RF TEST REPORT

Report No.: 18070575-FCC-R2

Supersede Report No.: N/A

Applicant	Shenzhen Cudy Technology Co. Ltd.
Product Name	AC1200 Dual Band Smart Wi-Fi Router
Model No.	WR1000
Serial No.	N/A
Test Standard	FCC Part 15.407, KDB 662911 D01 v02r01, KDB 789033 D02 v02r01, ANSI C63.10: 2013
Test Date	June 05 to 26, 2018
Issue Date	June 27, 2018
Test Result	☑ Pass ☐ Fail
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Aaron Liang	David Huang	
Aaron Liang Test Engineer	David Huang Checked By	

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Test result presented in this test report is applicable to the tested sample only

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

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Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

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Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
18070575-FCC-R2	NONE	Original	June 27, 2018

2. Customer information

Applicant Name	Shenzhen Cudy Technology Co. Ltd.
Applicant Add	Room A606, Gaoxinqi Industrial Park, Liuxianyi Road, Baoan District,Shenzhen China 518101
Manufacturer	Shenzhen Cudy Technology Co. Ltd.
Manufacturer Add	Room A606, Gaoxinqi Industrial Park, Liuxianyi Road, Baoan District,Shenzhen China 518101

3. Test site information

Test Lab A:

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	535293
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

Test Lab B:

Lab performing tests	BV 7LAYERS COMMUNICATION TRCHNOLOGY(SHENZHEN)CO.,LTD
Lab Address	No. B102, Dazu Cuangxin Mansion, North of Beihuan Avenue, North Area, Hi-Tech Industry Park, Nanshan District Shenzhen, Guangdong China
FCC Test Site No.	525120

Note: We just perform Radiated Spurious Emission above 18GHz in the test Lab. B.

4. Equipment under Test (EUT) Information

Description of EUT:	AC1200 Dual Band Smart Wi-Fi Router
Main Model:	WR1000
Serial Model:	N/A
Date EUT received:	June 04, 2018
Test Date(s):	June 05 to 26, 2018
Equipment Category：	NII
Antenna Gain:	WIFI(2.4G): 5dBi WIFI(5150-5250MHz):5dBi
Antenna Type:	Cable Antenna
Type of Modulation:	802.11b: DSSS 802.11g/n20/n40/a/ac20/ac40/ac80: OFDM
Number of Channels:	WIFI :802.11b/g: 11CH WIFI :802.11a/ac20: 24CH WIFI :802.11ac40: 12CH WIFI :802.11ac80: 6CH WIFI :802.11n20: 11CH(2.4GHz); WIFI :802.11n40: 9CH(2.4GHz); 12CH(5GHz)
RF Operating Frequency (ies):	802.11b/g: 2412-2462 MHz (TX/RX) 802.11n20: 2412-2462MHz; 802.11n40: 2422-2452 MHz (TX/RX); 5190-5230 MHz(TX/RX) 802.11 a: 5180-5240 MHz (TX/RX) 802.11ac 20: 5180-5240 MHz; (TX/RX) 802.11ac 40: 5190-5230 MHz; (TX/RX) 802.11ac 80: 5210 MHz; (TX/RX)

Max. Output Power:	802.11a: 11.83dBm 802.11ac(20M): 11.68dBm 802.11ac(40M): 17.76dBm 802.11ac(80M): 19.19dBm 802.11n(40M): 11.44dBm
Input Power:	Adapter: Model: S12A12-120A100-CJ Input:AC 100-240V~50/60Hz 0.5A Output:DC 12V, 1A
Port:	Please refer to the user manual
Trade Name :	N/A
FCC ID:	2APRGWR1000V1

5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.407 (i), §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.407 (a)(1)	DTS (99%&26 dB) CHANNEL BANDWIDTH	Compliance
§15.407 (e)	DTS (99%&6 dB) CHANNEL BANDWIDTH	Compliance
§15.407(a/1/2)	Conducted Maximum Output Power	Compliance
§15.407(a/1/2)	Peak Power Spectral Density	Compliance
§15.407(a)(6)	Peak Power Excursion	Compliance
§15.207 (a)	AC Power Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(b/1/2/3/6)	Radiated Spurious Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

6. Measurements, Examination And Derived Results

6.1 §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited.
The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.

b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has 2 antennas:
A permanently attached cable antenna for 2.4G/5G WIFI, the gain is 5dBi for 2.4G/5G WIFI.

Result: Pass

6.1 ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

Standard Requirement:

None. For reporting purpose only.

PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

Environmental Conditions	Temperature	24°C
	Relative Humidity	55%
	Atmospheric Pressure	1017mbar

Test date: June 13 to 25, 2018

Tested By: Aaron Liang

Test Result: Pass.

Please refer to the following tables and plots.

Measurement result

ON TIME AND DUTY CYCLE RESULTS

Ant.0

Test mode	Freq Band (MHz)	CH	Freq (MHz)	ON Time B(msec)	Period (msec)	Duty Cycle x(linear)	Duty Cycle(%)	Duty Cycle Correction Factor(dB)
820.11a	5150-5250	Low	5180	1	1	1	100%	0
		Middle	5200	1	1	1	100%	0
		High	5240	1	1	1	100%	0
802.11ac (20M)		Low	5180	1	1	1	100%	0
		Middle	5200	1	1	1	100%	0
		High	5240	1	1	1	100%	0
802.11ac (40M)		Low	5190	1	1	1	100%	0
		High	5230	1	1	1	100%	0
802.11ac (80M)		One	5210	1	1	1	100%	0
802.11n (40M)		Low	5190	1	1	1	100%	0
		Middle	5200	1	1	1	100%	0
		High	5230	1	1	1	100%	0

Ant.1

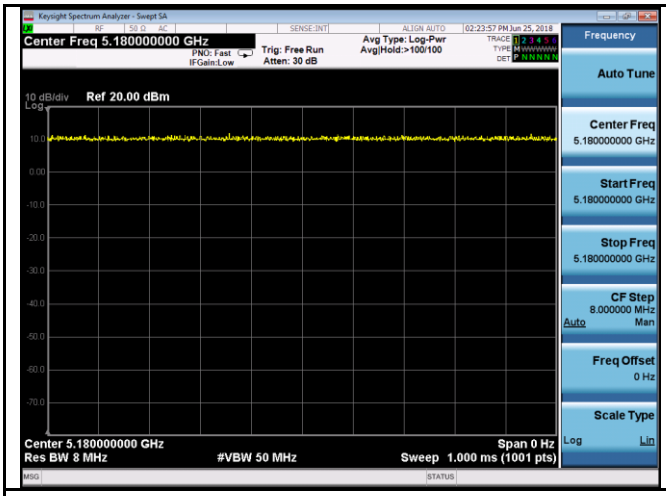
Test mode	Freq Band (MHz)	CH	Freq (MHz)	ON Time B(msec)	Period (msec)	Duty Cycle x(linear)	Duty Cycle(%)	Duty Cycle Correction Factor(dB)
820.11a	5150-5250	Low	5180	1	1	1	100%	0
		Middle	5200	1	1	1	100%	0
		High	5240	1	1	1	100%	0
802.11ac (20M)		Low	5180	1	1	1	100%	0
		Middle	5200	1	1	1	100%	0
		High	5240	1	1	1	100%	0
802.11ac (40M)		Low	5190	1	1	1	100%	0
		High	5230	1	1	1	100%	0
802.11ac (80M)		One	5210	1	1	1	100%	0
802.11n (40M)		Low	5190	1	1	1	100%	0
		Middle	5200	1	1	1	100%	0
		High	5230	1	1	1	100%	0

