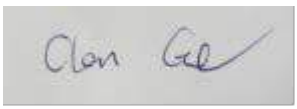
RF TEST REPORT

SIEMIC
GLOBAL TESTING & CERTIFICATIONS
YOUR CHOICE FOR- TCB FCB CB NB CAB RCB

Report No.: FCC_RF_SL16032801-RUC-016_UNII_Rev 1.0
Supersede Report No.: None

Applicant	:	Ruckus Wireless, Inc.
Product Name	:	ZoneFlex T610s Access Point
Model No.	:	T610s
Test Standard	:	47 CFR 15.407
Test Method	:	ANSI C63.4: 2014 789033 D02 General UNII Test Procedures New Rules v01
FCC ID	:	S9GT610
IC ID	:	5912A-T610
Dates of test	:	07/13/2016 – 07/20/2016
Issue Date	:	09/12/2016
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:	
	
Rachana Khanduri	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

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_ RF_SL16032801-RUC-016_UNII	None	Original	09/06/2016
FCC_ RF_SL16032801-RUC-016_UNII_Rev 1.0	Rev 1.0	Updated Radio Description	09/12/2016

2 Executive Summary

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

Company: Ruckus Wireless, Inc.
Product: ZoneFlex T610s Access Point
Model: T610s

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	ZoneFlex T610s Access Point
Model No.	T610s
Trade Name	Ruckus
Serial No.	271604504842
Host Model No.	N/A
Input Power	100Vac-240Vac 50-60Hz / 48VDC 1.0A (PoE)
Poe Power Adapter Manu/Model	Ruckus Wireless, Inc. / GRT-480125A(740-64216-001)
AC/DC Power Adapter SN	N/A
PoE Power Adapter SN	20150129
Product Hardware version	705-60425-001
Product Software version	812-72410-002
Radio Hardware version	705-60425-001
Radio Software version	812-72410-002
Test Software version	117-11325-001
Date of EUT received	11/05/2015
Equipment Class/ Category	DTS, UNII
Clock Frequencies	N/A
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 Sector Antenna			
Antenna Gain (Peak)	2.4GHz: 6 dBi 5GHz: 8 dBi			
Antenna Connector Type	U.FL			
Note	EUT has 4 antennas, 2 antennas are in horizontal polarity, and 2 antennas in vertical polarity. The 802.11b/g/a is in CDD mode with all 4 antenna transmit simultaneously. Since they're in 90 deg phase shift between the horizontal and vertical antennas, for radiated limit, the result from different polarization antenna will not be combined. So only the result for 2 vertical poparity antennas and 2 horizontal poparity antennas will be combined for MIMO mode separately.For cross-polarized antenna, the total gain—including array gain—is computed separately for each of polarizations using the procedures presented in this document. The highest of the total gains shall apply. For this case, the highest of the total gain will be the directional gain of 2 antennas. For conducted limit like power and psd, the result from all 4 chains will be summed. For 802.11b/g/a mode under CDD mode, the array gain for power will be 0 and for PSD will be 10 log (Nant/Nss) dB to be calculated separately for horizontal and vertical polarity.Reference to the following KDB for clarification. 662911 D01 Multiple Transmitter Output v02r01 662911 D02 MIMO with Cross-Polarized Antennas v01			

EUT Power level setting

Mode	Frequency	Power Setting
802.11-a	5180	19
802.11-a	5200	19
802.11-a	5240	19
802.11-n-20	5180	19
802.11-n-20	5200	19
802.11-n-20	5240	19
802.11-n-40	5190	18
802.11-n-40	5230	19
802.11-ac-80	5210	18
802.11-a	5745	21
802.11-a	5785	21
802.11-a	5825	21
802.11-n-20	5745	21
802.11-n-20	5785	21
802.11-n-20	5825	21
802.11-n-40	5755	20
802.11-n-40	5795	20
802.11-ac-80	5775	21

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	740-64157-001	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 mode

8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Restricted Band of Operation	FCC	15.205	ANSI C63.4 – 2014 789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.4 – 2014	☒ Pass ☐ N/A

Test Item	Test standard		Test Method/Procedure	Pass / Fail
26 & 6 dB Emission Bandwidth	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Maximum conducted Output Power	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Power reduction (Antenna Gain > 6 dBi)	FCC	15.407 (a) (2)	-	☐ Pass ☒ N/A
Band Edge and Radiated Spurious Emissions	FCC	15.407(b)(2), 15.407(b)(6)	ANSI C63.4 – 2014 789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Power Spectral Density	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Frequency Stability	FCC	15.407 (g)	-	☐ Pass ☒ N/A
Transmit Power Control (TPC)	FCC	15.407 (h)(1)	-	☐ Pass ☒ N/A
User Manual	FCC	-	-	☒ Pass ☐ N/A
Remark	1. All measurement uncertainties are not taken into consideration for all presented test result. 2. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.			

9 Measurement Uncertainty

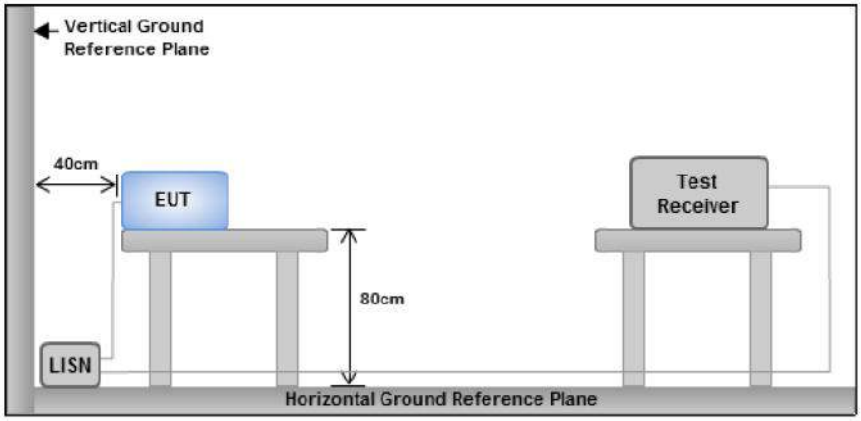
Emissions			
Test Item	Frequency Range	Description	Uncertainty
AC Conducted Emissions	150KHz – 30MHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	±3.5dB
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and Radiated Spurious Emissions	1GHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+4.3dB/-4.1dB

10 Measurements, Examination and Derived Results

10.1 Conducted Emissions

Conducted Emission Limit

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

Spec	Item	Requirement	Applicable
47CFR§15.207	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequency ranges.	☒
Test Setup	 Note: 1. Support units were connected to second LISN. 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes		
Procedure	- The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B. - The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. - All other supporting equipment was powered separately from another main supply.		
Remark	EUT tested with AC 120V 60Hz		
Result	☒ Pass ☐ Fail		

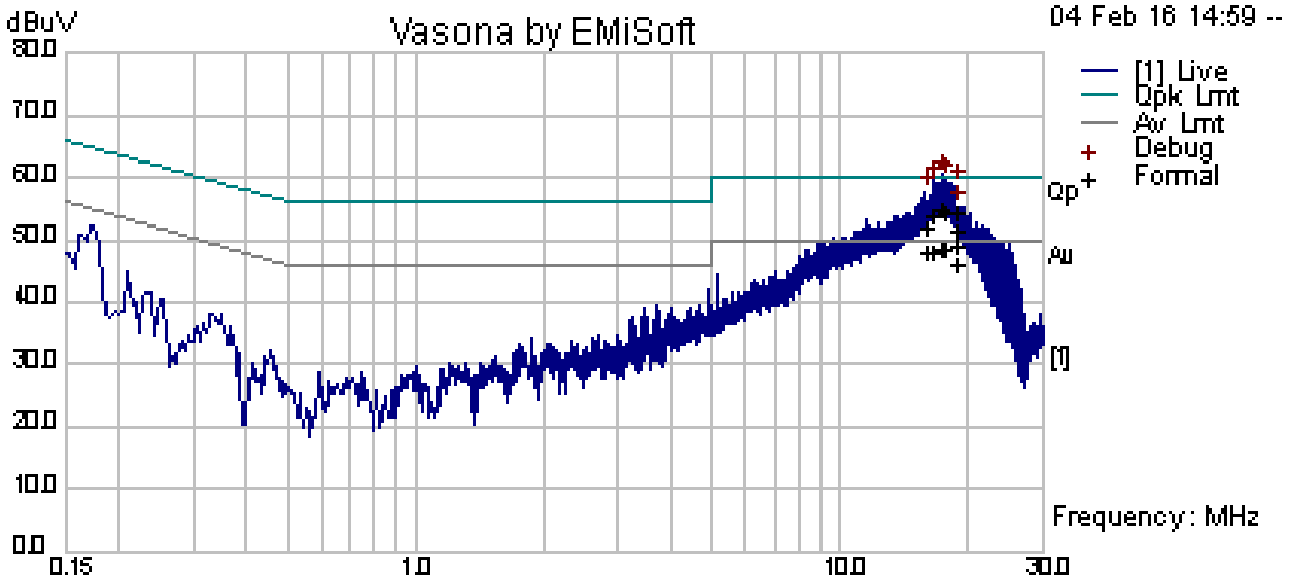
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at *Conducted Emission Test Site*.

Conducted Emission Test Results (Line)

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	23	Result:	☒ Pass ☐ Fail
	Humidity (%):	41		
	Atmospheric(mbar):	1015		
Mains Power:	120Vac, 60Hz			
Tested by:	Gary Chou			
Test Date:	02/03/2016			
Remarks:	Line – Tested with AC Line Power Cord			



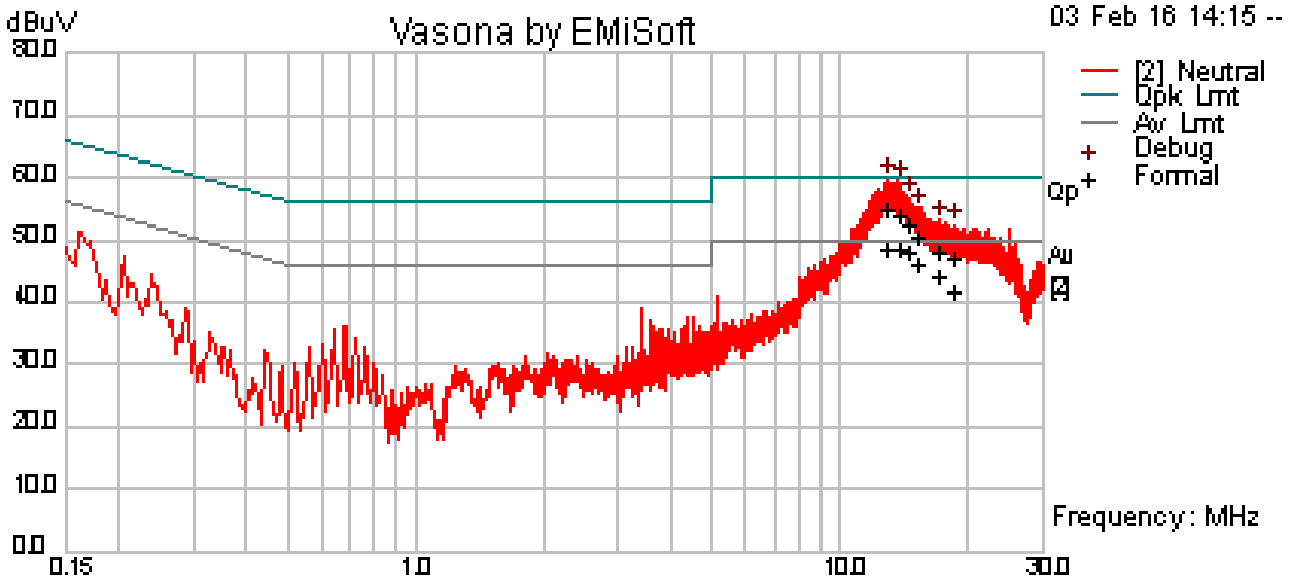
Line Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line/ Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
17.43	44.13	10.06	0.65	54.84	Quasi Peak	Live	60.00	-5.16	Pass
17.80	43.54	10.07	0.65	54.26	Quasi Peak	Live	60	-5.74	Pass
16.65	43.04	10.06	0.63	53.73	Quasi Peak	Live	60	-6.27	Pass
18.76	43.55	10.07	0.67	54.29	Quasi Peak	Live	60.00	-5.71	Pass
15.92	41.35	10.06	0.62	52.03	Quasi Peak	Live	60.00	-7.97	Pass
18.80	40.91	10.07	0.67	51.65	Quasi Peak	Live	60.00	-8.35	Pass
17.43	37.84	10.06	0.65	48.55	Average	Live	50.00	-1.45	Pass*
17.80	37.77	10.07	0.65	48.49	Average	Live	50	-1.51	Pass*
16.65	37.56	10.06	0.63	48.26	Average	Live	50	-1.74	Pass*
18.76	38.39	10.07	0.67	49.12	Average	Live	50.00	-0.88	Pass*
15.92	37.58	10.06	0.62	48.26	Average	Live	50.00	-1.74	Pass*
18.80	35.21	10.07	0.67	45.95	Average	Live	50.00	-4.05	Pass

Pass*: The margin is within the measurement uncertainty.

Conducted Emission Test Results (Neutral)

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	23	Result:	☒ Pass ☐ Fail
	Humidity (%):	41		
	Atmospheric(mbar):	1015		
Mains Power:	120Vac, 60Hz			
Tested by:	Gary Chou			
Test Date:	02/03/2016			
Remarks:	Neutral – Tested with AC Line Power Cord			



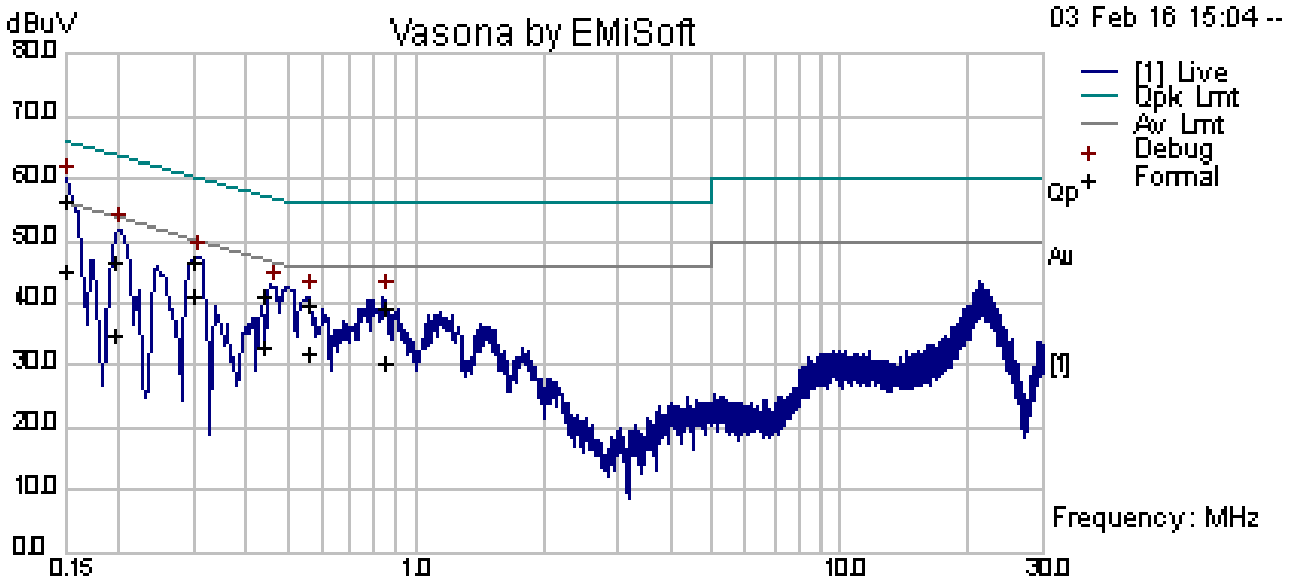
Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line/ Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
12.99	44.14	10.06	0.58	54.78	Quasi Peak	Neutral	60.00	-5.22	Pass
13.75	43.37	10.06	0.59	54.02	Quasi Peak	Neutral	60.00	-5.98	Pass
14.44	41.75	10.06	0.6	52.4	Quasi Peak	Neutral	60.00	-7.60	Pass
15.27	39.72	10.06	0.61	50.38	Quasi Peak	Neutral	60.00	-9.62	Pass
17.21	37.13	10.06	0.64	47.84	Quasi Peak	Neutral	60.00	-12.16	Pass
18.68	36.23	10.07	0.67	46.96	Quasi Peak	Neutral	60.00	-13.04	Pass
12.99	38.09	10.06	0.58	48.73	Average	Neutral	50.00	-1.27	Pass*
13.75	37.83	10.06	0.59	48.47	Average	Neutral	50.00	-1.53	Pass*
14.44	37.22	10.06	0.6	47.87	Average	Neutral	50.00	-2.13	Pass*
15.27	35.31	10.06	0.61	45.98	Average	Neutral	50.00	-4.02	Pass
17.21	33.26	10.06	0.64	43.97	Average	Neutral	50.00	-6.03	Pass
18.68	30.89	10.07	0.67	41.63	Average	Neutral	50.00	-8.37	Pass

Pass*: The margin is within the measurement uncertainty.

