RF TEST REPORT

SIEMIC
A Bureau Veritas Group Company

Report No.: RF_FCC IC_SL18010503-RUC-002_W5356 Rev:1.0
Supersede Report No.:

Applicant	:	Ruckus Wireless, Inc.
Product Name	:	R730 Access Point
Model No.	:	R730
Test Standard	:	47 CFR 15.407
Test Method	:	ANSI C63.4: 2014 789033 D02 General UNII Test Procedures New Rules v01
FCC ID	:	S9GRR730
IC ID	:	5912A-R730
Dates of test	:	04/27/2018 to 07/20/2018
Issue Date	:	08/07/2018
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

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A2LA ACCREDITED
TESTING CERT # 2742-01

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

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
RF_FCC IC_SL18010503-RUC-002_W5356	None	Original	08/07/2018
RF_FCC IC_SL18010503-RUC-002_W5356 Rev:1.0	Rev:1.0	Update Band edge remark discription	08/16/2018

2 Executive Summary

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

Company: Ruckus Wireless, Inc.
Product: ZoneFlex R730 Access Point
Model: R730

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.	881796
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	R730 Access Point
Model No.	R730
Trade Name	Ruckus
Serial No.	111806000002
Host Model No.	N/A
Input Power	48VDC (PoE)
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Date of EUT received	04/20/2018
Equipment Class/ Category	DTS, UNII
Port/Connectors	PoE, Ethernet

6.2 Radio Description

Radio Type	802.11a/n20/ac20/ax20	802.11n40/ac40/ax40	802.11ac80/ax80
Operating Frequency	5260-5320MHz 5500-5720MHz	5260-5320MHz 5500-5720MHz	5270-5310MHz 5510-5710MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Spacing	20MHz	40MHz	80MHz
Number of Channels	16	6	6
Antenna Type	Internal Omni PCB Antenna		
Antenna Gain (Peak)	5GHz: 1.5dBi		
Antenna Connector Type	U.FL		
Note	2.4GHz and 5GHz Radio transmit simultaneously		

EUT Power level setting for 8x8 mode

Mode	Frequency	Power Setting
802.11-a	5260	10
802.11-a	5280	10
802.11-a	5320	10
802.11-ax-20	5260	10
802.11-ax-20	5280	10
802.11-ax-20	5320	10
802.11-ax-40	5270	10
802.11-ax-40	5310	10
802.11-ax-80	5290	10
802.11-a	5550	10
802.11-a	5580	10
802.11-a	5700	10
802.11-ax-20	5500	10
802.11-ax-20	5580	10
802.11-ax-20	5700	10
802.11-ax-40	5510	10
802.11-ax-40	5590	10
802.11-ax-40	5670	10
802.11-ax-80	5530	10
802.11-ax-80	5610	10

CROSS Band channels power setting for 8x8 mode

Mode	Frequency	Power Setting
802.11-a	5720	10
802.11-ax-20	5720	10
802.11-ax-40	5710	10
802.11-ax-80	5690	10

EUT Power level setting for 4x4 mode

Mode	Frequency	Power Setting
802.11-a	5260	15
802.11-a	5280	15
802.11-a	5320	14
802.11-ax-20	5260	14
802.11-ax-20	5280	13
802.11-ax-20	5320	14
802.11-ax-40	5270	14
802.11-ax-40	5310	14
802.11-ax-80	5290	14
802.11-a	5550	13
802.11-a	5580	13
802.11-a	5700	12
802.11-ax-20	5500	13
802.11-ax-20	5580	14
802.11-ax-20	5700	13
802.11-ax-40	5510	14
802.11-ax-40	5590	14
802.11-ax-40	5670	15
802.11-ax-80	5530	13
802.11-ax-80	5610	14

CROSS Band channels power setting for 4x4 mode

Mode	Frequency	Power Setting
802.11-a	5720	12
802.11-ax-20	5720	12
802.11-ax-40	5710	14
802.11-ax-80	5690	14

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 C610	CN-06P823-48643-37P-4153	Dell	-
2	EUT power Supply	HK-AD-120A100-US	740-64190-011	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	3	Unshielded	-

7.3 Test Software Description

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

8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Restricted Band of Operation	FCC/IC	15.205/RSS 247 (2.2)	ANSI C63.10: 2013 789033 D01 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
AC Conducted Emissions Voltage	FCC/IC	15.207(a)/ RSS Gen Issue 4.0, Nov 2014 (8.8)	ANSI C63.10: 2013 RSS Gen Issue 4.0, Nov 2014 (8.8)	☒ Pass ☐ N/A

Test Item	Test standard		Test Method/Procedure	Pass / Fail
26 & 6 dB Emission Bandwidth	FCC/IC	15.407/RSS 247	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
99% Bandwidth	IC	RSS 247	RSS Gen Issue 4.0, Nov 2014 (6.6)	☒ Pass ☐ N/A
Maximum conducted Output Power	FCC/IC	15.407/RSS 247	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Power reduction (Antenna Gain > 6 dBi)	FCC/IC	15.407/RSS 247	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Band Edge and Radiated Spurious Emissions	FCC/IC	15.407/RSS 247	ANSI C63.4 – 2014 789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Power Spectral Density	FCC/IC	15.407/RSS 247	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Frequency Stability	FCC/IC	15.407/RSS 247	789033 D01 General UNII Test Procedures New Rules v01	☐ Pass ☒ N/A
Transmit Power Control (TPC)	FCC/IC	15.407/RSS 247	789033 D01 General UNII Test Procedures New Rules v01	☐ Pass ☒ N/A
User Manual	FCC/IC	-	-	☒ Pass ☐ N/A
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

9.1 Emissions (30MHz to 1GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:
- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
Antenna Factor	0.65	Normal	2	1	0.325
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
NSA Calibration	4.0	U-Shape	1.414	1	2.8288543
Combined Standard Uncertainty					3.0059131
Expanded Uncertainty (K=2)					6.0118262

The total derived measurement uncertainty is +/- 6.00 dB.

9.2 Radiated Emissions (1GHz to 40GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:
- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- VSWR Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.0692840
Cable Insertion Loss	0.21	Normal	2	1	0.1050000
Filter Insertion Loss	0.25	Normal	2	1	0.1250000
Antenna Factor	0.65	Normal	2	1	0.3250000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.8660508
PRF Response	1.5	Rectangular	1.732	1	0.8660508
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
VSWR Calibration	2.0	U-Shape	1.414	1	1.4144272
Combined Standard Uncertainty					4.2363
Expanded Uncertainty (K=2)					8.4726

The total derived measurement uncertainty is +/- 8.47 dB.

9.3 RF conducted measurement

The test is to measure the RF output power from the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the Reference Level Uncertainty
- Uncertainty of variable attenuators
- Uncertainty of cables
- Uncertainty due to the mismatches

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Reference Level	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Attenuator	0.25	Normal	2	1	0.125
Mismatch	0.25	U-Shape	1.414	1	0.1768033
Combined Standard Uncertainty					0.476087
Expanded Uncertainty (K=2)					0.952174

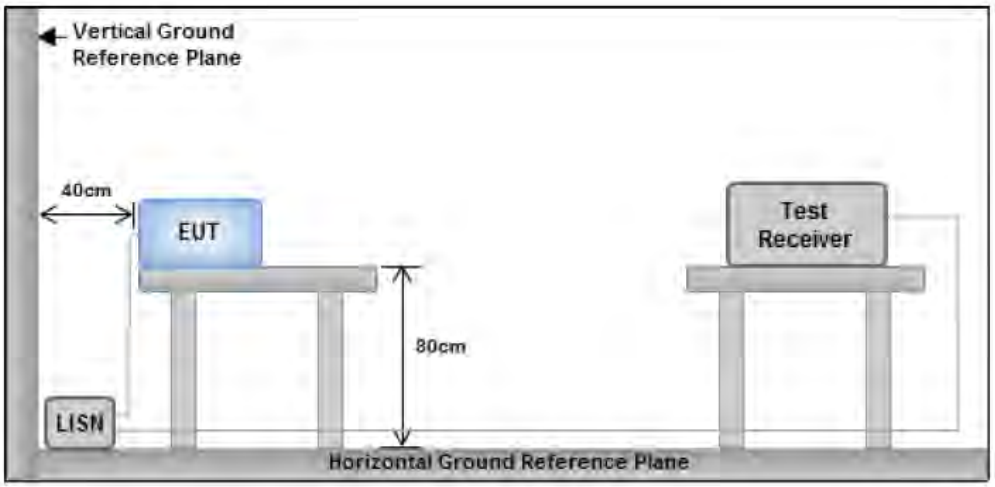
The total derived measurement uncertainty is +/- 0.95 dB.

10 Measurements, Examination and Derived Results

10.1 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
47CFR§15.207 RSS 247 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 tested with AC 120V 60Hz		
Result	☒ Pass ☐ Fail		

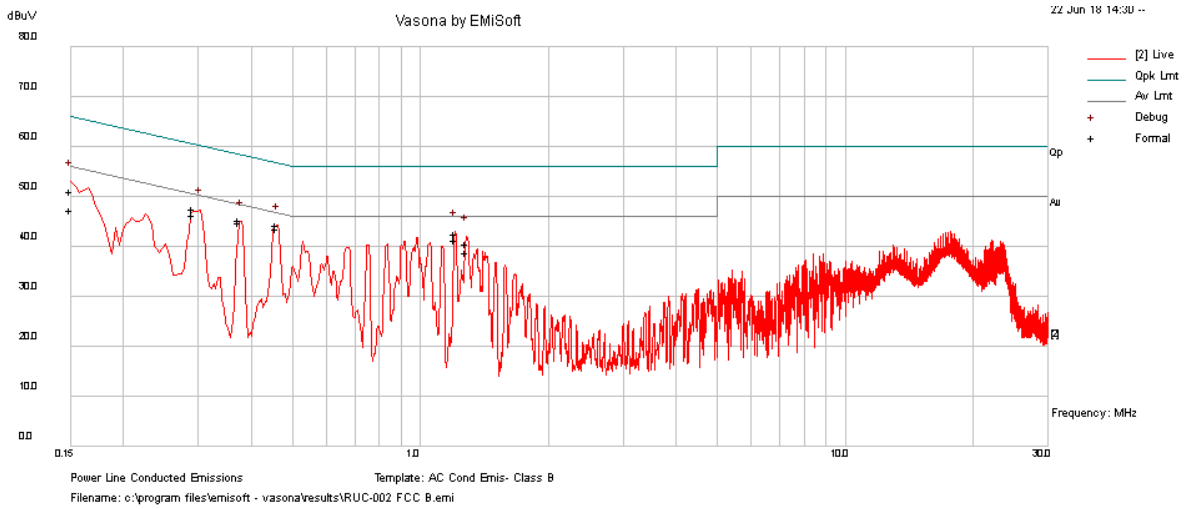
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Deon Dai at RF test site.

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:	06/22/2018			
Remarks	POE, Live			

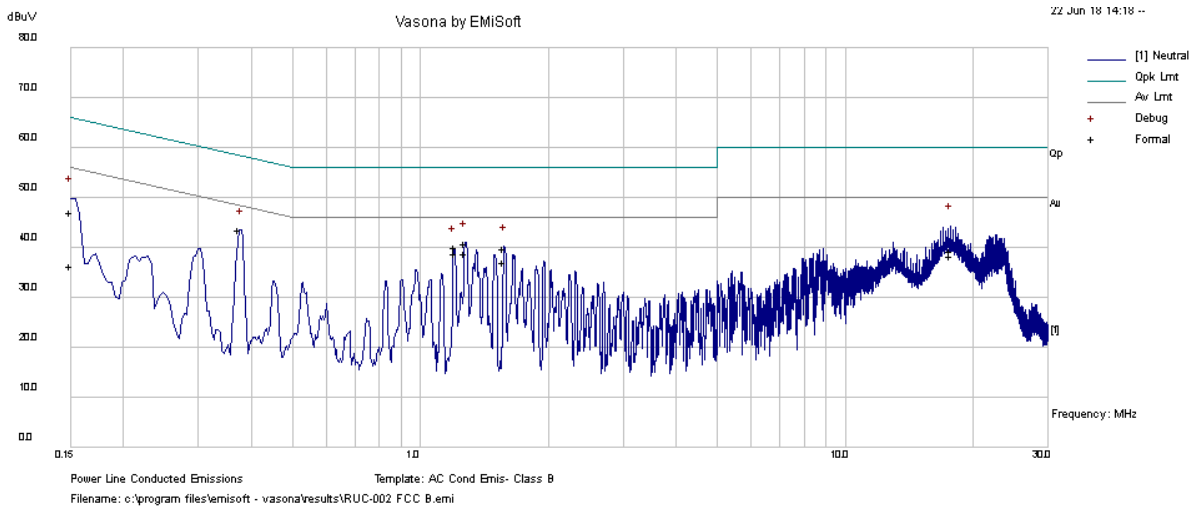


Live Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.46	34.99	9.33	0.04	44.36	Quasi Peak	Live	56.75	-12.39	Pass
0.29	38.19	9.32	0.04	47.56	Quasi Peak	Live	60.49	-12.93	Pass
0.15	41.7	9.33	0.05	51.08	Quasi Peak	Live	65.98	-14.9	Pass
1.20	33.32	9.33	0.05	42.7	Quasi Peak	Live	56	-13.3	Pass
0.37	35.91	9.33	0.04	45.28	Quasi Peak	Live	58.4	-13.12	Pass
1.28	31.09	9.34	0.05	40.47	Quasi Peak	Live	56	-15.53	Pass
0.46	34.29	9.33	0.04	43.66	Average	Live	46.75	-3.09	Pass
0.29	36.88	9.32	0.04	46.24	Average	Live	50.49	-4.25	Pass
0.15	38.03	9.33	0.05	47.41	Average	Live	55.98	-8.57	Pass
1.20	31.87	9.33	0.05	41.25	Average	Live	46	-4.75	Pass
0.37	35.57	9.33	0.04	44.93	Average	Live	48.4	-3.47	Pass
1.28	29.57	9.34	0.05	38.95	Average	Live	46	-7.05	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:	06/22/2018			
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	34.17	9.33	0.04	43.53	Quasi Peak	Neutral	58.41	-14.88	Pass
1.28	31.46	9.33	0.05	40.85	Quasi Peak	Neutral	56	-15.15	Pass
17.72	29.4	9.43	0.42	39.25	Quasi Peak	Neutral	60	-20.75	Pass
1.57	30.39	9.34	0.06	39.79	Quasi Peak	Neutral	56	-16.21	Pass
1.20	30.6	9.33	0.05	39.99	Quasi Peak	Neutral	56	-16.01	Pass
0.15	37.7	9.33	0.05	47.08	Quasi Peak	Neutral	66	-18.92	Pass
0.37	34.13	9.33	0.04	43.5	Average	Neutral	48.41	-4.91	Pass
1.28	29.46	9.33	0.05	38.84	Average	Neutral	46	-7.16	Pass
17.72	28.45	9.43	0.42	38.3	Average	Neutral	50	-11.7	Pass
1.57	27.65	9.34	0.06	37.05	Average	Neutral	46	-8.95	Pass
1.20	29.54	9.33	0.05	38.92	Average	Neutral	46	-7.08	Pass
0.15	26.86	9.33	0.05	36.24	Average	Neutral	56	-19.76	Pass

10.2 6dB & 26 dB & 99% Bandwidth

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	-	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 UNII Test Procedures New Rules v01 26dB Emission bandwidth measurement procedure (Other than 5.725-5.85 GHz) - Use the spectrum analyzer built-in measurement function to determine the 26dB BW. o Set RBW = around 1% of emission bandwidth o Set VBW > RBW o Detector = Peak o Trace mode = max hold - Allow the trace to stabilize. - Capture the plot. - Repeat above steps for different test channel and other modulation type. - 6dB Emission bandwidth measurement procedure - Use the spectrum analyzer built-in measurement function to determine the 26dB BW. o Set RBW = 100kHz o Set VBW > 3RBW o Detector = Peak o Trace mode = max hold - Allow the trace to stabilize. - Capture the plot. - Repeat above steps for different test channel and other modulation type.		

Test Date	05/17/2018 – 06/20/2018	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 5.3GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5260	Low	21.684
	802.11a	5280	Mid	21.602
	802.11a	5320	High	20.805
	802.11ax-20	5260	Low	21.958
	802.11ax-20	5280	Mid	22.545
	802.11ax-20	5320	High	22.033
	802.11ax-40	5270	Low	41.415
	802.11ax-40	5310	High	41.617
	802.11ax-80	5290	Mid	85.542

26dB Bandwidth measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5500	Low	19.593
	802.11a	5580	Mid	19.556
	802.11a	5700	High	19.456
	802.11ax-20	5500	Low	22.967
	802.11ax-20	5580	Mid	22.345
	802.11ax-20	5700	High	21.985
	802.11ax-40	5510	Low	42.696
	802.11ax-40	5590	Mid	42.264
	802.11ax-40	5670	High	42.581
	802.11ax-80	5530	Low	85.876
	802.11ax-80	5610	High	85.659

26dB Bandwidth measurement result for cross channels

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5720	CROSS	19.603
26dB BW	802.11ax-20	5720	CROSS	22.225
26dB BW	802.11ax-40	5710	CROSS	41.843
26dB BW	802.11ax-80	5690	CROSS	84.756

6 Bandwidth measurement result for cross channels

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5720	CROSS	16.488
26dB BW	802.11ax-20	5720	CROSS	18.974
26dB BW	802.11ax-40	5710	CROSS	38.114
26dB BW	802.11ax-80	5690	CROSS	78.061

99% Bandwidth measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5260	Low	18.968
	802.11a	5280	Mid	18.998
	802.11a	5320	High	18.982
	802.11ax-20	5260	Low	19.040
	802.11ax-20	5280	Mid	19.000
	802.11ax-20	5320	High	19.044
	802.11ax-40	5270	Low	37.971
	802.11ax-40	5310	High	37.928
	802.11ax-80	5290	Mid	77.528

99% Bandwidth measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5500	Low	16.478
	802.11a	5580	Mid	16.522
	802.11a	5700	High	16.561
	802.11ax-20	5500	Low	19.036
	802.11ax-20	5580	Mid	19.031
	802.11ax-20	5700	High	19.020
	802.11ax-40	5510	Low	37.907
	802.11ax-40	5590	Mid	37.930
	802.11ax-40	5670	High	37.953
	802.11ax-80	5530	Low	77.630
	802.11ax-80	5610	High	77.634

99% Bandwidth measurement result for cross channels

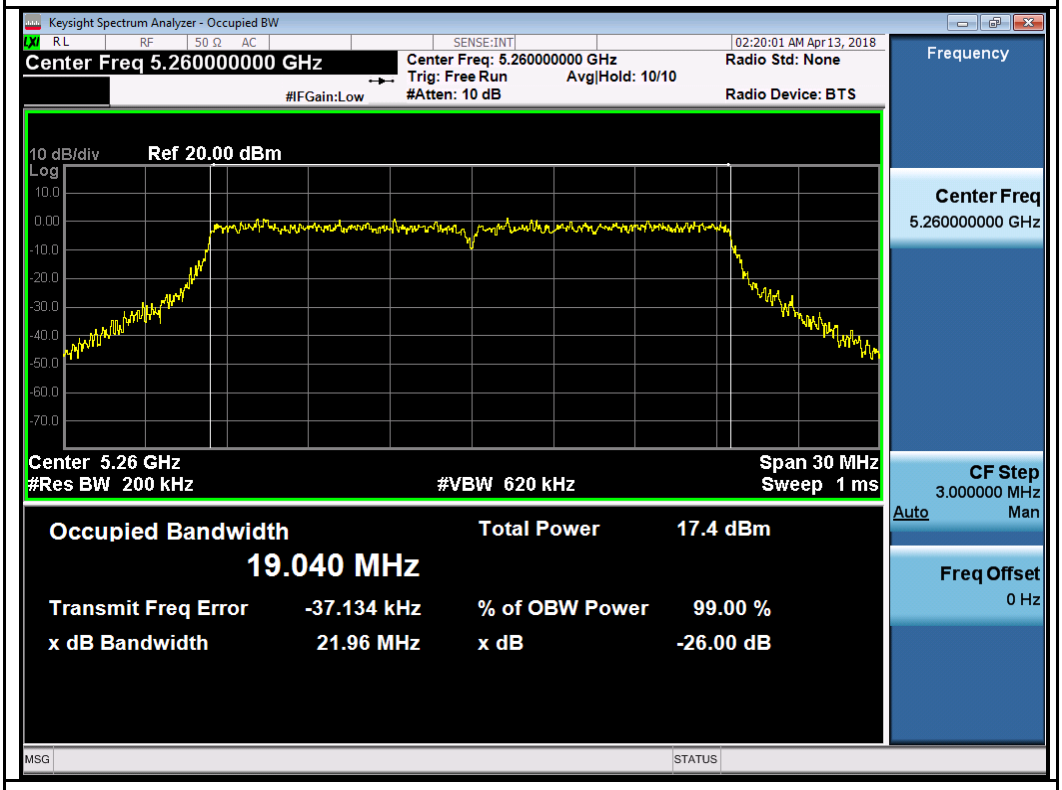
Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5720	CROSS	16.533
26dB BW	802.11ax-20	5720	CROSS	19.076
26dB BW	802.11ax-40	5710	CROSS	37.932
26dB BW	802.11ax-80	5690	CROSS	77.593

26dB Bandwidth Test Plots
W53:

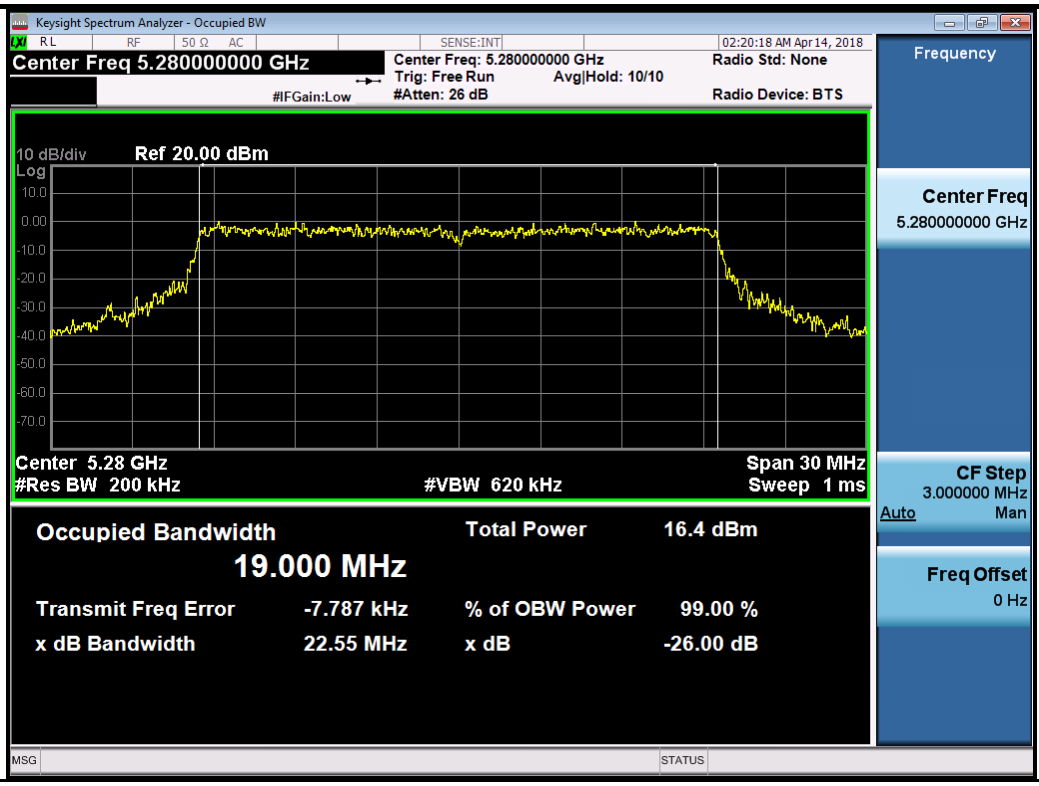
802.11a-5260MHz

802.11a-5280MHz

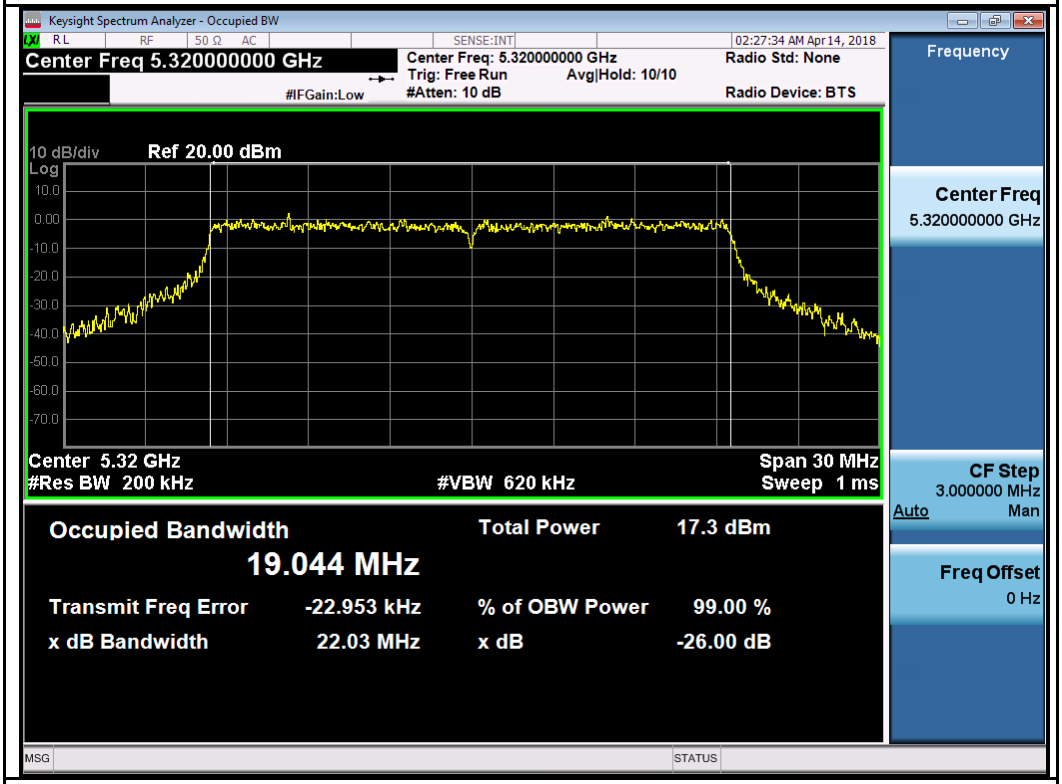
802.11a-5320MHz



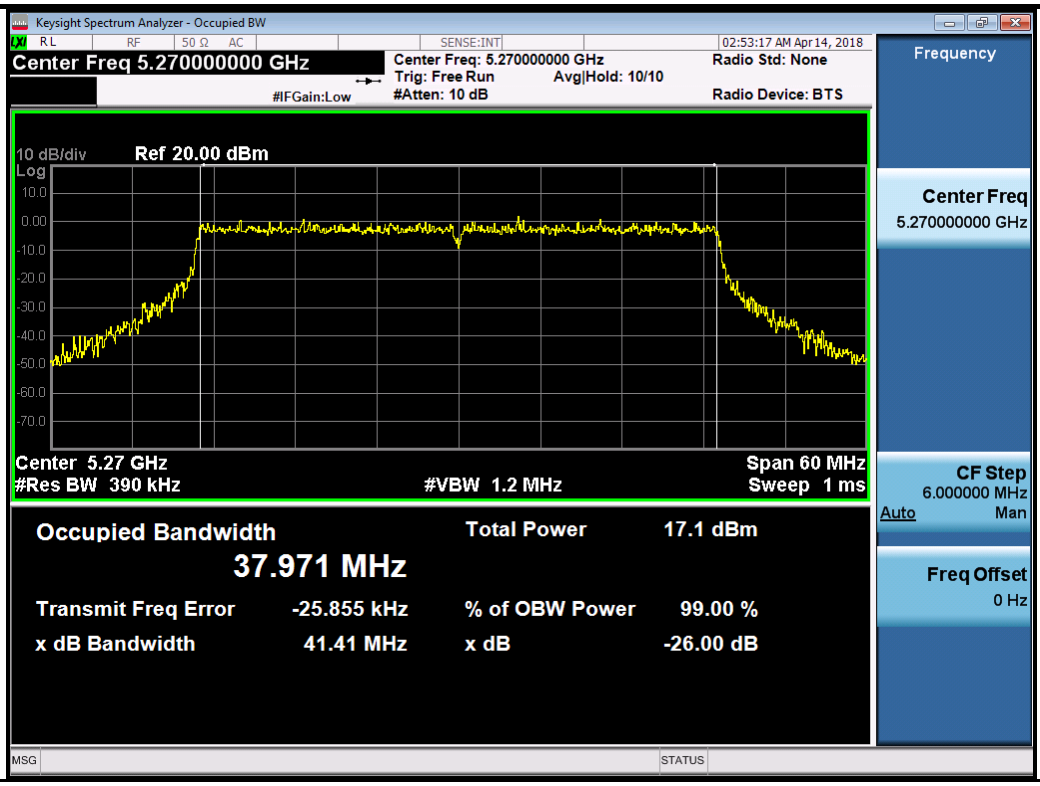
802.11ax20-5260MHz



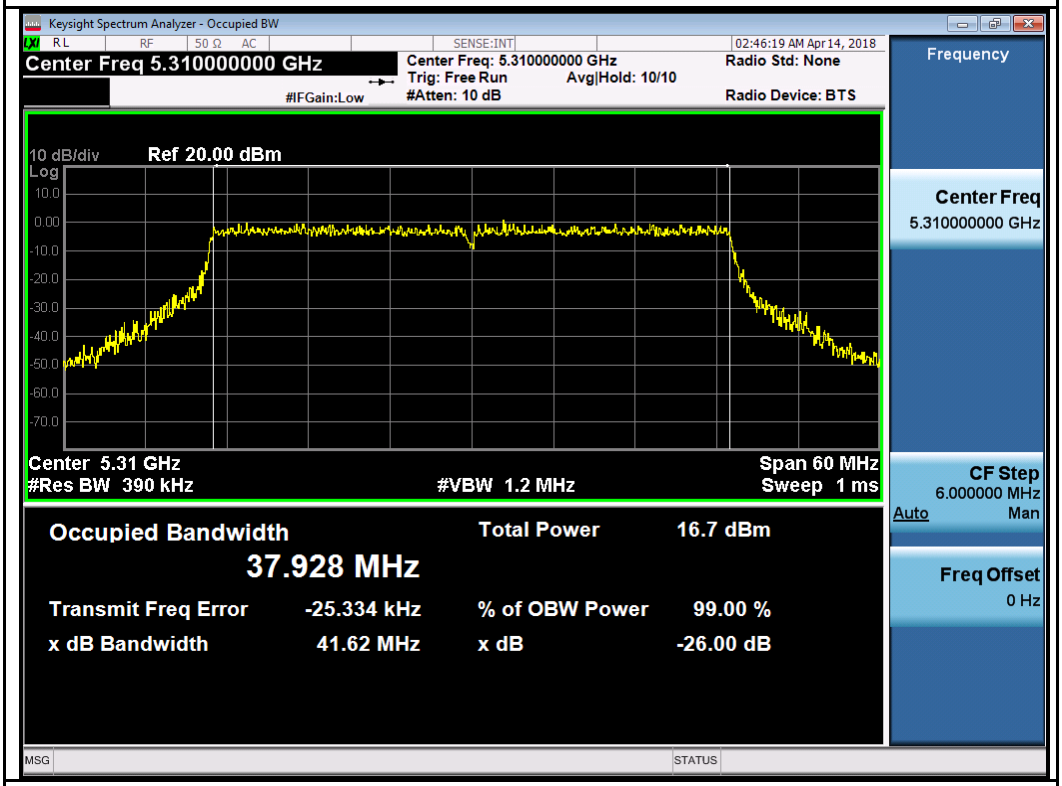
802.11ax20-5280MHz



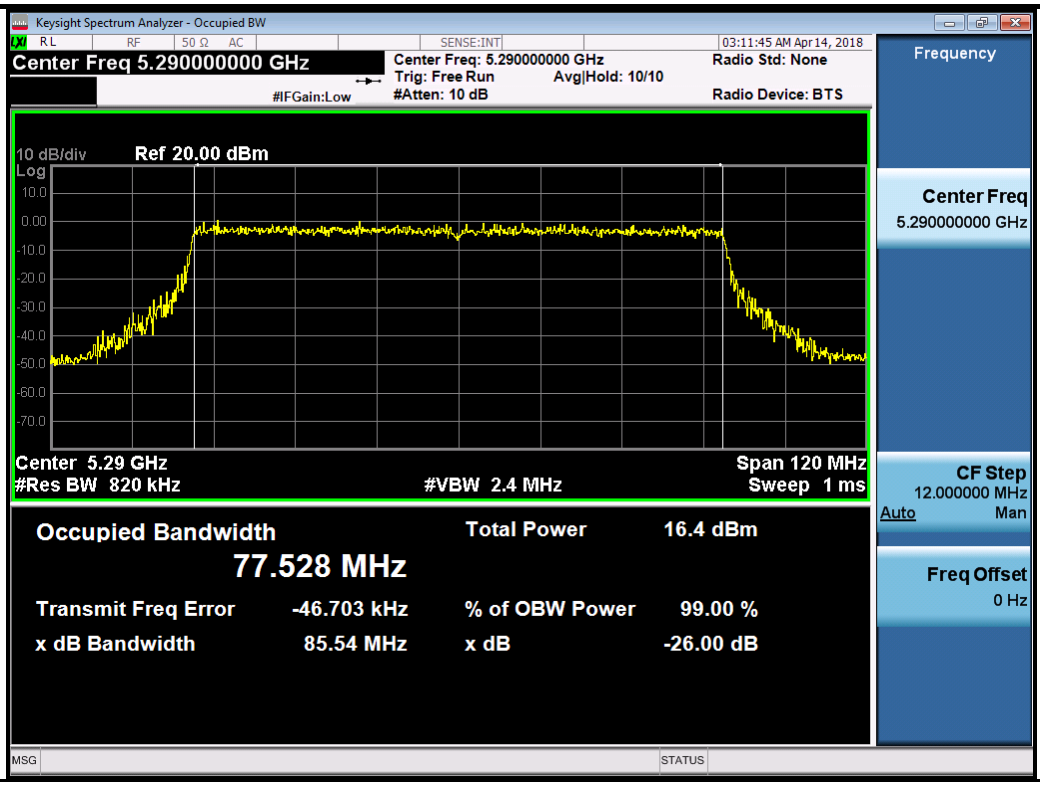
802.11ax20-5320MHz



802.11ax40-5270MHz

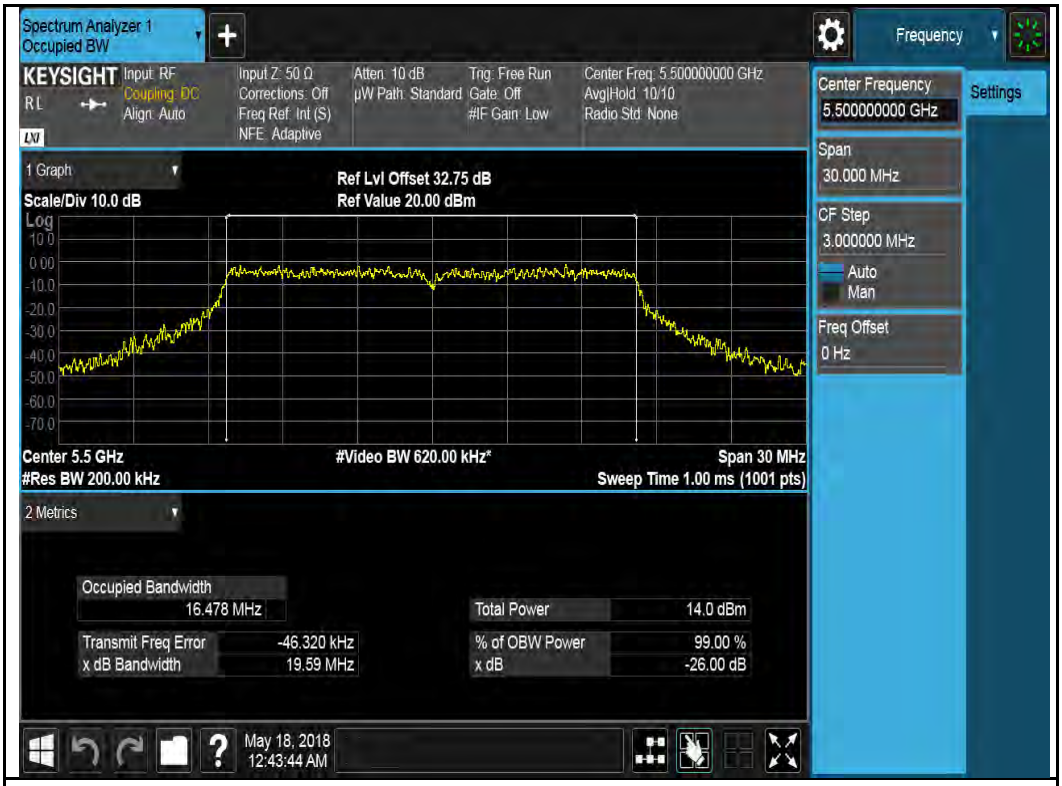


802.11ax40-5310MHz

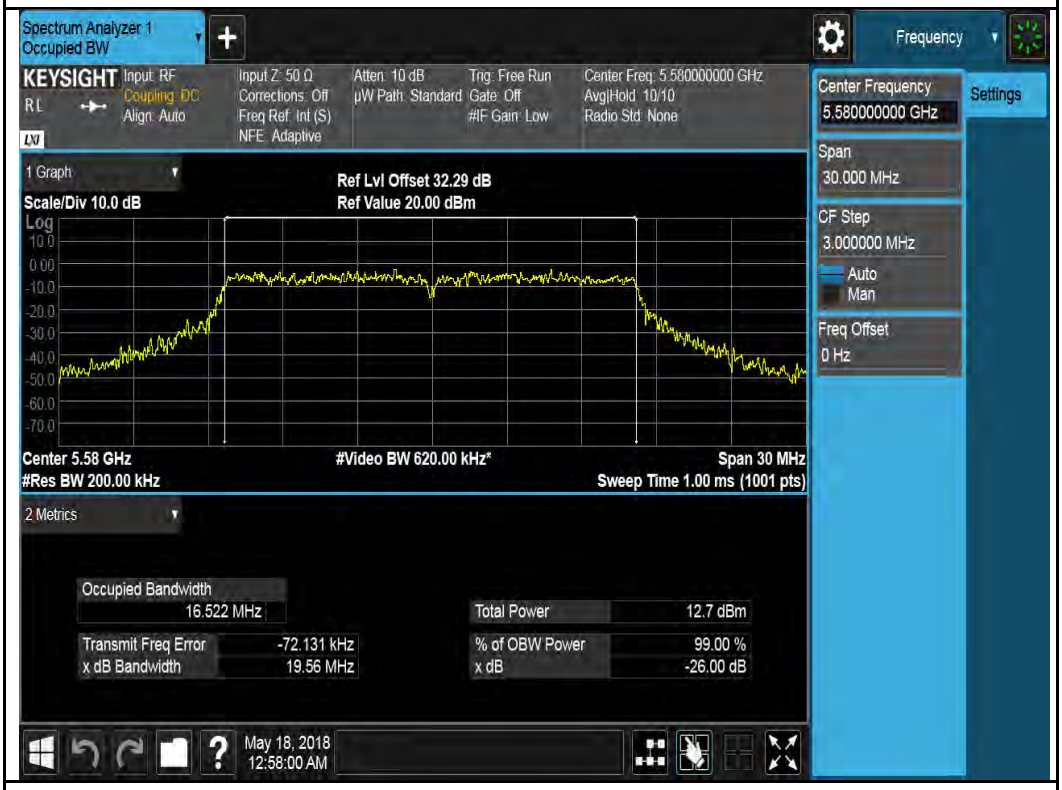


802.11ax80-5290MHz

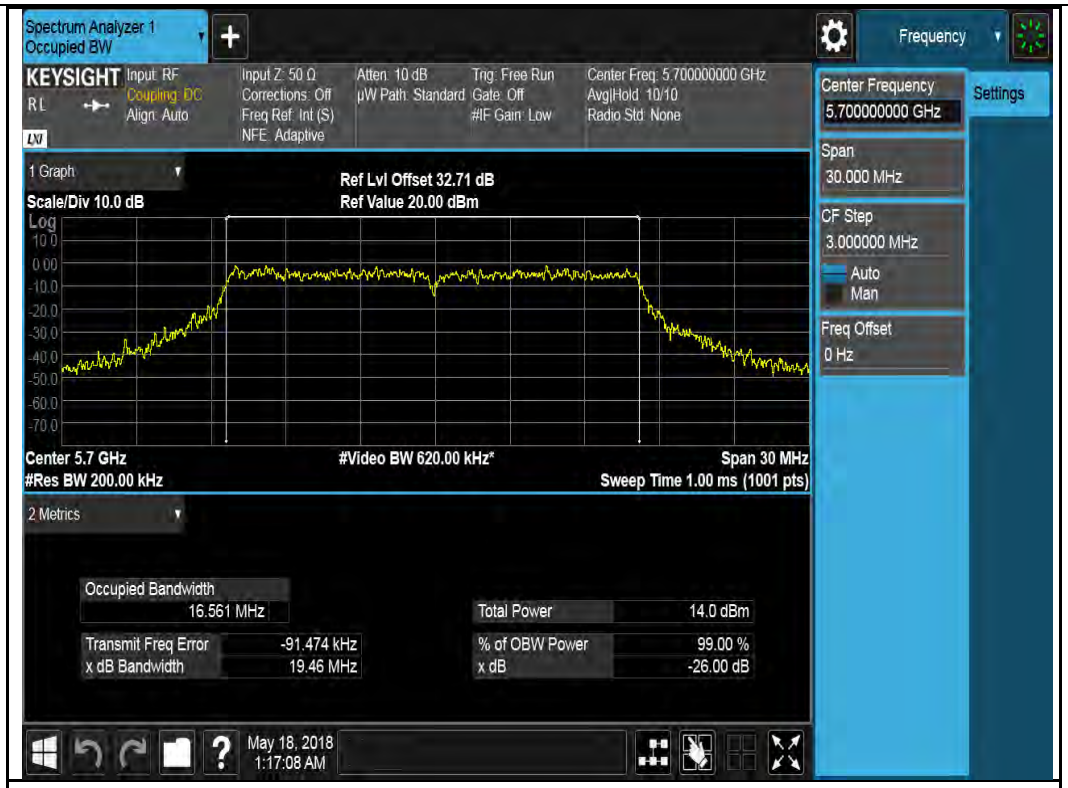
W56:



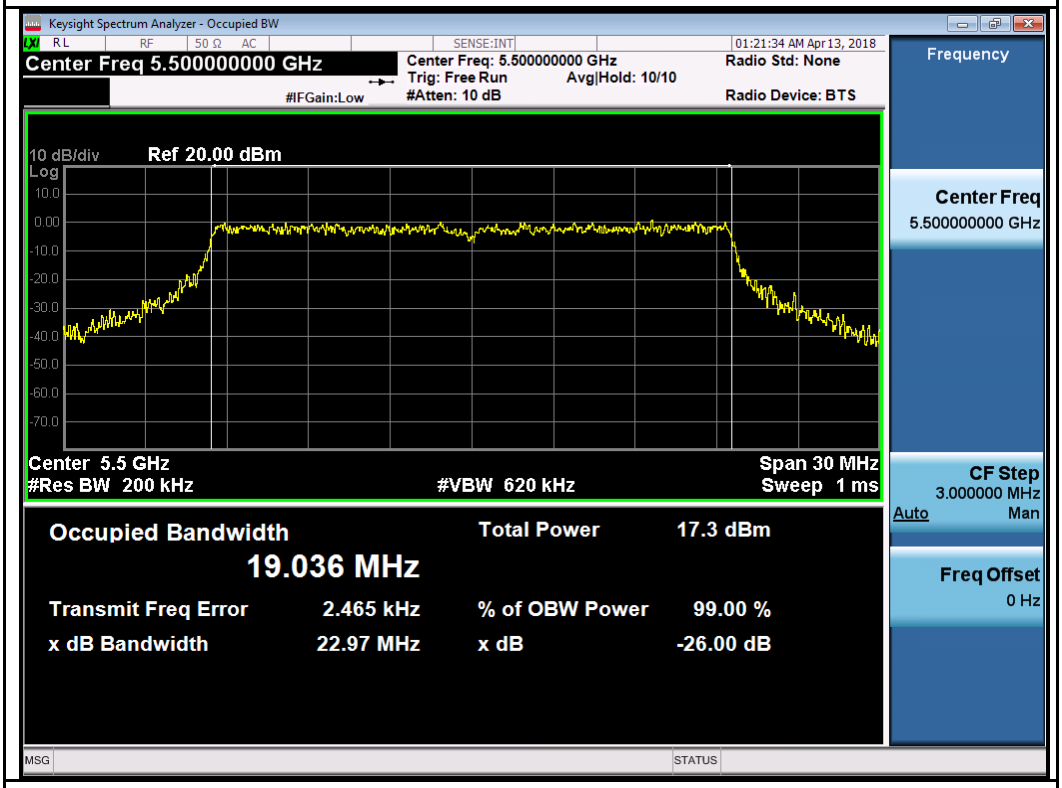
802.11a-5500MHz



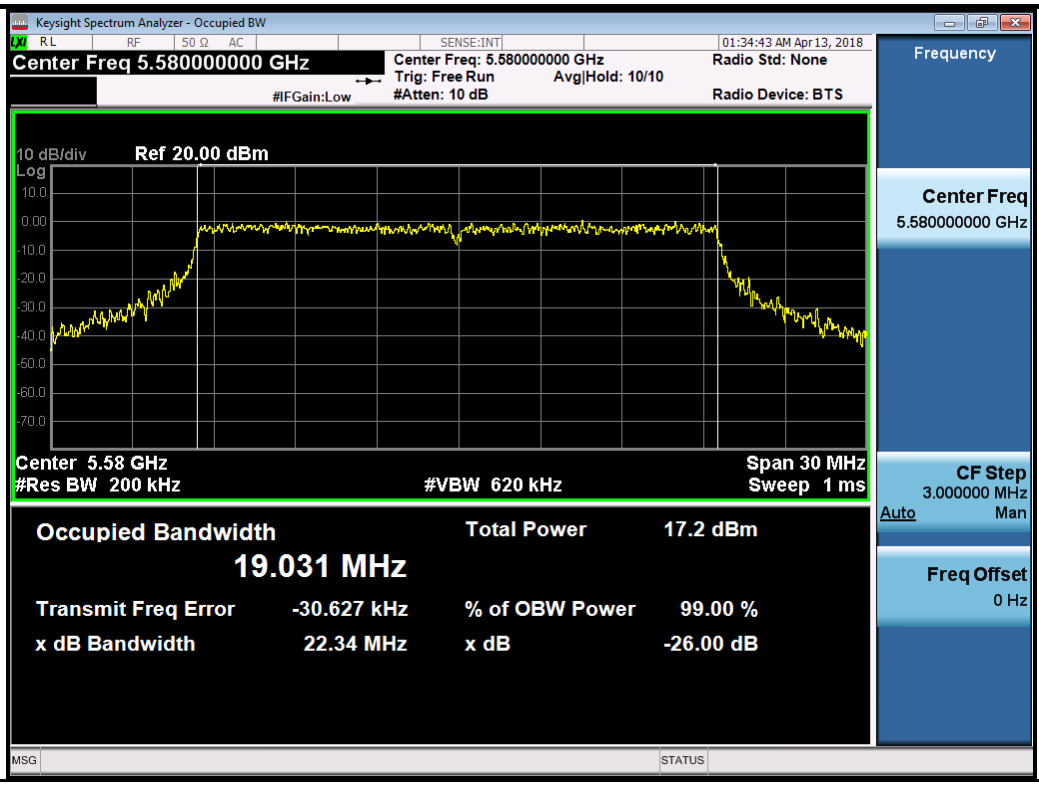
802.11a-5580MHz



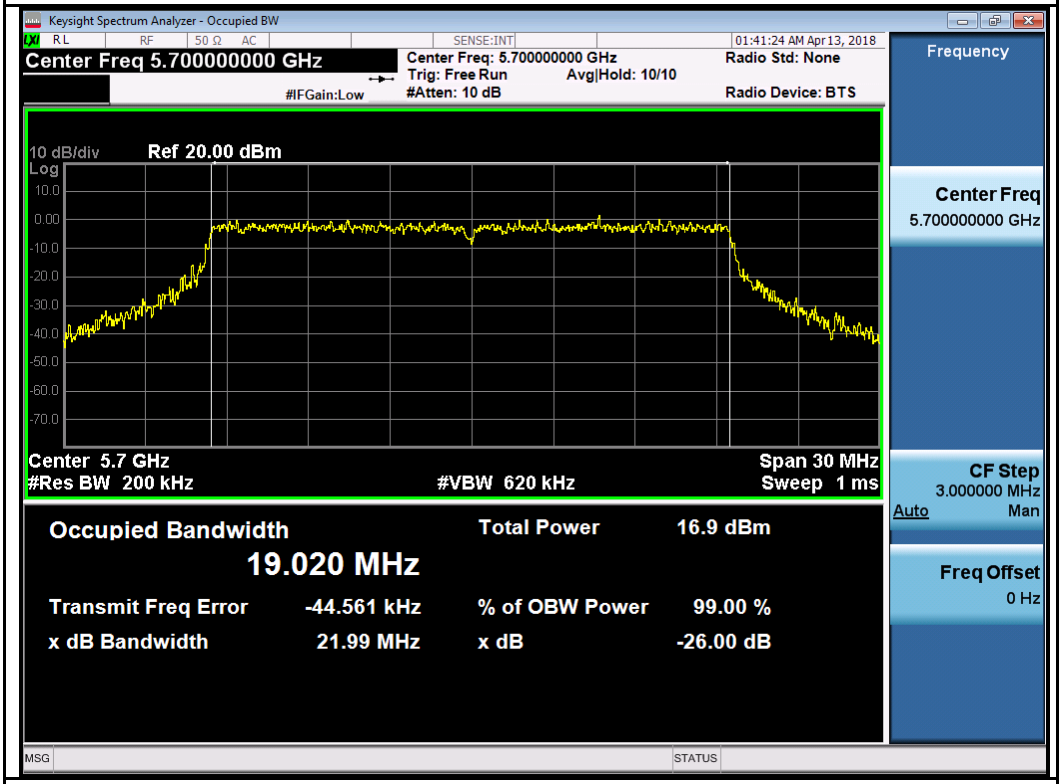
802.11a-5700MHz



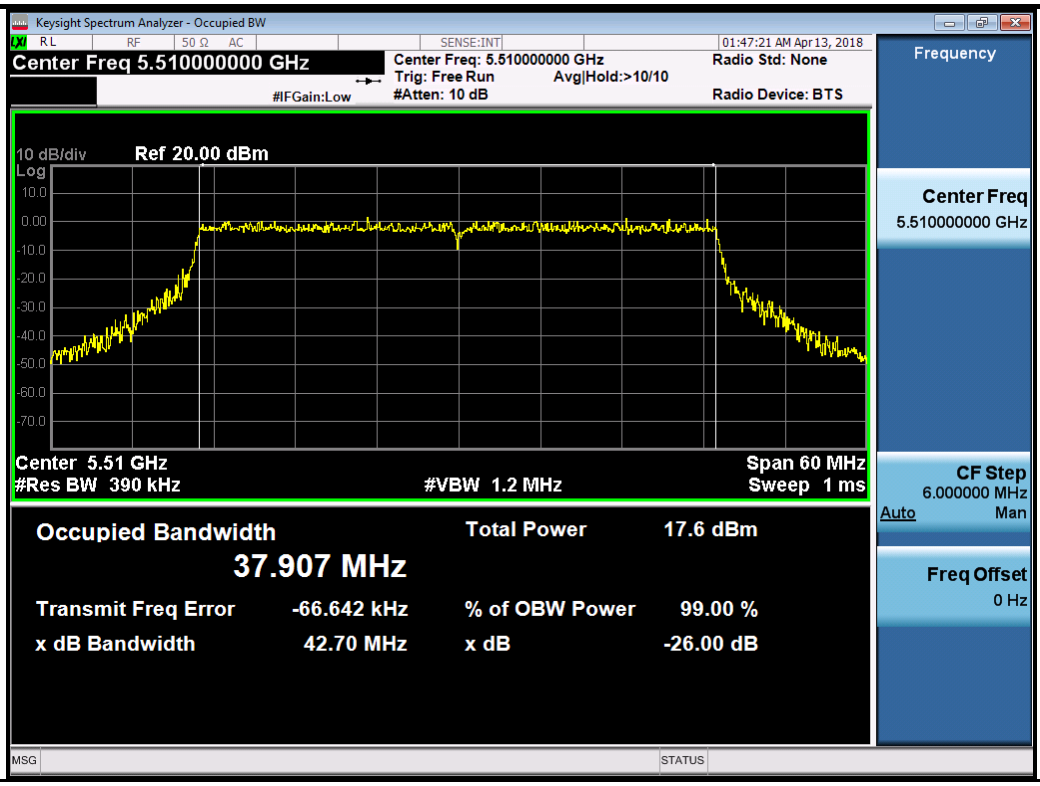
802.11ax20-5500MHz



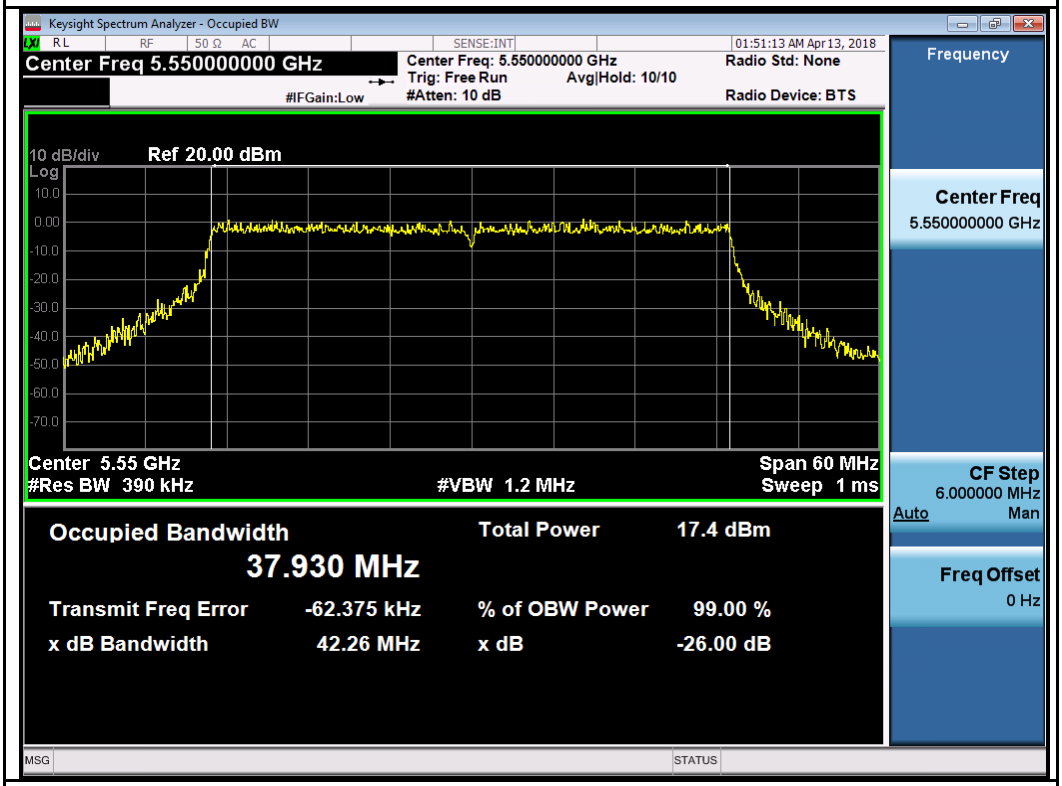
802.11ax20-5580MHz



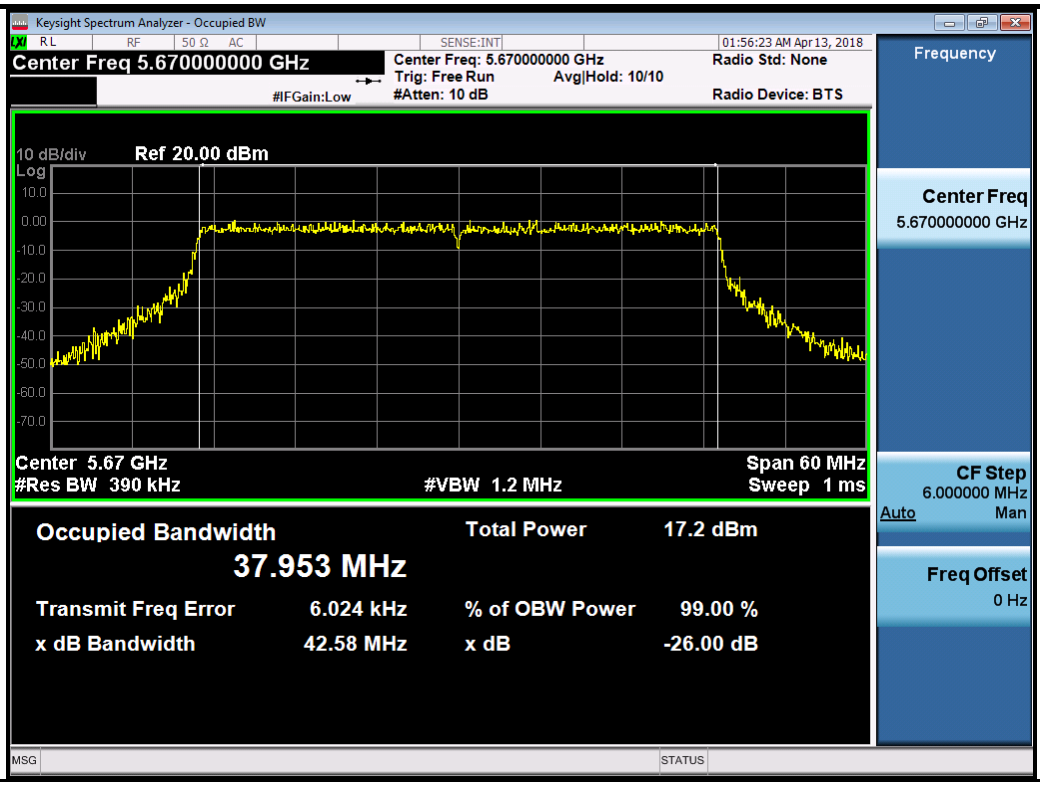
802.11ax20-5700MHz



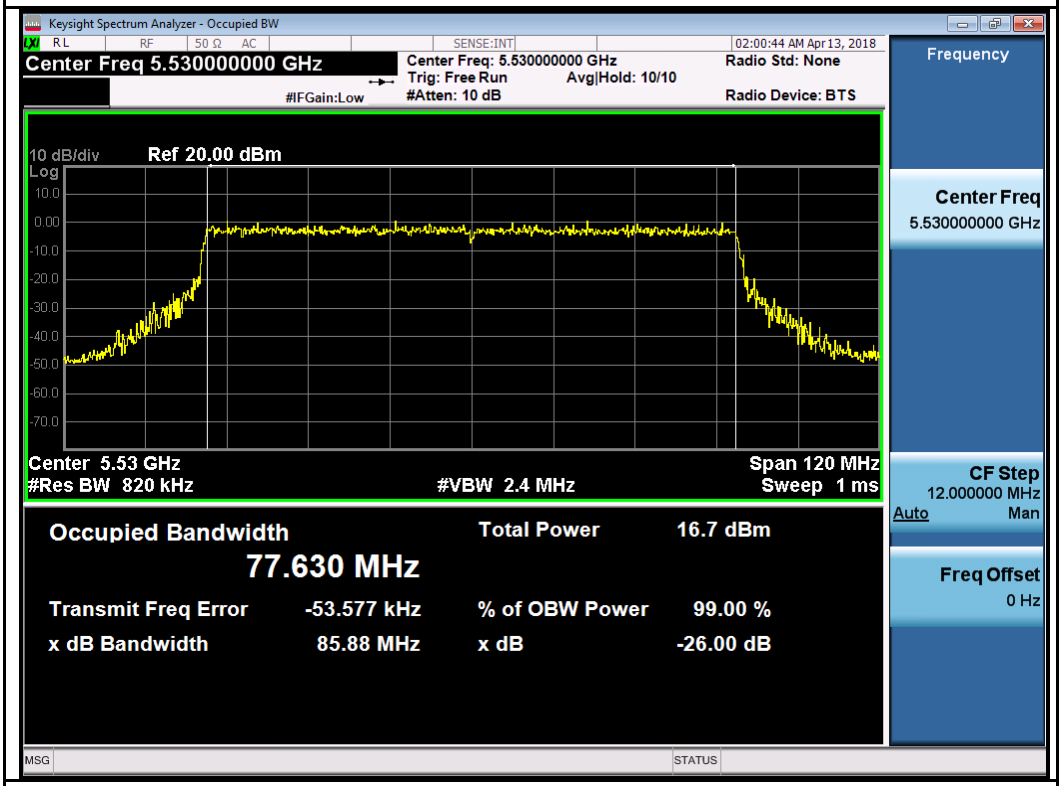
802.11ax40-5510MHz



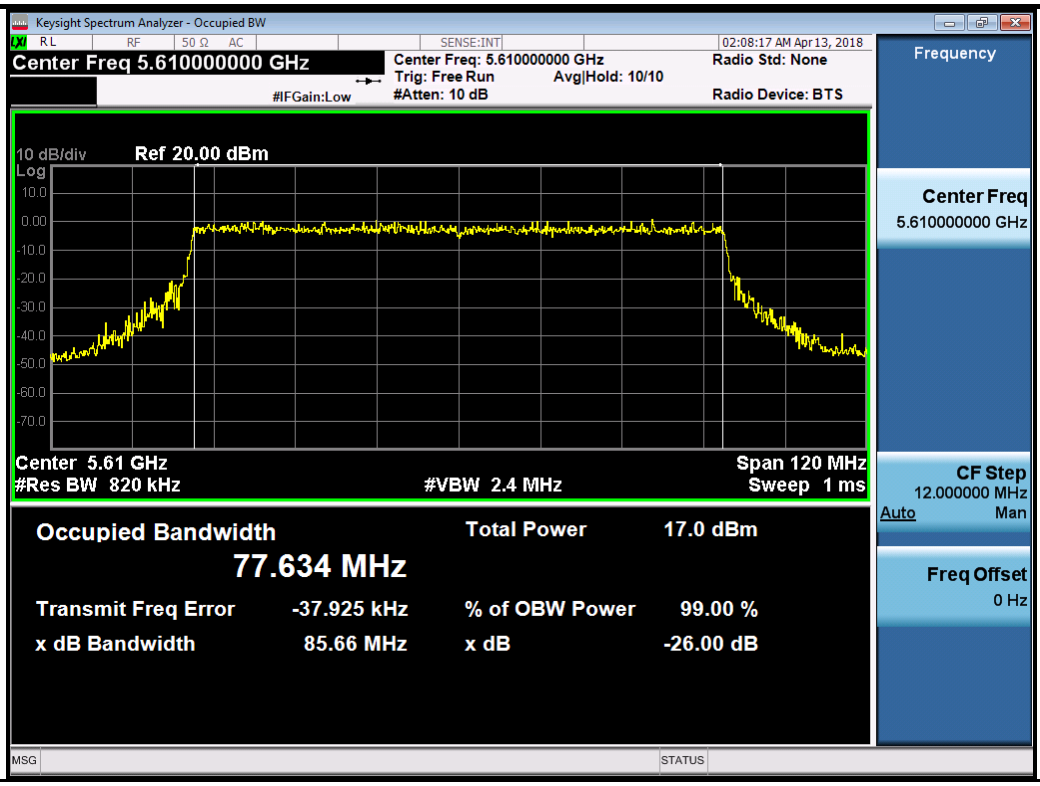
802.11ax40-5550MHz



802.11ax40-5670MHz

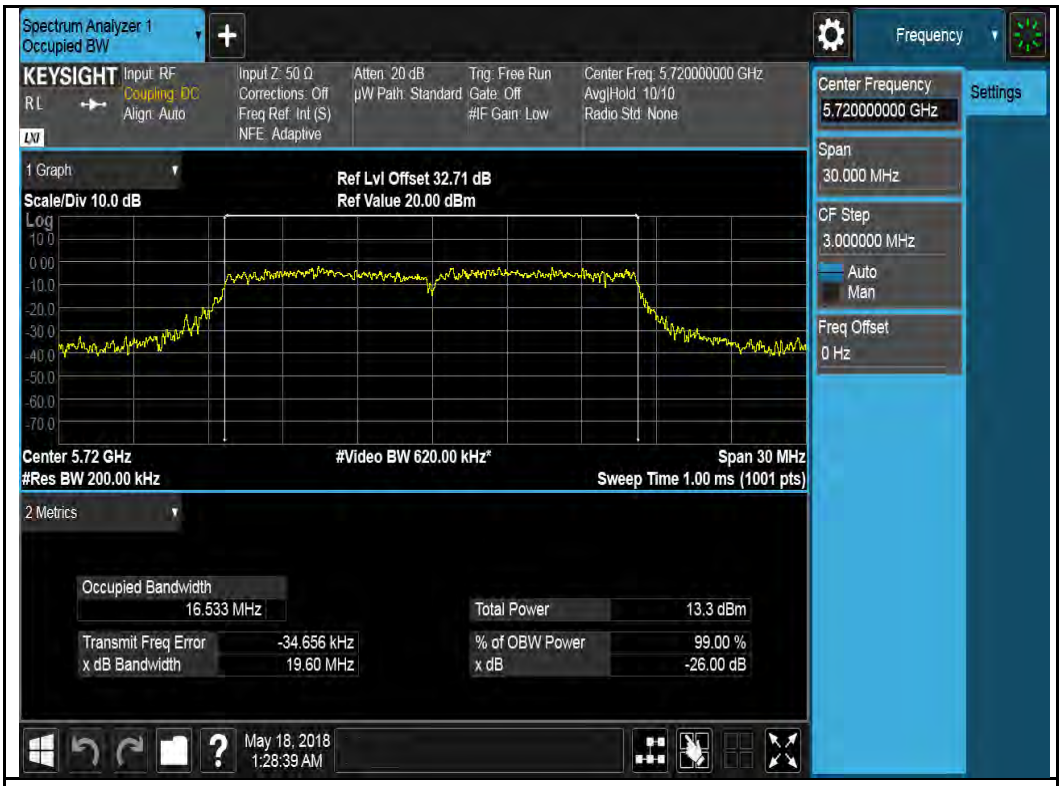


802.11ax80-5530MHz

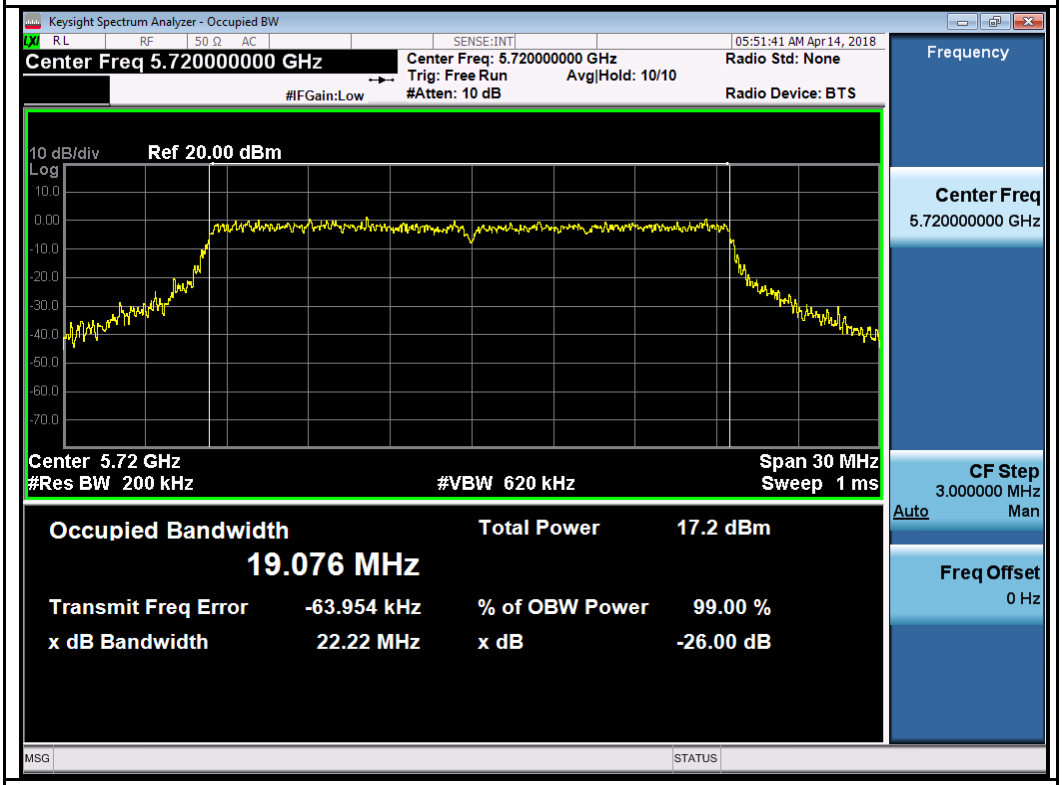


802.11ax80-5610MHz

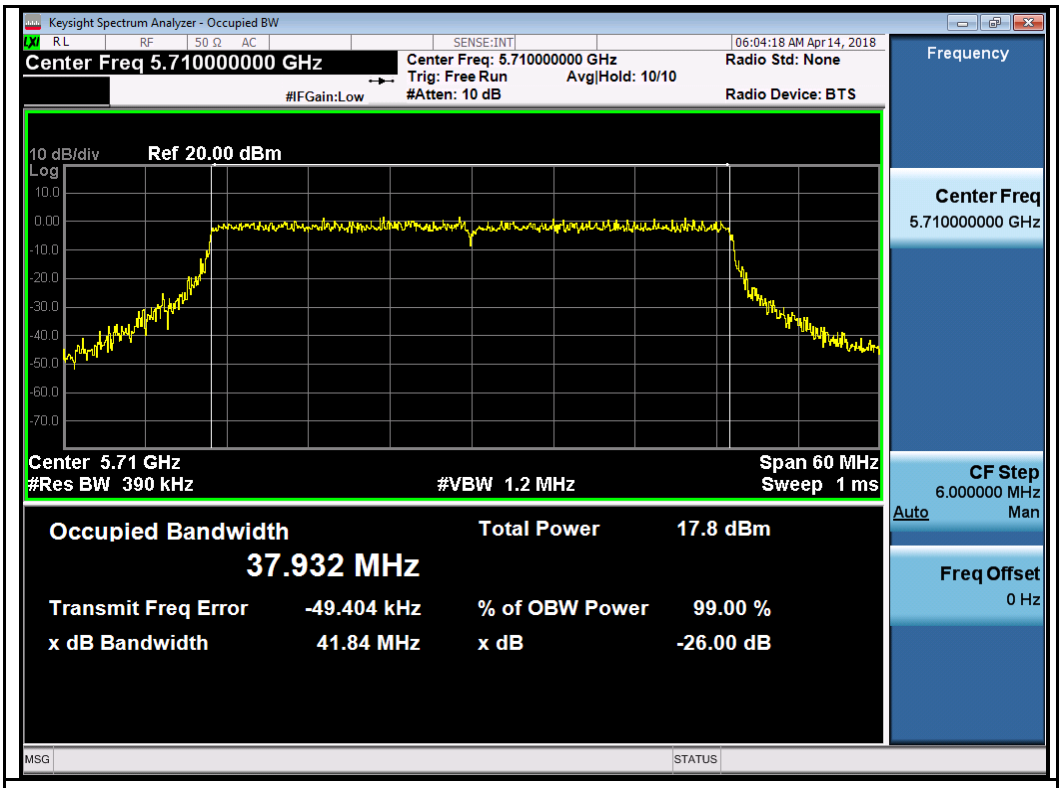
26dB BW Cross Band:



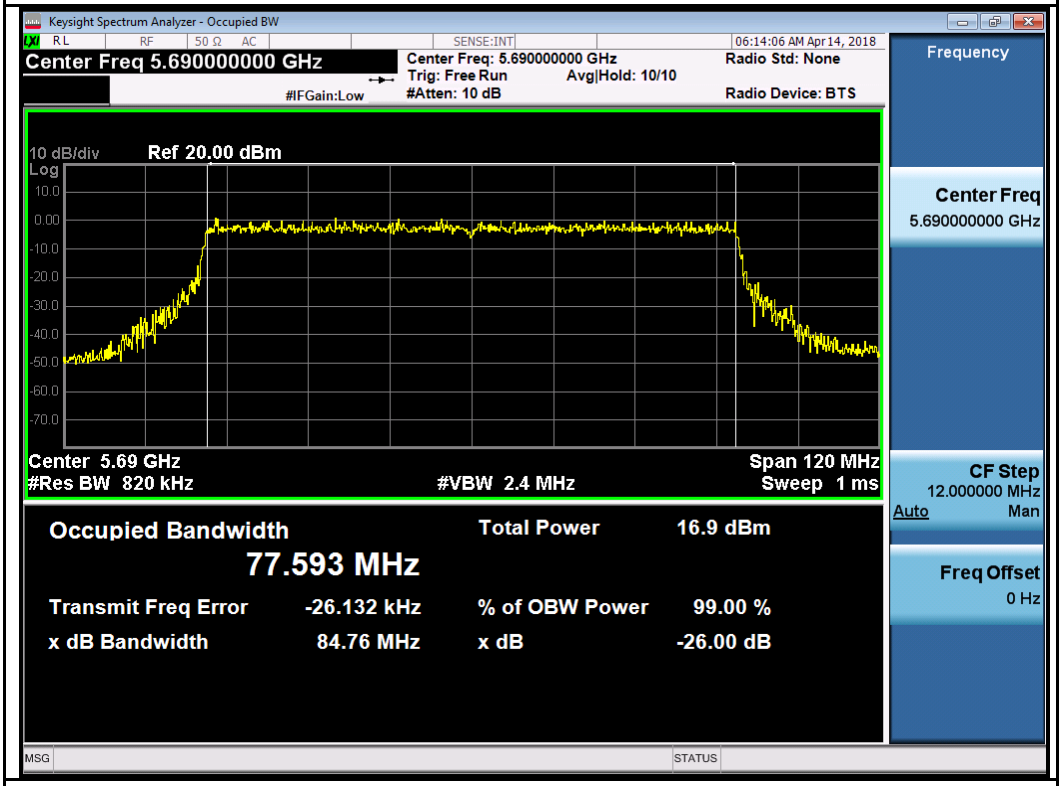
802.11a-5720MHz



802.11ax20 5720MHz



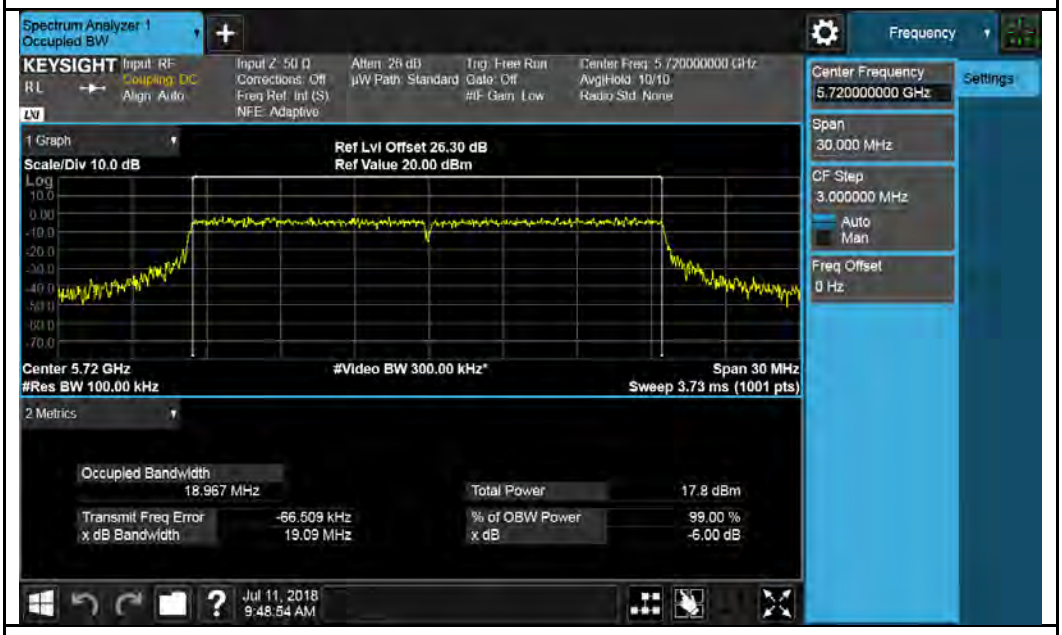
802.11ax40 5710MHz



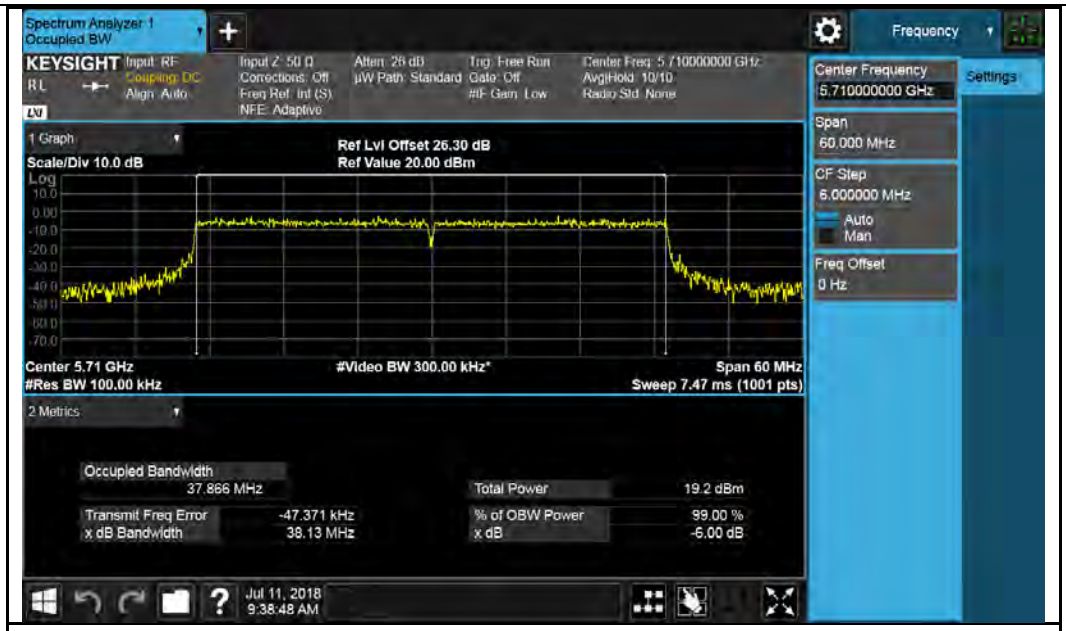
802.11ax80-5690MHz

6dB BW Cross Band:

802.11a-5720MHz



802.11ax20 5720MHz



802.11ax40 5710MHz

802.11ax80-5690MHz

10.3 Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407 RSS 247	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.	☒

Test Setup	
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01r02 Measurement using a Spectrum Analyzer or EMI Receiver (SA) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): - Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal. - Set RBW = 1 MHz - Set VBW = 3 MHz - 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.) - Sweep time = auto. - Detector = power averaging (rms), if available. Otherwise, use sample detector mode. - 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." - Trace average at least 100 traces in power averaging (rms) mode. - 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	05/17/2018 – 07/11/2018	Environmental condition	Temperature 23ºC Relative Humidity 44% Atmospheric Pressure 1021mbar
Remark	8x8 mode: The EUT has 8 antennas with 6 vertical and 2 horizontal, individual gain = 1.5dBi, the directional gain = 1.5 + 10 *log(6) = 9.3, therefore, the power and psd limit should decrease by 9.3 - 6 = 3.3dB. 4x4 mode: The EUT has 4 antennas with 3 vertical and 1 horizontal, individual gain = 1.5dBi, the directional gain = 1.5 + 10 *log(3) = 6.27, therefore, the power and psd limit should decrease by 6.27 - 6 = 0.27dB.		
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 8x8 mode 5.3GHz

Test mode	Freq (MHz)	CH	Conducted Power (dBm) Chain No.									Limit (dBm)	Result
			0	1	2	3	4	5	6	7	Total		
802.11a	5260	Low	10.25	9.32	11.04	12.44	10.67	10.33	9.90	10.49	19.67	20.7	Pass
	5280	Mid	10.43	9.85	10.59	11.76	10.31	9.75	9.75	10.11	19.40	20.7	Pass
	5320	High	10.05	10.62	10.34	11.60	11.13	10.51	10.52	10.39	19.70	20.7	Pass
802.11ax-20	5260	Low	11.33	10.69	11.64	12.77	11.66	11.50	10.80	11.25	20.53	20.7	Pass
	5280	Mid	10.57	10.63	10.73	12.40	10.95	11.16	10.33	10.51	19.99	20.7	Pass
	5320	High	11.18	10.90	11.76	11.81	11.65	11.81	11.12	11.07	20.46	20.7	Pass
802.11ax-40	5270	Low	10.98	10.35	11.23	12.67	11.24	10.81	10.86	11.10	20.23	20.7	Pass
	5310	Mid	10.46	11.00	11.06	12.54	11.45	11.52	10.90	11.14	20.33	20.7	Pass
802.11ax-80	5290	High	10.70	11.05	11.35	12.82	11.78	11.64	11.01	11.13	20.51	20.7	Pass

Output Power measurement result for 8x8 mode 5.5GHz

Test mode	Freq (MHz)	CH	Conducted Power (dBm) Chain No.									Limit (dBm)	Result
			0	1	2	3	4	5	6	7	Total		
802.11a	5500	Low	10.24	10.00	10.03	10.86	10.28	10.64	9.95	10.09	19.30	20.7	Pass
	5580	Mid	9.01	9.81	8.18	9.59	8.86	9.62	8.74	9.25	18.20	20.7	Pass
	5700	High	10.24	9.71	9.32	11.16	10.31	9.89	9.71	9.86	19.09	20.7	Pass
802.11ax-20	5500	Low	11.22	11.49	10.85	11.82	10.97	11.57	11.01	10.99	20.28	20.7	Pass
	5580	Mid	11.04	11.87	10.00	11.41	10.51	11.65	10.48	10.59	20.02	20.7	Pass
	5700	High	10.83	10.95	11.49	11.90	11.76	11.45	10.97	11.03	20.35	20.7	Pass
802.11ax-40	5510	Low	11.56	11.62	11.08	11.96	11.29	10.95	11.30	11.15	20.41	20.7	Pass
	5550	Mid	11.21	11.47	10.62	11.77	11.10	11.80	10.52	10.87	20.22	20.7	Pass
	5670	High	11.17	11.75	10.66	12.13	11.00	11.62	10.98	10.58	20.30	20.7	Pass
802.11ax-80	5530	Low	11.11	11.32	10.51	12.06	11.27	11.06	10.94	11.28	20.24	20.7	Pass
	5610	High	11.19	11.38	11.42	12.03	11.34	10.77	11.17	10.82	20.31	20.7	Pass

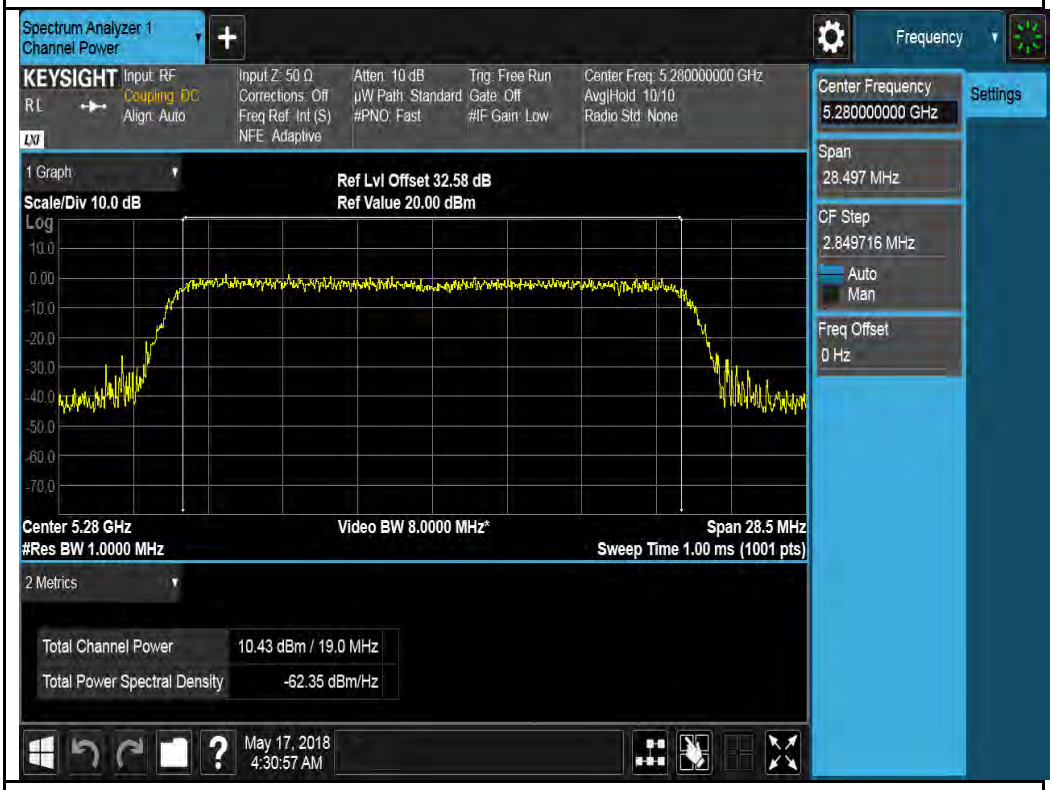
Output Power measurement result for 8x8 mode CROSS channels (in band 5470-5725MHz)

Test mode	Freq (MHz)	CH	Conducted Power (dBm) Chain No.									Limit (dBm)	Result
			0	1	2	3	4	5	6	7	Total		
802.11a	5720	CROSS	9.64	9.93	9.50	10.83	10.25	10.08	9.73	10.17	19.06	20.7	Pass
802.11ax-20	5720	CROSS	11.22	11.23	11.12	12.38	11.46	11.32	10.88	11.24	20.41	20.7	Pass
802.11ax-40	5710	CROSS	11.74	11.39	11.57	12.41	11.74	11.57	10.97	11.52	20.66	20.7	Pass
802.11ax-80	5690	CROSS	11.11	11.82	10.46	12.07	10.59	11.38	11.02	10.74	20.21	20.7	Pass

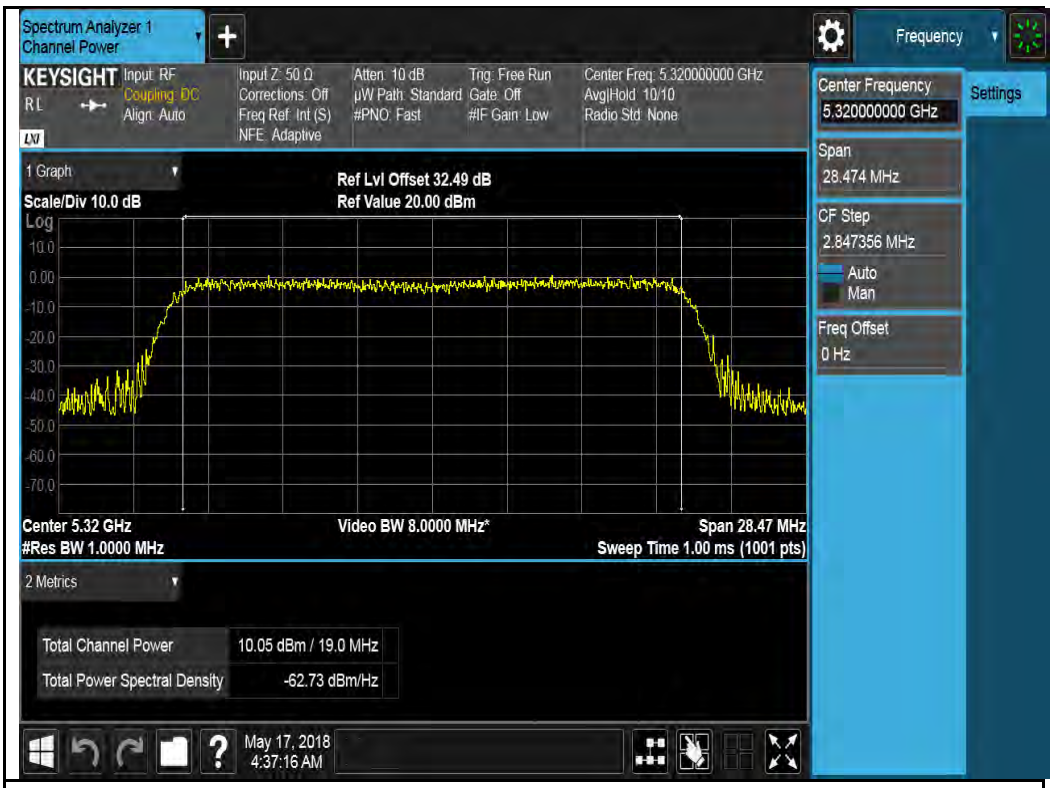
Test Plot for 8x8 mode W53:

Chain 0:

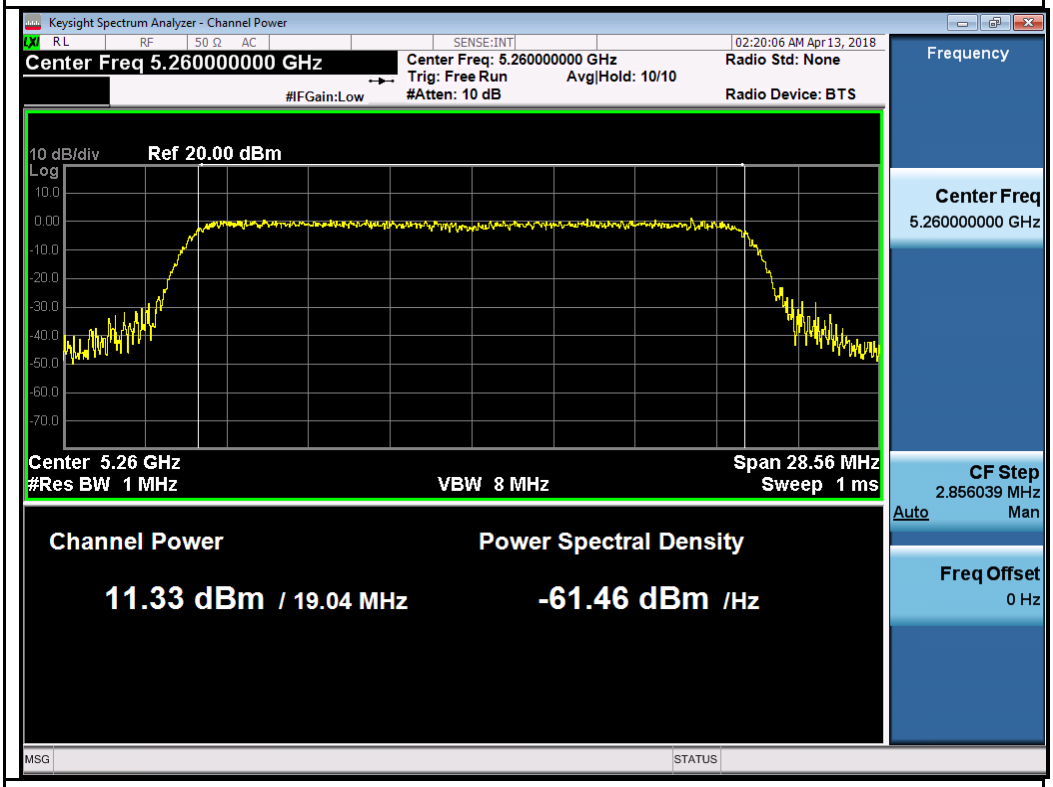
802.11a-5260M



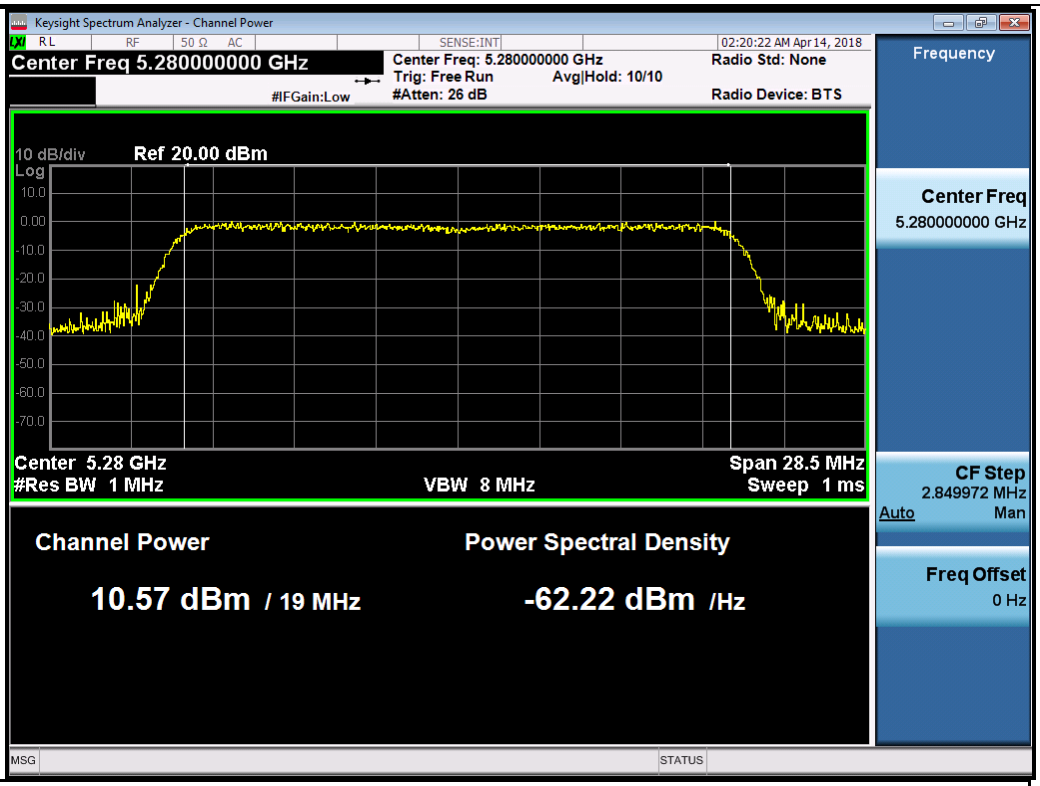
802.11a-5280M



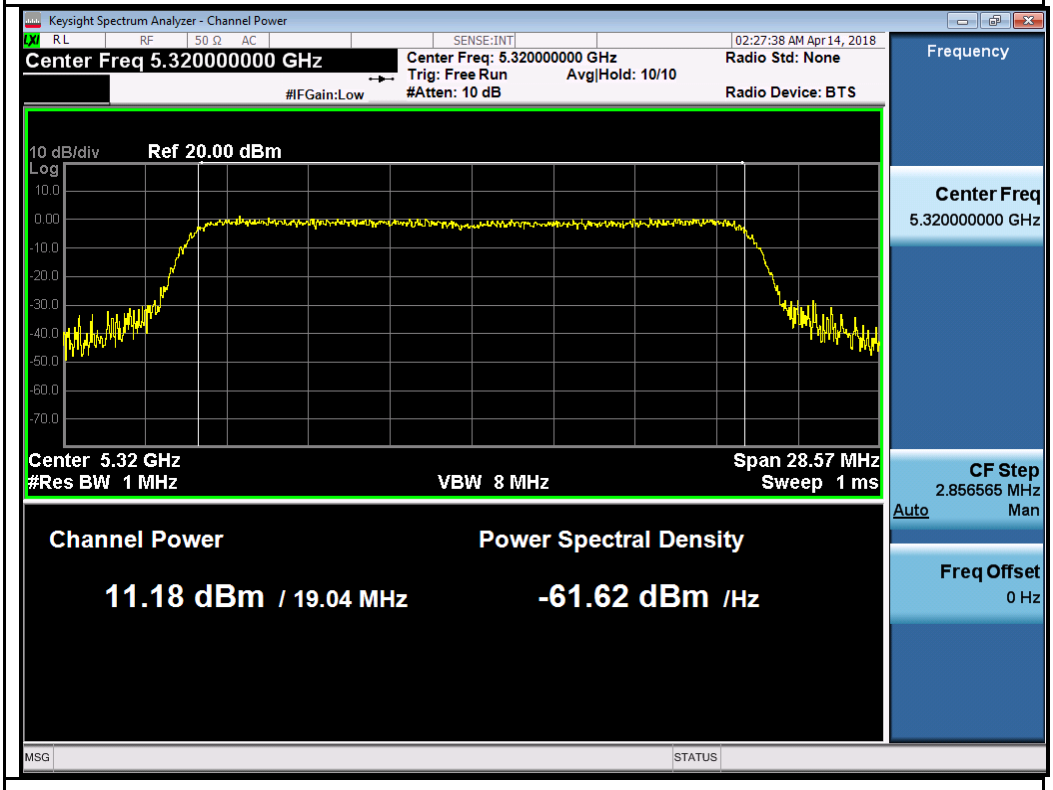
802.11a-5320M



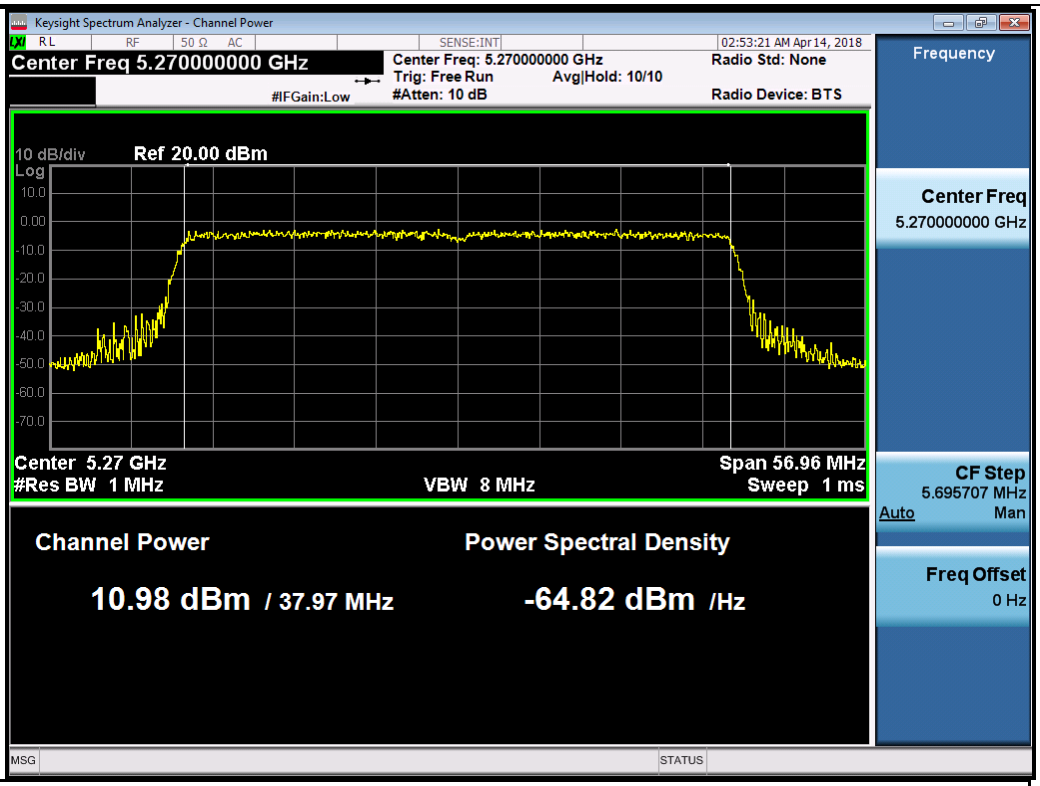
802.11ax20 5260M



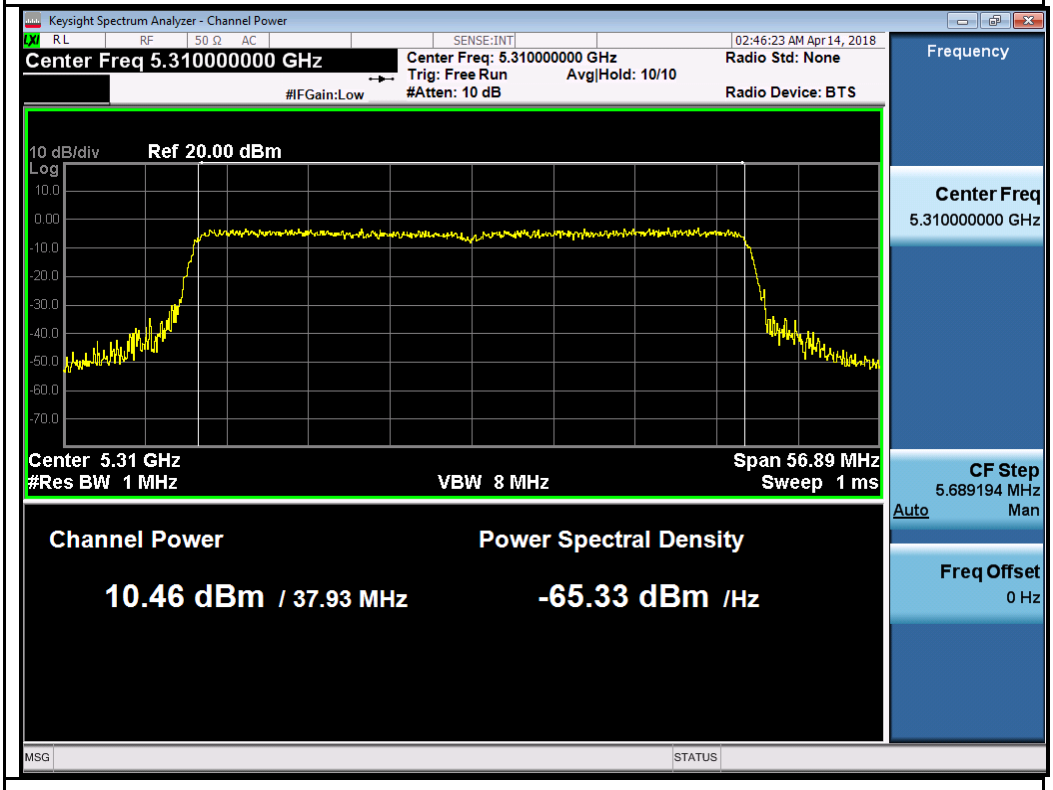
802.11ax20 5280M



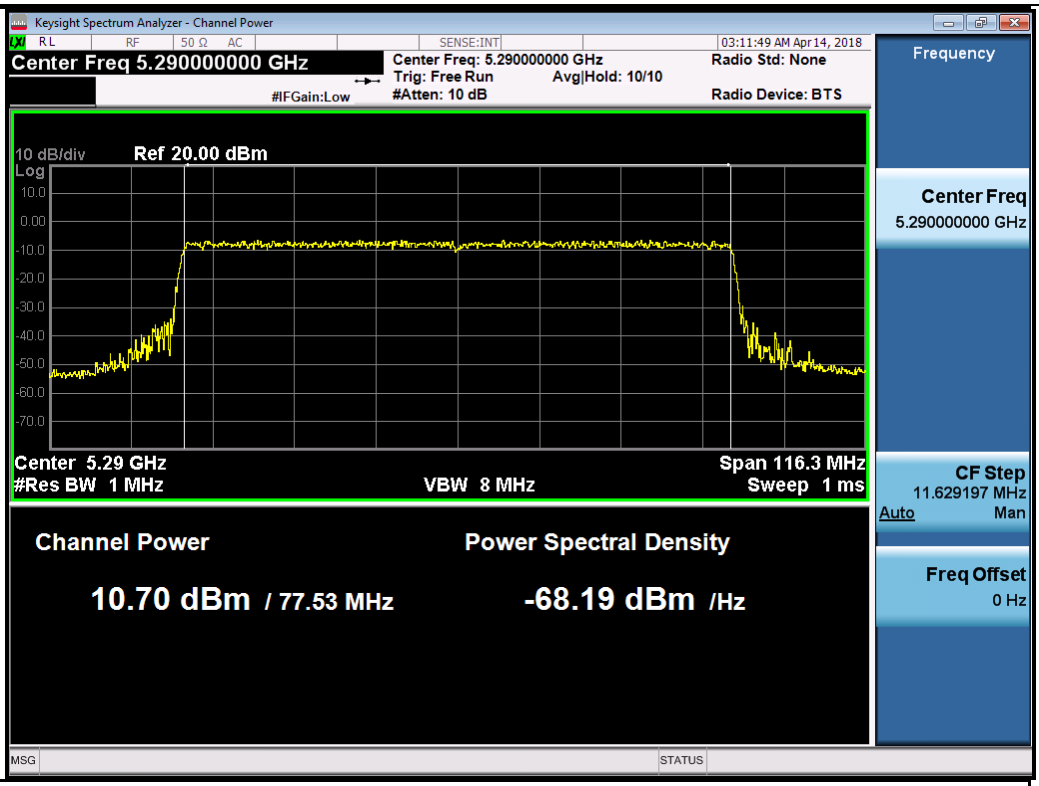
802.11ax20 5320M



802.11ax40 5270M



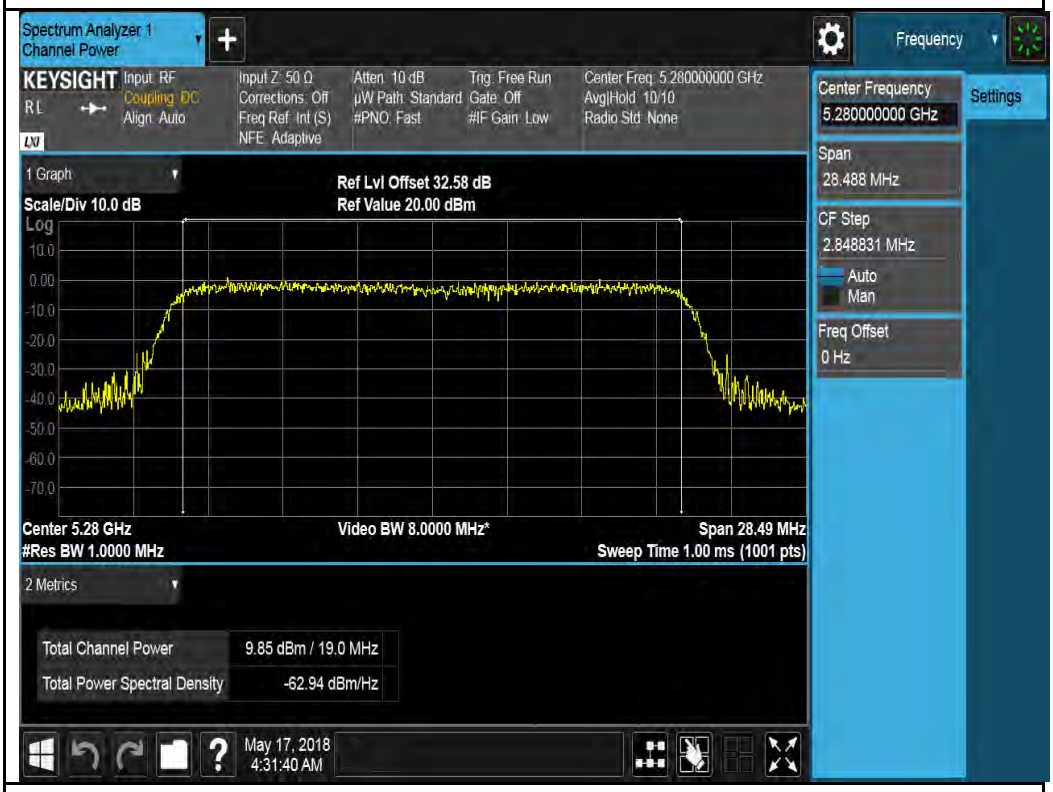
802.11ax40 5310M



802.11ax80 5290M

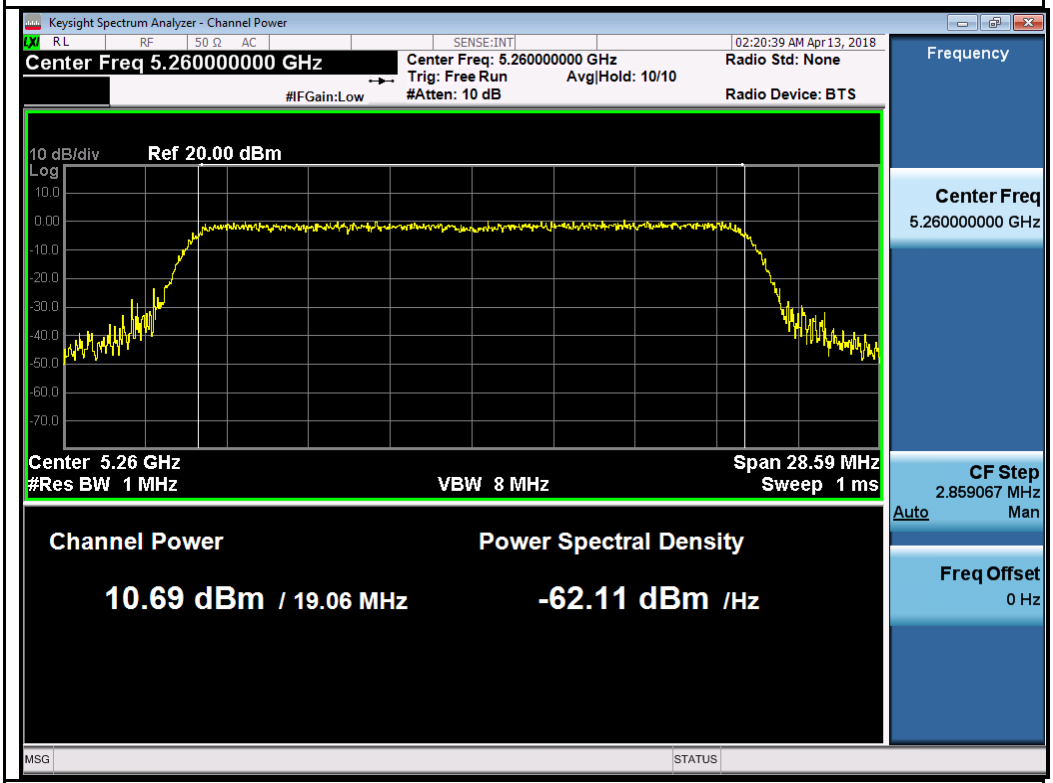
Chain 1:

802.11a-5260M

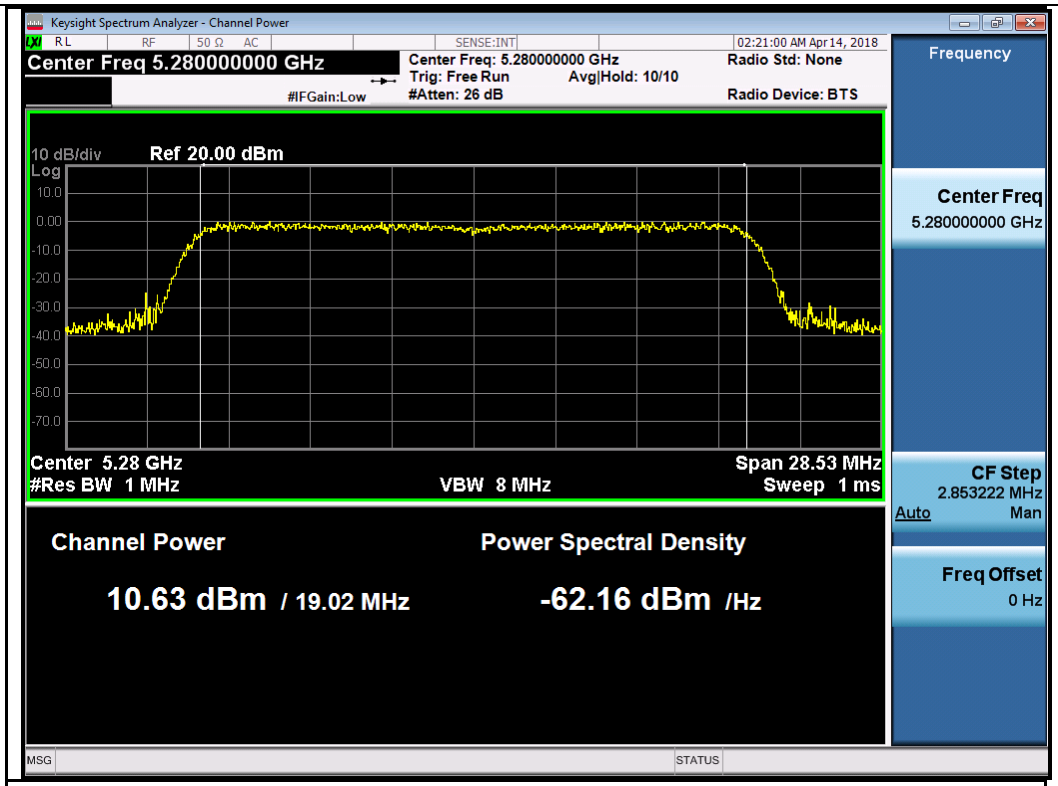


802.11a-5280M

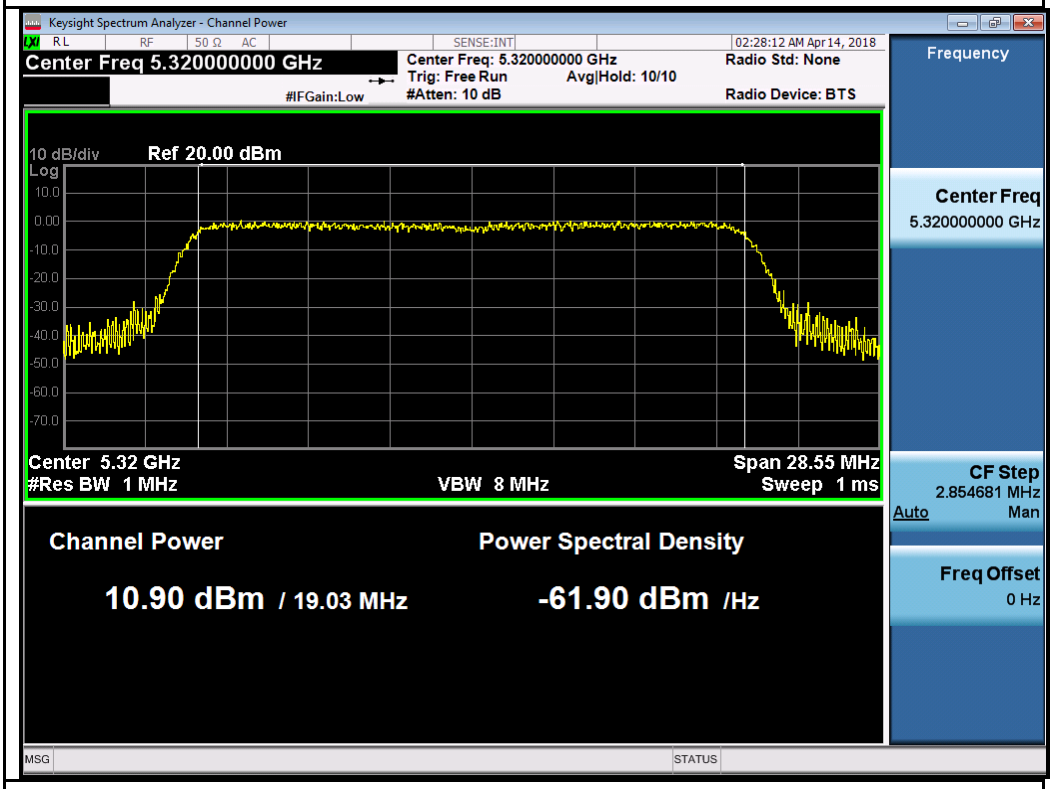
802.11a-5320M



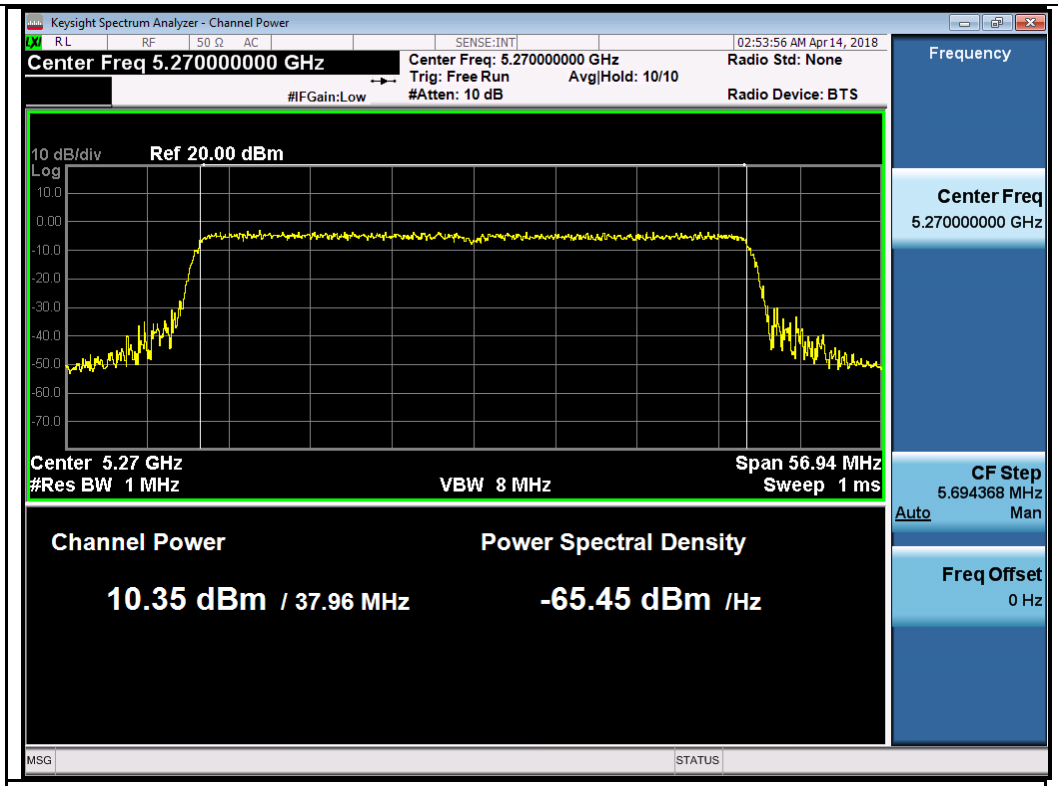
802.11ax20 5260M



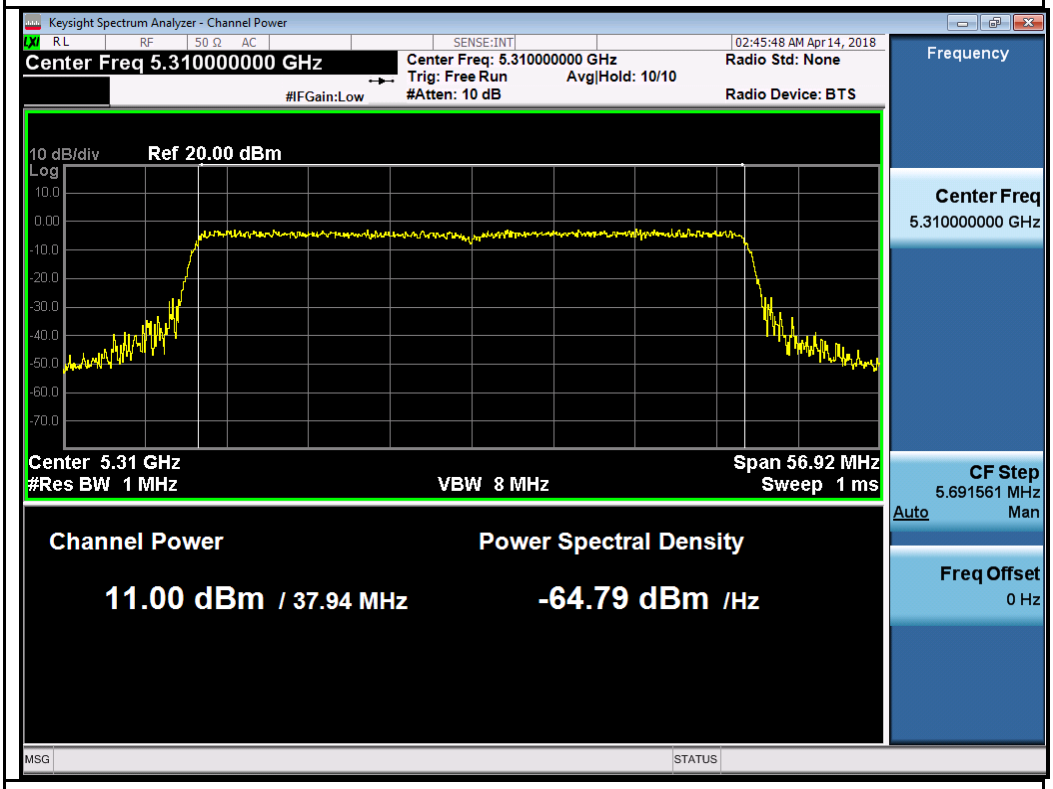
802.11ax20 5280M



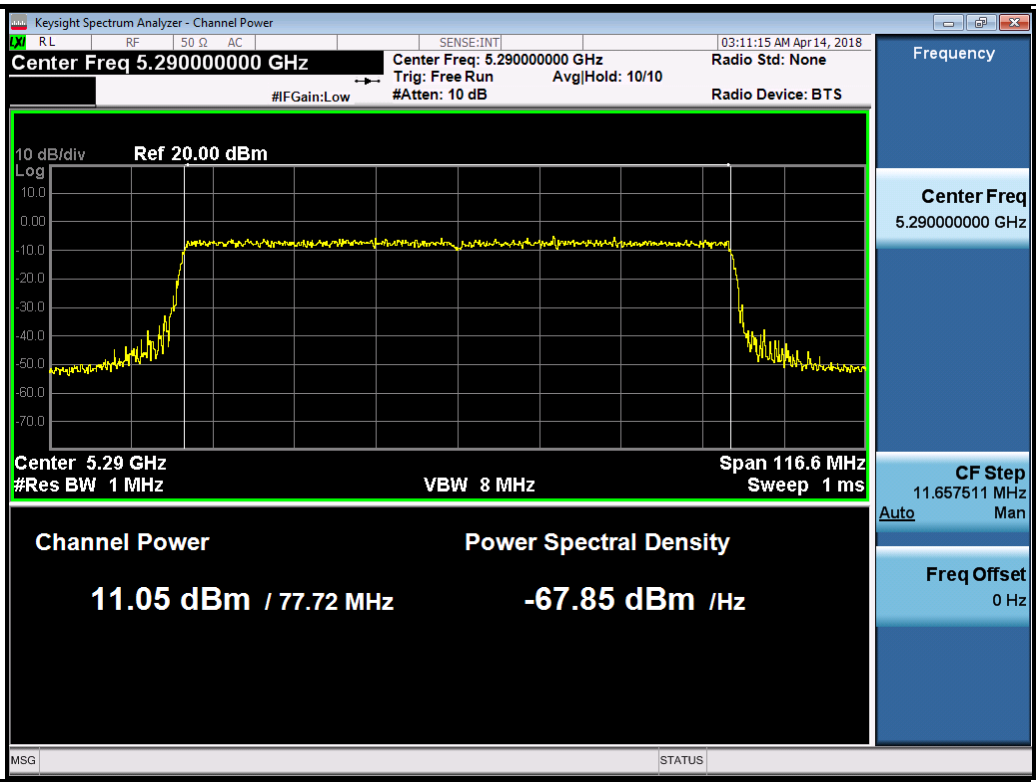
802.11ax20 5320M



802.11ax40 5270M



802.11ax40 5310M



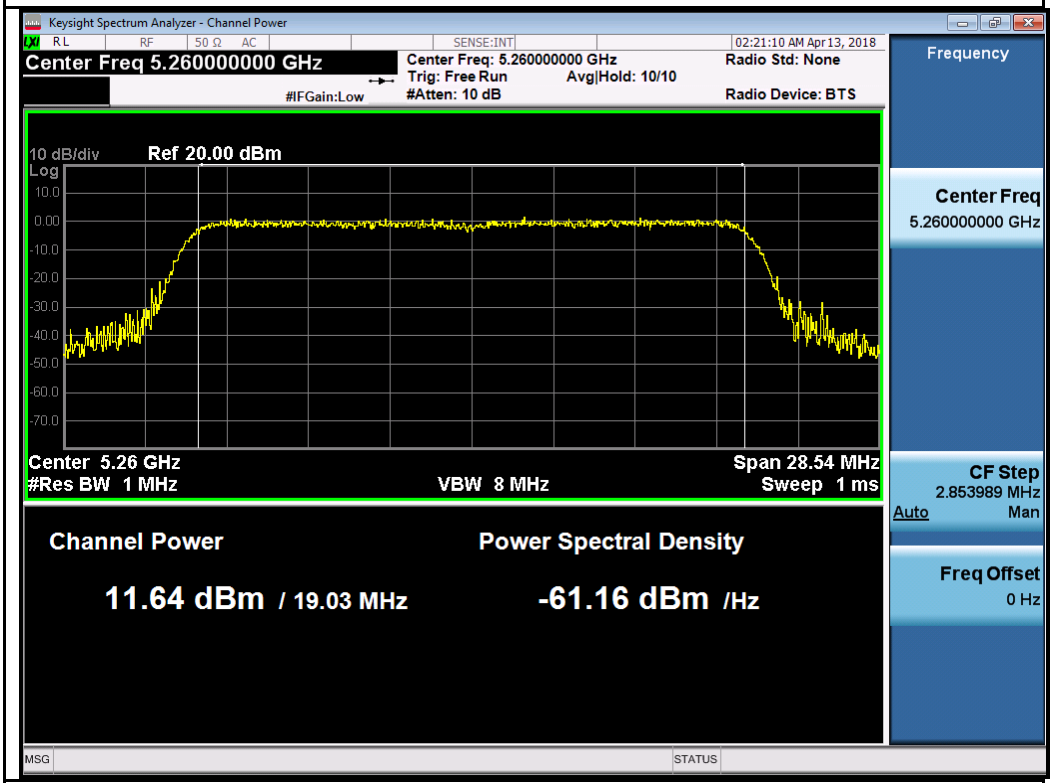
802.11ax80 5290M

Chain 2:

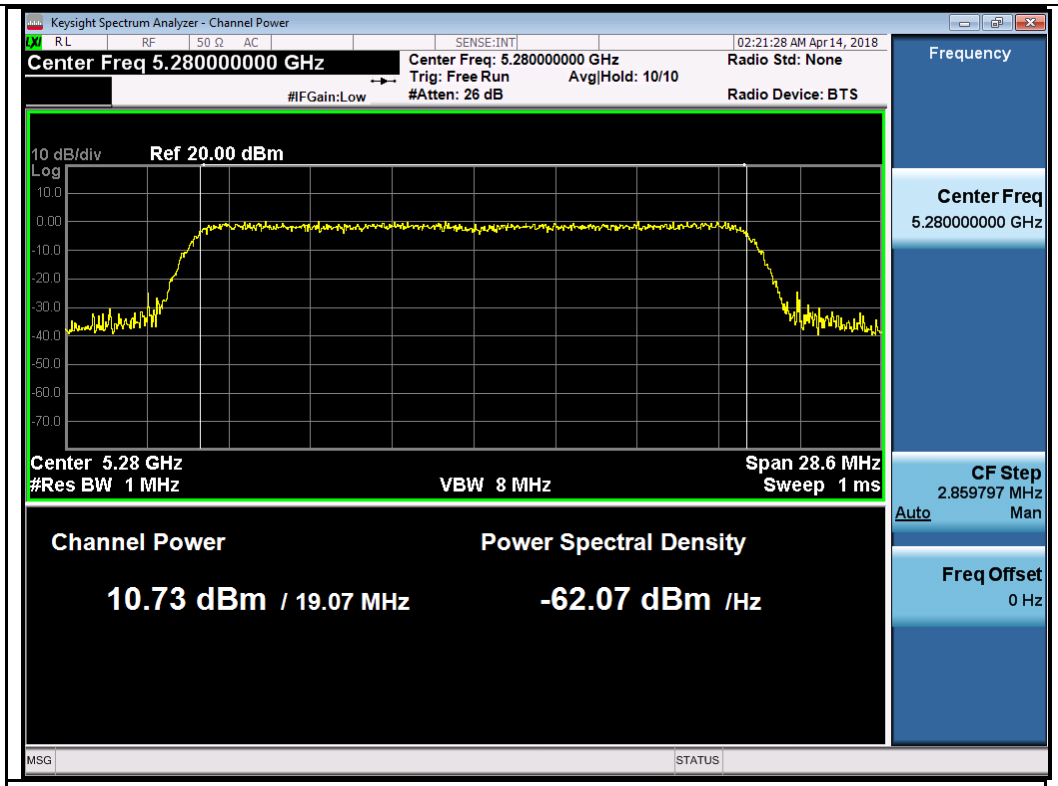
802.11a-5260M

802.11a-5280M

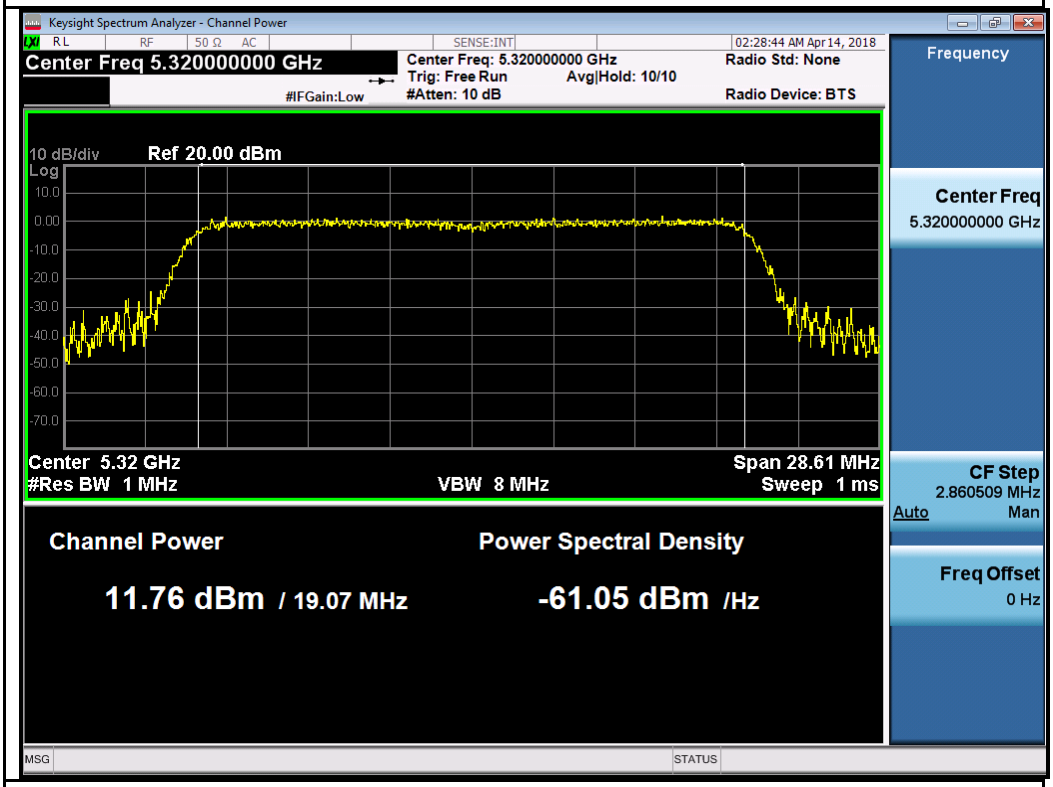
802.11a-5320M



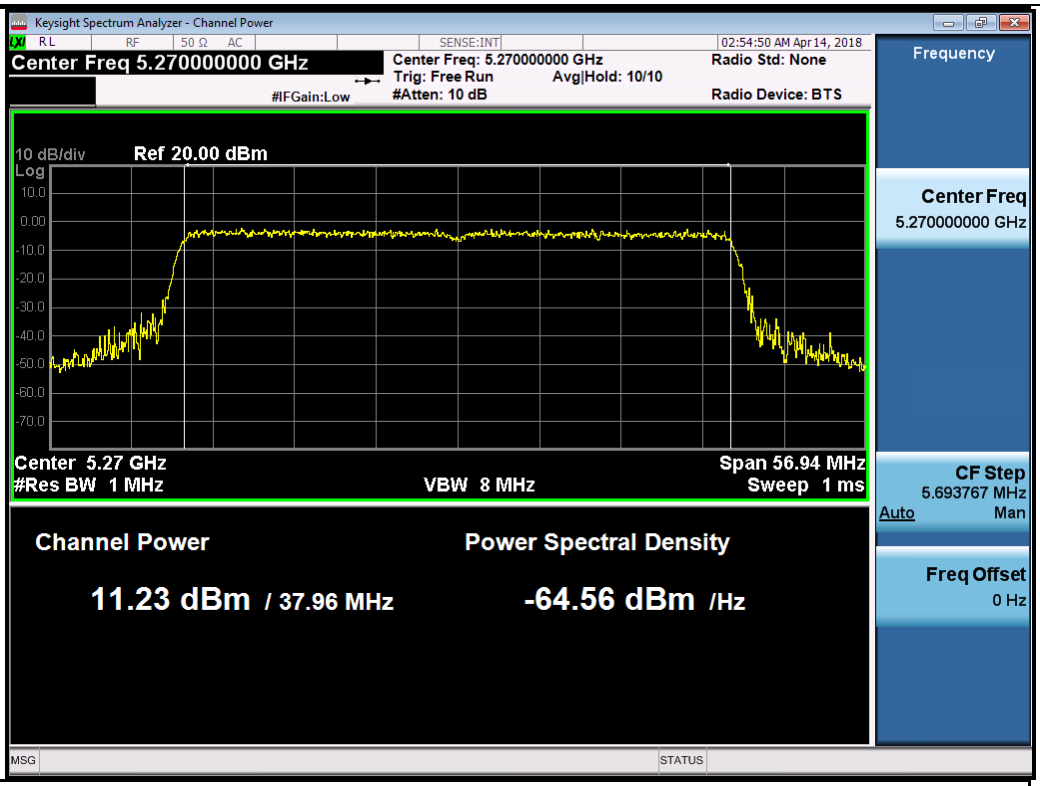
802.11ax20 5260M



802.11ax20 5280M



802.11ax20 5320M



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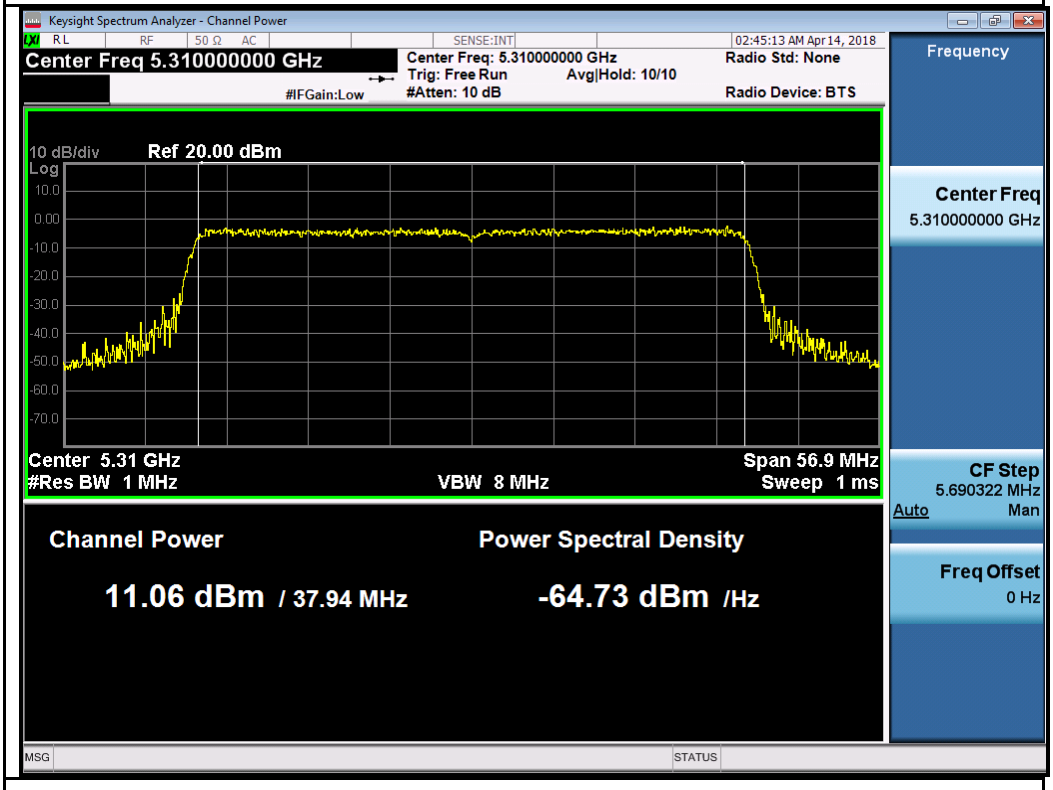

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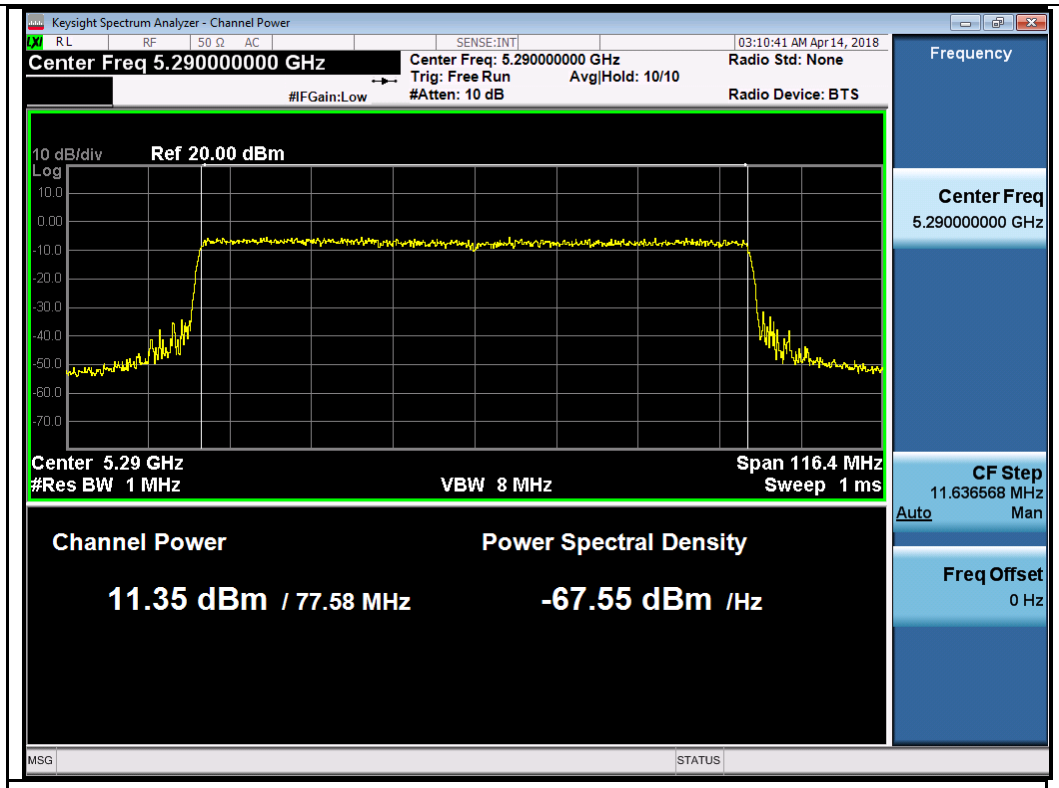

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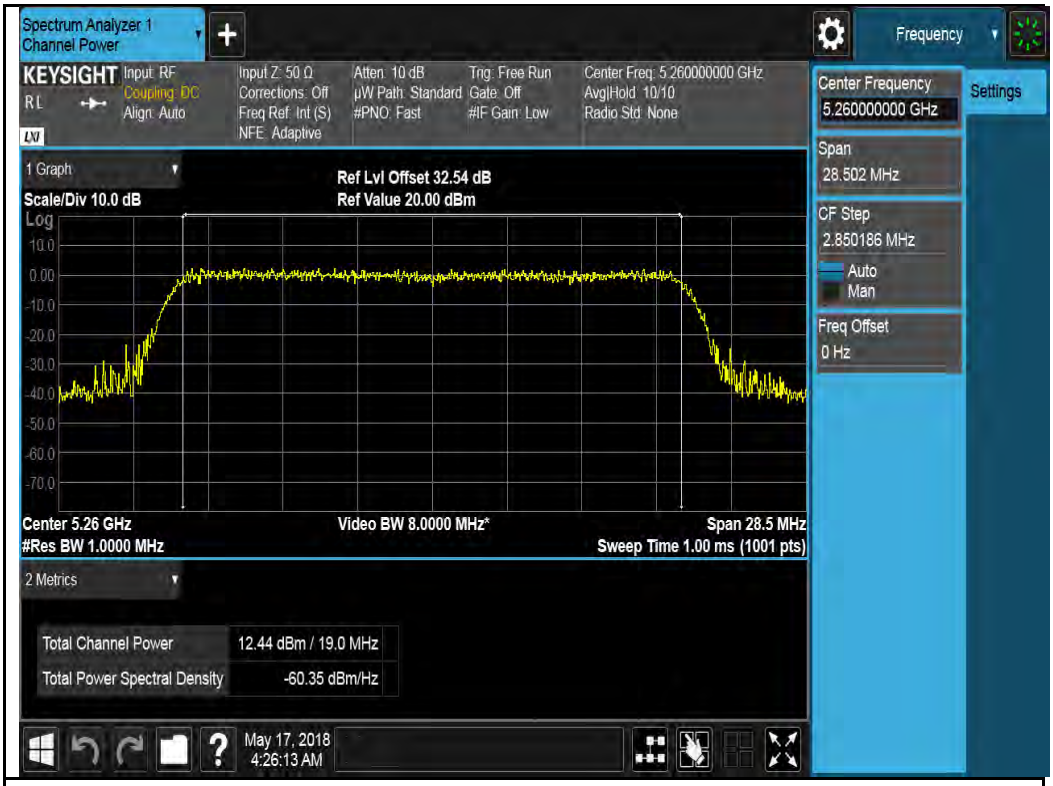

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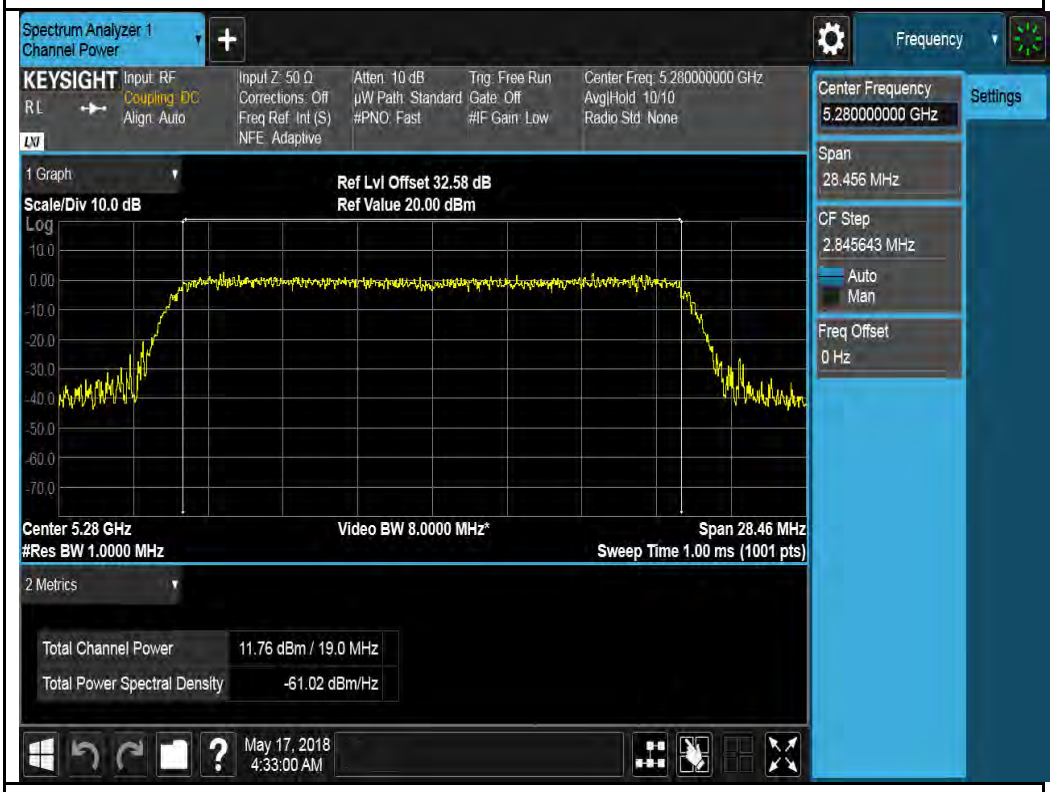

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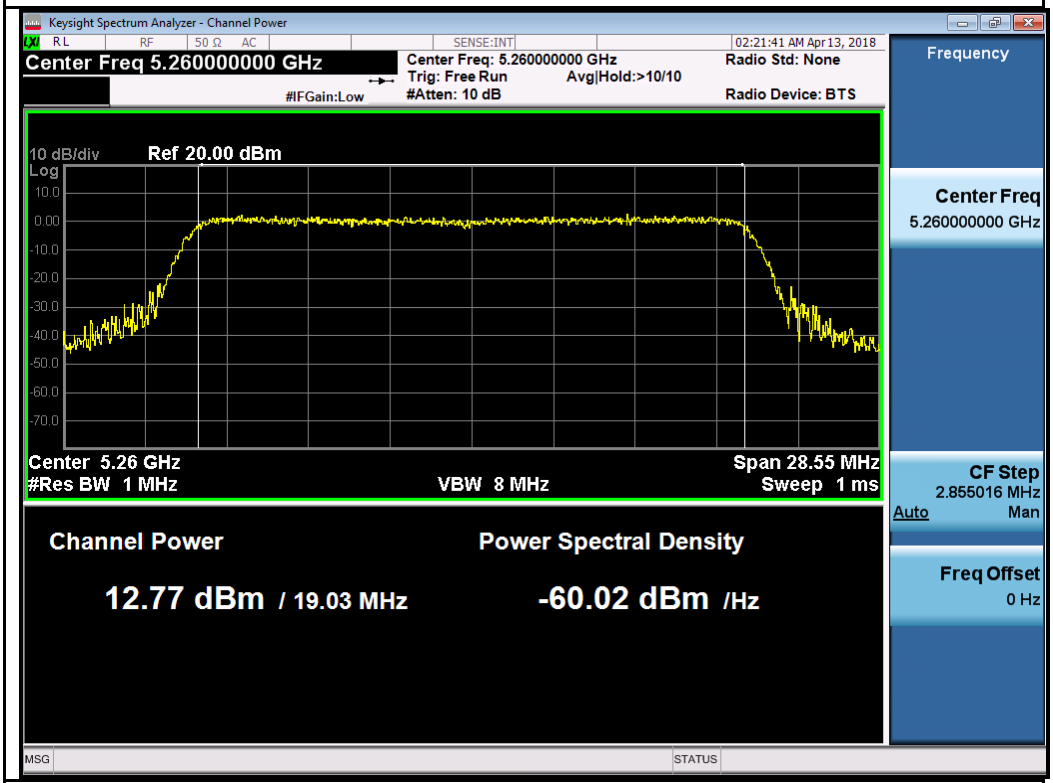
802.11a-5320M



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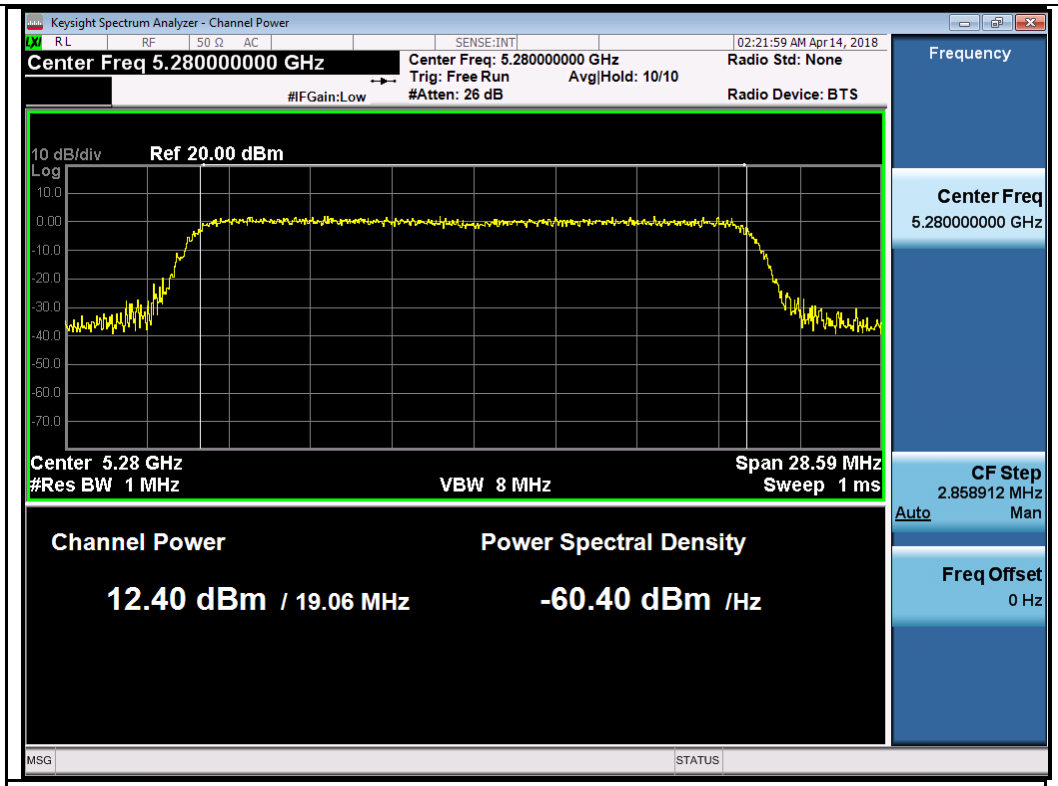

