Shenzhen Huaxia Testing Technology Co., Ltd

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

Telephone: +86-755-26648640
Fax: +86-755-26648637
Website: www.cqa-cert.com

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

Test Report

Report No. :	CQASZ20181200012E-04
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
Equipment Under Test (EUT):	
Product:	IOT Lock
Model No.:	2ASI7-LKF-05-BRW
Brand Name:	hesibond IOT Tech
FCC ID:	2ASI7-LKF-05-BRW
Standards:	47 CFR Part 15, Subpart C
Date of Test:	2018-12-06 to 2019-05-06
Date of Issue:	2019-05-06
Test Result :	**PASS***

Tested By: Tiny You

(Tiny You)

Reviewed By: Aaron Ma

(Aaron Ma)

Approved By: Jack Ai

(Jack Ai)

SHENZHEN HUAXIA TESTING TECHNOLOGY CO.,LTD 华夏准测 APPROVED

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* In the configuration tested, the EUT complied with the standards specified above.

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20181200012E-04	Rev.01	Initial report	2019-05-06

2 Test Summary

Test Item	Test Requirement	Test method	Result
Radiated Spurious Emissions	47 CFR Part 15, Subpart C Section 15.205/15.209, RSS-Gen Issue 5	ANSI C63.10 2013	PASS

Note: The simultaneously transmission mode

3 Contents

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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
Model No.:	2ASI7-LKF-05-BRW
Trade Mark :	hesibond IOT Tech
Hardware Version:	V501
Software Version:	2.4G-MKZB3X-V1.1
Power Supply:	DC1.5 X 4AA

4.3 General Description of 2.4G

Frequency Range:	2469 MHz
Modulation Type:	ASK
Number of Channels:	1 (declared by the client)
Test Software of EUT:	RF test (manufacturer declare)
Antenna Type:	Internal antenna
Antenna Gain:	0dBi

4.4 General Description of NFC

Operation Frequency:	13.56MHz
Modulation Type:	ASK
Product Type:	☐ Mobile ☐ Portable ☒ Fix Location
Antenna Type:	PCB antenna
Antenna Gain:	0dBi

4.5 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1008 mbar

The following test modes were adjusted during the tests:	
Operation mode	Description of the operation mode
Mode1 , 2.4G + NFC	Transmission at 2.4G (2469MHz)
	Transmission at NFC (13.56MHz)

4.6 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
-	-	-	-	-

4.7 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 New District, Shenzhen, Guangdong, China

4.8 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.

- **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

4.9 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)

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

4.10 Deviation from Standards

None.

4.11 Abnormalities from Standard Conditions

None.

4.12 Other Information Requested by the Customer

None.

4.13 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	2018/10/28	2020/10/27
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

5 Test results and Measurement Data

5.1 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205, RSS-Gen Issue 5
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
	Peak	1MHz	10Hz	Average

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
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: 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.

Test Setup:	

