REPORT No. : SZ170060076S01

SAR TEST REPORT

MANUFACTURER	:	CPS Telecom Limited
PRODUCT NAME	:	Walkie Talkie
MODEL NAME	:	CP228
TRADE NAME	:	CPS
BRAND NAME	:	CPS
STANDARD(S)	:	EN 50566: 2013/AC: 2014 IEC 62209-1:2005 EN 62209-1:2006 IEC/EN 62209-2: 2010
ISSUE DATE	:	2017-06-22

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DIRECTORY

Change History		
Issue	Date	Reason for change
1.0	2017-06-22	First edition

TEST REPORT DECLARATION

Manufacturer	CPS Telecom Limited		
Manufacturer Address	Office B, 15/F, King Palace Plaza, 55 King Yip Street, Kwun Tong, Kowloon, Hong Kong		
Factory	Contrad (HuiZhou) Ltd.		
Factory Address	No.8, He Chuang East 5 Road, HuiTai Industrial Park, ZhongKai New And High-Tech Zone, Huizhou City, Guangdong Provice, China		
Product Name	Walkie Talkie		
Model Name	CP228		
Brand Name	CPS		
HW Version	N/A		
SW Version	N/A		
Test Standards	EN 50566: 2013/AC: 2014;IEC 62209-1: 2005;EN 62209-1: 2006; IEC/EN 62209-2: 2010;		
Test Date	2017-06-11		
Max SAR	Head	0.523W/kg (50% Duty cycle)	Limit(W/kg): 2.0W/kg
	Body	0.324W/kg (50% Duty cycle)	

Tested by : Peng Fuwei

Peng Fuwei(Test Engineer)

Approved by : Peng Huarui

Peng Huarui(Supervisor)

1.TECHNICAL INFORMATION

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

1.1 Identification of Applicant

Company Name:	CPS Telecom Limited
Address:	Office B, 15/F, King Palace Plaza, 55 King Yip Street, Kwun Tong, Kowloon, Hong Kong

1.2 Identification of Manufacturer

Company Name:	Contrad (HuiZhou) Ltd.
Address:	No.8, He Chuang East 5 Road, HuiTai Industrial Park, ZhongKai New And High-Tech Zone, Huizhou City, Guangdong Provice, China

1.3 Equipment Under Test (EUT)

Model Name:	CP228
Trade Name:	CPS
Brand Name:	CPS
Hardware Version:	N/A
Software Version:	N/A
Frequency Bands:	446.00625-446.09375MHz
Rated Power:	N/A
Antenna type:	External Antenna
Development Stage:	Identical prototype
Battery Model:	CB28
Battery specification:	3.7V 1100mAh
Exposure Category::	Occupational/Controlled Exposure

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 EUTs

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

EUT Identity	Hardware Version	Software Version
1#	N/A	N/A

1.4 Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	**EN 50566: 2013/AC: 2014**	Product standard to demonstrate compliance of radio frequency fields from handheld and body-mounted wireless communication devices used by the general public (30 MHz - 6 GHz)
2	**IEC 62209-1: 2005**	Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)
3	**EN 62209-1: 2006**	Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)
4	**IEC/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

1.5 Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for Occupational/Controlled Exposure should be applied for this device, it is 10 W/kg as averaged over any 10 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. (ρ). The equation description is as below:

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

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

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

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

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

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

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

applied.

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.

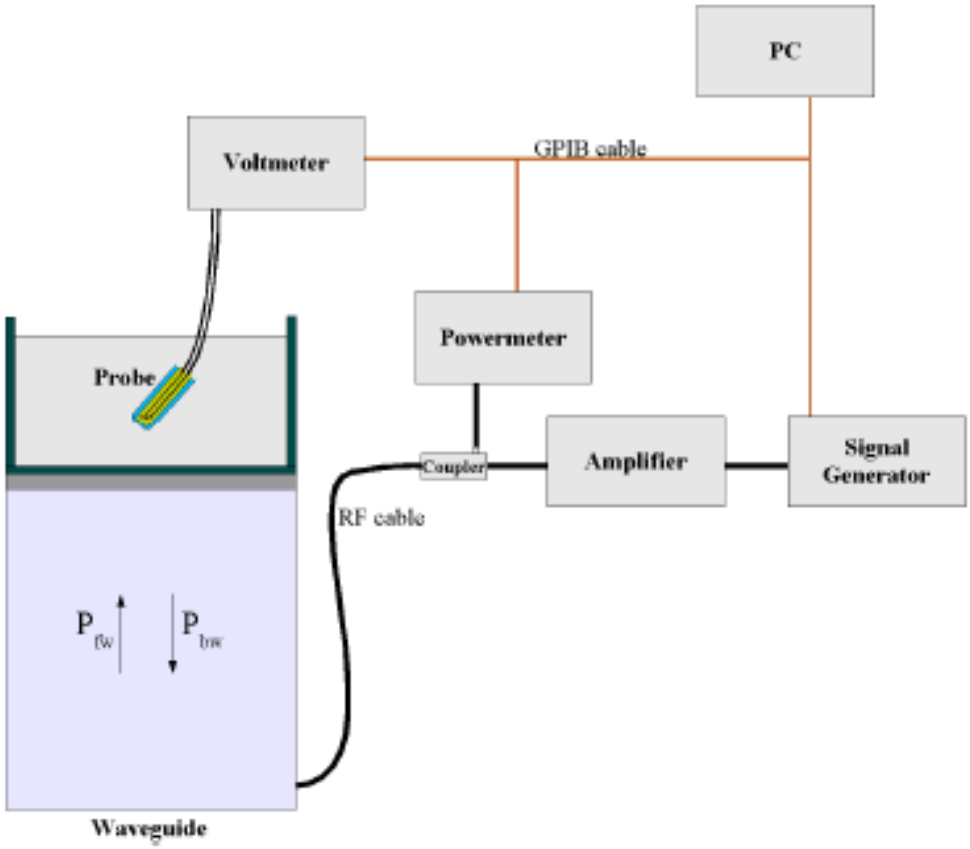
3.2 Probe

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: 835 to 2500MHz for head & body simulating liquid.

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

Probe calibration is realized, in compliance with CENELEC EN 62209 and IEEE 1528 std, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 62209-1 annex technique using reference guide at the five frequencies.



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

Where :

Pfw = Forward Power

Pbw = Backward Power

a and b = Waveguide dimensions

ı = Skin depth

Keithley configuration:

Rate = Medium; Filter =ON; RDGS=10; FILTER TYPE =MOVING AVERAGE; RANGE AUTO

After each calibration, a SAR measurement is performed on a validation dipole and compared with a NPL calibrated probe, to verify it.

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

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

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

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

where DCP is the diode compression point in mV.

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/cm²) 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/cm².

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),

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

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

δT = temperature increase due to RF exposure.

