FCC TEST REPORT

Test report
On Behalf of
Shenzhen Botan Innovation Co.,Ltd.
For
Remote Controller
Model No.:DSRC01A,DSRC01B,DSRC01C,DSRC02A,DSRC02B, DSRC03A,DSRC03B,DSRC04A,DSRC05A,DSRC06A,DSRC07A,DSRC08A, DSRC09A

FCC ID: 2AUYR-DSRC01A-09A

Prepared for : **Shenzhen Botan Innovation Co.,Ltd.**
21th floor,Building A,Cadre Building,No.168 Tongsha Road,Shenzhen,ChIna

Prepared By : **Shenzhen HUAK Testing Technology Co., Ltd.**
1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China

TEST REPORT

Applicant's name .....: **Shenzhen Botan Innovation Co.,Ltd.**

Address .....: 21th floor,Building A,Cadre Building,No.168 Tongsha Road,Shenzhen,ChIna

Manufacture's Name .....: **Shenzhen Botan Innovation Co.,Ltd.**

Address .....: 21th floor,Building A,Cadre Building,No.168 Tongsha Road,Shenzhen,ChIna

Product description

Trade Mark: Potensic®

Product name .....: Remote Controller

Model and/or type reference : DSRC01A,DSRC01B,DSRC01C,DSRC02A,DSRC02B, DSRC03A,DSRC03B,DSRC04A,DSRC05A,DSRC06A,DSRC07A, DSRC08A,DSRC09A

Standards .....: FCC Rules and Regulations Part 15 Subpart C Section 15.247 ANSI C63.10: 2013

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Date of Test .....:

Date (s) of performance of tests .....: Dec. 01, 2019~. Dec. 10, 2019

Date of Issue .....: Dec. 10, 2019

Test Result .....: **Pass**

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

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1. TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	RESULT
CONDUCTED EMISSIONS TEST	N/A
RADIATED EMISSION TEST	COMPLIANT
BAND EDGE	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	N/A
POWER SPECTRAL DENSITY	N/A
PEAK OUTPUT POWER	N/A
OUT OF BAND EMISSIONS	N/A
ANTENNA REQUIREMENT	N/A

1.2 TEST FACILITY

Test Firm : Shenzhen HUAK Testing Technology Co., Ltd.

Address 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China

1.3 MEASUREMENT UNCERTAINTY

Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	=	4.06dB, k=2

1.4 Test Description

Test Specification clause	Test case	Test Channel	Recorded In Report		Pass	Fail	NA	NP	Remark
§15.205	Band edge compliance radiated	☒ Lowest ☒ Highest	GFSK	☒ Lowest ☒ Highest	☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions radiated	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies

Remark:

The measurement uncertainty is not included in the test result.

NA = Not Applicable; NP = Not Performed

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Remote Controller
Trade Mark:	Potensic
Model Name	DSRC01A
Serial Model	DSRC01B,DSRC01C,DSRC02A,DSRC02B,DSRC03A,DSRC03B,DSRC04A,DSRC05A,DSRC06A,DSRC07A,DSRC08A,DSRC09A
FCC ID	2AUYR-DSRC01A-09A
Antenna Type	External antenna
Antenna Gain	2.1dBi
Operation frequency	2420~2461MHz
Number of Channels	30
Modulation Type	GFSK
Power Rating	DC 3.7V From Battey.DC 5.0V From external circuit
Adapter information(Auxiliary test)	Mode:EP-TA20CBC Input:AC100-240V-50/60Hz，0.5A Output:DC 5V,2A

2.1.1 Carrier Frequency of Channels

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing .There are 30 channels provided to the EUT. Channel Low/Mid/High was selected to test.

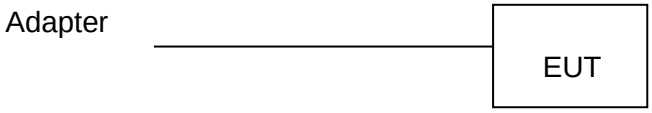
Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2420	11	2435	21	2450
2	2421	12	2436	22	2451
3	2423	13	2438	23	2453
4	2424	14	2439	24	2454
5	2425	15	2440	25	2455
6	2426	16	2441	26	2456
7	2428	17	2443	27	2458
8	2429	18	2444	28	2459
9	2430	19	2445	29	2460
10	2434	20	2446	30	2461

