FCC REPORT
(BDR)

Applicant:	Chuan Yu Electronics Ltd.
Address of Applicant:	18F., No.114, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22102,Taiwan

Equipment Under Test (EUT)

Product Name:	Dr.Driver
Model No.:	OBODO-1
Trade mark:	Dr.Driver
FCC ID:	2ARZ9OBODO-1
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	05 Jun., 2019
Date of Test:	06 Jun., to 17 Jun., 2019
Date of report issued:	18 Jun., 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.

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2 Version

Version No.	Date	Description
00	*18 Jun., 2019*	*Original*
01	*24 Jun., 2019*	*Update pages 19 and 20*

Tested by:	YT Yang	***Date:***	*24 Jun., 2019*
	Test Engineer		
Reviewed by:	Winner Zhang	***Date:***	*24 Jun., 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 EMISSIONS 9
6.3 CONDUCTED OUTPUT POWER 10
6.4 20DB OCCUPY BANDWIDTH 12
6.5 CARRIER FREQUENCIES SEPARATION 14
6.6 HOPPING CHANNEL NUMBER 17
6.7 DWELL TIME 19
6.8 PSEUDORANDOM FREQUENCY HOPPING SEQUENCE 21
6.9 BAND EDGE 22
6.9.1 Conducted Emission Method 22
6.9.2 Radiated Emission Method 24
6.10 SPURIOUS EMISSION 29
6.10.1 Conducted Emission Method 29
6.10.2 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	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:	Chuan Yu Electronics Ltd.
Address:	18F., No.114, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22102,Taiwan
Manufacturer:	Chuan Yu Electronics Ltd.
Address:	18F., No.114, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22102,Taiwan

5.2 General Description of E.U.T.

Product Name:	Dr.Driver
Model No.:	OBODO-1
Operation Frequency:	2402MHz~2480MHz
Transfer rate:	1 Mbits/s
Number of channel:	40
Modulation type:	GFSK
Modulation technology:	FHSS
Antenna Type:	PCB Antenna
Antenna gain:	-4 dBi
powered by:	DC 12V
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
00	2402MHz	12	2426MHz	24	2450MHz	36	2474MHz
01	2404MHz	13	2428MHz	25	2452MHz	37	2476MHz
02	2406MHz	14	2430MHz	26	2454MHz	38	2478MHz
03	2408MHz	15	2432MHz	27	2456MHz	39	2480MHz
04	2410MHz	16	2434MHz	28	2458MHz	/	
05	2412MHz	17	2436MHz	29	2460MHz		
06	2414MHz	18	2438MHz	30	2462MHz		
07	2416MHz	19	2440MHz	31	2464MHz		
08	2418MHz	20	2442MHz	32	2466MHz		
09	2420MHz	21	2444MHz	33	2468MHz		
10	2422MHz	22	2446MHz	34	2470MHz		
11	2424MHz	23	2448MHz	35	2472MHz		
Remark: Channels 0, 19 and 39 were selected as low, medium and high channels for testing							

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 with a fresh battery, 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

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)	±4.54 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.84 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

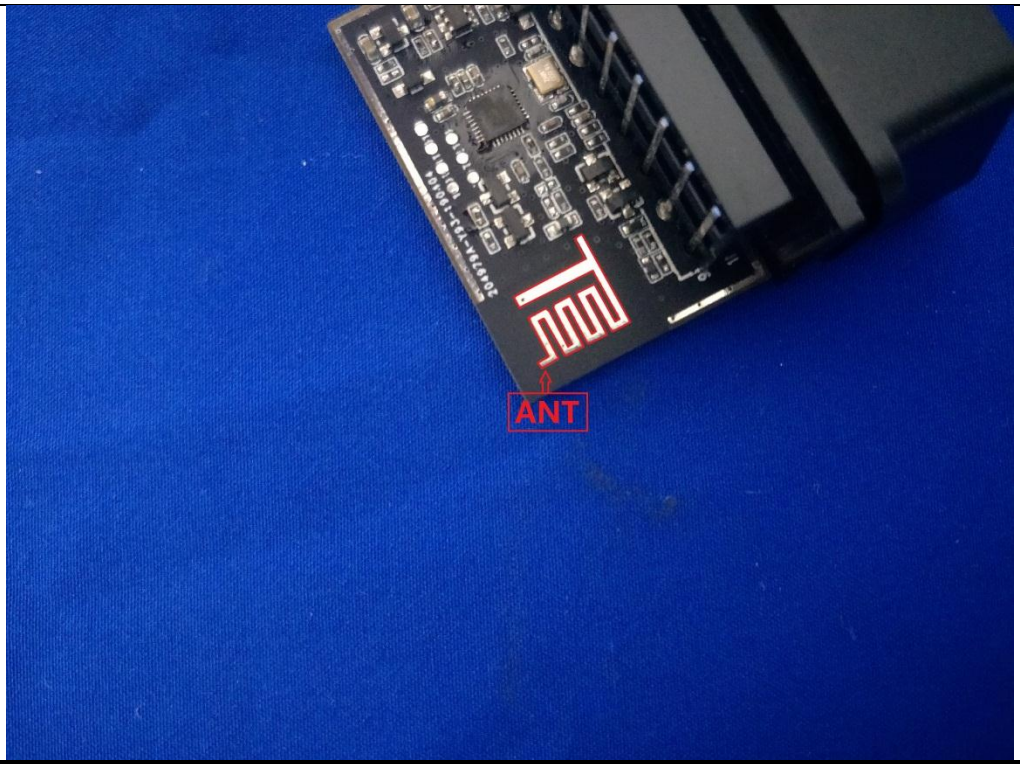
Radiated Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	03-18-2019	03-17-2020
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-18-2019	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		

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	101189	03-18-2019	03-17-2020
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-18-2019	03-17-2020
LISN	CHASE	MN2050D	1447	03-18-2019	03-17-2020
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2018	07-20-2019
Cable	HP	10503A	N/A	03-18-2019	03-17-2020
EMI Test Software	AUDIX	E3	Version: 6.110919b		

6 Test results and measurement data

6.1 Antenna Requirement

Standard requirement:	FCC Part 15 C Section 15.203
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 -4 dBi.	

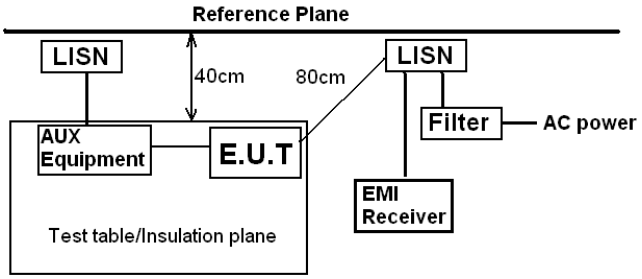


6.2 Conducted Emissions

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:



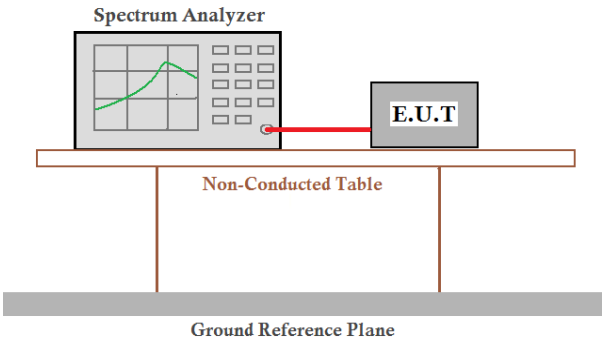
Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m

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: 2013 on conducted measurement.

