



PRECISE TESTING

Report No.: PTC20010901801E-FC01

FCC TEST REPORT

FCC ID: 2AVRT-W102

Product Name	:	Wireless Mouse
Model Name	:	W-102,W-102 Blue,W-102 Coral
Brand Name	:	N/A
Report No.	:	PTC20010901801E-FC01

Prepared for

DONGGUAN VIEW SECU TECH CO.,LIMITED

No. 1, Lane 2, Minchang Road, Nanzha 5 District, Humen Town, Dongguan

Prepared by

Dongguan Precise Testing & Certification Co., Ltd.

Building D, Baoding Technology Park, Guangming Road 2, Guangming Community,
Dongcheng District, Dongguan, Guangdong, China



1 TEST RESULT CERTIFICATION

Applicant's name : DONGGUAN VIEW SECU TECH CO.,LIMITED
Address : No. 1, Lane 2, Minchang Road, Nanzha 5 District, Humen Town, Dongguan
Manufacturer's name : DONGGUAN VIEW SECU TECH CO.,LIMITED
Address : No. 1, Lane 2, Minchang Road, Nanzha 5 District, Humen Town, Dongguan
Product name : Wireless Mouse
Model name : W-102,W-102 Blue,W-102 Coral
Brand Name : N/A
Standards : FCC CFR47 Part 15 Section 15.249
Test procedure : ANSI C63.10:2013
Test Date : Feb. 19, 2020 to Feb. 25, 2020
Date of Issue : Feb.26, 2020
Test Result : Pass

This device described above has been tested by PTC, 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

August Qiu

Technical Manager

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Authorized Signatory

Chris Du

Chris Du



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2 Test Summary

Test Items	Test Requirement	Result
AC Power Conducted Emission	15.207	N/A
20dB Bandwidth	15.215(c)	PASS
Band edge	15.249 15.205	PASS
Field Strength of Fundamental Emissions	15.249(a)	PASS
Radiated Spurious Emissions	15.205(a) 15.249(a) (d)	PASS
Antenna Requirement	15.203	PASS

Remark:

N/A: Not Applicable



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3 TEST FACILITY

Dongguan Precise Testing & Certification Corp., Ltd.

Address: Building D, Baoding Technology Park, Guangming Road2, Dongcheng District, Dongguan, Guangdong, China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A-1



4 General Information

4.1 General Description of E.U.T.

Product Name : Wireless Mouse

Model Name : W-102,W-102 Blue,W-102 Coral

Different : They are only different color with red, blue, black and white.

Operating frequency : 2.402-2.480GHZ

Numbers of Channel : 40

Channel Space : 2MHz

Antenna Type: : PCB Print Antenna

Antenna Gain: : 0dBi

Type of Modulation : GFSK

Power supply : DC1.5V Battery



4.2 Test Mode

For Radiated: The EUT's antenna was pre-tested under the following modes:

Test Mode	Description
Mode A	X-Y axis
Mode B	Y-Z axis
Mode C	X-Z axis

From the above modes, the worst case was found in Mode A, Therefore only the test data of the mode was recorded in this report.

Channel List:

1CH	2402 MHz	21CH	2442 MHz
2CH	2404 MHz	22CH	2444 MHz
3CH	2406 MHz	23CH	2446 MHz
4CH	2408 MHz	24CH	2448 MHz
5CH	2410 MHz	25CH	2450 MHz
6CH	2412 MHz	26CH	2452 MHz
7CH	2414 MHz	27CH	2454 MHz
8CH	2416 MHz	28CH	2456 MHz
9CH	2418 MHz	29CH	2458 MHz
10CH	2420 MHz	30CH	2460 MHz
11CH	2422 MHz	31CH	2462 MHz
12CH	2424 MHz	32CH	2464 MHz
13CH	2426 MHz	33CH	2466 MHz
14CH	2428 MHz	34CH	2468 MHz
15CH	2430 MHz	35CH	2470 MHz
16CH	2432 MHz	36CH	2472 MHz
17CH	2434 MHz	37CH	2474 MHz
18CH	2436 MHz	38CH	2476 MHz
19CH	2438 MHz	39CH	2478 MHz
20CH	2440 MHz	40CH	2480 MHz



The 3 channels of lower, middle and higher were chosen for test.

Channel	Frequency(MHz)
1	2402
20	2440
40	2480



5 Equipment During Test

5.1 Equipments List

RF Conducted Test

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
MXG Signal Analyzer	Agilent	N9020A	MY56070279	10Hz-30GHz	Sep.19, 2020
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	Sep.19, 2020
Antenna Connector	Florida RF Labs	N/A	RF01#	N/A	Sep.19, 2020

Remark: 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.

Radiated Emissions

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep.19, 2020
Loop Antenna	Schwarzbeck	FMZB 1519	012	9 KHz -30MHz	Sep.19, 2020
Bilog Antenna	SCHWARZBECK	VULB9160	9160-3355	25MHz-2GHz	Sep.19, 2020
Preamplifier (low frequency)	SCHWARZBECK	BBV 9475	9745-0013	1MHz-1GHz	Sep.19, 2020
Cable	Schwarzbeck	PLF-100	549489	9KHz-3GHz	Sep.19, 2020
Spectrum Analyzer	Agilent	E4407B	MY45109572	9KHz-40GHz	Sep.19, 2020
Horn Antenna	SCHWARZBECK	9120D	9120D-1246	1GHz-18GHz	Sep.19, 2020
Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	1GHz-26.5GHz	Sep.19, 2020
Horn Antenna	SCHWARZBECK	BBHA 9170	9170-181	14GHz-40GHz	Sep.25, 2019
Amplifier	SCHWARZBECK	BBV 9721	9721-205	18GHz-40GHz	Sep.19, 2020
Cable	H+S	CBL-26	N/A	1GHz-26.5GHz	Sep.19, 2020
RF Cable	R&S	R204	R21X	1GHz-40GHz	Sep.19, 2020



Conducted Emissions

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	Sep.19, 2020
Artificial Mains Network	Rohde&Schwarz	L2-16B	000WX31025	9KHz-300MHz	Sep.19, 2020
Artificial Mains Network	Rohde&Schwarz	ENV216	101342	9KHz-300MHz	Sep.19, 2020



5.2 Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	$\pm 1.0\text{dB}$
Power Spectral Density, conducted	$\pm 2.2\text{dB}$
Radio Frequency	$\pm 1 \times 10^{-6}$
Bandwidth	$\pm 1.5 \times 10^{-6}$
Time	$\pm 2\%$
Duty Cycle	$\pm 2\%$
Temperature	$\pm 1^\circ\text{C}$
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 3\%$
Conducted Emissions (150kHz~30MHz)	$\pm 3.64\text{dB}$
Radiated Emission(30MHz~1GHz)	$\pm 5.03\text{dB}$
Radiated Emission(1GHz~25GHz)	$\pm 4.74\text{dB}$
Remark: The coverage Factor (k=2), and measurement Uncertainty for a level of Confidence of 95%	



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5.3 Description of Support Units