Operation of EUT during testing

Operating Mode
The mode is used: **Transmitting mode for GFSK**
Low Channel 1: 2420MHz
Middle Channel 15: 2440MHz
High Channel 30: 2461MHz

2.2 DESCRIPTION OF TEST SETUP

Operation of EUT during conducted testing and Radiation and Above1GHz Radiation testing:



2.3 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 28, 2018	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 28, 2018	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 28, 2018	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 28, 2018	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2018	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 28, 2018	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 28, 2018	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 28, 2018	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2018	1 Year
10.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 28, 2018	1 Year
11.	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	HKE-017	Dec. 28, 2018	1 Year
12.	Pre-amplifier	EMCI	EMC051845 SE	HKE-015	Dec. 28, 2018	1 Year
13.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 28, 2018	1 Year
14.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	Dec. 28, 2018	N/A
15.	Power Sensor	Agilent	E9300A	HKE-086	Dec. 28, 2018	1 Year
16.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2018	1 Year
17.	Signal generator	Agilent	N5182A	HKE-029	Dec. 28, 2018	1 Year
18.	Signal Generator	Agilent	83630A	HKE-028	Dec. 28, 2018	1 Year
19.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 28, 2018	3 Year
20.	RF Cable(below 1GHz)	HUBER+SUHNER	RG214	HKE-055	Dec. 28, 2018	1 Year
21.	RF Cable(above 1GHz)	HUBER+SUHNER	RG214	HKE-056	Dec. 28, 2018	1 Year

4 RADIATED EMISSION TEST

4.1 Radiation Limit

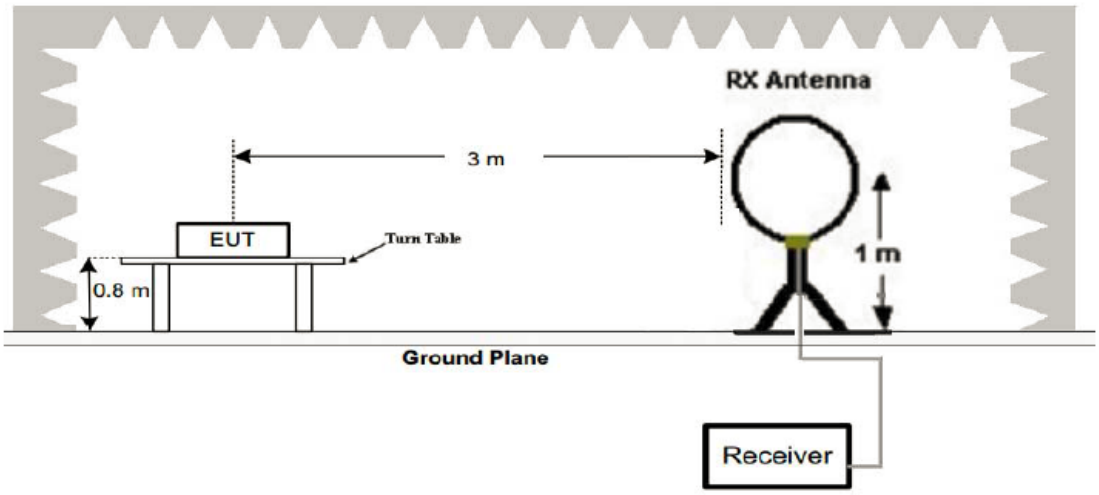
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

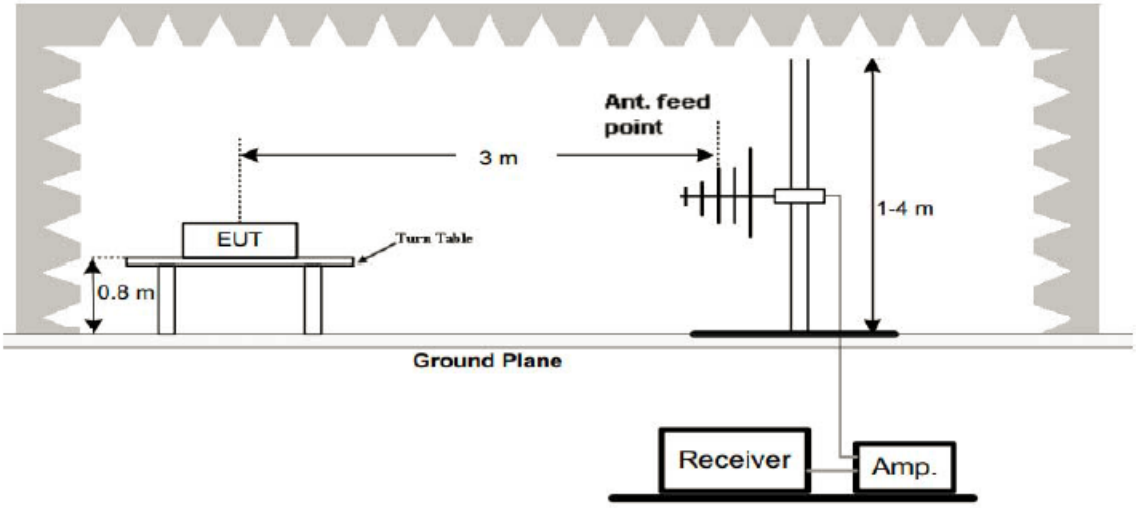
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