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

Where:

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

σ = simulated tissue conductivity,

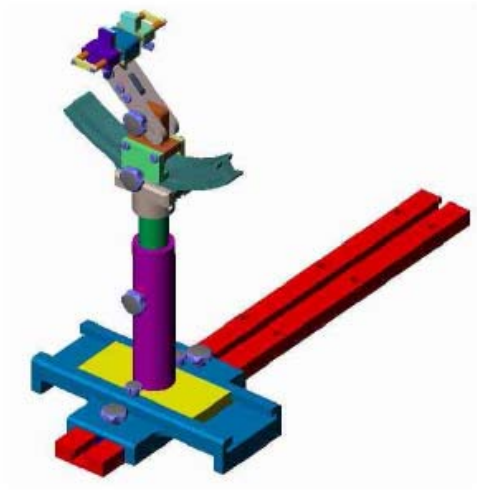
ρ = Tissue density (1.25 g/cm³ for brain tissue)

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 lower 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

Ingredients (% by weight)	Frequency Band
	450MHz
Water	38.56
Salt(NaCl)	3.95
Sugar	56.32
HEC	0.98
Bactericide	0.19
Triton	0.0
DGBE	0.0
Acticide SPX	0.0
Dielectric Constant	43.5
Conductivity (S/m)	0.87

Recipes for Tissue Simulating Liquid

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

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	450 MHZ	43.5	0.87
Validation value (June. 11)	450 MHZ	43.464979	0.863409

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 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	∞
Reponse Time	E.2.7	3.0	R	$\sqrt{3}$	1	1	1.73	1.7	∞
Integration Time	E.2.8	2.0	R	$\sqrt{3}$	1	1	1.15	1.1	∞
RF ambient Conditions	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.7	∞
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	$\sqrt{3}$	1	1	1.15	1.1 5	∞
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	$\sqrt{3}$	1	1	0.03	0.0 3	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5.2	5.0	R	$\sqrt{3}$	1	1	2.89	2.8 9	∞
Test sample Related									
Test sample positioning	E.4.2. 1	0.03	N	1	1	1	0.03	0.0 3	N-1
Device Holder Uncertainty	E.4.1. 1	5.00	N	1	1	1	5.00	5.0 0	N-1

Output power Power drift - SAR drift measurement	6.6.2	4.04	R	$\sqrt{3}$	1	1	2.33	2.33	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	∞
Liquid conductivity - deviation from target value	E.3.2	4.57	R	$\sqrt{3}$	0.64	0.43	1.69	1.13	∞
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	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	

5.2 UNCERTAINTY FOR SYSTEM PERFORMANCE CHECK

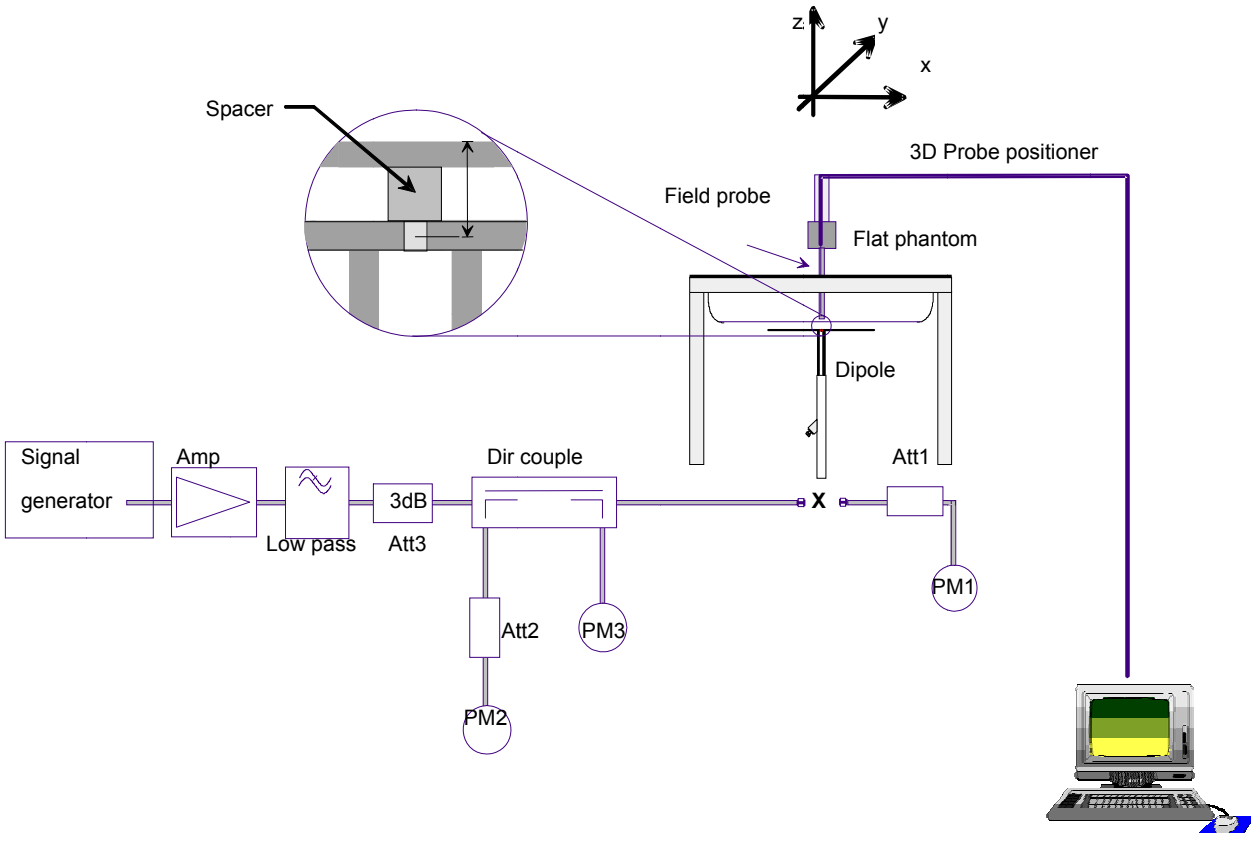
a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	Sec.	Tol (+-%)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System									
Probe calibration	E.2.1	4.76	N	1	1	1	4.76	4.7	∞
Axial Isotropy	E.2.2	2.5	R	$\sqrt{3}$	0.7	0.7	1.01	1.0	∞
Hemispherical Isotropy	E.2.2	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	1.15	∞
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5.2	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole									
Dipole axis to liquid Distance	8,E.4.2	1.00	N	$\sqrt{3}$	1	1	0.58	0.58	∞
Input power and SAR drift measurement	8,6.6.2	4.04	R	$\sqrt{3}$	1	1	2.33	2.33	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	∞
Liquid conductivity - deviation from target value	E.3.2	4.57	R	$\sqrt{3}$	0.64	0.43	1.69	1.13	∞
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	$\sqrt{3}$	0.64	0.43	1.85	1.24	M
Liquid permittivity - deviation from target value	E.3.2	3.69	R	$\sqrt{3}$	0.6	0.49	1.28	1.04	∞
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N	$\sqrt{3}$	0.6	0.49	3.46	2.83	M
Combined Standard Uncertainty			RSS				8.83	8.37	
Expanded Uncertainty (95% Confidence interval)			K=2				17.66	16.73	

6. 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

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

Frequency	450MHz
Target value(10g)	3.14 W/Kg
250 mW input power	0.759 W/Kg
Normalized to 1W value (10g)	3.036 W/Kg

Note: System checks the specific test data please see page 37-38 .

7. OPERATIONAL CONDITIONS DURING TEST

7.1 Body-worn Configurations

The body-worn configurations shall be tested with the supplied accessories (belt-clips, holsters, etc.) attached to the device in normal use configuration. The depth of the body tissue was 15.1cm.

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.

