

RF TEST REPORT



Report No.: FCC_SL17031601-RUC-009-W52W58_Rev1.0
Supersede Report No.:

Applicant	:	Ruckus Wireless, Inc.
Product Name	:	T811-CM Access Point
Model No.	:	T811-CM
Test Standard	:	47 CFR 15.407
Test Method	:	ANSI C63.4: 2014 789033 D02 General UNII Test Procedures New Rules v01r02
FCC ID	:	S9GT811CM
IC ID	:	5912A-T811CM
Dates of test	:	08/10/2017 – 09/20/2017
Issue Date	:	01/10/2018
Test Result	:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Equipment complied with the specification <input checked="" type="checkbox"/>		
Equipment did not comply with the specification <input type="checkbox"/>		

This Test Report is Issued Under the Authority of:	
Rachana Khanduri	Chen Ge
Test Engineer	Engineer Reviewer
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Issued By:
SIEMIC Laboratories
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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 & Radio Equipment Directive (RED)
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

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CONTENTS

1	REPORT REVISION HISTORY	4
2	EXECUTIVE SUMMARY	5
3	CUSTOMER INFORMATION	5
4	TEST SITE INFORMATION	5
5	MODIFICATION	5
6	EUT INFORMATION	6
6.1	EUT Description	6
6.2	Radio Description	6
7	SUPPORTING EQUIPMENT/SOFTWARE AND CABLING DESCRIPTION.....	8
7.1	Supporting Equipment	8
7.2	Cabling Description	8
7.3	Test Software Description	8
8	TEST SUMMARY.....	9
9	MEASUREMENT UNCERTAINTY	10
9.1	Conducted Emissions	10
9.2	Radiated Emissions (30MHz to 1GHz).....	10
9.3	Radiated Emissions (1GHz to 40GHz).....	11
9.4	RF conducted measurement.....	11
10	MEASUREMENTS, EXAMINATION AND DERIVED RESULTS	12
10.1	Conducted Emissions.....	12
10.2	26 dB Bandwidth & 6 dB Bandwidth.....	15
10.3	Output Power	27
10.4	Peak Spectral Density	69
10.5	Band Edge and Emission Mask Measurement	111
10.6	Radiated Emissions below 1GHz.....	148
10.7	Radiated Spurious Emissions above 1GHz.....	150
	ANNEX A. TEST INSTRUMENT	159
	ANNEX B. SIEMIC ACCREDITATION	160

1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_SL17031601-RUC-009-W52W58	None	Original	09/20/2017
FCC_SL17031601-RUC-009-W52W58_Rev1.0	Rev1.0	Updated Radio Description	01/10/2018

2 Executive Summary

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

Company: Ruckus Wireless, Inc.
Product: T811-CM Access Point
Model: T811-CM

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	T811-CM Access Point
Model No.	T811-CM
Trade Name	Ruckus
Serial No.	291706000007
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	08/10/2017
Equipment Class/ Category	DTS, UNII
Port/Connectors	-

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: 4.5dBi			
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	39
802.11-a	5200	39
802.11-a	5240	39
802.11-n-20	5180	40
802.11-n-20	5200	39
802.11-n-20	5240	40
802.11-n-40	5190	38
802.11-n-40	5230	39
802.11-ac-80	5210	35
802.11-a	5745	42
802.11-a	5785	44
802.11-a	5825	44
802.11-n-20	5745	42
802.11-n-20	5785	44
802.11-n-20	5825	44
802.11-n-40	5755	42
802.11-n-40	5795	44
802.11-ac-80	5775	42

Note: The AP supports Beamforming mode and the power setting for Beamforming and Non-Beamforming modes are the same.

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	Power Supply	DL 7000SSX	61688175	Electroline Equipment Inc.	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
USB	EUT	USB	Laptop	USB	2	N/A	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Putty	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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.4 – 2014	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> 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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Maximum conducted Output Power	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01r02	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Power reduction (Antenna Gain > 6 dBi)	FCC	15.407 (a) (2)	-	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> 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	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Power Spectral Density	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01r02	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Frequency Stability	FCC	15.407 (g)	-	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
Transmit Power Control (TPC)	FCC	15.407 (h)(1)	-	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
User Manual	FCC	-	-	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A

Remark	<ol style="list-style-type: none"> All measurement uncertainties are not taken into consideration for all presented test result. 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.
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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

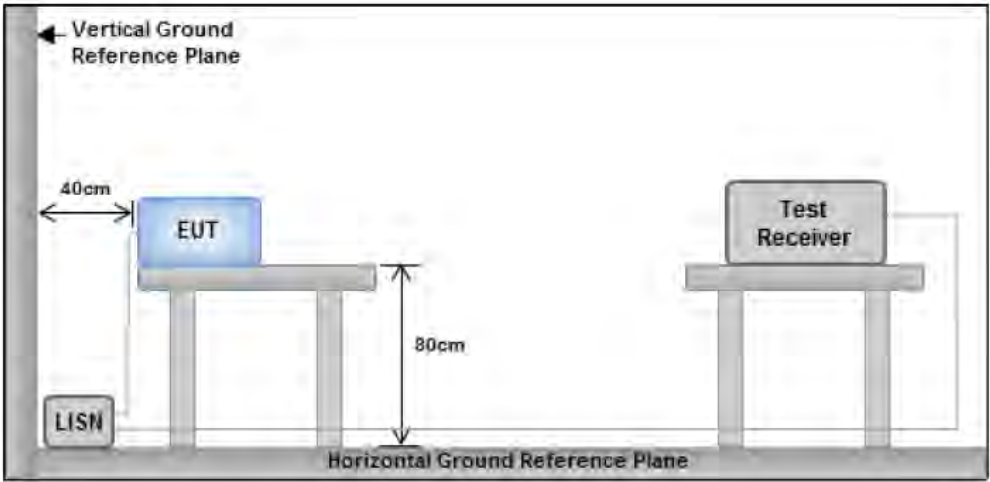
The total derived measurement uncertainty is +/- 0.95 dB.

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.	<input checked="" type="checkbox"/>
Test Setup		 <p>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</p>	
Procedure		<ul style="list-style-type: none"> - 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		<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	

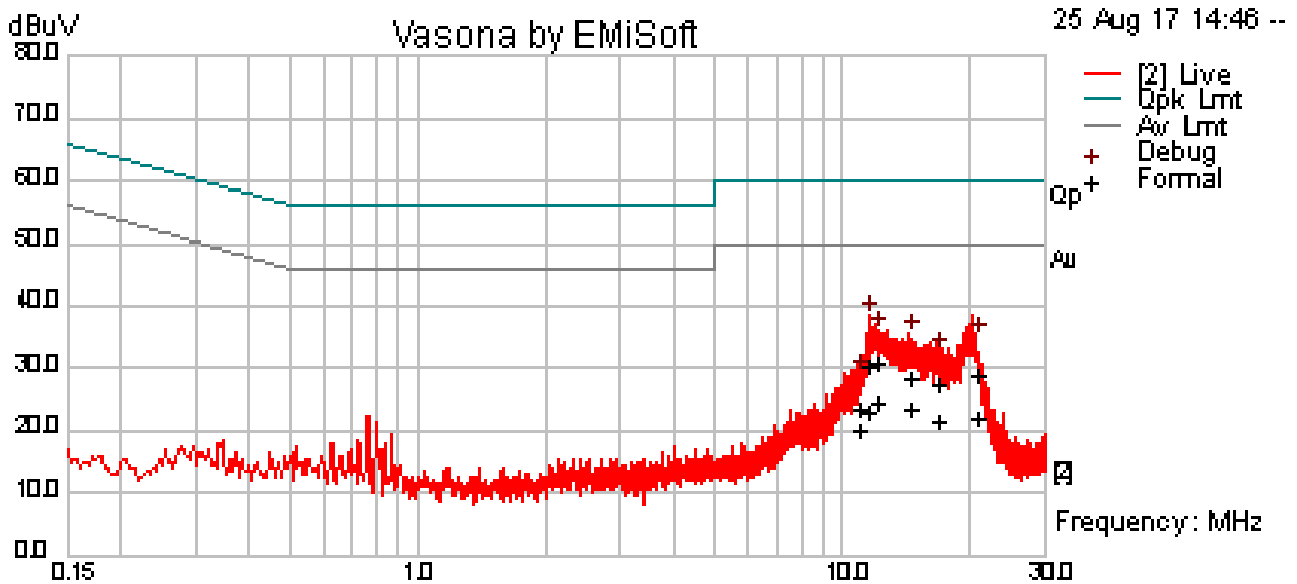
Test Data Yes N/A

Test Plot Yes (See below) N/A

Test was done by Rachana Khanduri at Conducted Emission test site.

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Rachana Khanduri			
Test Date:	08/25/2017			
Remarks	Conducted @ Live			

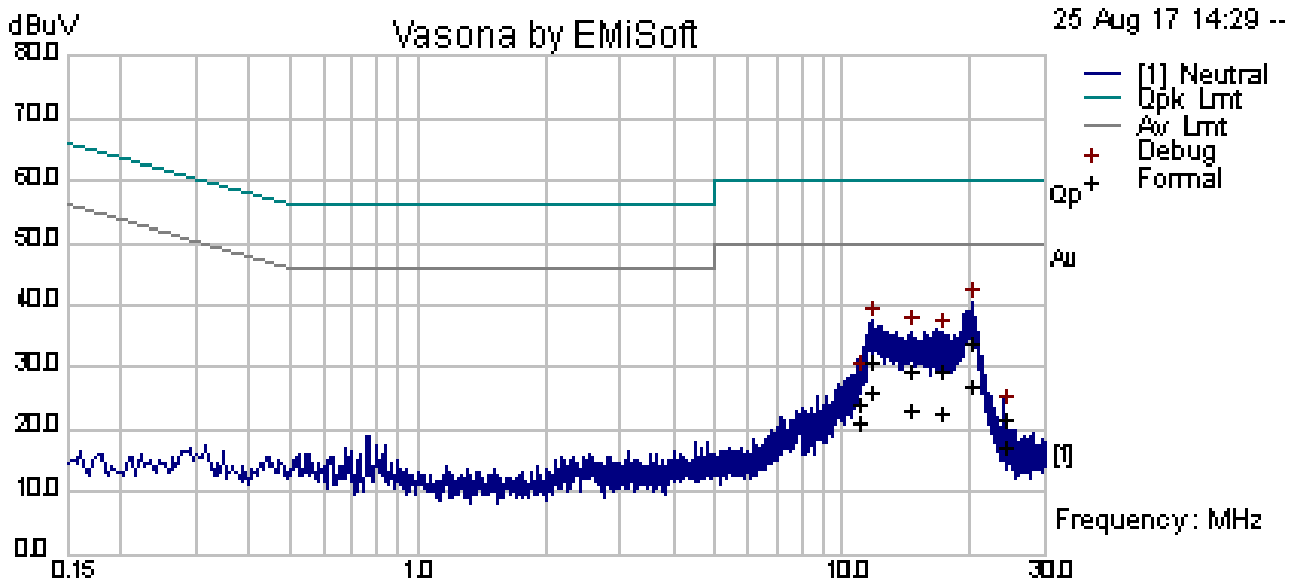


Live Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
11.53	19.61	10.05	0.53	30.19	Quasi Peak	Live	60.00	-29.81	Pass
12.17	20.25	10.05	0.53	30.84	Quasi Peak	Live	60.00	-29.16	Pass
14.39	18.00	10.06	0.55	28.61	Quasi Peak	Live	60.00	-31.39	Pass
20.75	18.16	10.07	0.67	28.90	Quasi Peak	Live	60.00	-31.10	Pass
16.70	16.68	10.06	0.60	27.34	Quasi Peak	Live	60.00	-32.66	Pass
10.87	13.05	10.05	0.52	23.62	Quasi Peak	Live	60.00	-36.38	Pass
11.53	12.41	10.05	0.53	22.99	Average	Live	50.00	-27.01	Pass
12.17	13.72	10.05	0.53	24.31	Average	Live	50.00	-25.69	Pass
14.39	12.91	10.06	0.55	23.52	Average	Live	50.00	-26.48	Pass
20.75	11.31	10.07	0.67	22.05	Average	Live	50.00	-27.95	Pass
16.70	10.80	10.06	0.60	21.46	Average	Live	50.00	-28.54	Pass
10.87	9.43	10.05	0.52	20.00	Average	Live	50.00	-30.00	Pass

Conducted Emission Test Results

Test specification:	Conducted Emissions			Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Environmental Conditions:	Temp(°C):	21			
	Humidity (%):	42			
	Atmospheric(mbar):	1021			
Mains Power:	120Vac, 60Hz				
Tested by:	Rachana Khanduri				
Test Date:	08/25/1017				
Remarks	Conducted @ Neutral				

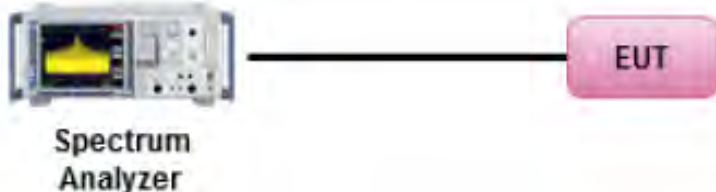


Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
20.24	23.07	10.07	0.66	33.80	Quasi Peak	Neutral	60.00	-26.20	Pass
11.67	20.43	10.05	0.53	31.01	Quasi Peak	Neutral	60.00	-28.99	Pass
14.49	18.67	10.06	0.56	29.28	Quasi Peak	Neutral	60.00	-30.72	Pass
16.96	18.70	10.06	0.60	29.37	Quasi Peak	Neutral	60.00	-30.63	Pass
10.98	13.45	10.05	0.52	24.02	Quasi Peak	Neutral	60.00	-35.98	Pass
24.00	10.82	10.08	0.72	21.61	Quasi Peak	Neutral	60.00	-38.39	Pass
20.24	16.06	10.07	0.66	26.80	Average	Neutral	50.00	-23.20	Pass
11.67	15.36	10.05	0.53	25.94	Average	Neutral	50.00	-24.06	Pass
14.49	12.59	10.06	0.56	23.20	Average	Neutral	50.00	-26.80	Pass
16.96	11.79	10.06	0.60	22.46	Average	Neutral	50.00	-27.54	Pass
10.98	10.72	10.05	0.52	21.29	Average	Neutral	50.00	-28.71	Pass
24.00	6.47	10.08	0.72	17.27	Average	Neutral	50.00	-32.73	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.	<input checked="" type="checkbox"/>
	a) (2)	26 dB Emission BW: Report only for power limit calculation.	<input type="checkbox"/>
	e)	Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.	<input checked="" type="checkbox"/>
Test Setup			
Test Procedure	<p>789033 D02 General UNII Test Procedures New Rules v01r02</p> <p><u>26dB Emission bandwidth measurement procedure (Other than 5.725-5.85 GHz)</u></p> <ul style="list-style-type: none"> - Allow the trace to stabilize. - Use the spectrum analyzer built-in measurement function to determine the 26dB BW. <ul style="list-style-type: none"> o Set RBW = around 1% of emission bandwidth o Set VBW > RBW o Detector = Peak o Trace mode = max hold - Capture the plot. - Repeat above steps for different test channel and other modulation type. <p><u>6 dB Minimum emission bandwidth measurement procedure (for 5.725-5.85 GHz)</u></p> <ul style="list-style-type: none"> - Allow the trace to stabilize. - Use the spectrum analyzer built-in measurement function to determine the 6dB BW. <ul style="list-style-type: none"> o Set RBW = 100 KHz o Set VBW ≥ 3 x RBW o Detector = Peak o Trace mode = max hold o Sweep = auto couple - Capture the plot. - Repeat above steps for different test channel and other modulation type. 		
Test Date	08/10/2017	Environmental condition	Temperature 22°C Relative Humidity 38% Atmospheric Pressure 1020mbar
Remark	-		
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data Yes N/A

Test Plot Yes N/A

Test was done by Rachana Khanduri at RF test site.

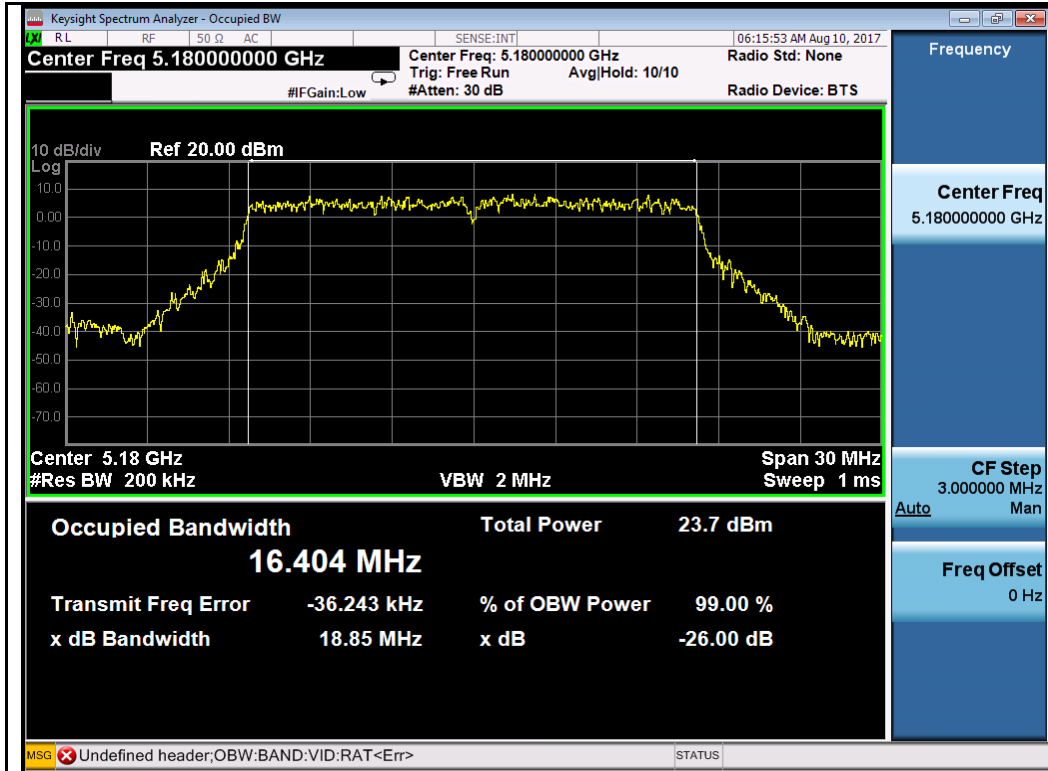
26dB Bandwidth measurement result for 5.2GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)
26dB BW	802.11a	5180	Low	18.85	-
		5200	Mid	18.84	-
		5240	High	19.11	-
	802.11n-20	5180	Low	19.83	-
		5200	Mid	19.96	-
		5240	High	19.80	-
	802.11n-40	5190	Low	38.97	-
		5230	High	38.90	-
	802.11ac-80	5210	Mid	82.04	-

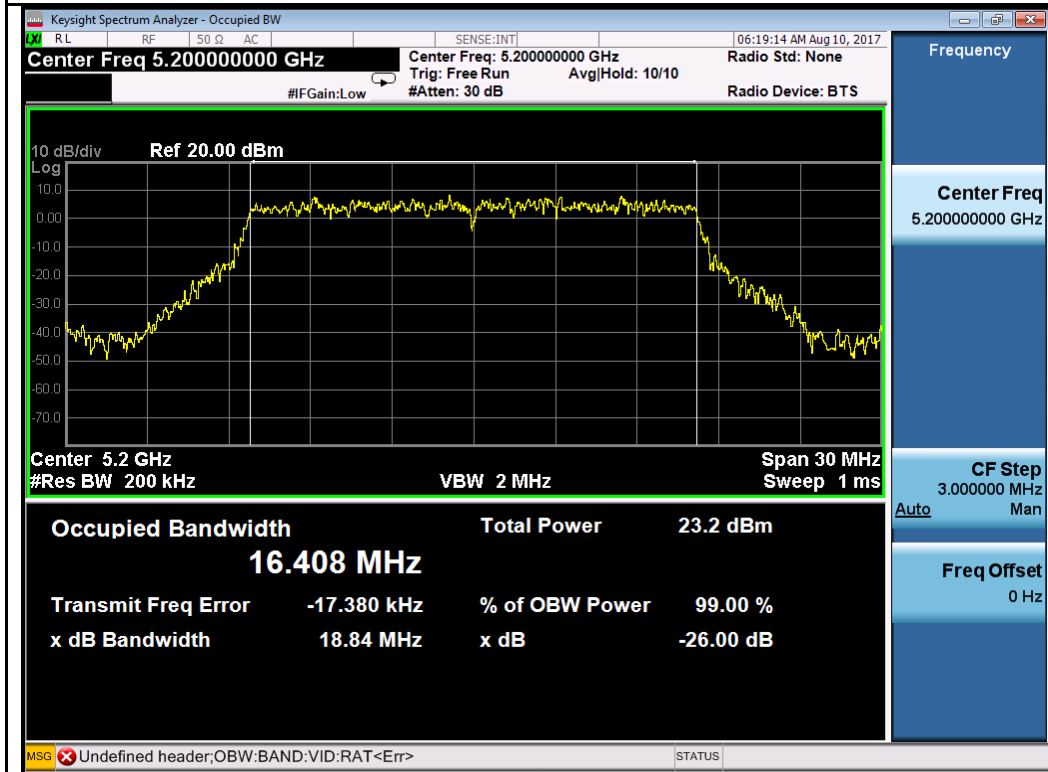
6dB Bandwidth measurement result for 5.8GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)	Result
6dB BW	802.11a	5745	Low	16.37	≥0.5	Pass
		5785	Mid	16.46	≥0.5	Pass
		5825	High	16.41	≥0.5	Pass
	802.11n-20	5745	Low	17.62	≥0.5	Pass
		5785	Mid	17.63	≥0.5	Pass
		5825	High	17.63	≥0.5	Pass
	802.11n-40	5755	Low	35.01	≥0.5	Pass
		5795	High	36.30	≥0.5	Pass
	802.11ac-80	5775	Mid	76.43	≥0.5	Pass

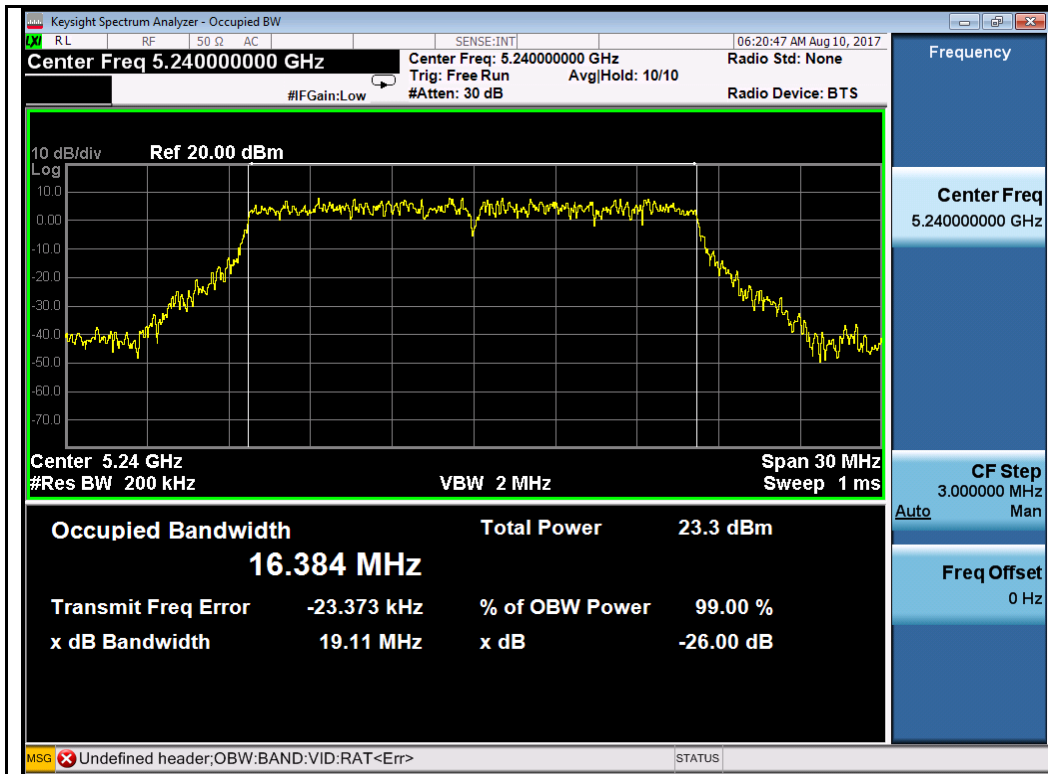
26dB Bandwidth Test Plots
W52:



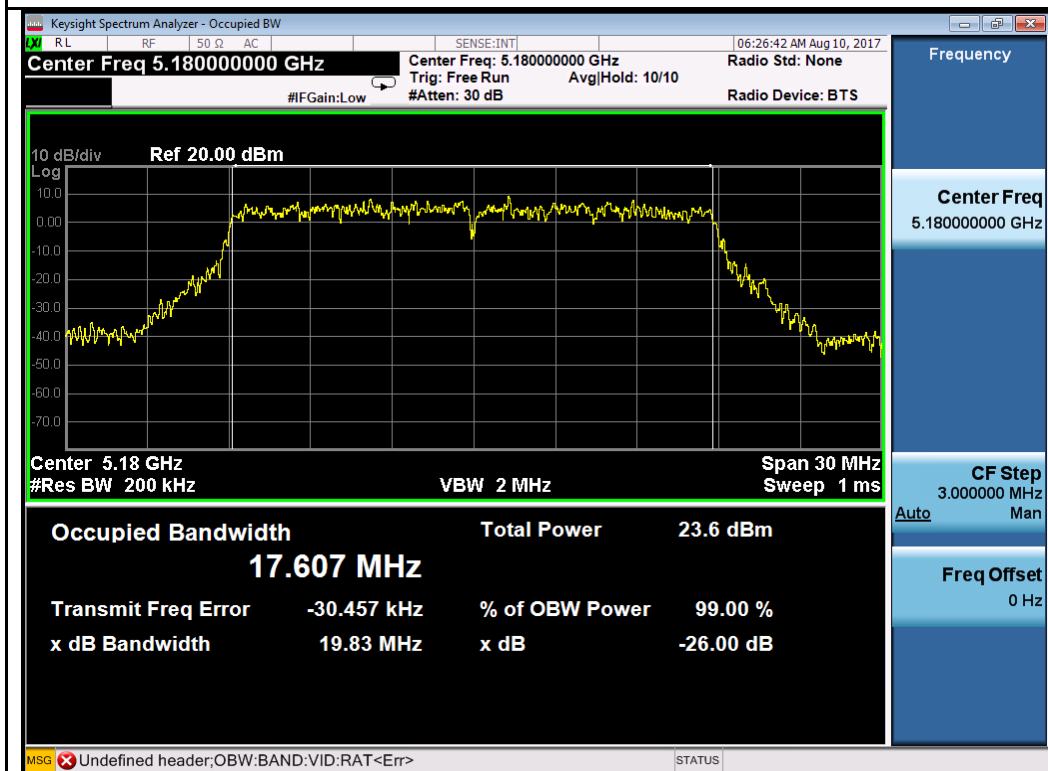
802.11a-5180MHz



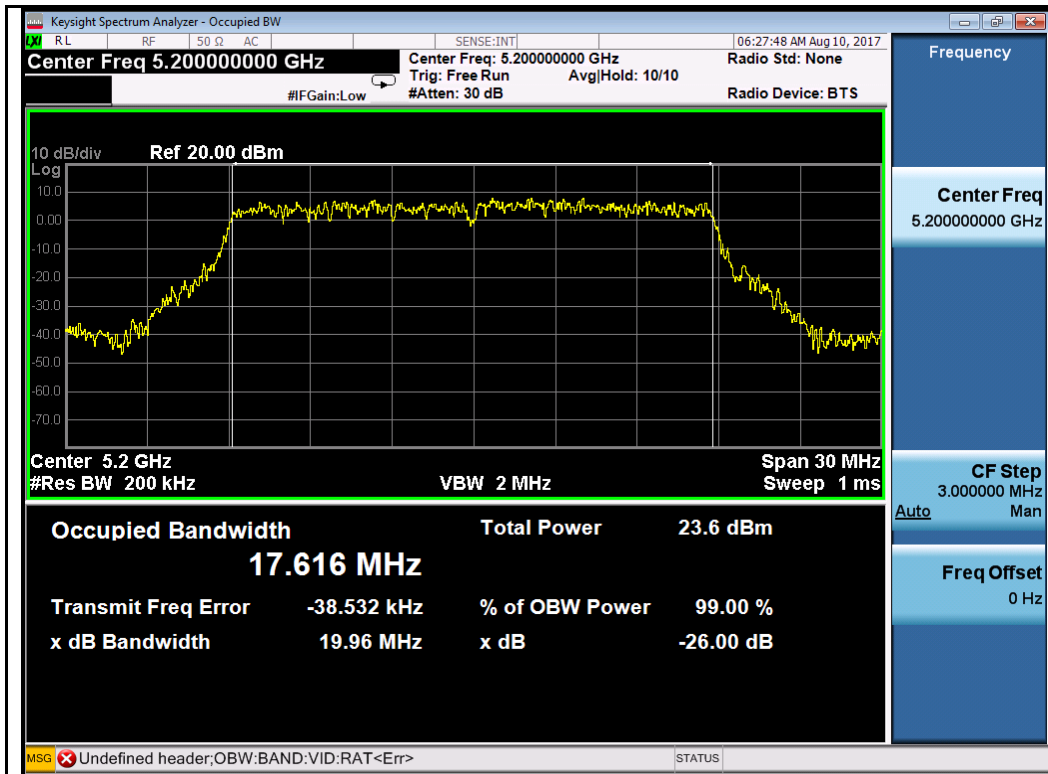
802.11a-5200MHz



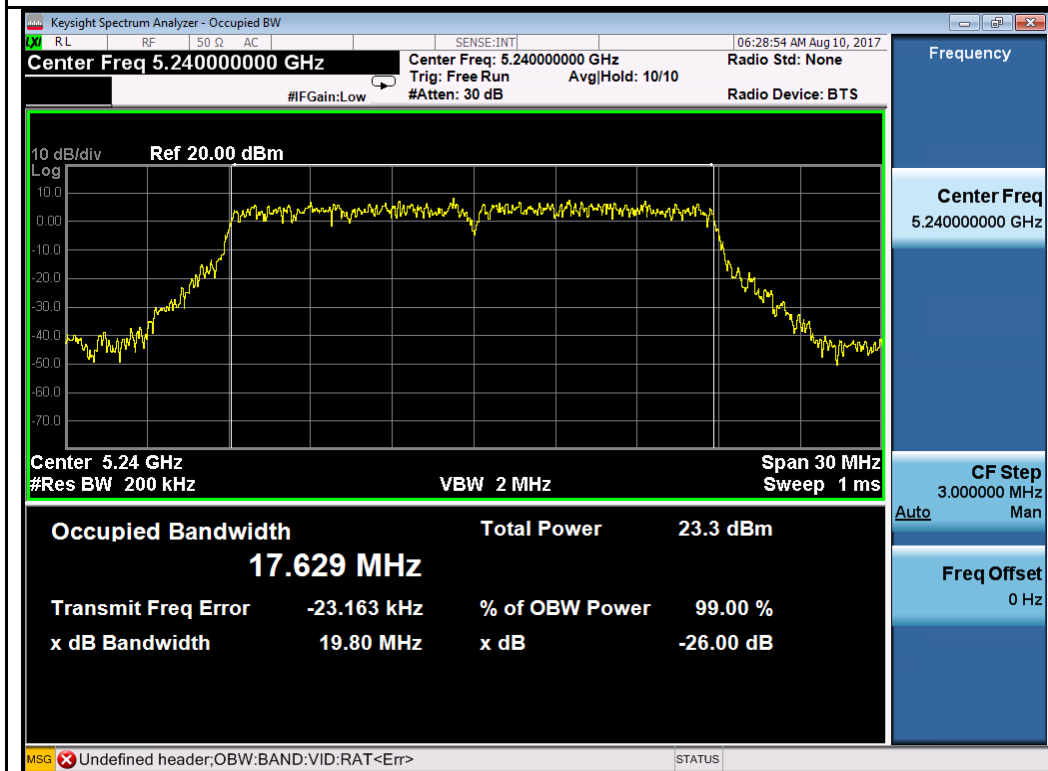
802.11a-5240MHz



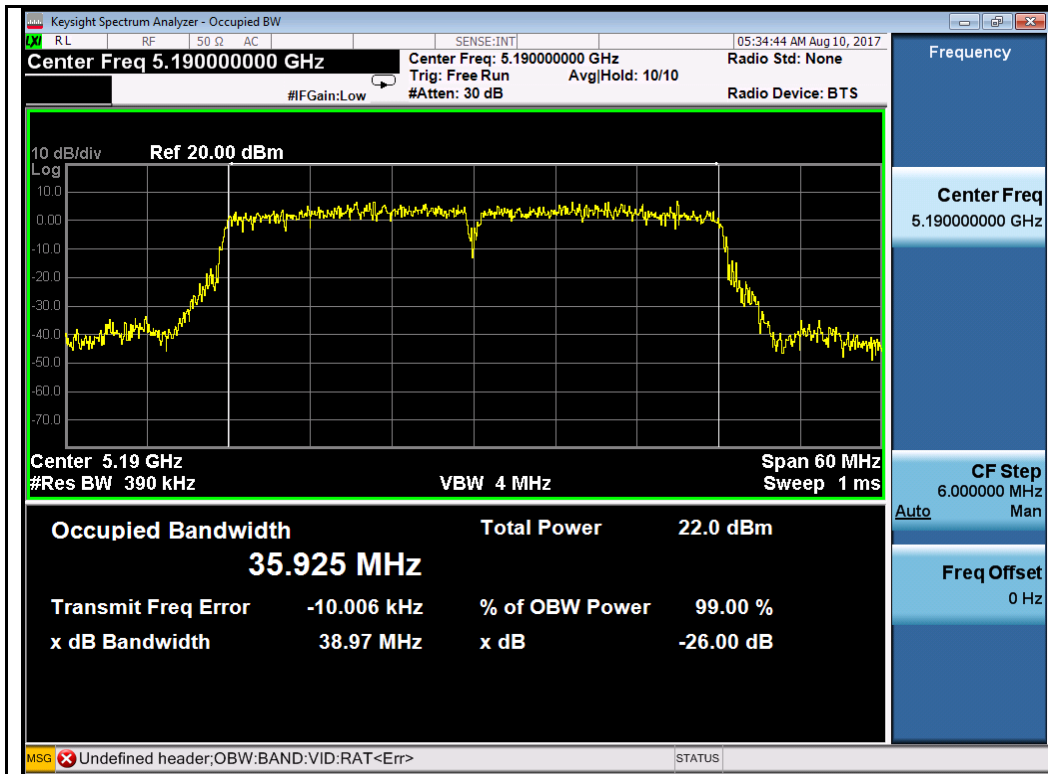
802.11n-HT20-5180MHz



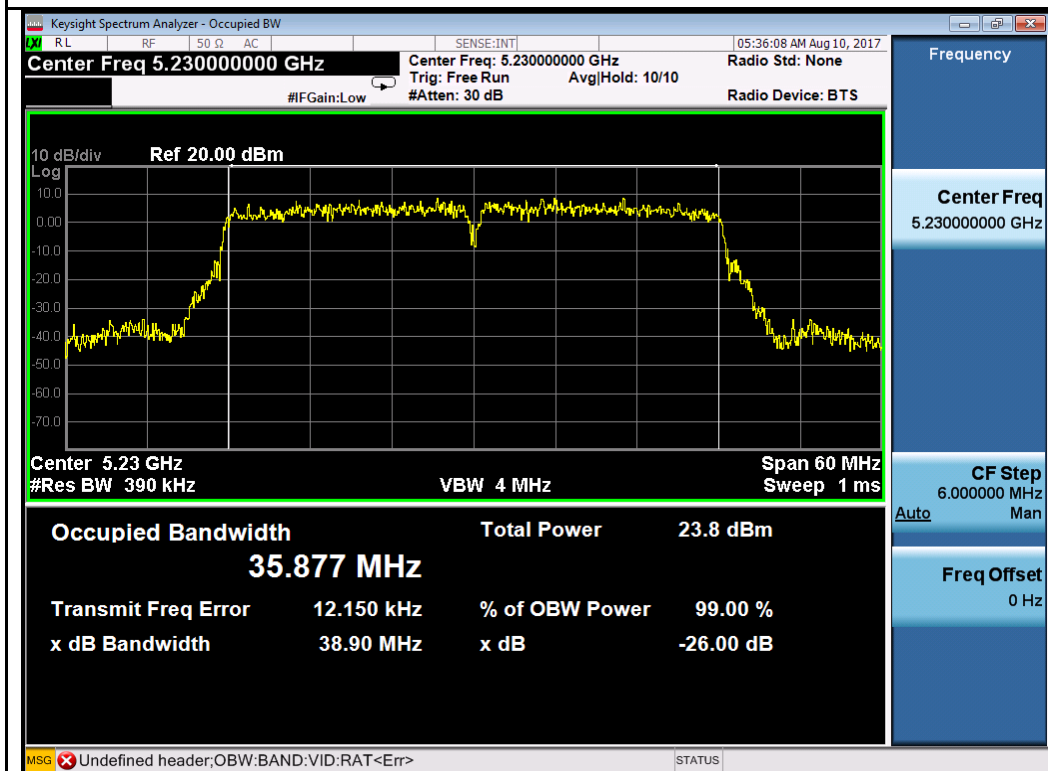
802.11n-HT20-5200MHz



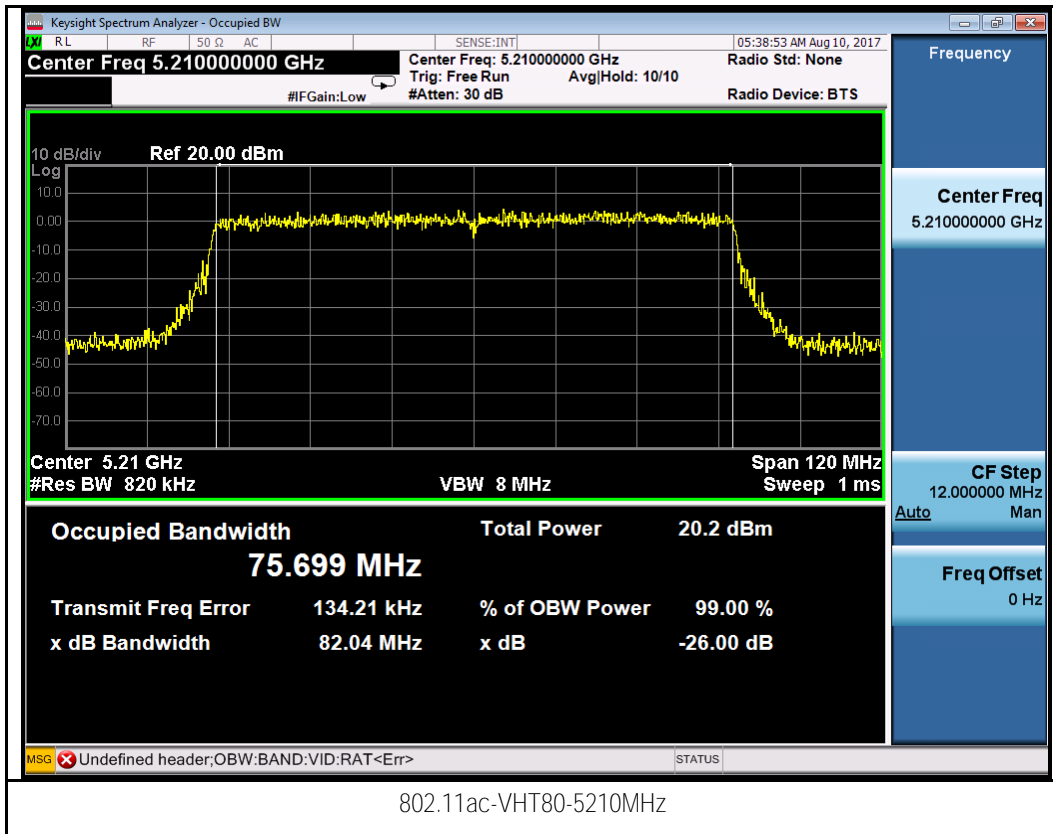
802.11n-HT20-5240MHz



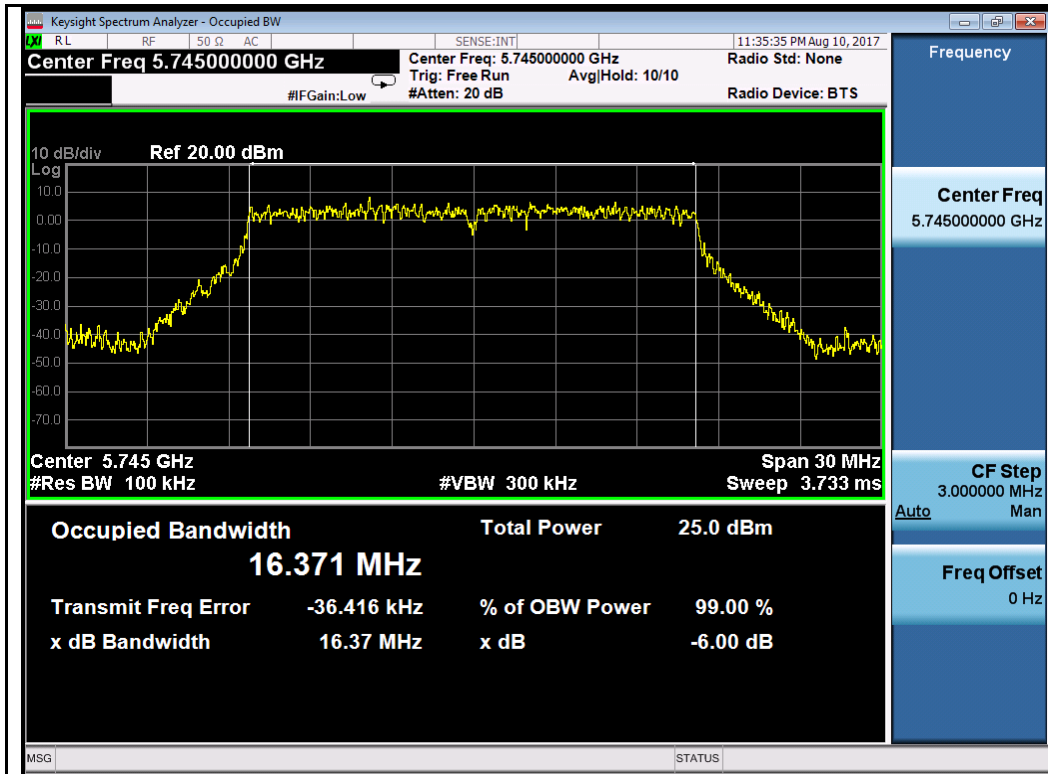
802.11n-HT40-5190MHz



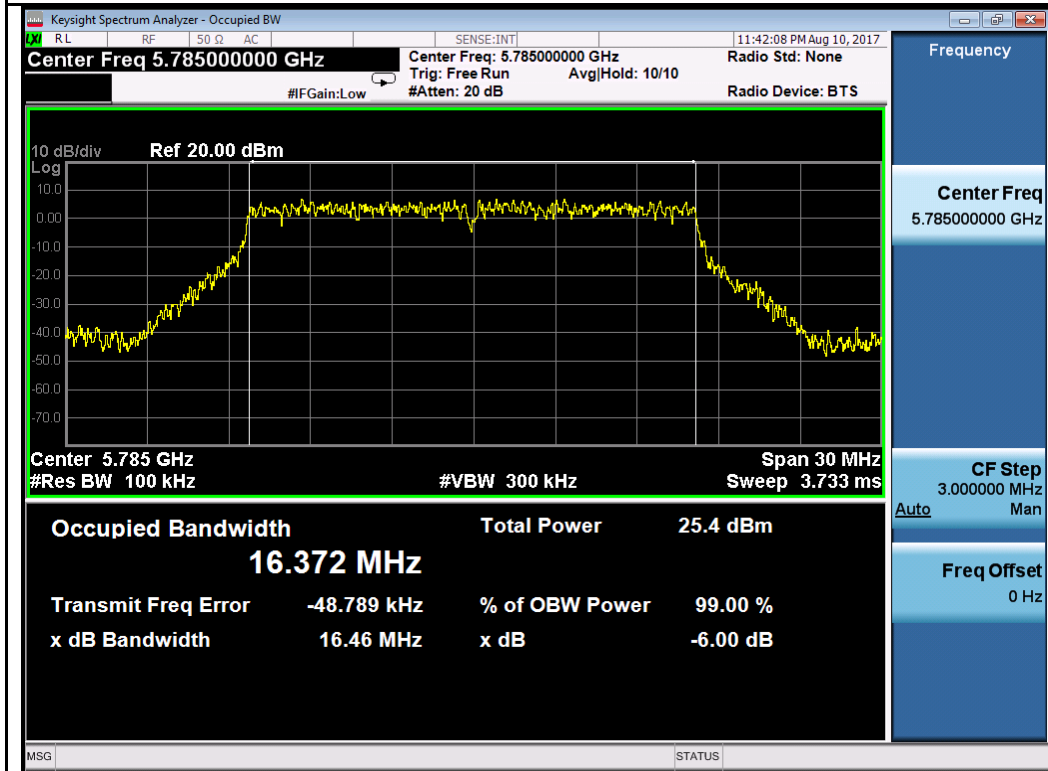
802.11n-HT40-5230MHz



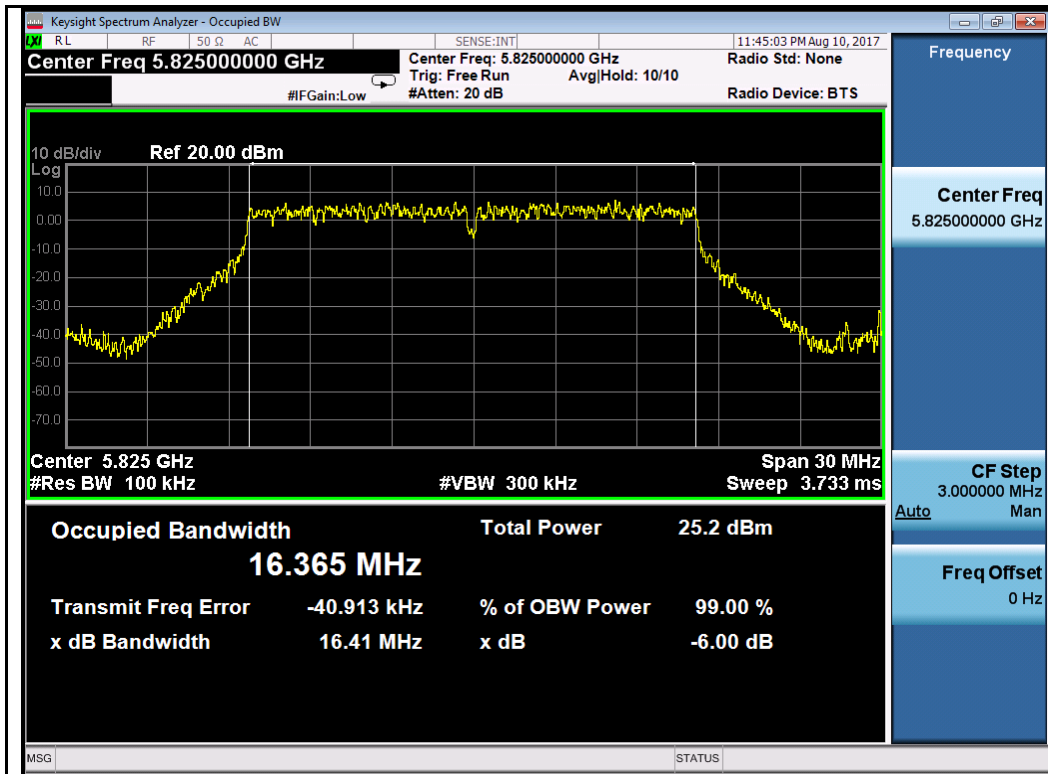
6dB Bandwidth Test Plots
W58:



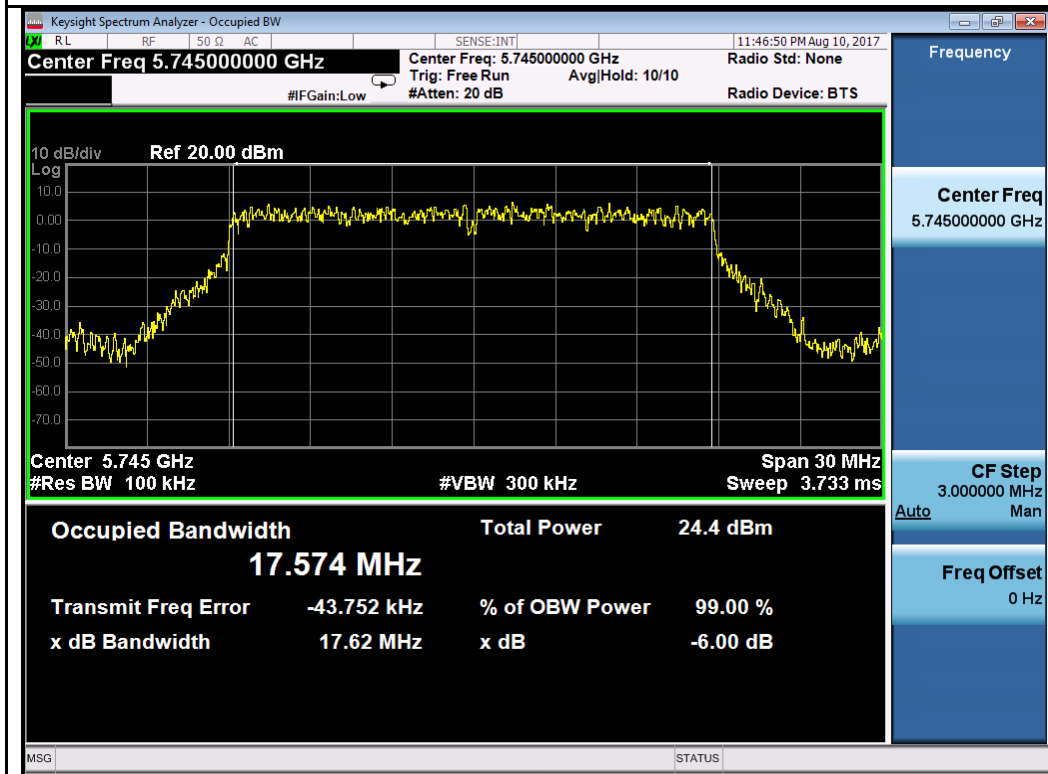
802.11a-5745MHz



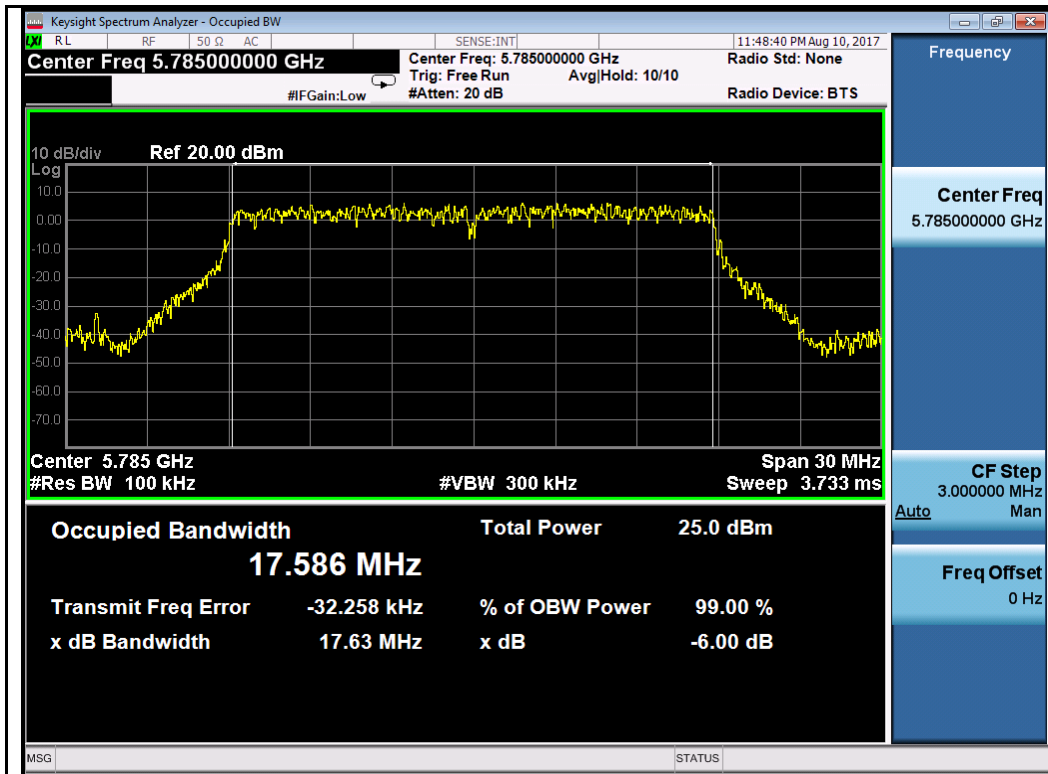
802.11a-5785MHz



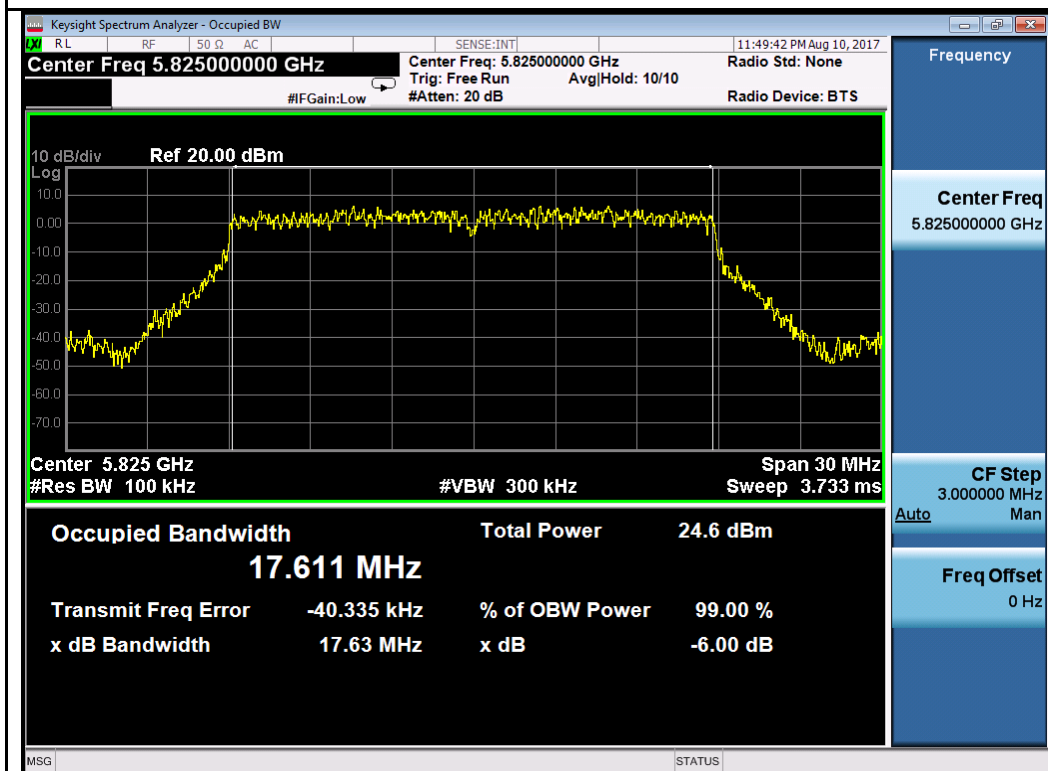
802.11a-5825MHz



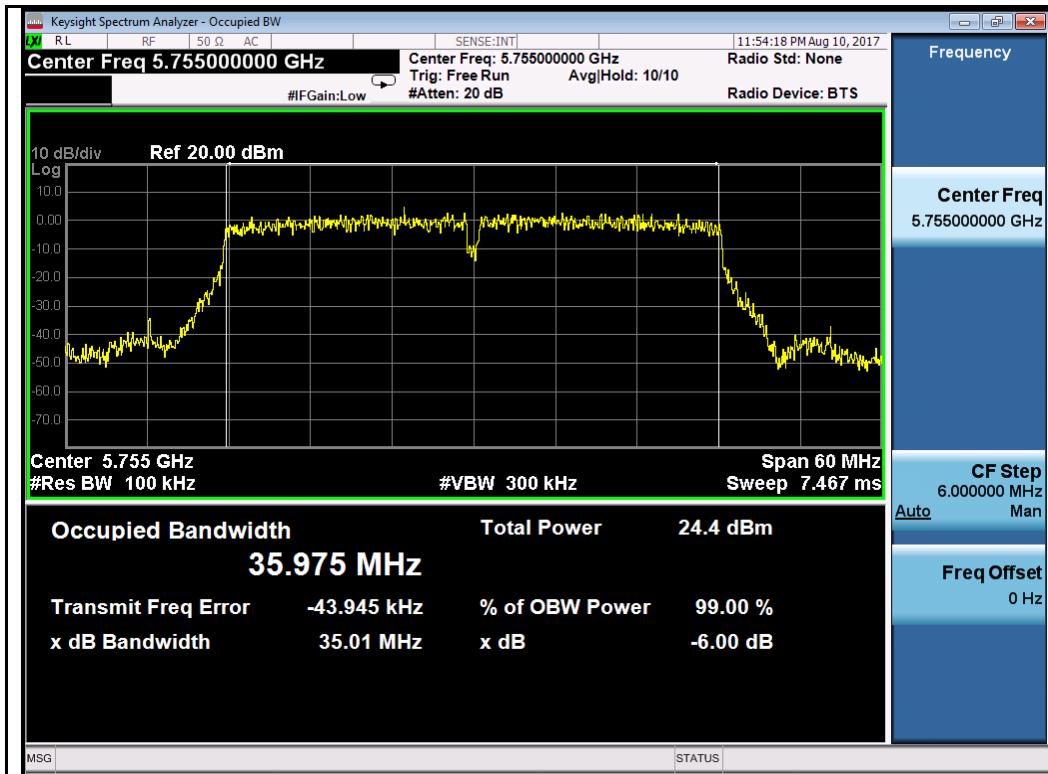
802.11n-HT20-5745MHz



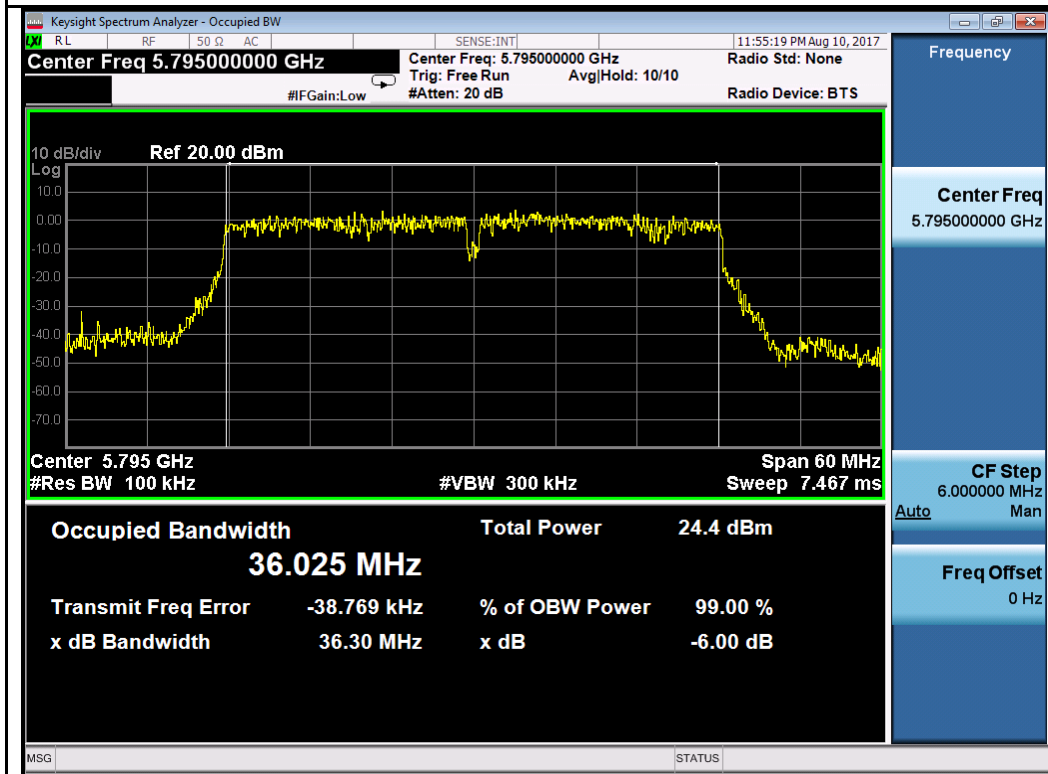
802.11n-HT20-5785MHz



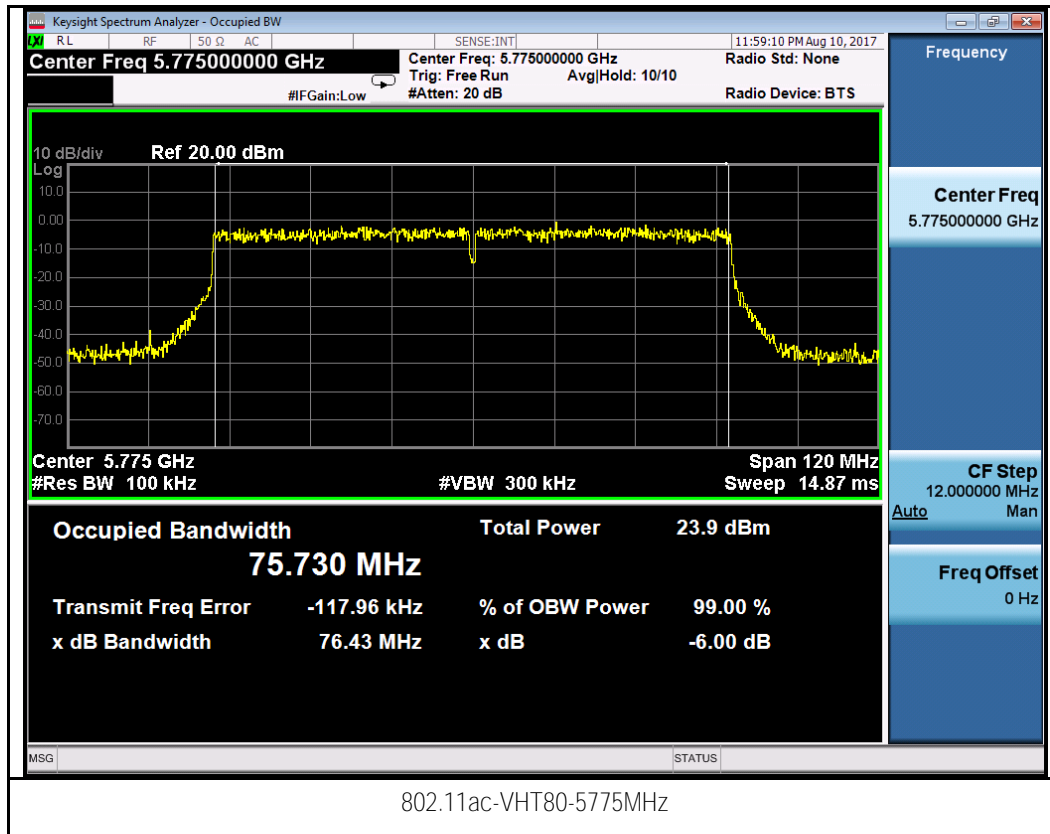
802.11n-HT20-5825MHz



802.11n-HT40-5755MHz



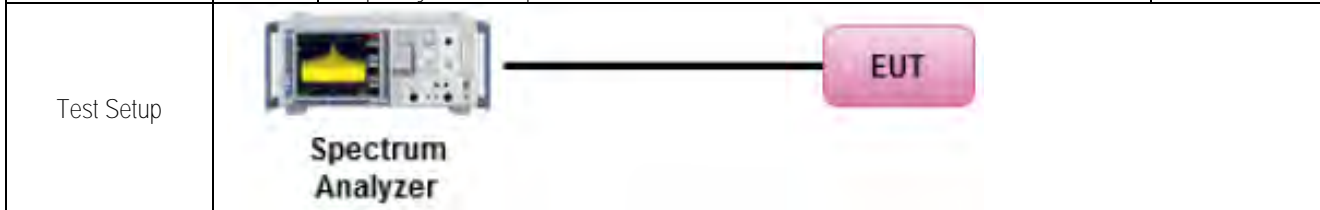
802.11n-HT40-5795MHz



10.3 Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	a)(1)(ii)	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.	<input checked="" type="checkbox"/>
	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.	<input checked="" type="checkbox"/>



Test Procedure	<p>789033 D02 General UNII Test Procedures New Rules v01r02</p> <p><u>Measurement using a Spectrum Analyzer or EMI Receiver (SA)</u> Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep):</p> <ul style="list-style-type: none"> (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 $\geq 2 \times \text{span} / \text{RBW}$. (This ensures that bin-to-bin spacing is $\leq \text{RBW}/2$, 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 $\geq 98\%$, 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. 		
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Test Date	08/10/2017 – 09/20/2017	Environmental condition	Temperature 21°C Relative Humidity 40% Atmospheric Pressure 1019mbar
Remark	Per KDB 662911 D01 Multiple Transmitter Output v02r01, the direction gain for horizontal polarization and vertical polarization is calculated separately. For 5GHz band, peak antenna gain = 4.5 dBi, directional gain = 3 dB, total gain = 7.5 dBi. Highest of total gain is 7.5 dBi. The power limit and PSD limit will be reduced by amount of 1.5 dB.		
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data Yes N/A

Test Plot Yes (See below) N/A

Test was done by Rachana Khanduri at RF test site.

