FCC TEST REPORT

FCC ID: VKSMOG3076

Product	:	2.4G Wireless Mouse
Model Name	:	MOG3076,MOG0902,MOG3069,MOG3071,MOG3077,MOG3078,MOG8118
Brand	:	N/A
Report No.	:	PT800781160328E-FC01

Prepared for

SHENZHEN COMTECH ELECTRONICS CO., LTD.

3rd Floor, Area C, HuaYi Industrial Areas, JinYing New Village,

Dalang Street, LongHua New District, ShenZhen, China

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name	:	SHENZHEN COMTECH ELECTRONICS CO., LTD.
Address	:	3rd Floor, Area C, HuaYi Industrial Areas, JinYing New Village, Dalang Street, LongHua New District, ShenZhen, China
Manufacture's name	:	SHENZHEN COMTECH ELECTRONICS CO., LTD.
Address	:	3rd Floor, Area C, HuaYi Industrial Areas, JinYing New Village, Dalang Street, LongHua New District, ShenZhen, China
Product name	:	2.4G Wireless Mouse
Model name	:	MOG3076,MOG0902,MOG3069,MOG3071,MOG3077,MOG3078, MOG8118
Standards	:	FCC CFR47 Part 15 Section 15.249
Test procedure	:	ANSI C63.10:2013
Test Date	:	Mar.29,2016 - Apr. 12, 2016
Date of Issue	:	Apr. 20, 2016
Test Result	:	Pass

This device described above has been tested by PTS, 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.

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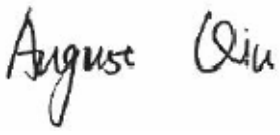
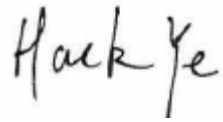
Testing Engineer

August Qiu



Technical Manager

Hack Ye



Authorized Signatory

Chris Du

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2 Test Summary

Test Items	Test Requirement	Result
Conducted Emission	15.207	PASS
Radiated Spurious Emission	15.249(a) 15.209 15.205(a)	PASS
Fundamental Measurement	15.249(a)	PASS
Band Edge Emission	15.249(d) 15.209	PASS
20dB Bandwidth	15:215(c)	PASS
Antenna Requirement	15.203	PASS

Remark:

N/A: Not Applicable

3 General Information

3.1 General Description of E.U.T.

Product Name : 2.4G Wireless Mouse

Model Name : MOG3076,MOG0902,MOG3069,MOG3071,MOG3077,MOG3078,MOG8118

Model Description : Only the colors and model names are difference

Operation Frequency: : 2405~2472MHz, 68 Channels

Antenna installation: : PCB Printed Antenna

Antenna Gain: : 0dBi

Type of Modulation : GFSK

The lowest oscillator : 12MHz

Power supply : DC1.5V power by battery

3.2 Channel List

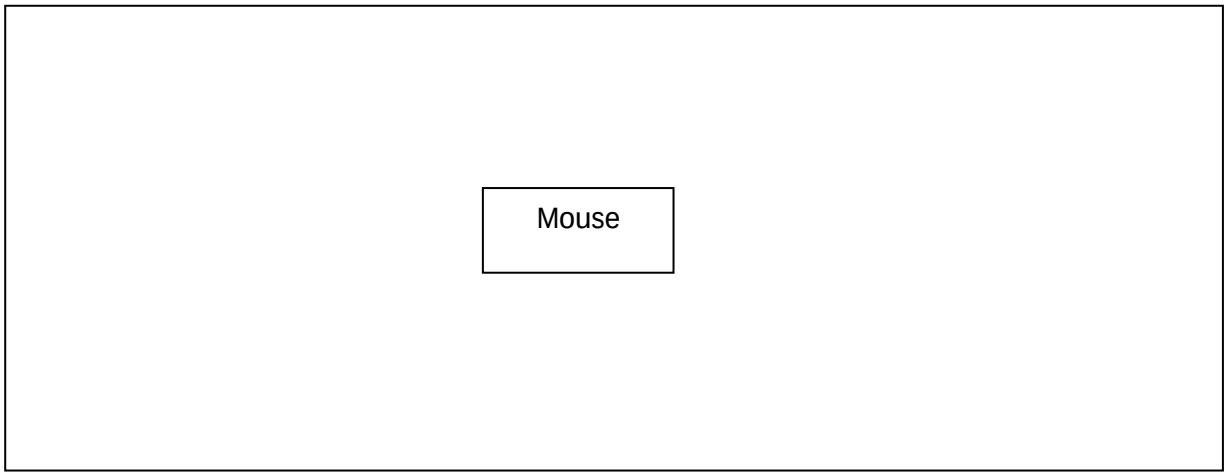
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405	18	2422	35	2439	52	2456
2	2406	19	2423	36	2440	53	2457
3	2407	20	2424	37	2441	54	2458
4	2408	21	2425	38	2442	55	2459
5	2409	22	2426	39	2443	56	2460
6	2410	23	2427	40	2444	57	2461
7	2411	24	2428	41	2445	58	2462
8	2412	25	2429	42	2446	59	2463
9	2413	26	2430	43	2447	60	2464
10	2414	27	2431	44	2448	61	2465
11	2415	28	2432	45	2449	62	2466
12	2416	29	2433	46	2450	63	2467
13	2417	30	2434	47	2451	64	2468
14	2418	31	2435	48	2452	65	2469
15	2419	32	2436	49	2453	66	2470
16	2420	33	2437	50	2454	67	2471
17	2421	34	2438	51	2455	68	2472

3.3 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Modulation	Test mode	Low channel	Middle channel	High channel
GFSK	continuously Transmitting	2405MHz	2448MHz	2472MHz
Tests Carried Out Under FCC part 15.107 & 15.109				
Test Item		Test Mode		
Conduction Emission, 0.15MHz to 30MHz		N/A		
Radiated Emission, 30M-1GHz		Communication		

