FCC SAR TEST REPORT

Report No: STS1710138H02

Issued for

Protempo Ltd

21 Taylors Road, Morningside, Auckland 1025, New Zealand.

Product Name:	Ultra Mini 4K Streaming PC / Mini Smart Cloud PC
Brand Name:	Ollee
Model Name:	MAHMG
Series Model:	MAPMG
FCC ID:	2AN4T-MPC-AMG
Test Standard:	ANSI/IEEE Std. C95.1
	FCC 47 CFR Part 2 (2.1093)
	IEEE 1528: 2013
Max. Report SAR (1g):	Body:1.131 W/kg

Shenzhen STS Test Services Co., Ltd.
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Test Report Certification

Applicant's name	:	Protempo Ltd
Address	:	21 Taylors Road, Morningside, Auckland 1025, New Zealand.
Manufacture's Name	:	ILIFE Technology (HK) Limited
Address	:	3rd Floor, Bld.3, LiJinChen Industrial Park, The East of Gong Ye Road, Longhua, shenzhen, China

Product description

Product name	:	Ultra Mini 4K Streaming PC / Mini Smart Cloud PC
Trademark	:	Ollee
Model and/or type reference	:	MAHMG
Series Model	:	MAPMG
Standards	:	ANSI/IEEE Std. C95.1-1992 FCC 47 CFR Part 2 (2.1093) IEEE 1528: 2013

The device was tested by Shenzhen STS Test Services Co., Ltd. in accordance with the measurement methods and procedures specified in KDB 865664 The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of Test	:	
Date (s) of performance of tests	:	31 Oct. 2017
Date of Issue	:	01 Nov. 2017
Test Result	:	**Pass**

Testing Engineer **:** Aaron Bu

(Aaron Bu)

Technical Manager **:**

(John Zou)

Authorized Signatory **:**

(Vita Li)

Table of Contents

1.General Information

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

1.1 EUT Description

Equipment	Ultra Mini 4K Streaming PC / Mini Smart Cloud PC		
Brand Name	Ollee		
Model No.	MAHMG		
Series Model	MAPMG		
FCC ID	2AN4T-MPC-AMG		
Model Difference	Only in different Windows OS and model name (MAHMG is Windows 10 Home /MAPMG is Windows 10 Pro)		
Adapter	Input: AC 100-240V, 450mA, 50/60 Hz Output: DC 12V, 2000mA		
Battery	Rated Voltage: 3.0V		
Device Category	Mobile		
Product stage	Production unit		
RF Exposure Environment	General Population / Uncontrolled		
Hardware Version	N/A		
Software Version	N/A		
Frequency Range	WLAN802.11b/g/n(HT20):2412~2462MHz WLAN 802.11a/n/ac(HT20/40/80): 5150~5250 MHz; Bluetooth:2402~ 2480MHz		
Max. Reported SAR(1g): (Limit:1.6W/kg)	Band	Mode	Body (W/kg)
	DTS	2.4G WLAN A	0.363
	DTS	2.4G WLAN B	0.454
	DTS	2.4G WALN A+B	0.609
	NII	WLAN(5.2 G) A	0.825
	NII	WLAN(5.2 G) B	0.982
	NII	WLAN(5.2 G) A+B	1.131
	DTS	Bluetooth Note	0.026
Operating Mode:	WLAN: 802.11 b/g/n(HT20) /n(HT40) /a/ac20/ac40/ac80;		
Antenna Specification:	WLAN: PIFA Antenna		
Hotspot Mode:	Not Support		
DTM Mode:	Not Support		
Note: 1. Bluetooth SAR was estimated 2. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power			

1.2 Test Environment

Ambient conditions in the SAR laboratory:

Items	Required
Temperature (℃)	18-25
Humidity (%RH)	30-70

1.3 Test Factory

Shenzhen STS Test Services Co., Ltd.
Add. : 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
CNAS Registration No.: L7649
FCC Registration No.: 625569
IC Registration No.: 12108A
A2LA Certificate No.: 4338.01

2.Test Standards And Limits

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	ANSI/IEEE Std. C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
3	IEEE Std. 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
4	FCC KDB 447498 D01 v06	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
5	FCC KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
6	FCC KDB 865664 D02 v01r02	RF Exposure Reporting
7	FCC KDB 248227 D01 WLAN SAR v02r02	SAR Considerations for 802.11 Devices

(A). Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

NOTE: Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

Population/Uncontrolled Environments:
are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Occupational/Controlled Environments:
are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

NOTE

GENERAL POPULATION/UNCONTROLLED EXPOSURE

PARTIAL BODY LIMIT

1.6 W/kg

3. SAR Measurement System

3.1 Definition Of Specific Absorption Rate (SAR)

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 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 a given density (ρ). The equation description is as below:

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

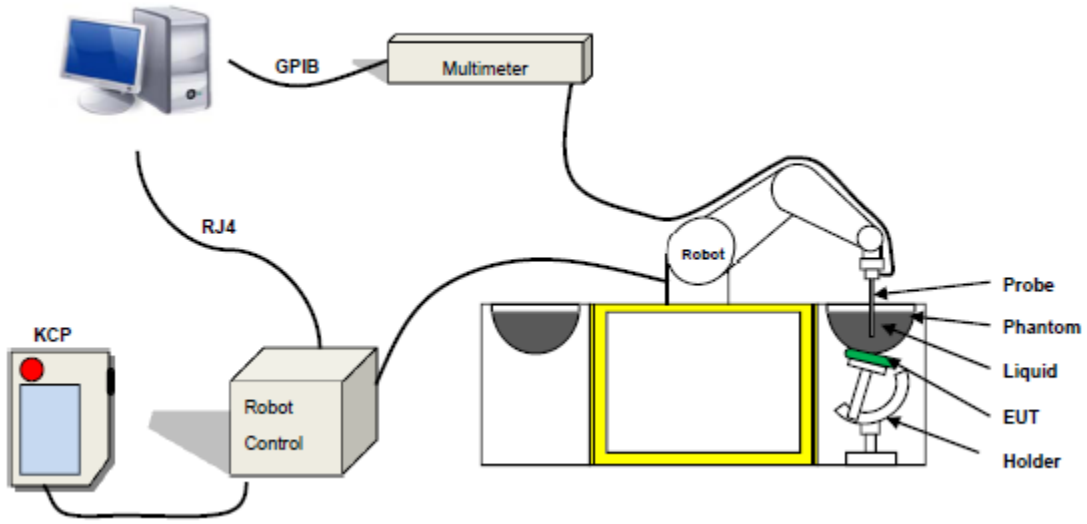
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue,
ρ is the mass density of the tissue and E is the RMS electrical field strength.

3.2 SAR System

SATIMO SAR System Diagram:



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.

3.2.1 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 45/15 EPGO281 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter: 2.5 mm
- Length of Individual Dipoles: 2 mm
- Maximum external diameter: 8 mm
- Distance between dipole/probe extremity: 8 mm (repeatability better than +/- 1mm)
- Probe linearity: 0±2.60%(0.11dB)
- Axial Isotropy: < 0.25 dB
- Spherical Isotropy: < 0.25 dB
- Calibration range: 450 MHz to 6 GHz for head & body simulating liquid.
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°

Figure 1 – *MVG COMOSAR Dosimetric E field Dipole*

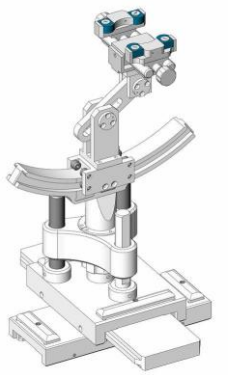
3.2.2 Phantom

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.

SN 32/14 SAM115

SN 32/14 SAM116

3.2.3 Device Holder



The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.4. Tissue Simulating Liquids

4. Tissue Simulating Liquids

4.1 Simulating Liquids Parameter Check

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 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 P1528 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 P1528.

Frequency (MHz)	Bactericide	DGBE	HEC	NaCl	Sucrose	1,2-Propanediol	X100	Water	Conductivity	Permittivity
	%	%	%	%	%	%	%	%	σ	εr
750	/	/	/	0.79	/	64.81	/	34.40	0.97	41.8
835	/	/	/	0.79	/	64.81	/	34.40	0.97	41.8
900	/	/	/	0.79	/	64.81	/	34.40	0.97	41.8
1800	/	13.84	/	0.35	/	/	30.45	55.36	1.38	41.0
1900	/	13.84	/	0.35	/	/	30.45	55.36	1.38	41.0
2000	/	7.99	/	0.16	/	/	19.97	71.88	1.55	41.1
2450	/	7.99	/	0.16	/	/	19.97	71.88	1.88	40.3
2600	/	7.99	/	0.16	/	/	19.97	71.88	1.88	40.3

Tissue dielectric parameters for head and body phantoms				
Frequency	ε_r		σ S/m	
	Head	Body	Head	Body
300	45.3	58.2	0.87	0.92
450	43.5	58.7	0.87	0.94
900	41.5	55.0	0.97	1.05
1450	40.5	54.0	1.20	1.30
1800	40.0	53.3	1.40	1.52
2450	39.2	52.7	1.80	1.95
3000	38.5	52.0	2.40	2.73
5800	35.3	48.2	5.27	6.00

