FCC RADIO TEST REPORT

FCC ID: 2AGZ8D4

Product：	RC Drone
Trade Name：	N/A
Model Name：	D4
Serial Model：	X2,X3,X5,X6,X7,X8,X9,X10,X11,X12,X13,X14, X15,X16,X17,X18,X19,X20,X35,D1,D2,D3,D5, D6,D7,D8,D9,D10,D11,D12,D13,D14,D15,D16, D17,D18,D19,D20,YY01
Report No.：	UNIA19101001FR-01

Prepared for

DOWELLIN TOYS FACTORY

1 Road FengXin ChengHai District, ShanTou City,GuangDong,China.

Prepared by

Shenzhen United Testing Technology Co., Ltd.

2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

TEST RESULT CERTIFICATION

Applicant's name	:	DOWELLIN TOYS FACTORY
Address	:	1 Road FengXin ChengHai District, ShanTou City,GuangDong, China.
Manufacture's Name	:	DOWELLIN TOYS FACTORY
Address	:	1 Road FengXin ChengHai District, ShanTou City,GuangDong, China.

Product description

Product name	:	RC Drone
Trade Mark	:	N/A
Model and/or type reference	:	D4,X2,X3,X5,X6,X7,X8,X9,X10,X11,X12,X13,X14,X15, X16,X17,X18,X19,X20,X35,D1,D2,D3,D5,D6,D7,D8,D9, D10,D11,D12,D13,D14,D15,D16,D17,D18,D19,D20,YY01
Standards	:	FCC Rules and Regulations Part 15 Subpart C Section 15.249, ANSI C63.10: 2013

This device described above has been tested by Shenzhen United Testing Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of UNI, this document may be altered or revised by Shenzhen United Testing Technology Co., Ltd., personnel only, and shall be noted in the revision of the document.

Date of Test	:	
Date (s) of performance of tests	:	Oct. 10, 2019 ~ Nov. 06, 2019
Date of Issue	:	Nov. 06, 2019
Test Result	:	Pass

Prepared by: Bob Liao

Bob Liao/Editor

Reviewer: Kahn Yang

Kahn yang/Supervisor

Approved & Authorized Signer: liuze

Liuze/Manager

Table of Contents Page

1 TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

ITEM	STANGARD	RESULT
CONDUCTED EMISSION	FCC Part 15.207	COMPLIANT
RADIATED EMISSION	FCC Part 15.209/15.249	COMPLIANT
BAND EDGE	FCC Part 15.249/15.205	COMPLIANT
OCCUPIED BANDWIDTH	FCC Part 15.249	COMPLIANT
ANTENNA REQUIREMENT	FCC Part 15.203	COMPLIANT

1.2 TEST FACILITY

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

Address : 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.The testing quality system of our laboratory meets with ISO/IEC-17025 requirements. This approval result is accepted by MRA of APLAC.

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

A2LA Certificate Number: 4747.01
The EMC Laboratory has been accredited by A2LA, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

FCC Registration Number: 674885
The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission.

IC Registration Number: 21947
The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada.

1.3 MEASUREMENT UNCERTAINTY

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

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
UNI	ANSI	9KHz ~ 150KHz	2.96	
		150KHz ~ 30MHz	2.44	

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
UNI	ANSI	9KHz ~ 30MHz	2.50	
		30MHz ~ 1000MHz	4.80	
		1000MHz ~ 6000MHz	4.13	

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment:	RC Drone
Trade Mark:	N/A
Model Name:	D4
Serial No.:	X2,X3,X5,X6,X7,X8,X9,X10,X11,X12,X13,X14,X15,X16,X17, X18,X19,X20,X35,D1,D2,D3,D5,D6,D7,D8,D9,D10,D11,D12, D13,D14,D15,D16,D17,D18,D19,D20,YY01
Model Difference:	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: D4.
FCC ID:	2AGZ8D4
Antenna Type:	Integral Antenna
Antenna Gain:	2.3dBi
Operation frequency:	2405MHz~2475MHz
Number of Channels:	71CH
Modulation Type:	GFSK
Battery:	DC3.7V, 160mAh
Power Source:	DC 5.0V from adapter with AC 120(240)V/60Hz
Adapter Model:	M/N: EQ-24BCN Input: AC 100-240V, 50/60Hz, 0.8A Max Output: DC 5.0V, 2.0A

2.2 CARRIER FREQUENCY OF CHANNELS

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2405	19	2423	37	2441	55	2459
02	2406	20	2424	38	2442	56	2460
03	2407	21	2425	39	2443	57	2461
04	2408	22	2426	40	2444	58	2462
05	2409	23	2427	41	2445	59	2463
06	2410	24	2428	42	2446	60	2464
07	2411	25	2429	43	2447	61	2465
08	2412	26	2430	44	2448	62	2466
09	2413	27	2431	45	2449	63	2467
10	2414	28	2432	46	2450	64	2468
11	2415	29	2433	47	2451	65	2469
12	2416	30	2434	48	2452	66	2470
13	2417	31	2435	49	2453	67	2471
14	2418	32	2436	50	2454	68	2472
15	2419	33	2437	51	2455	69	2473
16	2420	34	2438	52	2456	70	2474
17	2421	35	2439	53	2457	71	2475
18	2422	36	2440	54	2458		

2.3 TEST MODE

The EUT was programmed to be in continuously transmitting mode.

Channel List		
Test Channel	EUT Channel	Test Frequency (MHz)
Low	CH01	2405
Middle	CH36	2440
High	CH71	2475

2.4 TEST SETUP

Operation of EUT during Conducted testing:

Operation of EUT during Radiation and Above1GHz Radiation testing:

2.5 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

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.