Test Plots

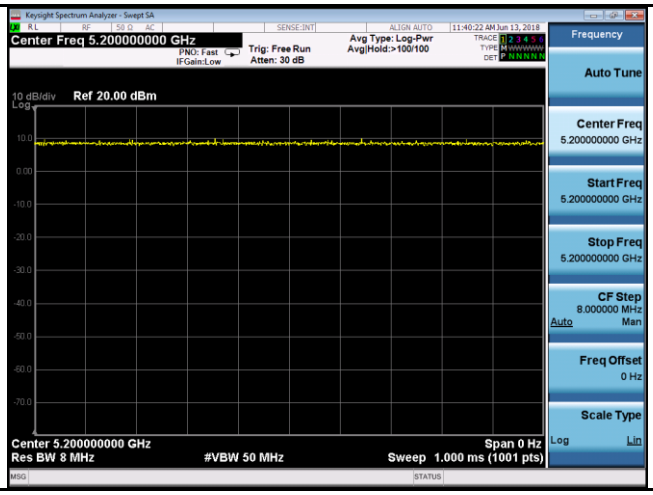
Duty cycle measurement result

Ant.0

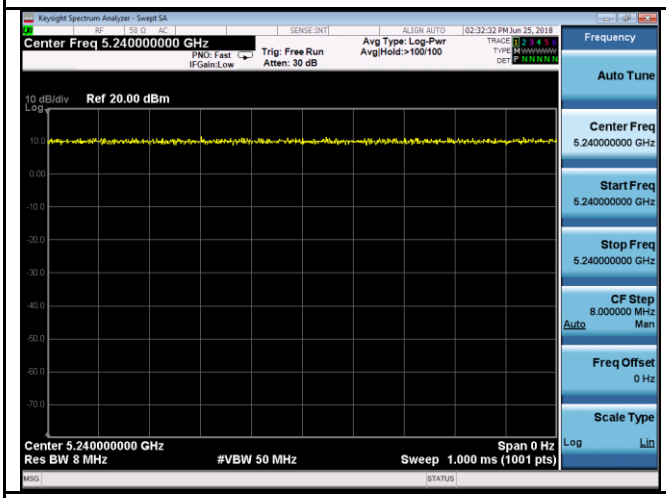
802.11a



5150-5250MHz Duty cycle - Low CH 5180

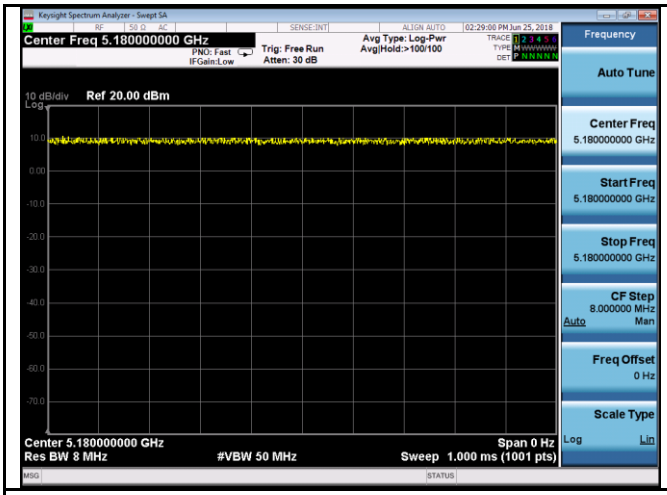


5150-5250MHz Duty cycle - Middle CH 5200

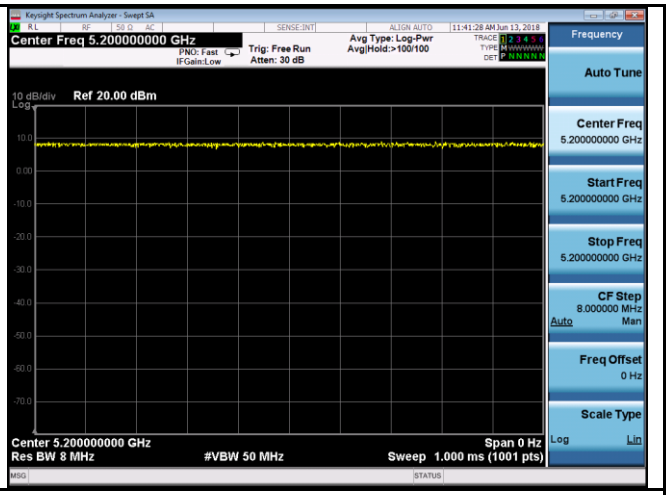


5150-5250MHz Duty cycle - High CH 5240

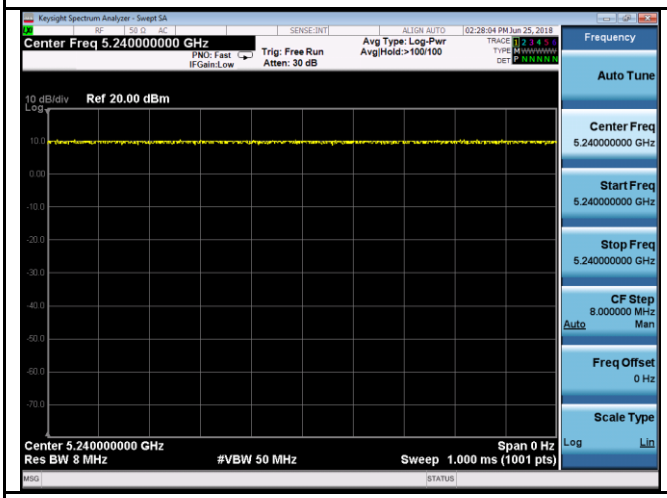
802.11ac (20M)



5150-5250MHz Duty cycle - Low CH 5180

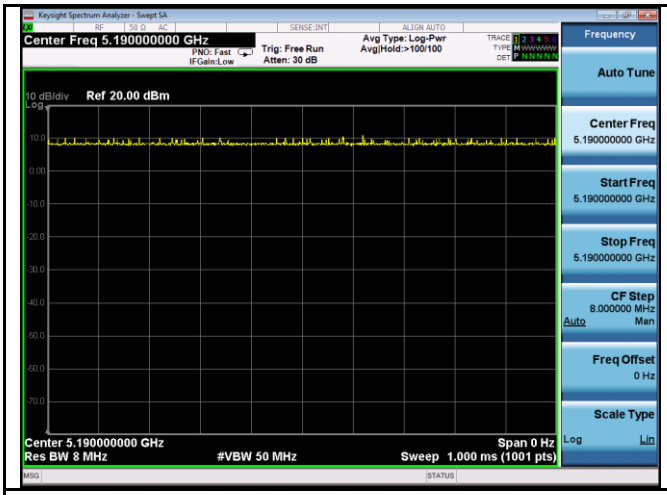
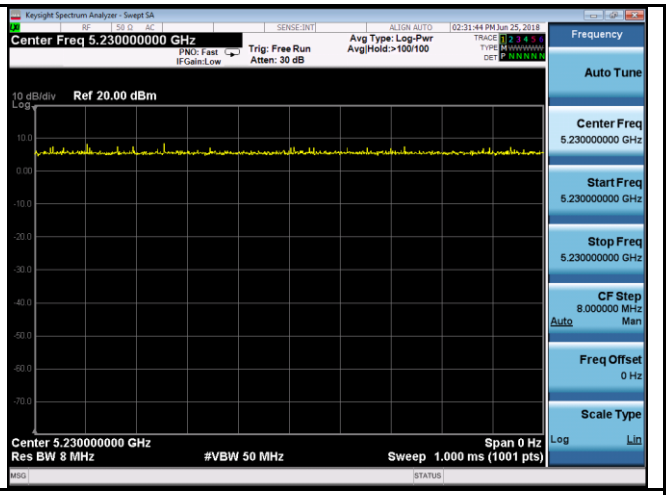