LIQUID MEASUREMENT RESULTS

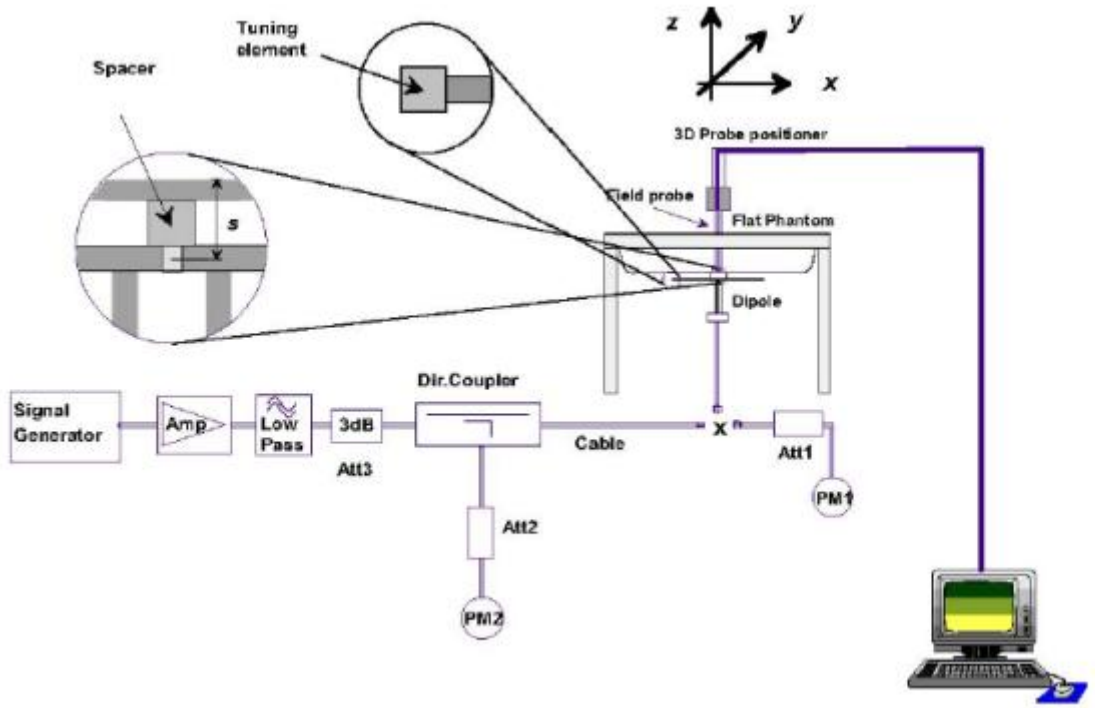
Date	Ambient condition		Body Simulating Liquid		Parameters	Target	Measured	Deviation [%]	Limited [%]
	Temp. [°C]	Humidity [%]	Frequency	Temp. [°C]					
2017-10-31	22.8	58	2450 MHz	22.4	Permittivity:	52.7	52.38	-0.61	±5
					Conductivity:	1.95	1.97	0.88	±5
2017-10-31	23.1	58	5200 MHz	22.7	Permittivity:	49.0	49.66	1.35	±10
					Conductivity:	5.30	5.41	2.08	±10

5. SAR System Validation

5.1 Validation System

Each SATIMO system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the SATIMO software, enable the user to conduct the system performance 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 validation setup is shown as below.



5.2 Validation Result

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

Freq.(MHz)	Power(mW)	Tested Value (W/Kg)	Normalized SAR (W/kg/W)	Target (W/Kg/W)	Tolerance(%)	Date
2450 Body	100	5.143	51.43	52.4	-1.85	2017-10-31
5200 Body	100	15.847	158.47	159	-0.33	2017-10-31

Note: The tolerance limit of System validation ±10%.

6. SAR Evaluation Procedures

The procedure for assessing the average SAR value consists of the following steps:
The following steps are used for each test position

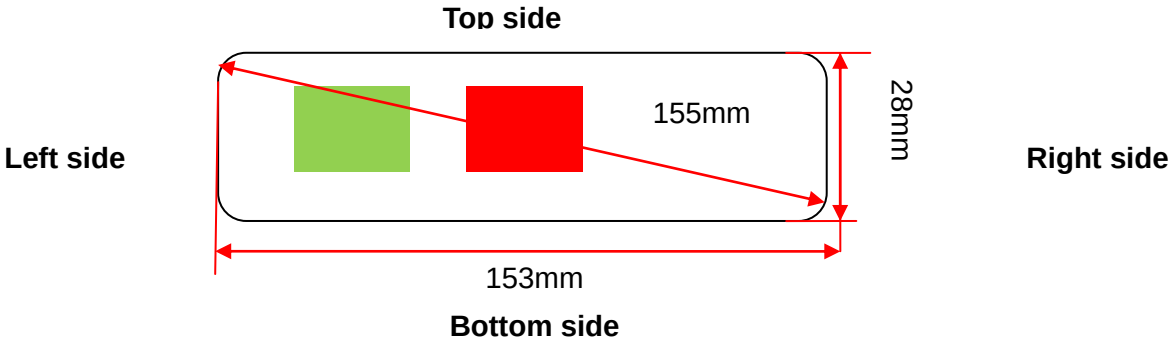
- Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface
- Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible 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 cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
- 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.

➢ Area Scan& Zoom Scan

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01 quoted below.
When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

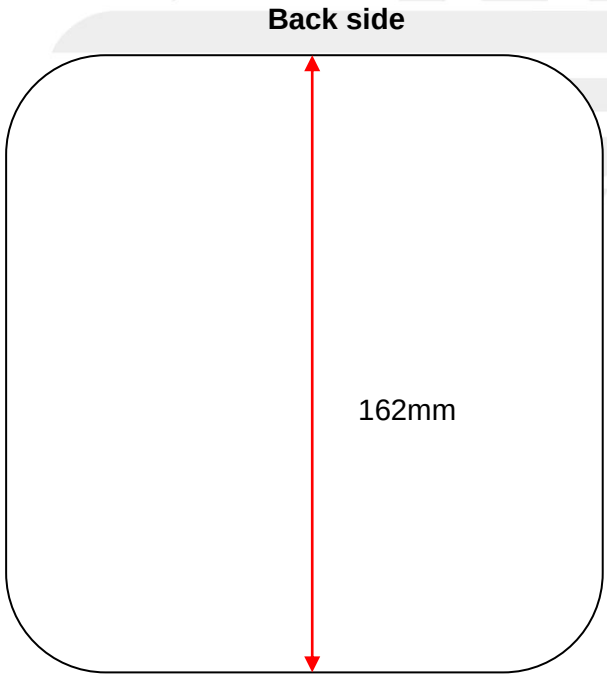
7. EUT Antenna Location Sketch

It is a Ultra Mini 4K Streaming PC / Mini Smart Cloud PC ,



WIFI/BT Antenna A

WIFI Antenna B



7.1 SAR test exclusion consider table

According with FCC KDB 447498 D01, appendix A, <SAR test exclusion thresholds for 100MHz ~6GHz and≤50mm＞table, this device SAR test configurations consider as following:

Band	Test position configurations					
	Front	Back	Right edge	Left edge	Top edge	Bottom edge
WLAN/BTA	＜5mm	162mm	55mm	66mm	＜5mm	＜5mm
	Yes	No	No	No	Yes	Yes
WLAN/B	＜5mm	162mm	93mm	27mm	＜5mm	＜5mm
	Yes	No	No	No	Yes	Yes
WLAN/A+B	＜5mm	162mm	55mm	27mm	＜5mm	＜5mm
	Yes	No	No	No	Yes	Yes

Note：

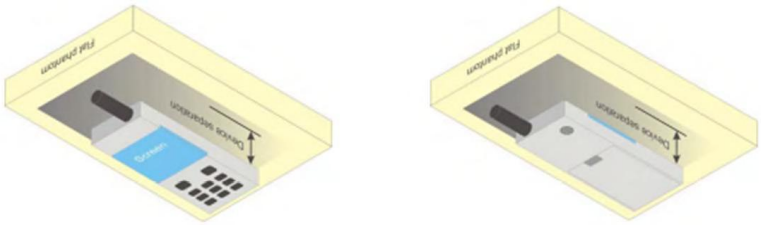
1. maximum power is the source-based time-average power and represents the maximum RF output power among production units.
2. per KDB 447498 D01, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. per KDB 447498 D01, standalone SAR test exclusion threshold is applied; if the distance of the antenna to the user is <5mm, 5mm is user to determine SAR exclusion threshold
4. per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distance ≤50mm are determined by:
   [(max. power of channel, including tune-up tolerance, Mw)/(min. test separation distance, mm)]*[√f(GHZ）)≤3.0 for 1-g SAR and≤7.5 for10-g extremity SAR ,f(GHz) is the RF channel transmit frequency in GHz. Power and distance are rounded to the nearest mW and mm before calculation. The result is rounded to one decimal place for comparison
   For <50mm distance, we just calculate mW of the exclusion threshold value(3.0)to do compare
5. per KDB 447498 D01, at 100 MHz to 6GHz and for test separation distances >50mm, the SAR test exclusion threshold is determined according to the following
   a)[threshold at 50mm in step 1]+(test separation distance -50mm)*(f (MHz)/150)]Mw, at 100 MHz to 1500 MHz
   b) [threshold at 50mm in step1]+(test separation distance -50mm) *10]mW at＞ 1500MHz and≤6GHz
6. Per KDB 447498 D02, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA/ HSUPA/DC-HSDPA output power is<0.25db higher than RMC 12.2Kbps,or reported SAR with RMC 12.2kbps setting is ≤1.2W/Kg, HSDPA/HSUPA/DC-HSDPA SAR evaluation can be excluded.
7. Per KDB 248227 D01, choose the highest output power channel to test SAR and determine futher SAR exclusion 8.for each frequency band ,testing at higher data rates and higher order modulations is not required when the maximum average output power for each of each of these configurations is less than 1/4db higher than those measured at the lower data rate than 11b mode ,thus the SAR can be excluded.

8. EUT Test Position

This EUT was tested in Front Face and Rear Face.

Body-worn Position Conditions:

Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. When the same wireless transmission configuration is used for testing body-worn accessory and hotspot mode SAR, respectively, in voice and data mode, SAR results for the most conservative *test separation distance* configuration may be used to support both SAR conditions. When the *reported* SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest *reported* SAR configuration for that wireless mode and frequency band should be repeated for the body-worn accessory with a headset attached to the handset.



