

# FCC TEST REPORT

**Product Name:** Mobile Phone  
**Trade Mark:** N/A  
**Model No.:** FLAME X555  
**Report Number:** 190104014RFC-4  
**Test Standards:** FCC 47 CFR Part 15 Subpart E  
**FCC ID:** 2AIMEX555  
**Test Result:** PASS  
**Date of Issue:** February 14, 2019

Prepared for:

**SMT TELECOMM HK LIMITED**  
**Unit C 8/F CHARMHILL CTR 50 HILLWOOD RD TST KL**

Prepared by:

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**Version**

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V1.0	February 14, 2019	Original

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## 1. GENERAL INFORMATION

### 1.1 CLIENT INFORMATION

<b>Applicant:</b>	SMT TELECOMM HK LIMITED
<b>Address of Applicant:</b>	Unit C 8/F CHARMHILL CTR 50 HILLWOOD RD TST KL
<b>Manufacturer:</b>	SMT TELECOMM HK LIMITED
<b>Address of Manufacturer:</b>	Unit C 8/F CHARMHILL CTR 50 HILLWOOD RD TST KL

### 1.2 EUT INFORMATION

#### 1.2.1 General Description of EUT

<b>Product Name:</b>	Mobile Phone		
<b>Model No.:</b>	FLAME X555		
<b>Trade Mark:</b>	N/A		
<b>DUT Stage:</b>	Identical Prototype		
<b>EUT Supports Function:</b>	GSM Bands:	GSM850/1900	
	UTRA Bands:	Band II/ Band IV/ Band V	
	E-UTRA Bands:	FDD Band 2/ Band 4/ Band 5/ Band 12/ Band 17	
	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth V4.0	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n
<b>IMEI Code:</b>	Radiation: 354707100011446 Conducted: 354707100011073		
<b>Sample Received Date:</b>	January 5, 2019		
<b>Sample Tested Date:</b>	January 5, 2019 to January 28, 2019		

#### 1.2.2 Description of Accessories

Adapter	
<b>Model No.:</b>	PCX555
<b>Input:</b>	100-240 V~50/60 Hz 0.15 A
<b>Output:</b>	5.0 V == 1A
<b>DC Cable:</b>	1.0 Meter, Unshielded without ferrite

Battery	
<b>Model No.:</b>	BPX555
<b>Battery Type:</b>	Lithium-ion Rechargeable Battery
<b>Rated Voltage:</b>	3.8 Vdc
<b>Limited Charge Voltage:</b>	4.35 Vdc
<b>Rated Capacity:</b>	2000 mAh

Cable	
<b>Description:</b>	USB Micro-B Plug Cable
<b>Cable Type:</b>	Unshielded without ferrite
<b>Length:</b>	1.0 Meter

### 1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

<b>Frequency Bands:</b>	5150 MHz to 5250 MHz (U-NII-1)				
	5250 MHz to 5350 MHz (U-NII-2A)				
	5470 MHz to 5725 MHz (U-NII-2C)				
	5 725 MHz to 5 850 MHz (U-NII-3)				
<b>Frequency Ranges:</b>	5180 MHz to 5240 MHz				
	5260 MHz to 5320 MHz				
	5500 MHz to 5700 MHz				
	5 745 MHz to 5 825 MHz				
<b>Support Standards:</b>	IEEE 802.11a/n				
<b>TPC Function:</b>	Not Support				
<b>DFS Operational mode:</b>	Slave without radar Interference detection function				
<b>Type of Modulation:</b>	IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK)				
	IEEE 802.11n: OFDM(64QAM, 16QAM, QPSK, BPSK)				
<b>Channel Spacing:</b>	IEEE 802.11a/n-HT20: 20 MHz				
	IEEE 802.11n-HT40: 40 MHz				
<b>Data Rate:</b>	IEEE 802.11a: Up to 54 Mbps				
	IEEE 802.11n-HT20: Up to MCS7				
	IEEE 802.11n-HT40: Up to MCS7				
<b>Number of Channels:</b>	5150 MHz to 5250 MHz: 4 for IEEE 802.11a/n-HT20 2 for IEEE 802.11n-HT40)				
	5250 MHz to 5350 MHz: 4 for IEEE 802.11a/n-HT20 2 for IEEE 802.11n-HT40)				
	5470 MHz to 5725 MHz: 11 for IEEE 802.11a/n-HT20 5 for IEEE 802.11n-HT40				
	5725 MHz to 5850 MHz: 5 for IEEE 802.11a/n-HT20 2 for IEEE 802.11n-HT40				
<b>Antenna Type:</b>	PIFA Antenna				
<b>Antenna Gain:</b>	5150 MHz to 5250 MHz	0.43 dBi			
	5250 MHz to 5350 MHz	0.45 dBi			
	5470 MHz to 5725 MHz	0.42 dBi			
	5725 MHz to 5850 MHz	0.41 dBi			
<b>Maximum conducted output power (dBm):</b>		<b>U-NII-1</b>	<b>U-NII-2A</b>	<b>U-NII-2C</b>	<b>U-NII-3</b>
	IEEE 802.11a:	12.59	11.38	9.47	11.10
	IEEE 802.11n-HT20:	13.01	8.79	11.01	10.16
	IEEE 802.11n-HT40:	9.80	9.31	9.91	10.12
<b>Normal Test Voltage:</b>	3.8 Vdc				

## 1.4 OTHER INFORMATION

Operation Frequency Each of Channel				
	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
<b>IEEE 802.11a, IEEE 802.11n-HT20,</b>	$f = 5000 + 5k, k = 32 + 4n$			$f = 5000 + 5k, k = 145 + 4n$
	$n = 1, \dots, 4$	$n = 5, \dots, 8$	$n = 17, \dots, 27$	$n = 1, \dots, 5$
<b>IEEE 802.11n-HT40,</b>	$f = 5000 + 5k, k = 30 + 8n$			$f = 5000 + 5k, k = 143 + 8n$
	$n = 1, 2$	$n = 1, \dots, 5$	$n = 9, \dots, 13$	$n = 1, 2$

Note:  
 $f$  is the operating frequency (MHz);  
 $k$  is the operating channel.

## 1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

### 1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	Lenovo	E450	SL10G10780	N/A
Wireless AP	Alcatel-Lucent	G-240W-B	N/A	2ADZRG240WB

### 2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable* 2	SMA	0.30 Meter	UnionTrust

## 1.6 TEST LOCATION

### Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109  
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## 1.7 TEST FACILITY

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

**CNAS-Lab Code: L9069**

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

**IC-Registration No.: 21600-1**

The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

**A2LA-Lab Certificate No.: 4312.01**

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

**FCC Accredited Lab.**

Designation Number: CN1194

Test Firm Registration Number: 259480

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## 1.8 DEVIATION FROM STANDARDS

None.

## 1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

## 1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

## 1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.8 dB
2	Conducted emission 150KHz-30MHz	±3.4 dB
3	Radiated emission 9KHz-30MHz	±4.9 dB
4	Radiated emission 30MHz-1GHz	±4.7 dB
5	Radiated emission 1GHz-18GHz	±5.1 dB
6	Radiated emission 18GHz-26GHz	±5.2 dB
7	Radiated emission 26GHz-40GHz	±5.2 dB

## 2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart E Test Cases			
Test Item	Test Requirement	Test Method	Result
<b>Antenna Requirement</b>	FCC 47 CFR Part 15 Subpart C Section 15.203 FCC 47 CFR Part 15 Subpart E Section 15.407(a)(1) (2)	N/A	PASS
<b>26 dB emission bandwidth</b>	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(2)(5)	KDB 789033 D02 v02r01 Section C.1	PASS
<b>6 dB bandwidth</b>	FCC 47 CFR Part 15 Subpart E Section 15.407 (e)	KDB 789033 D02 v02r01 Section C.2	PASS
<b>Maximum conducted output power</b>	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v02r01 Section E.3.a (Method PM)	PASS
<b>Peak Power Spectral Density</b>	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v02r01 Section F	PASS
<b>Radiated Emissions and Band Edge Measurement</b>	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(4)(6) FCC 47 CFR Part 15 Subpart C Section 15.209/205	KDB 789033 D02 v02r01 Section G.3, G.4, G.5, and G.6	PASS
<b>Dynamic Frequency Selection</b>	FCC 47 CFR Part 15 Subpart E Section 15.407 (h)	KDB 905462 D03 Client Without DFS New Rules v01r02	PASS
<b>AC Power Line Conducted Emission</b>	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(6) FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013, Section 6.2.	PASS

### For Dynamic Frequency Selection

Test Case	Result
Channel Availability Check Time	N/A <sup>1</sup>
U-NII Detection Bandwidth	N/A <sup>1</sup>
Channel Closing Transmission Time	PASS
Channel Move Time	PASS
DFS Detection Threshold	N/A <sup>1</sup>
Non- Occupancy Period	N/A <sup>1</sup>

**Note:**

- 1) The EUT is slave, NA In this whole report not application.