5150-5250MHz Duty cycle - Middle CH 5200

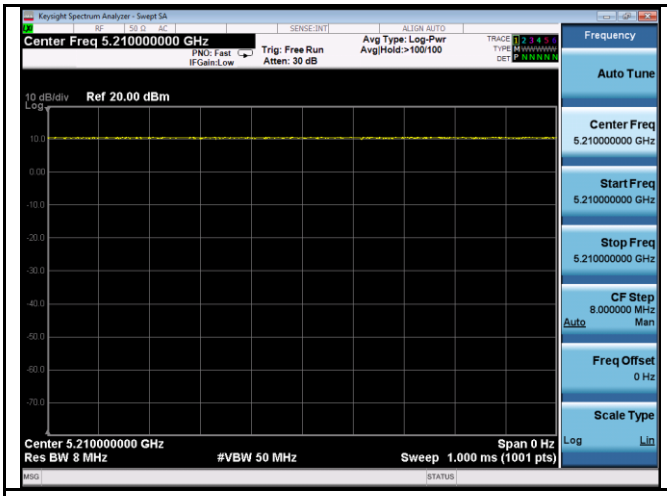


5150-5250MHz Duty cycle - High CH 5240

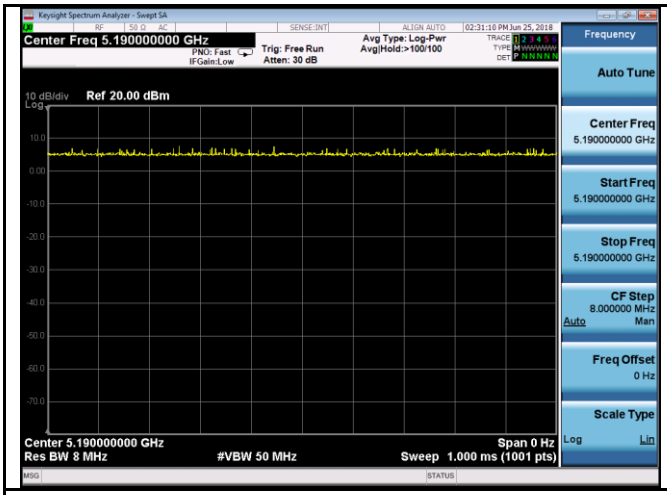
802.11ac (40M)

	
5150-5250MHz Duty cycle - Low CH 5190	5250-5350MHz Duty cycle - High CH 5230

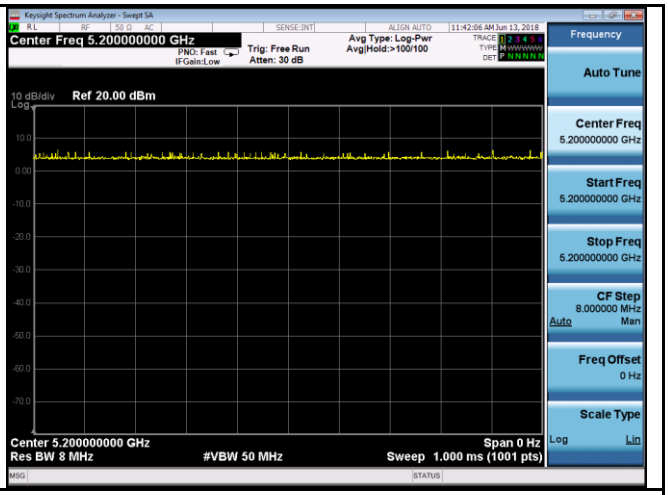
802.11ac (80M)

	
5150-5250MHz Duty cycle – One CH 5210	

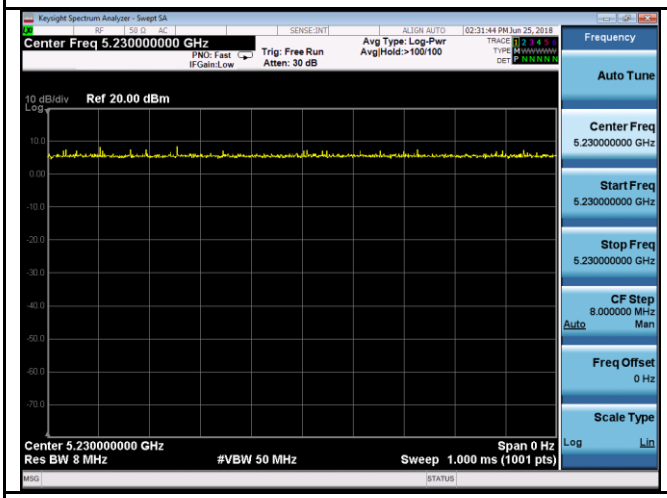
802.11n (40M)



5150-5250MHz Duty cycle - Low CH 5190



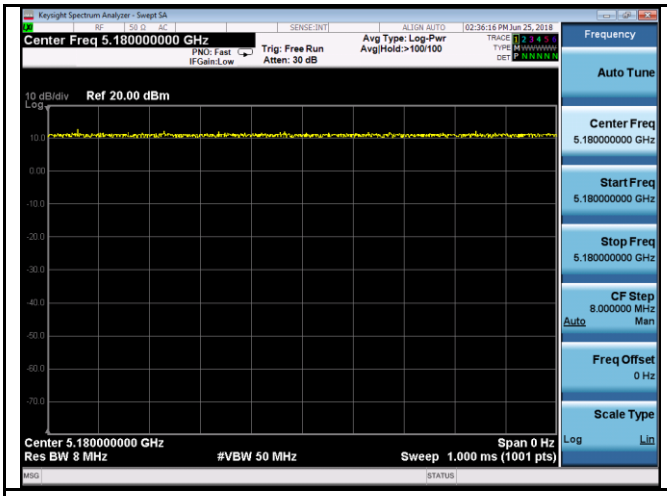
5150-5250MHz Duty cycle - Middle CH 5200



