

Nalloy, LLC

REVISED TEST REPORT TO 102802-3

Model: PFAY0H

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247
(DTS 2400-2483.5 MHz)

Report No.: 102802-3A

Date of issue: June 24, 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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Customer Reference Number: 2D-03187704

Project Number: 102802

DATE OF EQUIPMENT RECEIPT:

March 18, 2020

DATE(S) OF TESTING:

March 18, 24 and 27, 2020
April 1-3, 2020

Revision History

Original: Testing of the Model: PFAY0H to FCC Part 15 Subpart C Section(s) 15.207 & 15.247 (DTS 2400-2483.5 MHz)

Revision A: To replace the Section 15.247(d) Conducted Spurious data and Section 15.247 (d) Radiated Spurious data due to limit changed -10dB. Added statement to Section 15.247(e) PSD to clarify measurement option and revised Section 15.247(b)(3) Power Input measurement option to AVGPM.

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 C - 15.247 (DTS)

Test Procedure	Description	Modifications	Results
15.247(a)(2)	6dB Bandwidth	NA	Pass
15.247(b)(3)	Output Power	NA	Pass
15.247(e)	Power Spectral Density	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	NA	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable

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:

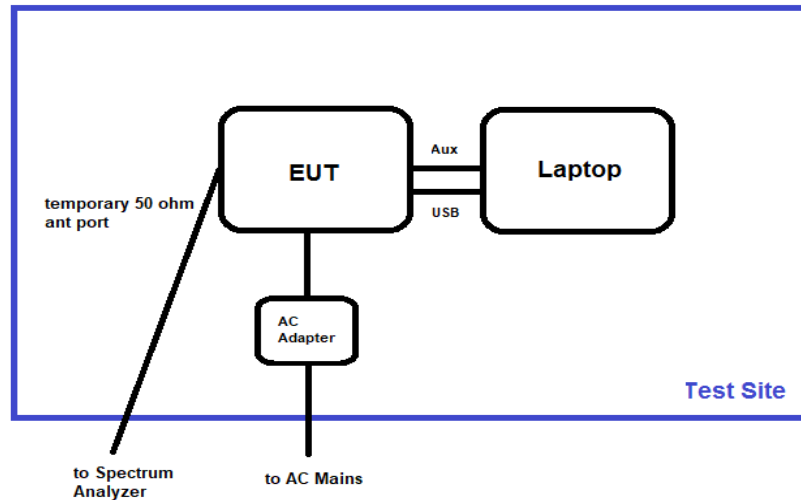
Device	Manufacturer	Model #	S/N
PC	Lenovo	81KT	YD07YGLG
PC PSU	Lenovo	ADL45WCC	NA
EUT PSU	Delta Electronics	MDS-030AAC15	24QW96P00CS

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	802.11b, 802.11g, 802.11n (20 and 40MHz BW)
Operating Frequency Range:	2412-2462 MHz
Modulation Type(s):	CCK, DBPSK/DQPSK+DSSS, BPSK, QPSK, 16-QAM, 64-QAM
Maximum Duty Cycle:	100% Modulated (tested worst-case)
Number of TX Chains:	1
Antenna Type(s) and Gain:	802.11b and 802.11g Linear Polarized / 3.7 dBi 802.11n802 MIMO with Antenna 0 Linear Polarized / 3.7dBi and Antenna 1 Linear Polarized / 3.6dBi
Beamforming Type:	NA
Antenna Connection Type:	Integral
Nominal Input Voltage:	120VAC
Firmware / Software used for Test:	ro.build.id=PKQ1.180819.001

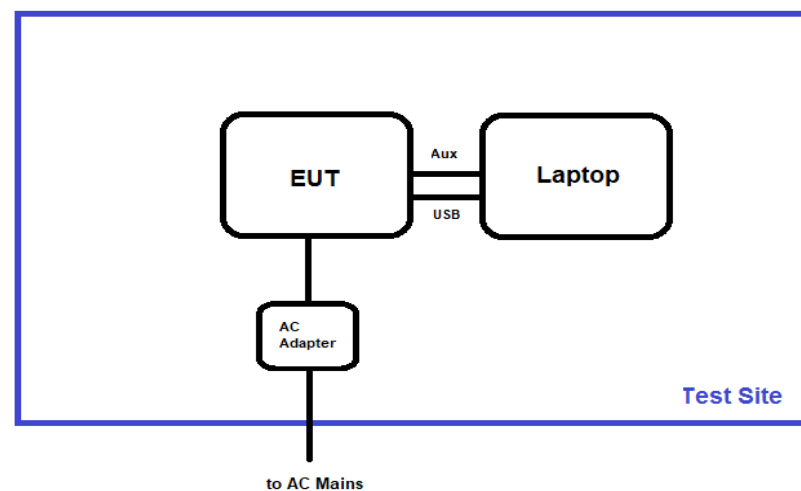
Block Diagram (s)