9. Uncertainty

9.1 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEEE 1528: 2013.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

NO	Source	Tol(%)	Prob. Dist.	Div. k	ci (1g)	ci (10g)	1gUi	10gUi	Veff
Measurement System□									
1	Probe calibration	5.8	N	1	1	1	5.8	5.8	∞
2	Axial isotropy	3.5	R	√3	$(1\text{-cp})^{1/2}$	$(1\text{-cp})^{1/2}$	1.43	1.43	∞
3	Hemispherical isotropy	5.9	R	√3	$\sqrt{C_p}$	$\sqrt{C_p}$	2.41	2.41	∞
4	Boundary effect	1.0	R	√3	1	1	0.58	0.58	∞
5	Linearity	4.7	R	√3	1	1	2.71	2.71	∞
6	System Detection limits	1.0	R	√3	1	1	0.58	0.58	∞
7	Readout electronics	0.5	N	1	1	1	0.50	0.50	∞
8	Response time	0	R	√3	1	1	0	0	∞
9	Integration time	1.4	R	√3	1	1	0.81	0.81	∞
10	Ambient noise	3.0	R	√3	1	1	1.73	1.73	∞
11	Ambient reflections	3.0	R	√3	1	1	1.73	1.73	∞
12	Probe positioner mech. restrictions	1.4	R	√3	1	1	0.81	0.81	∞
13	Probe positioning with respect to phantom shell	1.4	R	√3	1	1	0.81	0.81	∞
14	Max.SAR evaluation	1.0	R	√3	1	1	0.6	0.6	∞
Test sample related									

15	Device positioning	2.6	N	1	1	1	2.6	2.6	11
16	Device holder	3	N	1	1	1	3.0	3.0	7
17	Drift of output power	5.0	R	√3	1	1	2.89	2.89	∞
Phantom and set-up									
18	Phantom uncertainty	4.0	R	√3	1	1	2.31	2.31	∞
19	Liquid conductivity (target)	2.5	N	1	0.78	0.71	1.95	1.78	5
20	Liquid conductivity (meas)	4	N	1	0.23	0.26	0.92	1.04	5
21	Liquid Permittivity (target)	2.5	N	1	0.78	0.71	1.95	1.78	∞
22	Liquid Permittivity (meas)	5.0	N	1	0.23	0.26	1.15	1.30	∞
Combined standard			RSS	$U_C = \sqrt{\sum_{i=1}^{n} C_i^2 U_i^2}$			10.63%	10.54%	
Expanded uncertainty (P=95%)		$U = k\, U_C$,k=2					21.26%	21.08%	

9.2 System validation Uncertainty

NO	Source	Tol(%)	Prob. Dist.	Div. k	ci (1g)	ci (10g)	1gUi	10gUi	Veff
Measurement System□									
1	Probe calibration	5.8	N	1	1	1	5.8	5.8	∞
2	Axial isotropy	3.5	R	√3	$(1\text{-cp})^{1/2}$	$(1\text{-cp})^{1/2}$	1.43	1.43	∞
3	Hemispherical isotropy	5.9	R	√3	$\sqrt{C_p}$	$\sqrt{C_p}$	2.41	2.41	∞
4	Boundary effect	1.0	R	√3	1	1	0.58	0.58	∞
5	Linearity	4.7	R	√3	1	1	2.71	2.71	∞
6	System Detection limits	1.0	R	√3	1	1	0.58	0.58	∞
7	Modulation response	0	N	1	1	1	0	0	∞
8	Readout electronics	0.5	N	1	1	1	0.50	0.50	∞
9	Response time	0	R	√3	1	1	0	0	∞
10	Integration time	1.4	R	√3	1	1	0.81	0.81	∞
11	Ambient noise	3.0	R	√3	1	1	1.73	1.73	∞
12	Ambient reflections	3.0	R	√3	1	1	1.73	1.73	∞
13	Probe positioner mech. restrictions	1.4	R	√3	1	1	0.81	0.81	∞
14	Probe positioning with respect to phantom shell	1.4	R	√3	1	1	0.81	0.81	∞
15	Max.SAR evaluation	1.0	R	√3	1	1	0.6	0.6	∞
Dipole									
16	Deviation of experimental source from	4	N	1	1	1	4.00	4.00	∞

17	Input power and SAR drit measurement	5	R	√3	1	1	2.89	2.89	∞
18	Dipole Axis to liquid Distance	2	R	√3	1	1			∞
Phantom and set-up									
19	Phantom uncertainty	4.0	R	√3	1	1	2.31	2.31	∞
20	Uncertainty in SAR correction for deviation(in	2.0	N	1	1	0.84	2	1.68	∞
21	Liquid conductivity (target)	2	N	1	1	0.84	2.00	1.68	∞
22	Liquid conductivity (temperature uncertainty)	2.5	N	1	0.78	0.71	1.95	1.78	5
23	Liquid conductivity (meas)	4	N	1	0.23	0.26	0.92	1.04	5
24	Liquid Permittivity (target)	2.5	N	1	0.78	0.71	1.95	1.78	∞
25	Liquid Permittivity (temperature uncertainty)	2.5	N	1	0.78	0.71	1.95	1.78	5
26	Liquid Permittivity (meas)	5.0	N	1	0.23	0.26	1.15	1.30	∞
Combined standard			RSS	$U_C = \sqrt{\sum_{i=1}^{n} C_i^2 U_i^2}$			10.15%	10.05%	
Expanded uncertainty (P=95%)		$U = k\, U_C$,k=2					20.29%	20.10%	

10. Conducted Power Measurement

10.1 Test Result

WLAN (2.4Gband)

Mode	Channel Number	Frequency (MHz)	Average Power (dBm)		
			Antenna A	Antenna B	Antenna A+B
802.11b	1	2412	14.00	15.20	N/A
	6	2437	14.30	14.90	N/A
	11	2462	14.00	15.10	N/A
802.11g	1	2412	13.70	13.30	N/A
	6	2437	14.30	14.20	N/A
	11	2462	13.90	14.40	N/A
802.11n(HT 20)	1	2412	12.60	13.60	16.14
	6	2437	12.40	14.10	16.34
	11	2462	12.70	14.40	16.64

WLAN (5.2Gband)

Mode	Channel Number	Frequency (MHz)	Average EIRP Power (dBm)		
			Antenna A	Antenna B	Antenna A+B
802.11a	36	5180	8.28	9.01	N/A
	40	5200	9.75	9.21	N/A
	48	5240	8.57	8.67	N/A
802.11 n-HT20	36	5180	9.31	8.82	12.08
	40	5200	9.91	9.28	12.62
	48	5240	8.58	8.92	11.76
802.11 n-HT40	38	5190	9.10	8.44	11.79
	46	5230	8.45	8.35	11.41
802.11ac(HT20)	36	5180	9.60	8.51	12.10
	40	5200	8.87	8.23	11.57
	48	5240	9.19	8.44	11.84
802.11ac(HT40)	38	5190	8.83	8.72	11.79
	46	5230	8.68	8.05	11.39
802.11ac(HT80)	42	5210	7.93	8.17	11.06

Bluetooth

Mode	Channel Number	Frequency (MHz)	Average Power (dBm)
GFSK(1Mbps)	0	2402	-0.25
	39	2441	-0.69
	78	2480	-0.53
π/4-DQPSK(2Mbps)	0	2402	-5.08
	39	2441	-4.74
	78	2480	-4.66
8DPSK(3Mbps)	0	2402	-6.37
	39	2441	-6.01
	78	2480	-5.85

BLE

Mode	Channel Number	Frequency (MHz)	Average Power (dBm)
GFSK(1Mbps)	0	2402	0.05
	19	2440	0.16
	39	2480	0.38

10.2 Tune-up Power

Mode	WLAN(AVG)		
	Antenna A	Antenna B	Antenna A+B
IEEE 802.11b	14±1dBm	15±1dBm	N/A
IEEE 802.11g	14±1dBm	14±1dBm	N/A
IEEE 802.11n(HT 20)	12±1dBm	14±1dBm	16±1dBm

	Mode	WLAN(AVG)		
		Antenna A	Antenna B	Antenna A+B
5200 MHz	802.11a	9±1dBm	9±1dBm	N/A
	802.11 n-HT20	9±1dBm	9±1dBm	12±1dBm
	802.11 n-HT40	9±1dBm	8±1dBm	11±1dBm
	802.11ac(HT20)	9±1dBm	8±1dBm	12±1dBm
	802.11ac(HT40)	8±1dBm	8±1dBm	11±1dBm
	802.11ac(HT80)	8±1dBm	8±1dBm	11±1dBm

Mode	BT(AVG)
GFSK	-0±1dBm
π/4-DQPSK	-5±1dBm
8DPSK	-6±1dBm

Mode	BLE(AVG)
GFSK	0±1dBm

LTE

10.3 SAR Test Exclusions Applied

Per FCC KDB 447498D01, the 1-g SAR and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHZ)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where:

• f(GHZ) is the RF channel transmit frequency in GHz
• Power and distance are rounded to the nearest mW and mm before calculation
• The result is rounded to one decimal place for comparison

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

$$\frac{Max\ Power\ of\ Channel\ (mW)}{Test\ Separation\ Dist\ (mm)} * \sqrt{Frequency(GHz)} \leq 3.0$$

Based on the maximum conducted power of **Bluetooth Body** (rounded to the nearest mW) and the antenna to user separation distance,

Bluetooth Body SAR was not required; [(1.259/10)* √2.480] = **0.20** < 3.0.

Based on the maximum conducted power of **2.4 GHz WLAN Body** (rounded to the nearest mW) and the antenna to user separation distance,

2.4 GHz WLAN SAR was required; [(50.119/10)* √2.462] = **7.86** > 3.0.

Based on the maximum conducted power of **5.2 GHz WLAN Body** (rounded to the nearest mW) and the antenna to user separation distance,

5.2 GHz WLAN SAR was required; [(19.953/10)* √5.240] = **4.57** > 3.0.

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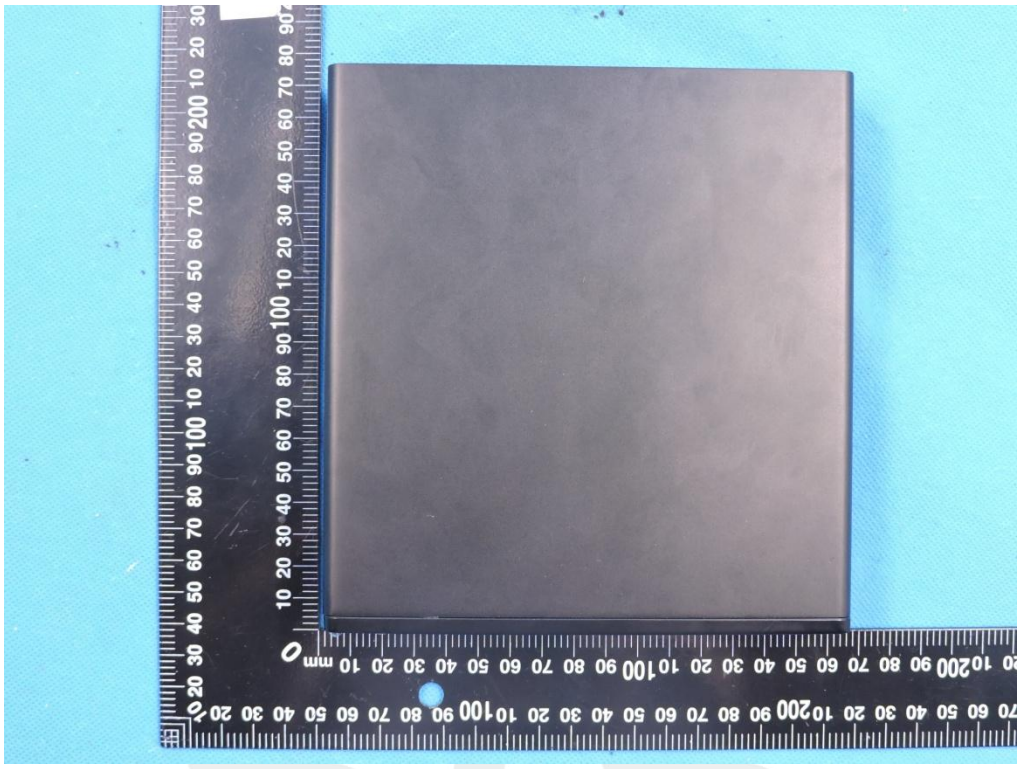
11. EUT And Test Setup Photo