Item	Equipment	Mfr/Brand	Model/Type No.	Note
E-1	RC Drone	N/A	D4	EUT
E-2	Adapter	HUAWEI	EQ-24BCN	AE

Item	Shielded Type	Ferrite Core	Length	Note

Note:

1. The support equipment was authorized by Declaration of Confirmation.
2. For detachable type I/O cable should be specified the length in cm in『Length』column.
3. “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.6 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
Conduction Emissions Measurement					
1	Conducted Emission Test Software	EZ-EMC	Ver.CCS-3A1-CE	N/A	N/A
2	AMN	Schwarzbeck	NNLK8121	8121370	2020.09.06
3	AMN	ETS	3810/2	00020199	2020.09.06
4	EMI TEST RECEIVER	Rohde&Schwarz	ESCI	101210	2020.09.06
5	Pulse limiter	CYBRTEK	EM5010	E115010056	2020.05.26
6	AAN	TESEQ	T8-Cat6	38888	2020.09.06
Radiated Emissions Measurement					
1	Radiated Emission Test Software	EZ-EMC	Ver.CCS-03A1	N/A	N/A
2	Horn Antenna	Sunol	DRH-118	A101415	2020.10.08
3	Broadband Hybrid Antenna	Sunol	JB1	A090215	2019.12.09
4	PREAMP	HP	8449B	3008A00160	2020.09.06
5	PREAMP	HP	8447D	2944A07999	2020.05.26
6	EMI TEST RECEIVER	Rohde&Schwarz	ESR3	101891	2020.09.06
7	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2020.09.06
8	Signal Generator	Agilent	E4421B	MY4335105	2020.09.06
9	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2020.09.06
10	MXA Signal Analyzer	Keysight	N9020A	MY51110104	2020.09.06
11	RF Power sensor	DARE	RPR3006W	15I00041SNO88	2020.06.09
12	RF Power sensor	DARE	RPR3006W	15I00041SNO89	2020.06.09
13	RF power divider	Anritsu	K241B	992289	2020.09.06
14	Wideband radio communication tester	Rohde&Schwarz	CMW500	154987	2020.09.06
15	Active Loop Antenna	Com-Power	AL-130R	10160009	2020.05.28
16	Broadband Hybrid Antennas	Schwarzbeck	VULB9163	VULB9163#958	2020.05.28
17	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2020.05.28
18	Horn Antenna	A-INFOMW	LB-180400-KF	J211060660	2020.05.28
19	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2020.05.28
20	Signal Generator	Agilent	N5183A	MY47420153	2020.05.28
21	Spctrum Analyzer	Rohde&Schwarz	FSP 40	100501	2020.05.28
22	Power Meter	KEYSIGHT	N1911A	MY50520168	2020.05.28
23	Frequency Meter	VICTOR	VC2000	997406086	2020.05.28
24	DC Power Source	HYELEC	HY5020E	055161818	2020.05.28

3 CONDUCTED EMISSION

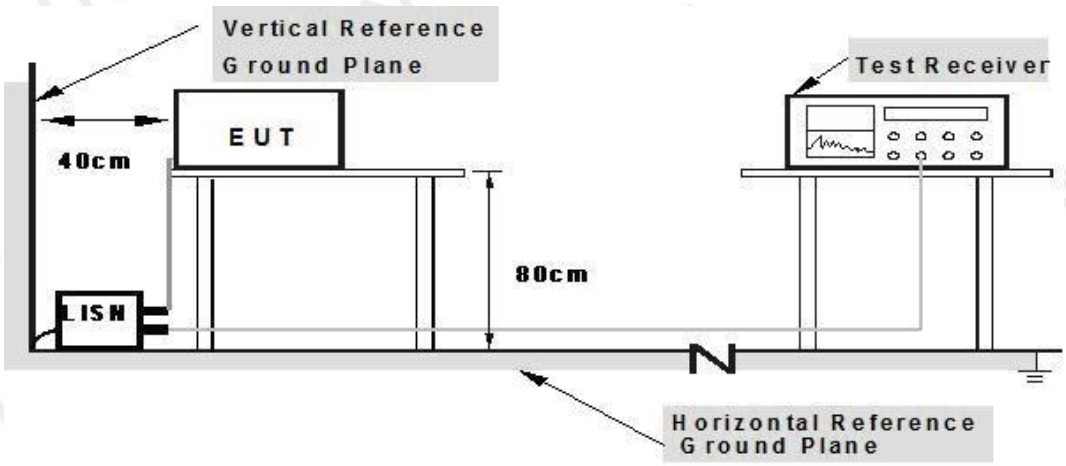
3.1 TEST LIMIT

For unintentional device, according to §15.207(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



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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 placed on 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.

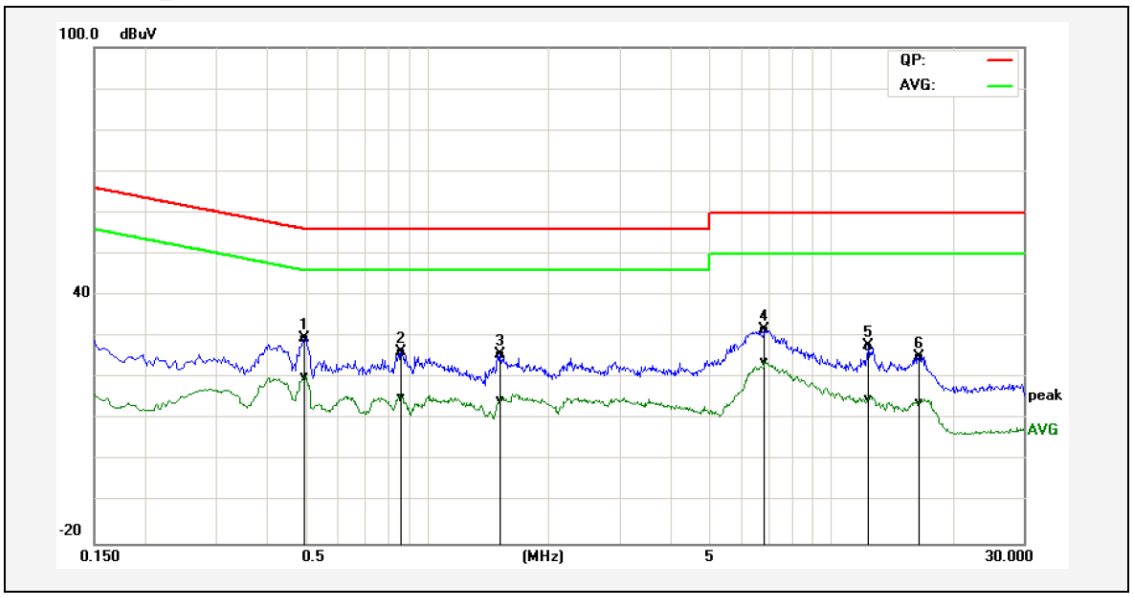
3.4 TEST RESULT

PASS

Remark:

1. All modes were tested at AC 120V and 240V, only the worst result of AC 120V was reported.
2. All modes were test at Low, Middle, and High channel, only the worst result of GFSK Low Channel was reported.