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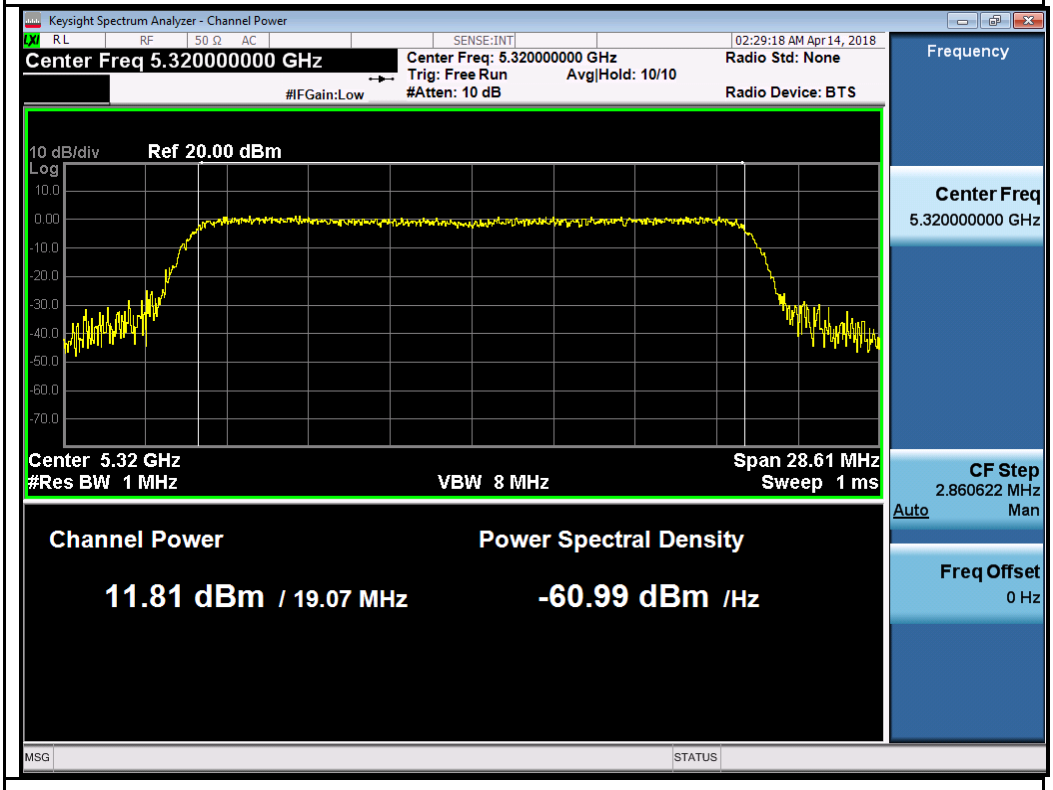

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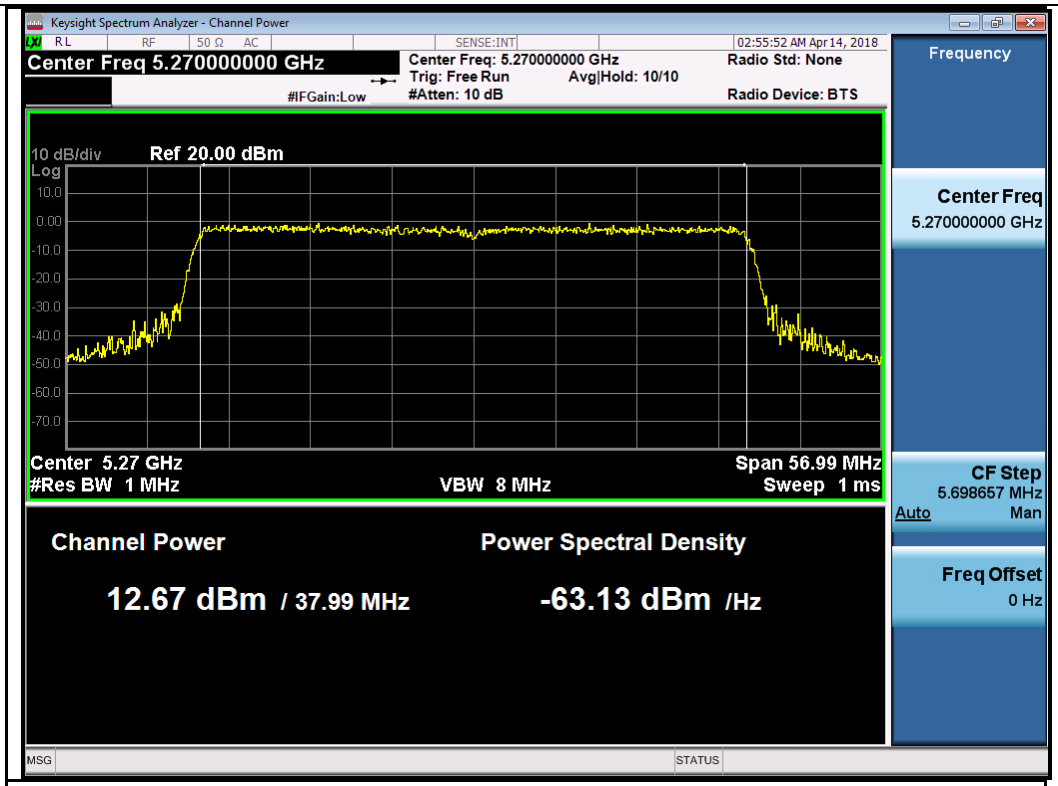

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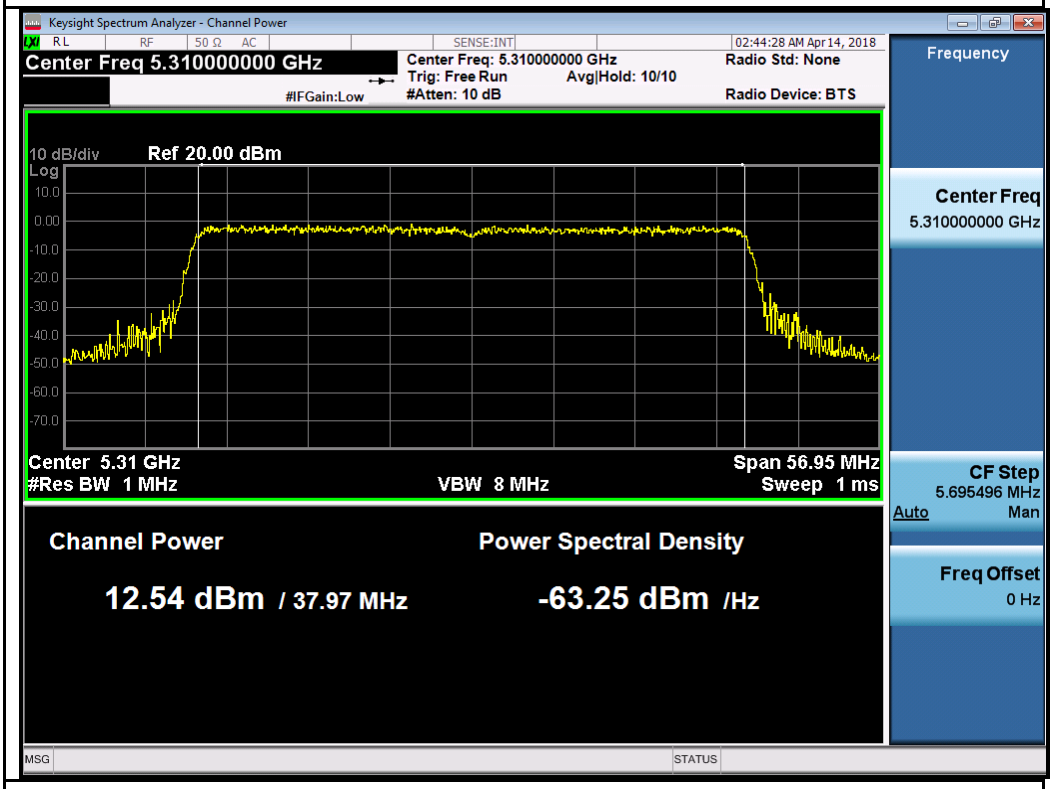

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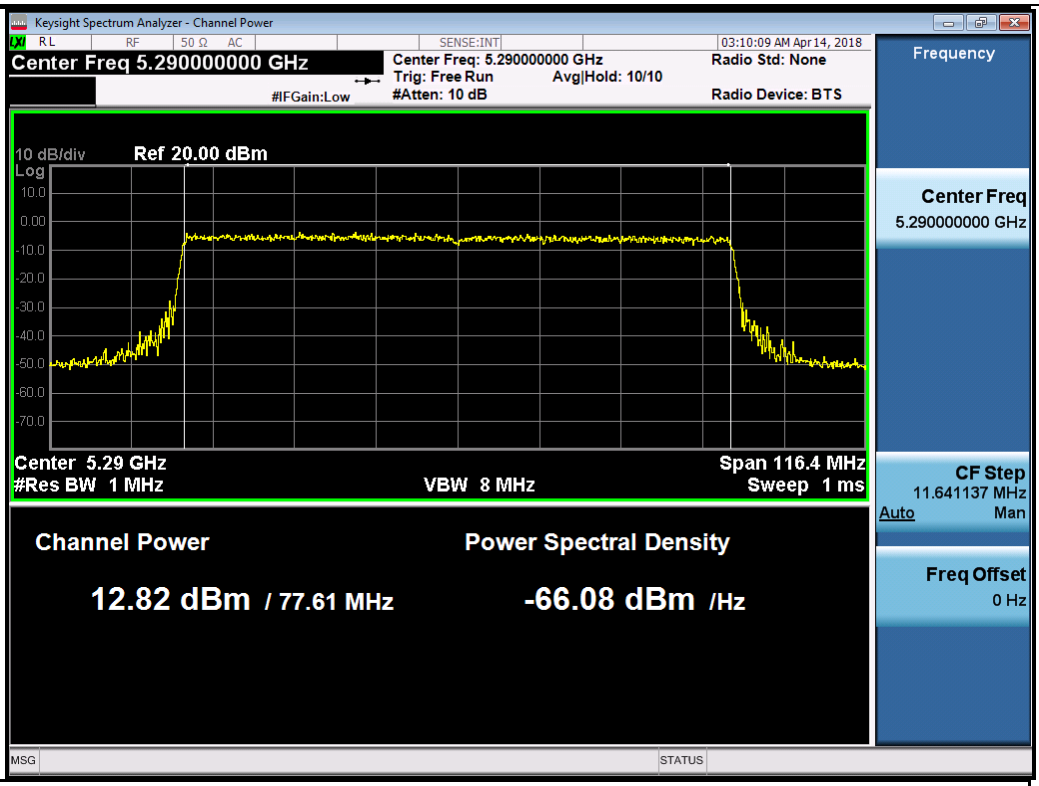

802.11ax80 5290M

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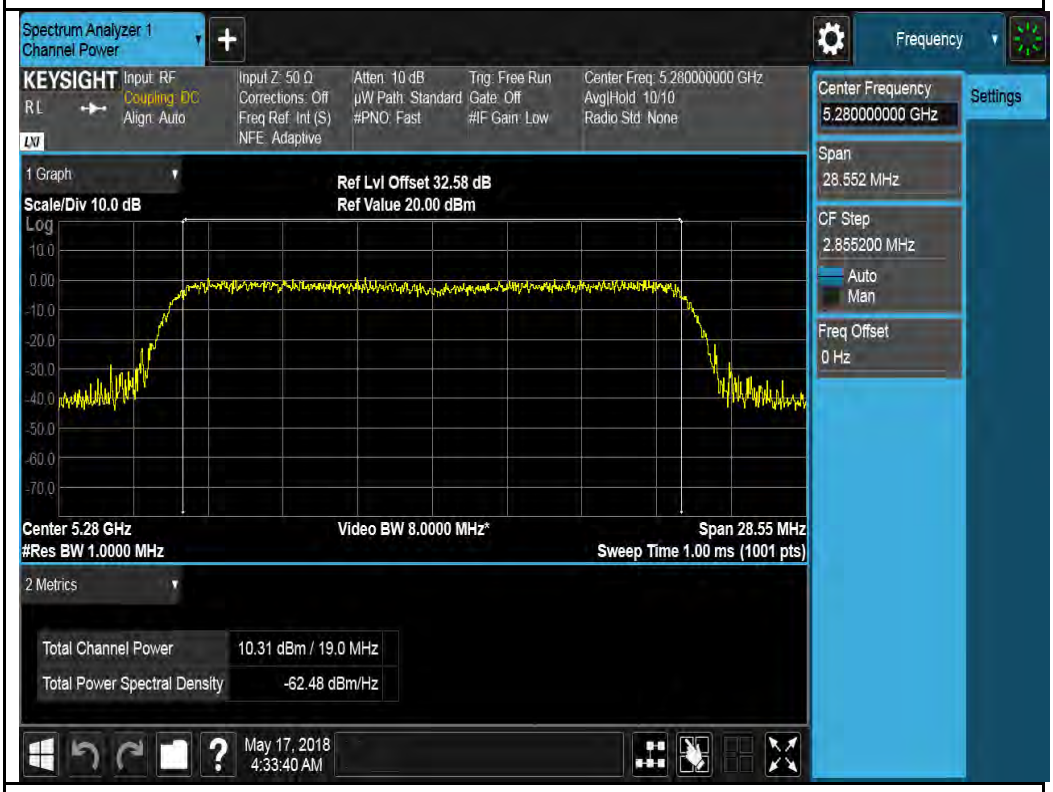

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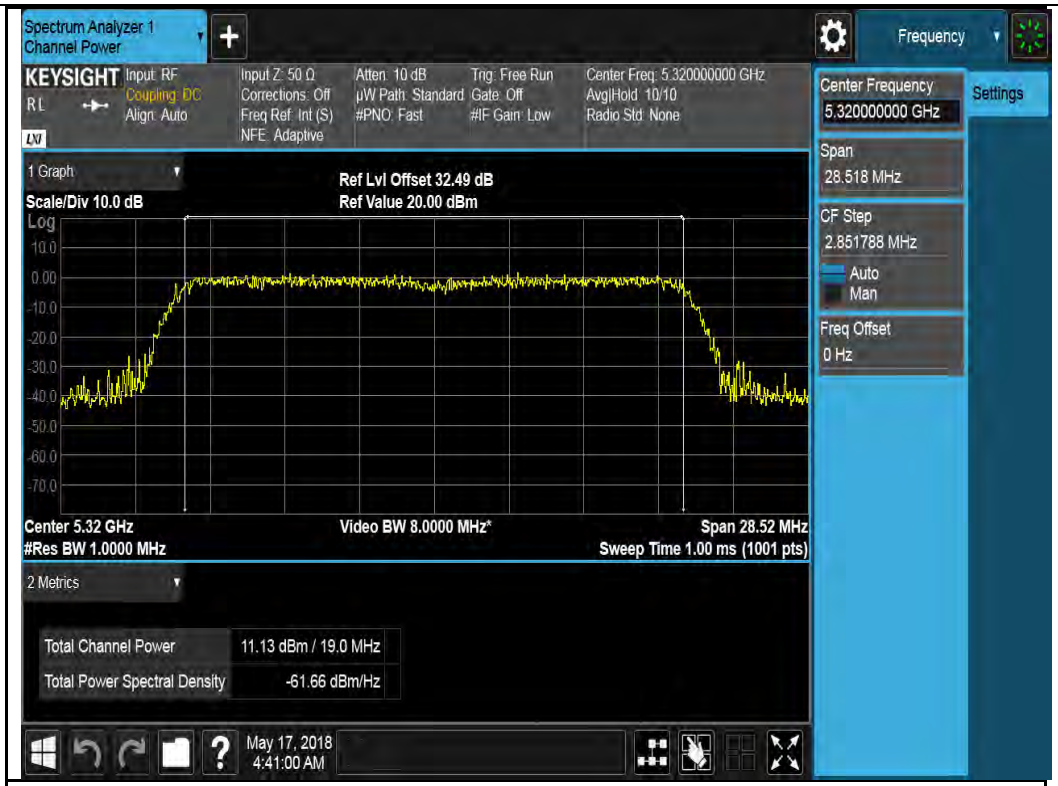

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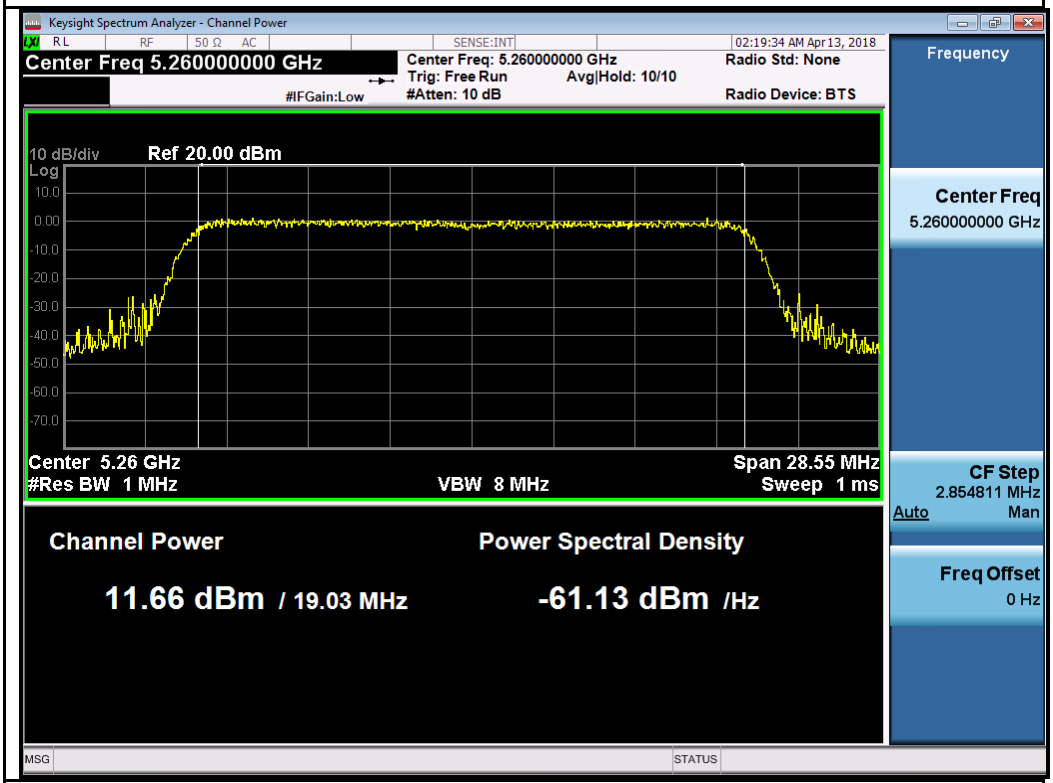

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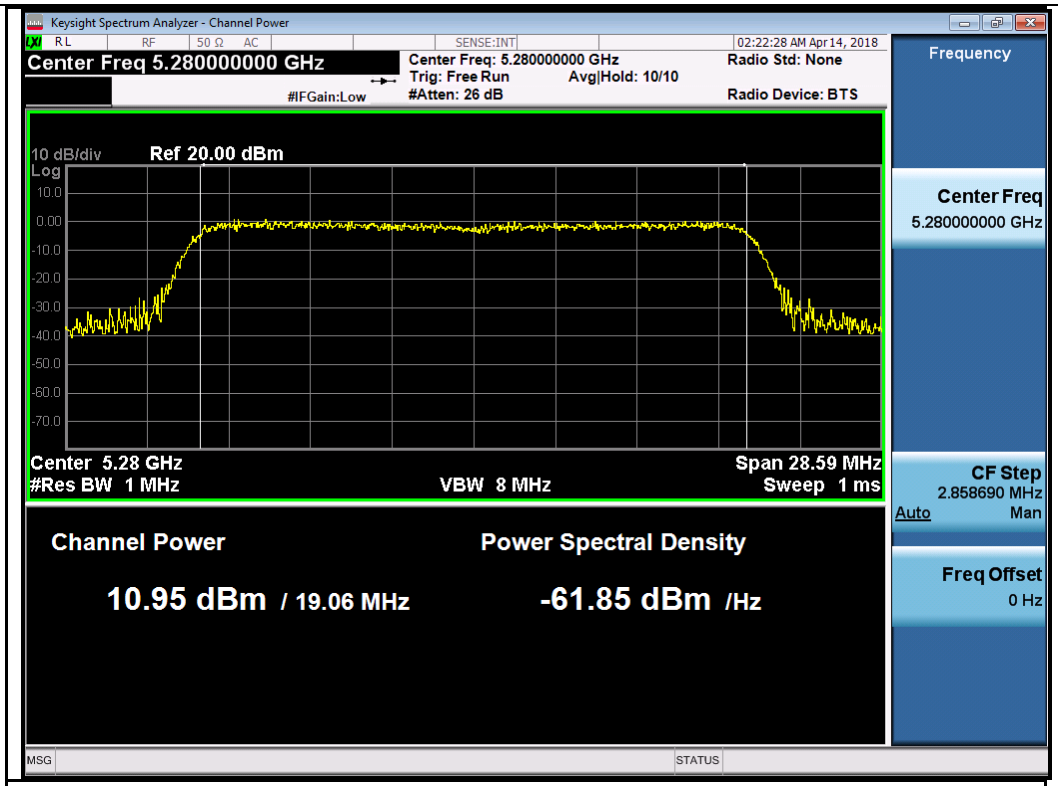

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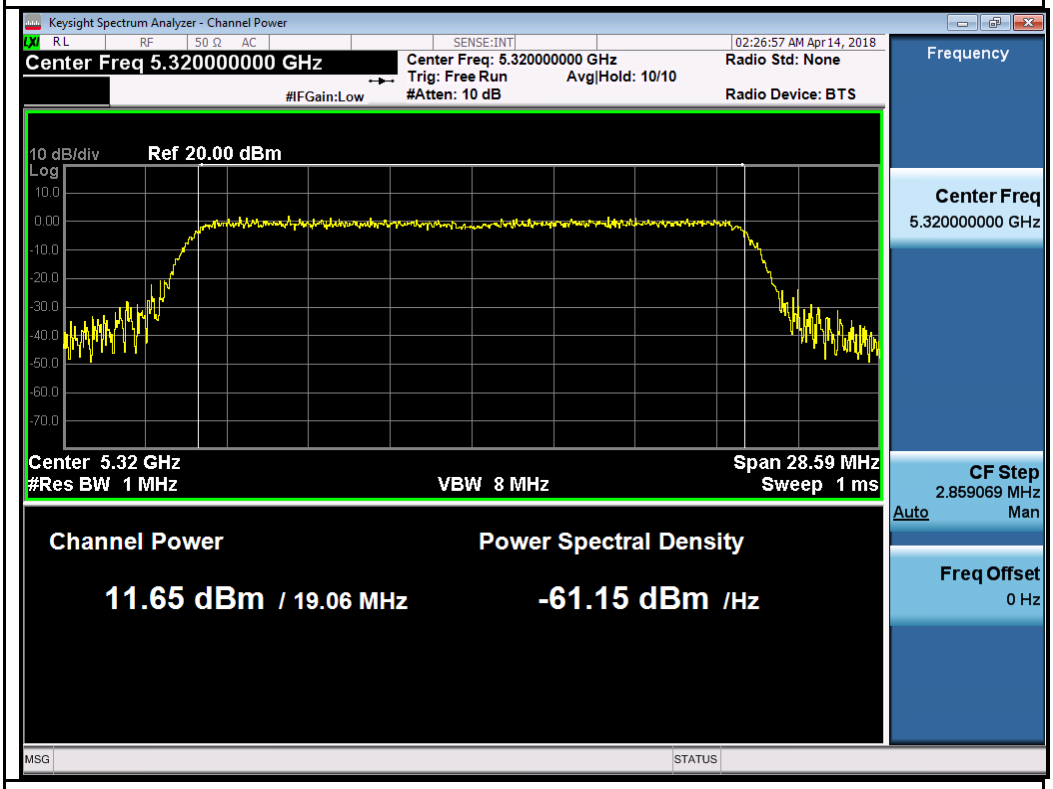

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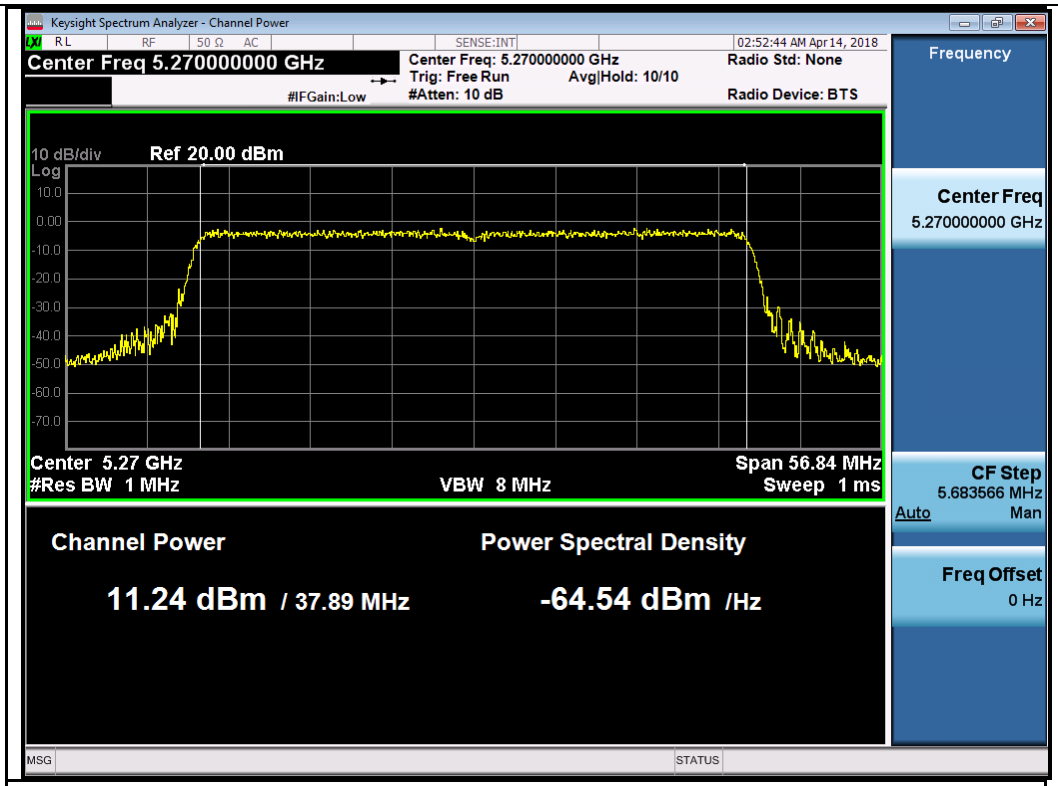

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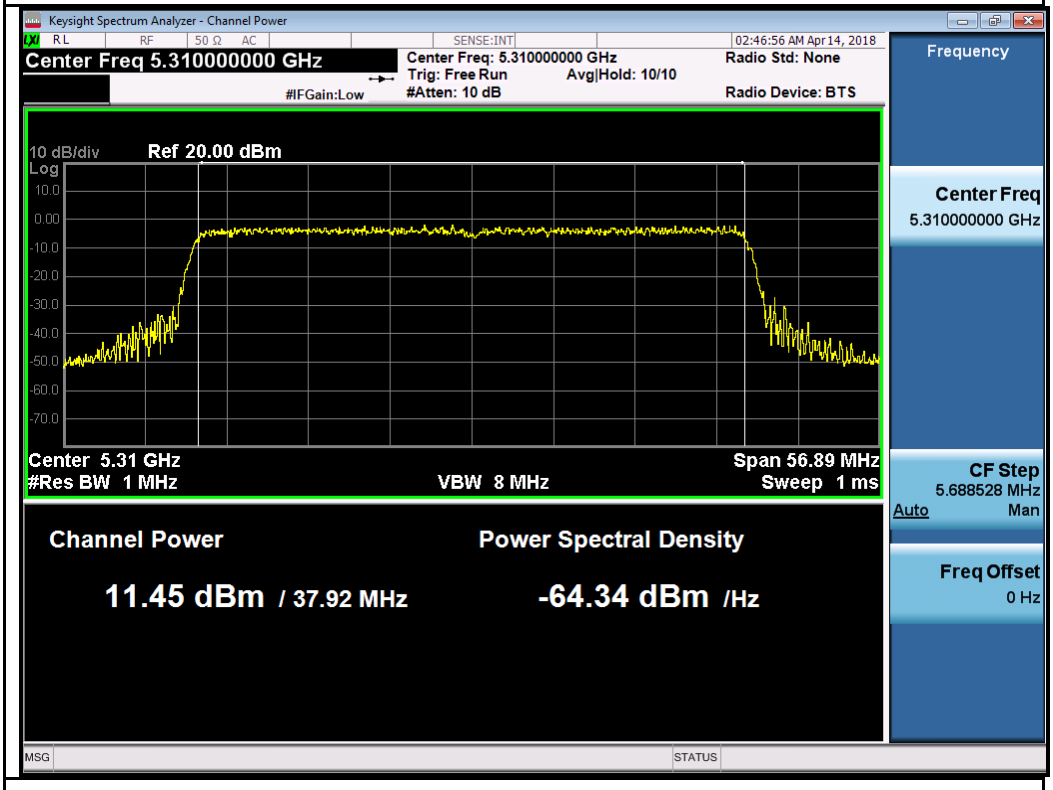