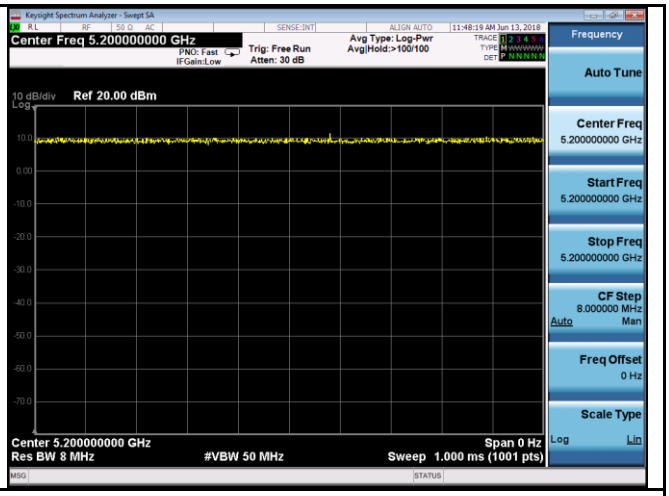
5250-5350MHz Duty cycle - High CH 5230

Ant.1

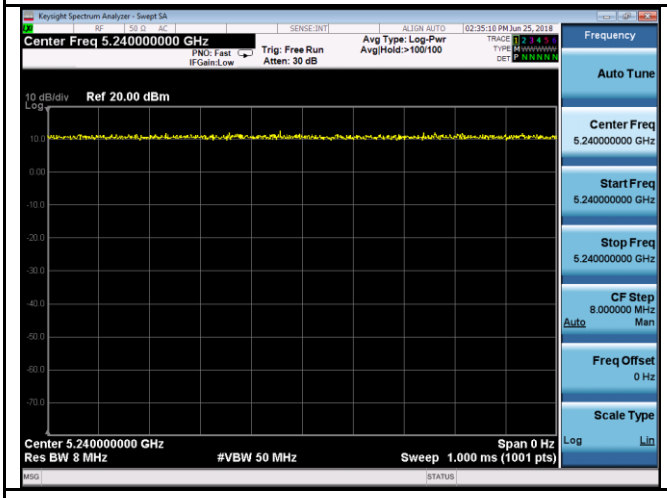
802.11a



5150-5250MHz Duty cycle - Low CH 5180

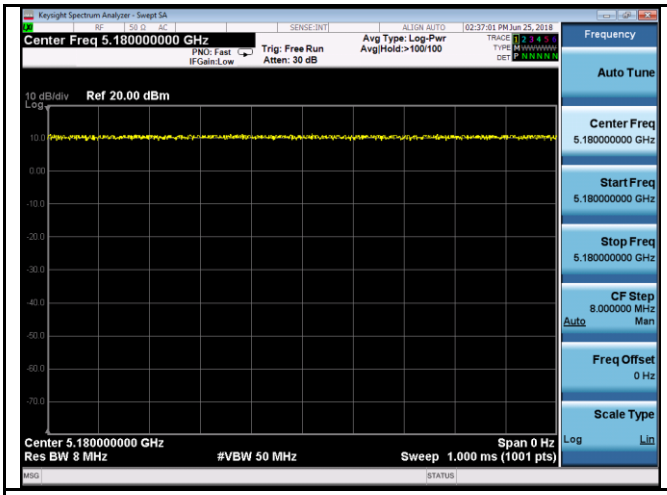


5150-5250MHz Duty cycle - Middle CH 5200

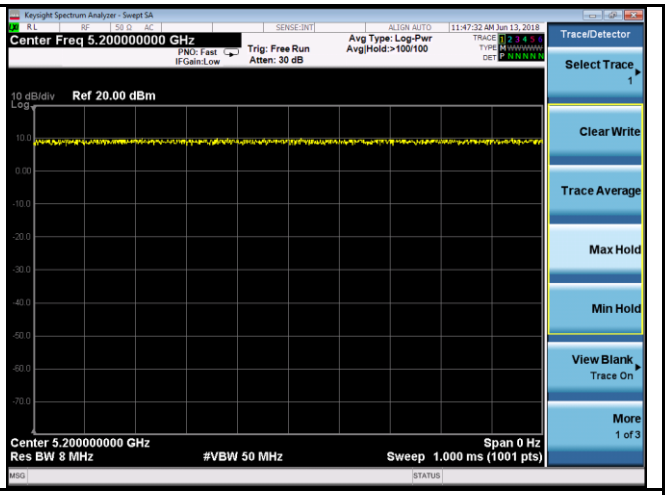


5150-5250MHz Duty cycle - High CH 5240

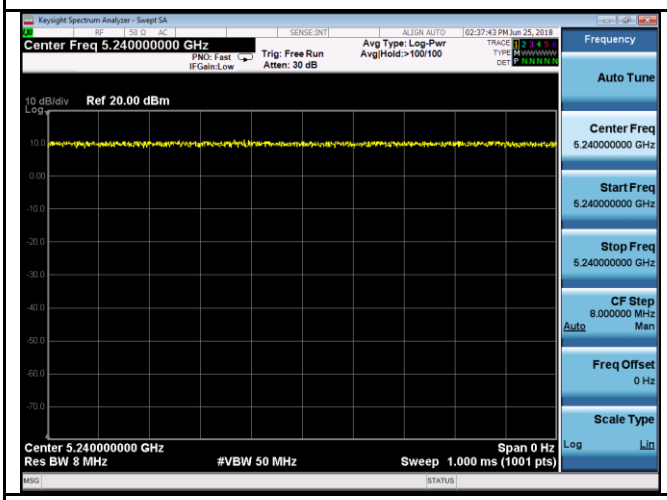
802.11ac (20M)



5150-5250MHz Duty cycle - Low CH 5180

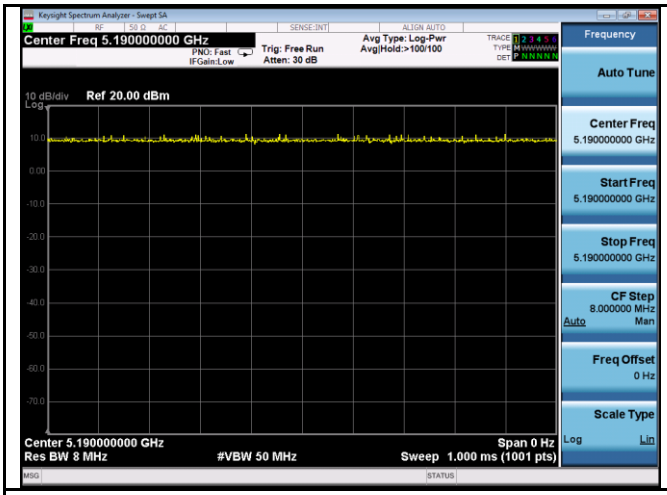


5150-5250MHz Duty cycle - Middle CH 5200

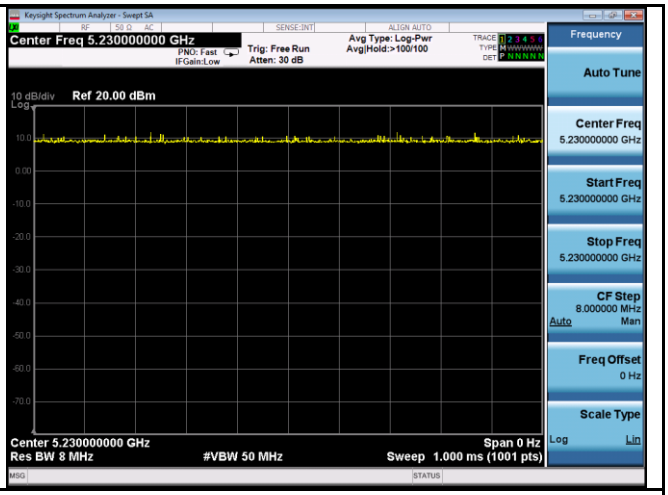


5150-5250MHz Duty cycle - High CH 5240

802.11ac (40M)

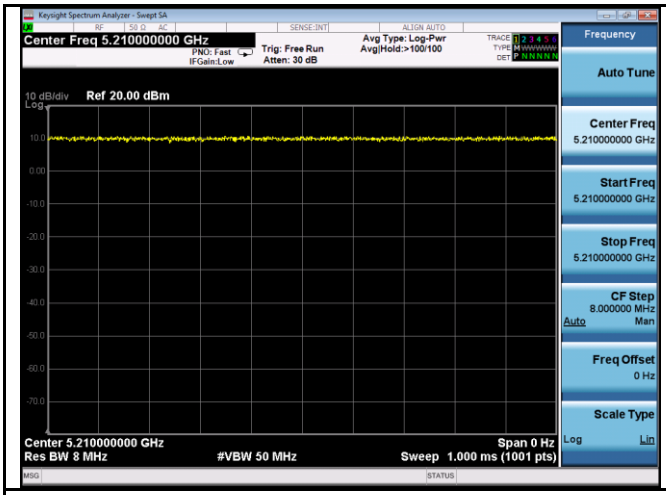


5150-5250MHz Duty cycle - Low CH 5190



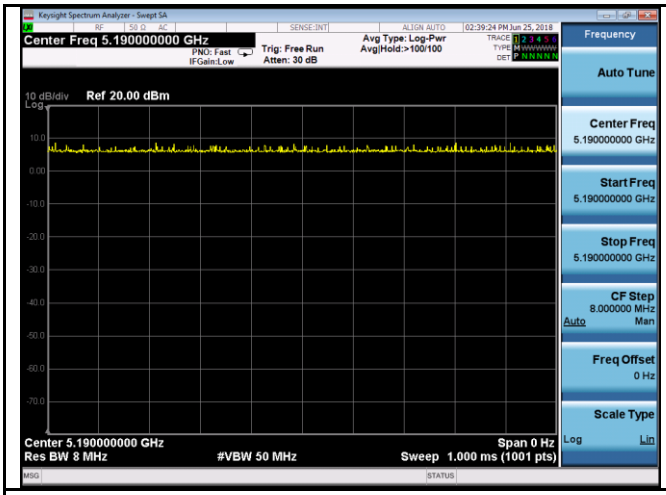
5250-5350MHz Duty cycle - High CH 5230

802.11ac (80M)

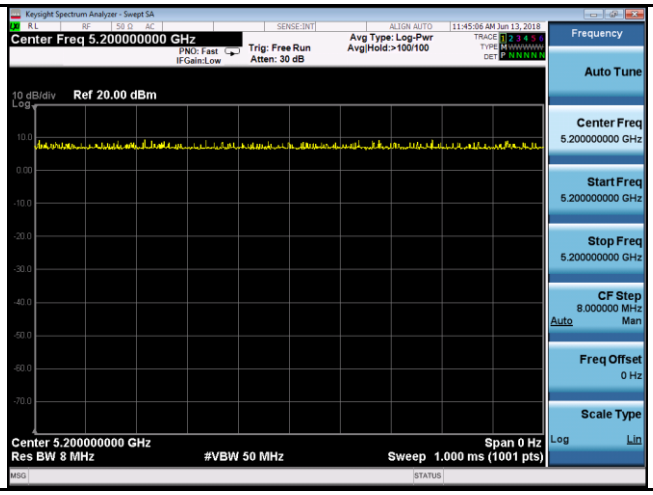


5150-5250MHz Duty cycle – One CH 5190

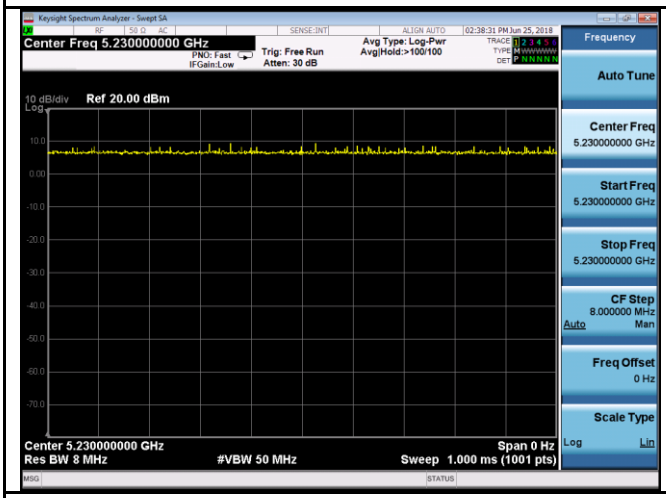
802.11n (40M)



5150-5250MHz Duty cycle - Low CH 5190



5150-5250MHz Duty cycle - Middle CH 5200



5250-5350MHz Duty cycle - High CH 5230

6.2 §15.407(a)-DTS (99% &26 dB) Channel Bandwidth

1. Conducted Measurement

   EUT was set for low, mid, high channel with modulated mode and highest RF output power.