Test Setup Block Diagram



Tx Cond Ant Port

Test Setup Block Diagram



Tx with Antenna

FCC Part 15 Subpart C

15.247(a)(2) 6dB Bandwidth

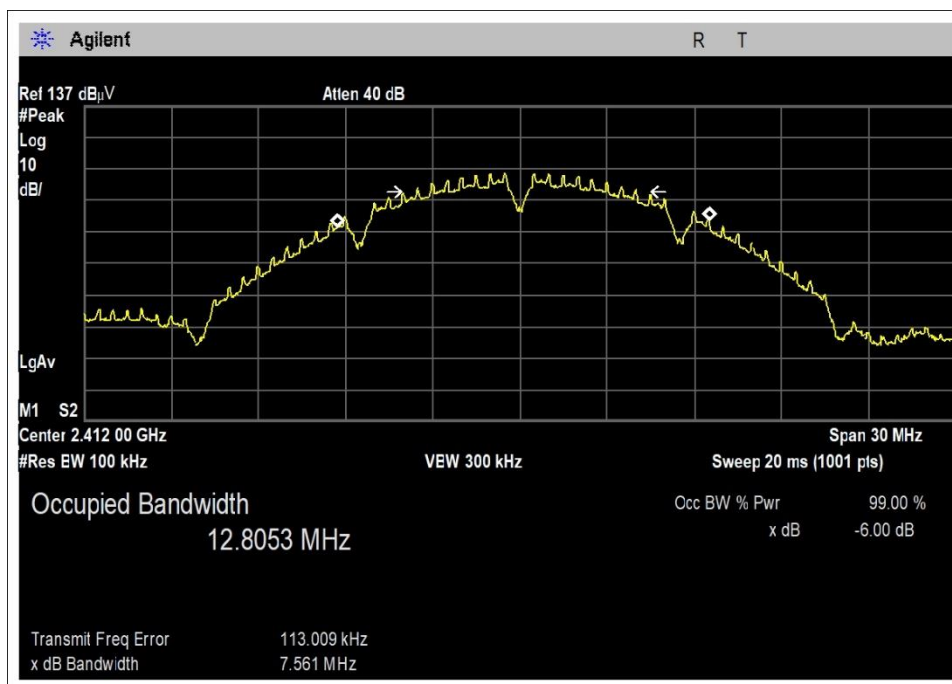
Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013), KDB 558074 (v05r02 APRIL 2, 2019) KDB 662911 (v02r01 10/31/2013)	Test Date(s):	3/24/2020
Configuration:	1		
Test Setup:	Duty Cycle: 100% (Test Mode) Test Mode: Continuously transmitting 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

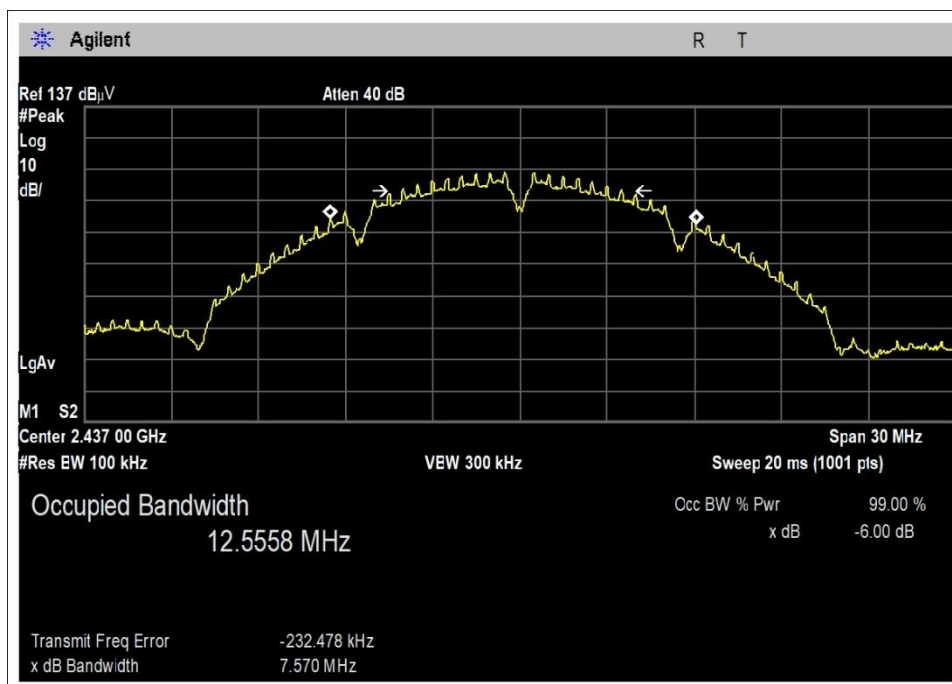
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02673	Spectrum Analyzer	Agilent	E4446A	2/22/2019	2/22/2021

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
2412	0	CCK	7561	≥500	Pass
2437	0	CCK	7570	≥500	Pass
2462	0	CCK	7579	≥500	Pass
2412	1	CCK	7571	≥500	Pass
2437	1	CCK	7563	≥500	Pass
2462	1	CCK	7572	≥500	Pass
2412	0	OFDM	16048	≥500	Pass
2437	0	OFDM	15736	≥500	Pass
2462	0	OFDM	15720	≥500	Pass
2412	1	OFDM	15746	≥500	Pass
2437	1	OFDM	15727	≥500	Pass
2462	1	OFDM	15460	≥500	Pass
2412	0	MCS (20M)	16365	≥500	Pass
2437	0	MCS (20M)	16345	≥500	Pass
2462	0	MCS (20M)	15965	≥500	Pass
2412	1	MCS (20M)	16350	≥500	Pass
2437	1	MCS (20M)	16202	≥500	Pass
2462	1	MCS (20M)	16552	≥500	Pass
2422	0	MCS (40M)	35111	≥500	Pass
2437	0	MCS (40M)	35129	≥500	Pass
2452	0	MCS (40M)	36371	≥500	Pass
2422	1	MCS (40M)	35140	≥500	Pass
2437	1	MCS (40M)	35139	≥500	Pass
2452	1	MCS (40M)	36058	≥500	Pass

