

# FCC TEST REPORT

For

Wintop Electronics Co., Limited  
Rechargeable Wireless Optical Mouse

Model No.: GM-769, PC131A

Prepared For : Wintop Electronics Co., Limited  
Address : Unit 04 7/F, Bright Way Tower 33, Mong Kok RD KL, HONGKONG

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited  
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Report Number : R0217100080W  
Date of Test : Oct. 31~Nov. 10, 2017  
Date of Report : Nov. 10, 2017

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# TEST REPORT

Applicant : Wintop Electronics Co., Limited  
Manufacturer : Shenzhen Wintop Electronics Co., Ltd  
Product Name : Rechargeable Wireless Optical Mouse  
Model No. : GM-769, PC131A  
Trade Mark : N/A  
Rating(s) : Input DC 5V 0.5A (Battery DC 3.7V 300mAh inside)

**Test Standard(s) : FCC Part15 Subpart C, Paragraph 15.249**

**Test Method(s) : ANSI C63.10: 2013**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Oct. 31~Nov. 10, 2017

Prepared by :



*Winkey Wang*

(Tested Engineer / Winkey Wang)

Reviewer :

*Tangcy. T.*

(Project Manager / Tangcy. T)

Approved & Authorized Signer :

*Tom Chen*

(Manager / Tom Chen)

## 1. General Information

### 1.1. Client Information

Applicant	:	Wintop Electronics Co., Limited
Address	:	Unit 04 7/F, Bright Way Tower 33, Mong Kok RD KL, HONGKONG
Manufacturer	:	Shenzhen Wintop Electronics Co., Ltd
Address	:	2, 3, 4 floor, Huaguan industrial park, 46th Xinhe Road, Baolai Industrial District, Shangmugu, Pinghu Town, Longgang District, Shenzhen City, 518000, China

### 1.2. Description of Device (EUT)

Product Name	:	Rechargeable Wireless Optical Mouse	
Model No.	:	GM-769, PC131A (Note: All samples are the same except the model number and name, so we prepare "GM-769" for test only.)	
Trade Mark	:	N/A	
Test Power Supply	:	AC 120V, 60Hz for adapter / AC 240V, 60Hz for adapter DC 3.7V By Battery	
Product Description	:	Operation Frequency:	2408-2474MHz
		Number of Channel:	34 Channels
		Modulation Type:	GFSK
		Antenna Type:	PCB Antenna
		Antenna Gain(Peak):	1.55 dBi
<p><b>Remark:</b> 1)For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.</p>			

### 1.3. Auxiliary Equipment Used During Test

Adapter	:	N/A
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### 1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Keeping TX mode
Mode 2	CH01
Mode 3	CH17
Mode 4	CH34

For Conducted Emission	
Final Test Mode	Description
Mode 1	Keeping TX mode

For Radiated Emission	
Final Test Mode	Description
Mode 2	CH01
Mode 3	CH17
Mode 4	CH34

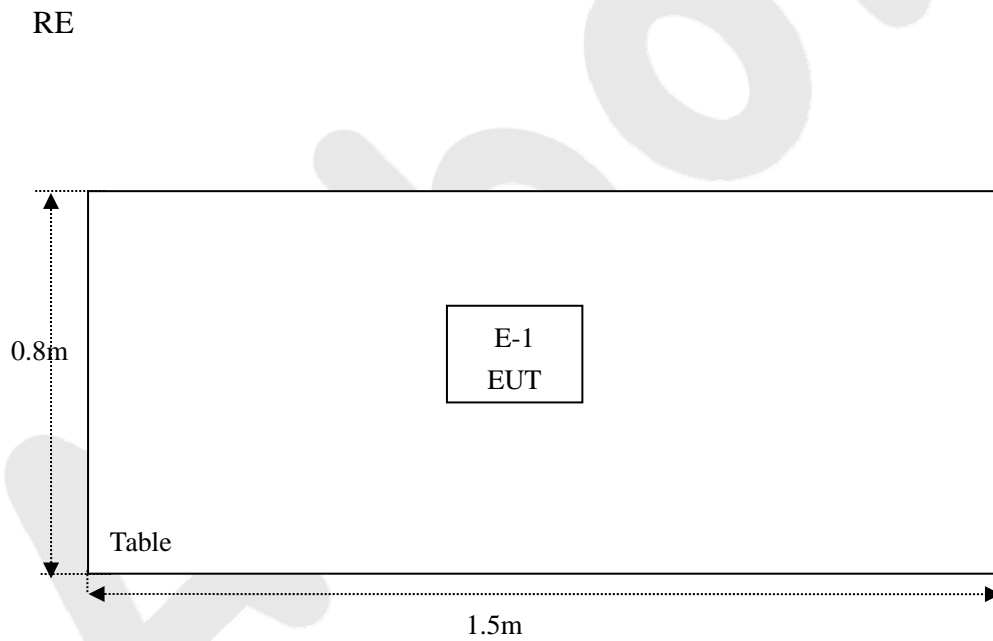
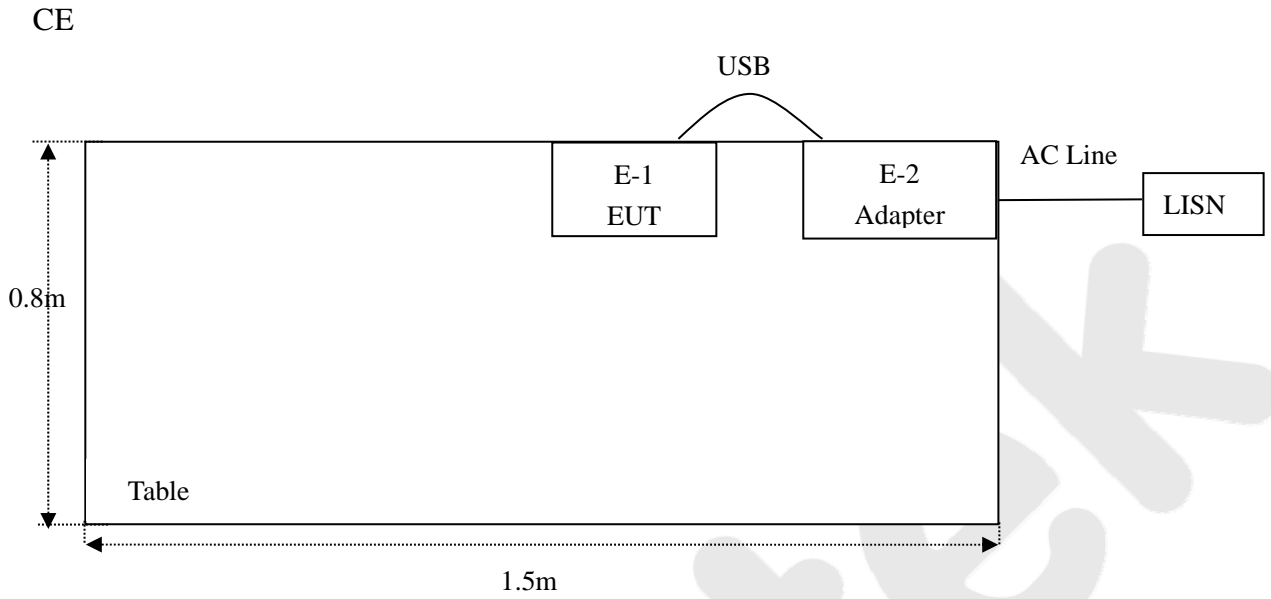
Note:

- The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.
- EUT built-in battery-powered, fully-charged battery use of the test battery.

### 1.5. List of Channels

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	2408	10	2426	19	2444	28	2462
2	2410	11	2428	20	2446	29	2464
3	2412	12	2430	21	2448	30	2466
4	2414	13	2432	22	2450	31	2468
5	2416	14	2434	23	2452	32	2470
6	2418	15	2436	24	2454	33	2472
7	2420	16	2438	25	2456	34	2474
8	2422	17	2440	26	2458		
9	2424	18	2442	27	2460		

### 1.6. Description of Test Setup



### 1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	May 27, 2017	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	May 27, 2017	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	May 27, 2017	1 Year
4.	Spectrum Analysis	Agilent	E4407B	US39390582	May 27, 2017	1 Year
5.	Spectrum Analysis	Agilent	N9038A	MY53227295	May 27, 2017	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30 D	KD17503	May 27, 2017	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	May 27, 2017	1 Year
8.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	May 31, 2017	1 Year
9.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 31, 2017	1 Year
10.	Loop Antenna	Schwarzbeck	HFH2-Z2	100047	Apr. 03, 2017	1 Year
11.	Horn Antenna	Schwarzbeck	BBHA9170	9170-375	May 27, 2017	1 Year
12.	Pre-amplifier	SONOMA	310N	186860	May 27, 2017	1 Year
13.	Pre-amplifier	SKET Electronic	BK1G40G50 A	KD25352	May 27, 2017	1 Year
14.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
15.	Power Sensor	DAER	RPR3006W	15I00041SN045	May 27, 2017	1 Year
16.	Power Sensor	DAER	RPR3006W	15I00041SN046	May 27, 2017	1 Year
17.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	May 27, 2017	1 Year
18.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	May 27, 2017	1 Year
19.	Signal Generator	Agilent	E4421B	MY41000743	May 27, 2017	1 Year
20.	DC Power supply	IVYTECH	IV6003	1601D6030007	May 26, 2017	1 Year
21.	TEMP&HUMI PROGRAMMABLE CHAMBER	Sertep	ZJ-HWHS80 B	ZJ-17042804	Mar. 03, 2017	1 Year

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

### 1.8. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.1 dB (Horizontal)
		Ur = 4.3 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4dB

### 1.9. Description of Test Facility

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

#### FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, July 31, 2017.

#### ISED-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A-1, June 13, 2016.

#### Test Location

All Emissions tests were performed at

Shenzhen Anbotek Compliance Laboratory Limited.

at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China



## 2. Summary of Test Results

Standard Section	Test Item	Result
15.203	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.249	Radiated Emission	PASS
15.215(c)	20dB Bandwidth	PASS
15.249(c)	Band Edge	PASS
<b>Remark:</b> "N/A" is an abbreviation for Not Applicable.		

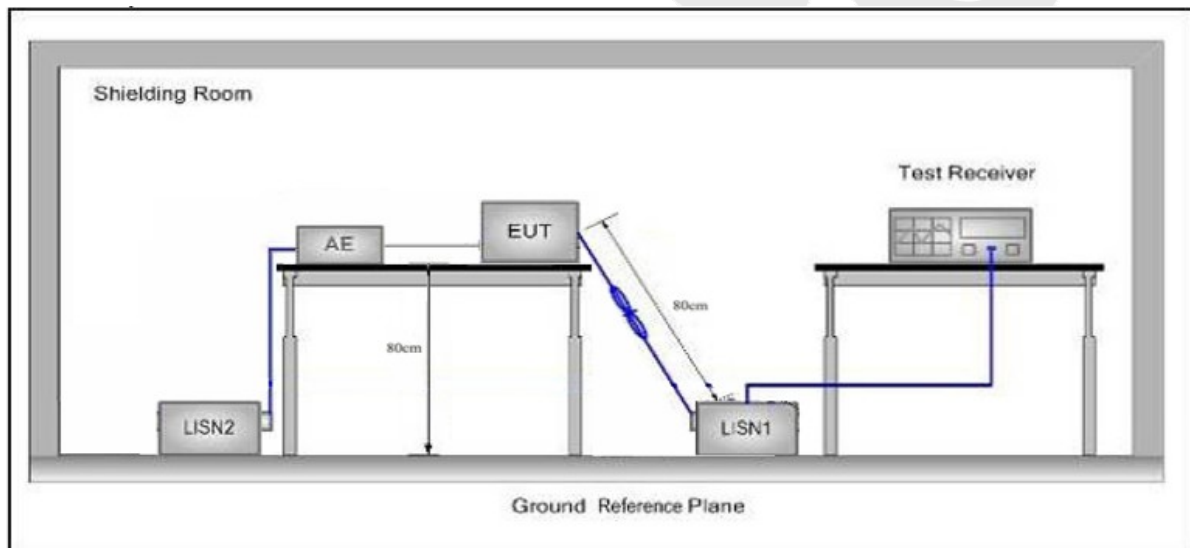
### 3. Conducted Emission Test

#### 3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
5MHz~30MHz	60	50	

**Remark:** (1) \*Decreasing linearly with logarithm of the frequency.  
(2) The lower limit shall apply at the transition frequency.

