

# FCC TEST REPORT

**Product Name:** Tablet  
**Trade Mark:** BLU  
**Model No.:** M10L PRO  
**Report Number:** 2305265352RFC-4  
**Test Standards:** FCC 47 CFR Part 15 Subpart E  
**FCC ID:** YHLBLUM10LP15  
**Test Result:** PASS  
**Date of Issue:** July 5, 2023

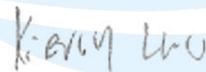
Prepared for:

**BLU Products, Inc.**  
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Prepared by:

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UTTR-RF-FCCPART15.407-V1.2

**Version**

Version No.	Date	Description
V1.0	July 5, 2023	Original

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# 1. GENERAL INFORMATION

## 1.1 CLIENT INFORMATION

<b>Applicant:</b>	BLU Products, Inc.
<b>Address of Applicant:</b>	8600 NW 36th Street, Suite #200 Doral, FL 33166
<b>Manufacturer:</b>	BLU Products, Inc.
<b>Address of Manufacturer:</b>	8600 NW 36th Street, Suite #200 Doral, FL 33166

## 1.2 EUT INFORMATION

### 1.2.1 General Description of EUT

<b>Product Name:</b>	Tablet		
<b>Model No.:</b>	M10L PRO		
<b>Trade Mark:</b>	BLU		
<b>DUT Stage:</b>	Identical Prototype		
<b>EUT Supports Function:</b> (Provided by the customer)	GSM Bands:	GSM850/PCS 1900	
	UTRA Bands:	WCDMA Band II/ Band IV/ Band V	
	E-UTRA Bands:	FDD Band 2/ Band 4/ Band 5/ Band 12/ Band 17/ Band 25 / Band 26 / Band 66/ Band 71 TDD Band 41	
	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth 5.0	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac
	RNSS Band:	1559 MHz to 1610 MHz	GPS
BSR:	VHF Band II	FM	
<b>Software Version:</b>	BLU_M0215_ND_V13.0.02.00_GENERIC_19-05-2023_0231 (Provided by the customer)		
<b>Hardware Version:</b>	Q869_MB_V2.0 (Provided by the customer)		
<b>Sample Received Date:</b>	May 25, 2023		
<b>Sample Tested Date:</b>	May 25, 2023 to June 20, 2023		
<b>Remark:</b>	The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.		

### 1.2.2 Description of Accessories

Adapter	
<b>Model No.:</b>	US-CR-2001
<b>Input:</b>	100-240 V~50/60 Hz 0.3 A
<b>Output:</b>	5.0 V $\overline{=}$ 2000 mA

Cable	
<b>Connector:</b>	USB Cable
<b>Cable Type:</b>	Unshielded without ferrite
<b>Length:</b>	0.5 Meter

Battery	
<b>Model No.:</b>	C12510129500P
<b>Battery Type:</b>	Lithium-ion Polymer Battery
<b>Rated Voltage:</b>	3.8 Vdc
<b>Rated Capacity:</b>	5000 mAh

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### 1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

<b>Frequency Bands:</b>	5150 MHz to 5250 MHz (U-NII-1)		
	5725 MHz to 5850 MHz (U-NII-3)		
<b>Frequency Ranges:</b>	5180 MHz to 5240 MHz		
	5745 MHz to 5825 MHz		
<b>Support Standards:</b>	IEEE 802.11a/n/ac		
<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)		
	IEEE 802.11ac: OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK)		
<b>Channel Spacing:</b>	IEEE 802.11a/n-HT20/ac-VHT20: 20 MHz		
	IEEE 802.11n-HT40/ac-VHT40: 40 MHz		
	IEEE 802.11ac-VHT80: 80 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		
	IEEE 802.11ac-VHT20: Up to MCS8		
	IEEE 802.11ac-VHT40: Up to MCS9		
	IEEE 802.11ac-VHT80: Up to MCS9		
<b>Number of Channels:</b>	5150 MHz to 5250 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40/ac-VHT40 1 for IEEE 802.11ac-VHT80		
	5725 MHz to 5850 MHz: 5 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40/ac-VHT40 1 for IEEE 802.11ac-VHT80		
<b>Antenna Type:</b>	PIFA Antenna		
<b>Antenna Gain:</b> (Provided by the customer)	5150 - 5250 MHz	1.4 dBi	
	5725 - 5850 MHz	1.4 dBi	
<b>Maximum conducted output power (dBm):</b>		<b>U-NII-1</b>	<b>U-NII-3</b>
	IEEE 802.11a:	6.05	7.52
	IEEE 802.11n-HT20:	5.99	7.46
	IEEE 802.11n-HT40:	5.86	7.50
	IEEE 802.11ac-VHT20:	5.95	7.44
	IEEE 802.11ac-VHT40:	5.87	7.47
IEEE 802.11ac-VHT80:	5.73	7.32	
<b>Normal Test Voltage:</b>	3.8 Vdc		

### 1.4 OTHER INFORMATION

Operation Frequency Each of Channel				
	U-NII-1			U-NII-3
IEEE 802.11a, IEEE 802.11n-HT20, IEEE 802.11ac-VHT20	$f = 5000 + 5k, k = 32 + 4n$			$f = 5000 + 5k,$ $k = 145 + 4n$
	$n = 1, \dots, 4$	$n = 5, \dots, 8$	$n = 17, \dots, 27$	$n = 1, \dots, 5$
IEEE 802.11n-HT40, IEEE 802.11ac-VHT40	$f = 5000 + 5k, k = 30 + 8n$			$f = 5000 + 5k,$ $k = 143 + 8n$
	$n = 1, 2$	$n = 1, \dots, 5$	$n = 9, \dots, 13$	$n = 1, 2$
IEEE 802.11ac-VHT80	$f = 5000 + 5k, k = 26 + 16n$			$f = 5000 + 5k,$ $k = 155$
	$n = 1$	$n = 1, 2$	$n = 5, 6$	
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
--	--	--	--	--

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.1 Meter	Applicant

### 1.6 TEST LOCATION

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

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### 1.7 TEST FACILITY

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 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

**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 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

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

**ISED Wireless Device Testing Laboratories**

CAB identifier: CN0032

**FCC Accredited Lab.**

Designation Number: CN1194

Test Firm Registration Number: 259480

**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	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated emission 9kHz-30MHz	± 4.7 dB
4	Radiated emission 30MHz-1GHz	± 4.9 dB
5	Radiated emission 1GHz-18GHz	± 4.8 dB
6	Radiated emission 18GHz-26GHz	± 5.1 dB
7	Radiated emission 26GHz-40GHz	± 5.1 dB
8	Conducted spurious emissions	± 2.7 dB
9	RF Power, Conducted	± 0.68 dB
10	Occupied Bandwidth	± 1.86 %
11	Radio Frequency	5.6 GHz: ± 6.4 x 10 <sup>-8</sup>
12	Transmission Time	± 0.19 %

## 2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart E Test Cases			
Test Item	Test Requirement	Test Method	Result
Antenna Requirement	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
26 dB emission bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(2)(5)	KDB 789033 D02 v02r01 Section C.1	PASS
6 dB bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (e)	KDB 789033 D02 v02r01 Section C.2	PASS
Maximum conducted output power	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
Peak Power Spectral Density	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v02r01 Section F	PASS
Radiated Emissions and Band Edge Measurement	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
Dynamic Frequency Selection	FCC 47 CFR Part 15 Subpart E Section 15.407 (h)	KDB 905462 D03 Client Without DFS New Rules v01r02	N/A (Note 1, 2)
AC Power Line Conducted Emission	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
<p><b>Note:</b></p> <p>1) N/A: In this whole report not applicable.</p> <p>2) This EUT does not support U-NII-2A and U-NII-2C frequency bands.</p>			
<p><b>Disclaimer and Explanations:</b></p> <p>The declared of product specification and data (e.g., antenna gain, RF specification, etc) for EUT presented in the report are provided by the customer, and the customer takes all the responsibilities for the accuracy of product specification.</p>			

### 3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
<input checked="" type="checkbox"/>	3m SAC	ETS-LINDGREN	3M	Euroshiedpn-CT001270-1317	22-Jan-2021	21-Jan-2024
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	3-Nov-2022	2-Nov-2023
<input checked="" type="checkbox"/>	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	14-Apr-2023	13-Apr-2024
<input checked="" type="checkbox"/>	Loop Antenna	ETS-LINDGREN	6502	00202525	21-Nov-2022	20-Nov-2023
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	13-Dec-2022	12-Dec-2023
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103001	13-Dec-2022	12-Dec-2023
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A02960	1-Nov-2022	31-Oct-2023
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	16-Apr-2023	15-Apr-2025
<input checked="" type="checkbox"/>	Pre-amplifier	ETS-LINDGREN	00118385	00201874	1-Nov-2022	31-Oct-2023
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	21-Nov-2022	20-Nov-2023
<input checked="" type="checkbox"/>	Pre-amplifier	ETS-LINDGREN	00118384	00202652	21-Nov-2022	20-Nov-2023
<input checked="" type="checkbox"/>	Band Rejection Filter (5150MHz~5880MHz)	Micro-Tronics	BRM50716	G186	2-Nov-2022	1-Nov-2023
<input checked="" type="checkbox"/>	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
<input checked="" type="checkbox"/>	Receiver	R&S	ESR7	101181	1-Nov-2022	31-Oct-2023
<input checked="" type="checkbox"/>	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	1-Nov-2022	31-Oct-2023
<input checked="" type="checkbox"/>	LISN	R&S	ESH2-Z5	860014/024	1-Nov-2022	31-Oct-2023
<input type="checkbox"/>	LISN	ETS-Lindgren	3816/2SH	00201088	1-Nov-2022	31-Oct-2023
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9 20151119i		

RF Conducted Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
<input checked="" type="checkbox"/>	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	14-Apr-2023	13-Apr-2024
<input checked="" type="checkbox"/>	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	3-Nov-2022	2-Nov-2023
<input type="checkbox"/>	EXG-B RF Analog Signal Generator	KEYSIGHT	N5171B	MY53051777	1-Nov-2022	31-Oct-2023
<input type="checkbox"/>	MXG X-Series RF Vector Signal Generator	KEYSIGHT	N5182B	MY51350267	1-Nov-2022	31-Oct-2023

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## 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	3.8 Vdc	20 to 75
<b>Remark:</b>			
1) NV: Normal Voltage; NT: Normal Temperature			

#### 4.1.2 Record of Normal Environment and Test Sample

Test Item	Temp. (°C)	Relative Humidity (%)	Pressure (kPa)	Sample No.	Tested by
AC Power Line Conducted Emission	23.3	55	99.3	S202305251543-ZJA01/6	Andy Lin
26 dB emission bandwidth	22.8	51	99.3	S202305251543-ZJA05/6	Rain Wang
Maximum conducted output power					
Peak Power Spectral Density					
6 dB bandwidth	21.5	60.7	99.3	S202305251543-ZJA02/6	Fire Huo
Radiated Emissions and Band Edge Measurement					

## 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 IEEE 802.11ac-VHT20	5150 MHz to 5250 MHz	Channel 36	Channel 44	Channel 48
		5180 MHz	5220 MHz	5240 MHz
	5725 MHz to 5850 MHz	Channel 149	Channel 157	Channel 165
		5745 MHz	5785 MHz	5825 MHz
IEEE 802.11n-HT40 IEEE 802.11ac-VHT40	5150 MHz to 5250 MHz	Channel 38	--	Channel 46
		5190 MHz	--	5230 MHz
	5725 MHz to 5850 MHz	Channel 151	--	Channel 159
		5755 MHz	--	5795 MHz
IEEE 802.11ac-VHT80	5150 MHz to 5250 MHz	--	Channel 42	--
		--	5210 MHz	--
	5725 MHz to 5850 MHz	Channel 138	Channel 155	--
		5610 MHz/	5775 MHz	--

### 4.3 EUT TEST STATUS

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

Power Setting (Provided by the customer)		
Mode	U-NII-1	U-NII-3
IEEE 802.11a	11	11
IEEE 802.11n-HT20	11	11
IEEE 802.11n-HT40	11	11
IEEE 802.11ac-VHT20	11	11
IEEE 802.11ac-VHT40	11	11
IEEE 802.11ac-VHT80	11	11

Test Software (Provided by the customer)
Engineering mode

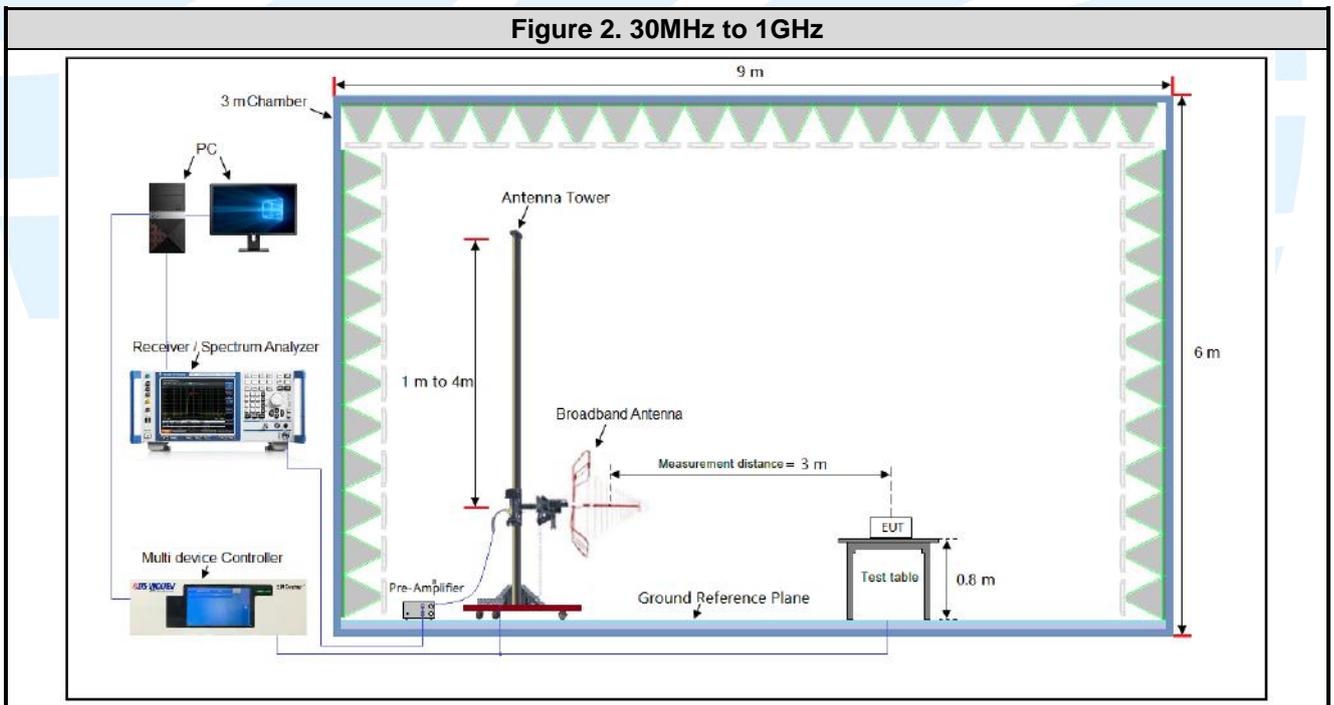
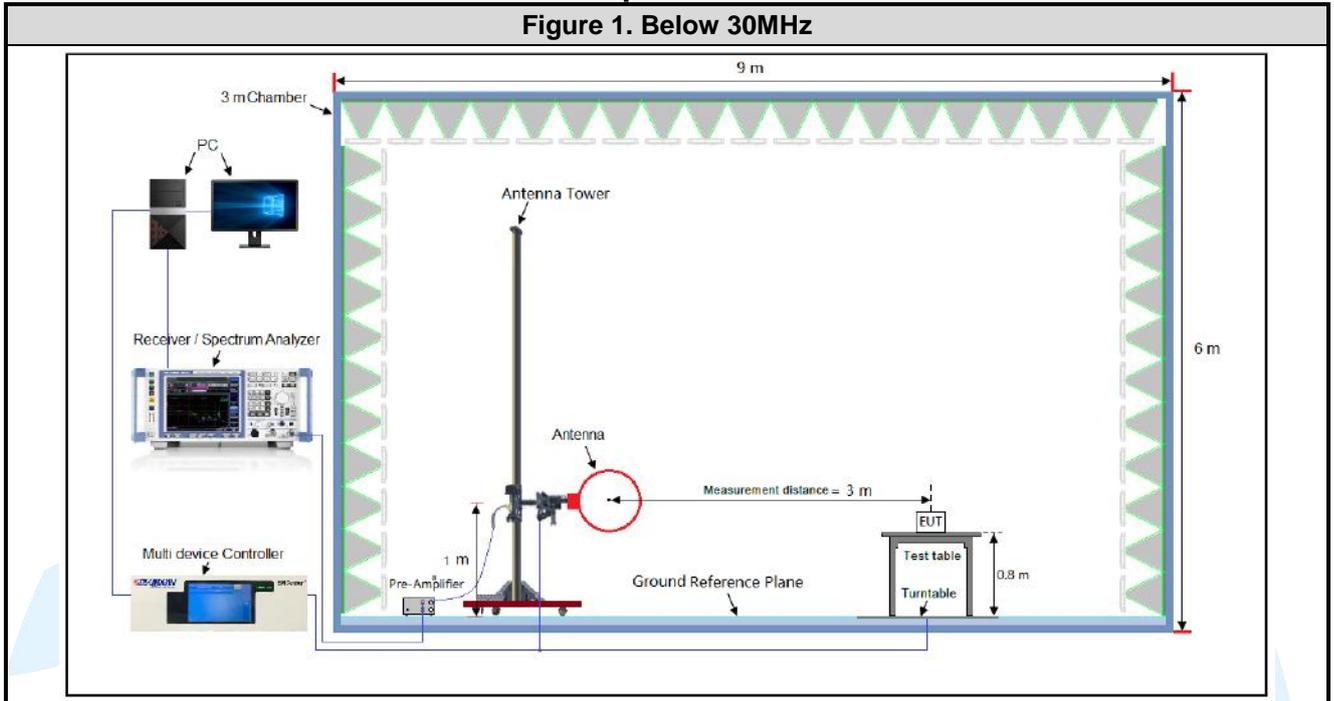
### 4.4 PRE-SCAN

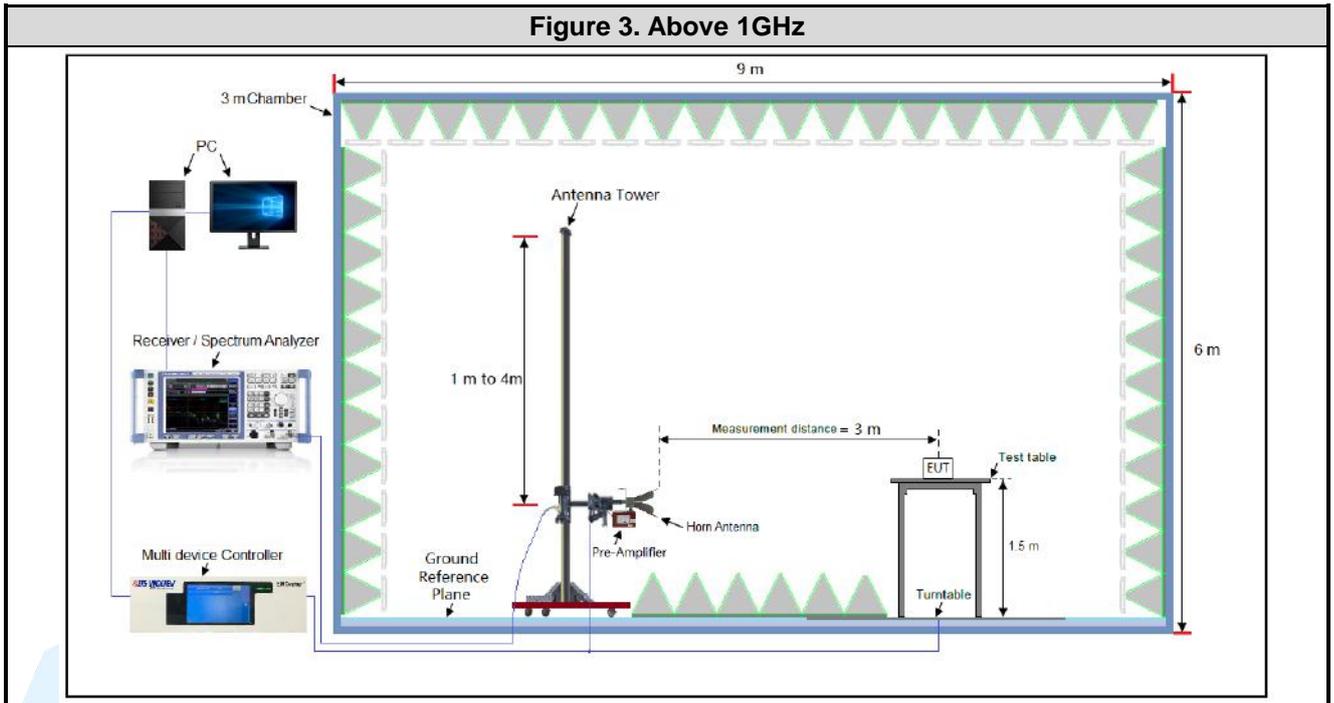
Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Following data rate was (were) selected for the final test as listed below

Mode	Worst-case data rates
IEEE 802.11a	6 Mbps
IEEE 802.11n-HT20	MCS0
IEEE 802.11n-HT40	MCS0
IEEE 802.11ac-VHT20	MCS0
IEEE 802.11ac-VHT40	MCS0
IEEE 802.11ac-VHT80	MCS0

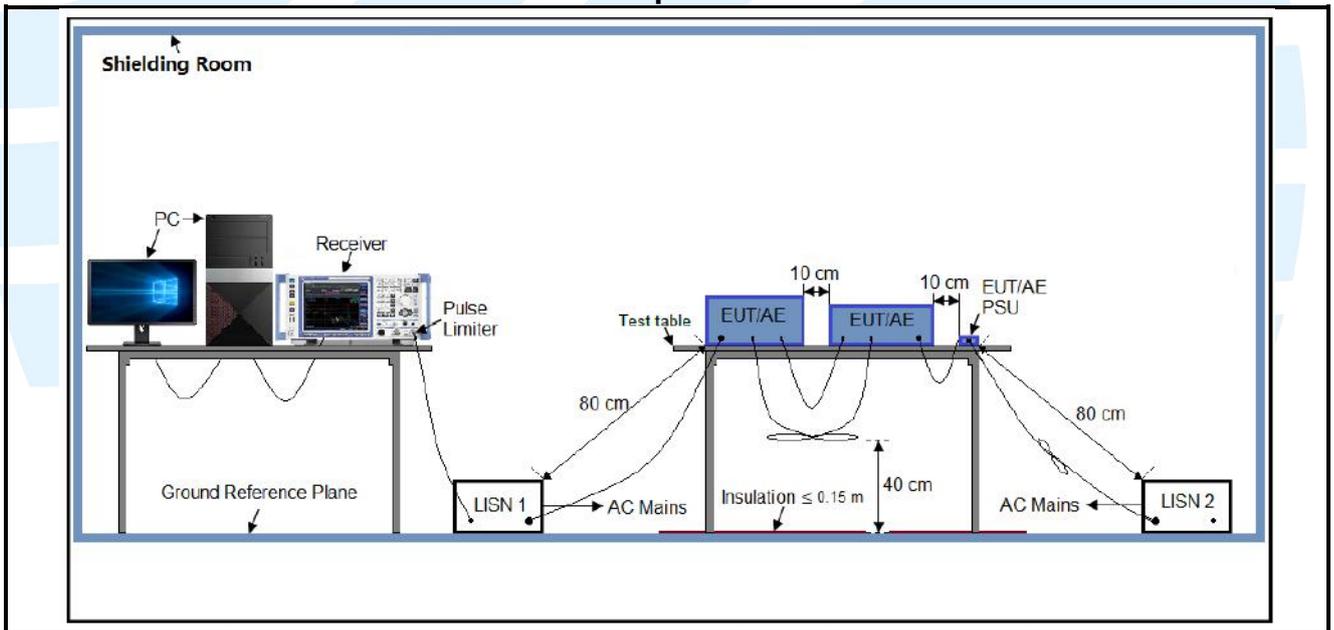
## 4.5 TEST SETUP

### 4.5.1 For Radiated Emissions test setup

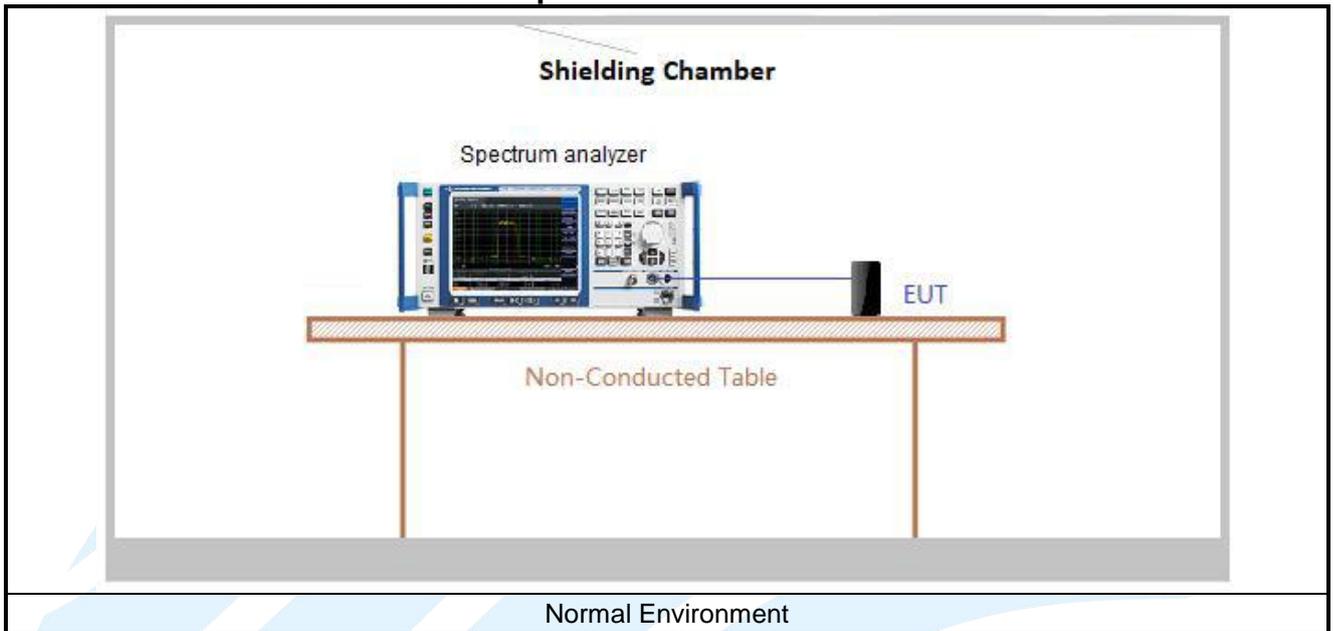




**4.5.2 For Conducted Emissions test setup**



### 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 orientation.

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.

