

# TEST REPORT

**FCC ID: 2AP9Y-X150**

**Product: 150M Wireless Video Transmission System**

**Model No.: X150**

**Additional Model No.: V2.6, WHD151**

**Trade Mark: Forhope, CINEGEARS**

**Report No.: TCT180615E018**

**Issued Date: Jul. 06, 2018**

Issued for:

**Shenzhen Forhope Science Technology Co., Ltd.**  
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**Shenzhen, China**

Issued By:

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**Appendix A: Photographs of Test Setup**

**Appendix B: Photographs of EUT**

## 1. Test Certification

<b>Product:</b>	150M Wireless Video Transmission System
<b>Model No.:</b>	X150
<b>Additional Model No.:</b>	V2.6, WHD151
<b>Trade Mark:</b>	<b>Forhope, CINEGEARS</b>
<b>Applicant:</b>	Shenzhen Forhope Science Technology Co., Ltd.
<b>Address:</b>	Rm. 311, 3/F., 146-147 Building, Leping Rd., Xin'an Street, Bao'an District, Shenzhen, China
<b>Manufacturer:</b>	Shenzhen Forhope Science Technology Co., Ltd.
<b>Address:</b>	Rm. 311, 3/F., 146-147 Building, Leping Rd., Xin'an Street, Bao'an District, Shenzhen, China
<b>Date of Test:</b>	Jun. 15, 2018 – Jul. 03, 2018
<b>Applicable Standards:</b>	FCC CFR Title 47 Part 15 Subpart E Section 15.407 KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General U-NII Test Procedures New Rules v02

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:



Jerry Xie

Date:

Jul. 03, 2018

Reviewed By:



Beryl Zhao

Date:

Jul. 06, 2018

Approved By:



Tomsin

Date:

Jul. 06, 2018

## 2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	N/A
Maximum Conducted Output Power	§15.407(a) §2.1046	PASS
6dB Emission Bandwidth	§15.407(a) §2.1049	PASS
26dB Emission Bandwidth & 99% Occupied Bandwidth	§15.407(a) §2.1049	PASS
Power Spectral Density	§15.407(a)	PASS
Band Edge	§15.407(a)	PASS
Radiated Emission	§15.407(a) §2.1053	PASS
Frequency Stability	§15.407(g) §2.1055	PASS

**Note:**

1. PASS: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

### 3. EUT Description

<b>Product:</b>	150M Wireless Video Transmission System
<b>Model No.:</b>	X150
<b>Additional Model No.:</b>	V2.6, WHD151
<b>Trade Mark:</b>	<b>Forhope, CINEGEARS</b>
<b>Hardware Version:</b>	5800-AMN001-T0
<b>Software Version:</b>	X150_FCC&IC
<b>Operation Frequency:</b>	5230 MHz, 5775 MHz, 5785 MHz, 5795 MHz
<b>Channel Bandwidth:</b>	40MHz
<b>Modulation Technology:</b>	Orthogonal Frequency Division Multiplexing(OFDM)
<b>Antenna Type:</b>	External Antenna
<b>Antenna Gain:</b>	All are 5dBi
<b>Power Supply:</b>	DC 7.4V via Li-ion battery
<b>Remark:</b>	All models above are identical in interior structure, electrical circuits and components, and just model names are different for the marketing requirement.

#### Test Frequency each of channel

Channel	Frequency
0	5230
1	5775
2	5785
3	5795

**Note:** All channels were selected to perform the test.

## 4. Genera Information

### 4.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations(The value of duty cycle is 100%)
<p>The sample was placed 0.8m/1.5m for blow/above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y &amp; 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.</p>	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Final Test Mode:	
Operation mode:	Keep the EUT in continuous transmitting with modulation

## 4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
Notebook	G485	LB00402300	/	Lenovo
Li-on battery	NP-F960	/	/	RUIBO

**Note:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. For conducted measurements (Output Power, Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

## 5. Facilities and Accreditations

### 5.1. Facilities

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

- FCC - Registration No.: 645098

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

### 5.2. Location

Shenzhen Tongce Testing Lab

Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China

TEL: +86-755-27673339

### 5.3. Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expanded 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	MU
1	Conducted Emission	$\pm 2.56\text{dB}$
2	RF power, conducted	$\pm 0.12\text{dB}$
3	Spurious emissions, conducted	$\pm 0.11\text{dB}$
4	All emissions, radiated(<1G)	$\pm 3.92\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.28\text{dB}$
6	Temperature	$\pm 0.1^\circ\text{C}$
7	Humidity	$\pm 1.0\%$



## 6. Test Results and Measurement Data

### 6.1. Antenna requirement

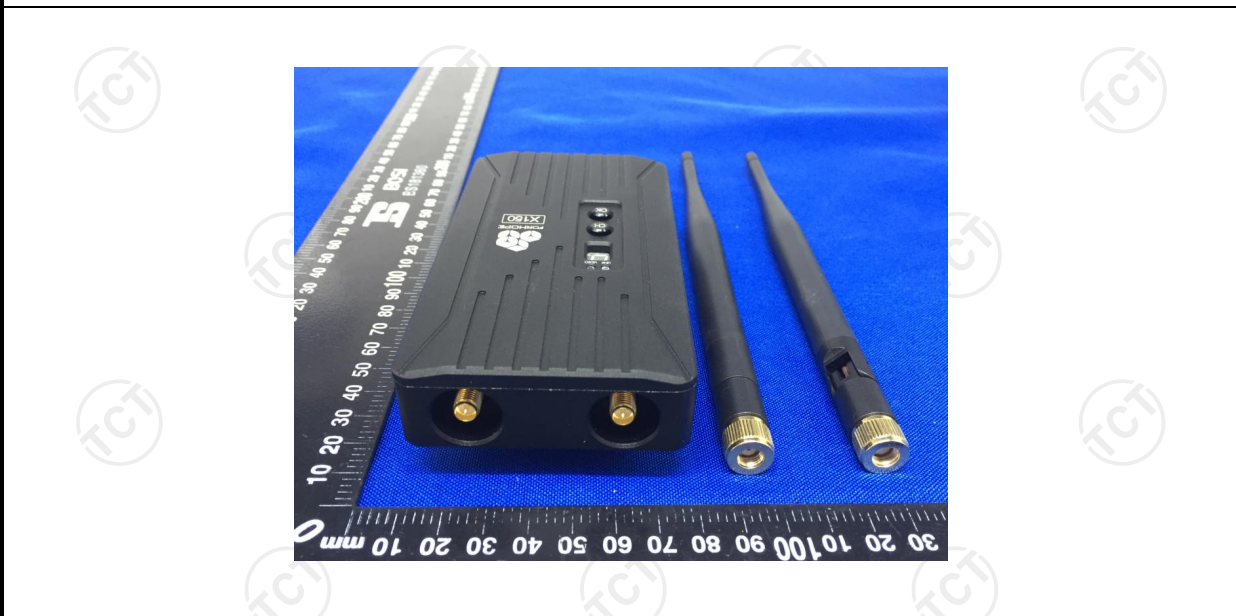
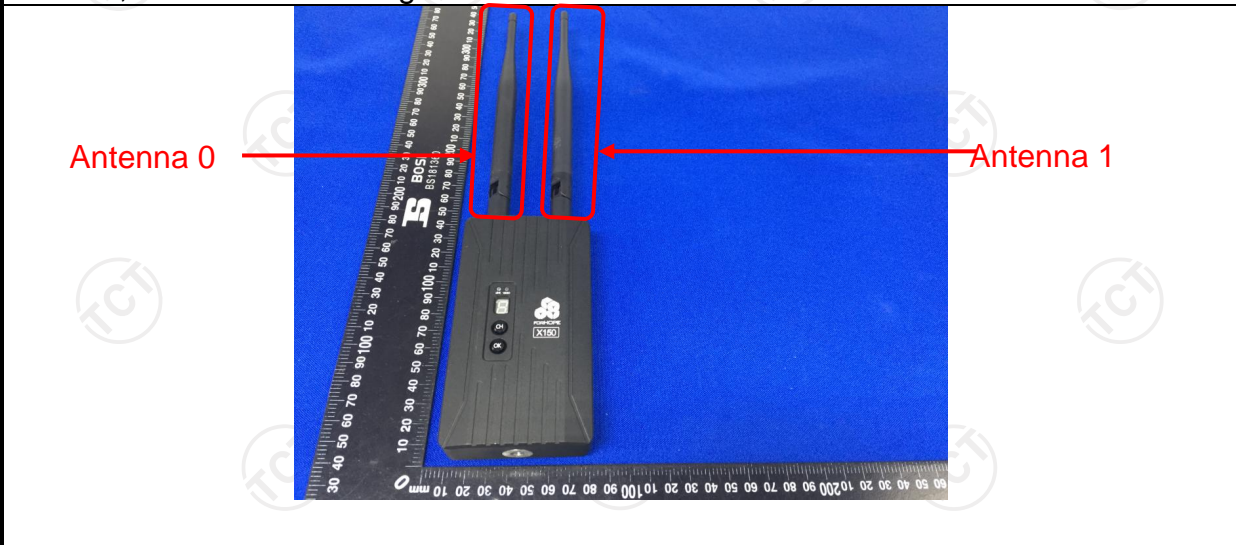
<b>Standard requirement:</b>	FCC Part15 C Section 15.203 /247(c)
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15.203 requirement:

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.

**E.U.T Antenna:**

The EUT has two External antennas that uses a unique coupling to the intentional radiator, and the best case gains of the both antennas are 5dBi.



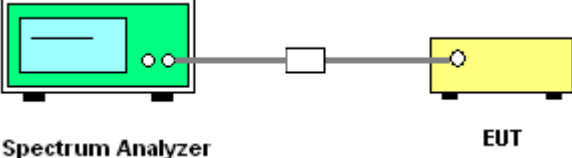
## 6.2. Conducted Emission

### 6.2.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.207														
<b>Test Method:</b>	ANSI C63.10:2013														
<b>Frequency Range:</b>	150 kHz to 30 MHz														
<b>Receiver setup:</b>	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
<b>Limits:</b>	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <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													
<b>Test Setup:</b>	<p><i>Remark</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>														
<b>Test Mode:</b>	Tx Mode														
<b>Test Procedure:</b>	<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.). This 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 C63.10: 2013 on conducted measurement.</li> </ol>														
<b>Test Result:</b>	N/A														

### 6.3. Maximum Conducted Output Power

#### 6.3.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 E Section 15.407(a)& Part 2 J Section 2.1046										
<b>Test Method:</b>	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General UNII Test Procedures New Rules v02 Section E										
<b>Limit:</b>	<table border="1"> <thead> <tr> <th>Frequency Band (MHz)</th> <th>Limit</th> </tr> </thead> <tbody> <tr> <td>5150 - 5250</td> <td>24dBm(250mW) for client device</td> </tr> <tr> <td>5250 - 5350</td> <td>24dBm(250mW)</td> </tr> <tr> <td>5470 - 5725</td> <td>24dBm(250mW)</td> </tr> <tr> <td>5725 - 5850</td> <td>30dBm(1W)</td> </tr> </tbody> </table>	Frequency Band (MHz)	Limit	5150 - 5250	24dBm(250mW) for client device	5250 - 5350	24dBm(250mW)	5470 - 5725	24dBm(250mW)	5725 - 5850	30dBm(1W)
Frequency Band (MHz)	Limit										
5150 - 5250	24dBm(250mW) for client device										
5250 - 5350	24dBm(250mW)										
5470 - 5725	24dBm(250mW)										
5725 - 5850	30dBm(1W)										
<b>Test Setup:</b>	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>										
<b>Test Mode:</b>	Transmitting mode with modulation										
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04.</li> <li>2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>3. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>4. Measure the conducted output power and record the results in the test report.</li> </ol>										
<b>Test Result:</b>	PASS										
<b>Remark:</b>	Conducted output power= measurement power +10log(1/x) X is duty cycle=1, so 10log(1/1)=0 Conducted output power= measurement power										

**6.3.2. Test Instruments**

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF Cable (9KHz-40GHz)	TCT	RE-03	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-03	N/A	Sep. 27, 2018

