



REPORT No. : SZ16050106S01A

SAR TEST REPORT

APPLICANT : HARXON CORPORATION

PRODUCT NAME : Wireless Data Transceiver

MODEL NAME : HX-DU1603D
HX-DU16XXD series: From HX-DU1690D to HX-DU1698D
HX-DU16XXR series: From HX-DU1690R to HX-DU1698R

TRADE NAME : HARXON

BRAND NAME : HARXON

FCC ID : 2ACRAHX-DU1603D

STANDARD(S) : 47CFR 2.1093
IEEE 1528-2013

ISSUE DATE : 2016-10-28



SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

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Change History		
Issue	Date	Reason for change
1.0	2016-10-28	First edition



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TEST REPORT DECLARATION

Applicant	HARXON CORPORATION		
Applicant Address	6/F, Block B, D3 Building, TCL International E City, No. 1001 Zhongshanyuan Road, Nanshan District, Shenzhen, 518055, PRC		
Manufacturer	HARXON CORPORATION		
Manufacturer Address	6/F, Block B, D3 Building, TCL International E City, No. 1001 Zhongshanyuan Road, Nanshan District, Shenzhen, 518055, PRC		
Product Name	Wireless Data Transceiver		
Model Name	HX-DU1603D HX-DU16XXD series: From HX-DU1690D to HX-DU1698D HX-DU16XXR series: From HX-DU1690R to HX-DU1698R		
Brand Name	HARXON		
HW Version	V1R0		
SW Version	A015.01.00		
Test Standards	47CFR 2.1093; IEEE 1528-2013		
Test Date	2016-10-25		
The Highest Reported 1g-SAR(W/kg)	Body	5.380W/kg	Limit(W/kg): 8.0W/kg
	Simultaneous	5.496W/kg	

Tested by : Chen Shengkui
Chen Shengkui

Reviewed by : Liu Jun
Liu Jun

Approved by : Peng Huarui
Peng Huarui



1. TECHNICAL INFORMATION

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

1.1 Identification of Applicant

Company Name:	HARXON CORPORATION
Address:	6/F, Block B, D3 Building, TCL International E City, No. 1001 Zhongshanyuan Road, Nanshan District, Shenzhen, 518055, PRC

1.2 Identification of Manufacturer

Company Name:	HARXON CORPORATION
Address:	6/F, Block B, D3 Building, TCL International E City, No. 1001 Zhongshanyuan Road, Nanshan District, Shenzhen, 518055, PRC

1.3 Equipment Under Test (EUT)

Model Name:	HX-DU1603D HX-DU16XXD series: From HX-DU1690D to HX-DU1698D HX-DU16XXR series: From HX-DU1690R to HX-DU1698R
Trade Name:	HARXON
Brand Name:	HARXON
Hardware Version:	V1R0
Software Version:	A015.01.00
Frequency Bands:	410MHz - 470MHz.; Bluetooth 2.1+EDR;
Modulation Mode:	GMSK/4FSK;Bluetooth:2.1+EDR;GFSK/ π /4-DQPSK/8-DPSK;
Antenna type:	Detachable Antenna
Antenna Gain:	4.0dBi



1.3.1 Photographs of the EUT

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

1.3.2 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#	V1R0	A015.01.00

1.4 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 D01v06	General RF Exposure Guidance
4	KDB 865664 D01v01r04	SAR Measurement 100 MHz to 6 GHz
5	KDB 865664 D02v01r02	SAR Reporting



1.5 Device Category and SAR Limits

Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

Note: 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 Occupational/Controlled Exposure should be applied for this device, it is 8.0 W/kg as averaged over any 1 gram of tissue.



2. SPECIFIC ABSORPTION RATE (SAR)

2.1 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.

2.2 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. (p). The equation description is as below:

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

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

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

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

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

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

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.

3. SAR MEASUREMENT SETUP

3.1 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.

3.2 Probe

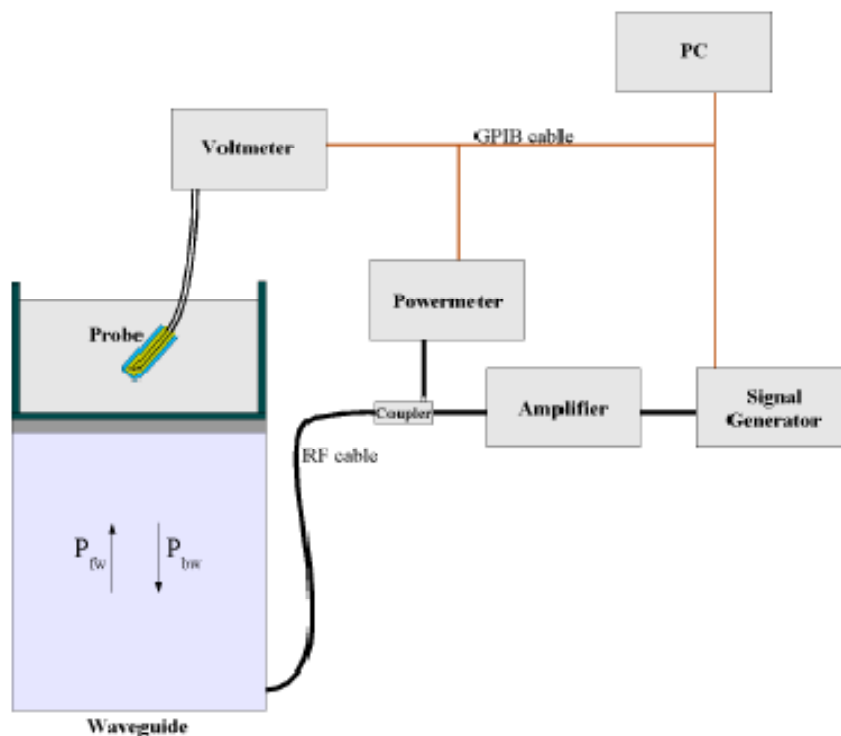
For the measurements the Specific Dosimetric E-Field Probe SN 37/08 EP80 with Following specifications is used

- 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.



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

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:

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

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

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

Where DCP is the diode compression point in mV.

3.3 Probe Calibration Process

3.3.1 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.

3.3.2 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 .

3.3.3 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,

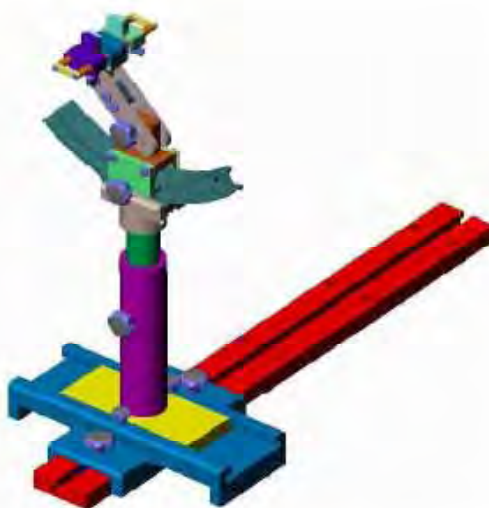
ρ = Tissue density (1.25 g/cm³ for brain tissue)

3.4 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.

3.5 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



4. 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)	450.00	
Tissue Type	Head	Body
Ingredients (% by weight)		
Deionised Water	38.56	51.16
Salt(NaCl)	3.95	1.49
Sugar	56.32	46.78
Tween 20	0.0	0.0
HEC	0.98	0.52
Bactericide	0.19	0.05
Triton X-100	0.0	0.0
DGBE	0.0	0.0
Diethylenglycol monohexylether	0.0	0.0
Measured dielectric parameters		
Dielectric Constant	43.42	58.0
Conductivity (S/m)	0.85	0.83

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.



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Table 1: Dielectric Performance of Tissue Simulating Liquid

Temperature: 22.0~23.8°C, humidity: 54~60%.						
Date	Freq.(MHz)	Liquid Parameters	Meas.	Target	Delta(%)	Limit±(%)
2016/10/25	Body 450	Relative Permittivity(er):	55.10	56.7	2.82	5
		Conductivity(σ):	0.93	0.94	-1.06	5



5. UNCERTAINTY ASSESSMENT

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

5.1 UNCERTAINTY EVALUATION FOR EUT SAR TEST

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/ e	k
Uncertainty Component	Sec.	Tol (+-%)	Prob . Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	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 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.	5.00	N	1	1	1	5.00	5.0	N-



	1							0	1
Output power Power drift - SAR drift measurement	6.6.2	4.04	R	$\sqrt{3}$	1	1	2.33	2.3 3	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	$\sqrt{3}$	1	1	0.03	0.0 3	∞
Liquid conductivity - deviation from target value	E.3.2	4.57	R	$\sqrt{3}$	0.64	0.43	1.69	1.1 3	∞
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	1	0.64	0.43	3.20	2.1 5	M
Liquid permittivity - deviation from target value	E.3.2	3.69	R	$\sqrt{3}$	0.6	0.49	1.28	1.0 4	∞
Liquid permittivity - measurement uncertainty	E.3.3	10.0 0	N	1	0.6	0.49	6.00	4.9 0	M
Combined Standard Uncertainty			RSS				11.55	10. 67	
Expanded Uncertainty (95% Confidence interval)			K=2				23.11	21. 33	

5.2 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	∞

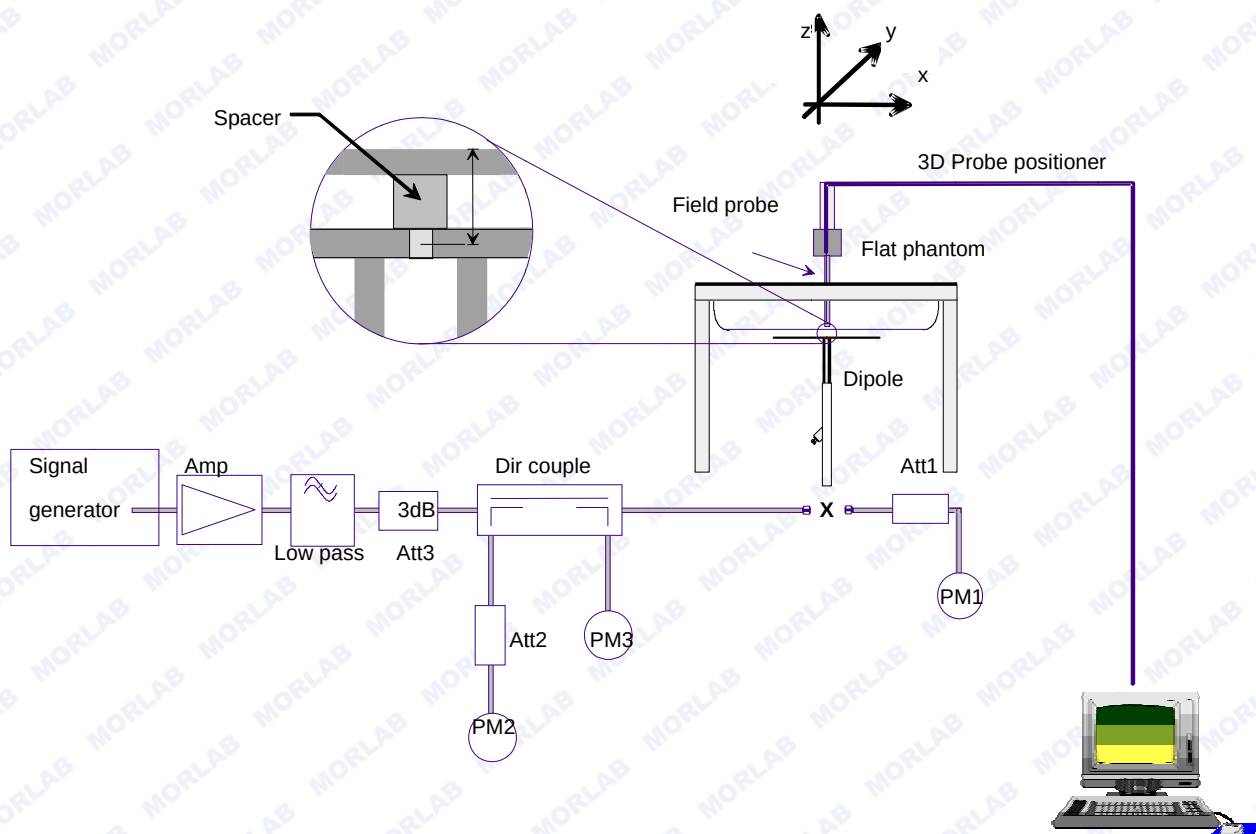


Reponse Time	E.2.7	3.0	R	$\sqrt{3}$	1	1	1.73	1.7	∞
Integration Time	E.2.8	2.0	R	$\sqrt{3}$	1	1	1.15	1.1	∞
RF ambient Conditions	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.7	∞
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	$\sqrt{3}$	1	1	1.15	1.1 5	∞
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	$\sqrt{3}$	1	1	0.03	0.0 3	∞
Extrapolation, interpolation and integration Algorithms for Max. SAR Evaluation	E.5.2	5.0	R	$\sqrt{3}$	1	1	2.89	2.8 9	∞
Dipole									
Dipole axis to liquid Distance	8,E.4. 2	1.00	N	$\sqrt{3}$	1	1	0.58	0.5 8	∞
Input power and SAR drift measurement	8,6.6. 2	4.04	R	$\sqrt{3}$	1	1	2.33	2.3 3	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	$\sqrt{3}$	1	1	0.03	0.0 3	∞
Liquid conductivity - deviation from target value	E.3.2	4.57	R	$\sqrt{3}$	0.64	0.43	1.69	1.1 3	∞
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	$\sqrt{3}$	0.64	0.43	1.85	1.2 4	M
Liquid permittivity - deviation from target value	E.3.2	3.69	R	$\sqrt{3}$	0.6	0.49	1.28	1.0 4	∞
Liquid permittivity - measurement uncertainty	E.3.3	10.0 0	N	$\sqrt{3}$	0.6	0.49	3.46	2.8 3	M
Combined Standard Uncertainty			RSS				8.83	8.3 7	
Expanded Uncertainty (95% Confidence interval)			K=2				17.66	16. 73	

6. SAR MEASUREMENT EVALUATION

6.1 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.

6.2 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	450MHz(B)
Target value (1g)	4.80 W/kg
Test value (1g 250 mW input)	1.156 W/kg
Normalized value (1g)	4.624 W/kg

Note: System checks the specific test data please see Annex D

7. OPERATIONAL CONDITIONS DURING TEST

7.1 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.

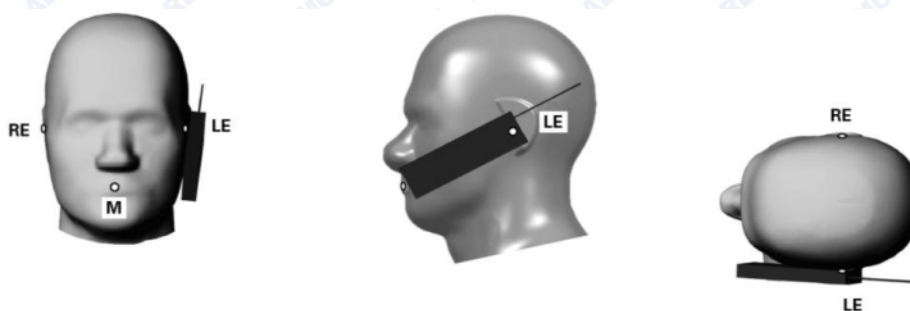


Illustration for Cheek Position

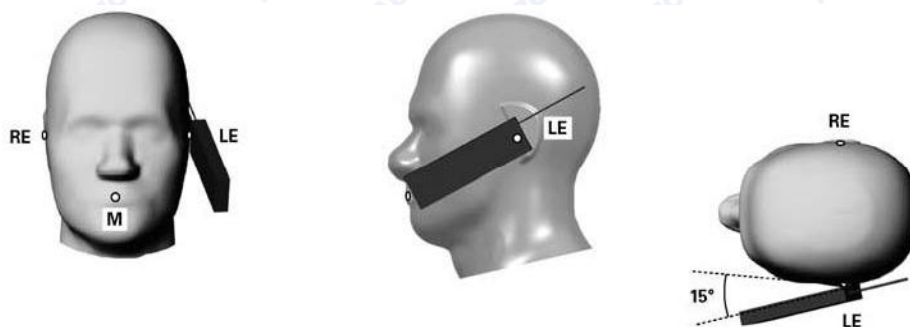


Illustration for Tilted Position

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.

Description of the “tilted” position:



The mobile phone is well placed in the “cheek” position as described above. Then the mobile phone is moved outward away from the mouth by an angle of 15 degrees or until contact with the ear lost.

Remark: Please refer to Appendix B for the test setup photos.

7.2 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.

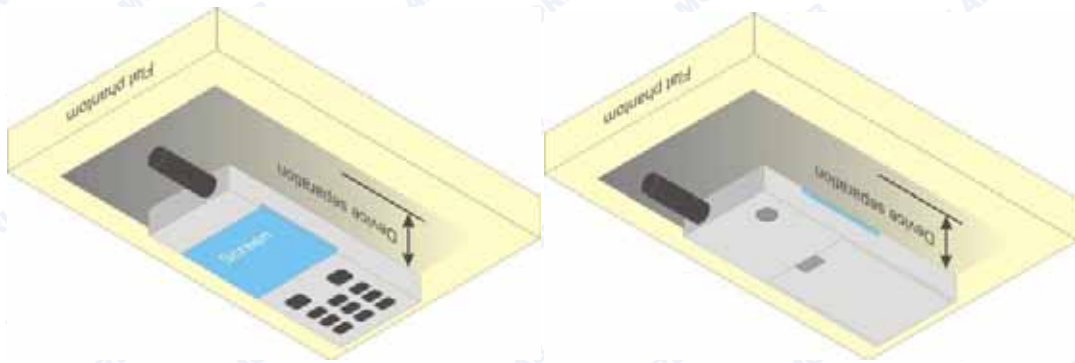


Illustration for Body Worn Position

7.3 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 to 16 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.

7.4 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.



