

# TEST REPORT

**FCC ID: 2AOVG-M503**

**Product: Bluetooth Smart Lock**

**Model No.: M503**

**Additional Model No.: M501, M502**

**Trade Mark: N/A**

**Report No.: TCT180116E004**

**Issued Date: Jan. 17, 2018**

Issued for:

**Hangzhou Sciener Smart Technology Co., Ltd.  
Room 401, Building 17, Wenyixi Road 998#, Yuhang District, Hangzhou,  
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Issued By:

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**Appendix A: Photographs of Test Setup**

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## 1. Test Certification

<b>Product:</b>	Bluetooth Smart Lock
<b>Model No.:</b>	M503
<b>Additional Model No.:</b>	M501, M502
<b>Trade Mark:</b>	N/A
<b>Applicant:</b>	Hangzhou Sciener Smart Technology Co., Ltd.
<b>Address:</b>	Room 401, Building 17, Wenyixi Road 998#, Yuhang District, Hangzhou, Zhejiang, China
<b>Manufacturer:</b>	Hangzhou Sciener Smart Technology Co., Ltd.
<b>Address:</b>	Room 401, Building 17, Wenyixi Road 998#, Yuhang District, Hangzhou, Zhejiang, China
<b>Date of Test:</b>	Jan. 09, 2018- Jan. 17, 2018
<b>Applicable Standards:</b>	FCC CFR Title 47 Part 15 Subpart C Section 15.249

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:

*Brews Xu*

Date:

Jan. 15, 2018

**Brews Xu**

Reviewed By:

*Joe Zhou*

Date:

Jan. 16, 2018

**Joe Zhou**

Approved By:

*Tomsin*

Date:

Jan. 17, 2018

**Tomsin**



## 2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna Requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Field Strength of Fundamental	§15.249 (a)	PASS
Spurious Emissions	§2.1053 §15.249 (a) (d)/ §15.209	PASS
Band Edge	§2.1053 §15.249 (d)/ §15.205	PASS
20dB Occupied Bandwidth	§2.1049 §15.215 (c)	PASS

**Note:**

1. Pass: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

### 3. EUT Description

<b>Product:</b>	Bluetooth Smart Lock
<b>Model No.:</b>	M503
<b>Additional Model No.:</b>	M501, M502
<b>Trade Mark:</b>	N/A
<b>Operation Frequency:</b>	2402MHz - 2480MHz
<b>Number of Channel:</b>	40
<b>Modulation Technology:</b>	GFSK
<b>Antenna Type:</b>	PCB antenna
<b>Antenna Gain:</b>	0dBi
<b>Power supply:</b>	DC6V by Battery
<b>Remark:</b>	All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are appearance and color and model name for commercial purpose.

Note:

Three models have tested, the worst one M503 test results in the report.

**Operation Frequency each of channel for GFSK**

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	11	2422	21	2442	31	2462
02	2404	12	2424	22	2444	32	2464
03	2406	13	2426	23	2446	33	2466
04	2408	14	2428	24	2448	34	2468
05	2410	15	2430	25	2450	35	2470
06	2412	16	2432	26	2452	36	2472
07	2414	17	2434	27	2454	37	2474
08	2416	18	2436	28	2456	38	2476
09	2418	19	2438	29	2458	39	2478
10	2420	20	2440	30	2460	40	2480

**Note:**

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2440MHz
The Highest channel	2480MHz

## 4. Genera Information

### 4.1. Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel
<p>The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y &amp; Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.</p>	

Pre-test mode.			
We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:			
Axis	X	Y	Z
Field Strength(dBuV/m)	85.48	91.00	87.42
Final Test Mode:			
The EUT was tested in GFSK modulation in this report.			

## 4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

**Note:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



## 5. Facilities and Accreditations

### 5.1. Facilities

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

- FCC - Registration No.: 645098

Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

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

### 5.2. Location

Shenzhen Tongce Testing Lab

Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China

TEL: +86-755-27673339

### 5.3. Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

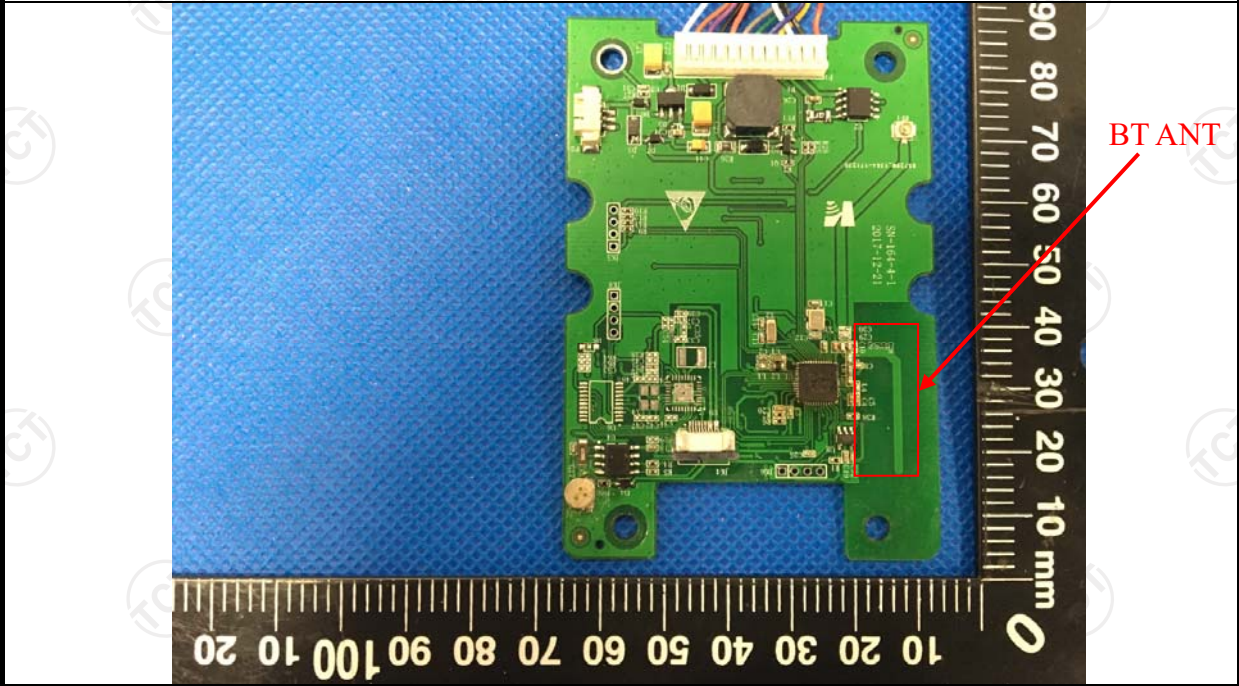
No.	Item	MU
1	Conducted Emission	$\pm 2.56\text{dB}$
2	RF power, conducted	$\pm 0.12\text{dB}$
3	Spurious emissions, conducted	$\pm 0.11\text{dB}$
4	All emissions, radiated(<1GHz)	$\pm 3.92\text{dB}$
5	All emissions, radiated(>1GHz)	$\pm 4.28\text{dB}$
6	Temperature	$\pm 0.1^\circ\text{C}$
7	Humidity	$\pm 1.0\%$

## 6. Test Results and Measurement Data

### 6.1. Antenna Requirement

<b>Standard requirement:</b>	FCC Part15 C 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.	

<b>E.U.T Antenna:</b>	
The EUT antenna is PCB antenna which permanently attached, and the best case gain of the antenna is 0dBi.	



