RF TEST REPORT

SIEMIC
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Report No.: FCC_RF_SL14091001-RUC-017_UNII REV3.1
Supersede Report No.: FCC_RF_SL14091001-RUC-017_UNII REV3.0

Applicant	:	Ruckus Wireless, Inc.
Product Name	:	Wireless Bridge
Model No.	:	P300
Test Standard	:	47 CFR 15.407
Test Method	:	ANSI C63.10: 2013 789033 D02 General UNII Test Procedures New Rules v01
FCC ID	:	S9GP300
IC ID	:	5912A-P300
Dates of test	:	04/06/2015 to 04/20/2015
Issue Date	:	07/06/2015
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:	
Ricky	David Zhang
Ricky Wang	**David Zhang**
Test Engineer	Engineer Reviewer
This test report may be reproduced in full only **Test result presented in this test report is applicable to the tested sample only**	

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, 95035 CA

ilac-MRA
ACCREDITED
TESTING CERT # 2742-01

Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC, RF/Wireless, Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless, Telecom
Taiwan	BSMI, NCC, NIST	EMC, RF, Telecom, Safety
Hong Kong	OFTA, NIST	RF/Wireless, Telecom
Australia	NATA, NIST	EMC, RF, Telecom, Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC, RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom, Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

CONTENTS

1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_RF_SL14091001-RUC-017_UNII	None	Original	04/20/2015
FCC_RF_SL14091001-RUC-017_UNII REV1.0	REV1.0	update antenna descreption	05/14/2015
FCC_RF_SL14091001-RUC-017_UNII REV2.0	REV2.0	change product type	05/15/2015
FCC_RF_SL14091001-RUC-017_UNII REV3.0	REV3.0	updated plots	06/02/2015
FCC_RF_SL14091001-RUC-017_UNII REV3.1	REV3.1	updated antenna information	07/06/2015

2 Executive Summary

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

Company: Ruckus Wireless, Inc.
Product: Wireless Bridge
Model: P300

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	:	Wireless Bridge
Model No.	:	P300
Trade Name	:	Ruckus
Serial No.	:	111573903705
Host Model No.	:	N/A
Input Power	:	48VDC (PoE)
Power Adapter Manu/Model	:	N/A
Power Adapter SN	:	N/A
Date of EUT received	:	03/25/2015
Equipment Class/ Category	:	UNII
Clock Frequencies	:	N/A
Port/Connectors	:	PoE, Ethernet

6.2 Radio Description

Radio Type	802.11a	802.11n-HT20	802.11n-HT40	802.11ac
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)
Channel Spacing	20MHz	20MHz	40MHz	80MHz
Number of Channels	9	9	5	2
Antenna Type	Internal Antenna/External Antenna			
Antenna Gain (Peak)	Internal:14dBi External1:21dBi External2:24dBi			
Antenna Connector Type	Internal_14dBi: U.FL External1_21dBi: N-Type External2_24dBi: N-Type			
Note	EUT has 3 antenna sets , 1internal antenna with 14dBi gain, 1 external antenna with 21dBi gain and 1 external antenna with 24dBi gain. All antennas are dual polarized directional antennas. 3 anrennas shall be used separately.			

EUT Power Level Settings

Band	Mode	Frequency	14dBi antenna	21dBi antenna	24dBi antenna
5.2GHz	802.11-a	5180	22	18	17
		5200	22	22	22
		5240	22	22	22
	802.11n-HT20	5180	22	18	17
		5200	22	22	22
		5240	22	22	22
	802.11n-HT40	5190	20	18	14
		5230	22	22	22
	802.11ac	5210	18	14	8
5.8GHz	802.11-a	5745	22	22	20
		5785	22	22	22
		5825	22	22	22
	802.11n-HT20	5745	22	22	20
		5785	22	22	22
		5825	22	22	22
	802.11n-HT40	5755	22	22	18
		5795	22	22	22
	802.11ac	5775	21	13	14

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 modes and channels

8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Restricted Band of Operation	FCC	15.205	ANSI C63.10: 2013 789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.10: 2013	☒ 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 C63.10: 2013 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

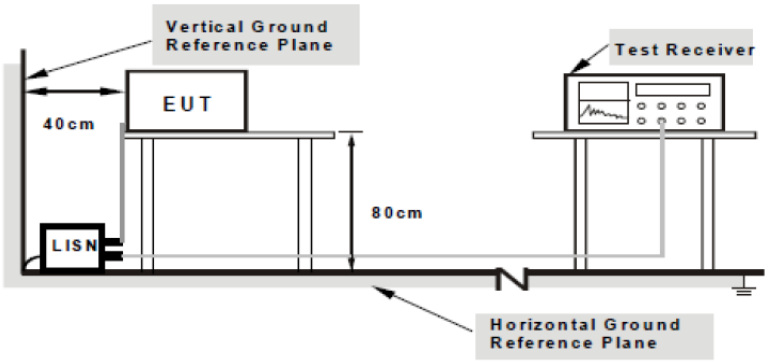
Emissions			
Test Item	**Frequency Range**	**Description**	**Uncertainty**
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and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

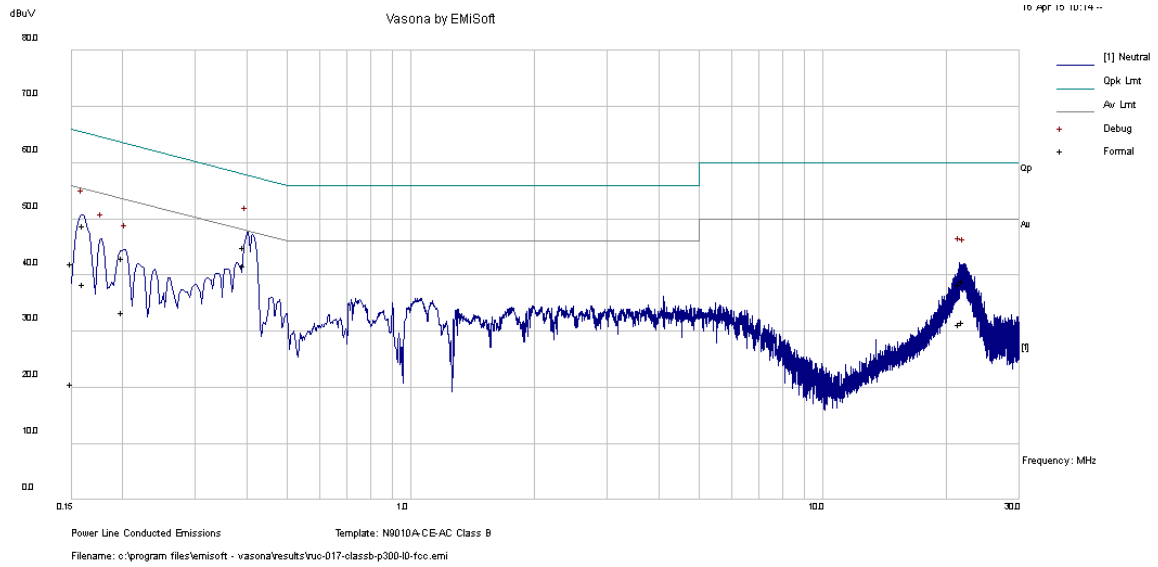
Spec	Item	Requirement	Applicable
47CFR§15.207	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, 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 80cm from EUT and at least 80cm from other units and other metal planes support units.		
Procedure	- The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B. - The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. - All other supporting equipment was powered separately from another main supply.		
Remark	EUT was tested at 120VAC, 60Hz		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Osvaldo Casorla			
Test Date:	04/08/2015			
Remarks	Neutral			

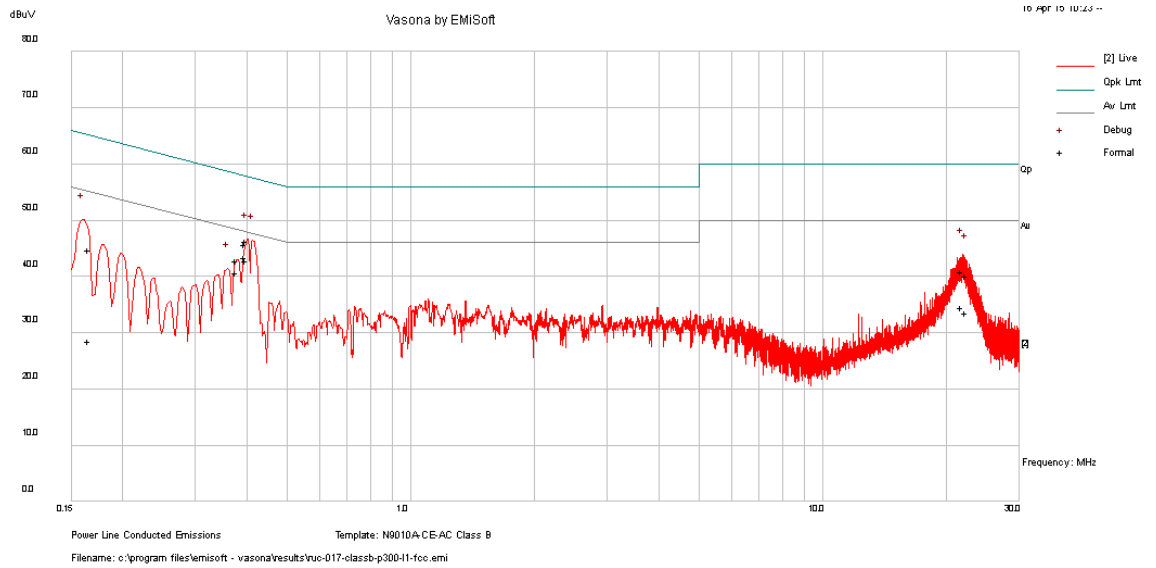


Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
0.39	34.24	10.01	0.73	44.97	Quasi Peak	Neutral	57.96	-12.99	Pass
0.15	31.30	10.00	0.76	42.06	Quasi Peak	Neutral	66.00	-23.94	Pass
21.48	26.03	10.07	2.27	38.37	Quasi Peak	Neutral	60.00	-21.63	Pass
21.95	26.56	10.07	2.27	38.90	Quasi Peak	Neutral	60.00	-21.10	Pass
0.16	38.00	10.00	0.75	48.76	Quasi Peak	Neutral	65.42	-16.66	Pass
0.20	32.34	10.00	0.74	43.09	Quasi Peak	Neutral	63.62	-20.54	Pass
0.39	30.89	10.01	0.73	41.63	Average	Neutral	47.96	-6.34	Pass
0.15	9.82	10.00	0.76	20.58	Average	Neutral	56.00	-35.42	Pass
21.48	18.89	10.07	2.27	31.24	Average	Neutral	50.00	-18.76	Pass
21.95	19.39	10.07	2.27	31.73	Average	Neutral	50.00	-18.27	Pass
0.16	27.66	10.00	0.75	38.42	Average	Neutral	55.42	-17.00	Pass
0.20	22.72	10.00	0.74	33.47	Average	Neutral	53.62	-20.15	Pass

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Osvaldo Casorla			
Test Date:	04/08/2015			
Remarks	Line			



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
0.40	35.51	10.01	0.73	46.25	Quasi Peak	Live	57.86	-11.61	Pass
0.40	35.05	10.01	0.73	45.79	Quasi Peak	Live	57.91	-12.12	Pass
0.17	33.96	10.00	0.75	44.71	Quasi Peak	Live	65.19	-20.48	Pass
21.78	28.57	10.07	2.27	40.91	Quasi Peak	Live	60.00	-19.09	Pass
22.30	27.75	10.07	2.27	40.10	Quasi Peak	Live	60.00	-19.90	Pass
0.38	32.17	10.01	0.72	42.90	Quasi Peak	Live	58.33	-15.43	Pass
0.40	32.11	10.01	0.73	42.85	Average	Live	47.86	-5.01	Pass
0.40	32.77	10.01	0.73	43.50	Average	Live	47.91	-4.41	Pass
0.17	17.88	10.00	0.75	28.63	Average	Live	55.19	-26.56	Pass
21.78	22.28	10.07	2.27	34.62	Average	Live	50.00	-15.38	Pass
22.30	21.29	10.07	2.27	33.64	Average	Live	50.00	-16.37	Pass
0.38	29.99	10.01	0.72	40.72	Average	Live	48.33	-7.61	Pass

Note: The results above show only the worst case.

10.2 26 dB Bandwidth & 6 dB Bandwidth

Requirement(s):

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

Test Setup

Test Procedure

789033 D02 General UNII Test Procedures New Rules 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.
  - Set RBW = around 1% of emission bandwidth
  - Set VBW > RBW
  - Detector = Peak
  - Trace mode = max hold
- Capture the plot.
- Repeat above steps for different test channel and other modulation type.

