RF TEST REPORT

Report No.: FCC_SL17063001-RUC-018A2_W53W56
Supersede Report No.:

Applicant	:	Ruckus Wireless, Inc.
Product Name	:	T310 (N/S) Access Point
Model No.	:	T310
Test Standard	:	47 CFR 15.407
Test Method	:	ANSI C63.4: 2014 789033 D02 General UNII Test Procedures New Rules v01
FCC ID	:	S9GT310NS
IC ID	:	5912A-T310NS
Dates of test	:	11/11/2017-11/21/2017
Issue Date	:	11/28/2017
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:	
Cipher	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

Report No.	Report Version	Description	Issue Date
FCC_SL17063001-RUC-018A2_W53W56	None	Original	11/28/2017

2 Executive Summary

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

Company: Ruckus Wireless, Inc.
Product: T310 (N/S) Access Point
Model: T310

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	T310 (N/S) Access Point
Model No.	T310
Trade Name	Ruckus
Serial No.	431706000021
Host Model No.	N/A
Input Power	100-240VAC 50/60Hz
Power Adapter Manu/Model	HK-AD-120A100-US
Power Adapter SN	N/A
Date of EUT received	11/10/2017
Equipment Class/ Category	DTS, UNII
Port/Connectors	PoE, Ethernet

6.2 Radio Description

Radio Type	802.11a	802.11n-20M	802.11n-40M	802.11ac-80M
Operating Frequency	5260-5320MHz 5500-5720MHz	5260-5320MHz 5500-5720MHz	5270-5310MHz 5510-5710MHz	5290MHz, 5530MHz 5610MHz, 5690MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Spacing	20MHz	20MHz	40MHz	80MHz
Number of Channels	16	16	6	4
Antenna Type	T310S: Internal dipole array T310N: Internal patch array			
Antenna Gain (Peak)	T310S: 5G: Highest Gain 8dBi T310N: 5G: 12.6dBi for Vertical 13.5dBi for Horizontal			
Antenna Connector Type	U.FL			
Note	T310S: Tow chains for 5G, both can be Vertical and Horizontal T310N: Tow chains for 5G, one for Vertical and one for Horizontal			

EUT Power level setting

T310N

Mode	Frequency	Power Setting
802.11-a	5260	28
802.11-a	5280	28
802.11-a	5320	28
802.11-n-20	5260	28
802.11-n-20	5280	28
802.11-n-20	5320	28
802.11-n-40	5270	28
802.11-n-40	5310	28
802.11-ac-80	5290	30
802.11-a	5500	26
802.11-a	5580	26
802.11-a	5700	26
802.11-n-20	5500	26
802.11-n-20	5580	26
802.11-n-20	5700	26
802.11-n-40	5510	27
802.11-n-40	5590	27
802.11-n-40	5670	27
802.11-ac-80	5530	28
802.11-ac-80	5610	28

CROSS Band channels power setting

Mode	Frequency	Power Setting
802.11-a	5720	26
802.11-n-20	5720	26
802.11-n-40	5710	26
802.11-ac-80	5690	27

Note:T310N power setting for Beamforming and Non-Beamforming modes are same.

T310S

Mode	Frequency	Power Setting
802.11-a	5260	38
802.11-a	5280	38
802.11-a	5320	38
802.11-n-20	5260	38
802.11-n-20	5280	38
802.11-n-20	5320	38
802.11-n-40	5270	38
802.11-n-40	5310	38
802.11-ac-80	5290	39
802.11-a	5500	36
802.11-a	5580	38
802.11-a	5700	38
802.11-n-20	5500	38
802.11-n-20	5580	38
802.11-n-20	5700	38
802.11-n-40	5510	38
802.11-n-40	5590	38
802.11-n-40	5670	38
802.11-ac-80	5530	39
802.11-ac-80	5610	39

CROSS Band channels power setting

Mode	Frequency	Power Setting
802.11-a	5720	37
802.11-n-20	5720	37
802.11-n-40	5710	38
802.11-ac-80	5690	39

T310S Beamforming Mode

Mode	Frequency	Power Setting
802.11-a	5260	32
802.11-a	5280	32
802.11-a	5320	32
802.11-n-20	5260	32
802.11-n-20	5280	32
802.11-n-20	5320	32
802.11-n-40	5270	32
802.11-n-40	5310	32
802.11-ac-80	5290	34
802.11-a	5500	30
802.11-a	5580	31
802.11-a	5700	31
802.11-n-20	5500	31
802.11-n-20	5580	31
802.11-n-20	5700	31
802.11-n-40	5510	31
802.11-n-40	5590	31
802.11-n-40	5670	31
802.11-ac-80	5530	32
802.11-ac-80	5610	34

CROSS Band channels power setting

Mode	Frequency	Power Setting
802.11-a	5720	31
802.11-n-20	5720	31
802.11-n-40	5710	31
802.11-ac-80	5690	32

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	VOSTRO 1520	26543939185	Dell	-

7.2 Cabling Description

Item	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
1	EUT	RJ45	Power Over Ethernet Injector	RJ45	>3m	N/A	-
2	Laptop	RJ45	Power Over Ethernet Injector	RJ45	>3m	N/A	

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Command prompt	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	15.205	ANSI C63.4 – 2014 789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.4 – 2014	☒ Pass ☐ N/A
Antenna requirement	FCC	15.203	15.203	☒ Pass ☐ N/A

Test Item	Test standard		Test Method/Procedure	Pass / Fail
26 & 6 dB Emission Bandwidth	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Maximum conducted Output Power	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Power reduction (Antenna Gain > 6 dBi)	FCC	15.407 (a) (2)	-	☐ Pass ☒ N/A
Band Edge and Radiated Spurious Emissions	FCC	15.407(b)(2), 15.407(b)(6)	ANSI C63.4 – 2014 789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Power Spectral Density	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Frequency Stability	FCC	15.407 (g)	-	☐ Pass ☒ N/A
Transmit Power Control (TPC)	FCC	15.407 (h)(1)	-	☐ Pass ☒ N/A
User Manual	FCC	-	-	☒ 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 Conducted Emissions

The test is to measure the conducted emissions to the mains port of the EUT.
Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the LISN
- Uncertainty of cables
- Uncertainty due to the mismatches
- Etc, see the below table for details

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
LISN Insertion Loss	0.40	Normal	2	1	0.20
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 LISN - Receiver	0.25	U-Shape	1.414	1	0.1768033
LISN Impedance	2.5	Triangular	2.449	1	1.0208248
Combined Standard Uncertainty					1.928133
Expanded Uncertainty (K=2)					3.856266

The total derived measurement uncertainty is +/- 3.86 dB.

9.2 Radiated 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.

9.3 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.

9.4 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 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. 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 use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.	☒
Remark	N/A	
Result	☒ Pass ☐ Fail	

Test Data ☐ Yes ☒ N/A
Test Plot ☐ Yes (See below) ☒ N/A

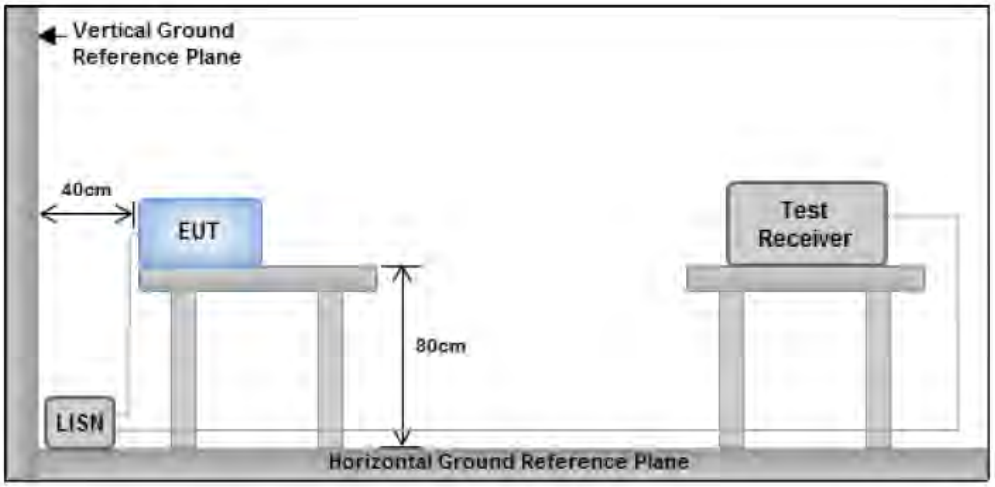
Antenna Connector Construction

Antenna Type	T310S: Internal dipole array T310N: Internal patch array
Antenna Gain (Peak)	T310S: 5G: Highest Gain 8dBi T310N: 5G: 12.6dBi for Vertical 13.5dBi for Horizontal
Antenna Connector Type	U.FL
Note	The antenna used U.FL antenna connectors which is a unique type which meet the requirement.

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
15.207(a)	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 μ H/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 in two modes of operations: (1) P.O.E Mode; (2) Power Supply Mode		
Result	☒ Pass ☐ Fail		

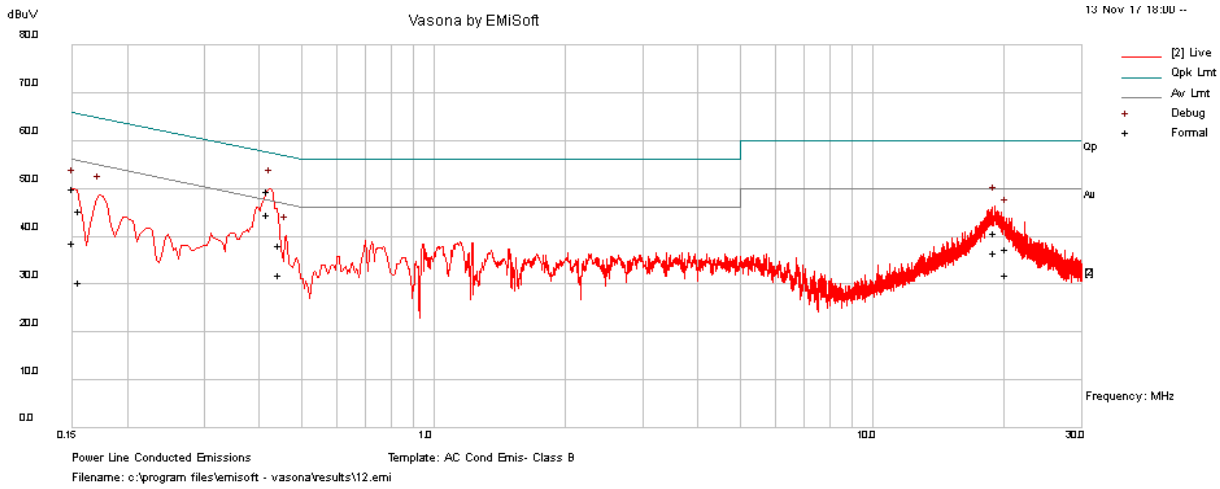
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Shuo Zhang at Conducted Emission test site.

Conducted Emission Test Results

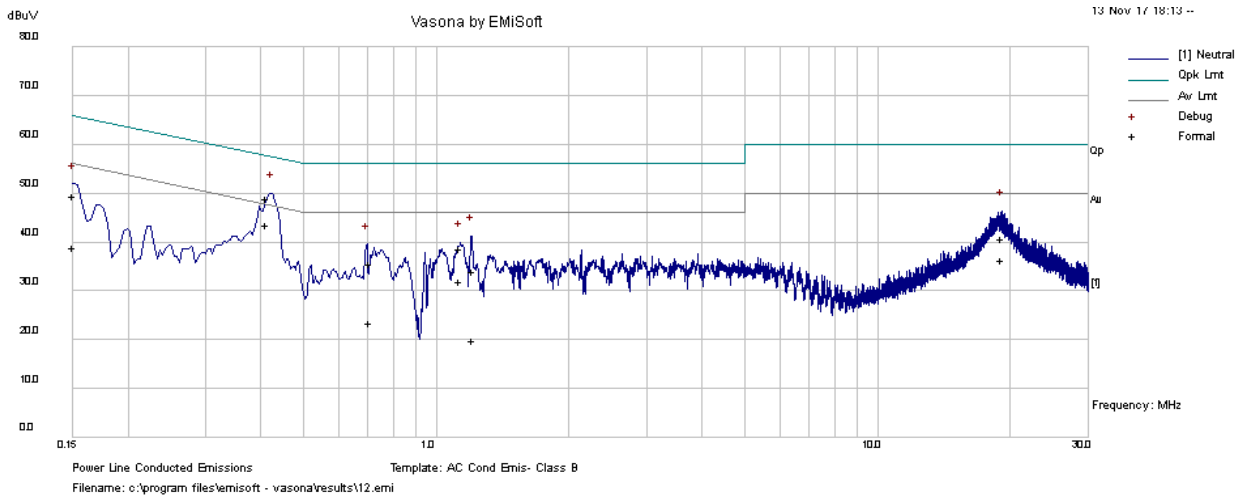
Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(° C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Shuo Zhang			
Test Date:	11/13/2017			
Remarks	Conducted @ Live – P.O.E Mode			



Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.42	39.36	9.33	0.69	49.37	Quasi Peak	Live	57.48	-8.11	Pass
19.08	30.78	9.38	0.64	40.81	Quasi Peak	Live	60	-19.19	Pass
0.15	38.78	9.33	1.74	49.84	Quasi Peak	Live	65.99	-16.15	Pass
0.16	34.22	9.33	1.67	45.22	Quasi Peak	Live	65.69	-20.47	Pass
20.24	27.4	9.39	0.66	37.45	Quasi Peak	Live	60	-22.55	Pass
0.44	28.08	9.33	0.67	38.08	Quasi Peak	Live	56.98	-18.91	Pass
0.42	34.58	9.33	0.69	44.59	Average	Live	47.48	-2.9	Pass
19.08	26.58	9.38	0.64	36.61	Average	Live	50	-13.39	Pass
0.15	27.59	9.33	1.74	38.65	Average	Live	55.99	-17.34	Pass
0.16	19.31	9.33	1.67	30.3	Average	Live	55.69	-25.39	Pass
20.24	21.81	9.39	0.66	31.86	Average	Live	50	-18.14	Pass
0.44	21.9	9.33	0.67	31.89	Average	Live	46.98	-15.09	Pass

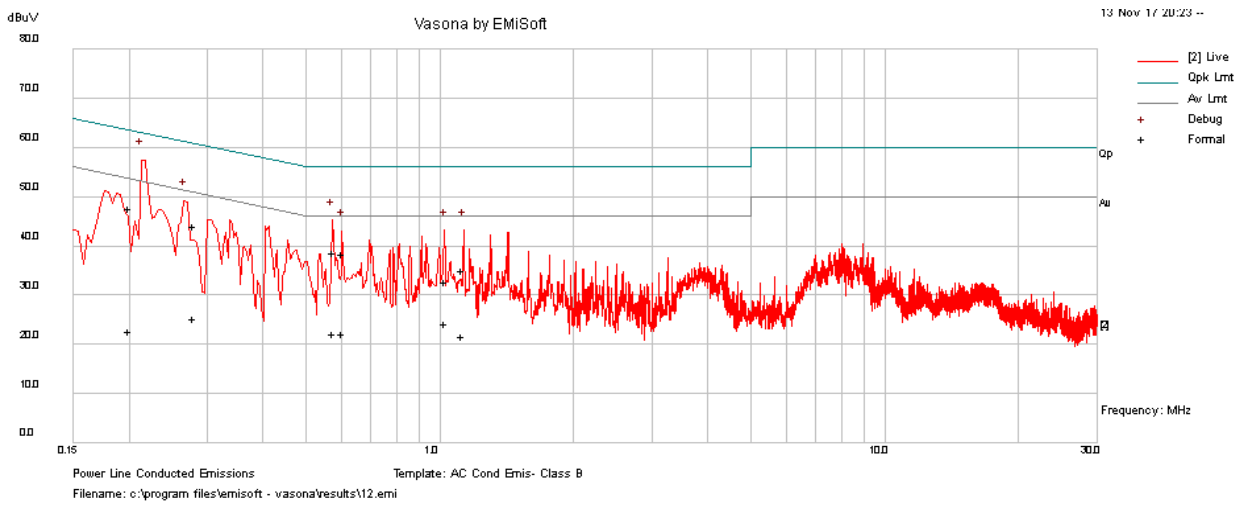
Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(° C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Shuo Zhang			
Test Date:	11/13/2017			
Remarks	Conducted @ Neutral - P.O.E Mode			



Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.41	38.91	9.33	0.69	48.93	Quasi Peak	Neutral	57.61	-8.68	Pass
19.11	30.7	9.38	0.64	40.73	Quasi Peak	Neutral	60	-19.27	Pass
0.15	38.48	9.33	1.74	49.55	Quasi Peak	Neutral	66	-16.45	Pass
1.21	24.11	9.33	0.52	33.96	Quasi Peak	Neutral	56	-22.04	Pass
1.13	28.92	9.33	0.52	38.77	Quasi Peak	Neutral	56	-17.23	Pass
0.71	25.6	9.33	0.56	35.48	Quasi Peak	Neutral	56	-20.52	Pass
0.41	33.48	9.33	0.69	43.5	Average	Neutral	47.61	-4.11	Pass
19.11	26.41	9.38	0.64	36.44	Average	Neutral	50	-13.56	Pass
0.15	27.8	9.33	1.74	38.87	Average	Neutral	56	-17.13	Pass
1.21	10.04	9.33	0.52	19.9	Average	Neutral	46	-26.1	Pass
1.13	22.05	9.33	0.52	31.9	Average	Neutral	46	-14.1	Pass
0.71	13.63	9.33	0.56	23.52	Average	Neutral	46	-22.48	Pass

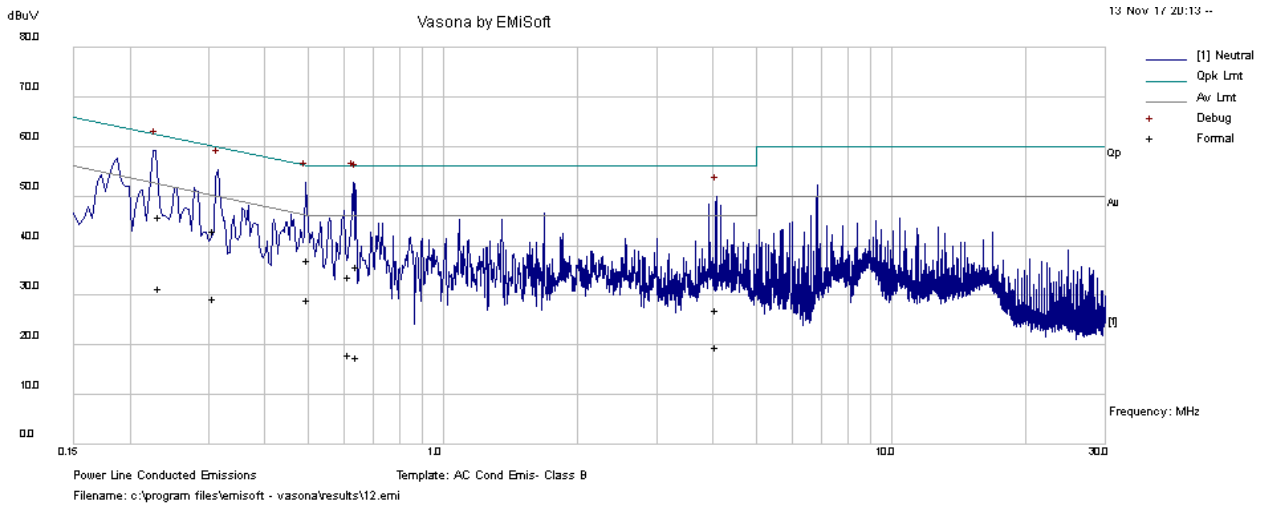
Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(° C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Shuo Zhang			
Test Date:	11/13/2017			
Remarks	Conducted @ Live – Power Supply Mode			



Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.20	37.07	9.32	1.25	47.64	Quasi Peak	Live	63.61	-15.97	Pass
0.58	28.71	9.33	0.6	38.64	Quasi Peak	Live	56	-17.36	Pass
0.28	33.7	9.32	0.91	43.93	Quasi Peak	Live	60.84	-16.9	Pass
1.03	22.74	9.33	0.53	32.6	Quasi Peak	Live	56	-23.4	Pass
1.13	25.31	9.33	0.52	35.17	Quasi Peak	Live	56	-20.83	Pass
0.61	28.34	9.33	0.59	38.26	Quasi Peak	Live	56	-17.74	Pass
0.20	12.19	9.32	1.25	22.76	Average	Live	53.61	-30.84	Pass
0.58	12.15	9.33	0.6	22.08	Average	Live	46	-23.92	Pass
0.28	14.95	9.32	0.91	25.18	Average	Live	50.84	-25.66	Pass
1.03	14.39	9.33	0.53	24.25	Average	Live	46	-21.75	Pass
1.13	11.75	9.33	0.52	21.6	Average	Live	46	-24.4	Pass
0.61	12.15	9.33	0.59	22.06	Average	Live	46	-23.94	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:	Shuo Zhang			
Test Date:	11/13/2017			
Remarks	Conducted @ Neutral - Power Supply Mode			



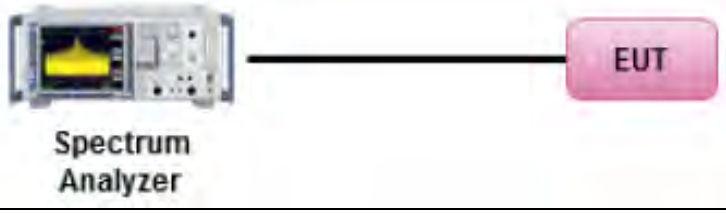
Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.23	35.39	9.32	1.08	45.79	Quasi Peak	Neutral	62.34	-16.54	Pass
0.50	27.17	9.33	0.63	37.12	Quasi Peak	Neutral	56.02	-18.9	Pass
0.62	23.9	9.33	0.58	33.82	Quasi Peak	Neutral	56	-22.18	Pass
0.64	25.91	9.33	0.58	35.82	Quasi Peak	Neutral	56	-20.18	Pass
0.31	32.81	9.32	0.84	42.97	Quasi Peak	Neutral	60.05	-17.08	Pass
4.06	17.26	9.34	0.5	27.1	Quasi Peak	Neutral	56	-28.9	Pass
0.23	20.99	9.32	1.08	31.39	Average	Neutral	52.34	-20.94	Pass
0.50	19.29	9.33	0.63	29.25	Average	Neutral	46.02	-16.77	Pass
0.62	8.22	9.33	0.58	18.14	Average	Neutral	46	-27.86	Pass
0.64	7.68	9.33	0.58	17.59	Average	Neutral	46	-28.41	Pass
0.31	19.22	9.32	0.84	29.38	Average	Neutral	50.05	-20.67	Pass
4.06	9.81	9.34	0.5	19.66	Average	Neutral	46	-26.34	Pass

10.3 6dB & 26 dB 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.
  - Set RBW = around 1% of emission bandwidth
  - Set VBW > RBW
  - Detector = Peak
  - 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.
  - Set RBW = 100kHz
  - Set VBW > 3RBW
  - Detector = Peak
  - 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	11/11/2017-11/21/2017	Environmental condition	Temperature	23°C
			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 Cipher at RF test site.

T310N

26dB Bandwidth measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5260	Low	18.63
	802.11a	5280	Mid	18.54
	802.11a	5320	High	18.71
	802.11n-20	5260	Low	19.61
	802.11n-20	5280	Mid	19.56
	802.11n-20	5320	High	19.47
	802.11n-40	5270	Low	38.90
	802.11n-40	5310	High	38.97
	802.11ac-80	5290	Mid	81.67

26dB Bandwidth measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5500	Low	18.56
	802.11a	5580	Mid	18.67
	802.11a	5700	High	18.58
	802.11n-20	5500	Low	19.66
	802.11n-20	5580	Mid	19.61
	802.11n-20	5700	High	19.64
	802.11n-40	5510	Low	38.70
	802.11n-40	5590	Mid	38.76
	802.11n-40	5670	High	38.70
	802.11ac-80	5530	Low	81.73
	802.11ac-80	5610	High	82.03

26dB Bandwidth measurement result for cross channels

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5720	CROSS	16.37
	802.11n-20	5720	CROSS	17.59
	802.11n-40	5710	CROSS	35.67
	802.11ac-80	5690	CROSS	76.33

6 Bandwidth measurement result for cross channels

Type	Test mode	Freq (MHz)	CH	Result (MHz)
6dB BW	802.11a	5720	CROSS	18.52
	802.11n-20	5720	CROSS	19.59
	802.11n-40	5710	CROSS	38.60
	802.11ac-80	5690	CROSS	81.61

T310S

26dB Bandwidth measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5260	Low	18.62
	802.11a	5280	Mid	18.75
	802.11a	5320	High	19.08
	802.11n-20	5260	Low	19.82
	802.11n-20	5280	Mid	19.93
	802.11n-20	5320	High	19.62
	802.11n-40	5270	Low	38.83
	802.11n-40	5310	High	39.46
	802.11ac-80	5290	Mid	82.11

26dB Bandwidth measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5500	Low	18.70
	802.11a	5580	Mid	18.61
	802.11a	5700	High	18.65
	802.11n-20	5500	Low	19.64
	802.11n-20	5580	Mid	19.65
	802.11n-20	5700	High	20.06
	802.11n-40	5510	Low	38.99
	802.11n-40	5590	Mid	39.05
	802.11n-40	5670	High	39.04
	802.11ac-80	5530	Low	82.06
	802.11ac-80	5610	High	81.88

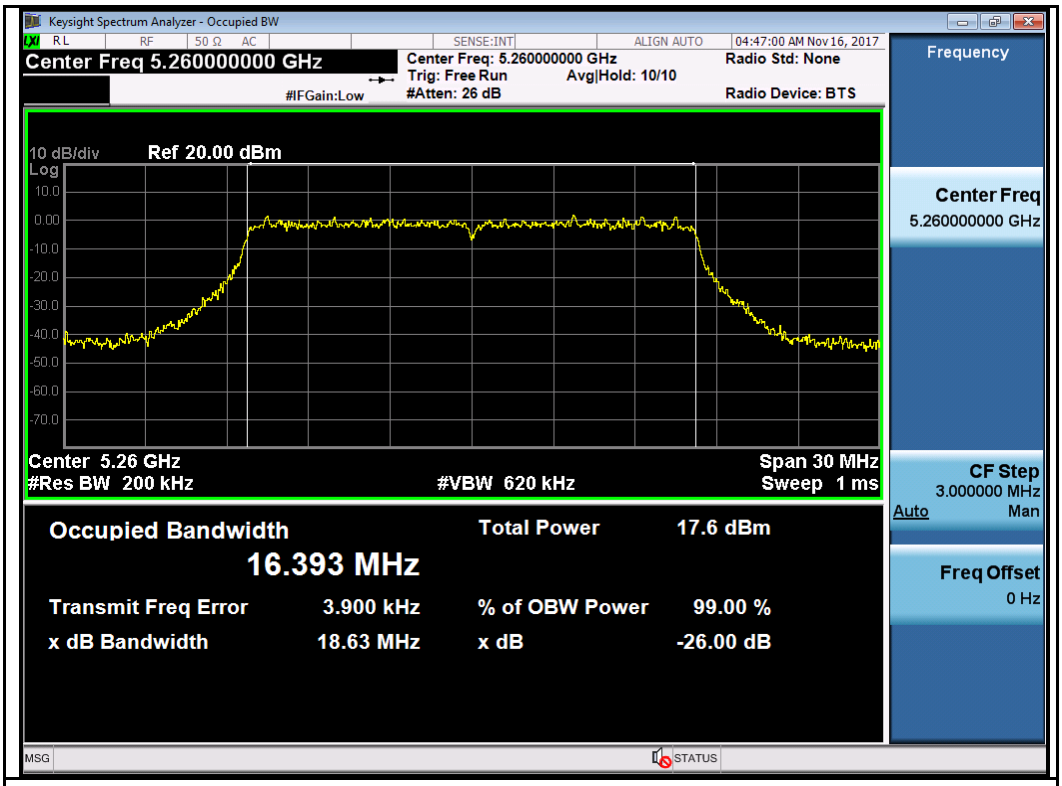
26dB Bandwidth measurement result for cross channels

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5720	CROSS	18.90
	802.11n-20	5720	CROSS	19.75
	802.11n-40	5710	CROSS	39.42
	802.11ac-80	5690	CROSS	81.70