Conducted Emission Test Results (Line)

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	23	Result:	☒ Pass ☐ Fail
	Humidity (%):	41		
	Atmospheric(mbar):	1015		
Mains Power:	120Vac, 60Hz			
Tested by:	Gary Chou			
Test Date:	02/03/2016			
Remarks	Line – Tested with POE			

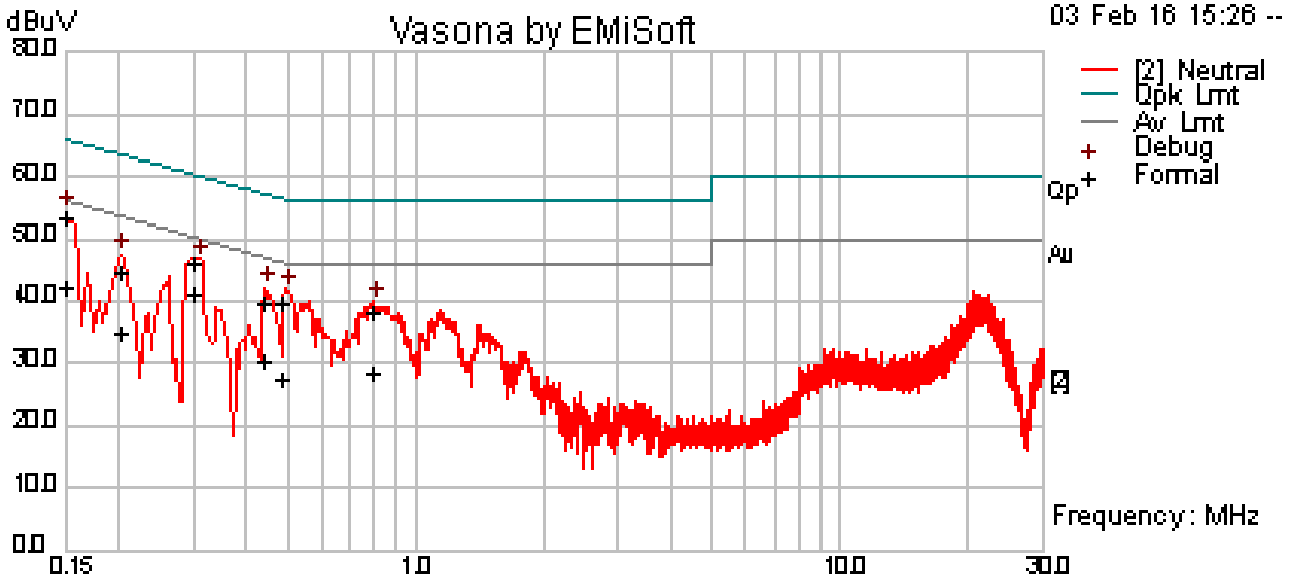


Line Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.15	44.76	10.00	1.80	56.57	Quasi Peak	Live	66.00	-9.43	Pass
0.19	35.34	10.00	1.35	46.69	Quasi Peak	Live	63.83	-17.13	Pass
0.30	35.72	10.00	0.91	46.64	Quasi Peak	Live	60.23	-13.60	Pass
0.44	30.69	10.01	0.72	41.42	Quasi Peak	Live	57.04	-15.62	Pass
0.56	29.14	10.01	0.66	39.81	Quasi Peak	Live	56.00	-16.19	Pass
0.84	28.38	10.01	0.59	38.99	Quasi Peak	Live	56.00	-17.01	Pass
0.15	33.52	10.00	1.80	45.33	Average	Live	56.00	-10.67	Pass
0.19	23.58	10.00	1.35	34.94	Average	Live	53.83	-18.89	Pass
0.30	30.48	10.00	0.91	41.39	Average	Live	50.23	-8.84	Pass
0.44	22.22	10.01	0.72	32.95	Average	Live	47.04	-14.09	Pass
0.56	21.01	10.01	0.66	31.68	Average	Live	46.00	-14.32	Pass
0.84	19.88	10.01	0.59	30.49	Average	Live	46.00	-15.51	Pass

Conducted Emission Test Results (Neutral)

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	23	Result:	☒ Pass ☐ Fail
	Humidity (%):	41		
	Atmospheric(mbar):	1015		
Mains Power:	120Vac, 60Hz			
Tested by:	Teody Manansala			
Test Date:	02/03/2016			
Remarks	Neutral – Tested with POE			



Neutral Plot at 120Vac, 60Hz

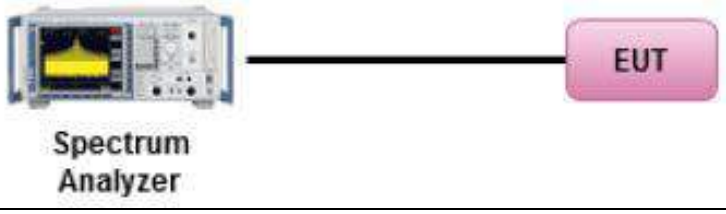
Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.15	41.67	10.00	1.80	53.48	Quasi Peak	Neutral	66.00	-12.52	Pass
0.30	35.10	10.00	0.91	46.02	Quasi Peak	Neutral	60.27	-14.25	Pass
0.49	28.91	10.01	0.69	39.60	Quasi Peak	Neutral	56.23	-16.63	Pass
0.44	28.99	10.01	0.72	39.72	Quasi Peak	Neutral	57.04	-17.32	Pass
0.20	33.21	10.00	1.31	44.52	Quasi Peak	Neutral	63.60	-19.08	Pass
0.79	27.56	10.01	0.60	38.18	Quasi Peak	Neutral	56.00	-17.82	Pass
0.15	30.50	10.00	1.80	42.30	Average	Neutral	56.00	-13.70	Pass
0.30	30.16	10.00	0.91	41.08	Average	Neutral	50.27	-9.19	Pass
0.49	16.63	10.01	0.69	27.33	Average	Neutral	46.23	-18.90	Pass
0.44	19.74	10.01	0.72	30.47	Average	Neutral	47.04	-16.57	Pass
0.20	23.45	10.00	1.31	34.76	Average	Neutral	53.60	-18.84	Pass
0.79	17.60	10.01	0.60	28.21	Average	Neutral	46.00	-17.79	Pass

Note: The results above show only the worst case.

10.2 6dB & 26 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 v01 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. 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. 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. 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	11/01/2015 – 11/20/2015	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	22ºC 38% 1020mbar
Remark	99% BW result is presented here to show the channels in 5.1GHz 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 *Gary Chou* at *RF Test Site*.

26dB Bandwidth measurement result for 5.2GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5180	Low	19.19
26dB BW	802.11a	5200	Mid	18.78
26dB BW	802.11a	5240	High	18.81
26dB BW	802.11n-20	5180	Low	20.17
26dB BW	802.11n-20	5200	Mid	20.04
26dB BW	802.11n-20	5240	High	20.19
26dB BW	802.11n-40	5190	Low	38.57
26dB BW	802.11n-40	5230	High	38.49
26dB BW	802.11ac-80	5210	Mid	82.31

6dB Bandwidth measurement result for 5.8GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)
6dB BW	802.11a	5745	Low	16.36
6dB BW	802.11a	5785	Mid	16.37
6dB BW	802.11a	5825	High	16.33
6dB BW	802.11n-20	5745	Low	17.66
6dB BW	802.11n-20	5785	Mid	17.68
6dB BW	802.11n-20	5825	High	17.62
6dB BW	802.11n-40	5755	Low	36.13
6dB BW	802.11n-40	5795	High	36.40
6dB BW	802.11ac-80	5775	Low	75.84

26dB Bandwidth Test Plots

26dB BW - 802.11a 5180MHz

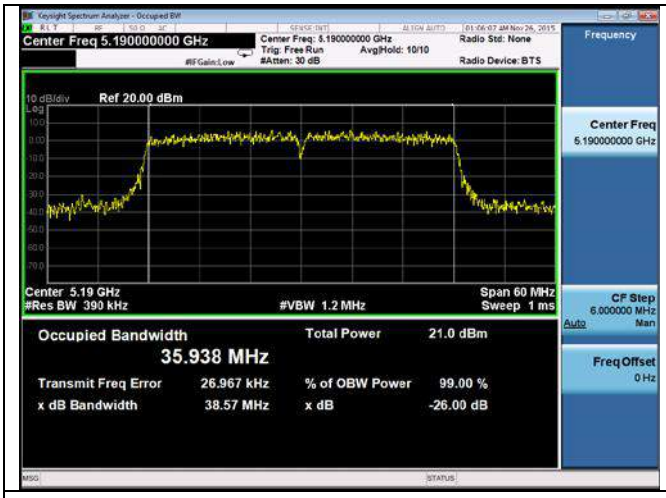
26dB BW - 802.11a 5200MHz

26dB BW - 802.11a 5240MHz

26dB BW - 802.11n-20M 5180MHz

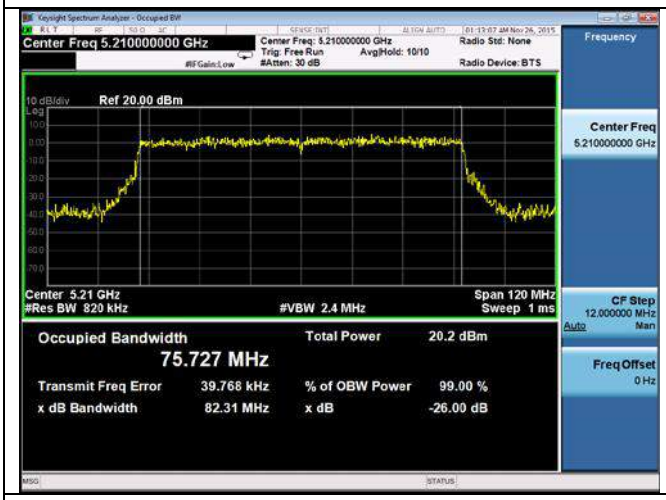
26dB BW - 802.11n-20M 5200MHz

26dB BW - 802.11n-20M 5240MHz



26dB BW - 802.11n-40M 5190MHz

26dB BW - 802.11n-40M 5230MHz



26dB BW - 802.11ac-80M 5210MHz

6dB Bandwidth Test Plots

6dB BW -802.11a 5745MHz

6dB BW -802.11a 5785MHz

6dB BW -802.11a 5825MHz

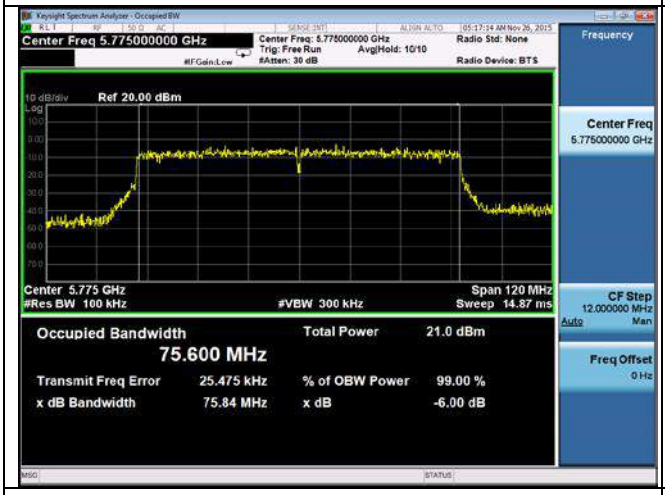
6dB BW -802.11n-20M 5745MHz

6dB BW -802.11n-20M 5785MHz

6dB BW -802.11n-20M 5825MHz

6dB BW -802.11n-40M 5755MHz

6dB BW -802.11n-40M 5795MHz



6dB BW -802.11ac-80M 5775MHz

10.3 Output Power

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 conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).	☒
	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)(1)(iii)	For fixed point-to-point access points 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. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.	☐
	a)(1)(iv)	For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.	☐
	a)(2)	For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz.	☐
	a)(3)	For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.	☒

Test Setup				
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01 Measurement using a Power Meter (PM) Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required. - Connect EUT's RF output power to power meter - Set EUT to be continuous transmission mode - Measurement the average output power using power meter and record the result - Repeat above steps for different test channel and other modulation type.			
Test Date	07/14/2016 – 07/15/2016	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	22ºC 44.6 % 1011.4mbar
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 = 8 dBi, array gain = 3 dB, directional gain = 11 dBi. Highest of totoal gain is 11 dBi. The power limit and PSD limit will be reduced by amount of 5 dB.			
Result	☒ Pass ☐ 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
				Chain1	Chain2	Chain3	Chain4	Combined Power		
Output Power	802.11a	5180	Low	16.24	16.32	17.41	15.99	22.55	25	Pass
		5200	Mid	16.35	16.38	17.59	15.98	22.64	25	Pass
		5240	High	16.52	16.33	17.70	16.06	22.72	25	Pass
	802.11n-20	5180	Low	16.15	16.36	17.51	15.92	22.55	25	Pass
		5200	Mid	16.14	16.56	17.60	16.13	22.67	25	Pass
		5240	High	16.27	16.91	17.62	16.23	22.82	25	Pass
	802.11n-40	5190	Low	15.94	16.37	17.69	16.08	22.60	25	Pass
		5230	Mid	16.92	17.41	18.50	17.05	23.54	25	Pass
	802.11ac-80	5210	High	15.17	15.20	16.73	15.30	21.67	25	Pass

