

# FCC REPORT

**Applicant:** PORTMAN ELECTRONICS (DONGGUAN) CO., LTD.

**Address of Applicant:** NO#10, Luyi 2 Road, Keyuancheng, Tangxia Town,  
DONGGUAN CITY, GUANGDONG PROVINCE CHINA 523718

**Equipment Under Test (EUT)**

Product Name: CAR ALARM

Model No.: 185TWSP,185TWXPR

**FCC ID:** TBQT12-SS2W

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.247

**Date of sample receipt:** 24 May, 2018

**Date of Test:** 31 May, to 19 Jun., 2018

**Date of report issued:** 20 Jun., 2018

**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.

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## 2 Version

Version No.	Date	Description
00	20 Jun., 2018	Original

**Tested by:** YT Yang **Date:** 20 Jun., 2018  
**Test Engineer**

**Reviewed by:** Wimer Zhang **Date:** 20 Jun., 2018  
**Project Engineer**

## 3 Contents

	Page
<b>1 COVER PAGE.....</b>	<b>1</b>
<b>2 VERSION.....</b>	<b>2</b>
<b>3 CONTENTS.....</b>	<b>3</b>
<b>4 TEST SUMMARY.....</b>	<b>4</b>
<b>5 GENERAL INFORMATION.....</b>	<b>5</b>
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
<b>6 TEST RESULTS AND MEASUREMENT DATA.....</b>	<b>8</b>
6.1 ANTENNA REQUIREMENT.....	8
6.2 CONDUCTED OUTPUT POWER .....	9
6.3 20dB OCCUPY BANDWIDTH .....	11
6.4 CARRIER FREQUENCIES SEPARATION.....	13
6.5 HOPPING CHANNEL NUMBER.....	16
6.6 DWELL TIME .....	18
6.7 PSEUDORANDOM FREQUENCY HOPPING SEQUENCE .....	20
6.8 BAND EDGE.....	21
6.8.1 Conducted Emission Method .....	21
6.8.2 Radiated Emission Method .....	23
6.9 SPURIOUS EMISSION.....	28
6.9.1 Conducted Emission Method .....	28
6.9.2 Radiated Emission Method .....	30
<b>7 TEST SETUP PHOTO .....</b>	<b>37</b>
<b>8 EUT CONSTRUCTIONAL DETAILS.....</b>	<b>38</b>

## 4 Test Summary

Test Items	Section in CFR 47	Result
Antenna Requirement	15.203 & 15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	N/A
Conducted Peak Output Power	15.247 (b)(2)	Pass
20dB Occupied Bandwidth	15.247 (a)(1)(i)	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Pass
Hopping Channel Number	15.247 (a)(1)(i)	Pass
Dwell Time	15.247 (a)(i)	Pass
Spurious Emission	15.205 & 15.209	Pass
Band Edge	15.247(d)	Pass
<i>Pass: The EUT complies with the essential requirements in the standard.</i> <i>N/A: N/A: Not Applicable.</i>		

## 5 General Information

### 5.1 Client Information

Applicant:	PORTMAN ELECTRONICS (DONGGUAN) CO., LTD.
Address:	NO#10, Luyi 2 Road, Keyuancheng, Tangxia Town, DONGGUAN CITY, GUANGDONG PROVINCE CHINA 523718
Manufacturer/ Factory:	PORTMAN ELECTRONICS (DONGGUAN) CO., LTD.
Address:	NO#10, Luyi 2 Road, Keyuancheng, Tangxia Town, DONGGUAN CITY, GUANGDONG PROVINCE CHINA 523718

### 5.2 General Description of E.U.T.

Product Name:	CAR ALARM
Model No.:	185TWSP,185TWXPR
Operation Frequency:	902MHz~928MHz
Number of channel:	25
Modulation technology:	2-FSK
Antenna Type:	Helix Antenna
Antenna gain:	-1.25 dBi
Power supply:	DC3.0V (CR2450 Battery)
Remark:	The No.: 185TWSP, 185TWXPR were identical inside, the electrical circuit design, layout, components used and internal wiring, with only difference being model name and for different areas

#### Operation Frequency each of channel for 2-FSK

Channel	Frequency	Channel	Frequency	Channel	Frequency
0	905.4MHz	11	914.2MHz	22	923.0MHz
1	906.2MHz	12	915.0MHz	23	923.8MHz
2	907.0MHz	13	915.8MHz	24	924.6MHz
3	907.8MHz	14	916.6MHz		
4	908.6MHz	15	917.4MHz		
5	909.4MHz	16	918.2MHz		
6	910.2MHz	17	919.0MHz		
7	911.0MHz	18	919.8MHz		
8	911.8MHz	19	920.6MHz		
9	912.6MHz	20	921.4MHz		
10	913.4MHz	21	922.2MHz		

Remark: In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test. Channel No. 0, 12 & 24 were selected as Lowest, Middle and Highest channel.

## 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.
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## 5.5 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±2.22 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±2.76 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.28 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.72 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±2.88 dB (k=2)

## 5.6 Laboratory Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> <li>● <b>FCC - Registration No.: 727551</b> Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.</li> <li>● <b>IC - Registration No.: 10106A-1</b> 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.</li> <li>● <b>CNAS - Registration No.: CNAS L6048</b> 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.</li> <li>● <b>A2LA - Registration No.: 4346.01</b> 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: <a href="https://portal.a2la.org/scopepdf/4346-01.pdf">https://portal.a2la.org/scopepdf/4346-01.pdf</a></li> </ul>
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## 5.7 Laboratory Location

<p>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</p>
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## 5.8 Test Instruments list

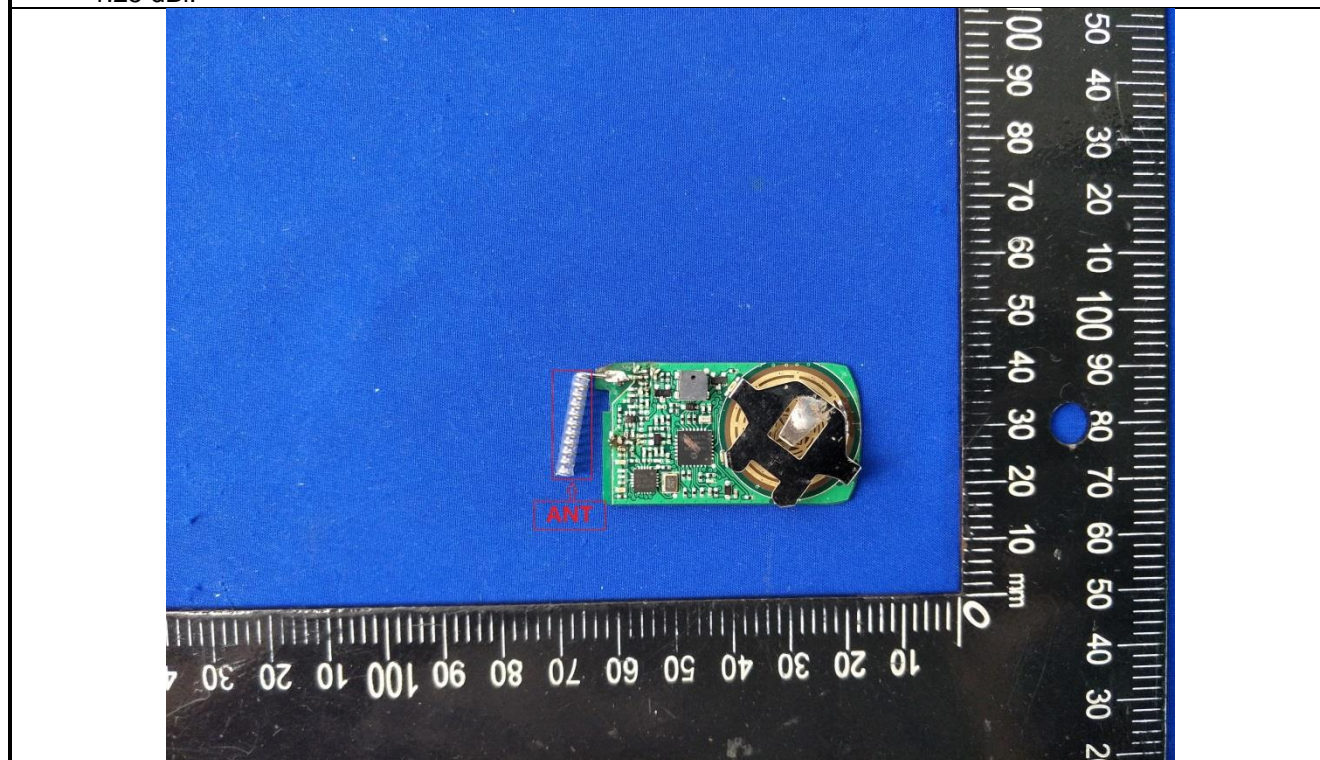
Radiated Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	03-16-2018	03-15-2019
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-16-2018	03-15-2019
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-16-2018	03-15-2019
EMI Test Software	AUDIX	E3	6.110919b	N/A	N/A
Pre-amplifier	HP	8447D	2944A09358	03-07-2018	03-06-2019
Pre-amplifier	CD	PAP-1G18	11804	03-07-2018	03-06-2019
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-07-2018	03-06-2019
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-07-2018	03-06-2019
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-07-2018	03-06-2019
Cable	MICRO-COAX	MFR64639	K10742-5	03-07-2018	03-06-2019
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-07-2018	03-06-2019

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	03-07-2018	03-06-2019
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-07-2018	03-06-2019
LISN	CHASE	MN2050D	1447	03-19-2018	03-18-2019
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2017	07-20-2018
Cable	HP	10503A	N/A	03-07-2018	03-06-2019
EMI Test Software	AUDIX	E3	6.110919b	N/A	N/A