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

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

Test Date	04/07/2015	Environmental condition	Temperature 22°C Relative Humidity 38% Atmospheric Pressure 1020mbar
Remark	None		
Result	☒ Pass ☐ Fail		

Equipment Setting

Test	RBW	VBW	Span	Detector	Sweep	Trace	Notes
26 dB Emission Bandwidth	1% of 26 dB EBW	>RBW	>EBW	PK	Auto	Maxhold	-
6 dB Bandwidth	100 KHz	≥3 x RBW	1.5 - 5 times of OBW	PK	Auto	Maxhold	-

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

26dB Bandwidth measurement result for 5.2GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)
26dB BW	802.11a	5180	Low	24.31	-
		5200	Mid	23.60	-
		5240	High	23.36	-
	802.11n-HT20	5180	Low	23.96	-
		5200	Mid	23.52	-
		5240	High	24.14	-
	802.11n-HT40	5190	Low	43.33	-
		5230	High	44.10	-
	802.11ac	5210	Mid	87.44	-

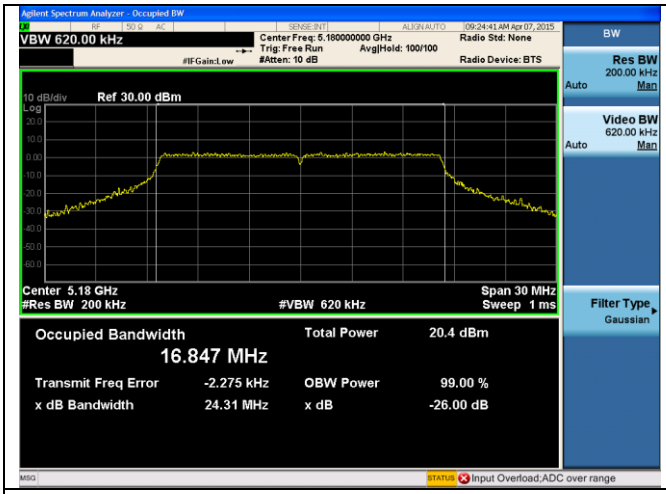
99% Bandwidth measurement result for 5.2GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)
26dB BW	802.11a	5180	Low	16.79	-
		5200	Mid	16.73	-
		5240	High	16.80	-
	802.11n-HT20	5180	Low	17.83	-
		5200	Mid	17.93	-
		5240	High	17.90	-
	802.11n-HT40	5190	Low	36.66	-
		5230	High	36.66	-
	802.11ac	5210	Mid	75.90	-

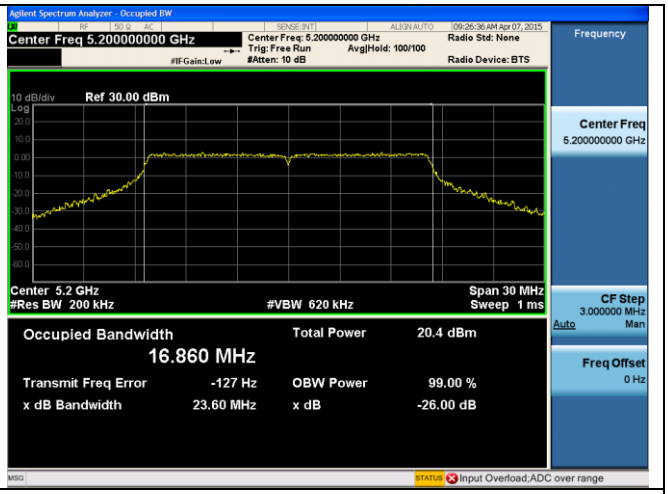
6dB Bandwidth measurement result for 5.8GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)	Result
6dB BW	802.11a	5745	Low	16.51	≥0.5	Pass
		5785	Mid	16.53	≥0.5	Pass
		5825	High	16.49	≥0.5	Pass
	802.11n-HT20	5745	Low	17.73	≥0.5	Pass
		5785	Mid	17.68	≥0.5	Pass
		5825	High	17.62	≥0.5	Pass
	802.11n-HT40	5755	Low	36.38	≥0.5	Pass
		5795	High	36.36	≥0.5	Pass
	802.11ac	5775	Mid	76.51	≥0.5	Pass