4.2 Test Setup

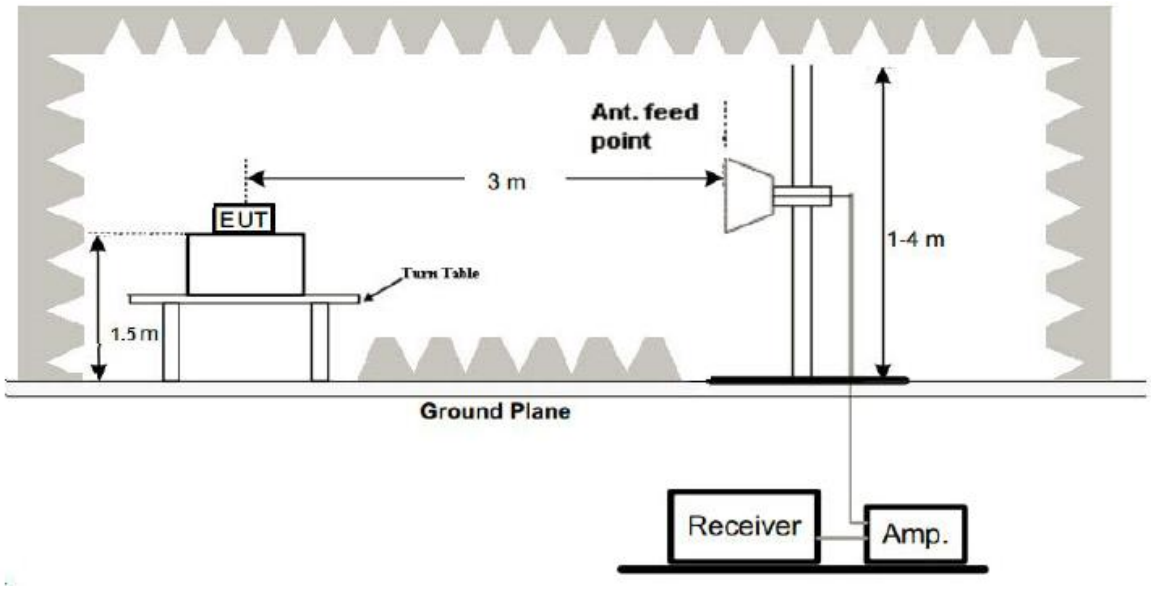
（1）Radiated Emission Test-Up Frequency Below 30MHz



（2）Radiated Emission Test-Up Frequency 30MHz~1GHz



（3）Radiated Emission Test-Up Frequency Above 1GHz



4.3 Test Procedure

1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a).

Note:
For battery operated equipment, the equipment tests shall be performed using a new battery.

