FCC REPORT

Applicant:	Eluktronics Inc
Address of Applicant:	861 Newtown Yardley Road Newtown, Pennsylvania, USA 18940
Equipment Under Test (EUT)	
Product Name:	Wireless eSports Gaming Mouse
Model No.:	Covert Varmint
FCC ID:	2A3CGCOVERTVARMI
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	31 Aug., 2021
Date of Test:	31 Aug., to 16 Sep., 2021
Date of report issued:	17 Sep., 2021
Test Result:	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Bruce Zhang
Laboratory Manager

2 Version

Version No.	Date	Description
00	*17 Sep., 2021*	*Original*

Tested by: Mike.ou ***Date:*** *17 Sep., 2021*

Test Engineer

Reviewed by: Winner Zhang ***Date:*** *17 Sep., 2021*

Project Engineer

3 Contents

Page

4 Test Summary

Test Items	Section in CFR 47	Test Data	Result
Antenna Requirement	15.203 & 15.247 (b)	See Section 6.1	Pass
AC Power Line Conducted Emission	15.207	See Section 6.2	Pass
Conducted Peak Output Power	15.247 (b)(1)	Appendix A - 2.4G	Pass
20dB Occupied Bandwidth	15.247 (a)(1)	Appendix A - 2.4G	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Appendix A - 2.4G	Pass
Hopping Channel Number	15.247 (a)(1)	Appendix A - 2.4G	Pass
Dwell Time	15.247 (a)(1)	Appendix A - 2.4G	Pass
Conducted Band Edge	15.205 & 15.209	Appendix A - 2.4G	Pass
Radiated Band Edge		See Section 6.9.2	Pass
Conducted Spurious Emission	15.247(d)	Appendix A - 2.4G	Pass
Radiated Spurious Emission		See Section 6.10.2	Pass

Remark:

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *N/A: Not Applicable.*
3. *The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB (provided by the customer).*

Test Method:	*ANSI C63.10-2013* *KDB 558074 D01 15.247 Meas Guidance v05r02*

5 General Information

5.1 Client Information

Applicant:	Eluktronics Inc
Address:	861 Newtown Yardley Road Newtown, Pennsylvania, USA 18940
Manufacturer:	Eluktronics Inc
Address:	861 Newtown Yardley Road Newtown, Pennsylvania, USA 18940

5.2 General Description of E.U.T.

Product Name:	Wireless eSports Gaming Mouse
Model No.:	Covert Varmint
Operation Frequency:	2402MHz~2480MHz
Transfer rate:	2 Mbits/s
Number of channel:	16
Modulation type:	GFSK
Modulation technology:	FHSS
Antenna Type:	Internal Antenna
Antenna gain:	-1dBi (Max.)
Power supply:	Rechargeable Li-ion Battery DC3.7V, 500mAh
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

Operation Frequency each of channel for GFSK							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	5	2407MHz	9	2414MHz	13	2419MHz
2	2426MHz	6	2422MHz	10	2436MHz	14	2439MHz
3	2441MHz	7	2445MHz	11	2459MHz	15	2453MHz
4	2463MHz	8	2466MHz	12	2473MHz	16	2480MHz
Remark: Channel 1, 3 &16 selected for GFSK							

5.3 Test environment and mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test Modes:	
Non-hopping mode:	Keep the EUT in continuous transmitting mode with worst case data rate.
Hopping mode:	Keep the EUT in hopping mode.
Remark	GFSK (1 Mbps) is the worst case mode.
Radiated Emission: The sample was placed 0.8m (below 1GHz)/1.5m (above 1GHz) above the ground plane of 3m chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

5.4 Description of Support Units

The EUT has been tested as an independent unit.

5.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%)
Conducted Emission (9kHz ~ 150KHz) for V-AMN	3.11 dB
Conducted Emission (150kHz ~ 30MHz) for V-AMN	2.62 dB
Conducted Emission (150kHz ~ 30MHz) for AAN	3.54 dB
Radiated Emission (9kHz ~ 30MHz electric field) for 3m SAC	3.13 dB
Radiated Emission (9kHz ~ 30MHz magnetic field) for 3m SAC	3.13 dB
Radiated Emission (30MHz ~ 1GHz) for 3m SAC	4.45 dB
Radiated Emission (1GHz ~ 18GHz) for 3m SAC	5.34 dB
Radiated Emission (18GHz ~ 40GHz) for 3m SAC	5.34 dB
Radiated Emission (30MHz ~ 1GHz) for 10m SAC	4.32 dB

5.6 Additions to, deviations, or exclusions from the method

No

5.7 Laboratory Facility

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

- **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

- **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

5.8 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.
Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info-JYTee@lets.com, Website: http://www.ccis-cb.com

5.9 Test Instruments list

Radiated Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
3m SAC	ETS	RFD-100	Q1984	04-14-2021	04-13-2024
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-044	03-07-2021	03-06-2022
BiConiLog Antenna	SCHWARZBECK	VULB9163	9163-1246	03-07-2021	03-06-2022
Biconical Antenna	SCHWARZBECK	VUBA 9117	9117#359	06-17-2021	06-17-2022
Horn Antenna	SCHWARZBECK	BBHA9120D	912D-916	03-07-2021	03-06-2022
Broad-Band Horn Antenna	SCHWARZBECK	BBHA9170	1067	04-02-2021	04-01-2022
Broad-Band Horn Antenna	SCHWARZBECK	BBHA9170	1068	04-02-2021	04-01-2022
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-03-2021	03-02-2022
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-03-2021	03-02-2022
Spectrum analyzer	Keysight	N9010B	MY60240202	11-27-2020	11-26-2021
Simulated Station	Anritsu	MT8820C	6201026545	03-03-2021	03-02-2022
Low Pre-amplifier	SCHWARZBECK	BBV9743B	00305	03-07-2021	03-06-2022
High Pre-amplifier	SKET	LNPA_0118G-50	MF280208233	03-07-2021	03-06-2022
Cable	Qualwave	JYT3M-1G-NN-8M	JYT3M-1	03-07-2021	03-06-2022
Cable	Qualwave	JYT3M-18G-NN-8M	JYT3M-2	03-07-2021	03-06-2022
Cable	Qualwave	JYT3M-1G-BB-5M	JYT3M-3	03-07-2021	03-06-2022
Cable	Bost	JYT3M-40G-SS-8M	JYT3M-4	04-02-2021	04-01-2022
EMI Test Software	Tonscend	TS+	Version:3.0.0.1		
10m SAC	ETS	RFSD-100-F/A	Q2005	04-28-2021	04-27-2024
BiConiLog Antenna	SCHWARZBECK	VULB 9168	1249	04-02-2021	04-01-2022
BiConiLog Antenna	SCHWARZBECK	VULB 9168	1250	04-02-2021	04-01-2022
EMI Test Receiver	R&S	ESR 3	102800	04-08-2021	04-07-2022
EMI Test Receiver	R&S	ESR 3	102802	04-08-2021	04-07-2022
Low Pre-amplifier	Bost	LNA 0920N	2016	04-06-2021	04-05-2022
Low Pre-amplifier	Bost	LNA 0920N	2019	04-06-2021	04-05-2022
Cable	Bost	JYT10M-1G-NN-10M	JYT10M-1	04-02-2021	04-01-2022
Cable	Bost	JYT10M-1G-NN-10M	JYT10M-2	04-02-2021	04-01-2022
Test Software	R&S	EMC32	Version: 10.50.40		