3.4 Configuration of System



4 Equipment During Test

4.1 Equipments List

Radiated Emissions							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 15, 2015	July 14, 2016	1 year
2	EMC Analyzer (9k~26.5GHz)	Agilent	E4407B	MY45109572	Aug.04, 2015	Aug.03, 2016	1 year
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3355	July 15, 2015	July 14, 2016	1 year
4	Amplifier	EM	EM-30180	060538	July 15, 2015	July 14, 2016	1 year
5	Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1246	July 15, 2015	July 14, 2016	1 year
6	Coaxial Cable(below 1GHz)	LARGE	CALB1	-	July 15, 2015	July 14, 2016	1 year
7	Coaxial Cable(above 1GHz)	LARGE	CALB2	-	July 15, 2015	July 14, 2016	1 year

4.2 Measurement Uncertainty

Parameter	**Uncertainty**
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10^{-6}
Bandwidth	± 1.5 x 10^{-6}
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB

5 Radiated Spurious Emissions

Test Requirement: : FCC CFR47 Part 15 Section 15.249 & 15.207 &15.205

Test Method: : ANSI C63.10:2013

Test Result: : PASS

Measurement Distance: : 3m

Limit: : See the follow table

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

5.1 EUT Operation

Operating Environment :

Temperature: : 23.5 °C

Humidity: : 51.1 % RH

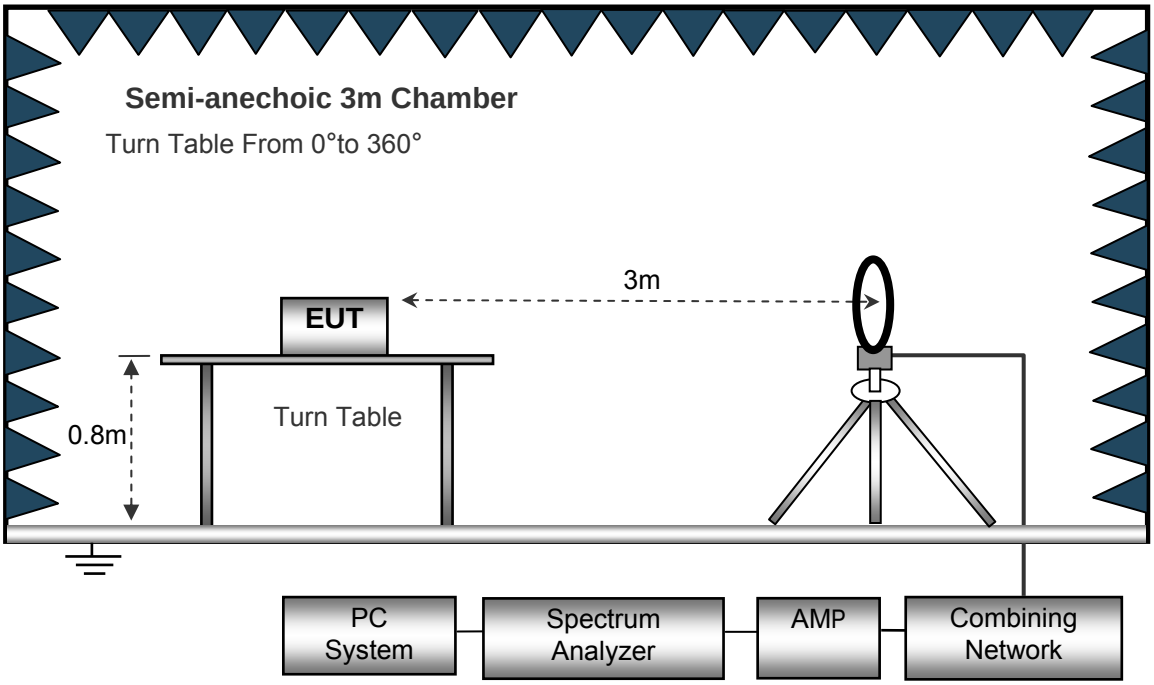
Atmospheric Pressure: : 101.2kPa

EUT Operation : : Refer to section 3.3

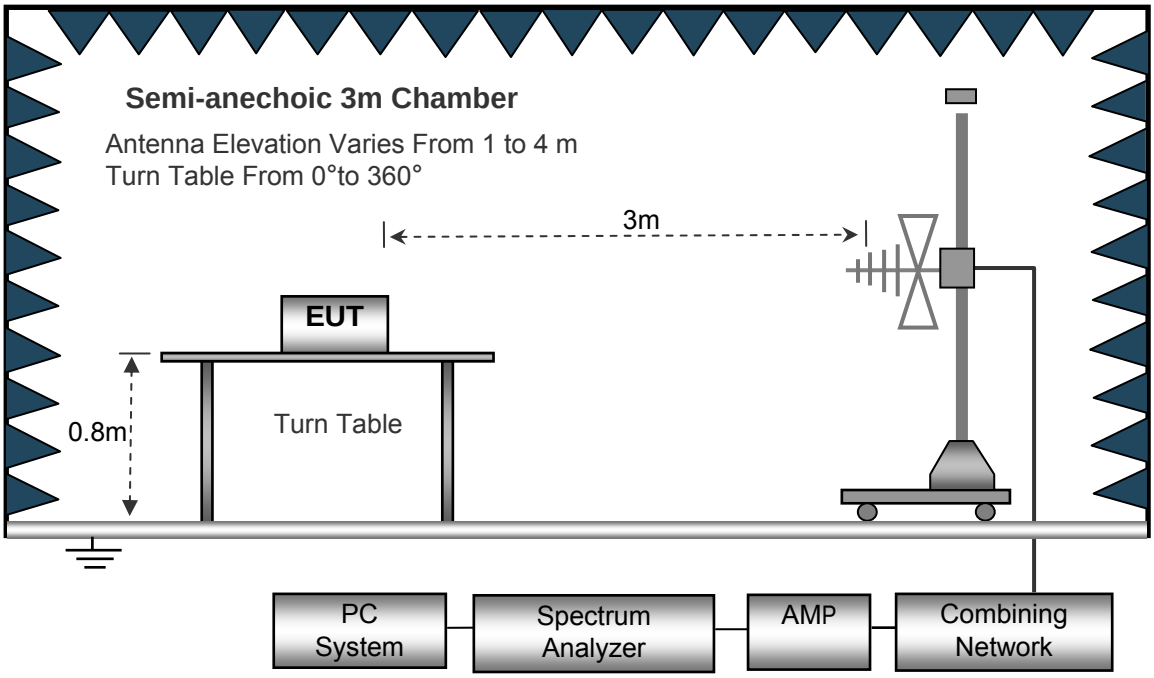
5.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