### 3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	Nov. 24, 2018	Nov. 24, 2019
<input checked="" type="checkbox"/>	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 24, 2018	Nov. 24, 2019
<input checked="" type="checkbox"/>	Loop Antenna	ETS-LINDGREN	6502	00202525	Dec. 03, 2018	Dec. 03, 2019
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec. 08, 2018	Dec. 08, 2019
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103001	Dec. 08, 2018	Dec. 08, 2019
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2018	Nov. 24, 2019
<input type="checkbox"/>	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	May 19, 2018	May 19, 2019
<input type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103002	Nov. 24, 2018	Nov. 24, 2019
<input type="checkbox"/>	Horn Antenna	ETS-LINDGREN	3117	00164202	Dec. 08, 2018	Dec. 08, 2019
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 22, 2018	May 22, 2019
<input type="checkbox"/>	Horn Antenna	ETS-LINDGREN	3116C	00200180	May 20, 2018	May 20, 2019
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Jan. 05, 2019	Jan. 05, 2020
<input checked="" type="checkbox"/>	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
<input type="checkbox"/>	Band Rejection Filter (2400MHz~2500MHz)	Micro-Tronics	BRM50702	G248	Jun. 06, 2018	Jun. 06, 2019
<input checked="" type="checkbox"/>	Band Rejection Filter (5150MHz~5880MHz)	Micro-Tronics	BRM50716	G1868	Jun. 06, 2018	Jun. 06, 2019
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9.160333		

Conducted Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Nov. 24, 2018	Nov. 24, 2019
<input checked="" type="checkbox"/>	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 24, 2018	Nov. 24, 2019
<input checked="" type="checkbox"/>	LISN	R&S	ESH2-Z5	860014/024	Nov. 24, 2018	Nov. 24, 2019
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9.160323		

Conducted RF test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 24, 2018	Nov. 24, 2019
<input checked="" type="checkbox"/>	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Nov. 24, 2018	Nov. 24, 2019
<input checked="" type="checkbox"/>	MXG X-Series RF Vector Signal Generator	KEYSIGHT	N5182B	MY51350267	Nov. 24, 2018	Nov. 24, 2019

## 4. TEST CONFIGURATION

### 4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

#### 4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage	Relative Humidity (%)
NT/NV	+15 to +35	3.8Vdc	20 to 75
<b>Remark:</b>			
1) NV: Normal Voltage; NT: Normal Temperature			

#### 4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
AC Power Line Conducted Emission	21.3	65	99.80	Gemini Huang
26 dB emission bandwidth	22.4	49	99.80	Terence Chen
Maximum conducted output power	22.4	49	99.80	Terence Chen
Peak Power Spectral Density	22.4	49	99.80	Terence Chen
6 dB bandwidth	22.4	49	99.80	Terence Chen
Dynamic Frequency Selection	22.4	49	99.80	Terence Chen
Radiated Emissions and Band Edge Measurement	24.6	44	100.38	Fire Huo

## 4.2 TEST CHANNELS

Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11a IEEE 802.11n-HT20	5150 MHz to 5250 MHz	Channel 36	Channel 44	Channel 48
		5180 MHz	5220 MHz	5240 MHz
	5250 MHz to 5350 MHz	Channel 52	Channel 60	Channel 64
		5260 MHz	5300 MHz	5320 MHz
	5470 MHz to 5725 MHz	Channel 100	Channel 116	Channel 140
		5500 MHz	5580 MHz	5700 MHz
IEEE 802.11n-HT40	5725 MHz to 5850 MHz	Channel 149	Channel 157	Channel 165
		5745 MHz	5785 MHz	5825 MHz
	5150 MHz to 5250 MHz	Channel 38	--	Channel 46
		5190 MHz	--	5230 MHz
	5250 MHz to 5350 MHz	Channel 54	--	Channel 62
		5270 MHz	--	5310 MHz
	5470 MHz to 5725 MHz	Channel 102	Channel 110	Channel 134
		5510 MHz	5550 MHz	5670 MHz
	5725 MHz to 5850 MHz	Channel 151	--	Channel 159
		5755 MHz	--	5795 MHz

**4.3 EUT TEST STATUS**

Mode	Tx/Rx Function	Description
IEEE 802.11a/n	1Tx	1. Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.

Power Setting				
	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
IEEE 802.11a	20	19	17	21
IEEE 802.11n-HT20	21	17	19	20
IEEE 802.11n-HT40	18	17	15	19

Test Software				
Engineering mode				
Engineering mode				

## 4.4 PRE-SCAN

### 4.4.1 Pre-scan under all rates

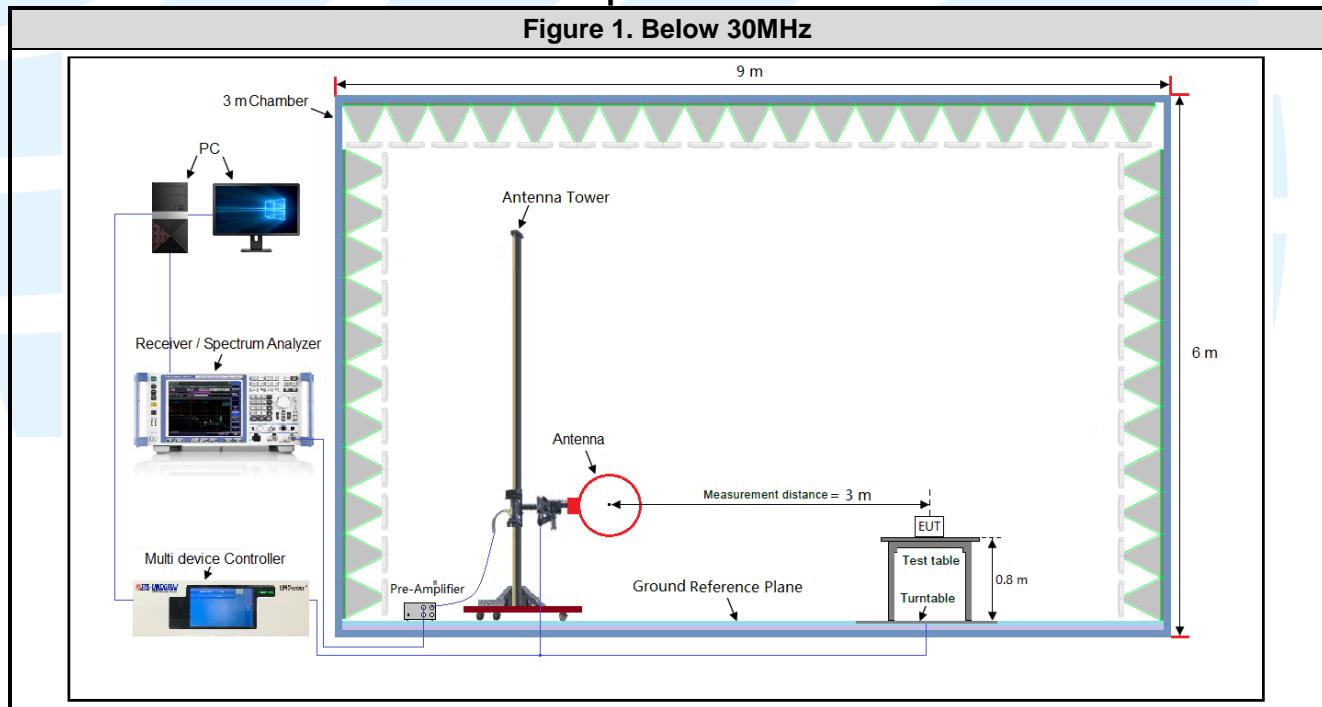
Mode and Frequency	Maximum Conducted Average Power (dBm) for Data Rates (Mbps)							
	6	9	12	18	24	36	48	54
IEEE 802.11a 5180 MHz	10.87	10.76	10.69	10.66	10.61	10.57	10.34	10.87
	11.52	11.42	11.31	11.25	11.11	10.82	10.78	10.72
IEEE 802.11n-HT20 5180 MHz	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
	9.05	9.01	8.85	8.81	8.73	8.62	8.57	8.34

