REPORT No. : SZ20120341W08

TEST REPORT

APPLICANT	:	Nortek Security & Control LLC
PRODUCT NAME	:	Edge Panel
MODEL NAME	:	2GIG-EDG-NA-A
BRAND NAME	:	2GIG
FCC ID	:	EF400216
STANDARD(S)	:	47 CFR Part 15 Subpart E
RECEIPT DATE	:	2020-12-24
TEST DATE	:	2021-01-12 to 2021-01-17
ISSUE DATE	:	2021-02-04

Edited by: Peng Mi

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DIRECTORY

Change History		
Version	Date	Reason for change
1.0	2021-02-04	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Nortek Security & Control LLC
Applicant Address:	5919 Sea Otter Place, Carlsbad, CA 92010, United States
Manufacturer:	Flextronics Electronics Technology (Shenzhen) Co., Ltd
Manufacturer Address:	89 Yong Fu Road, Tong Fu Yu Industrial Park, Fu Yong Town, Bao An District, Shenzhen, Guangdong, 518103, China

1.2. Equipment Under Test (EUT) Description

Product Name:	Edge Panel	
Serial No.:	(N/A, marked #1 by test site)	
Hardware Version:	A	
Software Version:	0	
Modulation Technology:	OFDM	
Modulation Mode:	802.11n(HT20), 802.11n(HT40) 802.11ac(VHT20), 802.11ac(VHT40), 802.11ac(VHT80)	
Operating Frequency Range:	5.180 GHz- 5.240 GHz; 5.745GHz- 5.825GHz	
Channel Number:	Refer to 1.4	
Antenna Type:	FPC Antenna	
Antenna Gain:	0.75dBi	
Accessory Information:	Battery	
	Brand Name:	Highpower
	Model No.:	115150
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	4020mAh
	Rated Voltage:	3.80V
	Charge Limit:	4.40V
	Manufacturer:	Huizhou Highpower Technology Co.,LTD.

Accessory Information:	Adaptor	
	Brand Name:	ZBPOWER
	Model No.:	ZB-H140017
	Serial No.:	(N/A, marked #1 by test site)
	Rated Output:	14.00V⎓1.70A
	Rated Input:	100-240V~50/60Hz, Max 0.6A
	Manufacturer:	Huizhou Zhong bang electronics co., ltd.

Note 1: WIFI hotspot does not support U-NII band.

Note 2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Modulation Type and Data Rate of EUT

Modulation Technology	Modulation Type	Data Rate (Mbps) Note1
OFDM (802.11n)	BPSK	**6.5**
	QPSK	13/19.5
	16QAM	26/39
	64QAM	52/58.5/65
OFDM (802.11ac)	BPSK	**6.5**
	QPSK	13/19.5
	16QAM	26/39
	64QAM	52/58.5/65
	256QAM	78

Note1: The worst-case mode (black bold) in all data rates has been determined during the pre-scan, only the test data of the worst-case were recorded in this report.

1.4. The Channel Number and Frequency

Frequency Range: 5180MHz-5240MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	**36**	**5180**	40	5200
	44	**5220**	**48**	**5240**
40MHz	**38**	**5190**	**46**	**5230**
80MHz	**42**	**5210**		
Frequency Range: 5745-5825MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	**149**	**5745**	153	5765
	157	**5785**	161	5805
	165	**5825**		
40MHz	**151**	**5775**	**159**	**5795**
80MHz	**155**	**5775**		

Note 1: The black bold channels were selected for test.

1.5. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart E (U-NII band) for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (5-1-14 Edition)	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result	Method determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	No deviation
2	ANSI C63.10	Duty Cycle of the test signal	Jan 12, 2021	Liu Bo	PASS	No deviation
3	15.407(a)	Maximum conducted output Power	Jan 12, 2021	Liu Bo	PASS	No deviation
4	15.407(a)(e)	Emission Bandwidth	Jan 12, 2021	Liu Bo	PASS	No deviation
5	15.407(a)	Maximum Power spectral density	Jan 12, 2021	Liu Bo	PASS	No deviation
6	15.407(g)	Frequency Stability	Jan 12, 2021	Liu Bo	PASS	No deviation
7	15.207	Conducted Emission	Jan 17, 2021	Huang Zhiye	PASS	No deviation
8	15.407(b)	Restricted Frequency Bands	Jan 16, 2021	Peng Xuewei	PASS	No deviation
9	15.407(b)	Radiated Emission	Jan 16, 2021	Peng Xuewei	PASS	No deviation

Note 1: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10 2013.

Note 2: These RF tests were performed according to the method of measurements prescribed in KDB789033 D02 v02r01.

Note 3: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 11.5dB contains two parts that cable loss 1.5dB and Attenuator 10dB.

Note 4: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 5: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% risk level.

1.6. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15-35
Relative Humidity (%):	30-60
Atmospheric Pressure (kPa):	86-106

2. 47 CFR Part 15E Requirements

2.1. Antenna Requirement

2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

2.1.2. Result: Compliant

The EUT has a permanently and irreplaceable attached antenna with the RP-SMA Jack. Please refer to the EUT external and internal photos.

2.2. Duty Cycle of the Test Signal

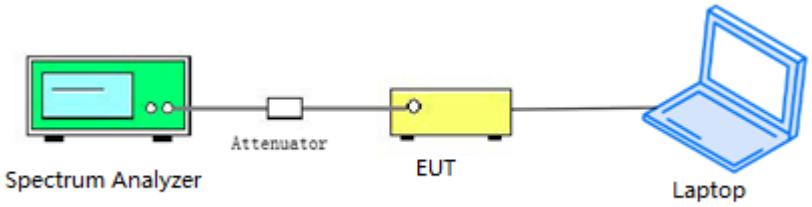
2.2.1. Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).

When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this subclause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than ±2%; otherwise, the duty cycle is considered to be nonconstant.

2.2.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2.2.3. Test Procedure

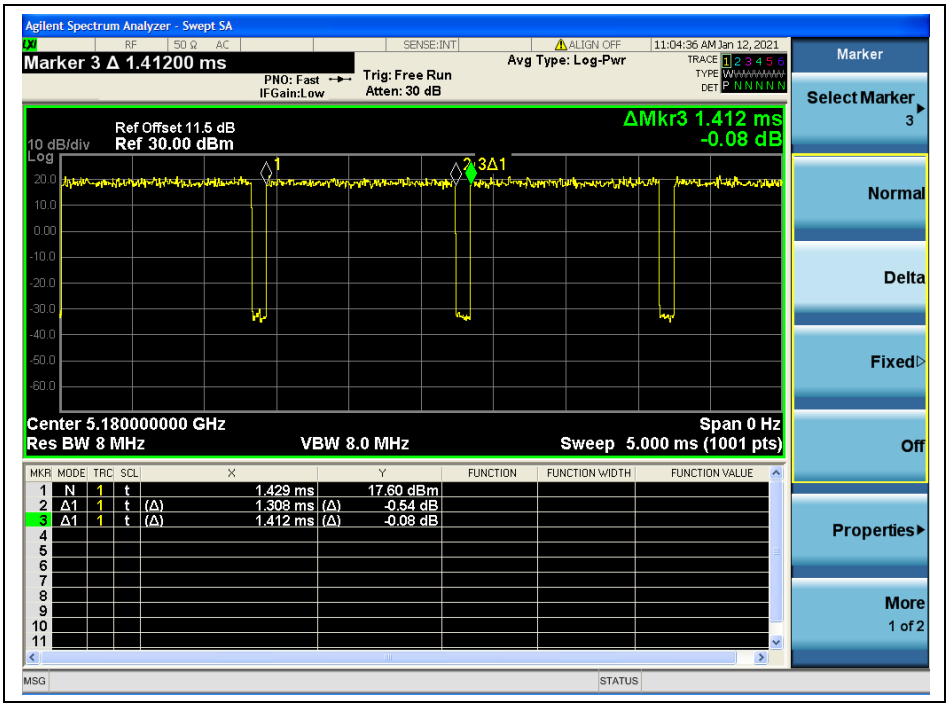
KDB 789033 Section B was used in order to prove compliance.

2.2.4. Test Result

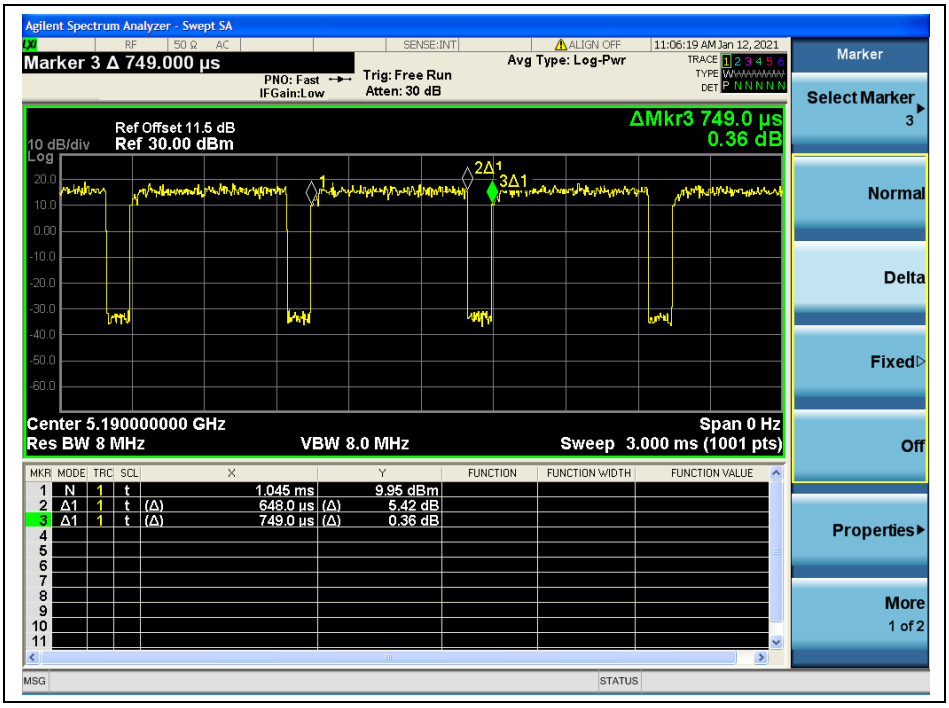
A. Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*log[1/D])
802.11n(HT20)	92.63	0.33
802.11n(HT40)	86.52	0.63
802.11ac(VHT20)	92.93	0.32
802.11ac(VHT40)	86.49	0.63
802.11ac(VHT80)	75.64	1.21

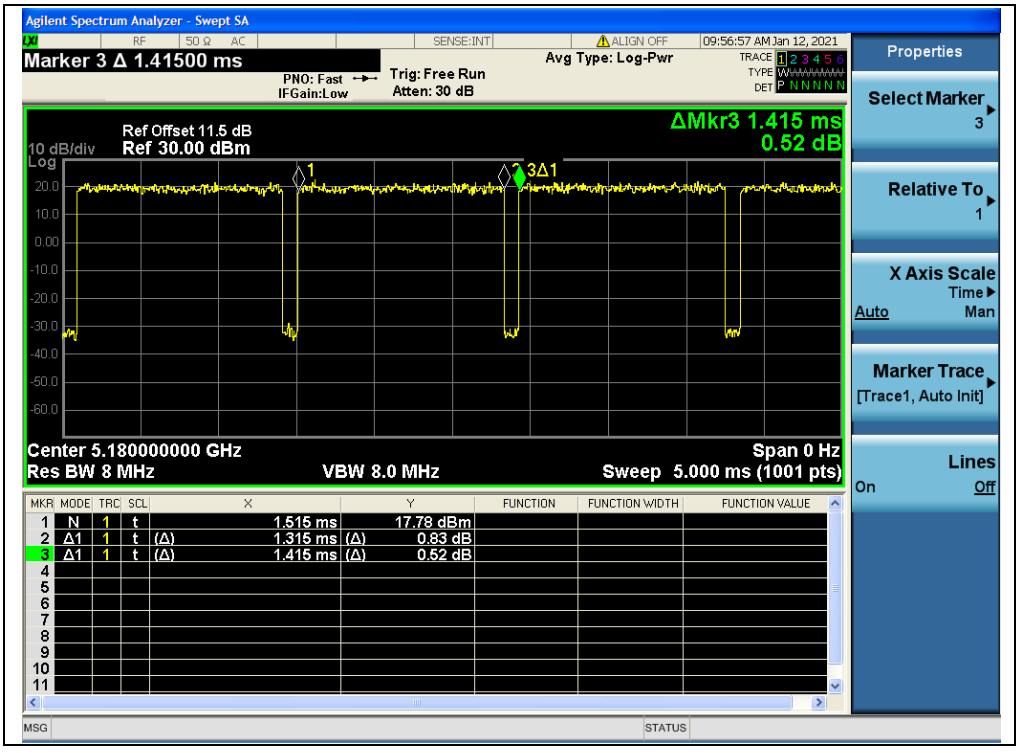
B. Test Plot:



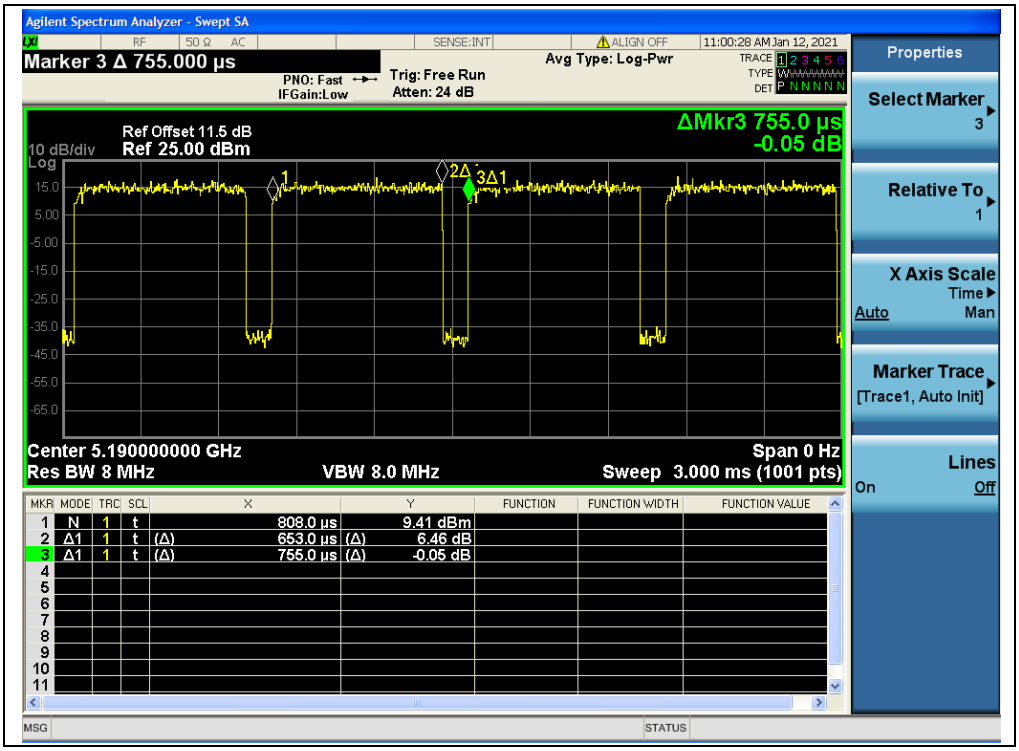
(CH36_5180MHz _802.11n(HT20))



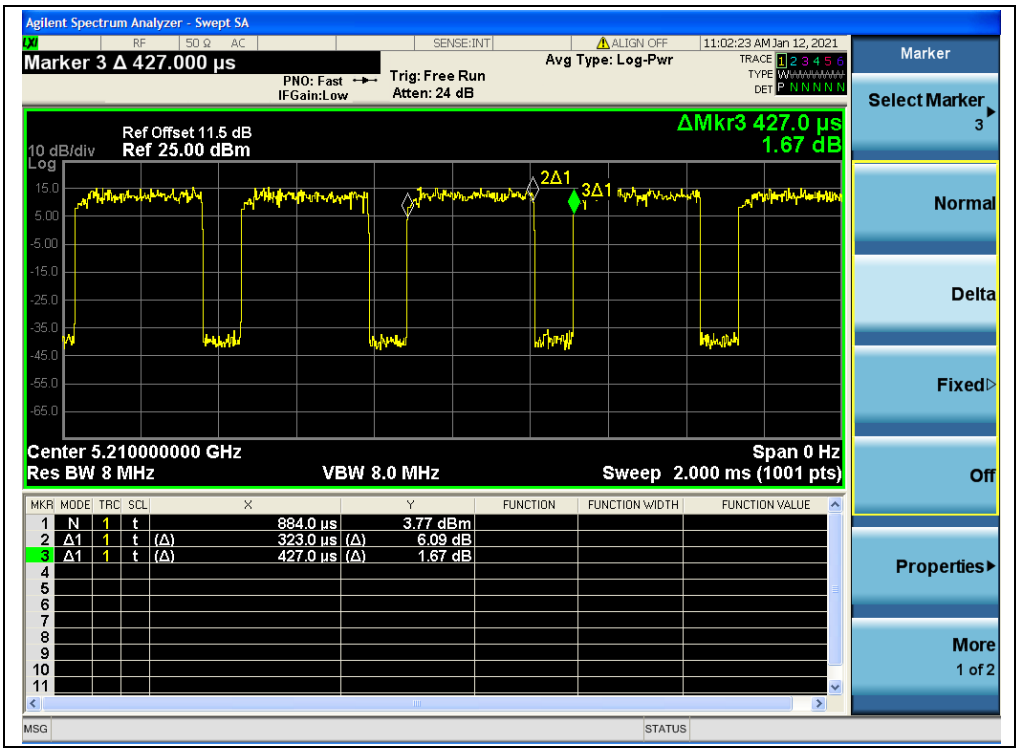
(CH38_5190MHz _802.11n(HT40))



(CH36_5180MHz _802.11ac(VHT20))



(CH38_5190MHz _802.11 ac(VHT40))



(CH42_5210MHz _802.11 ac(VHT80))

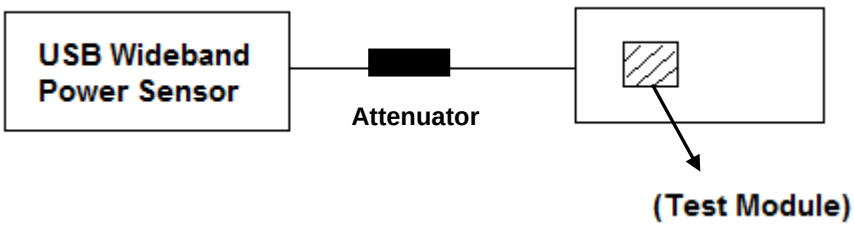
2.3. Maximum Conducted Output Power

2.3.1. Requirement

(1) 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.
(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 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.
(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.
If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(4) According to KDB662911D01Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.
(5) According to KDB 662911 D01, the directional gain = G_{ANT} +10log(N_{ANT}) dBi, where G_{ANT} is the antenna gain in dBi, N_{ANT} is the number of outputs.

2.3.2. Test Description

Section E) 3) of KDB 789033 defines a methodology using a USB Wideband Power Sensor.
Test Setup:



The EUT (Equipment under the test) which is coupled to the USB Wideband Power Sensor; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in USB Wideband Power Sensor.

2.3.3. Test Result

Maximum Average Conducted Output Power

802.11n (HT20) Test mode

Channel	Frequency (MHz)	Average Power (dBm)				Limit (dBm)		Verdict
		Measured	Duty Factor	Duty factor Calculated				
		dBm		dBm	W	dBm	W	
36	5180	15.99	0.33	16.32	0.043	24	0.25	PASS
44	5220	15.97		16.30	0.043			
48	5240	16.07		16.40	0.044			
149	5745	16.02		16.35	0.043	30	1	
157	5785	16.09		16.42	0.044			
165	5825	16.10		**16.43**	**0.044**			

802.11n (HT40) Test mode

Channel	Frequency (MHz)	Average Power				Limit (dBm)		Verdict
		Measured	Duty Factor	Duty factor Calculated				
		dBm		dBm	W	dBm	W	
38	5190	15.62	0.63	16.25	0.042	24	0.25	PASS
46	5230	15.55		16.18	0.041			
151	5755	15.60		16.23	0.042	30	1	
159	5795	15.51		16.14	0.041			

802.11ac (VHT20) Test mode

Channel	Frequency (MHz)	Average Power (dBm)				Limit (dBm)		Verdict
		Measured	Duty Factor	Duty factor Calculated				
		dBm		dBm	W	dBm	W	
36	5180	16.02	0.32	16.34	0.043	24	0.25	PASS
44	5220	16.07		16.39	0.044			
48	5240	15.97		16.29	0.043			
149	5745	15.98		16.30	0.043	30	1	
157	5785	16.09		16.41	0.044			
165	5825	15.96		16.28	0.042			

802.11ac (VHT40) Test mode

Channel	Frequency (MHz)	Average Power				Limit (dBm)		Verdict
		Measured	Duty Factor	Duty factor Calculated				
		dBm		dBm	W	dBm	W	
38	5190	16.01	0.63	16.64	0.046	24	0.25	PASS
46	5230	16.02		16.65	0.046			
151	5755	16.08		**16.71**	**0.047**	30	1	
159	5795	16.06		16.69	0.047			

802.11ac (VHT80) Test mode

Channel	Frequency (MHz)	Average Power				Limit (dBm)		Verdict
		Measured	Duty Factor	Duty factor Calculated				
		dBm		dBm	W	dBm	W	
42	5210	16.06	1.21	**17.27**	**0.053**	24	0.25	PASS
155	5775	16.06		17.27	0.053	30	1	

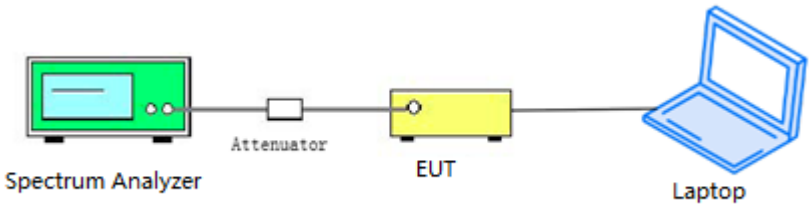
2.4. Emission Bandwidth

2.4.1. Requirement

For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement. Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

2.4.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2.4.3. Test Procedure

1. KDB 789033 Section C) 1) Emission Bandwidth was used in order to prove compliance
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%.
2. KDB 789033 Section C) 2) minimum emission bandwidth for the band 5.725-5.85GHz was used in order to prove compliance.
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 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.