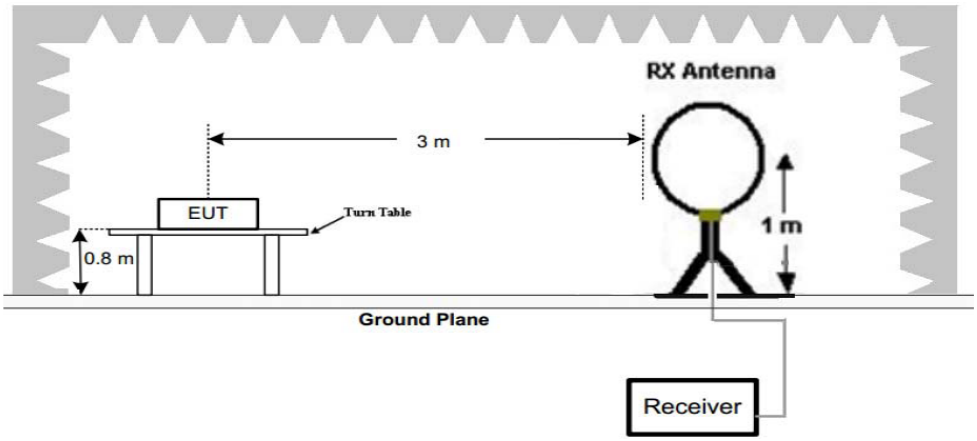


Figure 1. Below 30MHz

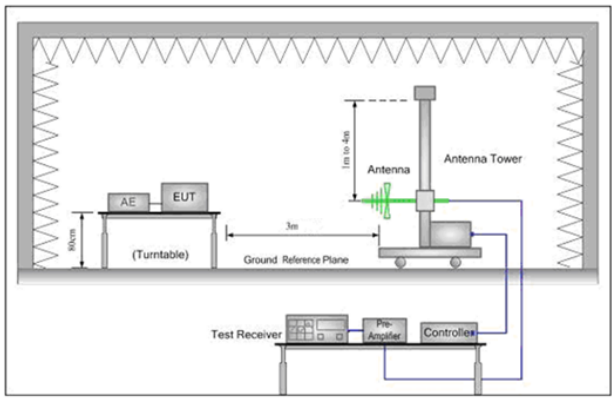


Figure 2. 30MHz to 1GHz

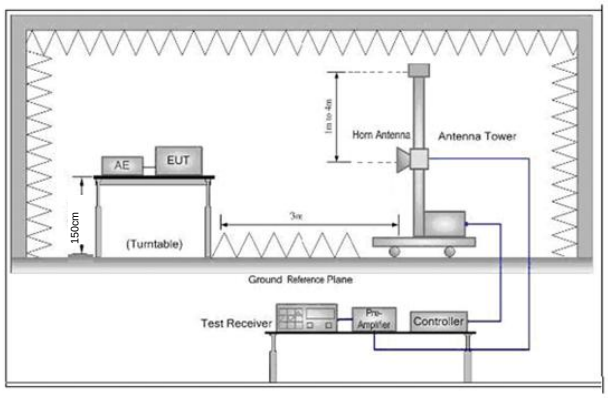


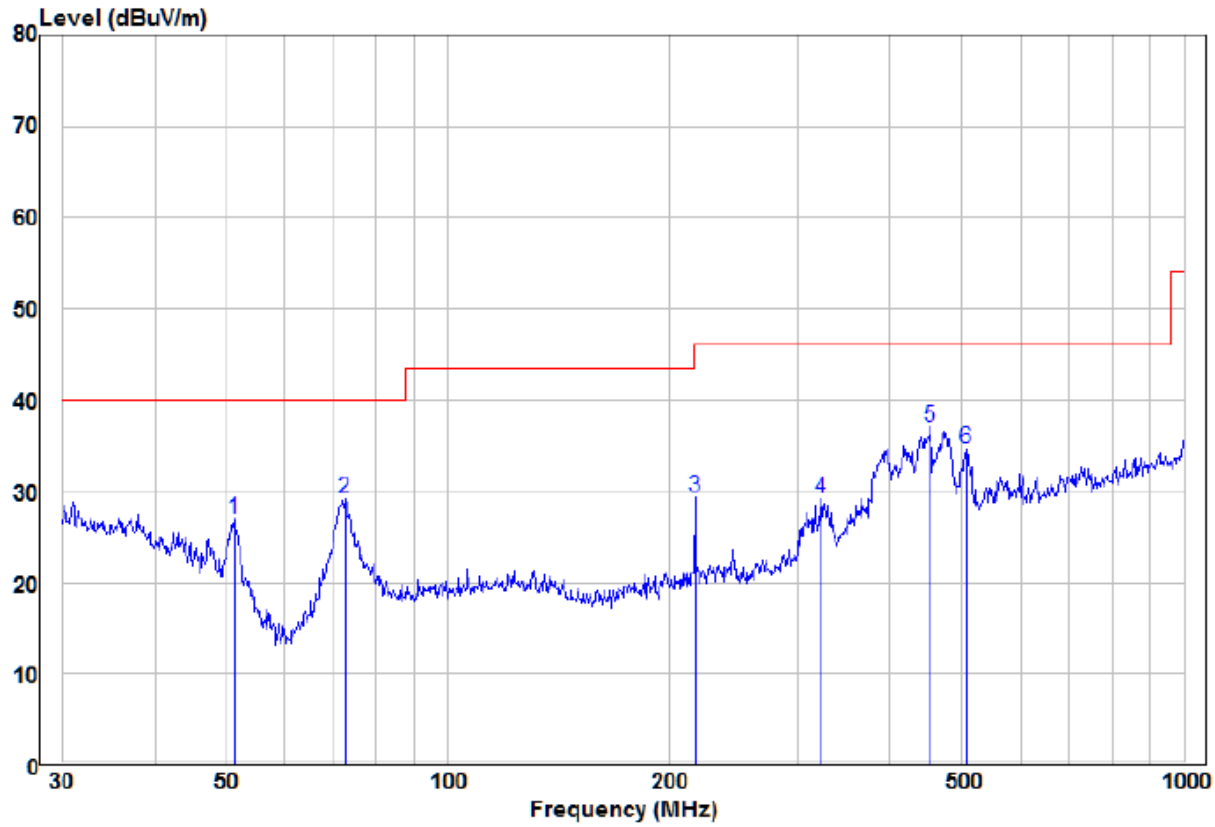
Figure 3. Above 1 GHz

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 was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 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. g. Test the EUT in the lowest channel ,the middle channel ,the Highest channel h. Repeat above procedures until all frequencies measured was complete.
Test Mode:	Pretest the EUT at Mode 1 For below 1GHz, through Pre-scan, find Mode 1 is the worst case. Only the worst case is recorded in the report.
Test Results:	Pass

