

# FCC REPORT

**Applicant:** Besstec Electronics (Zhongshan) Co., Ltd.

**Address of Applicant:** Yujing Industrial Park, Torch Development Zone, No. 106, Qihao Road, Zhongshan, China

## Equipment Under Test (EUT)

**Product Name:** Wireless FM Transmitter

**Model No.:** 1500061

**FCC ID:** Z371500061

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.239

**Date of sample receipt:** Jan. 07, 2015

**Date of Test:** Jan. 08,to Jan. 20, 2015

**Date of report issued:** Jan. 21, 2015

**Test Result :** PASS \*

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

*The results detailed in this test report relate only to the specific sample(s) tested. and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. This report is not to be reproduced except in full, without written approval from TCT Testing Technology.*

## 2 Version

Version No.	Date	Description
00	Jan. 21, 2015	Original

Prepared By:

*Beryl Zhao*

Date:

Jan. 21, 2015

*Project Engineer*

Check By:

*Zhu Xun*

Date:

Jan. 21, 2015

*EMC Manager*

### 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 MODE.....	6
5.4 DESCRIPTION OF SUPPORT UNITS .....	6
5.5 LABORATORY FACILITY .....	6
5.6 MEASUREMET UNCERTAINTY .....	7
5.7 LABORATORY LOCATION .....	7
5.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER.....	7
5.9 TEST INSTRUMENTS LIST .....	8
6 TEST RESULTS AND MEASUREMENT DATA .....	9
6.1 ANTENNA REQUIREMENT:.....	9
6.2 CONDUCTED EMISSION.....	10
6.3 RADIATED EMISSION .....	11
6.4 BANDWIDTH TEST .....	16

## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	N/A
Field strength of the fundamental signal	15.239 (b)	Pass
Spurious emissions	15.239 (b) (c)/15.209	Pass
Occupied Bandwidth	15.215 (c)	Pass

*Pass: The EUT comply with the essential requirements in the standard.*

## 5 General Information

### 5.1 Client Information

Applicant:	Besstec Electronics (Zhongshan) Co., Ltd.
Address of Applicant:	Yujing Industrial Park, Torch Development Zone, No. 106, Qihao Road, Zhongshan, China
Manufacturer:	Besstec Electronics (Zhongshan) Co., Ltd.
Address of Manufacturer:	Yujing Industrial Park, Torch Development Zone, No. 106, Qihao Road, Zhongshan, China

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

Product Name:	Wireless FM Transmitter
Model No.:	1500061
Operation Frequency:	88.1-107.9MHz
Channel numbers:	199CH(See NOTE 2)
Modulation type:	FM
Antenna Type:	Integrated PCB antenna
Antenna gain:	0dBi
Power supply:	DC 12 V via Battery

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2. Operation Frequency each of channel

Channel	Frequency
1	88.1MHz
2	88.2MHz
...	...
...	...
99	97.9MHz
100	98.0MHz
...	...
...	...
198	107.8MHz
199	107.9MHz

### 5.3 Test mode

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

Note:

(1) 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, and the selected channel see below:

(2) During testing, the EUT was actively playing music set to its maximum audio volume in order to generate the worst case emissions (e.g. to generate the maximum bandwidth during bandwidth test). The tuning range of the EUT was manually verified and the conclusion is that it only works at selected channels within 88.1-107.9MHz, not below and not above this range.

Channel	Frequency
The lowest channel	88.1MHz
The middle channel	97.1MHz
The Highest channel	107.9MHz

### 5.4 Description of Support Units

Manufacturer	Description	Model	S/N	FCC ID/DoC
LW	10-1MHz, SINE ,THD,0.1	TAG-101	011090928	DoC

### 5.5 Laboratory Facility

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

● **FCC - Registration No.: 572331**

Shenzhen TCT Testing Technology Co., Ltd., Shenzhen EMC Laboratory: Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

● **IC - Registration No.: 10668A-1**

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

● **CNAS - Registration No.: CNAS L6165**

## 5.6 Measurement uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission	$\pm 3.28\text{dB}$
2	RF power, conducted	$\pm 0.12\text{dB}$
3	Spurious emissions, conducted	$\pm 0.11\text{dB}$
4	All emissions, radiated(<1G)	$\pm 4.88\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.88\text{dB}$
6	Temperature	$\pm 0.5^\circ\text{C}$
7	Humidity	$\pm 2\%$

## 5.7 Laboratory Location

All tests were performed at:

Shenzhen Tongce Testing Lab

Address: 1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China

Tel: 13410377511

Fax: --

## 5.8 Other Information Requested by the Customer

None.

