



TEST REPORT

APPLICANT : Hot Pepper, Inc.
PRODUCT NAME : 4G Smart Phone
MODEL NAME : HPP-GS1
BRAND NAME : Hot Pepper
FCC ID : 2APD4-A81C
STANDARD(S) : 47 CFR Part 15 Subpart E
TEST DATE : 2019-03-22 to 2019-04-19
ISSUE DATE : 2019-05-23

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Lion Xiao (Project Manager)
Approved by: Anne Liu
Anne Liu(Supervisor)

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Change History		
Version	Date	Reason for change
1.0	2019-05-23	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Hot Pepper, Inc.
Applicant Address:	5151 California Ave., Suite 100, Irvine 92617, USA
Manufacturer:	Hot Pepper, Inc.
Manufacturer Address:	5151 California Ave., Suite 100, Irvine 92617, USA

1.2. Equipment Under Test (EUT) Description

Product Name:	4G Smart Phone	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	A81C_MAINBOARD_P1	
Software Version:	HPP- GS1-V1.0.4-190121	
Modulation Type:	OFDM	
Modulation Mode:	802.11a, 802.11n(HT20), 802.11n(HT40),802.11ac(HT80)	
Operating Frequency Range:	5.180 GHz- 5.240 GHz; 5.260 GHz -5.320 GHz ; 5.745GHz- 5.825GHz	
Channel Number:	Refer to 1.3	
Antenna Type:	PIFA Antenna	
Antenna Gain:	0.2 dBi	
Ancillary Equipment:	AC Adapter	
	Manufacturer:	Shenzhen Tianyin Electronics Co.,Ltd.
	Model No.:	TPA-23A050200UU01
	Rated Input:	100-240V~ 50/60Hz, 0.3A
	Rated Output:	5V=2.0A
	Battery	
	Manufacturer:	SHENZHEN HUATIAN TONG TECHNOLOGY CO., LTD
	Model No.:	H2019GS1
	Manufacturer:	Shenzhen Nine Liyuan Electronic Technology Co., Ltd
	Model No.:	H2019GS1A



REPORT No. : XM19020007W04

Note 1: The U-NII band is applicable to this report, another bands of operation (2.4GHz) is documented in a separate report.

Note 2: WIFI hotspot does not support U-NII band.

Note 3: During test, the duty cycle of the EUT was setting to 100%.

Note 4: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



1.3. The channel number and frequency of EUT

Frequency Range: 5180-5240MHz				
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: 5260-5320MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	52	5260	56	5280
	60	5300	64	5320
40MHz	54	5270	62	5310
80MHz	58	5290	/	/
Frequency Range: 5745-5805MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	149	5745	153	5765
	157	5785	161	5805
	165	5825	/	/
40MHz	151	5755	159	5795
80MHz	155	5775	/	/

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



1.4. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart E for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 15	Radio Frequency Devices

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

No.	Section	Description	Test Date	Test Engineer	Result
1	15.203	Antenna Requirement	N/A	N/A	PASS
2	15.407(a) (e)	Emission Bandwidth	Mar 09, 2019	Lion Xiao	PASS
3	15.407(a)	Maximum conducted output Power	Mar 09, 2019	Lion Xiao	PASS
4	15.407(a)	Peak Power spectral density	Mar 09, 2019	Lion Xiao	PASS
5	15.407(b)	Restricted Frequency Bands	Apr 10, 2019 Apr 18, 2019	Jiefeng Zhang	PASS
6	15.407(g)	Frequency Stability	Mar 10, 2019 Mar 11, 2019	Lion Xiao	PASS
7	15.207	Conducted Emission	Apr 08, 2019	Jiefeng Zhang	PASS
8	15.407(b)	Radiated Emission	Apr 10, 2019 Apr 18, 2019	Jiefeng Zhang	PASS
9	15.407(c)	Automatically discontinue transmission requirement	N/A	N/A	PASS

Note: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10 2013 and KDB789033 D02 V02r01.

1.5. 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. Please refer to the EUT internal photos.

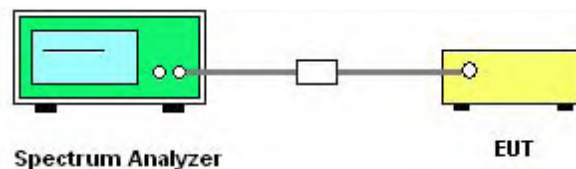
2.2. Emission Bandwidth

2.2.1. 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.

2.2.2. Test Description

A. 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.

B. 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) $\geq 3 \times$ 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.

2.2.3. Test Result

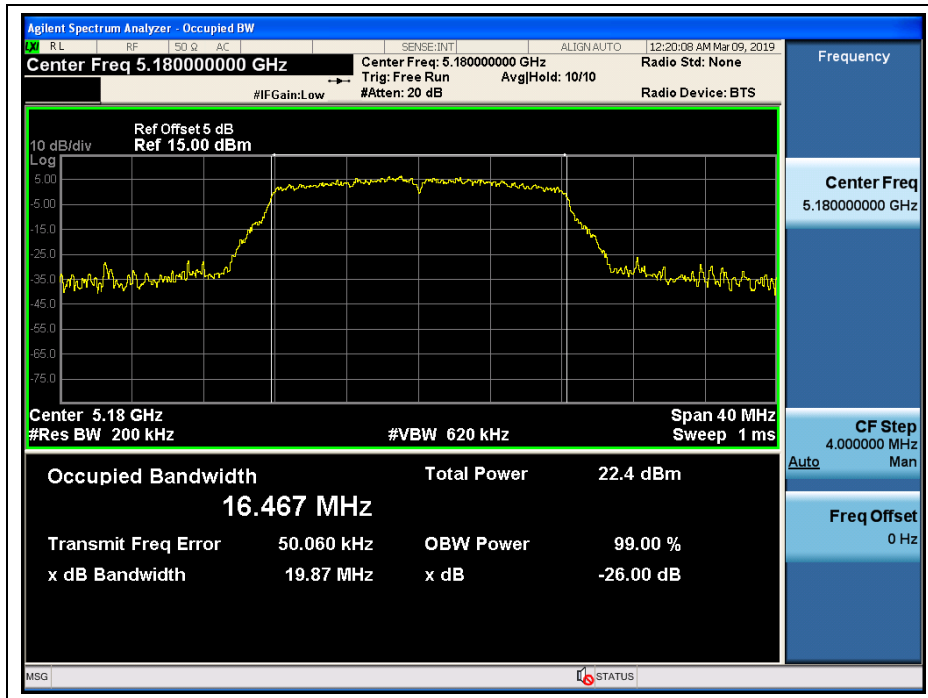
802.11a Test mode

A. Test Verdict:

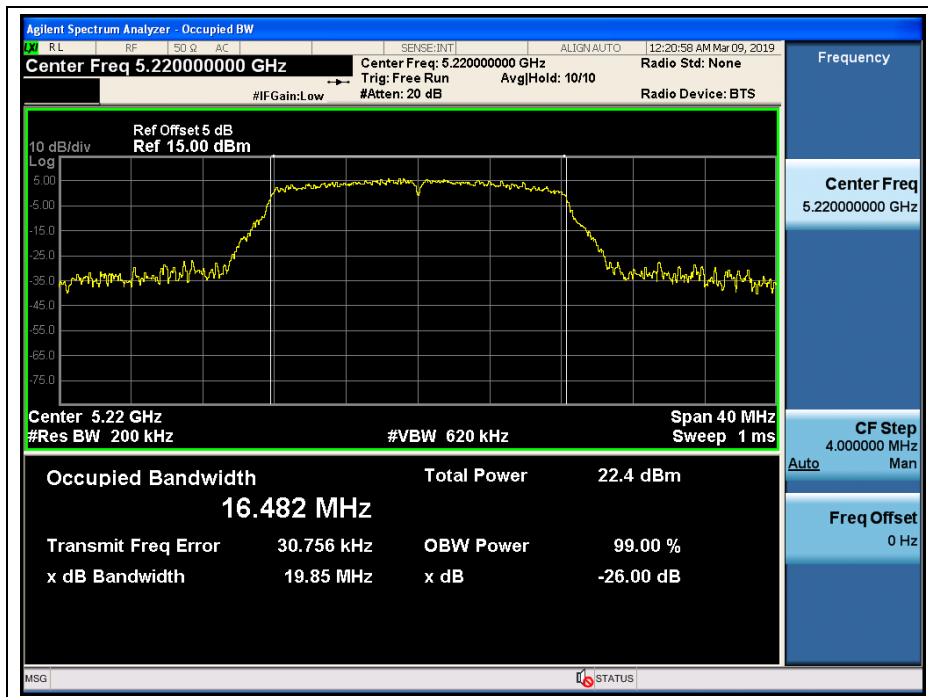
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	19.87
44	5220	19.85
48	5240	19.84
52	5260	19.76
60	5300	19.74
64	5320	19.53
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
149	5745	16.38
157	5785	15.41
165	5825	16.37



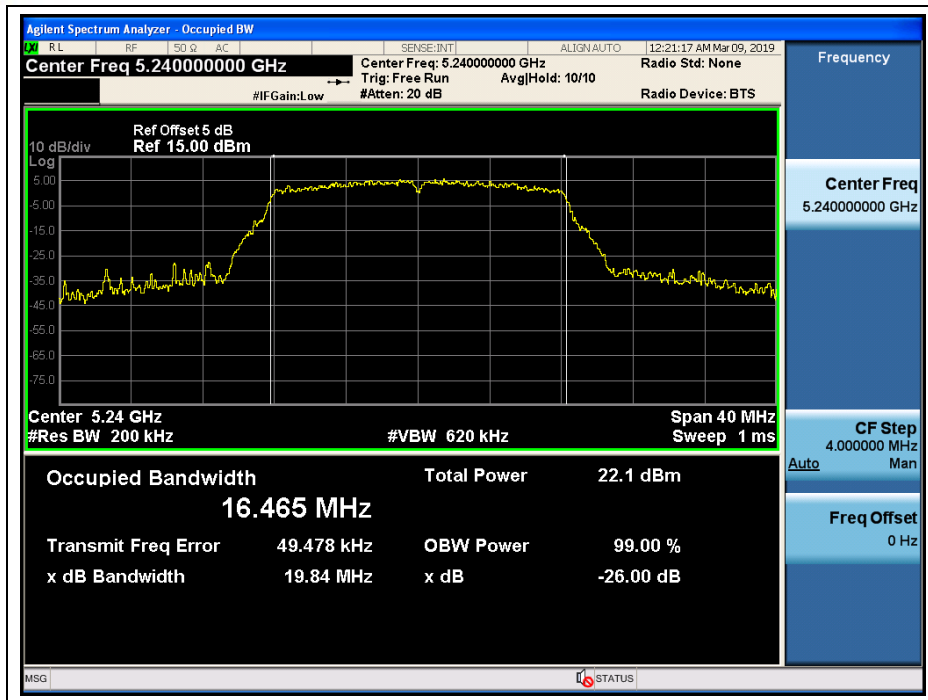
B. Test Plots



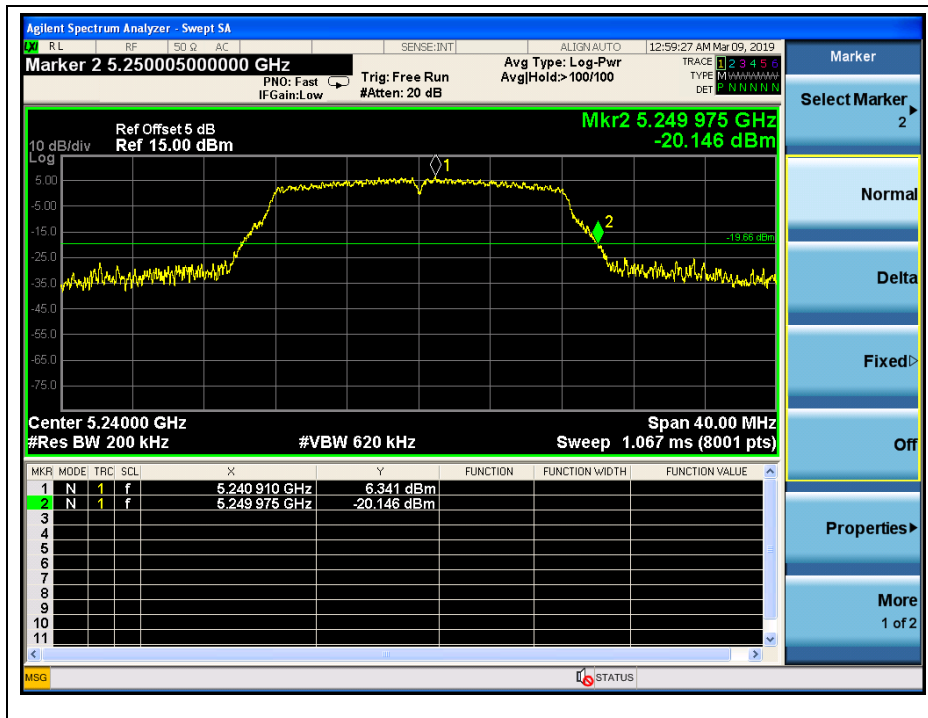
(Channel 36, 5180MHz, 802.11a)



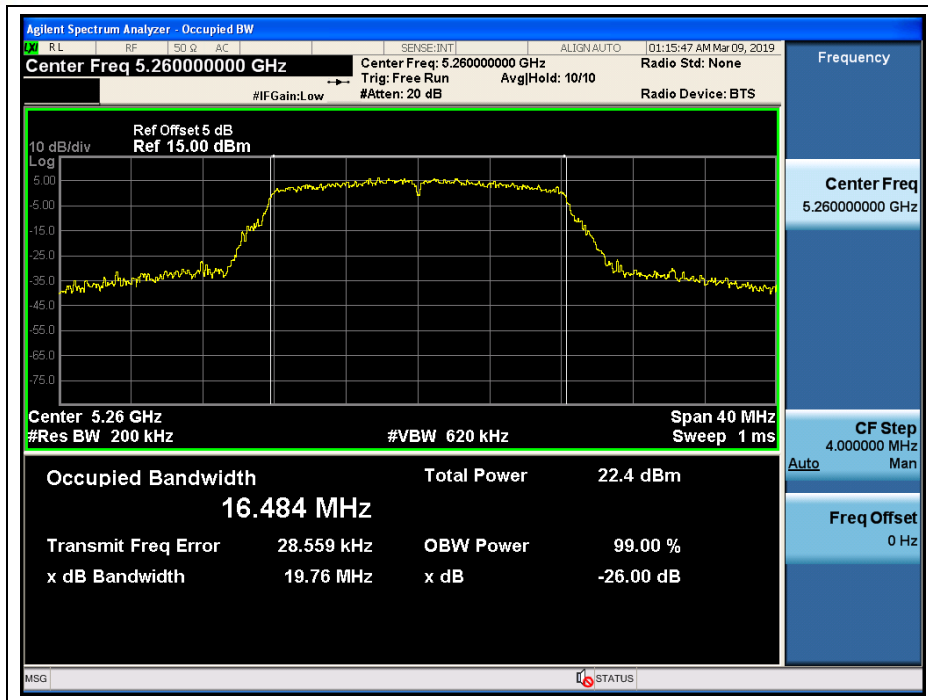
(Channel 44, 5220 MHz, 802.11a)



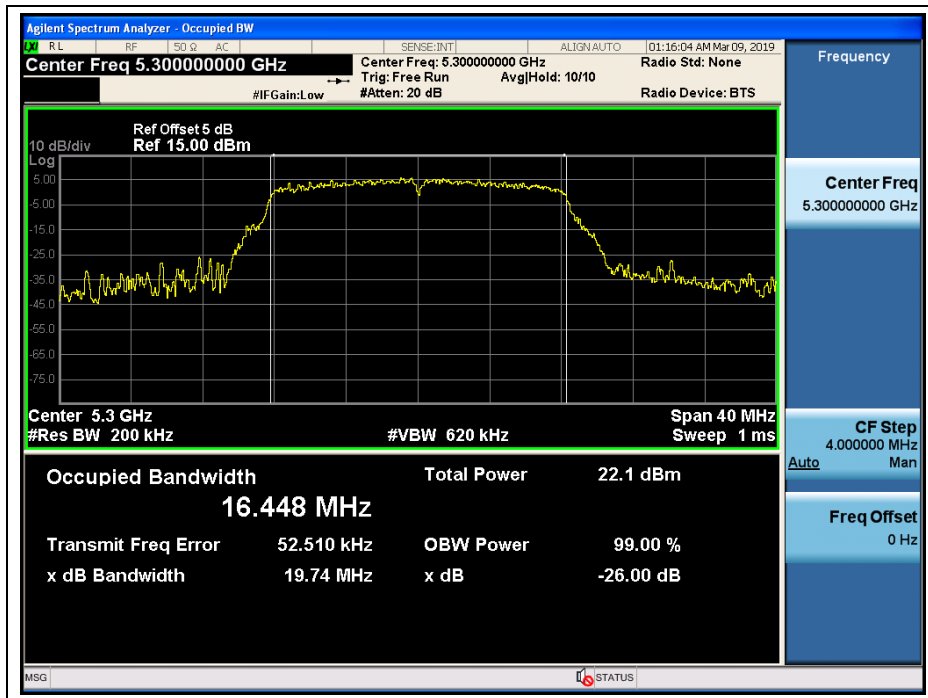
(Channel 48, 5240MHz, 802.11a)



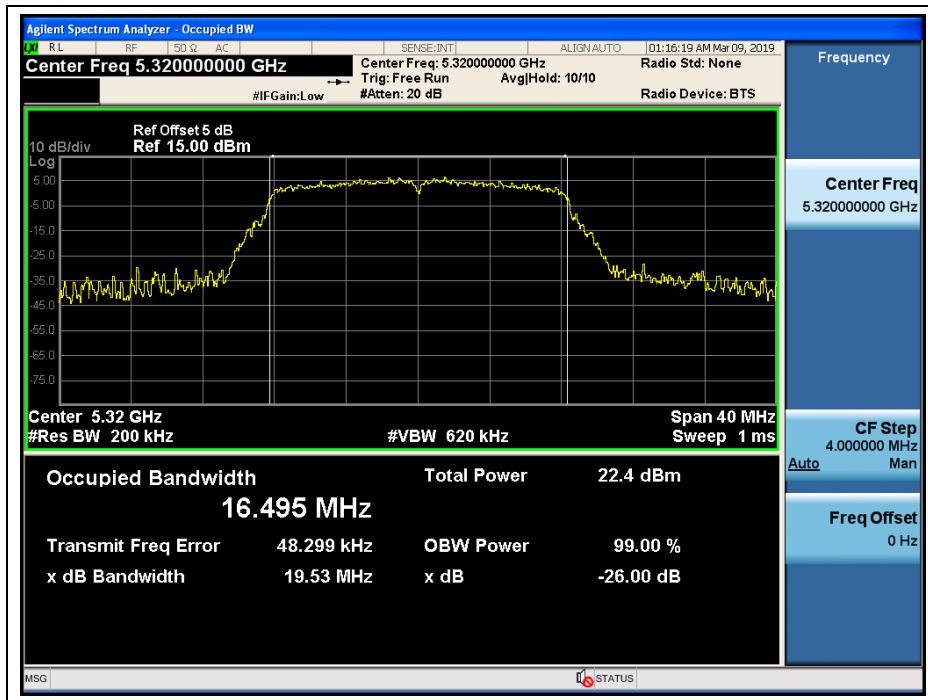
(Channel 48, 5240MHz, 802.11a)



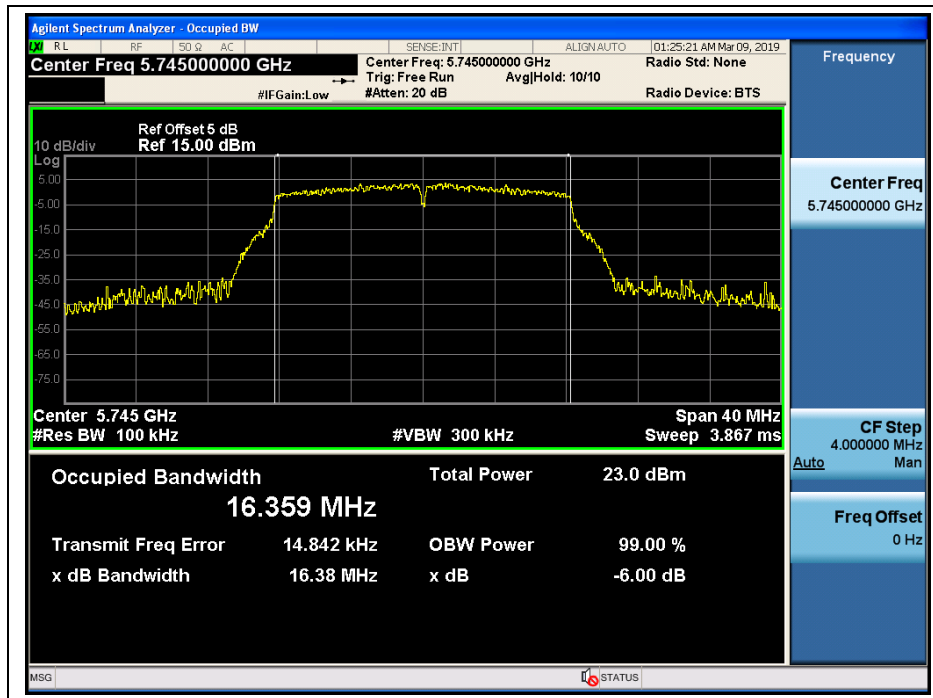
(Channel 52, 5260MHz, 802.11a)



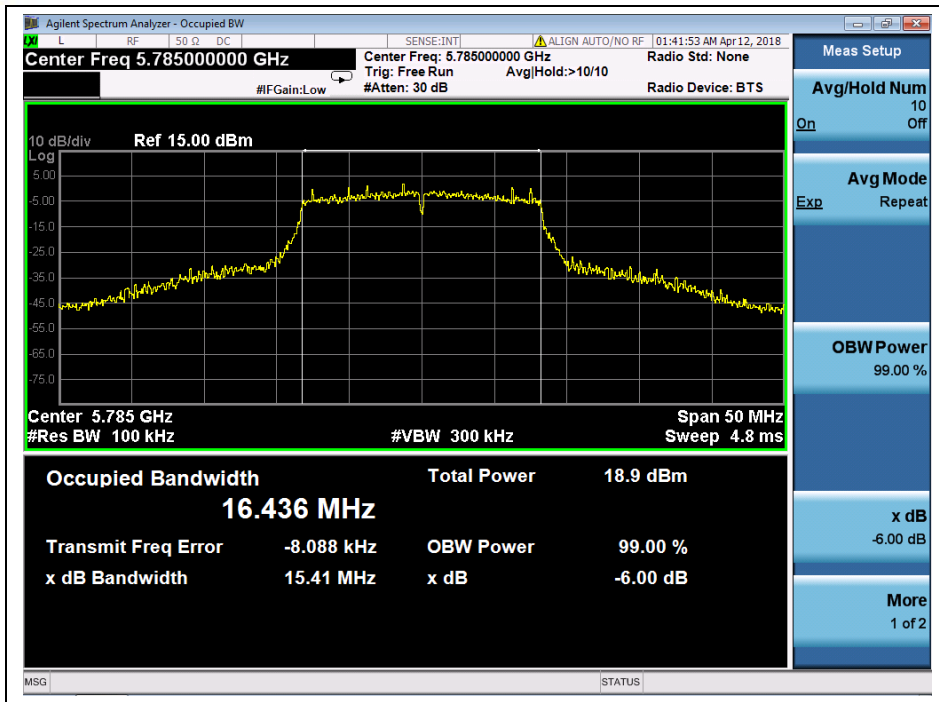
(Channel 60, 5300 MHz, 802.11a)



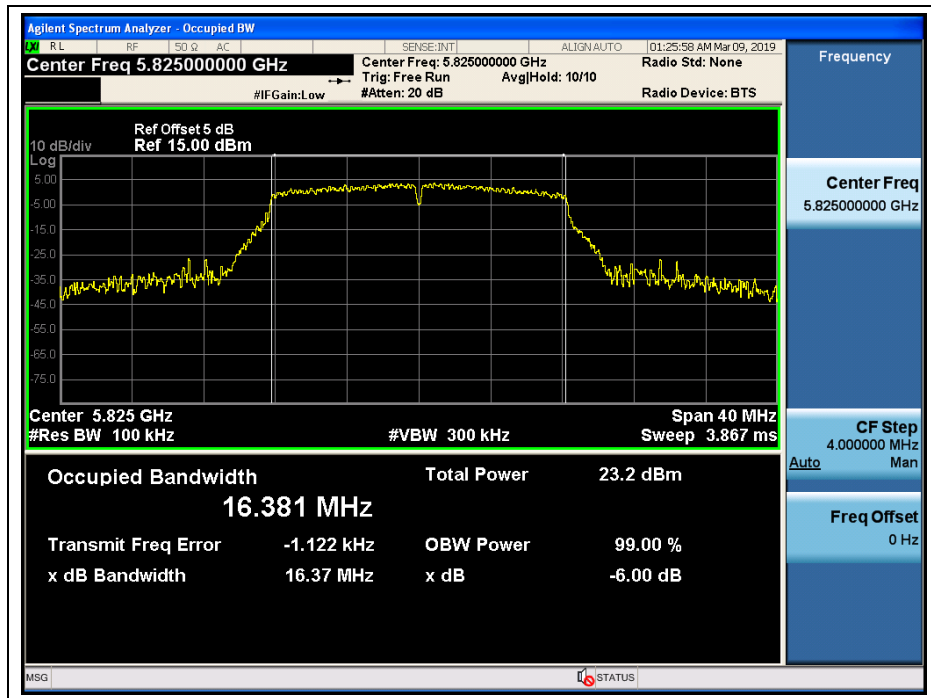
(Channel 64, 5320MHz, 802.11a)



(Channel 149, 5745MHz, 802.11a)



(Channel 157, 5785MHz, 802.11a)



(Channel 165, 5825MHz, 802.11a)

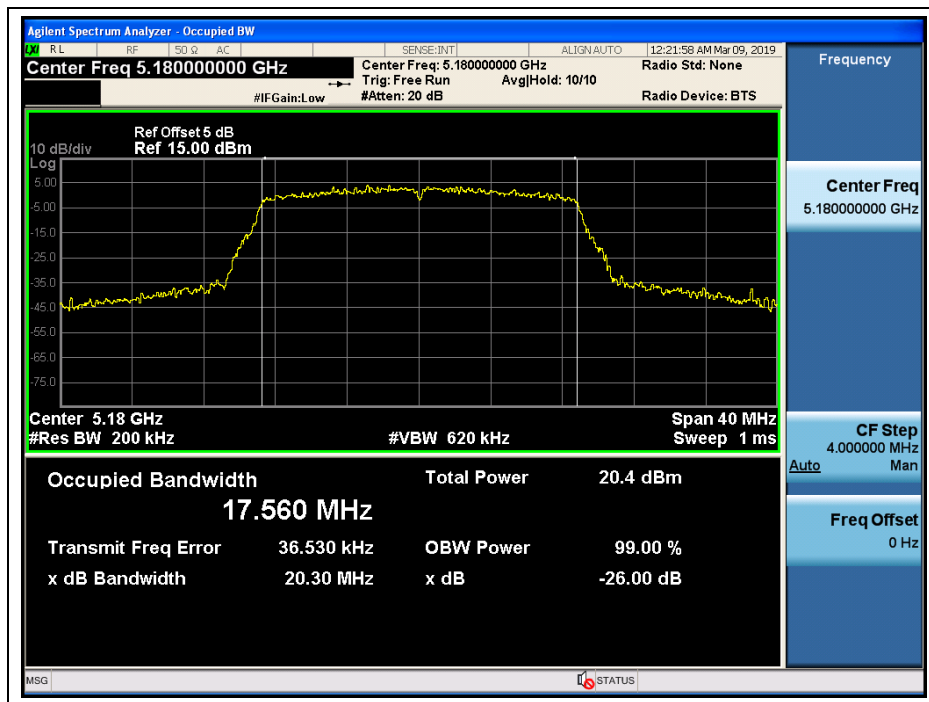


802.11n (HT20) Test mode

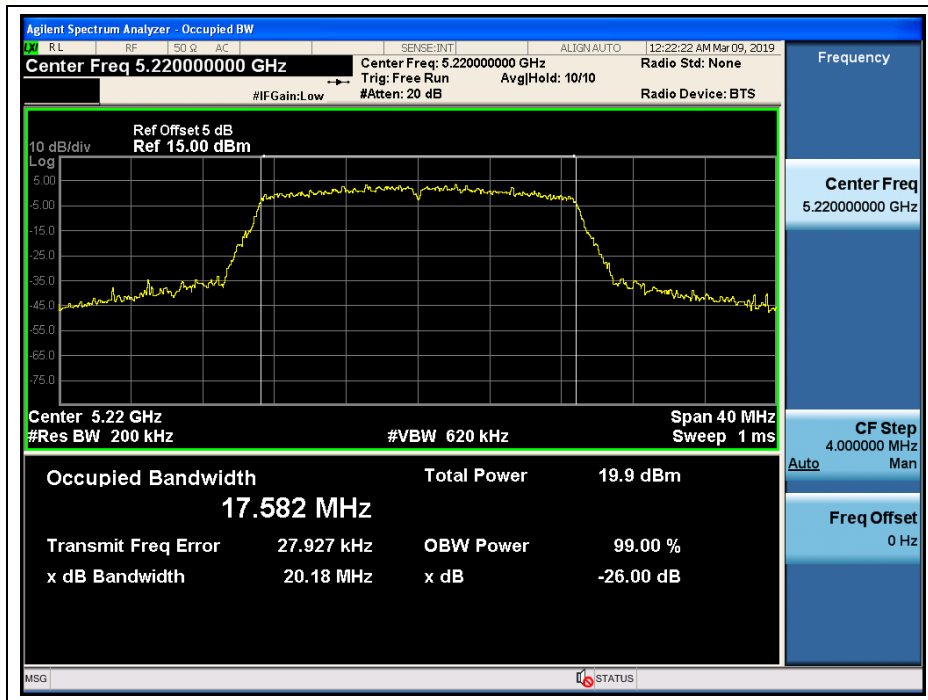
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	20.30
44	5220	20.18
48	5240	20.12
52	5260	20.13
60	5300	19.66
64	5320	19.53
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
149	5745	17.65
157	5785	17.61
165	5825	17.63

