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 .....: Oct. 12, 2019~. Nov. 13, 2019

Date of Issue .....: Nov. 13, 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	COMPLIANT
RADIATED EMISSION TEST	COMPLIANT
BAND EDGE	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	COMPLIANT
POWER SPECTRAL DENSITY	COMPLIANT
PEAK OUTPUT POWER	COMPLIANT
OUT OF BAND EMISSIONS	COMPLIANT
ANTENNA REQUIREMENT	COMPLIANT

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
§15.247(b)(4)	Antenna gain	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(e)	Power spectral density	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(a)(2)	Spectrum bandwidth – 6 dB bandwidth	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(b)(1)	Maximum output power	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒ ☒	☐	☐	☐	complies
§15.247(d)	Band edge compliance conducted	☒ Lowest ☒ Highest	GFSK	☒ Lowest ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.205	Band edge compliance radiated	☒ Lowest ☒ Highest	GFSK	☒ Lowest ☒ Highest	☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions conducted	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions radiated	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.109	RX spurious emissions radiated	-/-	- / -	-/-	☐	☐	☒	☐	complies
§15.209(a)	TX spurious Emissions Radiated < 30 MHz	-/-	GFSK	-/-	☒	☐	☐	☐	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.

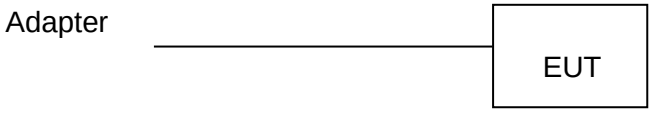
Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2420	11	2435	21	2450
2	2421	12	2436	22	2451
3	2423	13	2438	23	2453
4	2424	14	2439	24	2454
5	2425	15	2440	25	2455
6	2426	16	2441	26	2456
7	2428	17	2443	27	2458
8	2429	18	2444	28	2459
9	2430	19	2445	29	2460
10	2434	20	2446	30	2461

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

3. CONDUCTED EMISSIONS TEST

3.1 Conducted Power Line Emission Limit

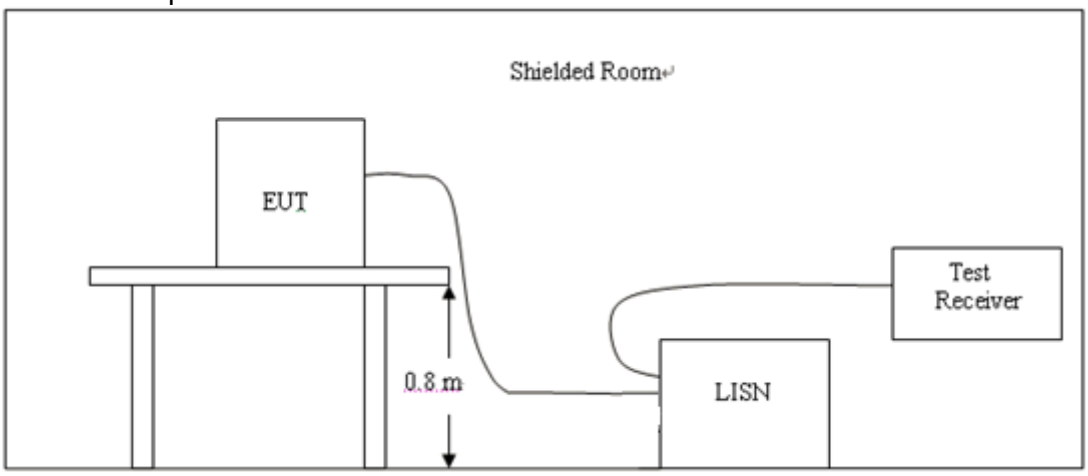
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

3.2 Test Setup



3.3 Test Procedure

1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
2, Support equipment, if needed, was placed as per ANSI C63.10.
3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5, All support equipments received AC power from a second LISN, if any.
6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7, Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

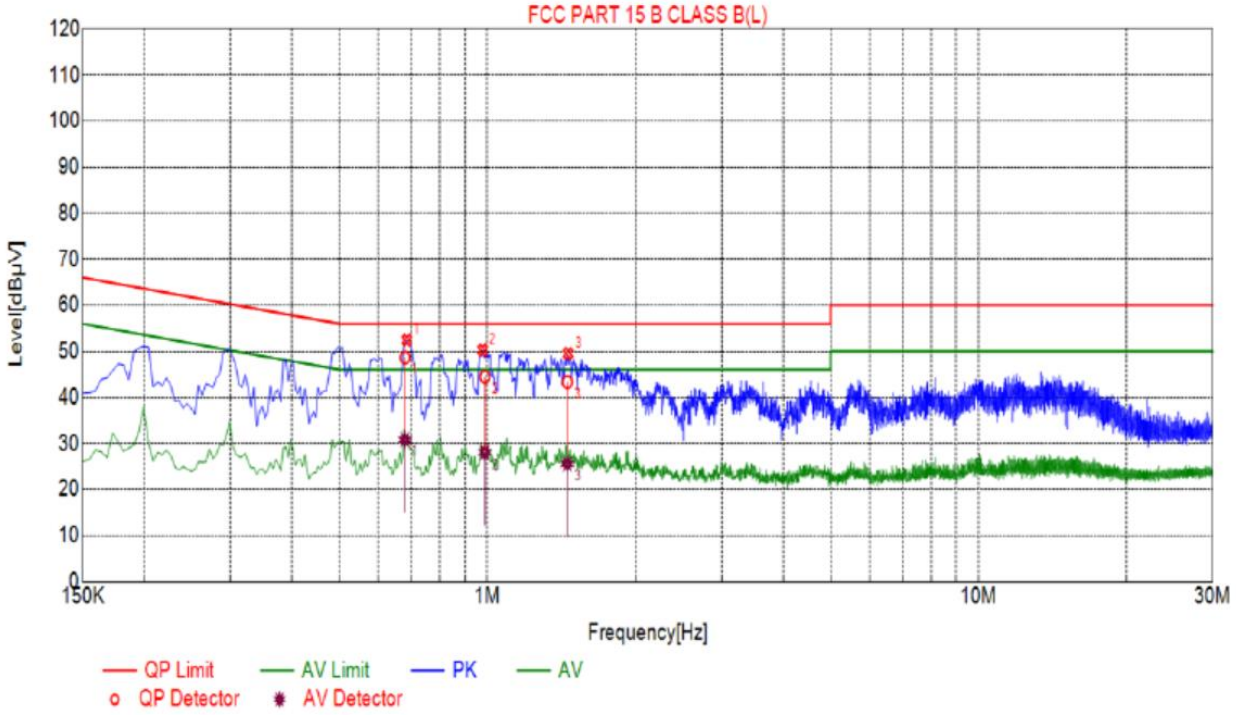
3.4 Test Result

PASS

All the test modes completed for test.