11.1 EUT Photo

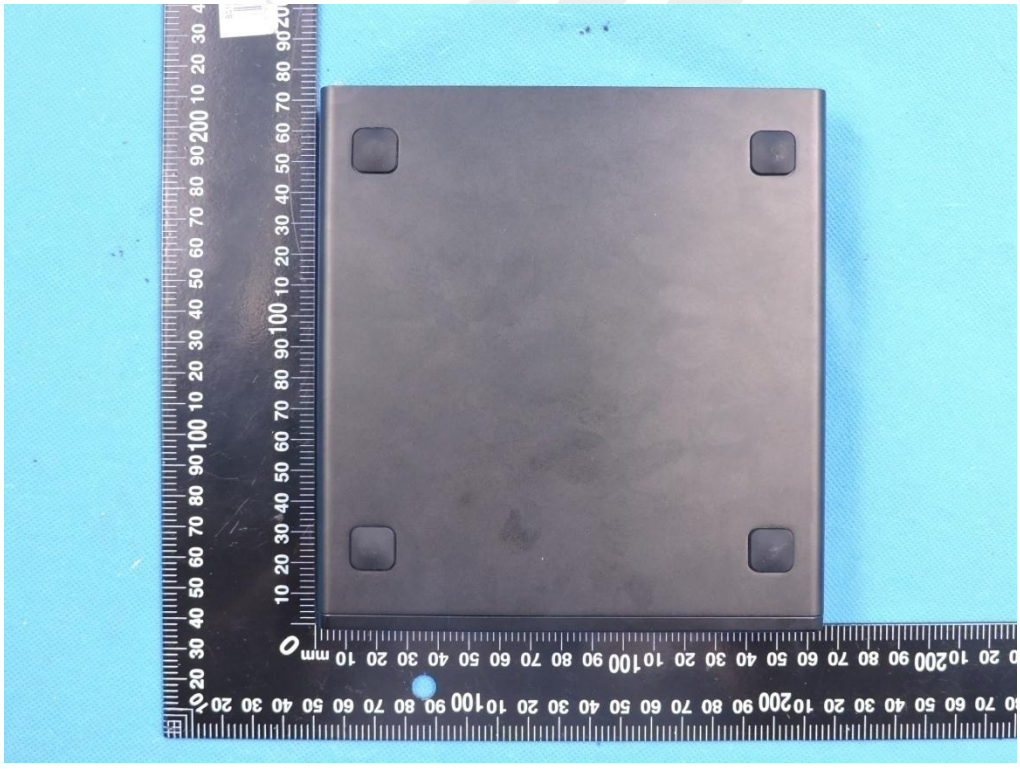
Front side

Back side

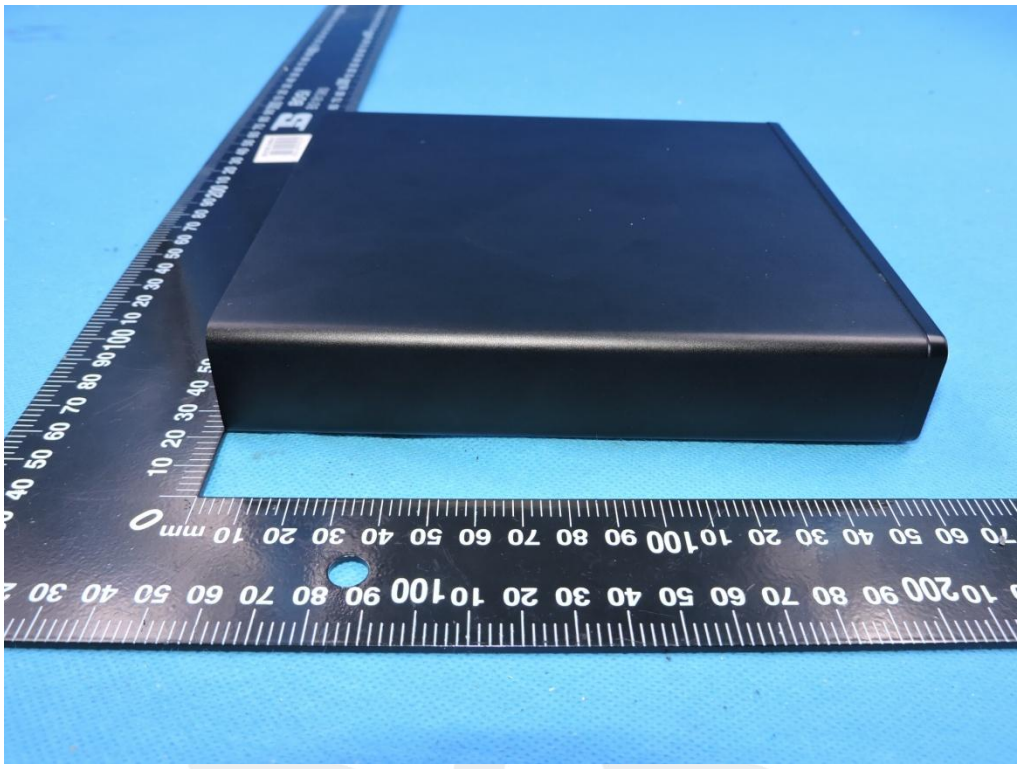
Top side



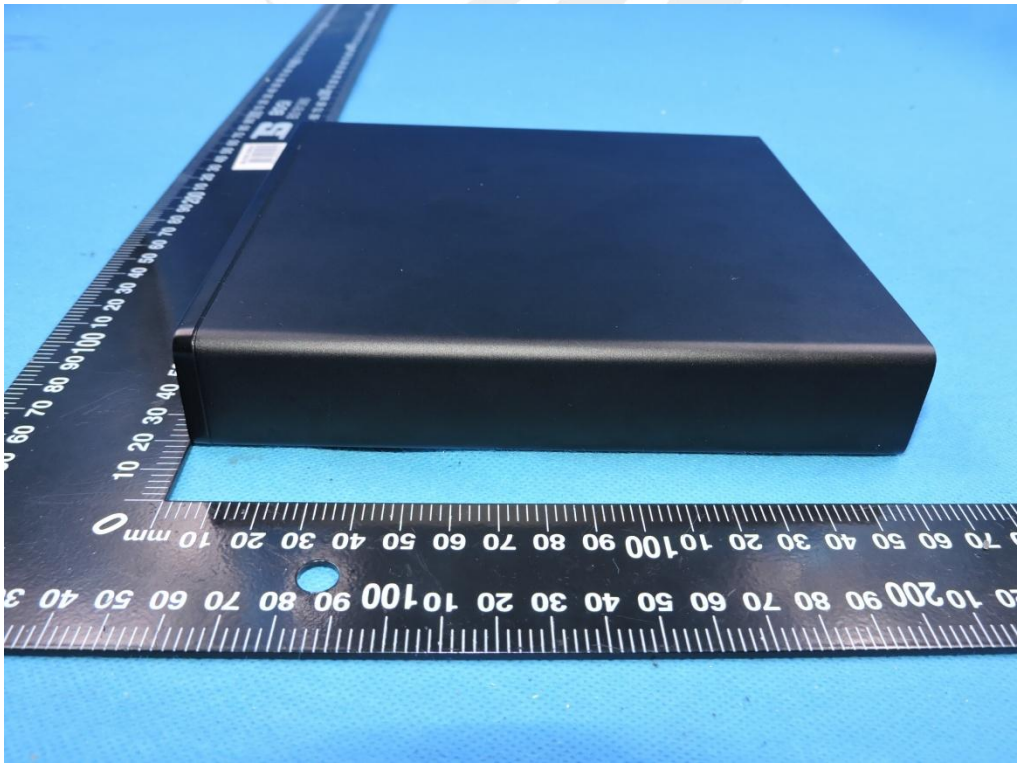
Bottom side



Left side

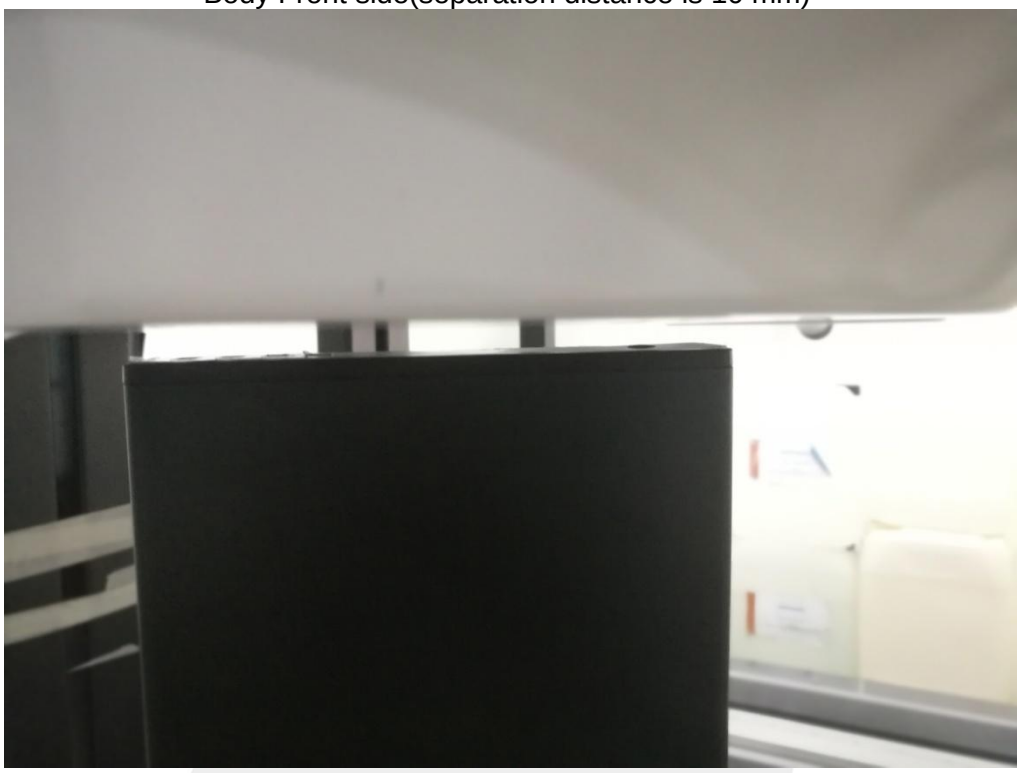


Right side

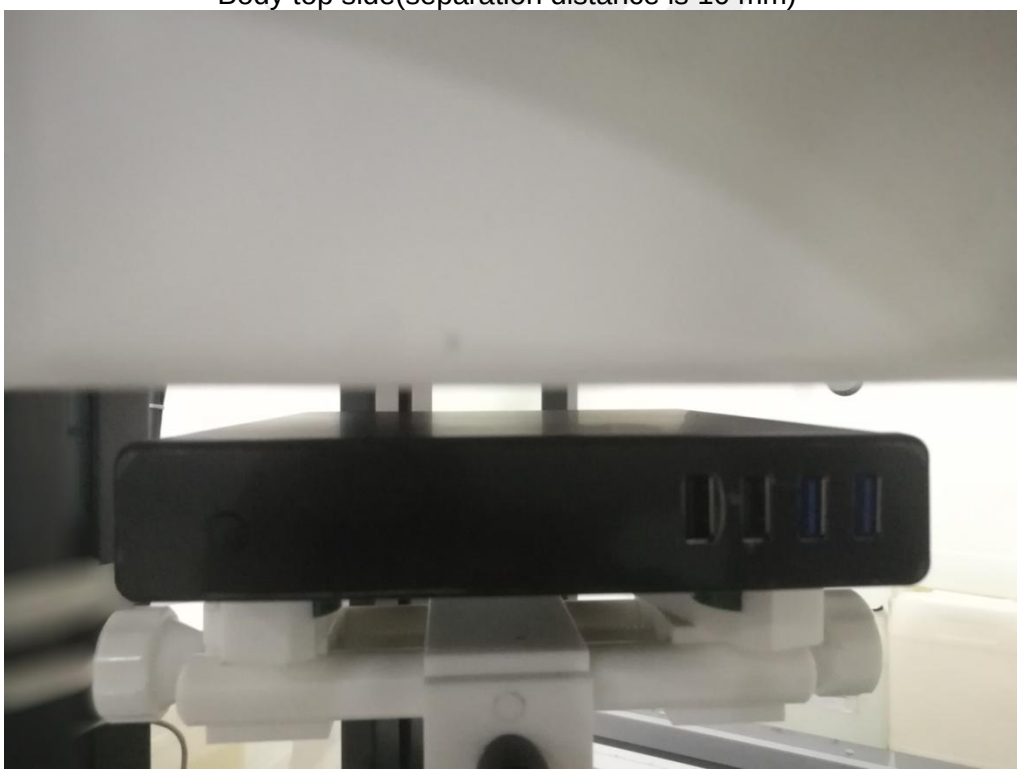


11.2 Setup Photo

Body Front side(separation distance is 10 mm)

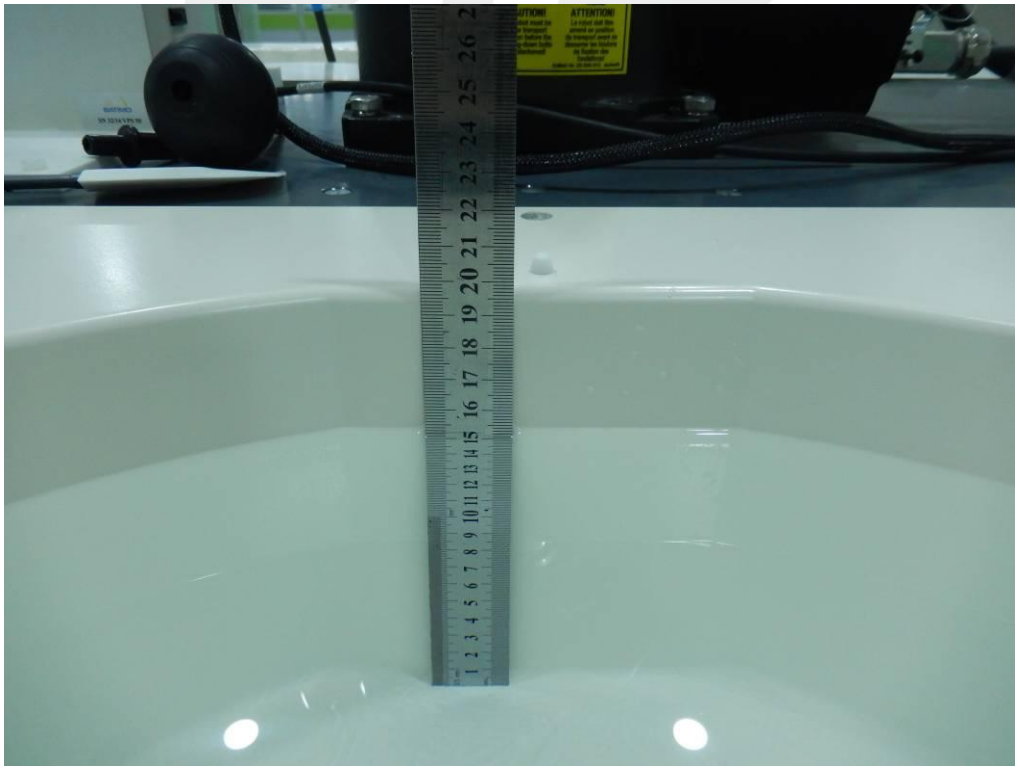


Body top side(separation distance is 10 mm)



Body Bottom side(separation distance is 10mm)

Liquid depth (15 cm)



12. SAR Result Summary

12.1 Body SAR

802.11b（Antenna A）：

Band	Mode	Test Position	Ch.	Result 1g (W/Kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Duty cycle(%)	Scaled SAR (W/Kg)	Meas. No.
WLAN 2.4G	802.11b	Front side	6	0.309	3.66	15	14.30	100%	**0.363**	1
		Top side	6	0.037	-2.73	15	14.30	100%	0.043	/
		Bottom side	6	0.025	1.64	15	14.30	100%	0.029	/
WLAN 5.2G	802.11a	Front side	36	0.523	-0.13	10	8.28	100%	0.777	/
		Front side	40	0.779	3.58	10	9.75	100%	**0.825**	2
		Front side	48	0.541	0.60	10	8.57	100%	0.752	/
		Top side	40	0.041	-0.74	10	9.75	100%	0.043	/
		Bottom side	40	0.028	1.78	10	9.75	100%	0.030	/

802.11b（Antenna B）：

Band	Mode	Test Position	Ch.	Result 1g (W/Kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Duty cycle(%)	Scaled SAR (W/Kg)	Meas. No.
WLAN 2.4G	802.11b	Front side	1	0.378	-1.74	16	15.20	100%	**0.454**	3
		Top side	1	0.042	-2.26	16	15.20	100%	0.050	/
		Bottom side	1	0.029	2.92	16	15.20	100%	0.035	/
WLAN 5.2G	802.11a	Front side	36	0.656	-2.71	10	9.01	100%	0.824	/
		Front side	40	0.819	-2.73	10	9.21	100%	**0.982**	4
		Front side	48	0.623	-3.16	10	8.67	100%	0.846	/
		Top side	40	0.055	0.95	10	9.21	100%	0.066	/
		Bottom side	40	0.040	-2.69	10	9.21	100%	0.048	/

802.11b（Antenna A+B）：