Test Instruments:	Refer to section 5.8 for details
Test mode:	Hopping mode
Test results:	Pass
Remark:	vehicle battery input does not apply

6.3 Conducted Output Power

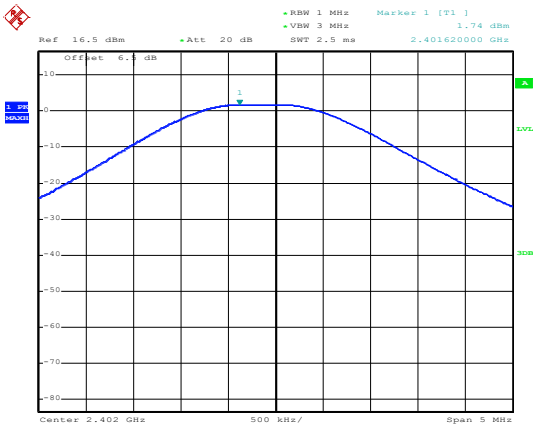
Test Requirement:	FCC Part 15 C Section 15.247 (b)(1)
Receiver setup:	RBW=1MHz, VBW=3MHz, Detector=Peak (20dB BW ≤1 MHz)
Limit:	For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt. For all other frequency hopping systems in 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
GFSK mode			
Lowest channel	1.71	21.00	Pass
Middle channel	1.34	21.00	Pass
Highest channel	0.77	21.00	Pass

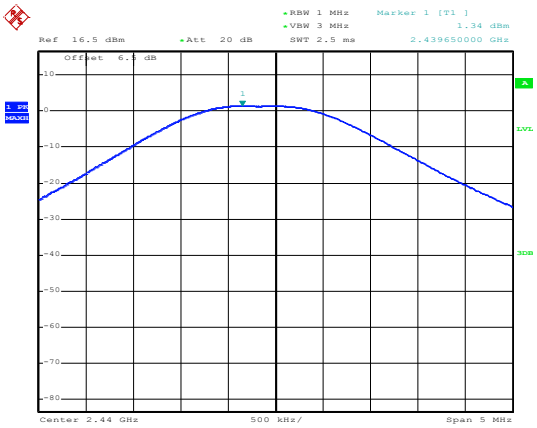
Test plot as follows:

Modulation mode: GFSK



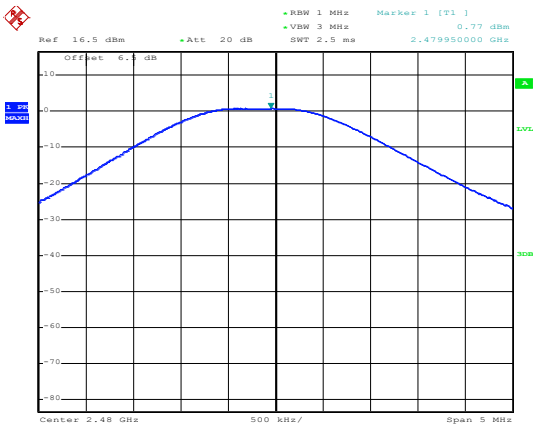
Date: 5.JUN.2019 18:40:12

Lowest channel



Date: 5.JUN.2019 18:47:40

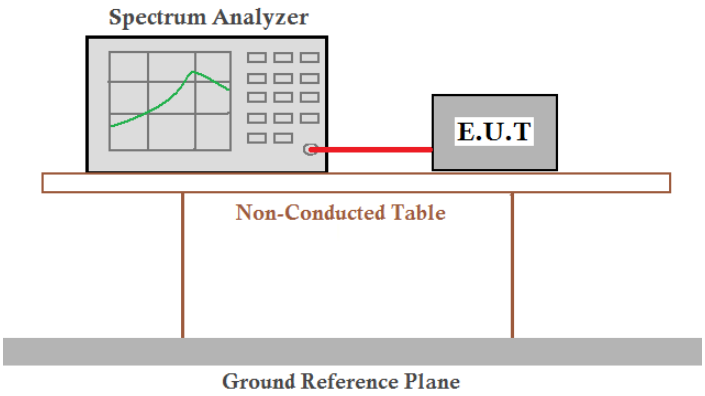
Middle channel



Date: 5.JUN.2019 18:42:43

Highest channel

6.4 20dB Occupy Bandwidth

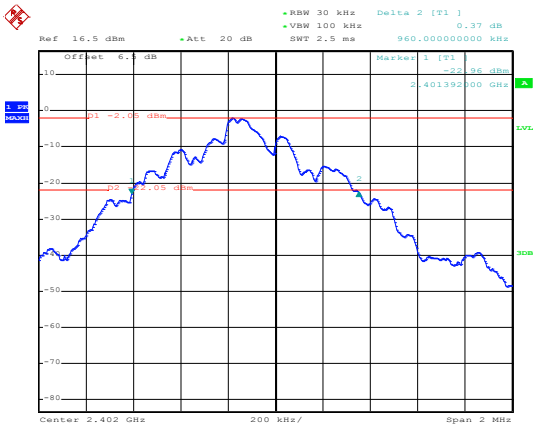
Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Receiver setup:	RBW=30 kHz, VBW=100 kHz, detector=Peak
Limit:	N/A
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass

Measurement Data:

Test channel	20dB Occupy Bandwidth (kHz)
	GFSK
Lowest	960
Middle	964
Highest	960

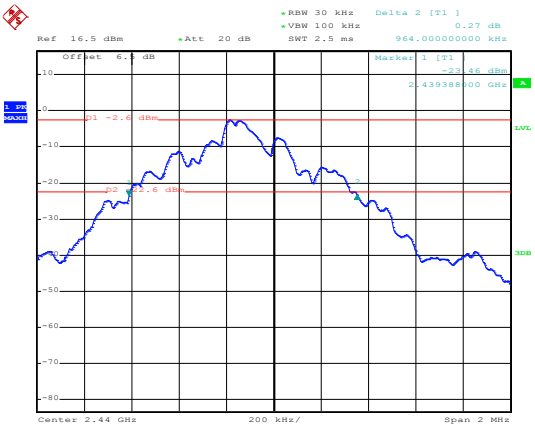
Test plot as follows:

Modulation mode: GFSK



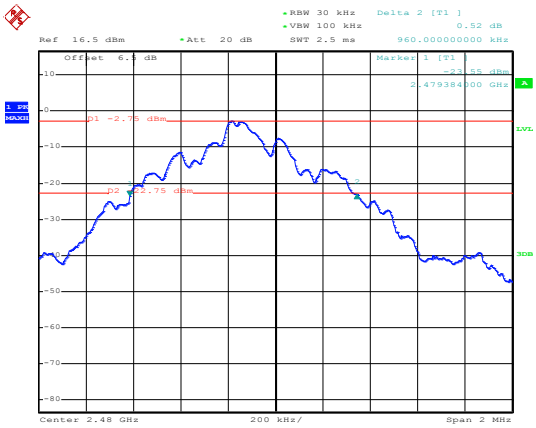
Date: 5.JUN.2019 20:43:56

Lowest channel



Date: 5.JUN.2019 18:49:04

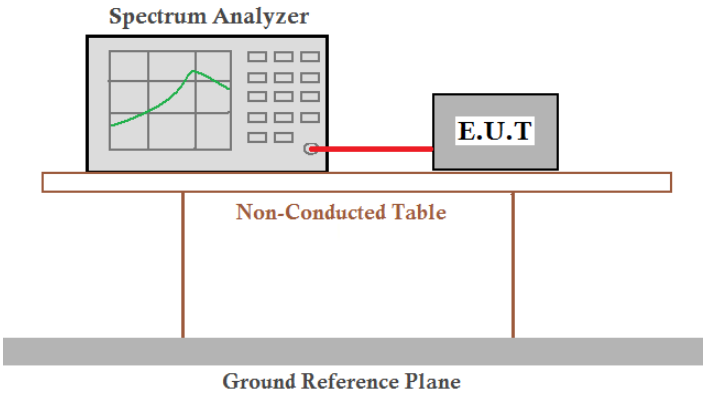
Middle channel



Date: 5.JUN.2019 20:45:24

Highest channel

6.5 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:

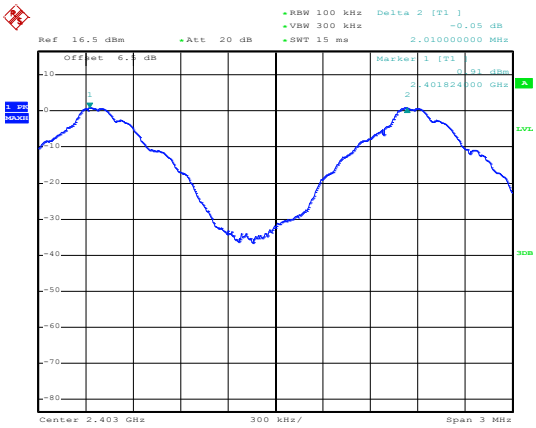
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
GFSK			
Lowest	2010	964.00	Pass
Middle	2004	964.00	Pass
Highest	2004	964.00	Pass

Note: According to section 6.4

Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
GFSK	964	964.00

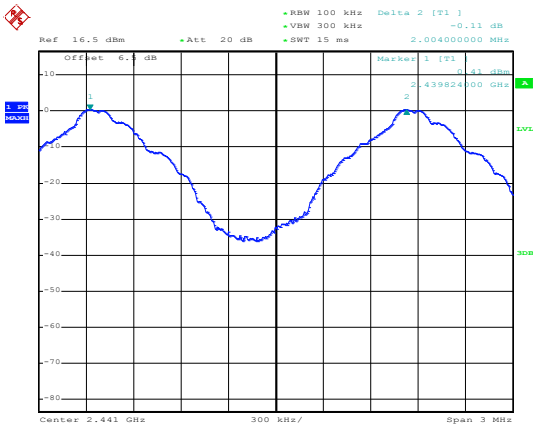
Test plot as follows:

Modulation mode: GFSK



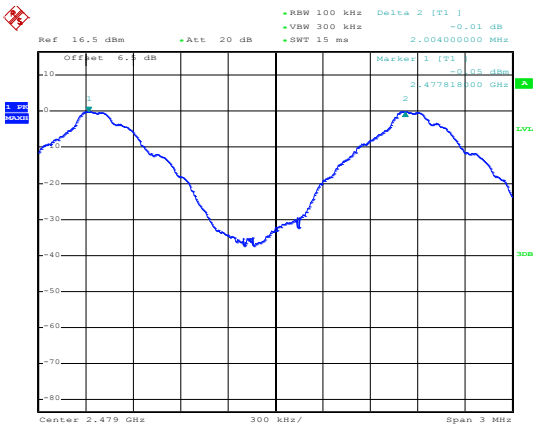
Date: 5.JUN.2019 21:03:59

Lowest channel



Date: 5.JUN.2019 21:02:02

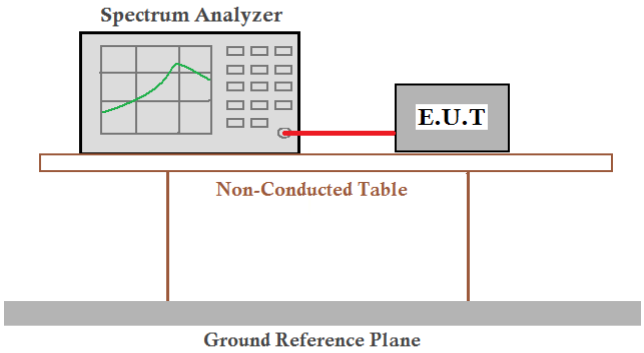
Middle channel



Date: 5.JUN.2019 21:00:38

Highest channel

6.6 Hopping Channel Number

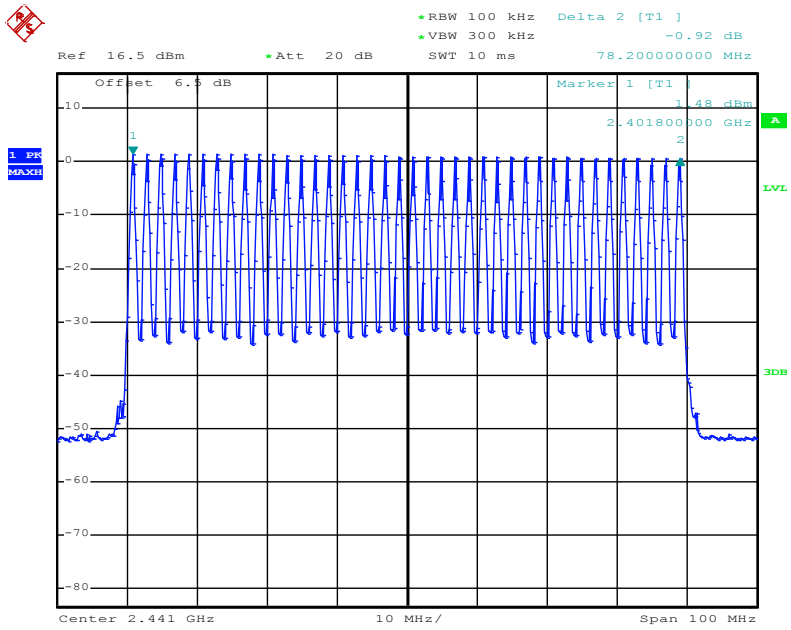
Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Hopping mode
Test results:	Pass

