SAR Test Report

Report No.: AGC08463190601FH01

FCC ID	:	2ATSTXG
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	smart watch
BRAND NAME	:	N/A
MODEL NAME	:	W87, W90, W81, W102, W104, W95, W100, W101
APPLICANT	:	Shenzhen Sinophy Technology Co., Ltd
DATE OF ISSUE	:	July 16,2019
STANDARD(S)	:	IEEE Std. 1528:2013 FCC 47CFR § 2.1093 IEEE/ANSI C95.1:2005
REPORT VERSION	:	V1.0

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	July 16,2019	Valid	Initial Release

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Test Report

Applicant Name	Shenzhen Sinophy Technology Co., Ltd
Applicant Address	4th Floor, Bldg. C, Guosheng Industry Area, Junxin Road, Guanlan Town, Longhua District, Shenzhen of China
Manufacturer Name	Shenzhen Sinophy Technology Co., Ltd
Manufacturer Address	4th Floor, Bldg. C, Guosheng Industry Area, Junxin Road, Guanlan Town, Longhua District, Shenzhen of China
Factory Name	Shenzhen Sinophy Technology Co., Ltd
Factory Address	4th Floor, Bldg. C, Guosheng Industry Area, Junxin Road, Guanlan Town, Longhua District, Shenzhen of China
Product Designation	smart watch
Brand Name	N/A
Model Name	W87, W90, W81, W102, W104, W95, W100, W101
Different Description	only outside looking is difference,PCB functions all same
EUT Voltage	DC3.7V by battery
Applicable Standard	IEEE Std. 1528:2013 FCC 47CFR § 2.1093 IEEE/ANSI C95.1:2005
Test Date	July 03,2019
Report Template	AGCRT-US-2.5G/SAR (2018-01-01)

Note: The results of testing in this report apply to the product/system which was tested only.

Tested By

Eric Zhou(Zhou Yongkang) July 03,2019

Checked By

Jack Gui (Gui Jiafeng) July 16,2019

Authorized By

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Authorized Officer
July 16,2019

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1. SUMMARY OF MAXIMUM SAR VALUE

The maximum results of Specific Absorption Rate (SAR) found during testing for EUT are as follows:

Frequency Band	Highest Reported 1g-SAR(W/Kg)		SAR Test Result
	Face-up 1g-SAR(W/kg)	Body back touch 10(g)-Extremity-SAR(W/kg)	
GSM 850	0.713	0.720	PASS
PCS 1900	0.159	0.422	
Simultaneous Reported SAR	0.734	0.761	
SAR Test Limit (W/Kg)	1.6	4.0	

This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6W/Kg& 4.0W/Kg) specified in IEEE Std. 1528:2013; FCC 47CFR § 2.1093; IEEE/ANSI C95.1:2005 and the following specific FCC Test Procedures:

- KDB 447498 D01 General RF Exposure Guidance v06
- KDB 865664 D01 SAR Measurement 100MHz to 6GHz v01r04
- KDB 941225 D01 3G SAR Procedures v03r01

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2. GENERAL INFORMATION

2.1. EUT Description

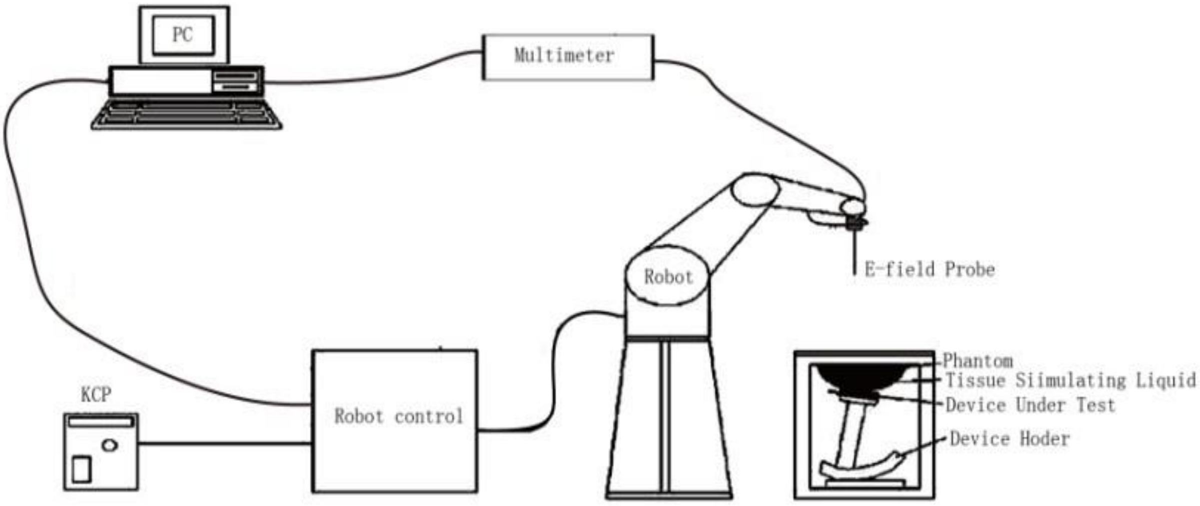
General Information	
Product Designation	smart watch
Test Model	W87
Hardware Version	W13S_MB_V1.2
Software Version	W13_61D_W88_B_QCY_7789_V1_190424_
Device Category	Portable
RF Exposure Environment	Uncontrolled
Antenna Type	Internal
GSM and GPRS	
Support Band	☒GSM 850 ☒PCS 1900 (U.S. Bands) ☒GSM 900 ☒DCS 1800 (Non-U.S. Bands)
GPRS Type	Class B
GPRS Class	Class 12(1Tx+4Rx, 2Tx+3Rx, 3Tx+2Rx, 4Tx+1Rx)
TX Frequency Range	GSM 850 : 820-850MHz;; PCS 1900: 1850-1910MHz;
RX Frequency Range	GSM 850 : 869~894MHz; PCS 1900: 1930~1990MHz
Release Version	R99
Type of modulation	GMSK for GSM/GPRS
Antenna Gain	GSM850:1.11dBi; PCS1900: 1.20dBi;
Max. Average Power	GSM850: 31.93dBm ;PCS1900: 28.96dBm
Bluetooth	
Bluetooth Version	☐V2.0 ☐V2.1 ☐V2.1+EDR ☒V3.0 ☐V3.0+HS ☐V4.0 ☐V4.1
Operation Frequency	2402~2480MHz
Type of modulation	☒GFSK ☒Π/4-DQPSK ☒8-DPSK
Peak Power	-0.689dBm
Antenna Gain	0dBi
Accessories	
Battery	Brand name: N/A Model No. : YX-W9A Voltage and Capacitance: 3.7 V & 380mAh
Earphone	Brand name: N/A Model No. : N/A

Note:1.CMU200 can measure the average power and Peak power at the same time
2.The sample used for testing is end product.

Product	Type	
	☒ Production unit	☐ Identical Prototype

3. SAR MEASUREMENT SYSTEM

3.1. The SATIMO system used for performing compliance tests consists of following items



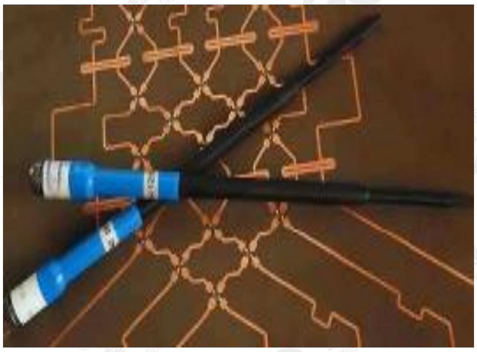
The COMOSAR system for performing compliance tests consists of the following items:

- The PC. It controls most of the bench devices and stores measurement data.A computer running WinXP and the Opensar software.
- The E-Field probe. The probe is a 3-axis system made of 3 distinct dipoles. Each dipole returns a voltage in function of the ambient electric field.
- The Keithley multimeter measures each probe dipole voltages.
- The SAM phantom simulates a human head. The measurement of the electric field is made inside the phantom.
- The liquids simulate the dielectric properties of the human head tissues.
- The network emulator controls the mobile phone under test.
- The validation dipoles are used to measure a reference SAR. They are used to periodically check the bench to make sure that there is no drift of the system characteristics over time.
- The phantom, the device holder and other accessories according to the targeted measurement.

3.2. COMOSAR E-Field Probe

The SAR measurement is conducted with the dosimetric probe manufactured by SATIMO. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. SATIMO conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528 and relevant KDB files.) The calibration data are in Appendix D.

Isotropic E-Field Probe Specification

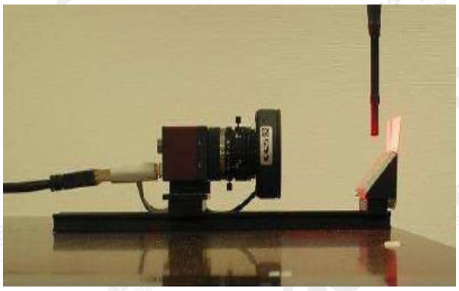
<table>
<tr><td>Model</td><td colspan="2">SSE5</td></tr>
<tr><td>Manufacture</td><td colspan="2">MVG</td></tr>
<tr><td>Identification No.</td><td colspan="2">SN 22/12 EP159</td></tr>
<tr><td>Frequency</td><td>0.45GHz-3GHz
Linearity:±0.11dB(0.45GHz-3GHz)</td><td rowspan="3"></td></tr>
<tr><td>Dynamic Range</td><td>0.01W/Kg-100W/Kg
Linearity:±0.11dB</td></tr>
<tr><td>Dimensions</td><td>Overall length:330mm
Length of individual dipoles:4.5mm
Maximum external diameter:8mm
Probe Tip external diameter:5mm
Distance between dipoles/ probe extremity:2.7mm</td></tr>
<tr><td>Application</td><td colspan="2">High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 3 GHz with precisin of better 30%.</td></tr>
</table>

3.3. Robot

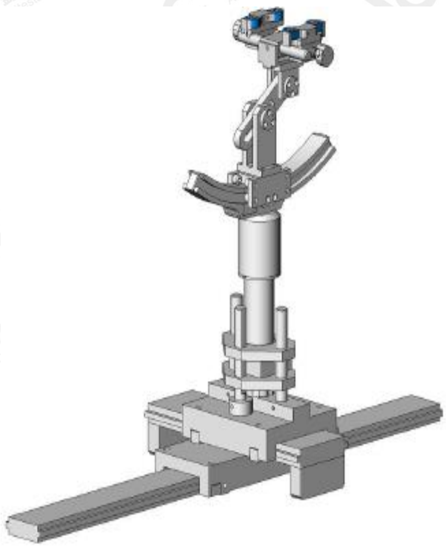
The COMOSAR system uses the KUKA robot from SATIMO SA (France).For the 6-axis controller COMOSAR system, the KUKA robot controller version from SATIMO is used.
The XL robot series have many features that are important for our application:

□ High precision (repeatability 0.02 mm)
□ High reliability (industrial design)
□ Jerk-free straight movements
□ Low ELF interference (the closed metallic construction shields against motor control fields)
□ 6-axis controller

3.4. Video Positioning System

The video positioning system is used in OpenSAR to check the probe. Which is composed of a camera, LED, mirror and mechanical parts.The camera is piloted by the main computer with firewire link. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.	