#### 3.2. Test Setup



#### 3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

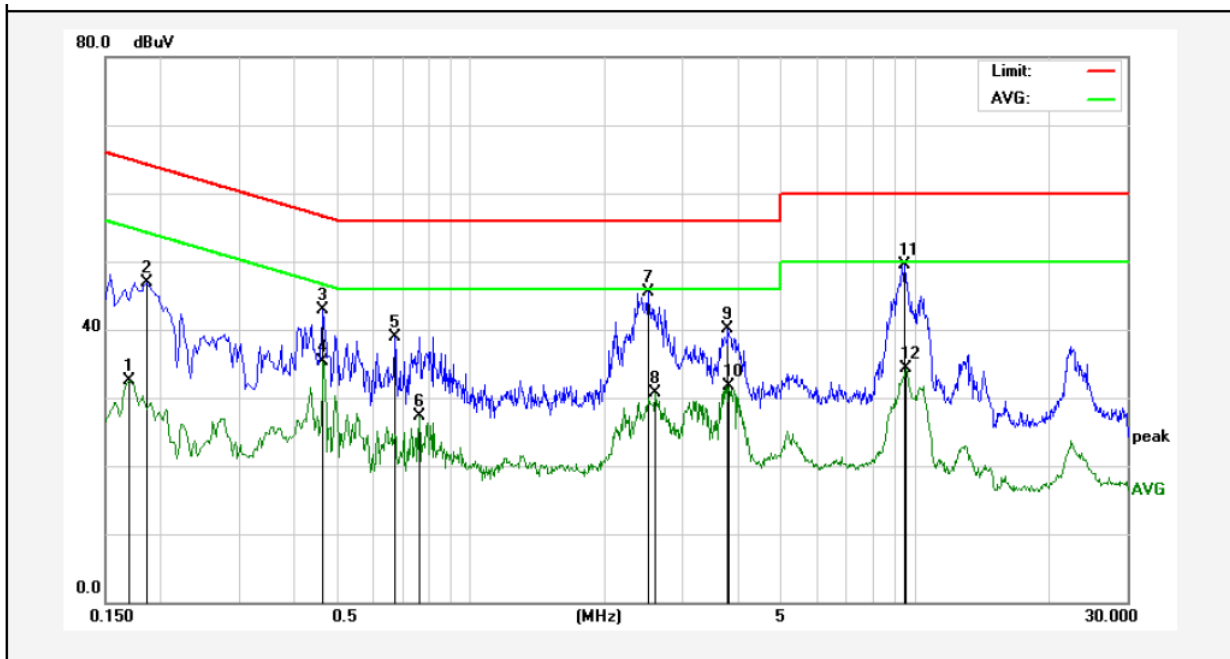
The frequency range from 150kHz to 30MHz is checked.

#### 3.4. Test Data

Please to see the following pages

**Conducted Emission Test Data**

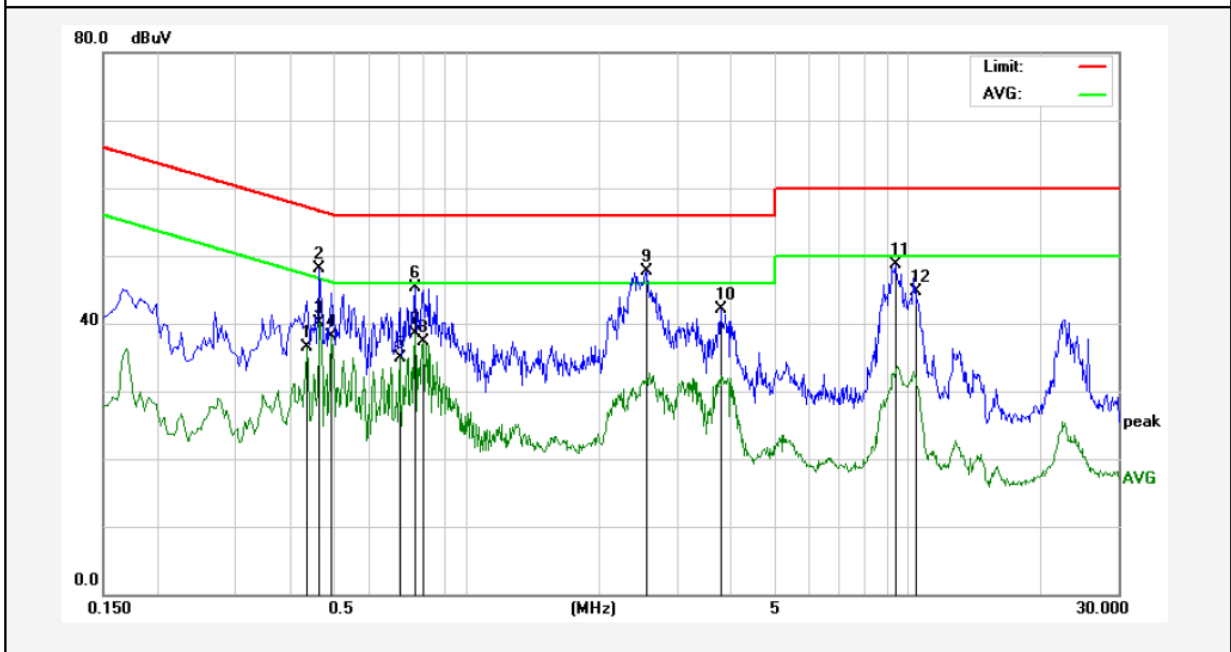
Test Site: 1# Shielded Room  
 Operating Condition: Keeping TX mode  
 Test Specification: AC 120V, 60Hz for adapter  
 Comment: Live Line  
 Tem.:25°C Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1700	12.67	19.90	32.57	54.96	-22.39	AVG	
2	0.1860	27.10	19.90	47.00	64.21	-17.21	QP	
3	0.4660	22.92	19.96	42.88	56.58	-13.70	QP	
4	0.4660	15.27	19.96	35.23	46.58	-11.35	AVG	
5	0.6740	18.89	20.03	38.92	56.00	-17.08	QP	
6	0.7660	7.30	20.06	27.36	46.00	-18.64	AVG	
7	2.5100	25.44	20.15	45.59	56.00	-10.41	QP	
8	2.6020	10.58	20.15	30.73	46.00	-15.27	AVG	
9	3.7900	19.93	20.18	40.11	56.00	-15.89	QP	
10	3.8180	11.61	20.18	31.79	46.00	-14.21	AVG	
11	9.4780	29.19	20.33	49.52	60.00	-10.48	QP	
12	9.5020	13.91	20.33	34.24	50.00	-15.76	AVG	

**Conducted Emission Test Data**

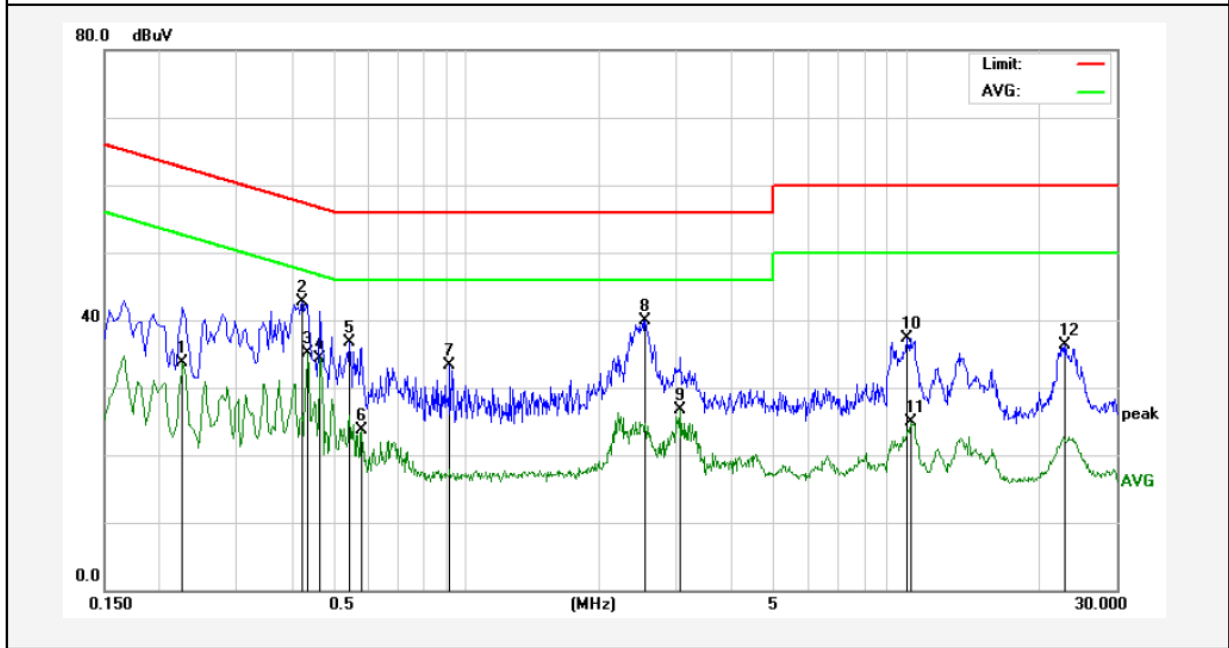
Test Site: 1# Shielded Room  
 Operating Condition: Keeping TX mode  
 Test Specification: AC 120V, 60Hz for adapter  
 Comment: Neutral Line  
 Tem.:25°C Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.4340	16.65	19.95	36.60	47.18	-10.58	AVG	
2	0.4660	28.14	19.96	48.10	56.58	-8.48	QP	
3	0.4660	20.17	19.96	40.13	46.58	-6.45	AVG	
4	0.4940	18.05	19.98	38.03	46.10	-8.07	AVG	
5	0.7060	14.96	20.04	35.00	46.00	-11.00	AVG	
6	0.7660	25.24	20.06	45.30	56.00	-10.70	QP	
7	0.7660	18.35	20.06	38.41	46.00	-7.59	AVG	
8	0.7980	17.15	20.07	37.22	46.00	-8.78	AVG	
9	2.5660	27.50	20.15	47.65	56.00	-8.35	QP	
10	3.7620	21.91	20.18	42.09	56.00	-13.91	QP	
11	9.3940	28.45	20.32	48.77	60.00	-11.23	QP	
12	10.4060	24.37	20.33	44.70	60.00	-15.30	QP	