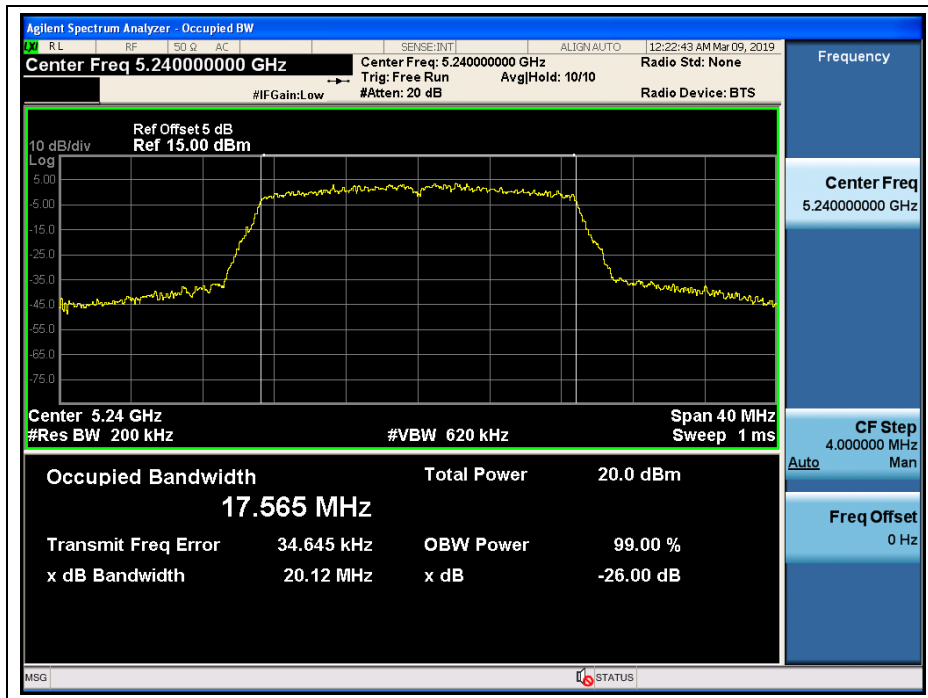
B. Test Plots



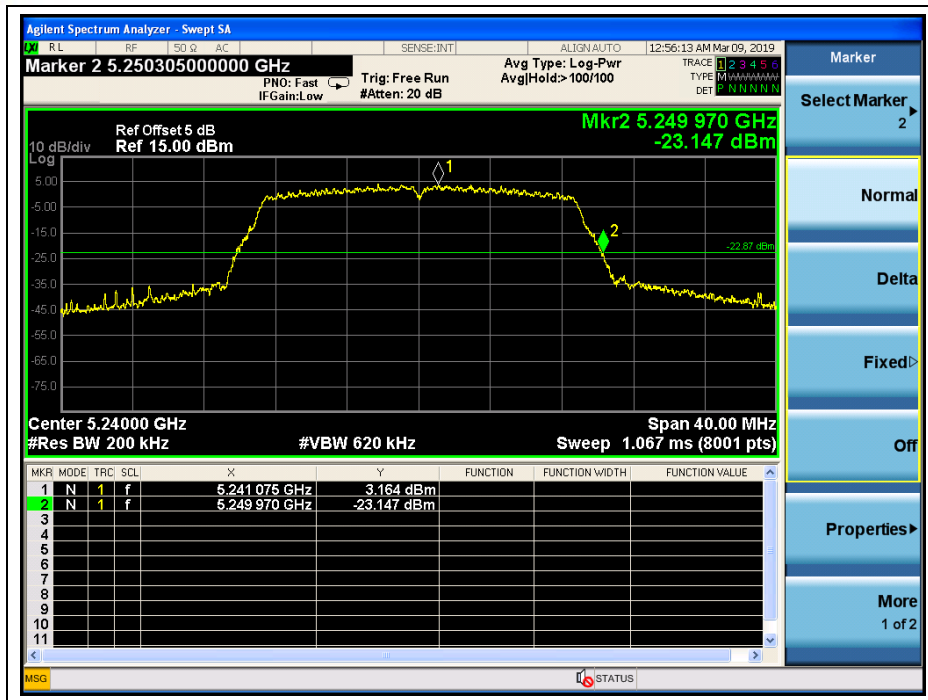
(Channel 36, 5180MHz, 802.11 n (HT20))



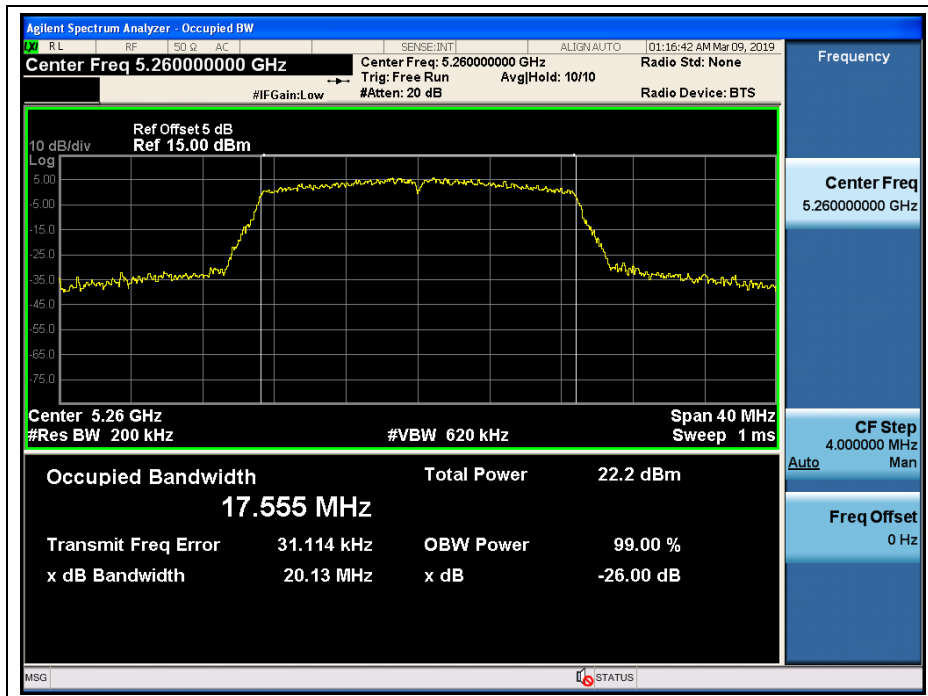
(Channel 44, 5220 MHz, 802.11 n (HT20))



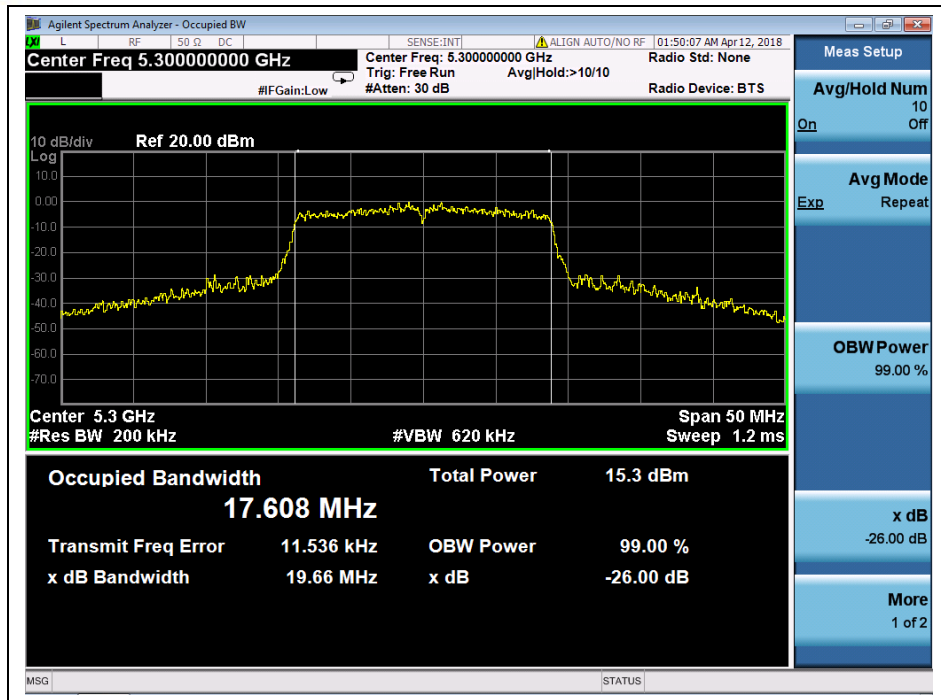
(Channel 48, 5240MHz, 802.11 n (HT20))



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

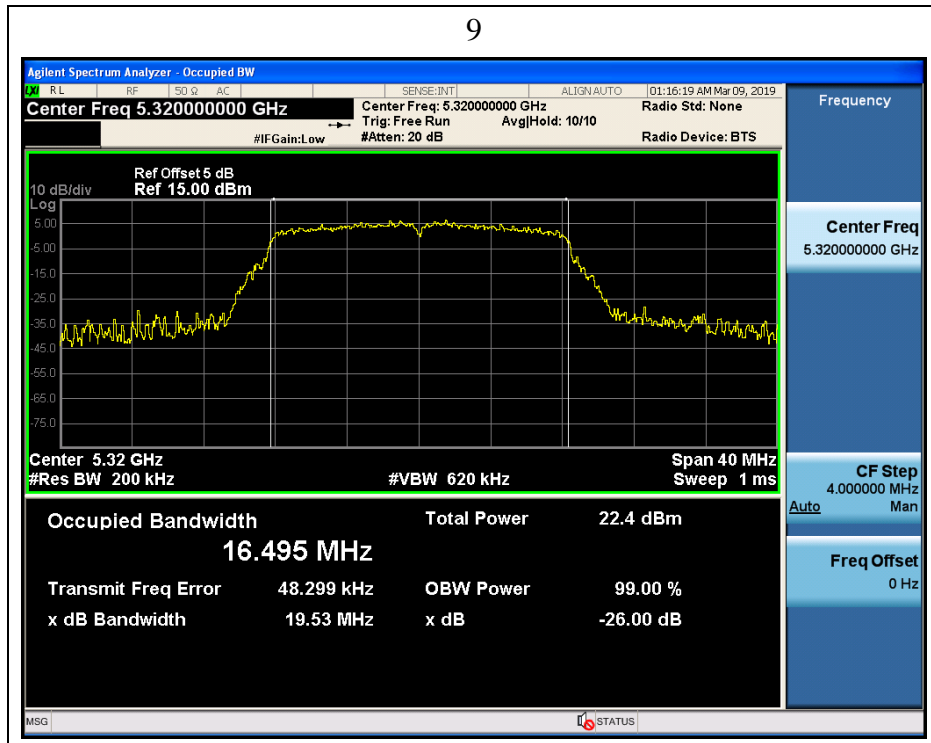


(Channel 52, 5260MHz, 802.11 n (HT20))

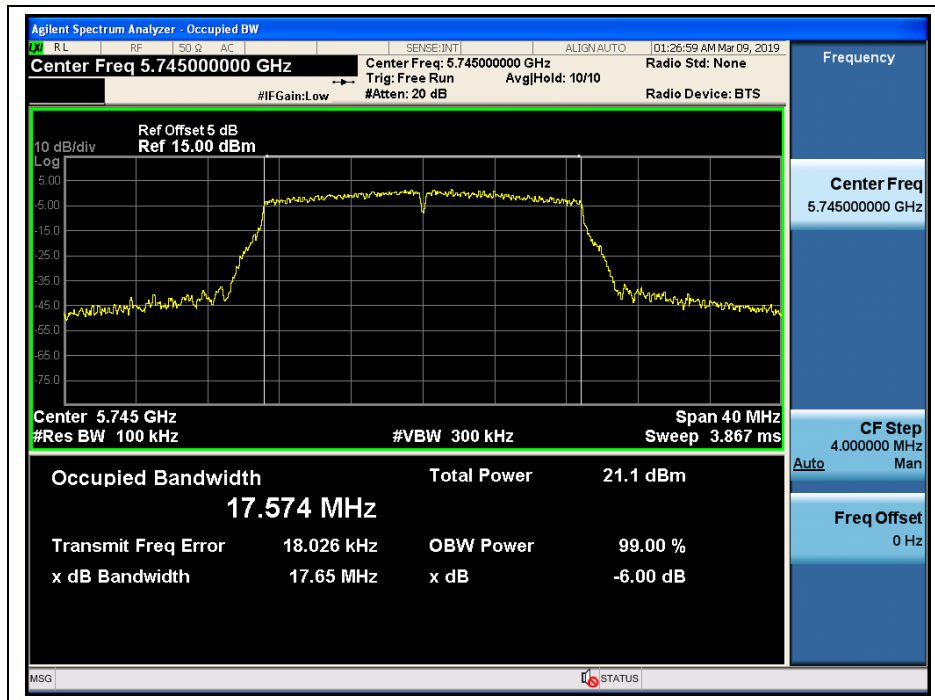


(Channel 60, 5300 MHz, 802.11 n (HT20))

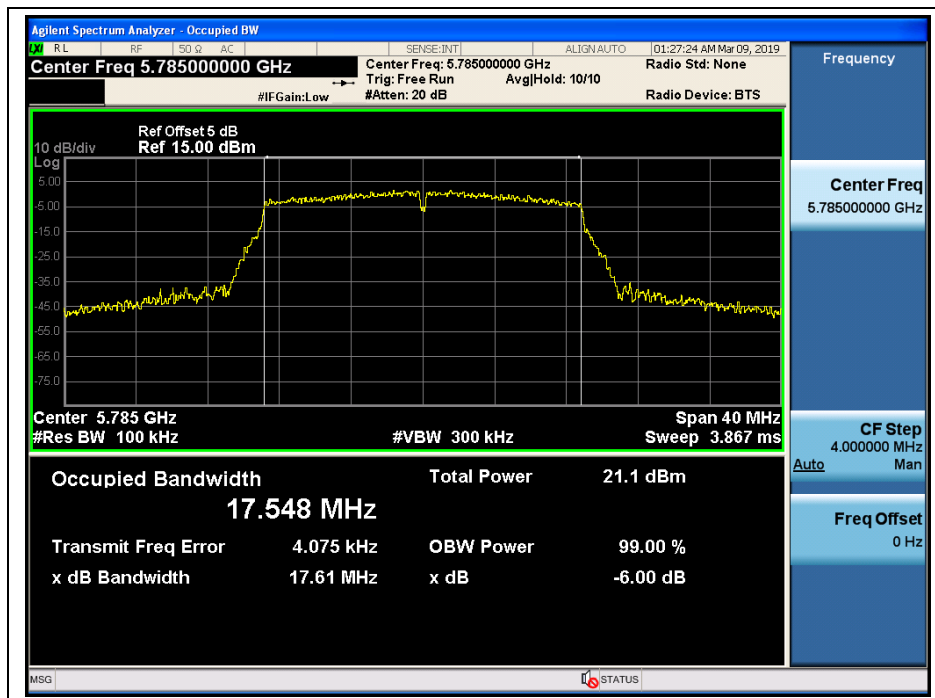
9



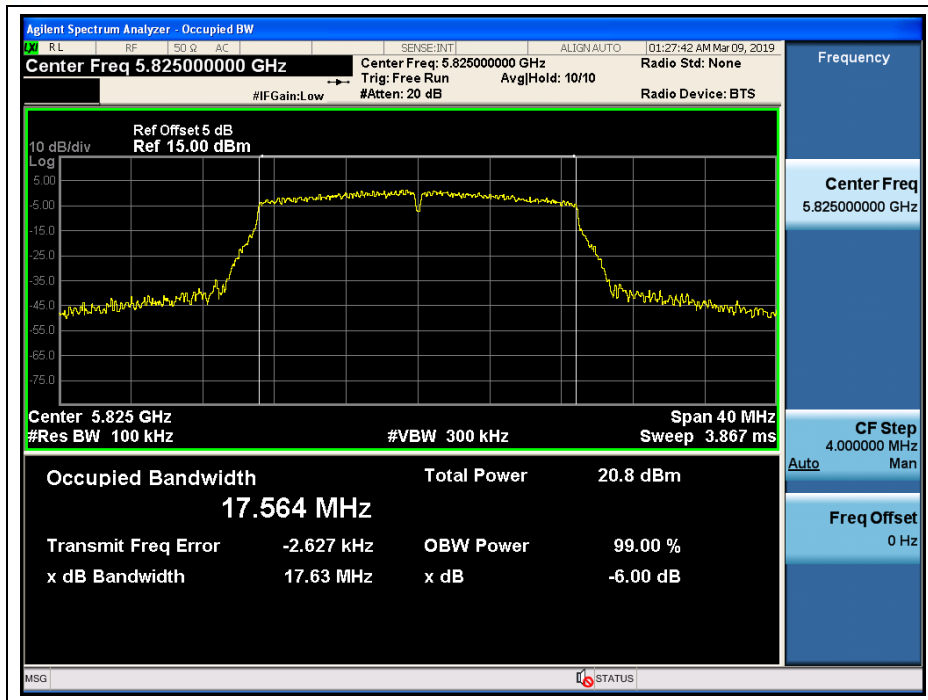
(Channel 64, 5320MHz, 802.11 n (HT20))



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



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



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

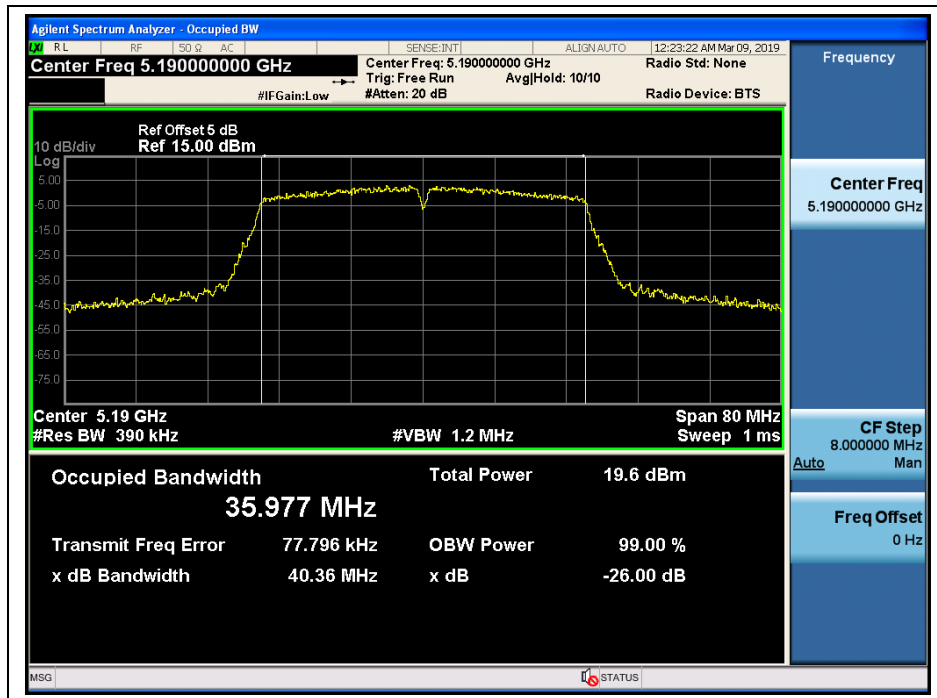


802.11n (HT40) Test mode

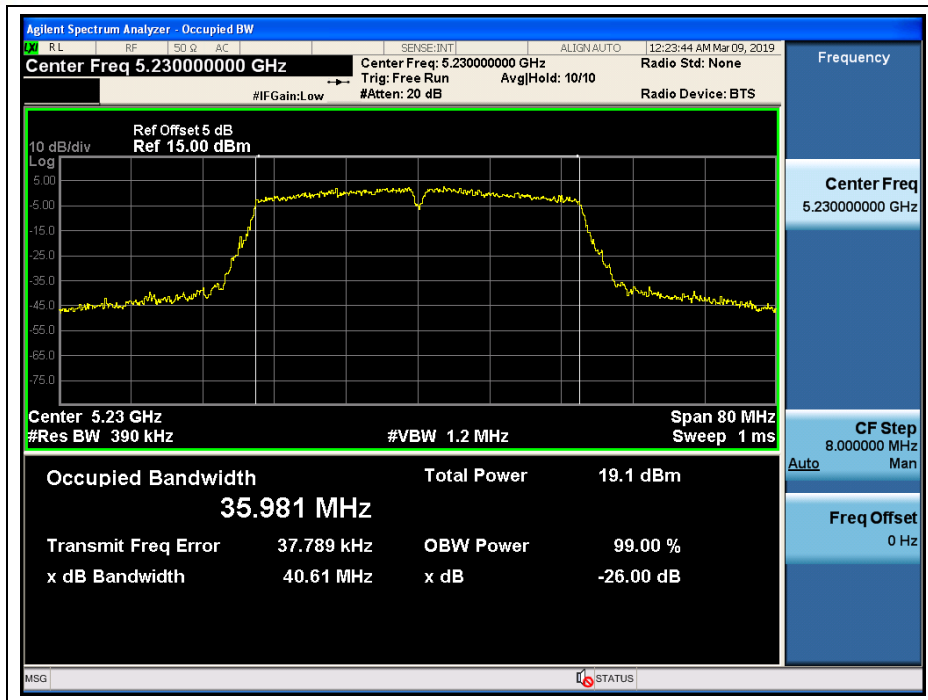
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	40.36
46	5230	40.61
54	5270	40.04
62	5310	40.11
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
151	5755	35.93
159	5795	36.37

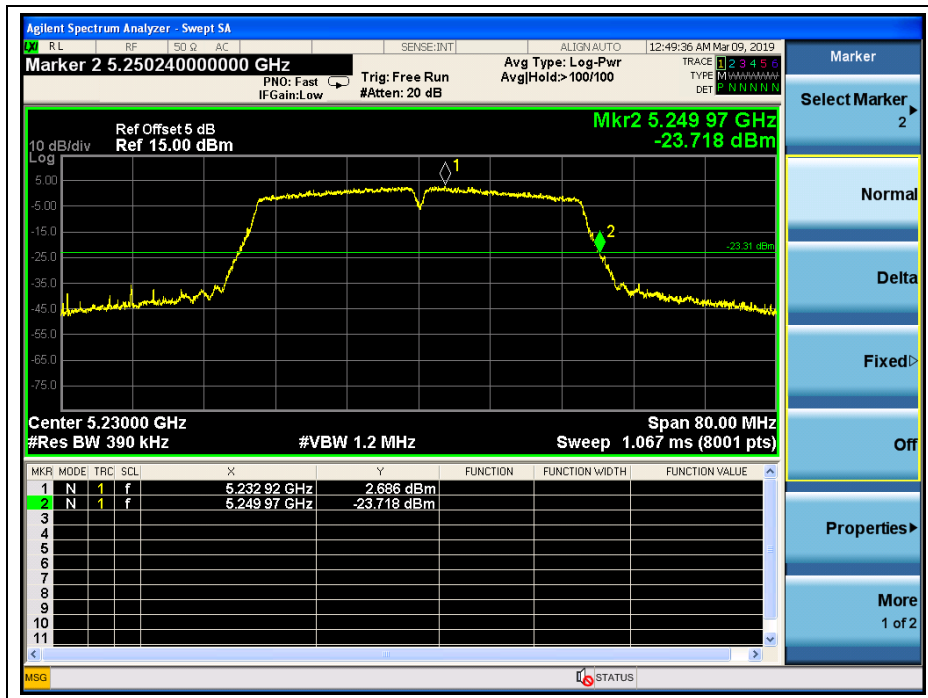
B. Test Plots



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



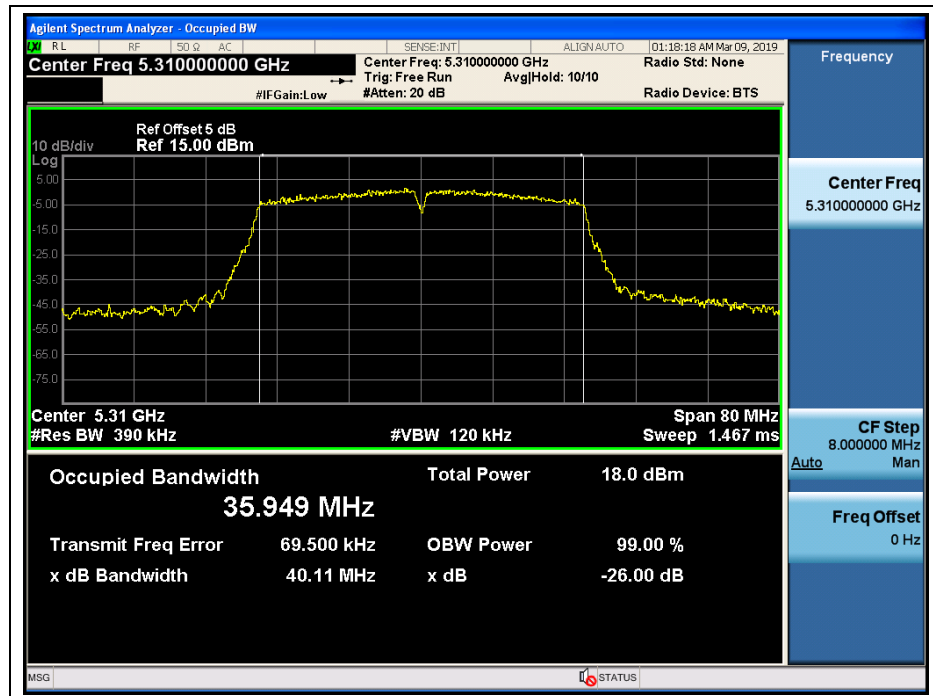
(Channel 46, 5230 MHz, 802.11n (HT40))



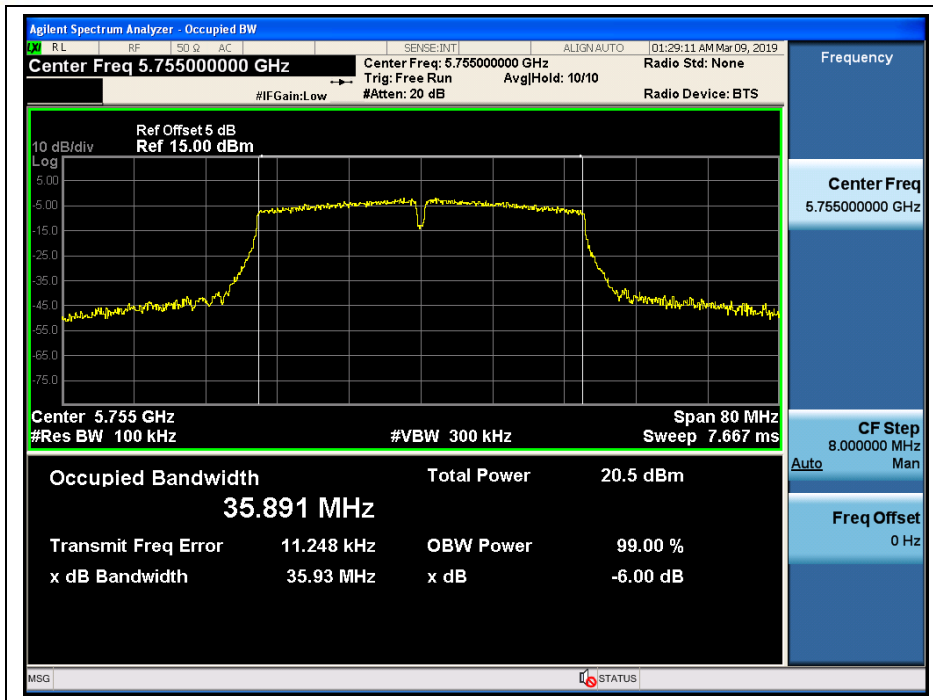
(Channel 46, 5230 MHz, 802.11n (HT40))



(Channel 54, 5270MHz, 802.11n (HT40))



(Channel 62, 5310 MHz, 802.11n (HT40))



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



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

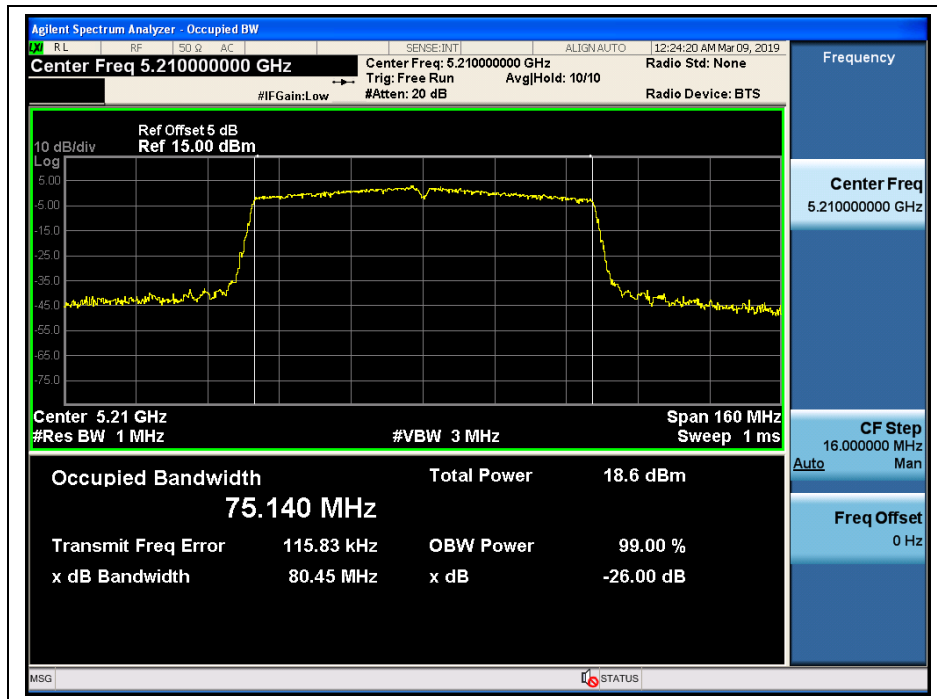


802.11ac (HT80) Test mode

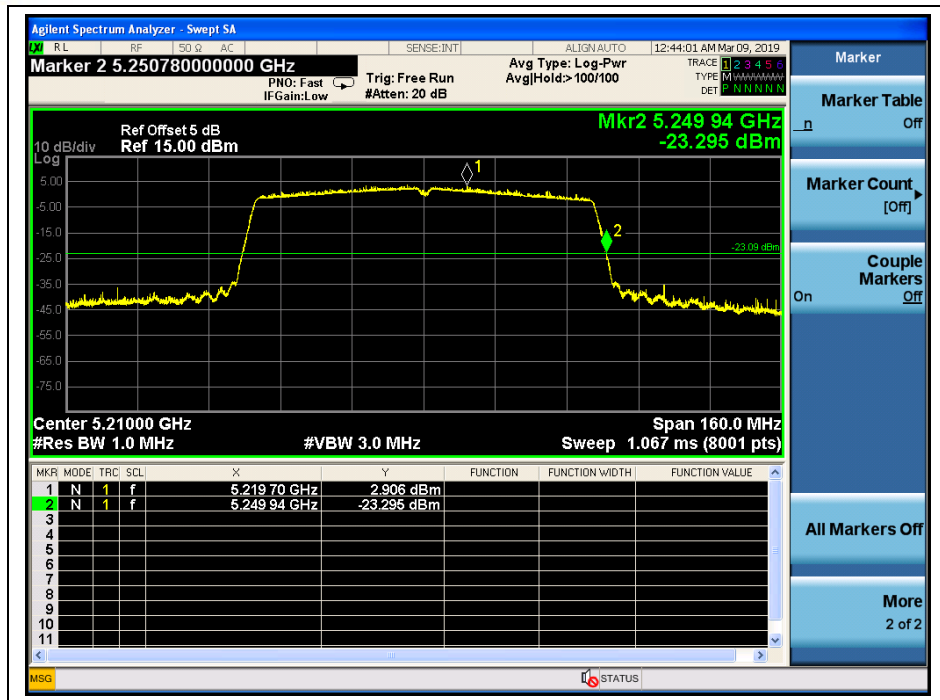
C. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
42	5210	80.45
58	5290	80.83
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
155	5775	76.33

