

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640 Fax: +86-755-26648637

Website: <u>www.cqa-cert.com</u>

Report Template Version: V03 Report Template Revision Date: Mar.1st, 2017

# **FCC Test Report**

**Report No. :** CQASZ20181200010E-01

Applicant: Shenzhen Hesibond IOT Technology Corp., Ltd.

Address of Applicant: Room 418, 4th Floor, Shenyi Industrial Building, Nanshan Avenue, Nanshan

Street, Nanshan District, Shenzhen, China

**Manufacturer:** Shenzhen Hesibond IOT Technology Corp., Ltd.

Address of Room 418, 4th Floor, Shenyi Industrial Building, Nanshan Avenue, Nanshan

Manufacturer: Street, Nanshan District, Shenzhen, China

**Equipment Under Test (EUT):** 

Product: IOT Lock Gateway

Model No.: 2ASI7-HB-WLK-02

Brand Name:

FCC ID: 2ASI7-HB-WLK-02

 Standards:
 47 CFR Part 15, Subpart C

 Date of Test:
 2018-12-06 to 2019-04-19

Date of Issue: 2019-04-19
Test Result: PASS\*

Tested By: I'my To U

(Tiny You)

Reviewed By:

(Aaron Ma)

Approved By:

( Jack Ai)



The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

<sup>\*</sup> In the configuration tested, the EUT complied with the standards specified above.



Report No.: CQASZ20181200010E-01

## 1 Version

## **Revision History Of Report**

Report No.	Version	Description	Issue Date
CQASZ20181200010E-01	Rev.01	Initial report	2019-04-19



Report No.: CQASZ20181200010E-01

# 2 Test Summary

Test Item	Test Requirement	Test Requirement Test method	
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203	ANSI C63.10 (2013)	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2013)	PASS
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C Section 15.249 (a)	ANSI C63.10 (2013)	PASS
Spurious Emissions	47 CFR Part 15, Subpart C Section 15.249 (a)/15.209	ANSI C63.10 (2013) PASS	
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.249(a)/15.205	ANSI C63.10 (2013) PASS	
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.215 (c)	ANSI C63.10 (2013) PASS	





## 3 Contents

			Page
1	V	/ERSION	2
2	TI	EST SUMMARY	3
3	C	CONTENTS	,
J	C,	ONIENIO	٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠٠
4	G	SENERAL INFORMATION	5
	4.1	CLIENT INFORMATION	5
	4.2	GENERAL DESCRIPTION OF EUT	
	4.3	TEST ENVIRONMENT AND MODE	
	4.4	DESCRIPTION OF SUPPORT UNITS	6
	4.5	STATEMENT OF THE MEASUREMENT UNCERTAINTY	
	4.6	TEST LOCATION	
	4.7	TEST FACILITY	7
	4.8	DEVIATION FROM STANDARDS	
	4.9	ABNORMALITIES FROM STANDARD CONDITIONS	
	4.10	·	
	4.11	EQUIPMENT LIST	8
5	T	EST RESULTS AND MEASUREMENT DATA	9
	5.1	Antenna Requirement	9
	5.2	CONDUCTED EMISSIONS	10
	5.3	RADIATED EMISSION	14
	5.4	20dB Bandwidth	20
6	P	PHOTOGRAPHS	22
	6.1	RADIATED EMISSION TEST SETUP	22
	6.2	EUT CONSTRUCTIONAL DETAILS	
FI	ND O	NE THE REPORT	35



Report No.: CQASZ20181200010E-01

## 4 General Information

## **4.1 Client Information**

Applicant:	Shenzhen Hesibond IOT Technology Corp., Ltd.
Address of Applicant:	Room 418, 4th Floor, Shenyi Industrial Building, Nanshan Avenue, Nanshan Street, Nanshan District, Shenzhen, China
Manufacturer:	Shenzhen Hesibond IOT Technology Corp., Ltd.
Address of Manufacturer:	Room 418, 4th Floor, Shenyi Industrial Building, Nanshan Avenue, Nanshan Street, Nanshan District, Shenzhen, China

## 4.2 General Description of EUT

Name:	IOT Lock Gateway		
Model No.:	2ASI7-HB-WLK-02		
Trade Mark :	tot Tech		
Hardware Version:	DOR007		
Software Version:	2.4G-SWG2X-V1.0		
Frequency Range:	2419 MHz		
Modulation Type:	ASK		
Number of Channels:	1 (declared by the client)		
Sample Type:	☐ Mobile ☐ Portable ☐ Fix Location		
Test Software of EUT:	RF test (manufacturer declare )		
Antenna Type:	Internal antenna		
Antenna Gain:	0dBi		
	Adapter:		
Power Supply:	Mode: P-046-090200 Input: AC100~240V 50/60Hz 0.6A, Output: DC9V 2A		
	Battery: DC3.7V 1800 mA		



Report No.: CQASZ20181200010E-01

#### 4.3 Test Environment and Mode

Operating Environment:	Operating Environment:				
Temperature:	24.0 °C				
Humidity:	52 % RH				
Atmospheric Pressure:	1008 mbar				
Test Mode:	Use test software (RF test) to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.				