Remark: We measured Conducted Emission at GFSK mode in AC 120V/60Hz

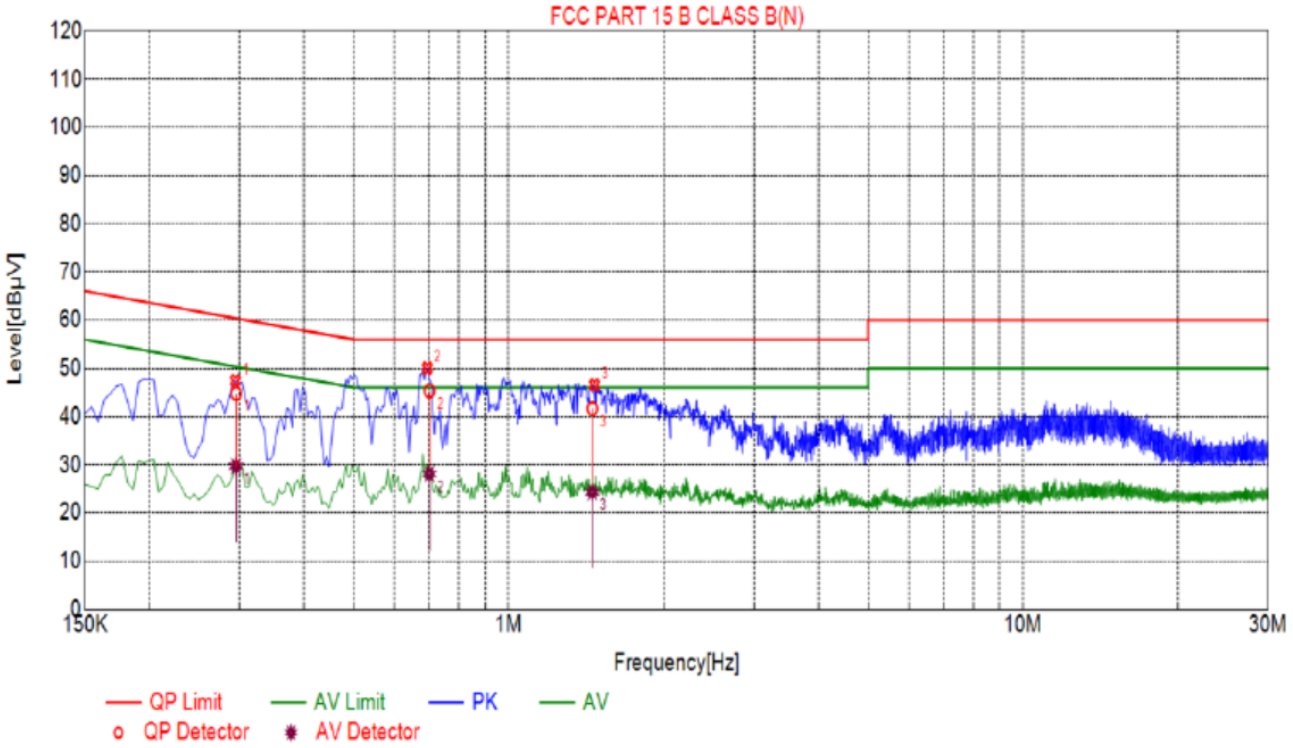
Power supply:	DC 5V From PC(AC 120V/60Hz)	Polarization	L



Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]
1	0.6794	10.05	48.66	56.00	7.34	30.85	46.00	15.15
2	0.9878	10.06	44.45	56.00	11.55	28.11	46.00	17.89
3	1.4543	10.10	43.34	56.00	12.66	25.61	46.00	20.39

Power supply:	DC 5V From PC(AC 120V/60Hz)	Polarization	N



Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]
1	0.2949	10.03	44.76	60.39	15.63	29.74	50.39	20.65
2	0.7014	10.05	45.30	56.00	10.70	28.14	46.00	17.86
3	1.4538	10.10	41.64	56.00	14.36	24.37	46.00	21.63

4 RADIATED EMISSION TEST

4.1 Radiation Limit

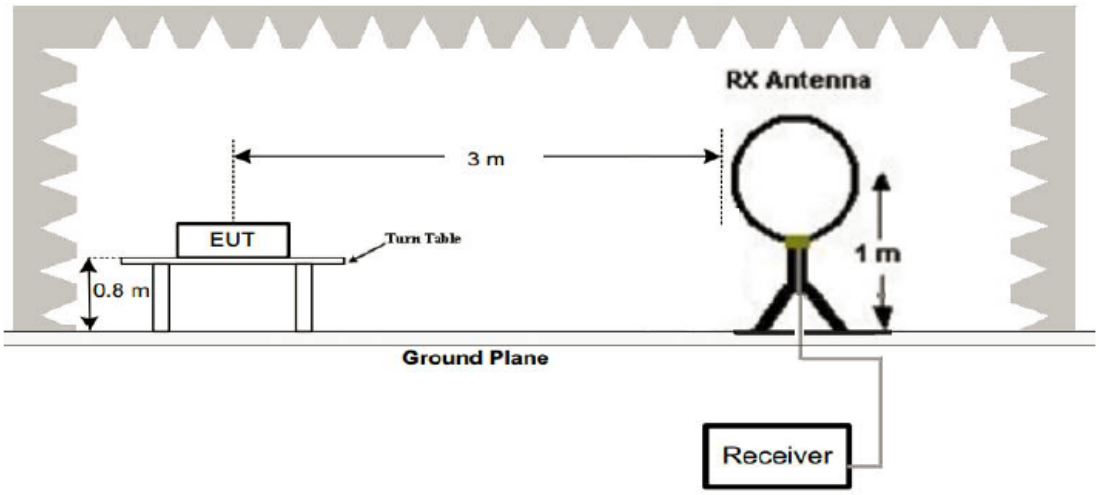
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

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

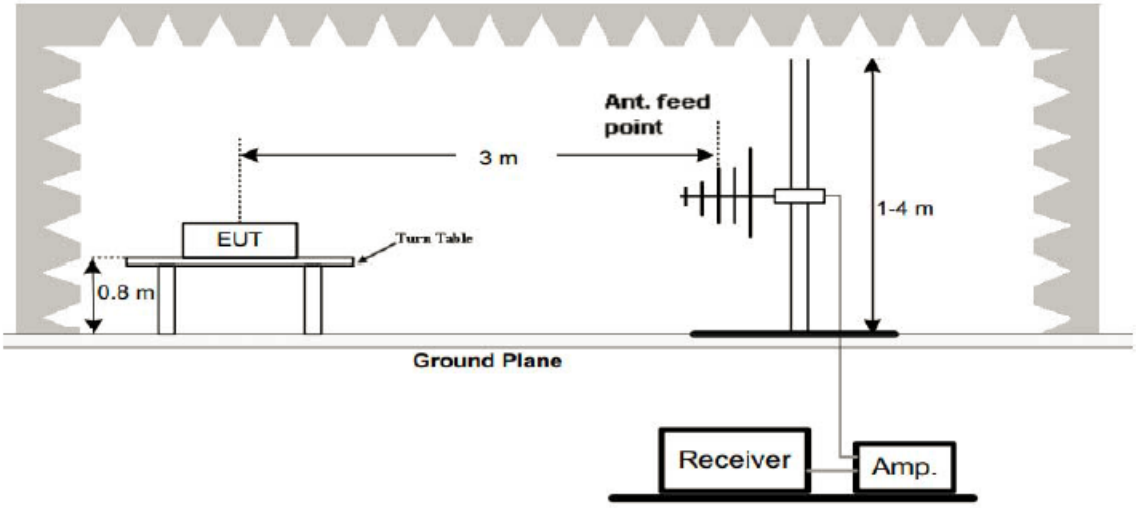
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

