RF TEST REPORT

SIEMIC
A Bureau Veritas Group Company

Report No.: FCC_SL17072501-RUC-022_W5258
Supersede Report No.:

Applicant	:	Ruckus Wireless, Inc.
Product Name	:	E510 Access Point
Model No.	:	E510
Test Standard	:	47 CFR 15.407
Test Method	:	ANSI C63.4: 2014 789033 D02 General UNII Test Procedures New Rules v01r02
FCC ID	:	S9GE510
IC ID	:	5912A-E510
Dates of test	:	10/24/2017-10/31/2017
Issue Date	:	11/02/2017
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:	
Gary Chou	
Gary Chou	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

ilac-MRA
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
FCC_SL17072501-RUC-022_W5258	None	Original	11/03/2017

2 Executive Summary

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

Company: Ruckus Wireless, Inc.
Product: E510 Access Point
Model: E510

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	E510 Access Point
Model No.	E510
Trade Name	Ruckus
Serial No.	361706000066
Host Model No.	N/A
Input Power	48VDC (PoE)
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Date of EUT received	10/20/2017
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	5180-5240MHz 5745-5825MHz	5180-5240MHz 5745-5825MHz	5190-5230MHz 5755-5795MHz	5210MHz 5775MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Spacing	20MHz	20MHz	40MHz	80MHz
Number of Channels	9	9	4	2
Antenna Type	Internal Omni PCB Antenna			
Antenna Gain (Peak)	5GHz: 3.5dBi			
Antenna Connector Type	U.FL			
Note	2.4GHz and 5GHz Radio transmit simultaneously			

EUT Power level setting

Mode	Frequency	ART Power Setting
802.11-a	5180	44
802.11-a	5200	46
802.11-a	5240	46
802.11-n-20	5180	44
802.11-n-20	5200	46
802.11-n-20	5240	46
802.11-n-40	5190	42
802.11-n-40	5230	46
802.11-ac-80	5210	42
802.11-a	5745	46
802.11-a	5785	46
802.11-a	5825	46
802.11-n-20	5745	46
802.11-n-20	5785	46
802.11-n-20	5825	46
802.11-n-40	5755	46
802.11-n-40	5795	46
802.11-ac-80	5775	46

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

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

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

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
RJ45	EUT	RJ45	POE	RJ45	2	Unshielded	-
RJ45	POE	RJ45	Laptop	RJ45	3	Unshielded	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Command Line in windows	Set the EUT to transmit continuously in diferent test modes and channels

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 v01r02	☒ Pass ☐ N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.4 – 2014	☒ 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 v01r02	☒ Pass ☐ N/A
Maximum conducted Output Power	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01r02	☒ 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 v01r02	☒ Pass ☐ N/A
Power Spectral Density	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01r02	☒ 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

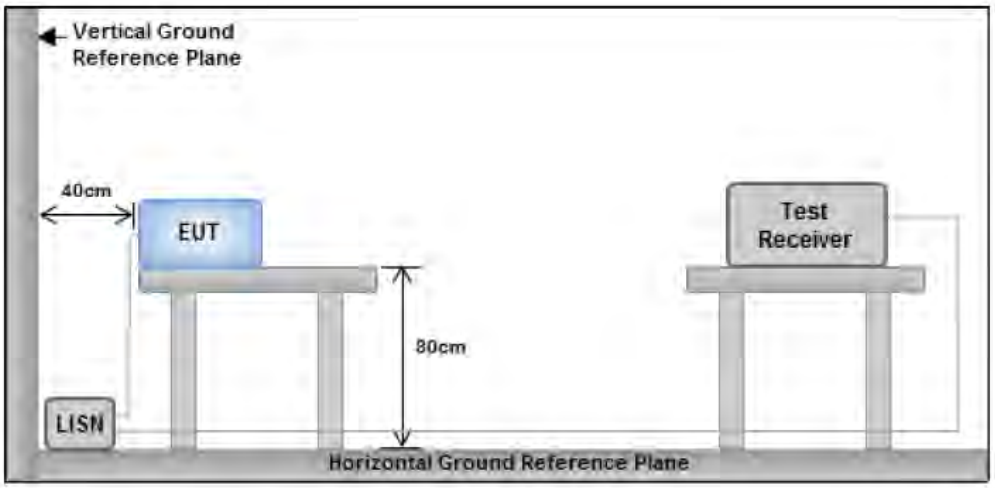
The total derived measurement uncertainty is +/- 0.95 dB.

10 Measurements, Examination and Derived Results

10.1 Conducted Emissions

Conducted Emission Limit

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

Spec	Item	Requirement	Applicable
RSS247(A8.1)	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 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 at 120VAC, 60Hz	
Result	☒ Pass ☐ Fail	

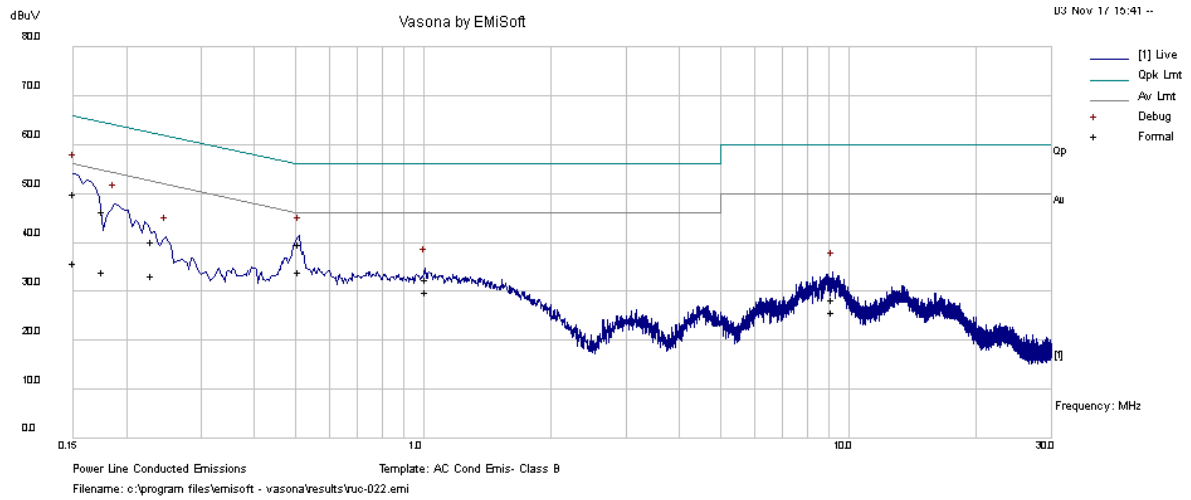
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou 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:	Gary Chou			
Test Date:	11/03/2017			
Remarks	Power Supply, Live			

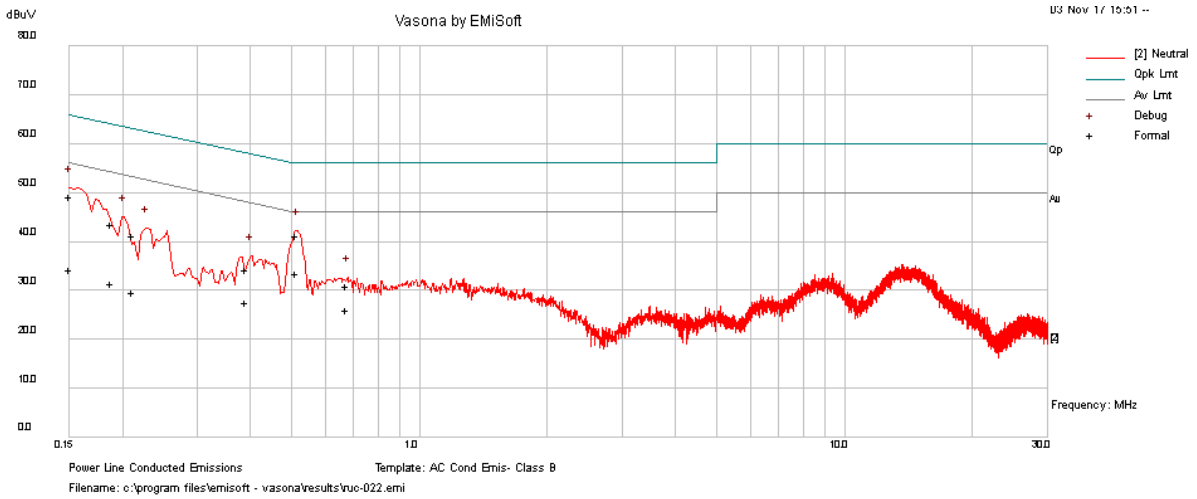


Line Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.15	38.84	9.33	1.74	49.91	Quasi Peak	Live	66	-16.09	Pass
0.51	29.73	9.33	0.63	39.68	Quasi Peak	Live	56	-16.32	Pass
0.18	35.59	9.33	1.44	46.36	Quasi Peak	Live	64.65	-18.29	Pass
0.23	29.86	9.32	1.1	40.28	Quasi Peak	Live	62.47	-22.19	Pass
1.02	22.64	9.33	0.53	32.5	Quasi Peak	Live	56	-23.50	Pass
9.19	18.05	9.86	0.51	28.42	Quasi Peak	Live	60	-31.58	Pass
0.15	24.84	9.33	1.74	35.9	Average	Live	56	-20.10	Pass
0.51	23.93	9.33	0.63	33.88	Average	Live	46	-12.12	Pass
0.18	23.17	9.33	1.44	33.94	Average	Live	54.65	-20.71	Pass
0.23	22.76	9.32	1.1	33.18	Average	Live	52.47	-19.29	Pass
1.02	19.96	9.33	0.53	29.82	Average	Live	46	-16.18	Pass
9.19	15.38	9.86	0.51	25.74	Average	Live	50	-24.26	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:	Gary Chou			
Test Date:	11/03/2017			
Remarks	Power Supply, Neutral			



Neutral Plot at 120Vac, 60Hz

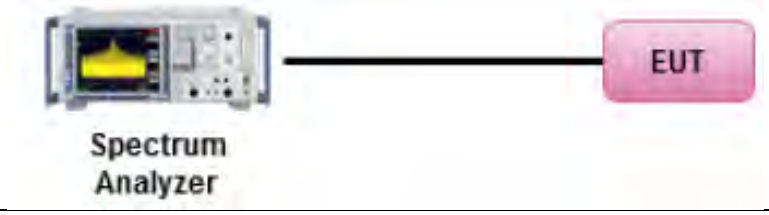
Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.51	31.29	9.33	0.62	41.24	Quasi Peak	Neutral	56	-14.76	Pass
0.15	38.11	9.33	1.74	49.18	Quasi Peak	Neutral	66	-16.82	Pass
0.19	32.95	9.32	1.34	43.62	Quasi Peak	Neutral	64.12	-20.51	Pass
0.21	30.64	9.32	1.18	41.15	Quasi Peak	Neutral	63.12	-21.97	Pass
0.39	24.27	9.33	0.71	34.31	Quasi Peak	Neutral	58.04	-23.74	Pass
0.67	20.97	9.33	0.57	30.86	Quasi Peak	Neutral	56	-25.14	Pass
0.51	23.6	9.33	0.62	33.55	Average	Neutral	46	-12.45	Pass
0.15	23.19	9.33	1.74	34.26	Average	Neutral	56	-21.74	Pass
0.19	20.85	9.32	1.34	31.51	Average	Neutral	54.12	-22.61	Pass
0.21	19.01	9.32	1.18	29.52	Average	Neutral	53.12	-23.61	Pass
0.39	17.64	9.33	0.71	27.68	Average	Neutral	48.04	-20.37	Pass
0.67	16.02	9.33	0.57	25.92	Average	Neutral	46	-20.08	Pass

10.2 26 dB Bandwidth & 6 dB Bandwidth

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	-	26 dB Emission BW: Report only for reference.	☒
	a) (2)	26 dB Emission BW: Report only for power limit calculation.	☐
	e)	Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.	☒

Test Setup



Test Procedure

789033 D02 General UNII Test Procedures New Rules v01r02

26dB Emission bandwidth measurement procedure (Other than 5.725-5.85 GHz)

- Allow the trace to stabilize.
- 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
- Capture the plot.
- Repeat above steps for different test channel and other modulation type.

6 dB Minimum emission bandwidth measurement procedure (for 5.725-5.85 GHz)

- Allow the trace to stabilize.
- Use the spectrum analyzer built-in measurement function to determine the 6dB BW.
  - Set RBW = 100 KHz
  - Set VBW ≥ 3 x RBW
  - Detector = Peak
  - Trace mode = max hold
  - Sweep = auto couple
- Capture the plot.
- Repeat above steps for different test channel and other modulation type.

Test Date	10/24/2017	Environmental condition	Temperature 22°C Relative Humidity 38% Atmospheric Pressure 1020mbar
Remark	99% BW result is presented here to show the channels in 5.2GHz is not crossing to DFS channel since the 26 dB BW is too wide.		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A
Test Plot ☒ Yes ☐ N/A

Test was done by Chen Ge at RF test site.

26dB Bandwidth measurement result for 5.2GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)
26dB BW	802.11a	5180	Low	16.409	-
		5200	Mid	16.459	-
		5240	High	16.503	-
	802.11n-20	5180	Low	17.652	-
		5200	Mid	17.641	-
		5240	High	17.702	-
	802.11n-40	5190	Low	36.007	-
		5230	High	36.092	-
	802.11ac-80	5210	Mid	75.802	-

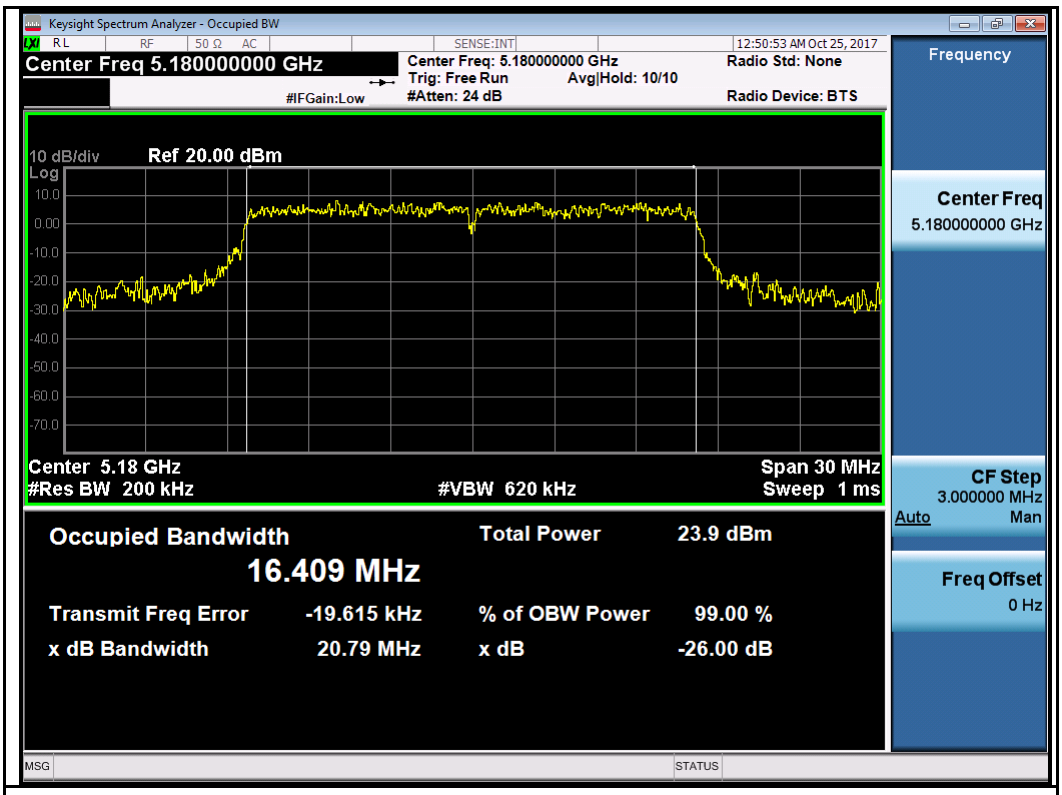
6dB Bandwidth measurement result for 5.8GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)	Result
6dB BW	802.11a	5745	Low	16.363	≥0.5	Pass
		5785	Mid	16.517	≥0.5	Pass
		5825	High	16.305	≥0.5	Pass
	802.11n-20	5745	Low	17.536	≥0.5	Pass
		5785	Mid	17.712	≥0.5	Pass
		5825	High	17.657	≥0.5	Pass
	802.11n-40	5755	Low	34.055	≥0.5	Pass
		5795	High	33.638	≥0.5	Pass
	802.11ac-80	5775	Mid	75.942	≥0.5	Pass

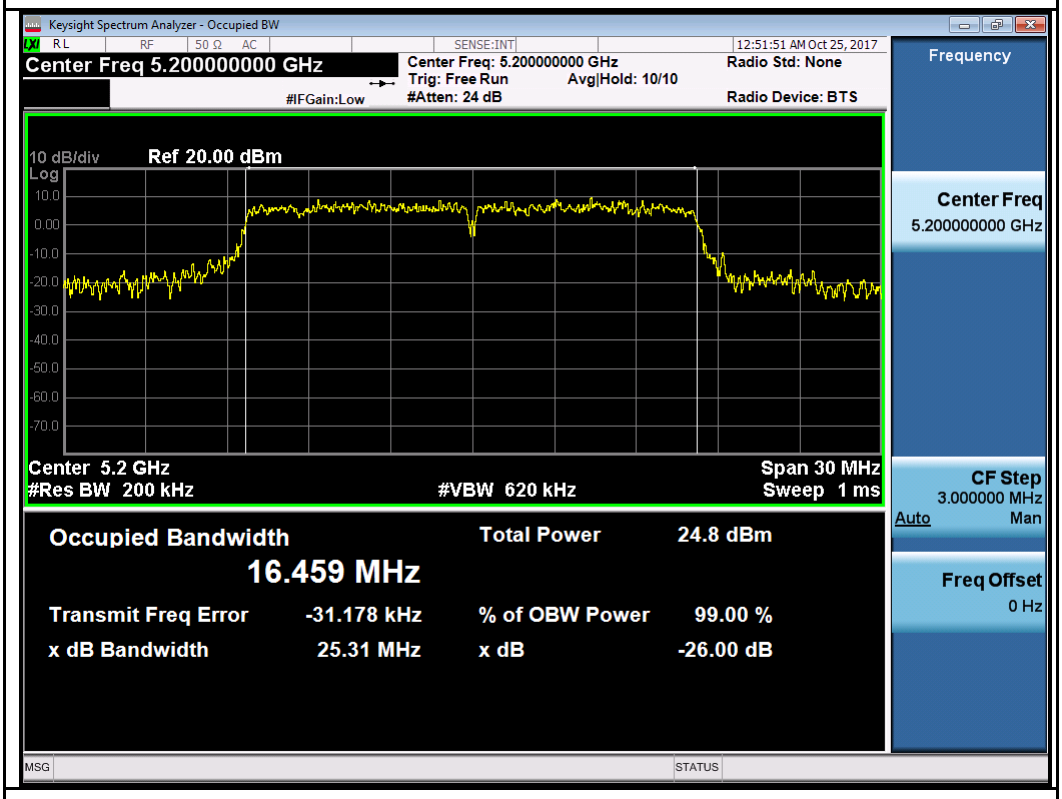
99% Bandwidth Measurement Result for 5.2GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit
99% OBW	802.11a	5180	Low	20.79	-
		5200	Mid	25.31	-
		5240	High	20.85	-
	802.11n-20	5180	Low	20.16	-
		5200	Mid	23.84	-
		5240	High	24.71	-
	802.11n-40	5190	Low	38.94	-
		5230	High	53.26	-
	802.11ac-80	5210	Mid	81.28	-

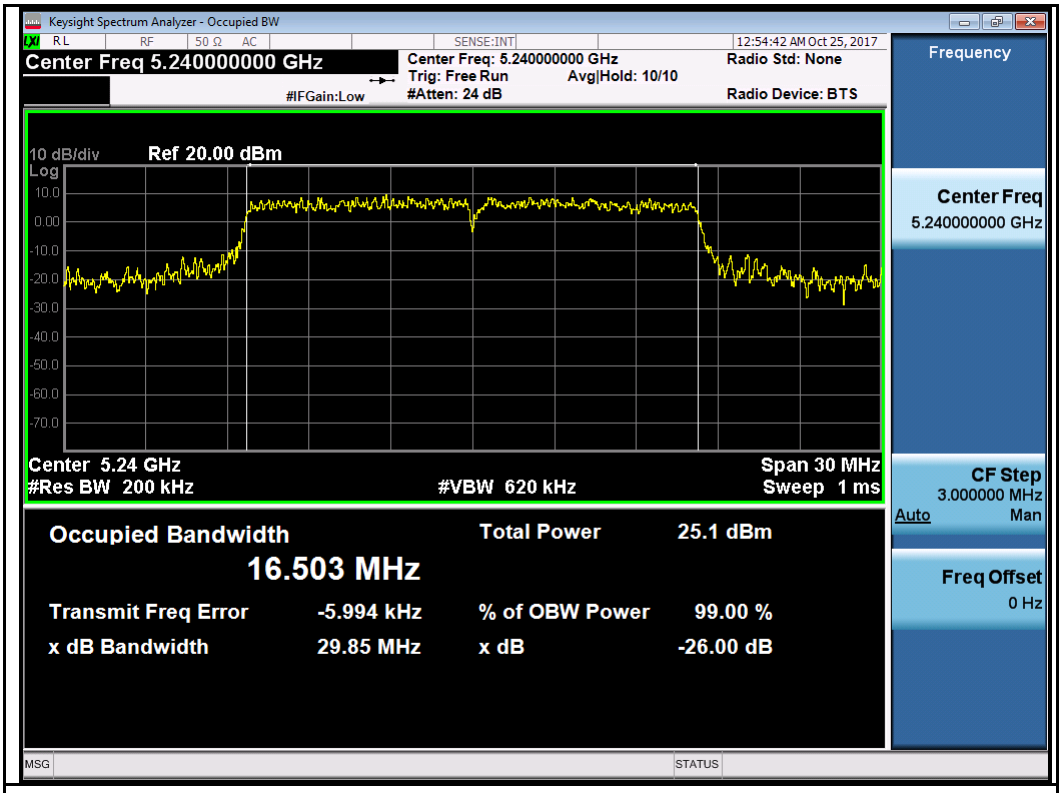
26dB Bandwidth Test Plots
W52:



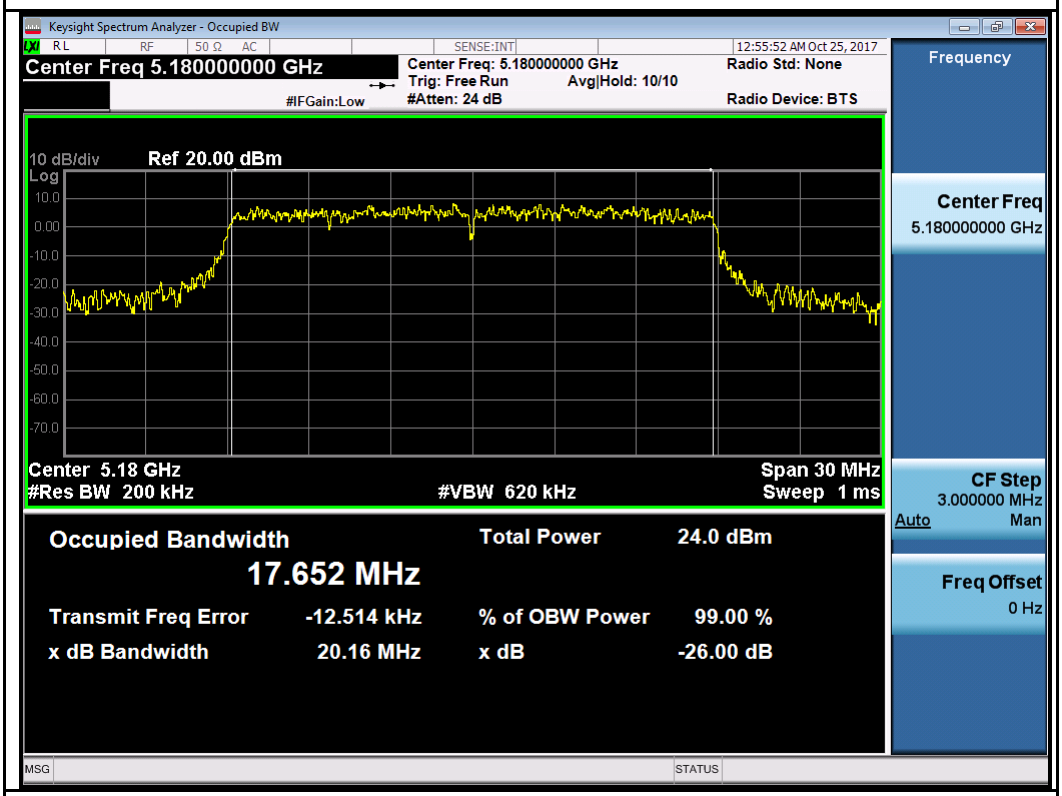
802.11a-5180MHz



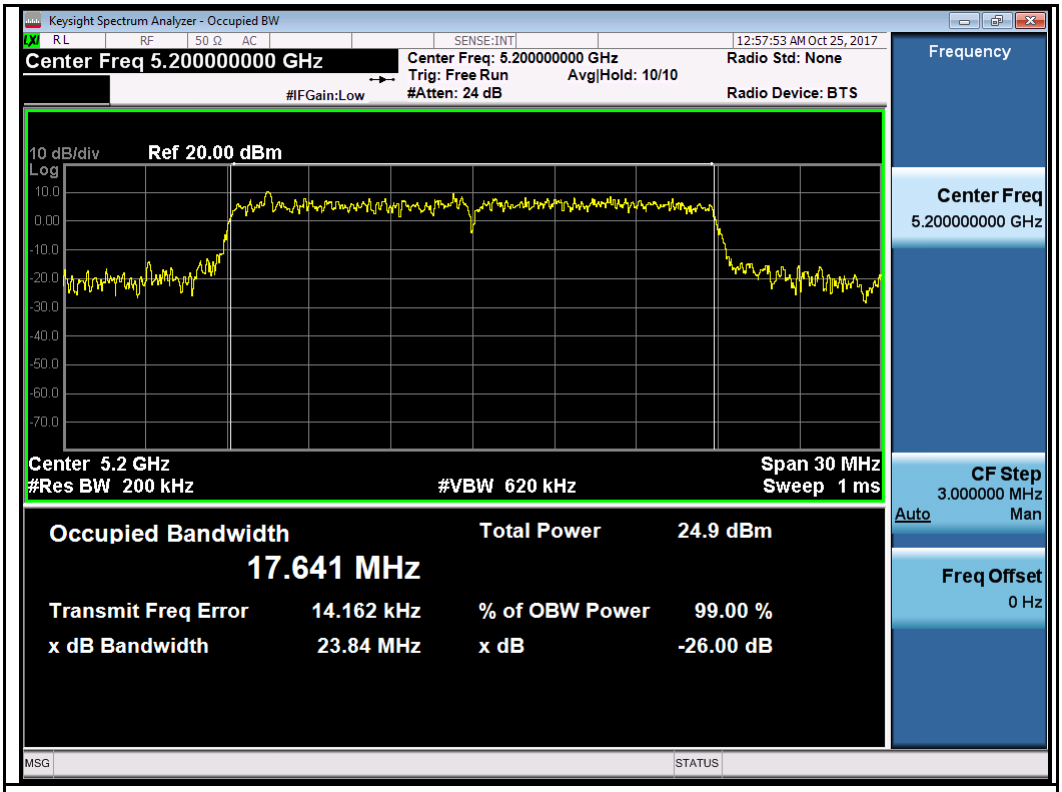
802.11a-5200MHz



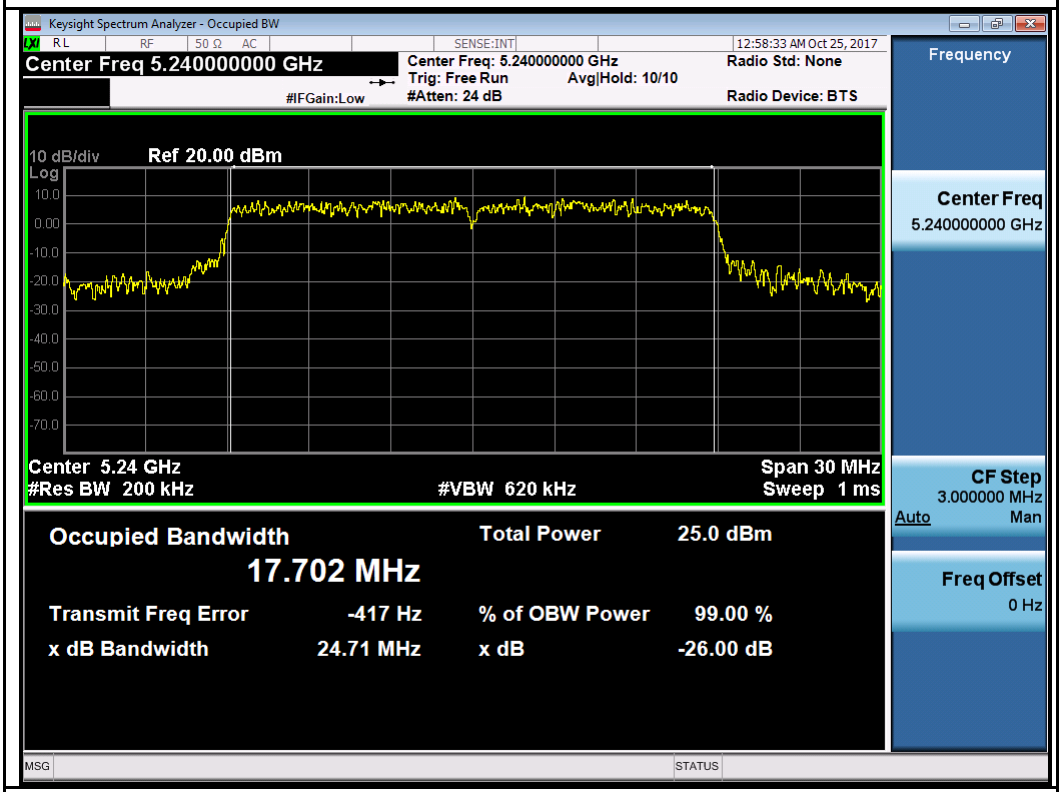
802.11a-5240MHz



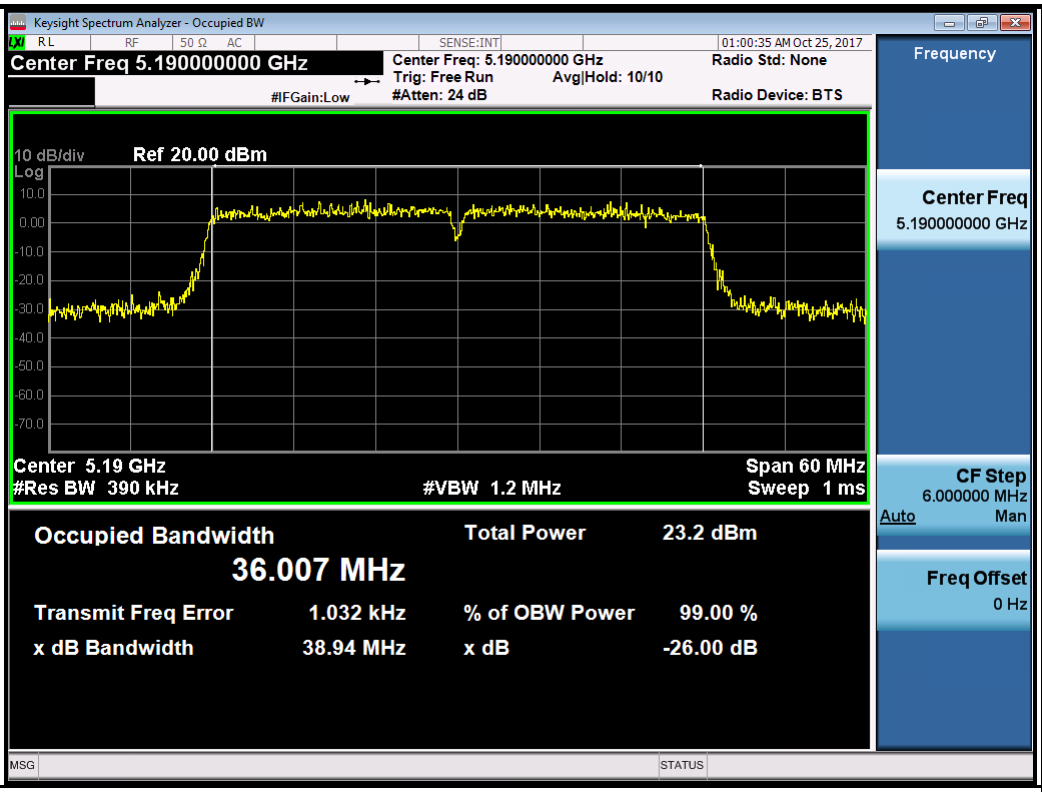
802.11n-HT20-5180MHz



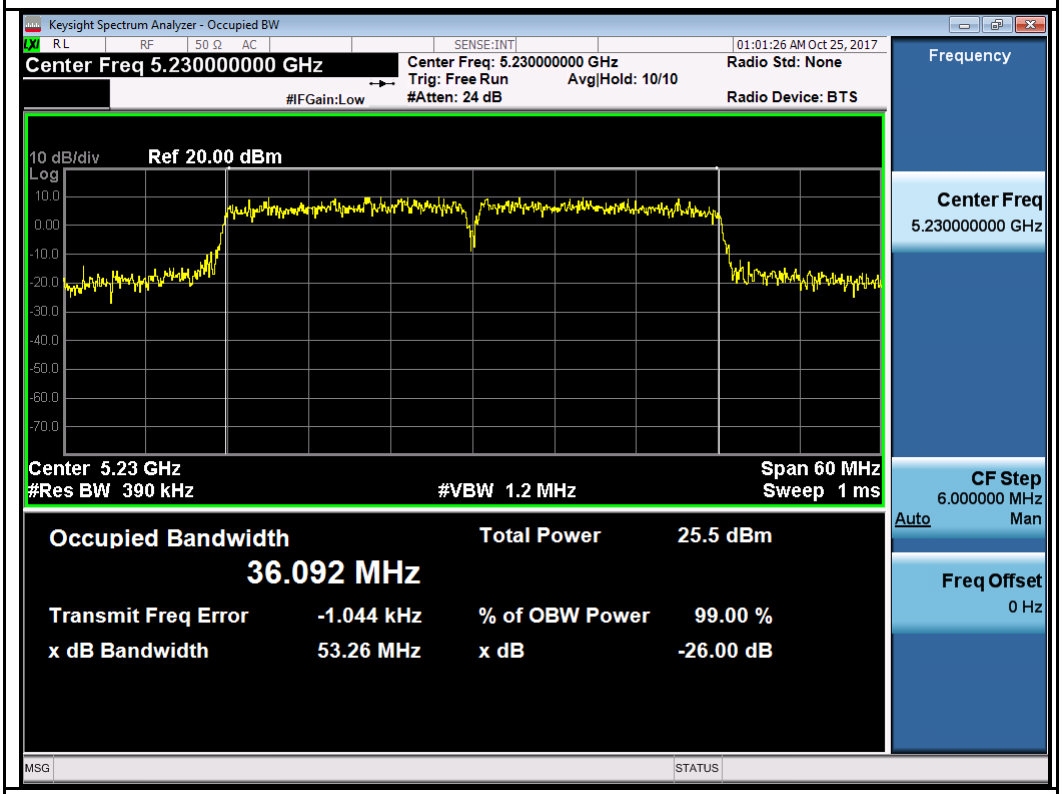
802.11n-HT20-5200MHz



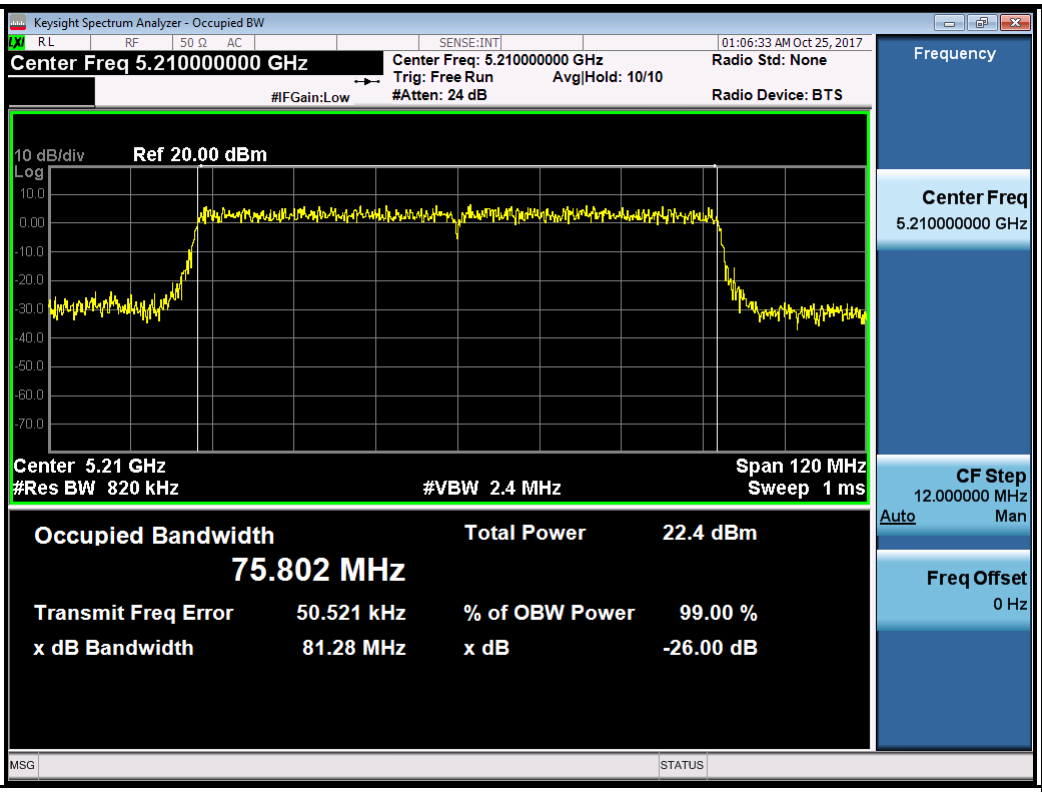
802.11n-HT20-5240MHz



802.11n-HT40-5190MHz

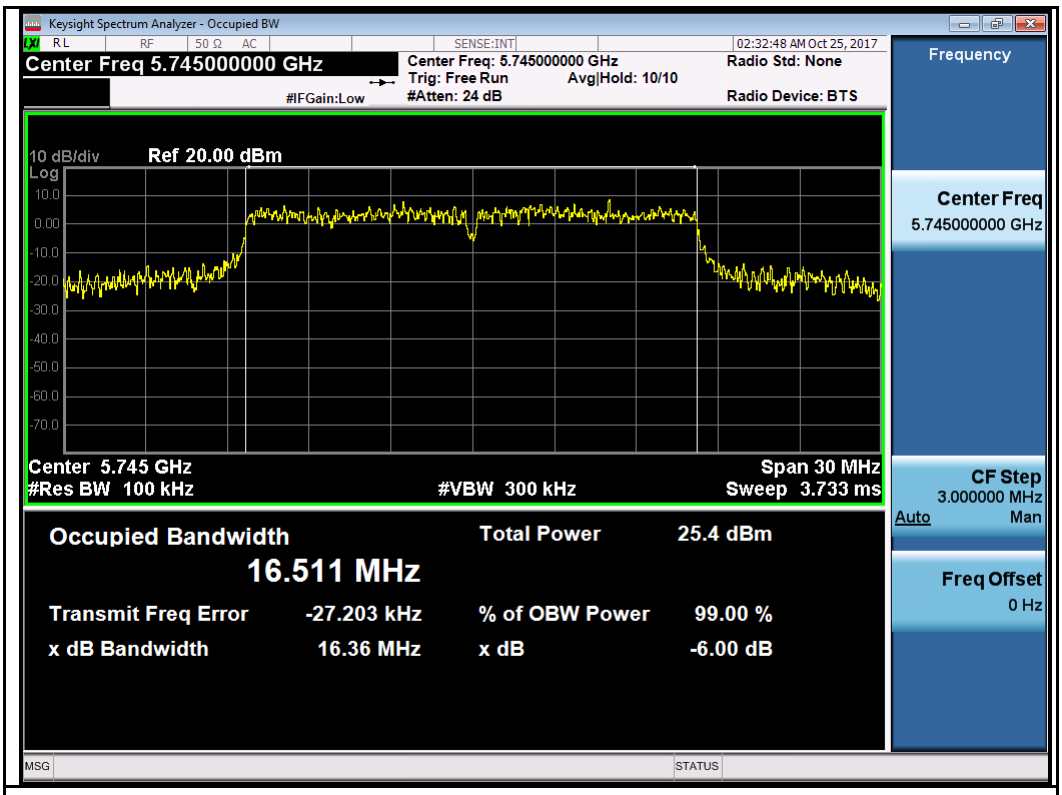


802.11n-HT40-5230MHz

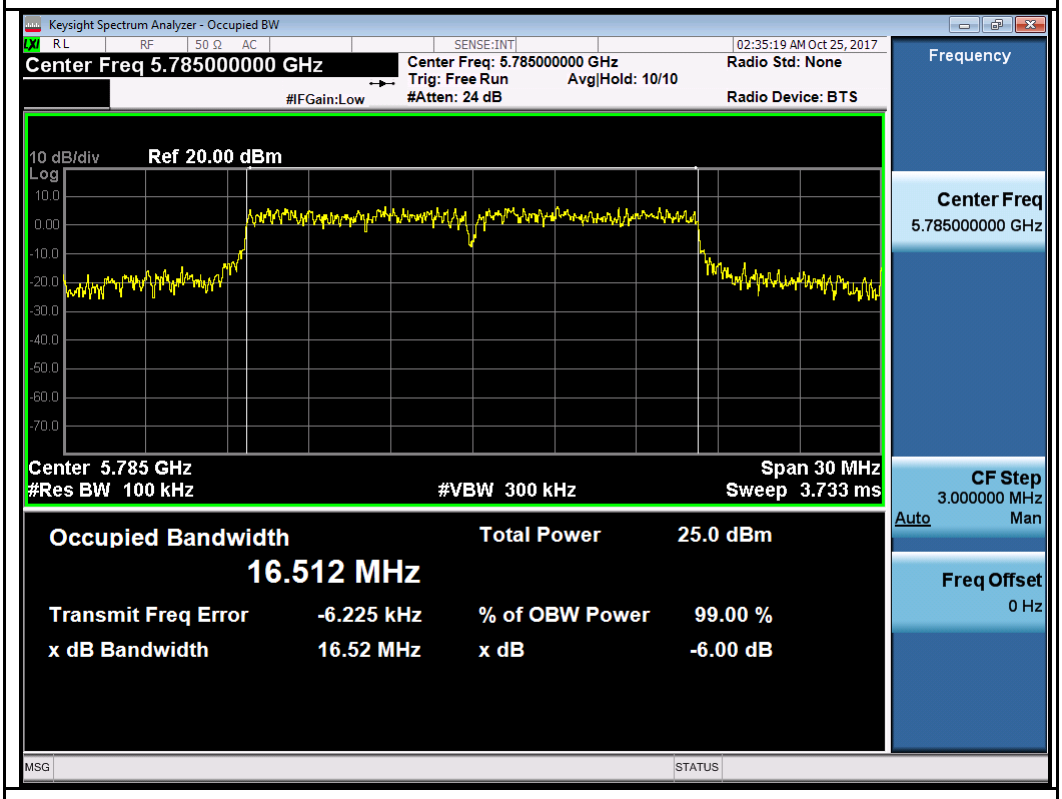


802.11ac-VHT80-5210MHz

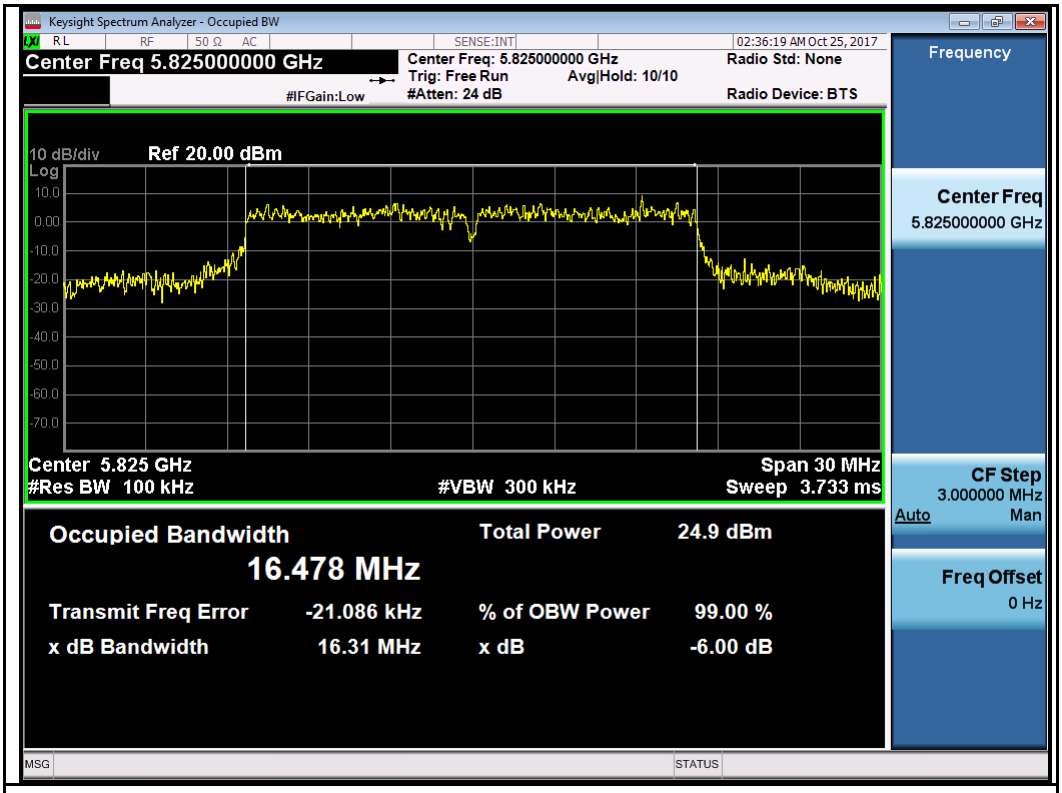
6dB Bandwidth Test Plots
W58:



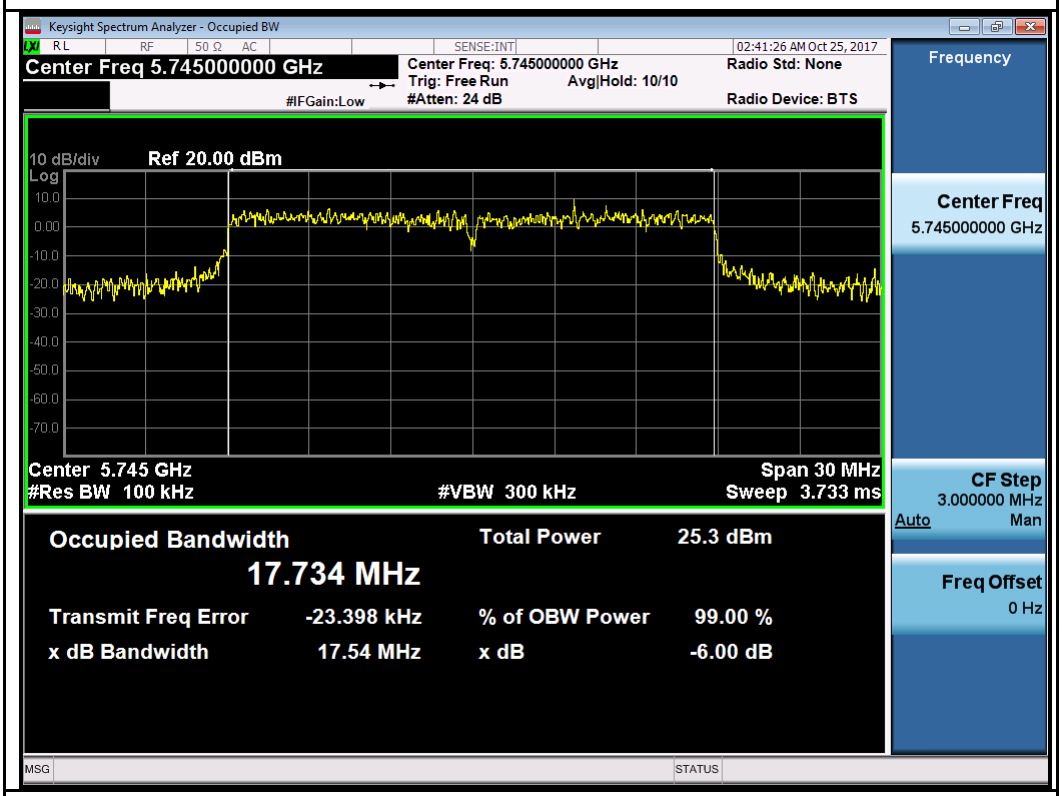
802.11a-5745MHz



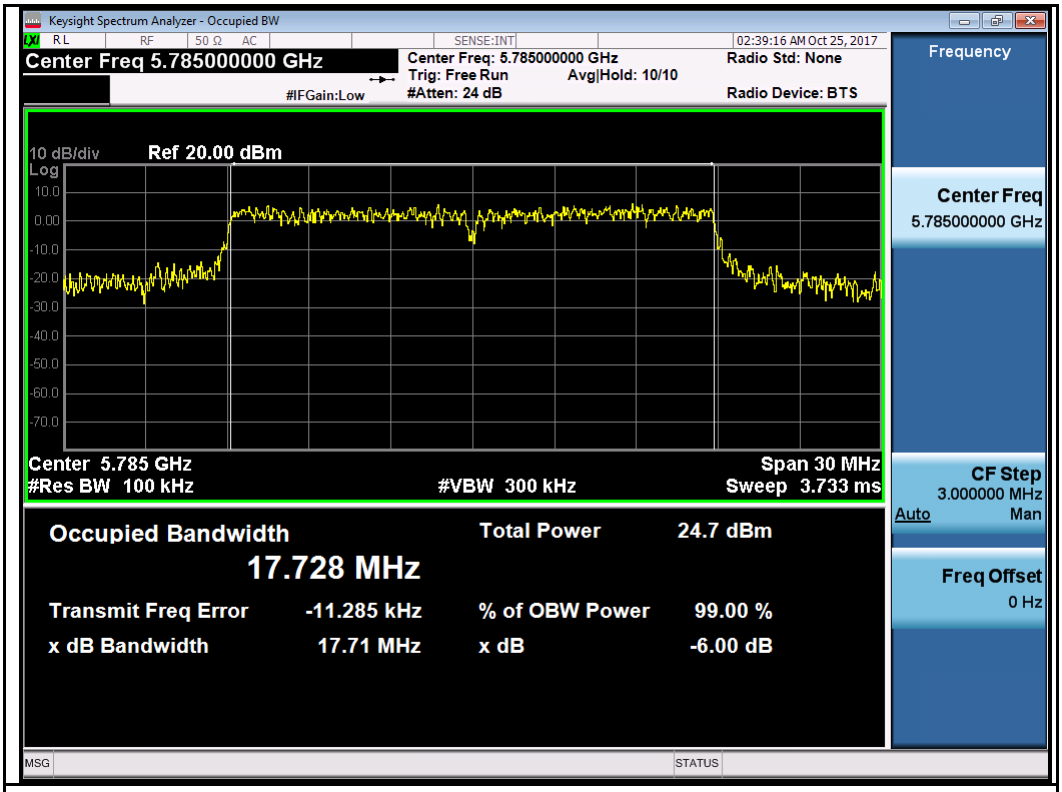
802.11a-5785MHz



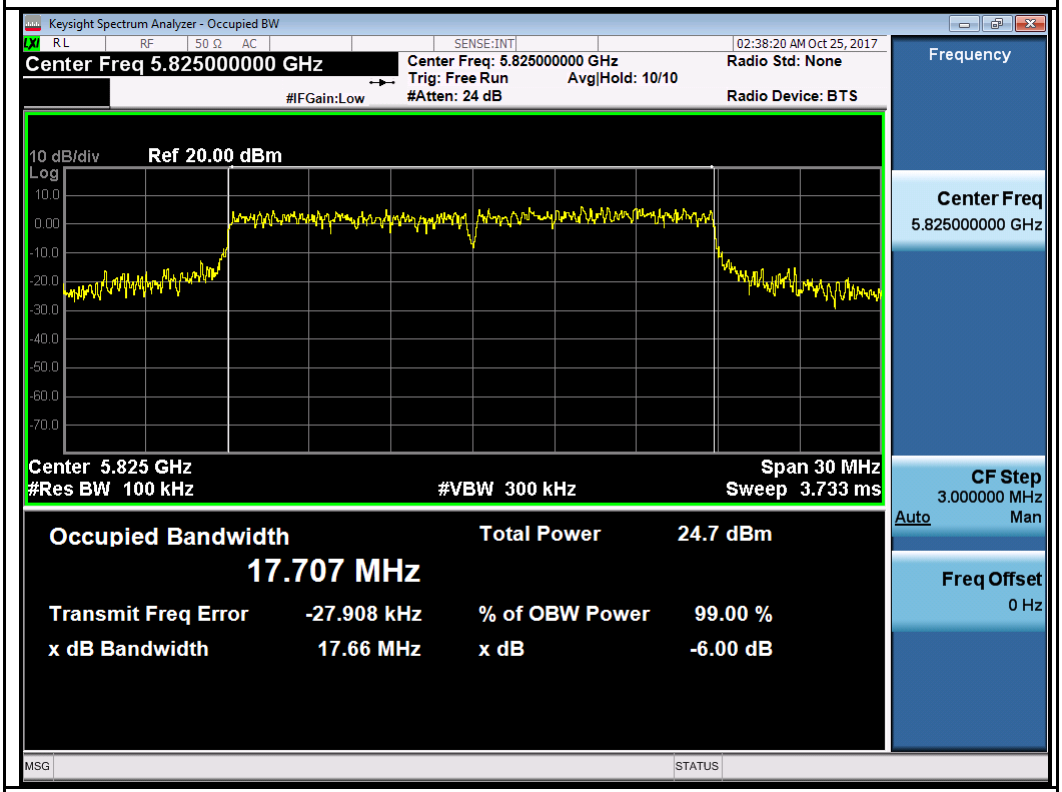
802.11a-5825MHz



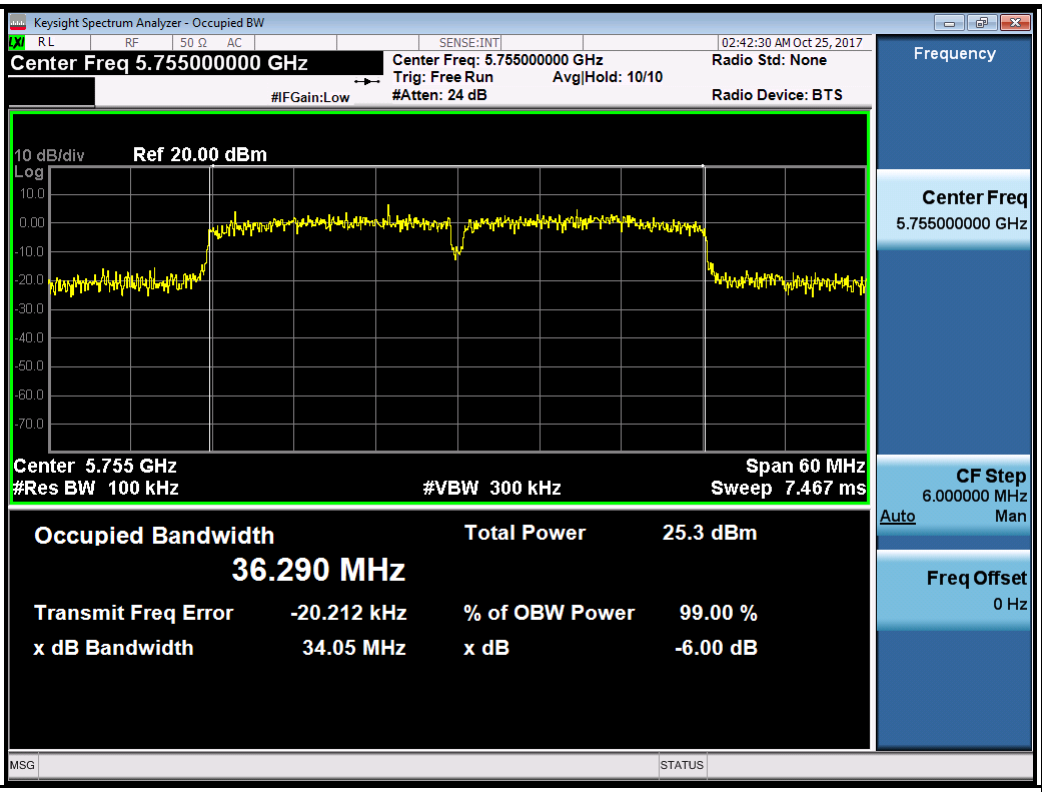
802.11n-HT20-5745MHz



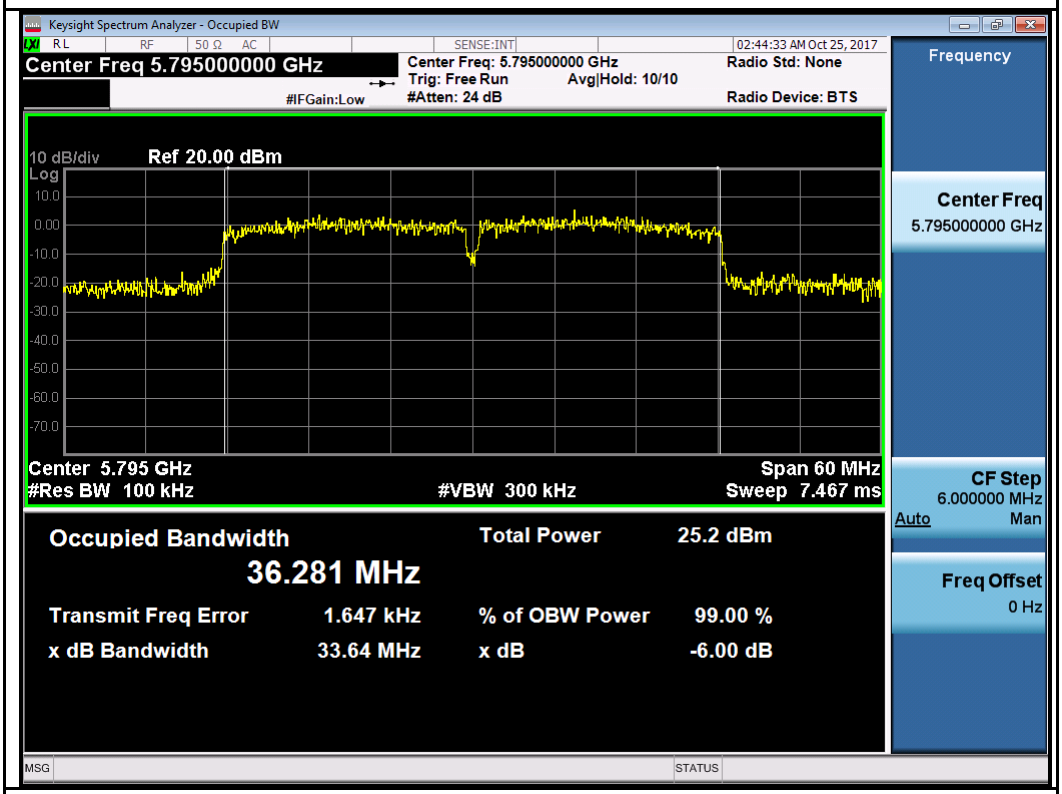
802.11n-HT20-5785MHz



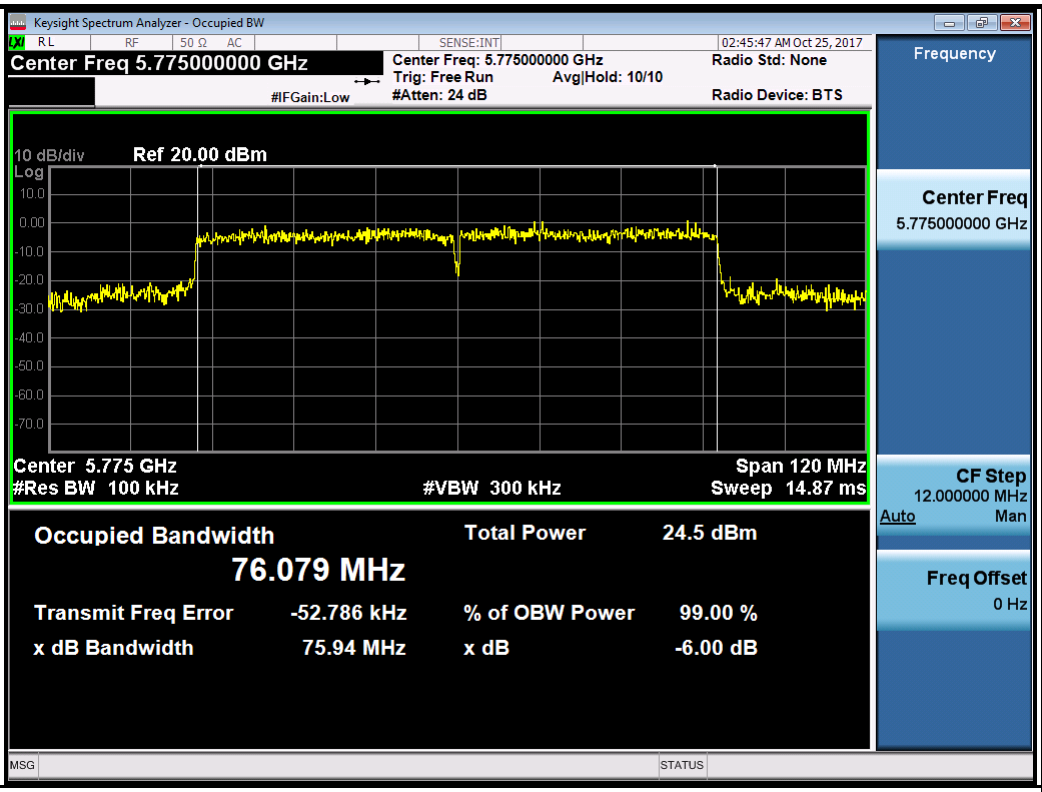
802.11n-HT20-5825MHz



802.11n-HT40-5755MHz



802.11n-HT40-5795MHz

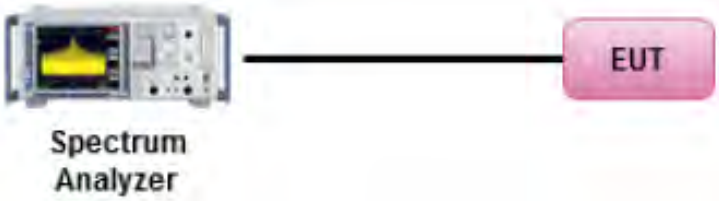


802.11ac-VHT80-5775MHz

10.3 Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	a)(1)(ii)	For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.	☒
	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): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal. (ii) Set RBW = 1 MHz (iii) Set VBW = 3 MHz (iv) Number of points in sweep ≥ 2 × span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.) (v) Sweep time = auto. (vi) Detector = power averaging (rms), if available. Otherwise, use sample detector mode. (vii) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run." (viii) Trace average at least 100 traces in power averaging (rms) mode. (ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.			
Test Date	10/24/2017	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	21°C 40% 1019mbar
Remark	The EUT has two antennas which are cross-polarized, the directional gain=individual gain of each antenna =1dBi.			
Result	☒ Pass ☐ Fail			

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF test site.