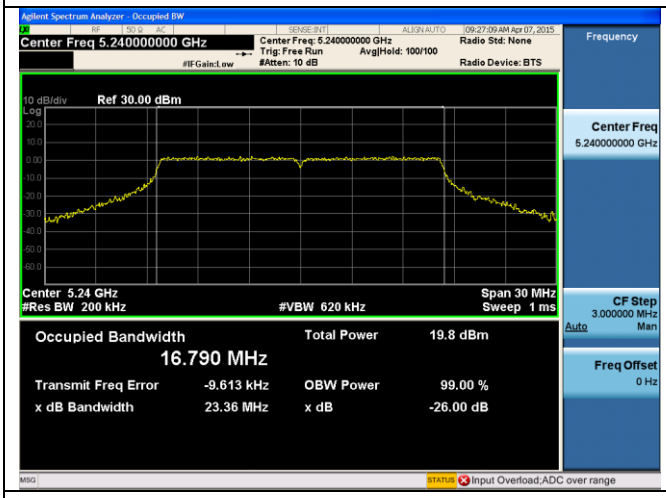
26dB Bandwidth Test Plots



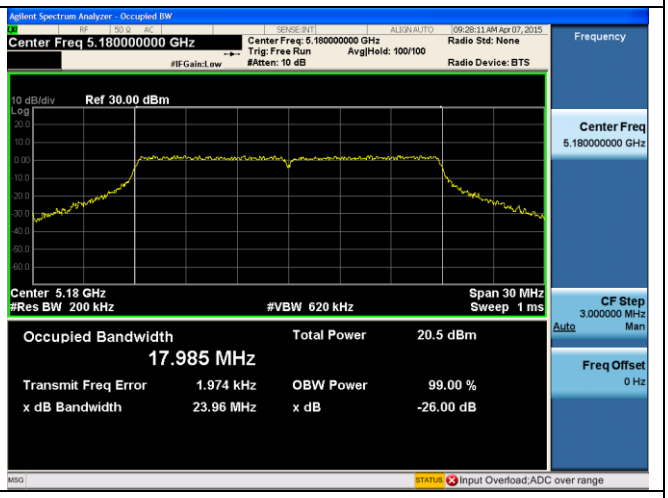
26dB BW - 802.11a 5180MHz



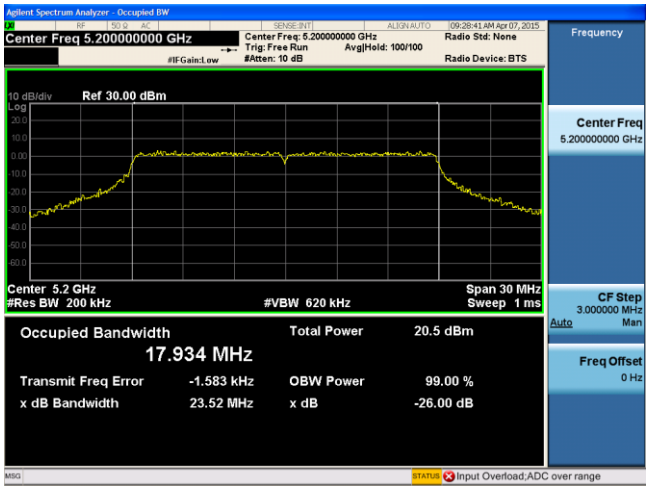
26dB BW - 802.11a 5200MHz



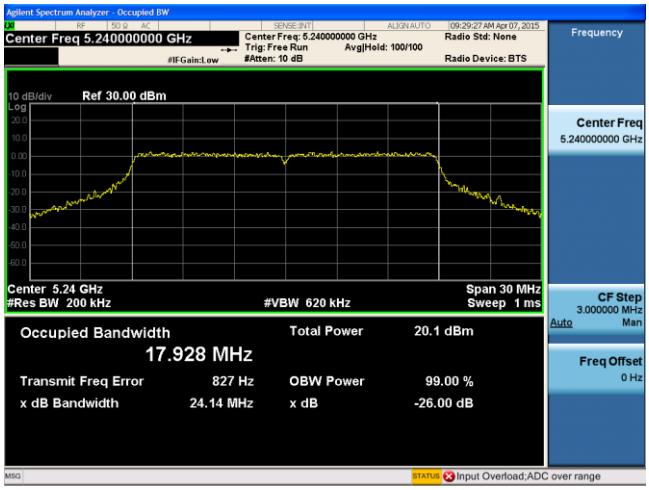
26dB BW - 802.11a 5240MHz



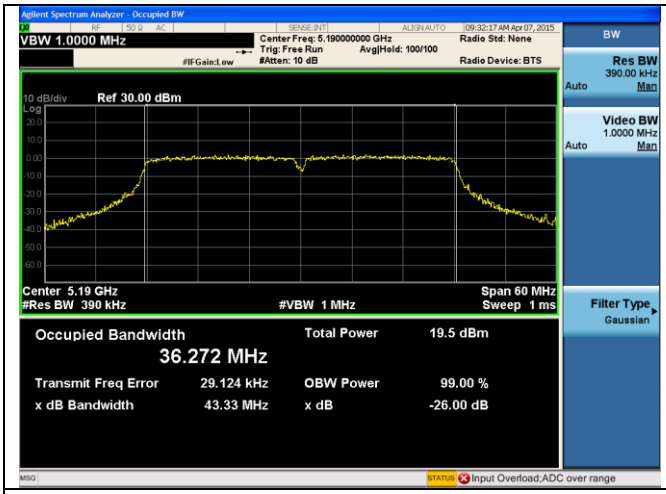
26dB BW - 802.11n-HT20 5180MHz



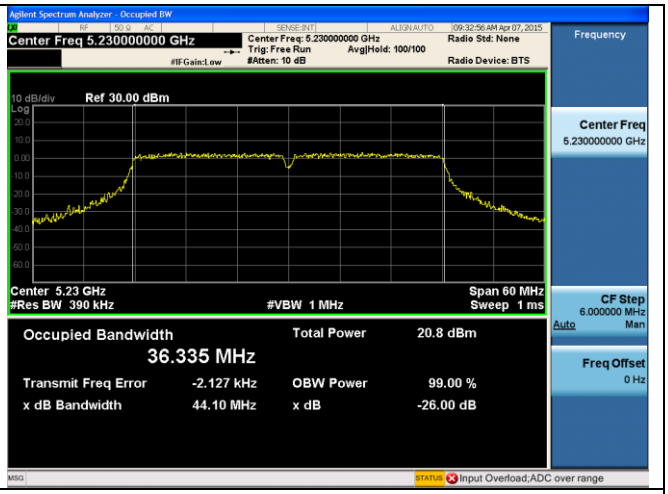
26dB BW - 802.11n-HT20 5200MHz



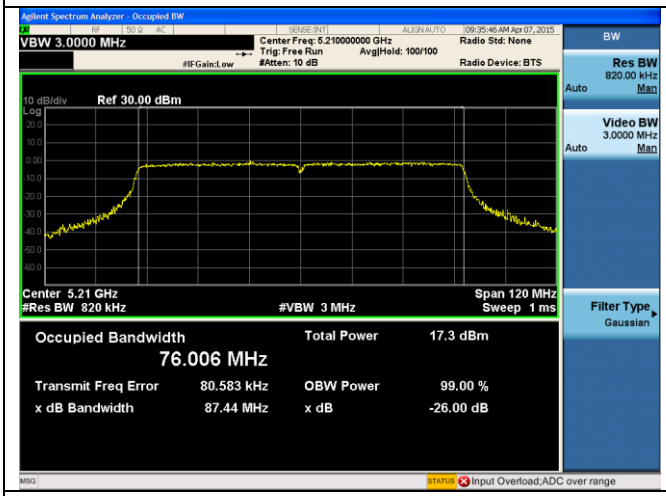
26dB BW - 802.11n-HT20 5240MHz



26dB BW - 802.11n-HT40 5190MHz

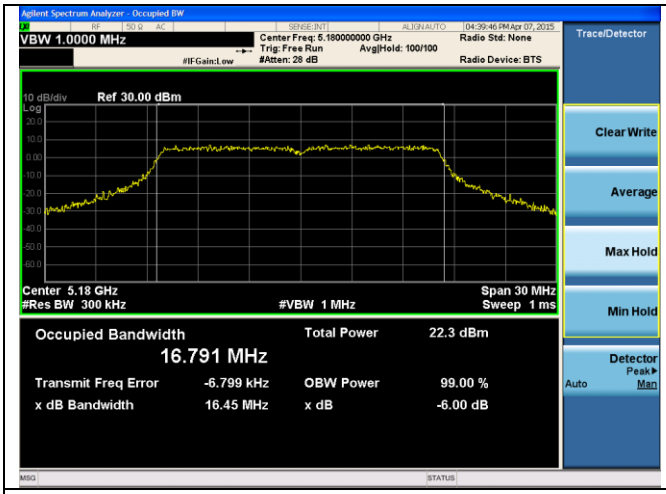


26dB BW - 802.11n-HT40 5230MHz

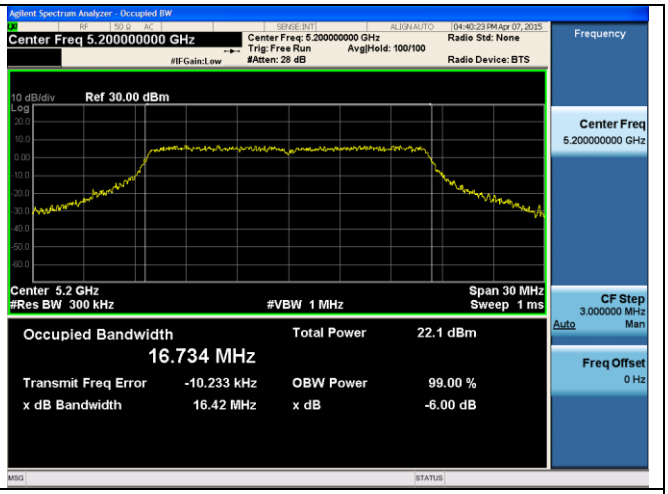


26dB BW - 802.11ac 5210MHz

99% Bandwidth Test Plots

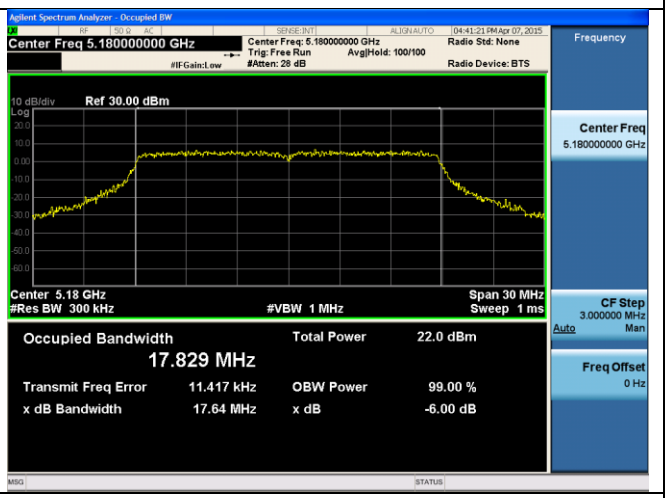


99% BW - 802.11a 5180MHz

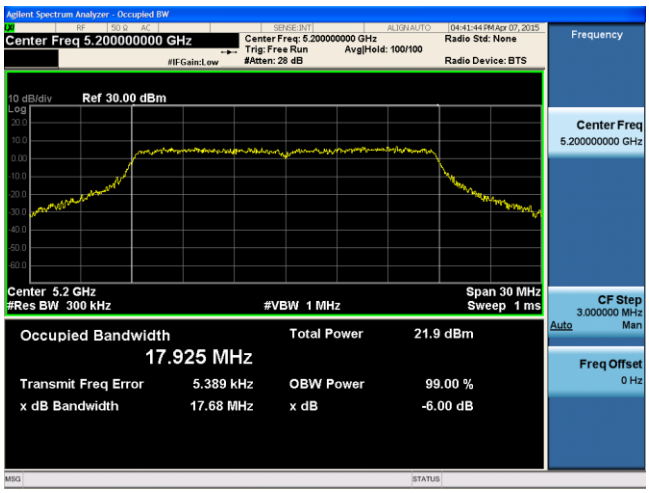


99% BW - 802.11a 5200MHz

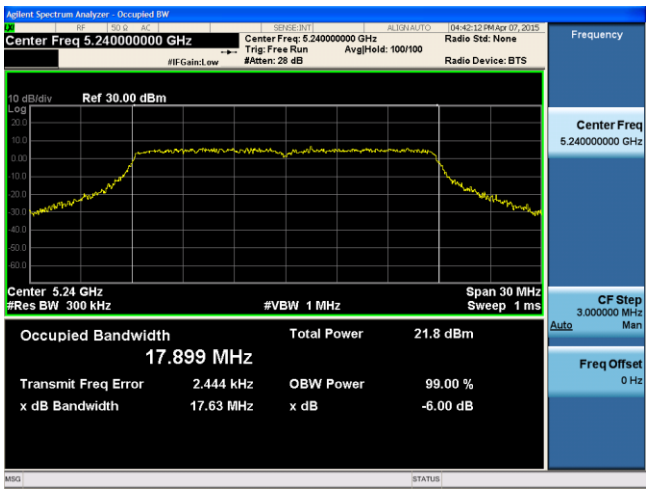
99% BW - 802.11a 5240MHz



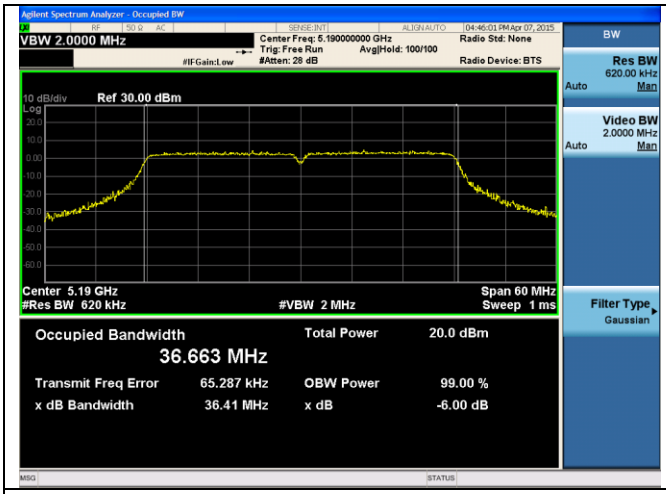
99% BW - 802.11n-HT20 5180MHz



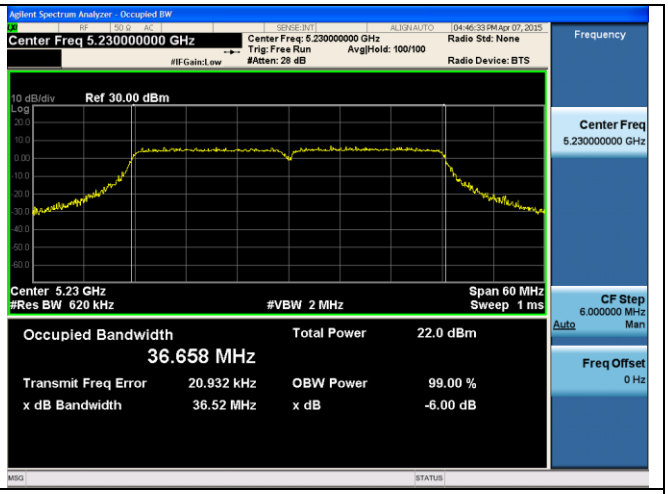
99% BW - 802.11n-HT20 5200MHz



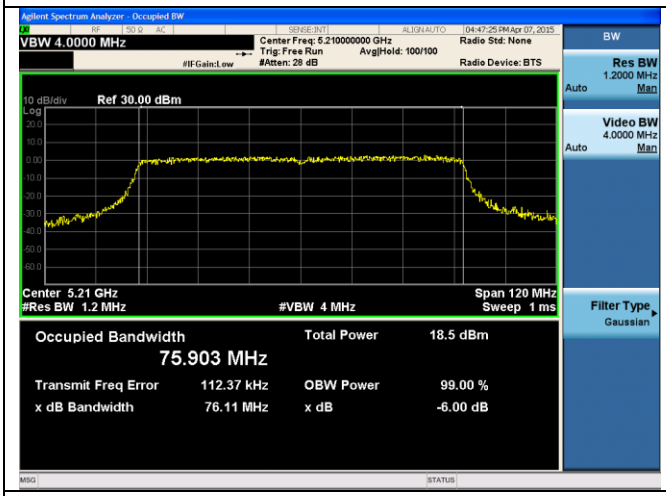
99% BW - 802.11n-HT20 5240MHz



99% BW - 802.11n-HT40 5190MHz

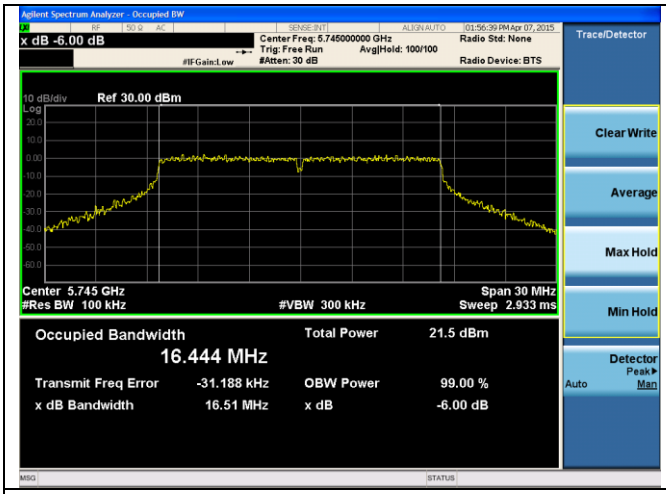


99% BW - 802.11n-HT40 5230MHz

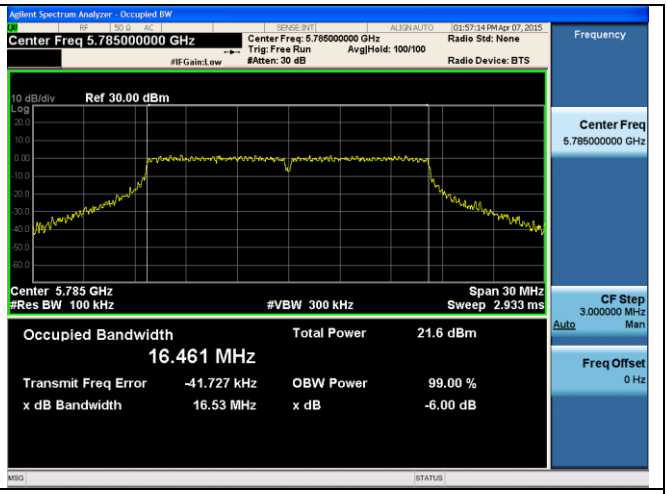


99% BW - 802.11ac 5210MHz

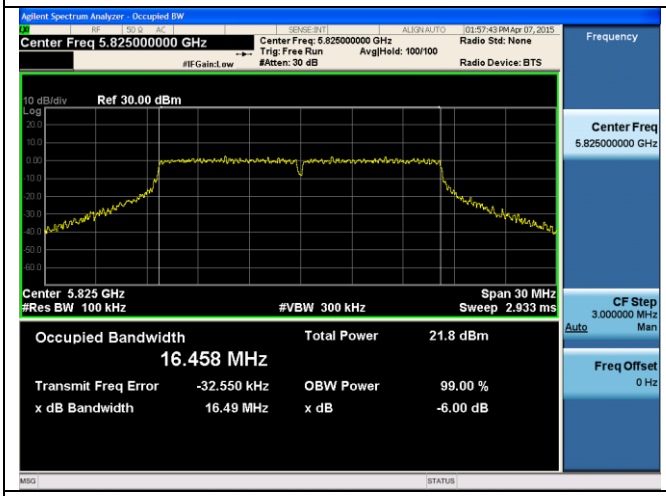
6dB Bandwidth Test Plots



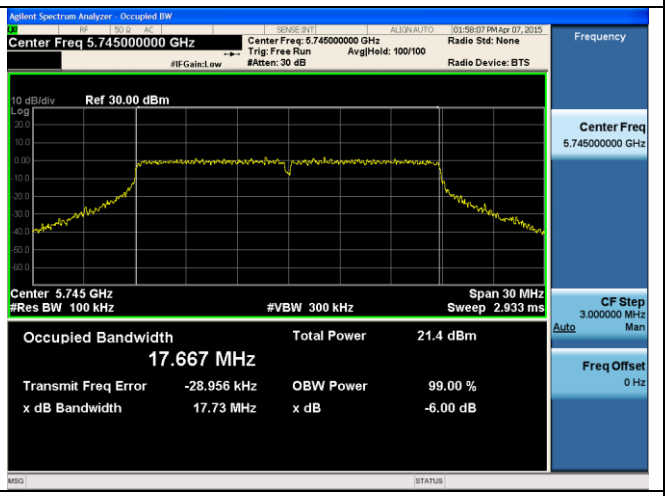
6dB BW 802.11a 5745MHz



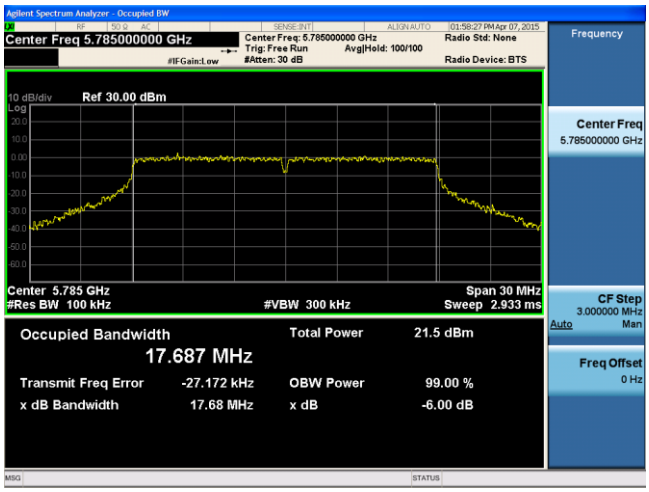
6dB BW 802.11a 5785MHz



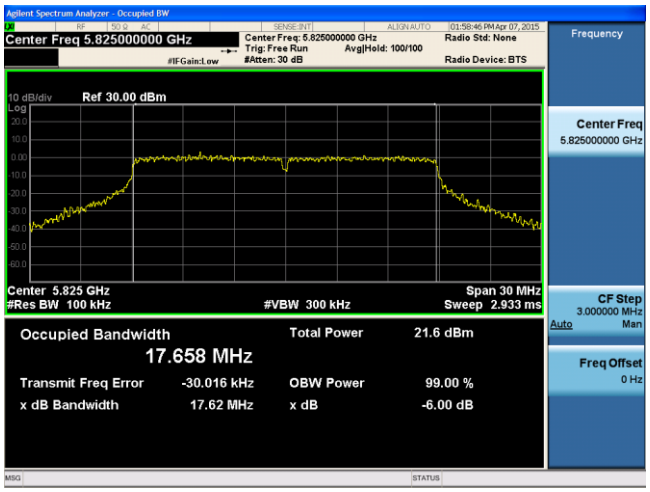
6dB BW 802.11a 5825MHz



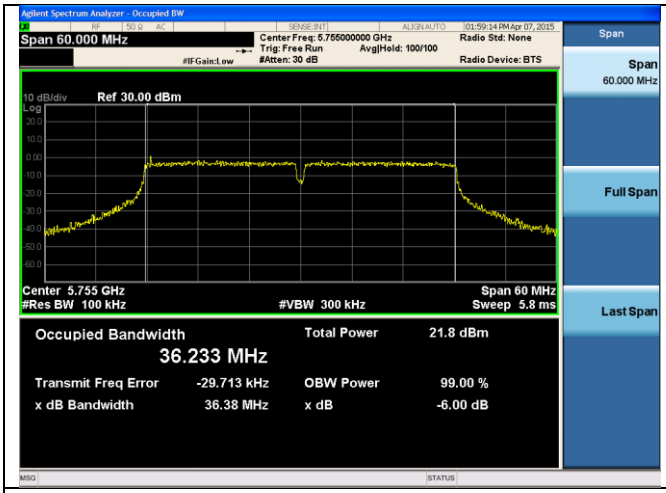
6dB BW 802.11n-HT20 5745MHz



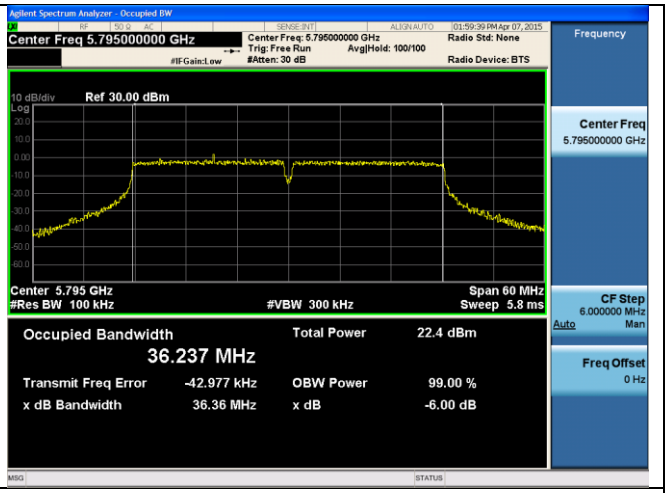
6dB BW 802.11n-HT20 5785MHz



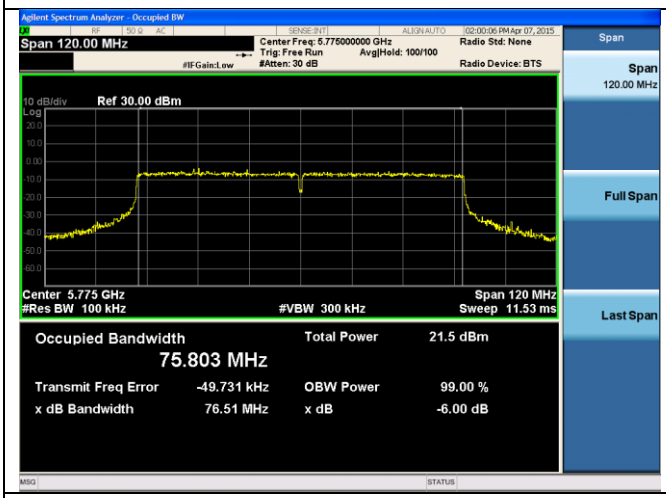
6dB BW 802.11n-HT20 5825MHz



6dB BW 802.11n-HT40 5755MHz



6dB BW 802.11n-HT40 5795MHz

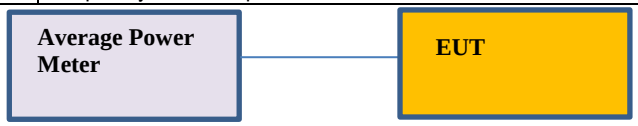


6dB BW 802.11ac 5775MHz

10.3 Peak 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	04/07/2015	Environmental condition	Temperature 21ºC 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. EUT is using cross-polarized antenna, thus the array gain is 0, and directional gain = highest individual gain of both polarization antenna, so the directional gain will be either 14 dBi, 21 dBi or 24 dBi. For 5.15-5.25 GHz Band, EUT is Fixed point-to-point U-NII device,it 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 24dBi antenna, power limit=30dBm-(24dBi-23dBi)=29dBm		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Output Power measurement result for 5.2GHz

Antenna Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain1	Chain2	Combined Power		
14dBi	802.11a	5180	Low	15.94	16.09	19.03	30	Pass
		5200	Mid	16.11	16.09	19.11	30	Pass
		5240	High	15.79	15.76	18.79	30	Pass
	802.11n-HT20	5180	Low	15.85	15.95	18.91	30	Pass
		5200	Mid	16.04	16.00	19.03	30	Pass
		5240	High	15.70	15.58	18.65	30	Pass
	802.11n-HT40	5190	Low	13.13	13.51	16.33	30	Pass
		5230	Mid	14.86	15.43	18.16	30	Pass
	802.11ac	5210	High	10.79	10.85	13.83	30	Pass
21dBi	802.11a	5180	Low	11.63	12.08	14.87	30	Pass
		5200	Mid	16.11	16.09	19.11	30	Pass
		5240	High	15.79	15.76	18.79	30	Pass
	802.11n-HT20	5180	Low	11.55	12.06	14.82	30	Pass
		5200	Mid	16.04	16.00	19.03	30	Pass
		5240	High	15.70	15.58	18.65	30	Pass
	802.11n-HT40	5190	Low	1.07	11.57	11.94	30	Pass
		5230	Mid	14.86	15.43	18.16	30	Pass
	802.11ac	5210	High	6.80	7.06	9.94	30	Pass
24dBi	802.11a	5180	Low	10.53	11.06	13.81	29	Pass
		5200	Mid	16.11	16.09	19.11	29	Pass
		5240	High	15.79	15.76	18.79	29	Pass
	802.11n-HT20	5180	Low	10.44	10.99	13.73	29	Pass
		5200	Mid	16.04	16.00	19.03	29	Pass
		5240	High	15.70	15.58	18.65	29	Pass
	802.11n-HT40	5190	Low	6.97	7.08	10.04	29	Pass
		5230	Mid	14.86	15.43	18.16	29	Pass
	802.11ac	5210	High	0.66	0.92	3.80	29	Pass

Output Power Measurement Results for 5.8GHz

Antenna Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain1	Chain2	Combined Power		
14dBi	802.11a	5745	Low	15.31	14.99	18.16	30	Pass
		5785	Mid	15.48	15.04	18.28	30	Pass
		5825	High	15.69	14.75	18.26	30	Pass
	802.11n-HT20	5745	Low	15.25	15.05	18.16	30	Pass
		5785	Mid	15.45	14.88	18.18	30	Pass
		5825	High	15.66	14.73	18.23	30	Pass
	802.11n-HT40	5755	Low	15.19	14.84	18.03	30	Pass
		5795	Mid	16.12	14.88	18.55	30	Pass
	802.11ac	5775	High	14.62	16.72	18.81	30	Pass
21dBi	802.11a	5745	Low	15.31	14.99	18.16	30	Pass
		5785	Mid	15.48	15.04	18.28	30	Pass
		5825	High	15.69	14.75	18.26	30	Pass
	802.11n-HT20	5745	Low	15.25	15.05	18.16	30	Pass