4.2 Test Setup

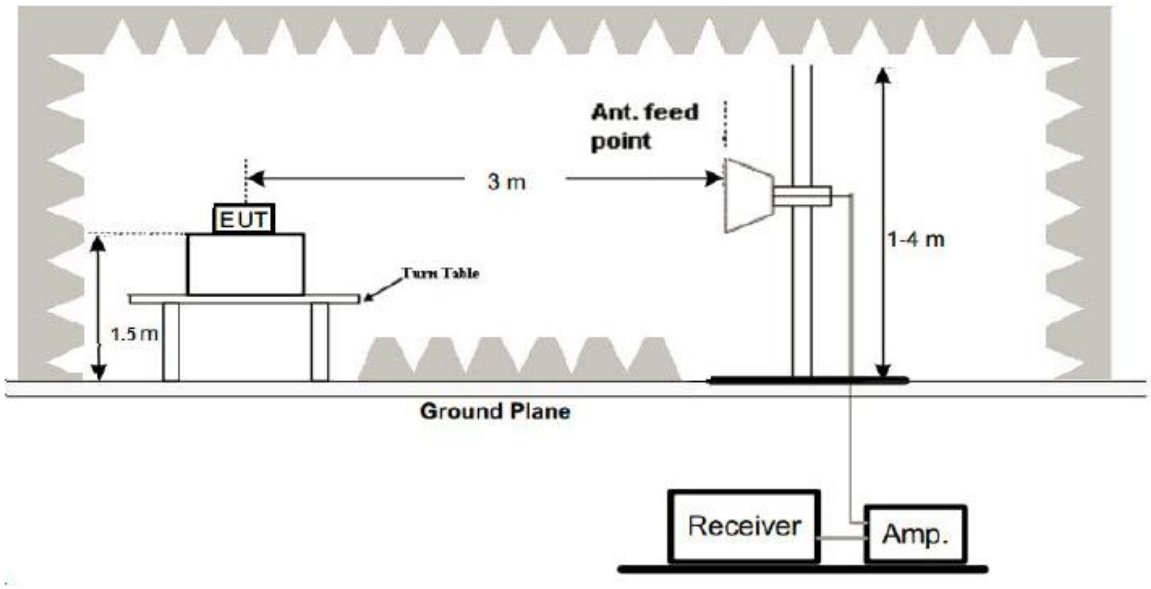
（1）Radiated Emission Test-Up Frequency Below 30MHz



（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

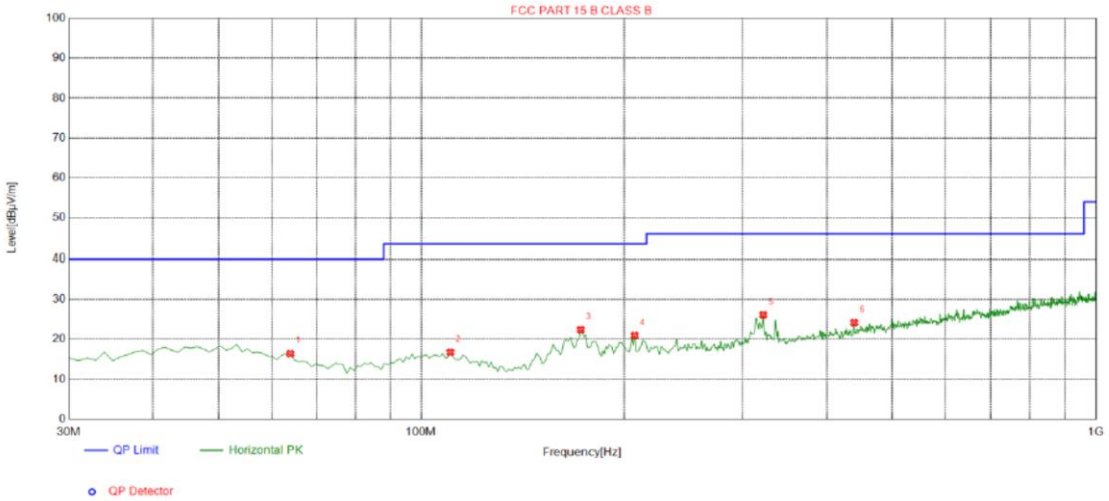
PASS

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

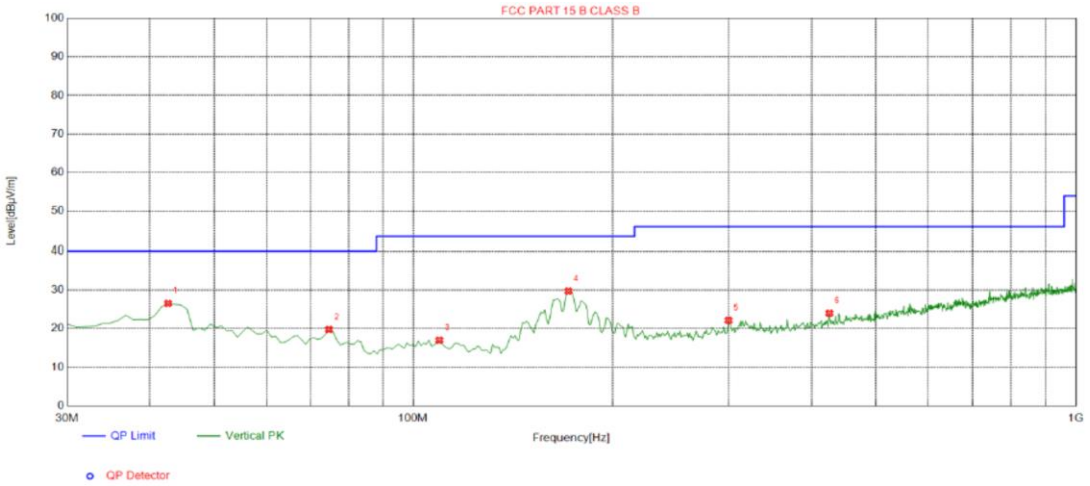
All the test modes completed for test. The worst case of Radiated Emission （Transmitting Low Channel-2420MHz (worst case) ）; the test data of this mode was reported.

Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	63.9500	16.39	-16.15	40.00	23.61	100	288	Horizontal
2	110.510	16.75	-15.52	43.50	26.75	100	187	Horizontal
3	172.590	22.39	-17.18	43.50	21.11	100	276	Horizontal
4	207.510	20.95	-14.86	43.50	22.55	100	348	Horizontal
5	321.970	26.12	-12.00	46.00	19.88	100	91	Horizontal
6	439.340	24.16	-9.45	46.00	21.84	100	308	Horizontal

Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	42.6100	26.54	-14.08	40.00	13.46	100	28	Vertical
2	74.6200	19.79	-18.50	40.00	20.21	100	141	Vertical
3	109.540	17.00	-15.43	43.50	26.50	100	259	Vertical
4	171.620	29.72	-17.23	43.50	13.78	100	191	Vertical
5	299.660	22.15	-12.74	46.00	23.85	100	59	Vertical
6	425.760	24.00	-9.93	46.00	22.00	100	154	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
4840	61.29	-3.58	57.71	74	-16.29	peak
4840	46.85	-3.58	43.27	54	-10.73	AVG
7260	56.85	-0.91	55.94	74	-18.06	peak
7260	42.16	-0.91	41.25	54	-12.75	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
4840	63.25	-3.58	59.67	74	-14.33	peak
4840	47.98	-3.58	44.4	54	-9.6	AVG
7260	58.12	-0.91	57.21	74	-16.79	peak
7260	43.38	-0.91	42.47	54	-11.53	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	61.05	-3.51	57.54	74	-16.46	peak
4880	46.02	-3.51	42.51	54	-11.49	AVG
7320	57.21	-0.82	56.39	74	-17.61	peak
7320	43.87	-0.82	43.05	54	-10.95	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	62.08	-3.51	58.57	74	-15.43	peak
4880	47.21	-3.51	43.7	54	-10.3	AVG
7320	58.32	-0.82	57.5	74	-16.5	peak
7320	43.59	-0.82	42.77	54	-11.23	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
4922	61.98	-3.45	58.53	74	-15.47	peak
4922	46.85	-3.45	43.4	54	-10.6	AVG
7383	58.35	-0.78	57.57	74	-16.43	peak
73.83	43.12	-0.78	42.34	54	-11.66	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
4922	61.37	-3.45	57.92	74	-16.08	peak
4922	47.16	-3.45	43.71	54	-10.29	AVG
7383	58.31	-0.78	57.53	74	-16.47	peak
7383	42.08	-0.78	41.3	54	-12.7	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	58.12	-5.81	52.31	74	-21.69	peak
2390	48.25	-5.81	42.44	54	-11.56	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
2390	59.02	-5.81	53.21	74	-20.79	peak
2390	48.67	-5.81	42.86	54	-11.14	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

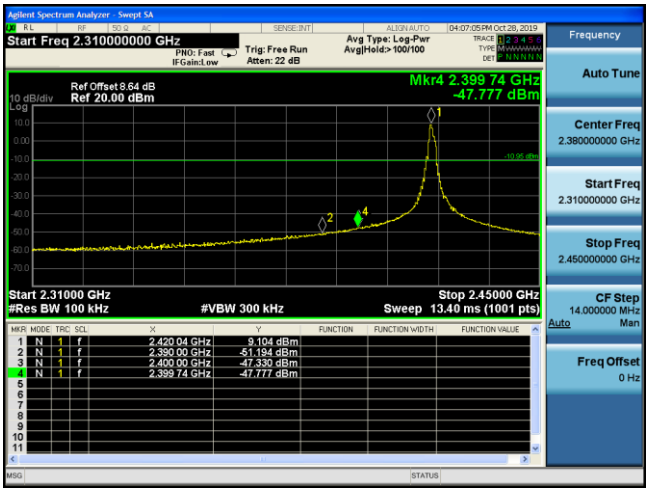
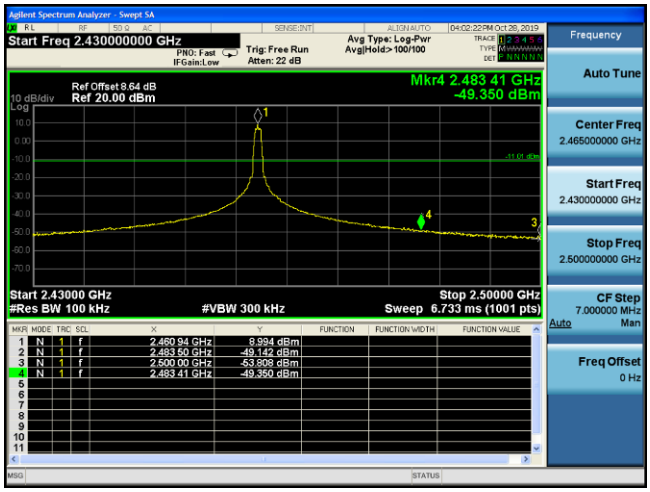
Operation Mode: MID CH30: 2461MHz
Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	56.81	-5.65	51.16	74	-22.84	peak
2483.5	48.06	-5.65	42.41	54	-11.59	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	57.12	-5.65	51.47	74	-22.53	peak
2483.5	48.85	-5.65	43.2	54	-10.8	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.						

For Conducted Bandedge Measurement

GFSK	
	
Low	High

6 6dB Bandwidth

6.1 Test Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

6.2 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz.The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.According to KDB558074 for one of the following procedures may be used to determine the modulated DTS device signal bandwidth.

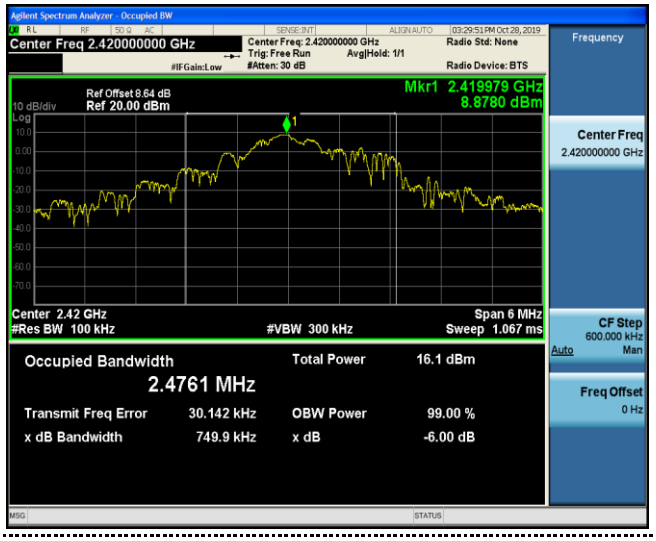
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3 Test Result

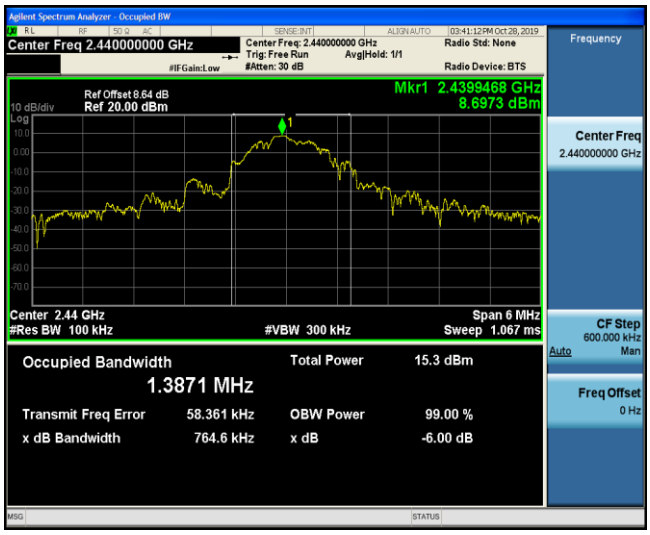
PASS

Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
GFSK	1	0.7499	≥500	Pass
	15	0.7646		
	30	0.7594		