## 5.9 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	ESPI Test Receiver	ROHDE&SCHWARZ	ESVD	100008	Sep.17, 2014	Sep.16 , 2015
2	Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Sep.17, 2014	Sep.16 , 2015
3	Spectrum Analyzer	ROHDE&SCHWARZ	FSU3	1166.1660.03	Sep.17, 2014	Sep.16, 2015
4	Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep.17, 2014	Sep.16 , 2015
5	Pre-amplifier	HP	8447D	2727A05017	Sep.17, 2014	Sep.16 , 2015
6	Loop antenna	ZHINAN	ZN30900A	12024	Dec.15, 2014	Dec.14 , 2015
7	Broadband Antenna	Schwarzbeck	VULB9163	340	Sep.17, 2014	Sep.16 , 2015
8	Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep.17, 2014	Sep.16 , 2015
9	Loop antenna	ZHINAN	ZN30900A	12024	Dec.15, 2014	Dec.14 , 2015
10	Coax cable	TCT	N/A	N/A	Sep.14, 2014	Sep.15 , 2015
11	Coax cable	TCT	N/A	N/A	Sep.14, 2014	Sep.15 , 2015
12	Coax cable	TCT	N/A	N/A	Sep.14, 2014	Sep.15 , 2015
13	Coax cable	TCT	N/A	N/A	Sep.14, 2014	Sep.15 , 2015
14	EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A	N/A

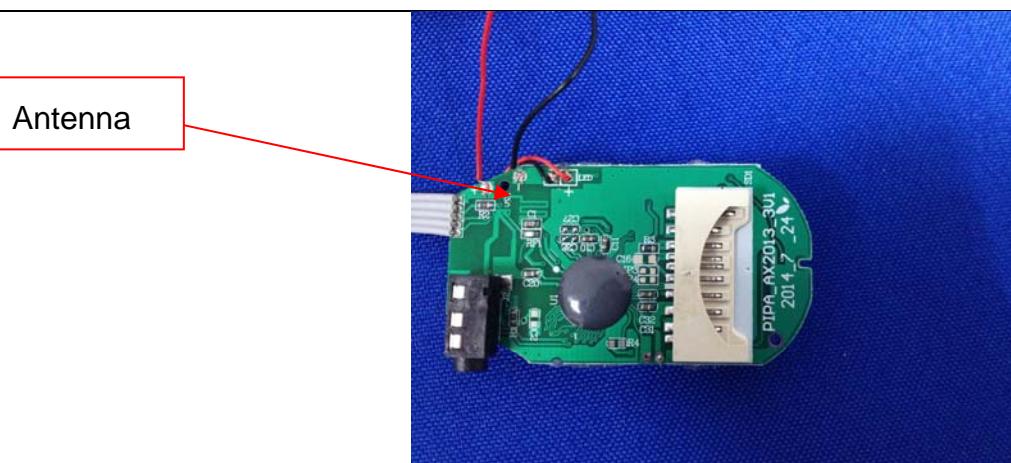
Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	EMI Test Receiver	R&S	ESCS30	100139	Sep.17, 2014	Sep.16 , 2015
2	LISN-1	AFJ	LS16C	16010947251	Sep.17, 2014	Sep.16 , 2015
3	LISN-2	Schwarzbeck	NSLK 8126	8126453	Sep.17, 2014	Sep.16 , 2015
4	Coax cable	TCT	N/A	164080	Sep.17, 2014	Sep.16 , 2015
5	EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A	N/A