Band	Mode	Test Position	Ch.	Result 1g (W/Kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Duty cycle(%)	Scaled SAR (W/Kg)	Meas. No.
WLAN 2.4G	802.11n	Front side	11	0.561	2.88	17	16.64	100%	**0.609**	5
		Top side	11	0.033	-3.77	17	16.64	100%	0.036	/
		Bottom side	11	0.026	-3.41	17	16.64	100%	0.028	/
WLAN 5.2G	802.11n	Front side	36	0.821	0.27	13	12.08	100%	1.015	/
		Front side	40	1.036	1.95	13	12.62	100%	**1.131**	6
		Front side	48	0.794	-3.87	13	11.78	100%	1.052	/
		Top side	40	0.068	3.03	13	12.62	100%	0.074	/
		Bottom side	40	0.055	-0.58	13	12.62	100%	0.060	/

Note:

1. The test separation of all above table is 10mm.

.

Repeated SAR

Band	Antenna	Mode	Test Position	Ch.	Result 1g (W/Kg)	Power Drift(%)	Max.Turn-up Power(dBm)	Meas.Output Power(dBm)	Scaled SAR (W/Kg)	Meas. No.
WLAN 5.2G	A	802.11a	Front side	40	0.763	-1.02	10	9.75	0.808	/
WLAN 5.2G	B	802.11a	Front side	40	0.804	0.35	10	9.21	0.964	/
WLAN 5.2G	A+B	80211n	Front side	40	1.025	-2.24	13	12.62	1.119	/

12.2 repeated SAR measurement

Band	Antenna	Mode	Test Position	Ch.	Original Measured SAR 1g(mW/g)	1 st Repeated SAR 1g	Ratio	Original Measured SAR 1g(mW/g)	2nd Repeated SAR 1g	Ratio
WLAN 5.2G	A	802.11a	Front side	40	0.779	0.763	1.02	-	-	-
WLAN 5.2G	B	802.11a	Front side	40	0.819	0.804	1.02	-	-	-
WLAN 5.2G	A+B	80211n	Front side	40	1.036	1.025	1.01	-	-	-

Note:

1. Per KDB 865664 D01,for each frequency band ,repeated SAR measurement is required only when the measured SAR is≥0.8W/Kg.
2. Per KDB 865664 D01,if the ratio of largest to smallest SAR for the original and first repeated measurement is≤1.2and the measured SAR＜1.45W/Kg, only one repeated measurement is required.
3. 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 ≥ 1.45W/Kg
4. The ratio is the difference in percentage between original and repeated measured SAR.