### 4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
PC	Lenovo	ThinkPad E450c	Provide by lab	FCC ID

### 4.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQA laboratory is reported:

Test	Range	Uncertainty	Notes
Radiated Emission	Below 1GHz	±5.12dB	(1)
Radiated Emission	Above 1GHz	±4.60dB	(1)
Conducted Disturbance	0.15~30MHz	±3.34dB	(1)

<sup>(1)</sup> This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



Report No.: CQASZ20181200010E-01

#### 4.6 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

### 4.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### • CNAS (No. CNAS L5785)

CNAS has accredited Shenzhen Huaxia Testing Technology Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

#### • ISED Registration No.: 22984-1

The 3m Semi-anechoic chamber of Shenzhen Huaxia Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

#### • A2LA (Certificate No. 4742.01)

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

#### • FCC Registration No.: 522263

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

### 4.8 Deviation from Standards

None.

#### 4.9 Abnormalities from Standard Conditions

None.

### 4.10 Other Information Requested by the Customer

None.



## 4.11 Equipment List

Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2018/9/26	2019/9/25
Spectrum analyzer	R&S	FSU26	CQA-038	2018/10/28	2019/10/27
Preamplifier	MITEQ	AFS4-00010300- 18-10P-4	CQA-035	2018/9/26	2019/9/25
Preamplifier	MITEQ	AMF-6D- 02001800-29- 20P	CQA-036	2018/11/2	2019/11/1
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2018/9/26	2020/9/25
Bilog Antenna	R&S	HL562	CQA-011	2018/9/26	2020/9/25
Horn Antenna	R&S	HF906	CQA-012	2018/9/26	2020/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2018/9/26	2020/9/25
Coaxial Cable (Above 1GHz)	CQA	N/A	C019	2018/9/26	2019/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2018/9/26	2019/9/25
Antenna Connector	CQA	RFC-01	CQA-080		2019/9/25
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2018/9/26	2019/9/25
Power Sensor	KEYSIGHT	U2021XA	CQA-30	2018/9/26	2019/9/25
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	2018/9/26	2019/9/25
Power divider	MIDWEST	PWD-2533-02- SMA-79	CQA-067	2018/9/26	2019/9/25
EMI Test Receiver	R&S	ESPI3	CQA-013	2018/9/26	2019/9/25
LISN	R&S	ENV216	CQA-003	2018/11/5	2019/11/4
Coaxial cable (9KHz~300MHz)	CQA	N/A	CQA-C009	2018/9/26	2019/9/25



Report No.: CQASZ20181200010E-01

## 5 Test results and Measurement Data

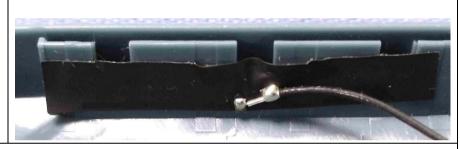
### 5.1 Antenna Requirement

**Standard requirement:** 47 CFR Part 15C Section 15.203

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

#### **EUT Antenna:**



The antenna is Internal antenna no consideration of replacement. The best case gain of the antenna is 0dBi.