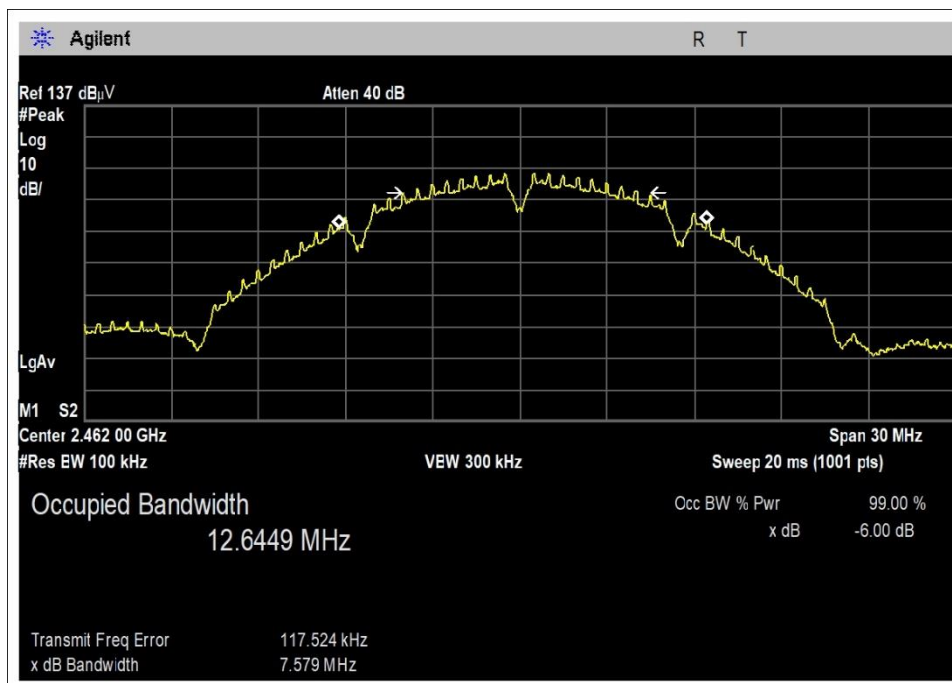
802.11b Plot(s)