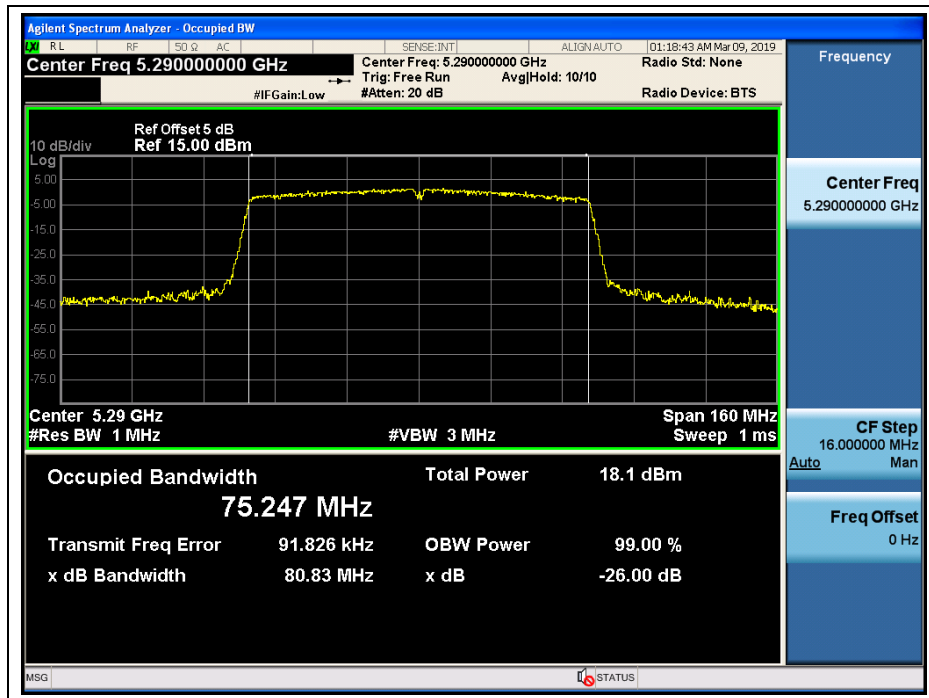
D. Test Plots



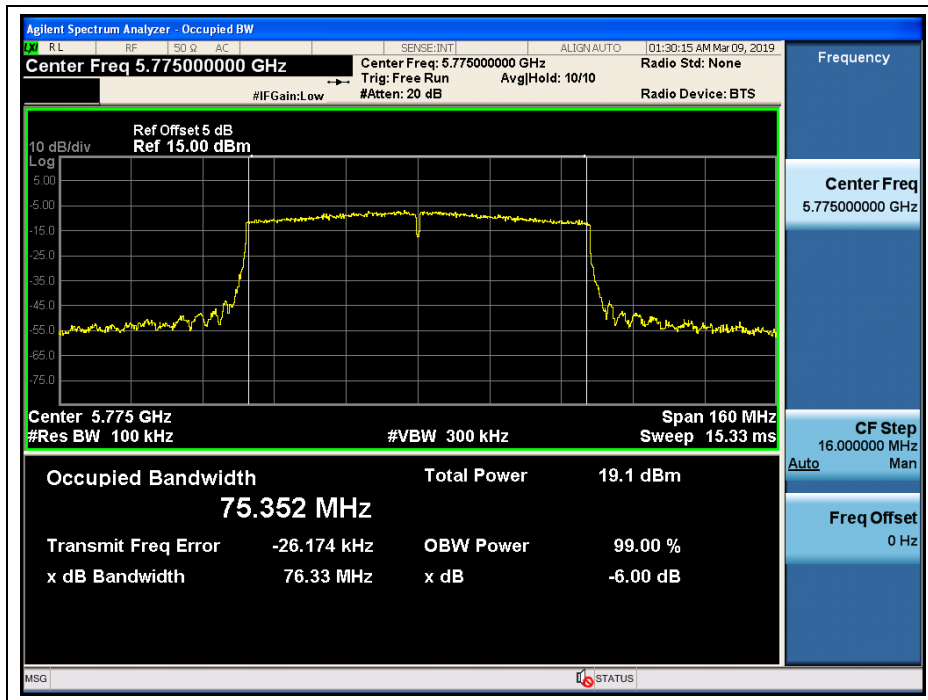
(Channel 42, 5210MHz, 802.11ac (HT80))



(Channel 42, 5210MHz, 802.11ac (HT80))



(Channel 58, 5290MHz, 802.11ac (HT80))



(Channel155, 5775MHz, 802.11ac (HT80))

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 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.

(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.

2.3.2. Test Description

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

A. Test Set:



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

Duty Cycle Factor

Mode	Channel	Frequency (MHz)	T _{on} (ms)	T _(on+off) (ms)	Duty Cycle (%)	Duty Cycle Factor
802.11 a	36	5180	100	100	100	0



Mode	Channel	Frequency (MHz)	T _{on} (ms)	T _(on+off) (ms)	Duty Cycle (%)	Duty Cycle Factor
802.11 HT20	36	5180	100	100	100	0
802.11 HT40	38	5190	100	100	100	0
802.11 HT80	42	5210	100	100	100	0

802.11a Test mode

Channel	Frequency (MHz)	Average Output Power (dBm)	Limit		Verdict
			(dBm)	11+10*log(EBW) (dBm)	
36	5180	15.89	24	\	PASS
44	5220	15.70		\	
48	5240	15.74		\	
52	5260	15.49	\	23.96	
60	5300	15.60	\	23.95	
64	5320	15.36	\	23.91	
149	5745	15.73	30		
157	5785	15.48			
165	5825	15.15			

Note: Power limit is 24dBm or 11+10*log(EBW)

802.11n (HT20) Test mode

Channel	Frequency (MHz)	Average Output Power (dBm)	Limit		Verdict
			(dBm)	11+10*log(EBW) (dBm)	
36	5180	13.45	24	\	PASS
44	5220	13.32		\	
48	5240	13.19		\	
52	5260	13.59	\	24.04	
60	5300	13.28	\	24.08	
64	5320	13.41	\	24.04	
149	5745	13.35	30		
157	5785	13.51			
165	5825	13.12			

Note: Power limit is 24dBm or 11+10*log(EBW)

802.11n (HT40) Test mode

Channel	Frequency (MHz)	Average Output Power (dBm)	Limit		Verdict
			(dBm)	11+10*log(EBW) (dBm)	



Channel	Frequency (MHz)	Average Output Power (dBm)	Limit		Verdict
			(dBm)	11+10*log(EBW) (dBm)	
38	5190	13.80	24	\	PASS
46	5230	13.52		\	PASS
54	5270	13.40	\	24.04	PASS
62	5310	13.66	\	24.04	PASS
151	5755	13.31	30		PASS
159	5795	13.45			PASS

Note: Power limit is 24dBm or 11+10*log(EBW)

802.11ac (HT80) Test mode

Channel	Frequency (MHz)	Average Output Power (dBm)	Limit		Verdict
			(dBm)	11+10*log(EBW) (dBm)	
42	5210	13.42	24	\	PASS
58	5290	13.17	\	30.08	
149	5745	13.35	30		

Note: Power limit is 24dBm or 11+10*log(EBW)

Note: The duty cycle factor has been compensated into the test result

2.4. Peak Power spectral density

2.4.1. 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 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.

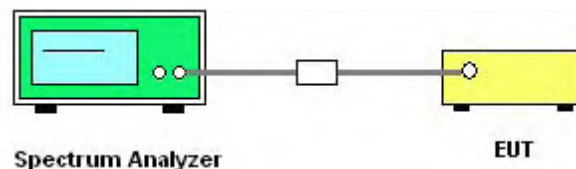
If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(4) According to KDB662911D01 Measure-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 = $G_{ANT} + 10\log(N_{ANT})$ dBi, where G_{ANT} is the antenna gain in dBi, N_{ANT} is the number of outputs.

2.4.2. Test Description

A. Test Set:



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.

B. Test Procedure

KDB 789033 Section F) Maximum Power Spectral Density (PSD) Method SA-1 was used in order to prove compliance. below test procedure only apply for Band 1 and Band 2A:

- 1) Set span to encompass the entire 26-dB emission bandwidth
- 2) Set RBW = 1 MHz. Set VBW \geq 3 MHz.
- 3) Number of points in sweep \geq 2 Span / RBW. Sweep time = auto.
- 4) Detector = RMS (i.e., power averaging)
- 5) Trace average at least 100 traces in power averaging (i.e., RMS) mode
- 6) Record the max value



Band 4 test procedure:

For devices operating in the band 5.725–5.85 GHz, the rules specify a measurement bandwidth of 500 kHz

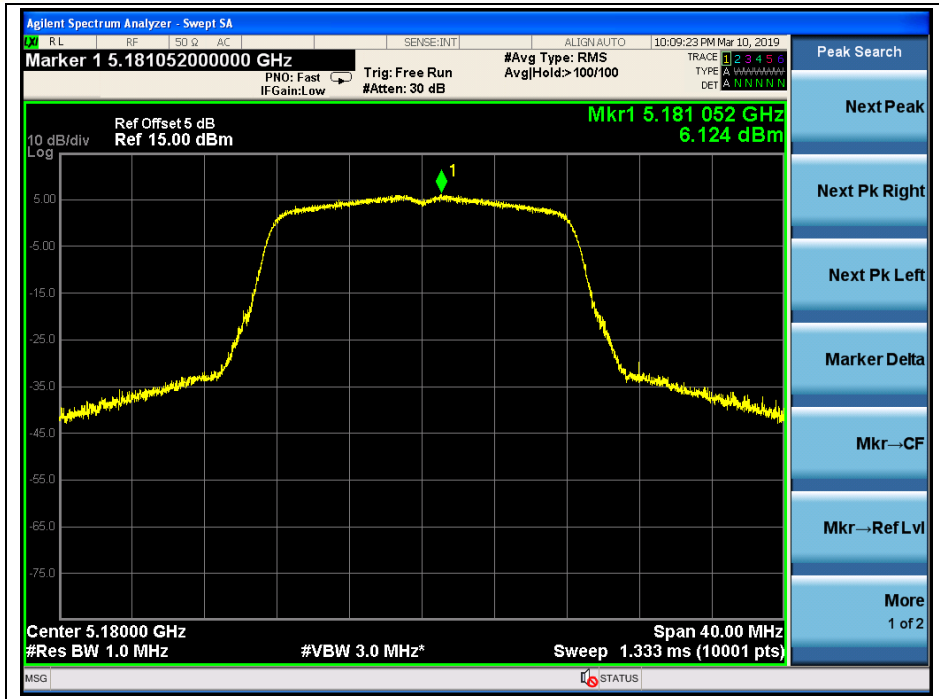
2.4.3. Test Result

802.11a Test mode

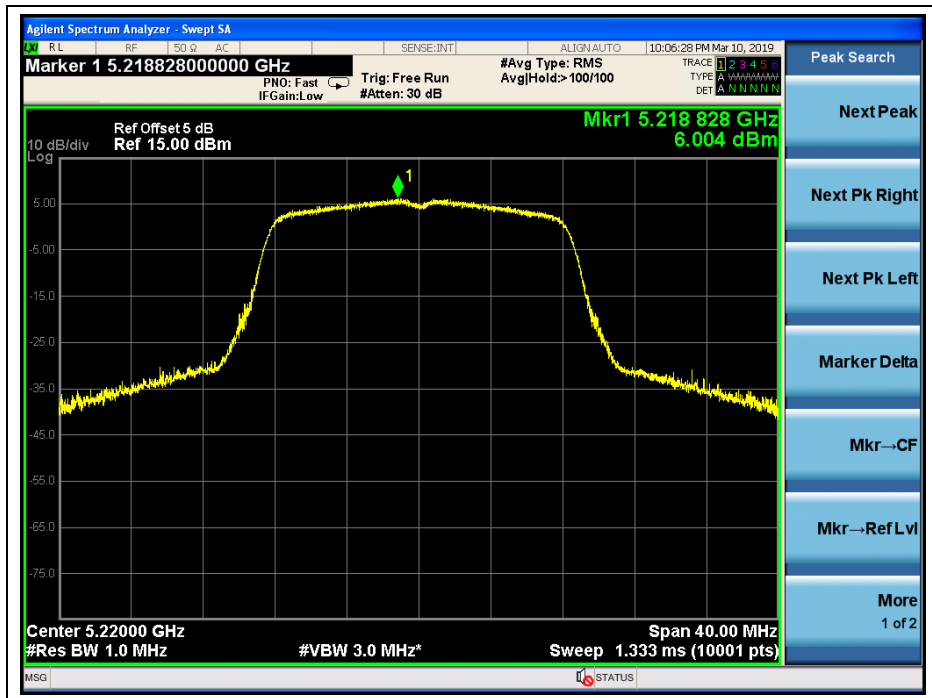
A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	6.124	11	PASS
44	5220	6.004		
48	5240	6.051		
52	5260	5.845		
60	5300	5.976		
64	5320	5.713		
Channel	Frequency (MHz)	Measured PSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	4.308	30	PASS
157	5785	4.159		
165	5825	3.827		

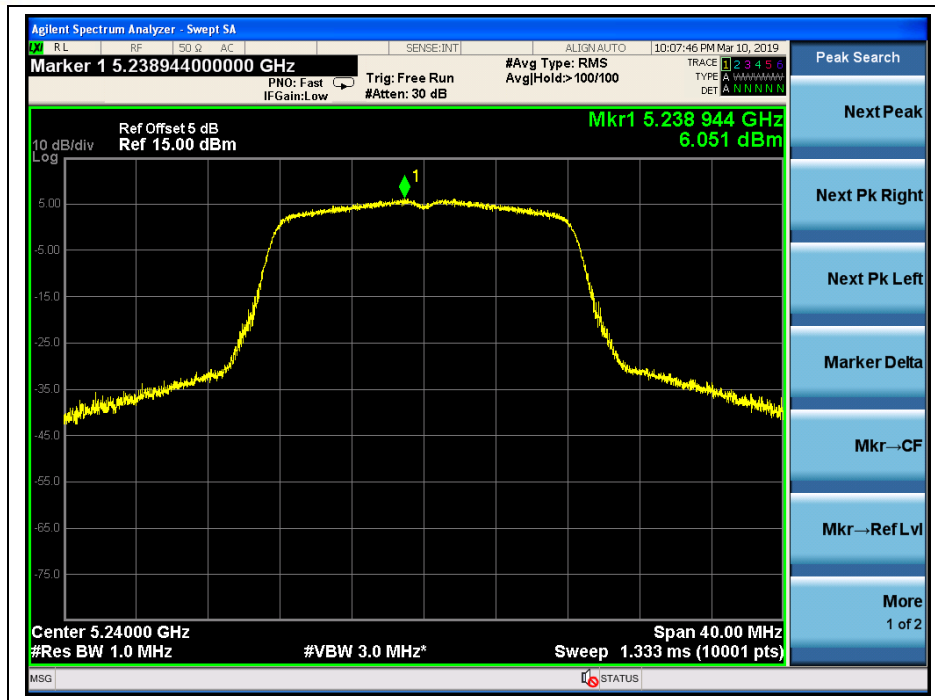
B. Test Plots



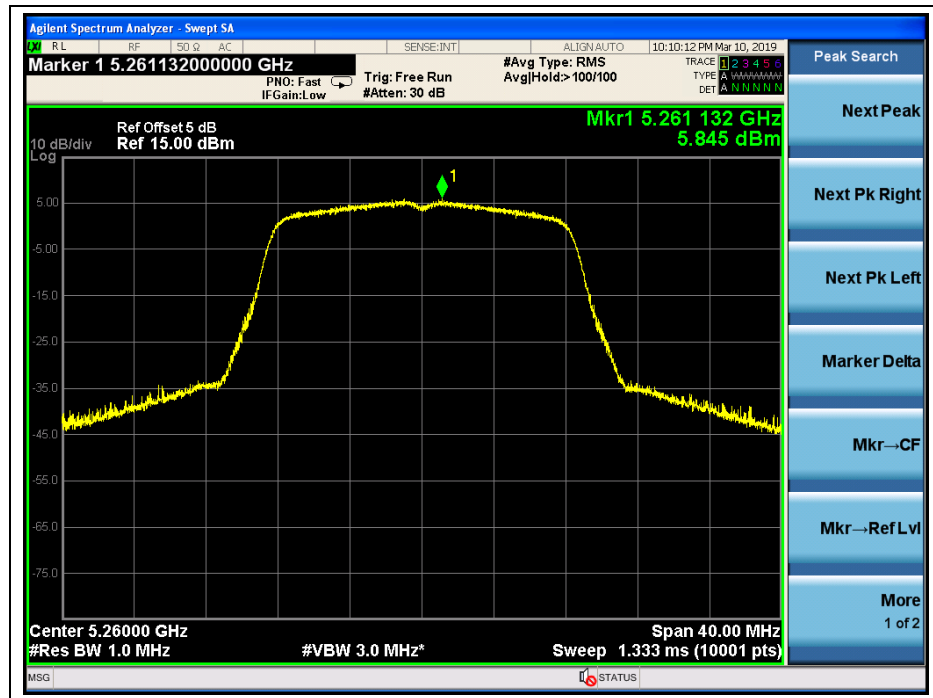
(Channel 36, 5180MHz, 802.11a,)



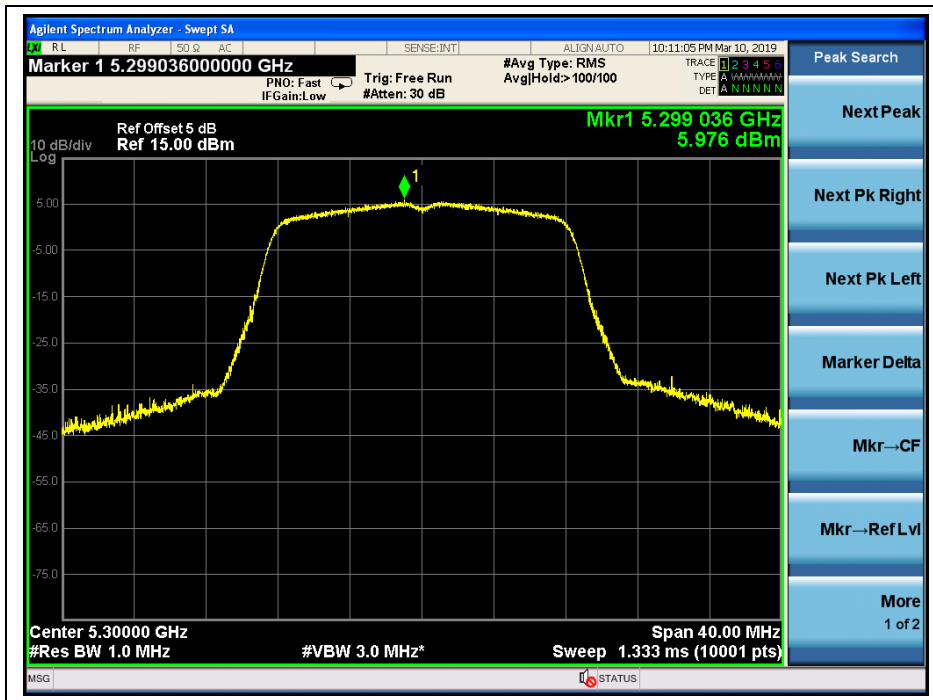
(Channel 44, 5220 MHz, 802.11a,)



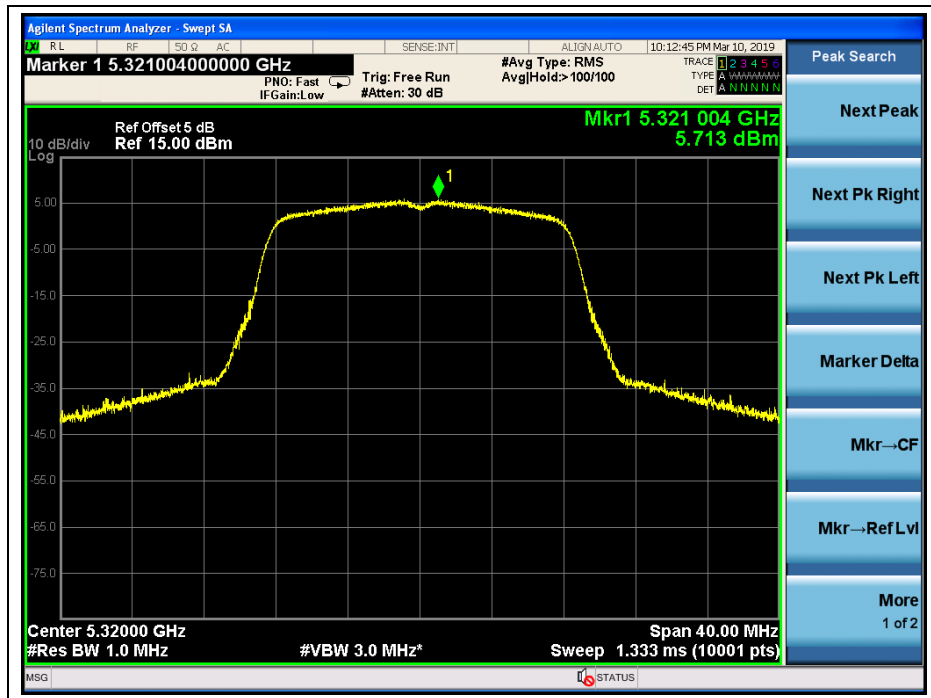
(Channel 48, 5240MHz, 802.11a,)



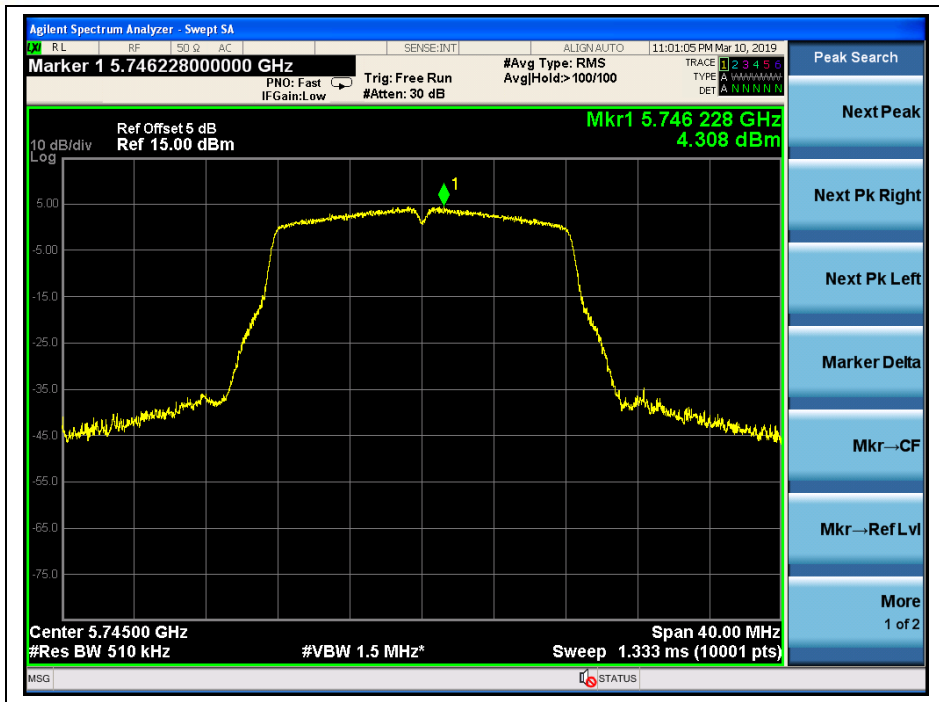
(Channel 52, 5260MHz, 802.11a,)



(Channel 60, 5300 MHz, 802.11a,)



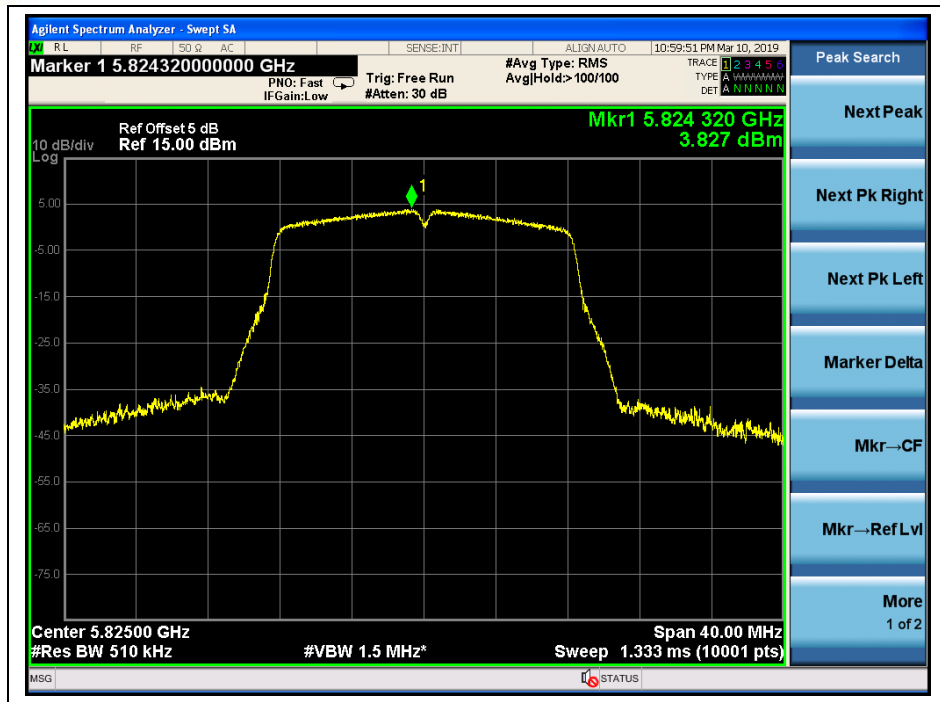
(Channel 64, 5320MHz, 802.11a,)



(Channel 149, 5745MHz, 802.11a)



(Channel 157, 5785MHz, 802.11a)



(Channel 165, 5825MHz, 802.11a)

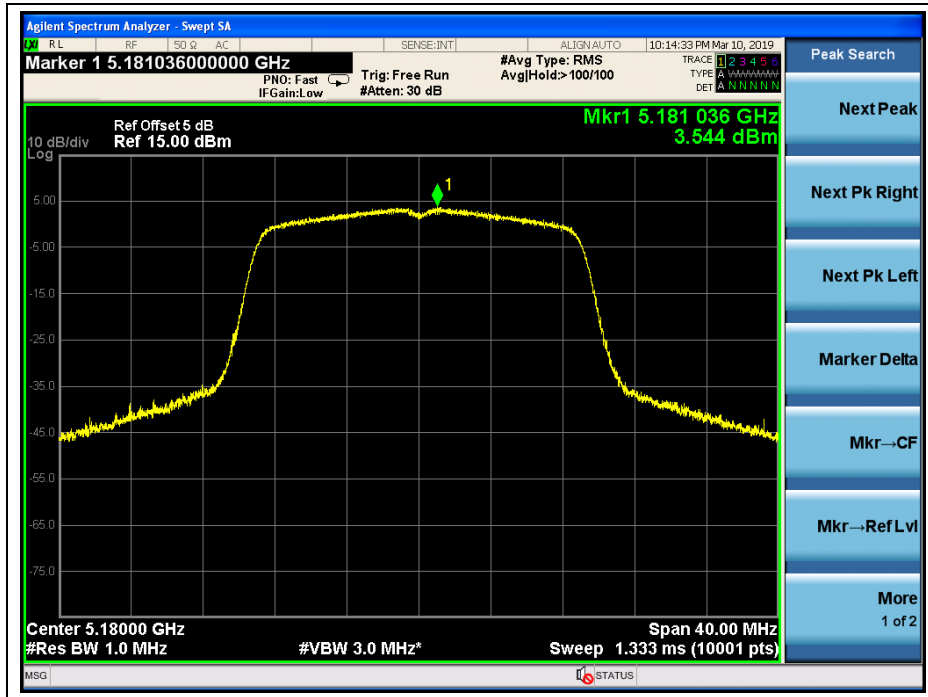
802.11n (HT20) Test mode

A. Test Verdict:

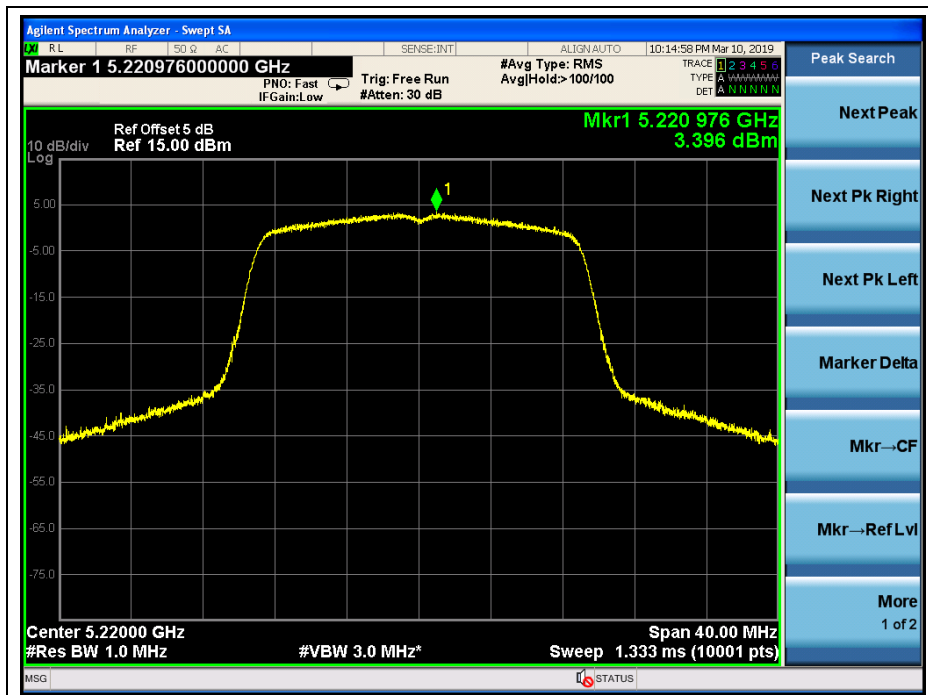
Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	3.544	11	PASS
44	5220	3.396		
48	5240	3.225		
52	5260	3.659		
60	5300	3.386		
64	5320	3.559		
Channel	Frequency (MHz)	Measured PSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	1.617	30	PASS
157	5785	1.888		
165	5825	1.392		