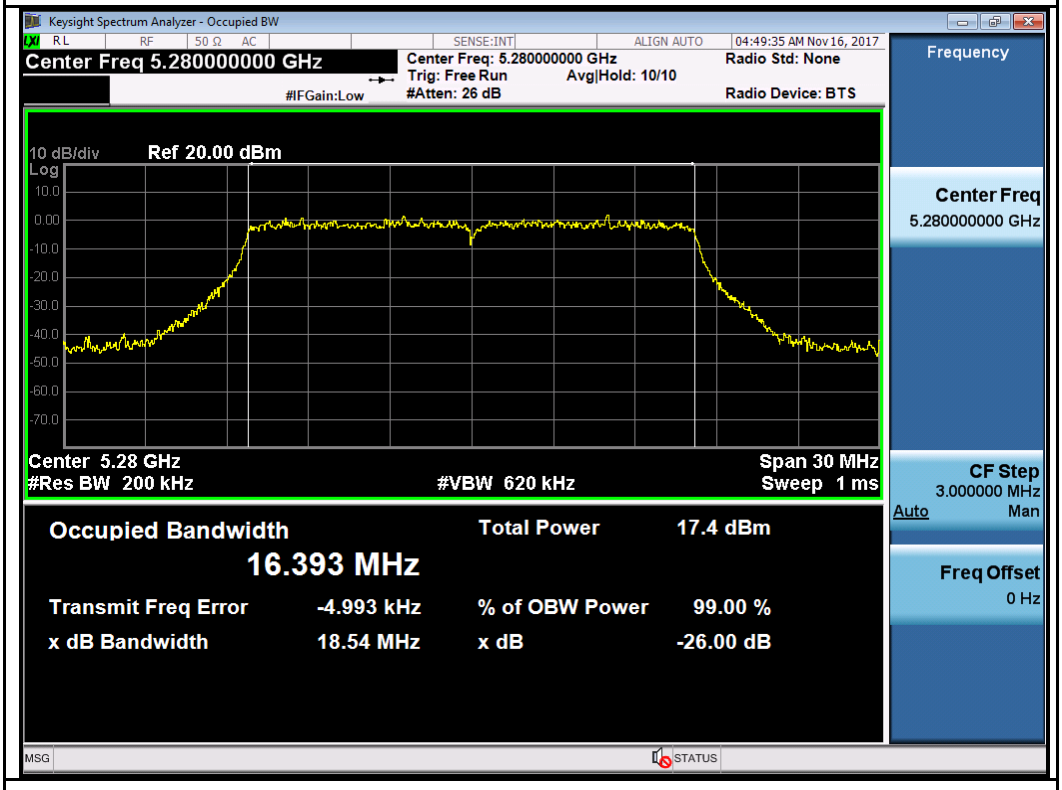
6 Bandwidth measurement result for cross channels

Type	Test mode	Freq (MHz)	CH	Result (MHz)
6dB BW	802.11a	5720	CROSS	16.37
	802.11n-20	5720	CROSS	17.60
	802.11n-40	5710	CROSS	35.66
	802.11ac-80	5690	CROSS	76.36

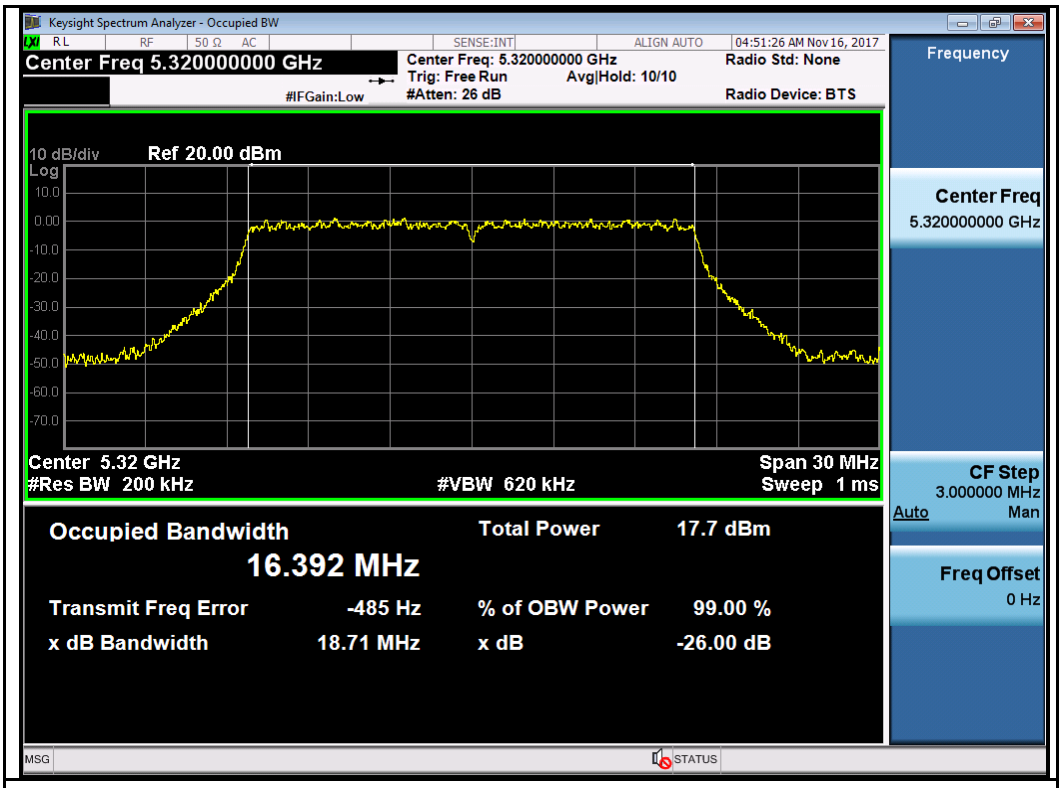
T310N
26dB Bandwidth Test Plots
W53:



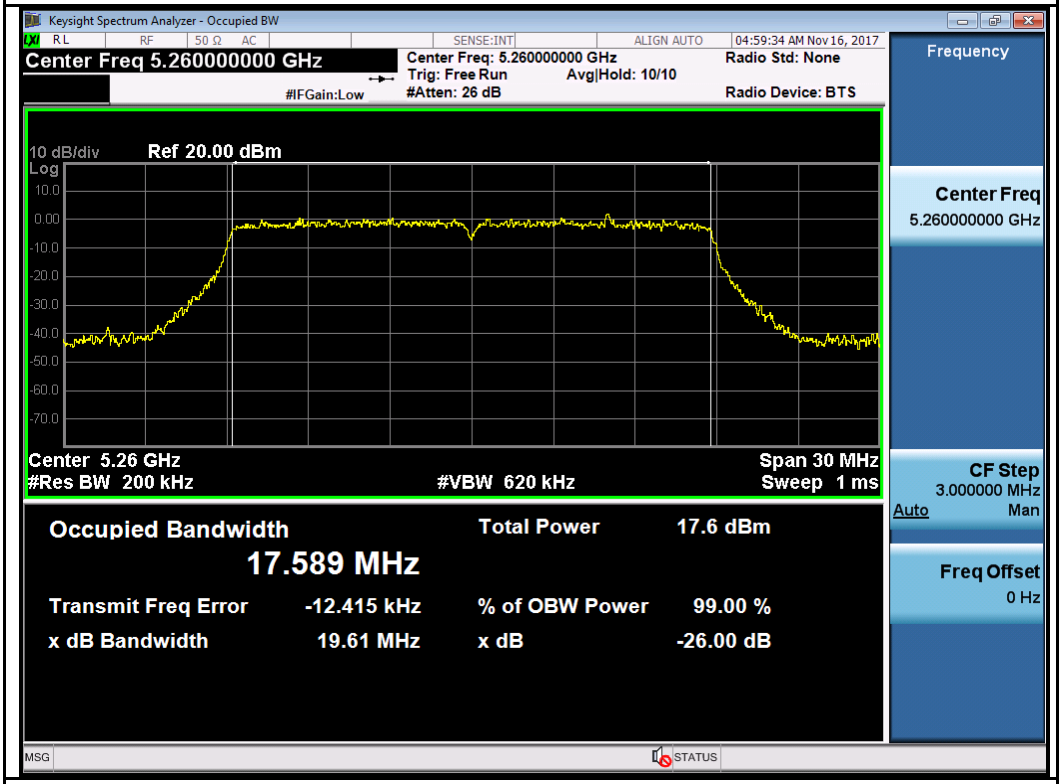
802.11a-5260MHz



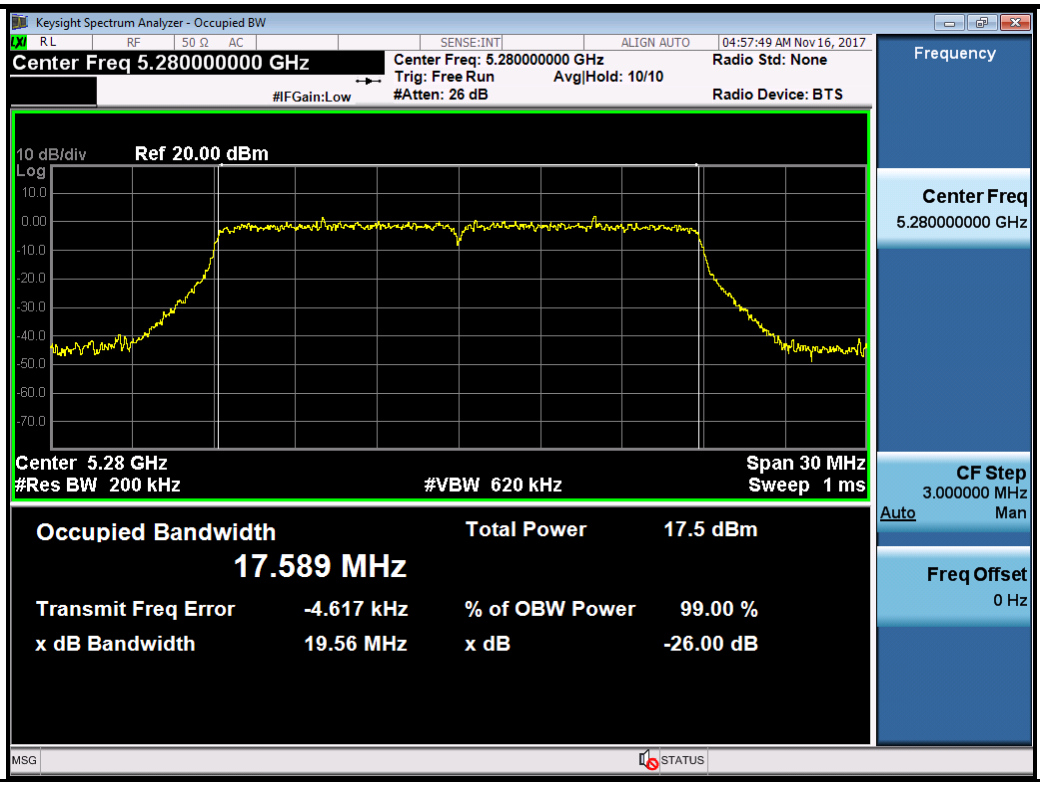
802.11a-5280MHz



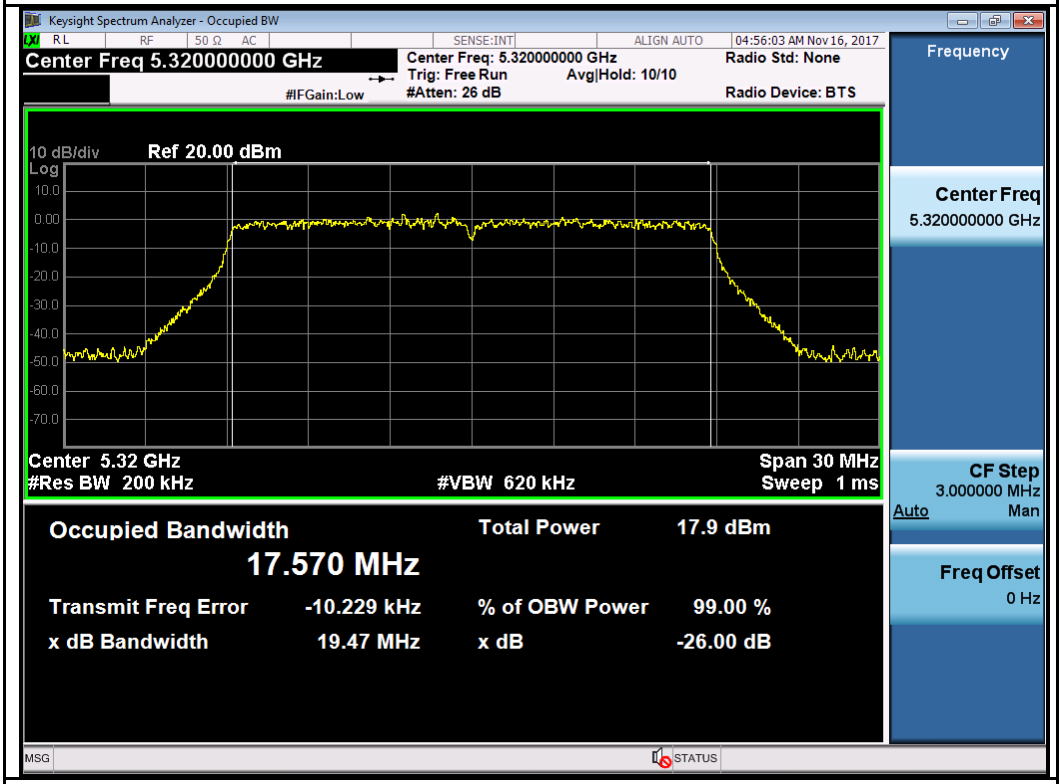
802.11a-5320MHz



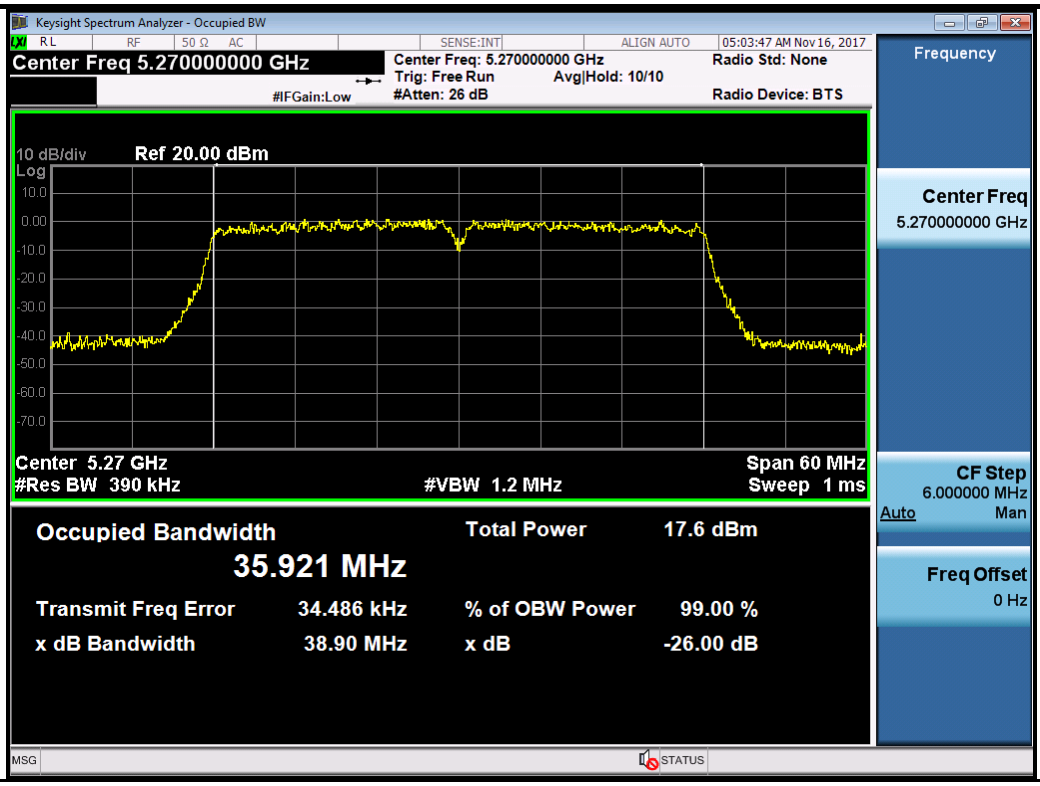
802.11n-HT20-5260MHz



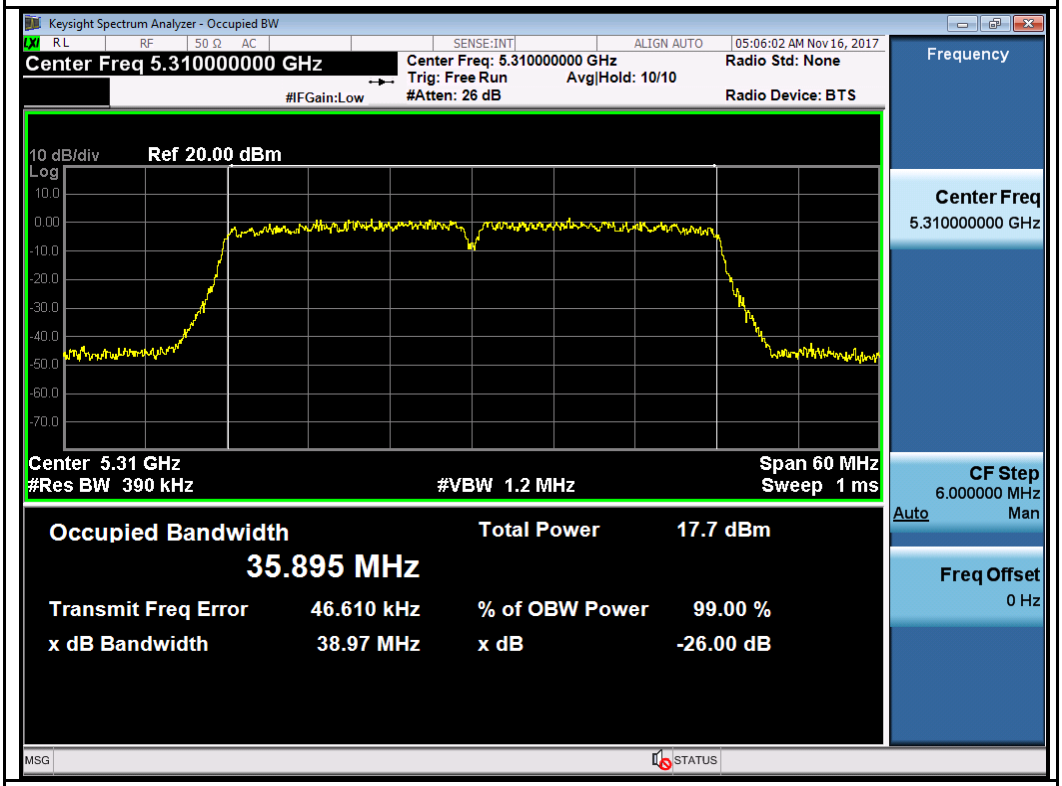
802.11n-HT20-5280MHz



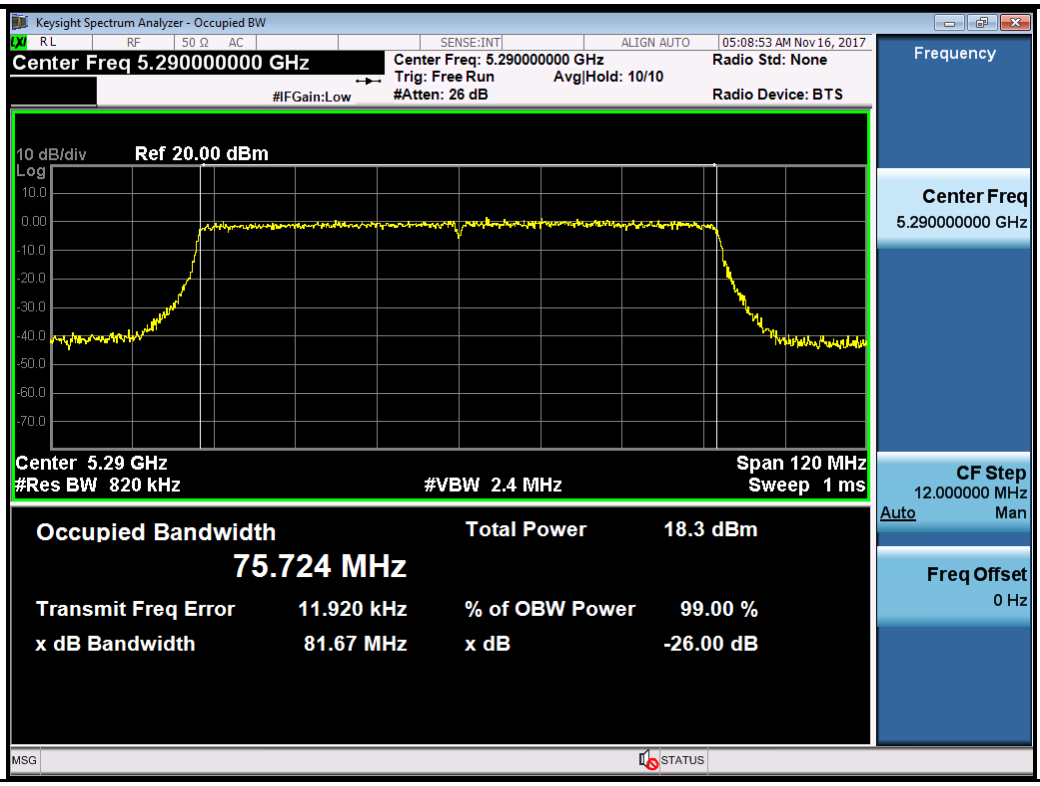
802.11n-HT20-5320MHz



802.11n-HT40-5270MHz

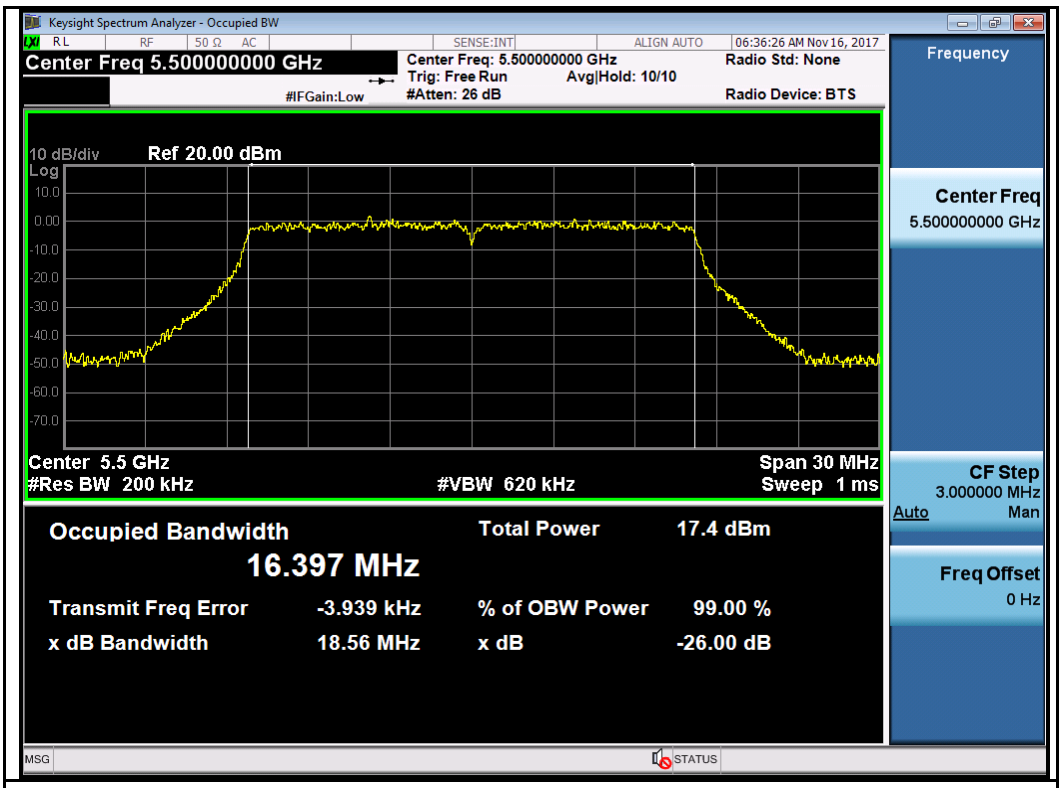


802.11n-HT40-5310MHz

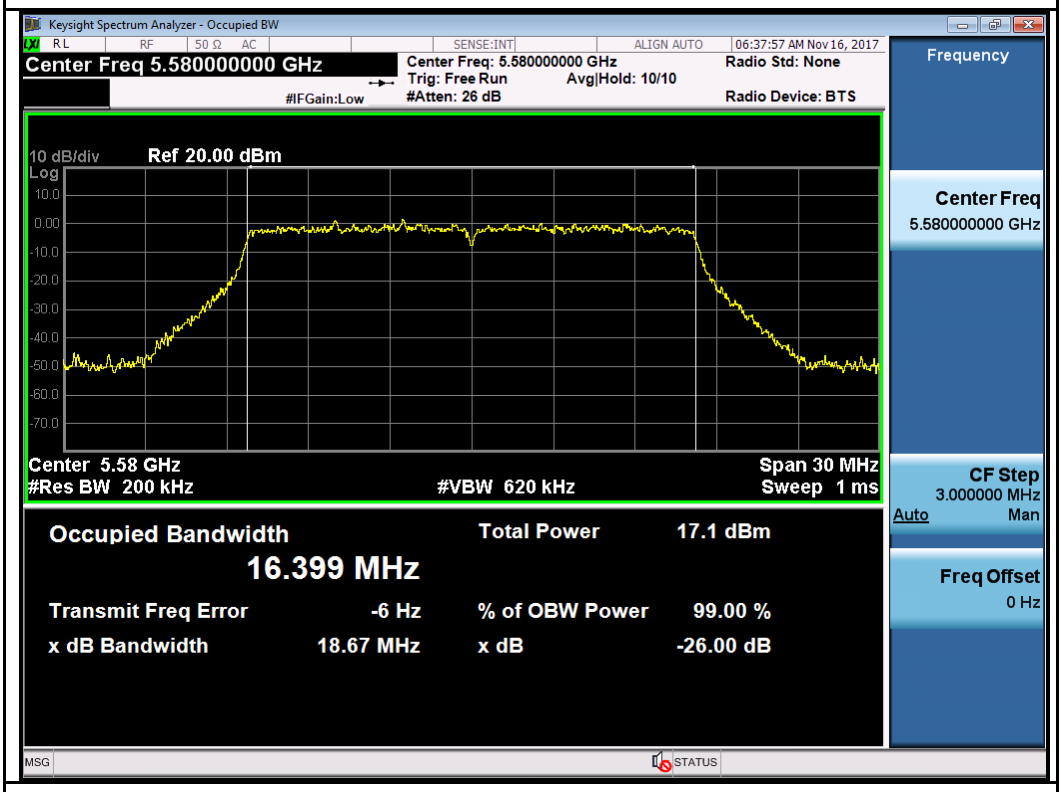


802.11ac-VHT80-5290MHz

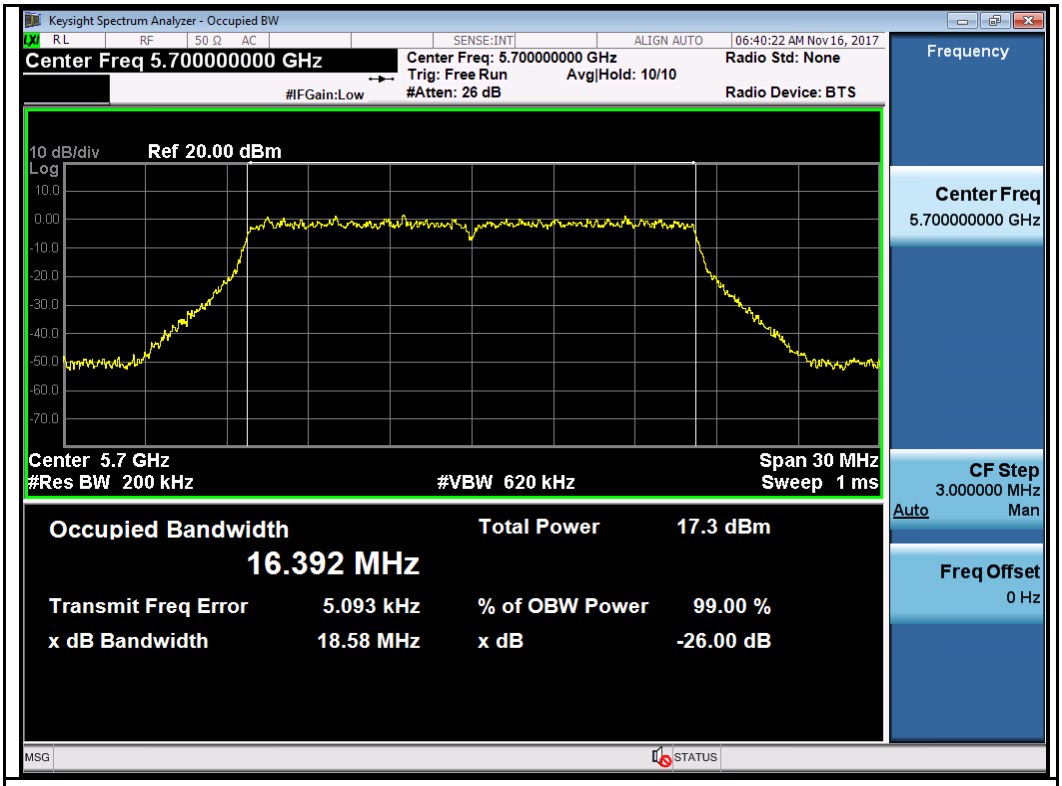
W56:



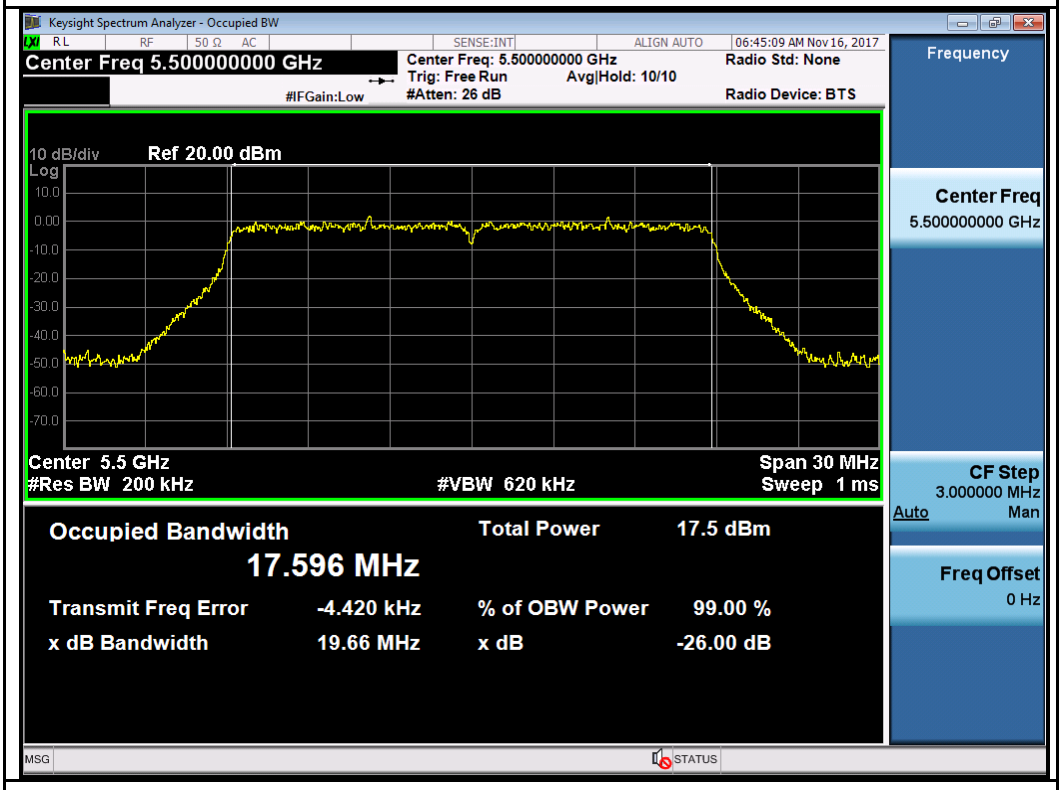
802.11a-5500MHz



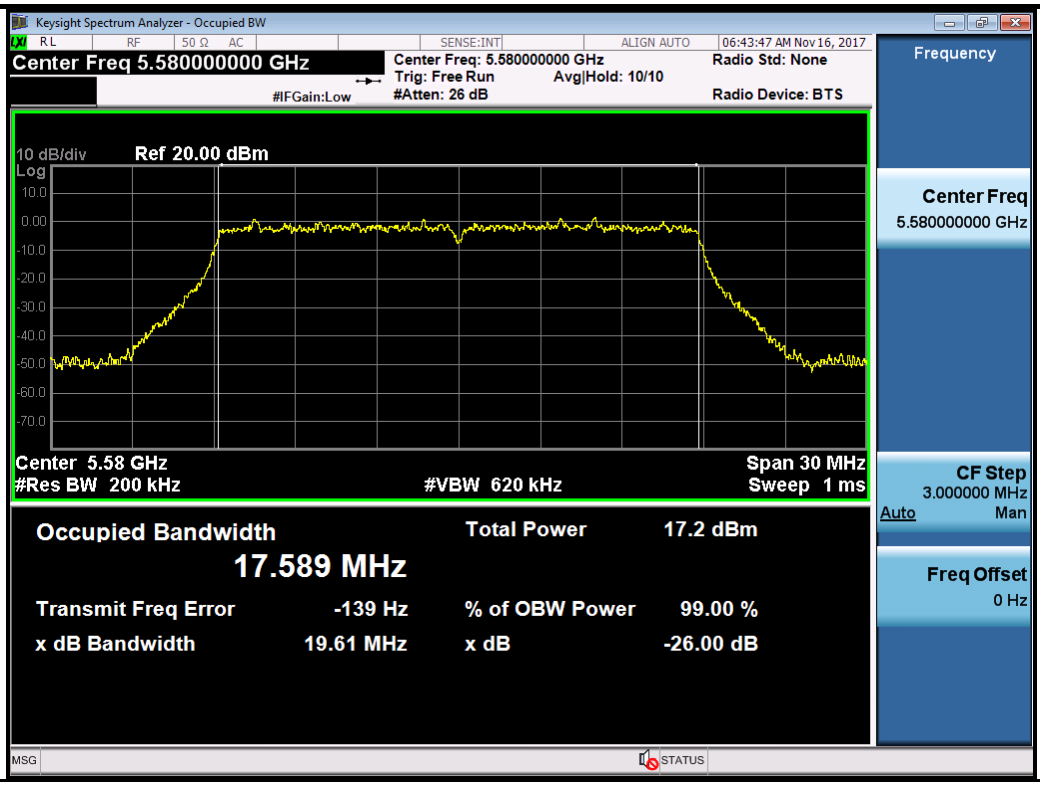
802.11a-5580MHz



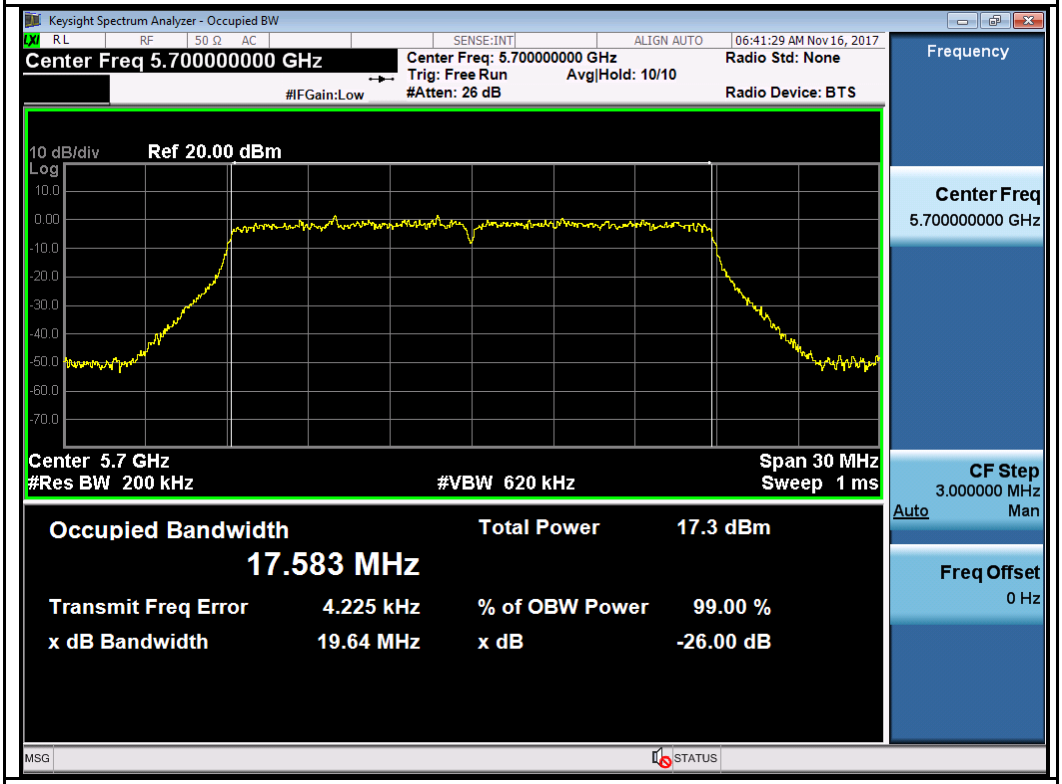
802.11a-5700MHz



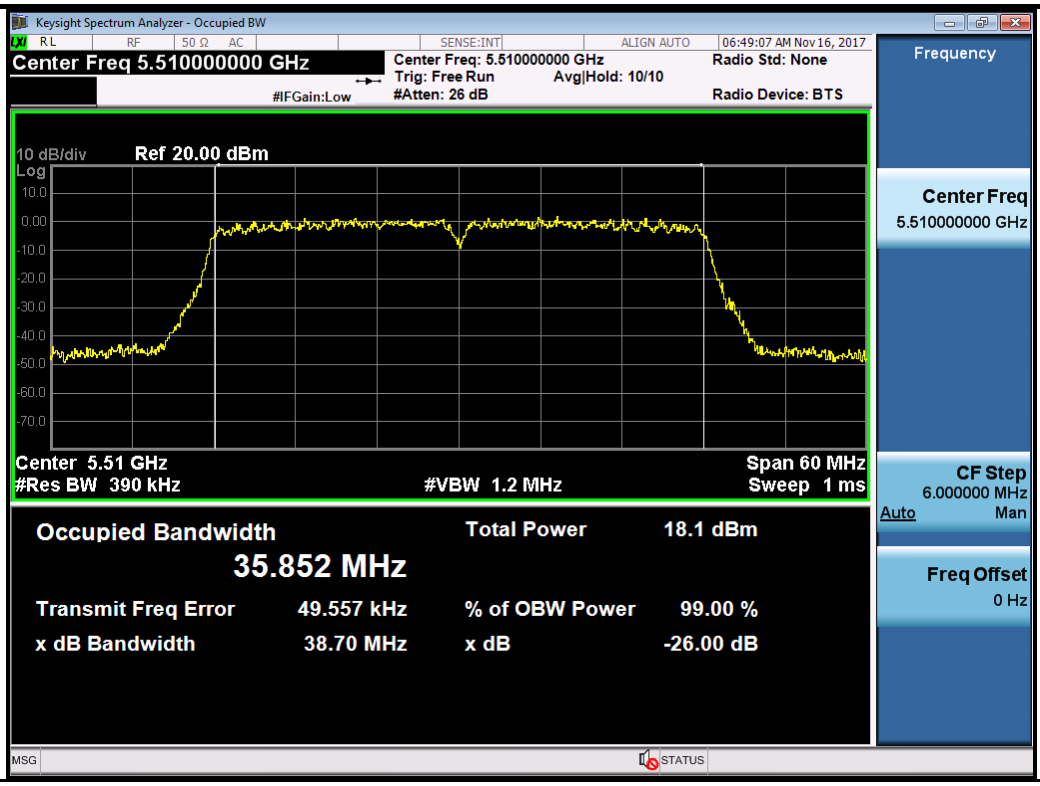
802.11n-HT20-5500MHz



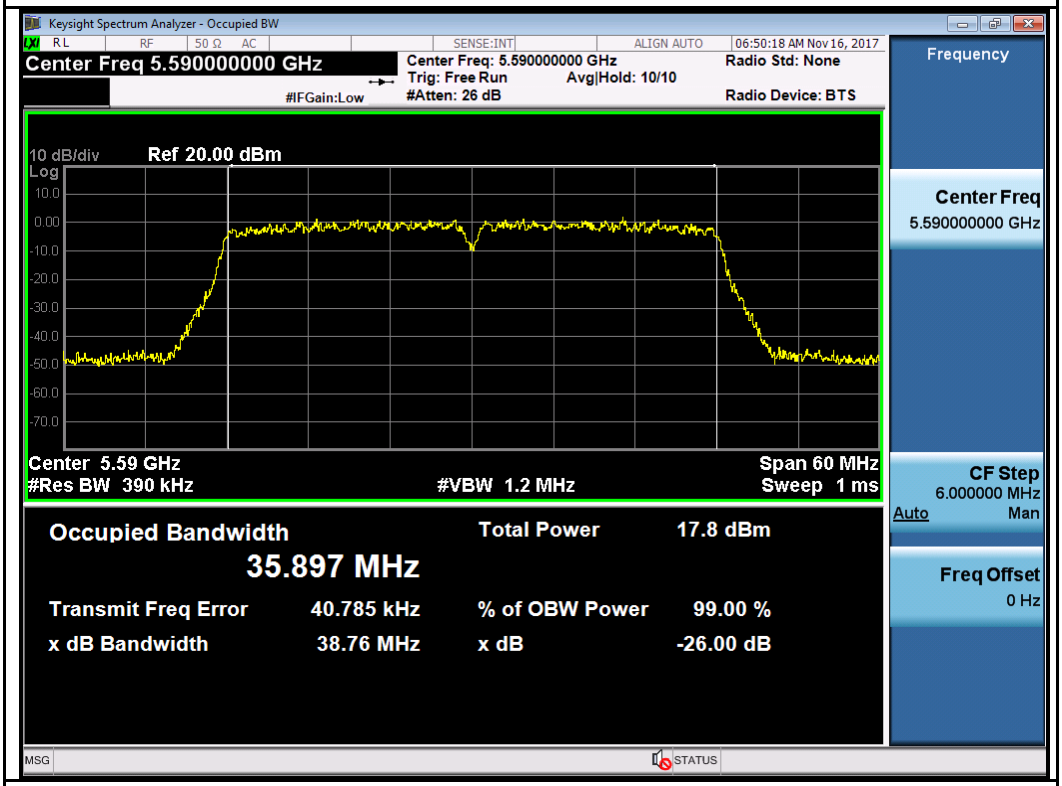
802.11n-HT20-5580MHz



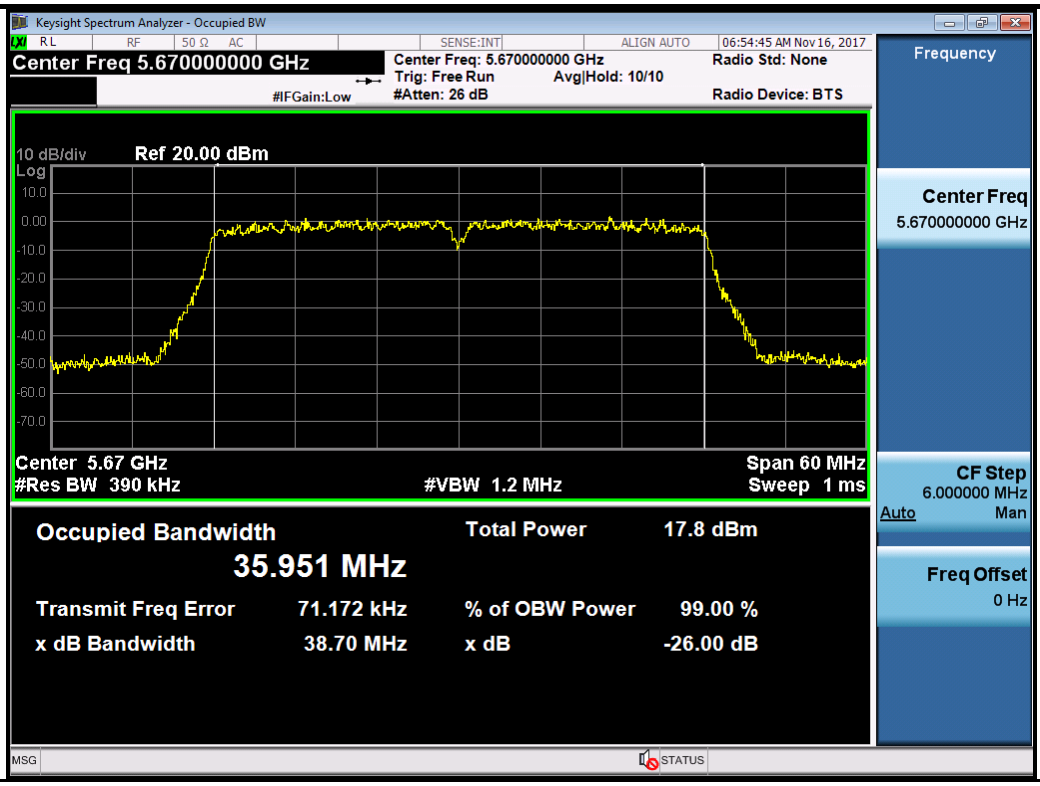
802.11n-HT20-5700MHz



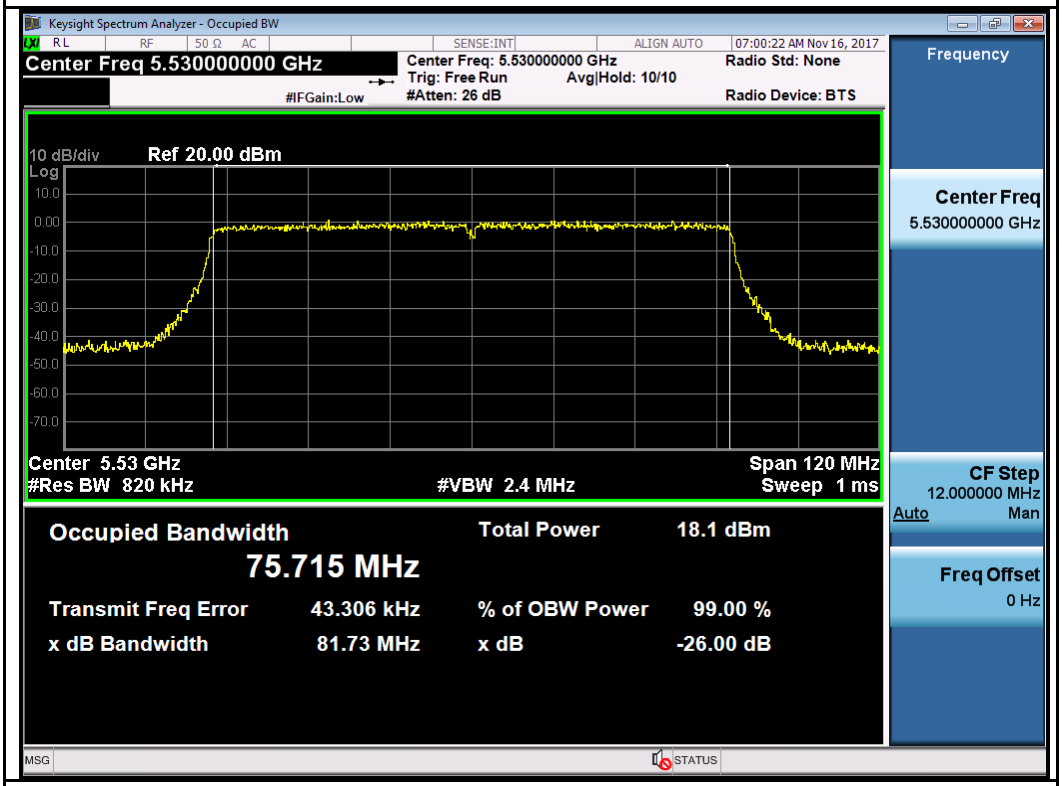
802.11n-HT40-5510MHz



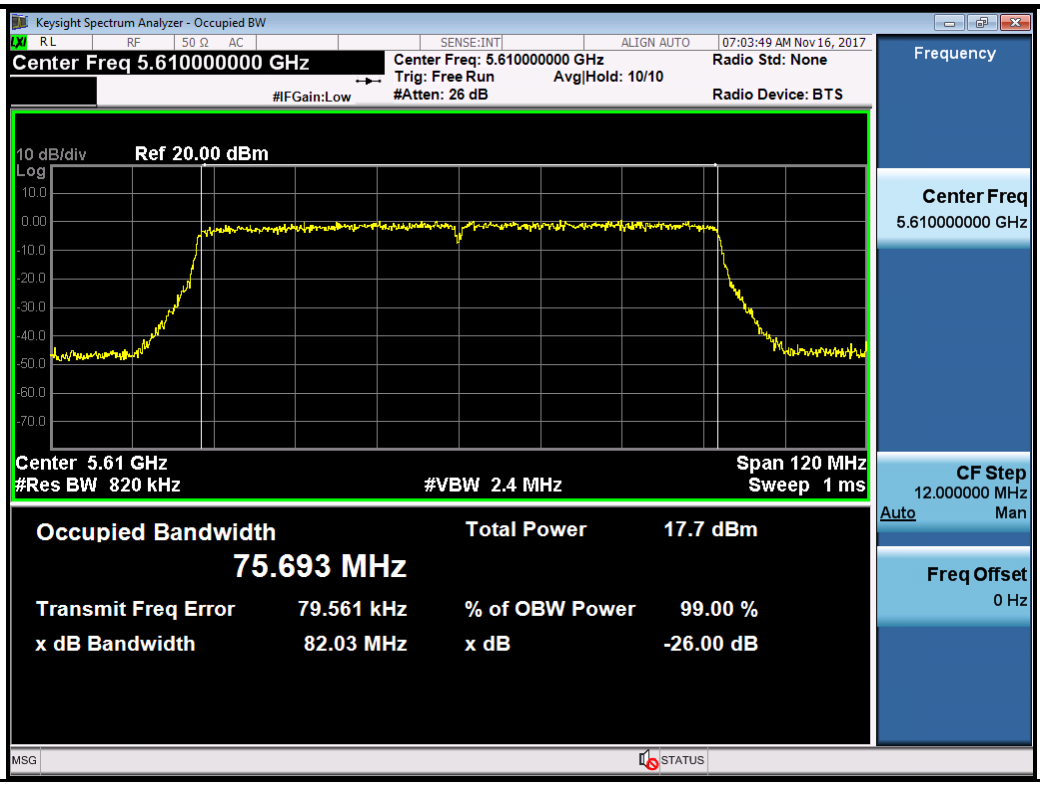
802.11n-HT40-5550MHz



802.11n-HT40-5670MHz

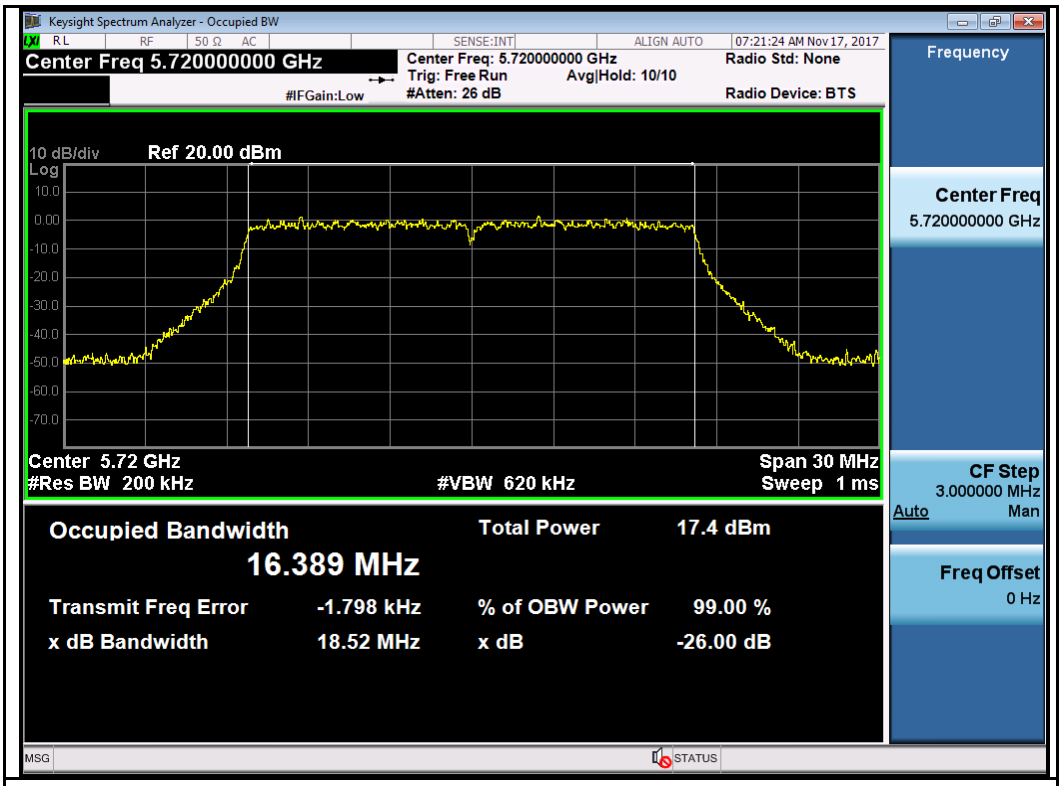


802.11ac-VHT80-5530MHz

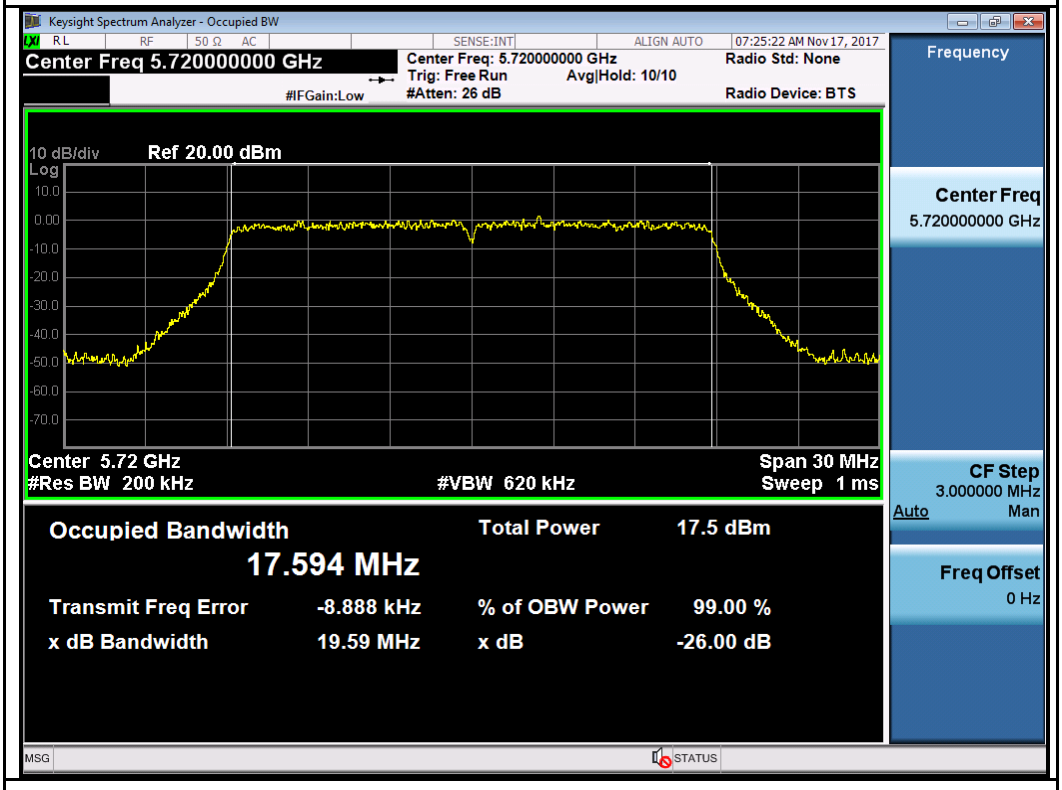


802.11ac-VHT80-5610MHz

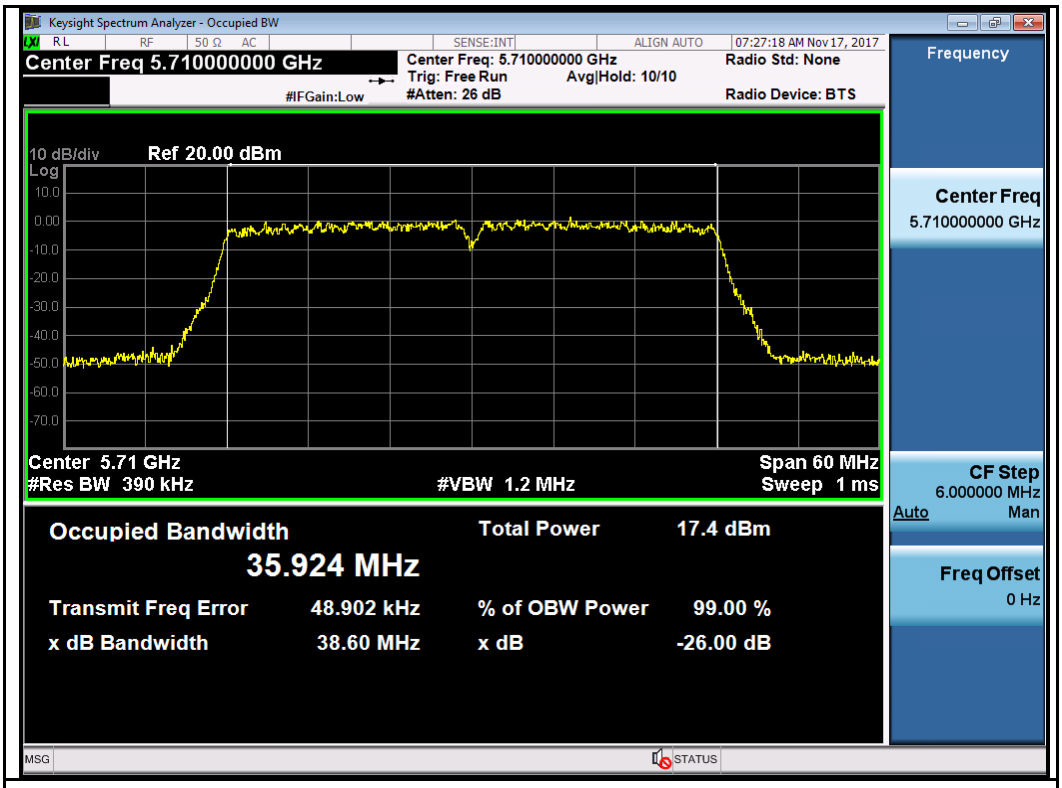
26dB BW Cross Band:



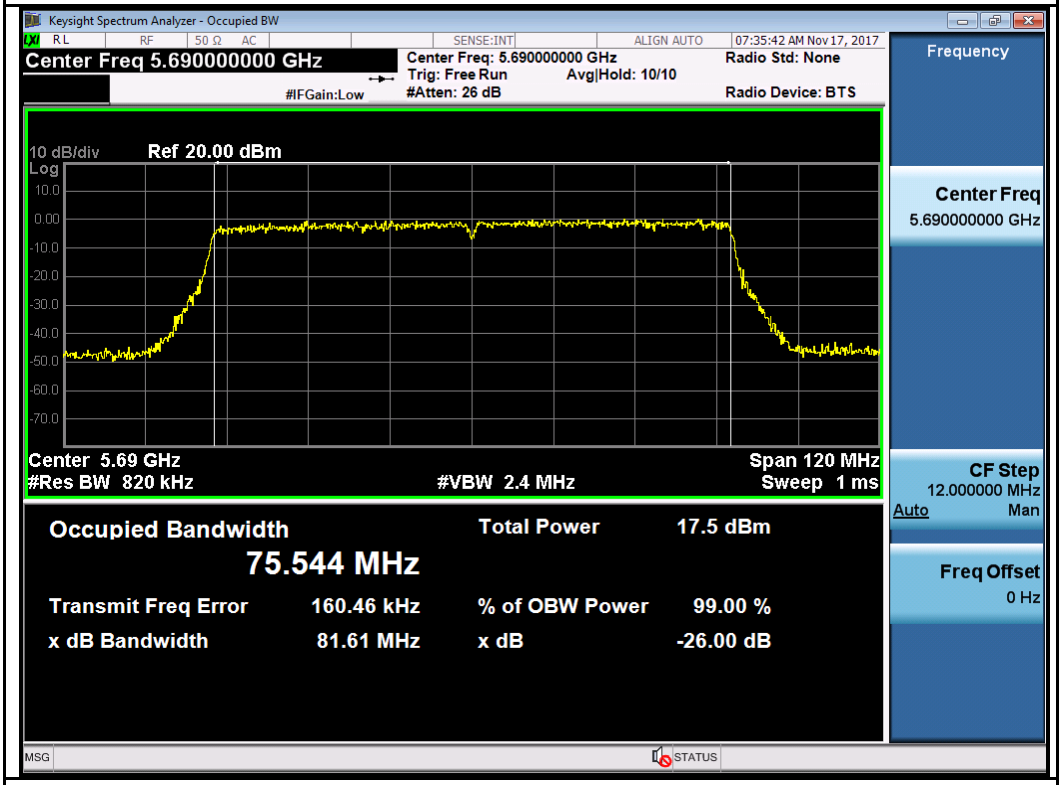
802.11a-5720MHz



802.11n-HT20 5720MHz

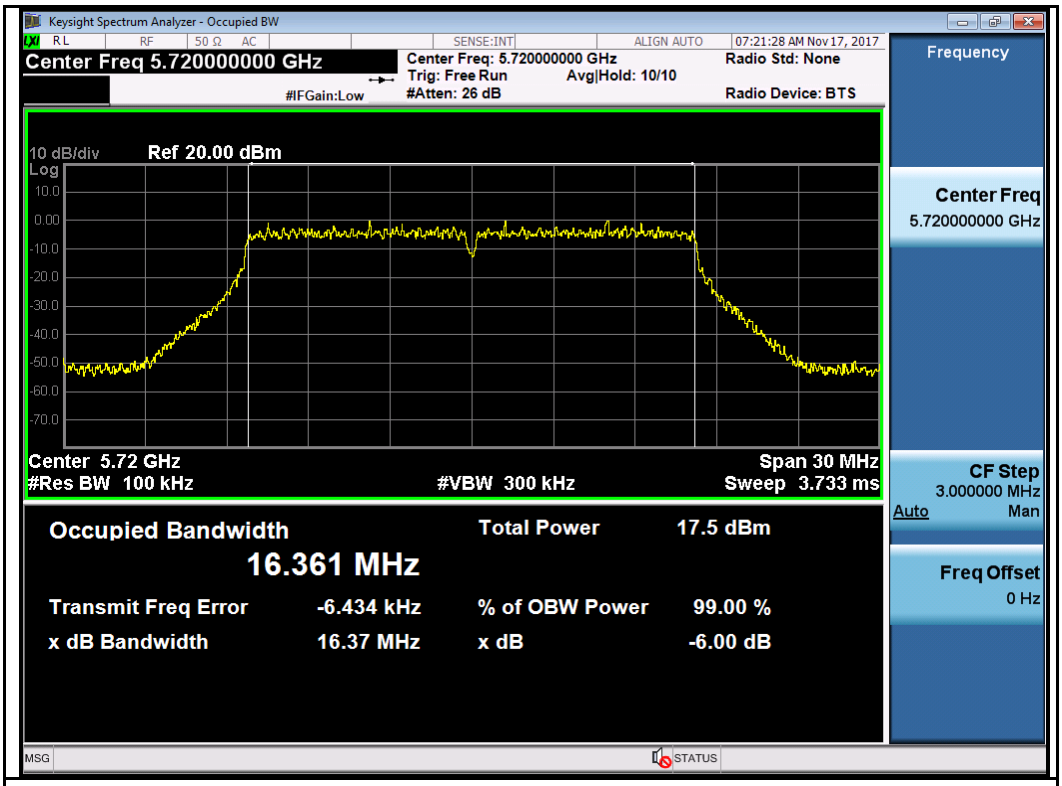


802.11n-HT40 5710MHz

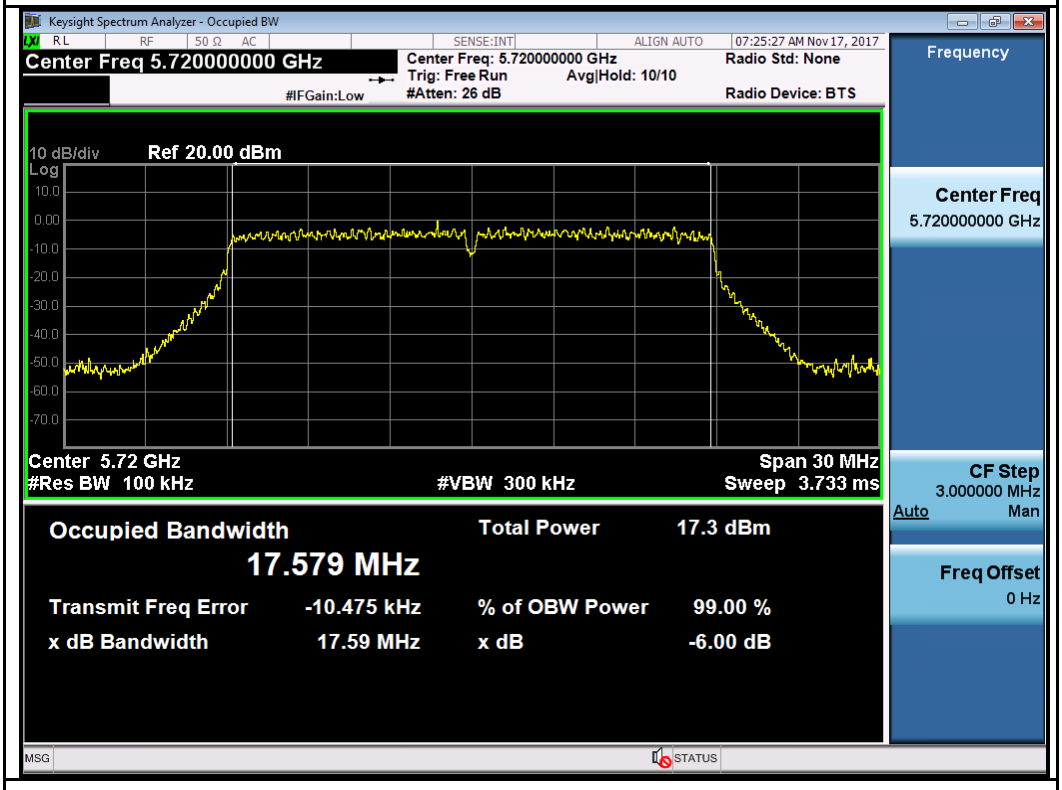


802.11n-HT20-5690MHz

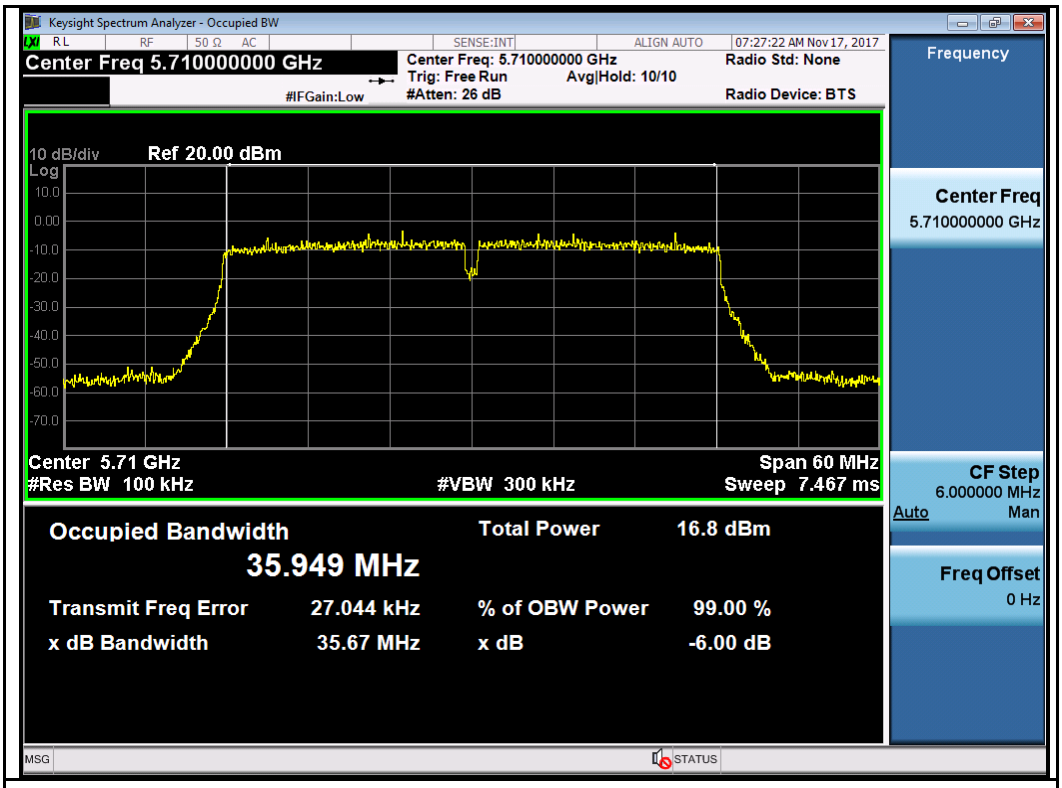
6dB BW Cross Band:



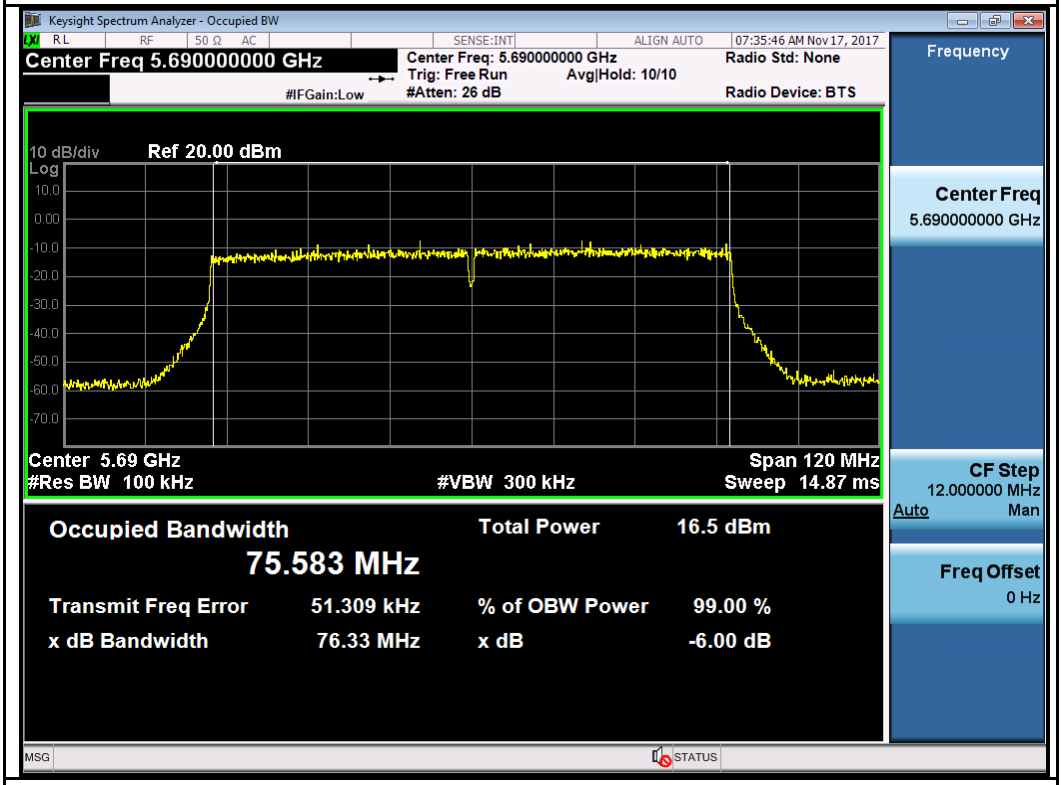
802.11a-5720MHz



802.11n-HT20 5720MHz

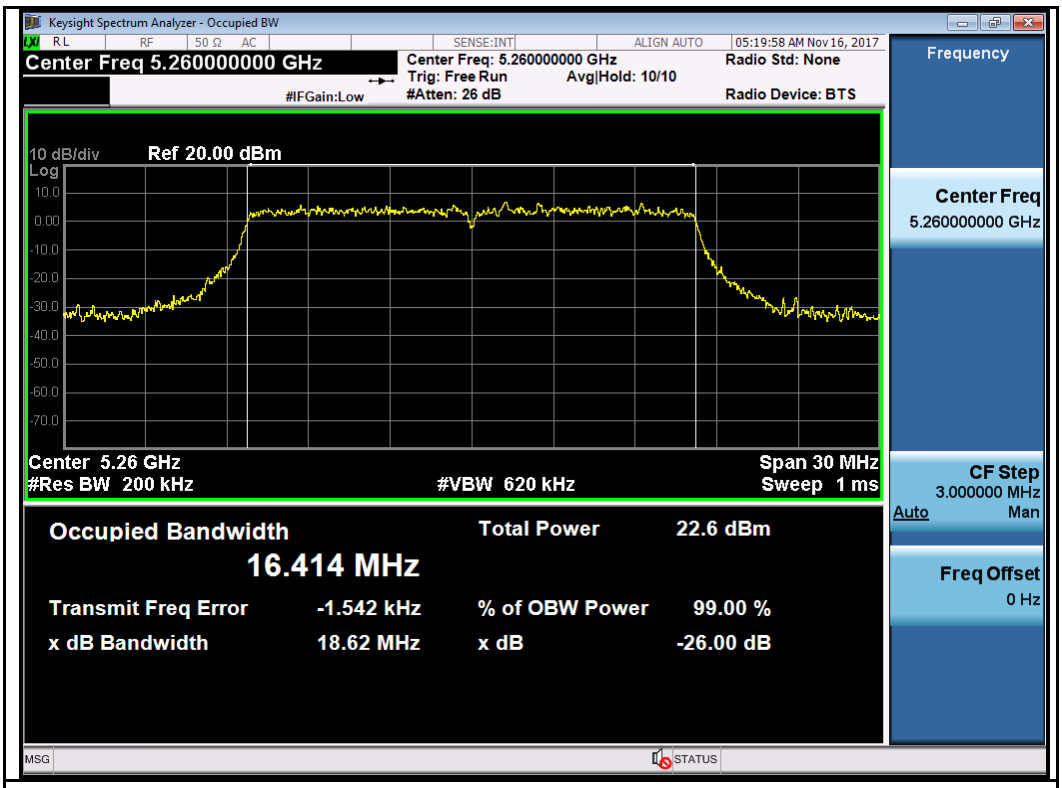


802.11n-HT40 5710MHz

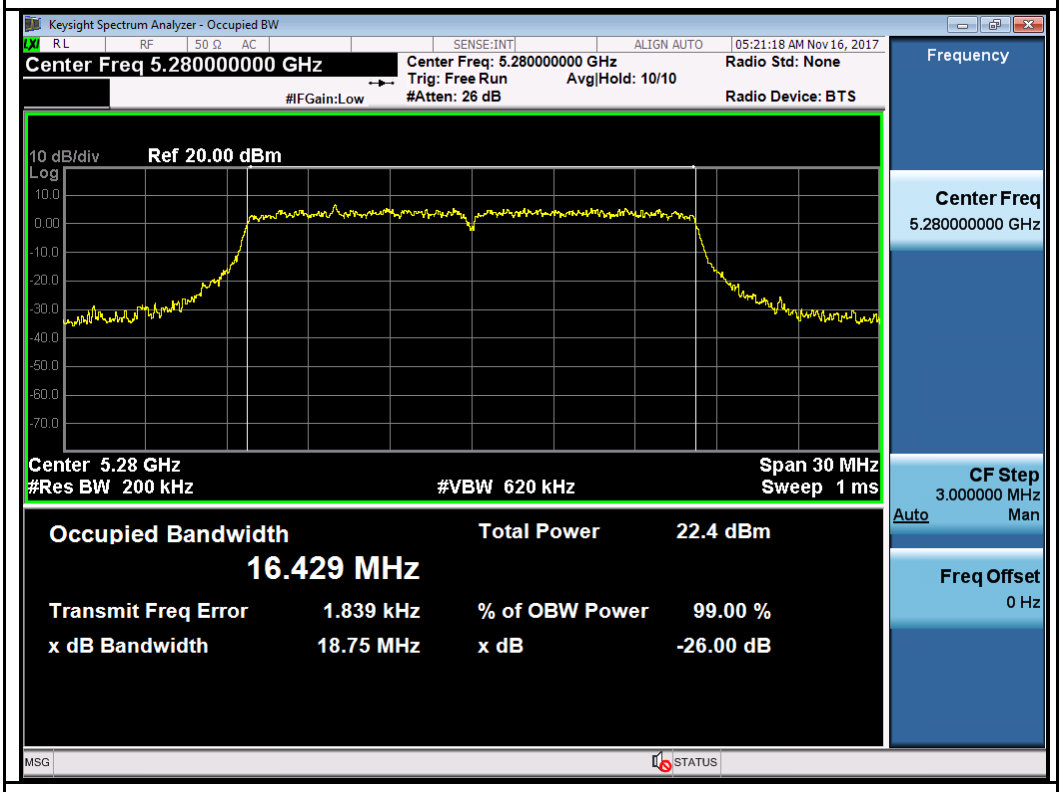


802.11ac-VHT80-5690MHz

T310S
26dB Bandwidth Test Plots
W53:

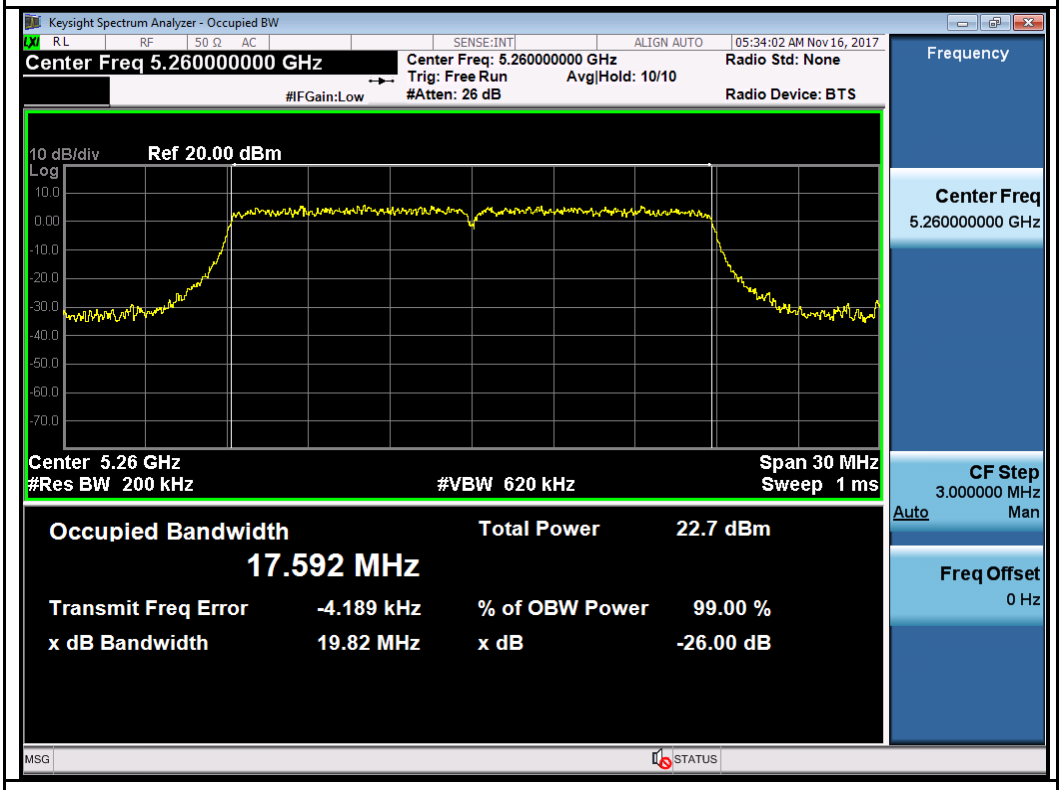


802.11a-5260MHz

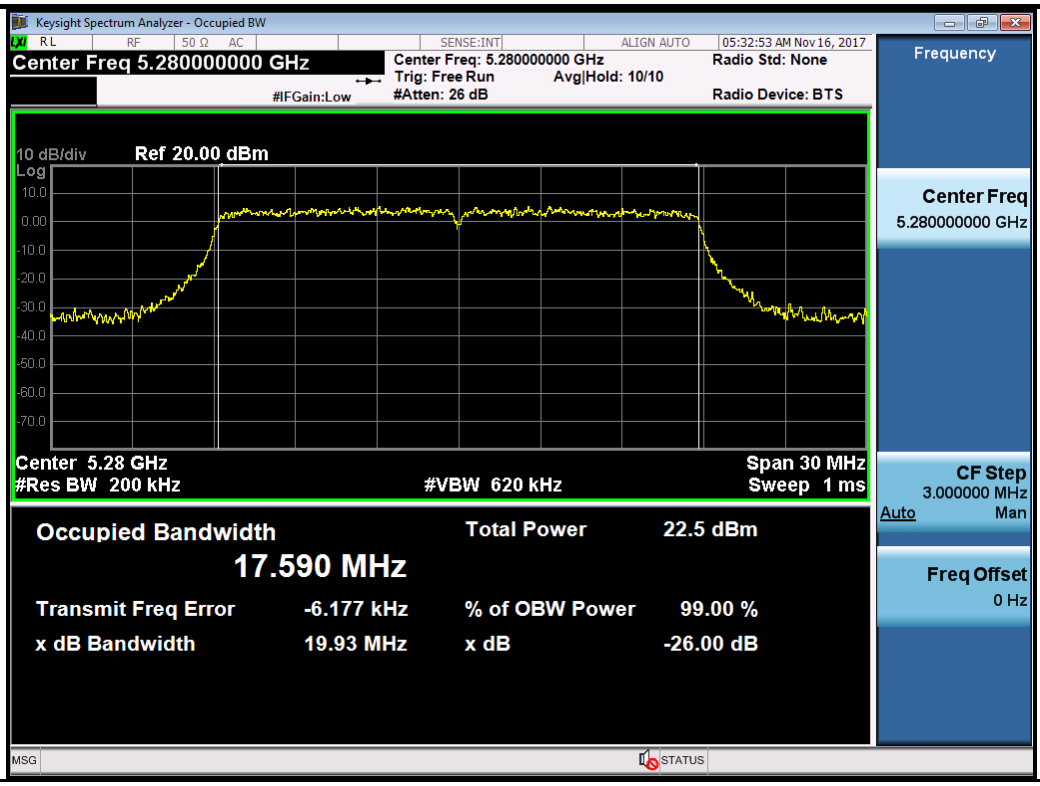


802.11a-5280MHz

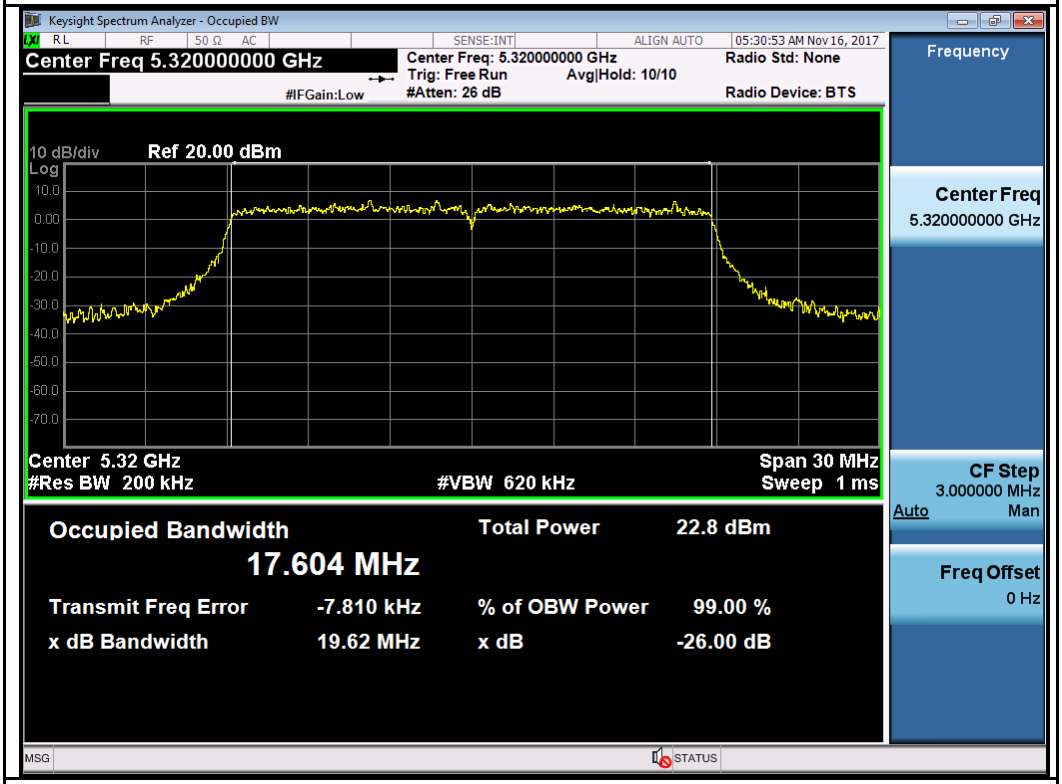
802.11a-5320MHz



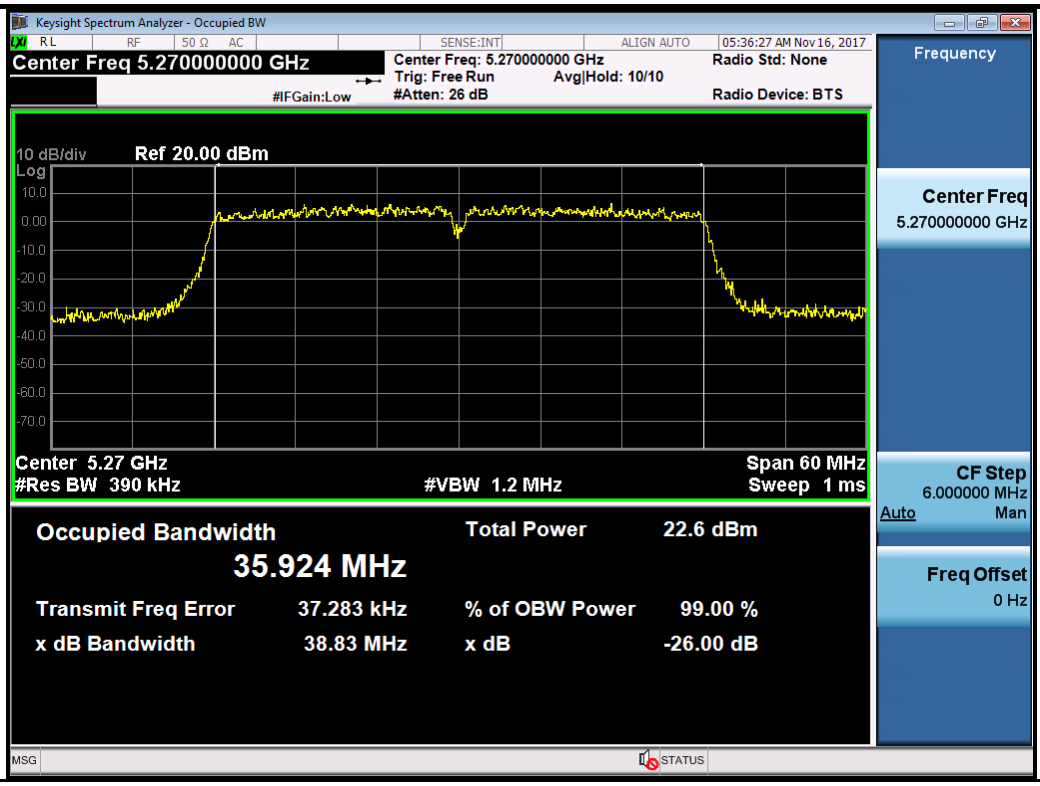
802.11n-HT20-5260MHz



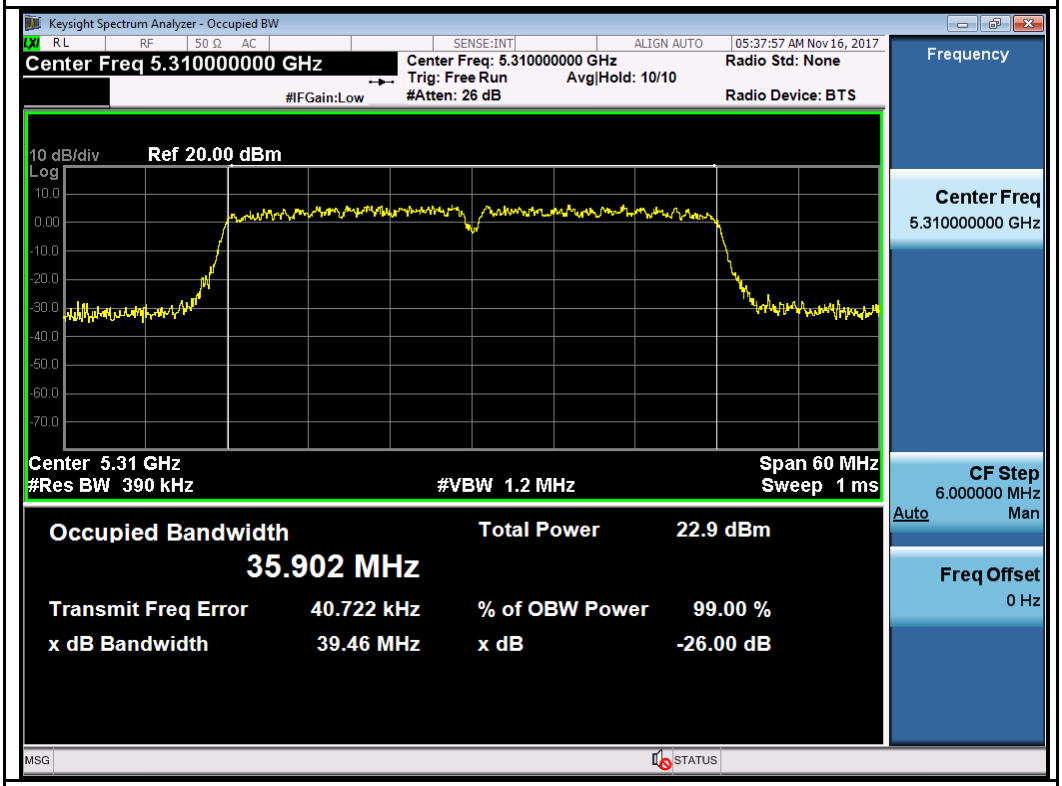
802.11n-HT20-5280MHz



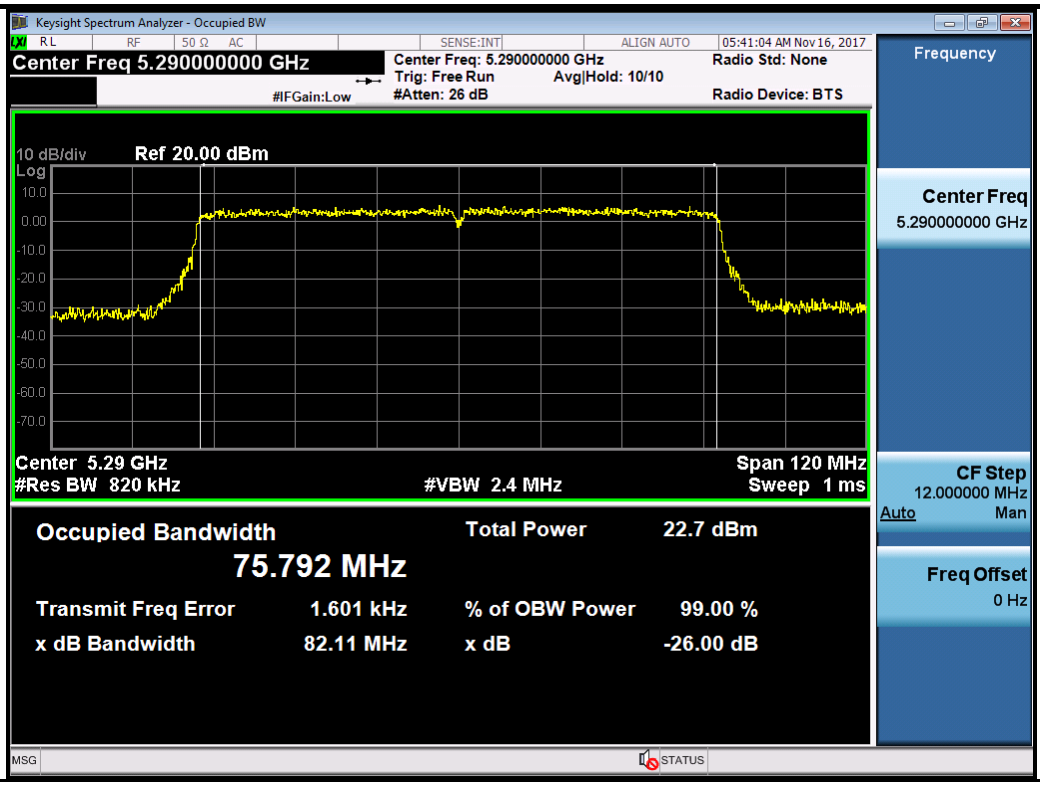
802.11n-HT20-5320MHz



802.11n-HT40-5270MHz

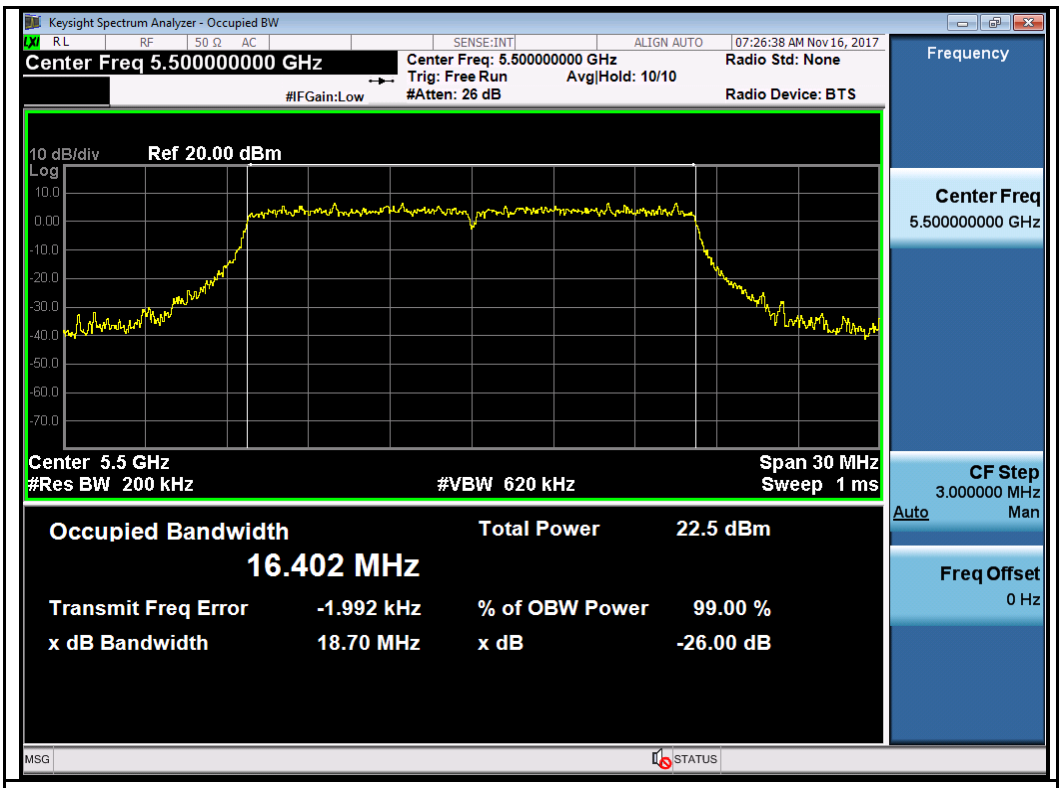


802.11n-HT40-5310MHz

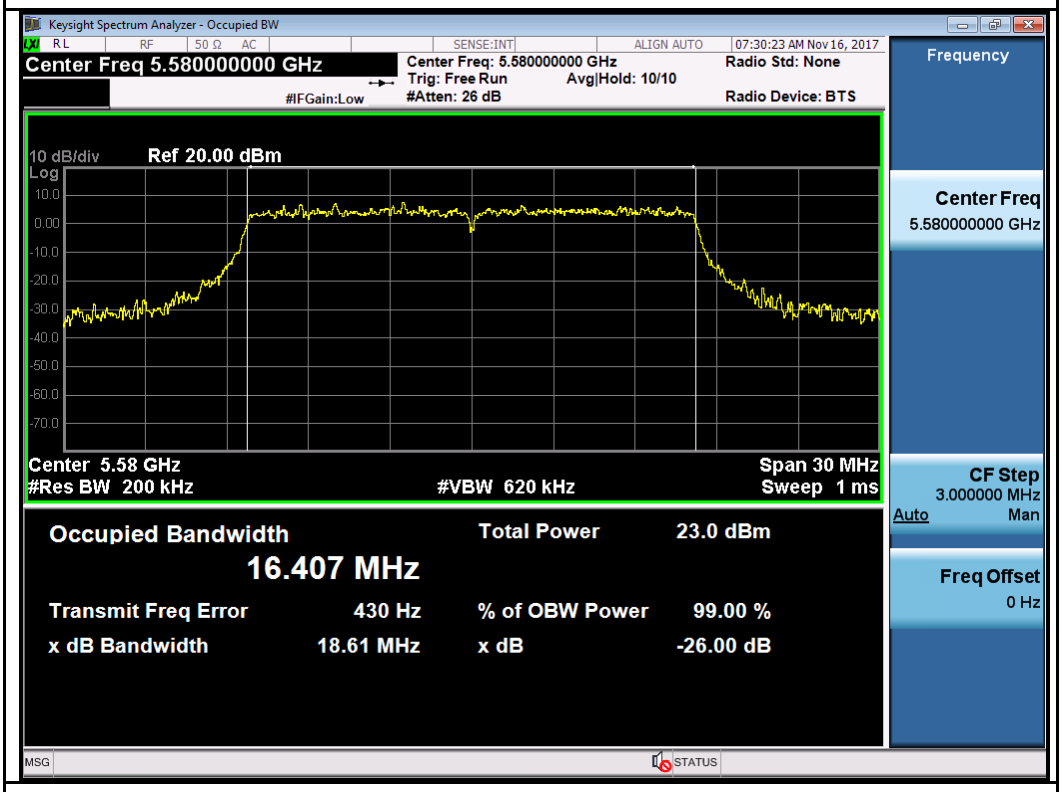


802.11ac-VHT80-5290MHz

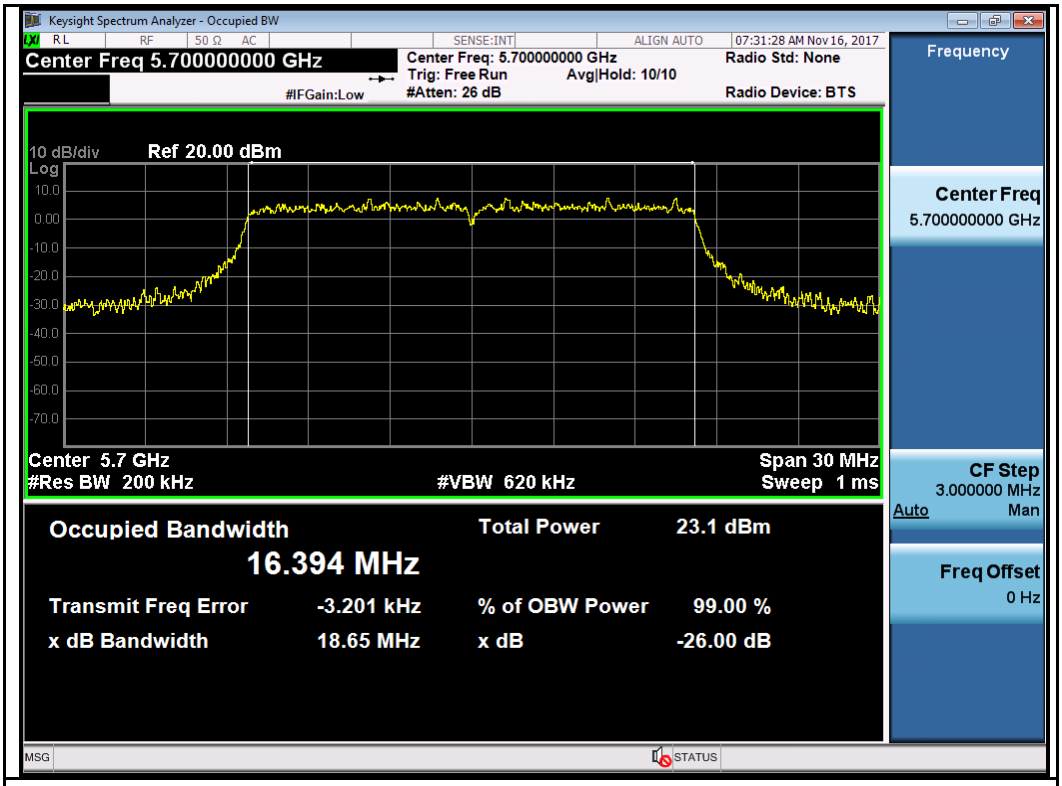
W56:



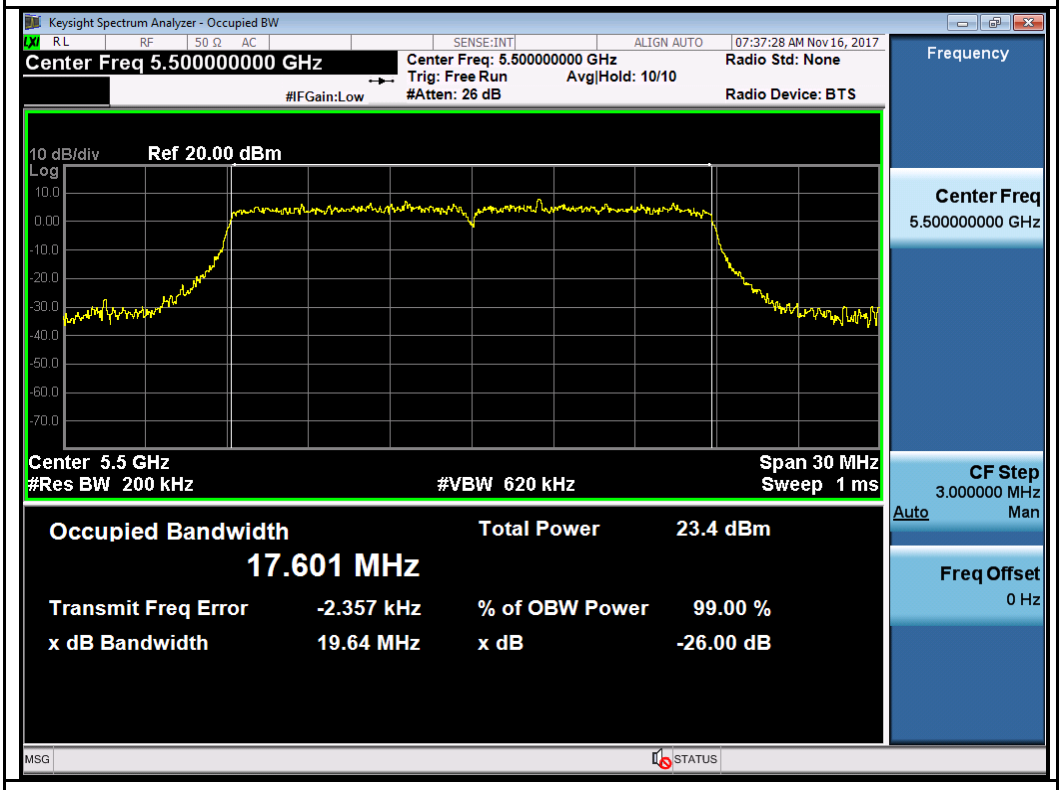
802.11a-5500MHz



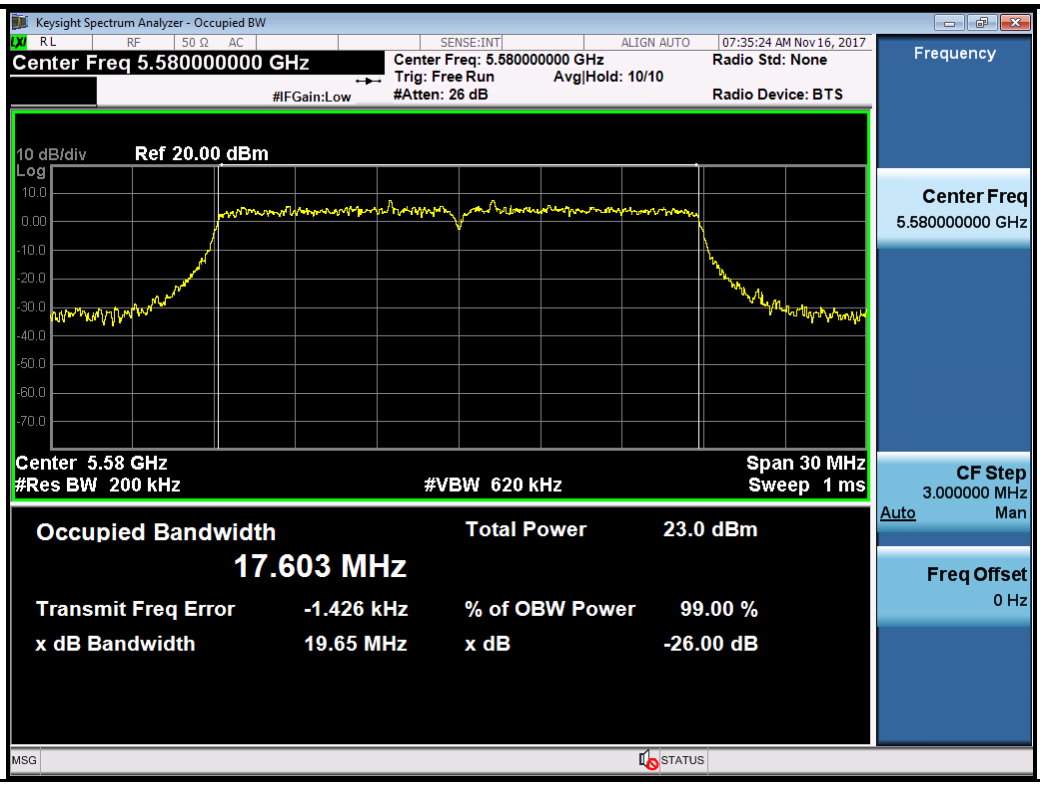
802.11a-5580MHz



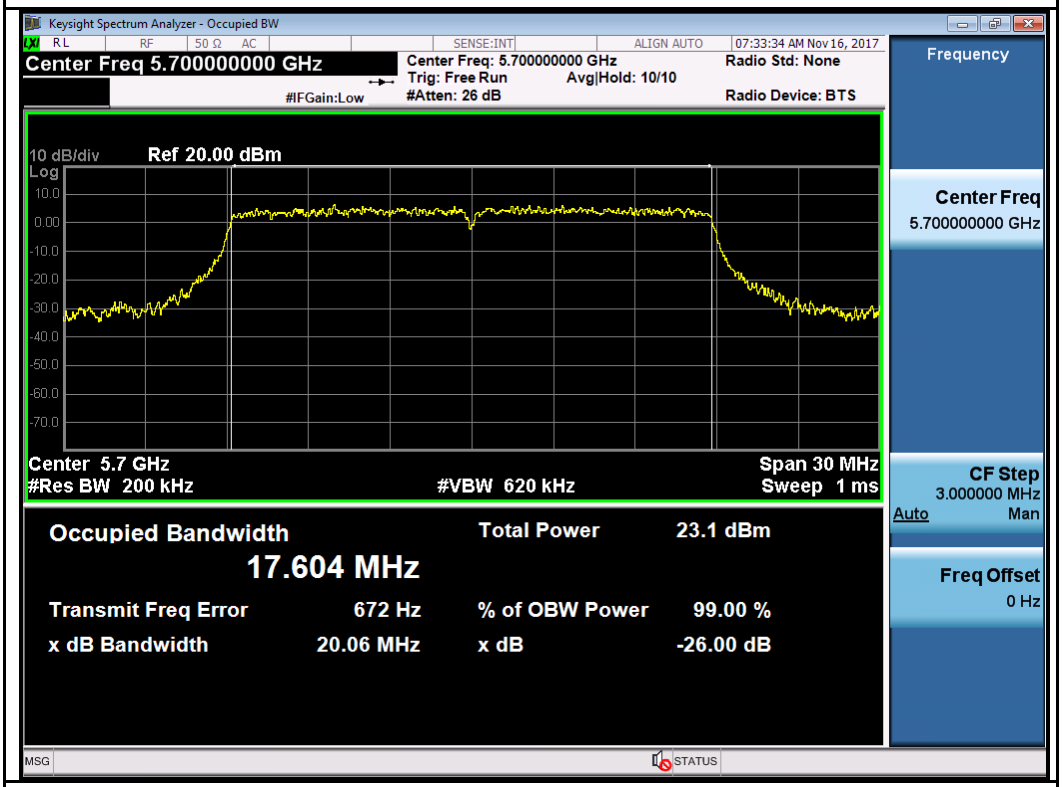
802.11a-5700MHz



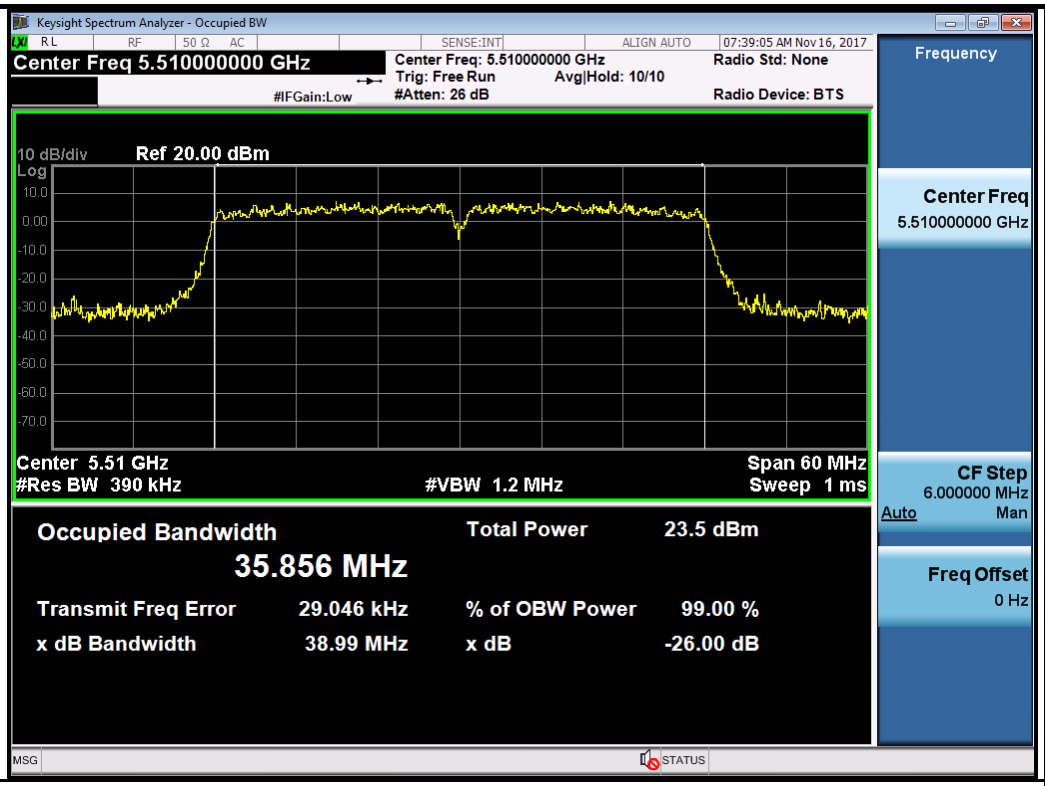
802.11n-HT20-5500MHz



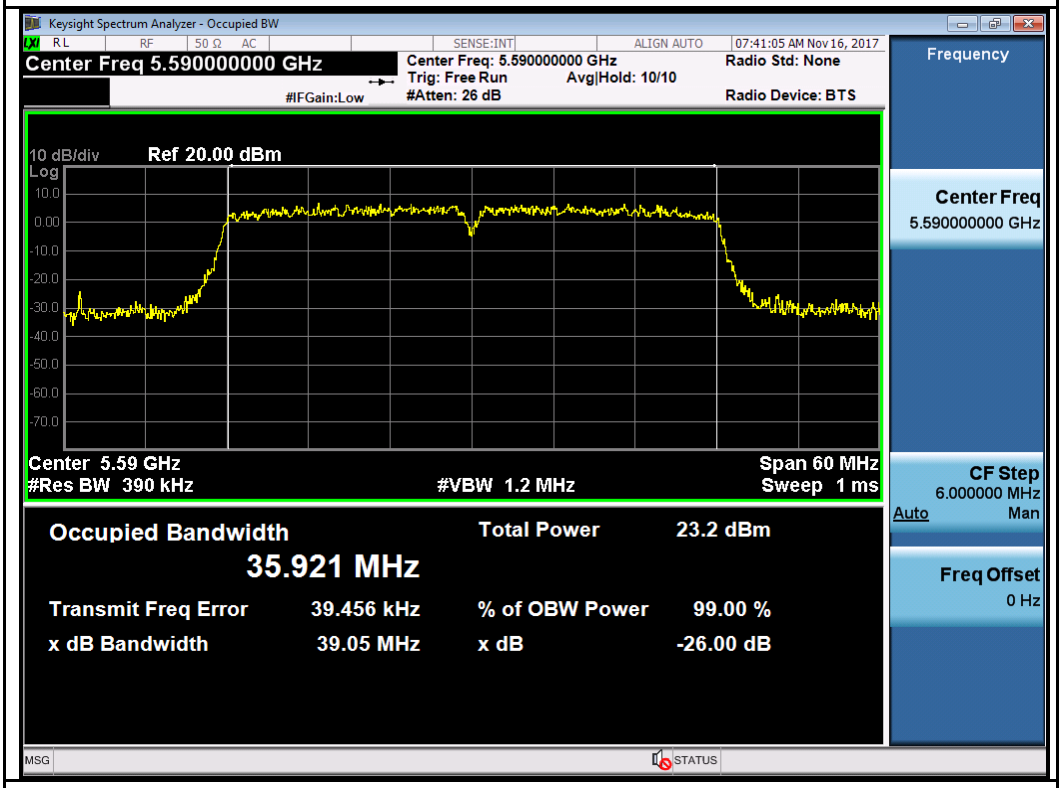
802.11n-HT20-5580MHz



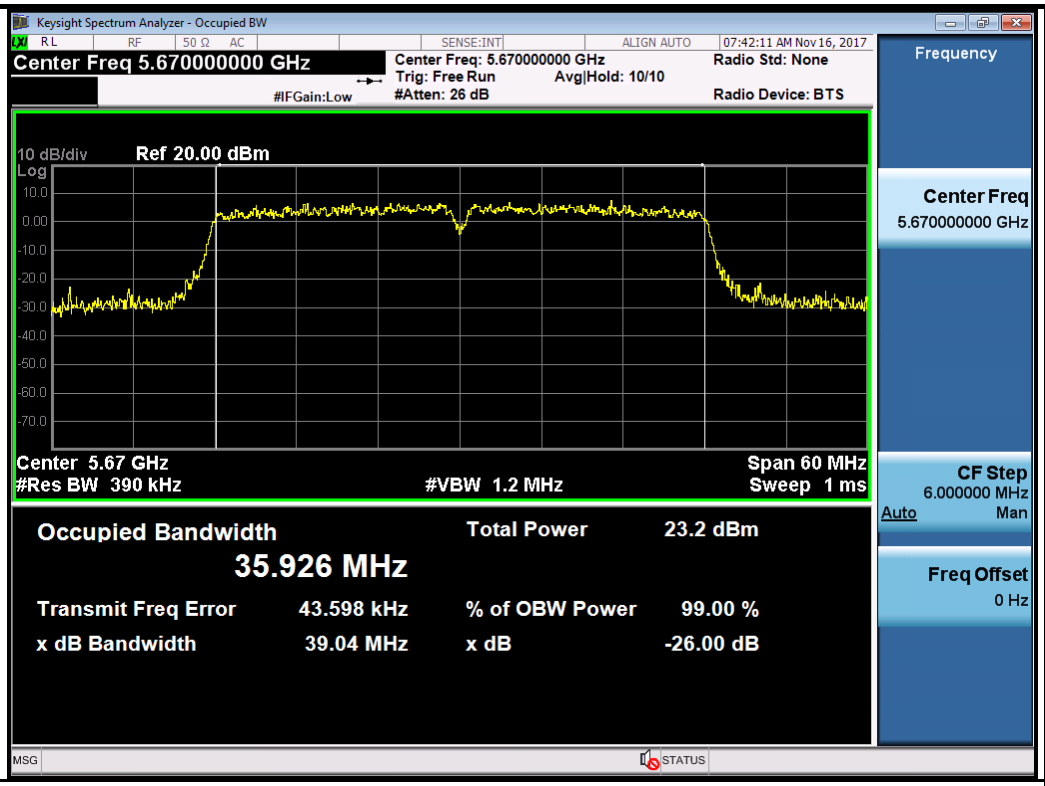
802.11n-HT20-5700MHz



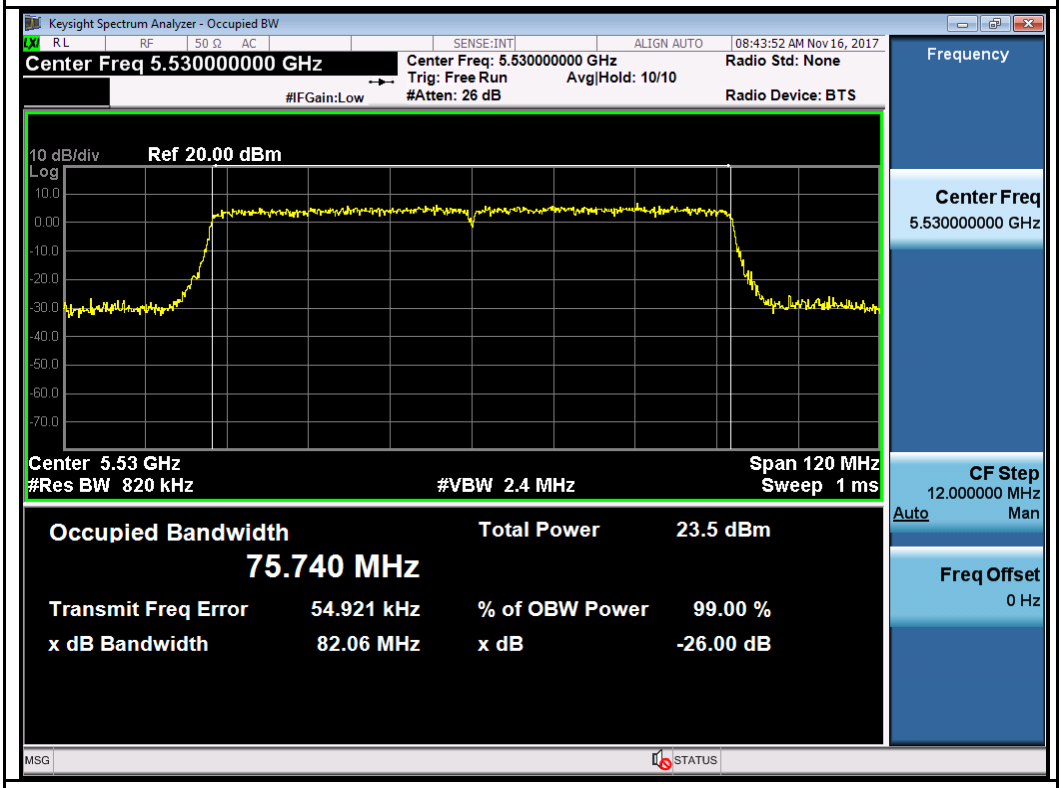
802.11n-HT40-5510MHz



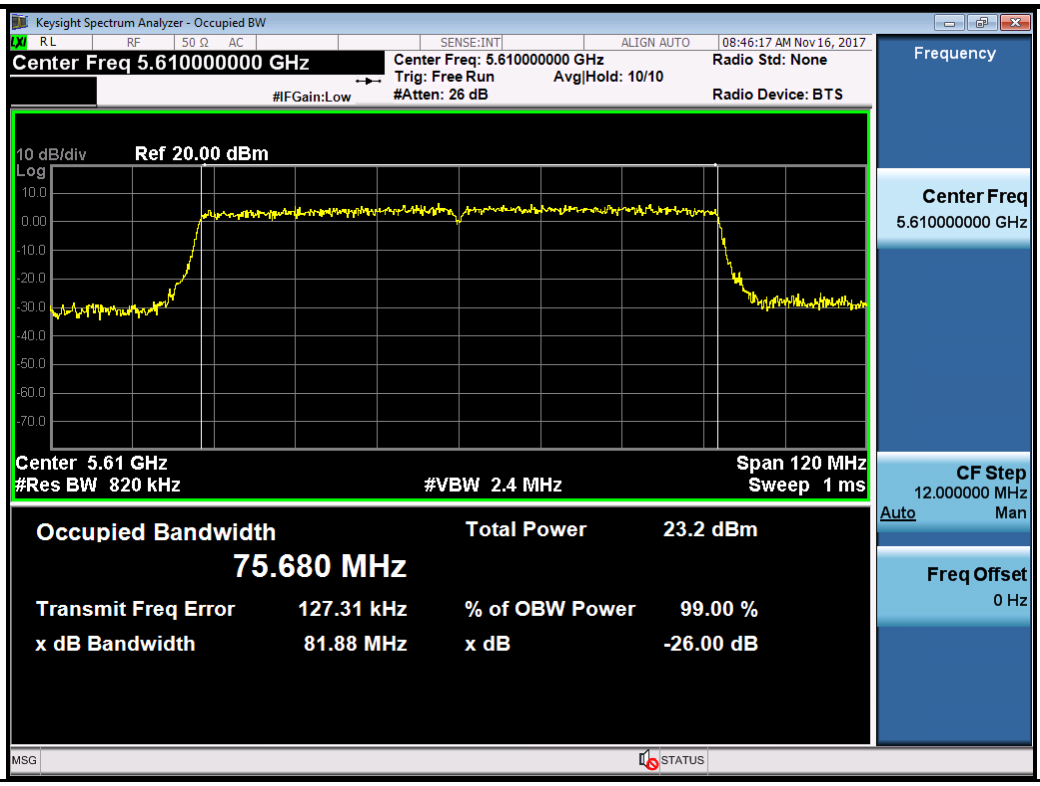
802.11n-HT40-5550MHz



802.11n-HT40-5670MHz

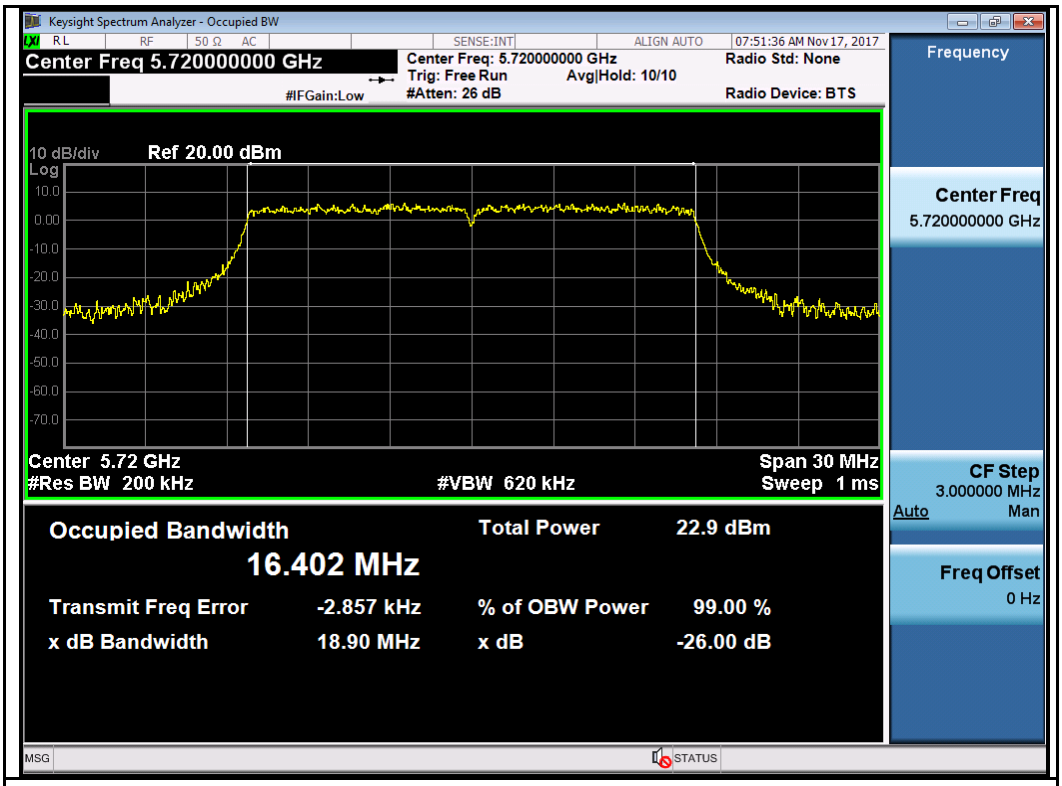


802.11ac-VHT80-5530MHz

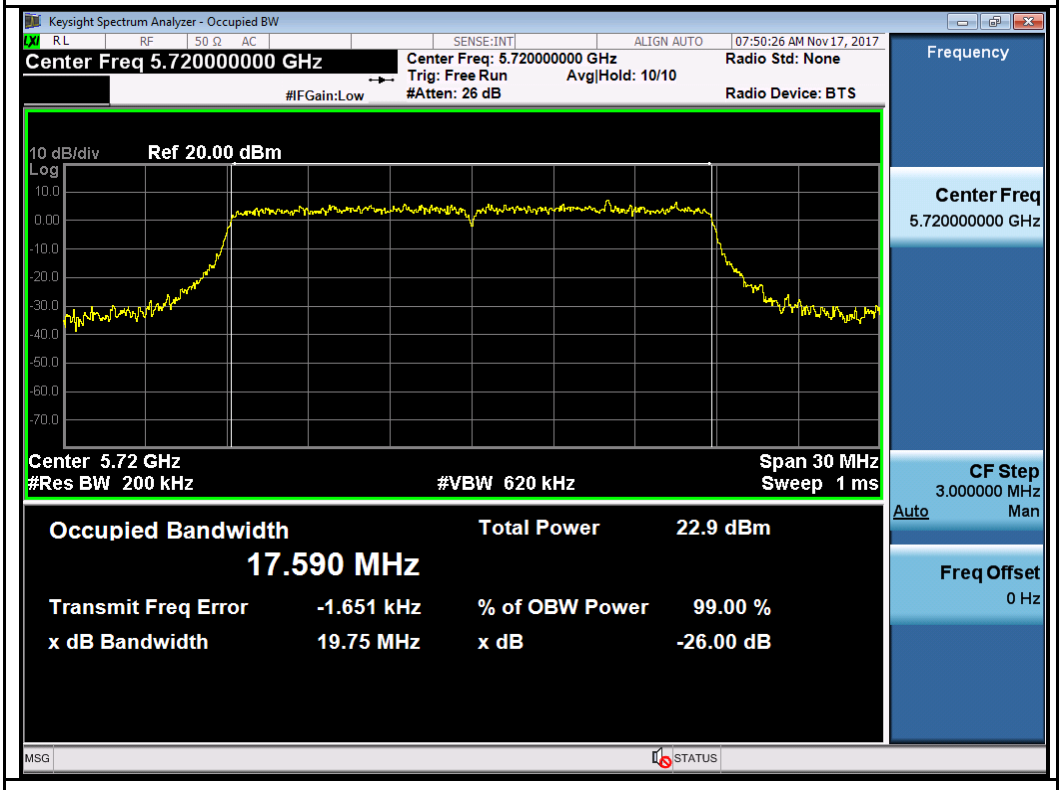


802.11ac-VHT80-5610MHz

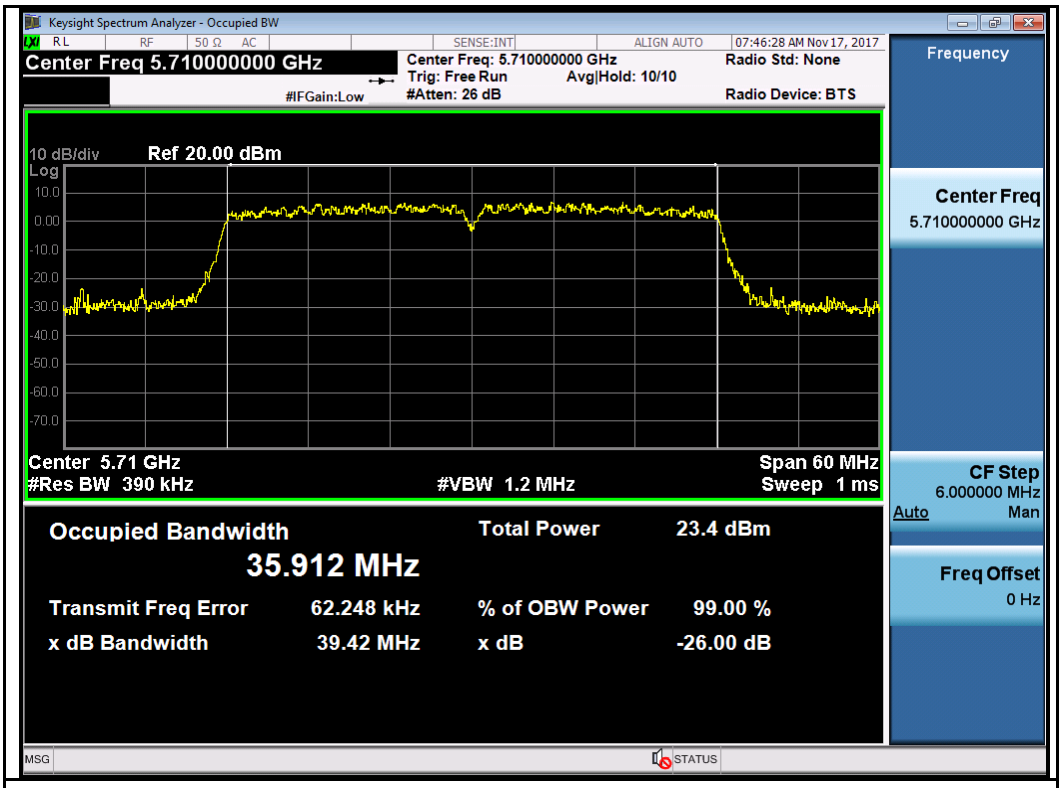
26dB BW Cross Band:



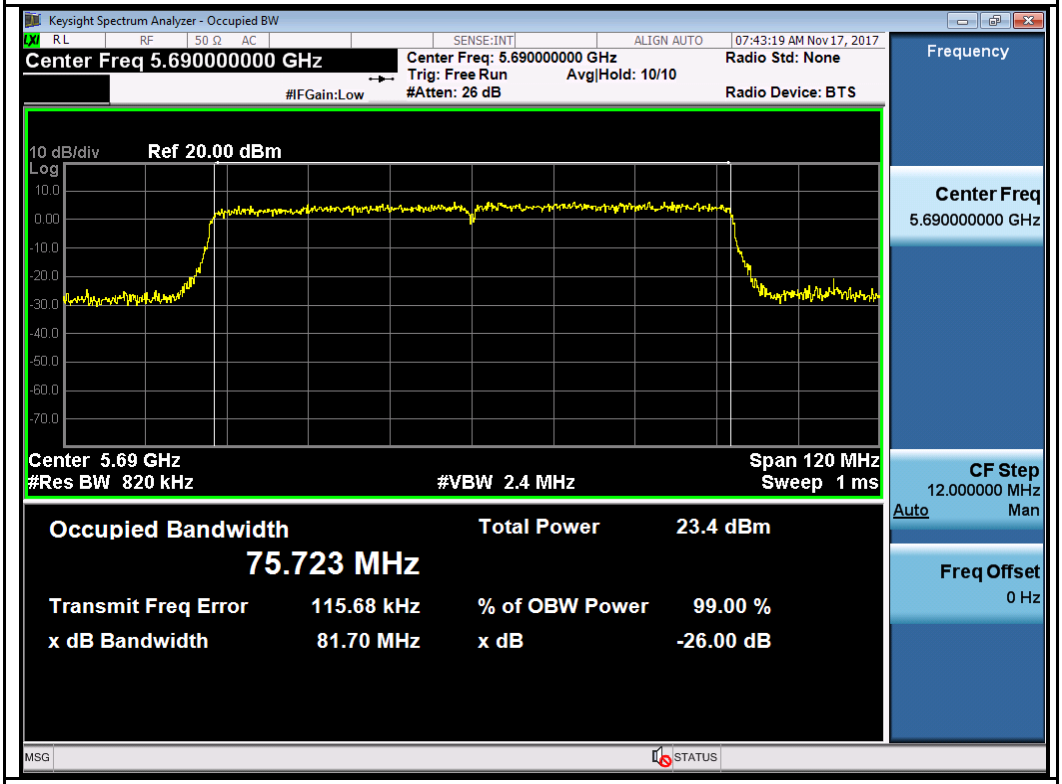
802.11a-5720MHz



802.11n-HT20 5720MHz

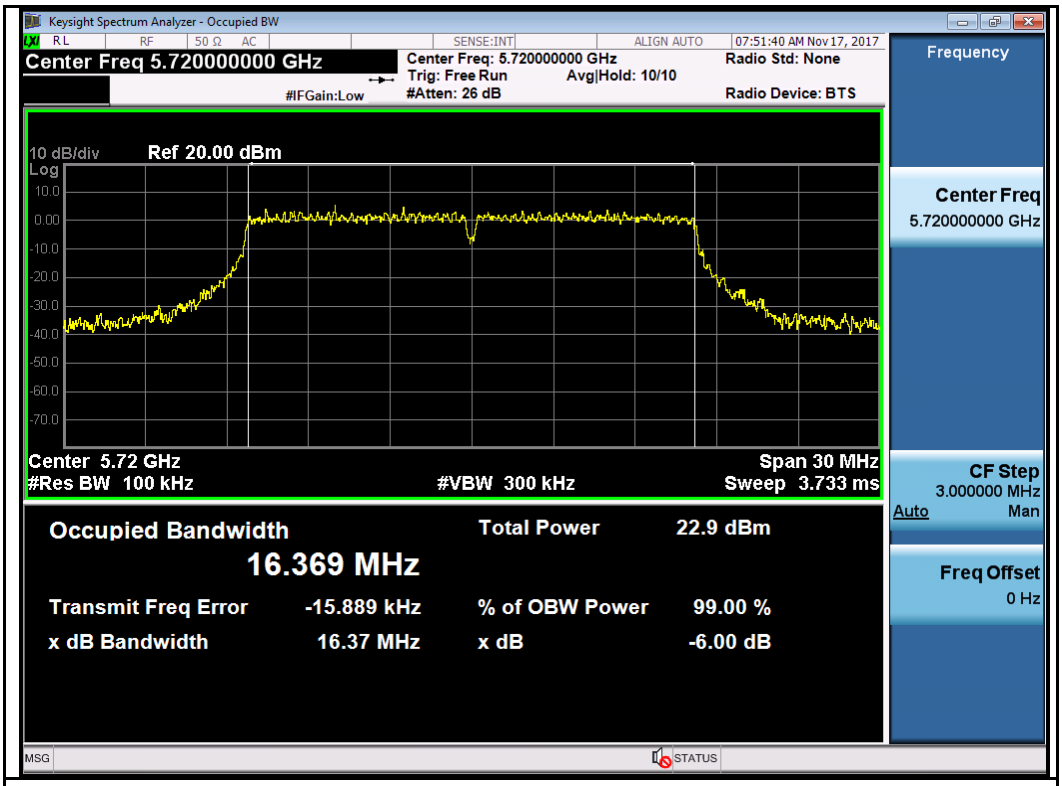


802.11n-HT40 5710MHz

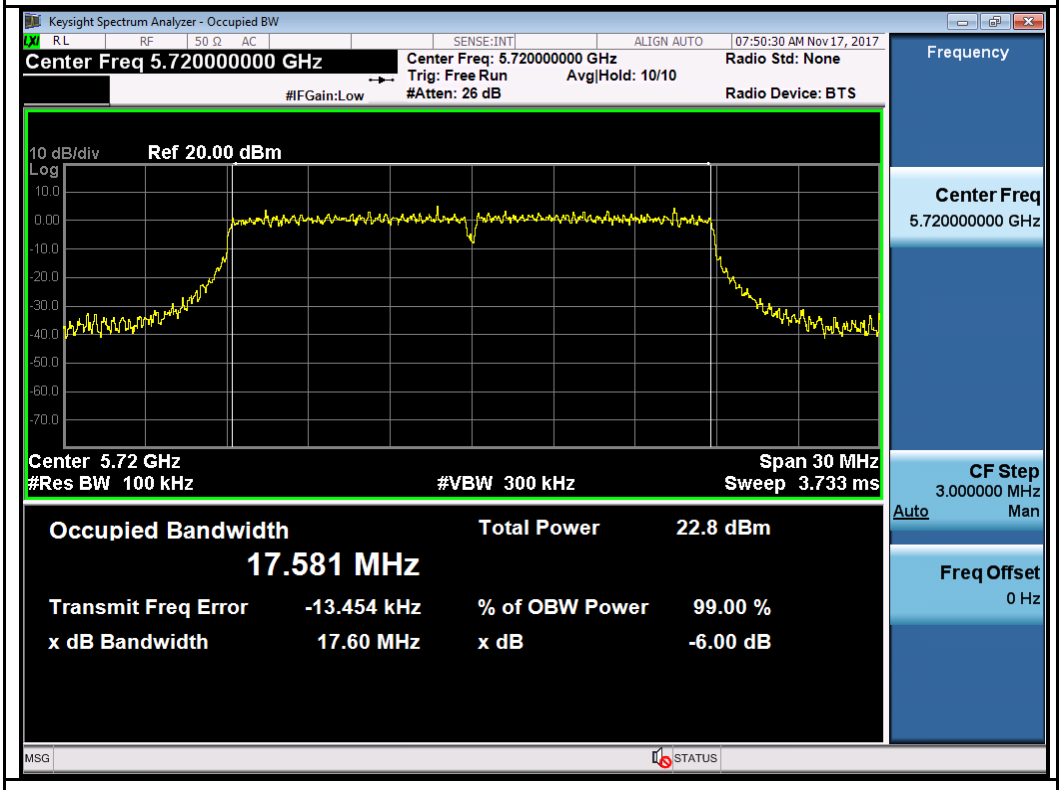


802.11n-HT20-5690MHz

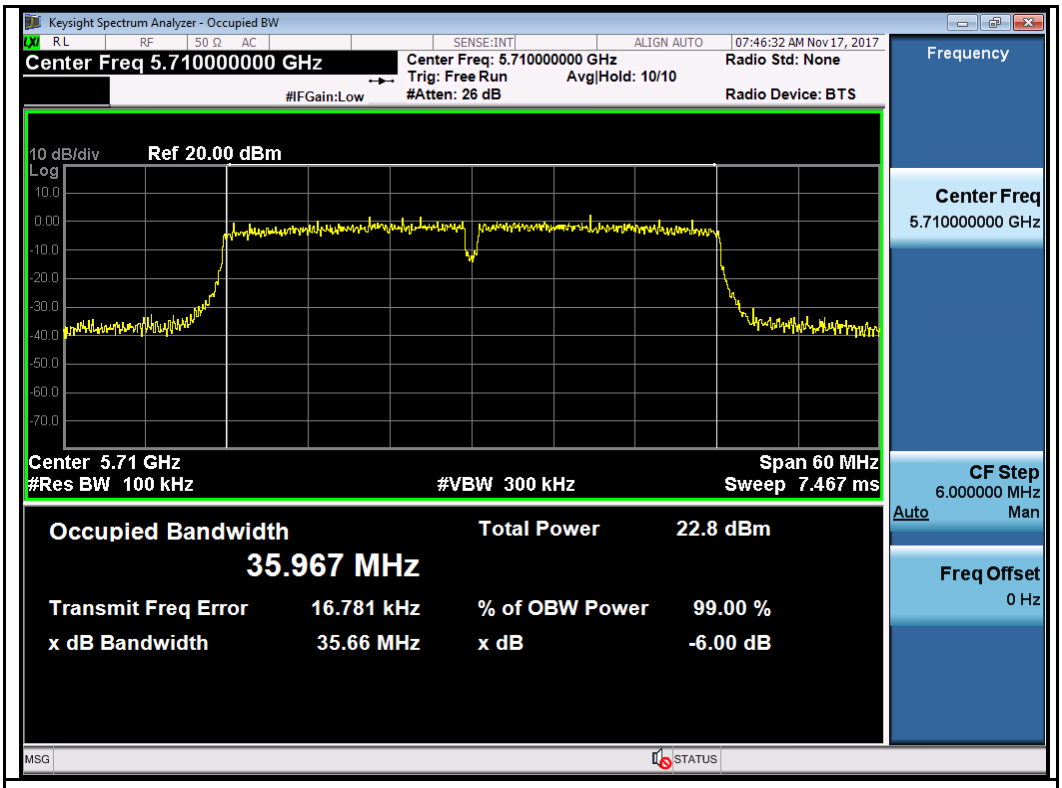
6dB BW Cross Band:



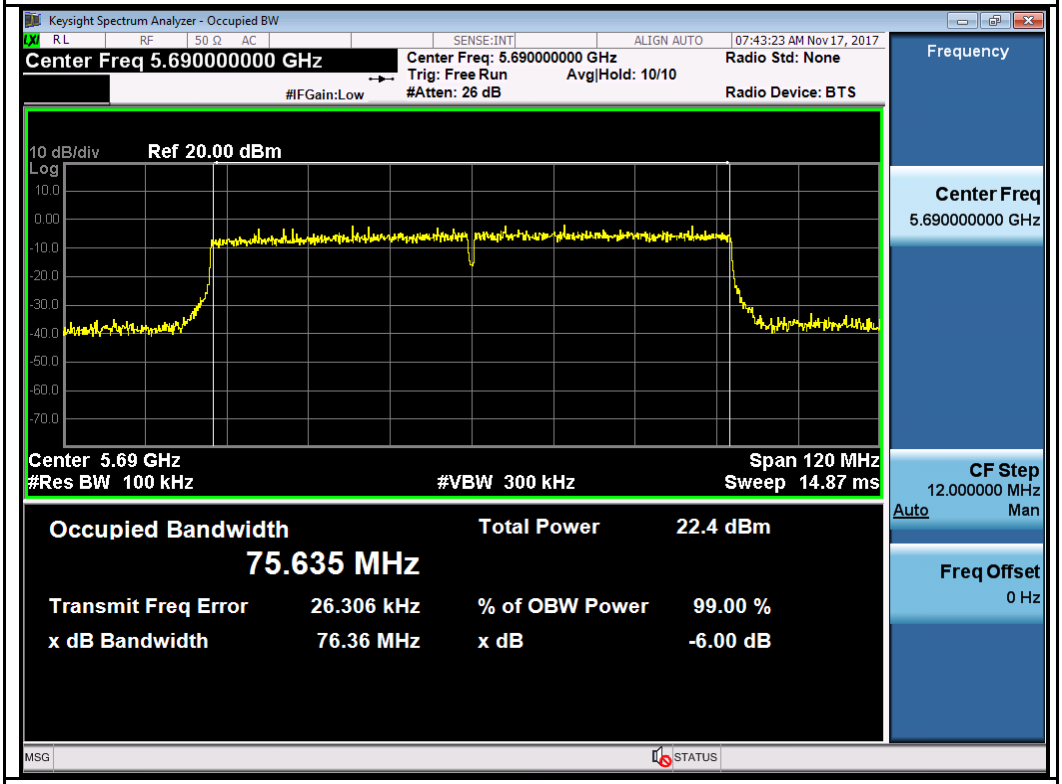
802.11a-5720MHz



802.11n-HT20 5720MHz



802.11n-HT40 5710MHz



802.11ac-VHT80-5690MHz

10.4 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.	☒

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	11/11/2017-11/21/2017	Environmental condition	Temperature 23ºC Relative Humidity 44% Atmospheric Pressure 1021mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Cipher at RF test site.

