RF TEST REPORT

SIEMIC
A Bureau Veritas Group Company

Report No.: FCC_IC_RF_SL18091002-RUC-050_U-NII-2 Rev_2.0
Supersede Report No.: FCC_IC_RF_SL18091002-RUC-050_U-NII-2 Rev_2.0

Applicant	:	Ruckus Wireless, Inc.
Product Name	:	R750 Access Point
Model No.	:	R750
Test Standard	:	47 CFR 15.407 RSS-247 Issue 2, February 2017
Test Method	:	ANSI C63.10:2013 RSS-Gen Issue 5, March 2019 789033 D02 General U-NII Test Procedures New Rules v02r01 662911 D01 Multiple Transmitter Output v02r01 662911 D02 MIMO with Cross Polarized Antenna v01
FCC ID	:	S9GR750
IC ID	:	5912A-R750
Dates of test	:	02/20/2019-04/12/2019
Issue Date	:	06/03/2019
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification [X] Equipment did not comply with the specification [ ]		

This Test Report is Issued Under the Authority of:	
	
Deon Dai	Chen Ge
Test Engineer	Engineer Reviewer
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only	

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, 95035 CA

Laboratory 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.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC, RF/Wireless, Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless, Telecom
Taiwan	BSMI, NCC, NIST	EMC, RF, Telecom, Safety
Hong Kong	OFTA, NIST	RF/Wireless, Telecom
Australia	NATA, NIST	EMC, RF, Telecom, Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC, RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom, Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

CONTENTS

1 REPORT REVISION HISTORY 4
2 EXECUTIVE SUMMARY 5
3 CUSTOMER INFORMATION 5
4 TEST SITE INFORMATION 5
5 MODIFICATION 5
6 EUT INFORMATION 6
6.1 EUT Description 6
6.2 Radio Description 6
7 SUPPORTING EQUIPMENT/SOFTWARE AND CABLING DESCRIPTION 8
7.1 Supporting Equipment 8
7.2 Cabling Description 8
7.3 Test Software Description 8
8 TEST SUMMARY 9
9 MEASUREMENT UNCERTAINTY 10
10 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS 11
10.1 Antenna Requirement 11
10.2 Conducted Emissions 12
10.3 6dB & 26 dB Bandwidth & 99% Bandwidth 15
10.4 Maxinum Conducted Output Power 33
10.5 Maximum Peak Power Spectral Density 112
10.6 Band Edge Measurement 176
10.7 Radiated Spurious Emissions below 1GHz 217
10.8 Radiated Spurious Emissions above 1GHz 219
10.9 Receiver Radiated Emissions 231
ANNEX A. TEST INSTRUMENT 235
ANNEX B. SIEMIC ACCREDITATION 236

1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_IC_RF_SL18091002-RUC-050_U-NII-2	None	Original	04/09/2019
FCC_IC_RF_SL18091002-RUC-050_U-NII-2 Rev_1.0	Rev_1.0	Add TPC Result	04/12/2019
FCC_IC_RF_SL18091002-RUC-050_U-NII-2 Rev_2.0	Rev_2.0	Update Per Review	06/03/2019

2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company:	Ruckus Wireless, Inc.
Product:	R750 Access Point
Model:	R750

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	:	Ruckus Wireless, Inc.
Applicant Address	:	350 West Java Drive, Sunnyvale, California 94089 U.S.A
Manufacturer Name	:	Ruckus Wireless, Inc.
Manufacturer Address	:	350 West Java Drive, Sunnyvale, California 94089 U.S.A

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	540430
IC Test Site No.	4842D
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	R750 Access Point
Model No.	R750
Trade Name	Ruckus
Serial No.	431806000043
Host Model No.	N/A
Input Power	Power Adapter: 48VDC 0.75A, or 48VDC (PoE)
Power Adapter Manu/Model	Ruckus / 740-64277-001
Power Adapter SN	N/A
Date of EUT received	02/18/2019
Equipment Class/ Category	DTS, UNII
Port/Connectors	Power Port, Ethernet*2, USB

6.2 Radio Description

Radio Type	802.11a/n	802.11ac/ax-20M	802.11ax-40M	802.11ac/ax-40M	802.11ac/ax-80M
Operating Frequency	5260-5320MHz 5500-5720MHz		5270-5310MHz 5510-5710MHz		5290MHz, 5530MHz 5610MHz, 5690MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM,256QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM,256QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Spacing	20MHz		40MHz		80MHz
Number of Channels	16		6		4
Antenna Type	PCB Antenna				
Antenna Gain (Peak)	5GHz: 3dBi				
Antenna Connector Type	I-pex				
Note	2.4GHz and 5GHz Radio transmit simultaneously				

Note: EUT has 4 antennas, 2 antennas are in horizontal polarity, and 2 antennas in vertical polarity. The 802.11b/g/a is in CDD mode with all 4 antenna transmit simultaneously.

Band	Antenna Port/Antenna Polarity			
	Chain 0	Chain 1	Chain 2	Chain 3
2.4G	V	H	H	V
5G	V	H	V	H

662911 D01 Multiple Transmitter Output v02r01
662911 D02 MIMO with Cross-Polarized Antennas v01

Since they're in 90 deg phase shift between the horizontal and vertical antennas, for radiated limit, the result from different polarization antenna will not be combined. So only the result for 2 vertical poparity antennas and 2 horizontal poparity antennas will be combined for MIMO mode separately.For Cross-polarized antenna, the total gain—including array gain—is computed separately for each of polarizations using the procedures presented in this document. The highest of the total gains shall apply. For this case, the highest of the total gain will be the directional gain of 2 antennas.
For conducted limit like power and psd, the result from all 4 chains will be summed.

EUT Power level setting

Band	Mode	Frequency	Power Setting	Band	Mode	Frequency	Power Setting
U-NII-2A	802.11-a	5260	16.0	U-NII-2C	802.11-a	5500	16.0
	802.11-a	5280	16.0		802.11-a	5580	16.5
	802.11-a	5320	16.0		802.11-a	5700	16.0
	802.11-n-20	5260	16.0		802.11-n-20	5500	16.0
	802.11-n-20	5280	16.0		802.11-n-20	5580	16.0
	802.11-n-20	5320	16.0		802.11-n-20	5700	15.0
	802.11-n-40	5270	16.5		802.11-n-40	5510	16.0
	802.11-n-40	5310	16.5		802.11-n-40	5590	16.0
	802.11-ac-80	5290	16.5		802.11-n-40	5670	16.5
	-	-	-		802.11-ac-80	5530	16.0
	-	-	-		802.11-ac-80	5610	16.5

CROSS Band channels power setting

Mode	Frequency	Power Setting
802.11-a	5720	16.5
802.11-n-20	5720	16.0
802.11-n-40	5710	17.0
802.11-ac-80	5690	17.0

Note: All data rate has been verified and worst case was used for all test items.

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	PP01L Latitude E5440	F1WPF12	Dell	-
2	POE Adapter	740-64211-001	133279963	Ruckus	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
RJ45	EUT	RJ45	POE	RJ45	2	Unshielded	-
RJ45	POE	RJ45	Laptop	RJ45	2	Unshielded	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Putty	Set the EUT to transmit continuously in diferent test mode

8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Antenna Requirement	FCC	15.203	ANSI C63.10:2013	☒ Pass ☐ N/A
Restricted Band of Operation	FCC	15.205	ANSI C63.10:2013 789033 D02 General U-NII Test Procedures New Rules v02r01	☒ Pass ☐ N/A
	IC	RSS 247 (3.3) RSS Gen (8.10)		
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.10:2013	☒ Pass ☐ N/A
	IC	RSS Gen (8.8)		

Test Item	Test standard		Test Method/Procedure	Pass / Fail
6 & 26 dB Emission Bandwidth	FCC	15.407 (a) (2)	789033 D02 General U-NII Test Procedures New Rules v02r01	☒ Pass ☐ N/A
99% Bandwidth	IC	RSS 247 (6.2)		
Maximum conducted Output Power	FCC	15.407 (a) (2)	789033 D02 General U-NII Test Procedures New Rules v02r01	☒ Pass ☐ N/A
	IC	RSS 247 (6.2)		
Power reduction (Antenna Gain > 6 dBi)	FCC	15.407 (a) (2)	-	☐ Pass ☒ N/A
	IC	RSS 247 (6.2)		
Band Edge and Radiated Spurious Emissions	FCC	15.407(b)(2), 15.407(b)(6)	ANSI C63.10:2013 789033 D02 General U-NII Test Procedures New Rules v02r01	☒ Pass ☐ N/A
	IC	RSS 247 (6.2)		
Power Spectral Density	FCC	15.407 (a) (2)	789033 D02 General U-NII Test Procedures New Rules v02r01	☒ Pass ☐ N/A
	IC	RSS 247 (6.2)		
Frequency Stability	FCC	15.407 (g)	-	☐ Pass ☒ N/A
	IC	RSS GEN (8.11)		
Transmit Power Control (TPC)	FCC	15.407 (h)(1)	-	☐ Pass ☒ N/A
	IC	RSS 247 (6.2)		
Receiver Radiated Emissions	IC	RSS Gen (7.3)	RSS Gen Issue 5: 2019	☒ Pass ☐ N/A
User Manual	FCC	-	-	☒ Pass ☐ N/A
	IC	-		
Remark	1. All measurement uncertainties are not taken into consideration for all presented test result. 2. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.			

9 Measurement Uncertainty

Emissions			
Test Item	Frequency Range	Description	Uncertainty
AC Conducted Emissions	150KHz – 30MHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	±3.5dB
RF conducted measurement	150KHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	±0.95dB
Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	±6dB
Radiated Spurious Emissions	1GHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	±6dB

10 Measurements, Examination and Derived Results

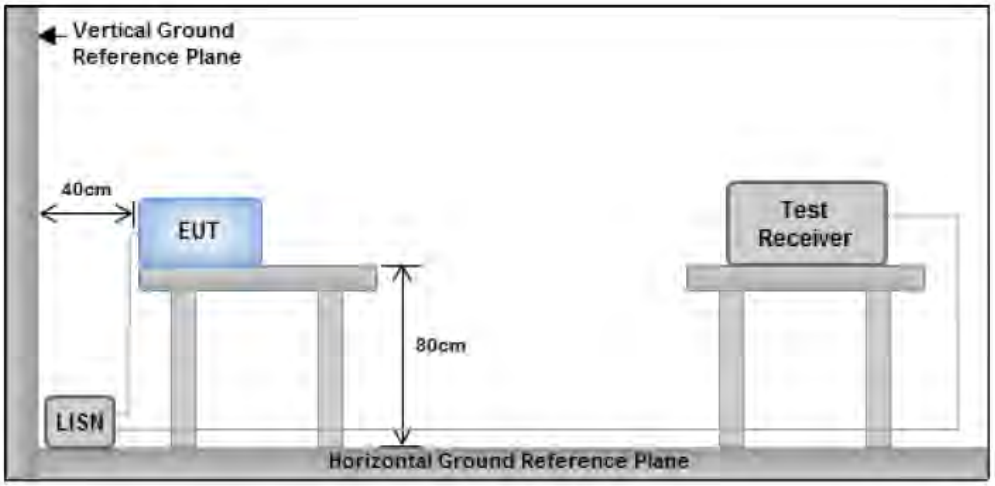
10.1 Antenna Requirement

Spec	Requirement	Applicable
§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. Antenna requirement must meet at least one of the following: a) Antenna must be permanently attached to the device. b) The antenna must use a unique type of connector to attach to the device. c) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.	☒
Remark	The EUT uses a I-PEX connector for antenna connection which meet the requirement.	
Result	☒ PASS ☐ FAIL	

10.2 Conducted Emissions

Conducted Emission Limit

Frequency ranges (MHz)	Limit (dBuV)	
	QP	Average
0.15 ~ 0.5	66 – 56	56 – 46
0.5 ~ 5	56	46
5 ~ 30	60	50

Spec	Item	Requirement	Applicable
RSS247(A8.1)	a)	For Low-power radio-frequency devices 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 or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequency ranges.	☒
Test Setup	 Note: 1. Support units were connected to second LISN. 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes		
Procedure	- The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B. - The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. - All other supporting equipment was powered separately from another main supply.		
Remark	EUT was tested at 120VAC, 60Hz		
Result	☒ Pass ☐ Fail		

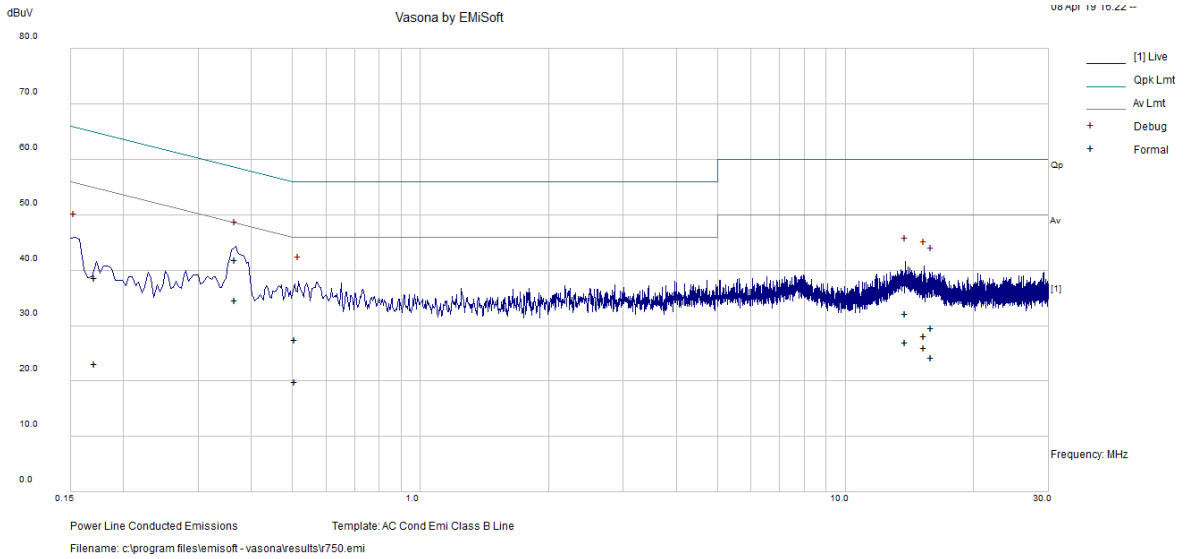
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Deon Dai at Conducted Emission test site.

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Deon Dai			
Test Date:	04/08/2019			
Remarks	POE, Live			

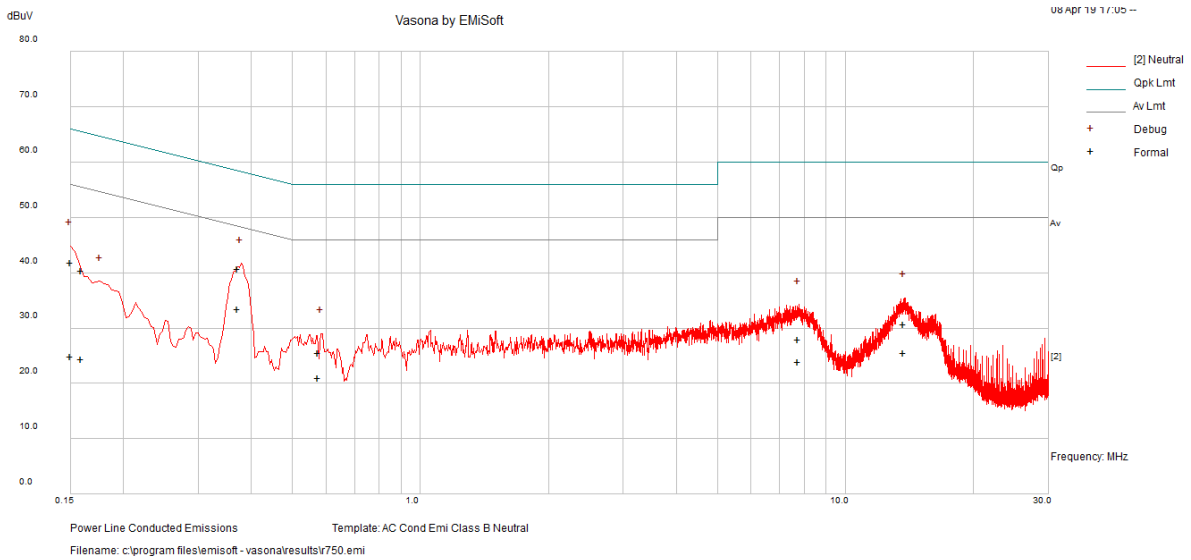


Line Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.37	34.54	7.29	0.04	41.87	Quasi Peak	Live	58.58	-16.7	Pass
0.51	20.11	7.36	0.04	27.51	Quasi Peak	Live	56	-28.49	Pass
13.87	22.95	8.84	0.33	32.12	Quasi Peak	Live	60	-27.88	Pass
15.35	18.91	8.92	0.37	28.19	Quasi Peak	Live	60	-31.81	Pass
0.17	31.42	7.14	0.05	38.61	Quasi Peak	Live	64.88	-26.27	Pass
16.00	20.2	8.95	0.38	29.54	Quasi Peak	Live	60	-30.46	Pass
0.37	27.32	7.29	0.04	34.64	Average	Live	48.58	-13.93	Pass
0.51	12.51	7.36	0.04	19.91	Average	Live	46	-26.09	Pass
13.87	17.8	8.84	0.33	26.97	Average	Live	50	-23.03	Pass
15.35	16.66	8.92	0.37	25.95	Average	Live	50	-24.05	Pass
0.17	15.88	7.14	0.05	23.07	Average	Live	54.88	-31.81	Pass
16.00	14.99	8.95	0.38	24.32	Average	Live	50	-25.68	Pass

