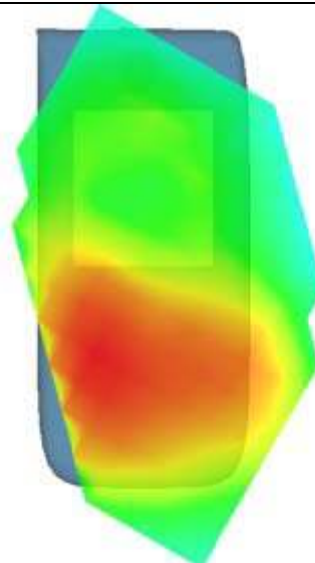
SAR, Z Axis Scan (X = -65, Y = -25)



3D scen shot



Hot spot position



MEASUREMENT 7

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 7 seconds

A. Experimental conditions.

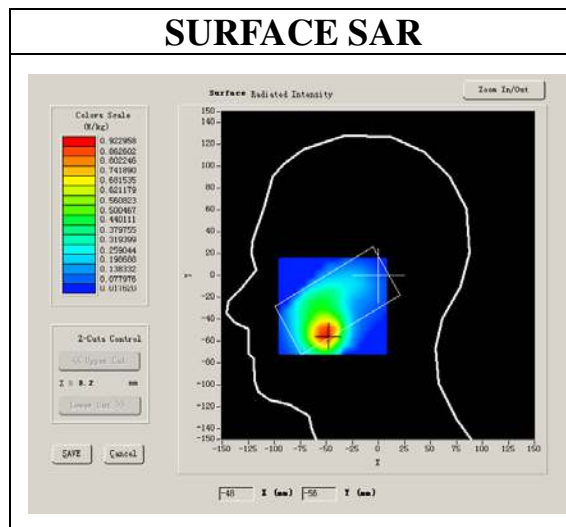
Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Right head
Band	Cheek
Channels	WCDMA Band8
Signal	Middle

B. SAR Measurement Results

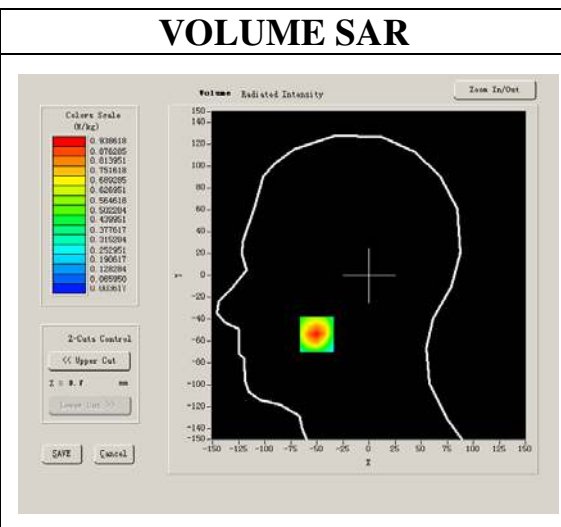
Middle Band SAR (Channel 2787):

Frequency (MHz)	880.000000
Relative permittivity (real part)	42.024192
Conductivity (S/m)	0.913467
Power drift (%)	-1.600000
Ambient Temperature:	22.6°C
Liquid Temperature:	22.7°C
ConvF:	40.136,34.843,38.721
Crest factor:	1:1

SURFACE SAR



VOLUME SAR

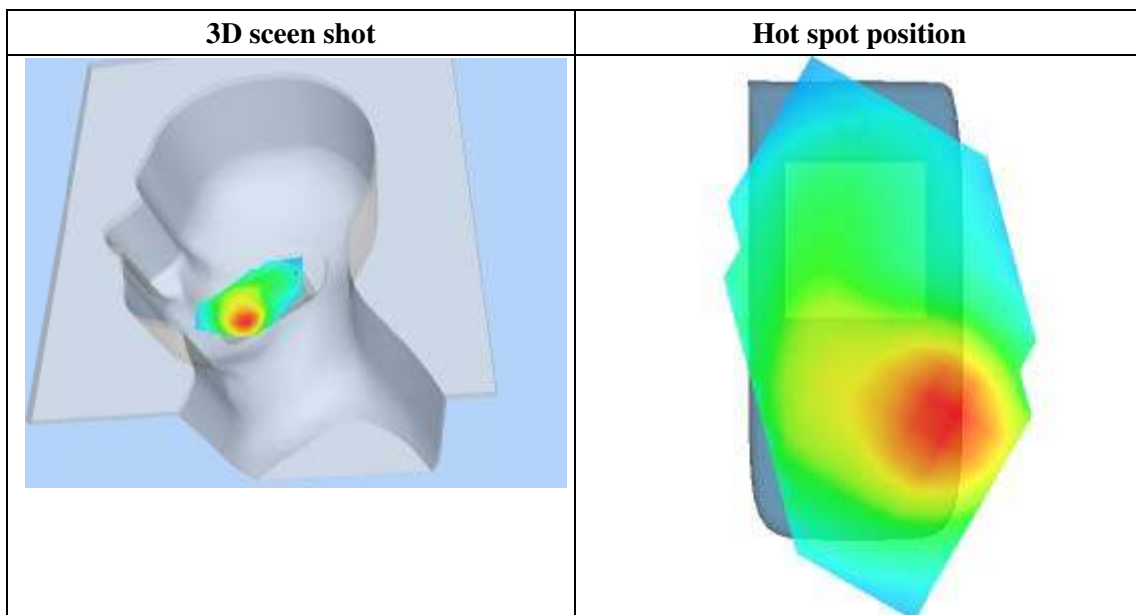
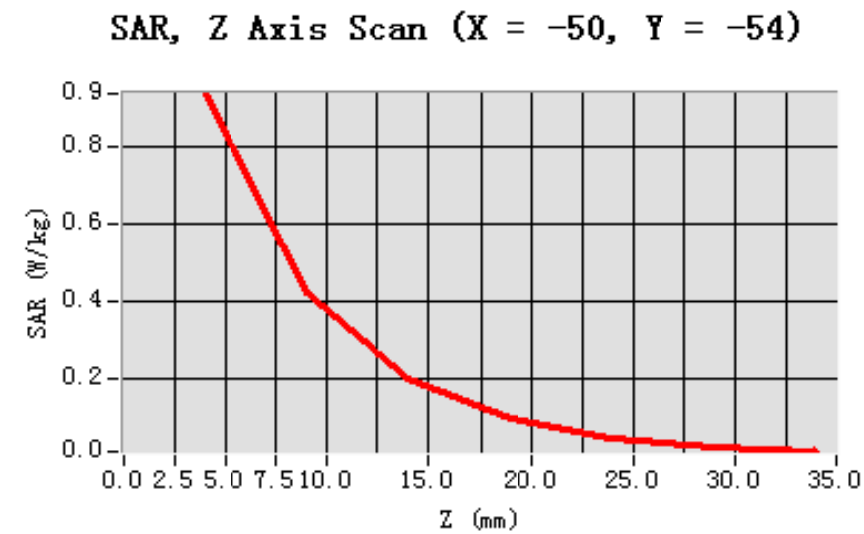


Maximum location: X=-50.00, Y=-54.00

SAR 10g (W/Kg)	0.407641
SAR 1g (W/Kg)	0.790568

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.9386	0.4260	0.2007	0.0963	0.0440	0.0209



MEASUREMENT 8

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 8 seconds

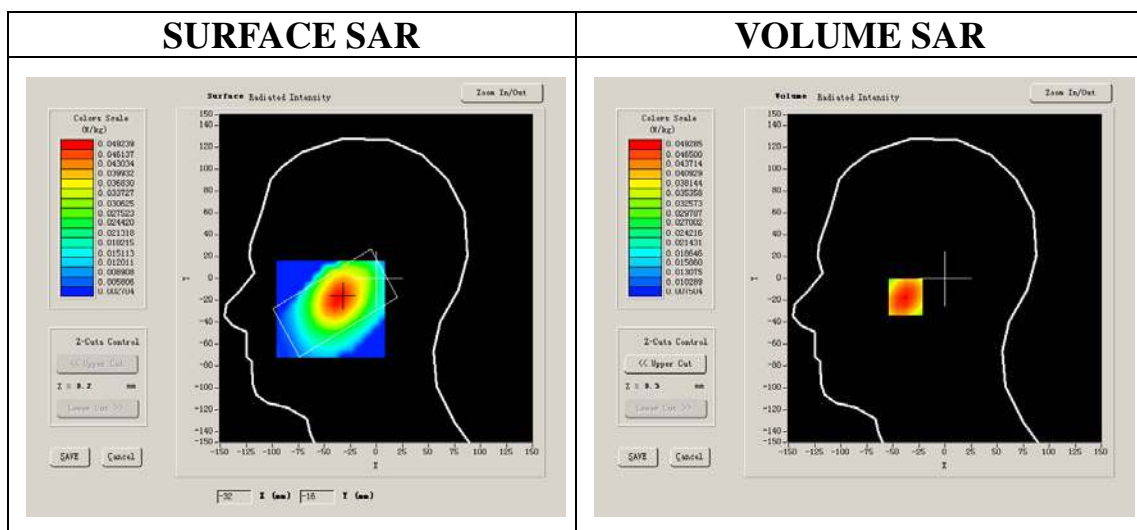
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	WCDMA Band8
Channels	Middle
Signal	Right head

B. SAR Measurement Results

Middle Band SAR (Channel 2787):

Frequency (MHz)	880.000000
Relative permittivity (real part)	42.024192
Conductivity (S/m)	0.913467
Power drift (%)	1.280000
Ambient Temperature:	22.6°C
Liquid Temperature:	22.7°C
ConvF:	40.136,34.843,38.721
Crest factor:	1:1