Equipment	Model No.	Series No.
N/A	N/A	N/A

6 Conducted Emission

Test Requirement: : FCC CFR 47 Part 15 Section 15.207
Test Method: : ANSI C63.10:2013
Test Result: : N/A
Frequency Range: : 150kHz to 30MHz
Class/Severity: : Class B
Detector: : Peak for pre-scan (9kHz Resolution Bandwidth)

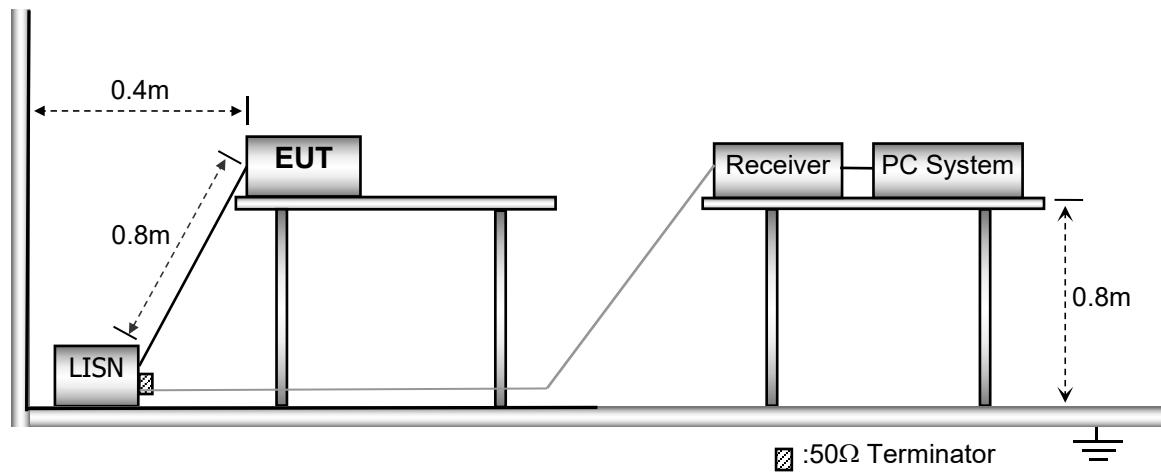
6.1 E.U.T. Operation

Operating Environment :

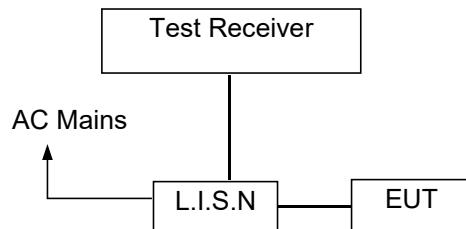
Temperature: : 25.5 °C
Humidity: : 51 % RH
Atmospheric Pressure: : 101.2kPa

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10: 2013



6.3 Test SET-UP (Block Diagram of Configuration)



6.4 Measurement Procedure:

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

6.5 Conducted Emission Limit

Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

6.6 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.7 Conducted Emission Test Result

N/A



7 Field Strength of Fundamental Emission and Radiated Spurious Emissions

Test Requirement: : FCC CFR47 Part 15 Section 15.209 & 15.249

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	$20\log^{(500)}$

Note: 1. Emission level in dBuV/m=20 log (uV/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

The field strength of emission from intentional radiators operated within these frequency bands shall comply with the following:

Frequency(MHz)	Filed Strength of Fundamental(at 3m)		Filed Strength of Harmonics(at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
902-928	114	94	74.0	54.0
2400-2483.5	114	94	74.0	54.0
5725-5875	114	94	74.0	54.0
24000-24250	128	108	88.0	68.0

7.1 EUT Operation

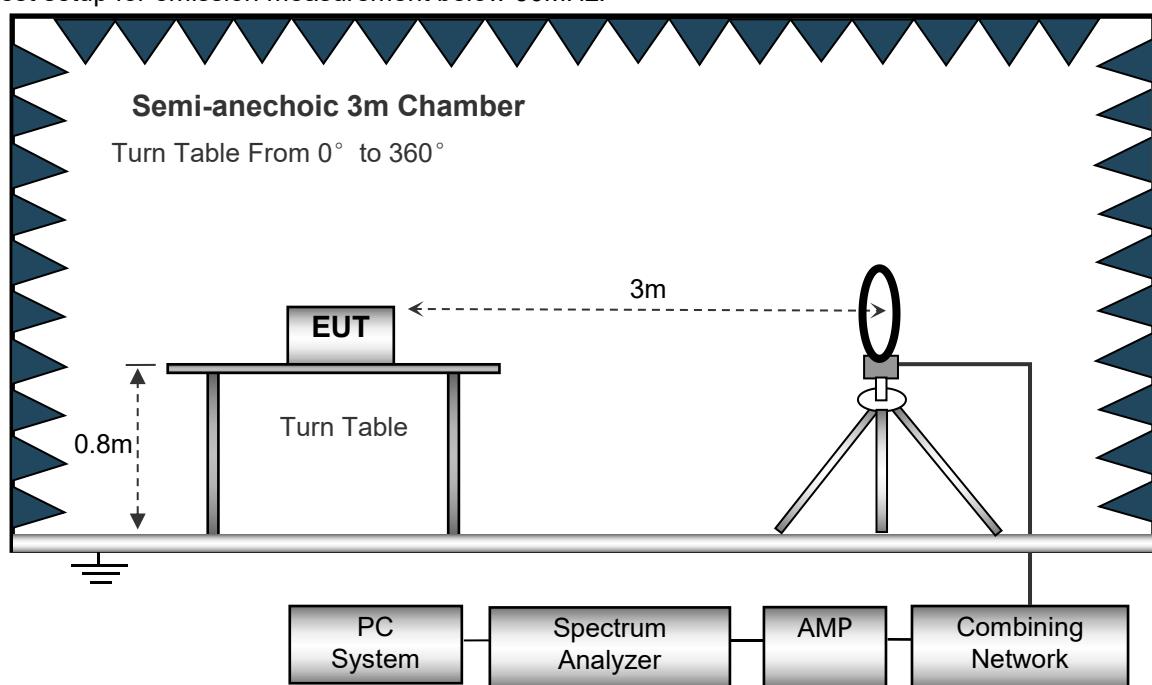
Operating Environment :

Temperature: : 23.5 °C
Humidity: : 51.1 % RH
Atmospheric Pressure: : 101.2kPa
Test Voltage : DC 1.5V

