



# FCC TEST REPORT

**Test report  
On Behalf of  
Sweam AB  
For  
Sweam  
Model No.: EN01-180515**

**FCC ID: 2AQJUN01-180515**

**Prepared for :** Sweam AB  
Kistagangen 12, SE-16440 Kista, Sweden

**Prepared By :** Shenzhen HUAKE Testing Technology Co., Ltd.  
1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street,  
Bao'an District, Shenzhen City, China

**Date of Test:** April 05, 2018 ~ June 27, 2018  
**Date of Report:** June 27, 2018  
**Report Number:** HK180619343-2E



## TEST RESULT CERTIFICATION

**Applicant's name** .....: Sweam AB  
Address .....: Kistagangen 12, SE-16440 Kista, Sweden  
**Manufacture's Name**.....: Sweam AB  
Address .....: Kistagangen 12, SE-16440 Kista, Sweden

### Product description

Trade Mark: Sweam  
Product name.....: Sweam  
Model and/or type reference .: EN01-180515  
**Standards** .....: FCC Rules and Regulations Part 15 Subpart C Section 15.407  
ANSI C63.10: 2013

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen HUAK Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen HUAK Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

**Date of Test** .....:  
Date (s) of performance of tests .....: April 05, 2018 ~ June 27, 2018  
Date of Issue.....: June 27, 2018  
Test Result.....: Pass

Testing Engineer : Gary Qian  
(Gary Qian)

Technical Manager : Eden Hu  
(Eden Hu)

Authorized Signatory : Jason Zhou  
(Jason Zhou)



## TABLE OF CONTENTS

<b>1. Test Result Summary .....</b>	<b>4</b>
1.1. TEST PROCEDURES AND RESULTS.....	4
1.2. TEST FACILITY .....	4
1.3. MEASUREMENT UNCERTAINTY .....	5
<b>2. EUT Description .....</b>	<b>6</b>
2.1. GENERAL DESCRIPTION OF EUT .....	6
2.2. OPERATION FREQUENCY EACH OF CHANNEL.....	7
2.3. OPERATION OF EUT DURING TESTING .....	7
2.4. DESCRIPTION OF TEST SETUP .....	8
<b>3. Genera Information .....</b>	<b>9</b>
3.1. TEST ENVIRONMENT AND MODE .....	9
3.2. DESCRIPTION OF SUPPORT UNITS .....	10
<b>4. Test Results and Measurement Data .....</b>	<b>11</b>
4.1. CONDUCTED EMISSION .....	11
4.2. MAXIMUM CONDUCTED OUTPUT POWER .....	15
4.3. 6dB EMISSION BANDWIDTH .....	18
4.4. 26dB BANDWIDTH AND 99% OCCUPIED BANDWIDTH.....	24
4.5. POWER SPECTRAL DENSITY .....	30
4.6. BAND EDGE.....	40
4.7. SPURIOUS EMISSION .....	55
4.8. REQUENCY STABILITY MEASUREMENT.....	65
4.9. ANTENNA REQUIREMENT .....	68
4.10. PHOTOGRAPHS OF TEST SETUP .....	69



# 1. Test Result Summary

## 1.1. TEST PROCEDURES AND RESULTS

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Maximum Conducted Output Power	§15.407(a) §2.1046	PASS
6dB Emission Bandwidth	§15.407(e)	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.

## 1.2. TEST FACILITY

Test Firm : Shenzhen HUAKE Testing Technology Co., Ltd.

Address : 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China



### 1.3. 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	$\pm 1.0\%$



## 2. EUT Description

### 2.1. GENERAL DESCRIPTION OF EUT

Equipment	Sweam
Model Name	EN01-180515
Serial No.	N/A
Trade Mark	N/A
Model Difference	N/A
FCC ID	<b>2AQJUN01-180515</b>
Operation Frequency:	802.11a/n 20:5180~5240 MHz; 5745~5825 MHz 802.11n 40: 5190~5230 MHz; 5755 MHz -5795 MHz
Channel Bandwidth:	802.11a/n 20:20MHz 802.11n 40: 40 MHz
Modulation Technology:	IEEE 802.11a/n20/n40
Modulation Type	CCK/OFDM/DBPSK/DAPSK
Antenna Type	Internal Antenna
Antenna Gain	2dBi
Power Source	DC 3.7V From Battery; DC5V/3A or DC9V/2A or DC12V/1.5A From Type-C
Power Supply:	DC 3.7V From Battery; DC5V/3A or DC9V/2A or DC12V/1.5A From Type-C



## 2.2. Operation Frequency each of channel

20MHz		40MHz	
Channel	Frequency	Channel	Frequency
36	5180	38	5190
40	5200	46	5230
44	5220	151	5755
48	5240	159	5790
149	5745		
153	5765		
157	5785		
161	5805		
165	5825		

**Note:**

*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:*

## 2.3. Operation of EUT during testing

### For 802.11a/n (HT20)

Band I (5150 - 5250 MHz)			Band IV (5725 - 5850 MHz)		
Channel Number	Channel	Frequency (MHz)	Channel Number	Channel	Frequency (MHz)
36	Low	5180	149	Low	5745
40	Mid	5200	157	Mid	5785
48	High	5240	165	High	5825

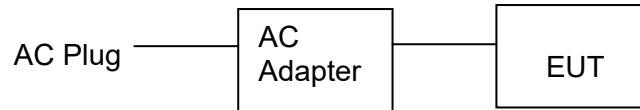
### For 802.11n (HT40)

Band I (5150 - 5250 MHz)			Band IV (5725 - 5850 MHz)		
Channel Number	Channel	Frequency (MHz)	Channel Number	Channel	Frequency (MHz)
38	Low	5190	151	Low	5755
46	High	5230	159	High	5795



## 2.4. DESCRIPTION OF TEST SETUP

Operation of EUT during conducted and during Radiation testing:



Operation of EUT Above 1GHz Radiation testing:



- Adapter information

Model: KA1803A-EU

Input: 100-240V~, 50/60Hz, 0.5A MAX

Output: 5VDC, 3.0A or 9VDC, 2A or 12VDC, 1.5A





### 3. Genera Information

#### 3.1. 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>	

<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:</p>	
Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.	
Mode	Data rate
802.11a	6 Mbps
802.11n(HT20)	MCS0
802.11n(HT40)	MCS0
Final Test Mode:	
Operation mode:	Keep the EUT in continuous transmitting with modulation



### 3.2. 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
/	/	/	/	/

**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.*



## 4. Test Results and Measurement Data

### 4.1. Conducted Emission

#### 4.1.1. 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 style="text-align: center;">Reference Plane</p> <p style="text-align: center;">40cm 80cm</p> <p style="text-align: center;">E.U.T AC power LISN Filter AC power</p> <p style="text-align: center;">EMI Receiver</p> <p style="text-align: center;">Test table/Insulation plane</p> <p><i>Remark:</i>  <i>E.U.T: Equipment Under Test</i>  <i>LISN: Line Impedance Stabilization Network</i>  <i>Test table height=0.8m</i></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>	PASS														



#### 4.1.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Receiver	R&S	ESCI 7	HKE-010	Sep. 27, 2018
LISN	R&S	ENV216	HKE-002	Sep. 27, 2018
Coax cable (9KHz-30MHz)	Times	381806-002	N/A	Sep. 27, 2018
Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	N/A

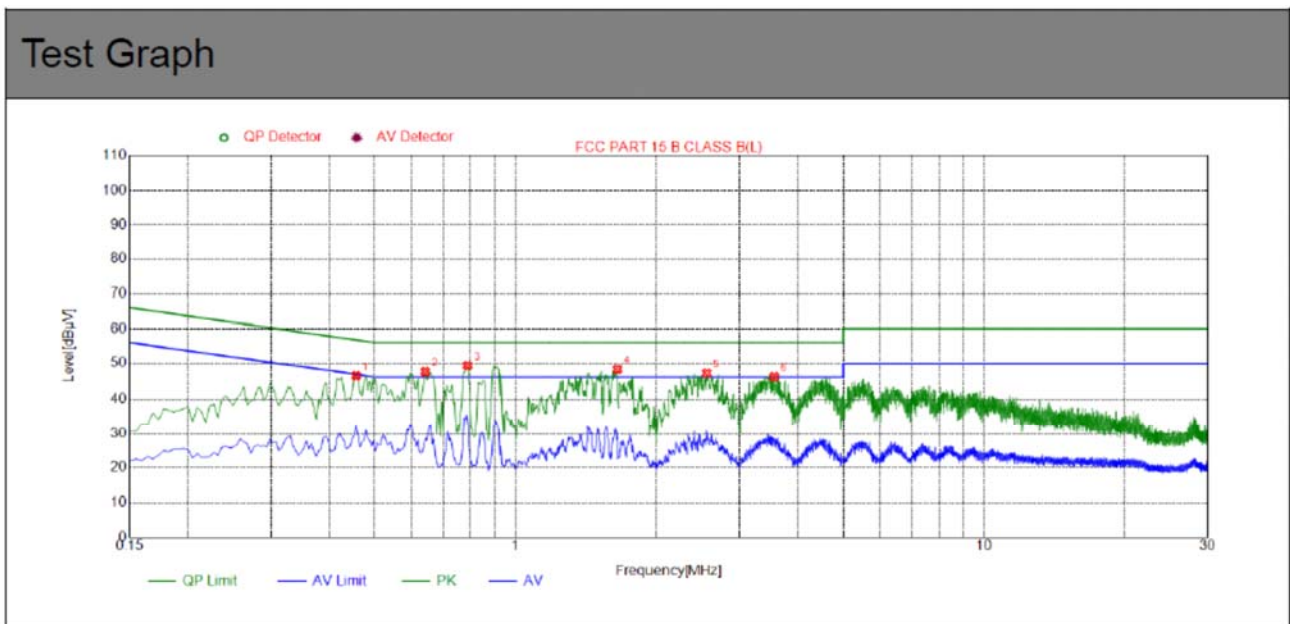
**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



### 4.1.3. Test data

Remark: We tested three Channels in AC 120V/60Hz and AC 230V/50Hz, the worst case was recorded.

Please refer to following diagram for individual  
Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



### Suspected List

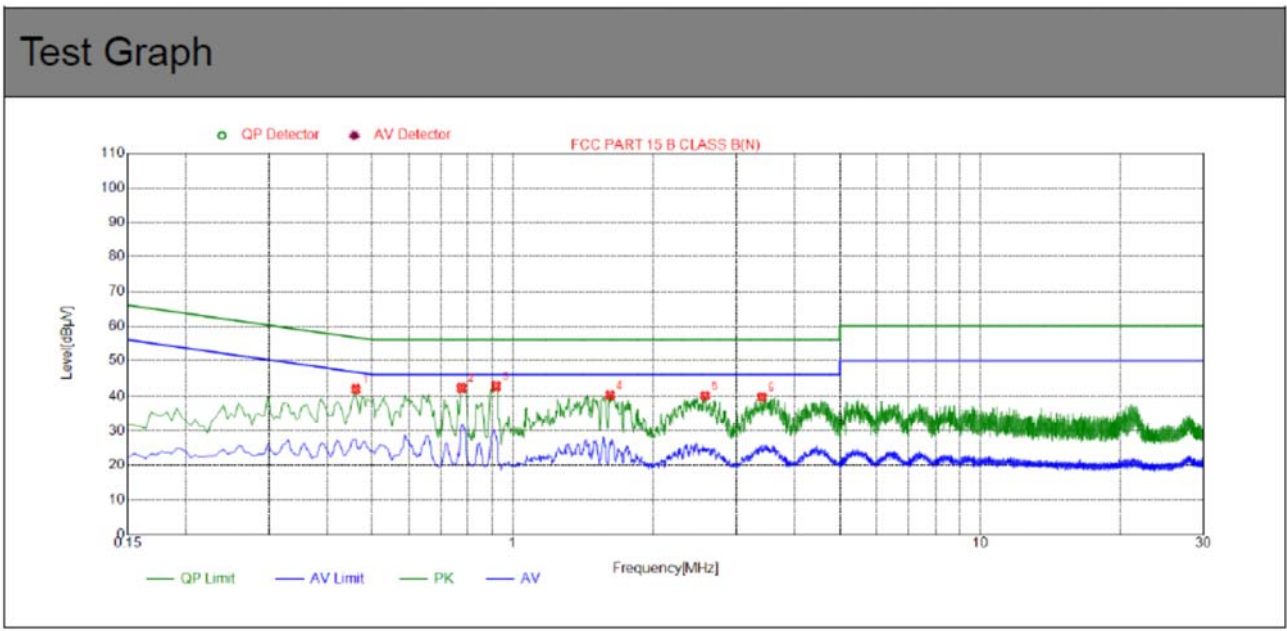
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector
1	0.4560	46.35	10.04	56.92	10.57	PK
2	0.6405	47.53	10.05	56.00	8.47	PK
3	0.7890	49.32	10.05	56.00	6.68	PK
4	1.6485	48.22	10.12	56.00	7.78	PK
5	2.5575	47.12	10.20	56.00	8.88	PK
6	3.5610	46.06	10.25	56.00	9.94	PK

### Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.



Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



Suspected List

NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector
1	0.4605	41.98	10.04	56.92	14.94	PK
2	0.7755	42.33	10.05	56.00	13.67	PK
3	0.9195	42.82	10.06	56.00	13.18	PK
4	1.6125	40.47	10.11	56.00	15.53	PK
5	2.5755	40.28	10.20	56.00	15.72	PK
6	3.4080	39.91	10.24	56.00	16.09	PK

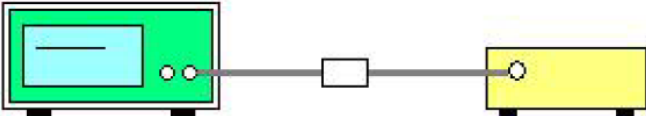
Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.