Conducted method test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	Spectrum Analyzer	ROHDE&SCHWARZ	FSU3	200054	Sep.17, 2014	Sep.16, 2015
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	Oct. 22, 2014	Oct. 23 , 2015

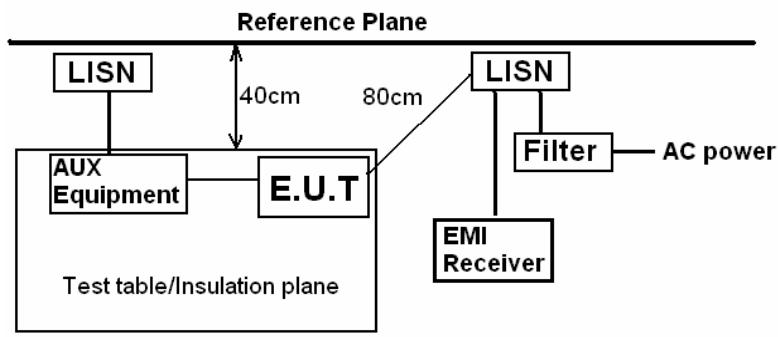
## 6 Test results and Measurement Data

### 6.1 Antenna requirement:

<b>Standard requirement:</b>	FCC Part15 C Section 15.203
15.203 requirement: <i>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.</i>	
<b>E.U.T Antenna:</b>	
	<i>The antenna is an internal antenna which cannot replace by end-user, the best case gain of the antenna is 0 dBi.</i>



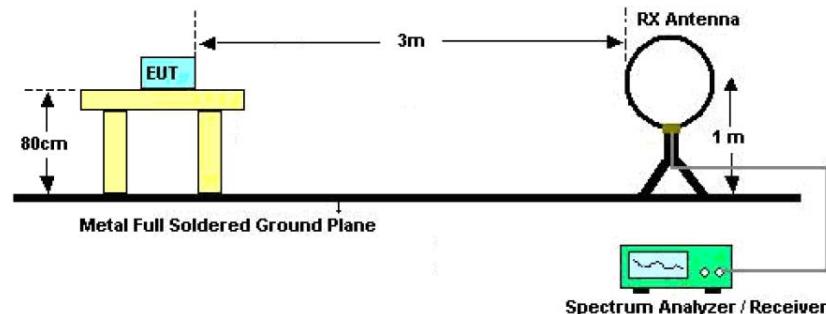
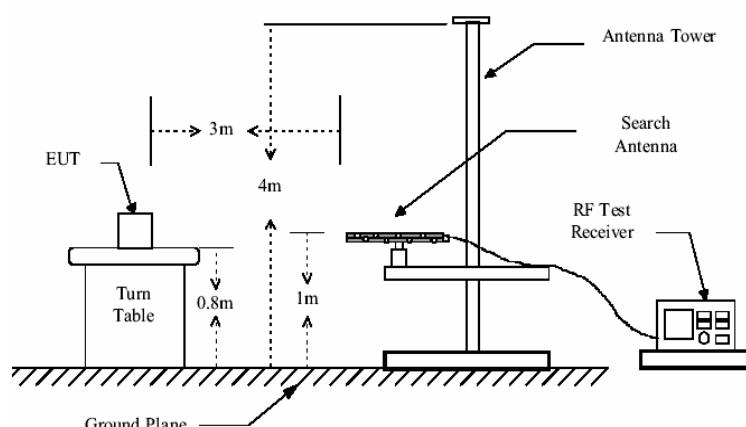
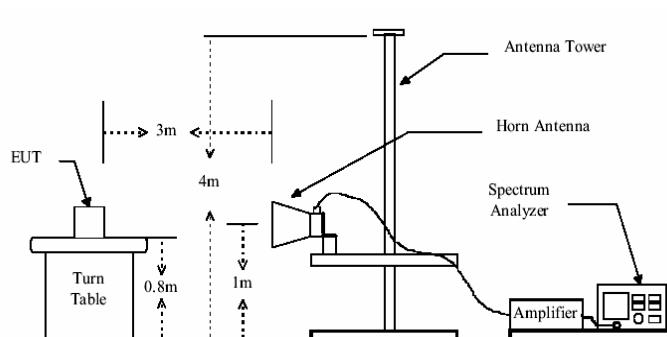
## 6.2 Conducted Emission