3.5. Device Holder

The COMOSAR device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR). Thus the device needs no repositioning when changing the angles. The COMOSAR device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity $\varepsilon r = 3$ and loss tangent $\delta = 0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.	

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3.6. SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas: □ Left head □ Right head □ Flat phantom	

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

4. SAR MEASUREMENT PROCEDURE

4.1. Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in 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 occupational/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

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 given mass density (ρ). 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 can be obtained using either of the following equations:

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

$$SAR = c_h \left.\frac{dT}{dt}\right|_{t=0}$$

Where

SAR is the specific absorption rate in watts per kilogram;
E is the r.m.s. value of the electric field strength in the tissue in volts per meter;
σ is the conductivity of the tissue in siemens per metre;
ρ is the density of the tissue in kilograms per cubic metre;
c_h is the heat capacity of the tissue in joules per kilogram and Kelvin;

$\frac{dT}{dt} | t = 0$ is the initial time derivative of temperature in the tissue in kelvins per second

4.2. SAR Measurement Procedure

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface is 2.7mm This distance cannot be smaller than the distance os sensor calibration points to probe tip as `defined in the probe properties,

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in SATIMO software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in db) is specified in the standards for compliance testing. For example, a 2db range is required in IEEE Standard 1528, whereby 3db is a requirement when compliance is assessed in accordance with the ARIB standard (Japan) If one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximum are detected, the number of Zoom Scan has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100MHz to 6GHz

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

Step 3: Zoom Scan

Zoom Scan are used to assess the peak spatial SAR value within a cubic average volume containing 1g abd 10g of simulated tissue. The Zoom Scan measures points(refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1g and 10g and displays these values next to the job's label.

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Zoom Scan Parameters extracted from KDB865664 d01 SAR Measurement 100MHz to 6GHz

<table>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

Step 4: Power Drift Measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the same settings. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

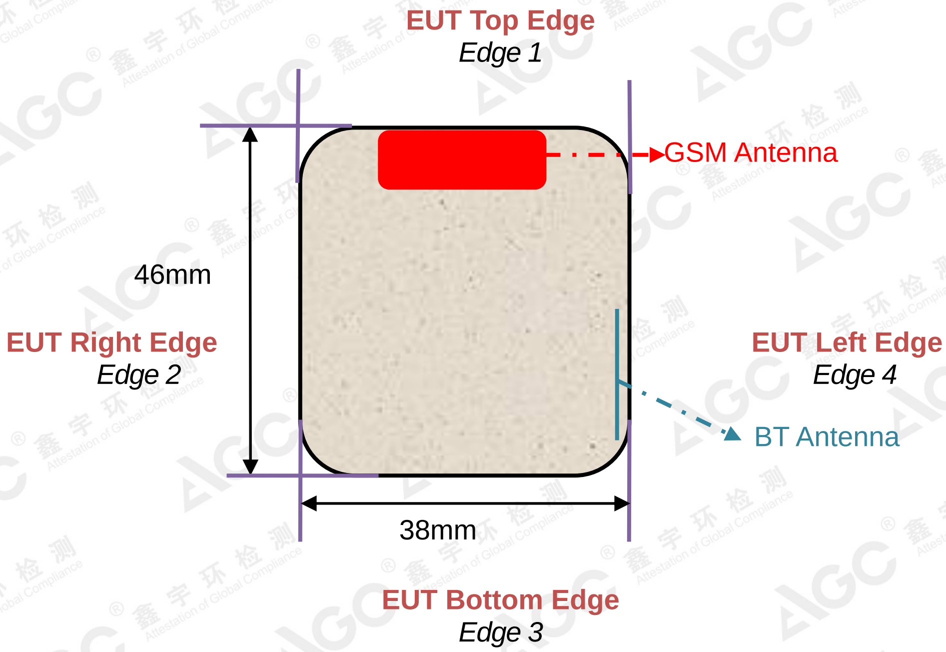
4.3. RF Exposure Conditions

Test Configuration and setting:

The EUT is a model of GSM Portable Mobile Station (MS). It supports GSM/GPRS and BT.

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

Antenna Location: (the back view)



5. TISSUE SIMULATING LIQUID

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 15cm. For head SAR testing the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15cm For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15cm.The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in 4.2

5.1. The composition of the tissue simulating liquid

Ingredient (% Weight) / Frequency (MHz)	Water	Nacl	Polysorbate 20	DGBE	1,2 Propanediol	Triton X-100
835 Head	50.36	1.25	48.39	0.0	0.0	0.0
835 Body	54.00	1	0.0	15	0.0	30
1900 Head	54.9	0.18	0.0	44.92	0.0	0.0
1900 Body	70	1	0.0	9	0.0	20

5.2. Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in IEEE 1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in IEEE 1528.

Target Frequency (MHz)	head		body	
	εr	σ (S/m)	εr	σ (S/m)
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	**41.5**	**0.90**	**55.2**	**0.97**
900	41.5	0.97	55.0	1.05
915	41.5	1.01	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	**40.0**	**1.40**	**53.3**	**1.52**
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73

(εr = relative permittivity, σ = conductivity and ρ = 1000 kg/m3)

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5.3. Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using SATIMO Dielectric Probe Kit and R&S Network Analyzer ZVL6.

Tissue Stimulant Measurement for 835MHz					
Head	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [ºC]	Test time
		εr 41.5 (39.425-43.575)	δ[s/m] 0.90(0.855-0.945)		
	824.2	43.15	0.89	20.5	July 03,2019
	835	42.16	0.91		
	836.6	41.23	0.92		
	848.8	40.59	0.93		
Body	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [oC]	Test time
		εr 55.20(52.44-57-96)	δ[s/m]0.97(0.9215-1.0185)		
	824.2	55.05	0.93	20.6	July 03,2019
	835	54.62	0.96		
	836.6	53.95	0.98		
	848.8	52.81	0.99		

Tissue Stimulant Measurement for 1900MHz					
Head	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [ºC]	Test time
		εr40.00(38.00-42.00)	δ[s/m]1.40(1.33-1.47)		
	1850.2	41.89	1.38	20.6	July 03,2019
	1880	41.78	1.40		
	1900	41.56	1.42		
	1909.8	40.26	1.43		
Body	Fr. (MHz)	Dielectric Parameters (±5%)		Tissue Temp [oC]	Test time
		εr53.30(50.635-55.965)	δ[s/m]1.52(1.444-1.596)		
	1850.2	54.10	1.45	20.6	July 03,2019
	1880	53.62	1.46		
	1900	52.64	1.48		
	1909.8	51.92	1.50		

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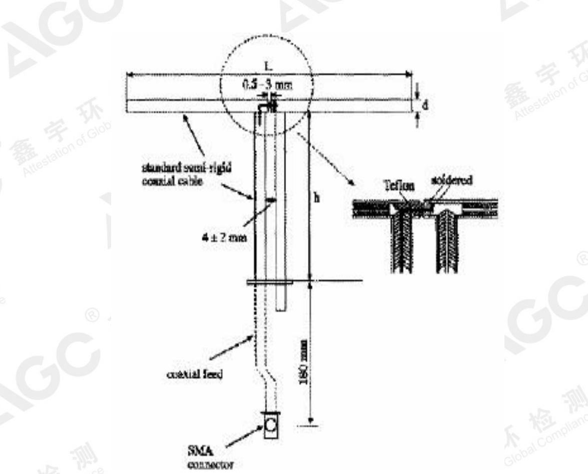
6. SAR SYSTEM CHECK PROCEDURE

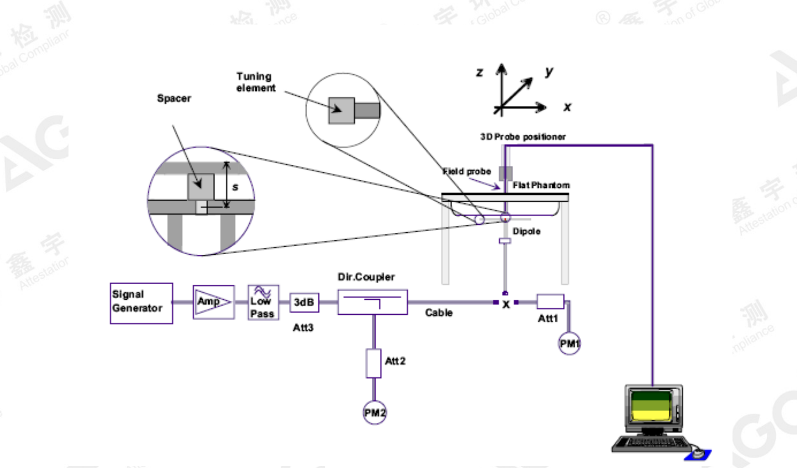
6.1. SAR System Check Procedures

SAR system check is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are remeasured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

Each SATIMO system is equipped with one or more system check kits. These units, together with the predefined measurement procedures within the SATIMO software, enable the user to conduct the system check and system validation. System kit includes a dipole, and dipole device holder.

