

Nalloy, LLC

REVISED TEST REPORT TO 102802-6

Model: PFAY0H

Tested to The Following Standards:

FCC Part 15 Subpart E Section(s)

15.207 & 15.407
(NII 5.15 – 5.25GHz)

Report No.: 102802-6A

Date of issue: June 26, 2020



Test Certificate # 803.01

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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Representative: Naga Suryadevara
Customer Reference Number: 2D-03187704

REPORT PREPARED BY:

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Project Number: 102802

DATE OF EQUIPMENT RECEIPT:

March 19, 2020

DATE(S) OF TESTING:

March 19, 2020
April 1, 2, 6 and 8, 2020

Revision History

Original: Testing of the Model: PFAY0H, to FCC Part 15 Subpart E Section(s) 15.207 & 15.407 (NII 5.15 – 5.25GHz).

Revision A: To correct the Antenna Gain in the General Product Table and in summary tables in Output Power, PSD and Radiated Emissions Band Edge to MIMO with Antenna 0 Linear Polarized / 5.3dBi and Antenna 1 Linear Polarized / 5.9dBi

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
Canyon Park
22116 23rd Drive S.E., Suite A
Bothell, WA 98021

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.12

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Japan
Canyon Park, Bothell, WA	US0081	US1022	A-0136
Brea, CA	US0060	US1025	A-0136
Fremont, CA	US0082	US1023	A-0136
Mariposa, CA	US0103	US1024	A-0136

*CKC's list of NIST designated countries can be found at: <https://standards.gov/cabs/designations.html>

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart E - 15.407 (NII)

Test Procedure	Description	Modifications	Results
15.215	Occupied Bandwidth	NA	Pass
15.407(a)(1)	Output Power	NA	Pass
15.407(a)(1)	Power Spectral Density	NA	Pass
15.407(a)(1)(iii)	EIRP at >30° Elevation	NA	NA1
15.407(g)	Frequency Stability	NA	NP
15.407(b)	Radiated Emissions & Band Edge	NA	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable

NA1 = Not applicable because EUT is for indoor use.

NP Test not performed because grantee is responsible for ensuring that the EUT meets Section 15.407(g) requirements.

ISO/IEC 17025 Decision Rule

The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions

No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions

None

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
NA	Nalloy, LLC.	PFAY0H	9906679780

Support Equipment:

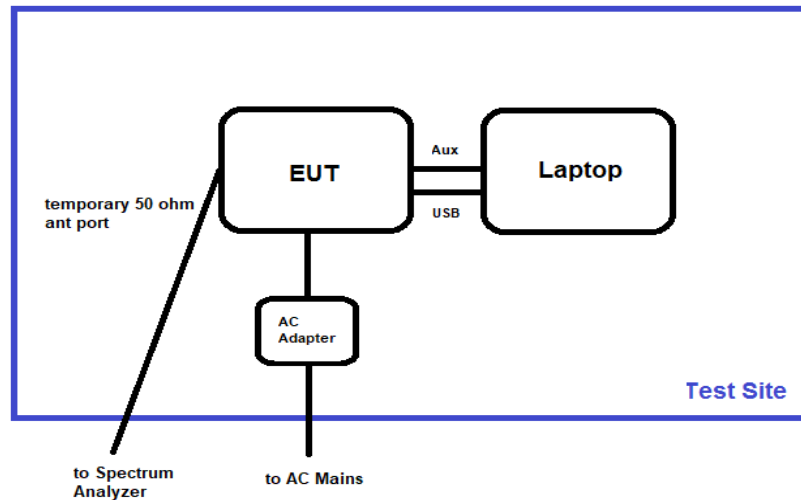
Device	Manufacturer	Model #	S/N
PC	Lenovo	81KT	YD07YGLG
PC PSU	Lenovo	ADL45WCC	NA
EUT PSU	Delta Electronics	MDS-030AAC15	24QW96P00CS

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	802.11a, ac, n
Operating Frequency Range:	5180-5240 MHz
Modulation Type(s):	BPSK, QPSK, 16-QAM, 64-QAM
Maximum Duty Cycle:	100% Modulated (Tested Worst-Case)
Number of TX Chains:	1
Antenna Type(s) and Gain:	MIMO with Antenna 0 Linear Polarized / 5.3dBi and Antenna 1 Linear Polarized / 5.9dBi
Beamforming Type:	NA
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	120VAC
Firmware / Software used for Test:	ro.build.id=PKQ1.180819.001

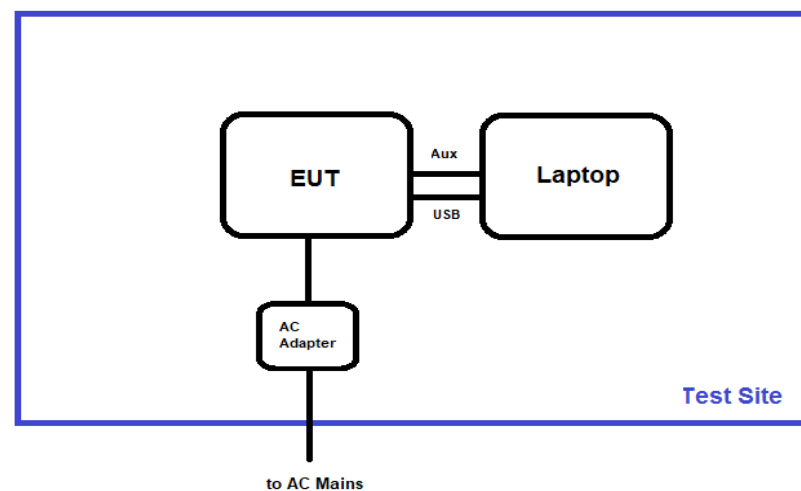
Block Diagram (s)

Test Setup Block Diagram



Tx Cond Ant Port

Test Setup Block Diagram



Tx with Antenna

FCC Part 15 Subpart E

15.215 Occupied Bandwidth

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013), KDB 789033 (v02r01 December 14, 2017)	Test Date(s):	4/6/2020
Configuration:	1		
Test Setup:	Duty Cycle: 100% (Test Mode) Test Mode: Continuously transmitting Test Setup: EUT is transmitting through the antenna port connector and is attached to the spectrum analyzer.		

Environmental Conditions			
Temperature (°C)	20	Relative Humidity (%):	35

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02673	Spectrum Analyzer	Agilent	E4446A	2/22/2019	2/22/2021

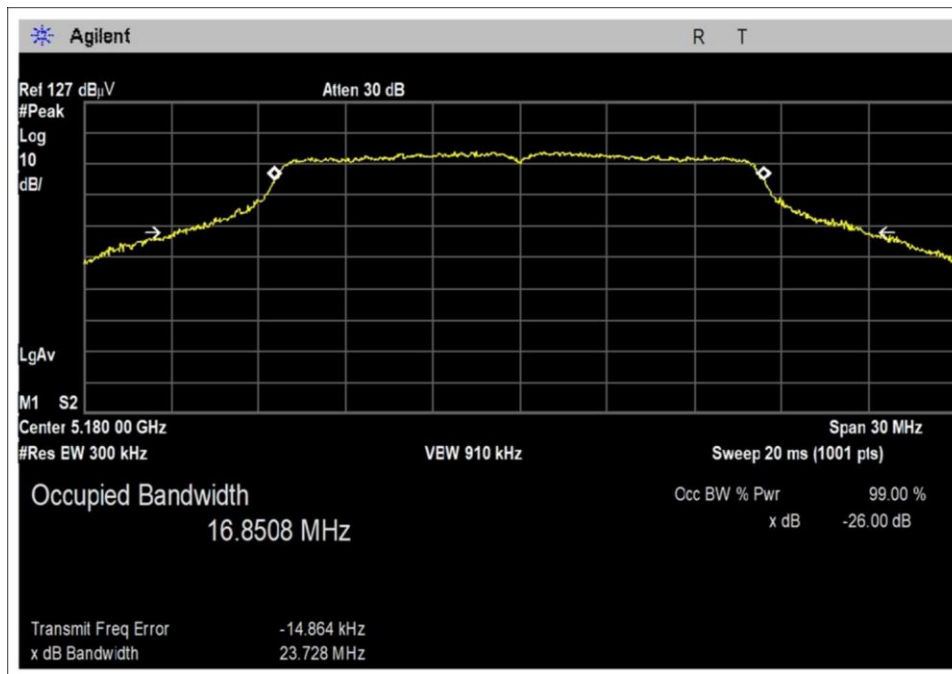
26dB Occupied Bandwidth

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
5180	0	802.11a	23728	None	Pass
5220	0	802.11a	23577		
5240	0	802.11a	23954		
5180	1	802.11a	23735	None	Pass
5220	1	802.11a	23703		
5240	1	802.11a	23540		
5180	0	802.11n20	25007	None	Pass
5220	0	802.11n20	25002		
5240	0	802.11n20	25058		
5180	1	802.11n20	25136	None	Pass
5220	1	802.11n20	25536		
5240	1	802.11n20	25378		
5190	0	802.11n40	41764	None	Pass
5230	0	802.11n40	41941		
5190	1	802.11n40	41470	None	Pass
5230	1	802.11n40	41299		
5180	0	802.11ac20	24755	None	Pass
5220	0	802.11ac20	24746		
5240	0	802.11ac20	25092		
5180	1	802.11ac20	25160	None	Pass
5220	1	802.11ac20	24909		
5240	1	802.11ac20	24888		
5190	0	802.11ac40	41346	None	Pass
5230	0	802.11ac40	41439		
5190	1	802.11ac40	41670	None	Pass
5230	1	802.11ac40	41597		
5210	0	802.11ac80	83921	None	Pass
5210	1	802.11ac80	83681	None	Pass

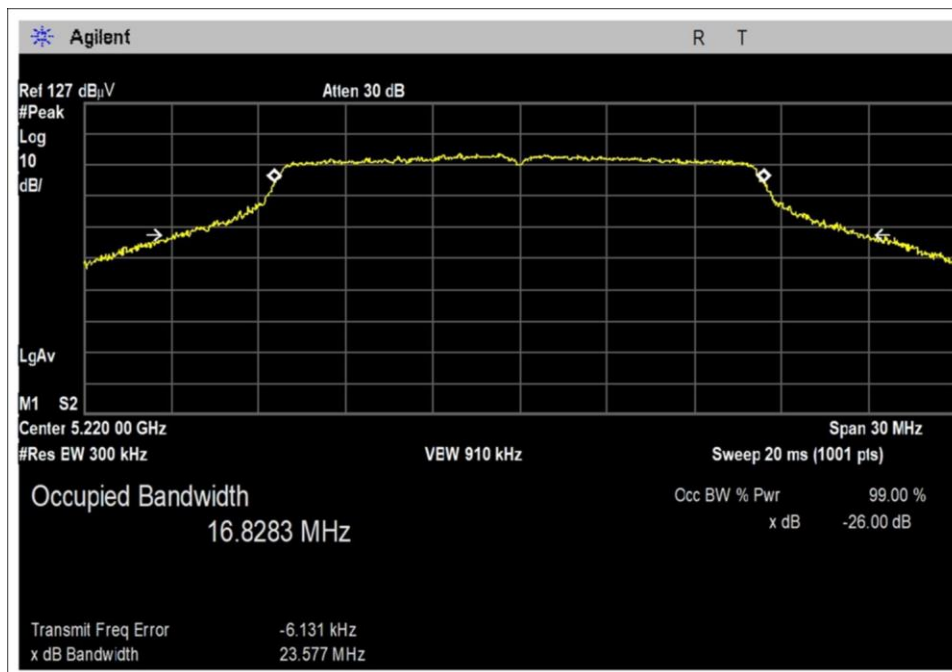
99% Occupied Bandwidth

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
5180	0	802.11a	16850.8	None	Pass
5220	0	802.11a	16823.3		
5240	0	802.11a	16867.1		
5180	1	802.11a	16761.8	None	Pass
5220	1	802.11a	16788		
5240	1	802.11a	16725.1		
5180	0	802.11n20	17964.6	None	Pass
5220	0	802.11n20	17998.3		
5240	0	802.11n20	17966.3		
5180	1	802.11n20	17992	None	Pass
5220	1	802.11n20	18013		
5240	1	802.11n20	17973		
5190	0	802.11n40	36243.2	None	Pass
5230	0	802.11n40	36265.1		
5190	1	802.11n40	36206.4	None	Pass
5230	1	802.11n40	36204.6		
5180	0	802.11ac20	17921.4	None	Pass
5220	0	802.11ac20	17957.3		
5240	0	802.11ac20	17974.4		
5180	1	802.11ac20	17985.2	None	Pass
5220	1	802.11ac20	17955.3		
5240	1	802.11ac20	17924.8		
5190	0	802.11ac40	36253.3	None	Pass
5230	0	802.11ac40	36241.2		
5190	1	802.11ac40	36234.7	None	Pass
5230	1	802.11ac40	36275.4		
5210	0	802.11ac80	75571.4	None	Pass
5210	1	802.11ac80	75586.9	None	Pass

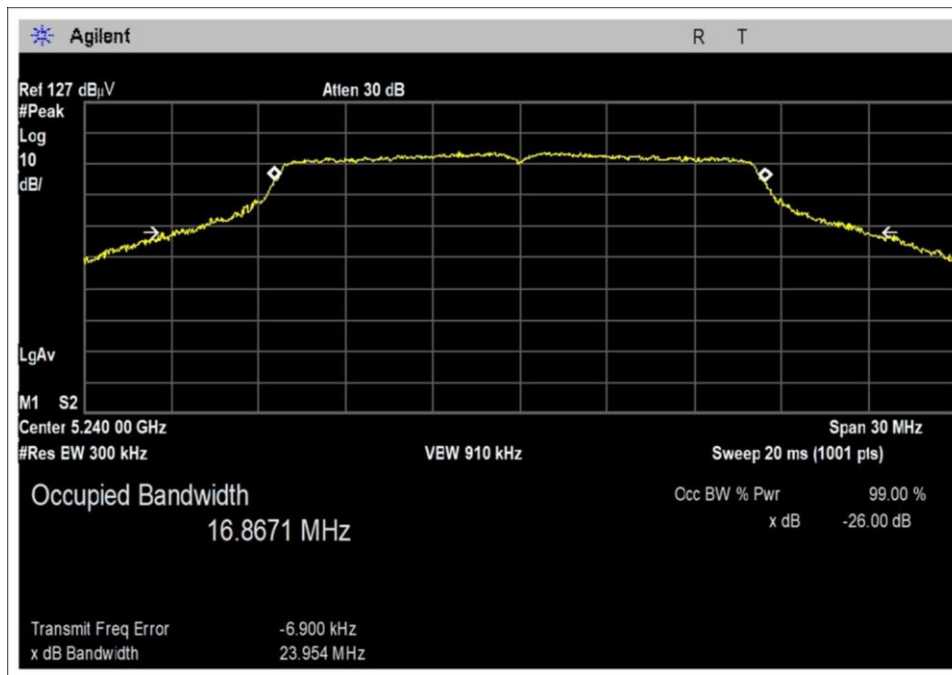
802.11a Plot(s)



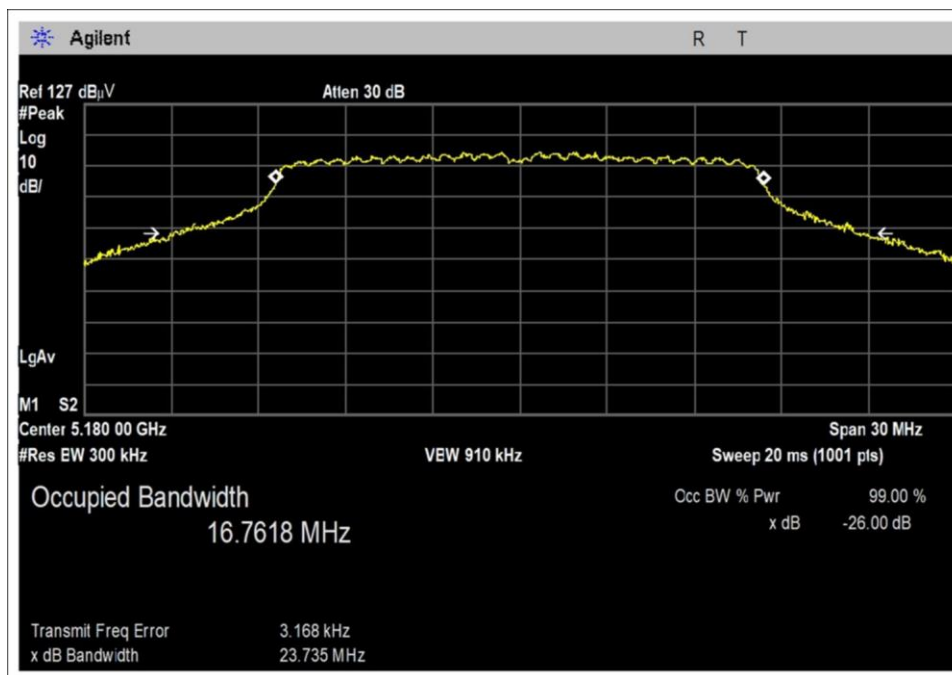
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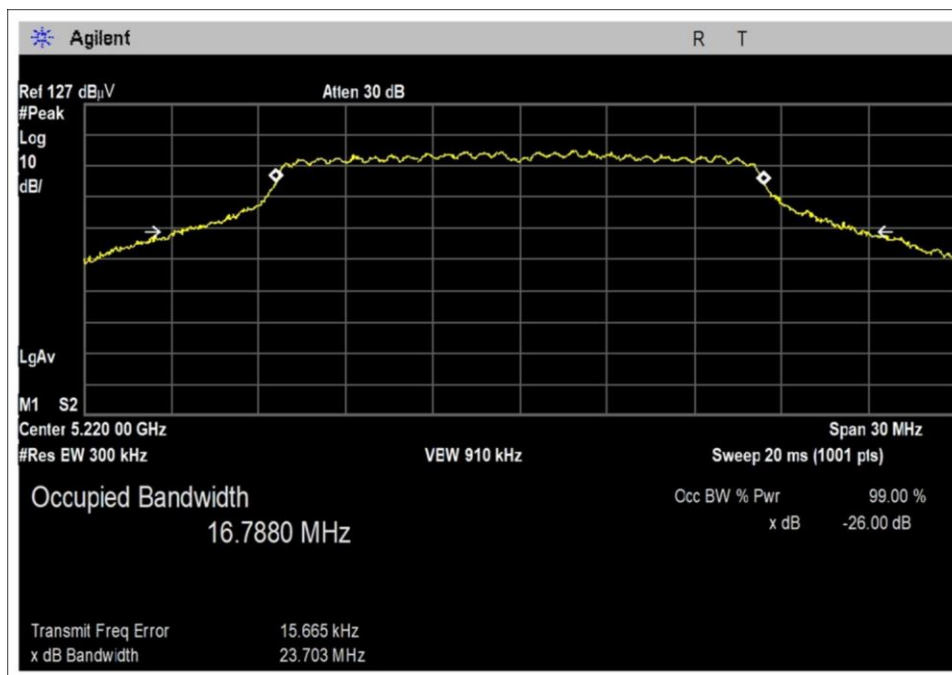
99p+26dB BW Middle Channel AP0