Conducted Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
EMI Test Receiver	Rohde & Schwarz	ESCI 3	101189	03-03-2021	03-02-2022
LISN	Rohde & Schwarz	ENV432	101602	04-06-2021	04-05-2022
LISN	Rohde & Schwarz	ESH3-Z5	843862/010	06-18-2020	06-17-2022
RF Switch	TOP PRECISION	RSU0301	N/A	03-03-2021	03-02-2022
Cable	Bost	JYTCE-1G-NN-2M	JYTCE-1	03-03-2021	03-02-2022
Cable	Bost	JYTCE-1G-BN-3M	JYTCE-2	03-03-2021	03-02-2022
EMI Test Software	AUDIX	E3	Version: 6.110919b		

Conducted method:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
Spectrum Analyzer	Keysight	N9010B	MY60240202	11-27-2020	11-26-2021
Vector Signal Generator	Keysight	N5182B	MY59101009	11-27-2020	11-26-2021
Analog Signal Generator	Keysight	N5173B	MY59100765	11-27-2020	11-26-2021
Power Detector Box	MWRF-test	MW100-PSB	MW201020JYT	11-27-2020	11-26-2021
Simulated Station	Rohde & Schwarz	CMW270	102335	11-27-2020	11-26-2021
RF Control Box	MWRF-test	MW100-RFCB	MW200927JYT	N/A	N/A

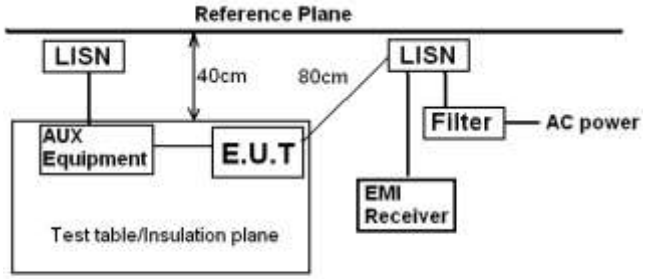
PDU	MWRF-test	XY-G10	N/A	N/A	N/A
DC Power Supply	Keysight	E3642A	MY60296194	11-27-2020	11-26-2021
Temperature Humidity Chamber	ZhongZhi	CZ－C－150D	ZH16491	11-01-2020	10-31-2021
Test Software	MWRF-tes	MTS 8310	Version: 2.0.0.0		

6 Test results and measurement data

6.1 Antenna Requirement

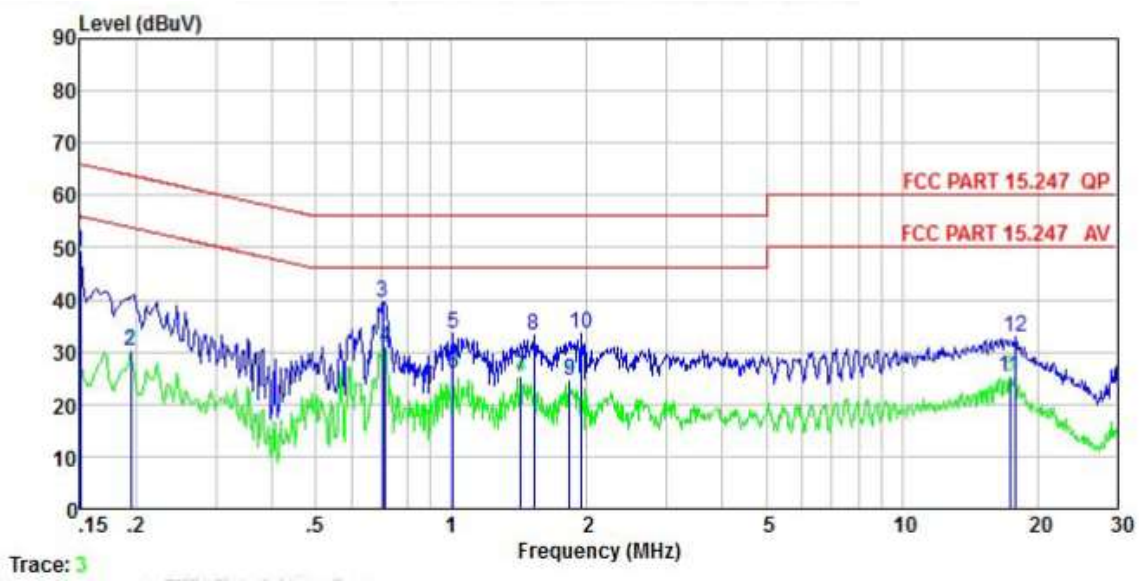
Standard requirement:	FCC Part 15 C Section 15.203 & 247(b)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a 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. 15.247(b) (4) requirement: (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
E.U.T Antenna:	
The Bluetooth antenna is an PCB antenna which permanently attached, and the best case gain of the antenna is-1 dBi.	

6.2 Conducted Emissions

Test Requirement:	FCC Part 15 C Section 15.207		
Test Frequency Range:	150 kHz to 30 MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	* Decreases with the logarithm of the frequency.		
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*		
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10(latest version) on conducted measurement.		
Test Instruments:	Refer to section 5.9 for details		
Test mode:	Hopping mode		
Test results:	Pass		

Measurement Data:

Product name:	Wireless eSports Gaming Mouse	Product model:	Covert Varmint
Test by:	Mike	Test mode:	Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 120 V/60 Hz	Environment:	Temp: 22.5℃ Huni: 55%