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Deon Dai			
Test Date:	04/08/2019			
Remarks	POE, Neutral			

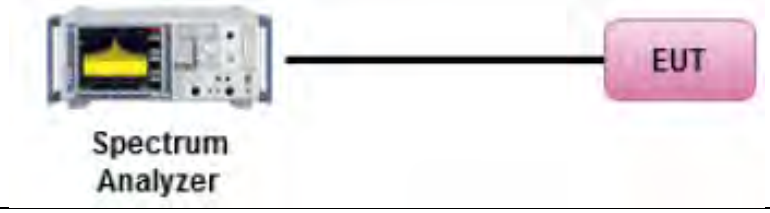


Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.37	33.37	7.29	0.03	40.69	Quasi Peak	Neutral	58.45	-17.76	Pass
0.15	34.73	7.11	0.04	41.88	Quasi Peak	Neutral	65.98	-24.1	Pass
13.76	21.6	8.83	0.33	30.77	Quasi Peak	Neutral	60	-29.23	Pass
7.75	19.46	8.27	0.16	27.89	Quasi Peak	Neutral	60	-32.11	Pass
0.16	33.26	7.12	0.04	40.43	Quasi Peak	Neutral	65.51	-25.08	Pass
0.57	18.04	7.42	0.03	25.49	Quasi Peak	Neutral	56	-30.51	Pass
0.37	26.08	7.29	0.03	33.4	Average	Neutral	48.45	-15.05	Pass
0.15	17.77	7.11	0.04	24.92	Average	Neutral	55.98	-31.06	Pass
13.76	16.45	8.83	0.33	25.62	Average	Neutral	50	-24.38	Pass
7.75	15.46	8.27	0.16	23.9	Average	Neutral	50	-26.1	Pass
0.16	17.2	7.12	0.04	24.37	Average	Neutral	55.51	-31.14	Pass
0.57	13.64	7.42	0.03	21.09	Average	Neutral	46	-24.91	Pass

10.3 6dB & 26 dB Bandwidth & 99% Bandwidth

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407 RSS GEN	-	26 dB Emission BW: Report only for reference.	☒
		6 dB Emission BW: Report only for reference(Cross Band)	☒
	a) (2)	26 dB Emission BW: Report only for power limit calculation.	☐
Test Setup			
Test Procedure	789033 D02 General U-NII Test Procedures New Rules v02r01 26dB Emission bandwidth measurement procedure (Other than 5.725-5.85 GHz) 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 maximum 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%. 6 dB Minimum emission bandwidth measurement procedure (for 5.725-5.85 GHz) 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.		
Test Date	02/15/2019-02/16/2019	Environmental condition	Temperature 23ºC Relative Humidity 42% Atmospheric Pressure 1021mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes ☐ N/A

Test was done by Deon Dai at RF test site.

26dB Bandwidth measurement result for U-NII-2A

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5260	Low	18.45
	802.11a	5280	Mid	18.55
	802.11a	5320	High	18.77
	802.11ax-20	5260	Low	21.16
	802.11ax-20	5280	Mid	20.14
	802.11ax-20	5320	High	20.38
	802.11ax-40	5270	Low	39.70
	802.11ax-40	5310	High	40.34
	802.11ax-80	5290	Mid	80.98

26dB Bandwidth measurement result for U-NII-2C

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5500	Low	20.44
	802.11a	5580	Mid	19.69
	802.11a	5700	High	20.04
	802.11ax-20	5500	Low	20.30
	802.11ax-20	5580	Mid	20.10
	802.11ax-20	5700	High	20.22
	802.11ax-40	5510	Low	39.83
	802.11ax-40	5590	Mid	39.45
	802.11ax-40	5670	High	39.85
	802.11ax-80	5530	Low	80.45
	802.11ax-80	5610	High	80.98

26dB Bandwidth measurement result for cross channels

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5720	CROSS	18.28
	802.11ax-20	5720	CROSS	20.12
	802.11ax-40	5710	CROSS	39.30
	802.11ax-80	5690	CROSS	79.76

6 Bandwidth measurement result for cross channels

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5720	CROSS	16.46
	802.11ax-20	5720	CROSS	18.94
	802.11ax-40	5710	CROSS	37.75
	802.11ax-80	5690	CROSS	77.35

99% Bandwidth measurement result for U-NII-2A

Type	Test mode	Freq (MHz)	CH	Result (MHz)
99% BW	802.11a	5260	Low	16.40
	802.11a	5280	Mid	16.34
	802.11a	5320	High	16.38
	802.11ax-20	5260	Low	18.94
	802.11ax-20	5280	Mid	18.95
	802.11ax-20	5320	High	18.85
	802.11ax-40	5270	Low	37.75
	802.11ax-40	5310	High	37.69
	802.11ax-80	5290	Mid	77.06

99% Bandwidth measurement result for U-NII-2C

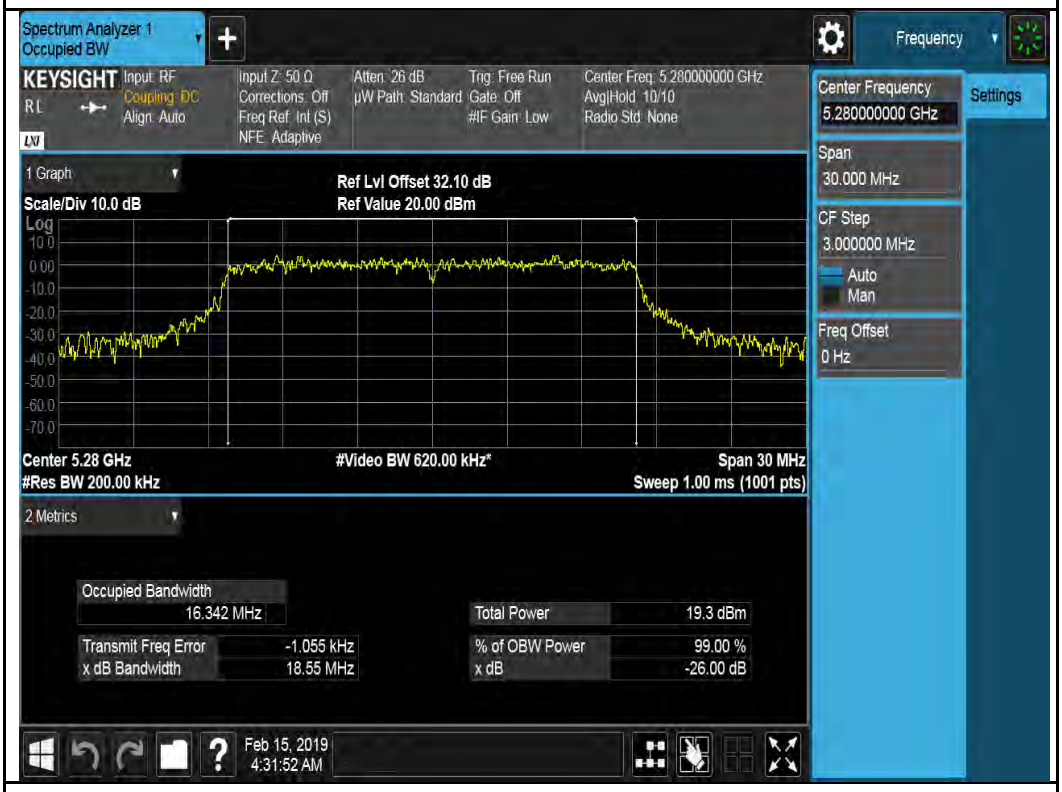
Type	Test mode	Freq (MHz)	CH	Result (MHz)
99% BW	802.11a	5500	Low	16.48
	802.11a	5580	Mid	16.51
	802.11a	5700	High	16.54
	802.11ax-20	5500	Low	18.95
	802.11ax-20	5580	Mid	18.91
	802.11ax-20	5700	High	18.89
	802.11ax-40	5510	Low	37.91
	802.11ax-40	5590	Mid	37.74
	802.11ax-40	5670	High	37.76
	802.11ax-80	5530	Low	76.99
	802.11ax-80	5610	High	77.24

99% Bandwidth measurement result for cross channels

Type	Test mode	Freq (MHz)	CH	Result (MHz)
99% BW	802.11a	5720	CROSS	16.40
	802.11ax-20	5720	CROSS	18.87
	802.11ax-40	5710	CROSS	37.64
	802.11ax-80	5690	CROSS	76.83

26dB Bandwidth Test Plots
U-NII-2A Band:

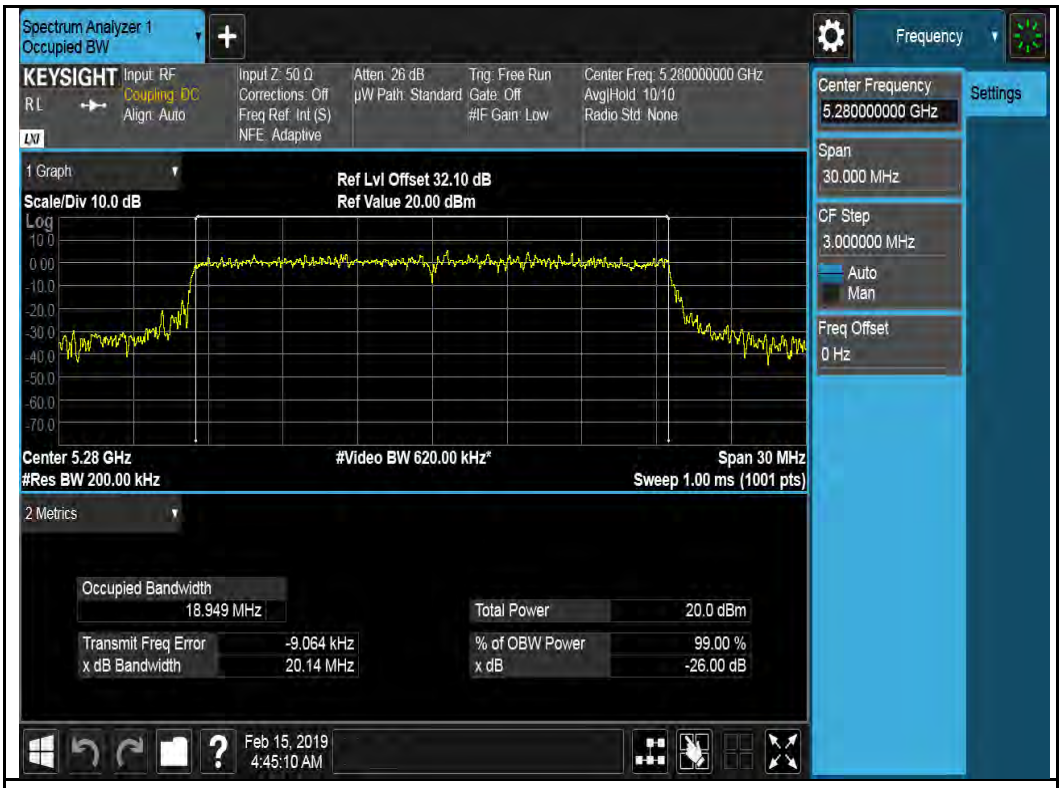
802.11a-5260MHz



802.11a-5280MHz

802.11a-5320MHz

802.11ax-HT20-5260MHz



802.11ax-HT20-5280MHz

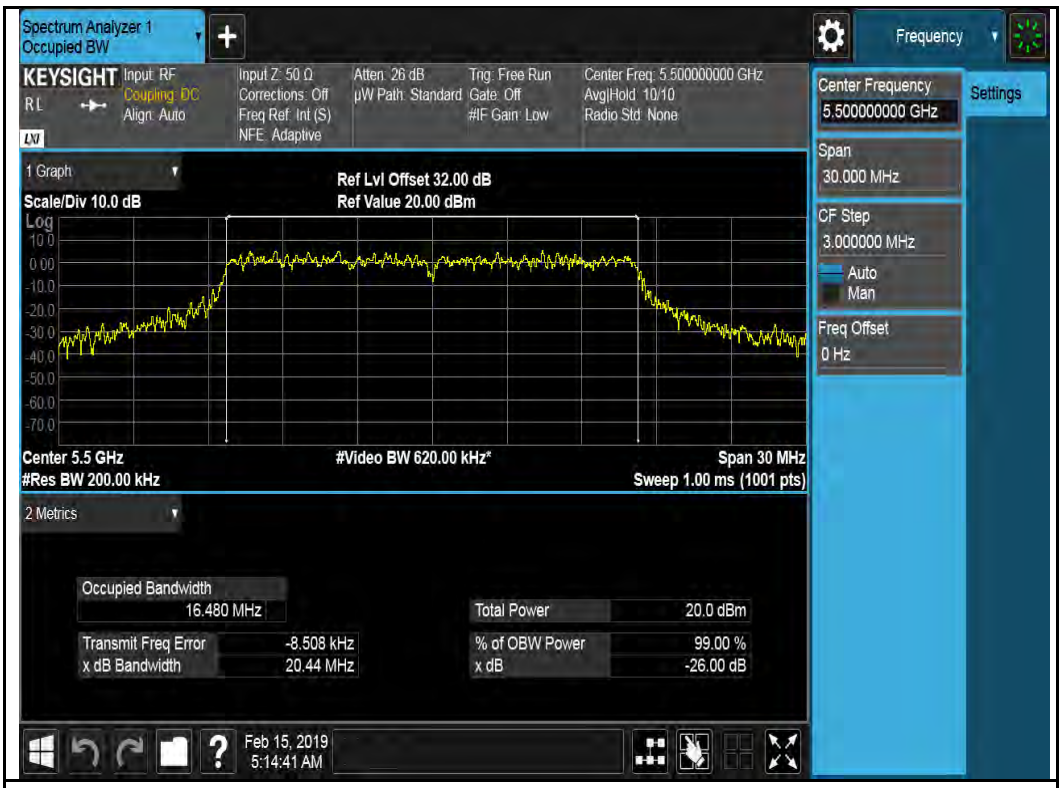
802.11ax-HT20-5320MHz

802.11ax-HT40-5270MHz

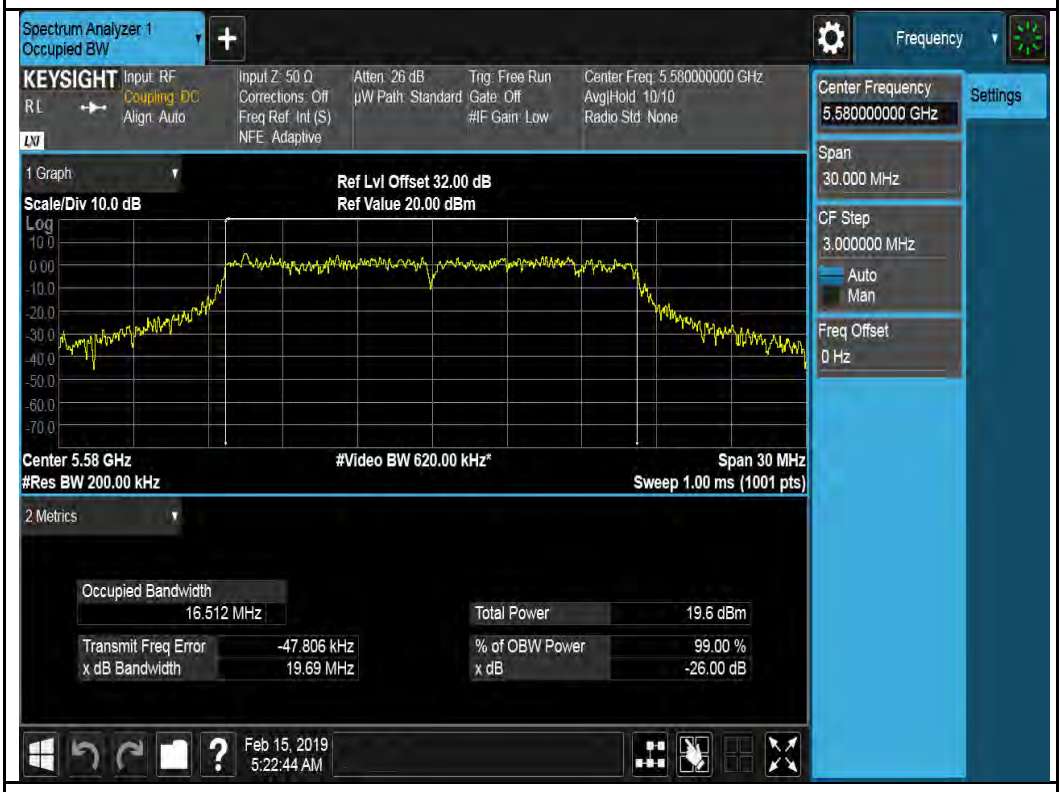
802.11ax-HT40-5310MHz

802.11ax-VHT80-5290MHz

U-NII-2C Band:



802.11a-5500MHz



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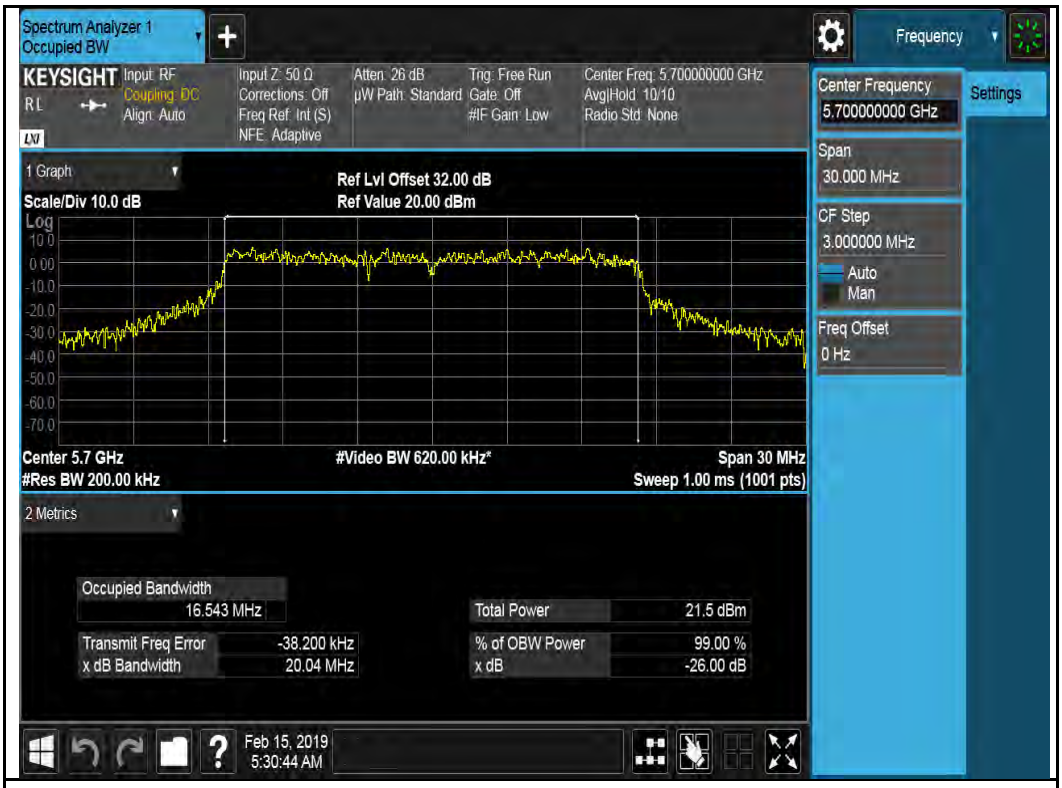
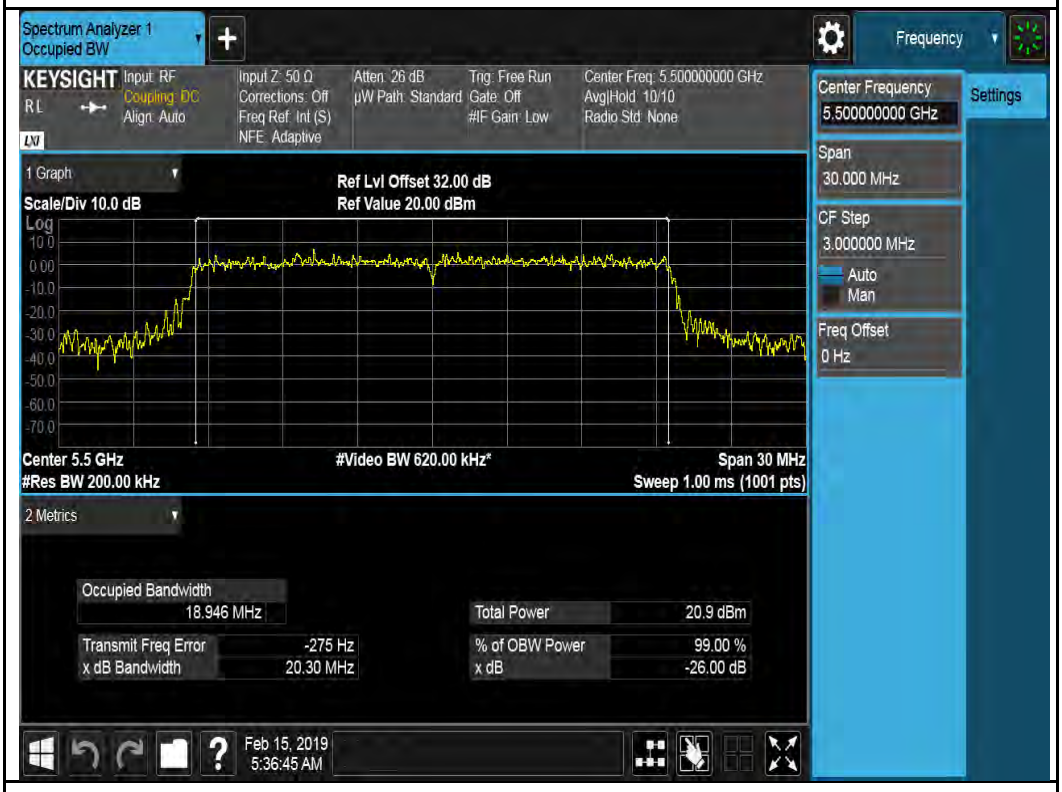
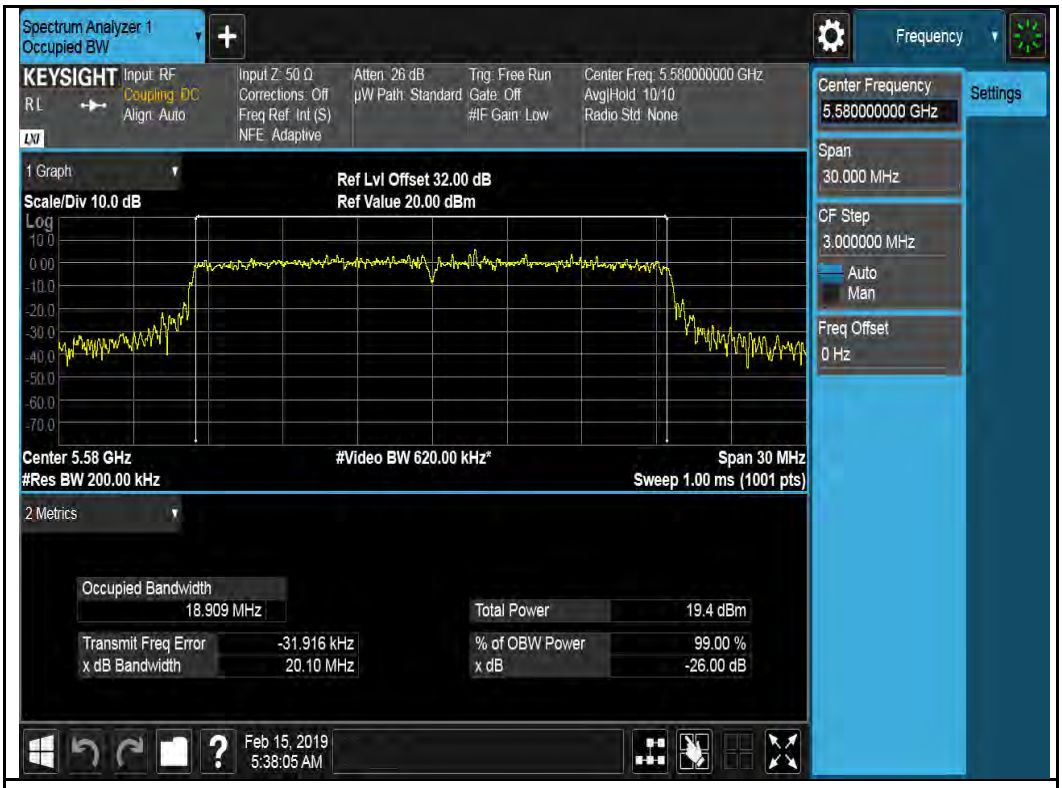


802.11a-5700MHz



802.11ax-HT20-5500MHz



802.11ax-HT20-5580MHz

802.11ax-HT20-5700MHz

802.11ax-HT40-5510MHz

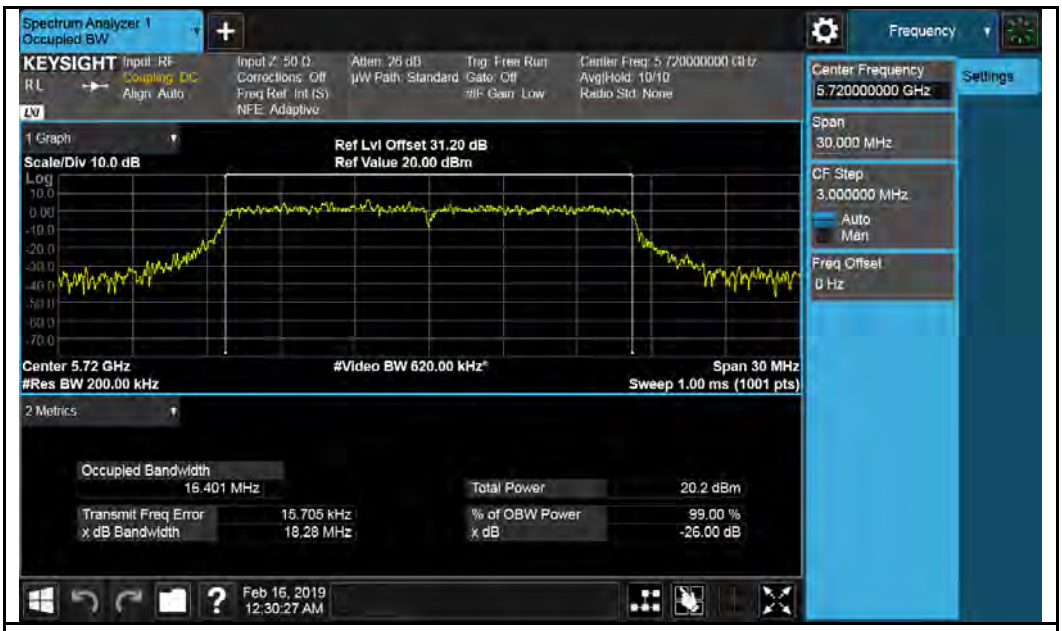
802.11ax-HT40-5550MHz

802.11ax-HT40-5670MHz

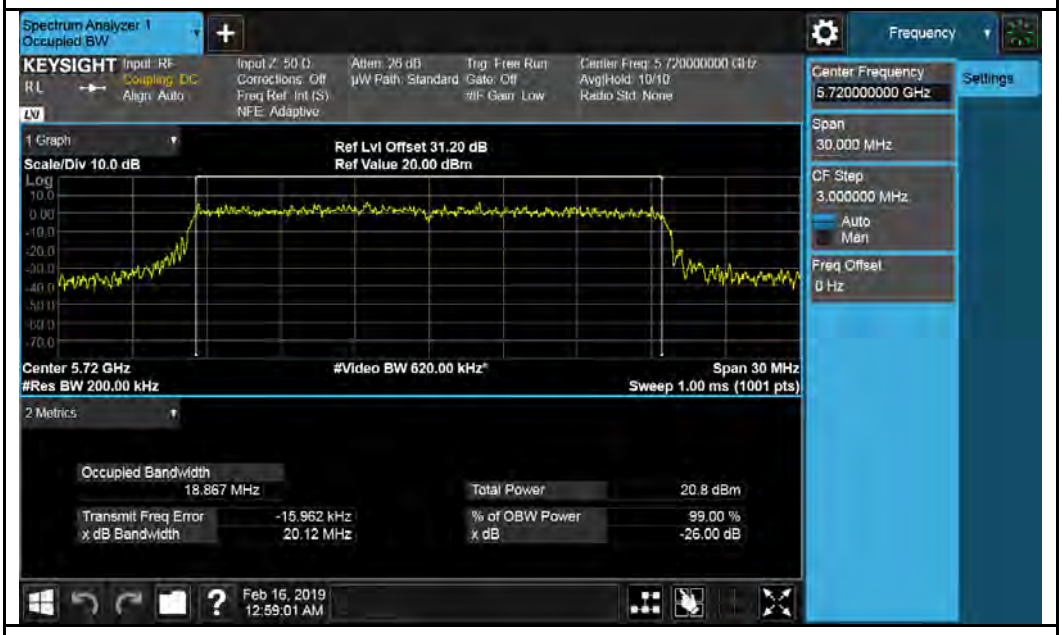
802.11ax-VHT80-5530MHz

802.11ax-VHT80-5610MHz

26dB BW Cross Band:



802.11a-5720MHz



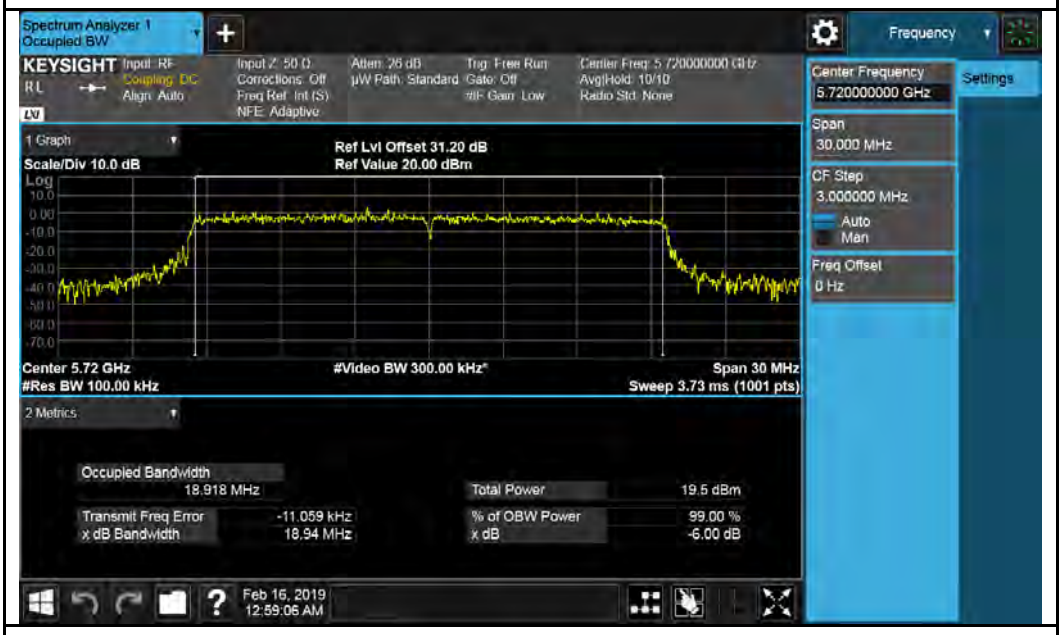
802.11ax-HT20 5720MHz

802.11ax-HT40 5710MHz

802.11ax-VHT80-5690MHz

6dB BW Cross Band:

802.11a-5720MHz



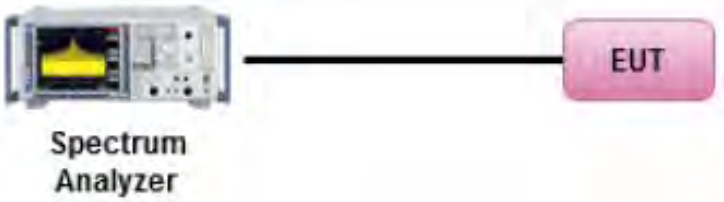
802.11ax-HT20 5720MHz

802.11ax-HT40 5710MHz

802.11ax-VHT80-5690MHz

10.4 Maximum Conducted Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	a)(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.	☒
	a)(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.	☐
RSS 247	6.2.2.1	For the band 5250-5350 MHz Device; a. The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band; b. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.	☒
	6.2.3.1	For the bands 5470-5600 MHz and 5650-5725 MHz; The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.	☒
Test Setup			
Test Procedure	789033 D02 General U-NII Test Procedures New Rules v02r01 Measurement using a Spectrum Analyzer or EMI Receiver (SA) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal. (ii) Set RBW = 1 MHz (iii) Set VBW = 3 MHz (iv) Number of points in sweep ≥ 2 × span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.) (v) Sweep time = auto. (vi) Detector = power averaging (rms), if available. Otherwise, use sample detector mode. (vii) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run." (viii) Trace average at least 100 traces in power averaging (rms) mode. (ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.		