Output Power measurement result for 5.2GHz

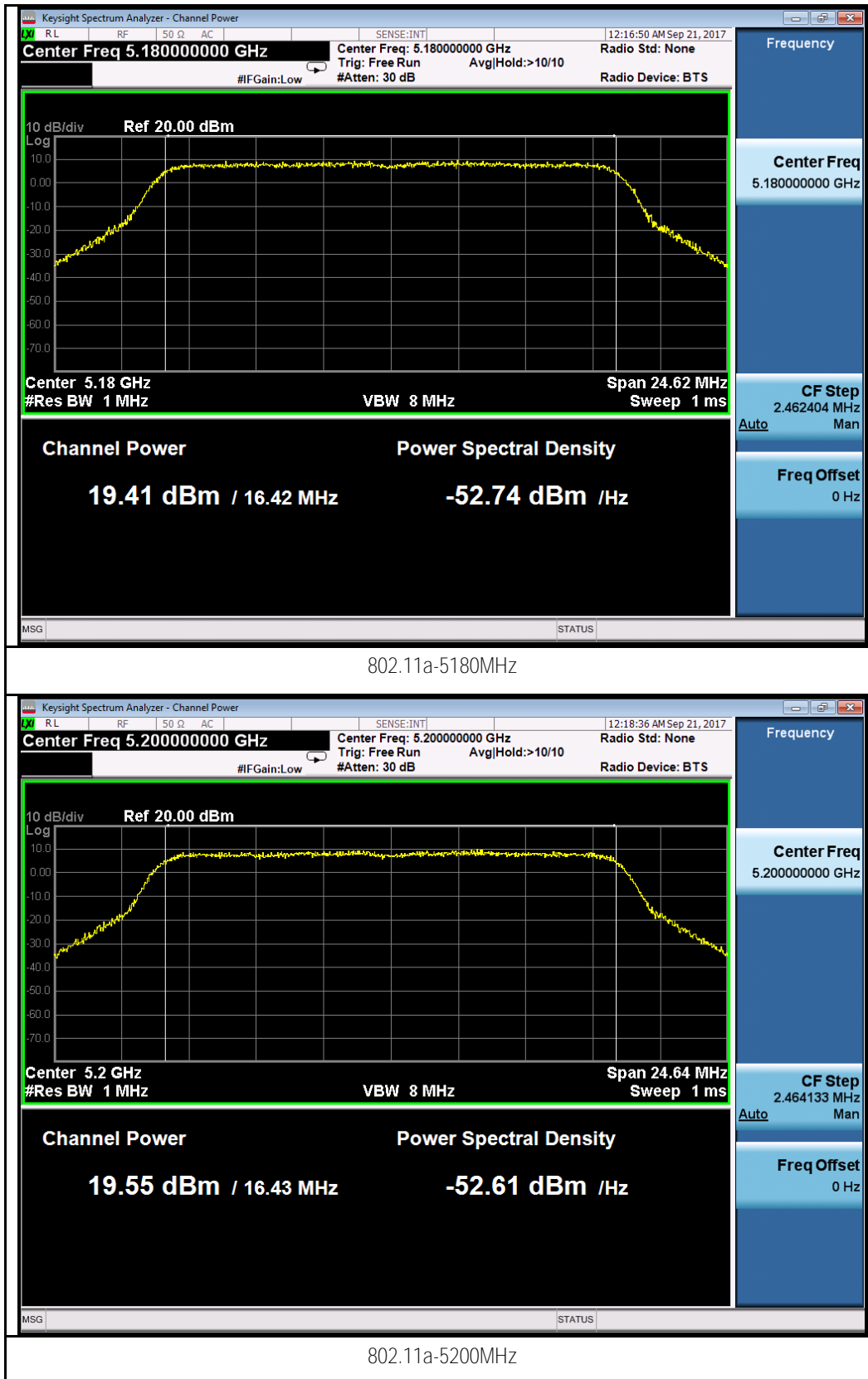
Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)					Limit (dBm)	Result
				Chain 0	Chain 1	Chain 2	Chain 3	Combined Power		
Output Power	802.11a	5180	Low	19.41	19.65	19.59	19.84	25.65	28.5	Pass
		5200	Mid	19.55	20.00	19.99	19.84	25.87	28.5	Pass
		5240	High	19.42	19.74	19.61	19.65	25.63	28.5	Pass
	802.11n-20	5180	Low	19.81	20.23	19.78	19.73	25.91	28.5	Pass
		5200	Mid	19.11	19.53	19.73	19.66	25.53	28.5	Pass
		5240	High	19.56	19.83	19.69	20.00	25.79	28.5	Pass
	802.11n-40	5190	Low	18.94	18.95	18.99	18.97	24.98	28.5	Pass
		5230	High	19.64	20.04	19.47	20.05	25.83	28.5	Pass
	802.11ac-80	5210	Mid	16.90	17.17	16.88	16.75	22.95	28.5	Pass

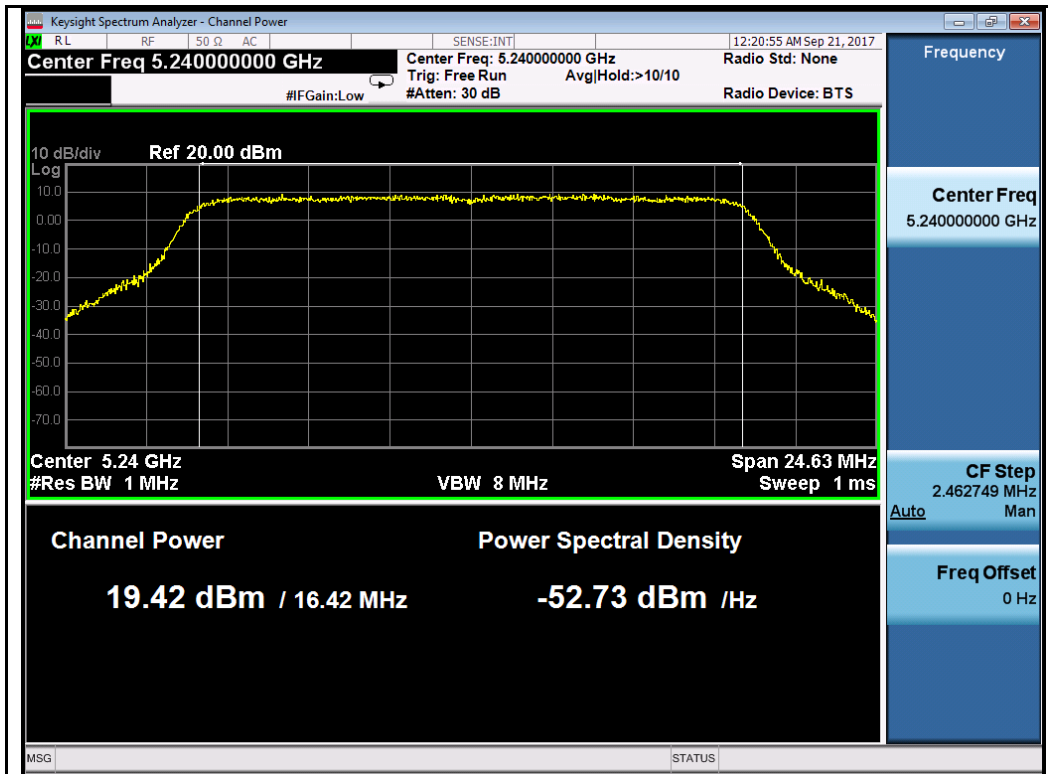
Output Power measurement result for 5.8GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)					Limit (dBm)	Result
				Chain 0	Chain 1	Chain 2	Chain3	Combined Power		
Output Power	802.11a	5745	Low	21.36	21.51	21.89	20.94	27.46	28.5	Pass
		5785	Mid	21.55	22.04	21.95	21.46	27.78	28.5	Pass
		5825	High	21.40	21.90	22.11	21.48	27.75	28.5	Pass
	802.11n-20	5745	Low	21.20	21.02	21.39	20.93	27.16	28.5	Pass
		5785	Mid	21.65	21.76	21.76	21.45	27.68	28.5	Pass
		5825	High	21.17	21.69	21.86	21.35	27.55	28.5	Pass
	802.11n-40	5755	Low	21.28	21.44	21.51	20.96	27.32	28.5	Pass
		5795	High	21.61	22.04	22.02	21.19	27.75	28.5	Pass
	802.11ac-80	5775	Mid	21.16	21.12	21.32	20.85	27.14	28.5	Pass

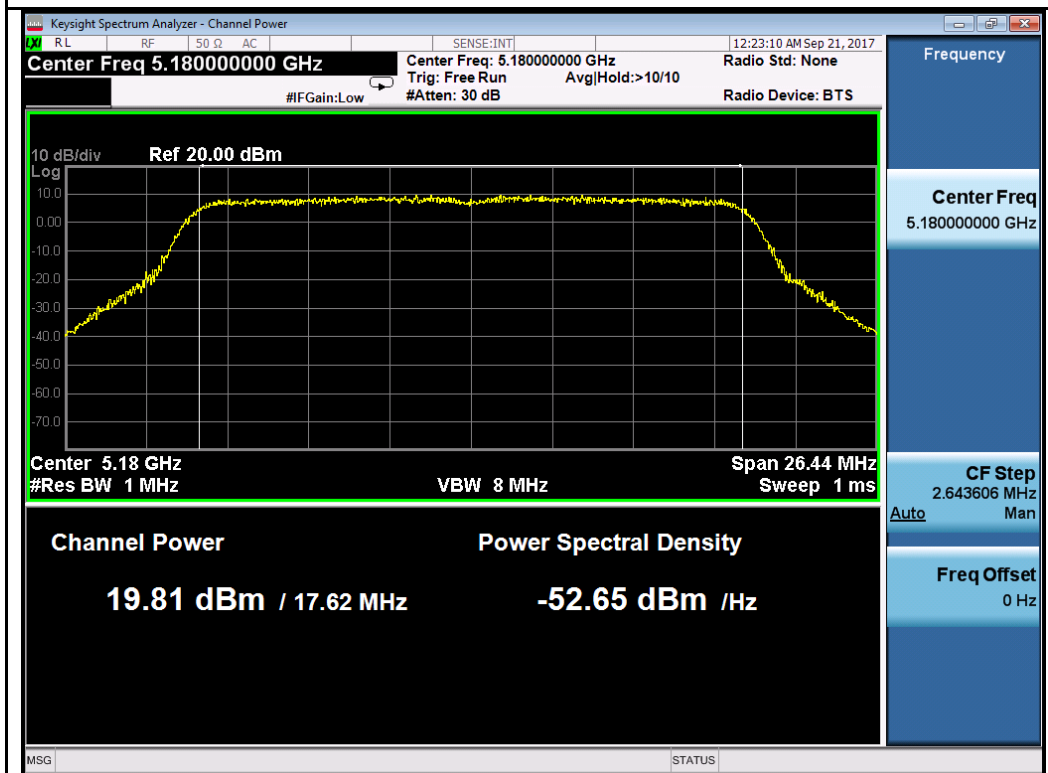
Test Plot for W52:

Chain 0:

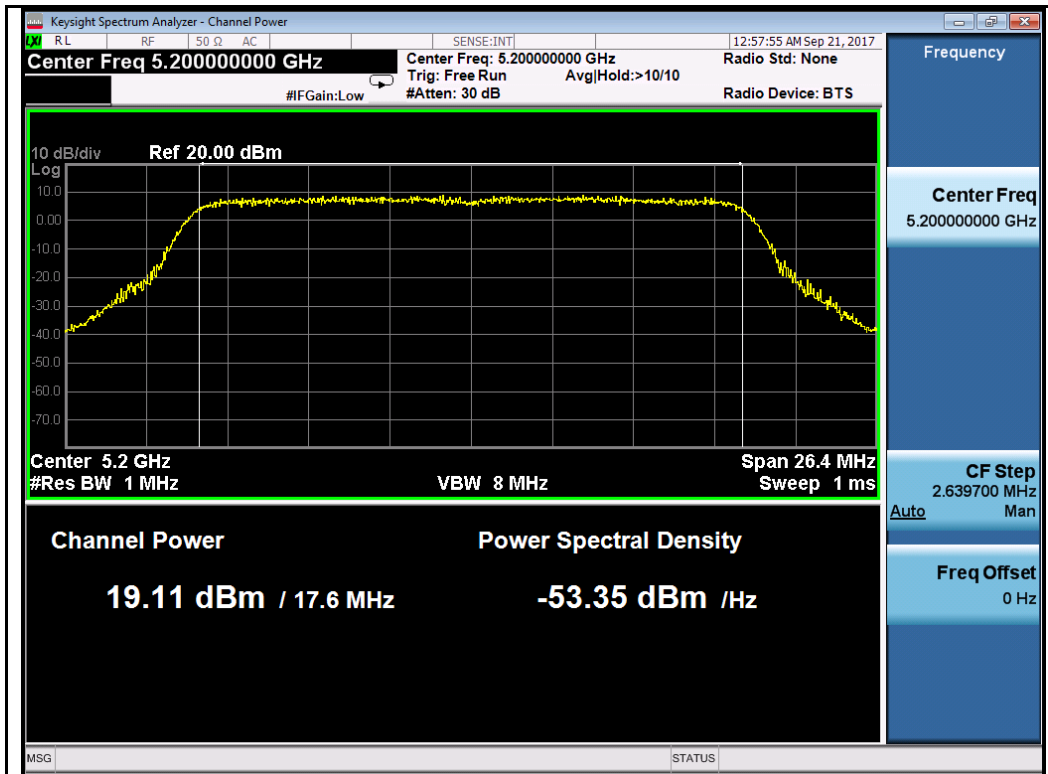




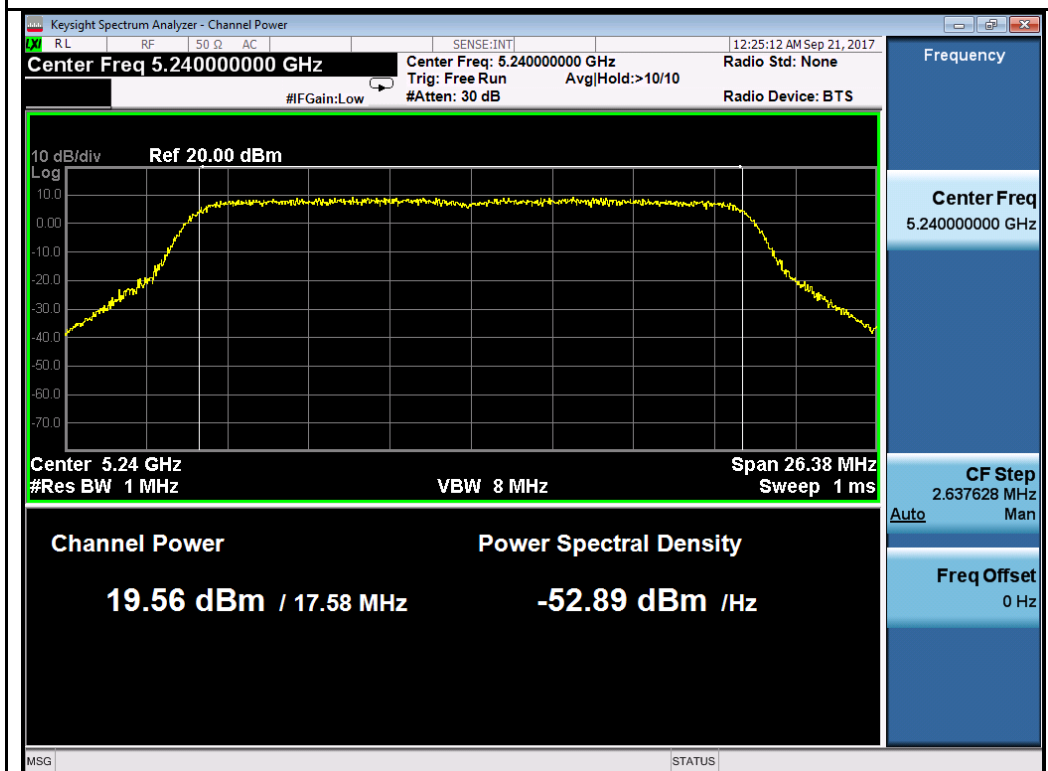
802.11a-5240MHz



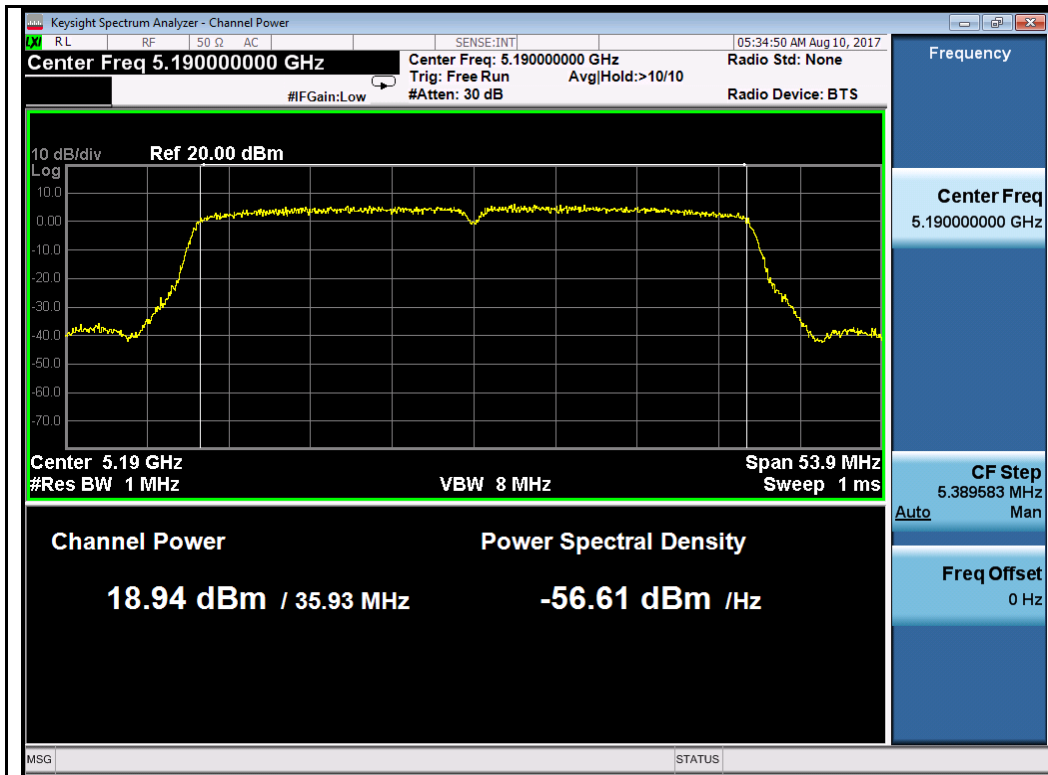
802.11n-HT20-5180MHz



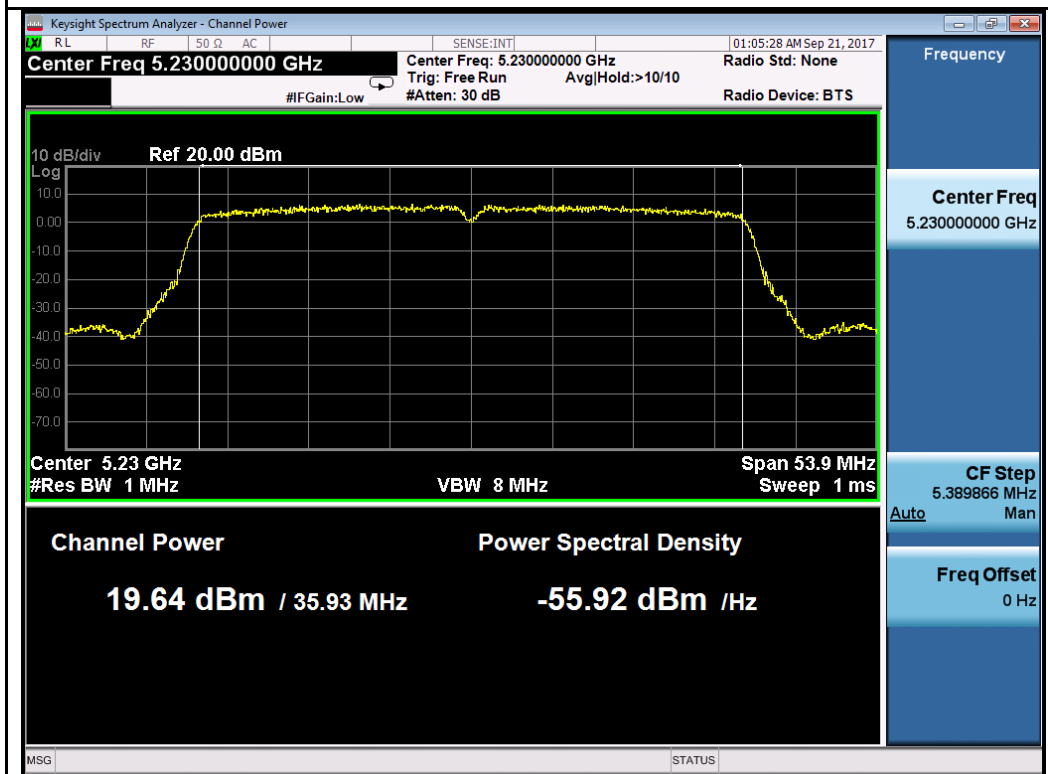
802.11n-HT20-5200MHz



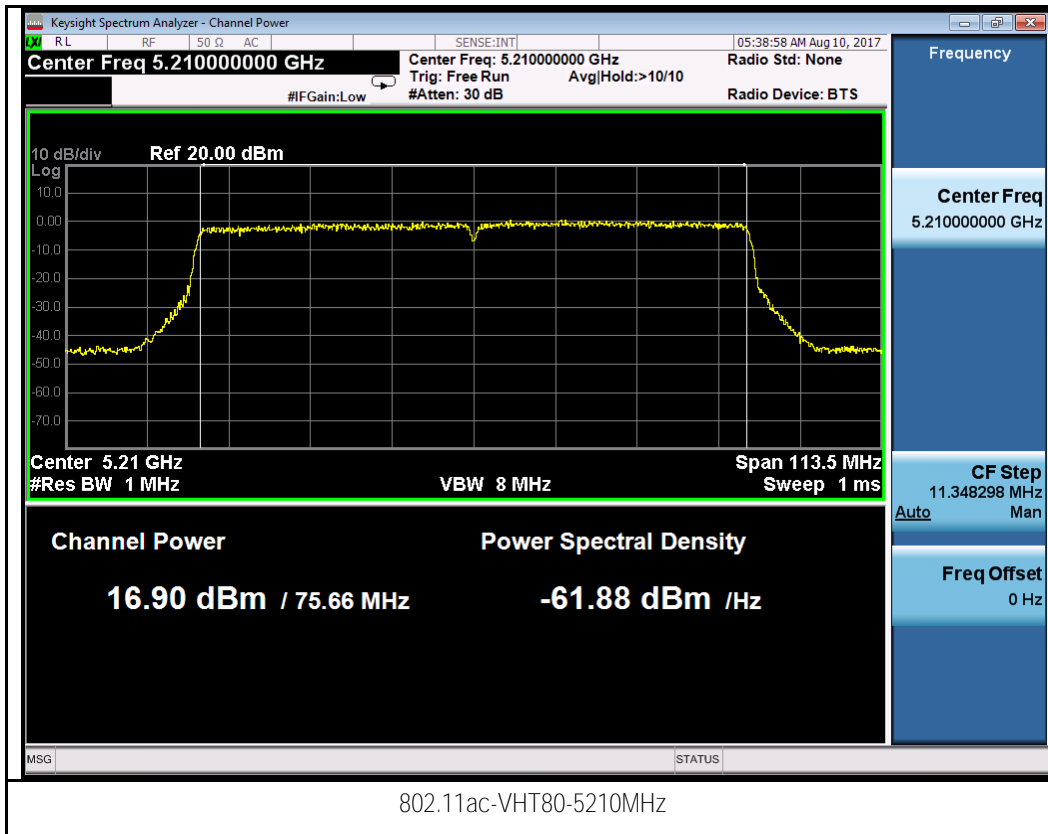
802.11n-HT20-5240MHz



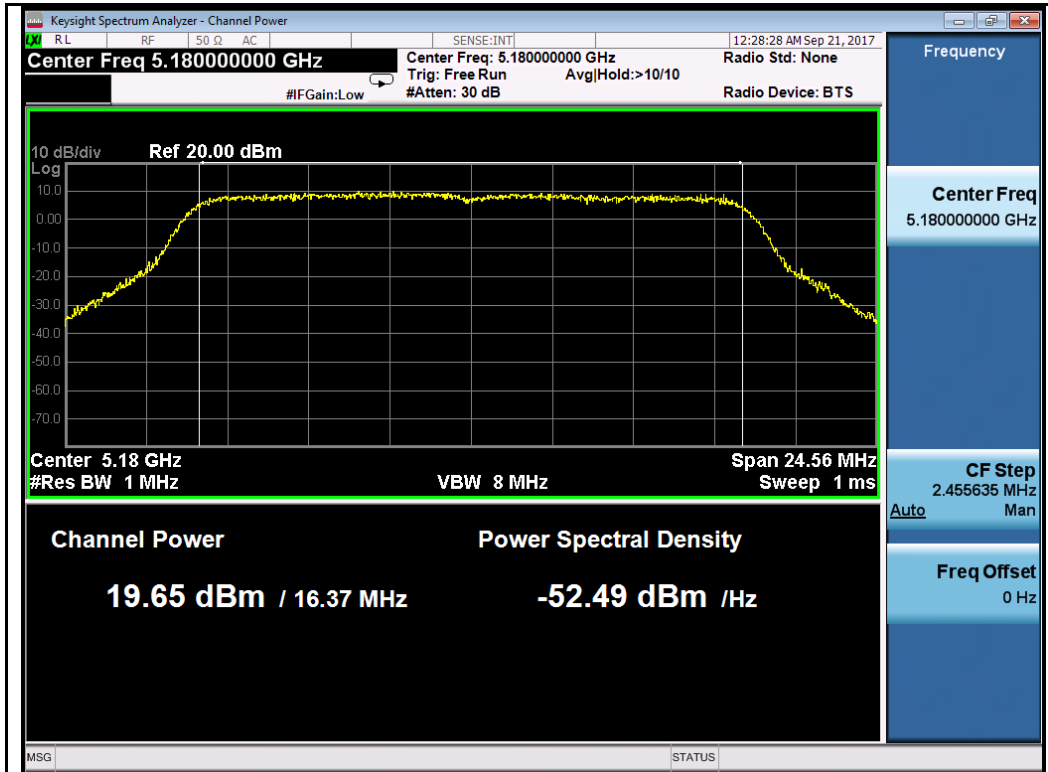
802.11n-HT40-5190MHz



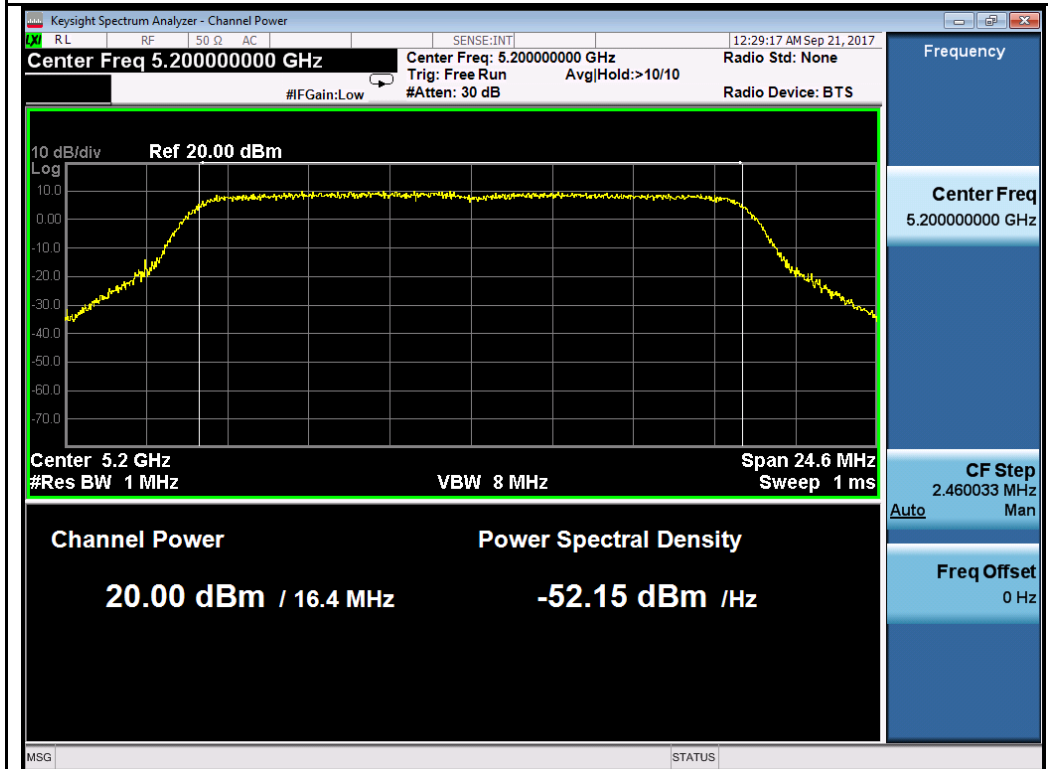
802.11n-HT40-5230MHz



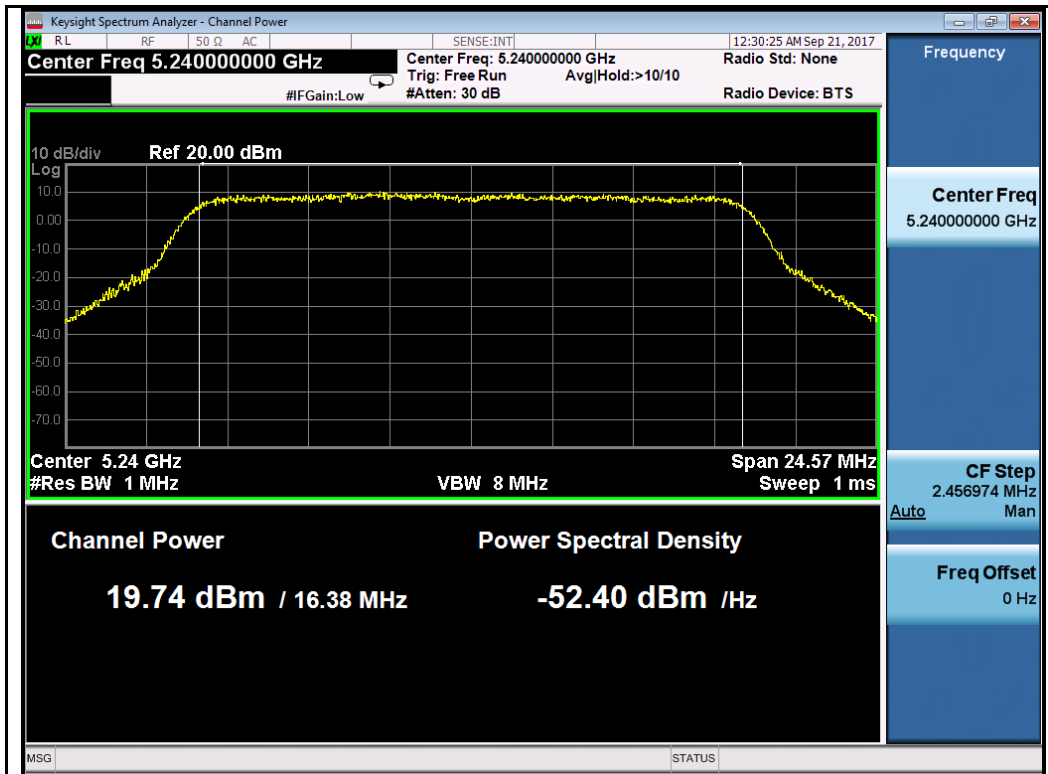
Chain 1:



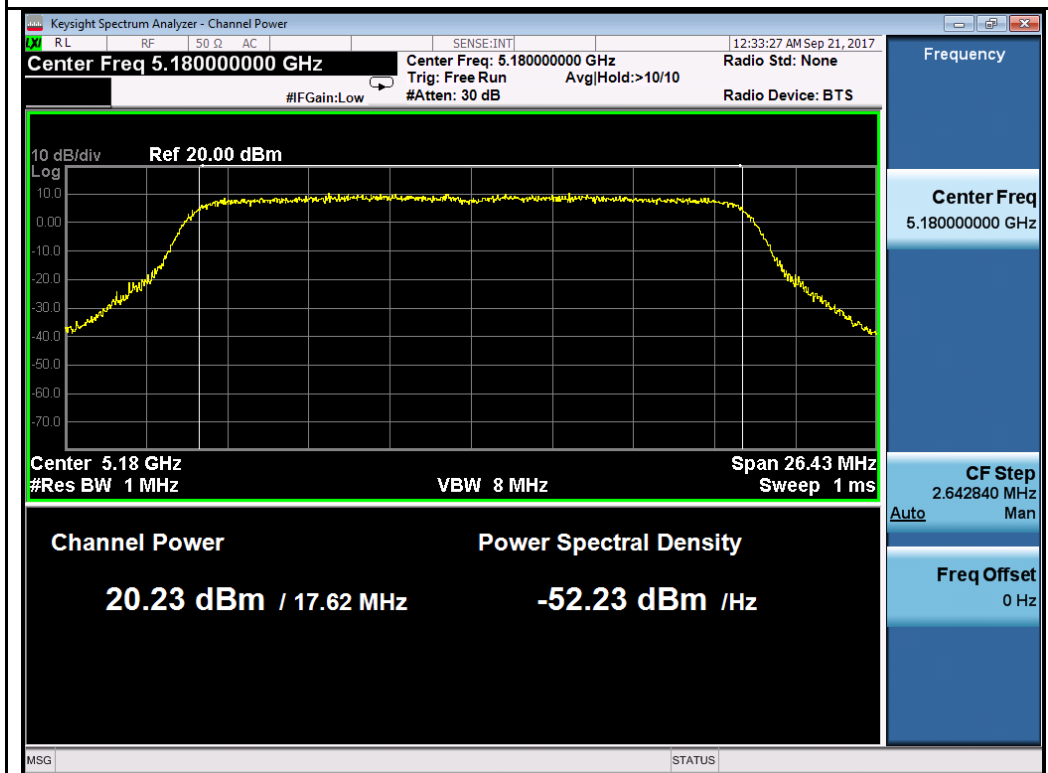
802.11a-5180MHz



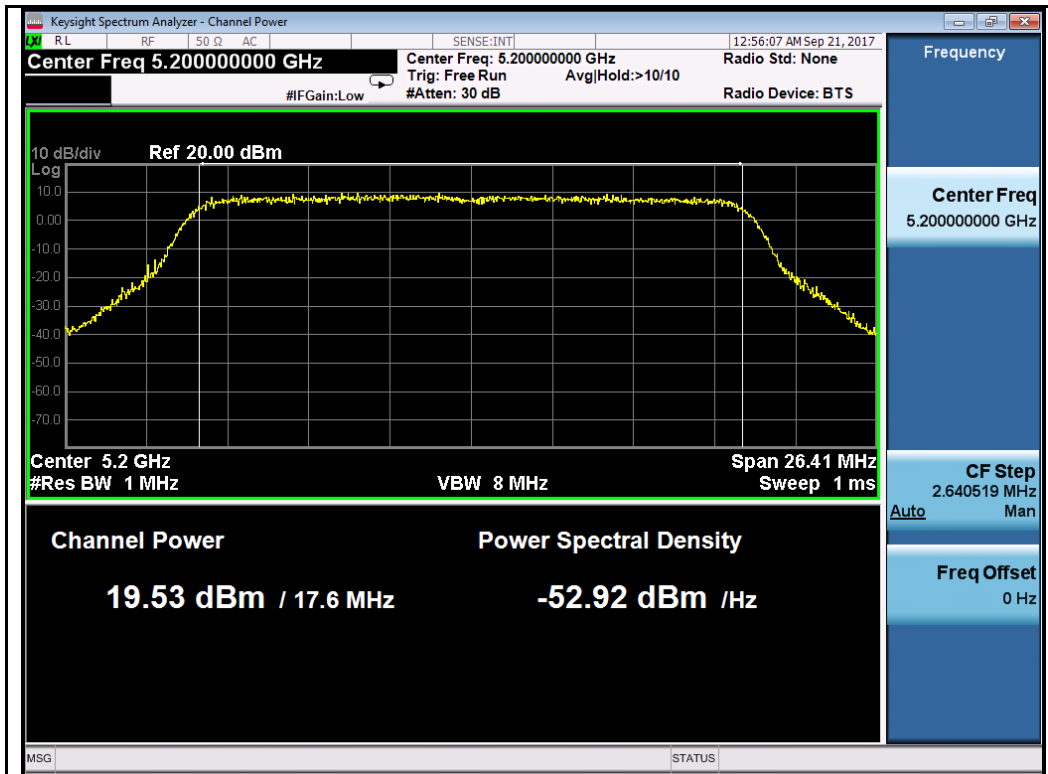
802.11a-5200MHz



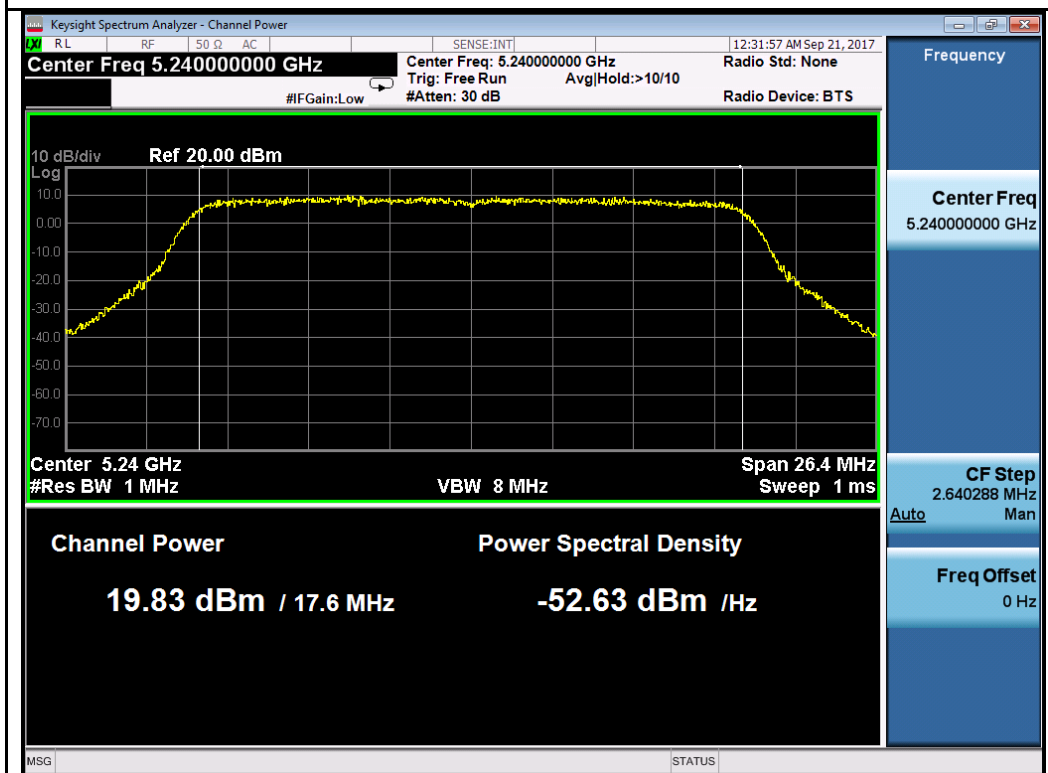
802.11a-5240MHz



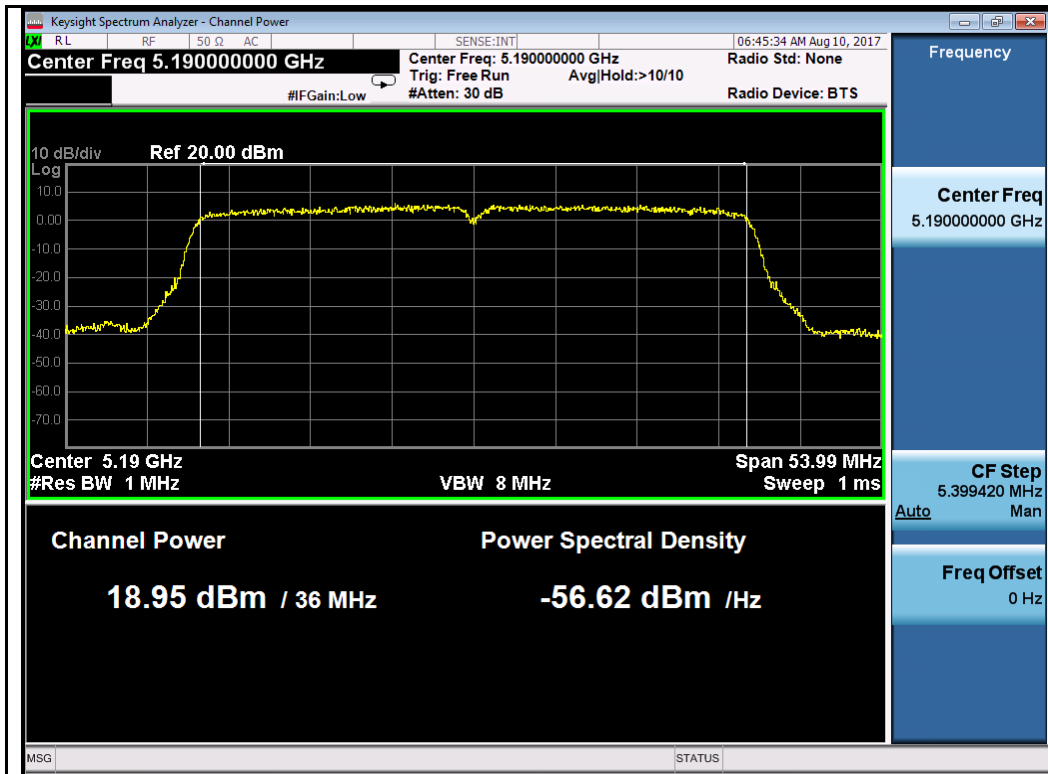
802.11n-HT20-5180MHz



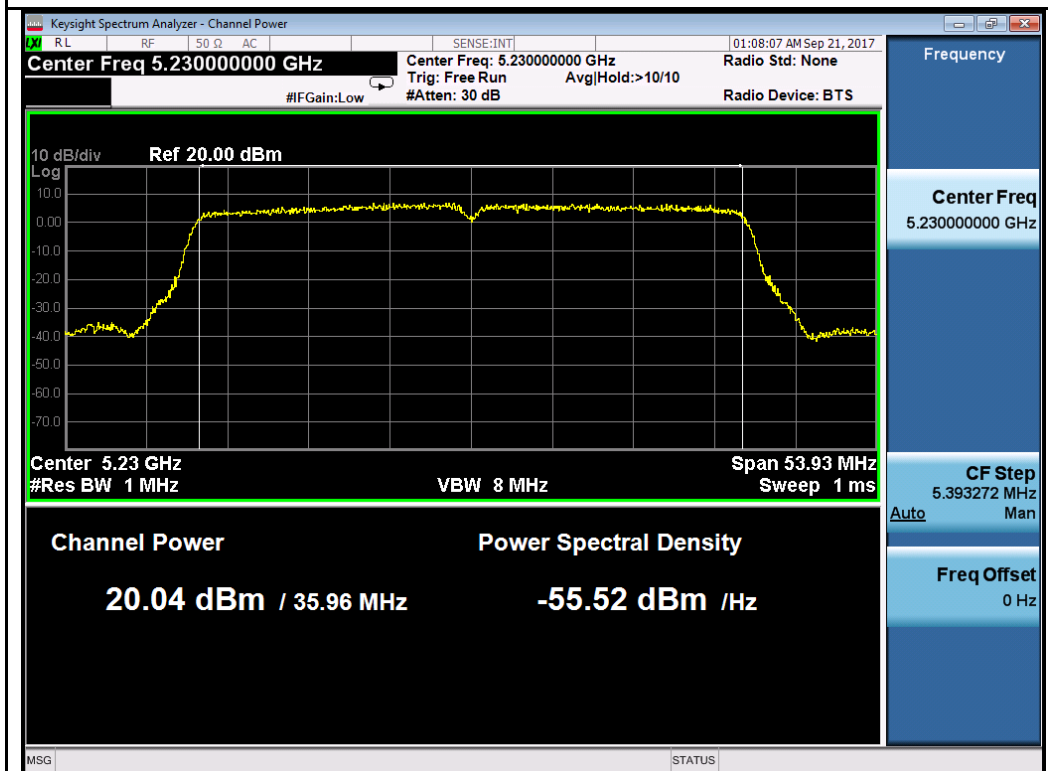
802.11n-HT20-5200MHz



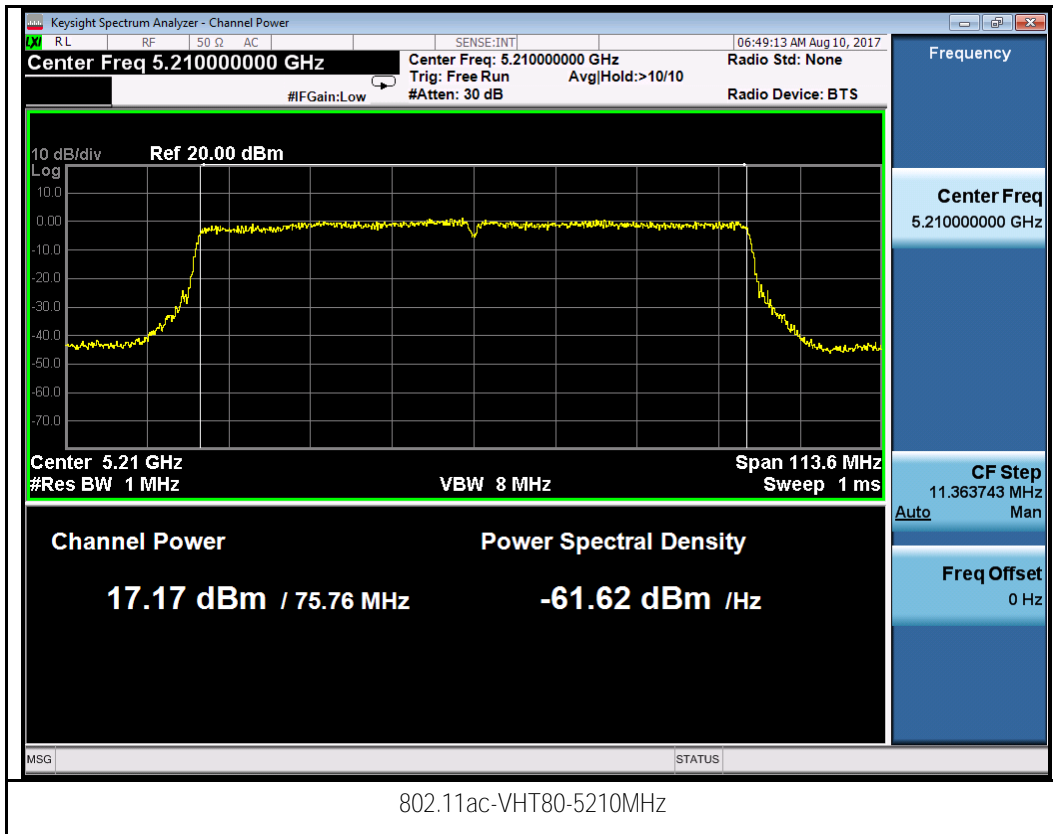
802.11n-HT20-5240MHz



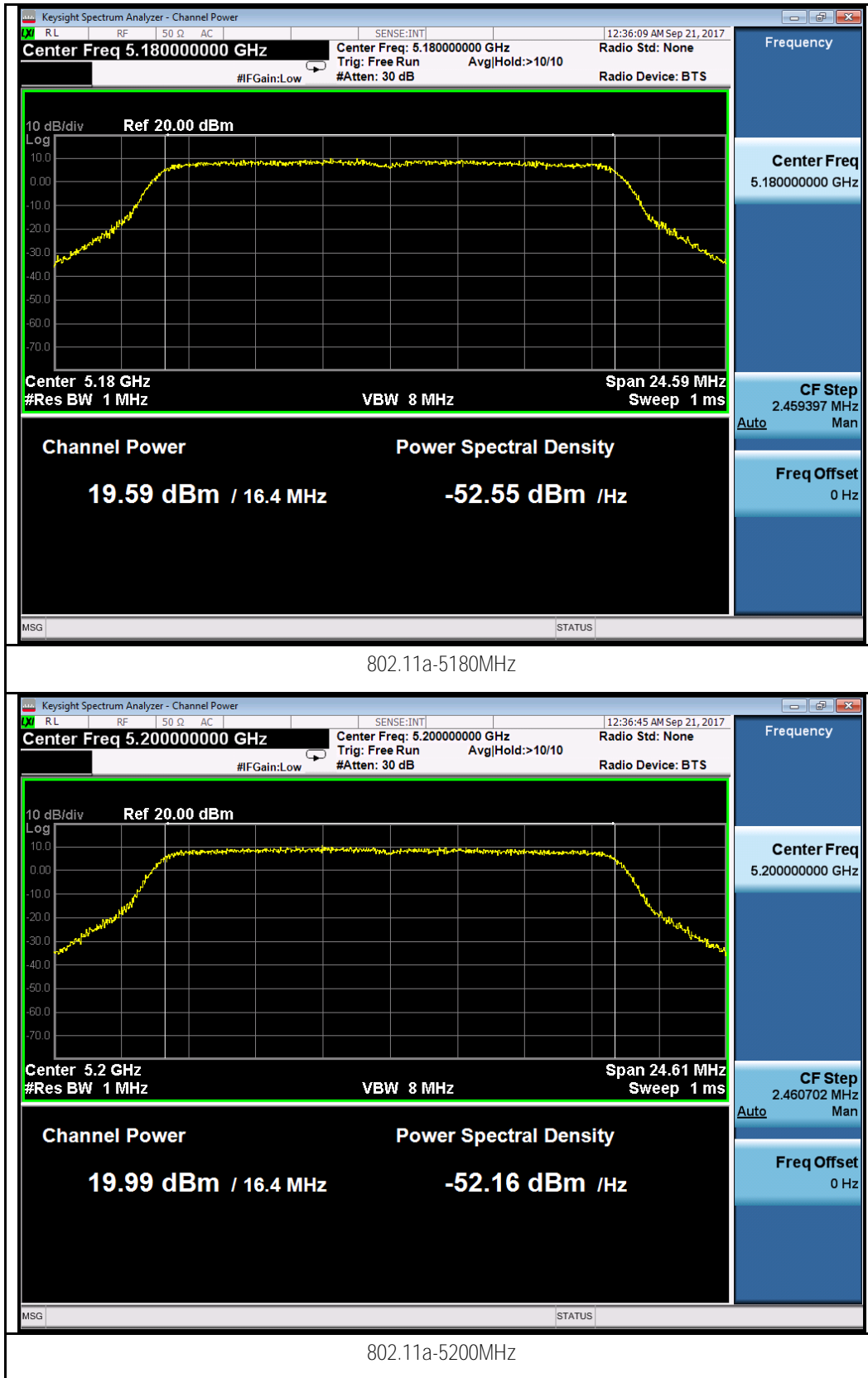
802.11n-HT40-5190MHz

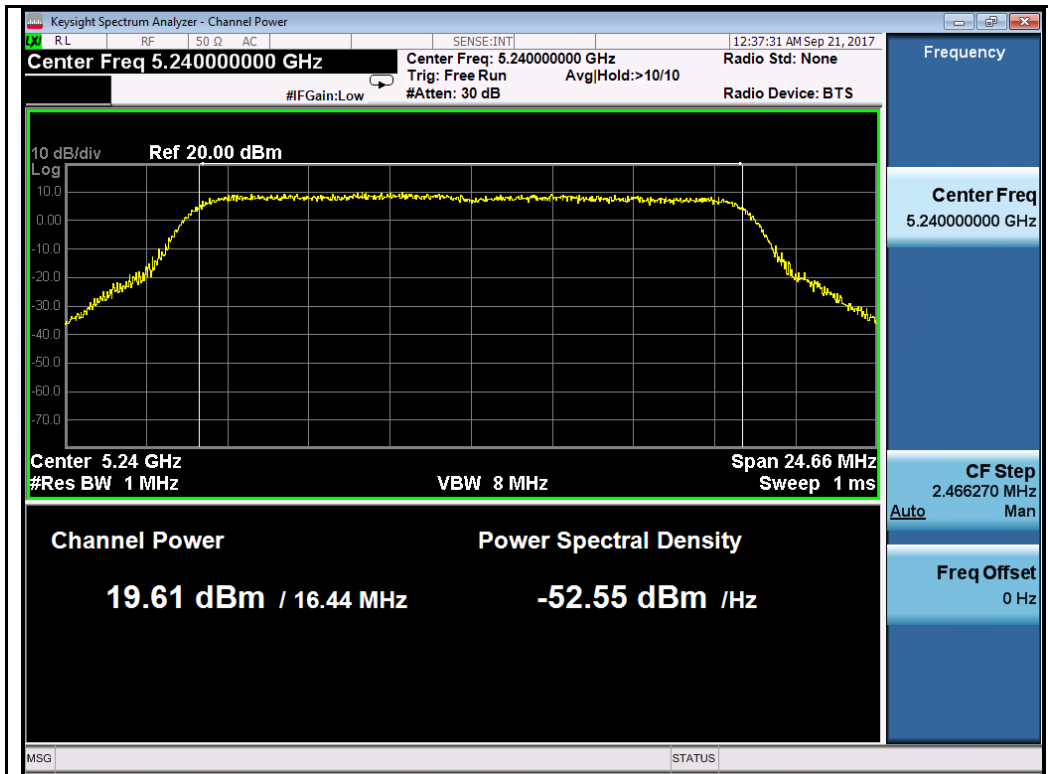


802.11n-HT40-5230MHz

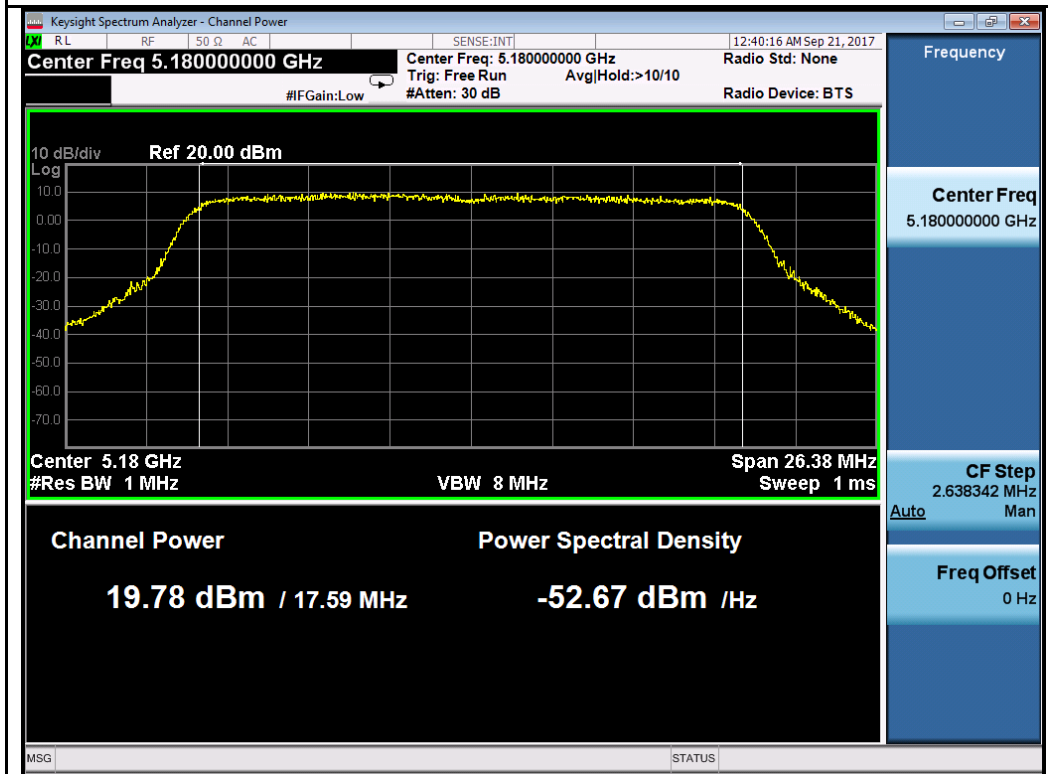


Chain 2:

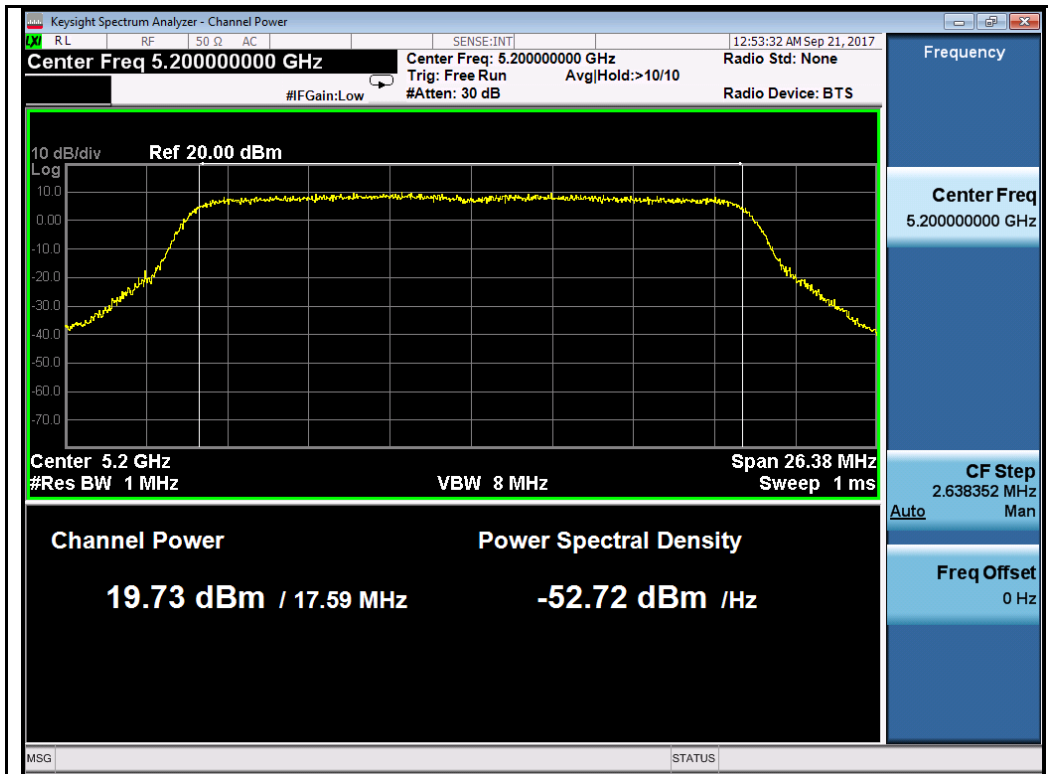




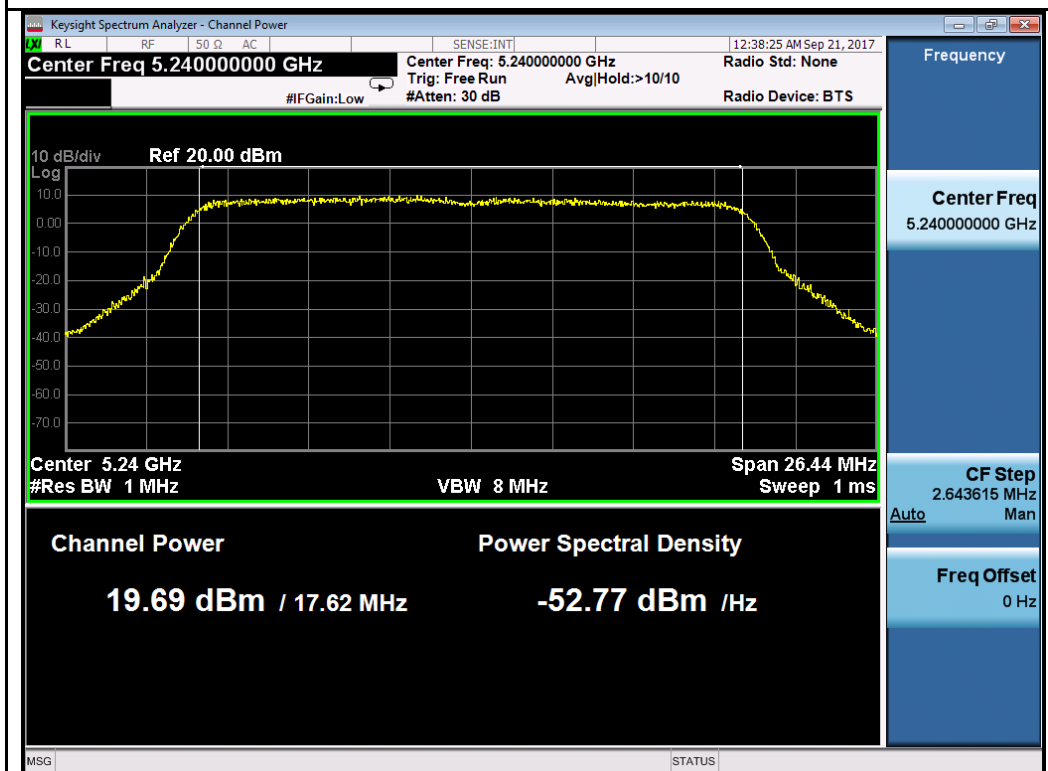
802.11a-5240MHz



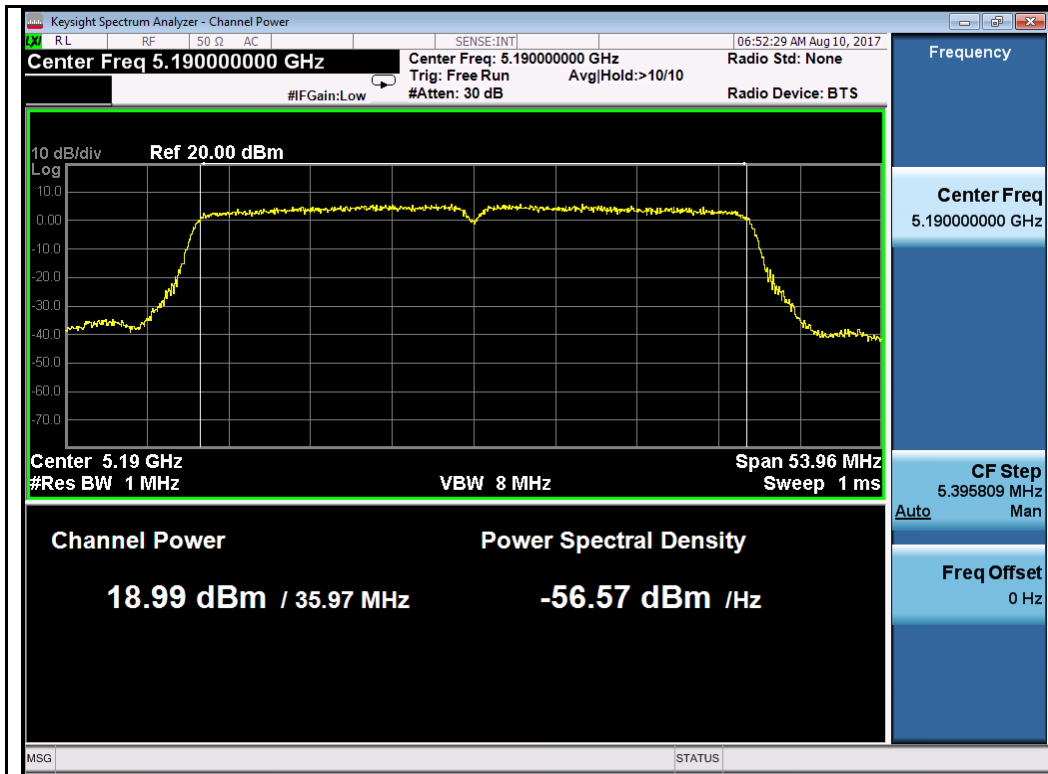
802.11n-HT20-5180MHz



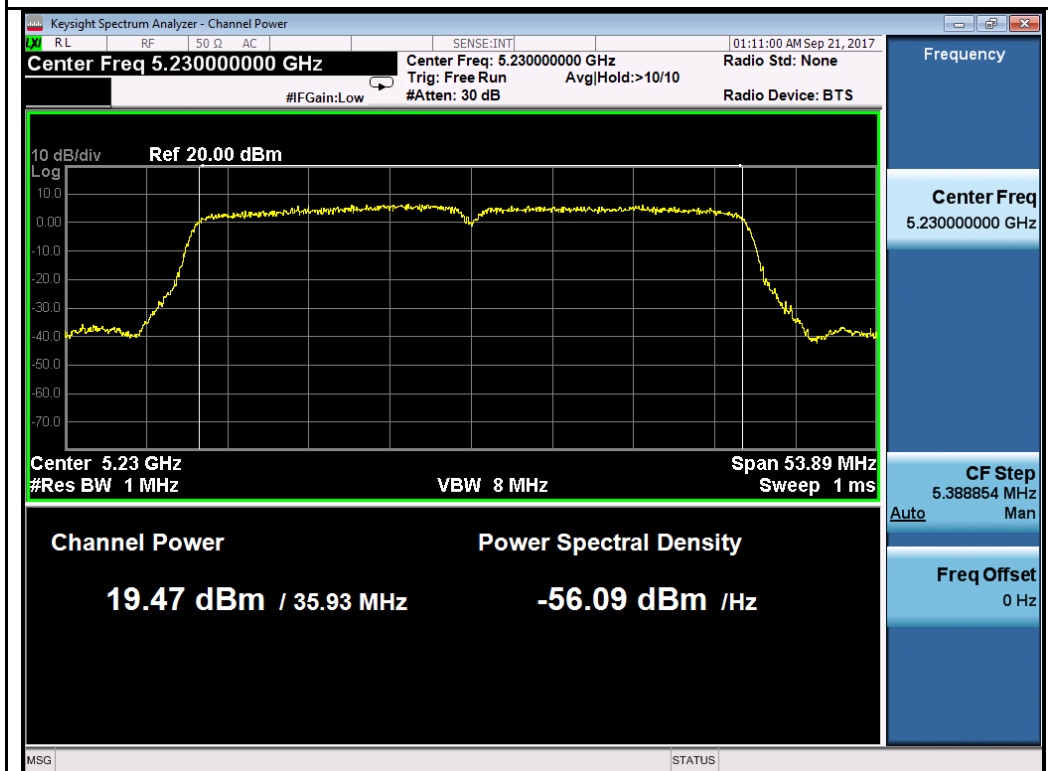
802.11n-HT20-5200MHz



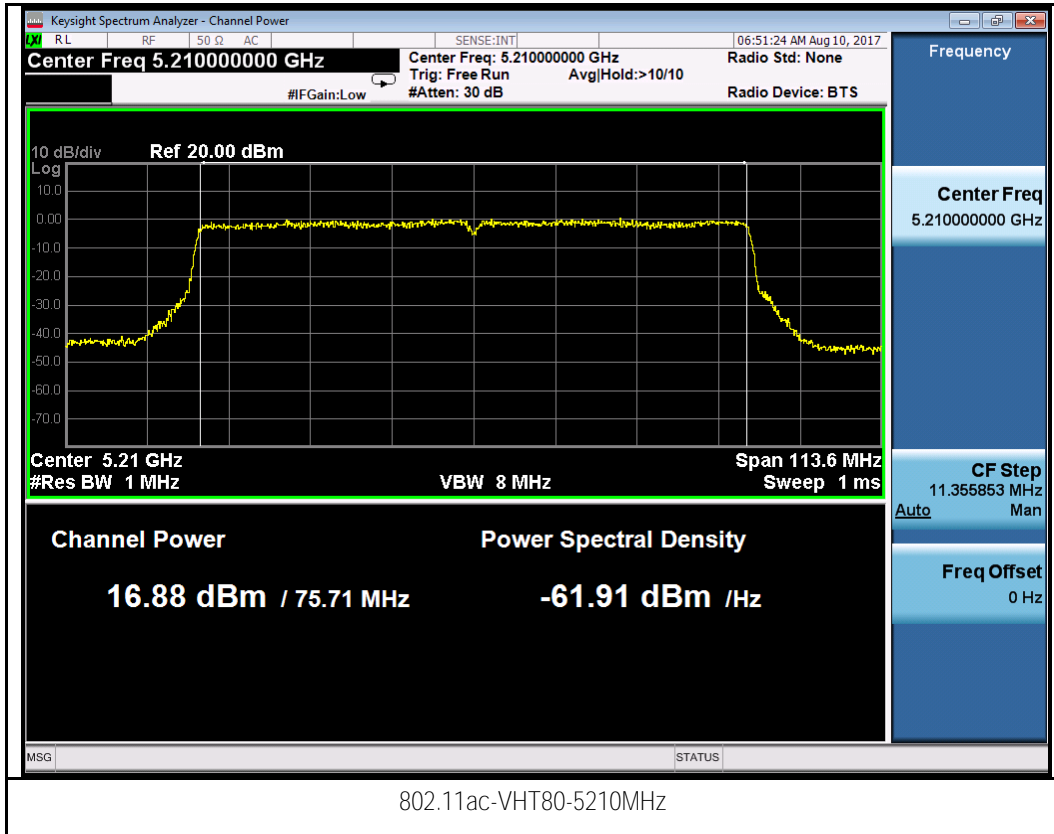
802.11n-HT20-5240MHz



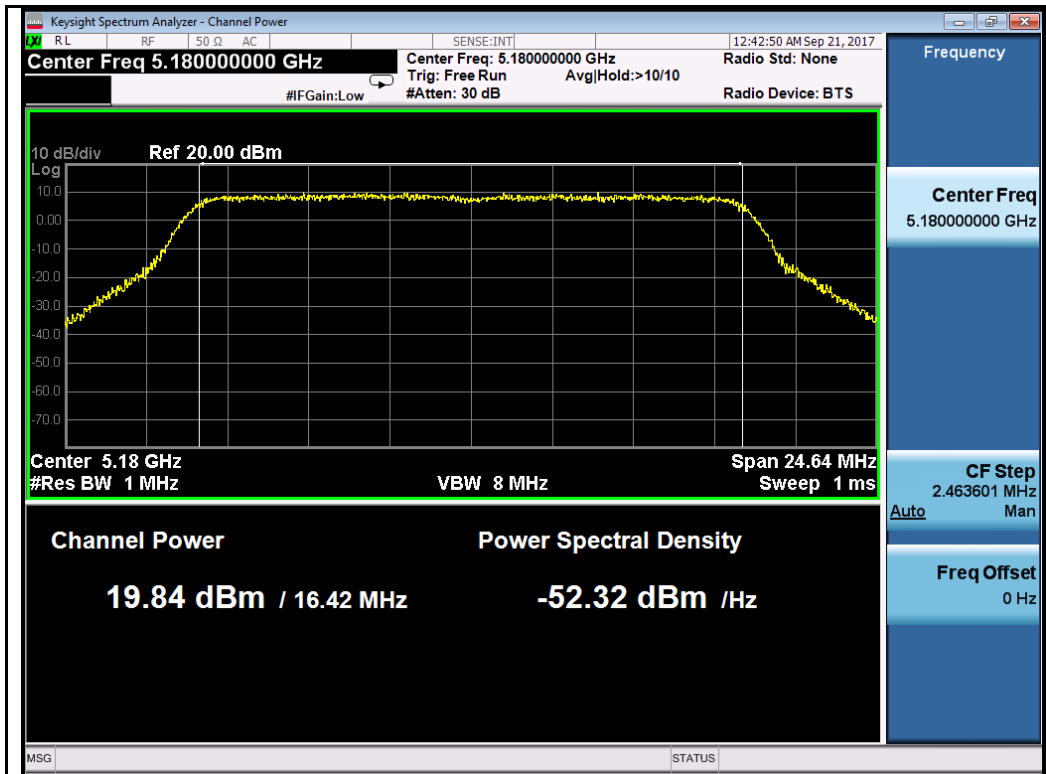
802.11n-HT40-5190MHz



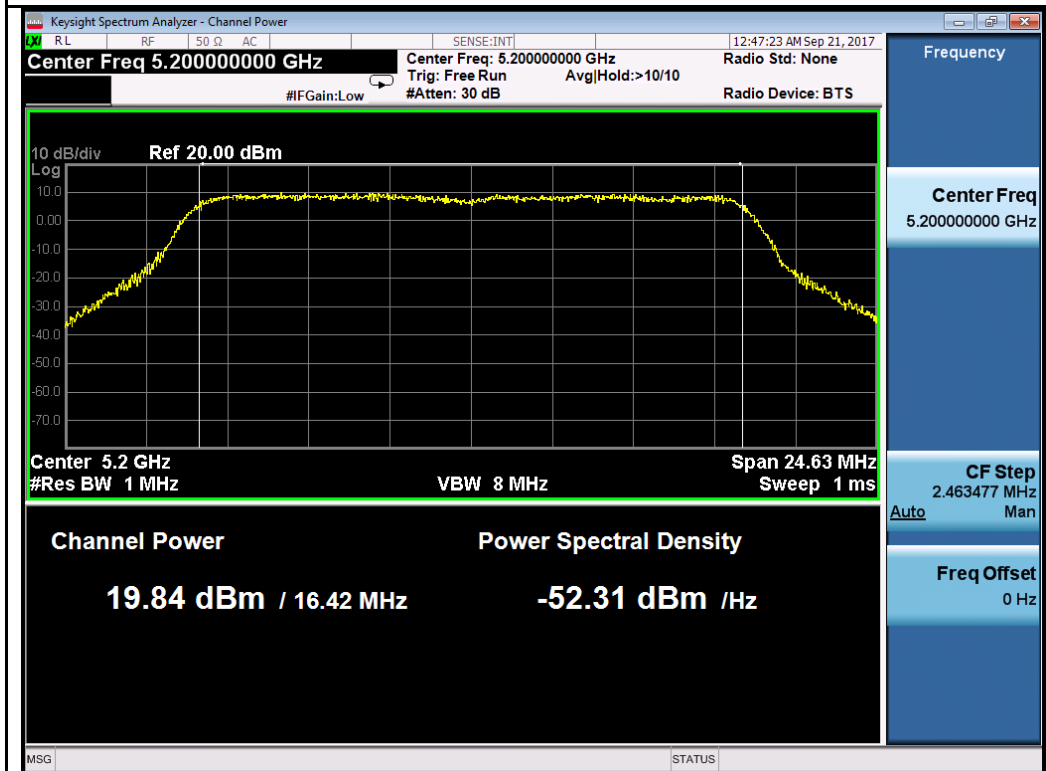
802.11n-HT40-5230MHz



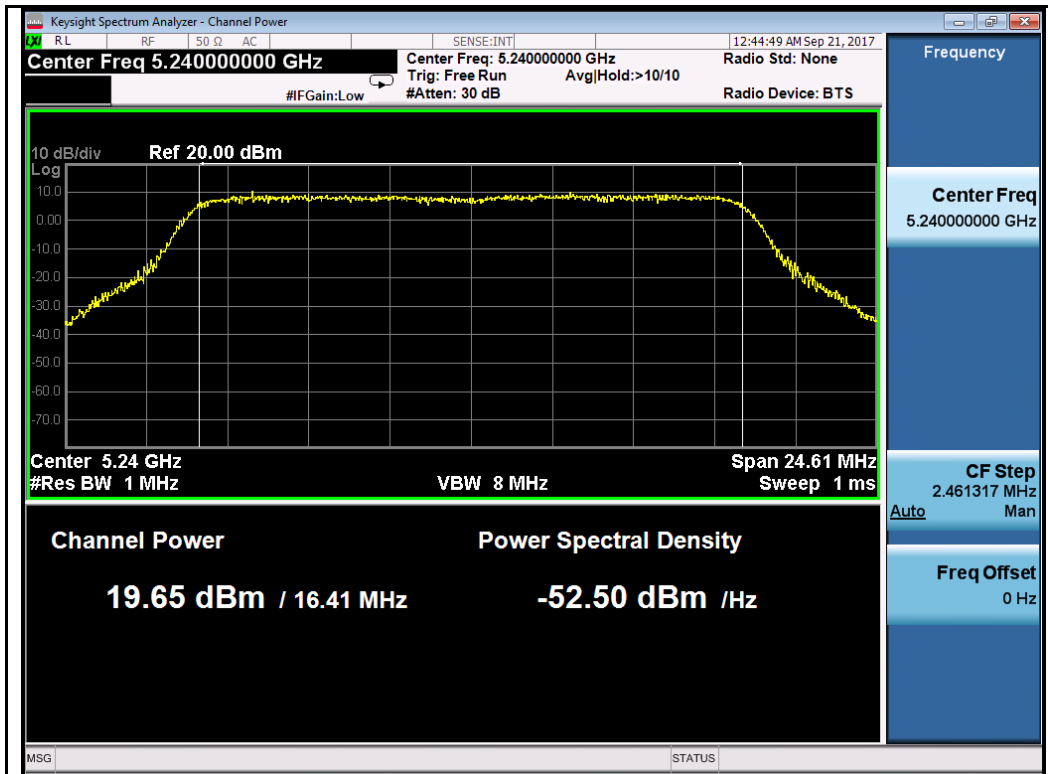
Chain 3:



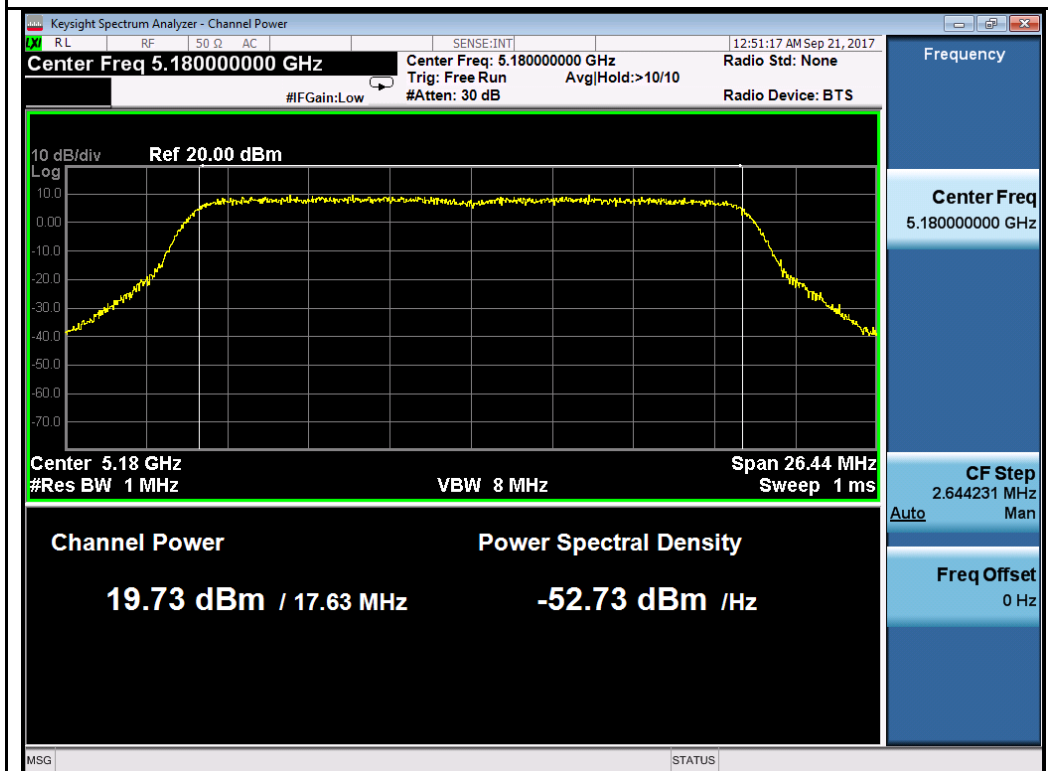
802.11a-5180MHz



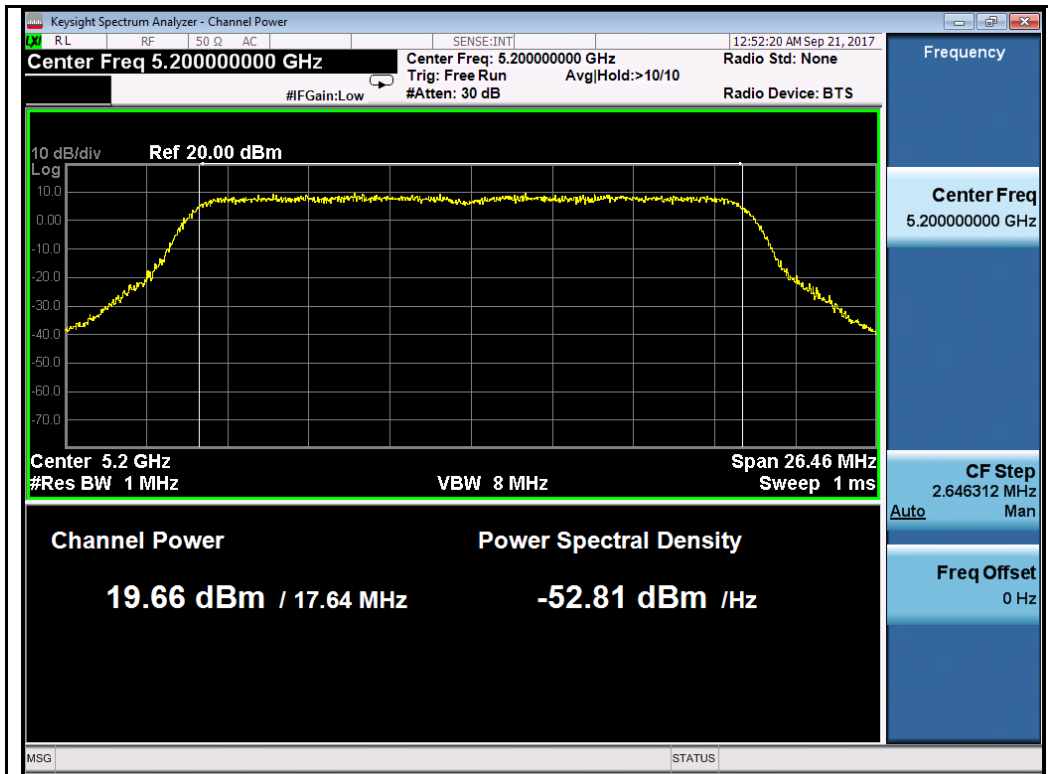
802.11a-5200MHz



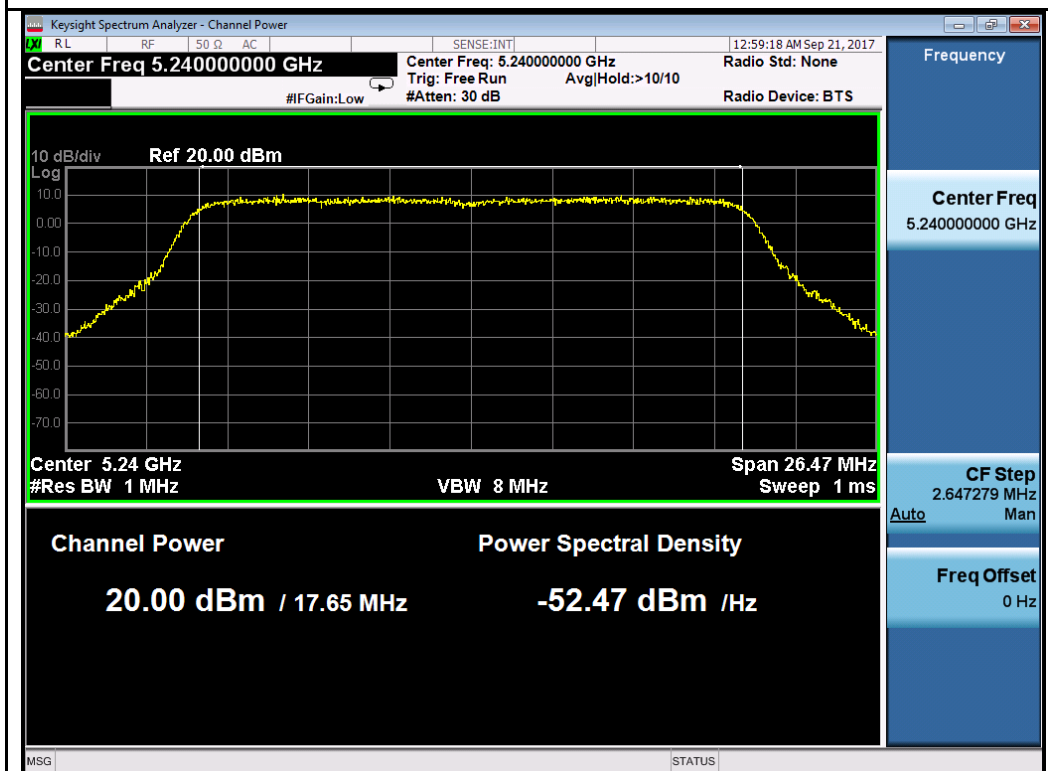
802.11a-5240MHz



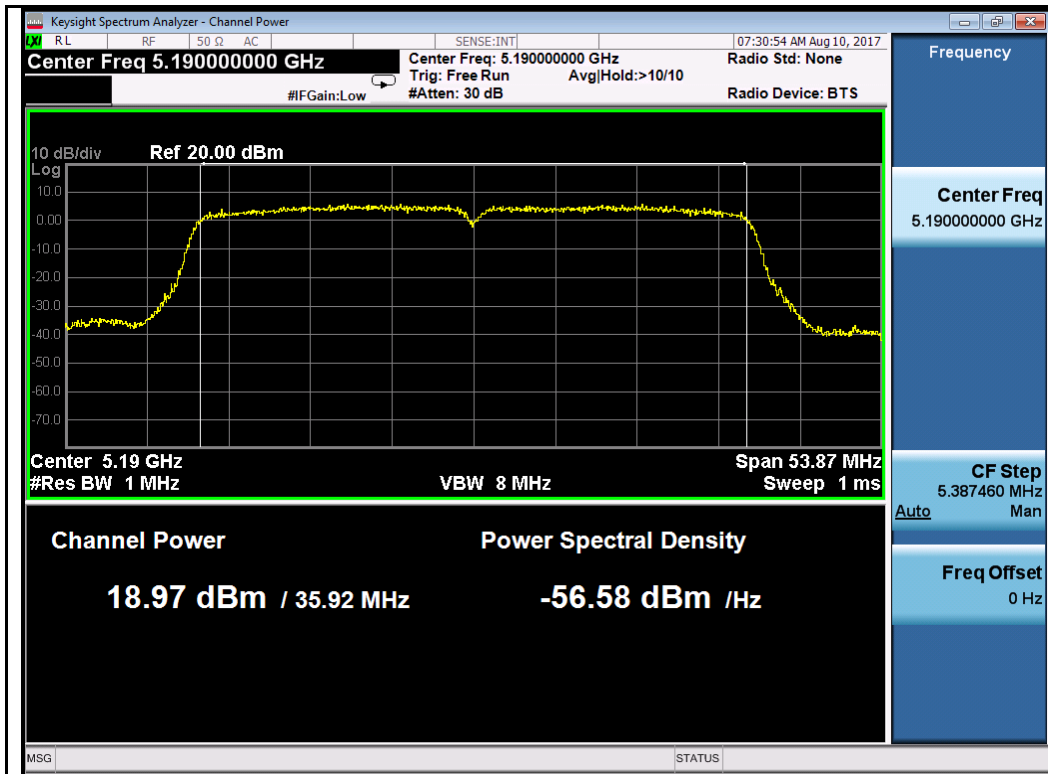
802.11n-HT20-5180MHz



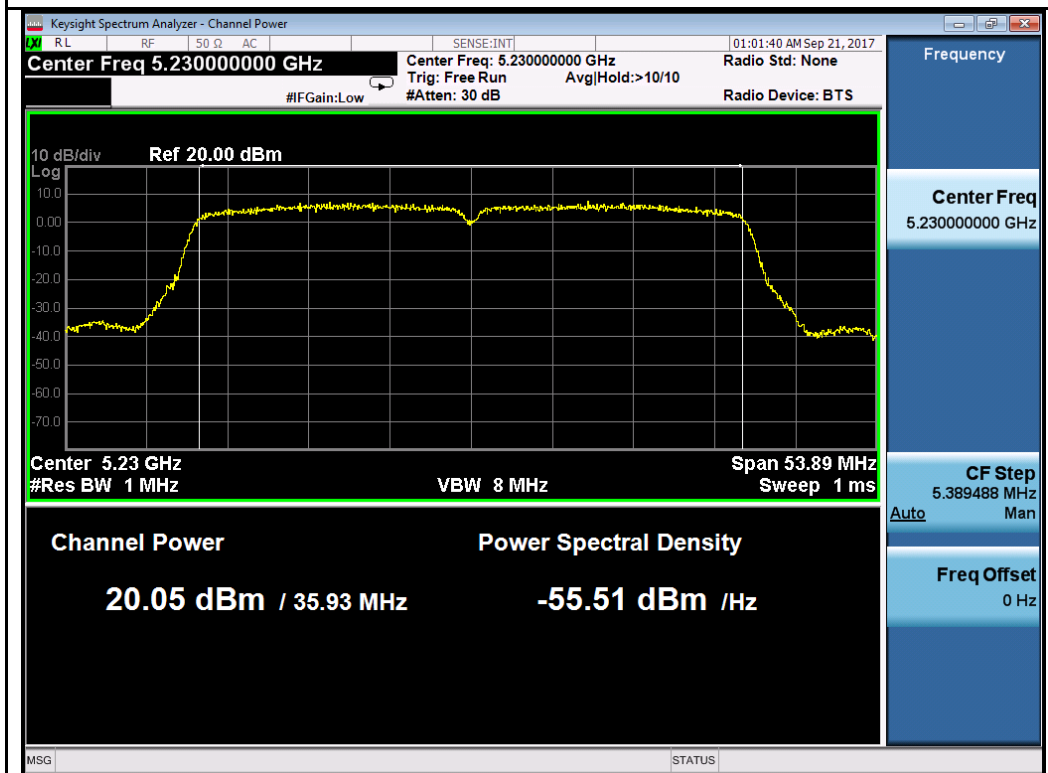
802.11n-HT20-5200MHz



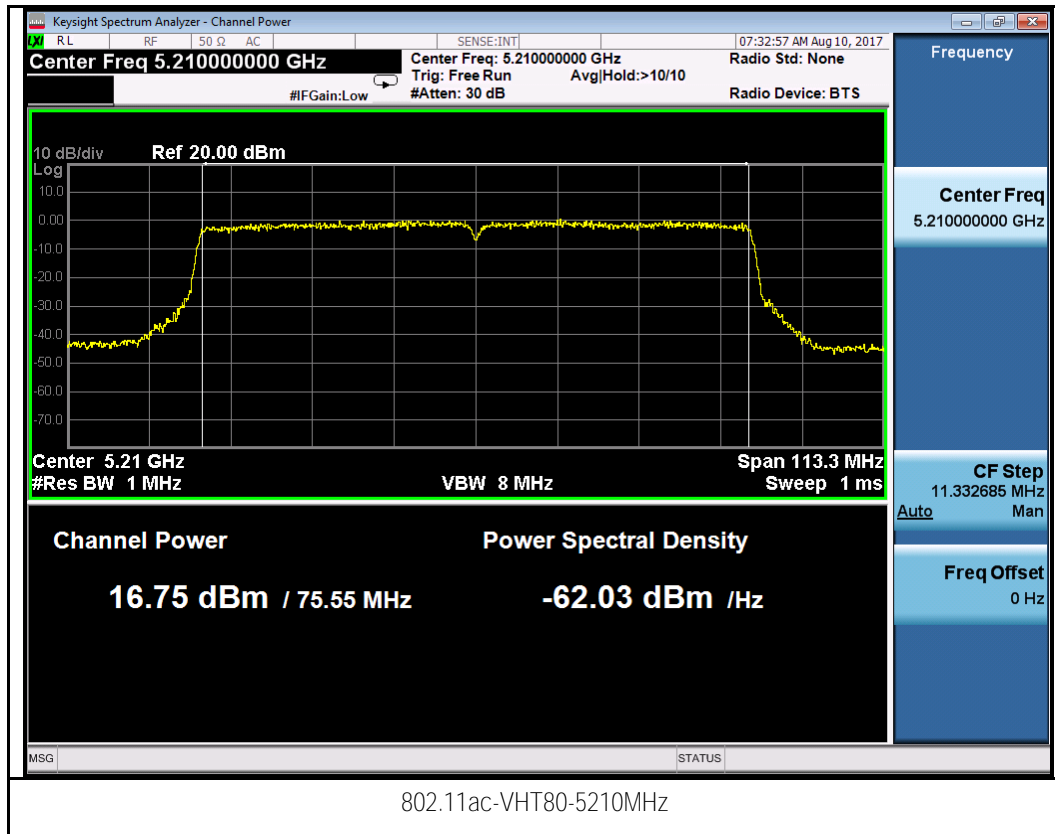
802.11n-HT20-5240MHz



802.11n-HT40-5190MHz



802.11n-HT40-5230MHz

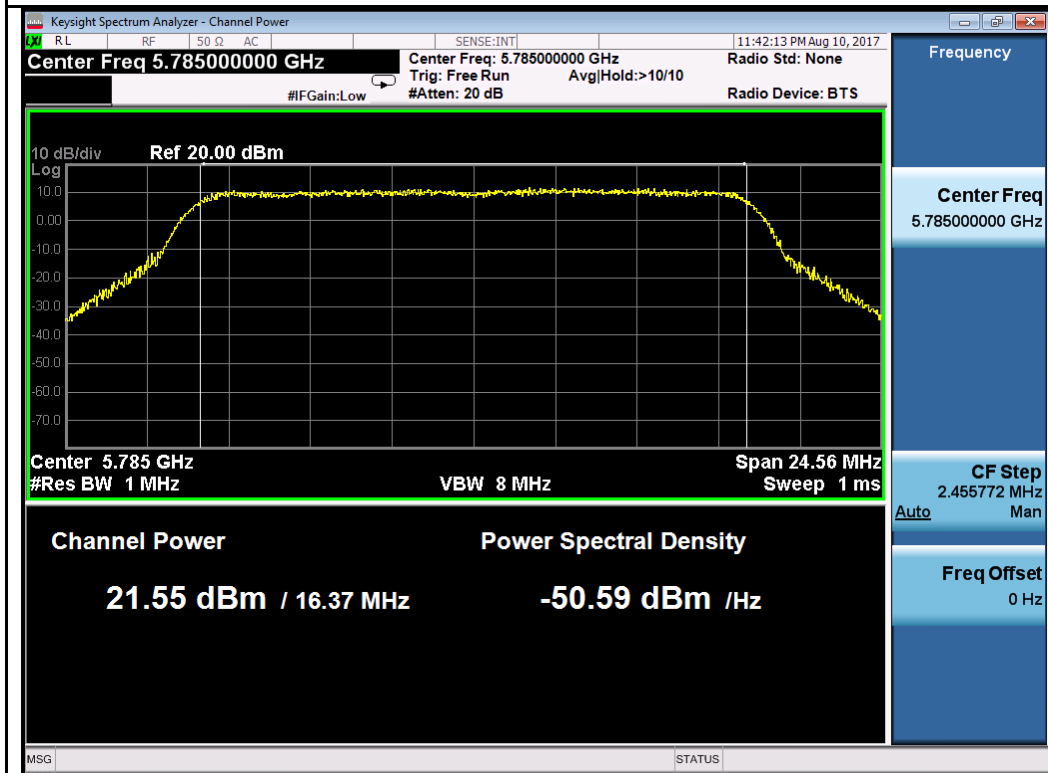


Test Plot for W58:

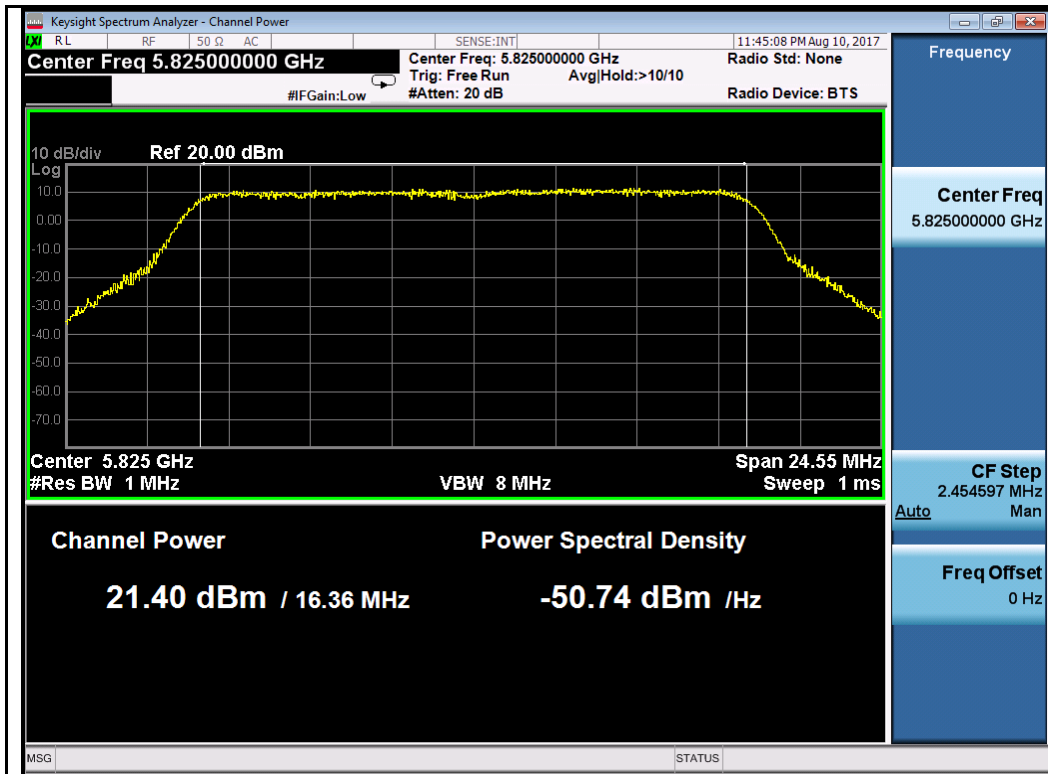
Chain 0:



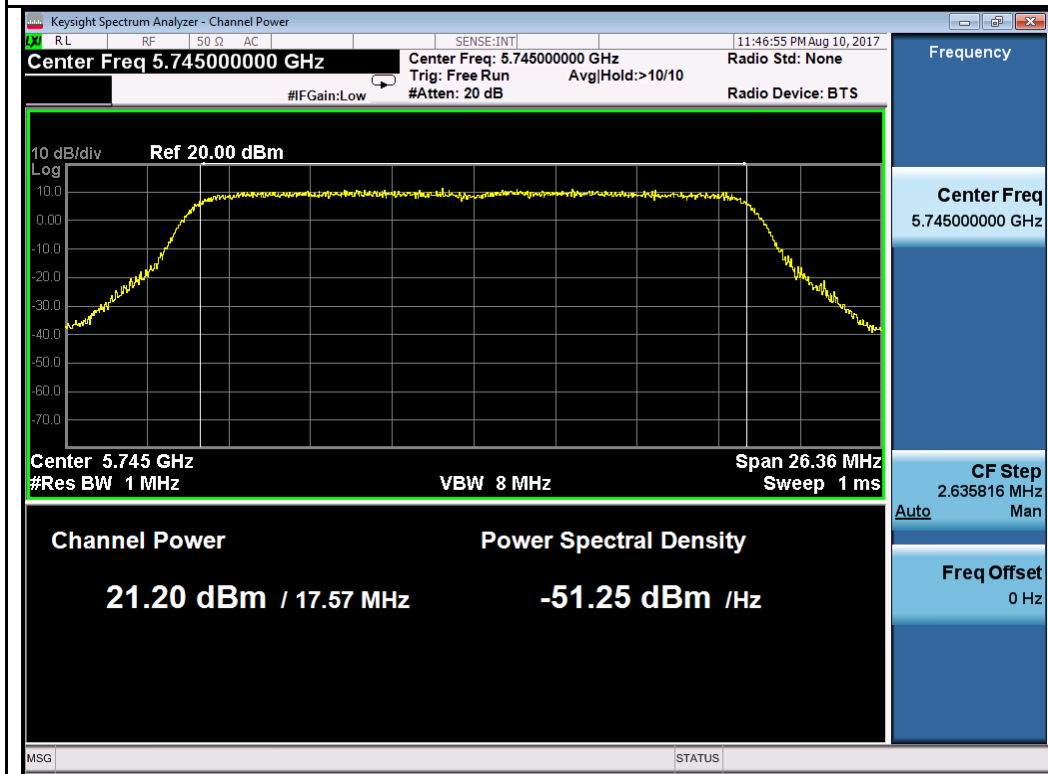
802.11a-5745MHz



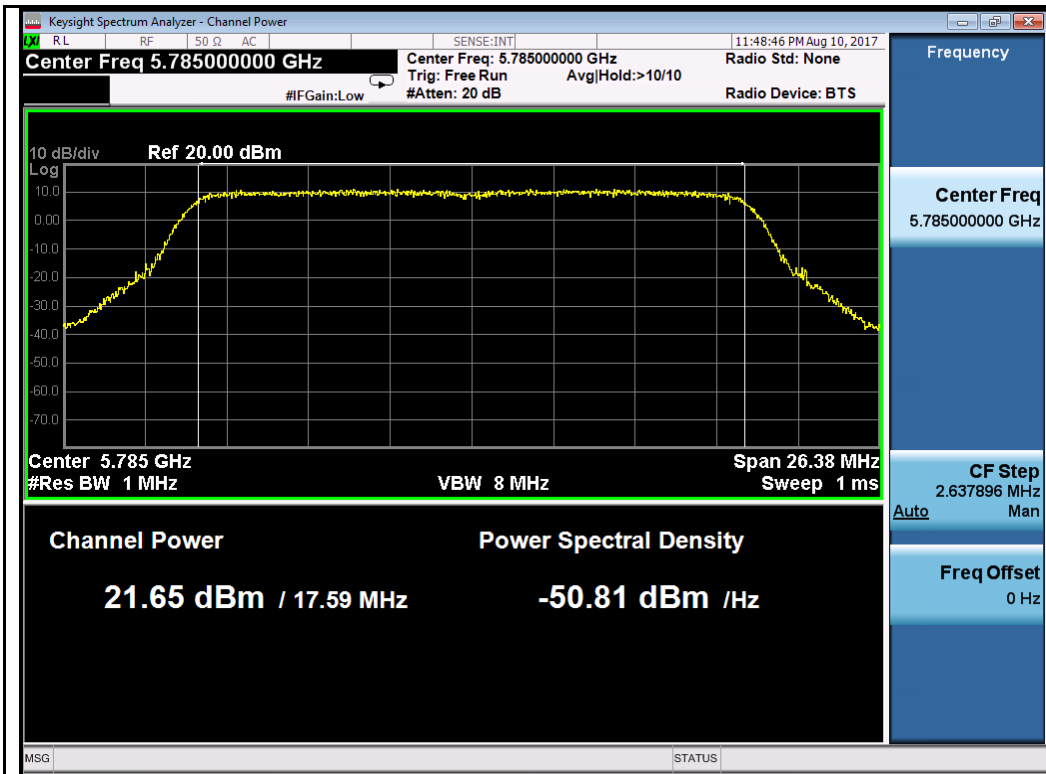
802.11a-5785MHz



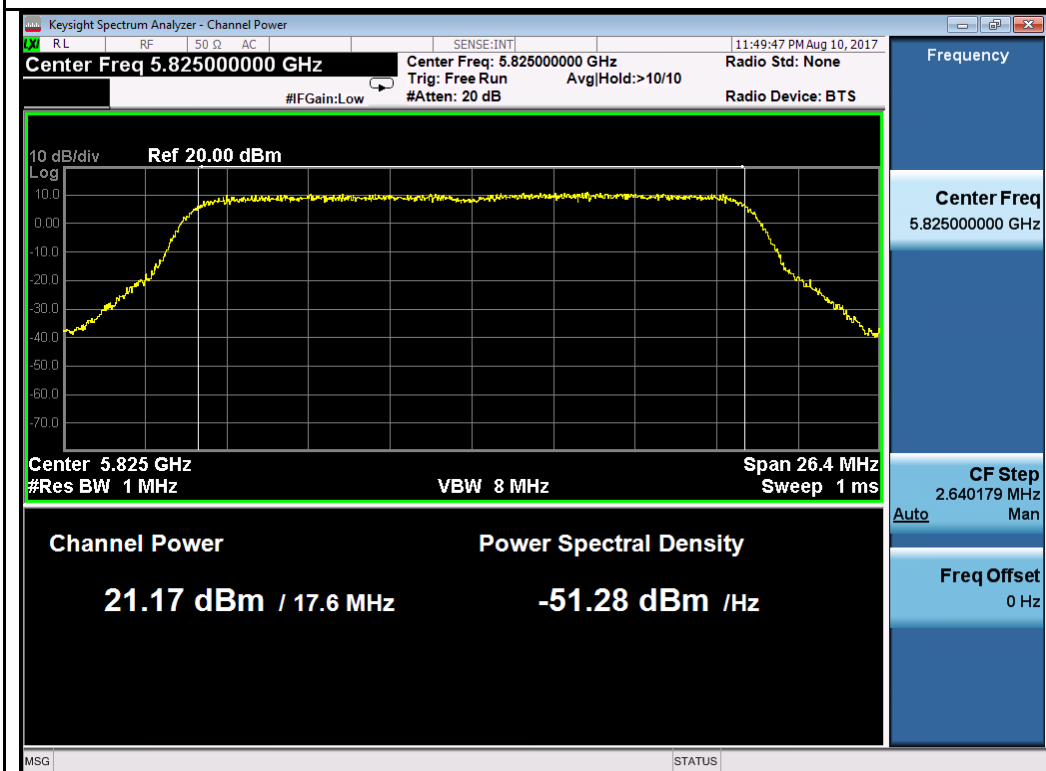
802.11a-5825MHz



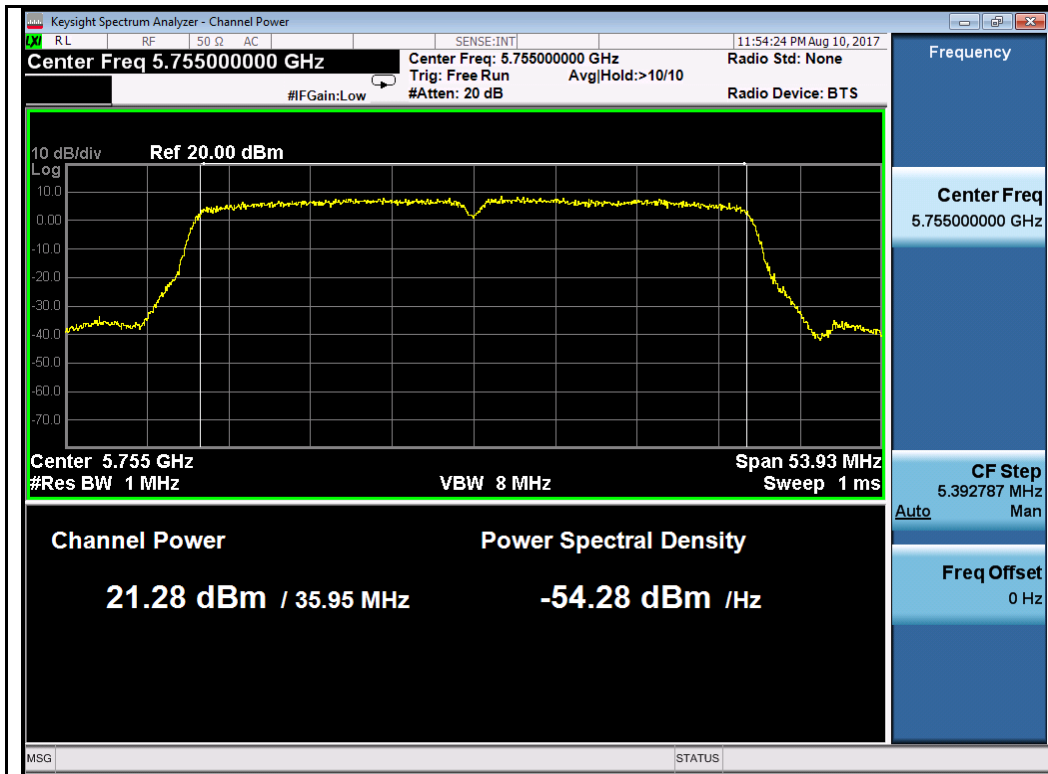
802.11n-HT20-5745MHz



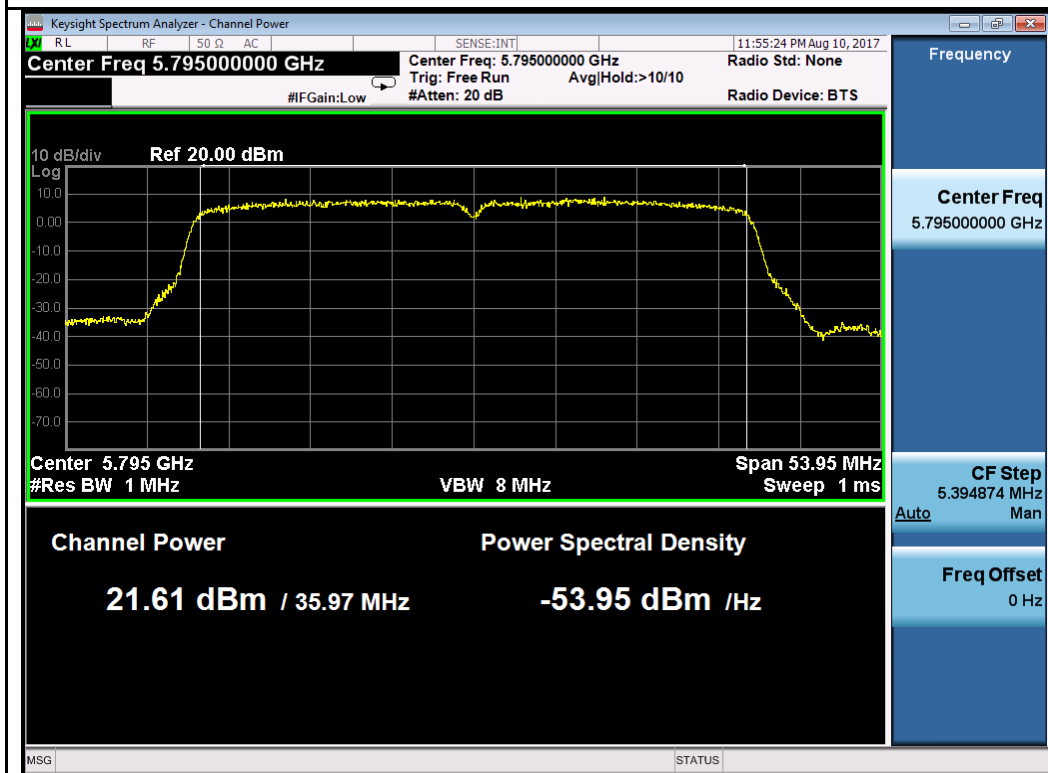
802.11n-HT20-5785MHz



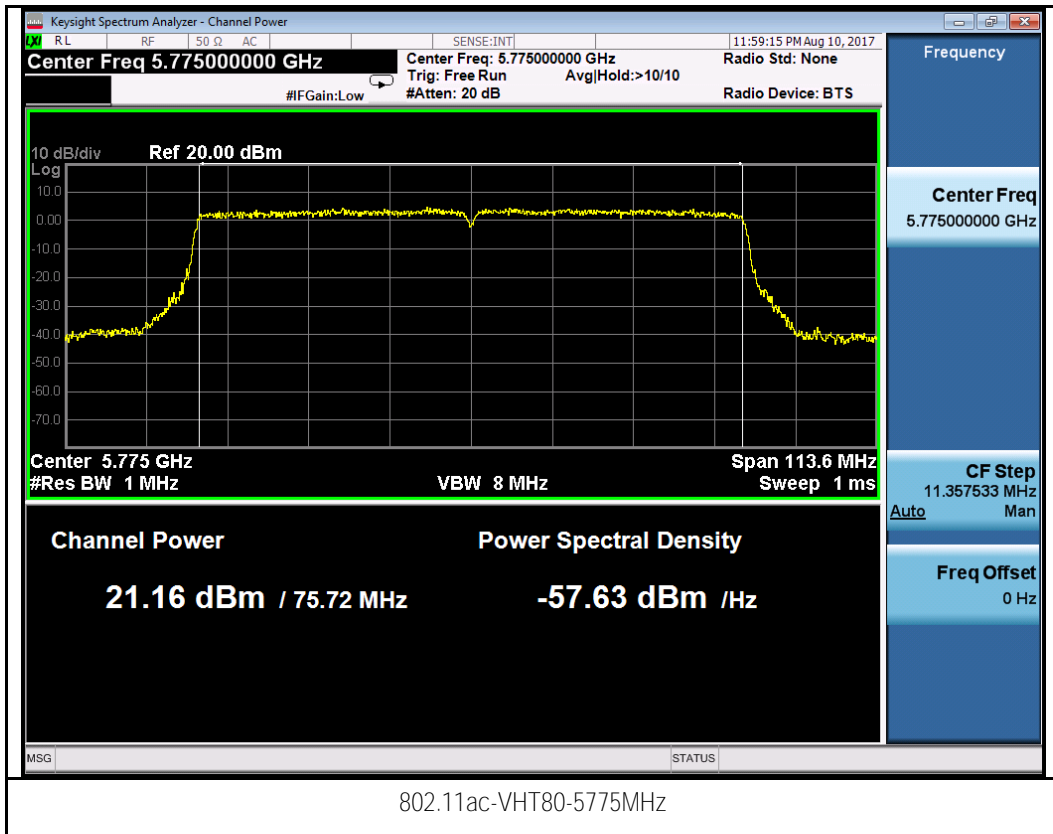
802.11n-HT20-5825MHz



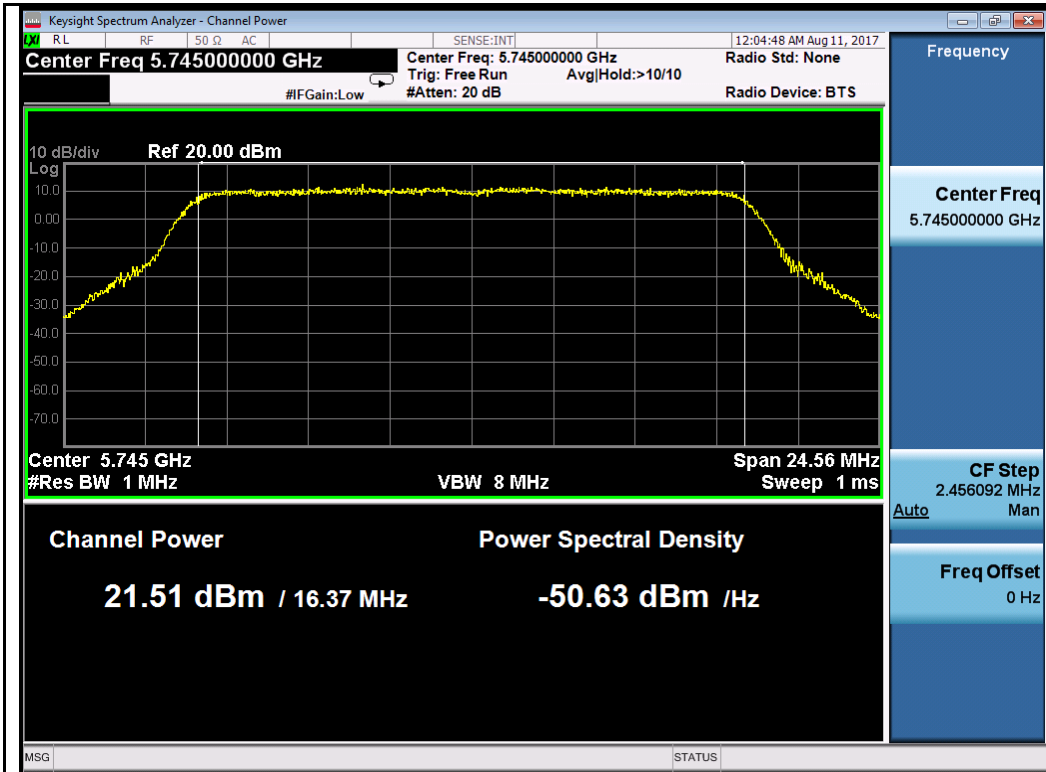
802.11n-HT40-5755MHz



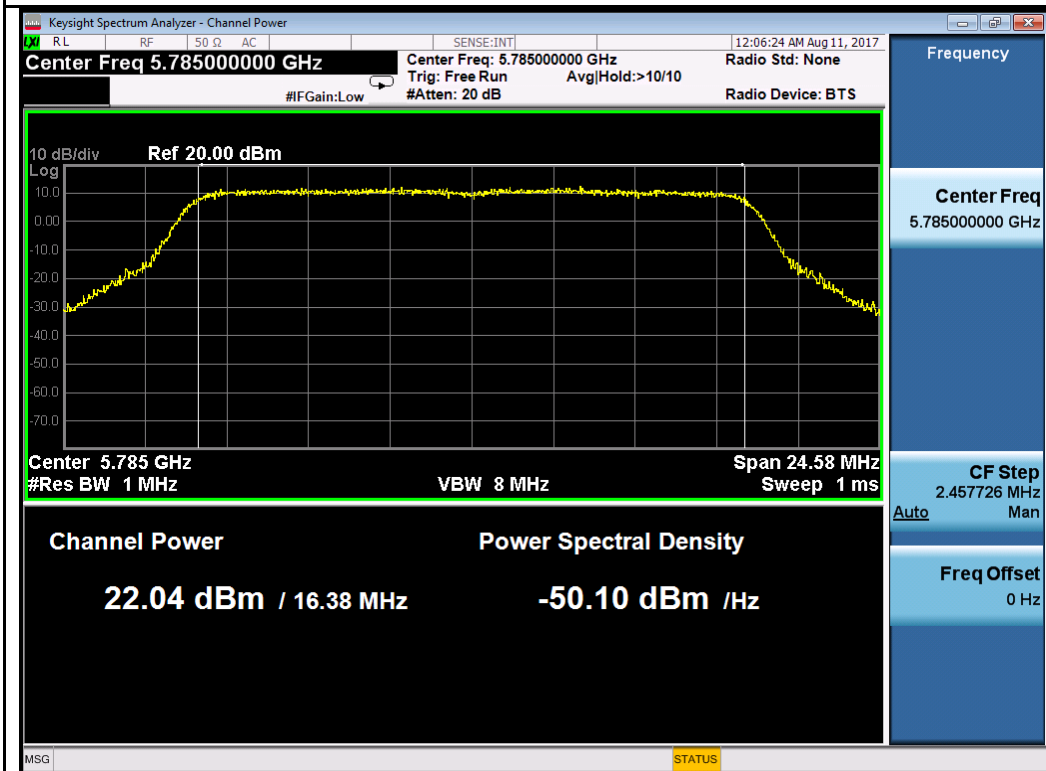
802.11n-HT40-5795MHz



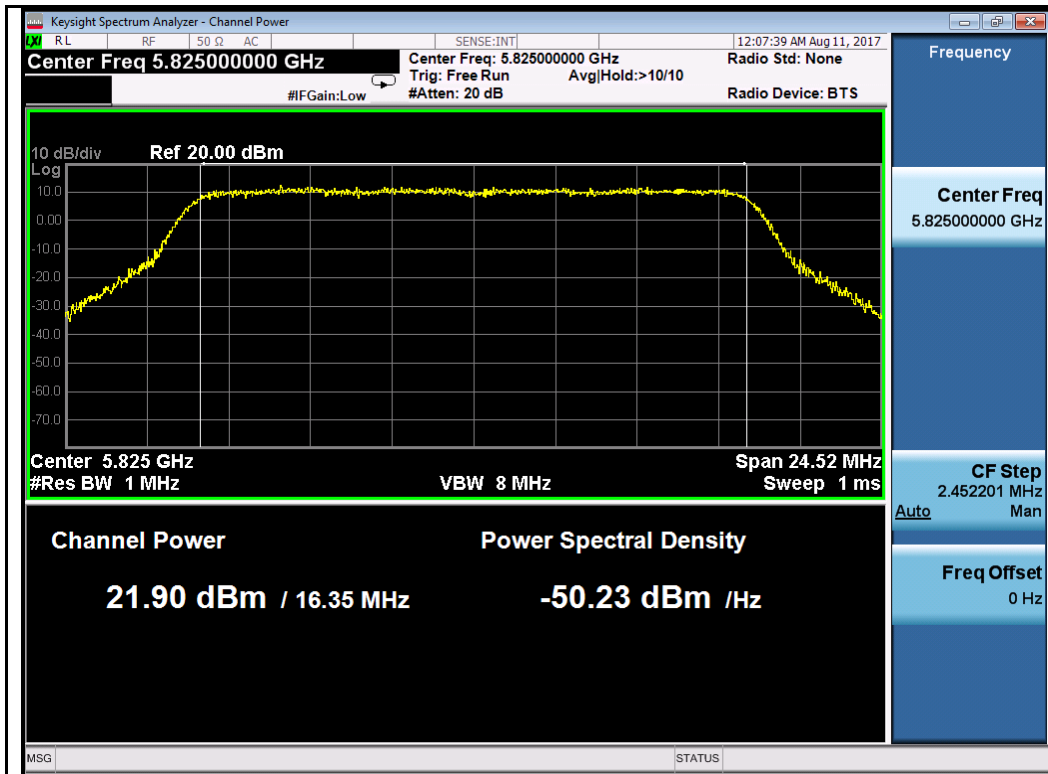
Chain 1:



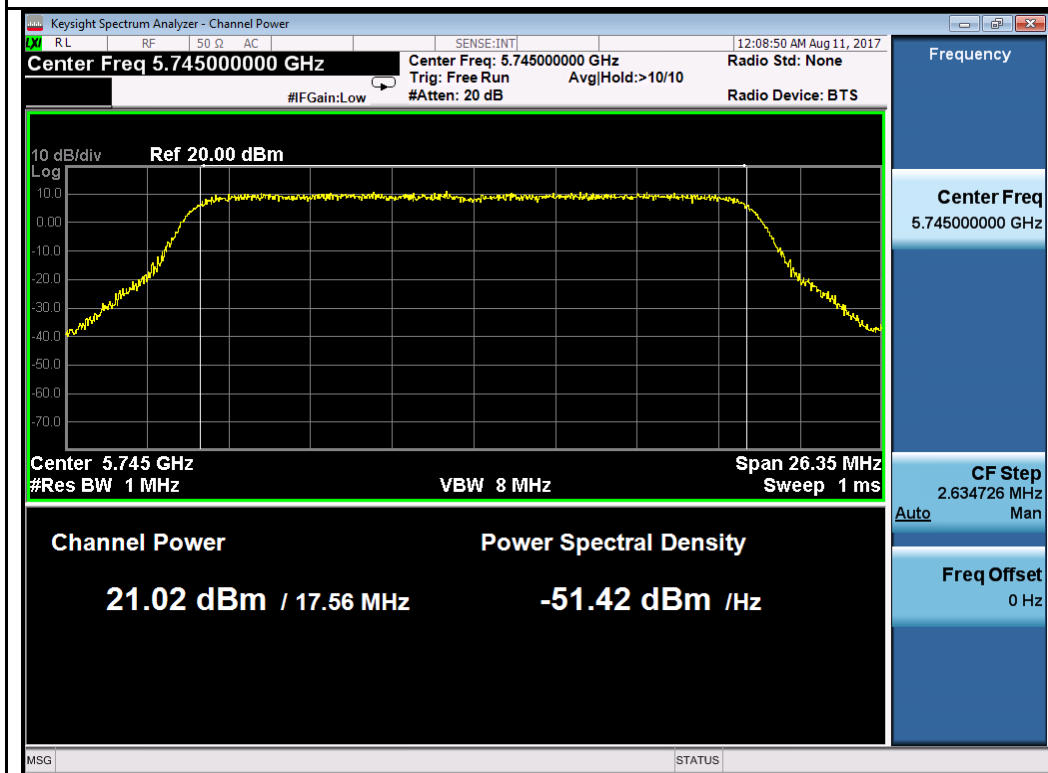
802.11a-5745MHz



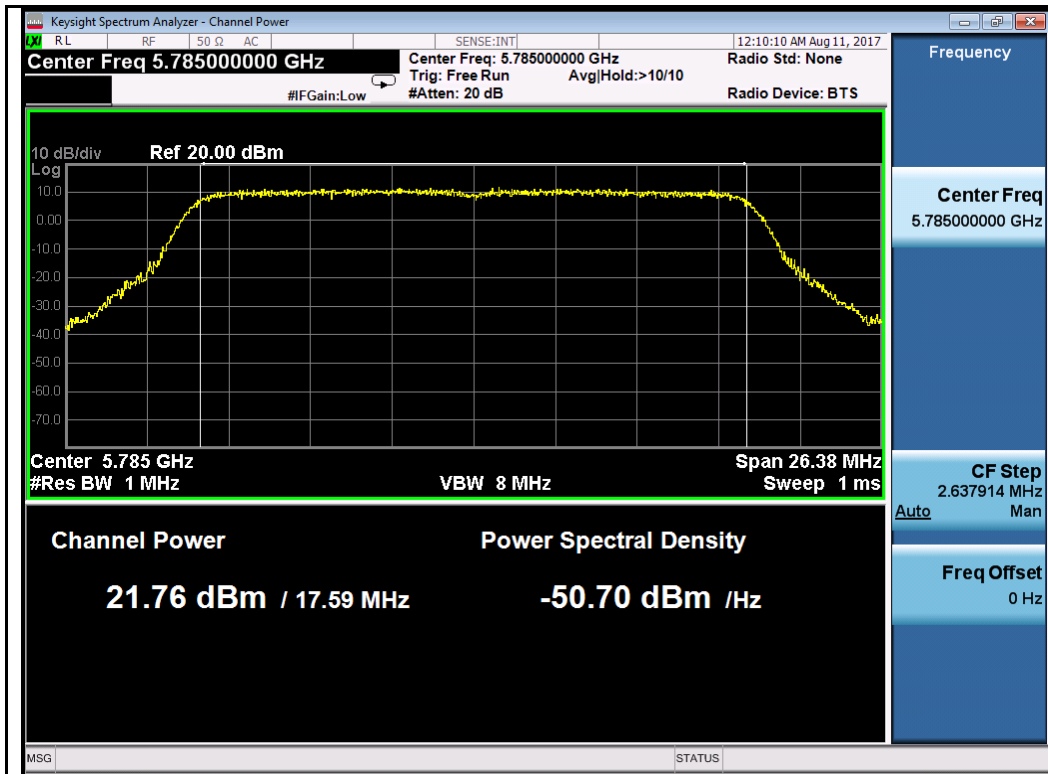
802.11a-5785MHz



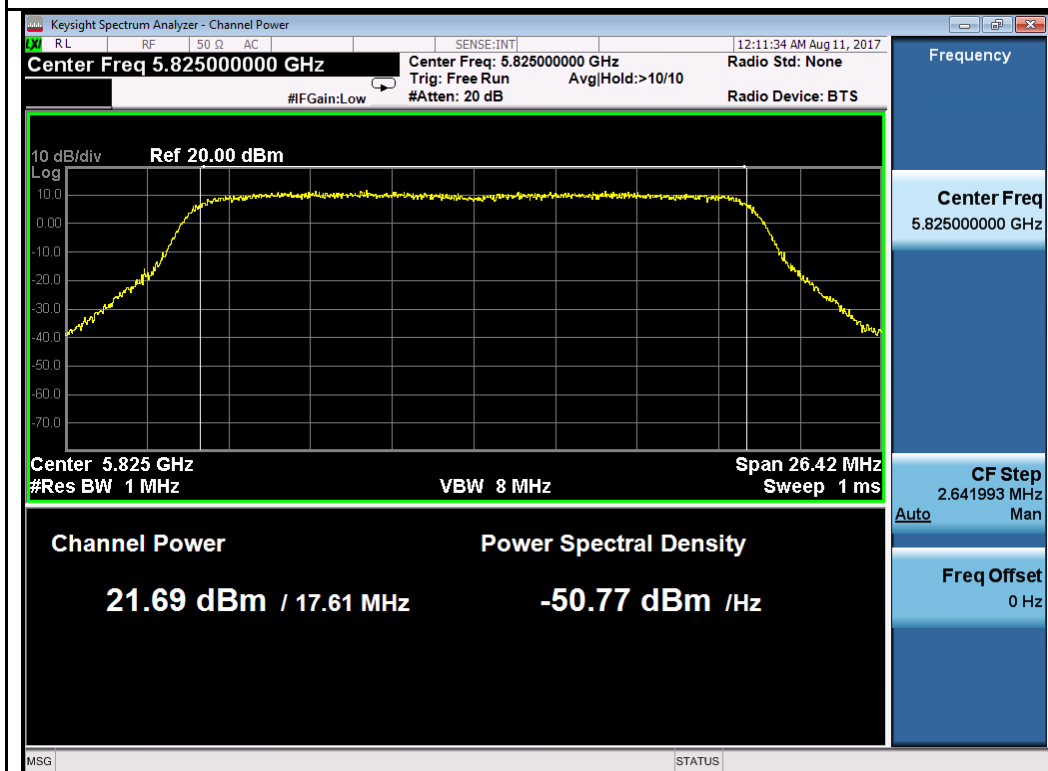
802.11a-5825MHz



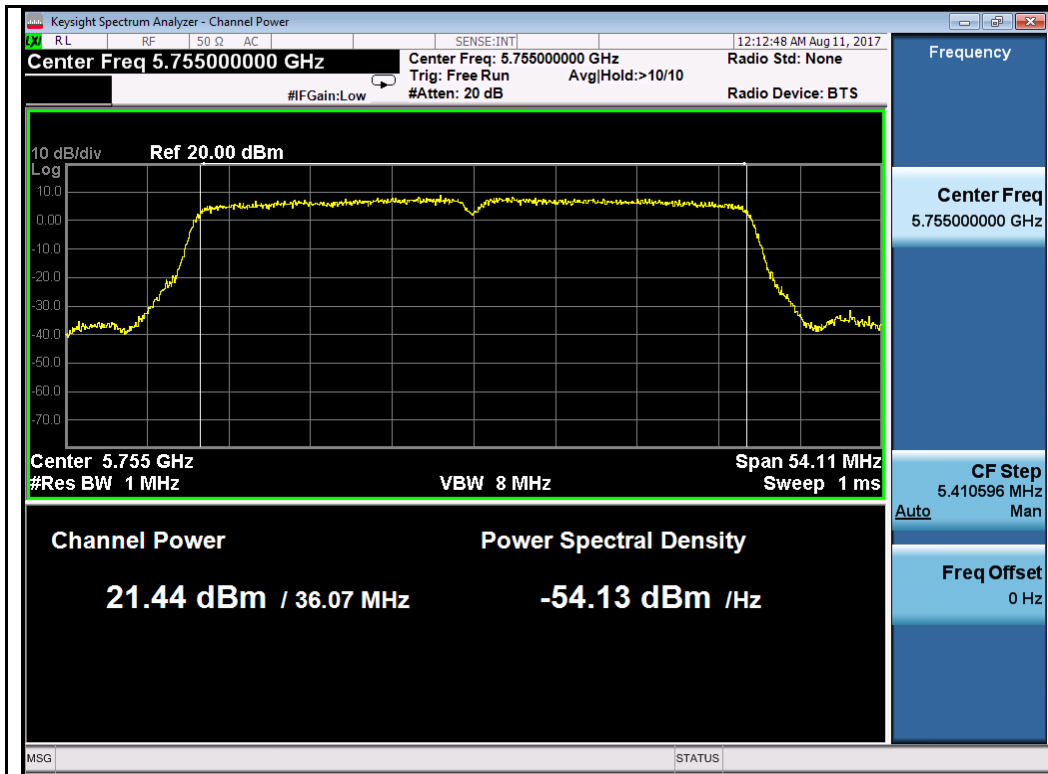
802.11n-HT20-5745MHz



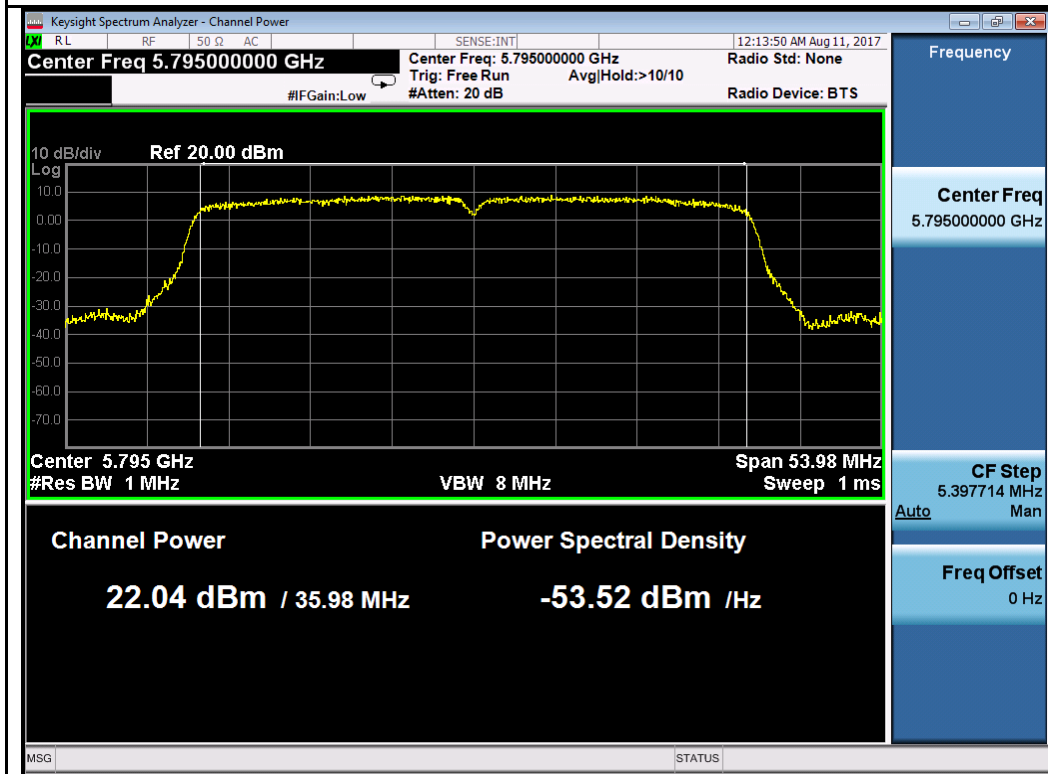
802.11n-HT20-5785MHz



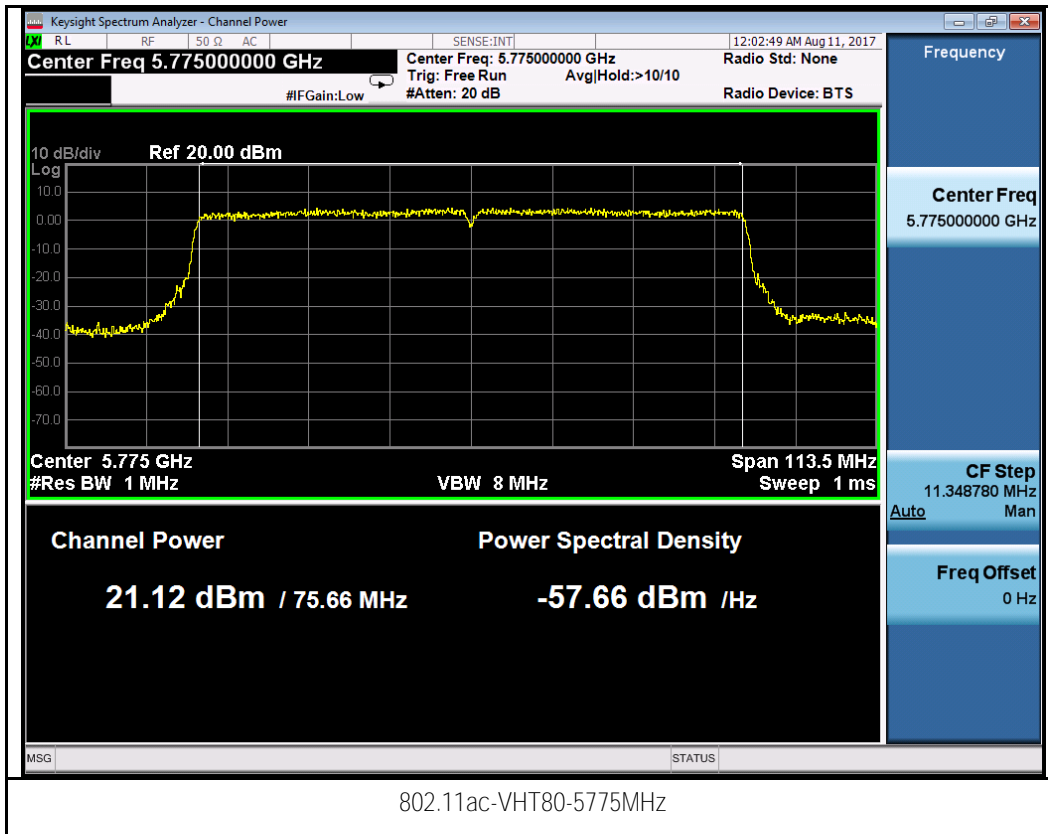
802.11n-HT20-5825MHz



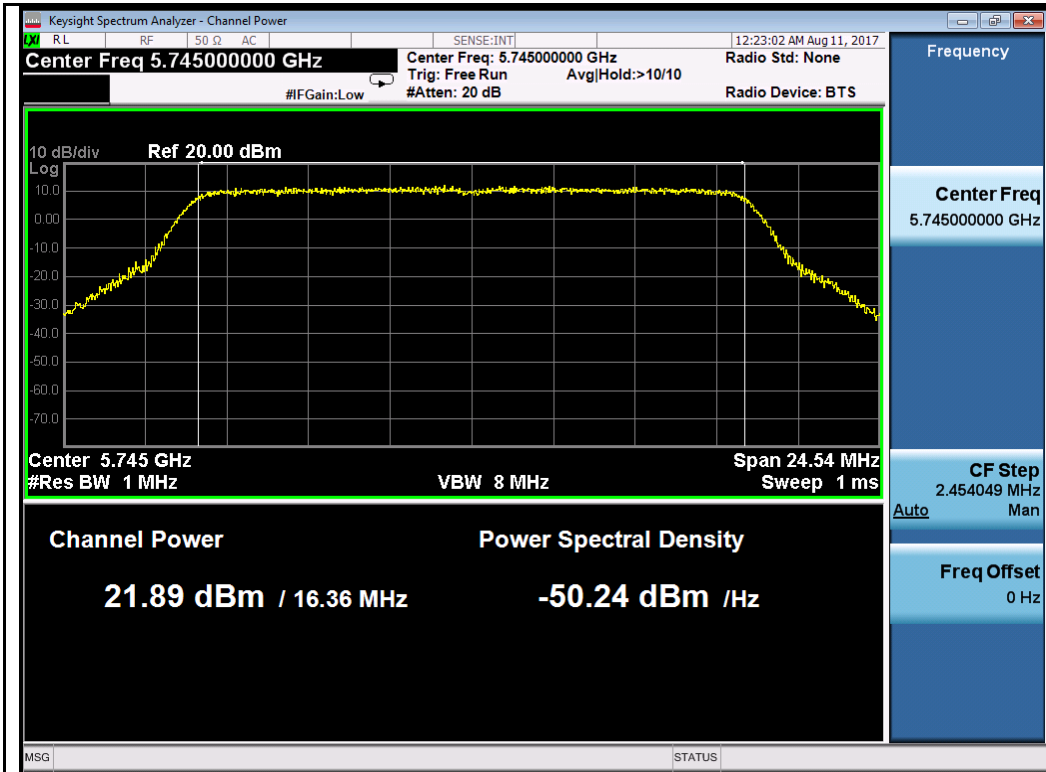
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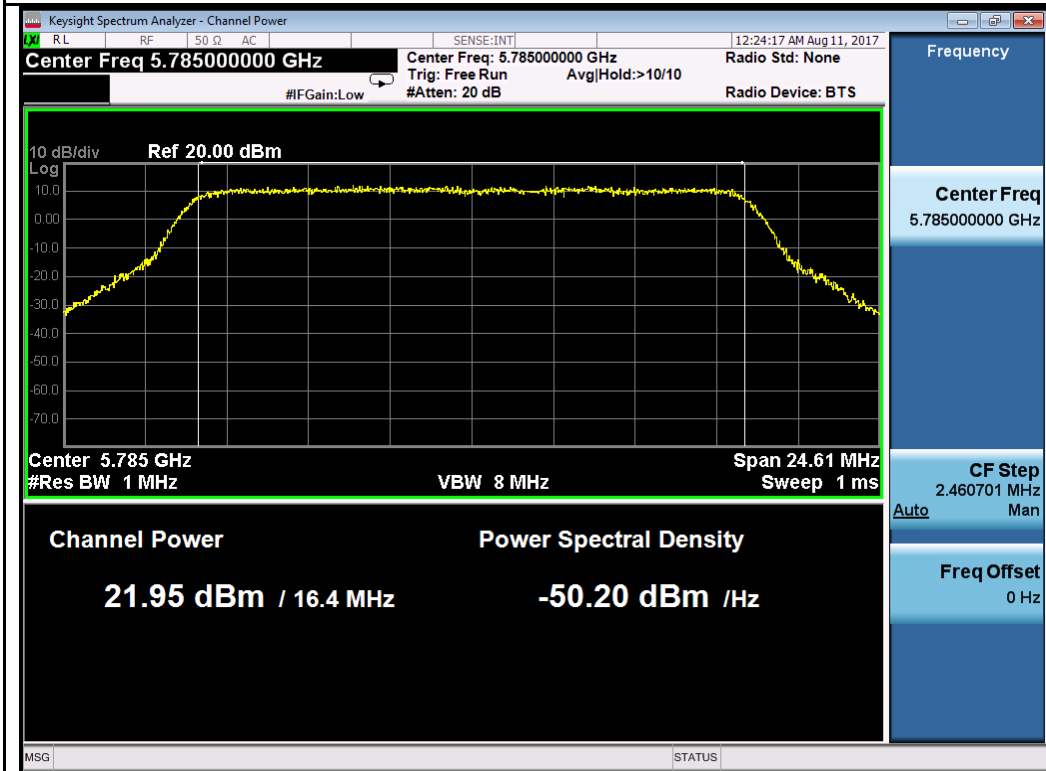
802.11n-HT40-5795MHz



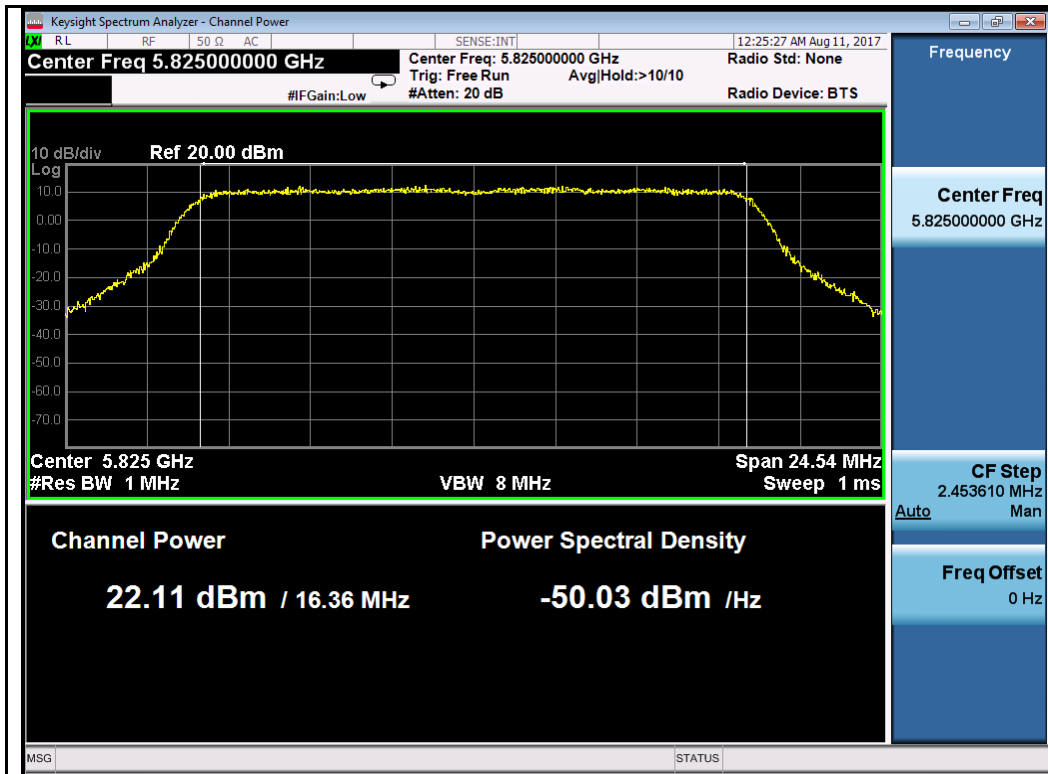
Chain 2:



802.11a-5745MHz



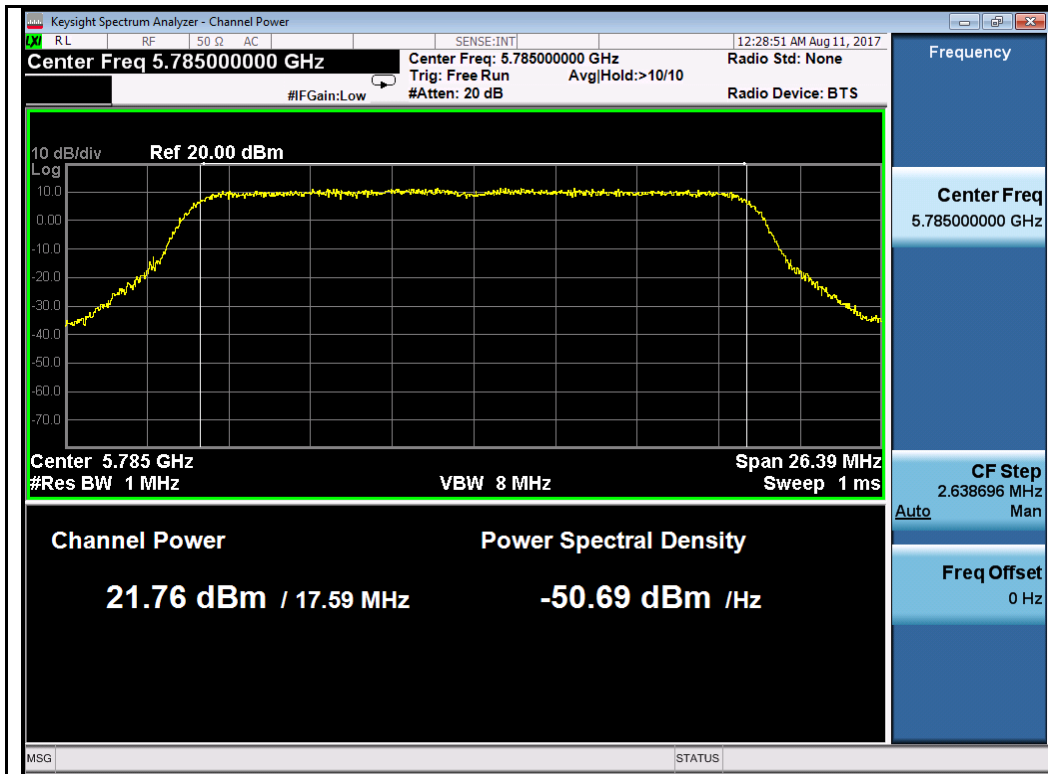
802.11a-5785MHz



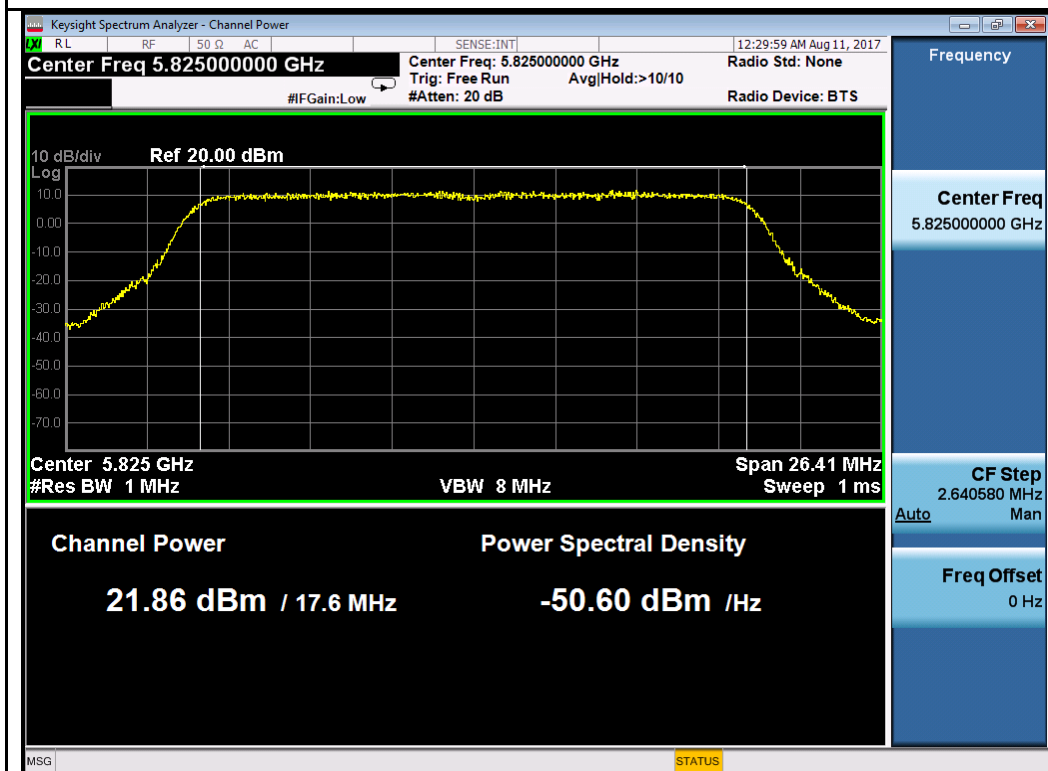
802.11a-5825MHz



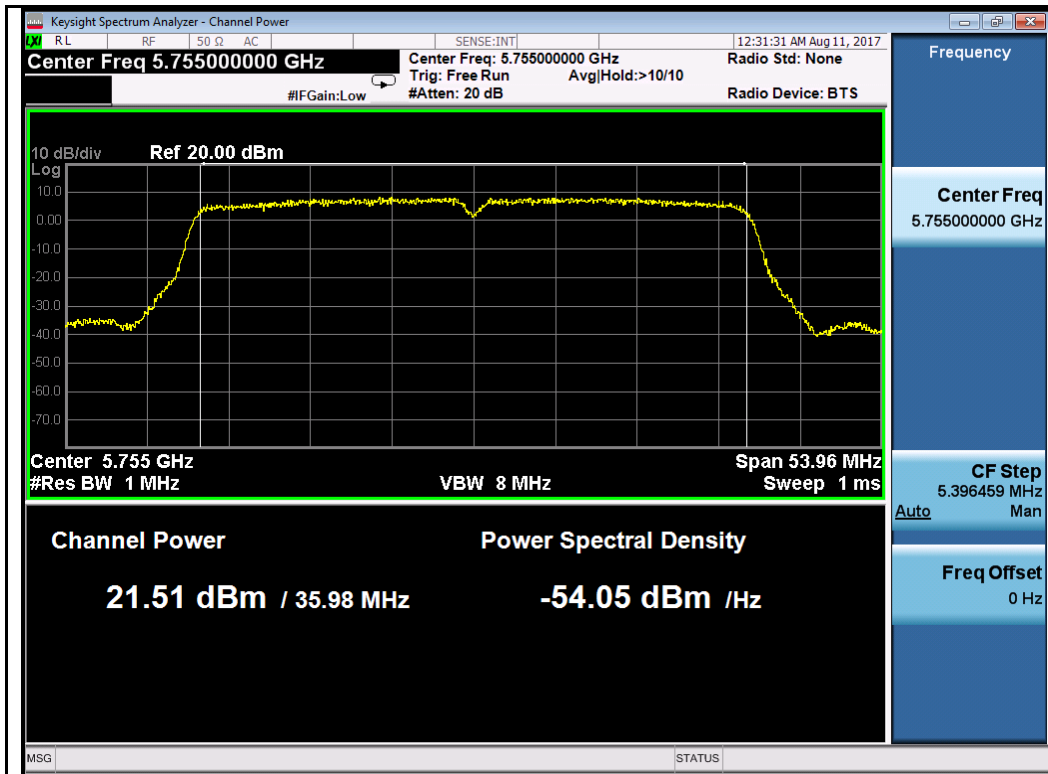
802.11n-HT20-5745MHz



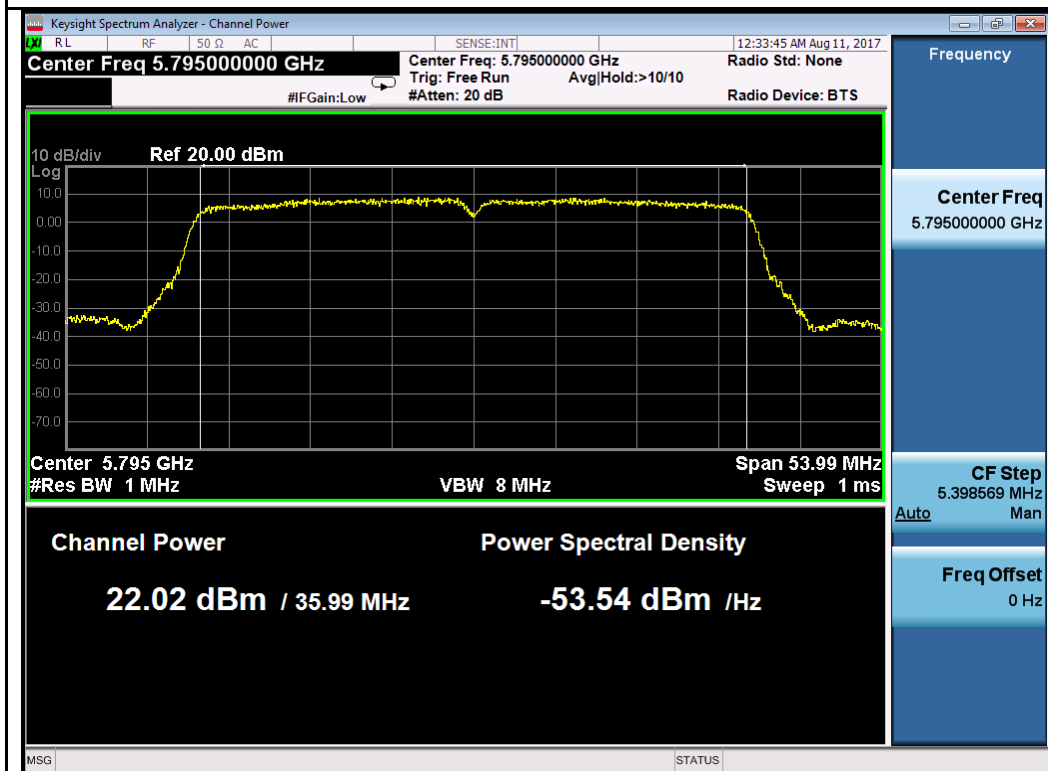
802.11n-HT20-5785MHz



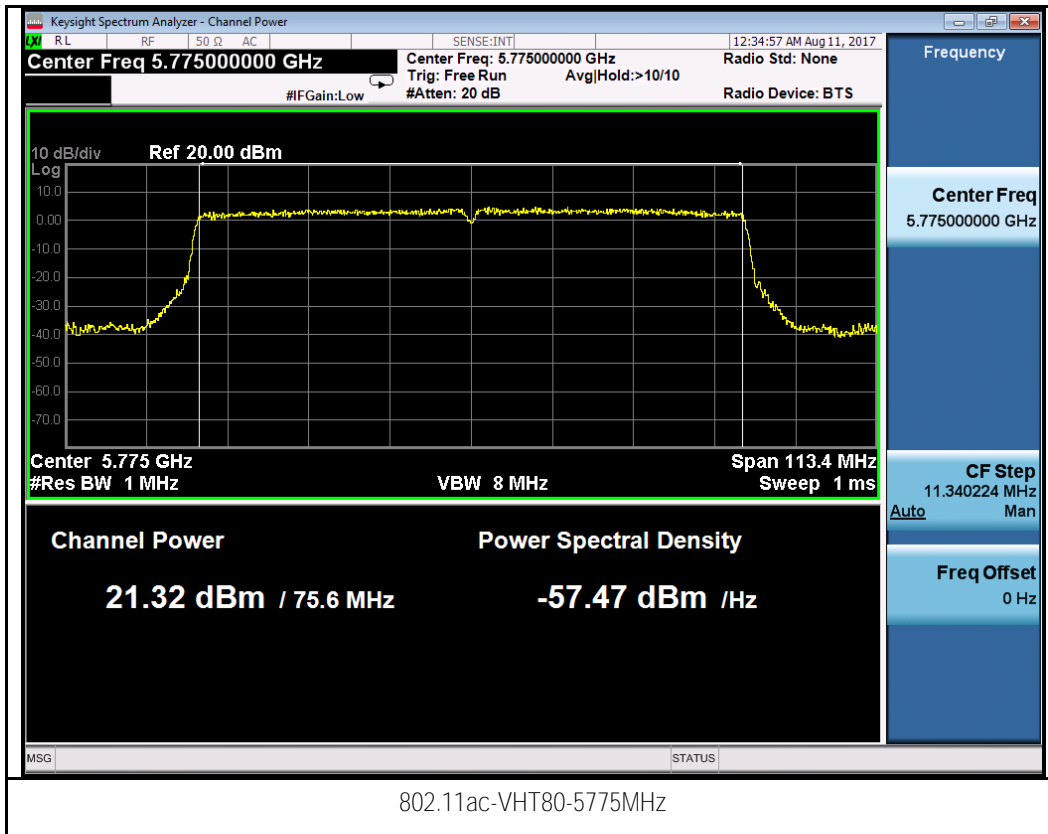
802.11n-HT20-5825MHz



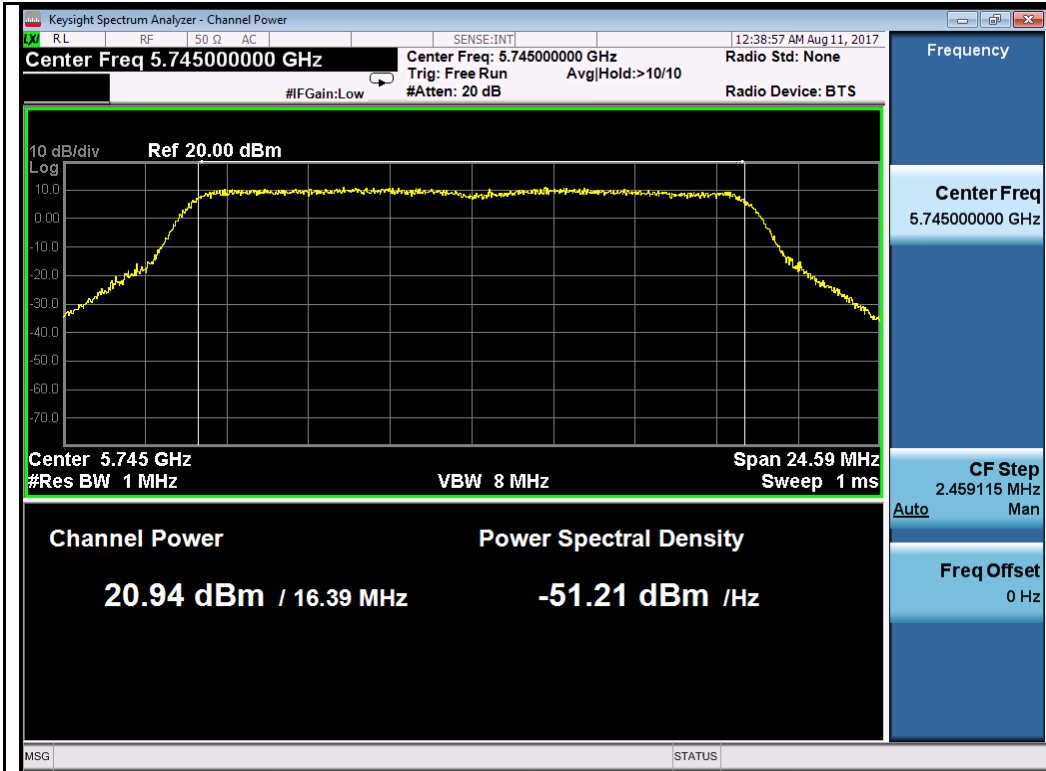
802.11n-HT40-5755MHz



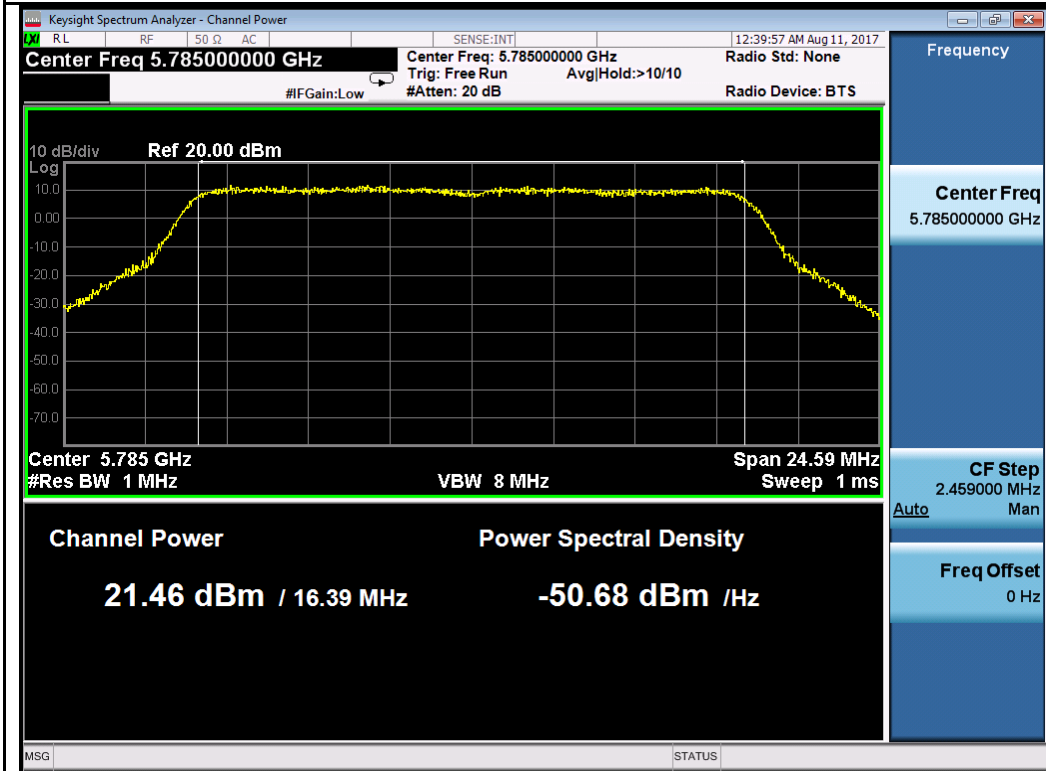
802.11n-HT40-5795MHz



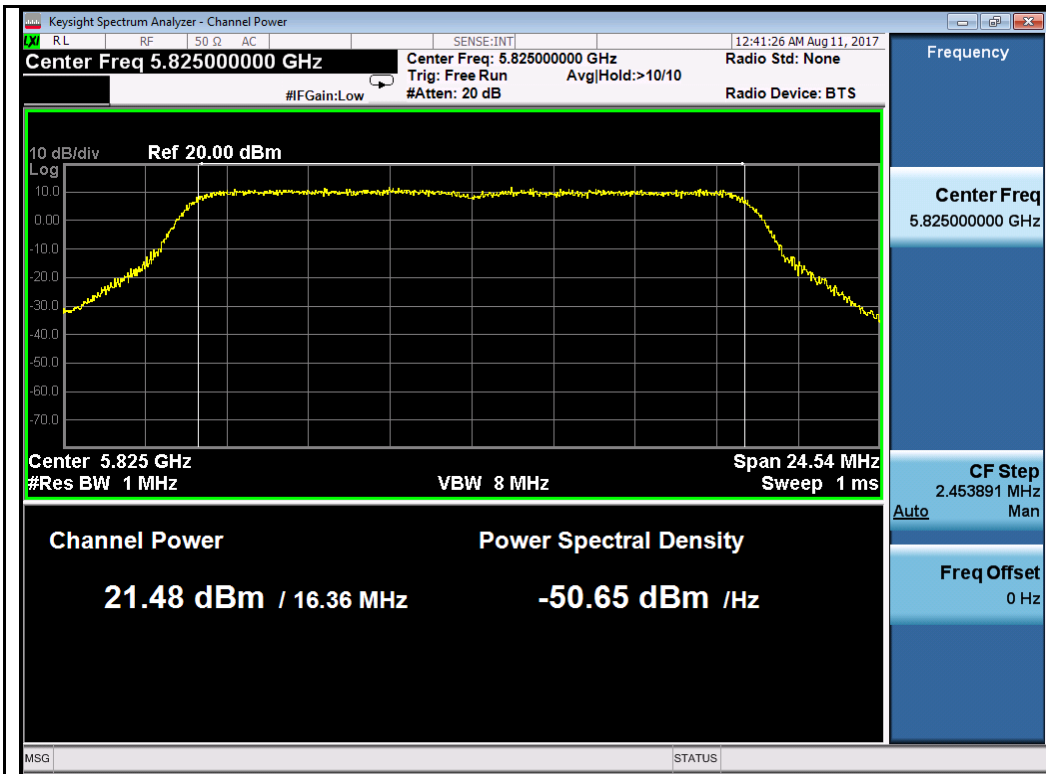
Chain 3:



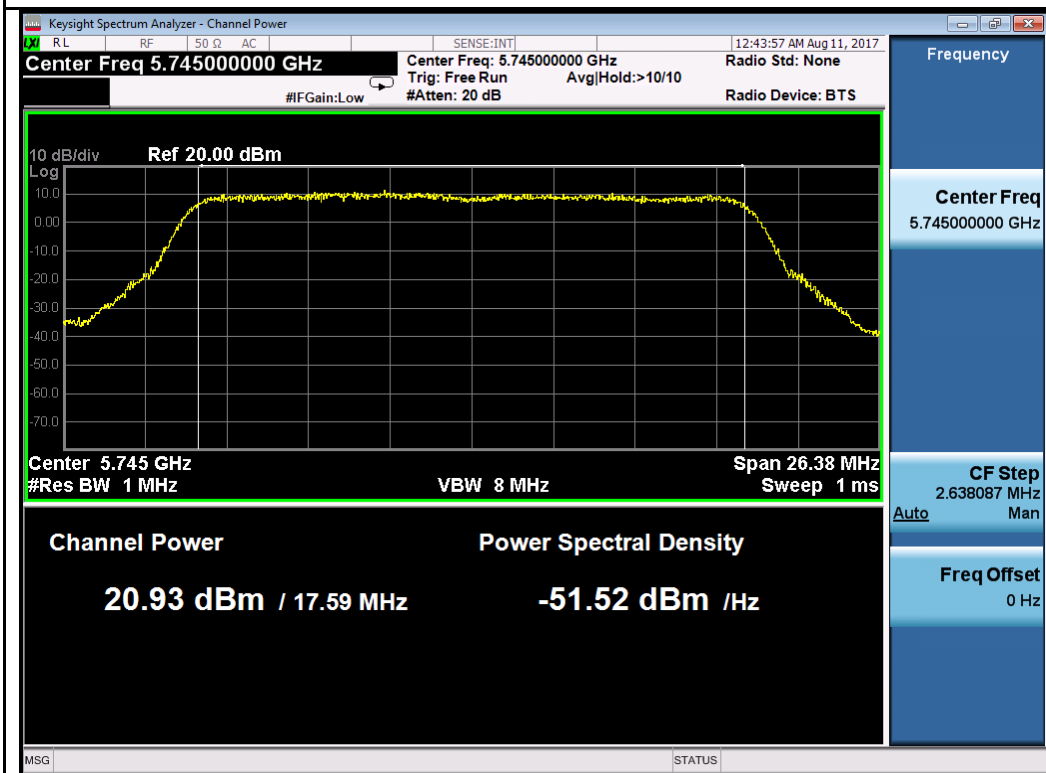
802.11a-5745MHz



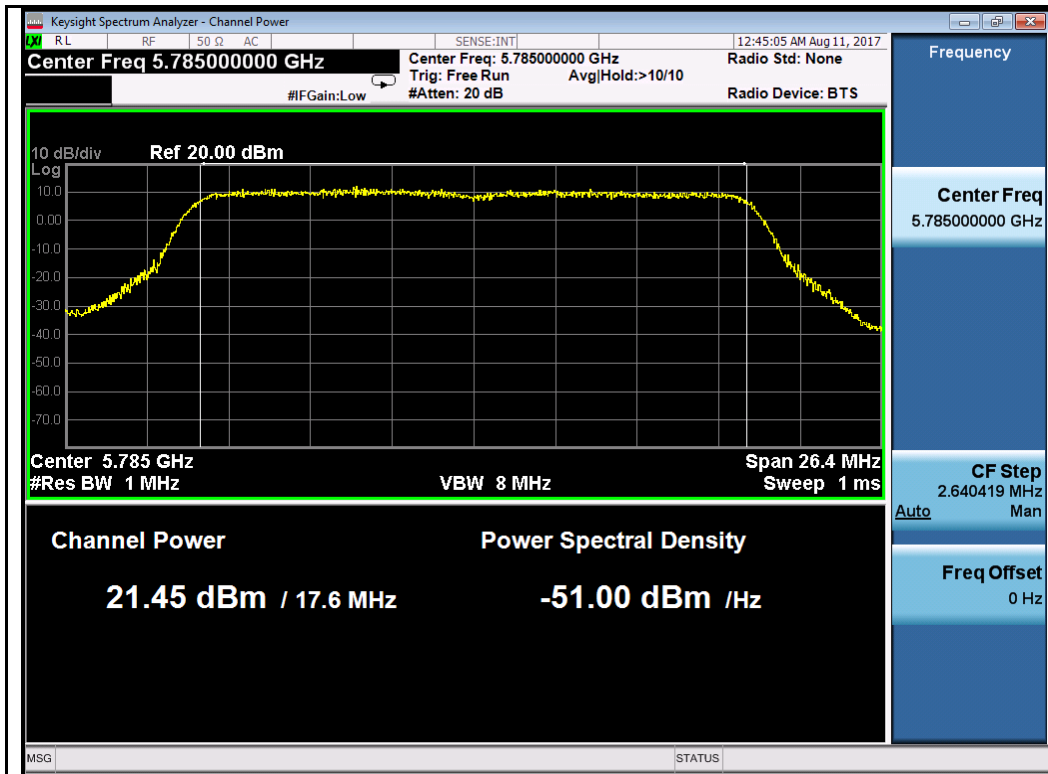
802.11a-5785MHz



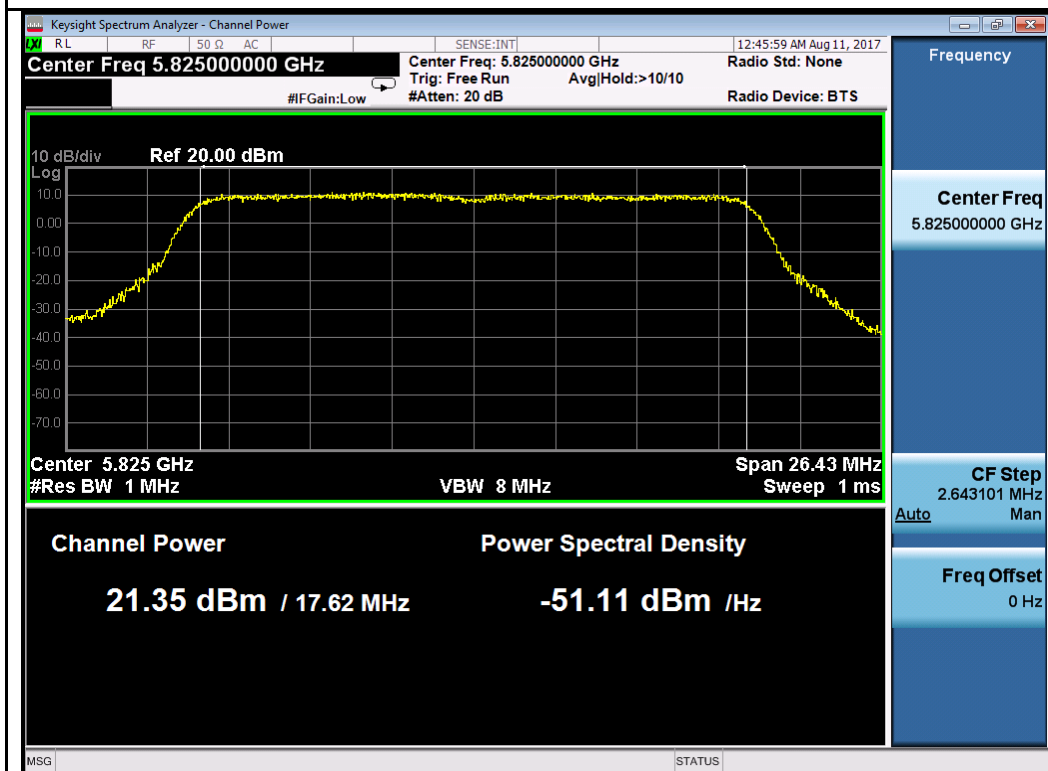
802.11a-5825MHz



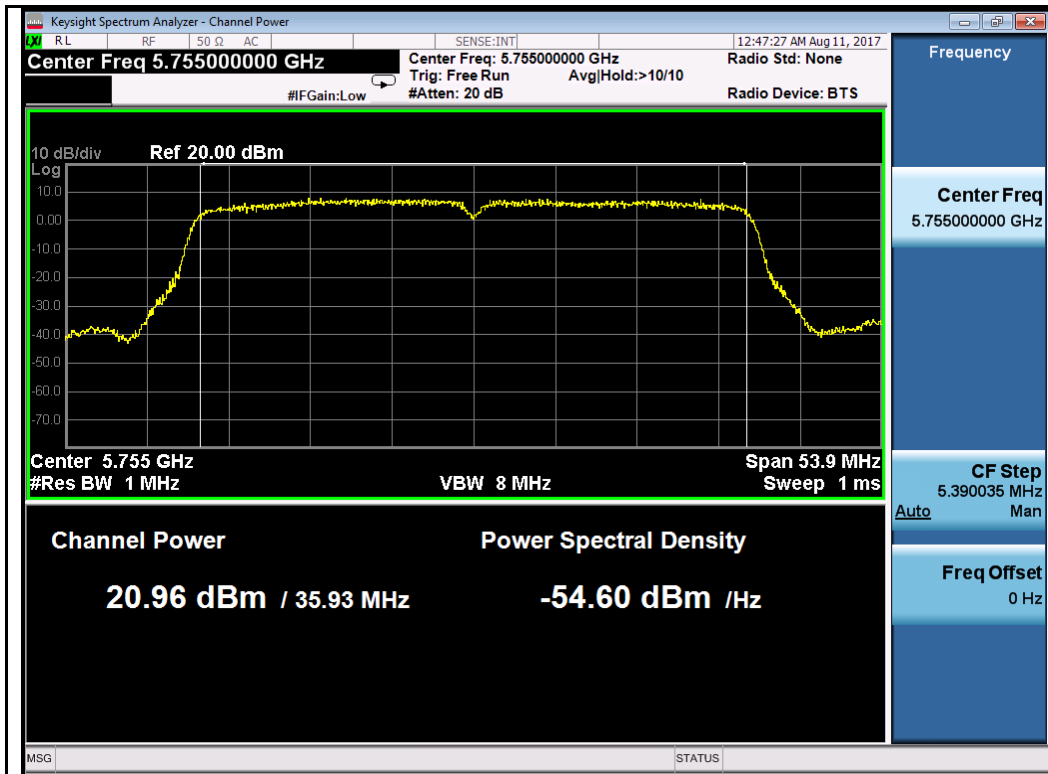
802.11n-HT20-5745MHz



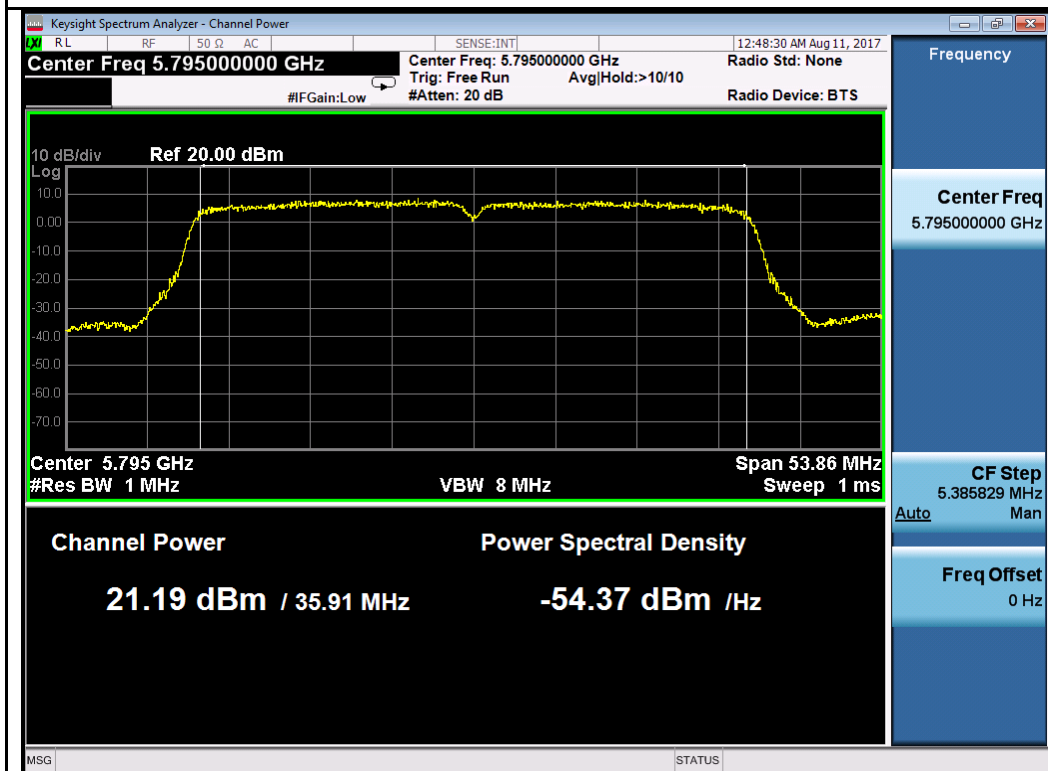
802.11n-HT20-5785MHz



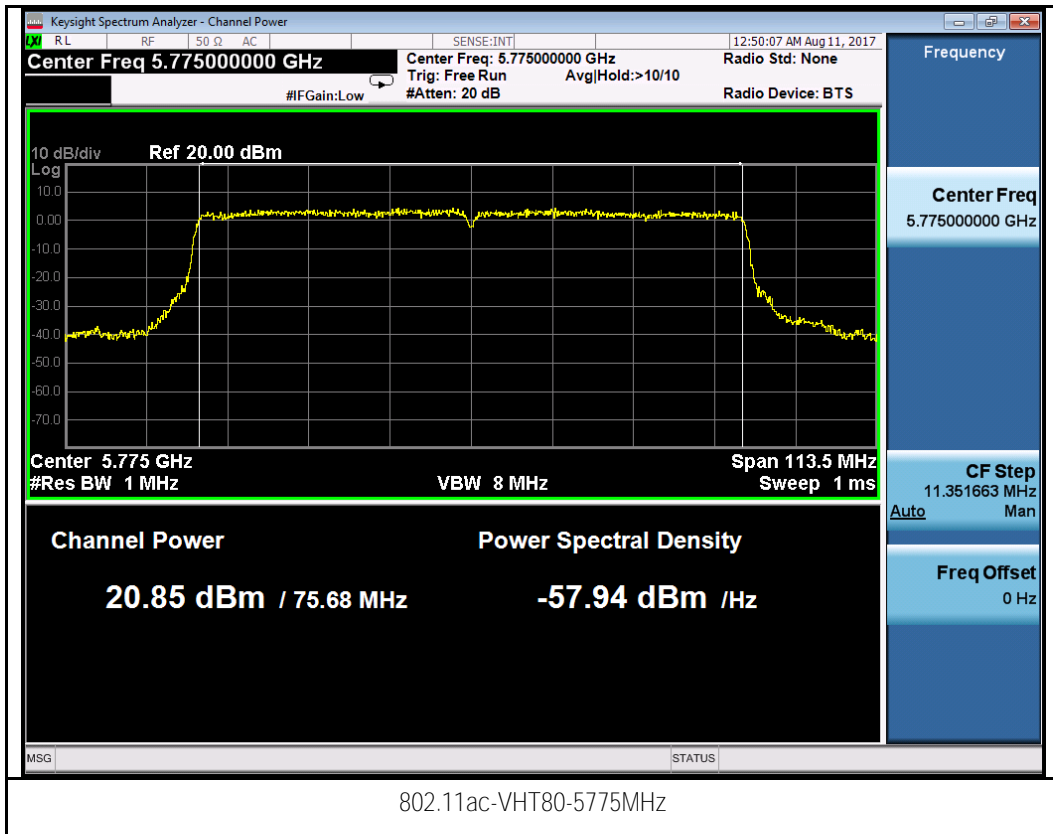
802.11n-HT20-5825MHz



802.11n-HT40-5755MHz

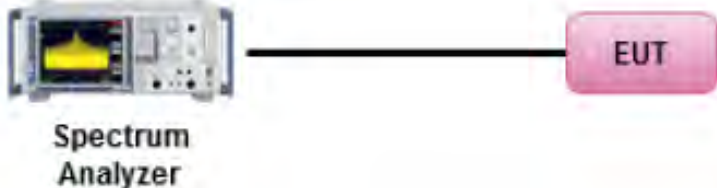


802.11n-HT40-5795MHz



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.	<input checked="" type="checkbox"/>
	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.	<input checked="" type="checkbox"/>
Test Setup			
Test Procedure	<p>789033 D02 General UNII Test Procedures New Rules v01r02, II.F. Method SA-1</p> <p><u>Maximum spectral density measurement procedure</u></p> <ul style="list-style-type: none"> - 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. <p>Apply correction to the result if different RBW is used.</p>		
Test Date	08/10/2017 – 09/20/2017	Environmental condition	Temperature 22°C Relative Humidity 42% Atmospheric Pressure 1020mbar
Remark	Per KDB 662911 D01 Multiple Transmitter Output v02r01, the direction gain for horizontal polarization and vertical polarization is calculated separately. For 5GHz band, peak antenna gain = 4.5 dBi, directional gain = 3 dB, total gain = 7.5 dBi. Highest of total gain is 7.5 dBi. The power limit and PSD limit will be reduced by amount of 1.5 dB.		
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data Yes N/A

Test Plot Yes (See below) N/A

Test was done by Rachana Khanduri at RF test site.

PSD measurement result for 5.2GHz

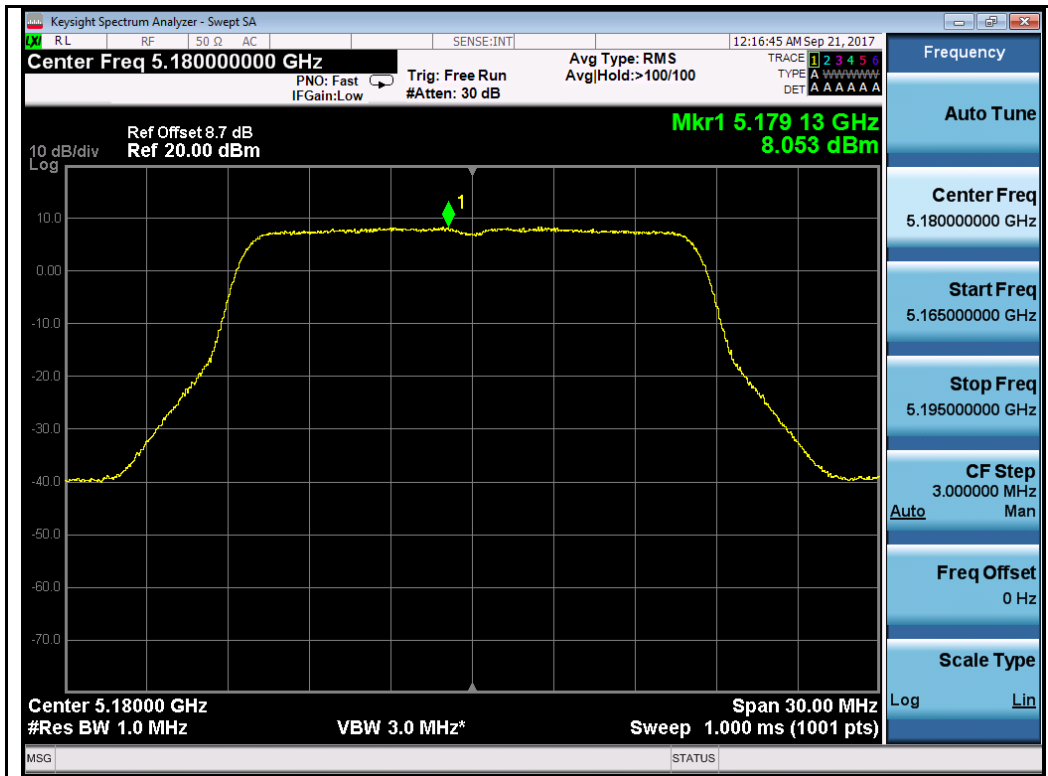
Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)					Limit (dBm/MHz)	Result
				Chain0	Chain1	Chain2	Chain3	Combined		
PSD	802.11a	5180	Low	8.05	8.74	8.90	8.83	14.66	15.5	Pass
		5200	Mid	8.72	8.91	8.84	8.70	14.81	15.5	Pass
		5240	High	8.23	8.64	8.60	8.38	14.49	15.5	Pass
	802.11n-20	5180	Low	8.28	8.78	8.94	8.53	14.66	15.5	Pass
		5200	Mid	7.64	8.31	8.43	8.29	14.20	15.5	Pass
		5240	High	8.39	8.54	8.45	8.50	14.49	15.5	Pass
	802.11n-40	5190	Low	4.58	4.80	4.77	4.55	10.70	15.5	Pass
		5230	High	5.57	5.76	5.57	5.79	11.69	15.5	Pass
	802.11ac-80	5210	Mid	-0.75	-0.14	-0.40	-0.97	5.47	15.5	Pass

PSD measurement result for 5.8GHz

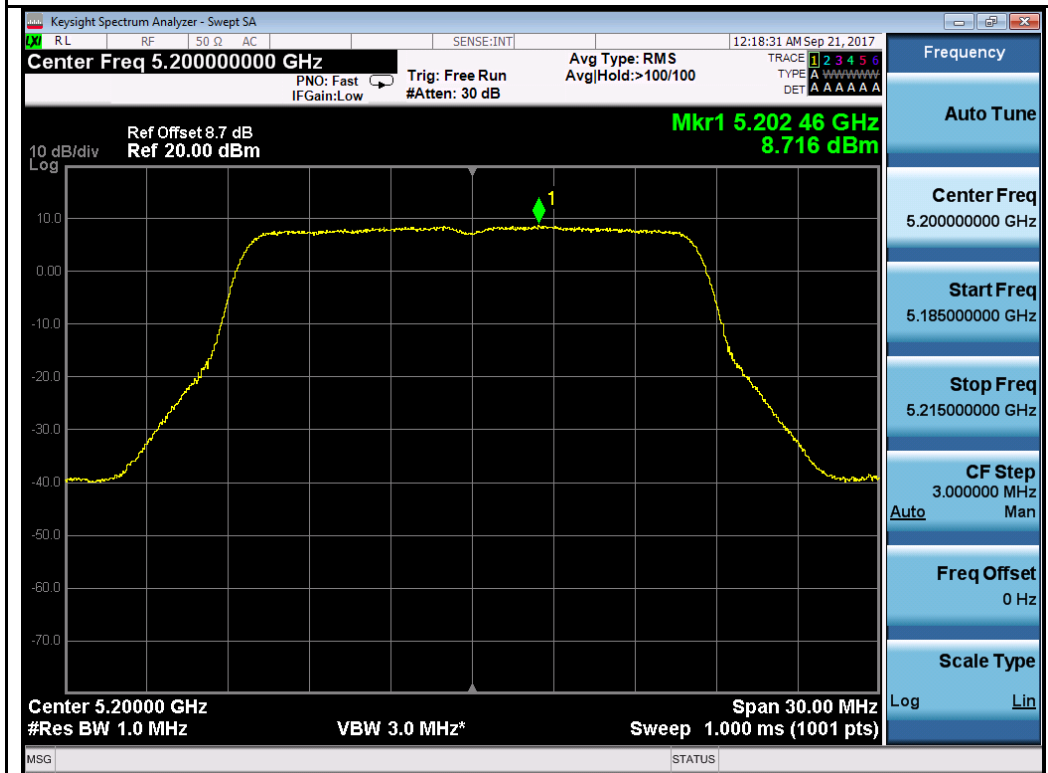
Test mode	Freq (MHz)	CH	Conducted PSD (dBm/100kHz)					Correction factor (dB)	PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
			Chain0	Chain1	Chain2	Chain3	Combined				
802.11a	5745	Low	1.32	1.85	2.06	1.11	7.62	6.99	14.61	28.5	Pass
	5785	Mid	2.11	1.87	1.95	1.42	7.87	6.99	14.86	28.5	Pass
	5825	High	1.89	1.92	1.90	1.33	7.79	6.99	14.78	28.5	Pass
802.11n-20	5745	Low	1.25	1.19	1.71	1.23	7.37	6.99	14.36	28.5	Pass
	5785	Mid	1.30	1.42	1.51	1.52	7.46	6.99	14.45	28.5	Pass
	5825	High	0.92	1.21	1.39	1.35	7.24	6.99	14.23	28.5	Pass
802.11n-40	5755	Low	-2.35	-1.78	-1.64	-2.13	4.05	6.99	11.04	28.5	Pass
	5795	High	-1.66	-1.79	-1.00	-2.03	4.42	6.99	11.41	28.5	Pass
802.11ac-80	5775	Mid	-6.03	-5.82	-5.57	-6.26	0.11	6.99	7.10	28.5	Pass
Note	BW correction factor = 10log(500kHz/RBW), RBW was set to 100kHz during test.										

Test Plot for W52:

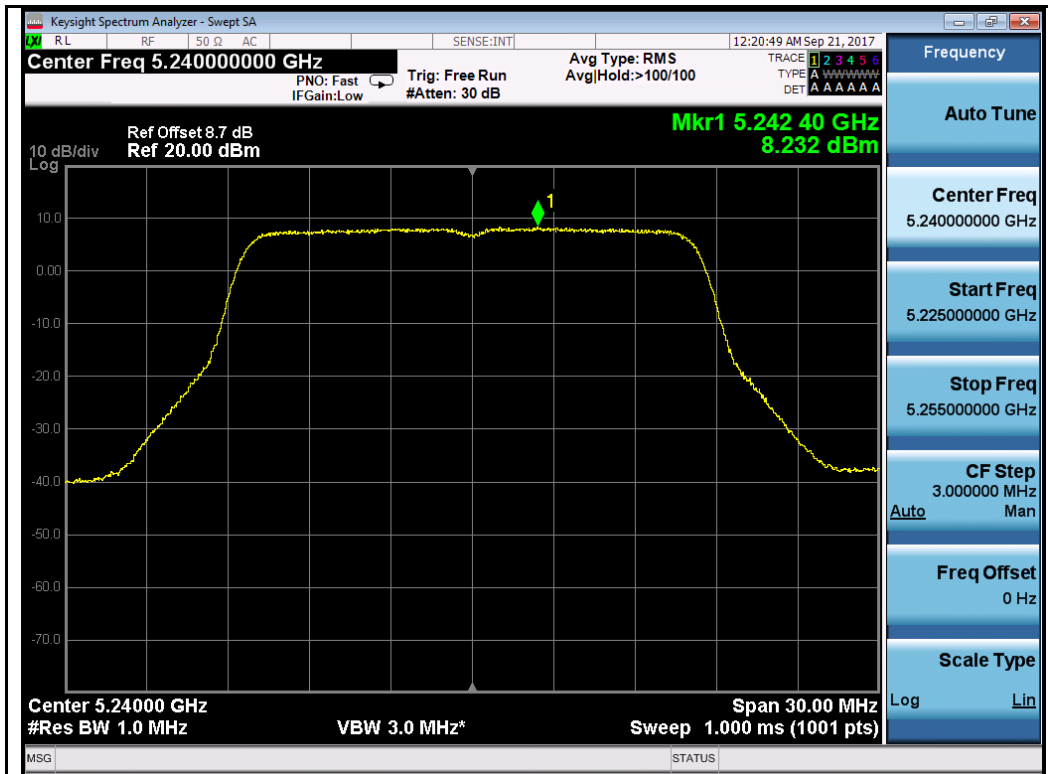
Chain 0:



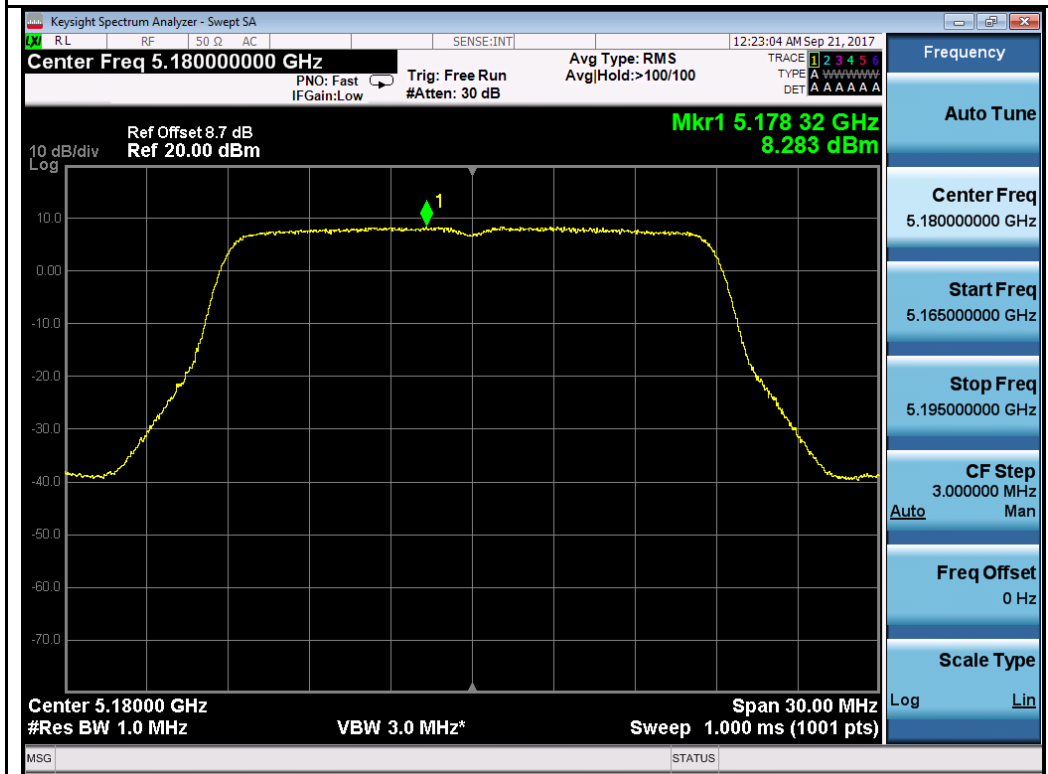
802.11a-5180MHz



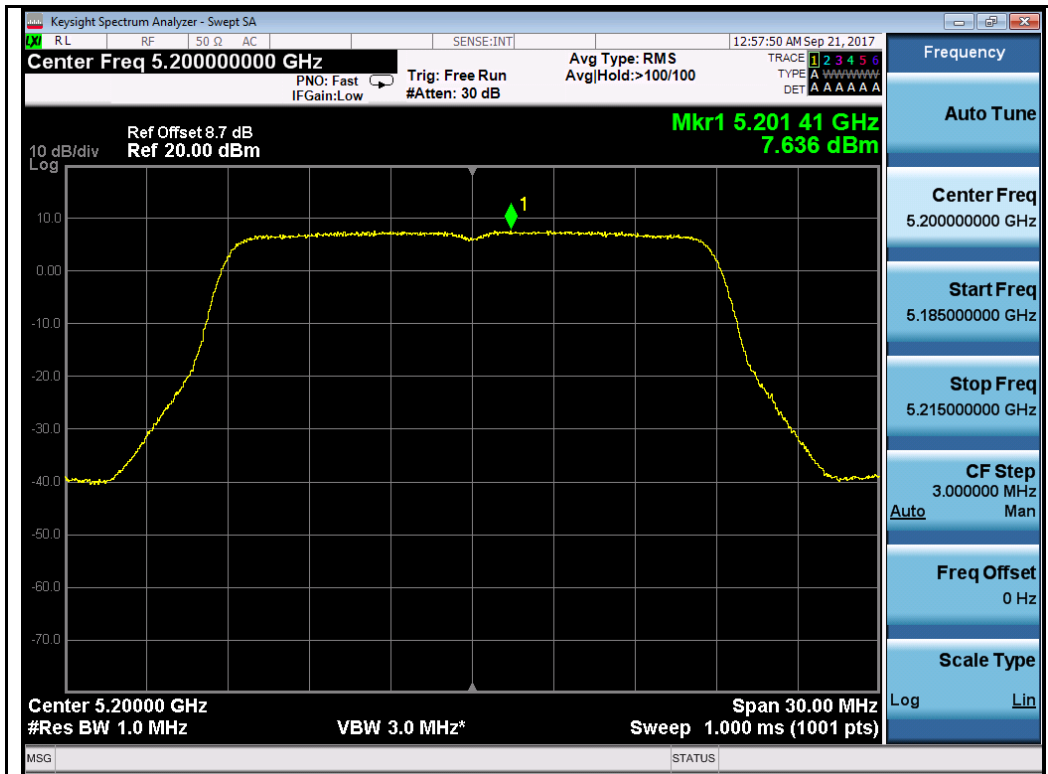
802.11a-5200MHz



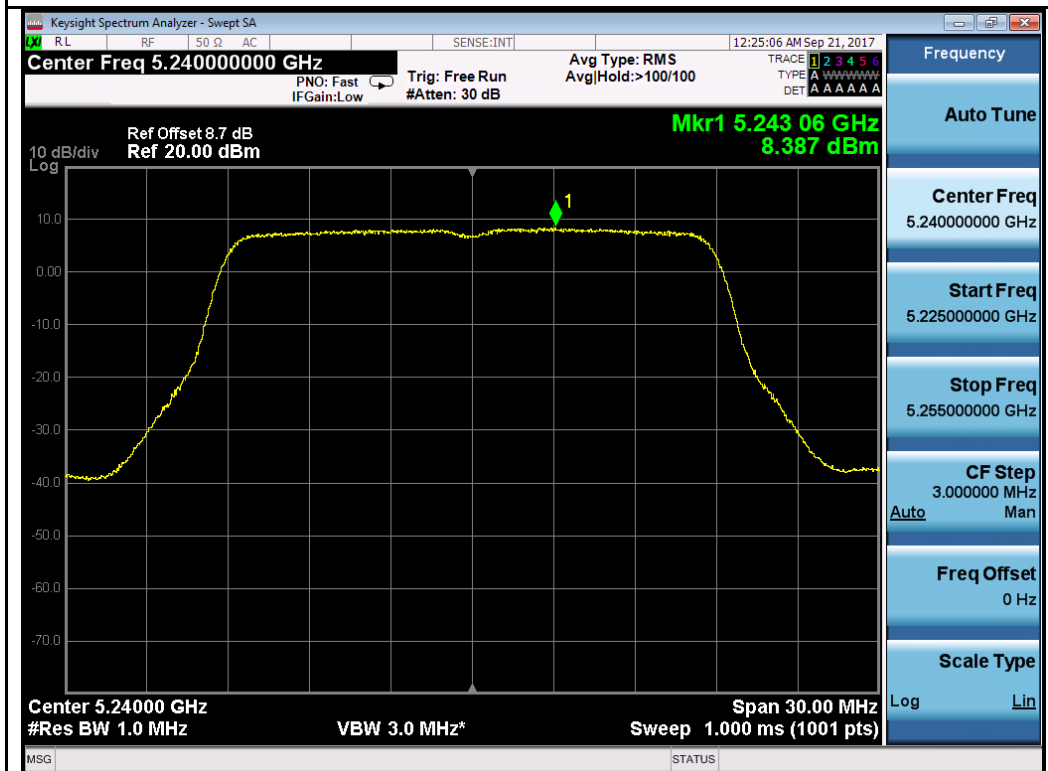
802.11a-5240MHz



802.11n-HT20-5180MHz



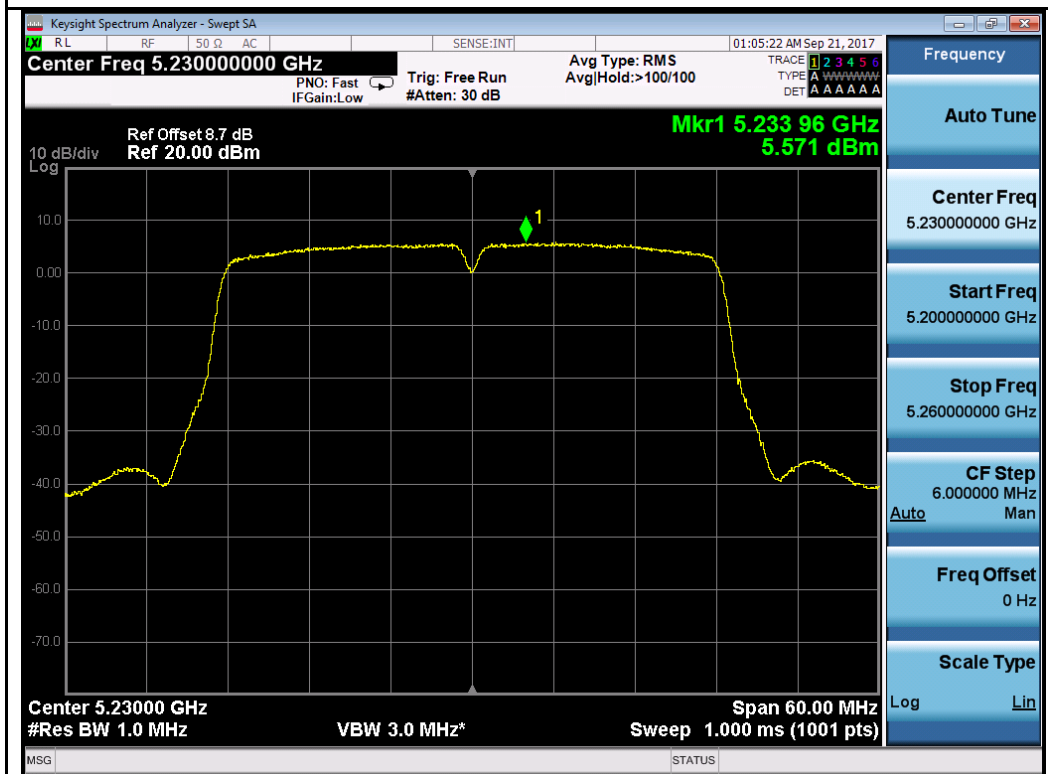
802.11n-HT20-5200MHz



802.11n-HT20-5240MHz



802.11n-HT40-5190MHz



802.11n-HT40-5230MHz