## 6.2. Conducted Emission

### 6.2.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.207														
<b>Test Method:</b>	ANSI C63.10:2013														
<b>Frequency Range:</b>	150 kHz to 30 MHz														
<b>Receiver setup:</b>	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
<b>Limits:</b>	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
<b>Test Setup:</b>	<p><i>Remark:</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>														
<b>Test Mode:</b>	Transmitting mode with modulation														
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</li> </ol>														
<b>Test Result:</b>	PASS														

**6.2.2. Test Instruments**

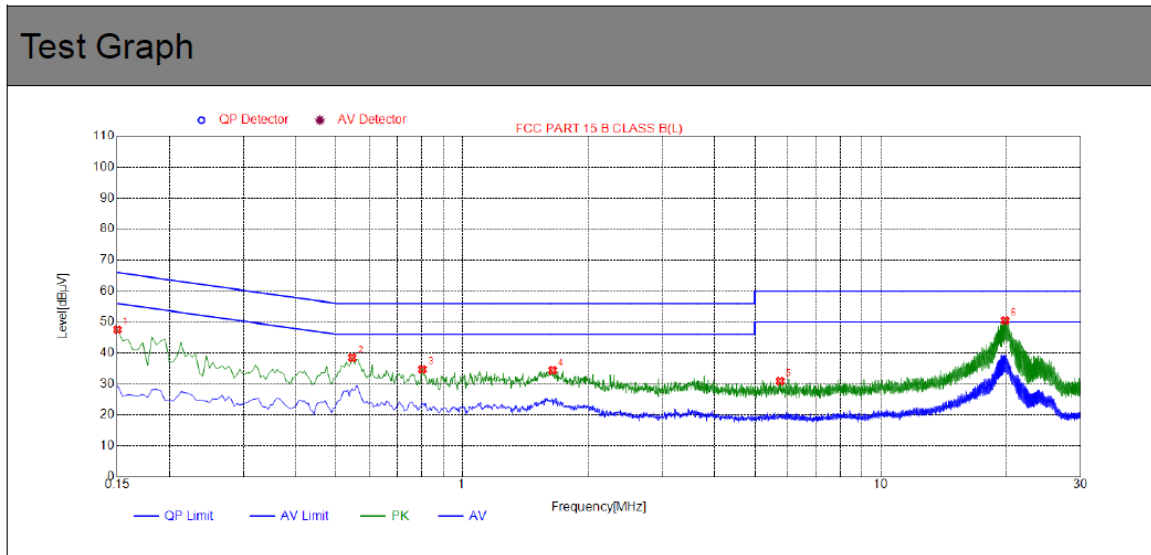
Conducted Emission Shielding Room Test Site (843)				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	R&S	ESPI	101401	Jun. 12, 2018
LISN	Schwarzbeck	NSLK 8126	8126453	Sep. 27, 2018
Coax cable (9KHz-30MHz)	TCT	CE-05	N/A	Sep. 27, 2018
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

*Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

### 6.2.3. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



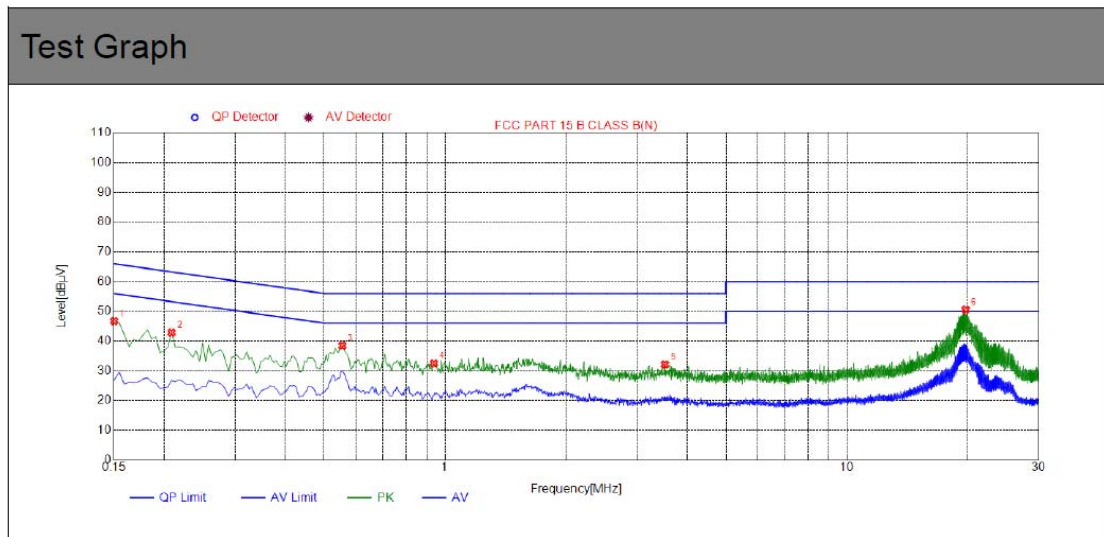
### Suspected List

NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector
1	0.1500	47.52	10.03	66.00	18.48	PK
2	0.5460	38.47	10.06	56.00	17.53	PK
3	0.8025	34.68	10.06	56.00	21.32	PK
4	1.6440	34.37	10.12	56.00	21.63	PK
5	5.7480	30.91	10.24	60.00	29.09	PK
6	19.8150	50.52	10.10	60.00	9.48	PK

#### Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

**Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)**



**Suspected List**

NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector
1	0.1500	46.68	10.03	66.00	19.32	PK
2	0.2085	42.85	10.04	63.27	20.42	PK
3	0.5550	38.44	10.06	56.00	17.56	PK
4	0.9375	32.49	10.06	56.00	23.51	PK
5	3.5250	32.12	10.25	56.00	23.88	PK
6	19.7475	50.58	10.09	60.00	9.42	PK

**Notes:**

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.



### 6.3. Radiated Emission Measurement

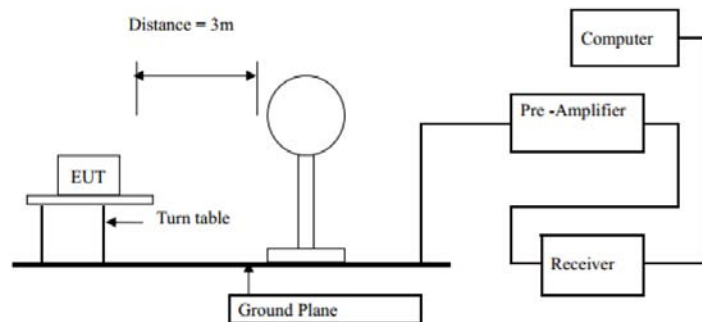
#### 6.3.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.209/ Part 2 J Section 2.1053				
<b>Test Method:</b>	ANSI C63.10:2013				
<b>Frequency Range:</b>	9 kHz to 25 GHz				
<b>Measurement Distance:</b>	3 m				
<b>Antenna Polarization:</b>	Horizontal & Vertical				
<b>Receiver Setup:</b>	Frequency	Detector	RBW	VBW	Remark
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
	150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
<b>Limit(Field strength of the fundamental signal):</b>	Frequency	Limit (dBuV/m @3m)		Remark	
	2400MHz-2483.5MHz	94.00		Average Value	
		114.00		Peak Value	
<b>Limit(Spurious Emissions):</b>	Frequency	Limit (dBuV/m @3m)		Remark	
	0.009-0.490	2400/F(KHz)		Quasi-peak Value	
	0.490-1.705	24000/F(KHz)		Quasi-peak Value	
	1.705-30	30		Quasi-peak Value	
	30MHz-88MHz	40.0		Quasi-peak Value	
	88MHz-216MHz	43.5		Quasi-peak Value	
	216MHz-960MHz	46.0		Quasi-peak Value	
	960MHz-1GHz	54.0		Quasi-peak Value	
	Above 1GHz	54.0		Average Value	
	74.0		Peak Value		
<b>Limit (band edge) :</b>	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.				
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber in below 1GHz, 1.5m above the ground in above 1GHz. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>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</li> </ol>				