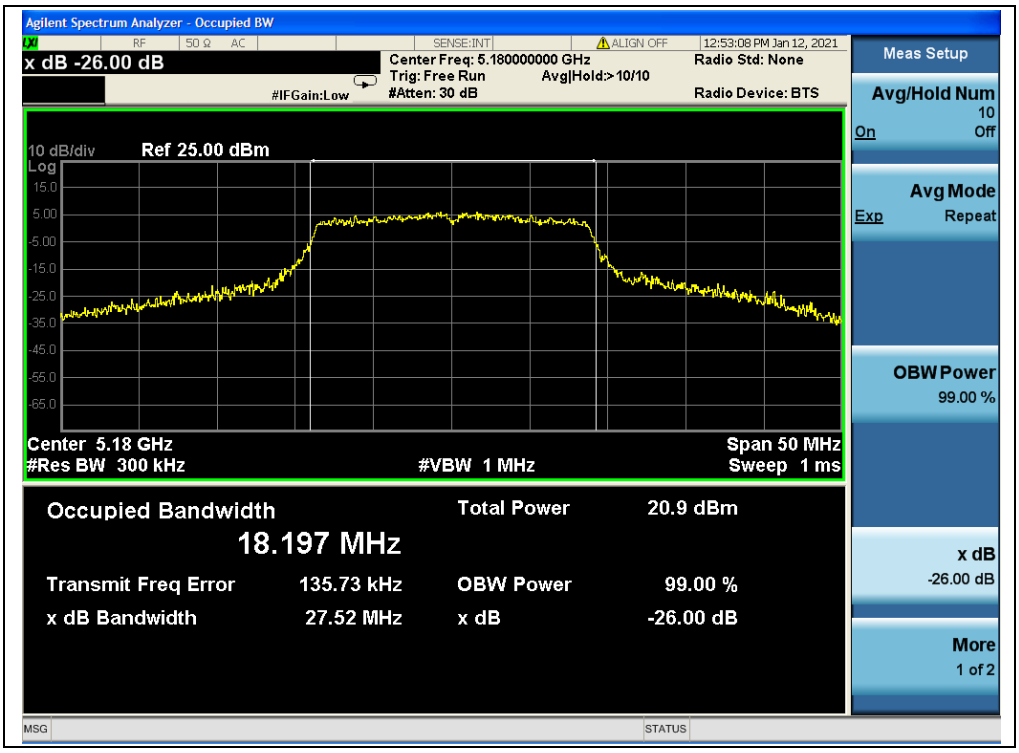
2.4.4. Test Result

802.11n (HT20) Test mode

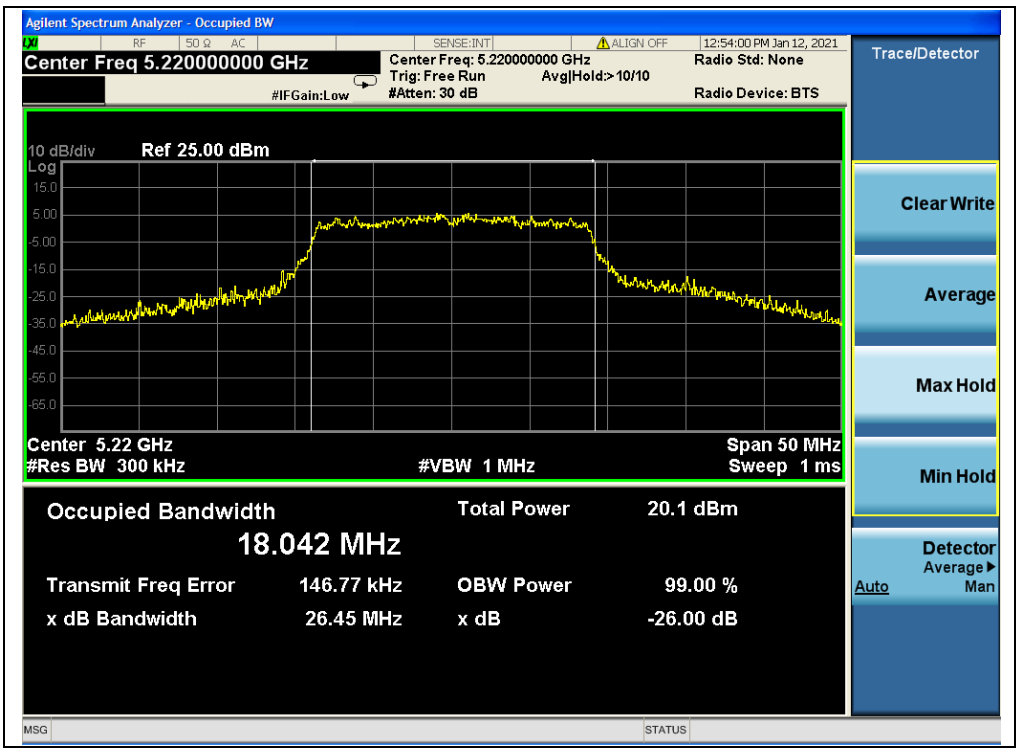
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	27.52
44	5220	26.45
48	5240	24.23
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
149	5745	17.54
157	5785	16.95
165	5825	17.55

B. Test Plot:



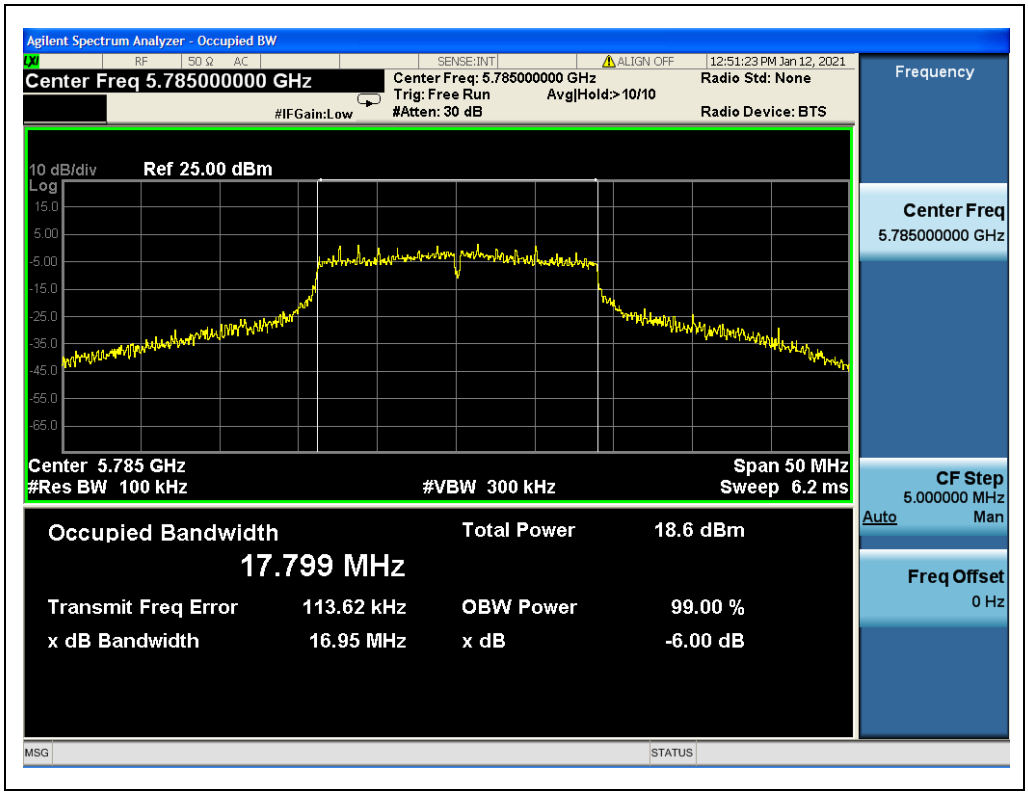
(Channel 36, 5180MHz, 802.11 n (HT20))



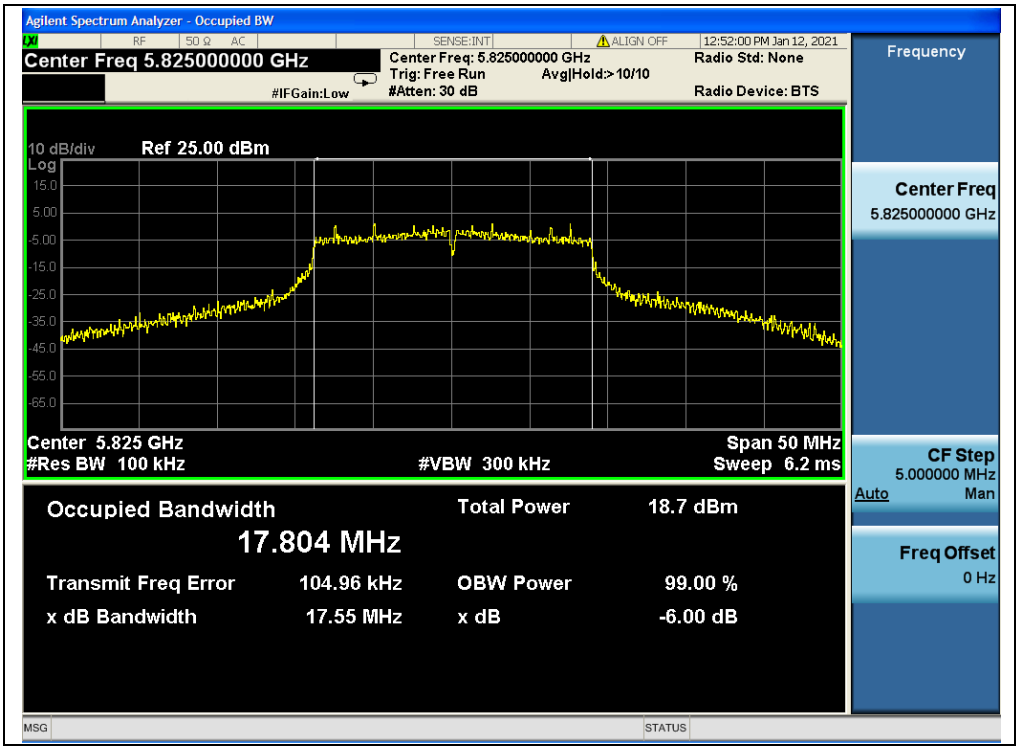
(Channel 44, 5220 MHz, 802.11 n (HT20))

(Channel 48, 5240MHz, 802.11 n (HT20))

(Channel 149, 5745MHz, 802.11 n (HT20))



(Channel 157, 5785MHz, 802.11 n (HT20))



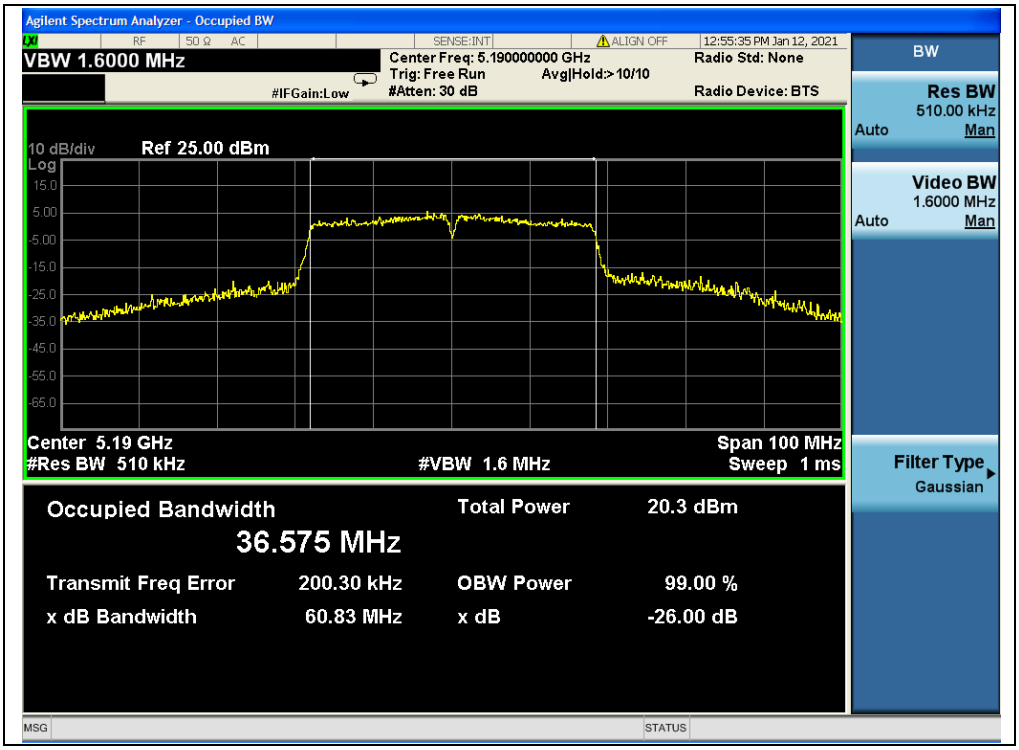
(Channel 165, 5825MHz, 802.11 n (HT20))

802.11n (HT40) Test mode

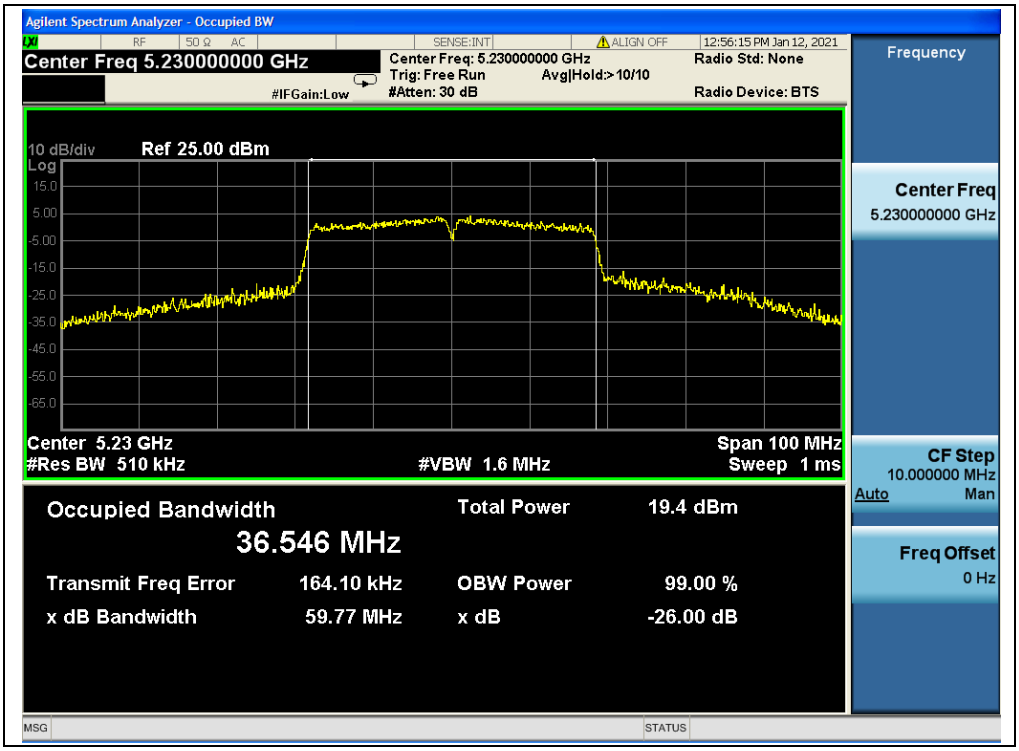
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	60.83
46	5230	59.77
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
151	5755	36.34
159	5795	36.38

B. Test Plot:



(Channel 38, 5190MHz, 802.11n (HT40))



(Channel 46, 5230 MHz, 802.11n (HT40))

(Channel 151, 5755 MHz, 802.11n (HT40))

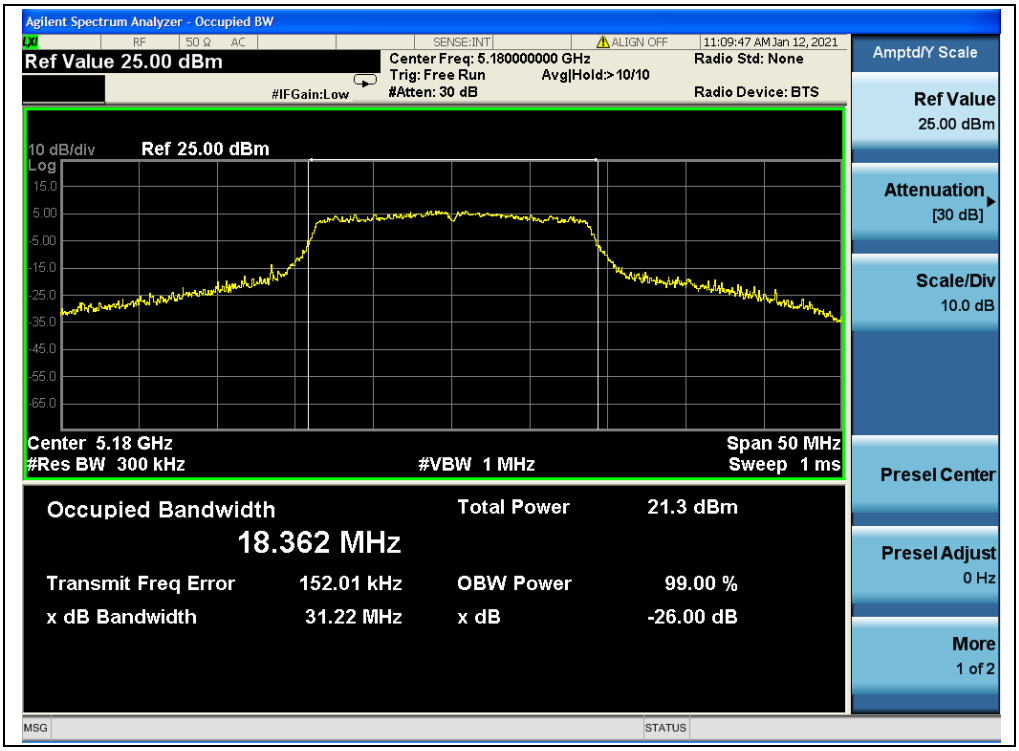
(Channel 159, 5795MHz, 802.11n (HT40))

802.11ac (VHT20) Test mode

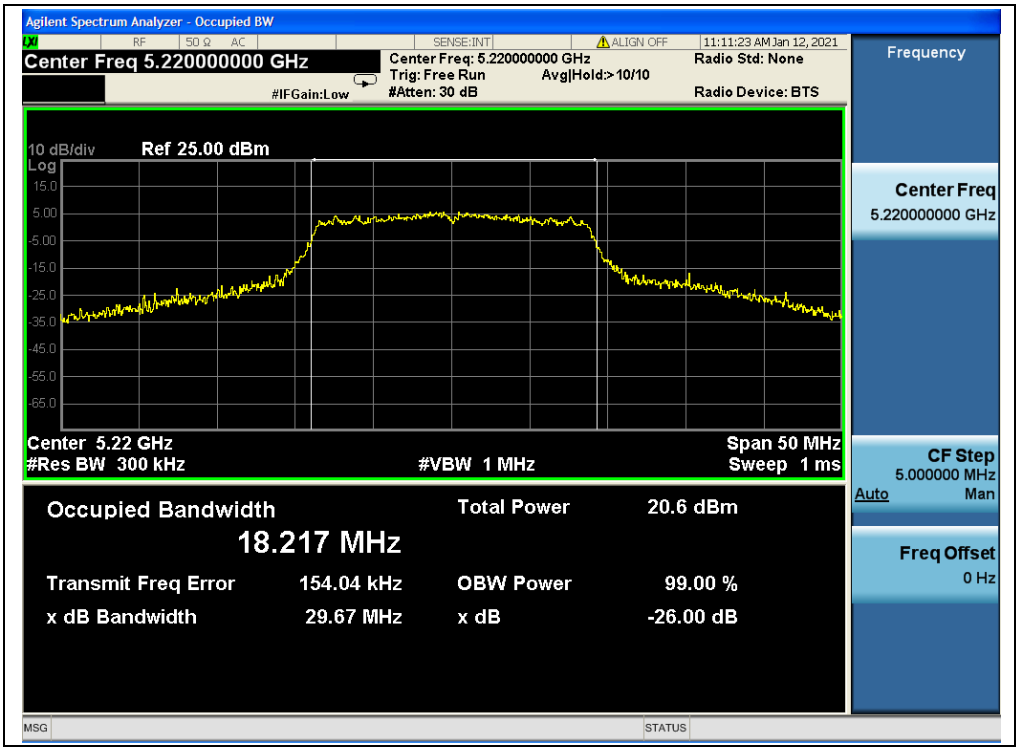
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	31.22
44	5220	29.67
48	5240	27.58
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
149	5745	17.56
157	5785	17.27
165	5825	17.54

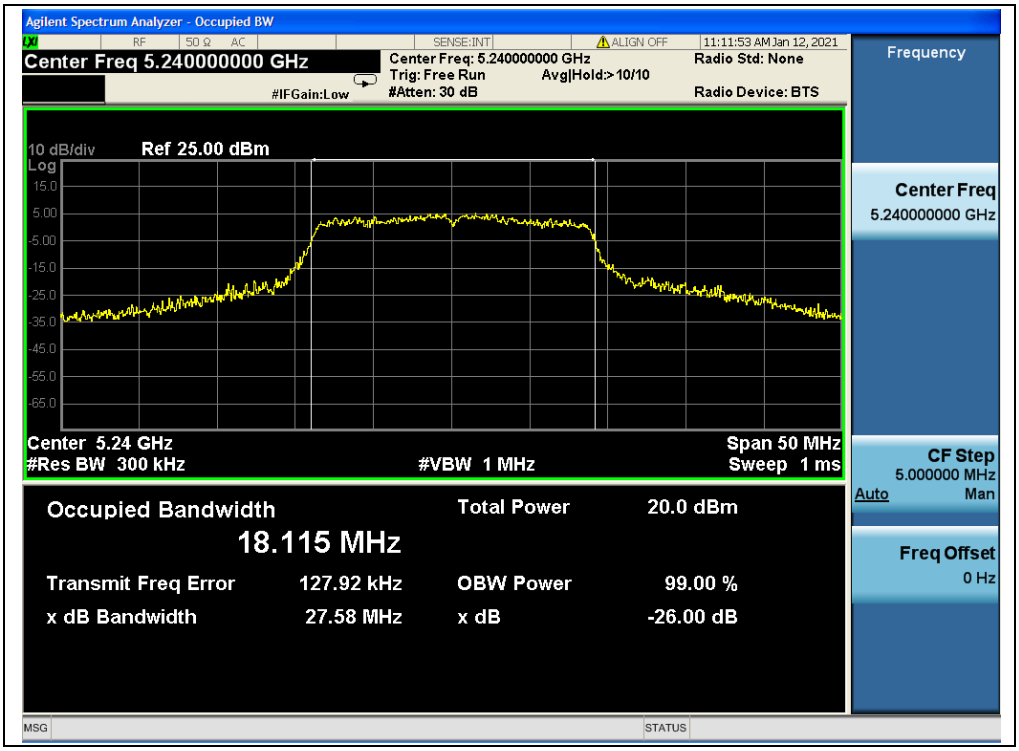
B. Test Plot:



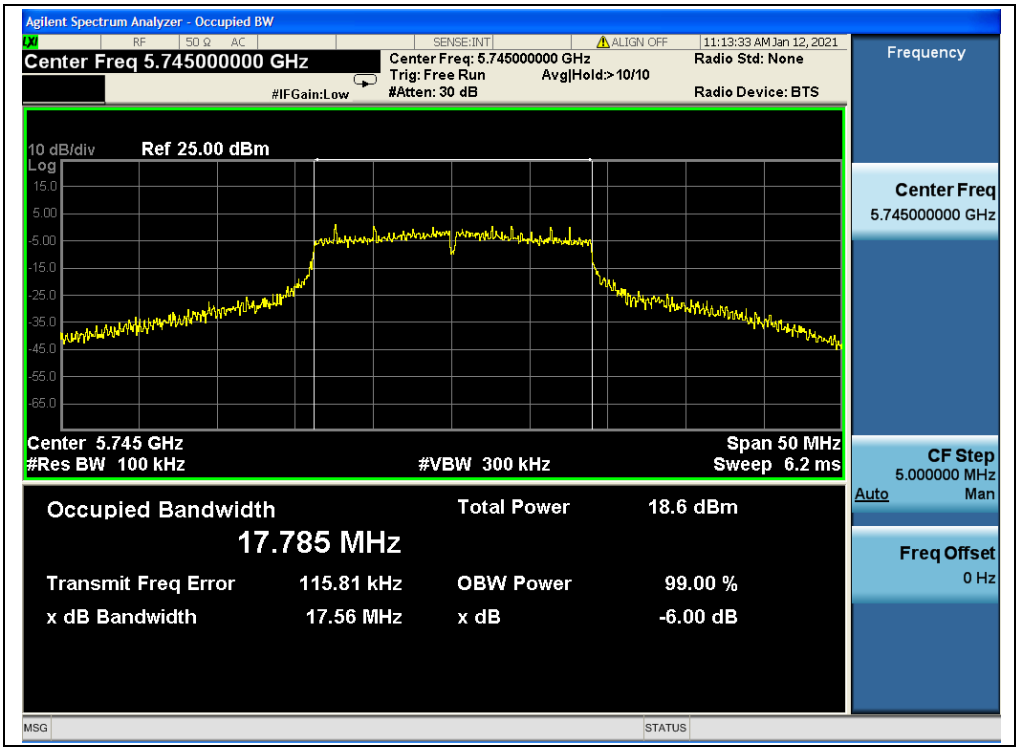
(Channel 36, 5180MHz, 802.11 ac (VHT20))