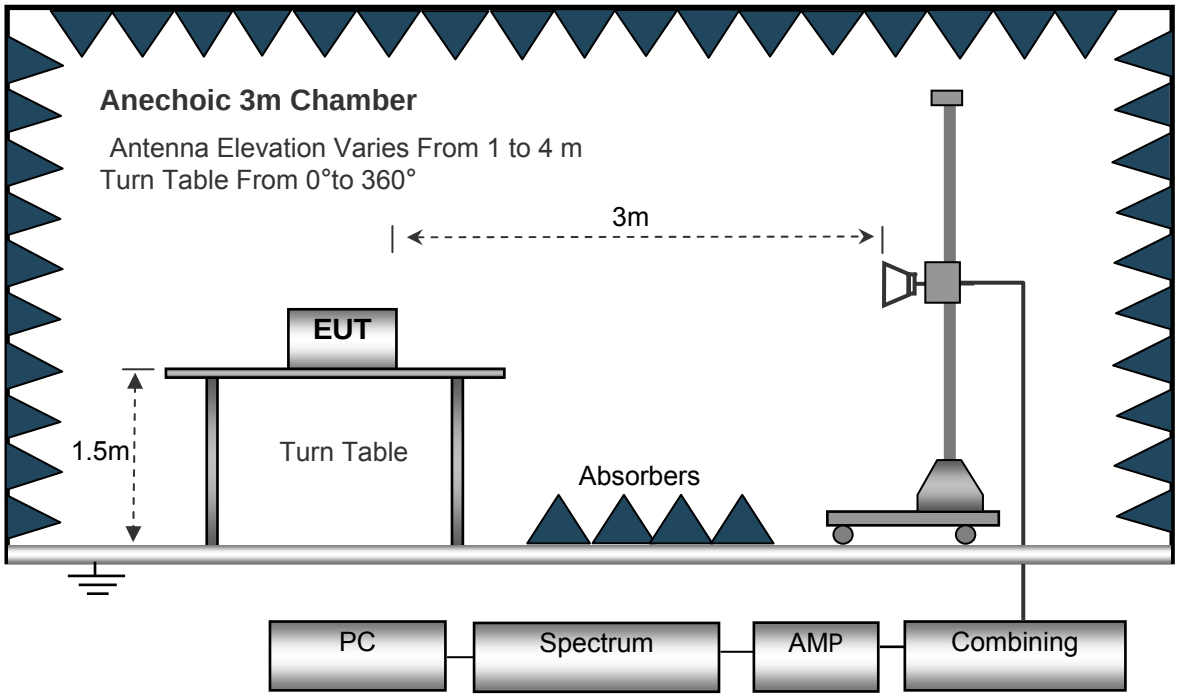
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



5.3 Spectrum Analyzer Setup

Below 30MHz

IF Bandwidth		10kHz
Resolution Bandwidth		10kHz
Video Bandwidth		10kHz

30MHz ~ 1GHz

Detector	:	PK
Resolution Bandwidth	:	100kHz
Video Bandwidth	:	300kHz
Detector	:	QP
Resolution Bandwidth	:	120kHz
Video Bandwidth	:	300kHz

Above 1GHz

Detector	:	PK
Resolution Bandwidth	:	1MHz
Video Bandwidth	:	3MHz
Detector	:	AV
Resolution Bandwidth	:	1MHz
Video Bandwidth	:	10Hz

5.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m or 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 moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

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 radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

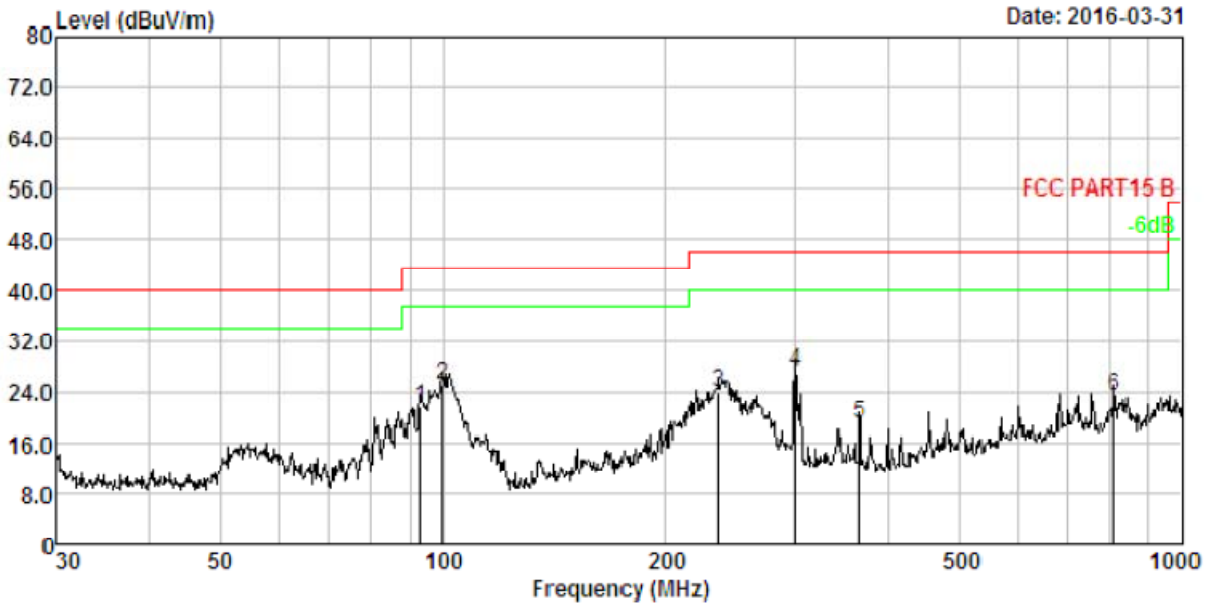
5.5 Summary of Test Results

Test Frequency: Below 30MHz

The measurements were more than 30 dB below the limit and not reported.