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Output Power measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
Output Power	802.11a	5260	Low	12.45	12.52	15.49	16.5	Pass
	802.11a	5280	Mid	12.25	12.02	15.14	16.5	Pass
	802.11a	5320	High	12.49	12.66	15.59	16.5	Pass
	802.11n-20M	5260	Low	12.49	12.48	15.49	16.5	Pass
	802.11n-20M	5280	Mid	12.37	12.32	15.35	16.5	Pass
	802.11n-20M	5320	High	12.66	12.58	15.63	16.5	Pass
	802.11n-40M	5270	Low	12.35	12.29	15.33	16.5	Pass
	802.11n-40M	5310	Mid	12.20	12.68	15.46	16.5	Pass
	802.11ac-80M	5290	High	12.73	13.22	15.99	16.5	Pass

Output Power measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
Output Power	802.11a	5500	Low	12.15	12.35	15.26	16.5	Pass
	802.11a	5580	Mid	11.97	11.94	14.96	16.5	Pass
	802.11a	5700	High	12.09	12.09	15.10	16.5	Pass
	802.11n-20M	5500	Low	12.40	12.45	15.44	16.5	Pass
	802.11n-20M	5580	Mid	12.09	12.11	15.11	16.5	Pass
	802.11n-20M	5700	High	12.11	12.22	15.18	16.5	Pass
	802.11n-40M	5510	Low	12.75	12.61	15.69	16.5	Pass
	802.11n-40M	5550	Mid	12.18	12.40	15.30	16.5	Pass
	802.11n-40M	5670	High	12.35	12.54	15.46	16.5	Pass
	802.11ac-80M	5530	Low	13.05	12.11	15.61	16.5	Pass
	802.11ac-80M	5610	High	12.77	12.34	15.57	16.5	Pass

Note: Two antennas are cross polarized, the directional gain = individual antenna gain = 13.5 dBi, 13.5-6 = 7.5 dB limit adjustment is needed. All the mode transmission is MIMO.

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

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
	802.11a	5720	CROSS	12.31	12.24	15.28	16.5	Pass
	802.11n-20M	5720	CROSS	12.47	12.17	15.33	16.5	Pass
	802.11n-40M	5710	CROSS	12.14	12.21	15.18	16.5	Pass
	802.11ac-80M	5690	CROSS	12.63	12.39	15.52	16.5	Pass

Output Power measurement result for CROSS channels (in band 5725-5850MHz)

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
Output Power	802.11a	5720	CROSS	12.31	12.24	15.28	22.5	Pass
	802.11n-20M	5720	CROSS	12.47	12.17	15.33	22.5	Pass
	802.11n-40M	5710	CROSS	12.14	12.21	15.18	22.5	Pass
	802.11ac-80M	5690	CROSS	12.63	12.39	15.52	22.5	Pass

Note: Two antennas are cross polarized, the directional gain = individual antenna gain = 13.5 dBi, 13.5-6 = 7.5 dB limit adjustment is needed. All the mode transmission is MIMO.

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Output Power measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
Output Power	802.11a	5260	Low	17.60	17.41	20.52	22	Pass
	802.11a	5280	Mid	17.36	17.21	20.29	22	Pass
	802.11a	5320	High	17.53	17.60	20.57	22	Pass
	802.11n-20M	5260	Low	17.25	17.20	20.24	22	Pass
	802.11n-20M	5280	Mid	17.46	17.50	20.49	22	Pass
	802.11n-20M	5320	High	17.76	17.65	20.71	22	Pass
	802.11n-40M	5270	Low	17.27	17.33	20.31	22	Pass
	802.11n-40M	5310	Mid	17.47	17.39	20.44	22	Pass
	802.11ac-80M	5290	High	17.48	17.78	20.64	22	Pass

Output Power measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
Output Power	802.11a	5500	Low	17.41	17.41	20.42	22	Pass
	802.11a	5580	Mid	17.74	17.89	20.83	22	Pass
	802.11a	5700	High	17.92	17.87	20.90	22	Pass
	802.11n-20M	5500	Low	17.89	18.30	21.11	22	Pass
	802.11n-20M	5580	Mid	17.87	17.79	20.84	22	Pass
	802.11n-20M	5700	High	18.08	18.10	21.10	22	Pass
	802.11n-40M	5510	Low	17.86	18.36	21.13	22	Pass
	802.11n-40M	5550	Mid	17.95	17.67	20.82	22	Pass
	802.11n-40M	5670	High	17.99	18.10	21.06	22	Pass
	802.11ac-80M	5530	Low	18.49	17.52	21.04	22	Pass
	802.11ac-80M	5610	High	17.58	18.45	21.04	22	Pass

Note: Two antennas are cross polarized, the directional gain = individual antenna gain = 8 dBi, 8-6 = 2 dB limit adjustment is needed.
All the mode transmission is MIMO.

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

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
	802.11a	5720	CROSS	17.53	17.66	20.61	22	Pass
	802.11n-20M	5720	CROSS	17.88	17.73	20.81	22	Pass
	802.11n-40M	5710	CROSS	17.66	17.92	20.80	22	Pass
	802.11ac-80M	5690	CROSS	18.70	17.41	21.11	22	Pass

Output Power measurement result for CROSS channels (in band 5725-5850MHz)

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
Output Power	802.11a	5720	CROSS	17.53	17.66	20.61	28	Pass
	802.11n-20M	5720	CROSS	17.88	17.73	20.81	28	Pass
	802.11n-40M	5710	CROSS	17.66	17.92	20.80	28	Pass
	802.11ac-80M	5690	CROSS	18.70	17.41	21.11	28	Pass

Note: Two antennas are cross polarized, the directional gain = individual antenna gain = 8 dBi, 8-6 = 2 dB limit adjustment is needed. All the mode transmission is MIMO.

T310S Beamforming Mode
Output Power measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
Output Power	802.11a	5260	Low	14.56	14.44	17.51	19	Pass
	802.11a	5280	Mid	14.05	14.39	17.23	19	Pass
	802.11a	5320	High	14.76	14.73	17.75	19	Pass
	802.11n-20M	5260	Low	14.43	14.21	17.33	19	Pass
	802.11n-20M	5280	Mid	14.40	14.53	17.47	19	Pass
	802.11n-20M	5320	High	14.70	14.81	17.76	19	Pass
	802.11n-40M	5270	Low	14.41	14.46	17.44	19	Pass
	802.11n-40M	5310	Mid	14.41	14.50	17.46	19	Pass
	802.11ac-80M	5290	High	14.96	14.83	17.90	19	Pass

Output Power measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
Output Power	802.11a	5500	Low	14.28	14.21	17.26	19	Pass
	802.11a	5580	Mid	14.54	14.49	17.52	19	Pass
	802.11a	5700	High	14.67	14.69	17.69	19	Pass
	802.11n-20M	5500	Low	14.96	14.41	17.70	19	Pass
	802.11n-20M	5580	Mid	14.61	14.58	17.60	19	Pass
	802.11n-20M	5700	High	14.89	14.88	17.89	19	Pass
	802.11n-40M	5510	Low	14.97	14.80	17.90	19	Pass
	802.11n-40M	5550	Mid	14.74	14.53	17.65	19	Pass
	802.11n-40M	5670	High	14.38	14.60	17.50	19	Pass
	802.11ac-80M	5530	Low	14.64	15.39	18.05	19	Pass
	802.11ac-80M	5610	High	15.01	15.46	18.25	19	Pass

Note: Array gain is 10 log10(N_{ANT})=3dB, N_{ANT} = 2, highest individual gain is 8dBi, so max directional gain of the EUT is 11dBi. 11-6 = 5 dB limit adjustment is needed. All the mode transmission is MIMO.

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

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
	802.11a	5720	CROSS	14.78	14.83	17.81	19	Pass
	802.11n-20M	5720	CROSS	15.06	15.08	18.08	19	Pass
	802.11n-40M	5710	CROSS	14.79	14.32	17.57	19	Pass
	802.11ac-80M	5690	CROSS	14.96	14.88	17.93	19	Pass

Output Power measurement result for CROSS channels (in band 5725-5850MHz)

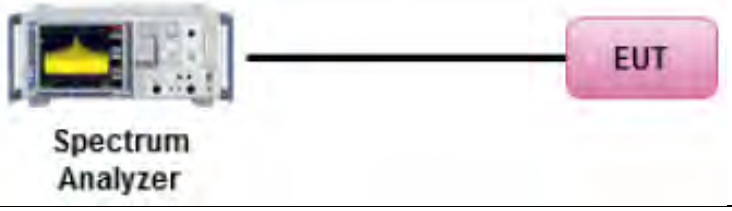
Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
Output Power	802.11a	5720	CROSS	14.78	14.83	17.81	25	Pass
	802.11n-20M	5720	CROSS	15.06	15.08	18.08	25	Pass
	802.11n-40M	5710	CROSS	14.79	14.32	17.57	25	Pass
	802.11ac-80M	5690	CROSS	14.96	14.88	17.93	25	Pass

Note: Array gain is 10 log10(N_{ANT})=3dB, N_{ANT} = 2, highest individual gain is 8dBi, so max directional gain of the EUT is 11dBi. 11-6 = 5 dB limit adjustment is needed. All the mode transmission is MIMO.

10.5 Peak Power Spectral Density

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	a)(1)(i)	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.	☐
	a)(1)(ii)	For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.	☐
	a)(2)	For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.	☒
	a)(3)	For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.	☒

Test Setup			
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01, II.F. Method SA-1 Maximum spectral density measurement procedure - 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 - Detector = RMS. - Sweep time = auto couple. - Trace mode = max hold. - Trace average at least 100 traces in power averaging - Use the peak marker function to determine the maximum amplitude level within the RBW. Apply correction to the result if different RBW is used.		
Test Date	11/11/2017-11/21/2017	Environmental condition	Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Cipher at RF test site.

T310N
PSD measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5260	Low	0.276	0.222	3.259	3.5	Pass
	802.11a	5280	Mid	0.070	0.173	3.132	3.5	Pass
	802.11a	5320	High	0.380	0.376	3.388	3.5	Pass
	802.11n-20M	5260	Low	0.060	0.008	3.044	3.5	Pass
	802.11n-20M	5280	Mid	-0.129	-0.101	2.895	3.5	Pass
	802.11n-20M	5320	High	0.236	0.228	3.242	3.5	Pass
	802.11n-40M	5270	Low	-2.739	-2.865	0.209	3.5	Pass
	802.11n-40M	5310	Mid	-2.804	-2.786	0.215	3.5	Pass
	802.11ac-80M	5290	High	-5.735	-5.765	-2.740	3.5	Pass

PSD measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5500	Low	0.189	0.248	3.229	3.5	Pass
	802.11a	5580	Mid	-0.239	-0.197	2.792	3.5	Pass
	802.11a	5700	High	0.141	0.029	3.096	3.5	Pass
	802.11n-20M	5500	Low	0.007	-0.051	2.988	3.5	Pass
	802.11n-20M	5580	Mid	-0.451	-0.535	2.518	3.5	Pass
	802.11n-20M	5700	High	-0.299	-0.067	2.829	3.5	Pass
	802.11n-40M	5510	Low	-2.340	-2.372	0.654	3.5	Pass
	802.11n-40M	5550	Mid	-2.757	-2.941	0.162	3.5	Pass
	802.11n-40M	5670	High	-2.790	-2.783	0.224	3.5	Pass
	802.11ac-80M	5530	Low	-6.112	-6.179	-3.135	3.5	Pass
	802.11ac-80M	5610	High	-6.127	-6.348	-3.226	3.5	Pass

Note: Two antennas are cross polarized, the directional gain = individual antenna gain = 13.5 dBi, 13.5-6 = 7.5 dB limit adjustment is needed. All the mode transmission is MIMO.

PSD measurement result for cross channels (in band 5470-5725MHz)

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5720	CROSS	0.131	0.090	3.12	3.5	Pass
	802.11n-20M	5720	CROSS	-0.017	-0.008	3.00	3.5	Pass
	802.11n-40M	5710	CROSS	-3.093	-3.042	-0.06	3.5	Pass
	802.11ac-80M	5690	CROSS	-6.305	-5.981	-3.13	3.5	Pass

PSD measurement result for cross channels (in band 5725-5850MHz)

Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Corrected Level (dBm/500kHz)	Limit (dBm/500kkHz)	Result
			Chain0	Chain1	Combined PSD			
802.11a	5720	CROSS	-7.624	-7.632	-4.618	2.372	22.5	Pass
802.11n-20M	5720	CROSS	-7.841	-7.420	-4.615	2.375	22.5	Pass
802.11n-40M	5710	CROSS	-10.766	-11.058	-7.899	-0.909	22.5	Pass
802.11ac-80M	5690	CROSS	-14.109	-14.118	-11.103	-4.113	22.5	Pass

Correction factor=10*log(500/100)=6.99

Note: Two antennas are cross polarized, the directional gain = individual antenna gain = 13.5 dBi, 13.5-6 = 7.5 dB limit adjustment is needed. All the mode transmission is MIMO.

T310S

PSD measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5260	Low	5.389	5.313	8.361	9	Pass
	802.11a	5280	Mid	5.072	5.101	8.097	9	Pass
	802.11a	5320	High	5.386	5.573	8.491	9	Pass
	802.11n-20M	5260	Low	5.115	5.327	8.233	9	Pass
	802.11n-20M	5280	Mid	4.953	5.029	8.001	9	Pass
	802.11n-20M	5320	High	5.362	5.289	8.336	9	Pass
	802.11n-40M	5270	Low	2.073	2.154	5.124	9	Pass
	802.11n-40M	5310	Mid	2.280	2.442	5.372	9	Pass
	802.11ac-80M	5290	High	-1.244	-1.541	1.620	9	Pass

PSD measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5500	Low	5.199	5.307	8.264	9	Pass
	802.11a	5580	Mid	5.679	5.688	8.694	9	Pass
	802.11a	5700	High	5.750	5.789	8.780	9	Pass
	802.11n-20M	5500	Low	5.663	5.689	8.686	9	Pass
	802.11n-20M	5580	Mid	5.334	5.364	8.359	9	Pass
	802.11n-20M	5700	High	5.598	5.728	8.674	9	Pass
	802.11n-40M	5510	Low	2.802	2.990	5.907	9	Pass
	802.11n-40M	5550	Mid	2.940	2.731	5.847	9	Pass
	802.11n-40M	5670	High	2.793	2.703	5.759	9	Pass
	802.11ac-80M	5530	Low	-0.368	-0.369	2.642	9	Pass
	802.11ac-80M	5610	High	-0.194	-0.663	2.588	9	Pass

Note: Two antennas are cross polarized, the directional gain = individual antenna gain = 8 dBi, 8-6 = 2 dB limit adjustment is needed.
All the mode transmission is MIMO.

PSD measurement result for cross channels (in band 5470-5725MHz)

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5720	CROSS	5.641	5.514	8.59	9	Pass
	802.11n-20M	5720	CROSS	5.370	5.384	8.39	9	Pass
	802.11n-40M	5710	CROSS	2.819	2.938	5.89	9	Pass
	802.11ac-80M	5690	CROSS	-0.415	-0.367	2.62	9	Pass

PSD measurement result for cross channels (in band 5725-5850MHz)

Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Corrected Level (dBm/500kHz)	Limit (dBm/500kkHz)	Result
			Chain0	Chain1	Combined PSD			
802.11a	5720	CROSS	-2.311	-2.339	0.685	7.675	28	Pass
802.11n-20M	5720	CROSS	-2.072	-2.378	0.788	7.778	28	Pass
802.11n-40M	5710	CROSS	-4.901	-4.491	-1.681	5.309	28	Pass
802.11ac-80M	5690	CROSS	-8.021	-8.202	-5.100	1.890	28	Pass

Correction factor=10*log(500/100)=6.99

Note: Two antennas are cross polarized, the directional gain = individual antenna gain = 8 dBi, 8-6 = 2 dB limit adjustment is needed.
All the mode transmission is MIMO.

T310S Beamforming Mode
PSD measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5260	Low	2.413	2.266	5.350	6	Pass
	802.11a	5280	Mid	2.143	2.226	5.195	6	Pass
	802.11a	5320	High	2.502	2.592	5.558	6	Pass
	802.11n-20M	5260	Low	2.137	2.255	5.207	6	Pass
	802.11n-20M	5280	Mid	2.029	1.988	5.019	6	Pass
	802.11n-20M	5320	High	2.531	2.366	5.460	6	Pass
	802.11n-40M	5270	Low	-0.780	-0.943	2.150	6	Pass
	802.11n-40M	5310	Mid	-0.640	-0.722	2.329	6	Pass
	802.11ac-80M	5290	High	-3.683	-3.659	-0.661	6	Pass

PSD measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5500	Low	2.337	2.313	5.335	6	Pass
	802.11a	5580	Mid	2.378	2.269	5.334	6	Pass
	802.11a	5700	High	2.620	2.583	5.612	6	Pass
	802.11n-20M	5500	Low	2.474	2.504	5.499	6	Pass
	802.11n-20M	5580	Mid	2.026	2.056	5.051	6	Pass
	802.11n-20M	5700	High	2.562	2.647	5.615	6	Pass
	802.11n-40M	5510	Low	-0.408	-0.467	2.573	6	Pass
	802.11n-40M	5550	Mid	-0.788	-0.604	2.315	6	Pass
	802.11n-40M	5670	High	-0.778	-0.739	2.252	6	Pass
	802.11ac-80M	5530	Low	-3.697	-3.742	-0.709	6	Pass
	802.11ac-80M	5610	High	-3.265	-3.221	-0.233	6	Pass

Note: Array gain is 10 log10(N_{ANT})=3dB, N_{ANT} = 2, highest individual gain is 8dBi, so max directional gain of the EUT is 11dBi. 11-6 = 5 dB limit adjustment is needed. All the mode transmission is MIMO.

PSD measurement result for cross channels (in band 5470-5725MHz)

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5720	CROSS	2.705	2.757	5.74	6	Pass
	802.11n-20M	5720	CROSS	2.497	2.534	5.53	6	Pass
	802.11n-40M	5710	CROSS	-0.501	-0.359	2.58	6	Pass
	802.11ac-80M	5690	CROSS	-3.733	-3.686	-0.70	6	Pass

PSD measurement result for cross channels (in band 5725-5850MHz)

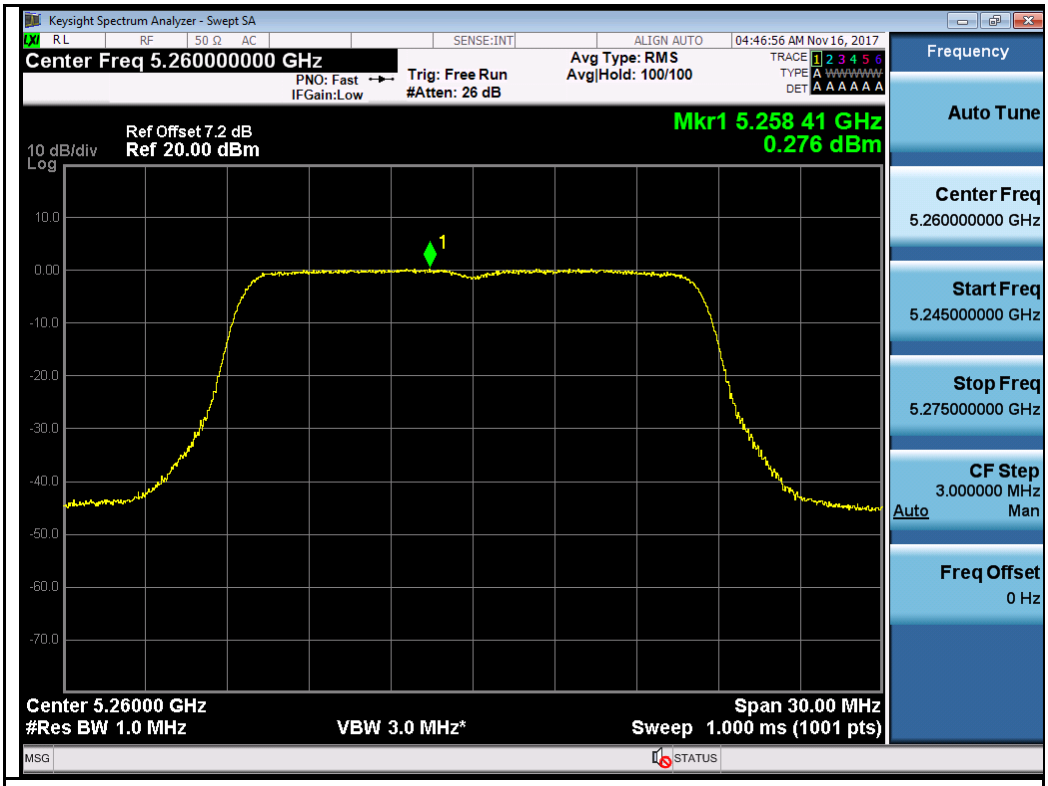
Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Corrected Level (dBm/500kHz)	Limit (dBm/500kkHz)	Result
			Chain0	Chain1	Combined PSD			
802.11a	5720	CROSS	-4.964	-4.951	-1.947	5.043	25	Pass
802.11n-20M	5720	CROSS	-5.199	-5.283	-2.230	4.760	25	Pass
802.11n-40M	5710	CROSS	-8.165	-8.400	-5.271	1.719	25	Pass
802.11ac-80M	5690	CROSS	-11.663	-11.634	-8.638	-1.648	25	Pass

Correction factor=10*log(500/100)=6.99

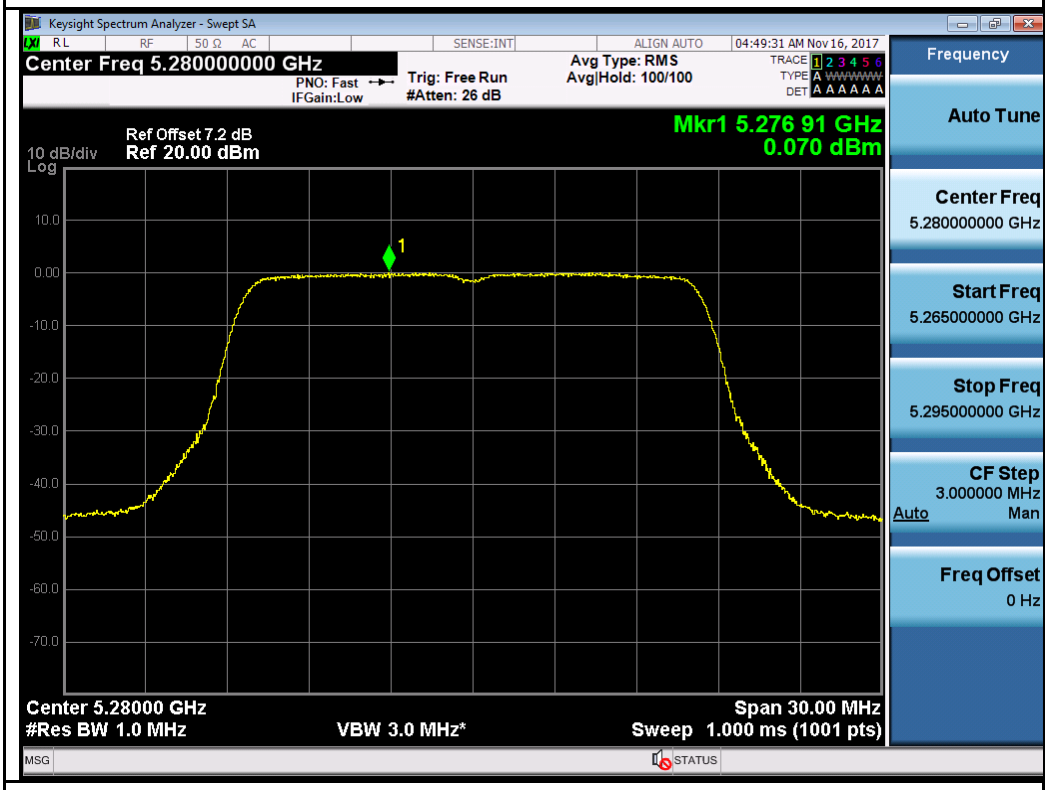
Note: Array gain is 10 log10(N_{ANT})=3dB, N_{ANT} = 2, highest individual gain is 8dBi, so max directional gain of the EUT is 11dBi. 11-6 = 5 dB limit adjustment is needed. All the mode transmission is MIMO.