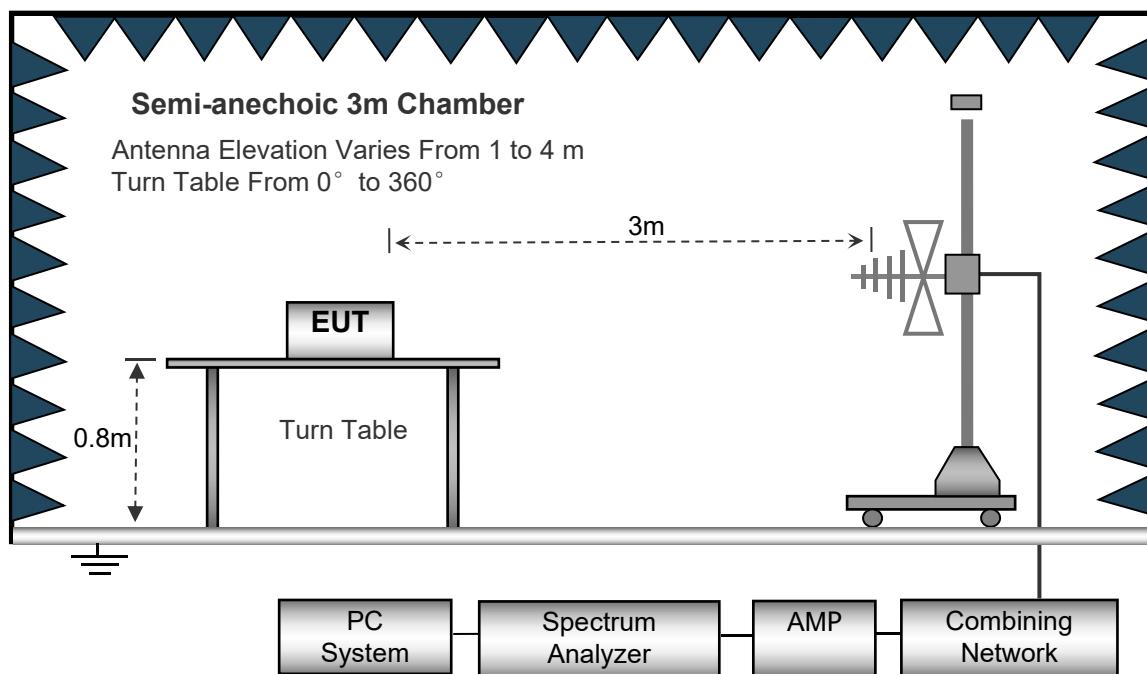
7.2 Test Setup

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

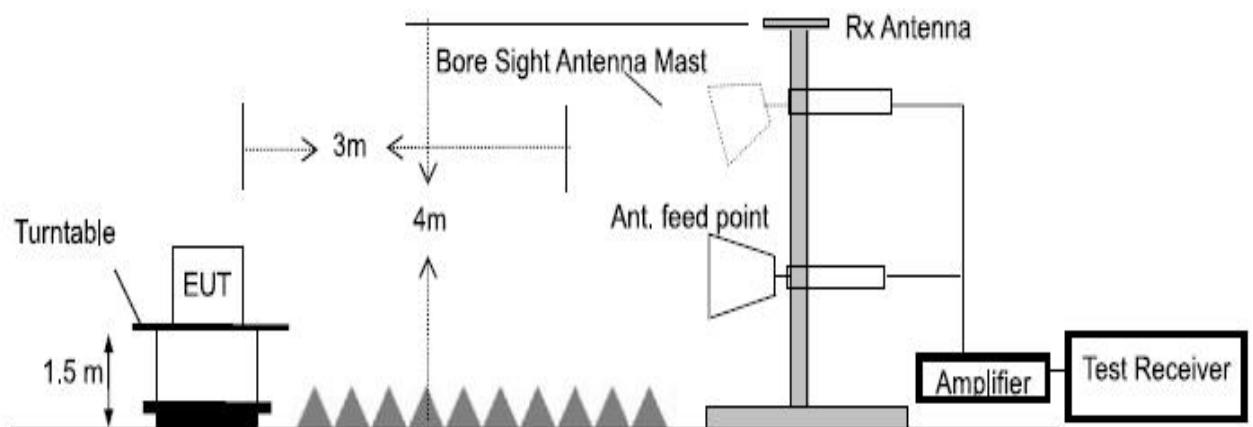
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.





7.3 Spectrum Analyzer Setup

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP



7.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2013.
2. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.
7. Test Procedure of measurement (For Above 1GHz):
 - 1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).
 - 2) Change the antenna polarization and repeat 1) with vertical polarization.
 - 3) Make a hardcopy of the spectrum.
 - 4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
 - 5) Change the analyser mode to Clear/ Write and found the cone of emission.
 - 6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.
 - 7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.
 - 8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.
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.



7.5 Summary of Test Results

Test Frequency: Below 30MHz

The measurements were more than 20 dB below the limit and not reported.

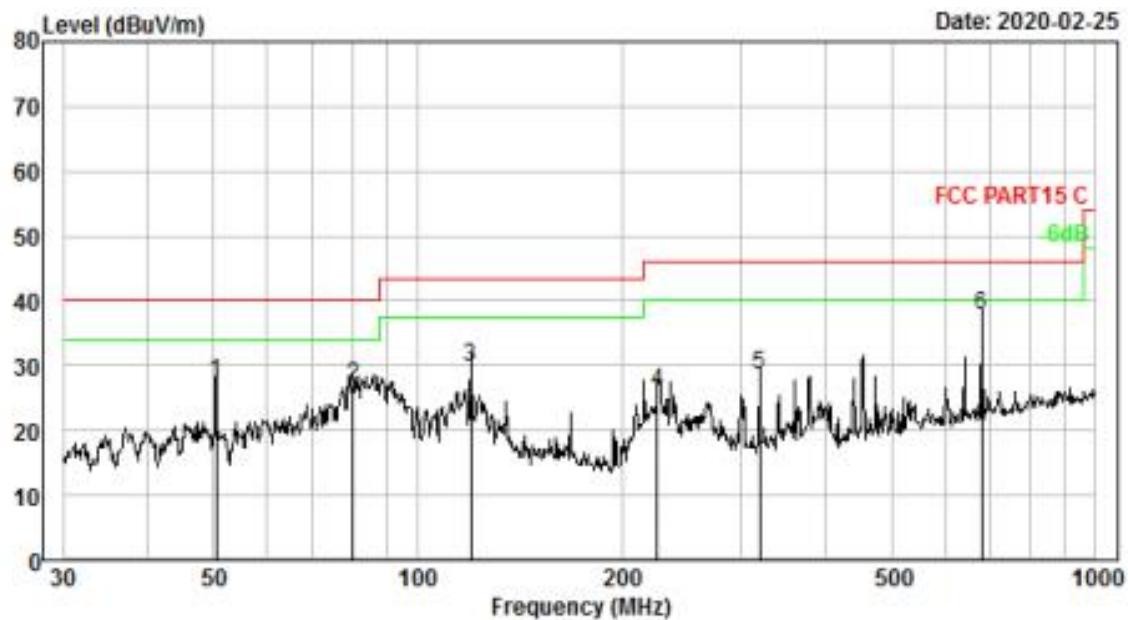
The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

Test Frequency: 30MHz ~ 1GHz

Remark: only the worst data were reported(CH01: 2402MHz).