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

**6.3.3. Test Data**

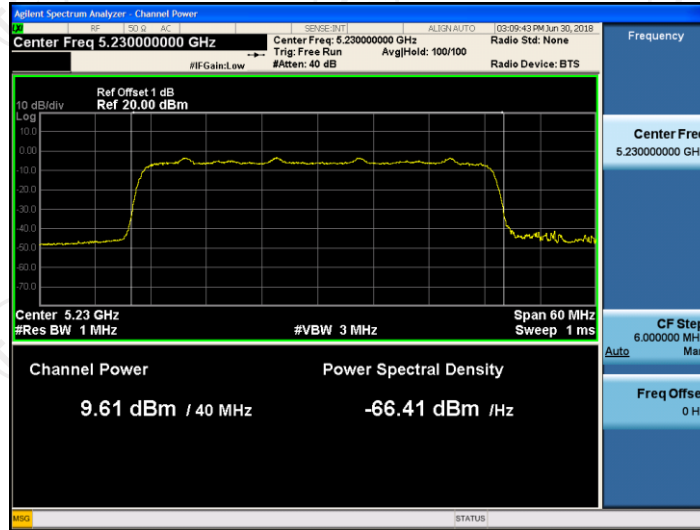
Antenna 0+Antenna 1						
Test channel	Frequency (MHz)	Maximum Conducted (Average) Output Power (dBm)			FCC Limit (dBm)	Result
		Ant0	Ant1	Total		
0	5230	9.61	9.95	12.79	21.99	PASS
1	5775	9.44	8.06	11.81	27.99	PASS
2	5785	9.65	8.11	11.96	27.99	PASS
3	5795	9.46	8.08	11.84	27.99	PASS

**Note :**  $G_{ANT}=5\text{dBi}$ ,  $\text{Array Gain}=10\log(N_{ANT}/N_{SS})=3.01\text{dBi}$ ,  $\text{Directional Gain}=G_{ANT} + \text{Array Gain}=8.01\text{dBi}$ ,  
 $8.01\text{dBi} > 6\text{dBi}$  so limit: 5150-5250 MHz,  $\text{Limit}=24-(8.01-6)=21.99\text{ dBm}$   
 5725-5850 MHz,  $\text{Limit}=30-(8.01-6)=27.99\text{ dBm}$

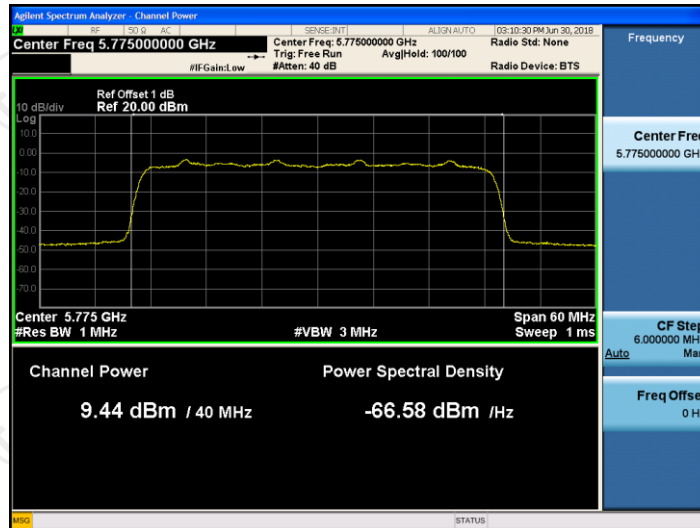
Test plots as follows:

ANT 0

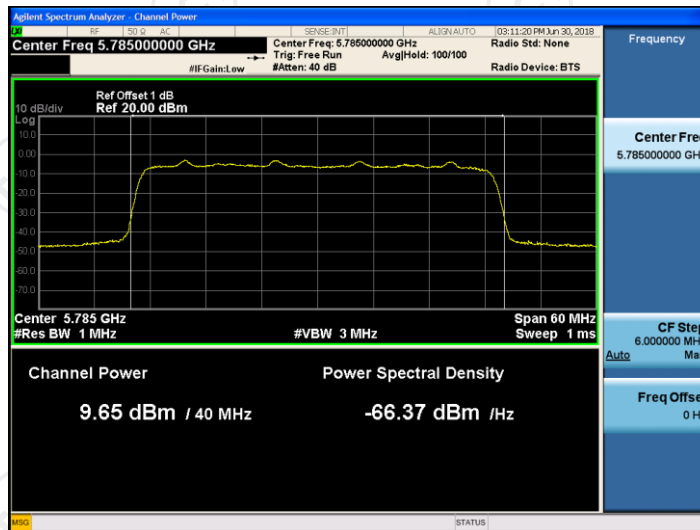
5230MHz



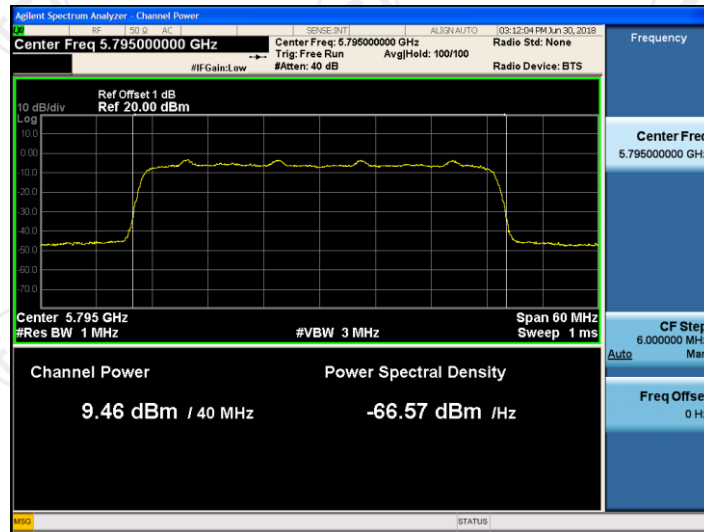
5775MHz



5785MHz

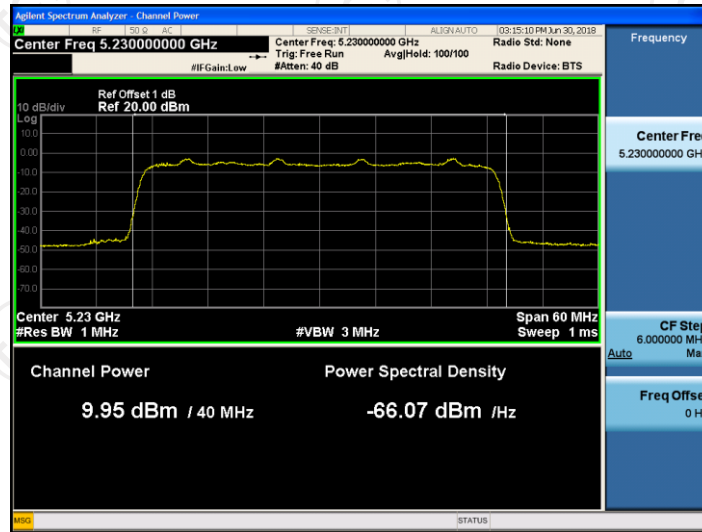


5795MHz

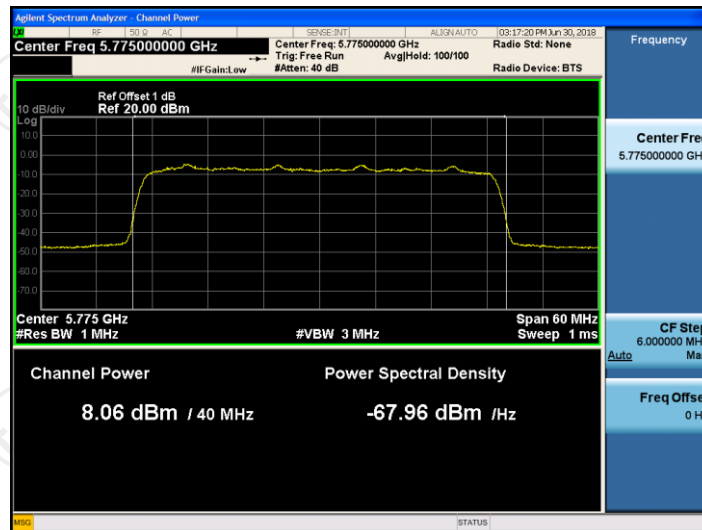


ANT 1

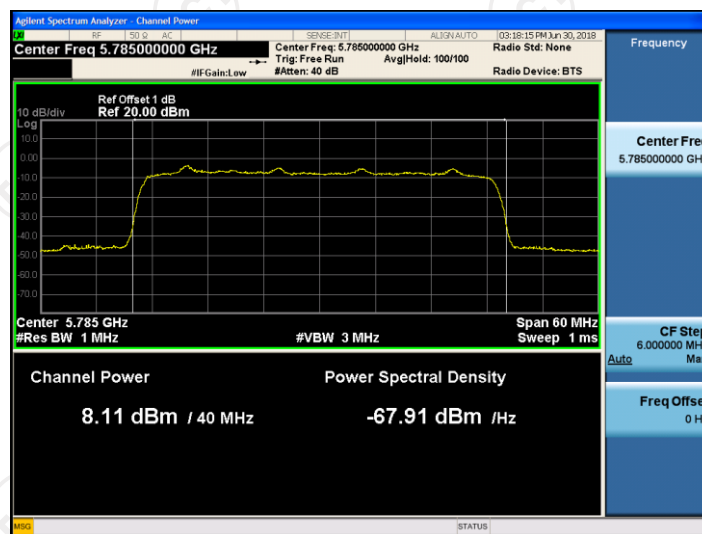
5230MHz



5775MHz

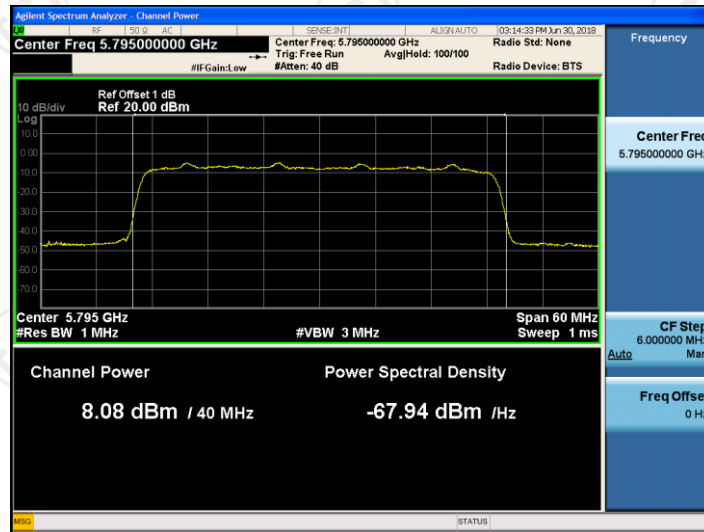


5785MHz






5795MHz



## 6.4. 6dB Emission Bandwidth

### 6.4.1. Test Specification

<b>Test Requirement:</b>	FCC CFR47 Part 15 Section 15.407(e)& Part 2 J Section 2.1049
<b>Test Method:</b>	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General UNII Test Procedures New Rules v02 Section C
<b>Limit:</b>	>500kHz
<b>Test Setup:</b>	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. KDB789033 D02 General UNII Test Procedures New Rules v02 Section C</li> <li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz.</li> <li>4. Measure and record the results in the test report.</li> </ol>
<b>Test Result:</b>	PASS

### 6.4.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF Cable (9KHz-40GHz)	TCT	RE-03	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-03	N/A	Sep. 27, 2018

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

**6.4.3. Test data****ANT 0**

Test channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
1	5775	35.50	0.5	PASS
2	5785	35.53	0.5	PASS
3	5795	32.52	0.5	PASS