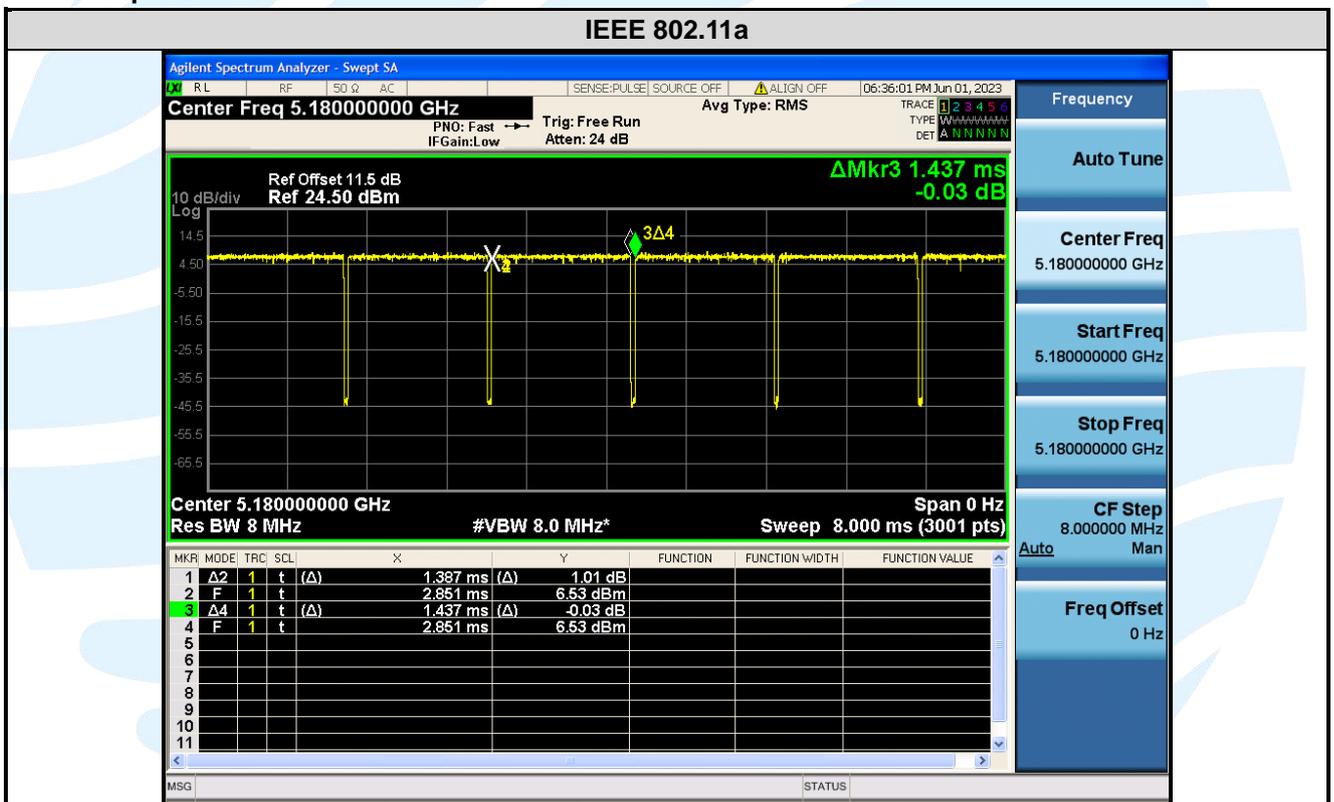
**Test Results**

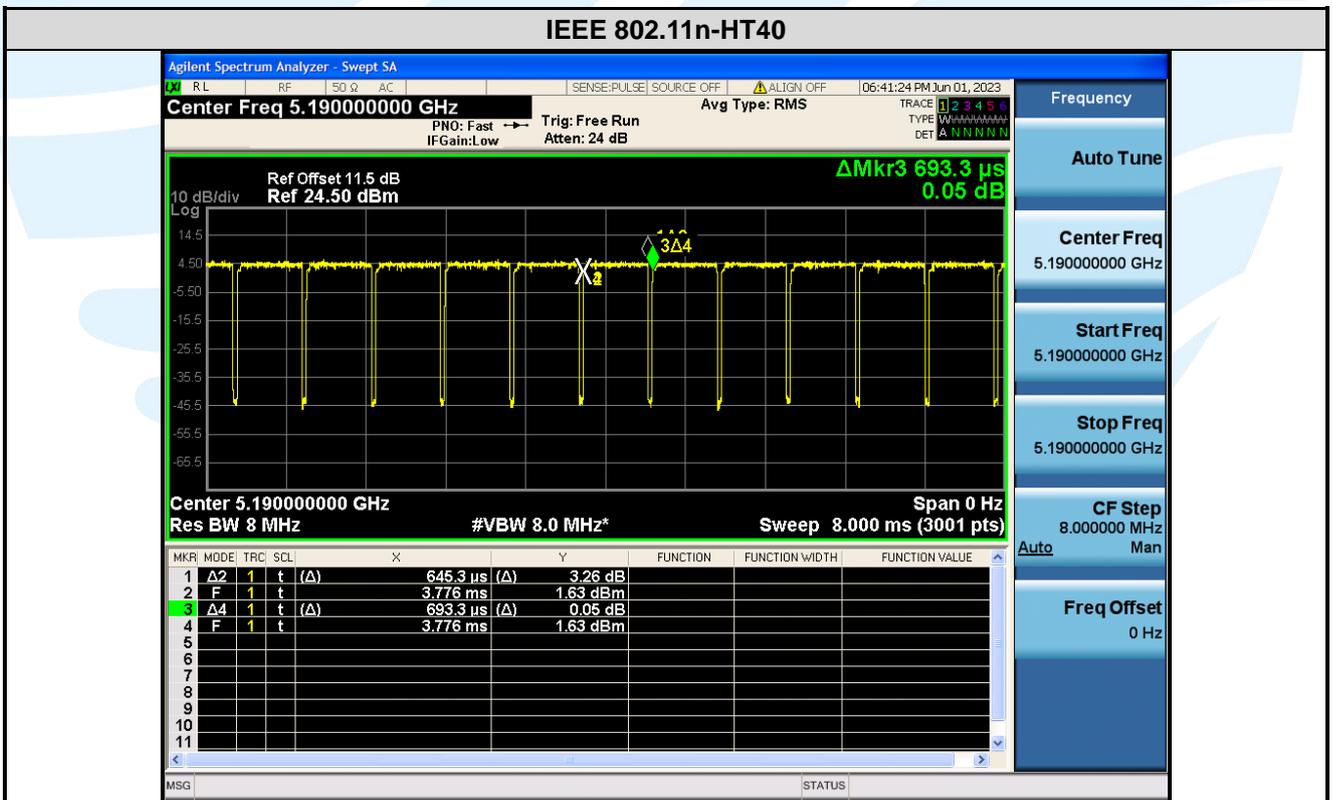
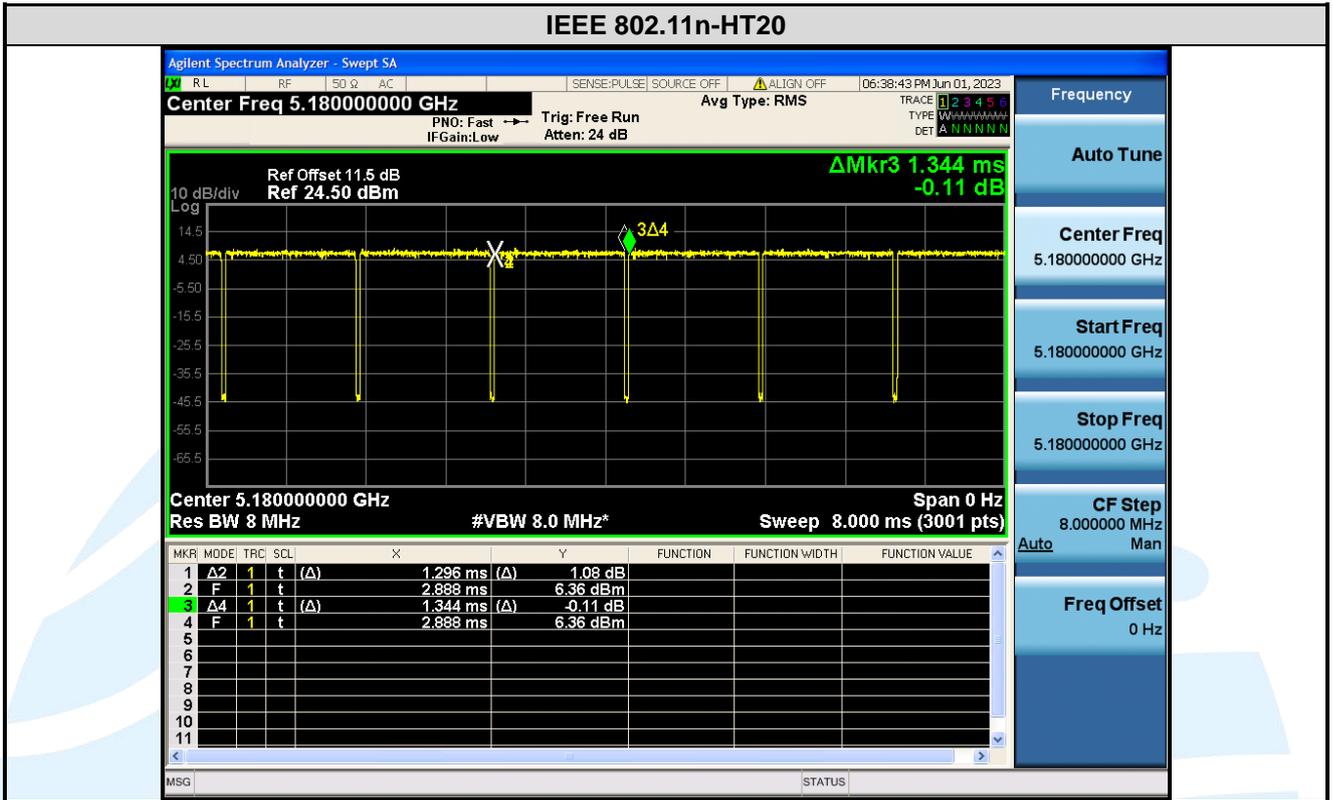
Mode	Data Rates	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/T Minimum VBW (kHz)
IEEE 802.11a	6 Mbps	1.387	1.437	0.97	96.52	0.15	0.72
IEEE 802.11n-HT20	MCS 0	1.296	1.344	0.96	96.43	0.16	0.77
IEEE 802.11n-HT40	MCS 0	0.645	0.693	0.93	93.08	0.31	1.55
IEEE 802.11ac-VHT20	MCS 0	1.309	1.357	0.96	96.46	0.16	0.76
IEEE 802.11ac-VHT40	MCS 0	0.651	0.696	0.93	93.49	0.29	1.54
IEEE 802.11ac-VHT80	MCS 0	0.324	0.368	0.88	88.04	0.55	3.09

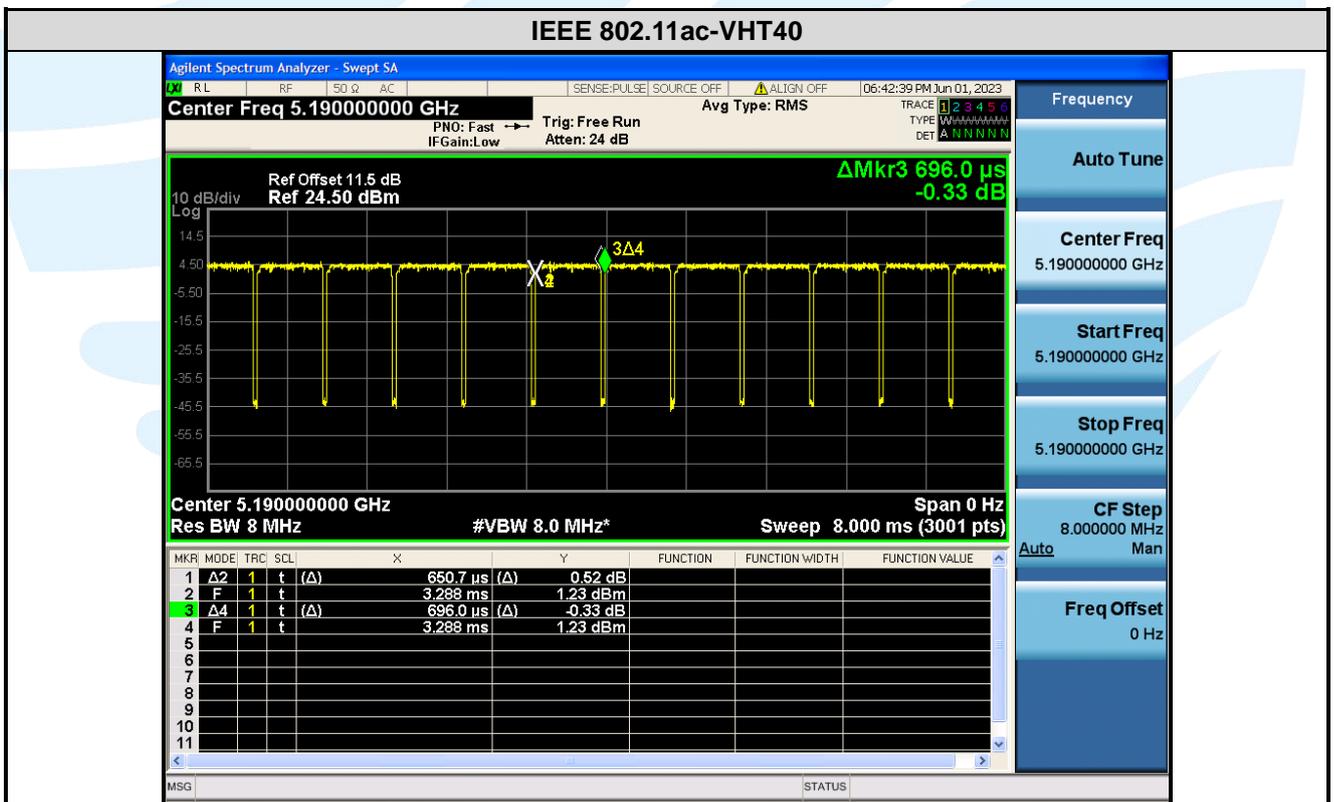
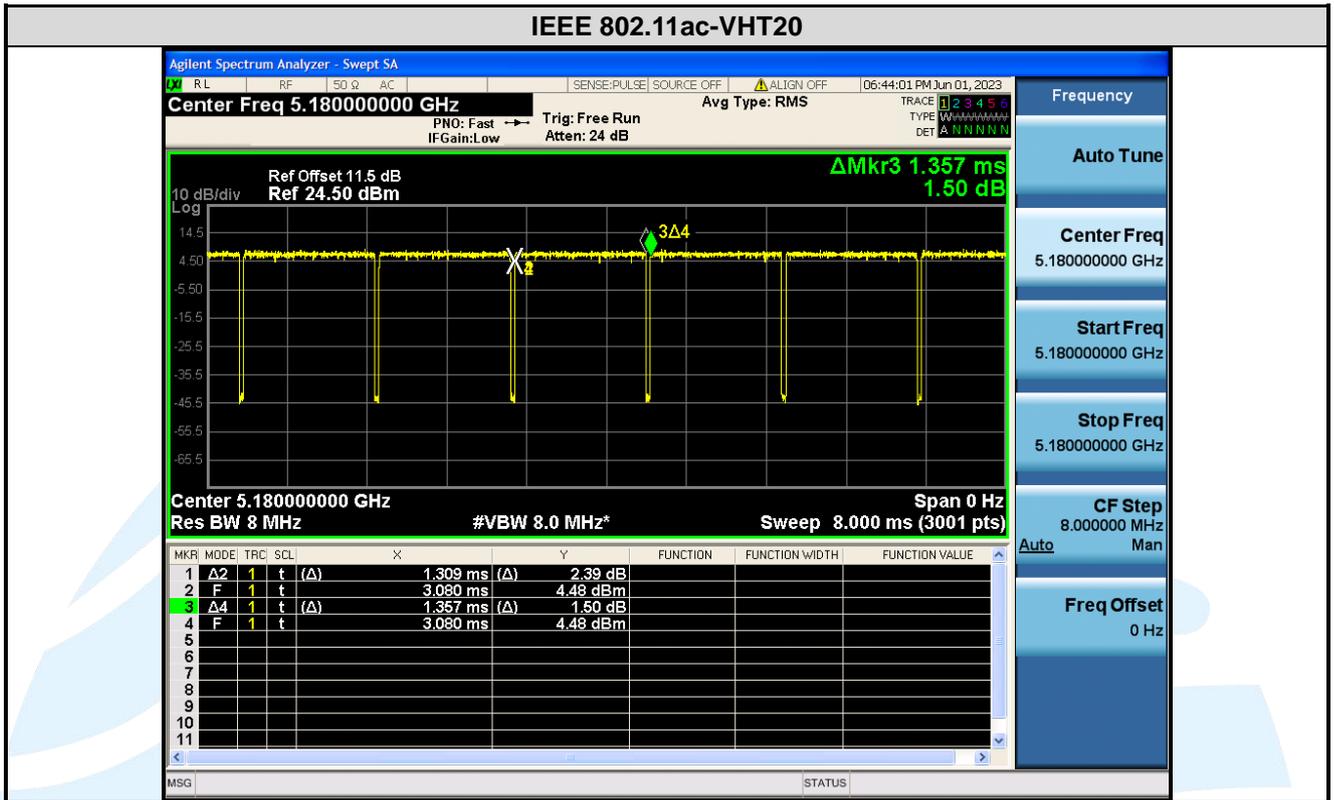
**Remark:**

- 1) Duty cycle= On Time/ Period;
- 2) Duty Cycle factor = 10 \* log(1/ Duty cycle);

The test plots as follows







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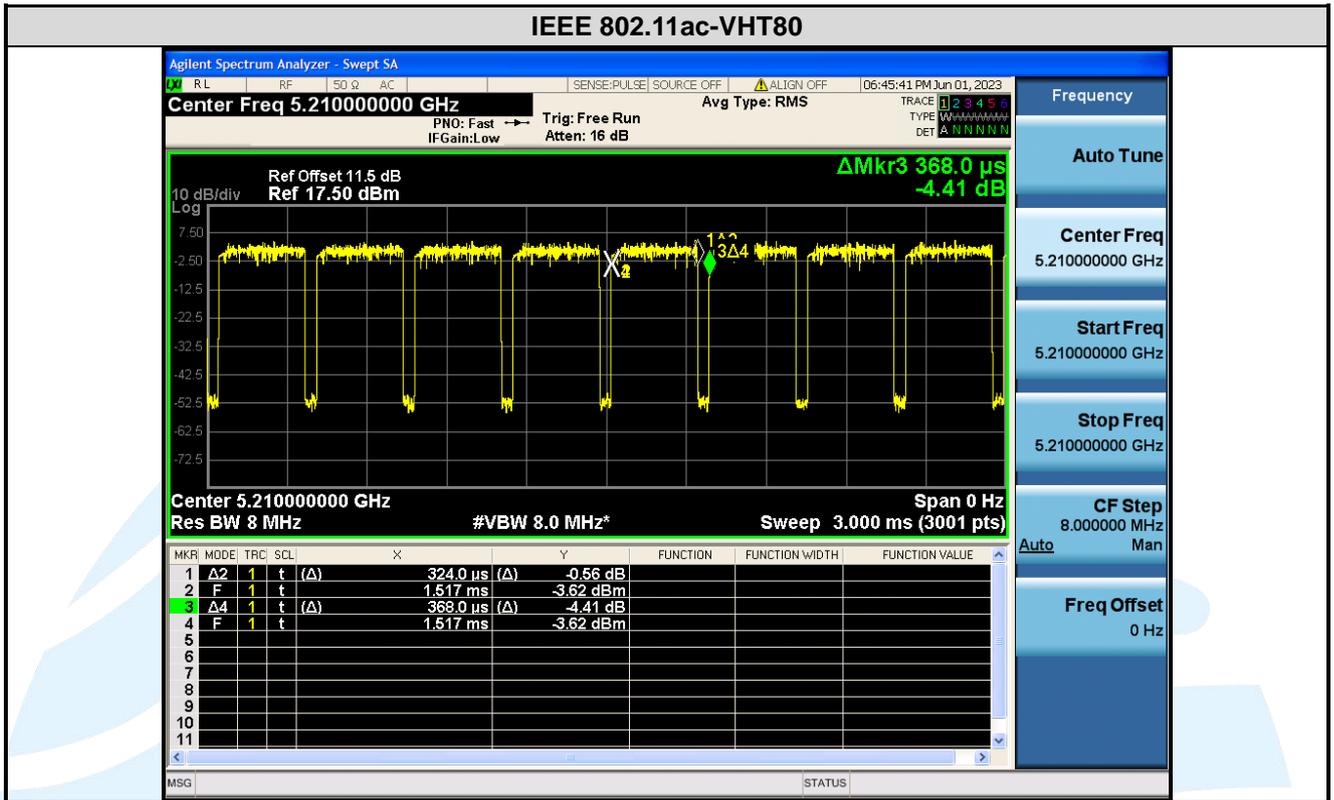
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## 5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

### 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

### 5.2 ANTENNA REQUIREMENT

Standard Requirement
<p><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.</p> <p><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 by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>
<p><b>EUT Antenna:</b> Antenna in the interior of the equipment and no consideration of replacement. The max gain of the antenna is 1.4 dBi.</p>

### 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 Mode:** Link mode

**Test Results:** Please refer to Appendix A

## 5.46 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)  $\geq 3 * RBW$ .

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:** Link mode

**Test Results:** Please refer to Appendix A

## 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.

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**Test Procedure:**

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	1.4	24.0
U-NII-3	1.4	30.0

**For U-NII-1 Band:**

Mode	Channel/ Frequency (MHz)	Maximum conducted output power (dBm)		Limit (dBm)	Result
		Meas Power	Corr'd Power		
IEEE 802.11a	36 (5180)	5.90	6.05	24	Pass
	44 (5220)	5.57	5.72	24	Pass
	48 (5240)	5.49	5.64	24	Pass
IEEE 802.11n-HT20	36 (5180)	5.83	5.99	24	Pass
	44 (5220)	5.49	5.65	24	Pass
	48 (5240)	5.31	5.47	24	Pass
IEEE 802.11n-HT40	38 (5190)	5.55	5.86	24	Pass
	46 (5230)	5.23	5.54	24	Pass
IEEE 802.11ac-VHT20	36 (5180)	5.79	5.95	24	Pass
	44 (5220)	5.47	5.63	24	Pass
	48 (5240)	5.42	5.58	24	Pass
IEEE 802.11ac-VHT40	38 (5190)	5.58	5.87	24	Pass
	46 (5230)	5.23	5.52	24	Pass
IEEE 802.11ac-VHT80	42 (5210)	5.18	5.73	24	Pass

**Remark:**

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

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

Mode	Channel/ Frequency (MHz)	Maximum conducted output power (dBm)		Limit (dBm)	Result
		Meas Power	Corr'd Power		
IEEE 802.11a	149 (5745)	7.33	7.48	30	Pass
	157 (5785)	7.34	7.49	30	Pass
	165 (5825)	7.37	7.52	30	Pass
IEEE 802.11n-HT20	149 (5745)	7.13	7.29	30	Pass
	157 (5785)	7.16	7.32	30	Pass
	165 (5825)	7.30	7.46	30	Pass
IEEE 802.11n-HT40	151 (5755)	7.03	7.34	30	Pass
	159 (5795)	7.19	7.50	30	Pass
IEEE 802.11ac-VHT20	149 (5745)	7.17	7.33	30	Pass
	157 (5785)	7.25	7.41	30	Pass
	165 (5825)	7.28	7.44	30	Pass
IEEE 802.11ac-VHT40	151 (5755)	7.01	7.30	30	Pass
	159 (5795)	7.18	7.47	30	Pass
IEEE 802.11ac-VHT80	155 (5775)	6.77	7.32	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.

**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:

**1. For U-NII-1 band:**

Using method SA-2

- a) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- b) Set RBW = 1 MHz, Set VBW ≥ 3 RBW, Detector = RMS
- c) Sweep time = auto, trigger set to “free run”.
- d) Trace average at least 100 traces in power averaging mode.
- e) Record the max value and add 10 log (1/duty cycle)

**2. For U-NII-3 band:**

- a) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- b) Set RBW = 500 kHz, Set VBW ≥ 3 RBW, Detector = RMS
- c) Use the peak marker function to determine the maximum power level in any 500 kHz band segment within the fundamental EBW.
- d) Sweep time = auto, trigger set to “free run”.
- e) Trace average at least 100 traces in power averaging mode.
- f) Record the max value and add 10 log (1/duty cycle)

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:** Link mode

**Test Results:** Please refer to Appendix A

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

Frequency Band	Antenna Gain (dBi)	PSD Limits (dBm/MHz or dBm/500kHz)
U-NII-1	1.4	11.0
U-NII-3	1.4	30.0

## 5.7 RADIATED EMISSIONS AND BAND EDGE MEASUREMENT

**Test Requirement:** 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

**Test Method:** KDB 789033 D02 v02r01 Section G.3, G.4, G.5, and G.6

**Receiver Setup:**

Frequency	RBW
0.009 MHz-0.150 MHz	200/300 kHz
0.150 MHz -30 MHz	9/10 kHz
30 MHz-1 GHz	100/120 kHz
Above 1 GHz	1 MHz

**Limits:**

### 1. Limits of Radiated Emission and Band edge Measurement

Radiated emissions that fall in the restricted bands must comply with the general emissions limits in 15.209(a) as below table. Other emissions shall be at least 20 dB below the highest level of the desired power.