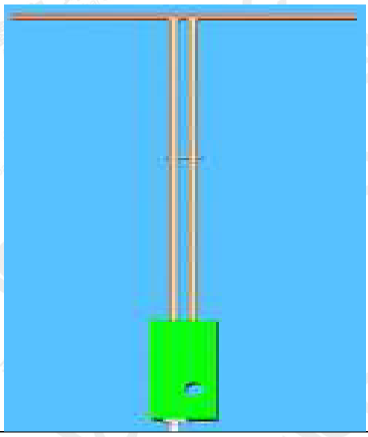
The system check verifies that the system operates within its specifications. It’s performed daily or before every SAR measurement. The system check uses normal SAR measurement in the flat section of the phantom with a matched dipole at a specified distance. The system check setup is shown as below.





6.2. SAR System Check

6.2.1. Dipoles



The dipoles used are based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of IEEE. the table below provides details for the mechanical and electrical Specifications for the dipoles.

Frequency	L (mm)	h (mm)	d (mm)
835MHz	161.0	89.8	3.6
1900MHz	68	39.5	3.6

6.2.2. System Check Result

System Performance Check at 835MHz&1900MHz for Head								
Validation Kit: SN29/15 DIP 0G835-383&SN 29/15 DIP 1G900-389								
Frequency [MHz]	Target Value(W/Kg)		Reference Result (± 10%)		Tested Value(W/Kg)		Tissue Temp. [°C]	Test time
	1g	10g	1g	10g	1g	10g		
835	10.04	6.43	9.036-11.044	5.787 -7.073	9.48	6.15	20.5	July 03,2019
1900	41.44	21.33	37.296-45.584	19.197-23.463	38.33	20.36	20.6	July 03,2019
System Performance Check at 835 MHz &1900MHz for Body								
Frequency [MHz]	Target Value(W/Kg)		Reference Result (± 10%)		Tested Value(W/Kg)		Tissue Temp. [°C]	Test time
	1g	10g	1g	10g	1g	10g		
835	9.85	6.45	8.865-10.835	5.805-7.095	9.25	6.00	20.6	July 03,2019
1900	39.38	20.86	35.442-43.318	18.774-22.946	39.33	20.80	20.6	July 03,2019

Note:
(1) We use a CW signal of 18dBm for system check, and then all SAR values are normalized to 1W forward power. The result must be within ±10% of target value.

7. EUT TEST POSITION

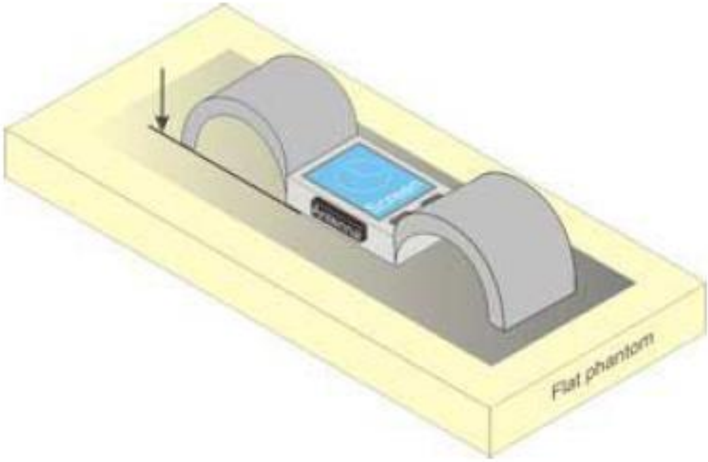
This EUT was tested in **Front Face and Rear Face**

7.4. Test Position

(1) To position the EUT parallel to the phantom surface.

(2) To adjust the EUT parallel to the flat phantom.

(3) To adjust the distance between the EUT surface and the flat phantom to **10mm** while used in front of face, and **0mm** while used in body back.



8. SAR EXPOSURE LIMITS

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

Type Exposure	Uncontrolled Environment Limit (W/kg)
Spatial Peak SAR (1g cube tissue for brain or body)	1.60
Spatial Average SAR (Whole body)	0.08
Spatial Peak SAR (Limbs)	4.0

9. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

10. TEST EQUIPMENT LIST

Equipment description	Manufacturer/ Model	Identification No.	Current calibration date	Next calibration date
SAR Probe	MVG	SN 22/12 EP159	Aug. 08,2018	Aug. 07,2019
Phantom	SATIMO	SN_4511_SAM90	Validated. No cal required.	Validated. No cal required.
Liquid	SATIMO	-	Validated. No cal required.	Validated. No cal required.
Comm Tester	Agilent-8960	GB46310822	Feb. 27,2019	Feb. 26,2020
Multimeter	Keithley 2000	4114939	Sep. 20,2018	Sep. 19,2019
Dipole	SATIMO SID835	SN29/15 DIP 0G835-383	July 05,2016	July 04,2019
Dipole	SATIMO SID1900	SN 29/15 DIP 1G900-389	July 05,2016	July 04,2019
Signal Generator	Agilent-E4438C	US41461365	Nov. 01,2018	Oct. 31,2019
Vector Analyzer	Agilent / E4440A	US41421290	Feb. 27,2019	Feb. 26,2020
Network Analyzer	Rhode & Schwarz ZVL6	SN101443	Nov. 01,2018	Oct. 31,2019
Attenuator	Warison /WATT-6SR1211	S/N:WRJ34AYM2F1	June 11,2019	June 10, 2020
Attenuator	Mini-circuits / VAT-10+	31405	June 11,2019	June 10, 2020
Amplifier	EM30180	SN060552	Feb. 27,2019	Feb. 26,2020
Directional Couple	Werlatone/ C5571-10	SN99463	June 12,2019	June 11,2020
Directional Couple	Werlatone/ C6026-10	SN99482	June 12,2019	June 11,2020
Power Sensor	NRP-Z21	1137.6000.02	Sep. 20,2018	Sep. 19,2019
Power Sensor	NRP-Z23	US38261498	Feb. 19,2019	Feb. 18,2020
Power Viewer	R&S	V2.3.1.0	N/A	N/A

Note: Per KDB 865664 Dipole SAR Validation, AGC Lab has adopted 3 years calibration intervals. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:
1. There is no physical damage on the dipole;
2. System validation with specific dipole is within 10% of calibrated value;
3. Return-loss is within 20% of calibrated measurement;
4. Impedance is within 5Ω of calibrated measurement.

11. MEASUREMENT UNCERTAINTY

Measurement uncertainty for Dipole averaged over 1 gram / 10 gram.									
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	5.831	N	1	1	1	5.83	5.83	∞
Axial Isotropy	E.2.2	0.579	R	$\sqrt{3}$	√0.5	√0.5	0.24	0.24	∞
Hemispherical Isotropy	E.2.2	0.813	R	$\sqrt{3}$	√0.5	√0.5	0.33	0.33	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	E.2.4	1.26	R	$\sqrt{3}$	1	1	0.73	0.73	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	E2.5	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Readout Electronics	E.2.6	0.021	N	1	1	1	0.021	0.021	∞
Response Time	E.2.7	0	R	$\sqrt{3}$	1	1	0	0	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF ambient conditions-Noise	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient conditions-reflections	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Test sample Related									
Test sample positioning	E.4.2	2.6	N	1	1	1	2.6	2.6	∞
Device holder uncertainty	E.4.1	3	N	1	1	1	3	3	∞
Output power variation—SAR drift measurement	E.2.9	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
SAR scaling	E.6.5	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Phantom and tissue parameters									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid conductivity measurement	E.3.3	4	N	1	0.78	0.71	3.12	2.84	M
Liquid permittivity measurement	E.3.3	5	N	1	0.23	0.26	1.15	1.30	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid permittivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Combined Standard Uncertainty			RSS				9.807	9.608	
Expanded Uncertainty (95% Confidence interval)			K=2				19.614	19.216	

System Validation uncertainty for Dipole averaged over 1 gram / 10 gram.									
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	5.831	N	1	1	1	5.83	5.83	∞
Axial Isotropy	E.2.2	0.579	R	$\sqrt{3}$	1	1	0.33	0.33	∞
Hemispherical Isotropy	E.2.2	0.813	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	E.2.4	1.26	R	$\sqrt{3}$	1	1	0.73	0.73	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Modulation response	E2.5	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Readout Electronics	E.2.6	0.021	N	1	1	1	0.021	0.021	∞
Response Time	E.2.7	0.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-Noise	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
RF ambient conditions-reflections	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
System check source (dipole)									
Deviation of experimental dipole from numerical dipole	E.6.4	5.0	N	1	1	1	5.00	5.00	∞
Input power and SAR drift measurement	8,6.6.4	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole axis to liquid distance	8,E.6.6	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Phantom and tissue parameters									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4.0	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid conductivity measurement	E.3.3	4.0	N	1	0.78	0.71	3.12	2.84	M
Liquid permittivity measurement	E.3.3	5.0	N	1	0.23	0.26	1.15	1.30	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid permittivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Combined Standard Uncertainty			RSS				9.735	9.534	
Expanded Uncertainty (95% Confidence interval)			K=2				19.470	19.069	

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System check uncertainty for Dipole averaged over 1 gram / 10 gram.									
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 drift	E.2.1.3	0.5	N	1	1	1	0.50	0.50	∞
Axial Isotropy	E.2.2	0.579	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Hemispherical Isotropy	E.2.2	0.813	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Linearity	E.2.4	1.26	R	$\sqrt{3}$	0	0	0.00	0.00	∞
System detection limits	E.2.4	1.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Modulation response	E2.5	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Readout Electronics	E.2.6	0.021	N	1	0	0	0.00	0.00	∞
Response Time	E.2.7	0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-Noise	E.6.1	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
RF ambient conditions-reflections	E.6.1	3.0	R	$\sqrt{3}$	0	0	0.00	0.00	∞
Probe positioner mechanical tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation	E.5	2.3	R	$\sqrt{3}$	0	0	0.00	0.00	∞
System check source (dipole)									
Deviation of experimental dipoles	E.6.4	2	N	1	1	1	2	2	∞
Input power and SAR drift measurement	8,6.6.4	5	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole axis to liquid distance	8,E.6.6	2	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Phantom and tissue parameters									
Phantom shell uncertainty—shape, thickness, and permittivity	E.3.1	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	1.9	N	1	1	0.84	1.90	1.60	∞
Liquid conductivity measurement	E.3.3	4	N	1	0.78	0.71	3.12	2.84	M
Liquid permittivity measurement	E.3.3	5	N	1	0.23	0.26	1.15	1.30	M
Liquid conductivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.78	0.71	1.13	1.02	∞
Liquid permittivity—temperature uncertainty	E.3.4	2.5	R	$\sqrt{3}$	0.23	0.26	0.33	0.38	∞
Combined Standard Uncertainty			RSS				5.564	5.205	
Expanded Uncertainty (95% Confidence interval)			K=2				11.128	10.410	