### 4.4.2 Worst-case data rates

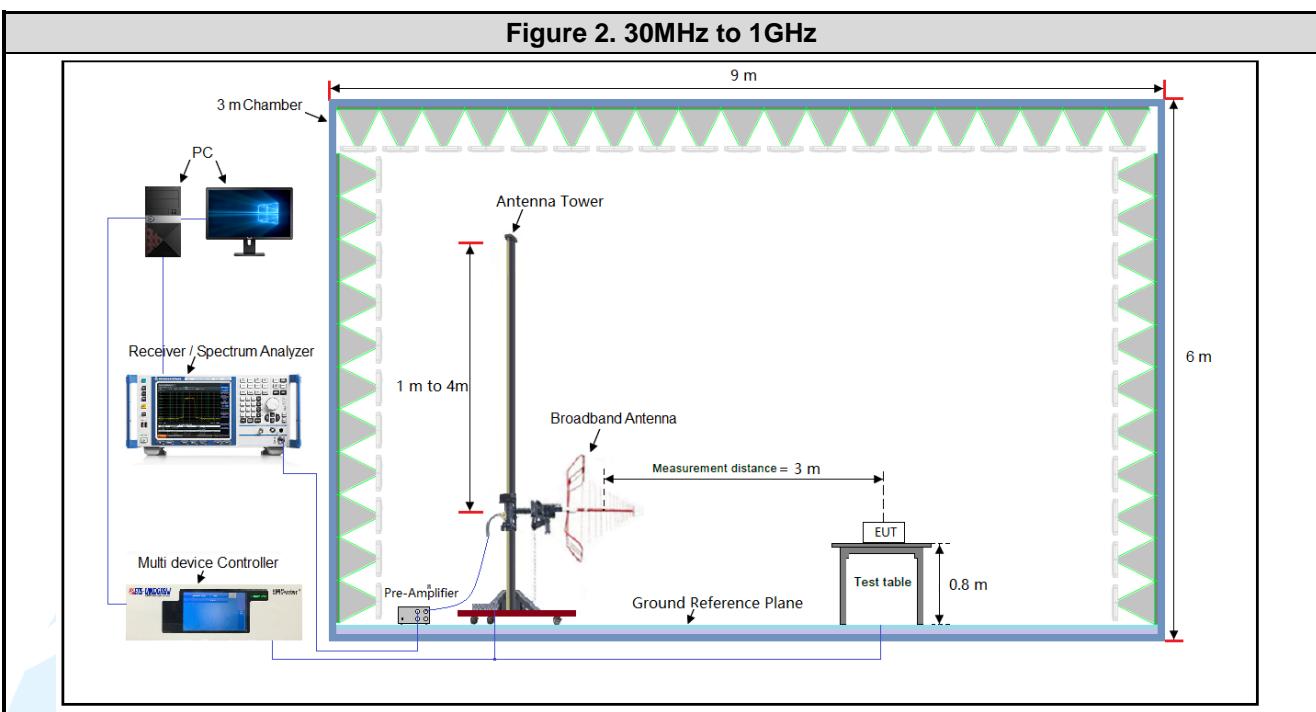
Mode	Worst-case data rates
IEEE 802.11a	6 Mbps
IEEE 802.11n-HT20	MCS0
IEEE 802.11n-HT40	MCS0

## 4.5 TEST SETUP

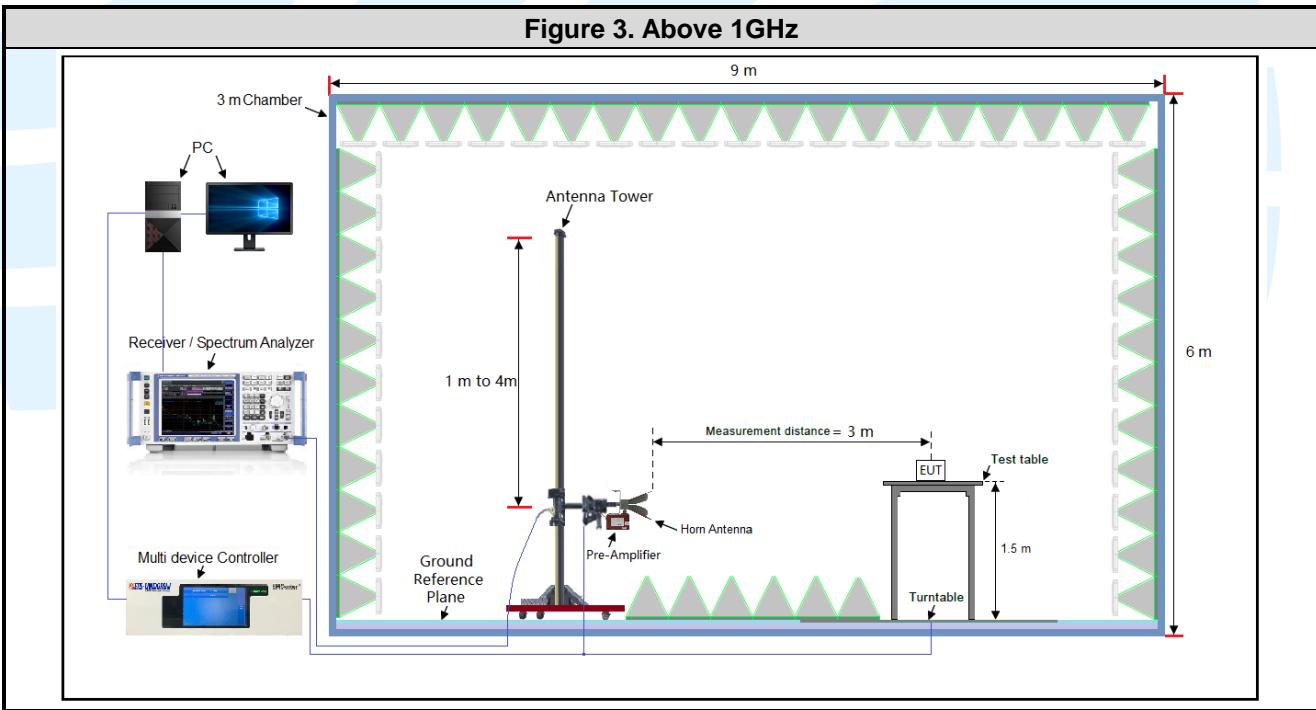
### 4.5.1 For Radiated Emissions test setup