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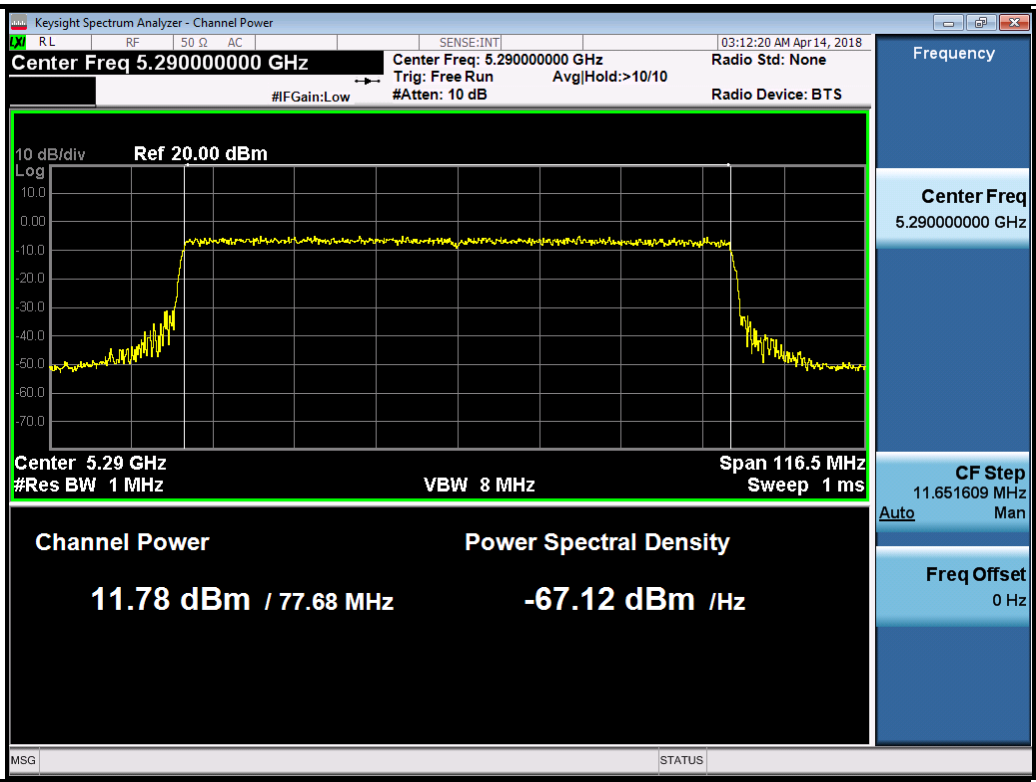

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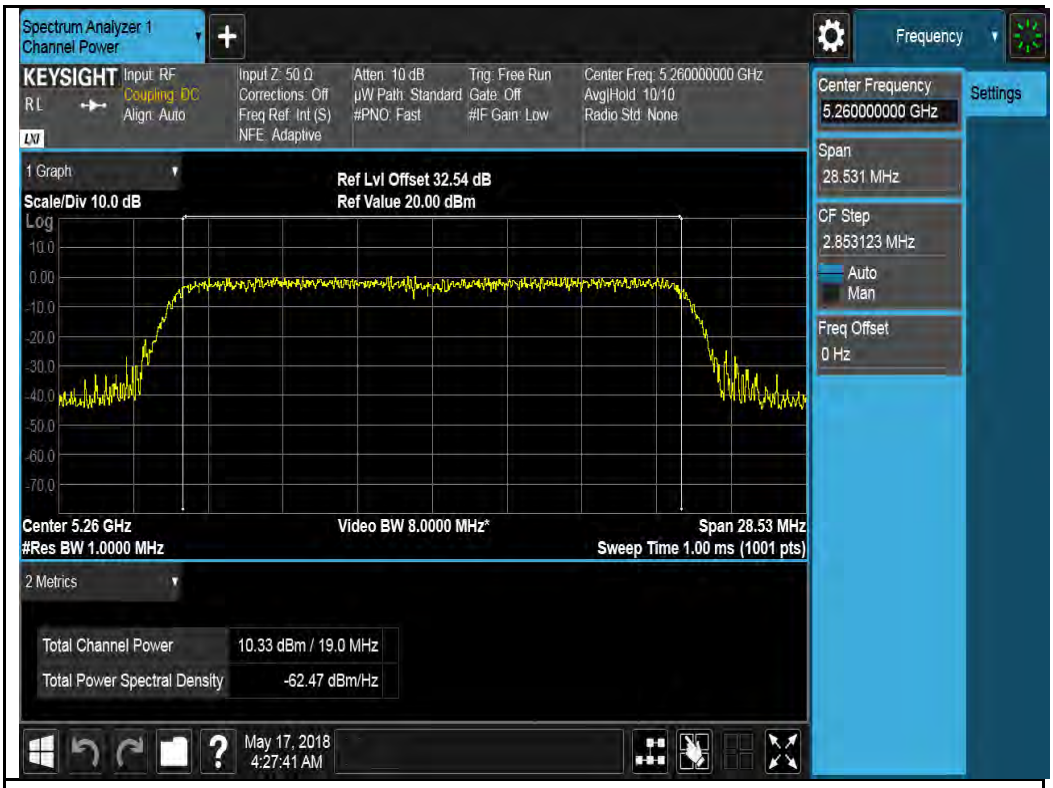
Chain 5:



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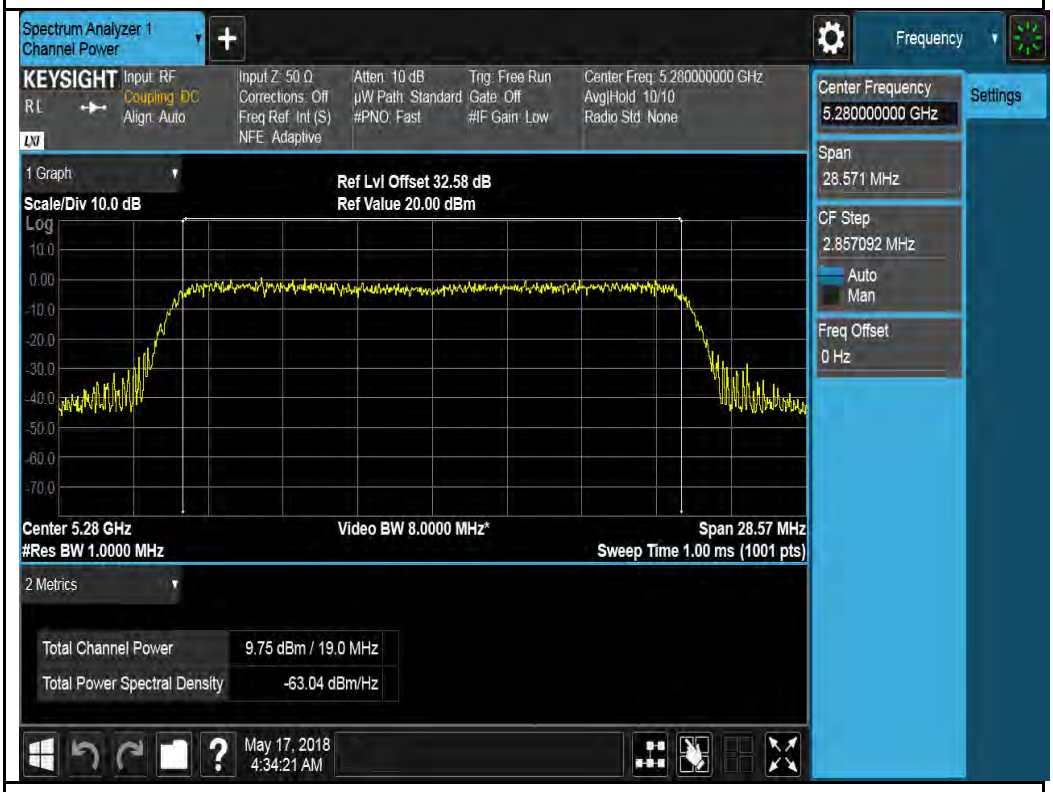

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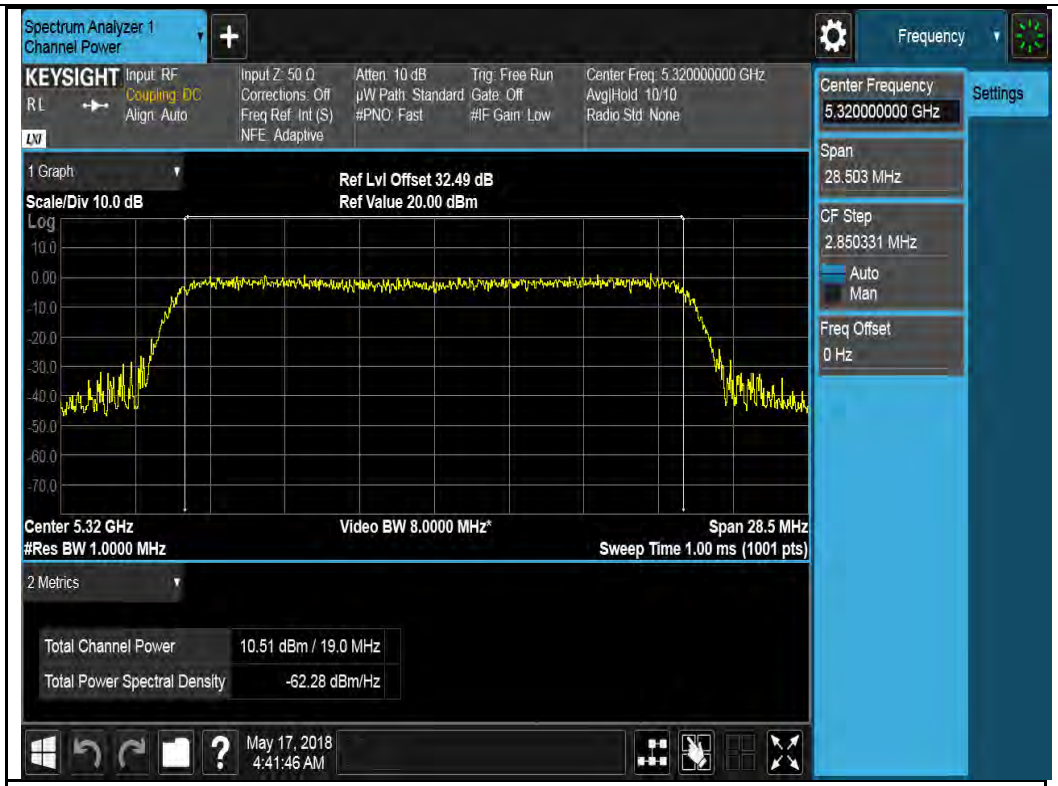

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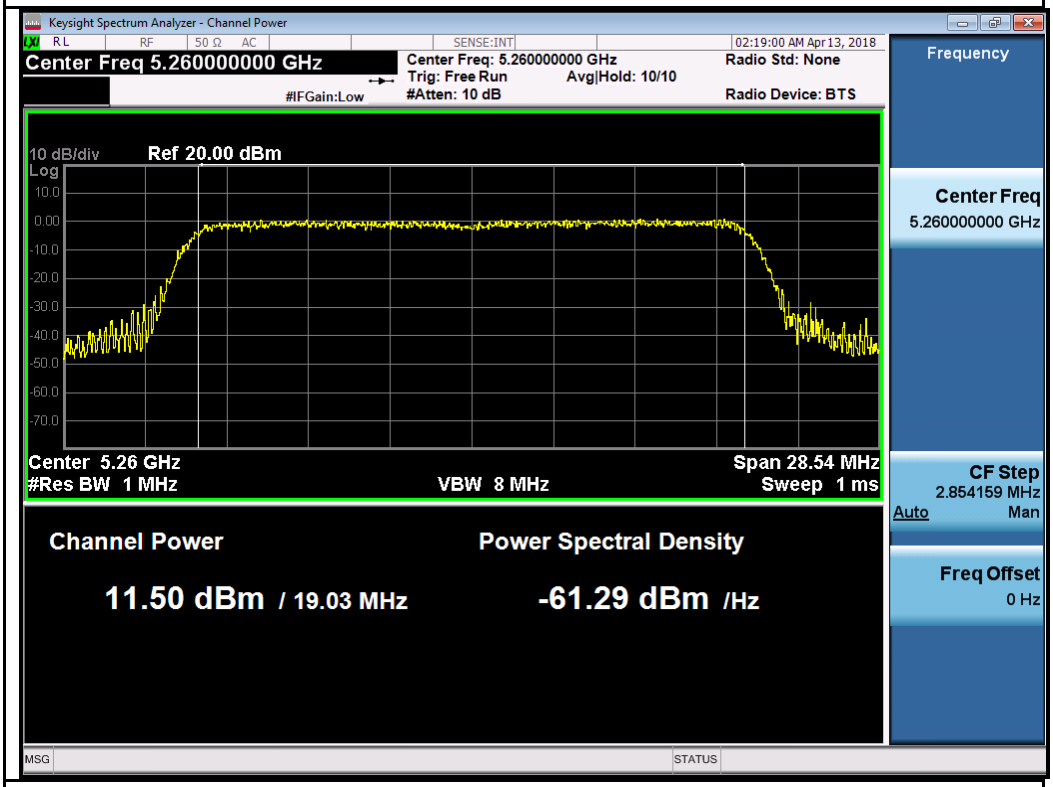

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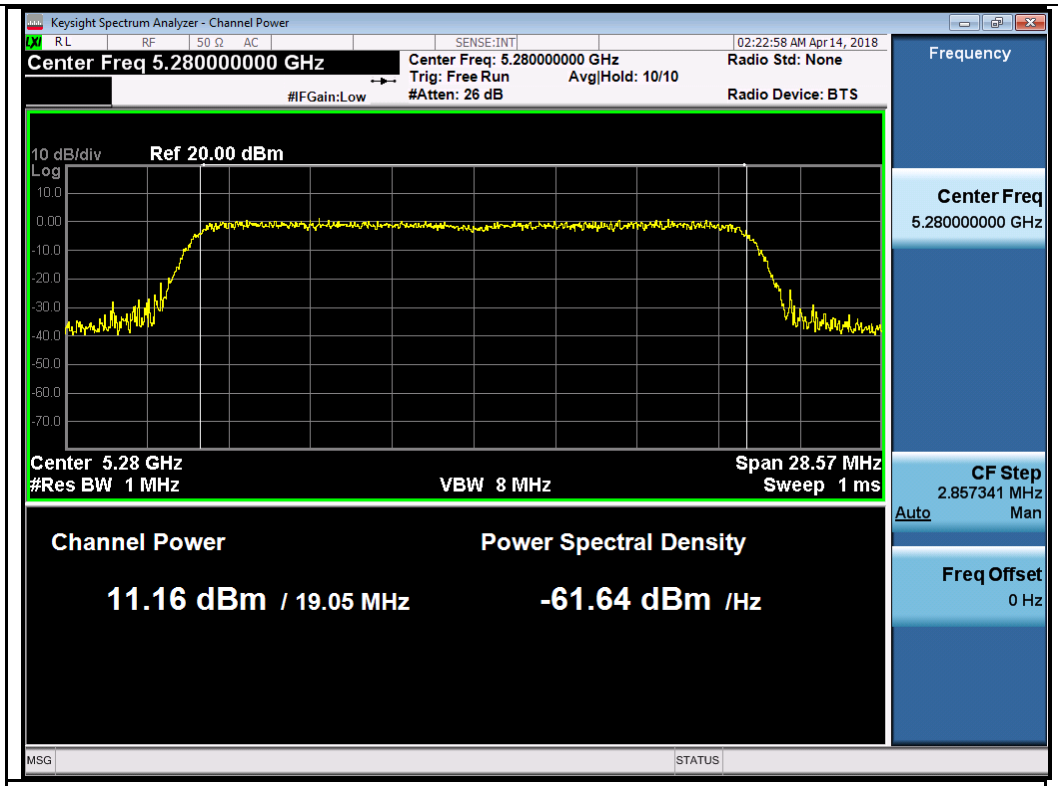

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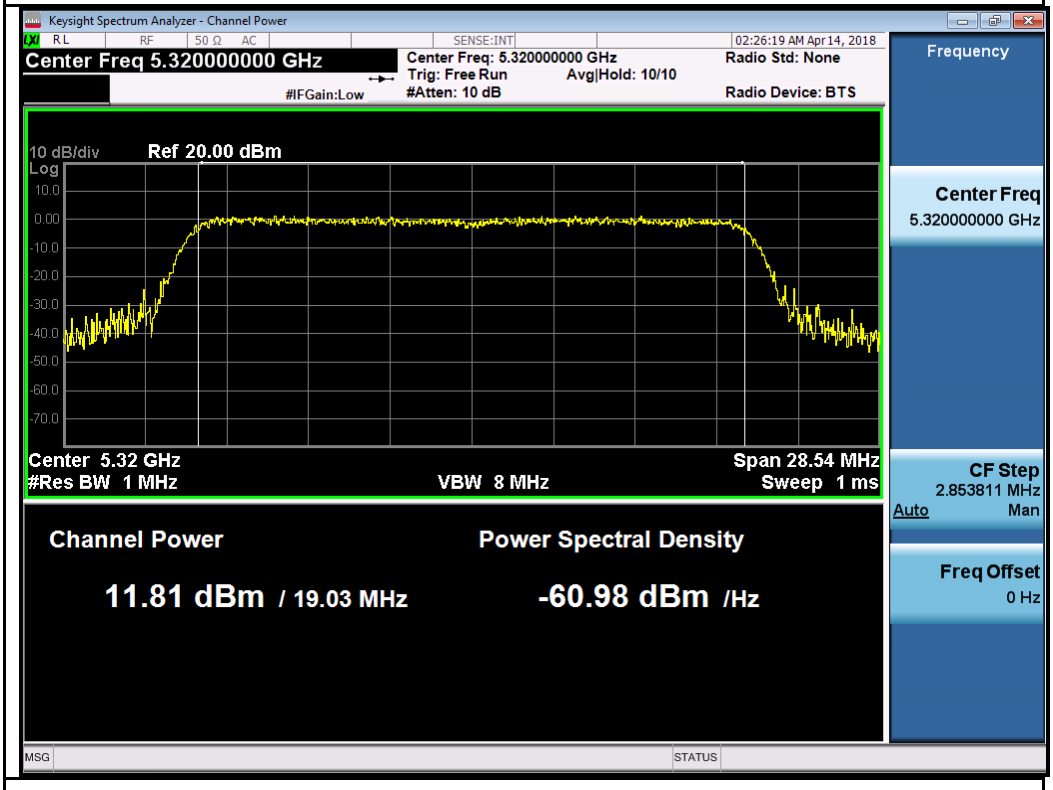

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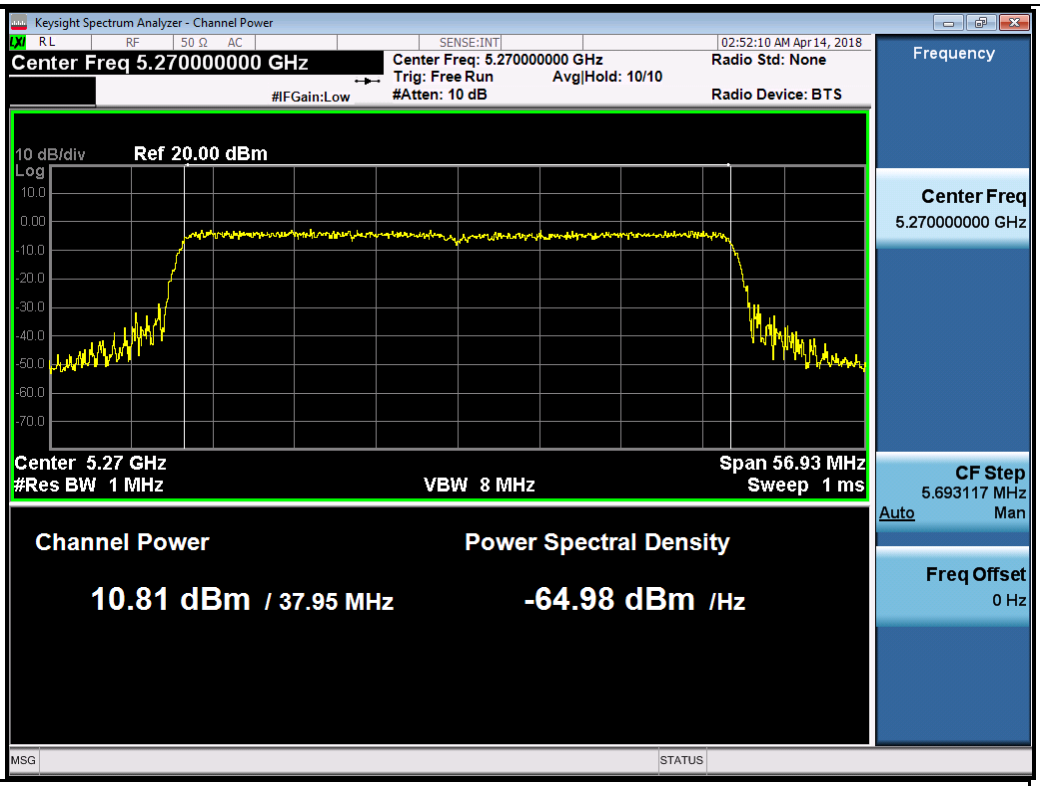

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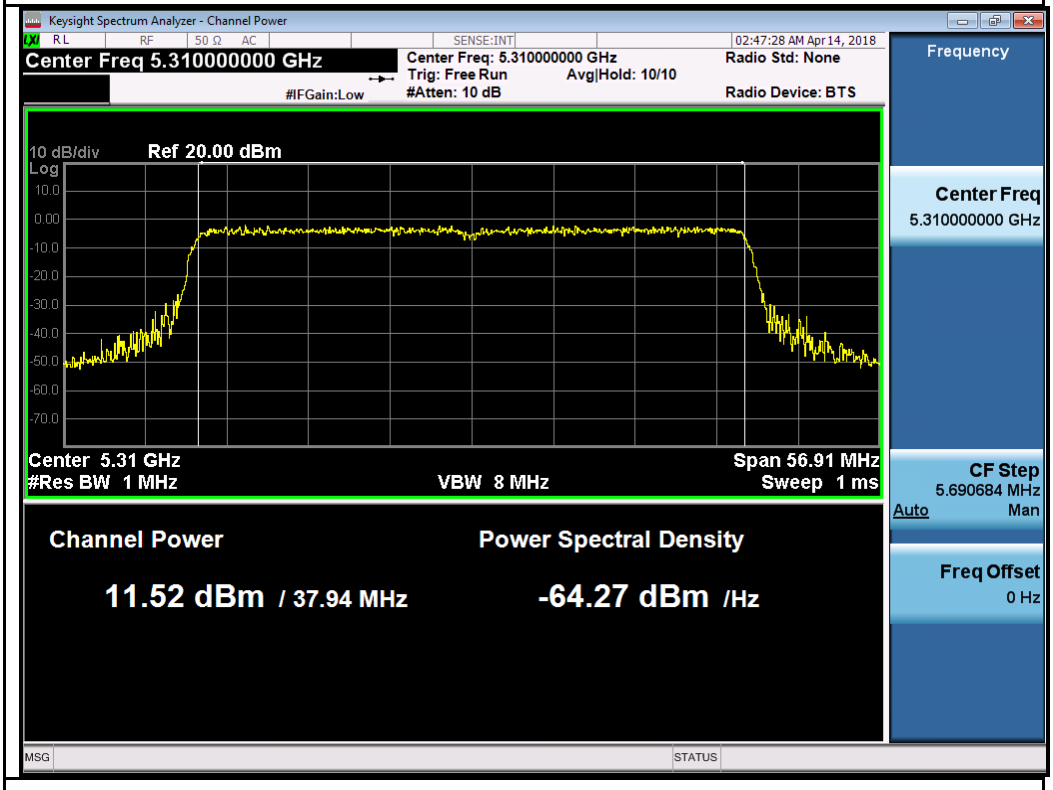

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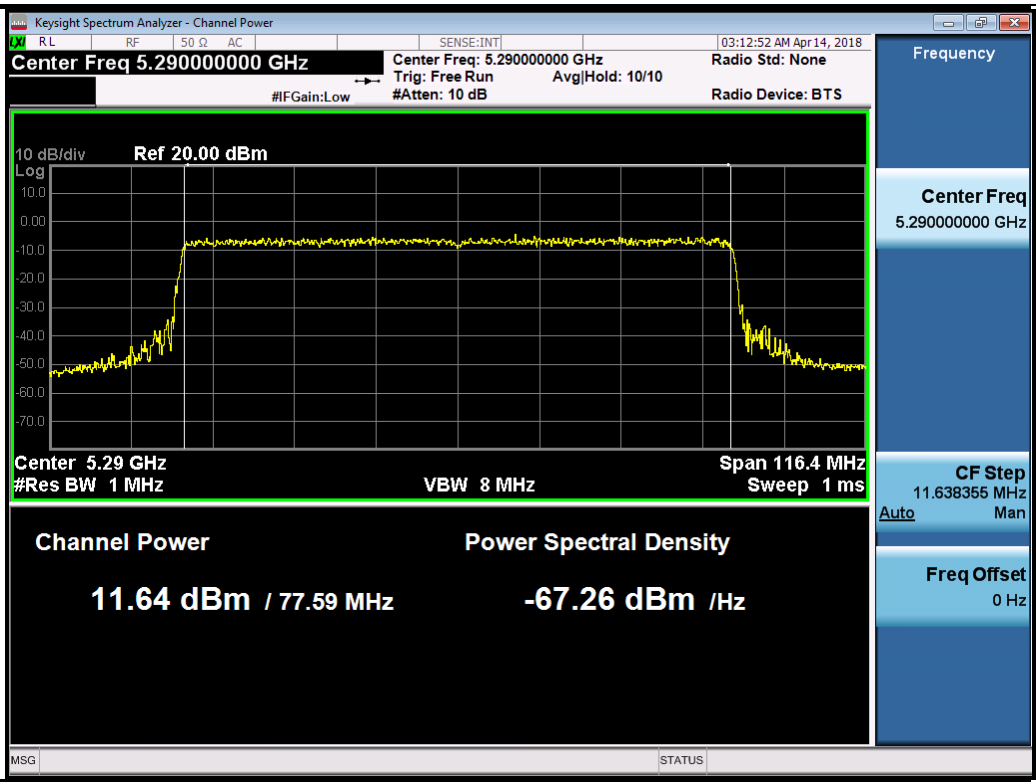
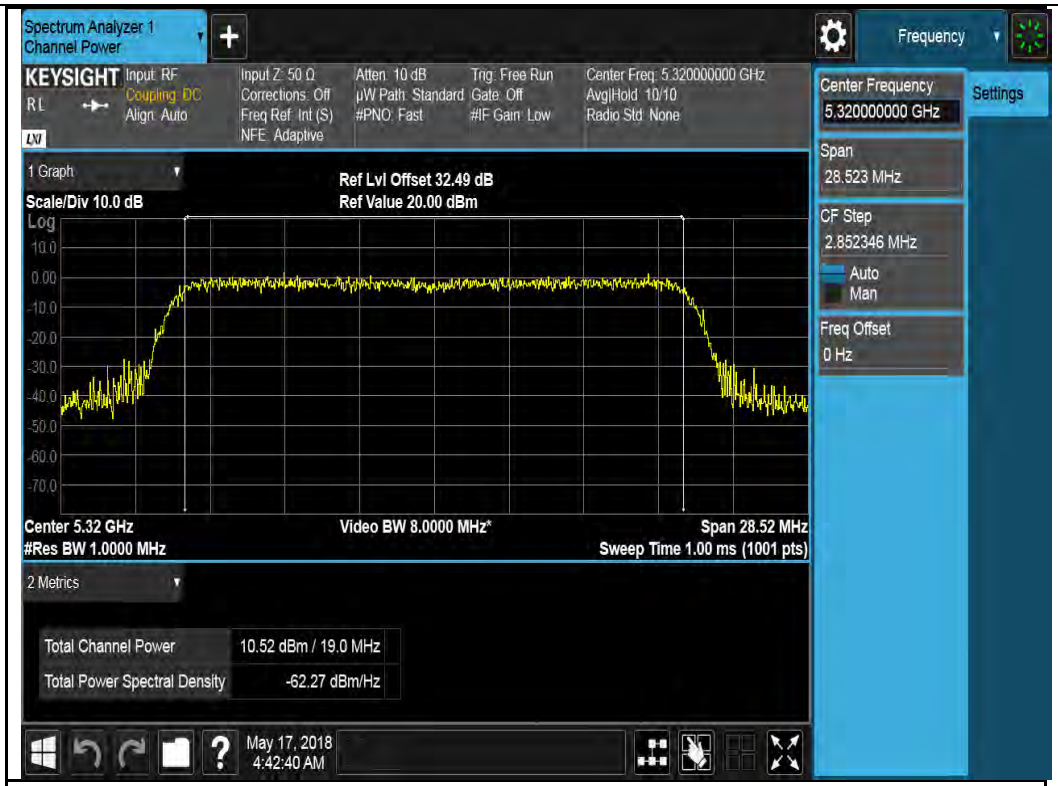


802.11ax80 5290M

Chain 6:

802.11a-5260M

802.11a-5280M



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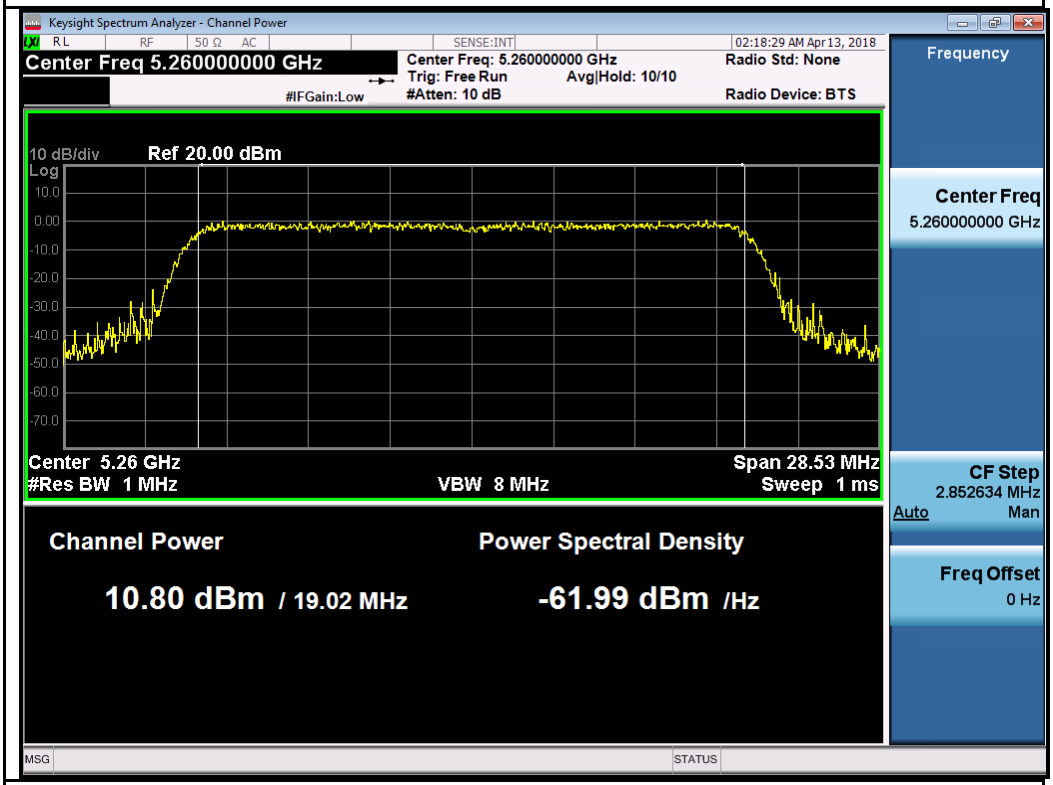