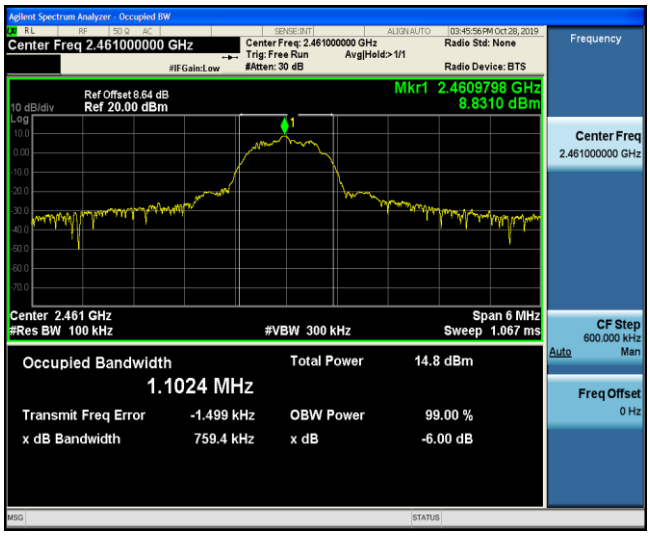
GFSK



Channel 1



Channel 15



Channel 30

7 POWER SPECTRAL DENSITY TEST

7.1 Test Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

7.2 Test Procedure

According to KDB 558074 D01 Method PKPSD (peak PSD) This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat

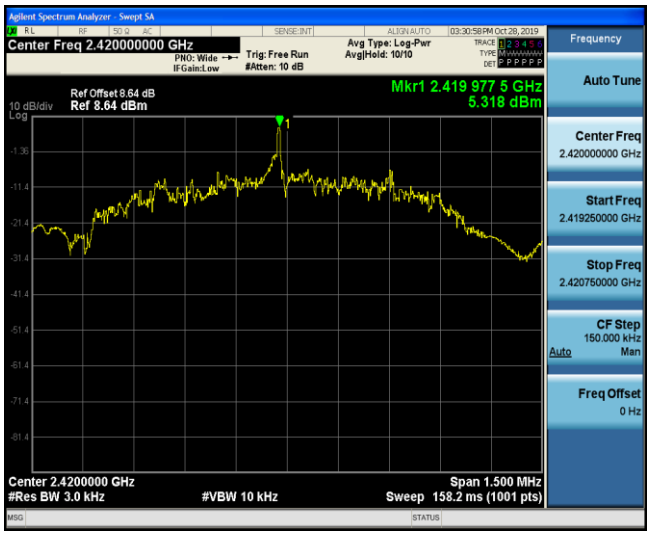
7.3 Test Result

PASS

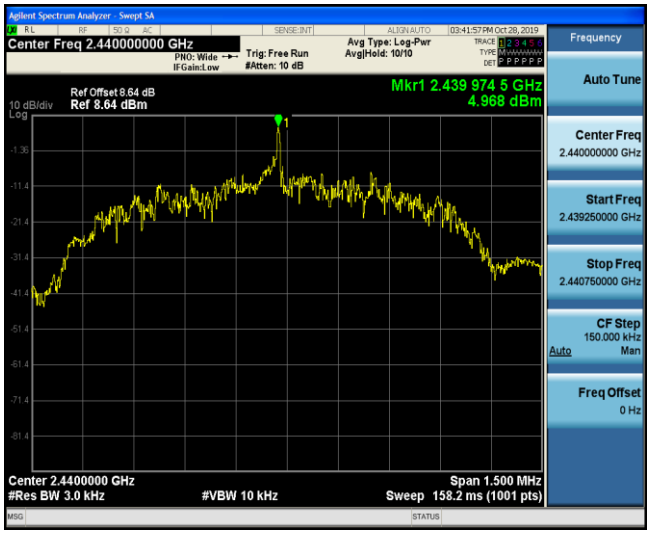
All the test modes completed for test.

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
GFSK	1	5.32	8.00	Pass
	15	4.97		
	30	6.48		

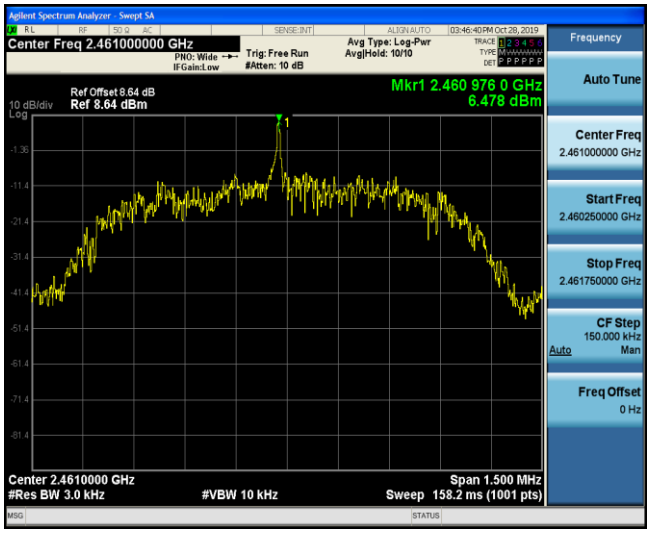
GFSK



Channel 1



Channel 15



Channel 30

8 PEAK OUTPUT POWER TEST

8.1 Test Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

8.2 Test Procedure

According to KDB558074 D01 DTS Measurement Guidance Section 9.1 Maximum peak conducted output power,9.1.2. and Average conducted output power, 9.2.3.1.

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The maximum Average conducted output power may be measured using a wideband RF power meter with a thermocouple derector or equivalent. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

8.3 Test Result

PASS

Type	Channel	Output power PK (dBm)	Limit (dBm)	Result
GFSK	1	8.950	30.00	Pass
	15	8.769		
	30	8.798		

Note: 1.The test results including the cable lose.

Duty cycle used in all test items: 100%

9 OUT OF BAND EMISSIONS TEST

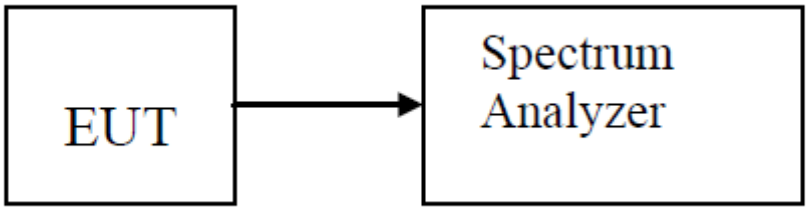
9.1 Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB

9.2 Test Procedure

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013, For 30MHz-25GHz ,Set RBW=100kHz and VBW= 300KHz in order to measure the peak field strength, and mwasure frequeny range from 30MHz to 25GHz.