## 4.2. Maximum Conducted Output Power

### 4.2.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 E Section 15.407(a)& Part 2 J Section 2.1046						
<b>Test Method:</b>	KDB789033 D02 General UNII Test Procedures New Rules v02.r01 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>250mW for client devices</td> </tr> <tr> <td>5725-5850</td> <td>1 W</td> </tr> </tbody> </table>	Frequency Band (MHz)	Limit	5150-5250	250mW for client devices	5725-5850	1 W
	Frequency Band (MHz)	Limit					
	5150-5250	250mW for client devices					
5725-5850	1 W						
<b>Test Setup:</b>	 <p>The diagram illustrates the test setup. On the left is a green box labeled 'Power meter'. A cable connects it to a small white box labeled 'Attenuator'. Another cable connects the attenuator to a yellow box labeled 'EUT' (Equipment Under Test).</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 KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section E, 3, a</li> <li>2. The RF output of EUT was connected to the power meter 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>5. Measure the conducted output power and record the results in the test report.</li> </ol>						
<b>Test Result:</b>	PASS						
<b>Remark:</b>	<p>Conducted output power= measurement power +10log(1/x) X is duty cycle=1, so 10log(1/1)=0</p> <p>Conducted output power= measurement power</p>						



#### 4.2.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Sep. 27, 2018
Power meter	Agilent	E4419B	HKE-085	Sep. 27, 2018
Power Sensor	Agilent	E9300A	HKE-086	Sep. 27, 2018
RF cable	Times	1-40G	HKE-034	Sep. 27, 2018
RF automatic control unit	Tonscend	JS0806-2	HKE-060	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).





#### 4.2.3. Test Data

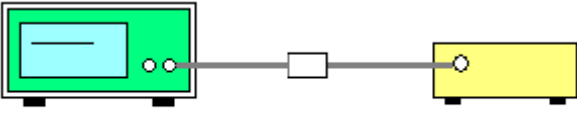
<b>Configuration Band I (5150 - 5250 MHz )</b>				
Mode	Test channel	Maximum Conducted Output Power (dBm)	FCC Limit (dBm)	Result
11a	CH36	16.24	24	PASS
11a	CH40	16.39	24	PASS
11a	CH48	16.11	24	PASS
11n(HT20)	CH36	15.87	24	PASS
11n(HT20)	CH40	15.62	24	PASS
11n(HT20)	CH48	15.74	24	PASS
11n(HT40)	CH38	15.35	24	PASS
11n(HT40)	CH46	15.26	24	PASS

<b>Configuration Band IV (5725 - 5850 MHz )</b>				
Mode	Test channel	Maximum Conducted Output Power (dBm)	FCC Limit (dBm)	Result
11a	CH149	16.31	30	PASS
11a	CH157	16.08	30	PASS
11a	CH165	16.24	30	PASS
11n (HT20)	CH149	15.87	30	PASS
11n (HT20)	CH157	15.66	30	PASS
11n (HT20)	CH165	15.52	30	PASS
11n (HT40)	CH151	15.47	30	PASS
11n (HT40)	CH159	15.33	30	PASS



### 4.3. 6dB Emission Bandwidth

#### 4.3.1. Test Specification

<b>Test Requirement:</b>	FCC CFR47 Part 15 Section 15.407(e)& Part 2 J Section 2.1049
<b>Test Method:</b>	KDB789033 D02 General UNII Test Procedures New Rules v02r01 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 v02r01 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

#### 4.3.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Sep. 27, 2018
RF cable	Times	1-40G	HKE-034	Sep. 27, 2018
RF automatic control unit	Tonscend	JS0806-2	HKE-060	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).



#### 4.3.3. Test data

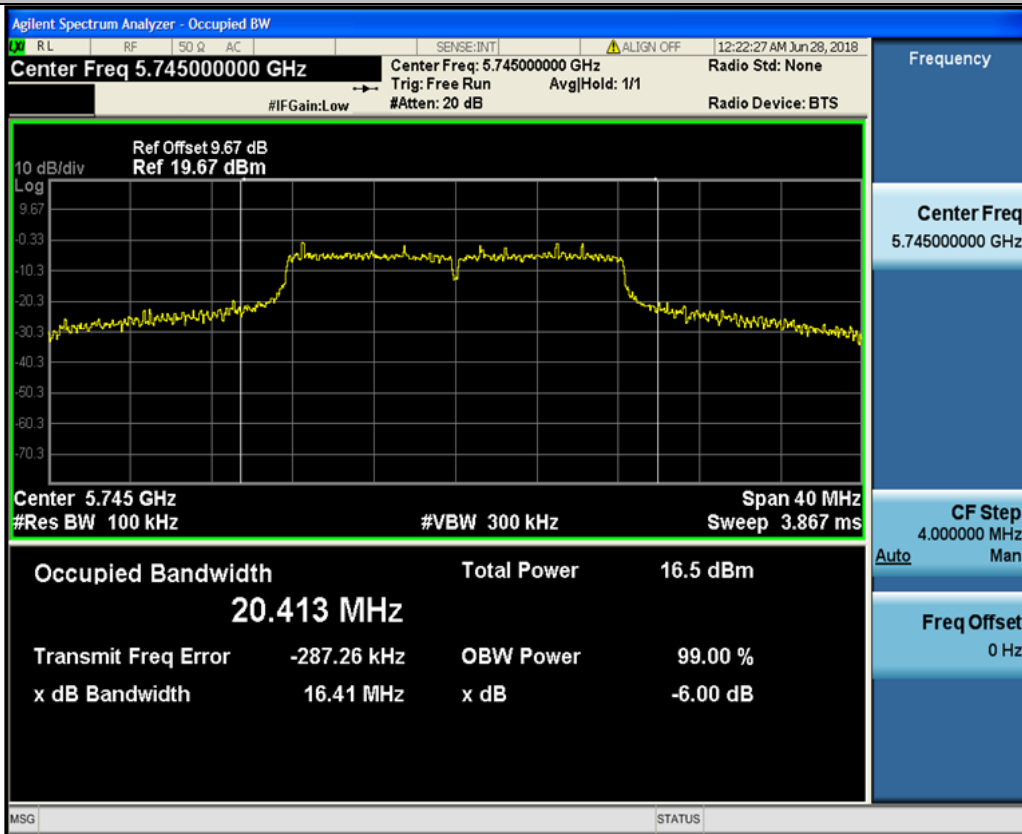
<b>Band IV (5725 - 5850 MHz )</b>					
Mode	Test channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
11a	CH149	5745	16.41	0.5	PASS
11a	CH157	5785	16.39	0.5	PASS
11a	CH161	5825	16.38	0.5	PASS
11n(HT20)	CH149	5745	17.60	0.5	PASS
11n(HT20)	CH157	5785	17.61	0.5	PASS
11n(HT20)	CH161	5825	17.64	0.5	PASS
11n(HT40)	CH151	5755	35.25	0.5	PASS
11n(HT40)	CH159	5795	35.28	0.5	PASS

Test plots as follows:

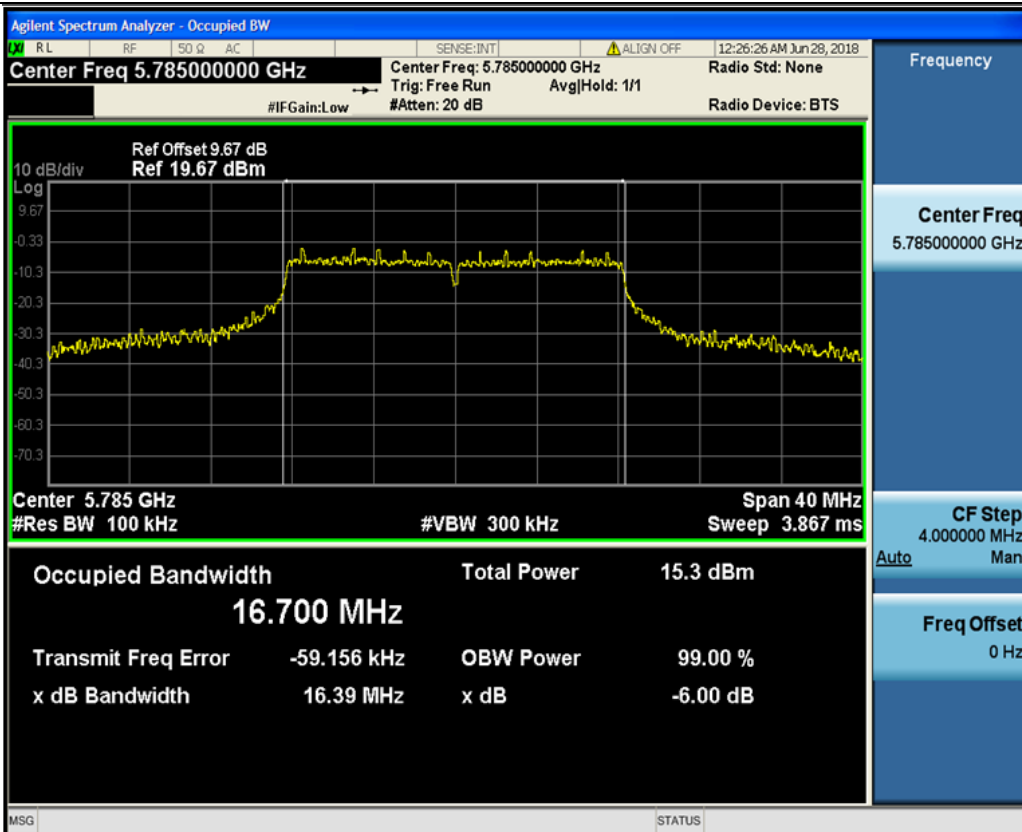


Band IV (5725 – 5850 MHz)