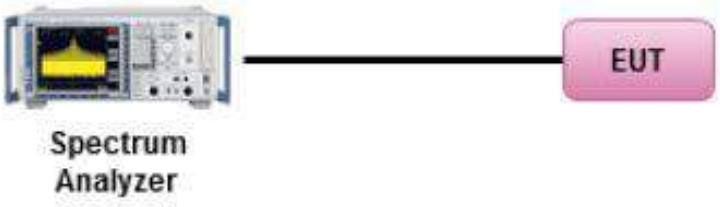
Output Power measurement result for 5.8GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)					Limit (dBm)	Result
				Chain1	Chain2	Chain3	Chain4	Combined Power		
Output Power	802.11a	5745	Low	17.97	17.57	17.99	17.31	23.74	25	Pass
		5785	Mid	17.83	17.53	17.78	17.15	23.60	25	Pass
		5825	High	17.66	17.70	17.90	17.23	23.65	25	Pass
	802.11n-20	5745	Low	17.69	17.55	18.17	17.56	23.77	25	Pass
		5785	Mid	17.39	17.57	17.98	17.19	23.56	25	Pass
		5825	High	17.69	17.82	18.02	17.48	23.78	25	Pass
	802.11n-40	5755	Low	17.44	17.61	17.55	17.23	23.48	25	Pass
		5795	High	17.60	17.53	17.84	17.22	23.57	25	Pass
	802.11ac-80	5775	Low	18.13	18.02	18.61	17.57	24.12	25	Pass

10.4 Peak Power Spectral Density

Requirement(s):

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

Test Setup				
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01, II.F. Method SA-1 Maximum spectral density measurement procedure - Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal. - Set RBW = 1 MHz - Set VBW ⩾ 3 MHz - Detector = RMS. - Sweep time = auto couple. - Trace mode = max hold. - Trace average at least 100 traces in power averaging - Use the peak marker function to determine the maximum amplitude level within the RBW. Apply correction to the result if different RBW is used.			
Test Date	07/14/2016 – 07/15/2016	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	22ºC 46% 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 = 8 dBi, array gain = 3 dB, directional gain = 11 dBi. Highest of totoal gain is 11 dBi. The power limit and PSD limit will be reduced by amount of 5 dB.			
Result	☒ Pass ☐ 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
				Chain1	Chain2	Chain3	Chain4	Combined		
PSD	802.11a	5180	Low	5.40	5.21	6.56	5.11	11.63	12	Pass
		5200	Mid	5.48	5.25	6.62	4.91	11.63	12	Pass
		5240	High	5.69	5.40	6.75	5.35	11.86	12	Pass
	802.11n-20	5180	Low	4.89	5.12	6.33	4.78	11.35	12	Pass
		5200	Mid	5.09	5.23	6.40	4.97	11.48	12	Pass
		5240	High	5.07	5.54	6.43	5.33	11.64	12	Pass
	802.11n-40	5190	Low	1.75	2.06	3.64	1.96	8.44	12	Pass
		5230	Mid	2.72	3.36	4.37	2.91	9.41	12	Pass
	802.11ac-	5210	High	-2.32	-2.20	-0.94	-2.14	4.16	12	Pass

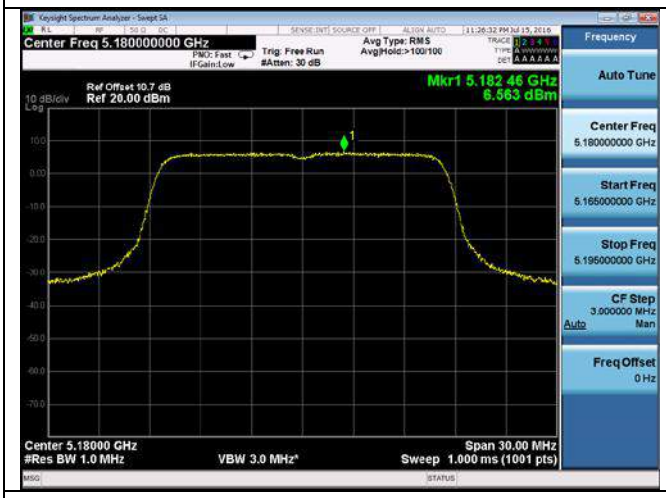
PSD measurement result for 5.8GHz

Test mode	Freq (MHz)	CH	Conducted PSD (dBm/100kHz)					Correction factor (dB)	PSD (dBm/500 kHz)	Limit (dBm/500kHz)	Result
			Chain1	Chain2	Chain3	Chain4	Combined				
802.11a	5745	Low	-2.54	-2.42	-2.21	-2.93	3.50	6.99	10.49	25	Pass
	5785	Mid	-2.51	-2.61	-2.53	-2.53	3.48	6.99	10.47	25	Pass
	5825	High	-2.06	-2.10	-2.17	-1.79	3.99	6.99	10.98	25	Pass
802.11n-20	5745	Low	-2.55	-2.68	-2.17	-2.94	3.44	6.99	10.43	25	Pass
	5785	Mid	-2.40	-2.38	-2.22	-2.87	3.56	6.99	10.55	25	Pass
	5825	High	-2.33	-2.14	-2.05	-1.97	3.90	6.99	10.89	25	Pass
802.11n-40	5755	Low	-6.96	-6.50	-6.47	-6.90	-0.68	6.99	6.31	25	Pass
	5795	High	-6.48	-6.15	-6.14	-6.75	-0.35	6.99	6.64	25	Pass
802.11ac-80	5775	Mid	-9.29	-8.99	-9.19	-9.87	-3.30	6.99	3.69	25	Pass
Note	BW correction factor = 10log(500kHz/RBW), RBW was set to 100kHz during test.										

Test Plots

PSD-802.11a-5180M-chain1

PSD-802.11a--5180M-chain2



PSD-802.11a--5180M -chain3

PSD-802.11a-5180M-chain4

PSD-802.11a-5200M-chain1

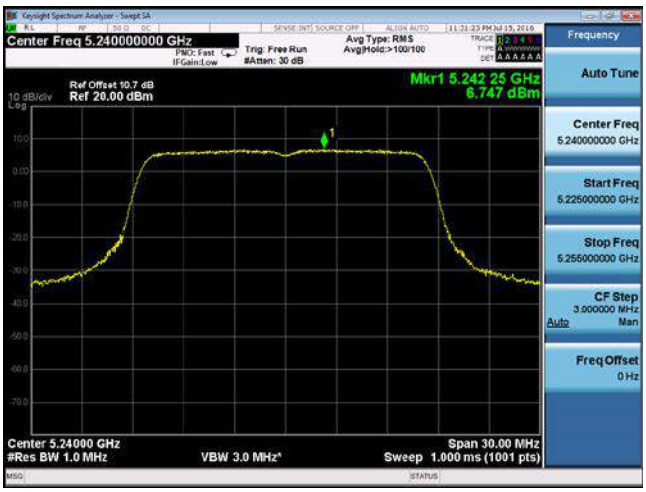
PSD-802.11a-5200M-chain2

PSD-802.11a-5200M-chain3

PSD-802.11a-5200M-chain4

PSD-802.11a-5240M-chain1

PSD-802.11a-5240M-chain2



PSD-802.11a-5240M-chain3

PSD-802.11a-5240M-chain4

PSD-802.11n-20M-5180M-chain1

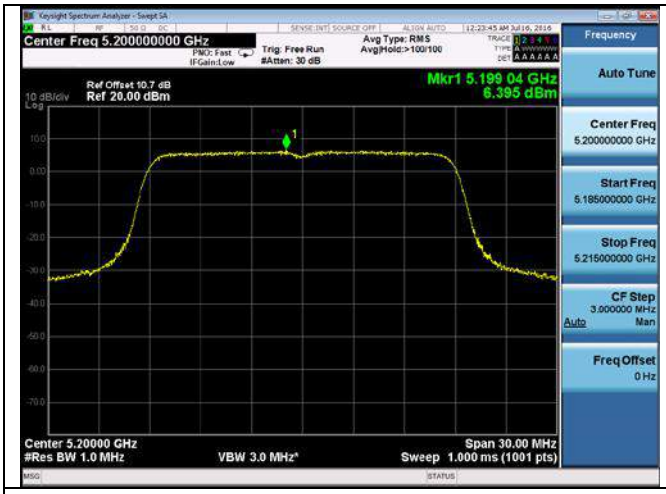
PSD-802.11n-20M-5180M-chain2

PSD-802.11n-20M-5180M-chain3

PSD-802.11n-20M-5180M-chain4

PSD-802.11n-20M-5200M-chain1

PSD-802.11n-20M-5200M-chain2



PSD-802.11n-20M-5200M-chain3

PSD-802.11n-20M-5200M-chain4

PSD-802.11n-20M-5240M-chain1

PSD-802.11n-20M-5240M-chain2

PSD-802.11n-20M-5240M-chain3

PSD-802.11n-20M-5240M-chain4

PSD-802.11n-40M-5190M-chain1

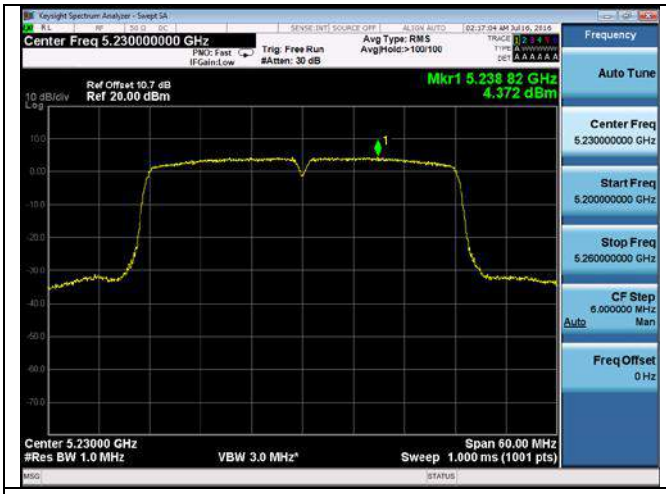
PSD-802.11n-40M-5190M-chain2

PSD-802.11n-40M-5190M-chain3

PSD-802.11n-40M-5190M-chain4

PSD-802.11n-40M-5230M-chain1

PSD-802.11n-40M-5230M-chain2



PSD-802.11n-40M-5230M-chain3

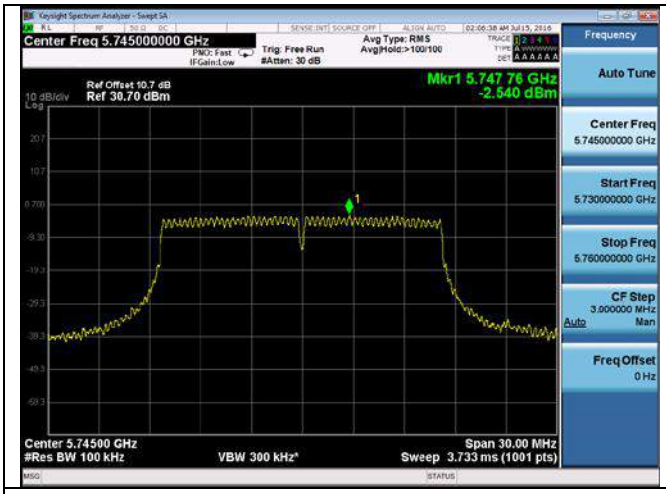
PSD-802.11n-40M-5230M-chain4

PSD-802.11ac-80M-5210M-chain1

PSD-802.11ac-80M-5210M-chain2

PSD-802.11ac-80M-5210M-chain3

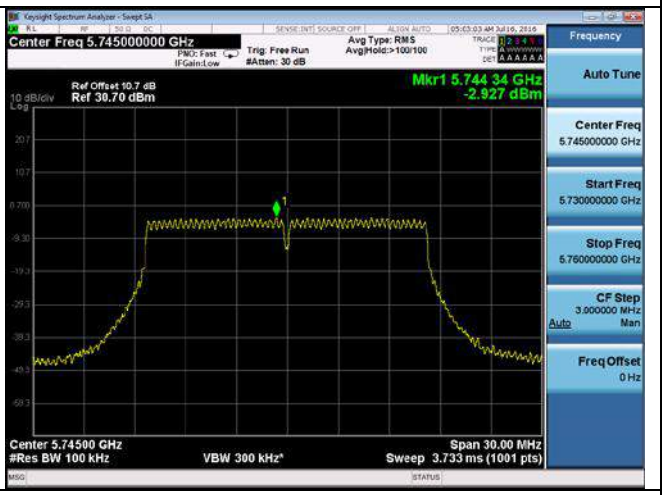
PSD-802.11ac-80M-5210M-chain4



PSD-802.11a-5745M-chain1

PSD-802.11a-5745M-chain2

PSD-802.11a-5745M-chain3



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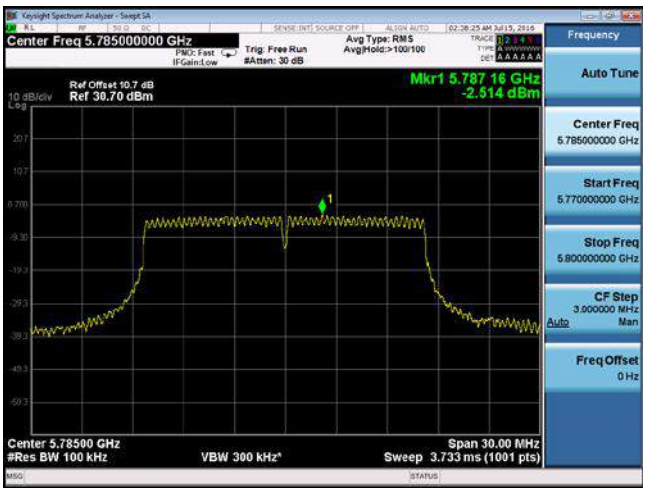
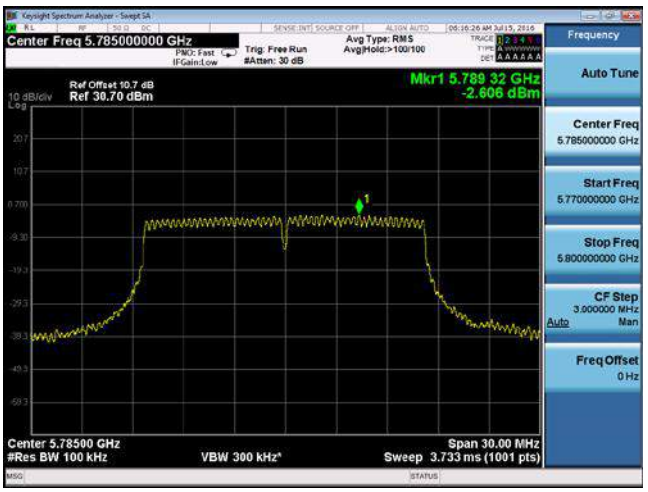
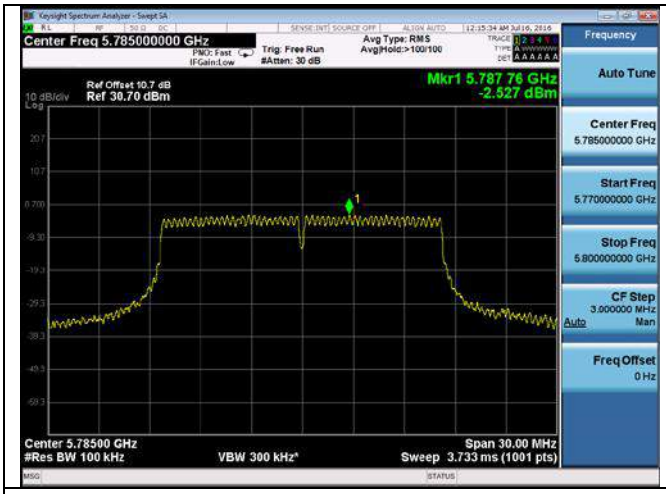