## 6 Test results and measurement data

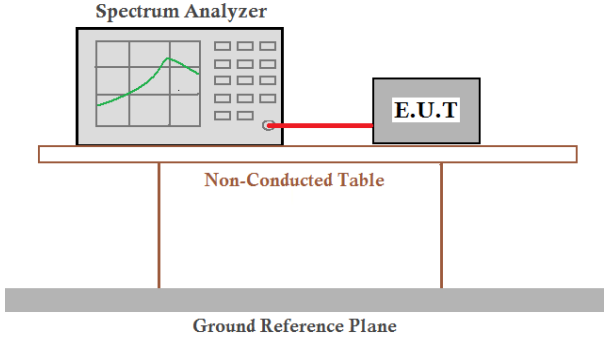
### 6.1 Antenna Requirement

<b>Standard requirement:</b>	FCC Part 15 C Section 15.203 & 247(c)
<p>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.</p> <p>15.247(c) (1)(i) requirement:                  (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</p>	
<b>E.U.T Antenna:</b>	
<p>The antenna is an Coil antenna which permanently attached, and the best case gain of the antenna is - 1.25 dBi.</p>	





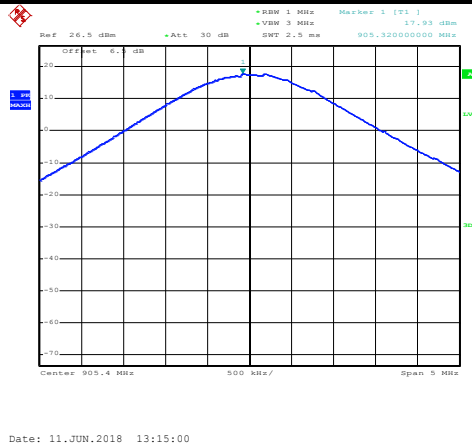
## 6.2 Conducted Output Power

Test Requirement:	FCC Part 15 C Section 15.247 (b)(2)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=1MHz, VBW=3MHz, Detector=Peak (If 20dB BW ≤1 MHz) RBW=3MHz, VBW=10MHz, Detector=Peak (If 20dB BW > 1 MHz and < 3MHz)
Limit:	For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass

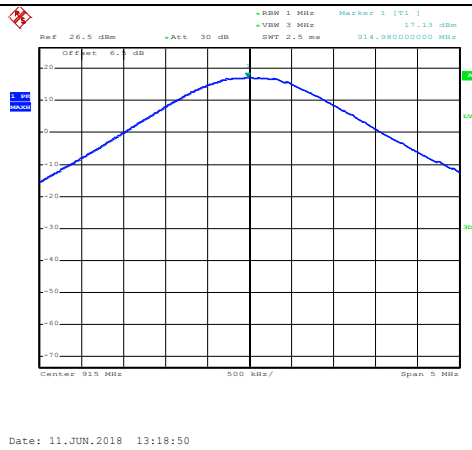
### Measurement Data:

Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest channel	17.93	24.00	Pass
Middle channel	17.13	24.00	Pass
Highest channel	16.98	24.00	Pass

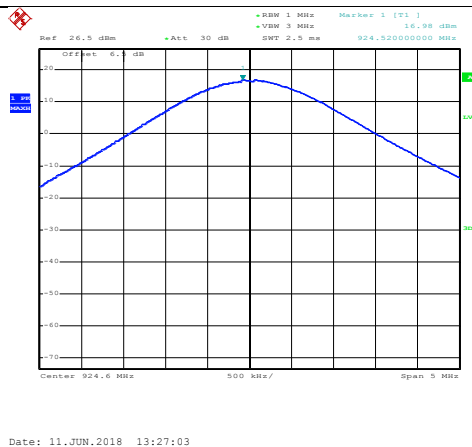
Test plot as follows:



Lowest channel

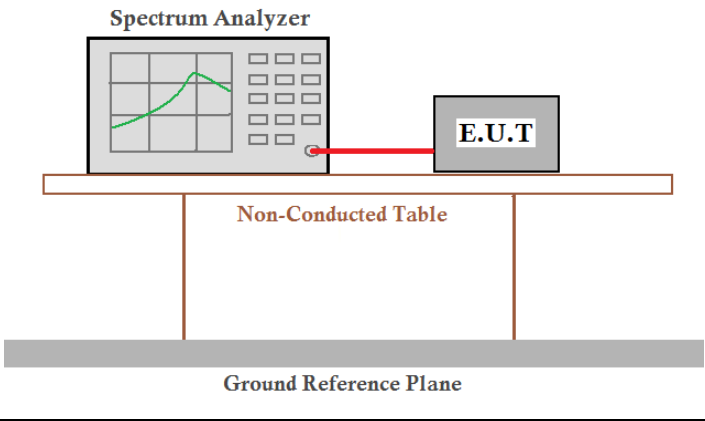


Middle channel



Highest channel

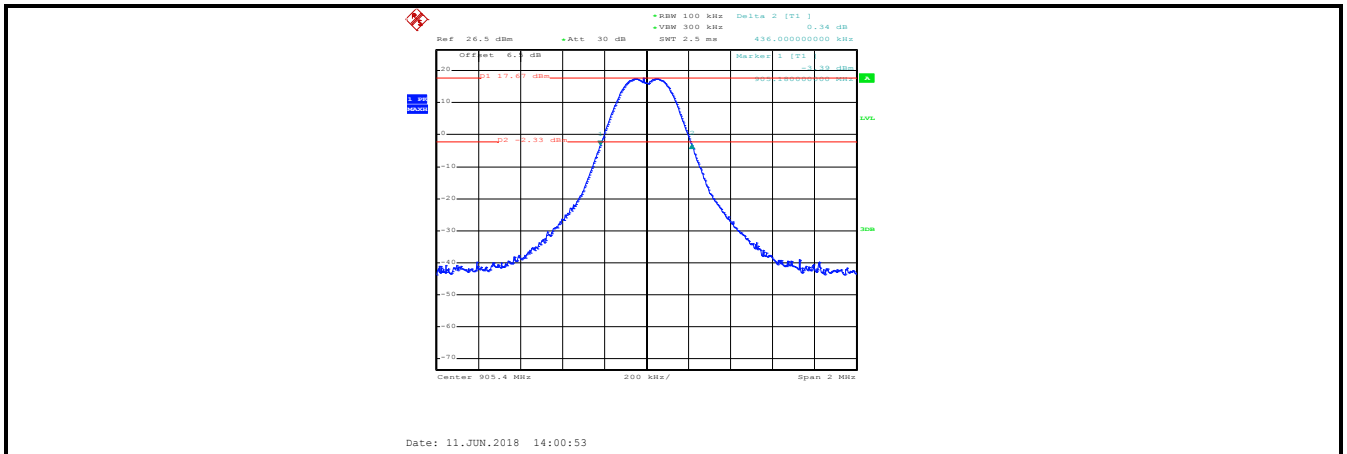
## 6.3 20dB Occupy Bandwidth

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=30 kHz, VBW=100 kHz, detector=Peak
Limit:	250KHz < 20dB < 500KHz
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass

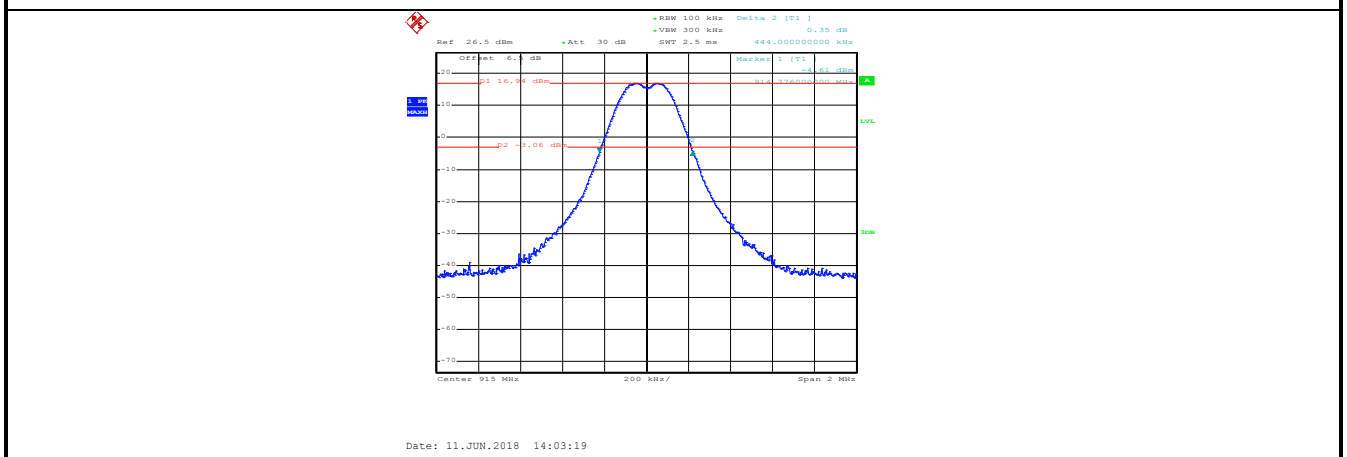
### Measurement Data:

Test channel	Lowest channel	Middle channel	Highest channel
20dB Occupy Bandwidth (kHz)	436	444	444