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12. CONDUCTED POWER MEASUREMENT

GSM BAND

Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
GSM 850				
GSM 850	824.2	**31.93**	-9	22.93
	836.6	31.85	-9	22.85
	848.8	31.39	-9	22.39
GPRS 850 （1 Slot）	824.2	31.80	-9	22.80
	836.6	31.01	-9	22.01
	848.8	31.64	-9	22.64
GPRS 850 （2 Slot）	824.2	30.44	-6	24.44
	836.6	30.72	-6	**24.72**
	848.8	30.69	-6	24.69
GPRS 850 （3 Slot）	824.2	28.59	-4.26	24.33
	836.6	28.77	-4.26	24.51
	848.8	28.46	-4.26	24.20
GPRS 850 （4 Slot）	824.2	27.22	-3	24.22
	836.6	27.41	-3	24.41
	848.8	27.38	-3	24.38
PCS1900				
PCS1900	1850.2	**28.96**	-9	19.96
	1880	28.93	-9	19.93
	1909.8	28.85	-9	19.85
GPRS1900 （1 Slot）	1850.2	28.04	-9	19.04
	1880	28.39	-9	19.39
	1909.8	28.27	-9	19.27
GPRS1900 （2 Slot）	1850.2	27.34	-6	21.34
	1880	27.25	-6	21.25
	1909.8	27.43	-6	**21.43**
GPRS1900 （3 Slot）	1850.2	25.44	-4.26	21.18
	1880	25.49	-4.26	21.23
	1909.8	25.51	-4.26	21.25
GPRS1900 （4 Slot）	1850.2	23.31	-3	20.31
	1880	23.47	-3	20.47
	1909.8	23.36	-3	20.36

Note 1:
The Frame Power (Source-based time-averaged Power) is scaled the maximum burst average power based on time slots. The calculated methods are show as following:
Frame Power = Max burst power (1 Up Slot) – 9 dB
Frame Power = Max burst power (2 Up Slot) – 6 dB
Frame Power = Max burst power (3 Up Slot) – 4.26 dB
Frame Power = Max burst power (4 Up Slot) – 3 dB

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Bluetooth_V3.0

Modulation	Channel	Frequency(MHz)	Peak Power (dBm)
GFSK	0	2402	-3.023
	39	2441	-3.441
	78	2480	-3.997
π /4-DQPSK	0	2402	-0.900
	39	2441	-1.299
	78	2480	-1.839
8-DPSK	0	2402	**-0.689**
	39	2441	-1.035
	78	2480	-1.610

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13. TEST RESULTS

13.1. SAR Test Results Summary

13.1.1. Test position and configuration

Face up SAR was performed with the device 10mm from the phantom according to IEEE 1528-2013 and Bpdy back SAR was performed with the device 0mm from the phantom.

13.1.2. Operation Mode

1. Per KDB 447498 D01 v06 ,for each exposure position, if the highest 1-g SAR is ≤ 0.8 W/kg, testing for low and high channel is optional.
2. Per KDB 865664 D01 v01r04,for each frequency band, if the measured SAR is ≥0.8W/Kg, testing for repeated SAR measurement is required , that the highest measured SAR is only to be tested. When the SAR results are near the limit, the following procedures are required for each device to verify these types of SAR measurement related variation concerns by repeating the highest measured SAR configuration in each frequency band.
   (1) When the original highest measured SAR is ≥0.8W/Kg, repeat that measurement once.
   (2) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is >1.20 or when the original or repeated measurement is ≥1.45 W/Kg.
   (3) Perform a third repeated measurement only if the original, first and second repeated measurement is ≥1.5 W/Kg and ratio of largest to smallest SAR for the original, first and second measurement is ≥ 1.20.
3. Body-worn exposure conditions are intended to voice call operations, therefore GSM voice call mode is selected to be test.
4. Maximum Scaling SAR in order to calculate the Maximum SAR values to test under the standard Peak Power, Calculation method is as follows:
   Maximum Scaling SAR =tested SAR (Max.) ×[maximum turn-up power (mw)/ maximum measurement output power(mw)]
7. Proximity sensor, just for avoiding the wrong operation in the phone screen when call, and has no influence on output power or SAR result.

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13.1.3. Test Result

SAR MEASUREMENT									
Depth of Liquid (cm):>15				Relative Humidity (%): 49.5					
Product: smart watch									
Test Mode: GSM850 with GMSK modulation									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/Kg)**	**Limit (W/kg)**
Face-up	voice	190	836.6	0.06	0.689	32.00	31.85	**0.713**	1.6
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**10(g)-Extremity SAR (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/Kg)**	**Limit (W/kg)**
Body back touch	GPRS-2 slot	190	836.6	-0.23	0.707	30.80	30.72	**0.720**	4.0

SAR MEASUREMENT									
Depth of Liquid (cm):>15				Relative Humidity (%): 49.5					
Product: smart watch									
Test Mode: PCS1900 with GMSK modulation									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**SAR (1g) (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/Kg)**	**Limit (W/kg)**
Face-up	voice	661	1880.0	0.15	**0.156**	29.00	28.93	**0.159**	1.6
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**10(g)-Extremity SAR (W/kg)**	**Max. Tune-up Power (dBm)**	**Meas. output Power (dBm)**	**Scaled SAR (W/Kg)**	**Limit (W/kg)**
Body back touch	GPRS-2 slot	661	1880.0	-0.39	**0.398**	27.50	27.25	**0.422**	4.0

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NO	Simultaneous state	Portable Handset		
		Head	Body-worn	Hotspot
1	GSM(voice)+Bluetooth(data)	-	Yes	-
2	GSM (Data) + Bluetooth(data)	-	Yes	Yes

NOTE:

1. Simultaneous with every transmitter must be the same test position.
2. KDB 447498 D01, BT SAR is excluded as below table.
3. KDB 447498 D01, for handsets the test separation distance is determined by the smallest distance between the outer surface of the device and the user; which is 0mm for body back SAR and 10mm for Face up SAR.
4. According to KDB 447498 D01 4.3.1, Standalone SAR test exclusion is as follow:
   For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:
   [(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] • [√f(GHz)] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR[30], where
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation[31]
   - The result is rounded to one decimal place for comparison
   - The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below

   The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.
5. If the test separation distance is <5mm, 5mm is used for excluded SAR calculation.
6. According to KDB 447498 D01 4.3.2, simultaneous transmission SAR test exclusion is as follow:
   (1) Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna.
   (2) Any transmitters and antennas should be considered when calculating simultaneous mode.
   (3) For mobile phone and PC, it's the sum of all transmitters and antennas at the same mode with same position in each applicable exposure condition
   (4)When the standalone SAR test exclusion of section 4.3.2 is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to det
   (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(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.
7. When the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR to peak location separation ratio. The simultaneous transmitting antennas in each operating mode and exposure condition combination must be considered one pair at a time to determine the SAR to peak location separation ratio to qualify for test exclusion. The ratio is determined by (SAR1 + SAR2)1.5/Ri, rounded to two decimal digits, and must be ≤ 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

Estimated SAR		Max Power including Tune-up Tolerance		Separation Distance (mm)	Estimated SAR (W/kg)
		dBm	mW		
BT	Face-up	0	1	10	0.021
	Body back touch	0	1	0	0.041

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Sum of the SAR for GSM 850, PCS 1900 & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario		Σ1-g SAR (W/Kg)	SPLSR (Yes/No)
		GSM 850	Bluetooth		
GSM 850	Face-up	0.713	0.021	**0.734**	No
	Body back touch	0.720	0.041	**0.761**	No
PCS 1900	Face-up	0.159	0.021	0.180	No
	Body back touch	0.422	0.041	0.463	No

Note:

·According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than1.6 W/Kg&4.0 W/Kg, SPLSR assessment is not required.

·SPLSR mean is “The SAR to Peak Location Separation Ratio “

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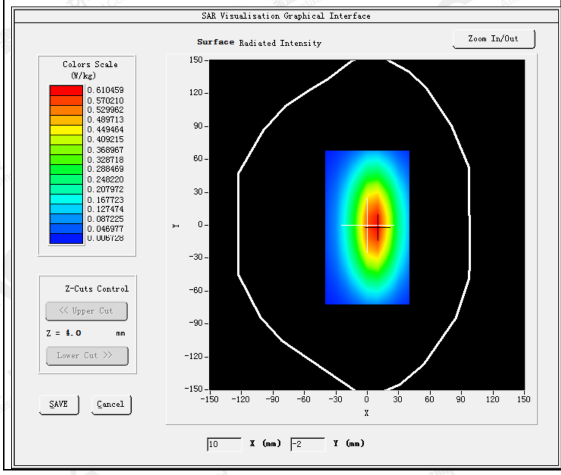
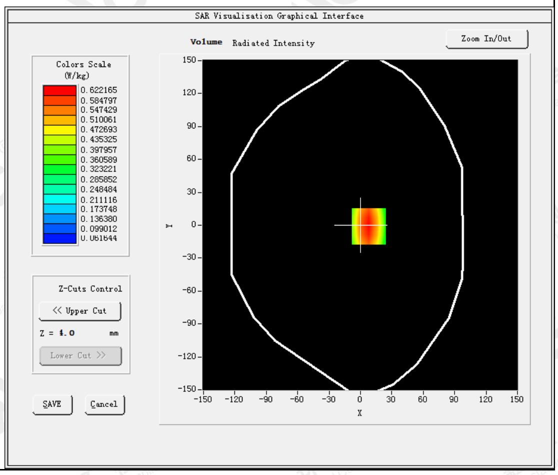
APPENDIX A. SAR SYSTEM CHECK DATA