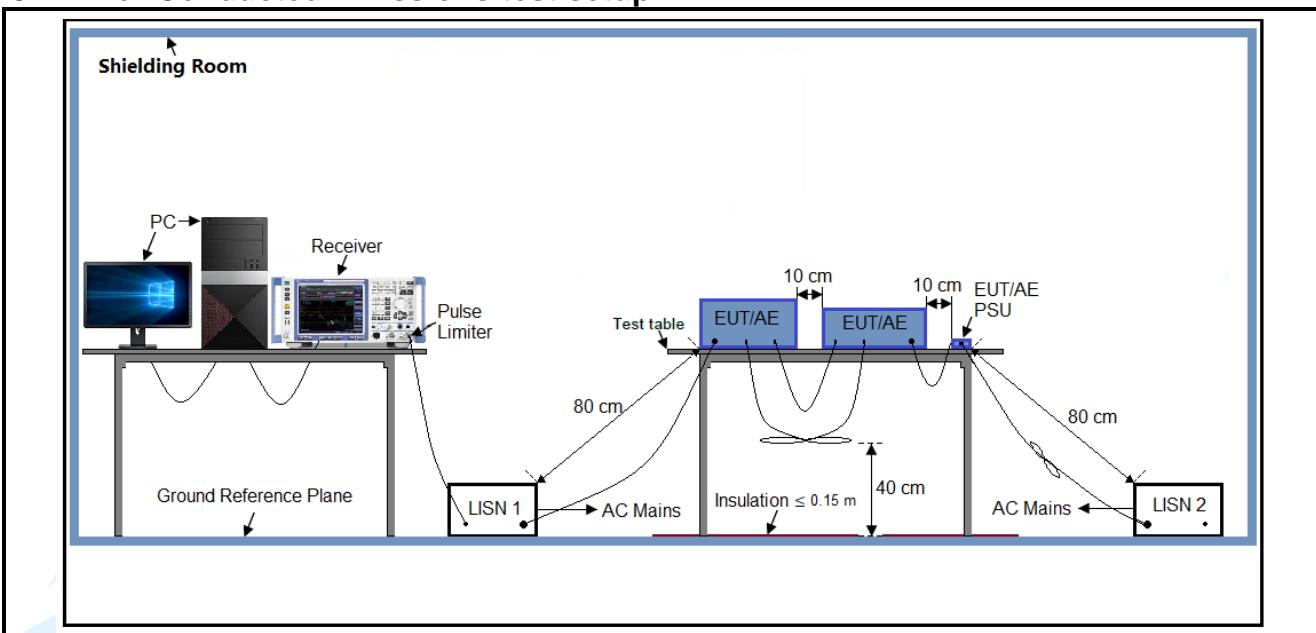
**Figure 2. 30MHz to 1GHz**



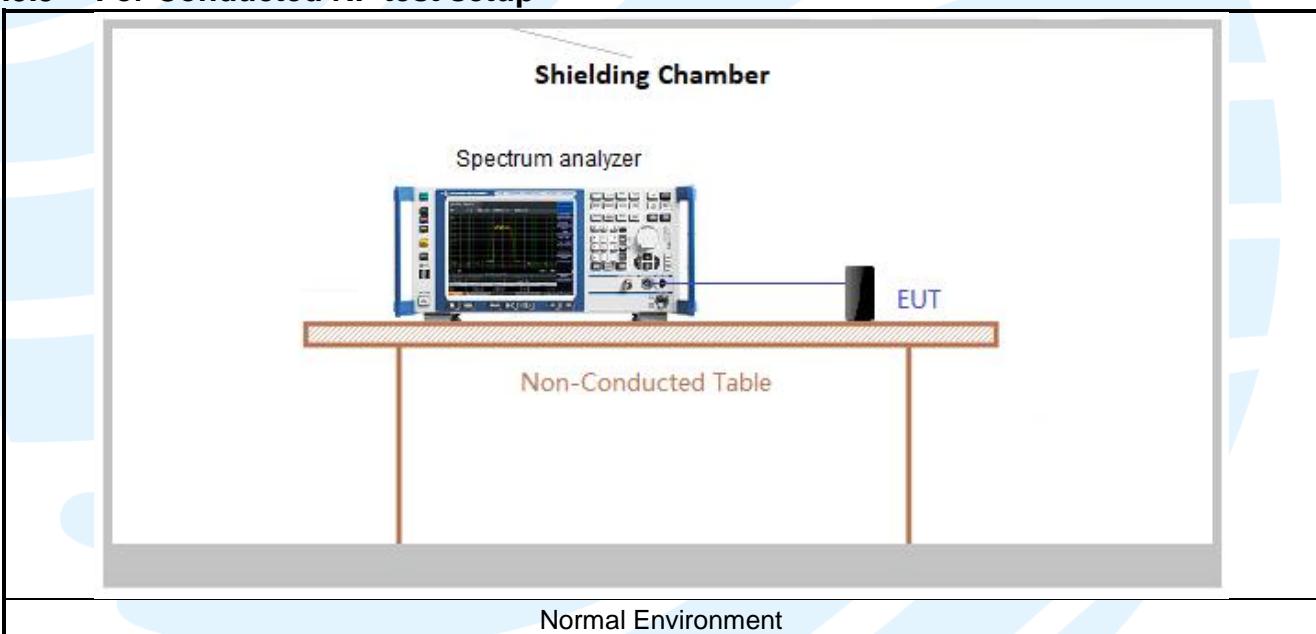
**Figure 3. Above 1GHz**



#### 4.5.2 For Conducted Emissions test setup



#### 4.5.3 For Conducted RF test setup



## 4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 3.8V battery. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in (see table below) orientation.

Frequency	Mode	Antenna Port	Worst-case axis positioning
Above 1GHz	1TX	Chain 0	Y axis