Test Requirement:	FCC Part15 C Section 15.207																	
Test Method:	ANSI C63.4: 2003																	
Test Frequency Range:	150 kHz to 30 MHz																	
Class / Severity:	Class B																	
Receiver setup:	RBW=9 kHz, VBW=30 kHz																	
Limit:	<table border="1"> <thead> <tr> <th>Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th></th> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>			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
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																
	<p>* Decreases with the logarithm of the frequency.</p>																	
Test procedure	<ol style="list-style-type: none"> <li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.), which provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>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).</li> <li>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 C63.4: 2003 on conducted measurement.</li> </ol>																	
Test setup:	 <p><b>Reference Plane</b></p> <p><b>Remark:</b>  <i>E.U.T: Equipment Under Test</i>  <i>LISN: Line Impedance Stabilization Network</i>  <i>Test table height=0.8m</i></p>																	
Test Instruments:	Refer to section 5.6 for details																	
Test mode:	Refer to section 5.3 for details																	
Test results:	N/A; Because the EUT is powered by battery, so the term is not application.																	

### Measurement Data

### 6.3 Radiated Emission

Test Requirement:	FCC Part15 C Section 15.239 and 15.209																																	
Test Method:	ANSI C63.4:2003																																	
Test Frequency Range:	9KHz to 1000MHz																																	
Test site:	Measurement Distance: 3m																																	
Receiver setup:	<table border="1"> <thead> <tr> <th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Remark</th></tr> </thead> <tbody> <tr> <td>9kHz- 150kHz</td><td>Quasi-peak</td><td>200Hz</td><td>1kHz</td><td>Quasi-peak Value</td></tr> <tr> <td>150kHz- 30MHz</td><td>Quasi-peak</td><td>9kHz</td><td>30kHz</td><td>Quasi-peak Value</td></tr> <tr> <td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr> <tr> <td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr> <tr> <td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr> </tbody> </table>					Frequency	Detector	RBW	VBW	Remark	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value	Above 1GHz	Peak	1MHz	3MHz	Peak Value	Peak	1MHz	10Hz	Average Value
Frequency	Detector	RBW	VBW	Remark																														
9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value																														
150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value																														
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value																														
Above 1GHz	Peak	1MHz	3MHz	Peak Value																														
	Peak	1MHz	10Hz	Average Value																														
Limit: (Field strength of the fundamental signal)	<table border="1"> <thead> <tr> <th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr> </thead> <tbody> <tr> <td>88-108MHz</td><td>48</td><td>Average Value</td></tr> <tr> <td></td><td>68</td><td>Peak Value</td></tr> </tbody> </table> <p>Notes:  (1) Fcc part15.239 (b) The field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.</p>					Frequency	Limit (dBuV/m @3m)	Remark	88-108MHz	48	Average Value		68	Peak Value																				
Frequency	Limit (dBuV/m @3m)	Remark																																
88-108MHz	48	Average Value																																
	68	Peak Value																																
Limit: (Spurious Emissions)	<table border="1"> <thead> <tr> <th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr> </thead> <tbody> <tr> <td>30MHz-88MHz</td><td>40.00</td><td>Quasi-peak Value</td></tr> <tr> <td>88MHz-216MHz</td><td>43.50</td><td>Quasi-peak Value</td></tr> <tr> <td>216MHz-960MHz</td><td>46.00</td><td>Quasi-peak Value</td></tr> <tr> <td>960MHz-1GHz</td><td>54.00</td><td>Quasi-peak Value</td></tr> <tr> <td rowspan="2">Above 1GHz</td><td>54.00</td><td>Average Value</td></tr> <tr> <td>74.00</td><td>Peak Value</td></tr> </tbody> </table>					Frequency	Limit (dBuV/m @3m)	Remark	30MHz-88MHz	40.00	Quasi-peak Value	88MHz-216MHz	43.50	Quasi-peak Value	216MHz-960MHz	46.00	Quasi-peak Value	960MHz-1GHz	54.00	Quasi-peak Value	Above 1GHz	54.00	Average Value	74.00	Peak Value									
Frequency	Limit (dBuV/m @3m)	Remark																																
30MHz-88MHz	40.00	Quasi-peak Value																																
88MHz-216MHz	43.50	Quasi-peak Value																																
216MHz-960MHz	46.00	Quasi-peak Value																																
960MHz-1GHz	54.00	Quasi-peak Value																																
Above 1GHz	54.00	Average Value																																
	74.00	Peak Value																																
Test Procedure:	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table 0.8 meters 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 rotatable 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 setup:	For radiated emissions below 30MHz																																	