Measurement Data:

Mode	Hopping channel numbers	Limit	Result
GFSK	40	15	Pass

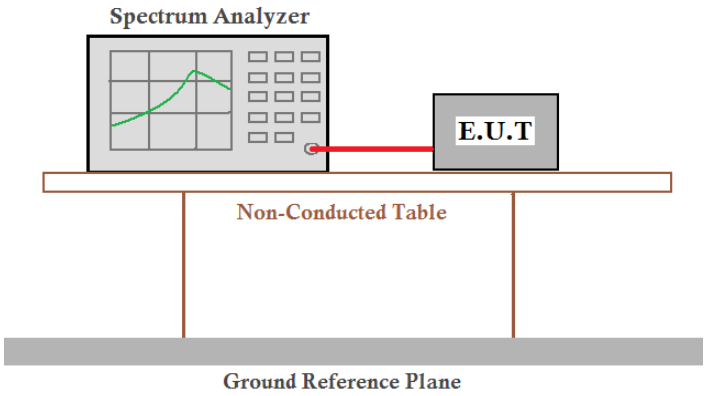
Test plot as follows:

GFSK



Date: 5.JUN.2019 20:39:18

6.7 Dwell Time

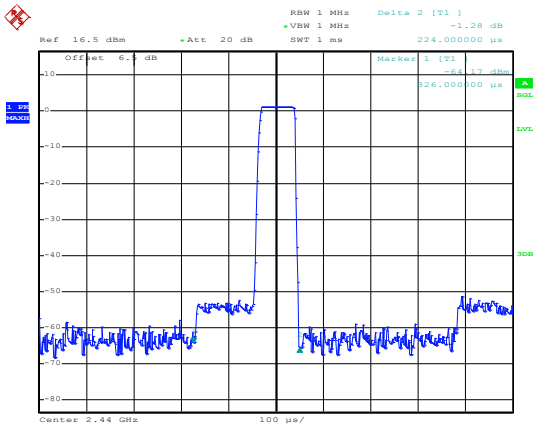
Test Requirement:	FCC Part 15 C Section 15.247 (a)(iii)
Receiver setup:	RBW=1 MHz, VBW=1 MHz, Span=0 Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Hopping mode
Test results:	Pass

Measurement Data (Worse case):

Mode	Dwell time (second)	Limit (second)	Result
GFSK	0.165	0.4	Pass
Note: The test period = 0.4 Second/Channel x 40 Channel = 16 s 46X16X0.224=165ms			

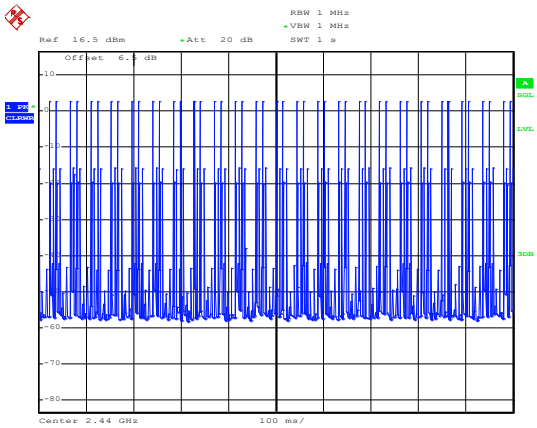
Test plot as follows:

Modulation mode: GFSK



Date: 5.JUN.2019 20:47:03

SWT=1ms



Date: 25.JUN.2019 18:25:00

SWT=1S

6.8 Pseudorandom Frequency Hopping Sequence

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

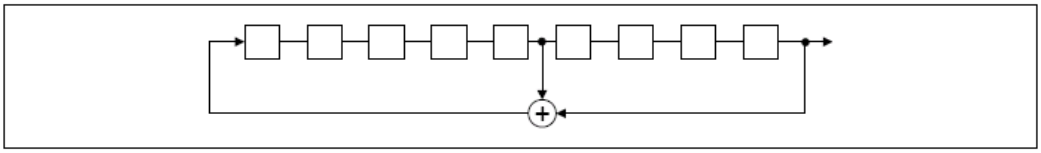
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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

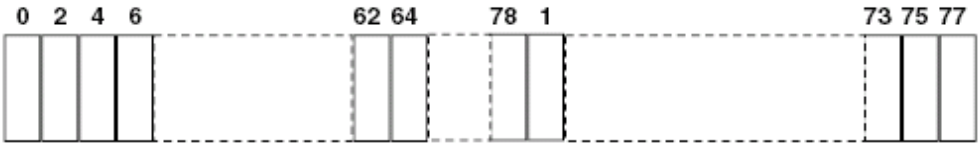
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized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

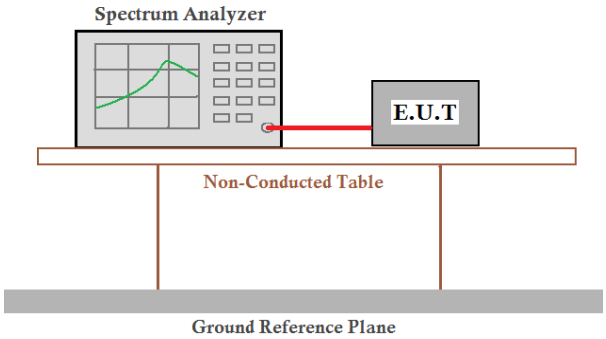


Each frequency used equally on the average by each transmitter.

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

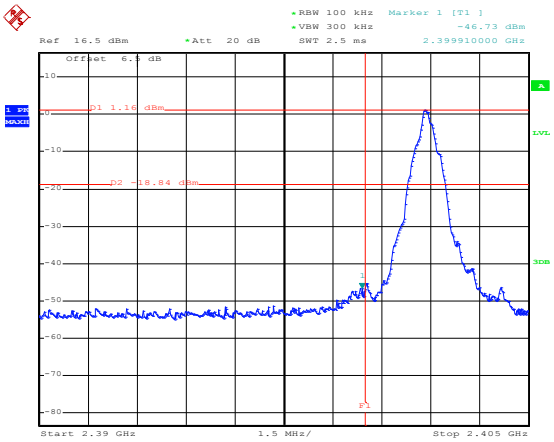
6.9.1 Conducted Emission Method

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

Test plot as follows:

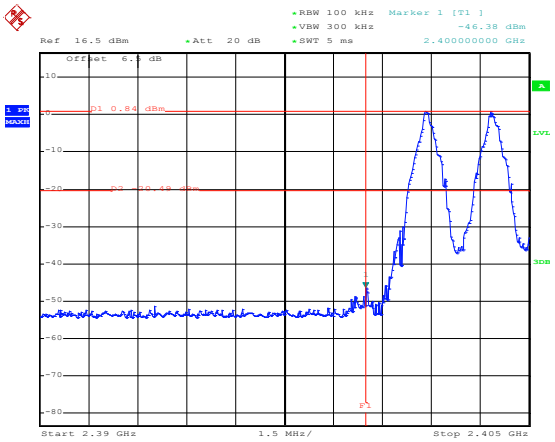
GFSK

Lowest Channel



Date: 5.JUN.2019 21:26:15

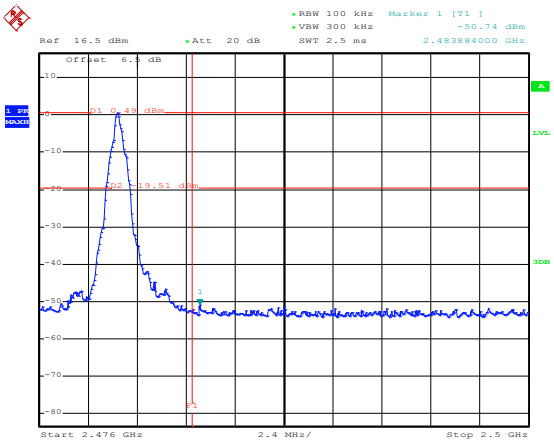
No-hopping mode



Date: 5.JUN.2019 20:53:09

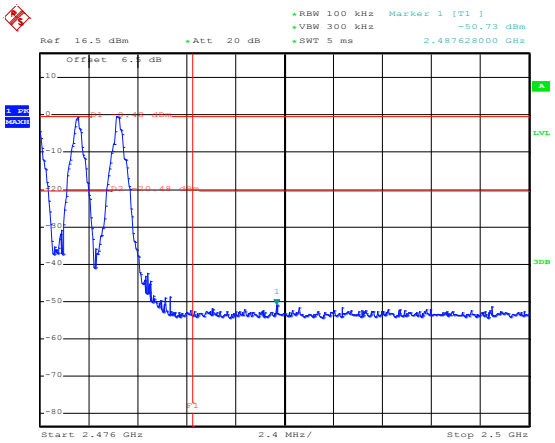
Hopping mode

Highest Channel



Date: 5.JUN.2019 21:25:08

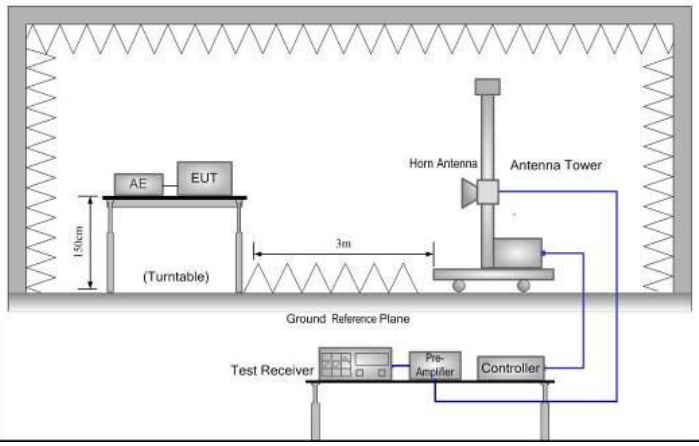
No-hopping mode



Date: 5.JUN.2019 20:54:47

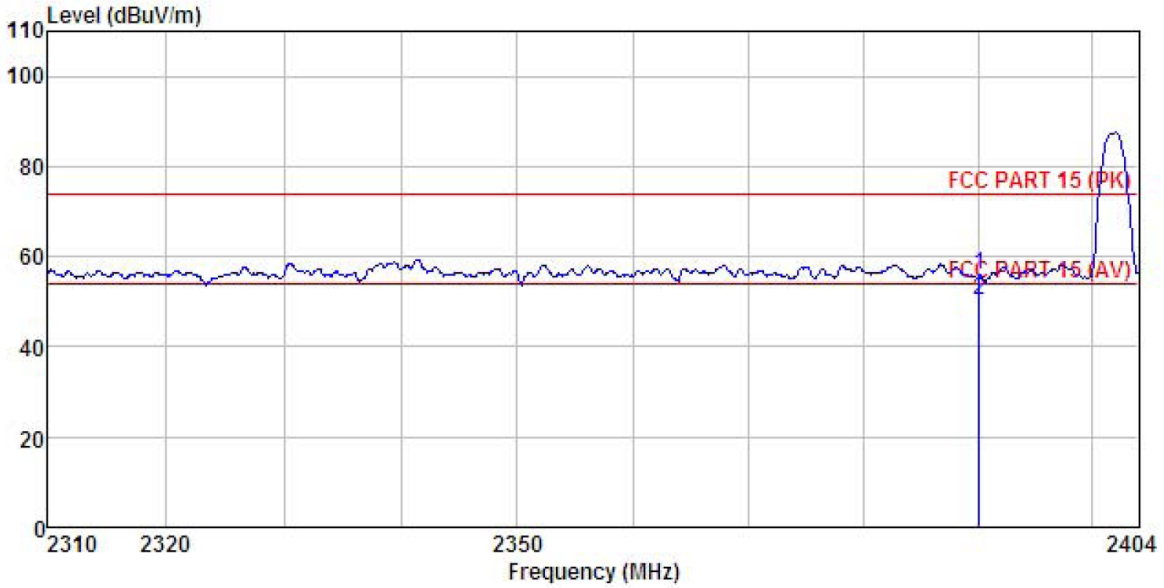
Hopping mode

6.9.2 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:	Dr.Driver	**Product Model:**	OBODO-1
Test By:	Mike	**Test mode:**	DH1 Tx mode
Test Channel:	Lowest channel	**Polarization:**	Vertical
Test Voltage:	DC 12V	**Environment:**	Temp: 24℃ Huni: 57%