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

## 4.7 DUTY CYCLE

**Test Procedure:** ANSI C63.10-2013 Clause 12.2.

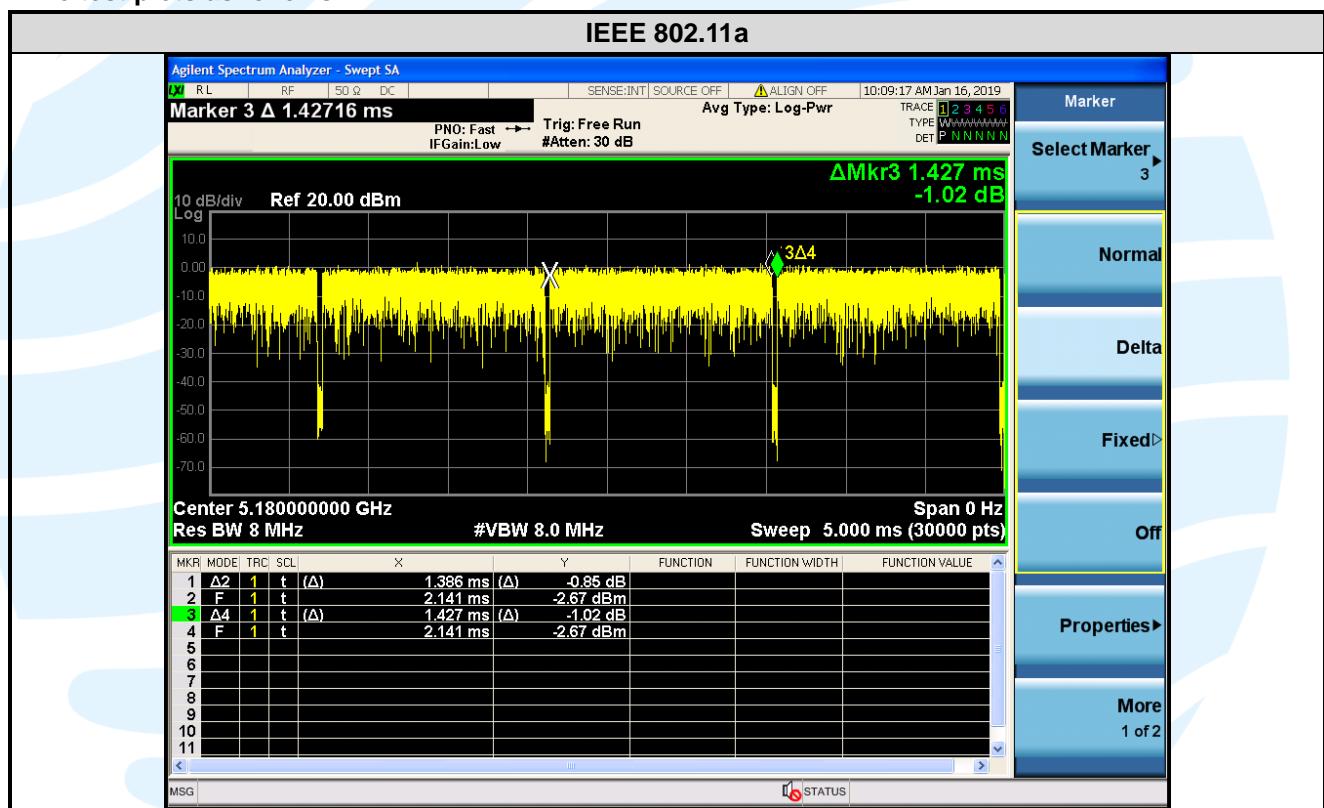
### Test Results

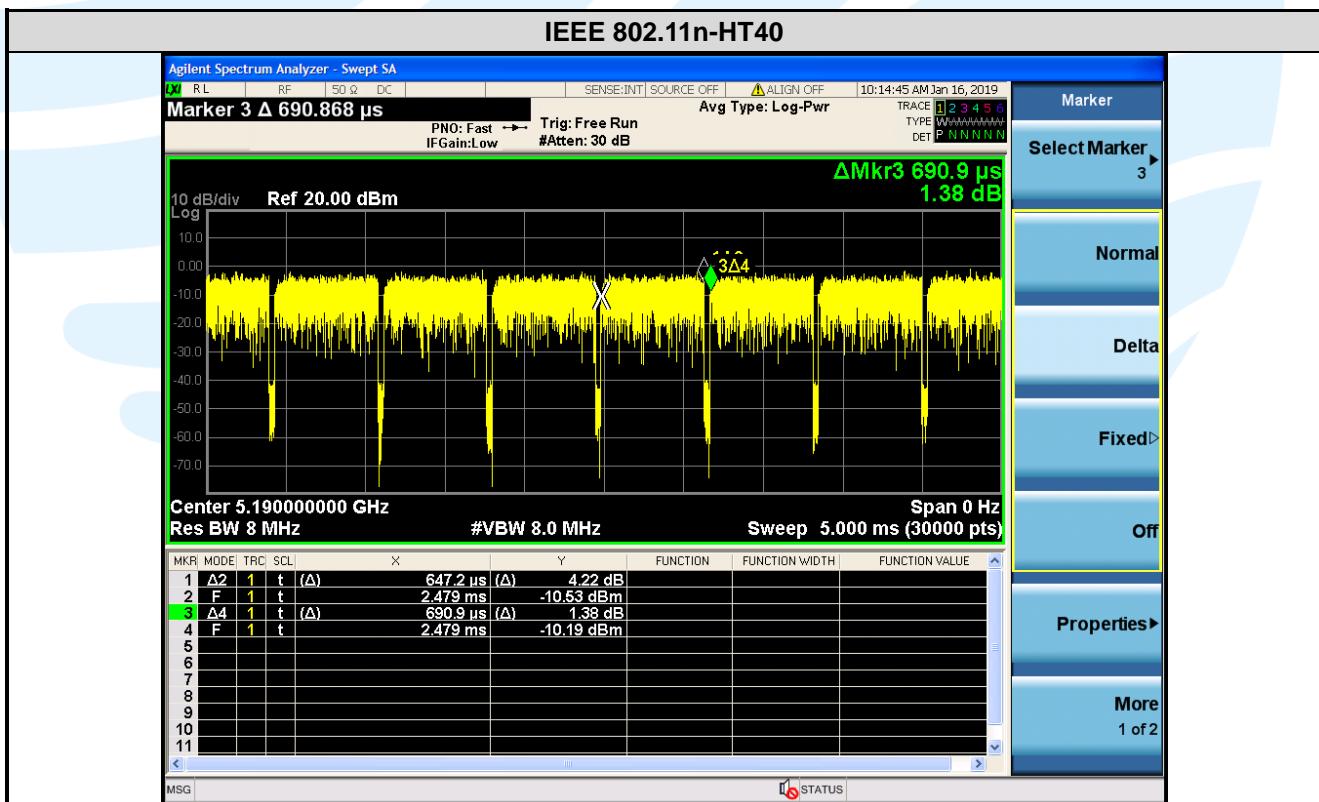
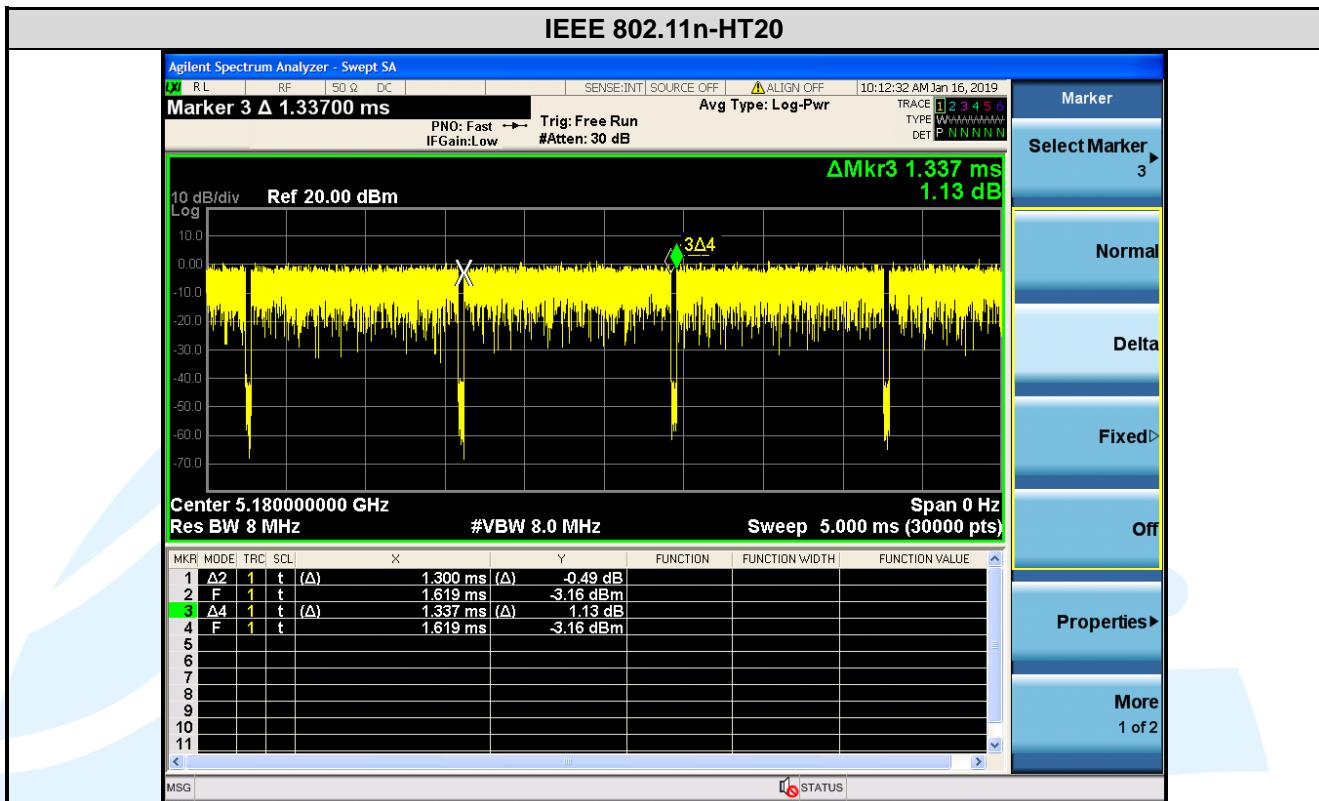
Mode	Data rates (Mbps)	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11a	6	1.39	1.43	0.97	97.13	0.13	0.72	-0.25
IEEE 802.11n-HT20	MCS0	1.30	1.34	0.97	97.23	0.12	0.77	-0.24
IEEE 802.11n-HT40	MCS0	0.65	0.69	0.94	93.67	0.28	1.55	-0.57

### Remark:

- 1) Duty cycle= On Time/ Period;
- 2) Duty Cycle factor =  $10 * \log(1/\text{Duty cycle})$ ;
- 3) Average factor =  $20 \log_{10} \text{Duty Cycle}$ .

### The test plots as follows





## 5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

### 5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
4	KDB 789033 D02 General UNII Test Procedures New Rules v02r01	Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) device part 15, subpart E
5	KDB 905462 D06 802.11 Channel Plans New Rules v02	Operation in U-NII bands -802.11 channel PLAN(§15.407)
6	KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02	Compliance measurement procedures for Unlicensed –National Information Infrastructure devices operates in the frequency bands 5250 MHz to 5350 MHz and 5470 MHz to 5725 MHz bands incorporating dynamic frequency selection
7	KDB 905462 D03 Client Without DFS New Rules v01r02	U-NII client devices without radar detection capability

### 5.2 ANTENNA REQUIREMENT

Standard Requirement
<b>15.203 requirement:</b> 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.
<b>15.407(a)(1) (2) requirement:</b> The conducted output power limit specified in paragraph (a) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (a) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
<b>EUT Antenna:</b> Antenna in the interior of the equipment and no consideration of replacement. The max gain of the antenna is 0.45 dBi.

## 5.326 DB BANDWIDTH

**Test Requirement:** FCC 47 CFR Part 15 Subpart E Section 15.407 (a) (2)(5)

**Test Method:** KDB 789033 D02 v02r01 Section C.1

**Limit:** None; for reporting purposes only.

**Test Procedure:**

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum analyzer.

Spectrum analyzer according to the following Settings:

a) Set RBW = approximately 1 % of the emission bandwidth.

b) Set the VBW > RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

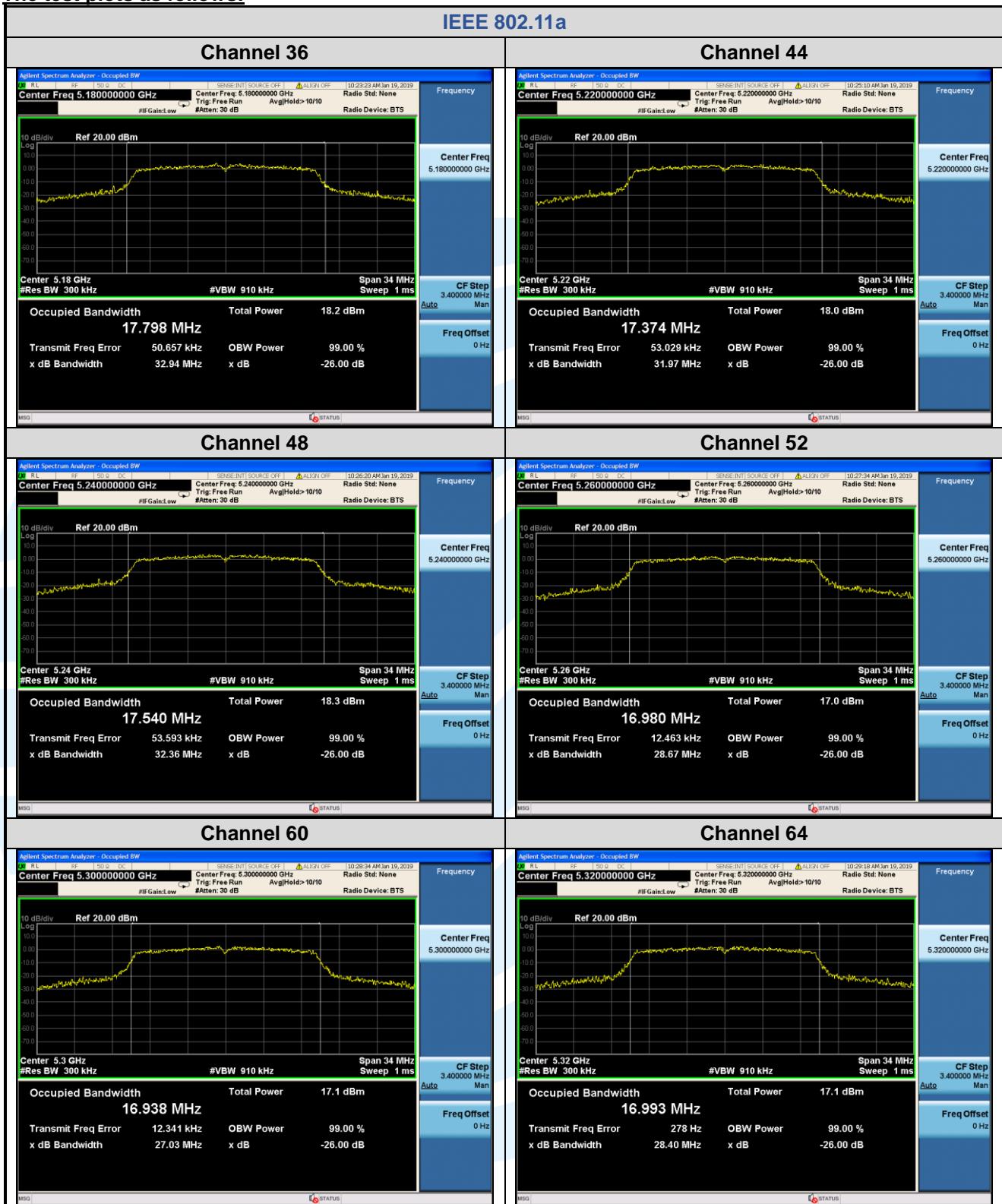
**Test Setup:** Refer to section 4.5.3 for details.