	 <p>30MHz to 1GHz</p>
	 <p>Above 1GHz</p>
	
	<p><b>Test Instruments:</b> Refer to section 5.7</p> <p><b>Test mode:</b> Refer to section 5.3</p> <p><b>Test results:</b> Passed</p> <p><b>Remark:</b></p> <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 30MHz is too low, the emission levels are 20 dB below the limit value, so only shows the data of above 30MHz in this report</li> </ol>

**Measured data:**

**Fundamental Radiation Emission**

88.10MHz:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Ant. Pol. H/V	Direction(H/V)
88.10	45.82	48	Average	H
88.10	66.13	68	Peak	H
88.10	41.38	48	Average	V
88.10	64.54	68	Peak	V

98.00MHz:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Ant. Pol. H/V	Direction(H/V)
98.00	44.16	48	Average	H
98.00	64.29	68	Peak	H
98.00	39.57	48	Average	V
98.00	63.05	68	Peak	V

107.90MHz:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Ant. Pol. H/V	Direction(H/V)
107.90	42.62	48	Average	H
107.90	62.44	68	Peak	H
107.90	38.81	48	Average	V
107.90	61.35	68	Peak	V

**Below 1GHz**

88.10MHz:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Ant. Pol. H/V	Direction(H/V)
60.2478	29.16	40.00	QP	H
176.2513	40.51	43.50	QP	H
264.3915	42.88	46.00	QP	H
60.1694	28.45	40.00	QP	V
176.2862	38.13	43.50	QP	V
264.3554	43.27	46.00	QP	V

98.00MHz:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Ant. Pol. H/V	Direction(H/V)
60.3354	29.88	40.00	QP	H
196.1149	41.42	43.50	QP	H
294.5688	43.39	46.00	QP	H
60.4268	29.04	40.00	QP	V
196.4371	37.17	43.50	QP	V
294.7615	43.95	46.00	QP	V

107.90MHz:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Ant. Pol. H/V	Direction(H/V)
60.3354	30.26	40.00	QP	H
215.8169	41.34	43.50	QP	H
327.7310	43.13	46.00	QP	H
60.2566	33.48	40.00	QP	V
215.8434	39.44	43.50	QP	V
327.7508	41.69	46.00	QP	V

Note: 1) QP= Quasi-peak  
2) Emission Level = Reading Level + Antenna Factor + Cable Loss.

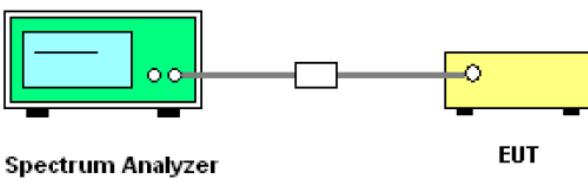
**Above 1GHz**

107.9MHz				
Frequency (MHz)	Emission PK/AV (dBuV/m)	Horizontal / Vertical	Limits PK/AV (dBuV/m)	Margin (dB)
1079.126	48.16(PK)	H	74/54	13.82
1079.284	46.52(PK)	V	74/54	13.34
1186.945	45.88(PK)	H	74/54	10.49
1186.971	44.37(PK)	V	74/54	11.27