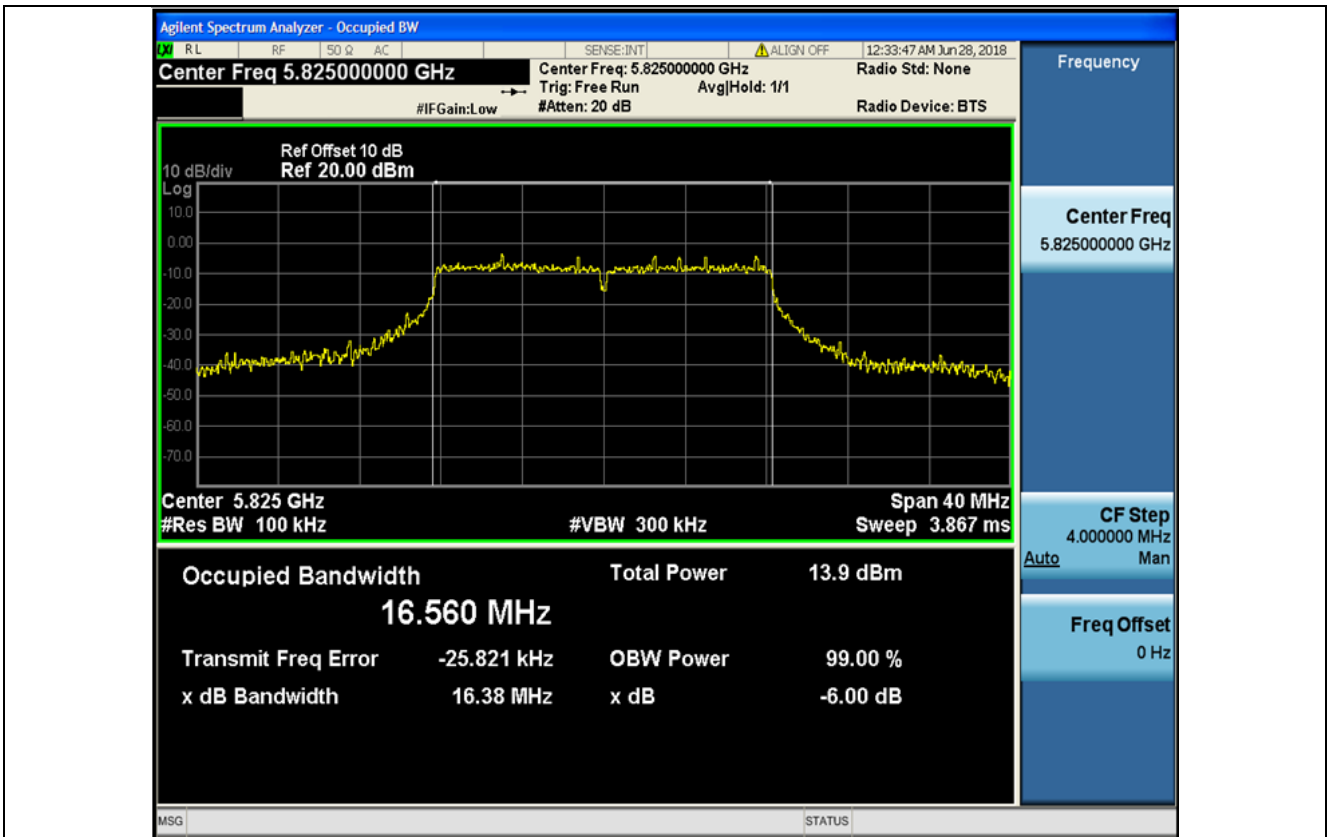
802.11a



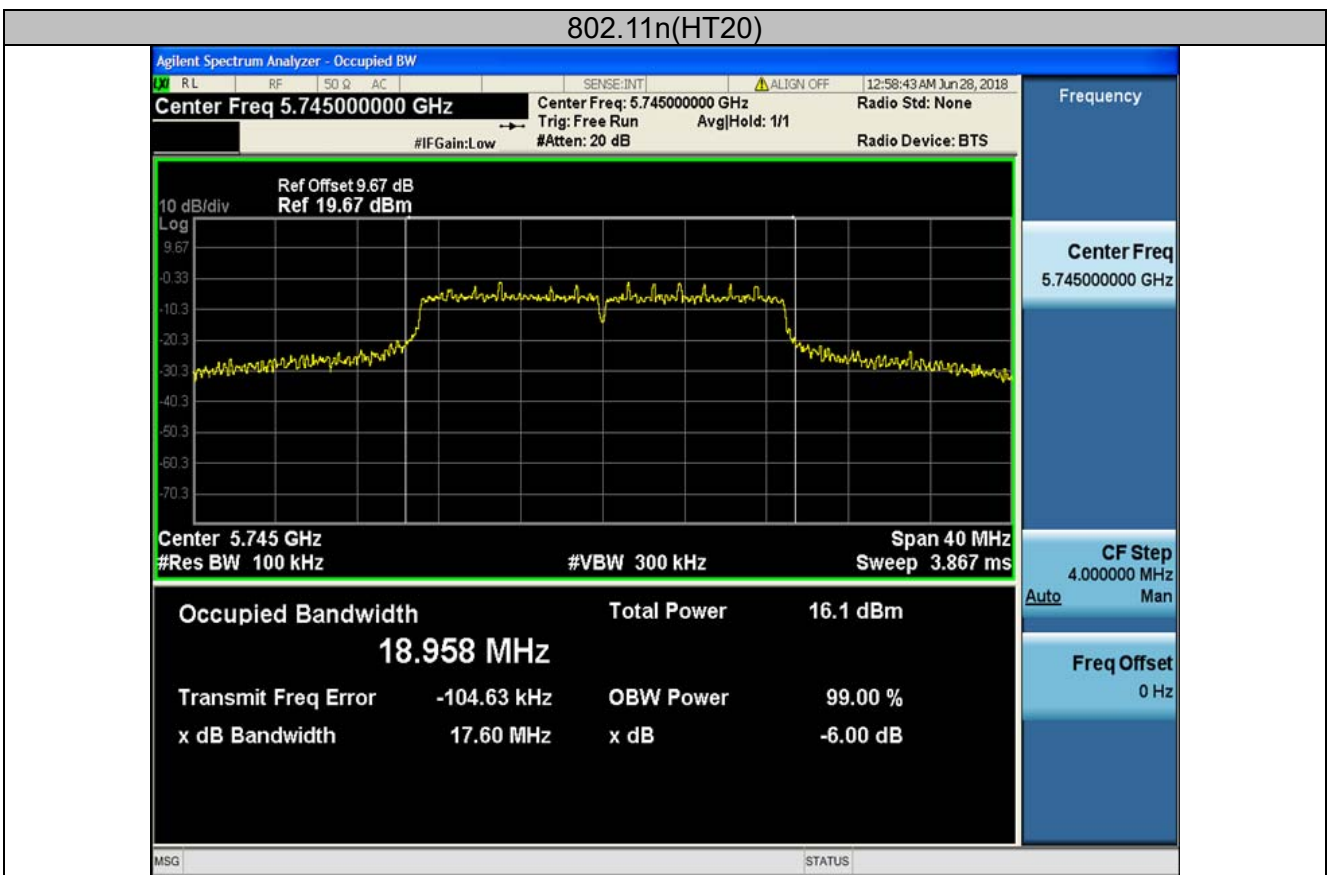
Low



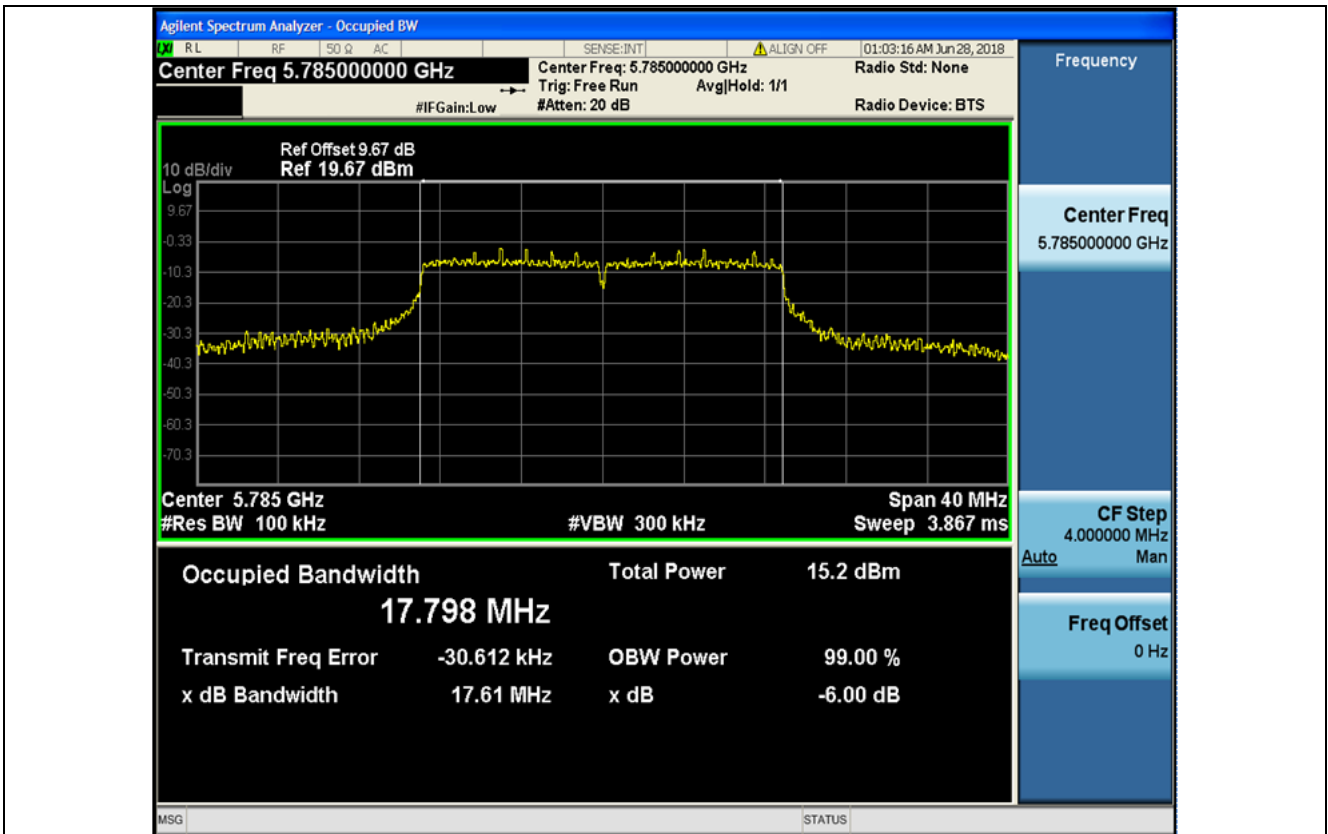
Mid



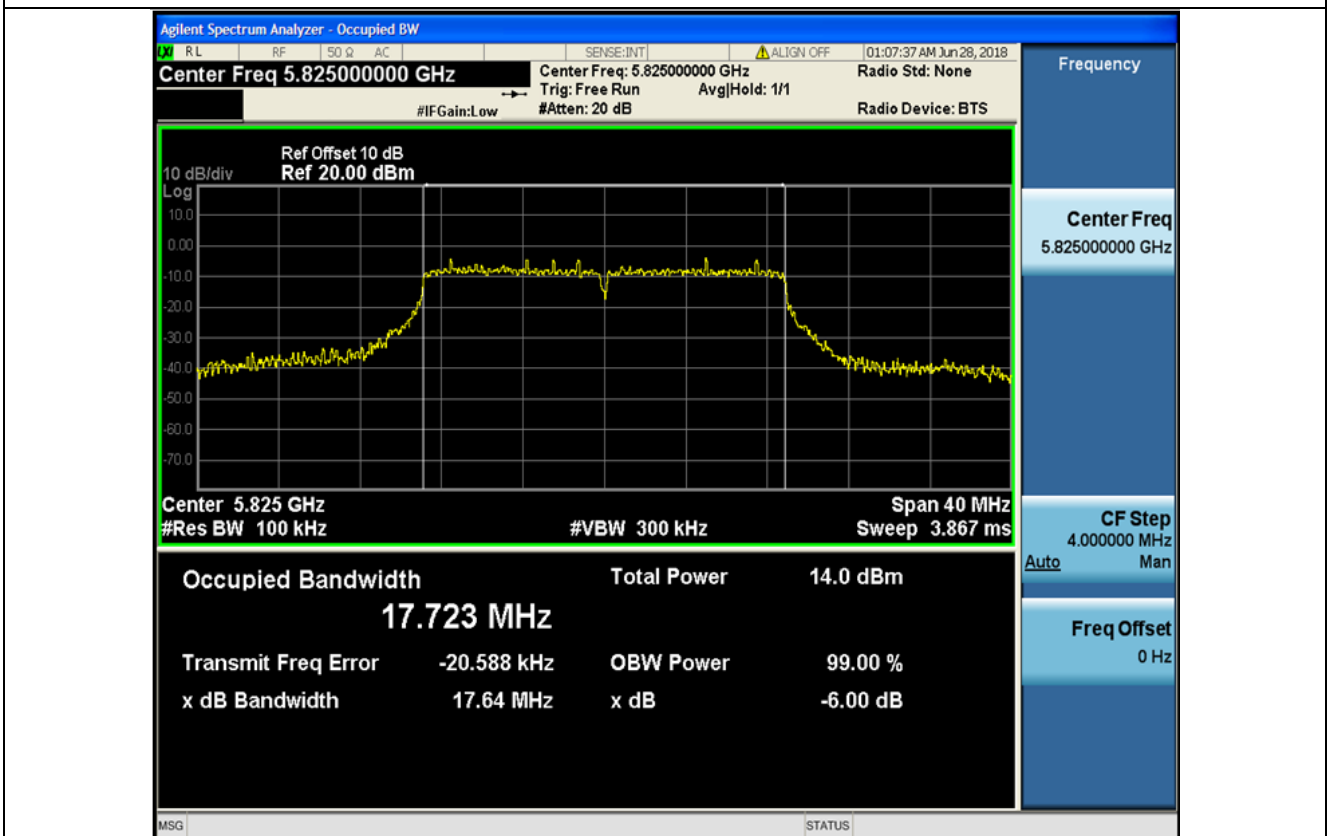
High



Low



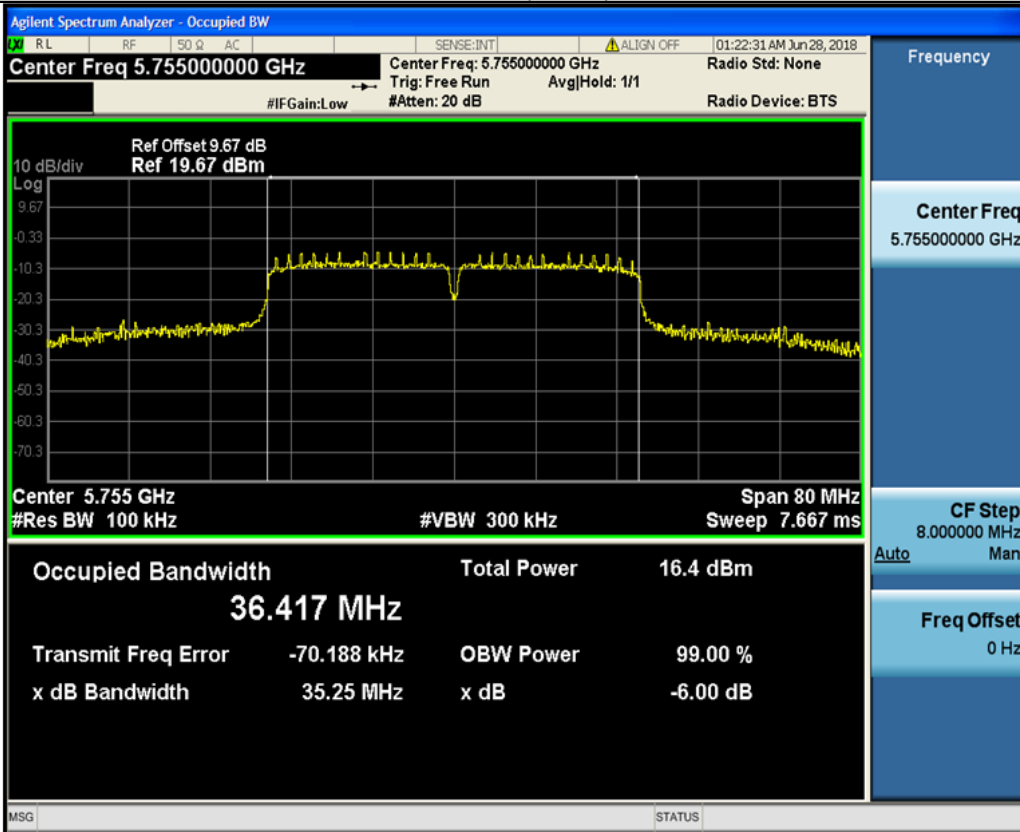
Mid



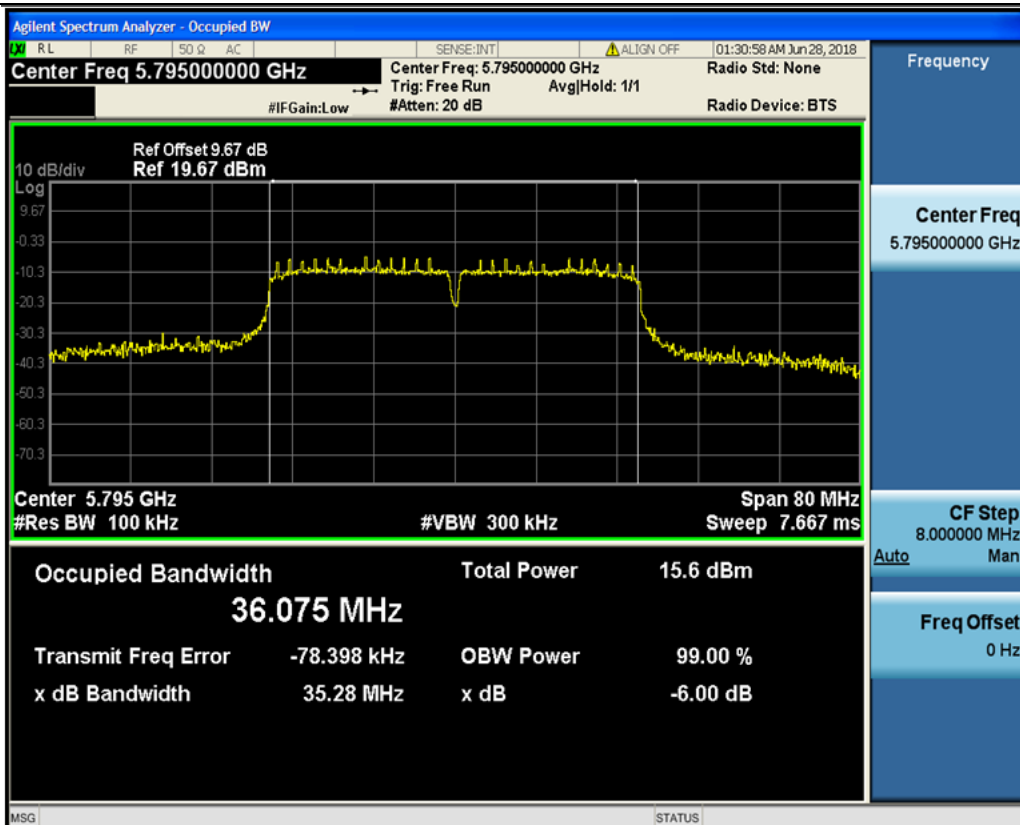
High



### 802.11n(HT40)



Low




High



#### 4.4. 26dB Bandwidth and 99% Occupied Bandwidth

##### 4.4.1. Test Specification

<b>Test Requirement:</b>	47 CFR Part 15C Section 15.407 (a)& Part 2 J Section 2.1049
<b>Test Method:</b>	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C
<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 v02r01 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 <math>RBW = 1\% EBW</math>, <math>VBW \geq 3RBW</math>, 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