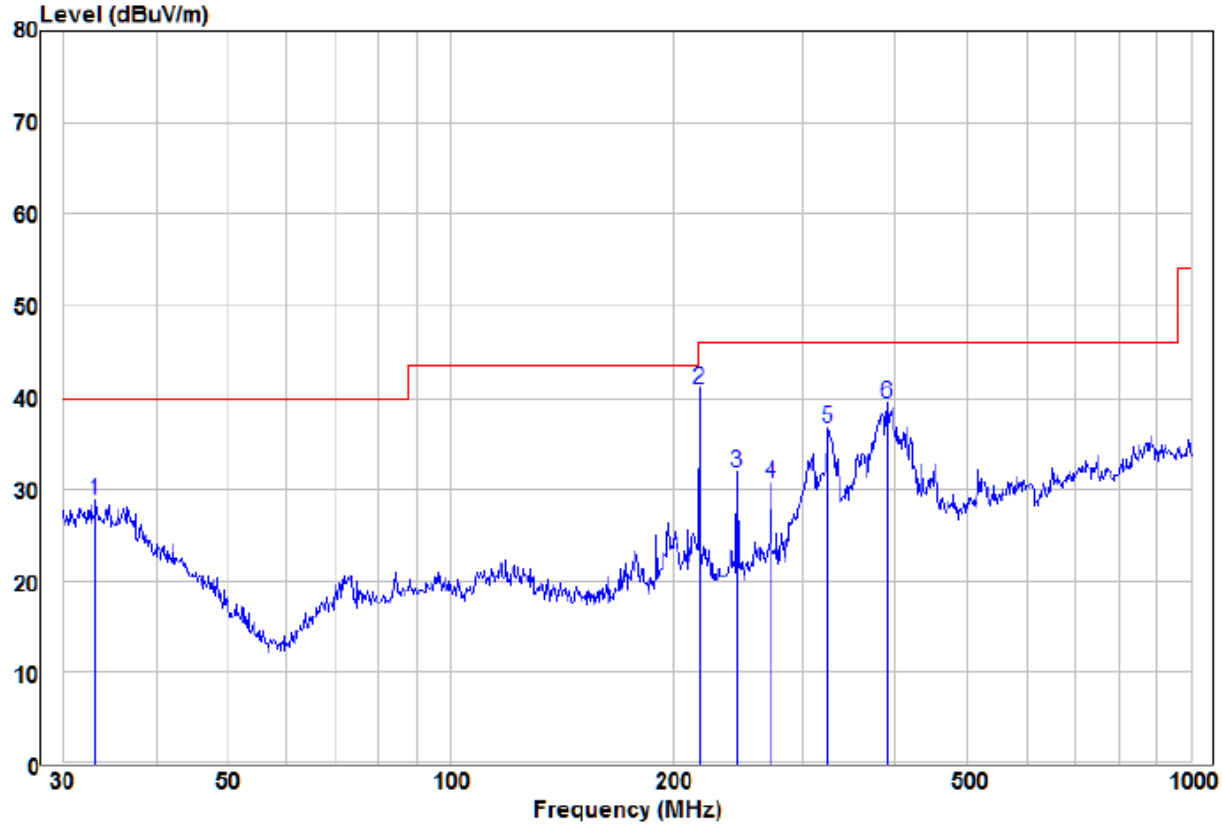
5.1.1 Radiated emission below 1GHz

30MHz~1GHz_mode 1 is the worst case		
Test mode:	mode 1	Vertical



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	51.30	18.96	8.08	27.04	40.00	-12.96	Peak	VERTICAL
2	72.59	20.48	8.74	29.22	40.00	-10.78	Peak	VERTICAL
3	216.78	18.37	11.04	29.41	46.00	-16.59	Peak	VERTICAL
4	322.19	15.25	13.90	29.15	46.00	-16.85	Peak	VERTICAL
5 pp	452.72	19.97	16.99	36.96	46.00	-9.04	Peak	VERTICAL
6	506.48	16.83	17.89	34.72	46.00	-11.28	Peak	VERTICAL

Test mode:	mode 1	Horizontal



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	33.21	11.37	17.43	28.80	40.00	-11.20	Peak	HORIZONTAL
2 pp	216.78	29.85	11.04	40.89	46.00	-5.11	QP	HORIZONTAL
3	244.23	20.20	11.64	31.84	46.00	-14.16	Peak	HORIZONTAL
4	271.32	18.20	12.44	30.64	46.00	-15.36	Peak	HORIZONTAL
5	324.46	22.77	13.95	36.72	46.00	-9.28	Peak	HORIZONTAL
6 pk	389.35	23.53	15.83	39.36	46.00	-6.64	Peak	HORIZONTAL

5.1.2 Transmitter emission above 1GHz

Test mode: mode 1	Transmitting	Test c Frequency:	2469MHz+13.56MHz

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2390	58.52	-9.2	49.32	74	-24.68	Peak	H
2390	44.24	-9.2	35.04	54	-18.96	AVG	H
2400	59.48	-9.39	50.09	74	-23.91	Peak	H
2400	45.98	-9.39	36.59	54	-17.41	AVG	H
2469	101.34	-8.71	92.63	114	-21.37	peak	H
2469	95.71	-8.71	87	94	-7	AVG	H
2483.5	57.53	-9.29	48.24	74	-25.76	Peak	H
2483.5	43.82	-9.29	34.53	54	-19.47	AVG	H
4838	51.45	-0.53	50.92	74	-23.08	peak	H
4838	36.53	-0.53	36.00	54	-18.00	AVG	H
7257	49.02	5.7	54.72	74	-19.28	peak	H
7257	36.15	5.7	41.85	54	-12.15	AVG	H
2390	59.00	-9.2	49.80	74	-24.20	peak	V
2390	44.78	-9.2	35.58	54	-18.42	AVG	V
2400	60.12	-9.39	50.73	74	-23.27	peak	V
2400	46.17	-9.39	36.78	54	-17.22	AVG	V
2469	104.29	-8.71	95.58	114	-18.42	peak	V
2469	96.11	-8.71	87.4	94	-6.6	AVG	V
2483.5	58.38	-9.29	49.09	74	-24.91	peak	V
2483.5	46.31	-9.29	37.02	54	-16.98	AVG	V
4838	52.51	-0.53	51.98	74	-22.02	peak	V
4838	37.66	-0.53	37.13	54	-16.87	AVG	V
7257	48.85	5.7	54.55	74	-19.45	peak	V
7257	35.29	5.7	40.99	54	-13.01	AVG	V