8. MEASUREMENT OF CONDUCTED PEAK OUTPUT POWER

1. Average output power

Band	Channel	Frequency (MHz)	Output Power(dBm)		
			GFSK	$\pi/4$ -DQPSK	8-DPSK
BT2.1+EDR	0	2402	0.31	-1.66	-1.39
	39	2441	3.92	2.72	2.89
	78	2480	4.19	2.75	2.92

High Power Mode :

Band	Channel	Frequency (MHz)	Output Power(dBm)
GMSK	1	410.125	33.14
	39	440.125	32.55
	36	469.125	33.30
4FSK	1	410.125	33.31
	39	440.125	32.92
	36	469.125	33.61

Low Power Mode :

Band	Channel	Frequency (MHz)	Output Power(dBm)
GMSK	1	410.125	27.91
	39	440.125	28.29
	36	469.125	28.04
4FSK	1	410.125	27.52
	39	440.125	28.07
	36	469.125	28.14



9. TEST RESULTS LIST

Summary of Measurement Results for High Power Mode

Temperature: 21.0~23.8°C, humidity: 54~60%.					
Phantom Configurations	Frequency (MHz)	Antenna Positions	1g SAR Value(W/Kg), Limit: 8.0W/Kg		
			Measured SAR(W/Kg)	Scaling Factor	Scaled SAR(W/Kg)
GMSK					
Body (direct)	410.125	External	3.058	1.219	3.728
	440.125	External	2.644	1.396	3.691
	469.125	External	3.223	1.175	3.787
4FSK					
Body (direct)	410.125	External	3.884	1.172	4.552
	440.125	External	2.566	1.282	3.290
	469.125	External	3.317	1.094	3.629

Summary of Measurement Results for High Power Mode

Temperature: 21.0~23.8°C, humidity: 54~60%.					
Phantom Configurations	Frequency (MHz)	Antenna Positions	1g SAR Value(W/Kg), Limit: 8.0W/Kg		
			Measured SAR(W/Kg)	Scaling Factor	Scaled SAR(W/Kg)
GMSK					
Body (Face upward)	410.125	External	4.212	1.219	5.134
	440.125	External	3.854	1.396	5.380
	469.125	External	4.335	1.175	5.094
4FSK					
Body (Face upward)	410.125	External	4.258	1.172	4.990
	440.125	External	4.021	1.282	5.155
	469.125	External	4.425	1.094	4.841



Summary of Measurement Results for High Power Mode

Temperature: 21.0~23.8°C, humidity: 54~60%.					
Phantom Configurations	Frequency (MHz)	Antenna Positions	1g SAR Value(W/Kg), Limit: 8.0W/Kg		
			Measured SAR(W/Kg)	Scaling Factor	Scaled SAR(W/Kg)
GMSK					
Body (edge A)	410.125	External	3.562	1.219	4.342
	440.125	External	3.221	1.396	4.497
	469.125	External	3.601	1.175	4.231
4FSK					
Body (edge A)	410.125	External	3.621	1.172	4.244
	440.125	External	3.125	1.282	4.006
	469.125	External	3.786	1.094	4.142

Summary of Measurement Results for High Power Mode

Temperature: 21.0~23.8°C, humidity: 54~60%.					
Phantom Configurations	Frequency (MHz)	Antenna Positions	1g SAR Value(W/Kg), Limit: 8.0W/Kg		
			Measured SAR(W/Kg)	Scaling Factor	Scaled SAR(W/Kg)
GMSK					
Body (edge B)	410.125	External	0.754	1.219	0.919
	440.125	External	0.561	1.396	0.783
	469.125	External	0.836	1.175	0.982
4FSK					
Body (edge B)	410.125	External	0.778	1.172	0.912
	440.125	External	0.605	1.282	0.776
	469.125	External	0.901	1.094	0.986

**Note :**

1. Scaling Factor calculation

	Tune-up power tolerance (dBm)	SAR test channel Power (dBm)	Scaling Factor
GMSK	Max output power =33±1	33.14	1.219
		32.55	1.396
		33.30	1.175
4FSK	Max output power =33±1	33.31	1.172
		32.92	1.282
		33.61	1.094



10. MULTIPLE TRANSMITTERS EVALUATION

Stand-alone SAR

Test distance: 5mm			
Band	Highest power(mW) per tune up	1-g SAR test threshold	Test required?
BT	2.82	$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f}(\text{GHz})] \leq 3.0$ for 1-g SAR	No

Note :

1. The SAR test for BT is not required.
2. The BT stand-alone SAR is not required, the standalone SAR must be estimated according to followingto determine simultaneous transmission SAR test exclusion:

$(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm}) \cdot [\sqrt{f}(\text{GHz})/x]$ W/kg for test separation distances ≤ 50 mm;

where $x = 7.5$ for 1-g SAR, and $x = 18.75$ for 10-g SAR.

(Max power=2.82 mW; min. test separation distance= 5mm for Head; $f=2.4\text{GHz}$)

BT estimated Body SAR =0.116 W/Kg (1g)

3. Applicable Multiple Scenario Evaluation

Test Position	Main Ant. SARMax (W/Kg)	Bluetooth SAR(W/Kg)	Σ 1-g SARMax(W/Kg)
			BT&Main Ant
Body SAR	5.380	0.116	5.496



11. ANNEX A PLOTS OF HIGH SAR TEST RESULTS

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: 2016.10.25

Measurement duration: 13 minutes 29 seconds

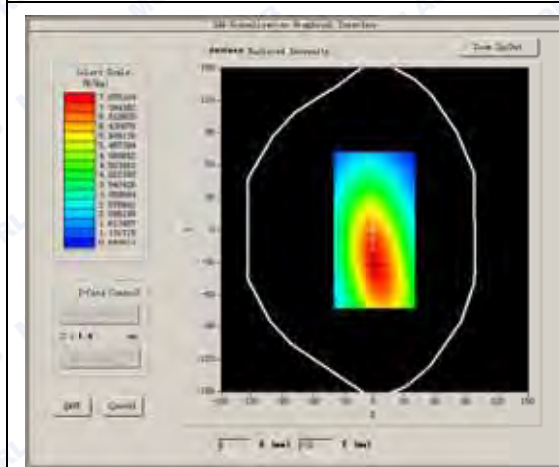
A. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	410.125MHz
Channels	Ch 1
Signal	GMSK

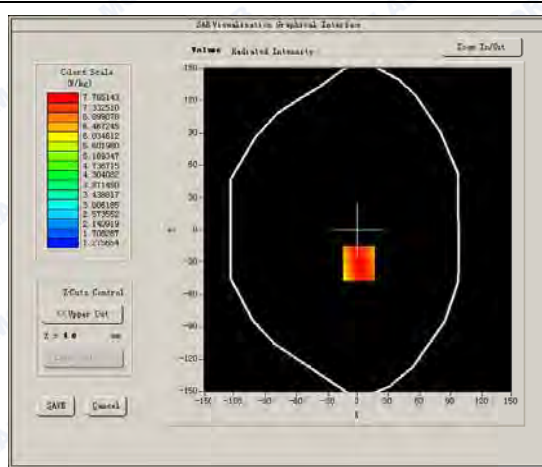
B. SAR Measurement Results

Frequency (MHz)	410.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.800000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR



VOLUME SAR





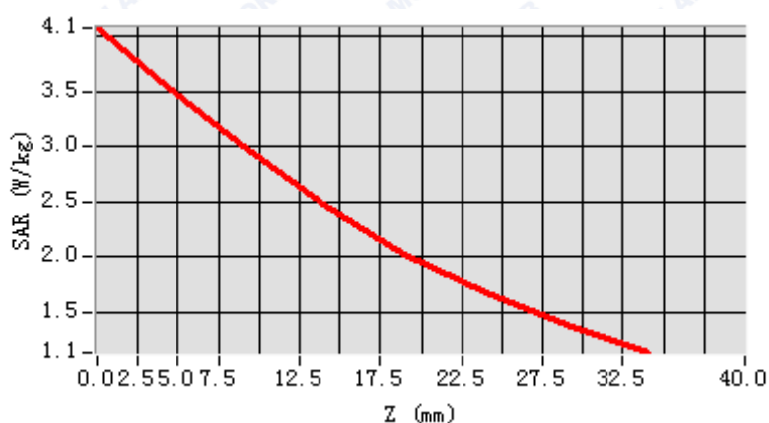
REPORT No. : SZ16050106S01A

Maximum location: X=1.00, Y=-31.00

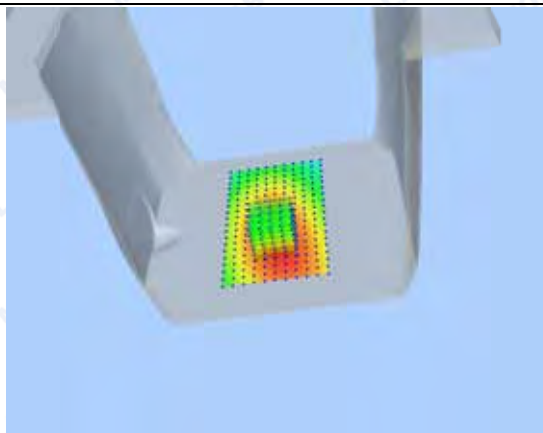
SAR Peak: 4.05 W/kg

SAR 10g (W/Kg)	1.637620
SAR 1g (W/Kg)	3.058237

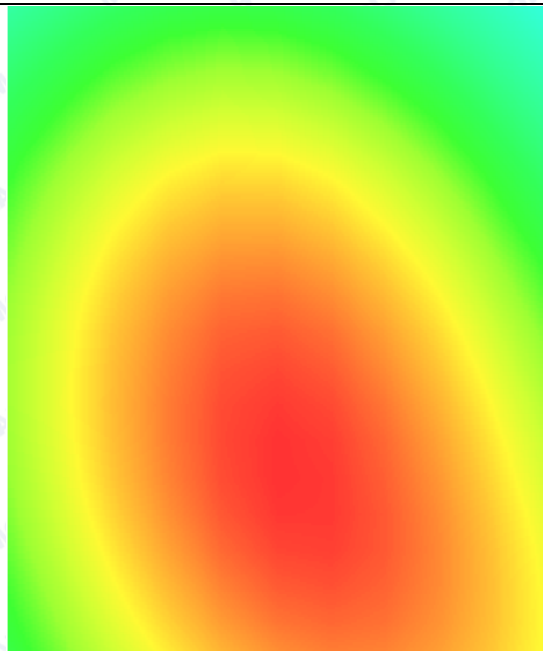
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 2**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

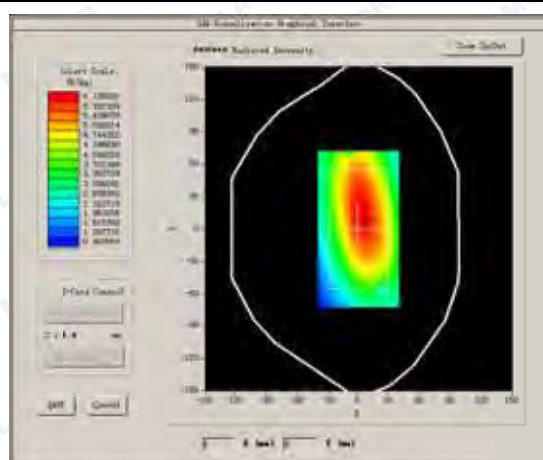
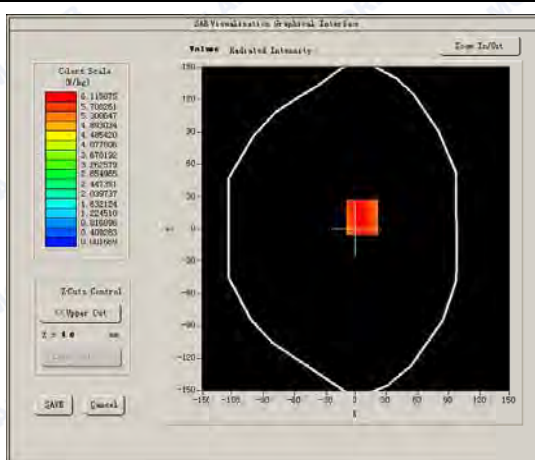
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	440.125MHz
Channels	Ch 39
Signal	GMSK

B. SAR Measurement Results

Frequency (MHz)	440.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-3.310000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



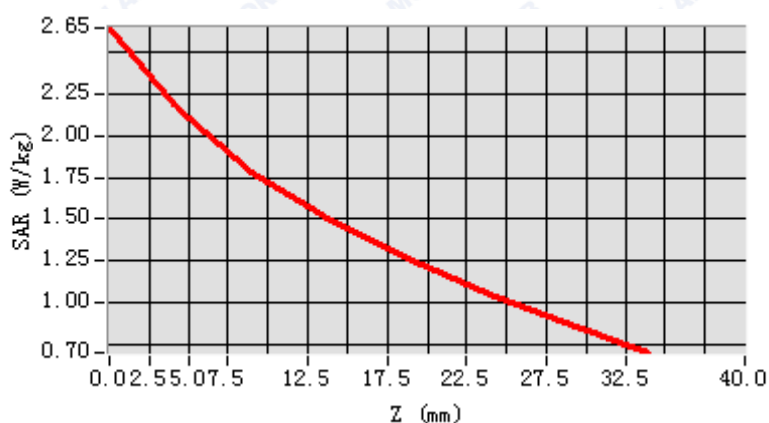
REPORT No. : SZ16050106S01A

Maximum location: X=6.00, Y=11.00

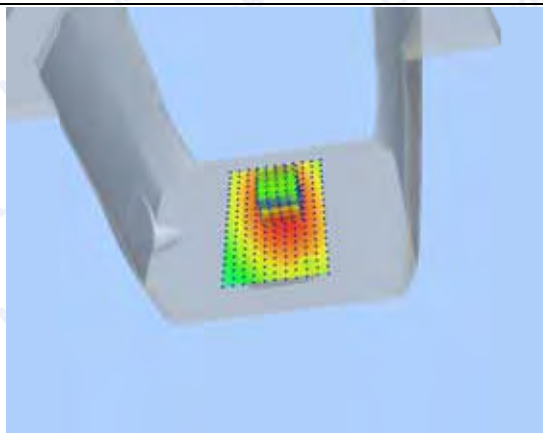
SAR Peak: 2.84 W/kg

SAR 10g (W/Kg)	1.398194
SAR 1g (W/Kg)	2.643897

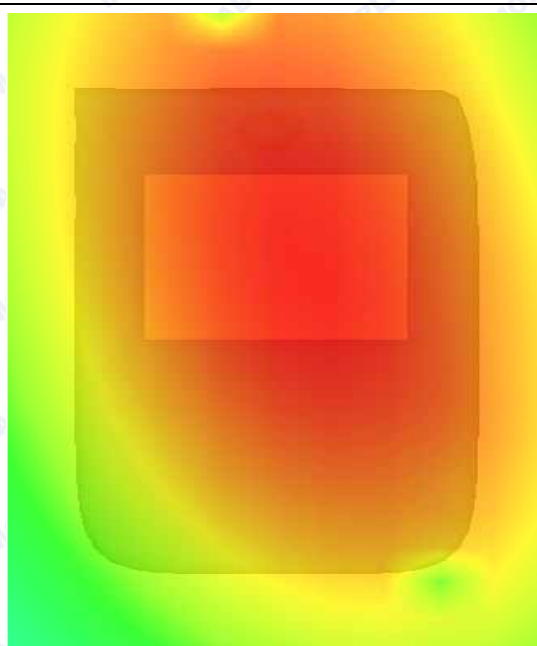
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 3**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

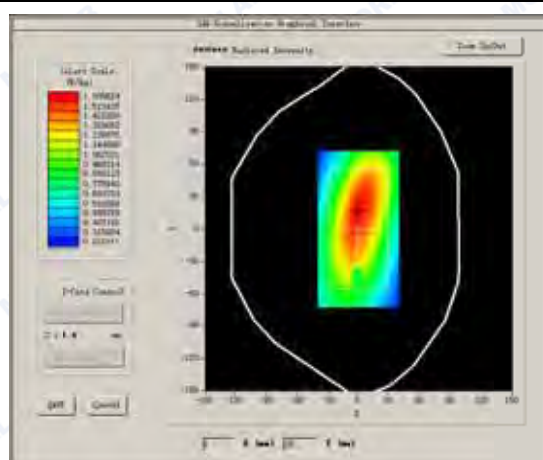
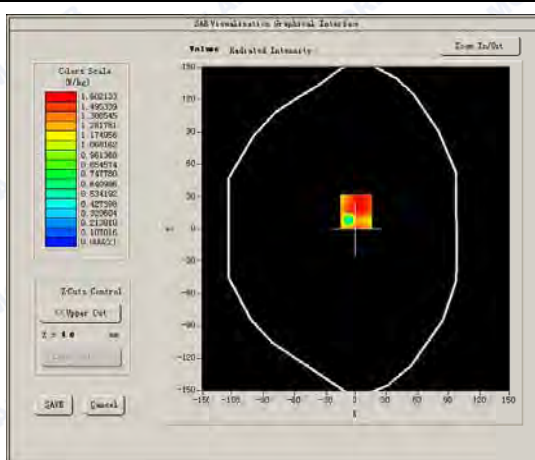
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	469.125MHz
Channels	Ch 36
Signal	GMSK

B. SAR Measurement Results

Frequency (MHz)	469.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.140000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



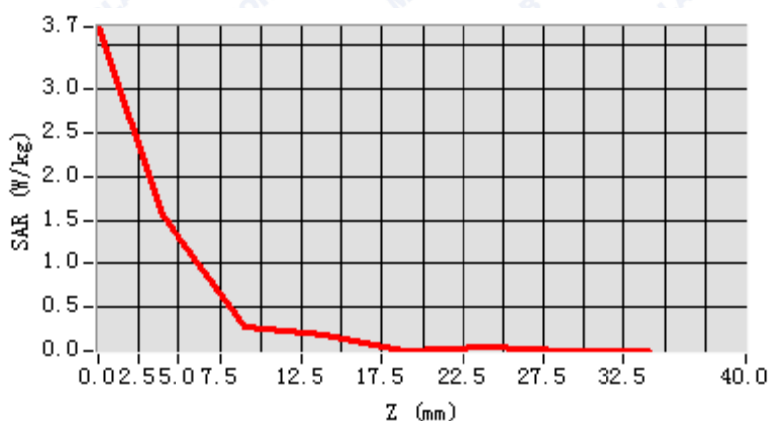
REPORT No. : SZ16050106S01A

Maximum location: X=0.00, Y=16.00

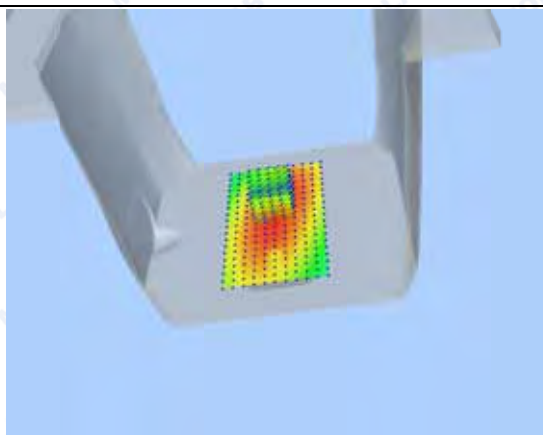
SAR Peak: 4.75 W/kg

SAR 10g (W/Kg)	1.787026
SAR 1g (W/Kg)	3.222687

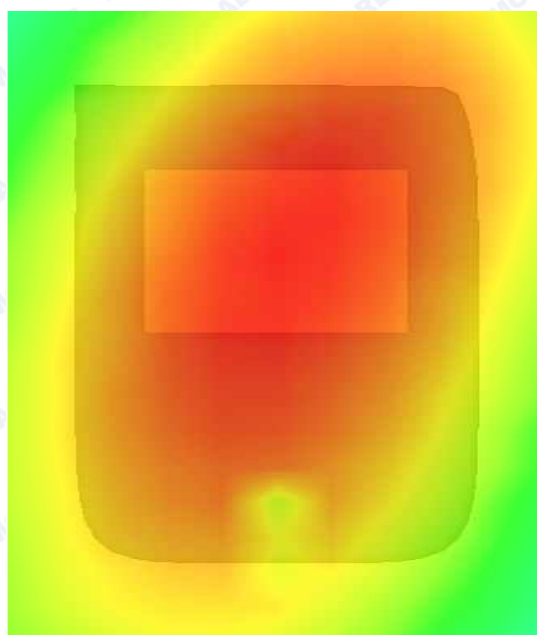
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 4**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