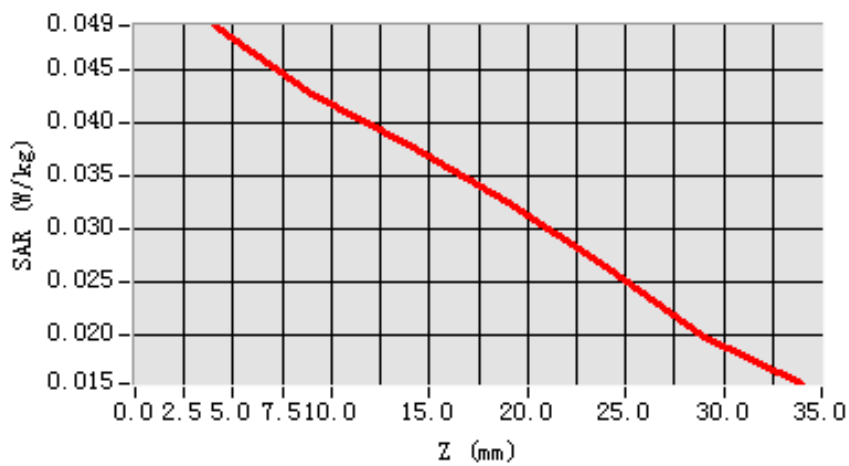
Maximum location: X=-35.00, Y=-17.00

SAR 10g (W/Kg)	0.047055
SAR 1g (W/Kg)	0.058197

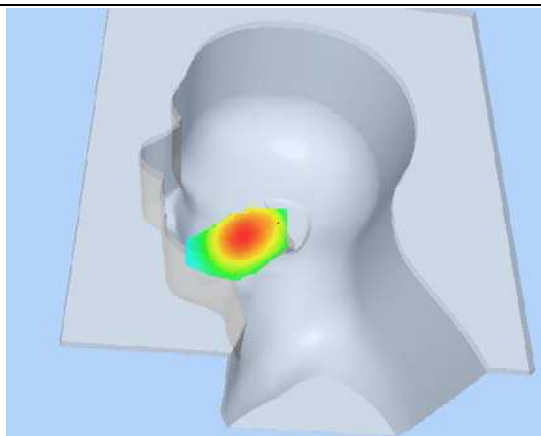
Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.0583	0.0428	0.0380	0.0326	0.0265	0.0198

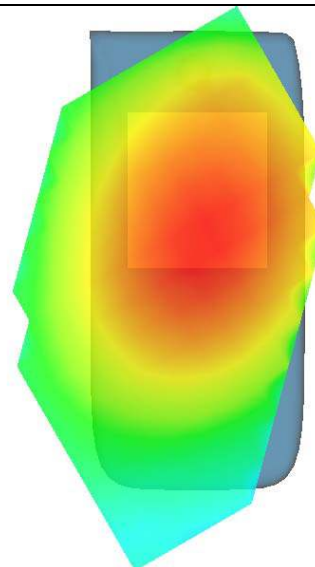
SAR, Z Axis Scan (X = -35, Y = -17)



3D scene shot



Hot spot position



MEASUREMENT 9

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 7 seconds

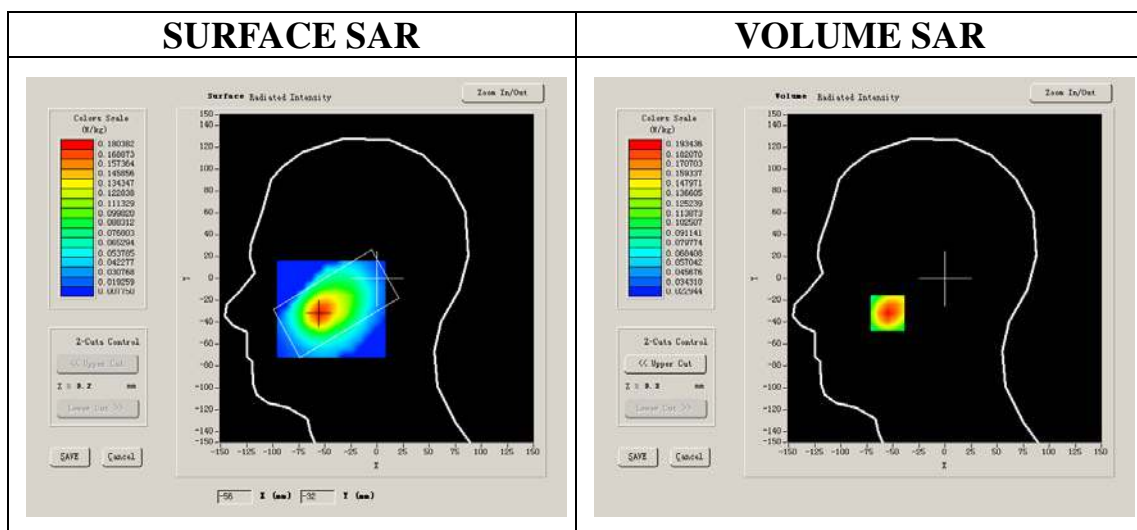
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	LTE Band2
Channels	Middle
Signal	QPSK

B. SAR Measurement Results

Middle Band SAR (Channel 18700):

Frequency (MHz)	1880.000000
Relative permittivity (real part)	41.868901
Conductivity (S/m)	1.437192
Power drift (%)	-2.100000
Ambient Temperature:	22.6°C
Liquid Temperature:	22.7°C
ConvF:	40.136,34.843,38.721
Crest factor:	1:1



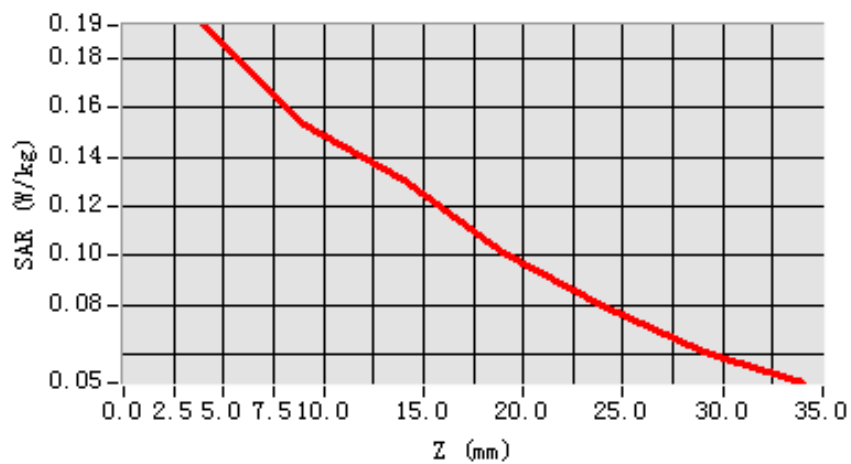
Maximum location: X=-55.00, Y=-32.00

SAR 10g (W/Kg)	0.115837
SAR 1g (W/Kg)	0.185303

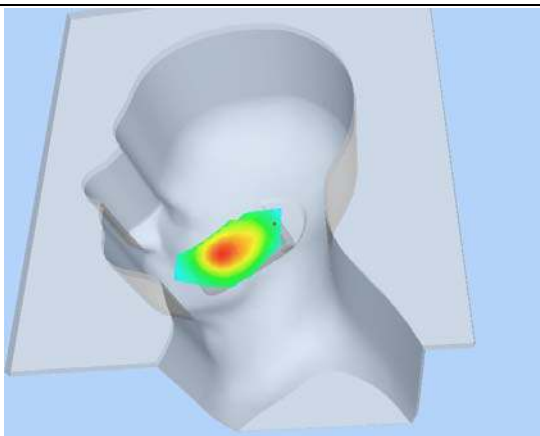
Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.1934	0.1534	0.1305	0.1010	0.0793	0.0611

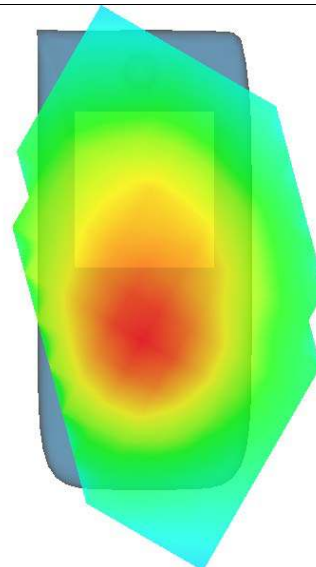
SAR, Z Axis Scan (X = -55, Y = -32)



3D scen shot



Hot spot position



MEASUREMENT 10

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 8 seconds

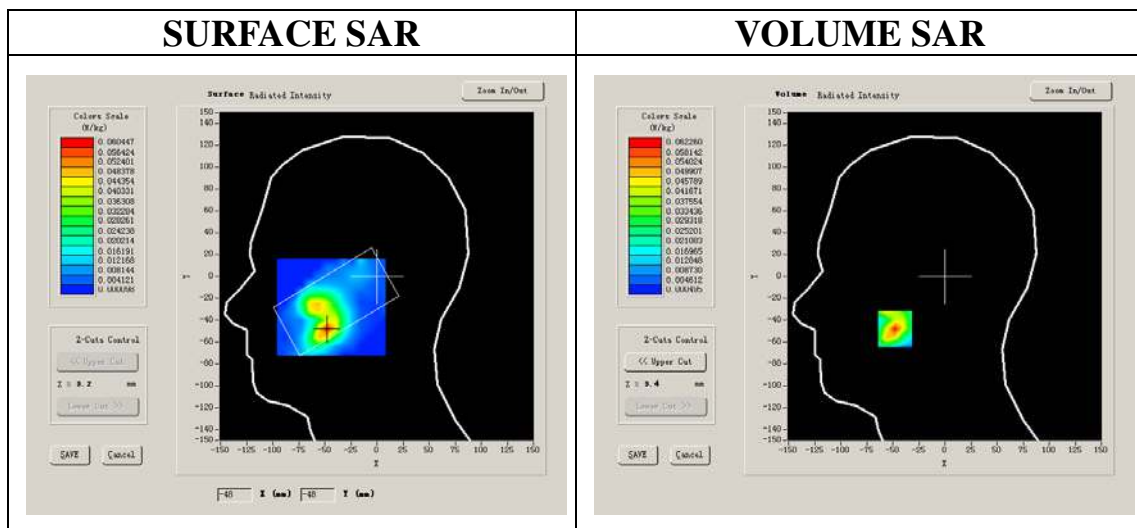
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	LTE Band2
Channels	Middle
Signal	QPSK