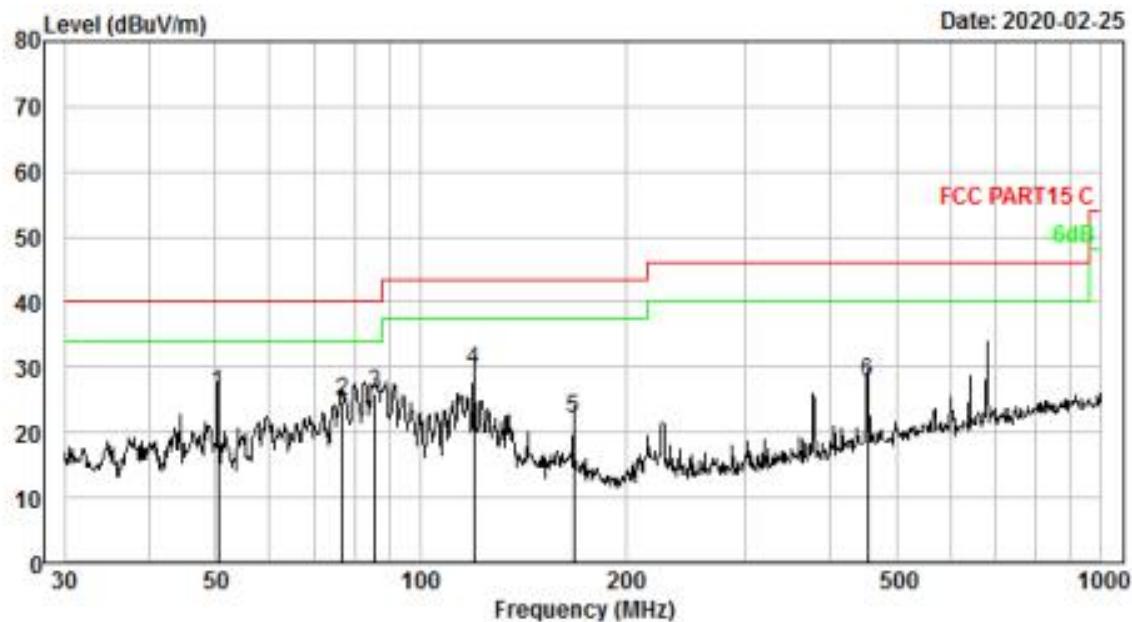
Test plot for Horizontal: 2402MHz



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.	50.409	2.09	12.10	43.29	29.92	27.56	40.00	-12.44	QP
2.	80.362	2.90	8.98	44.94	29.97	26.85	40.00	-13.15	QP
3.	119.856	3.59	11.98	44.36	30.00	29.93	43.50	-13.57	QP
4.	226.099	4.67	11.82	39.55	30.12	25.92	46.00	-20.08	QP
5.	319.937	5.27	13.70	40.01	30.40	28.58	46.00	-17.42	QP
6.	679.960	6.57	19.90	42.38	31.07	37.78	46.00	-8.22	QP



Test plot for Vertical: 2402MHz



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.	50.409	2.09	12.10	41.60	29.92	25.87	40.00	-14.13	
2.	76.781	2.82	9.25	42.71	29.96	24.82	40.00	-15.18	
3.	85.598	3.00	8.76	44.10	29.97	25.89	40.00	-14.11	
4.	119.856	3.59	11.98	44.03	30.00	29.60	43.50	-13.90	
5.	167.824	4.16	13.45	34.50	30.03	22.08	43.50	-21.42	
6.	454.310	5.88	16.01	36.63	30.81	27.71	46.00	-18.29	

**Above 1000MHz-10th Harmonics:**

	Freq. (MHz)	Receiver Reading (dBμV)	Detector (PK/QP/Ave)	Polar (H/V)	Corrected Factor (dB)	Emission Level (dBμV/m)	Limit	Margin (dB)	Result
Lower Channel 2402MHz	2402	86.25	PK	H	13.85	100.10	114	-13.90	Pass
	2402	67.96	Ave	H	13.85	81.81	94	-12.19	Pass
	4804	47.32	PK	H	19.33	66.65	74	-7.35	Pass
	4804	24.27	Ave	H	19.33	43.60	54	-10.40	Pass
	2402	85.37	PK	V	13.85	99.22	114	-14.78	Pass
	2402	67.42	Ave	V	13.85	81.27	94	-12.73	Pass
	4804	46.66	PK	V	19.33	65.99	74	-8.01	Pass
	4804	25.51	Ave	V	19.33	44.84	54	-9.16	Pass
Middle Channel 2440MHz	2440	85.28	PK	H	13.94	99.22	114	-14.78	Pass
	2440	67.13	Ave	H	13.94	81.07	94	-12.93	Pass
	4880	45.74	PK	H	19.43	65.17	74	-8.83	Pass
	4880	27.55	Ave	H	19.43	46.98	54	-7.02	Pass
	2440	86.02	PK	V	13.94	99.96	114	-14.04	Pass
	2440	68.35	Ave	V	13.94	82.29	94	-11.71	Pass
	4880	46.06	PK	V	19.43	65.49	74	-8.51	Pass
	4880	26.34	Ave	V	19.43	45.77	54	-8.23	Pass



Upper Channel 2480MHz	2480	85.73	PK	H	14.02	99.75	114	-14.25	Pass
	2480	67.37	Ave	H	14.02	81.39	94	-12.61	Pass
	4960	43.23	PK	H	19.51	62.74	74	-11.26	Pass
	4960	25.76	Ave	H	19.51	45.27	54	-8.73	Pass
	2480	84.89	PK	V	14.02	98.91	114	-15.09	Pass
	2480	68.33	Ave	V	14.02	82.35	94	-11.65	Pass
	4960	42.52	PK	V	19.51	62.03	74	-11.97	Pass
	4960	25.26	Ave	V	19.51	44.77	54	-9.23	Pass

8 BAND EDGE EMISSION

8.1 TEST PROCEDURE

The EUT was placed on a styrofoam table which is 1.5m above ground plane.

The measurement procedure at the band edges was simplified by performing the measurement in just one plot. Both, the in-band-emission and the unwanted emission were encompassed by the span. After trace stabilization, the maximum peak was determined by a peak detector and the value was marked by an appropriate limit line. The second limit line, which is 20dB below the first, marks the limit for the emissions in the unrestricted band. A maximum-peak-detector marks the highest emission in the unrestricted band next to the band edge.

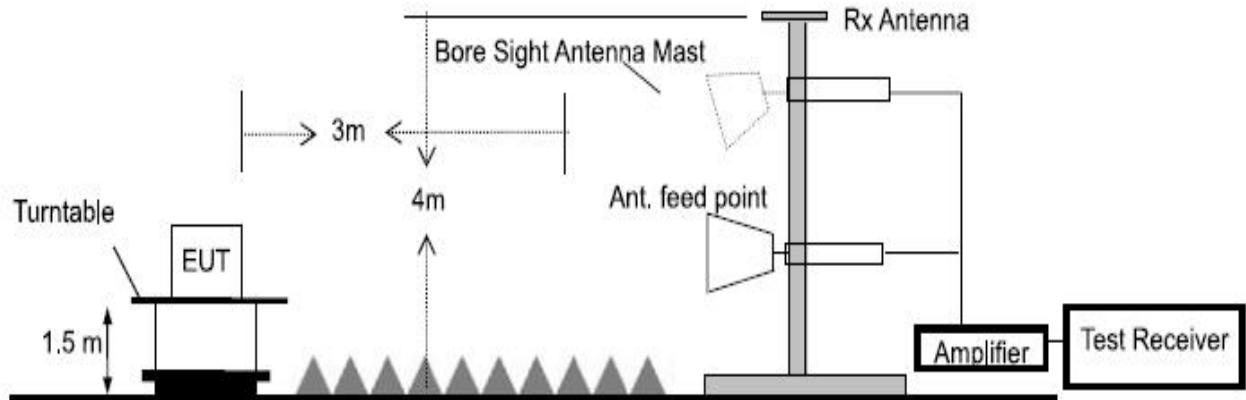
The measurements were performed at the lower end of the 2.4GHz band.