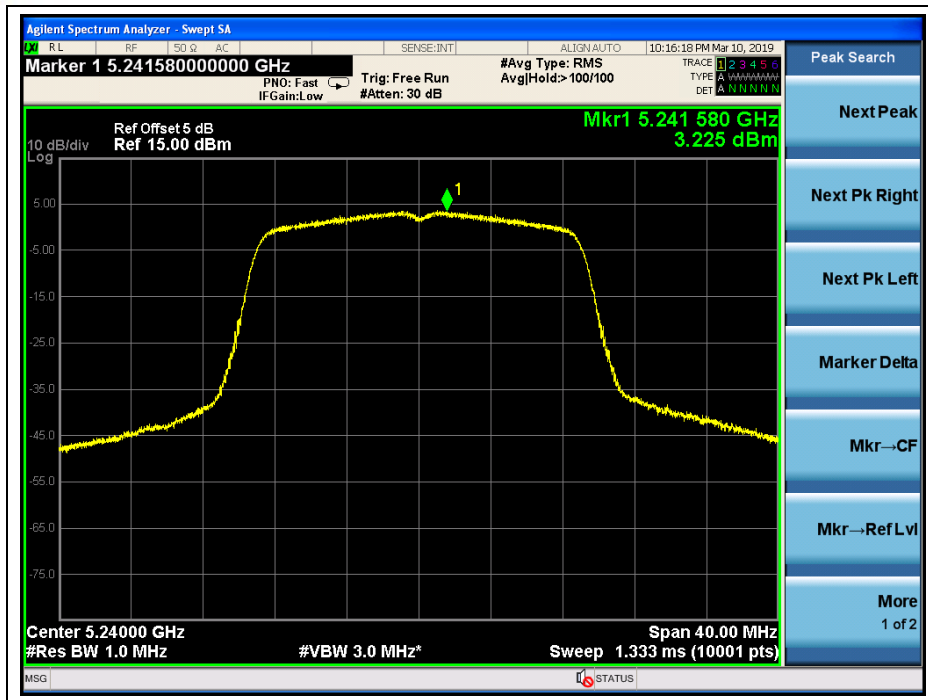
B. Test Plots



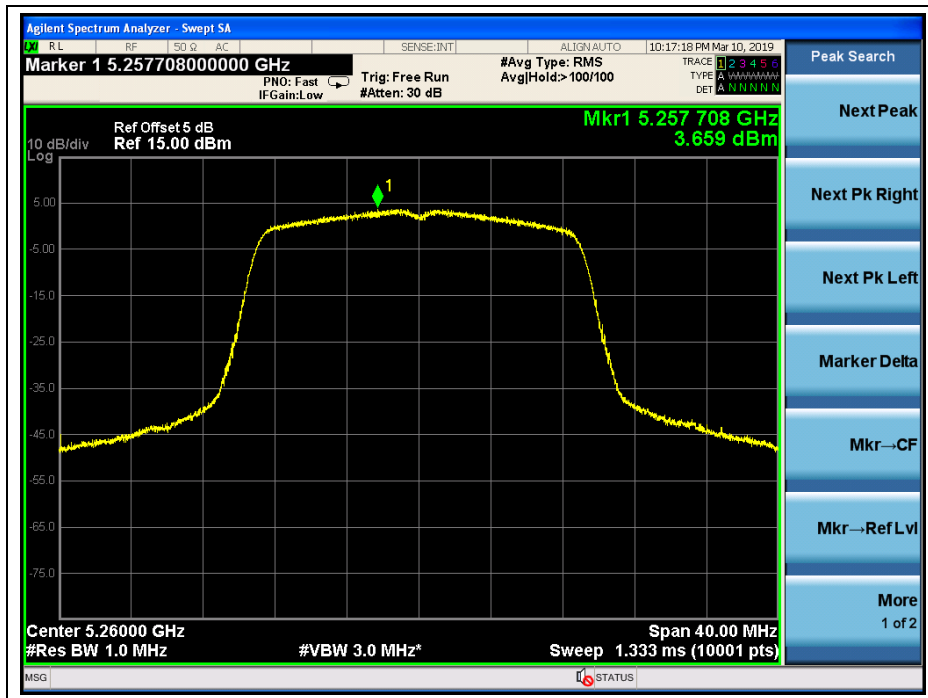
(Channel 36, 5180MHz, 802.11 n (HT20))



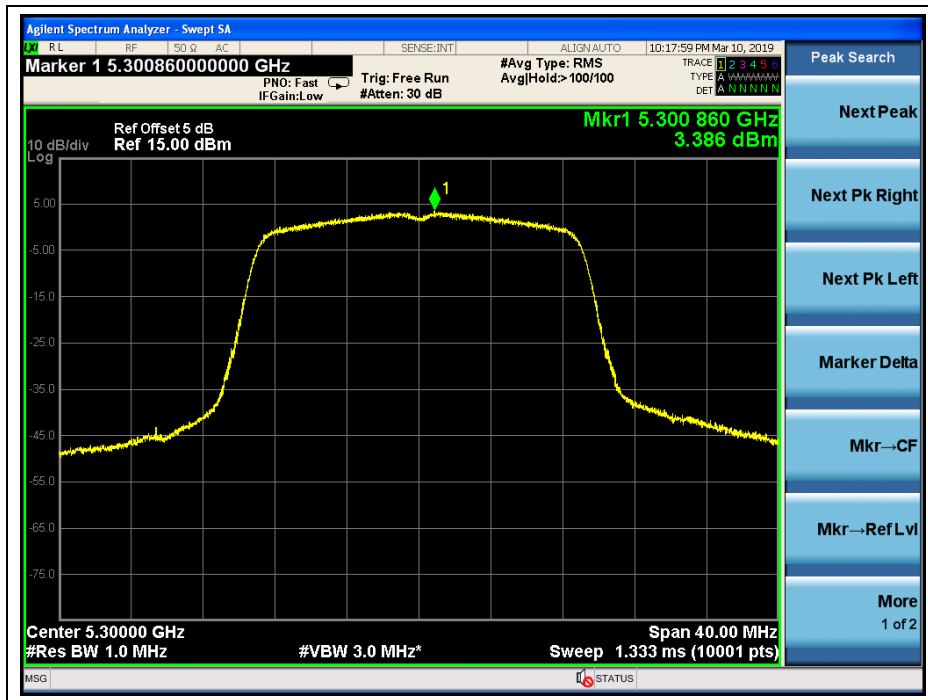
(Channel 44, 5220 MHz, 802.11 n (HT20))



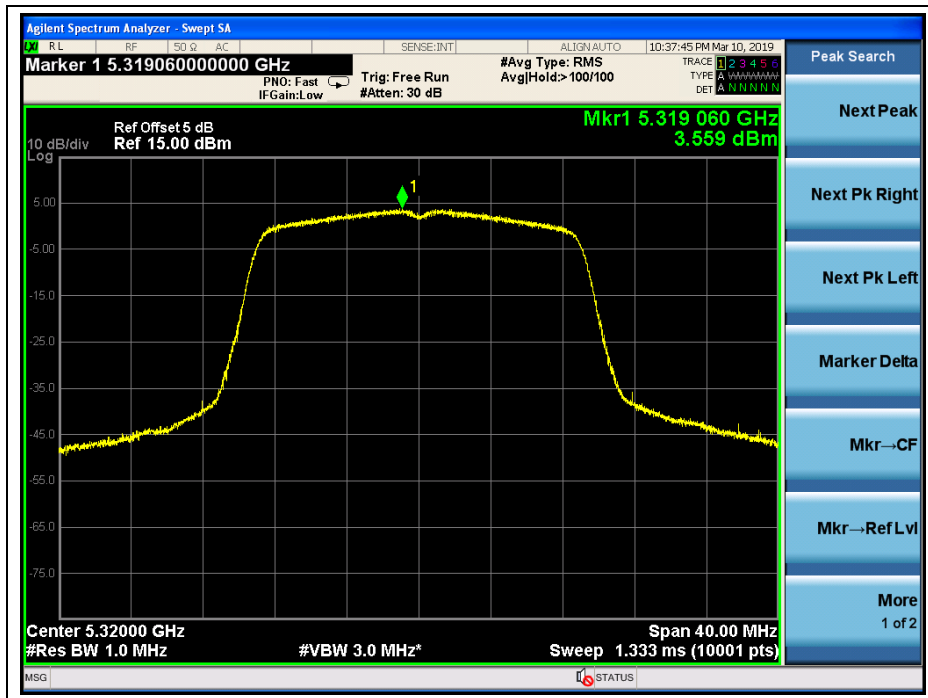
(Channel 48, 5240MHz, 802.11 n (HT20))



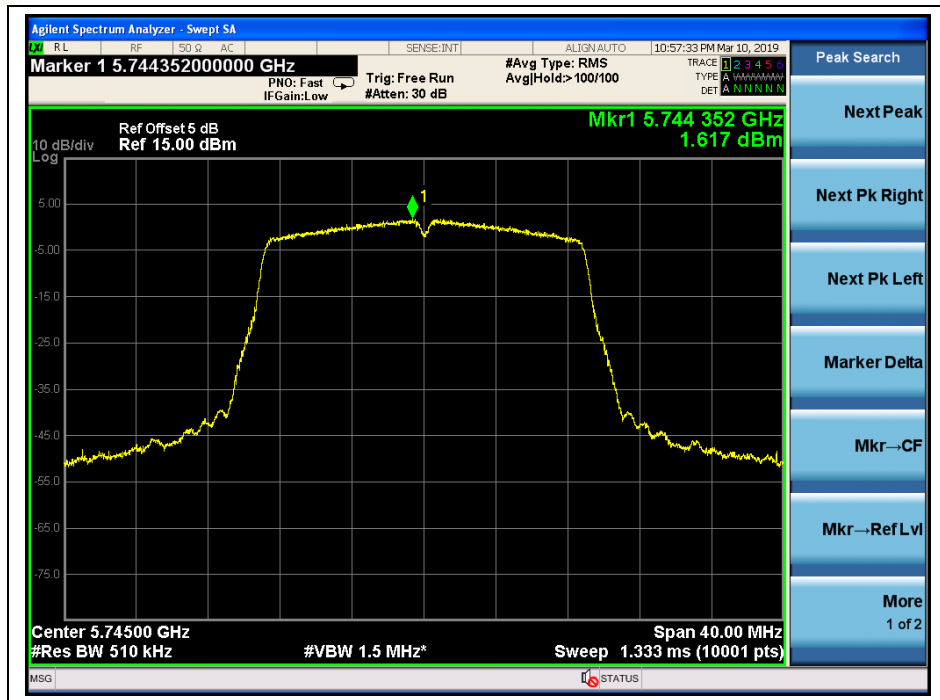
(Channel 52, 5260MHz, 802.11 n (HT20))



(Channel 60, 5300 MHz, 802.11 n (HT20))



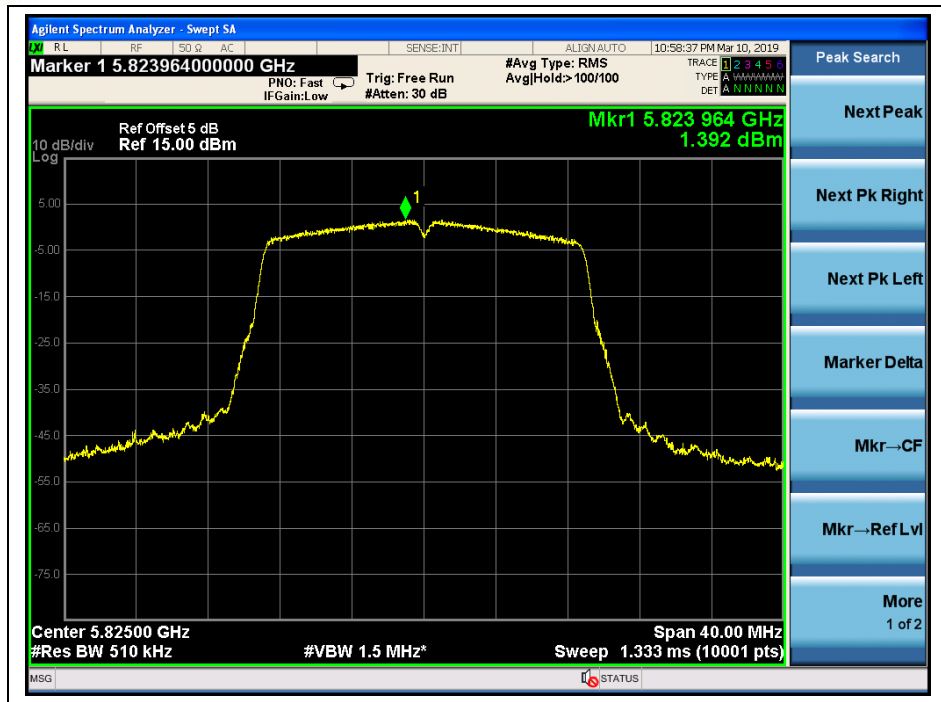
(Channel 64, 5320MHz, 802.11 n (HT20))



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



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



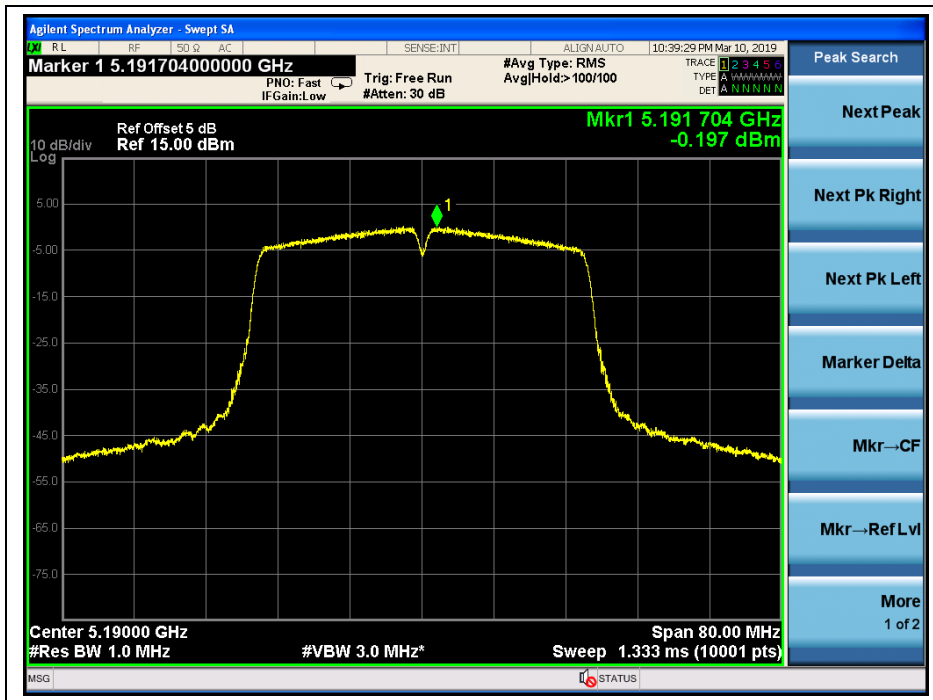
(Channel 165, 5825MHz, 802.11 n (HT20))

802.11n (HT40) Test mode

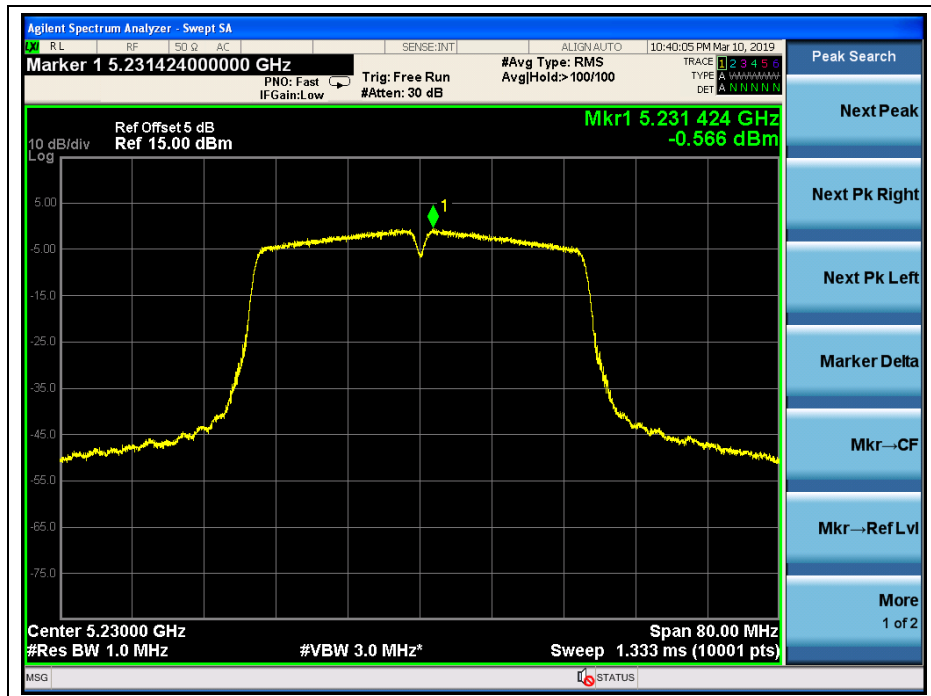
A. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	-0.197	11	PASS
46	5230	-0.566		
54	5270	-0.648		
62	5310	-0.295		
Channel	Frequency (MHz)	Measured PSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	-2.428	30	PASS
159	5795	-2.361		

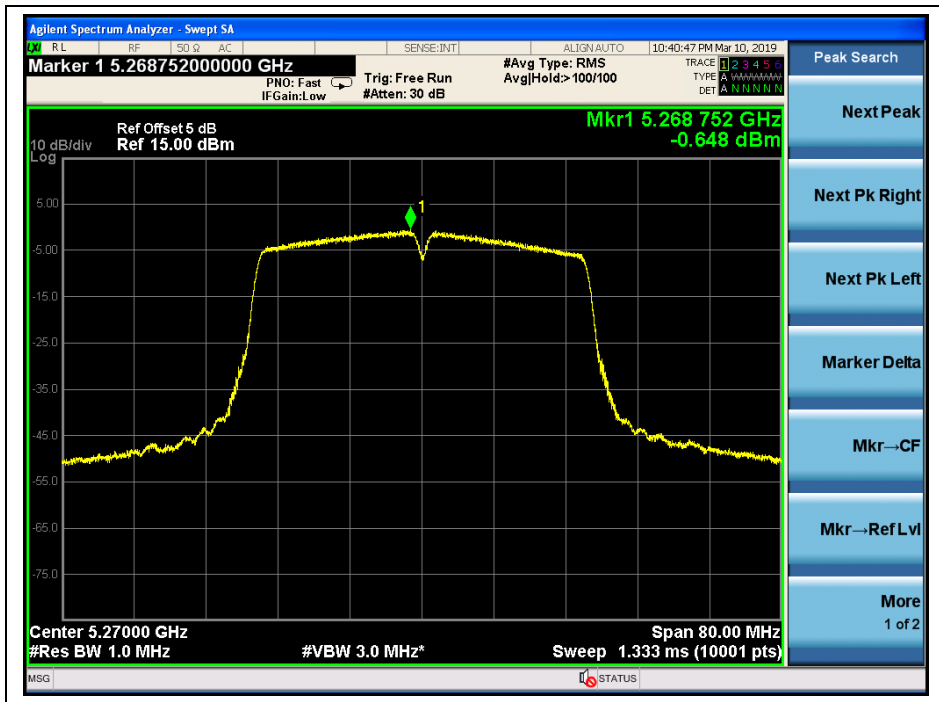
B. Test Plots



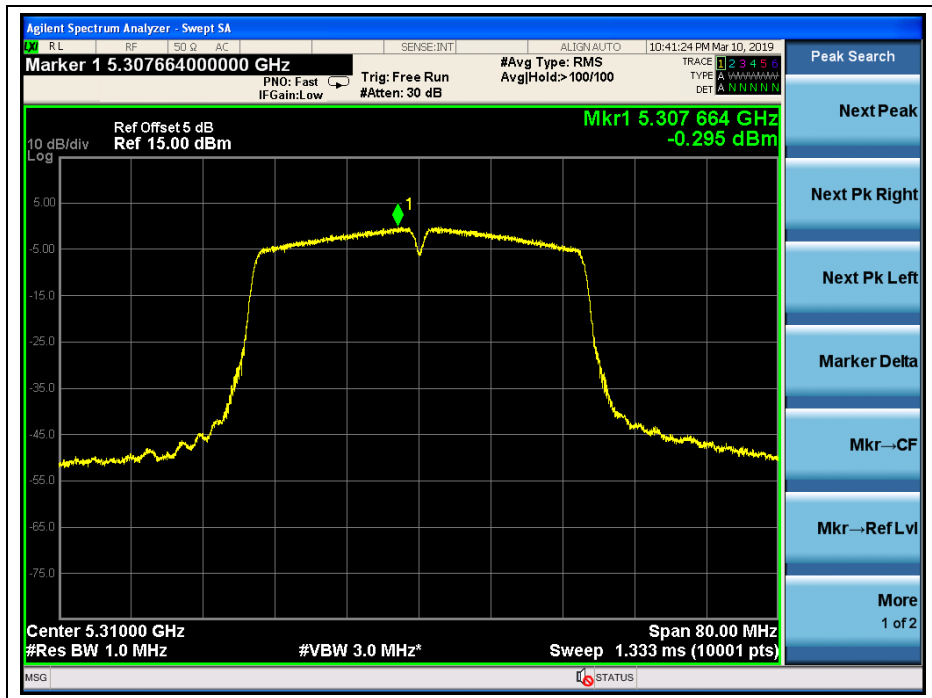
(Channel 38, 5190MHz, 802.11n (HT40))



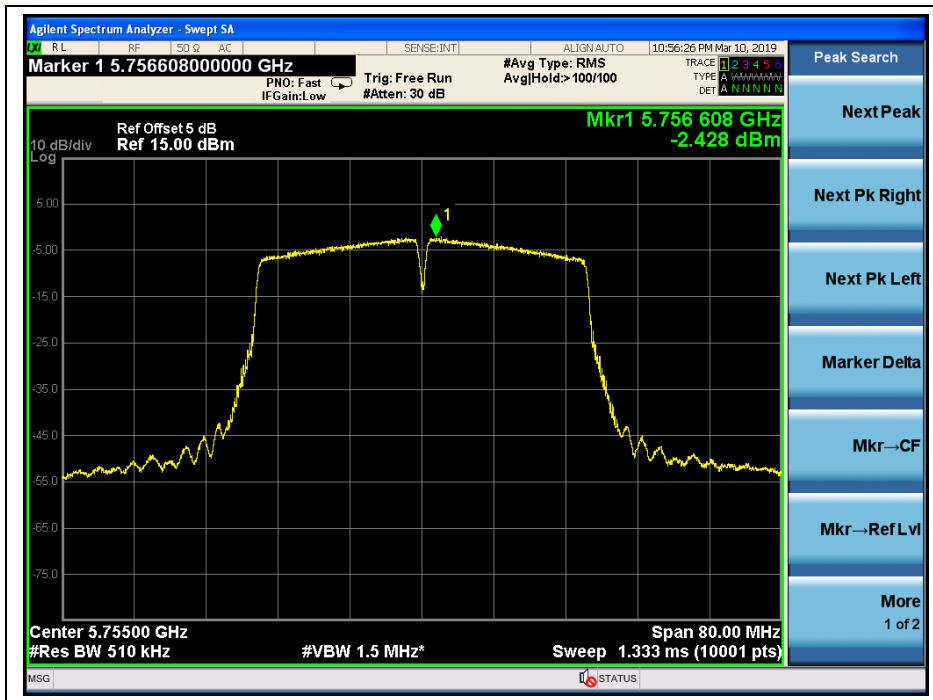
(Channel 46, 5230 MHz, 802.11n (HT40))



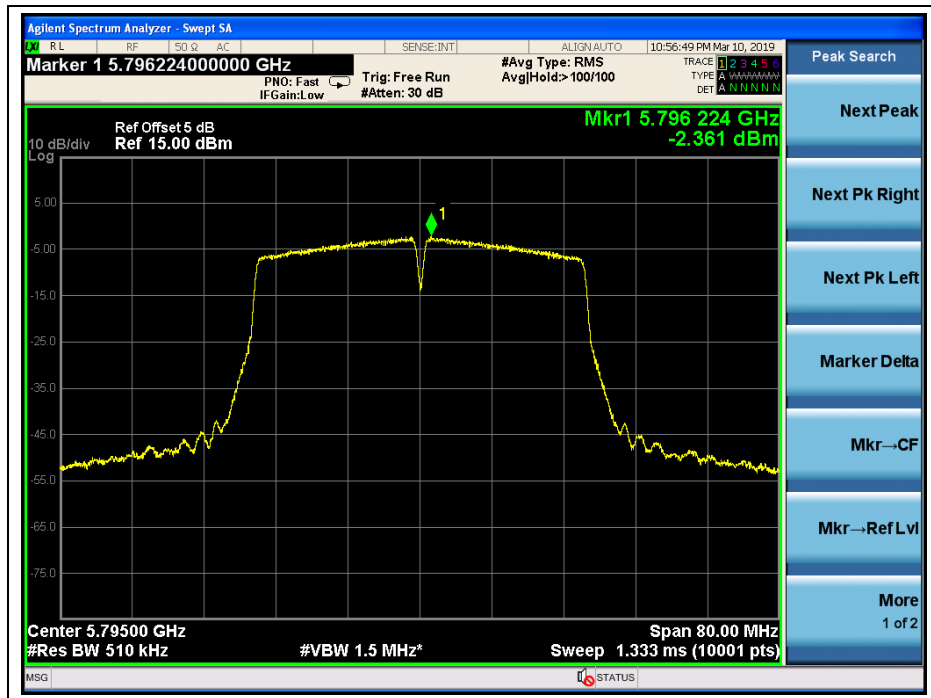
(Channel 54, 5270MHz, 802.11n (HT40))



(Channel 62, 5310 MHz, 802.11n (HT40))



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



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

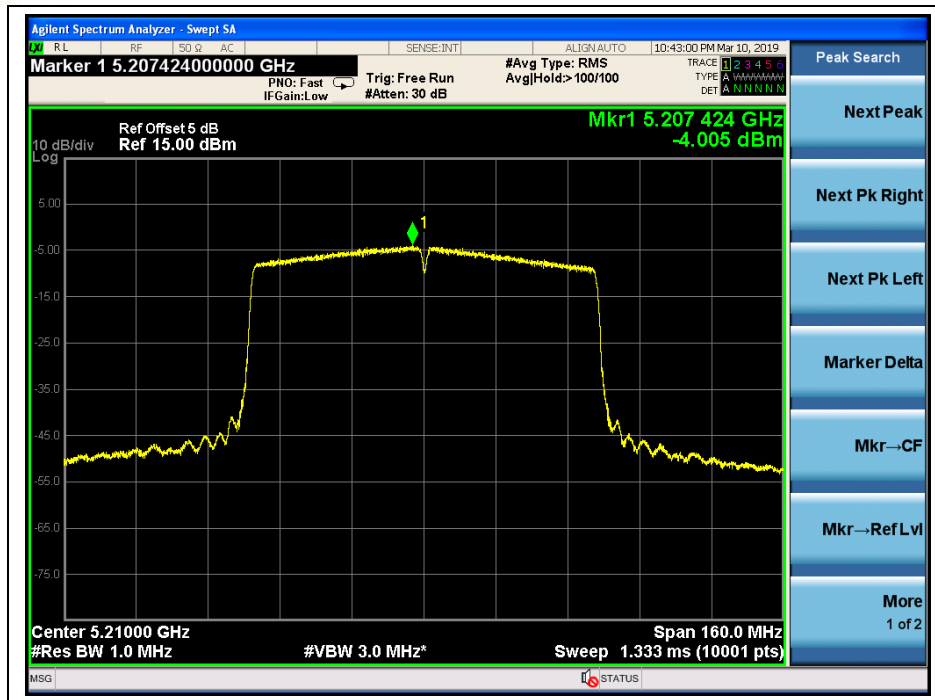


802.11ac (HT80) Test mode

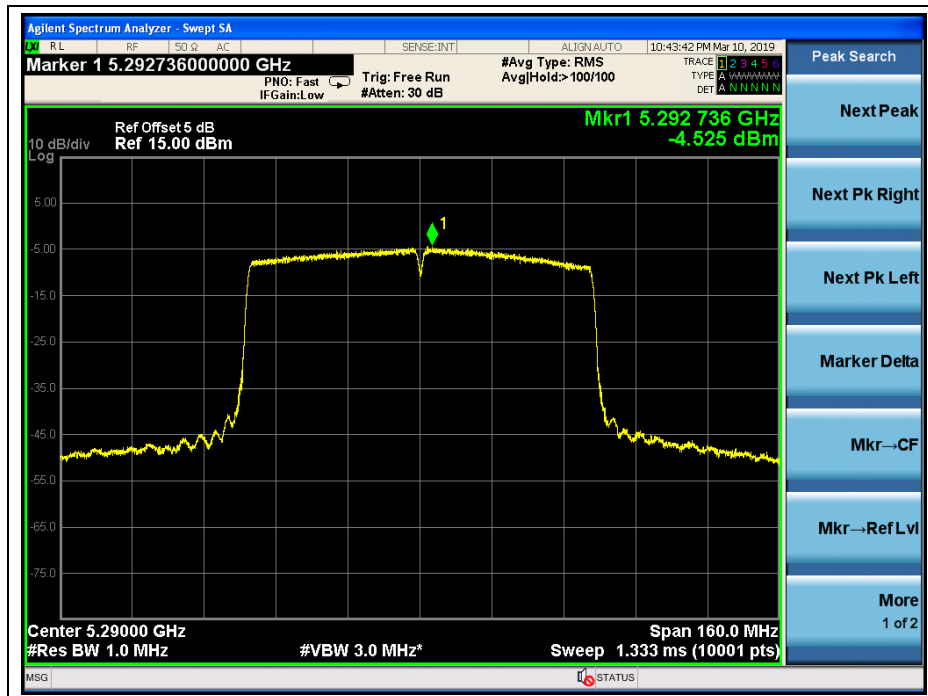
C. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
42	5210	-4.005	11	PASS
58	5290	-4.525		
Channel	Frequency (MHz)	Measured PSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
155	5775	-6.243	30	PASS

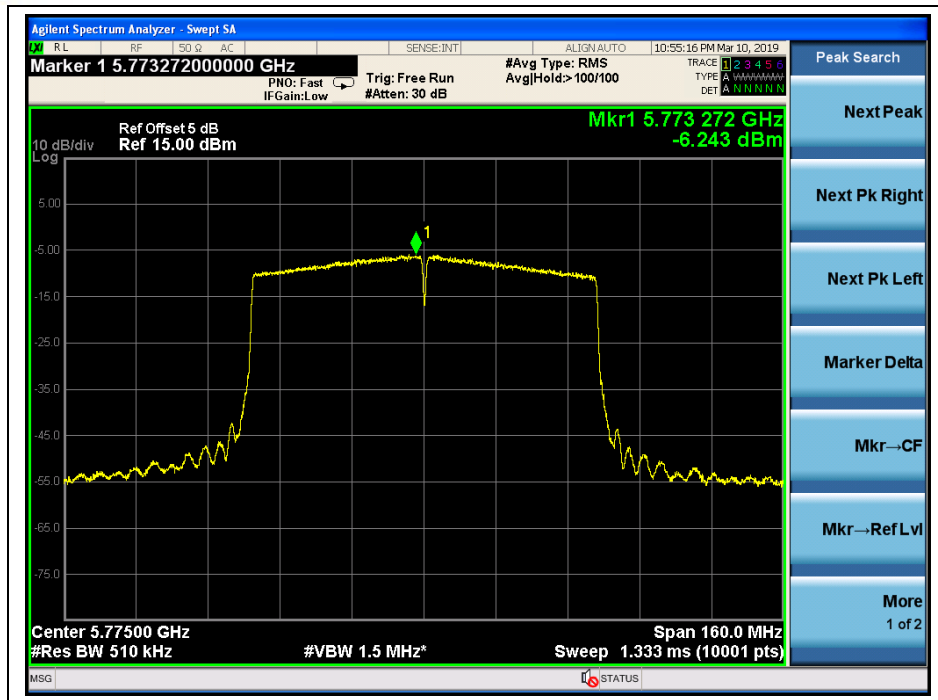
D. Test Plots



(Channel 42, 5210MHz, 802.11ac (HT80))



(Channel 58, 5290 MHz, 802.11ac (HT80))



(Channel 155, 5775MHz, 802.11ac (HT80))

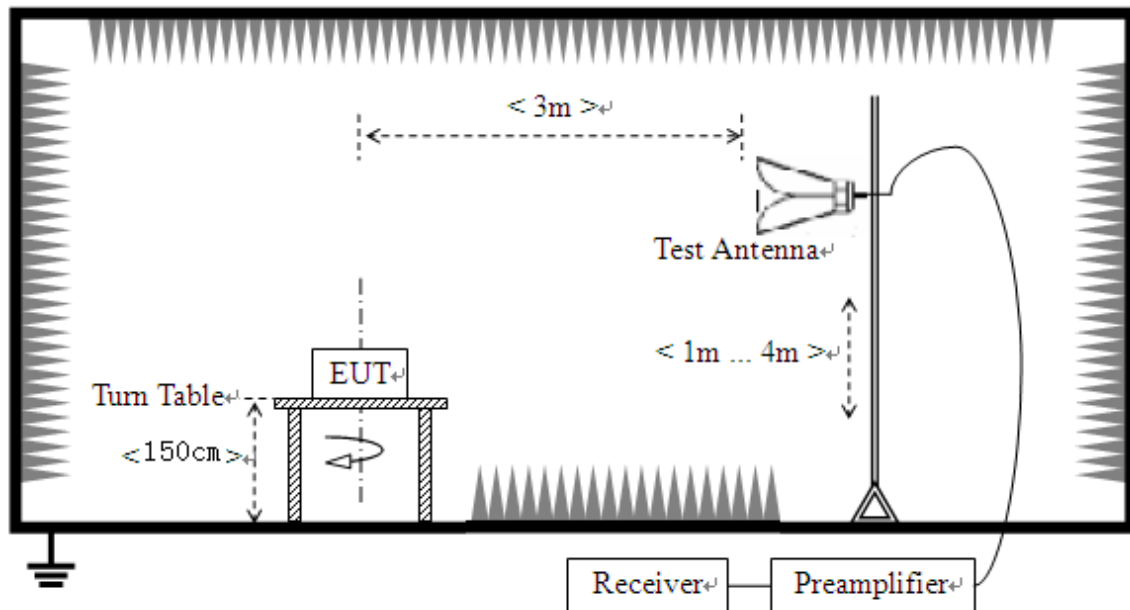
2.5. Restricted Frequency Bands

2.5.1. 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).