**Conducted Emission Test Data**

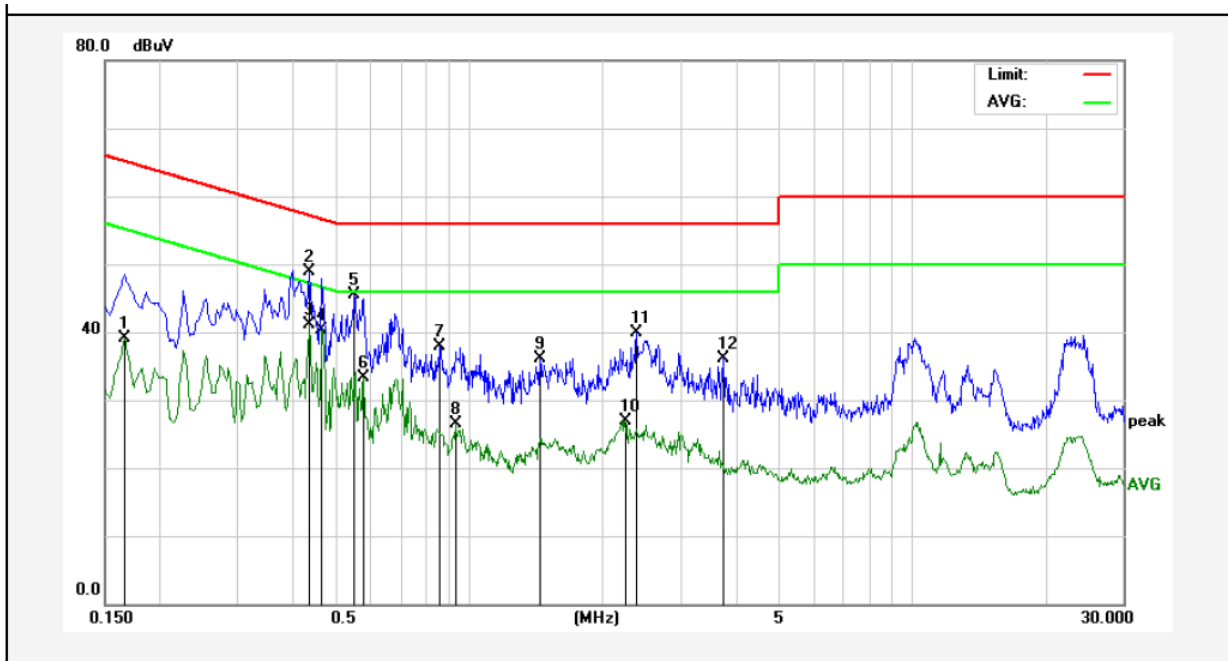
Test Site: 1# Shielded Room  
 Operating Condition: Keeping TX mode  
 Test Specification: AC 240V, 60Hz for adapter  
 Comment: Live Line  
 Tem.:25°C Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.2260	13.89	19.89	33.78	52.59	-18.81	AVG	
2	0.4220	22.83	19.94	42.77	57.41	-14.64	QP	
3	0.4340	15.16	19.95	35.11	47.18	-12.07	AVG	
4	0.4660	14.38	19.96	34.34	46.58	-12.24	AVG	
5	0.5420	16.62	19.99	36.61	56.00	-19.39	QP	
6	0.5780	3.61	20.00	23.61	46.00	-22.39	AVG	
7	0.9180	13.21	20.10	33.31	56.00	-22.69	QP	
8	2.5420	19.73	20.15	39.88	56.00	-16.12	QP	
9	3.0660	6.59	20.16	26.75	46.00	-19.25	AVG	
10	9.9700	16.96	20.34	37.30	60.00	-22.70	QP	
11	10.2180	4.52	20.34	24.86	50.00	-25.14	AVG	
12	22.9460	15.94	20.30	36.24	60.00	-23.76	QP	

**Conducted Emission Test Data**

Test Site: 1# Shielded Room  
 Operating Condition: Keeping TX mode  
 Test Specification: AC 240V, 60Hz for adapter  
 Comment: Neutral Line  
 Tem.:25°C Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1660	19.23	19.90	39.13	55.15	-16.02	AVG	
2	0.4340	28.93	19.95	48.88	57.18	-8.30	QP	
3	0.4340	21.11	19.95	41.06	47.18	-6.12	AVG	
4	0.4660	20.37	19.96	40.33	46.58	-6.25	AVG	
5	0.5500	25.43	19.99	45.42	56.00	-10.58	QP	
6	0.5780	13.35	20.00	33.35	46.00	-12.65	AVG	
7	0.8540	17.80	20.08	37.88	56.00	-18.12	QP	
8	0.9300	6.32	20.10	26.42	46.00	-19.58	AVG	
9	1.4420	16.04	20.13	36.17	56.00	-19.83	QP	
10	2.2420	6.83	20.14	26.97	46.00	-19.03	AVG	
11	2.3860	19.83	20.15	39.98	56.00	-16.02	QP	
12	3.7460	16.03	20.17	36.20	56.00	-19.80	QP	

## 4. Radiated Emission and Band Edge

### 4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209 and 15.205				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	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~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3

**Remark:**

(1)The lower limit shall apply at the transition frequency.

(2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Test Standard	FCC Part15 C Section 15.249					
Test Limit	Frequency (MHz)	Field Strength of fundamental ((millivolts /meter)	Field Strength of Harmonics (microvolts/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	2400~2483.5	50	-	114.0	Peak	3
	2400~2483.5	50	-	94.0	Average	3
	2400~2483.5	-	500	74.0	Peak	3
	2400~2483.5	-	500	54.0	Average	3

**Remark:**

(1) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

### 4.2. Test Setup

Figure 1. Below 30MHz

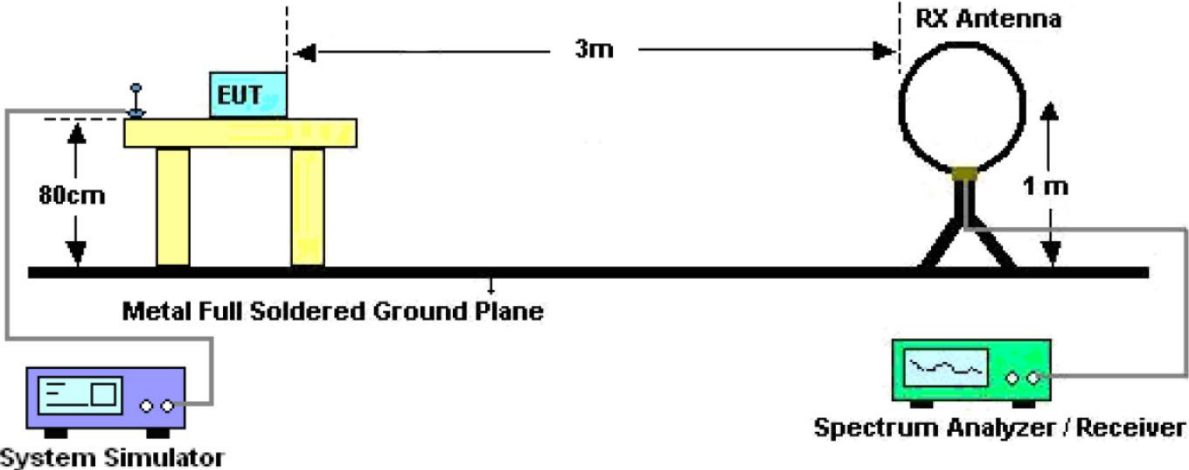


Figure 2. 30MHz to 1GHz

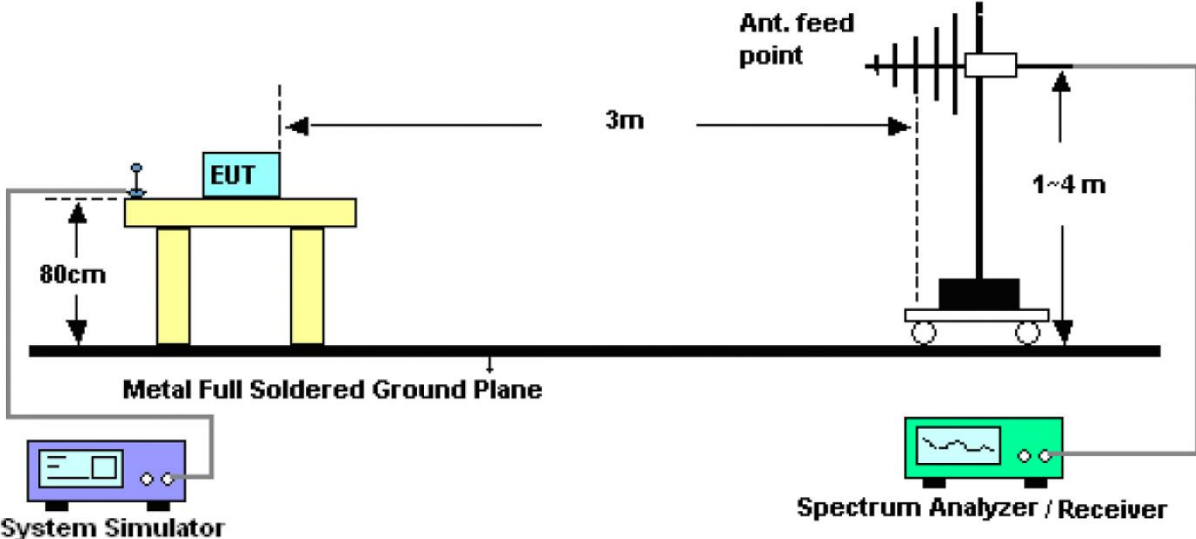
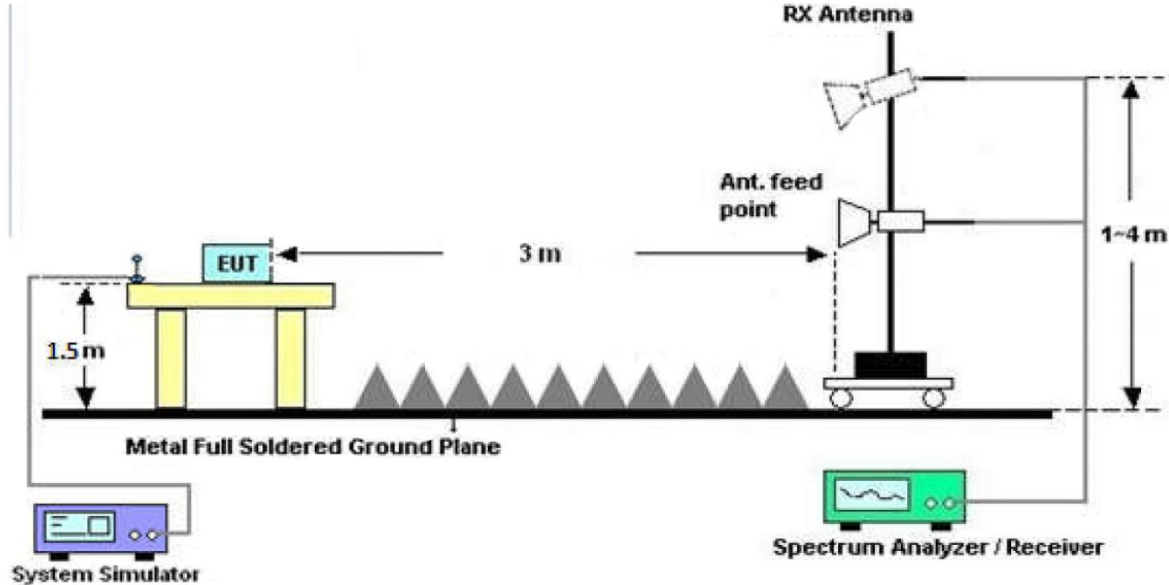


Figure 3. Above 1 GHz





### 4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9\*6\*6 Chamber. The device is evaluated in xyz orientation.

For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

For 9kHz to 150kHz, Set the spectrum analyzer as:

RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:

RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:

RBW = 100kHz, VBW =300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For above 1GHz,Set the spectrum analyzer as:

RBW =1MHz, VBW =1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.