B. SAR Measurement Results

Middle Band SAR (Channel 18700):

Frequency (MHz)	1880.000000
Relative permittivity (real part)	41.868901
Relative permittivity	1.437192
Conductivity (S/m)	1.720014
Power drift (%)	1.280000
Ambient Temperature:	22.6°C
Liquid Temperature:	22.7°C
ConvF:	40.136,34.843,38.721
Crest factor:	1:1



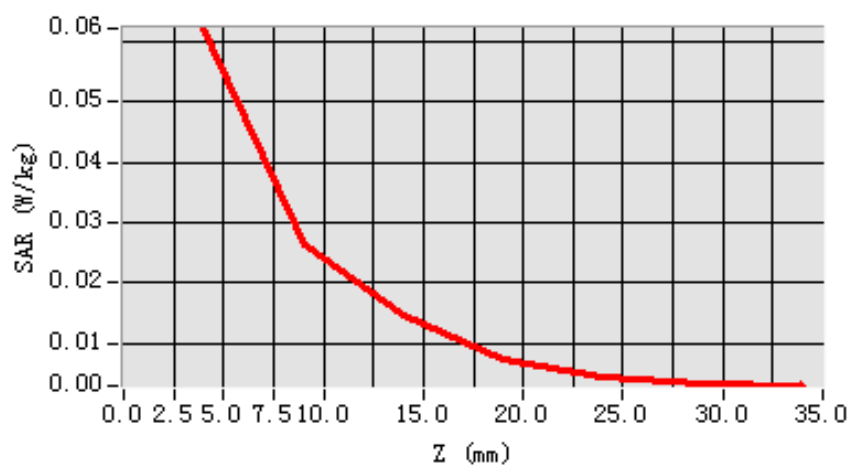
Maximum location: X=-48.00, Y=-48.00

SAR 10g (W/Kg)	0.030743
SAR 1g (W/Kg)	0.054316

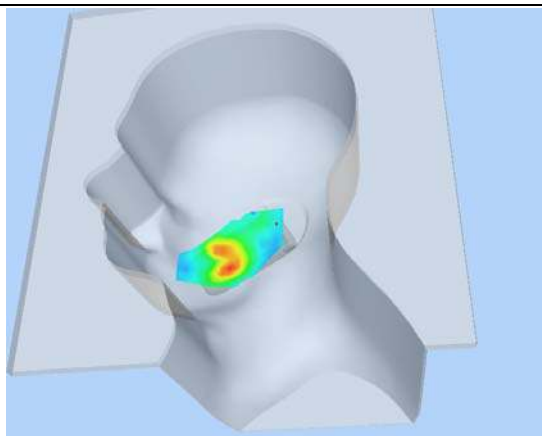
Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.0623	0.0262	0.0147	0.0073	0.0042	0.0031

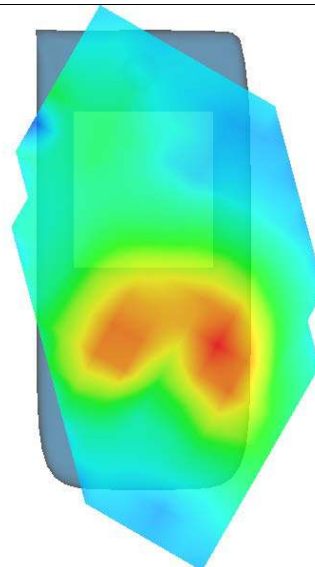
SAR, Z Axis Scan (X = -48, Y = -48)



3D scen shot



Hot spot position



MEASUREMENT 11

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 5 seconds

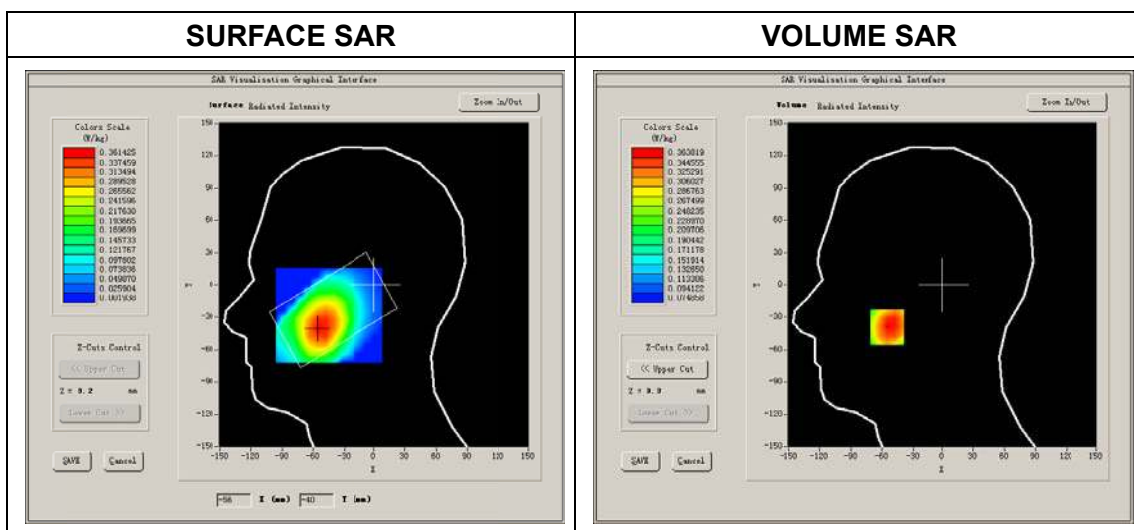
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	LTE Band8
Channels	Middle
Signal	QPSK

B. SAR Measurement Results

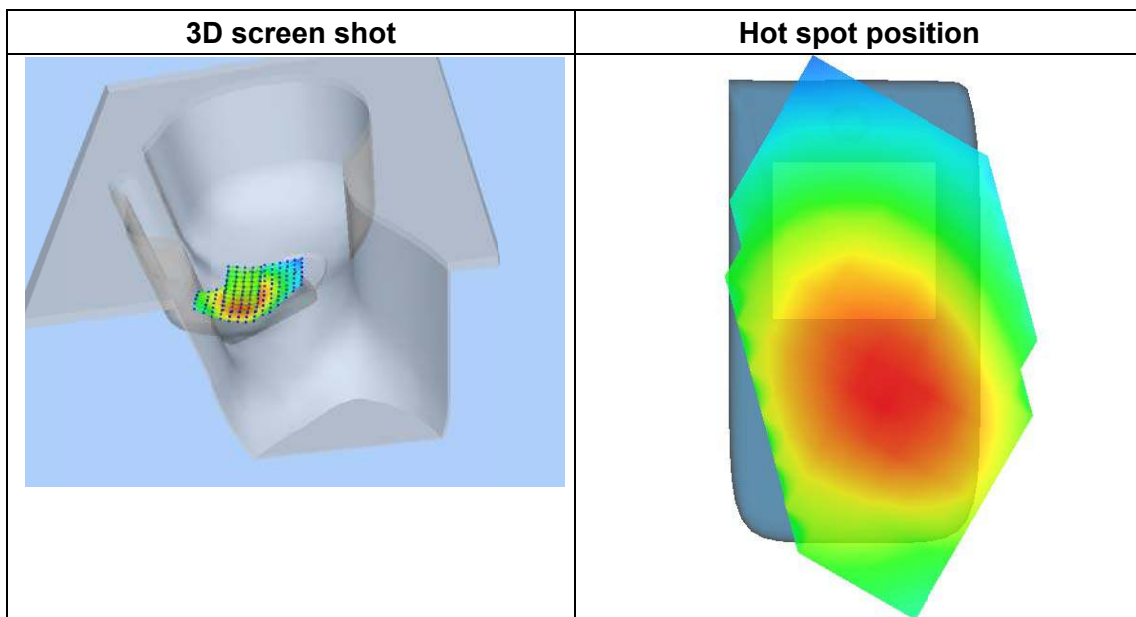
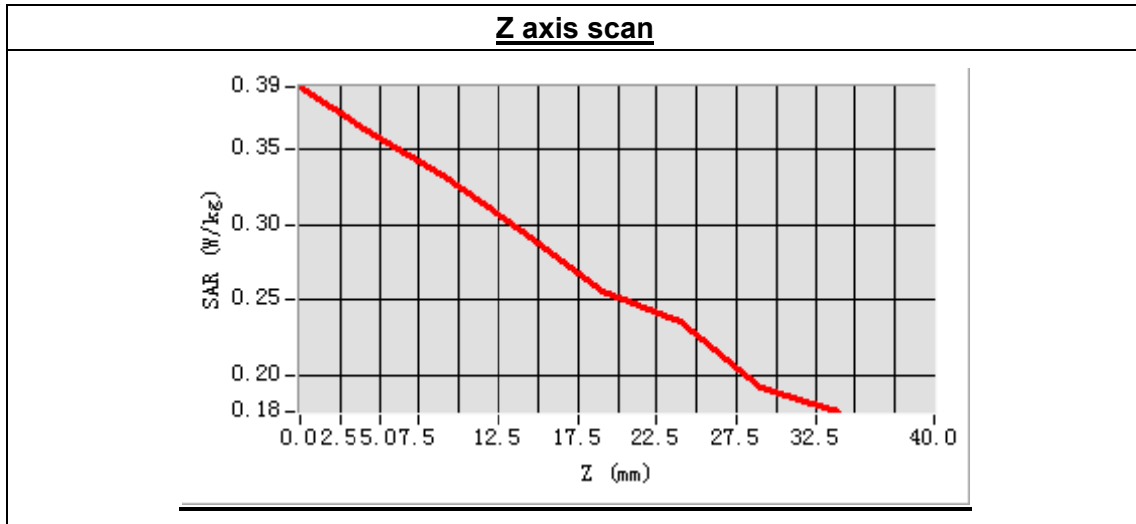
Middle Band SAR (Channel 21650):