4.4 Test Result

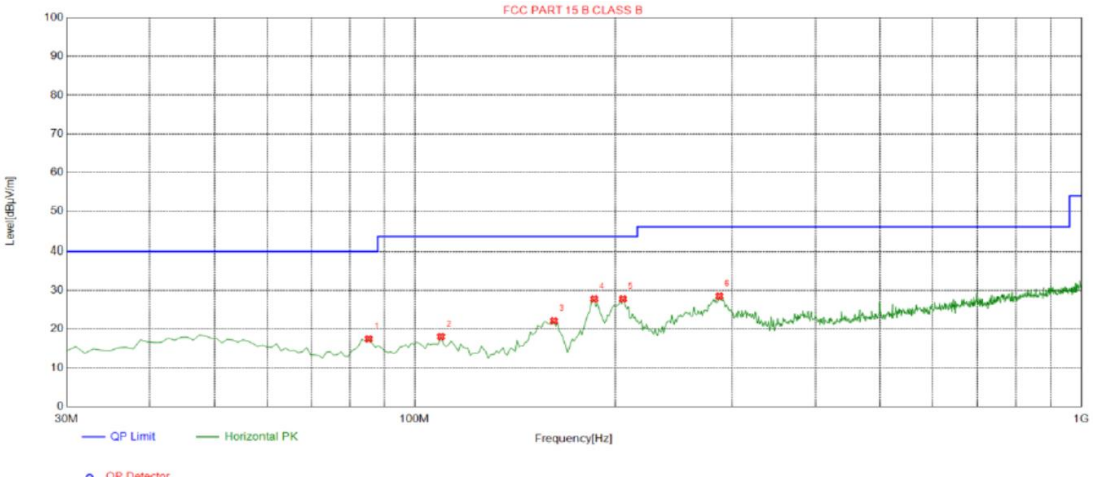
PASS

Remark: 1. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz

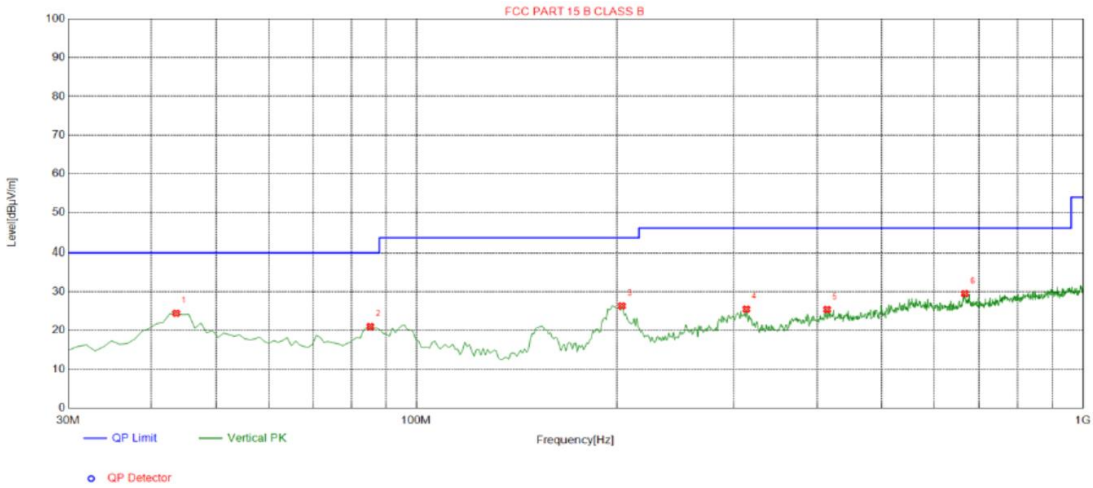
All the test modes completed for test. The worst case of Radiated Emission （Transmitting Low Channel-2420MHz (worst case) ）; the test data of this mode was reported.

Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	85.2900	17.45	-18.20	40.00	22.55	100	243	Horizontal
2	109.540	18.03	-15.43	43.50	25.47	100	349	Horizontal
3	161.920	22.15	-18.04	43.50	21.35	100	111	Horizontal
4	186.170	27.72	-16.33	43.50	15.78	100	96	Horizontal
5	205.570	27.76	-14.92	43.50	15.74	100	214	Horizontal
6	287.050	28.53	-12.96	46.00	17.47	100	57	Horizontal

Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	43.5800	24.42	-13.90	40.00	15.58	100	13	Vertical
2	85.2900	21.05	-18.20	40.00	18.95	100	336	Vertical
3	203.630	26.37	-14.97	43.50	17.13	100	243	Vertical
4	313.240	25.57	-12.44	46.00	20.43	100	348	Vertical
5	414.120	25.46	-10.14	46.00	20.54	100	134	Vertical
6	667.290	29.56	-4.73	46.00	16.44	100	307	Vertical

Above 1 GHz Test Results:

LOW CH1: 2420MHz
Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4804	60.08	-3.58	56.5	74	-17.5	peak
4804	46.12	-3.58	42.54	54	-11.46	AVG
7206	56.75	-0.91	55.84	74	-18.16	peak
7206	42.35	-0.91	41.44	54	-12.56	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
4804	60.97	-3.58	57.39	74	-16.61	peak
4804	47.03	-3.58	43.45	54	-10.55	AVG
7206	57.75	-0.91	56.84	74	-17.16	peak
7206	42.06	-0.91	41.15	54	-12.85	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

MID CH15:2440MHz
Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4880	60.36	-3.51	56.85	74	-17.15	peak
4880	45.97	-3.51	42.46	54	-11.54	AVG
7320	56.86	-0.82	56.04	74	-17.96	peak
7320	43.73	-0.82	42.91	54	-11.09	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
4880	62.13	-3.51	58.62	74	-15.38	peak
4880	46.92	-3.51	43.41	54	-10.59	AVG
7320	58.27	-0.82	57.45	74	-16.55	peak
7320	43.81	-0.82	42.99	54	-11.01	AVG
---	---	---	---	---	---	---
---	---	---	---	---	---	---
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

HIGH CH30: 2461MHz

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4960	61.72	-3.45	58.27	74	-15.73	peak
4960	46.69	-3.45	43.24	54	-10.76	AVG
7440	57.32	-0.78	56.54	74	-17.46	peak
7440	42.66	-0.78	41.88	54	-12.12	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
4960	62.03	-3.45	58.58	74	-15.42	peak
4960	47.05	-3.43	43.62	54	-10.38	AVG
7440	57.23	-0.78	56.45	74	-17.55	peak
7440	42.83	-0.78	42.05	54	-11.95	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 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.

5 BAND EDGE

5.1 Limits

Please refer section15.247

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

5.2 Test Procedure

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW to 100KHz and VBM to 300KHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW to 100 KHz and VBW to 300 KHz, to measure the conducted peak band edge.

5.3 Test Result

PASS

For Radiated Bandedge Measurement

Operation Mode: LOW CH1: 2420MHz

Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2390	57.86	-5.81	52.05	74	-21.95	peak
2390	48.09	-5.81	42.28	54	-11.72	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	59.12	-5.81	53.31	74	-20.69	peak
2390	49.11	-5.81	43.3	54	-10.7	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: MID CH30: 2461MHz
Horizontal

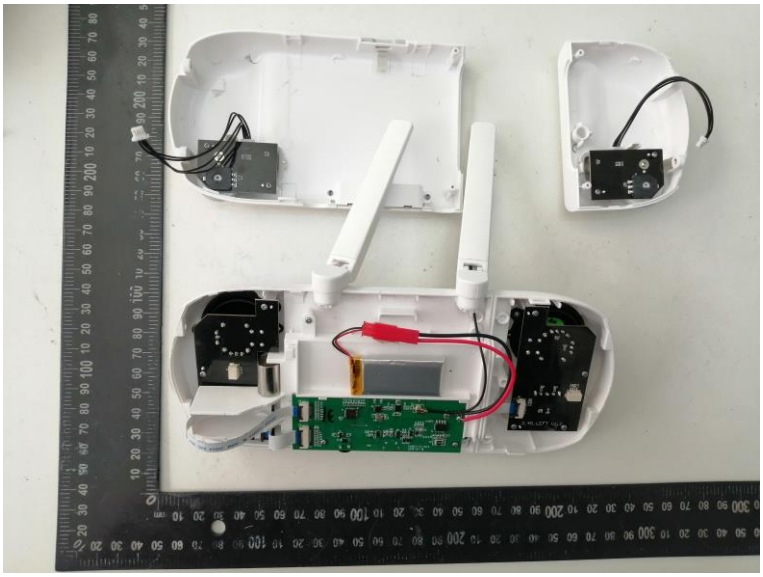
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	56.93	-5.65	51.28	74	-22.72	peak
2483.5	47.82	-5.65	42.17	54	-11.83	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