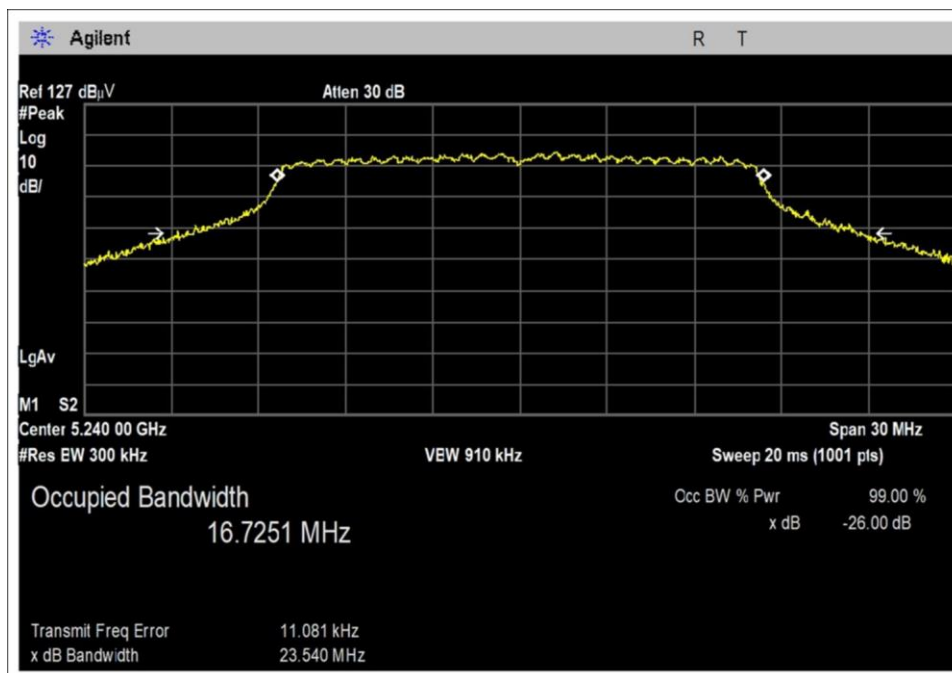
99p+26dB BW High Channel AP0



99p+26dB BW Low Channel AP1

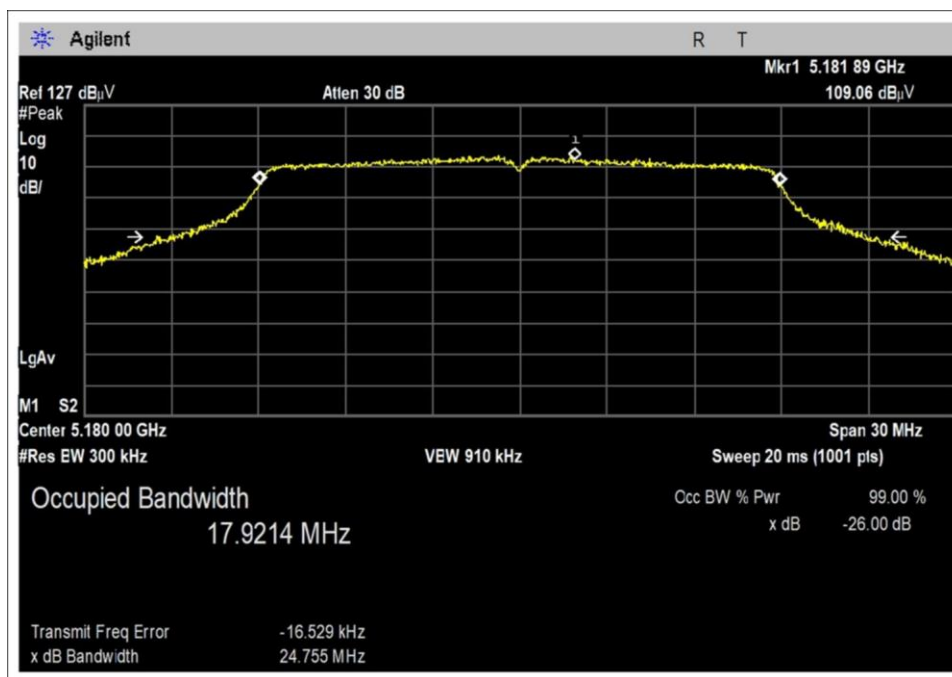


99p+26dB BW Middle Channel AP1

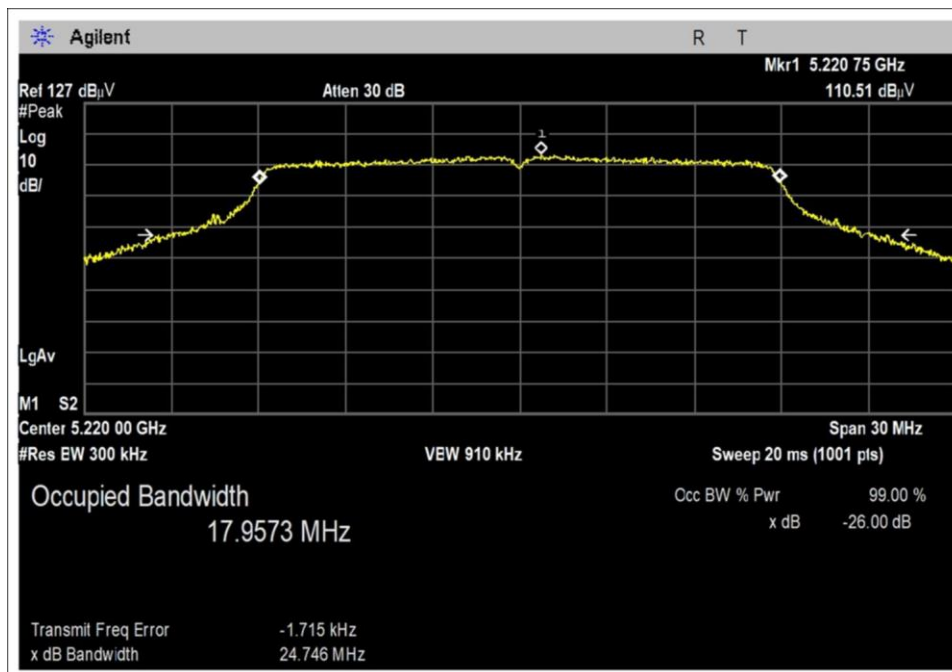


99p+26dB BW High Channel AP1

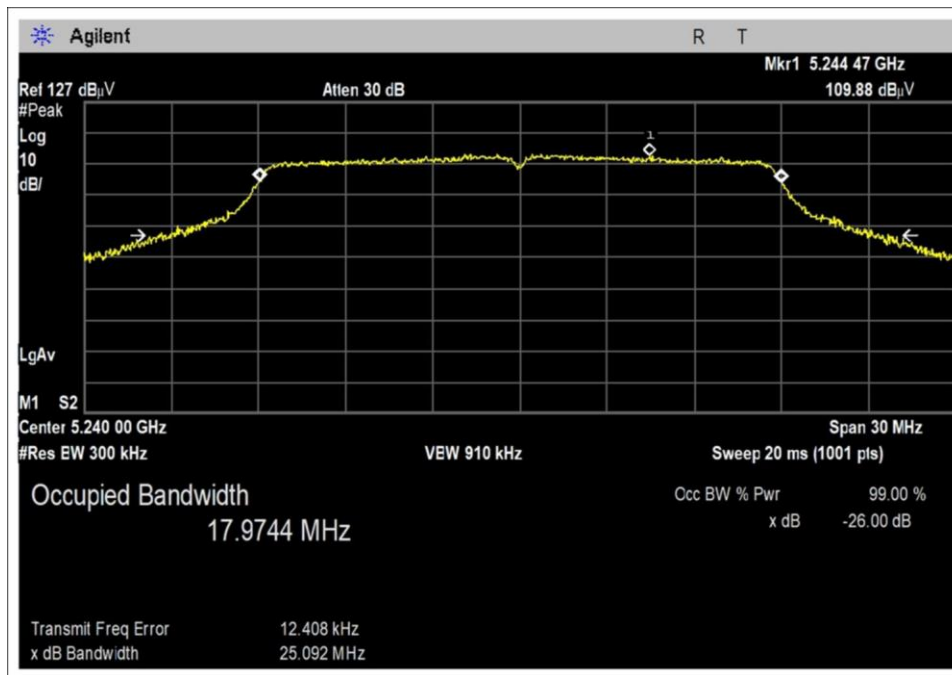
802.11ac20 Plot(s)



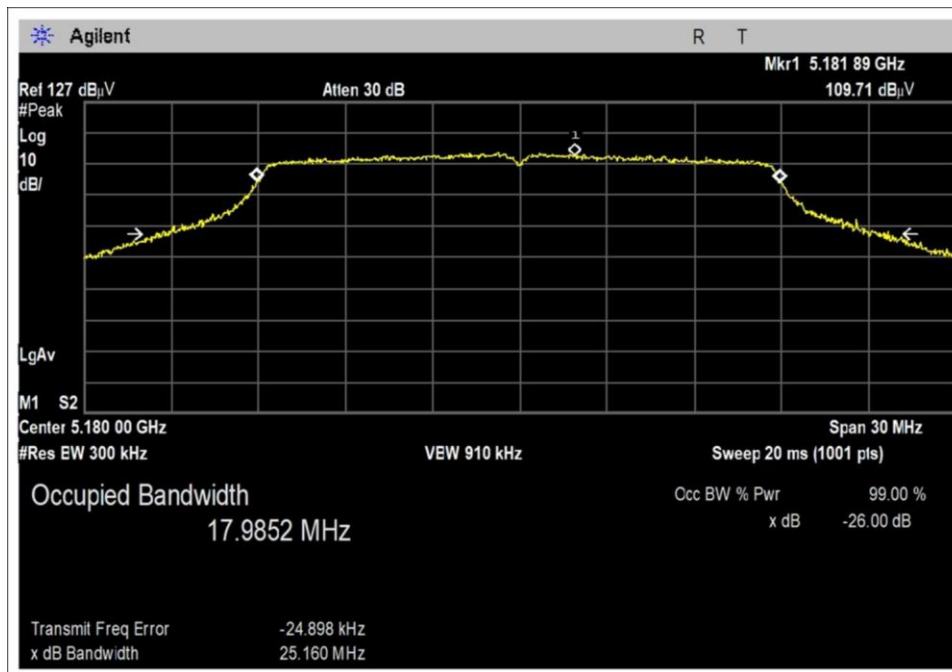
99p+26dB BW Low Channel AP0



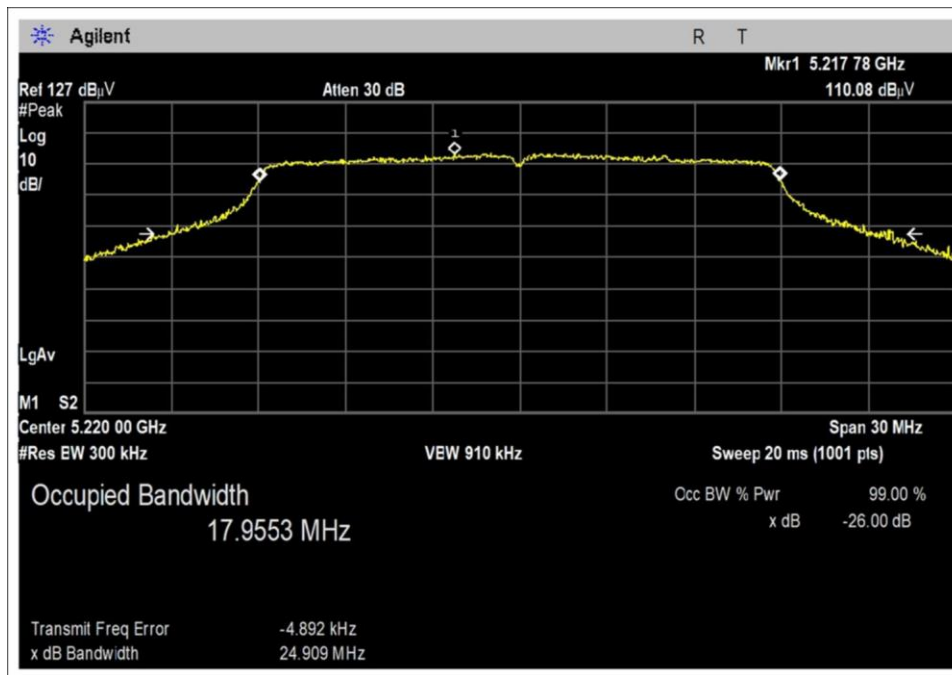
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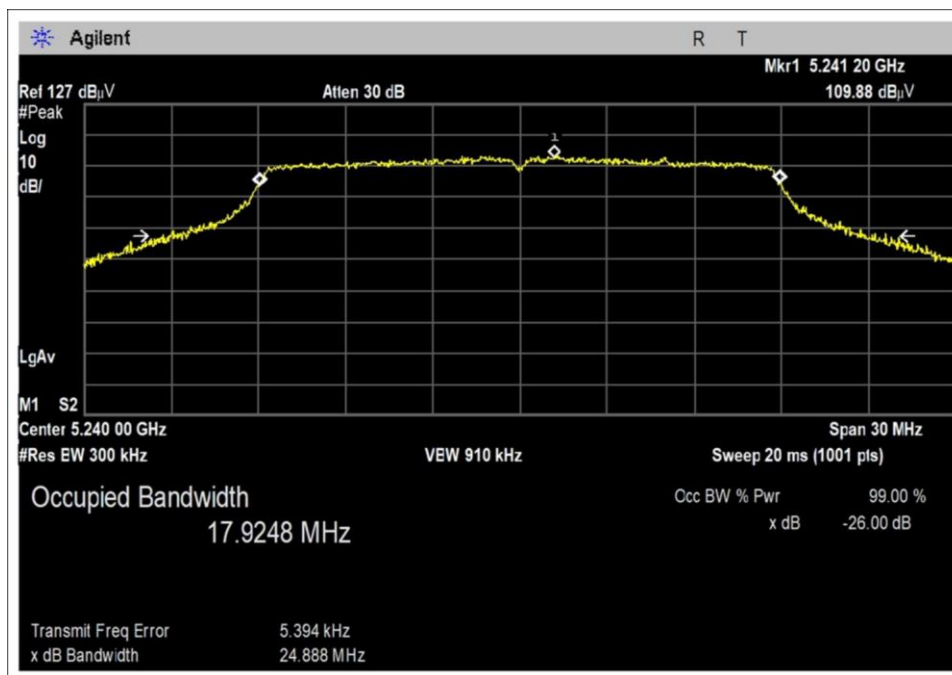
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99p+26dB BW Low Channel AP1