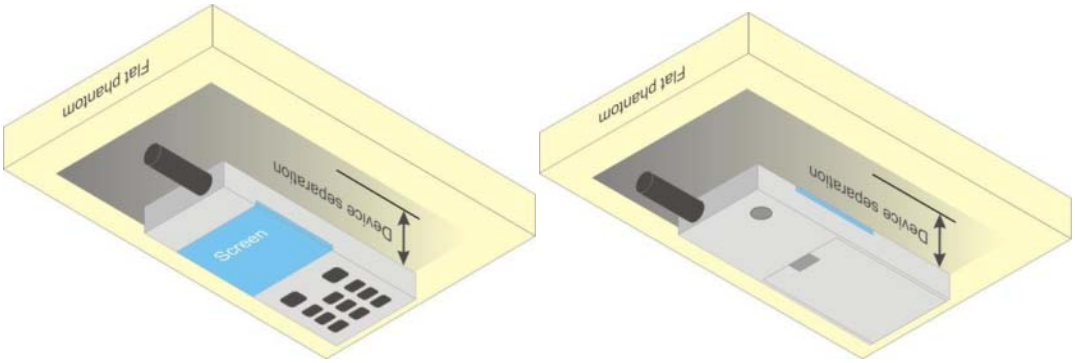


Illustration for Body Worn Position

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. The distance between of the device and the phantom was kept 5mm.

The separation distance 5mm is selected according to the user guide statement as below:

“It complies with the rules on exposure to radio frequencies when used in its normal position at the ear or at a minimum distance of 0.5 cm from the body.

Be sure to follow the instructions regarding the separation distance for establishing the transmission. If you use a case, belt-clip or holder for carrying the phone, it must not contain any metal and should be kept at a minimum distance of 0.5 cm from your body.”

The intended use of the DUT for body worn position is to carry the mobile phone on human body by non-metallic accessories and the typical use of this method will provide a face up and face down position to human body. The separation distance is clearly stated in the user guide as important information to the user. Therefore the separation distance 5mm and face up/face down positions are selected for this DUT.

7.2 Measurement procedure

The following steps are used for each test position

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

7.3 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.

8. MEASUREMENT OF CONDUCTED PEAK OUTPUT POWER

1. PTT Conducted peak output power

Channel	Frequency MHz	PK Power	AV Power
1	446.00625	26.07	25.88
2	446.01875	26.02	25.80
3	446.03125	26.03	25.79
4	446.04375	26.00	25.78
5	446.05625	26.07	25.88
6	446.06875	26.03	25.81
7	446.08125	26.04	25.81
8	446.09375	26.07	25.88

9. TEST RESULTS LIST

Summary of Measurement Results

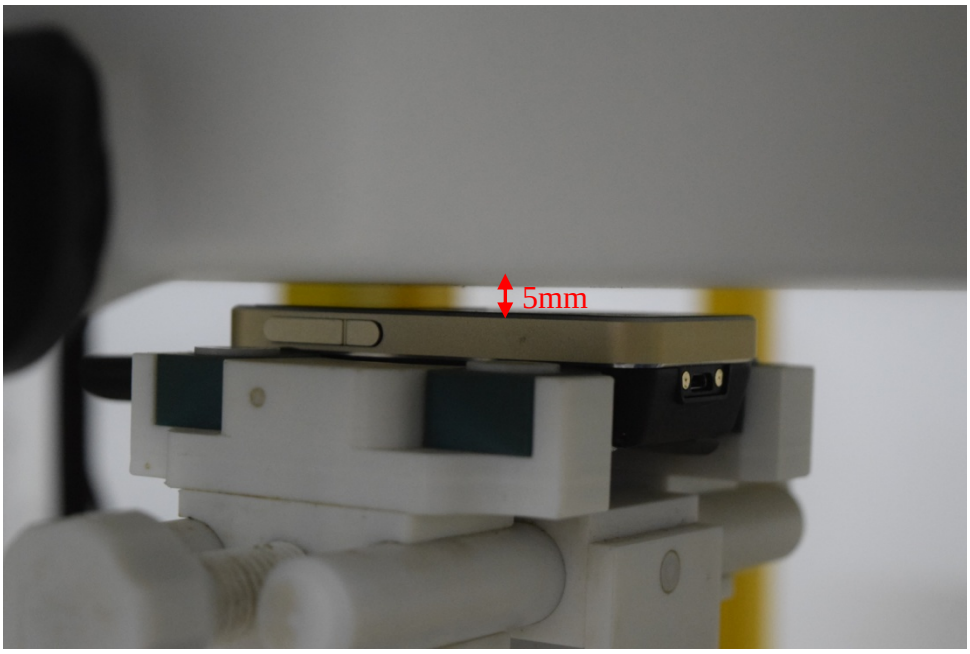
Temperature: 21.0~23.8°C, humidity: 54~60%.				
Phantom Configurations	Channel/Frequency	Antenna Positions	SAR(W/Kg), Limit: 10W/Kg	
			Value 10g Avg.	50% duty cycle
Face toward Flat phantom (Hold to face)				
Body (5 mm Separation)	1/446.00625MHz	External	1.046	0.523
	5/446.05625MHz	External	0.989	0.495
	8/446.09375MHz	External	0.976	0.488
Back with belt clip toward Flat phantom (Body-worn)				
Body (direct)	1/446.00625MHz	External	0.651	0.323
	5/446.05625MHz	External	0.648	0.324
	8/446.09375MHz	External	0.638	0.319

Note:

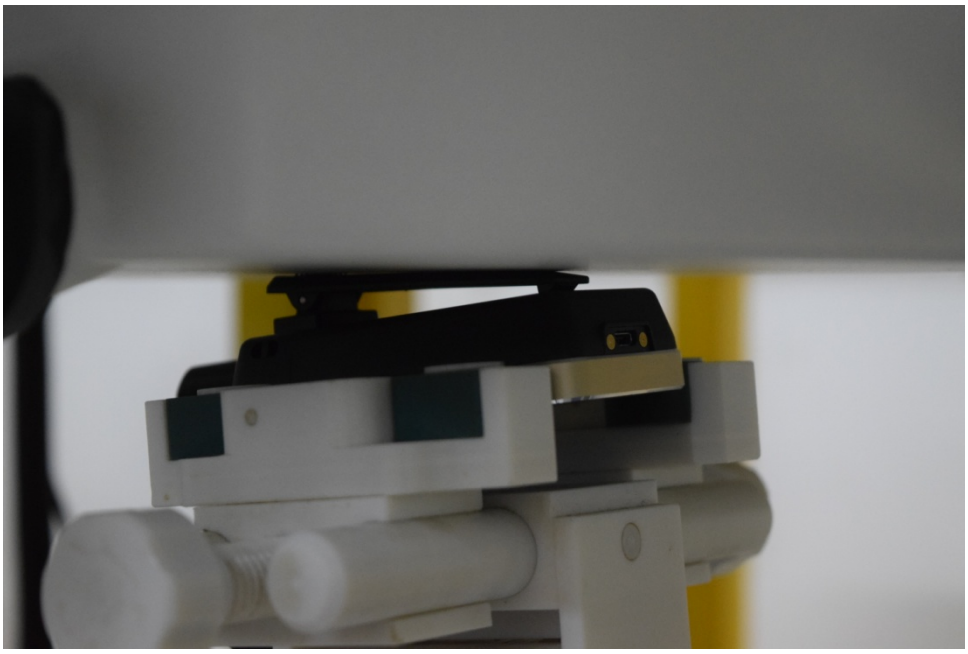
1. Head SAR is measured with the front surface of the radio positioned at 0.5 cm parallel to a flat phantom. Body SAR is measured with the radio placed in a body-worn accessory, positioned against a flat phantom, representative of the normal operating conditions expected by users and typically with a standard default audio accessory supplied with the radio.
2. The EUT is tested by 100% duty cycle. The EUT is controlled to continue transmitting.