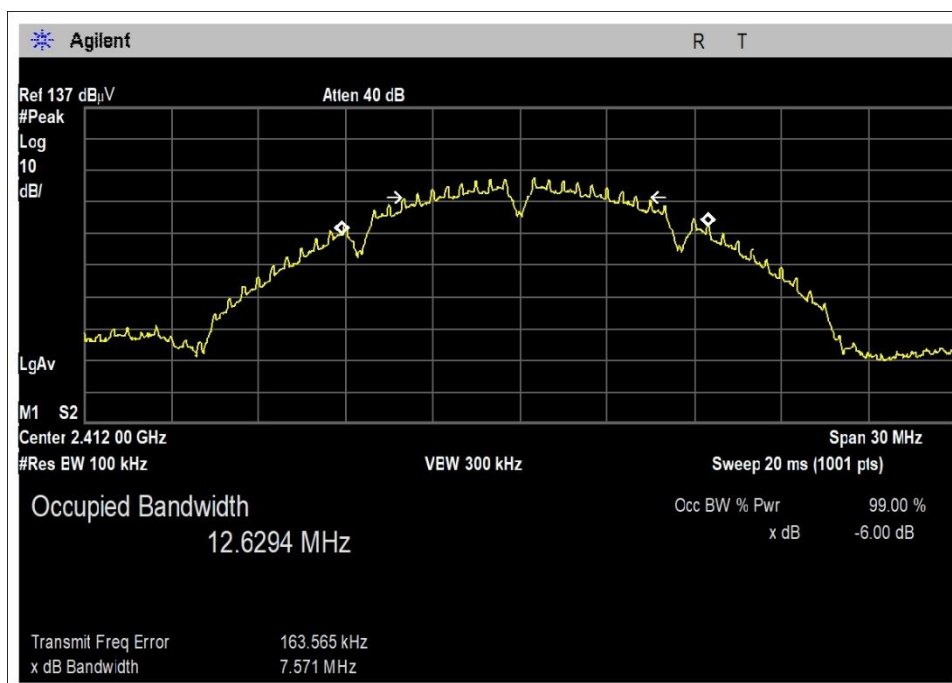
OBW Low Channel APO



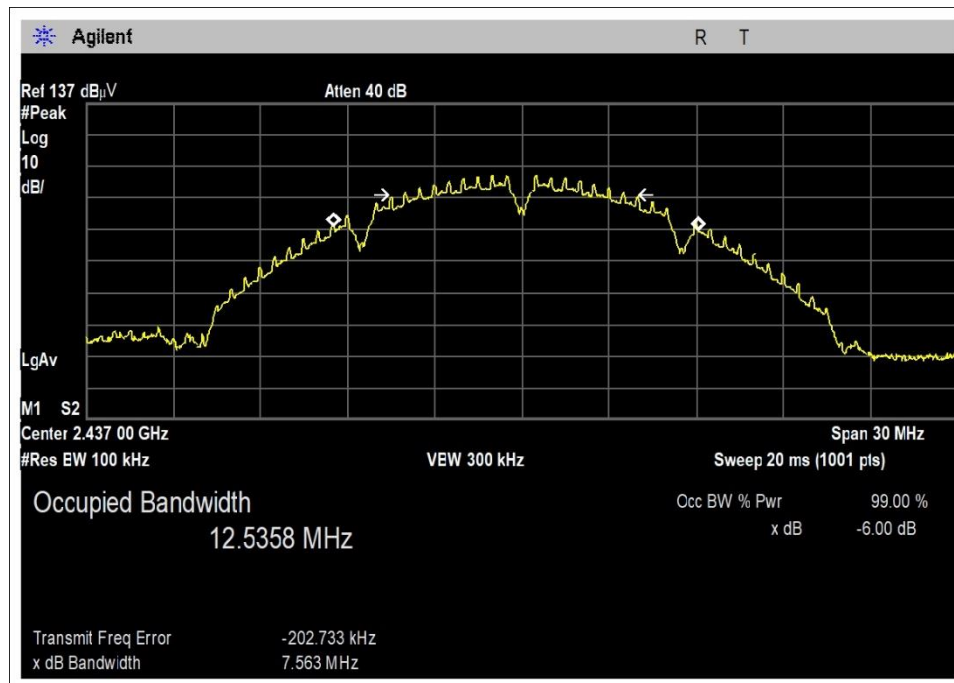
OBW Middle Channel APO



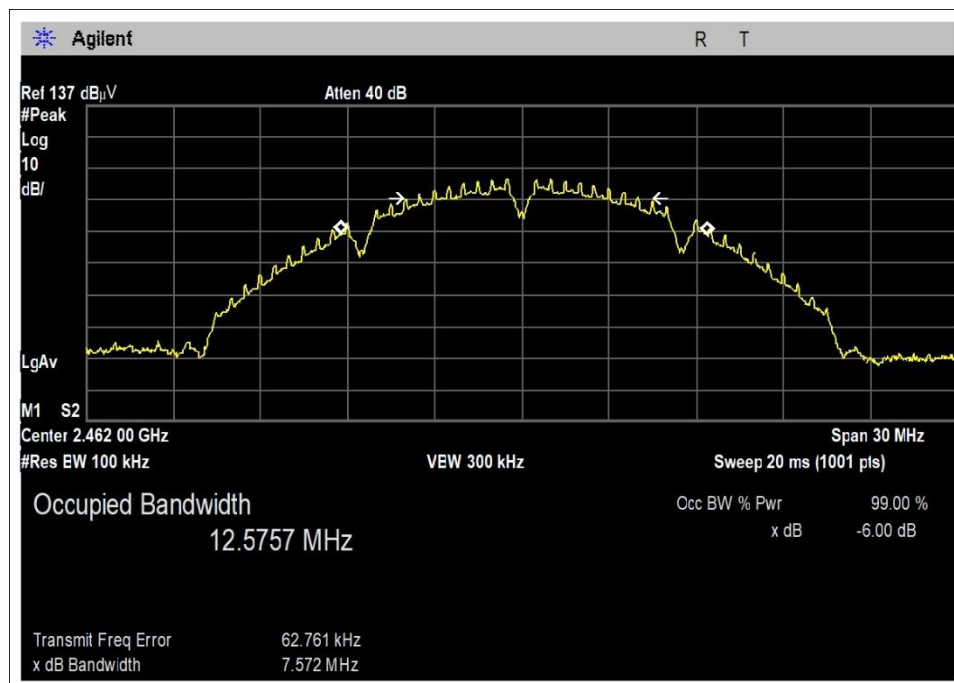
OBW High Channel AP0



OBW Low Channel AP1