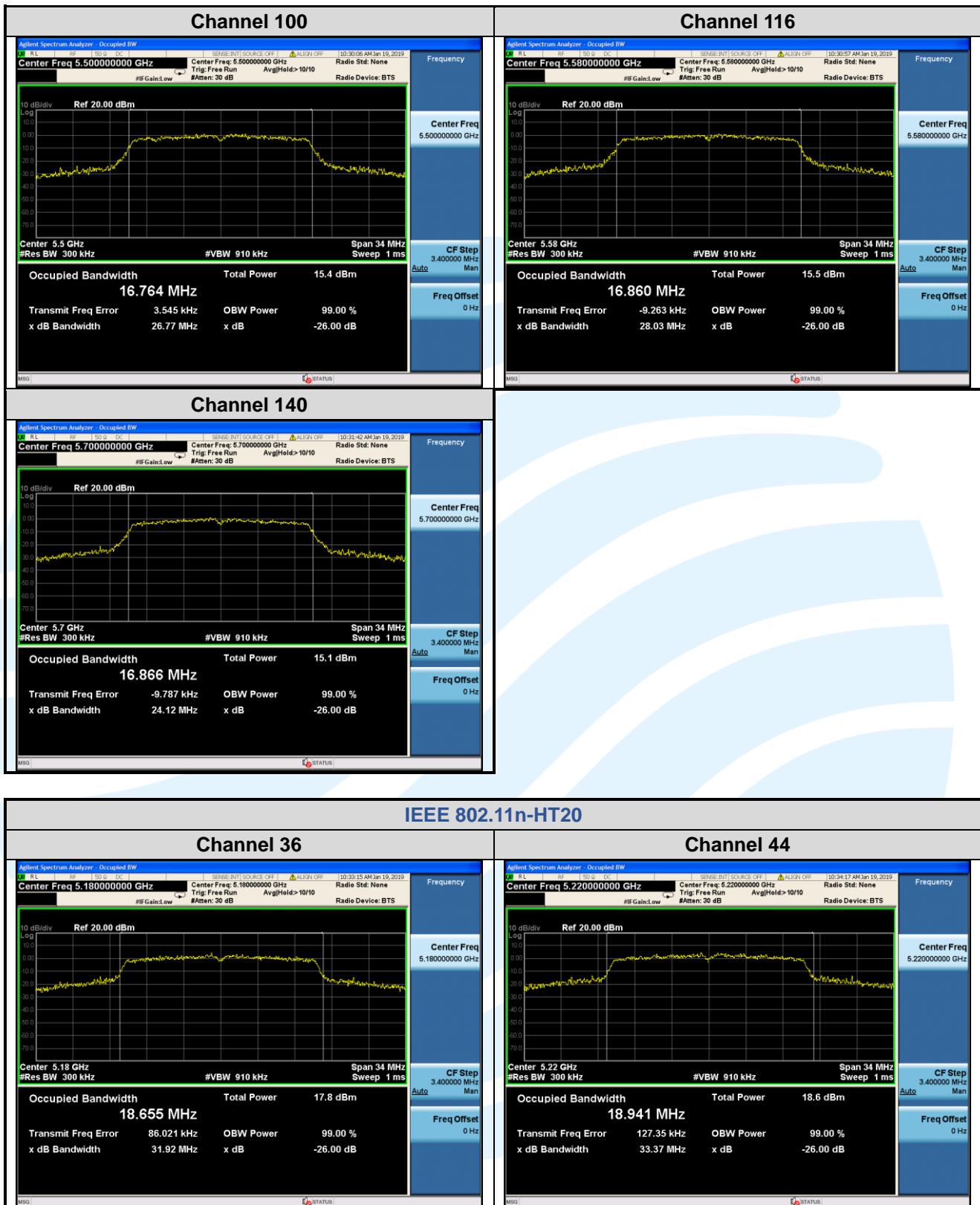
**Instruments Used:** Refer to section 3 for details