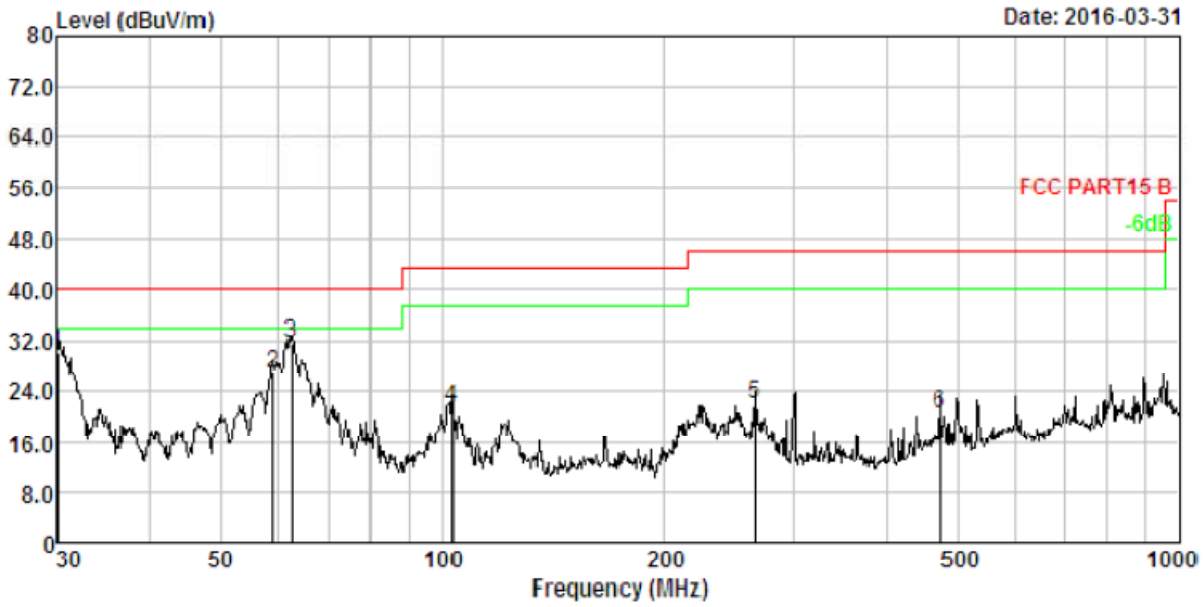
Test Frequency: 30MHz ~ 1GHz

Antenna Polarization: Horizontal



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	93.113	2.08	9.58	40.30	30.36	21.60	43.50	-21.90	QP
2.	99.878	2.14	10.23	43.03	30.39	25.01	43.50	-18.49	QP
3.	235.816	2.92	11.52	40.21	30.69	23.96	46.00	-22.04	QP
4.	299.316	3.14	13.18	41.66	30.77	27.21	46.00	-18.79	QP
5.	365.539	3.32	14.53	31.76	30.84	18.77	46.00	-27.23	QP
6.	810.265	4.04	21.83	28.47	31.12	23.22	46.00	-22.78	QP

Antenna Polarization: Vertical



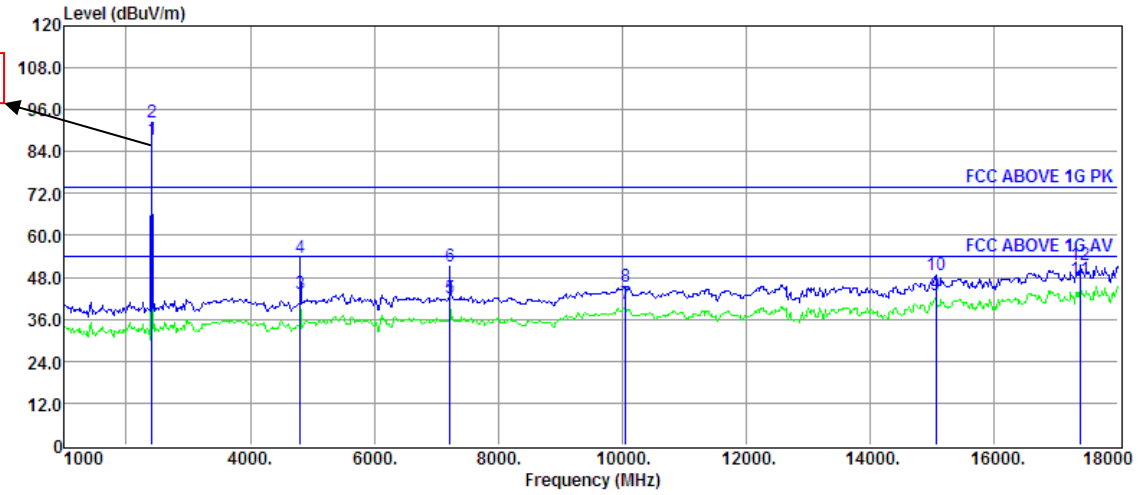
No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	30.000	1.06	13.24	45.73	29.97	30.06	40.00	-9.94	QP
2.	59.025	1.67	12.12	43.26	30.21	26.84	40.00	-13.16	QP
3.	62.431	1.72	12.01	48.04	30.22	31.55	40.00	-8.45	QP
4.	103.080	2.17	10.50	39.08	30.40	21.35	43.50	-22.15	QP
5.	265.676	3.03	12.33	37.34	30.73	21.97	46.00	-24.03	QP
6.	473.835	3.55	16.77	31.03	30.93	20.42	46.00	-25.58	QP

Test Frequency: 1GHz ~ 18GHz

Antenna Polarization: Vertical (worst case)