Output Power measurement result for 5.2GHz

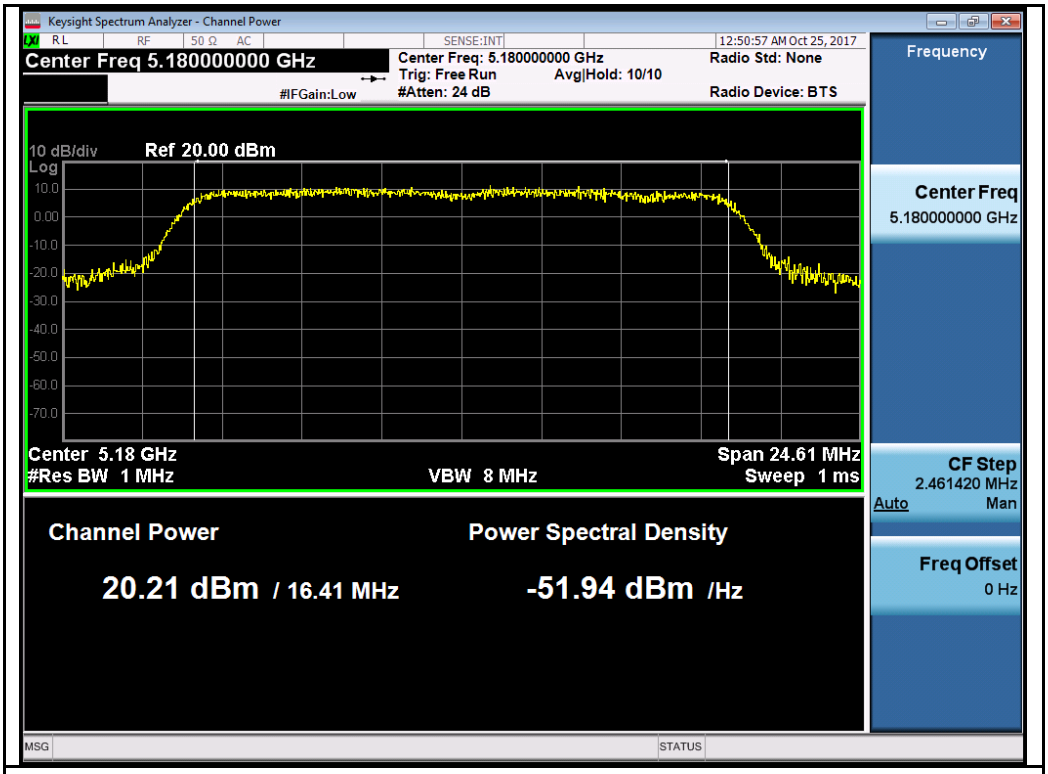
Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain 0	Chain 1	Combined Power		
Output Power	802.11a	5180	Low	20.215	20.287	23.261	30	Pass
		5200	Mid	21.219	21.396	24.319	30	Pass
		5240	High	21.684	21.392	24.551	30	Pass
	802.11n-20M	5180	Low	20.504	20.224	23.376	30	Pass
		5200	Mid	21.590	21.447	24.529	30	Pass
		5240	High	21.651	21.635	24.653	30	Pass
	802.11n-40M	5190	Low	19.863	19.424	22.659	30	Pass
		5230	High	22.193	22.237	25.225	30	Pass
	802.11ac-80M	5210	-	19.340	19.713	22.541	30	Pass

Output Power Measurement Results for 5.8GHz

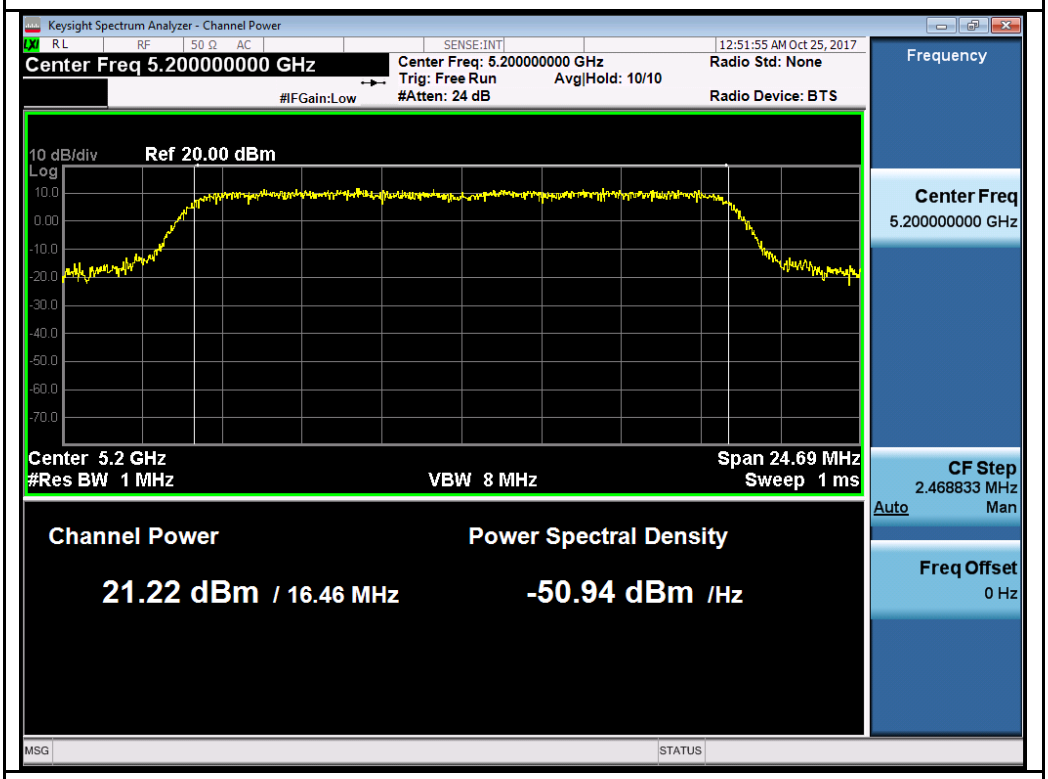
Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain 0	Chain 1	Combined Power		
Output Power	802.11a	5745	Low	21.529	21.468	24.509	30	Pass
		5785	Mid	21.297	21.323	24.321	30	Pass
		5825	High	21.029	21.233	24.142	30	Pass
	802.11n-20M	5745	Low	21.506	21.317	24.423	30	Pass
		5785	Mid	21.195	20.927	24.073	30	Pass
		5825	High	21.068	20.886	23.988	30	Pass
	802.11n-40M	5755	Low	21.786	22.083	24.948	30	Pass
		5795	Mid	21.889	21.710	24.811	30	Pass
	802.11ac-80M	5775	-	20.208	21.097	23.686	30	Pass

Test Plot for W52:

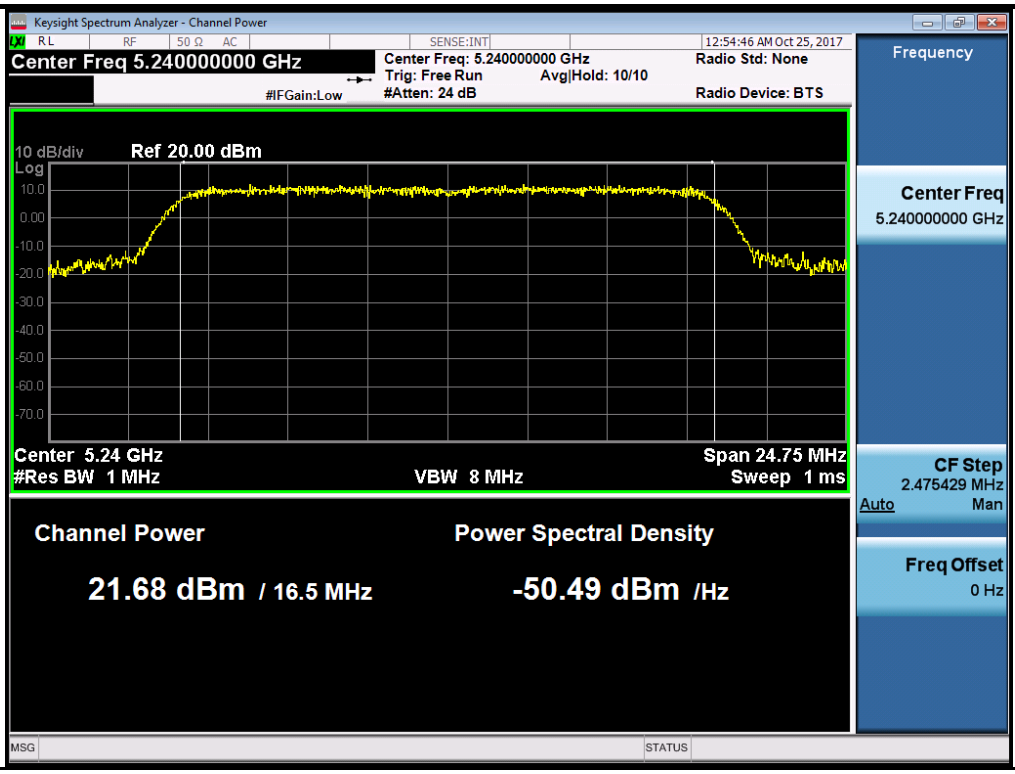
Chain 0:



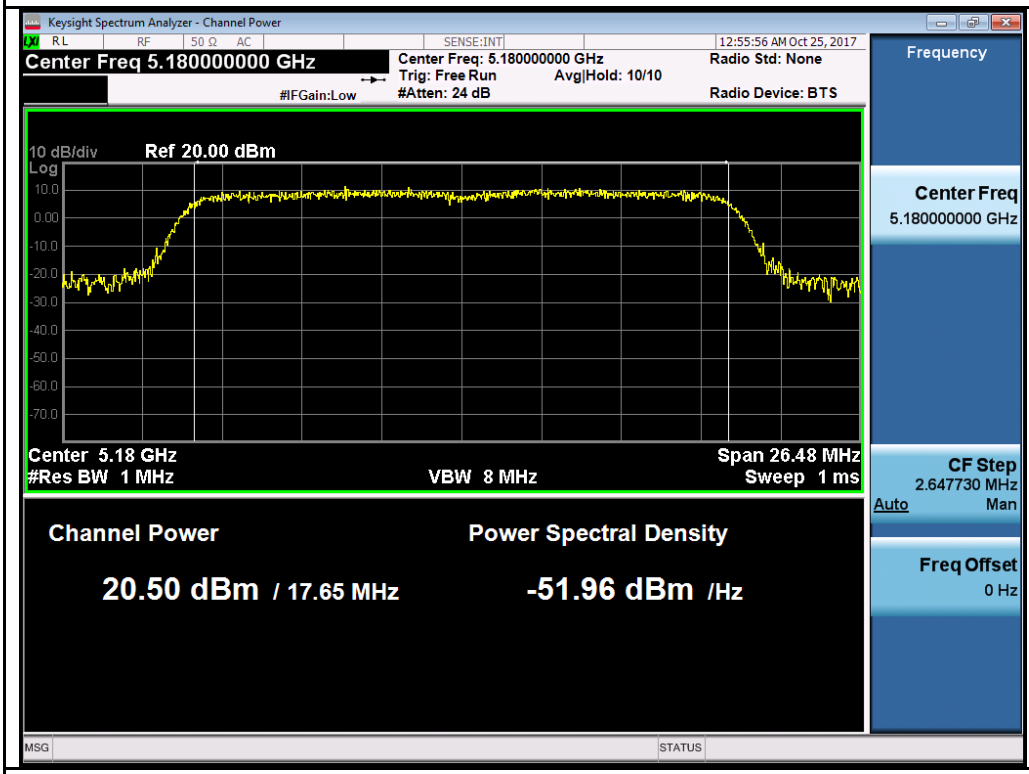
802.11a-5180M



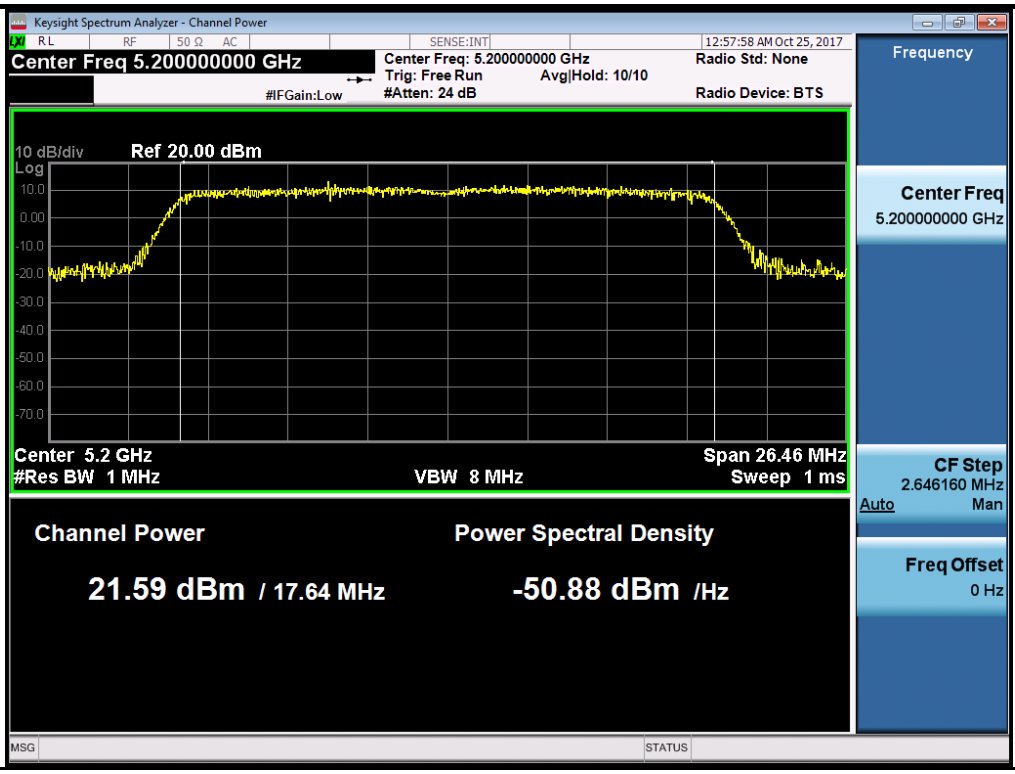
802.11a-5200M



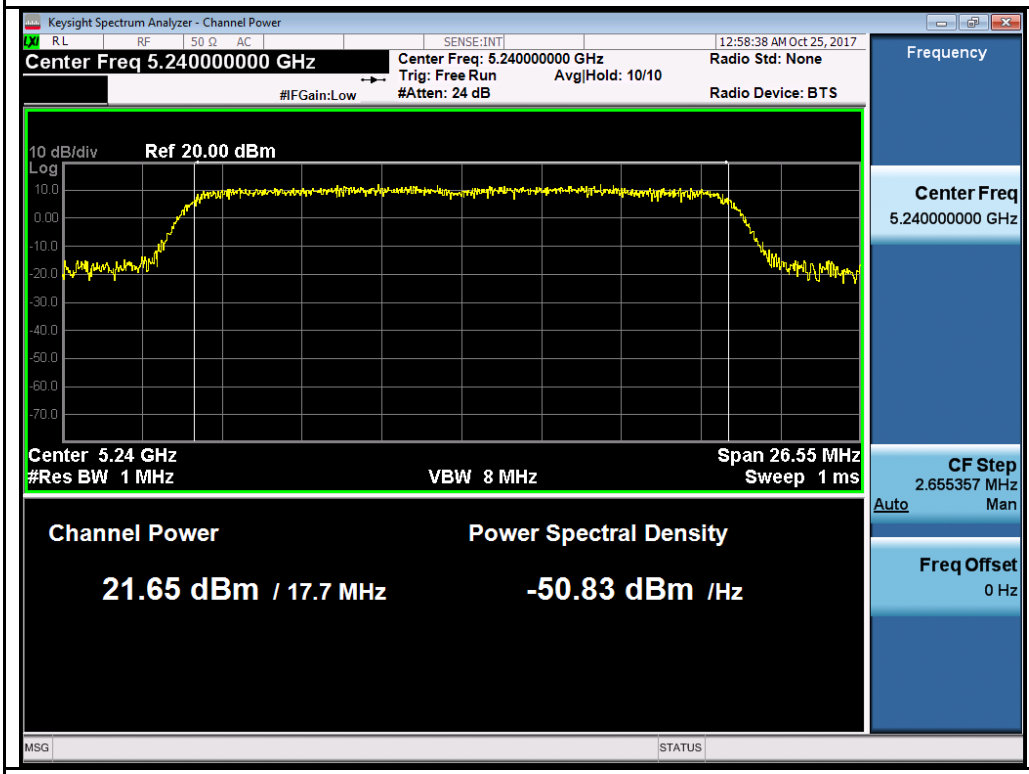
802.11a-5240M



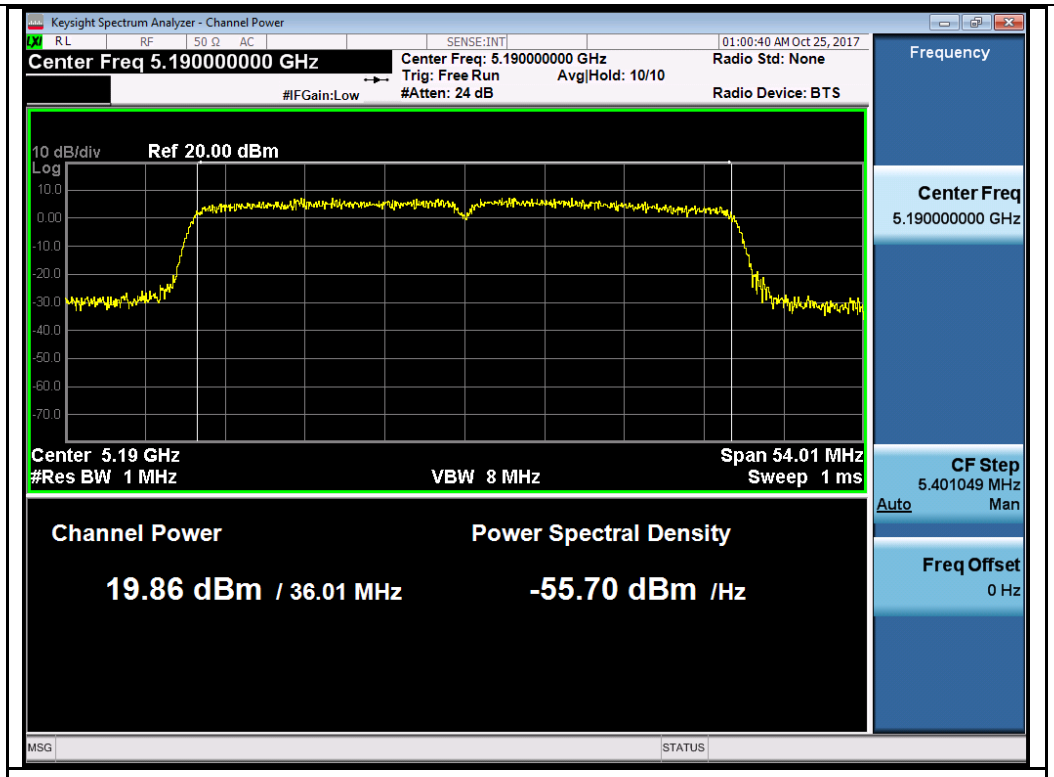
802.11n-HT20 5180M



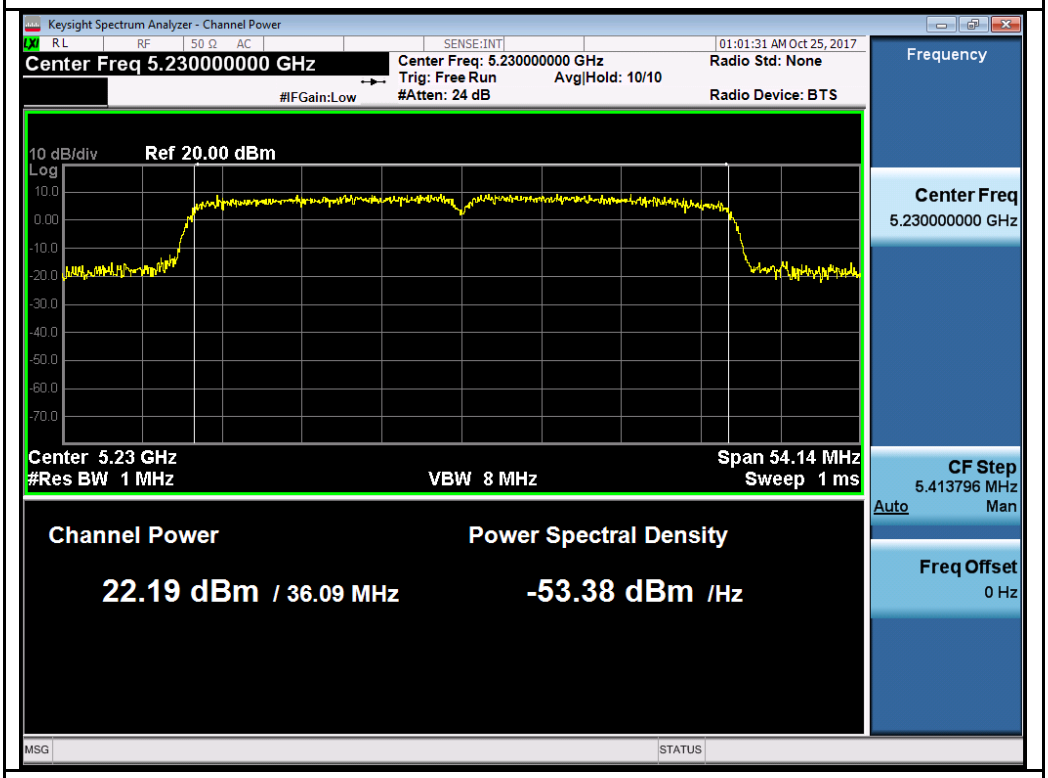
802.11n-HT20 5200M



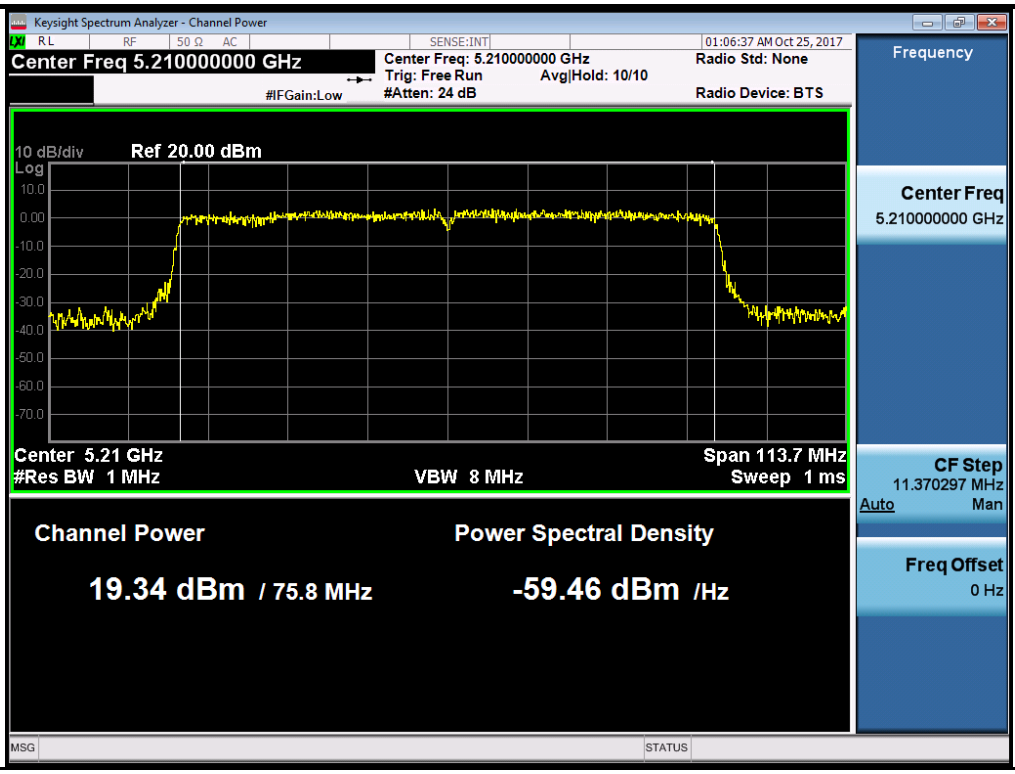
802.11n-HT20 5240M



802.11n-HT40 5190M

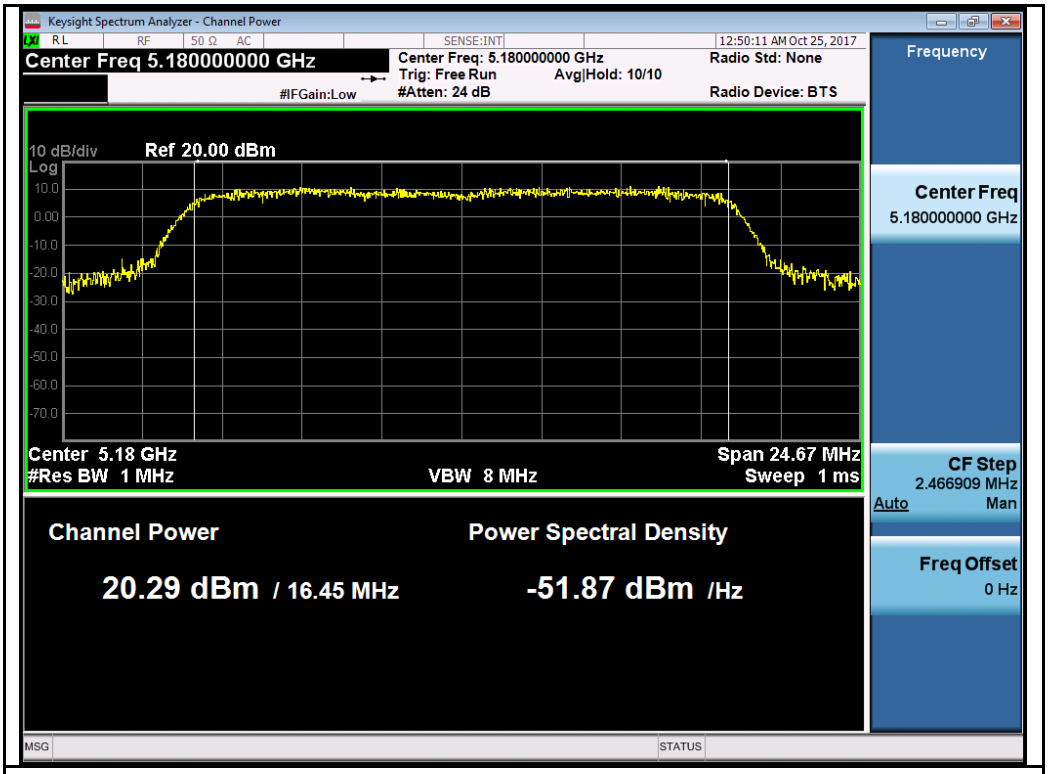


802.11n-HT40 5230M

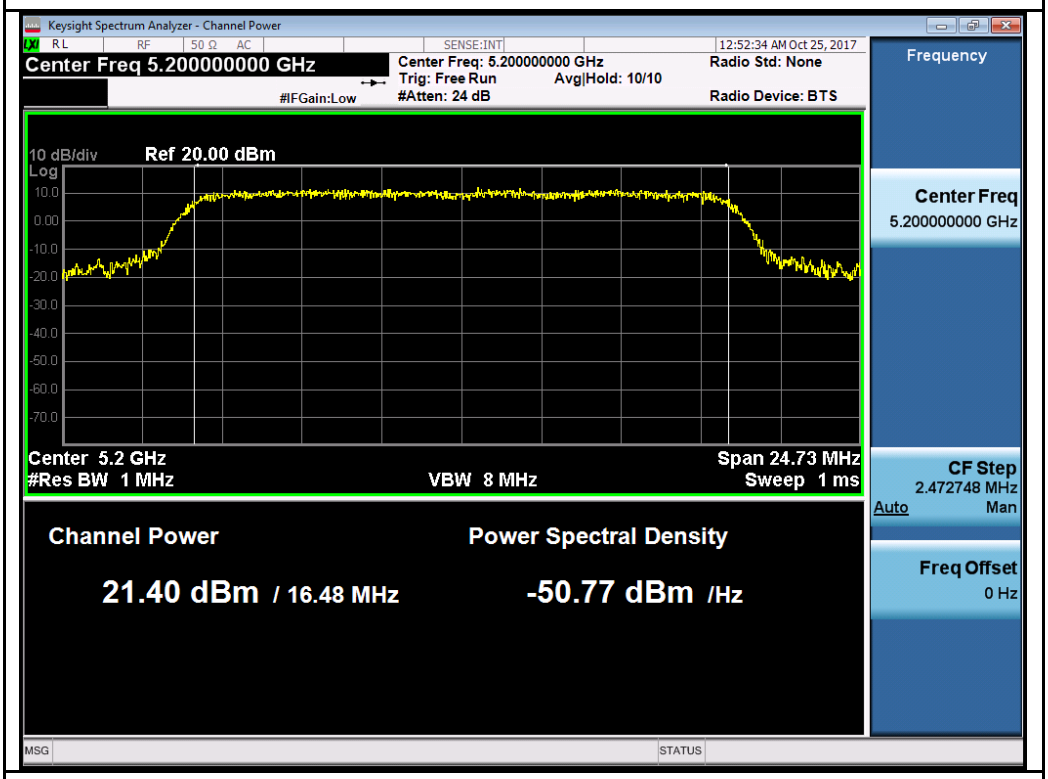


802.11ac-VHT80 5210M

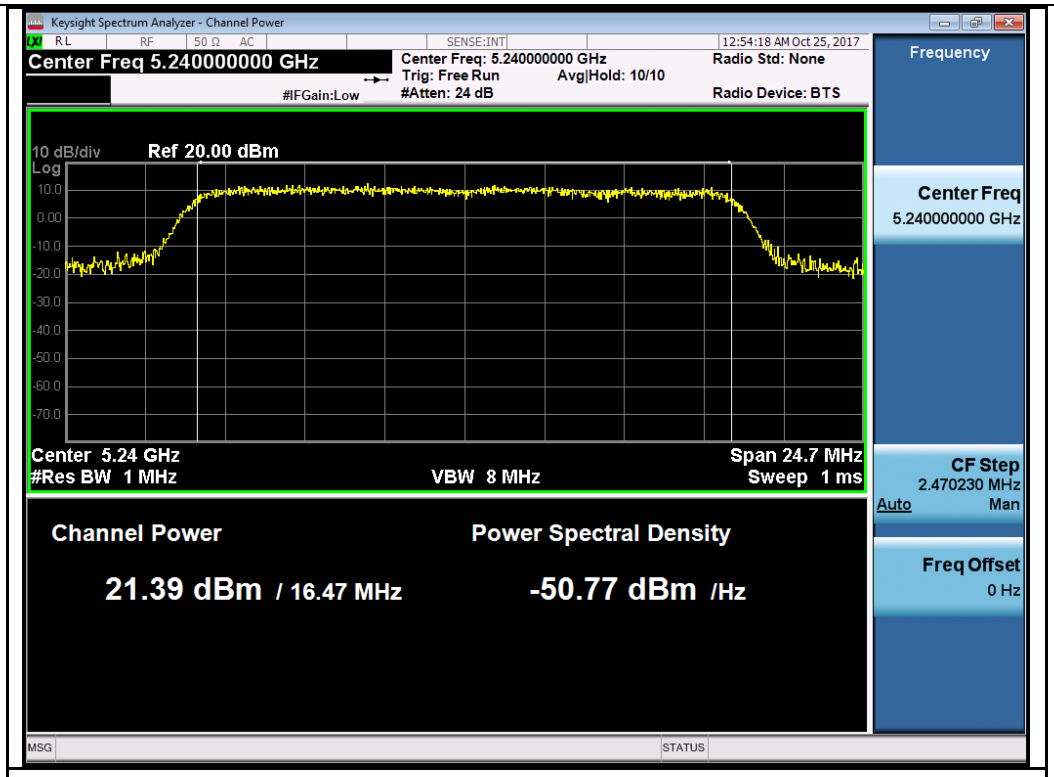
Chain 1:



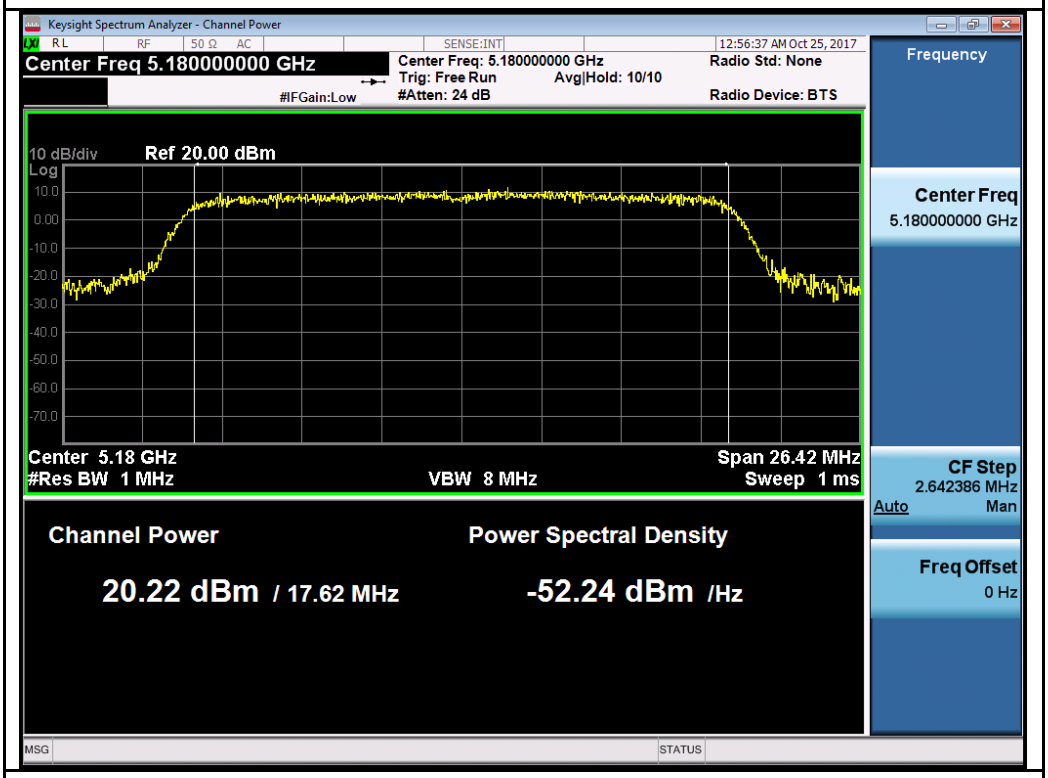
802.11a-5180M



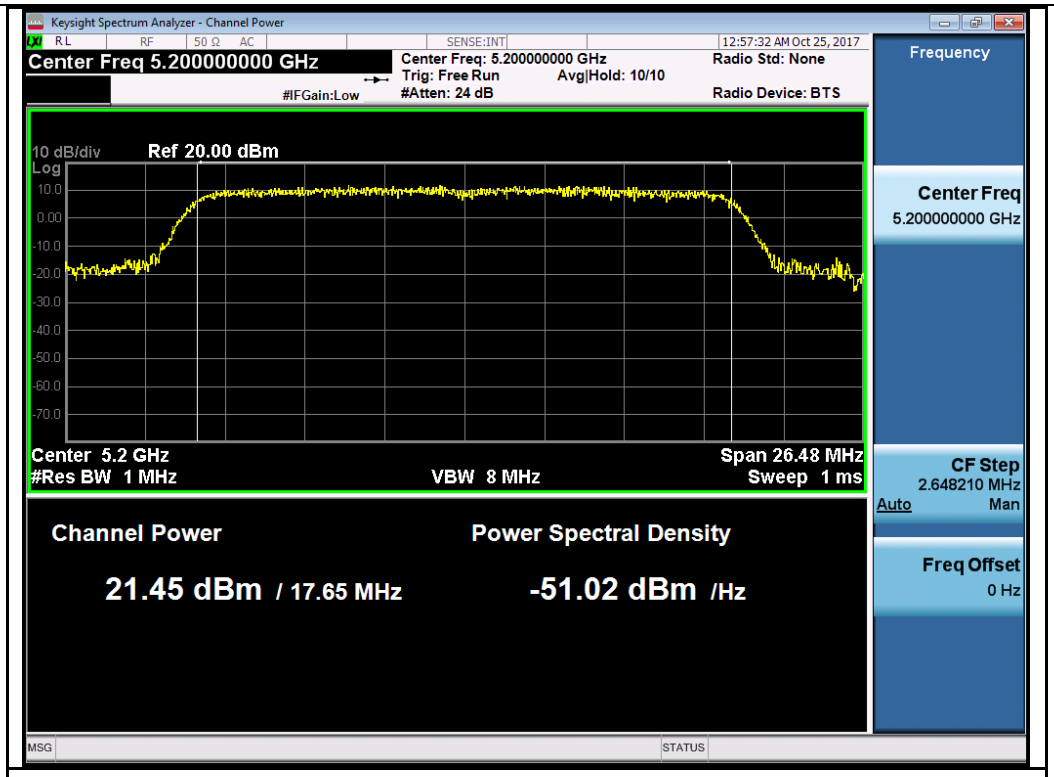
802.11a-5200M



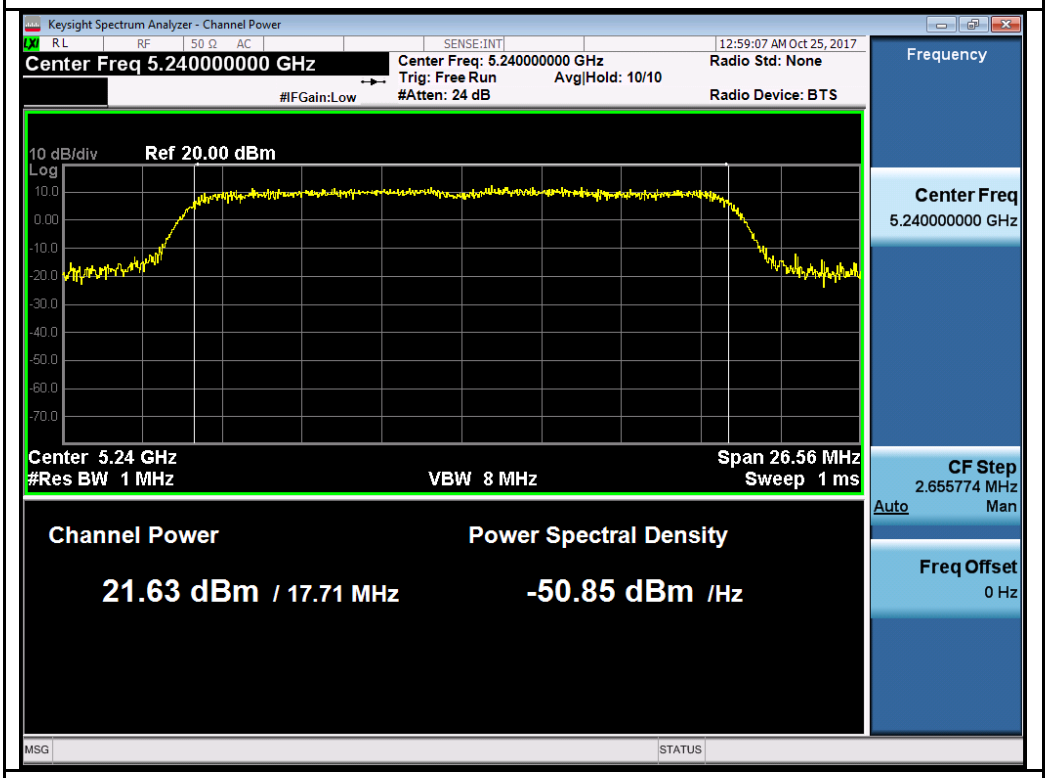
802.11a-5240M



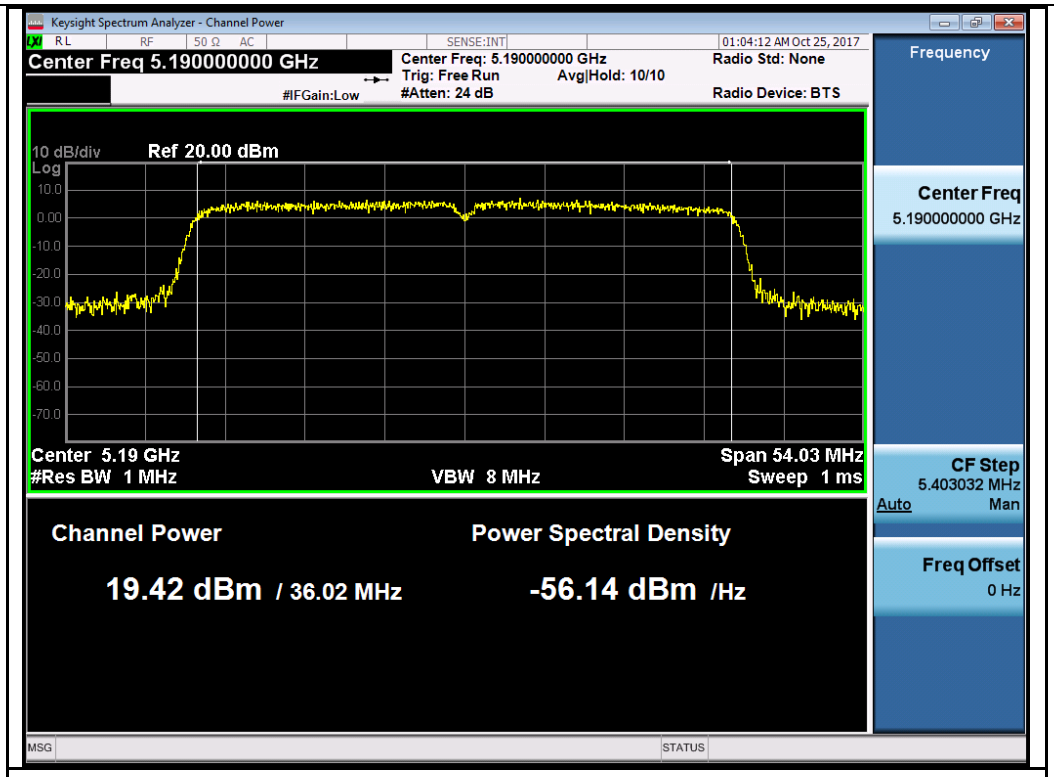
802.11n-HT20 5180M



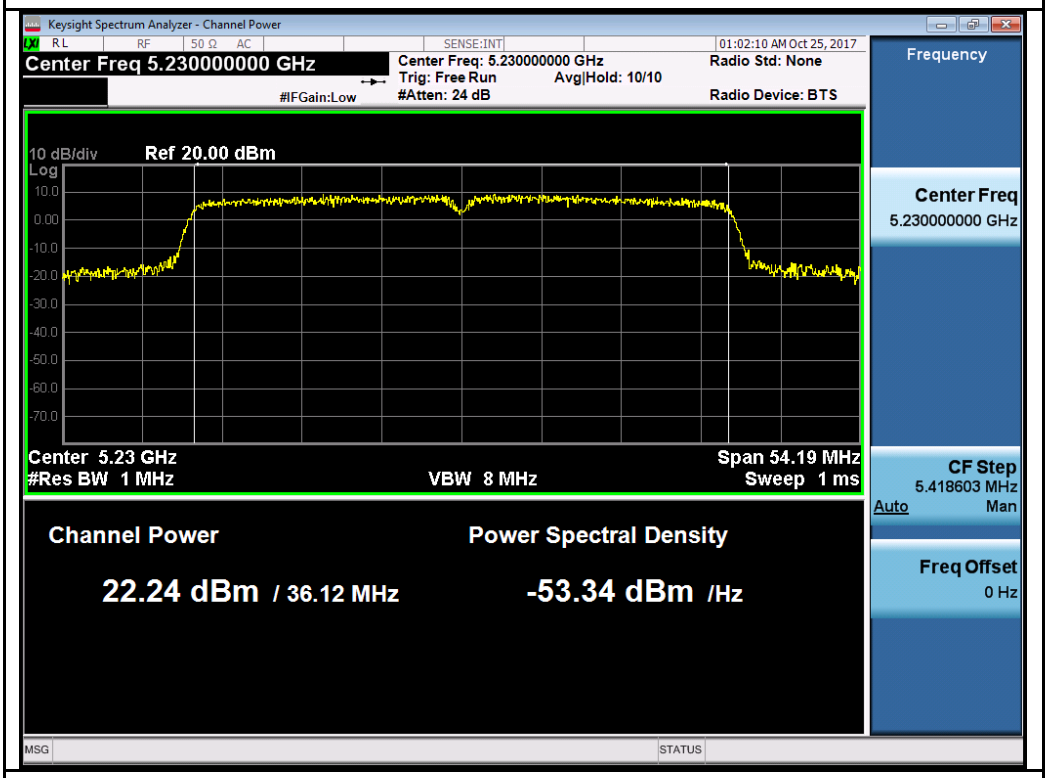
802.11n-HT20 5200M



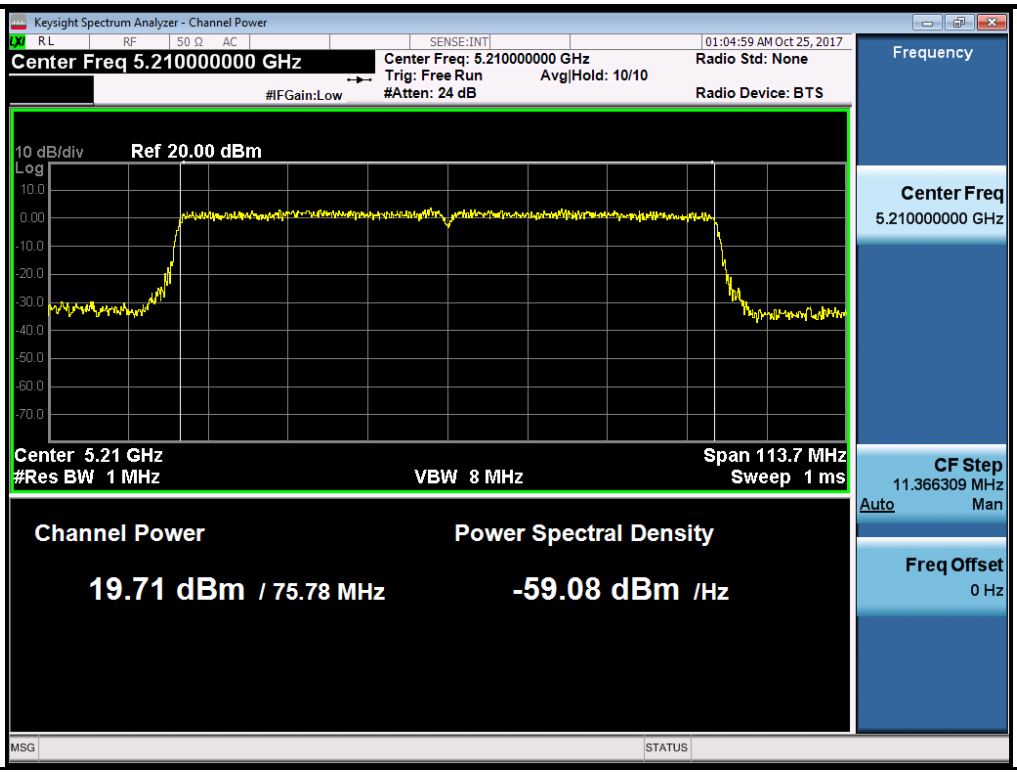
802.11n-HT20 5240M



802.11n-HT40 5190M



802.11n-HT40 5230M



802.11ac-VHT80 5210M

Test Plot for W58:

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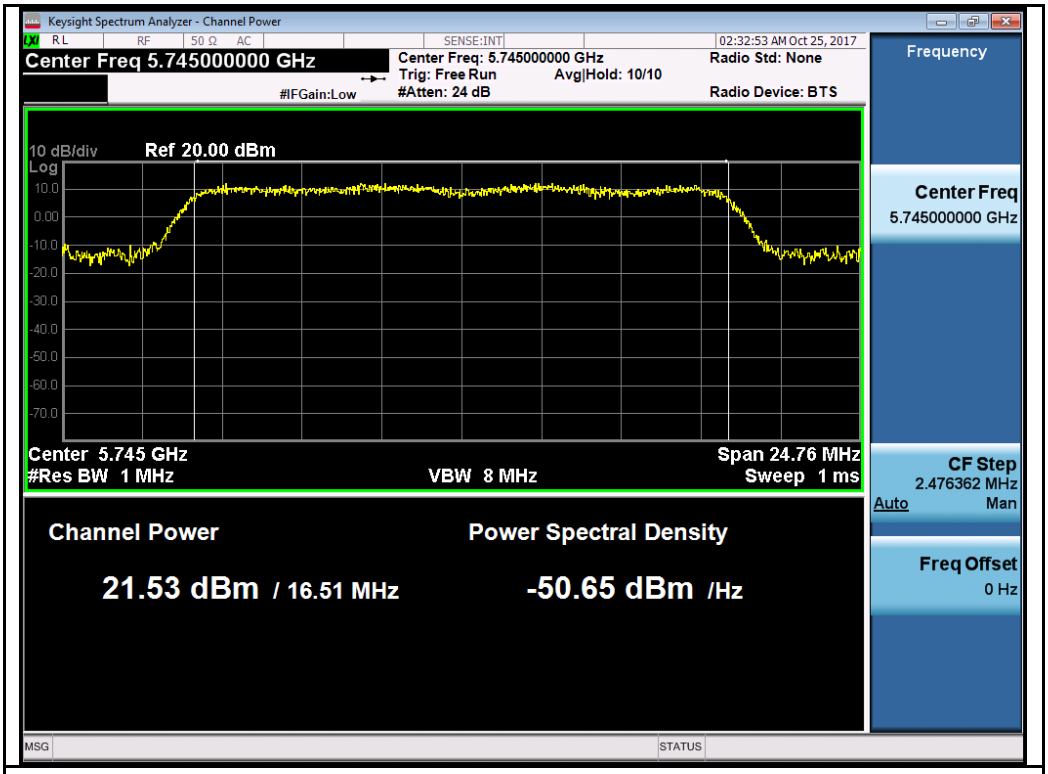
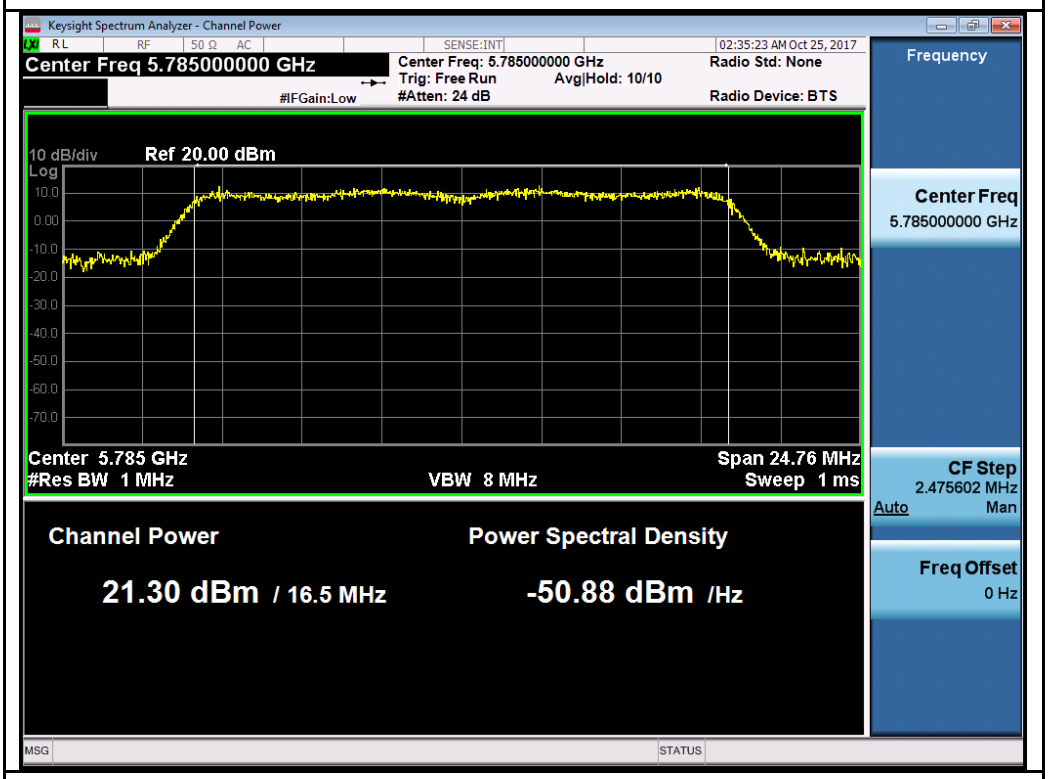
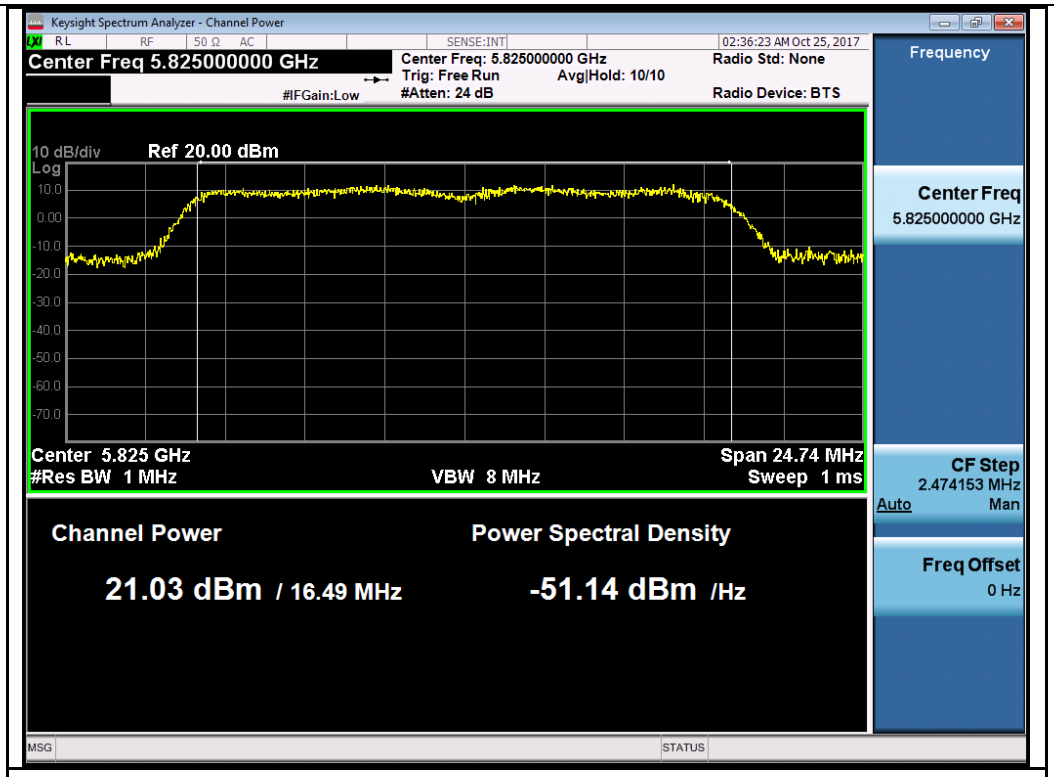