**Remark:**

- 1) *PK= Peak, AV= Average*
- 2) *Emission Level = Reading Level + Antenna Factor + Cable Loss.*
- 3) *Margin= Limit(AV) – Emission Level*
- 4) *If the peak measured value complies with the average limit, it is unnecessary to perform an average measurement. The other emission levels are too small, which are not reported. It is deemed to comply with the requirement of the rule.*

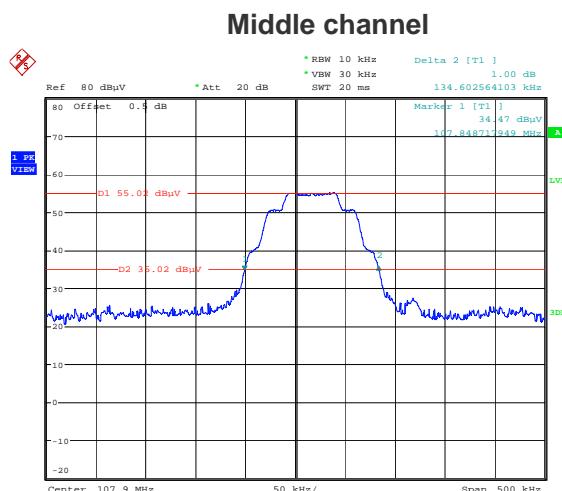
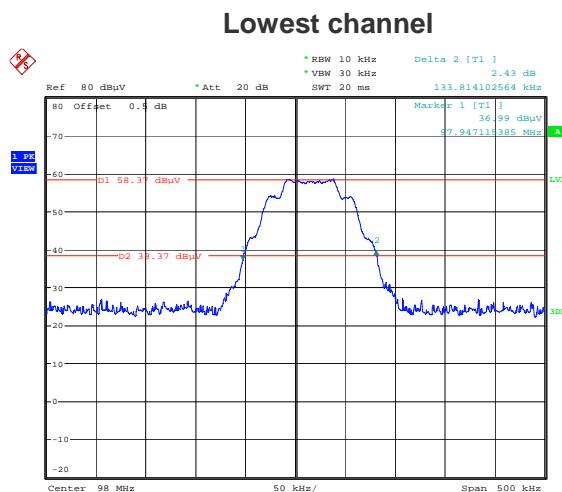
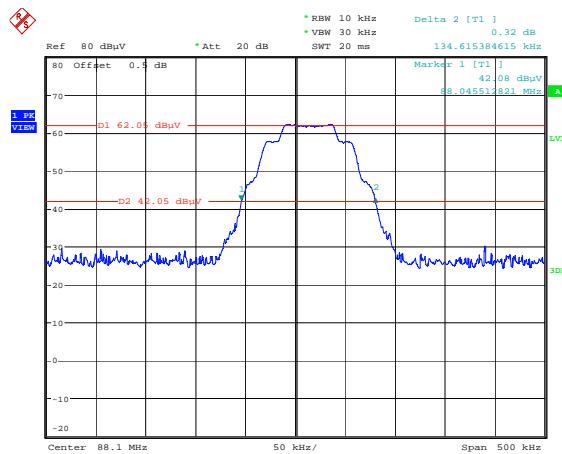
## 6.4 Bandwidth Test

Test Requirement:	FCC Part15 C Section 15.239/15.215
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=10kHz, VBW $\geq$ RBW, Sweep time = Auto.
Limit:	200kHz
Test Procedure:	<ol style="list-style-type: none"> <li>1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT.</li> <li>2. Set the EUT to proper test channel.</li> <li>3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points.</li> <li>4. Read 20dB bandwidth.</li> </ol>
Test setup:	 <p><b>Spectrum Analyzer</b>      <b>EUT</b></p>
Test Instruments:	Refer to section 4.7 for details
Test mode:	Refer to section 4.3 for details
Test results:	Passed

Measured data:

Test channel	20dB bandwidth (MHz)	Results
Lowest	134.6	Pass
Middle	133.8	Pass
Highest	134.6	Pass

Test plot as follows:



**Highest channel**

-----End-----