ANNEX A PHOTOGRAPHS OF THE EUT

1 Held to face Conditio



2 Body-worn Condition



Liquid Level Photo

ANNEX B GRAPH 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: 2017.6.11

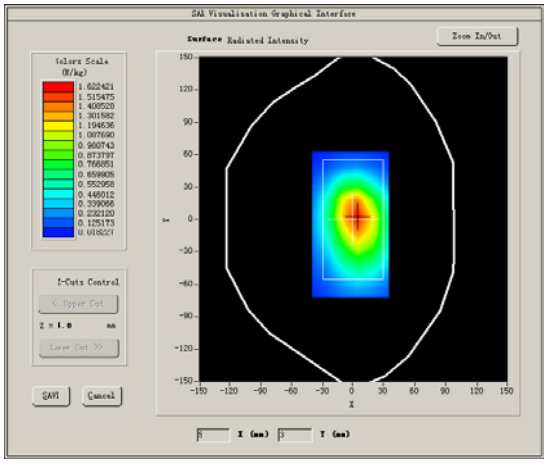
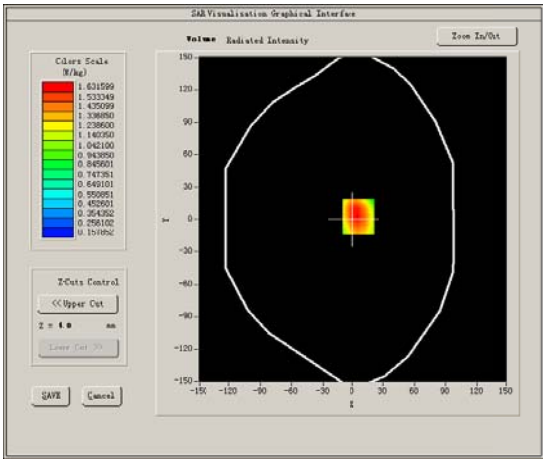
Measurement duration: 13 minutes 29 seconds

A. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	446.00625MHz
Channels	Ch 1
Signal	FM

B. SAR Measurement Results

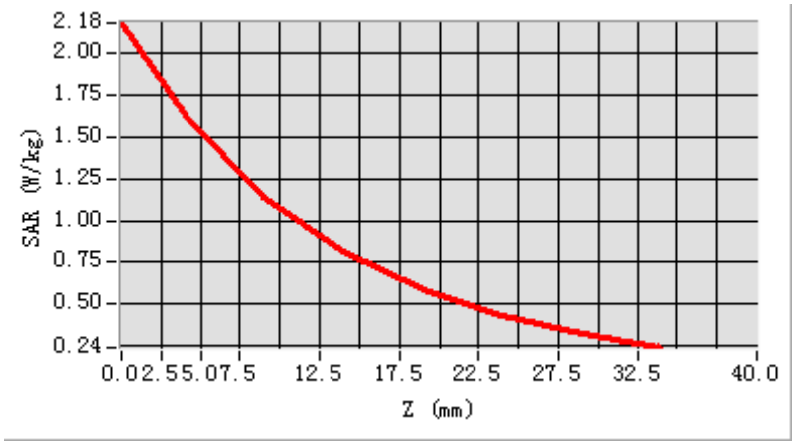
Frequency (MHz)	446.00625
Relative permittivity (real part)	43.464979
Conductivity (S/m)	0.863409
Power drift (%)	-2.800000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

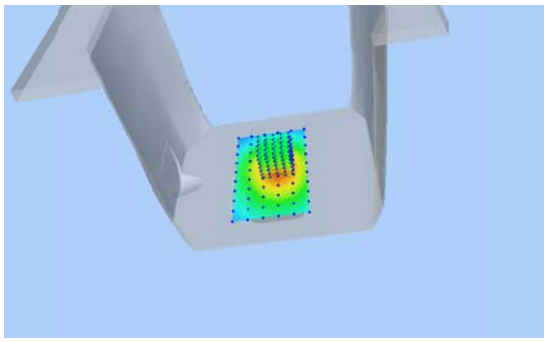
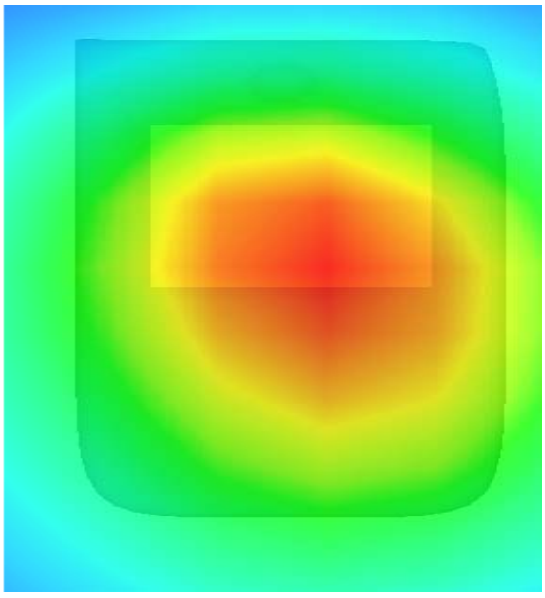
SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=3.00
SAR Peak: 2.24 W/kg

SAR 10g (W/Kg)	1.045948
SAR 1g (W/Kg)	1.583988

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**	**24.00**	**29.00**
SAR (W/Kg)	**2.1781**	**1.6316**	**1.1398**	**0.8114**	**0.5883**	**0.4307**	**0.3262**



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: 2017.6.11

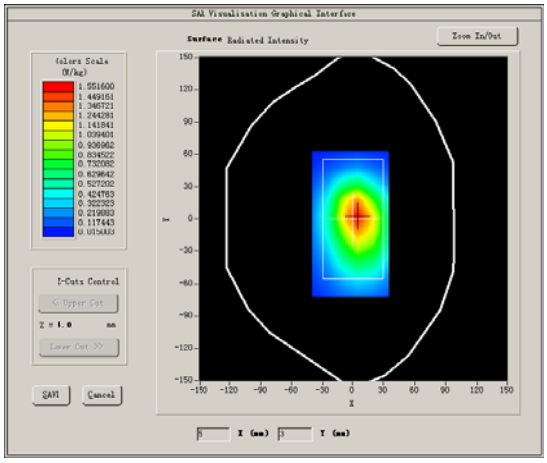
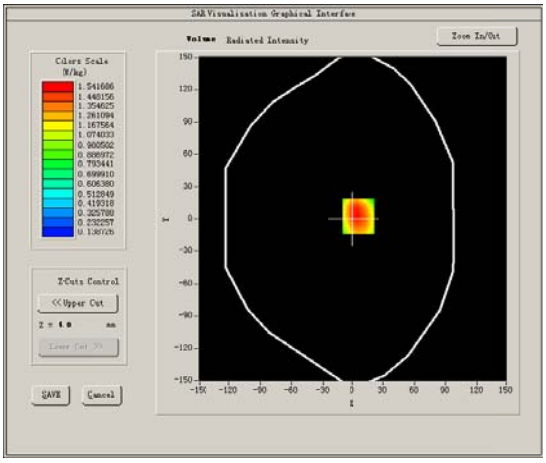
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	446.05625MHz
Channels	Ch 5
Signal	FM