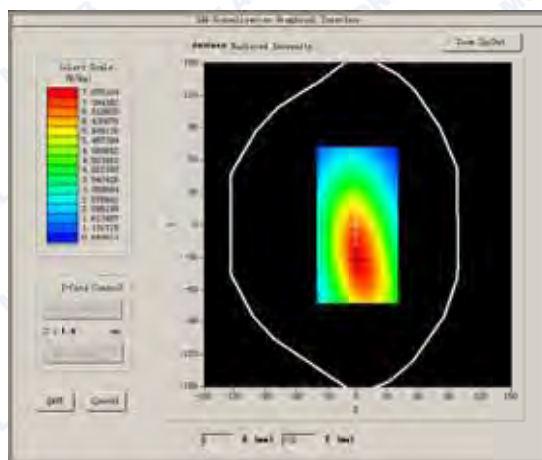
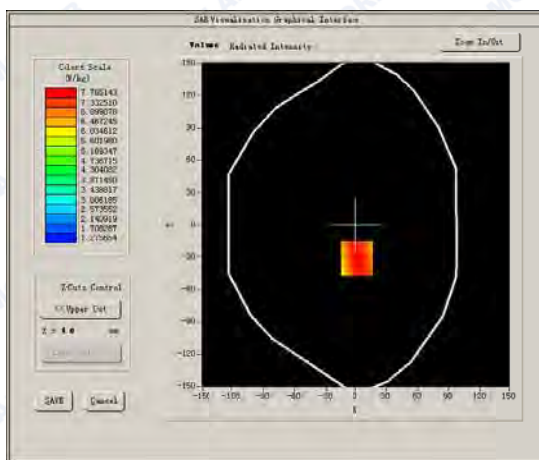
Measurement duration: 13 minutes 29 seconds

A. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	410.125MHz
Channels	Ch 1
Signal	4FSK

B. SAR Measurement Results

Frequency (MHz)	410.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.800000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



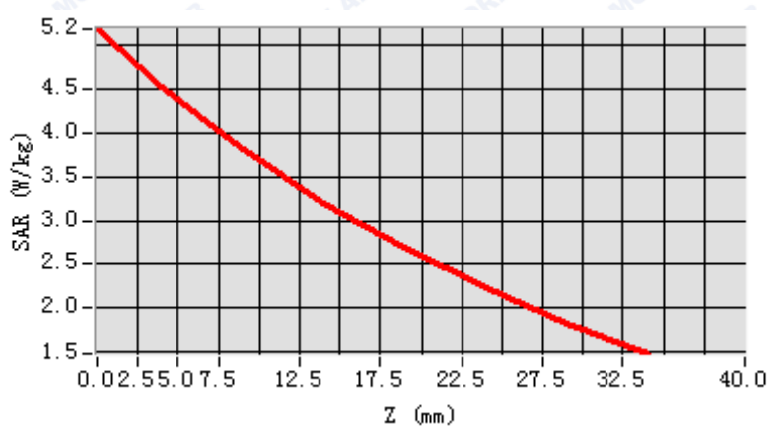
REPORT No. : SZ16050106S01A

Maximum location: X=1.00, Y=-31.00

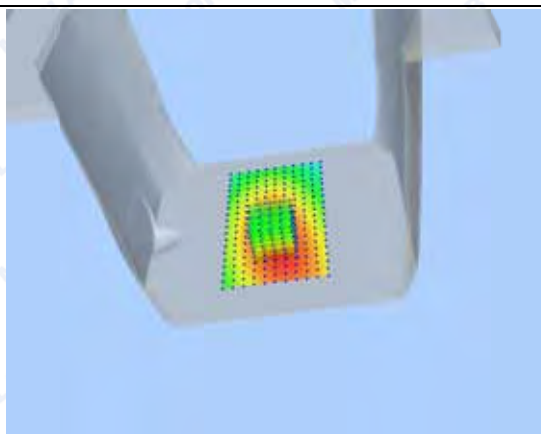
SAR Peak: 4.75 W/kg

SAR 10g (W/Kg)	1.937620
SAR 1g (W/Kg)	3.884237

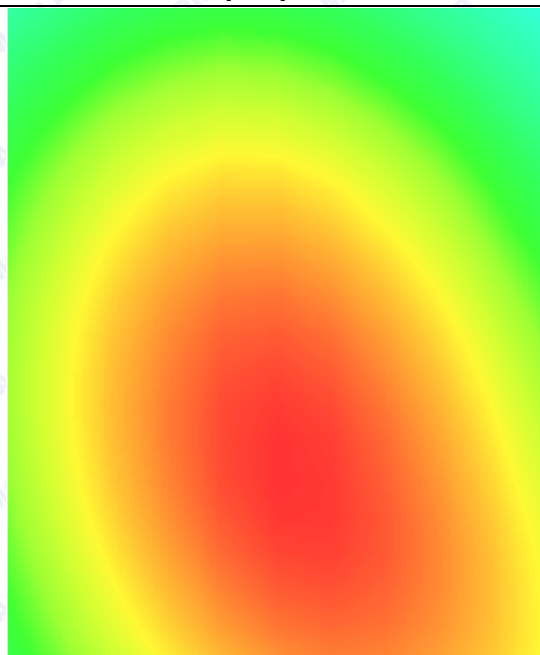
Z axis scan



3D screen shot



Hot spot position





MEASUREMENT 5

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

Measurement duration: 13 minutes 30 seconds

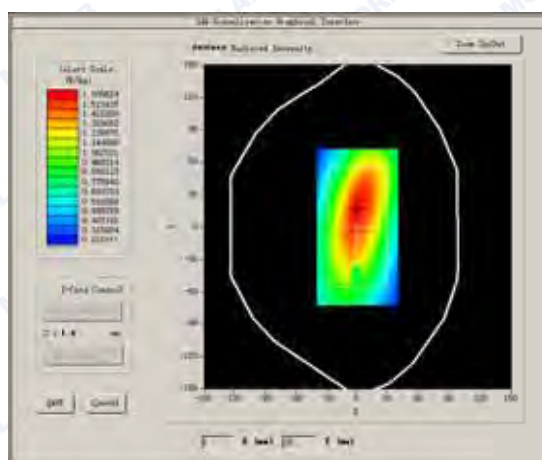
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	440.125MHz
Channels	Ch 39
Signal	4FSK

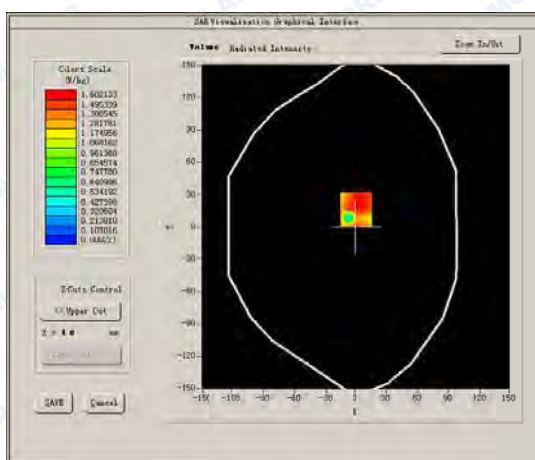
B. SAR Measurement Results

Frequency (MHz)	440.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.140000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR



VOLUME SAR





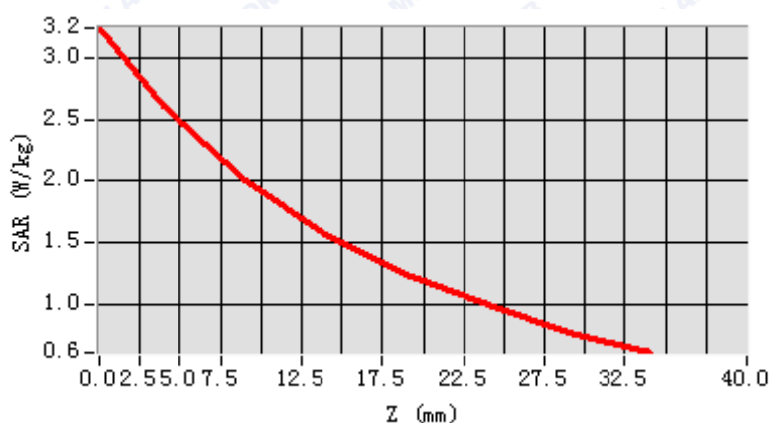
REPORT No. : SZ16050106S01A

Maximum location: X=0.00, Y=16.00

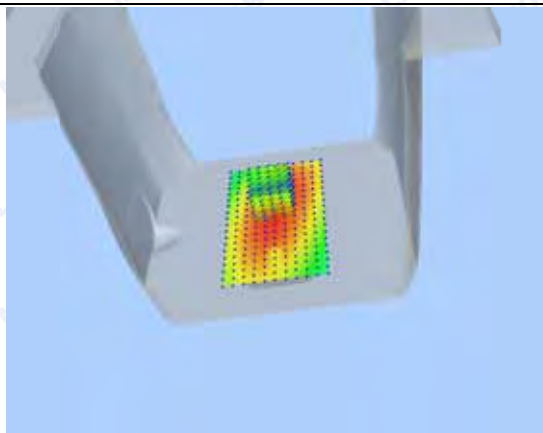
SAR Peak: 3.06 W/kg

SAR 10g (W/Kg)	1.387026
SAR 1g (W/Kg)	2.565873

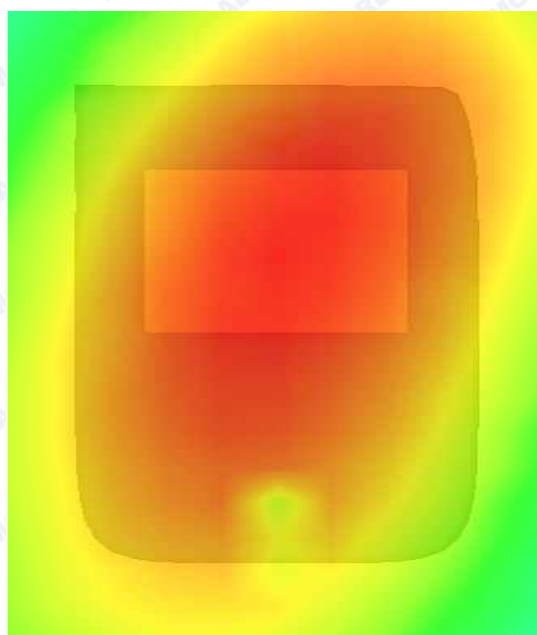
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 6**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

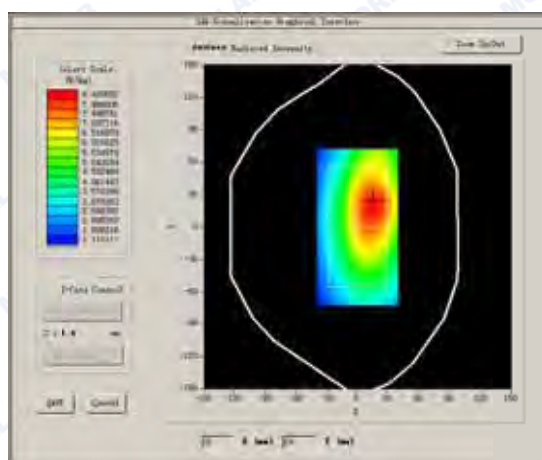
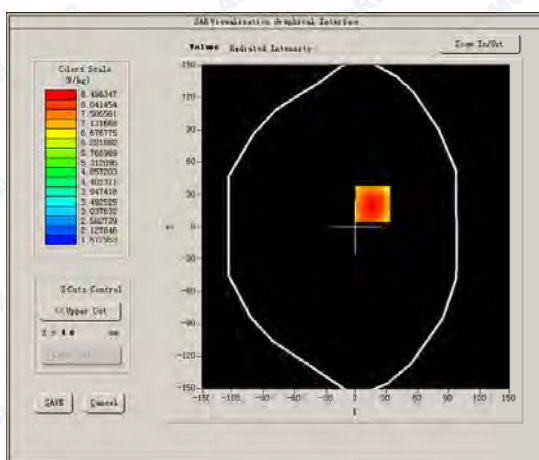
Measurement duration: 13 minutes 31 seconds

A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	469.125MHz
Channels	Ch 36
Signal	4FSK

B. SAR Measurement Results

Frequency (MHz)	469.125000
Relative permittivity (real part)	58.097261
Conductivity (S/m)	0.843652
Power drift (%)	-3.300000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



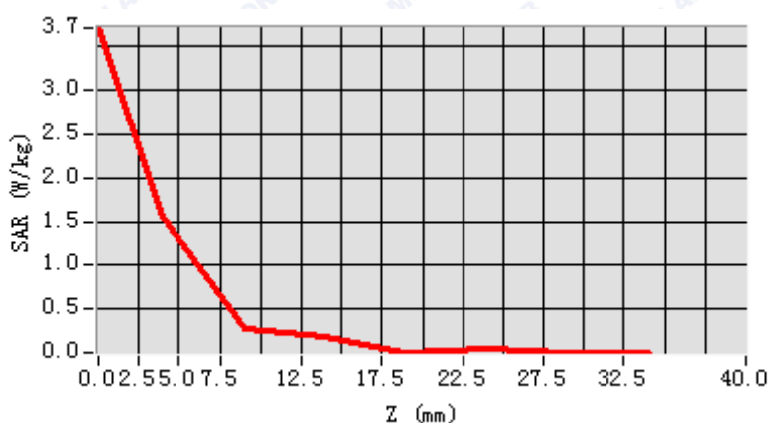
REPORT No. : SZ16050106S01A

Maximum location: X=17.00, Y=21.00

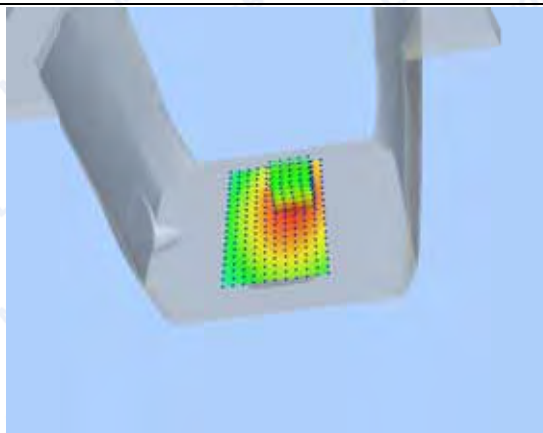
SAR Peak: 3.62 W/kg

SAR 10g (W/Kg)	1.182328
SAR 1g (W/Kg)	3.317070

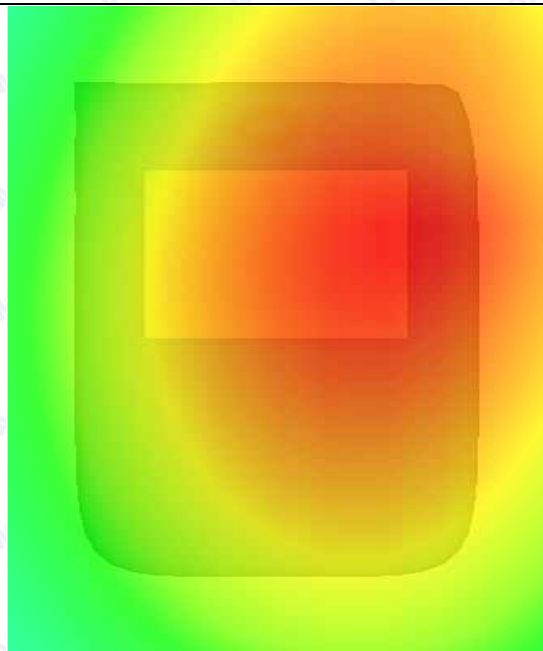
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 7**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

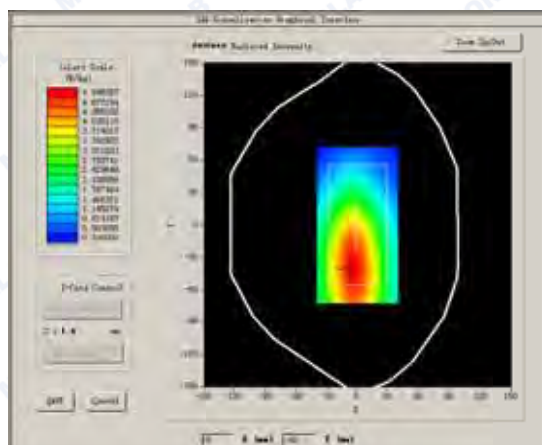
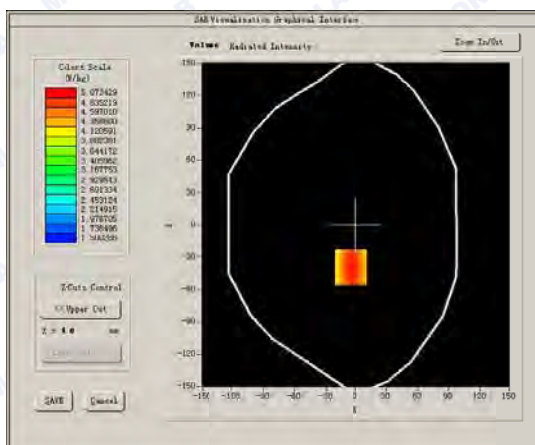
Measurement duration: 13 minutes 29 seconds

A. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	410.125MHz
Channels	Ch 1
Signal	GMSK

B. SAR Measurement Results

Frequency (MHz)	410.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	1.080000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



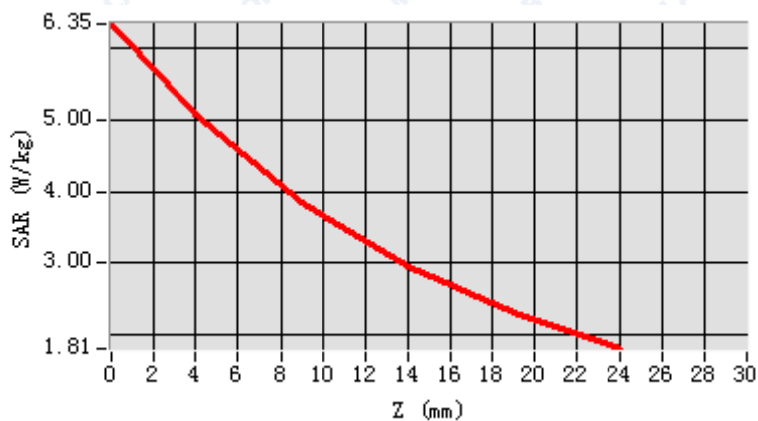
REPORT No. : SZ16050106S01A

Maximum location: X=-5.00, Y=-39.00

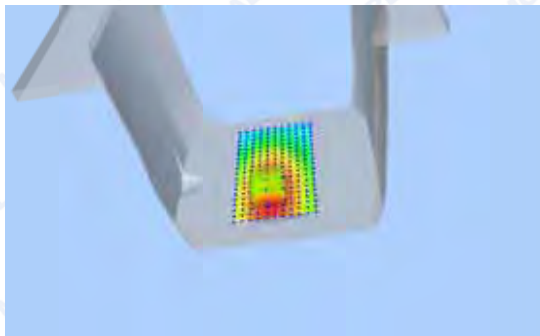
SAR Peak: 6.35 W/kg

SAR 10g (W/Kg)	3.651774
SAR 1g (W/Kg)	4.212303

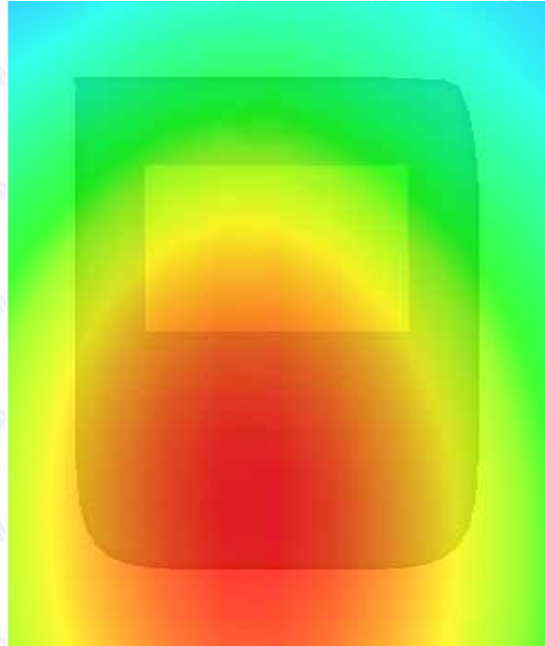
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 8**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