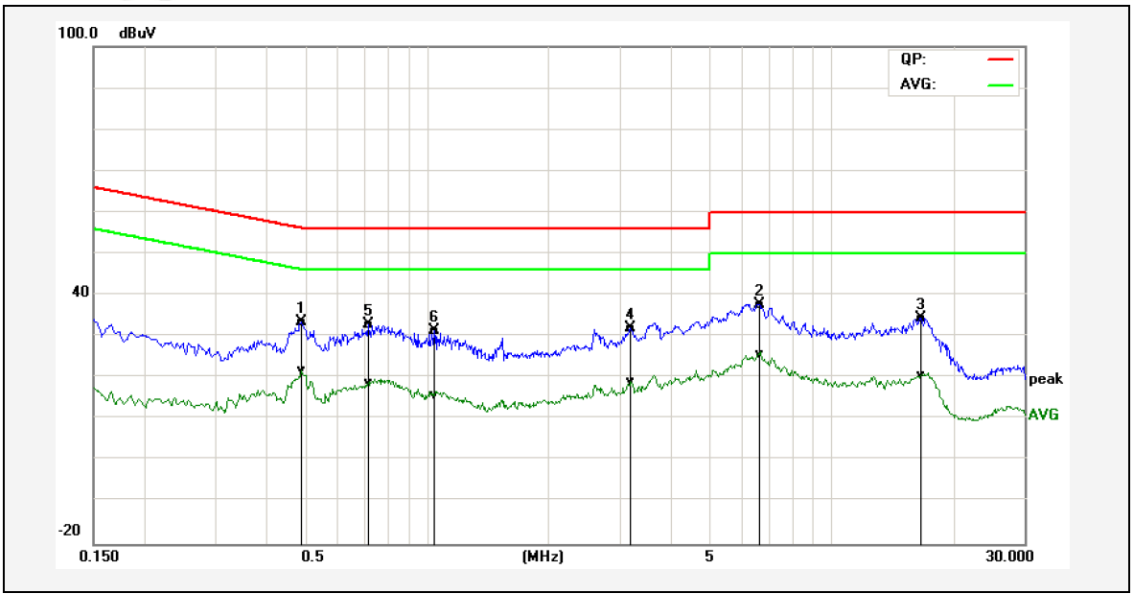
Temperature:	24℃	Relative Humidity:	48%
Test Date:	Oct. 18, 2019	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Line
Test Mode:	Transmitting mode of GFSK 2405MHz		



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1*	0.4980	19.82	10.56	9.79	29.61	20.35	56.03	46.03	-26.42	-25.68	Pass
2P	0.8620	16.43	5.30	9.84	26.27	15.14	56.00	46.00	-29.73	-30.86	Pass
3P	1.5180	15.80	4.87	9.86	25.66	14.73	56.00	46.00	-30.34	-31.27	Pass
4P	6.8700	21.92	13.98	9.96	31.88	23.94	60.00	50.00	-28.12	-26.06	Pass
5P	12.4379	27.47	14.60	0.23	27.70	14.83	60.00	50.00	-32.30	-35.17	Pass
6P	16.4980	24.87	13.56	0.35	25.22	13.91	60.00	50.00	-34.78	-36.09	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

Temperature:	24℃	Relative Humidity:	48%
Test Date:	Oct. 18, 2019	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Neutral
Test Mode:	Transmitting mode of GFSK 2405MHz		



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1P	0.4900	23.76	12.01	9.79	33.55	21.80	56.17	46.17	-22.62	-24.37	Pass
2*	6.6300	27.91	15.74	9.92	37.83	25.66	60.00	50.00	-22.17	-24.34	Pass
3P	16.6940	34.20	20.16	0.38	34.58	20.54	60.00	50.00	-25.42	-29.46	Pass
4P	3.1980	22.22	9.17	9.94	32.16	19.11	56.00	46.00	-23.84	-26.89	Pass
5P	0.7180	23.00	8.95	9.82	32.82	18.77	56.00	46.00	-23.18	-27.23	Pass
6P	1.0460	21.70	6.13	9.86	31.56	15.99	56.00	46.00	-24.44	-30.01	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

4 RADIATED EMISSION

4.1 TEST LIMIT

For unintentional device, according to §15.209(a), except for Class B digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F (kHz)	-	Quasi-peak	300
0.490MHz-1.705MHz	24000/F (kHz)	-	Quasi-peak	30
1.705MHz-30MHz	30	-	Quasi-peak	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
		74.0	Peak	3

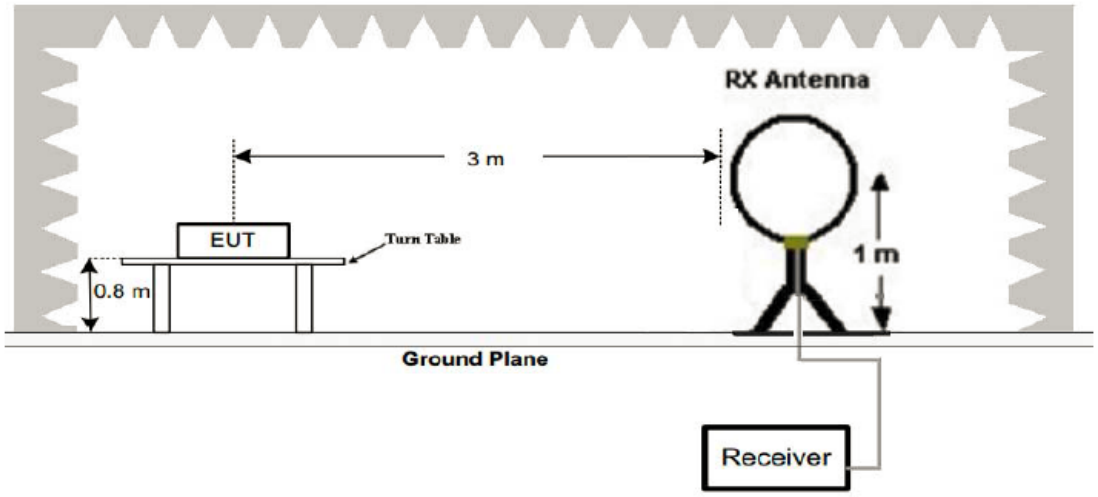
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