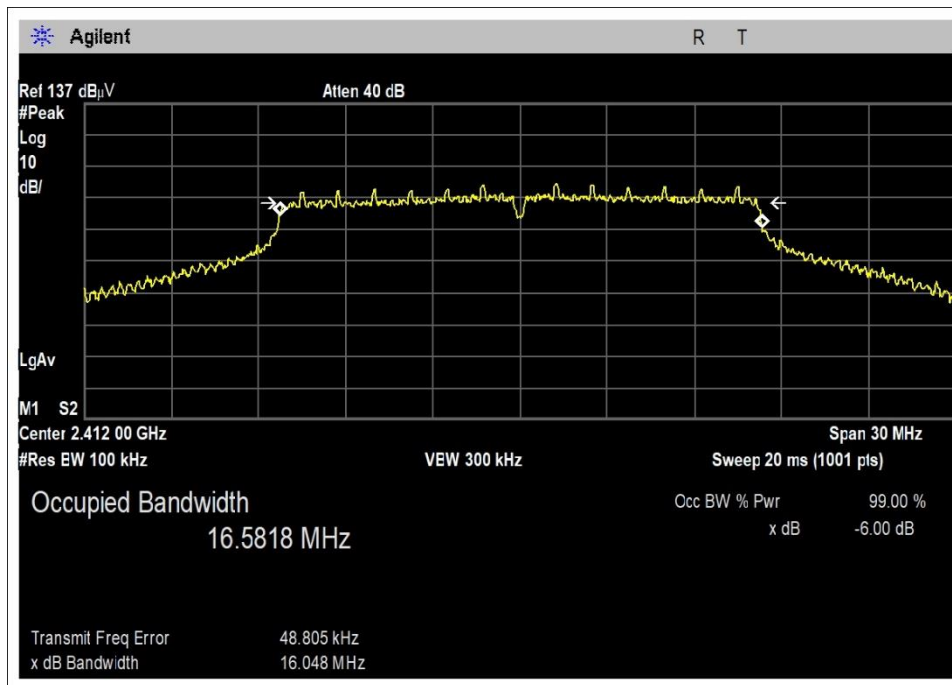


OBW Middle Channel AP1

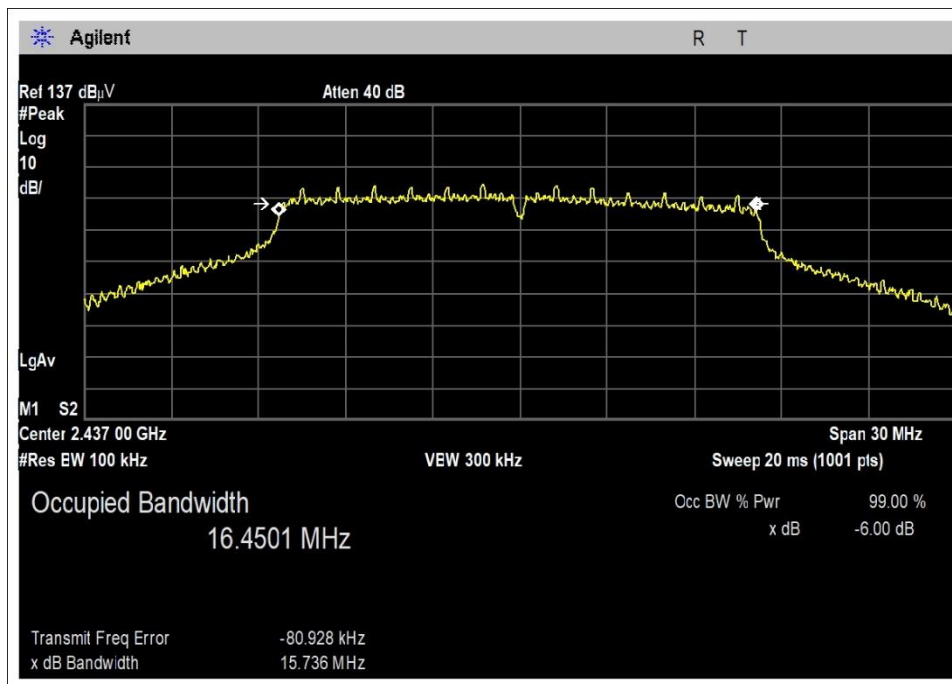


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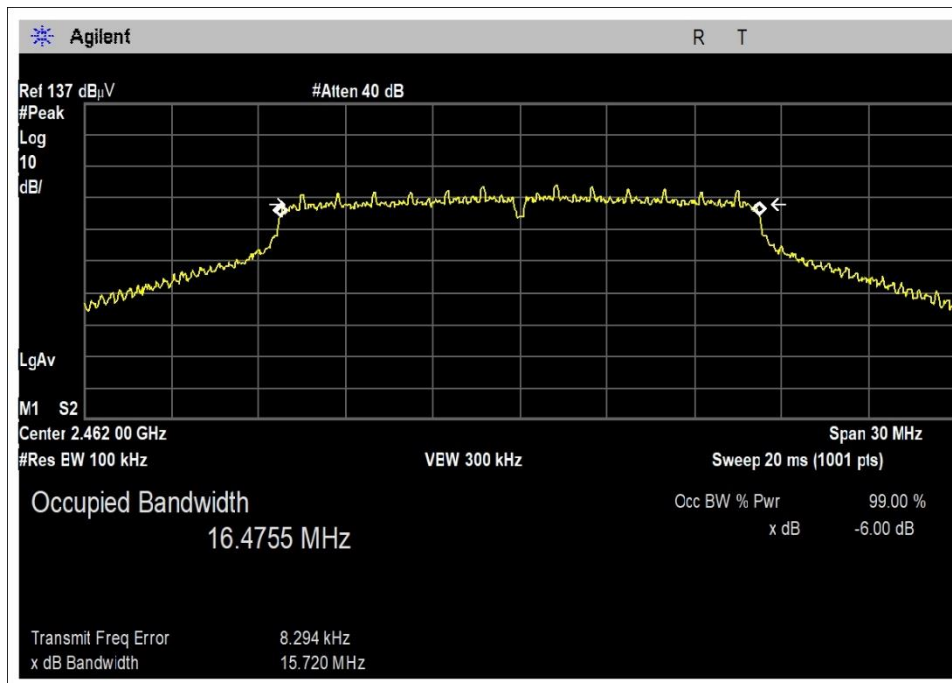
802.11g Plot(s)