##### 4.4.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Sep. 27, 2018
RF cable	Times	1-40G	HKE-034	Sep. 27, 2018
RF automatic control unit	Tonscend	JS0806-2	HKE-060	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).





#### 4.4.3. Test data

##### Band I

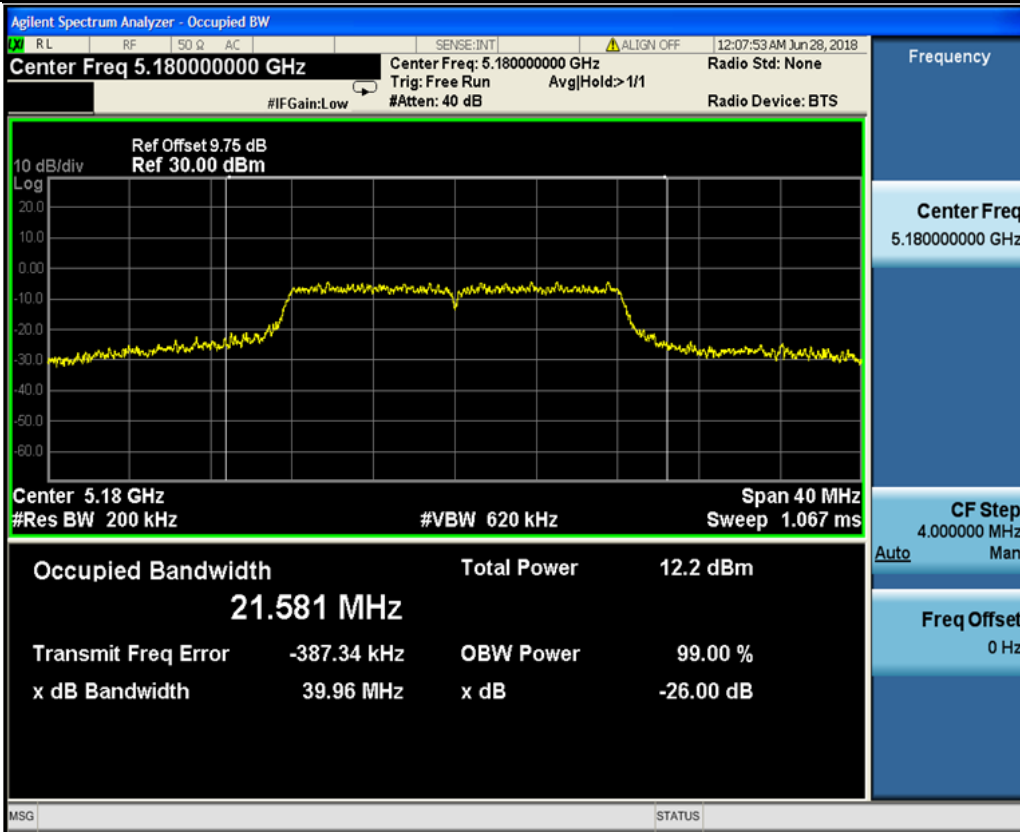
Mode	Test channel	Frequency (MHz)	26 dB Bandwidth (MHz)	Verdict
11a	CH36	5180	39.96	PASS
11a	CH40	5200	39.59	PASS
11a	CH48	5240	39.30	PASS
11n(HT20)	CH36	5180	40.00	PASS
11n(HT20)	CH40	5200	39.70	PASS
11n(HT20)	CH48	5240	39.04	PASS
11n(HT40)	CH38	5190	79.24	PASS
11n(HT40)	CH46	5230	77.66	PASS

Test plots as follows:

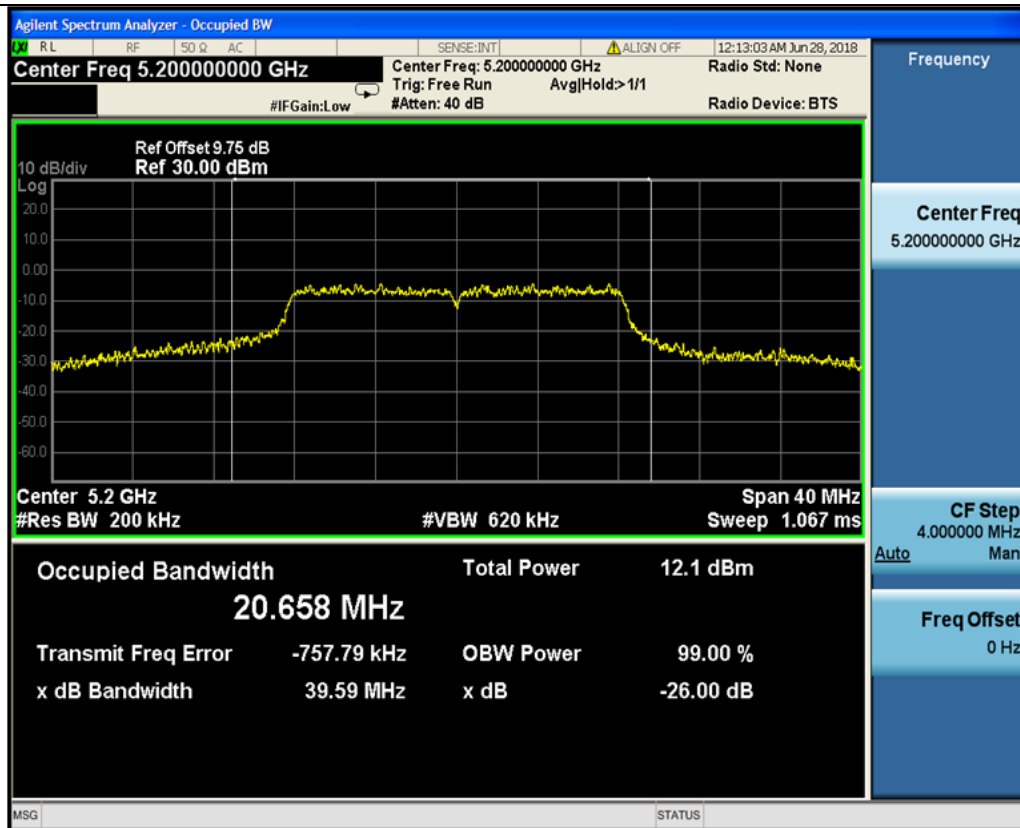


Band I (5150 – 5250 MHz)