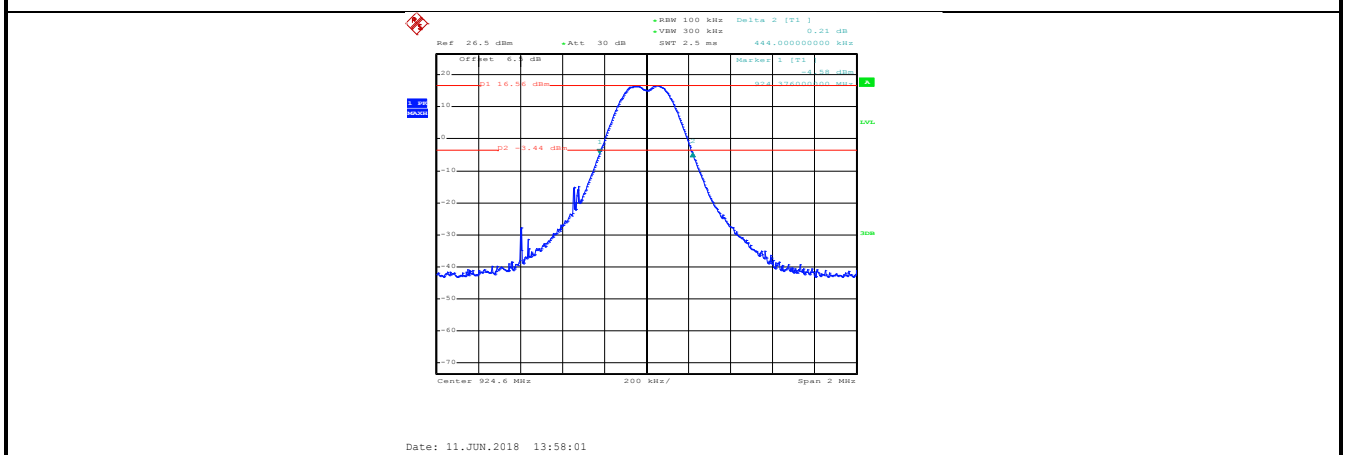
Test plot as follows:



Lowest channel

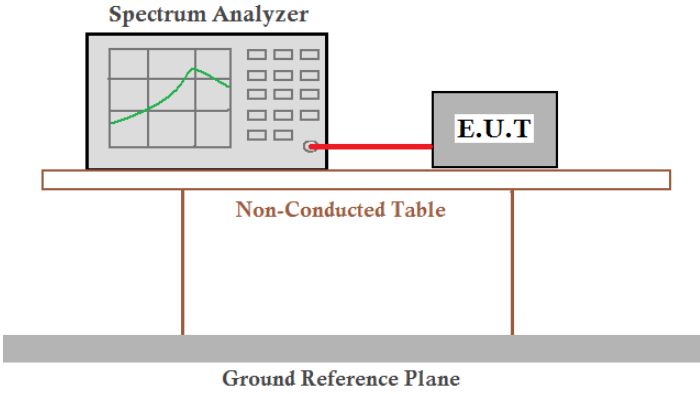


Middle channel



Highest channel

## 6.4 Carrier Frequencies Separation

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=100 kHz, VBW=300 kHz, detector=Peak
Limit:	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.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Hopping mode
Test results:	Pass

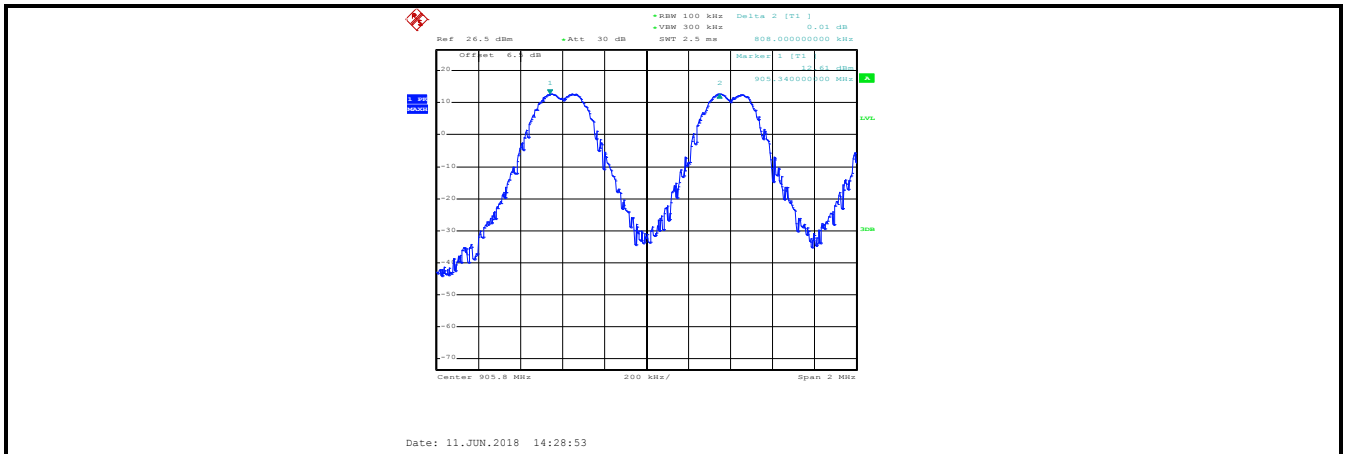
**Measurement Data:**

Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	808	444.00	Pass
Middle	804	444.00	Pass
Highest	804	444.00	Pass

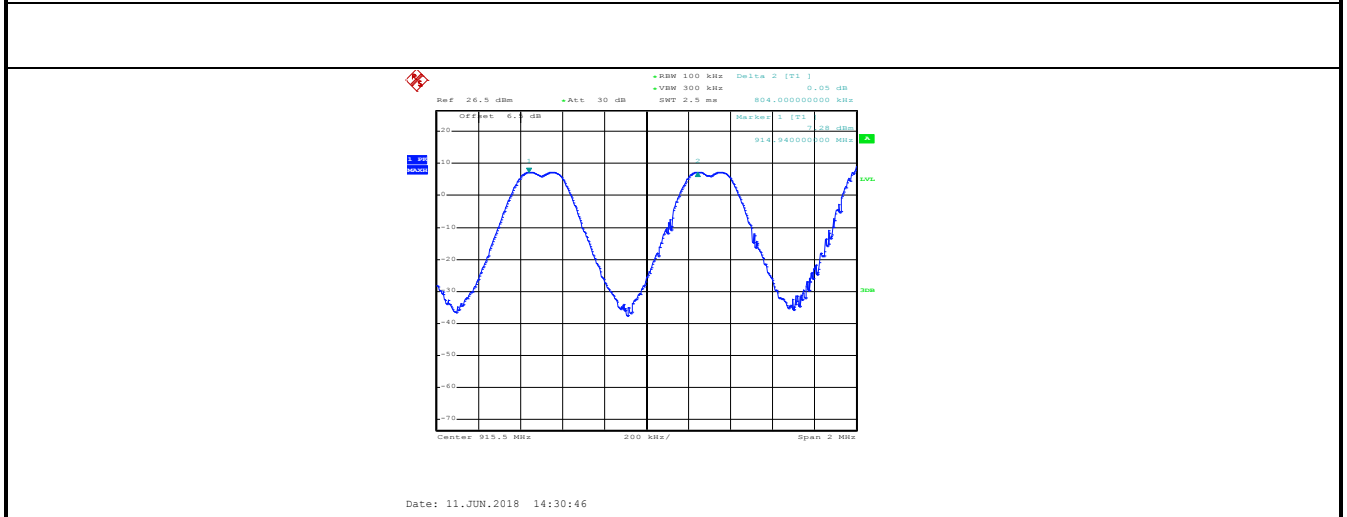
Note: According to section 6.4

Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
2-FSK	444	444.00

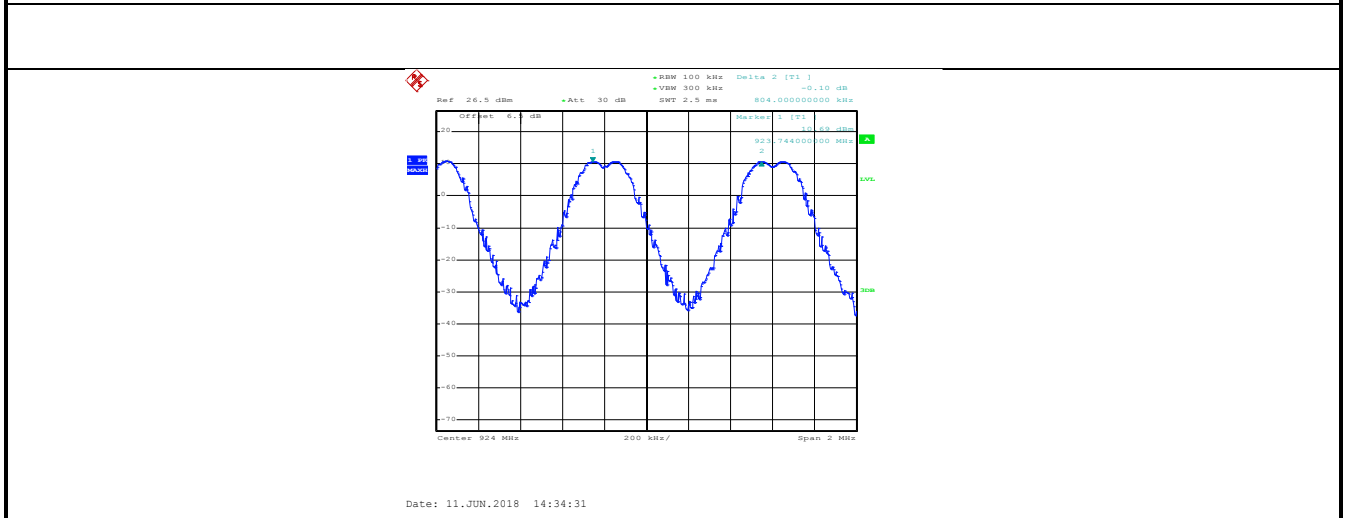
Test plot as follows:



Lowest channel

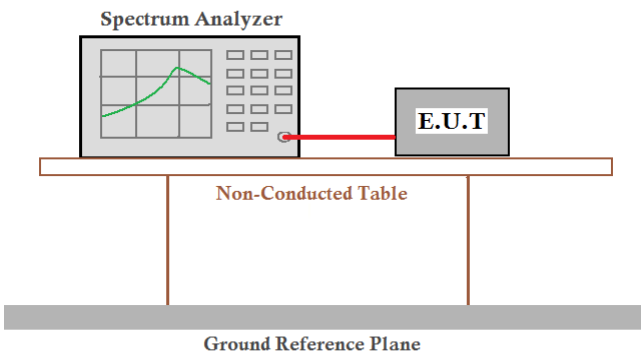


Middle channel



Highest channel

## 6.5 Hopping Channel Number

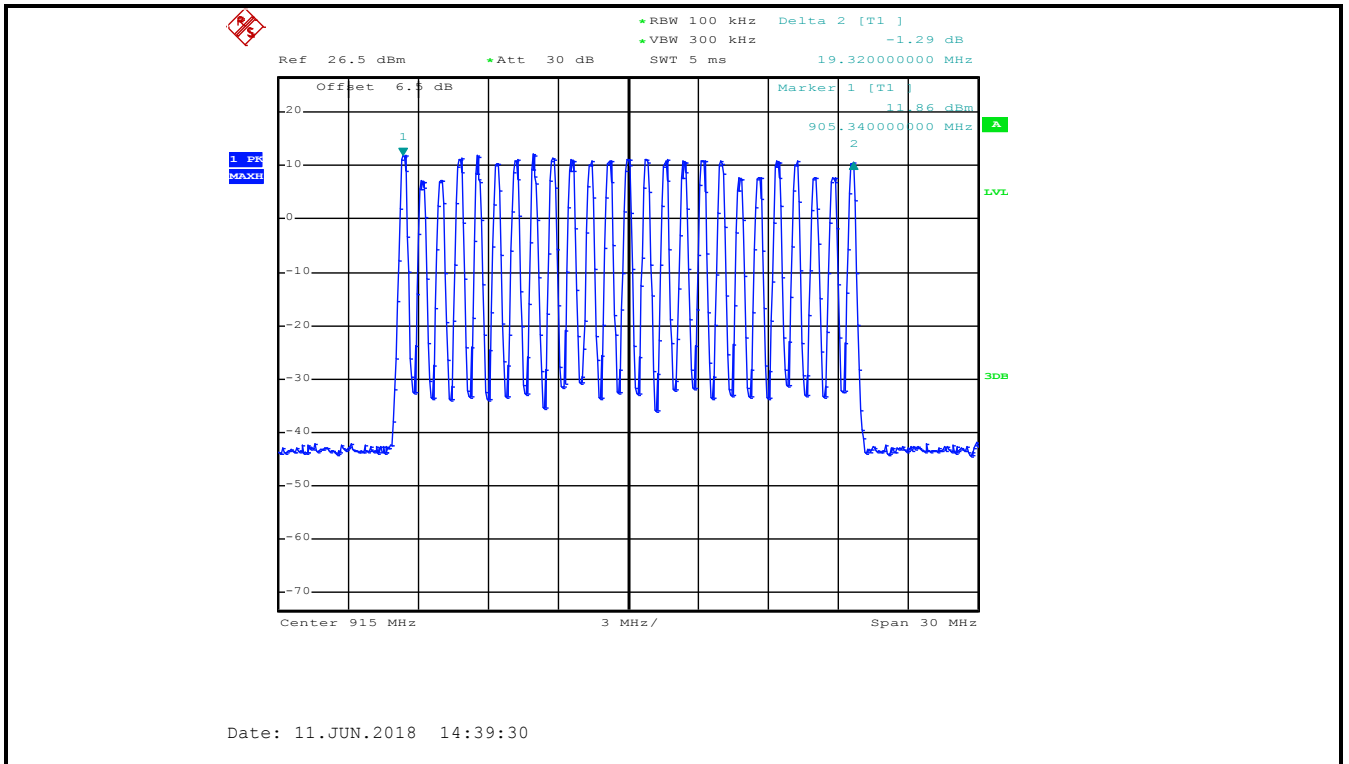
Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Frequency range=902MHz-928MHz, Detector=Peak
Limit:	25 channels
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Hopping mode
Test results:	Pass

### Measurement Data:

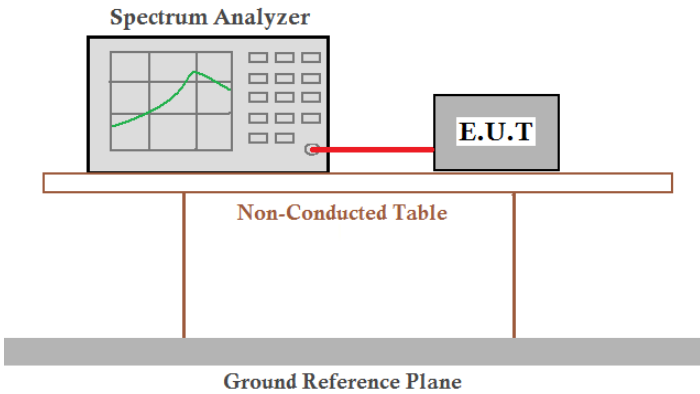
Mode	Hopping channel numbers	Limit	Result
2-FSK	25	25	Pass



Test plot as follows:



## 6.6 Dwell Time

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2013 and KDB DA00-705
Receiver setup:	RBW=1 MHz, VBW=1 MHz, Span=0 Hz, Detector=Peak
Limit:	The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.
Test setup:	 <p>The diagram shows a Spectrum Analyzer on the left, connected by a red cable to an E.U.T. (Equipment Under Test) on the right. Both are positioned on a table labeled 'Non-Conducted Table'. Below the table is a thick grey bar labeled 'Ground Reference Plane'.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Hopping mode
Test results:	Pass

### Measurement Data (Worse case):

Mode	10 second period (numbers)	Dwell time (second)	Limit (second)	Result
TX	1	0.24	0.4	Pass

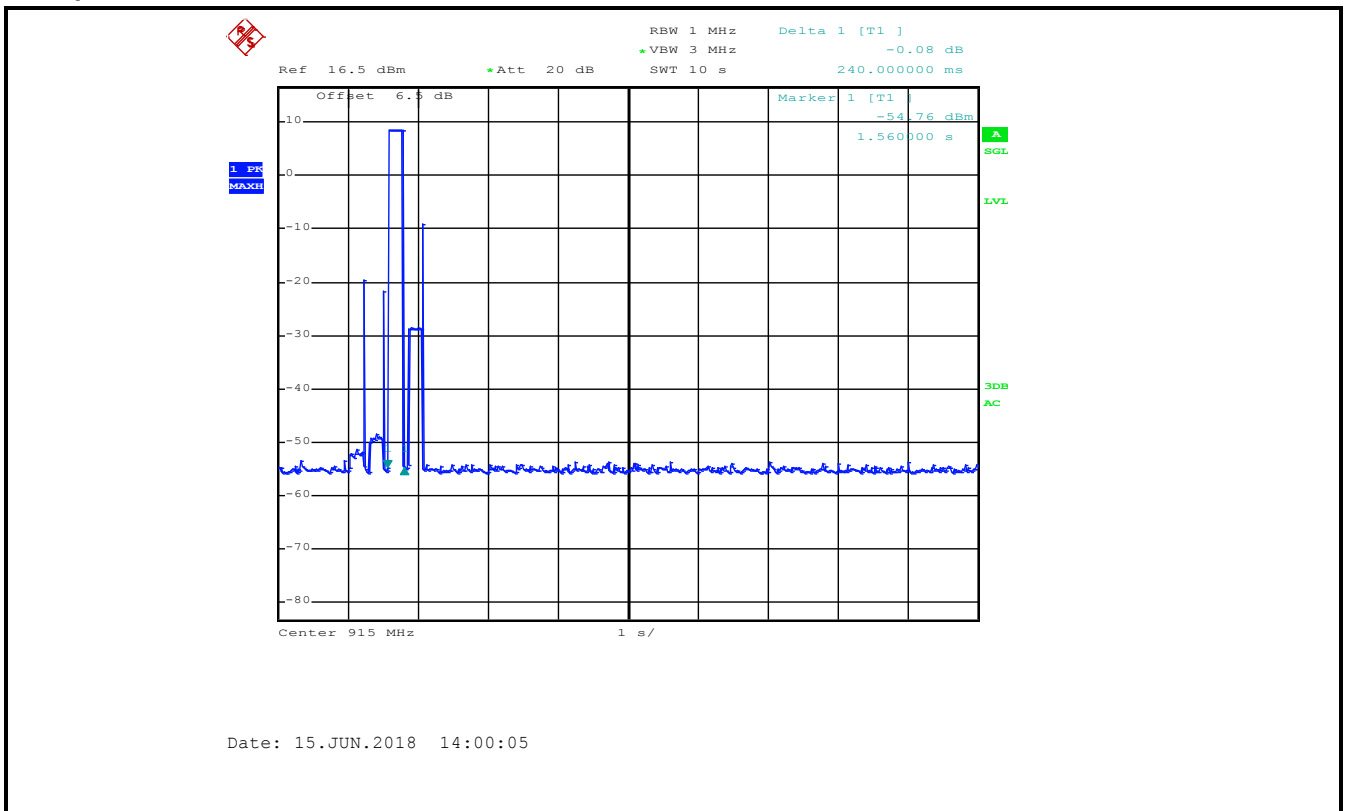
Note:

Calculation Formula: Dwell time = Ton time per hop \* Hopping numbers

For example:

Time slot=0.24\*1 =0.24S

Test plot as follows:

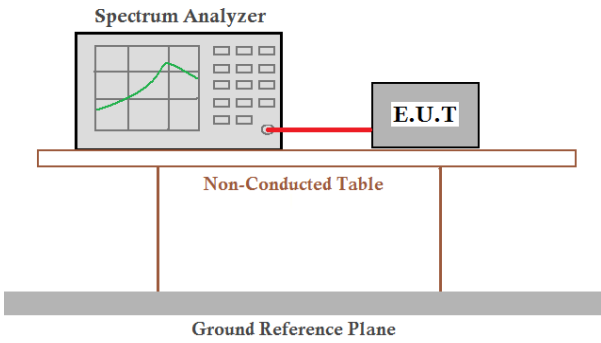


## 6.7 Pseudorandom Frequency Hopping Sequence

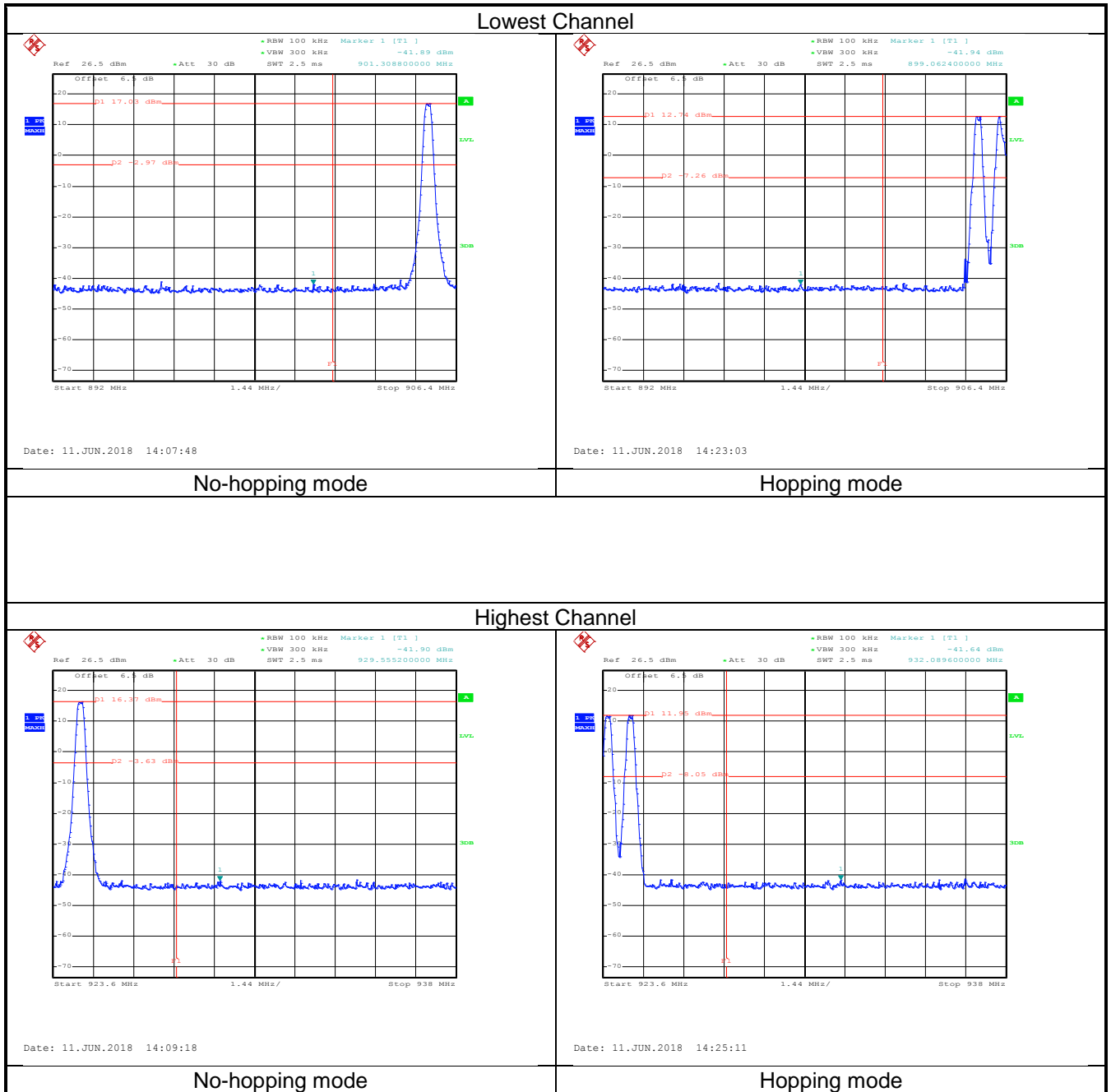
Test Requirement:	FCC Part 15 C Section 15.247 (a)(1) requirement:
<p>Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.</p> <p>Alternatively. Frequency hopping systems operating 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.</p>	
EUT Pseudorandom Frequency Hopping Sequence	
<p>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.</p> <ul style="list-style-type: none"> <li>• Number of shift register stages: 9</li> <li>• Length of pseudo-random sequence: <math>2^9 - 1 = 511</math> bits</li> <li>• Longest sequence of zeros: 8 (non-inverted signal)</li> </ul> <div data-bbox="256 909 1295 1055" style="text-align: center;"> </div> <p style="text-align: center;"><i>Linear Feedback Shift Register for Generation of the PRBS sequence</i></p> <p>An example of Pseudorandom Frequency Hopping Sequence as follow:</p> <div data-bbox="256 1155 1241 1294" style="text-align: center;"> </div> <p>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.</p>	

## 6.8 Band Edge

### 6.8.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and DA00-705
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:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode and hopping mode
Test results:	Pass

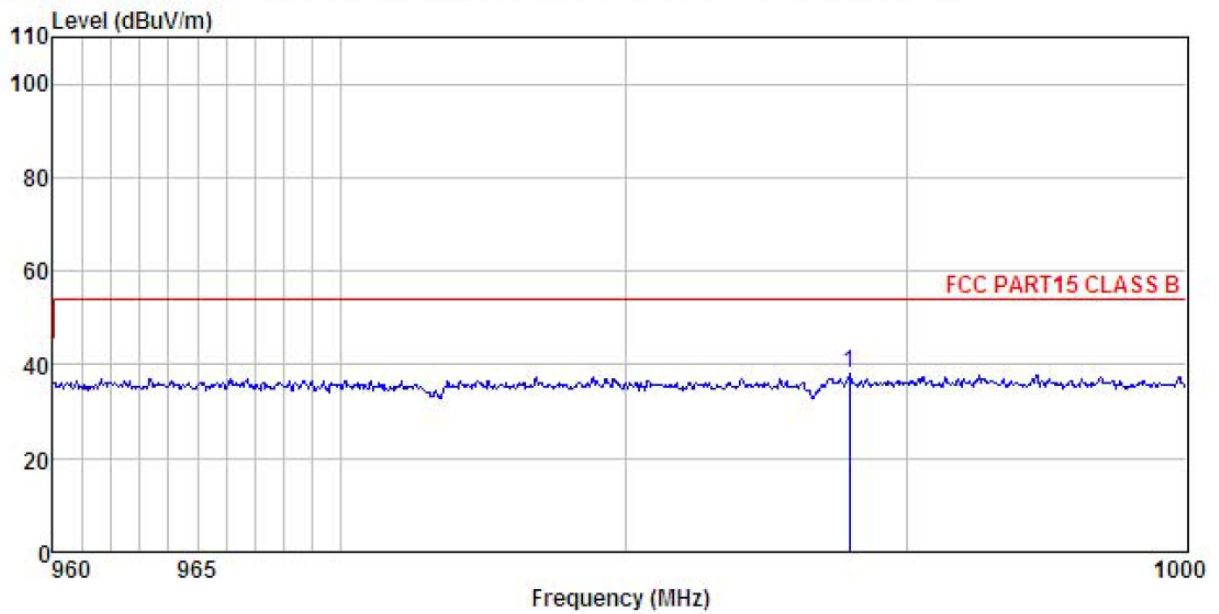
Test plot as follows:



## 6.8.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2013				
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:	<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>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.</li> </ol>				
Test Instruments:	Refer to section 5.8 for details				
Test mode:	Non-hopping mode				
Test results:	Passed				

Test Polarization: Horizontal

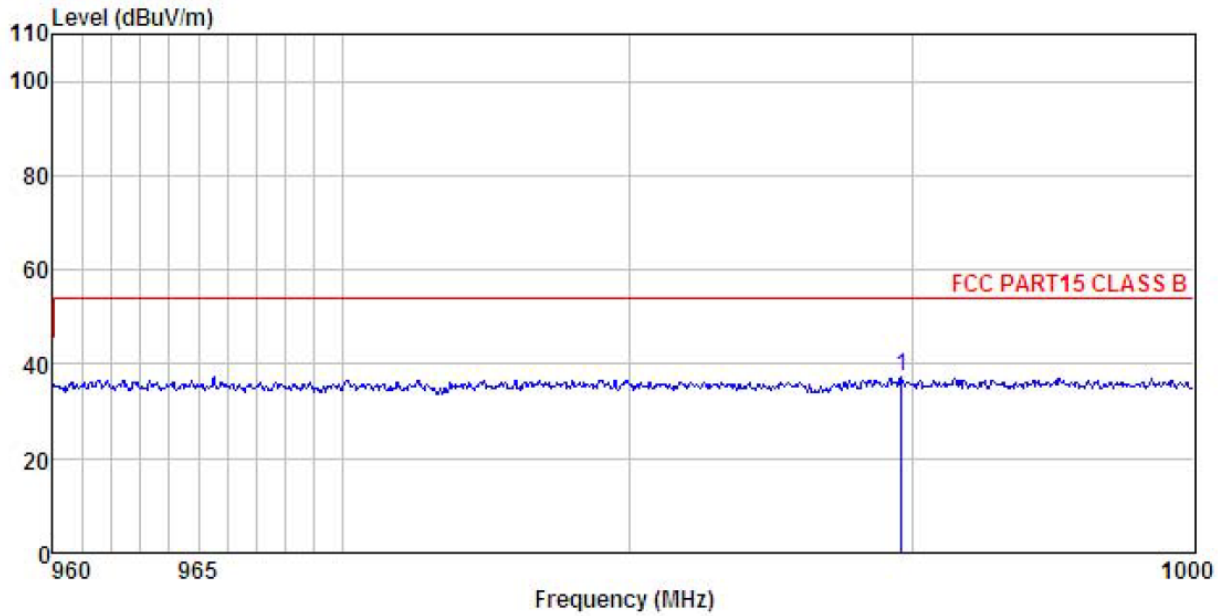


Site : 3m chamber  
 Condition : FCC PART15 CLASS B 3m VULB9163(30M2G) HORIZONTAL  
 EUT : CAR ALARM  
 Model : 185TWSP  
 Test mode : TX mode  
 Power Rating : DC 3.0V  
 Environment : Temp:25.5°C Humi:55%  
 Test Engineer: YT  
 Remark :