		5785	Mid	15.45	14.88	18.18	30	Pass
		5825	High	15.66	14.73	18.23	30	Pass
	802.11n-HT40	5755	Low	15.19	14.84	18.03	30	Pass
		5795	Mid	16.12	14.88	18.55	30	Pass
	802.11ac	5775	High	5.94	5.70	8.83	30	Pass
24dBi	802.11a	5745	Low	13.13	13.06	16.11	30	Pass
		5785	Mid	15.48	15.04	18.28	30	Pass
		5825	High	15.69	14.75	18.26	30	Pass
	802.11n-HT20	5745	Low	13.17	13.01	16.10	30	Pass
		5785	Mid	15.45	14.88	18.18	30	Pass
		5825	High	15.66	14.73	18.23	30	Pass
	802.11n-HT40	5755	Low	11.50	11.13	14.33	30	Pass
		5795	Mid	16.12	14.88	18.55	30	Pass
	802.11ac	5775	High	7.01	6.76	9.90	30	Pass

10.4 Peak Spectral Density

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	a)(1)(i)	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.	☒
	a)(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	04/07/2015	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	22ºC 42% 1020mbar
Remark	Per KDB 662911 D01 Multiple Transmitter Output v02r01, the direction gain for horizontal polarization and vertical polarization is calculated separately. EUT is using cross-polarized antenna, thus the array gain is 0, and directional gain = highest individual gain of both polarization antenna, so the directional gain will be either 14 dBi, 21 dBi or 24 dBi. For 5.15-5.25 GHz Band, EUT is Fixed point-to-point U-NII device,it 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 24dBi antenna, power limit=30dBm-(24dBi-23dBi)=29dBm			
Result	☒ Pass ☐ Fail			

Equipment Setting

Test	RBW	VBW	Span	Detector	Sweep	Trace	Notes
PSD	1MHz	≥3MHz	>EBW	RMS	Auto	Average	-

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

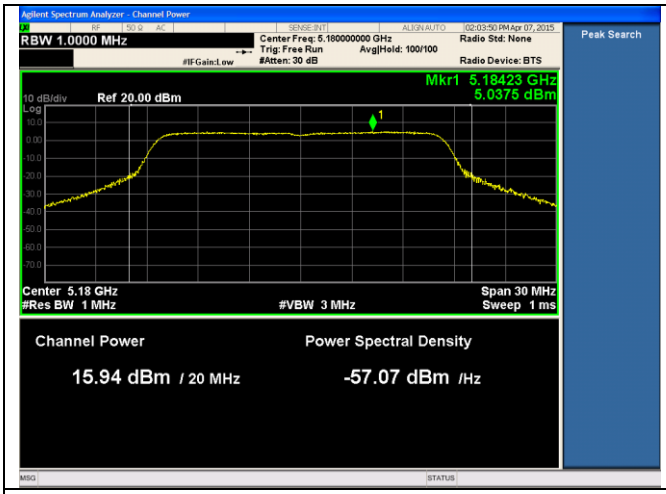
PSD measurement result for 5.2GHz

Antenna Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm)			Limit (dBm/MHz)	Result
				Chain1	Chain2	Combined PSD		
14dBi	802.11a	5180	Low	5.04	5.15	8.11	17	Pass
		5200	Mid	5.09	4.95	8.03	17	Pass
		5240	High	4.86	4.73	7.81	17	Pass
	802.11n-HT20	5180	Low	4.55	5.03	7.81	17	Pass
		5200	Mid	4.76	4.70	7.74	17	Pass
		5240	High	4.35	4.10	7.24	17	Pass
	802.11n-HT40	5190	Low	-1.18	-0.72	2.07	17	Pass
		5230	Mid	0.35	0.95	3.67	17	Pass
	802.11ac	5210	High	-6.45	-6.50	-3.46	17	Pass
21dBi	802.11a	5180	Low	0.65	1.06	3.87	17	Pass
		5200	Mid	5.09	4.95	8.03	17	Pass
		5240	High	4.86	4.73	7.81	17	Pass
	802.11n-HT20	5180	Low	0.39	0.94	3.68	17	Pass
		5200	Mid	4.76	4.70	7.74	17	Pass
		5240	High	4.35	4.10	7.24	17	Pass
	802.11n-HT40	5190	Low	-3.15	-2.73	0.08	17	Pass
		5230	Mid	0.35	0.95	3.67	17	Pass
	802.11ac	5210	High	-10.63	-10.39	-7.50	17	Pass
24dBi	802.11a	5180	Low	0.43	0.92	3.69	16	Pass
		5200	Mid	5.09	4.95	8.03	16	Pass
		5240	High	4.86	4.73	7.81	16	Pass
	802.11n-HT20	5180	Low	-0.32	0.37	3.05	16	Pass
		5200	Mid	4.76	4.70	7.74	16	Pass
		5240	High	4.35	4.10	7.24	16	Pass
	802.11n-HT40	5190	Low	-6.84	-6.64	-3.73	16	Pass
		5230	Mid	0.35	0.95	3.67	16	Pass
	802.11ac	5210	High	-15.79	-16.04	-12.90	16	Pass

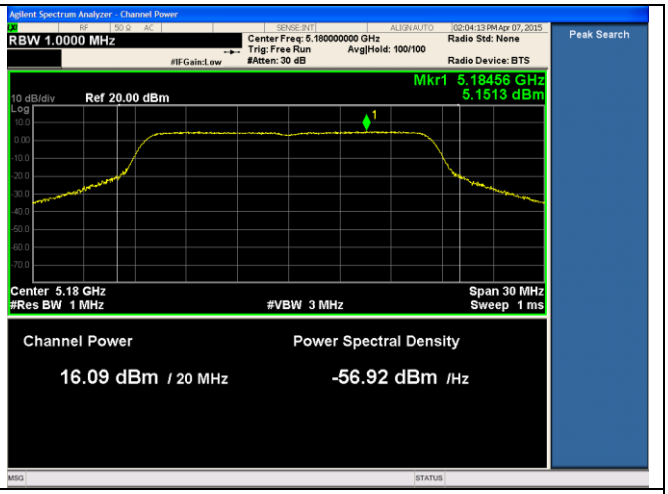
PSD measurement result for 5.8GHz

Antenna Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Combined PSD	Limit (dBm/ MHz)	Result
				Chain1	Chain2	correction factor (dB)			
14dBi	802.11a	5745	Low	3.237	2.512	6.99	12.89	30	Pass
		5785	Mid	1.843	2.645	6.99	12.26	30	Pass
		5825	High	1.633	1.629	6.99	11.63	30	Pass
	802.11n-HT20	5745	Low	2.185	2.149	6.99	12.17	30	Pass
		5785	Mid	3.201	3.007	6.99	13.11	30	Pass
		5825	High	0.951	1.776	6.99	11.38	30	Pass
	802.11n-HT40	5755	Low	-1.906	-1.384	6.99	8.36	30	Pass
		5795	High	-1.412	-2.269	6.99	8.18	30	Pass
	802.11ac	5775	Mid	-5.927	-7.366	6.99	3.41	30	Pass
21dBi	802.11a	5745	Low	3.237	2.512	6.99	12.89	30	Pass
		5785	Mid	1.843	2.645	6.99	12.26	30	Pass
		5825	High	1.633	1.629	6.99	11.63	30	Pass
	802.11n-HT20	5745	Low	2.185	2.149	6.99	12.17	30	Pass
		5785	Mid	3.201	3.007	6.99	13.11	30	Pass
		5825	High	0.951	1.776	6.99	11.38	30	Pass
	802.11n-HT40	5755	Low	-1.906	-1.384	6.99	8.36	30	Pass
		5795	High	-1.412	-2.269	6.99	8.18	30	Pass
	802.11ac	5775	Mid	-15.012	-16.049	6.99	-5.50	30	Pass
24dBi	802.11a	5745	Low	-1.160	-1.770	6.99	8.55	30	Pass
		5785	Mid	1.843	2.645	6.99	12.26	30	Pass
		5825	High	1.633	1.629	6.99	11.63	30	Pass
	802.11n-HT20	5745	Low	-1.356	-1.725	6.99	8.46	30	Pass
		5785	Mid	3.201	3.007	6.99	13.11	30	Pass
		5825	High	0.951	1.776	6.99	11.38	30	Pass
	802.11n-HT40	5755	Low	-5.136	-6.231	6.99	4.35	30	Pass
		5795	High	-1.412	-2.269	6.99	8.18	30	Pass
	802.11ac	5775	Mid	-13.945	-14.580	6.99	-4.25	30	Pass
Note	BW correction factor = 10log(500kHz/RBW)								