2.5.2. Test Description

A. 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.

For Radiated emission above 30MHz

- The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- 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.
- The test-receiver system was set to peak and average detect 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.

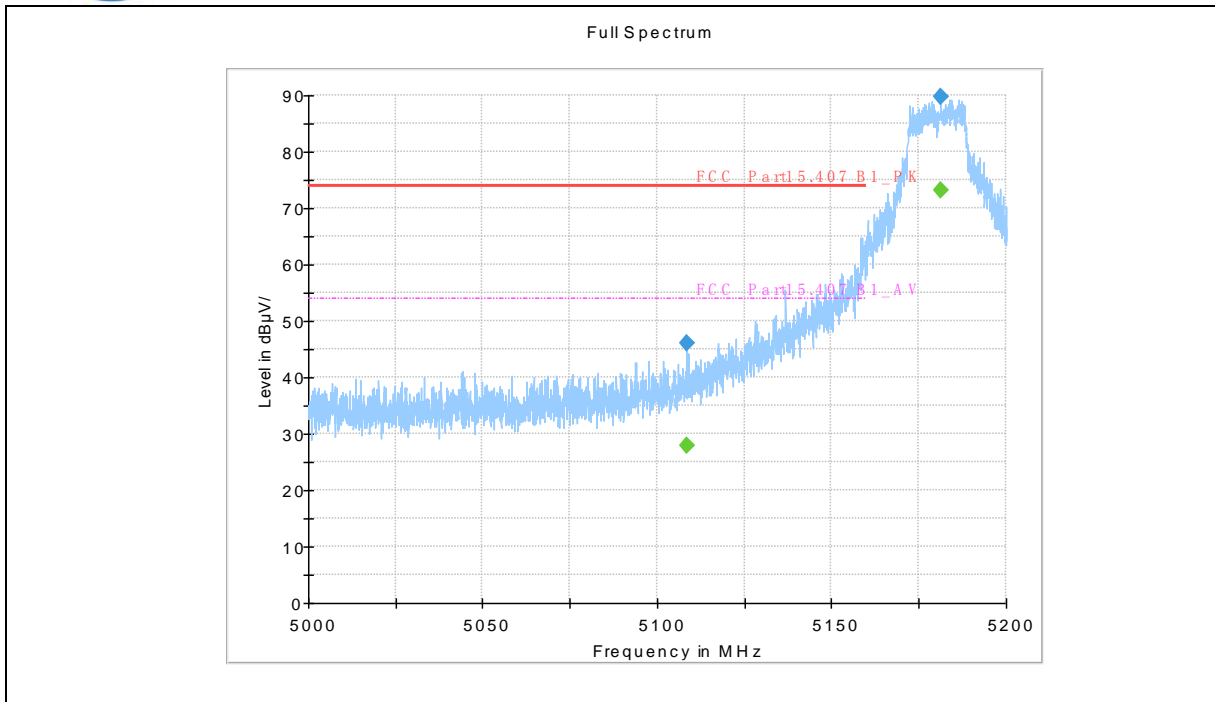
Note:



1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasipeak detection (QP) at frequency below 1GHz.
2. 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 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

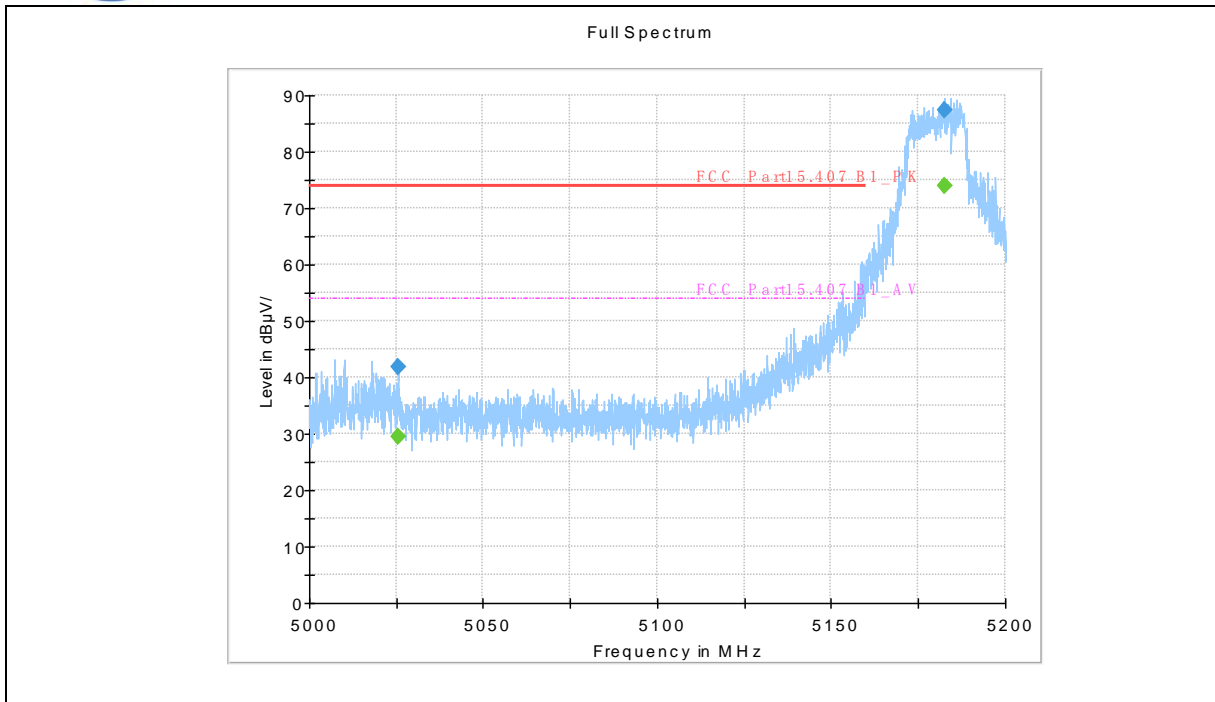
2.5.3. Test Result

802.11a Test mode



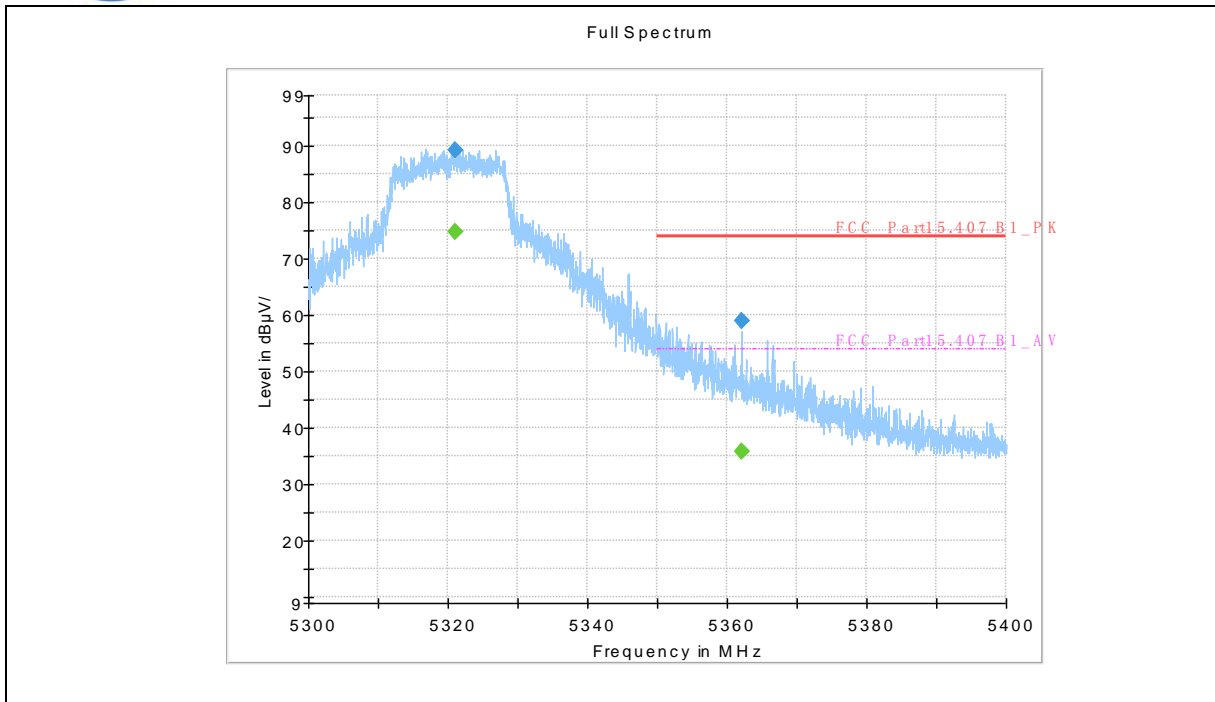
(802.11a _5180MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5108.350000	---	27.96	54.00	26.04	H	-4.1
5108.350000	46.03	---	74.00	27.97	H	-4.1
5181.300000	---	73.07	---	---	H	-4.1
5181.300000	89.63	---	---	---	H	-4.1



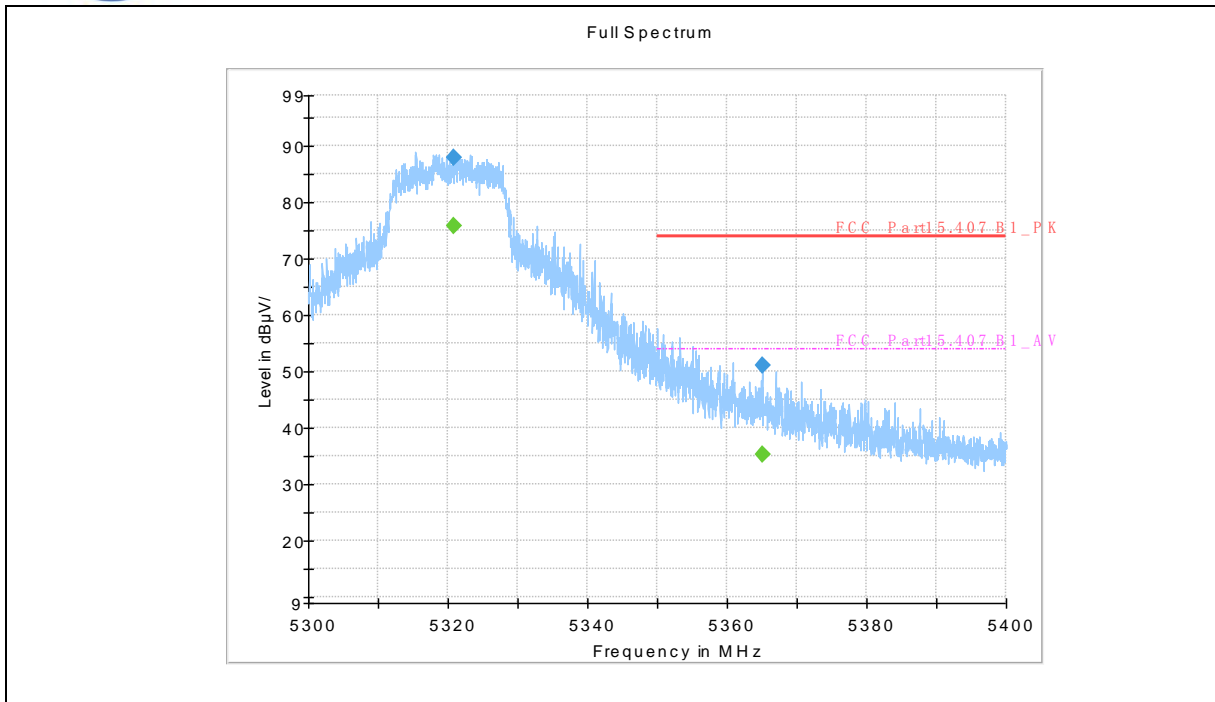
(802.11a _5180MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5025.600000	---	29.47	54.00	24.53	V	-4.6
5025.600000	41.84	---	74.00	32.16	V	-4.6
5182.400000	---	74.02	---	---	V	-4.1
5182.400000	87.49	---	---	---	V	-4.1



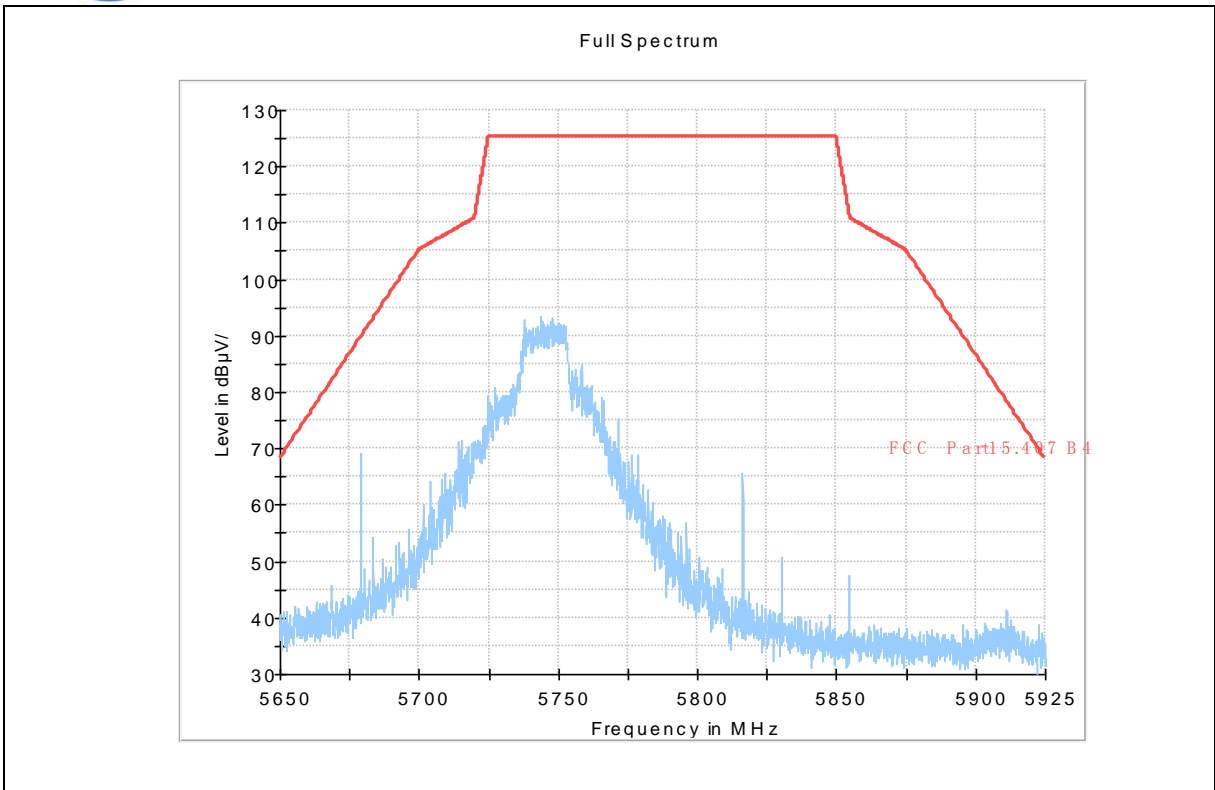
(802.11a _5320MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5321.000000	89.14	---	---	---	H	-4.0
5321.000000	---	74.88	---	---	H	-4.0
5362.175000	58.98	---	74.00	15.02		-3.8
5362.175000	---	35.97	54.00	19.03		-3.8

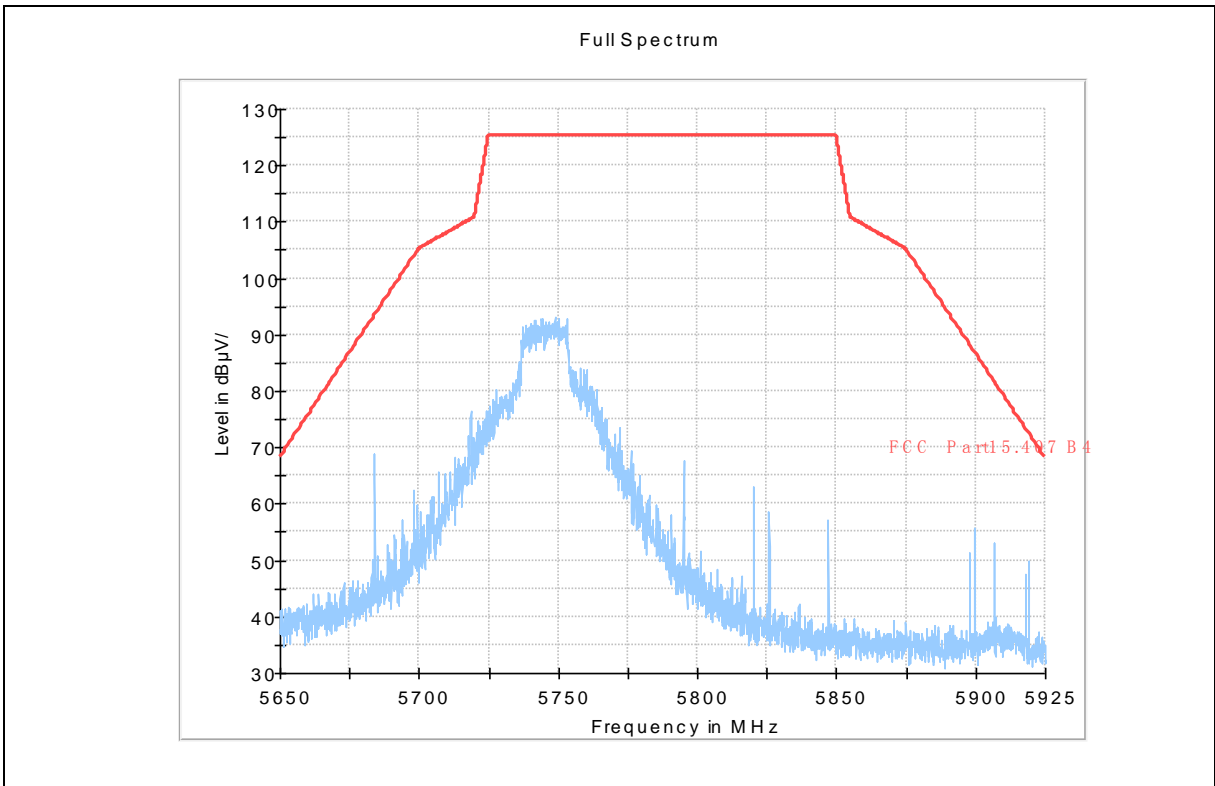


(802.11a _5320MHz, Antenna Vertical)

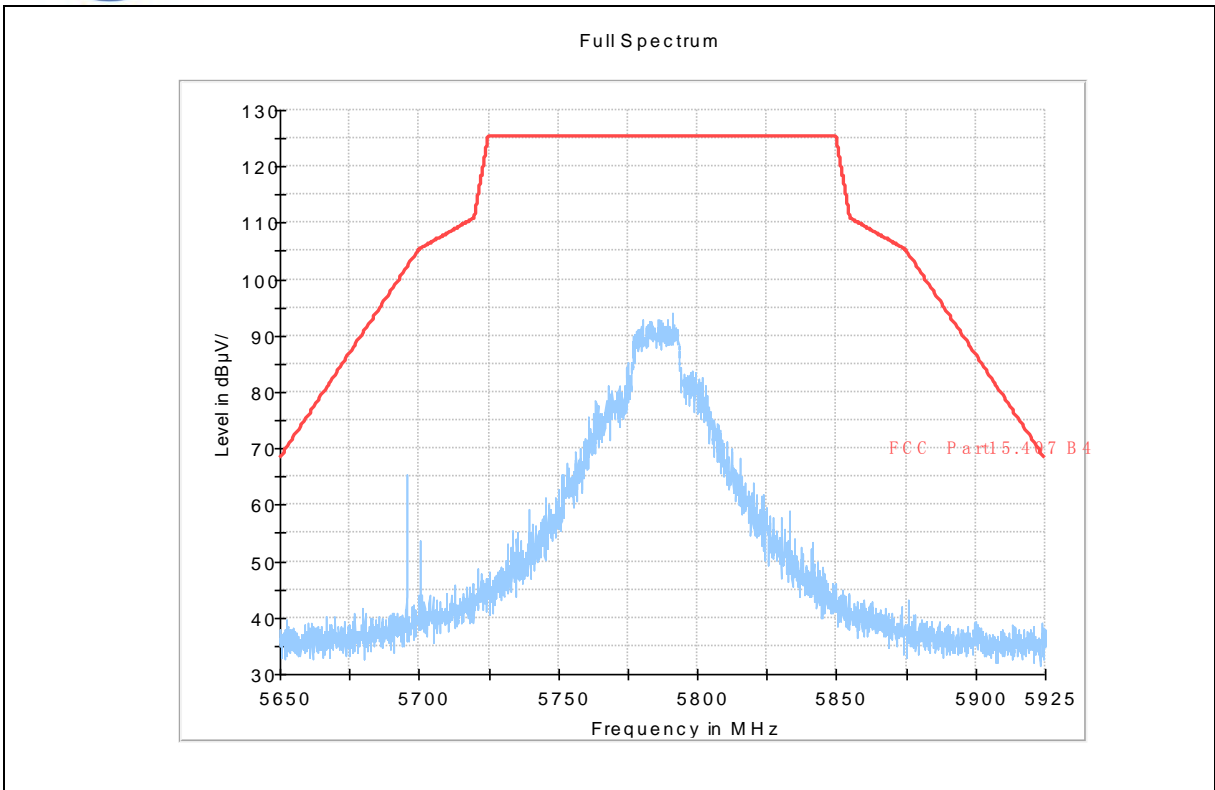
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5320.800000	---	75.90	---	---	V	-4.0
5320.800000	88.02	---	---	---	V	-4.0
5365.025000	---	35.37	54.00	18.63		-3.8
5365.025000	51.10	---	74.00	23.90		-3.8



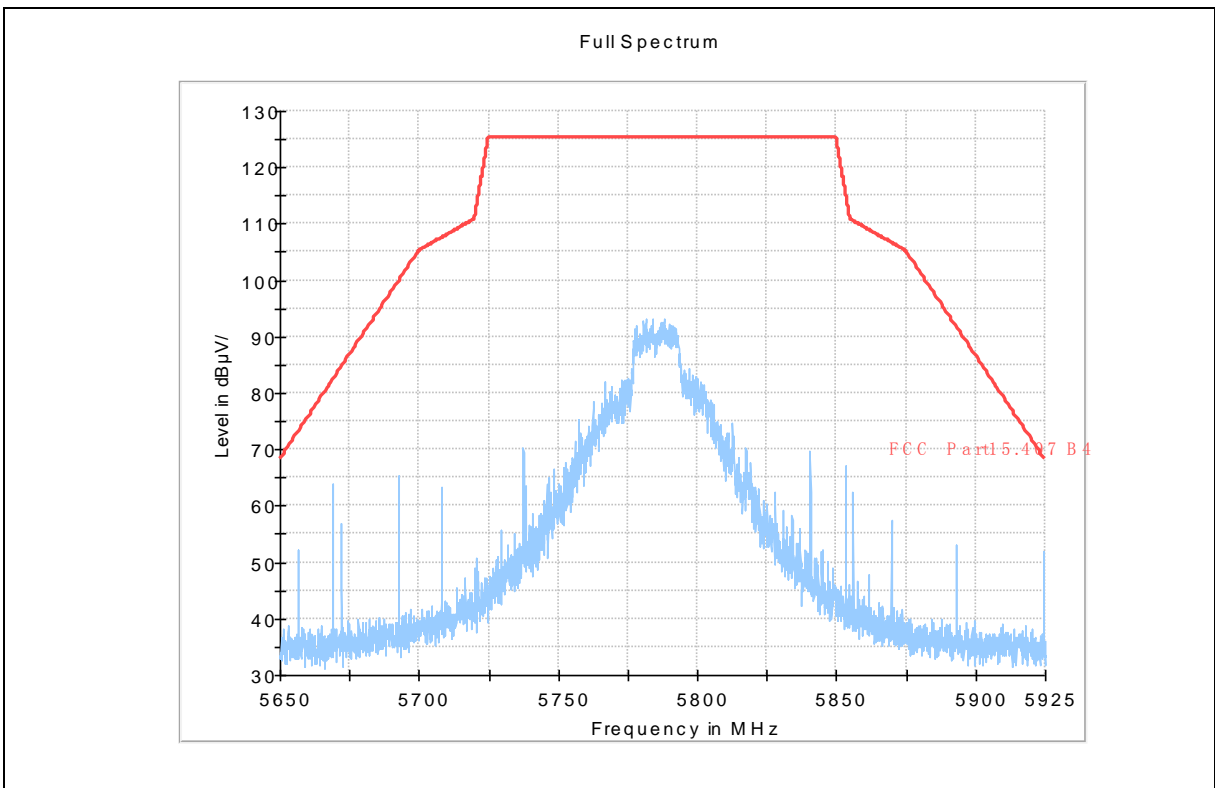
(802.11a _5745MHz, Antenna Horizontal)



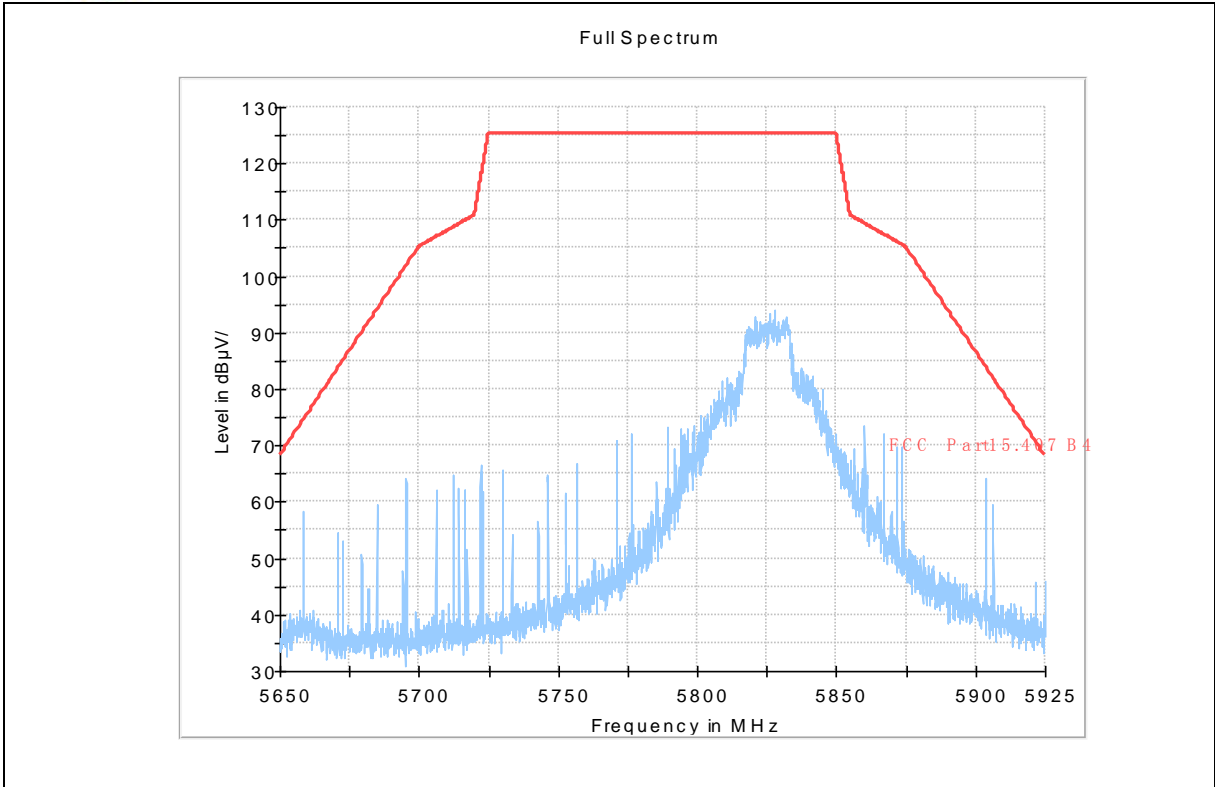
(802.11a _5745MHz, Antenna Vertical)