Limit: (Field strength of the fundamental signal)

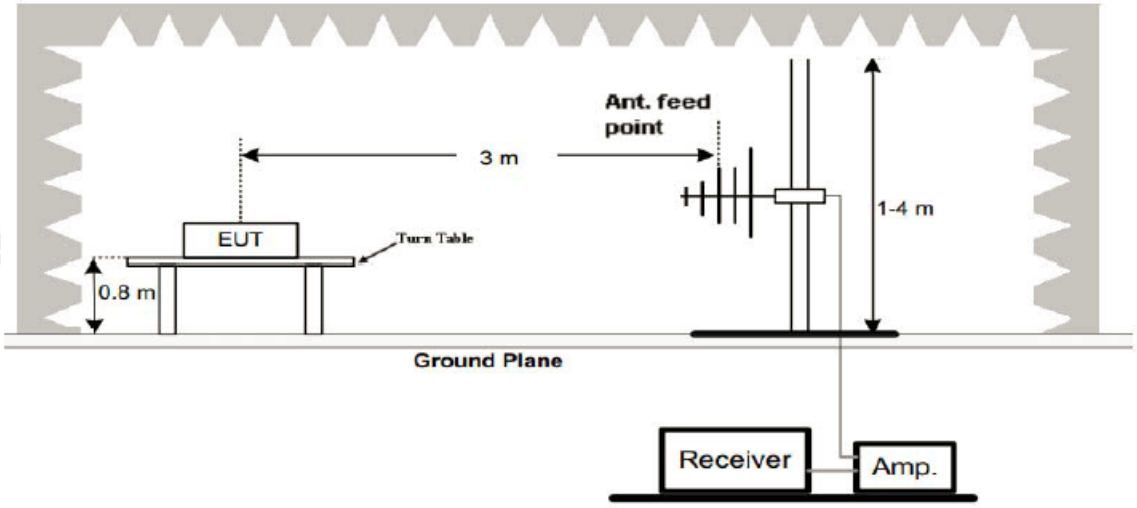
Frequency	Limit (dBuV/m @3m)	Remark
2400MHz-2483.5MHz	94.0	Average Value
	114.0	Peak Value

4.2 TEST SETUP

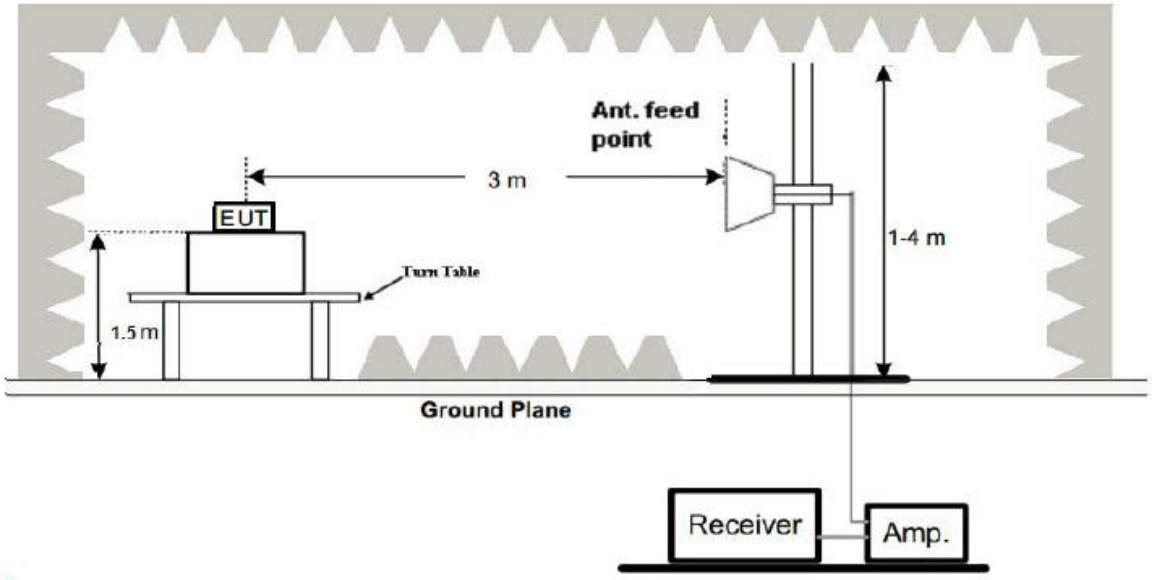
1. Radiated Emission Test-Up Frequency Below 30MHz



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.