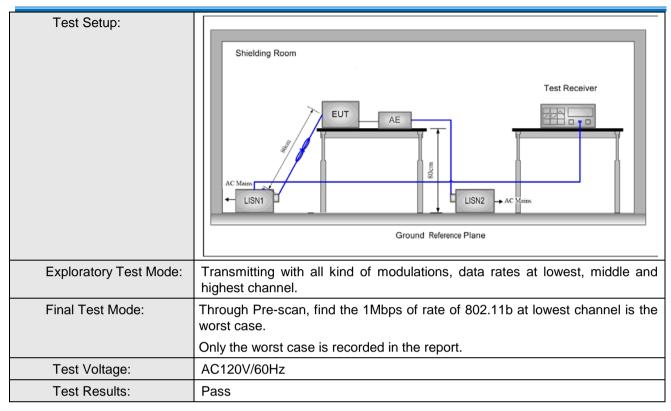


Report No.: CQASZ20181200010E-01

## 5.2 Conducted Emissions

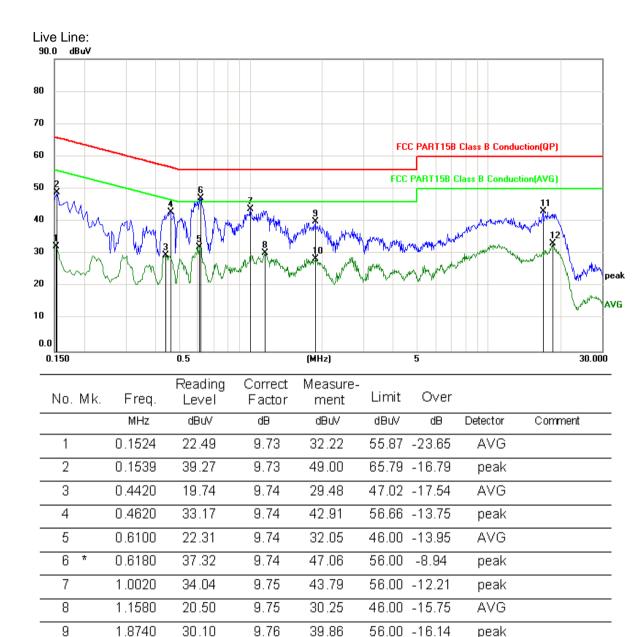
Test Requirement:	47 CFR Part 15C Section 15.207			
Test Method:	ANSI C63.10: 2013			
Test Frequency Range:	150kHz to 30MHz			
Limit:	[	Limit (c	dBuV)	
	Frequency range (MHz)	Quasi-peak	Average	
	0.15-0.5	66 to 56*	56 to 46*	
	0.5-5	56	46	
	5-30	60	50	
	* Decreases with the logarithn	n of the frequency.		
Test Procedure:	<ol> <li>The mains terminal disturbroom.</li> <li>The EUT was connected to Impedance Stabilization Not impedance. The power call connected to a second LIS plane in the same way as a multiple socket outlet strip single LISN provided the ration of the tabletop EUT was placed on the horizontal ground reference plane. All placed on the horizontal ground reference plane. The LISN unit under test and bonded mounted on top of the ground the EUT and associated eduction.</li> <li>In order to find the maximule equipment and all of the in ANSI C63.10: 2013 on correct and connected to the control of the in ANSI C63.10: 2013 on corrected to a second connected to the control of the in ANSI C63.10: 2013 on corrected to a second control of the interval of the</li></ol>	o AC power source throetwork) which provides oles of all other units of SN 2, which was bonded the LISN 1 for the unit is was used to connect mating of the LISN was noted upon a non-metallic and for floor-standing arround reference plane, the a vertical ground reference plane was bonded to the 1 was placed 0.8 m from the vertical ground reference und reference plane. The forthe LISN 1 and the quipment was at least 0 am emission, the relative terface cables must be	bugh a LISN 1 (Line a 50Ω/50μH + 5Ω lift the EUT were do not the ground refer peing measured. A multiple power cables not exceeded. It is table 0.8m above to trangement, the EUT derence plane. The red reference plane. The horizontal ground om the boundary of the plane for LISNs his distance was EUT. All other units 0.8 m from the LISN we positions of	inear rence s to a the was ear the of 2.







