FCC REPORT

Applicant:	Guangzhou Youli Plastic Manufacture Co. Ltd
Address of Applicant:	No.7 The Keer Road, Dongchong Town, Nansha, Guangzhou Guangdong China

Equipment Under Test (EUT)

Product Name:	TRANSMITTER
Model No.:	XTX200
Trade mark:	Xotik
FCC ID:	2AS4Q-XTX200
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	18 Jul., 2019
Date of Test:	19 Jul., to 14 Aug., 2019
Date of report issued:	14 Aug., 2019
Test Result:	PASS *

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

Authorized Signature:

Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

2 Version

Version No.	Date	Description
00	*07 Aug., 2019*	*Original*
01	*14 Aug., 2019*	*Update page 5 and section 6.4*
02	*14 Aug., 2019*	*Update 6.6 chapter test chart and test data*

Tested by:	YT Yang	***Date:***	*14 Aug., 2019*
	Test Engineer		
Reviewed by:	Winner zhang	***Date:***	*14 Aug., 2019*
	Project Engineer		

3 Contents

Page

1 COVER PAGE 1
2 VERSION 2
3 CONTENTS 3
4 TEST SUMMARY 4
5 GENERAL INFORMATION 5
5.1 CLIENT INFORMATION 5
5.2 GENERAL DESCRIPTION OF E.U.T. 5
5.3 TEST ENVIRONMENT AND TEST MODE 6
5.4 DESCRIPTION OF SUPPORT UNITS 6
5.5 MEASUREMENT UNCERTAINTY 6
5.6 LABORATORY FACILITY 6
5.7 LABORATORY LOCATION 6
5.8 TEST INSTRUMENTS LIST 7
6 TEST RESULTS AND MEASUREMENT DATA 8
6.1 ANTENNA REQUIREMENT 8
6.2 CONDUCTED OUTPUT POWER 9
6.3 20DB OCCUPY BANDWIDTH 11
6.4 CARRIER FREQUENCIES SEPARATION 14
6.5 HOPPING CHANNEL NUMBER 17
6.6 DWELL TIME 19
6.7 PSEUDORANDOM FREQUENCY HOPPING SEQUENCE 21
6.8 BAND EDGE 22
6.8.1 Conducted Emission Method 22
6.8.2 Radiated Emission Method 24
6.9 SPURIOUS EMISSION 29
6.9.1 Conducted Emission Method 29
6.9.2 Radiated Emission Method 31
7 TEST SETUP PHOTO 36
8 EUT CONSTRUCTIONAL DETAILS 37

4 Test Summary

Test Items	Section in CFR 47	Result
Antenna Requirement	15.203 & 15.247 (b)	Pass
AC Power Line Conducted Emission	15.207	N/A
Conducted Peak Output Power	15.247 (b)(1)	Pass
20dB Occupied Bandwidth	15.247 (a)(1)	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Pass
Hopping Channel Number	15.247 (a)(iii)	Pass
Dwell Time	15.247 (a)(iii)	Pass
Spurious Emission	15.205 & 15.209	Pass
Band Edge	15.247(d)	Pass
All measurement data were performed in accordance with ANSI C63.10: 2013 and KDB 558074 D01 15.247 Meas Guidance v05r02 of test method.		

Remark:
1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *N/A: Not Applicable.*

5 General Information

5.1 Client Information

Applicant:	Guangzhou Youli Plastic Manufacture Co. Ltd
Address:	No.7 The Keer Road, Dongchong Town, Nansha, Guangzhou Guangdong China
Manufacturer:	Guangzhou Youli Plastic Manufacture Co. Ltd
Address:	No.7 The Keer Road, Dongchong Town, Nansha, Guangzhou Guangdong China

5.2 General Description of E.U.T.

Product Name:	TRANSMITTER
Model No.:	XTX200
Operation Frequency:	2405MHz~2475MHz
Transfer rate:	1 Mbits/s
Number of channel:	16
Modulation type:	GFSK
Modulation technology:	FHSS
Antenna Type:	Internal Antenna
Antenna gain:	0 dBi
Power supply:	DC 3.0V(By 5AA battery)
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
0	2405MHz	11	2457MHz
1	2410MHz	12	2461MHz
2	2415MHz	13	2465MHz
3	2420MHz	14	2470MHz
4	2425MHz	15	2475MHz
5	2430MHz		
6	2435MHz		
7	2440MHz		
8	2445MHz		
9	2449MHz		
10	2453MHz		

Remark:

1. *Channel 0, 7 &15 selected for GFSK*
2. *The product has two channel spacings, 4MHz and 5MHz, which are reflected in Section 6.4.*

5.3 Test environment and test 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.

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. New battery is used during all test,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

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±1.60 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±3.12 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.32 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.38 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±3.36 dB (k=2)

5.6 Laboratory Facility

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

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

Shenzhen Zhongjian Nanfang Testing 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 Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

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

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 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

5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

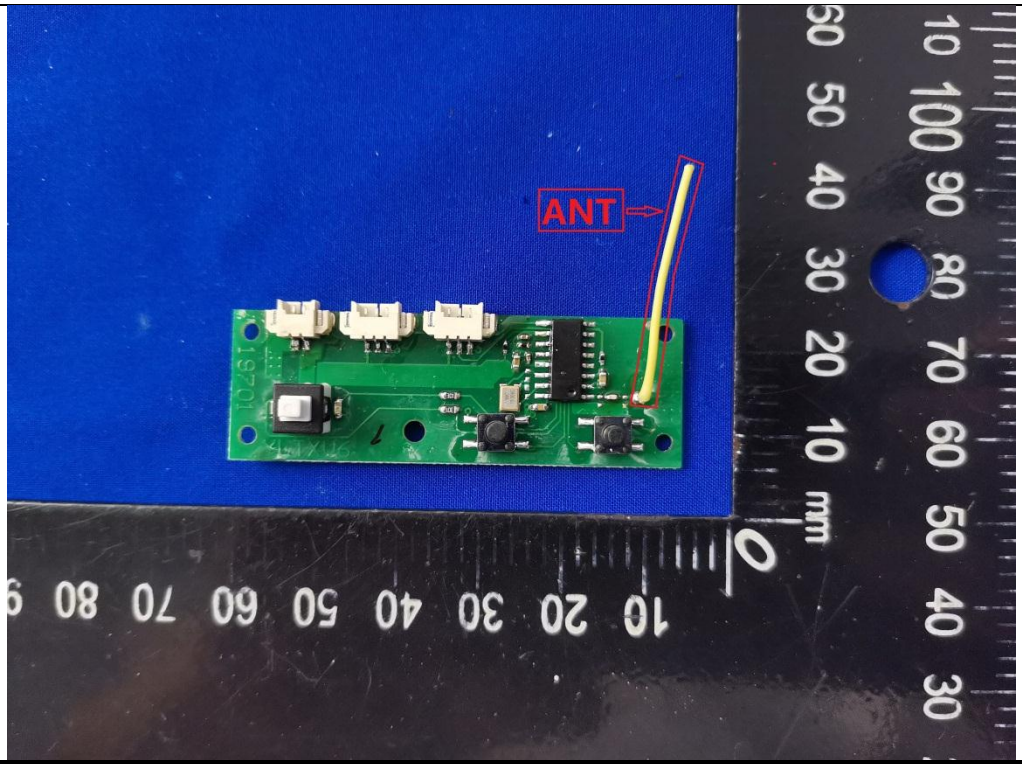
5.8 Test Instruments list

Radiated Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	03-18-2019	03-17-2020
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-18-2019	03-17-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-18-2019	03-17-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-22-2017	06-21-2020
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170582	11-21-2018	11-20-2019
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-18-2019	03-17-2020
Pre-amplifier	CD	PAP-1G18	11804	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-21-2018	11-20-2019
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-18-2019	03-17-2020
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-18-2019	03-17-2020
Cable	MICRO-COAX	MFR64639	K10742-5	03-18-2019	03-17-2020
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-18-2019	03-17-2020
RF Switch Unit	MWRFTEST	MW200	N/A	N/A	N/A
Test Software	MWRFTEST	MTS8200	Version: 2.0.0.0		

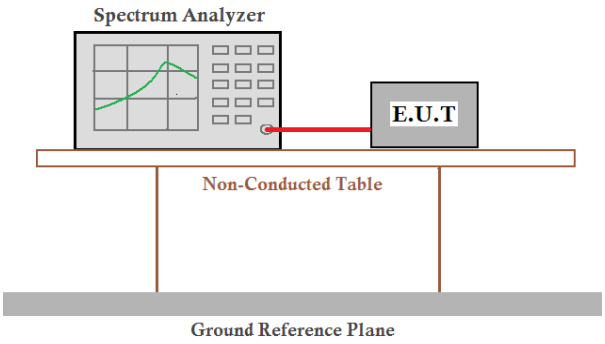
6 Test results and measurement data

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 Internal antenna which permanently attached, and the best case gain of the antenna is 0 dBi.	



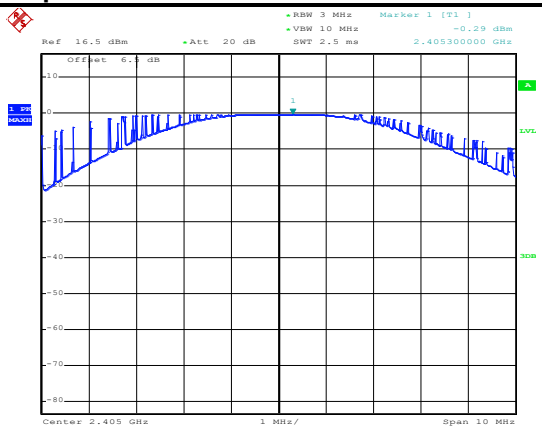
6.2 Conducted Output Power

Test Requirement:	FCC Part 15 C Section 15.247 (b)(1)
Receiver setup:	RBW=3MHz, VBW=10MHz, 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 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass

Measurement Data:

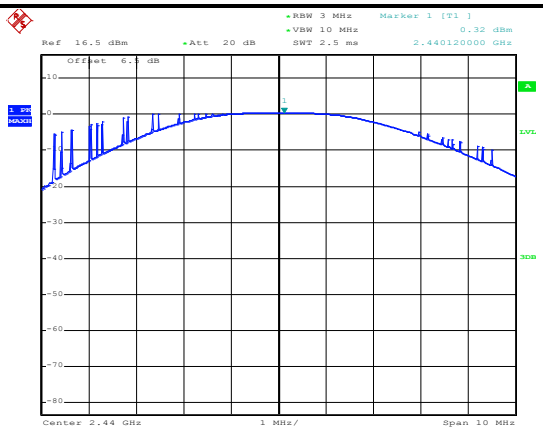
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest channel	-0.29	21.00	Pass
Middle channel	0.32	21.00	Pass
Highest channel	0.51	21.00	Pass

Test plot as follows:



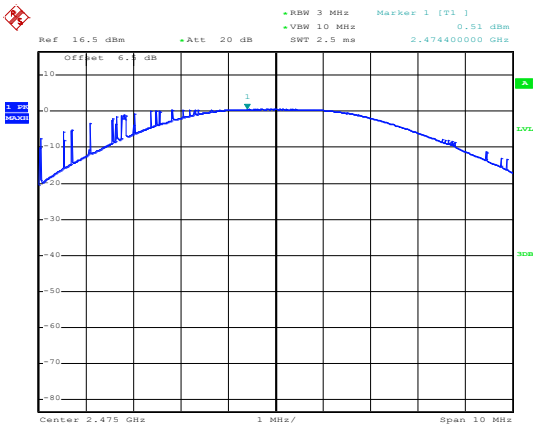
Date: 26.JUL.2019 10:43:50

Lowest channel



Date: 26.JUL.2019 10:44:03

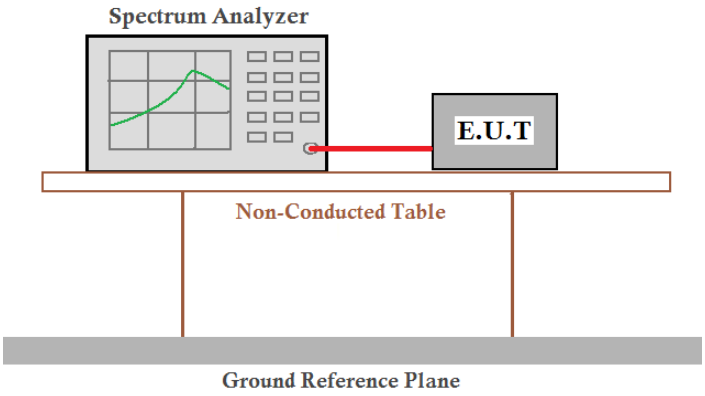
Middle channel



Date: 26.JUL.2019 10:44:21

Highest channel

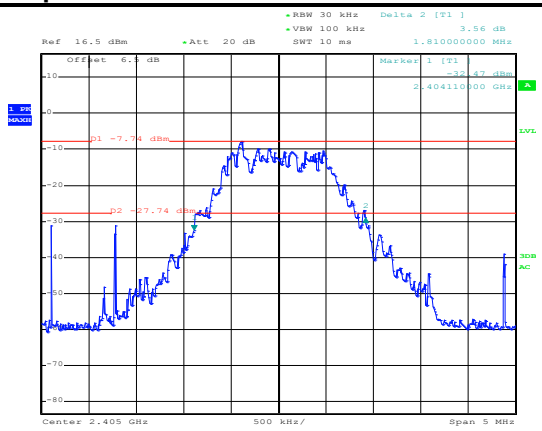
6.3 20dB Occupy Bandwidth

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Receiver setup:	RBW=30 kHz, VBW=100 kHz, detector=Peak
Limit:	N/A
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass

Measurement Data:

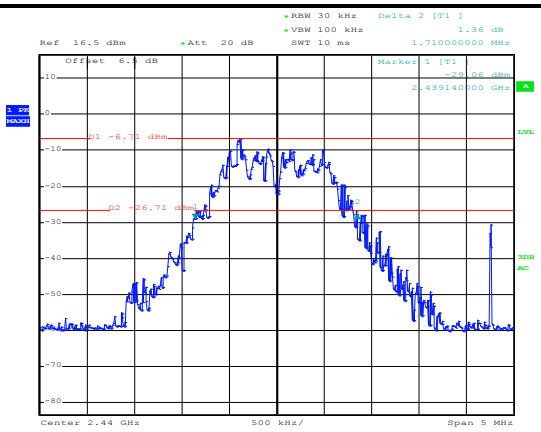
Test channel	20dB Occupy Bandwidth (kHz)
Lowest	1810
Middle	1710
Highest	1820
2445MHz	1690

Test plot as follows:



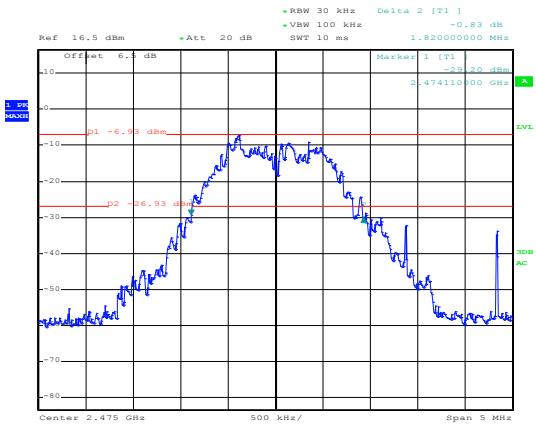
Date: 31.JUL.2019 15:09:39

Lowest channel



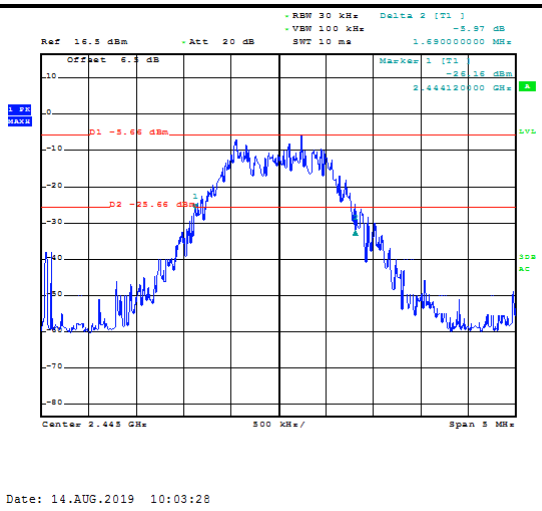
Date: 31.JUL.2019 15:08:25

Middle channel



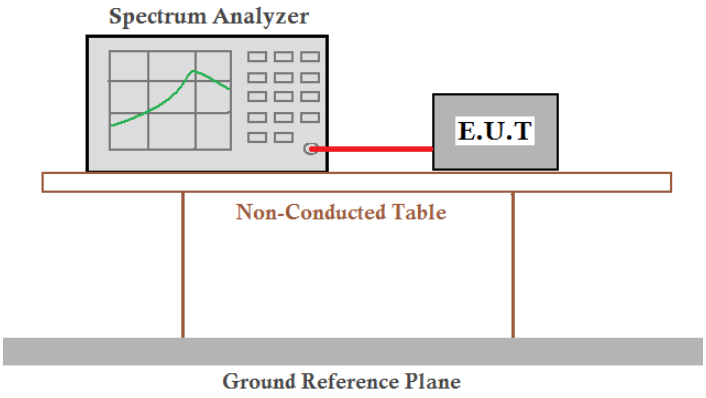
Date: 31.JUL.2019 15:02:57

Highest channel


RBW 30 kHz
VBW 100 kHz
SWT 10 ms
Delta 2 [T1]
-5.97 dB
1.690000000 MHz
Ref 16.5 dBm
Att 20 dB
Offset 6.5 dB
Marker 1 [T1]
-26.16 dBm
2.444120000 GHz
1 RB
MAXH
D1 -5.66 dBm
D2 -25.66 dBm
LVL
SGL
AC
Center 2.445 GHz
500 kHz/
Span 5 MHz
Date: 14.AUG.2019 10:03:28

2445MHz

6.4 Carrier Frequencies Separation

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Receiver setup:	RBW=100 kHz, VBW=300 kHz, 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 5.8 for details
Test mode:	Hopping mode
Test results:	Pass

Measurement Data(By 5MHz):

Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Middle	5040	1140.00	Pass
Highest	5040	1213.33	Pass
Lowest	5016	1206.67	Pass

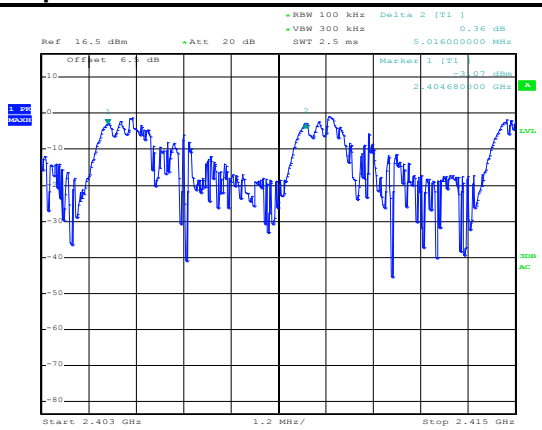
Measurement Data(By 4MHz):

Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
2445	4008	1126.67	Pass

Note: According to section 6.4

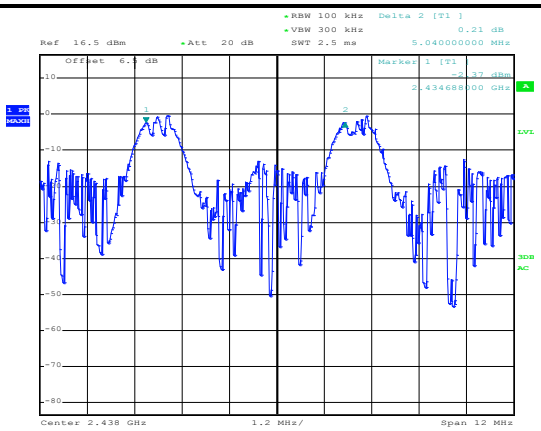
Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
Lowest	1810	1206.67
Middle	1710	1140.00
Highest	1820	1213.33
2445MHz	1690	1126.67

Test plot as follows:



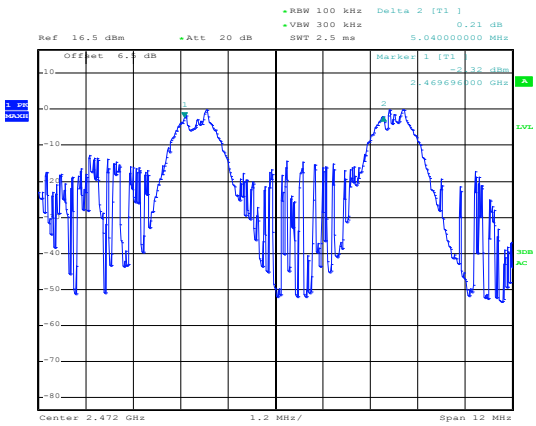
Date: 26.JUL.2019 11:57:16

Lowest channel



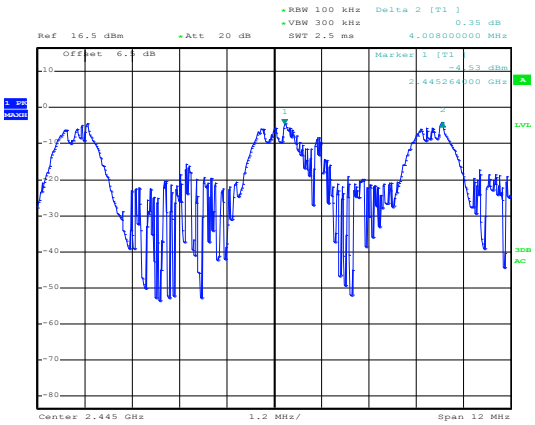
Date: 26.JUL.2019 12:04:17

Middle channel



Date: 26.JUL.2019 12:06:28

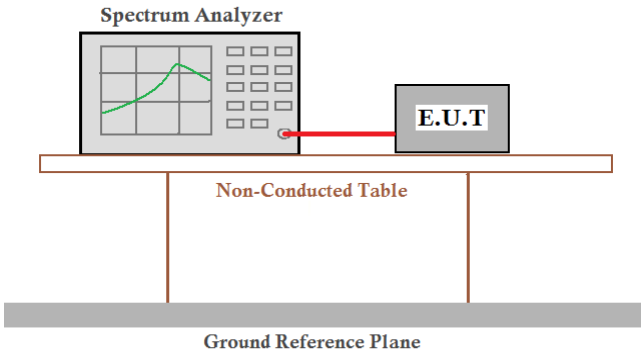
Highest channel



Date: 14.AUG.2019 09:20:23

2445MHz

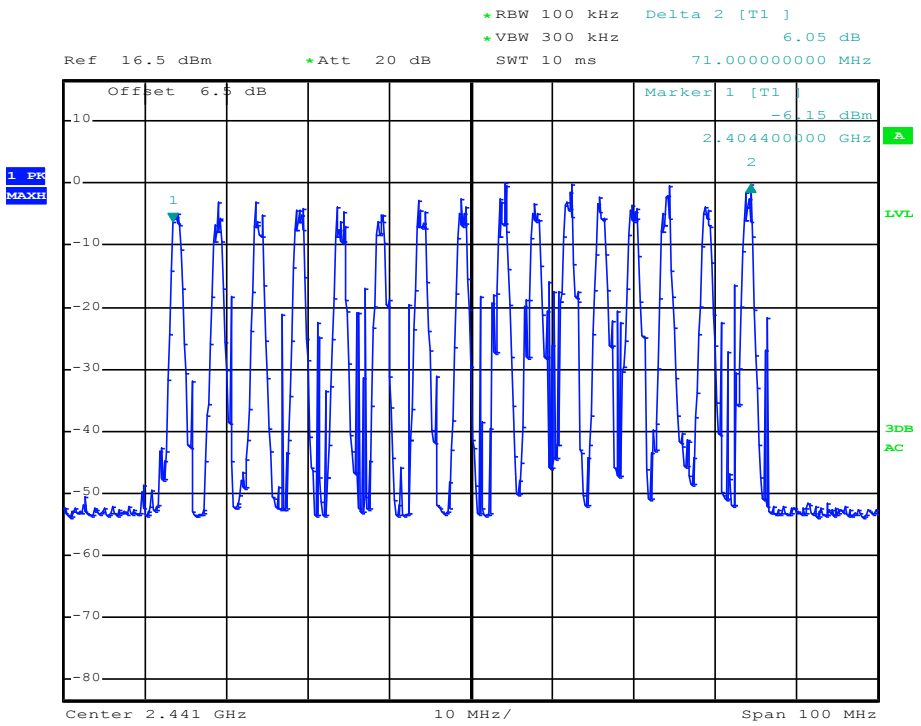
6.5 Hopping Channel Number

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Hopping mode
Test results:	Pass

Measurement Data:

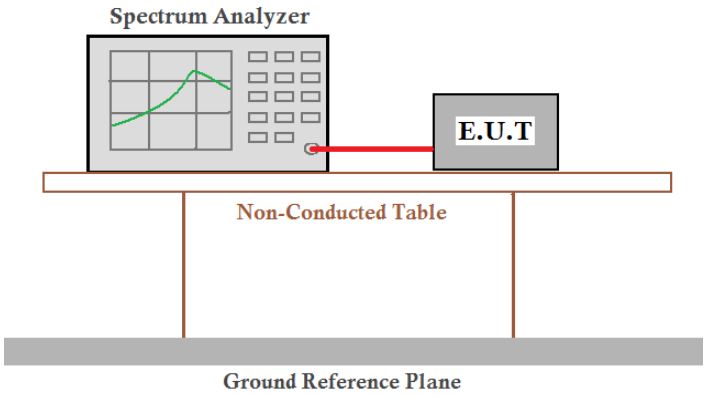
Mode	Hopping channel numbers	Limit	Result
GFSK	16	15	Pass

Test plot as follows:



Date: 26.JUL.2019 12:09:06

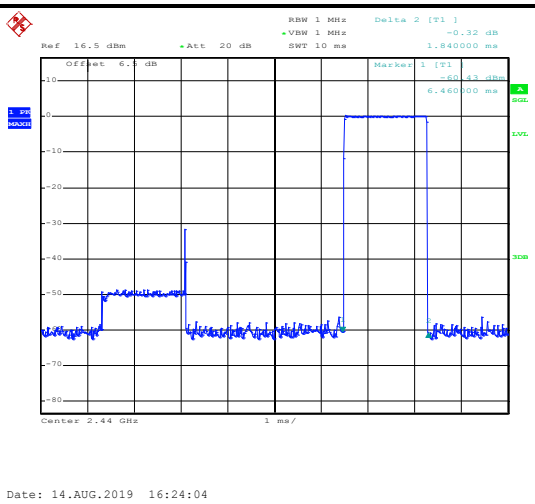
6.6 Dwell Time

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 5.8 for details
Test mode:	Hopping mode
Test results:	Pass

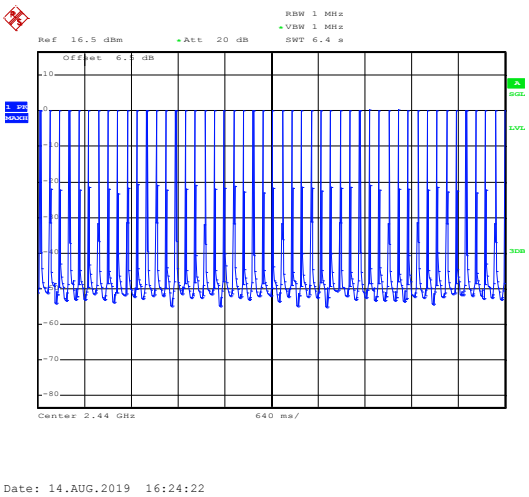
Measurement Data (Worse case):

Mode	Dwell time (second)	Limit (second)	Result
GFSK	0.10304	0.4	Pass
Note: The test period = 0.4 Second/Channel x 16 Channel = 6.4 s 1.84X56=103.04ms			

Test plot as follows:



10ms



6.4s

6.7 Pseudorandom Frequency Hopping Sequence

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

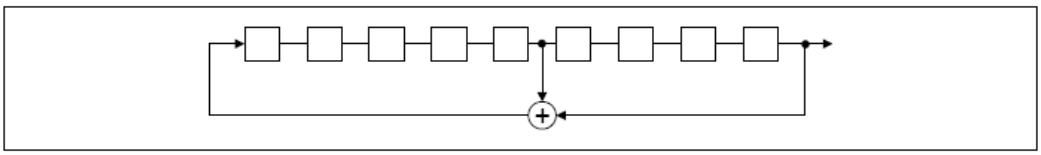
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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

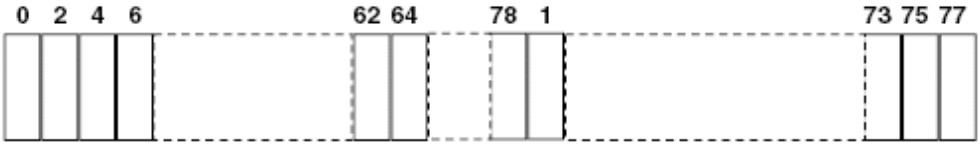
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized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

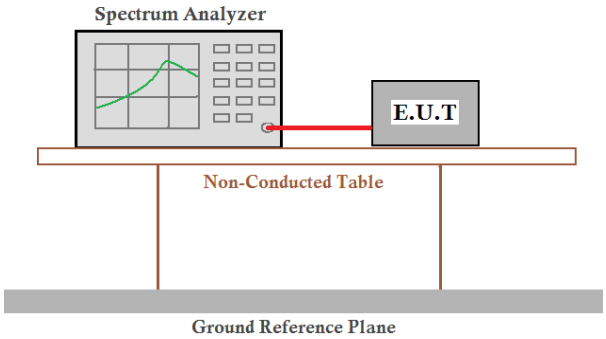


Each frequency used equally on the average by each transmitter.

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.

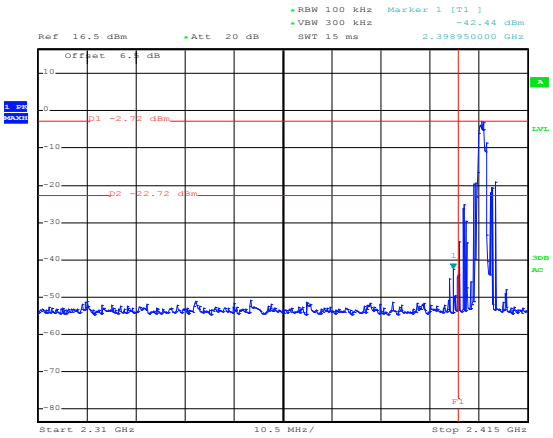
6.8 Band Edge

6.8.1 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 5.8 for details
Test mode:	Non-hopping mode and hopping mode
Test results:	Pass

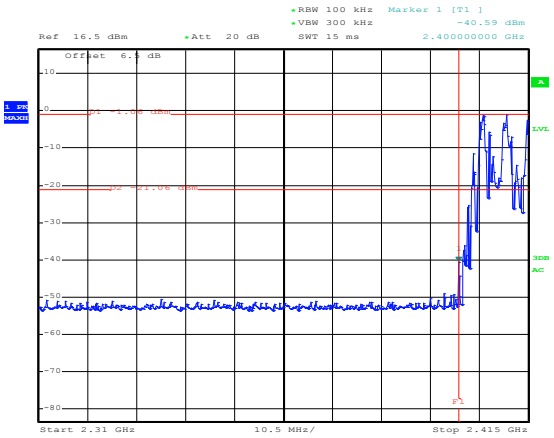
Test plot as follows:

Lowest Channel



Date: 26.JUL.2019 11:41:59

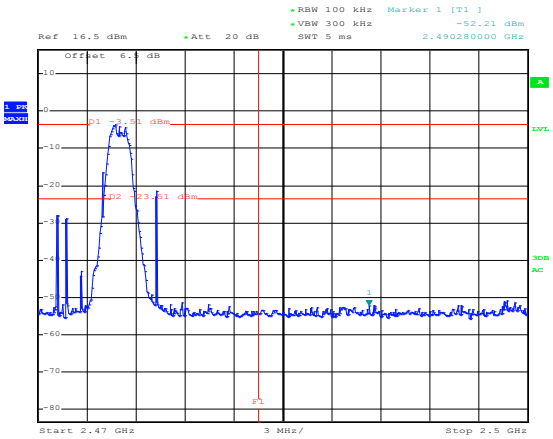
No-hopping mode



Date: 26.JUL.2019 11:41:13

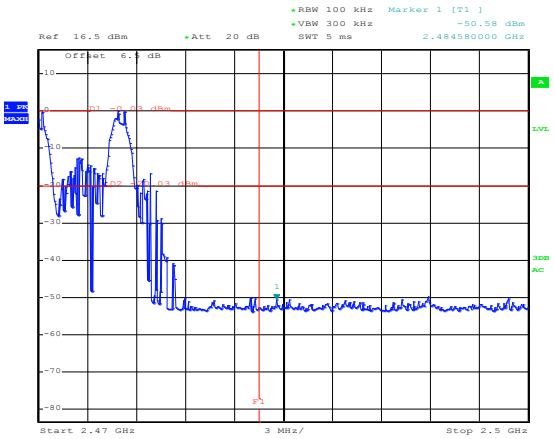
Hopping mode

Highest Channel



Date: 26.JUL.2019 11:43:45

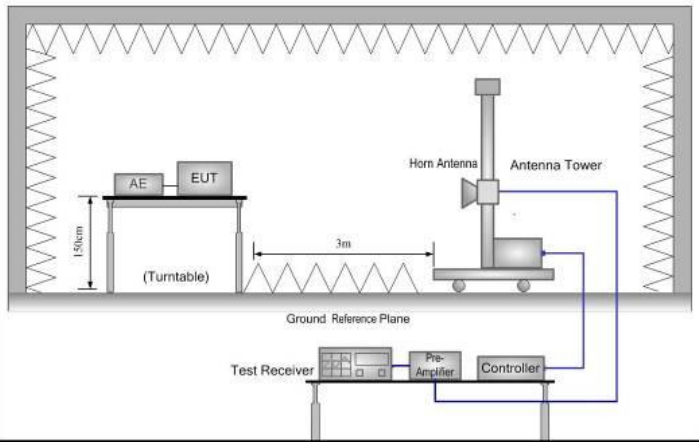
No-hopping mode



Date: 26.JUL.2019 11:49:56

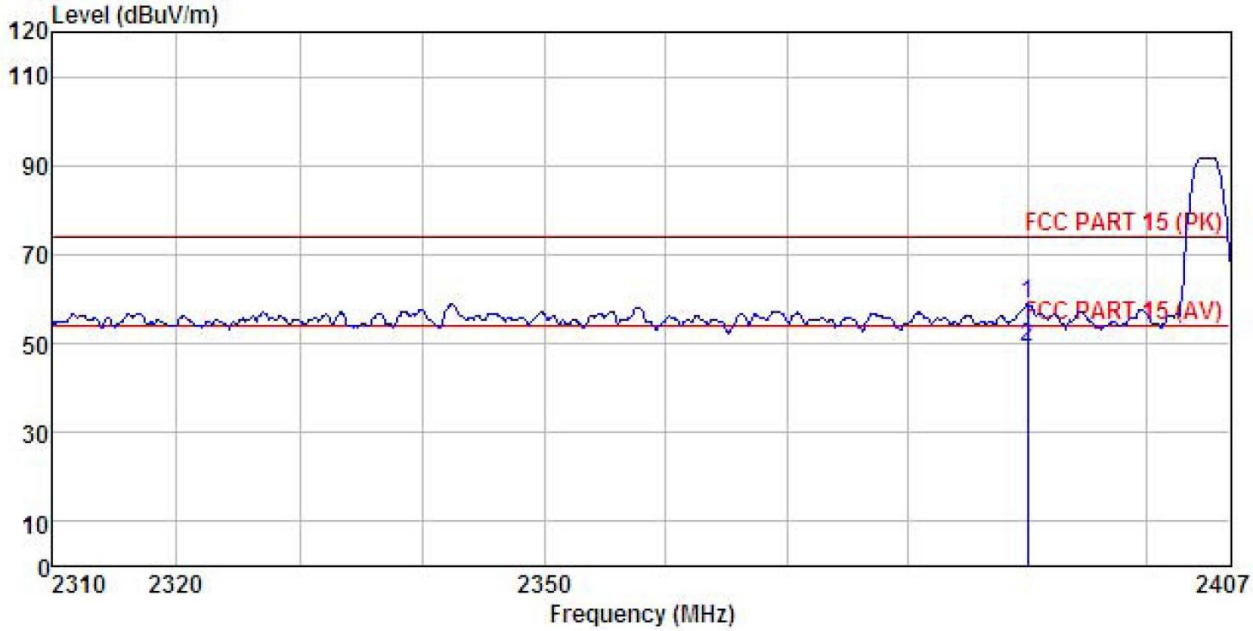
Hopping mode

6.8.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.209 and 15.205				
Test Frequency Range:	2.3GHz to 2.5GHz				
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 5.8 for details				
Test mode:	Non-hopping mode				
Test results:	Passed				

GFSK Mode:

Product Name:	TRANSMITTER	**Product Model:**	XTX200
Test By:	Mike	**Test mode:**	TX mode
Test Channel:	Lowest channel	**Polarization:**	Vertical
Test Voltage:	DC 3.0V	**Environment:**	Temp: 24℃ Huni: 57%

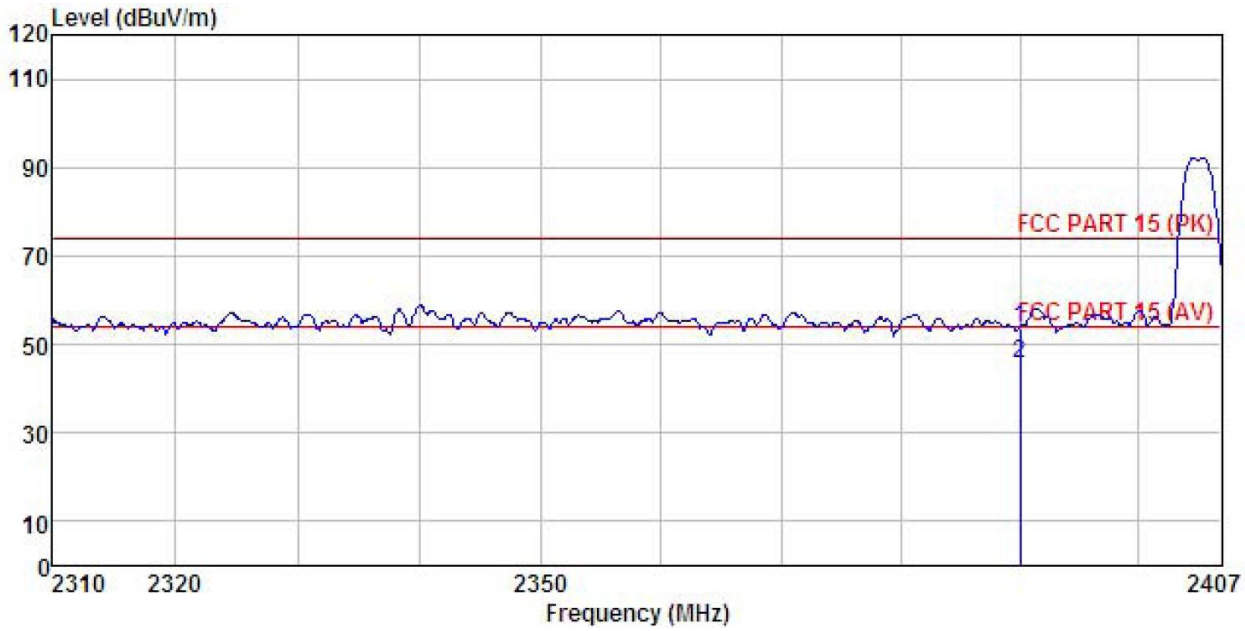


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	25.27	27.07	4.69	0.00	58.71	74.00	-15.29	Peak
2	2390.000	15.61	27.07	4.69	0.00	49.05	54.00	-4.95	Average

Remark:

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

Product Name:	TRANSMITTER	**Product Model:**	XTX200
Test By:	Mike	**Test mode:**	Tx mode
Test Channel:	Lowest channel	**Polarization:**	Horizontal
Test Voltage:	DC 3.0V	**Environment:**	Temp: 24℃ Huni: 57%

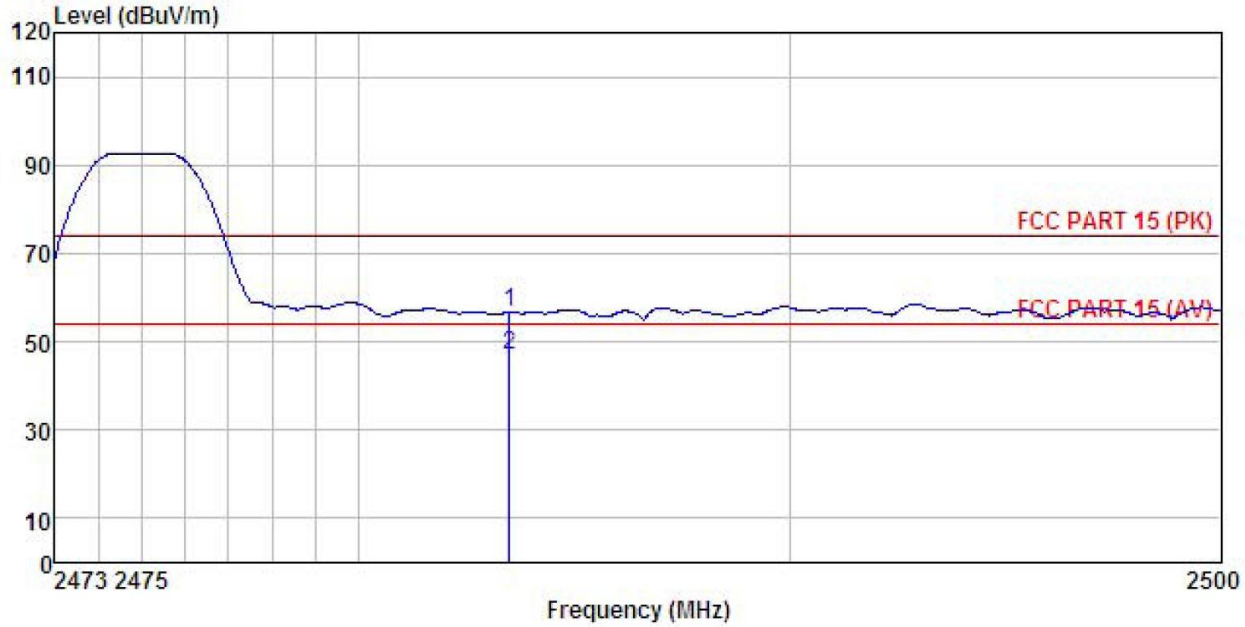


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	20.17	27.08	4.69	0.00	53.62	74.00	-20.38	Peak
2	2390.000	12.24	27.08	4.69	0.00	45.69	54.00	-8.31	Average