B. SAR Measurement Results

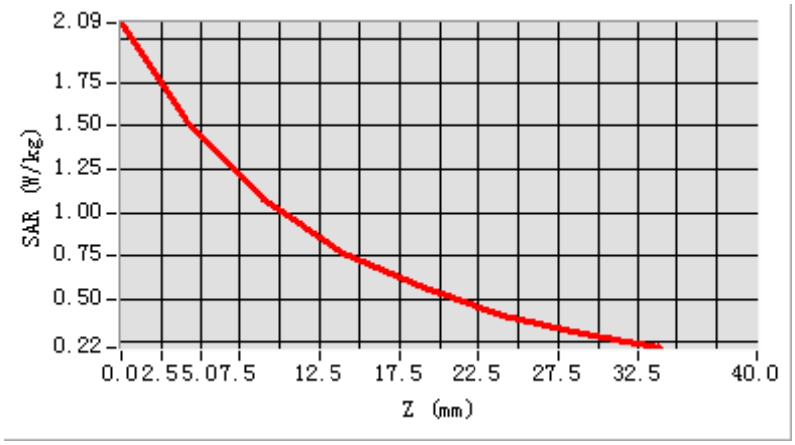
Frequency (MHz)	446.05625
Relative permittivity (real part)	43.464979
Conductivity (S/m)	0.863409
Power drift (%)	-3.310000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

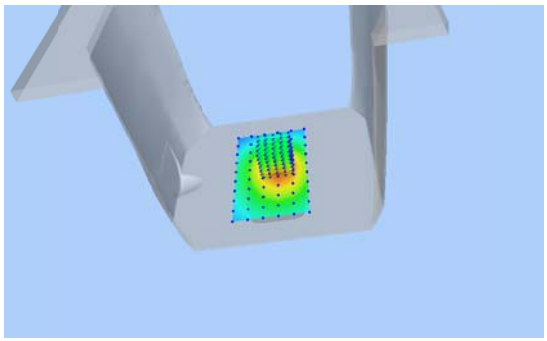
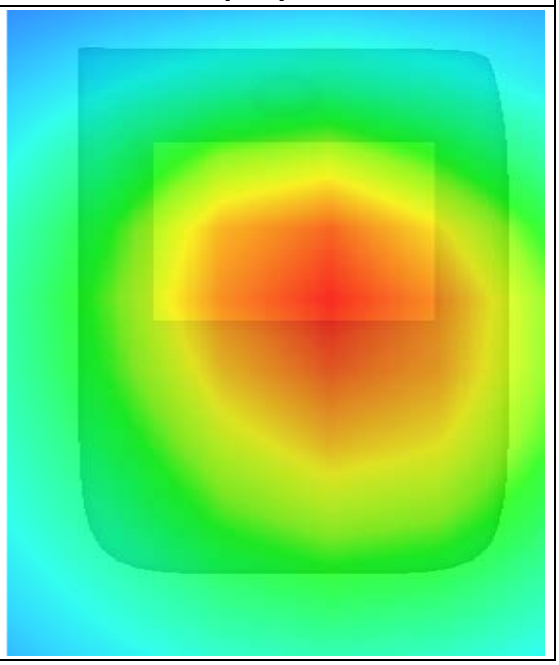
SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=3.00
SAR Peak: 2.11 W/kg

SAR 10g (W/Kg)	0.989124
SAR 1g (W/Kg)	1.496332

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.0912	1.5417	1.0720	0.7656	0.5635	0.4053	0.2995



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: 2017.6.11

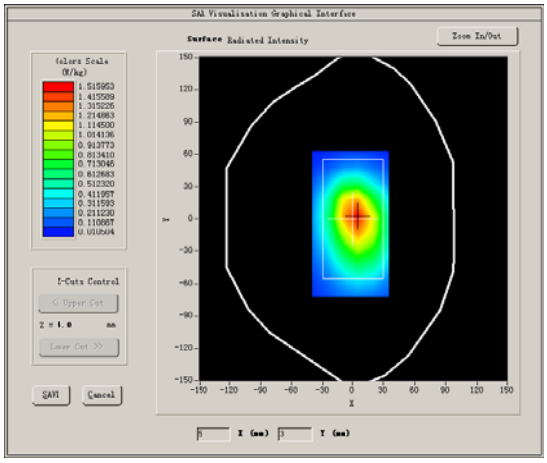
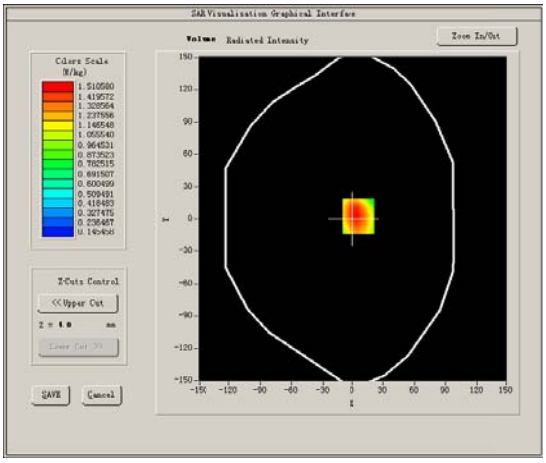
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	446.09375MHz
Channels	Ch 8
Signal	FM

B. SAR Measurement Results

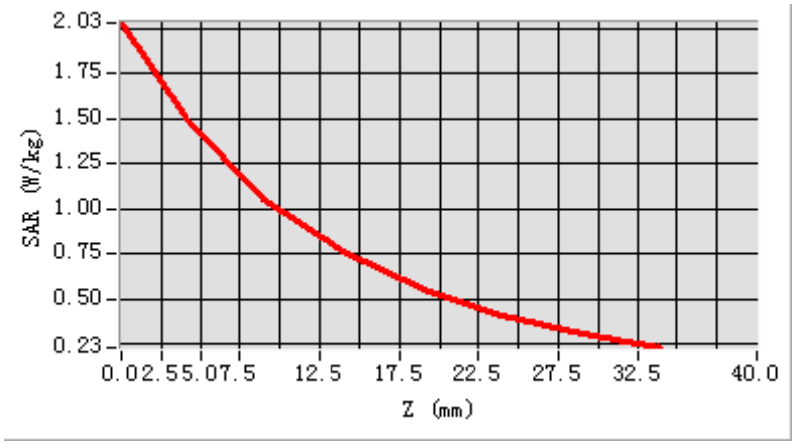
Frequency (MHz)	446.09375
Relative permittivity (real part)	43.464979
Conductivity (S/m)	0.863409
Power drift (%)	-2.140000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

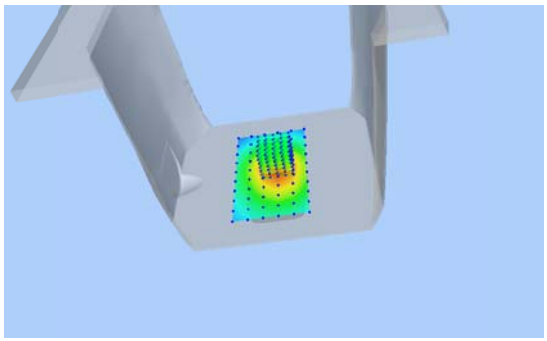
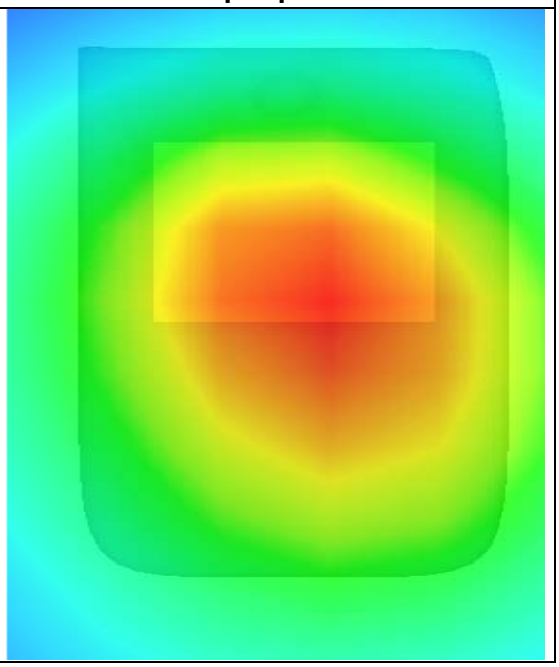
SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=3.00
SAR Peak: 2.12 W/kg