Frequency	Field strength (microvolt/meter)	Limit (dBµV/m)	Remark	Measurement distance (m)
0.009 MHz-0.490 MHz	2400/F(kHz)	--	--	300
0.490 MHz-1.705 MHz	24000/F(kHz)	--	--	30
1.705 MHz-30 MHz	30	--	--	30
30 MHz-88 MHz	100	40.0	Quasi-peak	3
88 MHz-216 MHz	150	43.5	Quasi-peak	3
216 MHz-960 MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1 GHz	500	54.0	Average	3

**Remark:**

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

### 2. Limits of Unwanted Emission Out of the Restricted Bands

Applicable To	Limit	
789033 D02 General U-NII Test Procedures New Rules v01r04	Field Strength at 3 m	
	PK: 74 (dBµV/m)	AV: 54 (dBµV/m)
Applicable To	EIRP Limit	Equivalent Field Strength at 3 m
FCC Part 15.407 (b)(1)	PK: -27 (dBm/MHz)	PK: 74 (dBµV/m)
FCC Part 15.407 (b)(2)	PK: -27 (dBm/MHz)	PK: 74 (dBµV/m)
FCC Part 15.407 (b)(3)	PK: -27 (dBm/MHz)	PK: 68.2 (dBµV/m)
FCC Part 15.407 (b)(4)	27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;	PK: 68.2 (dBµV/m)
	15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;	
	10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges;	
	-27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.	

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**Test Setup:** Refer to section 4.5.1 for details.

**Test Procedures:**

1. The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
6. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

**Remark:**

- a) The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
- b) The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
- c) The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for RMS Average (Duty cycle < 98 %) for Average detection (AV) at frequency above 1 GHz, then the measurement results was added to a correction factor ( $10 \log(1/\text{duty cycle})$ ).
- d) The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle  $\geq 98 \%$ ) or  $\geq 1/T$ (duty cycle is < 98%) for Average detection (AV) at frequency above 1 GHz.
- e) All modes of operation were investigated and the worst-case emissions are reported.

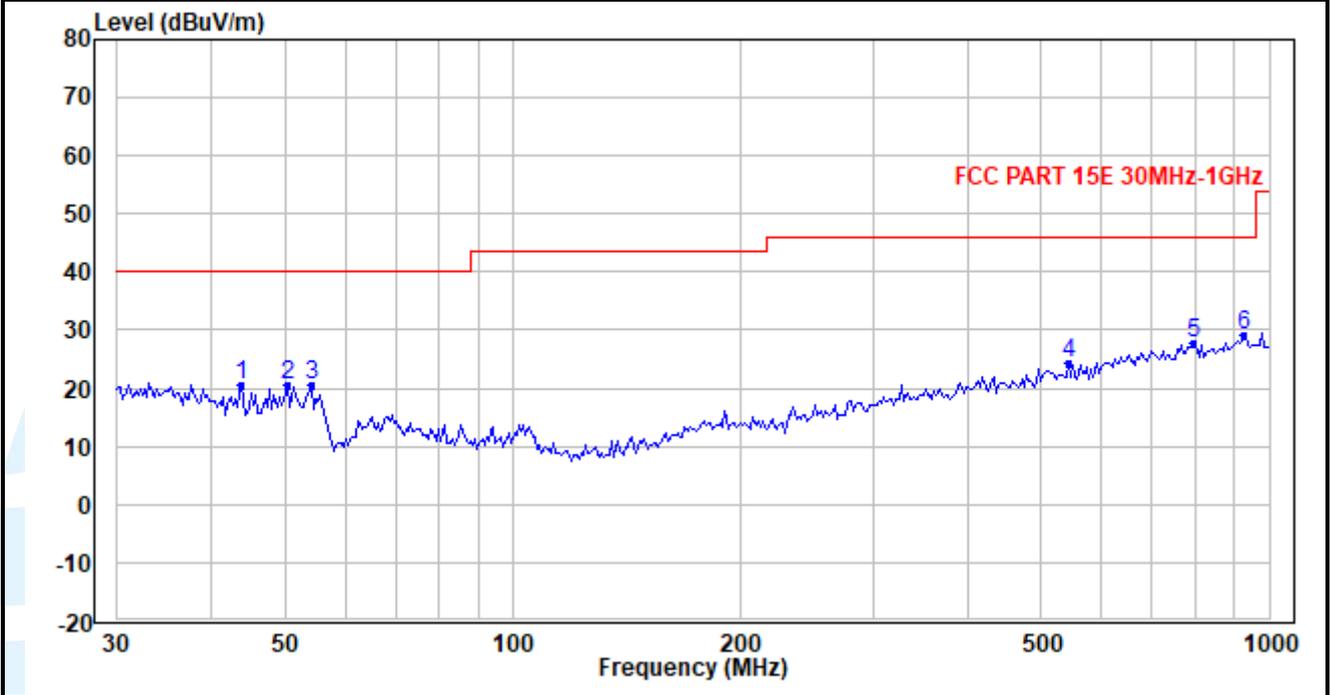
**Equipment Used:** Refer to section 3 for details.

**Test Result:** Pass

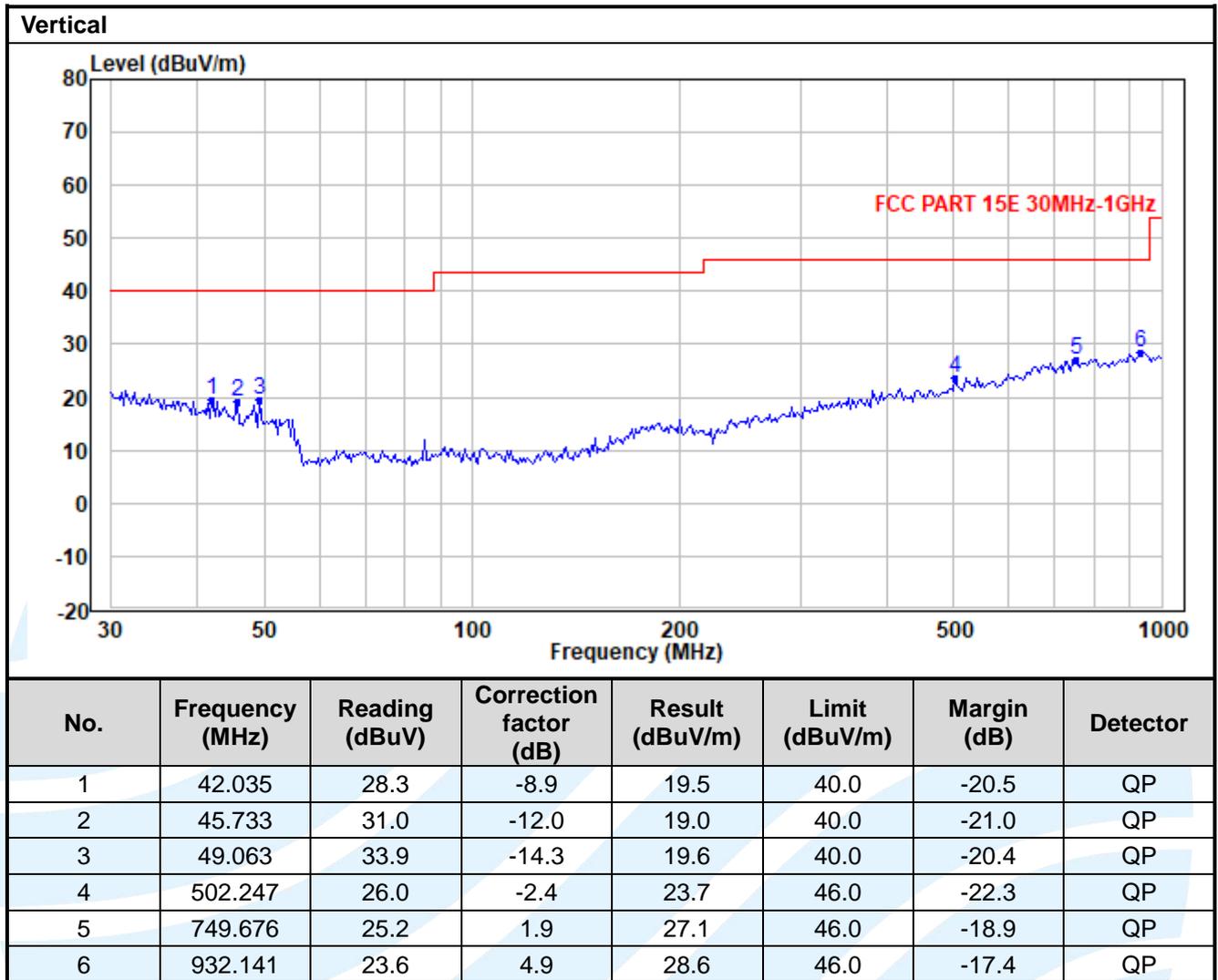
**The measurement data as follows:**

**Radiated Emission Test Data (9 kHz ~ 30 MHz):**  
 The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

**Radiated Emission Test Data (30 MHz ~ 1 GHz):**  
**Worst-Case Configuration**  
**Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	43.845	31.1	-10.5	20.6	40.0	-19.4	QP
2	50.461	35.5	-14.9	20.6	40.0	-19.4	QP
3	54.135	37.0	-16.3	20.6	40.0	-19.4	QP
4	542.61	26.0	-1.8	24.2	46.0	-21.8	QP
5	793.028	24.8	3.0	27.8	46.0	-18.2	QP
6	925.613	24.3	4.8	29.1	46.0	-16.9	QP



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Radiated Emission Test Data (Above 1GHz): Worst-Case Configuration								
No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Antenna Polaxis
<b>IEEE 802.11a_Channel 36</b>								
1	10360	41.2	6.2	47.5	68.2	-20.7	Peak	Horizontal
2	10360	28.2	6.2	34.4	54	-19.6	Average	Horizontal
3	15540	37.5	11.3	48.7	74	-25.3	Peak	Horizontal
4	15540	24.0	11.3	35.3	54	-18.7	Average	Horizontal
5	10360	41.6	6.2	47.8	68.2	-20.4	Peak	Vertical
6	10360	28.3	6.2	34.5	54	-19.5	Average	Vertical
7	15540	38.5	11.3	49.8	74	-24.2	Peak	Vertical
8	15540	25.2	11.3	36.5	54	-17.5	Average	Vertical
<b>IEEE 802.11a_Channel 44</b>								
1	10440	39.6	6.3	45.9	68.2	-22.3	Peak	Horizontal
2	10440	28.4	6.3	34.7	54	-19.3	Average	Horizontal
3	15660	37.0	11.4	48.4	74	-25.6	Peak	Horizontal
4	15660	24.6	11.4	36.0	54	-18.0	Average	Horizontal
5	10440	39.8	6.3	46.1	68.2	-22.1	Peak	Vertical
6	10440	28.4	6.3	34.7	54	-19.3	Average	Vertical
7	15660	37.4	11.4	48.8	74	-25.2	Peak	Vertical
8	15660	24.6	11.4	36.0	54	-18.0	Average	Vertical
<b>IEEE 802.11a_Channel 48</b>								
1	10480	40.6	6.3	47.0	68.2	-21.2	Peak	Horizontal
2	10480	28.3	6.3	34.6	54	-19.4	Average	Horizontal
3	15720	38.8	11.5	50.3	74	-23.7	Peak	Horizontal
4	15720	23.9	11.5	35.3	54	-18.7	Average	Horizontal
5	10480	39.9	6.3	46.2	68.2	-22.0	Peak	Vertical
6	10480	26.9	6.3	33.2	54	-20.8	Average	Vertical
7	15720	36.7	11.5	48.2	74	-25.8	Peak	Vertical
8	15720	23.9	11.5	35.3	54	-18.7	Average	Vertical
<b>IEEE 802.11a_Channel 149</b>								
1	11490	40.7	7.1	47.8	74	-26.2	Peak	Horizontal
2	11490	26.4	7.1	33.5	54	-20.5	Average	Horizontal
3	17235	35.0	13.1	48.1	68.2	-20.1	Peak	Horizontal
4	17235	22.7	13.1	35.8	54	-18.2	Average	Horizontal
5	11490	40.9	7.1	48.0	74	-26.0	Peak	Vertical
6	11490	24.3	7.1	31.4	54	-22.6	Average	Vertical
7	17235	34.9	13.1	48.0	68.2	-20.2	Peak	Vertical
8	17235	22.6	13.1	35.7	54	-18.3	Average	Vertical

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No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Antenna Polaxis
<b>IEEE 802.11a_Channel 157</b>								
1	11570	39.5	7.2	46.7	74	-27.3	Peak	Horizontal
2	11570	26.6	7.2	33.8	54	-20.2	Average	Horizontal
3	17355	37.8	13.3	51.1	68.2	-17.1	Peak	Horizontal
4	17355	23.3	13.3	36.6	54	-17.4	Average	Horizontal
5	11570	39.1	7.2	46.3	74	-27.7	Peak	Vertical
6	11570	25.9	7.2	33.1	54	-20.9	Average	Vertical
7	17355	35.4	13.3	48.7	68.2	-19.5	Peak	Vertical
8	17355	23.1	13.3	36.4	54	-17.6	Average	Vertical
<b>IEEE 802.11a_Channel 165</b>								
1	11650	38.6	7.3	45.9	74	-28.1	Peak	Horizontal
2	11650	27.1	7.3	34.4	54	-19.6	Average	Horizontal
3	17475	35.5	13.5	49.0	68.2	-19.2	Peak	Horizontal
4	17475	22.8	13.5	36.3	54	-17.7	Average	Horizontal
5	11650	41.9	7.3	49.2	74	-24.8	Peak	Vertical
6	11650	27.1	7.3	34.4	54	-19.6	Average	Vertical
7	17475	34.6	13.5	48.0	68.2	-20.2	Peak	Vertical
8	17475	22.8	13.5	36.3	54	-17.7	Average	Vertical

<b>Radiated Emission Test Data (Above 1GHz): Worst-Case Configuration</b>								
No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Antenna Polaxis
<b>IEEE 802.11n-HT20_Channel 36</b>								
1	10360	41.1	6.2	47.3	68.2	-20.9	Peak	Horizontal
2	10360	28.3	6.2	34.6	54	-19.4	Average	Horizontal
3	15540	37.4	11.3	48.7	74	-25.3	Peak	Horizontal
4	15540	24.4	11.3	35.7	54	-18.3	Average	Horizontal
5	10360	40.7	6.2	46.9	68.2	-21.3	Peak	Vertical
6	10360	28.2	6.2	34.4	54	-19.6	Average	Vertical
7	15540	38.0	11.3	49.3	74	-24.7	Peak	Vertical
8	15540	24.2	11.3	35.5	54	-18.5	Average	Vertical
<b>IEEE 802.11n-HT20_Channel 44</b>								
1	10440	40.0	6.3	46.3	68.2	-21.9	Peak	Horizontal
2	10440	28.5	6.3	34.8	54	-19.2	Average	Horizontal
3	15660	37.2	11.4	48.6	74	-25.4	Peak	Horizontal
4	15660	24.7	11.4	36.1	54	-17.9	Average	Horizontal
5	10440	40.1	6.3	46.4	68.2	-21.8	Peak	Vertical
6	10440	28.3	6.3	34.6	54	-19.4	Average	Vertical
7	15660	37.2	11.4	48.6	74	-25.4	Peak	Vertical
8	15660	24.5	11.4	35.9	54	-18.1	Average	Vertical

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No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Antenna Polaxis
<b>IEEE 802.11n-HT20_Channel 48</b>								
1	10480	39.6	6.3	45.9	68.2	-22.3	Peak	Horizontal
2	10480	28.1	6.3	34.5	54	-19.5	Average	Horizontal
3	15720	36.3	11.5	47.8	74	-26.2	Peak	Horizontal
4	15720	24.0	11.5	35.5	54	-18.5	Average	Horizontal
5	10480	39.4	6.3	45.7	68.2	-22.5	Peak	Vertical
6	10480	28.2	6.3	34.5	54	-19.5	Average	Vertical
7	15720	36.8	11.5	48.3	74	-25.7	Peak	Vertical
8	15720	23.9	11.5	35.4	54	-18.6	Average	Vertical
<b>IEEE 802.11n-HT20_Channel 149</b>								
1	11490	39.1	7.1	46.2	74	-27.8	Peak	Horizontal
2	11490	26.2	7.1	33.3	54	-20.7	Average	Horizontal
3	17235	34.0	13.1	47.1	68.2	-21.1	Peak	Horizontal
4	17235	22.5	13.1	35.6	54	-18.4	Average	Horizontal
5	11490	38.8	7.1	45.9	74	-28.1	Peak	Vertical
6	11490	26.1	7.1	33.2	54	-20.8	Average	Vertical
7	17235	34.1	13.1	47.3	68.2	-20.9	Peak	Vertical
8	17235	22.3	13.1	35.5	54	-18.5	Average	Vertical
<b>IEEE 802.11n-HT20_Channel 157</b>								
1	11570	38.4	7.2	45.6	74	-28.4	Peak	Horizontal
2	11570	27.5	7.2	34.7	54	-19.3	Average	Horizontal
3	17355	35.9	13.3	49.2	68.2	-19.0	Peak	Horizontal
4	17355	23.1	13.3	36.4	54	-17.6	Average	Horizontal
5	11570	39.8	7.2	47.0	74	-27.0	Peak	Vertical
6	11570	26.0	7.2	33.2	54	-20.8	Average	Vertical
7	17355	35.2	13.3	48.5	68.2	-19.7	Peak	Vertical
8	17355	23.0	13.3	36.3	54	-17.7	Average	Vertical
<b>IEEE 802.11n-HT20_Channel 165</b>								
1	11650	39.0	7.3	46.3	74	-27.7	Peak	Horizontal
2	11650	26.5	7.3	33.8	54	-20.2	Average	Horizontal
3	17475	35.0	13.5	48.4	68.2	-19.8	Peak	Horizontal
4	17475	22.9	13.5	36.4	54	-17.6	Average	Horizontal
5	11650	37.6	7.3	44.9	74	-29.1	Peak	Vertical
6	11650	26.0	7.3	33.3	54	-20.7	Average	Vertical
7	17475	35.5	13.5	48.9	68.2	-19.3	Peak	Vertical
8	17475	22.7	13.5	36.2	54	-17.8	Average	Vertical

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No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
<b>IEEE 802.11n-HT40_Channel 38</b>								
1	10380	41.1	6.3	47.3	68.2	-20.9	Peak	Horizontal
2	10380	28.3	6.3	34.6	54	-19.4	Average	Horizontal
3	15570	36.6	11.3	47.9	74	-26.1	Peak	Horizontal
4	15570	24.4	11.3	35.7	54	-18.3	Average	Horizontal
5	10380	41.3	6.3	47.5	68.2	-20.7	Peak	Vertical
6	10380	28.2	6.3	34.5	54	-19.5	Average	Vertical
7	15570	37.0	11.3	48.3	74	-25.7	Peak	Vertical
8	15570	24.2	11.3	35.5	54	-18.5	Average	Vertical
<b>IEEE 802.11n-HT40_Channel 46</b>								
1	10460	40.2	6.3	46.5	68.2	-21.7	Peak	Horizontal
2	10460	28.4	6.3	34.7	54	-19.3	Average	Horizontal
3	15690	36.3	11.5	47.7	74	-26.3	Peak	Horizontal
4	15690	24.5	11.5	35.9	54	-18.1	Average	Horizontal
5	10460	40.2	6.3	46.5	68.2	-21.7	Peak	Vertical
6	10460	28.3	6.3	34.6	54	-19.4	Average	Vertical
7	15690	36.5	11.5	48.0	74	-26.0	Peak	Vertical
8	15690	24.5	11.5	35.9	54	-18.1	Average	Vertical
<b>IEEE 802.11n-HT40_Channel 151</b>								
1	11510	38.8	7.1	45.9	74	-28.1	Peak	Horizontal
2	11510	27.3	7.1	34.4	54	-19.6	Average	Horizontal
3	17265	34.7	13.2	47.8	68.2	-20.4	Peak	Horizontal
4	17265	22.5	13.2	35.7	54	-18.3	Average	Horizontal
5	11510	38.1	7.1	45.2	74	-28.8	Peak	Vertical
6	11510	26.3	7.1	33.4	54	-20.6	Average	Vertical
7	17265	34.2	13.2	47.3	68.2	-20.9	Peak	Vertical
8	17265	23.0	13.2	36.3	54	-17.7	Average	Vertical
<b>IEEE 802.11n-HT40_Channel 159</b>								
1	11590	39.7	7.2	46.9	74	-27.1	Peak	Horizontal
2	11590	26.6	7.2	33.8	54	-20.2	Average	Horizontal
3	17385	35.9	13.3	49.3	68.2	-18.9	Peak	Horizontal
4	17385	23.0	13.3	36.4	54	-17.6	Average	Horizontal
5	11590	40.2	7.2	47.4	74	-26.6	Peak	Vertical
6	11590	26.0	7.2	33.2	54	-20.8	Average	Vertical
7	17385	34.6	13.3	47.9	68.2	-20.3	Peak	Vertical
8	17385	23.0	13.3	36.4	54	-17.6	Average	Vertical

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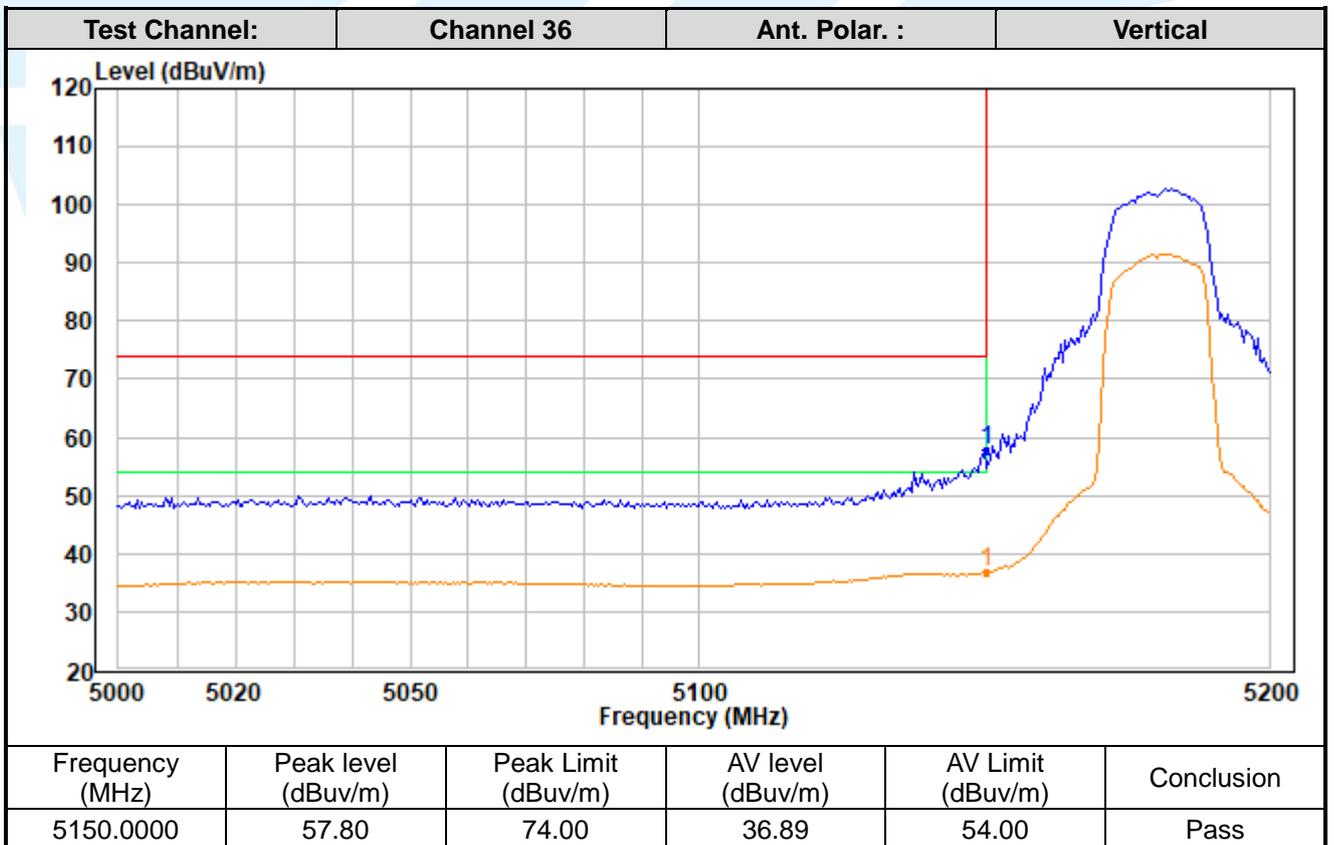
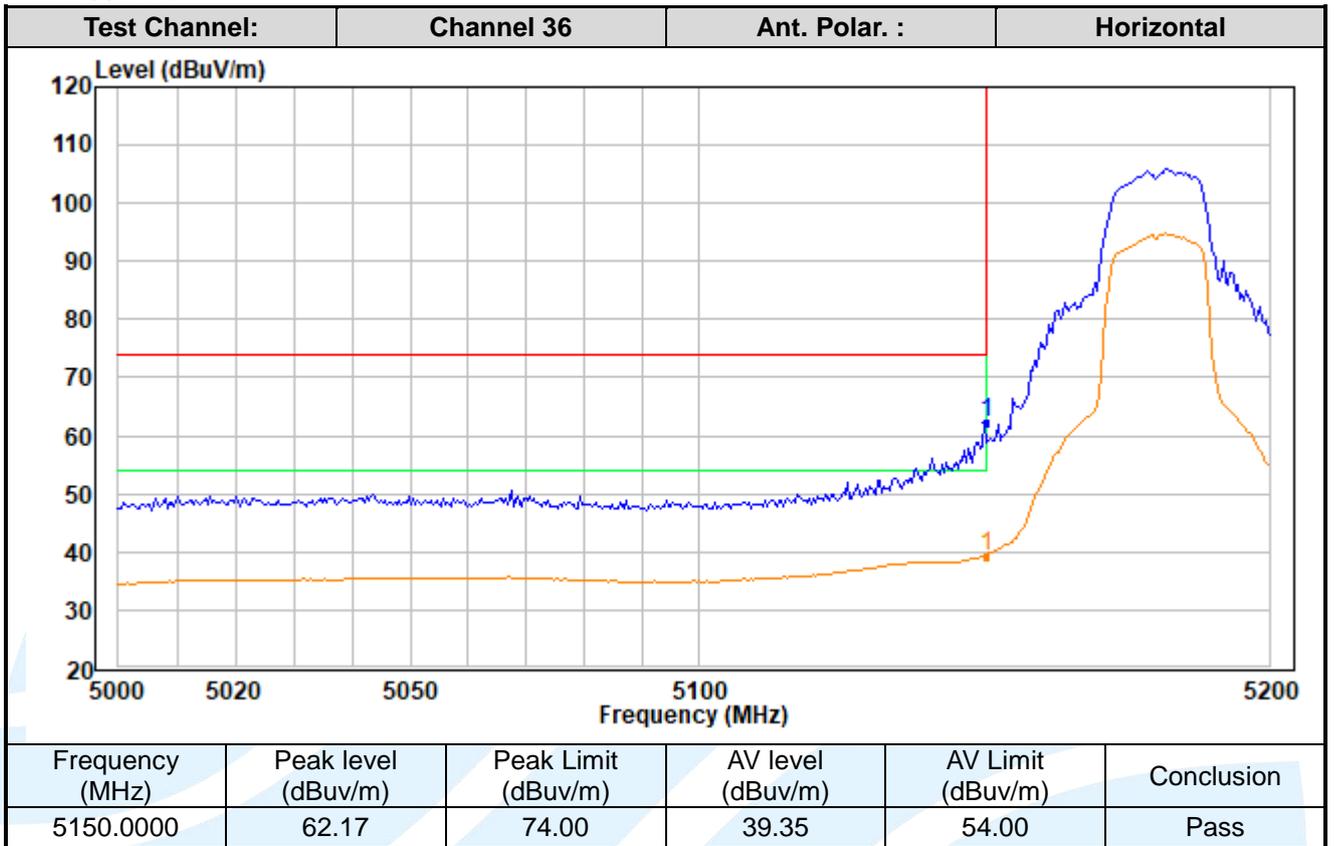
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No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Antenna Polaxis
<b>IEEE 802.11ac-VHT80_Channel 42</b>								
1	10420	40.5	6.3	46.8	68.2	-21.4	Peak	Horizontal
2	10420	28.5	6.3	34.8	54	-19.2	Average	Horizontal
3	15630	36.4	11.4	47.8	74	-26.2	Peak	Horizontal
4	15630	24.7	11.4	36.1	54	-17.9	Average	Horizontal
5	10420	40.6	6.3	46.9	68.2	-21.3	Peak	Vertical
6	10420	28.4	6.3	34.7	54	-19.3	Average	Vertical
7	15630	36.4	11.4	47.8	74	-26.2	Peak	Vertical
8	15630	24.7	11.4	36.0	54	-18.0	Average	Vertical
<b>IEEE 802.11ac-VHT80_Channel 155</b>								
1	11550	37.1	7.2	44.3	74	-29.7	Peak	Horizontal
2	11550	24.1	7.2	31.3	54	-22.7	Average	Horizontal
3	17325	35.2	13.2	48.5	68.2	-19.7	Peak	Horizontal
4	17325	22.4	13.2	35.7	54	-18.3	Average	Horizontal
5	11550	40.5	7.2	47.6	74	-26.4	Peak	Vertical
6	11550	24.2	7.2	31.4	54	-22.6	Average	Vertical
7	17325	34.5	13.2	47.7	68.2	-20.5	Peak	Vertical
8	17325	22.4	13.2	35.7	54	-18.3	Average	Vertical