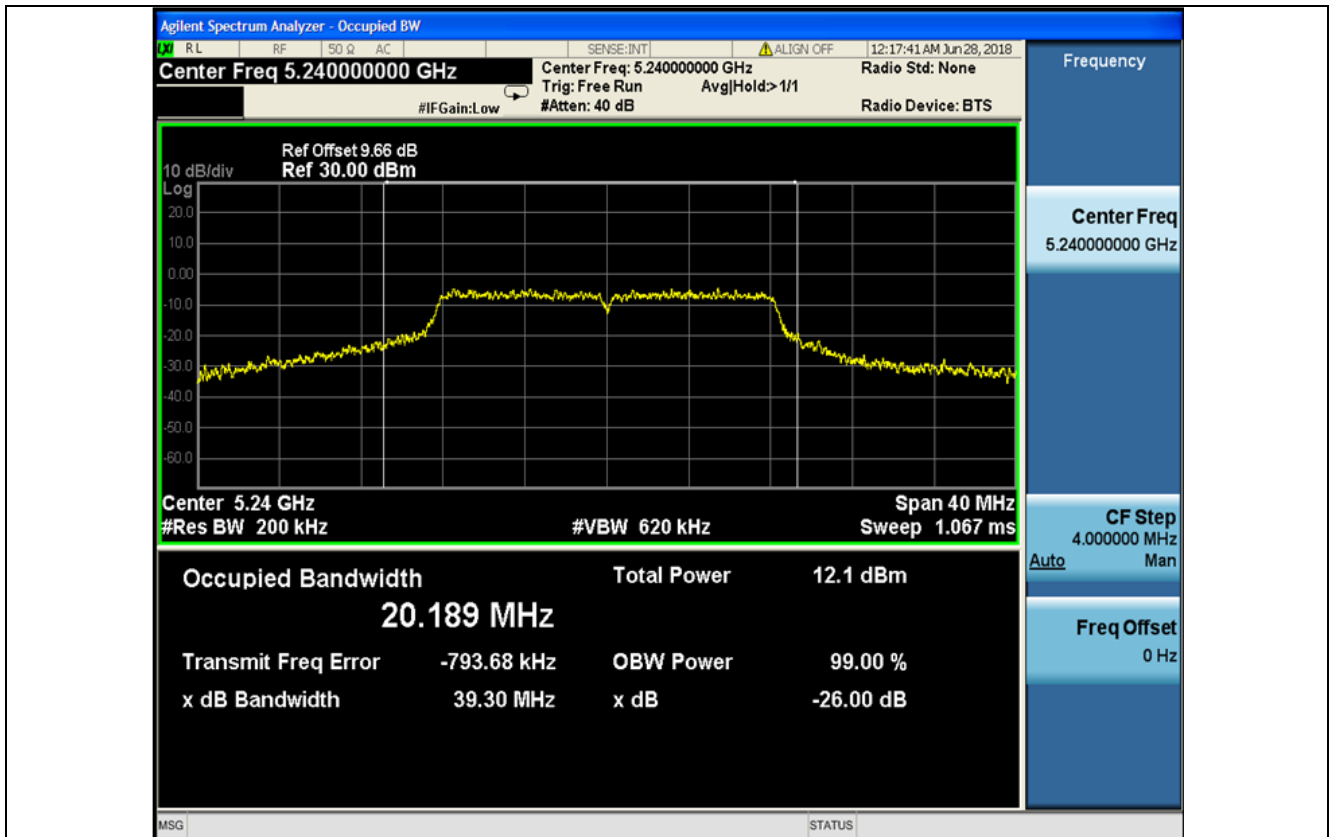
802.11a



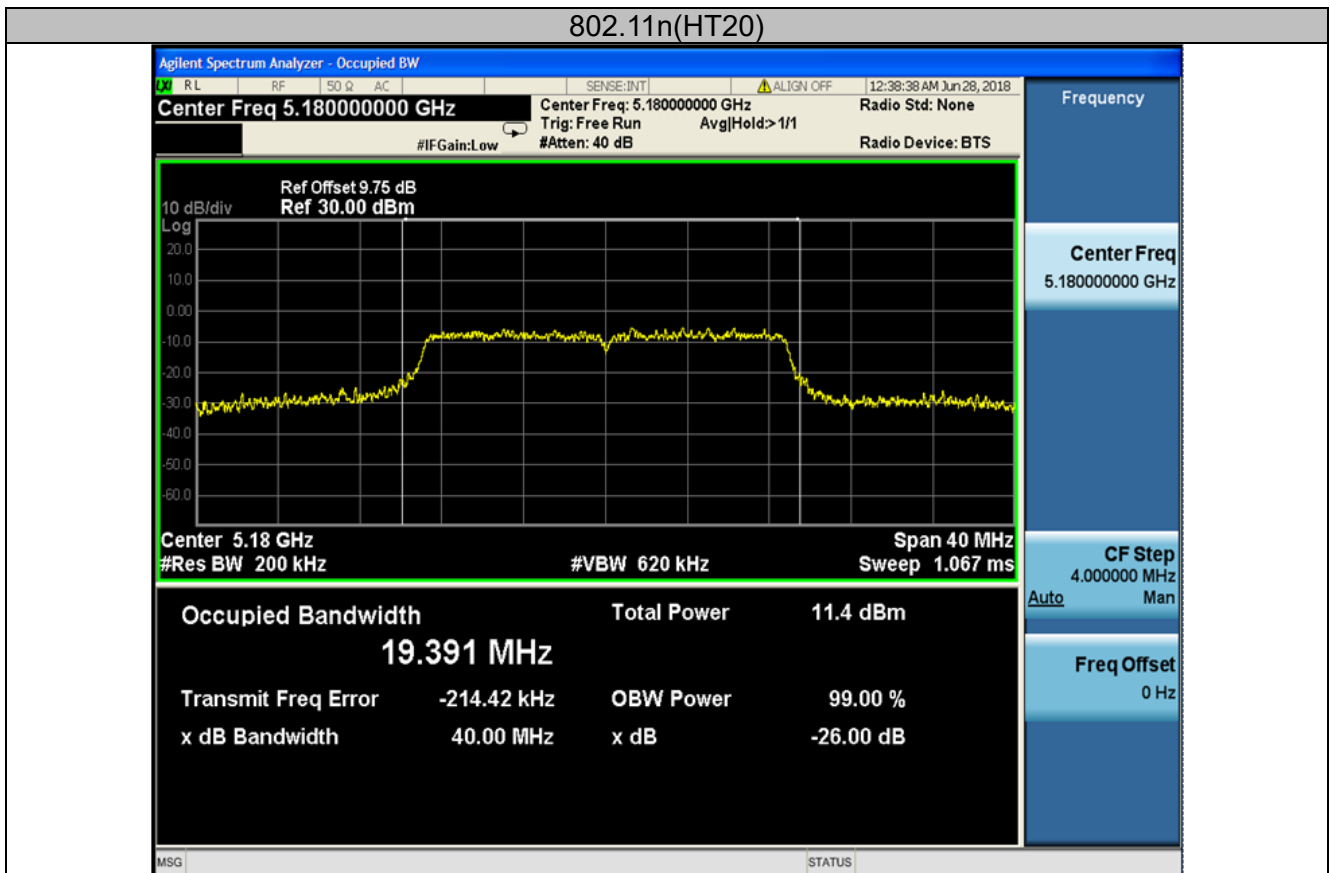
Low



Mid



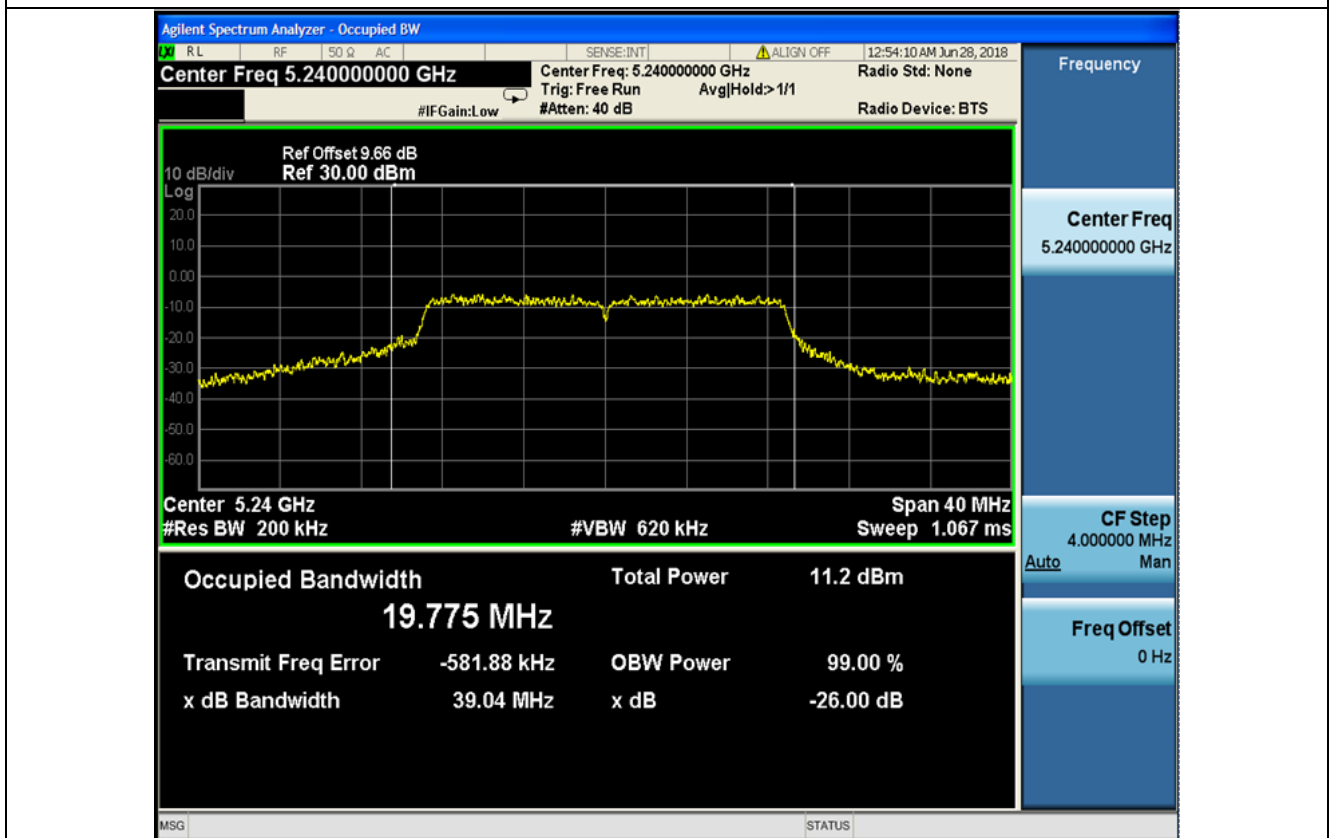
High



Low



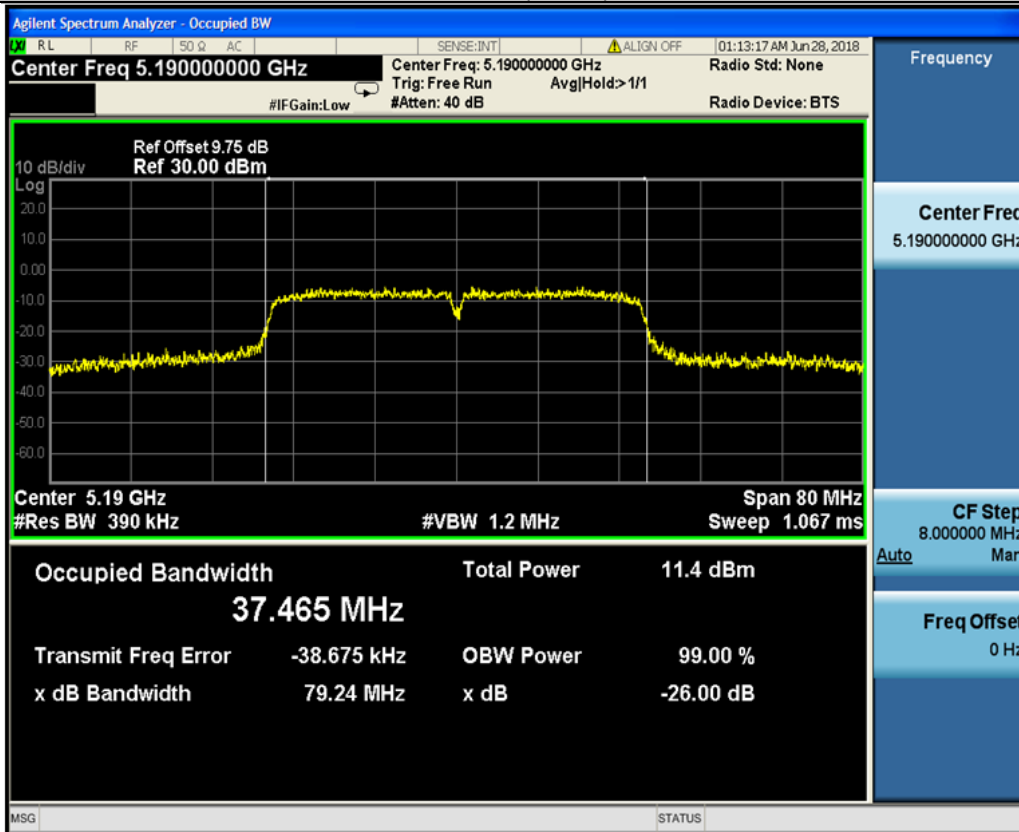
Mid



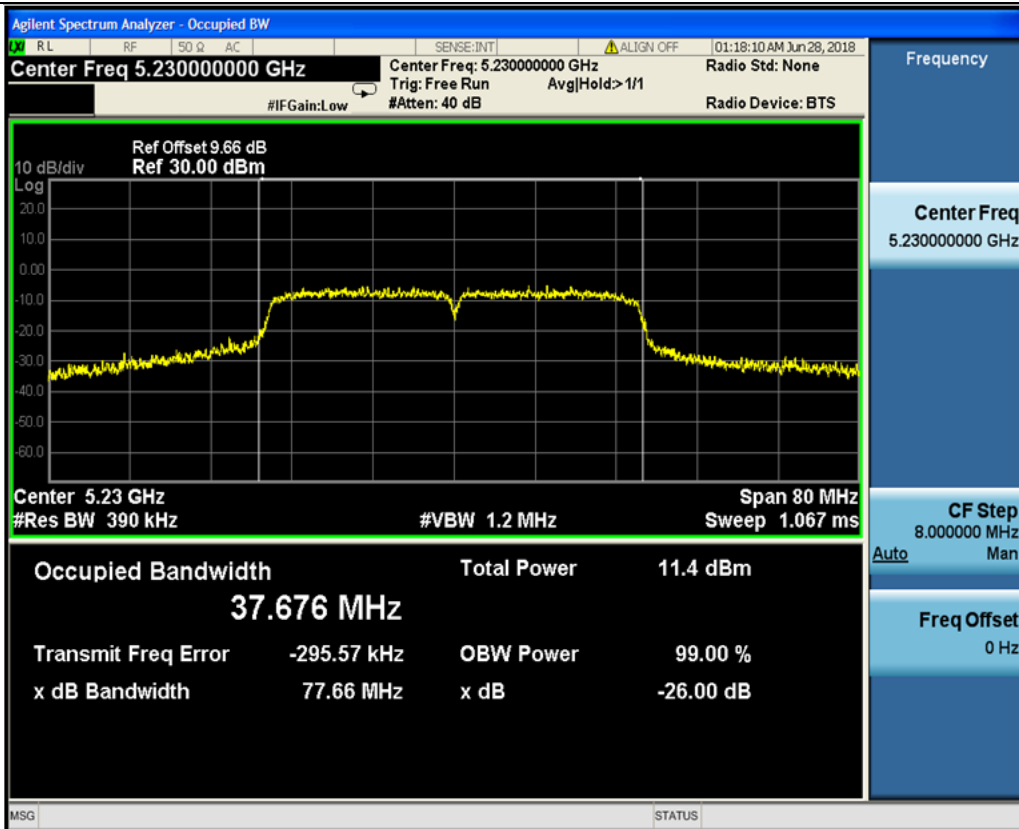
High



### 802.11n(HT40)



Low

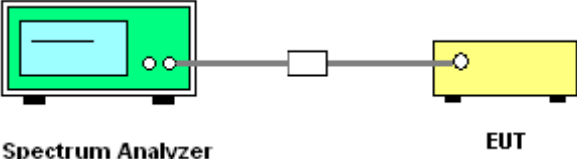


High



### 4.5. Power Spectral Density

#### 4.5.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 E Section 15.407 (a)
<b>Test Method:</b>	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section F
<b>Limit:</b>	$\leq 11.00\text{dBm/MHz}$ for Band I 5150MHz-5250MHz $\leq 30.00\text{dBm}/500\text{KHz}$ for Band IV 5725MHz-5850MHz The e.i,r,p spectral density for Band I 5150MHz – 5250 MHz should not exceed 10dBm/MHz
<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>	1. Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth. 1. Set RBW = 510 kHz/1 MHz, VBW $\geq 3$ *RBW, Sweep time = Auto, Detector = RMS. 2. Allow the sweeps to continue until the trace stabilizes. 3. Use the peak marker function to determine the maximum amplitude level. 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.
<b>Test Result:</b>	PASS

#### 4.5.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Sep. 27, 2018
RF cable	Times	1-40G	HKE-034	Sep. 27, 2018
RF automatic control unit	Tonscend	JS0806-2	HKE-060	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).