PSD-802.11a-5785M-chain1



PSD-802.11a-5785M-chain2

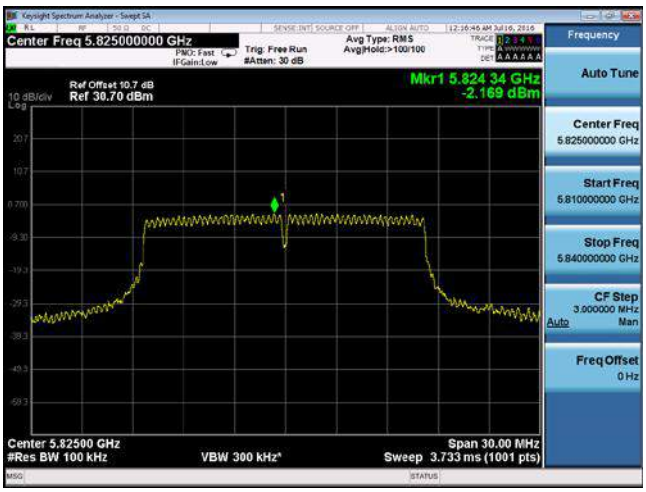


PSD-802.11a-5785M-chain3

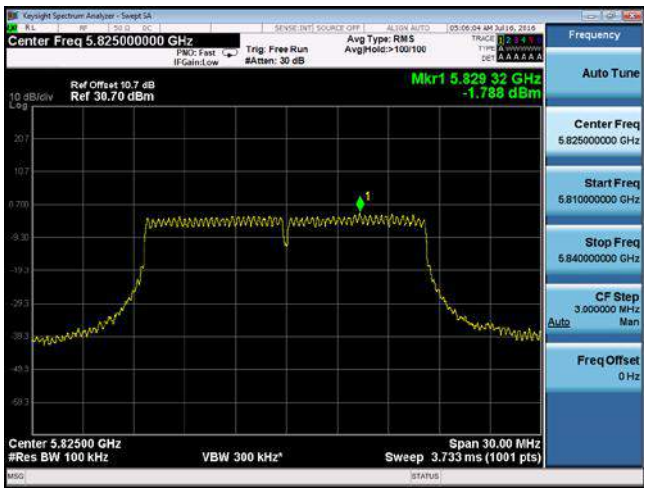
PSD-802.11a-5785M-chain4

PSD-802.11a-5825M-chain1

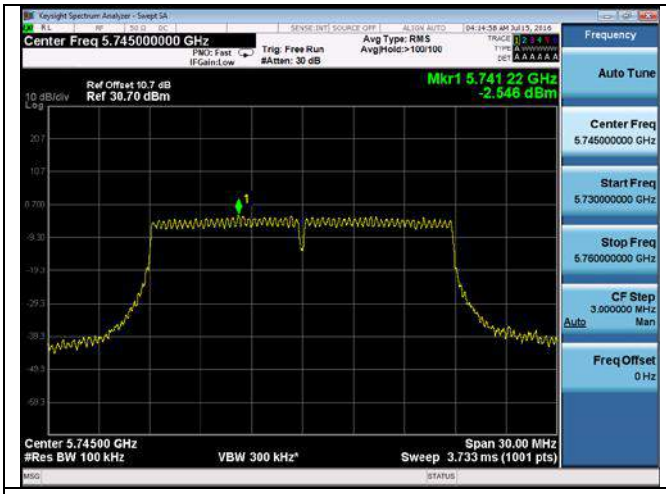
PSD-802.11a-5825M-chain2



PSD-802.11a-5825M-chain3

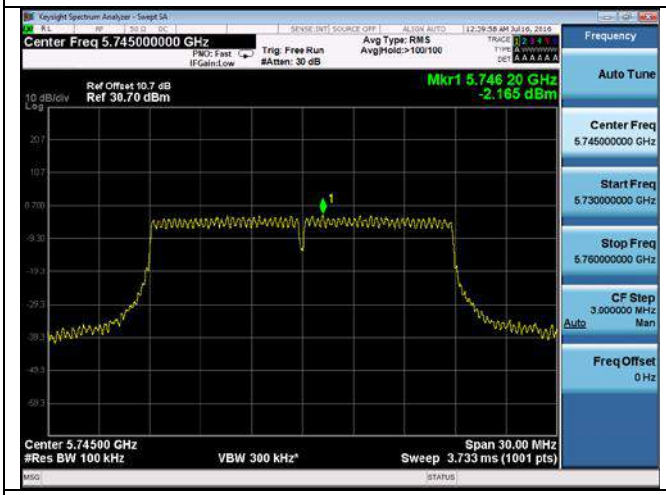


PSD-802.11a-5825M-chain4

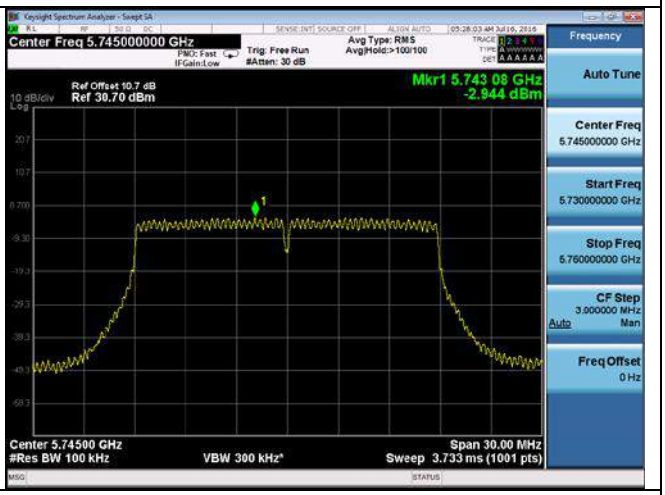


PSD-802.11n-20M-5745M-chain1

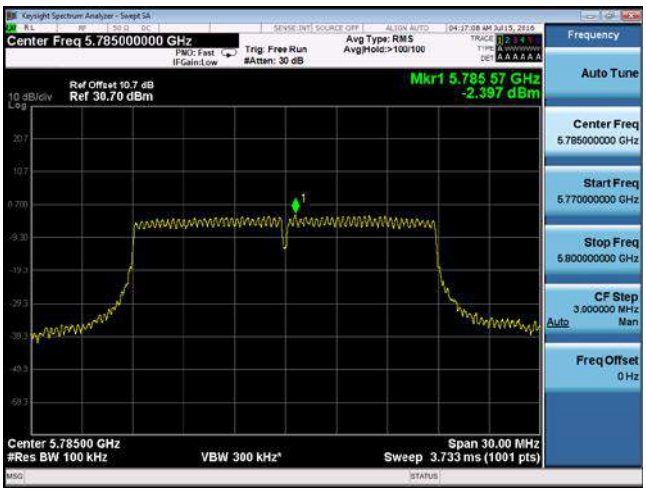
PSD-802.11n-20M-5745M-chain2



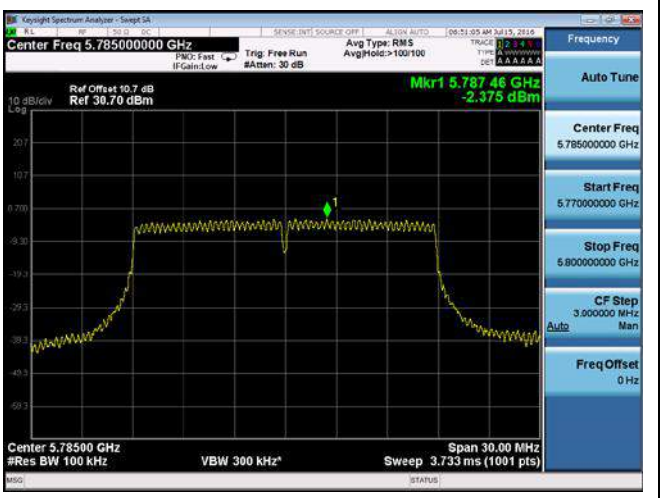
PSD-802.11n-20M-5745M-chain3



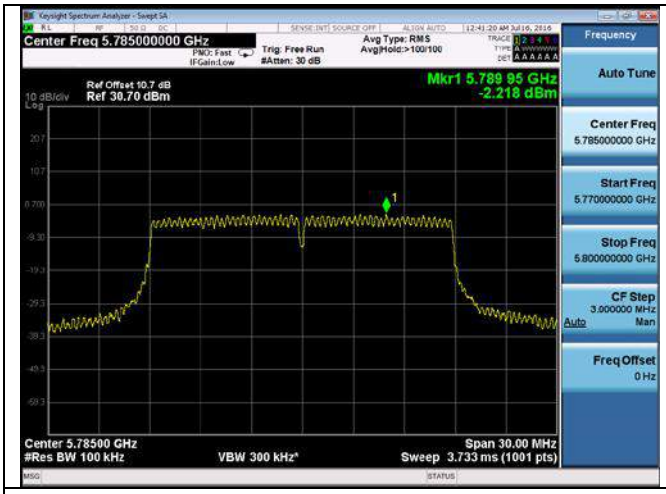
PSD-802.11n-20M-5745M-chain4



PSD-802.11n-20M-5785M-chain1



PSD-802.11n-20M-5785M-chain2

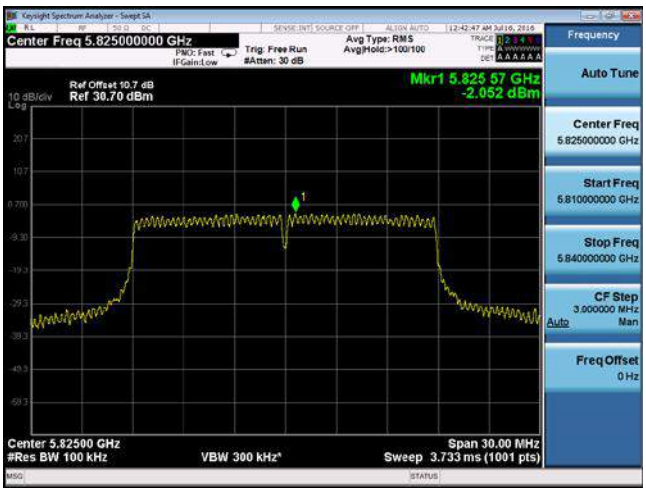


PSD-802.11n-20M-5785M-chain3

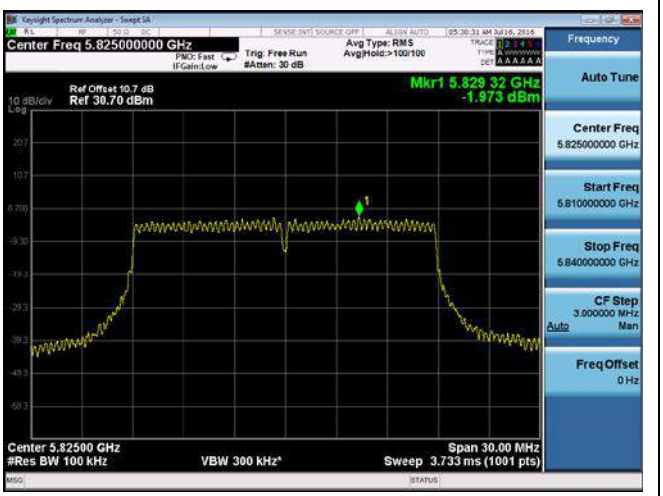
PSD-802.11n-20M-5785M-chain4

PSD-802.11n-20M-5825M-chain1

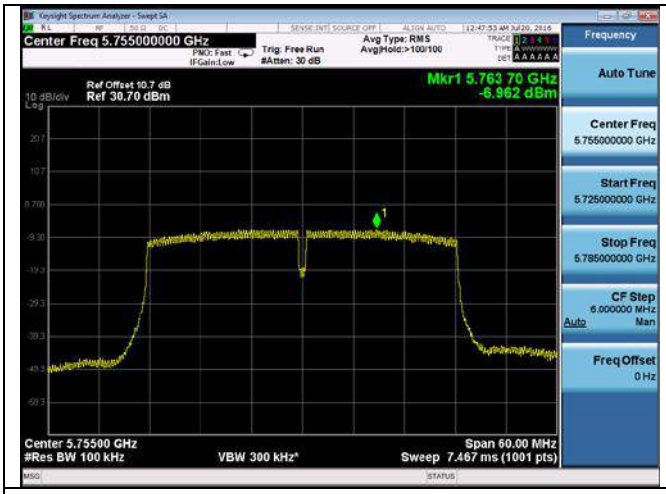
PSD-802.11n-20M-5825M-chain2



PSD-802.11n-20M-5825M-chain3



PSD-802.11n-20M-5825M-chain4

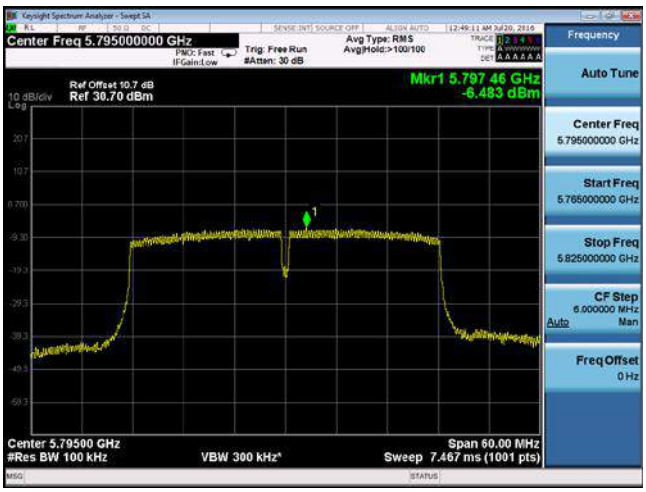


PSD-802.11n-40M-5755M-chain1

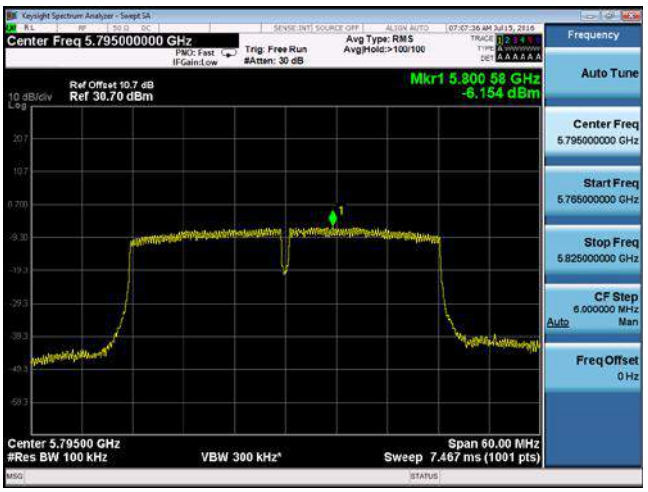
PSD-802.11n-40M-5755M-chain2

PSD-802.11n-40M-5755M-chain3

PSD-802.11n-40M-5755M-chain4



PSD-802.11n-40M-5795M-chain1



PSD-802.11n-40M-5795M-chain2

PSD-802.11n-40M-5795M-chain3

PSD-802.11n-40M-5795M-chain4

PSD-802.11ac-80M-5775M-chain1

PSD-802.11ac-80M-5775M-chain2

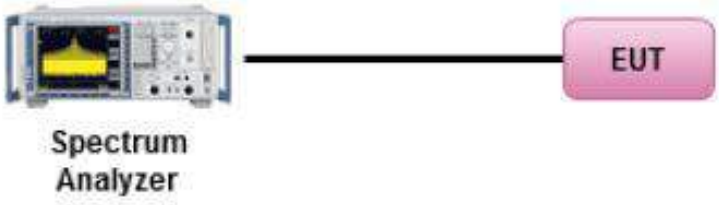
PSD-802.11ac-80M-5775M-chain3

PSD-802.11ac-80M-5775M-chain4

10.5 Band Edge Measurement

Requirement(s):