	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit
-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	987.909	10.95	22.71	4.41	0.00	38.07	54.00 -15.93



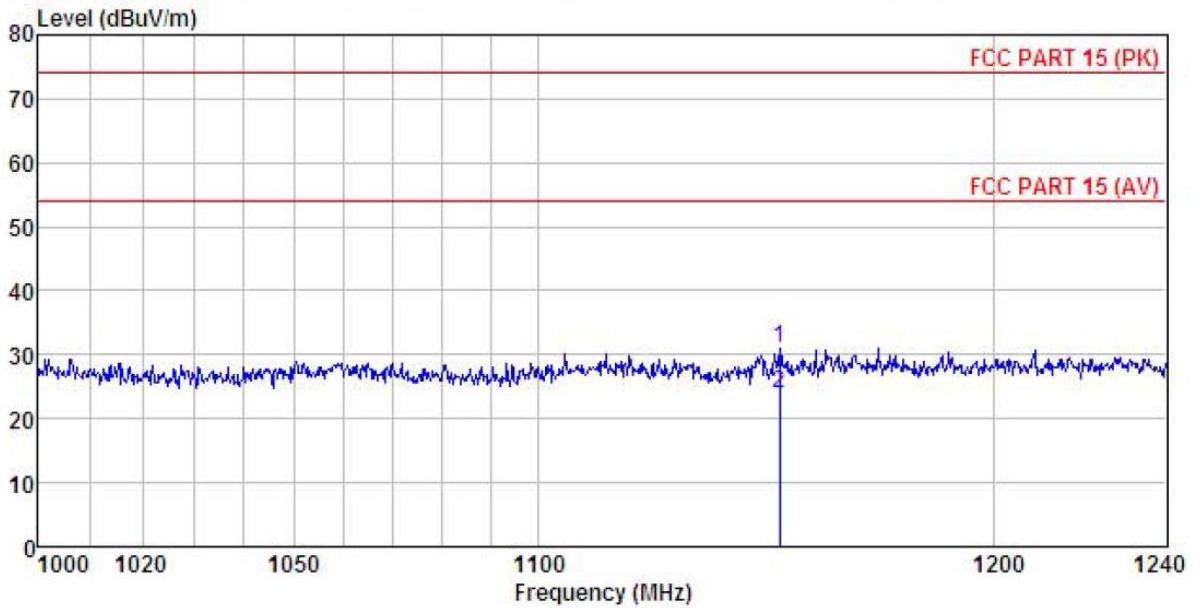
Test Polarization: Vertical



Site : 3m chamber  
 Condition : FCC PART15 CLASS B 3m VULB9163(30M2G) VERTICAL  
 EUT : CAR ALARM  
 Model : 185TWSP  
 Test mode : TX mode  
 Power Rating : DC 3.0V  
 Environment : Temp:25.5°C Humi:55%  
 Test Engineer: YT  
 Remark :

	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	989.564	10.21	22.72	4.41	0.00	37.34	54.00 -16.66 QP

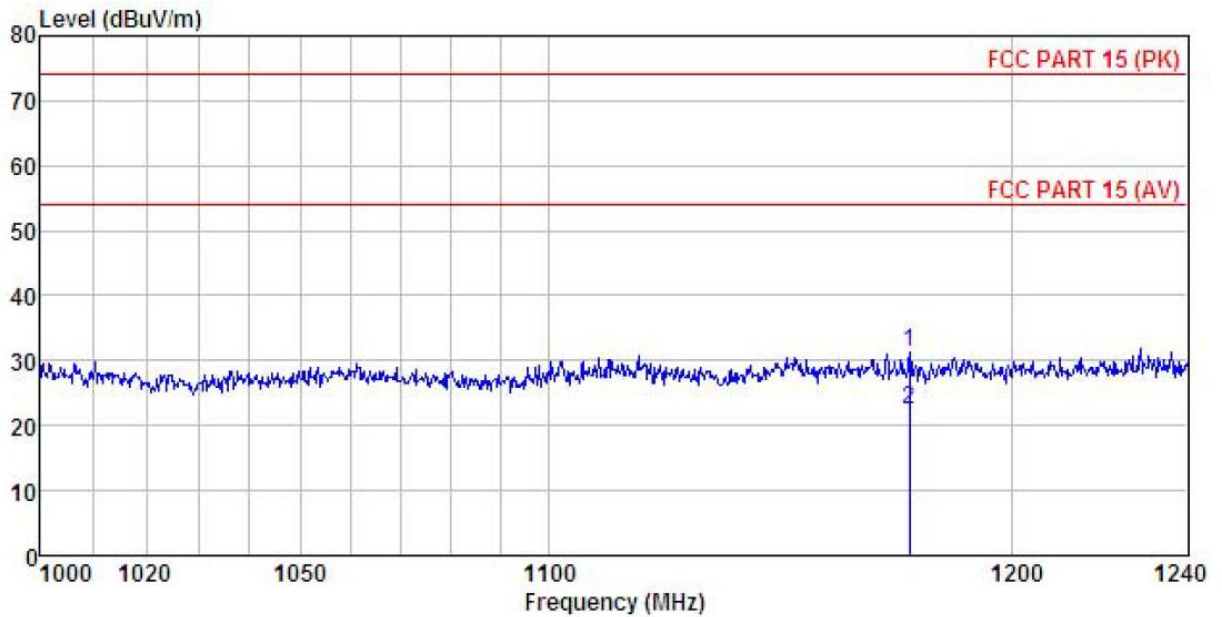
Test Polarization: Horizontal



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL  
 EUT : CAR ALARM  
 Model : 185TWSP  
 Test mode : TX mode  
 Power Rating : DC 3.0V  
 Environment : Temp:25.5°C Humi:55%  
 Test Engineer: YT  
 Remark :

	ReadAntenna	Cable	Preamp	Limit	Over				
Freq	Level	Factor	Loss	Factor	Level	Line			
-----	-----	-----	-----	-----	-----	-----			
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m			
1	1151.803	45.66	24.16	0.00	41.14	31.07	74.00	-42.93	Peak
2	1151.803	38.56	24.16	0.00	41.14	23.97	54.00	-30.03	Average

Test Polarization: Vertical

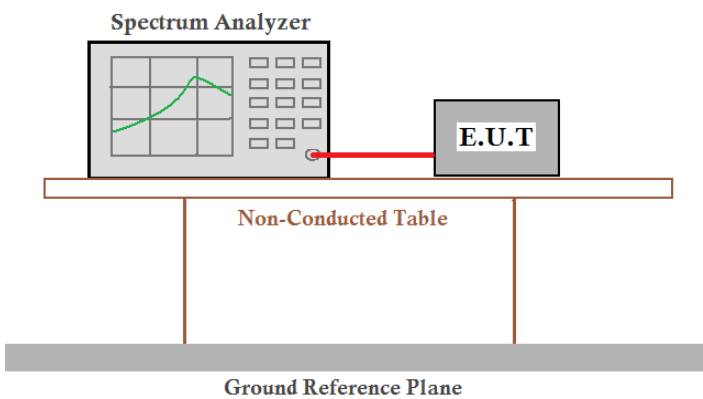


Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
 EUT : CAR ALARM  
 Model : 185TWSP  
 Test mode : TX mode  
 Power Rating : DC 3.0V  
 Environment : Temp:25.5°C Humi:55%  
 Test Engineer: YI  
 Remark :