RBW =1MHz, VBW =10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.

### 4.4. Test Data

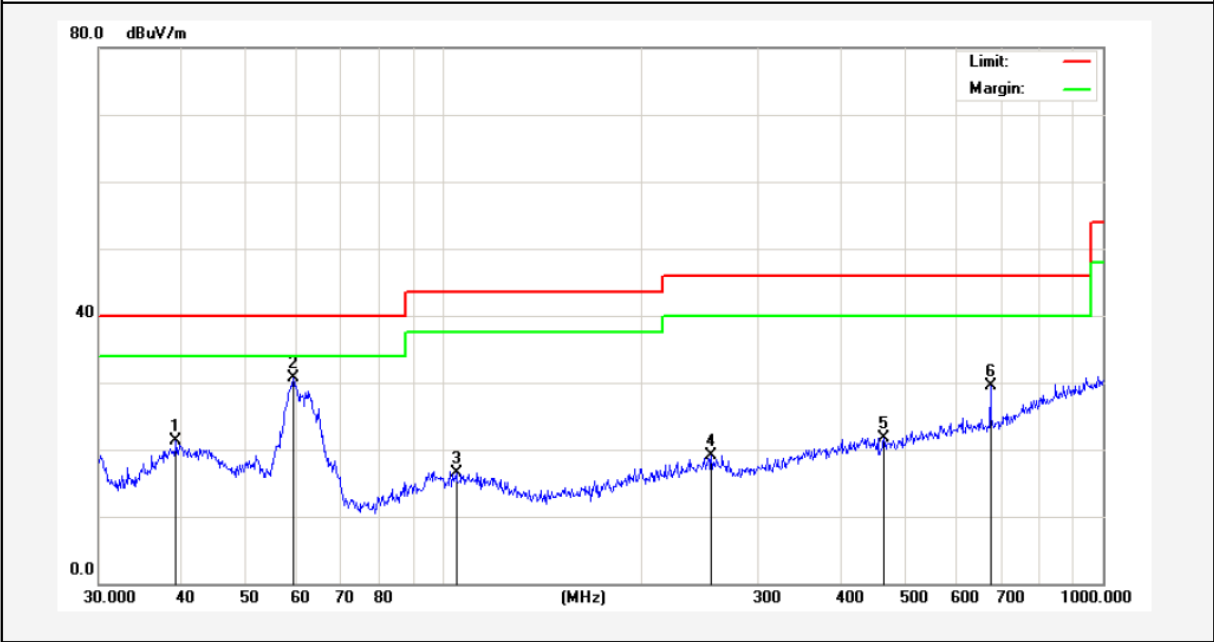
**PASS**

During the test, Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis is the worst case.

The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.

**Test Results (30~1000MHz)**

Job No.: 0217100080W Temp.(°C)/Hum.(%RH): 24.3°C/55%RH  
 Standard: FCC PART 15C Power Source: DC 3.7V  
 Test Mode: TX Mode Lowest CH Polarization: Horizontal

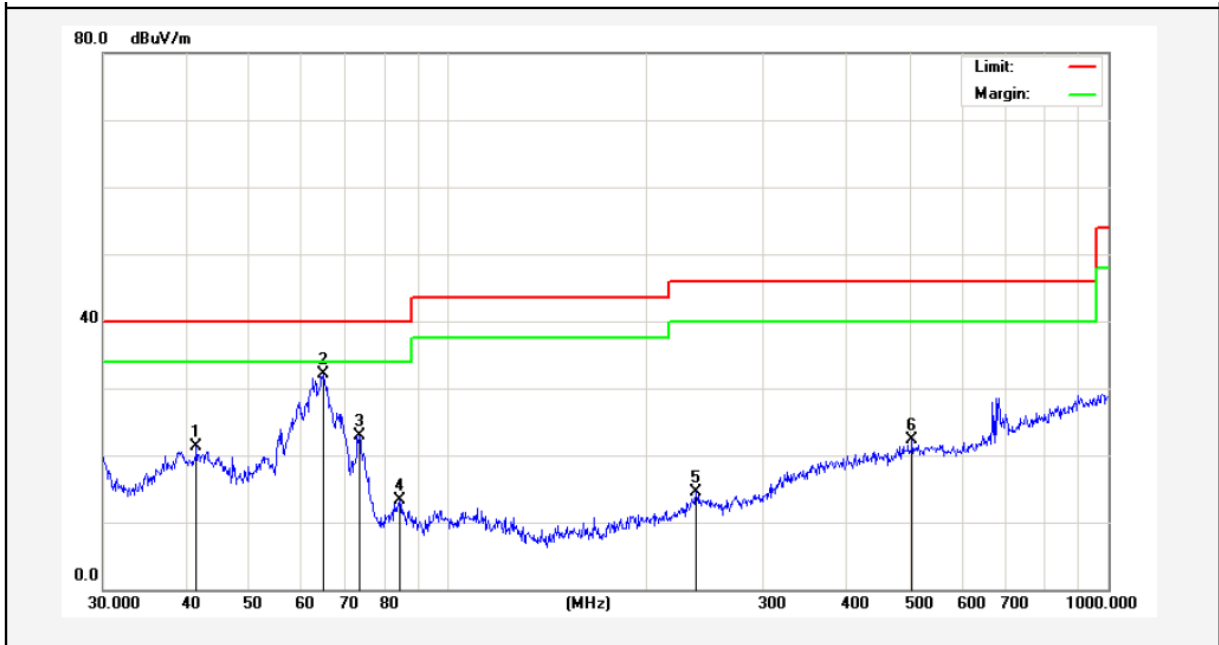


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	39.2991	32.67	-11.39	21.28	40.00	-18.72	QP	300	14	
2	59.2325	45.97	-15.32	30.65	40.00	-9.35	QP	300	26	
3	104.5361	37.25	-20.69	16.56	43.50	-26.94	QP	300	147	
4	254.7284	37.77	-18.76	19.01	46.00	-26.99	QP	300	196	
5	465.5994	33.72	-11.94	21.78	46.00	-24.22	QP	300	214	
6	675.2080	38.76	-9.17	29.59	46.00	-16.41	QP	300	263	



**Test Results (30~1000MHz)**

Job No.: 0217100080W Temp.(°C)/Hum.(%RH): 24.3°C/55%RH  
 Standard: FCC PART 15C Power Source: DC 3.7V  
 Test Mode: TX Mode Lowest CH Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	41.5670	32.79	-11.41	21.38	40.00	-18.62	QP	300	14	
2	64.6594	49.53	-17.33	32.20	40.00	-7.80	QP	300	32	
3	73.3593	43.17	-20.28	22.89	40.00	-17.11	QP	300	74	
4	84.4054	31.78	-18.54	13.24	40.00	-26.76	QP	300	121	
5	237.4760	28.66	-14.21	14.45	46.00	-31.55	QP	300	232	
6	504.7062	33.24	-10.86	22.38	46.00	-23.62	QP	300	247	



**Test Results (1GHz-25GHz)**

Test Mode: CH01 (Low channel)									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Detector
2408.0000	90.65	31.12	2.18	35.33	88.62	114.00	-25.38	V	Peak
2408.0000	81.77	31.12	2.18	35.33	79.74	94.00	-14.26	V	AVG
4816.0000	45.38	34.01	2.58	34.65	47.32	74.00	-26.68	V	Peak
4816.0000	38.81	34.01	2.58	34.65	40.75	54.00	-13.25	V	AVG
7224.0000	41.55	36.16	2.97	35.07	45.61	74.00	-28.39	V	Peak
7224.0000	32.85	36.16	2.97	35.07	36.91	54.00	-17.09	V	AVG
9632.0000	*								
12040.0000	*								
14448.0000	*								
16856.0000	*								
2408.0000	87.65	31.12	2.18	35.33	85.62	114.00	-28.38	H	Peak
2408.0000	80.17	31.12	2.18	35.33	78.14	94.00	-15.86	H	AVG
4816.0000	42.89	34.01	2.58	34.65	44.83	74.00	-29.17	H	Peak
4816.0000	34.17	34.01	2.58	34.65	36.11	54.00	-17.89	H	AVG
7224.0000	38.44	36.16	2.97	35.07	42.50	74.00	-31.50	H	Peak
7224.0000	31.63	36.16	2.97	35.07	35.69	54.00	-18.31	H	AVG
9632.0000	*								
12040.0000	*								
14448.0000	*								
16856.0000	*								

**Note:**

1. Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. “\*” means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Test Mode: CH17 (Middle channel)									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Detector
2440.0000	91.77	31.12	2.20	34.51	90.58	114.00	-23.42	V	Peak
2440.0000	84.36	31.22	2.20	34.51	83.27	94.00	-10.73	V	AVG
4880.0000	46.58	34.98	2.49	34.14	49.91	74.00	-24.09	V	Peak
4880.0000	39.94	34.98	2.49	34.14	43.27	54.00	-10.73	V	AVG
7320.0000	40.17	36.01	3.01	34.56	44.63	74.00	-29.37	V	Peak
7320.0000	32.59	36.01	3.01	34.56	37.05	54.00	-16.95	V	AVG
9760.0000	*								
12200.0000	*								
14640.0000	*								
17080.0000	*								
2440.0000	88.69	31.12	2.20	34.51	87.50	114.00	-26.50	H	Peak
2440.0000	79.48	31.12	2.20	34.51	78.29	94.00	-15.71	H	AVG
4880.0000	43.65	34.98	2.49	34.14	46.98	74.00	-27.02	H	Peak
4880.0000	33.58	34.98	2.49	34.14	36.91	54.00	-17.09	H	AVG
7320.0000	39.52	36.01	3.01	34.56	43.98	74.00	-30.02	H	Peak
7320.0000	31.69	36.01	3.01	34.56	36.15	54.00	-17.85	H	AVG
9760.0000	*								
12200.0000	*								
14640.0000	*								
17080.0000	*								

**Note:**

1. Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. “\*” means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Test Mode: CH34 (High channel)									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Detector
2474.0000	94.68	31.65	2.23	36.07	92.49	114.00	-21.51	V	Peak
2474.0000	85.29	31.65	2.23	36.07	83.10	94.00	-10.90	V	AVG
4948.0000	47.66	35.06	2.60	34.93	50.39	74.00	-23.61	V	Peak
4948.0000	40.29	35.06	2.60	34.93	43.02	54.00	-10.98	V	AVG
7422.0000	41.54	36.19	3.12	35.11	45.74	74.00	-28.26	V	Peak
7422.0000	34.17	36.19	3.12	35.11	38.37	54.00	-15.63	V	AVG
9896.0000	*								
12370.0000	*								
14844.0000	*								
17318.0000	*								
2474.0000	92.36	31.65	2.23	36.07	90.17	114.00	-23.83	H	Peak
2474.0000	80.47	31.65	2.23	36.07	78.28	94.00	-15.72	H	AVG
4948.0000	41.69	35.06	2.60	34.93	44.42	74.00	-29.58	H	Peak
4948.0000	35.28	35.06	2.60	34.93	38.01	54.00	-15.99	H	AVG
7422.0000	43.66	36.19	3.12	35.11	47.86	74.00	-26.14	H	Peak
7422.0000	35.77	36.19	3.12	35.11	39.97	54.00	-14.03	H	AVG
9896.0000	*								
12370.0000	*								
14844.0000	*								
17318.0000	*								