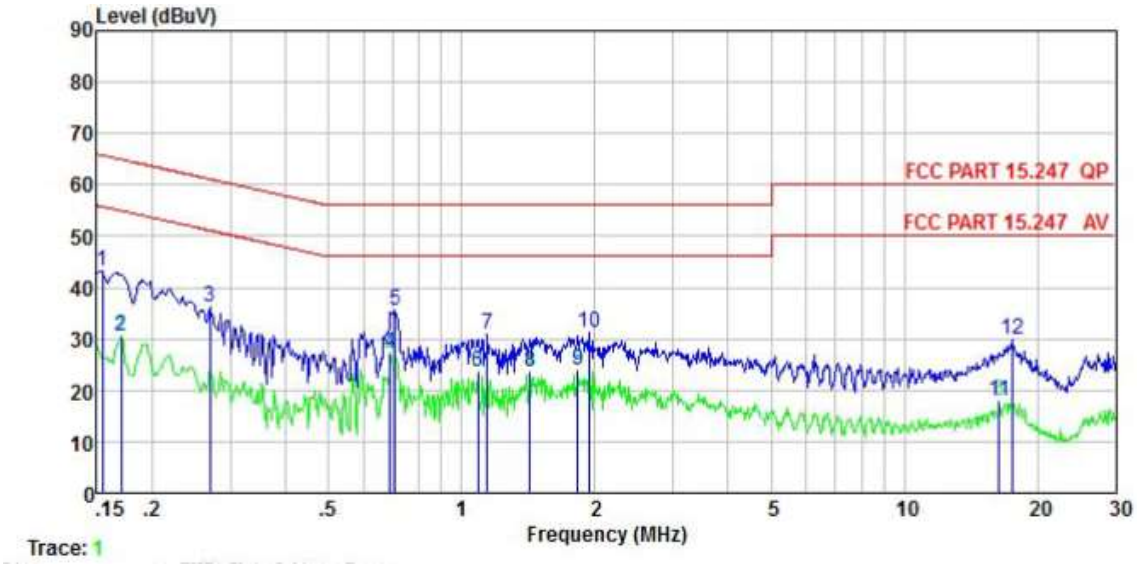


	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.150	39.04	10.22	-0.05	0.01	49.22	66.00	-16.78	QP
2	0.194	20.11	10.23	-0.15	0.03	30.22	53.84	-23.62	Average
3	0.705	29.61	10.30	-0.38	0.03	39.56	56.00	-16.44	QP
4	0.712	20.79	10.30	-0.36	0.03	30.76	46.00	-15.24	Average
5	1.010	22.70	10.32	0.45	0.05	33.52	56.00	-22.48	QP
6	1.010	14.95	10.32	0.45	0.05	25.77	46.00	-20.23	Average
7	1.426	14.68	10.33	0.07	0.13	25.21	46.00	-20.79	Average
8	1.527	22.71	10.33	-0.02	0.15	33.17	56.00	-22.83	QP
9	1.829	14.26	10.33	-0.22	0.19	24.56	46.00	-21.44	Average
10	1.949	23.28	10.33	-0.29	0.20	33.52	56.00	-22.48	QP
11	17.383	12.10	10.84	2.21	0.15	25.30	50.00	-24.70	Average
12	17.849	19.77	10.85	1.98	0.15	32.75	60.00	-27.25	QP

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level = Receiver Read level + LISN Factor + Aux Factor + Cable Loss.*

Product name:	Wireless eSports Gaming Mouse	Product model:	Covert Varmint
Test by:	Mike	Test mode:	Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 120 V/60 Hz	Environment:	Temp: 22.5℃ Huni: 55%

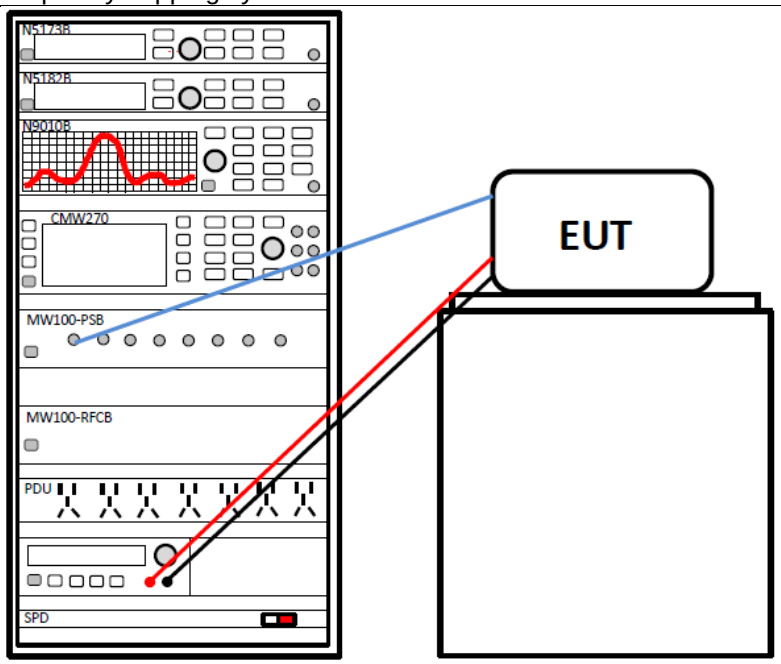


	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.154	32.94	10.19	0.01	0.01	43.15	65.78	-22.63	QP
2	0.170	20.22	10.20	0.01	0.01	30.44	54.94	-24.50	Average
3	0.270	25.90	10.24	0.01	0.02	36.17	61.12	-24.95	QP
4	0.690	16.91	10.30	0.04	0.03	27.28	46.00	-18.72	Average
5	0.708	25.22	10.30	0.04	0.03	35.59	56.00	-20.41	QP
6	1.088	12.97	10.31	0.09	0.07	23.44	46.00	-22.56	Average
7	1.141	20.30	10.31	0.10	0.08	30.79	56.00	-25.21	QP
8	1.426	13.15	10.32	0.13	0.13	23.73	46.00	-22.27	Average
9	1.829	13.20	10.32	0.16	0.19	23.87	46.00	-22.13	Average
10	1.939	20.37	10.32	0.17	0.20	31.06	56.00	-24.94	QP
11	16.398	4.80	10.78	2.21	0.16	17.95	50.00	-32.05	Average
12	17.475	17.33	10.81	1.63	0.15	29.92	60.00	-30.08	QP

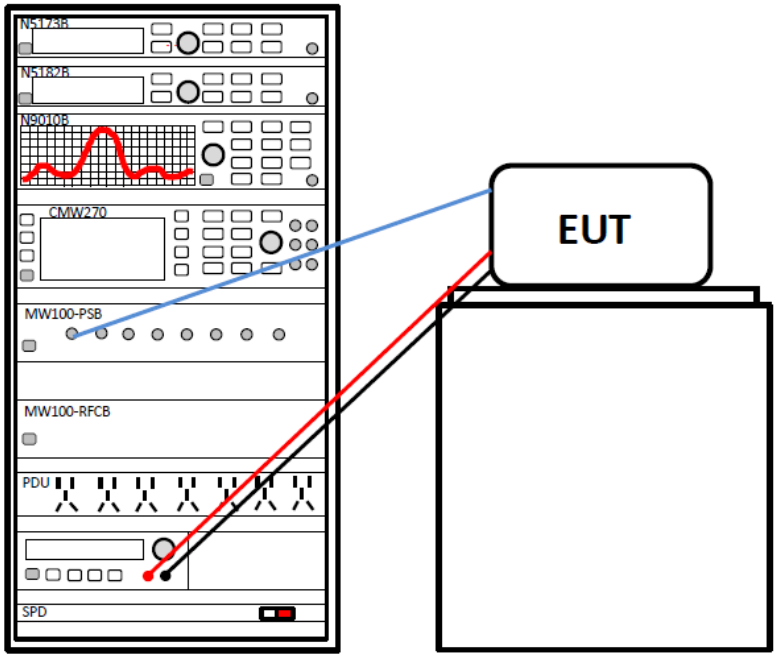
Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Aux Factor + Cable Loss.*