NOTE:

1. Bluetooth and 2.4G WLAN/5.2G WLAN can't simultaneous transmission at the same time.
2. For simultaneous transmission at head and body exposure position, 2 transmitters simultaneous transmission was the worst state.
3. Based upon KDB 447498 D01, BT SAR is excluded as below table.
4. If the test separation distance is <5mm, 5mm is used for excluded SAR calculation.
5. For minimum test separation distance≦50mm,Bluetooth standalone SAR is excluded according to [(max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm) ·[√f (GHz) /x] ≦3.0 for 1-g SAR and ≦7.5 for 10-g extremity SAR
6. The reported SAR summation is calculated based on the same configuration and test position.
7. KDB 447498 / 4.3.2 (2) when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
   a) (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.
   b) 0.4W/Kg for 1-g SAR and 1.0W/Kg for 10-g SAR, when the separation distance is >50mm.

Estimated SAR		Maximum Power		Antenna to user(mm)	Frequency(GHz)	Stand alone SAR(1g) [W/kg]
		dBm	mW			
BT	Body	1	1.259	10	2.480	0.026

13. Equipment List

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
2450MHzDipole	SATIMO	SID2450	SN 30/14 DIP2G450-335	2017.08.15	2020.08.14
Waveguide	SATIMO	SWG5500	SN 13/14 WGA32	2017.08.15	2020.08.14
E-Field Probe	MVG	SSE2	SN 45/15 EPGO281	2017.02.04	2018.02.03
Dielectric Probe Kit	SATIMO	SCLMP	SN 32/14 OCPG67	2016.12.05	2017.12.04
Antenna	SATIMO	Antenna3	SN 07/13 ZNTA52	N/A	N/A
Phantom1	SATIMO	SAM	SN 32/14 SAM115	2014.09.01	N/A
Phantom2	SATIMO	SAM	SN 32/14 SAM116	2014.09.01	N/A
Phone holder	SATIMO	N/A	SN 32/14 MSH97	2014.09.01	N/A
Laptop holder	SATIMO	N/A	SN 32/14 LSH29	2014.09.01	N/A
Network Analyzer	Agilent	8753ES	US38432810	2017.03.16	2018.03.15
Multi Meter	Keithley	Multi Meter 2000	4050073	2017.10.15	2018.10.14
Signal Generator	Agilent	N5182A	MY50140530	2017.10.15	2018.10.14
Wireless Communication Test Set	Agilent	8960-E5515C	MY48360751	2017.10.15	2018.10.14
Power Amplifier	DESAY	ZHL-42W	9638	2017.10.15	2018.10.14
Power Meter	R&S	NRP	100510	2017.10.15	2018.10.14
Power Meter	Agilent	E4418B	GB43312526	2017.10.15	2018.10.14
Power Sensor	R&S	NRP-Z11	101919	2017.10.15	2018.10.14
Power Sensor	Agilent	E9301A	MY41497725	2017.10.15	2018.10.14
9dB Attenuator	Agilent	99899	DC-18GHz	2017.05.10	2018.05.09
11dB Attenuator	Agilent	8494B	DC-18GHz	2017.05.10	2018.05.09
110dB Attenuator	Agilent	8494B	DC-18GHz	2017.05.10	2018.05.09
Dual Directional Coupler	Agilent	SHWPDI-1080S	N/A	2017.05.09	2018.05.08
Temperature & Humitidy	MiEO	HH660	N/A	2017.10.15	2018.10.14

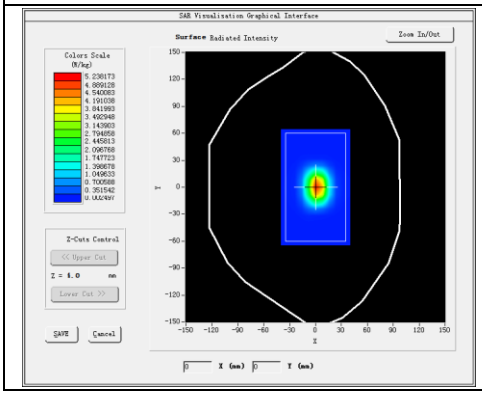
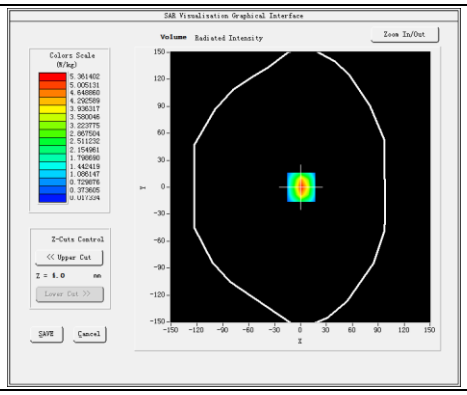
Appendix A. System Validation Plots

System Performance Check Data (2450MHz Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2017-10-31
Measurement duration: 14 minutes 23 seconds

Experimental conditions.

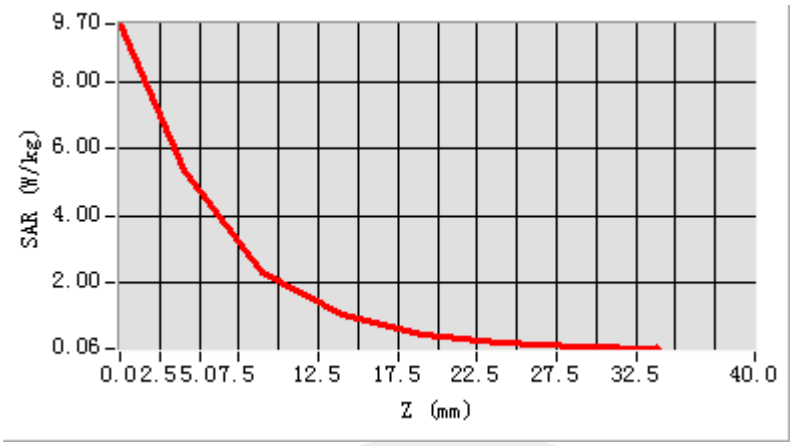
Device Position	Validation plane
Band	2450 MHz
Channels	-
Signal	CW
Frequency (MHz)	2450
Relative permittivity	52.38
Conductivity (S/m)	1.97
Power drift (%)	-0.30
Probe	SN 45/15 EPGO281
ConvF	2.28
Crest factor:	1:1

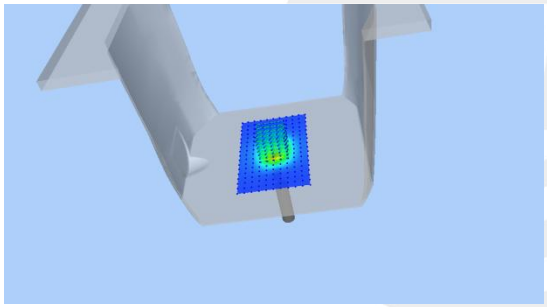
SURFACE SAR	VOLUME SAR
	

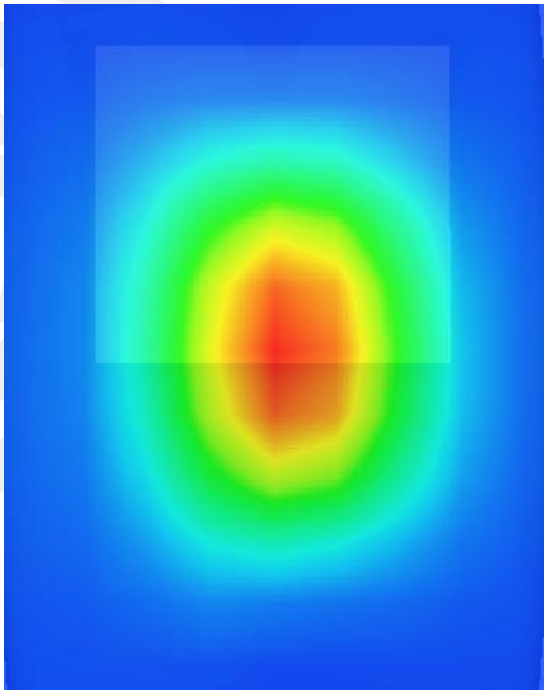
Maximum location: X=1.00, Y=0.00

SAR 10g (W/Kg)	2.344807
SAR 1g (W/Kg)	5.143226

Z Axis Scan


9.70
8.00
6.00
4.00
2.00
0.06
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)



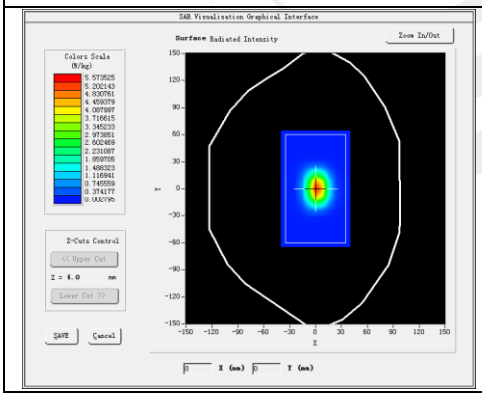
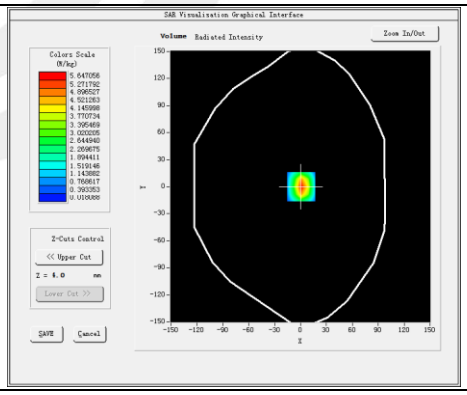


System Performance Check Data(5200MHz Body)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2017-10-31

Experimental conditions.