#### **Measurement Data**



#### Remark:

10

11

12

1.8780

16,9980

18.6620

1. The following Quasi-Peak and Average measurements were performed on the EUT:

9.76

9.85

9.87

2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

18.66

33.24

23.33

3. If the Peak value under Average limit, the Average value is not recorded in the report.

28.42

43.09

33.20

46.00 -17.58

60.00 -16.91

50.00 -16.80

AVG

peak

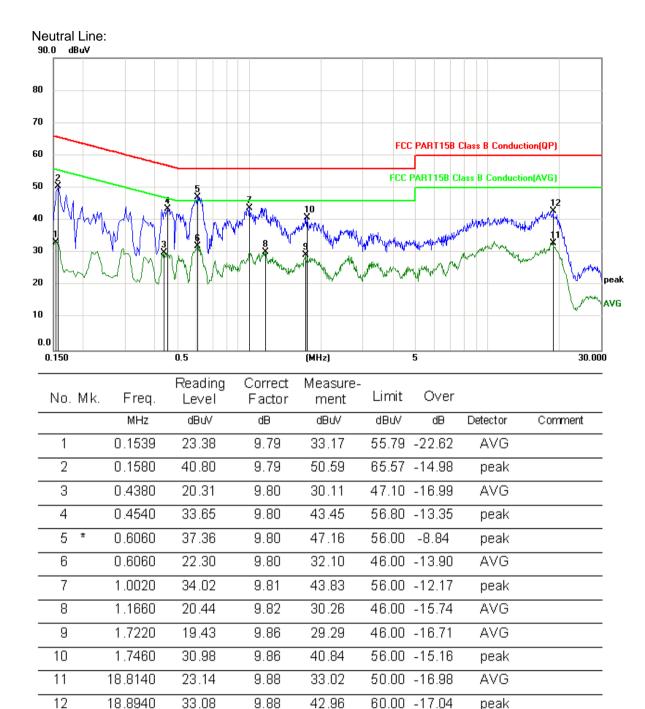
AVG



peak



Report No.: CQASZ20181200010E-01



#### Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

9.88

- 2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
- 3. If the Peak value under Average limit, the Average value is not recorded in the report.



Report No.: CQASZ20181200010E-01

## 5.3 Radiated Emission

Test Requirement:	47 CFR Part 15C Section 15.249 and 15.209 and 15.205					
Test Method:	ANSI C63.10: 2013					
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)					
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark	
	0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak	
	0.009MHz-0.090MHz	Average	10kHz	30KHz	Average	
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak	
	0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak	
	0.110MHz-0.490MHz	Average	10kHz	30KHz	Average	
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak	
	30MHz-1GHz	Quasi-peak	100 kHz	300KHz	Quasi-peak	
	Above 1GHz	Peak	1MHz	3MHz	Peak	
	Above 1G112	Peak	1MHz	10Hz	Average	
	Note: For fundamental f	•		5MHz, Peak	detector is for	PK
Limit: (Spurious Emissions and band edge)	Frequency	Field strength (microvolt/meter )	Limit (dBuV/m)	Remark	Measurem distance (i	- I
<i>,</i>	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300	
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30	
	1.705MHz-30MHz	30	-	=	30	
	30MHz-88MHz	100	40.0	Quasi-peak	3	
	88MHz-216MHz	150	43.5	Quasi-peak	3	
	216MHz-960MHz	200	46.0	Quasi-peak	3	
	960MHz-1GHz	500	54.0	Quasi-peak	3	
	Above 1GHz	500	54.0	Average	3	
	Note: 1) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.					
	2) Emissions radiated outside of the specified frequency bands, except for					
	harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209,					
	whichever is the lesser attenuation.					
Limit:	Frequency	Limit (dBuV/	/m @3m)	Remark		
(Field strength of the		94.0	)	Average Valu	ıe	
fundamental signal)	2400MHz-2483.5MHz 114.0 Peak Value			)		



Report No.: CQASZ20181200010E-01

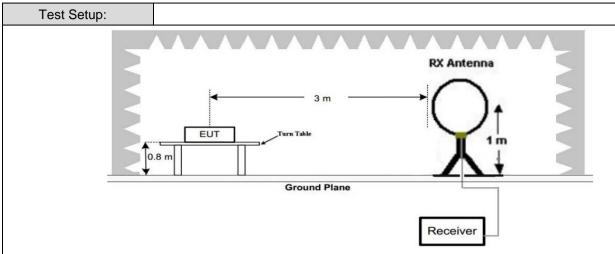
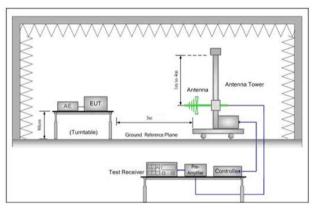


Figure 1. Below 30MHz



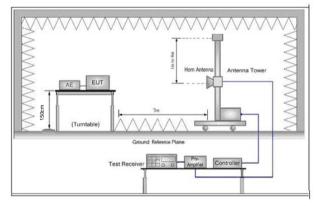


Figure 2. 30MHz to 1GHz

Figure 3. Above 1 GHz

#### Test Procedure:

- a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
  - 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