SAR 10g (W/Kg)	0.975949
SAR 1g (W/Kg)	1.482478

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.0292	1.5106	1.0552	0.7564	0.5494	0.4076	0.3025



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: 2017.6.11

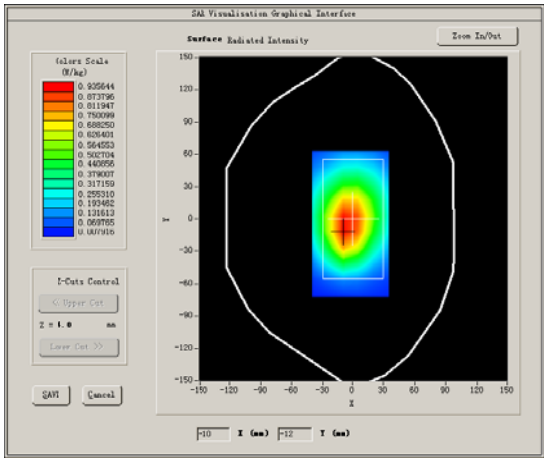
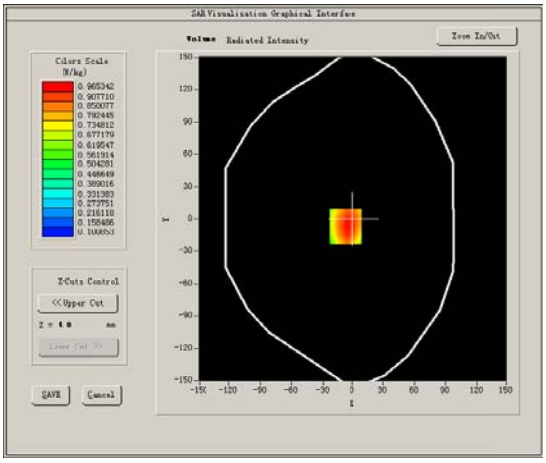
Measurement duration: 13 minutes 31 seconds

A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	446.00625MHz
Channels	Ch 1
Signal	FM

B. SAR Measurement Results

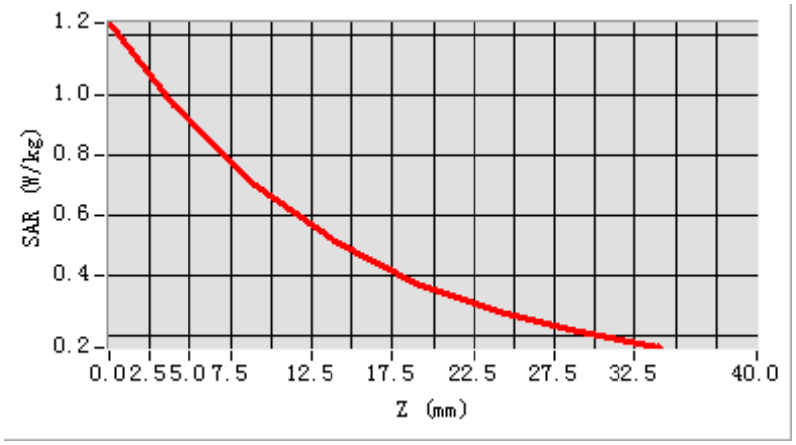
Frequency (MHz)	446.00625
Relative permittivity (real part)	43.464979
Conductivity (S/m)	0.863409
Power drift (%)	1.300000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

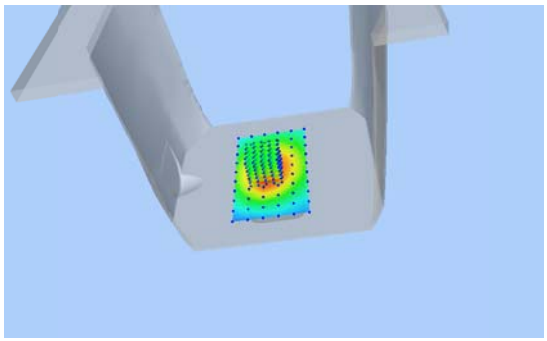
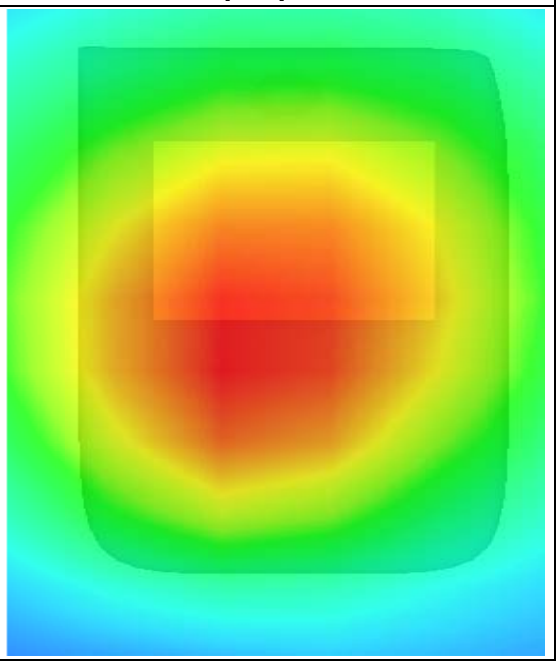
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-7.00, Y=-7.00
SAR Peak: 1.25 W/kg

SAR 10g (W/Kg)	0.651280
SAR 1g (W/Kg)	0.931843

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.2402	0.9653	0.6982	0.5160	0.3745	0.2817	0.2176



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: 2017.6.11

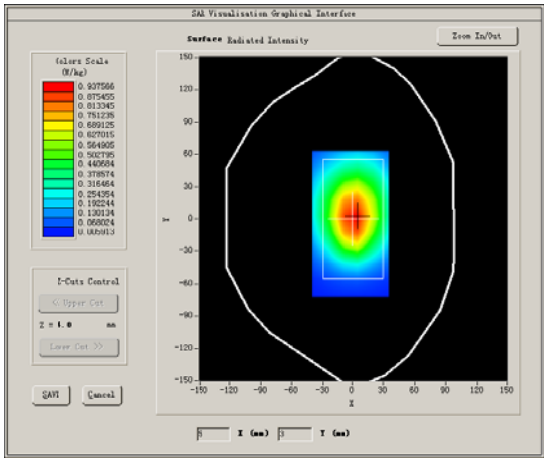
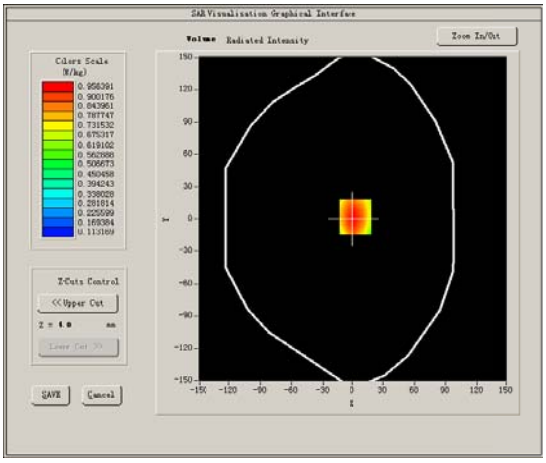
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	sam_direct_droit2_surf8mm.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	446.05625MHz
Channels	Ch 5
Signal	FM