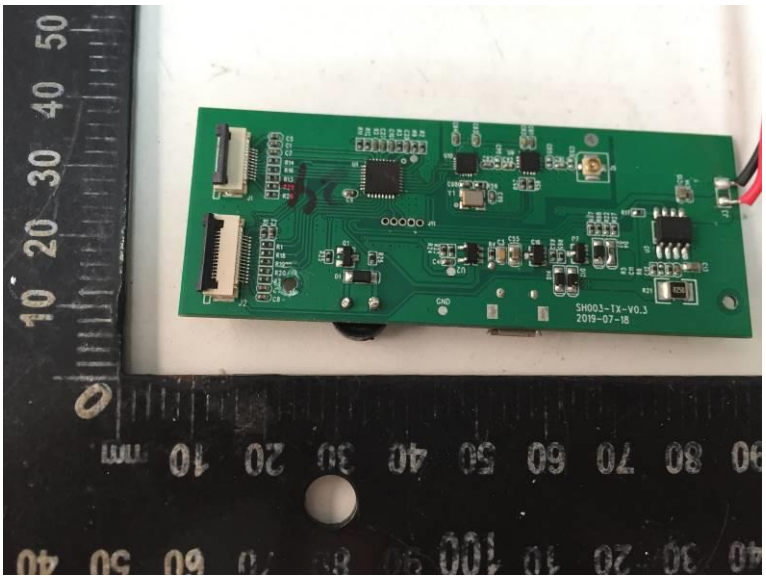
Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	58.28	-5.65	52.63	74	-21.37	peak
2483.5	49.03	-5.65	43.38	54	-10.62	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 Test Setup Photos of the EUT

7 External and Internal Photos of the EUT

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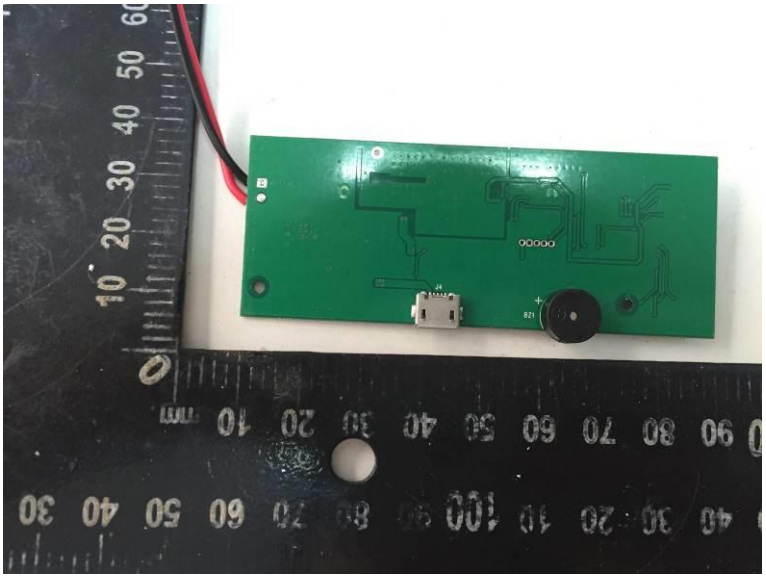