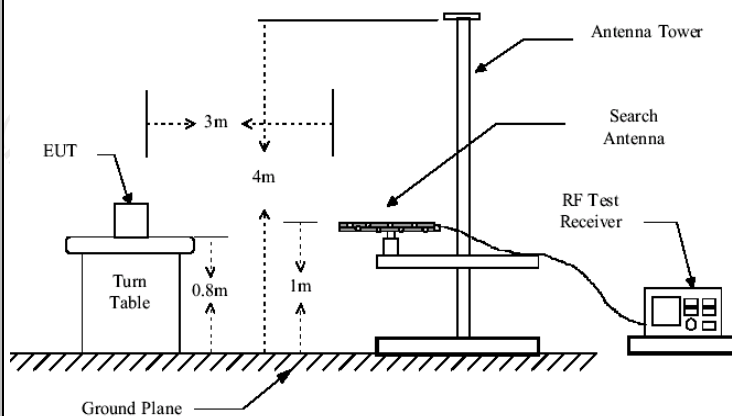
Test setup:

- the measurement.
4. 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
  5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
  6. 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.

For radiated emissions below 30MHz



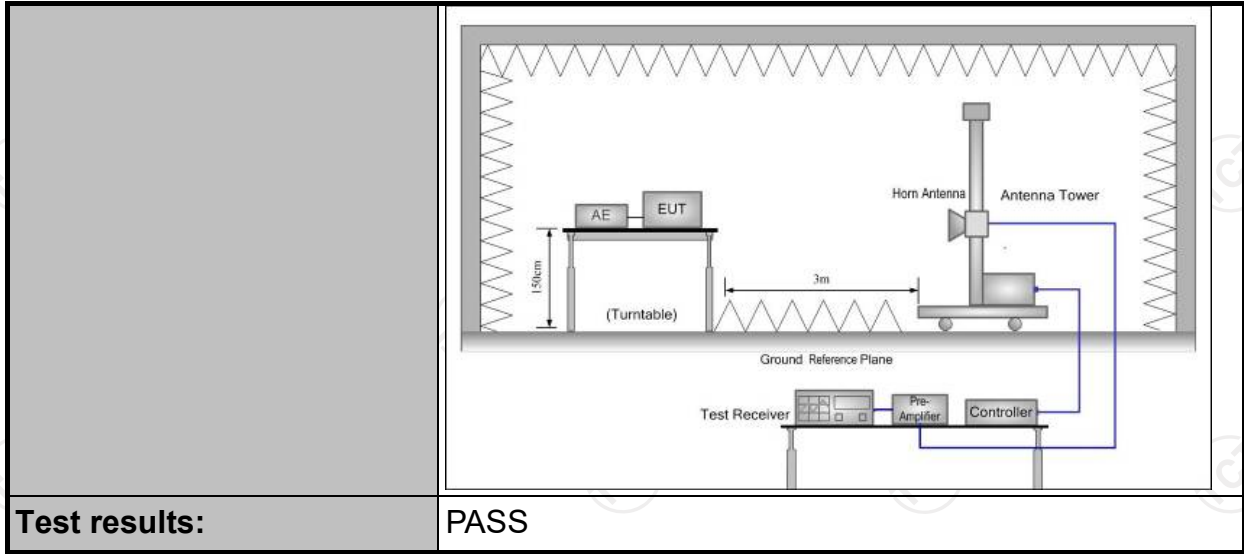
30MHz to 1GHz



Above 1GHz

(The diagram below shows the test setup that is utilized to make the measurements for emission from 1GHz to the tenth harmonic of the highest fundamental frequency or to 40GHz emissions, whichever is lower.)





Test results:

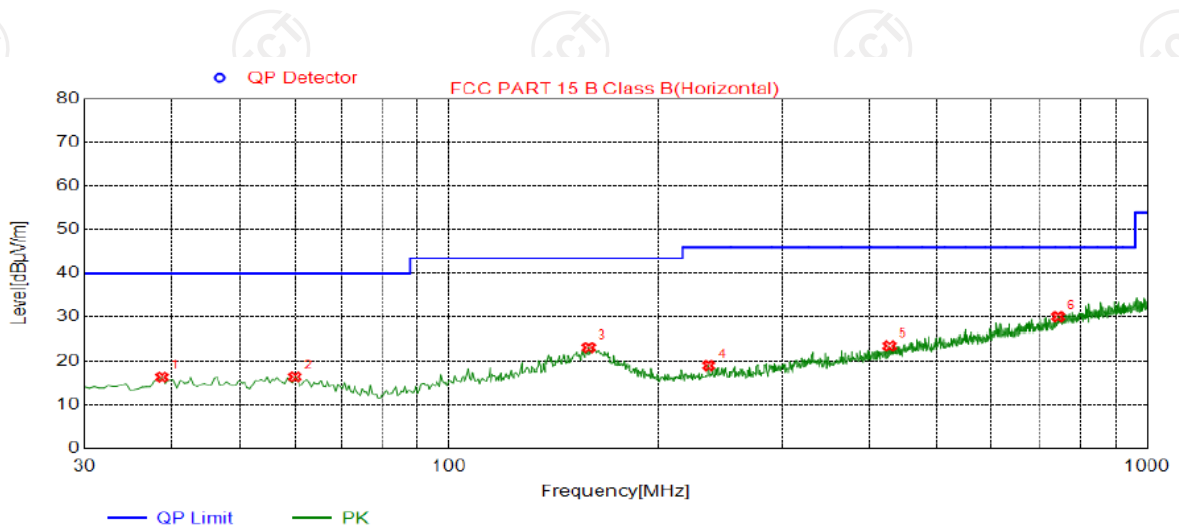
PASS

### 6.3.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	ROHDE&SCHW ARZ	ESVD	100008	Sep. 27, 2018
Spectrum Analyzer	ROHDE&SCHW ARZ	FSQ	200061	Sep. 27, 2018
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 27, 2018
Pre-amplifier	HP	8447D	2727A05017	Sep. 27, 2018
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 27, 2018
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBH 9170	582	Jun. 07, 2018
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
Coax cable (9KHz-1GHz)	TCT	RE-low-01	N/A	Sep. 27, 2018
Coax cable (9KHz-40GHz)	TCT	RE-high-02	N/A	Sep. 27, 2018
Coax cable (9KHz-1GHz)	TCT	RE-low-03	N/A	Sep. 27, 2018
Coax cable (9KHz-40GHz)	TCT	RE-high-04	N/A	Sep. 27, 2018
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