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

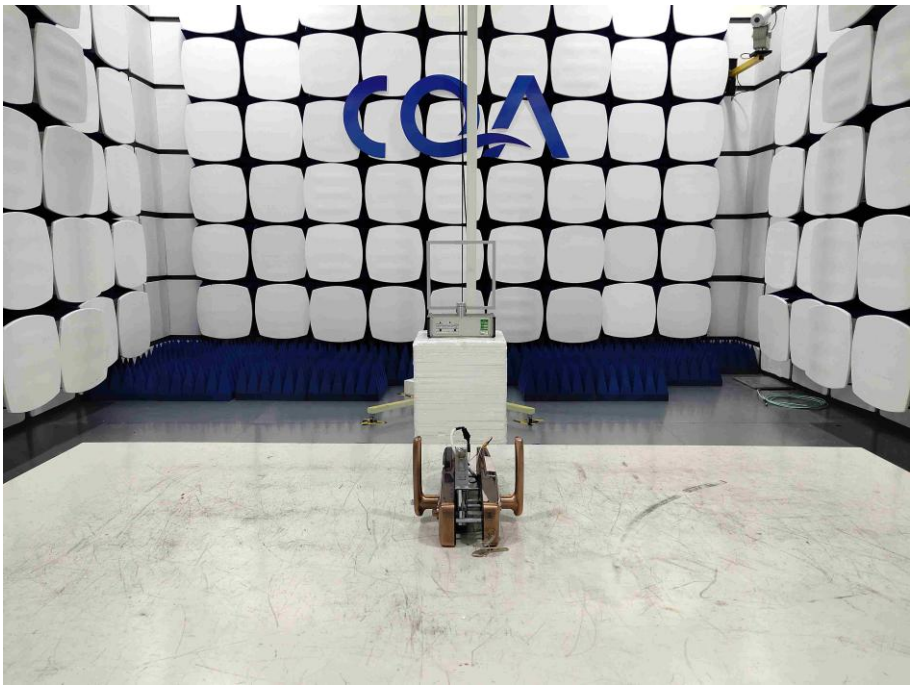
   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz,The disturbance above 13GHz 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.

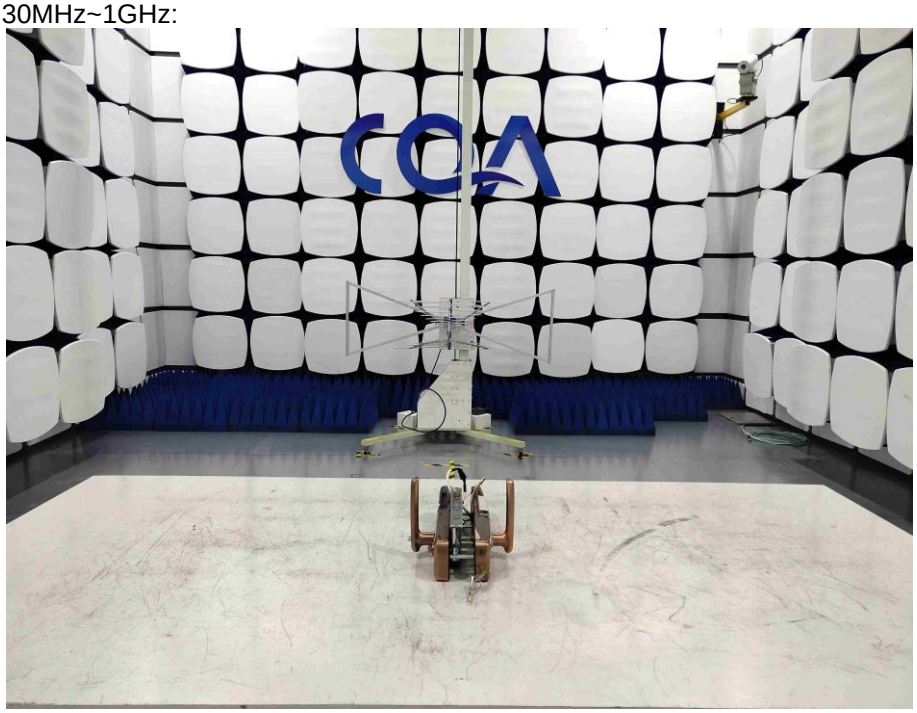
6 Photographs - EUT Test Setup

6.1 Radiated Spurious Emission

9KHz~30MHz



30MHz~1GHz:



Above 1GHz:

THE END