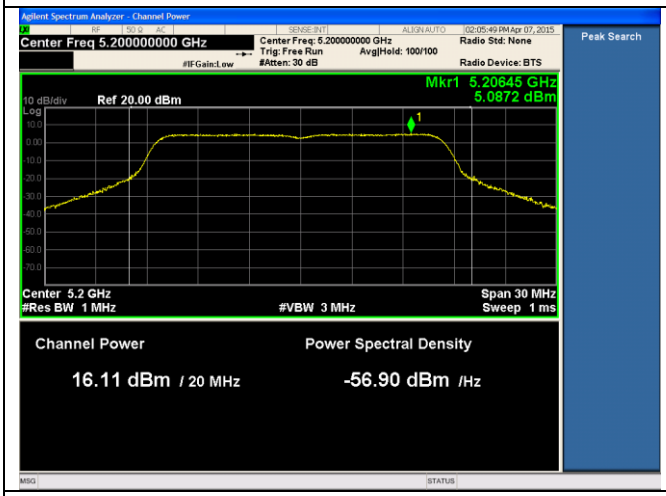
Test Plots



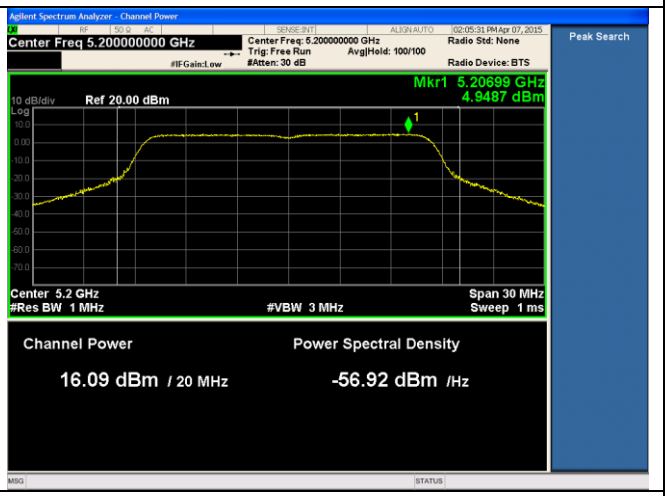
14dBi ANT-PSD-802.11a-5180M-chain1



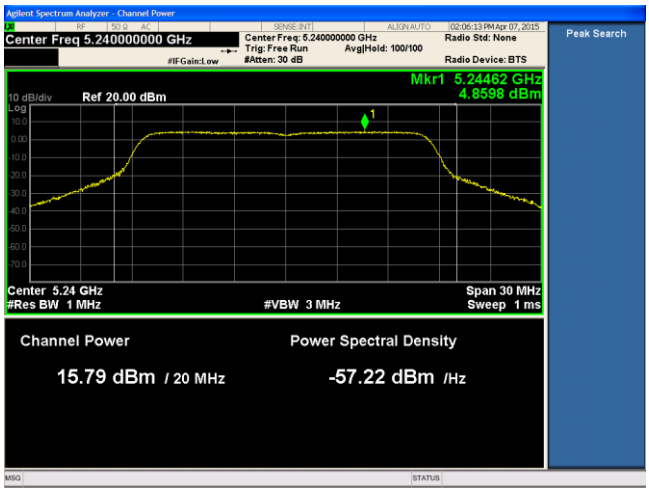
14dBi ANT-PSD-802.11a-5180M-chain2



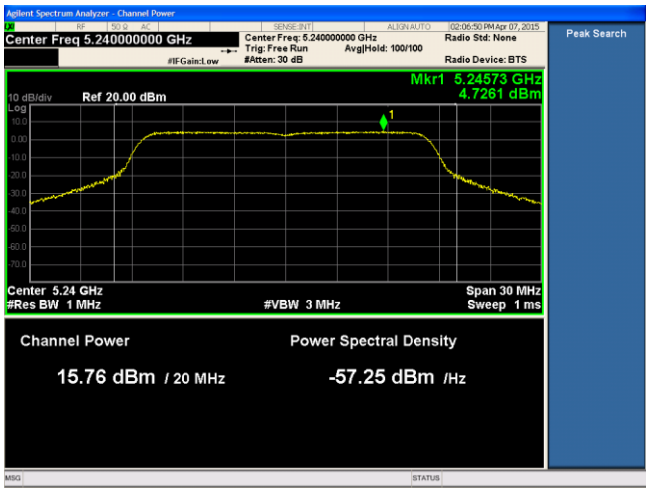
14dBi ANT-PSD-802.11a-5200M-chain1



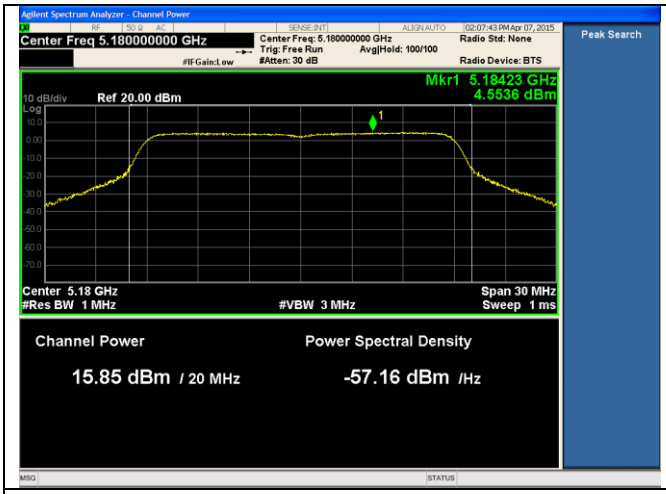
14dBi ANT-PSD-802.11a-5200M-chain2



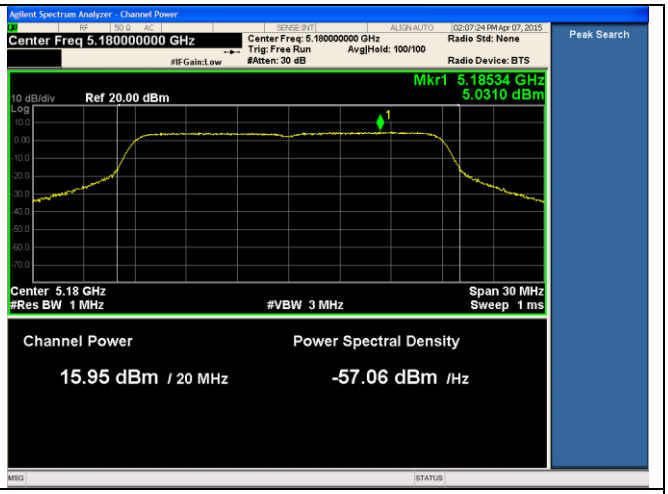
14dBi ANT-PSD-802.11a-5240M-chain1



14dBi ANT-PSD-802.11a-5240M-chain2



14dBi ANT-PSD-802.11n-HT20-5180M-chain1



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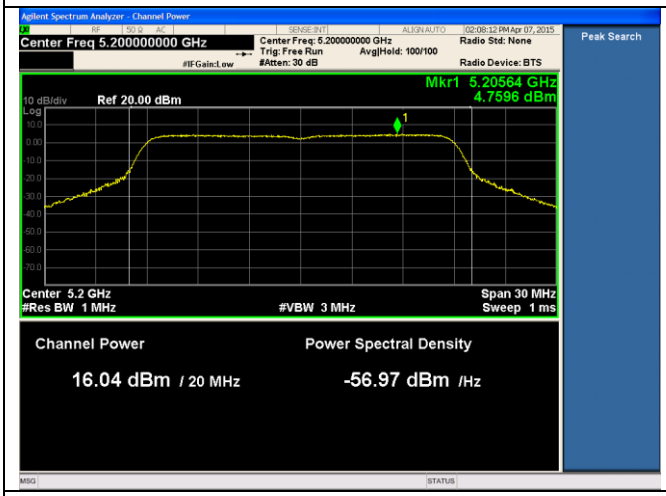

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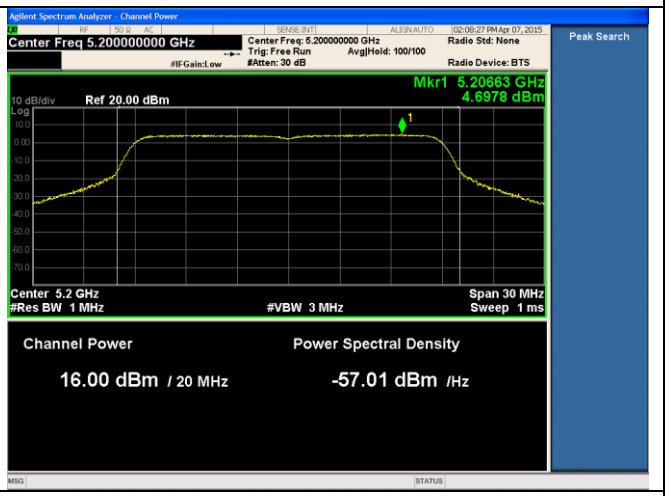

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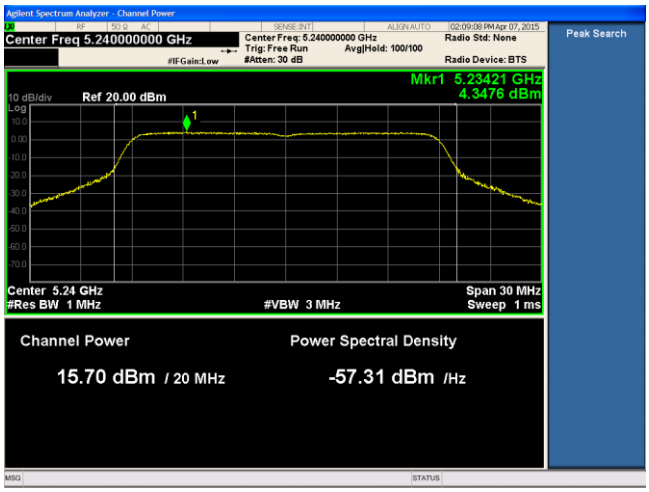
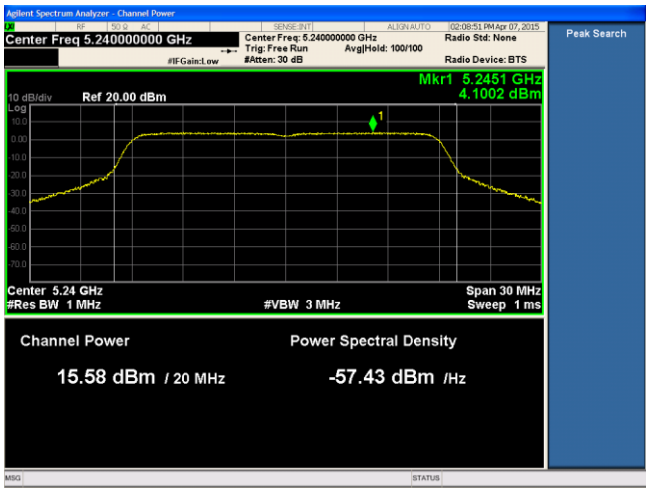


14dBi ANT-PSD-802.11n-HT20-5240M-chain1



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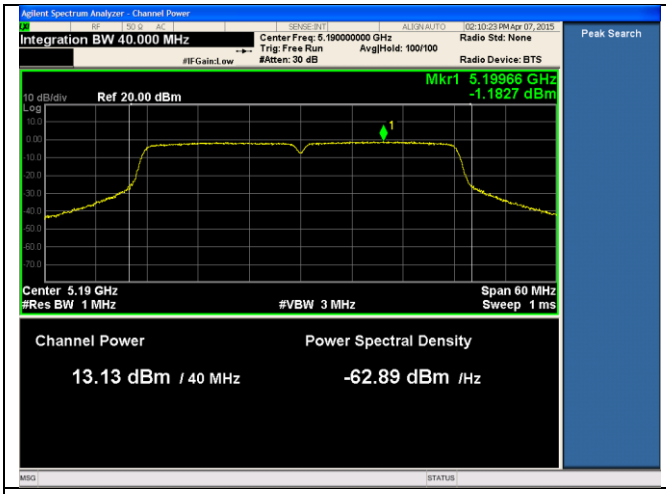
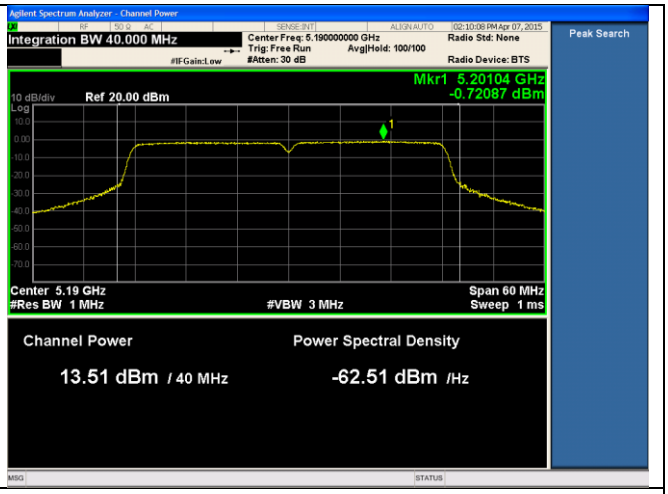
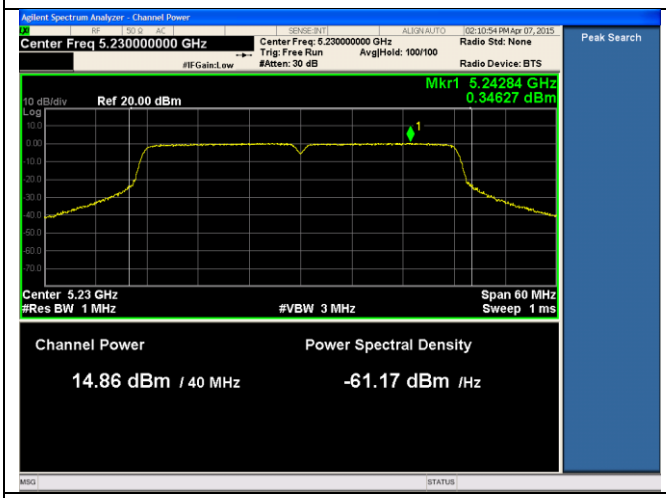