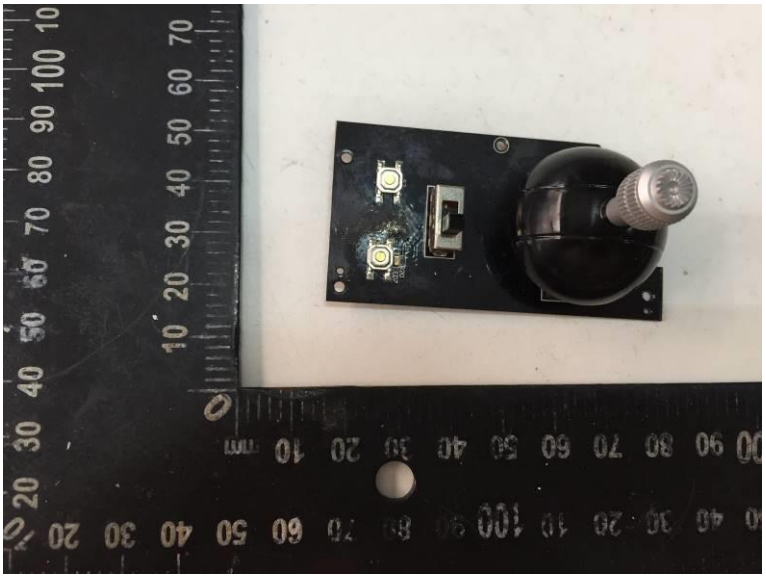

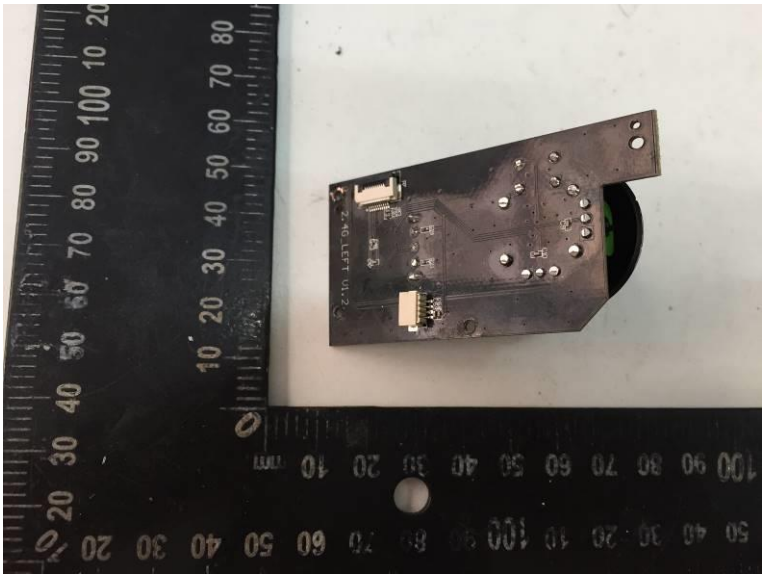

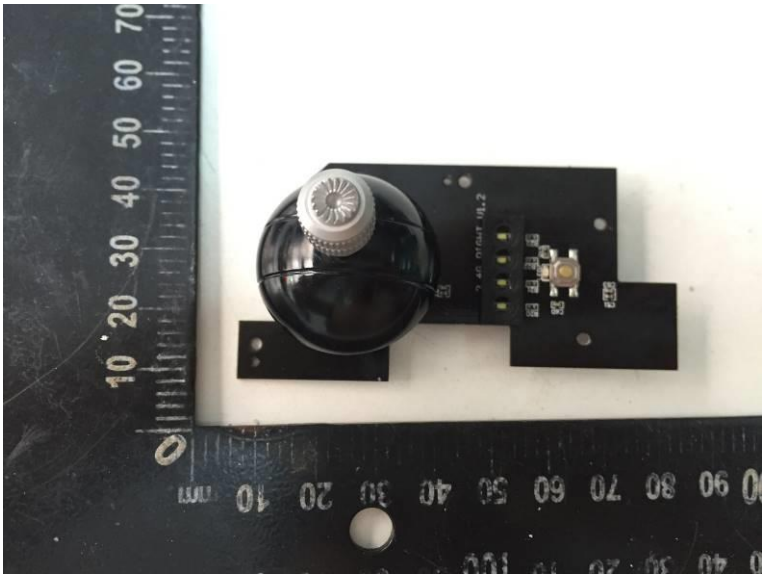

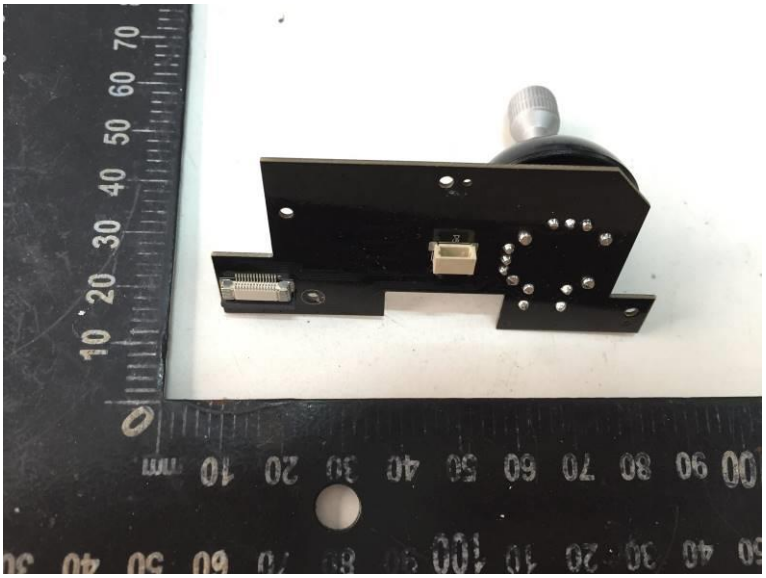