T310N
Test Plot for W53:

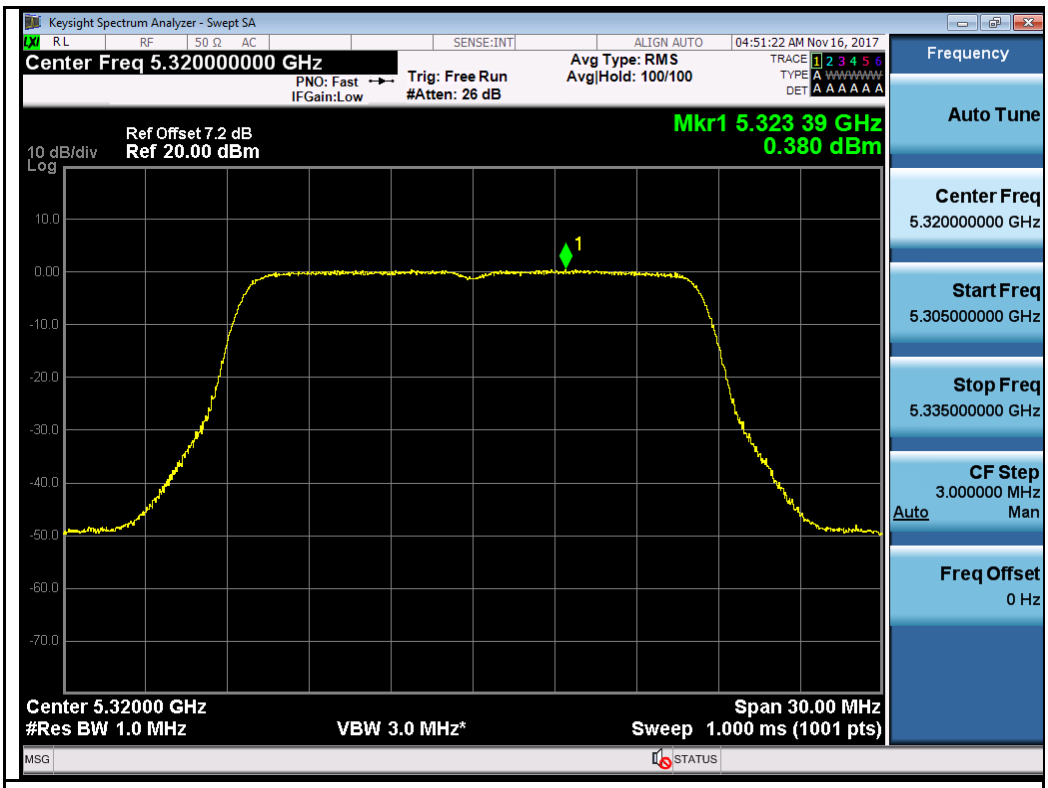
Chain 0:



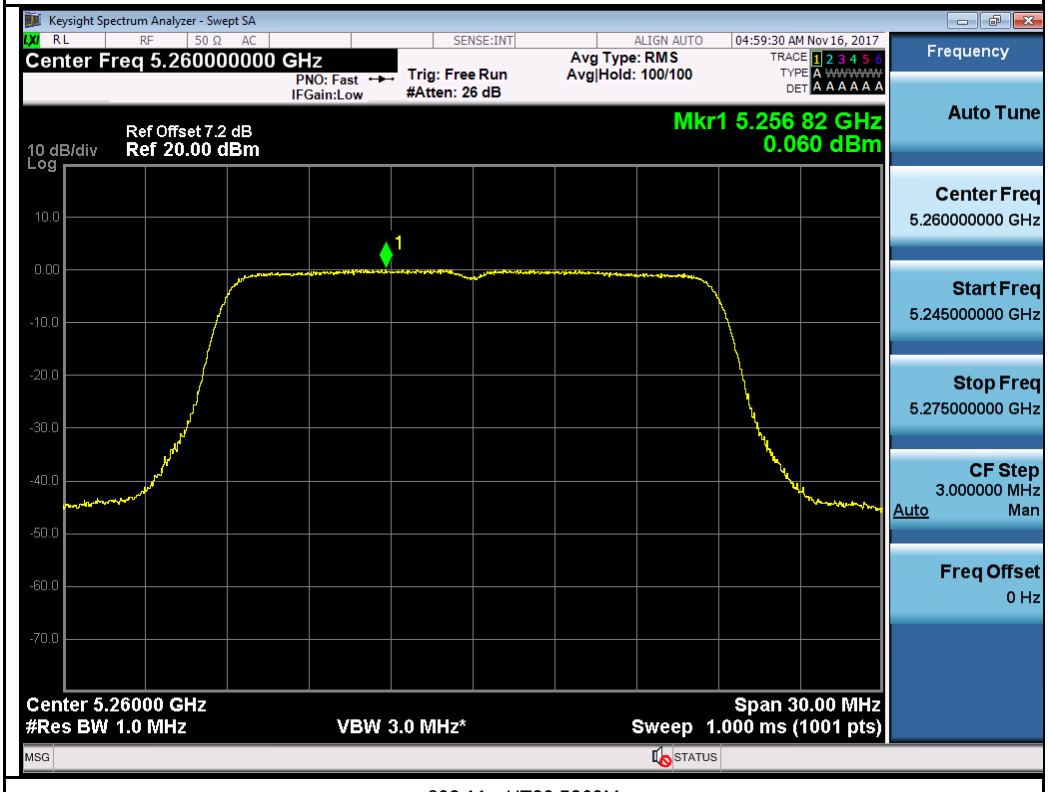
802.11a-5260M



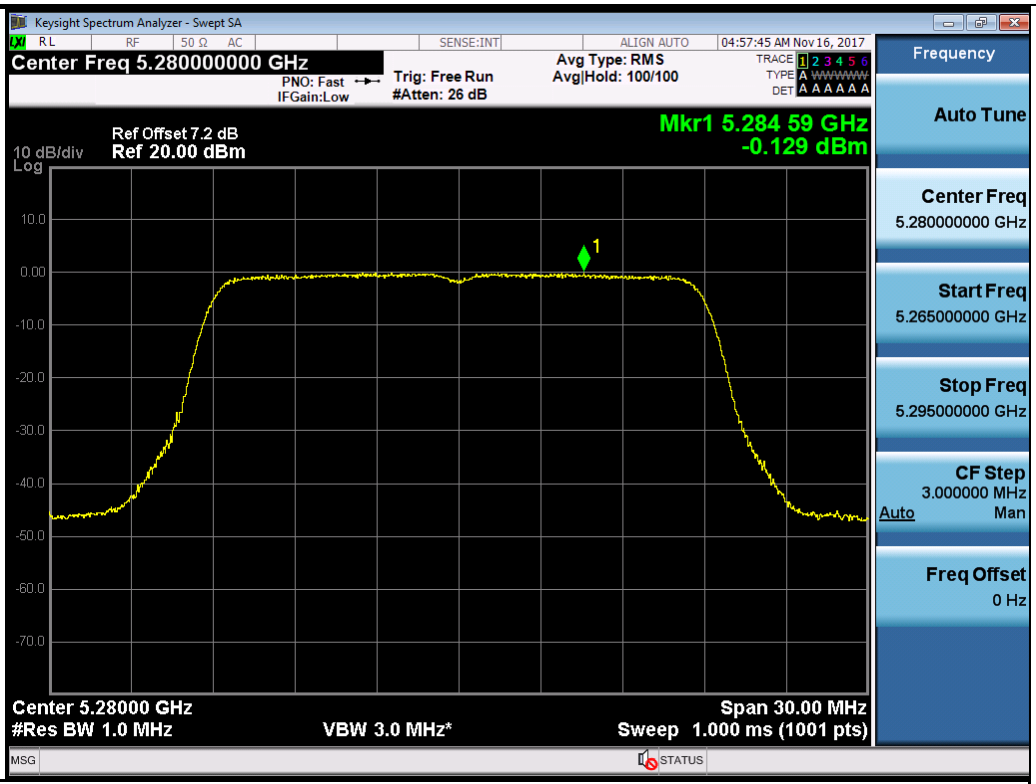
802.11a-5280M



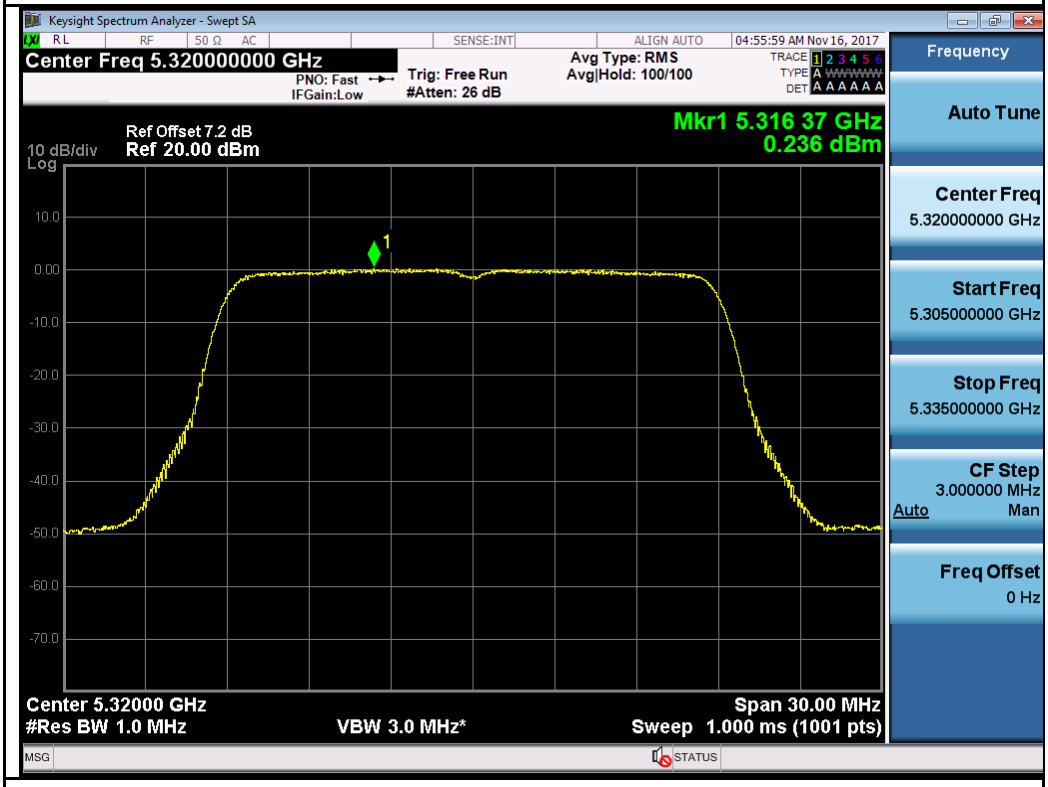
802.11a-5320M



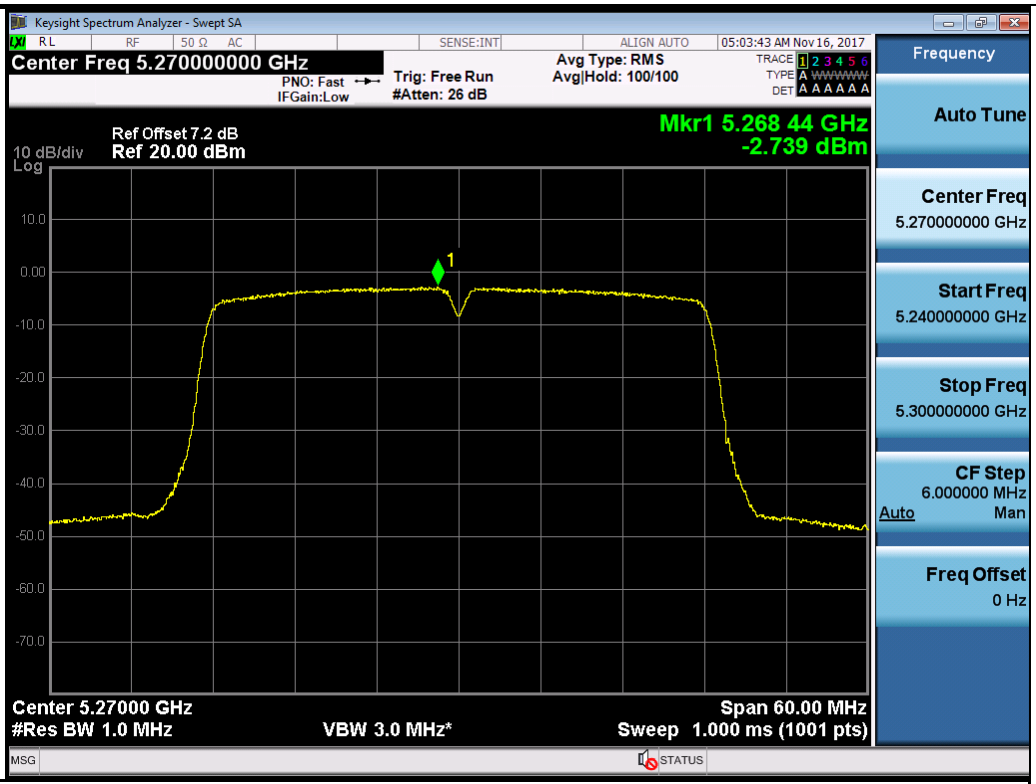
802.11n-HT20 5260M



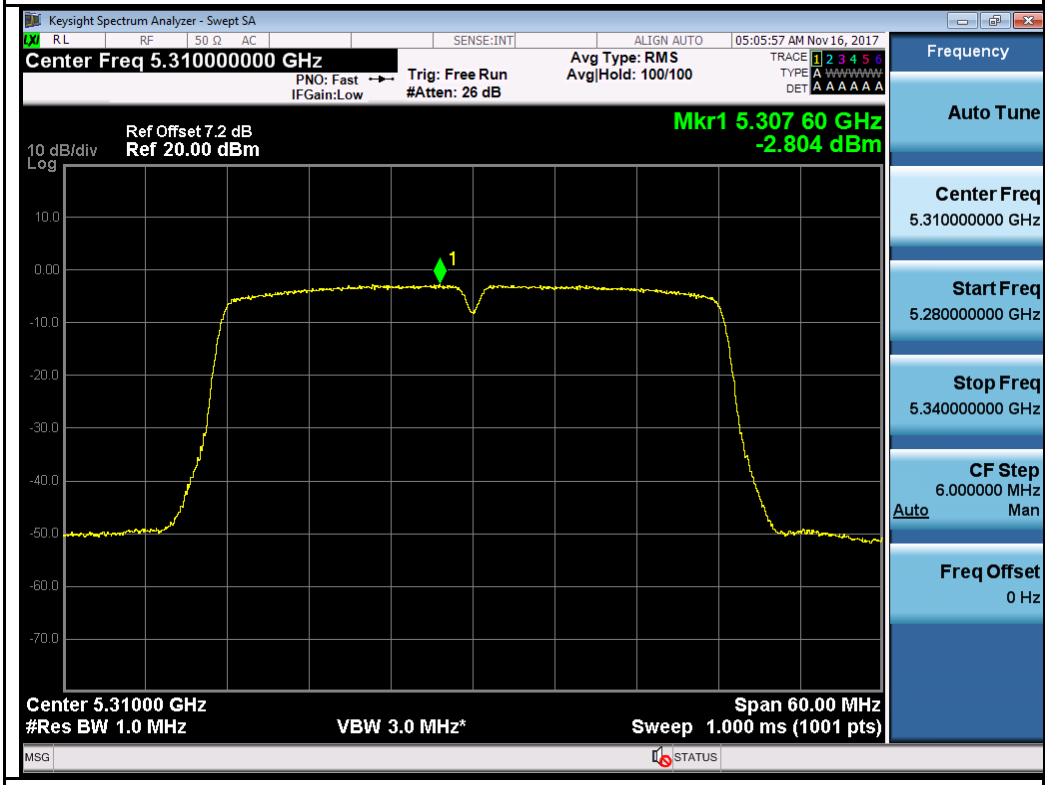
802.11n-HT20 5280M



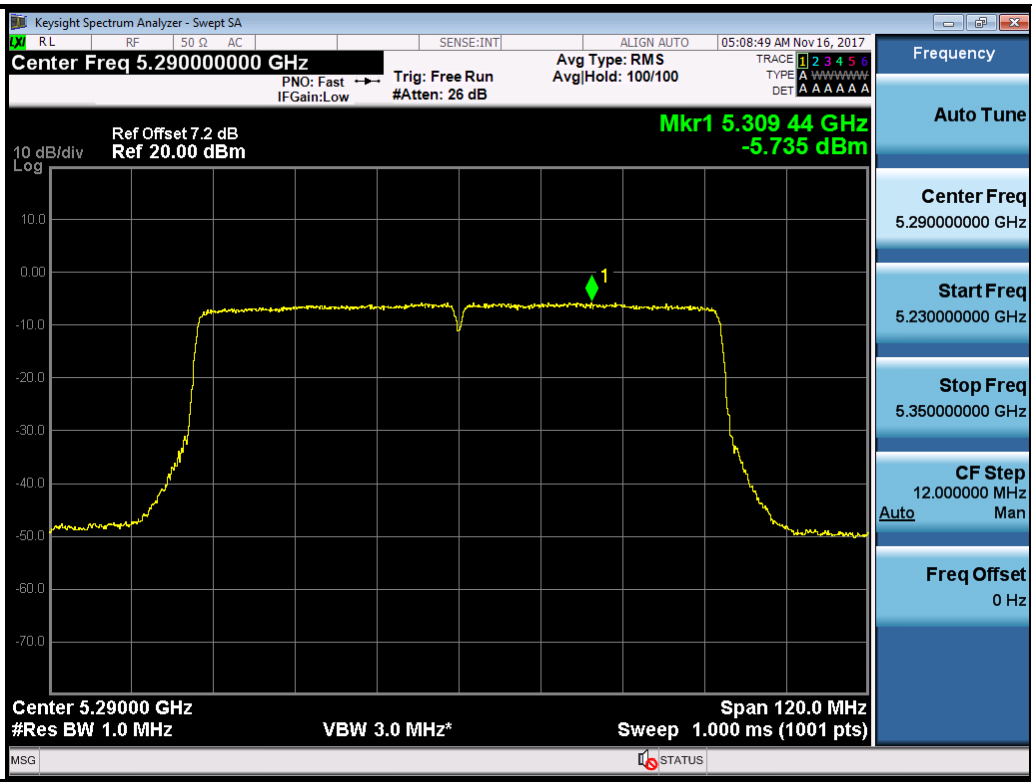
802.11n-HT20 5320M



802.11n-HT40 5270M

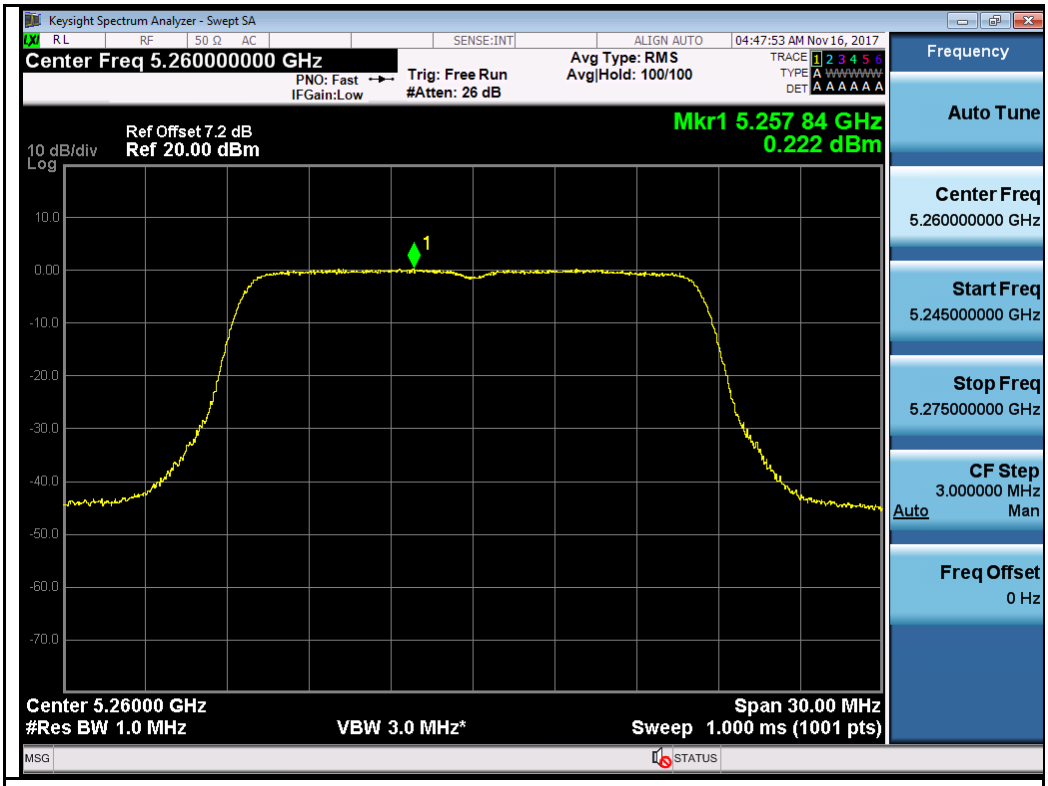


802.11n-HT40 5310M

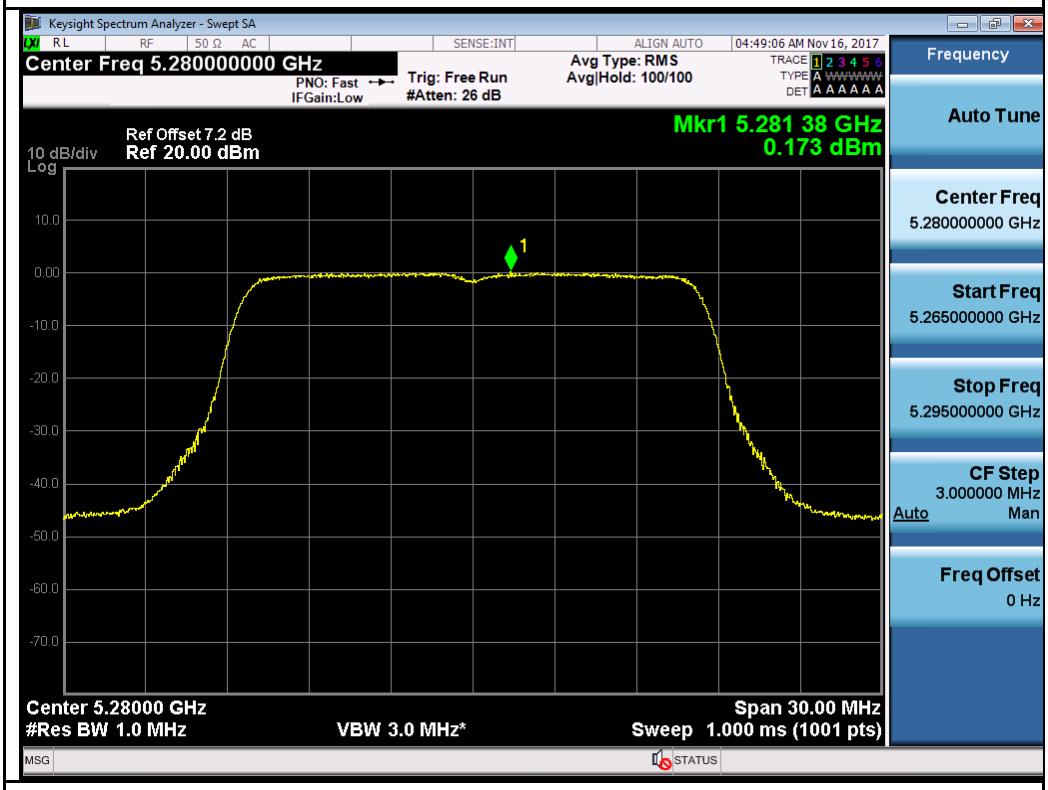


802.11ac-VHT80 5290M

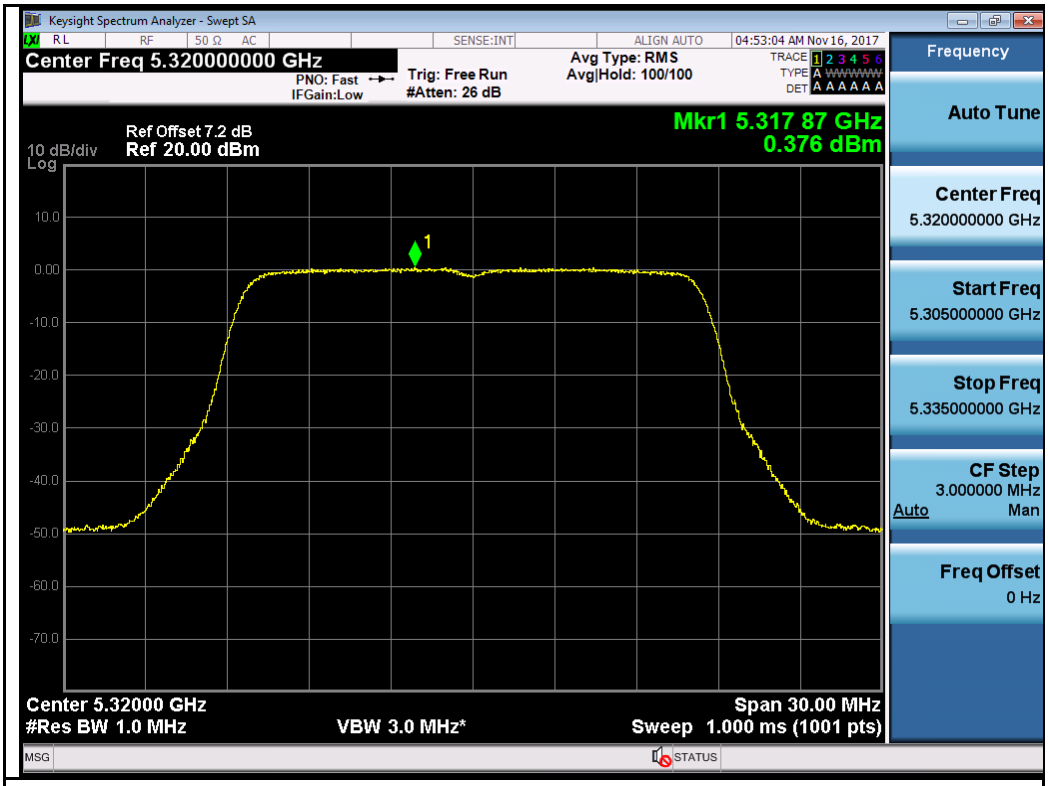
Chain 1:



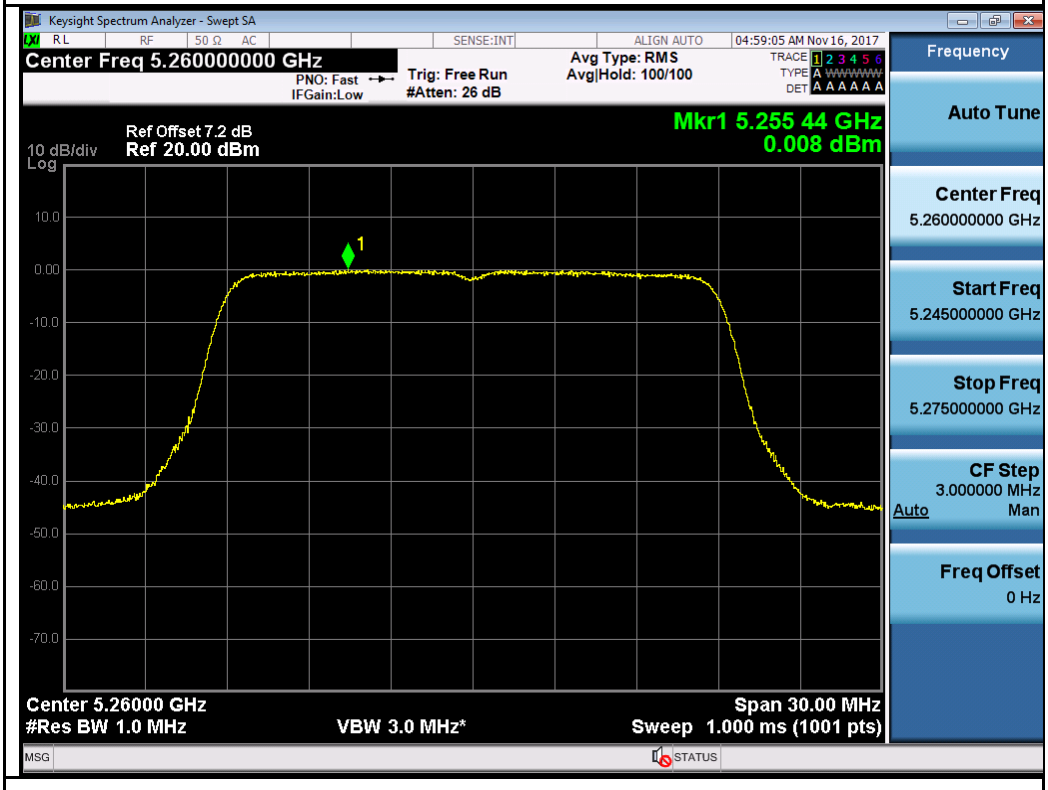
802.11a-5260M



802.11a-5280M



802.11a-5320M



802.11n-HT20 5260M