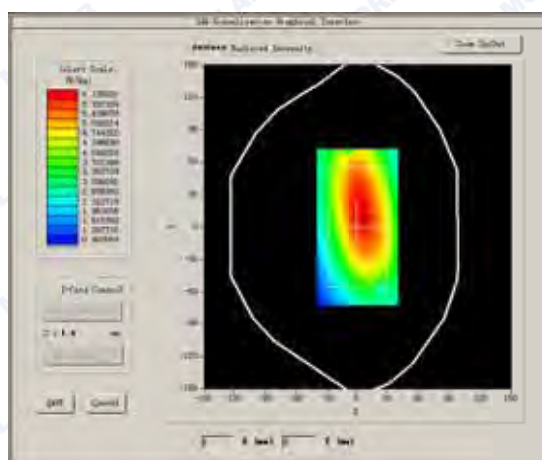
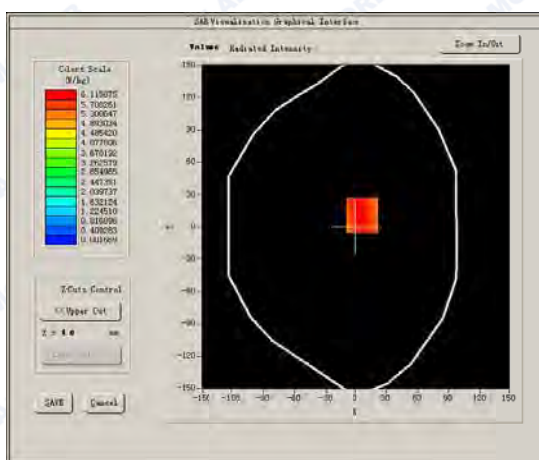
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	440.125MHz
Channels	Ch 39
Signal	GMSK

B. SAR Measurement Results

Frequency (MHz)	440.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	2.010000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



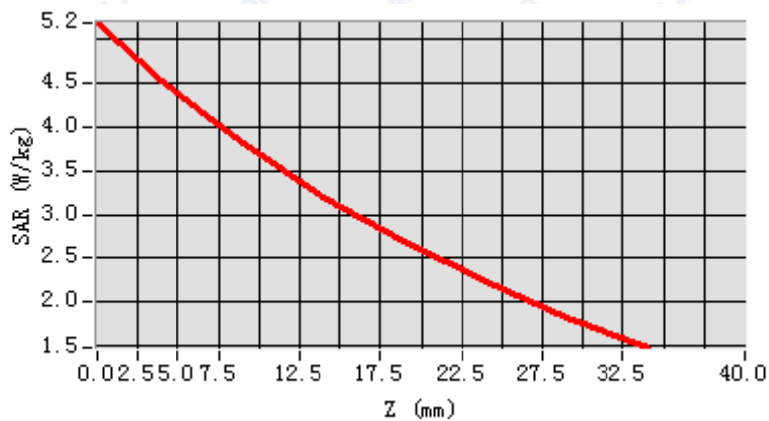
REPORT No. : SZ16050106S01A

Maximum location: X=6.00, Y=11.00

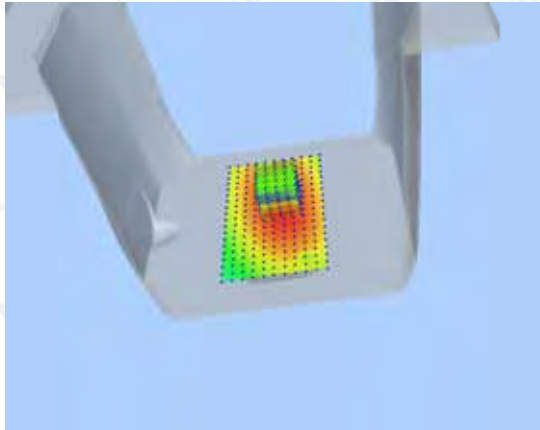
SAR Peak: 5.44 W/kg

SAR 10g (W/Kg)	2.998194
SAR 1g (W/Kg)	3.854389

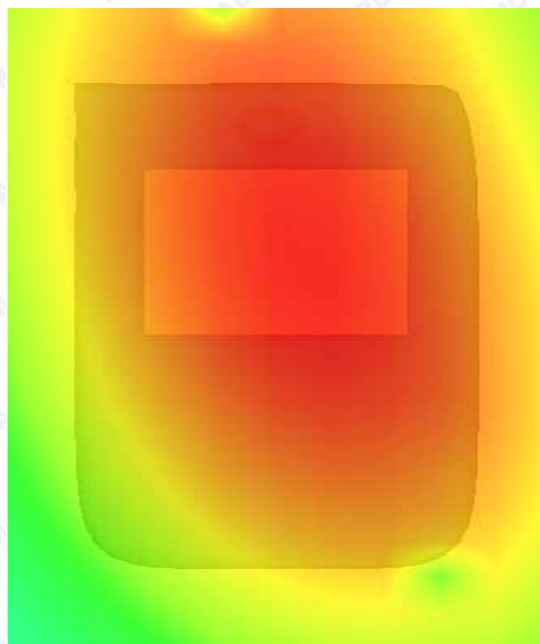
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 9**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

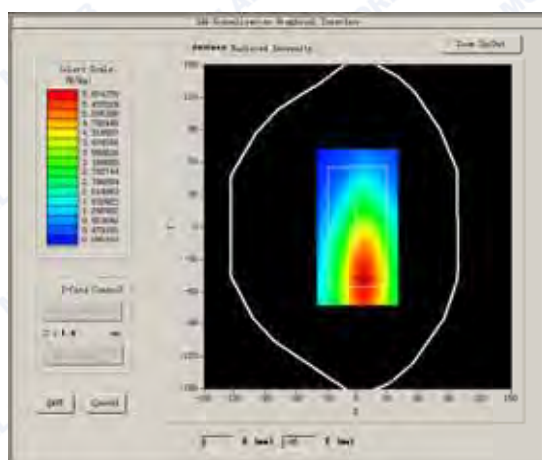
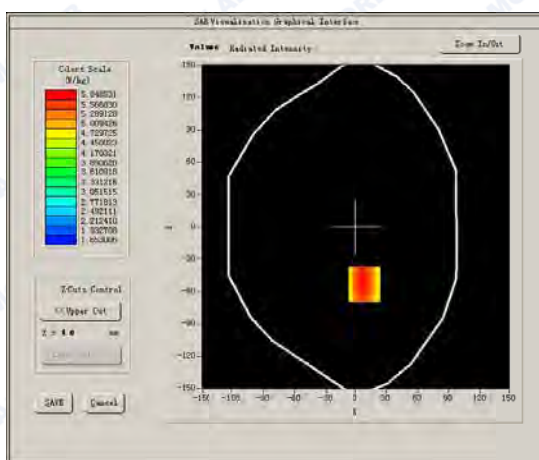
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	469.125MHz
Channels	Ch 36
Signal	GMSK

B. SAR Measurement Results

Frequency (MHz)	469.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	0.740000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**

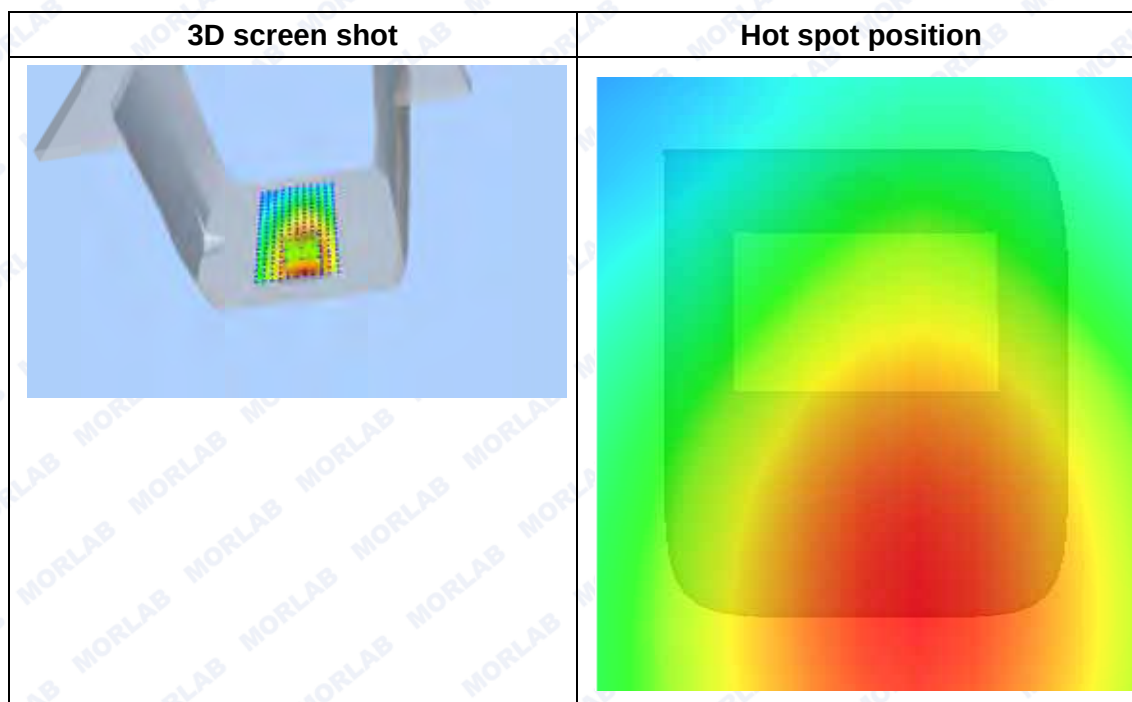
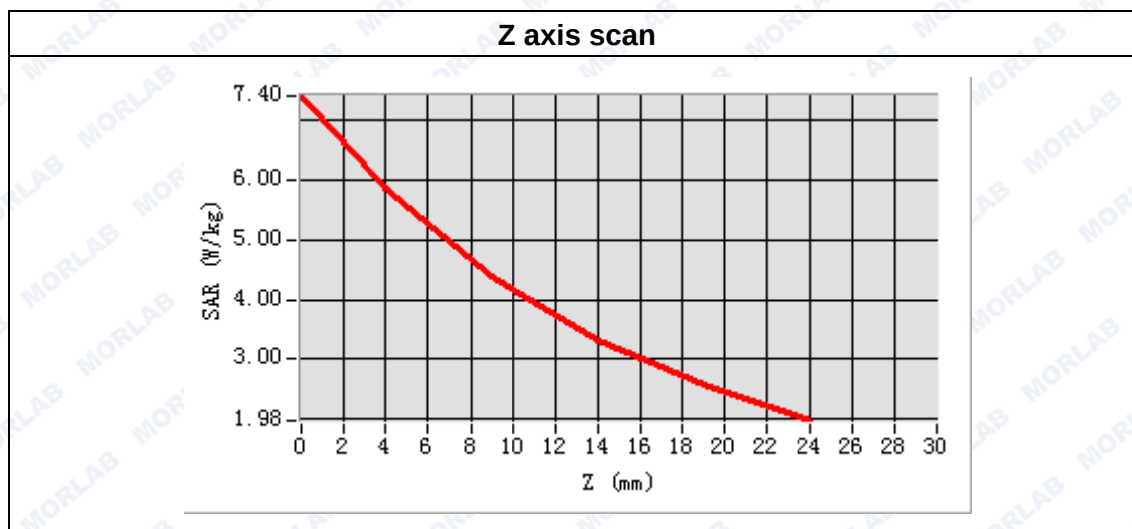


REPORT No. : SZ16050106S01A

Maximum location: X=8.00, Y=-53.00

SAR Peak: 7.43 W/kg

SAR 10g (W/Kg)	3.138352
SAR 1g (W/Kg)	4.335483





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: 2016.10.25

Measurement duration: 13 minutes 29 seconds

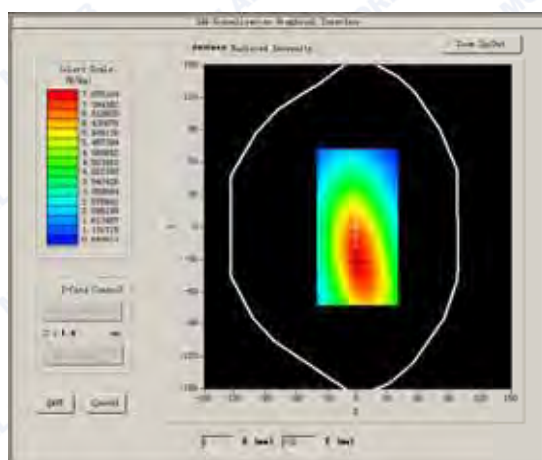
B. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	410.125MHz
Channels	Ch 1
Signal	4FSK

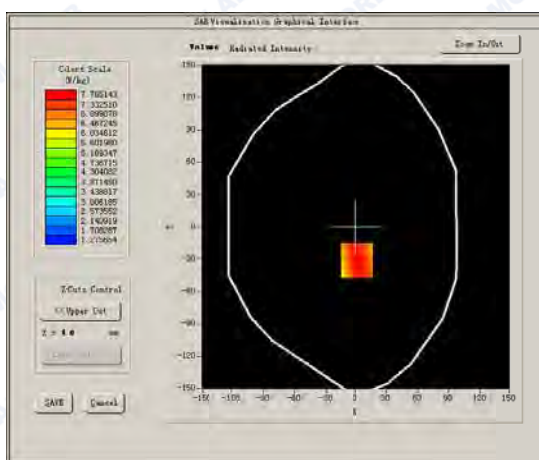
B. SAR Measurement Results

Frequency (MHz)	410.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.800000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR



VOLUME SAR





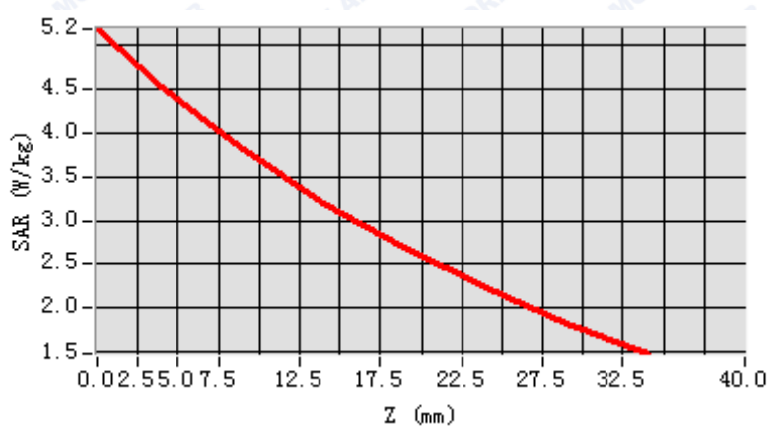
REPORT No. : SZ16050106S01A

Maximum location: X=1.00, Y=-31.00

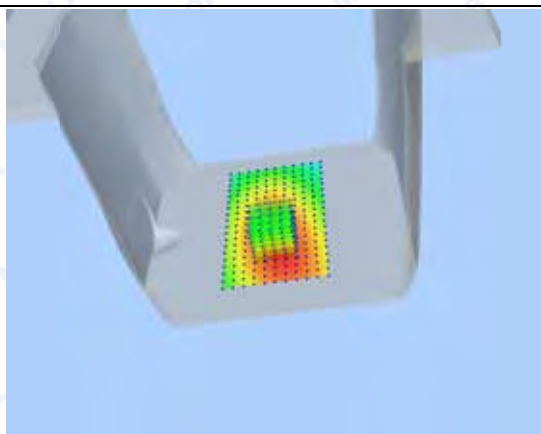
SAR Peak: 4.75 W/kg

SAR 10g (W/Kg)	3.137620
SAR 1g (W/Kg)	4.258237

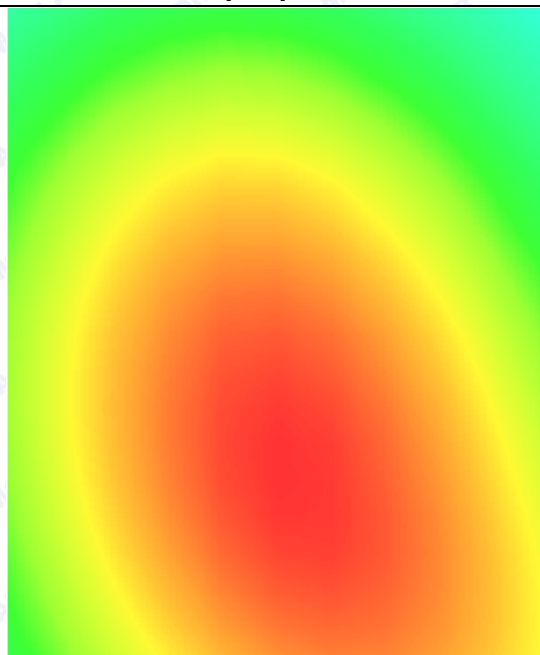
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 11**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

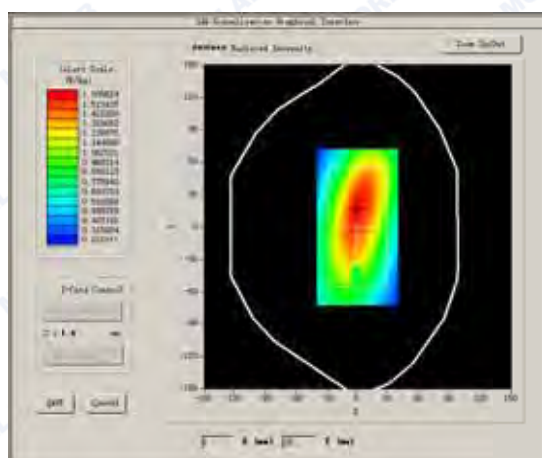
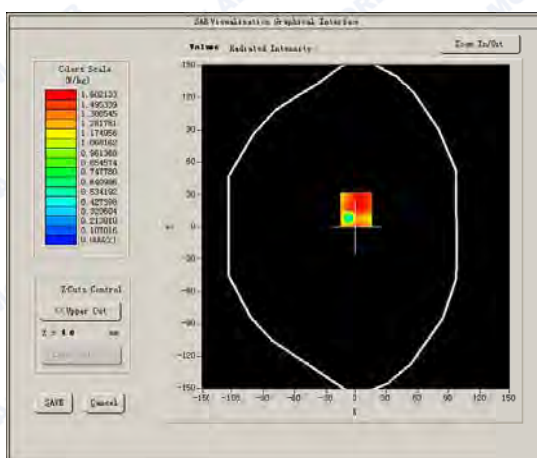
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	440.125MHz
Channels	Ch 39
Signal	4FSK