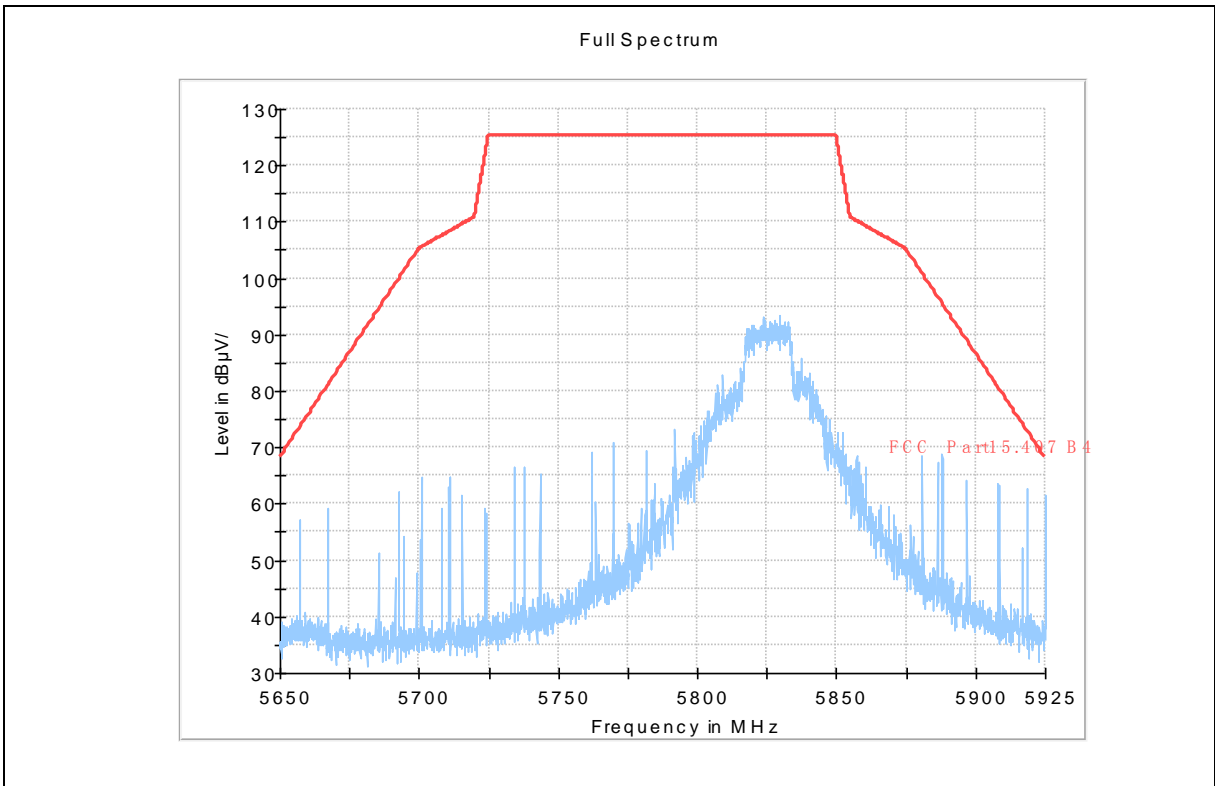
(802.11a _5785MHz, Antenna Horizontal)



(802.11a _5785MHz, Antenna Vertical)



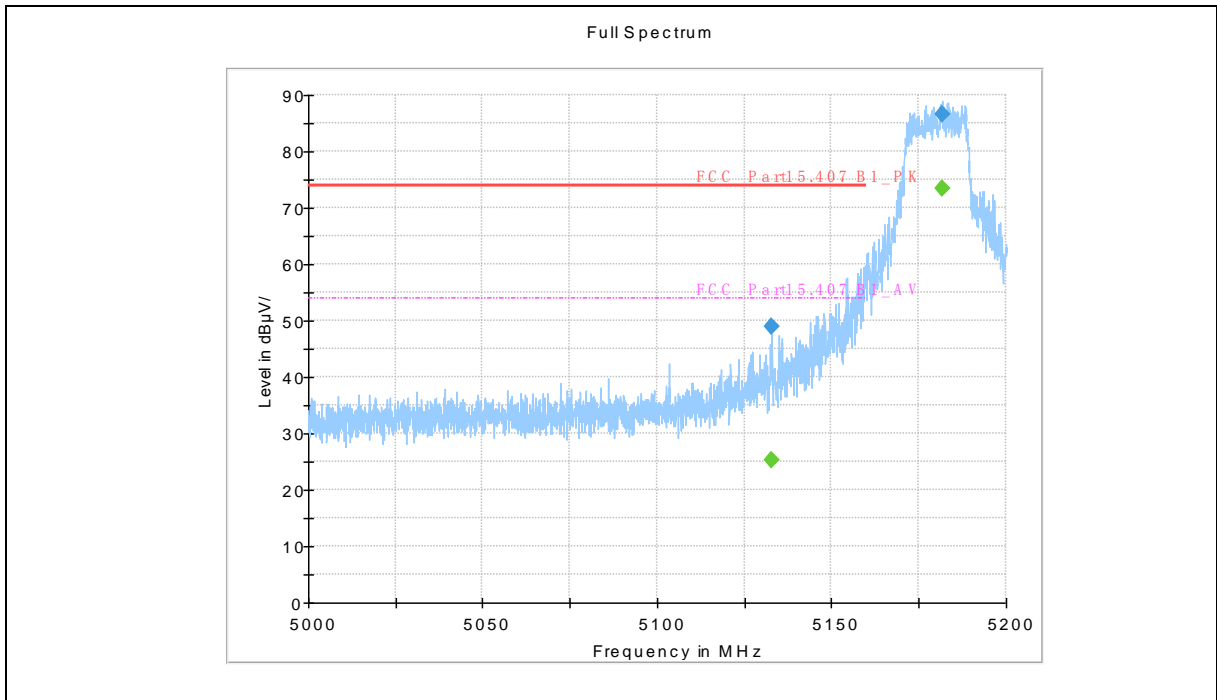
(802.11a _5825MHz, Antenna Horizontal)



(802.11a _5825MHz, Antenna Vertical)

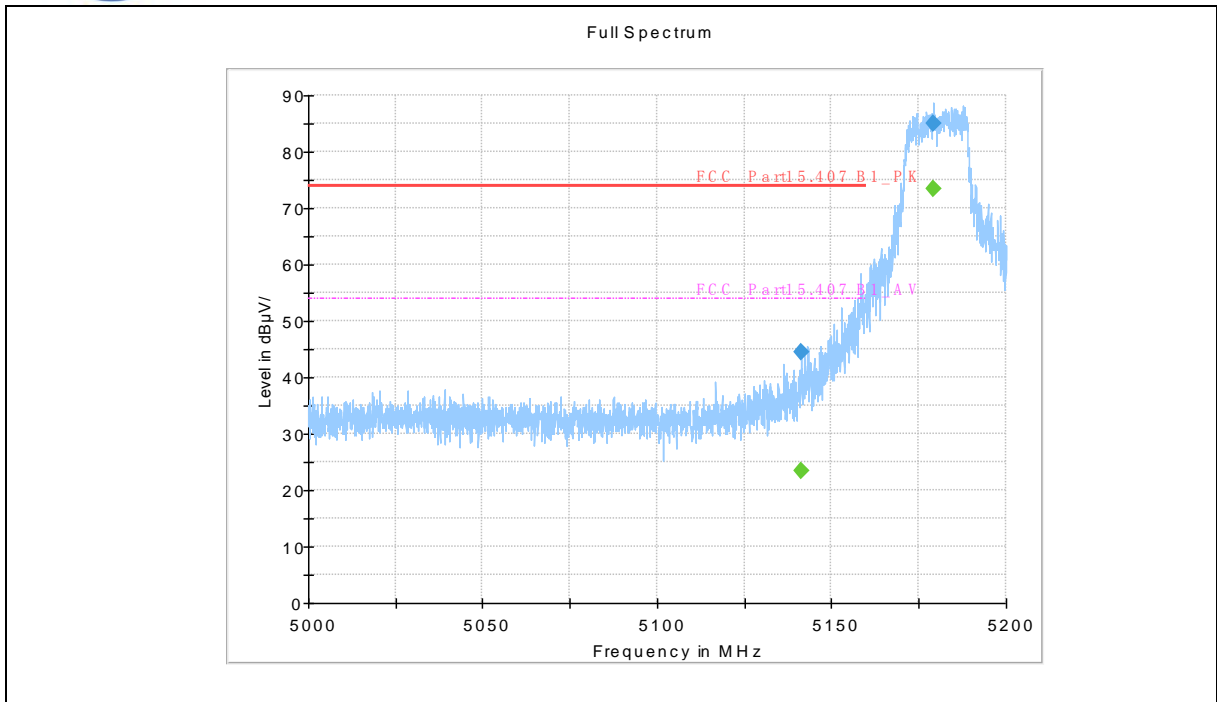


802.11n (HT20) Test mode



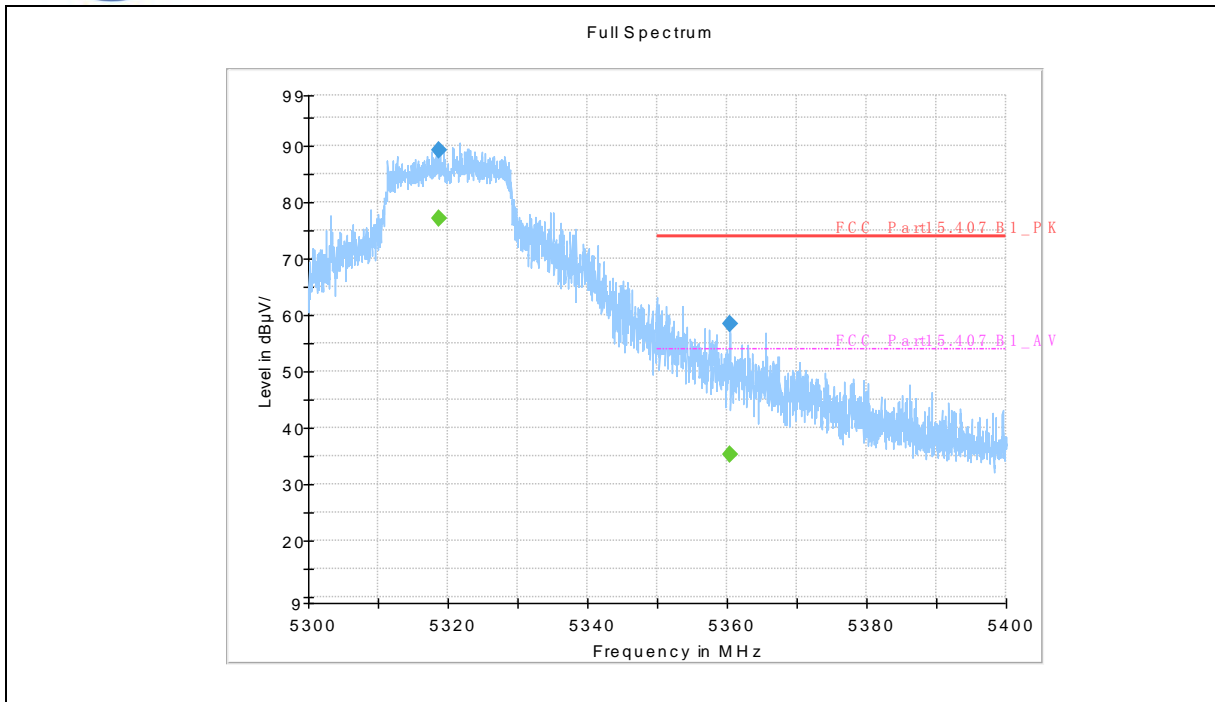
(802.11n (HT20) _5180MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5132.750000	---	25.29	54.00	28.71	H	-4.0
5132.750000	48.99	---	74.00	23.01	H	-4.0
5181.700000	---	73.37	---	---	H	-4.1
5181.700000	86.65	---	---	---	H	-4.1



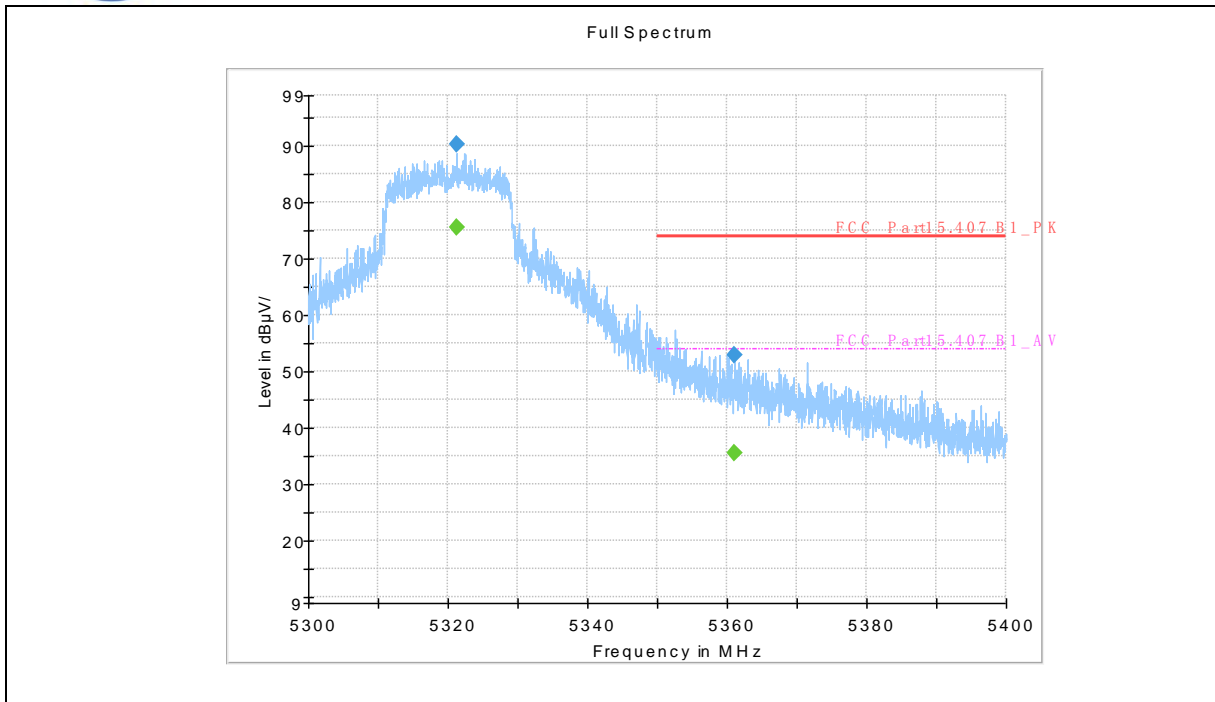
(802.11n (HT20) _5180MHz,, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5141.150000	---	23.38	54.00	30.62	V	-3.9
5141.150000	44.51	---	74.00	29.49	V	-3.9
5179.000000	---	73.46	---	---	V	-4.1
5179.000000	85.11	---	---	---	V	-4.1



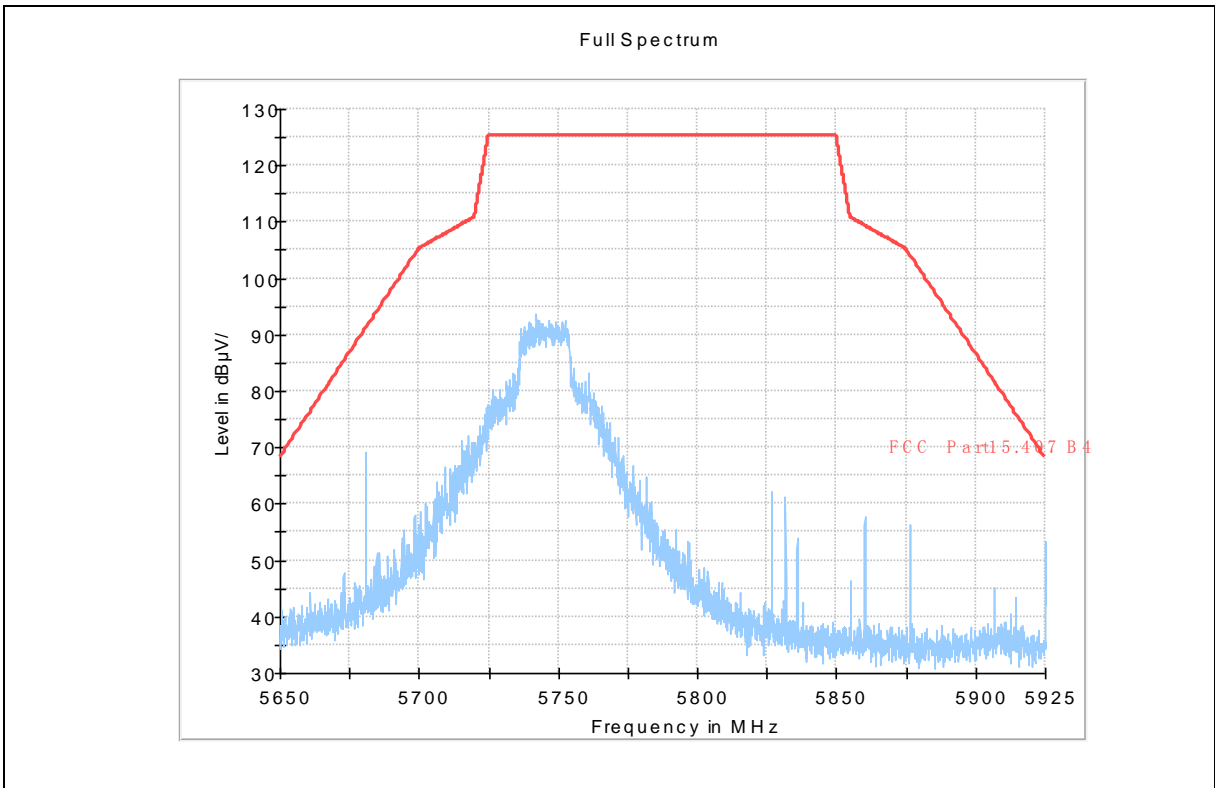
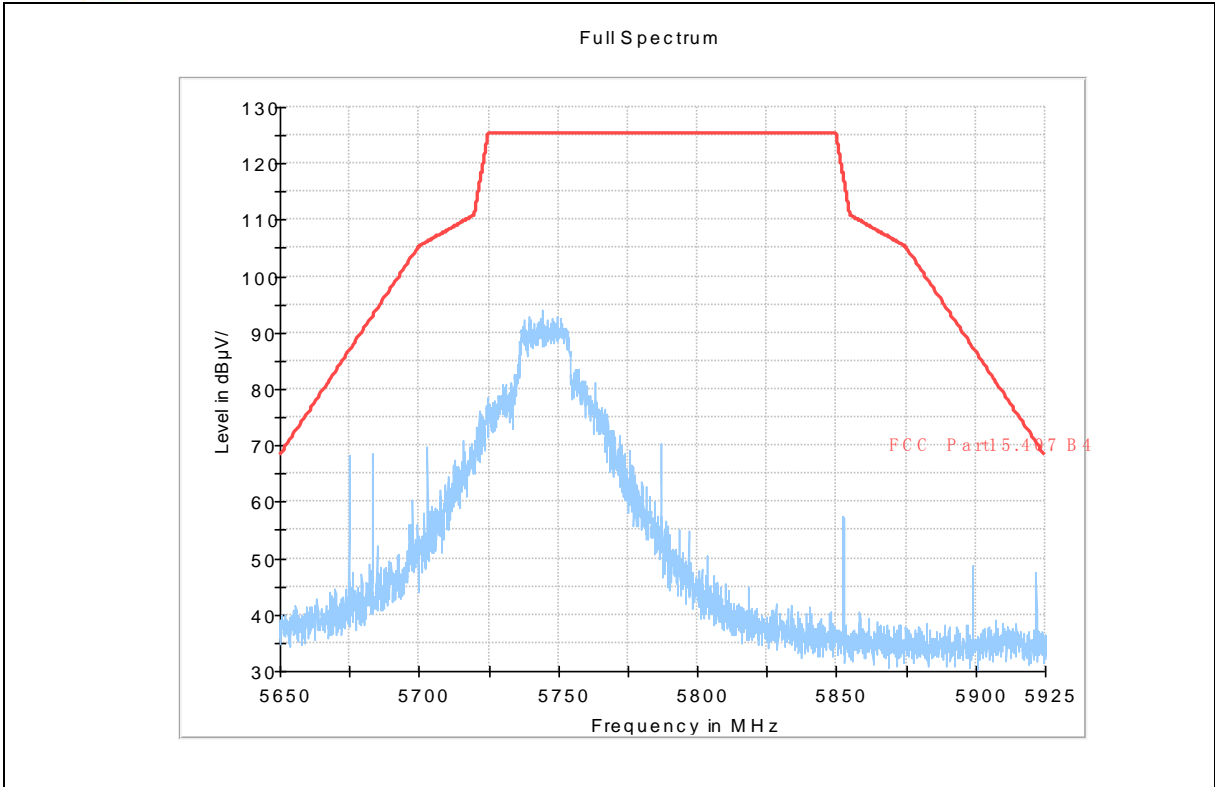
(802.11n (HT20) _5320MHz, Antenna Horizontal)

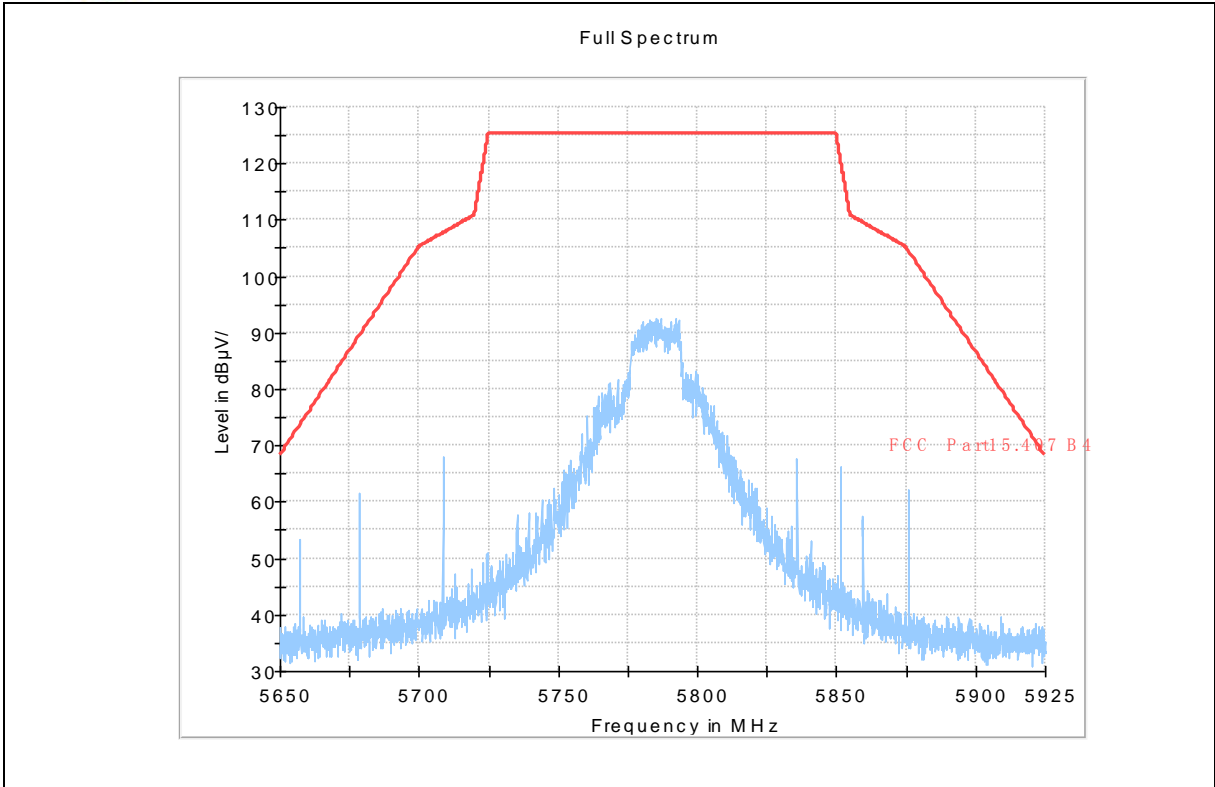
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2311.493056	---	31.58	54.00	22.42	H	6.8
2311.493056	41.75	---	74.00	32.25	H	6.8
2390.000000	---	39.75	54.00	14.25	H	8.0
2390.000000	47.69	---	74.00	26.31	H	8.0
2413.243056	---	89.57	---	---	H	8.6
2413.243056	95.78	---	---	---	H	8.6



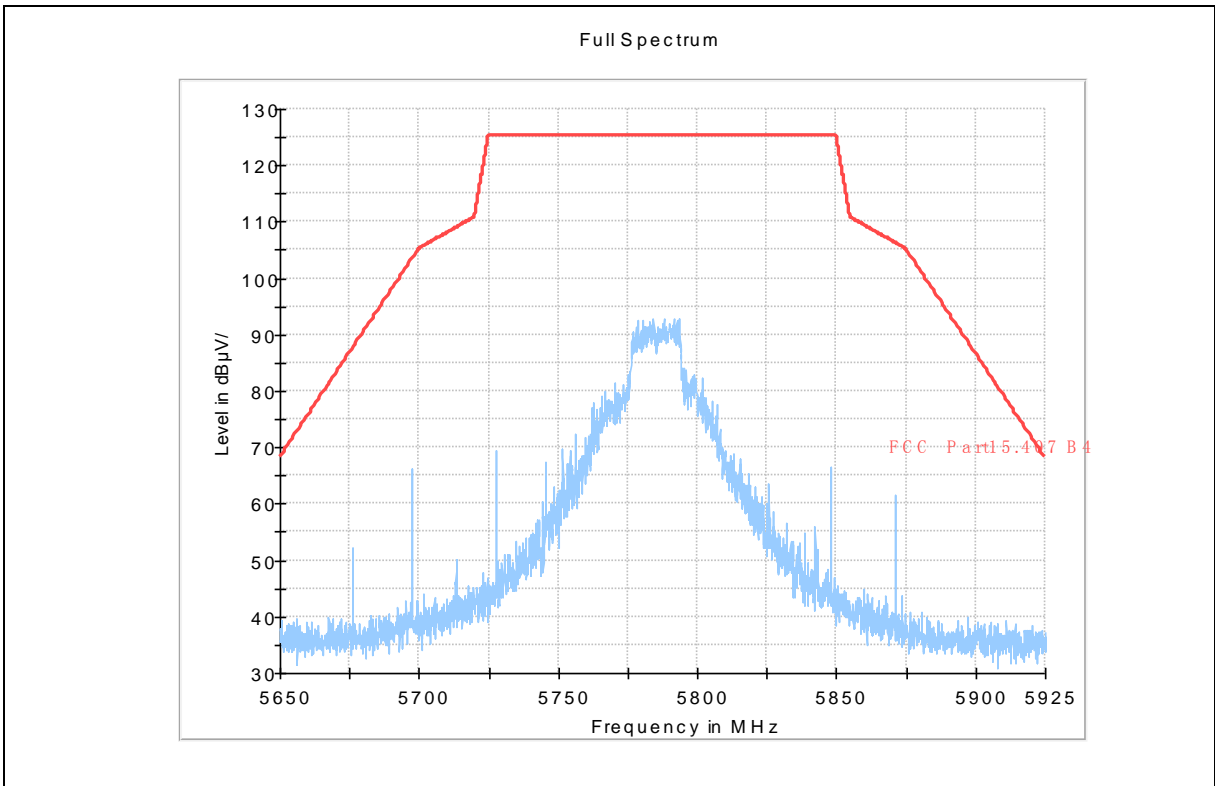
(802.11n (HT20) _5320MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5321.250000	90.28	---	---	---	V	-4.0
5321.250000	---	75.71	---	---	V	-4.0
5361.075000	53.07	---	74.00	20.93	V	-3.8
5361.075000	---	35.54	54.00	18.46	V	-3.8