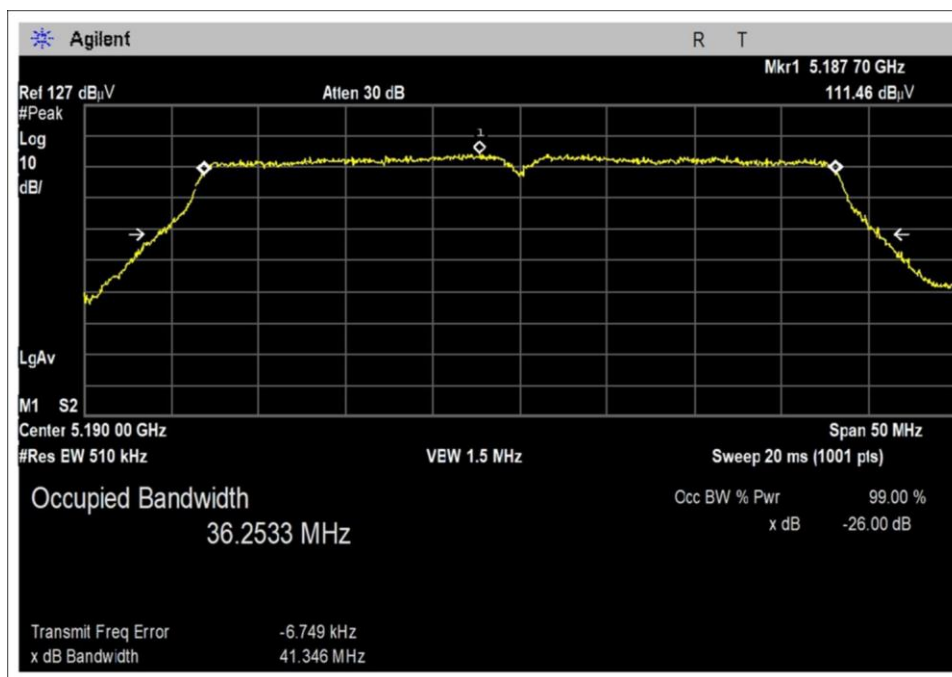


99p+26dB BW Middle Channel AP1

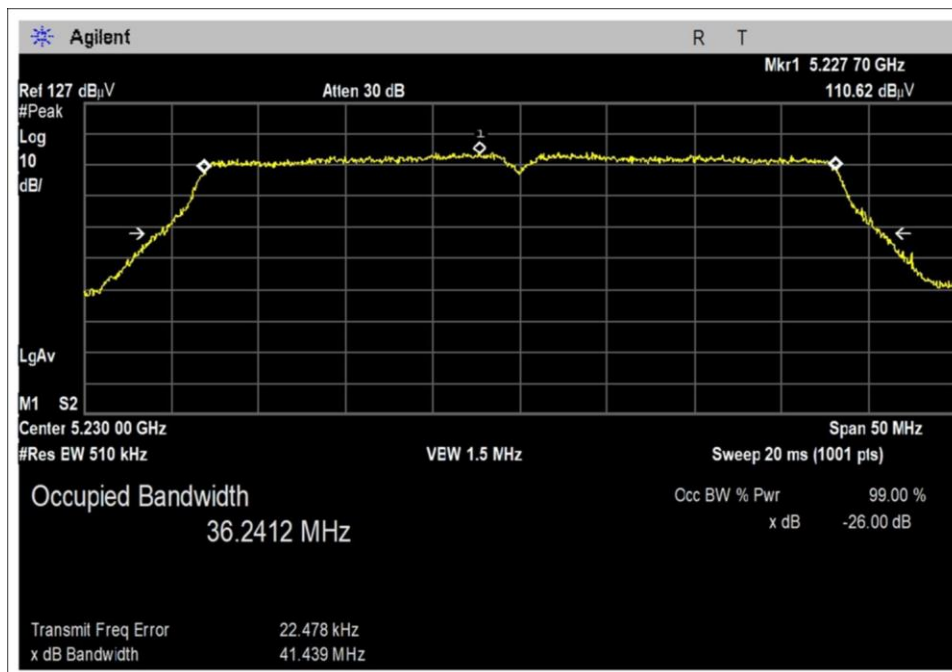


99p+26dB BW High Channel AP1

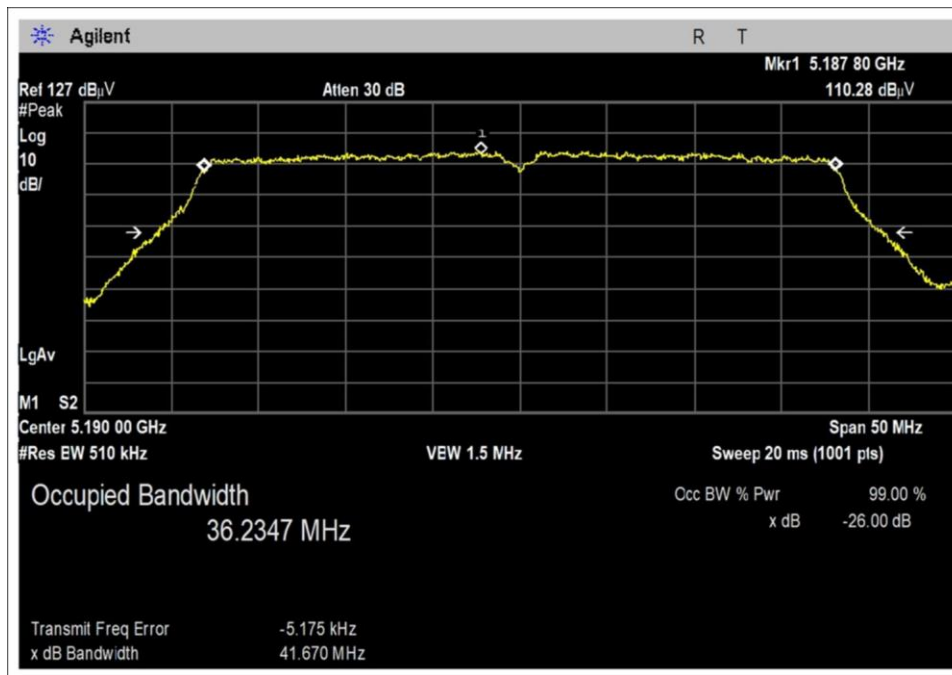
802.11ac40 Plot(s)



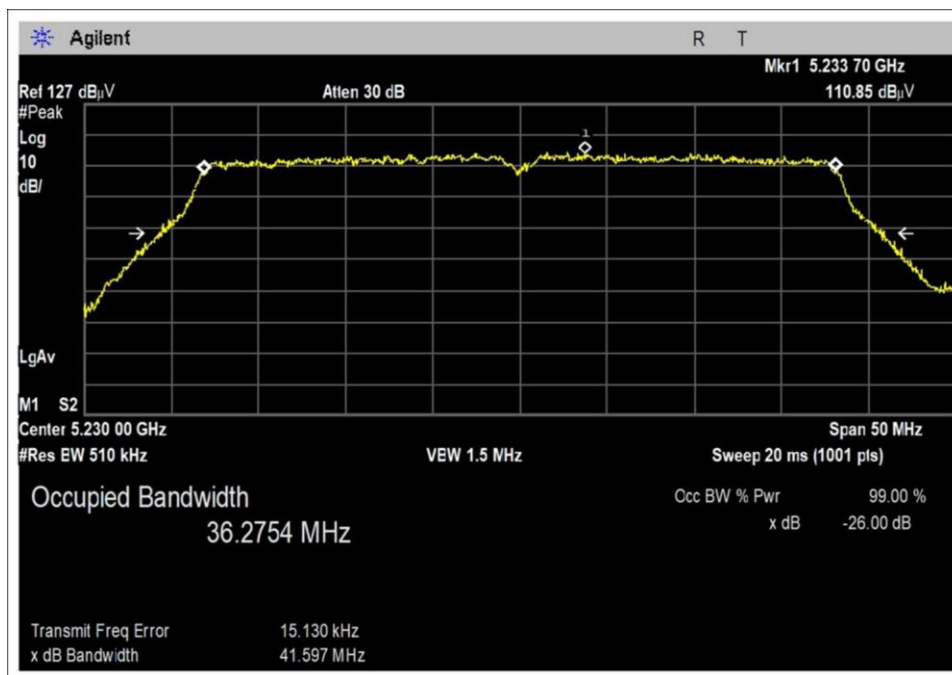
99p+26dB BW Low Channel AP0



99p+26dB BW High Channel AP0

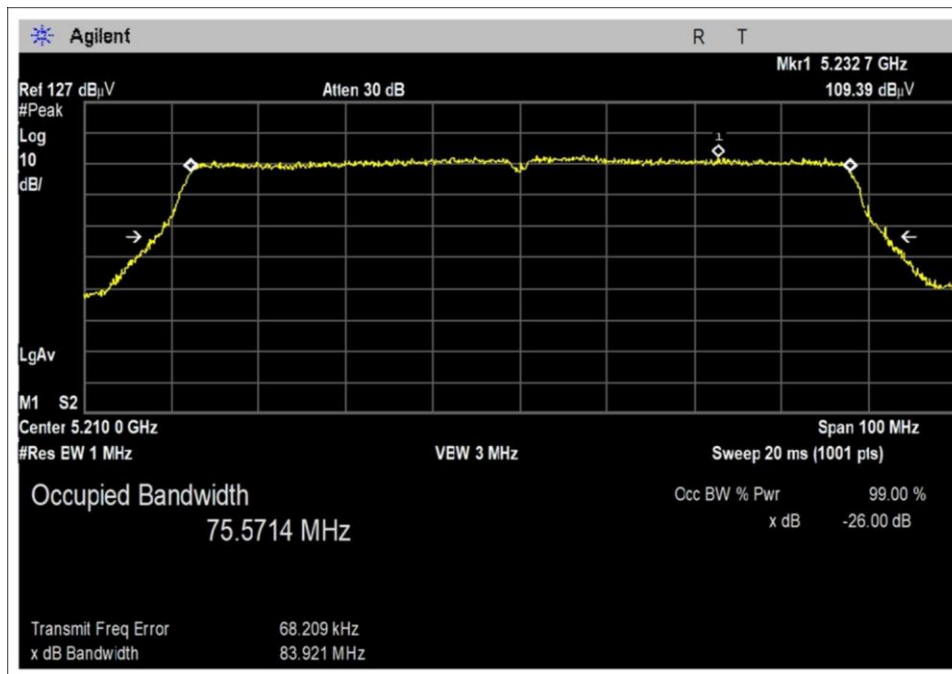


99p+26dB BW Low Channel AP1

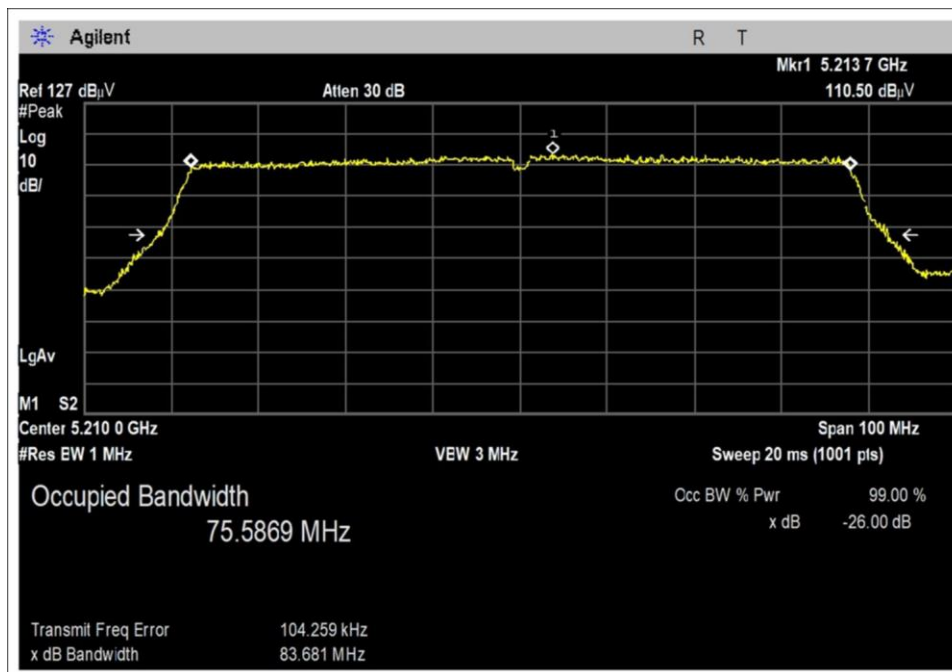


99p+26dB BW High Channel AP1

802.11ac80 Plot(s)

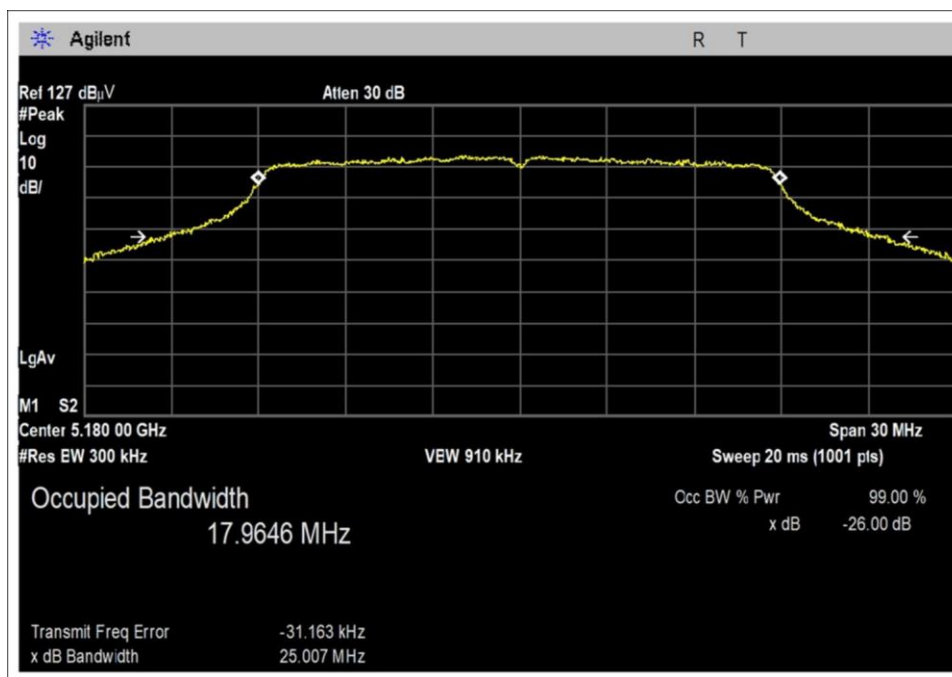


99p+26dB BW AP0

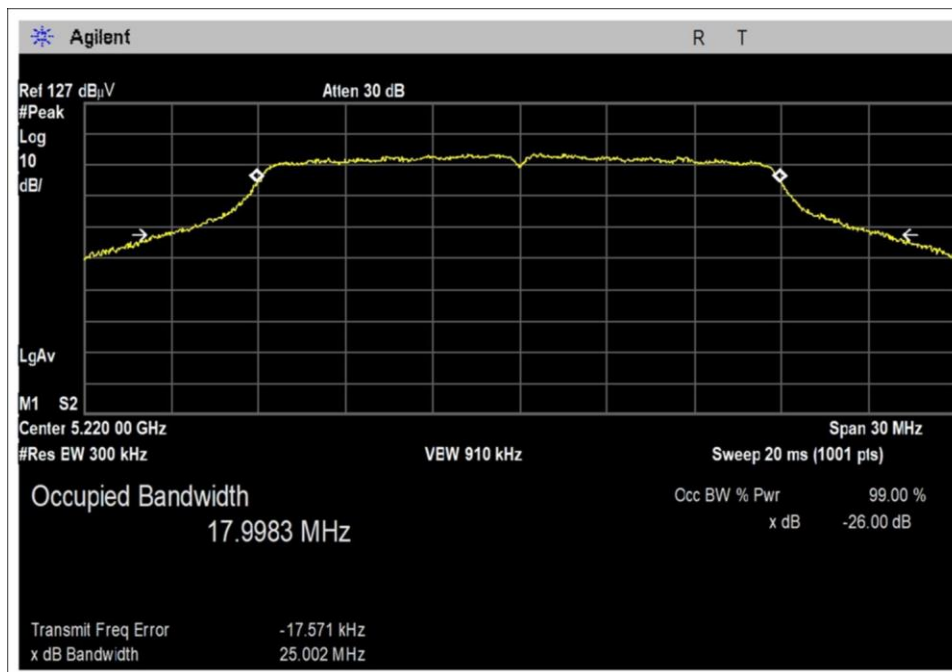


99p+26dB BW AP1

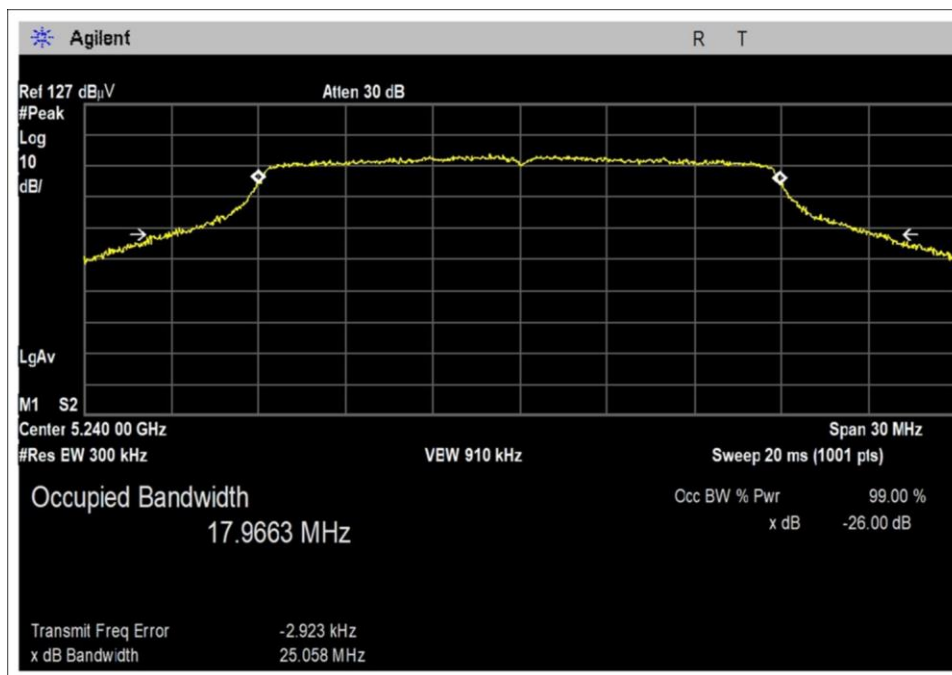
802.11n20 Plot(s)