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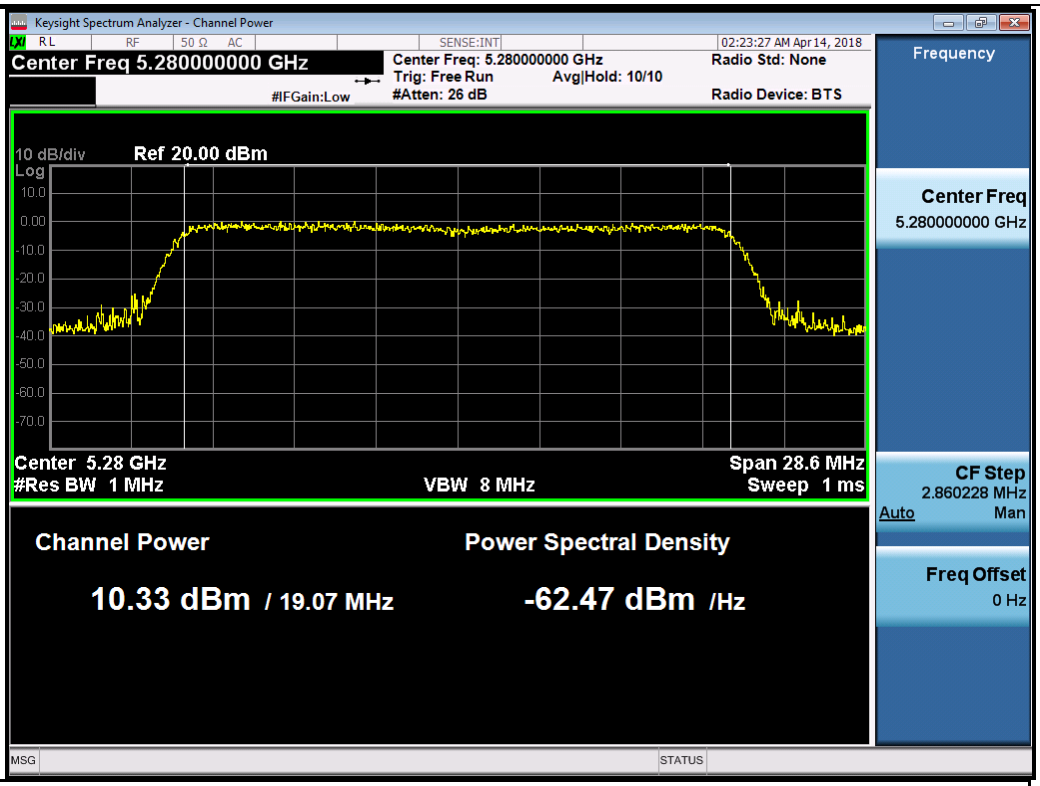

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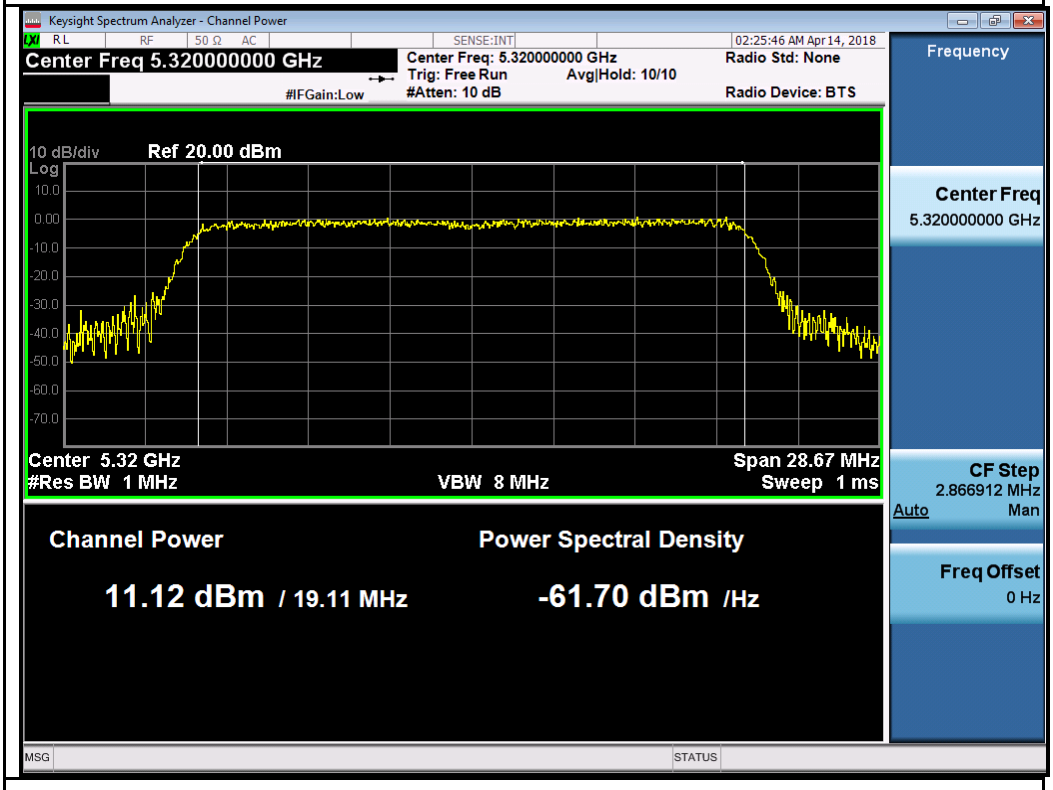

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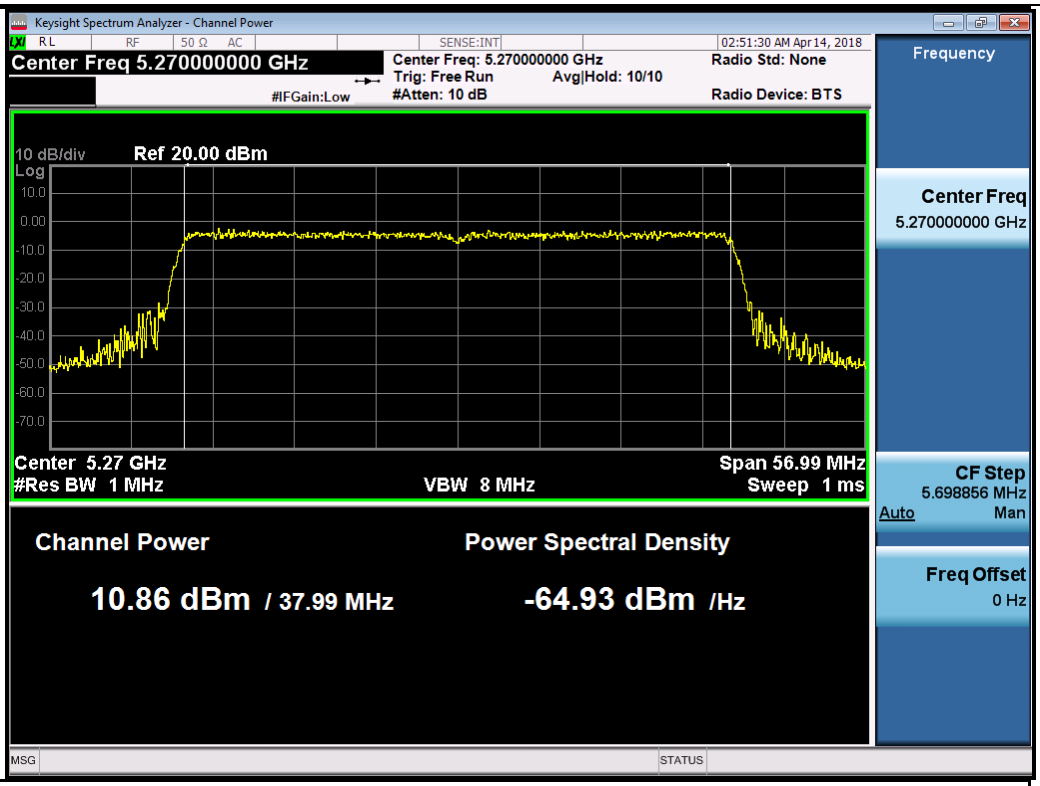

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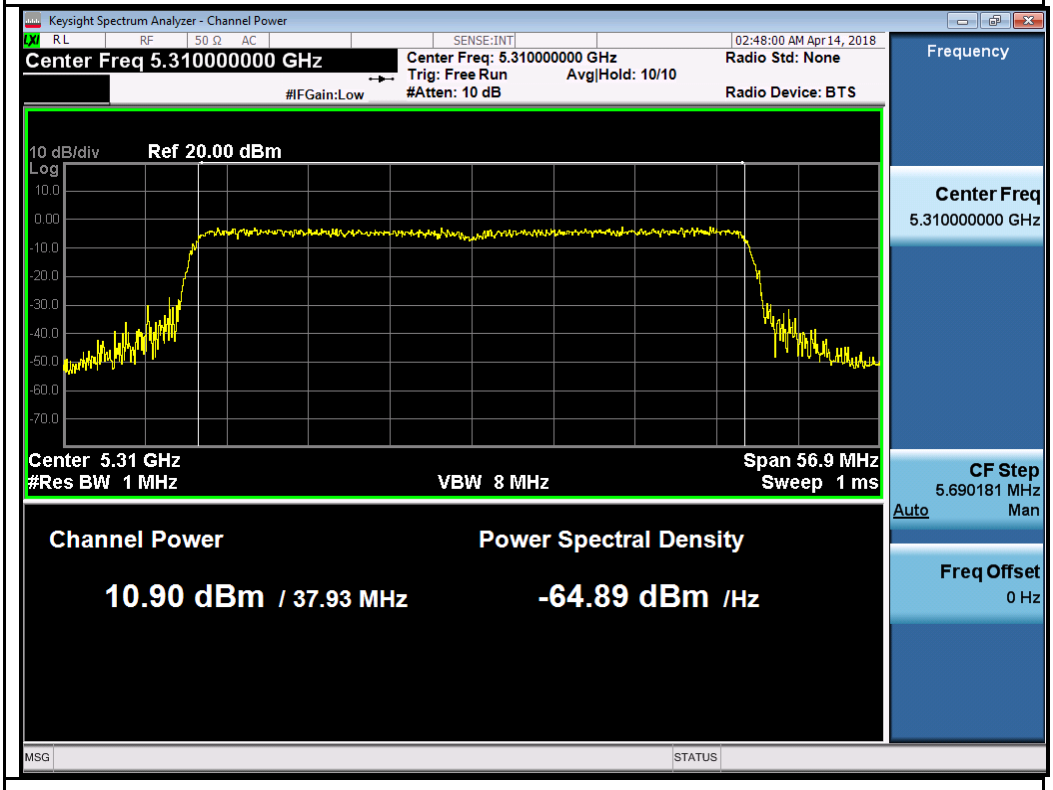

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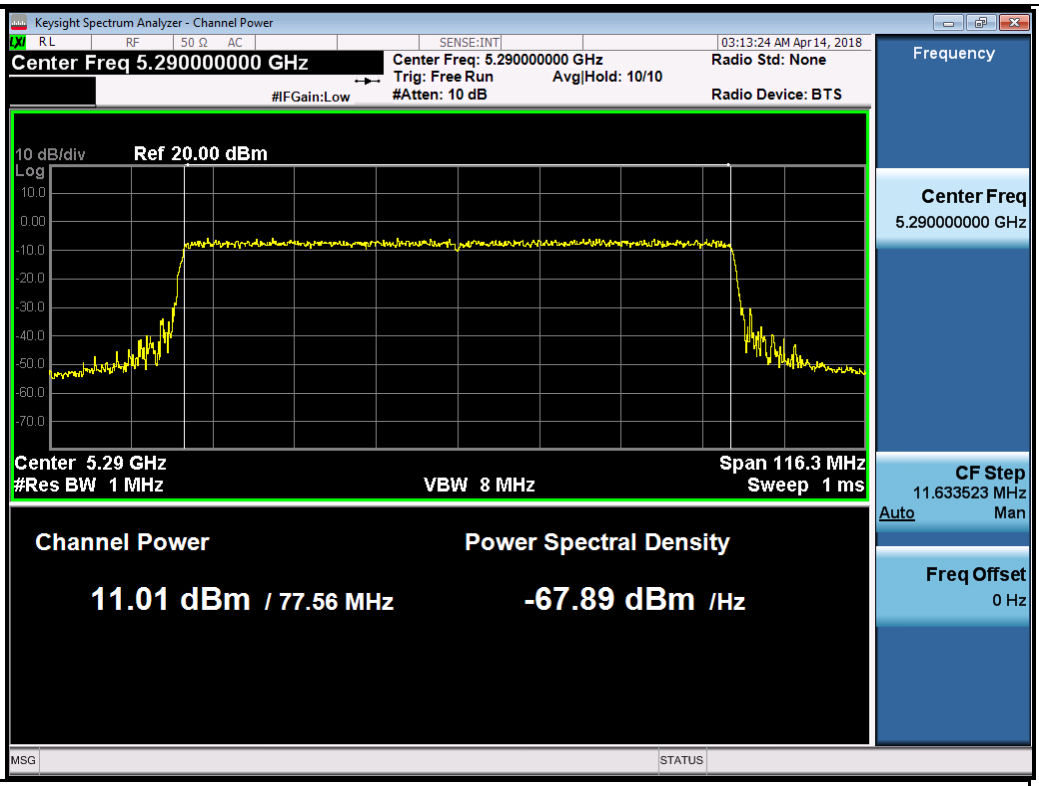

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Chain 7:

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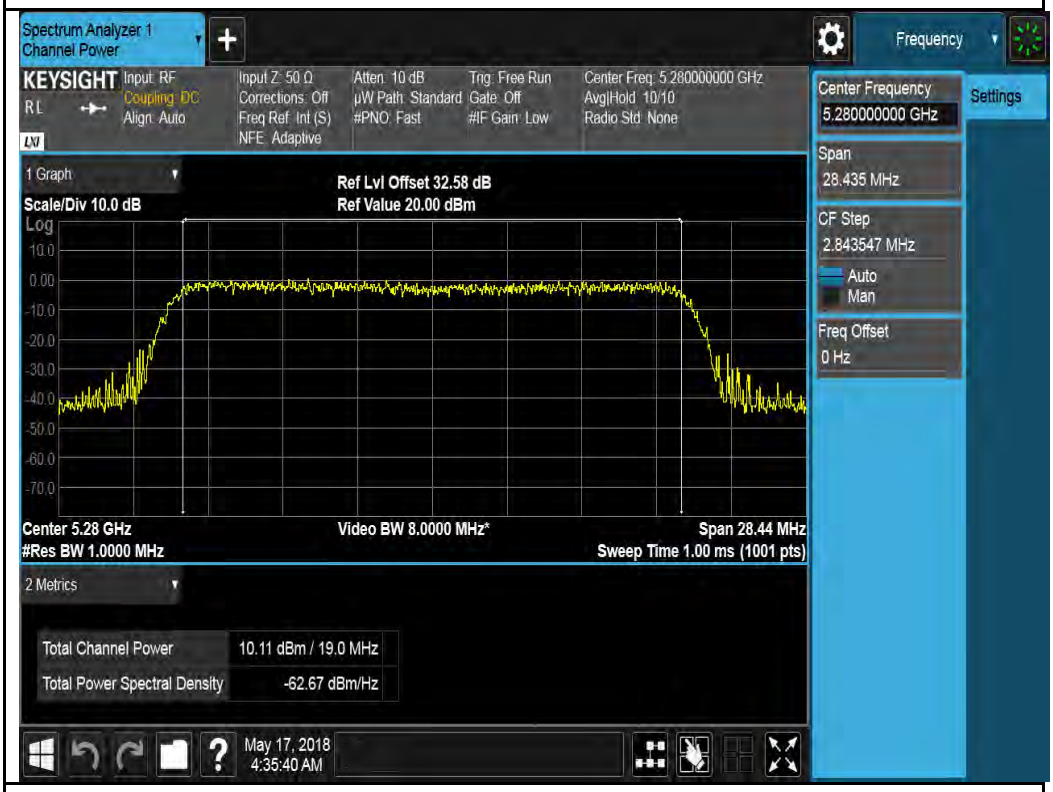

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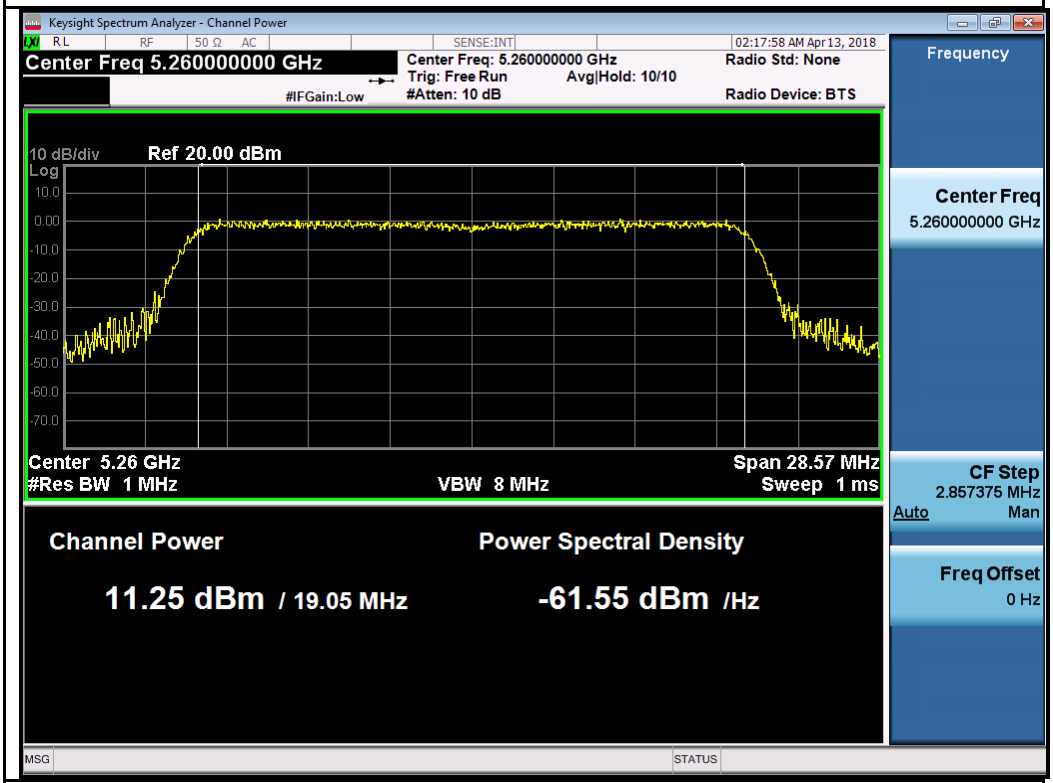
802.11a-5320M



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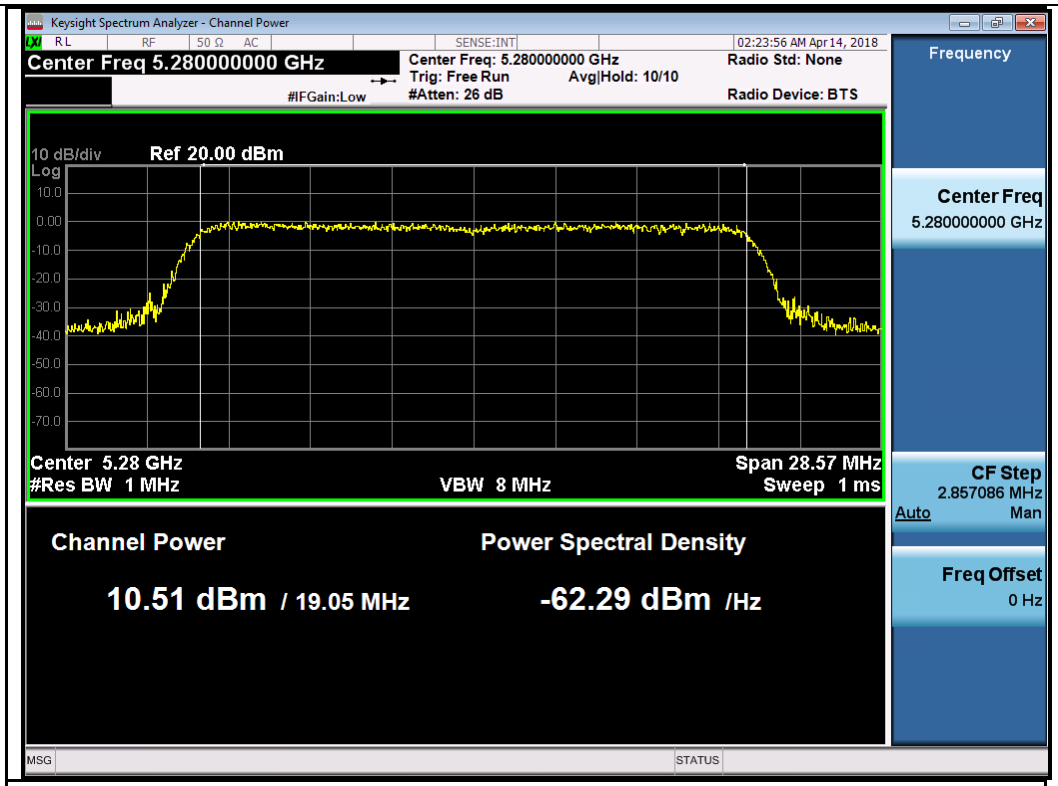

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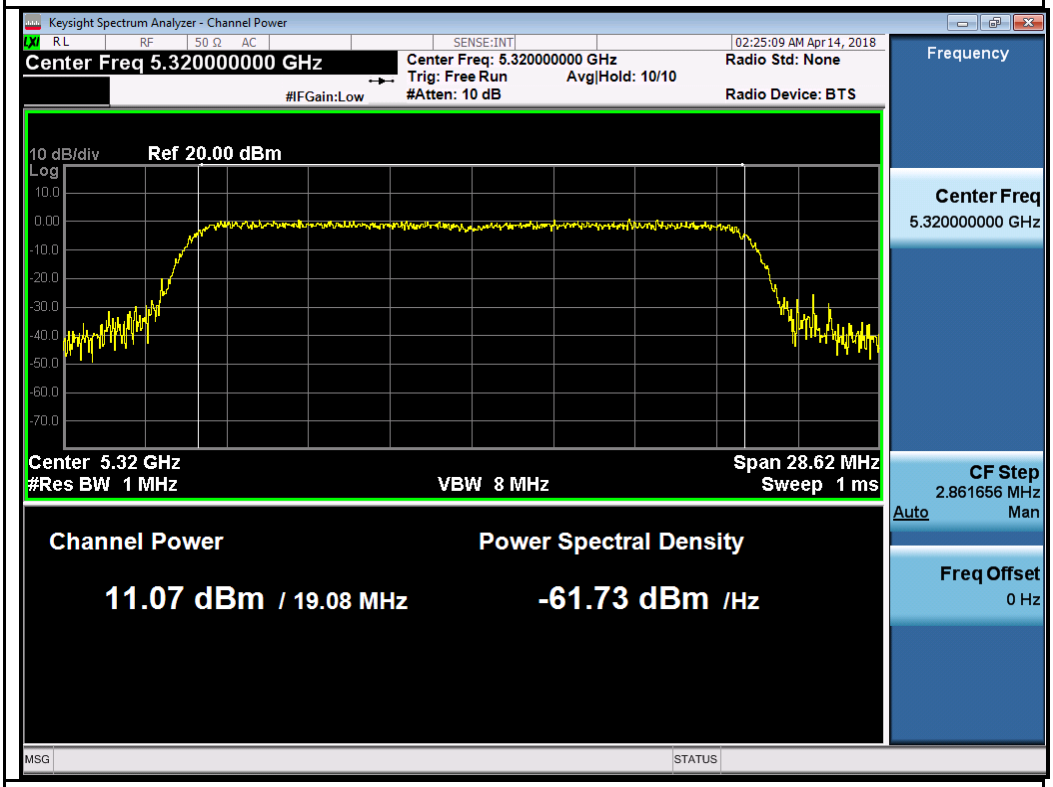

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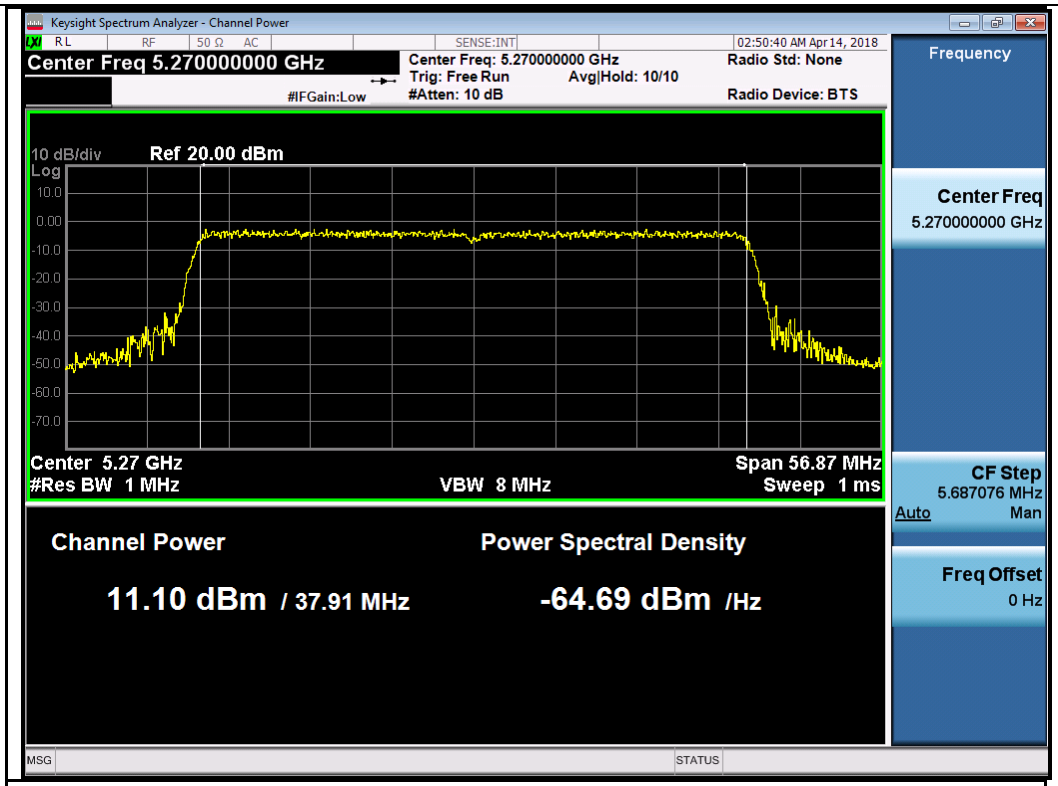

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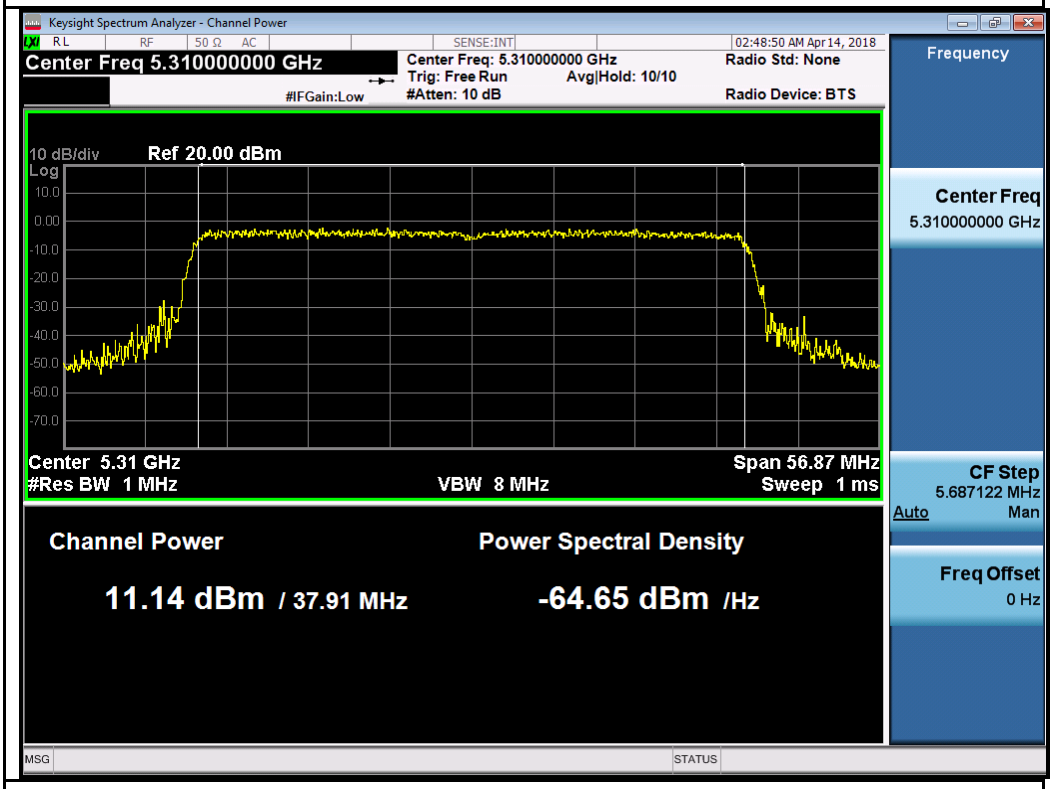

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