Note: For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

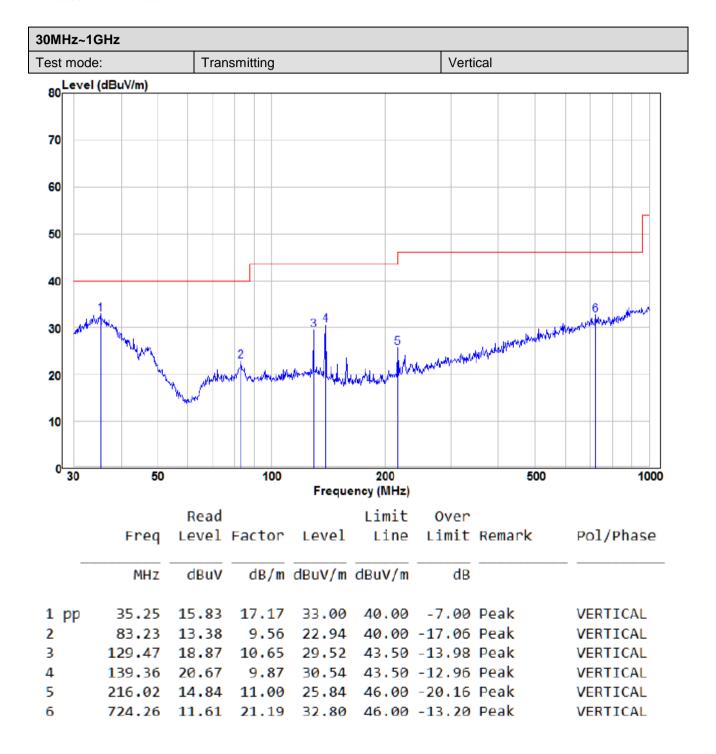
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table



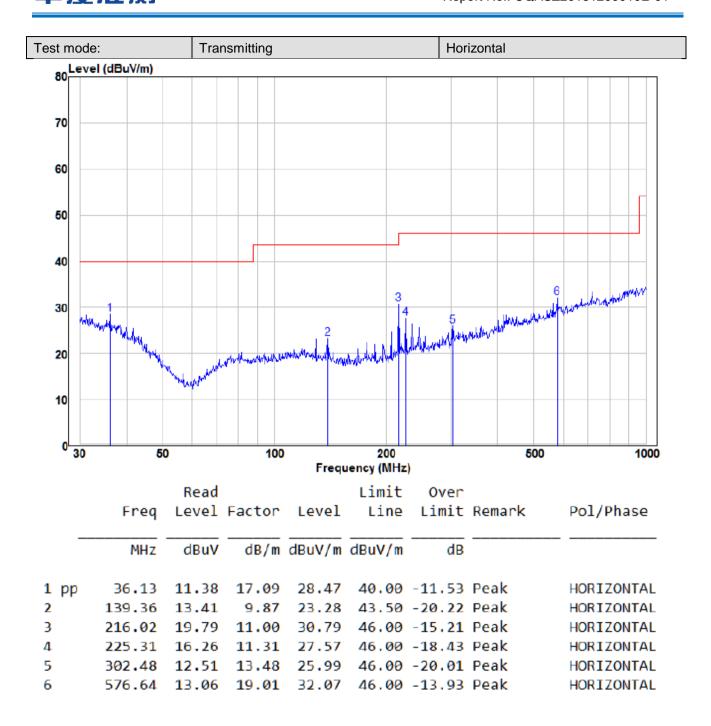
	<ul> <li>was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> <li>g. Test the EUT in the lowest channel,the middle channel,the Highest channel</li> <li>h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode,And found the X axis positioning which it is worse case.</li> <li>i. Repeat above procedures until all frequencies measured was complete.</li> </ul>
Exploratory Test Mode:	Transmitting mode
Final Test Mode:	Pretest the EUT at Transmitting mode, For below 1GHz part, through pre-scan, the worst case is the highest channel.  Only the worst case is recorded in the report.
Test Voltage:	AC120V/60Hz
Test Results:	Pass