Remark:

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

Product Name:	TRANSMITTER	**Product Model:**	XTX200
Test By:	Mike	**Test mode:**	Tx mode
Test Channel:	Highest channel	**Polarization:**	Vertical
Test Voltage:	DC 3.0V	**Environment:**	Temp: 24℃ Huni: 57%

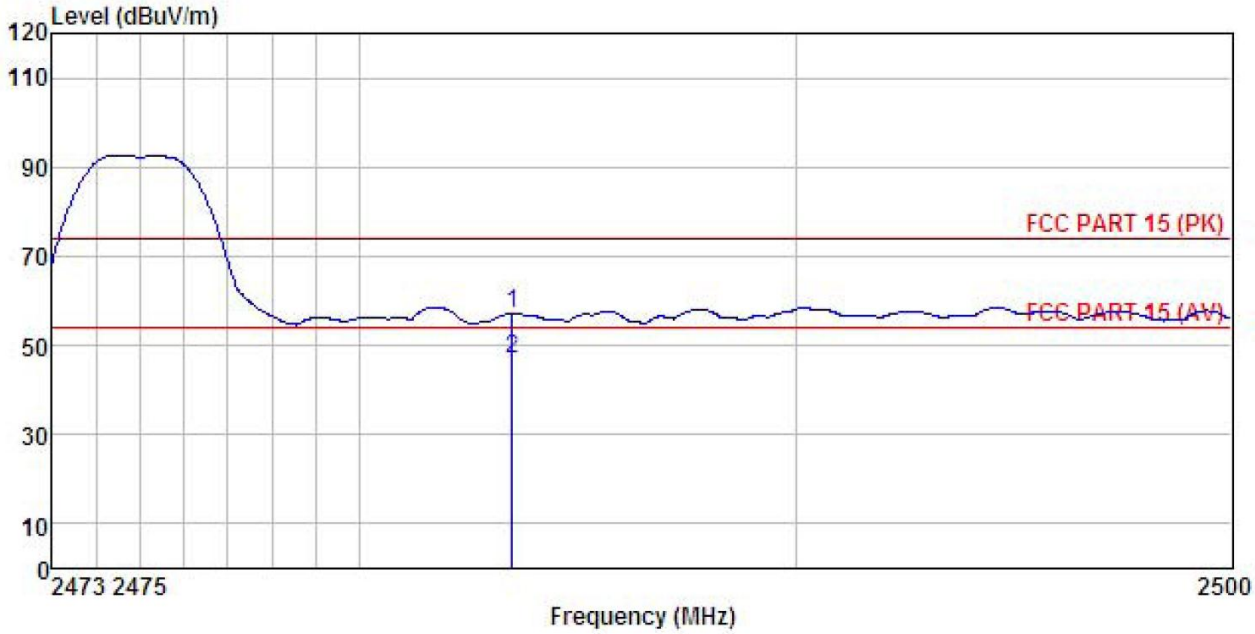


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	22.96	27.36	4.81	0.00	56.83	74.00	-17.17	Peak
2	2483.500	13.06	27.36	4.81	0.00	46.93	54.00	-7.07	Average

Remark:

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

Product Name:	TRANSMITTER	**Product Model:**	XTX200
Test By:	Mike	**Test mode:**	Tx mode
Test Channel:	Highest channel	**Polarization:**	Horizontal
Test Voltage:	DC 3.0V	**Environment:**	Temp: 24℃ Huni: 57%



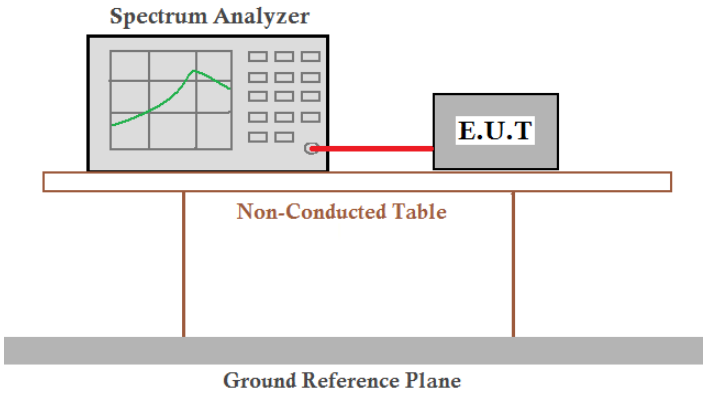
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	23.32	27.35	4.81	0.00	57.18	74.00	-16.82	Peak
2	2483.500	13.04	27.35	4.81	0.00	46.90	54.00	-7.10	Average

Remark:

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

6.9 Spurious Emission

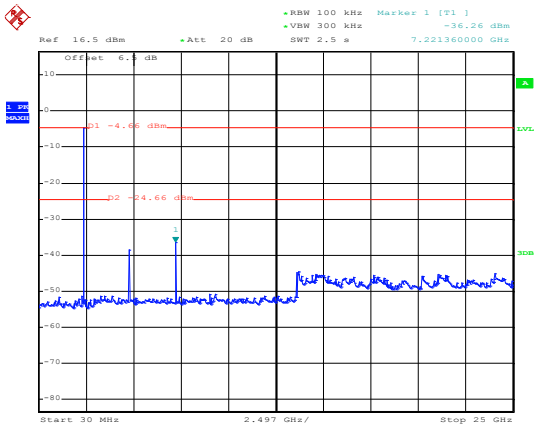
6.9.1 Conducted Emission Method

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 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass

Test plot as follows:

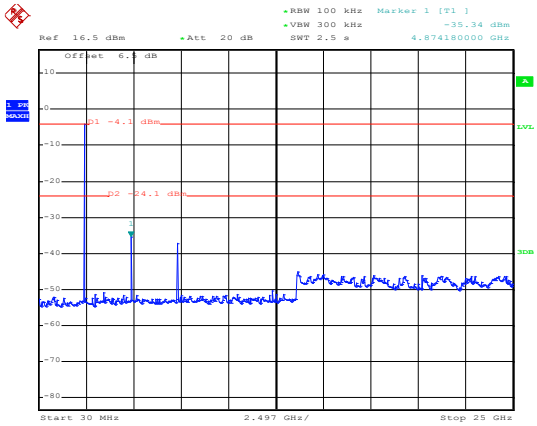
GFSK

Lowest channel



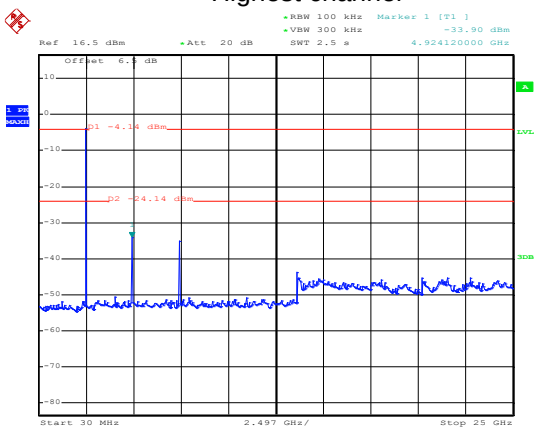
Date: 26.JUL.2019 16:05:10

Middle channel



Date: 26.JUL.2019 16:05:31

Highest channel



Date: 26.JUL.2019 16:06:08

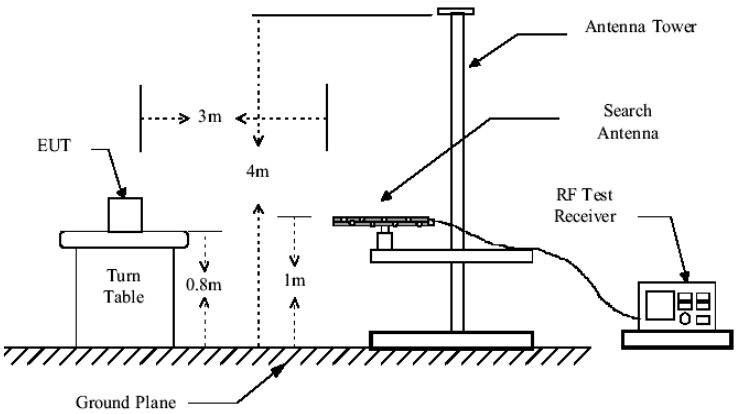
6.9.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.209				
Test Frequency Range:	9 kHz to 25 GHz				
Test Distance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value

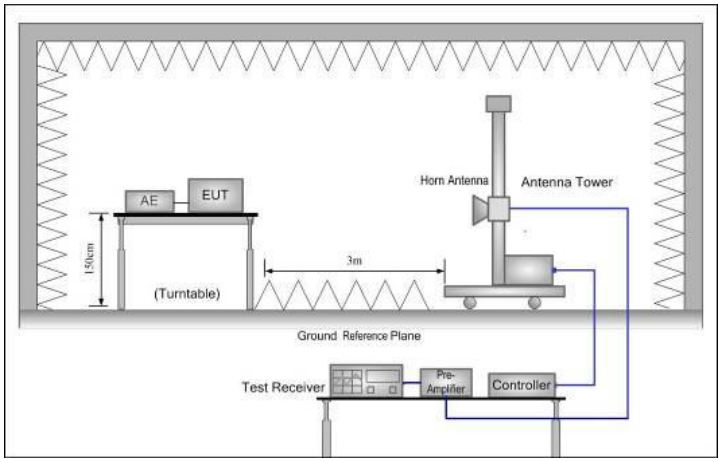
Limit:	Frequency	Limit (dBuV/m @3m)	Remark
	30MHz-88MHz	40.0	Quasi-peak Value
	88MHz-216MHz	43.5	Quasi-peak Value
	216MHz-960MHz	46.0	Quasi-peak Value
	960MHz-1GHz	54.0	Quasi-peak Value
	Above 1GHz	54.0	Average Value
		74.0	Peak Value

Test setup:

Below 1GHz



Above 1GHz



Test Procedure:

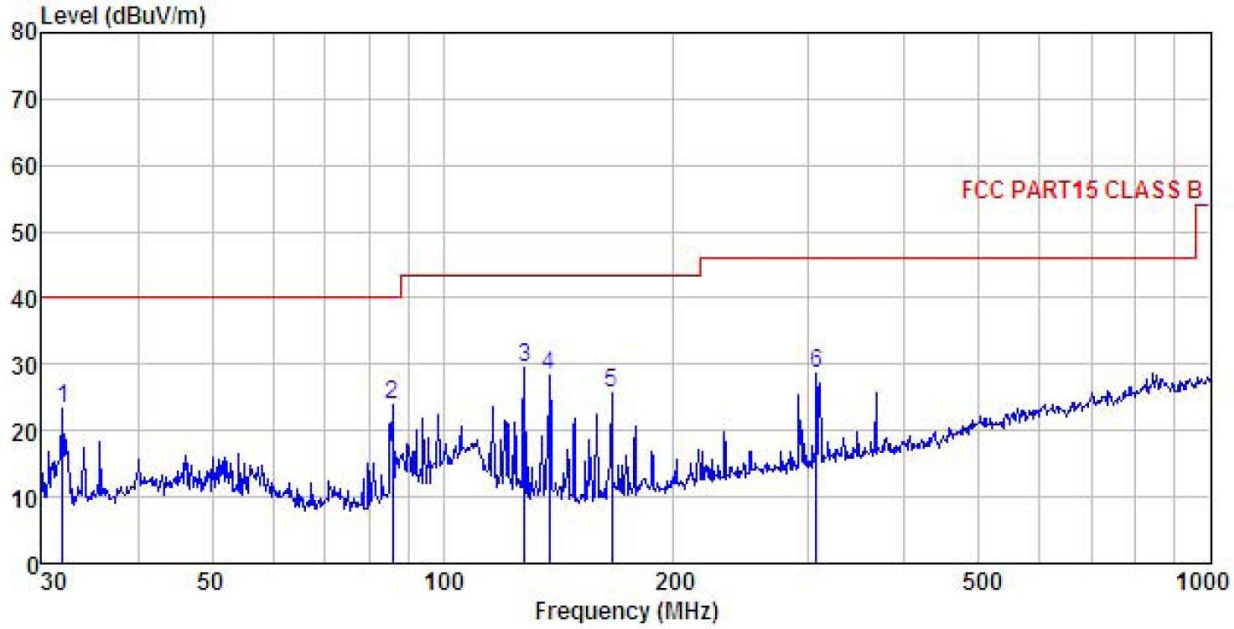
1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz) /1.5m(above 1GHz) above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving

	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 5.8 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, so only shows the data of above 30MHz in this report.

Measurement Data (worst case):

Below 1GHz:

Product Name:	TRANSMITTER	**Product Model:**	XTX200
Test By:	Mike	**Test mode:**	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical
Test Voltage:	DC 3.0V	**Environment:**	Temp: 24℃ Huni: 57%

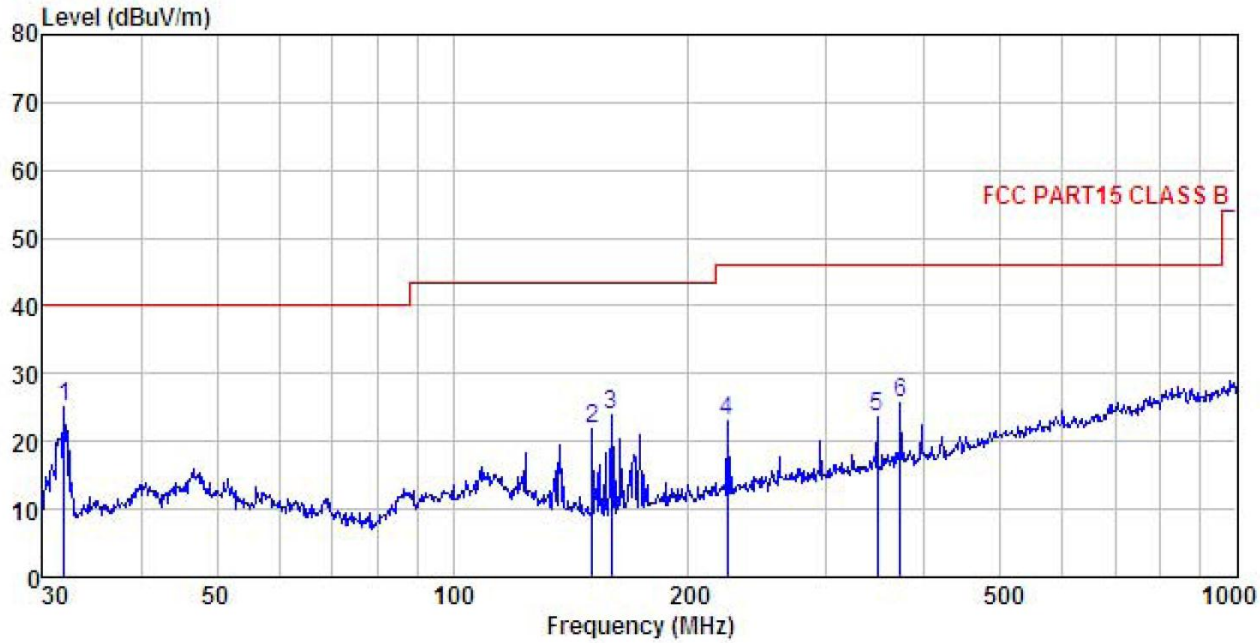


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	31.955	41.63	10.84	0.85	29.97	23.35	40.00	-16.65	QP
2	85.898	42.82	8.89	1.87	29.59	23.99	40.00	-16.01	QP
3	127.665	46.28	10.32	2.26	29.34	29.52	43.50	-13.98	QP
4	137.420	45.57	9.69	2.37	29.29	28.34	43.50	-15.16	QP
5	166.068	42.76	9.49	2.63	29.08	25.80	43.50	-17.70	QP
6	306.754	40.43	13.76	2.96	28.47	28.68	46.00	-17.32	QP

Remark:

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

Product Name:	TRANSMITTER	Product Model:	XTX200
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	DC 3.0V	Environment:	Temp: 24℃ Huni: 57%



	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	31.955	43.30	10.84	0.85	29.97	25.02	40.00	-14.98	QP
2	150.538	39.70	8.92	2.52	29.22	21.92	43.50	-21.58	QP
3	159.225	41.14	9.24	2.58	29.14	23.82	43.50	-19.68	QP
4	223.733	37.10	11.63	2.84	28.69	22.88	46.00	-23.12	QP
5	348.027	34.48	14.57	3.09	28.56	23.58	46.00	-22.42	QP
6	372.005	36.43	14.91	3.09	28.66	25.77	46.00	-20.23	QP

Remark:

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

Above 1GHz:

Test channel: Lowest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4810.00	60.38	31.05	6.81	41.82	56.42	74.00	-17.58	Vertical
4810.00	64.16	31.05	6.81	41.82	60.20	74.00	-13.80	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4810.00	54.87	31.05	6.81	41.82	50.91	54.00	-3.09	Vertical
4810.00	54.37	31.05	6.81	41.82	50.41	54.00	-3.59	Horizontal
Test channel: Middle channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4880.00	59.90	31.18	6.85	41.84	56.09	74.00	-17.91	Vertical
4880.00	63.02	31.18	6.85	41.84	59.21	74.00	-14.79	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4880.00	51.72	31.18	6.85	41.84	47.91	54.00	-6.09	Vertical
4880.00	54.78	31.18	6.85	41.84	50.97	54.00	-3.03	Horizontal
Test channel: Highest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4950.00	59.55	31.29	6.89	41.86	55.87	74.00	-18.13	Vertical
4950.00	63.13	31.29	6.89	41.86	59.45	74.00	-14.55	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4950.00	51.86	31.29	6.89	41.86	48.18	54.00	-5.82	Vertical
4950.00	53.91	31.29	6.89	41.86	50.23	54.00	-3.77	Horizontal

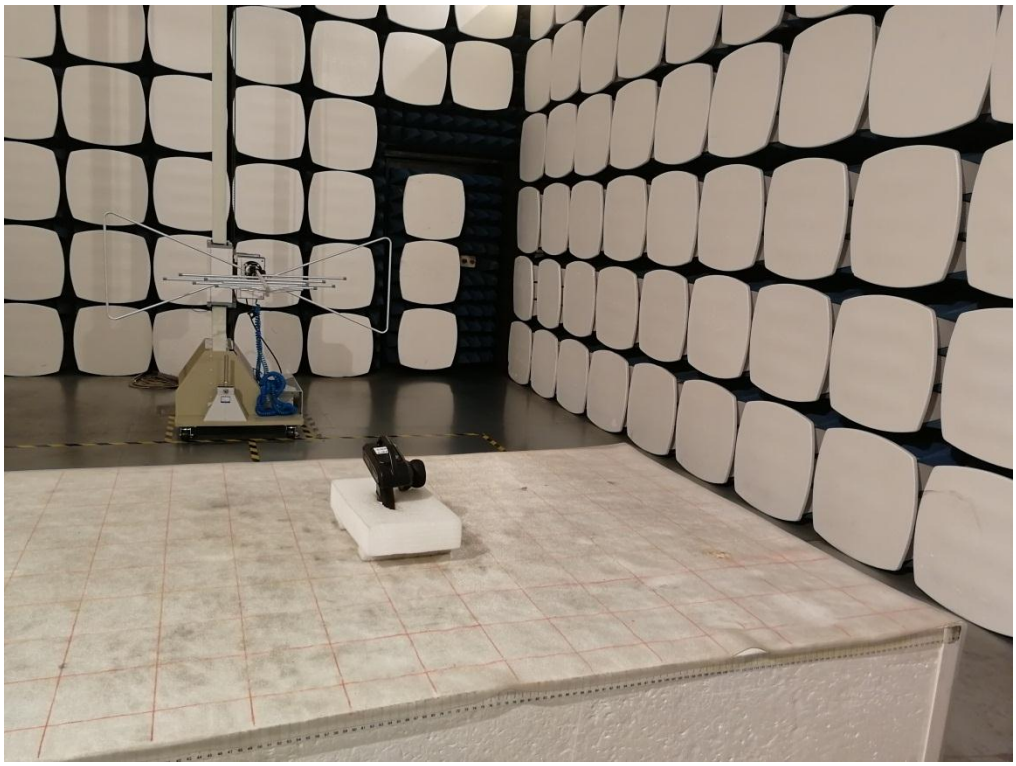
Remark:

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

7 Test Setup Photo

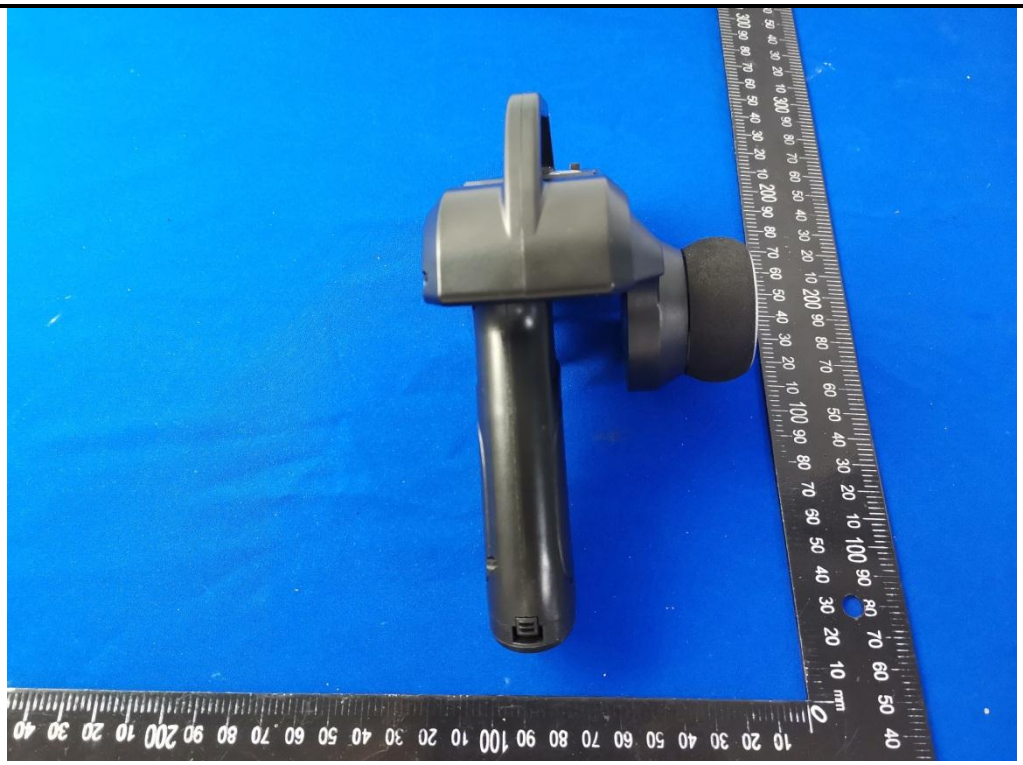
Radiated Spurious Emission

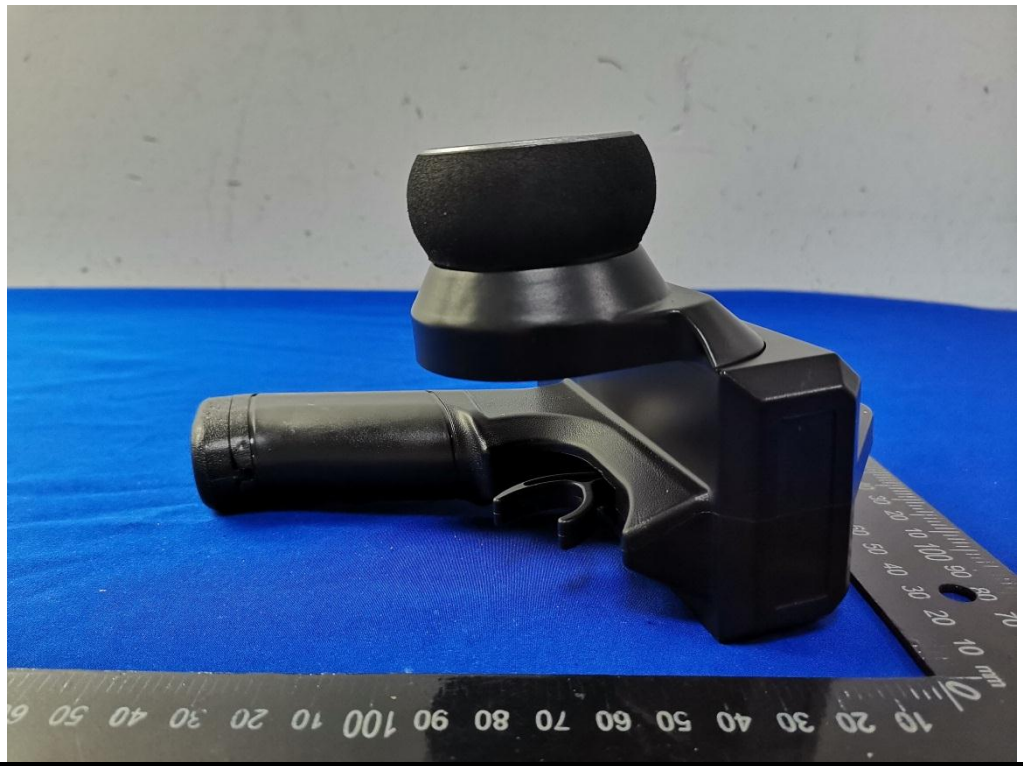
Below 1GHz

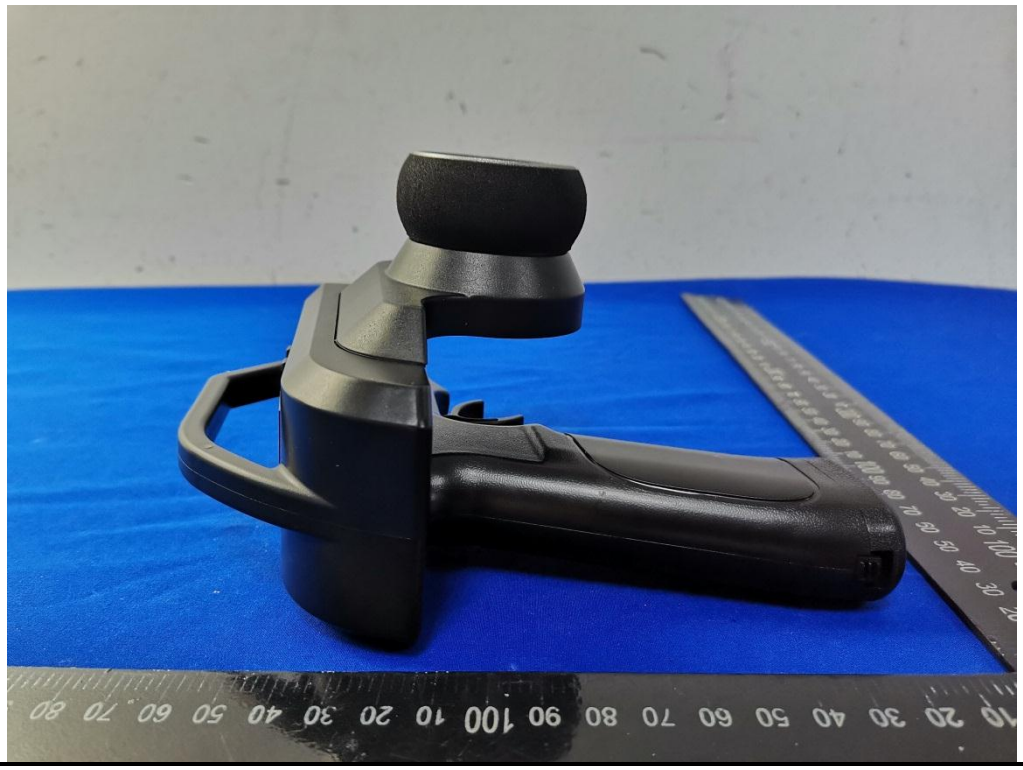


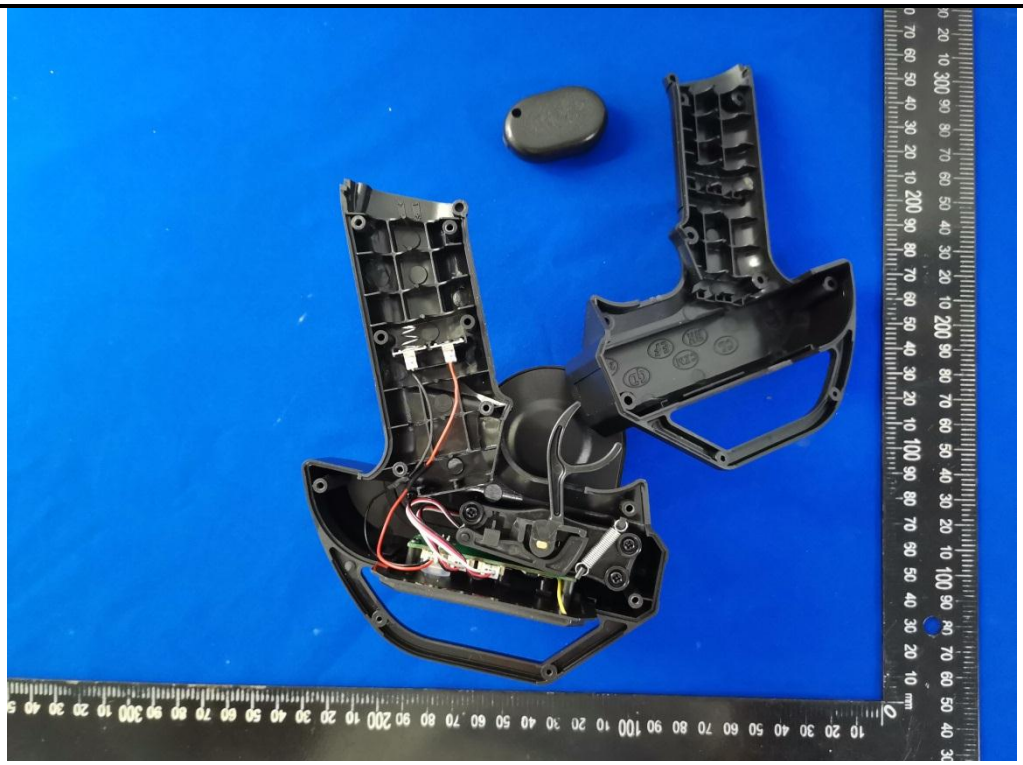