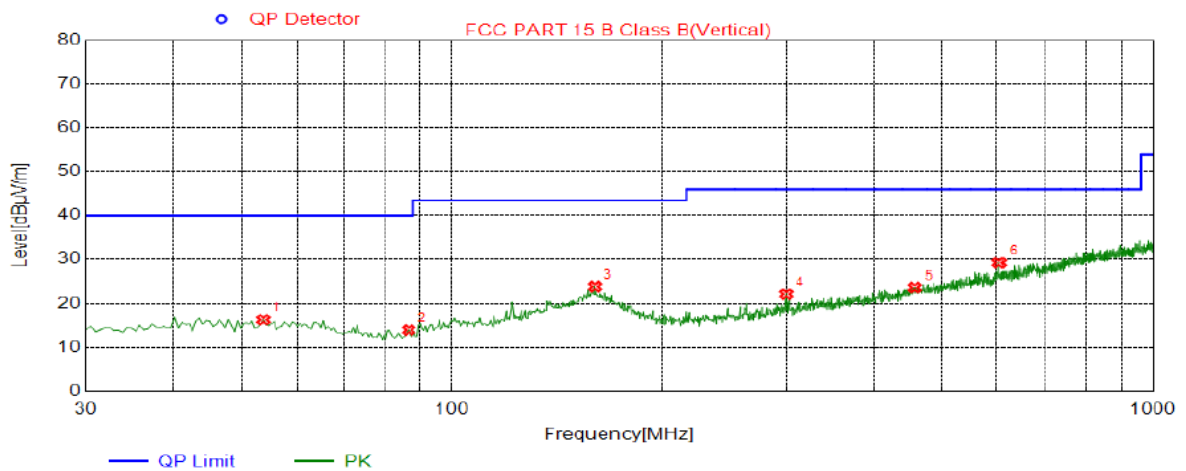
**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

**6.3.3. Test Data**



**Suspected List**

NO.	Freq. [MHz]	Level [dBuV/m]	Factor [dB]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	38.7300	16.50	-16.80	40.00	23.50	100	185	Horizontal
2	60.0700	16.57	-16.27	40.00	23.43	100	234	Horizontal
3	158.5250	23.30	-9.40	43.50	20.20	100	344	Horizontal
4	235.6400	19.16	-14.91	46.00	26.84	100	12	Horizontal
5	428.1850	23.67	-10.00	46.00	22.33	100	356	Horizontal
6	743.4350	30.09	-3.26	46.00	15.91	100	46	Horizontal



**Suspected List**

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	53.7650	16.51	-16.50	40.00	23.49	100	348	Vertical
2	86.7450	14.14	-18.22	40.00	25.86	100	338	Vertical
3	159.9800	24.08	-9.12	43.50	19.42	100	151	Vertical
4	300.1450	22.36	-13.13	46.00	23.64	100	95	Vertical
5	458.2550	23.86	-8.75	46.00	22.14	100	4	Vertical
6	603.7550	29.24	-5.88	46.00	16.76	100	252	Vertical

**Remark:**

- (1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.
- (2) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

**Above 1 GHz Test Results:**

CH Low (2402MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2402	111.21	-5.84	105.37	114	-8.63	peak
2402	86.49	-5.84	80.65	94	-13.35	AVG
4804	56.34	-3.64	52.7	74	-21.3	peak
4804	46.27	-3.64	42.63	54	-11.37	AVG
7206	55.86	-0.95	54.91	74	-19.09	peak
7206	42.33	-0.95	41.38	54	-12.62	AVG
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---	---	---	---	---	---	---

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2402	110.63	-5.84	104.79	114	-9.21	peak
2402	86.45	-5.84	80.61	94	-13.39	AVG
4804	56.52	-3.64	52.88	74	-21.12	peak
4804	46.17	-3.64	42.53	54	-11.47	AVG
7206	55.48	-0.95	54.53	74	-19.47	peak
7206	42.06	-0.95	41.11	54	-12.89	AVG
---	---	---	---	---	---	---
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Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

CH Middle (2440MHz)  
Horizontal:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2440	110.04	-5.71	104.33	114	-9.67	peak
2440	86.42	-5.71	80.71	94	-13.29	AVG
4880	55.37	-3.51	51.86	74	-22.14	peak
4880	46.18	-3.51	42.67	54	-11.33	AVG
7320	55.73	-0.82	54.91	74	-19.09	peak
7320	41.69	-0.82	40.87	54	-13.13	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2440	109.56	-5.71	103.85	114	-10.15	peak
2440	86.34	-5.71	80.63	94	-13.37	AVG
4880	56.67	-3.51	53.16	74	-20.84	peak
4880	45.23	-3.51	41.72	54	-12.28	AVG
7320	55.71	-0.82	54.89	74	-19.11	peak
7320	41.68	-0.82	40.86	54	-13.14	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

CH High (2480MHz)  
Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
2480	109.22	-5.65	103.57	114	-10.43	peak
2480	85.47	-5.65	79.82	94	-14.18	AVG
4960	55.61	-3.43	52.18	74	-21.82	peak
4960	44.83	-3.43	41.4	54	-12.6	AVG
7440	53.62	-0.75	52.87	74	-21.13	peak
7440	41.36	-0.75	40.61	54	-13.39	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
2480	108.85	-5.65	103.2	114	-10.8	peak
2480	84.63	-5.65	78.98	94	-15.02	AVG
4960	55.72	-3.43	52.29	74	-21.71	peak
4960	44.96	-3.43	41.53	54	-12.47	AVG
7440	53.04	-0.75	52.29	74	-21.71	peak
7440	41.57	-0.75	40.82	54	-13.18	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dB $\mu$ V/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dB $\mu$ V/m(PK Value) <54 dB $\mu$ V/m(AV Limit), the Average Detected not need to completed.

**BAND EDGE**

Radiated Band Edge Test:  
Operation Mode: TX CH Low (2402MHz)  
Horizontal (Worst case)

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2390	55.69	-5.81	49.88	74	-24.12	peak
2390	/	-5.81	/	54	/	AVG
2400	54.73	-5.84	48.89	74	-25.11	peak
2400	/	-5.84	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2390	54.16	-5.81	48.35	74	-25.65	peak
2390	/	-5.81	/	54	/	AVG
2400	55.25	-5.84	49.41	74	-24.59	peak
2400	/	-5.84	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High (2480MHz)  
Horizontal (Worst case)

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
2483.5	55.81	-5.65	50.16	74	-23.84	peak
2483.5	/	-5.65	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

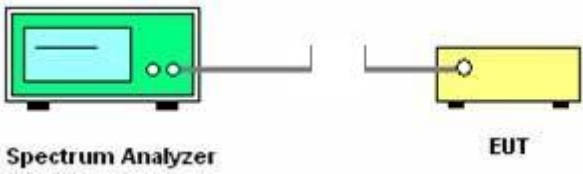
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
2483.5	52.44	-5.65	46.79	74	-27.21	peak
2483.5	/	-5.65	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

## 6.4.20dB Occupied Bandwidth

### 6.4.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.215(c)/ Part 2 J Section 2.1049
<b>Test Method:</b>	ANSI C63.10: 2013
<b>Limit:</b>	N/A
	<ol style="list-style-type: none"> <li>1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT.</li> <li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; RBW<math>\geq</math>1% of the 20 dB bandwidth; VBW<math>\geq</math>RBW; Sweep = auto; Detector function = peak; Trace = max hold.</li> <li>4. Measure and record the results in the test report.</li> </ol>
<b>Test setup:</b>	 <p>The diagram illustrates the test setup. On the left is a Spectrum Analyzer, represented by a green monitor-like shape with a blue screen and two small circles below it. A line connects it to a yellow rectangular box on the right labeled 'EUT' (Equipment Under Test).</p>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test results:</b>	PASS