B. SAR Measurement Results

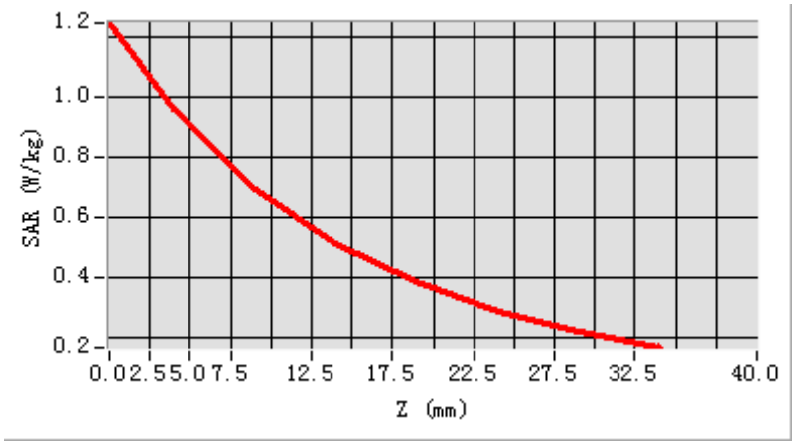
Frequency (MHz)	446.05625
Relative permittivity (real part)	43.464979
Conductivity (S/m)	0.863409
Power drift (%)	2.310000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

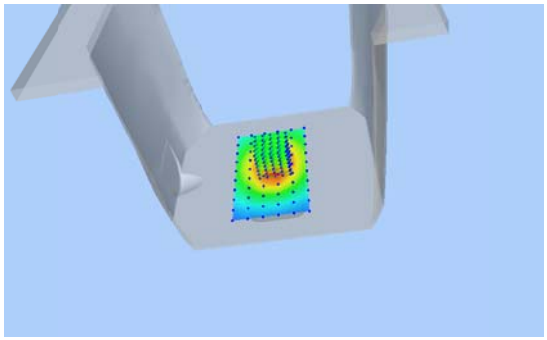
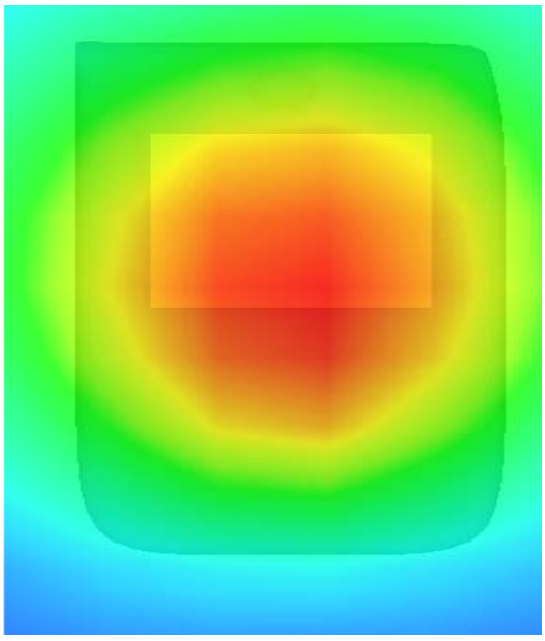
SURFACE SAR	VOLUME SAR
	

Maximum location: X=2.00, Y=2.00
SAR Peak: 1.25 W/kg

SAR 10g (W/Kg)	0.647799
SAR 1g (W/Kg)	0.929481

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.2451	0.9564	0.6919	0.5164	0.3855	0.2853	0.2222



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: 2017.6.11

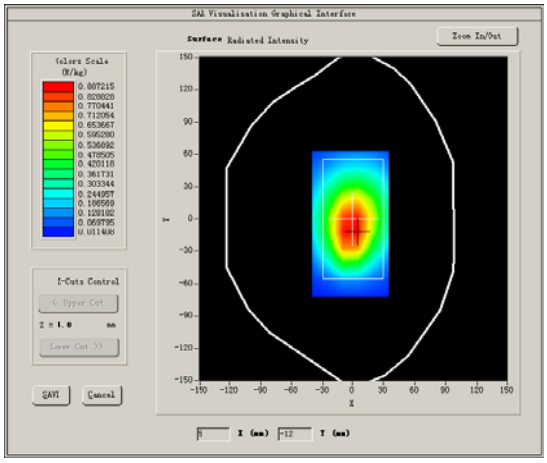
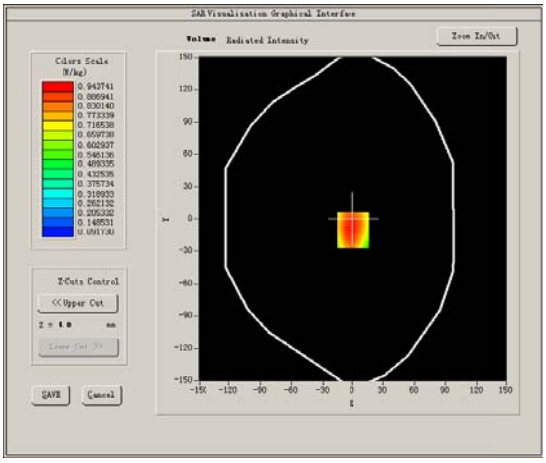
Measurement duration: 13 minutes 30 seconds

A. Experimental conditions.

Phantom File	surf_sam_plan.txt
Phantom	Validation plane
Device Position	Flat phantom
Band	446.09375MHz
Channels	Ch 8
Signal	FM

B. SAR Measurement Results

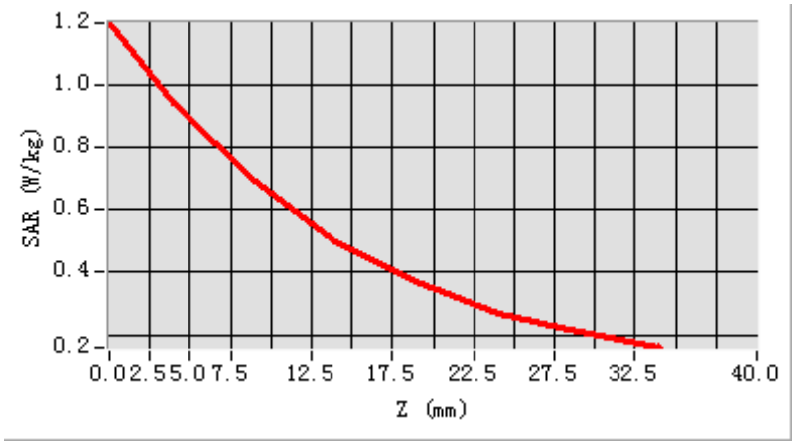
Frequency (MHz)	446.09375
Relative permittivity (real part)	43.464979
Conductivity (S/m)	0.863409
Power drift (%)	1.080000
Ambient Temperature:	22.3°C
Liquid Temperature:	22.6°C
ConvF:	7.77
Crest factor:	1:1