Frequency (MHz)	900.000000
Relative permittivity (real part)	42.024192
Conductivity (S/m)	0.913467
Power drift (%)	0.250000
Ambient Temperature:	22.6°C
Liquid Temperature:	22.7°C
ConvF:	28.479,25.214,27.19
Crest factor:	1:1



Maximum location: X=-55.00, Y=-39.00

SAR 10g (W/Kg)	0.293395
SAR 1g (W/Kg)	0.362626



MEASUREMENT 12

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 5 seconds

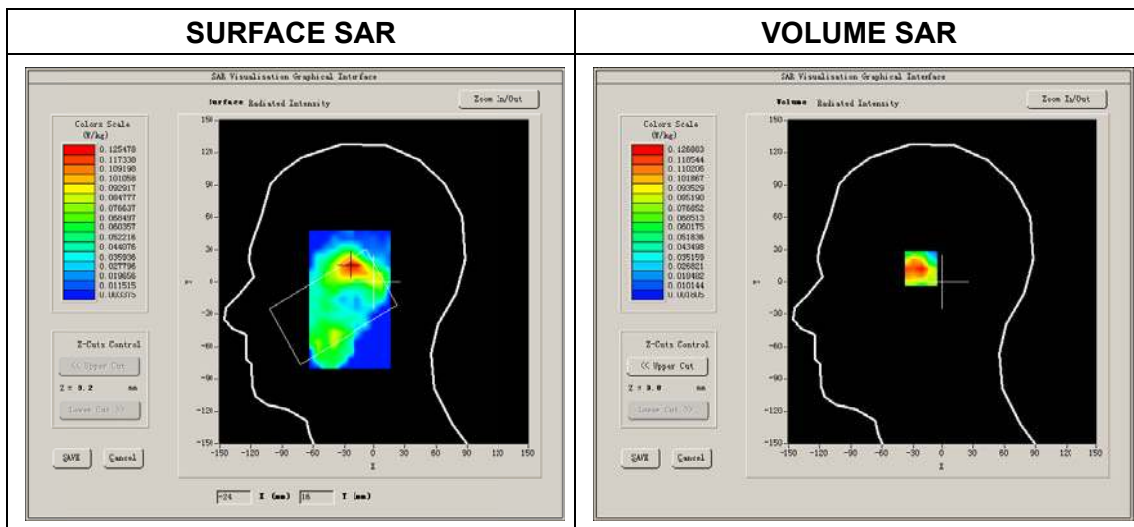
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	LTE Band8
Channels	Middle
Signal	QPSK

B. SAR Measurement Results

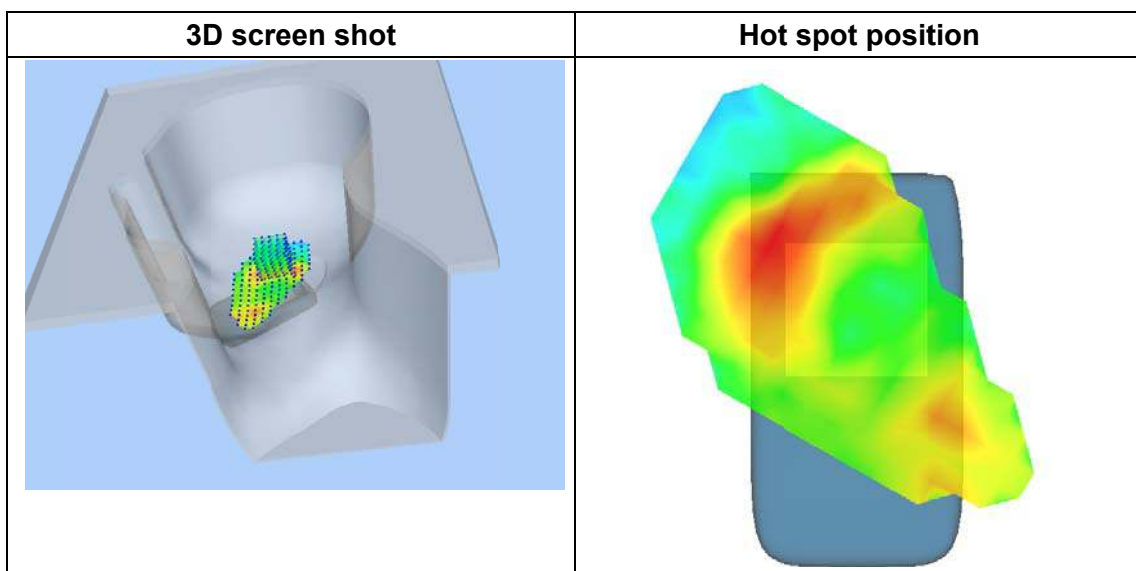
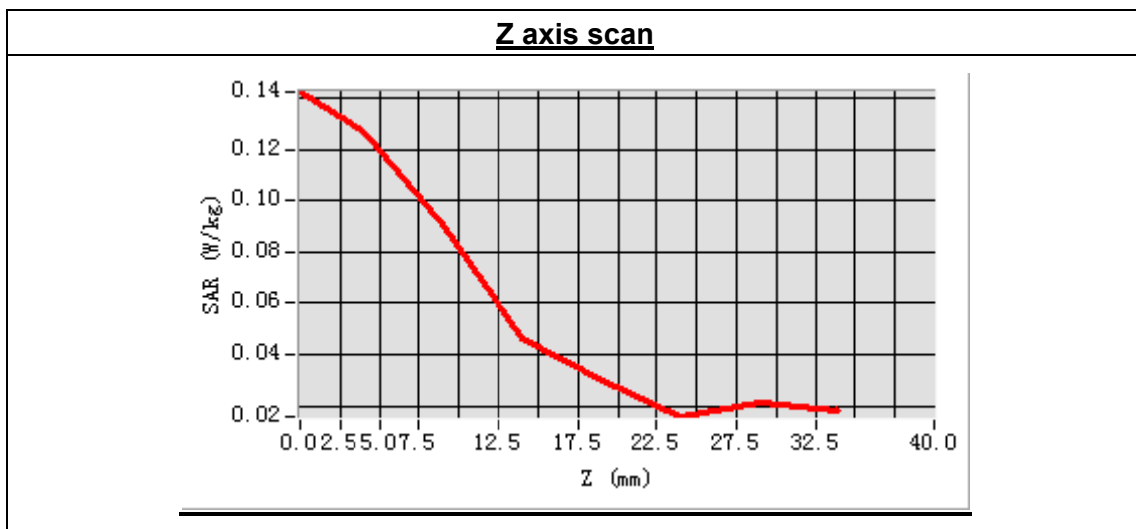
Middle Band SAR (Channel 21650):

Frequency (MHz)	900.000000
Relative permittivity (real part)	42.024192
Conductivity (S/m)	0.913467
Power drift (%)	-0.420000
Ambient Temperature:	22.6°C
Liquid Temperature:	22.7°C
ConvF:	28.479,25.214,27.19
Crest factor:	1:1



Maximum location: X=-19.00, Y=15.00

SAR 10g (W/Kg)	0.045365
SAR 1g (W/Kg)	0.087339



MEASUREMENT 13

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 10 seconds

A. Experimental conditions.

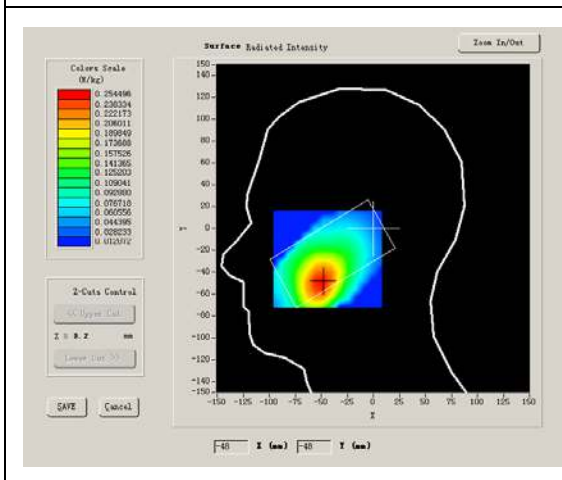
Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	WCDMA Band1
Channels	Middle
Signal	CDMA

B. SAR Measurement Results

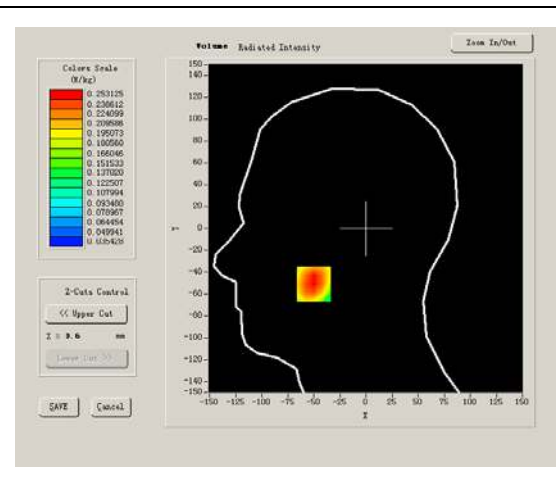
Middle Band SAR (Channel 9750)

Frequency (MHz)	1950.000000
Relative permittivity (real part)	41.868901
Conductivity (S/m)	1.437192
Power drift (%)	-1.150000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	39.772,33.946,37.835
Crest factor:	1:1