Use the following spectrum analyzer settings:

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz:

EMI Test Receiver	Setting
Attenuation	Auto
RBW	1MHz
VBW	3MHz
Detector	Peak
Trace	Max hold

8.2 TEST SETUP





8.3 TEST RESULTS

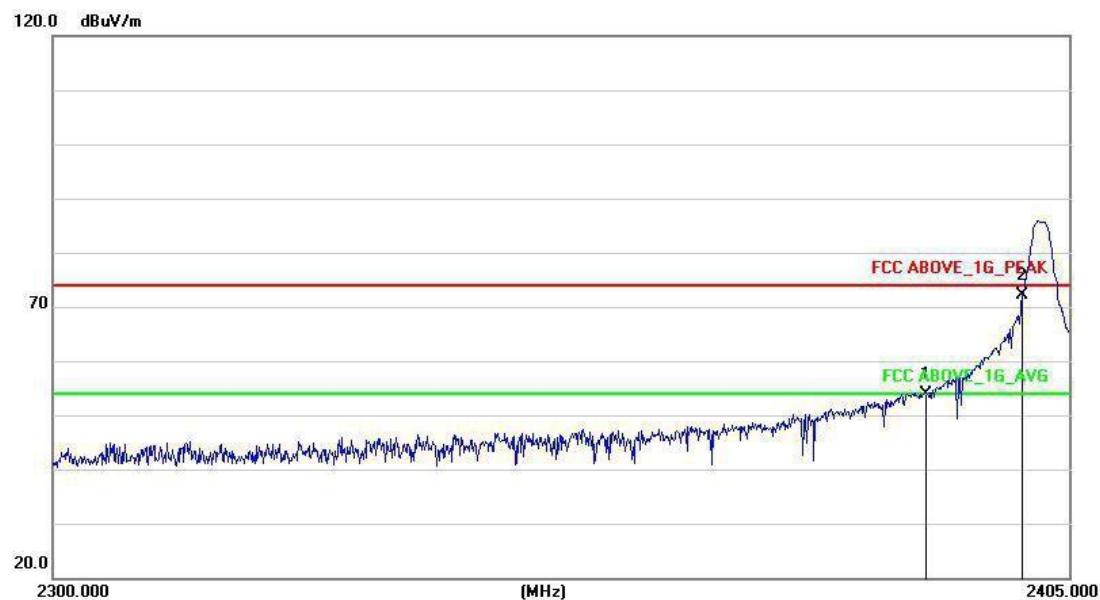
	Frequency (MHz)	Antenna polarization (H/V)	Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission	Emission	Band edge Limit		Result
						(dBuV/m)	(dBuV/m)	PK	AV	
GFSK	<2400	H	2390.00	58.51	-4.71	53.80	38.78	74.00	54.00	Pass
	<2400	V	2390.00	51.22	-4.71	46.51	31.53	74.00	54.00	Pass
	<2400	H	2400.00	76.80	-4.77	72.03	57.02	74.00	54.00	Pass
	<2400	V	2400.00	68.89	-4.77	64.12	49.15	74.00	54.00	Pass
	>2483.5	H	2483.50	64.30	-5.08	59.22	44.19	74.00	54.00	Pass
	>2483.5	V	2483.50	61.02	-5.08	55.94	40.98	74.00	54.00	Pass
	>2483.5	H	2485.50	60.03	-5.08	54.95	39.97	74.00	54.00	Pass
	>2483.5	V	2485.50	57.01	-5.08	51.93	36.91	74.00	54.00	Pass