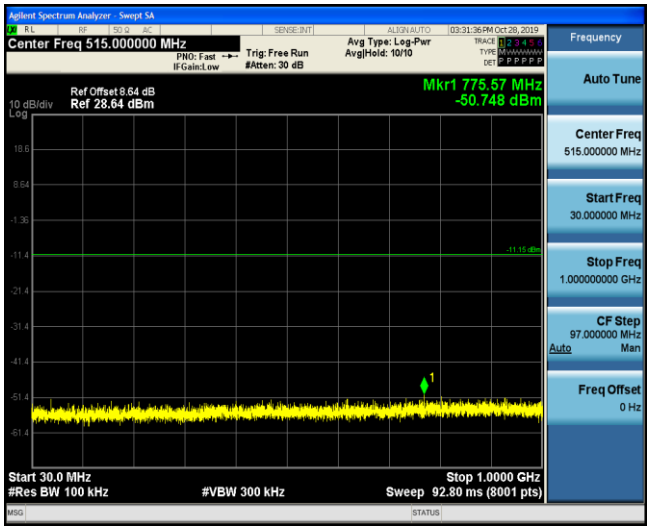
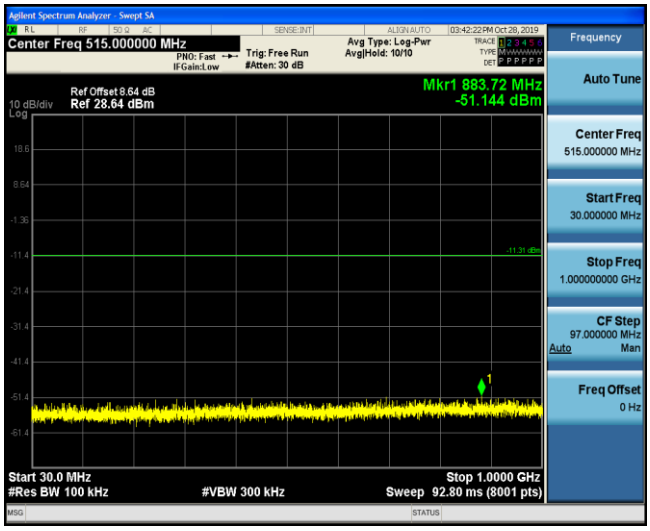
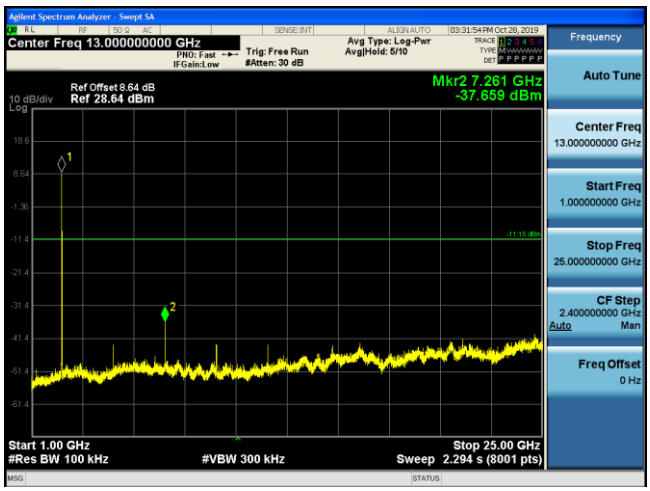
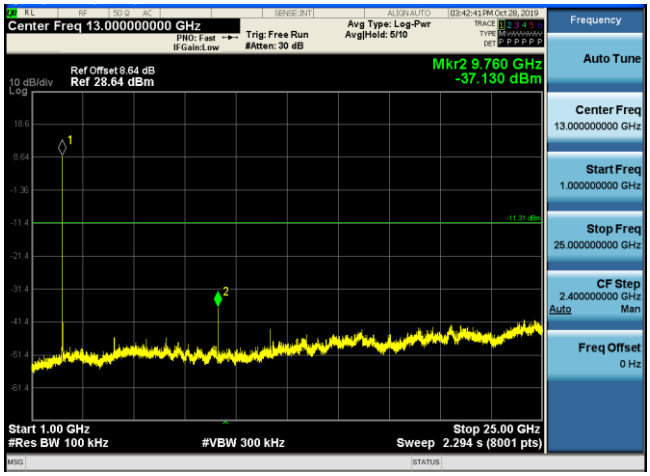
9.3 Test Setup



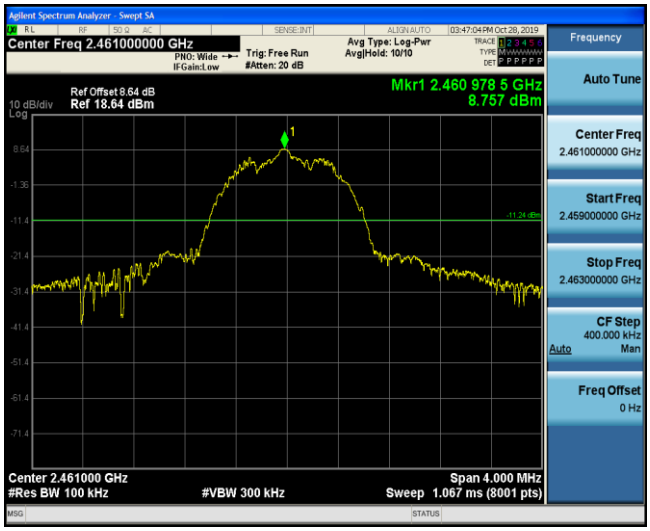
7.4 Test Result

PASS

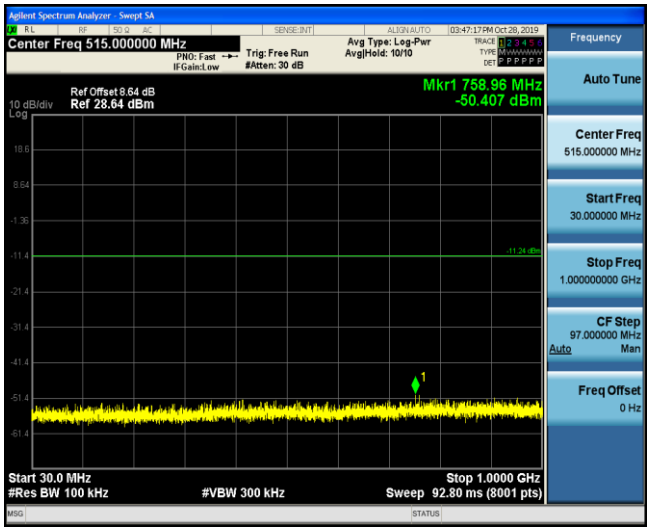
All the test modes completed for test.