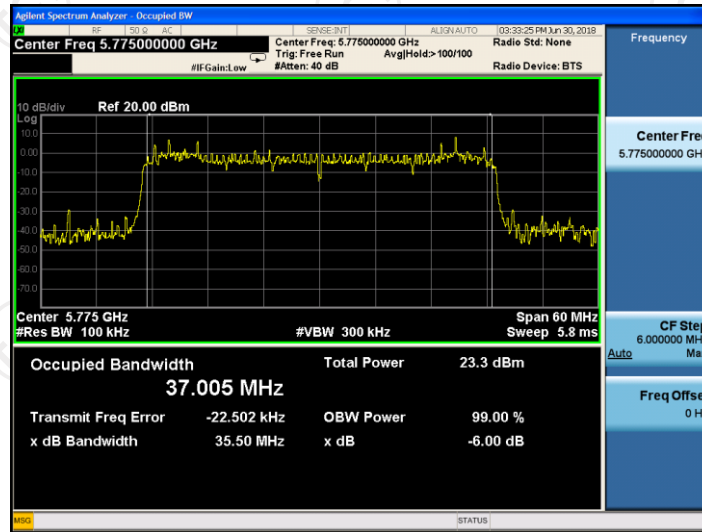
**ANT 1**

Test channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
1	5775	33.91	0.5	PASS
2	5785	34.88	0.5	PASS
3	5795	34.00	0.5	PASS

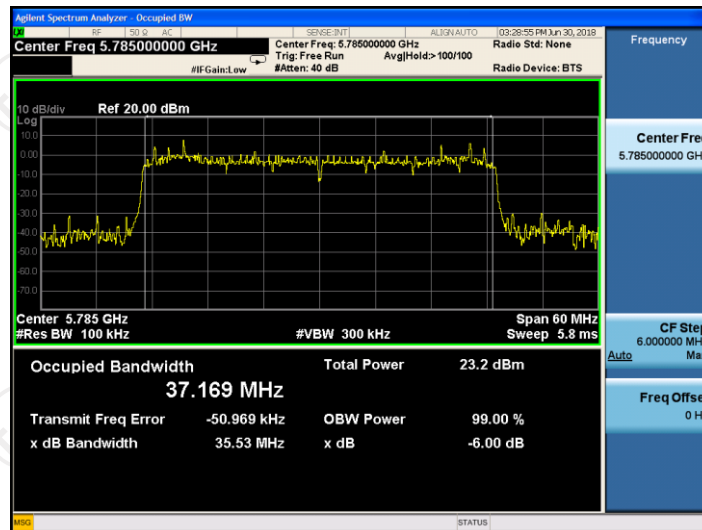
Test plots as follows:

ANT 0

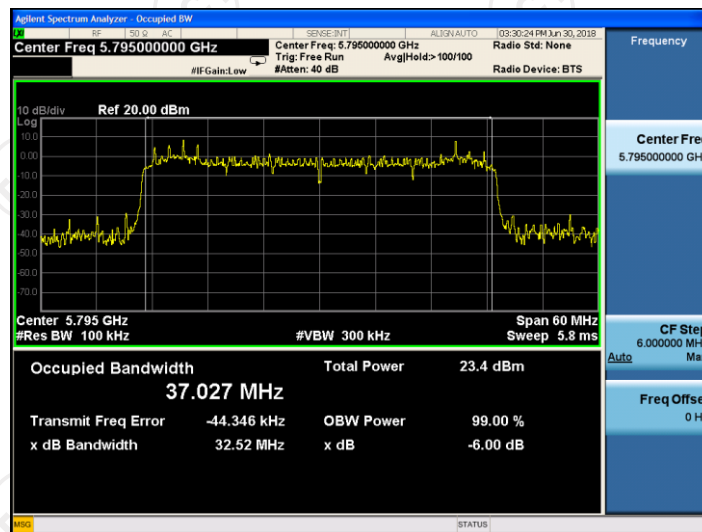
5775MHz



5785MHz

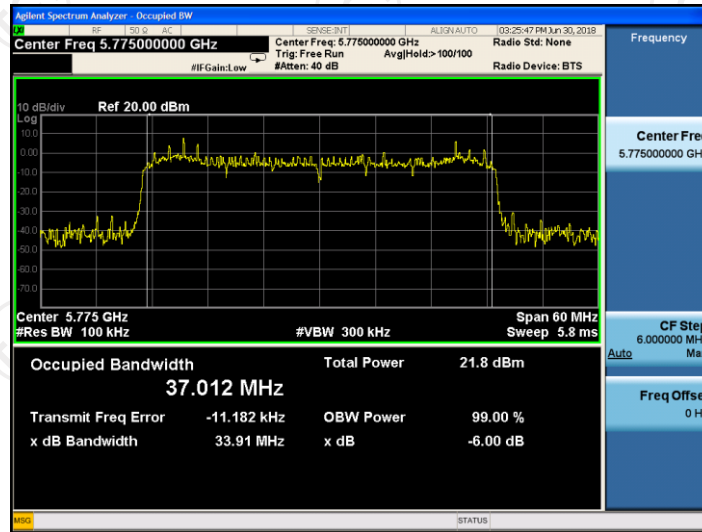


5795MHz

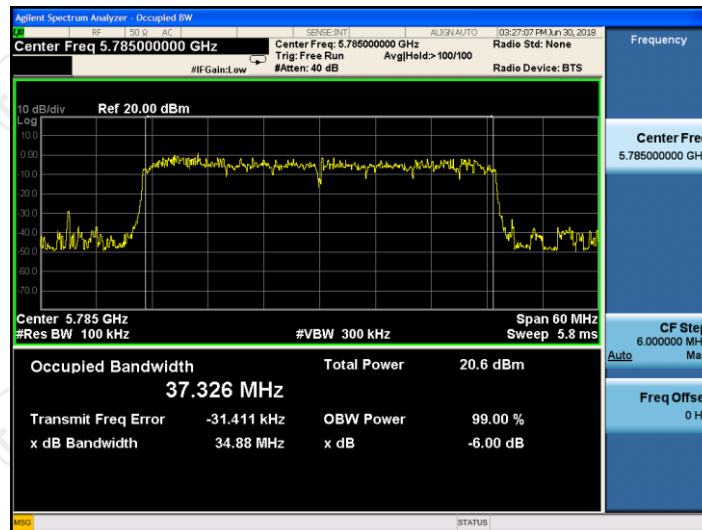


ANT 1

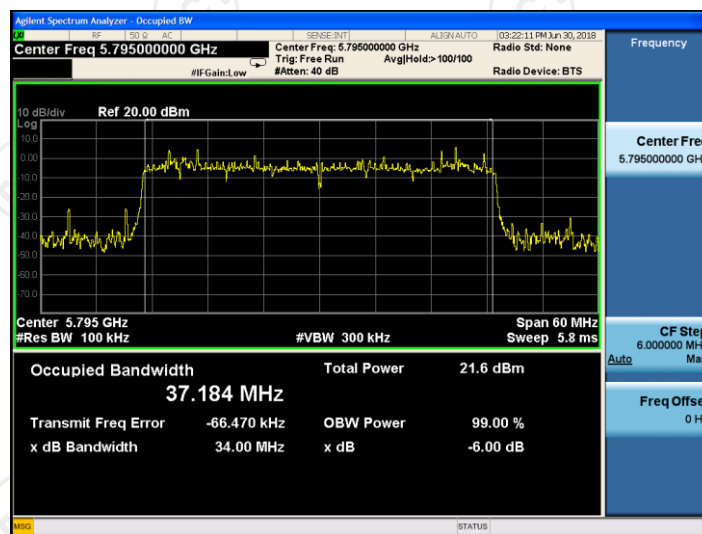
5775MHz



5785MHz




5795MHz



## 6.5. 26dB Bandwidth and 99% Occupied Bandwidth

### 6.5.1. Test Specification

<b>Test Requirement:</b>	47 CFR Part 15C Section 15.407 (a)& Part 2 J Section 2.1049
<b>Test Method:</b>	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General UNII Test Procedures New Rules v02 Section D
<b>Limit:</b>	No restriction limits
<b>Test Setup:</b>	 <p style="text-align: center;">Spectrum Analyzer                      EUT</p>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. KDB789033 D02 General UNII Test Procedures New Rules v02 Section D</li> <li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement.</li> <li>4. Measure and record the results in the test report.</li> </ol>
<b>Test Result:</b>	PASS

### 6.5.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF Cable (9KHz-26.5GHz)	TCT	RE-06	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-01	N/A	Sep. 27, 2018

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

**6.5.3. Test data**

**ANT 0**

Test channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
CH0	5230	38.27	37.205

Test channel	Frequency (MHz)	99% Bandwidth (MHz)
CH1	5775	37.005
CH2	5785	37.169
CH3	5795	37.027

**ANT 1**

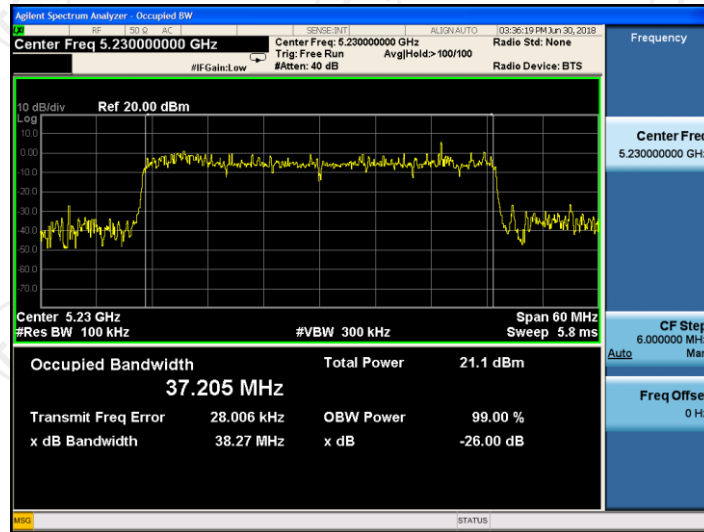
Test channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
CH0	5230	38.15	37.114

Test channel	Frequency (MHz)	99% Bandwidth (MHz)
CH1	5775	37.012
CH2	5785	37.326
CH3	5795	37.184

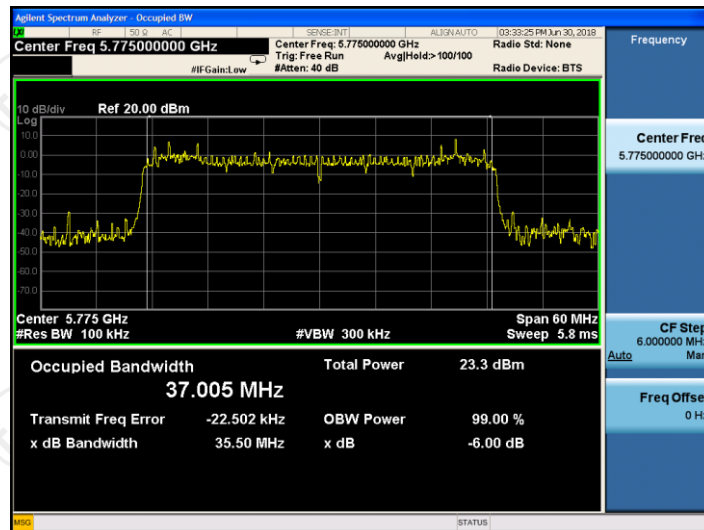
Test plots as follows:

ANT 0

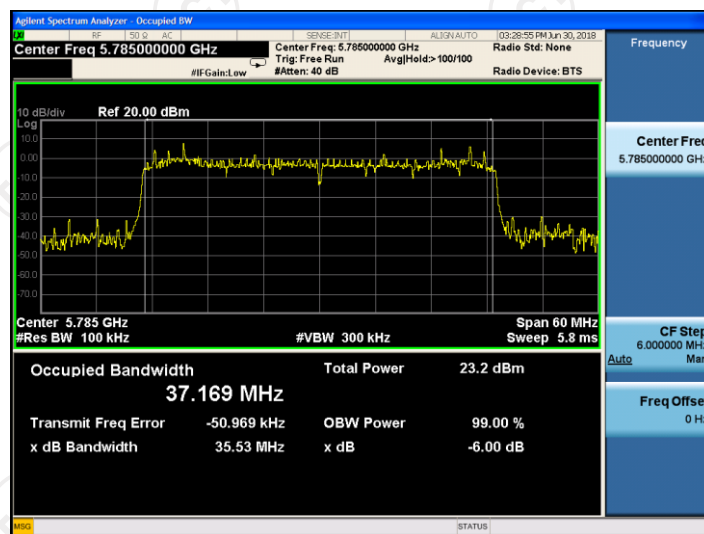
## 5230MHz



## 5775MHz

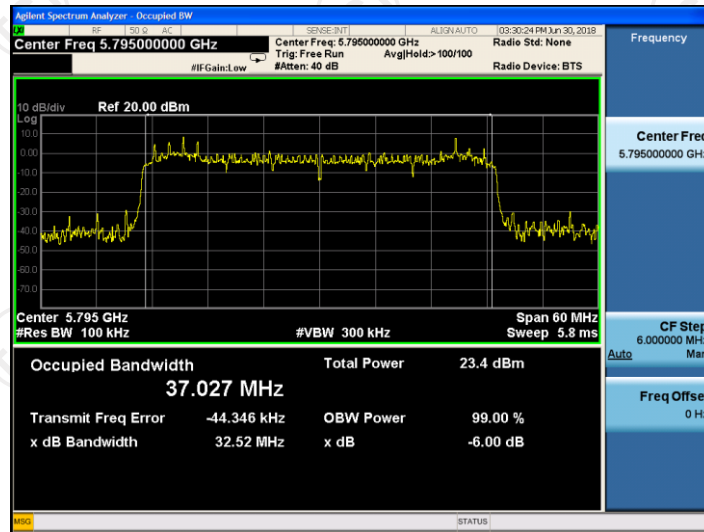


## 5785MHz



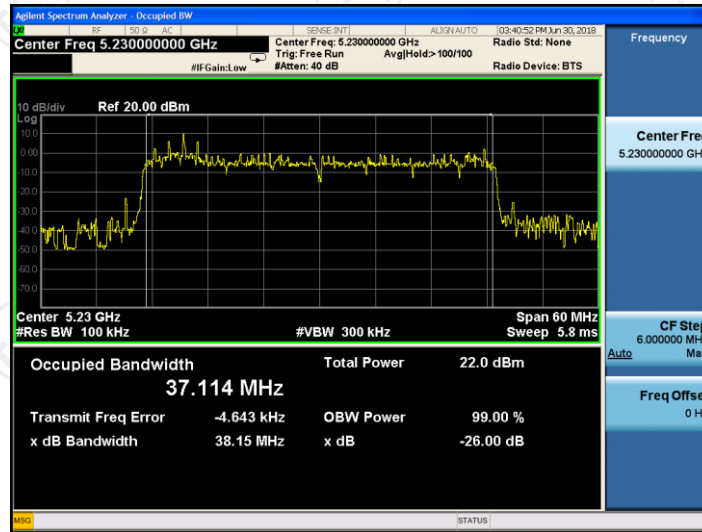


5795MHz

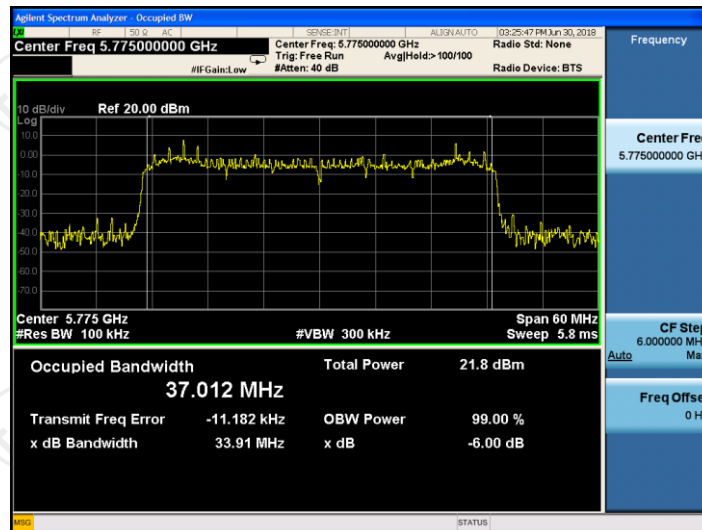


ANT 1

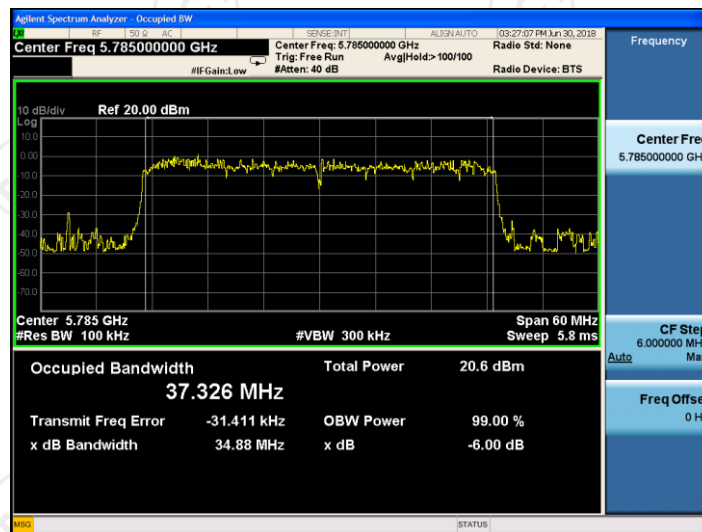
5230MHz



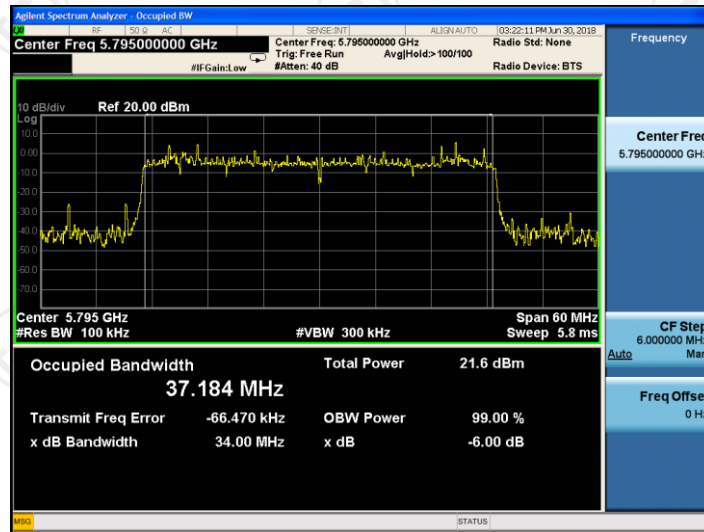
5775MHz



5785MHz




5795MHz



## 6.6. Power Spectral Density

### 6.6.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 E Section 15.407 (a)
<b>Test Method:</b>	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General UNII Test Procedures New Rules v02 Section F
<b>Limit:</b>	<p>≤11.00dBm/MHz for Band 1 5150MHz-5250MHz(client device)</p> <p>≤11.00dBm/MHz for Band 2A&amp;2C 5250-5350&amp;5470-5725</p> <p>≤30.00dBm/500KHz for Band 3 5725MHz-5850MHz</p> <p>The e.i,r,p spectral density for Band 1 5150MHz – 5250 MHz should not exceed 10dBm/MHz</p>
<b>Test Setup:</b>	 <p>Spectrum Analyzer                      EUT</p>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test Procedure:</b>	<p>1. Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth.</p> <p>1. Set RBW = 510 kHz/1 MHz, VBW ≥ 3*RBW, Sweep time = Auto, Detector = RMS.</p> <p>2. Allow the sweeps to continue until the trace stabilizes.</p> <p>3. Use the peak marker function to determine the maximum amplitude level.</p> <p>4. The E.I.R.P spectral density used radiated test method. At a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment.</p>
<b>Test Result:</b>	PASS

### 6.6.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF Cable (9KHz-40GHz)	TCT	RE-03	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-03	N/A	Sep. 27, 2018

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

**6.6.3. Test data**

Antenna 0+Antenna 1						
Test channel	Frequency (MHz)	Power Spectral Density			Limit (dBm/MHz)	Result
		Ant0	Ant1	Total		
CH0	5230	-4.197	-3.495	-0.82	8.99	PASS
CH1	5775	-2.825	-5.499	-0.95	27.99	PASS
CH2	5785	-3.140	-5.461	-1.14	27.99	PASS
CH3	5795	-2.666	-5.592	-0.88	27.99	PASS

**Note: 1. All antennas have the same gain.  $G_{ANT}=5dBi$ , Array Gain= $10\log(N_{ANT}/N_{SS})=3.01dBi$**

**Directional Gain= $G_{ANT} + \text{Array Gain}=8.01dBi$ ,  $8.01dBi > 6dBi$**

**so limit: 5150-5250 MHz, Limit= $11-(8.01-6)=8.99 \text{ dBm}$**

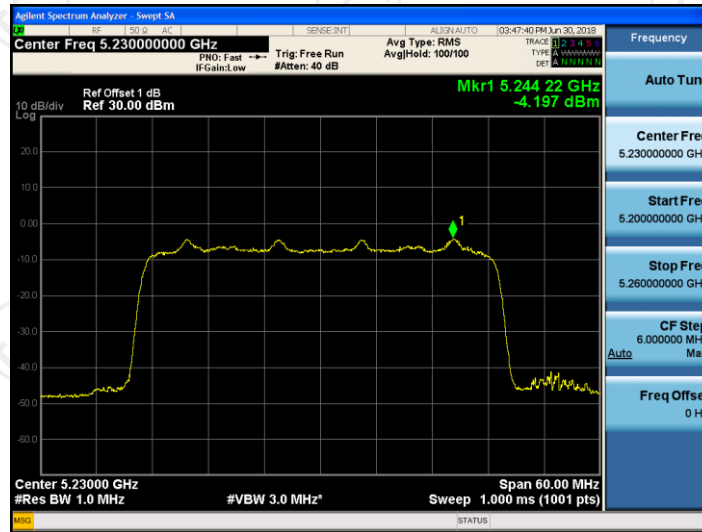
**5725-5850 MHz, Limit= $30-(8.01-6)=27.99 \text{ dBm}$**

**2. The total PSD method used the sum spectra maxima across the outputs.**

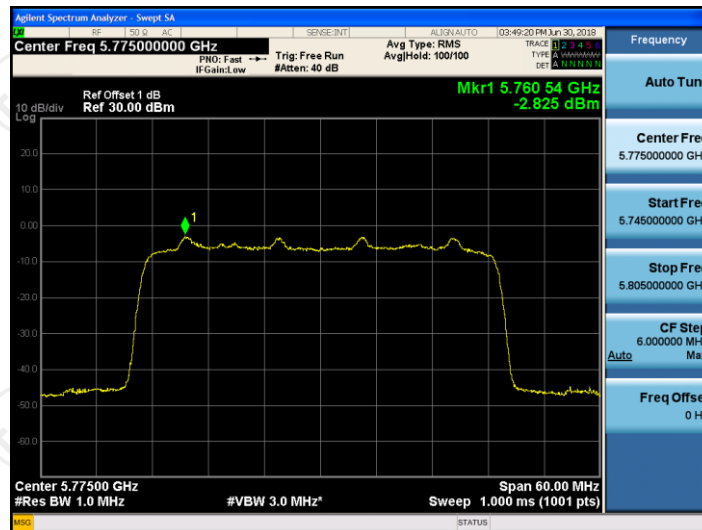
Test plots as follows:

ANT 0

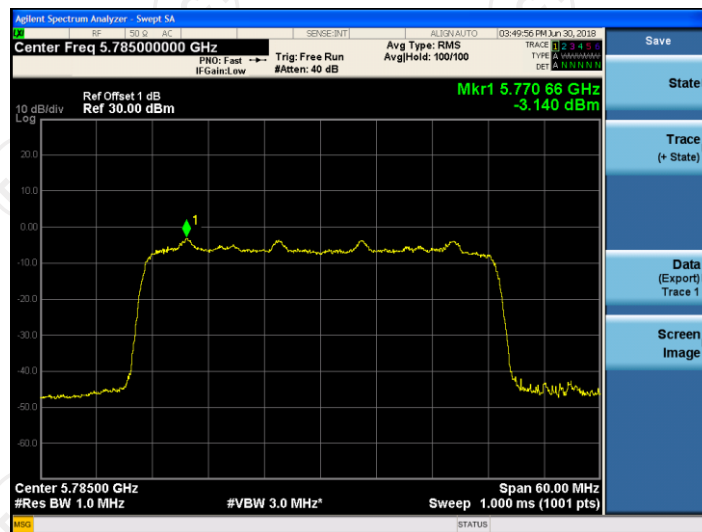
5230MHz



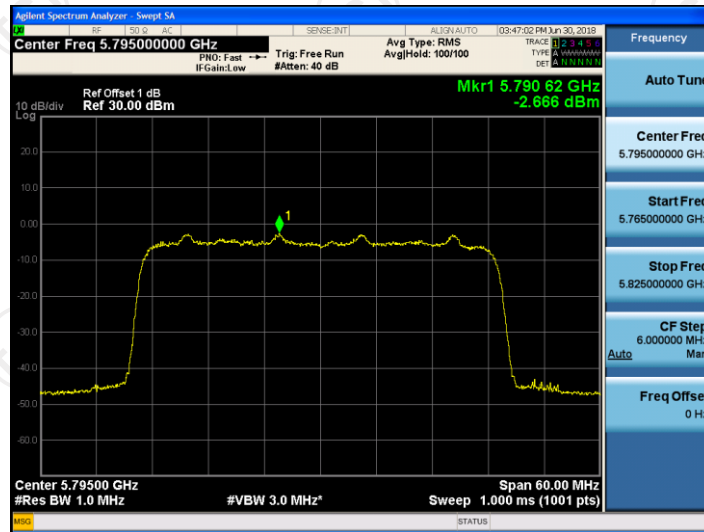
5775MHz



5785MHz

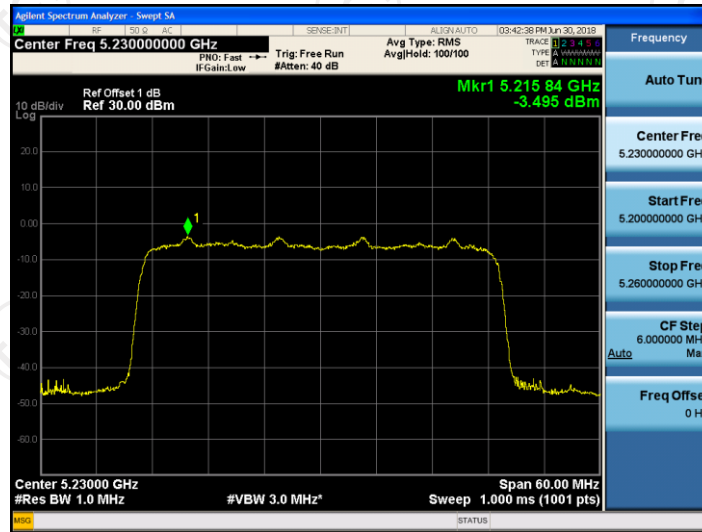


5795MHz

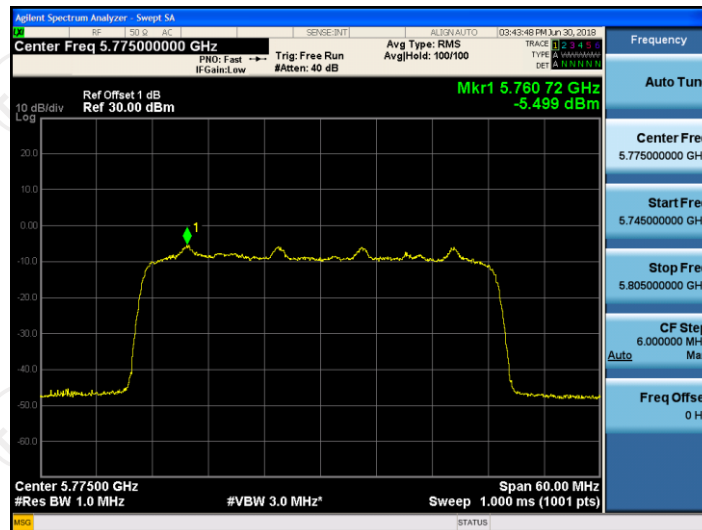


ANT 1

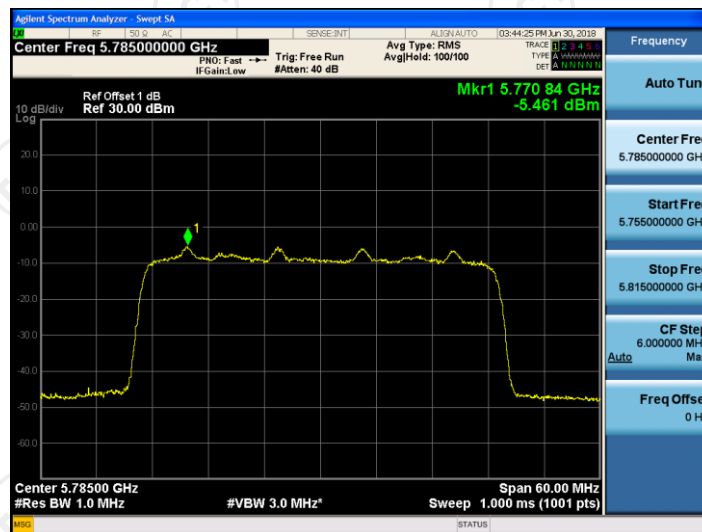
5230MHz



5775MHz

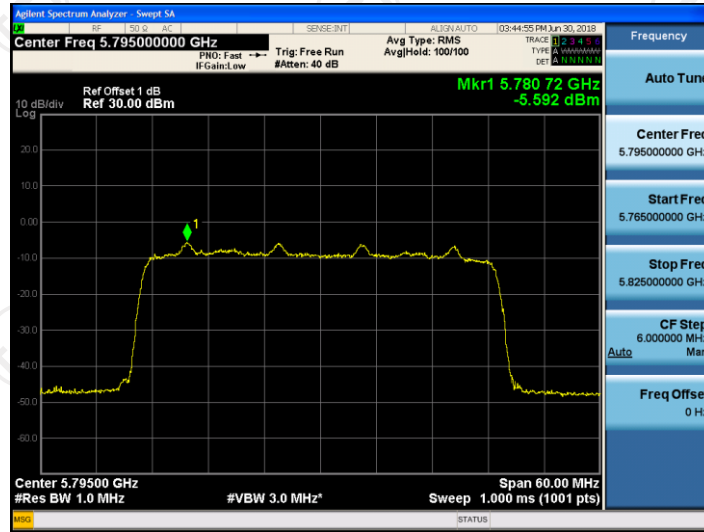


5785MHz



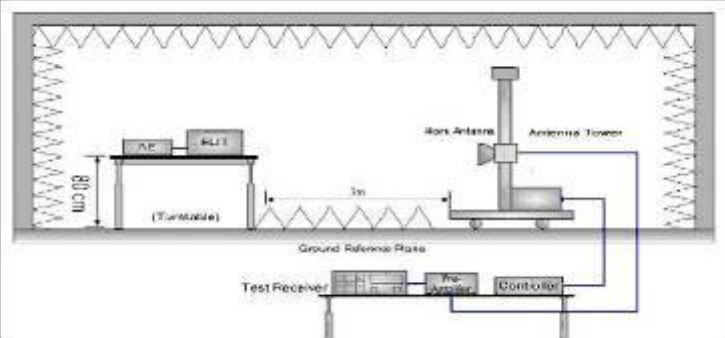


5795MHz



## 6.7. Band edge

### 6.7.1. Test Specification

<b>Test Requirement:</b>	FCC CFR47 Part 15E Section 15.407								
<b>Test Method:</b>	ANSI C63.10 2013								
<b>Limit:</b>	<p>For Band 1&amp;2A&amp;2C: <math>E[dB\mu V/m] = EIRP[dBm] + 95.2 = 68.2</math> dB<math>\mu</math>V/m, for EIRP(dBm)= <b>-27dBm</b></p> <p>For Band 3(5715-5725MHz&amp;5850-5860MHz): <math>E[dB\mu V/m] = EIRP[dBm] + 95.2 = 78.2</math> dB<math>\mu</math>V/m, for EIRP(dBm)= <b>-17dBm</b>;                      For Band 3(other un-restricted band): <math>E[dB\mu V/m] = EIRP[dBm] + 95.2 = 68.2</math> dB<math>\mu</math>V/m, for EIRP(dBm)= <b>-27dBm</b></p> <p>For Restrict Bands</p> <table border="1"> <thead> <tr> <th>Frequency</th> <th>Limit (dBuV/m @3m)</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Above 1GHz</td> <td>74</td> <td>Peak Value</td> </tr> <tr> <td>54</td> <td>Average Value</td> </tr> </tbody> </table>	Frequency	Limit (dBuV/m @3m)	Remark	Above 1GHz	74	Peak Value	54	Average Value
Frequency	Limit (dBuV/m @3m)	Remark							
Above 1GHz	74	Peak Value							
	54	Average Value							
<b>Test Setup:</b>	 <p>The diagram illustrates the test setup. A transmitting antenna (EUT) is placed on a rotating table (Turntable) at a height of 0.8 meters. The table is rotated 360 degrees. An interference-receiving antenna is mounted on a variable-height antenna tower, positioned 3 meters away from the EUT. The antenna height is varied from 1 meter to 4 meters. The test receiver system consists of a Test Receiver, Pre-Amplifier, and Controller, all connected to the antenna tower. A Ground Reference Plane is also shown.</p>								
<b>Test Mode:</b>	Transmitting mode with modulation								
<b>Test Procedure:</b>	<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 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</li> </ol>								

	<p>Mode.</p> <p>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, quasipeak or average method as specified and then reported in a data sheet.</p> <p>7. A 5.8GHz high -PASS filter is used during radiated emissions above 1GHz measurement.</p>
<b>Test Result:</b>	PASS

6.7.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	ROHDE&SCHW ARZ	ESVD	100008	Sep. 27, 2018
Spectrum Analyzer	ROHDE&SCHW ARZ	FSQ	200061	Sep. 27, 2018
Spectrum Analyzer	ROHDE&SCHW ARZ	FSP40	100056	Sep. 27, 2018
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 27, 2018
Pre-amplifier	HP	8447D	2727A05017	Sep. 27, 2018
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 27, 2018
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBH 9170	582	Jun. 07, 2018
Coax cable (9KHz-1GHz)	TCT	RE-low-01	N/A	Sep. 27, 2018
Coax cable (9KHz-40GHz)	TCT	RE-high-02	N/A	Sep. 27, 2018
Coax cable (9KHz-1GHz)	TCT	RE-low-03	N/A	Sep. 27, 2018
Coax cable (9KHz-40GHz)	TCT	RE-high-04	N/A	Sep. 27, 2018
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

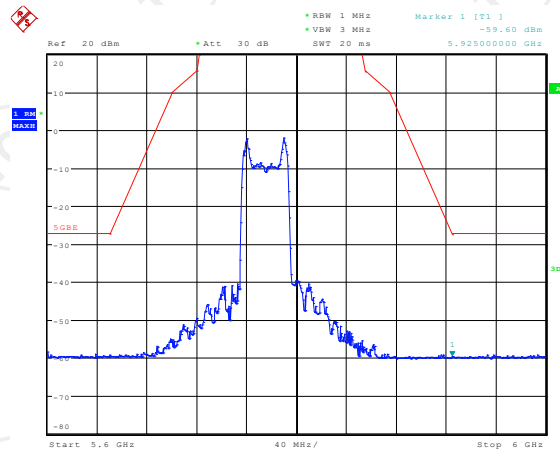
**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