Test Laboratory: AGC Lab **Date: July 03,2019**
System Check Head 835 MHz
DUT: Dipole 835 MHz Type: SID 835
Communication System CW; Communication System Band: D835 (835.0 MHz); Duty Cycle: 1:1; Conv.F=5.29
Frequency: 835 MHz; Medium parameters used: f = 835 MHz; σ =0.91 mho/m; ε r =42.16; ρ = 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):20.9, Liquid temperature (℃): 20.5

SATIMO Configuration

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

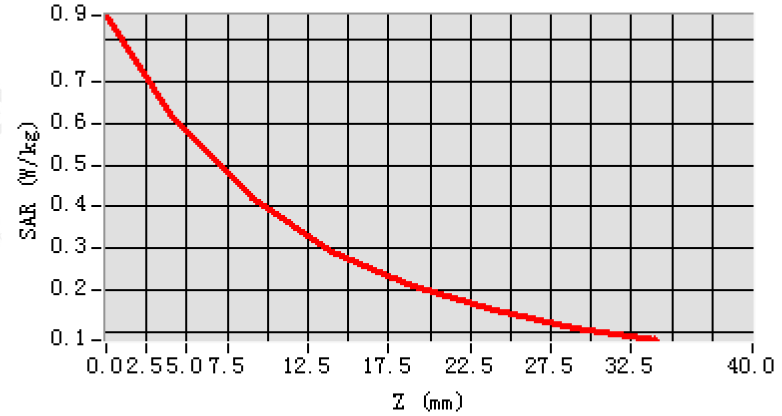
Configuration/System Check 835MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 835MHz Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

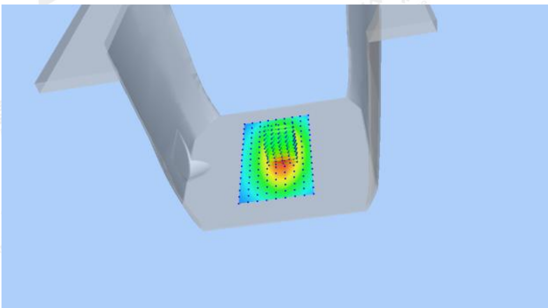
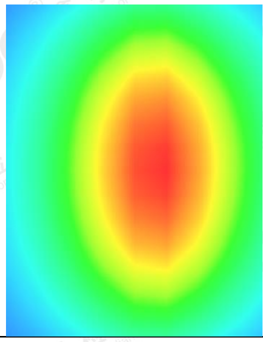
SURFACE SAR	VOLUME SAR
	

Maximum location: X=8.00, Y=-1.00
SAR Peak: 0.86 W/kg

SAR 10g (W/Kg)	0.388326
SAR 1g (W/Kg)	0.598226

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.8590	0.6222	0.4204	0.2921	0.2078	0.1483	0.1073



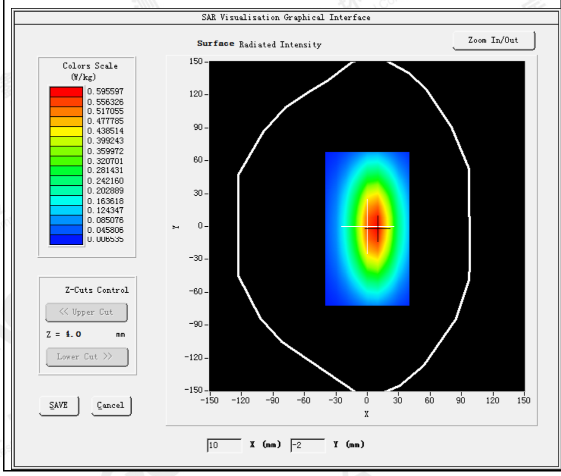
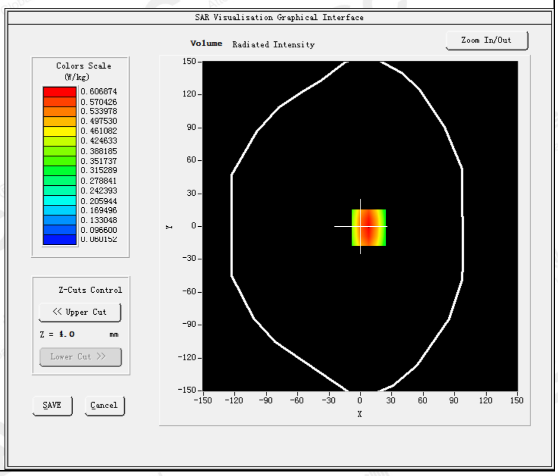
3D screen shot	Hot spot position
	

Test Laboratory: AGC Lab **Date: July 03,2019**
System Check Body 835 MHz
DUT: Dipole 835 MHz Type: SID 835
Communication System CW; Communication System Band: D835 (835.0 MHz); Duty Cycle: 1:1; Conv.F=5.49
Frequency: 835 MHz; Medium parameters used: f = 835 MHz; σ =0.96 mho/m; ε r =54.62; ρ = 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):20.9, Liquid temperature (℃): 20.6

SATIMO Configuration

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

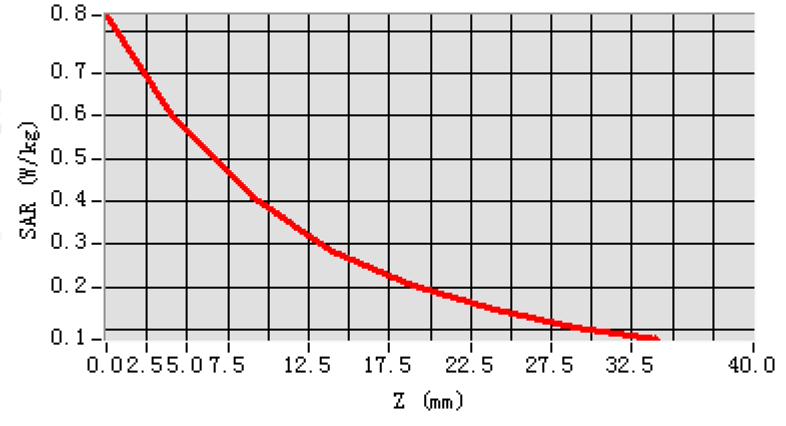
Configuration/System Check 835MHz Body/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 835MHz Body/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

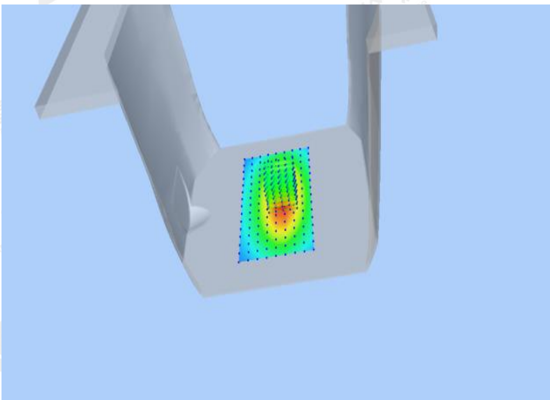
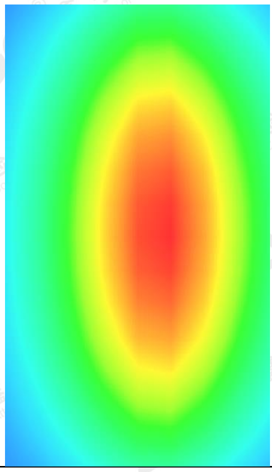
SURFACE SAR	VOLUME SAR
	

Maximum location: X=8.00, Y=-1.00
SAR Peak: 0.84 W/kg

SAR 10g (W/Kg)	0.378680
SAR 1g (W/Kg)	0.583792

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.8363	0.6069	0.4106	0.2851	0.2027	0.1447	0.1049



3D screen shot	Hot spot position
	

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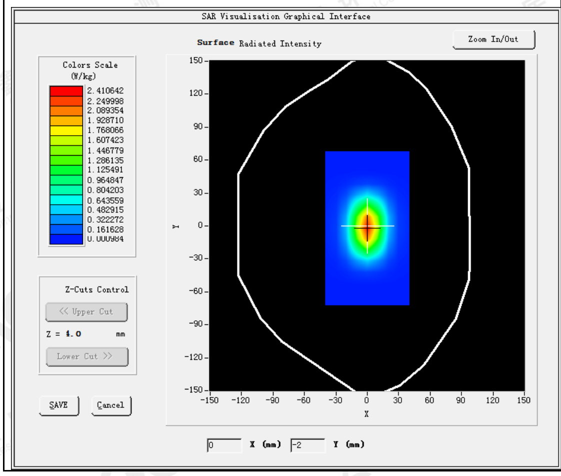
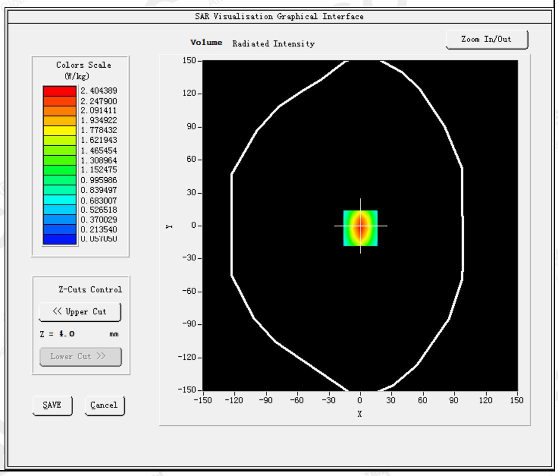
Test Laboratory: AGC Lab **Date: July 03,2019**
System Check Head 1900MHz
DUT: Dipole 1900 MHz; Type: SID 1900
Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1; Conv.F=5.24
Frequency: 1900 MHz; Medium parameters used: f = 1850 MHz; σ =1.42 mho/m; ε r =41.56; ρ = 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):20.9, Liquid temperature (℃): 20.6