CH01	CH15
Reference	Reference
	
30MHz - 3GHz	30MHz - 3GHz
	
3GHz - 25GHz	3GHz - 25GHz

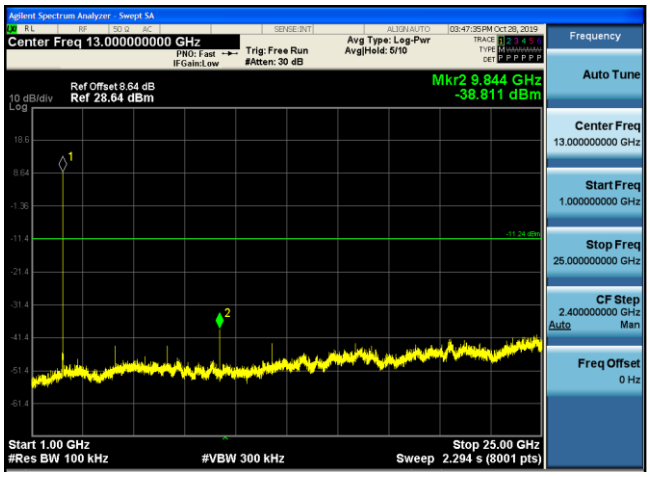
CH30



Reference



30MHz-3GHz



3GHz-25GHz

10 ANTENNA REQUIREMENT

Standard Applicable

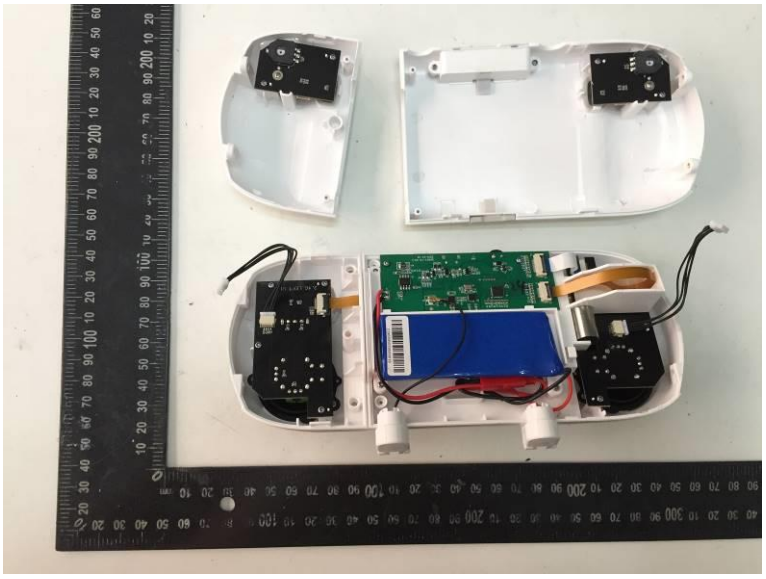
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.249, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

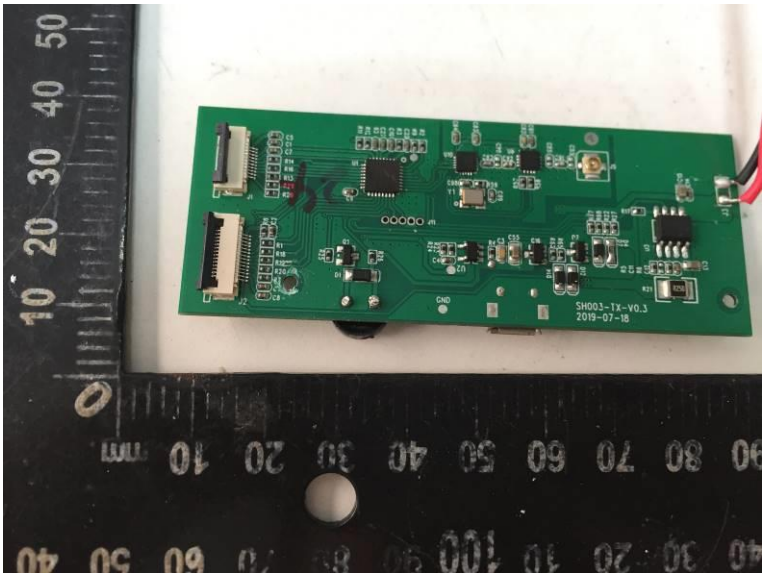
Antenna Information

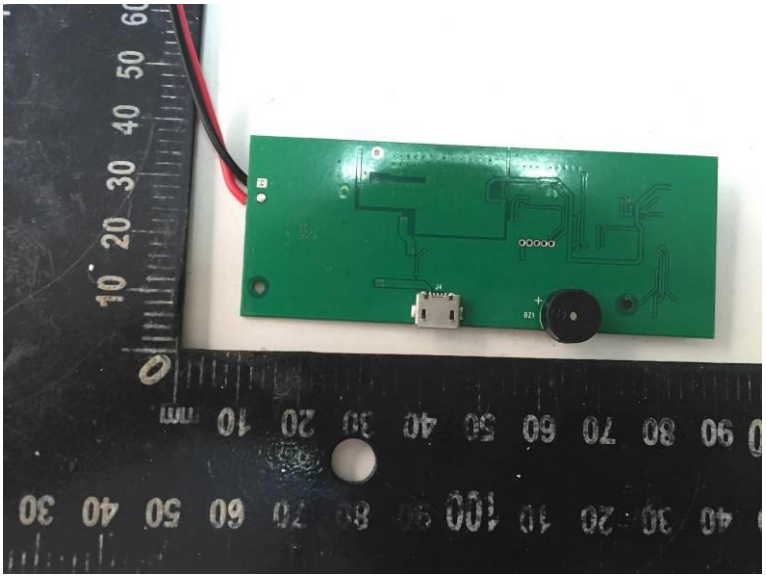
The antenna is External antenna, the directional gains of antenna used for transmitting is 2.1 dBi.

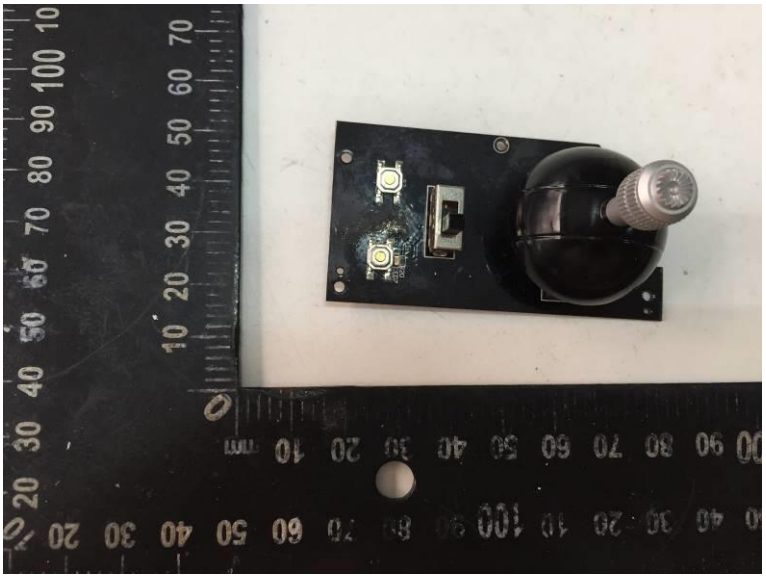
11 Test Setup Photos of the EUT

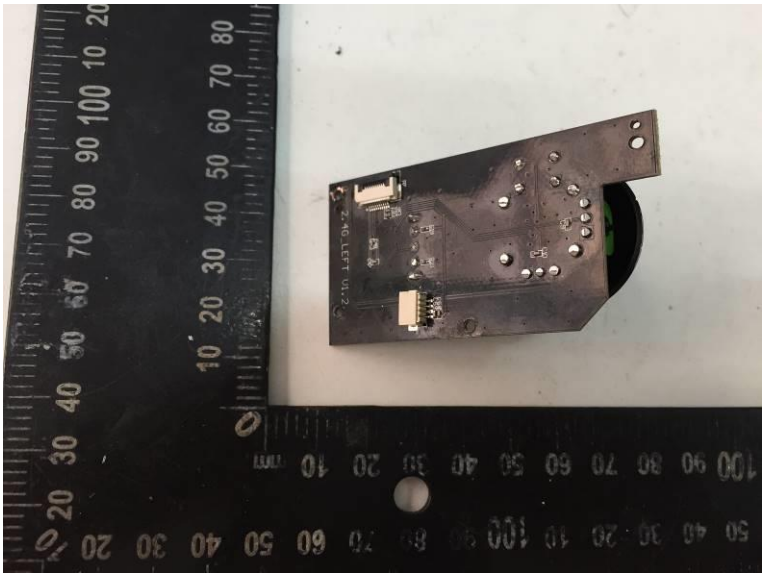
12 External and Internal Photos of the EUT