**6.7.3. Test Data**

5230MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
5150	H	58.46	---	1.75	60.21	---	74.00	---	-13.79
5150	H	---	41.53	1.75	---	43.28	---	54.00	-10.72
5350	H	53.61	---	0.97	54.58	---	74.00	---	-19.42
5350	H	---	40.15	0.97	---	41.12	---	54.00	-12.88
---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---
5150	V	66.31	---	1.75	68.06	---	74.00	---	-5.94
5150	V	---	43.68	1.75	---	45.43	---	54.00	-8.57
5350	V	54.73	---	0.97	55.70	---	74.00	---	-18.30
5350	V	---	40.44	0.97	---	41.41	---	54.00	-12.59
---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---
5775MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
5725	H	59.35	---	-4.2	55.15	---	68.20	---	-13.05
5725	H	---	43.24	-4.2	---	39.04	---	48.20	-9.16
---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---
5725	V	60.53	---	-4.2	56.33	---	68.20	---	-11.87
5725	V	---	40.40	-4.2	---	36.20	---	48.20	-12.00
---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---
5795MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
5850	H	56.24	---	-4.2	52.04	---	68.20	---	-16.16
5850	H	---	42.16	-4.2	---	37.95	---	48.20	-10.25
---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---
5850	V	59.73	---	-4.2	55.55	---	68.20	---	-12.65
5850	V	---	44.67	-4.2	---	40.47	---	48.20	-7.73
---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---

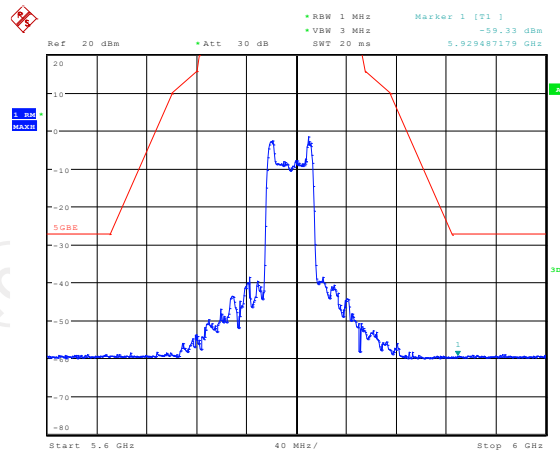
Band 3 Band-edge for RF Conducted Emissions

5775 MHz



Date: 3 Nov 2018 11:16:59

5795 MHz



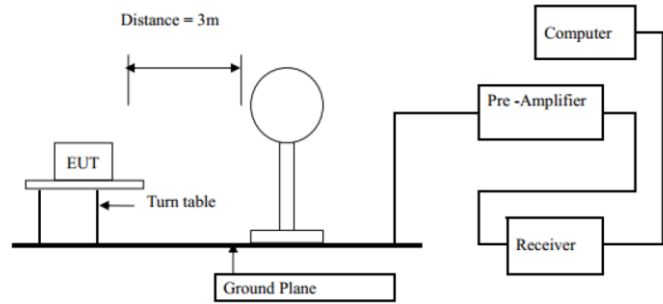
Date: 3 Nov 2018 11:23:03

## 6.8. Spurious Emission

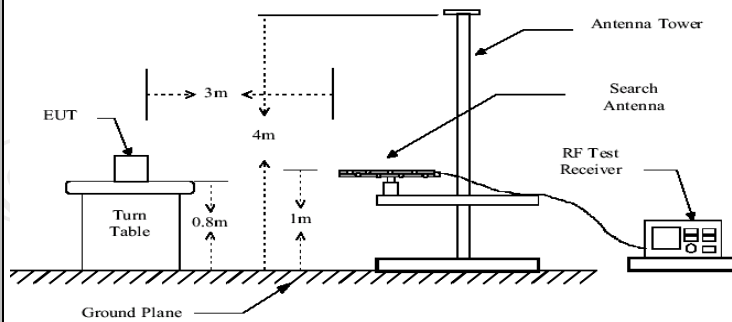
### 6.8.1. Unwanted Emissions out of the Restricted Bands

#### 6.8.1.1. Test Specification

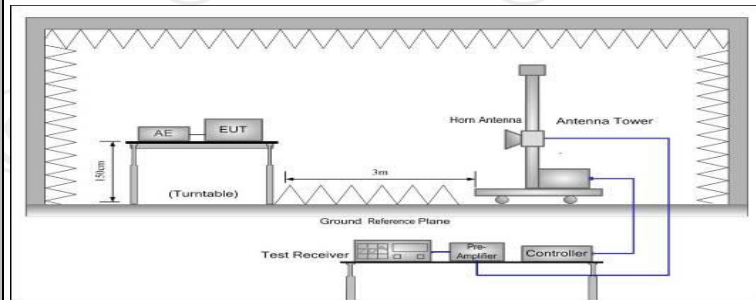
<b>Test Requirement:</b>	FCC CFR47 Part 15 Section 15.407 & 15.209 & 15.205				
<b>Test Method:</b>	KDB 789033 D02 v02				
<b>Frequency Range:</b>	9kHz to 40GHz				
<b>Measurement Distance:</b>	3 m				
<b>Antenna Polarization:</b>	Horizontal & Vertical				
<b>Operation mode:</b>	Transmitting mode with modulation				
<b>Receiver Setup:</b>	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	
<b>Limit:</b>	Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,				
	Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)		
	0.009-0.490	2400/F(KHz)	300		
	0.490-1.705	24000/F(KHz)	30		
	1.705-30	30	30		
	30-88	100	3		
	88-216	150	3		
	216-960	200	3		
	Above 960	500	3		
	Frequency	Limit (dBuV/m @3m)	Detector		
Above 1G	74.0	Peak			
	54.0	Average			
<b>Test setup:</b>	For radiated emissions below 30MHz				



30MHz to 1GHz



Above 1GHz



**Test Procedure:**

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.
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 rotating 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

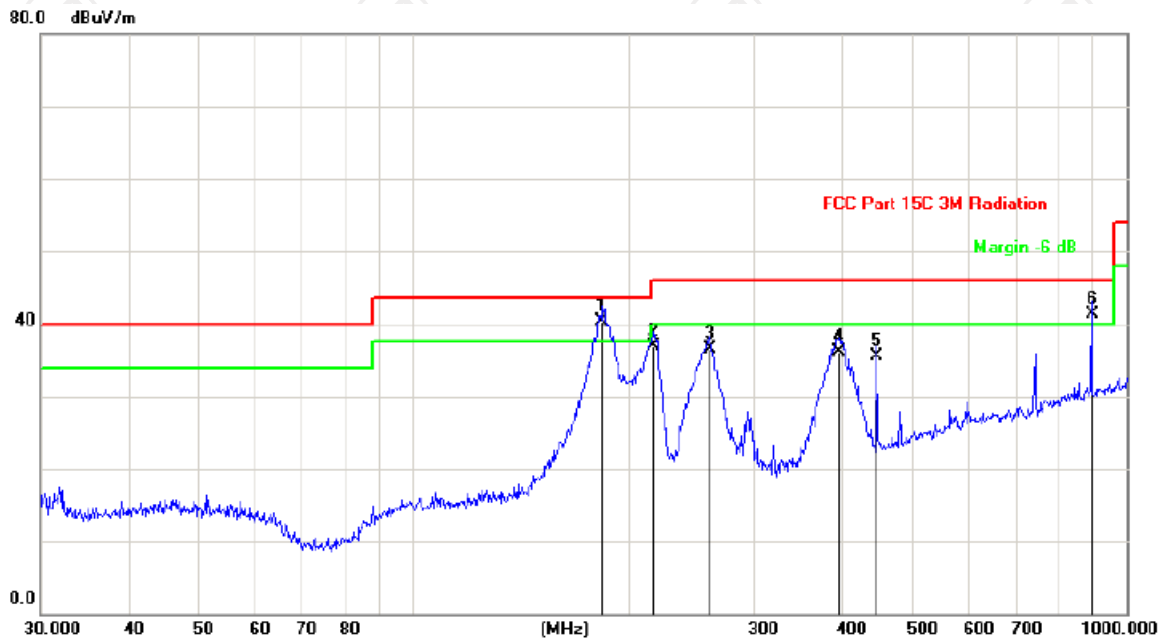


	Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limitspecified, then testing could be stopped and the peak values of the EUT wouldbe reported. Otherwise the emissions that did not have 10dB margin would bere-tested one by one using peak, quasi-peak or average method as specified andthen reported in a data sheet.
<b>Test results:</b>	PASS

**6.8.2. Test Data**

Please refer to following diagram for individual  
Below 1GHz

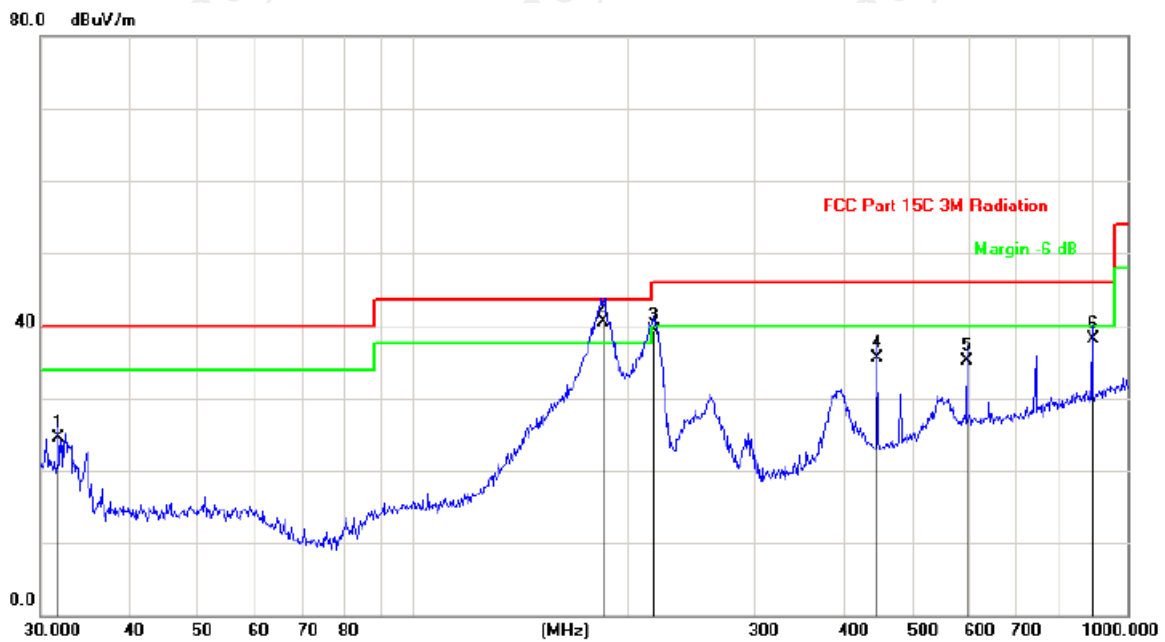
Horizontal:



Site: Polarization: **Horizontal** Temperature: 25  
Limit: FCC Part 15C 3M Radiation Power: Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Antenna Height cm	Table Degree	Comment
1	*	183.8439	54.00	-13.73	40.27	43.50	-3.23	QP		
2		216.7828	49.00	-12.09	36.91	46.00	-9.09	QP		
3		260.1444	46.80	-10.39	36.41	46.00	-9.59	QP		
4		394.8544	42.00	-5.94	36.06	46.00	-9.94	QP		
5		446.4141	40.00	-4.55	35.45	46.00	-10.55	QP		
6	!	893.8567	38.10	3.21	41.31	46.00	-4.69	QP		

Vertical:



Site: Polarization: **Vertical** Temperature: 25  
 Limit: FCC Part 15C 3M Radiation Power: Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		31.8427	38.10	-13.61	24.49	40.00	-15.51	QP			
2	*	184.4898	54.10	-13.69	40.41	43.50	-3.09	QP			
3		216.7828	51.40	-12.09	39.31	46.00	-6.69	QP			
4		446.4141	40.00	-4.55	35.45	46.00	-10.55	QP			
5		595.1329	36.00	-0.88	35.12	46.00	-10.88	QP			
6		893.8567	34.90	3.21	38.11	46.00	-7.89	QP			

**Note:** 1. The low frequency, which started from 9KHz~30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported

2. Measurements were conducted in all channels (5230MHz, 5775MHz, 5785MHz, 5795MHz), and the worst case Mode (5230MHz) was submitted only.