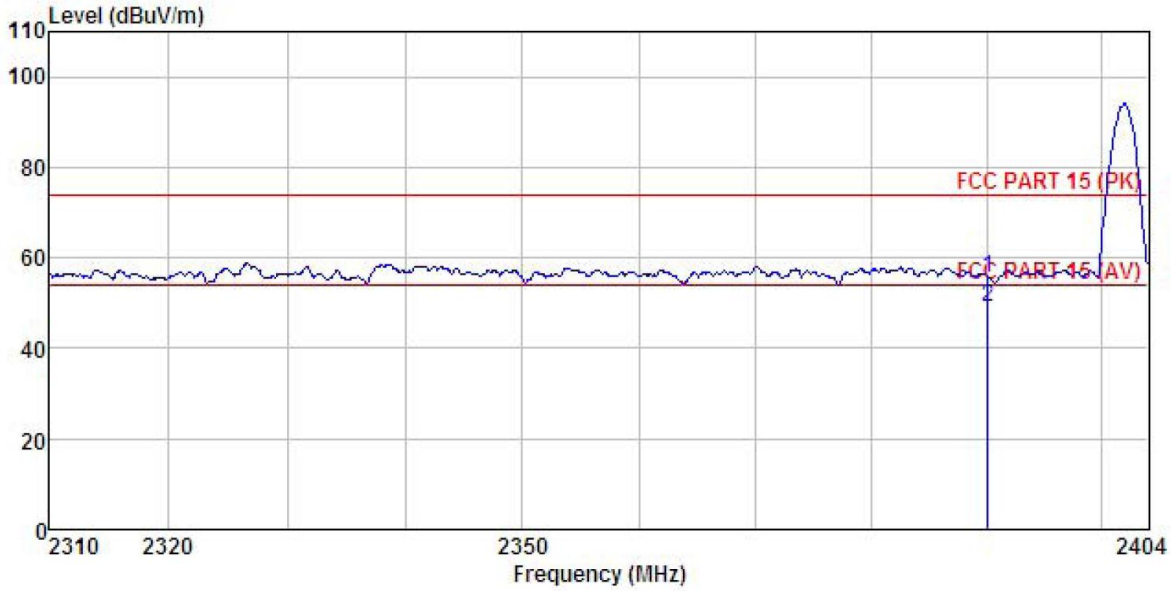


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	24.07	27.07	4.69	0.00	55.83	74.00	-18.17	Peak
2	2390.000	18.62	27.07	4.69	0.00	50.38	54.00	-3.62	Average

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:	Dr.Driver	**Product Model:**	OBODO-1
Test By:	Mike	**Test mode:**	DH1 Tx mode
Test Channel:	Lowest channel	**Polarization:**	Horizontal
Test Voltage:	DC 12V	**Environment:**	Temp: 24℃ Huni: 57%

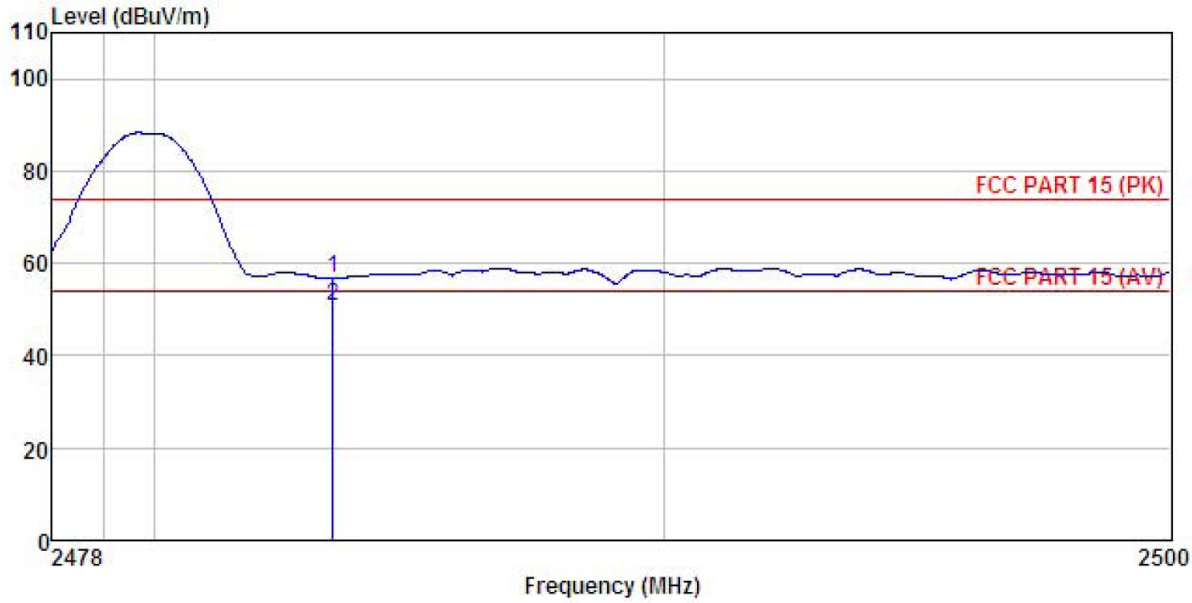


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	23.95	27.08	4.69	0.00	55.72	74.00	-18.28	Peak
2	2390.000	17.42	27.08	4.69	0.00	49.19	54.00	-4.81	Average

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:	Dr.Driver	**Product Model:**	OBODO-1
Test By:	Mike	**Test mode:**	DH1 Tx mode
Test Channel:	Highest channel	**Polarization:**	Vertical
Test Voltage:	DC 12V	**Environment:**	Temp: 24℃ Huni: 57%

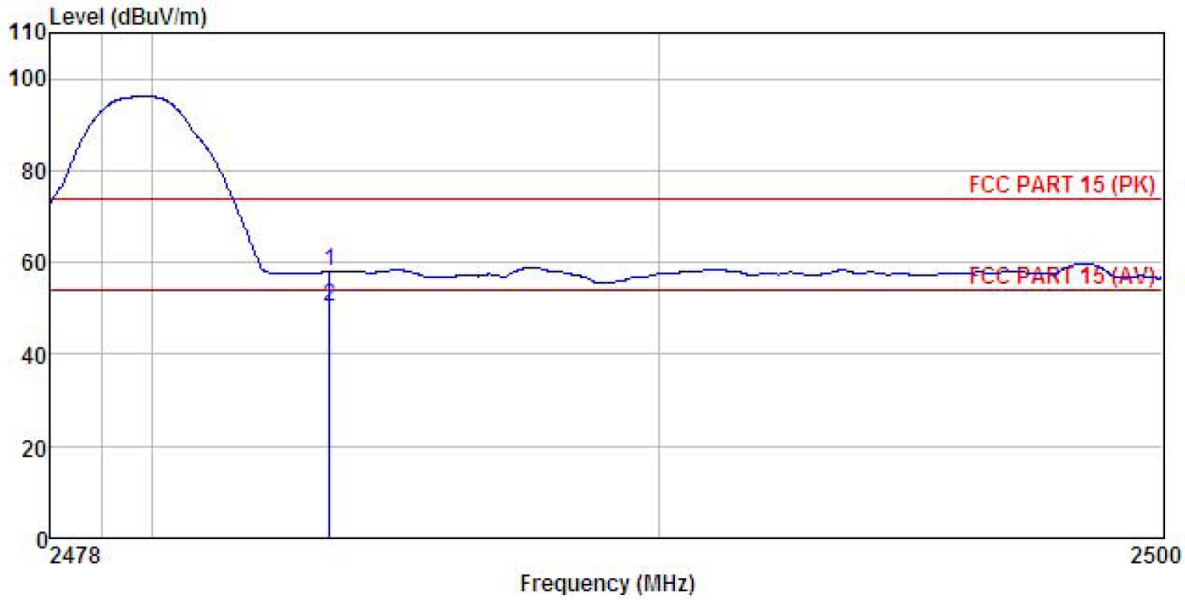


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	24.73	27.36	4.81	0.00	56.90	74.00	-17.10	Peak
2	2483.500	18.76	27.36	4.81	0.00	50.93	54.00	-3.07	Average