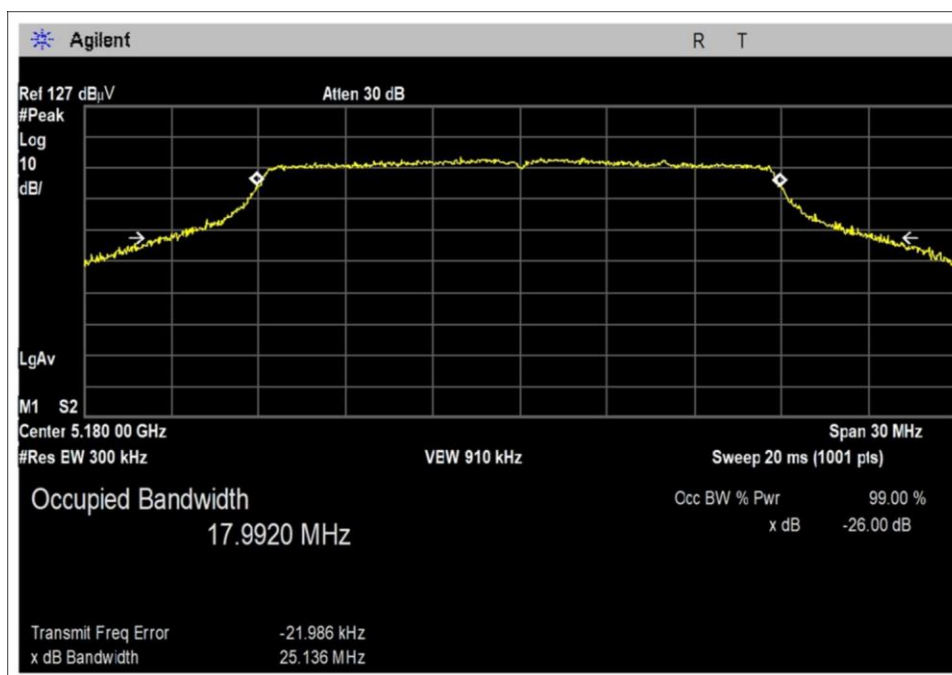
99p+26dB BW Low Channel AP0



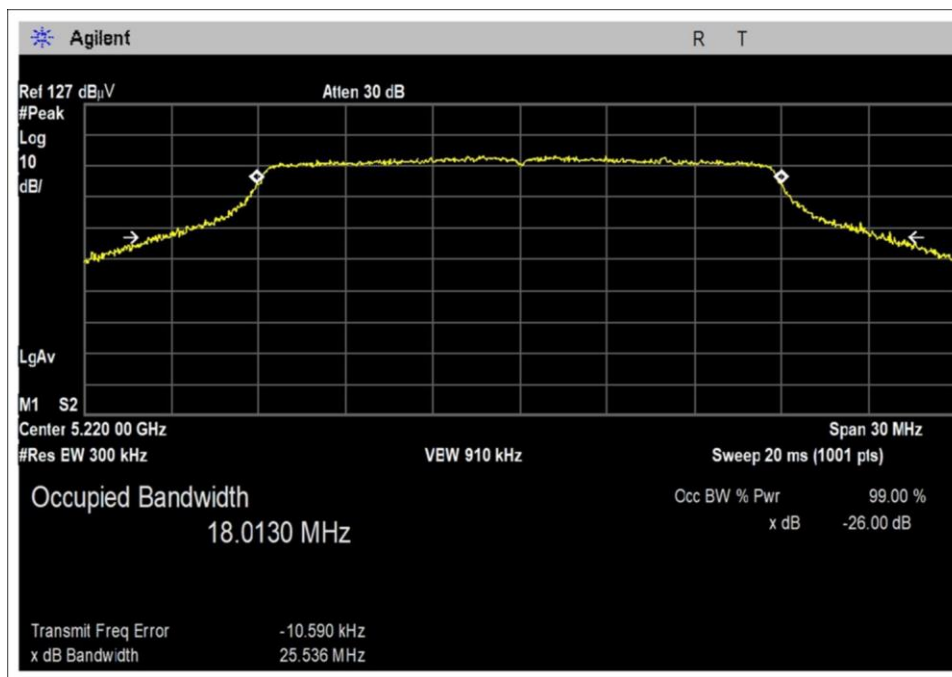
99p+26dB BW Middle Channel AP0



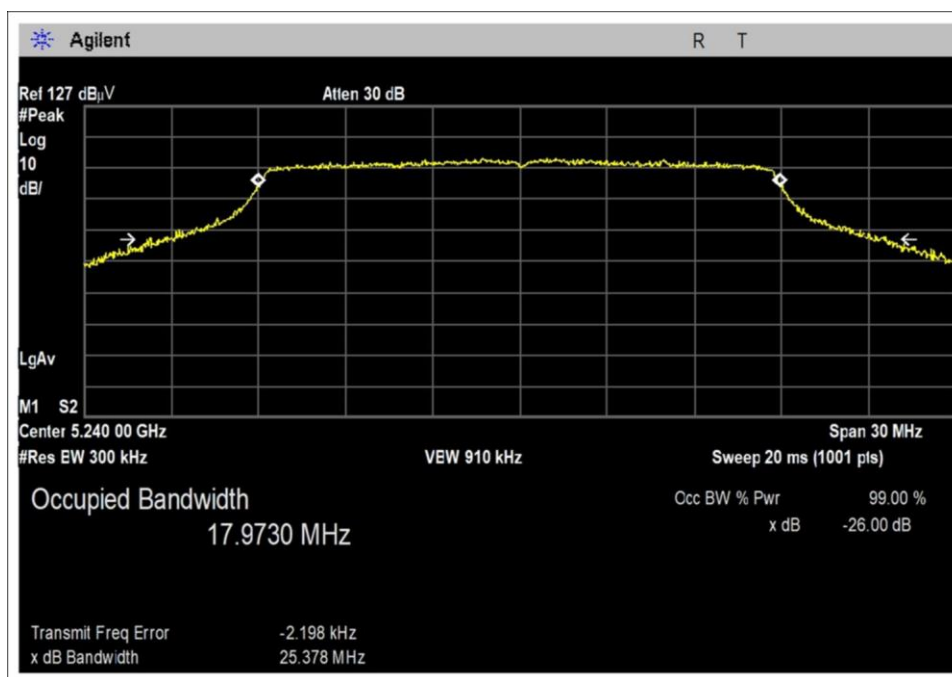
99p+26dB BW High Channel AP0



99p+26dB BW Low Channel AP1

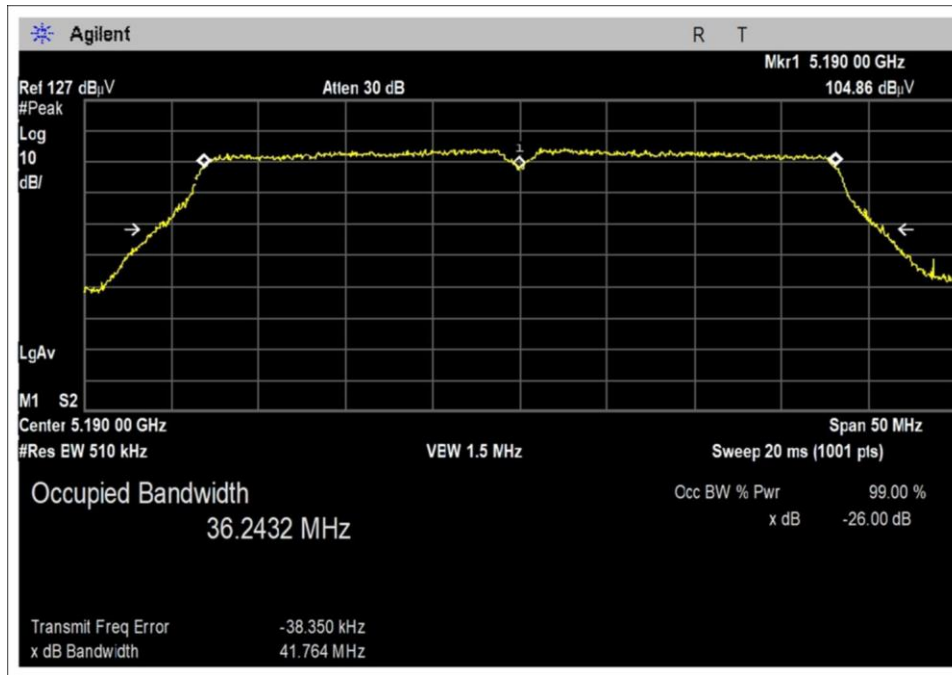


99p+26dB BW Middle Channel AP1

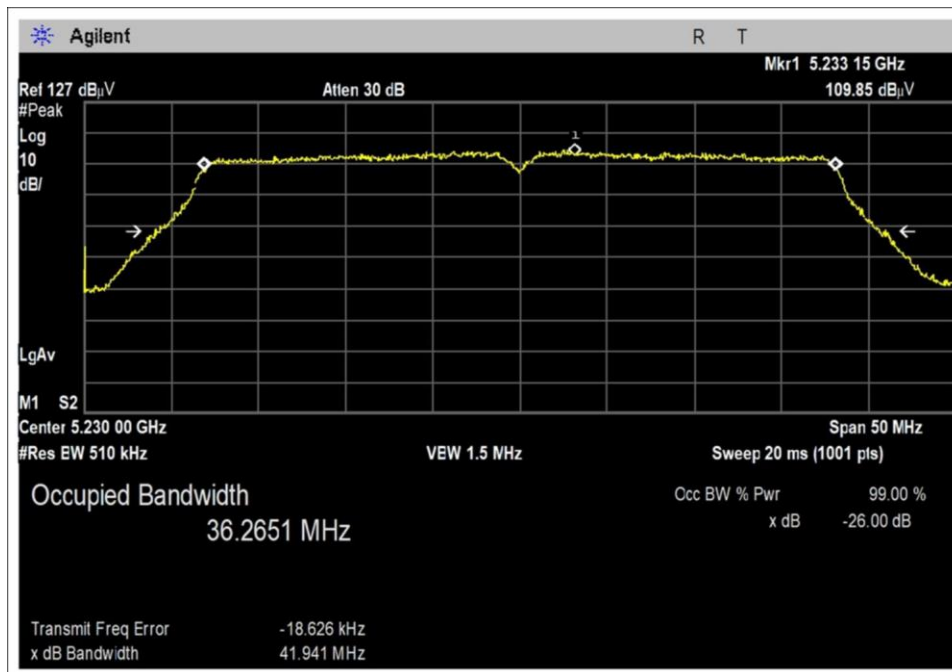


99p+26dB BW High Channel AP1

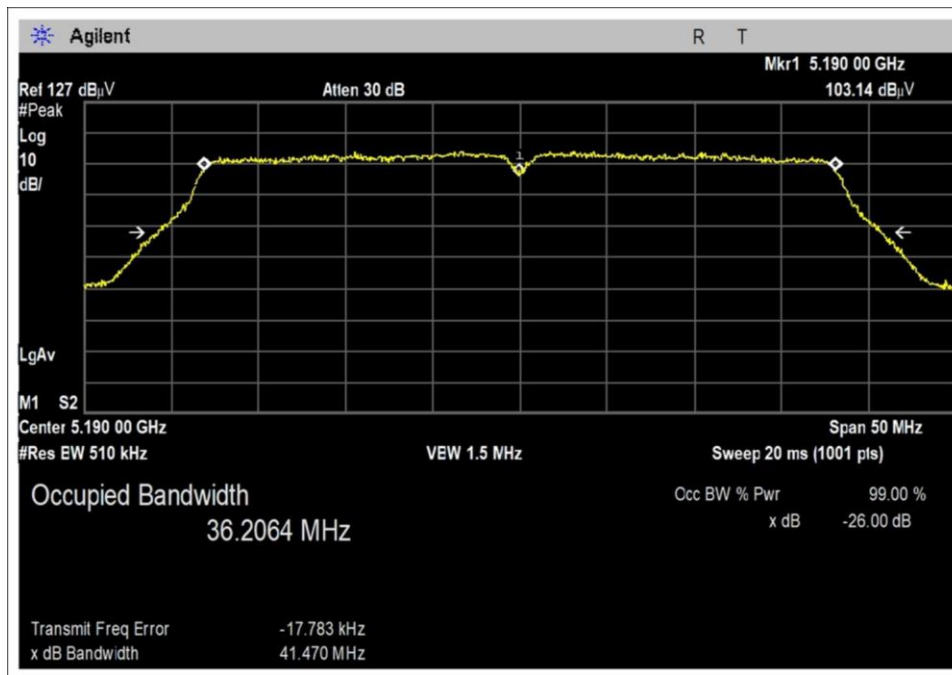
802.11n40 Plot(s)



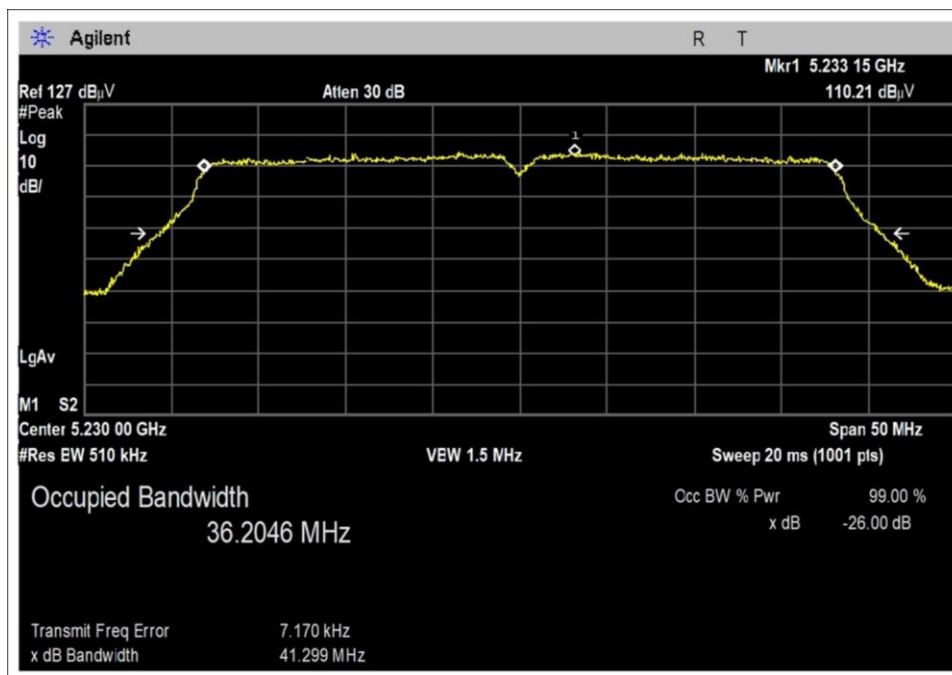
99p+26dB BW Low Channel AP0



99p+26dB BW High Channel AP0

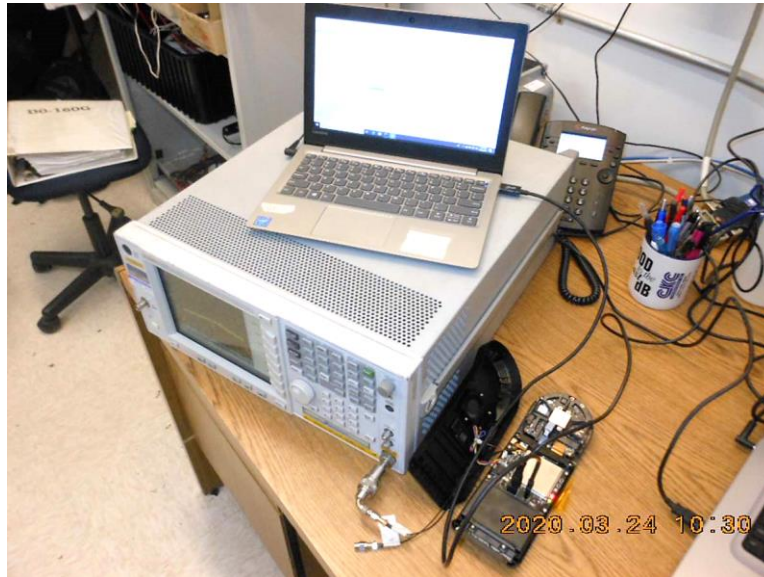


99p+26dB BW Low Channel AP1



99p+26dB BW High Channel AP1

Test Setup Photo(s)



15.407(a)(1) Output Power

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013), KDB 789033 (v02r01 December 14, 2017) KDB 662911 (v02r01 10/31/2013)	Test Date(s):	4/6/2020
Configuration:	1		
Test Setup:	Duty Cycle: 100% (Test Mode) Test Mode: Continuously transmitting Test Setup: EUT is transmitting through the antenna port connector and is attached to the Power Meter. 802.11n and 802.11ac are MIMO and summed using KDB662911 (E)(1)		

Environmental Conditions			
Temperature (°C)	20	Relative Humidity (%):	35

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
P05748	Attenuator	Pasternack	PE7004-20	3/4/2020	3/4/2022
03530	Power Sensor	ETS	7002-006	6/6/2019	6/6/2021
01318	Multimeter	Fluke	Fluke 85	7/22/2019	7/22/2021
P07527	Variac	Simpson	NA	11/21/2018	11/21/2020

Test Data Summary - Voltage Variations					
Frequency (MHz)	Modulation / Ant Port	V _{Minimum} (dBm)	V _{Nominal} (dBm)	V _{Maximum} (dBm)	Max Deviation from V _{Nominal} (dB)
5180	802.11a / 0	11.8	12	11.8	0.2
5220	802.11a / 0	11.2	11.2	11.1	0.1
5240	802.11a / 0	11.3	11.3	11.3	0
5180	802.11a / 1	11.6	11.6	11.6	0
5220	802.11a / 1	11.3	11.4	11.3	0.1
5240	802.11a / 1	11.3	11.3	11.3	0
5180	802.11n20 / 0	11.6	11.6	11.6	0
5220	802.11n20 / 0	11.4	11.4	11.4	0
5240	802.11n20 / 0	11.5	11.5	11.5	0
5180	802.11n20 / 1	11.5	11.5	11.5	0
5220	802.11n20 / 1	11.7	11.7	11.7	0
5240	802.11n20 / 1	11.4	11.4	11.4	0
5190	802.11n40 / 0	12.3	12.4	12.3	0.1
5230	802.11n40 / 0	12.1	12.1	12.1	0
5190	802.11n40 / 1	12.2	12.3	12.2	0.1
5230	802.11n40 / 1	12	12	12	0
5180	802.11ac20 / 0	11.9	12	11.9	0.1
5220	802.11ac20 / 0	11.5	11.5	11.5	0
5240	802.11ac20 / 0	11.5	11.5	11.5	0
5180	802.11ac20 / 1	11.8	11.8	11.8	0
5220	802.11ac20 / 1	11.7	11.7	11.7	0
5240	802.11ac20 / 1	11.2	11.2	11.2	0
5190	802.11ac40 / 0	10.8	10.8	10.8	0
5230	802.11ac40 / 0	10.9	10.9	10.9	0
5190	802.11ac40 / 1	11	11	11	0
5230	802.11ac40 / 1	11.1	11.1	11.1	0
5210	802.11ac80 / 0	10.6	10.6	10.6	0
5210	802.11ac80 / 1	10.7	10.7	10.7	0

Test performed using operational mode with the highest output power, representing worst case.

Parameter Definitions:

Measurements performed at input voltage V_{Nominal} ± 15%.

Parameter	Value
V _{Nominal} :	120
V _{Minimum} :	102
V _{Maximum} :	138

Test Data Summary - RF Conducted Measurement

Measurement Option: AVGPM

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
5180	802.11a / 0	Linear Polarized / 5.3	12	≤30	Pass
5220	802.11a / 0	Linear Polarized / 5.3	11.2	≤30	Pass
5240	802.11a / 0	Linear Polarized / 5.3	11.3	≤30	Pass
5180	802.11a / 1	Linear Polarized / 5.9	11.6	≤30	Pass
5220	802.11a / 1	Linear Polarized / 5.9	11.4	≤30	Pass
5240	802.11a / 1	Linear Polarized / 5.9	11.3	≤30	Pass

Test Data Summary - RF Conducted Measurement

Measurement Option: AVGPM

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Summed Power (dBm)	Limit (dBm)	Results
5180	802.11n20 / 0	Linear Polarized / 5.3	11.6	14.9	≤30	Pass
5180	802.11n20 / 1	Linear Polarized / 5.9	11.5			
5220	802.11n20 / 0	Linear Polarized / 5.3	11.4	14.6	≤30	Pass
5220	802.11n20 / 1	Linear Polarized / 5.9	11.7			
5240	802.11n20 / 0	Linear Polarized / 5.3	11.5	14.5	≤30	Pass
5240	802.11n20 / 1	Linear Polarized / 5.9	11.4			
5190	802.11n40 / 0	Linear Polarized / 5.3	12.4	15.4	≤30	Pass
5190	802.11n40 / 1	Linear Polarized / 5.9	12.3			
5230	802.11n40 / 0	Linear Polarized / 5.3	12.4	15.2	≤30	Pass
5230	802.11n40 / 1	Linear Polarized / 5.9	12			

Test Data Summary - RF Conducted Measurement

Measurement Option: AVGPM

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Summed Power (dBm)	Limit (dBm)	Results
5180	802.11ac20 / 0	Linear Polarized / 5.3	12	14.9	≤30	Pass
5180	802.11ac20 / 1	Linear Polarized / 5.9	11.8			
5220	802.11ac20 / 0	Linear Polarized / 5.3	11.5	14.6	≤30	Pass
5220	802.11ac20 / 1	Linear Polarized / 5.9	11.7			
5240	802.11ac20 / 0	Linear Polarized / 5.3	11.5	14.4	≤30	Pass
5240	802.11ac20 / 1	Linear Polarized / 5.9	11.2			
5190	802.11ac40 / 0	Linear Polarized / 5.3	10.8	13.9	≤30	Pass
5190	802.11ac40 / 1	Linear Polarized / 5.9	11			
5230	802.11ac40 / 0	Linear Polarized / 5.3	10.9	14.0	≤30	Pass
5230	802.11ac40 / 1	Linear Polarized / 5.9	11.1			
5210	802.11ac80 / 0	Linear Polarized / 5.3	10.6	13.7	≤30	Pass
5210	802.11ac80 / 1	Linear Polarized / 5.9	10.7			

For access points using antennas other than in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(i):

$$\text{Limit} = 30 - \text{Roundup}(G - 6)$$

For access points using antennas in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(ii):

$$\text{Limit} = 30 - \text{Roundup}(G - 23)$$

For client devices access points using antennas in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(iii):

$$\text{Limit} = 24 - \text{Roundup}(G - 6)$$

Test Setup Photo(s)



15.407(a)(1) Power Spectral Density

Test Setup/Conditions – RF Conducted Measurement			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013), KDB 789033 (v02r01 December 14, 2017) KDB 662911 (v02r01 10/31/2013)	Test Date(s):	4/8/2020
Configuration:	1		
Test Setup:	Duty Cycle: 100% (Test Mode) Test Mode: Continuously transmitting Test Setup: EUT is transmitting through the antenna port connector and is attached to the spectrum analyzer.		