   The spectrum analyzer was connected to the antenna terminal.

2. Environmental Conditions

Temperature	24°C
Relative Humidity	55%
Atmospheric Pressure	1017mbar

3. Conducted Emissions Measurement Uncertainty

   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.

4. Test date : June 13, 2018

   Tested By : Aaron Liang

Standard Requirement:

None; for reporting purposes only.

Procedures:

99% Bandwidth:

1. Set center frequency to the nominal EUT channel center frequency
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. he video bandwidth (VBW) ≥ 3 x RBW.
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used
6. Use the 99 % power bandwidth function of the instrument (if available)
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning

at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the

difference between these two frequencies.

Emission Bandwidth (EBW)

1) Set RBW = approximately 1% of the emission bandwidth.
2) Set the VBW > RBW.
3) Detector = Peak.
4) Trace mode = max hold.
5) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust

Test Result: Pass.

Please refer to the following tables and plots.

Measurement result

Ant.0

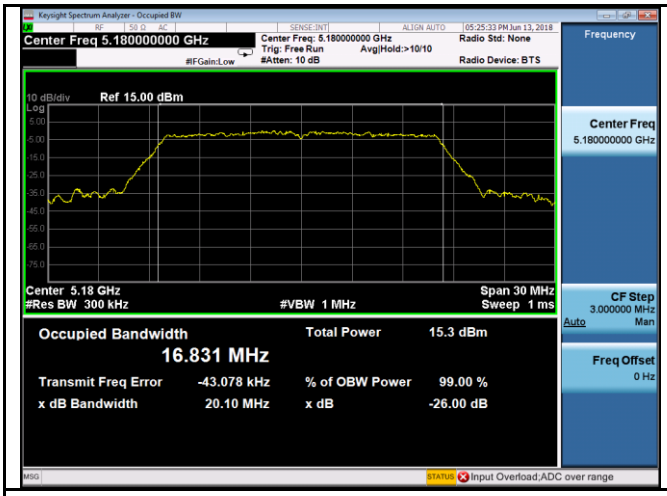
Test mode	Freq Band (MHz)	CH	Freq (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)	
				Ant.0	Ant.1	Ant.0	Ant.1
820.11a	5150-5250	Low	5180	16.831	16.923	20.10	20.10
		Middle	5200	16.841	16.921	19.97	20.30
		High	5240	16.837	16.979	20.20	20.47
802.11ac (20M)		Low	5180	17.667	17.731	20.29	20.45
		Middle	5200	17.681	17.732	20.35	20.36
		High	5240	17.671	17.726	20.30	20.47
802.11ac (40M)		Low	5190	36.031	35.916	39.44	39.85
		High	5230	35.988	35.916	39.47	39.48
802.11ac (80M)		One	5210	74.901	74.884	80.04	80.07
802.11n (40M)		Low	5190	35.918	35.954	39.50	39.76
		High	5230	35.888	35.918	39.60	39.69

Test Plots

Bandwidth measurement result

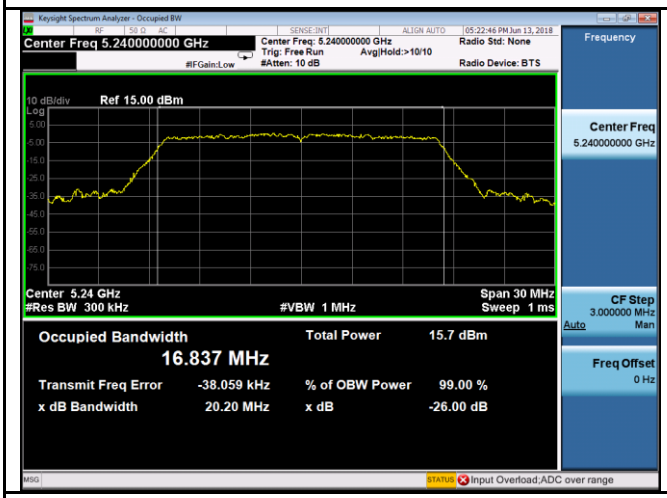
Ant.0

802.11a



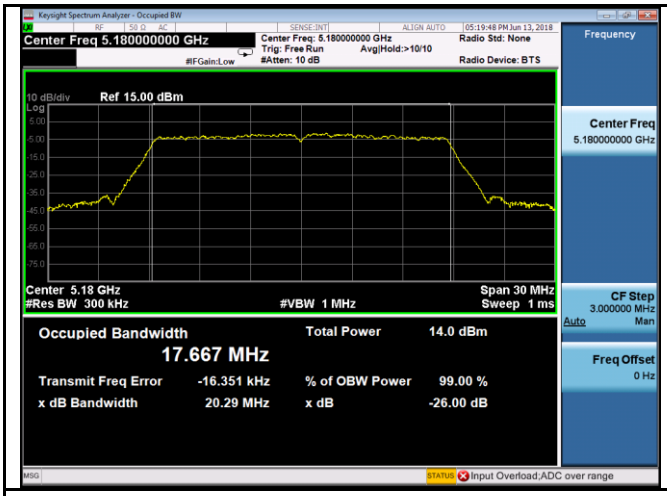
5150-5250MHz Bandwidth - Low CH 5180

5150-5250MHz Bandwidth - Middle CH 5200

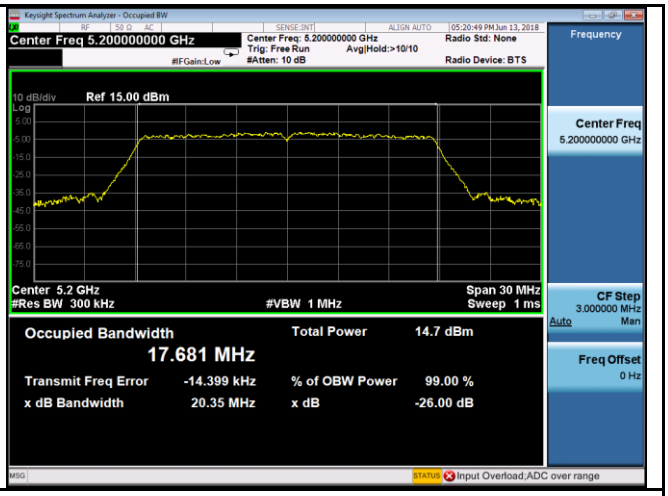


5150-5250MHz Bandwidth - High CH 5240

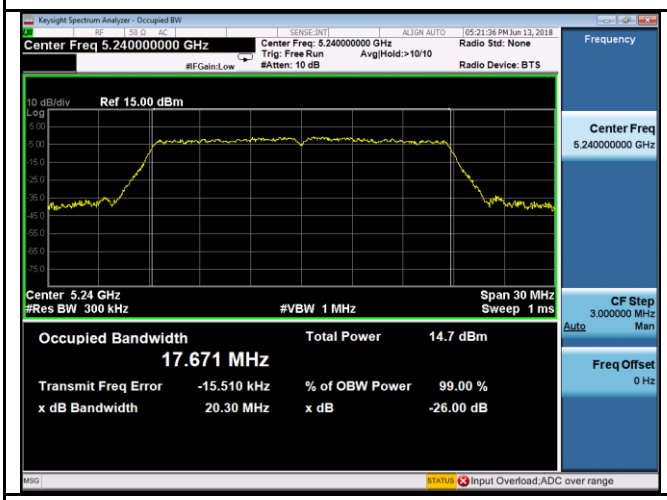
802.11ac (20M)