Low Channel:2405MHz

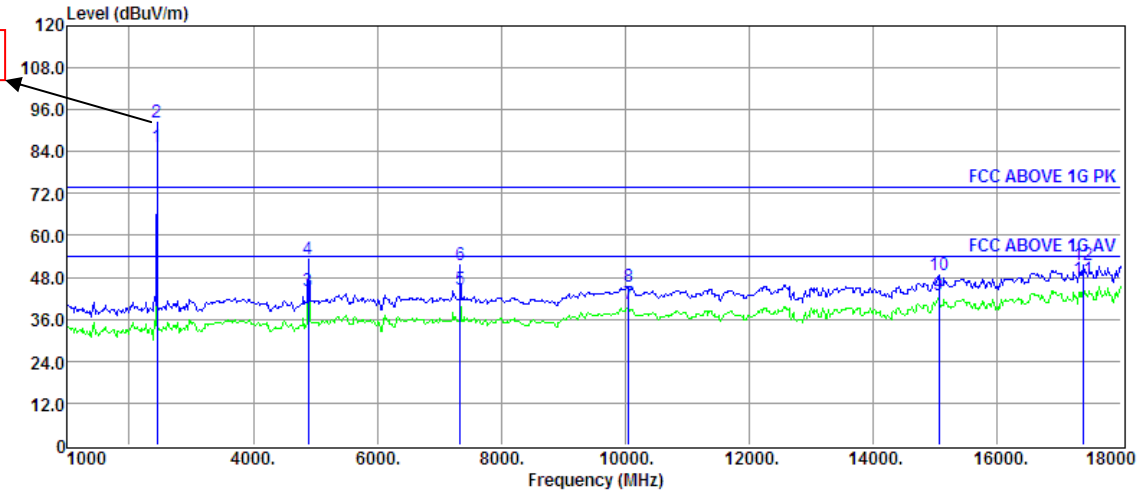
Fundamental



No.	Freq	Cable Loss	Antenna Factor	Receiver Reading	Preamp Factor	Emission Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dBuV	dB	dBuV/m	dBuV/m	dB	
1.	2405.00	2.79	27.72	84.89	28.00	87.40	94.00	-6.60	Average
2.	2405.00	2.79	27.72	89.89	28.00	92.40	114.00	-21.60	Peak
3.	4810.00	4.10	31.66	35.66	28.00	43.42	54.00	-10.58	Average
4.	4810.00	4.10	31.66	45.66	28.00	53.42	74.00	-20.58	Peak
5.	7215.00	6.23	35.10	28.68	28.00	42.01	54.00	-11.99	Average
6.	7215.00	6.23	35.10	37.68	28.00	51.01	74.00	-22.99	Peak
7.	10061.00	8.09	38.63	21.73	28.00	40.45	54.00	-13.55	Average
8.	10061.00	8.09	38.63	26.73	28.00	45.45	74.00	-28.55	Peak
9.	15059.00	10.35	40.62	19.79	28.00	42.76	54.00	-11.24	Average
10.	15059.00	10.35	40.62	25.79	28.00	48.76	74.00	-25.24	Peak
11.	17388.00	11.16	44.88	19.32	28.00	47.36	54.00	-6.64	Average
12.	17388.00	11.16	44.88	23.32	28.00	51.36	74.00	-22.64	Peak

Middle Channel:2448MHz

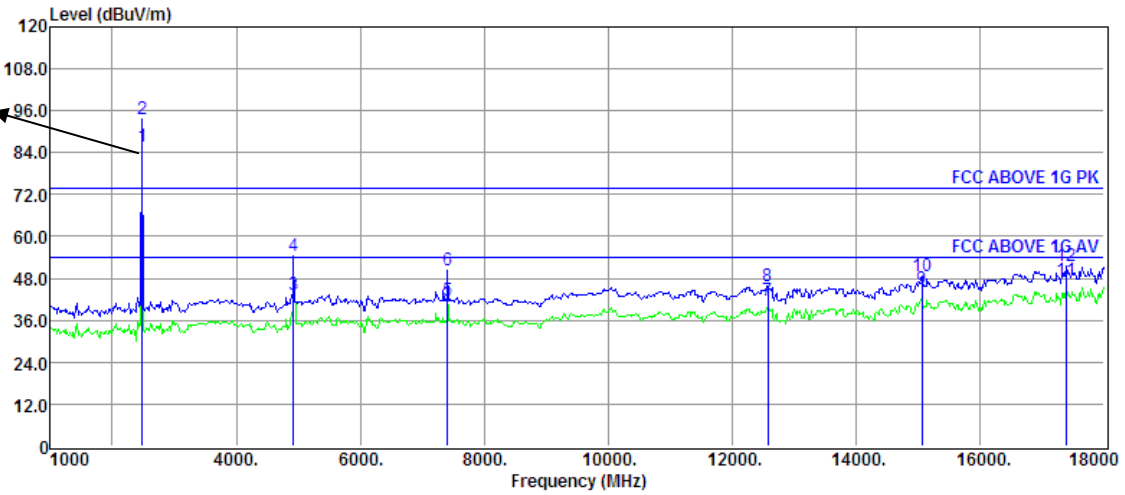
Fundamental



No.	Freq	Cable Loss	Antenna Factor	Receiver Reading	Preamp Factor	Emission Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dBuV	dB	dBuV/m	dBuV/m	dB	
1.	2448.000	2.81	27.83	82.82	28.00	85.46	94.00	-8.54	Average
2.	2448.000	2.81	27.83	89.82	28.00	92.46	114.00	-21.54	Peak
3.	4896.000	4.13	31.78	36.35	28.00	44.26	54.00	-9.74	Average
4.	4896.000	4.13	31.78	45.35	28.00	53.26	74.00	-20.74	Peak
5.	7344.000	6.32	35.27	31.05	28.00	44.64	54.00	-9.36	Average
6.	7344.000	6.32	35.27	38.05	28.00	51.64	74.00	-22.36	Peak
7.	10061.00	8.09	38.63	21.73	28.00	40.45	54.00	-13.55	Average
8.	10061.00	8.09	38.63	26.73	28.00	45.45	74.00	-28.55	Peak
9.	15059.00	10.35	40.62	19.79	28.00	42.76	54.00	-11.24	Average
10.	15059.00	10.35	40.62	25.79	28.00	48.76	74.00	-25.24	Peak
11.	17388.00	11.16	44.88	19.32	28.00	47.36	54.00	-6.64	Average
12.	17388.00	11.16	44.88	23.32	28.00	51.36	74.00	-22.64	Peak