SURFACE SAR



VOLUME SAR



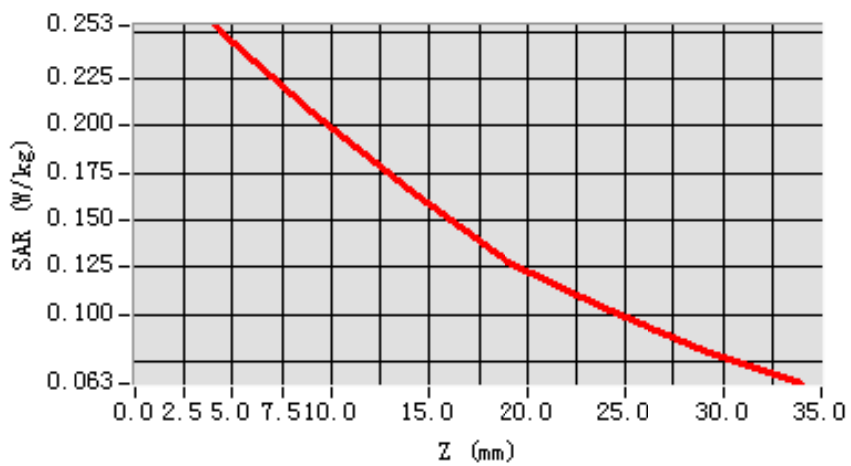
Maximum location: X=-50.00, Y=-51.00

SAR 10g (W/Kg)	0.157964
SAR 1g (W/Kg)	0.214251

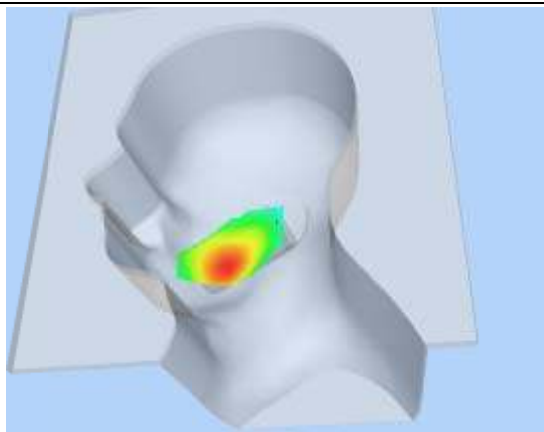
Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.2531	0.2071	0.1661	0.1281	0.1027	0.0805

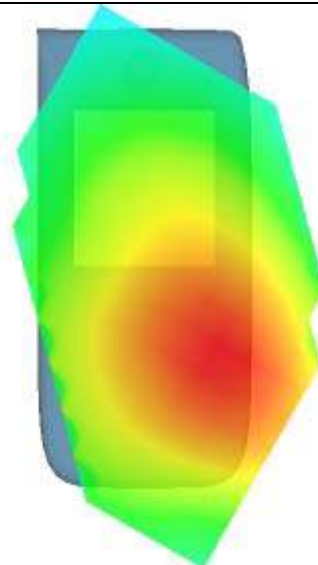
SAR, Z Axis Scan (X = -50, Y = -51)



3D scene shot



Hot spot position



MEASUREMENT 14

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 10 seconds

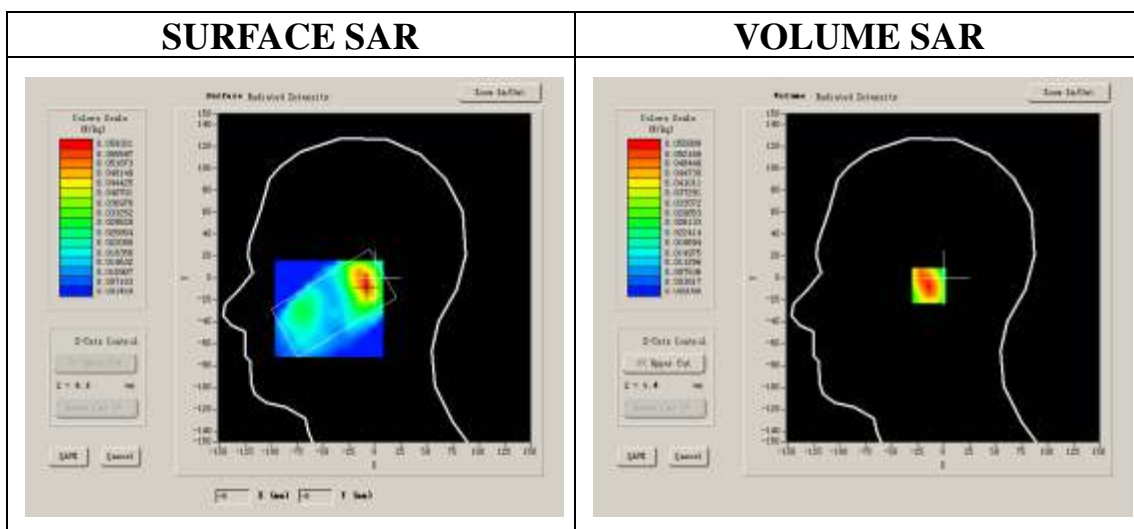
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	WCDMA Band1
Channels	Middle
Signal	CDMA

B. SAR Measurement Results

Middle Band SAR (Channel 9750)

Frequency (MHz)	1950.000000
Relative permittivity (real part)	41.868901
Conductivity (S/m)	1.437192
Power drift (%)	-1.210000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	39.772,33.946,37.835
Crest factor:	1:1

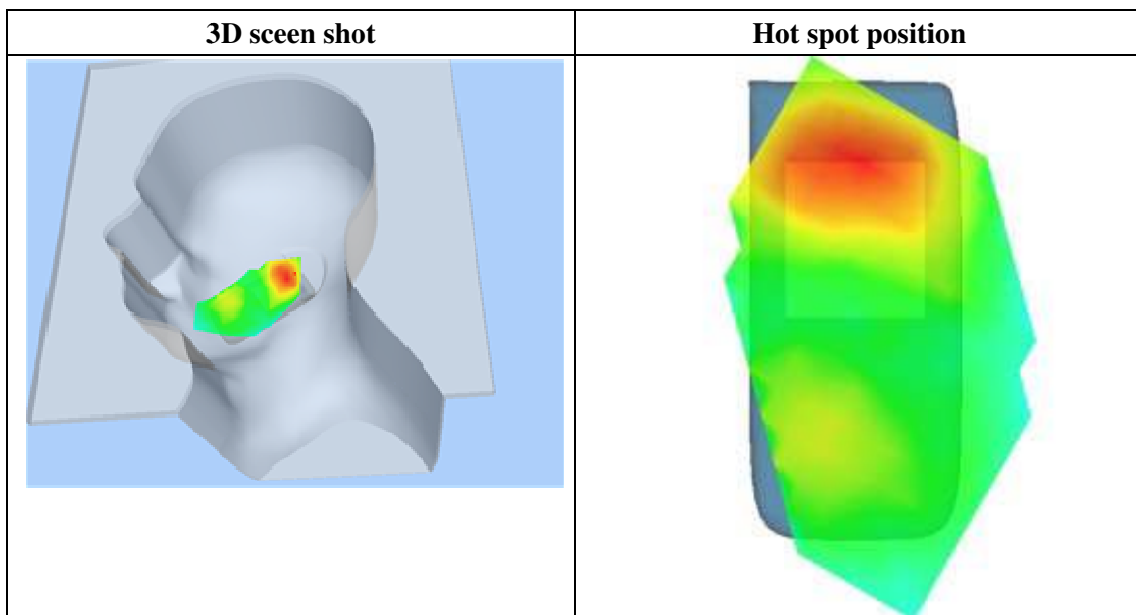
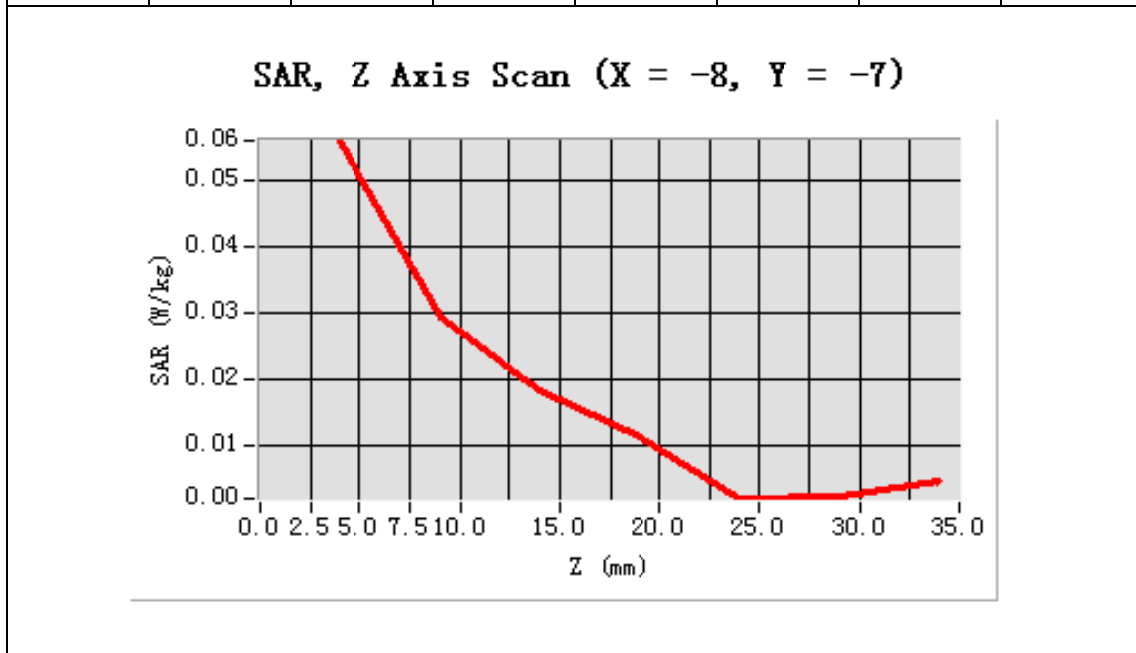