CH0: 5230MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
10460	H	41.54	---	8.02	49.56	---	74	54	-4.44
15690	H	36.23	---	9.87	46.1	---	74	54	-7.9
---	H	---	---	---	---	---	---	---	---
10460	V	40.15	---	8.02	48.17	---	74	54	-5.83
15690	V	34.26	---	9.87	44.13	---	74	54	-9.87
---	V	---	---	---	---	---	---	---	---

CH1: 5775MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
11550	H	40.95	---	7.97	48.92	---	74	54	-5.08
17325	H	35.16	---	9.83	44.99	---	74	54	-9.01
---	H	---	---	---	---	---	---	---	---
11550	V	41.06	---	7.97	49.03	---	74	54	-4.97
17325	V	34.33	---	9.83	44.16	---	74	54	-9.84
---	V	---	---	---	---	---	---	---	---

CH2: 5785MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
11570	H	40.72	---	7.97	48.69	---	74	54	-5.31
17355	H	34.27	---	9.83	44.1	---	74	54	-9.9
---	H	---	---	---	---	---	---	---	---
11570	V	41.35	---	7.97	49.32	---	74	54	-4.68
17355	V	32.87	---	9.83	42.7	---	74	54	-11.3
---	V	---	---	---	---	---	---	---	---

CH3: 5795MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
11590	H	41.19	---	8.02	49.21	---	74	54	-4.79
17385	H	34.48	---	9.87	44.35	---	74	54	-9.65
---	H	---	---	---	---	---	---	---	---
11590	V	40.33	---	8.02	48.35	---	74	54	-5.65
17385	V	36.02	---	9.87	45.89	---	74	54	-8.11
---	V	---	---	---	---	---	---	---	---

**Note:**

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dB $\mu$ V/m)-Average limit (dB $\mu$ V/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 40GHz.
5. Data of measurement shown "---" in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

## 6.9. Frequency Stability Measurement

### 6.9.1. Test Specification

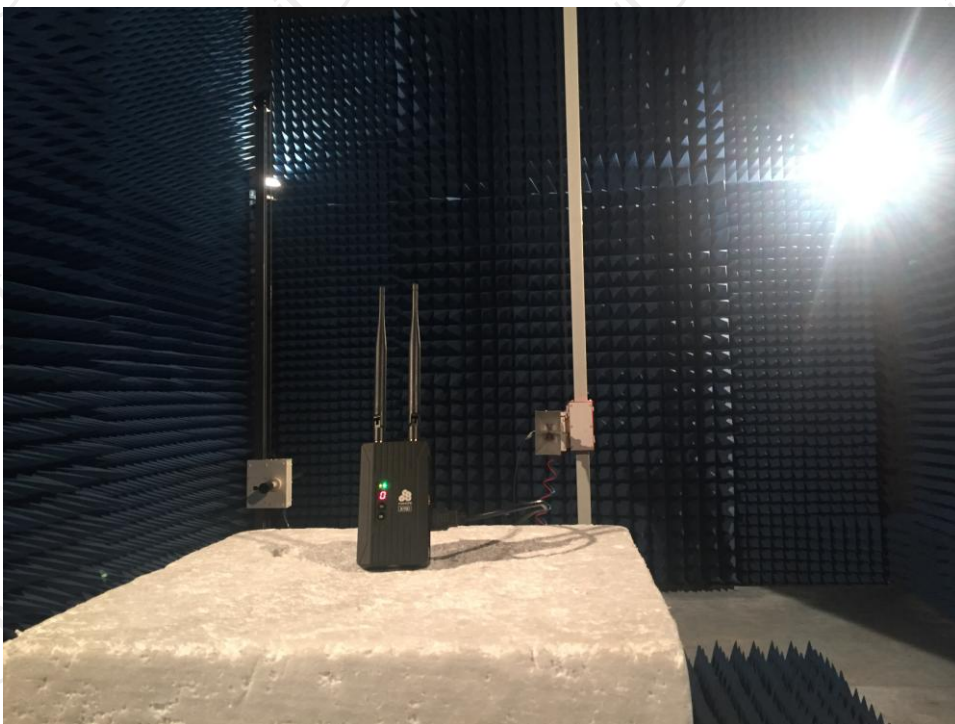
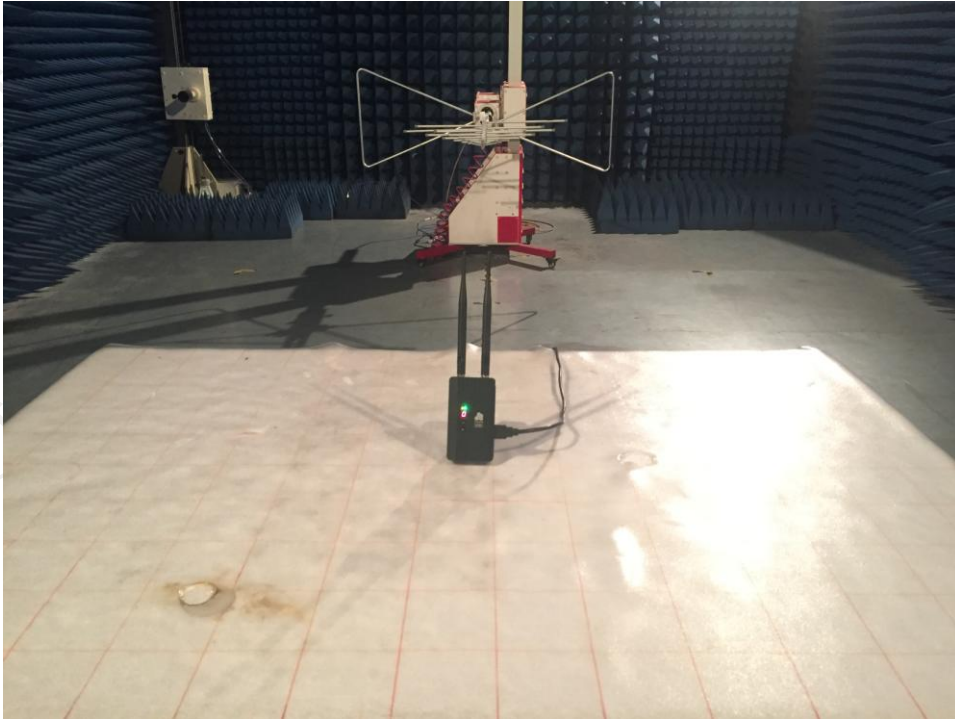
<b>Test Requirement:</b>	FCC Part15 Section 15.407(g) &Part2 J Section 2.1055
<b>Test Method:</b>	ANSI C63.10: 2013
<b>Limit:</b>	The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 45 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.
<b>Test Setup:</b>	<pre> graph LR     SA[Spectrum Analyzer] --- EUT[EUT]     subgraph TC [Temperature Chamber]         EUT     end     EUT --- P[AC/DC Power supply]     </pre>
<b>Test Procedure:</b>	The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage. b. Turn the EUT on and couple its output to a spectrum analyzer. c. Turn the EUT off and set the chamber to the highest temperature specified. d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature. f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
<b>Test Result:</b>	PASS
<b>Remark:</b>	Pre-scan was performed at Antenna 0 and Antenna 1, the worst case was found. Only the test data of Antenna 0 was shown in this report.

Test plots as follows:

Frequency(MHz): 5230				
Temperature (°C)	Voltage(V)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	7.4	5230.0087	8700	PASS
35		5230.0061	6100	PASS
25		5230.0065	6500	PASS
15		5230.0043	4300	PASS
5		5230.0038	3800	PASS
0		5230.0042	4200	PASS
20		7	5230.0037	3700
	7.4	5230.0040	4000	PASS
	8.51	5180.0075	7500	PASS

Frequency(MHz): 5785				
Temperature (°C)	Voltage(V)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	7.4	5785.0085	8500	PASS
35		5785.0053	5300	PASS
25		5785.0044	4400	PASS
15		5785.0040	4000	PASS
5		5785.0039	3900	PASS
0		5785.0032	3200	PASS
20		7	5785.0037	3700
	7.4	5785.0036	3600	PASS
	8.51	5180.0076	7600	PASS

**Appendix A: Photographs of Test Setup**  
Product: 150M Wireless Video Transmission System  
Model: X150  
Radiated Emission



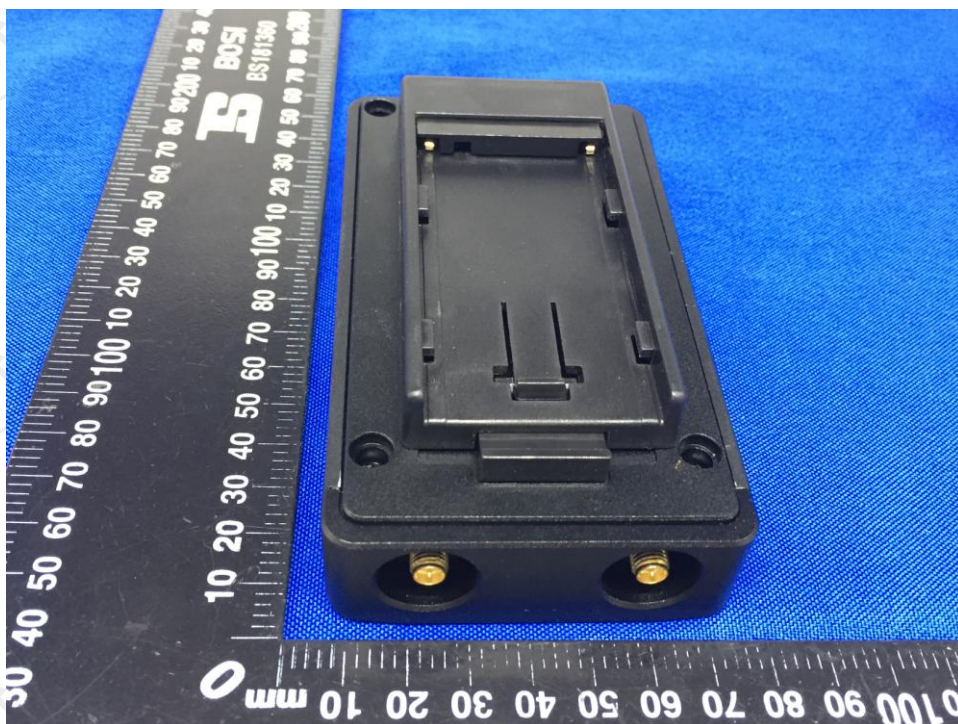
**Appendix B: Photographs of EUT**  
**Product: 150M Wireless Video Transmission System**  
**Model: X150**  
**External Photos**