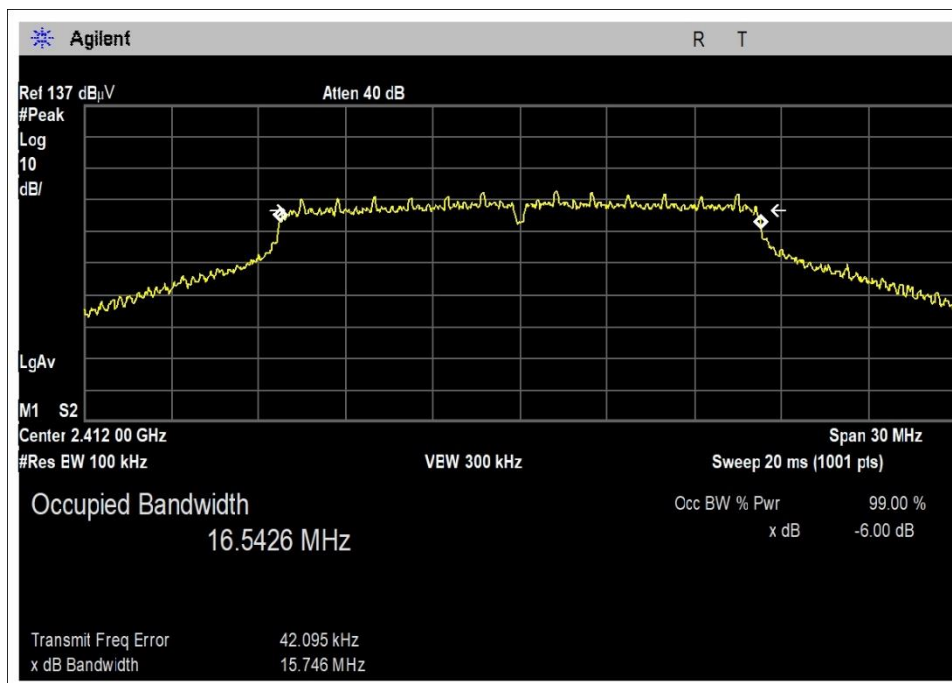
OBW Low Channel APO



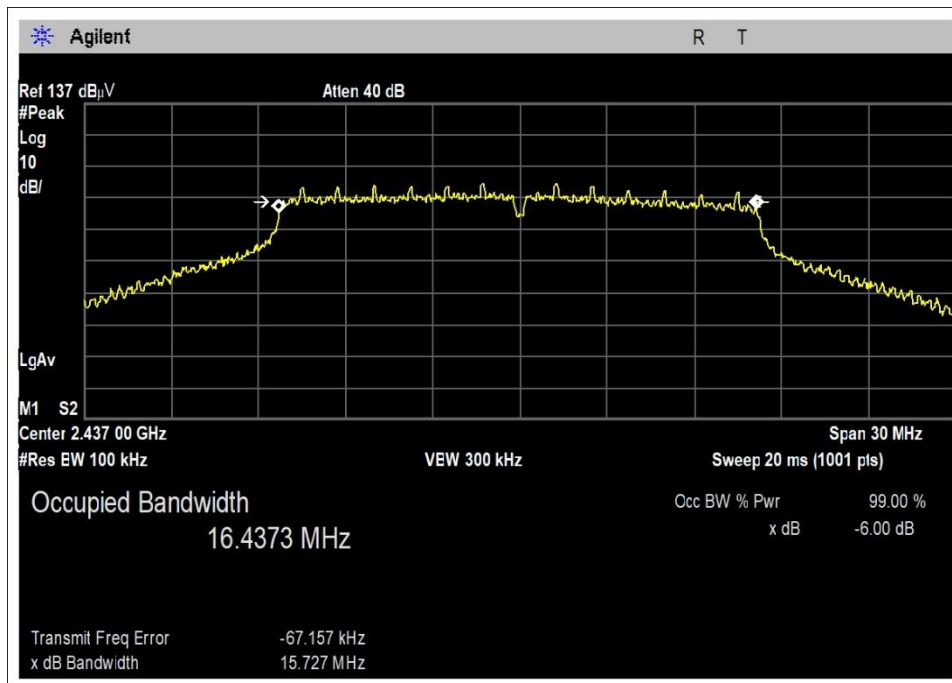
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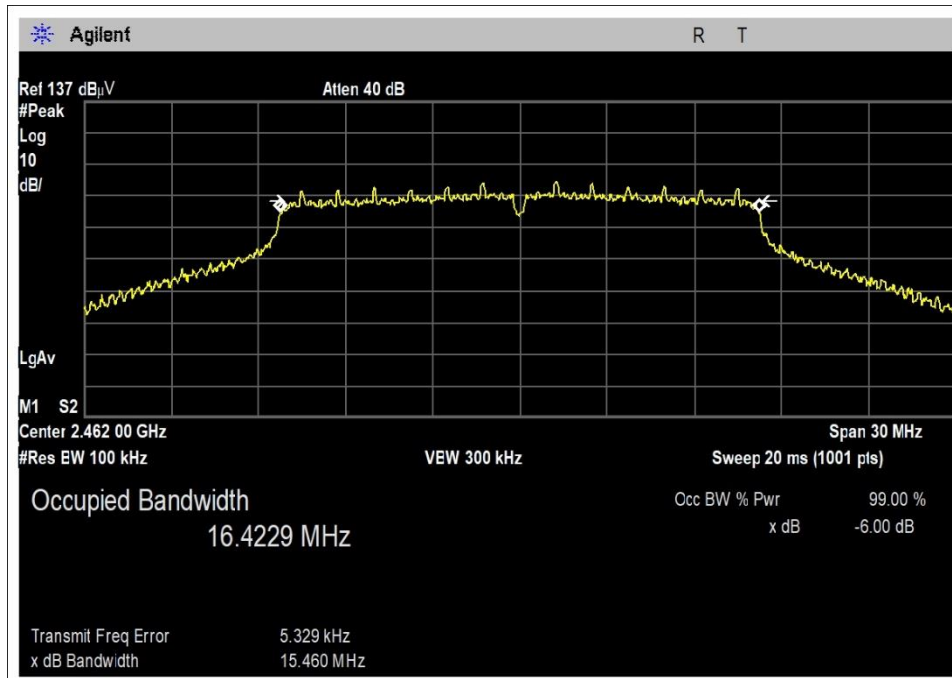
OBW High Channel AP0