Environmental Conditions			
Temperature (°C)	20	Relative Humidity (%):	40

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02673	Spectrum Analyzer	Agilent	E4446A	2/22/2019	2/22/2021

Test Data Summary - RF Conducted Measurement

Measurement Option: AVGSA-1

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm/MHz)	Limit (dBm/MHz)	Results
5180	802.11a / 0	Linear Polarized / 5.3	0.45	≤17	Pass
5220	802.11a / 0	Linear Polarized / 5.3	0.18	≤17	Pass
5240	802.11a / 0	Linear Polarized / 5.3	0.27	≤17	Pass
5180	802.11a / 1	Linear Polarized / 5.9	0.25	≤17	Pass
5220	802.11a / 1	Linear Polarized / 5.9	0.47	≤17	Pass
5240	802.11a / 1	Linear Polarized / 5.9	0.28	≤17	Pass

Test Data Summary - RF Conducted Measurement

802.11n and 802.11ac are MIMO and are Summed using KDB662911 (E)(2)(b)

Measurement Option: AVGPM

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Summed Power (dBm)	Limit (dBm)	Results
5180	802.11n20 / 0	Linear Polarized / 5.3	-0.23	2.9	≤17	Pass
5180	802.11n20 / 1	Linear Polarized / 5.9	-0.05			
5220	802.11n20 / 0	Linear Polarized / 5.3	-0.38	2.8	≤17	Pass
5220	802.11n20 / 1	Linear Polarized / 5.9	0.04			
5240	802.11n20 / 0	Linear Polarized / 5.3	-0.24	2.8	≤17	Pass
5240	802.11n20 / 1	Linear Polarized / 5.9	-0.15			
5190	802.11n40 / 0	Linear Polarized / 5.3	-3.11	-0.1	≤17	Pass
5190	802.11n40 / 1	Linear Polarized / 5.9	-3.15			
5230	802.11n40 / 0	Linear Polarized / 5.3	-3.17	0.0	≤30	Pass
5230	802.11n40 / 1	Linear Polarized / 5.9	-2.79			

Test Data Summary - RF Conducted Measurement

802.11n and 802.11ac are MIMO and are Summed using KDB662911 (E)(2)(b)

Measurement Option: AVGPM

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Summed Power (dBm)	Limit (dBm)	Results
5180	802.11ac20 / 0	Linear Polarized / 5.3	-0.01	2.9	≤17	Pass
5180	802.11ac20 / 1	Linear Polarized / 5.9	-0.25			
5220	802.11ac20 / 0	Linear Polarized / 5.3	-0.16	2.8	≤17	Pass
5220	802.11ac20 / 1	Linear Polarized / 5.9	-0.21			
5240	802.11ac20 / 0	Linear Polarized / 5.3	-0.14	2.9	≤17	Pass
5240	802.11ac20 / 1	Linear Polarized / 5.9	0.05			
5190	802.11ac40 / 0	Linear Polarized / 5.3	-2.83	0.2	≤17	Pass
5190	802.11ac40 / 1	Linear Polarized / 5.9	-2.76			
5230	802.11ac40 / 0	Linear Polarized / 5.3	-2.83	0.2	≤17	Pass
5230	802.11ac40 / 1	Linear Polarized / 5.9	-2.82			
5210	802.11ac80 / 0	Linear Polarized / 5.3	-7.04	3.8	≤17	Pass
5210	802.11ac80 / 1	Linear Polarized / 5.9	-6.54			

For access points using antennas other than in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(i):

$$\text{Limit} = 17 - \text{Roundup}(G - 6)$$

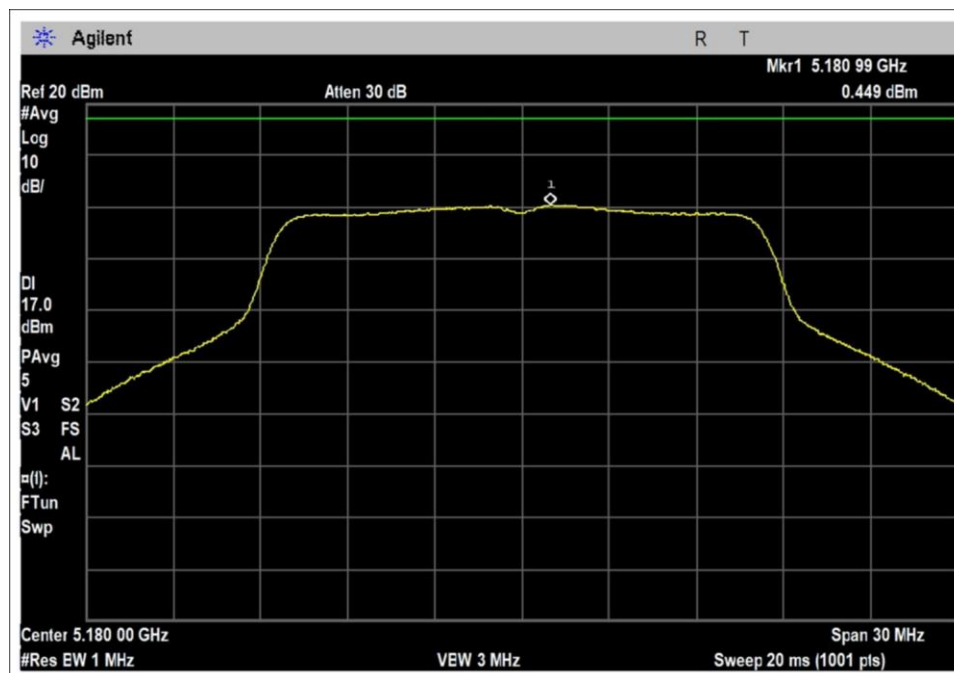
For access points using antennas in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(ii):

$$\text{Limit} = 17 - \text{Roundup}(G - 23)$$

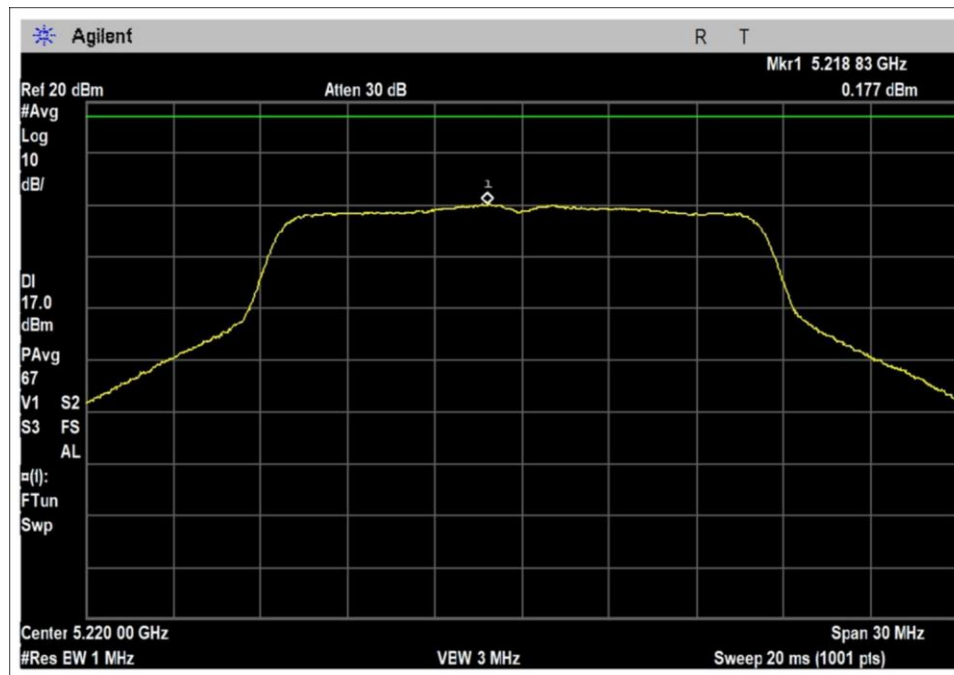
For client devices access points using antennas in fixed point-to-point applications, the limit is calculated in accordance with 15.407(a)(1)(iii):

RF Conducted

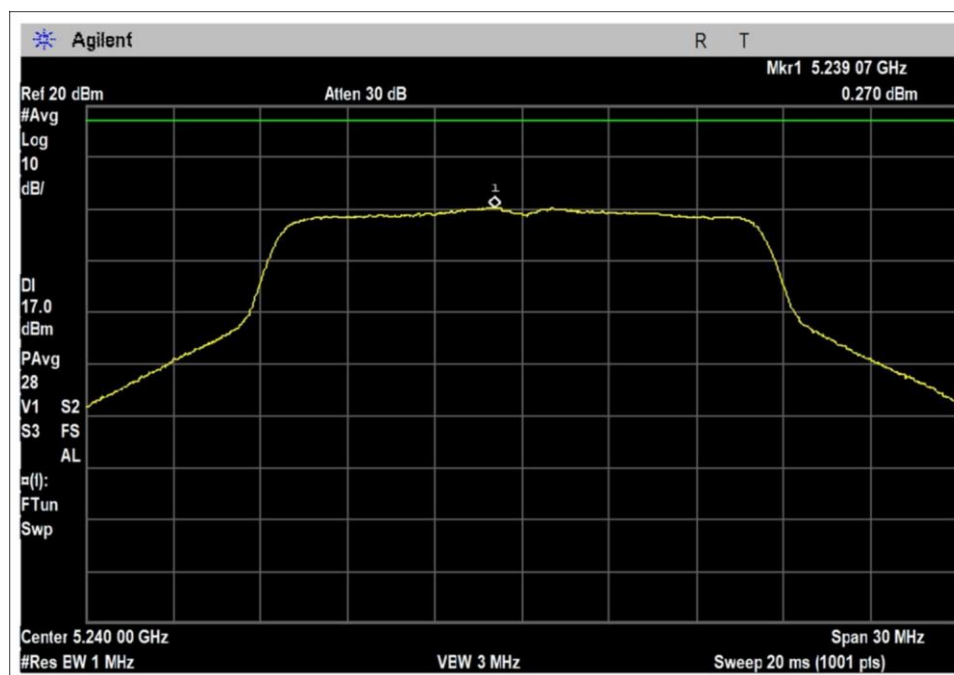
802.11a Test Plot(s)