### 6.4.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

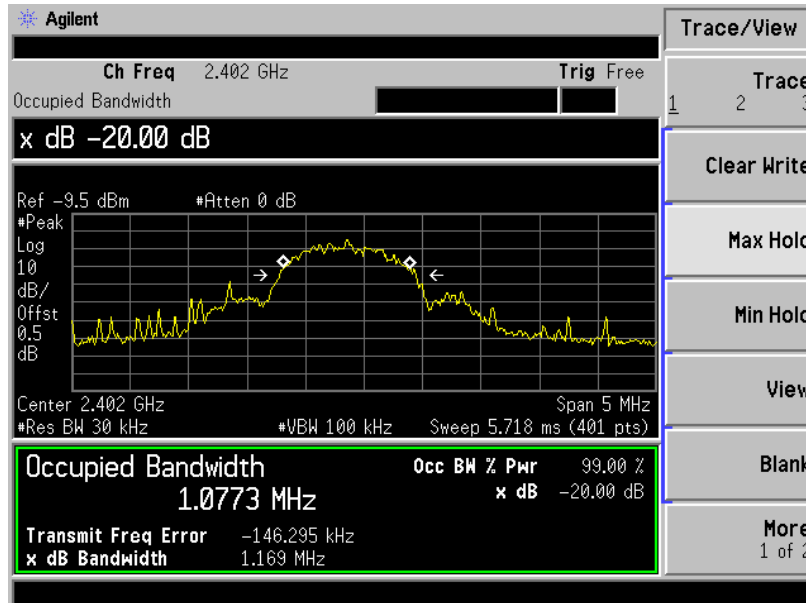
**6.4.3. Test data**

Test Channel	20dB Occupy Bandwidth (MHz)	Limit	Conclusion
Lowest	1.169	---	PASS
Middle	1.193	---	PASS
Highest	1.213	---	PASS

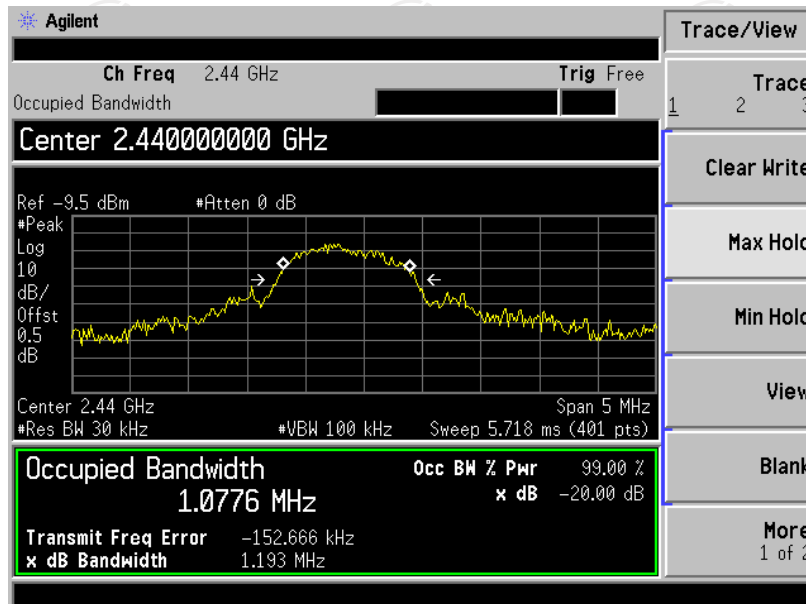
Test plots as follows:



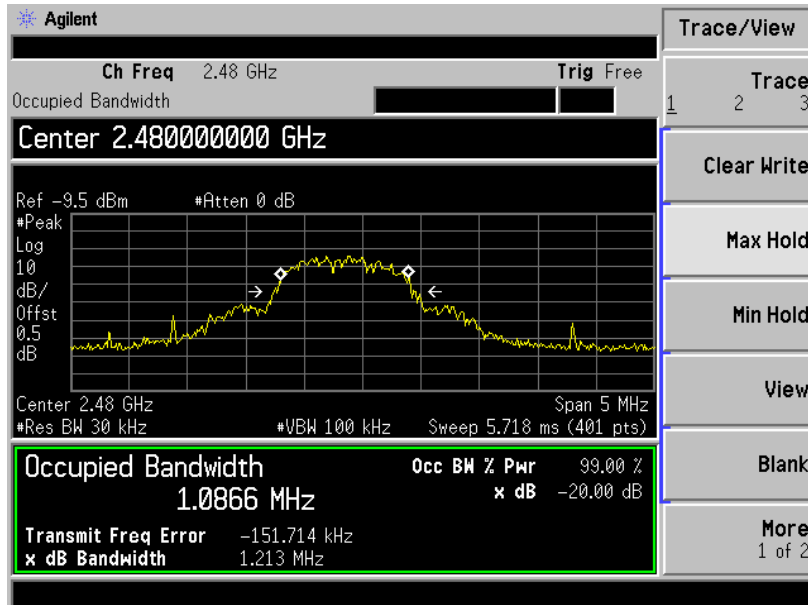
Lowest channel



Middle channel



Highest channel

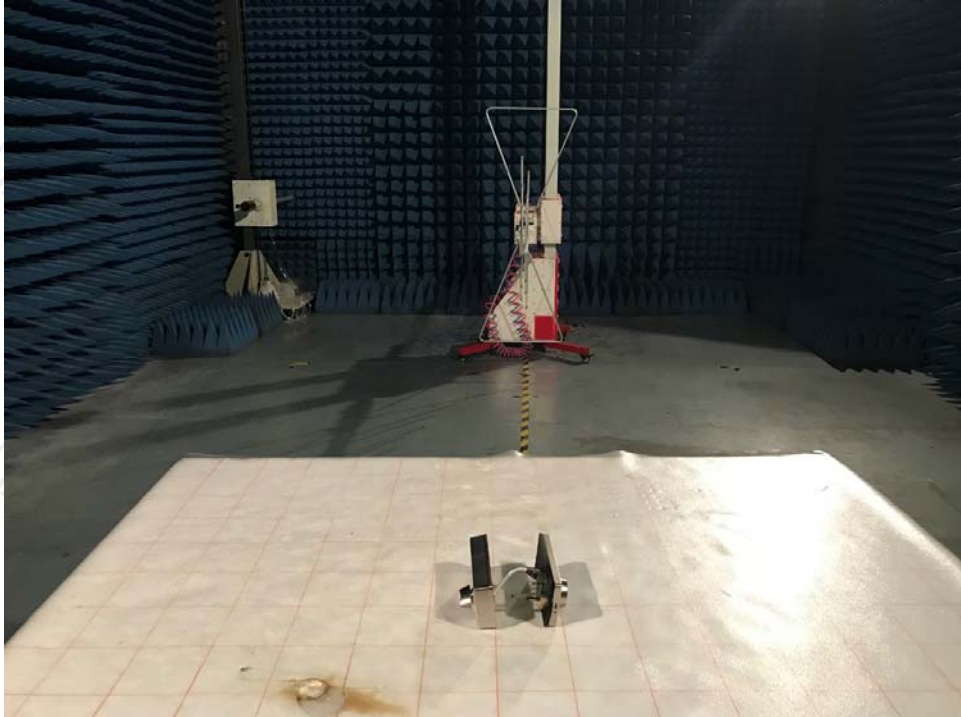


## Appendix A: Photographs of Test Setup

Product: Bluetooth Smart Lock

Model: M503

Radiated Emission



Conducted Power Line Emission test



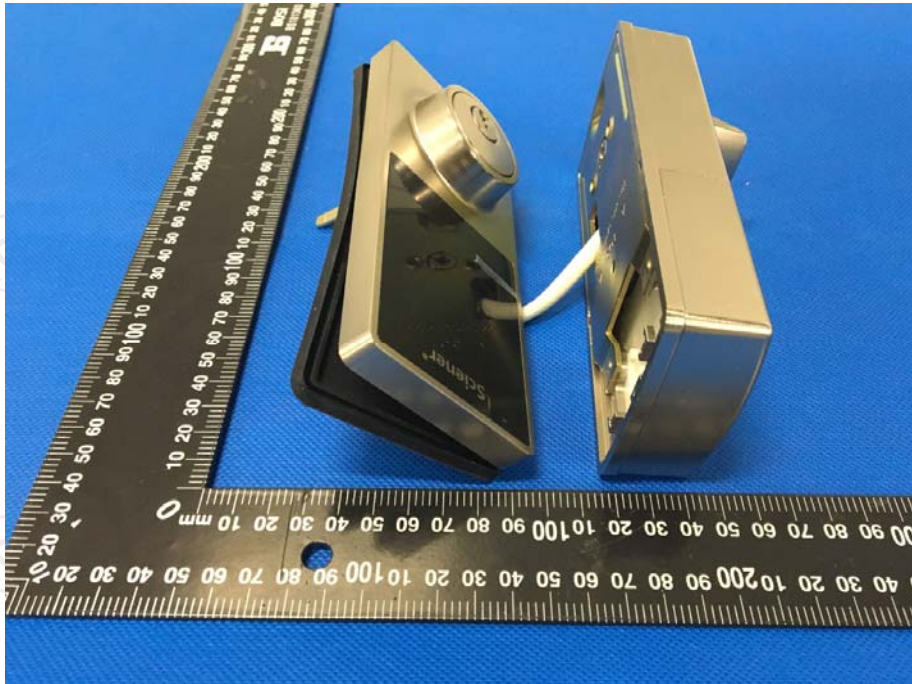


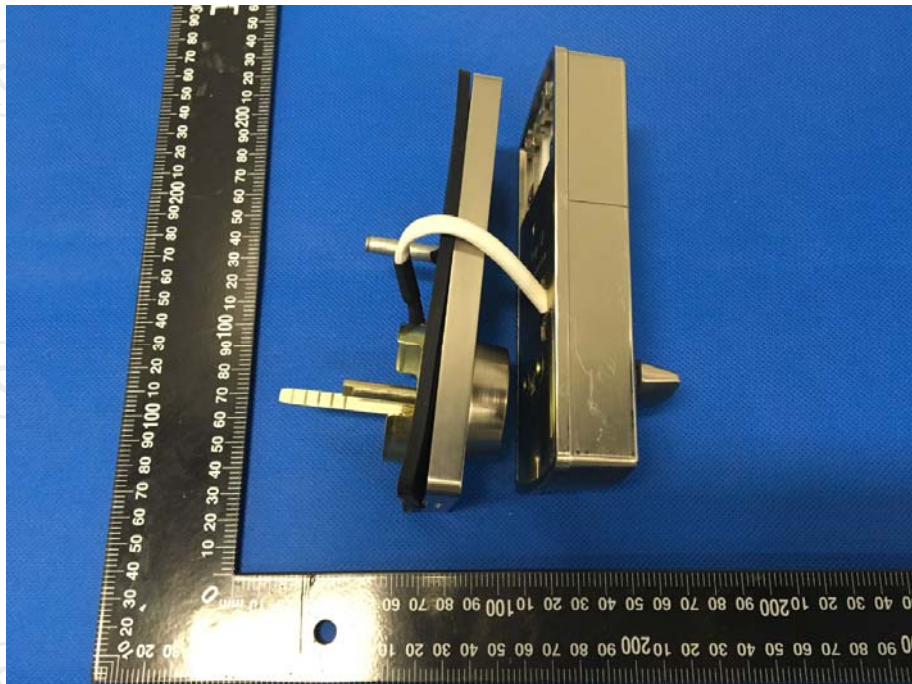
## Appendix B: Photographs of EUT

Product: Bluetooth Smart Lock  
Model No.: M503  
External photos



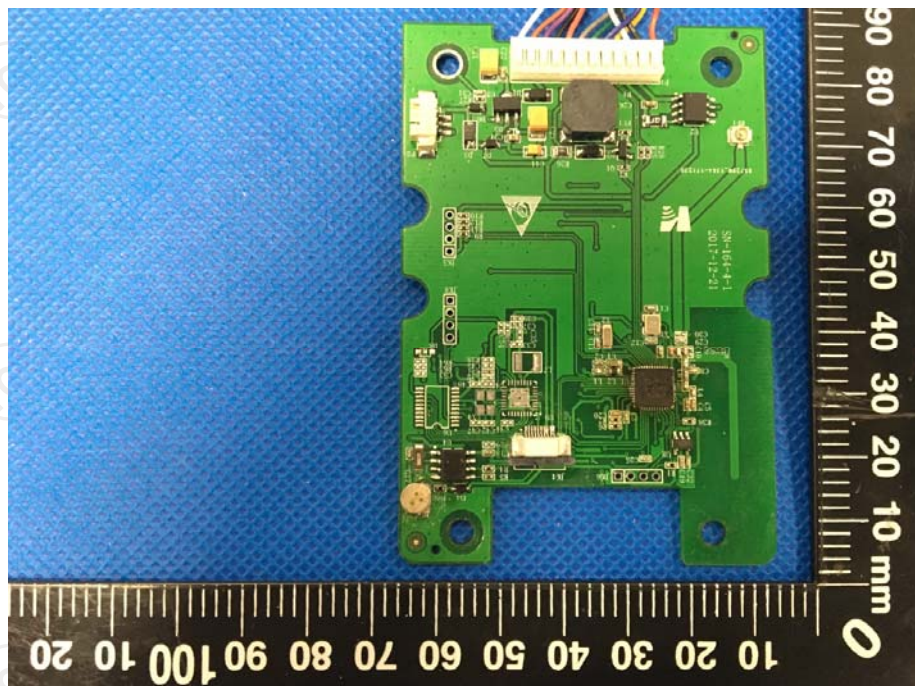
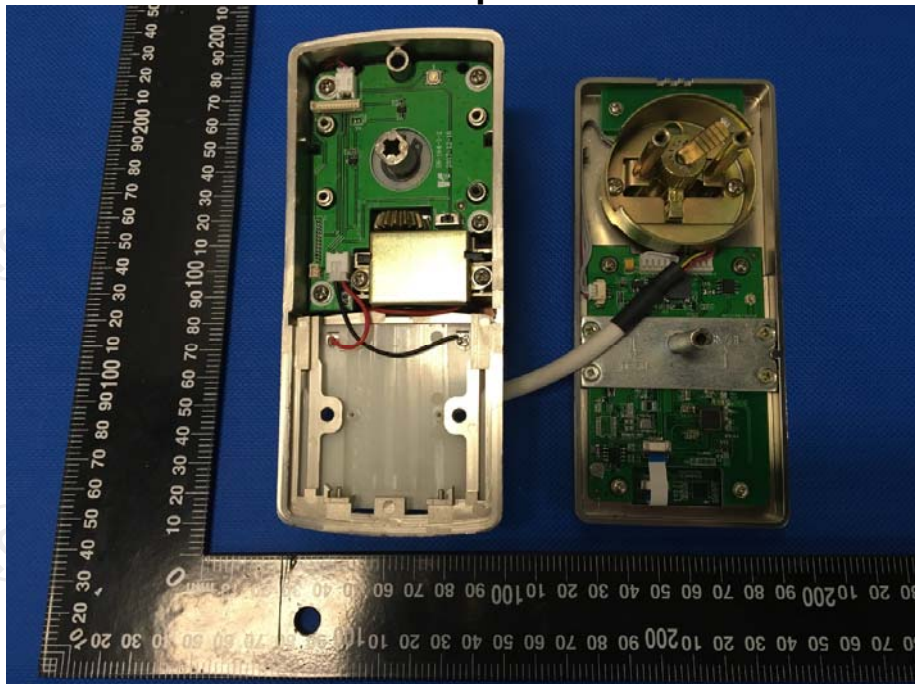