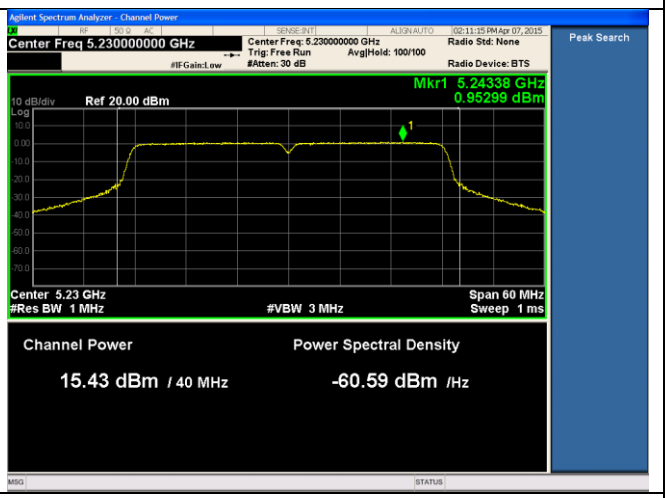
14dBi ANT-PSD-802.11n-HT40-5190M-chain1



14dBi ANT-PSD-802.11n-HT40-5190M-chain2



14dBi ANT-PSD-802.11n-HT40-5230M-chain1



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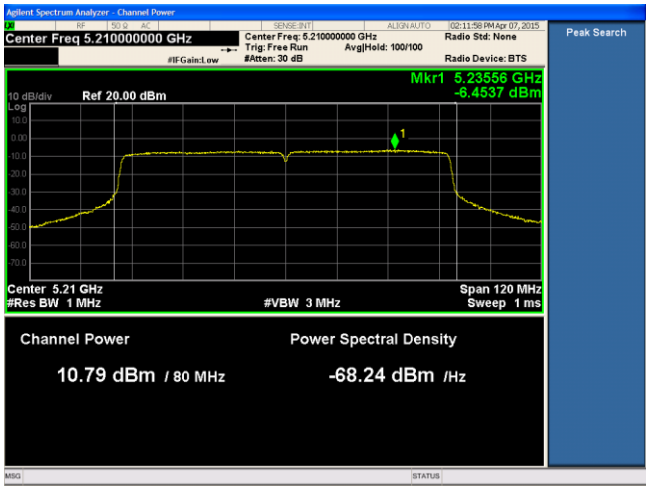
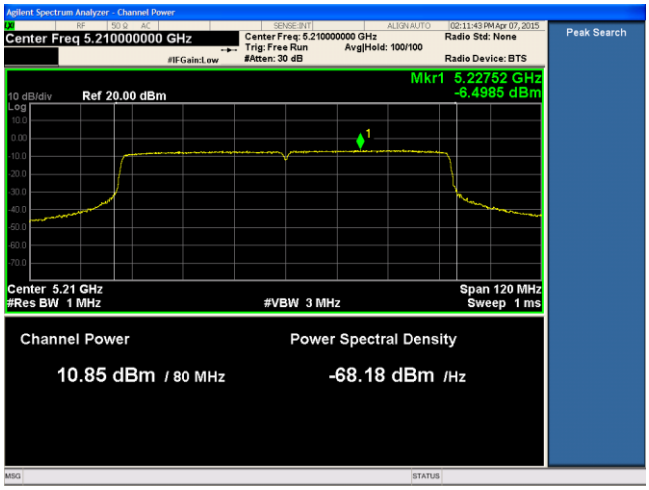


14dBi ANT-PSD-802.11ac -5210M-chain1



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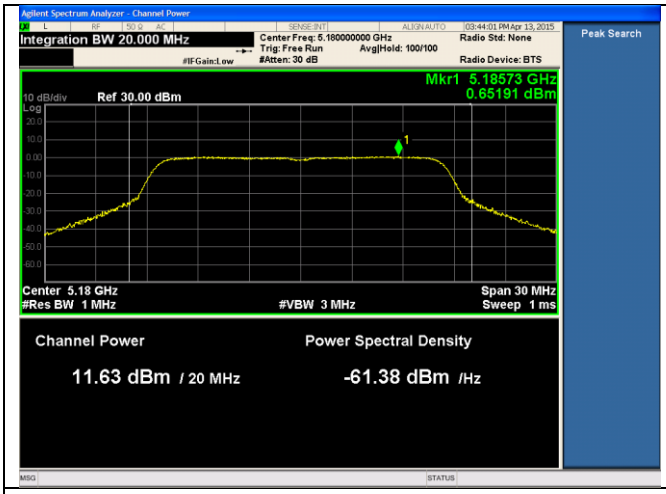
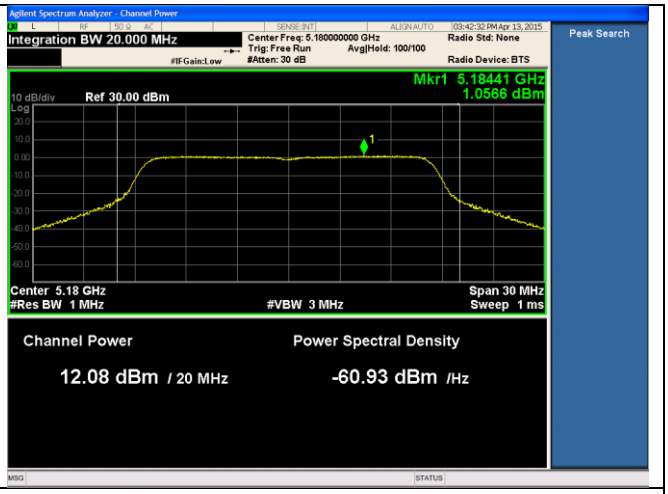


21dBi ANT-PSD-802.11a-5180M-chain1



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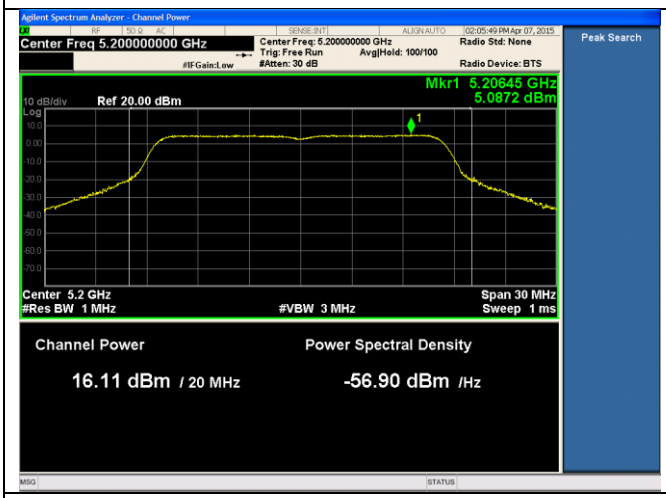

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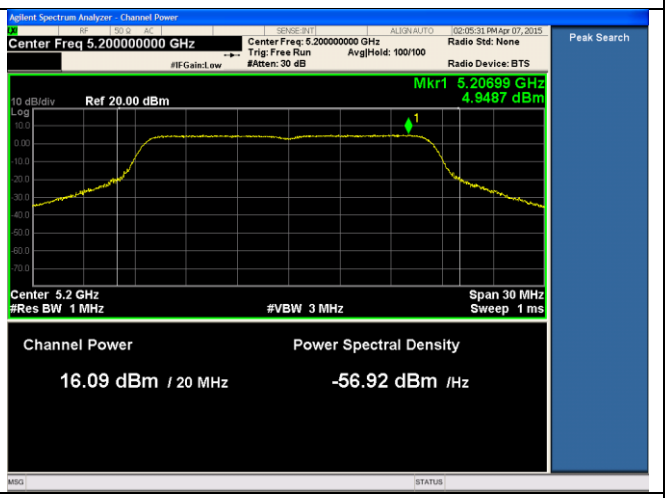

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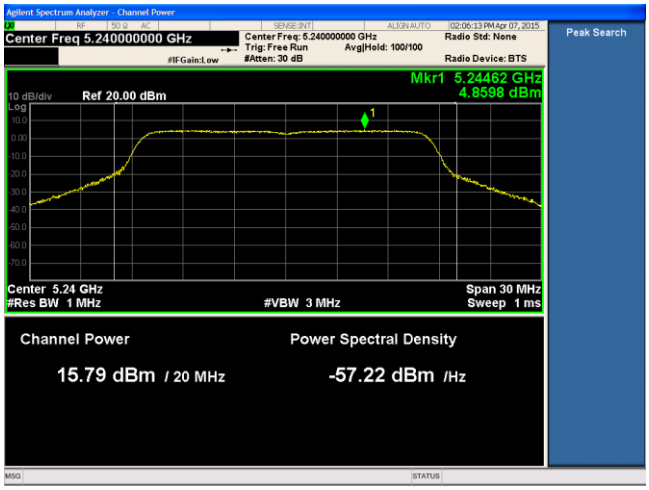
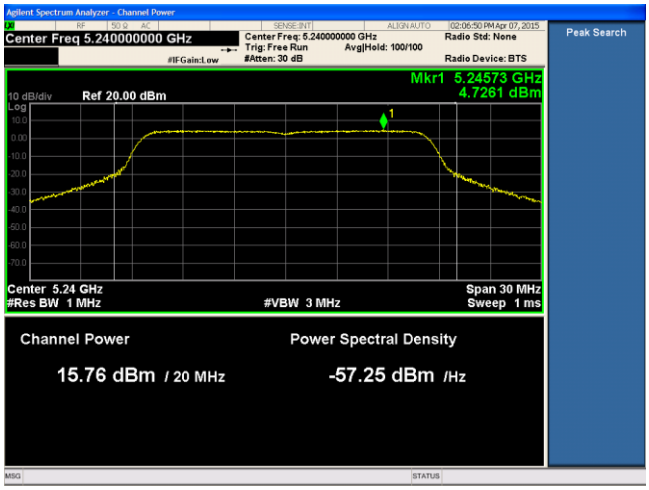


21dBi ANT-PSD-802.11a-5240M-chain1



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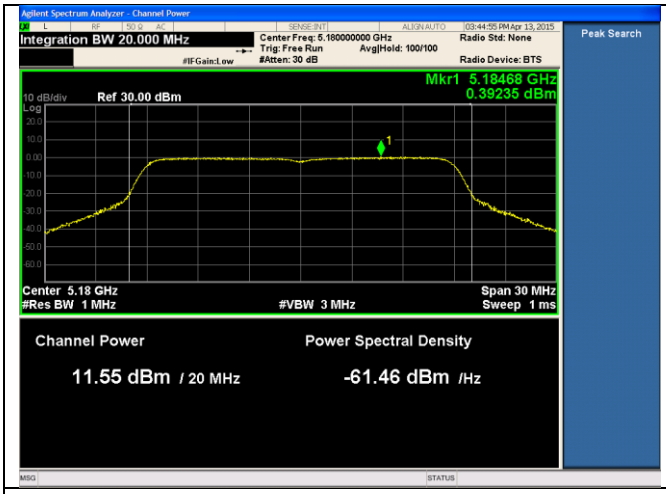

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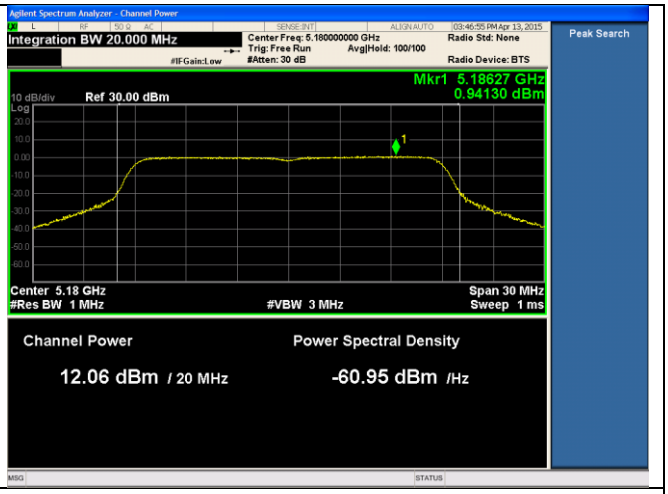

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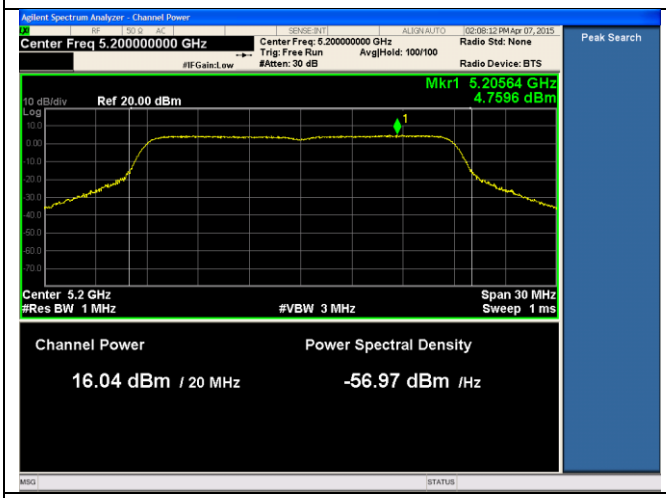

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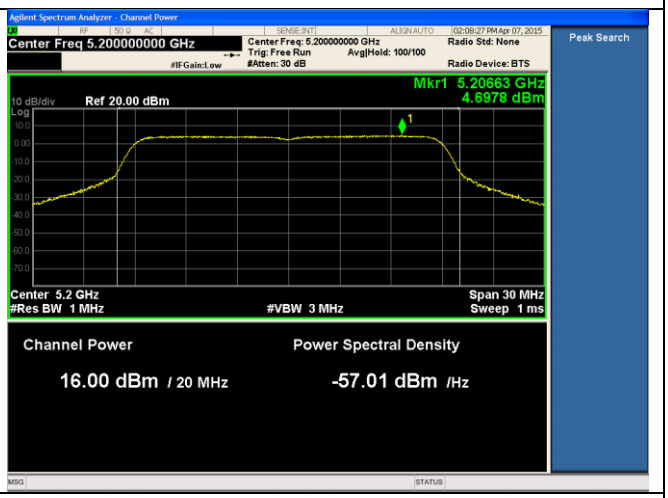