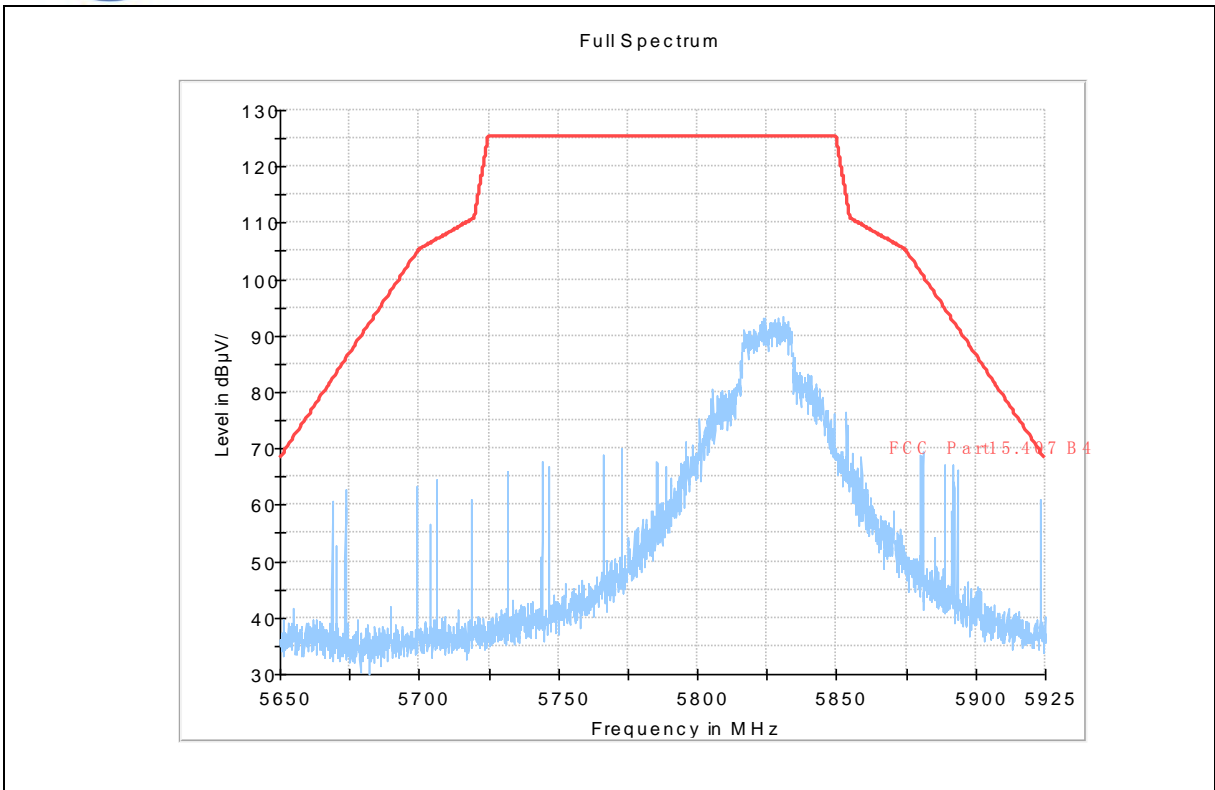




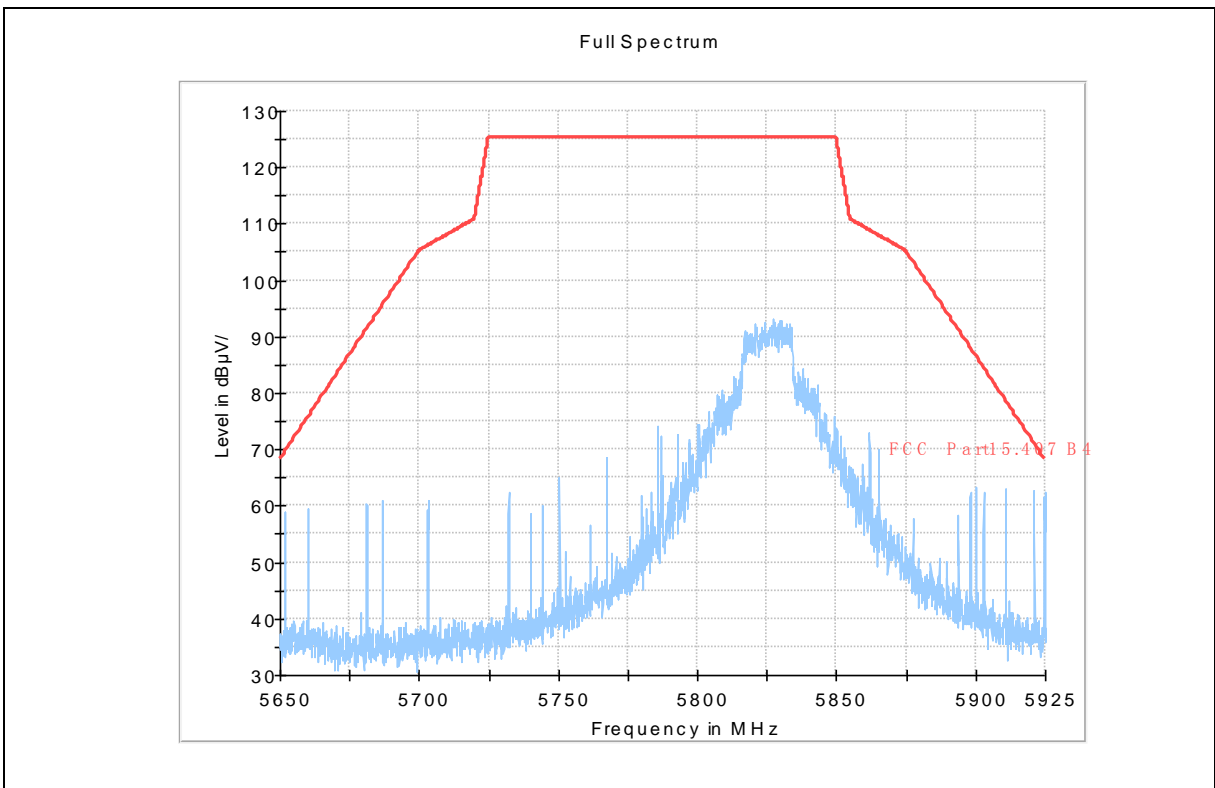
(802.11n(HT20) _5785MHz, Antenna Horizontal)



(802.11n(HT20) _5785MHz, Antenna Vertical)



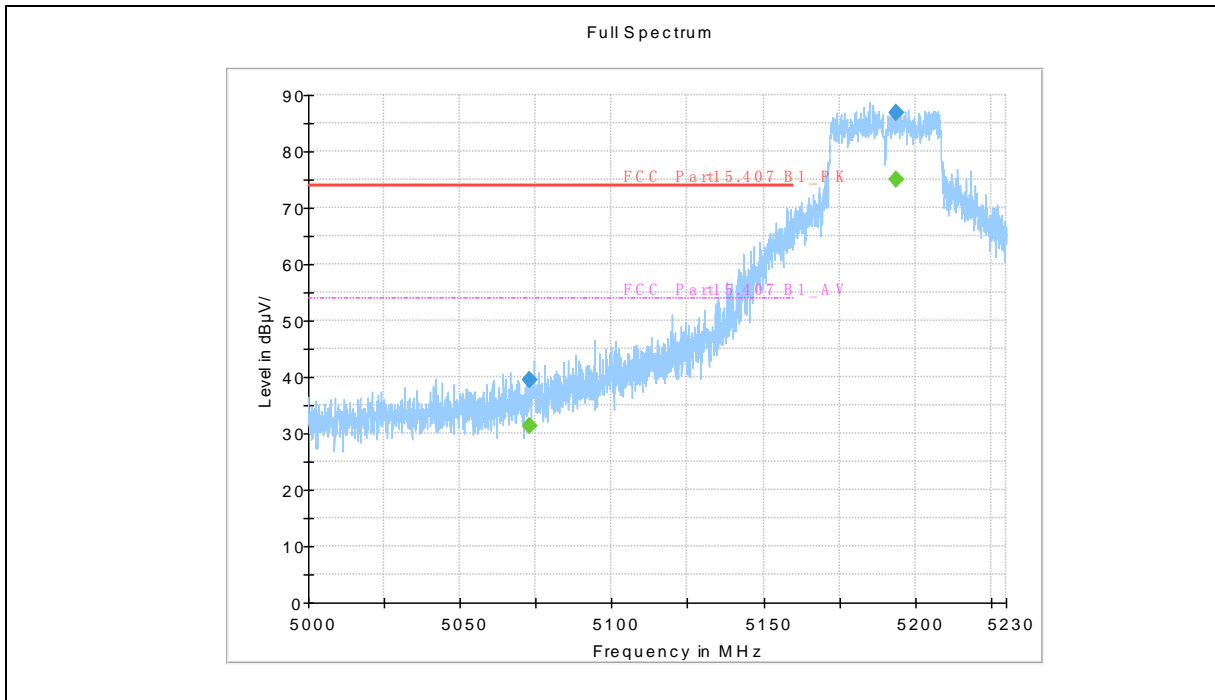
(802.11n(HT20)_5825MHz, Antenna Horizontal)



(802.11n(HT20)_5825MHz, Antenna Vertical)

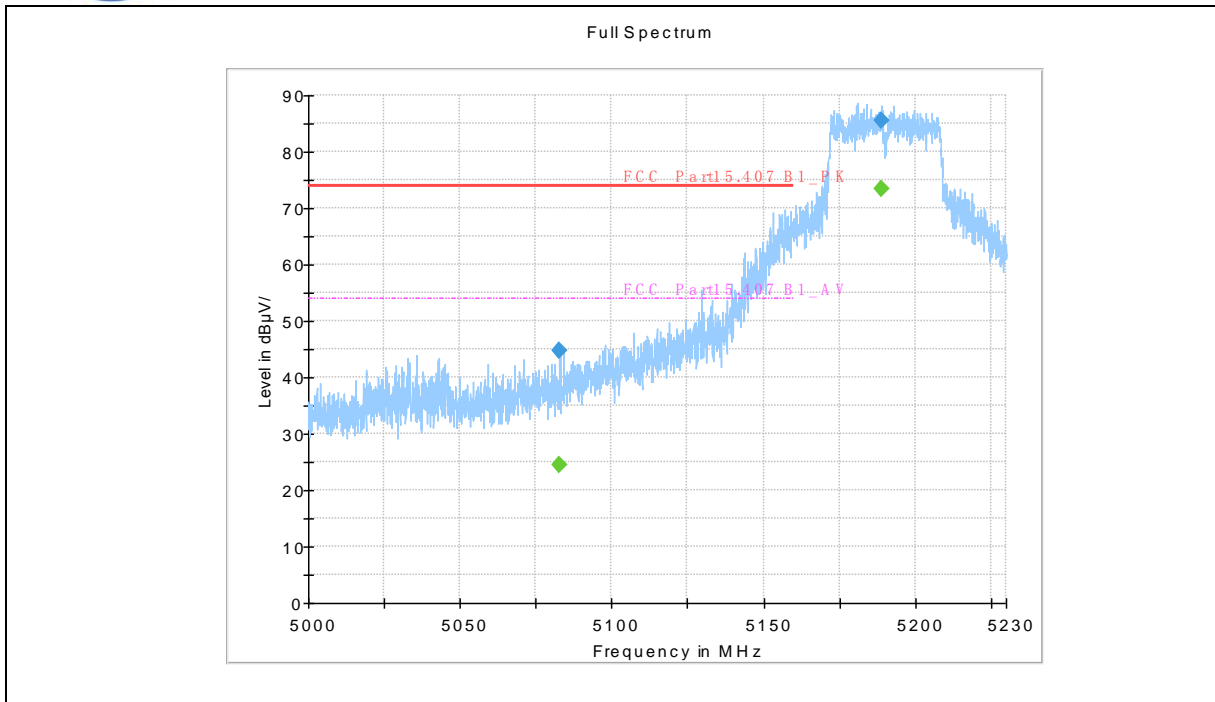


802.11n (HT40) Test mode



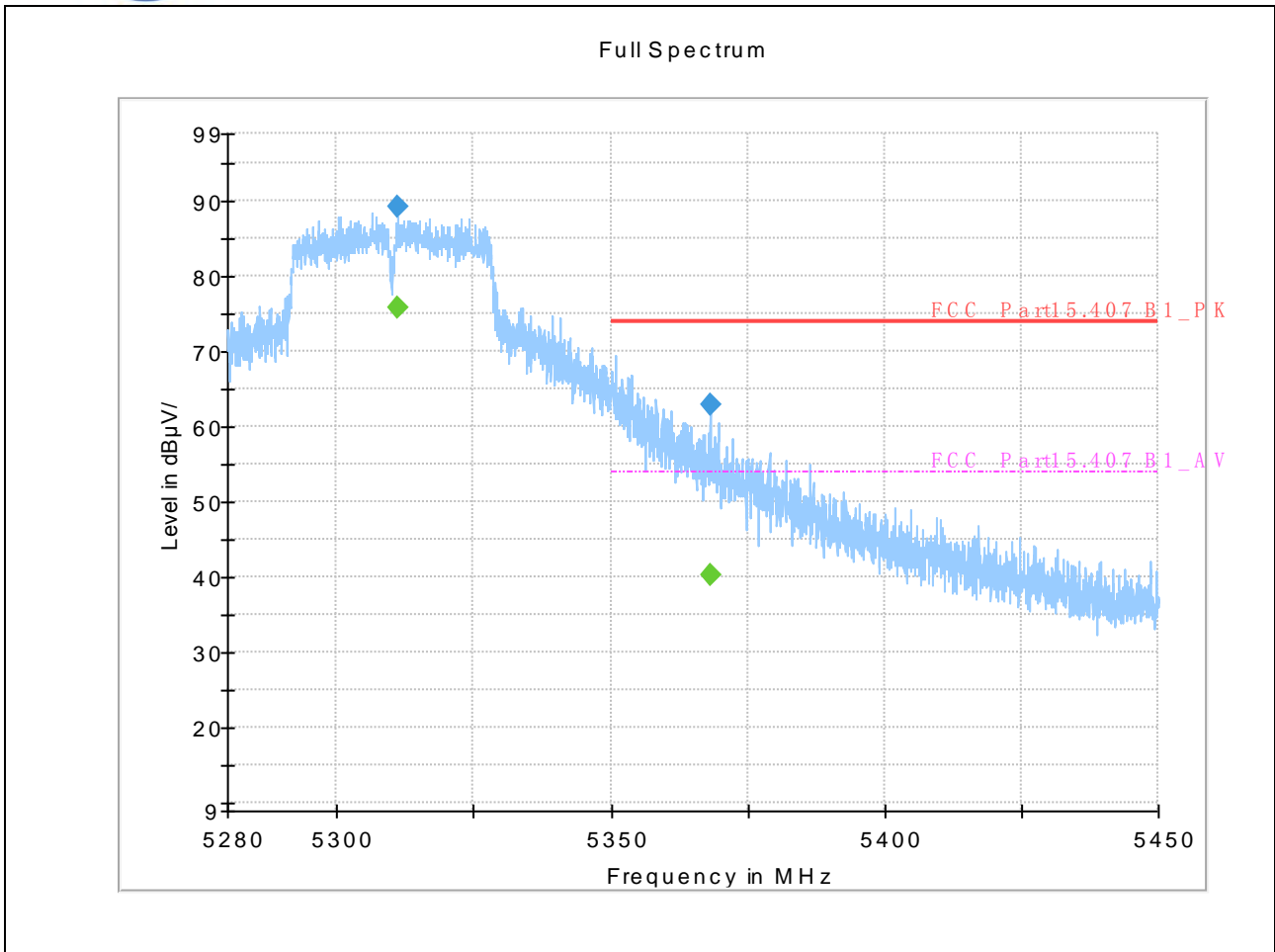
(802.11n (HT40) _5190MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5072.795000	39.58	---	74.00	34.42	H	-4.1
5072.795000	---	31.41	54.00	22.59	H	-4.1
5193.545000	86.80	---	---	---		-4.2
5193.545000	---	74.92	---	---		-4.2



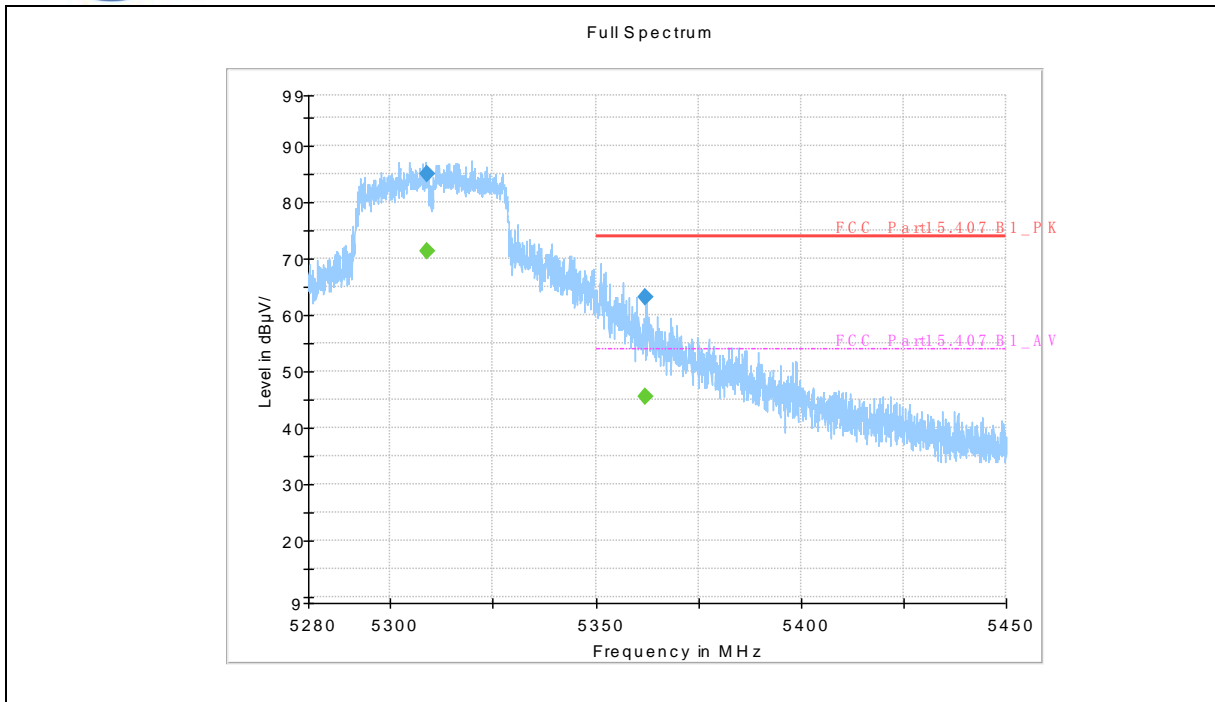
(802.11n (HT40) _5190MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5082.915000	---	24.50	54.00	29.50	V	-4.1
5082.915000	44.80	---	74.00	29.20	V	-4.1
5188.830000	---	73.31	---	---		-4.1
5188.830000	85.60	---	---	---		-4.1



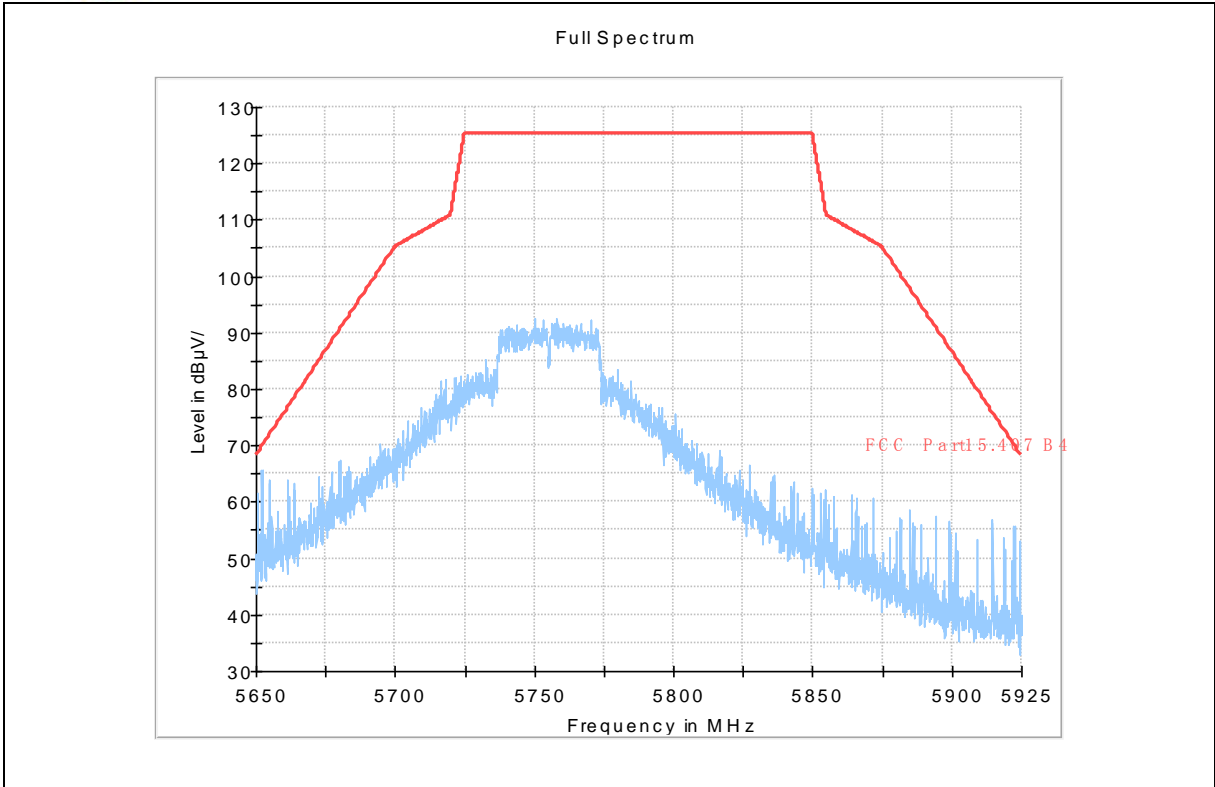
(802.11n (HT40) _5310MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5310.982500	89.26	---	---	---	H	-3.9
5310.982500	---	75.74	---	---	H	-3.9
5368.102500	62.85	---	74.00	11.15	H	-3.8
5368.102500	---	40.40	54.00	13.60	H	-3.8

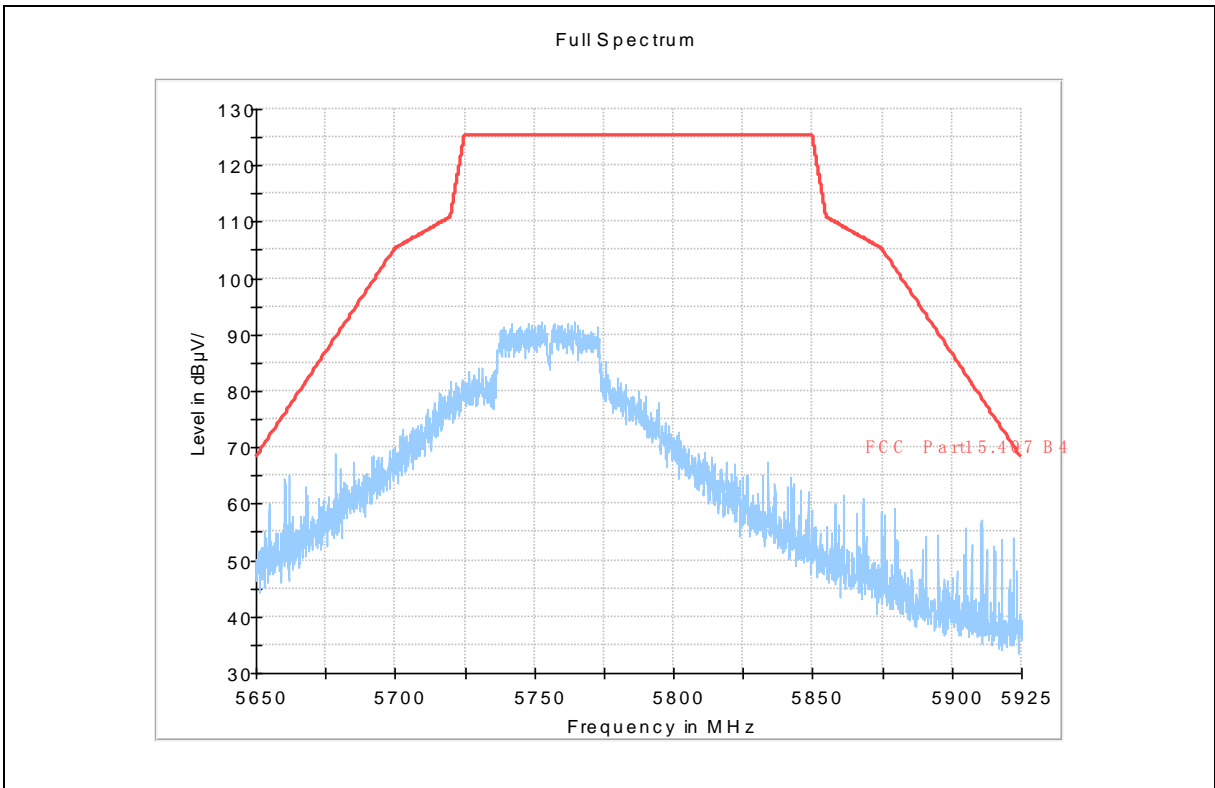


(802.11n (HT40) _5310MHz, Antenna Vertical)

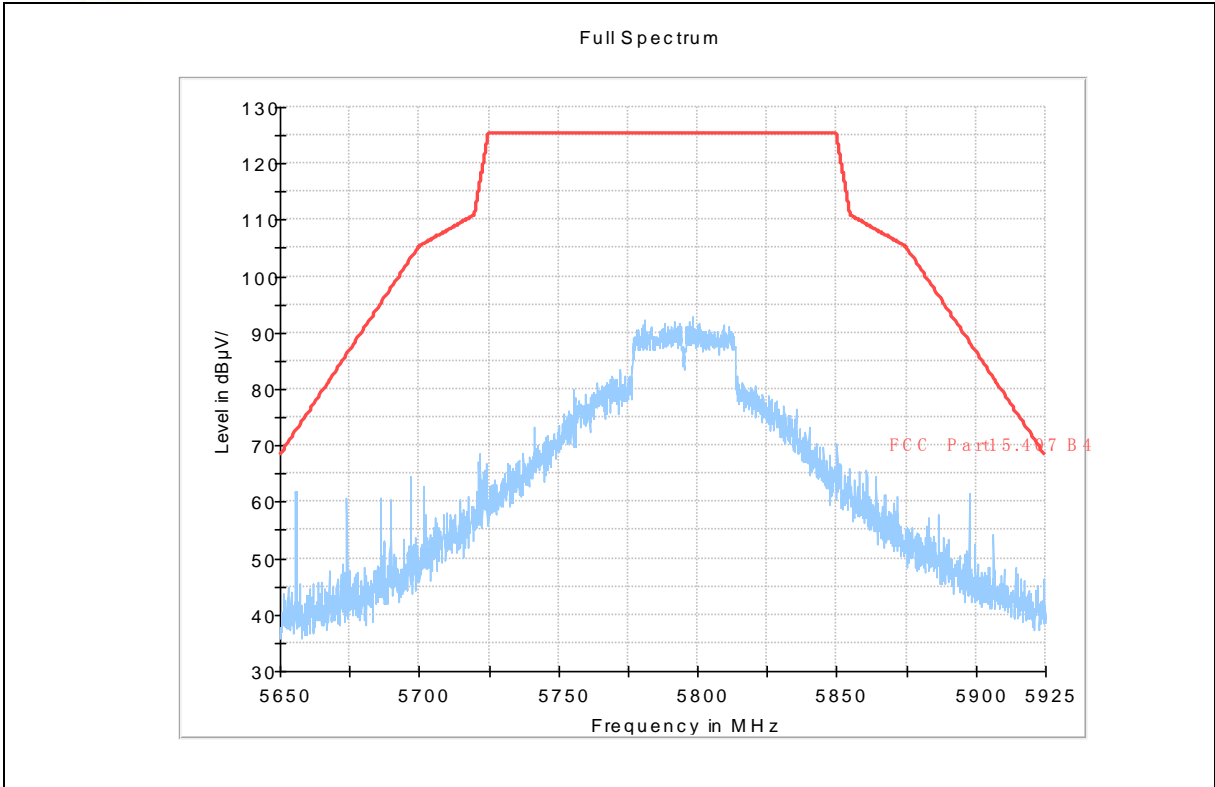
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5308.900000	---	71.35	---	---	V	-3.9
5308.900000	85.00	---	---	---	V	-3.9
5362.280000	---	45.56	54.00	8.44	V	-3.8
5362.280000	63.12	---	74.00	10.88	V	-3.8



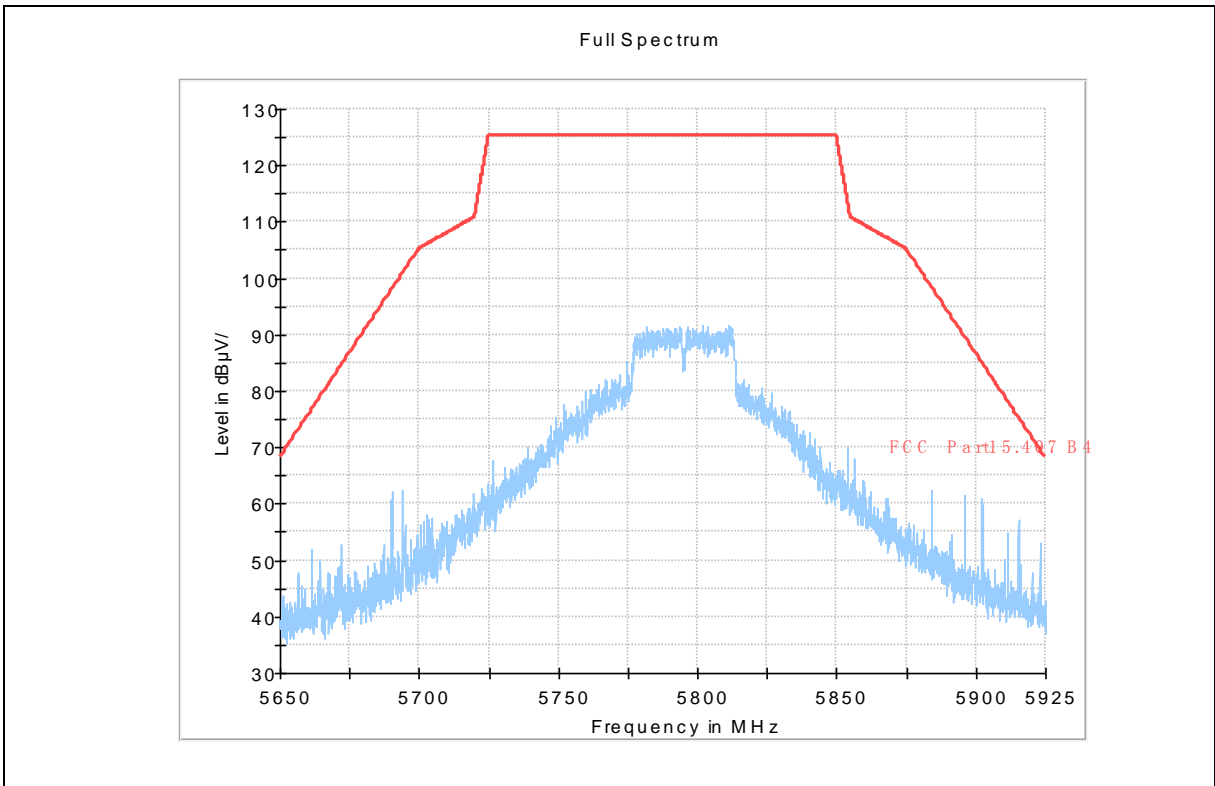
(802.11n(HT40) _5755MHz, Antenna Horizontal)



(802.11n(HT40) _5755MHz, Antenna Vertical)