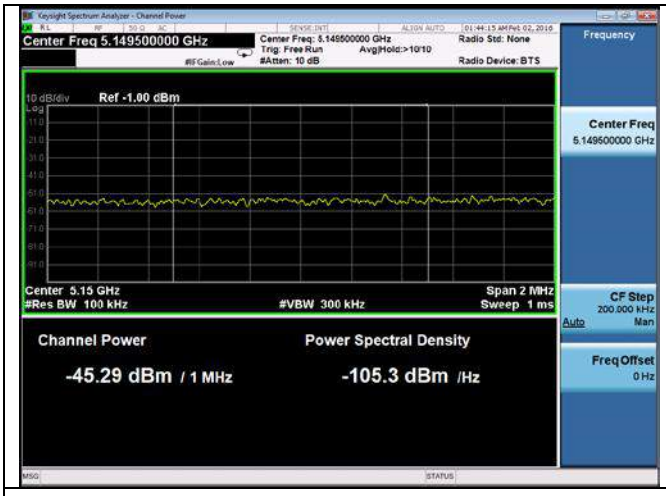
Spec	Item	Requirement	Applicable
47CFR§ 15.407(b)(2), 15.407(b)(6)	(1)	For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.	☒
	(2)	For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.	☐
	(3)	For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.	☐
	(4)	For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.	☒

Test Setup			
Procedure	789033 D02 General UNII Test Procedures New Rules v01, II.F. Method SA-1 Band Edge measurement: - For average emissions measurements, follow the procedures described in section II.G.6., "Procedures for Average Unwanted Emissions Measurements above 1000 MHz", except for the following changes: - Set RBW=100kHz - Set VBW=100kHz - Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured.		
Test Date	11/20/2015	Environmental condition	Temperature 22ºC Relative Humidity 38% Atmospheric Pressure 1020mba
Remark	Antenna gain was added to the offset.		
Result	☒ Pass ☐ Fail		

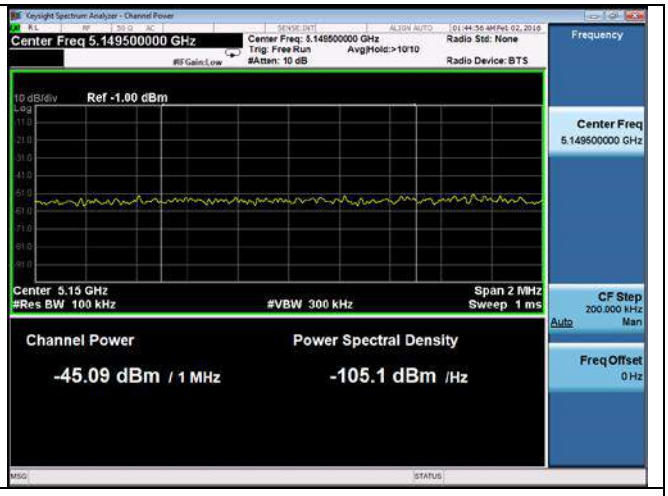
Test Data ☐ Yes (See below) ☒ N/A
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at *RF Test Site*.