(Channel 44, 5220 MHz, 802.11 ac (VHT20))



(Channel 48, 5240MHz, 802.11 ac (VHT20))



(Channel 149, 5745MHz, 802.11 ac (VHT20))

(Channel 157, 5785MHz, 802.11 ac (VHT20))

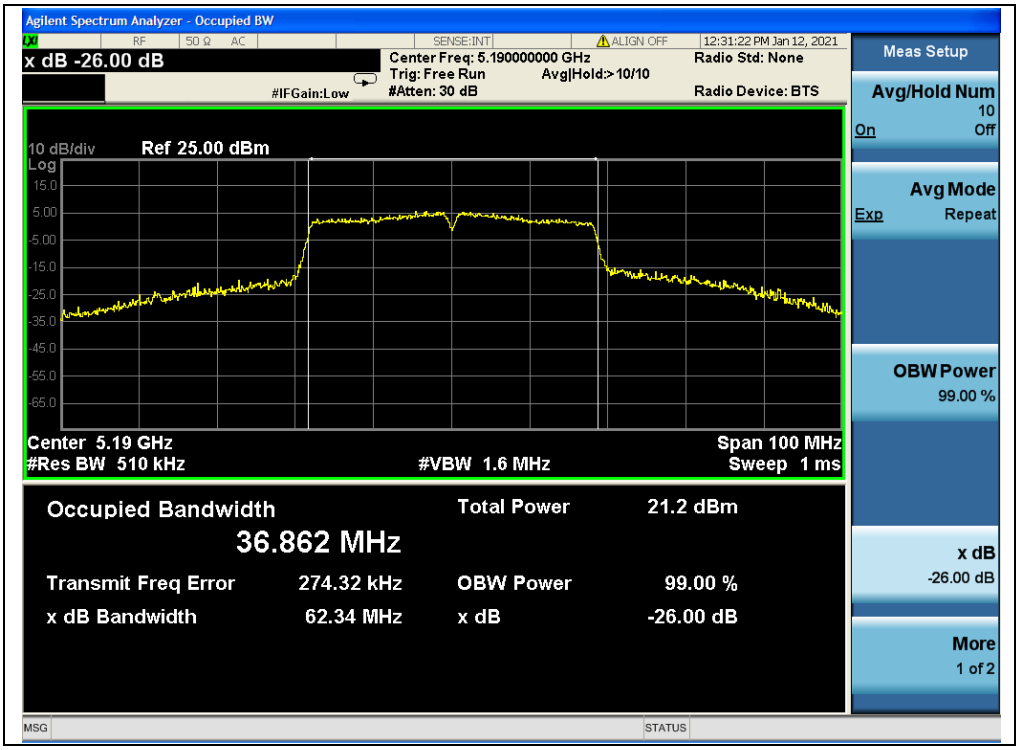
(Channel 165, 5825MHz, 802.11 ac (VHT20))

802.11ac (VHT40) Test mode

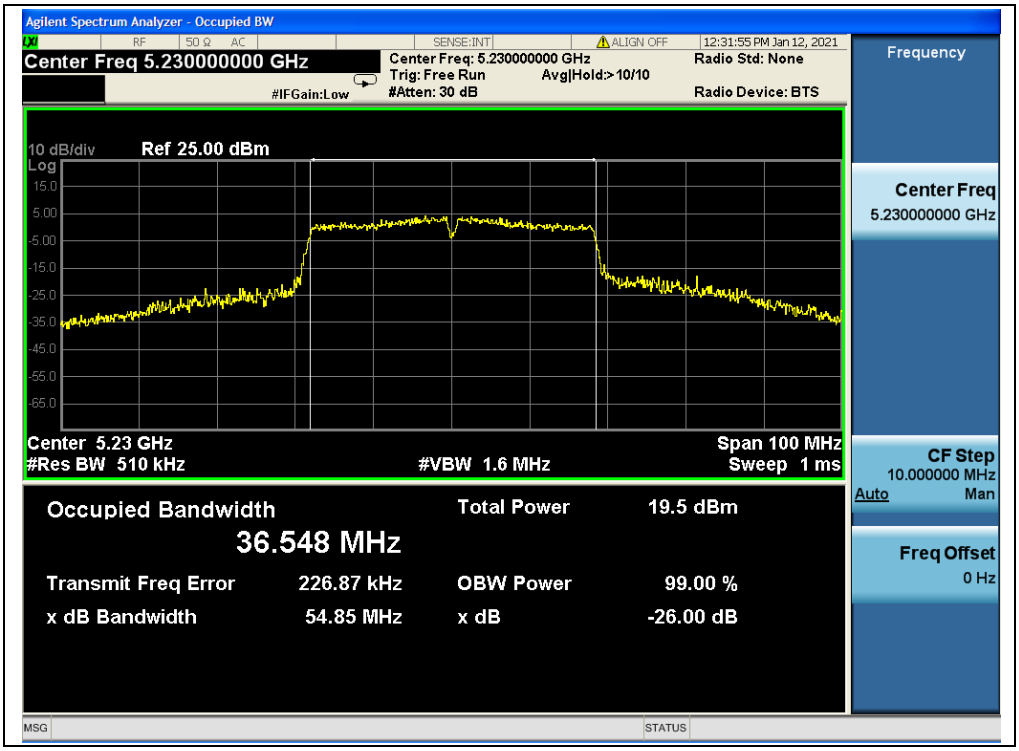
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	62.34
46	5230	54.85
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
151	5755	36.33
159	5795	36.33

B. Test Plot:



(Channel 38, 5190MHz, 802.11ac (VHT40))



(Channel 46, 5230 MHz, 802.11ac (VHT40))

(Channel 151, 5755 MHz, 802.11ac (VHT40))

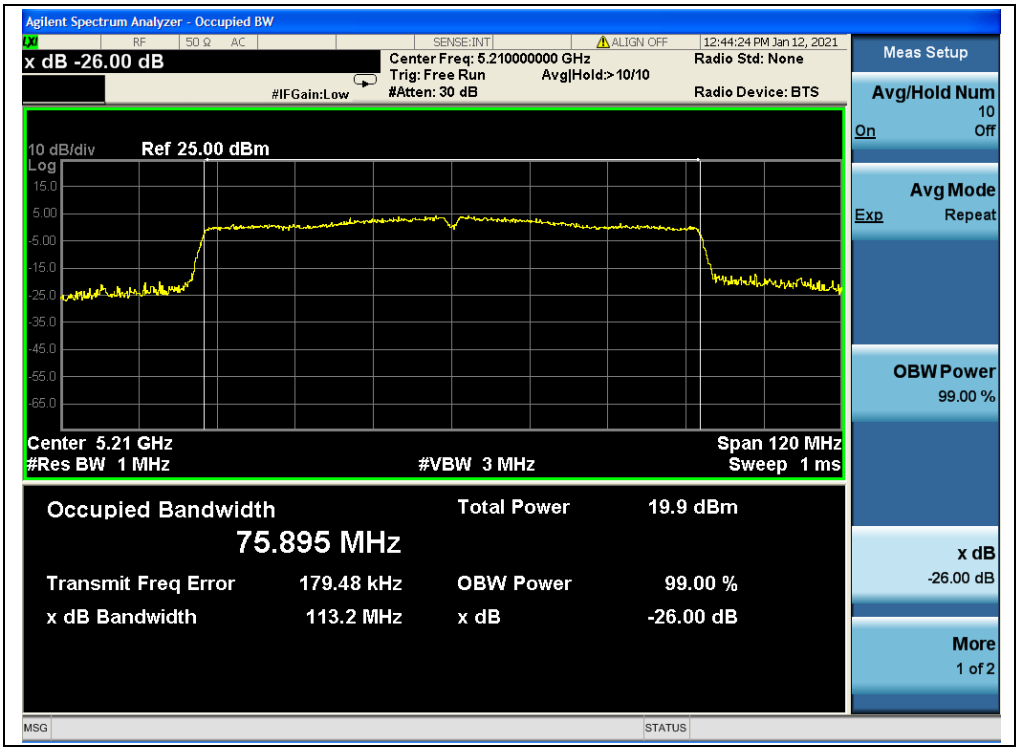
(Channel 159, 5795MHz, 802.11ac (VHT40))

802.11ac (VHT80) Test mode

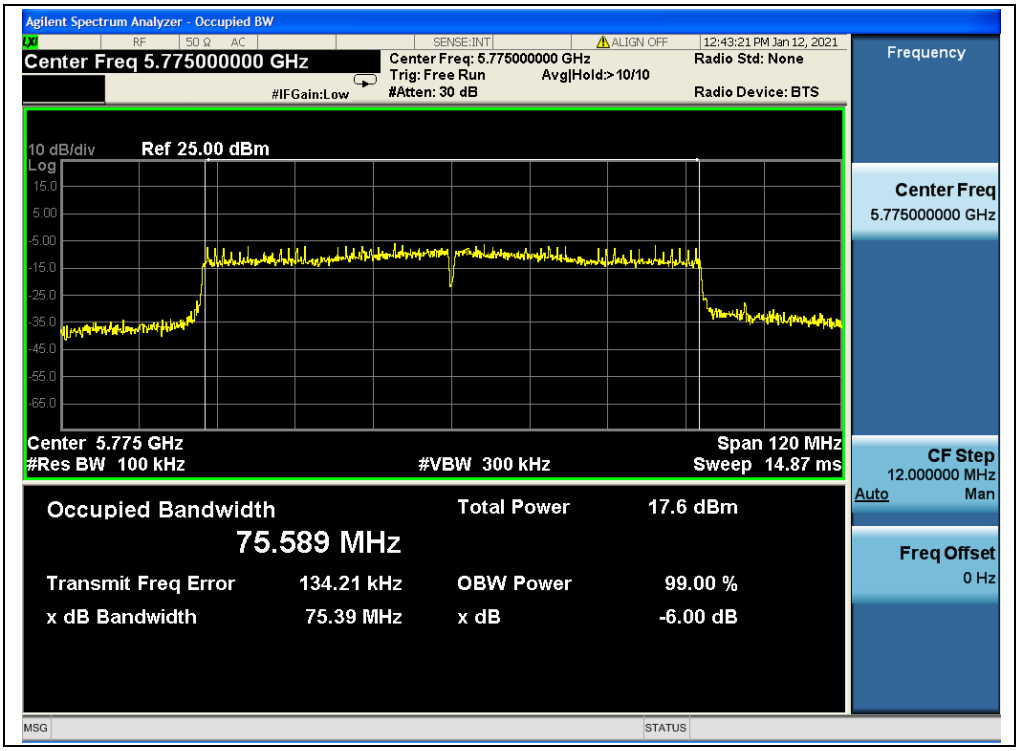
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
42	5210	113.20
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
155	5775	75.39

B. Test Plot:



(Channel 42, 5210MHz, 802.11ac (VHT80))



(Channel 155, 5775 MHz, 802.11ac (VHT80))

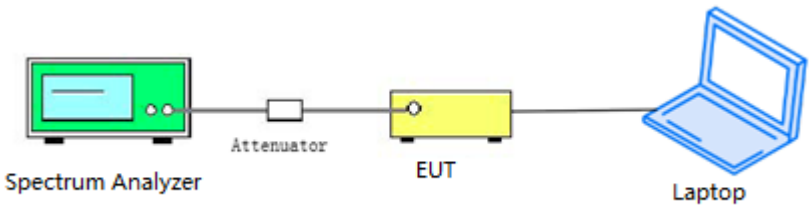
2.5. Peak Power spectral density

2.5.1. Requirement

(1) For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.
(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.
(3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500KHz band.
If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(4) According to KDB662911D01Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.
(5) According to KDB 662911 D01, the directional gain = G_{ANT} +10log(N_{ANT}) dBi, where G_{ANT} is the antenna gain in dBi, N_{ANT} is the number of outputs.

2.5.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2.5.3. Test Procedure

KDB 789033 Section F) Maximum Power Spectral Density (PSD) Method SA-1 was used in order to prove compliance

1) Set span to encompass the entire 26-dB emission bandwidth
2) Set RBW = 1 MHz. Set VBW ≥ 3 MHz.
3) Number of points in sweep ≥ 2 Span / RBW. Sweep time = auto.
4) Detector = Average
5) Trace mode=Max hold
6) Record the max value

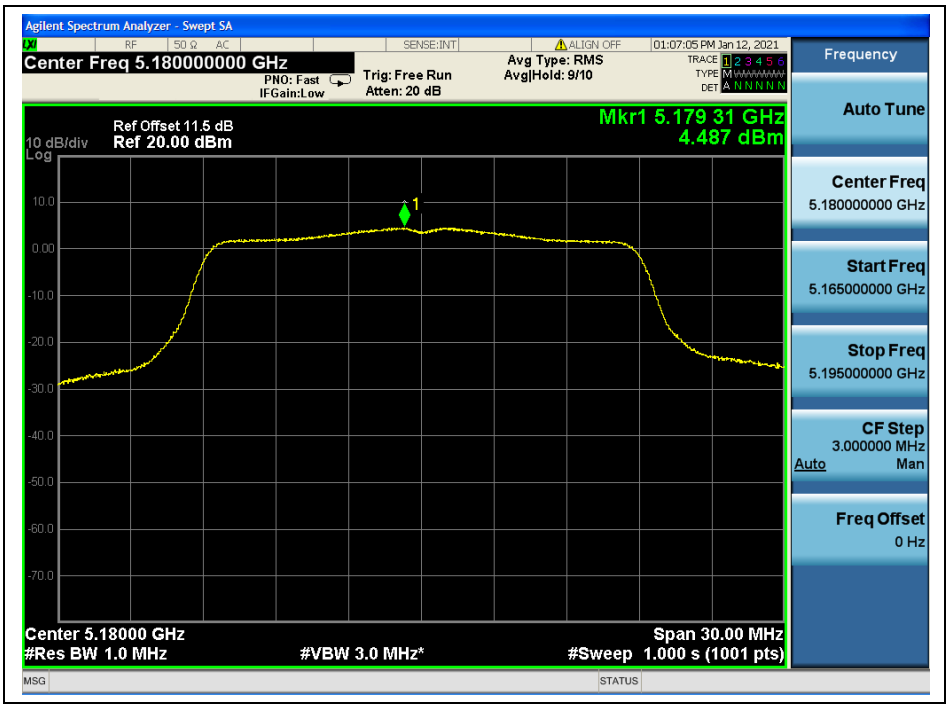
2.5.4. Test Result

802.11n (HT20) Test mode

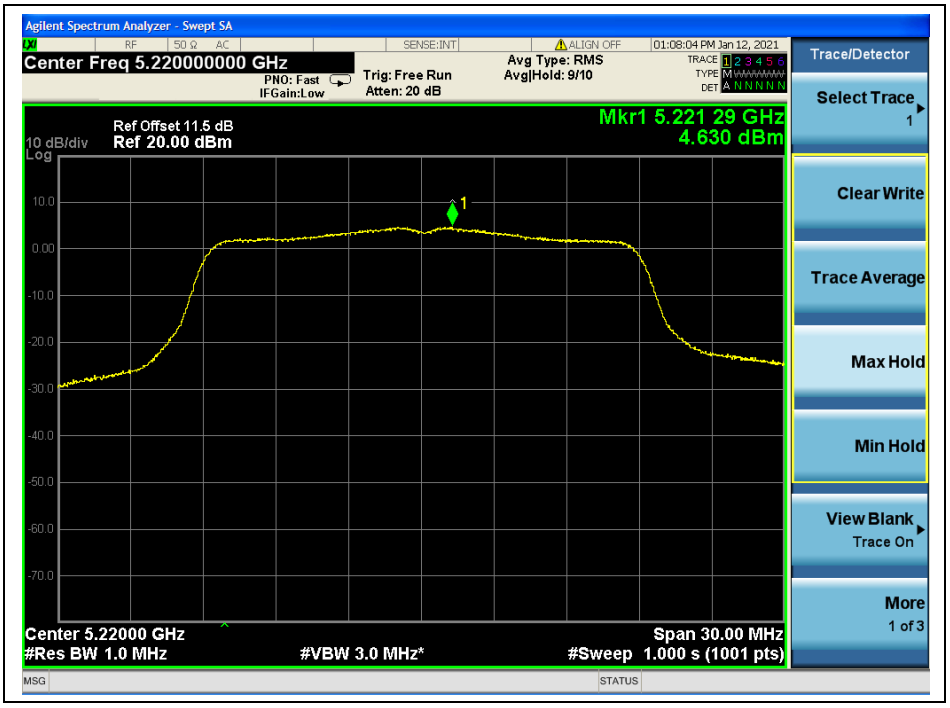
A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	4.49	0.33	4.82	11	PASS
44	5220	4.63		4.96		
48	5240	4.24		4.57		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	0.85	0.33	1.18	30	PASS
157	5785	1.03		1.36		
165	5825	0.83		1.16		

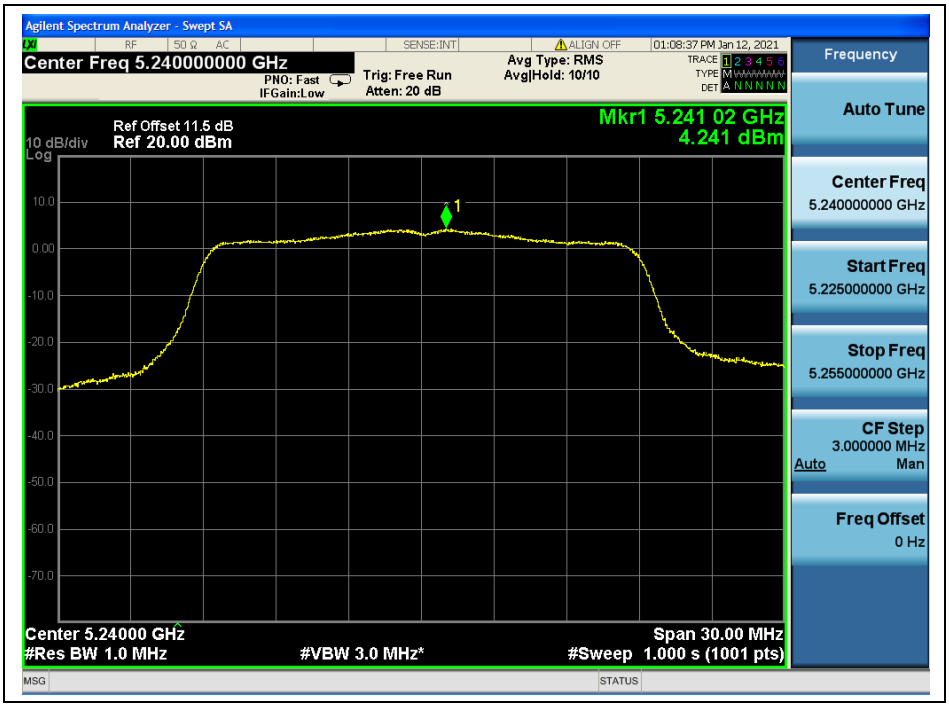
B. Test Plot:



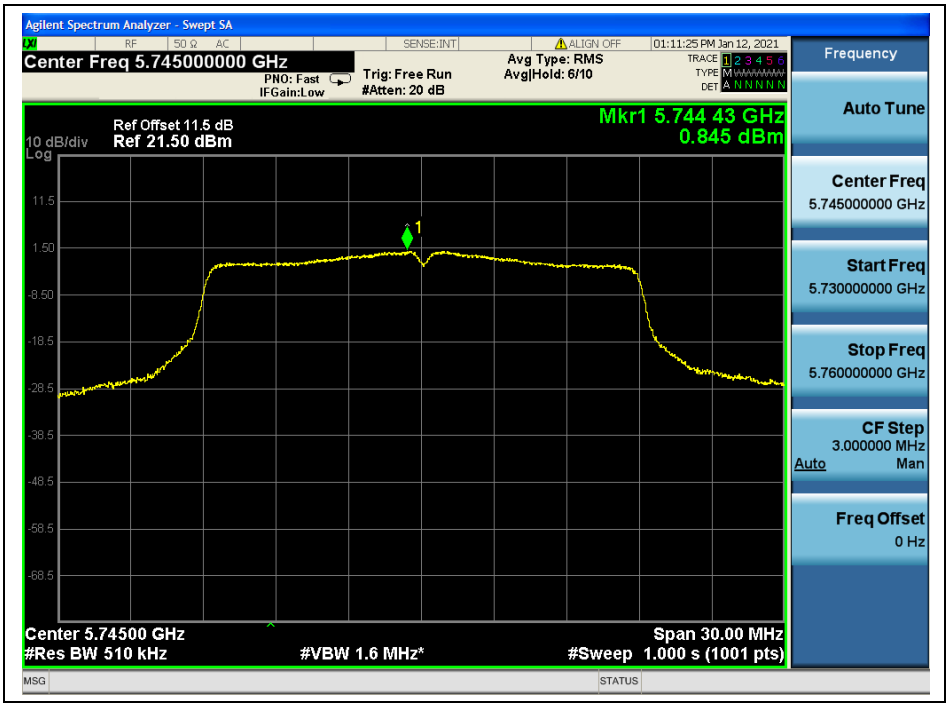
(Channel 36, 5180MHz, 802.11n (HT20))



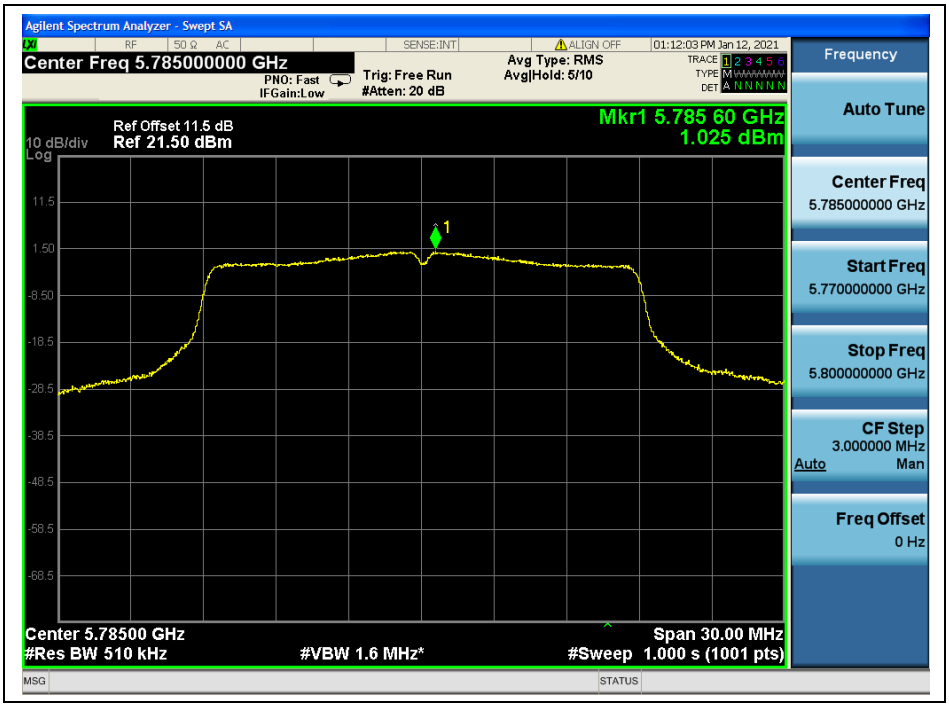
(Channel 44, 5220 MHz, 802.11n (HT20))