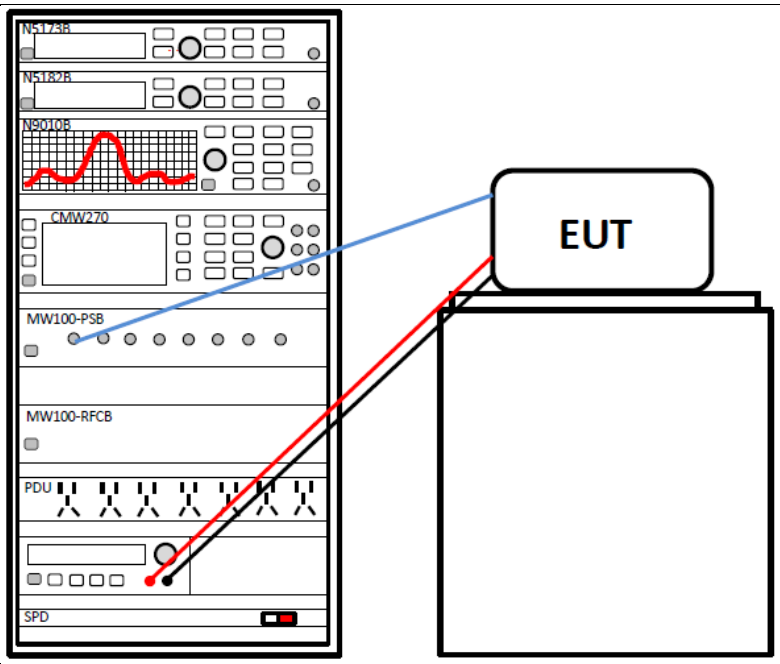
6.3 Conducted Output Power

Test Requirement:	FCC Part 15 C Section 15.247 (b)(1)
Receiver setup:	RBW=1MHz, VBW=3MHz, Detector=Peak (If 20dB BW ≤1 MHz) RBW=2MHz, VBW=6MHz, Detector=Peak (If 20dB BW > 1 MHz and < 3MHz)
Limit:	For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
Test setup:	
Test Instruments:	Refer to section 5.9 for details
Test mode:	Non-hopping mode
Test results:	Pass
Measurement Data:	**Refer to Appendix A - 2.4G**

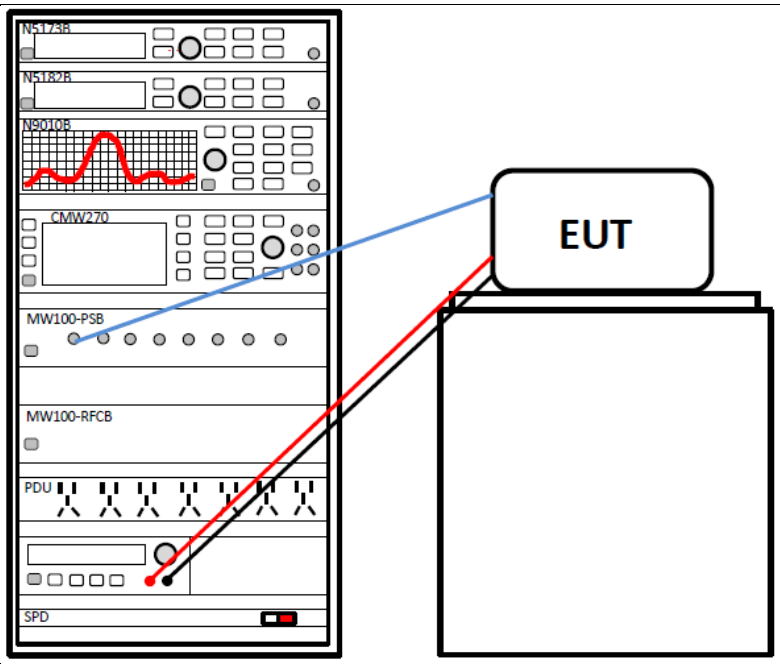
6.4 20dB Occupy Bandwidth

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Receiver setup:	DH1: RBW=15 kHz, VBW=47 kHz, detector=Peak 2DH1&3DH: RBW=20 kHz, VBW=62 kHz, detector=Peak
Limit:	Within authorization band
Test setup:	
Test Instruments:	Refer to section 5.9 for details
Test mode:	Non-hopping mode
Test results:	Pass
Measurement Data:	**Refer to Appendix A - 2.4G**

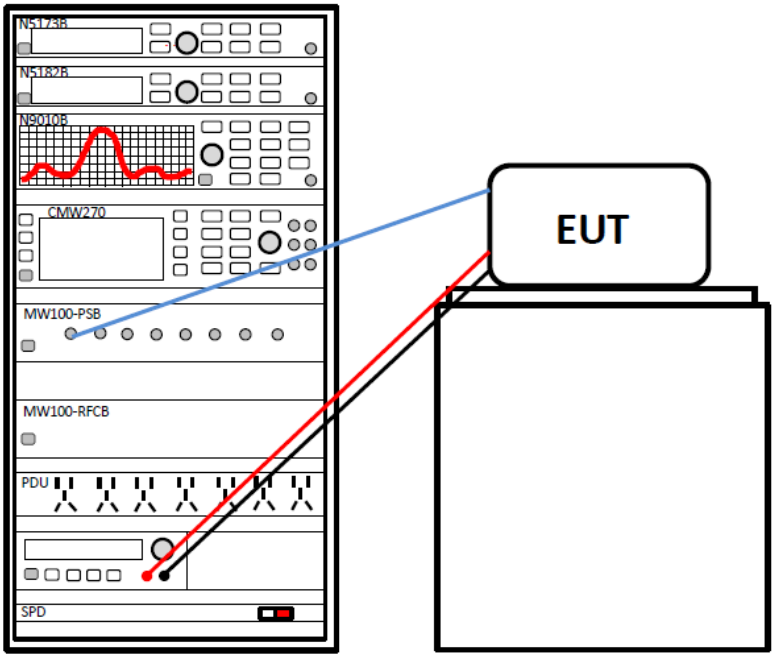
6.5 Carrier Frequencies Separation

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Receiver setup:	RBW=300 kHz, VBW=1 MHz, detector=Peak
Limit:	a) 0.025MHz or the 20dB bandwidth (whichever is greater) b) 0.025MHz or two-thirds of the 20dB bandwidth (whichever is greater)
Test setup:	
Test Instruments:	Refer to section 5.9 for details
Test mode:	Hopping mode
Test results:	Pass
Measurement Data:	**Refer to Appendix A - 2.4G**