High Channel:2472MHz

Fundamental



No.	Freq	Cable Loss	Antenna Factor	Receiver Reading	Preamp Factor	Emission Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dBuV	dB	dBuV/m	dBuV/m	dB	
1.	2472.00	2.84	27.94	83.02	28.00	85.80	94.00	-8.20	Average
2.	2472.00	2.84	27.94	91.02	28.00	93.80	114.00	-10.20	Peak
3.	4944.00	4.14	31.82	35.51	28.00	43.47	54.00	-10.53	Average
4.	4944.00	4.14	31.82	46.51	28.00	54.47	74.00	-19.53	Peak
5.	7416.00	6.37	35.37	27.77	28.00	41.51	54.00	-12.49	Average
6.	7416.00	6.37	35.37	36.77	28.00	50.51	74.00	-23.49	Peak
7.	12577.00	9.34	39.67	20.78	28.00	41.79	54.00	-12.21	Average
8.	12577.00	9.34	39.67	24.78	28.00	45.79	74.00	-28.21	Peak
9.	15059.00	10.35	40.62	21.79	28.00	44.76	54.00	-9.24	Average
10.	15059.00	10.35	40.62	25.79	28.00	48.76	74.00	-25.24	Peak
11.	17388.00	11.16	44.88	19.32	28.00	47.36	54.00	-6.64	Average
12.	17388.00	11.16	44.88	23.32	28.00	51.36	74.00	-22.64	Peak

Test Frequency: Above 18-24.72GHz

The measurements were more than 30 dB below the limit and not reported

Remark : 1. The testing has been conformed to 10*2472 =24720MHz.
2. All other emissions more than 20dB below the limit

6 Band Edge Emission

Test Requirement	:	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.
Test Method	:	ANSI C63.10:2013
Test Limit	:	50 dB below the level of the fundamental or to the general radiated emission limits
Test Mode	:	Refer to section 3.3

6.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

6.2 Summary of Test Results

Frequency	Receiver Reading	Detector	Corrected Factor	Corrected Amplitude	Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Low Channel 2405MHz						
2343.15	45.02	PK	-13.19	31.83	74.00	-42.17
2343.15	39.30	Ave	-13.19	26.11	54.00	-27.89
2374.76	42.91	PK	-13.14	29.77	74.00	-44.23
2374.76	38.12	Ave	-13.14	24.98	54.00	-29.02
2492.25	42.47	PK	-13.08	29.39	74.00	-44.61
2492.25	40.29	Ave	-13.08	27.21	54.00	-26.79
GFSK High Channel 2472MHz						
2311.61	44.84	PK	-13.19	31.65	74.00	-42.35
2311.61	37.72	Ave	-13.19	24.53	54.00	-29.47
2383.98	43.34	PK	-13.14	30.20	74.00	-43.80
2383.98	38.89	Ave	-13.14	25.75	54.00	-28.25
2497.62	43.49	PK	-13.08	30.41	74.00	-43.59
2497.62	40.92	Ave	-13.08	27.84	54.00	-26.16
Remark:						
1.Corrected Factor=ANT Factor + Cable Loss – Amp Gain						
2.The testing has been conformed to 10*2472 =24720MHz.						
3. All other emissions more than 30dB below the limit						

7 20dB Bandwidth Measurement

Test Requirement	:	FCC CFR47 Part 15 Section 15.249
Test Method	:	ANSI C63.10:2013
Test Mode	:	Refer to section 3.3

7.1 Test Procedure

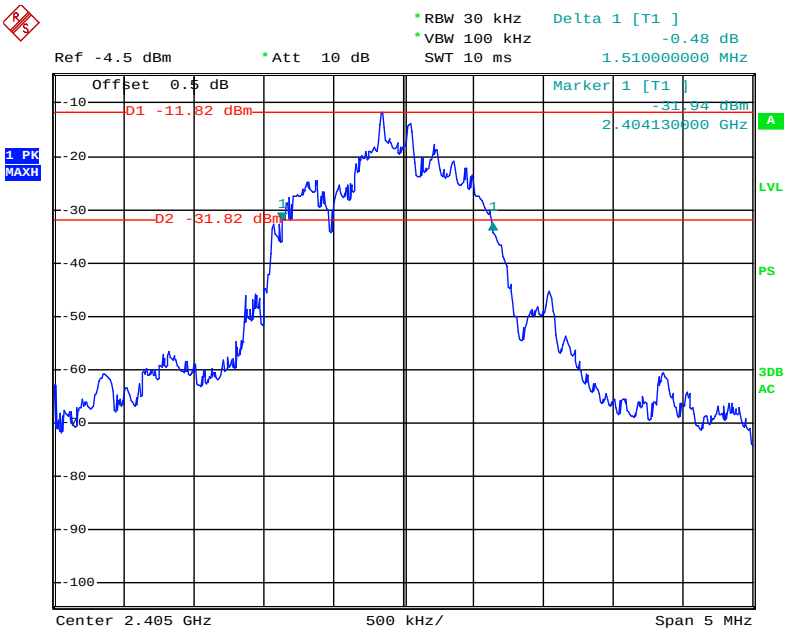
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

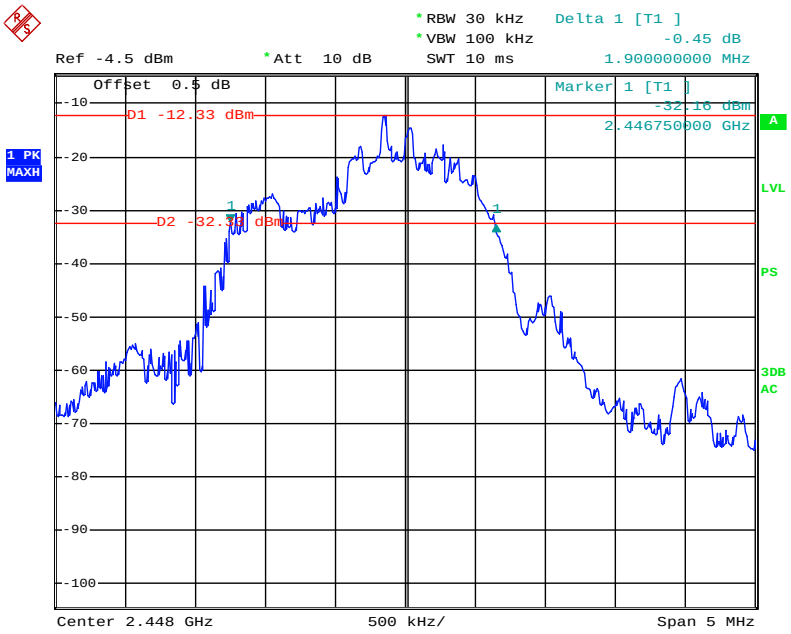
2. Set the spectrum analyzer: For BLE, RBW = 3 kHz, VBW = 10kHz,