B. SAR Measurement Results

Frequency (MHz)	440.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.140000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



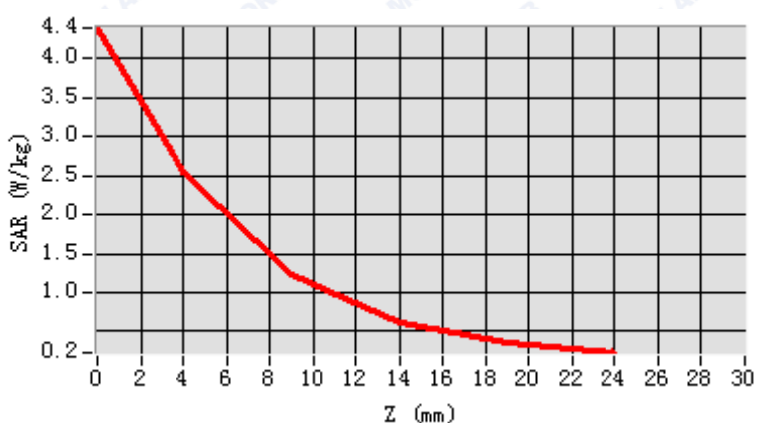
REPORT No. : SZ16050106S01A

Maximum location: X=0.00, Y=16.00

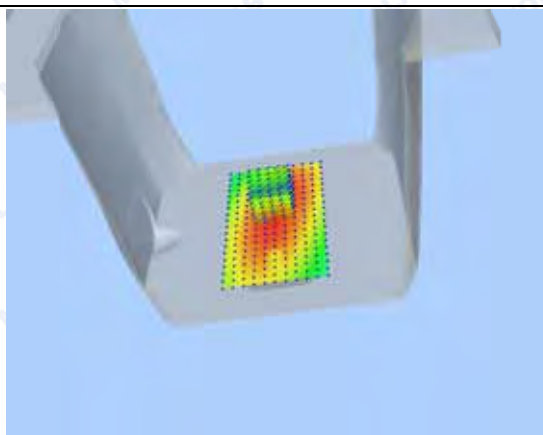
SAR Peak: 4.46 W/kg

SAR 10g (W/Kg)	3.187026
SAR 1g (W/Kg)	4.020873

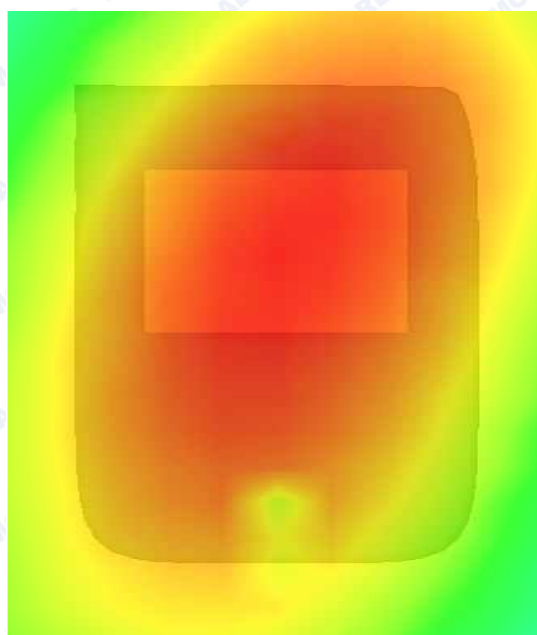
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 12**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

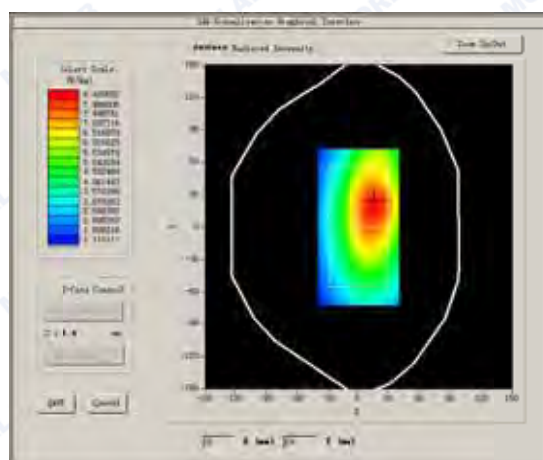
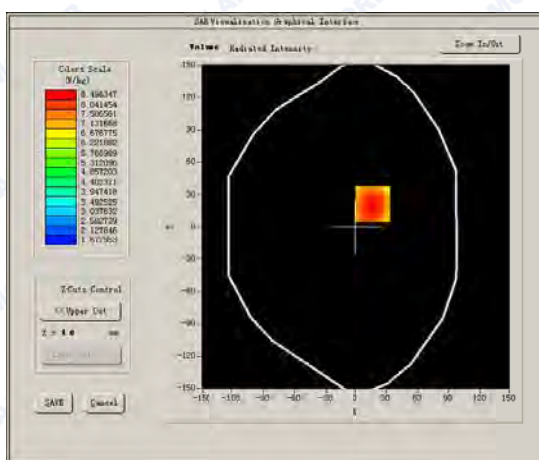
Measurement duration: 13 minutes 31 seconds

A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	469.125MHz
Channels	Ch 36
Signal	4FSK

B. SAR Measurement Results

Frequency (MHz)	469.125000
Relative permittivity (real part)	58.097261
Conductivity (S/m)	0.843652
Power drift (%)	-3.300000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



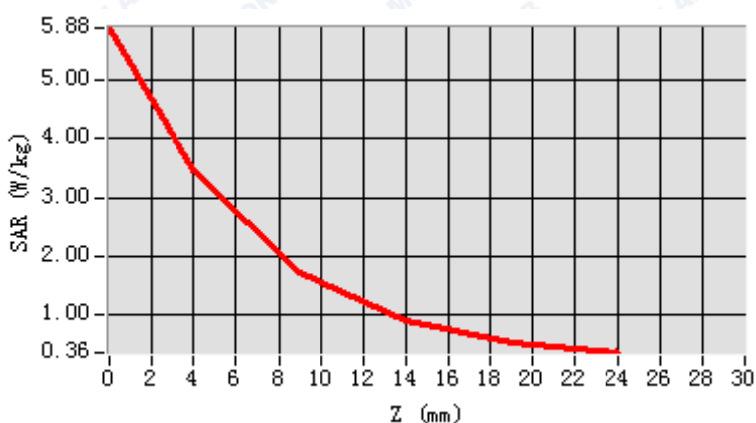
REPORT No. : SZ16050106S01A

Maximum location: X=17.00, Y=21.00

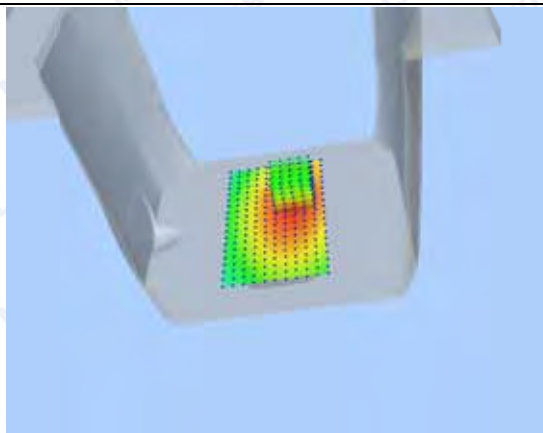
SAR Peak: 5.62 W/kg

SAR 10g (W/Kg)	3.582328
SAR 1g (W/Kg)	4.425070

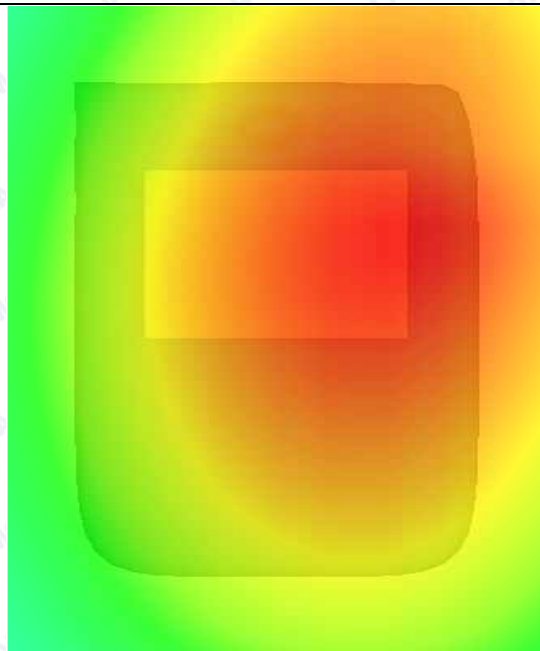
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 13**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

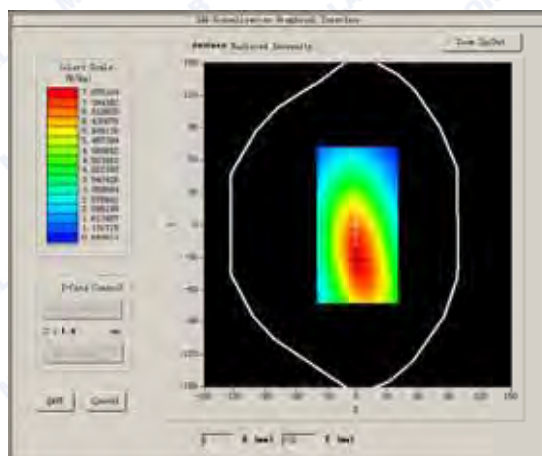
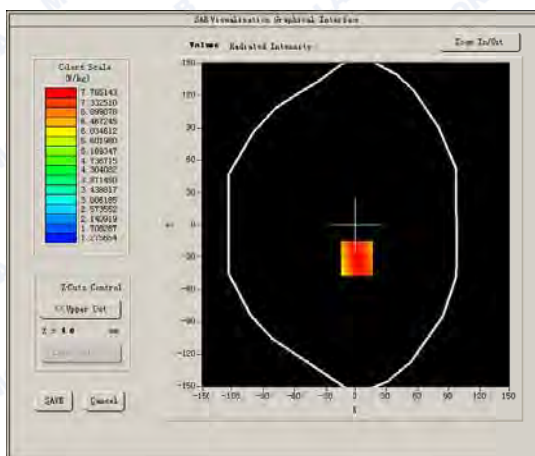
Measurement duration: 13 minutes 29 seconds

A. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	410.125MHz
Channels	Ch 1
Signal	GMSK

B. SAR Measurement Results

Frequency (MHz)	410.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	1.800000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



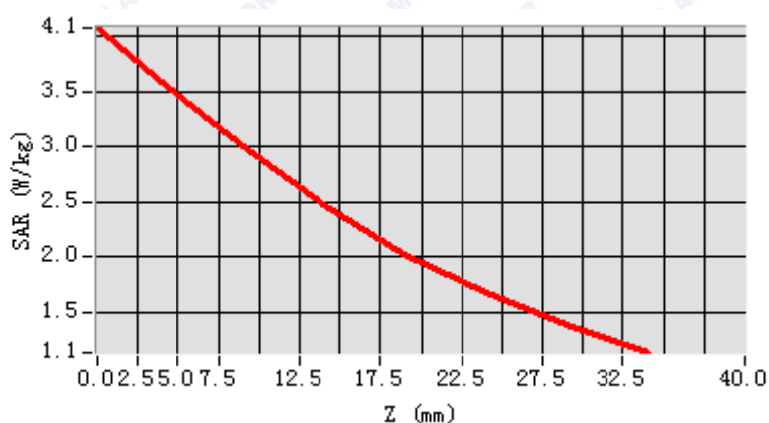
REPORT No. : SZ16050106S01A

Maximum location: X=1.00, Y=-31.00

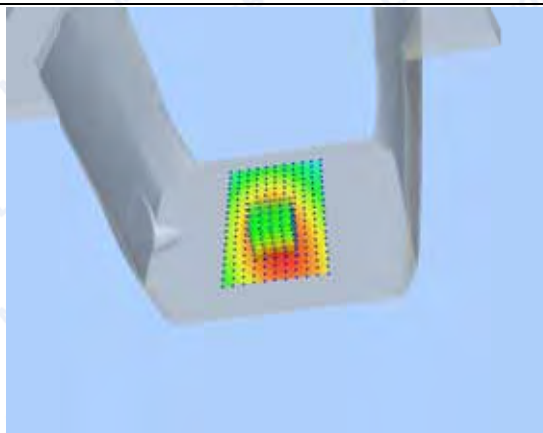
SAR Peak: 4.05 W/kg

SAR 10g (W/Kg)	1.752211
SAR 1g (W/Kg)	3.562137

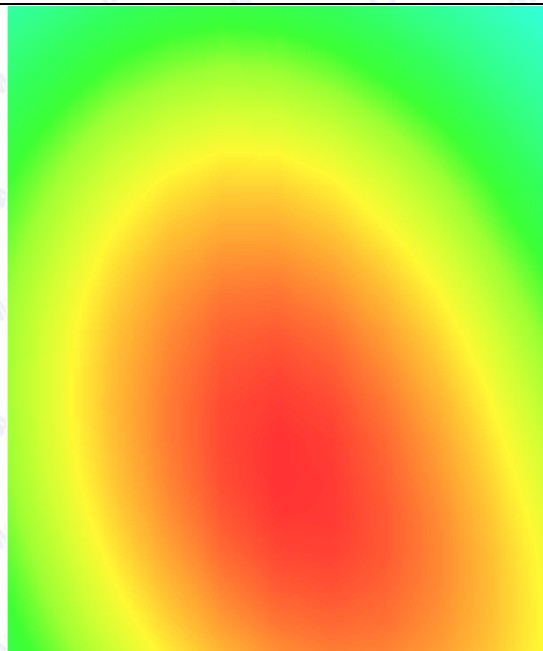
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 14**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

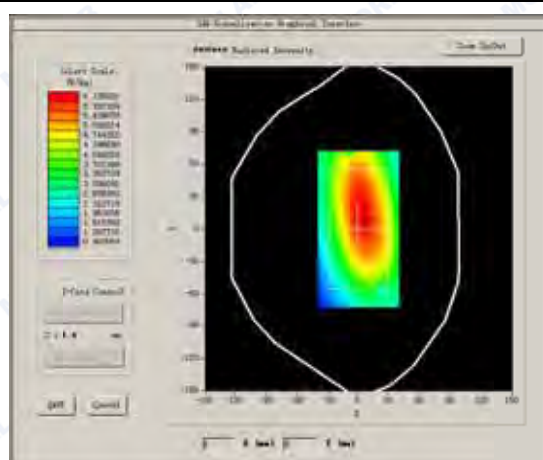
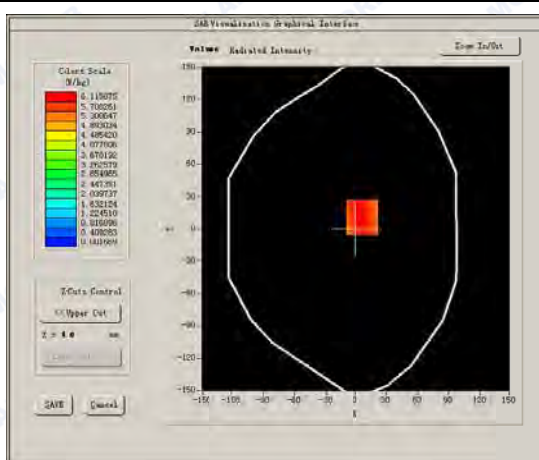
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	440.125MHz
Channels	Ch 39
Signal	GMSK

B. SAR Measurement Results

Frequency (MHz)	440.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	0.810000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



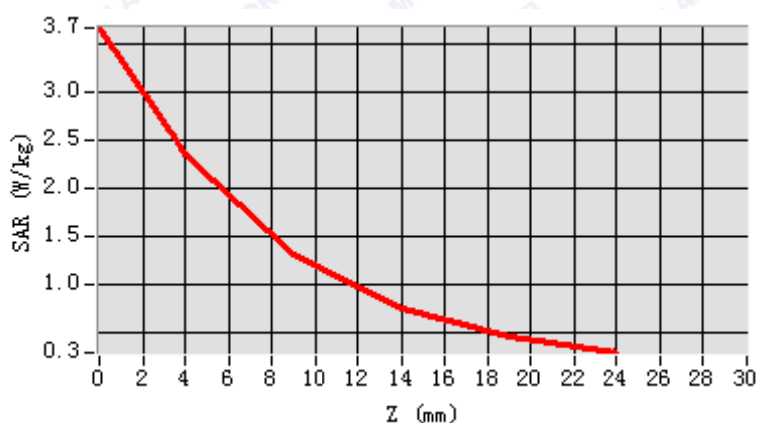
REPORT No. : SZ16050106S01A

Maximum location: X=6.00, Y=11.00

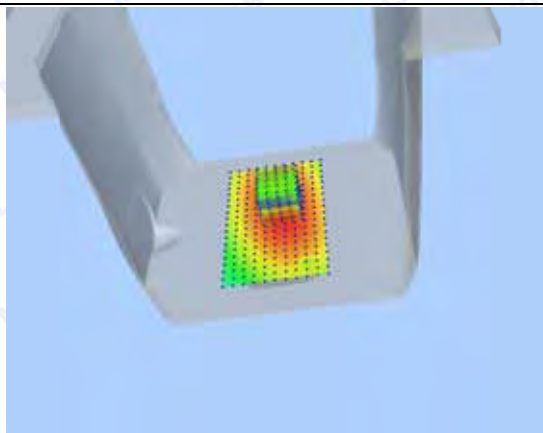
SAR Peak: 3.44 W/kg

SAR 10g (W/Kg)	1.402852
SAR 1g (W/Kg)	3.221021

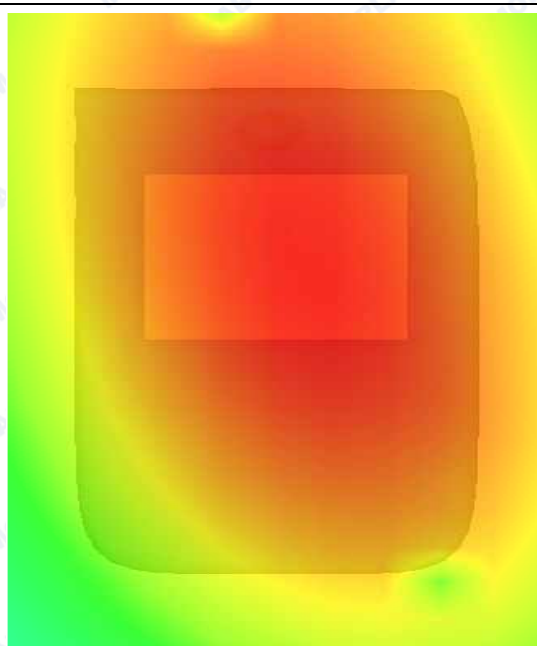
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 15**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