**Note:**

1. Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. “\*” means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

**Radiated Band Edge:**

Test Mode:					Test channel: Lowest			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
2390.00	53.69	29.15	3.41	34.01	52.24	74.00	-21.76	V
2400.00	56.74	29.16	3.43	34.01	55.32	74.00	-18.68	V
2390.00	52.17	29.15	3.41	34.01	50.72	74.00	-23.28	H
2400.00	55.66	29.16	3.43	34.01	54.24	74.00	-19.76	H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
2390.00	42.67	29.15	3.41	34.01	41.22	54.00	-12.78	V
2400.00	44.28	29.16	3.43	34.01	42.86	54.00	-11.14	V
2390.00	41.55	29.15	3.41	34.01	40.10	54.00	-13.90	H
2400.00	42.17	29.16	3.43	34.01	40.75	54.00	-13.25	H

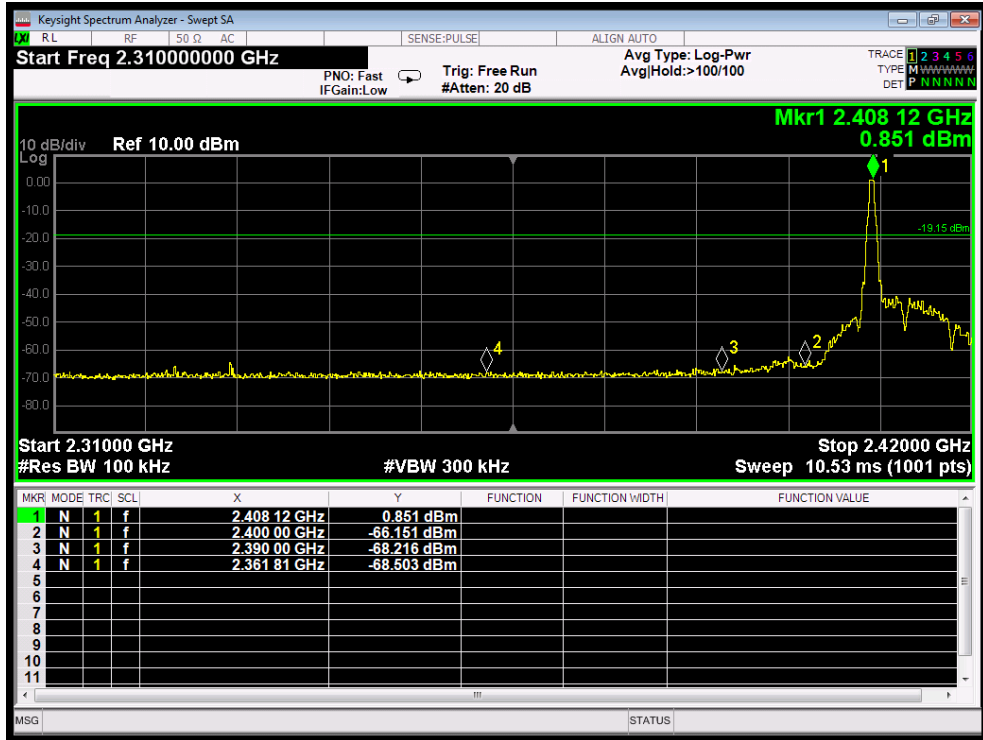
Test Mode:					Test channel: Highest			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
2483.50	55.43	29.28	3.53	34.03	54.21	74.00	-19.79	V
2500.00	52.66	29.30	3.56	34.03	51.49	74.00	-22.51	V
2483.50	57.41	29.28	3.53	34.03	56.19	74.00	-17.81	H
2500.00	54.63	29.30	3.56	34.03	53.46	74.00	-20.54	H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
2483.50	43.40	29.28	3.53	34.03	42.18	54.00	-11.82	V
2500.00	41.69	29.30	3.56	34.03	40.52	54.00	-13.48	V
2483.50	40.57	29.28	3.53	34.03	39.35	54.00	-14.65	H
2500.00	39.77	29.30	3.56	34.03	38.60	54.00	-15.40	H

Remark:

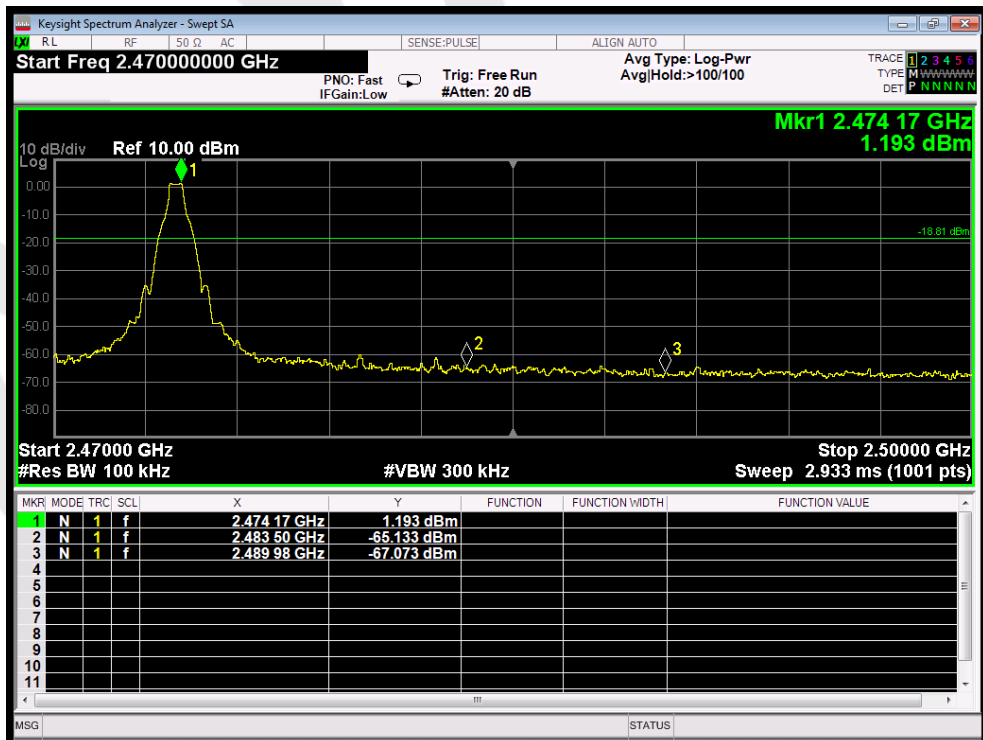
1. Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

Conducted band edge

Frequency Band (MHz)	Delta Peak toBand Emission (dBc)	Limit (dBc)	Results
2408	67.002	>20	PASS
2474	66.326	>20	PASS



Lowest



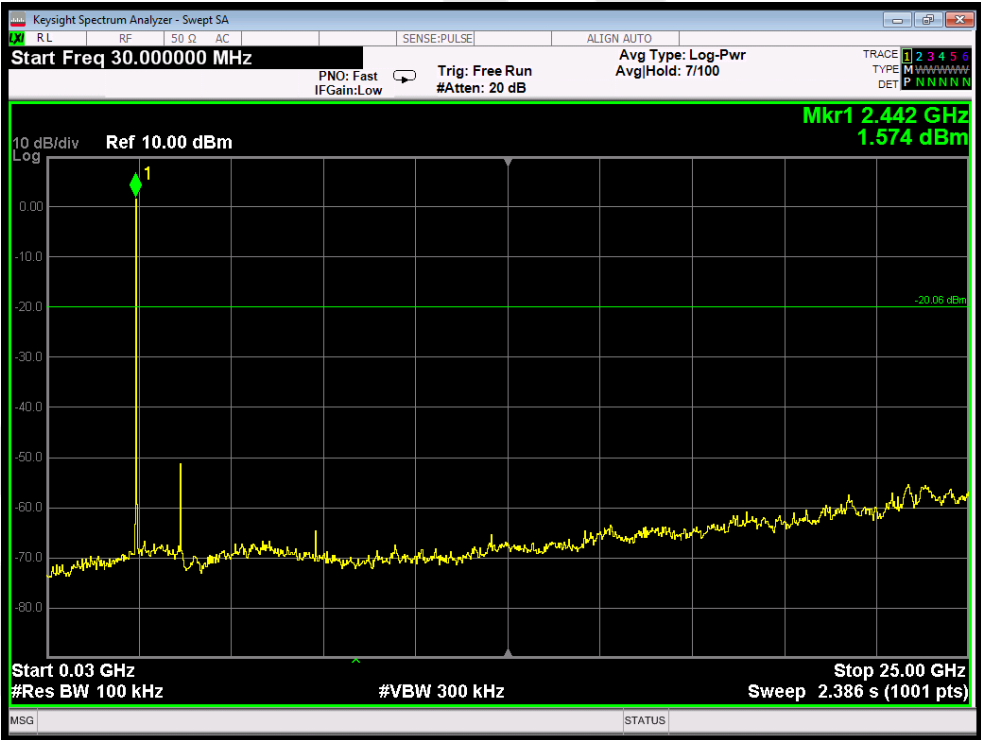
Highest



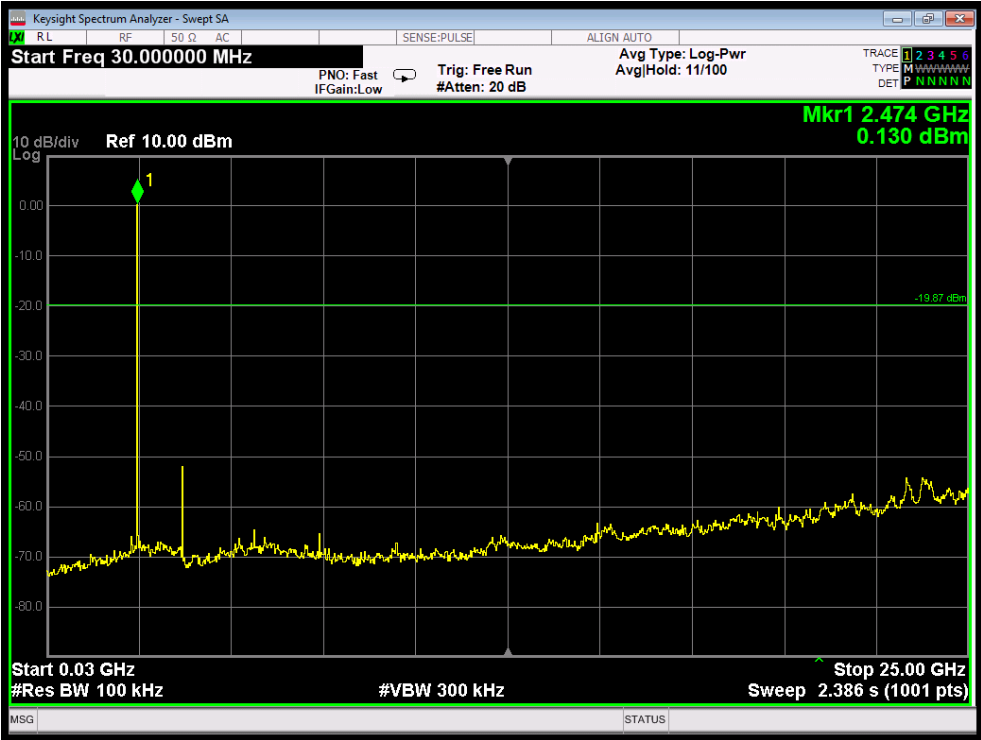
Conducted Emission Method



CH: Low



CH: Middle



CH: High

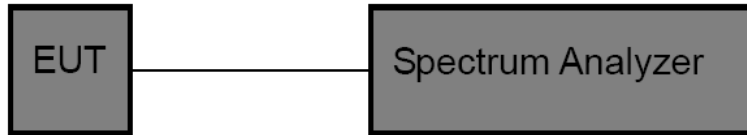
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## 5. 20dB Bandwidth Test