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:	Dr.Driver	**Product Model:**	OBODO-1
Test By:	Mike	**Test mode:**	DH1 Tx mode
Test Channel:	Highest channel	**Polarization:**	Horizontal
Test Voltage:	DC 12V	**Environment:**	Temp: 24℃ Huni: 57%



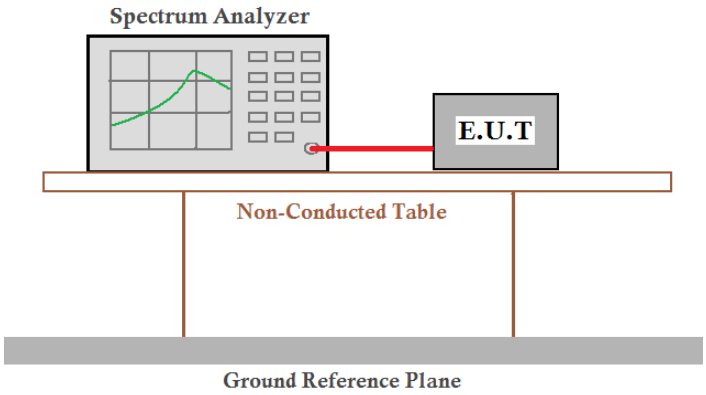
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	25.88	27.35	4.81	0.00	58.04	74.00	-15.96	Peak
2	2483.500	18.36	27.35	4.81	0.00	50.52	54.00	-3.48	Average

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.*

6.10 Spurious Emission

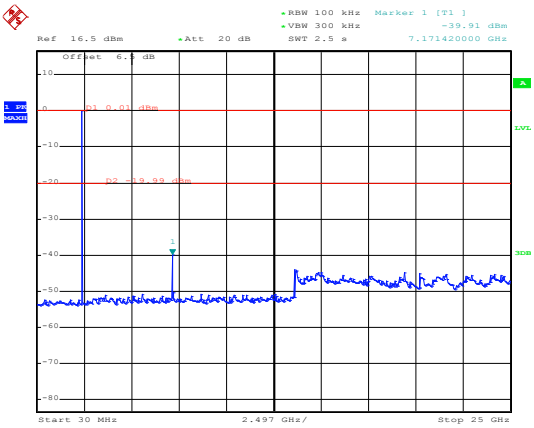
6.10.1 Conducted Emission Method

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

Test plot as follows:

GFSK

Lowest channel



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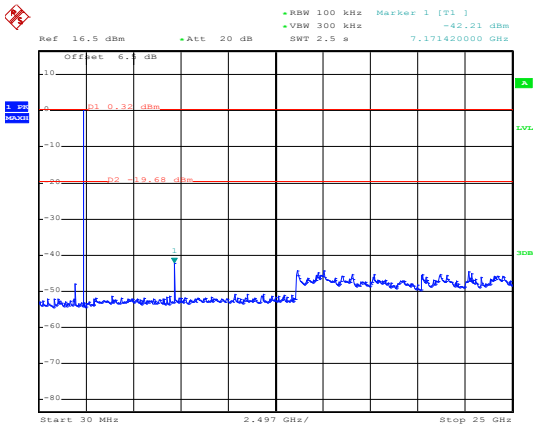
Middle channel



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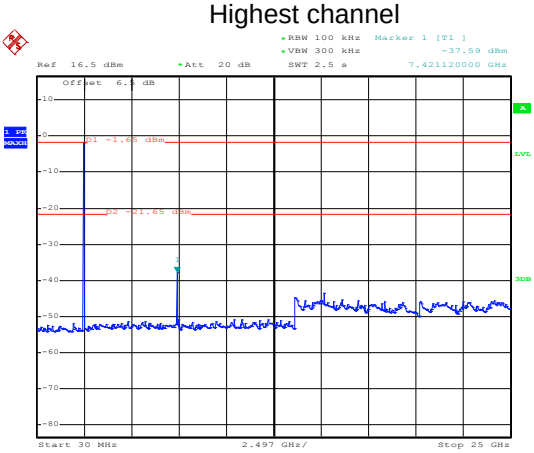
Highest channel



Date: 5.JUN.2019 21:10:59

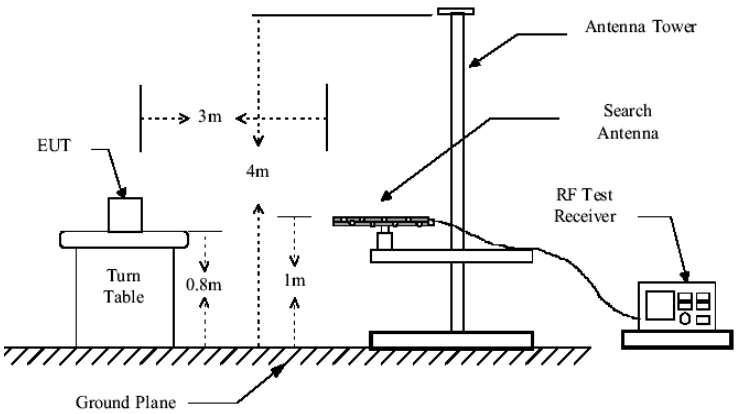
6.10.2 Radiated Emission Method

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

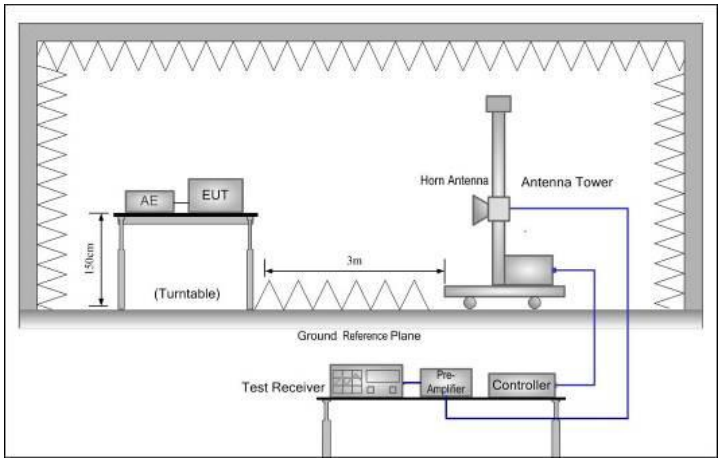
Limit:	Frequency	Limit (dBuV/m @3m)	Remark
	30MHz-88MHz	40.0	Quasi-peak Value
	88MHz-216MHz	43.5	Quasi-peak Value
	216MHz-960MHz	46.0	Quasi-peak Value
	960MHz-1GHz	54.0	Quasi-peak Value
	Above 1GHz	54.0	Average Value
		74.0	Peak Value

Test setup:

Below 1GHz



Above 1GHz



Test Procedure:

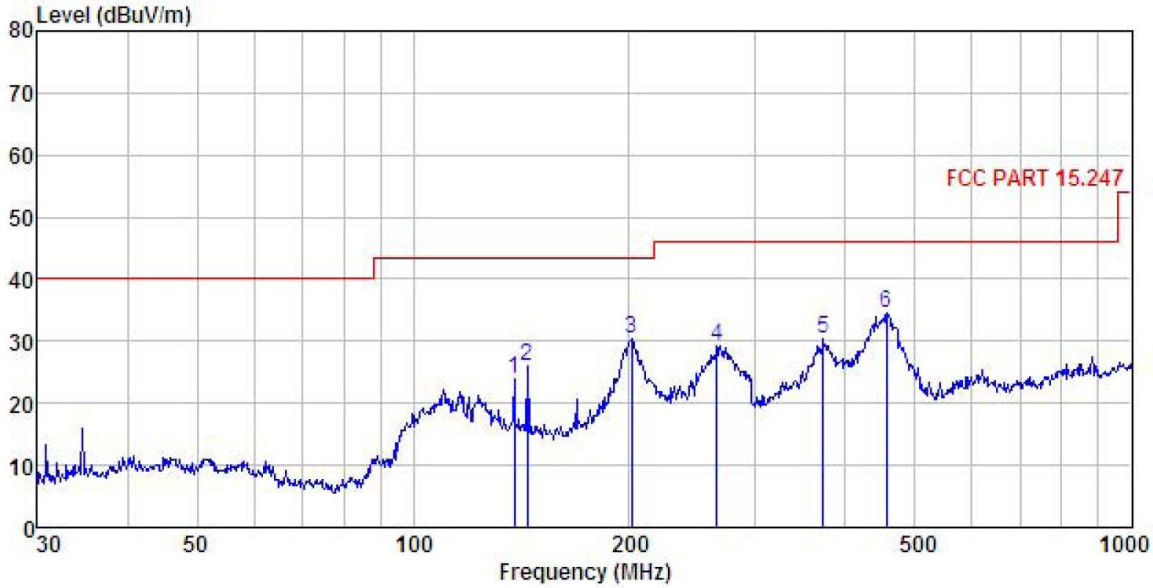
1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz) /1.5m(above 1GHz) above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving

	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:	Dr.Driver	**Product Model:**	OBODO-1
Test By:	Mike	**Test mode:**	BDR Tx mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical
Test Voltage:	DC 12V	**Environment:**	Temp: 24℃ Huni: 57%

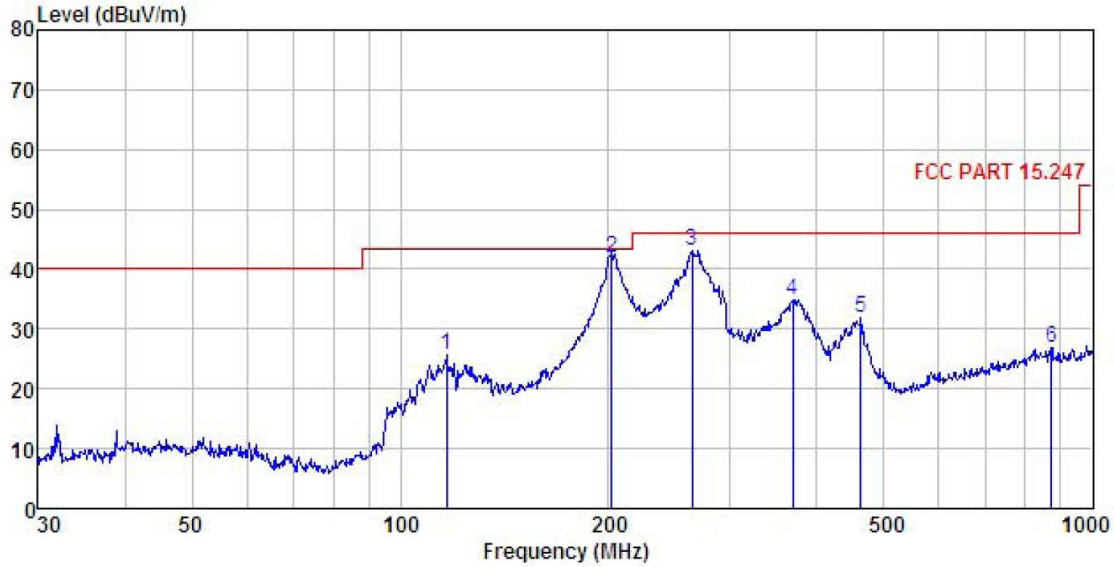


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	138.387	41.11	9.61	2.38	29.28	23.82	43.50	-19.68	QP
2	144.335	43.57	9.24	2.45	29.25	26.01	43.50	-17.49	QP
3	201.393	45.74	10.64	2.87	28.82	30.43	43.50	-13.07	QP
4	264.746	41.90	12.99	2.85	28.51	29.23	46.00	-16.77	QP
5	372.005	41.14	14.91	3.09	28.66	30.48	46.00	-15.52	QP
6	455.906	43.48	16.70	3.25	28.88	34.55	46.00	-11.45	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:	Dr.Driver	**Product Model:**	OBODO-1
Test By:	Mike	**Test mode:**	BDR Tx mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Horizontal
Test Voltage:	DC 12V	**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	116.540	41.71	11.15	2.13	29.41	25.58	43.50	-17.92	QP
2	202.100	57.30	10.68	2.87	28.82	42.03	43.50	-1.47	QP
3	263.819	55.72	12.97	2.85	28.51	43.03	46.00	-2.97	QP
4	369.405	45.63	14.88	3.09	28.65	34.95	46.00	-11.05	QP
5	462.346	40.50	16.91	3.30	28.89	31.82	46.00	-14.18	QP
6	872.183	28.39	22.56	3.97	27.95	26.97	46.00	-19.03	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
4804.00	50.63	30.85	6.80	41.81	46.47	74.00	-27.53	Vertical
4804.00	50.17	30.85	6.80	41.81	46.01	74.00	-27.99	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
4804.00	46.68	30.85	6.80	41.81	42.52	54.00	-11.48	Vertical
4804.00	45.61	30.85	6.80	41.81	41.45	54.00	-12.55	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
4884.00	50.97	31.02	6.80	41.81	46.98	74.00	-27.02	Vertical
4884.00	50.24	31.03	6.80	41.81	46.26	74.00	-27.74	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
4884.00	46.67	31.02	6.80	41.81	42.68	54.00	-11.32	Vertical
4884.00	45.70	31.03	6.80	41.81	41.72	54.00	-12.28	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
4960.00	51.48	31.32	6.91	41.87	47.84	74.00	-26.16	Vertical
4960.00	51.40	31.32	6.91	41.87	47.76	74.00	-26.24	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
4960.00	46.85	31.32	6.91	41.87	43.21	54.00	-10.79	Vertical
4960.00	47.86	31.32	6.91	41.87	44.22	54.00	-9.78	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.*