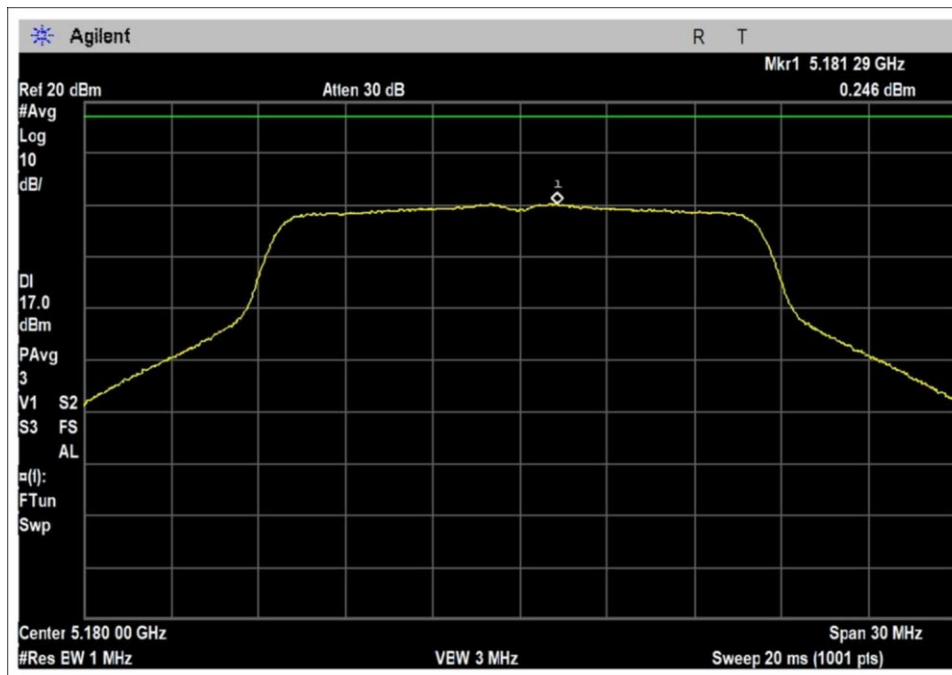
AP0 Low Channel



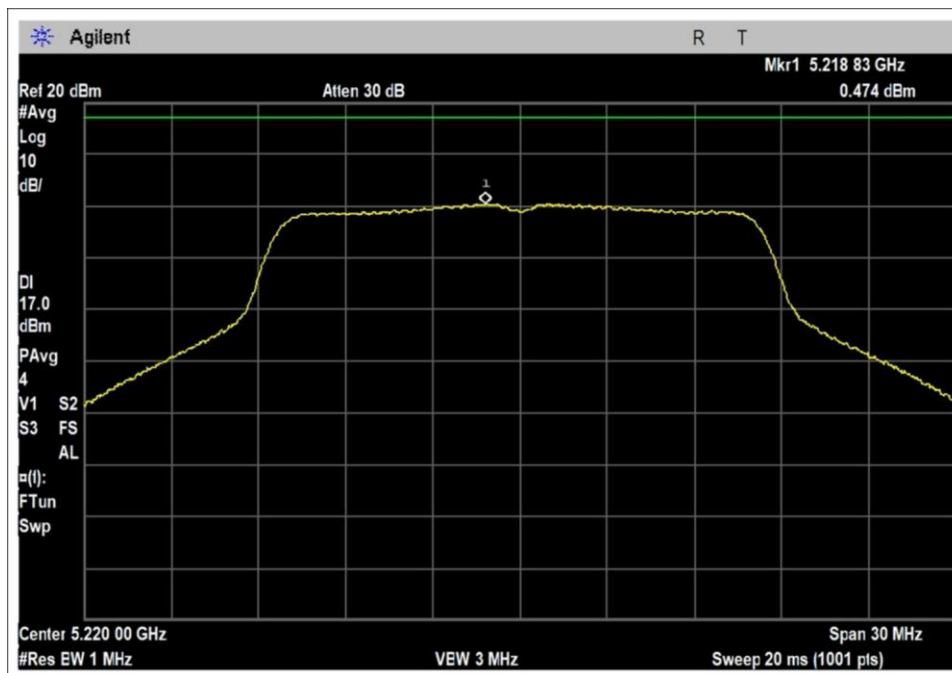
APO Middle Channel



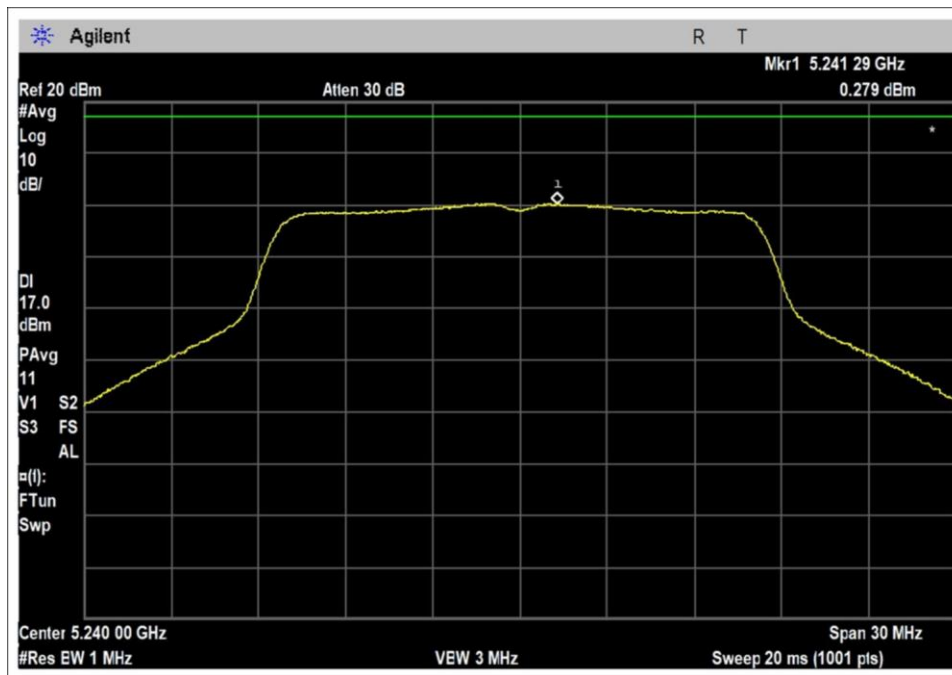
APO High Channel



AP1 Low Channel

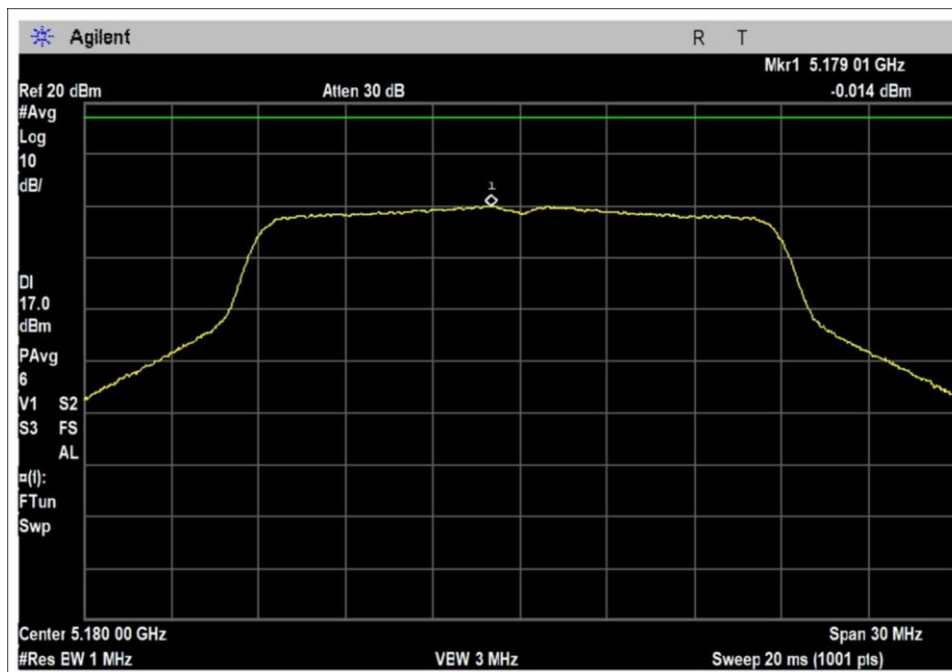


AP1 Middle Channel

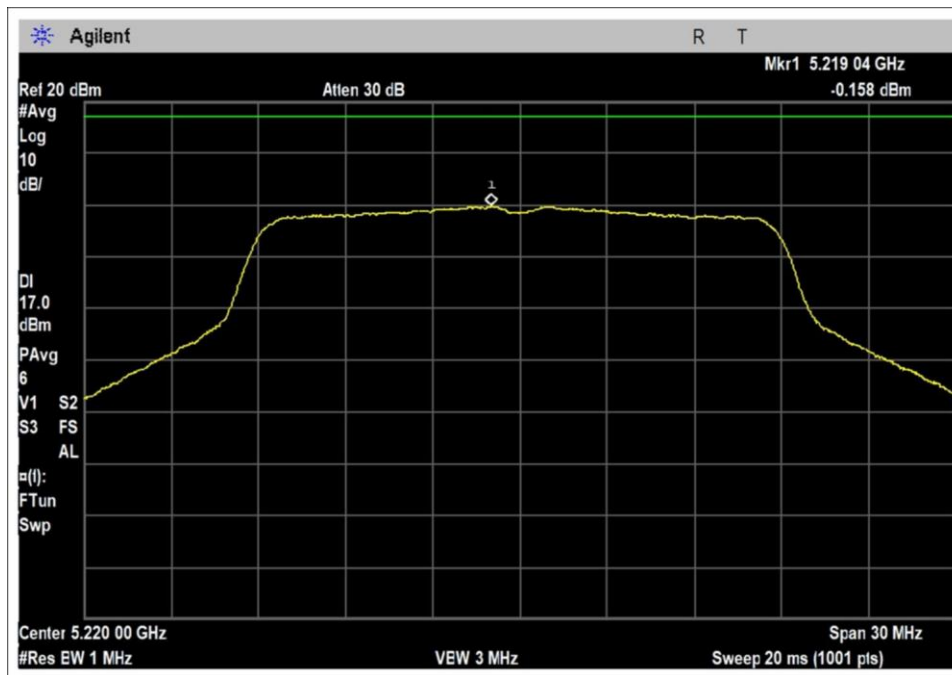


AP1 High Channel

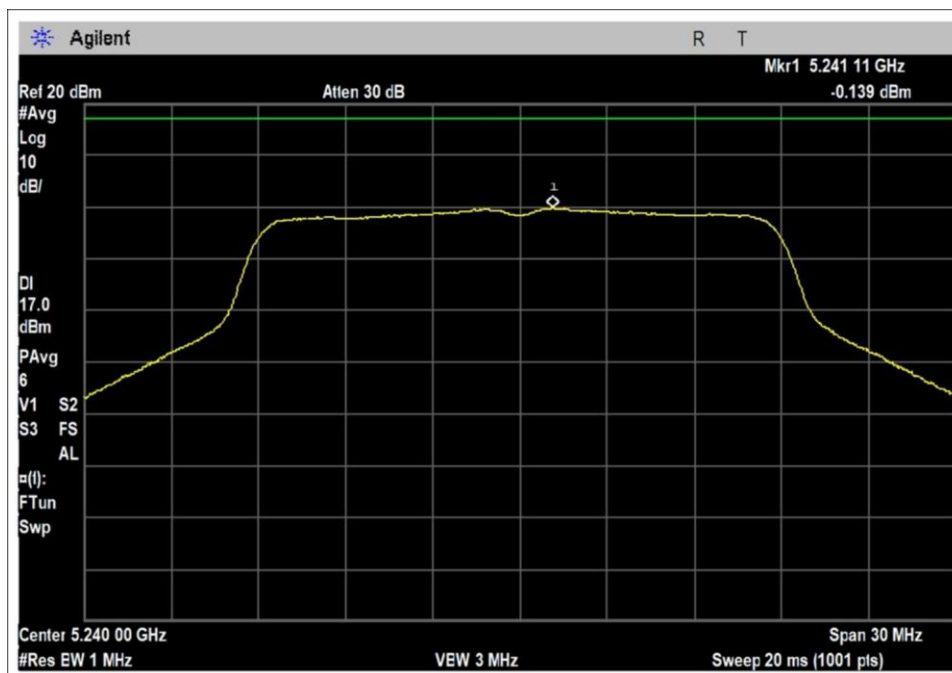
802.11ac20 Test Plot(s)



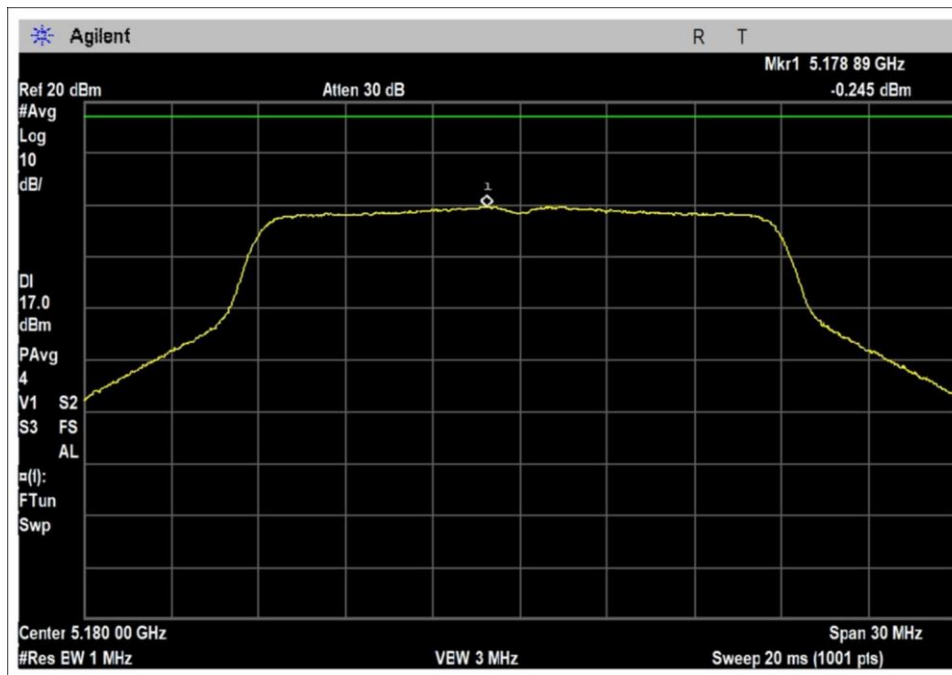
AP0 Low Channel



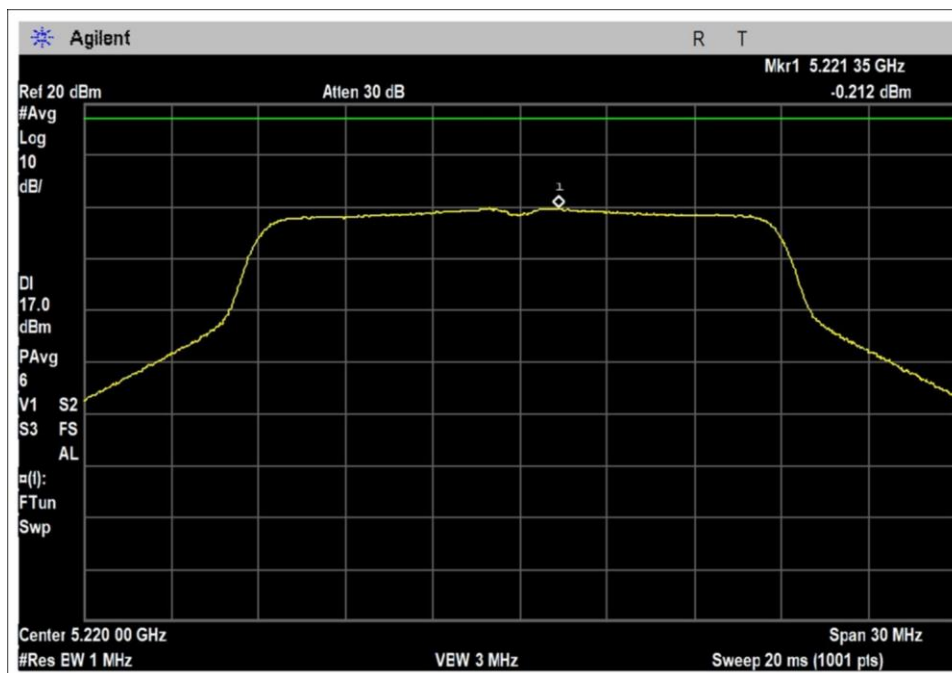
APO Middle Channel



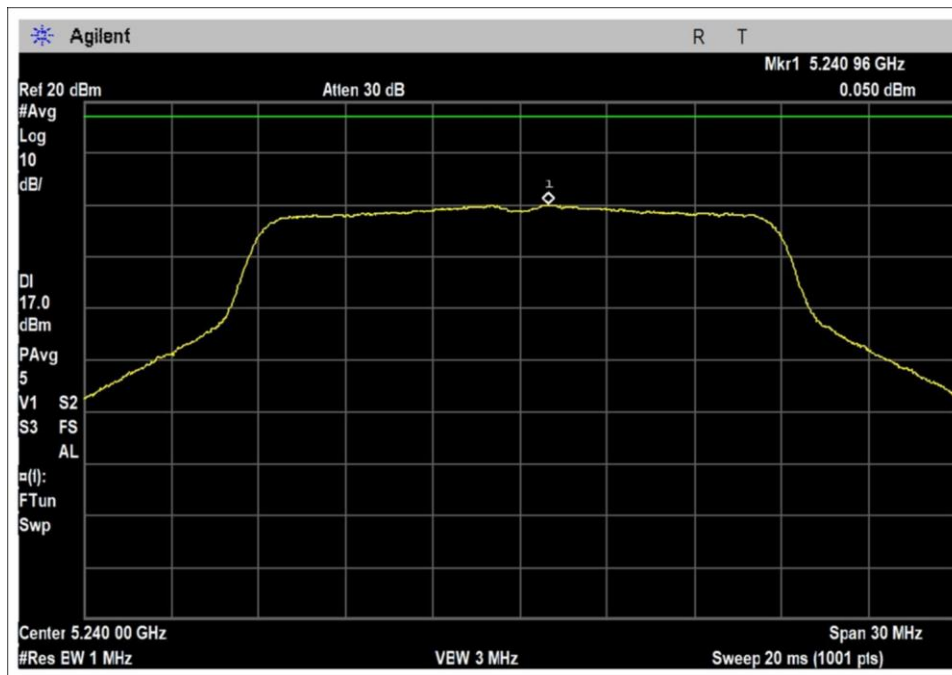
APO High Channel



AP1 Low Channel

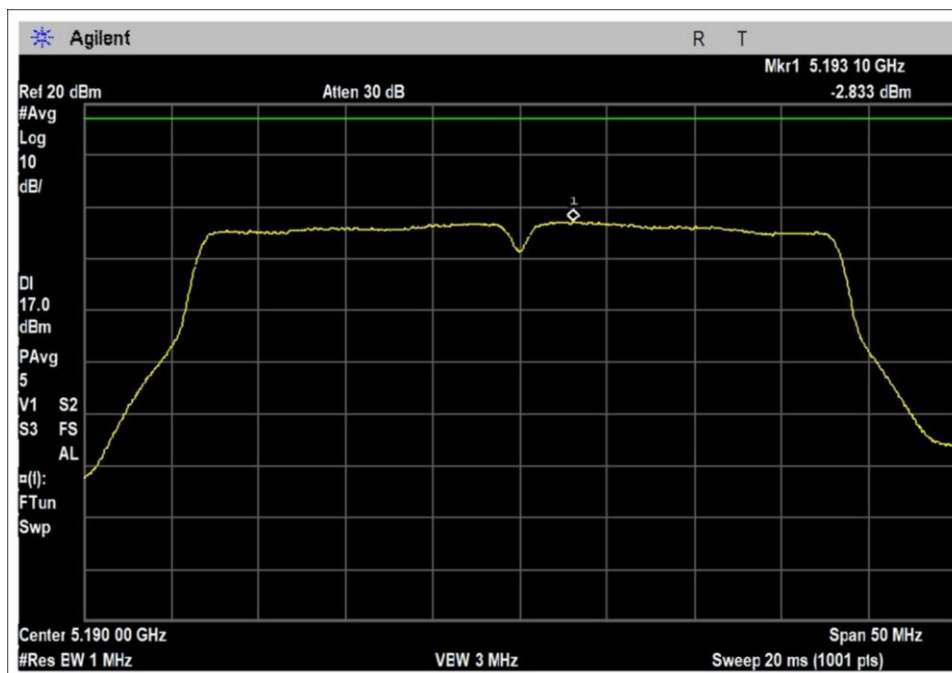


AP1 Middle Channel

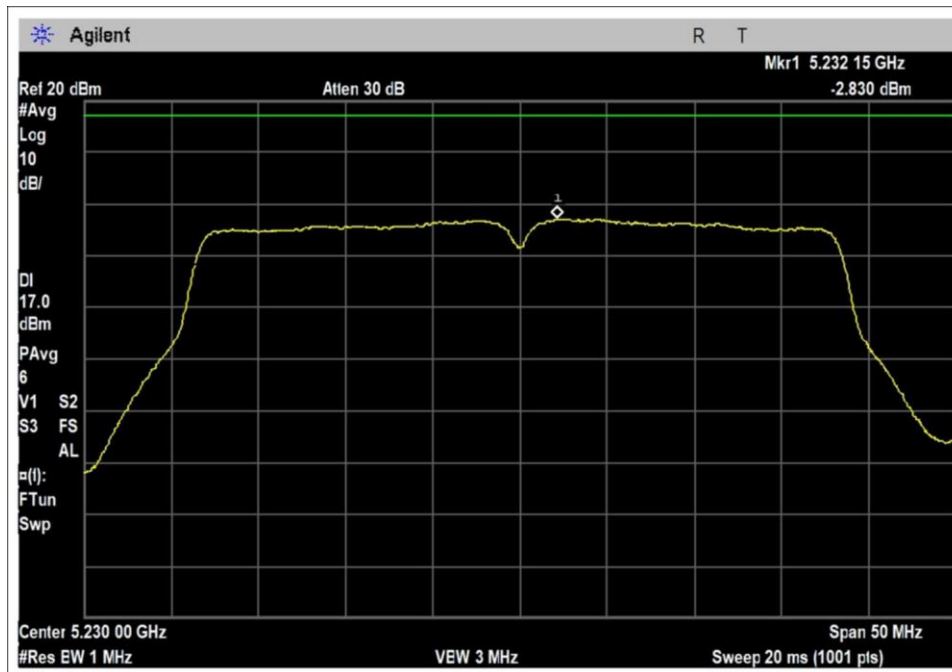


AP1 High Channel

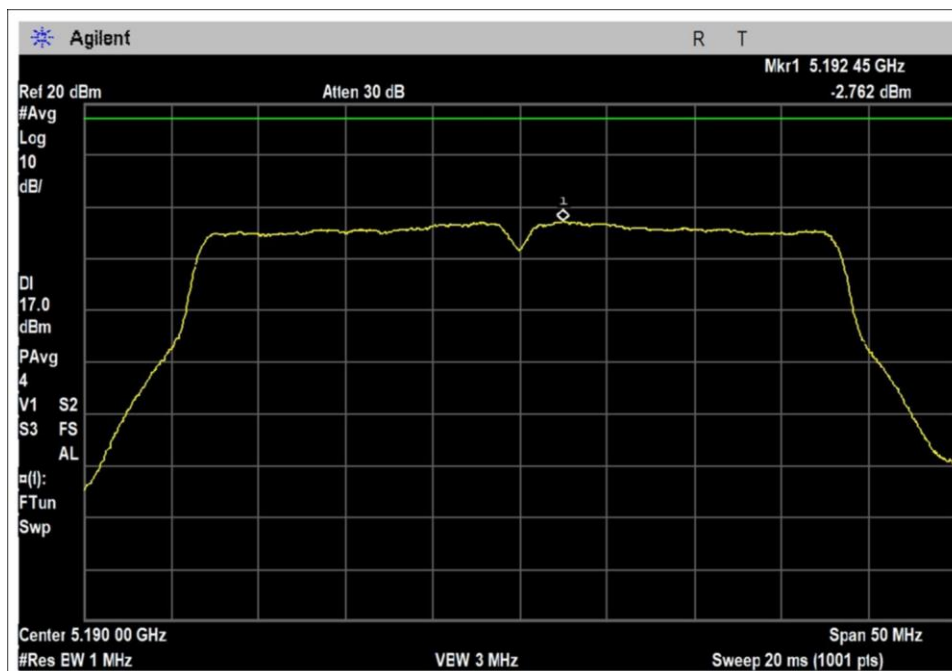
802.11ac40 Test Plot(s)