6.6 Hopping Channel Number

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Center Frequency=2441MHz, Frequency Range: 2400MHz~2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 5.9 for details
Test mode:	Hopping mode
Test results:	Pass
Measurement Data:	**Refer to Appendix A - 2.4G**

6.7 Dwell Time

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Receiver setup:	RBW=1 MHz, VBW=1 MHz, Span=0 Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	
Test Instruments:	Refer to section 5.9 for details
Test mode:	Hopping mode
Test results:	Pass
Measurement Data:	**Refer to Appendix A - 2.4G**

6.8 Pseudorandom Frequency Hopping Sequence

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1) requirement:

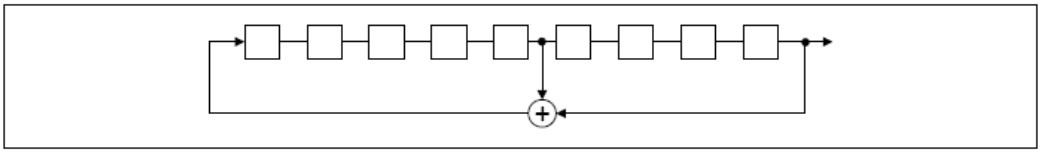
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively. Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

EUT Pseudorandom Frequency Hopping Sequence

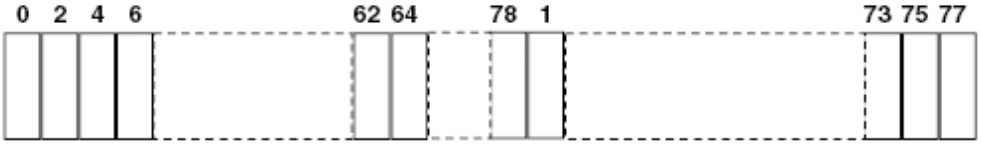
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

• Number of shift register stages: 9
• Length of pseudo-random sequence: 2^9 -1 = 511 bits
• Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

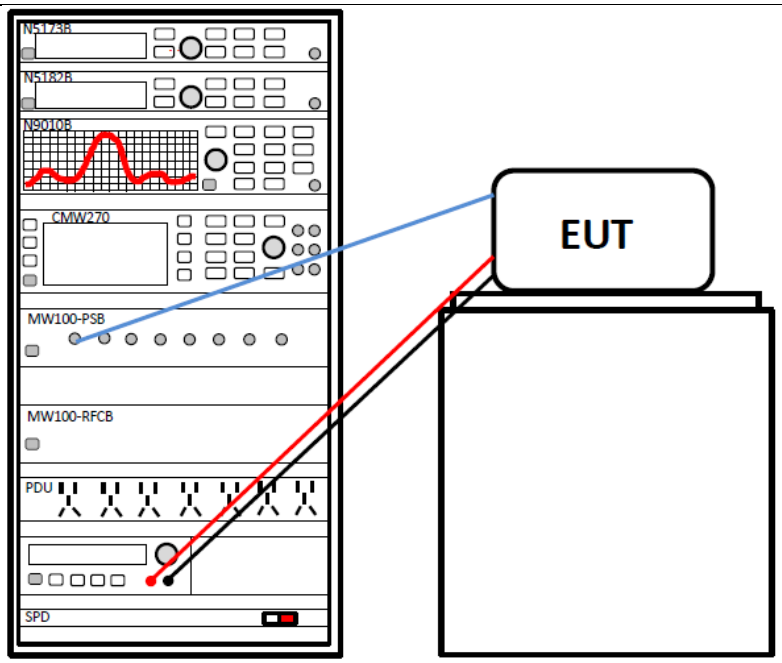


Each frequency used equally on the average by each transmitter.

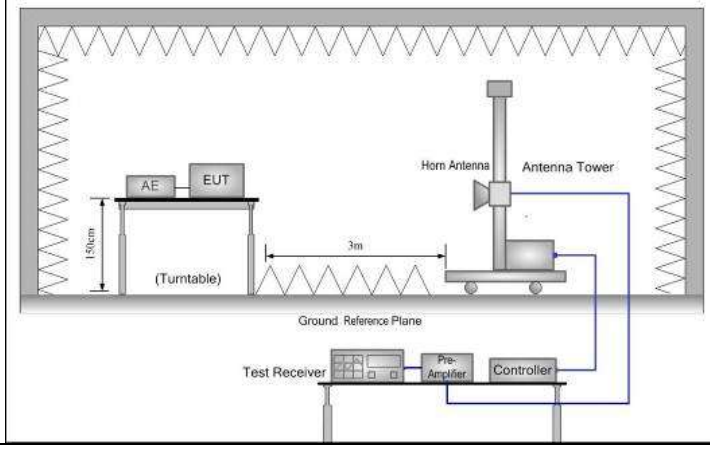
The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

6.9 Band Edge

6.9.1 Conducted Emission Method

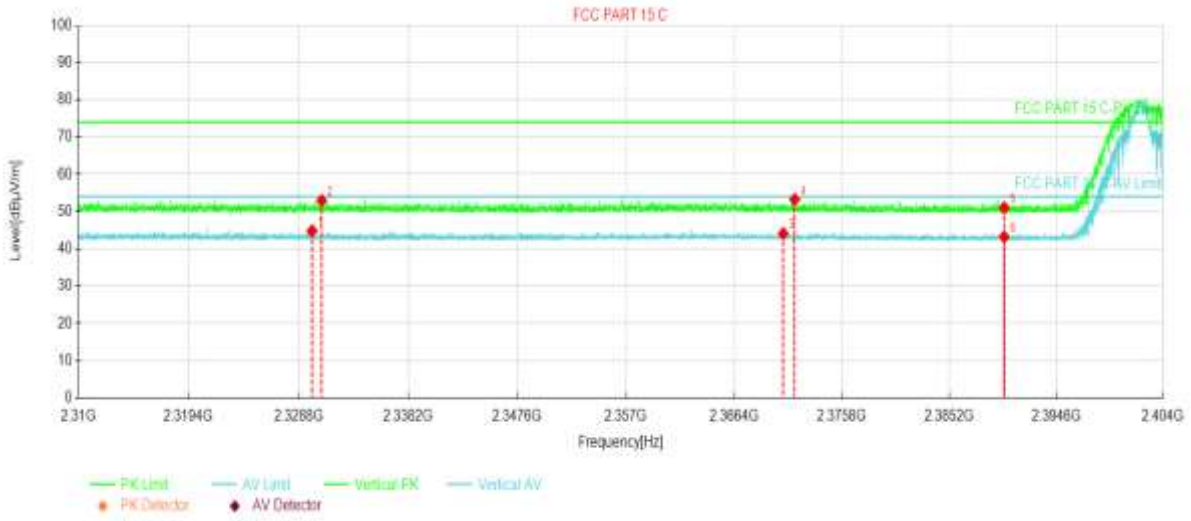
Test Requirement:	FCC Part 15 C Section 15.247 (d)
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 5.9 for details
Test mode:	Non-hopping mode and hopping mode
Test results:	Pass
Measurement Data:	**Refer to Appendix A - 2.4G**