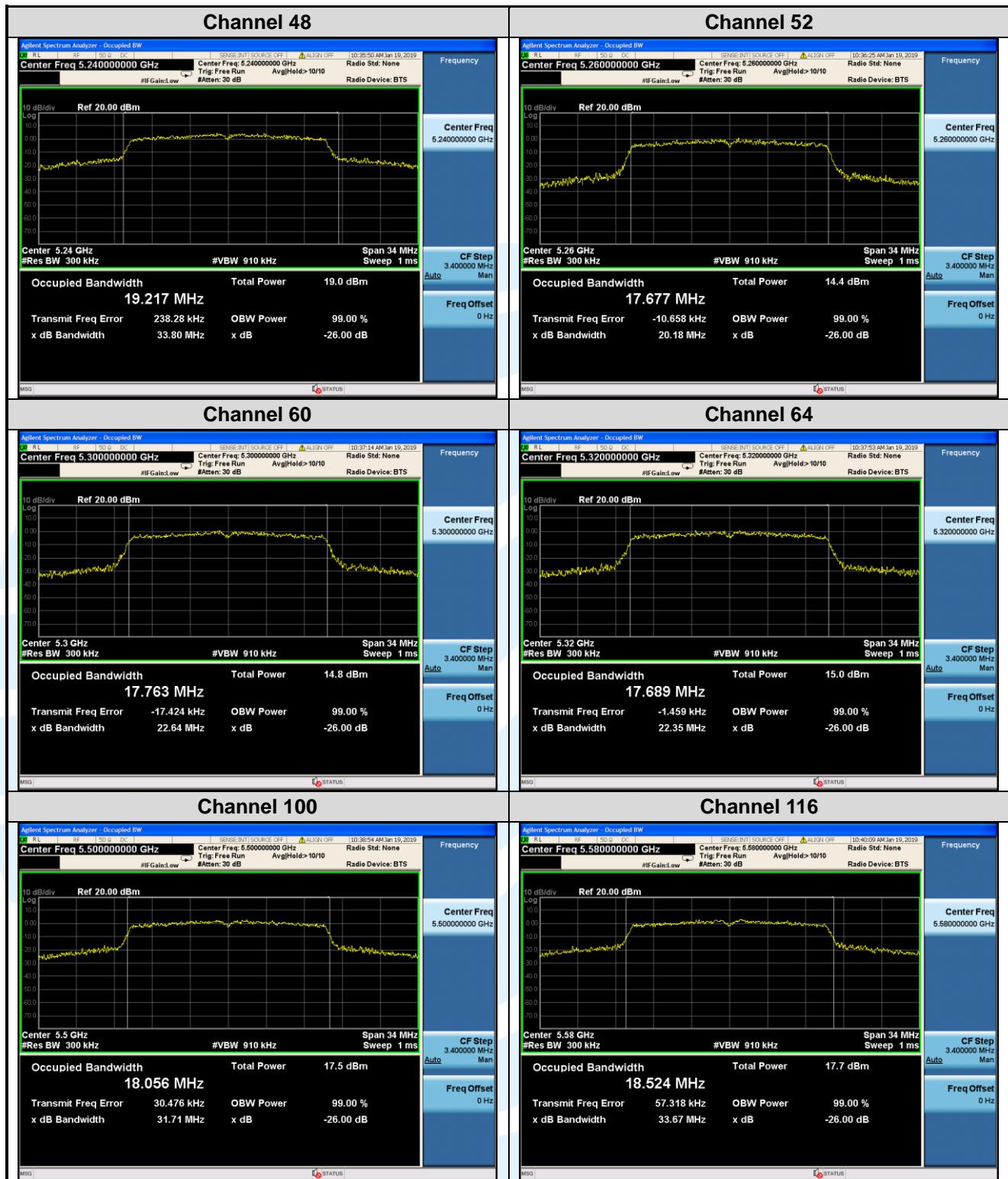
**Test Results:** Pass

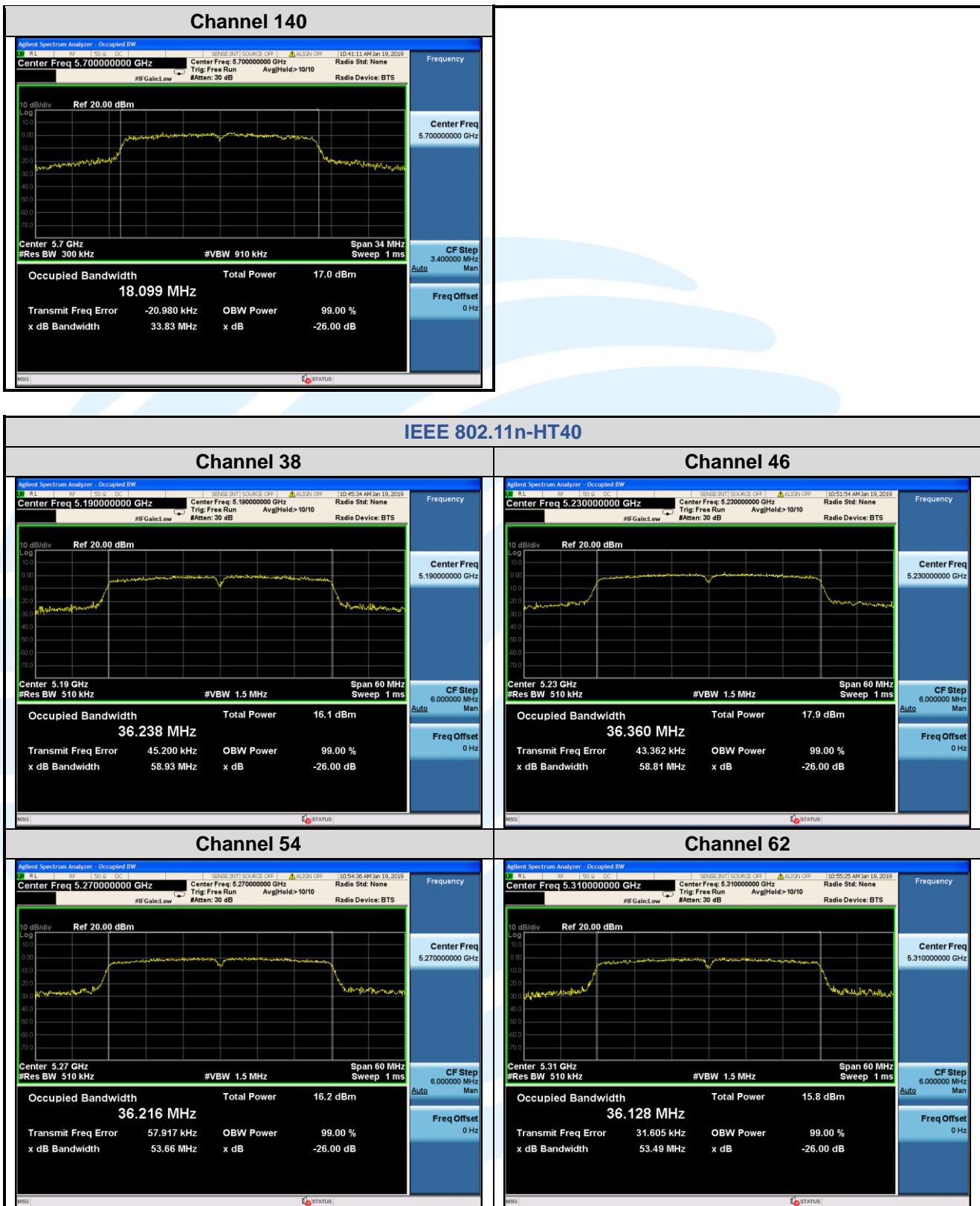
Mode	Channel	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
IEEE 802.11a	36 (5180)	32.94	17.798
	44 (5220)	31.97	17.374
	48 (5240)	32.36	17.540
	52 (5260)	28.67	16.980
	60 (5300)	27.03	16.938
	64 (5320)	28.40	16.993
	100 (5500)	26.77	16.764
	116 (5580)	28.03	16.860
	140 (5700)	24.12	16.866
IEEE 802.11n-HT20	36 (5180)	31.92	18.655
	44 (5220)	33.37	18.941
	48 (5240)	33.80	19.217
	52 (5260)	20.18	17.677
	60 (5300)	22.64	17.763
	64 (5320)	22.35	17.689
	100 (5500)	31.71	18.056
	116 (5580)	33.67	18.524
	140 (5700)	33.83	18.099
IEEE 802.11n-HT40	38 (5190)	58.93	36.238
	46 (5230)	58.81	36.360
	54 (5270)	53.66	36.216
	62 (5310)	53.49	36.128
	102 (5510)	49.92	36.139
	110 (5550)	58.26	36.191
	134 (5670)	54.68	36.147

The test plots as follows:











## 5.4.6 DB BANDWIDTH

**Test Requirement:** FCC 47 CFR Part 15 Subpart C Section 15.407 (e)

**Test Method:** KDB 789033 D02 v02r01Section C.2

**Limit:** Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

**Test Procedure:**

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum Analyzer.

Spectrum analyzer according to the following Settings:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW)  $\geq 3 * \text{RBW}$ .
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