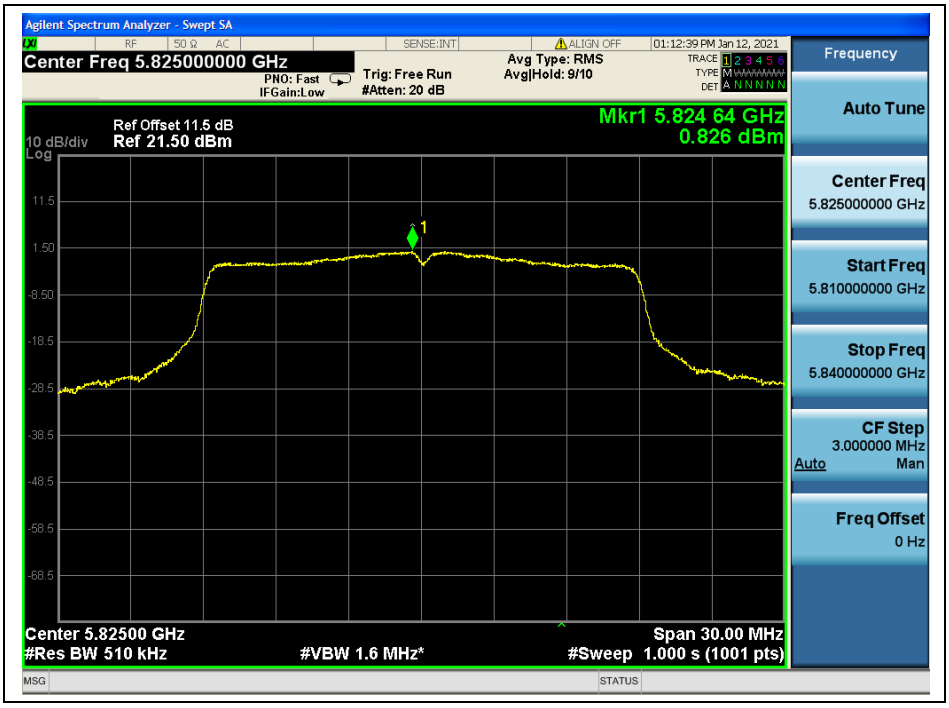
(Channel 48, 5240MHz, 802.11n (HT20))



(Channel 149, 5745MHz, 802.11n (HT20))



(Channel 157, 5785MHz, 802.11n (HT20))



(Channel 165, 5825MHz, 802.11n (HT20))

802.11n (HT40) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	1.18	0.63	1.81	11	PASS
46	5230	0.68		1.31		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	-2.49	0.63	-1.86	30	PASS
159	5795	-2.37		-1.74		

B. Test Plot:

(Channel 38, 5190MHz, 802.11n (HT40))

(Channel 46, 5230 MHz, 802.11n (HT40))

(Channel 151, 5755 MHz, 802.11n (HT40))

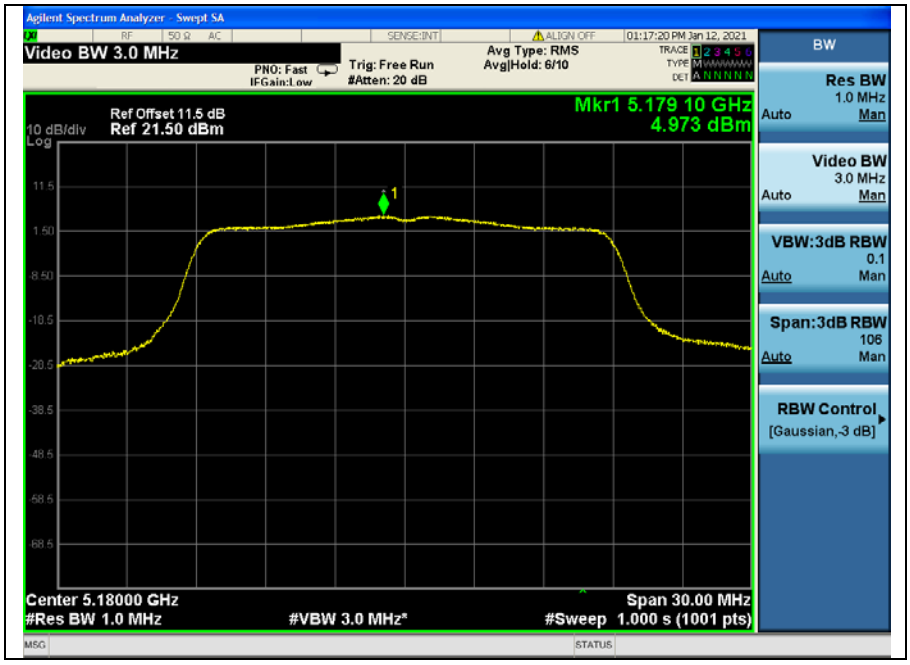
(Channel 159, 5795MHz, 802.11n (HT40))

802.11ac (VHT20) Test mode

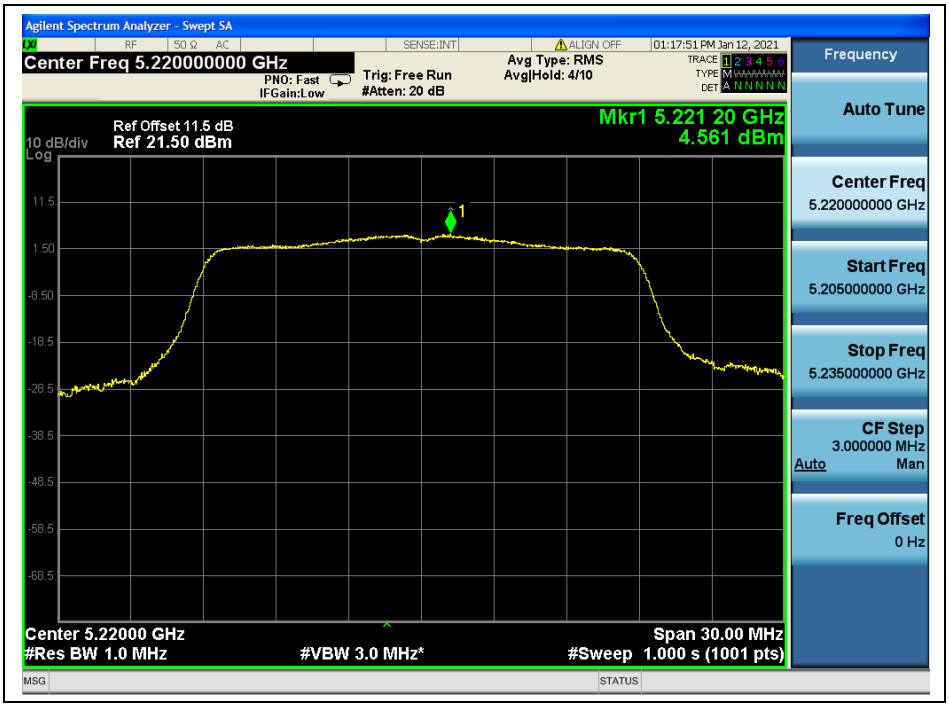
A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	4.97	0.32	5.29	11	PASS
44	5220	4.56		4.88		
48	5240	4.39		4.71		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	1.13	0.32	1.45	30	PASS
157	5785	0.93		1.25		
165	5825	1.17		1.49		

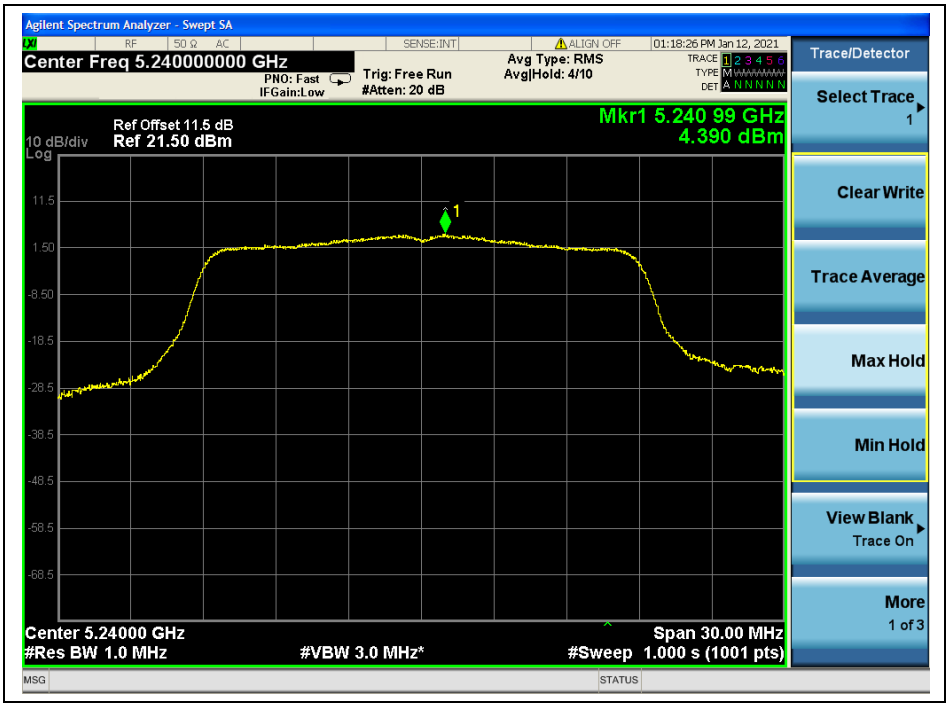
B. Test Plot:



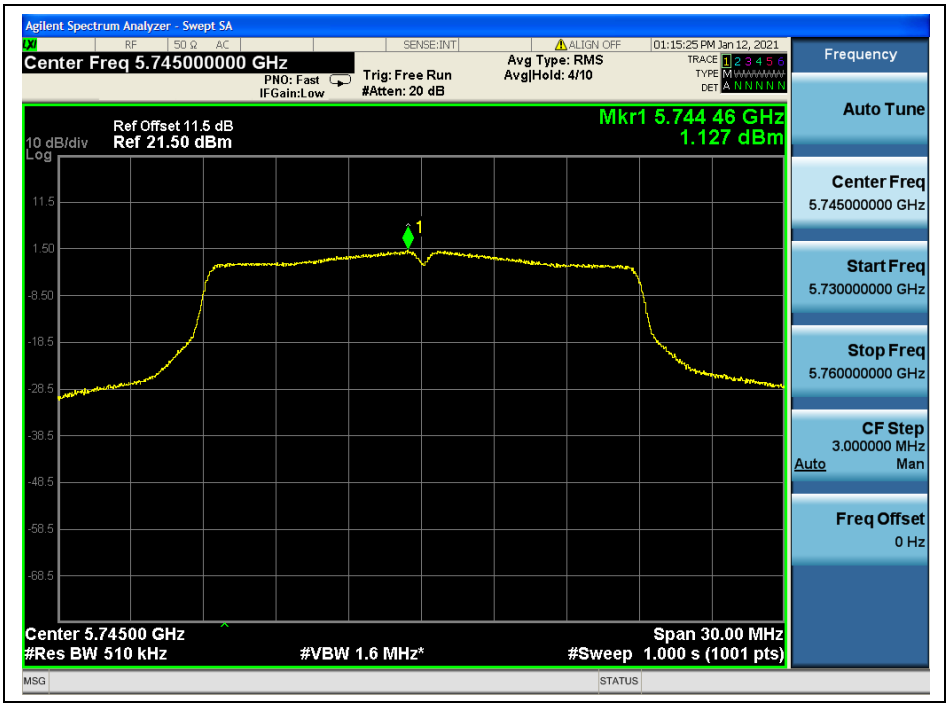
(Channel 36, 5180MHz, 802.11ac (VHT20))



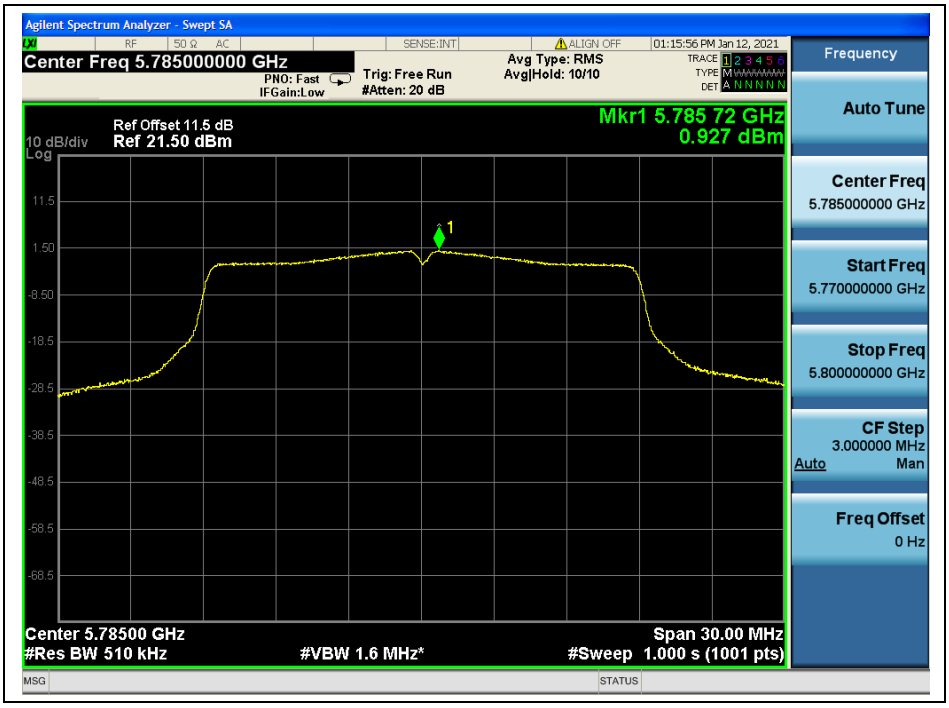
(Channel 44, 5220 MHz, 802.11 ac (VHT20))



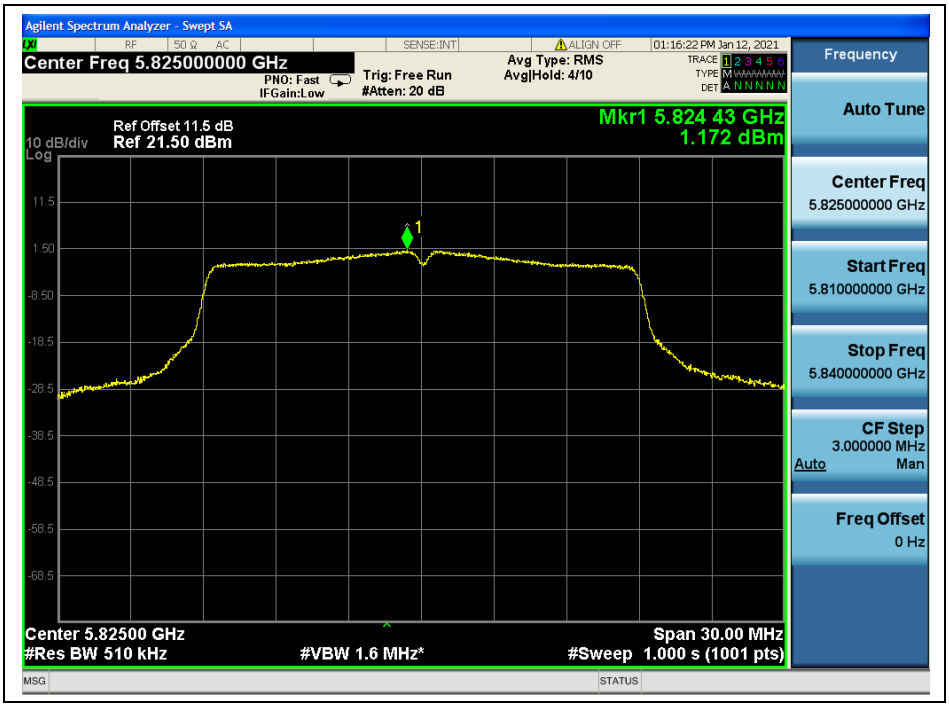
(Channel 48, 5240MHz, 802.11 ac (VHT20))



(Channel 149, 5745MHz, 802.11 ac (VHT20))



(Channel 157, 5785MHz, 802.11 ac (VHT20))



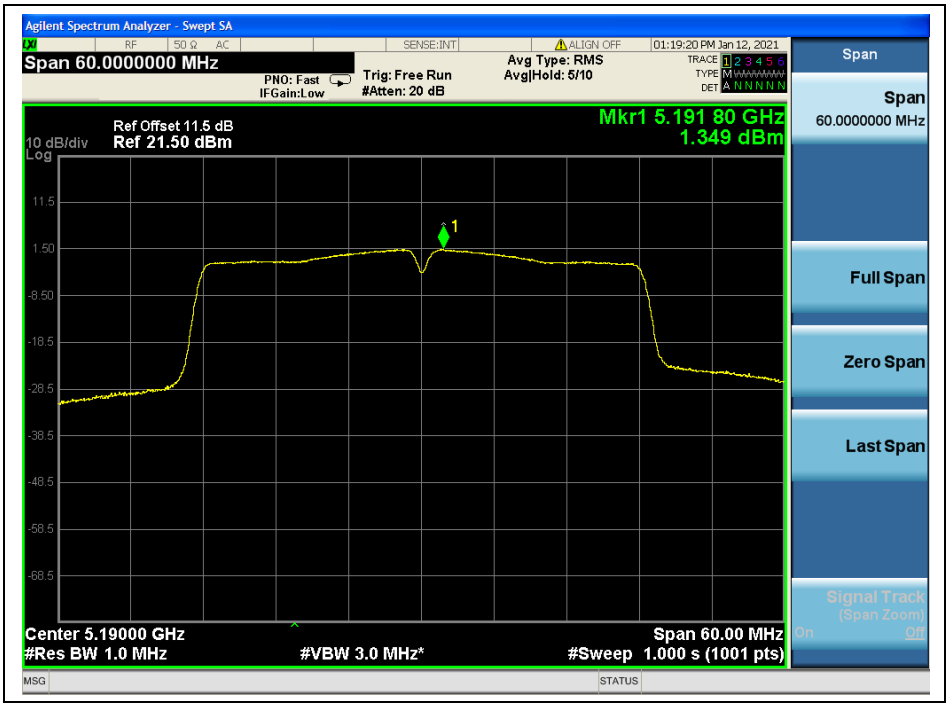
(Channel 165, 5825MHz, 802.11 ac (VHT20))

802.11ac (VHT40) Test mode

A. Test Verdict:

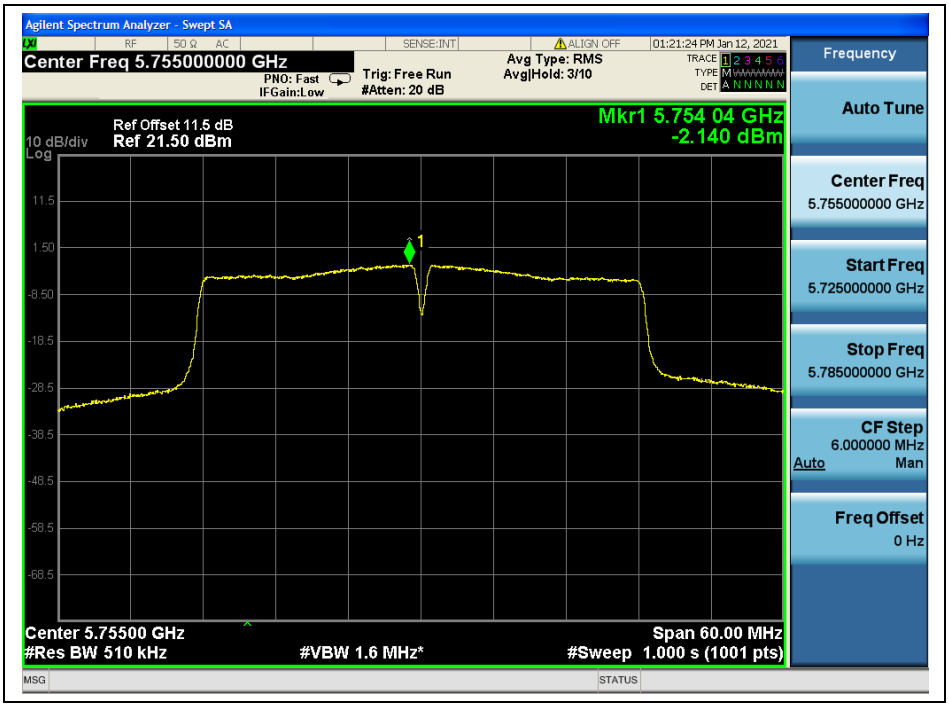
Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	1.35	0.63	1.98	10	PASS
46	5230	0.81		1.44		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	-2.14	0.63	-1.51	30	PASS
159	5795	-2.16		-1.53		

B. Test Plot:

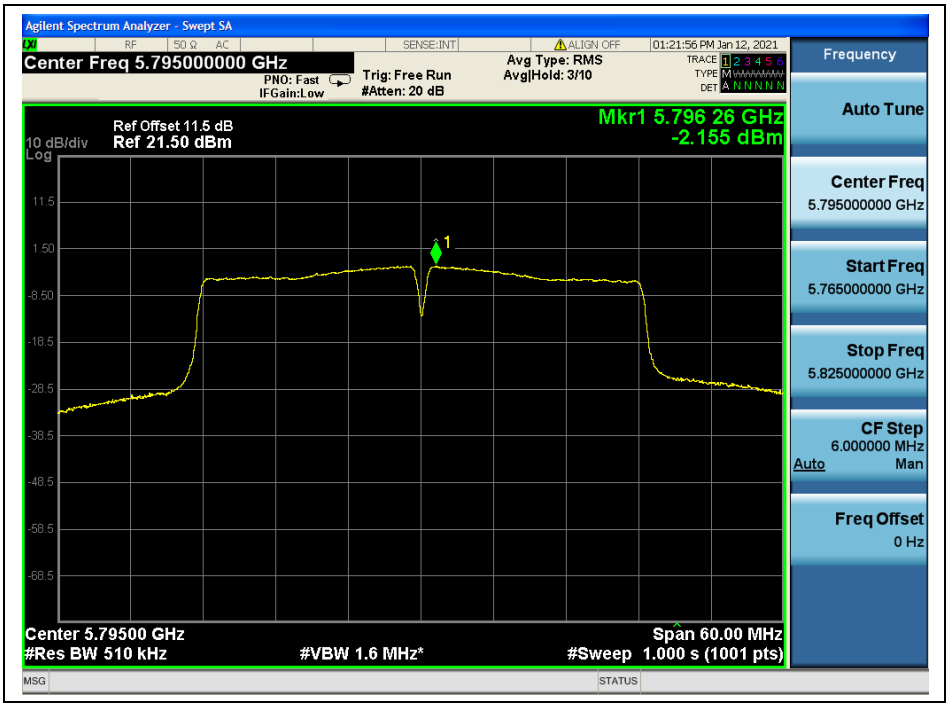


(Channel 38, 5190MHz, 802.11ac (VHT40))

(Channel 46, 5230 MHz, 802.11ac (VHT40))



(Channel 151, 5755MHz, 802.11ac (VHT40))



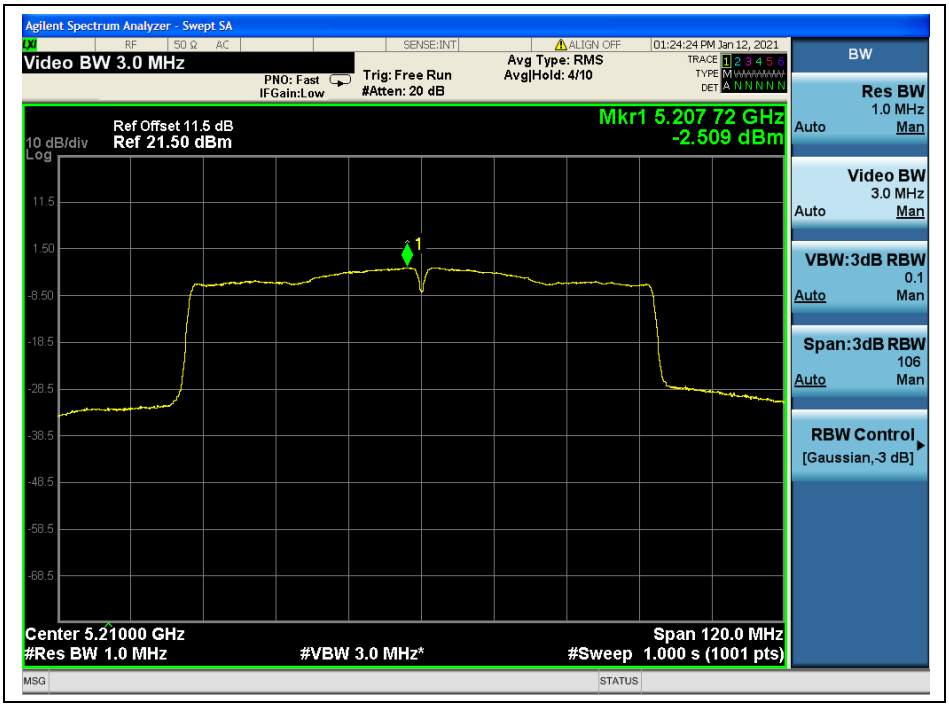
(Channel 159, 5795MHz, 802.11ac (VHT40))