6.9.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.209 and 15.205				
Test Frequency Range:	2310 MHz to 2390 MHz and 2483.5 MHz to 2500 MHz				
Test Distance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value
Limit:	Frequency	Limit (dBuV/m @3m)	Remark		
	Above 1GHz	54.00	Average Value		
		74.00	Peak Value		
Test setup:					
Test Procedure:	1. The EUT was placed on the top of a rotating table 1.5meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.				
Test Instruments:	Refer to section 5.9 for details				
Test mode:	Non-hopping mode				
Test results:	Passed				

GFSK Mode:

Product Name:	Wireless eSports Gaming Mouse	**Product Model:**	Covert Varmint
Test By:	Mike	**Test mode:**	Tx mode
Test Channel:	Lowest channel	**Polarization:**	Vertical
Test Voltage:	3.7VDC	**Environment:**	Temp: 24℃ Huni: 57%



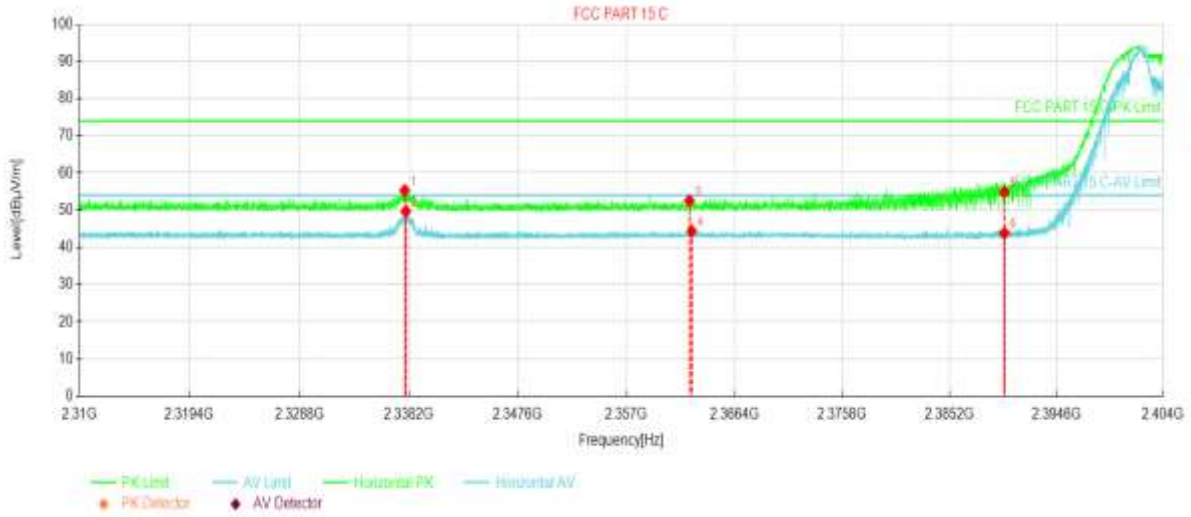
Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	2329.95	37.93	44.81	6.88	54.00	9.19	AV	Vertical
2	2330.77	46.07	52.95	6.88	74.00	21.05	PK	Vertical
3	2370.66	37.08	44.09	7.01	54.00	9.91	AV	Vertical
4	2371.66	46.21	53.23	7.02	74.00	20.77	PK	Vertical
5	2390.00	43.96	51.04	7.08	74.00	22.96	PK	Vertical
6	2390.00	36.13	43.21	7.08	54.00	10.79	AV	Vertical

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are lower than the limit 20dB and not show in test report.*

Product Name:	Wireless eSports Gaming Mouse	Product Model:	Covert Varmint
Test By:	Mike	Test mode:	Tx mode
Test Channel:	Lowest channel	Polarization:	Horizontal
Test Voltage:	3.7VDC	Environment:	Temp: 24℃ Huni: 57%



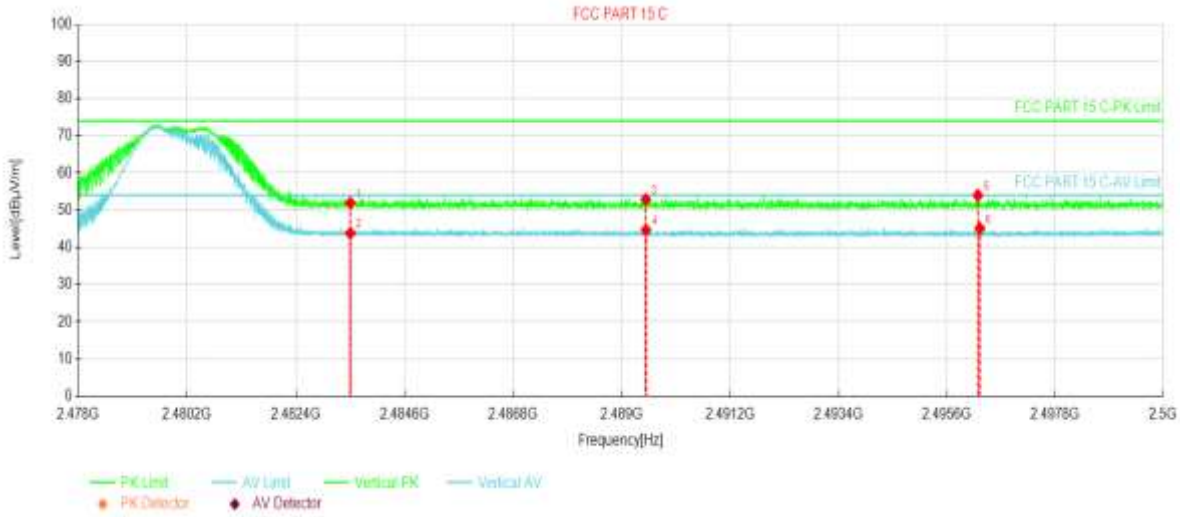
Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	2337.84	48.39	55.29	6.90	74.00	18.71	PK	Horizontal
2	2337.94	42.77	49.68	6.91	54.00	4.32	AV	Horizontal
3	2362.46	45.55	52.54	6.99	74.00	21.46	PK	Horizontal
4	2362.66	37.36	44.35	6.99	54.00	9.65	AV	Horizontal
5	2390.00	47.78	54.86	7.08	74.00	19.14	PK	Horizontal
6	2390.00	36.74	43.82	7.08	54.00	10.18	AV	Horizontal

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are lower than the limit 20dB and not show in test report.*

Product Name:	Wireless eSports Gaming Mouse	Product Model:	Covert Varmint
Test By:	Mike	Test mode:	Tx mode
Test Channel:	Highest channel	Polarization:	Vertical
Test Voltage:	3.7VDC	Environment:	Temp: 24℃ Huni: 57%