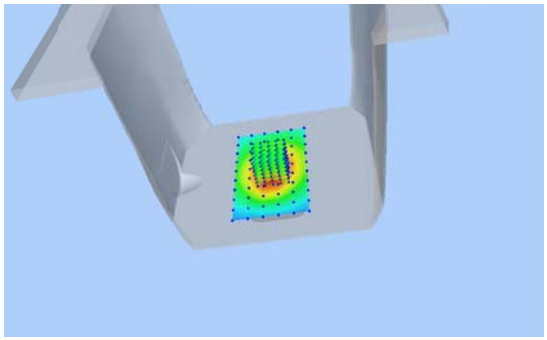
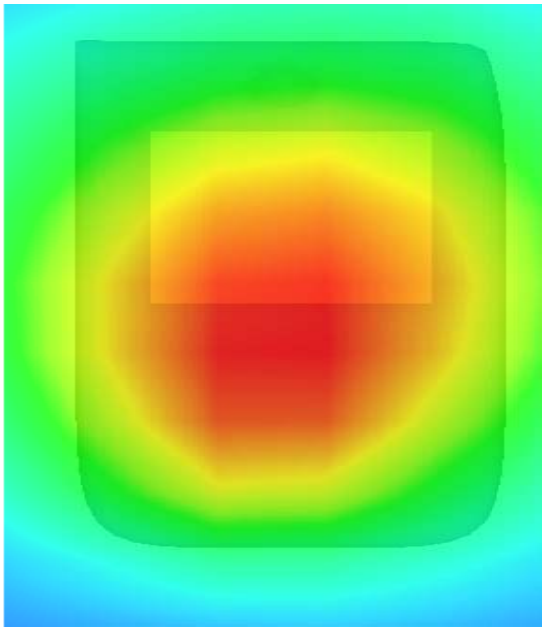
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-10.00
SAR Peak: 1.24 W/kg

SAR 10g (W/Kg)	0.637706
SAR 1g (W/Kg)	0.920185

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.1995	0.9437	0.6925	0.4978	0.3721	0.2694	0.2103



3D screen shot	Hot spot position
	

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: 2017.6.11

Measurement duration: 13 minutes 27 seconds

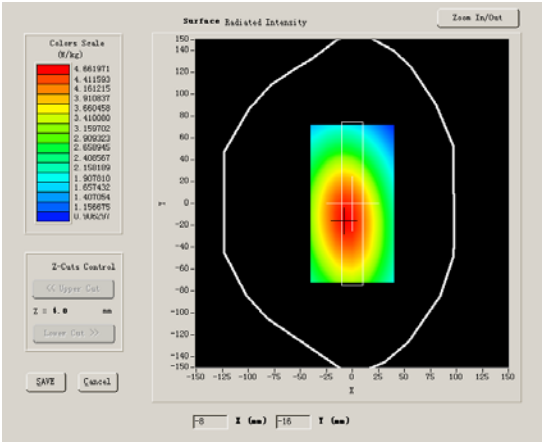
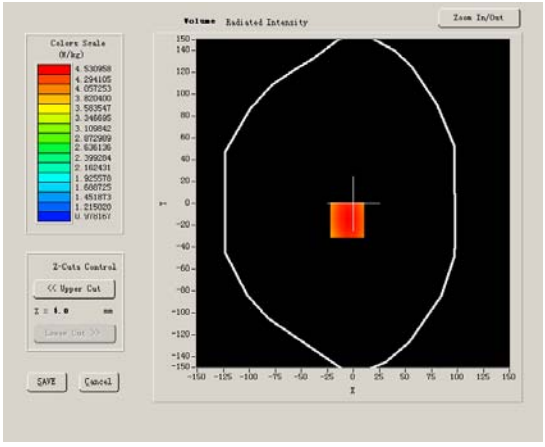
A. Experimental conditions.

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)	43.464979
Conductivity (S/m)	0.863409
Power Drift (%)	1.220000
Ambient Temperature:	22.0°C
Liquid Temperature:	21.8°C
ConvF:	7.77
Crest factor:	1:1

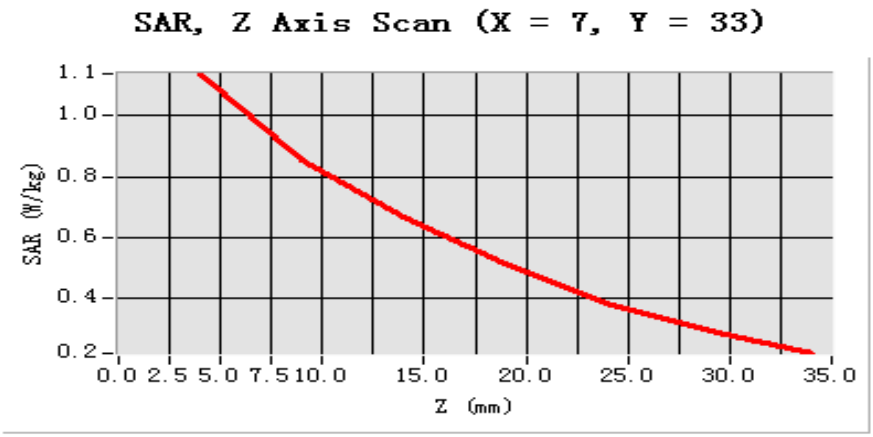
SURFACE SAR	VOLUME SAR
	

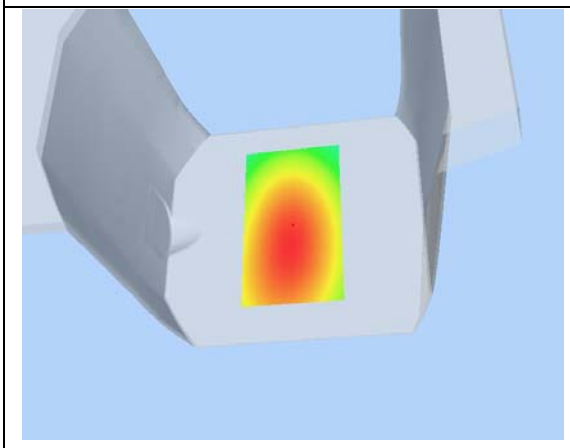
Maximum location: X=7.00, Y=33.00

SAR 10g (W/Kg)	0.759428
SAR 1g (W/Kg)	1.356247

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



3D sceen shot	Hot spot position
	

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
CNAS No.:	L3572

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	Rohde&Schwarz (CMW500,SN:124534)	2017-5-25	1year
3	Voltmeter	Keithley (2000, SN:1000572)	2016-8-21	1year
4	Synthetizer	Rohde&Schwarz (SML_03, SN:101868)	2016-8-24	1year
5	Amplifier	Nucl udes (ALB216, SN:10800)	2016-8-24	1year
6	Power Meter	Rohde&Schwarz (NRVD, SN:101066)	2016-8-24	1year
7	Power Meter	Rohde&Schwarz (NRVD, SN:102055)	2016-7-21	1year
8	Power Sensor	MA2411B	2016-8-24	1year
9	Power Sensor	N1921A	2016-7-21	1year
10	Probe	Satimo (SN:SN 37/08 EP80)	2016-7-05	1year
11	Phantom	Satimo (SN:SN_36_08_SAM62)	N/A	N/A
12	Liquid	Satimo (Last Calibration: 2017-06-11)	N/A	N/A
13	Dipole 450MHz	Satimo (SN 36/08 DIPB 98)	2016-7-05	1year
14	Thermo meter	KTJ(mode-01)	2016-7-05	1year

***** END OF REPORT *****