OBW Low Channel AP1

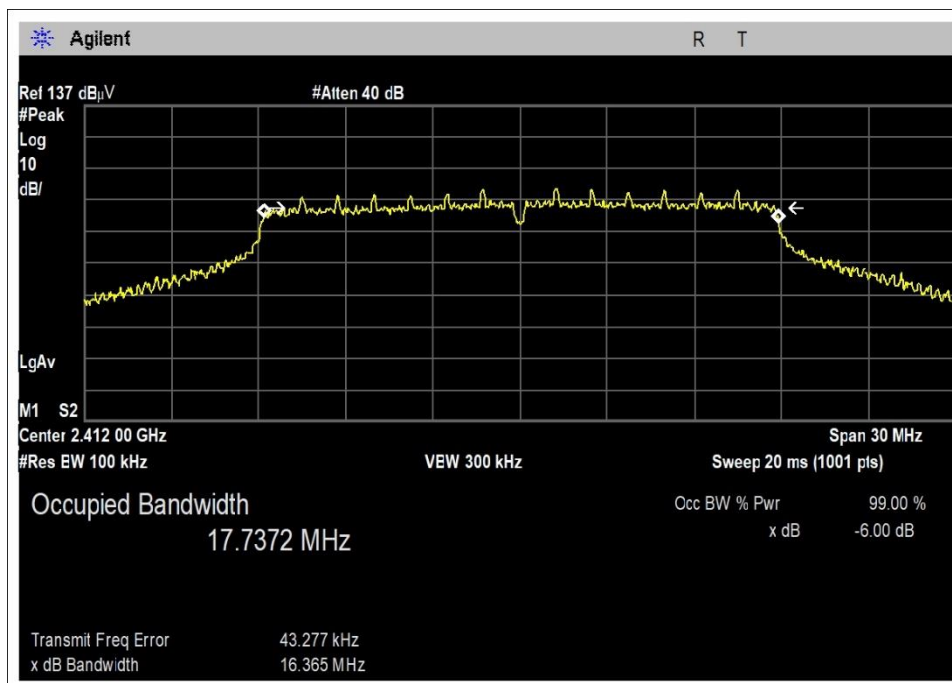


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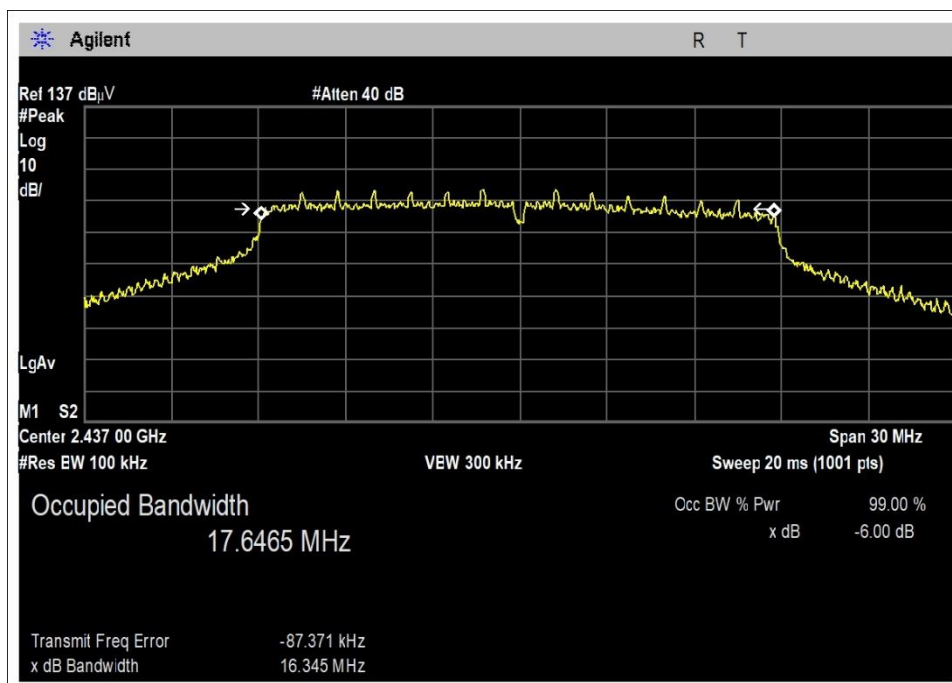