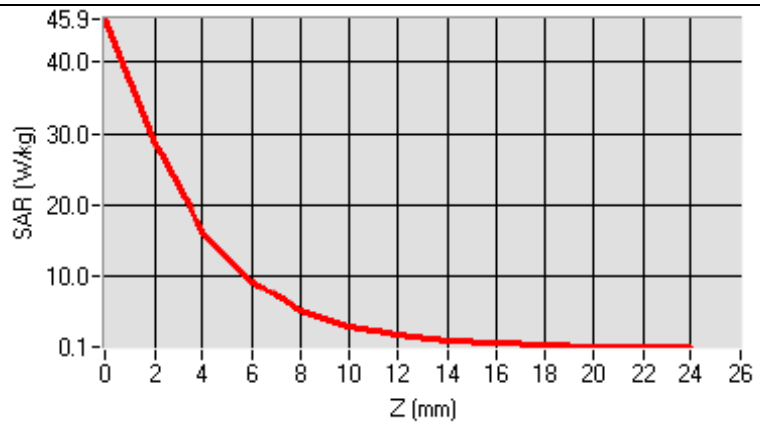
Device Position	Validation plane
Band	5200 MHz
Channels	-
Signal	CW
Frequency (MHz)	5200
Relative permittivity	49.66
Conductivity (S/m)	5.41
Power drift (%)	2.52
Probe	SN 45/15 EPGO281
ConvF	2.52
Crest factor:	1:1

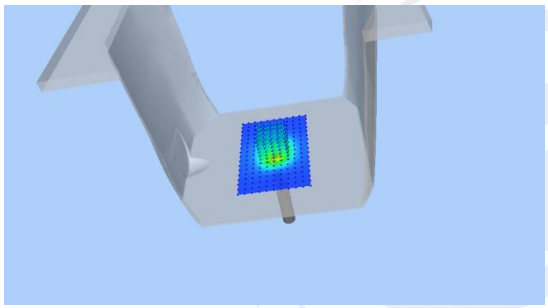
SURFACE SAR	VOLUME SAR
	

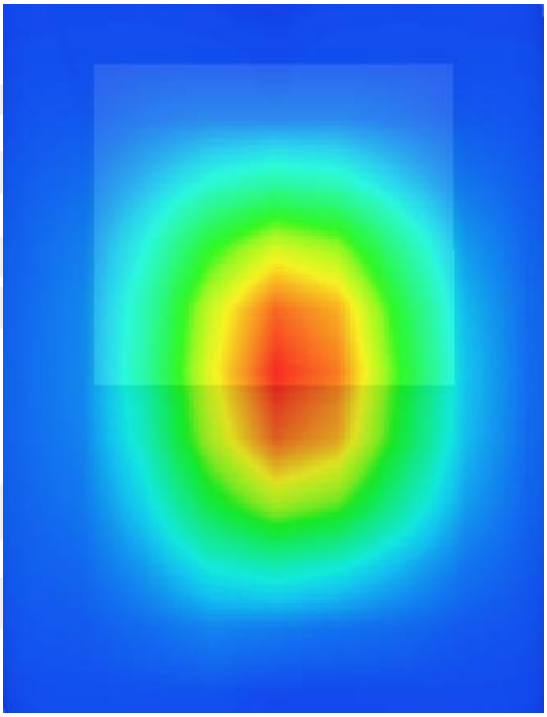
Maximum location: X=7.00, Y=2.00

SAR 10g (W/Kg)	5.762062
SAR 1g (W/Kg)	15.847001

Z Axis Scan







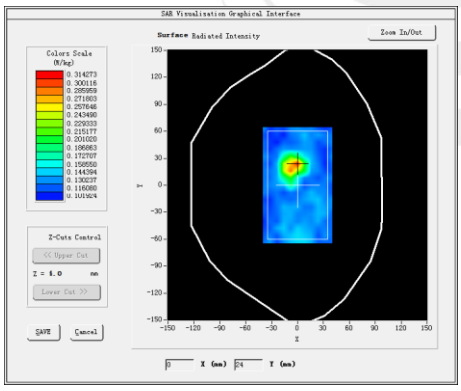
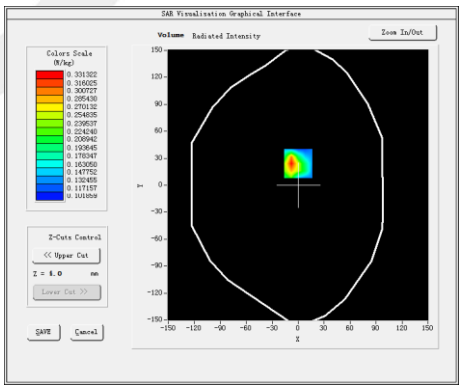
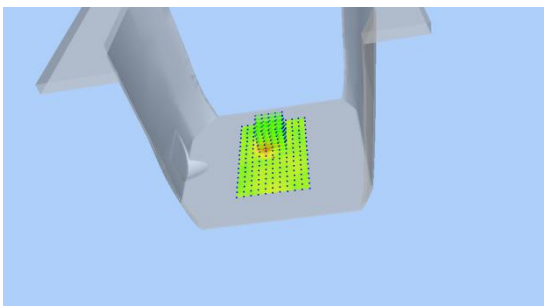
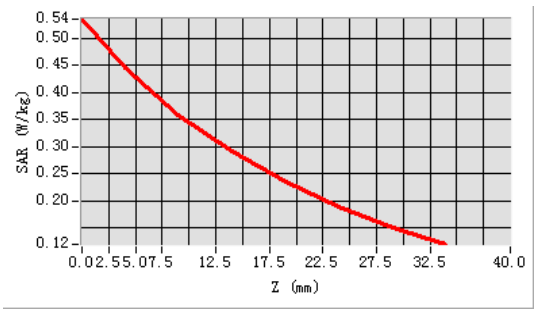
Appendix B. SAR Test Plots

Plot 1: DUT: Ultra Mini 4K Streaming PC / Mini Smart Cloud PC ; EUT Model: MAHMG

Test Date	2017-10-31
Probe	SN 45/15 EPGO281
ConvF	2.28
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body front
Antenna	A
Band	IEEE 802.11b ISM
Channels	Middle
Signal	IEEE802.b (Crest factor: 1.0)
Frequency (MHz)	2437
Relative permittivity (real part)	52.7
Conductivity (S/m)	1.95
Variation (%)	3.66

Maximum location: X=0.00, Y=24.00
SAR Peak: 0.54 W/kg

SAR 10g (W/Kg)	0.189765
SAR 1g (W/Kg)	0.309053

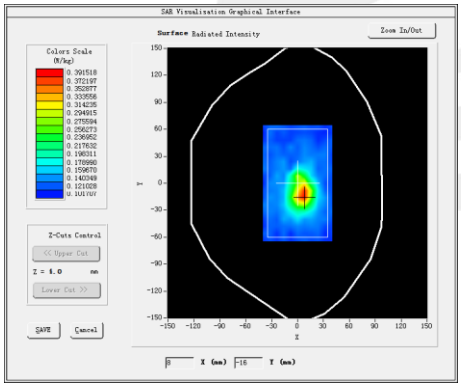
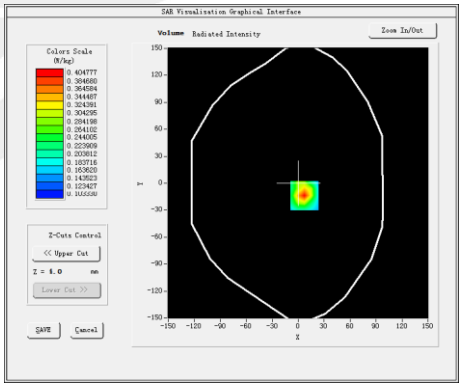
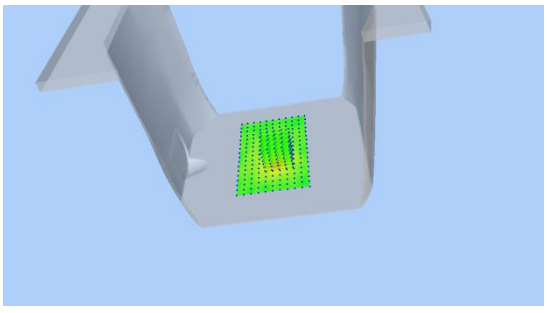
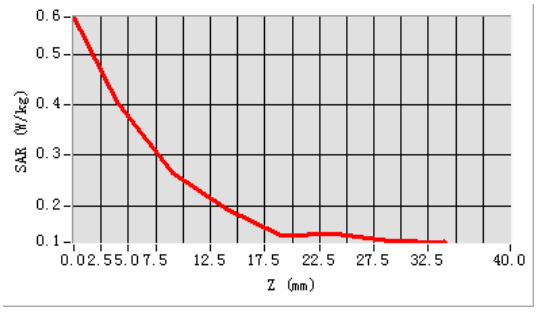
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 2: DUT: Ultra Mini 4K Streaming PC / Mini Smart Cloud PC ; EUT Model: MAHMG

Test Date	2017-10-31
Probe	SN 45/15 EPGO281
ConvF	2.28
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body front
Antenna	B
Band	IEEE 802.11b ISM
Channels	Low
Signal	IEEE802.b (Crest factor: 1.0)
Frequency (MHz)	2412
Relative permittivity (real part)	52.7
Conductivity (S/m)	1.95
Variation (%)	-1.74

Maximum location: X=7.00, Y=-14.00
SAR Peak: 0.59 W/kg

SAR 10g (W/Kg)	0.234508
SAR 1g (W/Kg)	0.377879

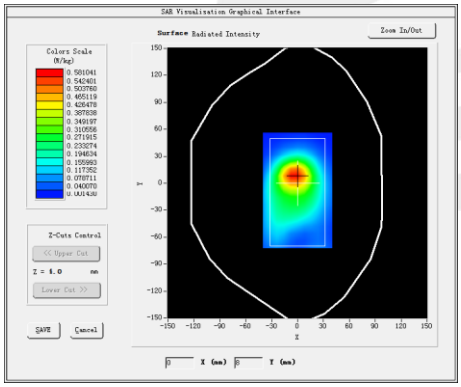
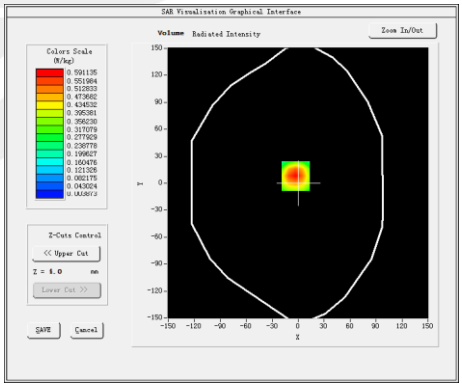
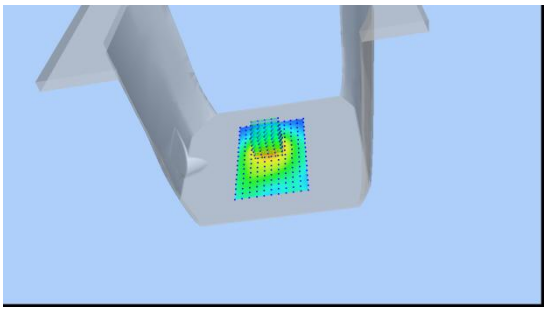
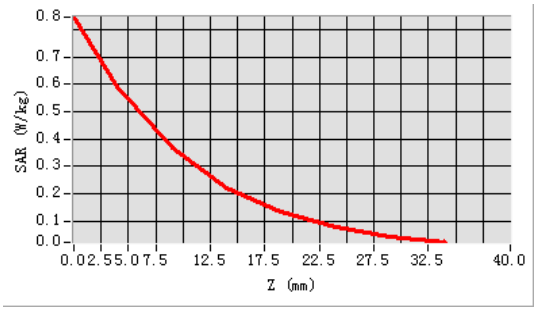
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 3: DUT: Ultra Mini 4K Streaming PC / Mini Smart Cloud PC ; EUT Model: MAHMG