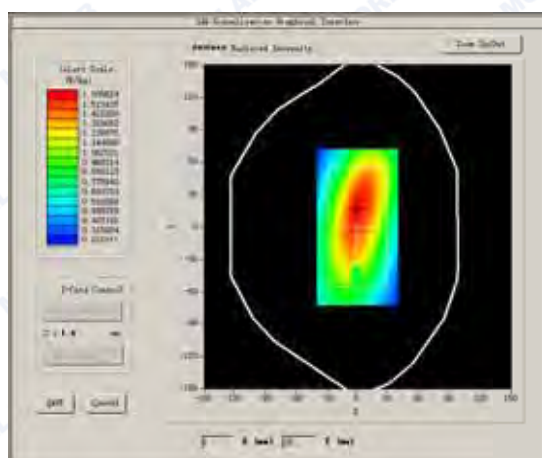
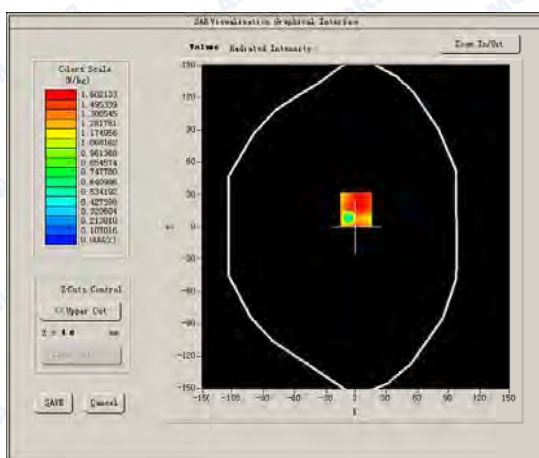
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	469.125MHz
Channels	Ch 36
Signal	GMSK

B. SAR Measurement Results

Frequency (MHz)	469.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.140000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



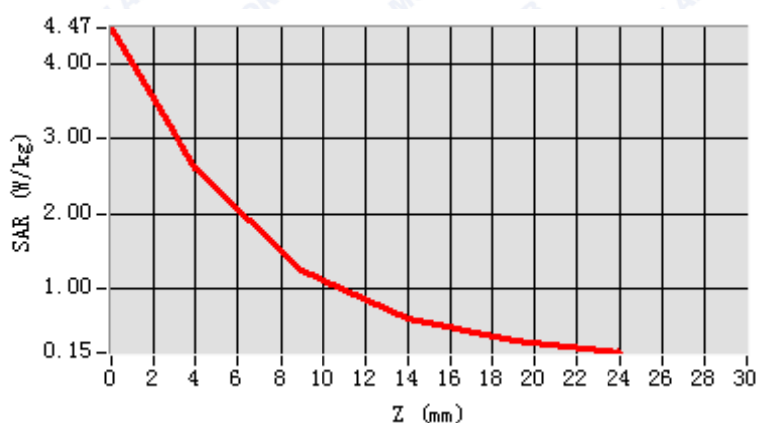
REPORT No. : SZ16050106S01A

Maximum location: X=0.00, Y=16.00

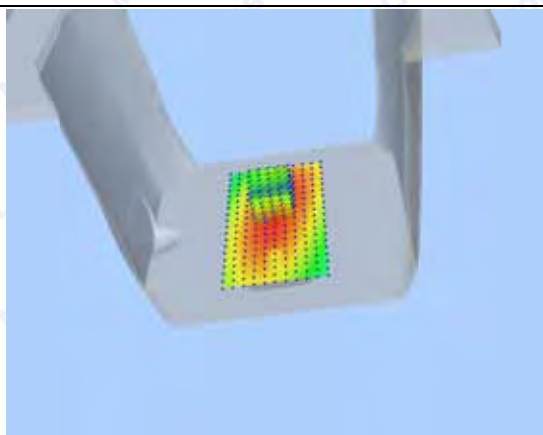
SAR Peak: 4.75 W/kg

SAR 10g (W/Kg)	2.224574
SAR 1g (W/Kg)	3.601195

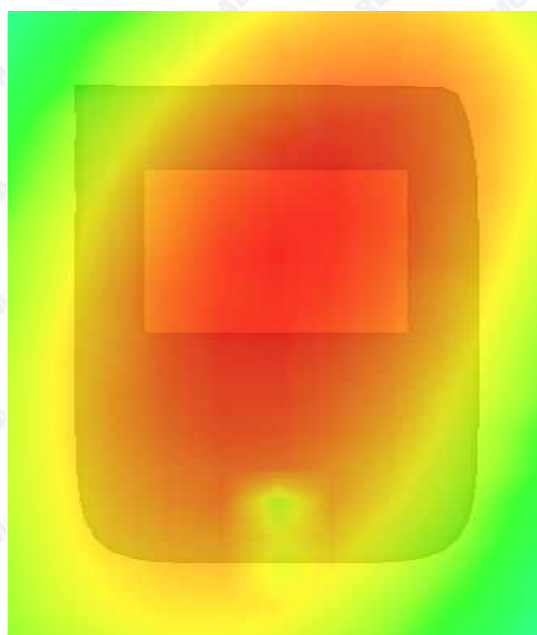
Z axis scan



3D screen shot



Hot spot position





MEASUREMENT 16

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

Measurement duration: 13 minutes 29 seconds

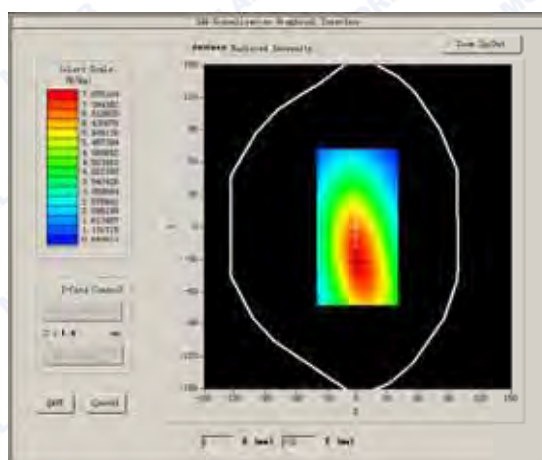
C. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	410.125MHz
Channels	Ch 1
Signal	4FSK

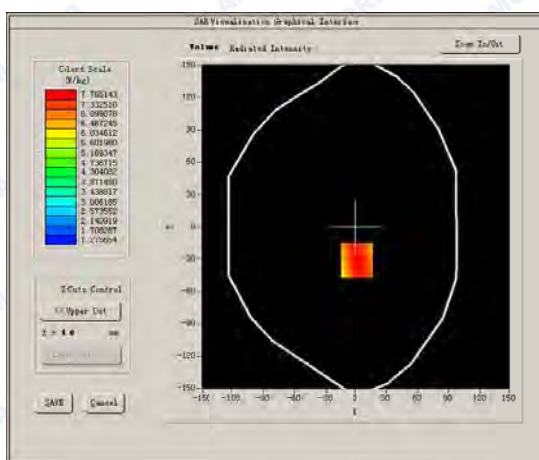
B. SAR Measurement Results

Frequency (MHz)	410.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.800000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR



VOLUME SAR





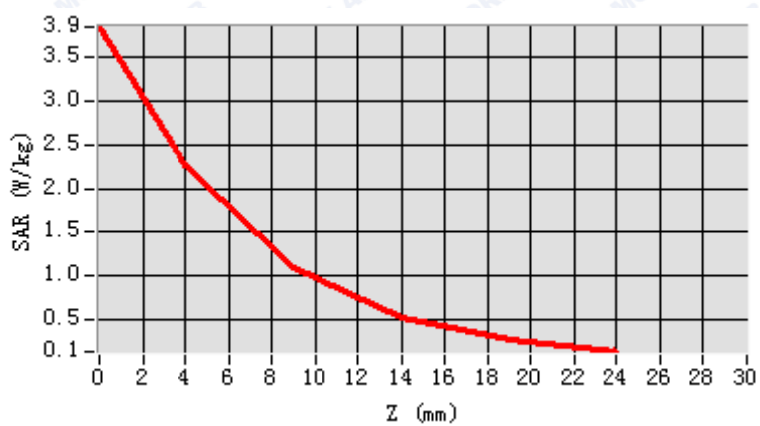
REPORT No. : SZ16050106S01A

Maximum location: X=1.00, Y=-31.00

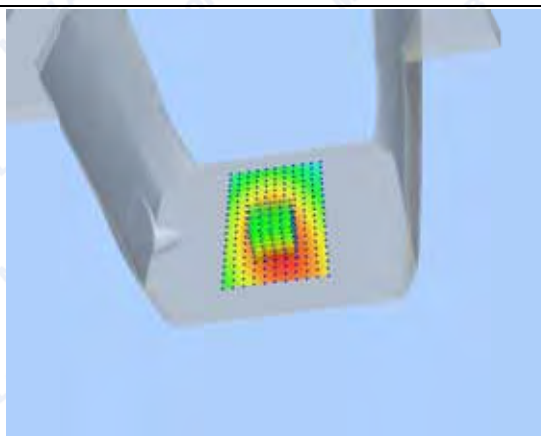
SAR Peak: 4.05 W/kg

SAR 10g (W/Kg)	2.021523
SAR 1g (W/Kg)	3.621237

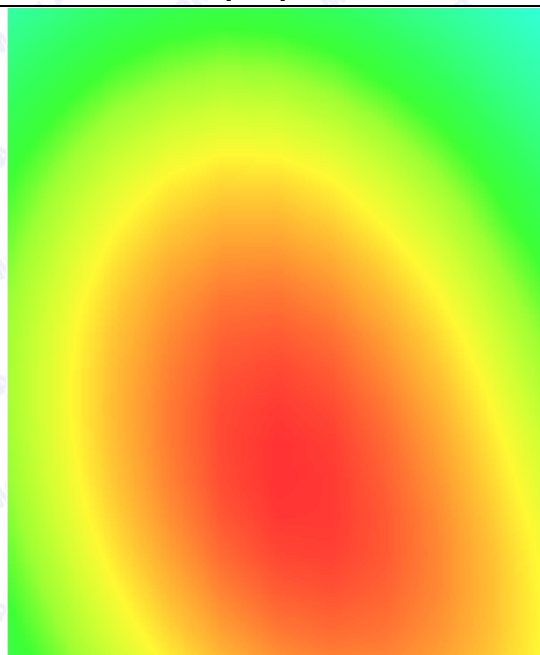
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 17**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

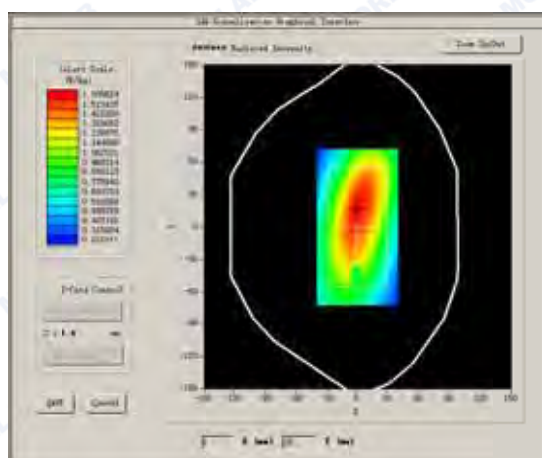
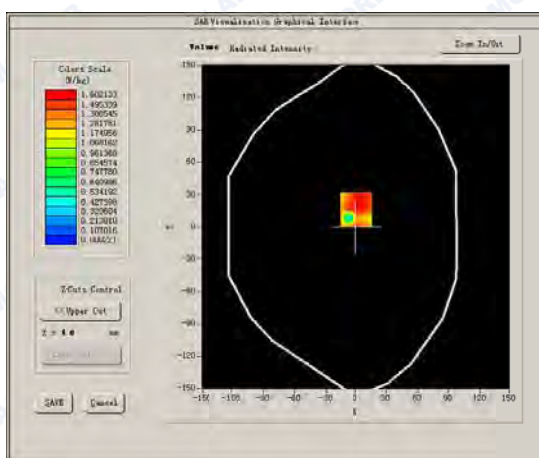
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	440.125MHz
Channels	Ch 39
Signal	4FSK

B. SAR Measurement Results

Frequency (MHz)	440.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.140000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



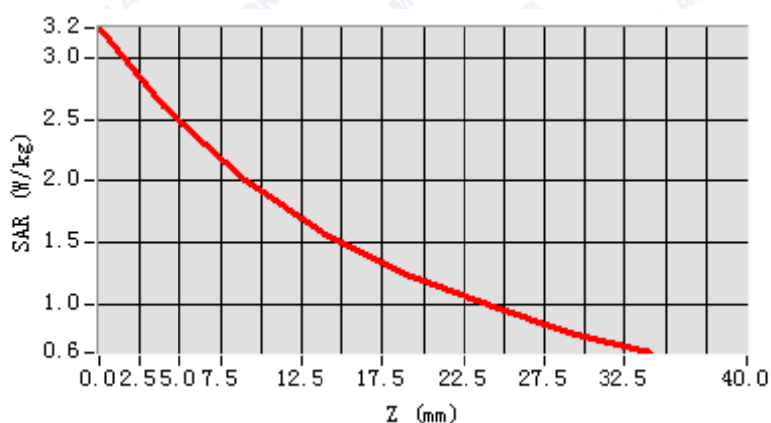
REPORT No. : SZ16050106S01A

Maximum location: X=0.00, Y=16.00

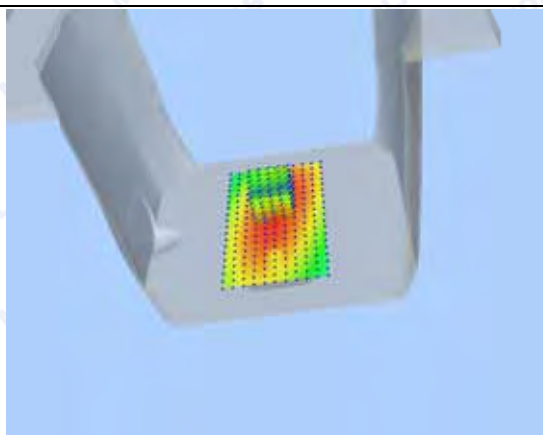
SAR Peak: 3.06 W/kg

SAR 10g (W/Kg)	1.523542
SAR 1g (W/Kg)	3.125235

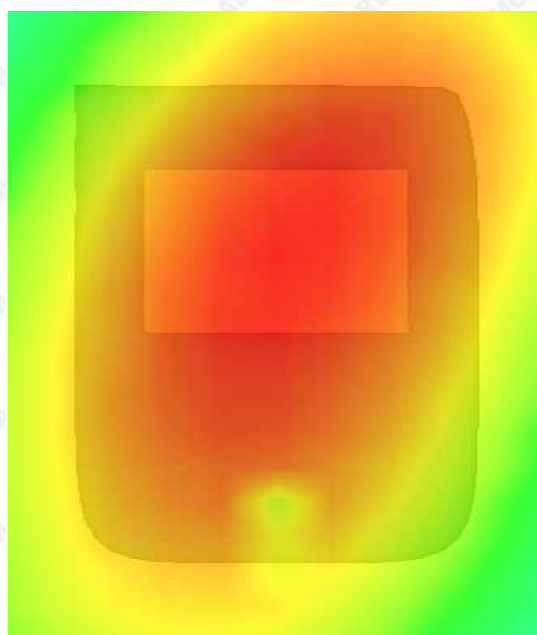
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 18**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

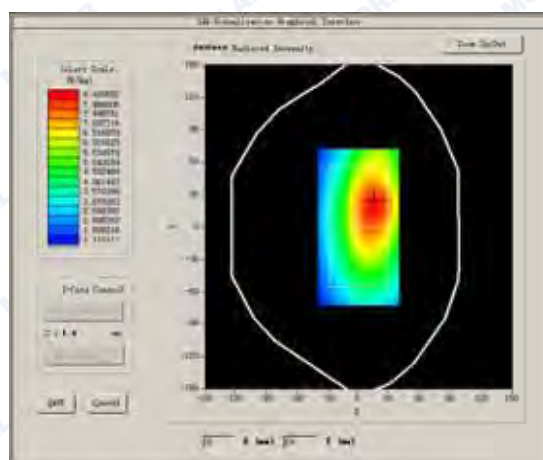
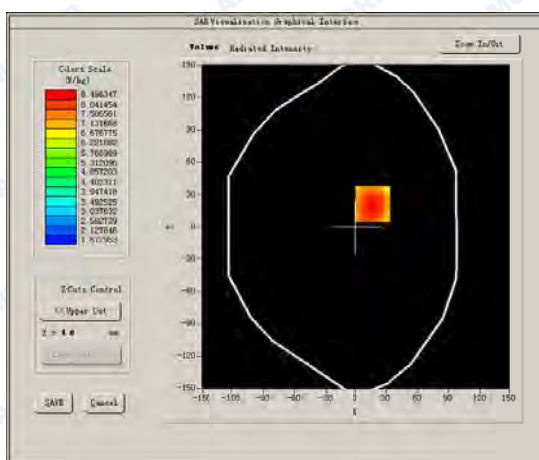
Measurement duration: 13 minutes 31 seconds

A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	469.125MHz
Channels	Ch 36
Signal	4FSK

B. SAR Measurement Results

Frequency (MHz)	469.125000
Relative permittivity (real part)	58.097261
Conductivity (S/m)	0.843652
Power drift (%)	-3.300000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



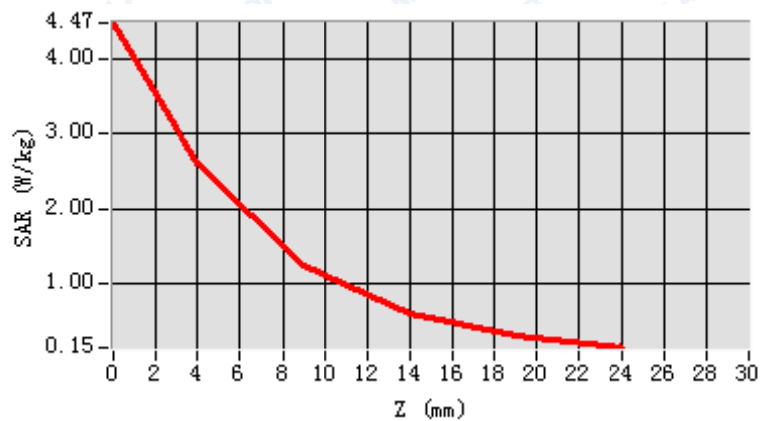
REPORT No. : SZ16050106S01A

Maximum location: X=17.00, Y=21.00

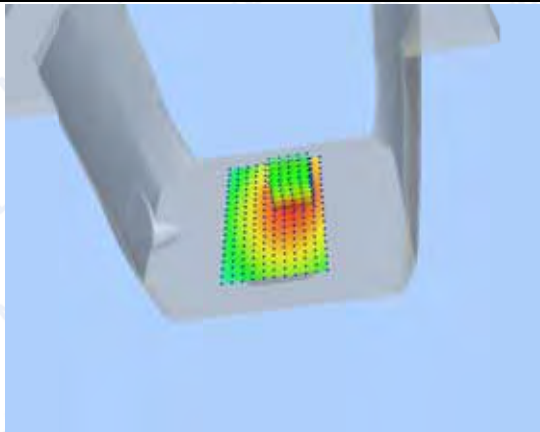
SAR Peak: 4.12 W/kg

SAR 10g (W/Kg)	2.012563
SAR 1g (W/Kg)	3.786214

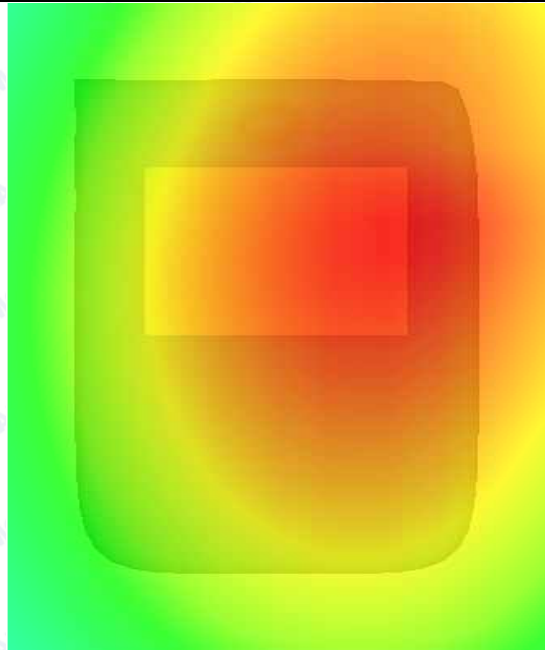
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 19**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