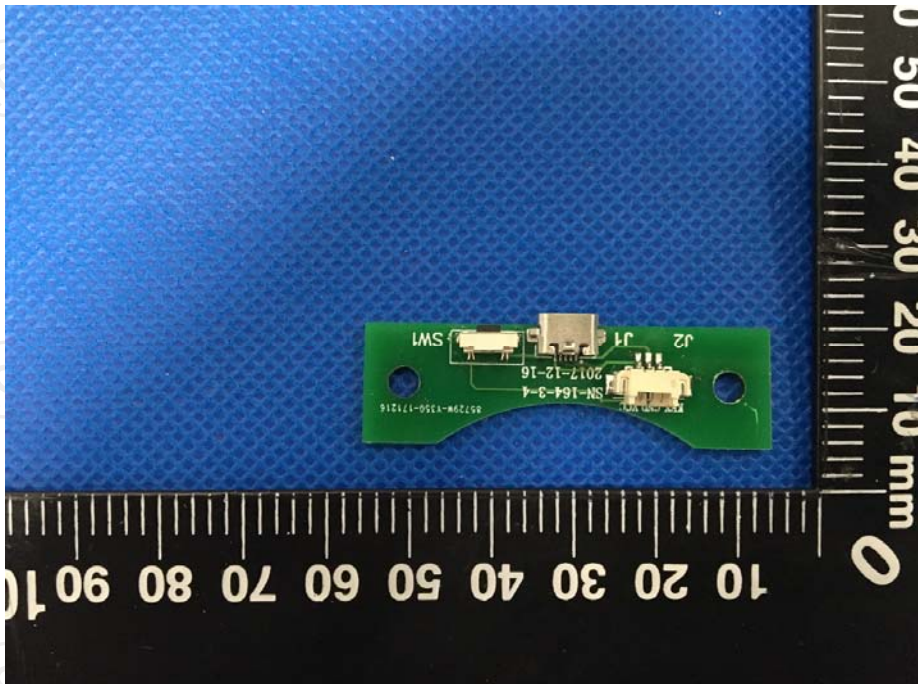
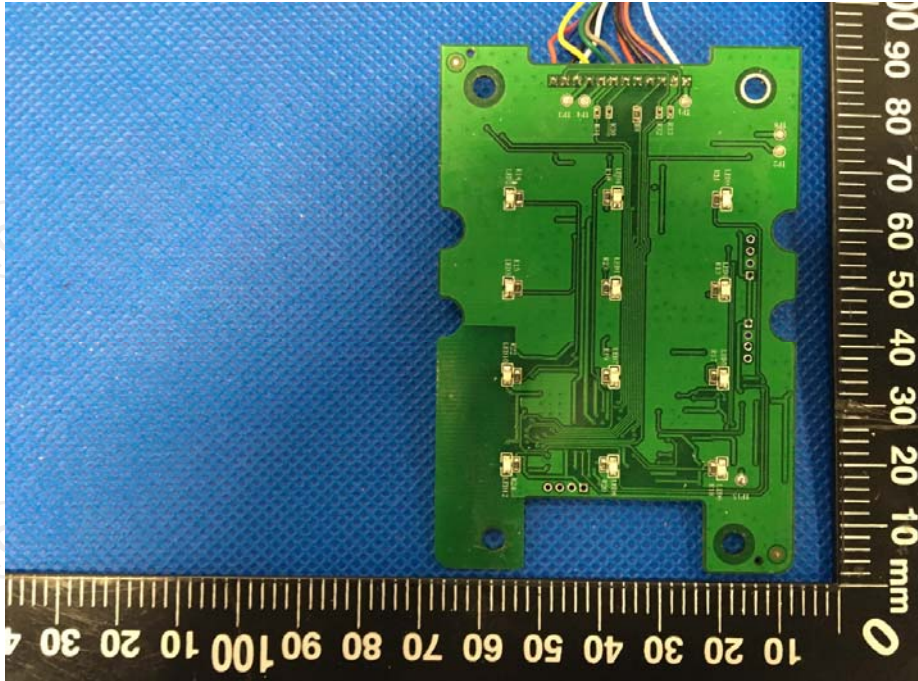




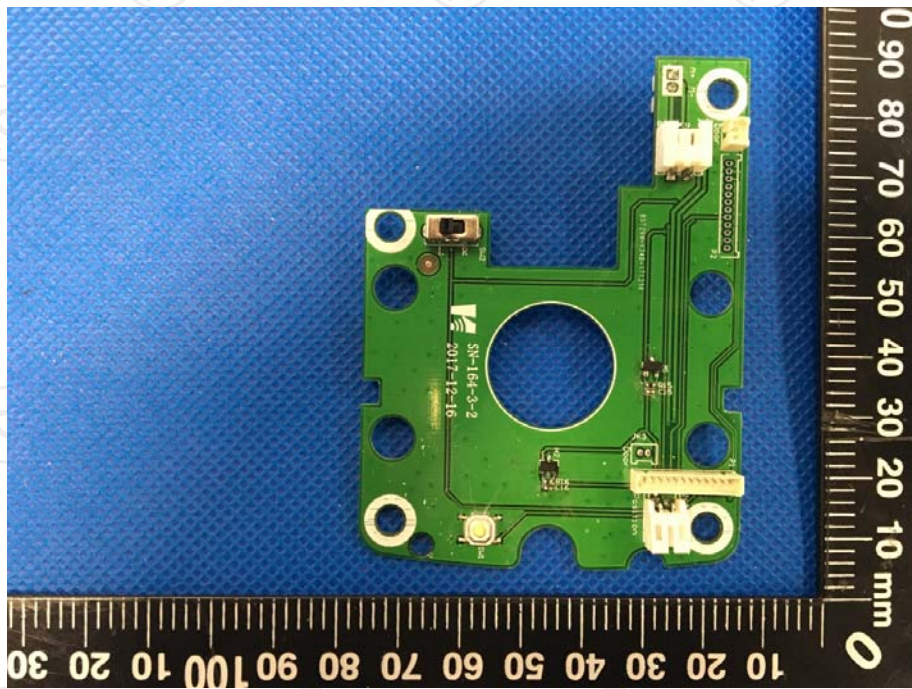
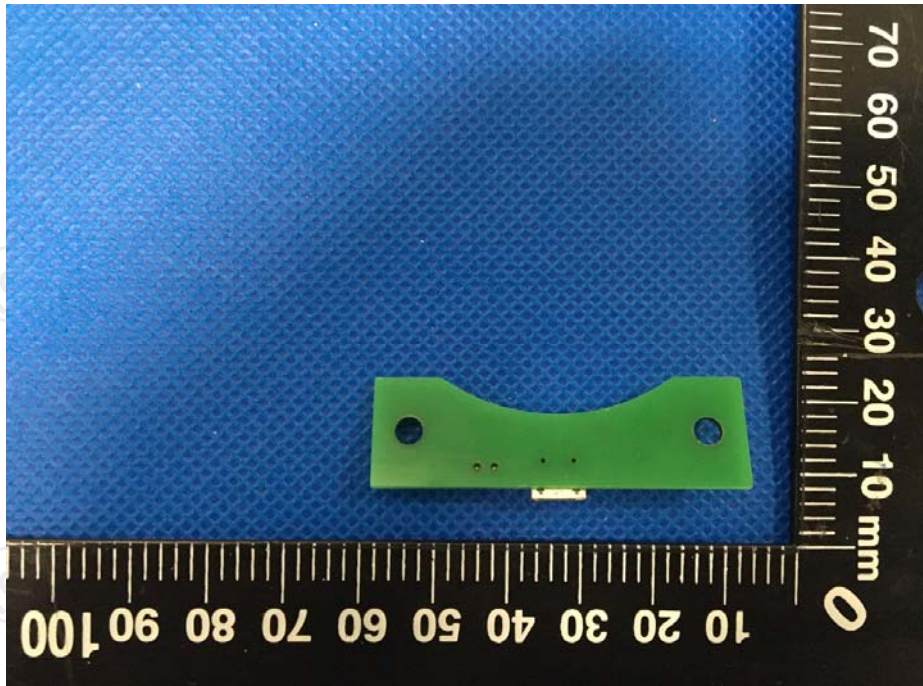