Test Date	2017-10-31
Probe	SN 45/15 EPGO281
ConvF	2.28
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body front
Antenna	A+B
Band	IEEE 802.11n ISM
Channels	High
Signal	IEEE802.n (Crest factor: 1.0)
Frequency (MHz)	2462
Relative permittivity (real part)	52.7
Conductivity (S/m)	1.95
Variation (%)	2.88

Maximum location: X=-3.00, Y=8.00
SAR Peak: 0.87 W/kg

SAR 10g (W/Kg)	0.319256
SAR 1g (W/Kg)	0.560703

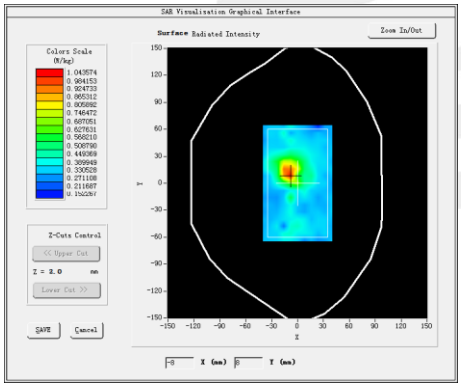
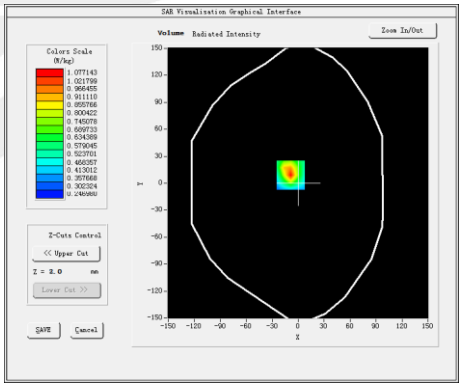
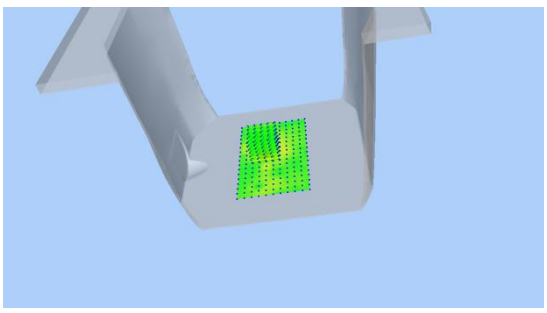
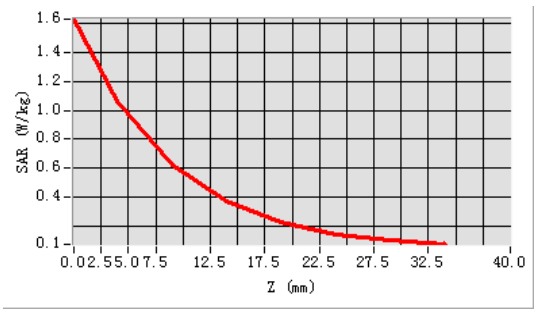
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 4: DUT: Ultra Mini 4K Streaming PC / Mini Smart Cloud PC ; EUT Model: MAHMG

Test Date	2017-10-31
Probe	SN 45/15 EPGO281
ConvF	2.52
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body front side
Antenna	A
Band	IEEE 802.11a ISM
Channels	Middle
Signal	IEEE802.a (Crest factor: 1.0)
Frequency (MHz)	5200
Relative permittivity (real part)	49.0
Conductivity (S/m)	5.30
Variation (%)	3.58

Maximum location: X=-9.00, Y=9.00
SAR Peak: 1.58 W/kg

SAR 10g (W/Kg)	0.456122
SAR 1g (W/Kg)	0.778703

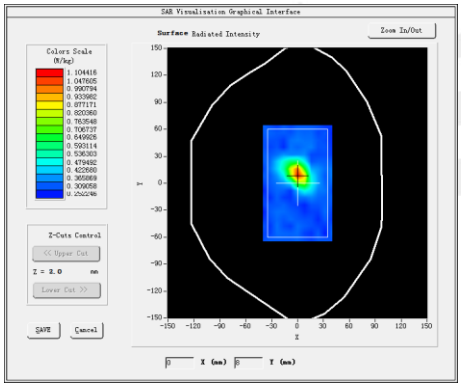
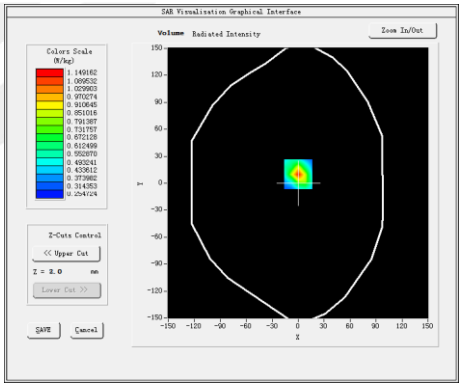
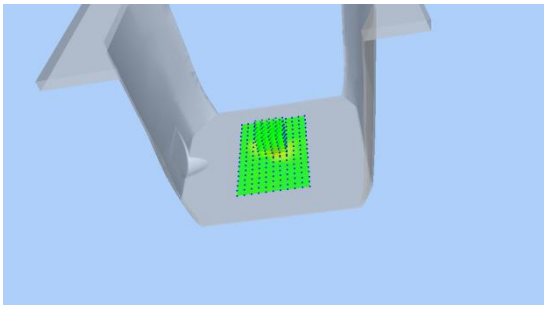
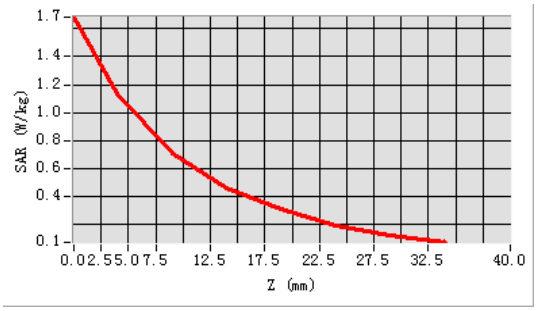
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 5: DUT: Ultra Mini 4K Streaming PC / Mini Smart Cloud PC ; EUT Model: MAHMG

Test Date	2017-10-31
Probe	SN 45/15 EPGO281
ConvF	2.52
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body front side
Antenna	B
Band	IEEE 802.11a ISM
Channels	Middle
Signal	IEEE802.a (Crest factor: 1.0)
Frequency (MHz)	5200
Relative permittivity (real part)	49.0
Conductivity (S/m)	5.30
Variation (%)	-2.73

Maximum location: X=0.00, Y=10.00
SAR Peak: 1.69 W/kg

SAR 10g (W/Kg)	0.460870
SAR 1g (W/Kg)	0.818771

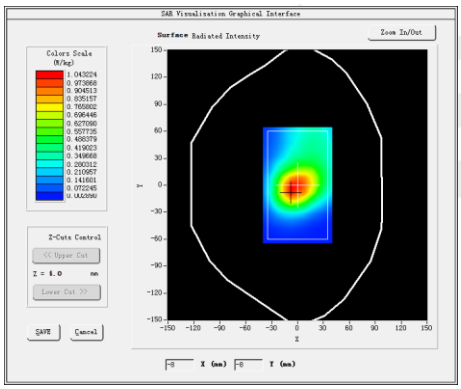
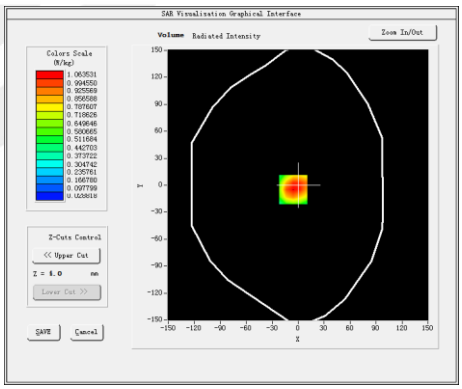
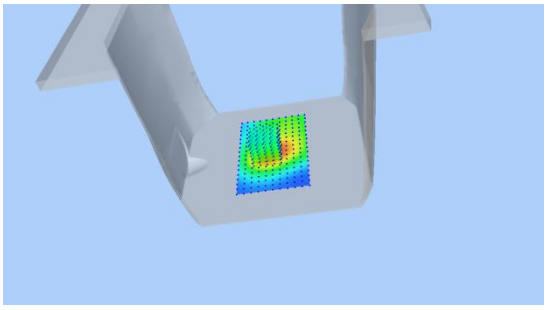
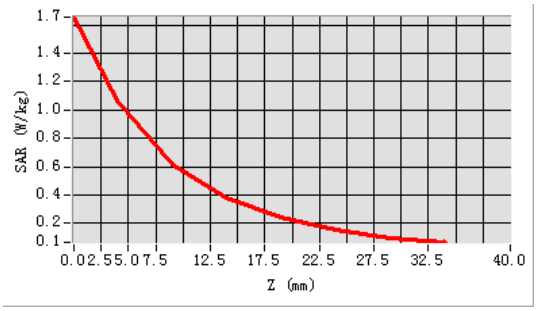
SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Plot 6: DUT: Ultra Mini 4K Streaming PC / Mini Smart Cloud PC ; EUT Model: MAHMG

Test Date	2017-10-31
Probe	SN 45/15 EPGO281
ConvF	2.52
Area Scan	dx=8mm dy=8mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm
Phantom	Validation plane
Device Position	Body front side
Antenna	A+B
Band	IEEE 802.11n ISM
Channels	Middle
Signal	IEEE802.n (Crest factor: 1.0)
Frequency (MHz)	5200
Relative permittivity (real part)	49.0
Conductivity (S/m)	5.30
Variation (%)	1.95

Maximum location: X=-6.00, Y=-5.00
SAR Peak: 1.65 W/kg

SAR 10g (W/Kg)	0.615649
SAR 1g (W/Kg)	1.035998

SURFACE SAR	VOLUME SAR
	
3D	**Z Axis Scan**
	

Appendix C. Probe Calibration And Dipole Calibration Report

Refer the appendix Calibration Report.

※※※※※END OF THE REPORT※※※※※