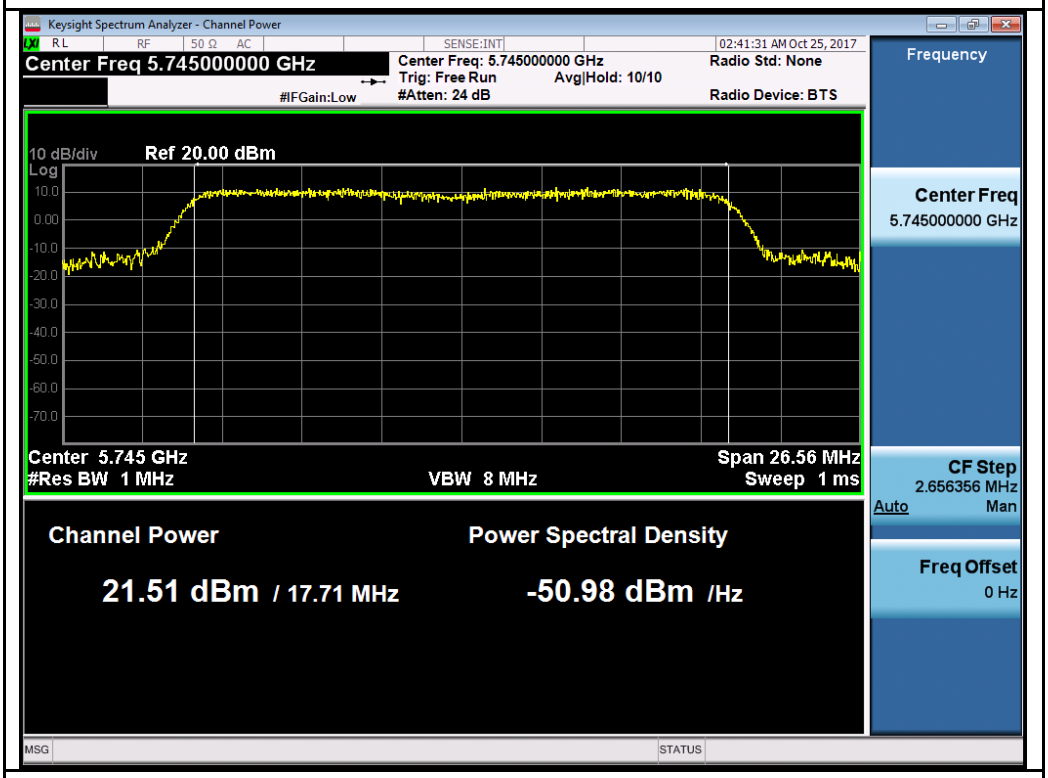
802.11a-5745M



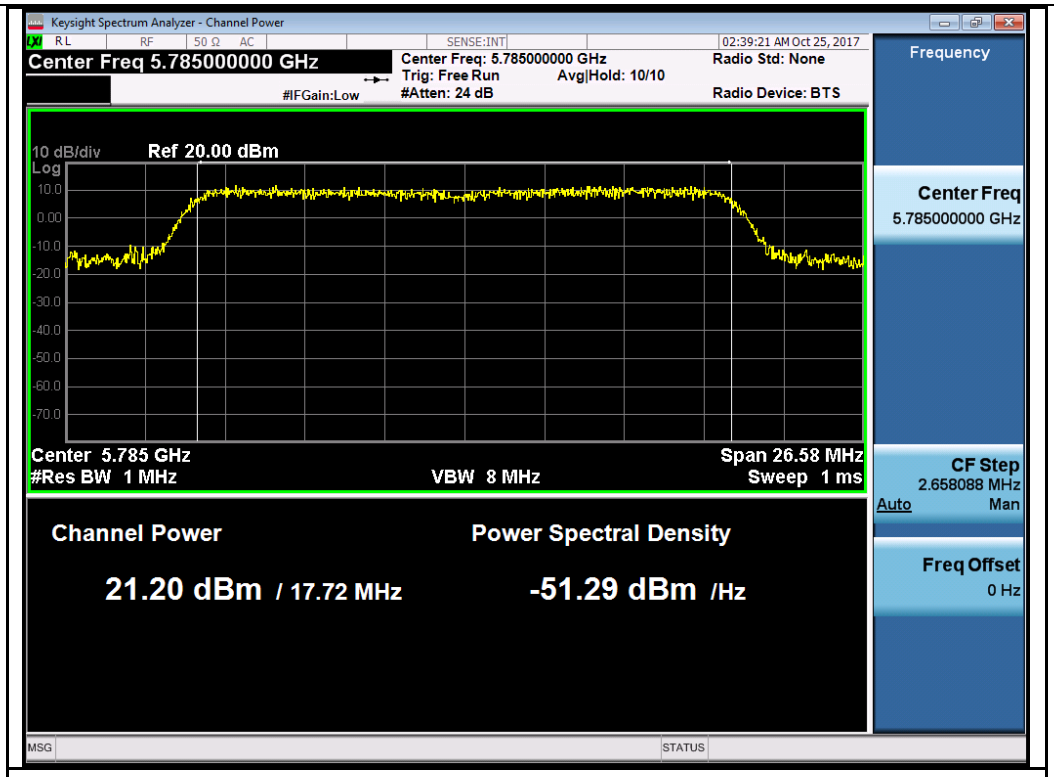
802.11a-5785M



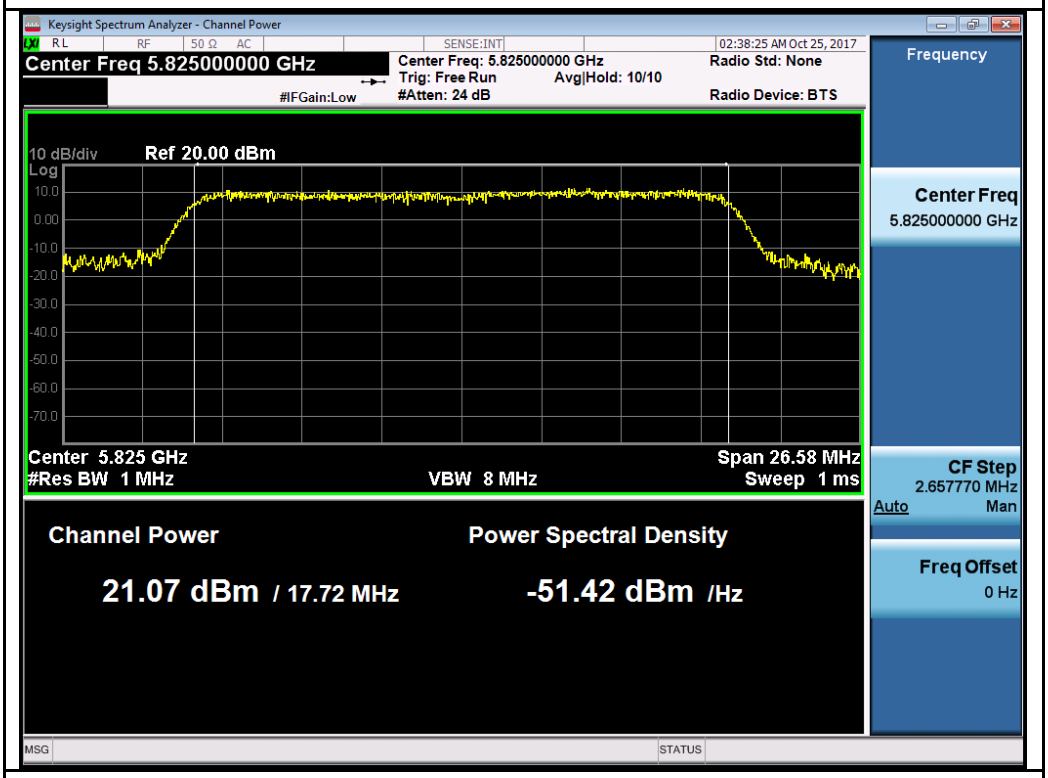
802.11a-5825M



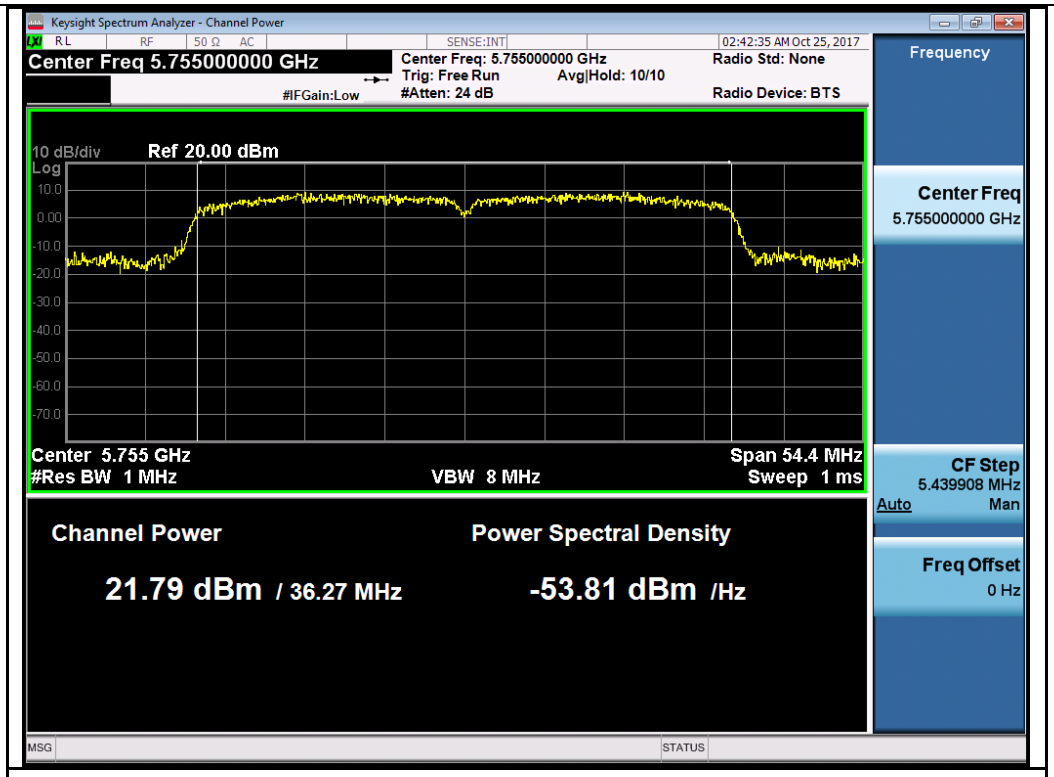
802.11n-HT20 5745M



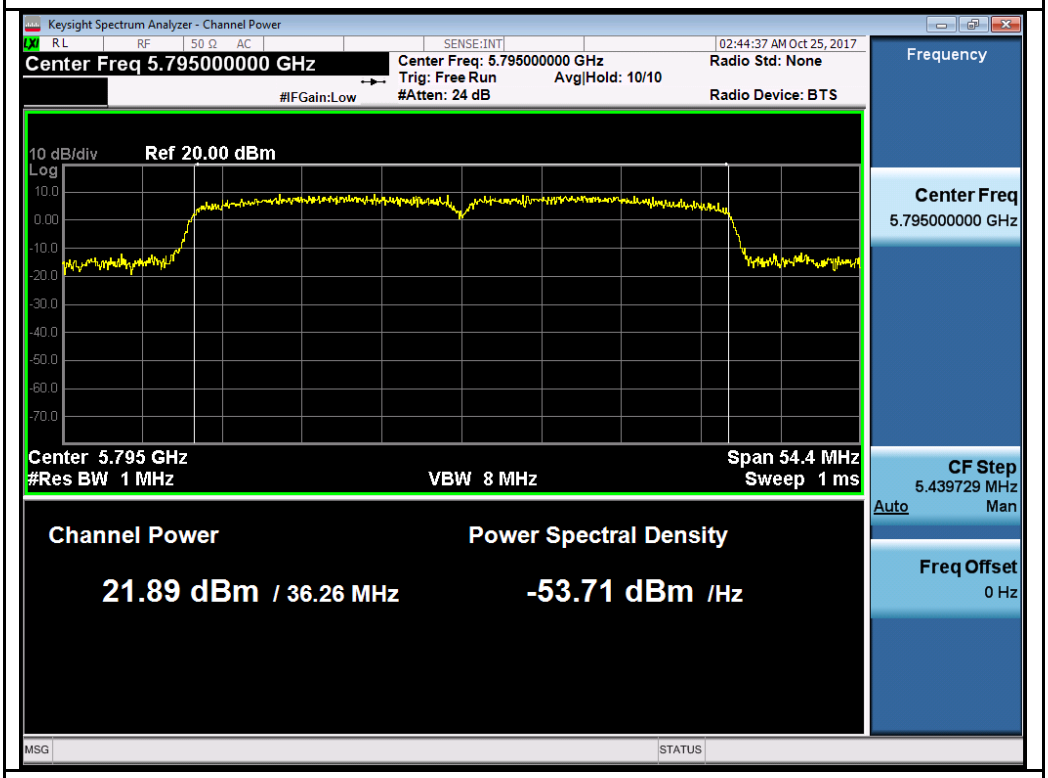
802.11n-HT20 5785M



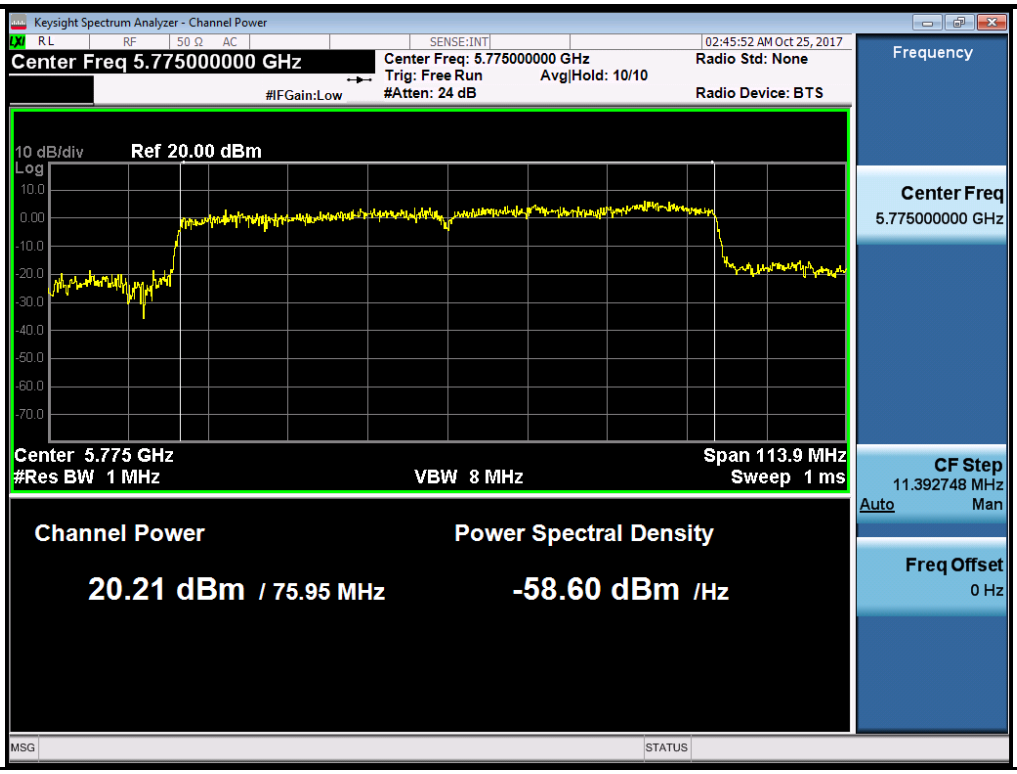
802.11n-HT20 5825M



802.11n-HT40 5755M

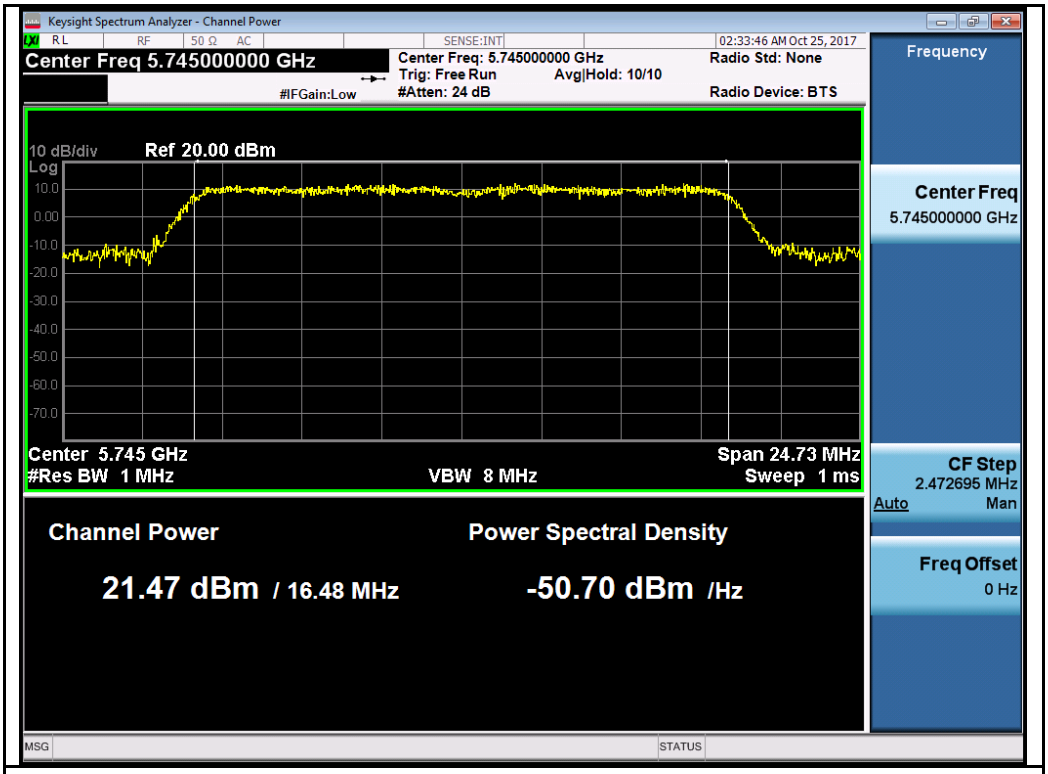


802.11n-HT40 5795M

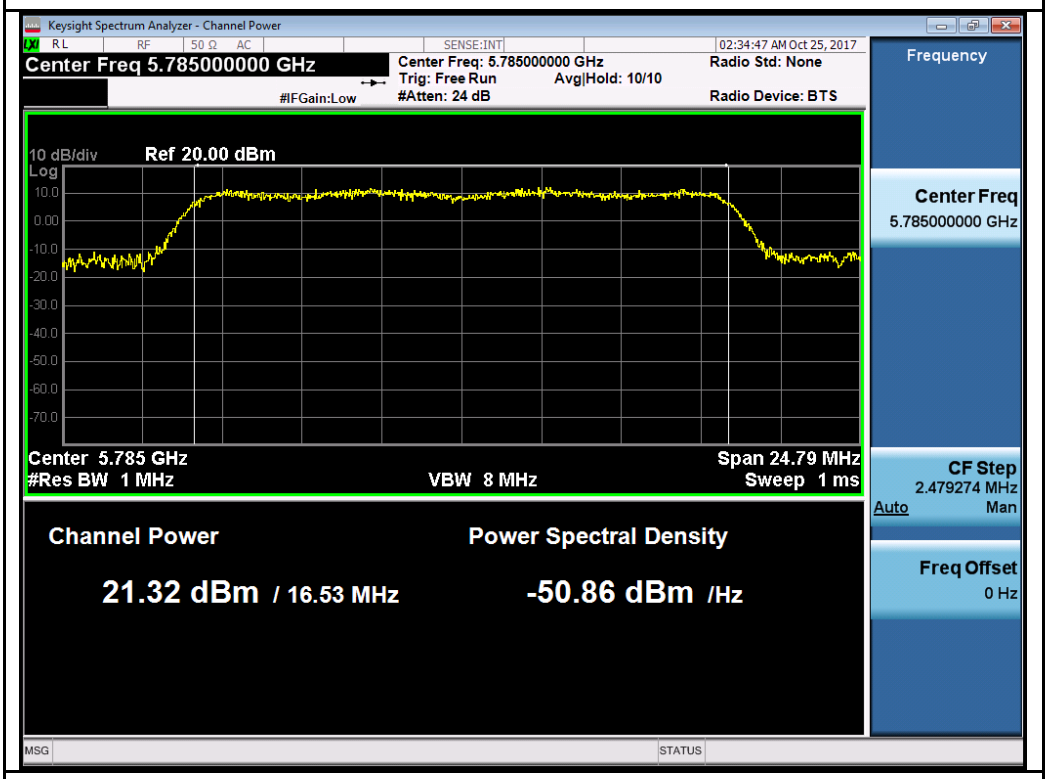


802.11ac-VHT80 5775M

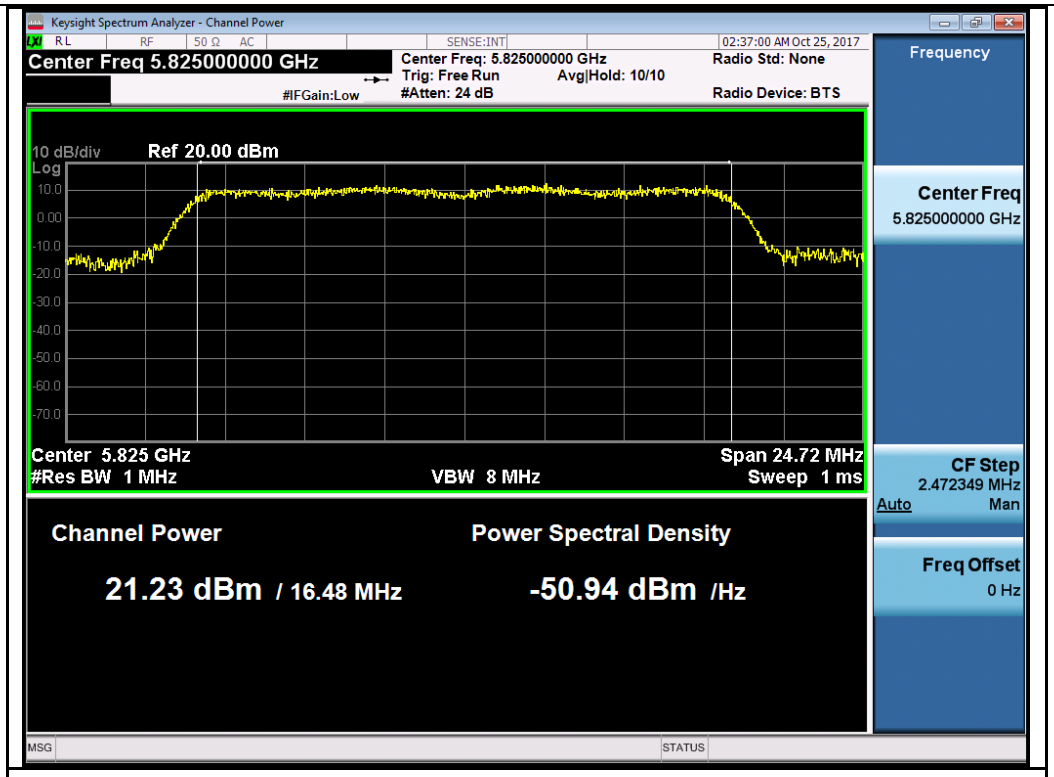
Chain 1:



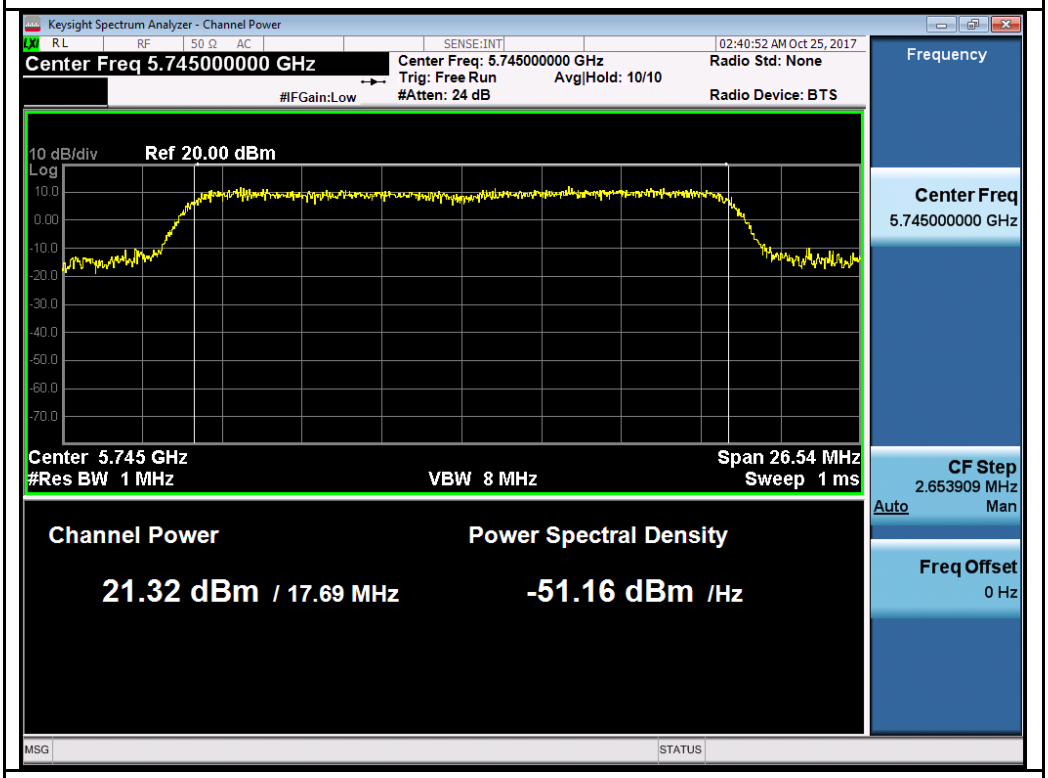
802.11a-5745M



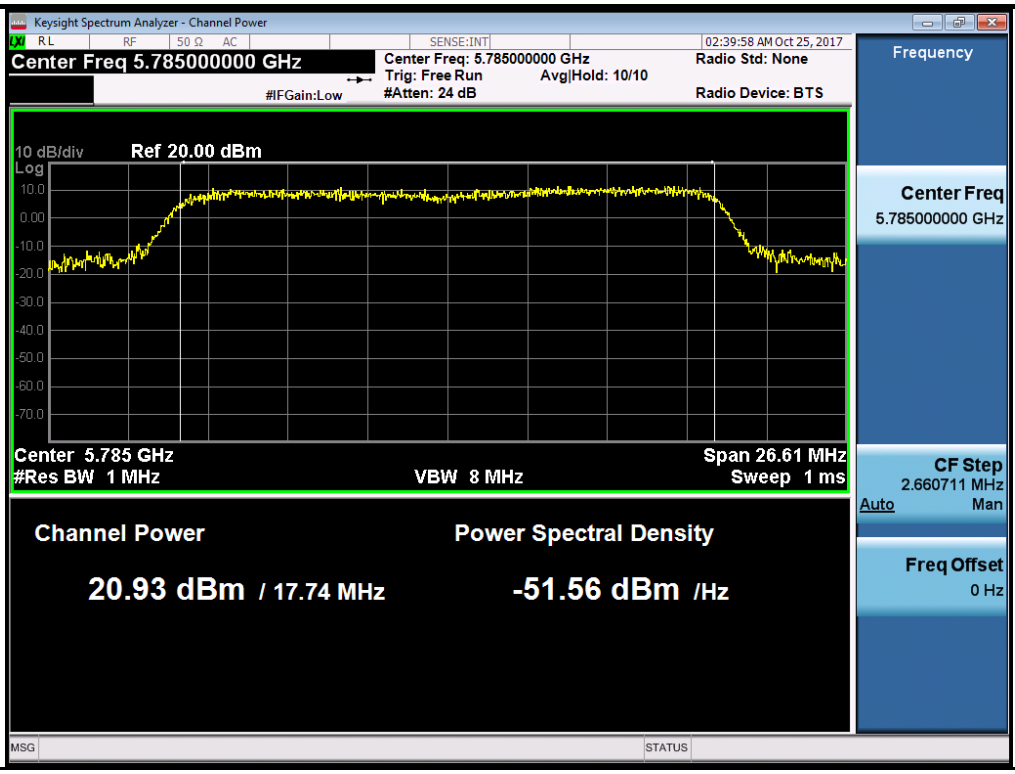
802.11a-5785M



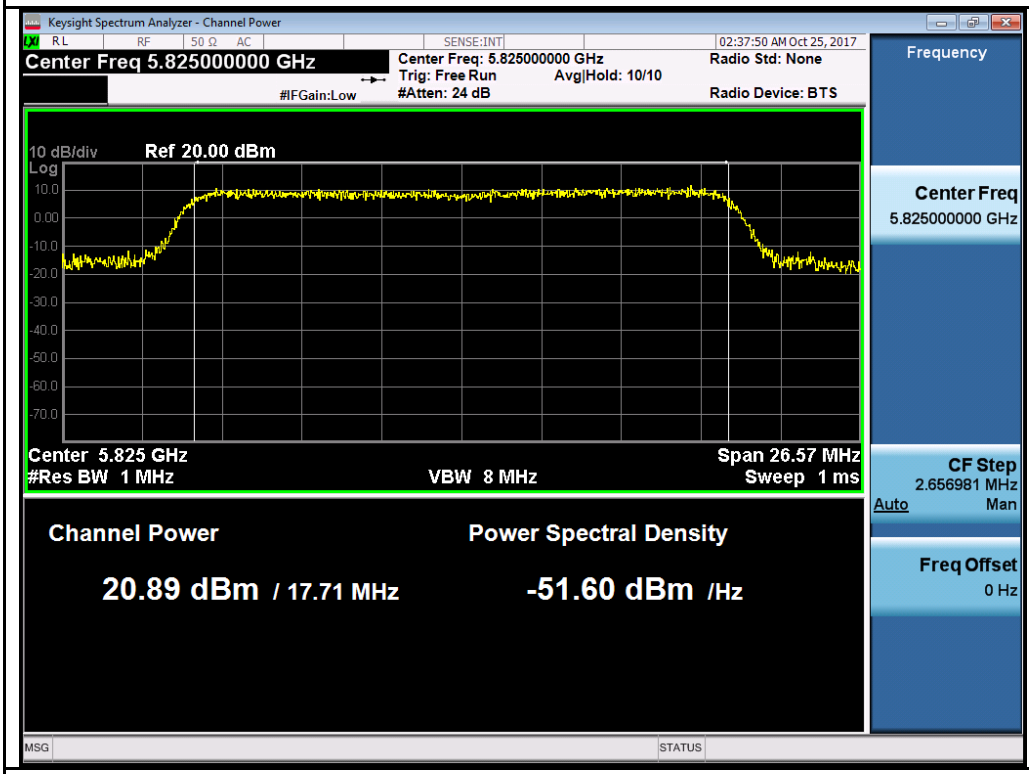
802.11a-5825M



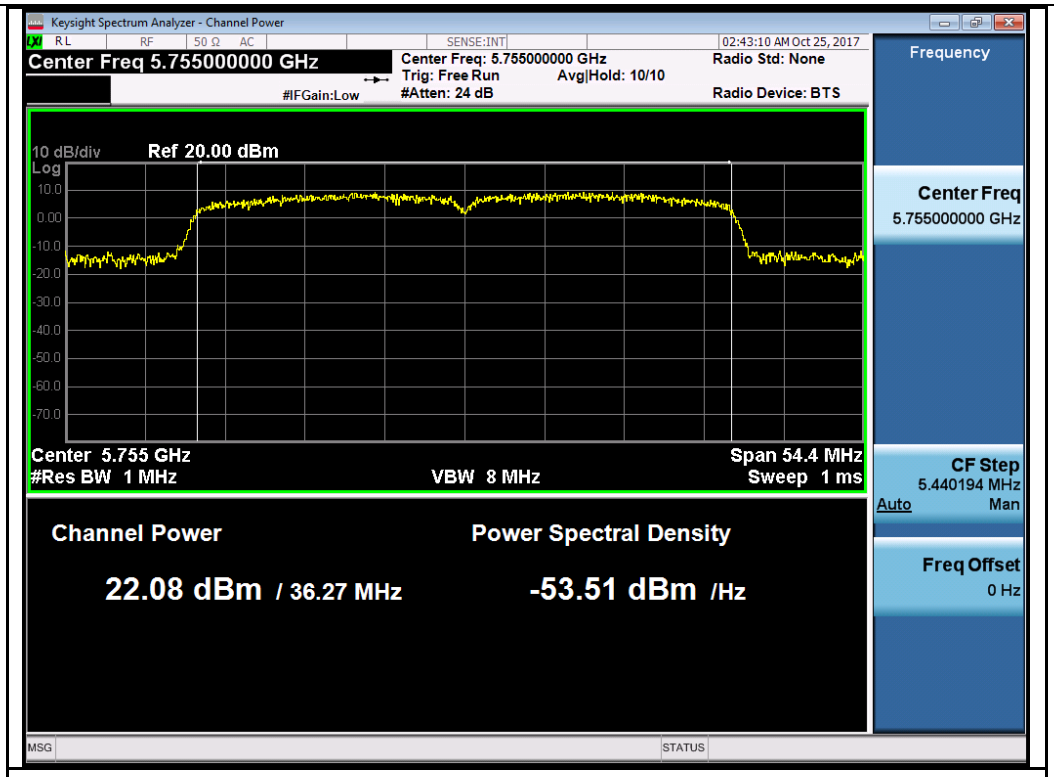
802.11n-HT20 5745M



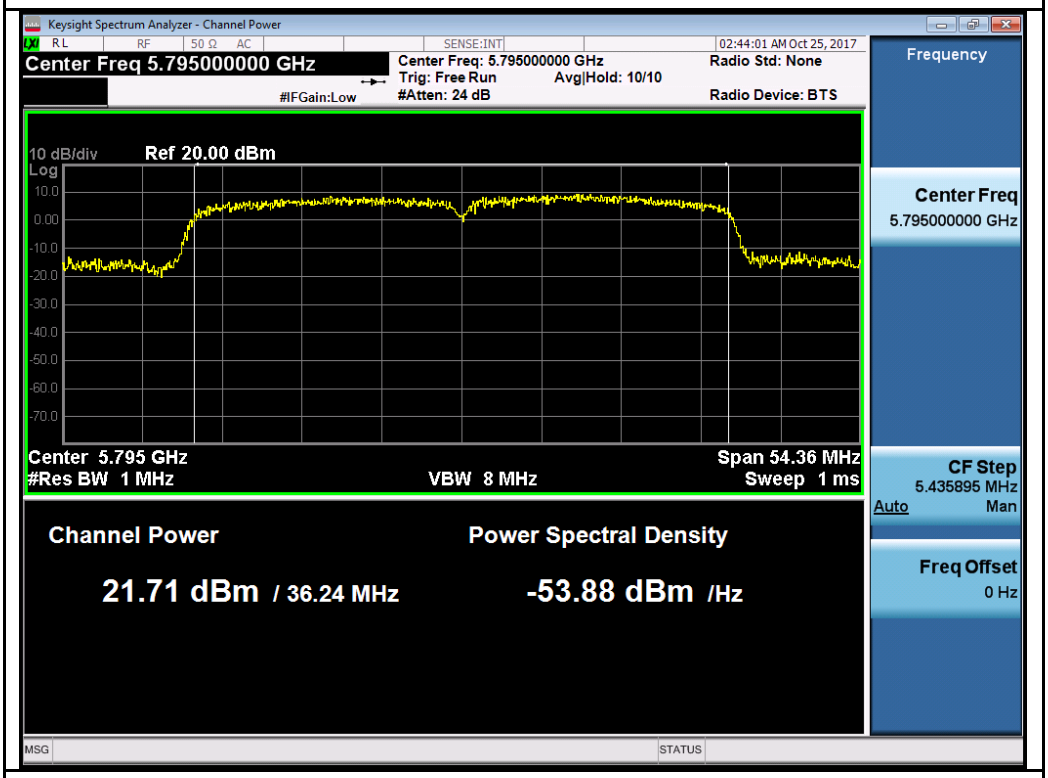
802.11n-HT20 5785M



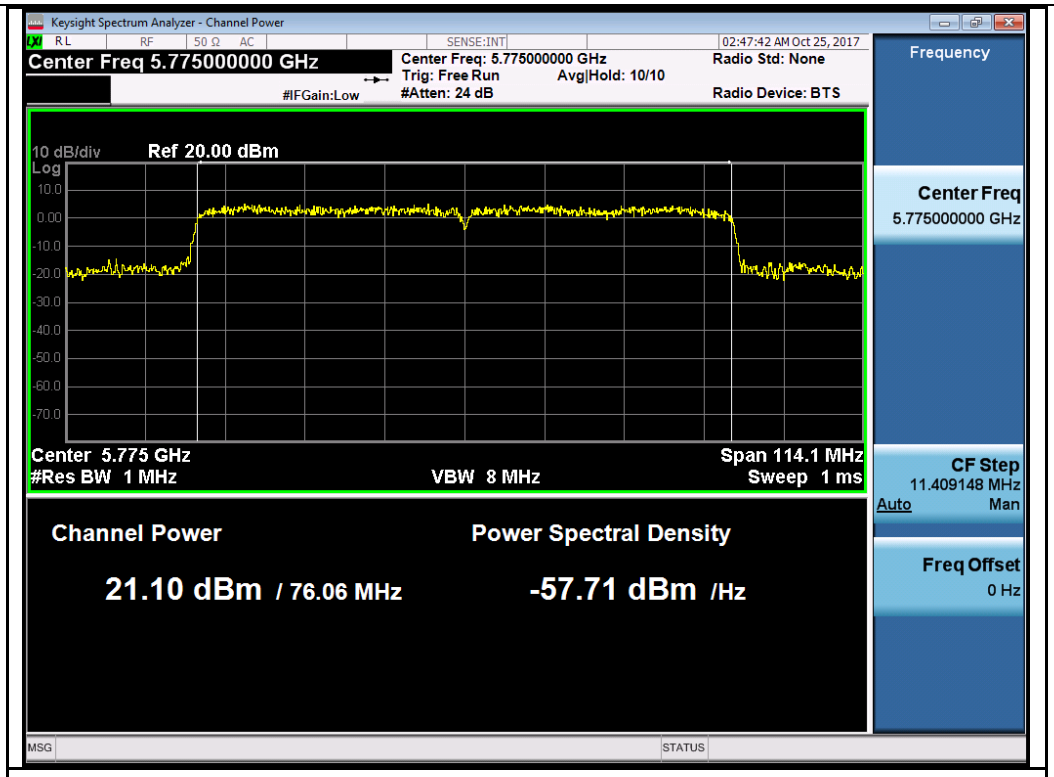
802.11n-HT20 5825M



802.11n-HT40 5755M



802.11n-HT40 5795M

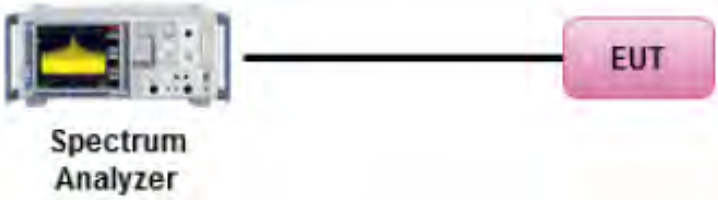


802.11ac-VHT80 5775M

10.4 Peak 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)(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 v01r02, 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	10/24/2017	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	22°C 42% 1020mbar
Remark	The EUT has two antennas which are cross-polarized, the directional gain=individual gain of each antenna =1dBi.			
Result	☒ Pass ☐ Fail			

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF test site.

PSD measurement result

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm/MHz)	Result
				Chain 0	Chain 1	Combined PSD		
PSD	802.11a	5180	Low	8.280	8.370	11.336	17	Pass
		5200	Mid	9.186	9.290	12.249	17	Pass
		5240	High	9.300	9.341	12.331	17	Pass
	802.11n-20	5180	Low	8.256	8.054	11.166	17	Pass
		5200	Mid	9.274	9.037	12.167	17	Pass
		5240	High	9.126	9.206	12.176	17	Pass
	802.11n-40	5190	Low	4.605	4.516	7.571	17	Pass
		5230	High	6.640	6.822	9.742	17	Pass
	802.11ac-80	5210	-	0.512	0.366	3.450	17	Pass

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/100kHz)			Combined PSD(dBm/ 500kHz)	Limit (dBm/ 500k Hz)	Result
				Chain 0	Chain 1	correction factor (dB)			
PSD	802.11a	5745	Low	1.834	1.769	6.99	11.802	30	Pass
		5785	Mid	1.676	1.683	6.99	11.680	30	Pass
		5825	High	1.880	1.627	6.99	11.756	30	Pass
	802.11n-20	5745	Low	1.468	1.276	6.99	11.373	30	Pass
		5785	Mid	1.183	1.302	6.99	11.243	30	Pass
		5825	High	1.471	1.264	6.99	11.369	30	Pass
	802.11n-40	5755	Low	-0.934	-0.784	6.99	9.142	30	Pass
		5795	High	-1.003	-0.977	6.99	9.010	30	Pass
	802.11ac-80	5775	Mid	-4.629	-4.883	6.99	5.246	30	Pass
Note	BW correction factor = 10log(500kHz/RBW), RBW was set to 100kHz during test.								

Test Plot for W52:

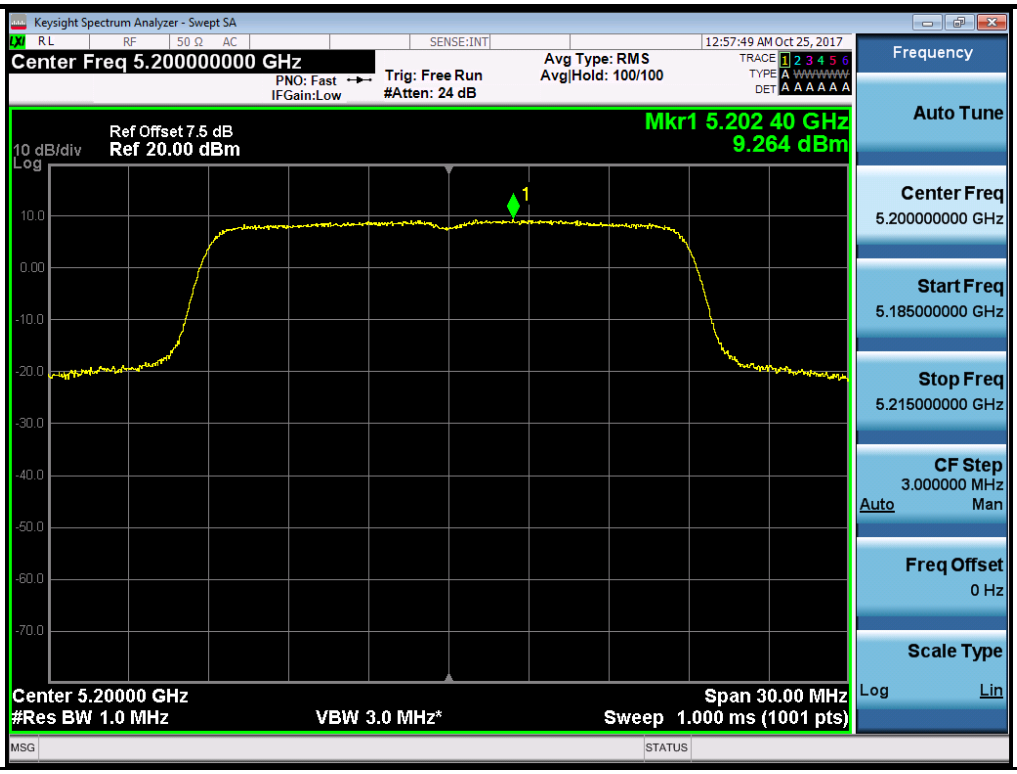
Chain 0:

802.11a-5180M

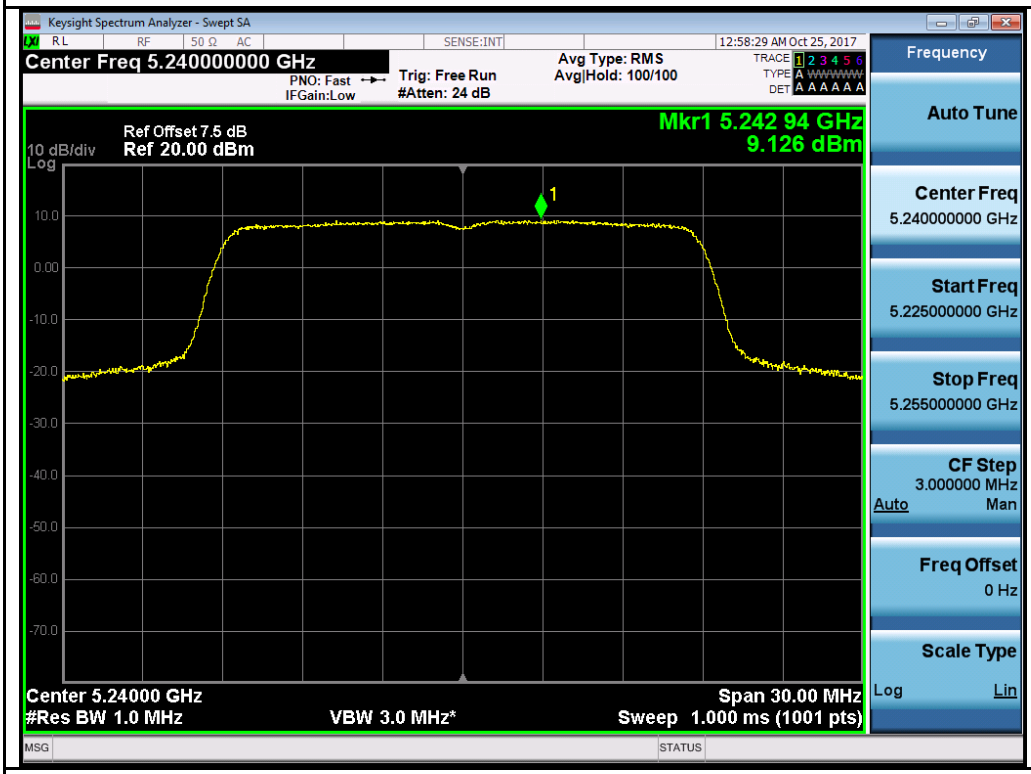
802.11a-5200M

802.11a-5240M

802.11n-HT20 5180M



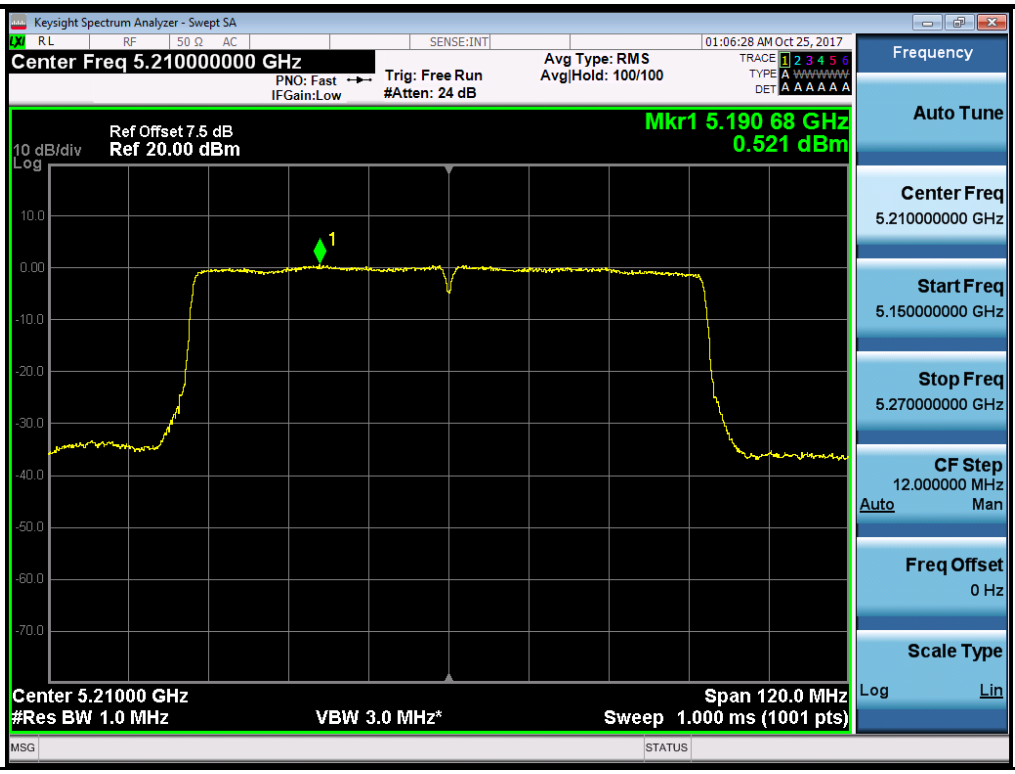
802.11n-HT20 5200M



802.11n-HT20 5240M

802.11n-HT40 5190M

802.11n-HT40 5230M



802.11ac-VHT80 5210M