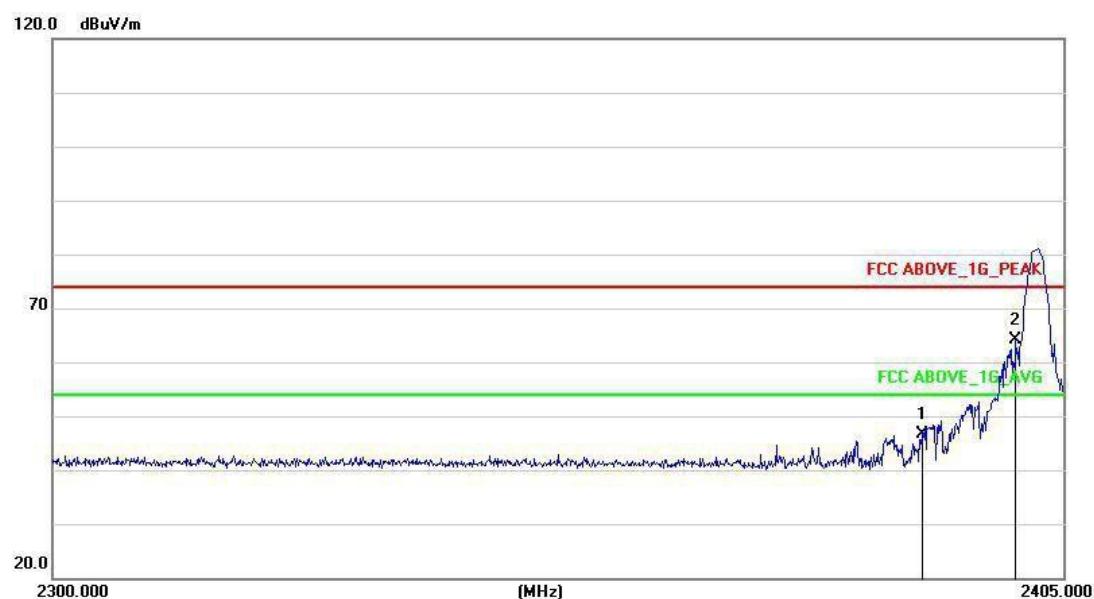
PRECISE TESTING

Report No.: PTC20010901801E-FC01

2402MHz Horizontal



2402MHz Vertical

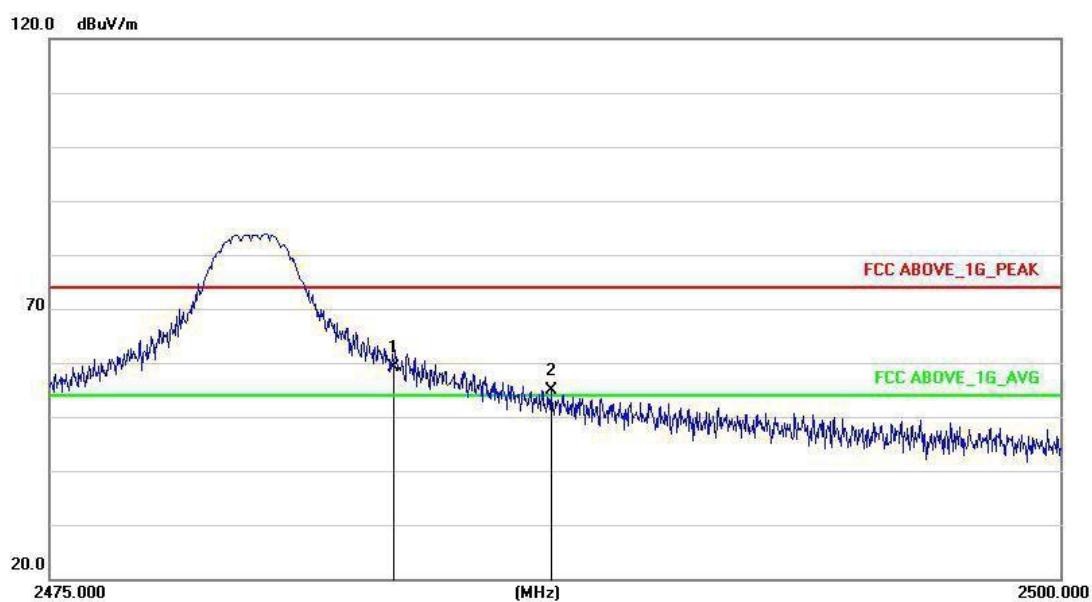




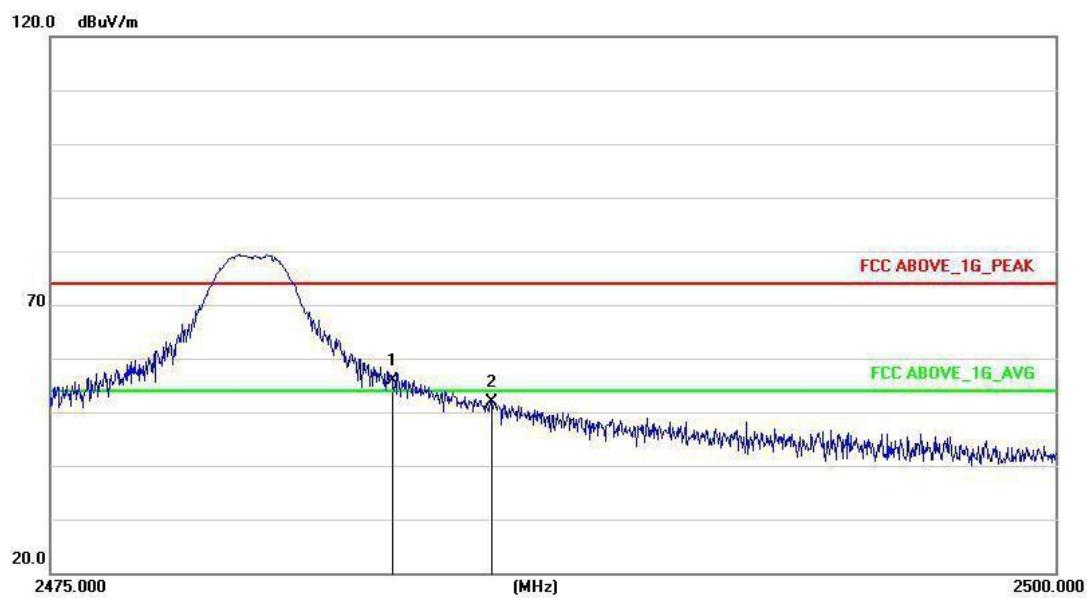
PRECISE TESTING

Report No.: PTC20010901801E-FC01

2480MHz Horizontal



2480MHz Vertical





9 20 dB Bandwidth Measurement

Test Requirement : FCC Part 15C Section 15.215(c)/Part 2 J Section 2.1049

Test Method : ANSI C63.10:2013

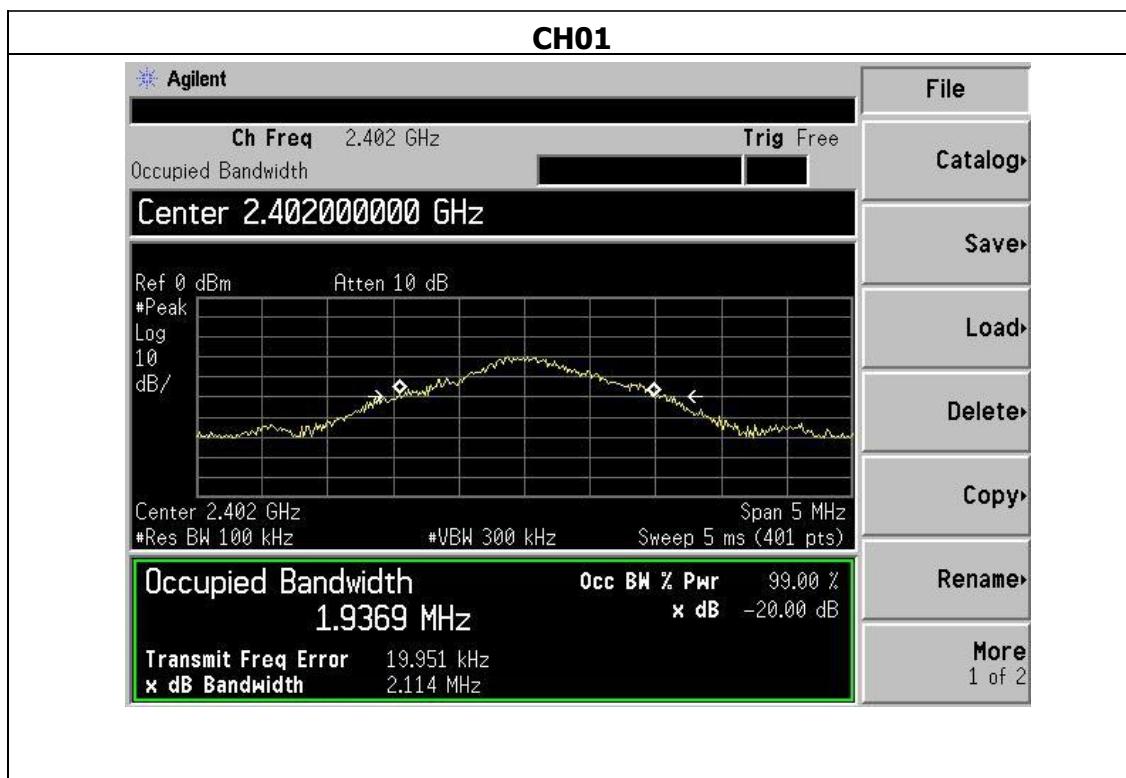
9.1 Test Procedure