802.11ac (VHT80) Test mode

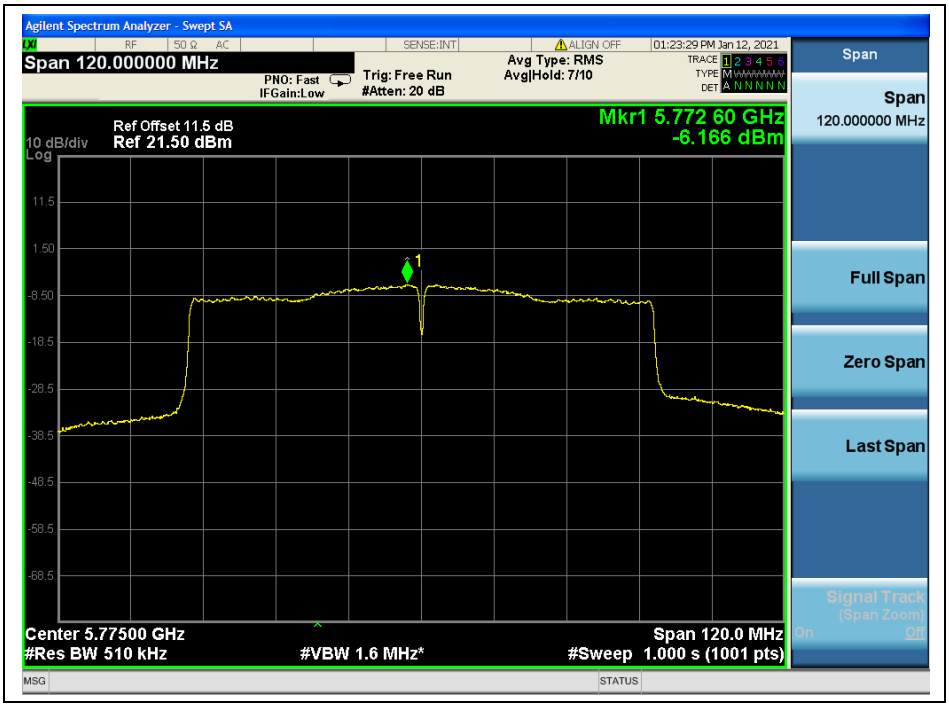
A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
42	5210	-2.51	1.21	-1.88	10	PASS
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
155	5775	-6.17	1.21	-5.54	30	PASS

B. Test Plot:



(Channel 42, 5210MHz, 802.11ac (VHT80))



(Channel 155, 5775MHz, 802.11ac (VHT80))

2.6. Frequency Stability

2.6.1. Requirement

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

2.6.2. Test Description

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between 5°C to 40°C. The temperature was incremented by 10^{o} intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

2.6.3. Test Result

U-NII-1 (Ch. 36) 5180MHz				
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	Freq Dev. (kHz)	Deviation (ppm)
100%	5.00	+20(Ref)	22	4.247
100%		-30	26	5.019
100%		-20	27	5.212
100%		-10	21	4.054
100%		0	30	5.792
100%		+10	25	4.826
100%		+20	26	5.019
100%		+30	26	5.019
100%		+40	28	5.405
100%		+50	28	5.405
85%	4.25	+20	31	5.985
115%	5.75	+20	29	5.598

U-NII-3 (Ch. 149) 5745MHz				
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	Freq Dev. (kHz)	Deviation (ppm)
100%	5.00	+20(Ref)	23	4.003
100%		-30	31	5.396
100%		-20	29	5.048
100%		-10	26	4.526
100%		0	25	4.352
100%		+10	22	3.829
100%		+20	20	3.481
100%		+30	23	4.003
100%		+40	26	4.526
100%		+50	23	4.003
85%	4.25	+20	28	4.874
115%	5.75	+20	30	5.222

2.7. Conducted Emission

2.7.1. Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

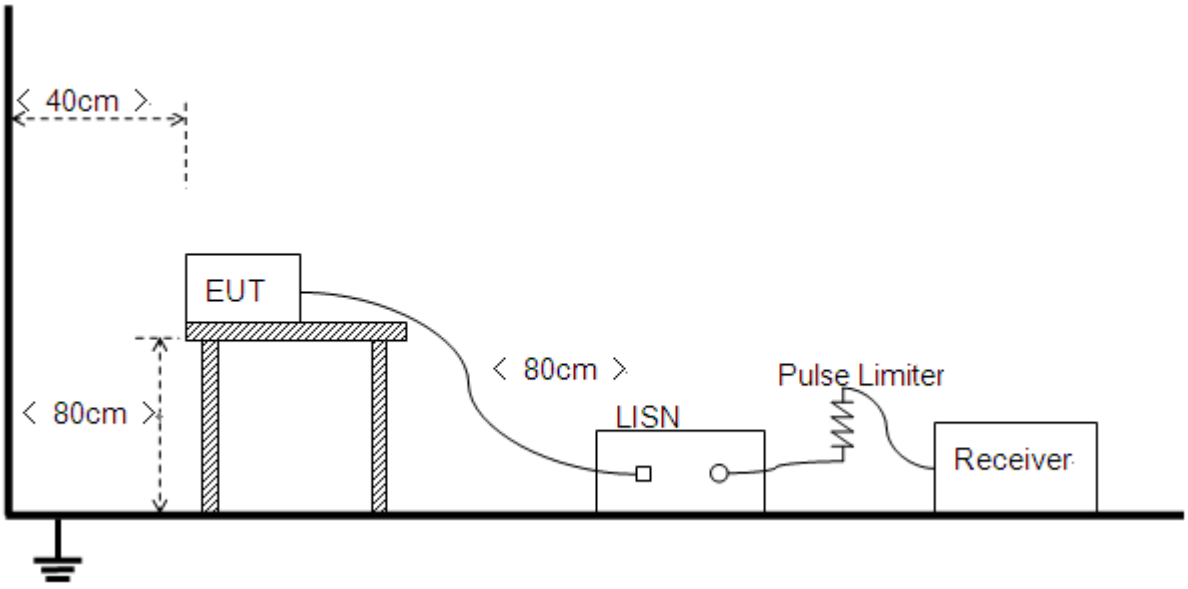
NOTE:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.7.2. Test Description

Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

2.7.3. Test Result

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test Setup:

Test Mode: EUT + Adapter +wifi TX

Test Voltage: AC 120V/60Hz

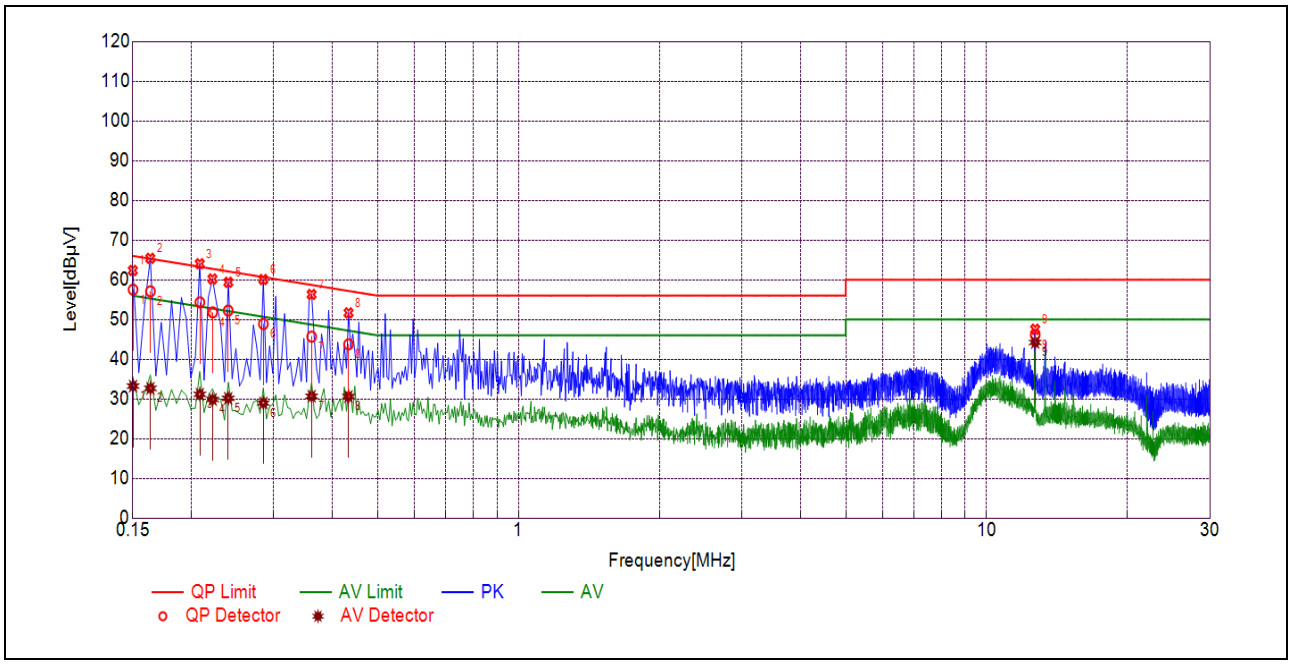
The measurement results are obtained as below:

$E\ [dB\mu V] = U_R + L_{Cable\ loss}\ [dB] + A_{Factor}$

U_R: Receiver Reading

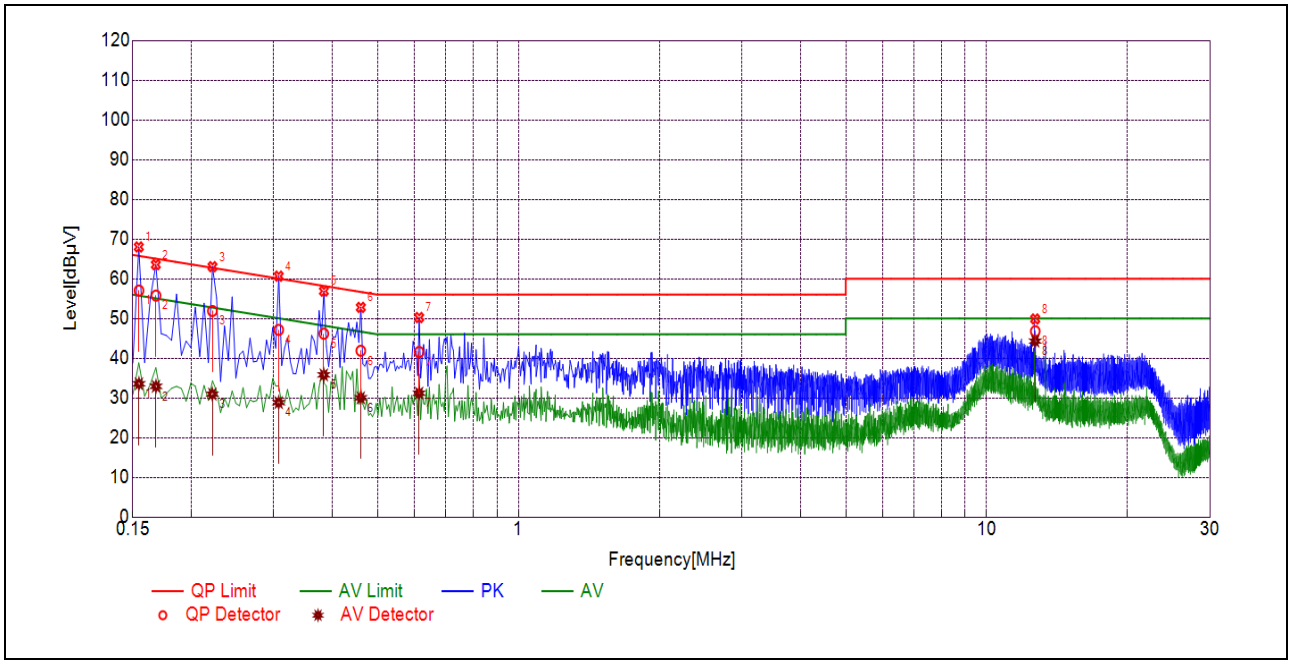
A_{Factor}: Voltage division factor of LISN

B. Test Plot:



(L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1502	57.52	33.23	65.99	55.99	Line	PASS
2	0.1636	57.10	32.66	65.28	55.28		PASS
3	0.2086	54.33	31.17	63.26	53.26		PASS
4	0.2222	51.80	29.86	62.74	52.74		PASS
5	0.2398	52.25	30.15	62.10	52.10		PASS
6	0.2851	48.87	28.98	60.66	50.66		PASS
7	0.3615	45.69	30.69	58.69	48.69		PASS
8	0.4334	43.75	30.61	57.19	47.19		PASS
9	12.6953	46.09	44.22	60.00	50.00		PASS



(N Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1546	57.04	33.55	65.75	55.75	Neutral	PASS
2	0.1681	55.77	32.91	65.06	55.06		PASS
3	0.2218	51.89	30.96	62.75	52.75		PASS
4	0.3074	47.13	28.83	60.04	50.04		PASS
5	0.3838	46.17	35.80	58.20	48.20		PASS
6	0.4603	41.87	30.03	56.69	46.69		PASS
7	0.6133	41.57	31.20	56.00	46.00		PASS
8	12.6978	46.79	44.30	60.00	50.00		PASS

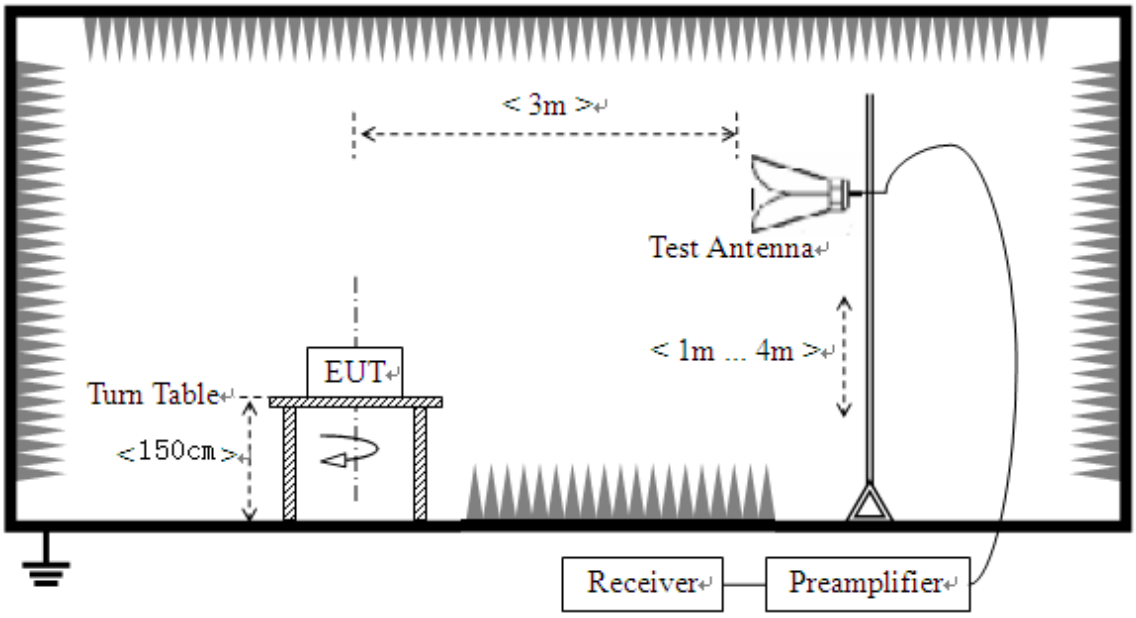
2.8. Restricted Frequency Bands

2.8.1. Requirement

According to FCC section 15.407(b)(7), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.8.2. Test Description

Test Setup



The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.
KDB 789033 Section H) 3)5)6(d)) was used in order to prove compliance
For the Test Antenna:
Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

2.8.3. Test Result

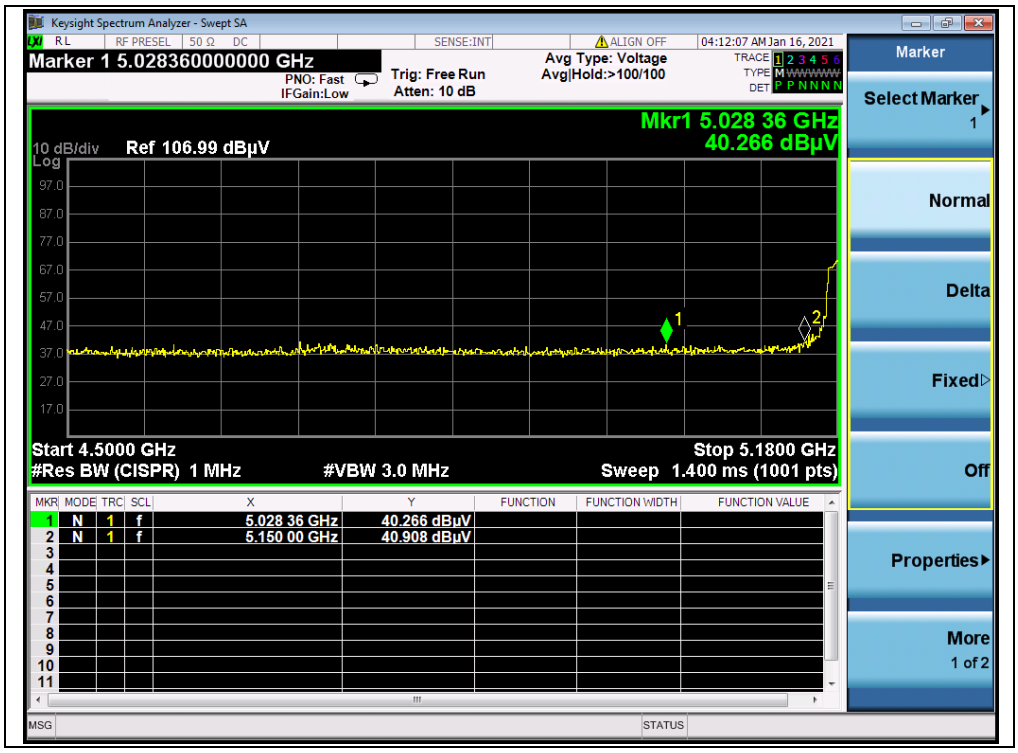
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] =U_R + A_T + A_{Factor} [dB]; A_T =$L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
A_T: Total correction Factor except Antenna; U_R: Receiver Reading
G_{preamp}: Preamplifier Gain; A_{Factor}: Antenna Factor at 3m
Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

802.11n (HT20) Test mode

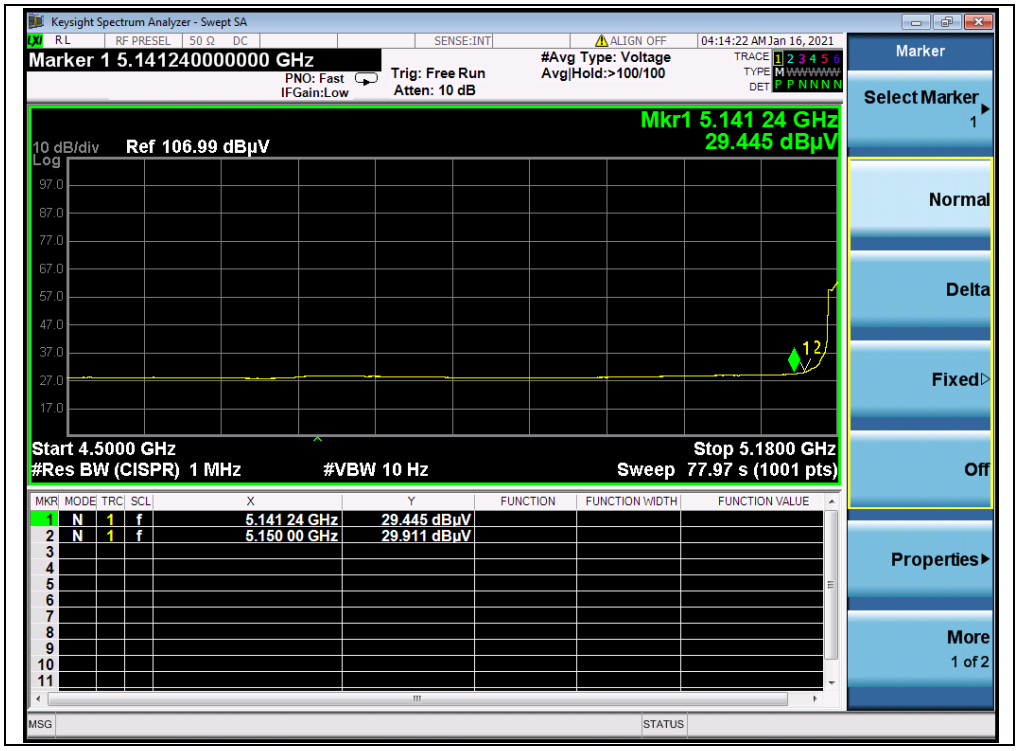
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
36	5150.00	PK	40.91	-16.92	32.2	56.19	74	PASS
36	5150.00	AV	29.91	-16.92	32.2	45.19	54	PASS
48	5357.14	PK	37.57	-16.92	32.2	52.85	74	PASS
48	5350.00	AV	26.60	-16.92	32.2	41.88	54	PASS
149	5725.00	PK	39.17	-16.23	32.2	55.14	122.23	PASS
165	5850.00	PK	38.29	-16.23	32.2	54.26	122.23	PASS

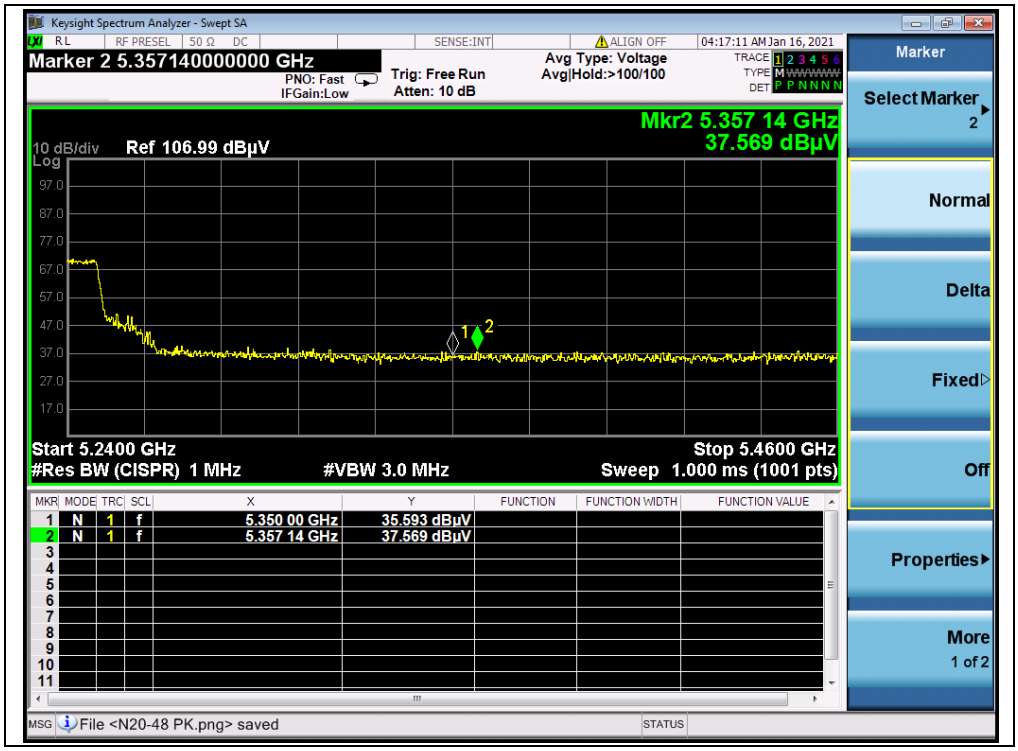
B. Test Plot:



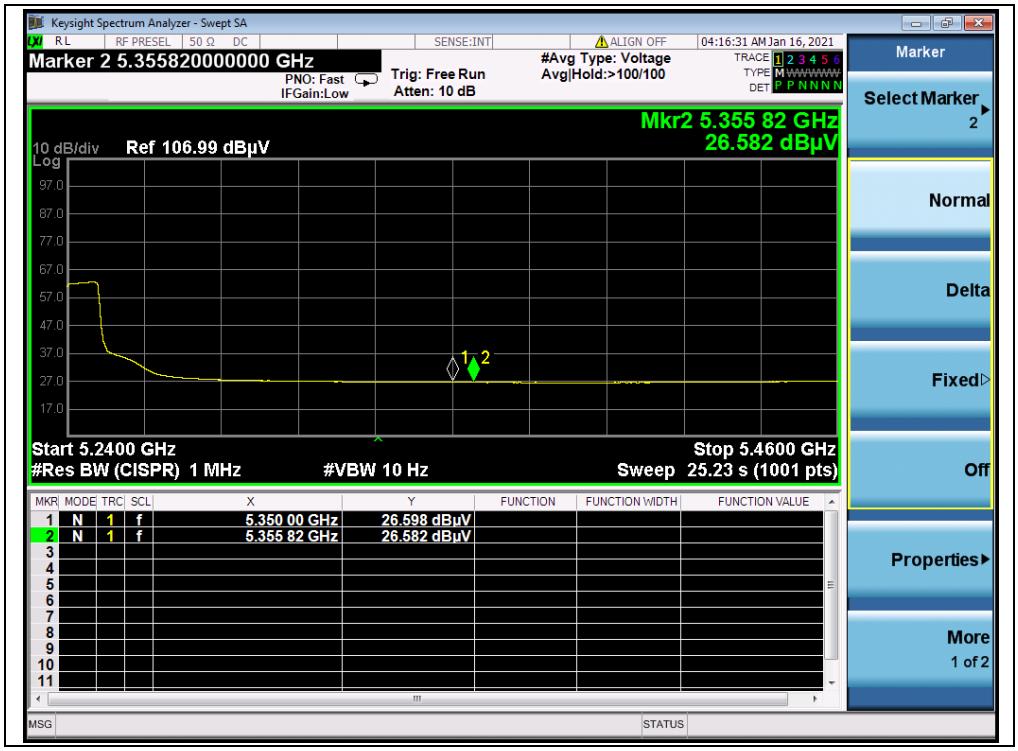
(Channel 36, PEAK, 802.11n (HT20))



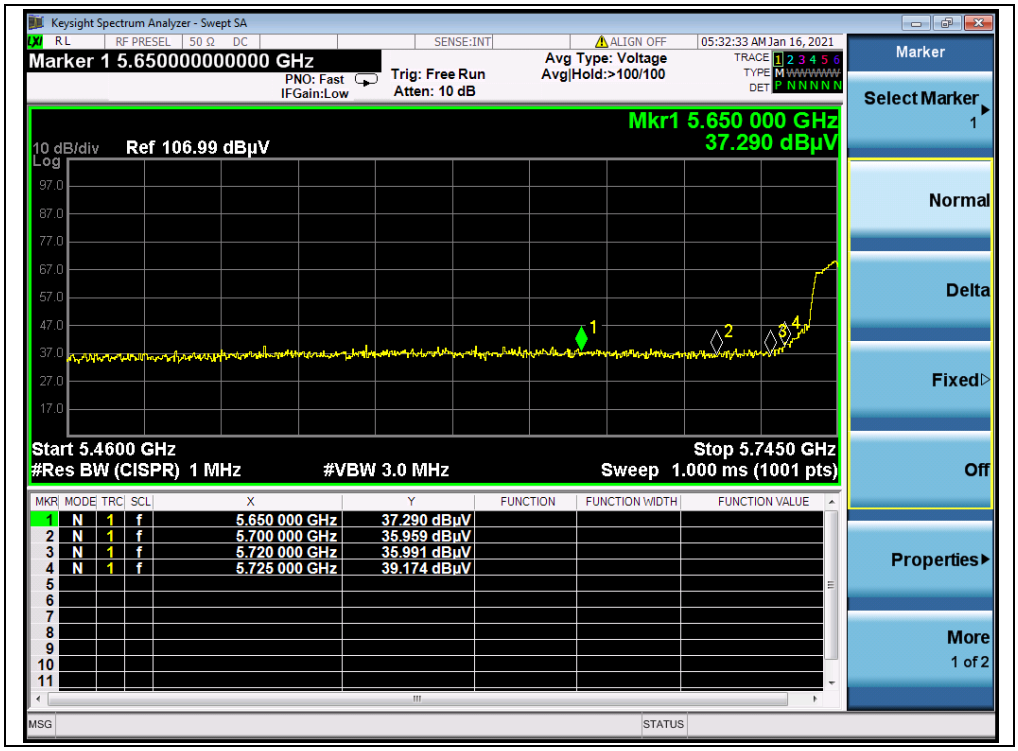
(Channel 36, AVG, 802.11 n (HT20))



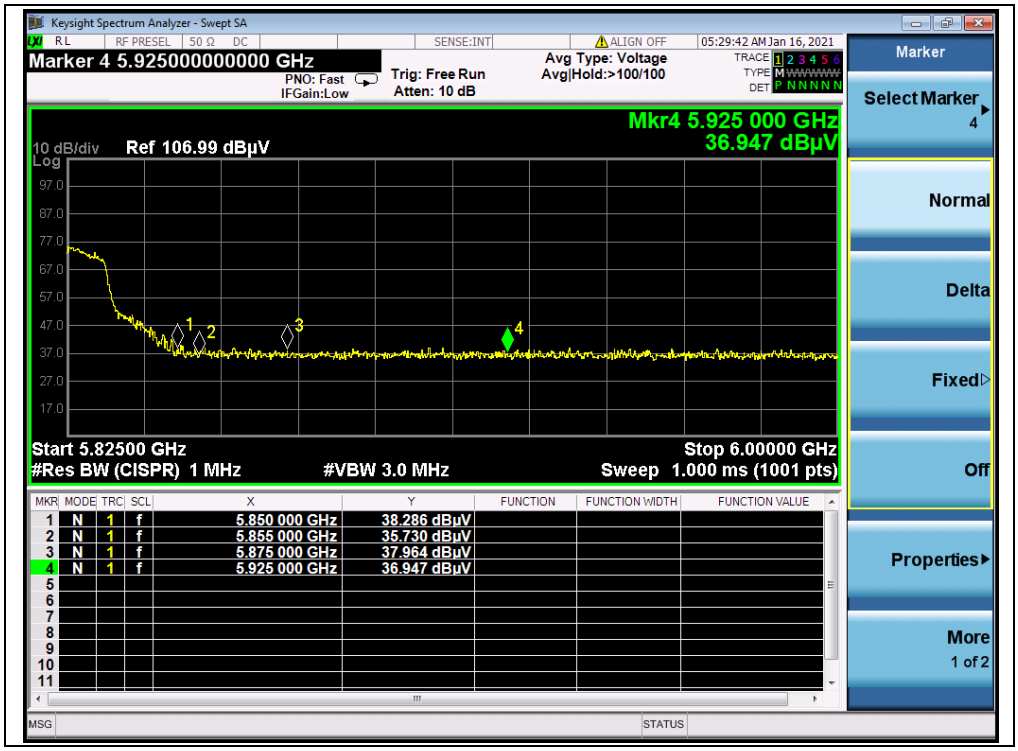
(Channel 48, PEAK, 802.11 n (HT20))



(Channel 48, AVG, 802.11n (HT20))



(Channel 149, PEAK, 802.11n (HT20))



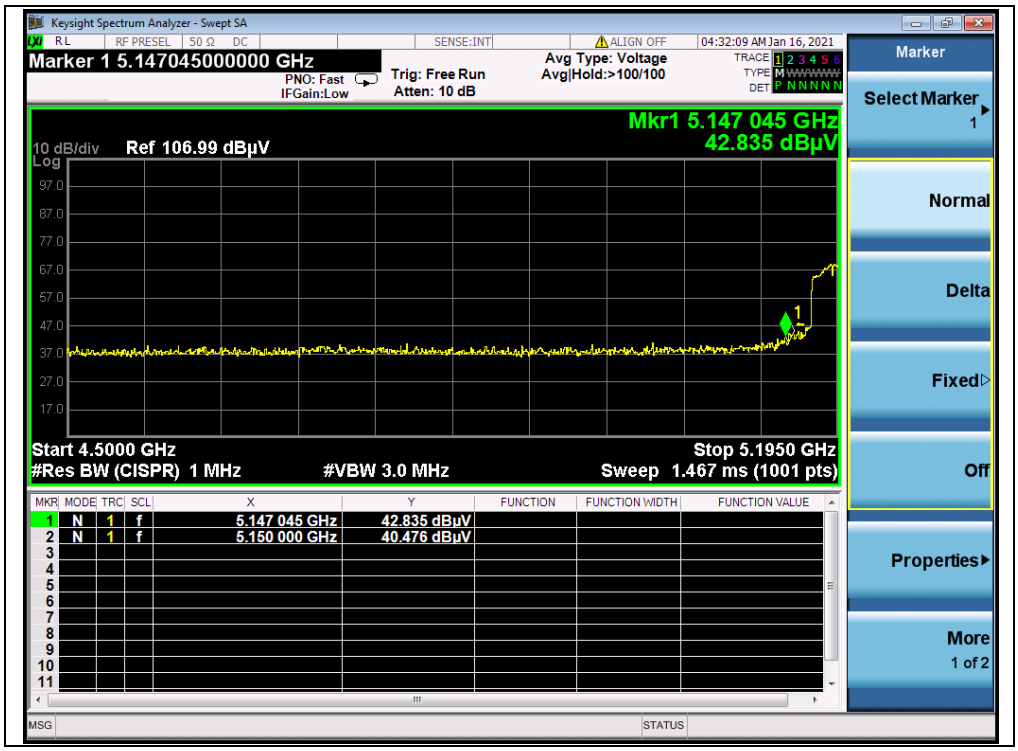
(Channel 165, PEAK, 802.11n (HT20))

802.11n (HT40) Test mode

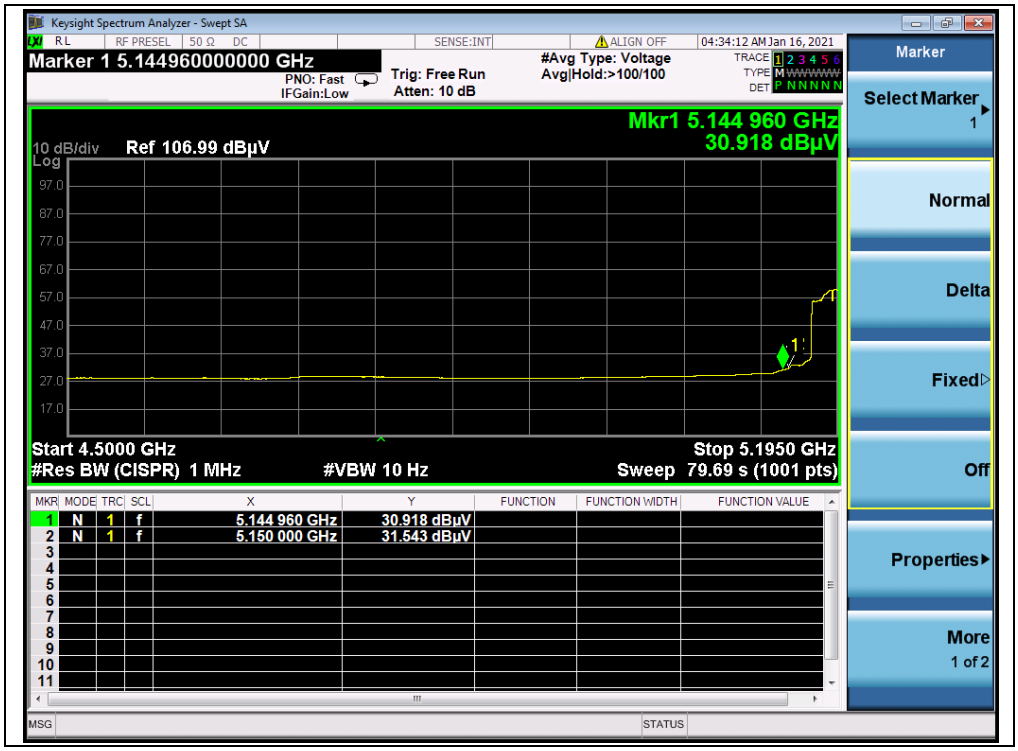
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
38	5147.05	PK	42.84	-16.92	32.2	58.12	74	PASS
38	5150.00	AV	31.54	-16.92	32.2	46.82	54	PASS
46	5379.55	PK	38.31	-16.92	32.2	53.59	74	PASS
46	5350.00	AV	26.57	-16.92	32.2	41.85	54	PASS
151	5725.00	PK	40.31	-16.23	32.2	56.28	122.23	PASS
159	5925.00	PK	37.51	-16.23	32.2	53.48	68.23	PASS

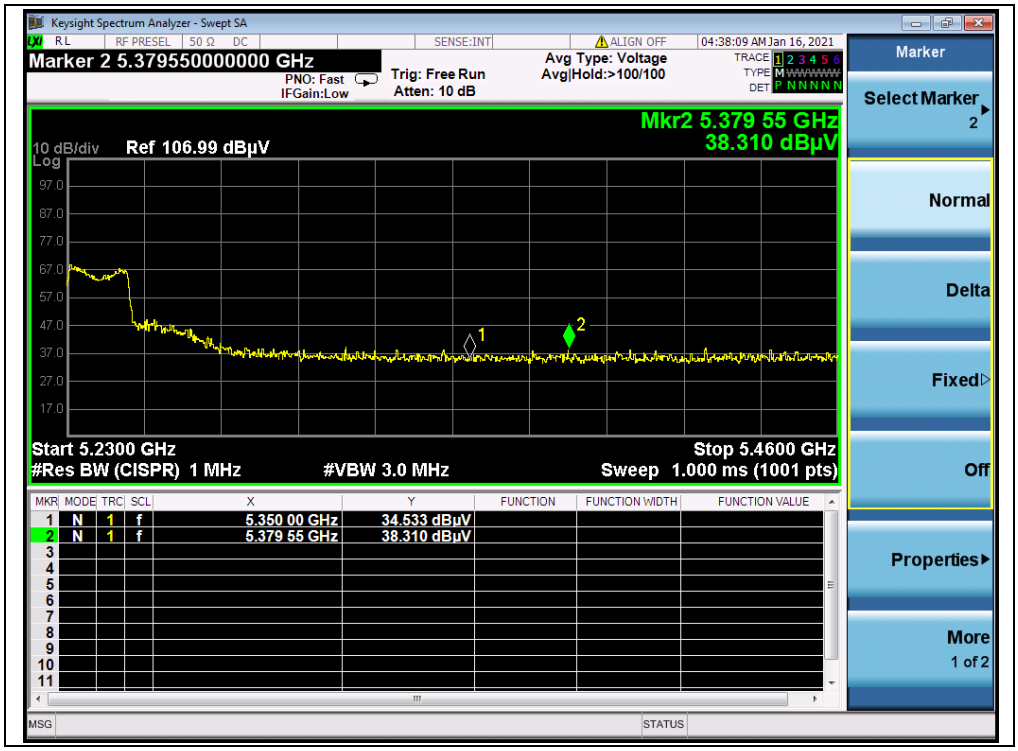
B. Test Plot:



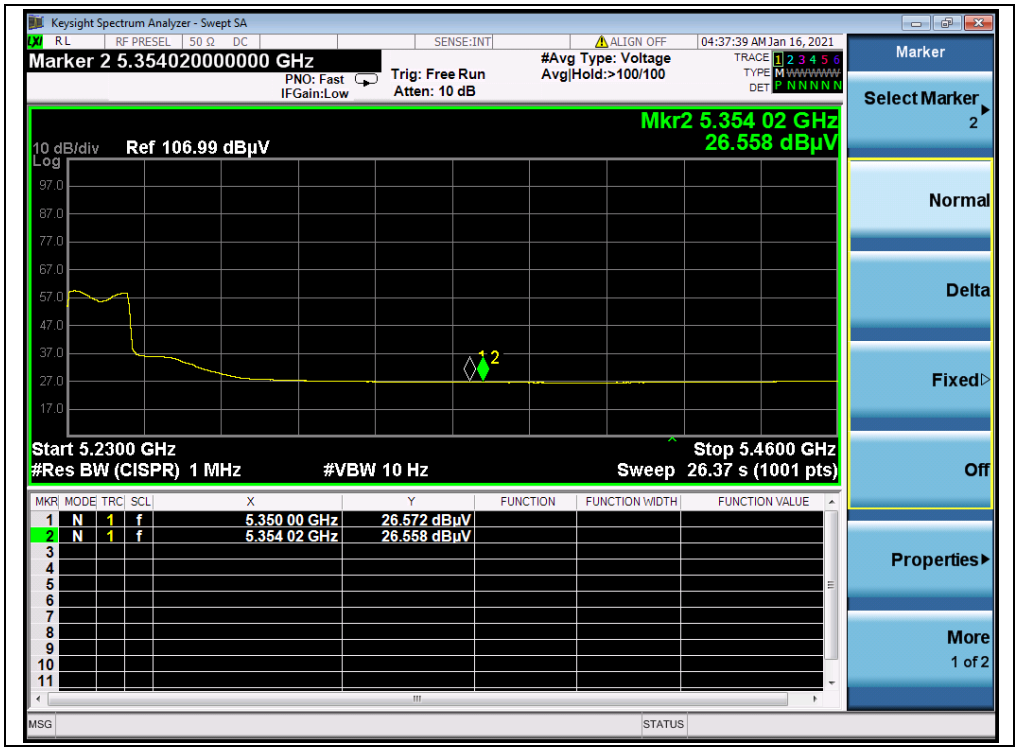
(Channel 38, PEAK, 802.11n (HT40))



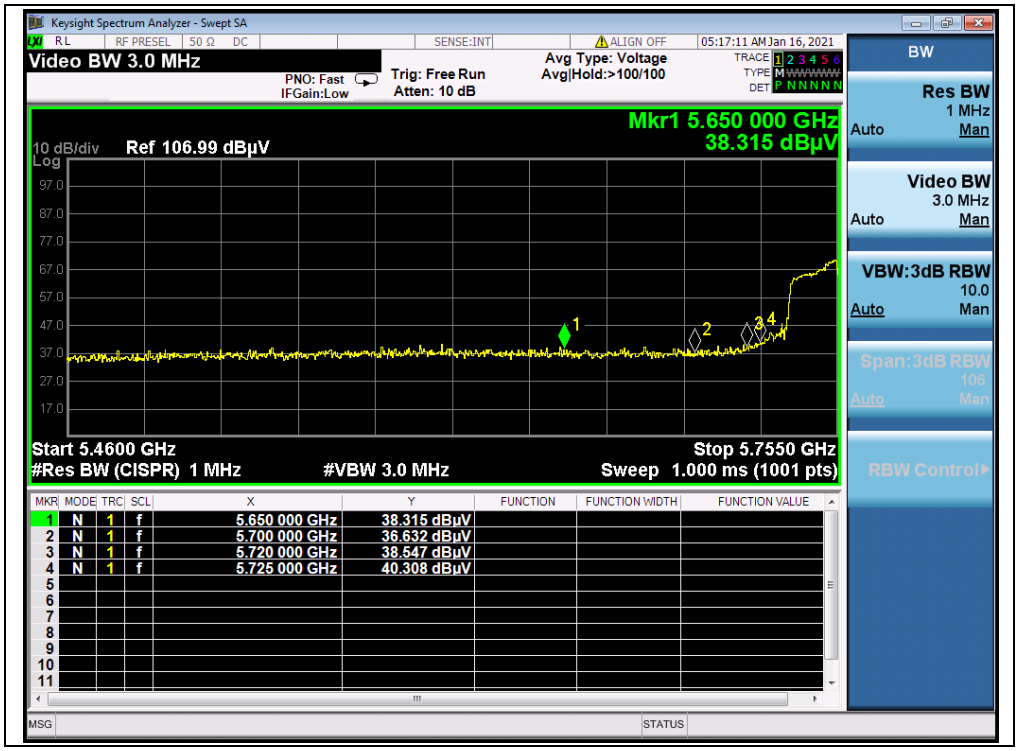
(Channel 38, AVG, 802.11n (HT40))



(Channel 46, PEAK, 802.11n (HT40))



(Channel 46, AVG, 802.11n (HT40))



(Channel 151, PEAK, 802.11n (HT40))

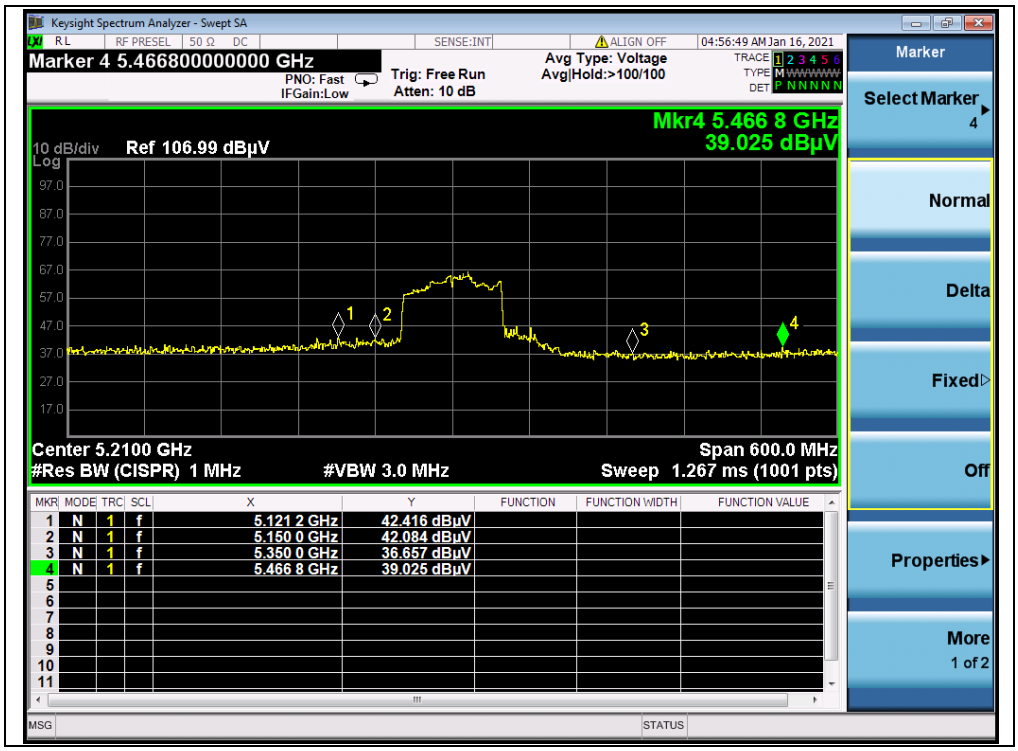
(Channel 159, PEAK, 802.11n (HT40))