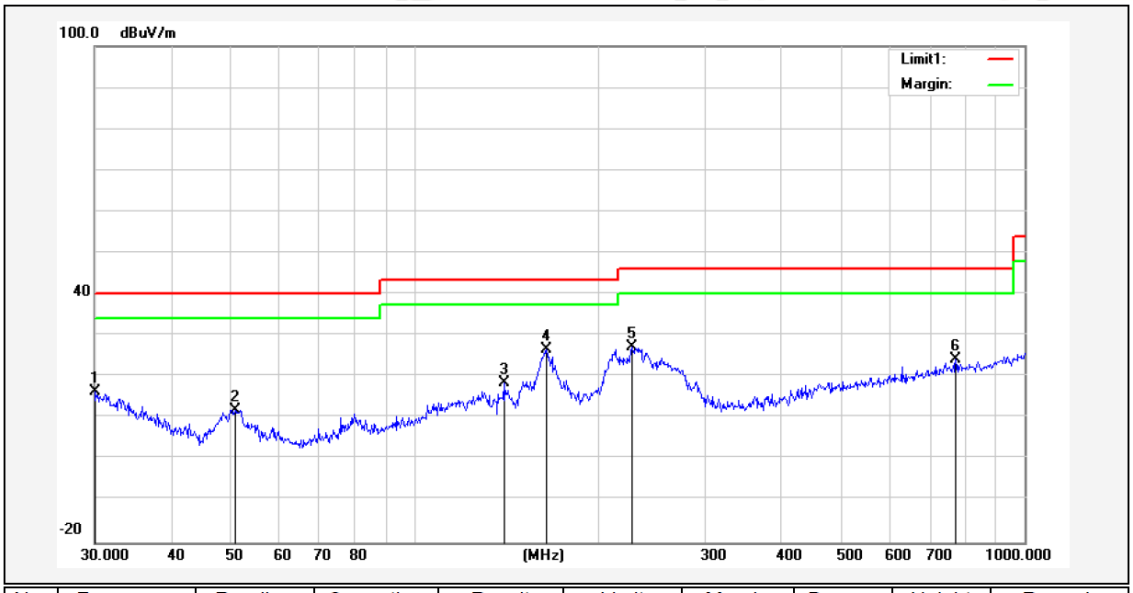
4.4 TEST RESULT

PASS

Remark:
1. All modes were test at Low, Middle, and High channel, only the worst result of GFSK Low Channel was reported for below 1GHz test.
2. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, and test data recorded in this report.
3. Radiated emission test from 9KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9KHz to 30MHz and not recorded in this report.

Below 1GHz Test Results:

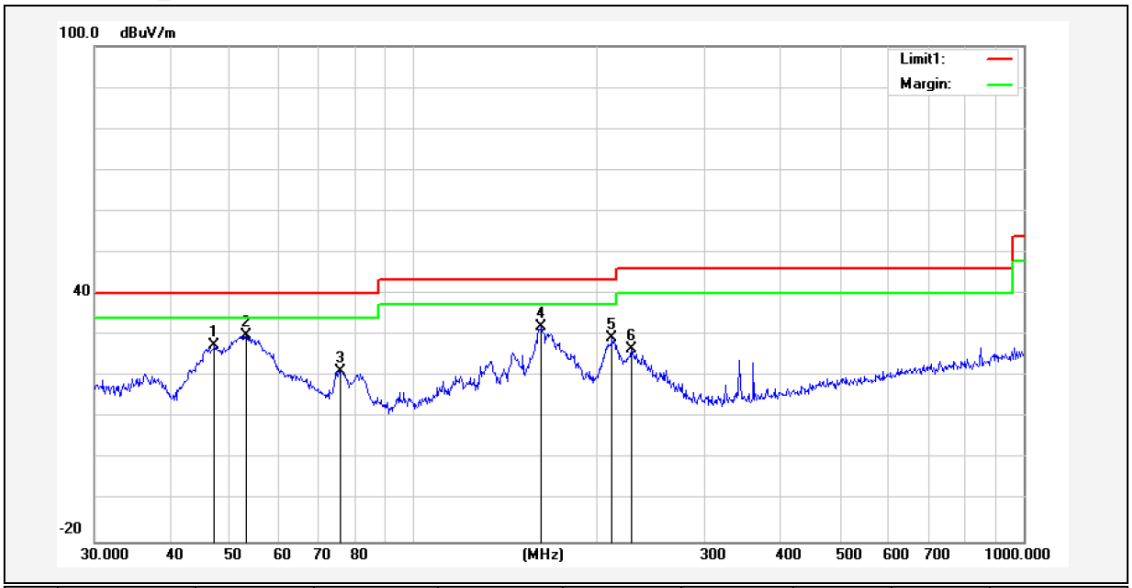
Temperature:	24℃	Relative Humidity:	48%
Test Date:	Oct. 18, 2019	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Horizontal
Test Mode:	Transmitting mode of GFSK 2405MHz		



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	30.0000	26.73	-10.21	16.52	40.00	-23.48	150	100	peak
2	50.9420	35.78	-23.84	11.94	40.00	-28.06	95	100	peak
3	140.3421	31.97	-13.41	18.56	43.50	-24.94	60	100	peak
4*	164.9075	38.00	-11.26	26.74	43.50	-16.76	200	100	peak
5	227.6906	41.64	-14.37	27.27	46.00	-18.73	205	100	peak
6	771.4486	28.22	-3.83	24.39	46.00	-21.61	310	100	peak

Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Temperature:	24℃	Relative Humidity:	48%
Test Date:	Oct. 18, 2019	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Vertical
Test Mode:	Transmitting mode of GFSK 2405MHz		



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	47.1599	50.77	-23.08	27.69	40.00	-12.31	200	100	peak
2*	53.1313	53.98	-23.96	30.02	40.00	-9.98	150	100	peak
3	75.9773	41.39	-20.04	21.35	40.00	-18.65	180	100	peak
4	162.0414	43.74	-11.70	32.04	43.50	-11.46	85	100	peak
5	211.5265	43.80	-14.49	29.31	43.50	-14.19	160	100	peak
6	227.6906	41.06	-14.37	26.69	46.00	-19.31	220	100	peak

Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Remark：

1. Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHzwas 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:
CH01 (2405MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2405	111.77	-5.84	105.93	114	-8.07	PK
2405	83.74	-5.84	77.90	94	-16.10	AV
4810	63.51	-3.64	59.87	74	-14.13	PK
4810	50.46	-3.64	46.82	54	-7.18	AV
7215	60.24	-0.95	59.29	74	-14.71	PK
7215	47.03	-0.95	46.08	54	-7.92	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2405	112.14	-5.84	106.30	114	-7.70	PK
2405	83.97	-5.84	78.13	94	-15.87	AV
4810	64.05	-3.64	60.41	74	-13.59	PK
4810	50.74	-3.64	47.10	54	-6.90	AV
7215	60.52	-0.95	59.57	74	-14.43	PK
7215	47.26	-0.95	46.31	54	-7.69	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