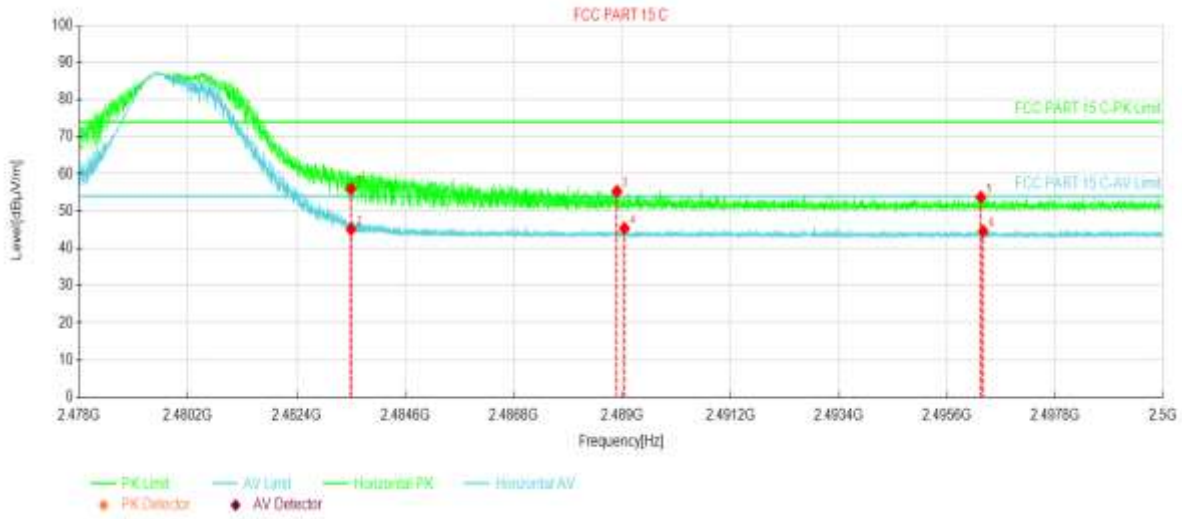
Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	2483.50	44.19	51.88	7.69	74.00	22.12	PK	Vertical
2	2483.50	36.13	43.82	7.69	54.00	10.18	AV	Vertical
3	2489.48	45.12	52.85	7.73	74.00	21.15	PK	Vertical
4	2489.48	36.92	44.65	7.73	54.00	9.35	AV	Vertical
5	2496.23	46.21	53.98	7.77	74.00	20.02	PK	Vertical
6	2496.27	37.33	45.10	7.77	54.00	8.90	AV	Vertical

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are lower than the limit 20dB and not show in test report.*

Product Name:	Wireless eSports Gaming Mouse	Product Model:	Covert Varmint
Test By:	Mike	Test mode:	Tx mode
Test Channel:	Highest channel	Polarization:	Horizontal
Test Voltage:	3.7VDC	Environment:	Temp: 24℃ Huni: 57%



Suspected Data List

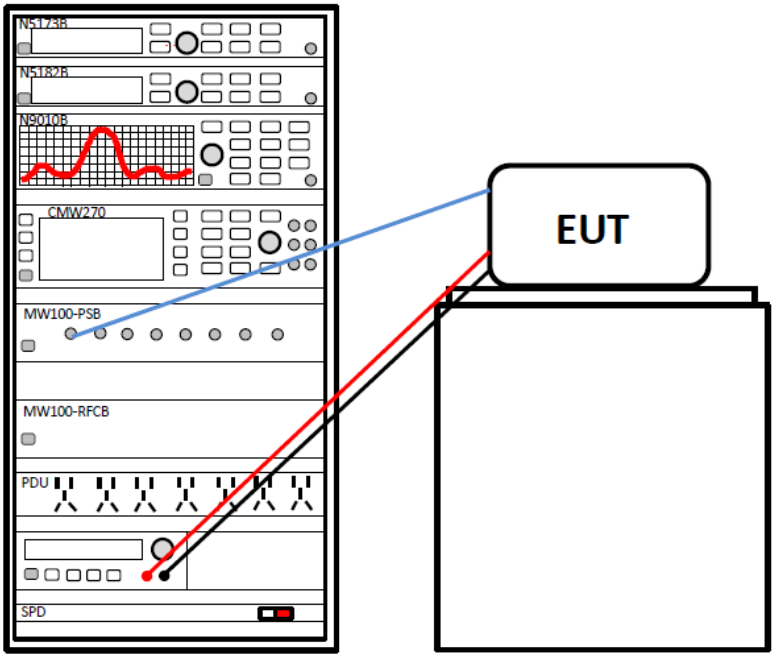
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	2483.50	48.34	56.03	7.69	74.00	17.97	PK	Horizontal
2	2483.50	37.43	45.12	7.69	54.00	8.88	AV	Horizontal
3	2488.89	47.60	55.32	7.72	74.00	18.68	PK	Horizontal
4	2489.04	37.62	45.34	7.72	54.00	8.66	AV	Horizontal
5	2496.29	45.94	53.71	7.77	74.00	20.29	PK	Horizontal
6	2496.33	36.81	44.58	7.77	54.00	9.42	AV	Horizontal

Remark:

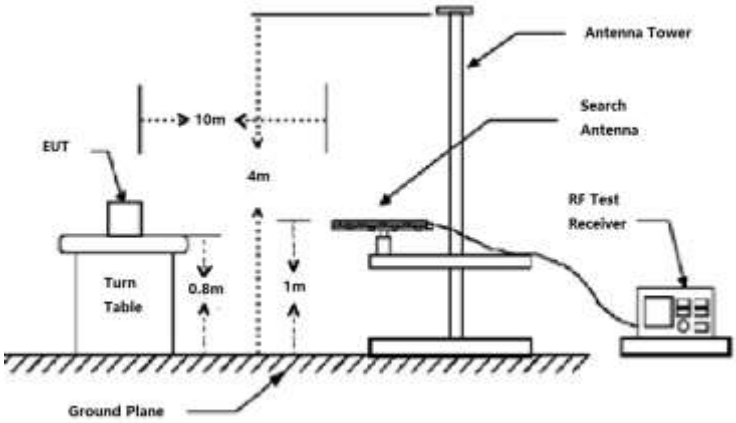
1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are lower than the limit 20dB and not show in test report.*

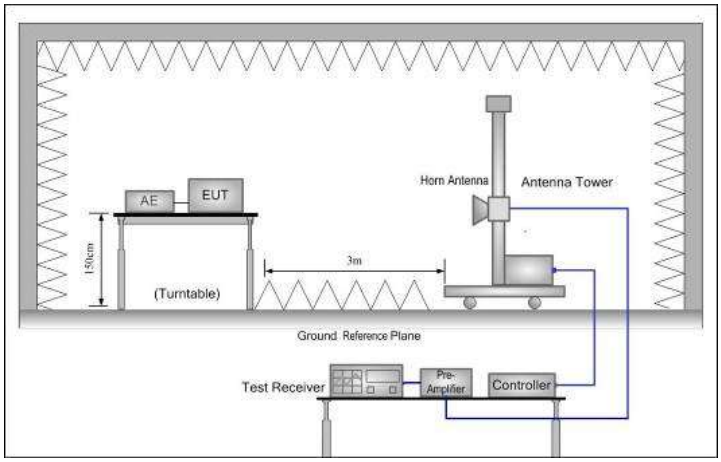
6.10 Spurious Emission

6.10.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 5.9 for details
Test mode:	Non-hopping mode
Test results:	Pass
Measurement Data:	**Refer to Appendix A - 2.4G**