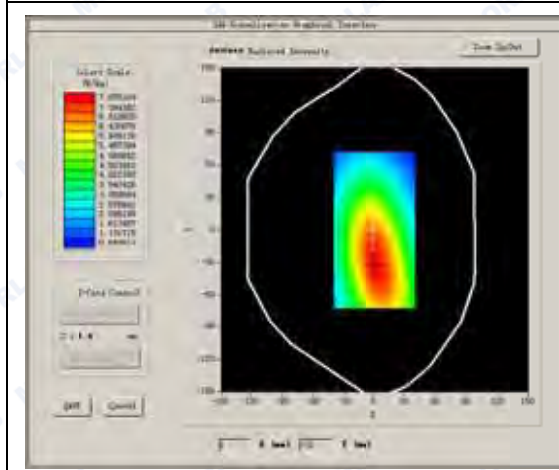
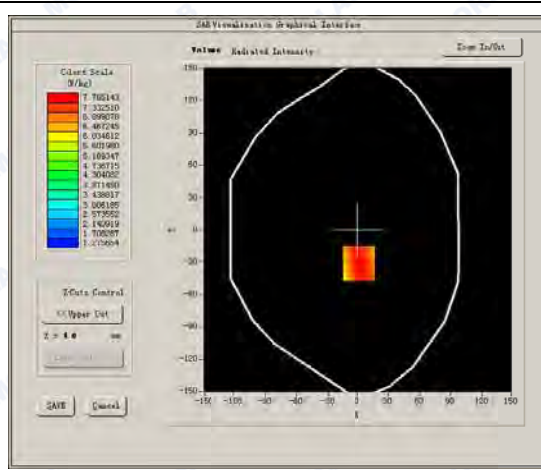
Measurement duration: 13 minutes 29 seconds

A. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	410.125MHz
Channels	Ch 1
Signal	GMSK

B. SAR Measurement Results

Frequency (MHz)	410.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.800000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



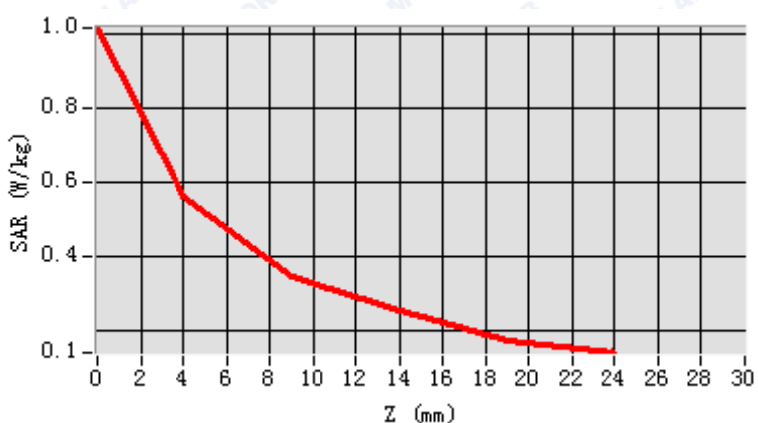
REPORT No. : SZ16050106S01A

Maximum location: X=1.00, Y=-31.00

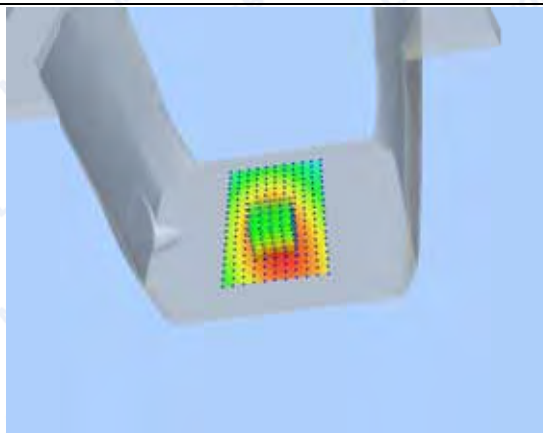
SAR Peak: 1.05 W/kg

SAR 10g (W/Kg)	0.332154
SAR 1g (W/Kg)	0.754235

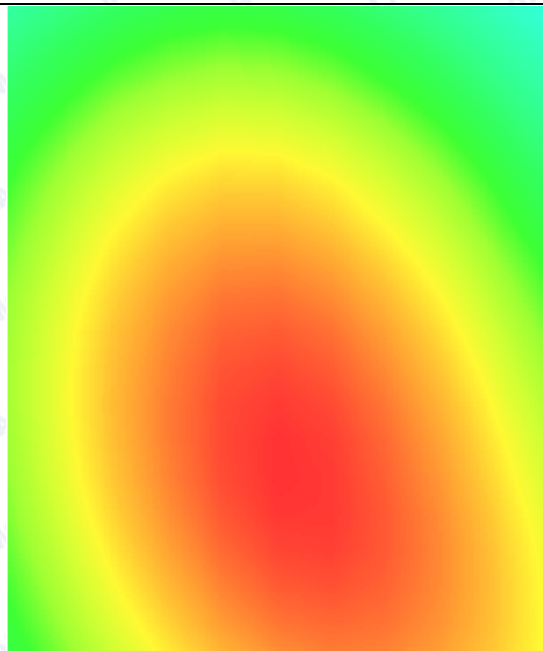
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 20**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

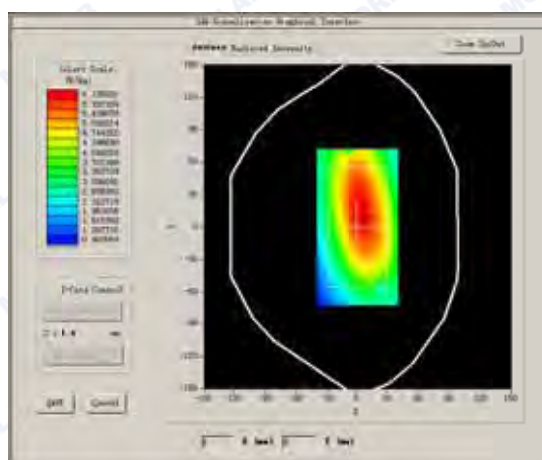
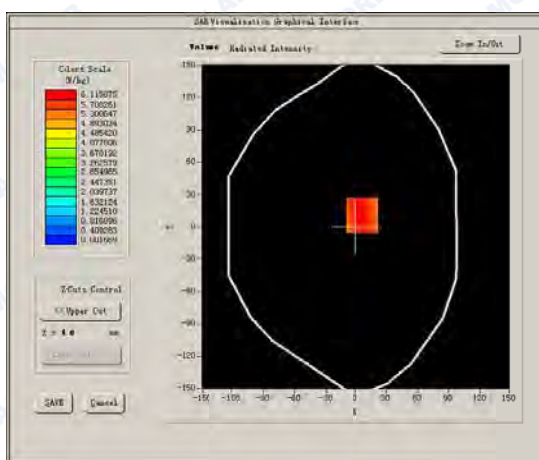
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	440.125MHz
Channels	Ch 39
Signal	GMSK

B. SAR Measurement Results

Frequency (MHz)	440.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-3.310000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



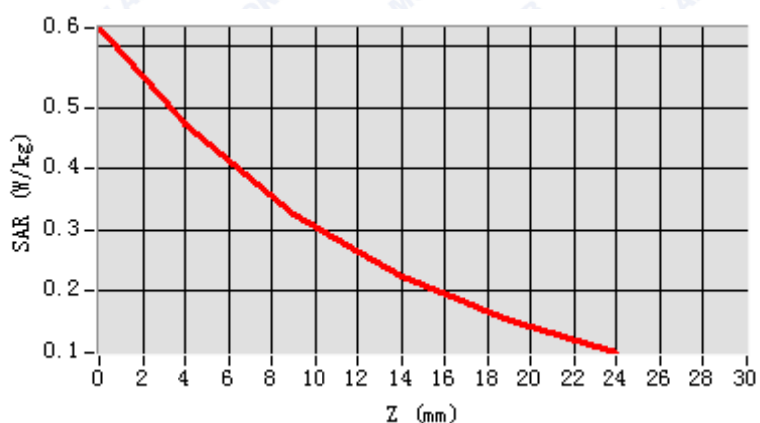
REPORT No. : SZ16050106S01A

Maximum location: X=6.00, Y=11.00

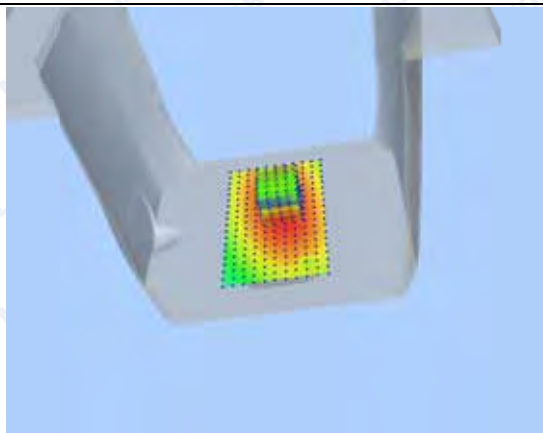
SAR Peak: 0.84 W/kg

SAR 10g (W/Kg)	0.325423
SAR 1g (W/Kg)	0.561354

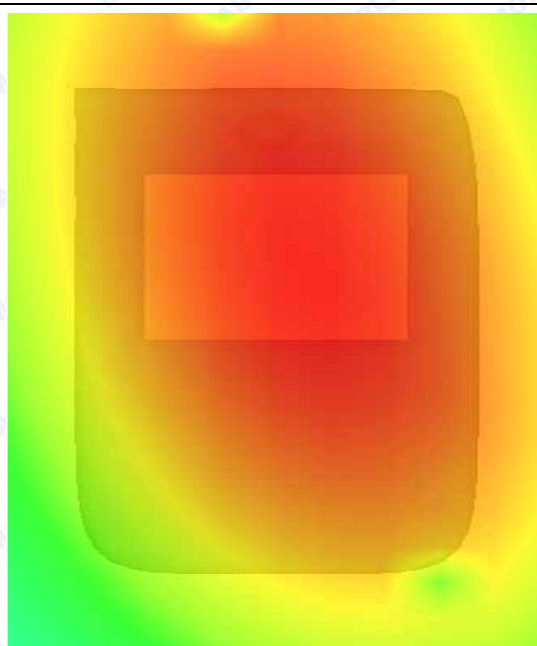
Z axis scan



3D screen shot



Hot spot position





MEASUREMENT 21

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

Measurement duration: 13 minutes 30 seconds

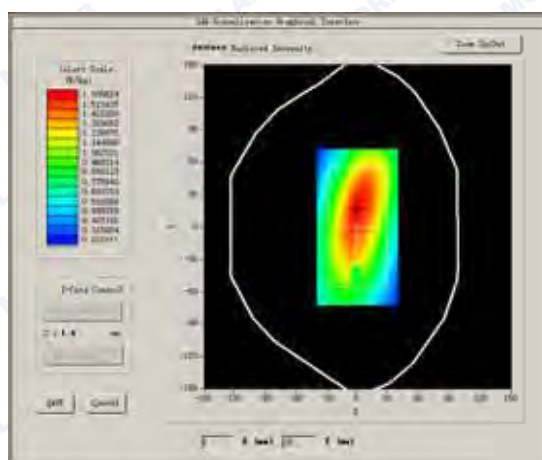
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	469.125MHz
Channels	Ch 36
Signal	GMSK

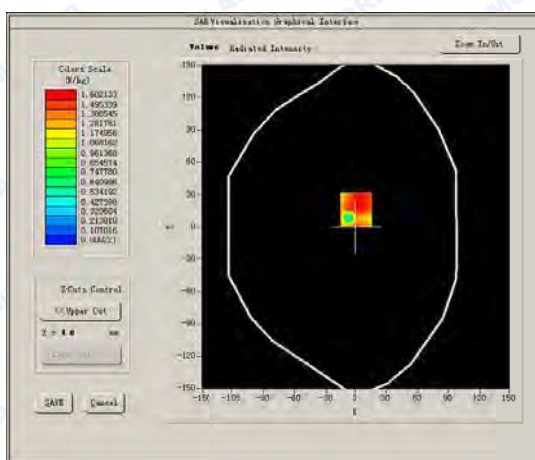
B. SAR Measurement Results

Frequency (MHz)	469.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.140000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR



VOLUME SAR





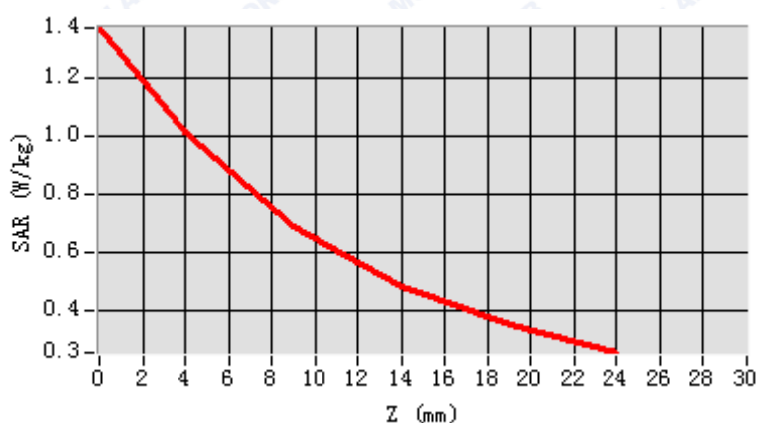
REPORT No. : SZ16050106S01A

Maximum location: X=0.00, Y=16.00

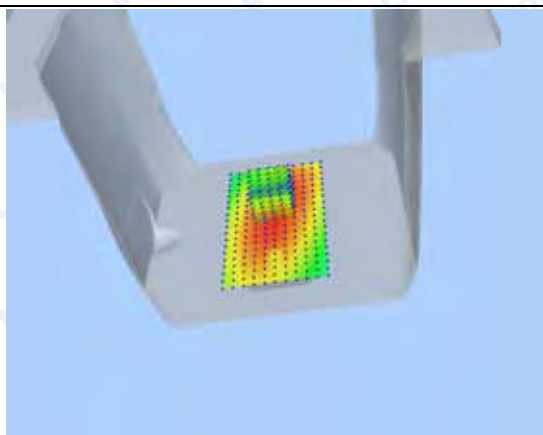
SAR Peak: 1.45 W/kg

SAR 10g (W/Kg)	0.625332
SAR 1g (W/Kg)	0.836025

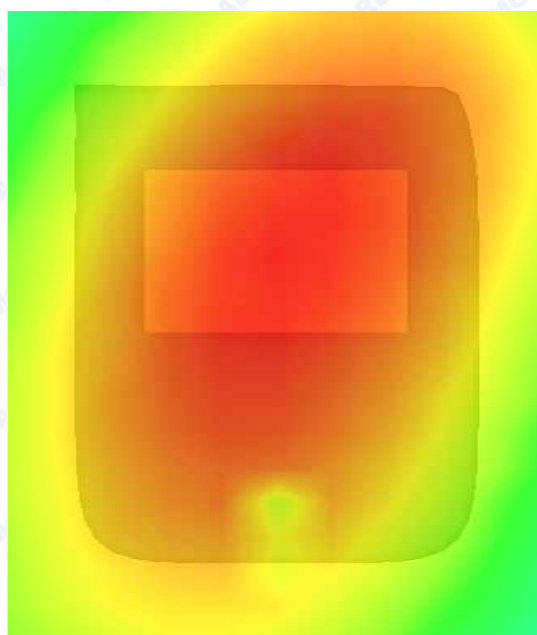
Z axis scan



3D screen shot



Hot spot position





MEASUREMENT 22

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

Measurement duration: 13 minutes 29 seconds

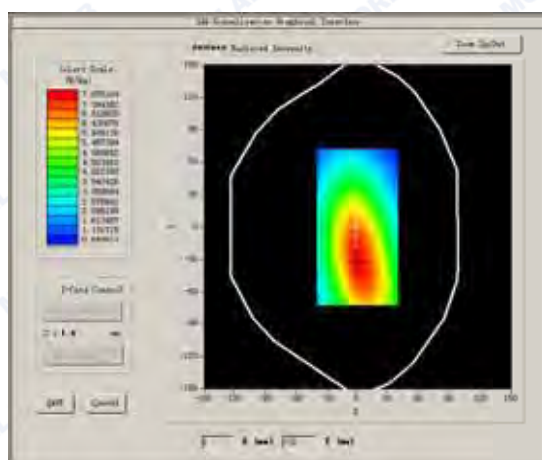
D. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	410.125MHz
Channels	Ch 1
Signal	4FSK

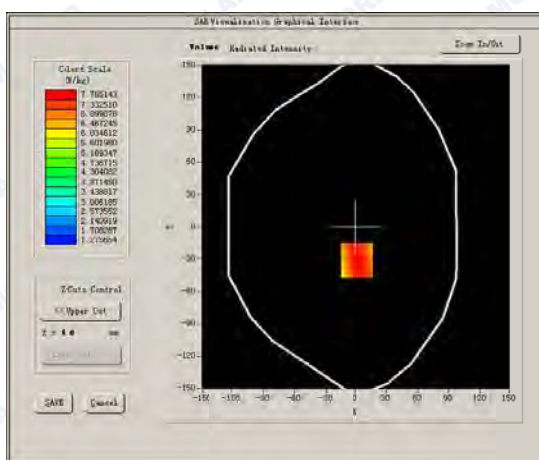
B. SAR Measurement Results

Frequency (MHz)	410.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.800000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR



VOLUME SAR





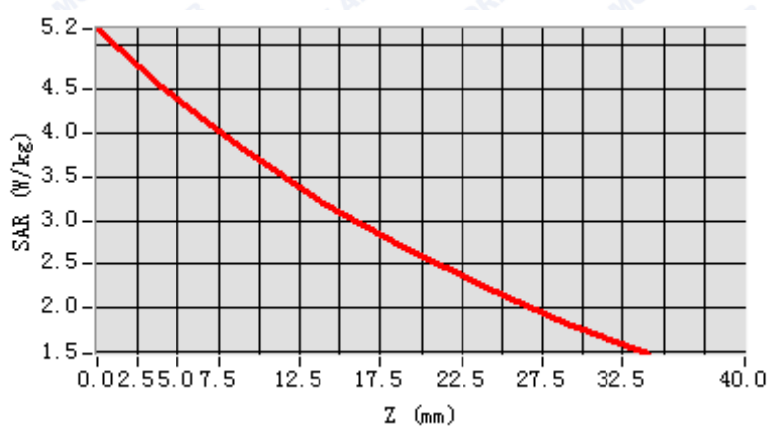
REPORT No. : SZ16050106S01A

Maximum location: X=1.00, Y=-31.00

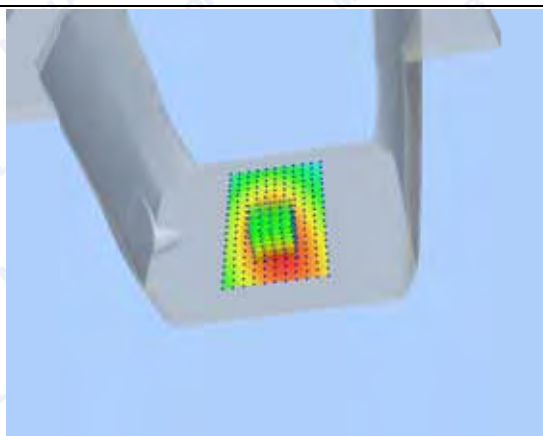
SAR Peak: 1.75 W/kg

SAR 10g (W/Kg)	0.436521
SAR 1g (W/Kg)	0.777658

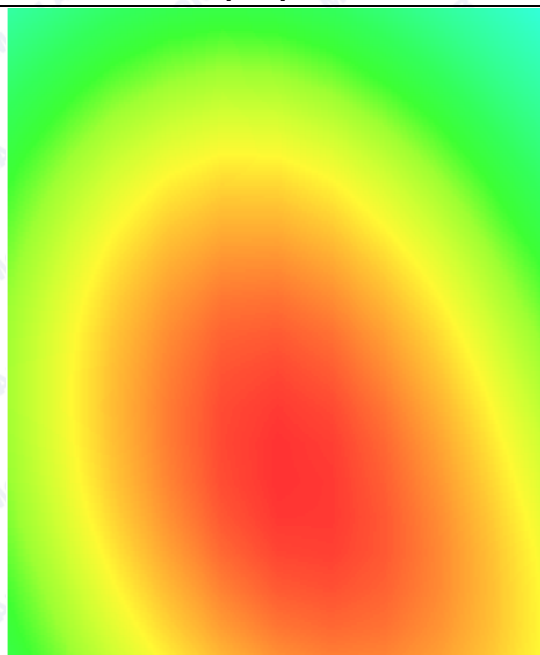
Z axis scan



3D screen shot



Hot spot position





MEASUREMENT 23

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

Measurement duration: 13 minutes 30 seconds

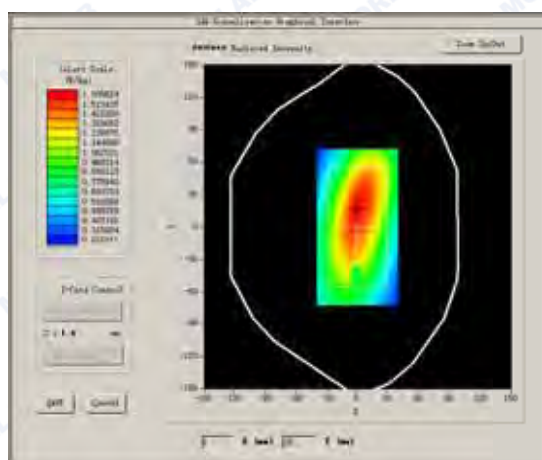
A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	440.125MHz
Channels	Ch 39
Signal	4FSK

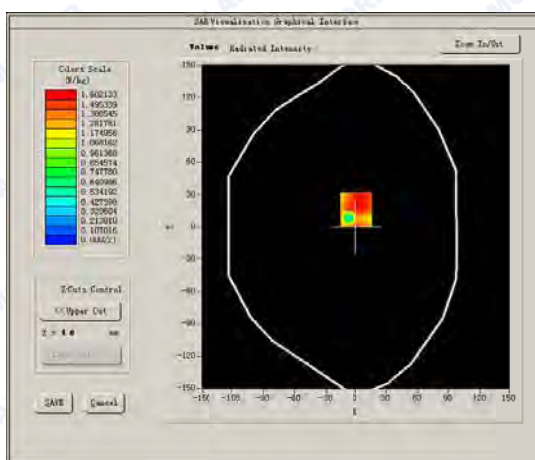
B. SAR Measurement Results

Frequency (MHz)	440.125000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power drift (%)	-2.140000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR



VOLUME SAR





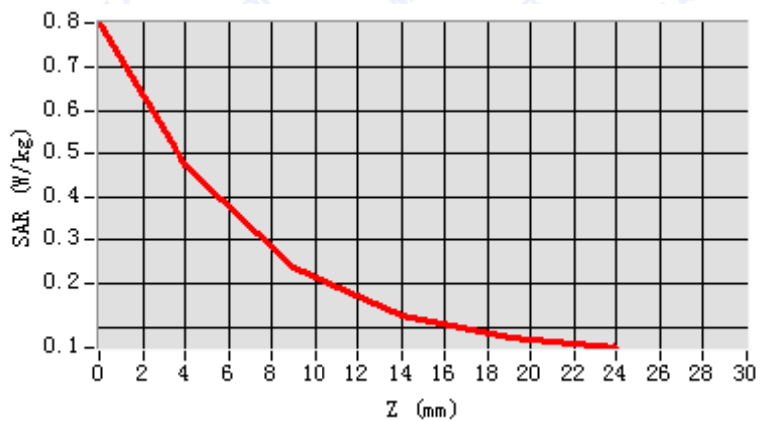
REPORT No. : SZ16050106S01A

Maximum location: X=0.00, Y=16.00

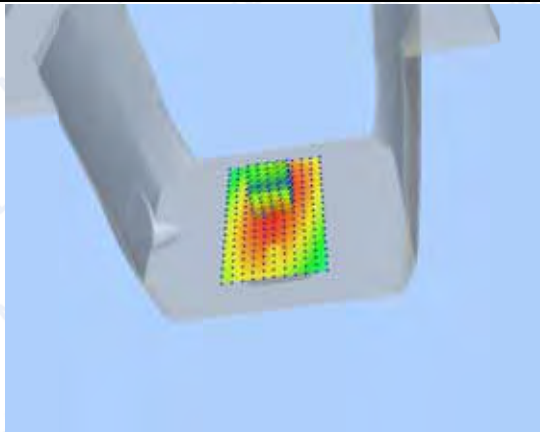
SAR Peak: 0.86 W/kg

SAR 10g (W/Kg)	0.323571
SAR 1g (W/Kg)	0.604687

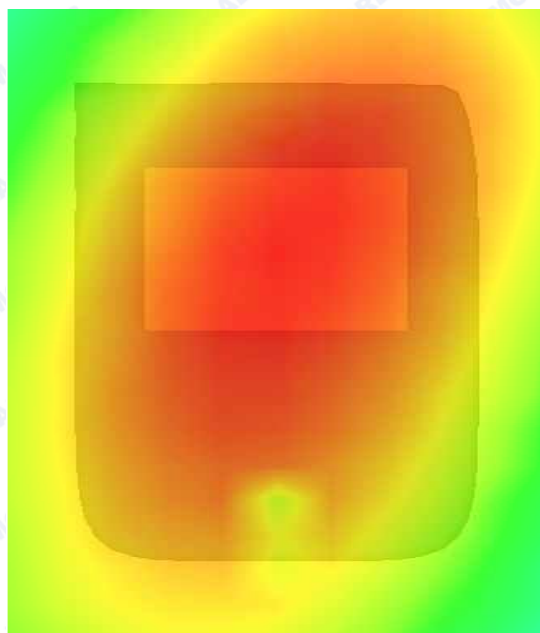
Z axis scan



3D screen shot



Hot spot position



**MEASUREMENT 24**

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

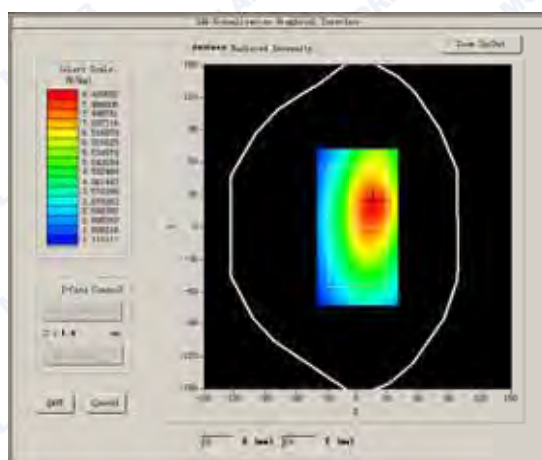
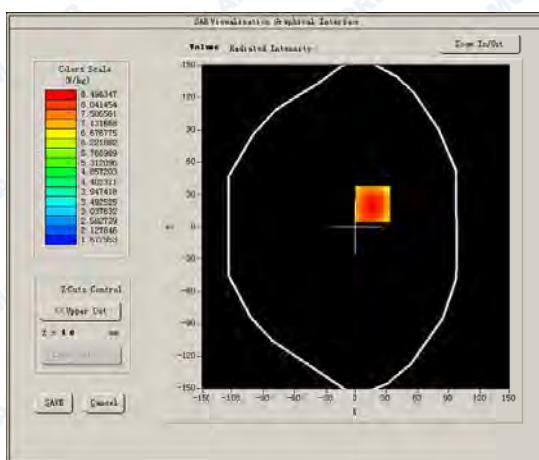
Measurement duration: 13 minutes 31 seconds

A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	469.125MHz
Channels	Ch 36
Signal	4FSK

B. SAR Measurement Results

Frequency (MHz)	469.125000
Relative permittivity (real part)	58.097261
Conductivity (S/m)	0.843652
Power drift (%)	-3.300000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR**VOLUME SAR**



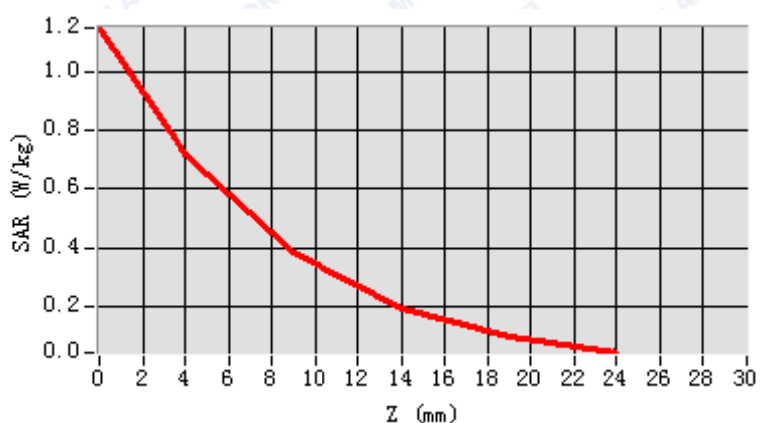
REPORT No. : SZ16050106S01A

Maximum location: X=17.00, Y=21.00

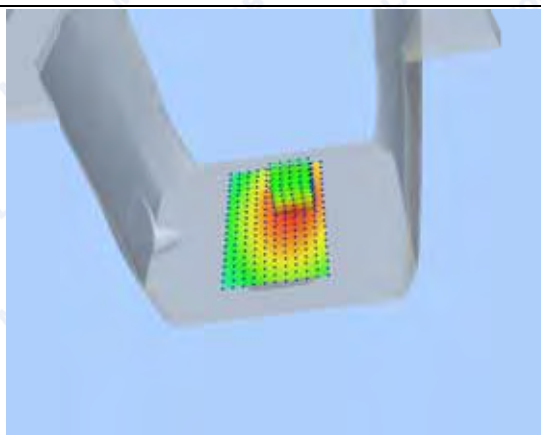
SAR Peak: 1.12 W/kg

SAR 10g (W/Kg)	0.633245
SAR 1g (W/Kg)	0.901453

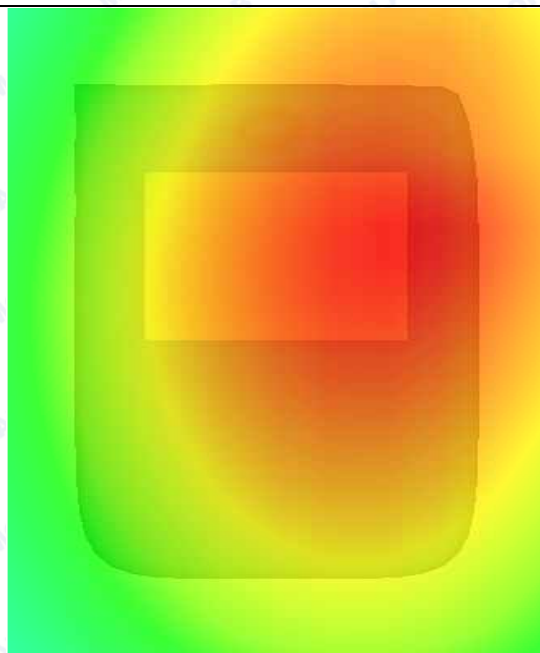
Z axis scan



3D screen shot



Hot spot position





12. ANNEX B SYSTEM CHECK DATA

450MHz System Check Data(Body)

Type: Phone measurement (Complete)

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

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

Date of measurement: 2016.10.25

Measurement duration: 13 minutes 27 seconds

A. Experimental conditions.

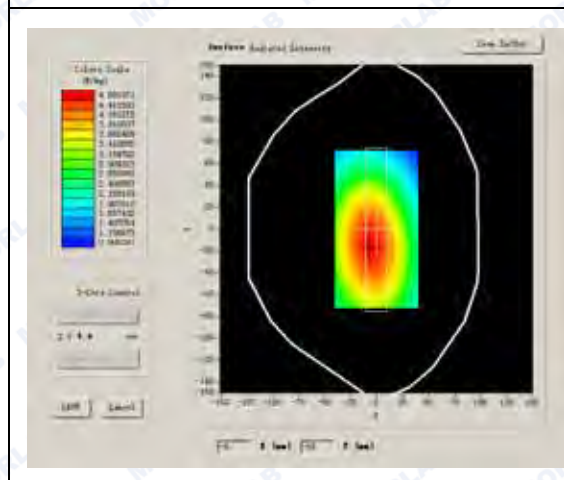
Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	
Band	450MHz
Channels	
Signal	CW

B. SAR Measurement Results

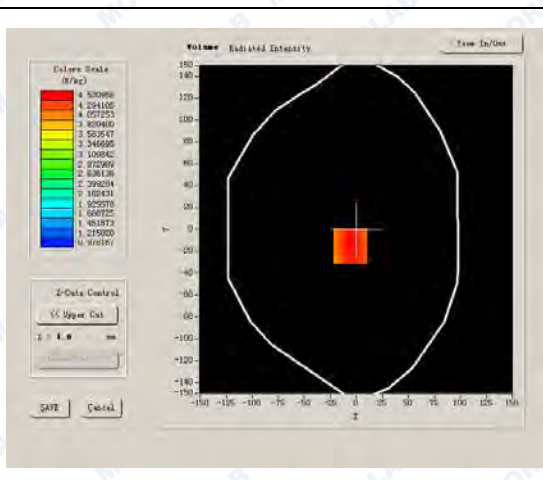
Band SAR

Frequency (MHz)	450.000000
Relative permittivity (real part)	55.103498
Conductivity (S/m)	0.934139
Power Drift (%)	0.170000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	7.77
Crest factor:	1:1

SURFACE SAR



VOLUME SAR





REPORT No. : SZ16050106S01A

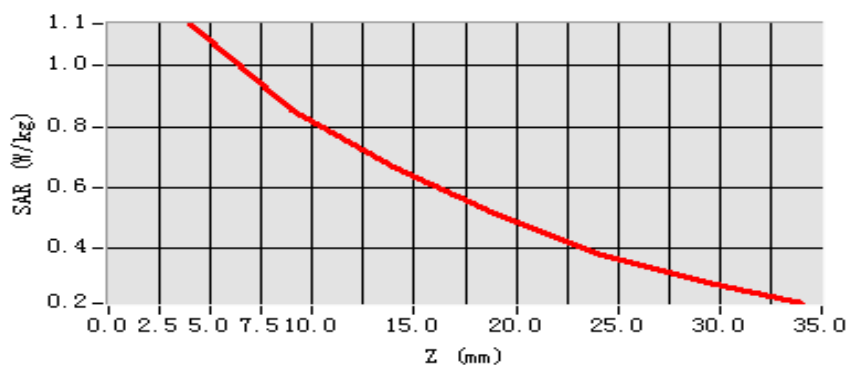
Maximum location: X=7.00, Y=33.00

SAR 10g (W/Kg)	0.706428
SAR 1g (W/Kg)	1.156247

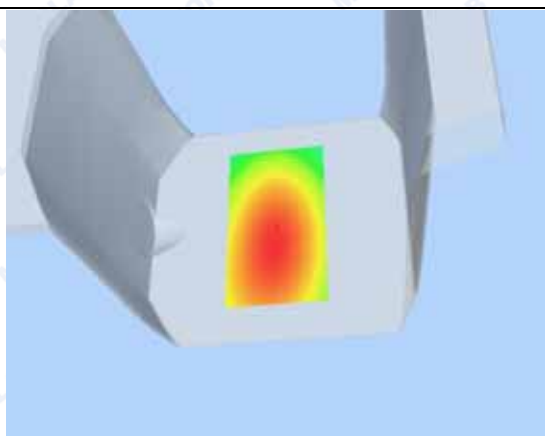
Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	1.1038	0.9671	0.7264	0.5926	0.3061	0.2140

SAR, Z Axis Scan (X = 7, Y = 33)



3D scene shot



Hot spot position





REPORT No. : SZ16050106S01A

13. ANNEX C GENERAL INFORMATION

1. Identification of the Responsible Testing Laboratory

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

2. Identification of the Responsible Testing Location

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

**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 Analyzer	Agilent(E5071B ,SN:MY42404762)	2015-9-26	1year
3	Voltmeter	Keithley (2000, SN:1000572)	2015-9-24	1year
4	Signal Generator	Rohde&Schwarz (SMP_02)	2015-9-24	1year
5	Power Amplifier	PRANA (Ap32 SV125AZ)	2015-9-24	1year
6	Power Meter	Agilent (E4416A, SN:MY45102093)	2016-6-7	1year
7	Power Sensor	Agilent (N8482A, SN:MY41091706)	2016-6-7	1year
8	Directional coupler	Giga-tronics(SN:1829112)	2015-9-24	1year
9	Probe	Satimo (SN:SN 37/08 EP80)	2016-7-5	1year
10	Dielectric Probe Kit	Agilent (85033E)	2015-9-24	1year
11	Phantom	Satimo (SN:SN_36_08_SAM62)	N/A	N/A
12	Liquid	Satimo(Last Calibration: 2016-8-5)	N/A	N/A
13	Dipole 450MHz	Satimo (SN 36/08 DIPB98)	2016-7-5	1year