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit

**Band Edge Measurements (Radiated): Worst-Case Configuration**  
**IEEE 802.11a**



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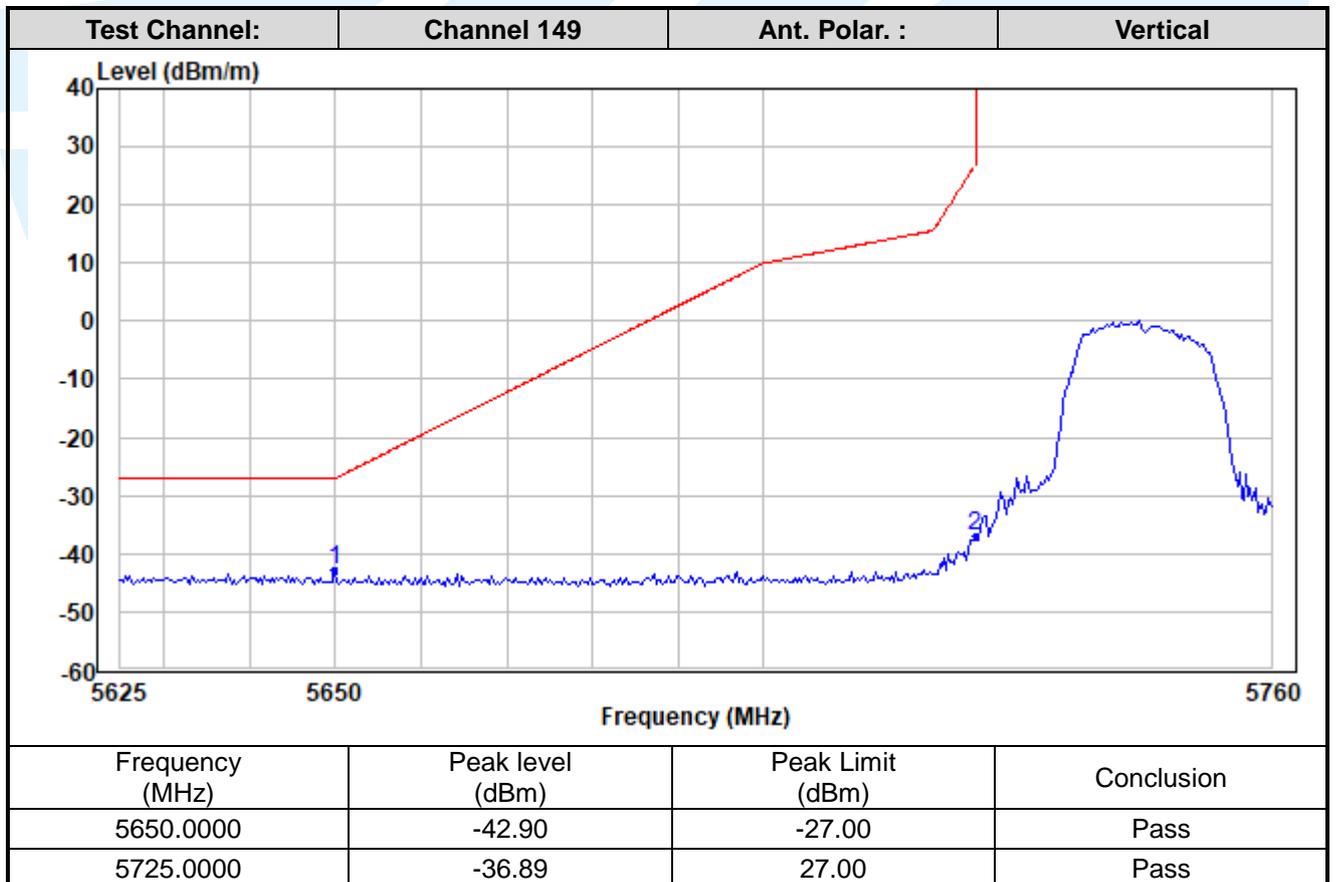
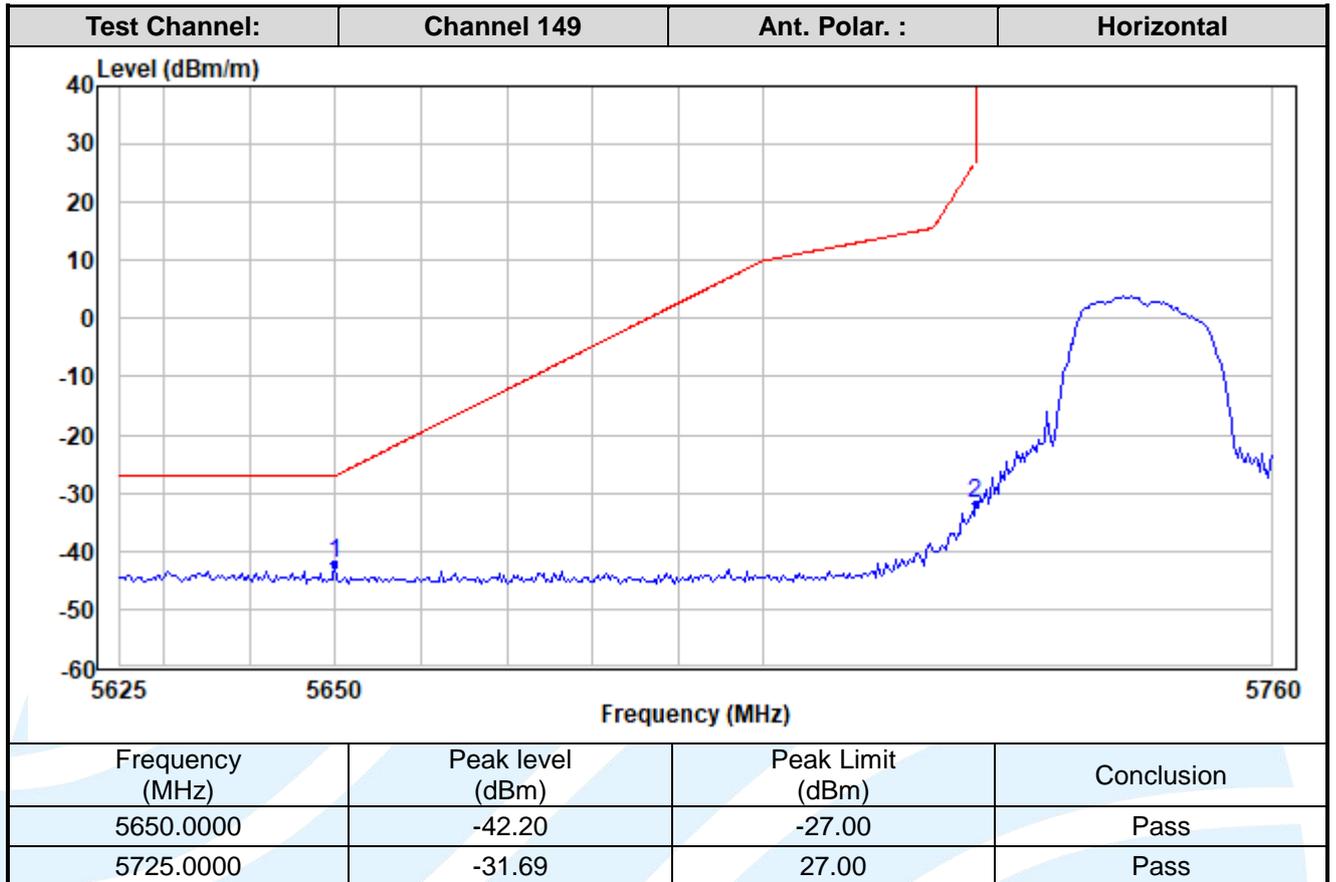
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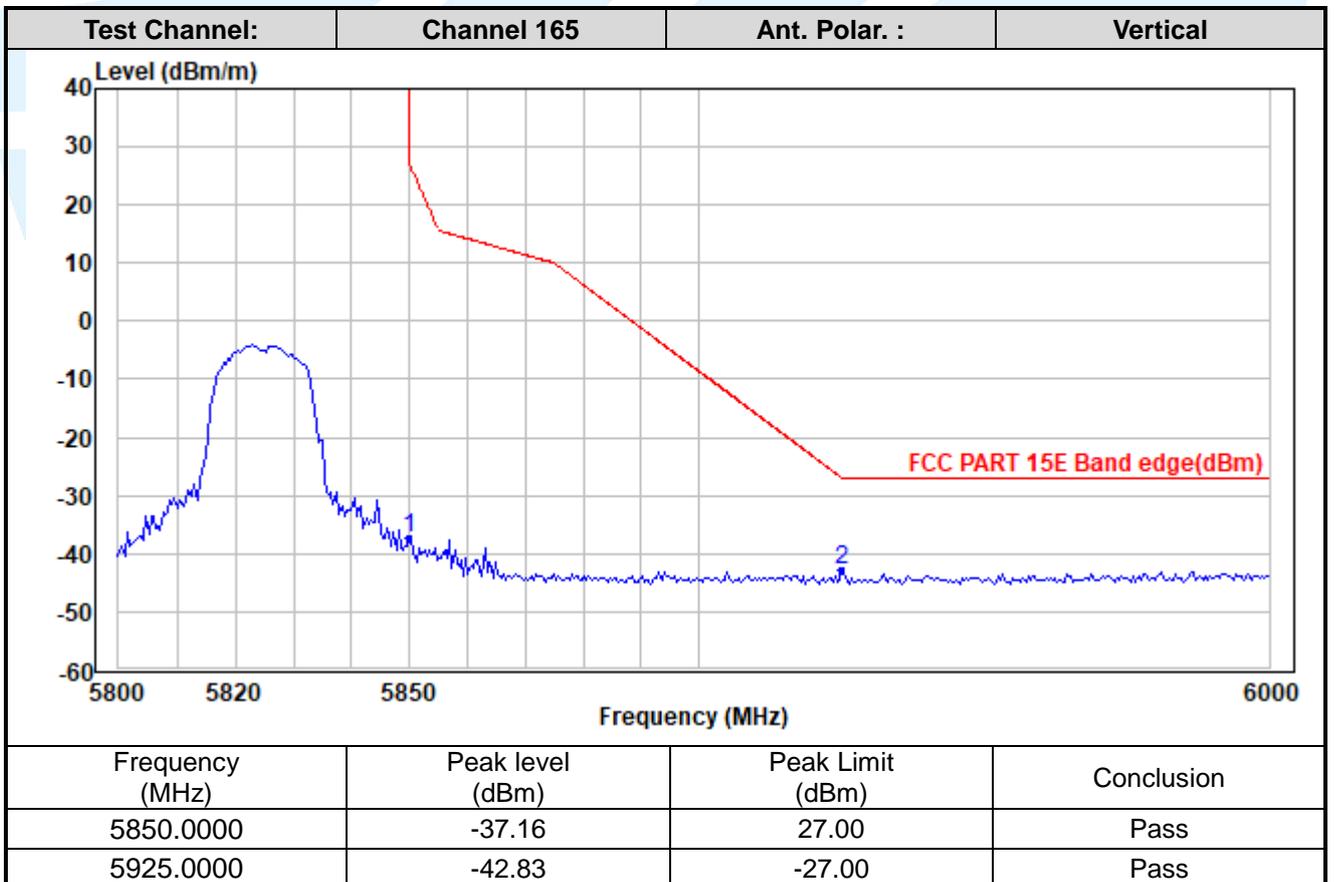
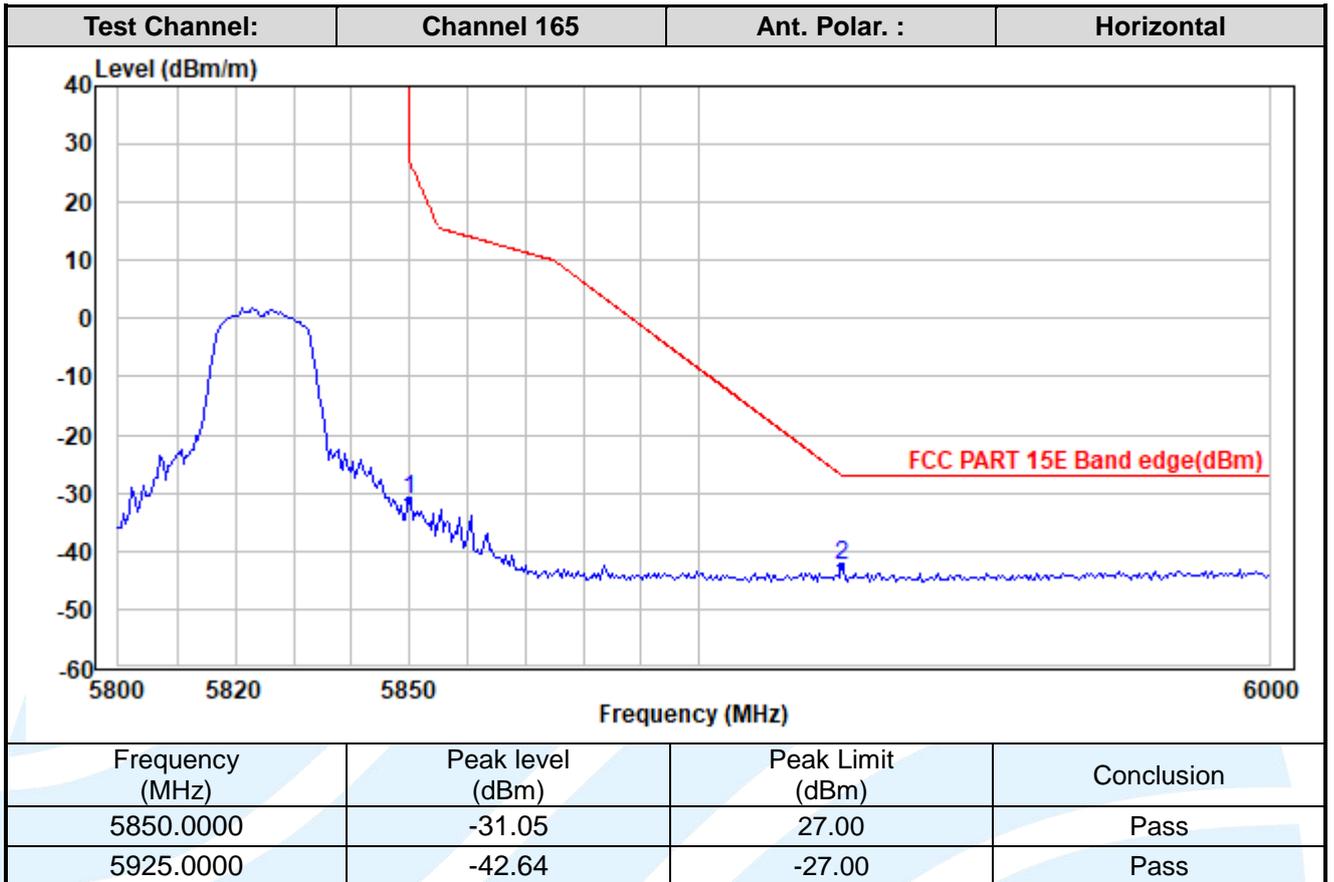
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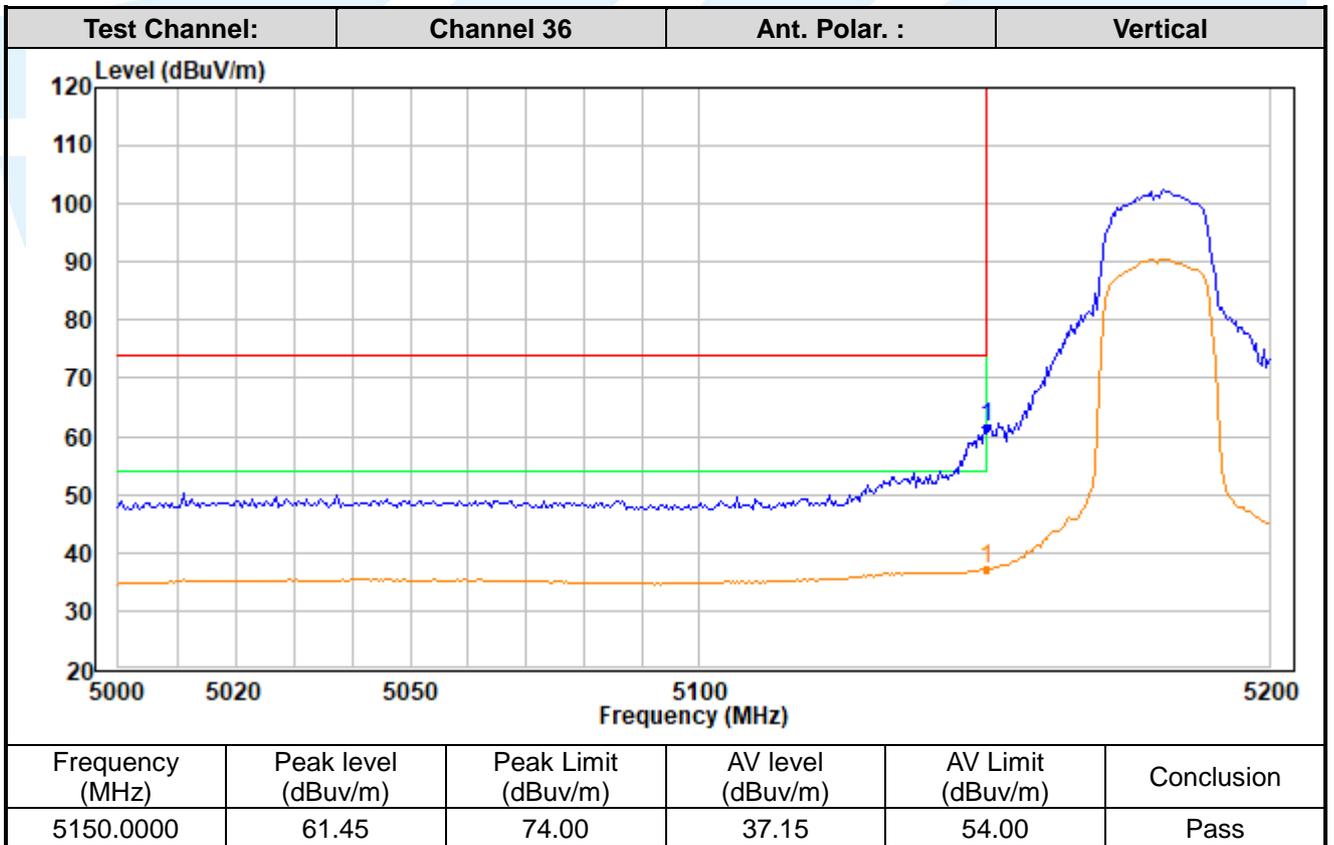
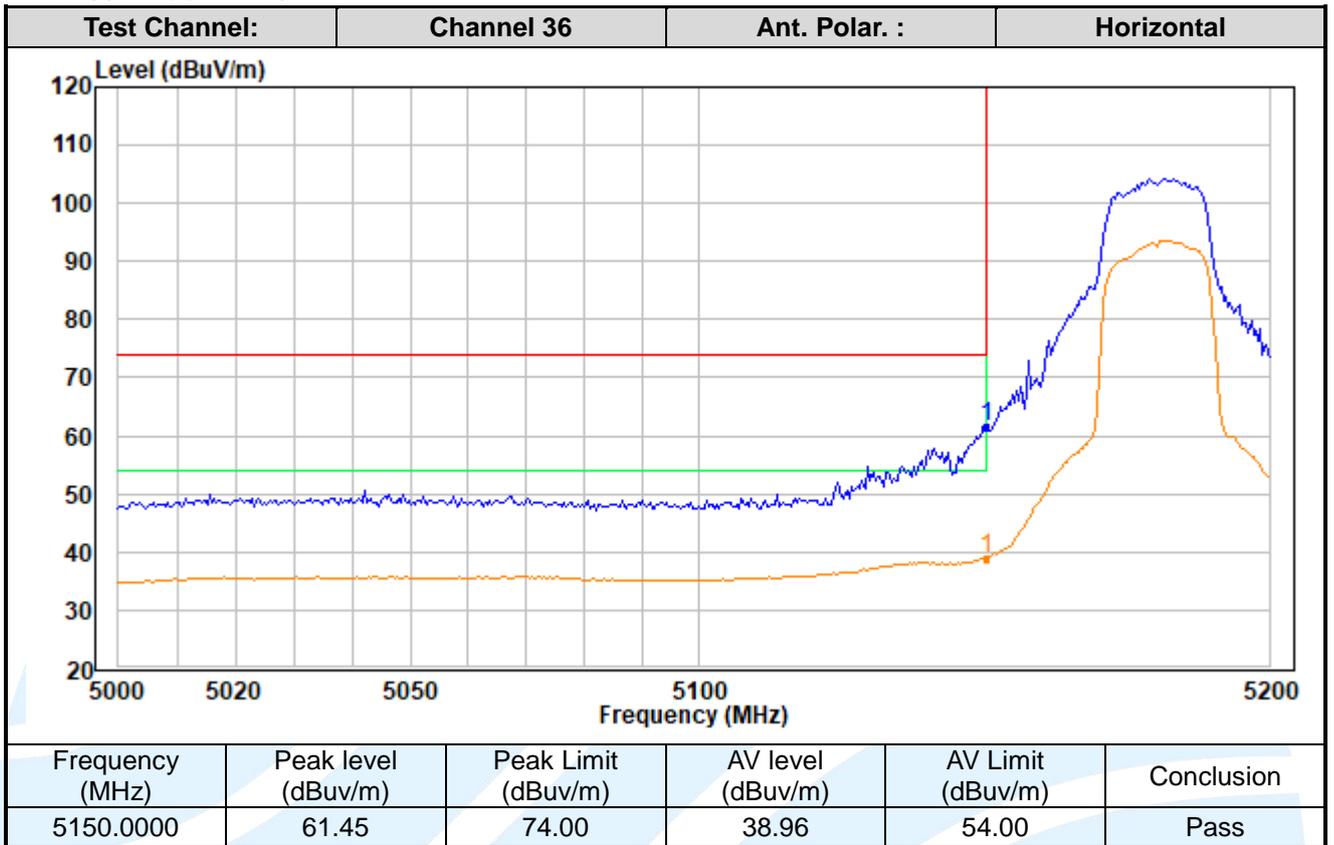
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IEEE 802.11ac-VHT20