7.2 Test Result

Test Frequency	Bandwidth
2405MHz	1.51MHz
2448MHz	1.90MHz
2472MHz	1.95MHz

Test plots





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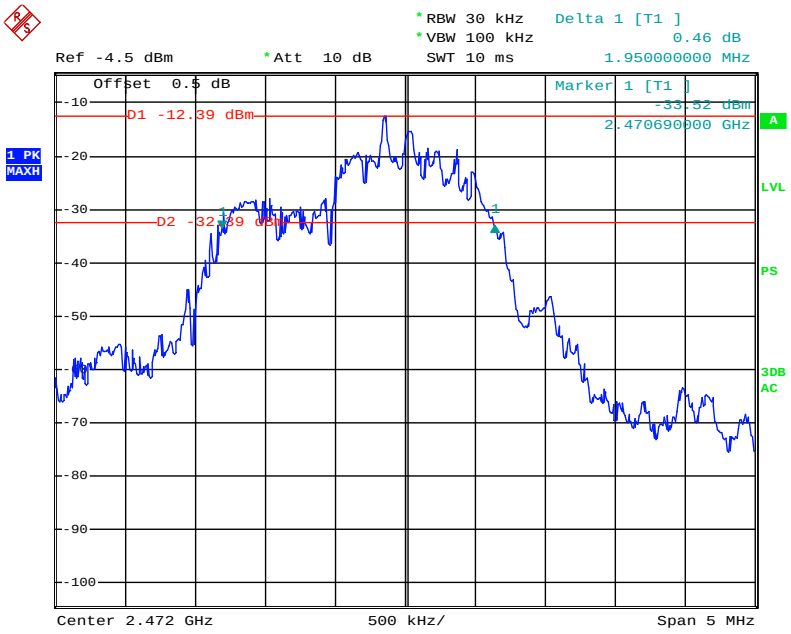

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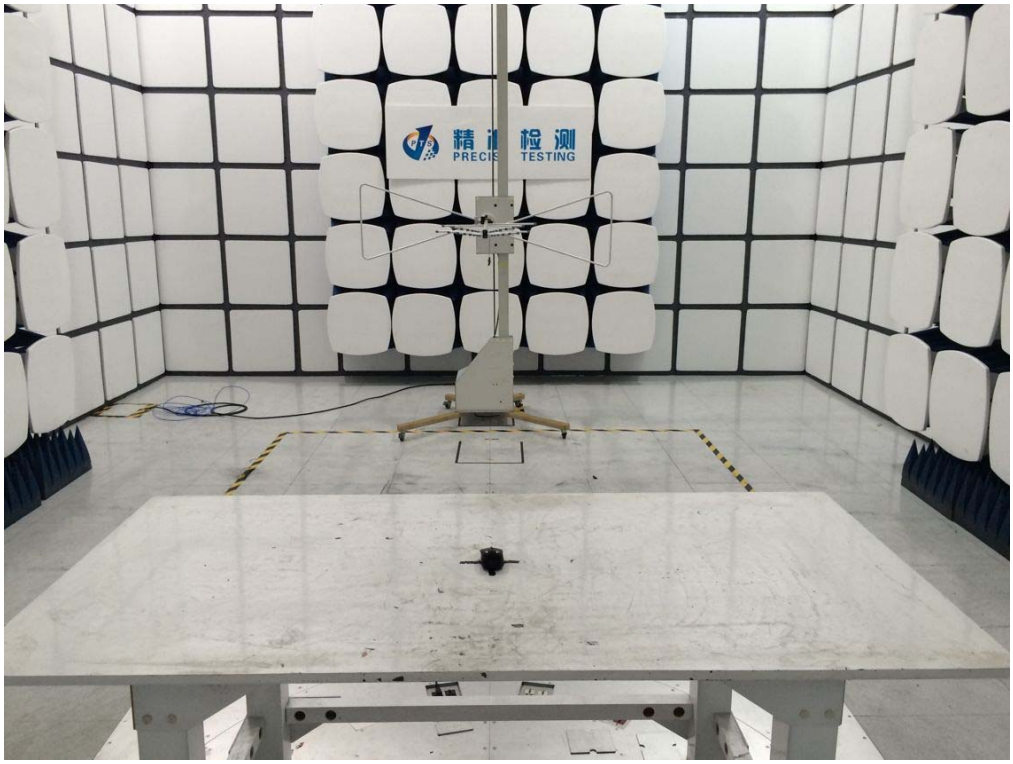
8 Antenna Requirement

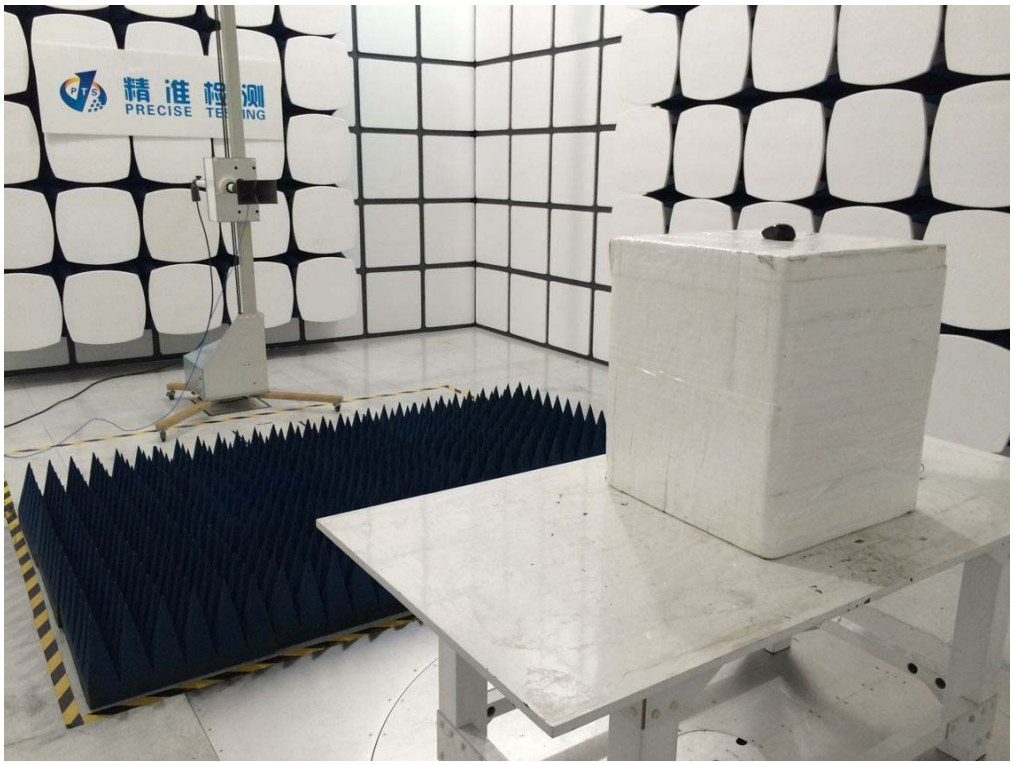
According to the FCC part15.203, a transmitter can only be sold or operated with antennas with which it was approved. This product has an PCB printed antenna which meet the requirement of this section.