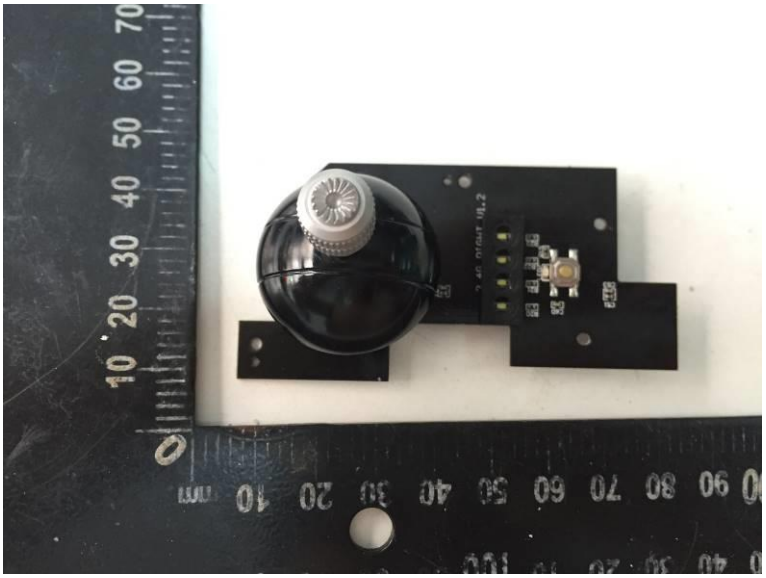


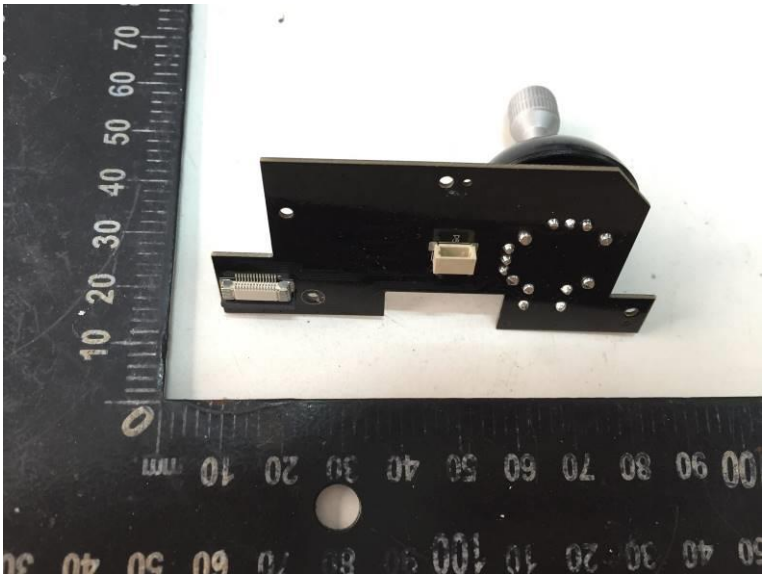

SH003-TX-V0.3
2019-07-18

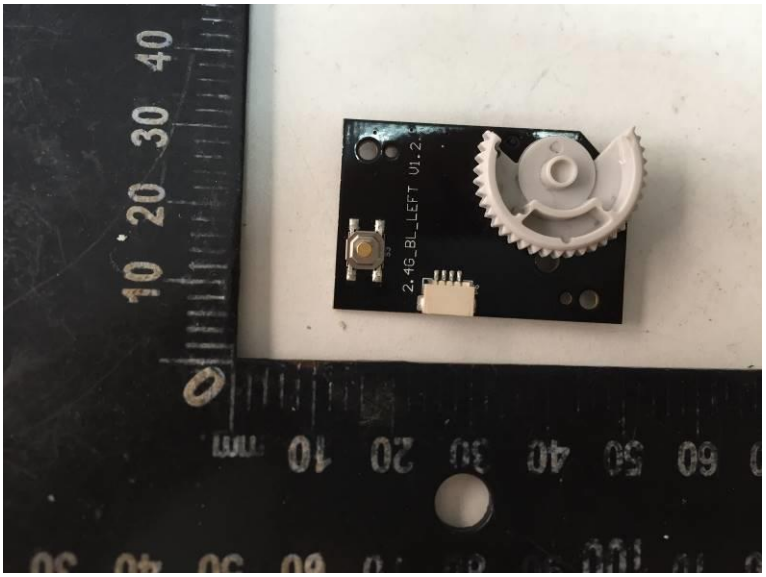


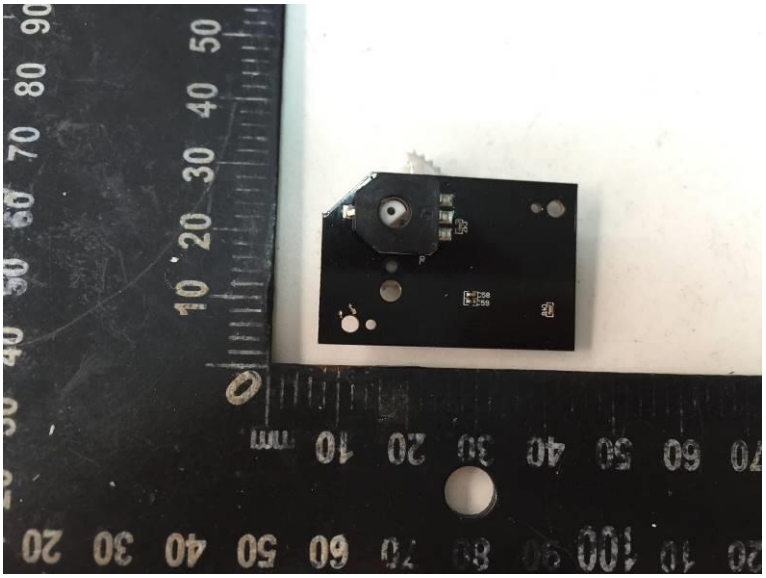


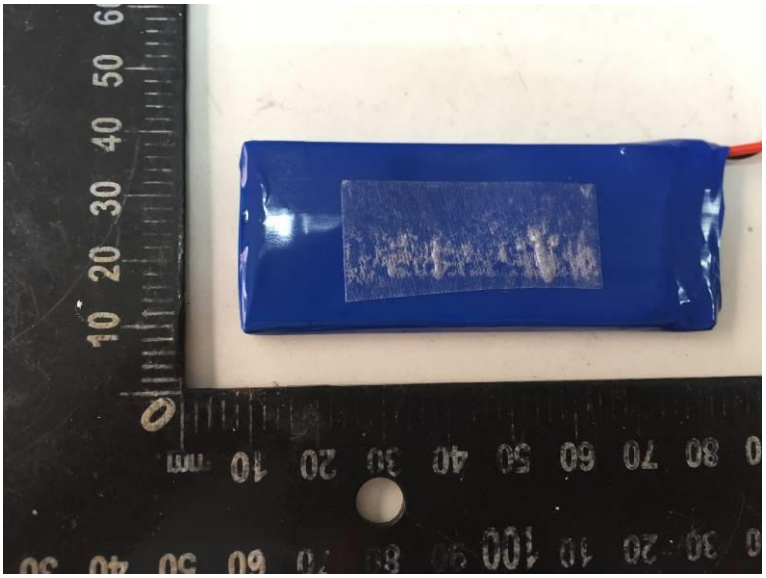







2.4G_BL_LEFT V1.2





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