#### **Measurement Data**









Report No.: CQASZ20181200010E-01

Above 1GHz									
Test mode:		Transmitting		Test c Frequency:		2419MHz			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	H/V		
2390	58.97	-9.2	49.77	74	-24.23	Peak	Н		
2390	44.94	-9.2	35.74	54	-18.26	AVG	Н		
2400	59.95	-9.39	50.56	74	-23.44	Peak	Н		
2400	46.64	-9.39	37.25	54	-16.75	AVG	Н		
2419	104.36	-8.9	95.46	114	-18.54	peak	Н		
2419	97.14	-8.9	88.24	94	-5.76	AVG	Н		
2483.5	57.85	-9.29	48.56	74	-25.44	Peak	Н		
2483.5	43.98	-9.29	34.69	54	-19.31	AVG	Н		
4838	53.14	-1.08	52.06	74	-21.94	peak	Н		
4838	38.93	-1.08	37.85	54	-16.15	AVG	Н		
7257	51.23	5.97	57.20	74	-16.80	peak	Н		
7257	37.43	5.97	43.40	54	-10.60	AVG	Н		
2390	58.49	-9.2	49.29	74	-24.71	peak	V		
2390	44.98	-9.2	35.78	54	-18.22	AVG	V		
2400	59.72	-9.39	50.33	74	-23.67	peak	V		
2400	46.43	-9.39	37.04	54	-16.96	AVG	V		
2419	106.54	-8.9	97.64	114	-16.36	106.54	V		
2419	97.65	-8.9	88.75	94	-5.25	97.65	V		
2483.5	57.56	-9.29	48.27	74	-25.73	peak	V		
2483.5	46.19	-9.29	36.90	54	-17.10	AVG	V		
4838	54.12	-1.08	53.04	74	-20.96	peak	V		
4838	37.37	-1.08	36.29	54	-17.71	AVG	V		
7257	50.97	5.97	56.94	74	-17.06	peak	V		
7257	36.35	5.97	42.32	54	-11.68	AVG	V		

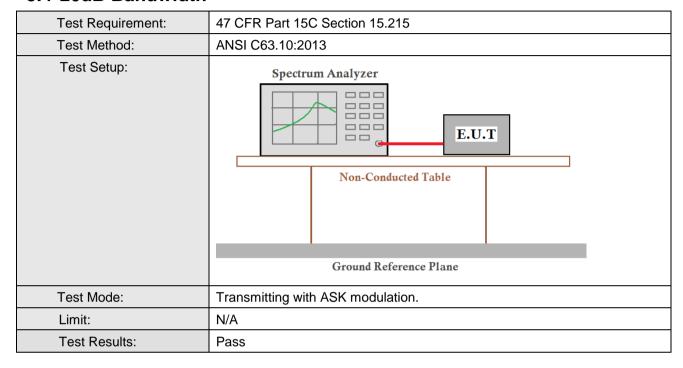
#### Remark:

- The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
   Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor
- 2) Scan from 9kHz to 25GHz, The disturbance above 10GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.