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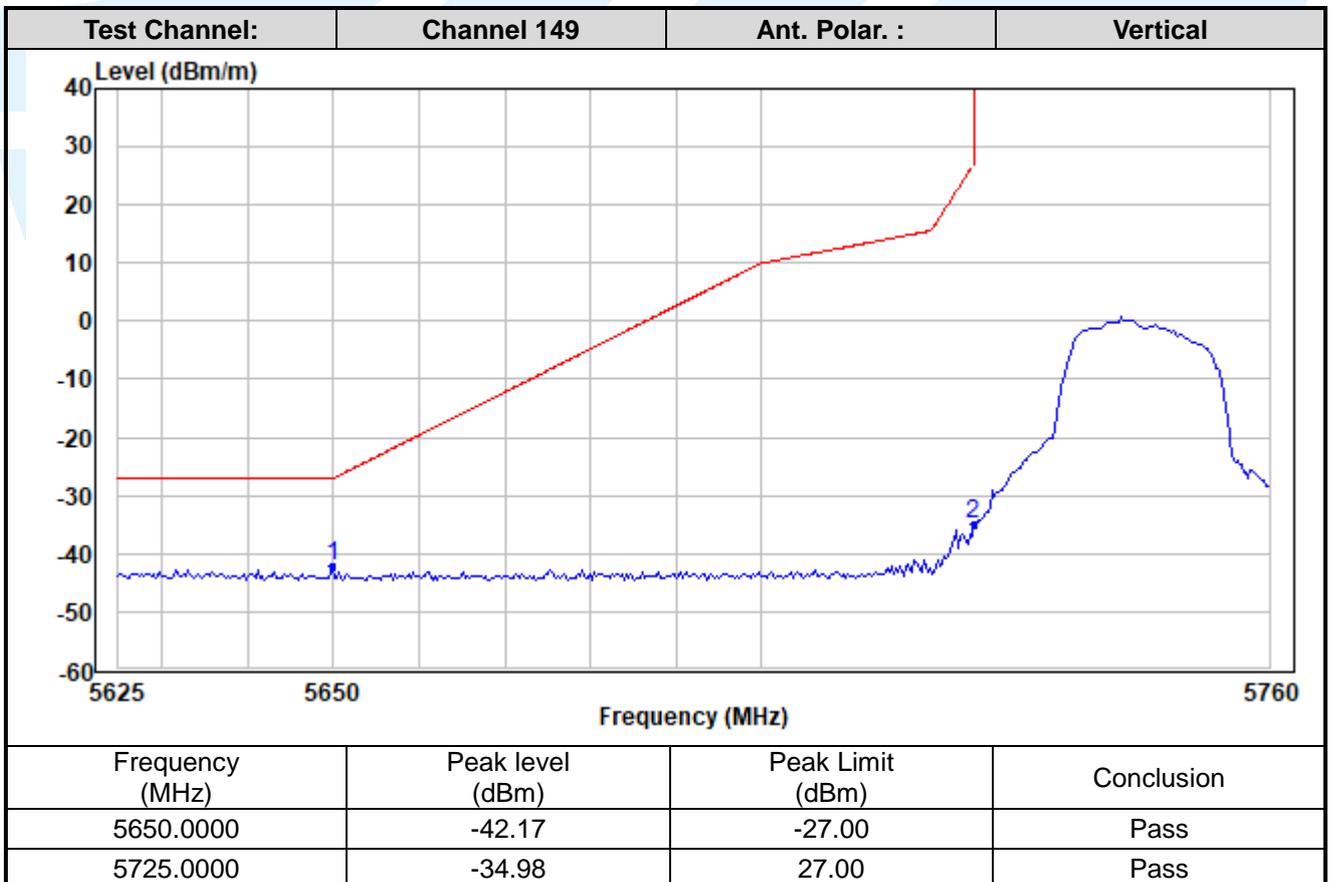
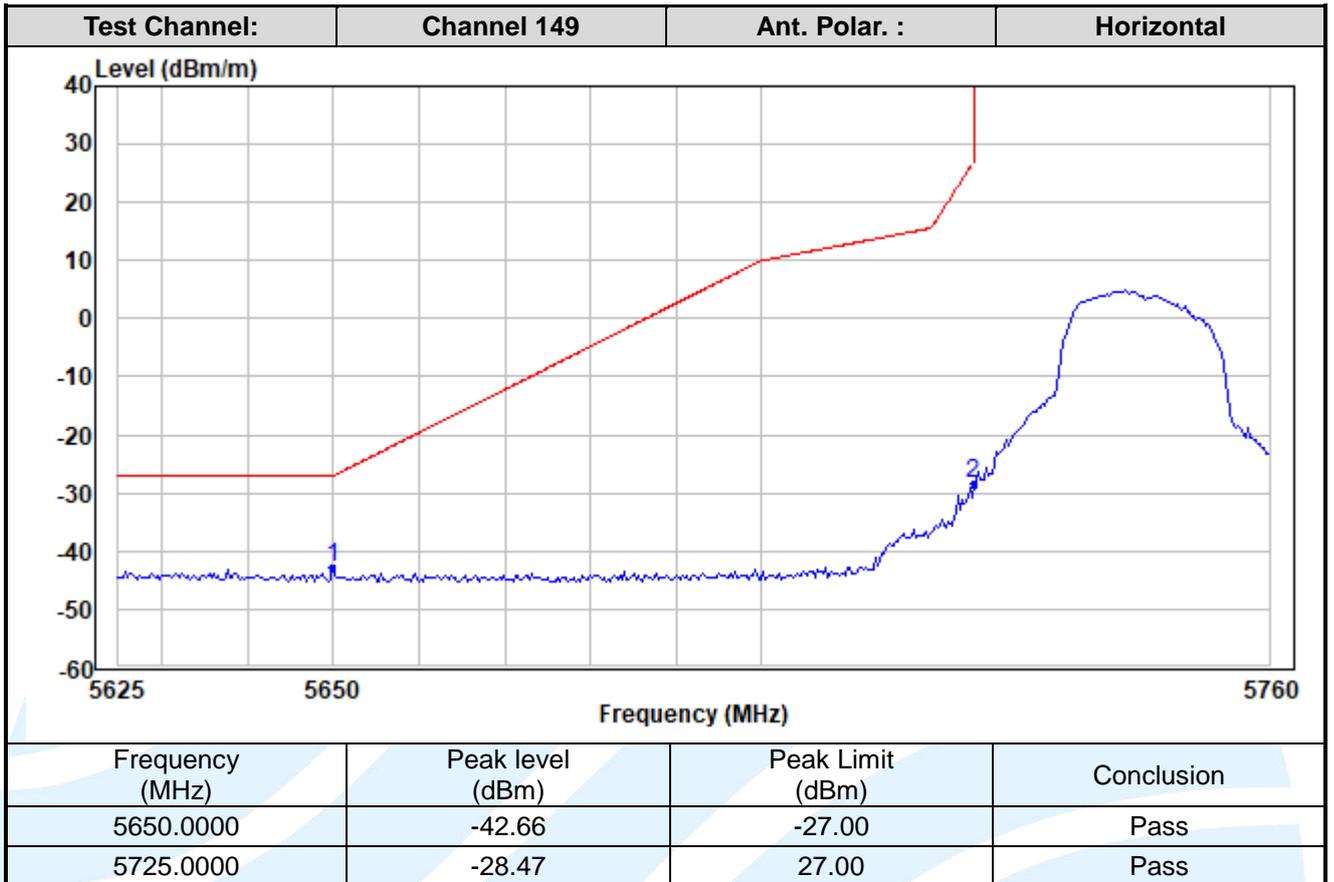
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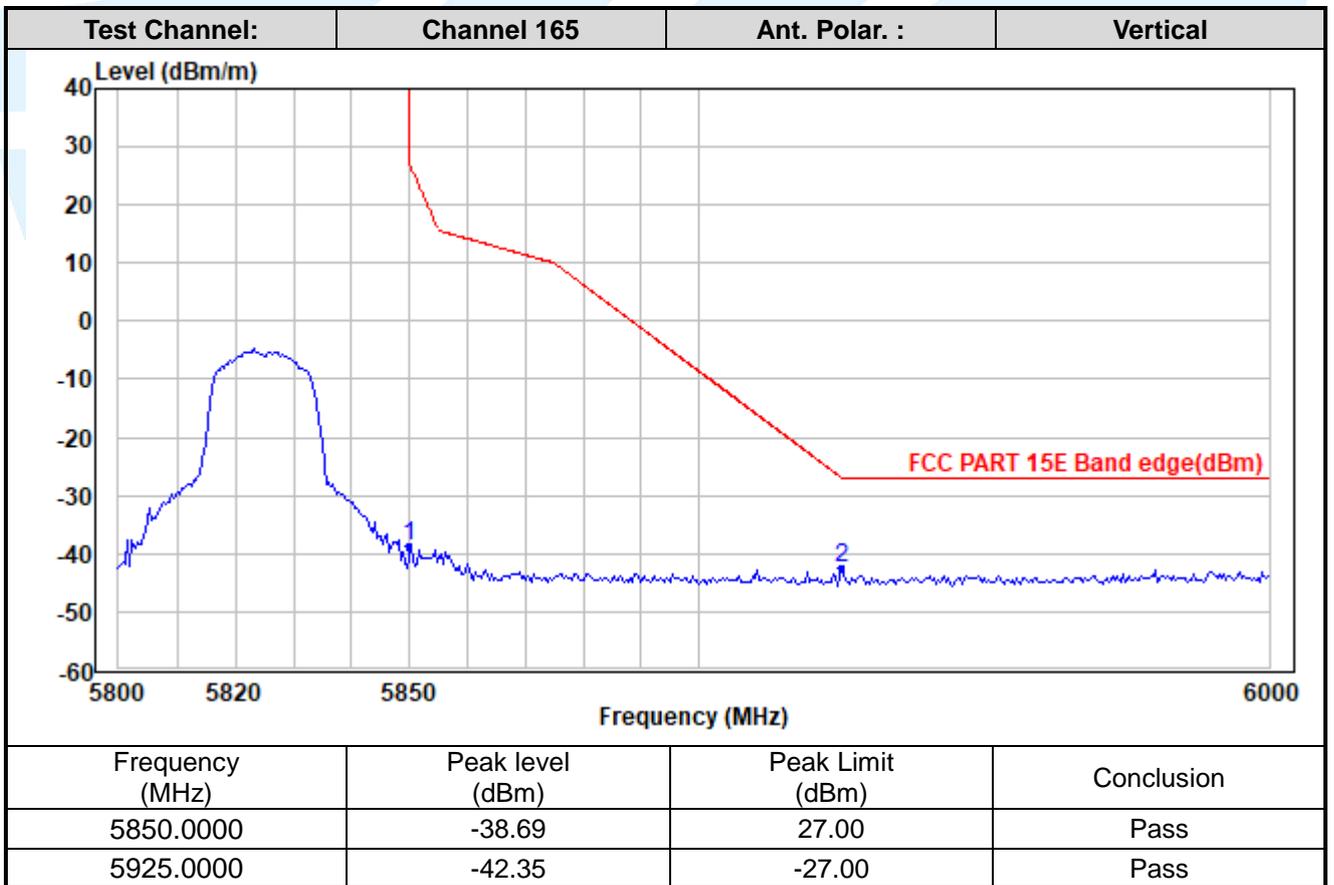
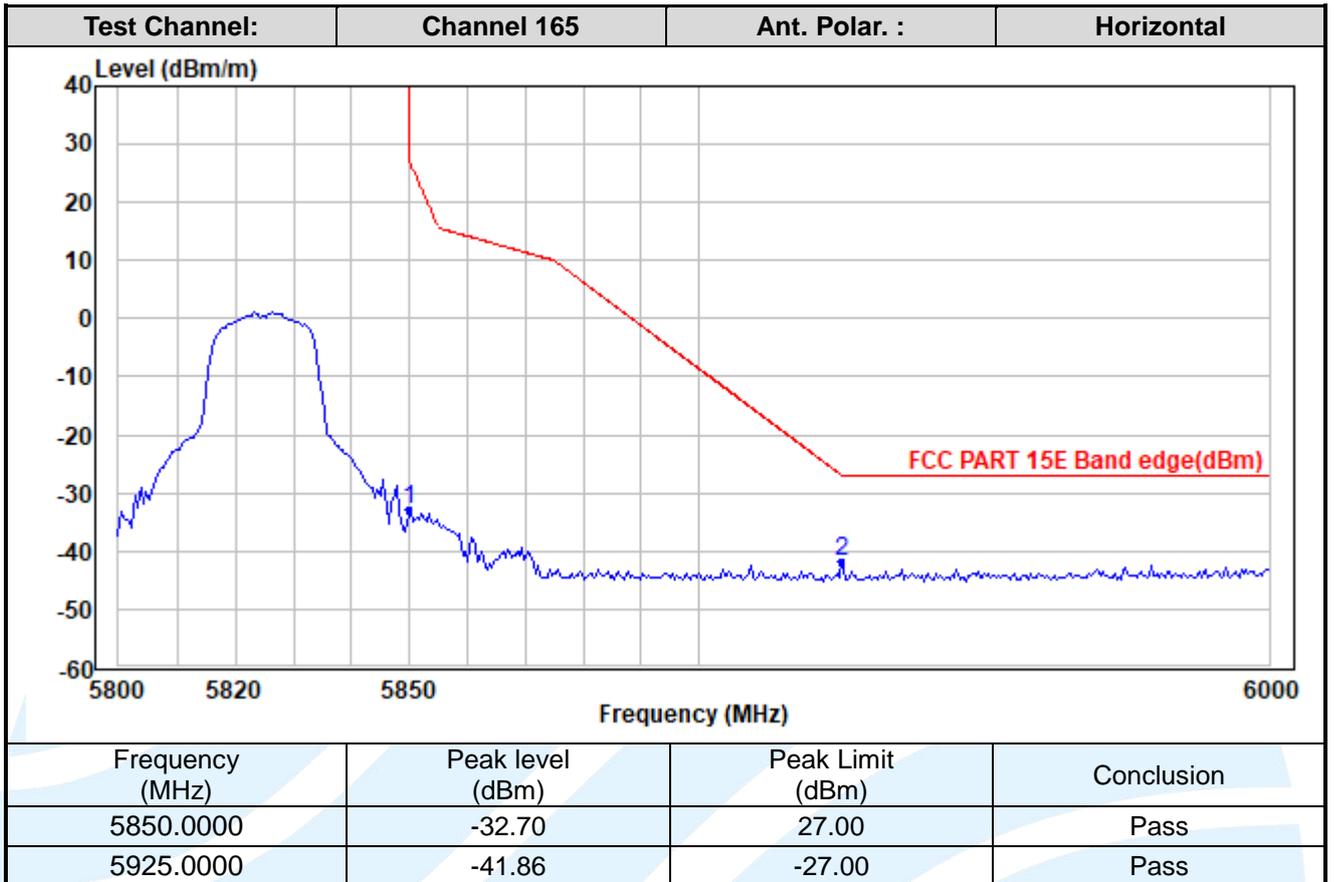
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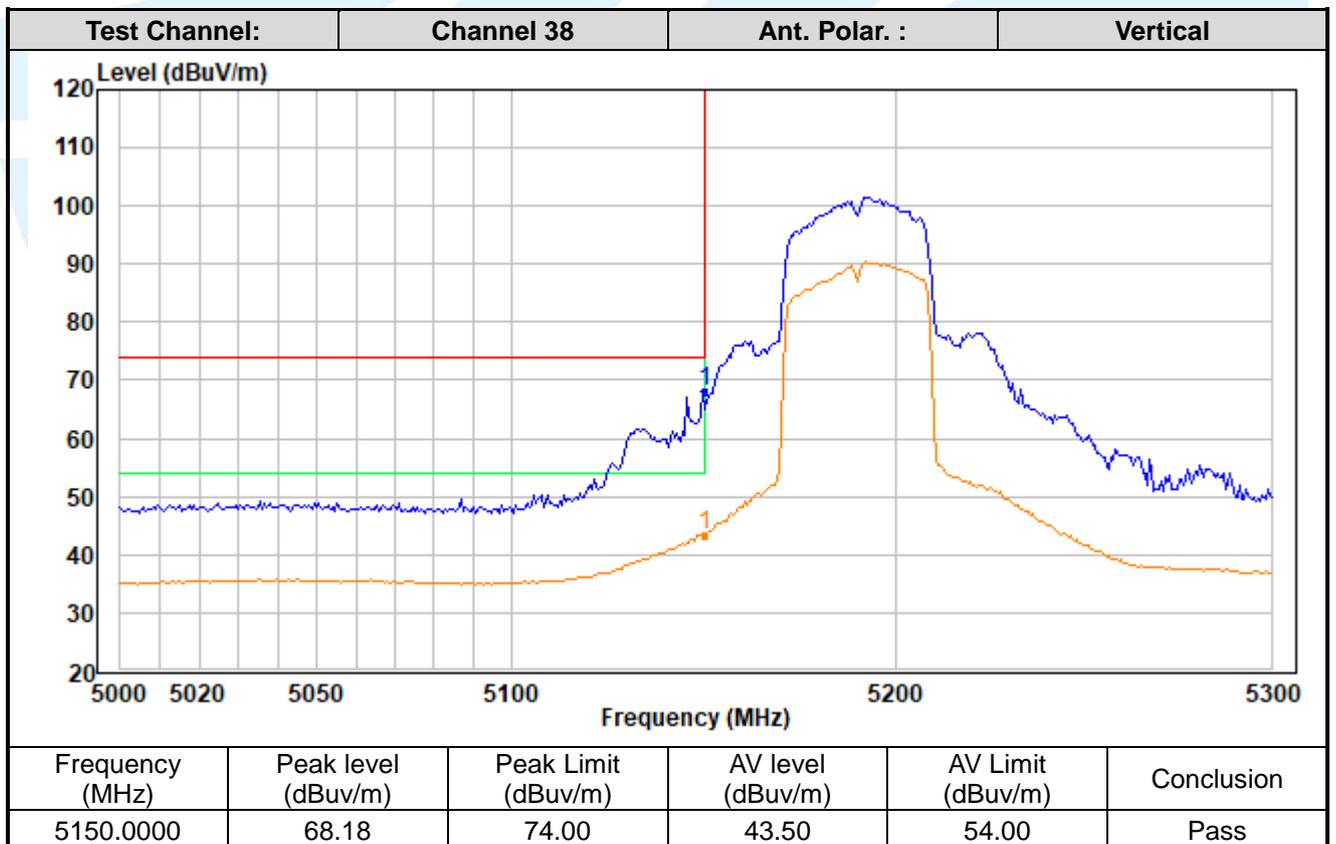
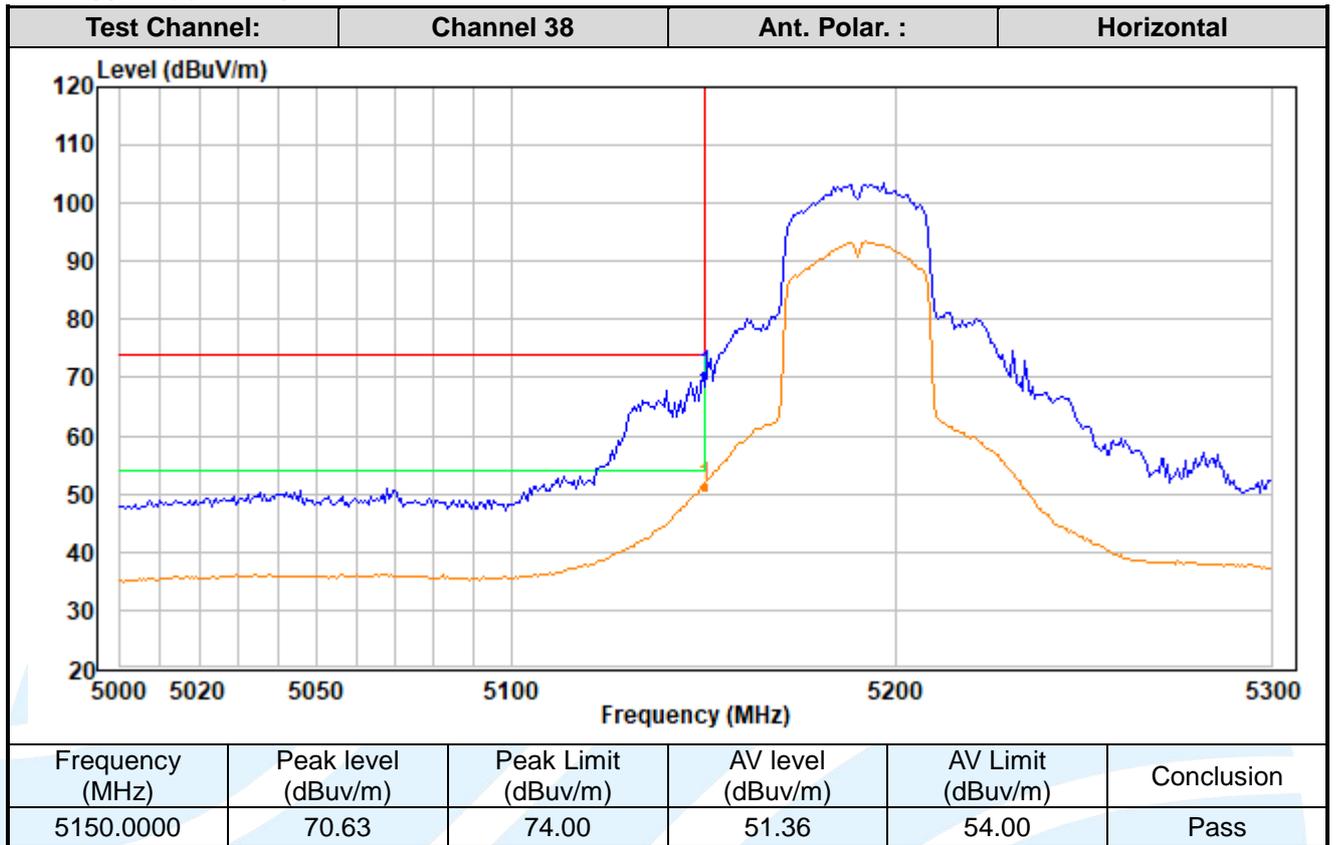
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IEEE 802.11ac-VHT40