SATIMO Configuration:

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

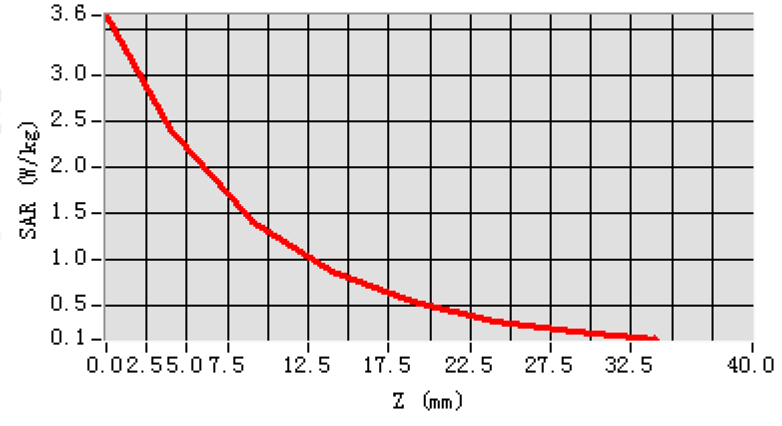
Configuration/System Check 1900MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 1900MHz Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

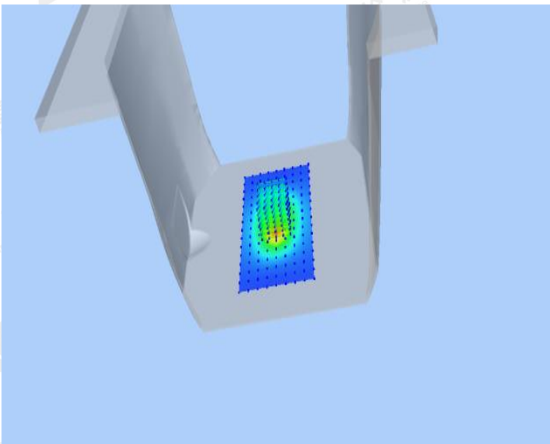
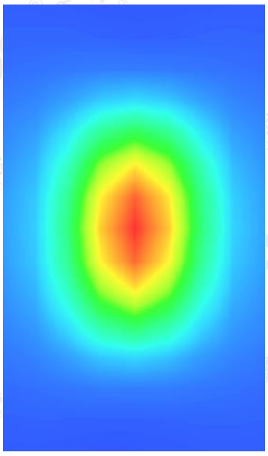
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-2.00
SAR Peak: 3.62 W/kg

SAR 10g (W/Kg)	1.284562
SAR 1g (W/Kg)	2.418514

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	3.6328	2.4026	1.4117	0.8628	0.5237	0.3216	0.2029



3D screen shot	Hot spot position
	

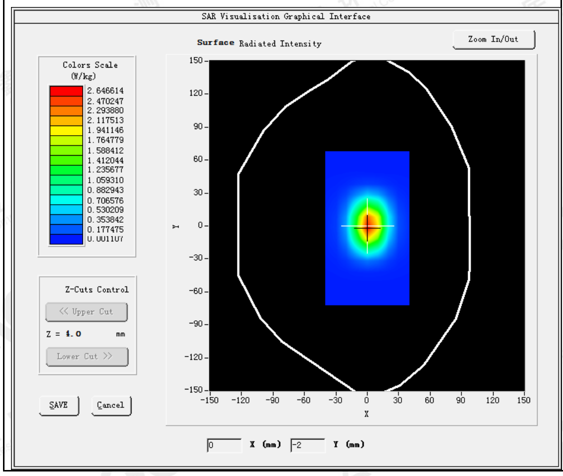
Test Laboratory: AGC Lab **Date: July 03,2019**
System Check Body 1900MHz
DUT: Dipole 1900 MHz; Type: SID 1900
Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1; Conv.F=5.39
Frequency: 1900 MHz; Medium parameters used: f = 1850 MHz; σ =1.48 mho/m; ε r =52.64; ρ = 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (℃):20.9, Liquid temperature (℃): 20.6

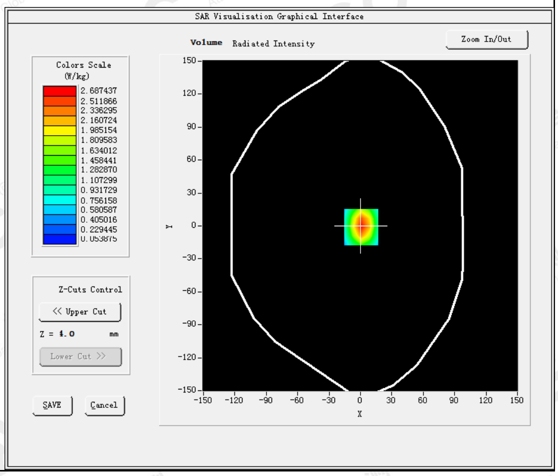
SATIMO Configuration:

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/System Check 1900MHz Body/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 1900MHz Body/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

SURFACE SAR	VOLUME SAR

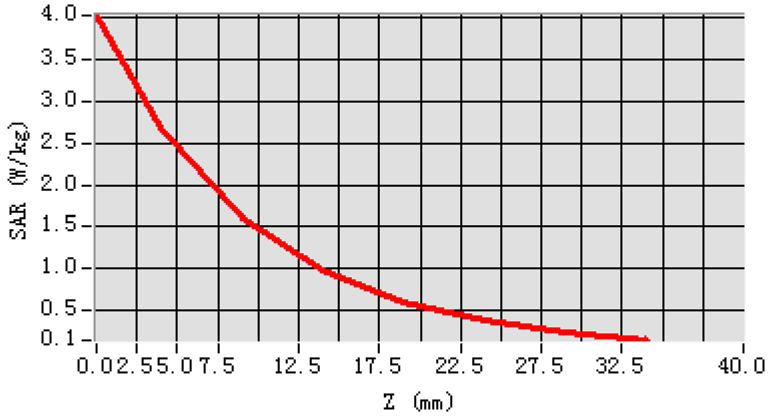


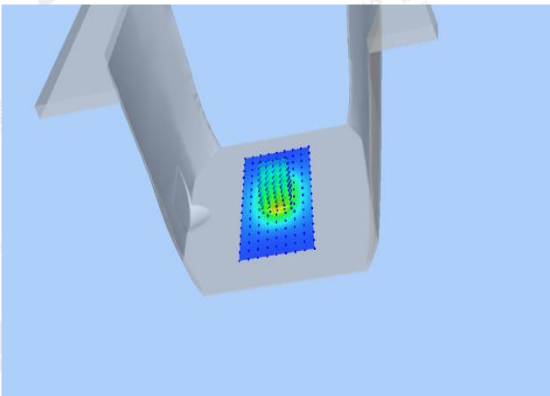
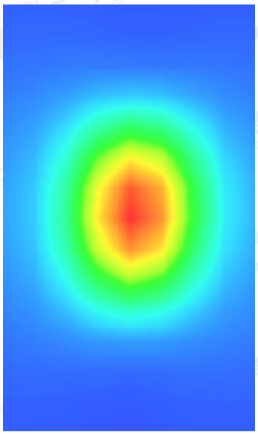


Maximum location: X=1.00, Y=-1.00
SAR Peak: 4.05 W/kg

SAR 10g (W/Kg)	1.312492
SAR 1g (W/Kg)	2.481597

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	4.0308	2.6846	1.5954	0.9829	0.5937	0.3682	0.2264



3D screen shot	Hot spot position
	

APPENDIX B. SAR MEASUREMENT DATA

Test Laboratory: AGC Lab **Date: July 03,2019**
GSM 850 Mid- Face-up (MS) <SIM 1>
DUT: smart watch; Type: W87

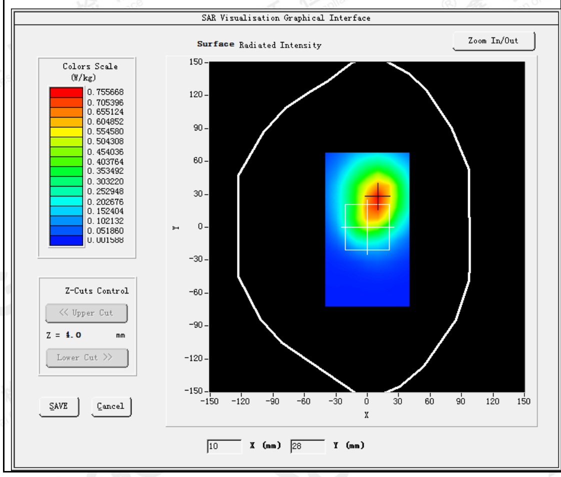
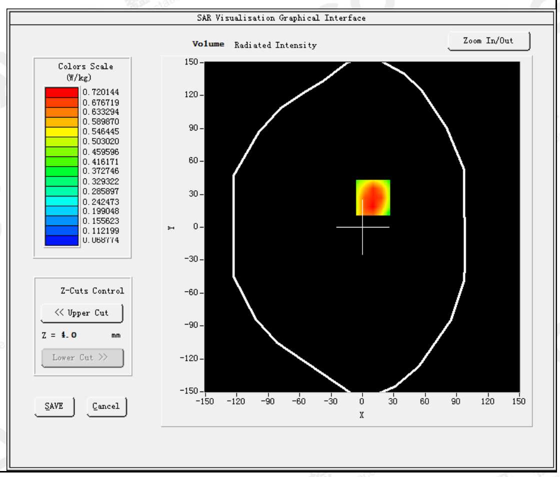
Communication System: Generic GSM; Communication System Band: GSM 850; Duty Cycle: 1:8.3; Conv.F=5.49;
Frequency: 836.6 MHz; Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; ε r = 53.95; ρ = 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 20.9, Liquid temperature (℃): 20.6

SATIMO Configuration:

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/GSM 850 Mid-Face-up /Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/GSM 850 Mid-Face-up Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	surf_sam_plan.txt, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Face-up
Band	GSM 850
Channels	Middle
Signal	TDMA (Crest factor: 8.0)