Report No.: CQASZ20181200010E-01

### 5.4 20dB Bandwidth

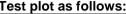


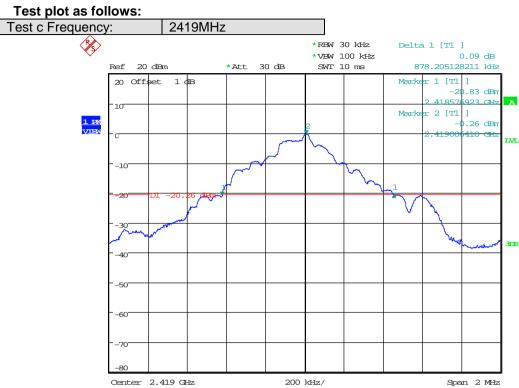
#### **Measurement Data**

Test c Frequency	20dB bandwidth (MHz)	Results
2419MHz	0.878	Pass



Report No.: CQASZ20181200010E-01



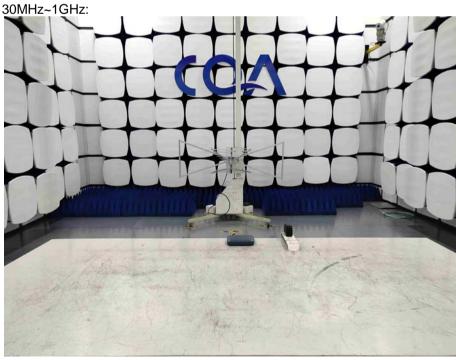


Date: 15.APR.2019 16:09:29

## 6 Photographs

## 6.1 Radiated Emission Test Setup









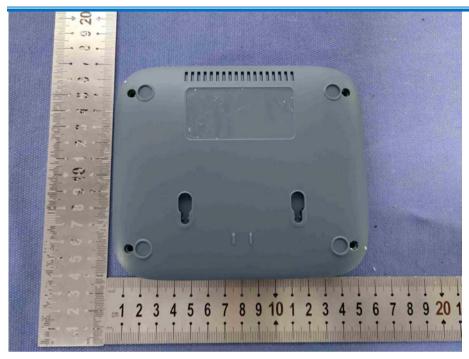


### **6.2 EUT Constructional Details**















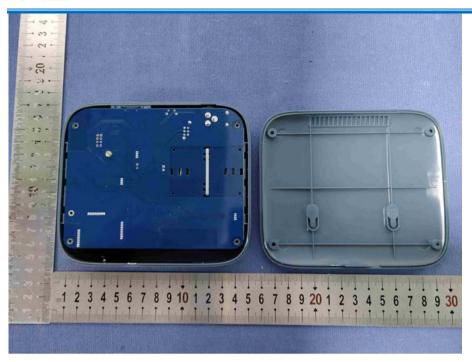






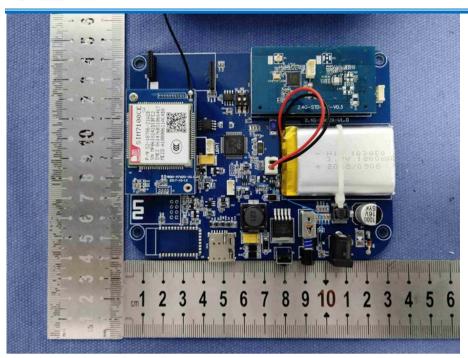