#### 4.5.3. Test data

Configuration Band I (5150 - 5250 MHz )						
Mode	Test channel	Level [dBm/MHz]	10log(1/x) Factor [dB]	Power Spectral Density	Limit (dBm/MHz)	Result
11a	CH36	2.66	0	0.19	11	PASS
11a	CH40	2.12	0	0.38	11	PASS
11a	CH48	2.19	0	0.62	11	PASS
11n(HT20)	CH36	2.72	0	-0.30	11	PASS
11n(HT20)	CH40	1.98	0	-0.53	11	PASS
11n(HT20)	CH48	1.25	0	0.32	11	PASS
11n(HT40)	CH38	-0.47	0	-3.40	11	PASS
11n(HT40)	CH46	-0.98	0	-3.48	11	PASS

Configuration Band IV (5725 - 5850 MHz )						
Mode	Test channel	Level [dBm/500kHz]	10log(1/x) Factor[dB]	Power Spectral Density	Limit (dBm/500kHz)	Result
11a	CH149	0.42	0	2.13	30	PASS
11a	CH157	-0.11	0	1.00	30	PASS
11a	CH161	-0.41	0	-0.45	30	PASS
11n(HT20)	CH149	0.31	0	2.49	30	PASS
11n(HT20)	CH157	-0.69	0	1.43	30	PASS
11n(HT20)	CH161	-1.49	0	-0.13	30	PASS
11n(HT40)	CH151	-2.56	0	-1.53	30	PASS
11n(HT40)	CH159	-2.76	0	-2.24	30	PASS

Test plots as follows:

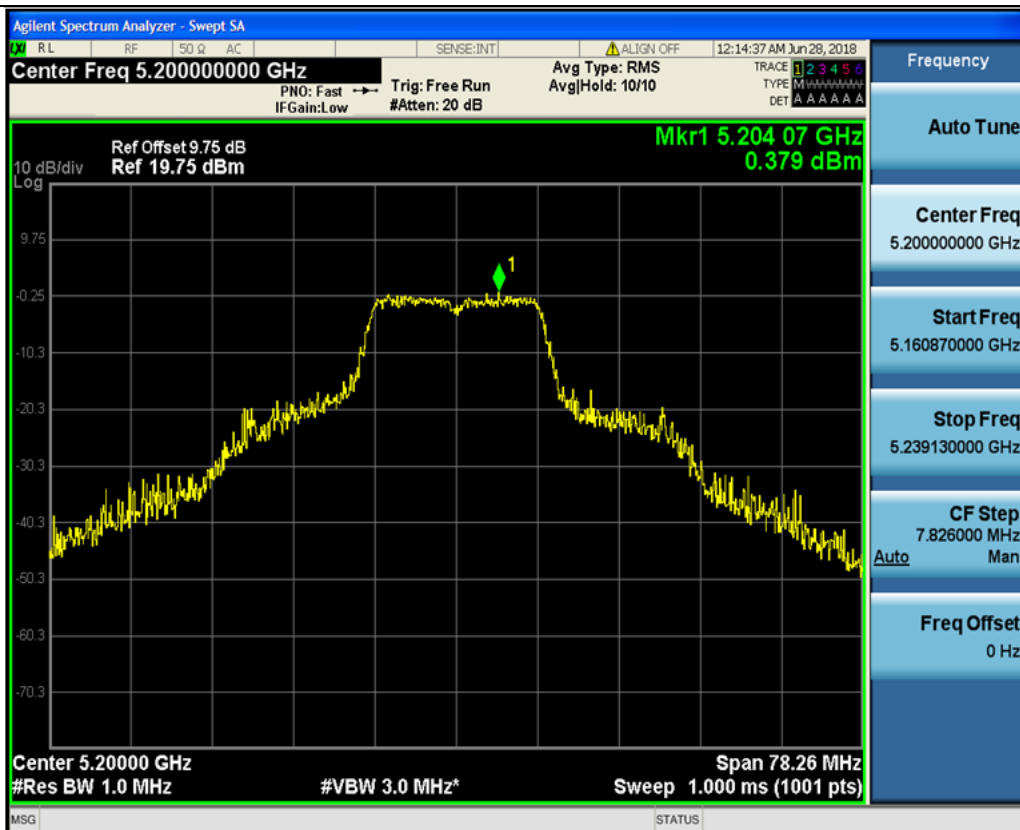


Band I (5150 – 5250 MHz)

802.11a

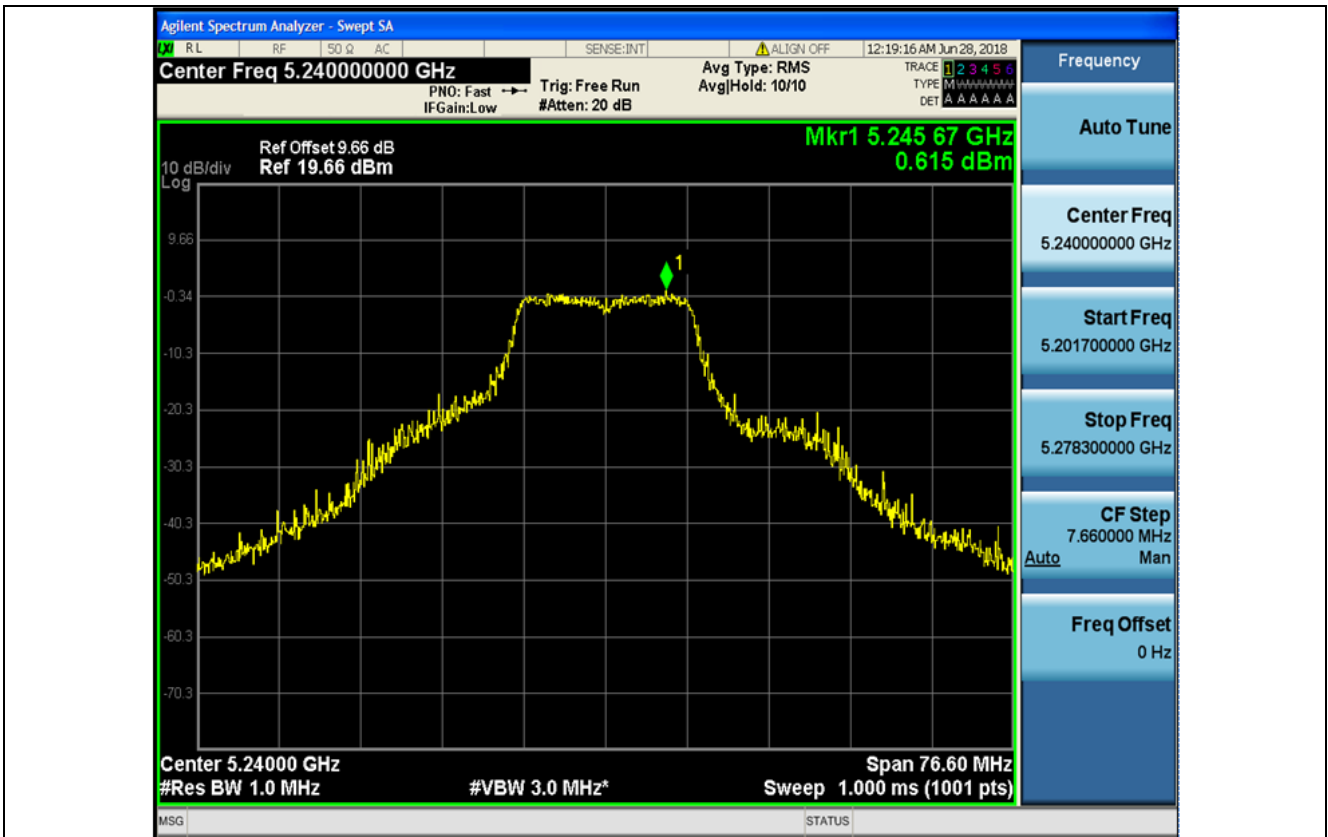


Low



Mid





High

802.11n(HT20)