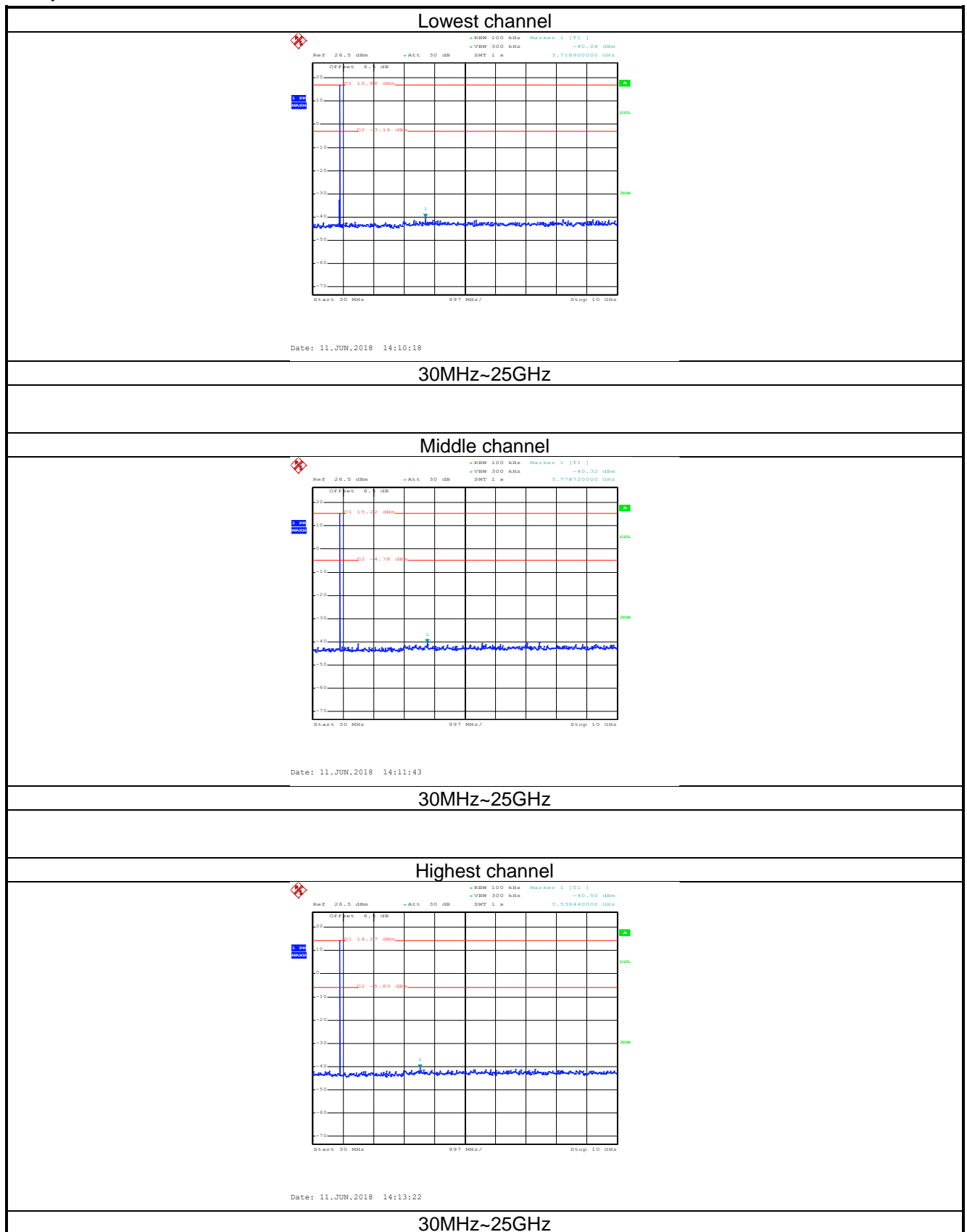
	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit	Over	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1177.101	45.80	24.24	0.00	41.10	31.38	74.00	-42.62	Peak
2	1177.101	36.90	24.24	0.00	41.10	22.48	54.00	-31.52	Average

## 6.9 Spurious Emission

### 6.9.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and DA00-705
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:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass

Test plot as follows:



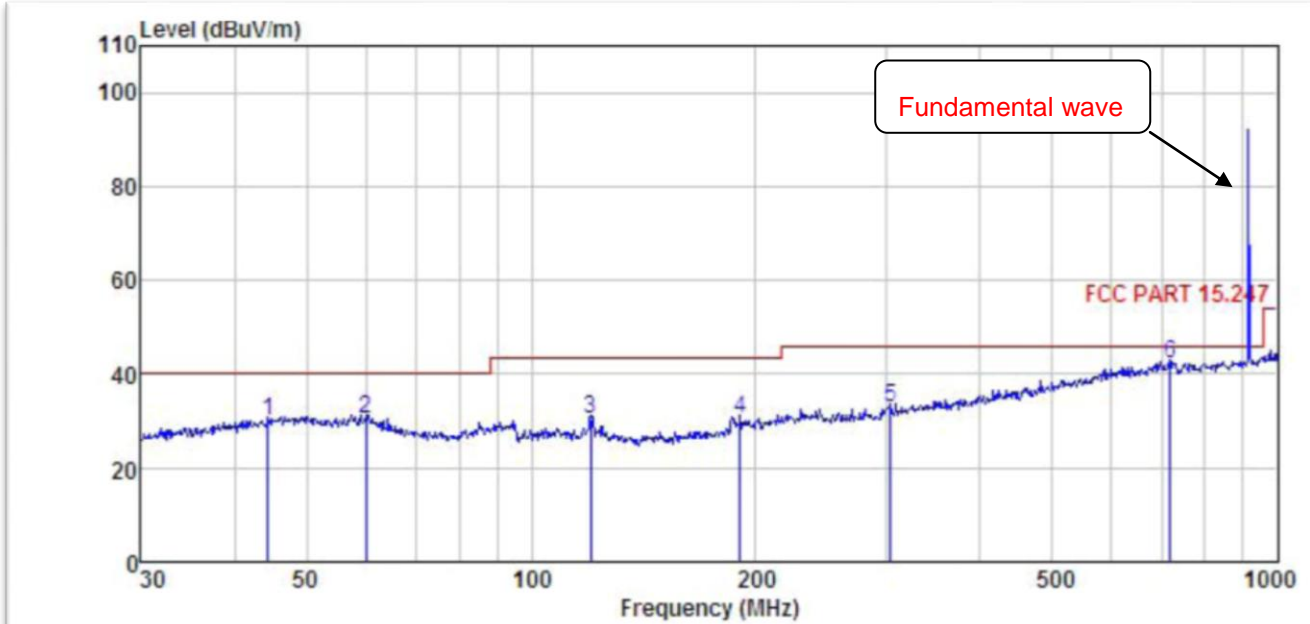
## 6.9.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.209				
Test Method:	ANSI C63.10: 2013				
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				
Test setup:	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				

	<p>was rotated 360 degrees to determine the position of the highest radiation.</p> <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>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.</li> </ol>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass
Remark:	<ol style="list-style-type: none"> <li>1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case.</li> <li>2. 9 kHz to 30 MHz is noise floor, so only shows the data of above 30MHz in this report.</li> </ol>

**Measurement Data (worst case):  
Below 1GHz:**

Test Polarization: Vertical



Site : 3m chamber  
 Condition : FCC PART 15.247 3m VULB9163(30M2G) VERTICAL  
 EUT : CAR ALARM  
 Model : 185TWSP  
 Test mode : TX mode  
 Power Rating : DC 3V  
 Environment : Temp:25.5'C Humi:55%  
 Test Engineer: YT  
 Remark :

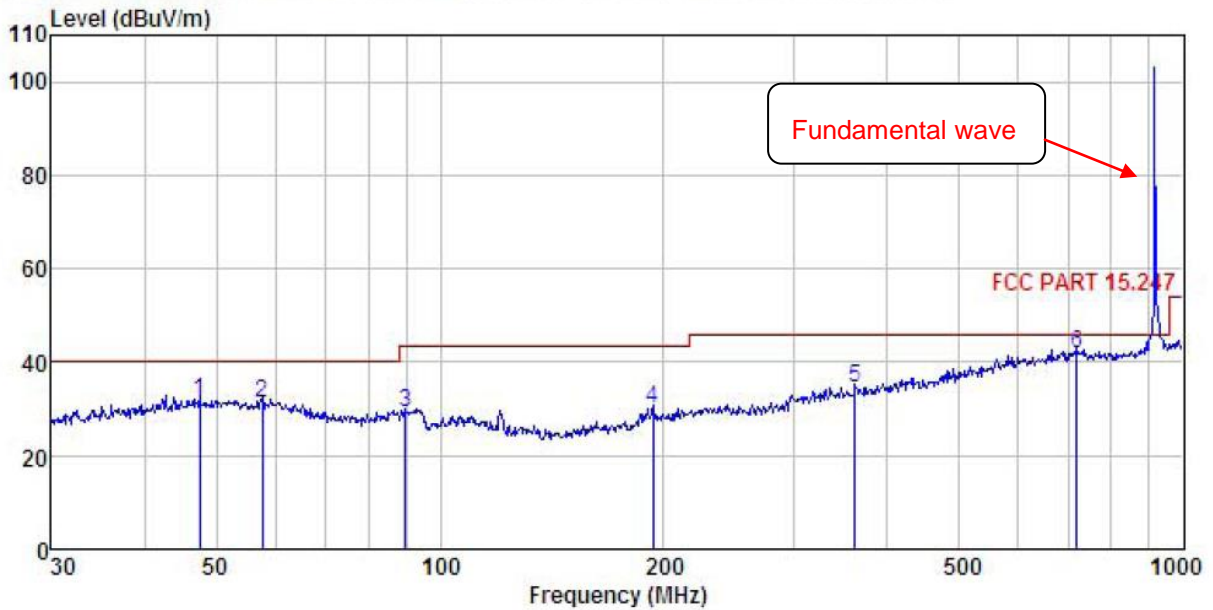
	Freq	ReadAntenna	Cable Preamp	Limit	Over	
	MHz	Level	Loss Factor	Line	Limit	Remark
		dBuV	dB/m	dB	dB	dB
1	44.431	15.12	13.60	1.28	0.00	30.00 40.00 -10.00 QP
2	60.069	16.51	12.38	1.38	0.00	30.27 40.00 -9.73 QP
3	120.277	18.04	10.16	2.17	0.00	30.37 43.50 -13.13 QP
4	190.405	16.33	11.21	2.80	0.00	30.34 43.50 -13.16 QP
5	303.544	16.20	13.68	2.95	0.00	32.83 46.00 -13.17 QP
6	719.200	17.65	20.27	4.25	0.00	42.17 46.00 -3.83 QP

**Remark:**

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



Test Polarization: Horizontal



Site : 3m chamber  
 Condition : FCC PART 15.247 3m VULB9163(30M2G) HORIZONTAL  
 EUT : CAR ALARM  
 Model : 185TWSP  
 Test mode : TX mode  
 Power Rating : DC 3V  
 Environment : Temp:25.5°C Humi:55%  
 Test Engineer: YT  
 Remark :