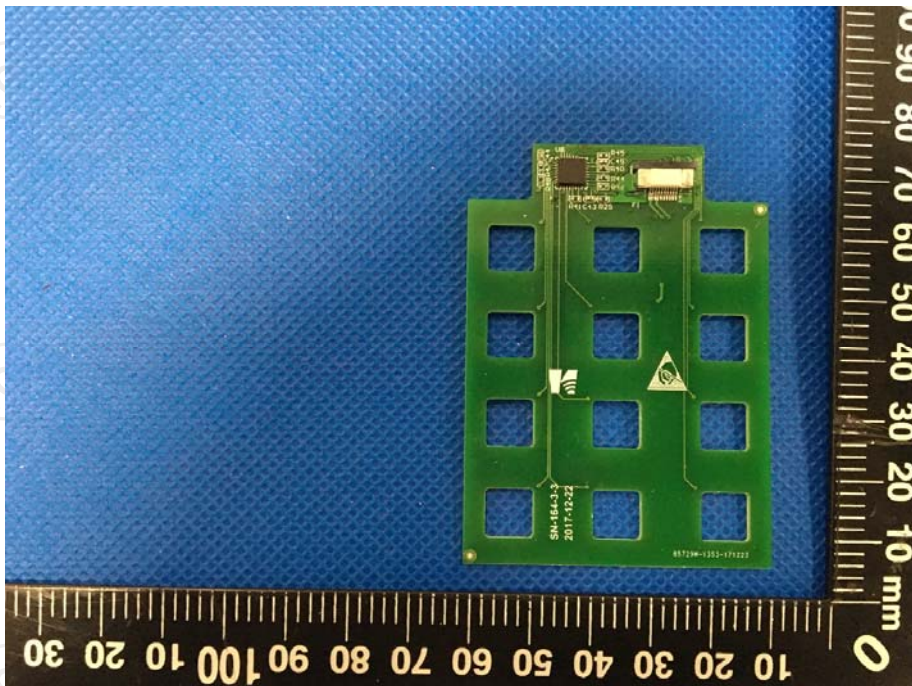
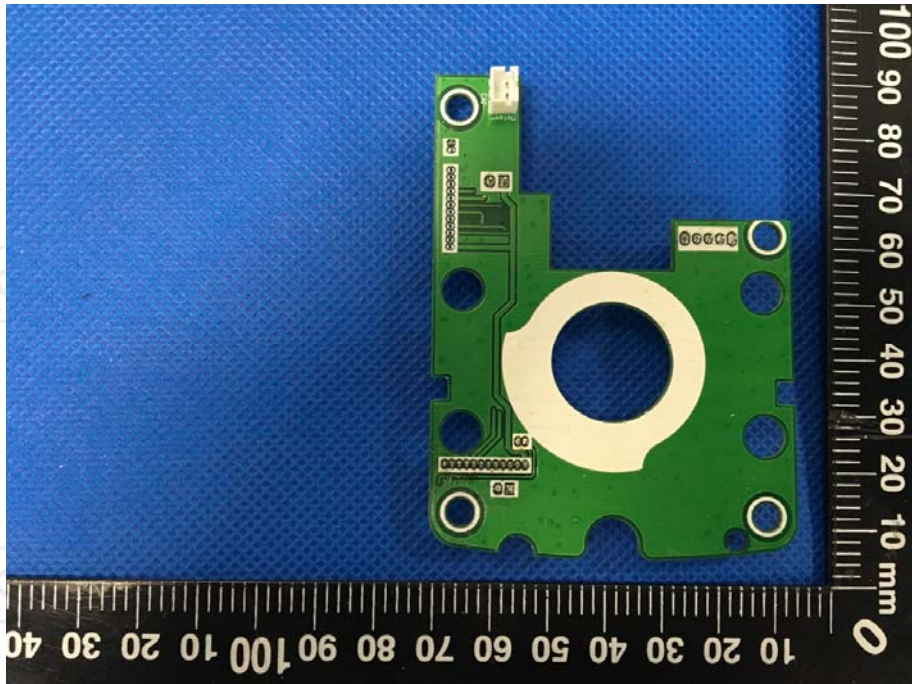
**Internal photos**



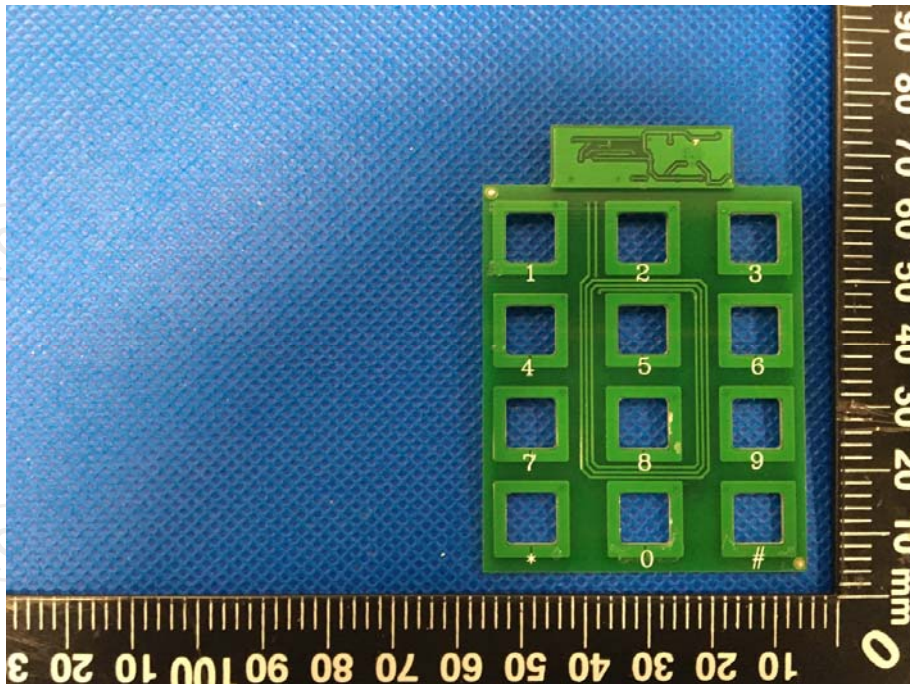












**\*\*\*\*\*END OF REPORT\*\*\*\*\***