Maximum location: X=-8.00, Y=-7.00

SAR 10g (W/Kg)	0.028394
SAR 1g (W/Kg)	0.053644

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.0559	0.0294	0.0184	0.0114	0.0021	0.0025



MEASUREMENT 15

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 7 seconds

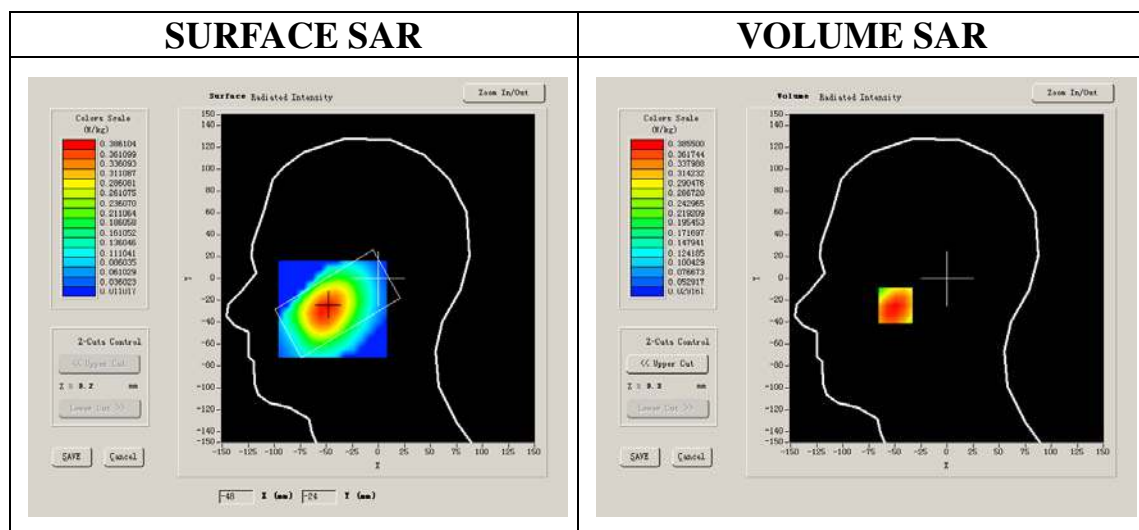
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Right head
Band	Cheek
Channels	WCDMA Band8
Signal	Middle

B. SAR Measurement Results

Middle Band SAR (Channel 2787):

Frequency (MHz)	880.000000
Relative permittivity (real part)	42.024192
Conductivity (S/m)	0.913467
Power drift (%)	-1.600000
Ambient Temperature:	22.6°C
Liquid Temperature:	22.7°C
ConvF:	40.136,34.843,38.721
Crest factor:	1:1



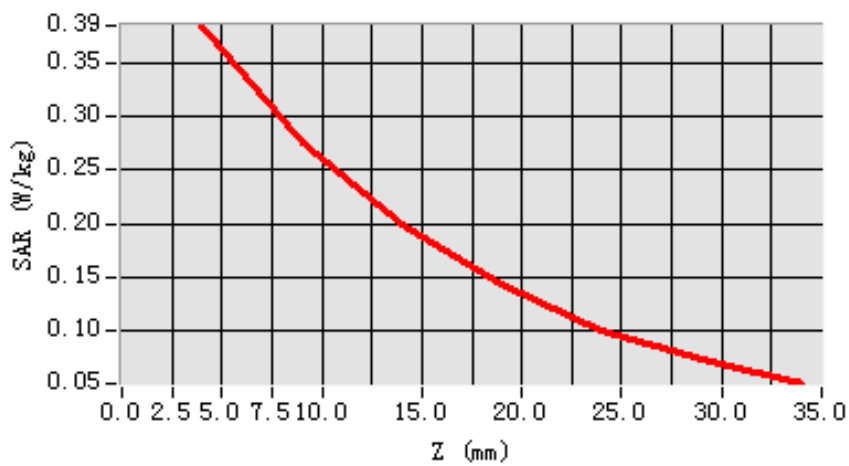
Maximum location: X=-49.00, Y=-25.00

SAR 10g (W/Kg)	0.292564
SAR 1g (W/Kg)	0.372219

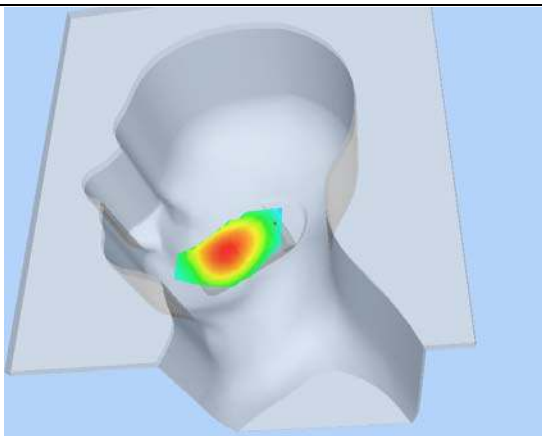
Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.3855	0.2763	0.2001	0.1426	0.0991	0.0722

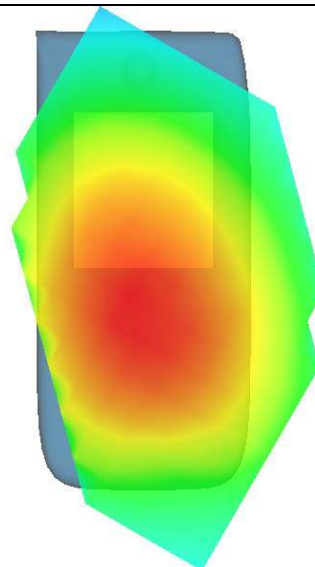
SAR, Z Axis Scan (X = -49, Y = -25)



3D scen shot



Hot spot position



MEASUREMENT 16

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 9 minutes 8 seconds

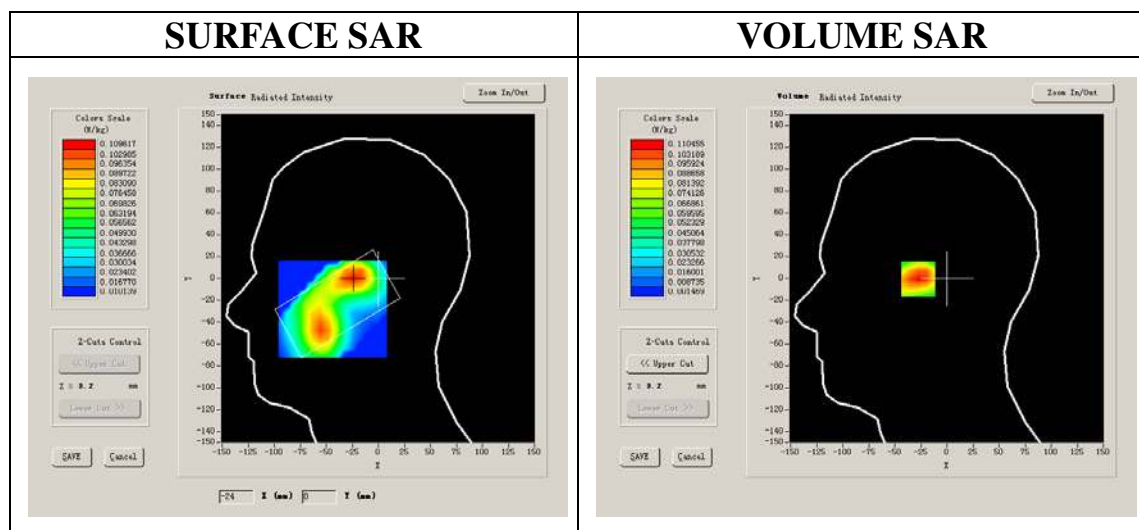
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Right head
Device Position	Cheek
Band	WCDMA Band8
Channels	Middle
Signal	Right head

B. SAR Measurement Results

Middle Band SAR (Channel 2787):

Frequency (MHz)	880.000000
Relative permittivity (real part)	42.024192
Conductivity (S/m)	0.913467
Power drift (%)	1.280000
Ambient Temperature:	22.6°C
Liquid Temperature:	22.7°C
ConvF:	40.136,34.843,38.721
Crest factor:	1:1