CH36 (2440MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2440	111.53	-5.71	105.82	114	-8.18	PK
2440	83.54	-5.71	77.83	94	-16.17	AV
4880	63.14	-3.51	59.63	74	-14.37	PK
4880	50.17	-3.51	46.66	54	-7.34	AV
7320	59.85	-0.82	59.03	74	-14.97	PK
7320	46.77	-0.82	45.95	54	-8.05	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2440	111.65	-5.71	105.94	114	-8.06	PK
2440	83.61	-5.71	77.90	94	-16.10	AV
4880	63.35	-3.51	59.84	74	-14.16	PK
4880	50.20	-3.51	46.69	54	-7.31	AV
7320	60.03	-0.82	59.21	74	-14.79	PK
7320	46.89	-0.82	46.07	54	-7.93	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

CH71 (2475MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2475	111.27	-5.65	105.62	114	-8.38	PK
2475	83.15	-5.65	77.50	94	-16.50	AV
4950	62.87	-3.43	59.44	74	-14.56	PK
4950	49.95	-3.43	46.52	54	-7.48	AV
7425	58.96	-0.75	58.21	74	-15.79	PK
7425	46.72	-0.75	45.97	54	-8.03	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2475	111.36	-5.65	105.71	114	-8.29	PK
2475	83.24	-5.65	77.59	94	-16.41	AV
4950	63.16	-3.43	59.73	74	-14.27	PK
4950	50.05	-3.43	46.62	54	-7.38	AV
7425	59.12	-0.75	58.37	74	-15.63	PK
7425	47.16	-0.75	46.41	54	-7.59	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Absolute Level – Limit						

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. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
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.
7. All modes of operation were investigated and the worst-case emissions are reported.

5 BAND EDGE

5.1 TEST LIMIT

FCC PART 15.249(d) 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 §15.209, whichever is the lesser attenuation.

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 1MHz and VBM to 3MHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength. Peak detector is for both.

5.3 TEST RESULT

PASS

Operation Mode: TX CH01 (2405MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2310	56.79	-5.81	50.98	74	-23.02	PK
2310	/	-5.81	/	54	/	AV
2390	57.07	-5.84	51.23	74	-22.77	PK
2390	/	-5.84	/	54	/	AV
2400	56.54	-5.84	50.70	74	-23.30	PK
2400	/	-5.84	/	54	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2310	57.12	-5.81	51.31	74	-22.69	PK
2310	/	-5.81	/	54	/	AV
2390	57.44	-5.84	51.60	74	-22.40	PK
2390	/	-5.84	/	54	/	AV
2400	56.97	-5.84	51.13	74	-22.87	PK
2400	/	-5.84	/	54	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: TX CH71 (2475MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	56.16	-5.65	50.51	74	-23.49	PK
2483.5	/	-5.65	/	54	/	AV
2500	55.96	-5.72	50.24	74	-23.76	PK
2500	/	-5.72	/	54	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	56.25	-5.65	50.60	74	-23.40	PK
2483.5	/	-5.65	/	54	/	AV
2500	56.26	-5.72	50.54	74	-23.46	PK
2500	/	-5.72	/	54	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

6 OCCUPIED BANDWIDTH

6.1 TEST SETUP

Same as Radiated Emission Measurement.

6.2 TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Based on ANSI C63.10 section 6.9.2: RBW=30KHz, VBW=100KHz, Span=8MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector.