5150-5250MHz Bandwidth - Low CH 5180

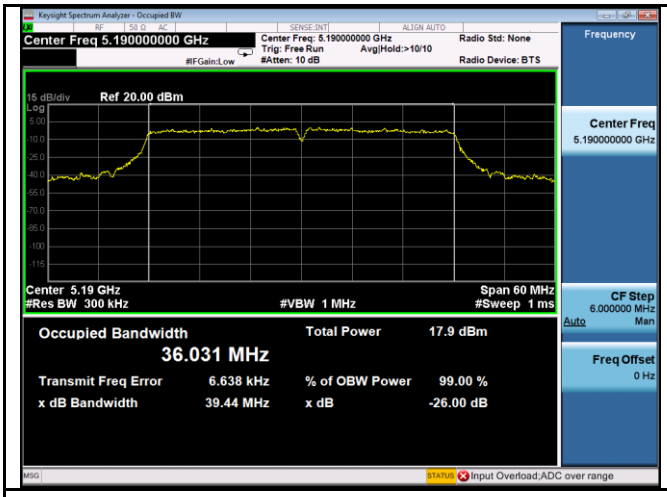


5150-5250MHz Bandwidth - Middle CH 5200



5150-5250MHz Bandwidth - High CH 5240

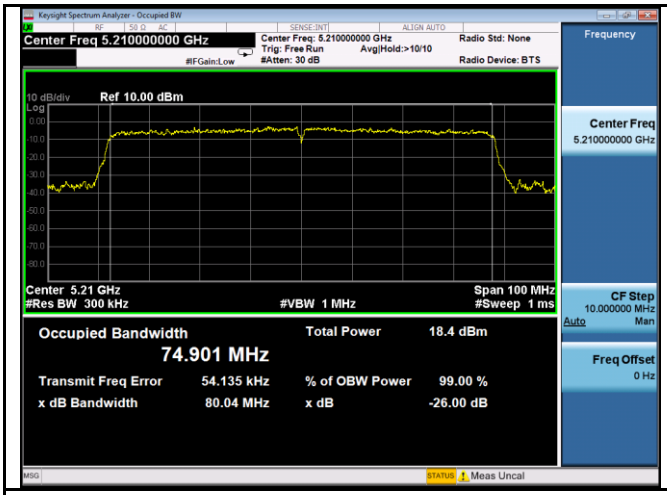
802.11ac (40M)



5150-5250MHz Bandwidth - Low CH 5190

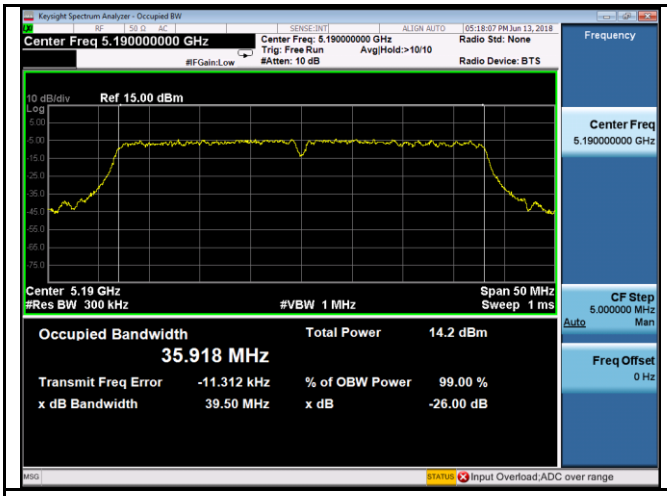
5150-5250MHz Bandwidth - High CH 5230

802.11ac (80M)

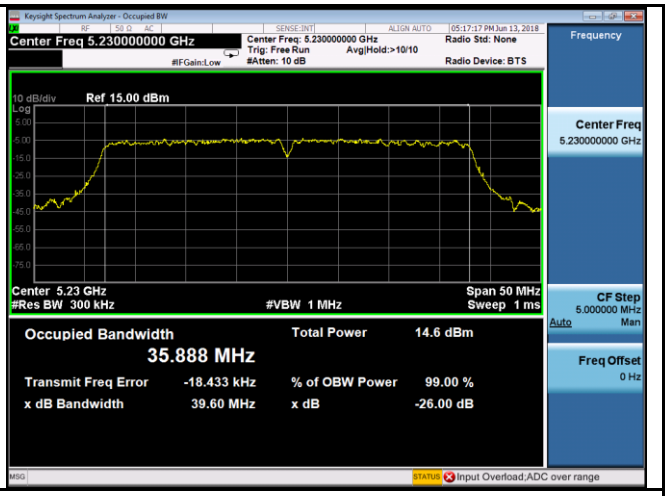


5150-5250MHz Bandwidth -One CH 5210

802.11n (40M)