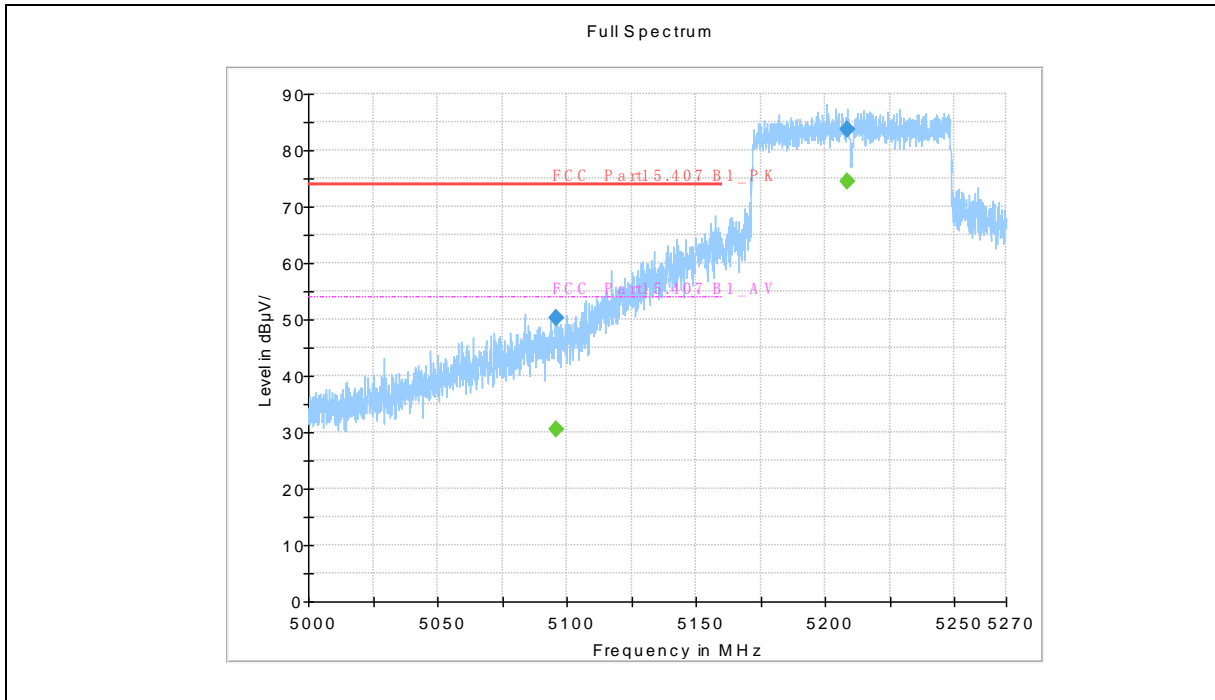
(802.11n(HT40)_5795MHz, Antenna Horizontal)



(802.11n(HT40)_5795MHz, Antenna Vertical)

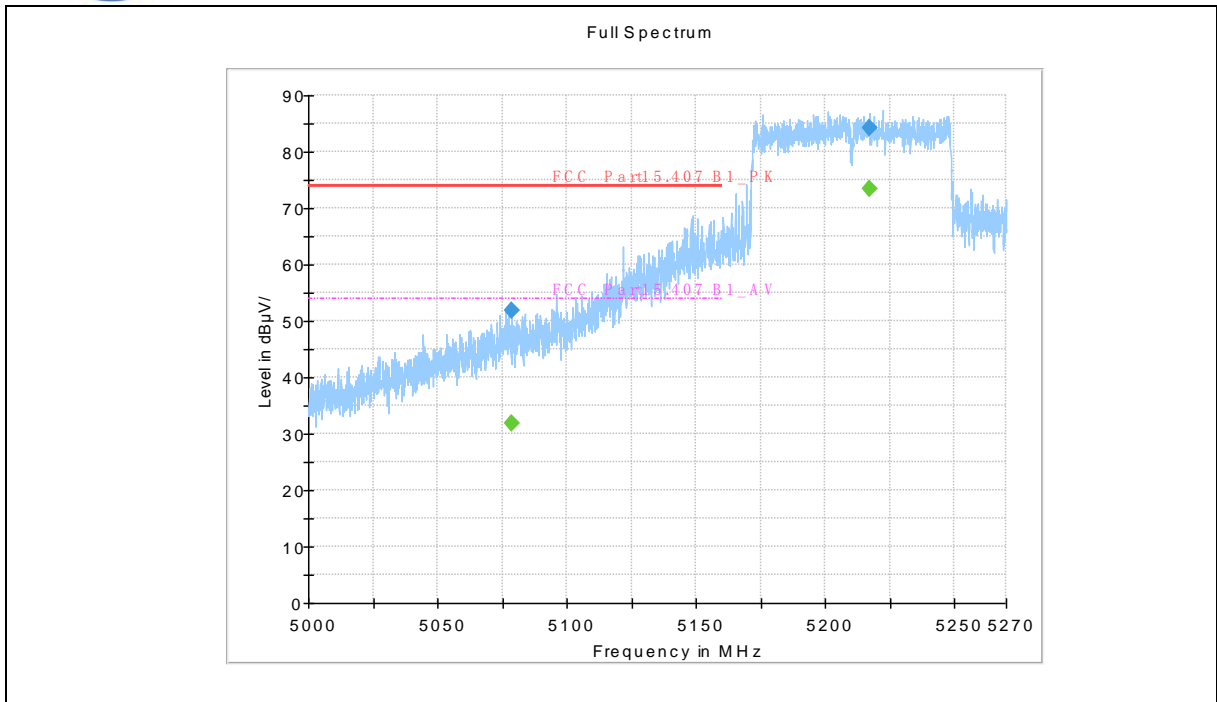


802.11ac (HT80) Test mode



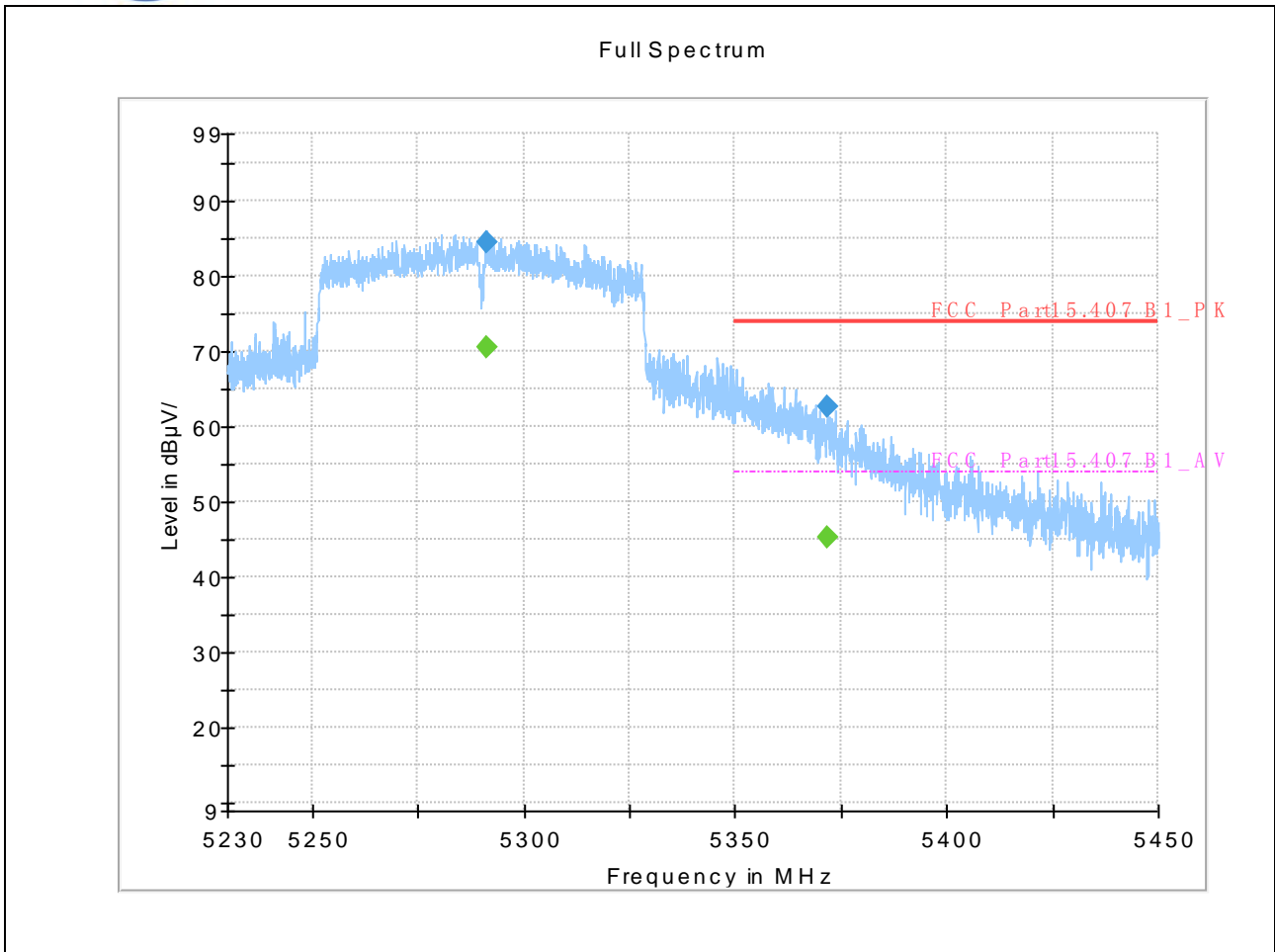
(802.11ac (HT80) _5210MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5095.985000	---	30.53	54.00	23.47	H	-4.1
5095.985000	50.17	---	74.00	23.83	H	-4.1
5208.575000	---	74.41	---	---	H	-4.2
5208.575000	83.74	---	---	---	H	-4.2



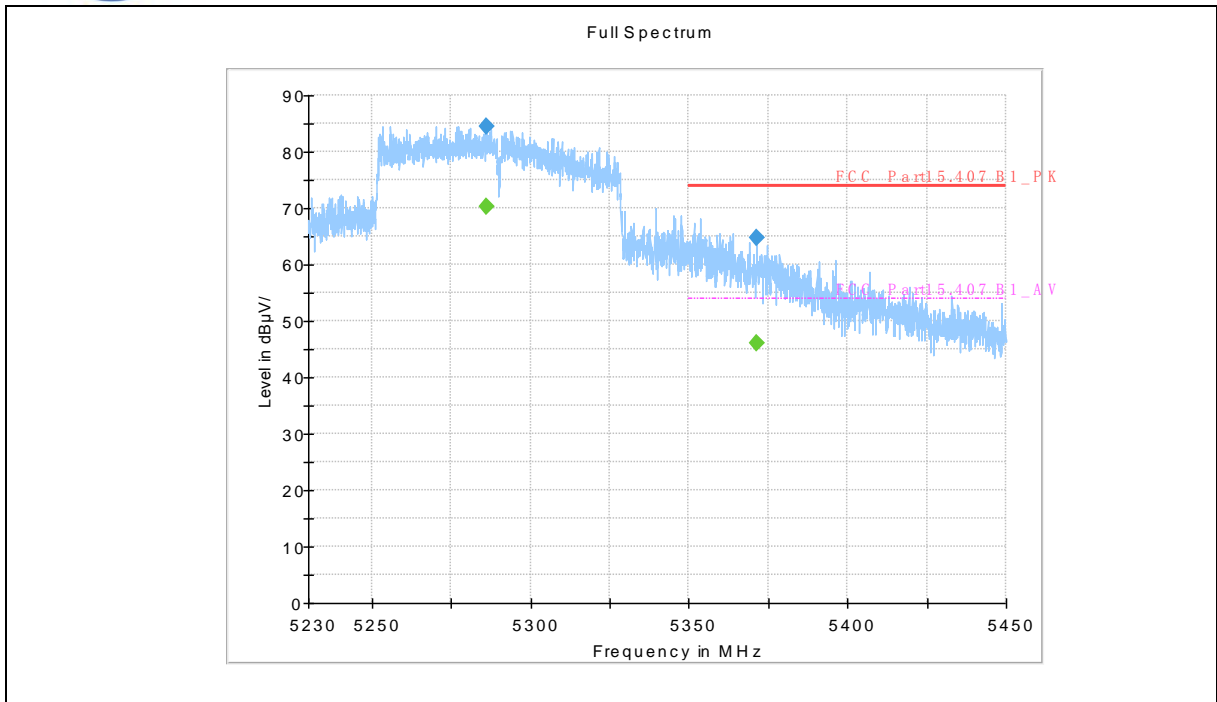
(802.11ac (HT80) _5210MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5078.772500	---	31.81	54.00	22.19	V	-4.1
5078.772500	51.83	---	74.00	22.17	V	-4.1
5217.282500	---	73.36	---	---	V	-4.2
5217.282500	84.33	---	---	---	V	-4.2



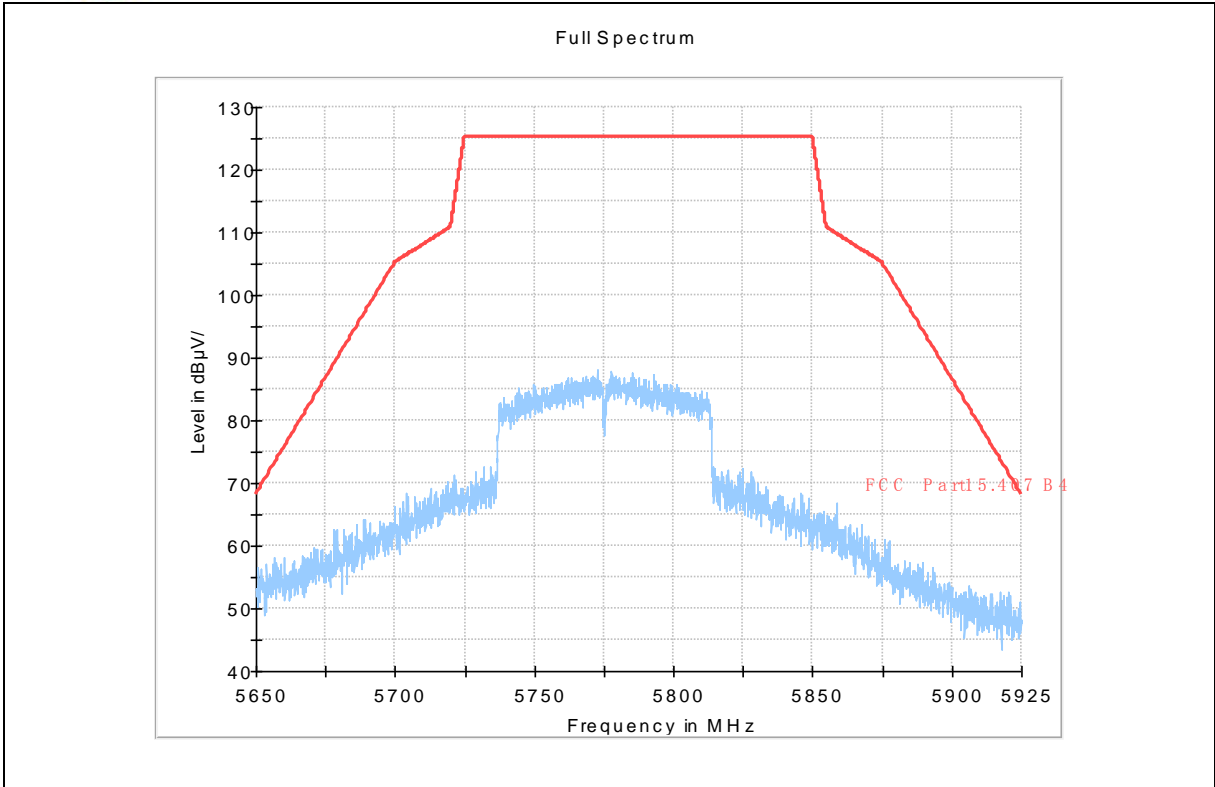
(802.11ac (HT80) _5290MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5291.270000	---	70.62	---	---	H	-3.9
5291.270000	84.40	---	---	---	H	-3.9
5371.790000	---	45.28	54.00	8.72		-3.8
5371.790000	62.77	---	74.00	11.23		-3.8

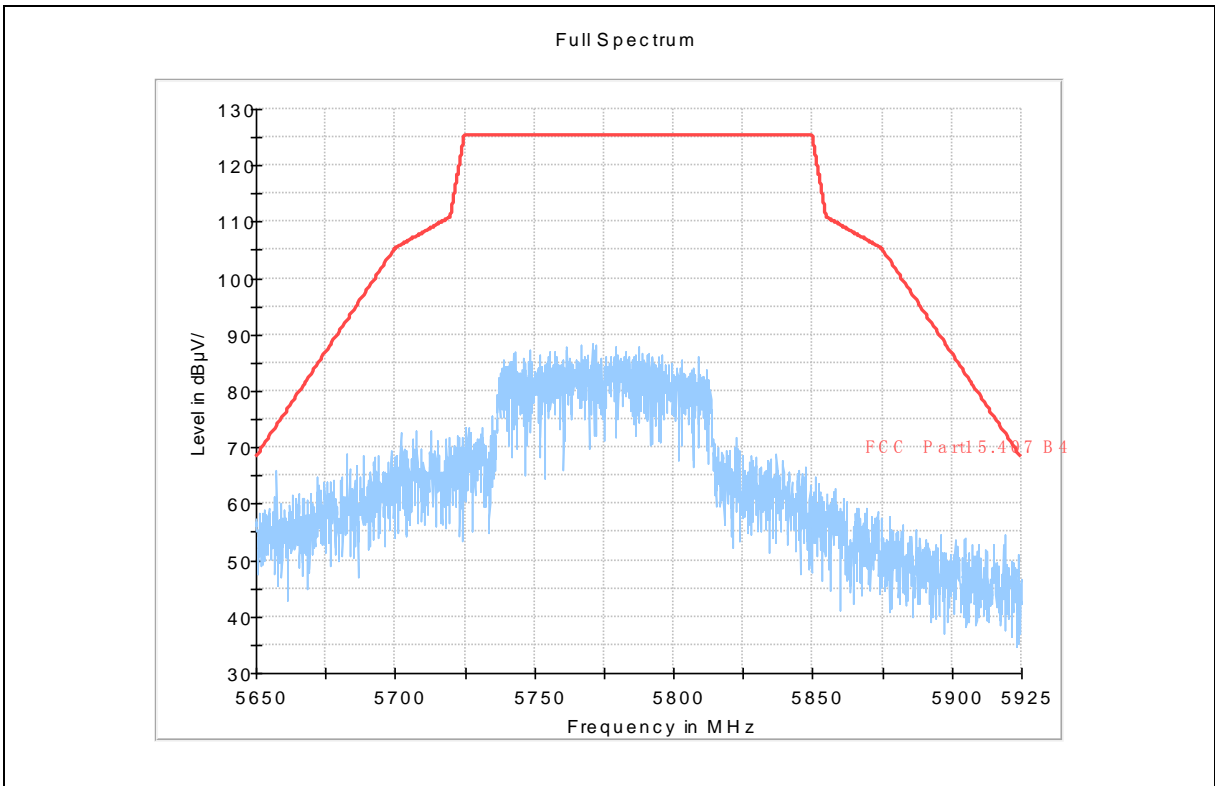


(802.11ac (HT80) _5290MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
5286.320000	---	70.29	---	---	V	-3.9
5286.320000	84.43	---	---	---	V	-3.9
5371.460000	---	45.99	54.00	8.01		-3.8
5371.460000	64.63	---	74.00	9.37		-3.8



(802.11ac(HT80)_5775MHz, Antenna Horizontal)



(802.11ac(HT80)_5775MHz, Antenna Vertical)



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 Procedure

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30°C to 50°C. The temperature was incremented by 10° 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

Frequency Stability Measurements for UNII Band 1 (Ch. 36)

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq Dev. (Hz)	Deviation (%)
100%	3.8	+20(Ref)	5179.981	-19000	-3.67
100%		-30	5179.978	-22000	-4.25
100%		-20	5179.986	-14000	-2.70
100%		-10	5179.972	-28000	-5.41
100%		0	5179.979	-21000	-4.05
100%		+10	5179.984	-16000	-3.09
100%		+20	5179.967	-33000	-6.37
100%		+30	5179.970	-30000	-5.79
100%		+40	5179.983	-17000	-3.28
100%		+50	5179.977	-23000	-4.44
85%	3.5	+20	5179.971	-29000	-5.60
115%	4.4	+20	5179.985	-15000	-2.90



Frequency Stability Measurements for UNII Band 2A (Ch. 52)

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq Dev. (Hz)	Deviation (%)
100%	3.8	+20(Ref)	5260.020	20000	3.80
100%		-30	5260.028	28000	5.32
100%		-20	5260.034	34000	6.46
100%		-10	5260.041	41000	7.79
100%		0	5260.037	37000	7.03
100%		+10	5260.029	29000	5.51
100%		+20	5260.013	13000	2.47
100%		+30	5260.028	28000	5.32
100%		+40	5260.032	32000	6.08
100%		+50	5260.039	39000	7.41
85%	3.5	+20	5260.026	26000	4.94
115%	4.4	+20	5260.024	24000	4.56

Frequency Stability Measurements for UNII Band 3 (Ch. 149)

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq Dev. (Hz)	Deviation (%)
100%	3.8	+20(Ref)	5745.048	48000	8.36
100%		-30	5745.041	41000	7.14
100%		-20	5745.036	36000	6.27
100%		-10	5745.049	49000	8.53
100%		0	5745.043	43000	7.48
100%		10	5745.035	35000	6.09
100%		20	5745.031	31000	5.40
100%		30	5745.044	44000	7.66
100%		40	5745.038	38000	6.61
100%		50	5745.042	42000	7.31
85%	3.5	20	5745.045	45000	7.83
115%	4.4	20	5745.037	37000	6.44

Note: Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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 50 μ H/50 Ω line impedance stabilization network (LISN).

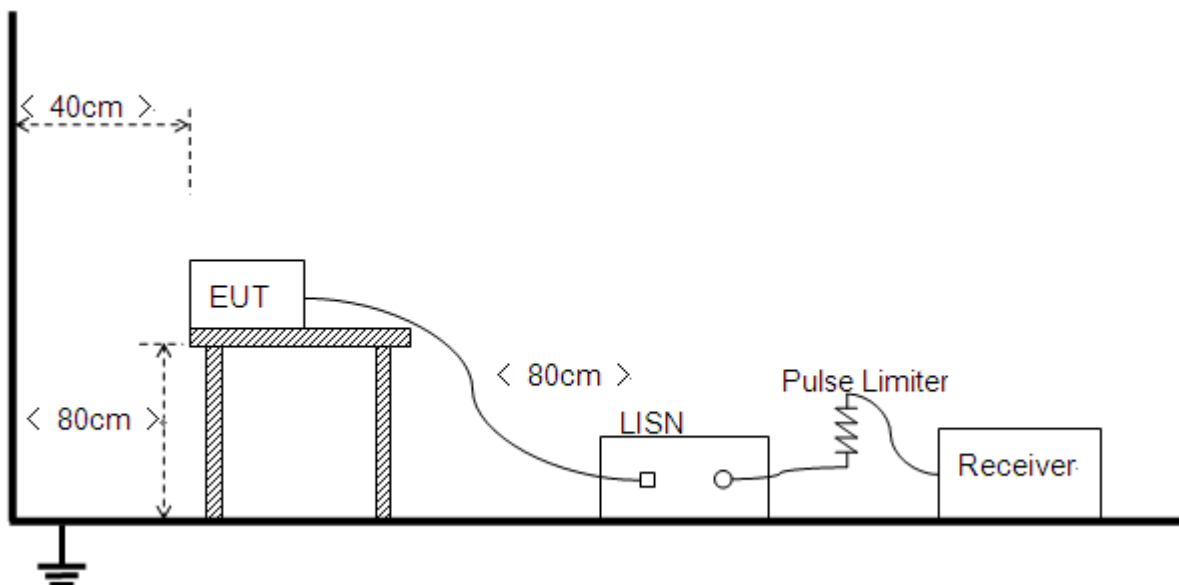
Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

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

A. 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.

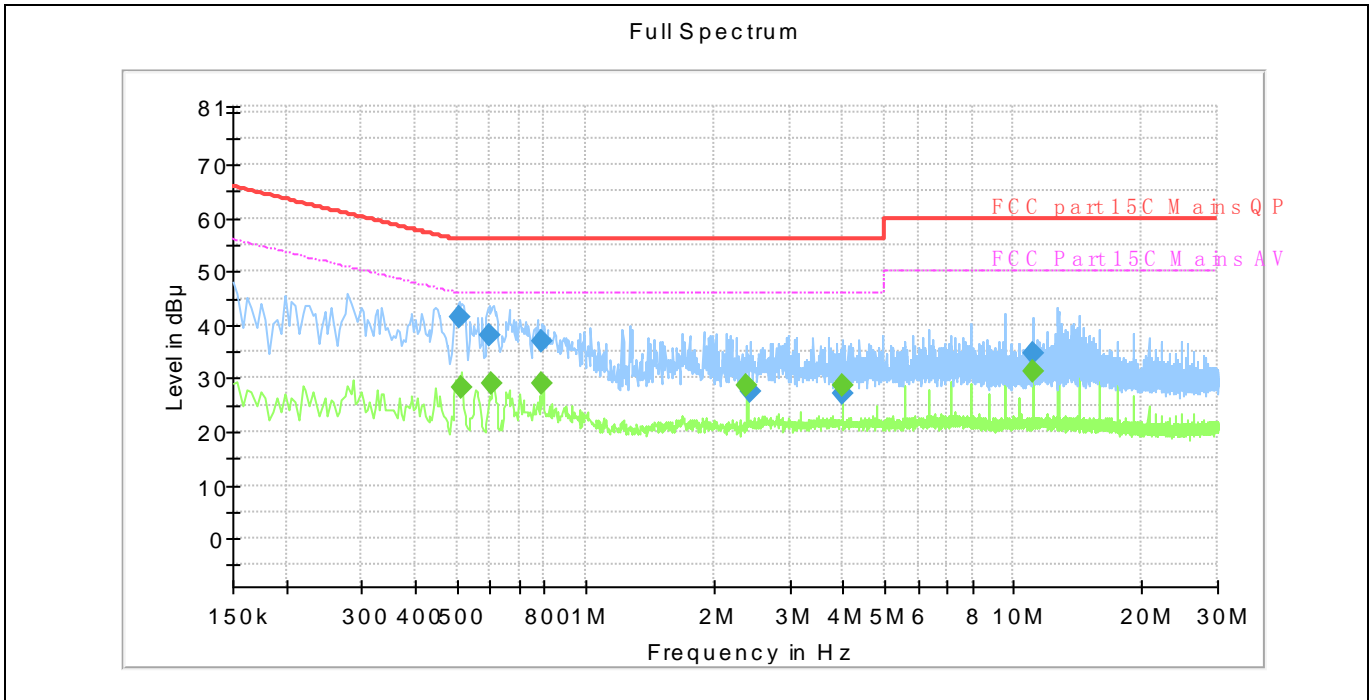
A. Test setup:

The EUT configuration of the emission tests is Charging + Wlan 5G Link.

Note: The test voltage is AC 120V/60Hz.

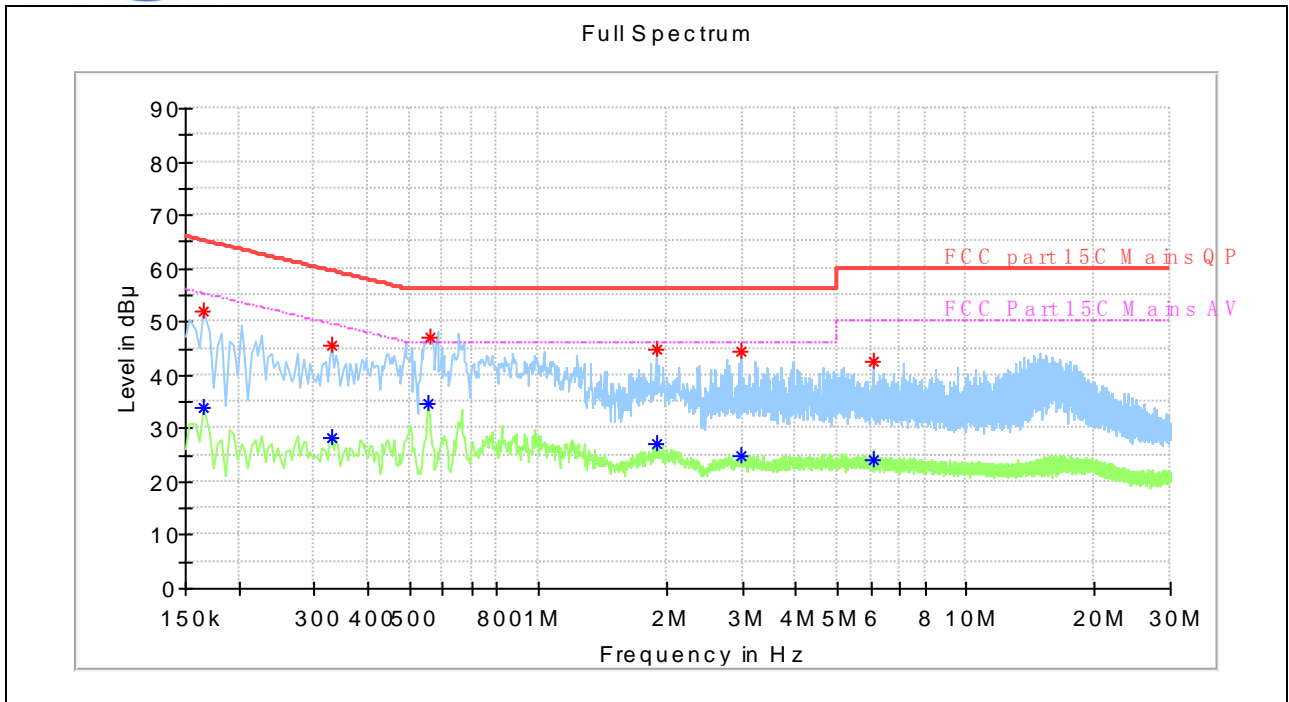


A. Test Plots:



(Plot A: L Phase)

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.506000	44.64	---	56.00	11.36	L1	10.2
0.514000	---	31.27	46.00	14.73	L1	10.2
0.594000	43.74	---	56.00	12.26	L1	10.2
0.606000	---	29.22	46.00	16.78	L1	10.2
0.794000	---	29.53	46.00	16.47	L1	10.2
0.794000	40.19	---	56.00	15.81	L1	10.2
2.386000	---	28.20	46.00	17.80	L1	10.3
2.434000	36.92	---	56.00	19.08	L1	10.3
3.970000	37.20	---	56.00	18.80	L1	10.4
3.978000	---	28.03	46.00	17.97	L1	10.4
11.130000	41.43	---	60.00	18.57	L1	10.7
11.134000	---	31.85	50.00	18.15	L1	10.7



(Plot B: N Phase)

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.166000	---	33.93	55.16	21.23	N	10.2
0.166000	51.87	---	65.16	13.29	N	10.2
0.330000	---	28.08	49.45	21.38	N	10.2
0.330000	45.62	---	59.45	13.83	N	10.2
0.554000	---	34.52	46.00	11.48	N	10.2
0.558000	47.09	---	56.00	8.91	N	10.2
1.886000	44.77	---	56.00	11.23	N	10.3
1.894000	---	27.28	46.00	18.72	N	10.3
2.978000	44.36	---	56.00	11.64	N	10.4
2.982000	---	25.03	46.00	20.97	N	10.4
6.066000	---	24.19	50.00	25.81	N	10.5
6.070000	42.69	---	60.00	17.31	N	10.5