802.11ac (VHT80) Test mode

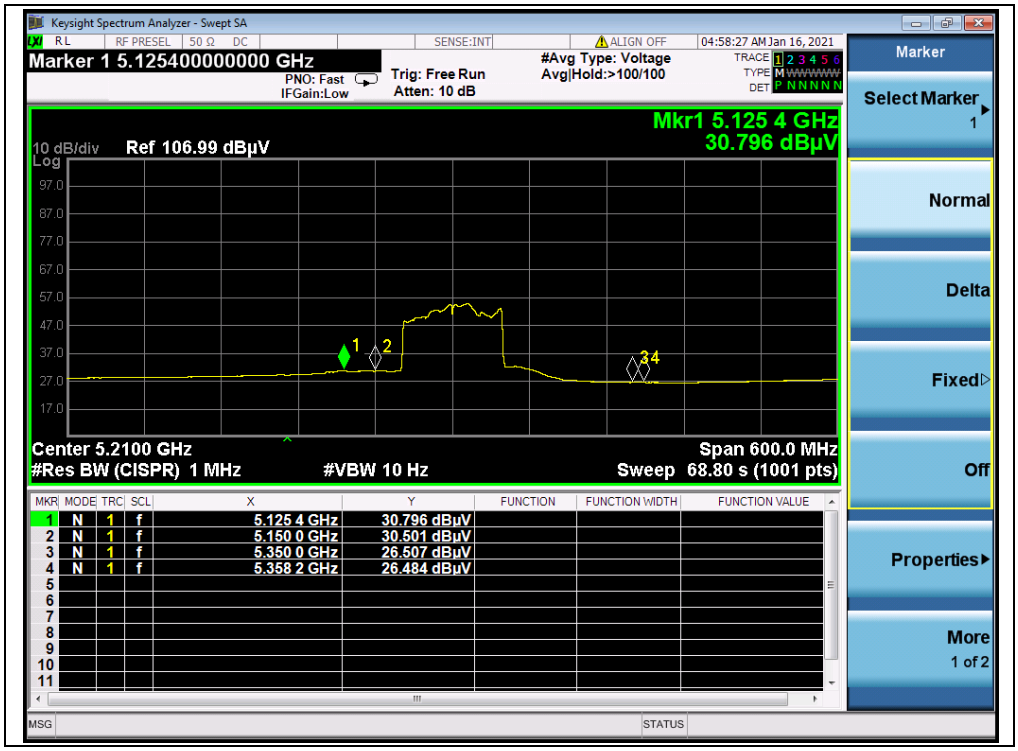
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
42	5121.20	PK	42.42	-16.92	32.2	57.70	74	PASS
42	5125.40	AV	30.80	-16.92	32.2	46.08	54	PASS
42	5466.80	PK	39.03	-16.92	32.2	54.31	68.23	PASS
42	5350.00	AV	26.51	-16.92	32.2	41.79	54	PASS
155	5720.40	PK	39.25	-16.23	32.2	55.22	111.74	PASS
155	5850.00	PK	41.48	-16.23	32.2	57.45	122.23	PASS

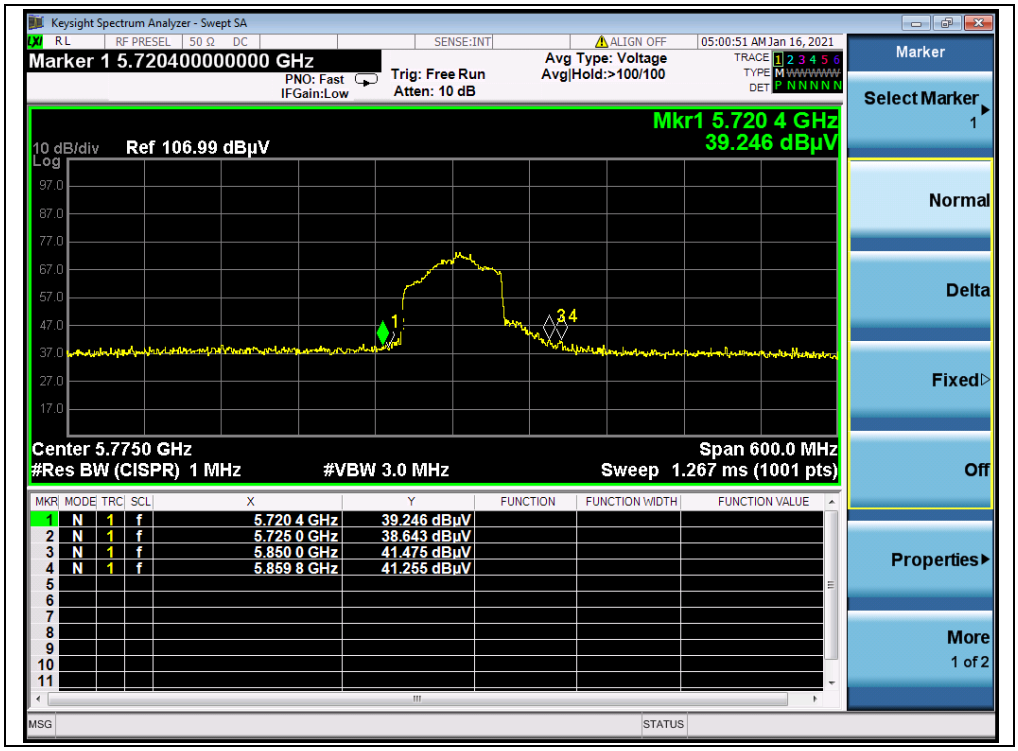
B. Test Plot:



(Channel 42, PEAK, 802.11ac (VHT80))



(Channel 42, AVG, 802.11ac (VHT80))



(Channel 155, PEAK, 802.11ac (VHT80))

2.9. Radiated Emission

2.9.1. Requirement

The peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.

(2) For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.

(3) For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of -27dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.

The following formula is used to convert the equipment isotropic radiated power(eirp) to field strength (dBμV/m);

$$E = 1000000 \times \sqrt{30P} / 3 \ \mu V/m$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note:

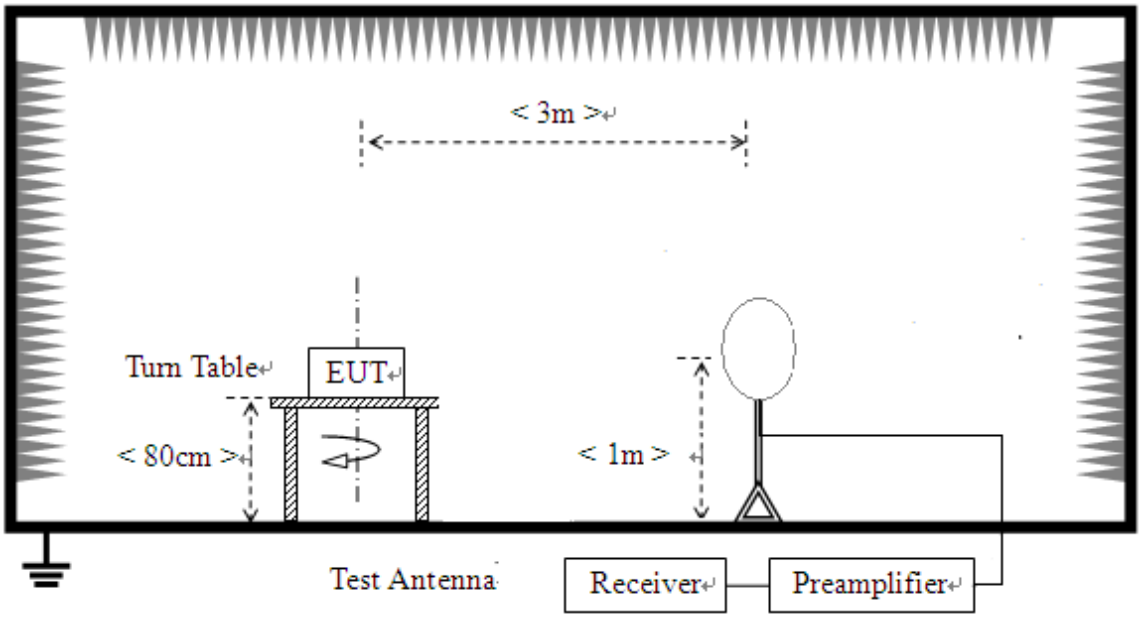
For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

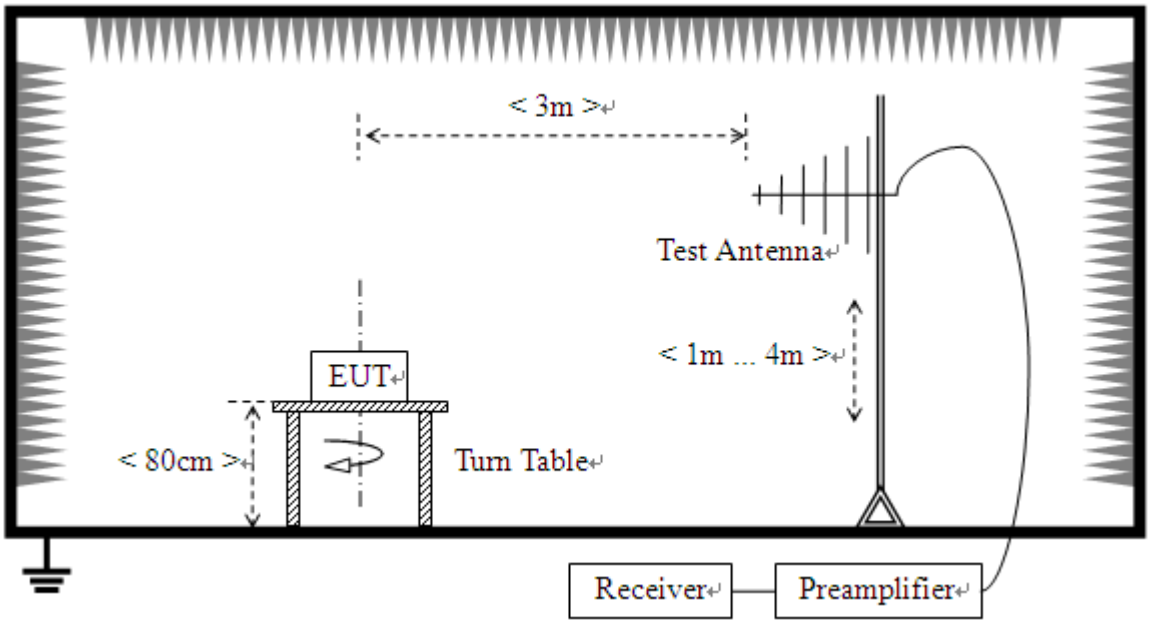
2.9.2. Test Description

Test Setup:

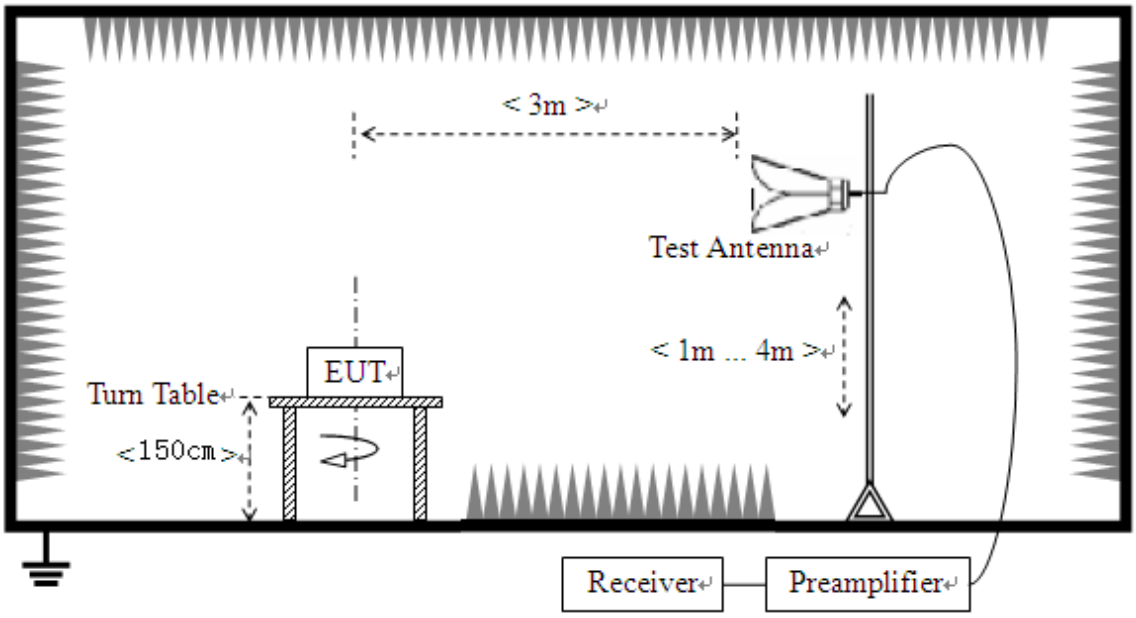
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz.The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

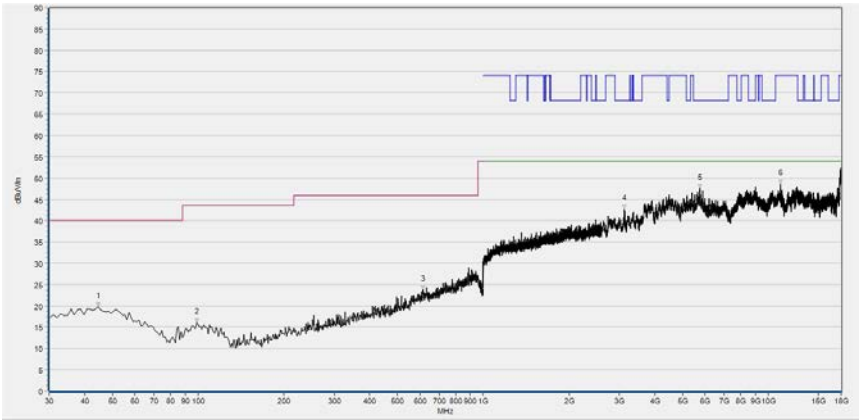
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

2.9.3. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).
The measurement results are obtained as below:
$E\ [dB\mu V/m] = U_R + A_T + A_{Factor}\ [dB]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$
A_T: Total correction Factor except Antenna
U_R: Receiver Reading
G_{preamp}: Preamplifier Gain
A_{Factor}: Antenna Factor at 3m
During the test, the total correction Factor A_T and A_{Factor} were built in test software.
Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.
Note2: For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.
Note3: For the frequency, which started from 18GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.
Note 4: All test modes and bandwidth were considered and evaluated respectively by performing full test, only the worst data were recorded for each bandwidth.

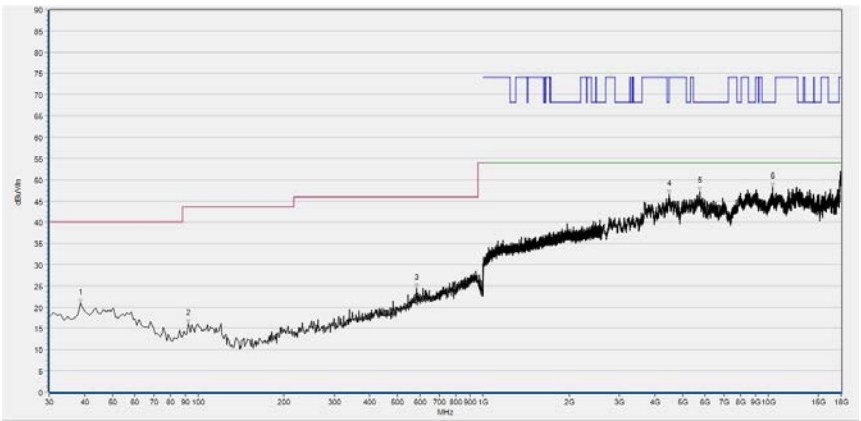
802.11n (HT20) Test mode

Plot for Channel 36



Fre. (MHz)	Pk (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
44.550	19.73	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
98.870	16.02	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
612.970	23.75	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3120.520	42.77	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5747.760	47.58	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
11005.320	48.56	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

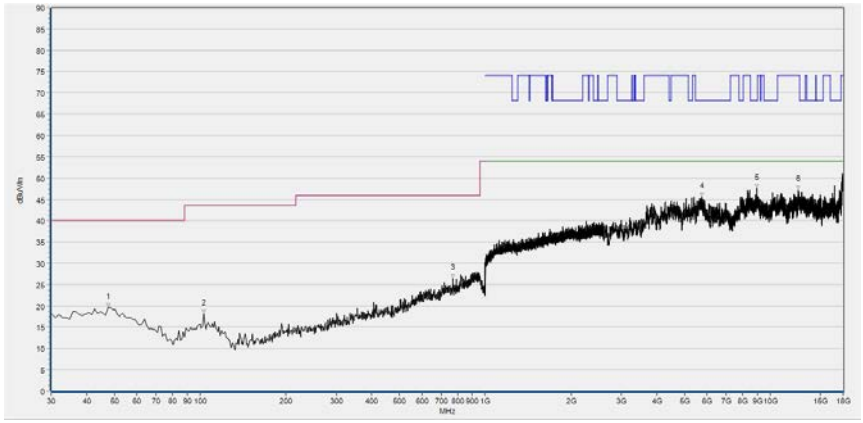
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	Pk (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
38.730	20.96	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
92.080	16.11	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
582.900	24.54	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4484.960	46.63	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5738.520	47.19	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
10346.200	48.32	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

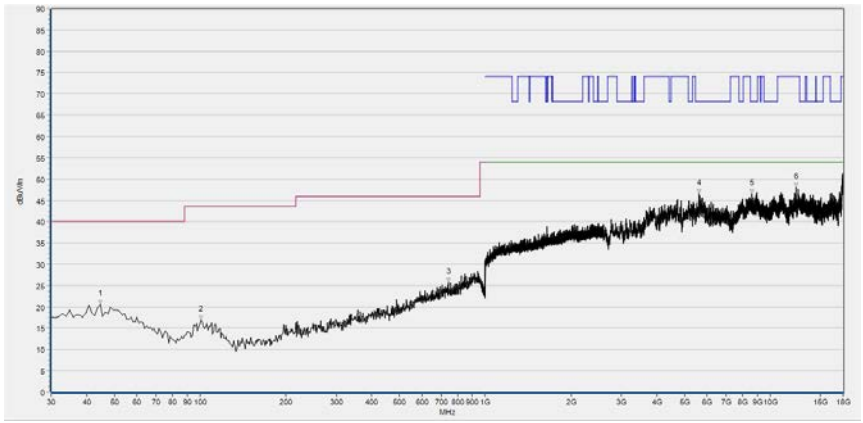
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 44



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
47.460	19.55	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
102.750	18.09	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
771.080	26.43	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5750.840	45.58	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8972.520	47.54	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12536.080	47.27	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

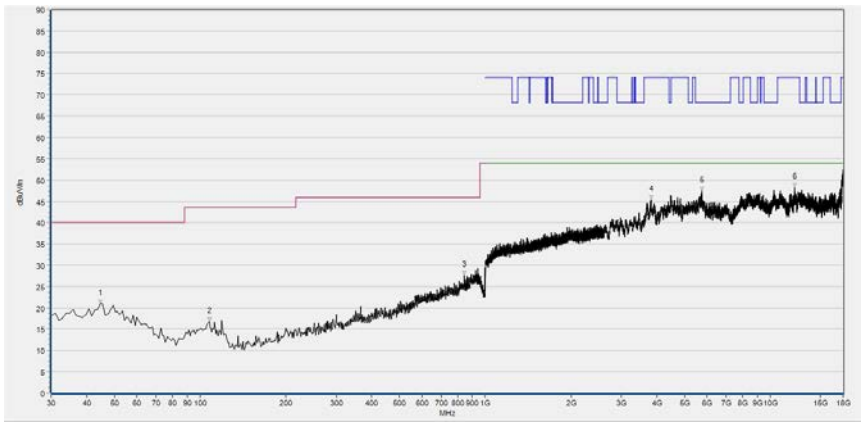
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
44.550	20.68	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
100.810	16.96	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
741.980	25.85	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5621.480	46.58	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8618.320	46.53	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12292.760	48.02	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

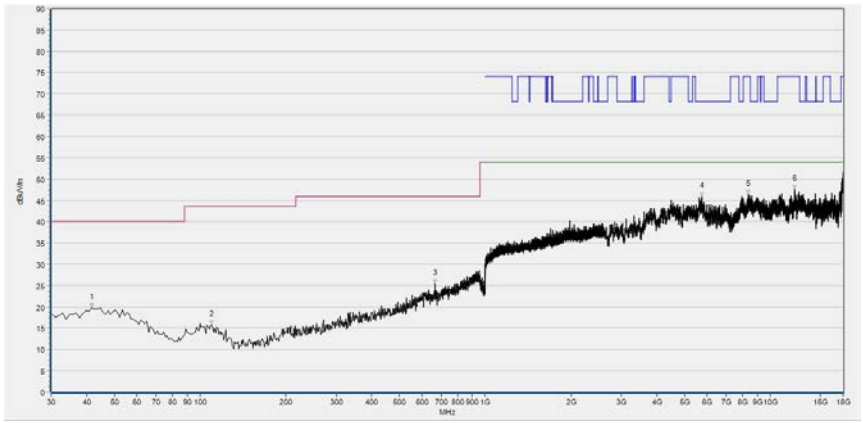
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 48



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
44.550	21.00	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
107.600	16.75	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
843.830	27.62	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3825.840	45.49	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5738.520	47.46	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12154.160	48.28	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

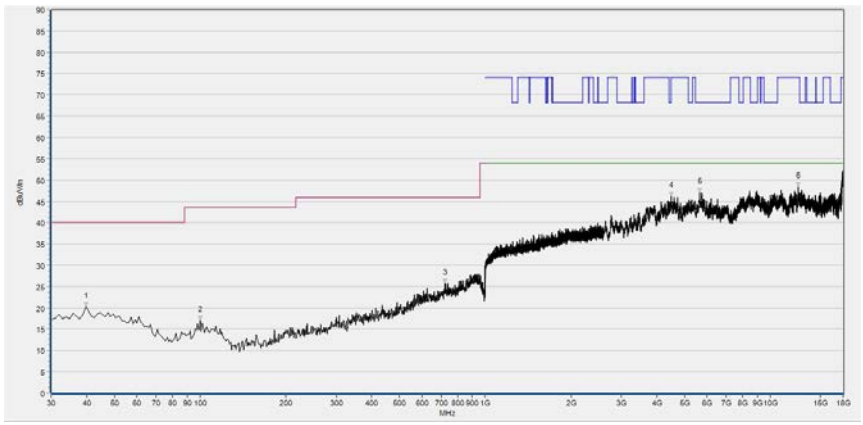
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
41.640	19.85	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
109.540	15.82	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
667.290	25.56	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5738.520	45.88	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8362.680	46.39	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12157.240	47.68	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

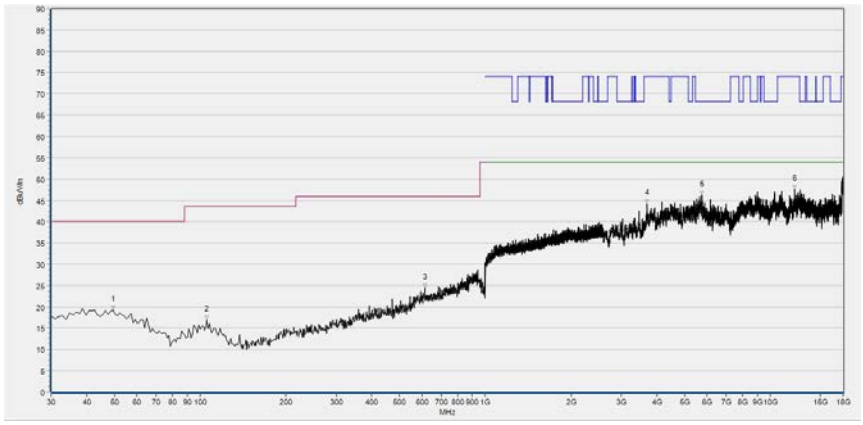
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 149



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
39.700	20.27	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
99.840	17.08	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
722.580	25.81	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
4491.120	46.19	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5646.120	47.10	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12502.200	48.48	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