### 5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.249
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### 5.2. Test Setup



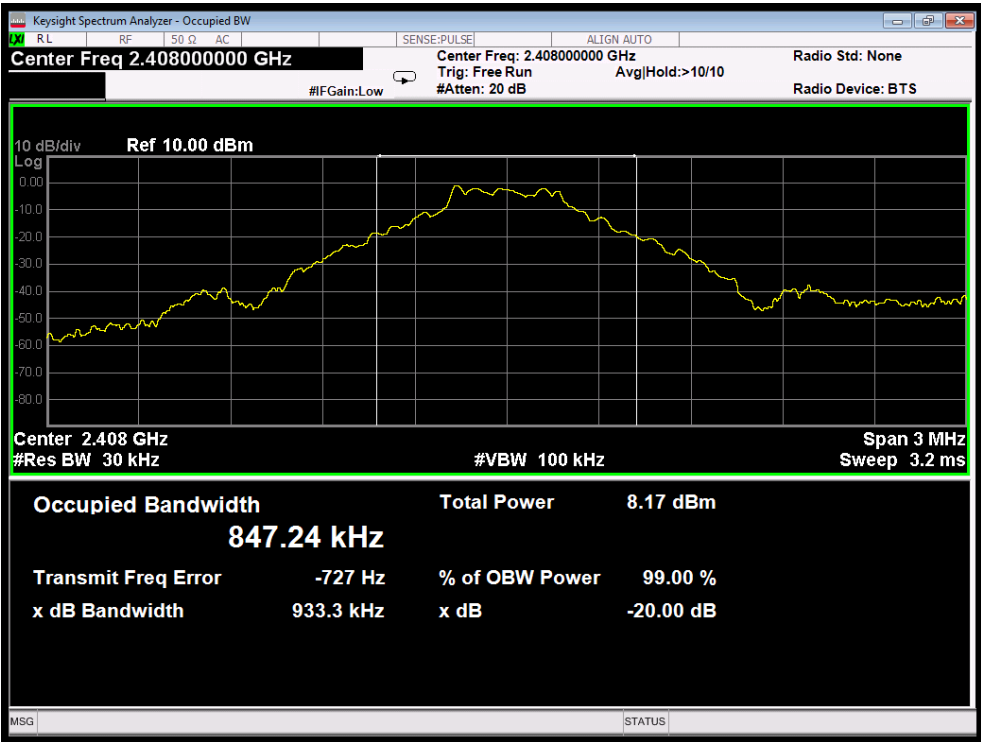
### 5.3. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:  
 RBW = 30kHz, VBW ≥ 3\*RBW = 100kHz,  
 Detector= Average  
 Trace mode= Max hold.  
 Sweep- auto couple.
4. Mark the peak frequency and -20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

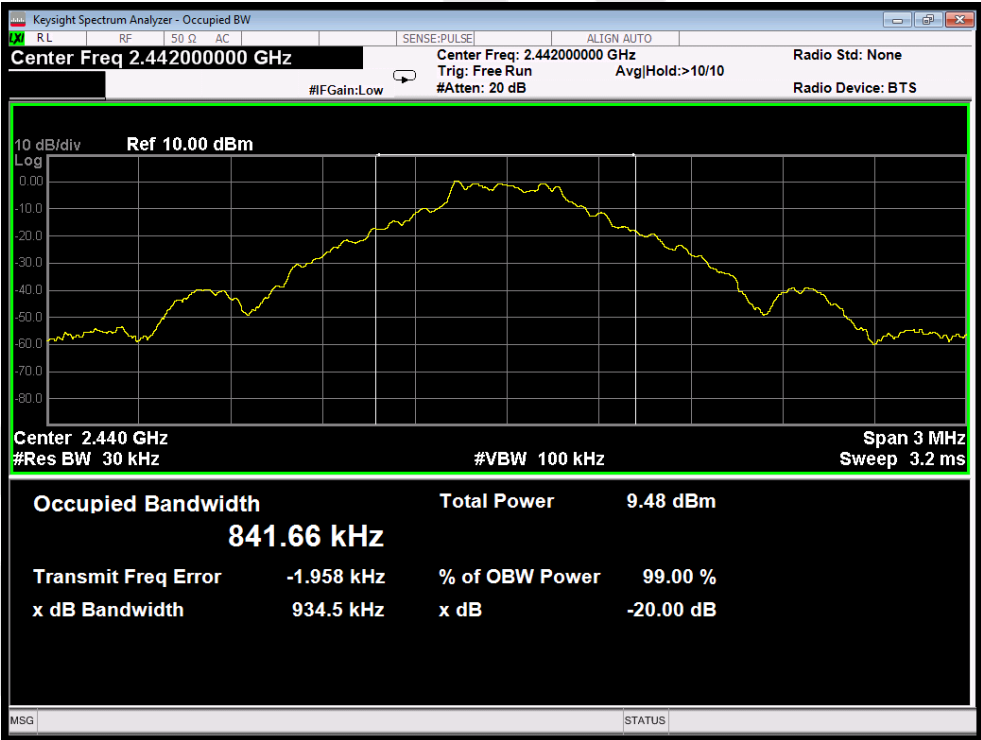
### 5.4. Test Data

Test Item	: 20dB Bandwidth	Test Mode	: TX Mode
Test Voltage	: DC 3.7V	Temperature	: 24°C
Test Result	: PASS	Humidity	: 55%RH

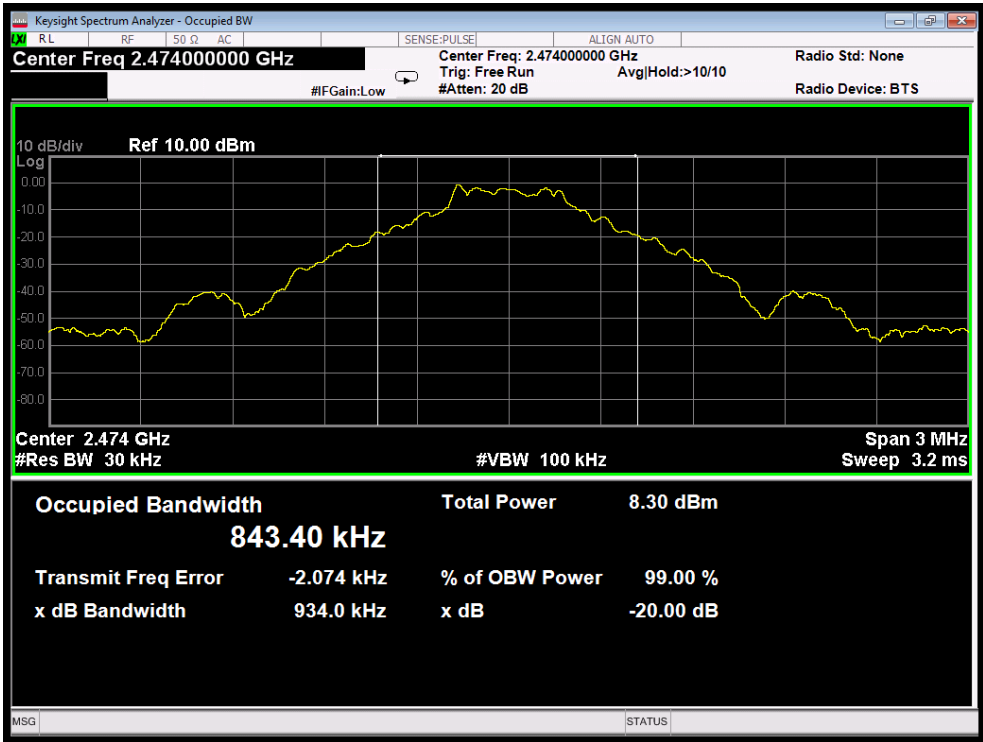
Frequency (MHz)	Bandwidth (kHz)	Result
2408MHZ	933.3	PASS
2440MHZ	934.5	PASS
2474MHZ	934.0	PASS



Test Mode: Low



Test Mode: Middle



Test Mode: High

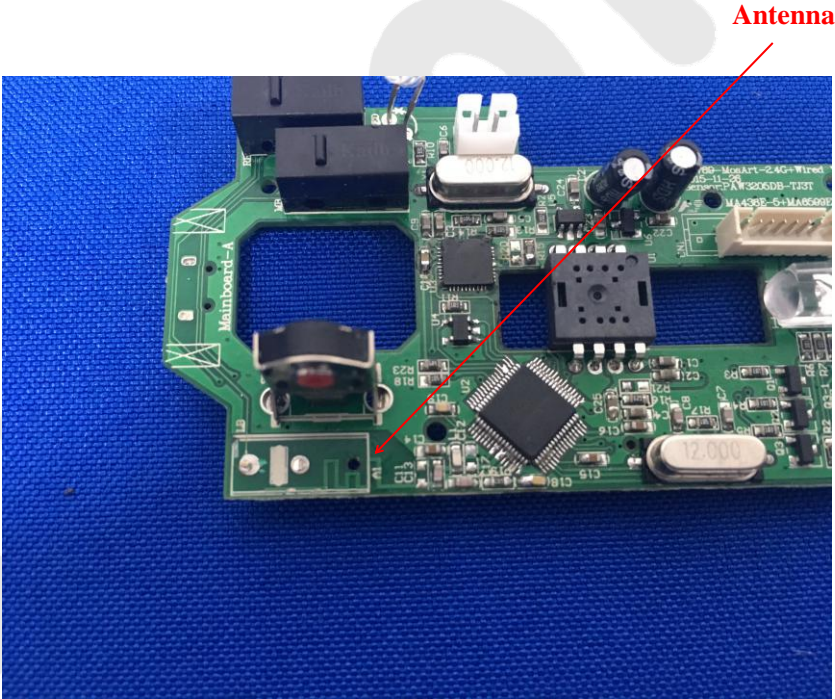
## 6. Antenna Requirement

### 6.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
Requirement	1) 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### 6.2. Antenna Connected Construction

The antenna is a PCB Antenna which permanently attached, and the best case gain of the antenna is 1.55 dBi. It complies with the standard requirement.



## APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Measurement

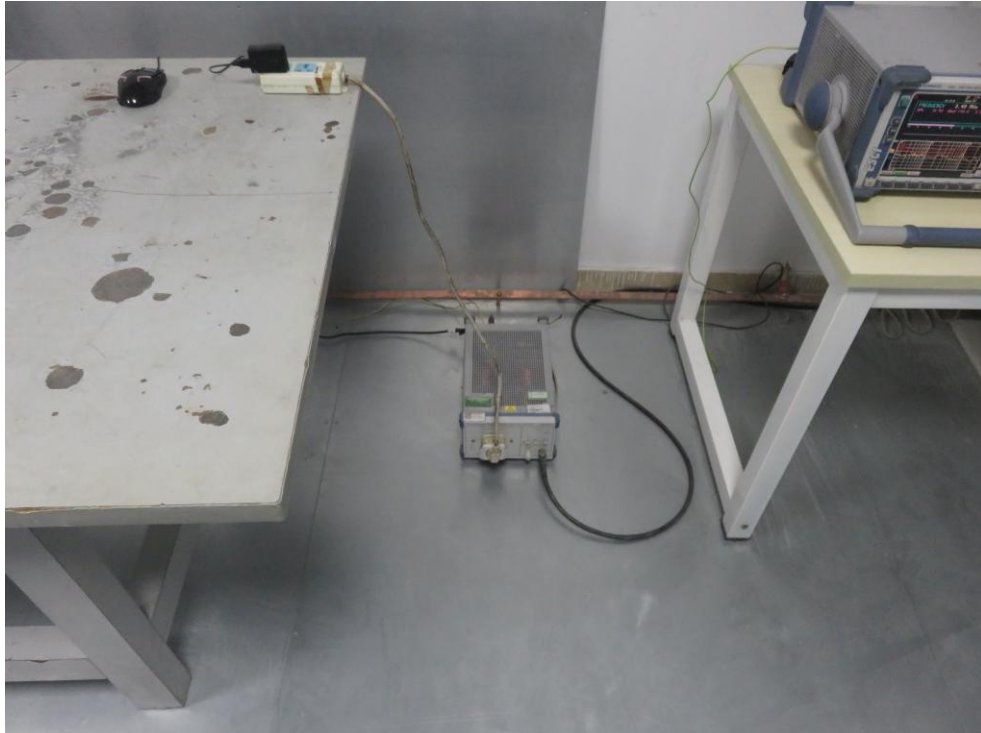
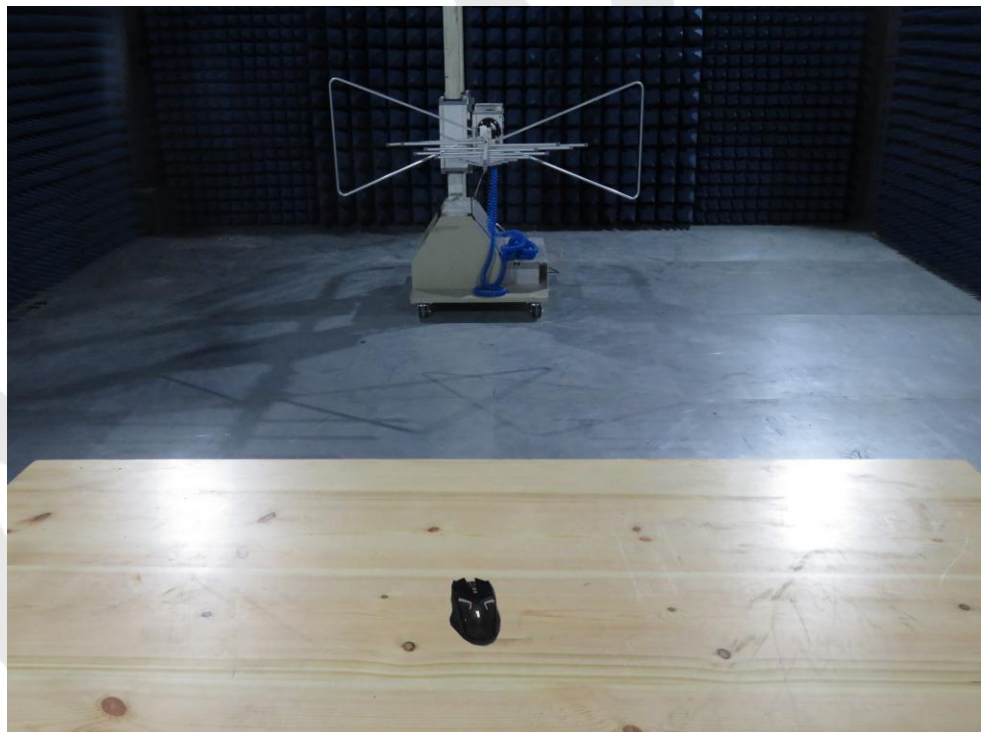
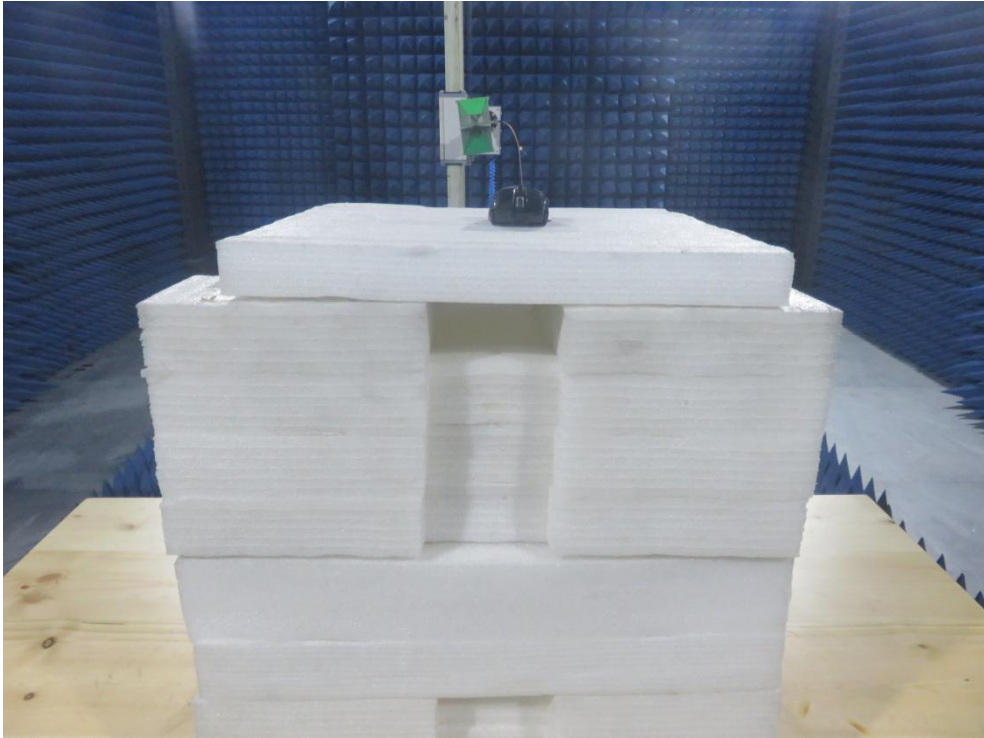


Photo of Radiation Emission Test





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**APPENDIX II -- EXTERNAL PHOTOGRAPH**



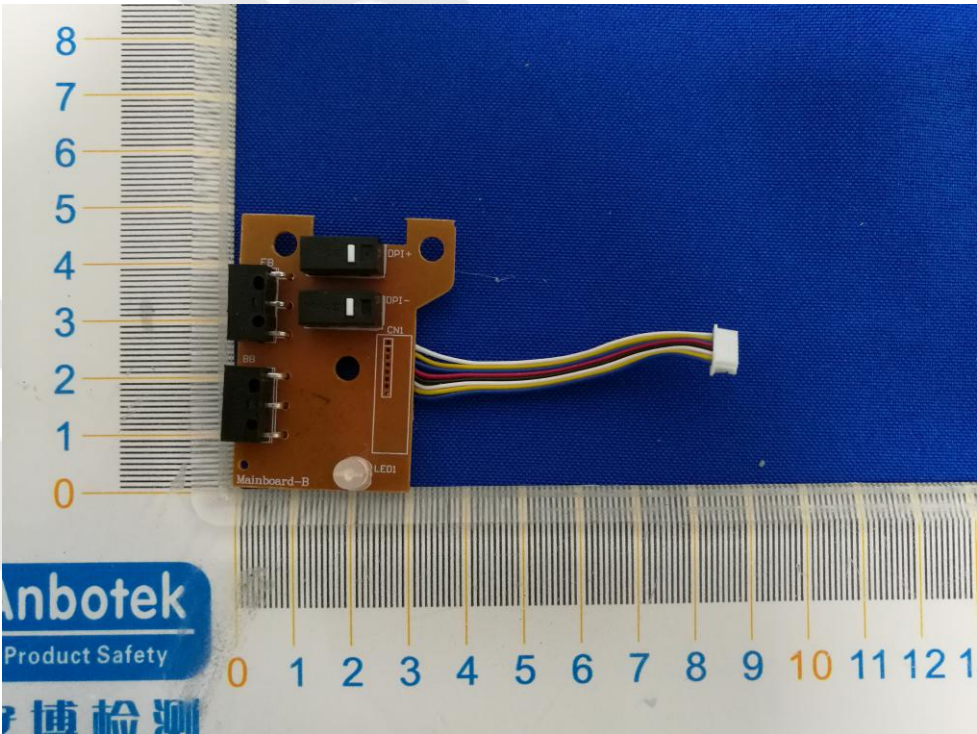
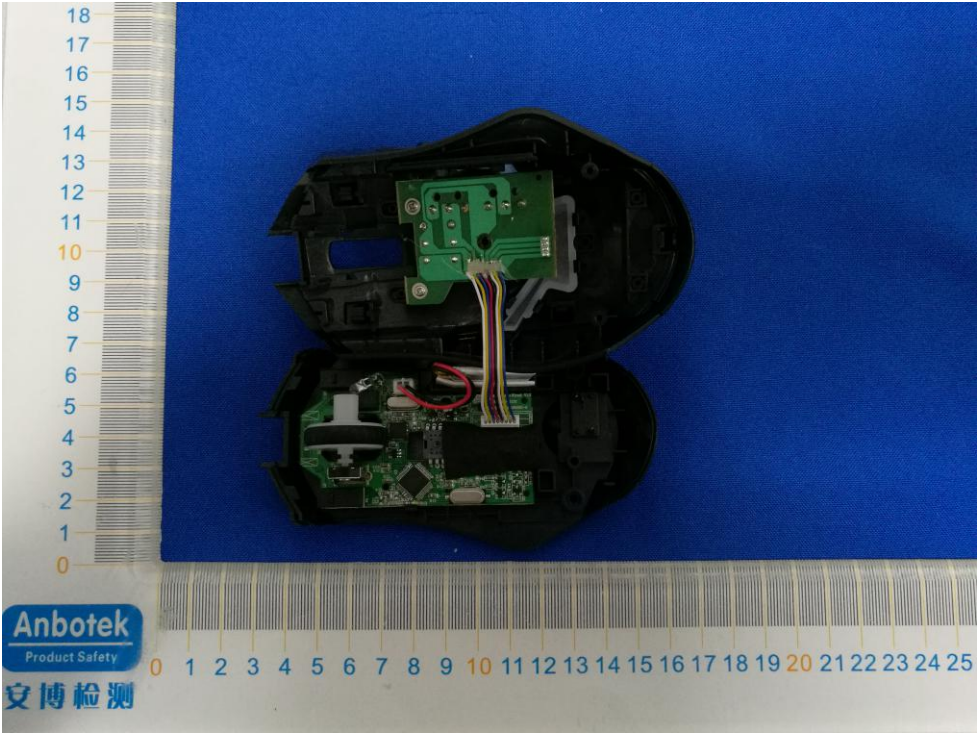