SURFACE SAR	VOLUME SAR
	

Maximum location: X=10.00, Y=27.00
SAR Peak: 0.98 W/kg

SAR 10g (W/Kg)	0.467506
SAR 1g (W/Kg)	0.689386

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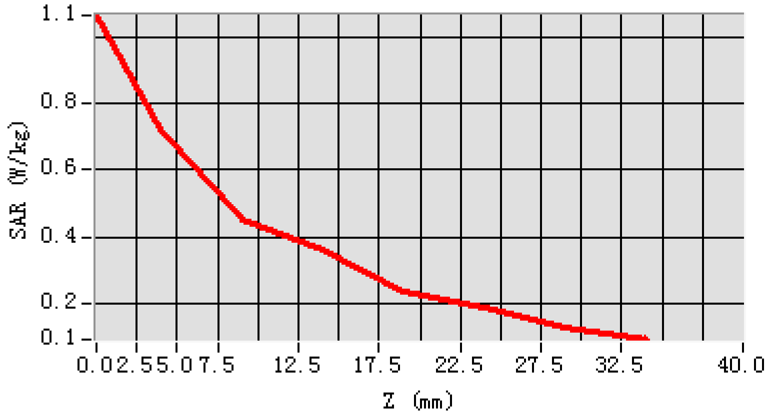
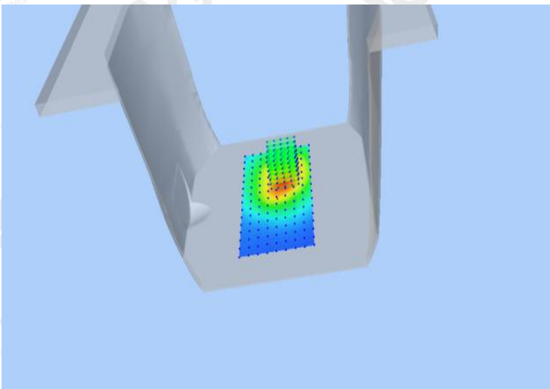
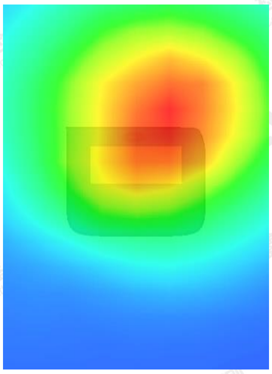
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.0634	0.7201	0.4556	0.3627	0.2380	0.1904	0.1283



3D screen shot	Hot spot position
	

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Test Laboratory: AGC Lab **Date: July 03,2019**
GPRS 850 Mid- Body- Back (2up)
DUT: smart watch; Type: W87

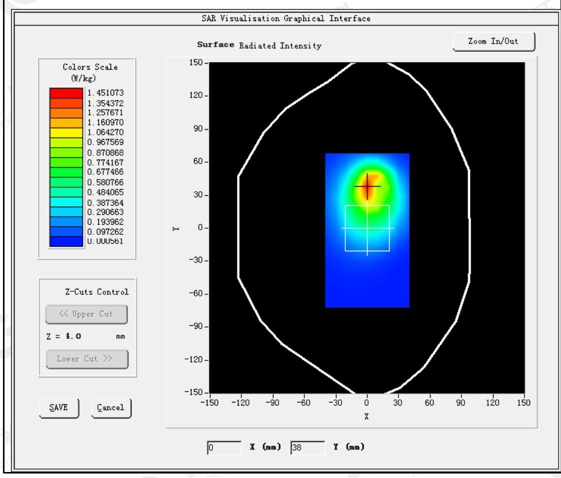
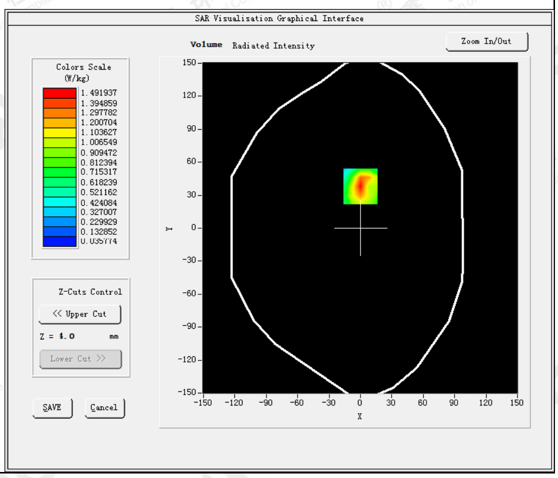
Communication System: GPRS-2 Slot; Communication System Band: GSM 850; Duty Cycle: 1:4.2; Conv.F=5.49;
Frequency: 836.6 MHz; Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; ε r = 53.95; ρ = 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 20.9, Liquid temperature (℃): 20.6

SATIMO Configuration:

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/GPRS 850 Mid-Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/GPRS 850 Mid-Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

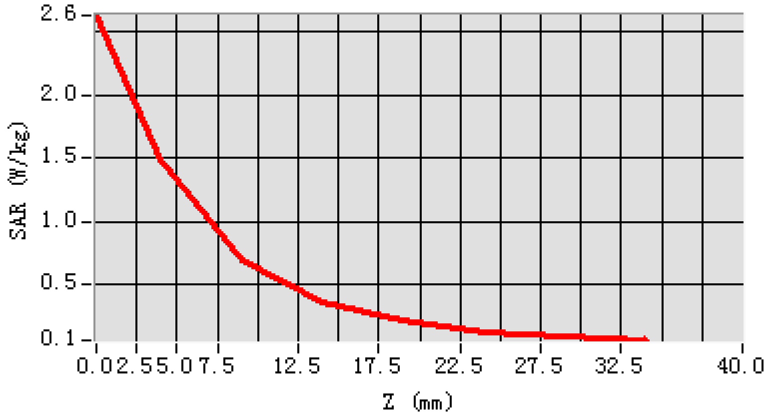
Area Scan	surf_sam_plan.txt, h= 5.00 mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	GSM 850
Channels	Middle
Signal	TDMA (Crest factor: 4.0)

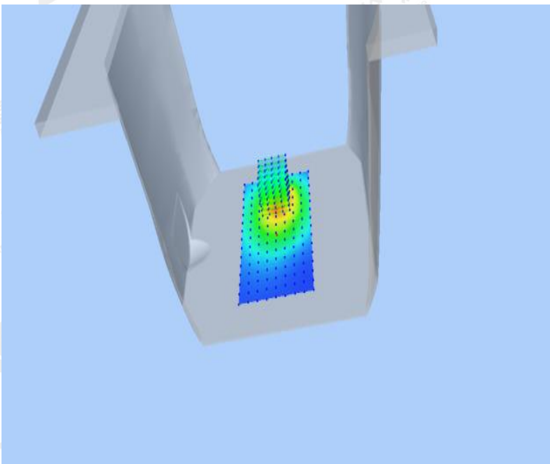
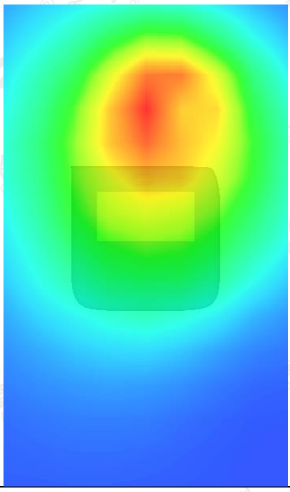
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=38.00
SAR Peak: 2.67 W/kg

SAR 10g (W/Kg)	0.706942
SAR 1g (W/Kg)	1.400503

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.6319	1.4919	0.7010	0.3588	0.2153	0.1316	0.0904



3D screen shot	Hot spot position
	

Test Laboratory: AGC Lab **Date: July 03,2019**
PCS 1900 Mid-Face-up (MS) <SIM 1>
DUT: smart watch; Type: W87

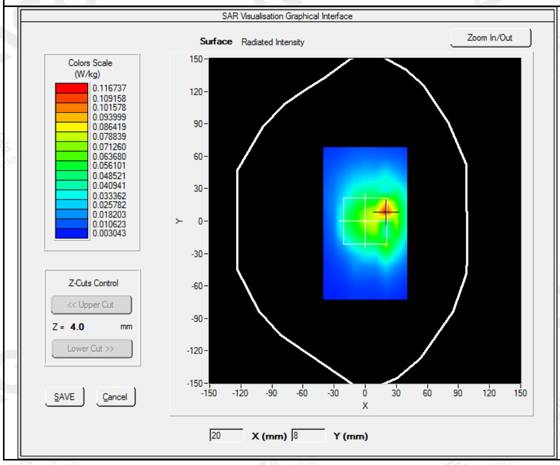
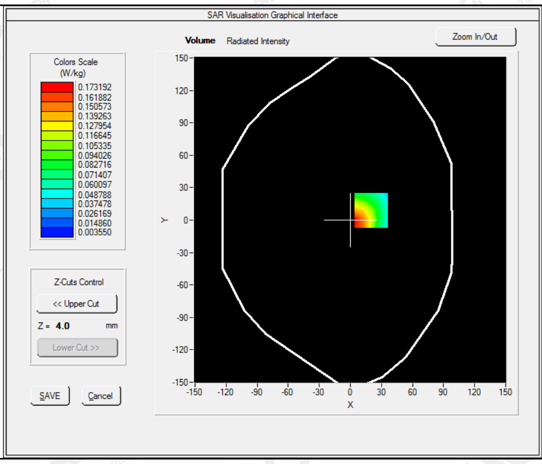
Communication System: Generic GSM; Communication System Band: PCS 1900; Duty Cycle: 1:8.3; Conv.F=5.39;
Frequency: 1880 MHz; Medium parameters used: f = 1850 MHz; σ = 1.46 mho/m; ε r =53.62; ρ = 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 20.9, Liquid temperature (℃): 20.6

SATIMO Configuration:

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/PCS1900 Mid-Face-up /Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/PCS1900 Mid-Face-up /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