6.10.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td colspan="5">FCC Part 15 C Section 15.209</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="5">9 kHz to 25 GHz</td></tr>
<tr><td>Test Distance:</td><td colspan="5">3m or 10m</td></tr>
<tr><td>Receiver setup:</td><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td rowspan="3"></td><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120kHz</td><td>300kHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>RMS</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
<tr><td rowspan="8">Limit:</td><td colspan="2">Frequency</td><td colspan="2">Limit (dBuV/m @10m)</td><td>Remark</td></tr>
<tr><td colspan="2">30MHz-88MHz</td><td colspan="2">30.0</td><td>Quasi-peak Value</td></tr>
<tr><td colspan="2">88MHz-216MHz</td><td colspan="2">33.5</td><td>Quasi-peak Value</td></tr>
<tr><td colspan="2">216MHz-960MHz</td><td colspan="2">36.0</td><td>Quasi-peak Value</td></tr>
<tr><td colspan="2">960MHz-1GHz</td><td colspan="2">44.0</td><td>Quasi-peak Value</td></tr>
<tr><td colspan="2">Frequency</td><td colspan="2">Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td colspan="2" rowspan="2">Above 1GHz</td><td colspan="2">54.0</td><td>Average Value</td></tr>
<tr><td colspan="2">74.0</td><td>Peak Value</td></tr>
<tr><td>Test setup:</td><td colspan="5">Below 1GHz
 

Above 1GHz
 
</td></tr>
<tr><td>Test Procedure:</td><td colspan="5">1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground at a 10 meter chamber (below 1GHz)or 3 meter chamber(above 1GHz). The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 10 meters(below 1GHz) or 3 meters(above 1GHz)</td></tr>
</table>

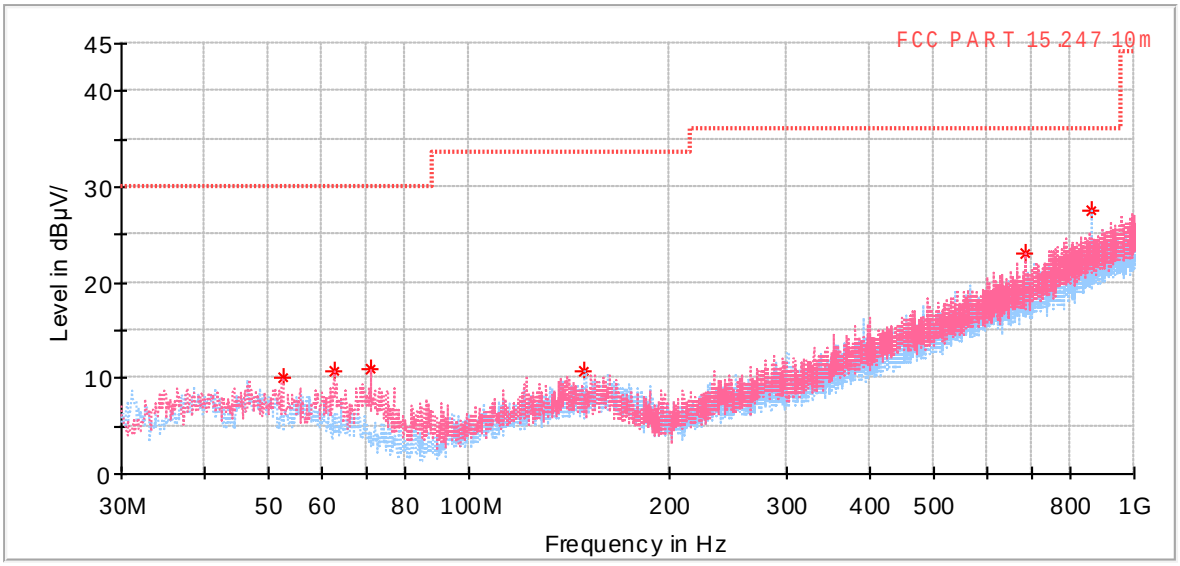
	away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Instruments:	Refer to section 5.9 for details
Test mode:	Non-hopping mode
Test results:	Pass
Remark:	1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case. 2. 9 kHz to 30 MHz is noise floor and lower than the limit 20dB, so only shows the data of above 30MHz in this report.

Measurement Data (worst case):

Below 1GHz:

Product Name:	Wireless eSports Gaming Mouse	**Product Model:**	Covert Varmint
Test By:	Mike	**Test mode:**	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical & Horizontal
Test Voltage:	3.7VDC	**Environment:**	Temp: 24℃ Huni: 57%

Full Spectrum



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
52.407000	10.08	30.00	19.92	100.0	V	284.0	-15.9
62.592000	10.67	30.00	19.33	100.0	V	265.0	-16.9
71.128000	11.04	30.00	18.96	100.0	V	239.0	-18.5
149.407000	10.75	33.50	22.75	100.0	H	94.0	-15.3
687.563000	23.04	36.00	12.96	100.0	V	20.0	-5.1
864.006000	27.61	36.00	8.39	100.0	H	13.0	-1.9

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are lower than the limit 20dB and not show in test report.*
3. *The Aux Factor is a notch filter switch box loss, this item is not used.*

Above 1GHz:

Test channel: Lowest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization
4804.00	61.11	-9.60	51.51	74.00	22.49	Vertical
4804.00	64.24	-9.60	54.64	74.00	19.36	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization
4804.00	56.17	-9.60	46.57	54.00	7.43	Vertical
4804.00	62.64	-9.60	53.04	54.00	0.96	Horizontal
Test channel: Middle channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization
4882.00	59.36	-9.05	50.31	74.00	23.69	Vertical
4882.00	60.31	-9.05	51.26	74.00	22.74	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization
4882.00	55.20	-9.05	46.15	54.00	7.85	Vertical
4882.00	56.17	-9.05	47.12	54.00	6.88	Horizontal
Test channel: Highest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization
4960.00	58.30	-8.45	49.85	74.00	24.15	Vertical
4960.00	61.80	-8.45	53.35	74.00	20.65	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization
4960.00	54.00	-8.45	45.55	54.00	8.45	Vertical
4960.00	58.04	-8.45	49.59	54.00	4.41	Horizontal

Remark:

1. Final Level =Receiver Read level + Factor.

2. *The emission levels of other frequencies are lower than the limit 20dB and not show in test report.*