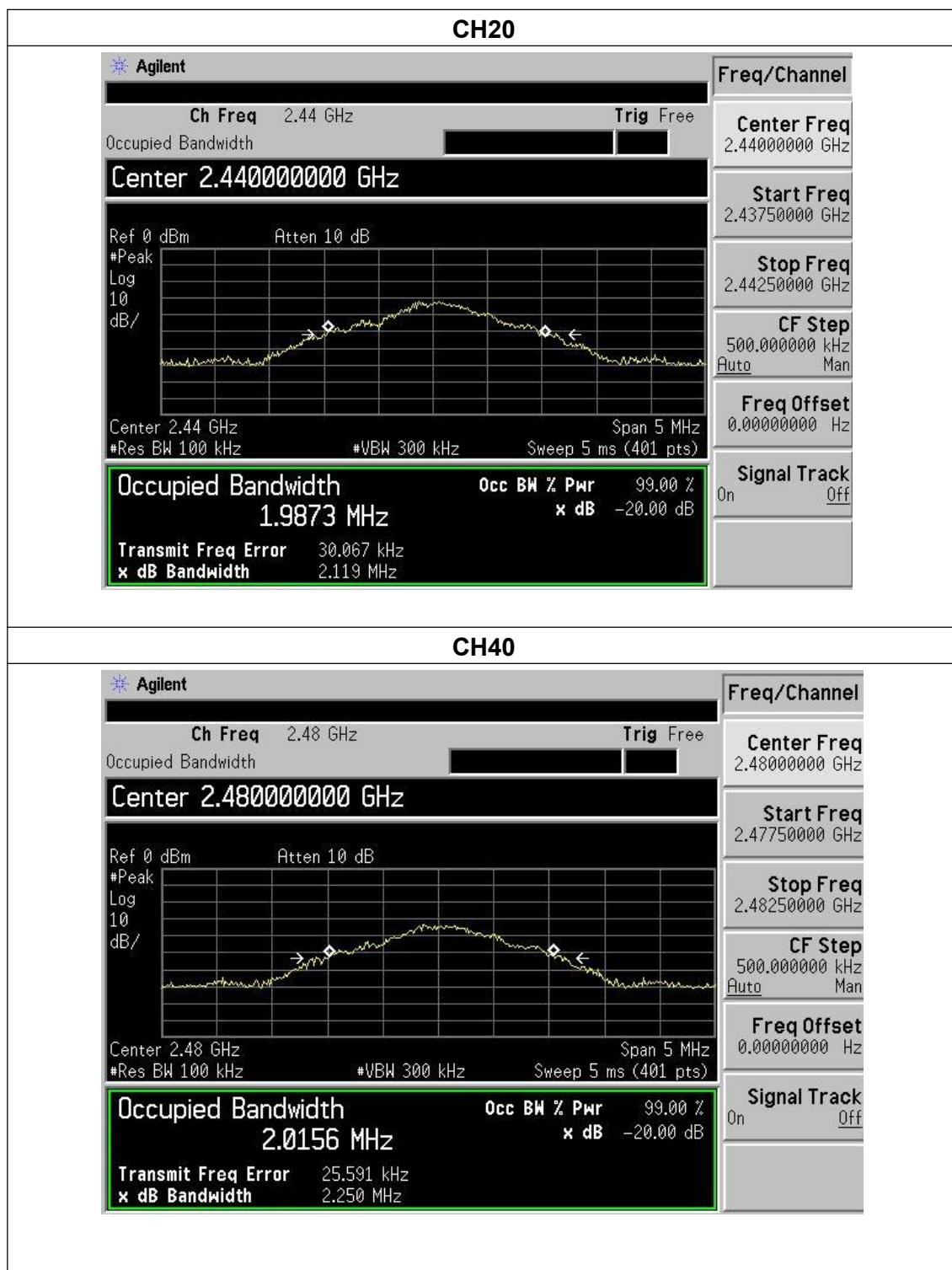
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

9.2 Test Result

Test Mode: CH1 / CH20 / CH40 (GFSK Mode)

Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
01	2402	2114
20	2440	2119
40	2480	2250







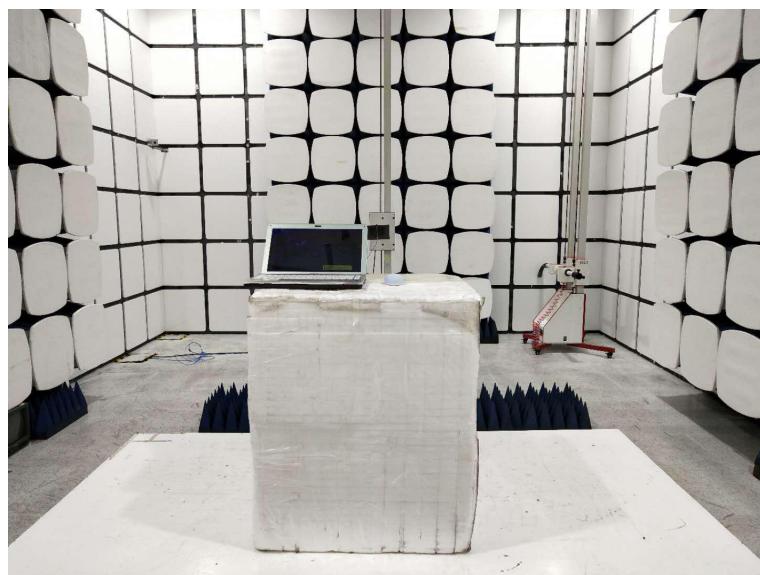
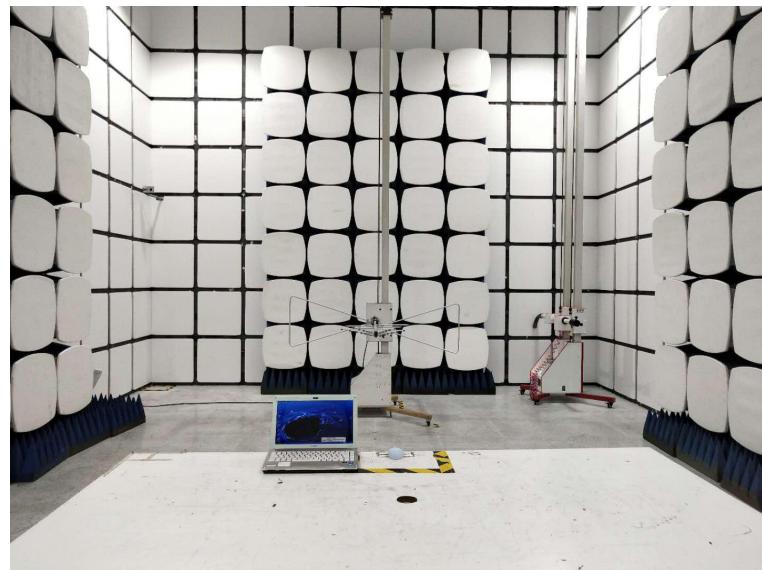
PRECISE TESTING

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10 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 internal PCB Antenna, 0dBi, it meet the requirement of this section.