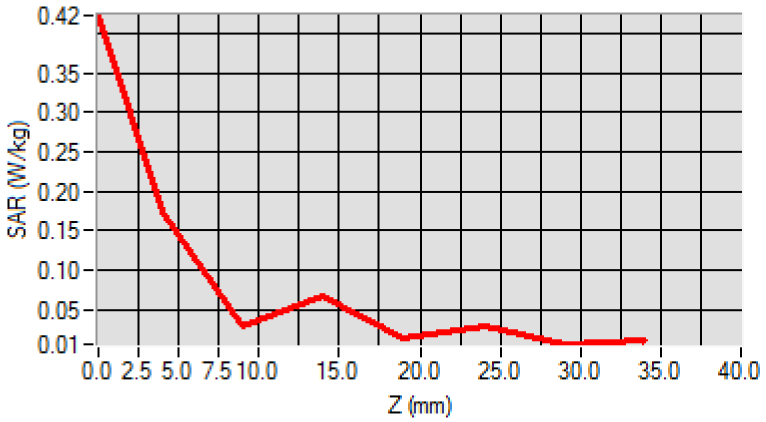
Area Scan	surf_sam_plan.txt, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Face-up
Band	PCS 1900
Channels	Middle
Signal	TDMA (Crest factor: 8.0)

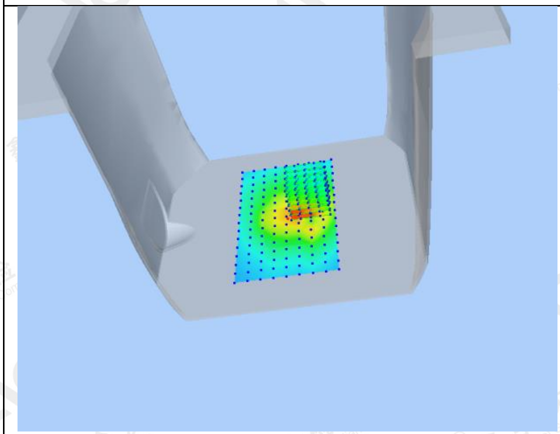
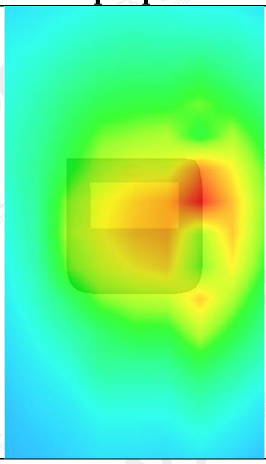
SURFACE SAR	VOLUME SAR
	

Maximum location: X=20.00, Y=9.00
SAR Peak: 0.26 W/kg

SAR 10g (W/Kg)	0.086385
SAR 1g (W/Kg)	0.156283

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.4231	0.1732	0.0291	0.0664	0.0130	0.0288	0.0063



3D screen shot	Hot spot position
	

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Test Laboratory: AGC Lab **Date: July 03,2019**
GPRS 1900 Mid-Body-Back (2up)
DUT: smart watch; Type: W87

Communication System: GPRS-2Slot; Communication System Band: PCS 1900; Duty Cycle: 1:4.2; Conv.F=5.39;
Frequency: 1880 MHz; Medium parameters used: f = 1850 MHz; σ = 1.46 mho/m; ε r =53.62; ρ = 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 20.9, Liquid temperature (℃): 20.6

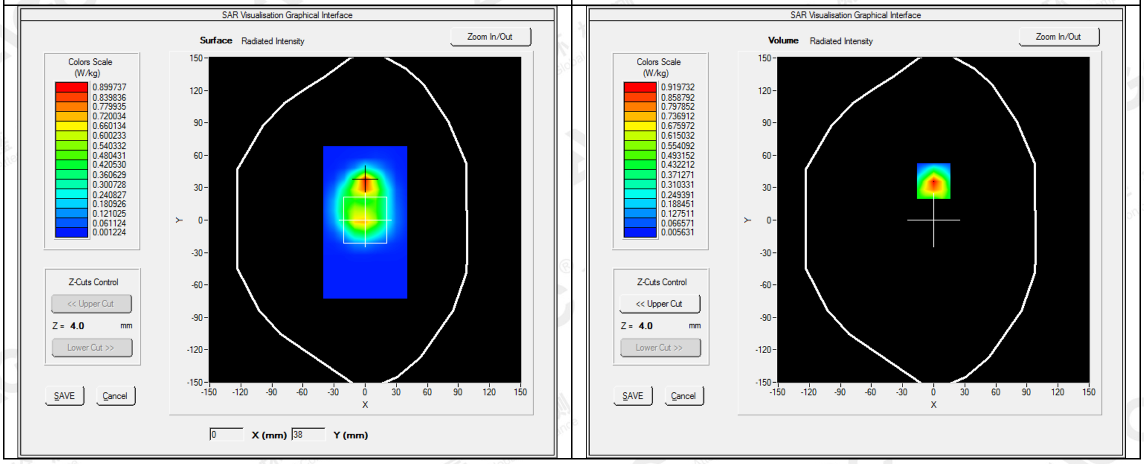
SATIMO Configuration:

- Probe: SSE5; Calibrated: Aug. 08,2018; Serial No.: SN 22/12 EP159
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/GPRS1900 Mid-Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/GPRS1900 Mid-Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	surf_sam_plan.txt, h= 5.00 mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	PCS 1900
Channels	Middle
Signal	TDMA (Crest factor: 4.0)

SURFACE SAR	VOLUME SAR



Maximum location: X=0.00, Y=36.00
SAR Peak: 1.52 W/kg

SAR 10g (W/Kg)	0.397519
SAR 1g (W/Kg)	0.856148

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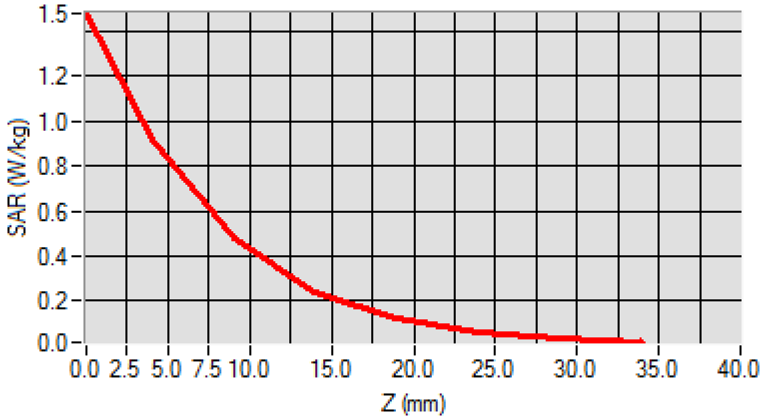
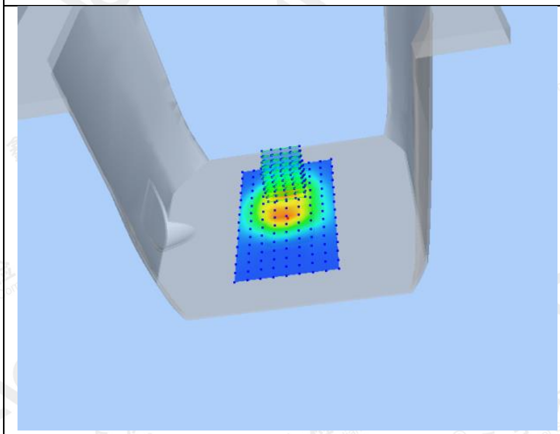
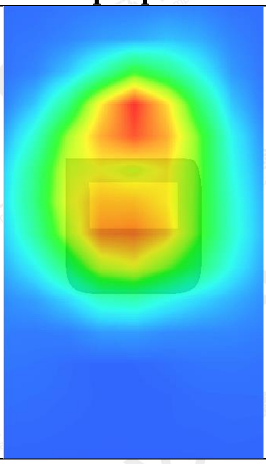
Add: 2/F. , Building 2, No.1-4,Chaxi Sanwei Technical Industrial Park,Gushu, Xixiang, Baoan District, Shenzhen, Guangdong China

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.4772	0.9197	0.4821	0.2394	0.1195	0.0624	0.0325



3D screen shot	Hot spot position
	

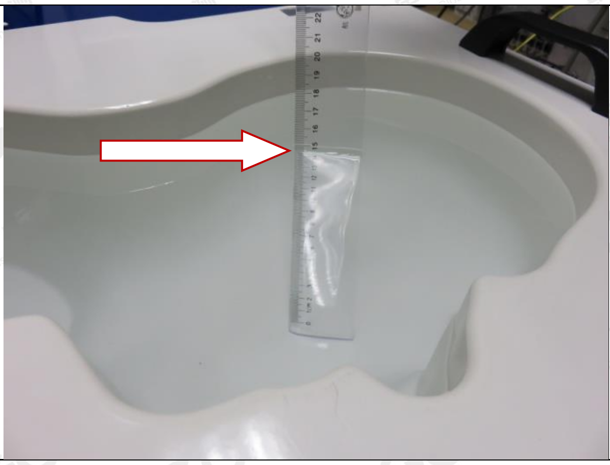
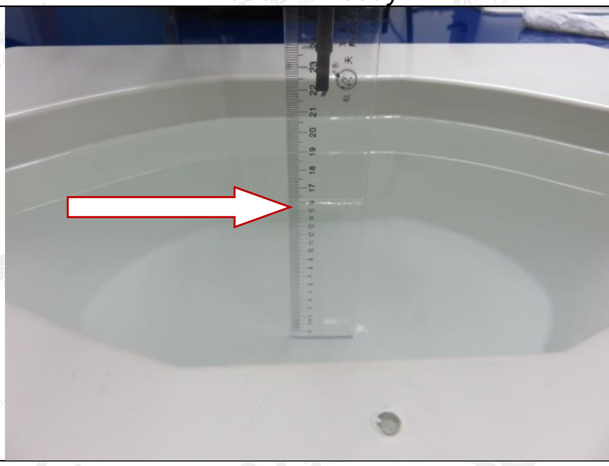
APPENDIX C. TEST SETUP PHOTOGRAPHS

Face-up 10mm

Body Back touch

DEPTH OF THE LIQUID IN THE PHANTOM—ZOOM IN

Note：The position used in the measurement were according to IEEE 1528-2013

835MHz head	835MHz body
	
1900MHz head	1900MHz body
	

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APPENDIX D. CALIBRATION DATA

Refer to Attached files.