Low



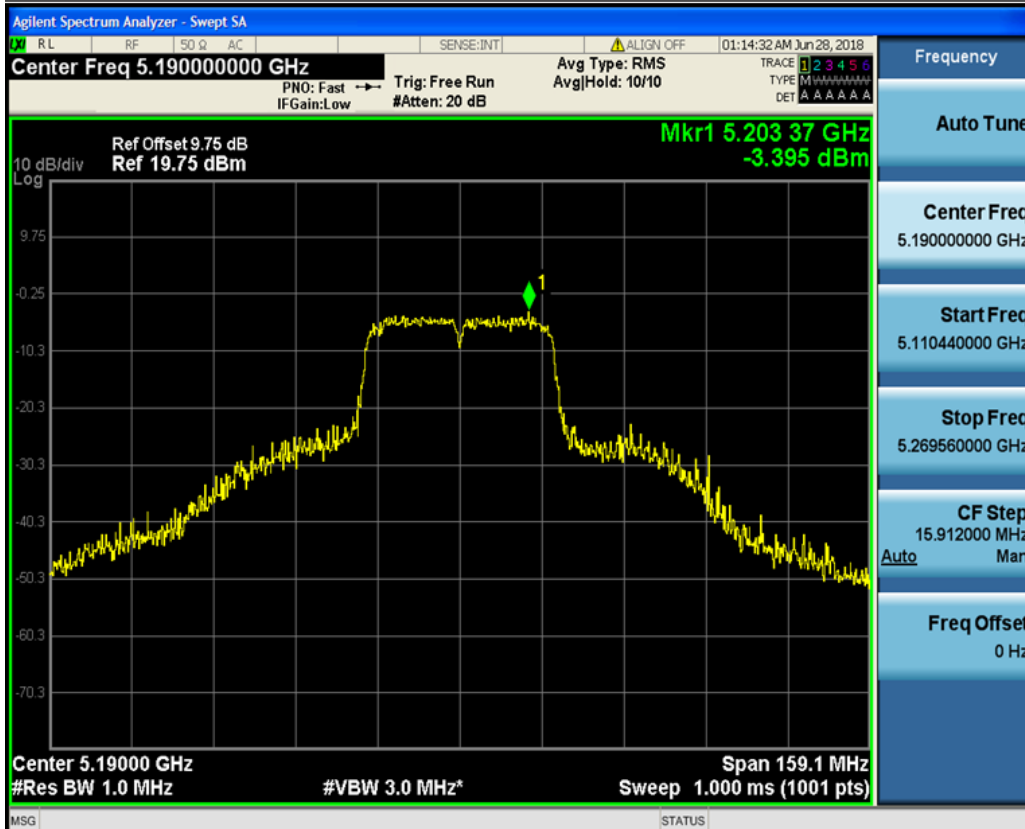
Mid



High



### 802.11n(HT40)



Low

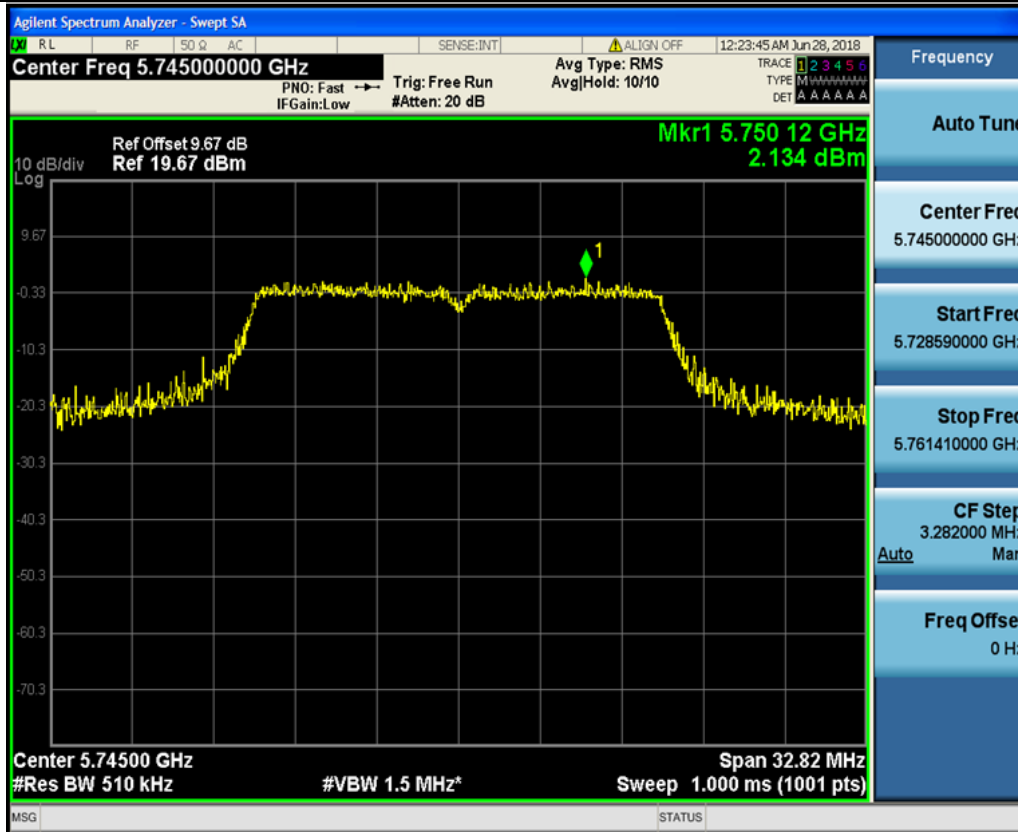


High

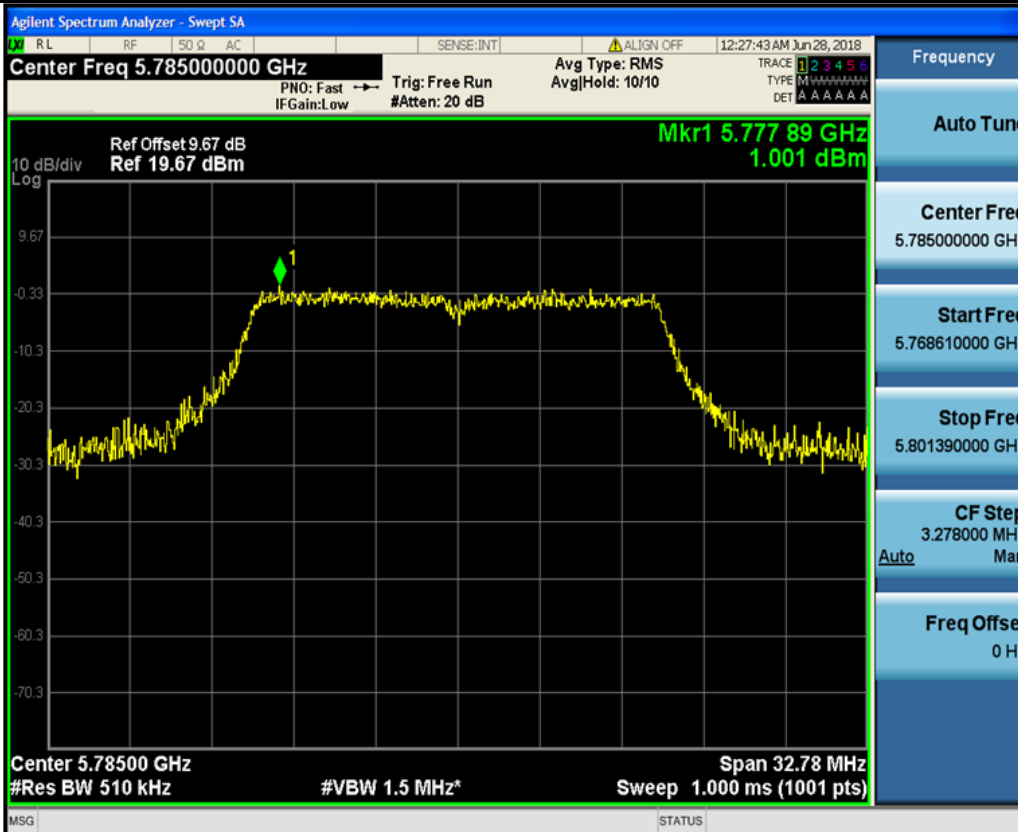


Band IV (5725 – 5850 MHz)

802.11a



Low

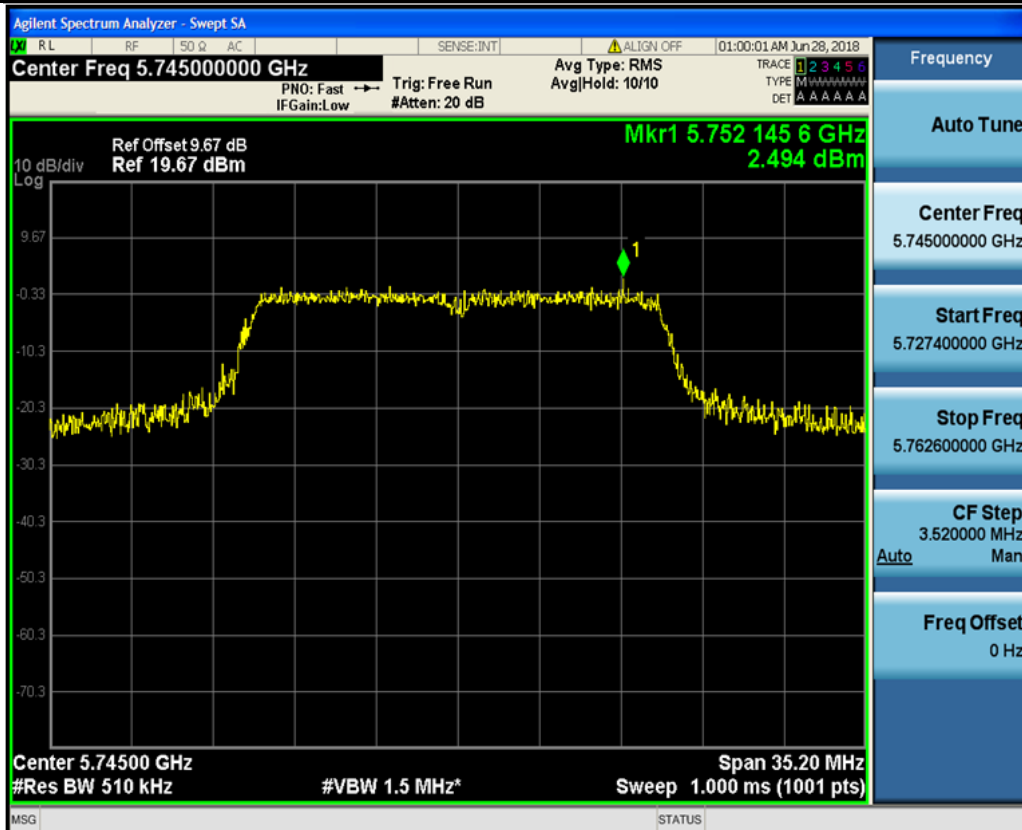


Mid



High

802.11n(HT20)



Low



Mid



High



### 802.11n(HT40)



Low



High



## 4.6. Band edge

### 4.6.1. 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 I&amp;II&amp;III: <math>E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = 68.2 \text{ dB}\mu\text{V}/\text{m}</math>, for <math>\text{EIRP}(\text{dBm}) = -27\text{dBm}</math></p> <p>For transmitters operating in the 5.725-5.85 GHz band:</p> <p>All emissions shall be limited to a level of <math>-27 \text{ dBm}/\text{MHz}</math> at 75 MHz or more above or below the band edge increasing linearly to <math>10 \text{ dBm}/\text{MHz}</math> at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of <math>15.6 \text{ dBm}/\text{MHz}</math> at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of <math>27 \text{ dBm}/\text{MHz}</math> at the band edge.</p> <p>For band IV(5715-5725MHz&amp;5850-5860MHz): <math>E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = 78.2 \text{ dB}\mu\text{V}/\text{m}</math>, for <math>\text{EIRP}(\text{dBm}) = -27\text{dBm}</math>;</p> <p>For band IV(other un-restricted band): <math>E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = 68.2 \text{ dB}\mu\text{V}/\text{m}</math>, for <math>\text{EIRP}(\text{dBm}) = -27\text{dBm}</math></p>
<b>Test Setup:</b>	<p>The diagram illustrates the test setup. An Equipment Under Test (EUT) is placed on a turn table at a height of 1.5 meters. The turn table is positioned 3 meters away from an antenna feed point. The antenna is mounted on a tower that can be adjusted in height from 1 meter to 4 meters. The entire setup is on a ground plane. A receiver and amplifier are connected to the antenna feed point.</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</li> </ol>





	<p>turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold 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>
<b>Test Result:</b>	PASS



#### 4.6.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Receiver	R&S	ESRP3	HKE-005	Sep. 27, 2018
Spectrum analyzer	Agilent	N9020A	HKE-048	Sep. 27, 2018
Preamplifier	EMCI	EMC051845S E	HKE-015	Sep. 27, 2018
Preamplifier	Agilent	83051A	HKE-016	Sep. 27, 2018
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Sep. 26, 2019
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Sep. 26, 2019
Horn antenna	Schwarzbeck	9120D	HKE-013	Sep. 26, 2019
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
Position controller	Taiwan MF	MF7802	HKE-011	Sep. 27, 2018
Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A
RF cable (9KHz-1GHz)	Times	381806-001	N/A	N/A
Hf antenna	Schwarzbeck	LB-180400-KF	HKE-031	Sep. 27, 2019
RF cable	Tonscend	1-18G	HKE-099	Sep. 27, 2018
RF cable	Times	1-40G	HKE-034	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).



### 4.6.3. Test Data

Radiated Band Edge Test:

Operation Mode: 802.11a Mode with 5.2G TX CH Low

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5150	51.23	-2.49	48.74	74	-25.26	peak
5150	/	-2.49	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5150	52.76	-2.49	50.27	74	-23.73	peak
5150	/	-2.49	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High with 5.2G

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5250	52.41	-2.28	50.13	68.2	-18.07	peak
5250	/	-2.28	/	54	/	AVG
5350	50.39	-2.11	48.28	74	-25.72	peak
5350	/	-2.11	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5250	52.17	-2.28	49.89	68.2	-18.31	peak
5250	/	-2.28	/	54	/	AVG
5350	50.26	-2.11	48.15	74	-25.85	peak
5350	/	-2.11	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: 802.11n20 Mode with 5.2G TX CH Low

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5150	53.14	-2.49	50.65	74	-23.35	peak
5150	/	-2.49	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5150	51.82	-2.49	49.33	74	-24.67	peak
5150	/	-2.49	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High with 5.2G

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5250	52.36	-2.28	50.08	68.2	-18.12	peak
5250	/	-2.28	/	54	/	AVG
5350	50.51	-2.11	48.4	74	-25.6	peak
5350	/	-2.11	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5250	51.78	-2.28	49.5	68.2	-18.7	peak
5250	/	-2.28	/	54	/	AVG
5350	50.13	-2.11	48.02	74	-25.98	peak
5350	/	-2.11	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: 802.11 n40 Mode with 5.2G TX CH Low

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5150	52.54	-2.49	50.05	74	-23.95	peak
5150	/	-2.49	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5150	51.2	-2.49	48.71	74	-25.29	peak
5150	/	-2.49	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High with 5.2G

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5250	52.41	-2.28	50.13	68.2	-18.07	peak
5250	/	-2.28	/	54	/	AVG
5350	50.63	-2.11	48.52	74	-25.48	peak
5350	/	-2.11	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5250	51.75	-2.28	49.47	68.2	-18.73	peak
5250	/	-2.28	/	54	/	AVG
5350	49.88	-2.11	47.77	74	-26.23	peak
5350	/	-2.11	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.





Operation Mode: 802.11a Mode with 5.8G TX CH Low

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5460	54.29	-2.06	52.23	74	-21.77	peak
5460	/	-2.06	/	54	/	AVG
5725	52.05	-1.96	50.09	74	-23.91	peak
5725	/	-1.96	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5460	52.64	-2.06	50.58	74	-23.42	peak
5460	/	-2.06	/	54	/	AVG
5725	51.57	-1.96	49.61	74	-24.39	peak
5725	/	-1.96	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High with 5.8G

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5850	51.94	-1.97	49.97	74	-24.03	peak
5850	/	-1.97	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5850	50.21	-1.97	48.24	74	-25.76	peak
5850	/	-1.97	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: 802.11n20 Mode with 5.8G TX CH Low

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5460	52.09	-2.06	50.03	74	-23.97	peak
5460	/	-2.06	/	54	/	AVG
5725	50.65	-1.96	48.69	74	-25.31	peak
5725	/	-1.96	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5460	52.32	-2.06	50.26	74	-23.74	peak
5460	/	-2.06	/	54	/	AVG
5725	49.87	-1.96	47.91	74	-26.09	peak
5725	/	-1.96	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High with 5.8G  
Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5850	51.28	-1.97	49.31	74	-24.69	peak
5850	/	-1.97	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5850	50.16	-1.97	48.19	74	-25.81	peak
5850	/	-1.97	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: 802.11n40 Mode with 5.8G TX CH Low

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5460	53.26	-2.06	51.2	74	-22.8	peak
5460	/	-2.06	/	54	/	AVG
5725	51.69	-1.96	49.73	74	-24.27	peak
5725	/	-1.96	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5460	52.43	-2.06	50.37	74	-23.63	peak
5460	/	-2.06	/	54	/	AVG
5725	50.18	-1.96	48.22	74	-25.78	peak
5725	/	-1.96	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Operation Mode: TX CH High with 5.8G

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5850	52.31	-1.97	50.34	74	-23.66	peak
5850	/	-1.97	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
5850	50.45	-1.97	48.48	74	-25.52	peak
5850	/	-1.97	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



## 4.7. Spurious Emission

### 4.7.1.1. Test Specification

<b>Test Requirement:</b>	FCC CFR47 Part 15 Section 15.407 & 15.209 & 15.205				
<b>Test Method:</b>	KDB 789033 D02 v02r01				
<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				
	<p>The diagram illustrates the test setup for radiated emissions below 30MHz. It shows an EUT (Equipment Under Test) on a turn table, a distance of 3m to a circular antenna, a ground plane, a pre-amplifier, a receiver, and a computer connected to the receiver.</p>				
	30MHz to 1GHz				

	<p>Above 1GHz</p>
<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 rotating 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>
<b>Test results:</b>	PASS