**Test Setup:** Refer to section 4.5.3 for details.

**Instruments Used:** Refer to section 3 for details

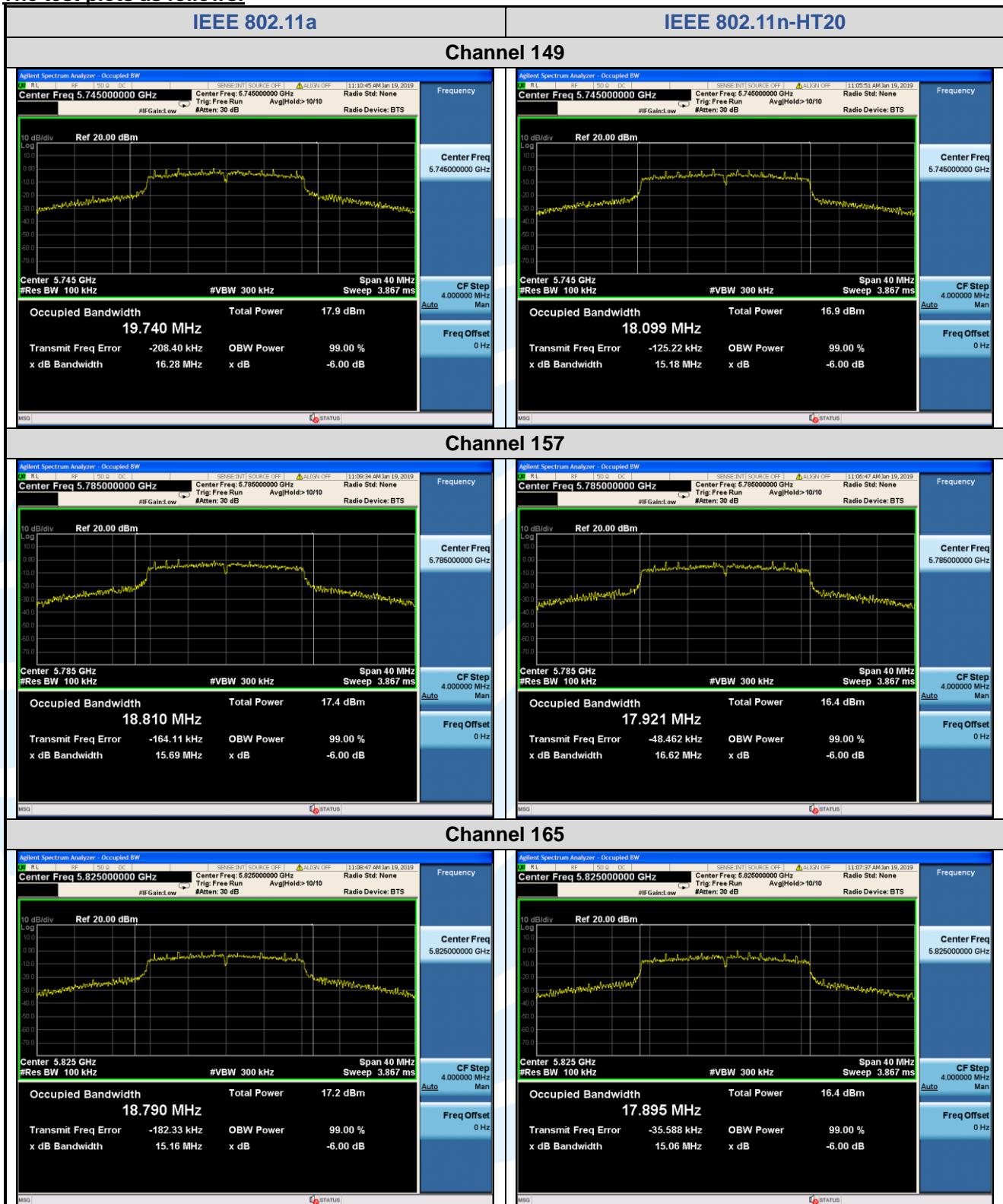
**Test Mode:** Transmitter mode

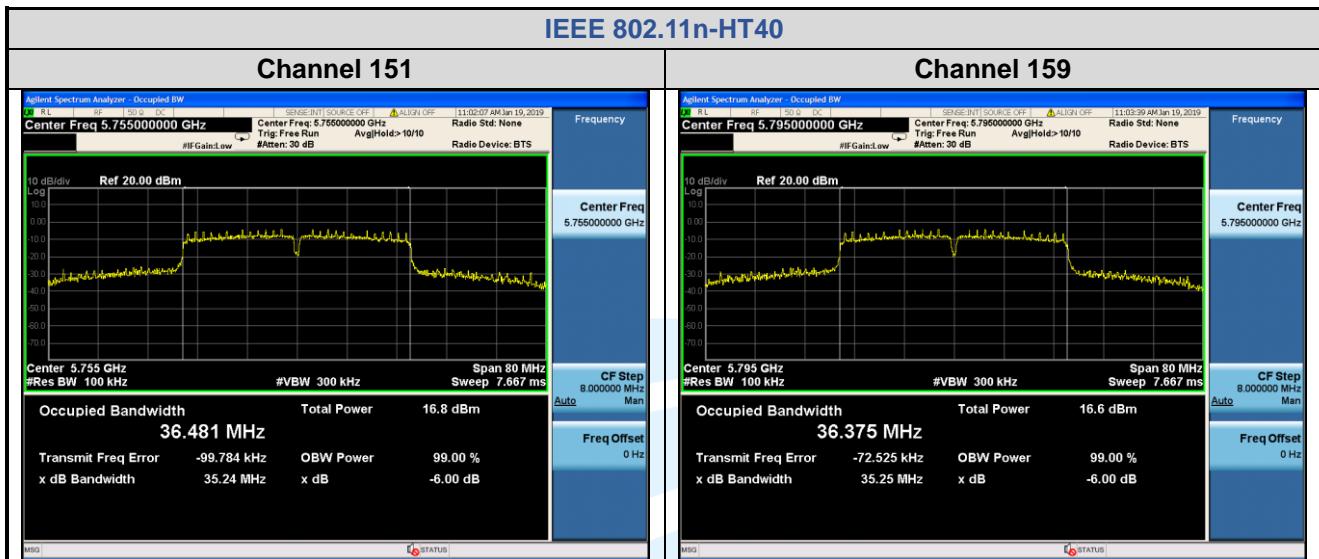
**Test Results:** Pass

**Test Data:**

Mode	Channel/ Frequency (MHz)	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limit	Pass / Fail
IEEE 802.11a	149 (5745)	16.28	19.740	> 500 kHz	Pass
	157 (5785)	15.69	18.810	> 500 kHz	Pass
	165 (5825)	15.16	18.790	> 500 kHz	Pass
IEEE 802.11n-HT20	149 (5745)	18.15	18.099	> 500 kHz	Pass
	157 (5785)	16.62	17.921	> 500 kHz	Pass
	165 (5825)	15.06	17.895	> 500 kHz	Pass
IEEE 802.11n-HT40	151 (5755)	35.24	36.481	> 500 kHz	Pass
	159 (5795)	35.25	36.375	> 500 kHz	Pass

The test plots as follows:





## 5.5 MAXIMUM CONDUCTED OUTPUT POWER

**Test Requirement:** FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)

**Test Method:** KDB 789033 D02 v02r01 Section E.3.a(Method PM)

**Limits:**

1. For the band 5.15-5.25 GHz.
  - (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
  - (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
  - (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
  - (iv) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
2. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
3. For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

**Test Procedure:**

**Shenzhen UnionTrust Quality and Technology Co., Ltd.**

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China  
Tel: +86-755-28230888 Fax: +86-755-28230886 E-mail: info@uttlab.com

[Http://www.uttlab.com](http://www.uttlab.com)

1. Connected the EUT's antenna port to measure device by 10dB attenuator.
2. Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of Tx on burst.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

**Test Setup:** Refer to section 4.5.3 for details.

**Instruments Used:** Refer to section 3 for details

**Test Mode:** Transmitter mode

**Test Results:** Pass

**Test Data:**

#### Antenna gain and the maximum output power limit.

Frequency Band	Antenna Gain (dBi))	Peak Power Limits (dBm)
U-NII-1	0.43	24.00
U-NII-2A	0.45	24.00
U-NII-2C	0.42	24.00
U-NII-3	0.41	30.00

#### For U-NII-1 Band:

Mode	Channel/ Frequency (MHz)	Maximum conducted output power (dBm)		Limit (dBm)	Pass / Fail
		Meas Power	Corr'd Power		
IEEE 802.11a	36 (5180)	10.90	11.03	24	Pass
	44 (5220)	11.49	11.62	24	Pass
	48 (5240)	12.46	12.59	24	Pass
IEEE 802.11n-HT20	36 (5180)	11.52	11.64	24	Pass
	44 (5220)	12.89	13.01	24	Pass
	48 (5240)	12.63	12.75	24	Pass
IEEE 802.11n-HT40	38 (5190)	9.05	9.33	24	Pass
	46 (5230)	9.52	9.80	24	Pass

#### Remark:

1. Corr'd Power = Meas Power + Duty Cycle Factor

#### For U-NII-2A Band:

Mode	Channel/ Frequency (MHz)	Maximum conducted output power (dBm)		Limit (dBm)	Pass / Fail
		Meas Power	Corr'd Power		
IEEE 802.11a	52 (5260)	10.52	10.65	24	Pass
	60 (5300)	10.75	10.88	24	Pass
	64 (5320)	11.25	11.38	24	Pass
IEEE 802.11n-HT20	52 (5260)	8.57	8.69	24	Pass
	60 (5300)	8.52	8.64	24	Pass
	64 (5320)	8.67	8.79	24	Pass
IEEE 802.11n-HT40	54 (5270)	8.75	9.03	24	Pass
	62 (5310)	9.03	9.31	24	Pass

#### Remark:

1. Corr'd Power = Meas Power + Duty Cycle Factor

#### Note:

For IEEE 802.11 a/n, the minimum 26db emission bandwidth is 20.18 MHz

$$11 \text{ dBm} + 10\log_{10}(20.18) = 24.05 \text{ dBm} > 24 \text{ dBm (250mW)}$$

So the 24 dBm limit applicable

#### Shenzhen UnionTrust Quality and Technology Co., Ltd.

**For U-NII-2C Band:**

Mode	Channel/ Frequency (MHz)	Maximum conducted output power (dBm)		Limit (dBm)	Pass / Fail
		Meas Power	Corr'd Power		
IEEE 802.11a	100 (5500)	9.34	9.47	24	Pass
	116 (5580)	8.81	8.94	24	Pass
	140 (5700)	8.01	8.14	24	Pass
IEEE 802.11n-HT20	100 (5500)	10.89	11.01	24	Pass
	116 (5580)	10.41	10.53	24	Pass
	140 (5700)	9.73	9.85	24	Pass
IEEE 802.11n-HT40	102 (5510)	9.63	9.91	24	Pass
	110 (5550)	9.56	9.84	24	Pass
	134 (5670)	8.27	8.55	24	Pass

**Remark:**

1. Corr'd Power = Meas Power + Duty Cycle Factor

**Note:**

For IEEE 802.11 a/n, the minimum 26db emission bandwidth is 24.12 MHz

$$11 \text{ dBm} + 10\log_{10}(24.12) = 24.82 \text{ dBm} > 24 \text{ dBm (250mW)}$$

So the 24 dBm limit applicable

**For U-NII-3 Band:**

Mode	Channel/ Frequency (MHz)	Maximum conducted output power (dBm)		Limit (dBm)	Pass / Fail
		Meas Power	Corr'd Power		
IEEE 802.11a	149 (5745)	10.97	11.10	30	Pass
	157 (5785)	10.91	11.04	30	Pass
	165 (5825)	10.89	11.02	30	Pass
IEEE 802.11n-HT20	149 (5745)	10.04	10.16	30	Pass
	157 (5785)	9.92	10.04	30	Pass
	165 (5825)	9.91	10.03	30	Pass
IEEE 802.11n-HT40	151 (5755)	9.84	10.12	30	Pass
	159 (5795)	9.31	9.59	30	Pass

**Remark:**

1. Corr'd Power = Meas Power + Duty Cycle Factor

## 5.6 PEAK POWER SPECTRAL DENSITY

**Test Requirement:** FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)

**Test Method:** KDB 789033 D02 v02r01 Section F

**Limits:**

1. For the band 5.15-5.25 GHz.
  - (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
    - (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
    - (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
    - (iv) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
2. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
3. For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.