11 TEST PHOTOS

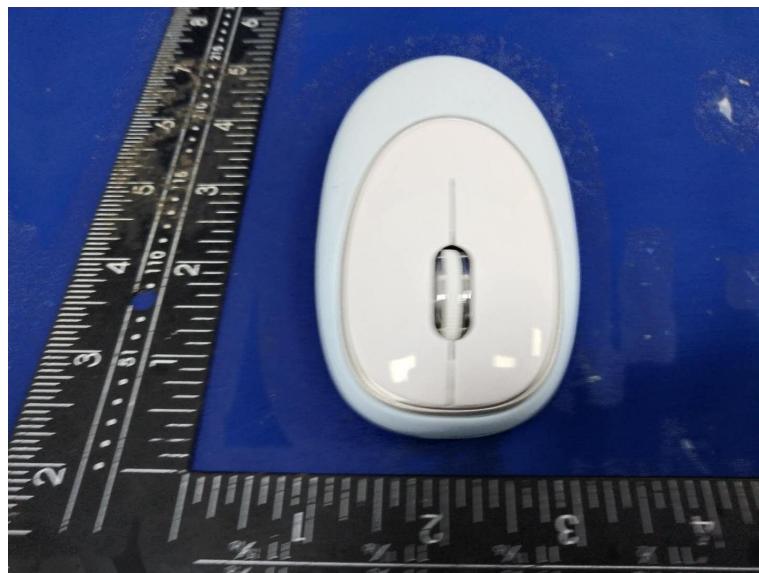




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12 EUT PHOTOS





PRECISE TESTING

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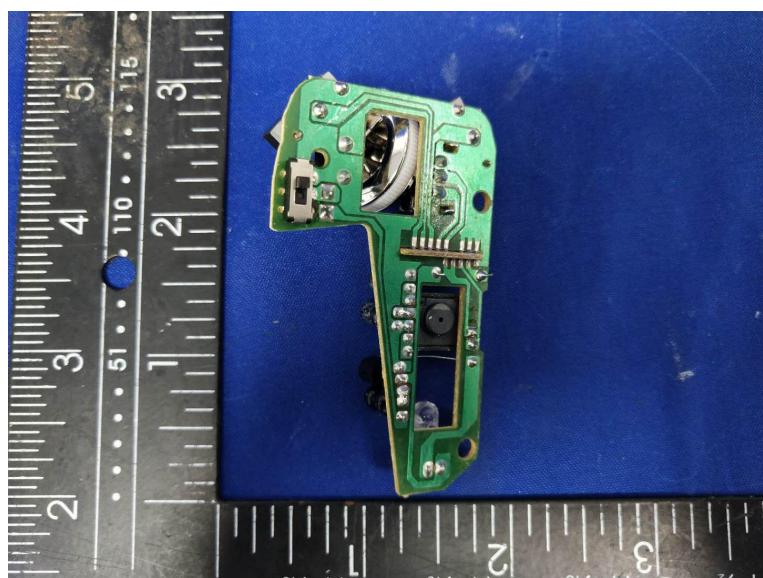
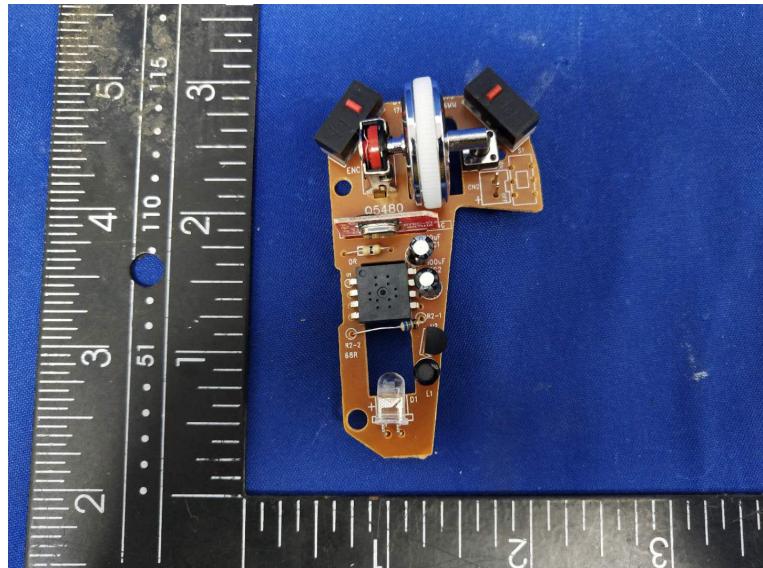






PRECISE TESTING

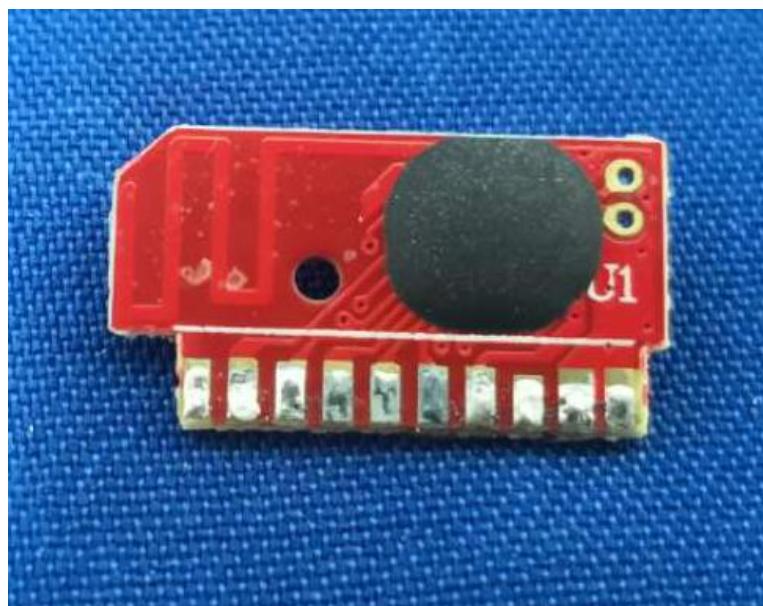
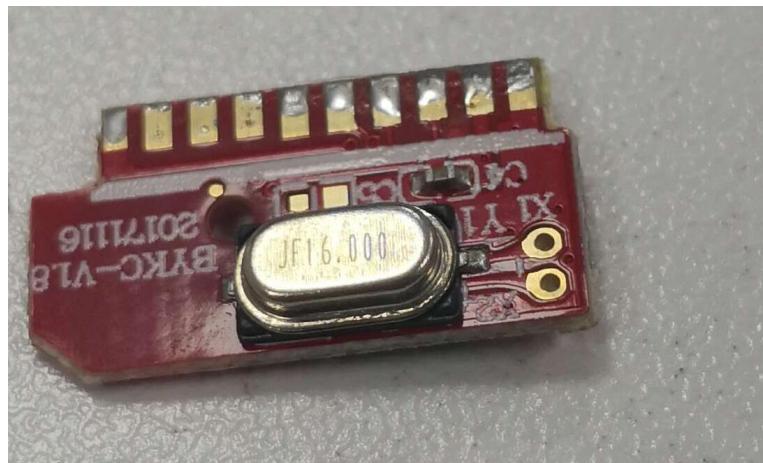
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PRECISE TESTING

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