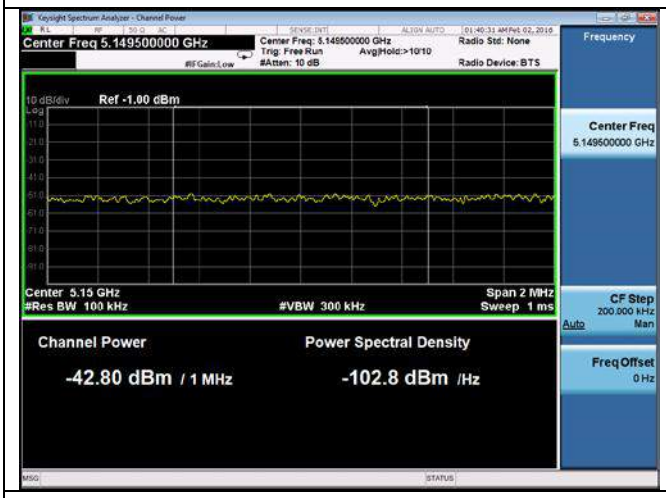
Test Plots



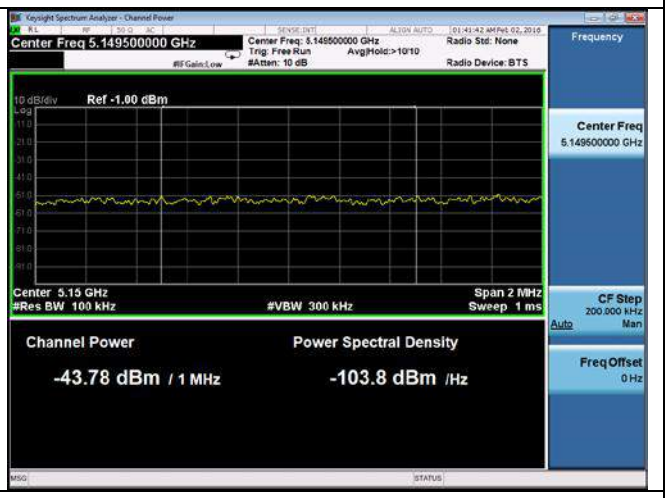
Band Edge-802.11a-5180M-chain1



Band Edge-802.11a-5180M-chain2

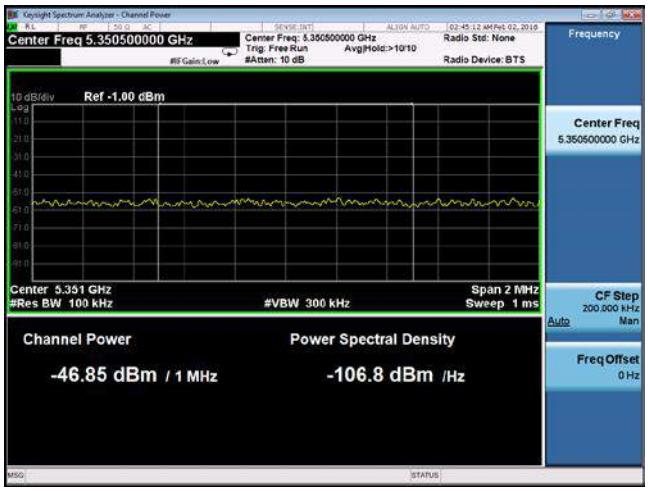


Band Edge -802.11a-5180M-chain3



Band Edge -802.11a-5180M-chain4

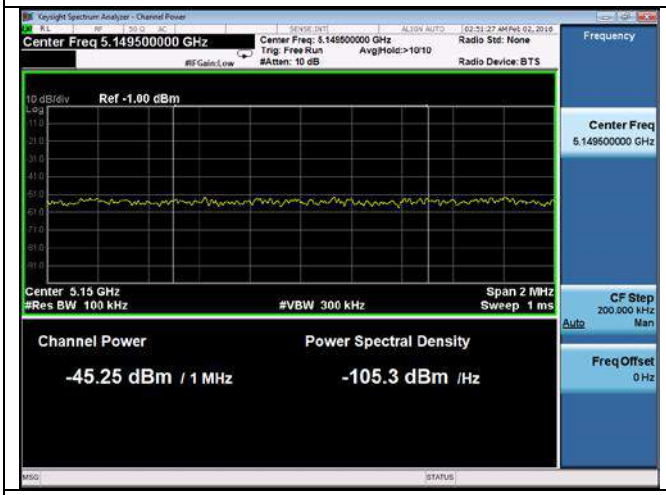
Band Edge -802.11a-5240M-chain1



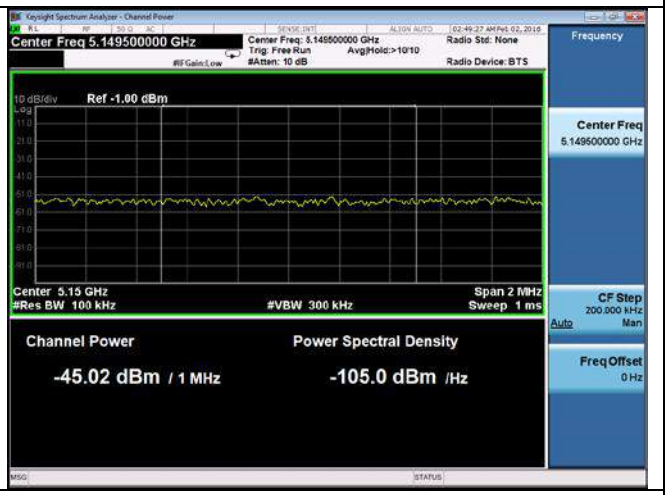
Band Edge -802.11a-5240M-chain2

Band Edge -802.11a-5240M-chain3

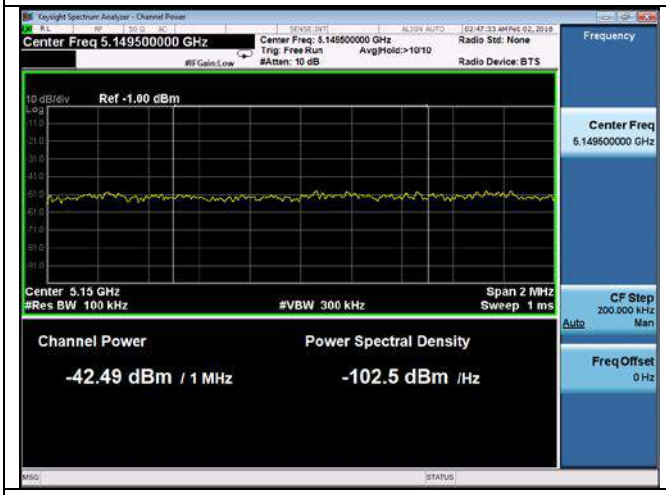
Band Edge -802.11a-5240M-chain4



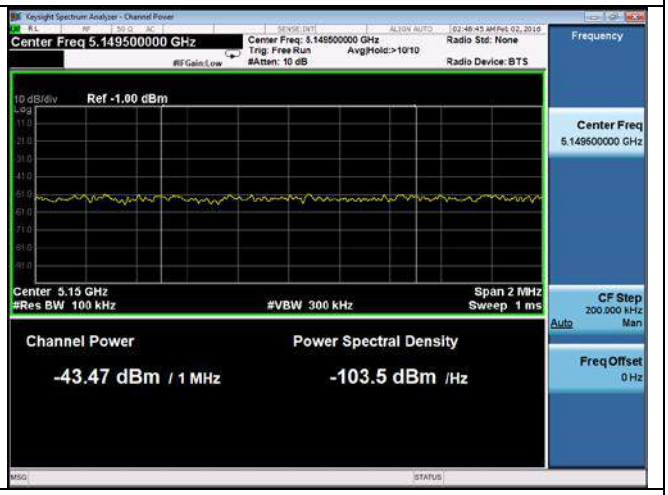
Band Edge -802.11n-20M-5180M-chain1



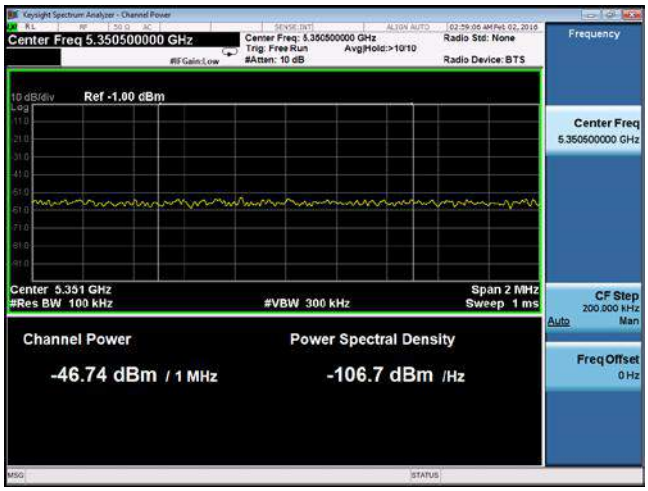
Band Edge -802.11n-20M-5180M-chain2



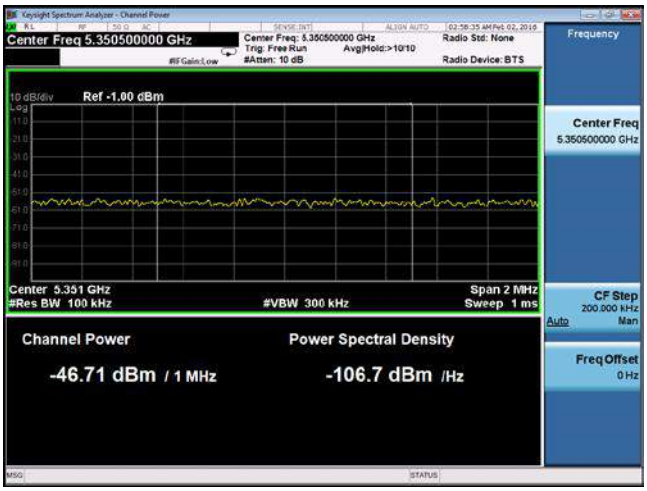
Band Edge -802.11n-20M-5180M-chain3



Band Edge -802.11n-20M-5180M-chain4



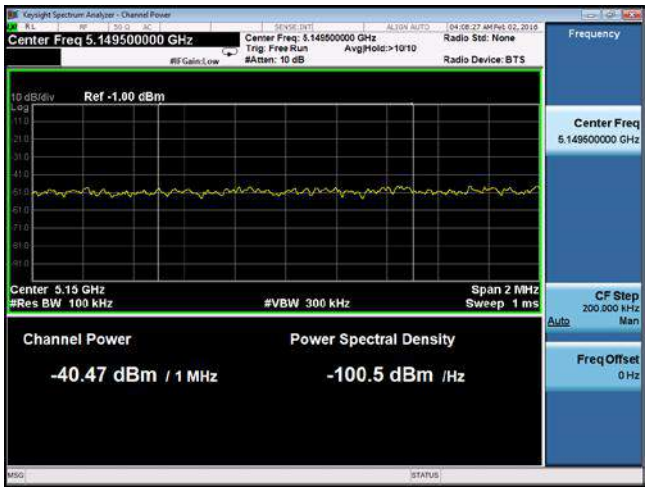
Band Edge -802.11n-20M-5240M-chain1



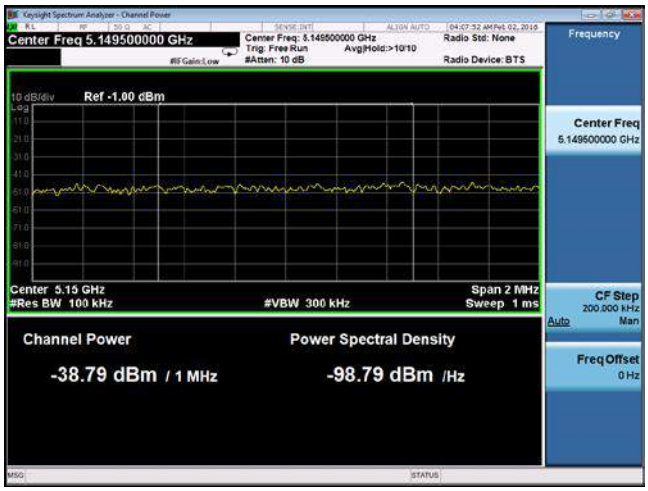
Band Edge -802.11n-20M-5240M-chain2

Band Edge -802.11n-20M-5240M-chain3

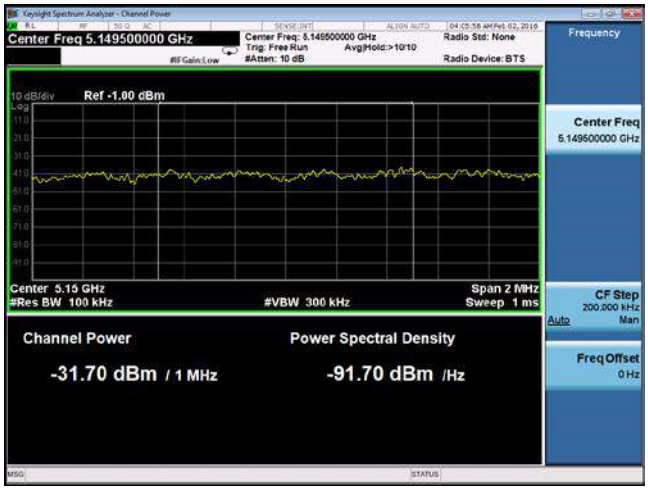
Band Edge -802.11n-20M-5240M-chain4



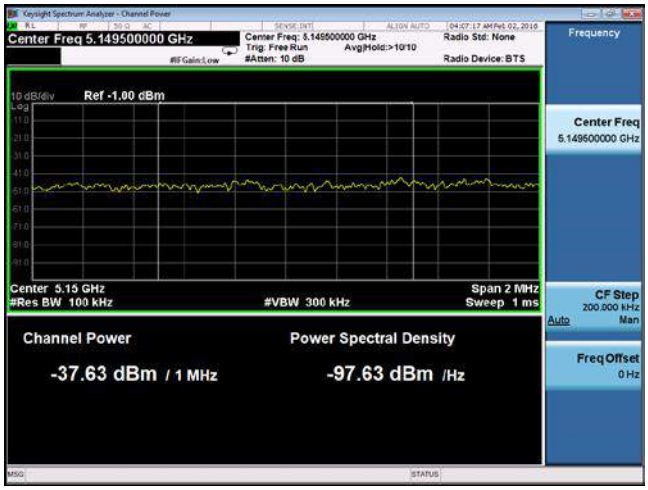
Band Edge -802.11n-40M-5190M-chain1



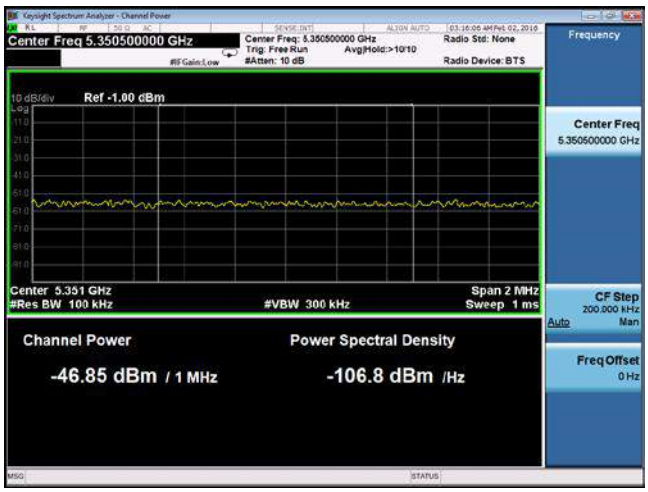
Band Edge -802.11n-40M-5190M-chain2



Band Edge -802.11n-40M-5190M-chain3

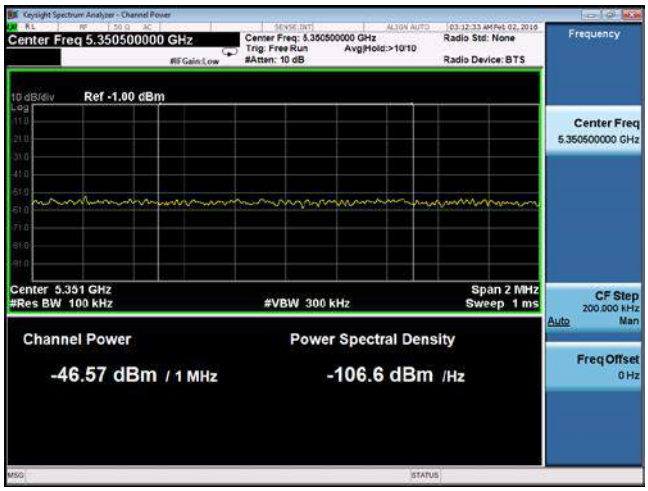


Band Edge -802.11n-40M-5190M-chain4

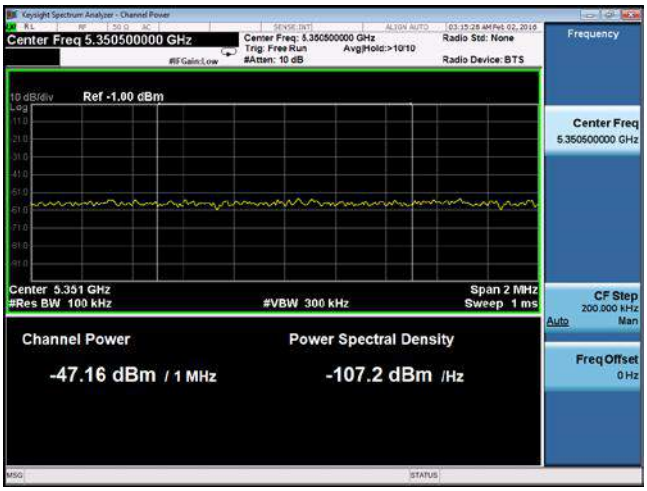


Band Edge -802.11n-40M-5230M-chain1

Band Edge -802.11n-40M-5230M-chain2

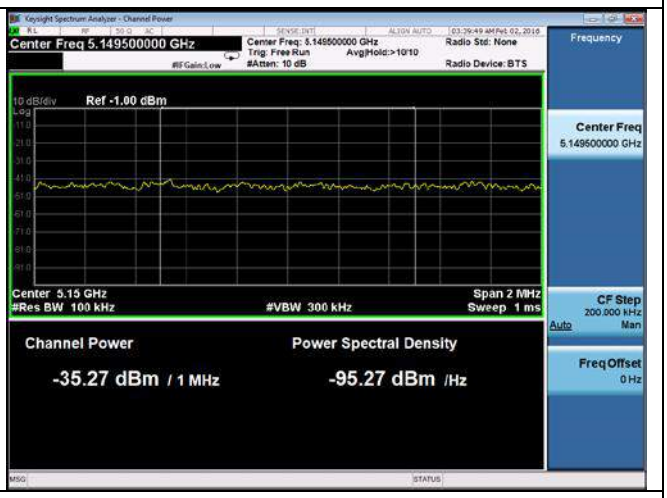


Band Edge -802.11n-40M-5230M-chain3

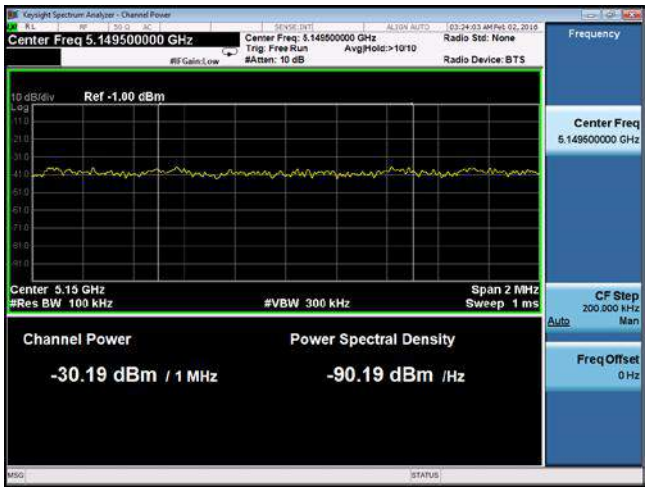


Band Edge -802.11n-40M-5230M-chain4

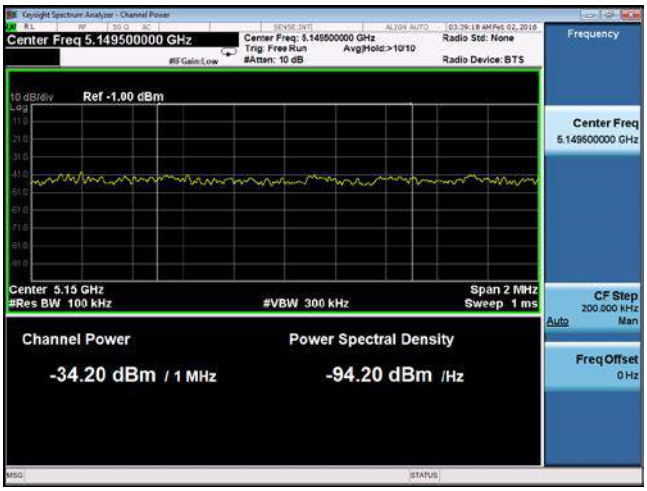
Band Edge -802.11ac-80M-5210M-chain1



Band Edge -802.11ac-80M-5210M-chain2



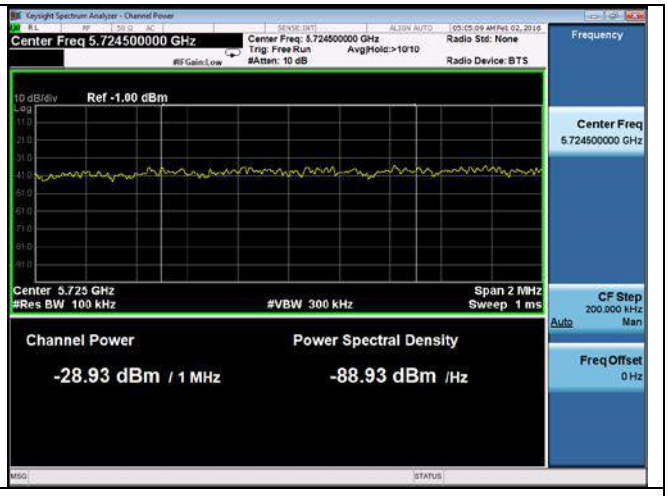
Band Edge -802.11ac-80M-5210M-chain3



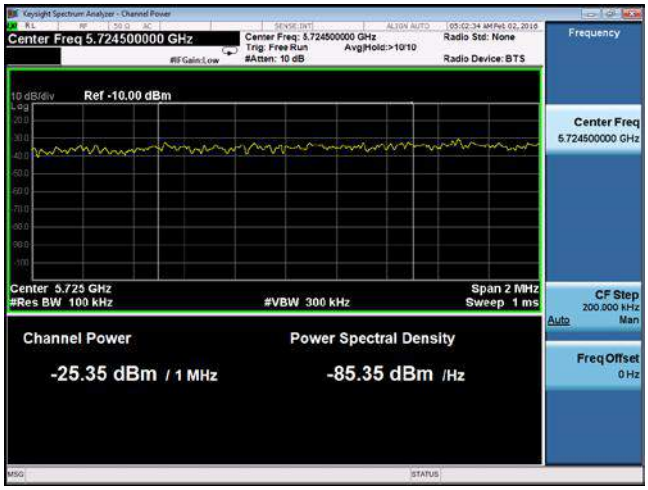
Band Edge -802.11ac-80M-5210M-chain4

5.8GHz band: (10MHz offset)