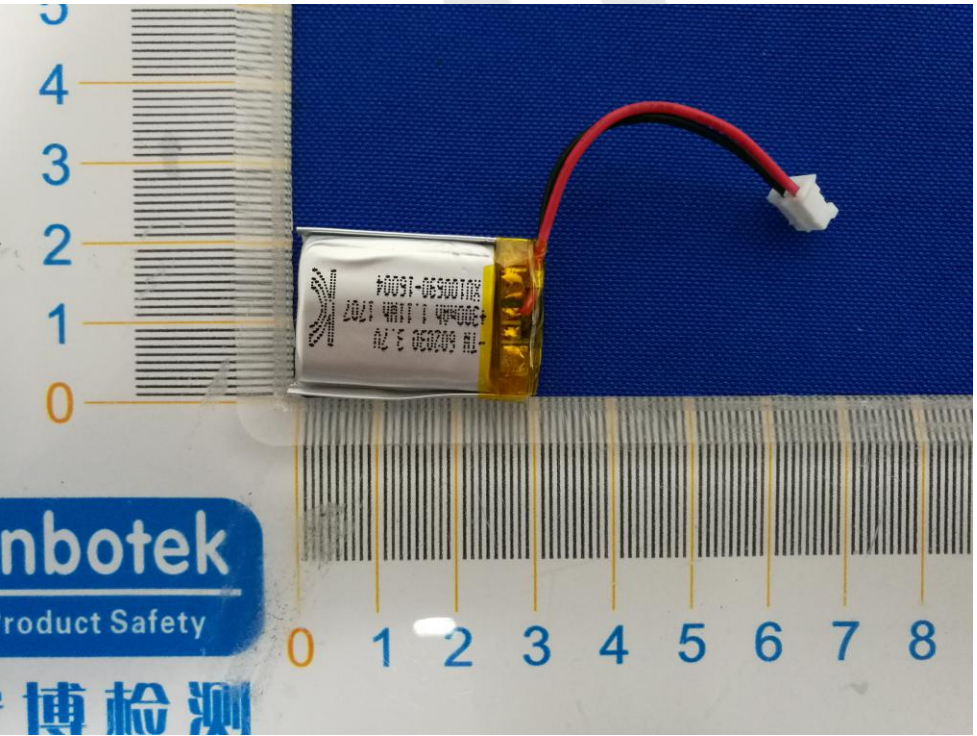
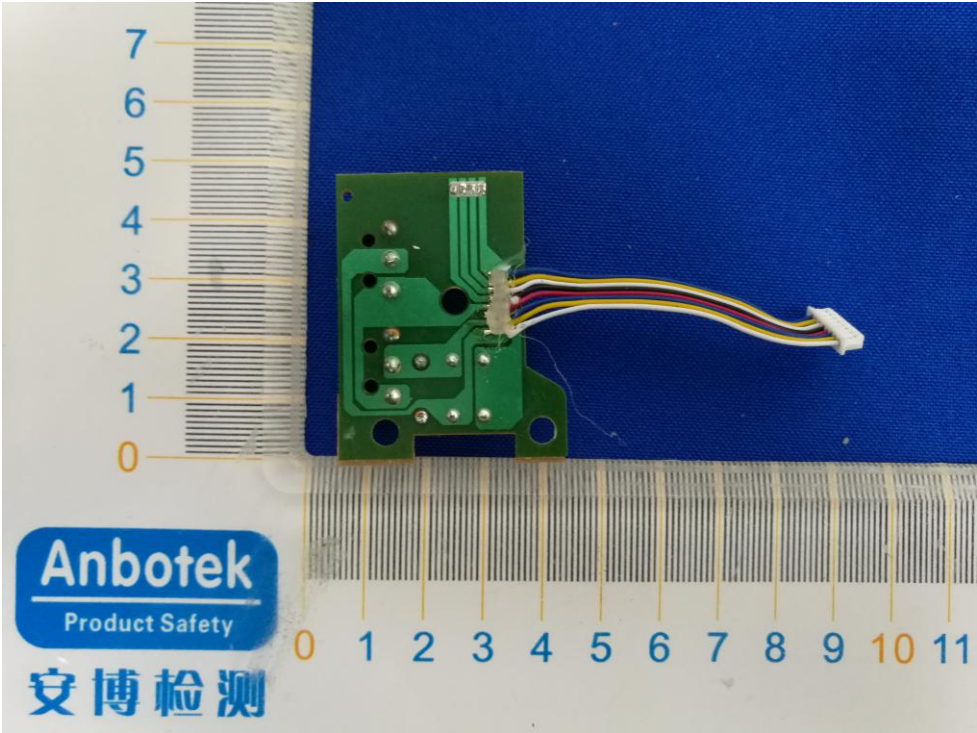


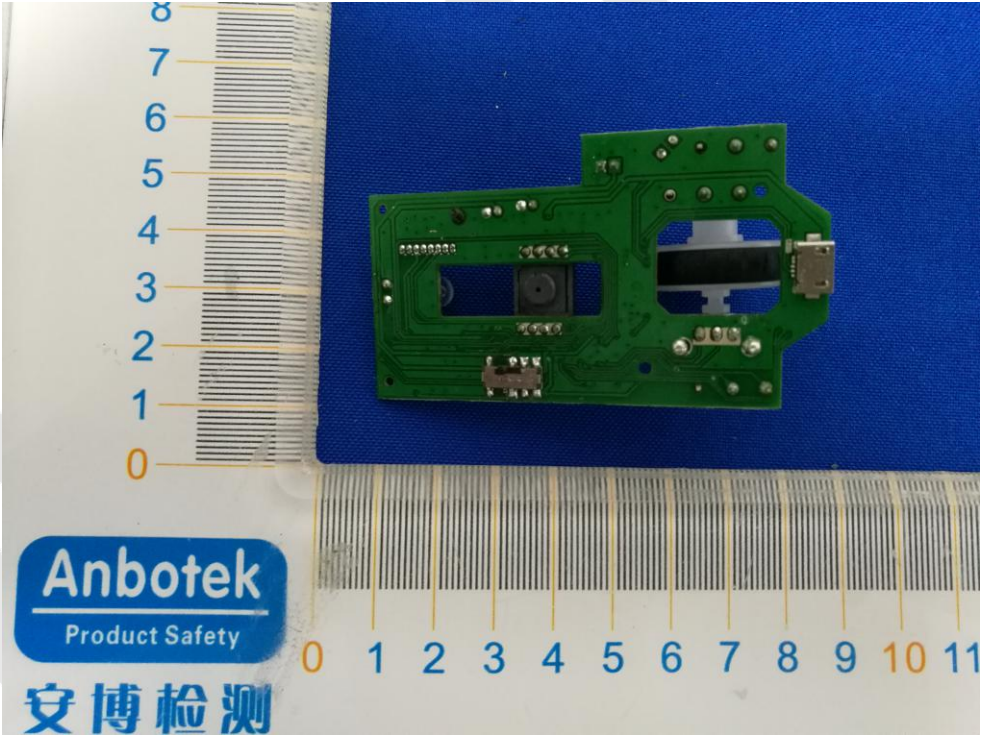
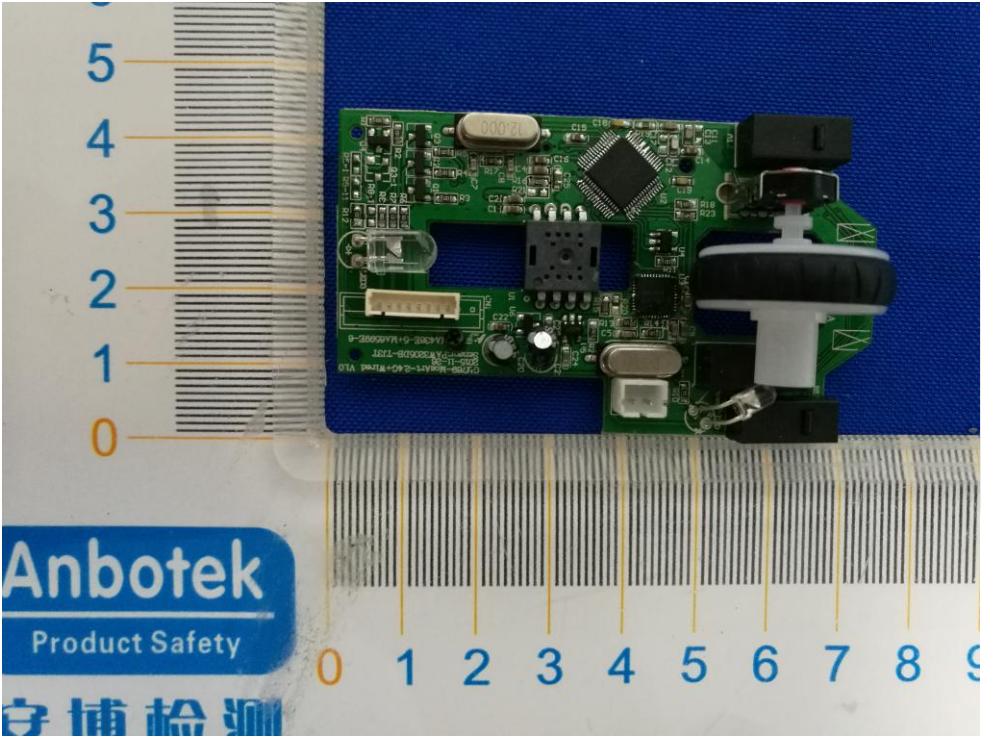


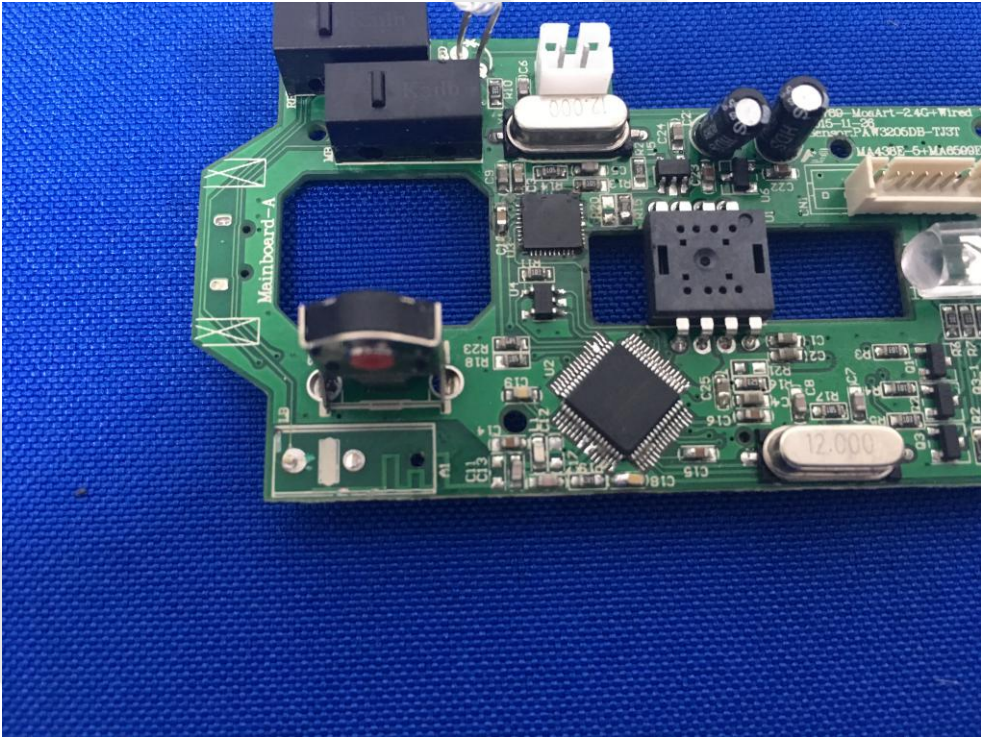
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### APPENDIX III -- INTERNAL PHOTOGRAPH









----- End of Report -----