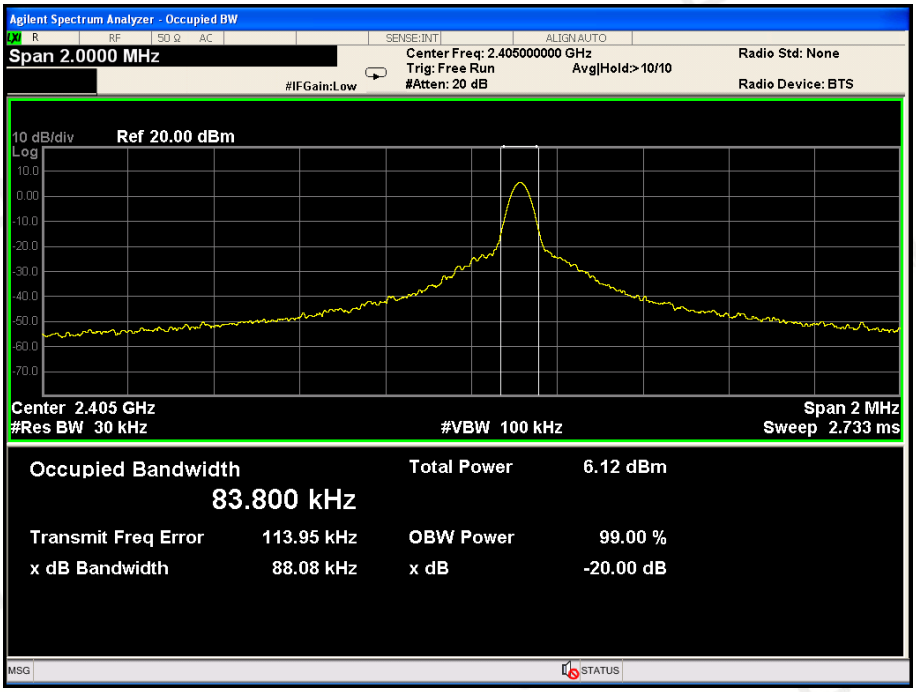
6.4 TEST RESULT

PASS

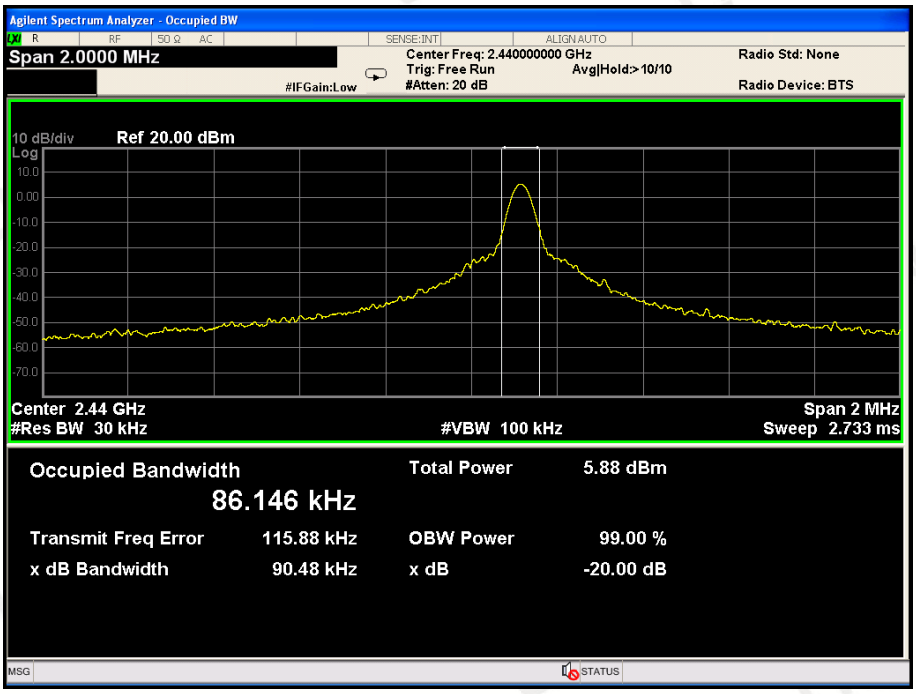
GFSK Modulation:

Frequency (MHz)	20dB Bandwidth (kHz)	Result
2405	88.08	PASS
2440	90.48	PASS
2475	93.40	PASS

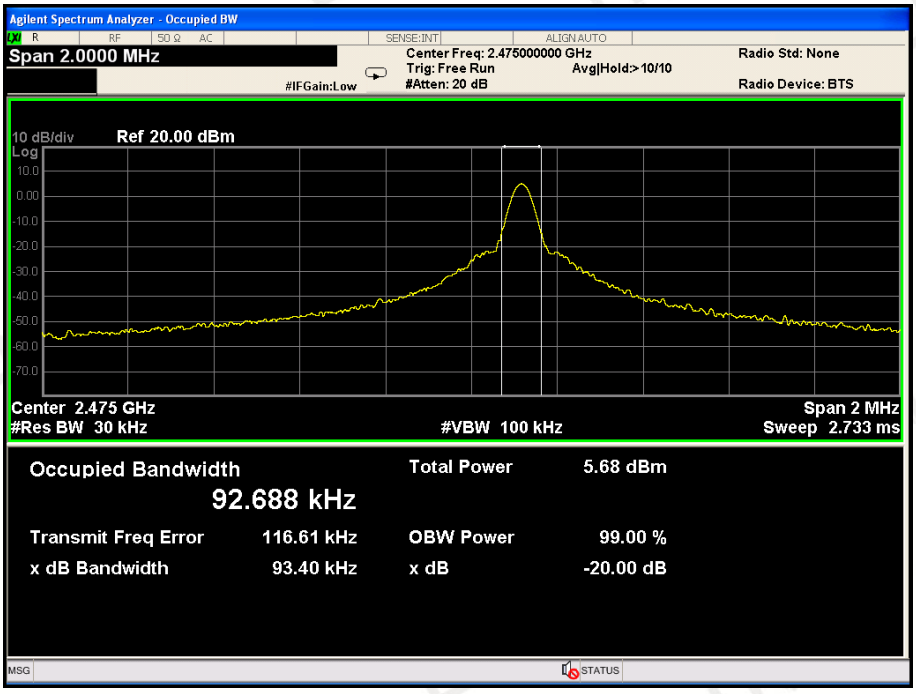
CH01: 2405MHz



CH36: 2440MHz



CH71: 2475MHz

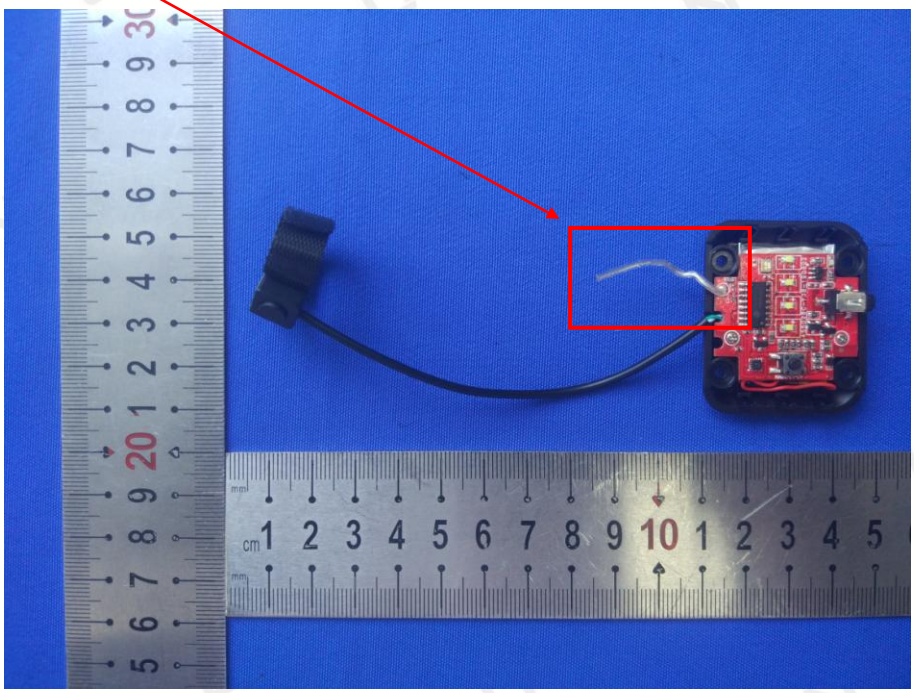


7 ANTENNA REQUIREMENT

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.