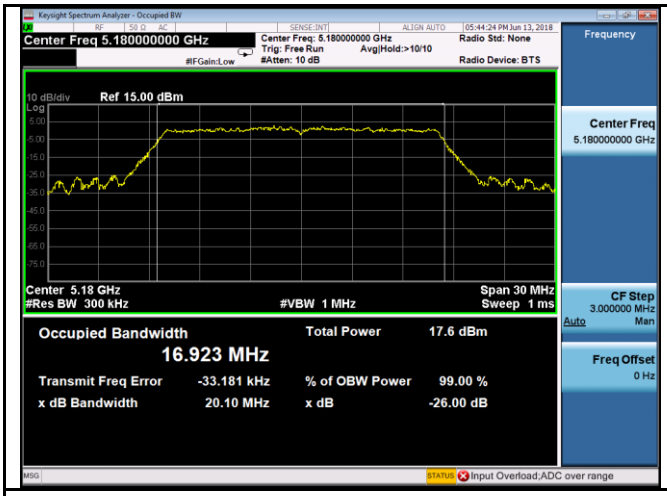
5150-5250MHz Bandwidth - Low CH 5190



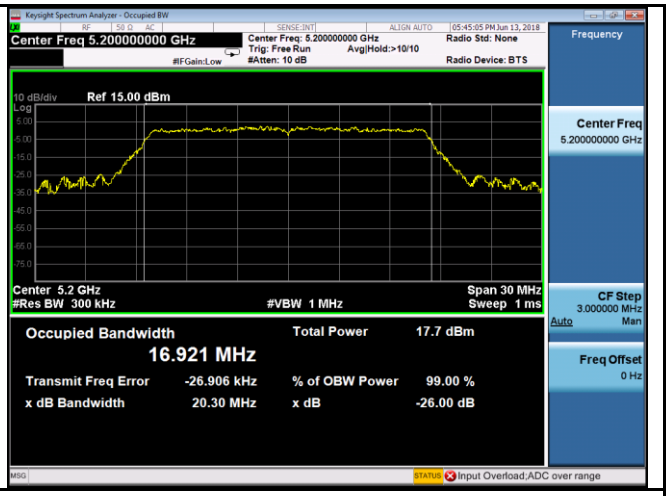
5150-5250MHz Bandwidth - High CH 5230

Ant.1

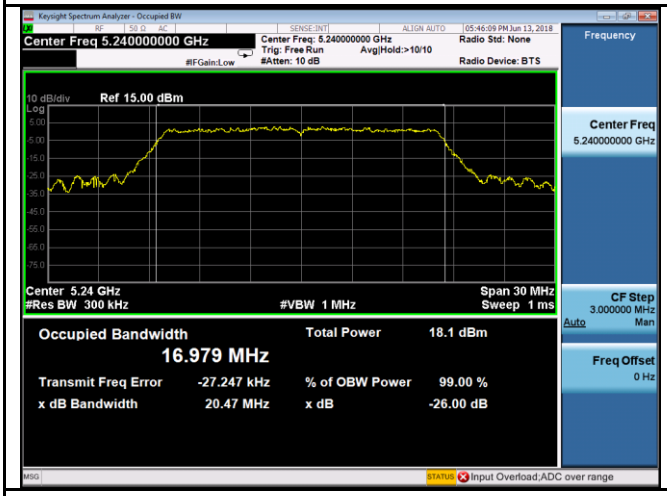
802.11a



5150-5250MHz Bandwidth - Low CH 5180

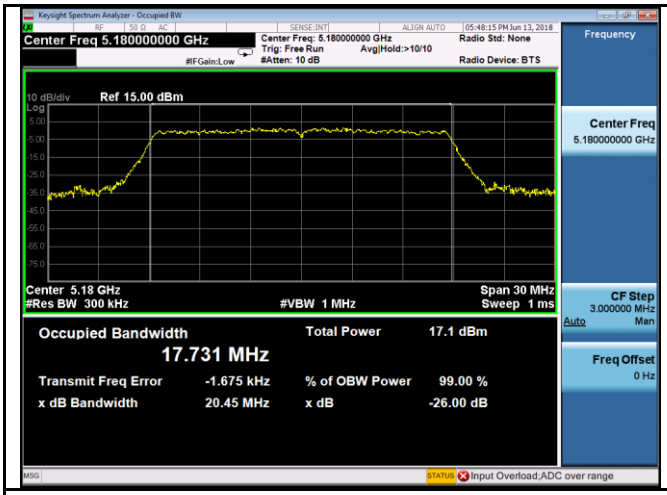


5150-5250MHz Bandwidth - Middle CH 5200

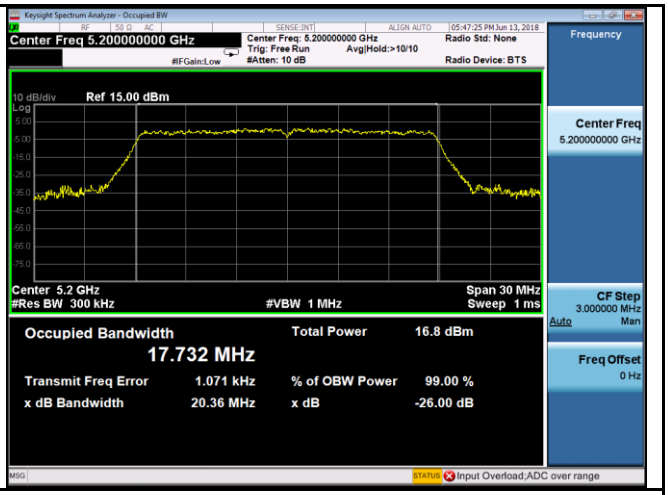


5150-5250MHz Bandwidth - High CH 5240

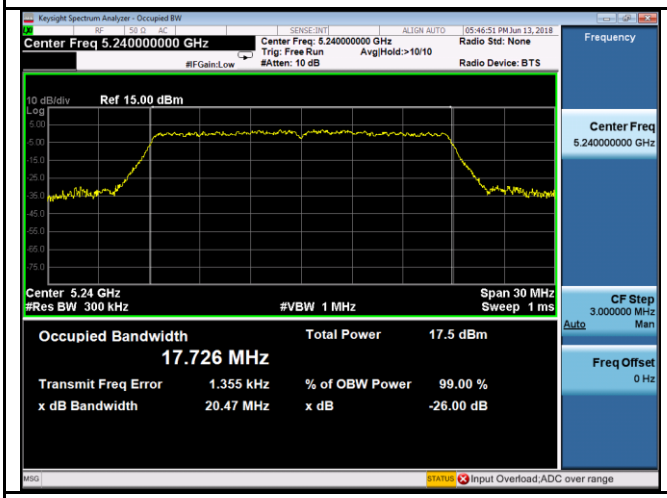
802.11ac (20M)



5150-5250MHz Bandwidth - Low CH 5180



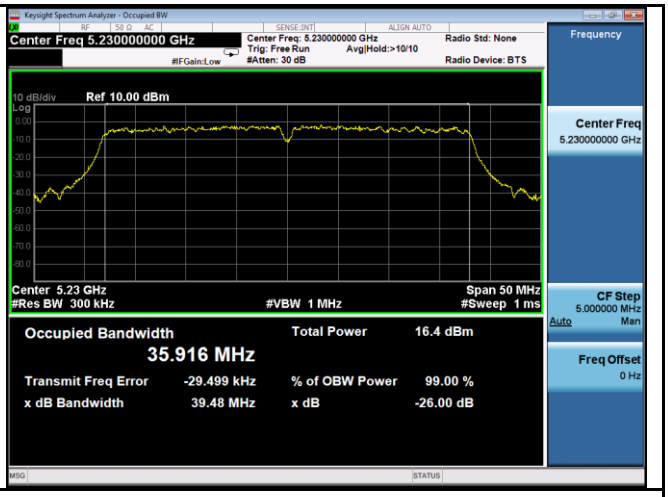
5150-5250MHz Bandwidth - Middle CH 5200



5150-5250MHz Bandwidth - High CH 5240

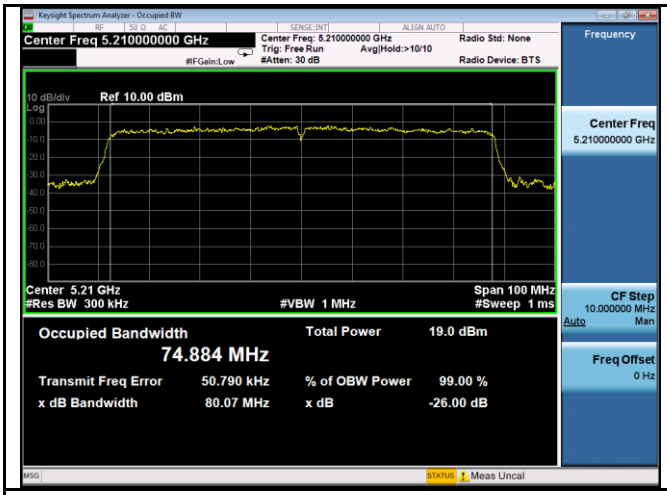
802.11ac (40M)

5150-5250MHz Bandwidth - Low CH 5190



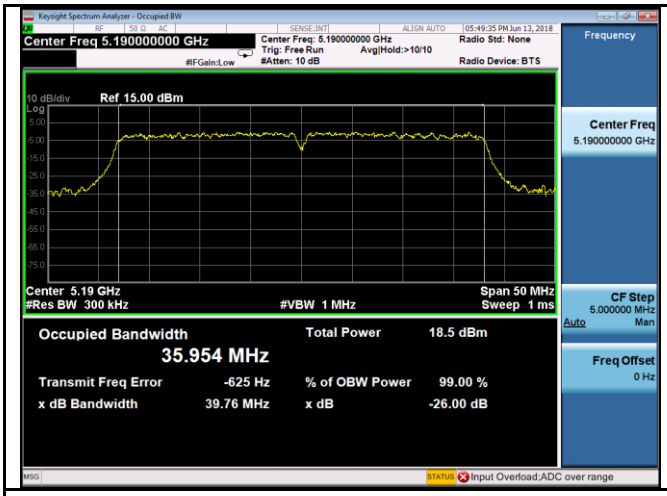
5150-5250MHz Bandwidth - High CH 5230

802.11ac (80M)

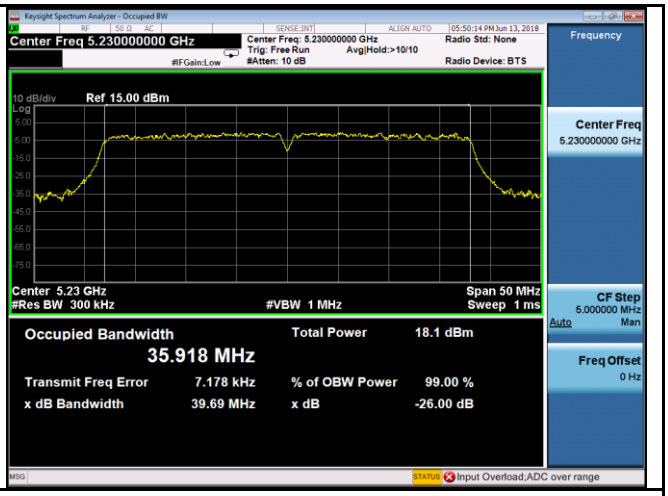


5150-5250MHz Bandwidth -One CH 5210

802.11n (40M)



5150-5250MHz Bandwidth - Low CH 5190



5150-5250MHz Bandwidth - High CH 5230

6.3 §15.407(a)-DTS (99% &6 dB) Channel Bandwidth

1. Conducted Measurement

   EUT was set for low, mid, high channel with modulated mode and highest RF output power.