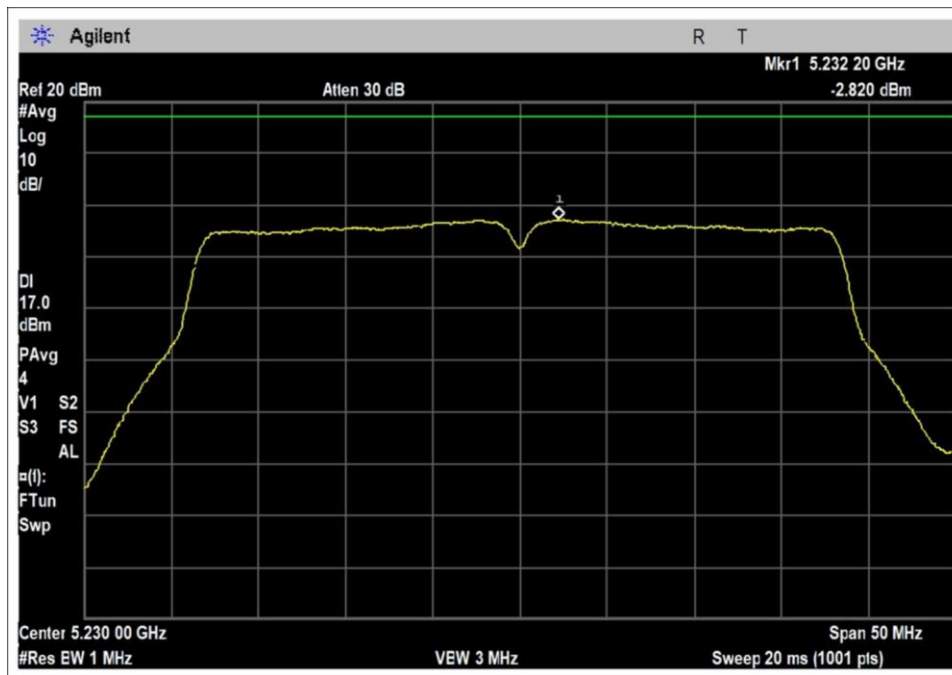
AP0 Low Channel



APO High Channel

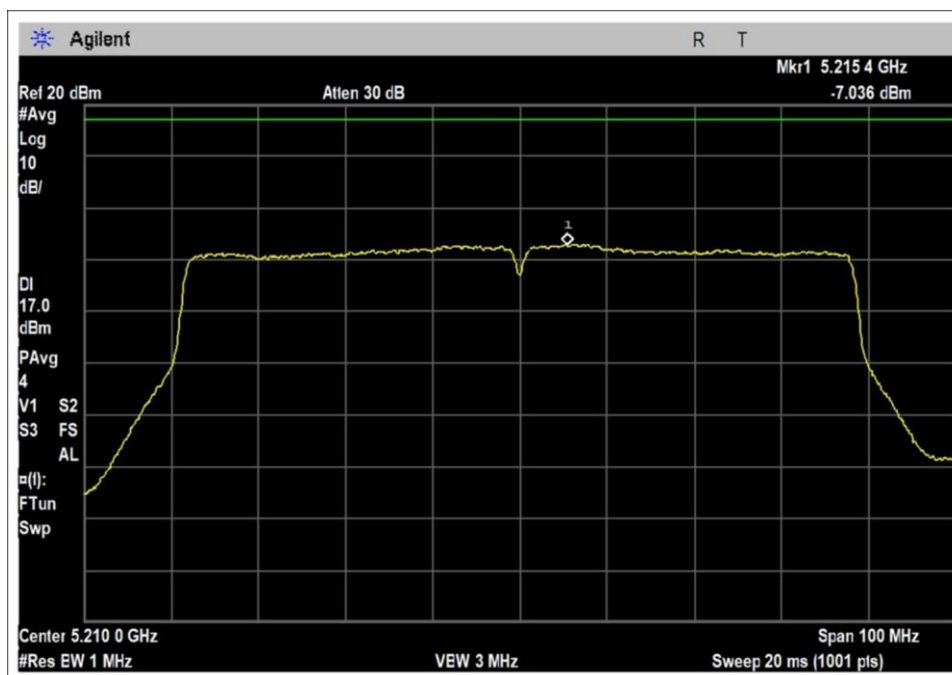


AP1 Low Channel

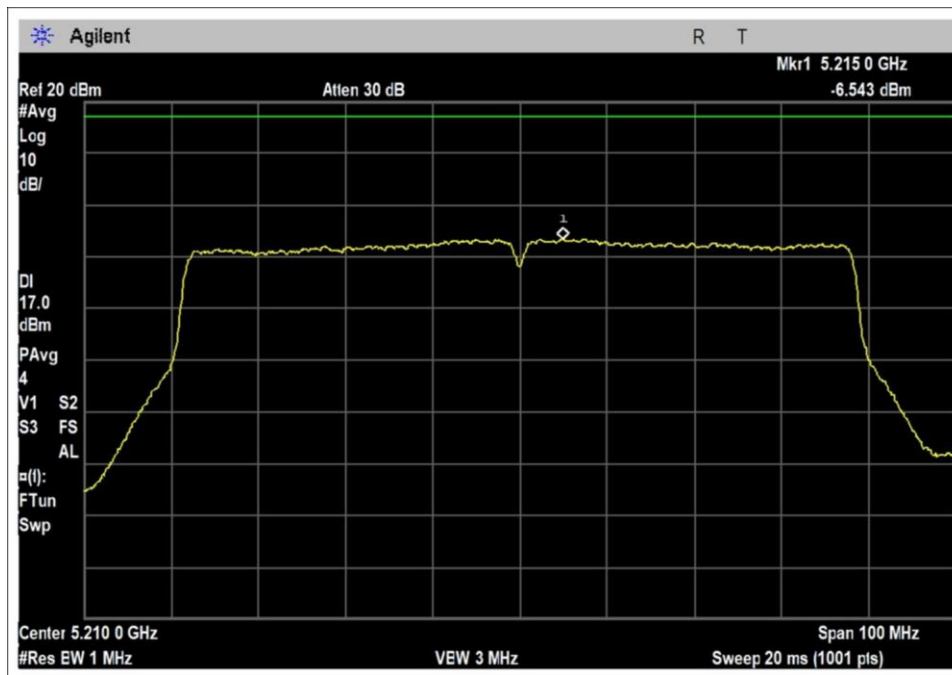


AP1 High Channel

802.11ac80 Test Plot(s)

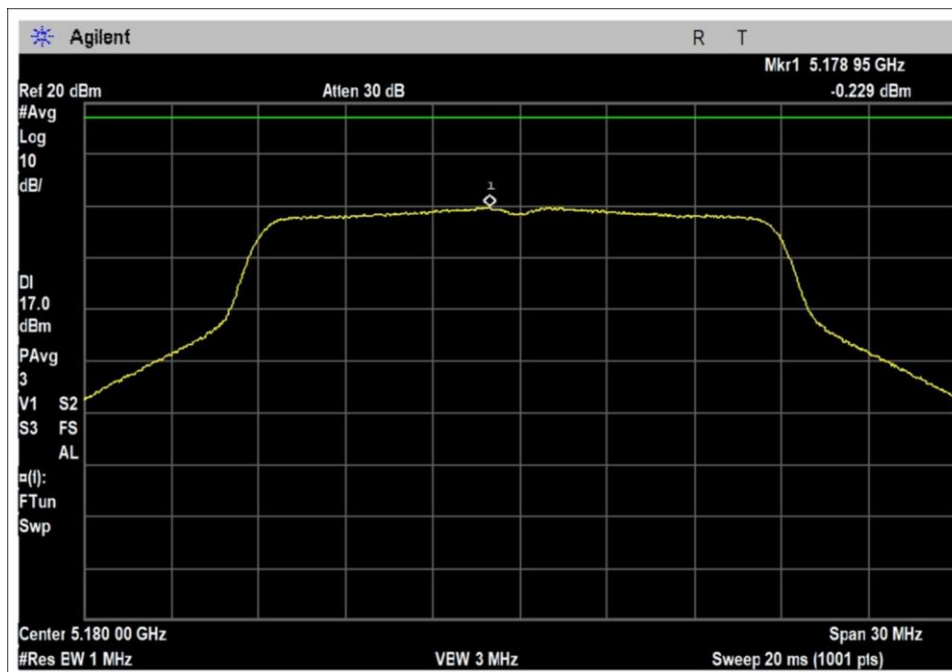


APO

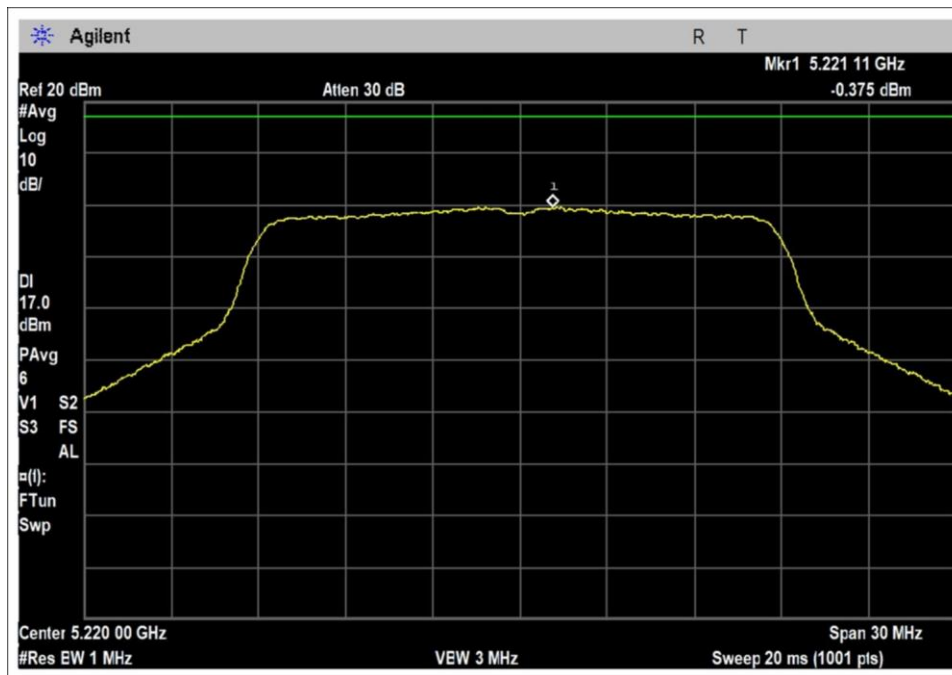


AP1

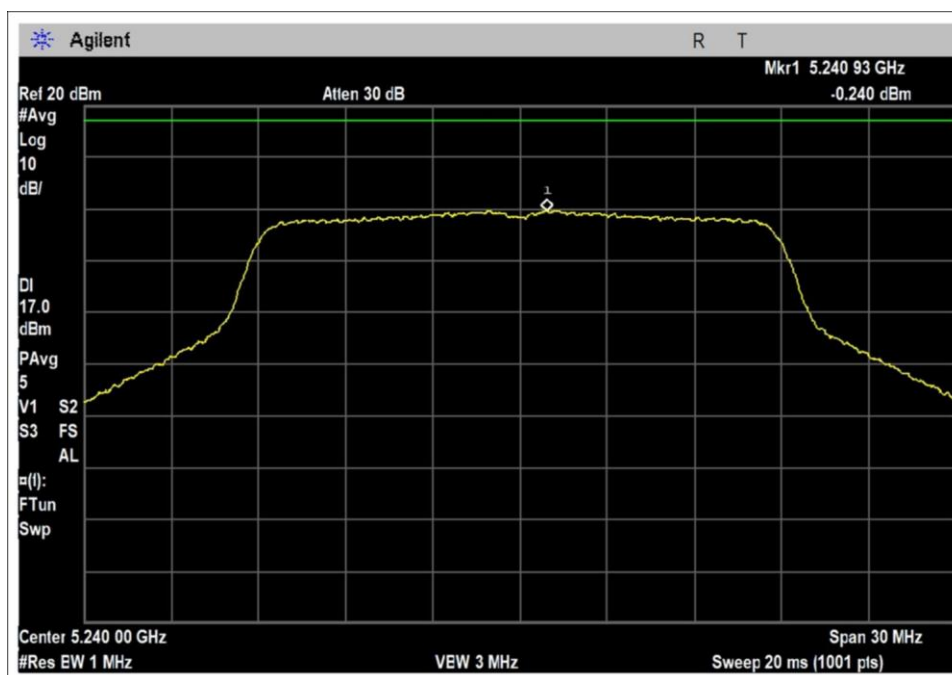
802.11n20 Test Plot(s)