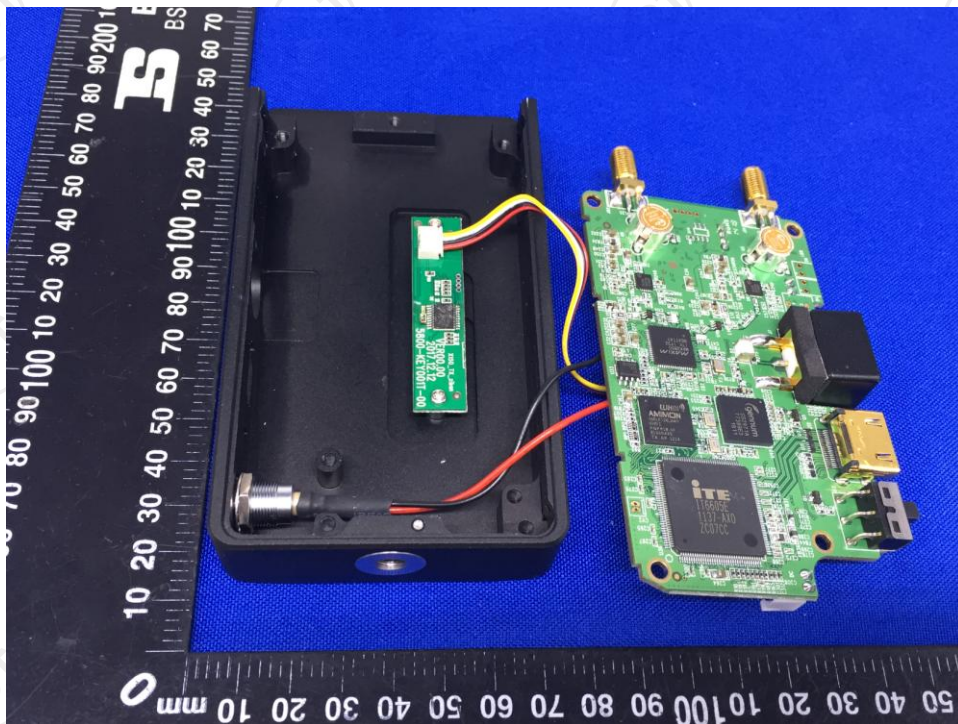
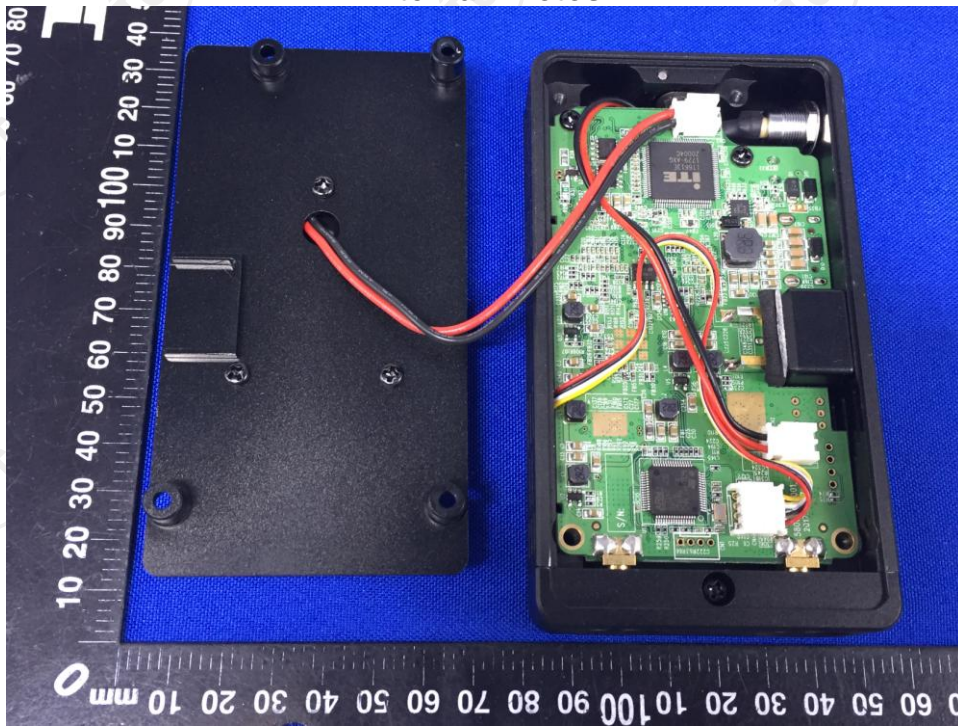


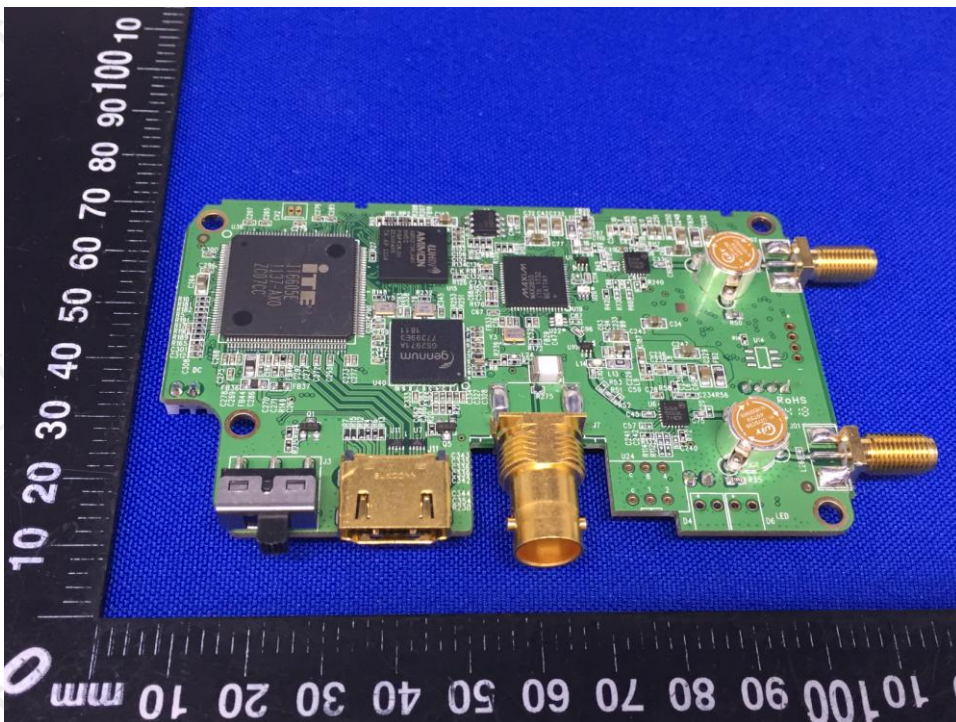
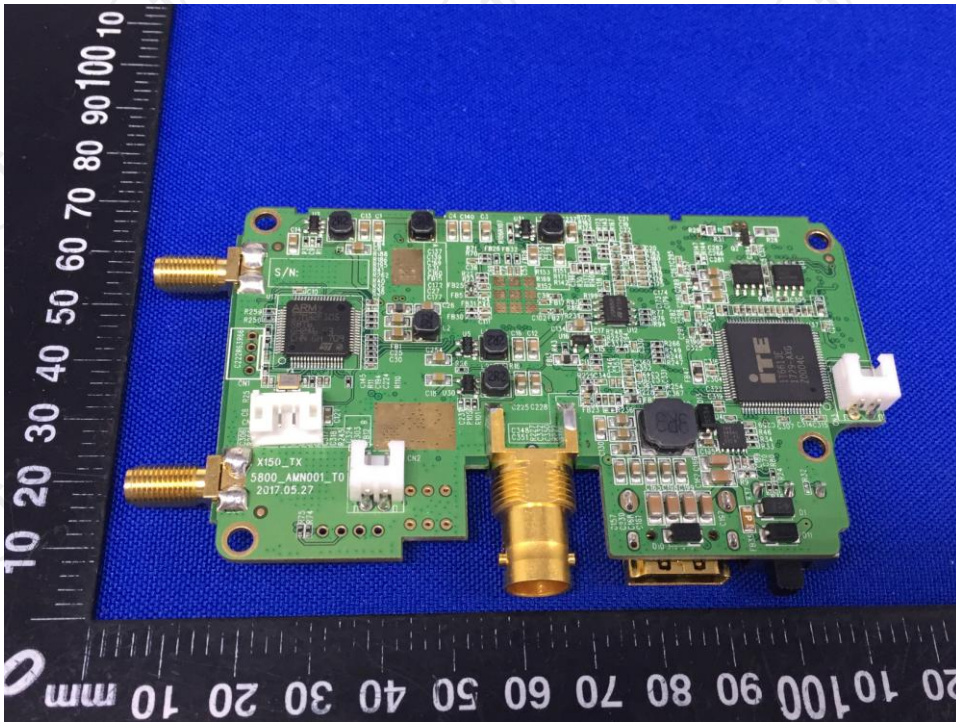


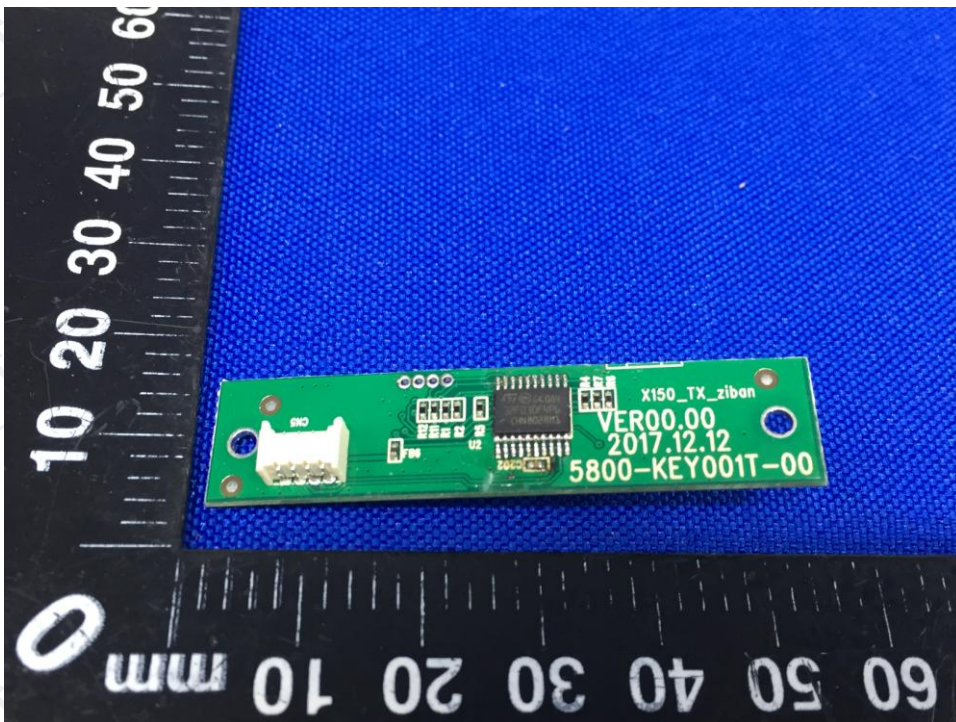
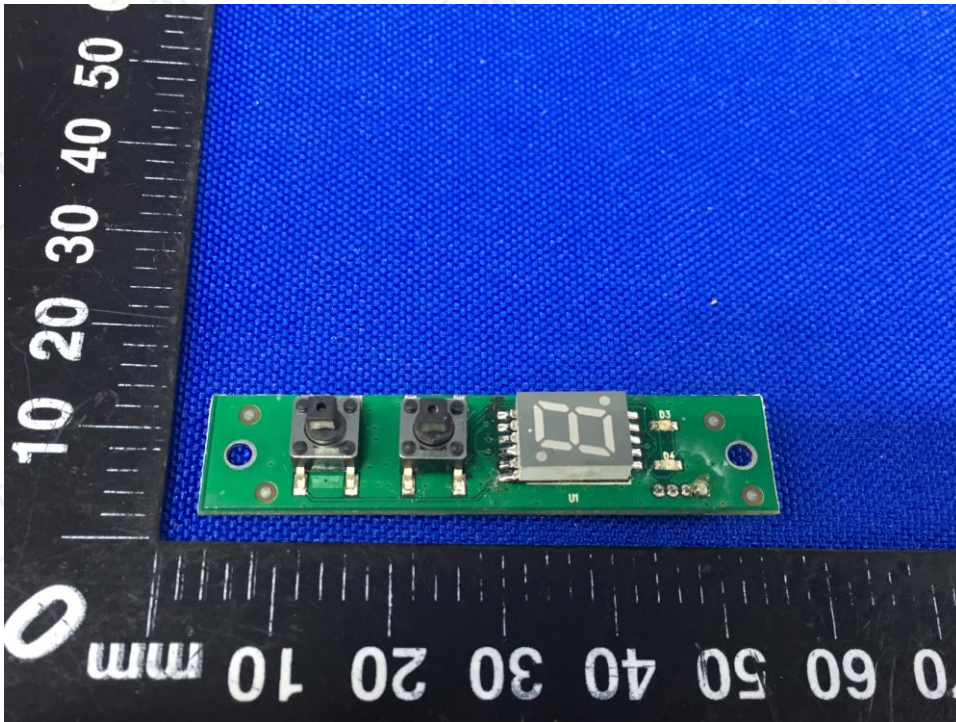




**Product: 150M Wireless Video Transmission System**  
**Model: X150**  
**Internal Photos**







\*\*\*\*\*END OF REPORT\*\*\*\*\*