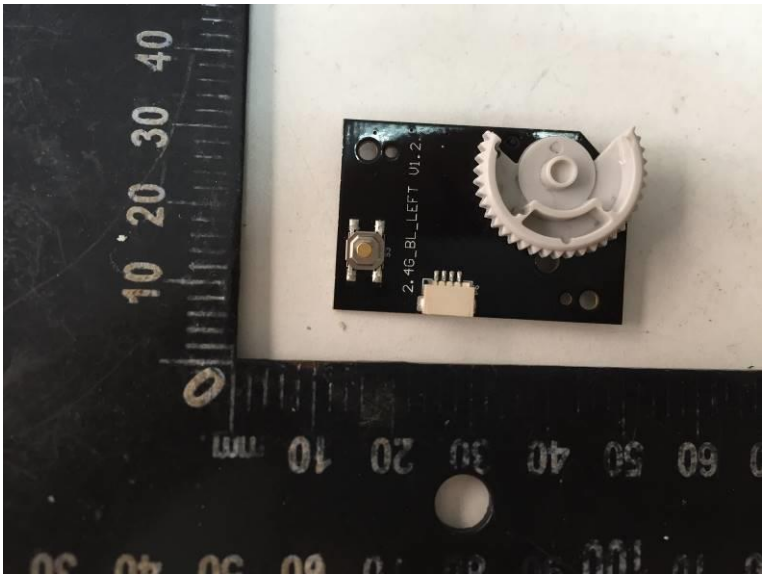
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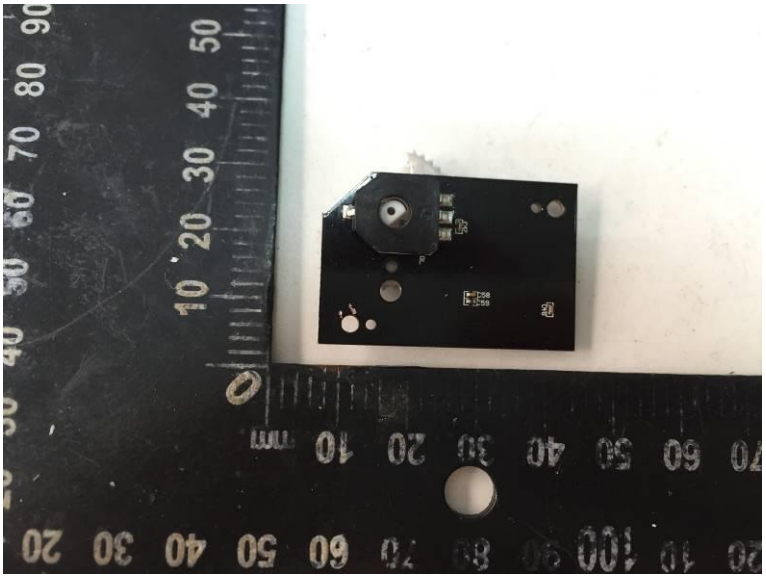

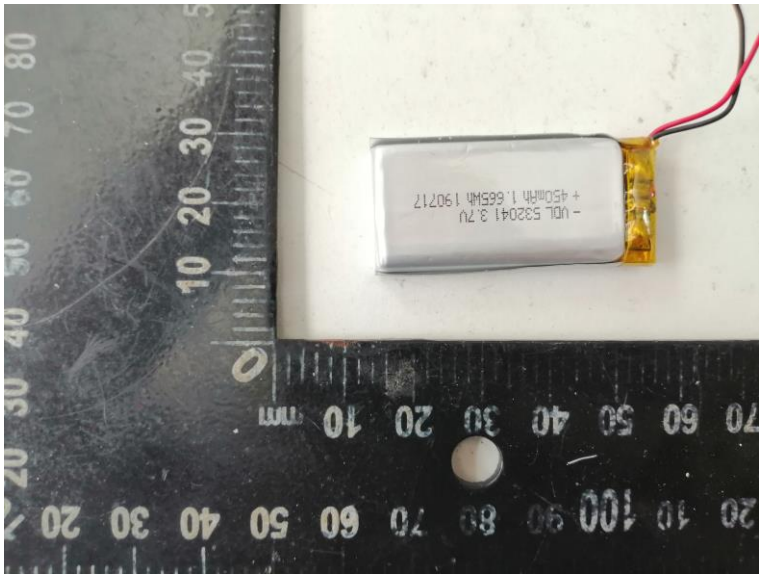

.....End of Report.....