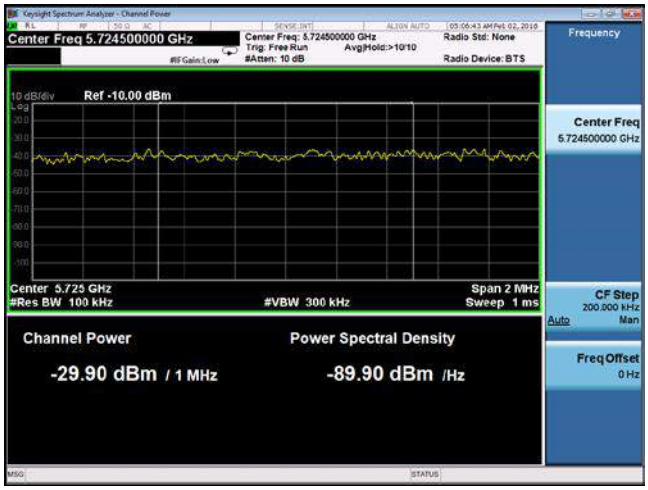
Band Edge -802.11a-5745M-chain1



Band Edge -802.11a-5745M-chain2

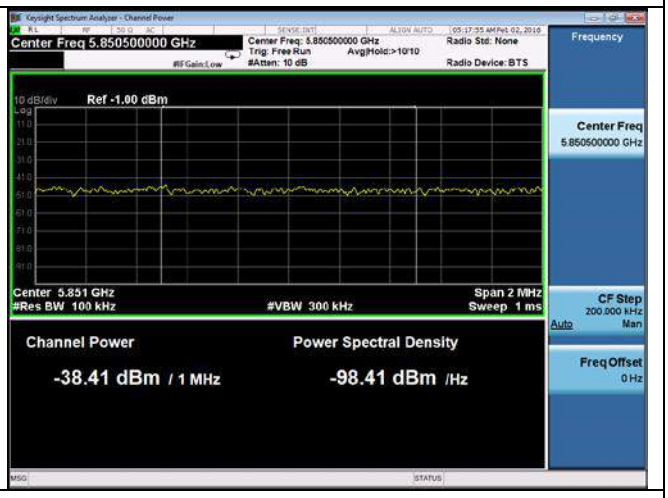


Band Edge -802.11a-5745M-chain3

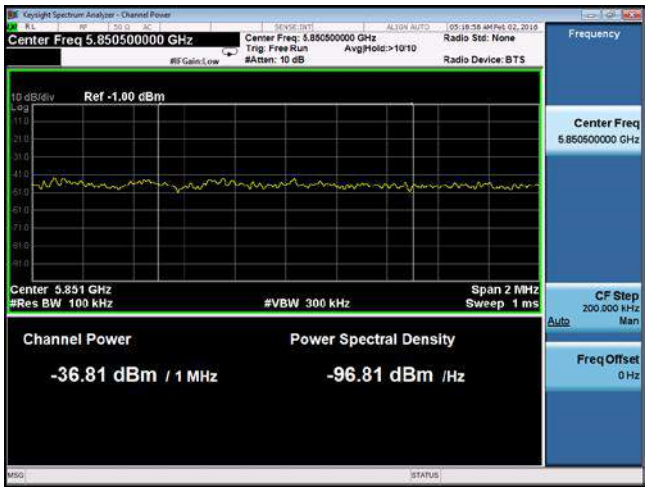


Band Edge -802.11a-5745M-chain4

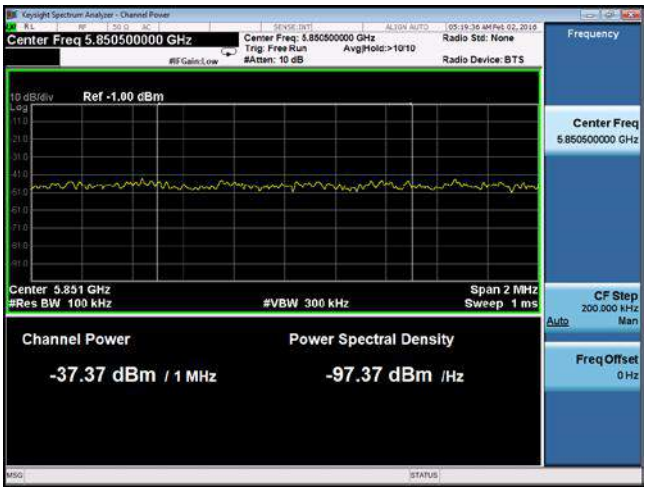
Band Edge -802.11a-5785M-chain1



Band Edge -802.11a-5785M-chain2

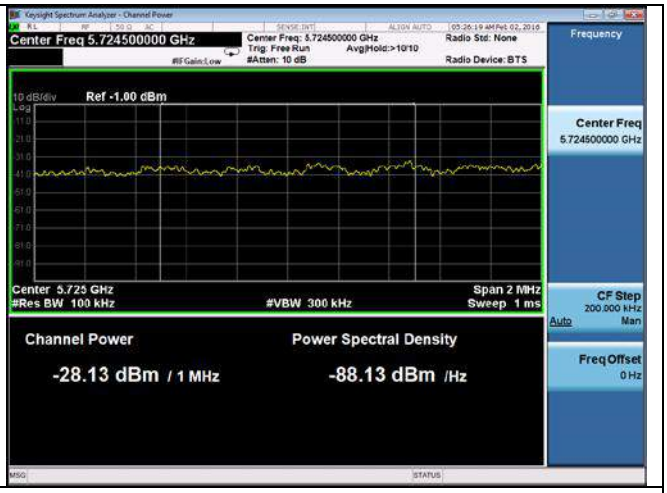


Band Edge -802.11a-5785M-chain3

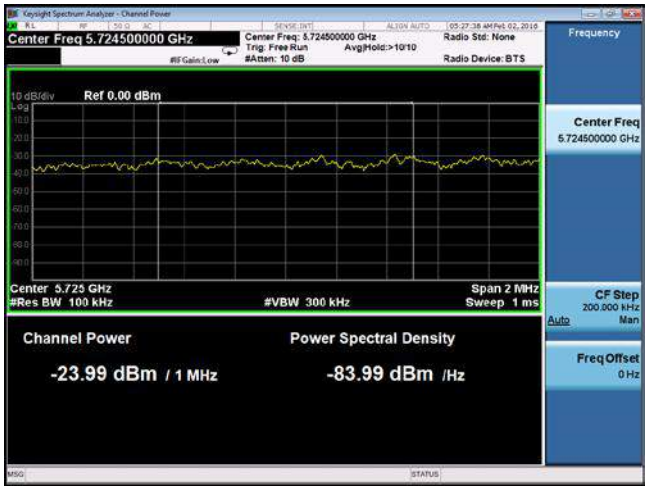


Band Edge -802.11a-5785M-chain4

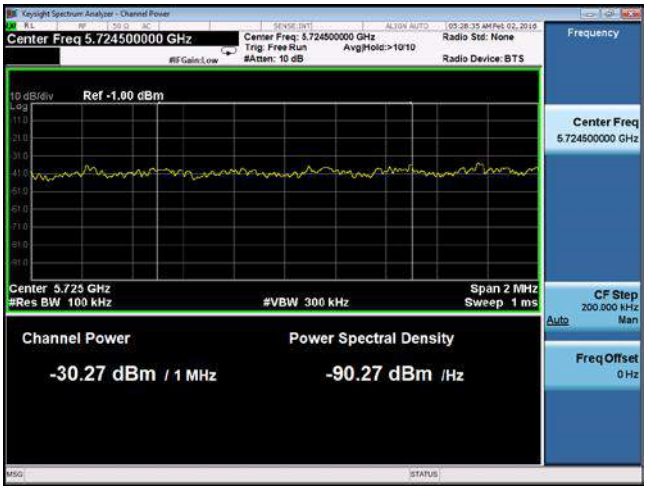
Band Edge -802.11n-20M -5745M-chain1



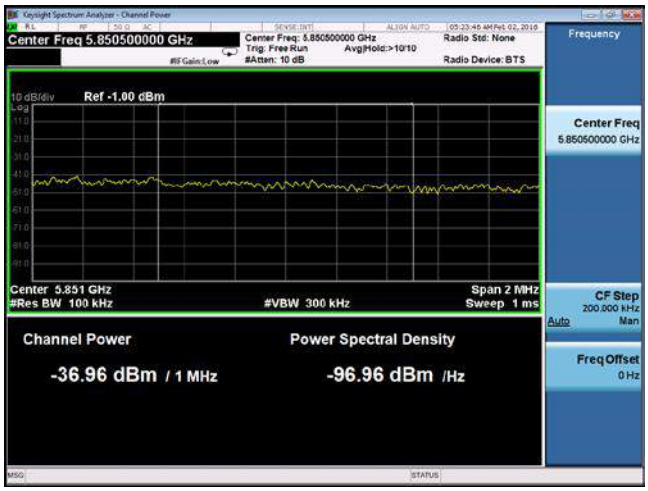
Band Edge -802.11n-20M -5745M-chain2



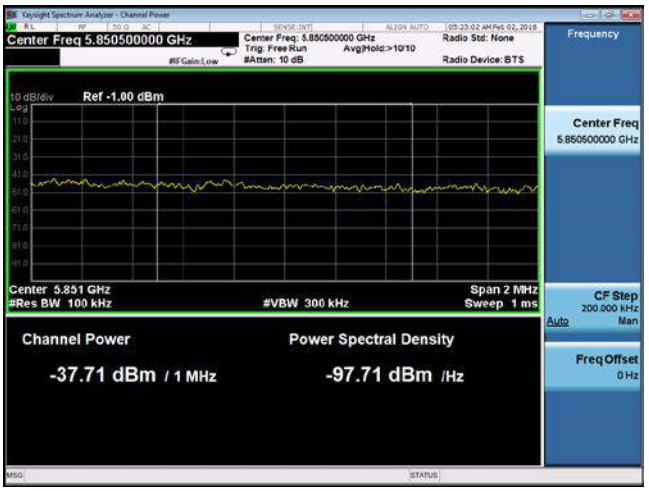
Band Edge -802.11n-20M -5745M-chain3



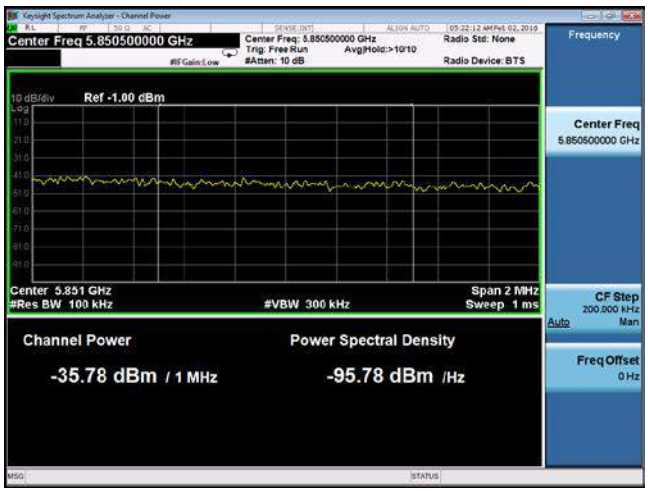
Band Edge -802.11n-20M -5745M-chain4



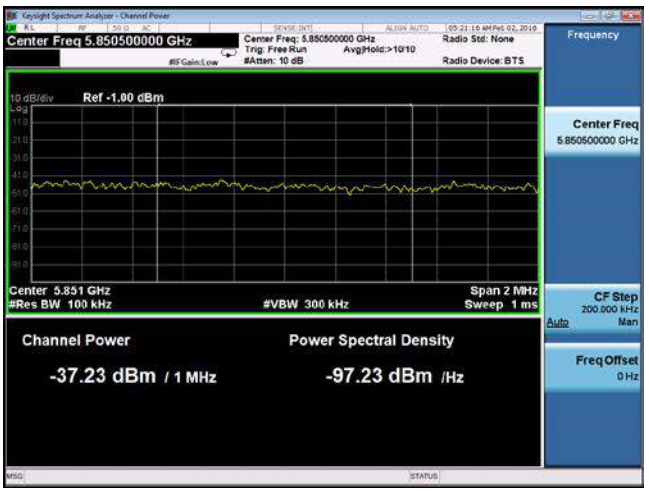
Band Edge -802.11n-20M-5825M-chain1



Band Edge -802.11n-20M-5825M-chain2

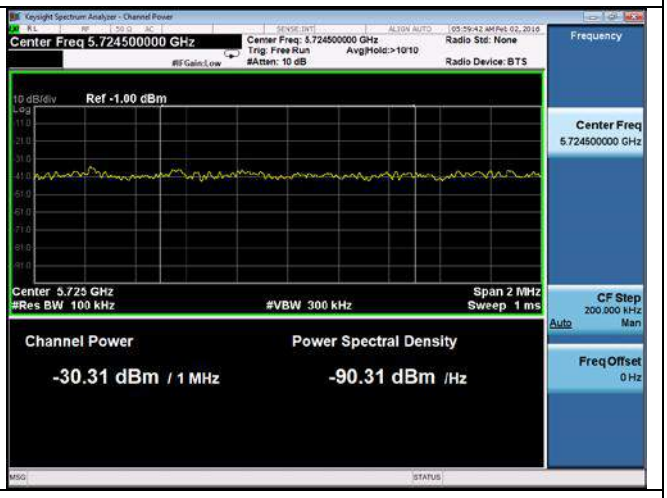


Band Edge -802.11n-20M-5825M-chain3

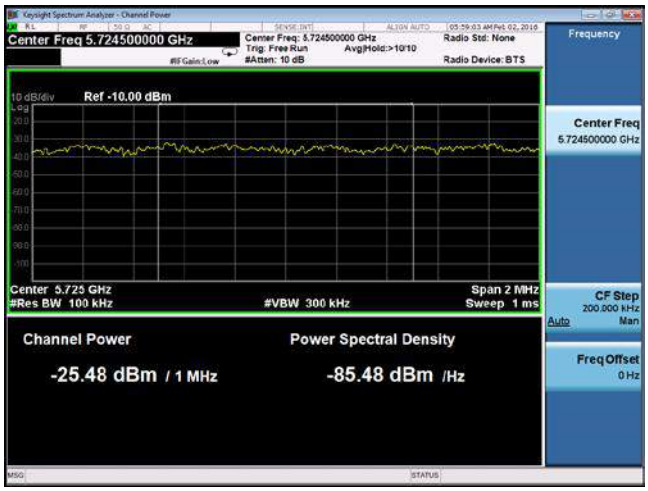


Band Edge -802.11n-20M-5825M-chain4

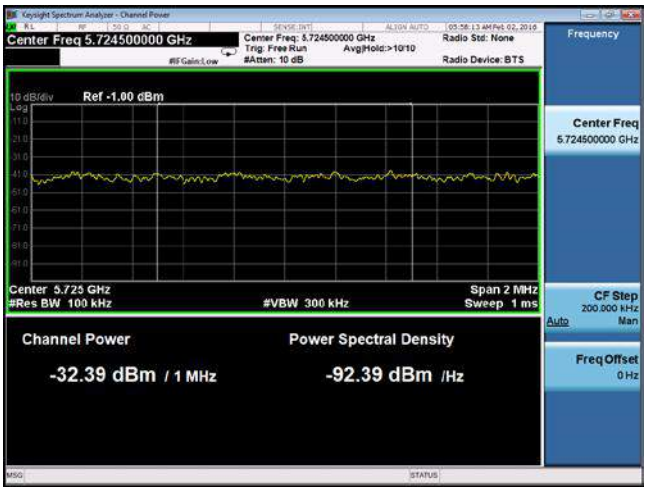
Band Edge -802.11n-40M-5755M-chain1



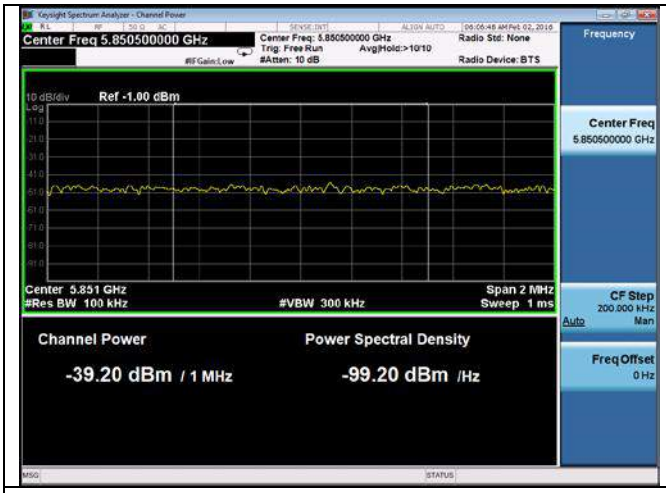
Band Edge -802.11n-40M-5755M-chain2



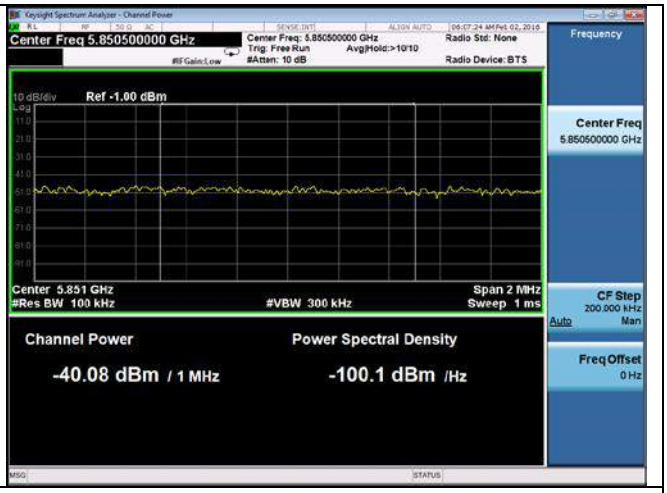
Band Edge -802.11n-40M-5755M-chain3



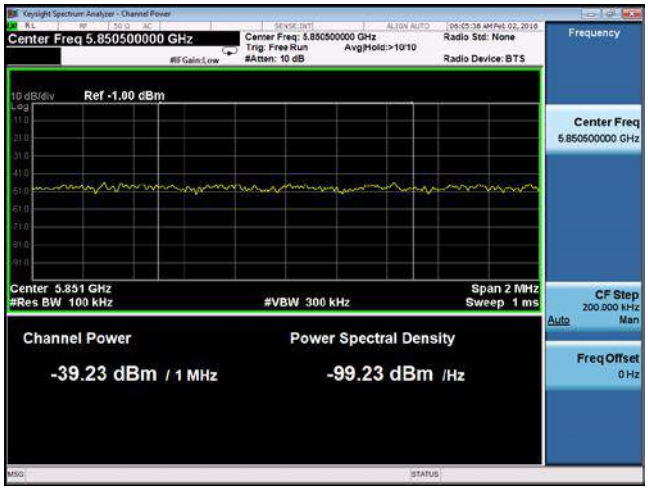