	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit Remark
-----MHz	-----dBuV	-----dB/m	-----dB	-----dB	-----dBuV/m	-----dBuV/m	-----dB
1	47.492	16.63	13.90	1.27	0.00	31.80	40.00 -8.20 QP
2	57.594	17.29	12.78	1.37	0.00	31.44	40.00 -8.56 QP
3	89.905	17.09	9.98	2.04	0.00	29.11	43.50 -14.39 QP
4	193.095	15.86	11.29	2.82	0.00	29.97	43.50 -13.53 QP
5	361.714	16.58	14.82	3.10	0.00	34.50	46.00 -11.50 QP
6	719.200	17.48	20.27	4.25	0.00	42.00	46.00 -4.00 QP

Remark:

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

**Above 1GHz**

LOW CHANNEL									
Peak value									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	AUX Factor(dB )	Preamp Factor (dB)	Level (dBuV/ m)	Limit Line (dBuV/ m)	Over Limit (dB)	Polarization
1810.80	54.40	25.98	4.12	2.37	41.22	45.65	74.00	-28.35	Vertical
2716.20	50.04	28.06	5.05	2.87	41.76	44.26	74.00	-29.74	Vertical
3621.60	50.99	29.24	5.92	2.97	41.58	47.54	74.00	-26.46	Vertical
4527.00	51.31	31.15	6.82	3.54	42.07	50.75	74.00	-23.25	Vertical
5432.40	48.54	32.34	7.16	3.89	41.85	50.08	74.00	-23.92	Vertical
6337.80	46.61	34.09	8.17	4.63	41.95	51.55	74.00	-22.45	Vertical
1810.80	60.64	25.98	4.12	2.37	41.22	51.89	74.00	-22.11	Horizontal
2716.20	54.26	28.06	5.05	2.87	41.76	48.48	74.00	-25.52	Horizontal
3621.60	52.86	29.23	5.91	2.97	41.57	49.40	74.00	-24.60	Horizontal
4527.00	56.05	31.15	6.82	3.54	42.07	55.49	74.00	-18.51	Horizontal
5432.40	47.93	32.34	7.16	3.89	41.85	49.47	74.00	-24.53	Horizontal
6337.80	46.77	34.12	8.19	4.63	41.94	51.77	74.00	-22.23	Horizontal
Averagevalue									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	AUX Factor(dB )	Preamp Factor (dB)	Level (dBuV/ m)	Limit Line (dBuV/ m)	Over Limit (dB)	Polarization
1810.80	51.34	25.98	4.12	2.37	41.22	42.59	54.00	-11.41	Vertical
2716.20	48.37	28.06	5.05	2.87	41.76	42.59	54.00	-11.41	Vertical
3621.60	47.86	29.24	5.92	2.97	41.58	44.41	54.00	-9.59	Vertical
4527.00	49.38	31.15	6.82	3.54	42.07	48.82	54.00	-5.18	Vertical
5432.40	46.38	32.34	7.16	3.89	41.85	47.92	54.00	-6.08	Vertical
6337.80	43.28	34.09	8.17	4.63	41.95	48.22	54.00	-5.78	Vertical
1810.80	56.34	25.98	4.12	2.37	41.22	47.59	54.00	-6.41	Horizontal
2716.20	48.67	28.06	5.05	2.87	41.76	42.89	54.00	-11.11	Horizontal
3621.60	48.69	29.23	5.91	2.97	41.57	45.23	54.00	-8.77	Horizontal
4527.00	52.97	31.15	6.82	3.54	42.07	52.41	54.00	-1.59	Horizontal
5432.40	43.37	32.34	7.16	3.89	41.85	44.91	54.00	-9.09	Horizontal
6337.80	42.89	34.12	8.19	4.63	41.94	47.89	54.00	-6.11	Horizontal

*Remark:*

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

MID CHANNEL									
Peak value									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	AUX Factor(dB )	Preamp Factor (dB)	Level (dBuV/ m)	Limit Line (dBuV/ m)	Over Limit (dB)	Polarization
1830.00	58.69	26.02	4.15	2.40	41.27	49.99	74.00	-24.01	Vertical
2745.00	52.45	28.12	5.08	2.88	41.72	46.81	74.00	-27.19	Vertical
3660.00	51.93	29.34	5.95	2.97	41.62	48.57	74.00	-25.43	Vertical
4575.00	49.41	31.23	6.87	3.47	42.12	48.86	74.00	-25.14	Vertical
5490.00	48.67	32.40	7.22	3.92	41.83	50.38	74.00	-23.62	Vertical
6405.00	46.98	34.27	8.23	4.76	41.92	52.32	74.00	-21.68	Vertical
1830.00	61.68	26.02	4.15	2.40	41.27	52.98	74.00	-21.02	Horizontal
2745.00	53.42	28.12	5.08	2.88	41.72	47.78	74.00	-26.22	Horizontal
3660.00	59.02	29.34	5.95	2.97	41.62	55.66	74.00	-18.34	Horizontal
4575.00	53.30	31.23	6.87	3.47	42.12	52.75	74.00	-21.25	Horizontal
5490.00	48.79	32.40	7.22	3.92	41.83	50.50	74.00	-23.50	Horizontal
6405.00	47.36	34.28	8.24	4.76	41.92	52.72	74.00	-21.28	Horizontal
Averagevalue									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	AUX Factor(dB )	Preamp Factor (dB)	Level (dBuV/ m)	Limit Line (dBuV/ m)	Over Limit (dB)	Polarization
1830.00	57.85	26.02	4.15	2.40	41.27	49.15	54.00	-4.85	Vertical
2745.00	51.36	28.12	5.08	2.88	41.72	45.72	54.00	-8.28	Vertical
3660.00	50.39	29.43	5.95	2.97	41.62	47.12	54.00	-6.88	Vertical
4575.00	48.57	31.23	6.87	3.47	42.12	48.02	54.00	-5.98	Vertical
5490.00	47.85	32.40	7.22	3.92	41.83	49.56	54.00	-4.44	Vertical
6405.00	44.78	34.27	8.23	4.76	41.92	50.12	54.00	-3.88	Vertical
1830.00	60.74	26.02	4.15	2.40	41.27	52.04	54.00	-1.96	Horizontal
2745.00	52.36	28.12	5.08	2.88	41.72	46.72	54.00	-7.28	Horizontal
3660.00	56.43	29.34	5.95	2.97	41.62	53.07	54.00	-0.93	Horizontal
4575.00	52.26	31.23	6.87	3.47	42.12	51.71	54.00	-2.29	Horizontal
5490.00	46.39	32.40	7.22	3.92	41.83	48.10	54.00	-5.90	Horizontal
6405.00	45.79	34.28	8.24	4.76	41.92	46.39	54.00	-7.61	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.

HIG CHANNEL									
Peak value									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	AUX Factor(dB )	Preamp Factor (dB)	Level (dBuV/ m)	Limit Line (dBuV/ m)	Over Limit (dB)	Polarization
1849.20	55.51	26.07	4.17	2.41	41.32	46.84	74.00	-27.16	Vertical
2773.80	49.80	28.17	5.11	2.88	41.69	44.27	74.00	-29.73	Vertical
3698.40	48.88	29.43	5.98	2.97	41.66	45.60	74.00	-28.40	Vertical
4623.00	46.22	31.31	6.89	3.57	42.10	45.89	74.00	-28.11	Vertical
5547.60	46.00	32.48	7.24	3.91	41.81	47.82	74.00	-26.18	Vertical
6472.20	46.25	34.44	8.28	4.76	41.90	51.83	74.00	-22.17	Vertical
1849.20	66.19	26.07	4.17	2.41	41.32	57.52	74.00	-16.48	Horizontal
2773.80	57.44	28.17	5.11	2.88	41.69	51.91	74.00	-22.09	Horizontal
3698.40	58.16	29.43	5.98	2.97	41.66	54.88	74.00	-19.12	Horizontal
4623.00	46.18	31.31	6.89	3.57	42.10	45.85	74.00	-28.15	Horizontal
5547.60	46.13	32.48	7.24	3.91	41.81	47.95	74.00	-26.05	Horizontal
6472.20	46.54	34.44	8.28	4.76	41.90	52.12	74.00	-21.88	Horizontal
Averagevalue									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	AUX Factor(dB )	Preamp Factor (dB)	Level (dBuV/ m)	Limit Line (dBuV/ m)	Over Limit (dB)	Polarization
1849.20	53.78	26.07	4.17	2.41	41.32	45.11	54.00	-8.89	Vertical
2773.80	48.56	28.17	5.11	2.88	41.69	43.03	54.00	-10.97	Vertical
3698.40	46.58	29.43	5.98	2.97	41.66	43.30	54.00	-10.70	Vertical
4623.00	44.16	31.31	6.89	3.57	42.10	43.83	54.00	-10.17	Vertical
5547.60	44.26	32.48	7.24	3.91	41.81	46.08	54.00	-7.92	Vertical
6472.20	44.52	34.44	8.28	4.76	41.90	50.10	54.00	-3.90	Vertical
1849.20	61.77	26.07	4.17	2.41	41.32	53.10	54.00	-0.90	Horizontal
2773.80	55.49	28.17	5.11	2.88	41.69	49.96	54.00	-4.04	Horizontal
3698.40	55.18	29.43	5.98	2.97	41.66	51.90	54.00	-2.10	Horizontal
4623.00	44.84	31.31	6.89	3.57	42.10	44.51	54.00	-9.49	Horizontal
5547.60	43.68	32.48	7.24	3.91	41.81	45.50	54.00	-8.50	Horizontal
6472.20	44.78	34.44	8.28	4.76	41.90	50.36	54.00	-3.64	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.