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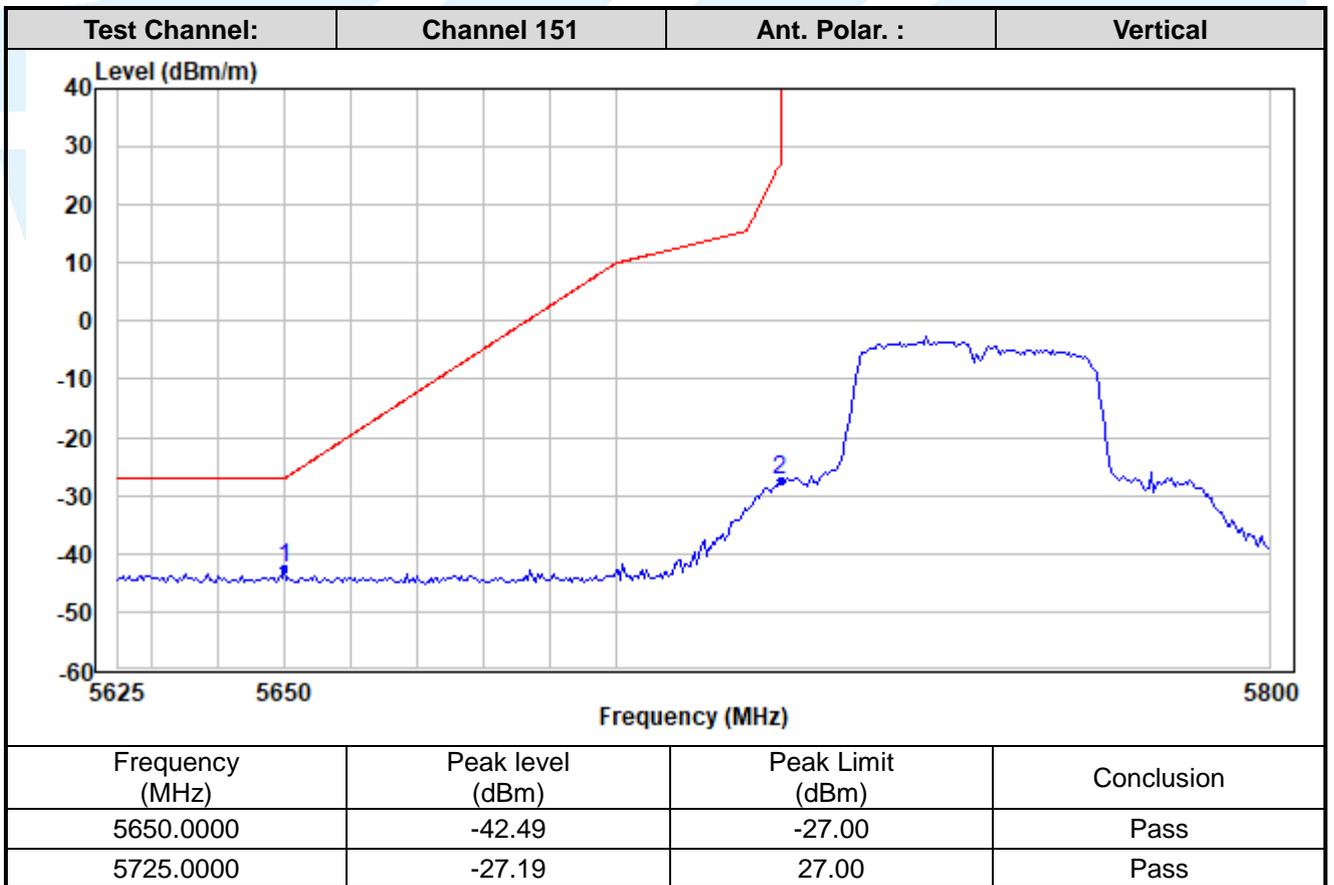
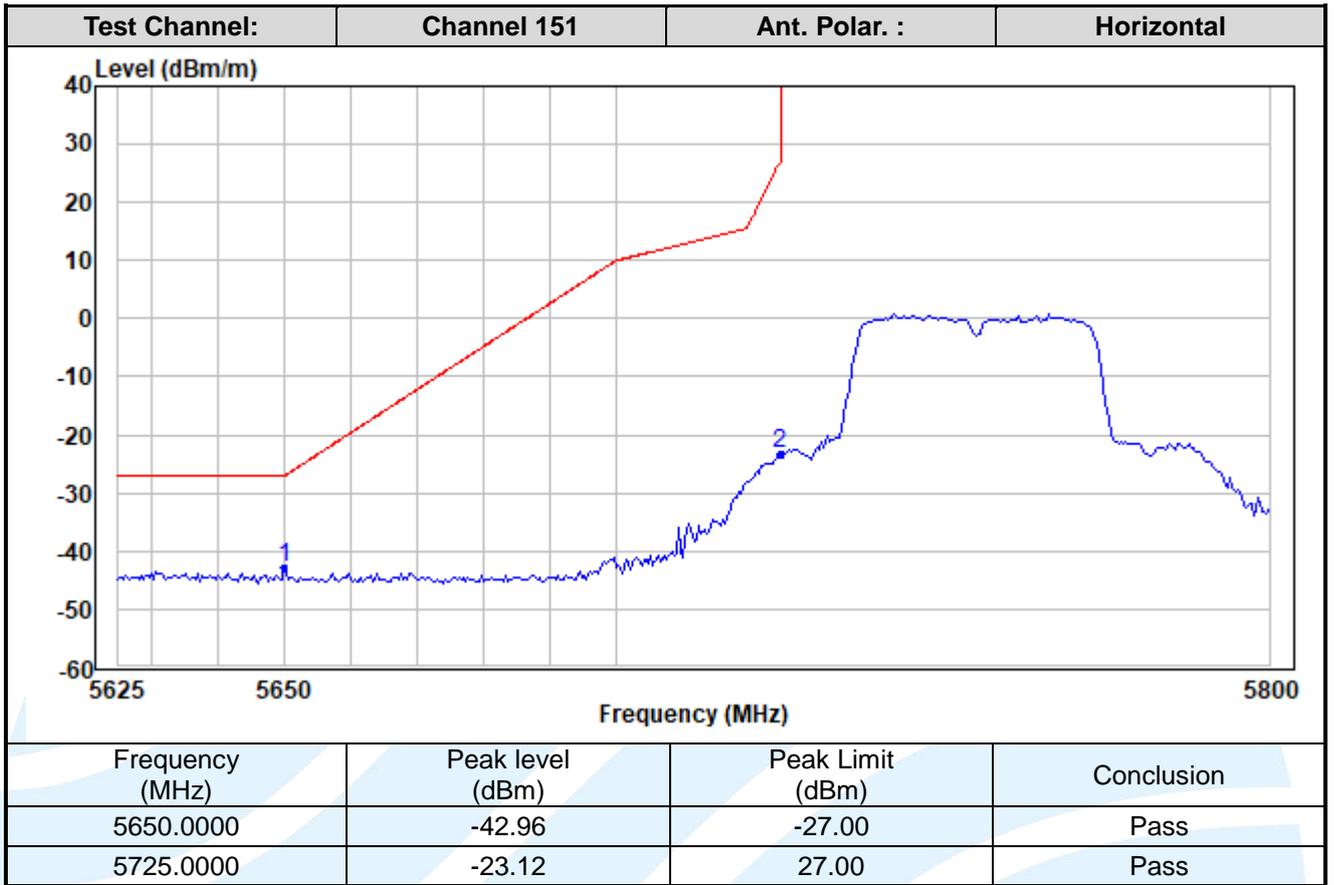
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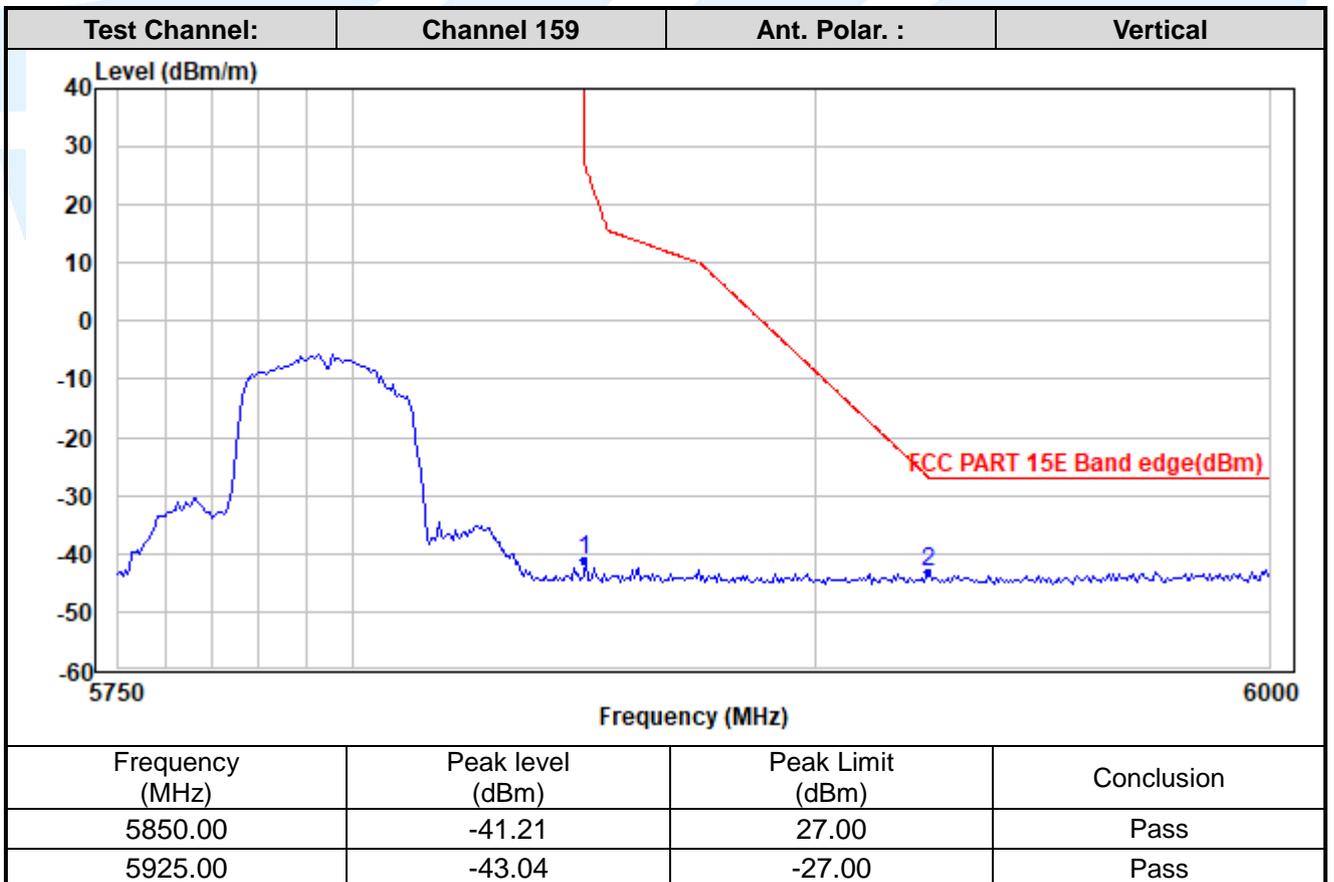
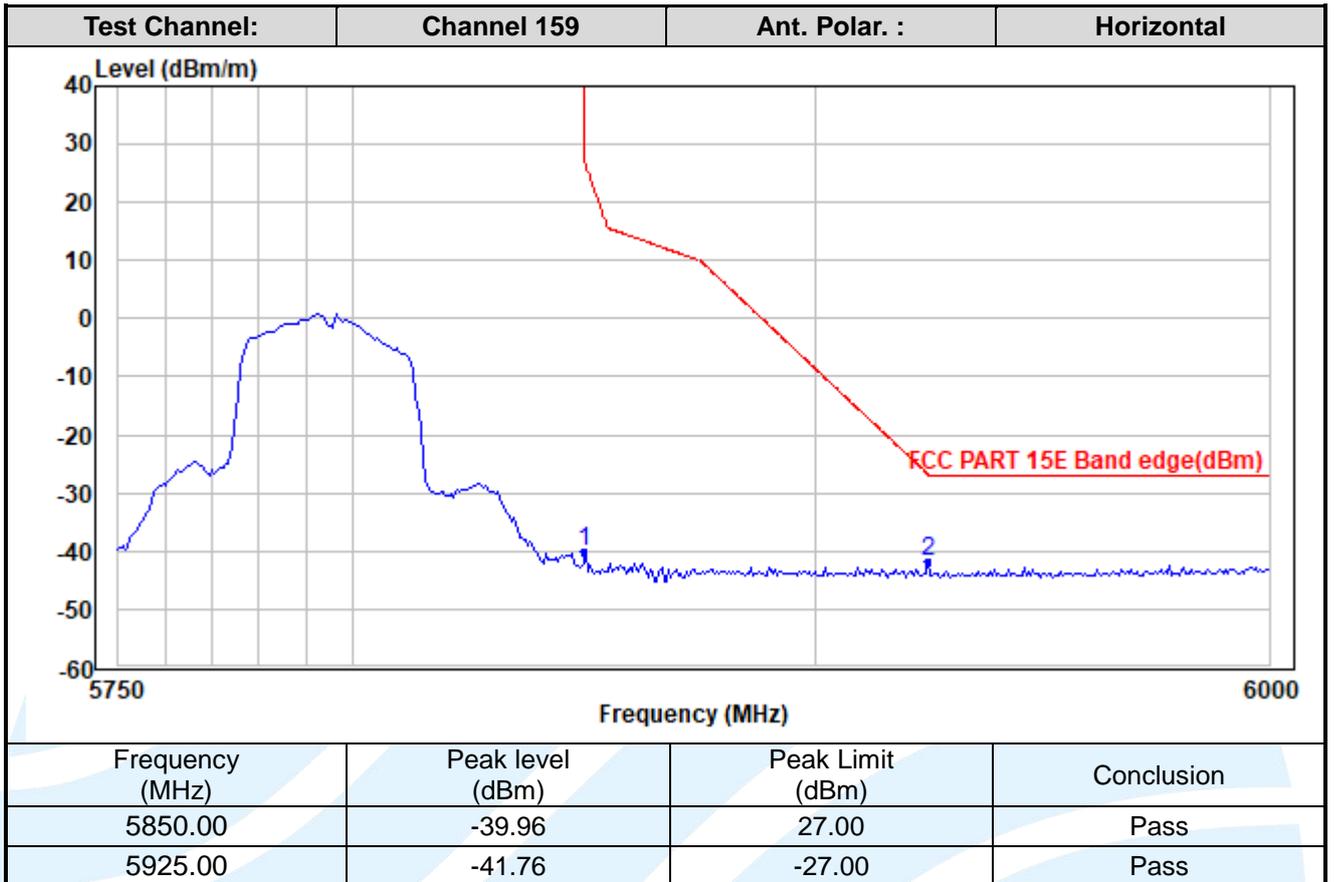
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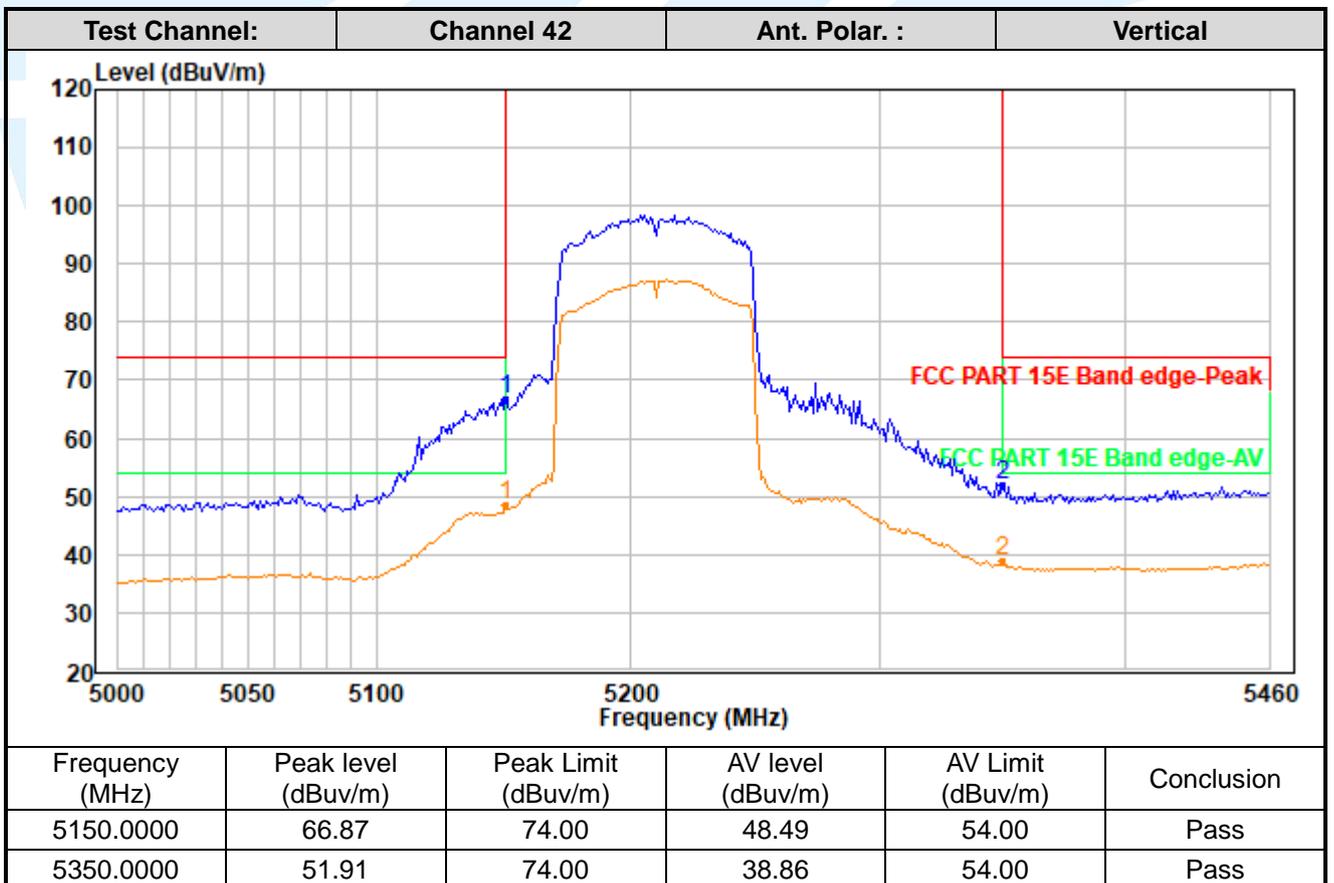
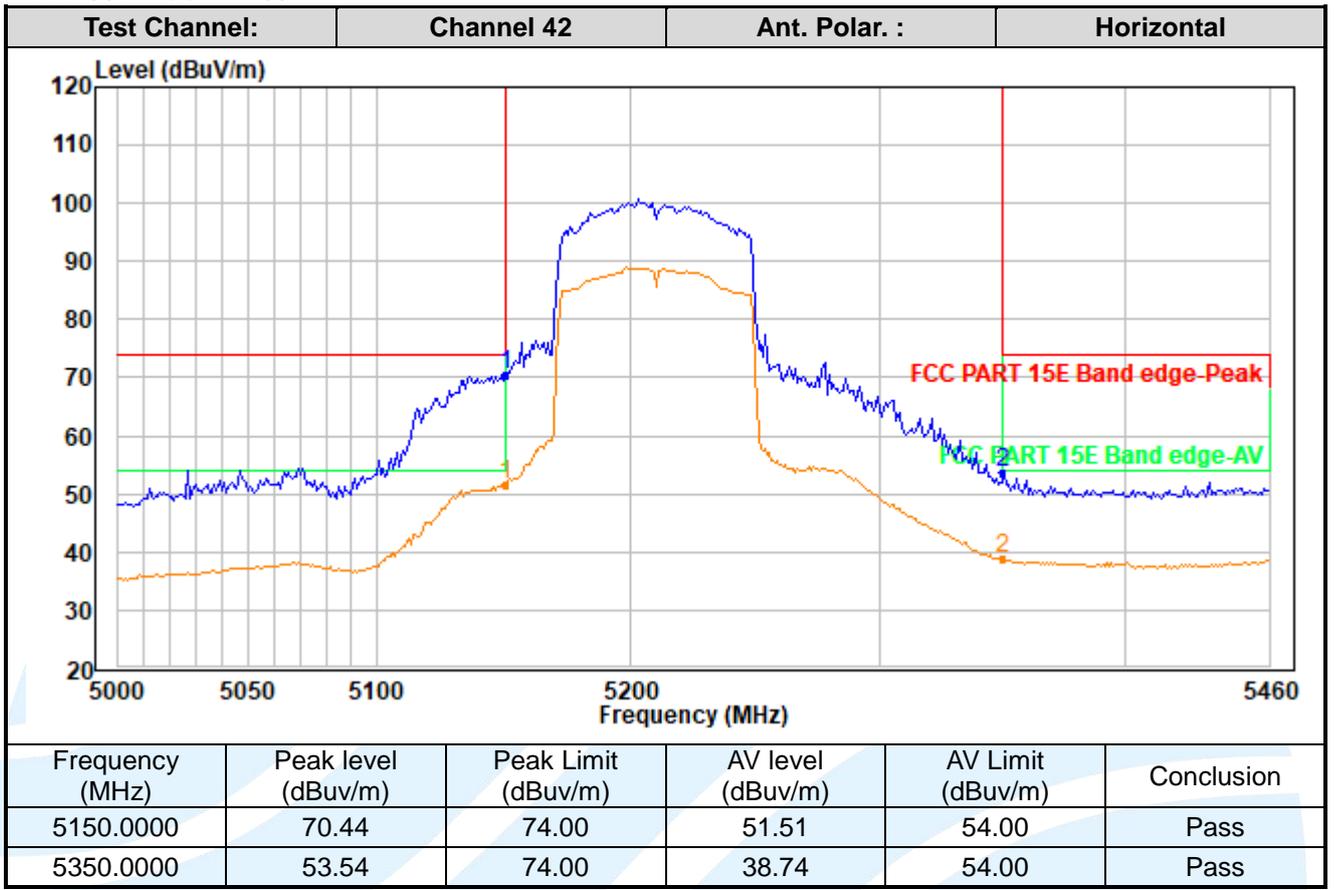
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IEEE 802.11ac-VHT80



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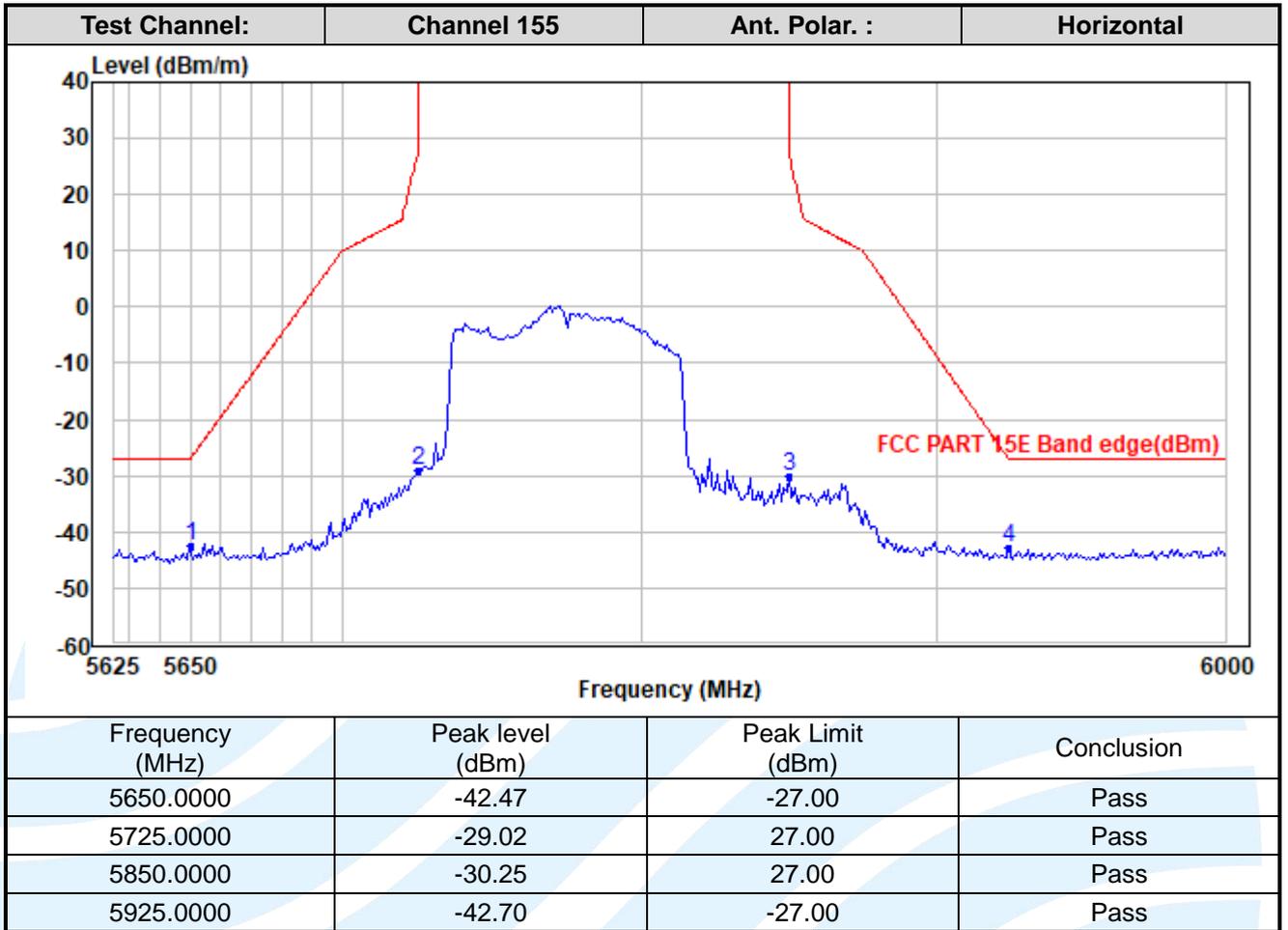
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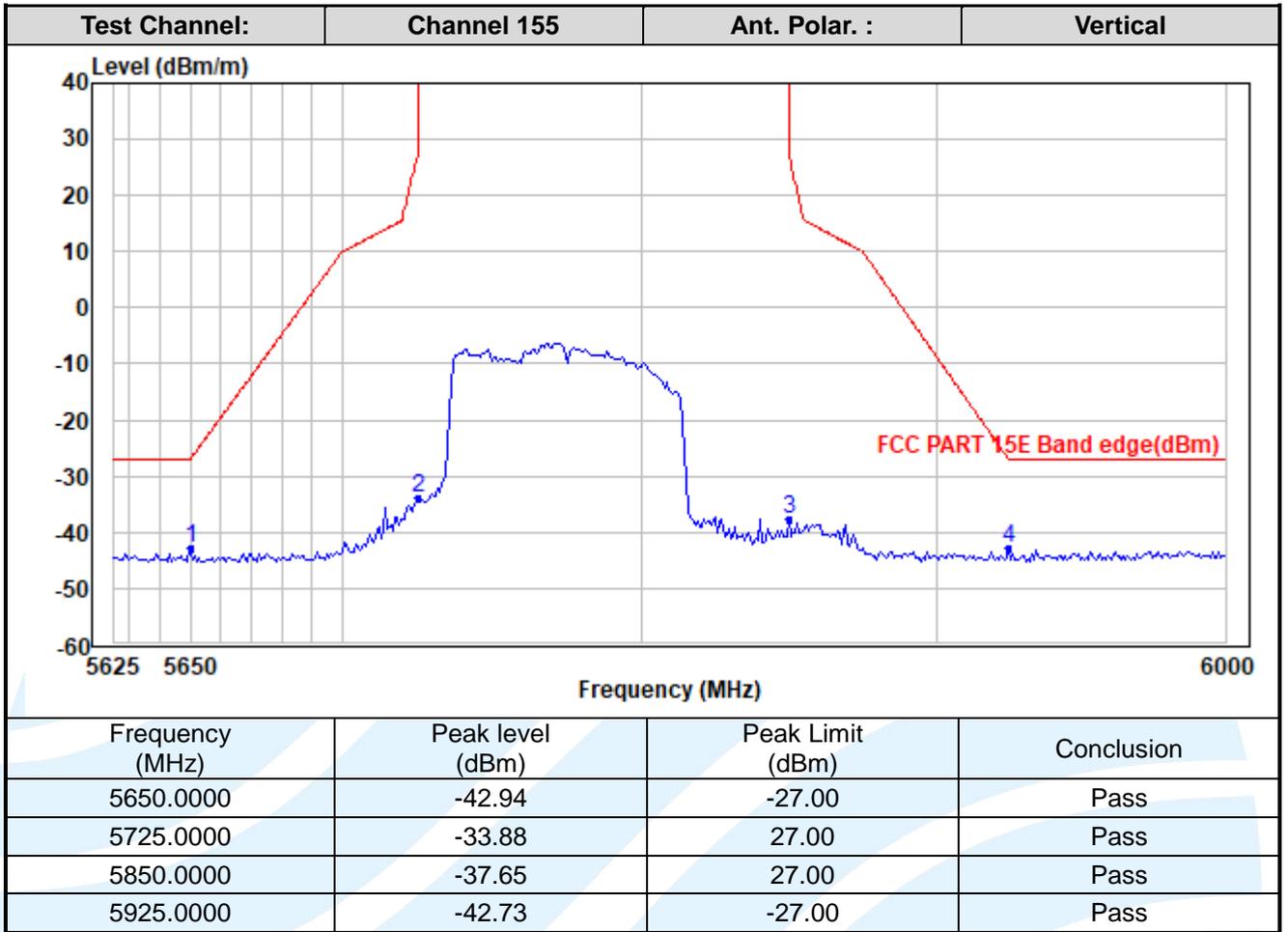
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### 5.8 AC POWER LINE CONDUCTED EMISSION

**Test Requirement:** FCC 47 CFR Part 15 Subpart C Section 15.207

**Test Method:** ANSI C63.10-2013 Section 6.2

**Limits:**

Frequency range (MHz)	Limits (dB(μV))	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

**Remark:**

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

**Test Setup:** Refer to section 4.4.2 for details.

**Test Procedures:**

Test frequency range :150KHz-30MHz

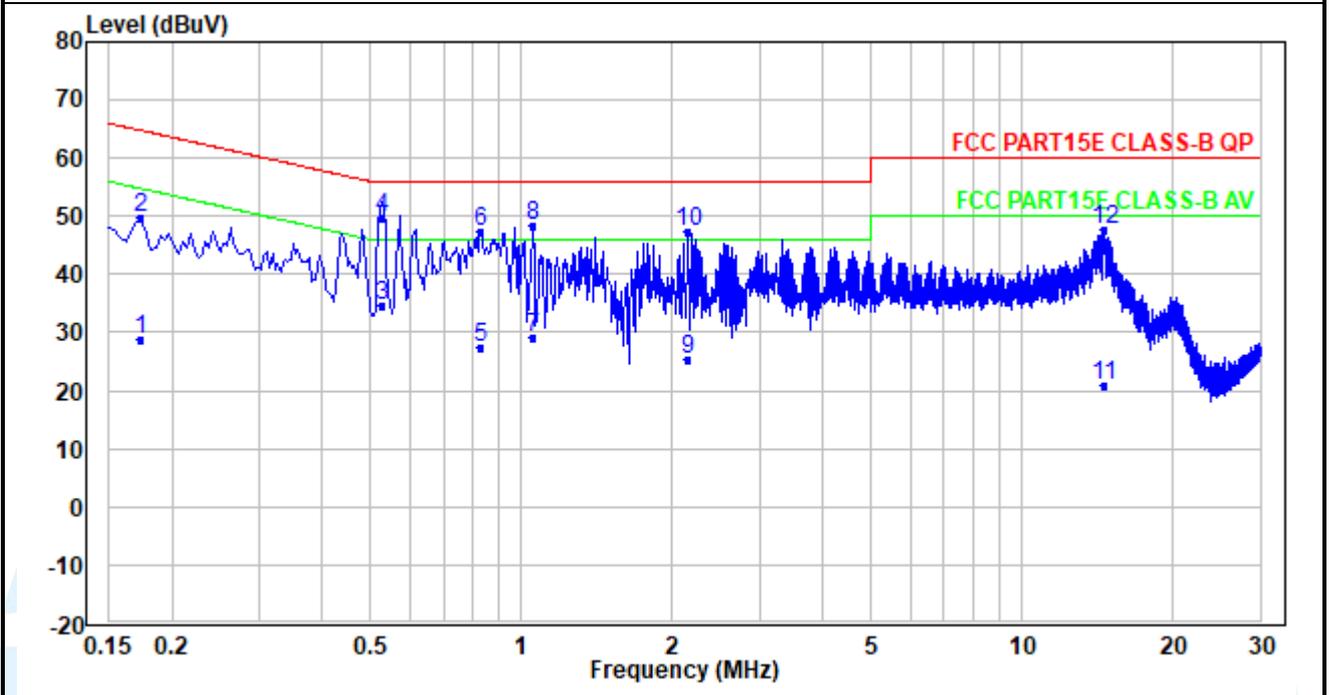
- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) 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 on conducted measurement.