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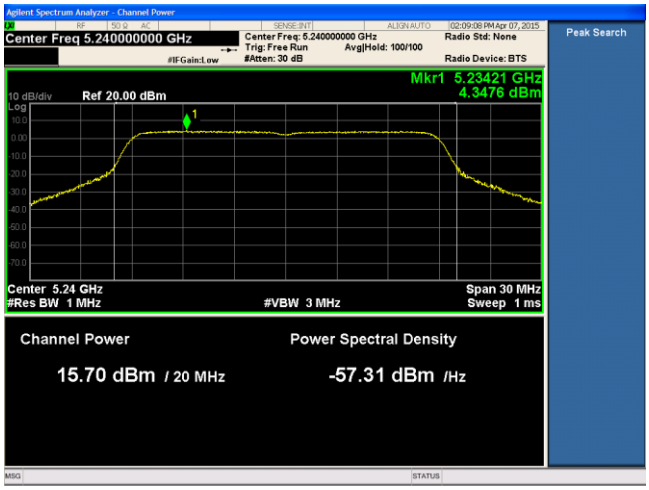

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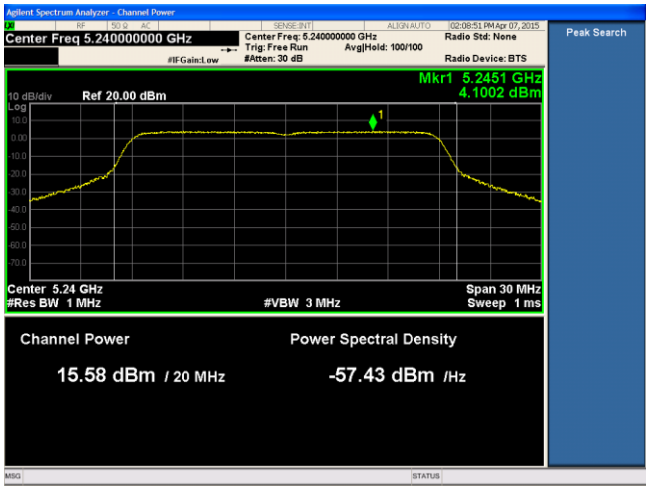

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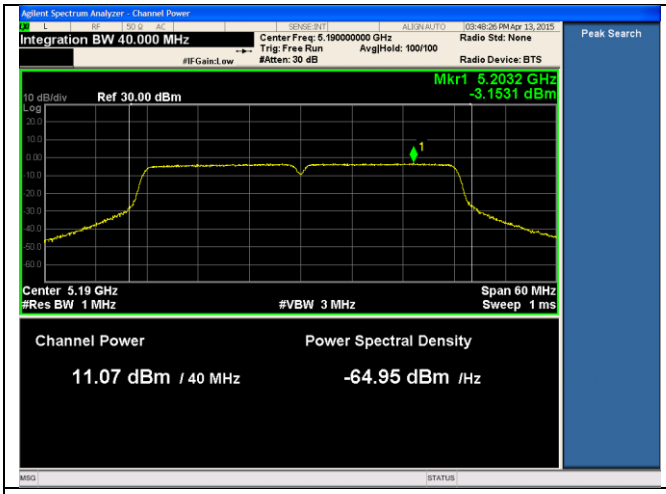
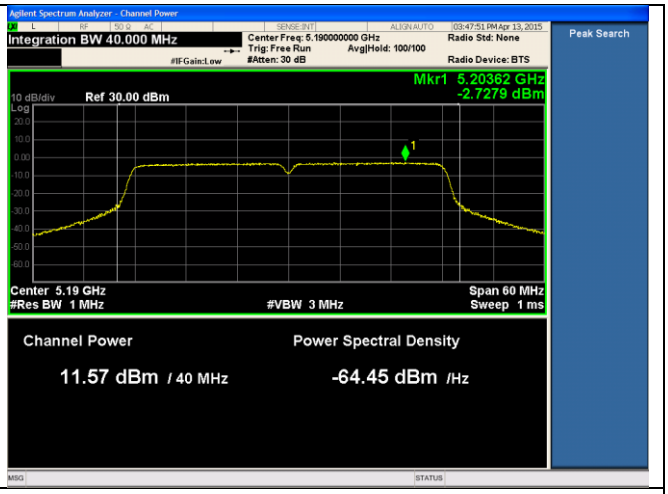


24dBi ANT-PSD-802.11n-HT40-5190M-chain1



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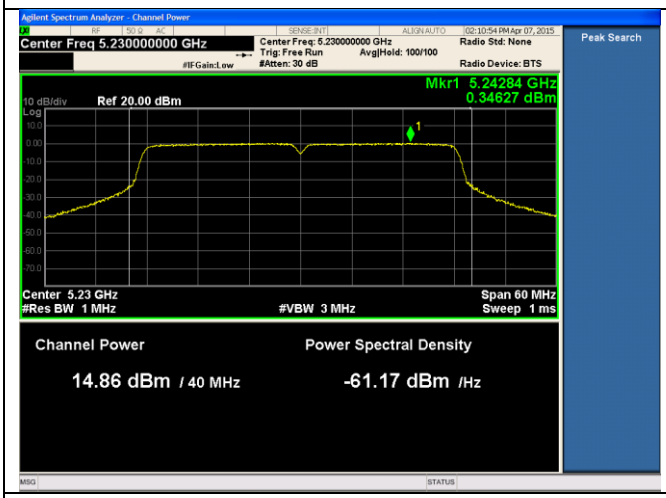

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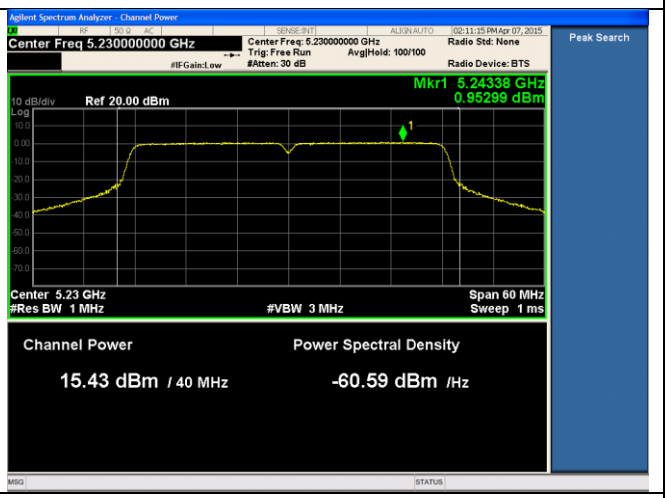

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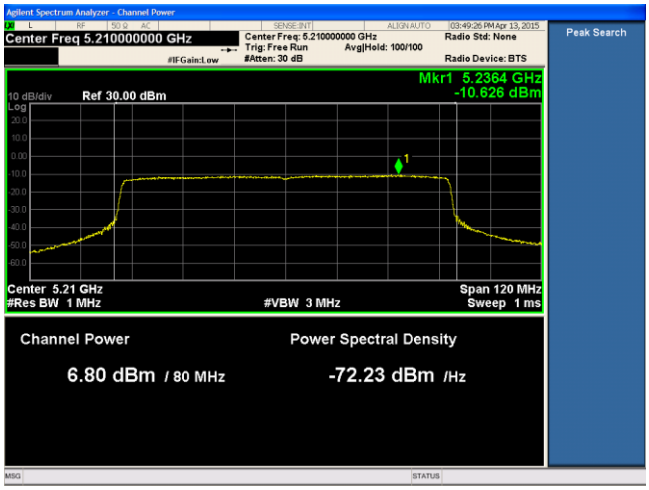

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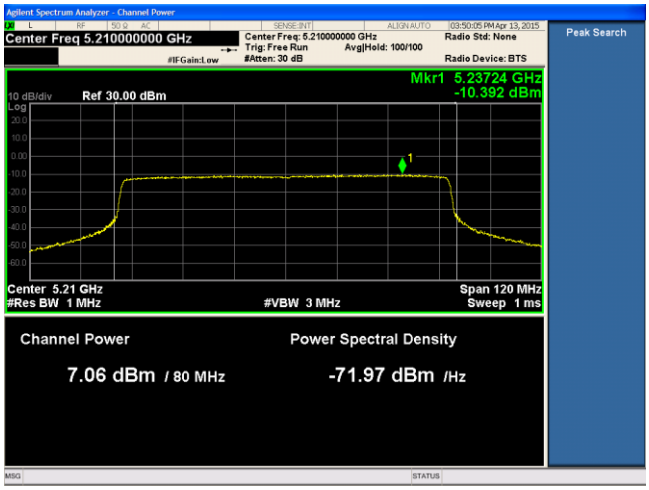

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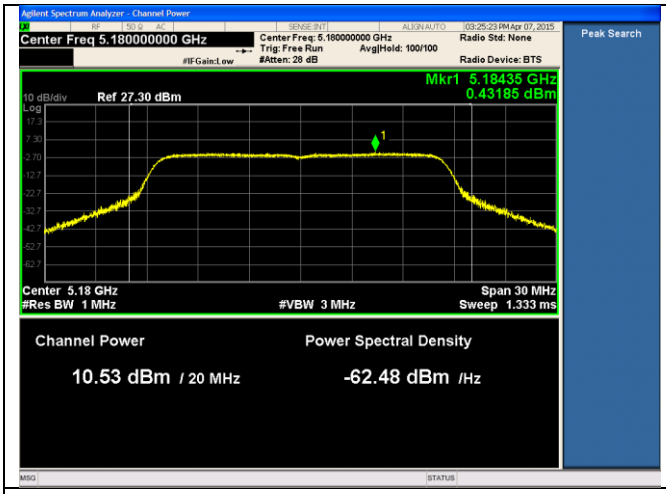

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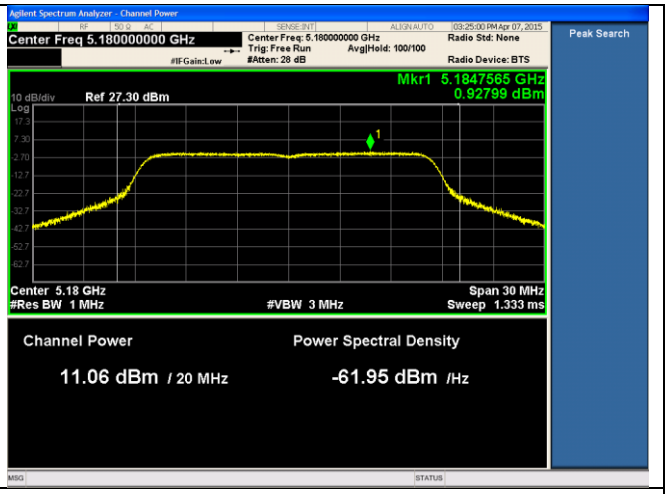

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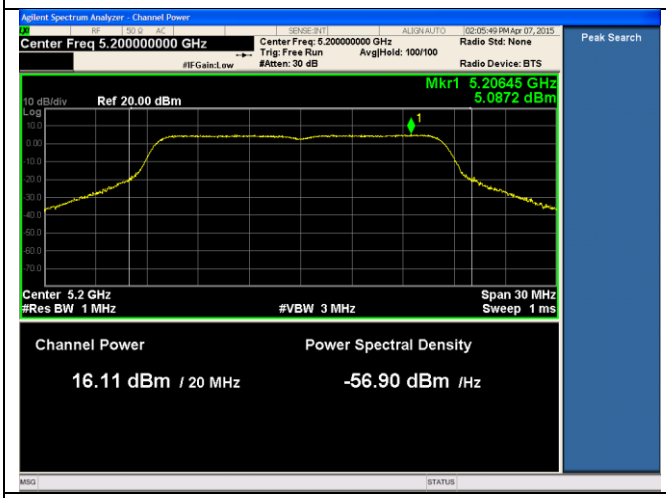

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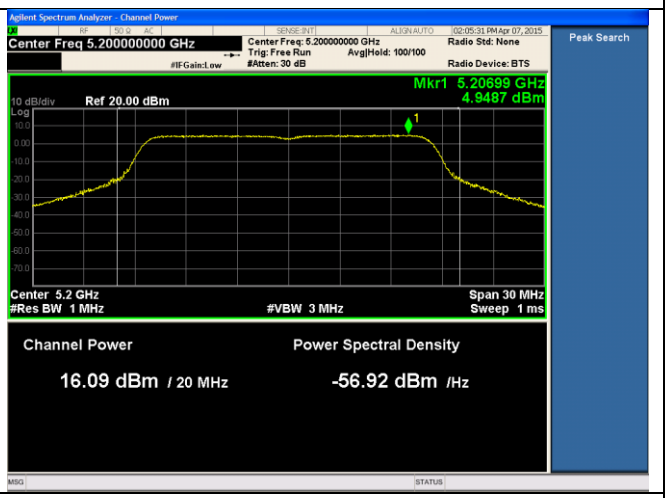

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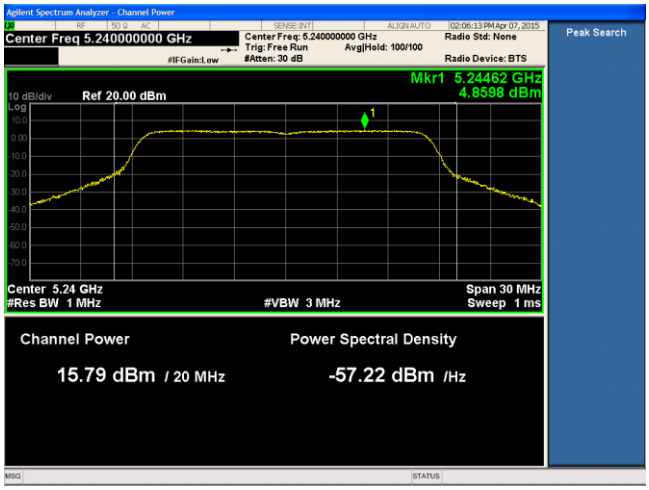