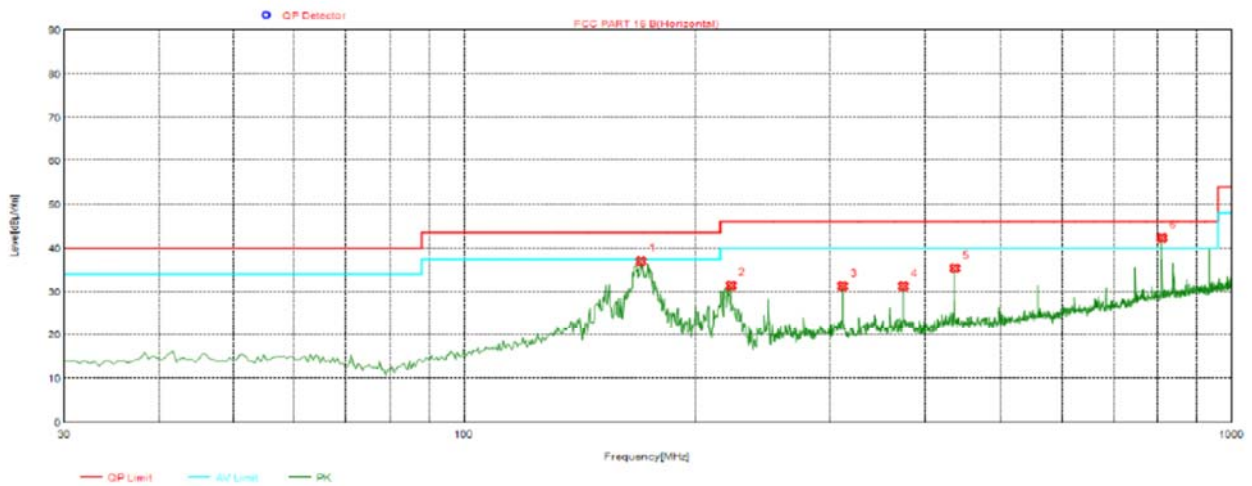
### 4.7.2. Test Data

Remark: We tested all Channels, the worst case was recorded.

Please refer to following diagram for individual

Below 1GHz

#### Horizontal

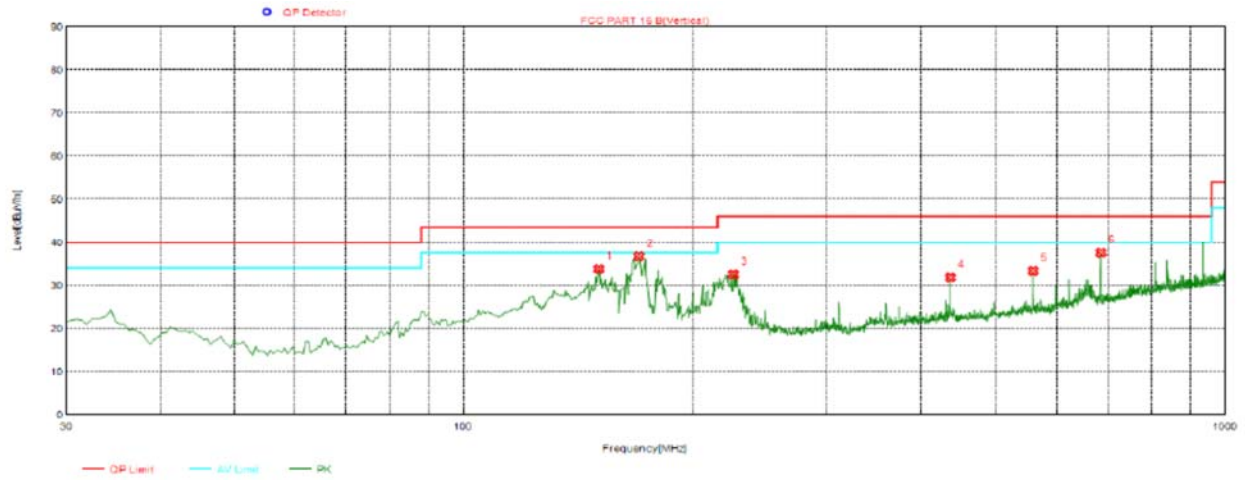


#### Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Trace	Height [cm]	Angle [°]	Polarity
1	170.1650	37.02	-10.94	43.50	6.48	PK	100	350	Horizontal
2	223.0300	31.46	-15.22	46.00	14.54	PK	100	10	Horizontal
3	311.7850	31.33	-12.90	46.00	14.67	PK	100	15	Horizontal
4	374.3500	31.31	-11.18	46.00	14.69	PK	100	152	Horizontal
5	436.9150	35.41	-9.64	46.00	10.59	PK	100	133	Horizontal
6	811.3350	42.31	-2.03	46.00	3.69	PK	100	86	Horizontal



**Vertical**



**Suspected List**

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Height [cm]	Angle [°]	Polarity
1	150.7650	33.74	-10.89	43.50	9.76	PK	100	28	Vertical
2	170.1650	36.65	-10.94	43.50	6.85	PK	100	24	Vertical
3	226.4250	32.49	-15.17	46.00	13.51	PK	100	132	Vertical
4	436.9150	31.78	-9.64	46.00	14.22	PK	100	90	Vertical
5	561.5600	33.31	-6.60	46.00	12.69	PK	100	283	Vertical
6	686.6900	37.53	-4.58	46.00	8.47	PK	100	94	Vertical

**Above 1GHz**

LOW CH 36 (802.11 a Mode with 5.2G)/5180

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
3647	62.53	-4.59	57.94	74	-16.06	peak
3647	47.28	-4.59	42.69	54	-11.31	AVG
10360	52.14	3.74	55.88	68.2	-12.32	peak
10360	41.36	3.74	45.1	54	-8.9	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
3647	62.15	-4.59	57.56	74	-16.44	peak
3647	46.83	-4.59	42.24	54	-11.76	AVG
10360	52.46	3.74	56.2	68.2	-12	peak
10360	40.77	3.74	44.51	54	-9.49	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



MID CH40 (802.11 a Mode with 5.2G)/5200

Horizontal:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
3647	62.48	-4.59	57.89	74	-16.11	peak
3647	46.35	-4.59	41.76	54	-12.24	AVG
10400	52.29	3.74	56.03	68.2	-12.17	peak
10400	40.84	3.74	44.58	54	-9.42	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
3647	61.73	-4.59	57.14	74	-16.86	peak
3647	46.18	-4.59	41.59	54	-12.41	AVG
10400	51.85	3.74	55.59	68.2	-12.61	peak
10400	40.29	3.74	44.03	54	-9.97	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



HIGH CH 48 (802.11a Mode with 5.2G)/5240  
Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
3647	61.85	-4.59	57.26	74	-16.74	peak
3647	47.03	-4.59	42.44	54	-11.56	AVG
10480	51.42	3.75	55.17	68.2	-13.03	peak
10480	40.66	3.75	44.41	54	-9.59	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
3647	60.57	-4.59	55.98	74	-18.02	peak
3647	46.62	-4.59	42.03	54	-11.97	AVG
10480	51.18	3.75	54.93	68.2	-13.27	peak
10480	38.95	3.75	42.7	54	-11.3	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.



LOW CH 149 (802.11 a Mode with 5.8G)/5745

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
3647	62.62	-4.59	58.03	74	-15.97	peak
3647	46.75	-4.59	42.16	54	-11.84	AVG
11570	52.31	4.21	56.52	74	-17.48	peak
11570	39.58	4.21	43.79	54	-10.21	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
3647	62.39	-4.59	57.8	74	-16.2	peak
3647	47.12	-4.59	42.53	54	-11.47	AVG
11570	52.04	4.21	56.25	74	-17.75	peak
11570	37.61	4.21	41.82	54	-12.18	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



MID CH157 (802.11 a Mode with 5.8G)/5785

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
3647	61.78	-4.59	57.19	74	-16.81	peak
3647	46.59	-4.59	42	54	-12	AVG
11570	52.41	4.21	56.62	74	-17.38	peak
11570	40.25	4.21	44.46	54	-9.54	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
3647	61.45	-4.59	56.86	74	-17.14	peak
3647	46.31	-4.59	41.72	54	-12.28	AVG
11570	52.29	4.21	56.5	74	-17.5	peak
11570	38.85	4.21	43.06	54	-10.94	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.



HIGH CH 165 (802.11a Mode with 5.8G)/5825

Horizontal:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
3647	62.15	-4.59	57.56	74	-16.44	peak
3647	47.29	-4.59	42.7	54	-11.3	AVG
11650	52.44	4.84	57.28	74	-16.72	peak
11650	38.67	4.84	43.51	54	-10.49	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
3647	60.72	-4.59	56.13	74	-17.87	peak
3647	46.36	-4.59	41.77	54	-12.23	AVG
11650	51.49	4.84	56.33	74	-17.67	peak
11650	38.55	4.84	43.39	54	-10.61	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.





## 4.8. Frequency Stability Measurement

### 4.8.1. 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 35 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     P[AC/DC Power supply] --- EUT     </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>	N/A

**Test Result as follows:**

Mode	Voltage (V)	FHL (5180MHz)	Deviation (KHz)	FHH (5240MHz)	Deviation (KHz)
5.2G Band	132 V	5179.985	15	5239.982	18
	120 V	5179.983	17	5239.987	13
	108 V	5179.986	14	5239.986	14

Mode	Temperature (°C)	FHL (5180MHz)	Deviation (KHz)	FHH (5240MHz)	Deviation (KHz)
5.2G Band	-30	5179.968	32	5239.963	37
	-20	5179.966	34	5239.965	35
	-10	5179.971	29	5239.977	24
	0	5179.970	30	5239.975	25
	10	5179.976	24	5239.979	21
	20	5179.985	15	5239.981	19
	30	5179.981	19	5239.978	22
	40	5179.978	22	5239.979	21
	50	5179.972	28	5239.968	32



Mode	Voltage (V)	FHL (5745MHz)	Deviation (KHz)	FHH (5825MHz)	Deviation (KHz)
5.8G Band	132 V	5744.988	12	5824.984	16
	120 V	5744.986	14	5824.987	13
	108 V	5744.987	13	5824.985	15

Mode	Temperature (°C)	FHL (5745MHz)	Deviation (KHz)	FHH (5825MHz)	Deviation (KHz)
5.8G Band	-30	5744.963	37	5824.966	34
	-20	5744.971	29	5824.967	33
	-10	5744.972	28	5824.972	28
	0	5744.975	25	5824.978	22
	10	5744.976	24	5824.976	24
	20	5744.984	16	5824.982	18
	30	5744.979	21	5824.980	20
	40	5744.975	25	5824.983	17
	50	5744.974	26	5824.979	21



## 4.9. ANTENNA REQUIREMENT

### Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, 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. And according to FCC 47 CFR Section 15.249, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

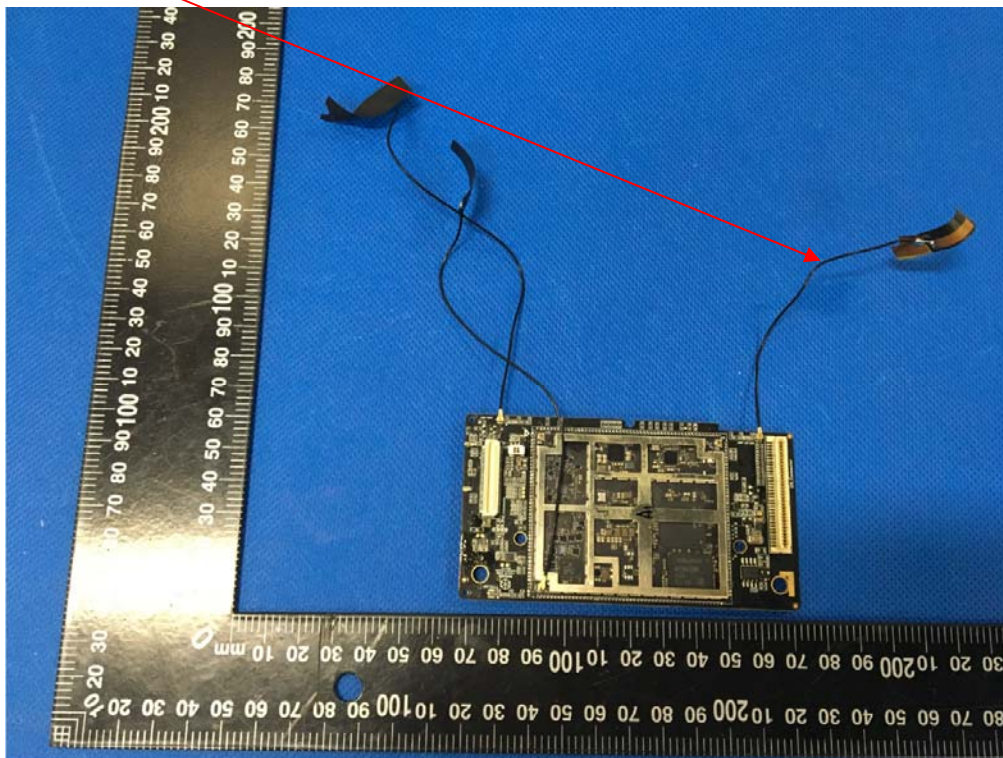
### Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### Antenna Connected Construction

The antenna used in this product is a Integral Antenna, The directional gains of antenna used for transmitting is 2dBi.

### WIFI ANTENNA





#### 4.10. Photographs of Test Setup