   The spectrum analyzer was connected to the antenna terminal.

2. Environmental Conditions

Temperature	---
Relative Humidity	---
Atmospheric Pressure	---

3. Conducted Emissions Measurement Uncertainty

   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.

4. Test date : --

   Tested By : --

Standard Requirement:

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

Procedures:

99% &6 dB Bandwidth:

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.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

Emission Bandwidth (EBW)

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

2) Set the VBW > RBW.

3) Detector = Peak.

4) Trace mode = max hold.

5) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust

Test Result: N/A.

6.4 §15.407(a)-Conducted Maximum Output Power

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	24°C
Relative Humidity	55%
Atmospheric Pressure	1017mbar

4. Test date : June 13, 2018

   Tested By : Aaron Liang

Standard Requirement:

For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. f transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

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

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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Procedures:

Measurement Procedure Maximum conducted output power:

Maximum conducted output power may be measured using a spectrum analyzer/EMI receiver or an RF power meter.

1. Device Configuration

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).

a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

2. Measurement using a Power Meter (PM)

a) Method PM (Measurement using an RF average power meter):

(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

- The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
- At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.

• The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

(ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section II.B.
(iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
(iv) Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10

log(1/0.25) if the duty cycle is 25 percent).

Test Result: Pass.

Please refer to the following tables and plots:

Output Power measurement result

Test mode	Freq Band (MHz)	CH	Frequency (MHz)	Conducted Power (dBm)		Limit (dBm)	Result
				Ant. 0	Ant. 1		
820.11a	5150-5250	Low	5180	11.56	11.49	30	Pass
		Middle	5200	11.44	11.26	30	Pass
		High	5240	**11.83**	11.55	30	Pass
802.11ac (20M)		Low	5180	**11.68**	10.52	30	Pass
		Middle	5200	10.35	11.18	30	Pass
		High	5240	11.18	10.73	30	Pass
802.11ac (40M)		Low	5190	16.97	17.71	30	Pass
		High	5230	16.84	**17.76**	30	Pass
802.11ac (80M)		One	5210	17.97	**19.19**	30	Pass
802.11n (40M)		Low	5190	**11.44**	10.71	30	Pass
		High	5230	11.40	11.42	30	Pass

6.5 §15.407(a) - Power Spectral Density

1. Conducted Measurement

   EUT was set for low, mid, high channel with modulated mode and highest RF output power.

   The spectrum analyzer was connected to the antenna terminal.

2. Environmental Conditions

Temperature	24°C
Relative Humidity	55%
Atmospheric Pressure	1017mbar

3. Conducted Emissions Measurement Uncertainty

   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.

4. Test date : June 13, 2018

   Tested By : Aaron Liang

Standard Requirement:

The maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

The maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional

gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII
device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Procedures:

The rules requires " maximum power spectral density" measurements where the intent is to measure the maximum value of the time average of the power spectral density measured during a period of continuous transmission.

1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, " Compute power…" . (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)

2. Use the peak search function on the instrument to find the peak of the spectrum and record its value.

3. Make the following adjustments to the peak value of the spectrum, if applicable:

a) If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.

b) If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.

4. The result is the Maximum PSD over 1 MHz reference bandwidth.

5. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, " provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and

integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/T, where T is defined in section II.B.l.a).

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since RBW=100 KHZ is available on nearly all spectrum analyzers.

Test Result: Pass.

Please refer to the following tables and plots.

Power Spectral Density measurement result

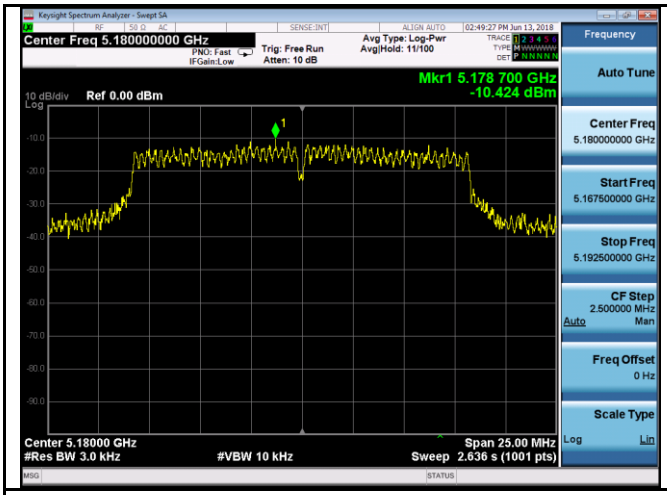
Test mode	Freq Band (MHz)	CH	Frequency (MHz)	PSD (dBm)		Limit (dBm)	Result
				Ant.0	Ant.1		
820.11a	5150-5250	Low	5180	-10.424	-10.858	17	Pass
		Mid	5200	-12.893	-11.914	17	Pass
		High	5240	-12.249	-10.813	17	Pass
802.11ac (20M)		Low	5180	-14.263	-13.848	17	Pass
		Middle	5200	-11.743	-12.319	17	Pass
		High	5240	-13.220	-13.381	17	Pass
802.11ac (40M)		Low	5190	-15.855	-15.622	17	Pass
		High	5230	-15.202	-12.717	17	Pass
802.11ac (80M)		One	5210	-15.582	-15.211	17	Pass
802.11n (40M)		Low	5190	-14.219	-14.585	17	Pass
		High	5230	-15.636	-11.615	17	Pass

Test Plots

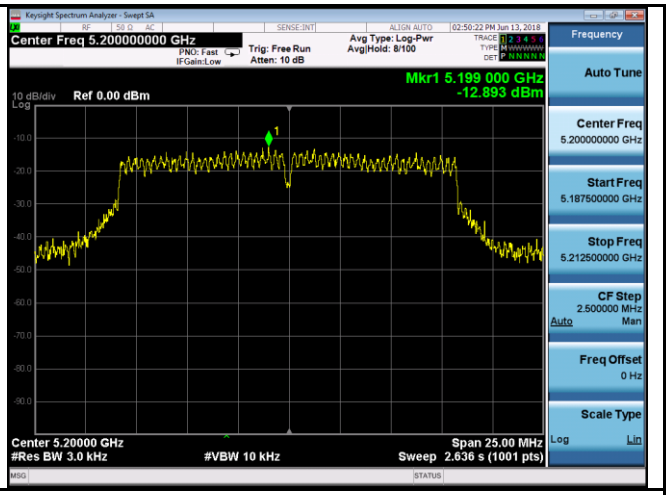
Power Spectral Density measurement result Test Plots

Ant.0

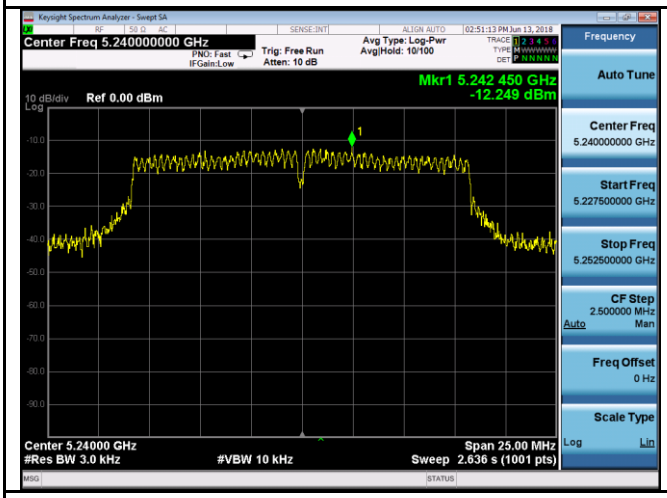
802.11a



5150-5250MHz PSD - Low CH 5180



5150-5250MHz PSD - Middle CH 5200



5150-5250MHz PSD - High CH 5240