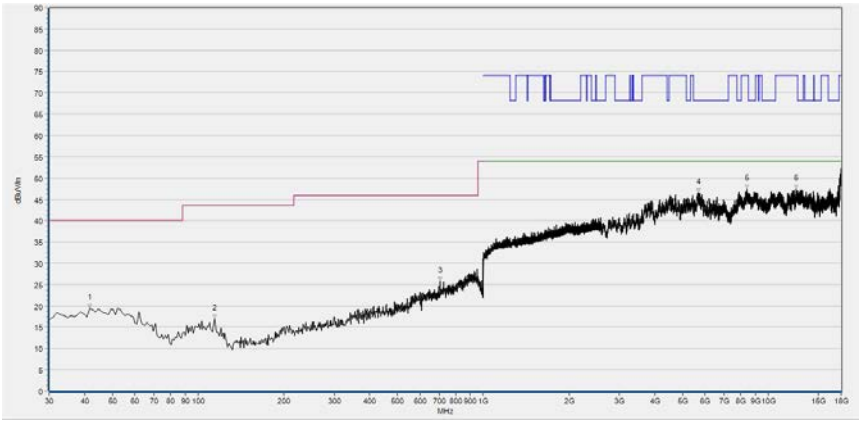
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.400	19.19	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
105.660	16.92	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
612.970	24.45	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3699.560	44.18	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5747.760	46.30	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12166.480	47.58	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

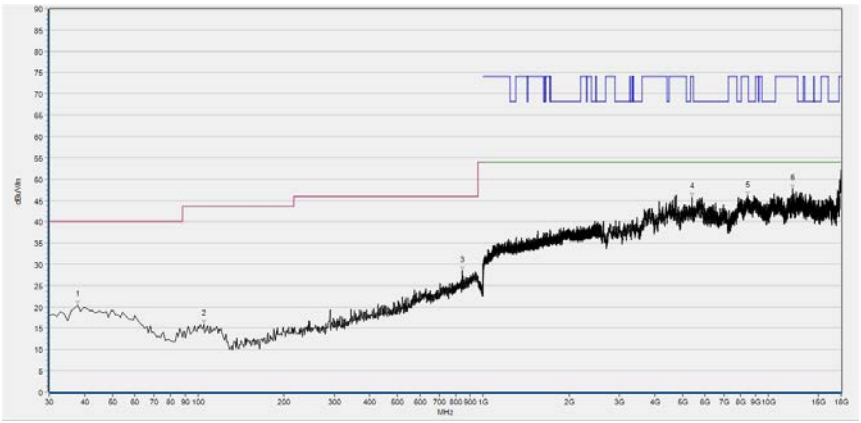
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 157



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
41.640	19.37	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
114.390	16.95	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
706.090	25.84	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5673.840	46.66	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8415.040	47.36	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12514.520	47.49	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

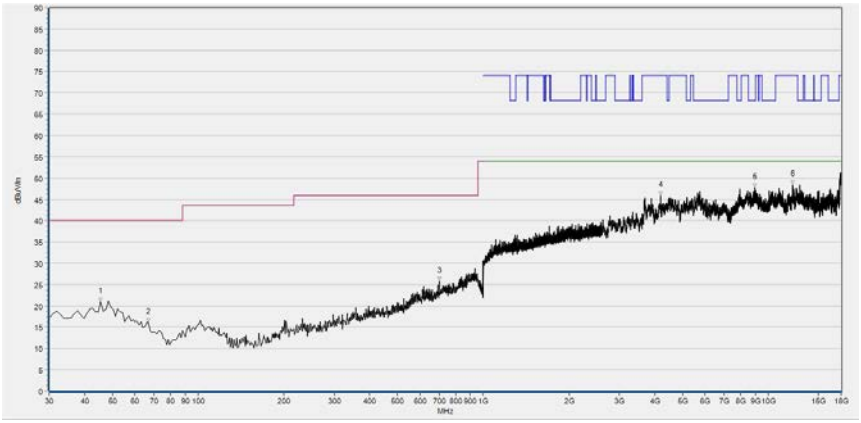
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
37.760	20.44	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
104.690	15.87	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
844.800	28.49	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5408.960	45.83	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8448.920	46.17	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12132.600	47.69	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

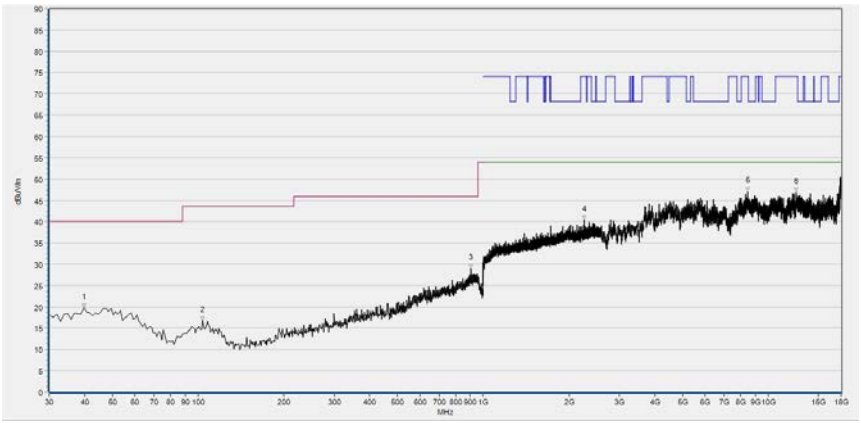
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 165



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
45.520	20.97	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
66.860	16.04	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
701.240	25.80	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
4183.120	45.86	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8954.040	47.76	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12160.320	48.43	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

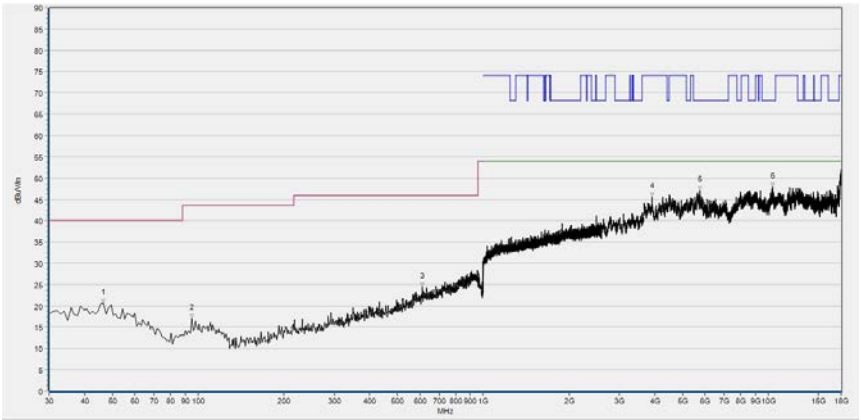


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
39.700	19.82	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
103.720	16.70	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
905.910	28.92	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2262.933	40.35	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8445.840	47.09	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12526.840	46.90	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

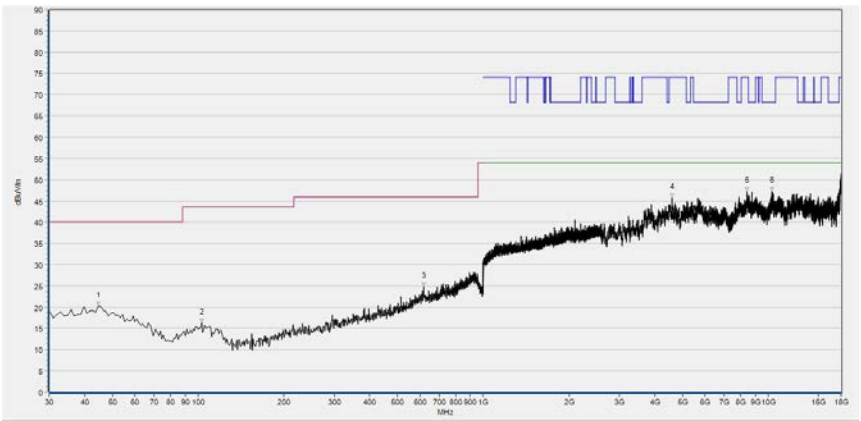
802.11n (HT40) Test mode

Plot for Channel 38



Fre. (MHz)	Pk (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
46.490	20.56	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
94.990	17.10	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
611.030	24.45	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3909.000	45.62	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5753.920	47.09	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
10361.600	47.92	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

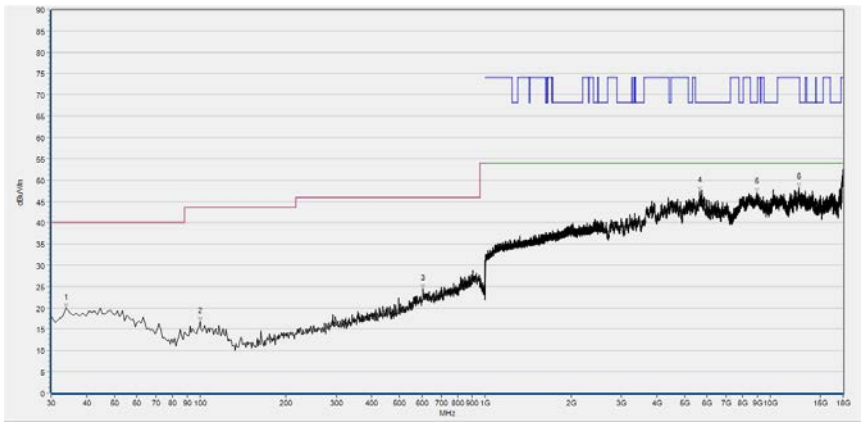
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	Pk (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
44.550	20.20	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
102.750	16.31	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
617.820	24.83	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4592.760	45.78	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8418.120	47.29	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10318.480	47.22	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

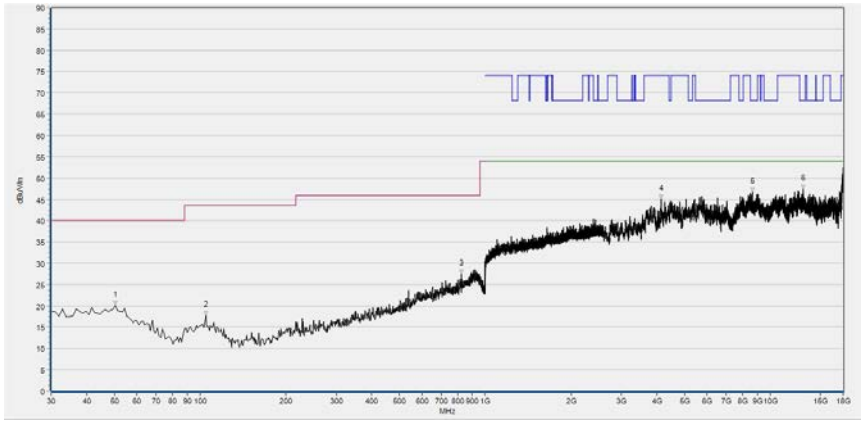
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 46



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
33.880	19.93	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
99.840	16.76	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
605.210	24.45	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5646.120	47.40	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8981.760	47.01	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12594.600	48.31	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

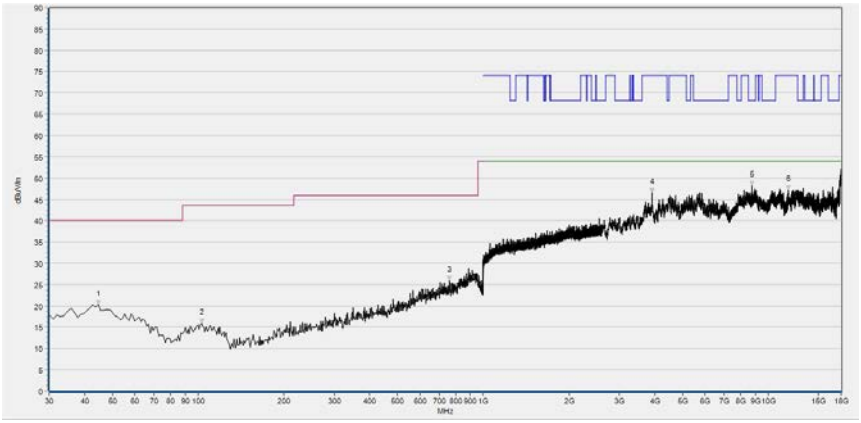
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
50.370	20.13	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
104.690	17.83	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
824.430	27.52	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4149.240	45.00	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8636.800	46.74	N/A	N/A	68.23	N/A	54.00	Vertical	PASS
13041.200	47.47	N/A	N/A	68.23	N/A	54.00	Vertical	PASS

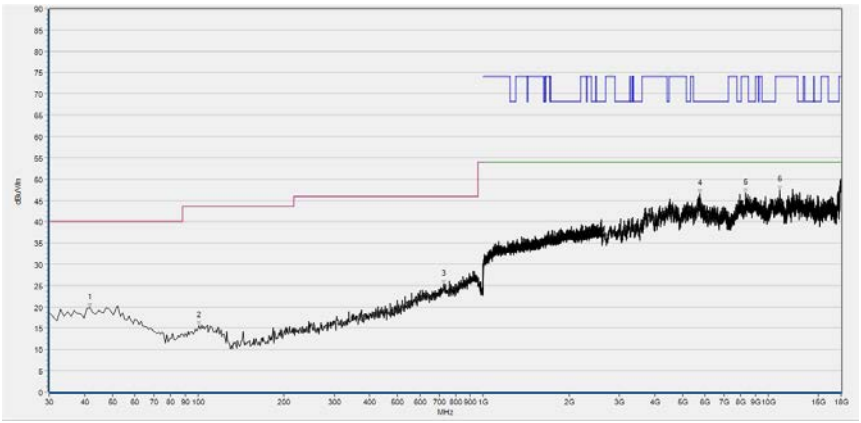
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 151



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
44.550	20.24	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
102.750	15.92	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
761.380	26.05	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3902.840	46.66	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8772.320	48.27	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
11735.280	47.22	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

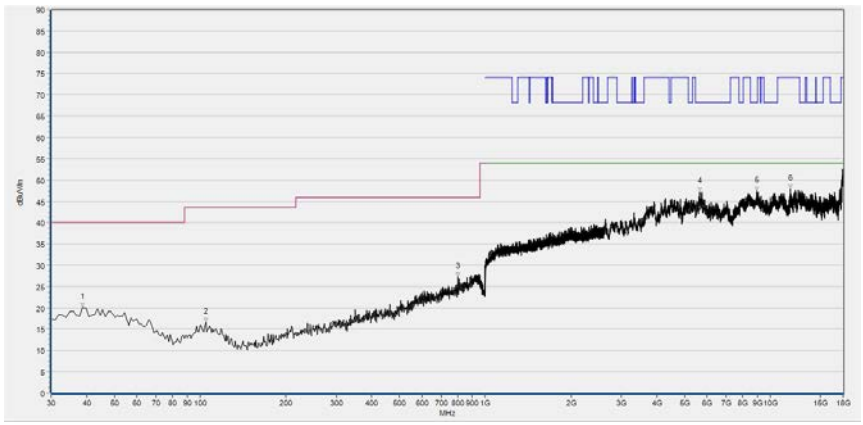
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
41.640	19.73	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
100.810	15.51	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
726.460	25.32	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5760.080	46.51	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8313.400	46.79	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10949.880	47.36	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

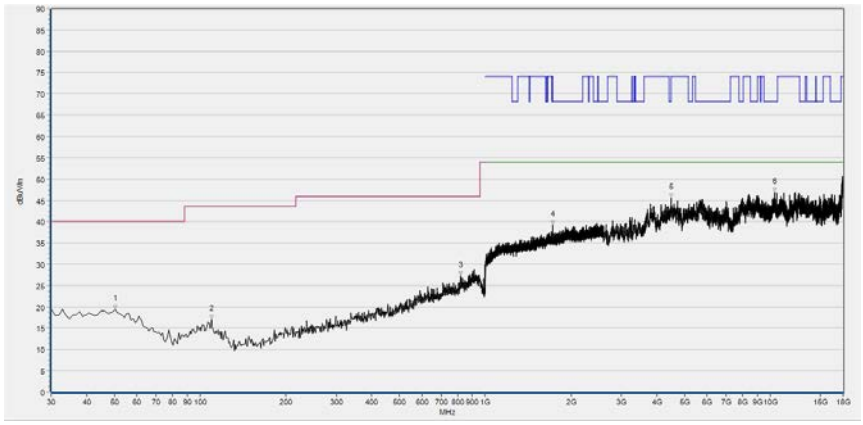
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 159



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
38.730	20.12	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
104.690	16.55	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
803.090	27.24	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5652.280	47.20	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8954.040	47.50	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
11747.600	47.97	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

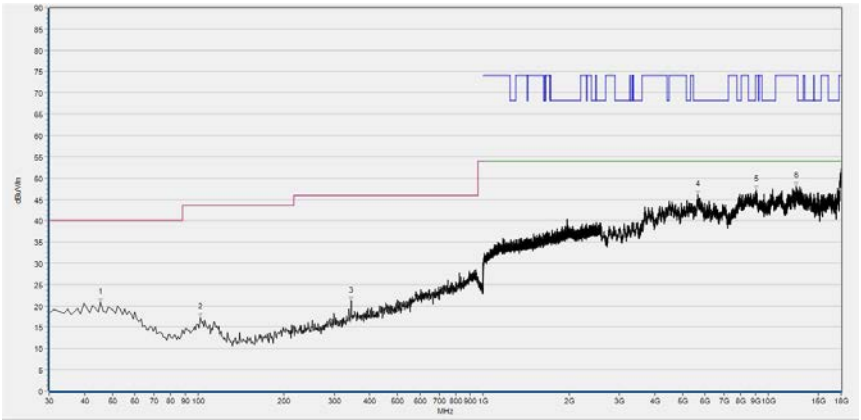


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
50.370	19.44	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
109.540	17.10	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
817.640	27.37	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1725.333	39.27	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
4478.800	45.53	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
10324.640	46.90	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

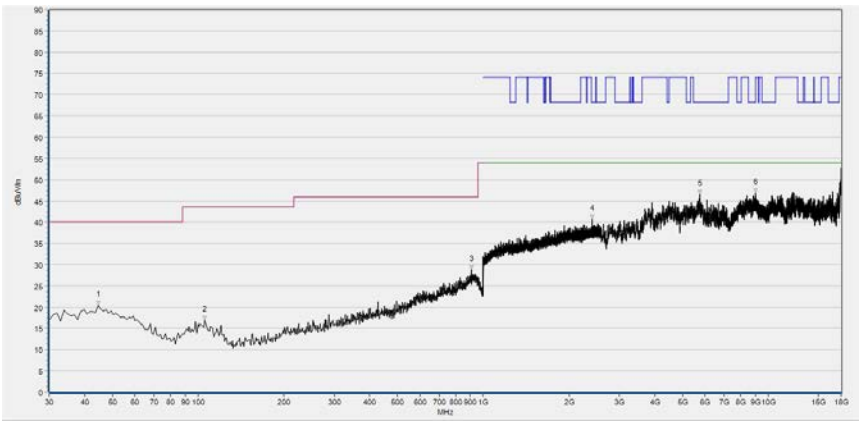
802.11ac (VHT80) Test mode

Plot for Channel 42



Fre. (MHz)	Pk (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
45.520	20.81	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
101.780	17.26	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
344.280	21.17	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5667.680	46.04	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
9077.240	47.32	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12520.680	48.13	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

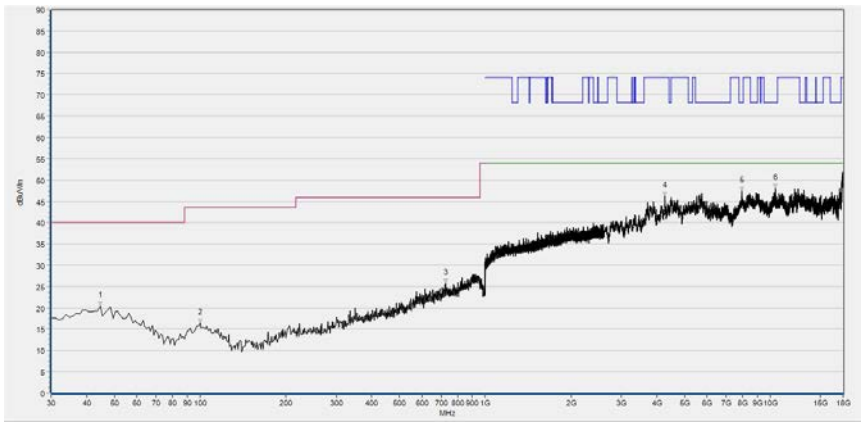
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	Pk (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
44.550	20.47	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
105.660	16.86	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
907.850	28.80	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2412.267	40.75	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5757.000	46.54	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
9015.640	46.94	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

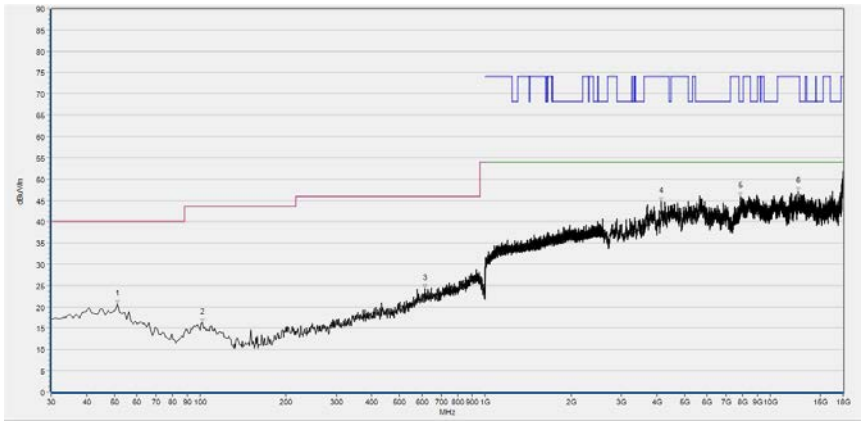
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 155



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
44.550	20.37	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
99.840	16.43	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
727.430	25.85	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
4272.440	46.23	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
7943.800	47.46	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
10438.600	48.03	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
51.340	20.57	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
101.780	16.19	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
612.970	24.24	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4149.240	44.76	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
7863.720	45.96	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12520.680	47.13	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test items	Uncertainty
Peak Output Power	±2.22dB
Power spectral density (PSD)	±2.22dB
Bandwidth	±5%
Restricted Frequency Bands	±5%
Radiated Emission	±2.95dB
Conducted Emission	±2.44dB

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Attenuator 1	(N/A)	10dB	Resnet	N/A	N/A
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2020.04.01	2021.03.31
USB Wideband Power Sensor	MY54210011	U2021XA	Agilent	2020.04.01	2021.03.31
RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial cable	CB02	RF02	Morlab	N/A	N/A
SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A
Temperature Chamber	YOMA	DTL-003S101	12108015	2020.10.26	2021.10.25
Computer	T430i	Think Pad	Lenovo	N/A	N/A

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2020.03.26	2021.03.25
LISN	8127449	NSLK 8127	Schwarzbeck	2020.03.26	2021.03.25
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2020.07.24	2021.07.23
Coaxial cable(BNC)	CB01	EMC01	Morlab	N/A	N/A

4.3 List of Software Used

Description	Manufacturer	Software Version
Test system	Tonscend	V2.6
Power Panel	Agilent	V3.8
MORLAB EMCR V1.2	MORLAB	V1.0

4.4 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2020.07.21	2021.07.20
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.24	2022.05.23
Test Antenna - Horn	BBHA9170 #774	BBHA 9170	Schwarzbeck	2019.07.26	2022.07.25
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2019.02.14	2022.02.13
Test Antenna - Horn	01774	BBHA 9120D	Schwarzbeck	2019.07.26	2022.07.25
Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial cable(N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
Coaxial cable(N male) (30MHz-40GHz)	CB05	EMC05	Morlab	N/A	N/A
1-18GHz pre-Amplifier	61171/61172	S020180L3203	Tonscend	2020.07.21	2021.07.20
26-40GHz pre-Amplifier	56774	S40M400L4002	Tonscend	2020.07.21	2021.07.20
18-26.5GHz pre-Amplifier	46732	S10M100L3802	Tonscend	2020.07.21	2021.07.20
Notch Filter	N/A	WRCG-5150-5350	Wainwright	2020.07.21	2021.07.20
Notch Filter	N/A	WRCG-5470-5725	Wainwright	2020.07.21	2021.07.20
Notch Filter	N/A	WRCG-5725-5850	Wainwright	2020.07.21	2021.07.20

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

END OF REPORT