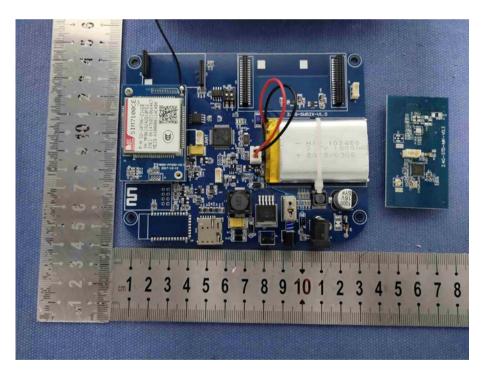




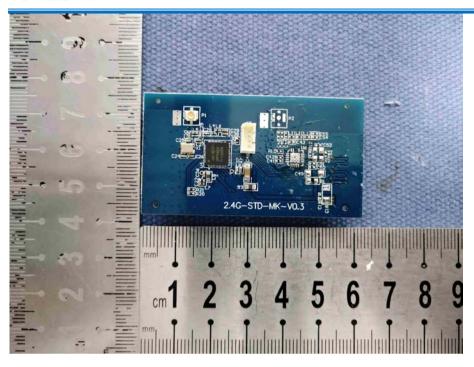


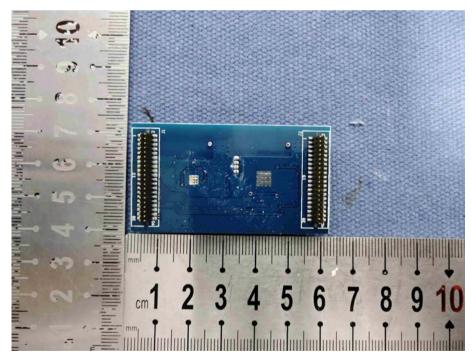




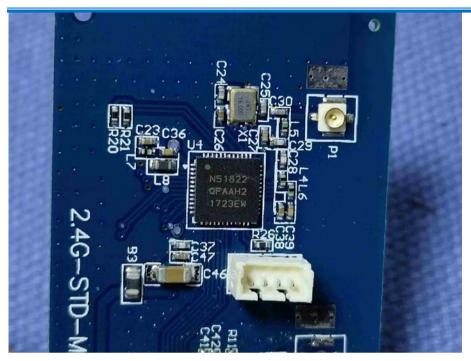


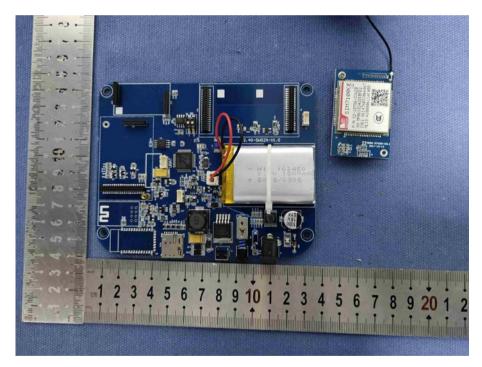




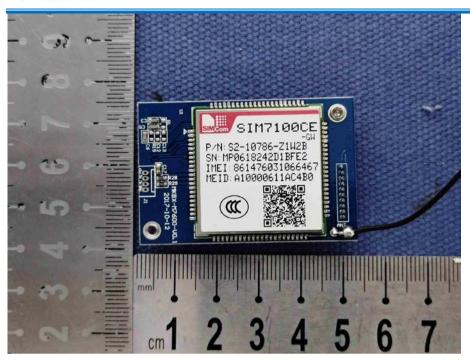


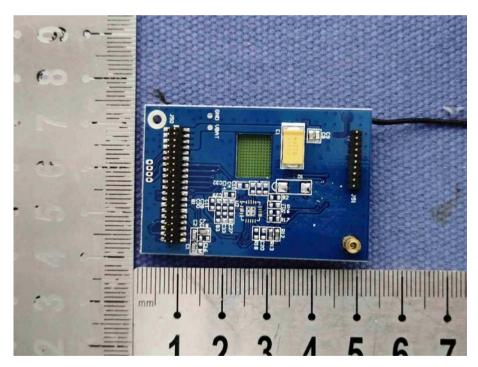




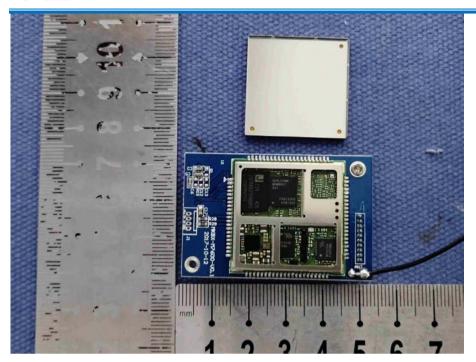


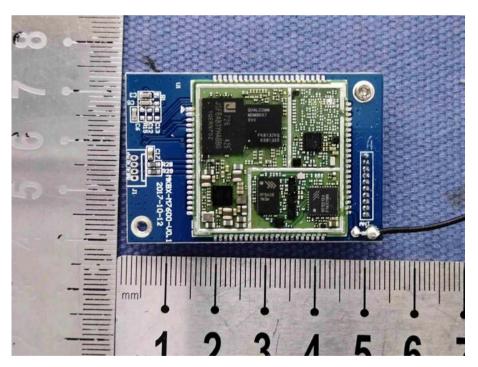




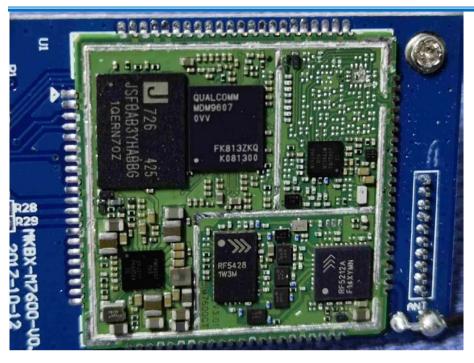


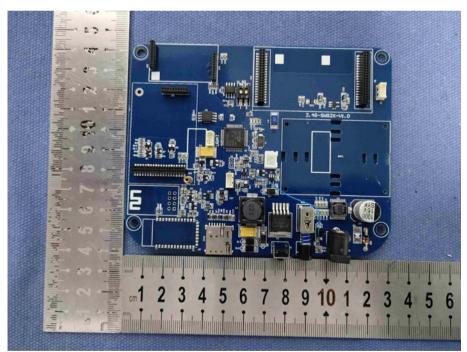




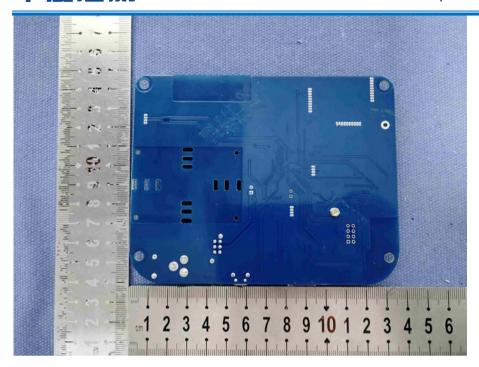


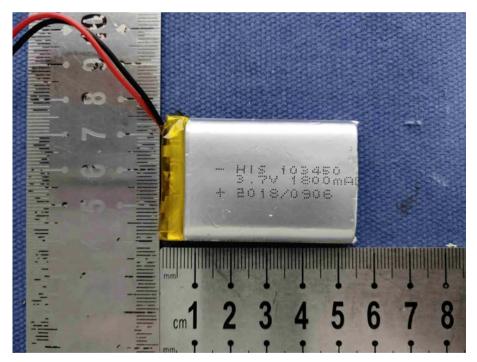












**END OF THE REPORT**