**Equipment Used:** Refer to section 3 for details.

**Test Result:** Pass

The worst measurement data as follows:  
 Quasi Peak and Average:  
 Test Mode: WIFI Link

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.174	18.78	10.03	28.81	54.77	-25.96	Average
2	0.174	39.78	10.03	49.81	64.77	-14.96	QP
3	0.526	24.63	10.04	34.67	46.00	-11.33	Average
4	0.526	39.63	10.04	49.67	56.00	-6.33	QP
5	0.826	17.46	10.06	27.52	46.00	-18.48	Average
6	0.826	37.46	10.06	47.52	56.00	-8.48	QP
7	1.050	19.17	10.06	29.23	46.00	-16.77	Average
8	1.050	38.17	10.06	48.23	56.00	-7.77	QP
9	2.150	15.15	10.14	25.29	46.00	-20.71	Average
10	2.150	37.15	10.14	47.29	56.00	-8.71	QP
11	14.581	9.99	10.79	20.78	50.00	-29.22	Average
12	14.581	36.99	10.79	47.78	60.00	-12.22	QP

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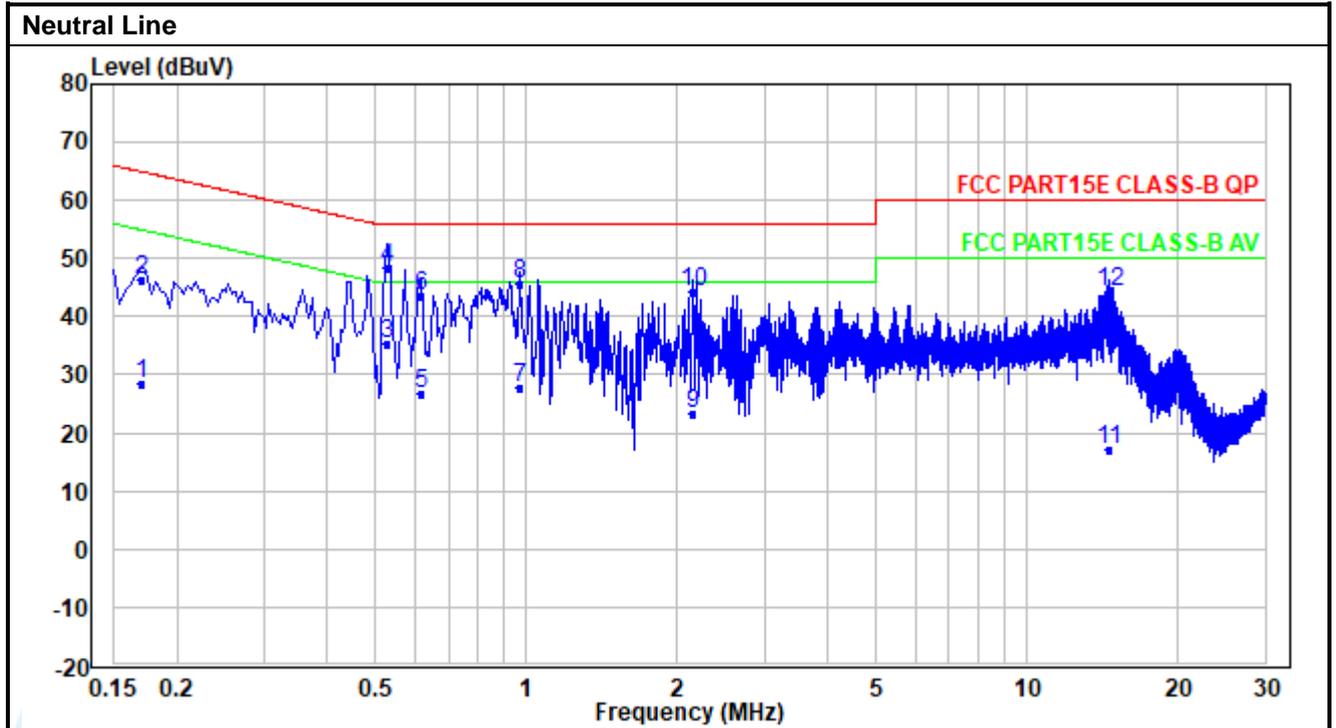
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No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.170	18.37	10.01	28.38	54.96	-26.58	Average
2	0.170	36.37	10.01	46.38	64.96	-18.58	QP
3	0.526	25.36	10.03	35.39	46.00	-10.61	Average
4	0.526	38.36	10.03	48.39	56.00	-7.61	QP
5	0.614	16.69	10.03	26.72	46.00	-19.28	Average
6	0.614	33.69	10.03	43.72	56.00	-12.28	QP
7	0.974	17.68	10.05	27.73	46.00	-18.27	Average
8	0.974	35.68	10.05	45.73	56.00	-10.27	QP
9	2.154	13.19	10.11	23.30	46.00	-22.70	Average
10	2.154	34.19	10.11	44.30	56.00	-11.70	QP
11	14.585	6.34	10.82	17.16	50.00	-32.84	Average
12	14.585	33.34	10.82	44.16	60.00	-15.84	QP

Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.
5. All possible modes of operation were investigated, and testing at two nominal voltages of 240V/50Hz and 120V/60Hz, only the worst case emissions reported.

## APPENDIX A RF TEST DATA

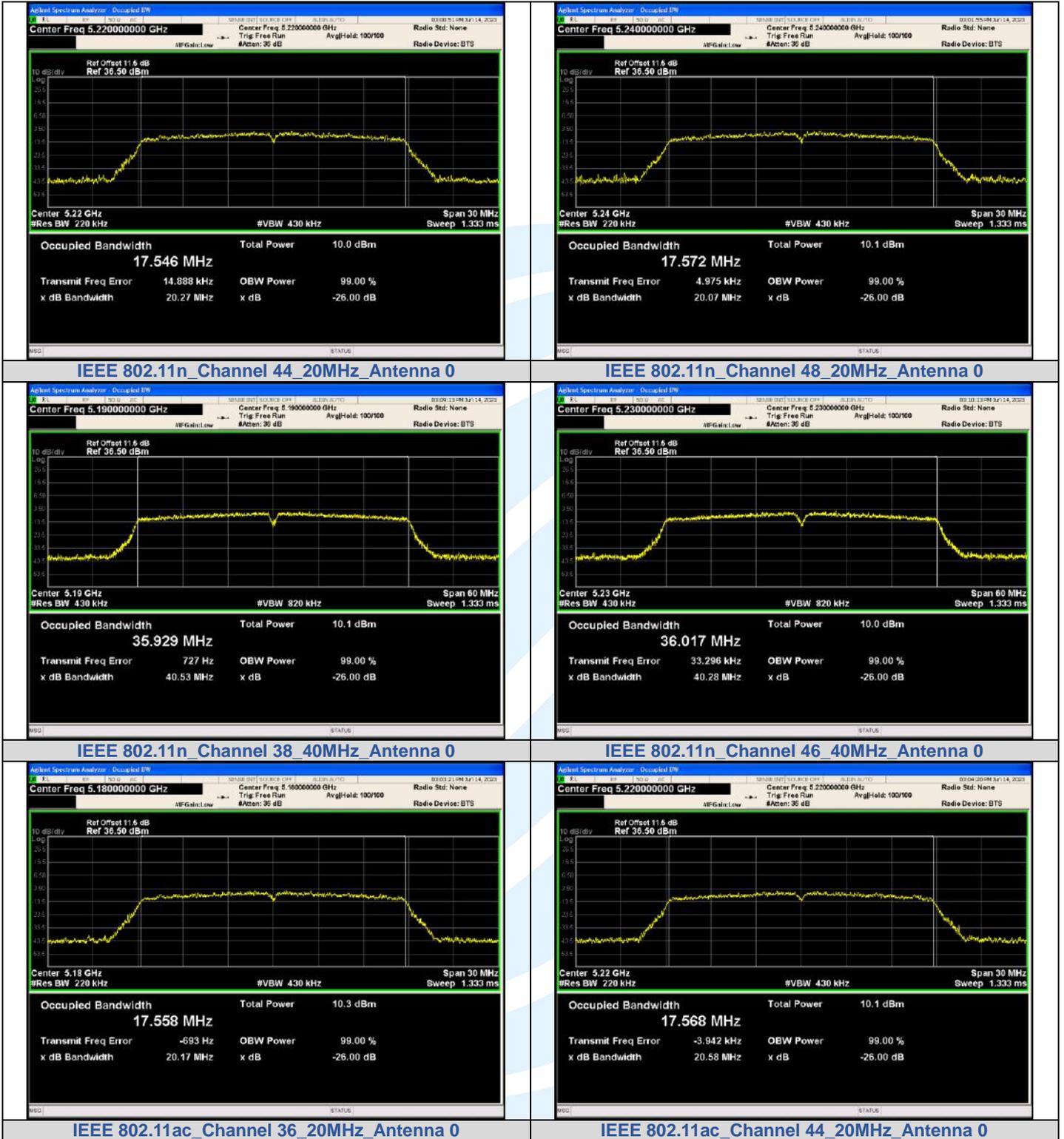
### A.1 26DB BANDWIDTH

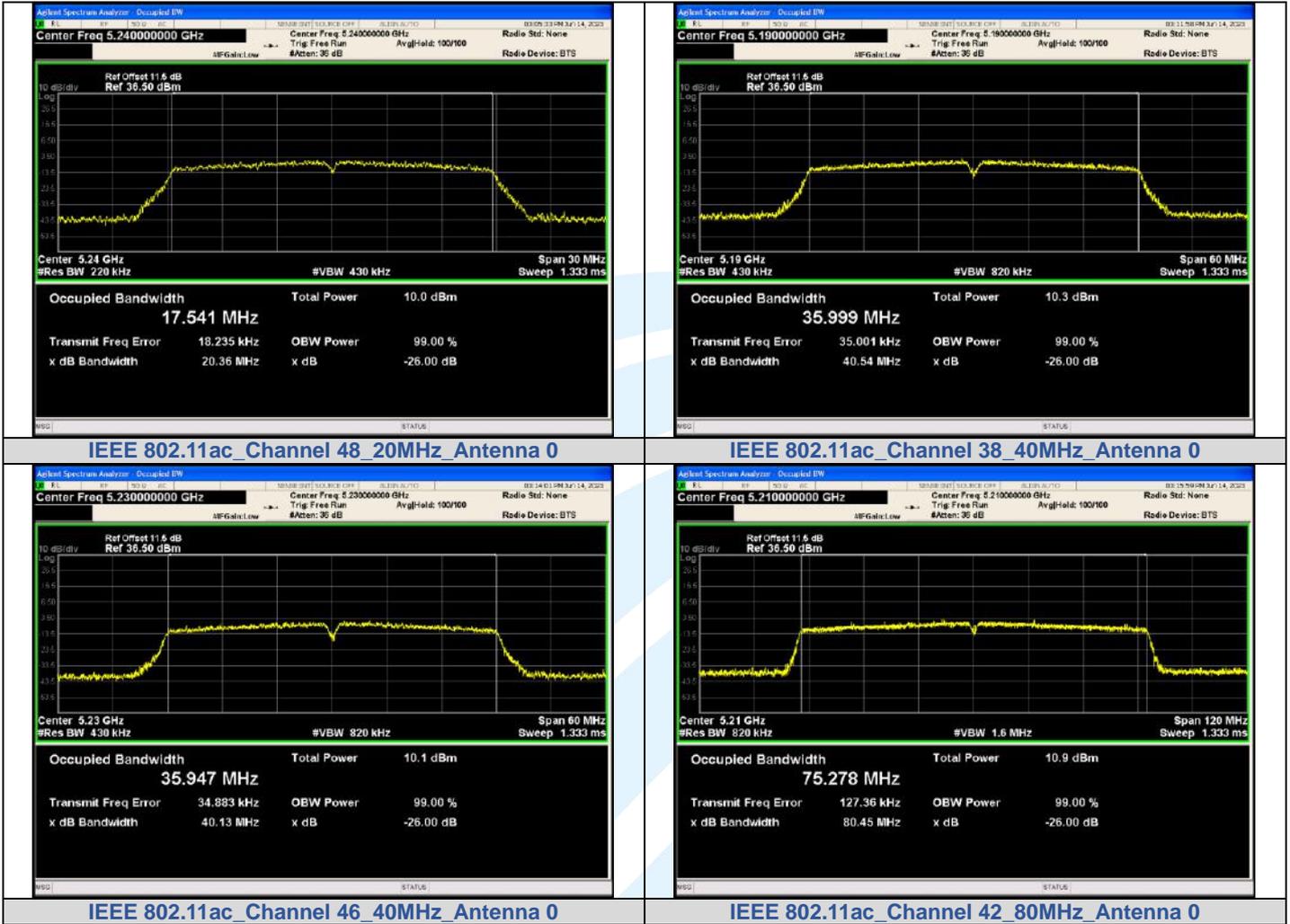
For U-NII-1 band

Mode	Channel	Ant.	Center Frequency (MHz)	26 dB Bandwidth (MHz)
IEEE 802.11a	36	0	5180	19.88
	44		5220	19.69
	48		5240	19.58
IEEE 802.11n_20	36		5180	20.22
	44		5220	20.27
	48		5240	20.07
IEEE 802.11n_40	38		5190	40.53
	46		5230	40.28
IEEE 802.11ac_20	36		5180	20.17
	44		5220	20.58
	48		5240	20.36
IEEE 802.11ac_40	38		5190	40.54
	46	5230	40.13	
IEEE 802.11ac_80	42	5210	80.45	

### Test Graphs





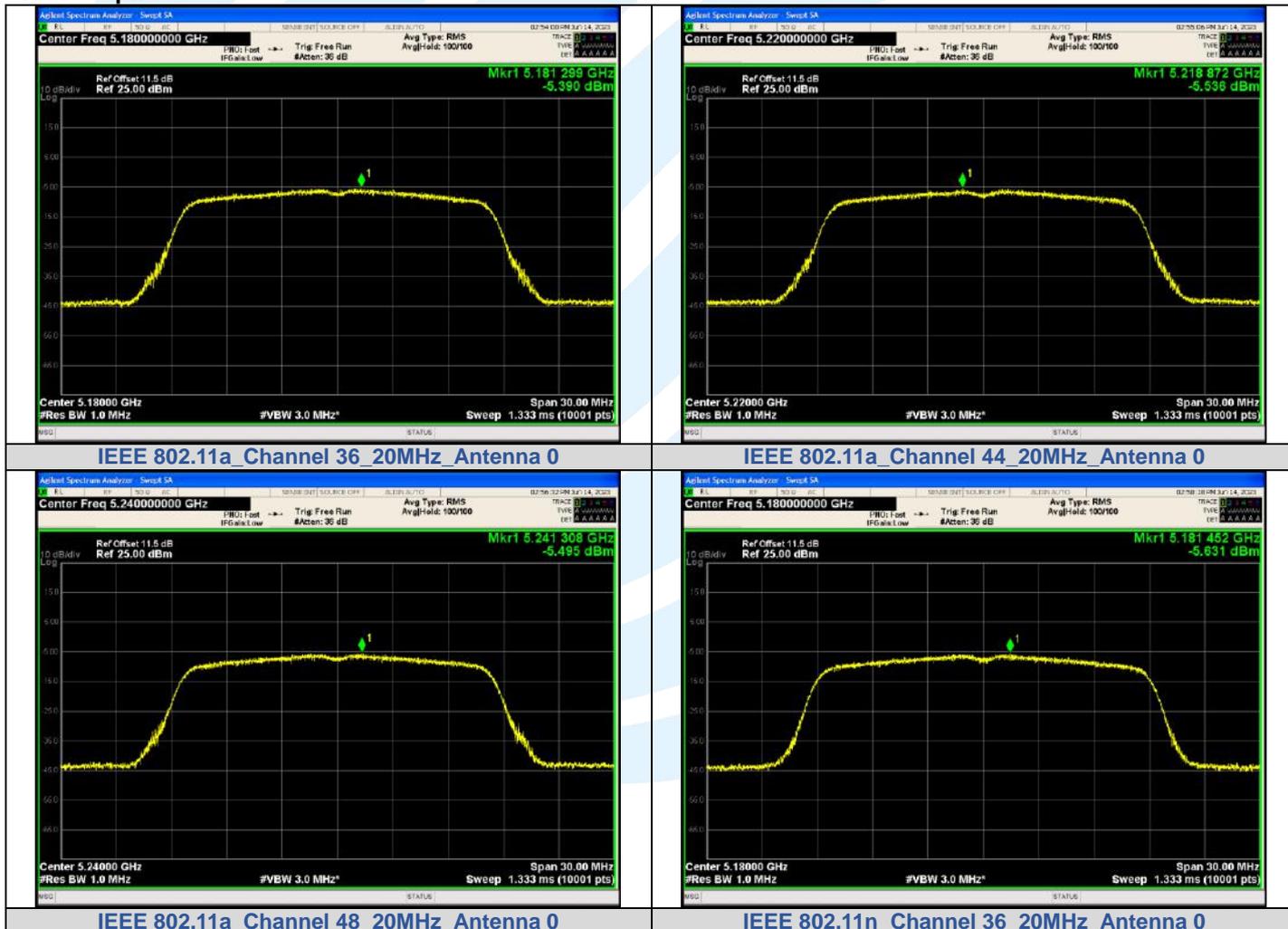


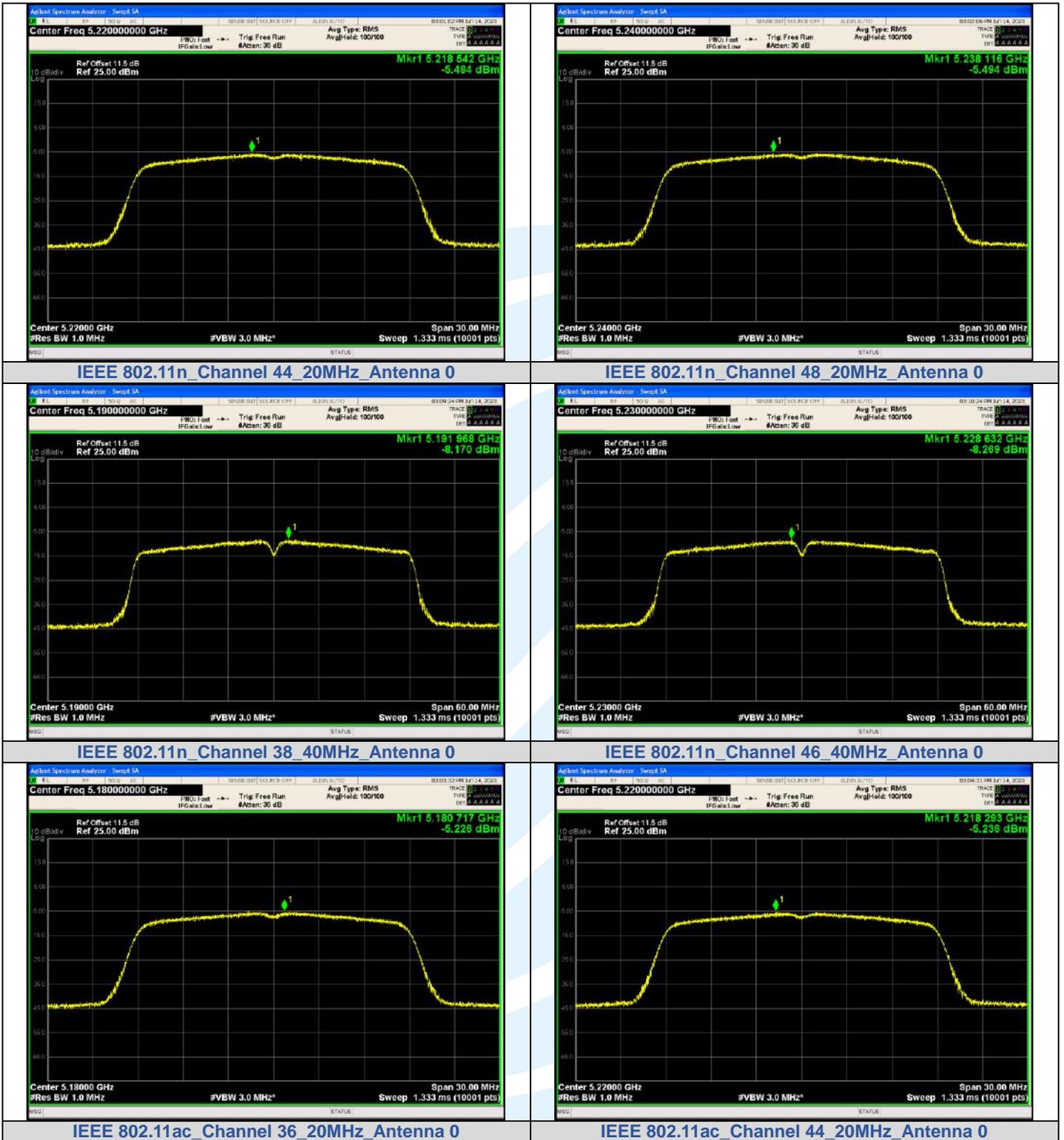
## A.2 PEAK POWER SPECTRAL DENSITY

For U-NII-1 band

Mode	Channel	Ant. 0 Meas PSD (dBm/MHz or dBm/0.5MHz)	Ant. 0 Corr'd PSD (dBm/MHz or dBm/0.5MHz)	Limit (dBm/MHz or dBm/0.5MHz)	Result
IEEE 802.11a	36	-5.390	-5.24	11	PASS
	44	-5.536	-5.38		PASS
	48	-5.495	-5.34		PASS
IEEE 802.11n_20	36	-5.631	-5.47		PASS
	44	-5.484	-5.33		PASS
	48	-5.494	-5.34		PASS
IEEE 802.11n_40	38	-8.170	-7.86		PASS
	46	-8.269	-7.96		PASS
IEEE 802.11ac_20	36	-5.226	-5.07		PASS
	44	-5.236	-5.08		PASS
	48	-5.610	-5.45		PASS
IEEE 802.11ac_40	38	-8.193	-7.90		PASS
	46	-8.367	-8.07	PASS	
IEEE 802.11ac_80	42	-11.772	-11.22	PASS	