Above 1GHz

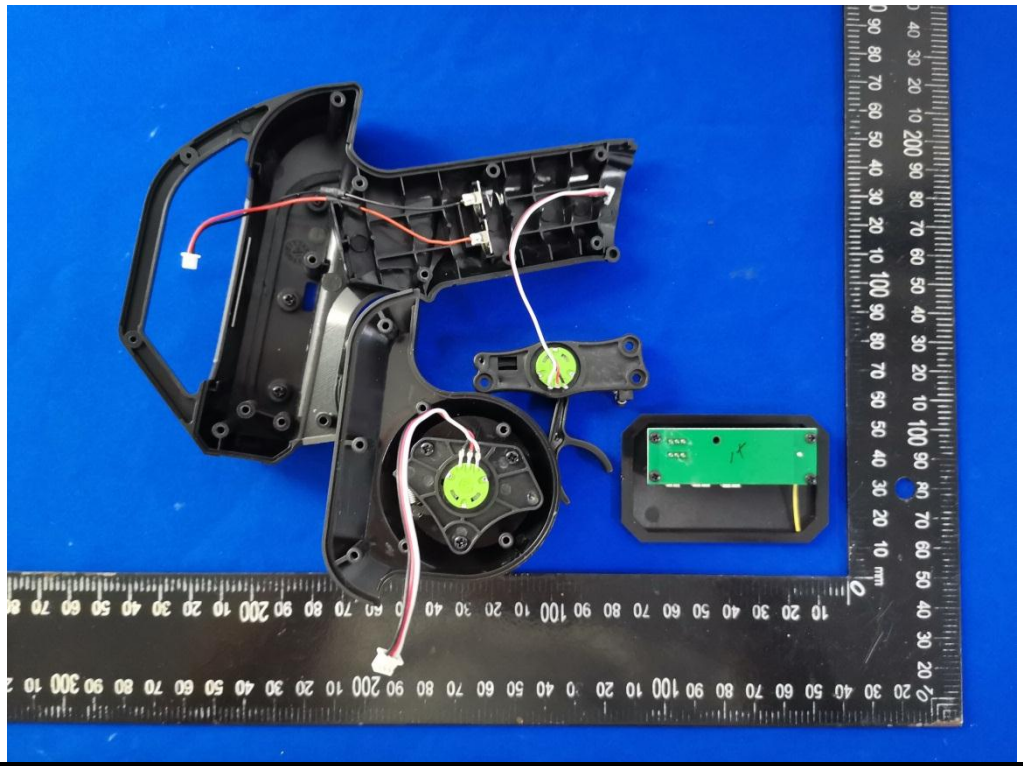
8 EUT Constructional Details

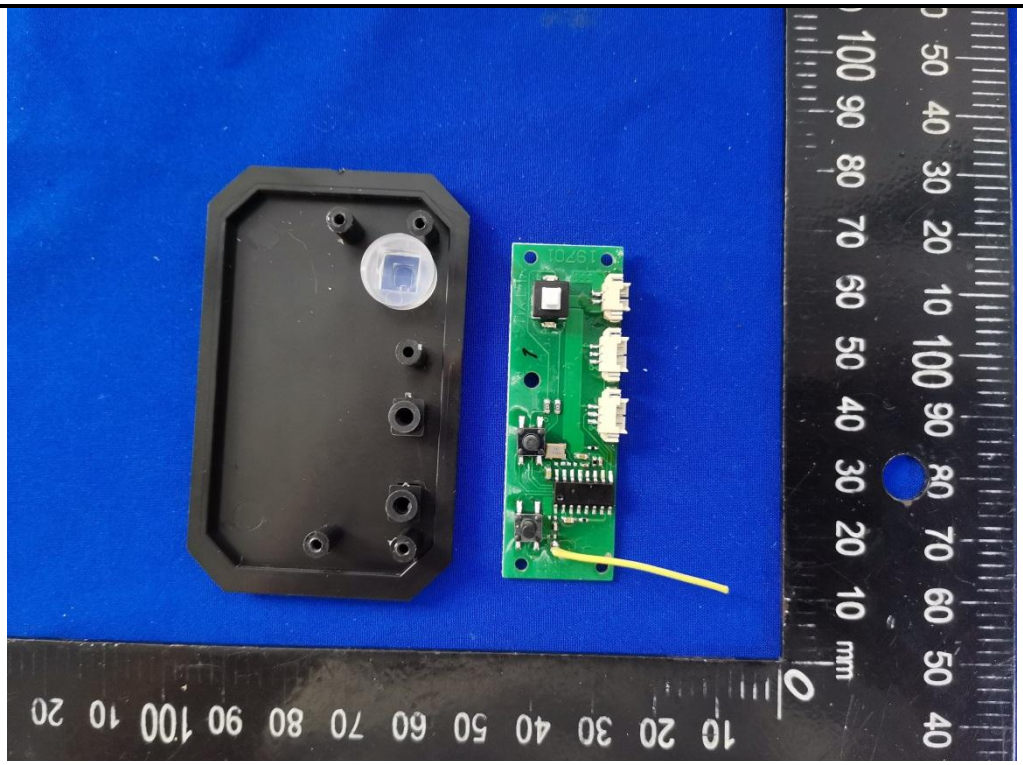


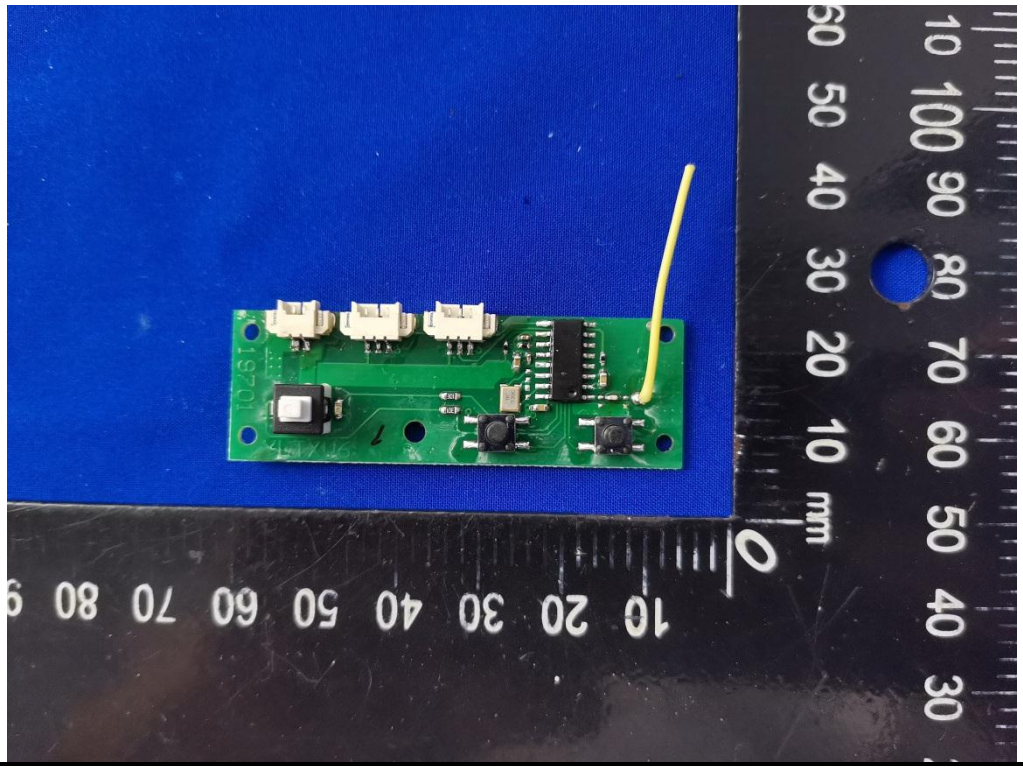


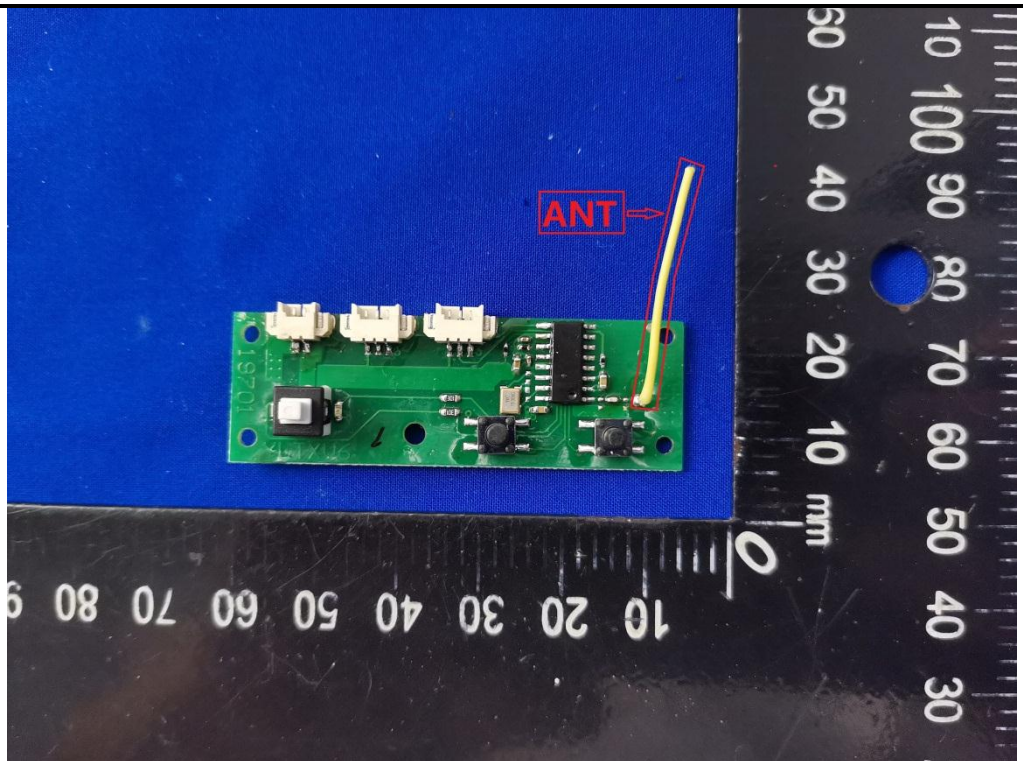


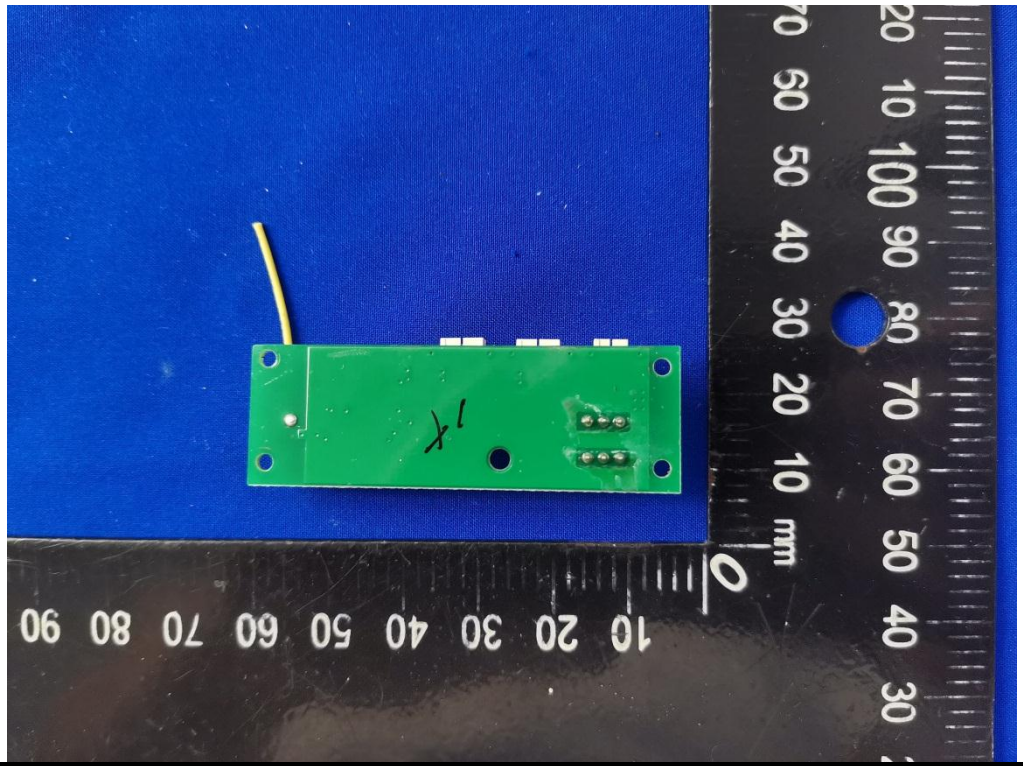












-----End of report------