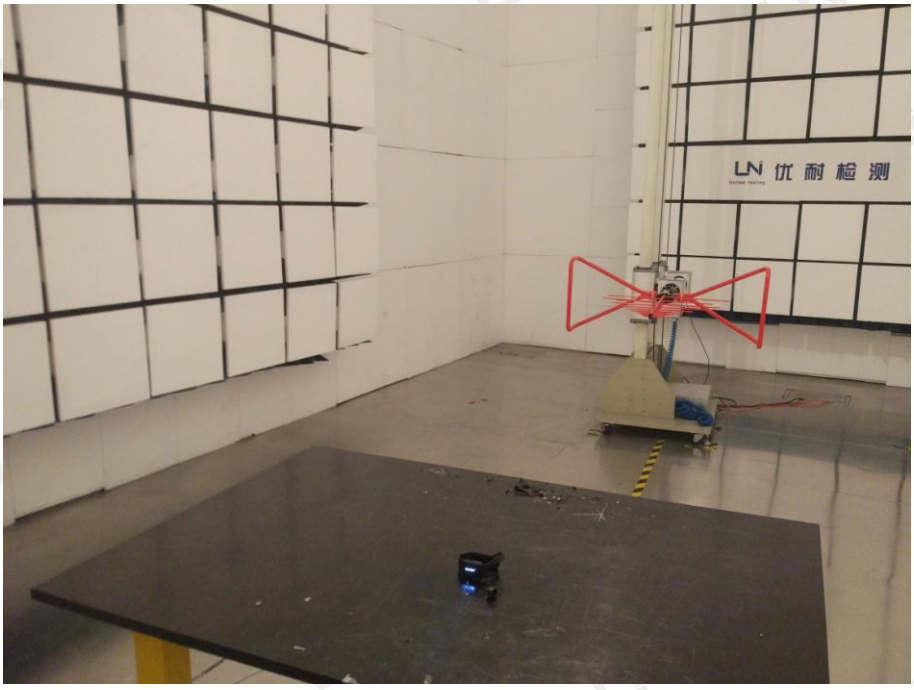
Antenna Connected Construction
The antenna used in this product is an Integral Antenna, The directional gains of antenna used for transmitting is 2.3dBi.

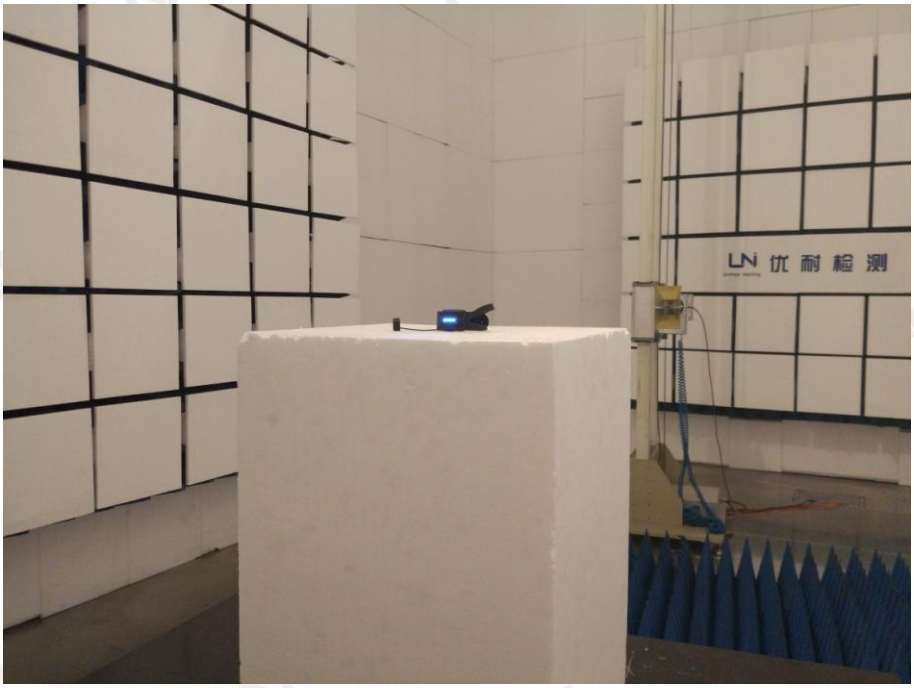
ANTENNA:



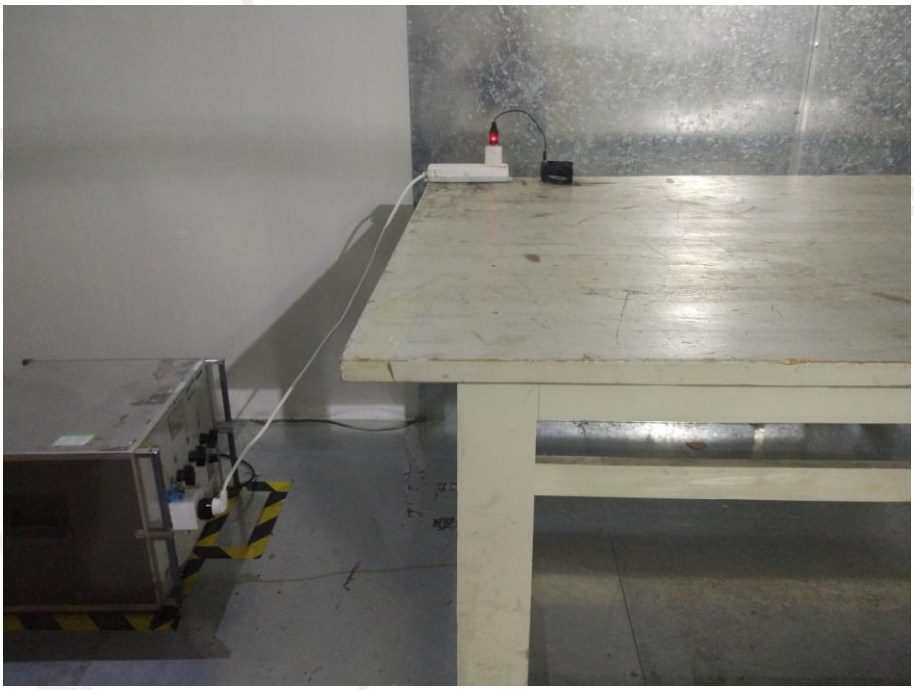
8 PHOTO OF TEST

8.1 RADIATED EMISSION





8.2 CONDUCTED EMISSION



End of Report