Band Edge -802.11n-40M-5755M-chain4



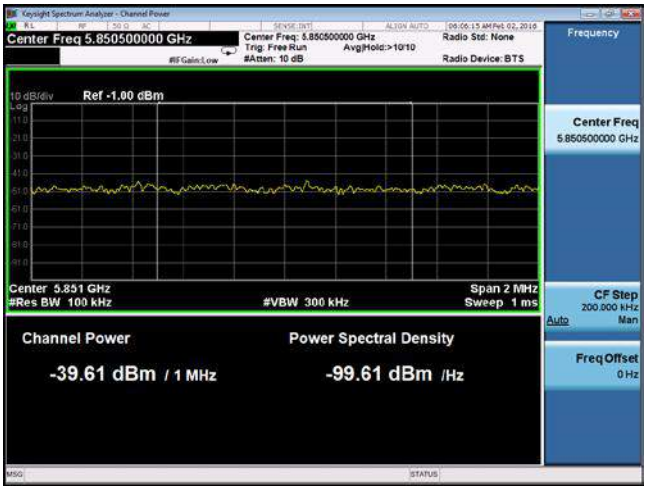
Band Edge -802.11n-40M-5795M-chain1



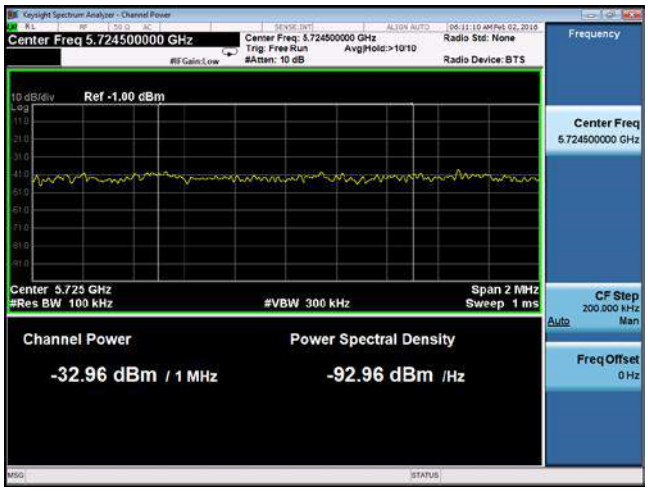
Band Edge -802.11n-40M-5795M-chain2



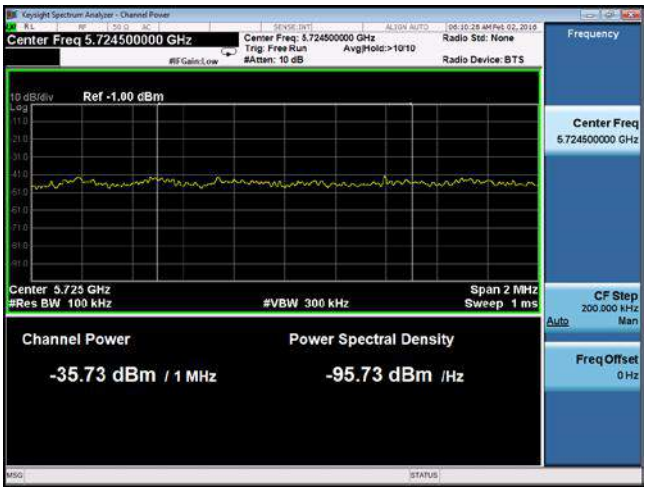
Band Edge -802.11n-40M-5795M-chain3



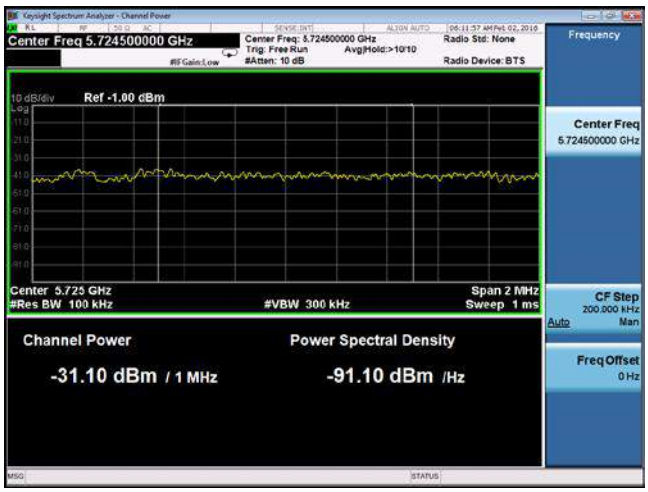
Band Edge -802.11n-40M-5795M-chain4



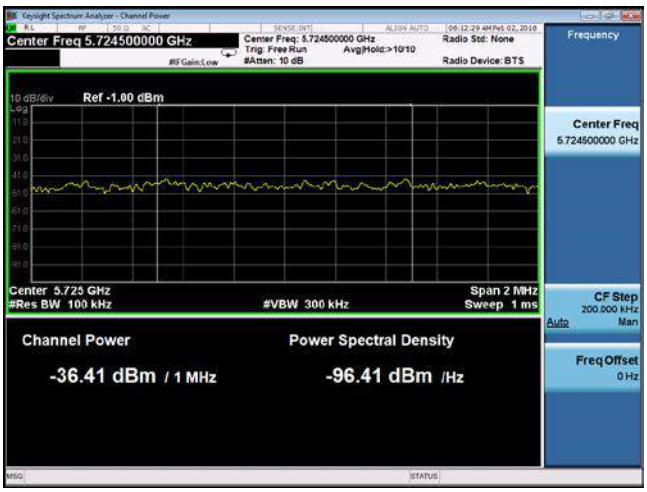
Band Edge -802.11ac-80M-5775M-chain1 (Left)



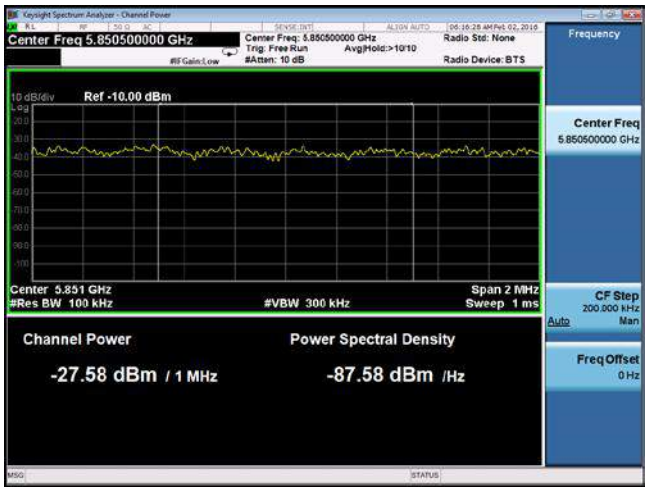
Band Edge -802.11ac-80M-5775M-chain2 (Left)



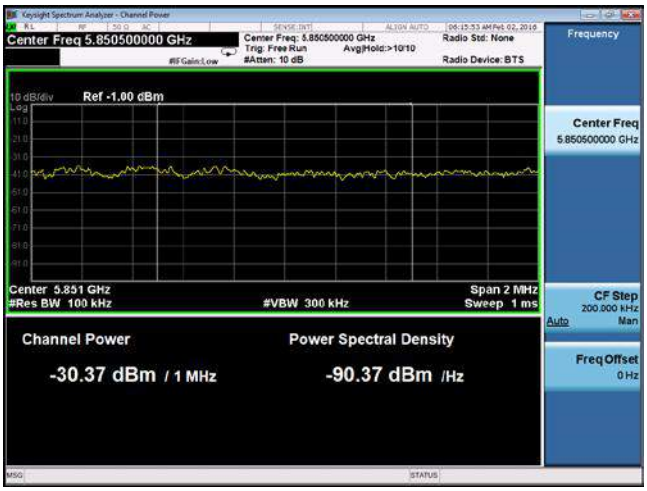
Band Edge -802.11ac-80M-5775M-chain3 (Left)



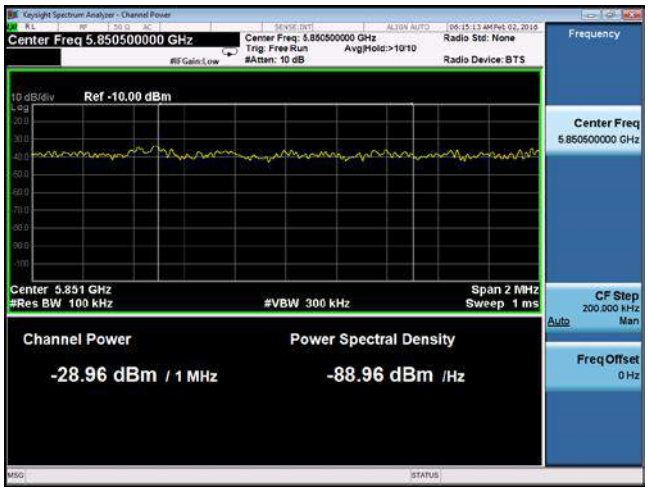
Band Edge -802.11ac-80M-5775M-chain4 (Left)



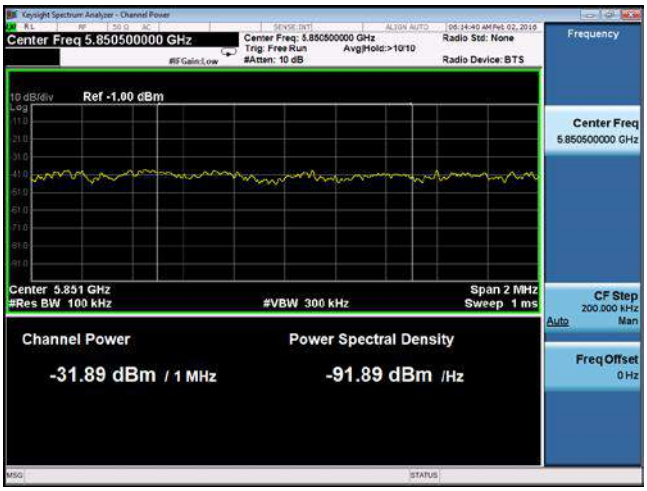
Band Edge -802.11ac-80M-5775M-chain1 (Right)



Band Edge -802.11ac-80M-5775M-chain2 (Right)



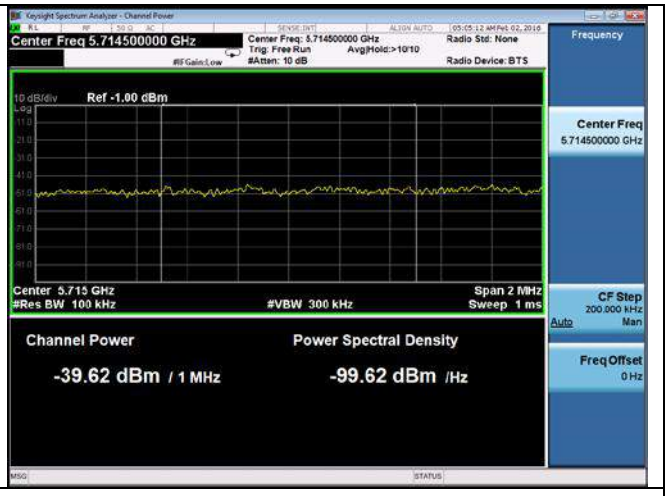
Band Edge -802.11ac-80M-5775M-chain3 (Right)



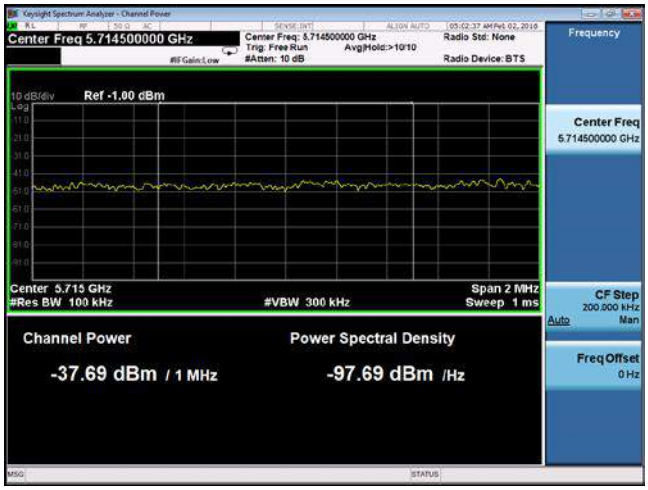
Band Edge -802.11ac-80M-5775M-chain4 (Right)

5.8GHz band: (20MHz offset)

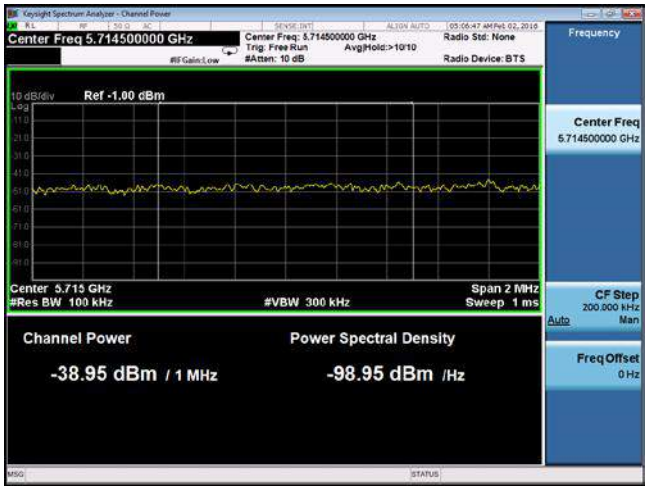
Band Edge -802.11a-5745M-chain1



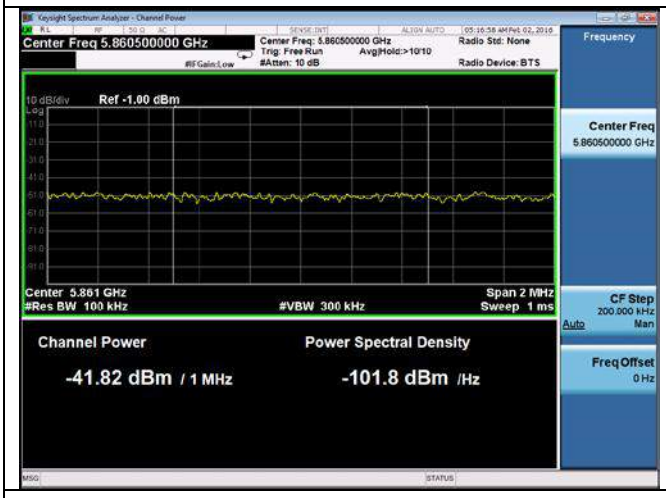
Band Edge -802.11a-5745M-chain2



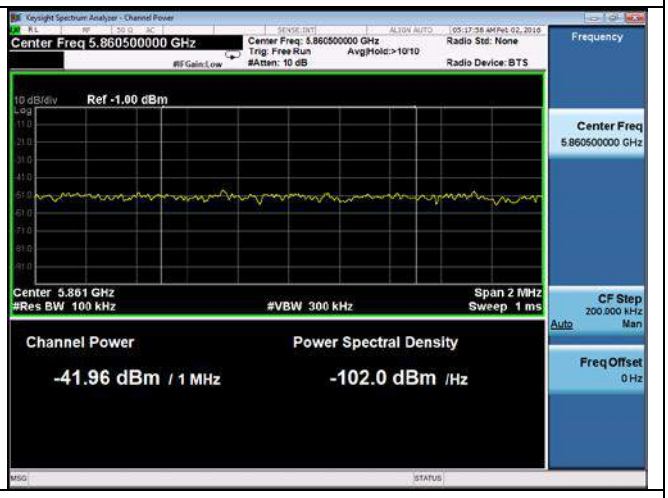
Band Edge -802.11a-5745M-chain3



Band Edge -802.11a-5745M-chain4



Band Edge -802.11a-5785M-chain1



Band Edge -802.11a-5785M-chain2