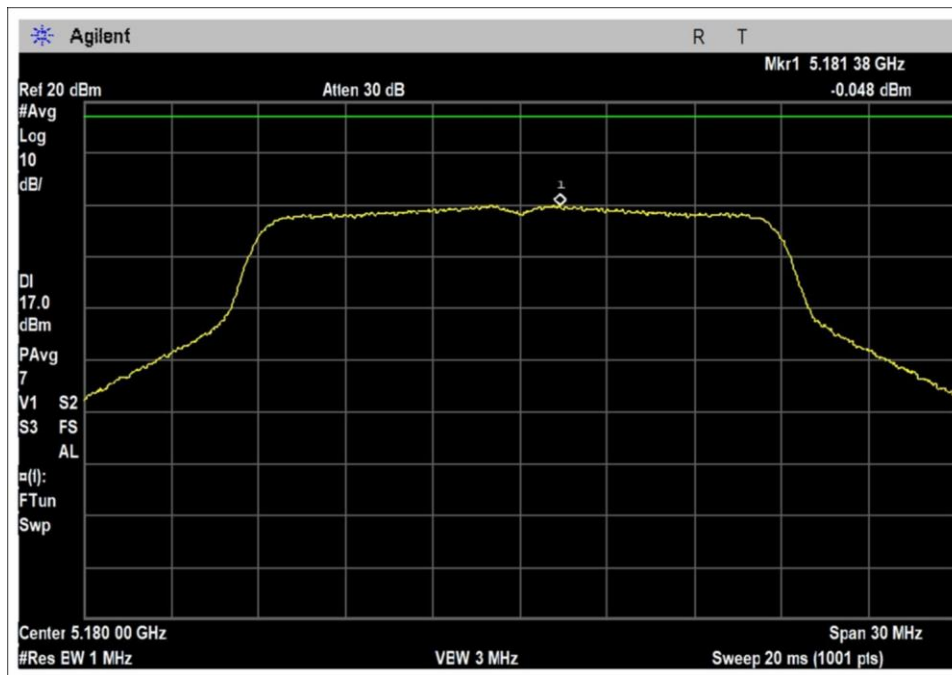
AP0 Low Channel



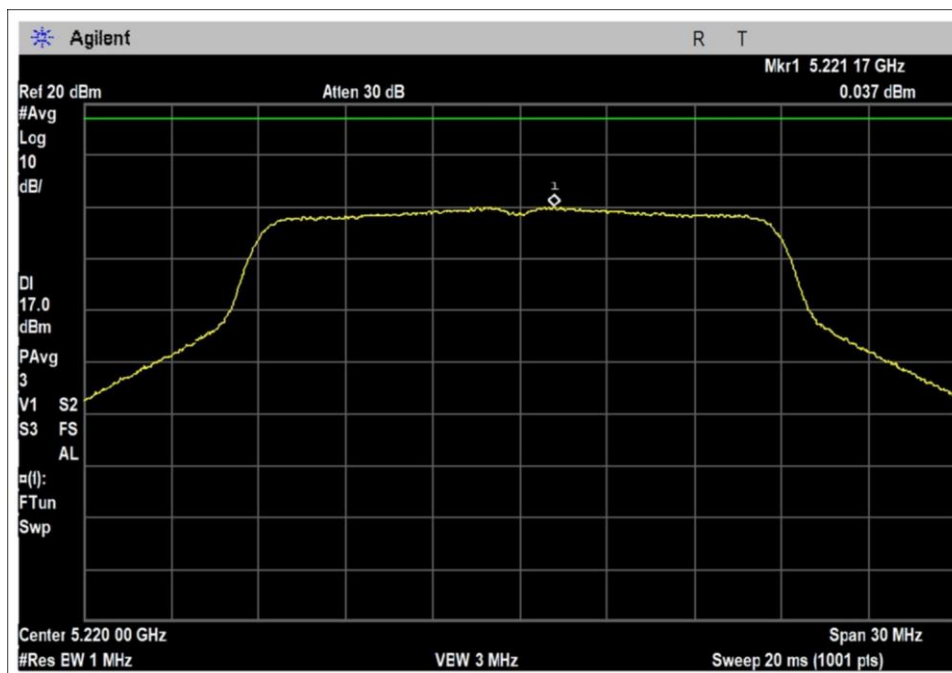
APO Middle Channel



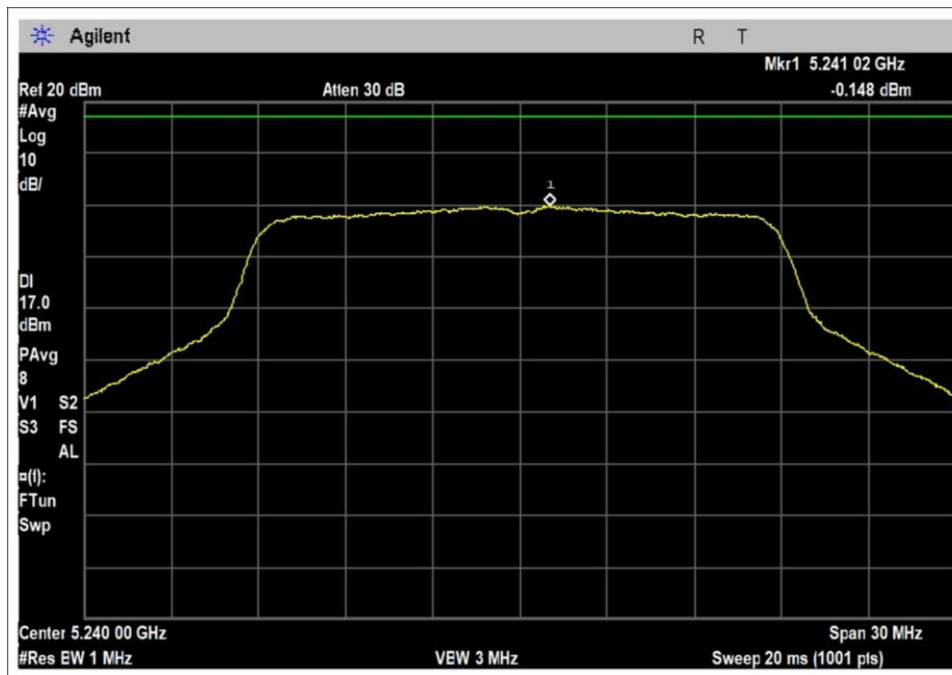
APO High Channel



AP1 Low Channel

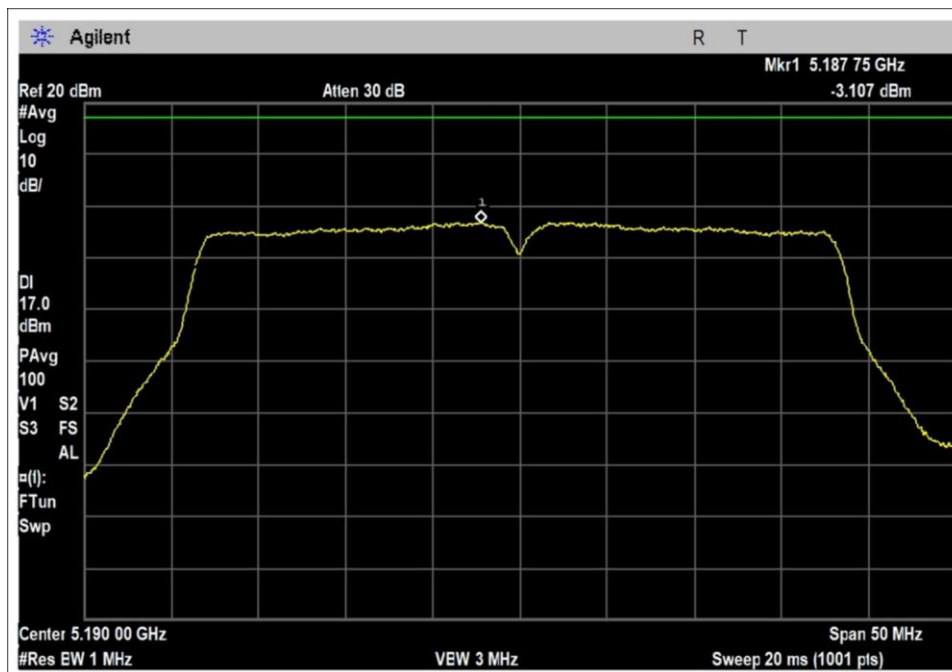


AP1 Middle Channel

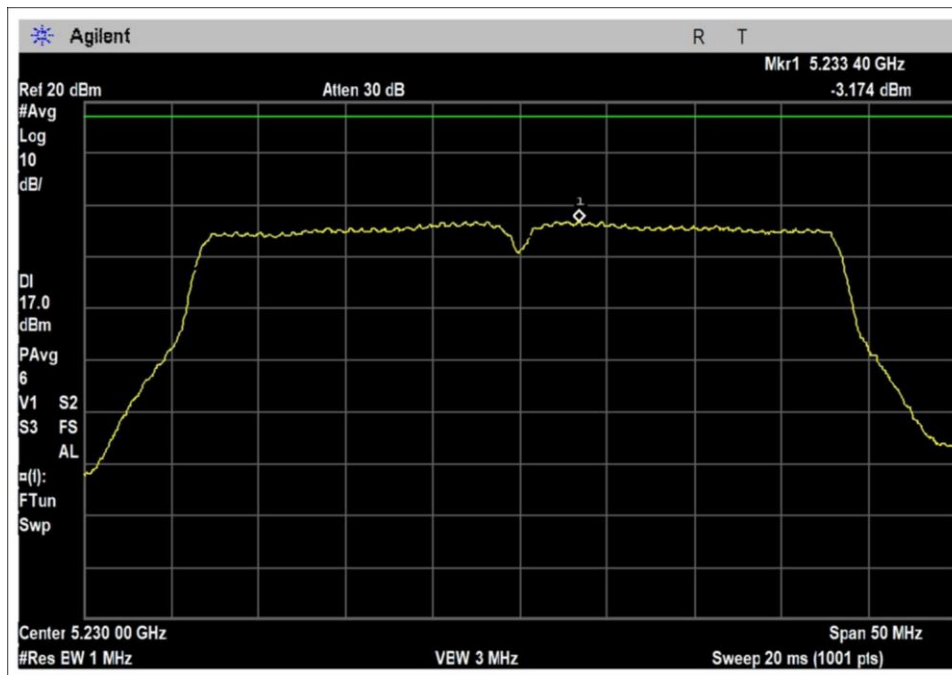


AP1 High Channel

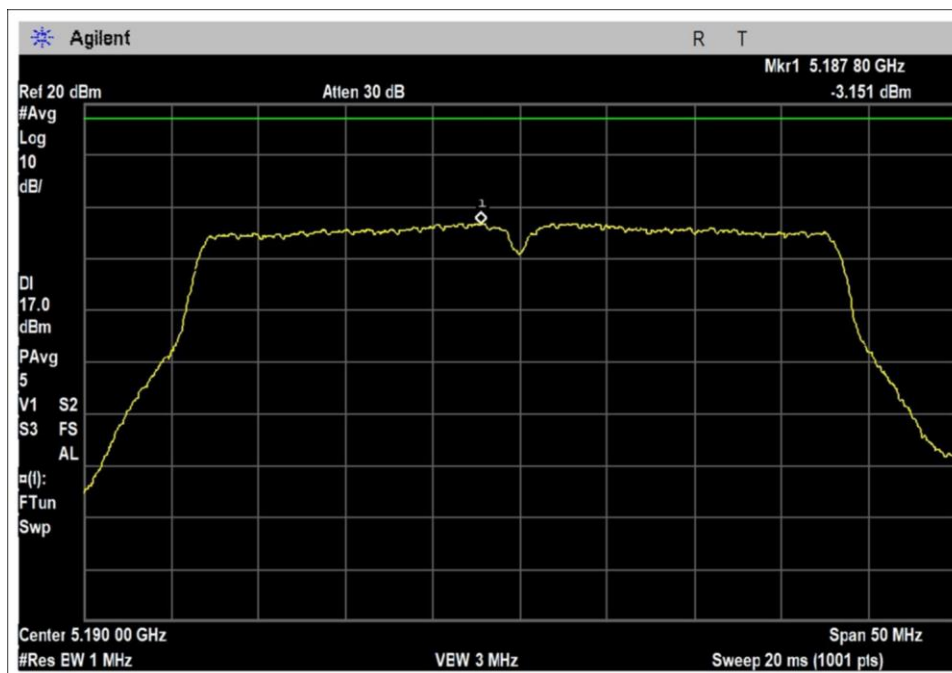
802.11n40 Test Plot(s)



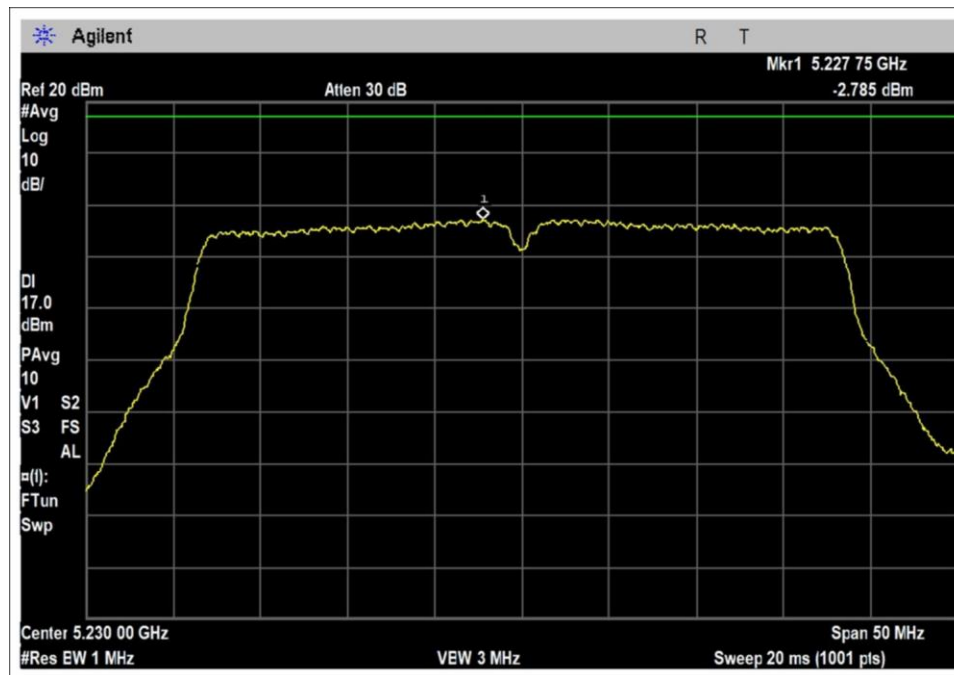
AP0 Low Channel



APO High Channel



AP1 Low Channel



AP1 High Channel

Test Setup Photo(s)



15.407(b) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013), KDB 789033 v02r01 December 14, 2017)	Test Date(s):	3/20/2020
Configuration:	1		
	(4) For transmitters operating in the 5.725-5.85 GHz band: (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. $E[dB\mu V/m] = EIRP[dBm] + 95.2$, for $d = 3$ m		

15.209 Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Nalloy, LLC.**
 Specification: **15.209 Radiated Emissions**
 Work Order #: **102802** Date: 4/2/2020
 Test Type: **Maximized Emissions** Time: 15:55:29
 Tested By: Matthew Harrison Sequence#: 27
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

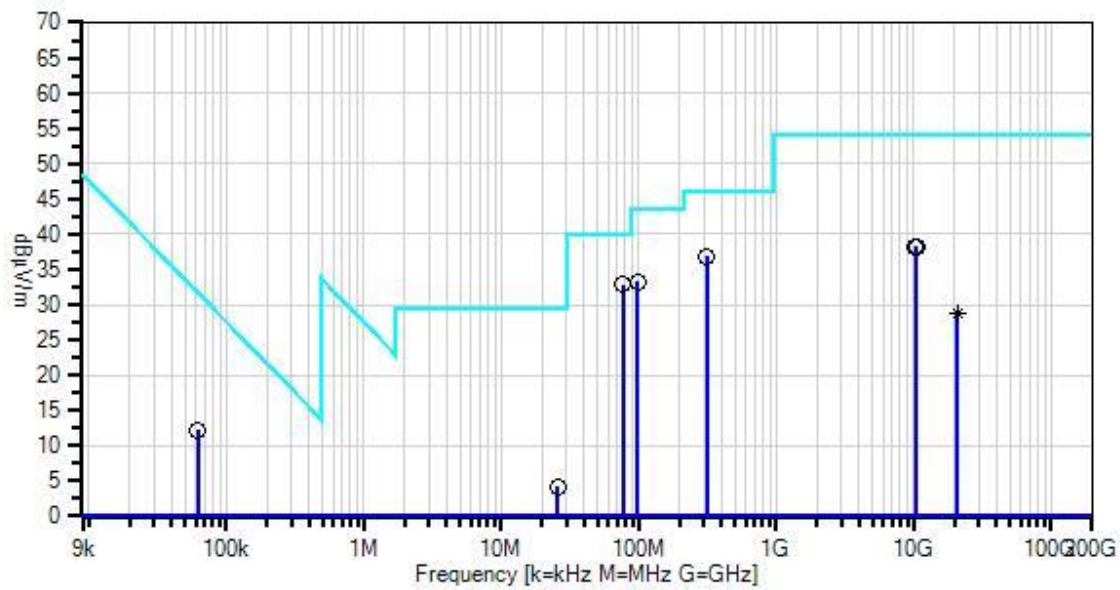
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Environmental Conditions: Temperature: 22° C Humidity: 45% Pressure: 101.3 kPa Frequency Range: 9kHz-40GHz Frequency tested: 5180, 5220, 5240 MHz Firmware power setting: 14 dBm EUT Firmware: Protocol /MCS/Modulation: 802.11a, 20MHz BW, 6Mbps(worst-case) Antenna type: Linear Polarized Antenna Gain: 5.9 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 KDB 789033 v02r01 December 14, 2017) Test Mode: Transmitting Test Setup: EUT is setup 1.5m high on a Styrofoam table. Modifications Added: None Setup: EUT is connected to a Laptop via USB and Audio cable. All data rates investigated, worst-case provided No emissions found above 26GHz

Nalloy, LLC. WO#: 102802 Sequence#: 27 Date: 4/2/2020
15.209 Radiated Emissions Test Distance: 3 Meters Perp



— Sweep Data
x QP Readings
Software Version: 5.03.12

— Readings
* Average Readings
— 1 - 15.209 Radiated Emissions

○ Peak Readings
▼ Ambient

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T1	ANP06515	Cable	Heliac	6/29/2018	6/29/2020
T2	ANP06540	Cable	Heliac	8/23/2019	8/23/2021
	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021
	AN03540	Preamplifier	83017A	5/13/2019	5/13/2021
	ANP07504	Cable	CLU40-KMKM-02.00F	1/17/2019	1/17/2021
T3	AN02741	Active Horn Antenna	AMFW-5F-12001800-20-10P	4/26/2019	4/26/2021
T4	AN02742	Active Horn Antenna	AMFW-5F-18002650-20-10P	10/16/2018	10/16/2020
T5	AN02763-69	Waveguide	Multiple	4/23/2018	4/23/2020
T6	ANP06678	Cable	32026-29801-29801-144	2/20/2020	2/20/2022
T7	ANP07211	Cable	32026-29801-29801-18	8/7/2019	8/7/2021
T8	ANP07212	Cable	32026-29801-29801-18	8/7/2019	8/7/2021
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021
	AN02743	Active Horn Antenna	AMFW-5F-260400-33-8P	4/26/2019	4/26/2021
	AN02764-70	Waveguide	Multiple	4/23/2018	4/23/2020
T9	AN02307	Preamplifier	8447D	1/10/2020	1/10/2022
T10	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T11	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T12	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T13	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T14	AN00052	Loop Antenna	6502	5/7/2018	5/7/2020

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9 T13	T2 T6 T10 T14	T3 T7 T11	T4 T8 T12	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	76.400M	46.9	+0.0 +0.0 -27.8 +0.5	+0.1 +0.0 +6.9 +0.0	+0.0 +0.0 +5.8	+0.0 +0.0 +0.4	+0.0	32.8	40.0	-7.2	Vert
2	314.700M	42.1	+0.0 +0.0 -27.1 +1.1	+0.2 +0.0 +13.8 +0.0	+0.0 +0.0 +5.8	+0.0 +0.0 +0.9	+0.0	36.8	46.0	-9.2	Horiz

3	98.500M	45.9	+0.0	+0.1	+0.0	+0.0	+0.0	33.2	43.5	-10.3	Vert
			+0.0	+0.0	+0.0	+0.0					
			-27.7	+8.0	+5.8	+0.5					
			+0.6	+0.0							
4	10445.070 M	42.7	+6.2	+1.4	-12.0	+0.0	+0.0	38.3	54.0	-15.7	Horiz
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
5	10364.590 M	42.8	+6.2	+1.3	-12.1	+0.0	+0.0	38.2	54.0	-15.8	Horiz
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
6	10480.330 M	42.4	+6.2	+1.4	-11.9	+0.0	+0.0	38.1	54.0	-15.9	Horiz
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
7	62.439k	42.5	+0.0	+0.0	+0.0	+0.0	-40.0	12.2	31.7	-19.5	Perp
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.7							
8	20720.000 M Ave	29.6	+0.0	+0.0	+0.0	-13.9	+0.0	28.9	54.0	-25.1	Horiz
			+1.9	+9.2	+0.9	+1.2					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
^	20720.000 M	44.6	+0.0	+0.0	+0.0	-13.9	+0.0	43.9	54.0	-10.1	Horiz
			+1.9	+9.2	+0.9	+1.2					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
10	25.821M	17.0	+0.3	+0.1	+0.0	+0.0	-20.0	4.2	29.5	-25.3	Perp
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+6.8							

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Nalloy, LLC.**
 Specification: **15.209 Radiated Emissions**
 Work Order #: **102802** Date: 4/2/2020
 Test Type: **Maximized Emissions** Time: 16:11:37
 Tested By: Matthew Harrison Sequence#: 30
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

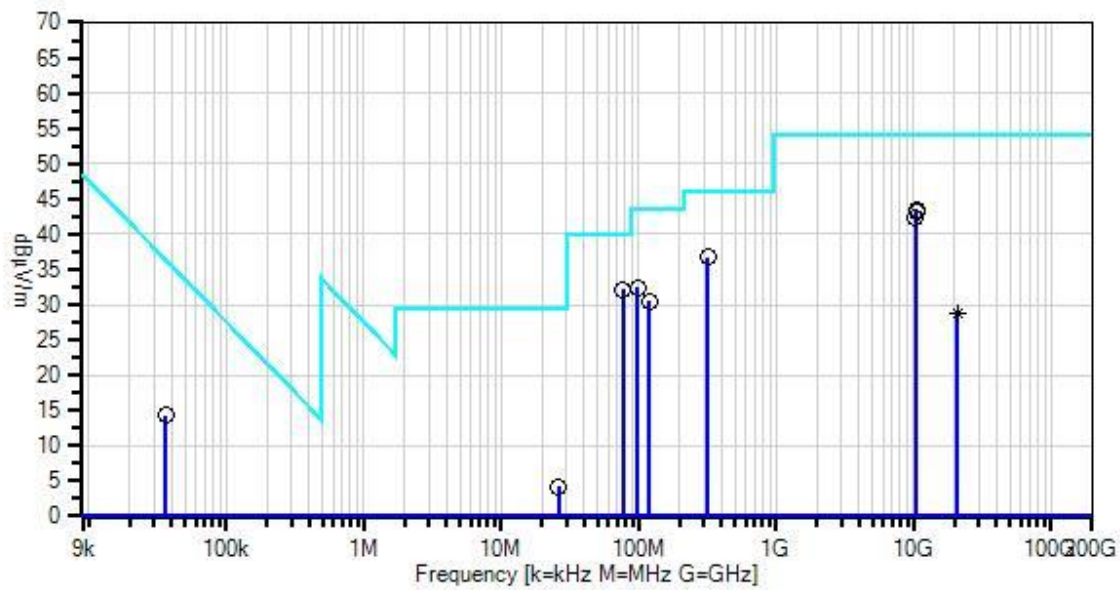
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Environmental Conditions: Temperature: 22° C Humidity: 45% Pressure: 101.3 kPa Frequency Range: 9kHz-40GHz Frequency tested: 5180, 5220, 5240 MHz Firmware power setting: 14 dBm EUT Firmware: Protocol /MCS/Modulation: 802.11ac, 20MHz BW, MCS0 (worst-case) Antenna type: Linear Polarized Antenna Gain: 5.9 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 KDB 789033 v02r01 December 14, 2017) Test Mode: Transmitting Test Setup: EUT is setup 1.5m high on a Styrofoam table. Modifications Added: None Setup: EUT is connected to a Laptop via USB and Audio cable. All data rates investigated, worst-case provided No emissions found above 26GHz
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Nalloy, LLC. WO#: 102802 Sequence#: 30 Date: 4/2/2020
15.209 Radiated Emissions Test Distance: 3 Meters Perp



— Sweep Data
x QP Readings
Software Version: 5.03.12

— Readings
* Average Readings
— 1 - 15.209 Radiated Emissions

○ Peak Readings
▼ Ambient