### Test Graphs





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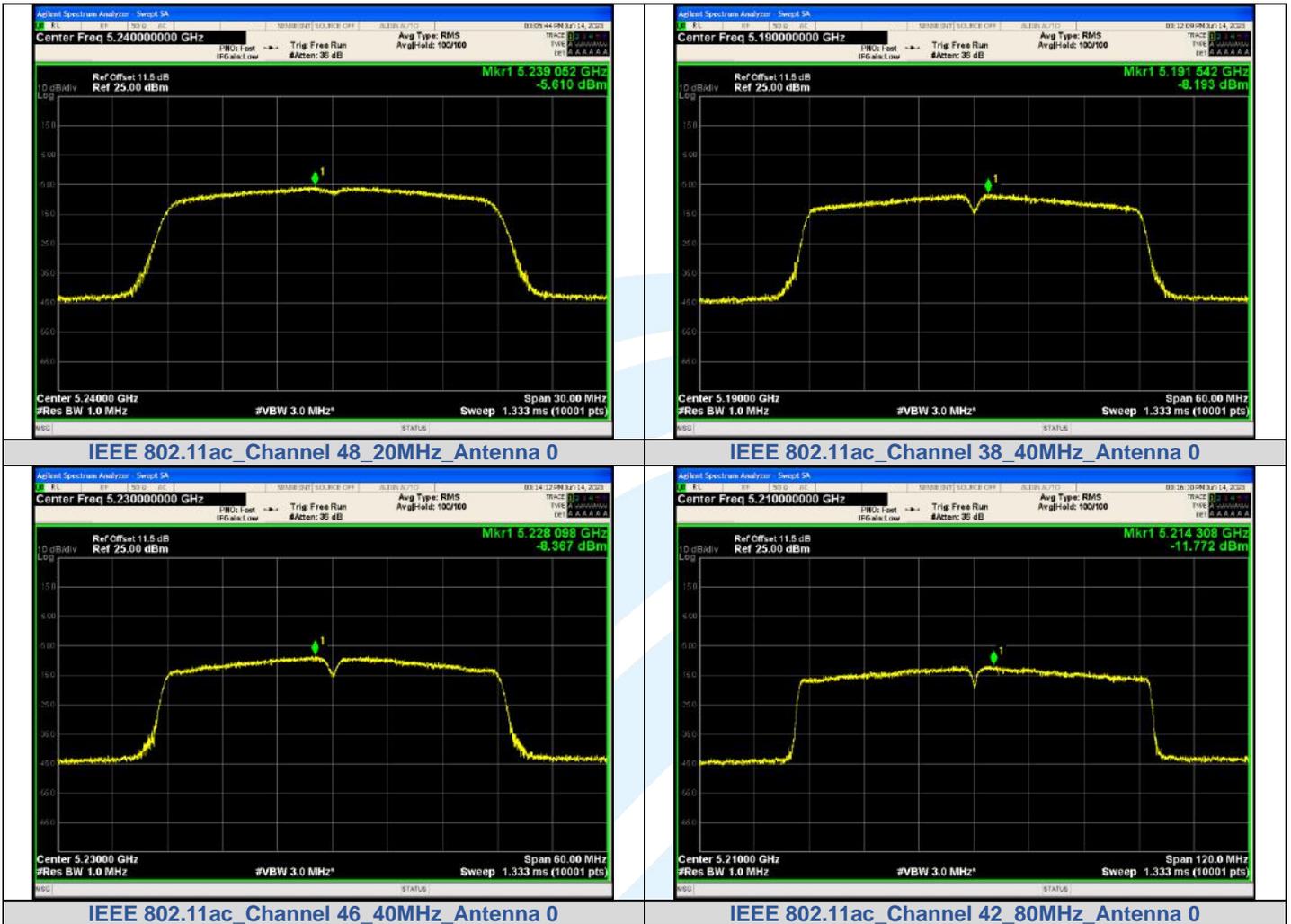
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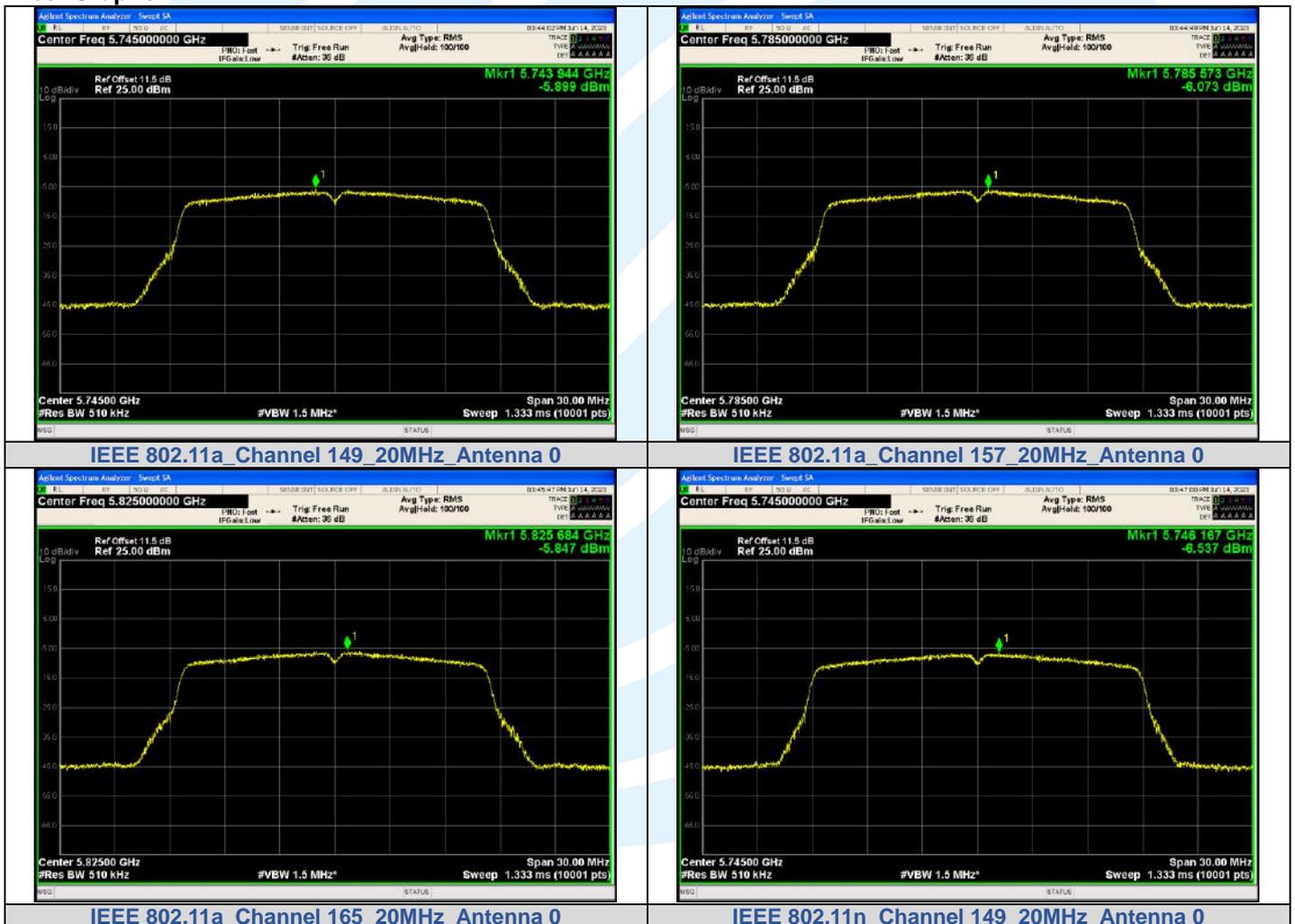
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For U-NII-3 band

Mode	Channel	Ant. 0 Meas PSD (dBm/MHz or dBm/0.5MHz)	Ant. 0 Corr'd PSD (dBm/MHz or dBm/0.5MHz)	Limit (dBm/MHz or dBm/0.5MHz)	Result
IEEE 802.11a	149	-5.899	-5.75	30	PASS
	157	-6.073	-5.92		PASS
	165	-5.847	-5.69		PASS
IEEE 802.11n_20	149	-6.537	-6.38		PASS
	157	-6.240	-6.08		PASS
	165	-6.505	-6.35		PASS
IEEE 802.11n_40	151	-9.468	-9.16		PASS
	159	-9.283	-8.97		PASS
	149	-6.225	-6.07		PASS
IEEE 802.11ac_20	157	-6.461	-6.30		PASS
	165	-6.222	-6.07		PASS
	151	-9.370	-9.08		PASS
IEEE 802.11ac_40	159	-9.271	-8.98	PASS	
	155	-12.875	-12.32	PASS	

Test Graphs



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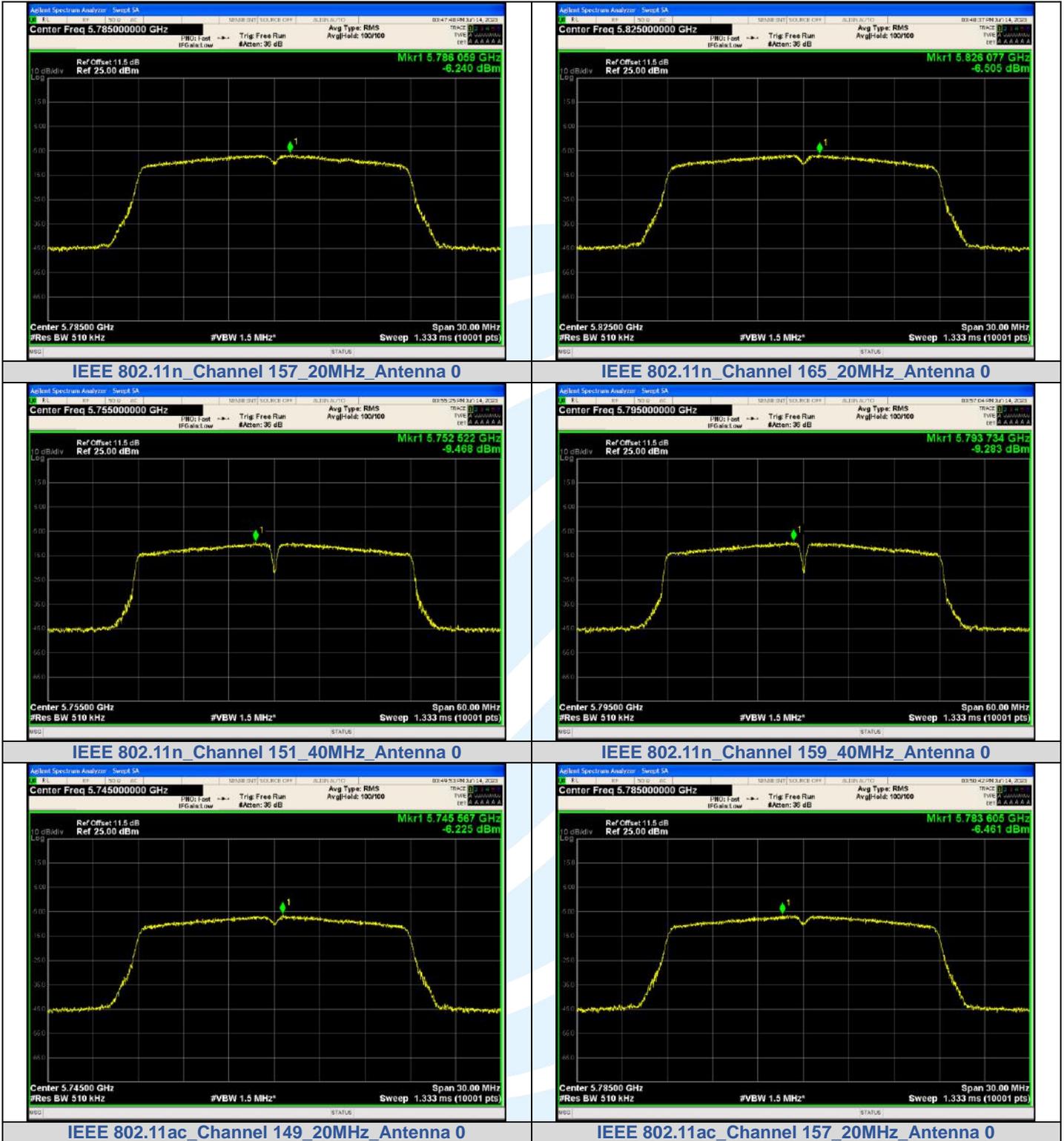
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IEEE 802.11ac\_Channel 165\_20MHz\_Antenna 0



IEEE 802.11ac\_Channel 151\_40MHz\_Antenna 0



IEEE 802.11ac\_Channel 159\_40MHz\_Antenna 0



IEEE 802.11ac\_Channel 155\_80MHz\_Antenna 0

**A.3 99% BANDWIDTH**

For U-NII-3 band

Mode	Channel	Ant.	99% BW (MHz)
IEEE 802.11a	149	0	16.467
	157		16.479
	165		16.488
IEEE 802.11n_20	149		17.609
	157		17.597
	165		17.613
IEEE 802.11n_40	151		36.019
	159		35.988
IEEE 802.11ac_20	149		17.591
	157		17.600
	165		17.616
IEEE 802.11ac_40	151		35.946
	159	35.929	
IEEE 802.11ac_80	155	75.212	

**Test Graphs**





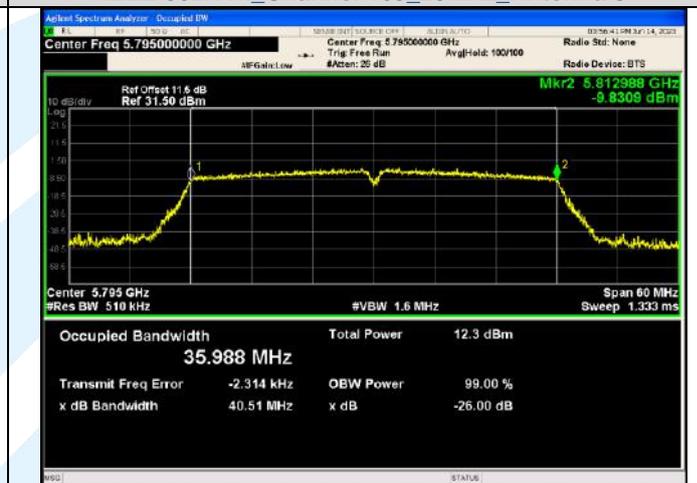
IEEE 802.11n\_Channel 157\_20MHz\_Antenna 0



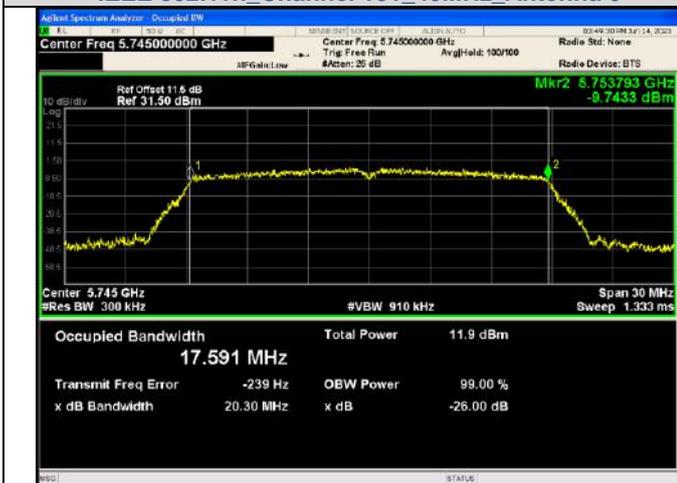
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IEEE 802.11n\_Channel 151\_40MHz\_Antenna 0



IEEE 802.11n\_Channel 159\_40MHz\_Antenna 0



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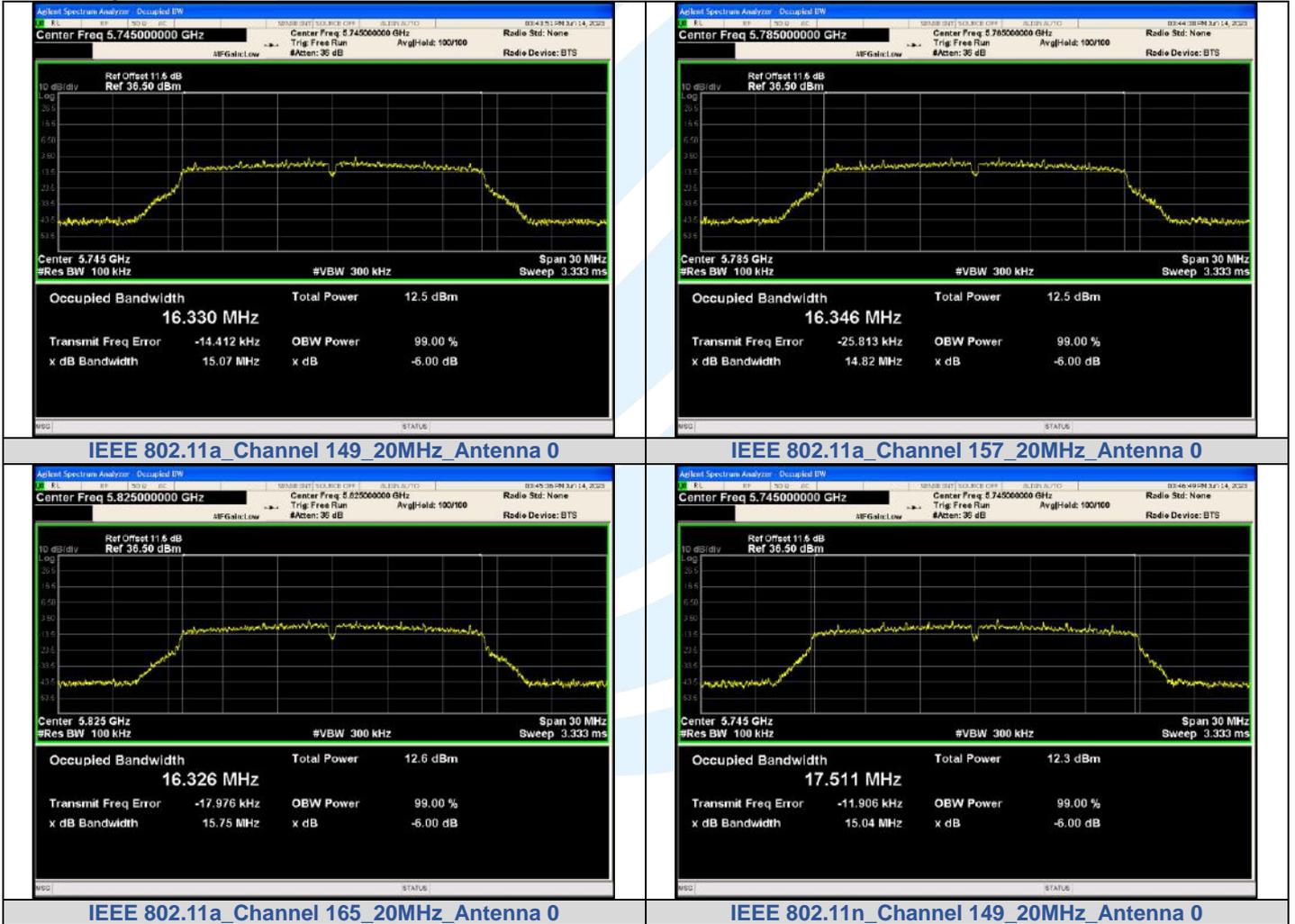


## A.4 6DB BANDWIDTH

For U-NII-3 band

Mode	Channel	Ant.	Center Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
IEEE 802.11a	149	0	5745	15.07	0.5	PASS
	157		5785	14.82		PASS
	165		5825	15.75		PASS
IEEE 802.11n_20	149		5745	15.04		PASS
	157		5785	15.05		PASS
	165		5825	15.93		PASS
IEEE 802.11n_40	151		5755	35.06		PASS
	159		5795	35.06		PASS
IEEE 802.11ac_20	149		5745	16.70		PASS
	157		5785	15.03		PASS
	165		5825	15.65		PASS
IEEE 802.11ac_40	151		5755	35.11		PASS
	159	5795	34.99	PASS		
IEEE 802.11ac_80	155	5775	75.10	PASS		

### Test Graphs



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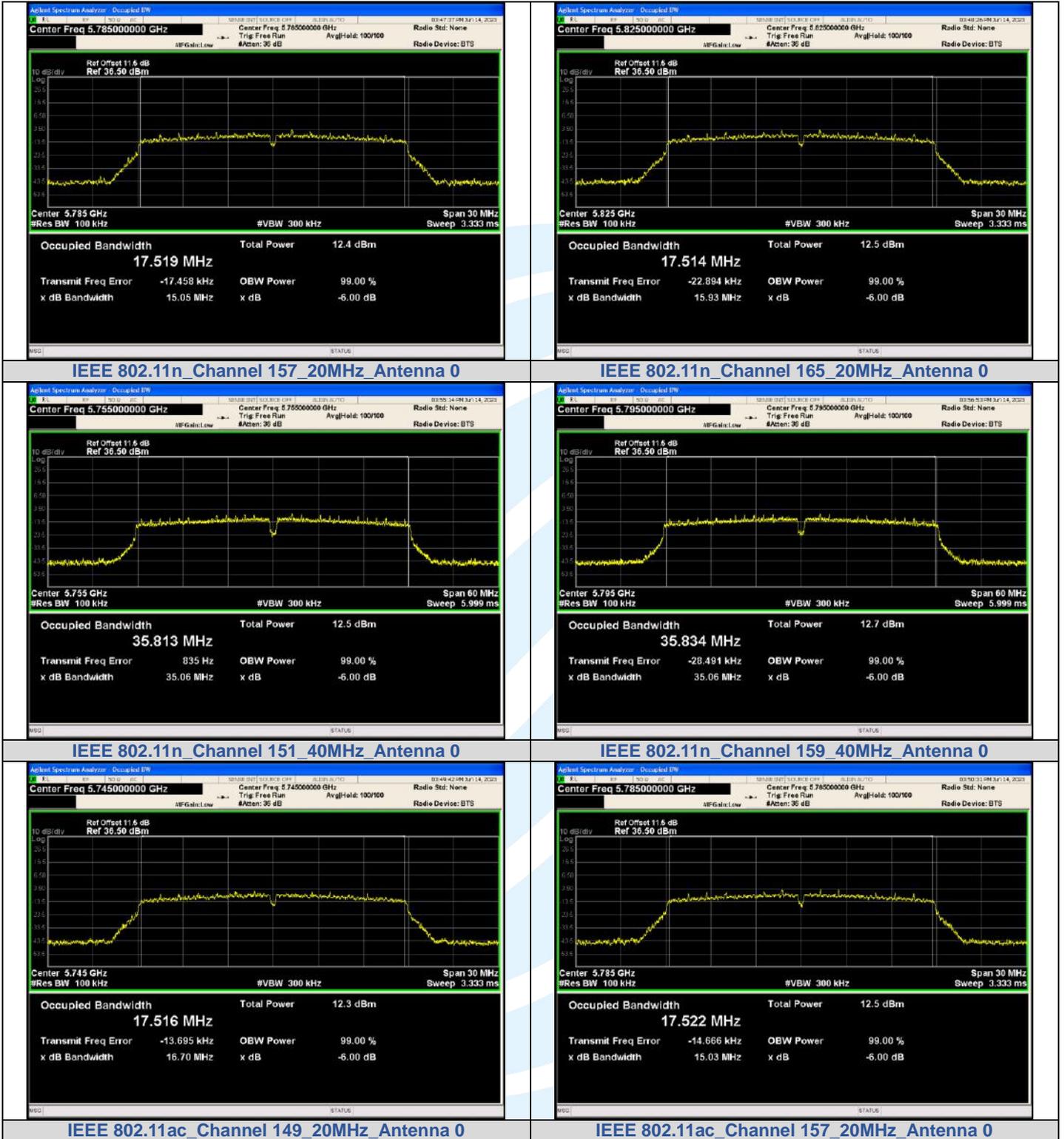
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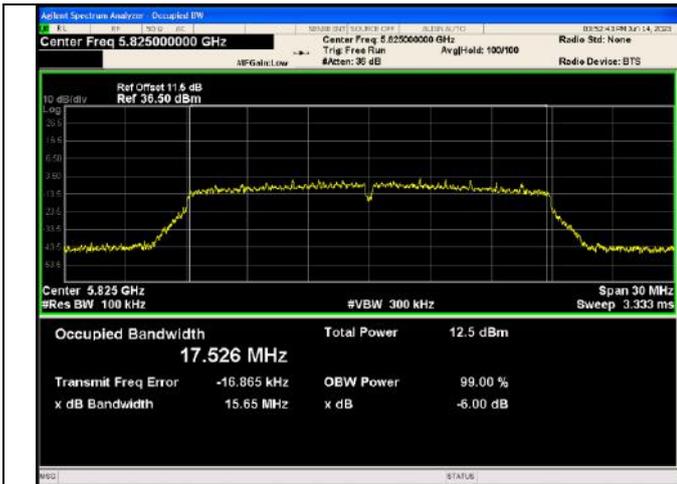
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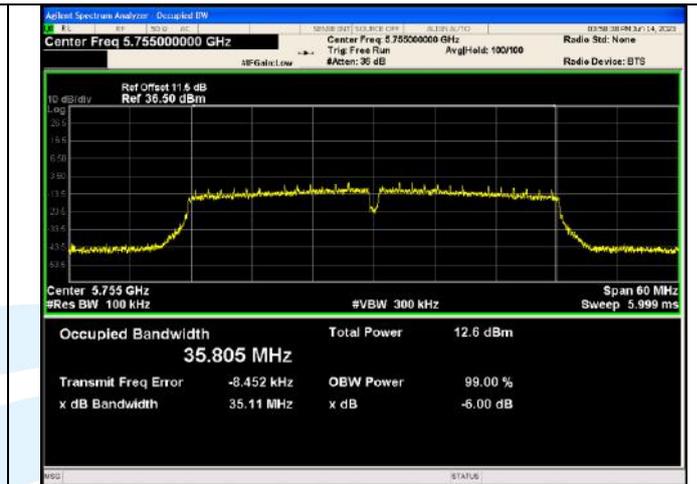
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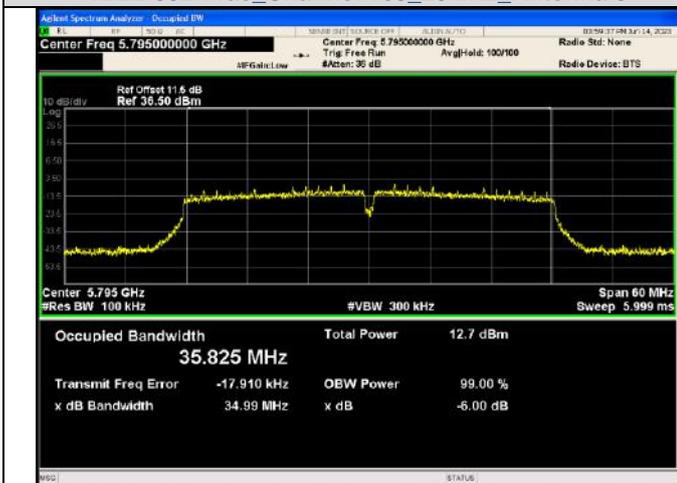
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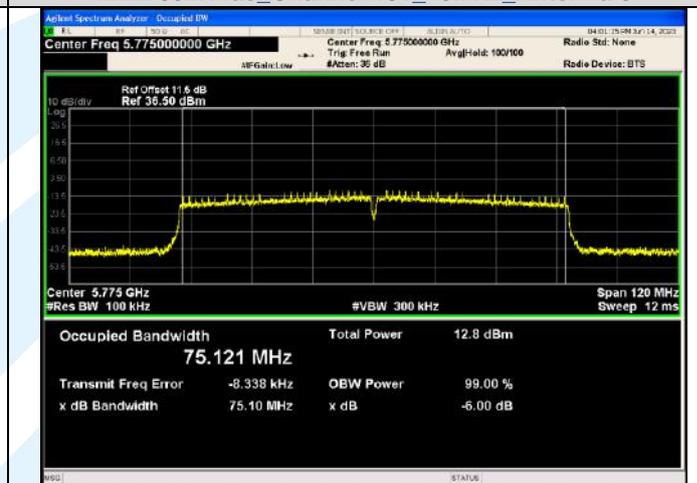
IEEE 802.11ac\_Channel 165\_20MHz\_Antenna 0



IEEE 802.11ac\_Channel 151\_40MHz\_Antenna 0



IEEE 802.11ac\_Channel 159\_40MHz\_Antenna 0



IEEE 802.11ac\_Channel 155\_80MHz\_Antenna 0

## APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

## APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

\*\*\* End of Report \*\*\*

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