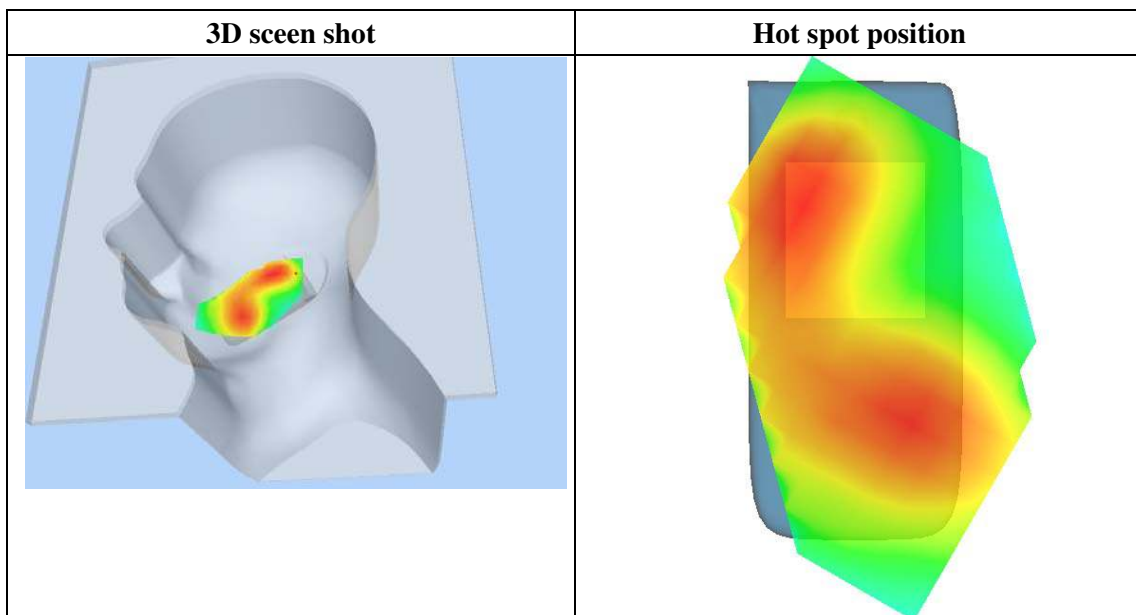
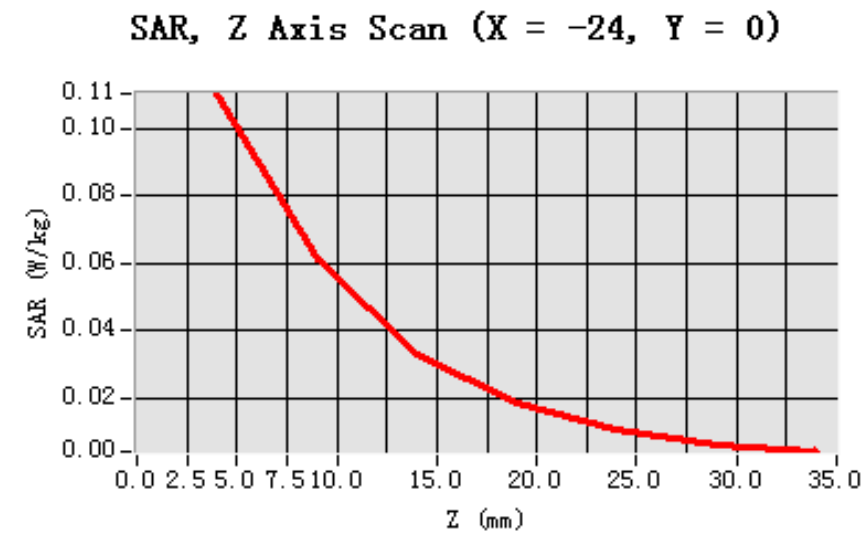


Maximum location: X=-24.00, Y=0.00

SAR 10g (W/Kg)	0.034008
SAR 1g (W/Kg)	0.085579

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	0.1105	0.0612	0.0329	0.0186	0.0108	0.0061



System Performance Check Data(1800MHz)

Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 13 minutes 27 seconds

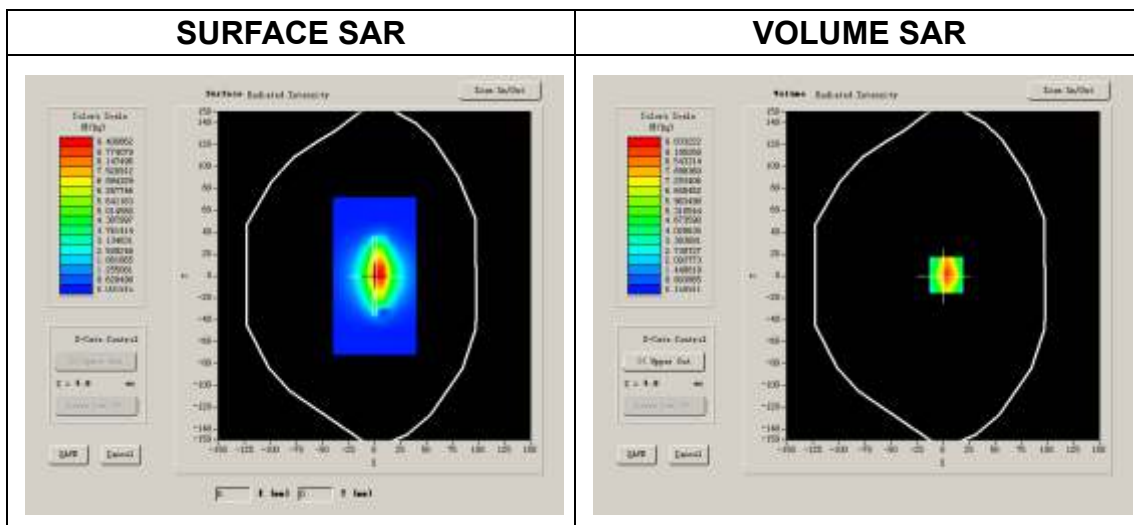
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Flat
Device Position	
Band	1800MHz
Channels	
Signal	CW

B. SAR Measurement Results

Band SAR

Frequency (MHz)	1800.000000
Relative permittivity (real part)	38.930000
Relative permittivity	15.070000
Conductivity (S/m)	1.436111
Power drift (%)	-0.140000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	42.533, 36.791, 41.019
Crest factor:	1:1

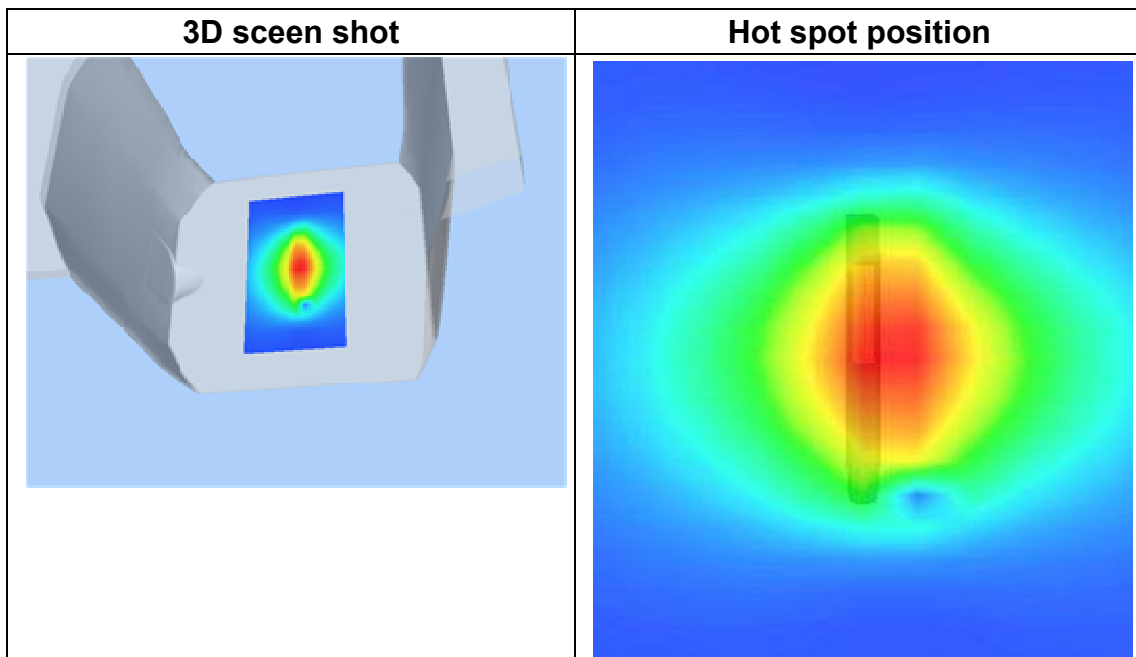
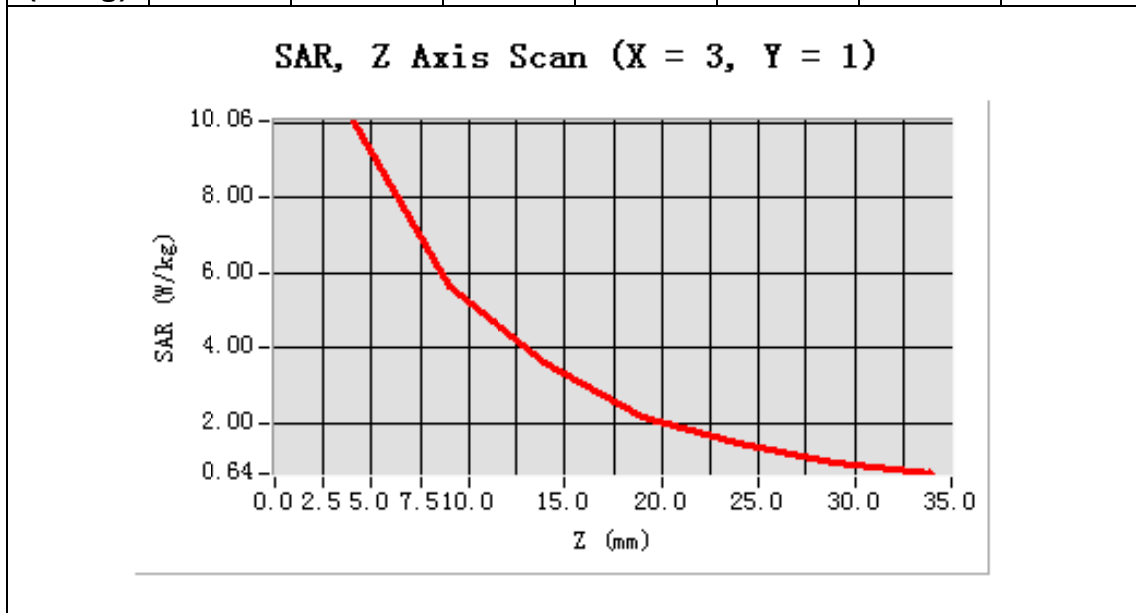


Maximum location: X=3.00, Y=1.00

SAR 10g (W/Kg)	4.982021
SAR 1g (W/Kg)	9.530270

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	10.0584	5.6351	3.6143	2.1598	1.4418	0.9132



System Performance Check Data(Head)