9 Test Setup

Radiated Spurious Emissions
From 30MHz-1000MHz



Above 1GHz



10 EUT Photos

External Photos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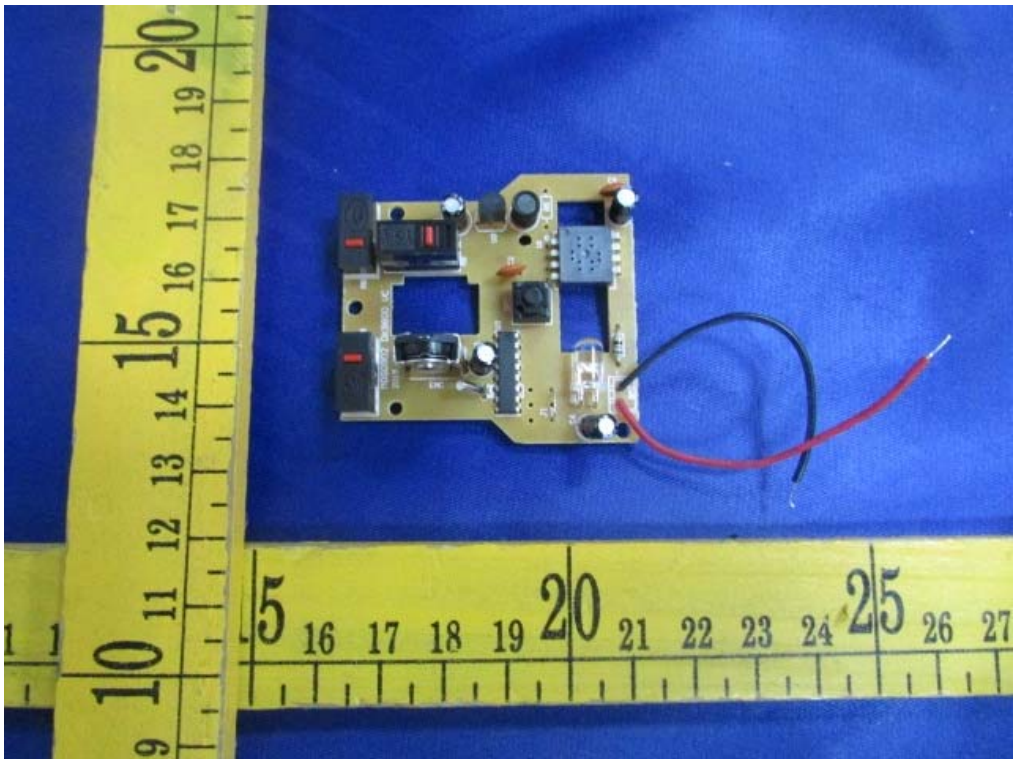
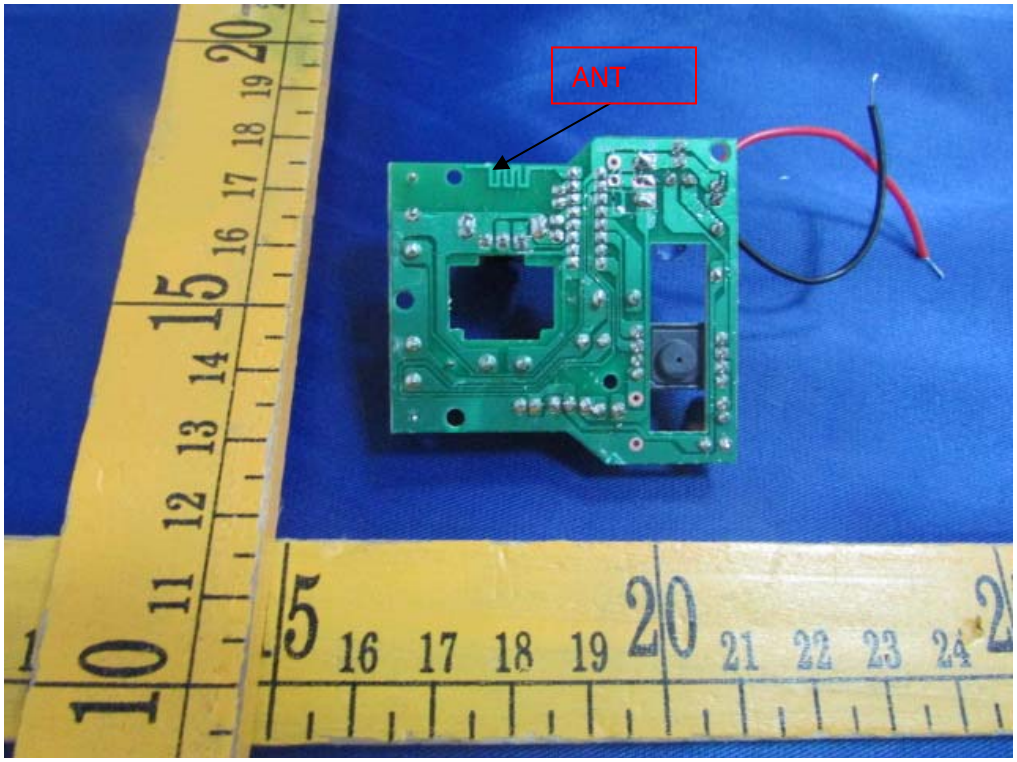
Internal Photos





******THE END REPORT******