Test Date	02/15/2019-04/12/2019	Environmental condition	Temperature 23ºC Relative Humidity 44% Atmospheric Pressure 1021mbar
Remark	Per KDB 662911 D01 Multiple Transmitter Output v02r01, the direction gain for horizontal polarization and vertical polarization is calculated separately. For 5Ghz band, individual gain = 3 dBi, the directional gain = 3+10*log(2)= 6 dBi.Highest of totoal directional gain is 6 dBi. No limit adjustment is needed.For the Cross band channels, the output power of full bandwidth is compared to the power limit in 5.5G and 5.8G as the worst case.		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Deon Dai at RF test site.

Output Power measurement result for U-NII-2A

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)					Limit (dBm)	Result
				Chain0	Chain1	Chain2	Chain3	Combined Power		
Output Power	802.11a	5260	Low	15.78	16.16	14.67	16.80	21.94	24	Pass
		5280	Mid	15.57	16.96	14.06	16.67	21.98	24	Pass
		5320	High	16.25	16.68	13.95	16.23	21.92	24	Pass
	802.11ax-20M	5260	Low	15.91	17.31	14.90	17.09	22.43	24	Pass
		5280	Mid	15.85	17.04	14.29	16.95	22.19	24	Pass
		5320	High	16.37	16.86	13.87	16.52	22.07	24	Pass
	802.11ax-40M	5270	Low	17.44	18.65	15.87	18.04	23.64	24	Pass
		5310	Mid	17.55	18.49	15.19	18.47	23.63	24	Pass
	802.11ax-80M	5290	High	17.27	18.16	15.23	18.40	23.45	24	Pass

Output Power measurement result for U-NII-2C

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)					Limit (dBm)	Result
				Chain0	Chain1	Chain2	Chain3	Combined Power		
Output Power	802.11a	5500	Low	15.33	15.30	15.29	15.45	21.36	24	Pass
		5580	Mid	14.76	15.44	15.88	15.48	21.43	24	Pass
		5700	High	16.24	16.27	15.90	14.75	21.85	24	Pass
	802.11ax-20M	5500	Low	16.63	16.66	16.62	16.59	22.65	24	Pass
		5580	Mid	15.13	16.45	16.86	16.66	22.34	24	Pass
		5700	High	17.23	16.79	16.60	15.17	22.53	24	Pass
	802.11ax-40M	5510	Low	17.64	17.86	17.06	17.81	23.62	24	Pass
		5550	Mid	16.49	17.70	17.92	17.91	23.56	24	Pass
		5670	High	17.21	18.22	16.93	16.92	23.38	24	Pass
	802.11ax-80M	5530	Low	17.28	17.73	17.57	17.47	23.54	24	Pass
		5610	High	17.31	17.62	16.78	16.11	23.01	24	Pass

Output Power measurement result for CROSS channels

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)					Limit (dBm)	Result
				Chain1	Chain2	Chain3	Chain4	Combined Power		
Output Power	802.11a	5720	CROSS	16.50	16.59	15.83	15.13	22.07	24	Pass
	802.11ax-20M	5720	CROSS	16.75	16.47	15.51	15.26	22.06	24	Pass
	802.11ax-40M	5710	CROSS	17.33	17.74	17.06	16.33	23.17	24	Pass
	802.11ax-80M	5690	CROSS	17.42	18.45	16.62	17.39	23.54	24	Pass

EIRP measurement result(Chain0+Chain3) for U-NII-2A Band - IC

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result
				Chain0	Chain3	Combined Power				
EIRP	802.11a	5260	Low	15.78	16.80	19.33	6.0	25.33	30	Pass
		5280	Mid	15.57	16.67	19.17	6.0	25.17	30	Pass
		5320	High	16.25	16.23	19.25	6.0	25.25	30	Pass
	802.11ax-HT20	5260	Low	15.91	17.09	19.55	6.0	25.55	30	Pass
		5280	Mid	15.85	16.95	19.45	6.0	25.45	30	Pass
		5320	High	16.37	16.52	19.46	6.0	25.46	30	Pass
	802.11ax-HT40	5270	Low	17.44	18.04	20.76	6.0	26.76	30	Pass
		5310	Mid	17.55	18.47	21.04	6.0	27.04	30	Pass
	802.11ax-VHT80	5290	Low	17.27	18.40	20.88	6.0	26.88	30	Pass

EIRP measurement result(Chain1+Chain2) for U-NII-2A Band – IC

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result
				Chain1	Chain2	Combined Power				
EIRP	802.11a	5260	Low	16.16	14.67	18.49	6.0	24.49	30	Pass
		5280	Mid	16.96	14.06	18.76	6.0	24.76	30	Pass
		5320	High	16.68	13.95	18.54	6.0	24.54	30	Pass
	802.11ax-HT20	5260	Low	17.31	14.90	19.28	6.0	25.28	30	Pass
		5280	Mid	17.04	14.29	18.89	6.0	24.89	30	Pass
		5320	High	16.86	13.87	18.63	6.0	24.63	30	Pass
	802.11ax-HT40	5270	Low	18.65	15.87	20.49	6.0	26.49	30	Pass
		5310	Mid	18.49	15.19	20.16	6.0	26.16	30	Pass
	802.11ax-VHT80	5290	Low	18.16	15.23	19.95	6.0	25.95	30	Pass

EIRP measurement result(Chain0+Chain3) for U-NII-2C Band - IC

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result
				Chain0	Chain3	Combined Power				
EIRP	802.11a	5500	Low	15.33	15.45	18.40	6.0	24.40	30	Pass
		5580	Mid	14.76	15.48	18.15	6.0	24.15	30	Pass
		5700	High	16.24	14.75	18.57	6.0	24.57	30	Pass
	802.11ax-HT20	5500	Low	16.63	16.59	19.62	6.0	25.62	30	Pass
		5580	Mid	15.13	16.66	18.97	6.0	24.97	30	Pass
		5700	High	17.23	15.17	19.33	6.0	25.33	30	Pass
	802.11ax-HT40	5510	Low	17.64	17.81	20.74	6.0	26.74	30	Pass
		5550	Mid	16.49	17.91	20.27	6.0	26.27	30	Pass
		5670	High	17.21	16.92	20.08	6.0	26.08	30	Pass
	802.11ax-VHT80	5530	Low	17.28	17.47	20.39	6.0	26.39	30	Pass
		5610	High	17.31	16.11	19.76	6.0	25.76	30	Pass

EIRP measurement result(Chain1+Chain2) for U-NII-2C Band - IC

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result
				Chain1	Chain2	Combined Power				
EIRP	802.11a	5500	Low	15.30	15.29	18.31	6.0	24.31	30	Pass
		5580	Mid	15.44	15.88	18.68	6.0	24.68	30	Pass
		5700	High	16.27	15.90	19.10	6.0	25.10	30	Pass
	802.11ax-HT20	5500	Low	16.66	16.62	19.65	6.0	25.65	30	Pass
		5580	Mid	16.45	16.86	19.67	6.0	25.67	30	Pass
		5700	High	16.79	16.60	19.71	6.0	25.71	30	Pass
	802.11ax-HT40	5510	Low	17.86	17.06	20.49	6.0	26.49	30	Pass
		5550	Mid	17.70	17.92	20.82	6.0	26.82	30	Pass
		5670	High	18.22	16.93	20.63	6.0	26.63	30	Pass
	802.11ax-VHT80	5530	Low	17.73	17.57	20.66	6.0	26.66	30	Pass
		5610	High	17.62	16.78	20.23	6.0	26.23	30	Pass

EIRP measurement result(Chain0+Chain3) for U-NII-2C Band -IC

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result
				Chain0	Chain3	Combined Power				
EIRP	802.11a	5500	Low	16.50	15.13	18.88	6.0	24.88	30	Pass
	802.11ax-HT20	5500	Low	16.75	15.26	19.08	6.0	25.08	30	Pass
	802.11ax-HT40	5510	Low	17.33	16.33	19.87	6.0	25.87	30	Pass
	802.11ax-VHT80	5530	Low	17.42	17.39	20.42	6.0	26.42	30	Pass

EIRP measurement result(Chain1+Chain2) for for U-NII-2C Band -IC

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result
				Chain1	Chain2	Combined Power				
EIRP	802.11a	5500	Low	16.59	15.83	19.24	6.0	25.24	30	Pass
	802.11ax-HT20	5500	Low	16.47	15.51	19.03	6.0	25.03	30	Pass
	802.11ax-HT40	5510	Low	17.74	17.06	20.42	6.0	26.42	30	Pass
	802.11ax-VHT80	5530	Low	18.45	16.62	20.64	6.0	26.64	30	Pass

TPC Test Result

EIRP measurement result(Chain0+Chain3) for U-NII-2A Band - IC

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result
				Chain0	Chain3	Combined Power				
EIRP	802.11a	5260	Low	14.010	12.730	16.43	6.0	22.43	24	Pass
		5280	Mid	14.240	12.840	16.61	6.0	22.61	24	Pass
		5320	High	13.940	12.190	16.16	6.0	22.16	24	Pass
	802.11ax-HT20	5260	Low	14.430	12.750	16.68	6.0	22.68	24	Pass
		5280	Mid	14.330	12.840	16.66	6.0	22.66	24	Pass
		5320	High	13.560	12.070	15.89	6.0	21.89	24	Pass
	802.11ax-HT40	5270	Low	15.070	13.480	17.36	6.0	23.36	24	Pass
		5310	Mid	14.280	13.470	16.90	6.0	22.90	24	Pass
	802.11ax-VHT80	5290	Low	14.840	13.530	17.24	6.0	23.24	24	Pass

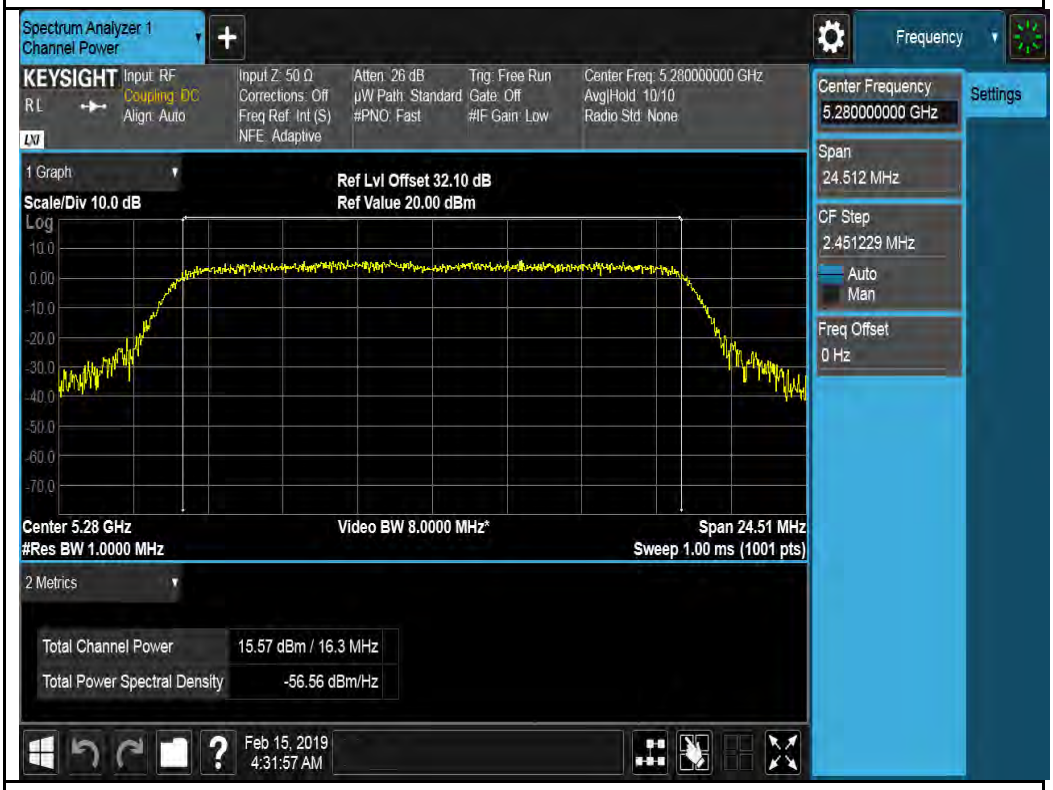
EIRP measurement result(Chain1+Chain2) for U-NII-2A Band – IC

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result
				Chain1	Chain2	Combined Power				
EIRP	802.11a	5260	Low	13.450	12.660	16.08	6.0	22.08	24	Pass
		5280	Mid	13.170	12.450	15.84	6.0	21.84	24	Pass
		5320	High	12.590	13.120	15.87	6.0	21.87	24	Pass
	802.11ax-HT20	5260	Low	13.400	12.500	15.98	6.0	21.98	24	Pass
		5280	Mid	13.260	12.780	16.04	6.0	22.04	24	Pass
		5320	High	12.480	13.270	15.90	6.0	21.90	24	Pass
	802.11ax-HT40	5270	Low	14.410	13.170	16.84	6.0	22.84	24	Pass
		5310	Mid	14.260	13.240	16.79	6.0	22.79	24	Pass
	802.11ax-VHT80	5290	Low	14.580	13.670	17.16	6.0	23.16	24	Pass

Test Plot for U-NII-2A:

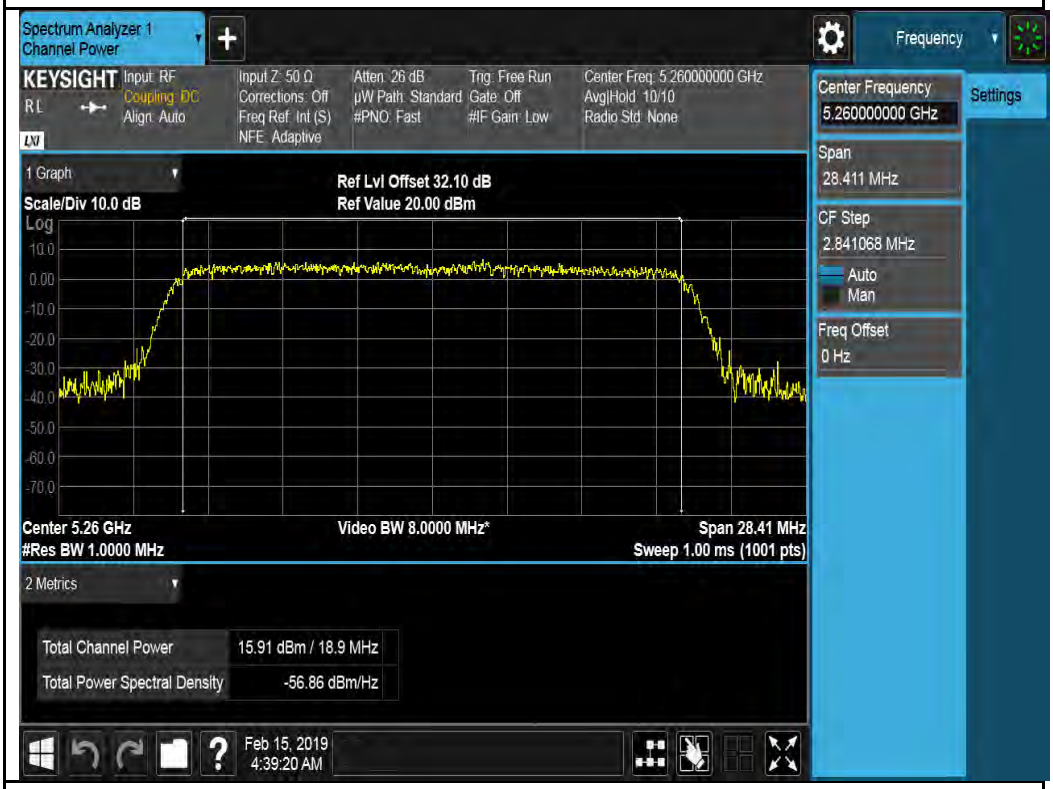
Chain 0:

802.11a-5260M



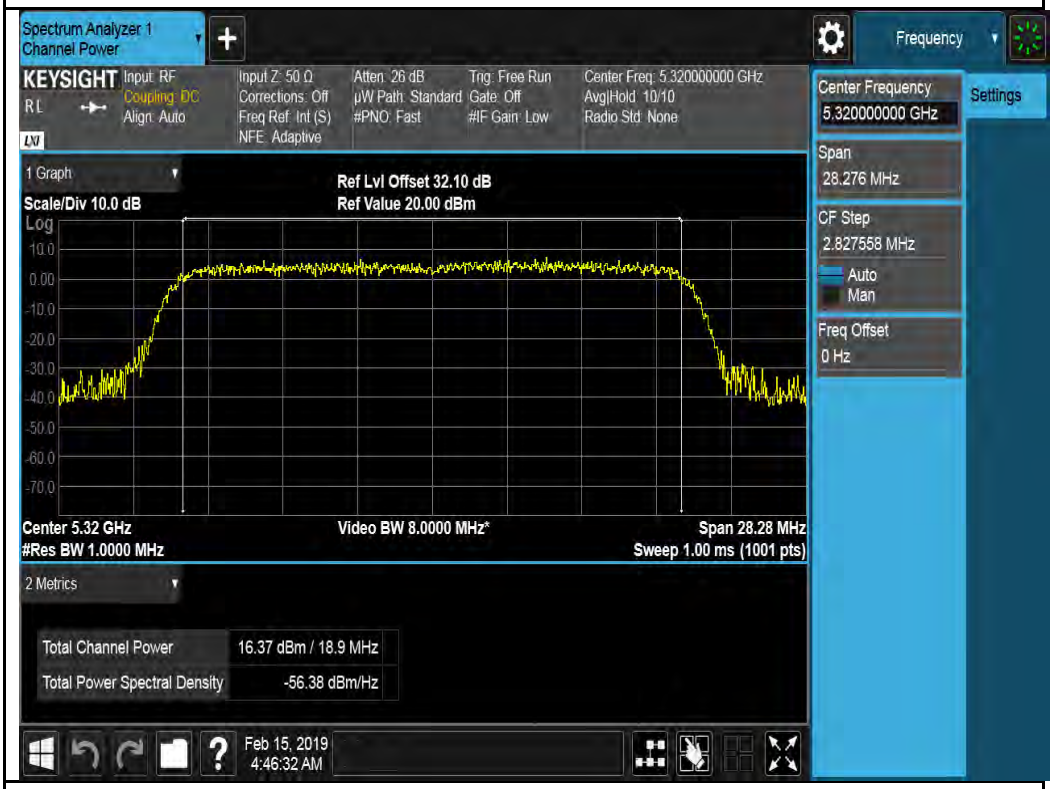
802.11a-5280M

802.11a-5320M



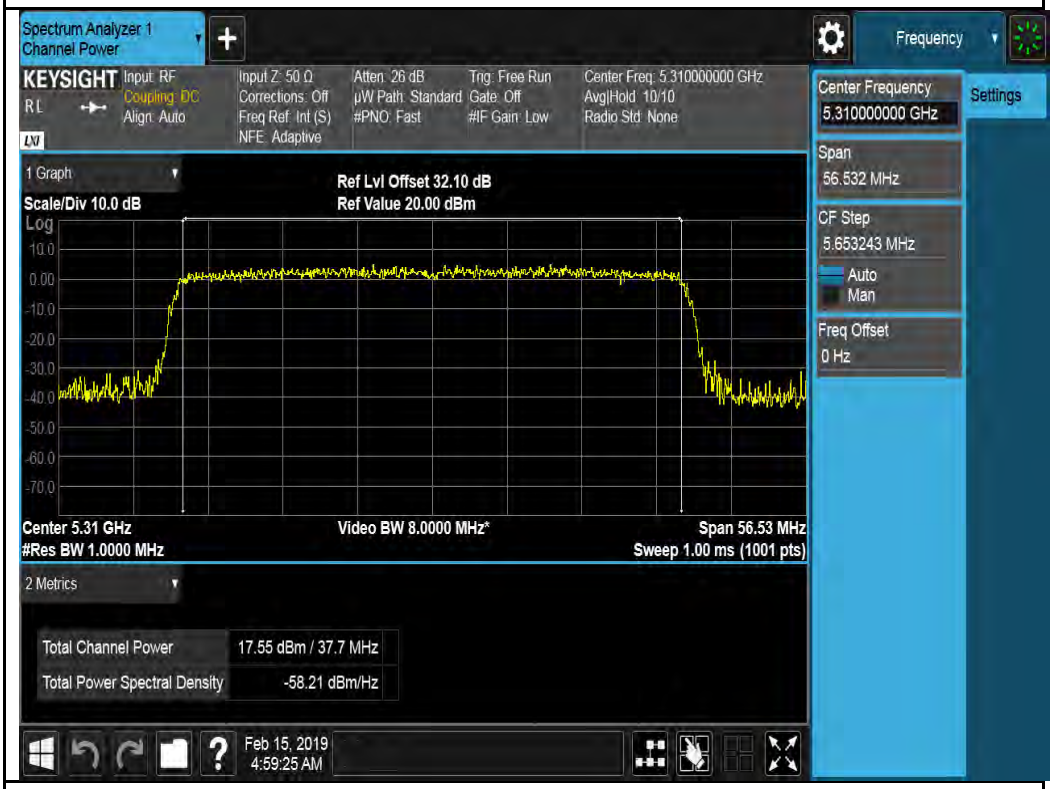
802.11ax-HT20 5260M

802.11ax-HT20 5280M



802.11ax-HT20 5320M

802.11ax-HT40 5270M

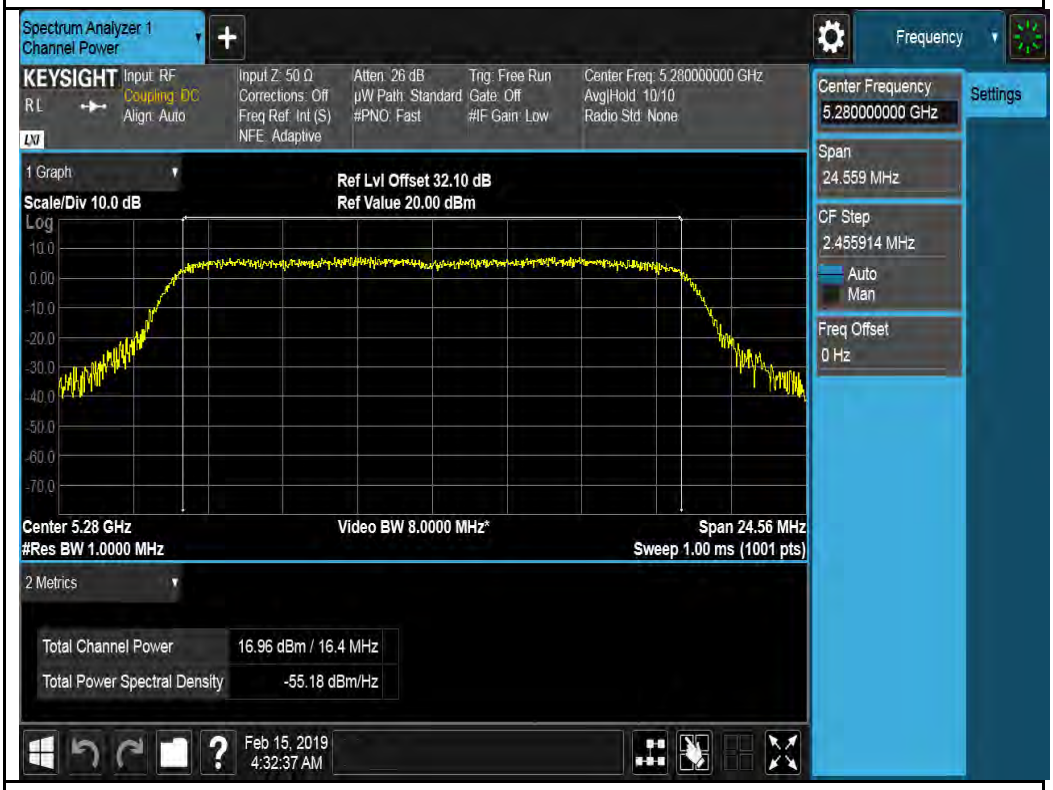


802.11ax-HT40 5310M

802.11ax-VHT80 5290M

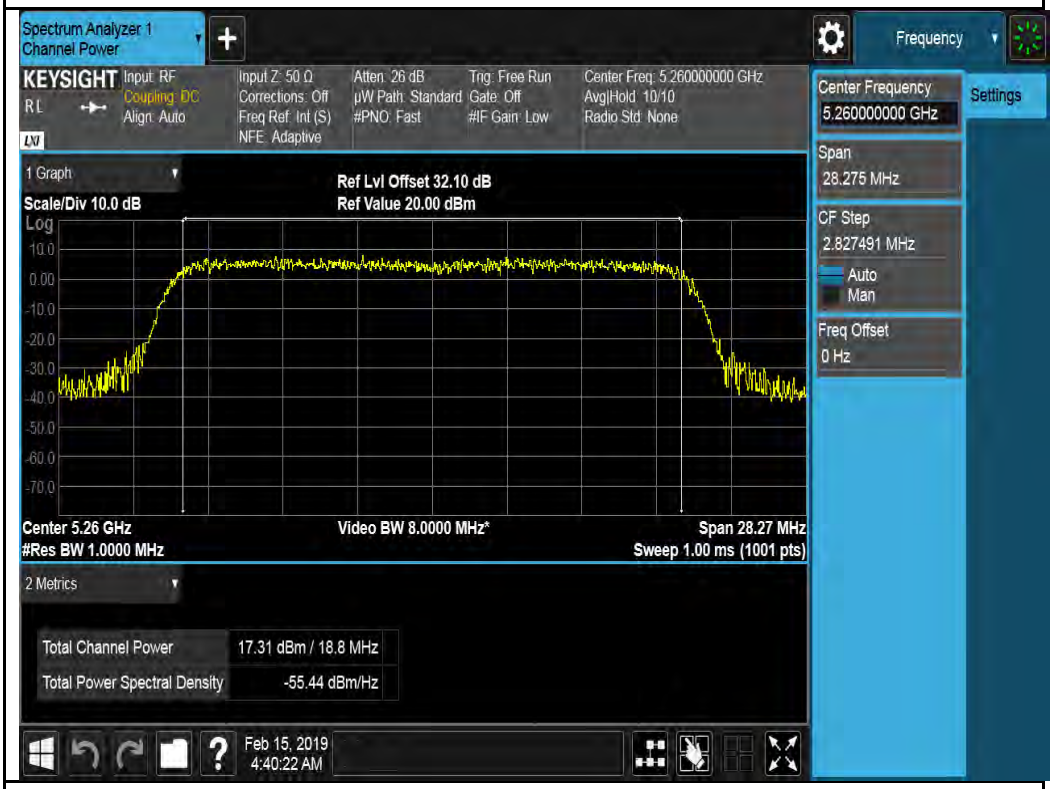
Chain 1:

802.11a-5260M

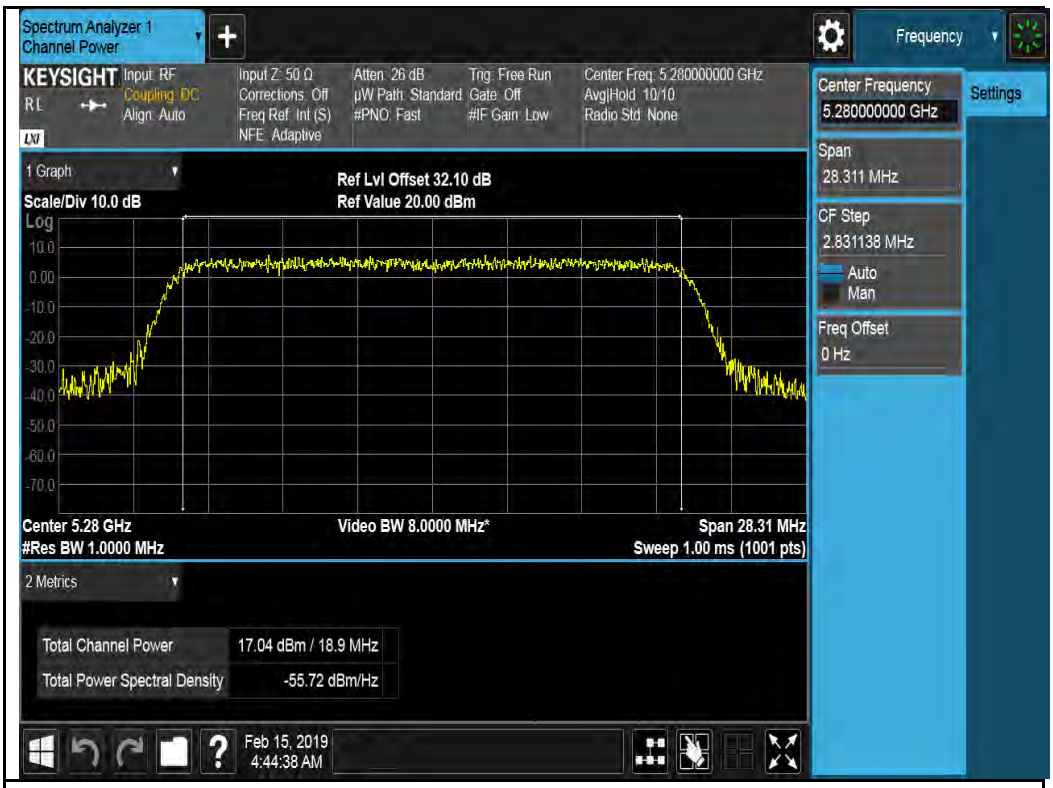


802.11a-5280M

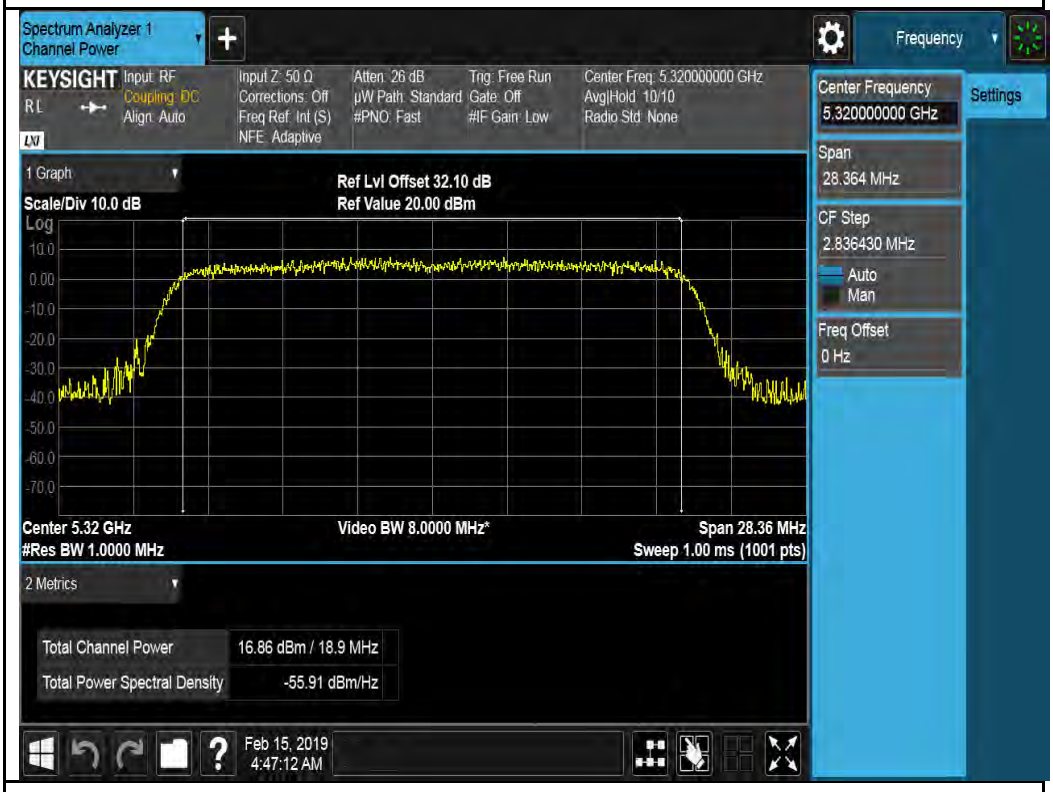
802.11a-5320M



802.11ax-HT20 5260M

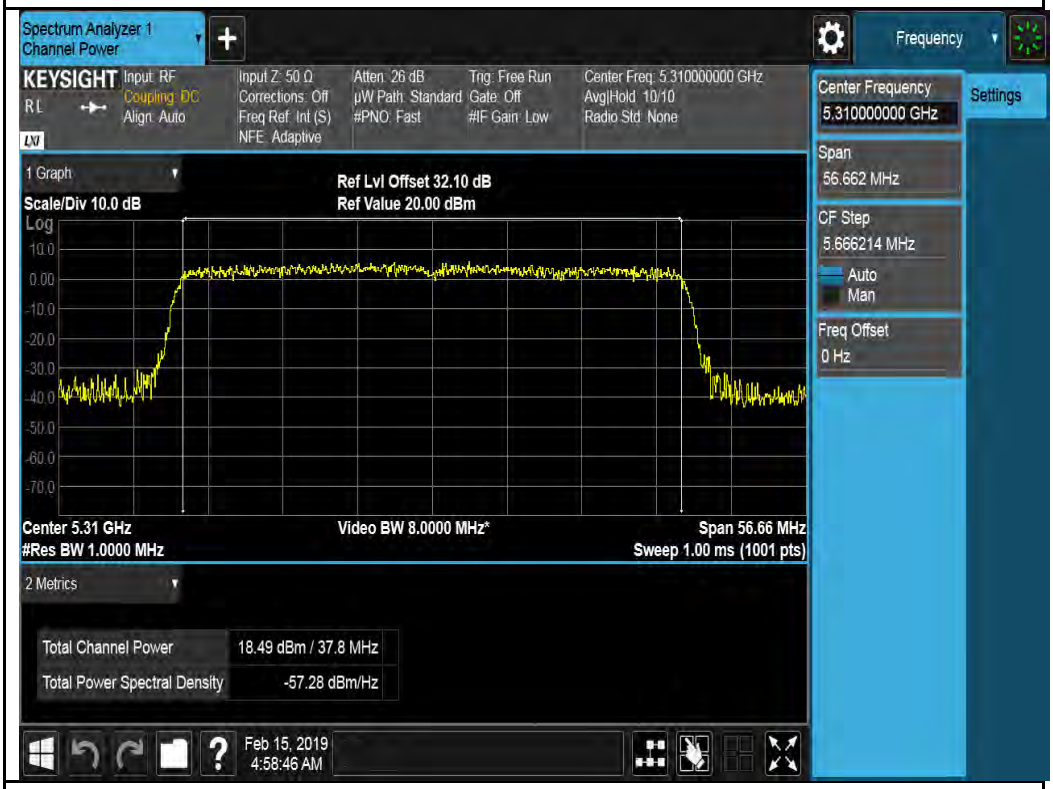


802.11ax-HT20 5280M



802.11ax-HT20 5320M

802.11ax-HT40 5270M

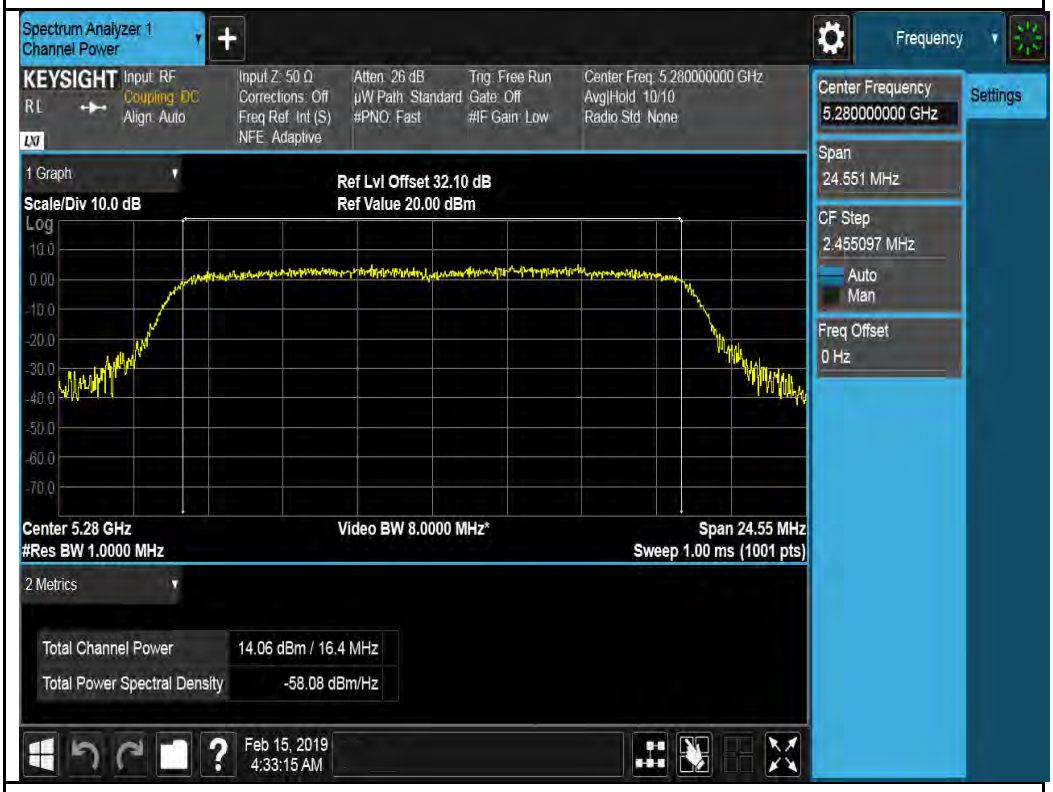


802.11ax-HT40 5310M

802.11ax-VHT80 5290M

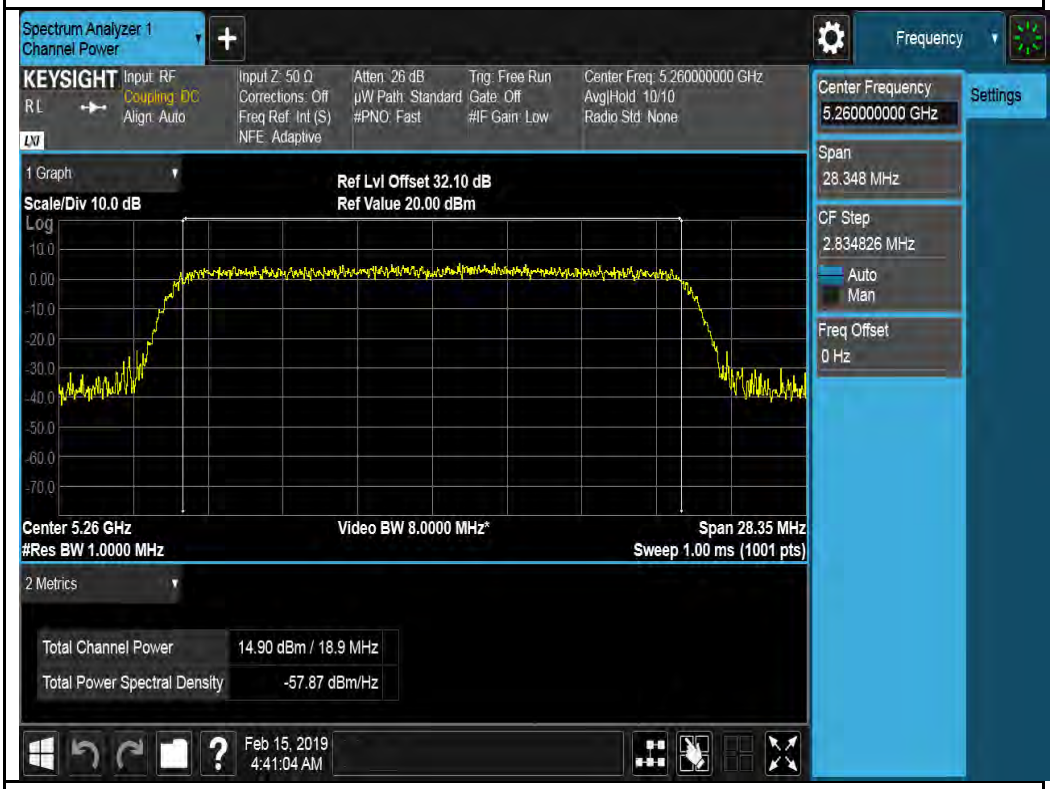
Chain 2:

802.11a-5260M



802.11a-5280M

802.11a-5320M



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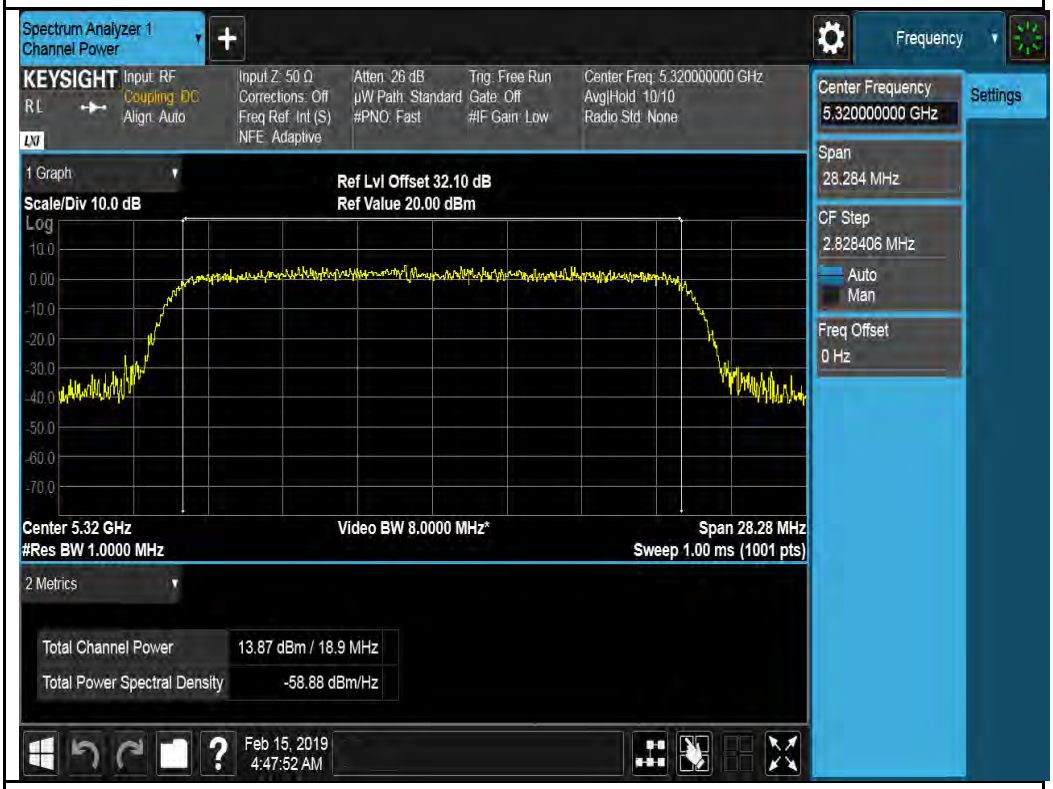
802.11ax-HT20 5280M



802.11ax-HT20 5320M

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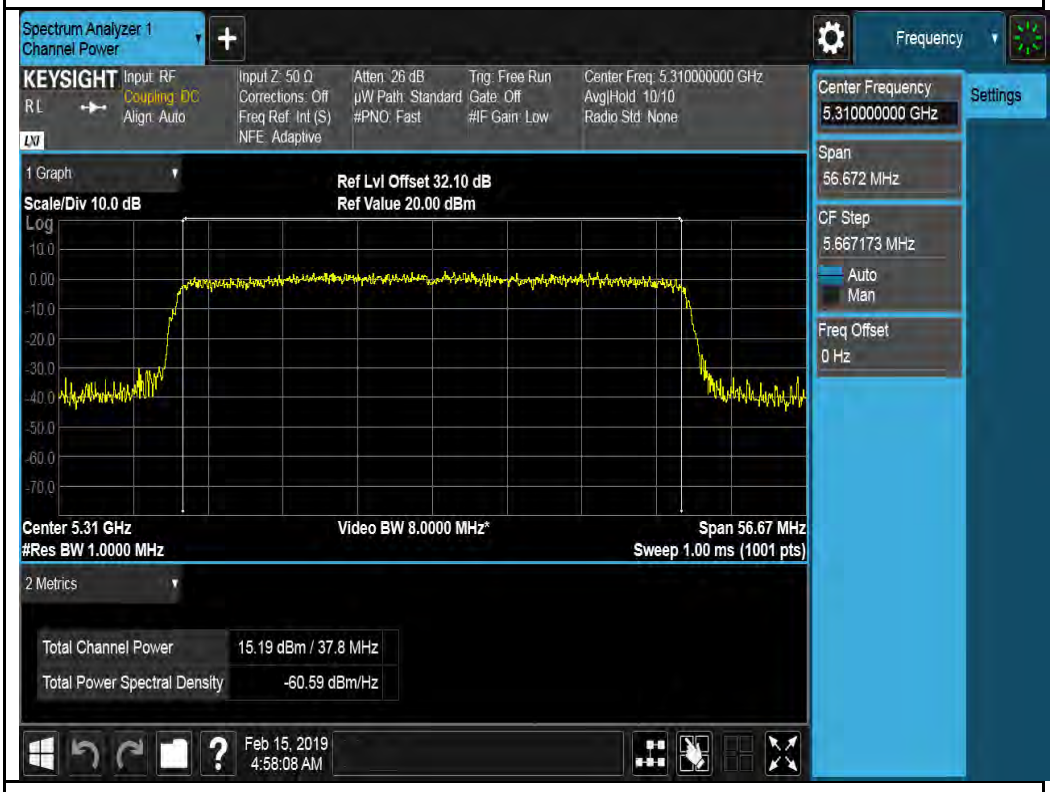
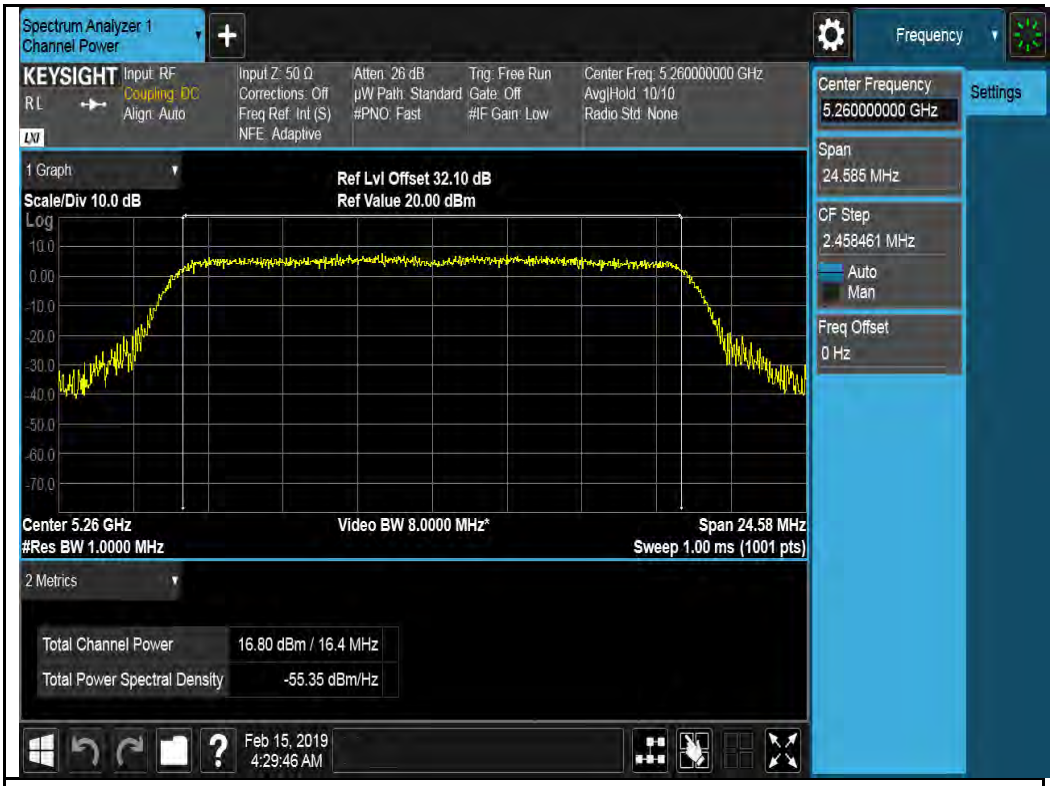


802.11ax-HT40 5310M

802.11ax-VHT80 5290M

Chain 3:



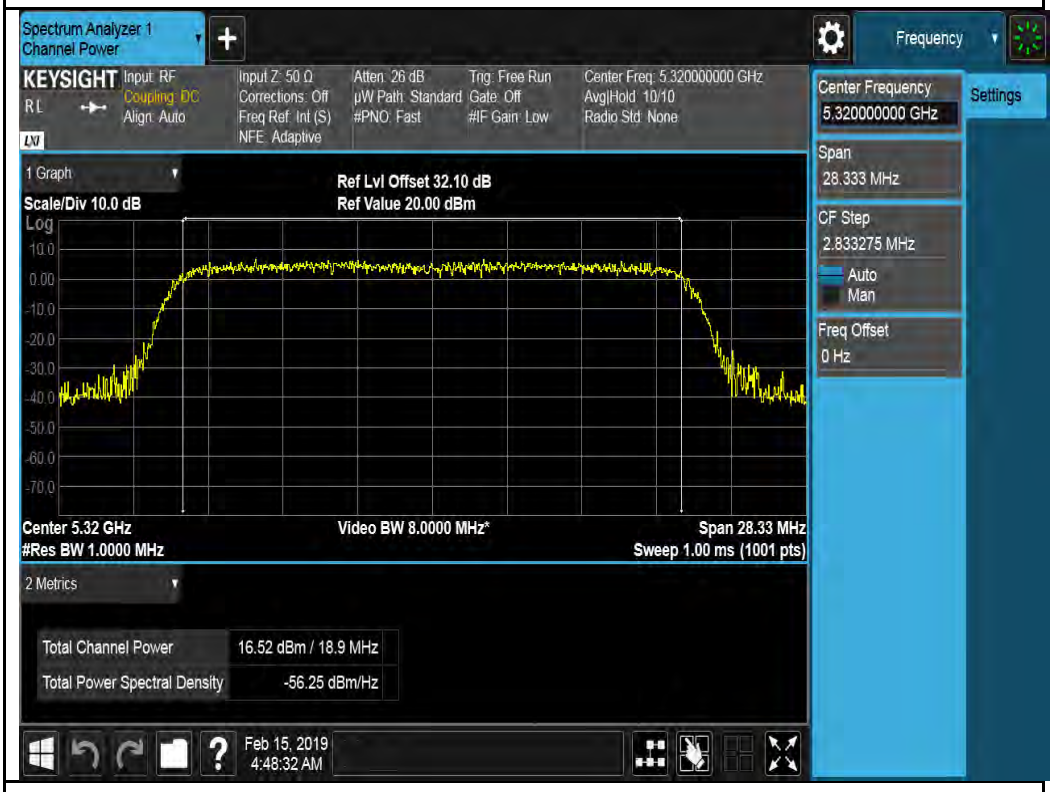
802.11a-5260M

802.11a-5280M

802.11a-5320M

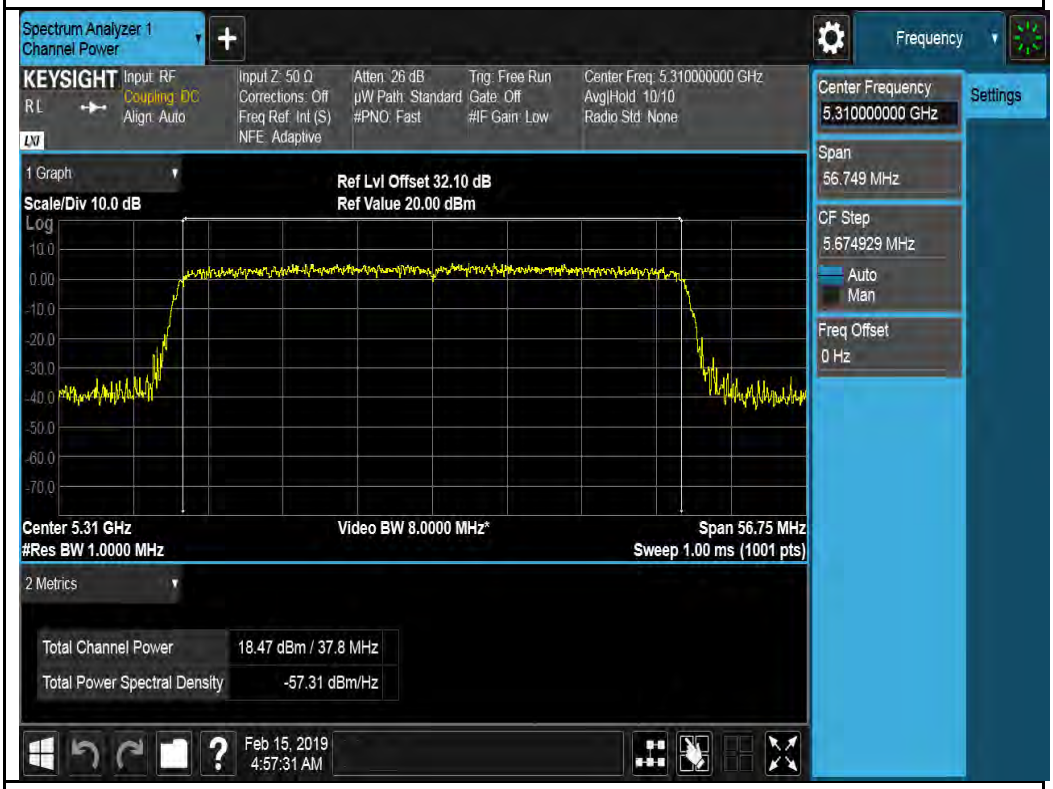
802.11ax-HT20 5260M

802.11ax-HT20 5280M



802.11ax-HT20 5320M

802.11ax-HT40 5270M



802.11ax-HT40 5310M

802.11ax-VHT80 5290M

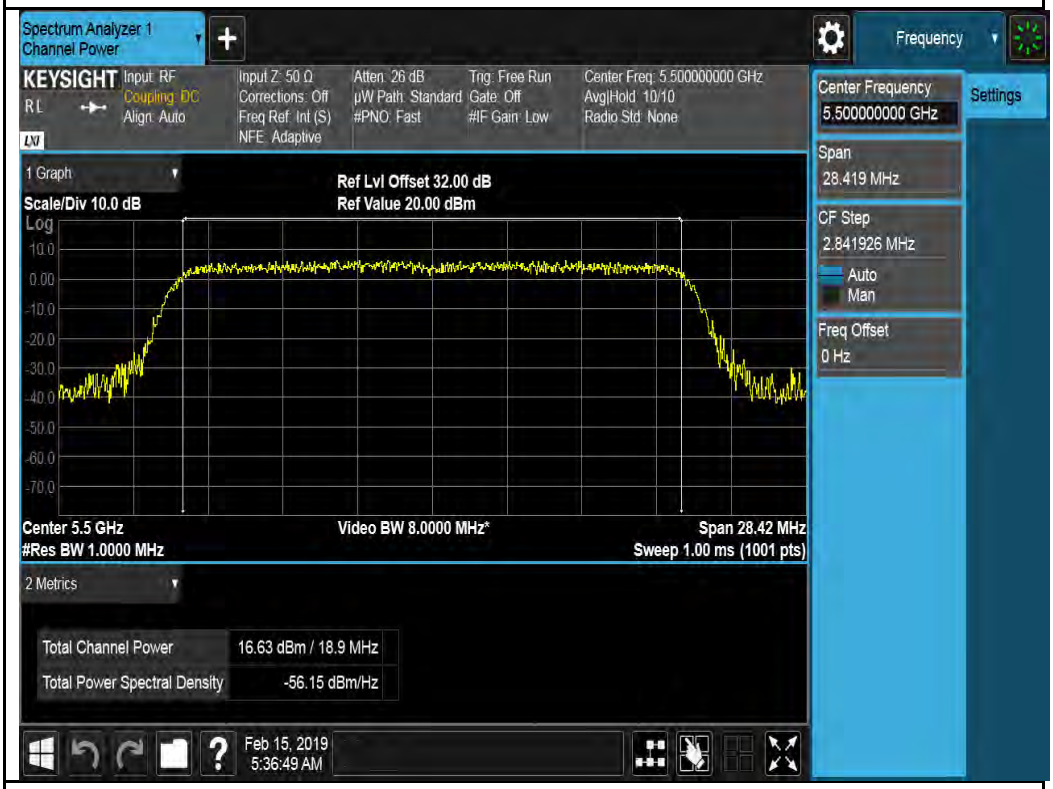
Test Plot for U-NII-2C:

Chain 0:

802.11a-5500M

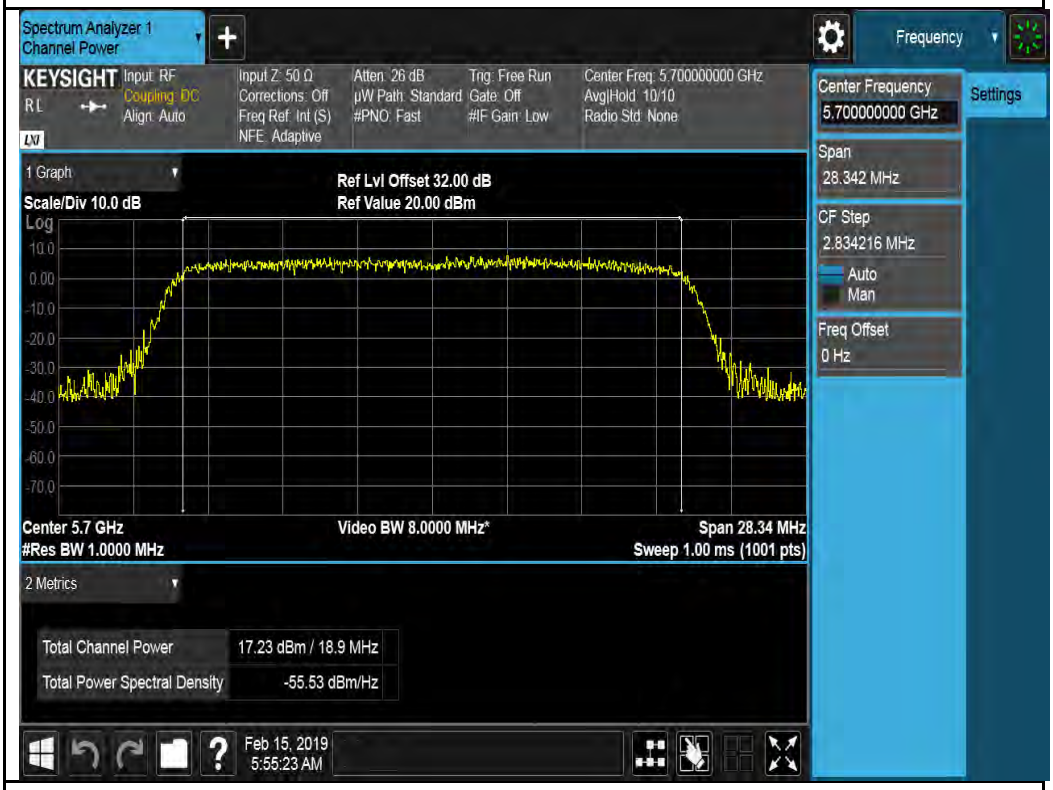
802.11a-5580M

802.11a-5700M



802.11ax-HT20 5500M

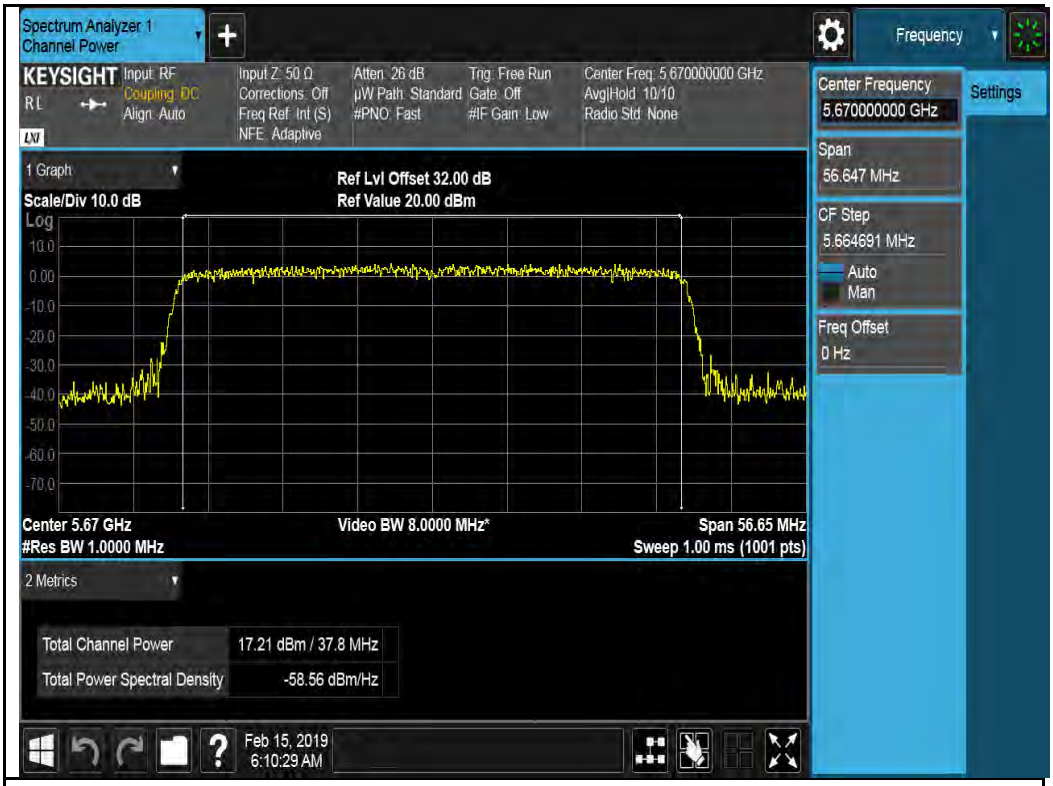
802.11ax-HT20 5580M



802.11ax-HT20 5700M

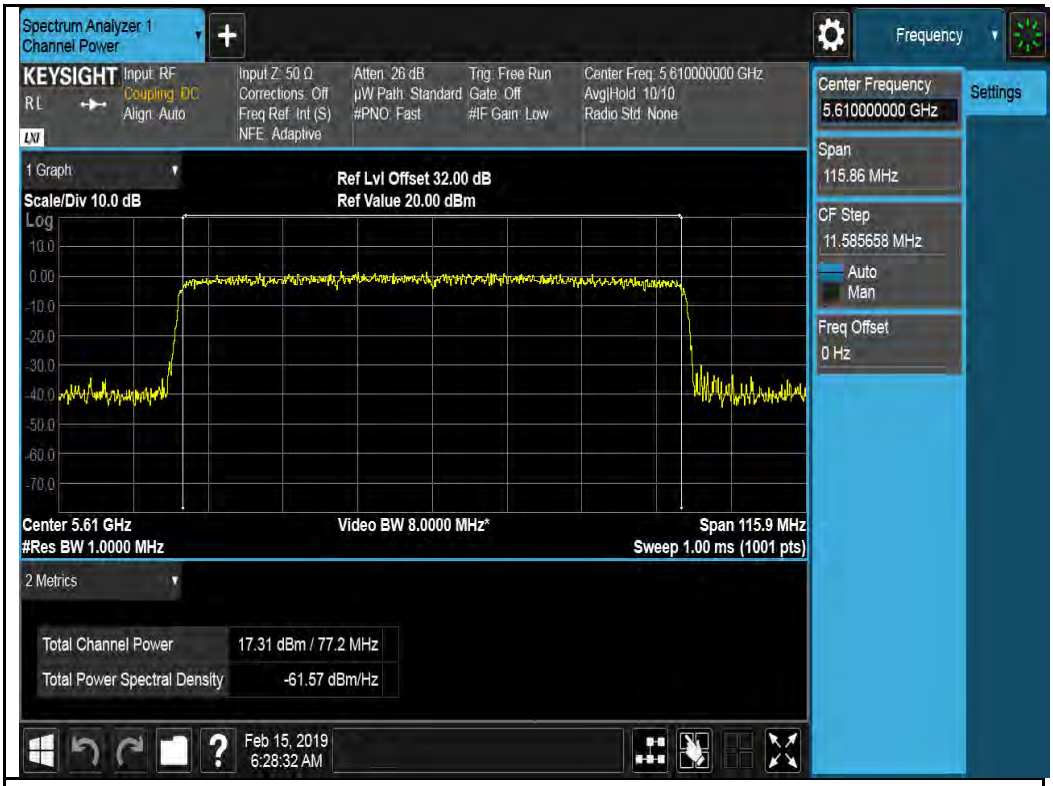
802.11ax-HT40 5510M

802.11ax-HT40 5550M



802.11ax-HT40 5670M

802.11ax-VHT80 5530M



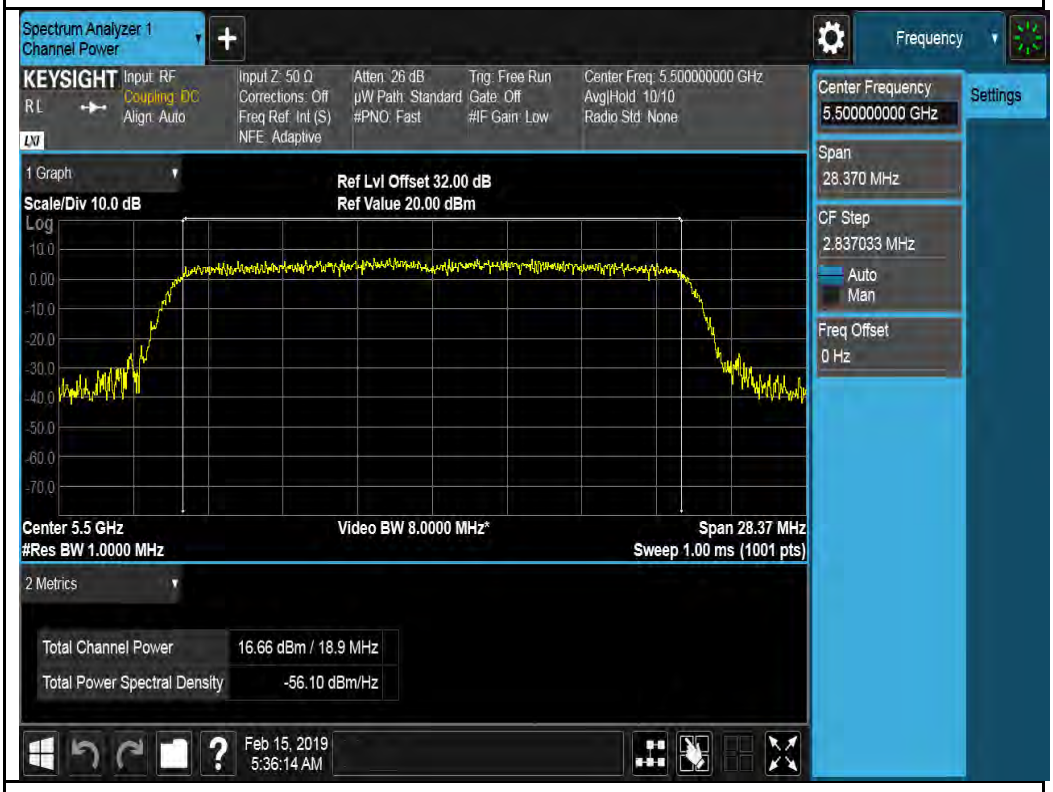
802.11ax-VHT80 5610M

Chain 1:

802.11a-5500M

802.11a-5580M

802.11a-5700M

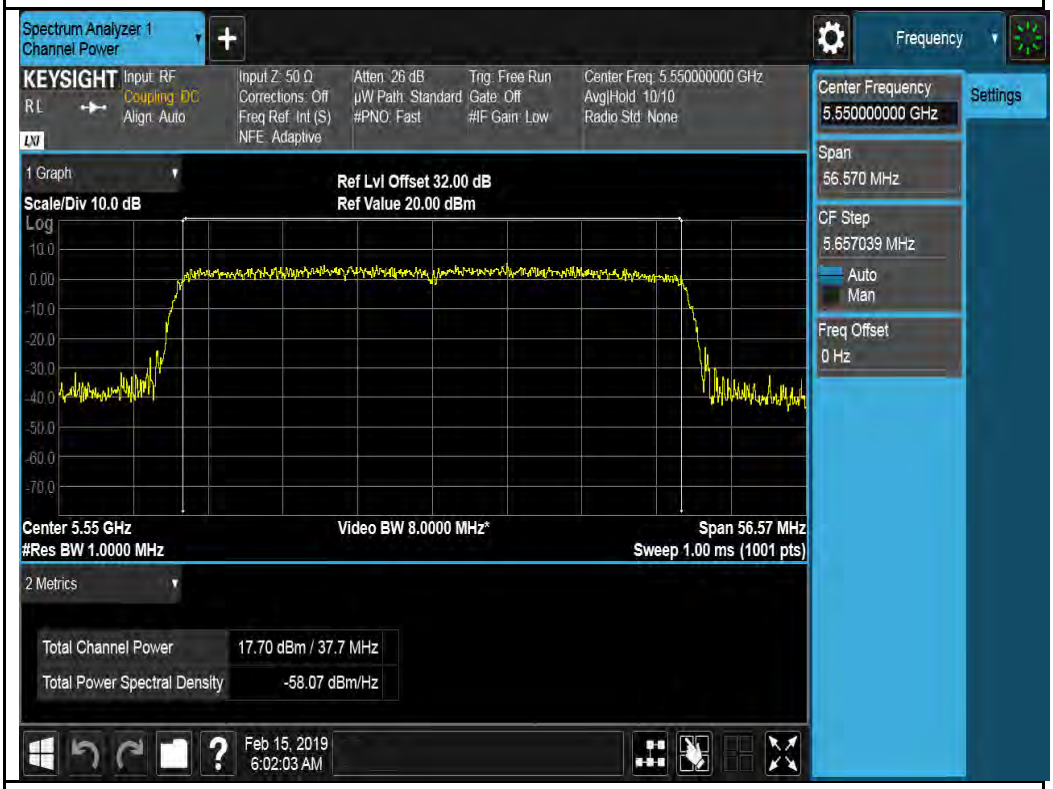


802.11ax-HT20 5500M

802.11ax-HT20 5580M

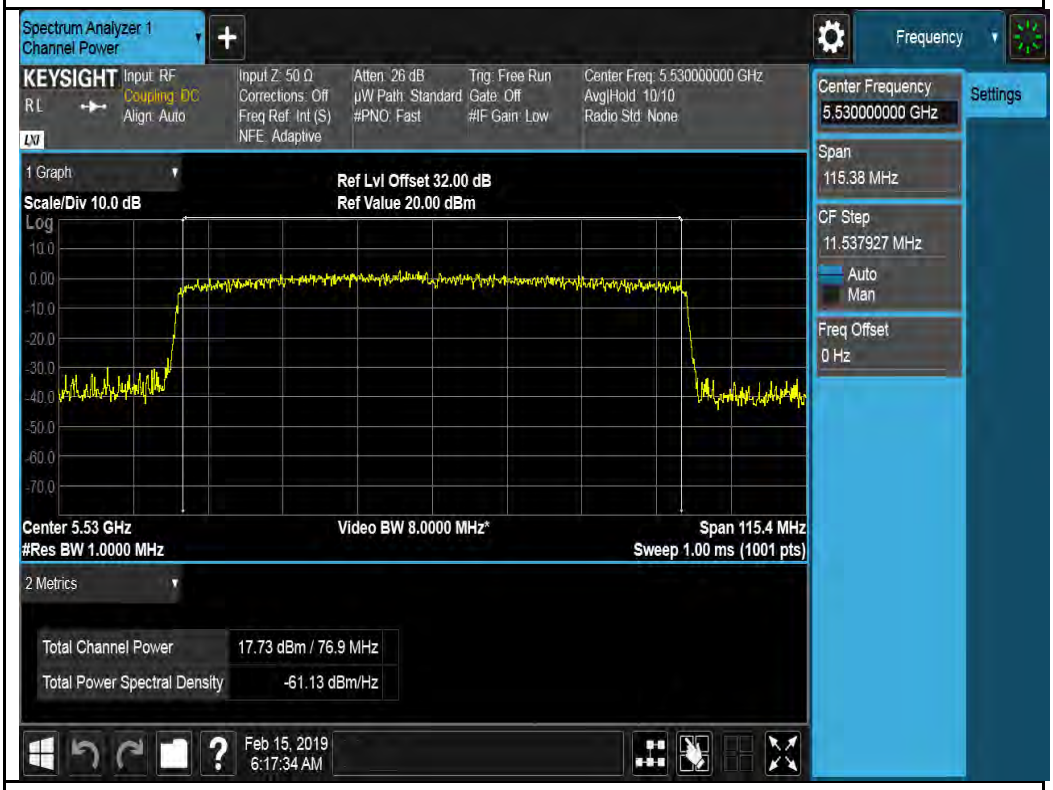
802.11ax-HT20 5700M

802.11ax-HT40 5510M



802.11ax-HT40 5550M

802.11ax-HT40 5670M

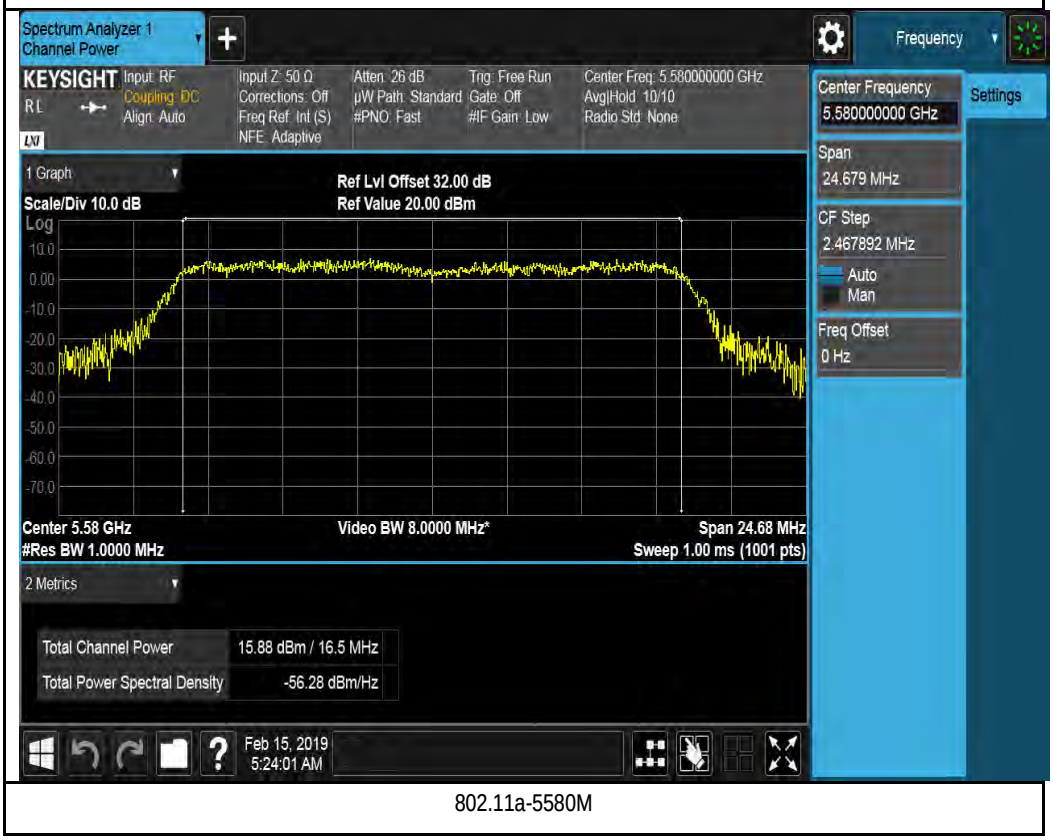


802.11ax-VHT80 5530M

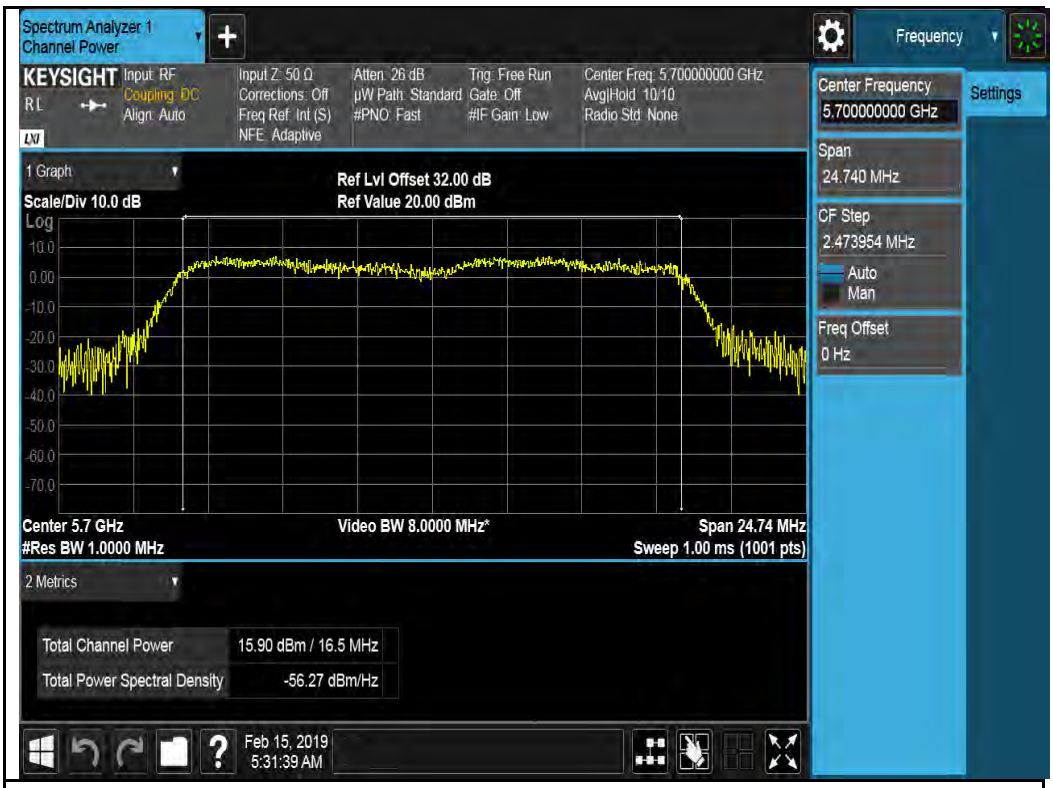
802.11ax-VHT80 5610M

Chain 2:

802.11a-5500M



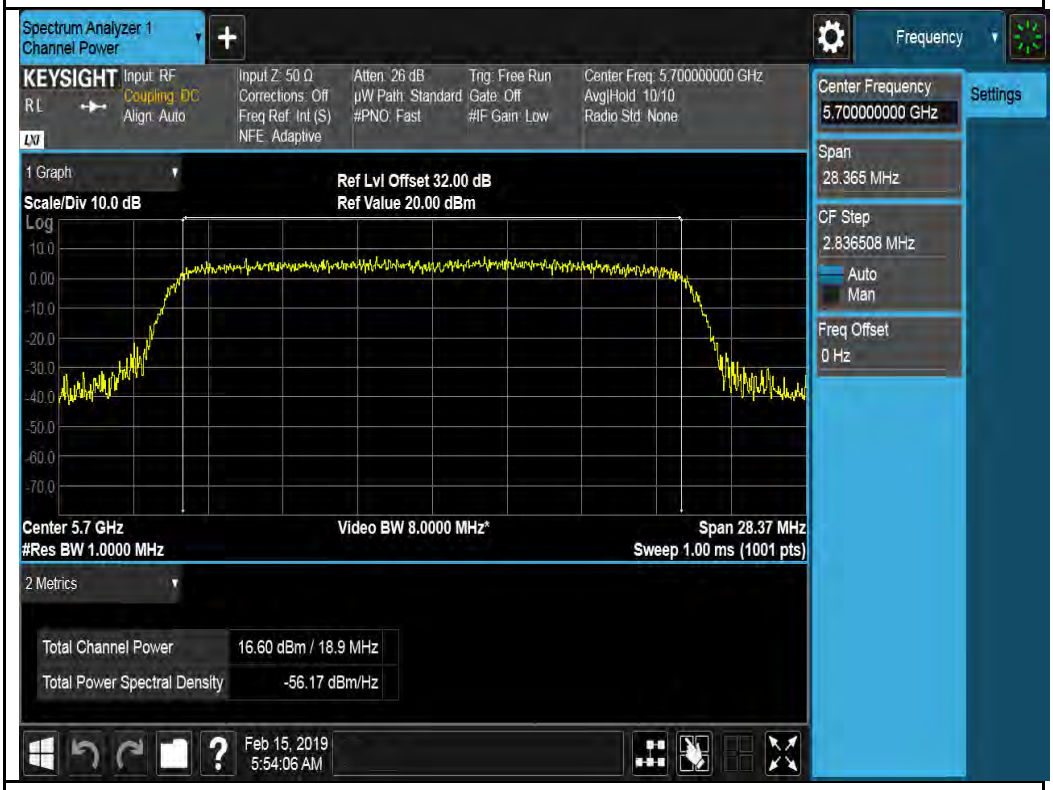
802.11a-5580M



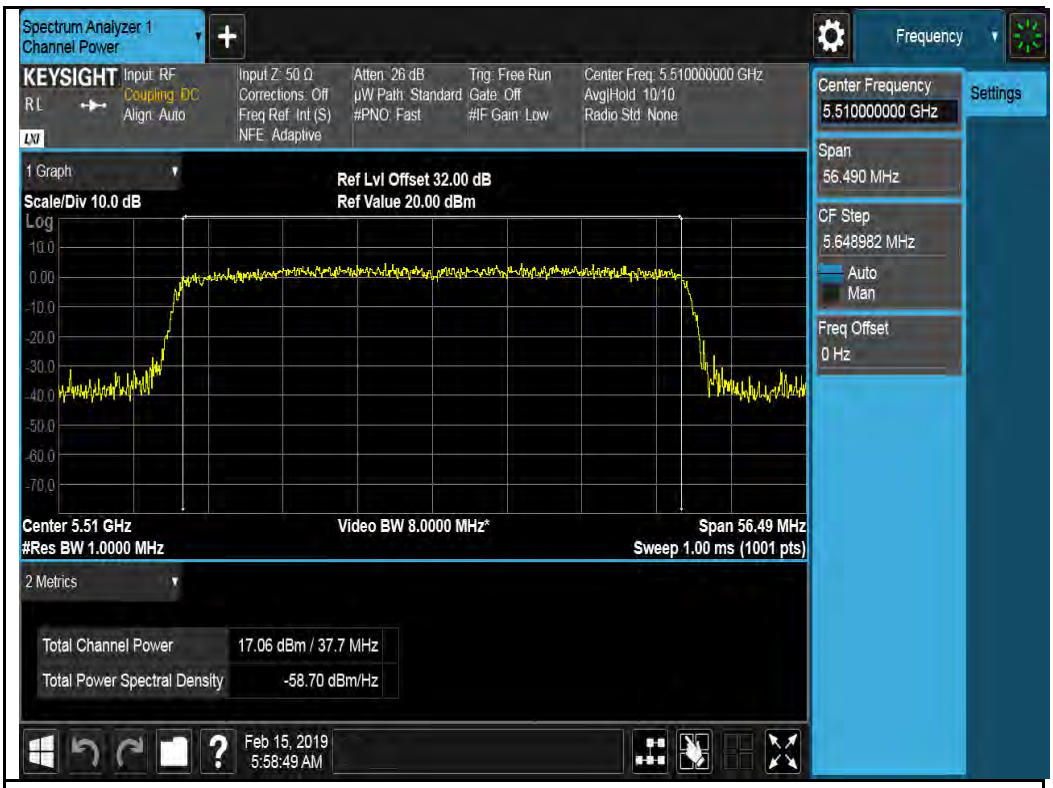
802.11a-5700M

802.11ax-HT20 5500M

802.11ax-HT20 5580M



802.11ax-HT20 5700M



802.11ax-HT40 5510M

802.11ax-HT40 5550M