Type: Phone measurement (Complete)

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

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

Date of measurement: 2015.8.11

Measurement duration: 13 minutes 27 seconds

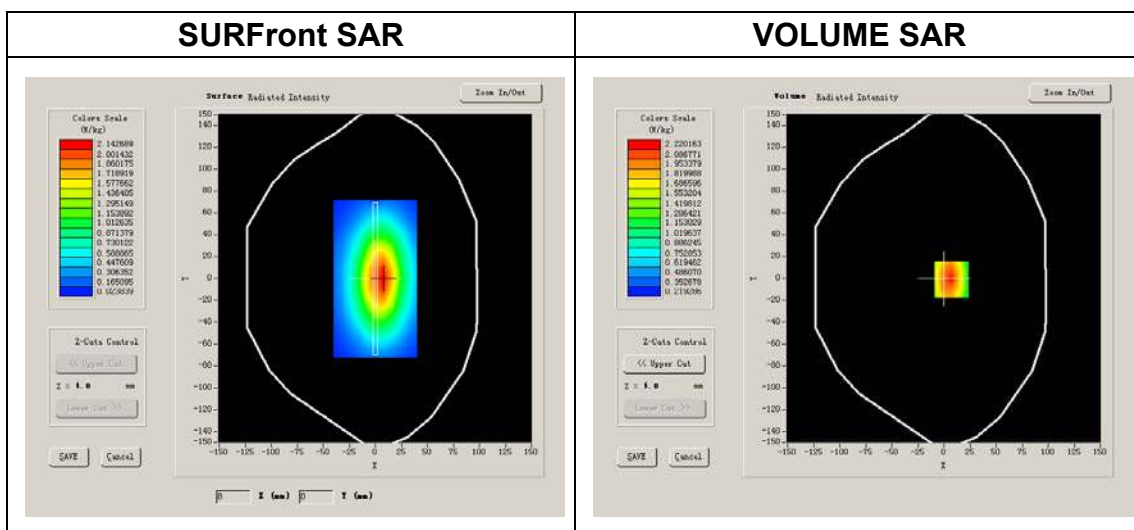
A. Experimental conditions.

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

B. SAR Measurement Results

Band SAR

Frequency (MHz)	835.000000
Relative permittivity (real part)	42.024192
Conductivity (S/m)	0.913467
Power drift (%)	-0.310000
Ambient Temperature:	22.4°C
Liquid Temperature:	21.5°C
ConvF:	28.479,25.214,27.196
Crest factor:	1:1

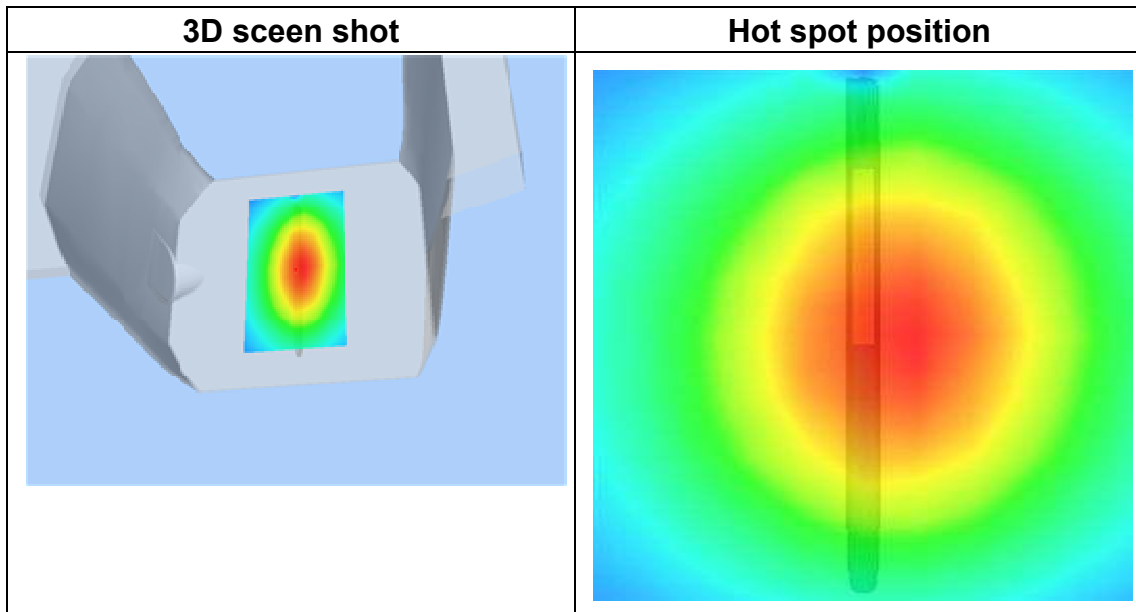
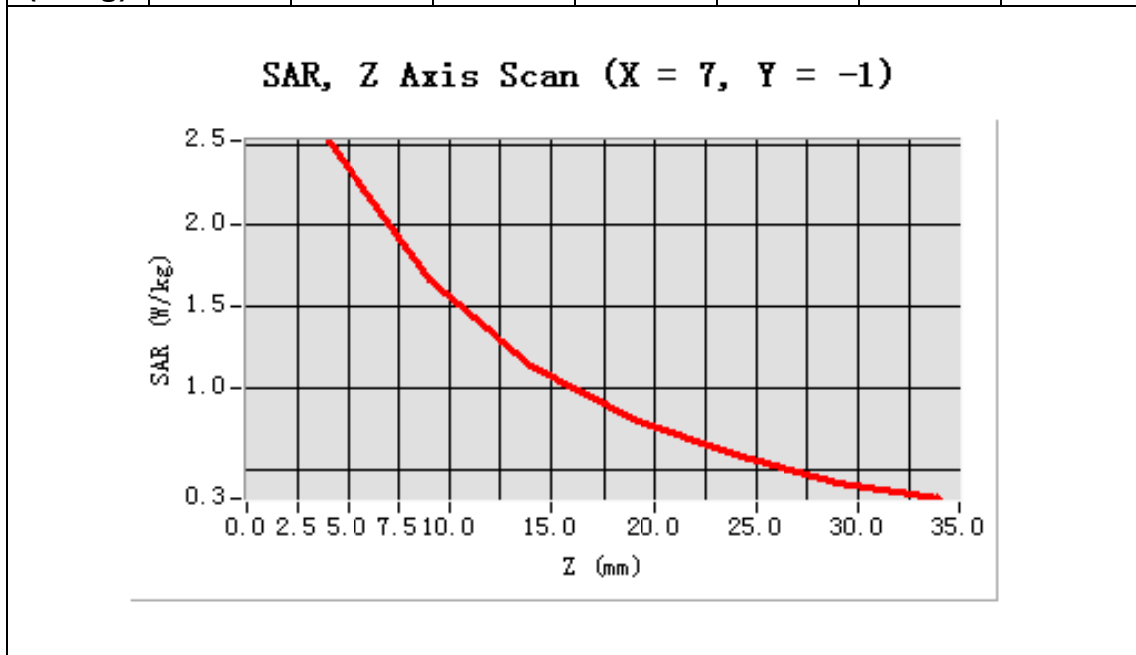


Maximum location: X=7.00, Y=-1.00

SAR 10g (W/Kg)	1.539476
SAR 1g (W/Kg)	2.385979

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



System Performance Check Data(Head)

Type: Phone measurement (Complete)
 Area scan resolution: dx=8mm,dy=8mm
 Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
 Date of measurement: 2015.8.11
 Measurement duration: 13 minutes 27 seconds

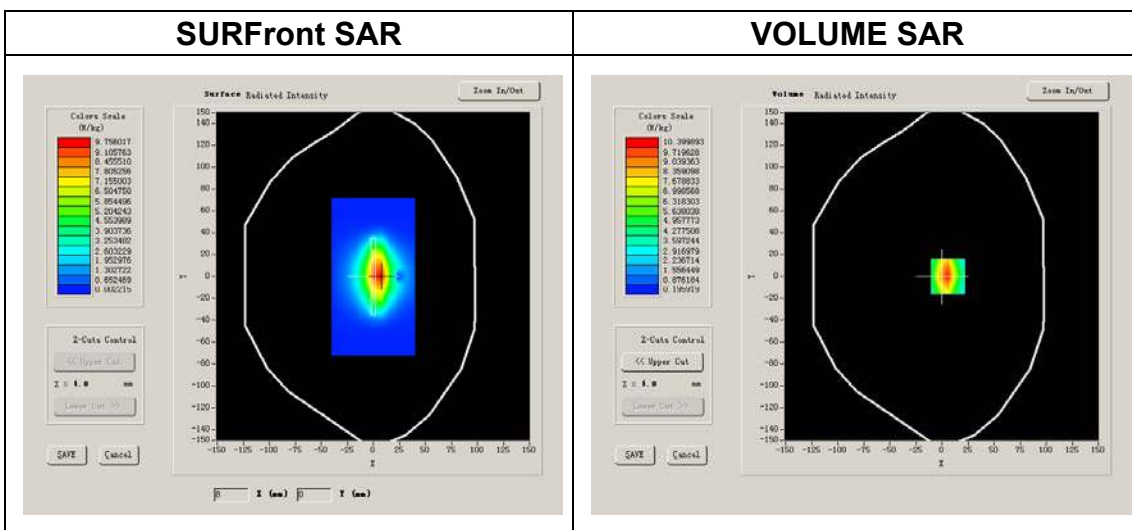
A. Experimental conditions.

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

B. SAR Measurement Results

Band SAR

Frequency (MHz)	1900.000000
Relative permittivity (real part)	41.868901
Conductivity (S/m)	1.437192
Power drift (%)	-0.140000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.7°C
ConvF:	40.136,34.843,38.721
Crest factor:	1:1



Maximum location: X=6.00, Y=0.00

SAR 10g (W/Kg)	4.845210
SAR 1g (W/Kg)	9.790543

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