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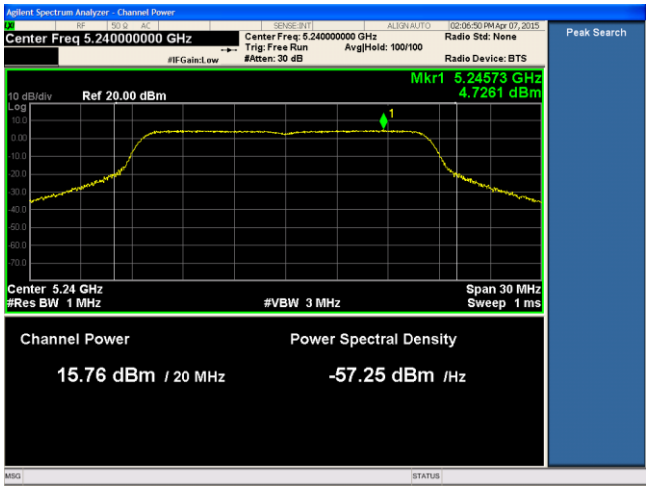

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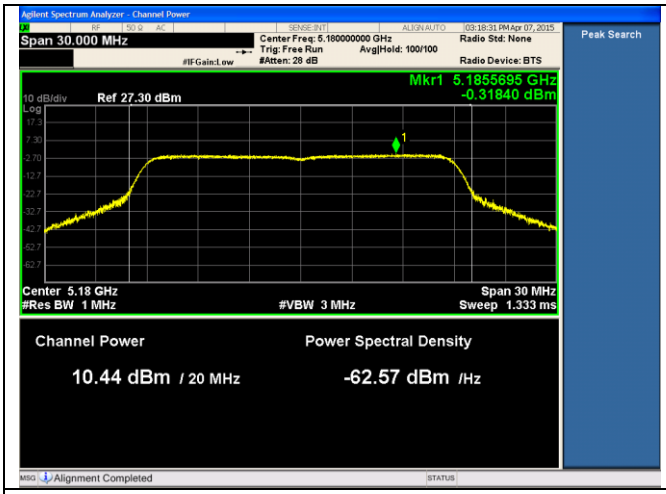

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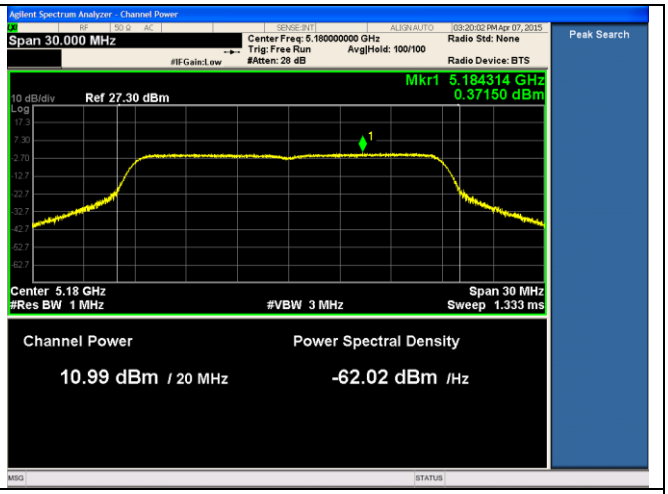

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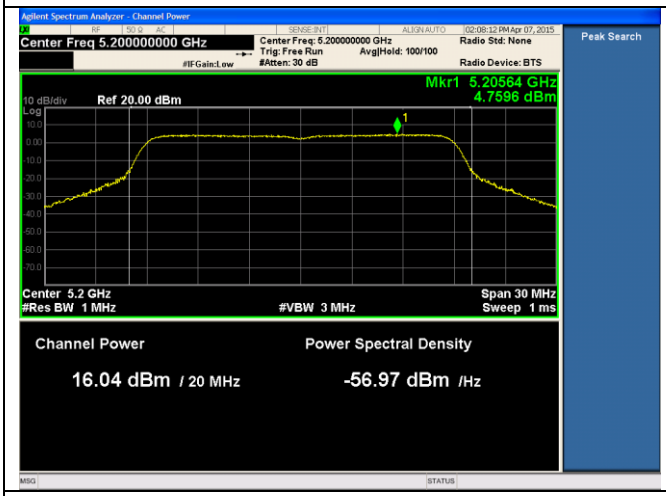

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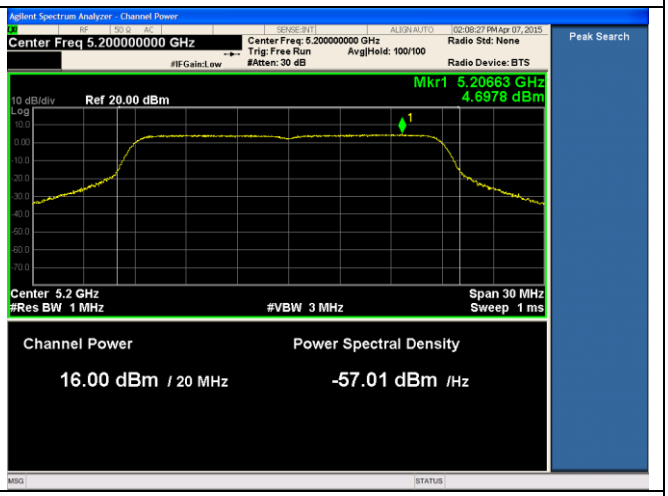

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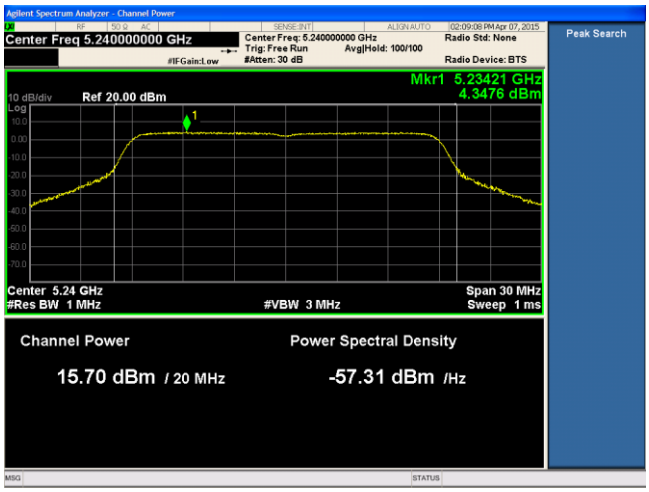

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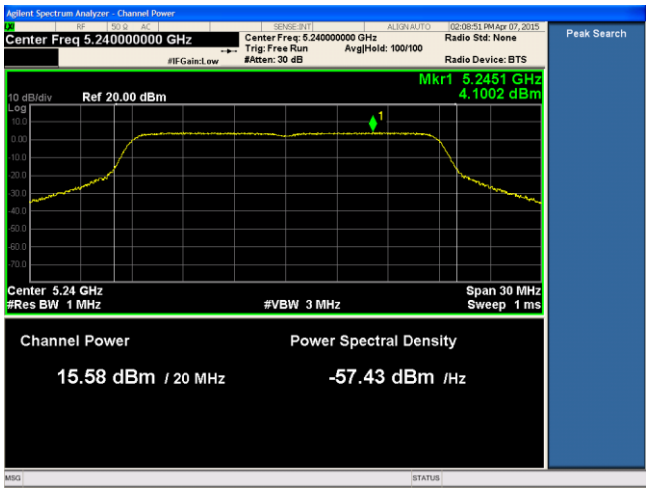

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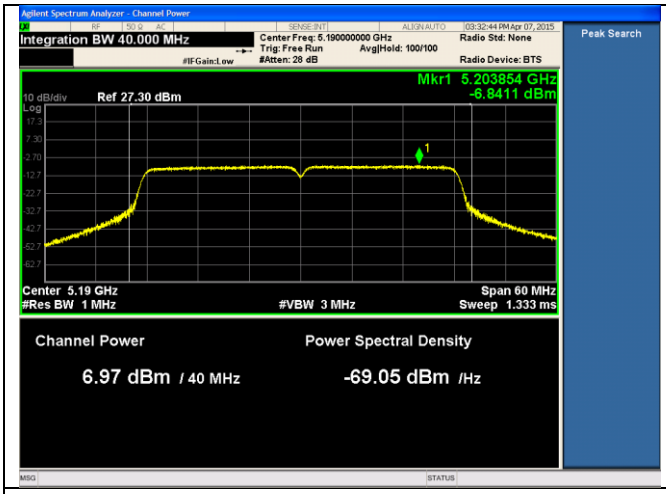

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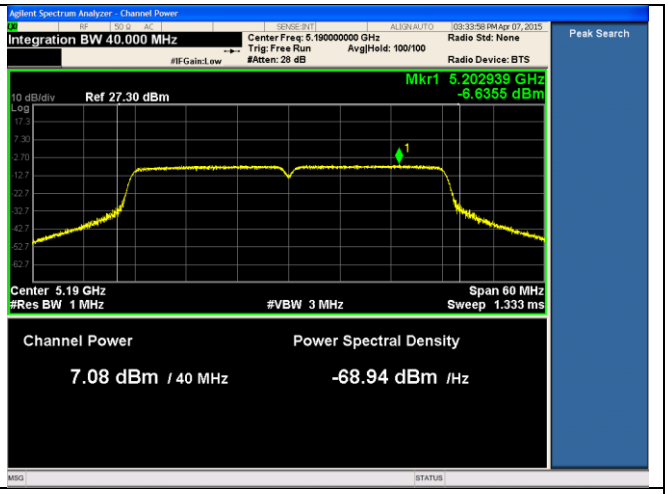

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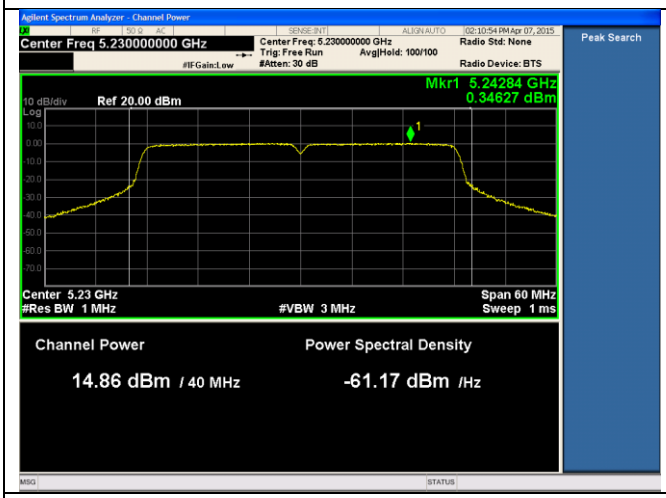

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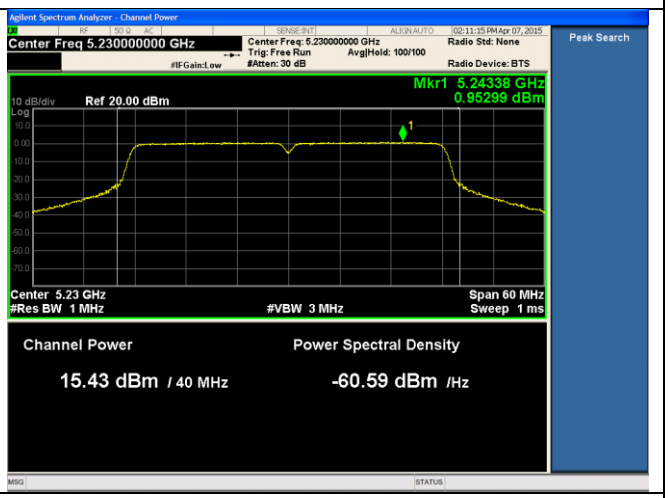

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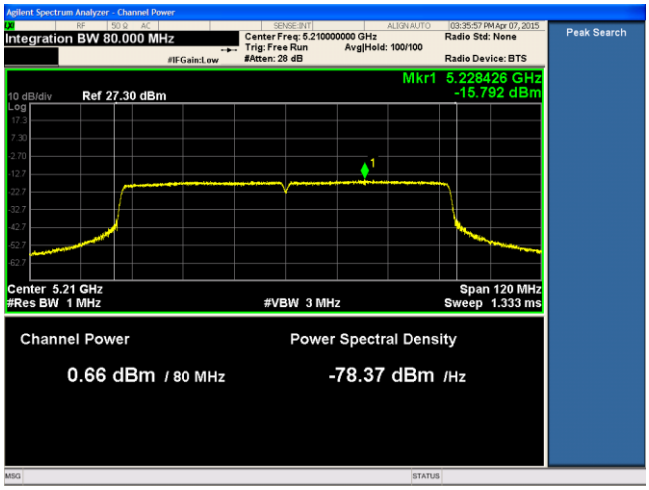

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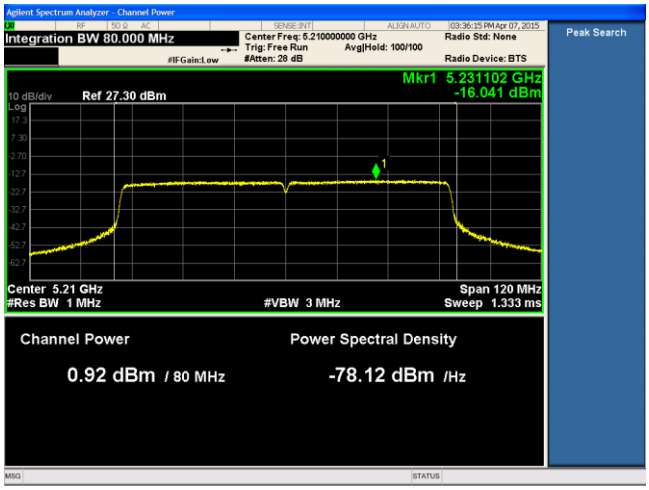

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