OBW High Channel AP1

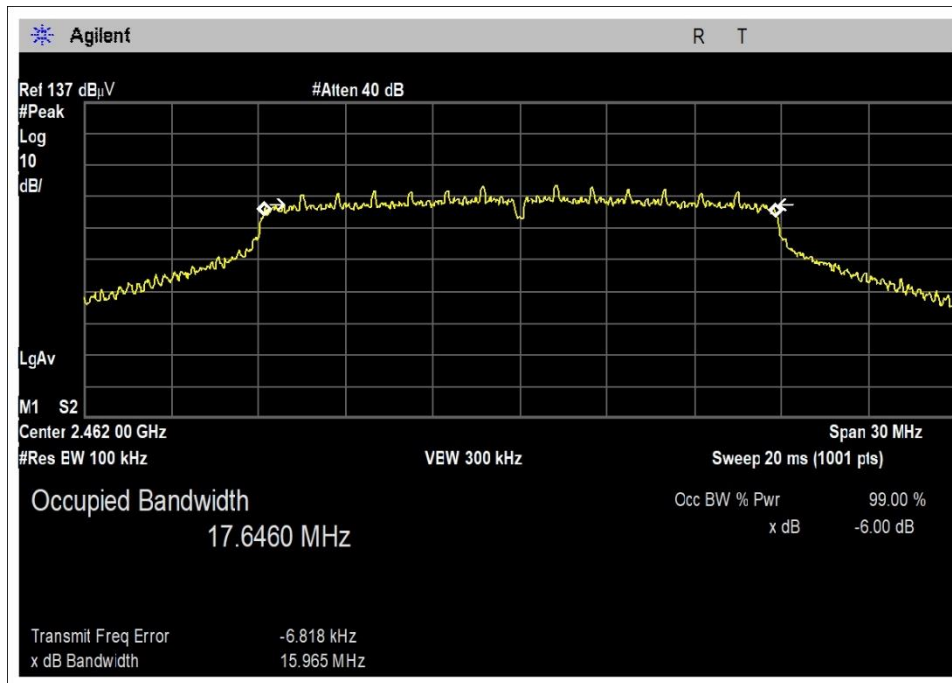
802.11n20 Plot(s)



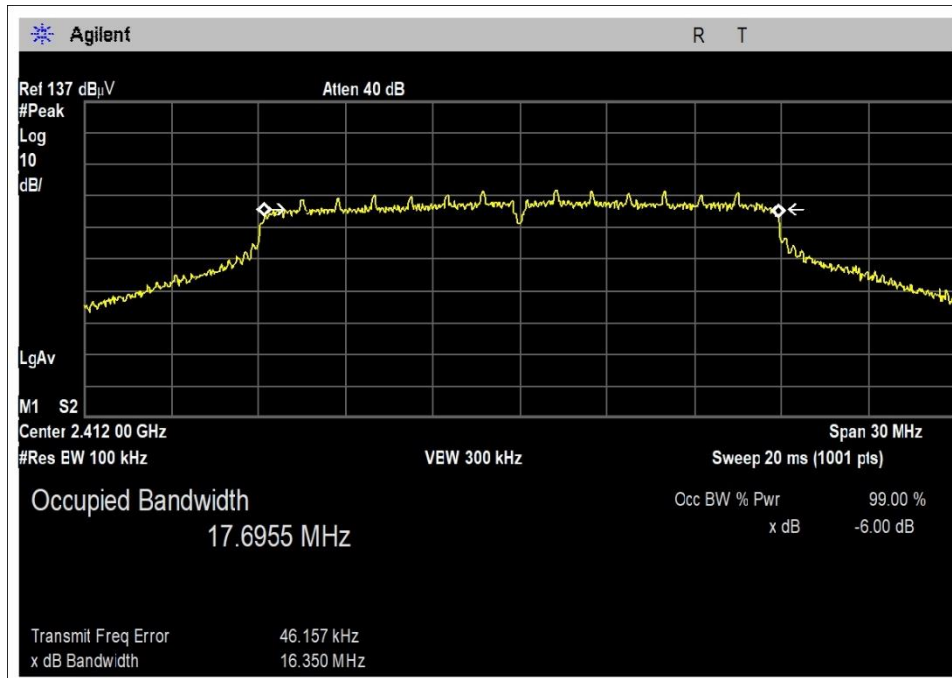
OBW Low Channel APO



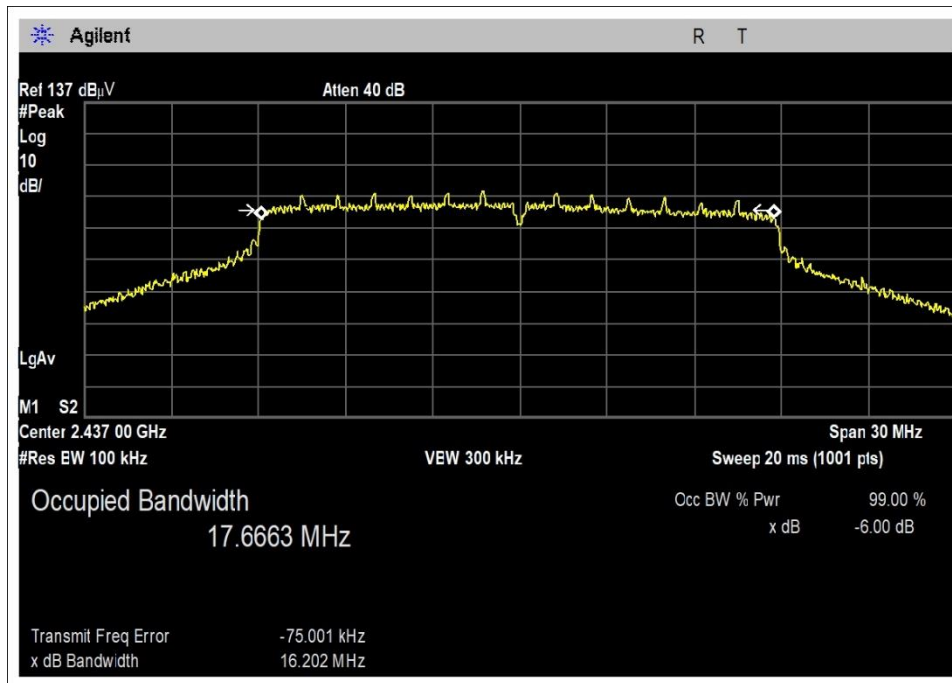
OBW Middle Channel APO



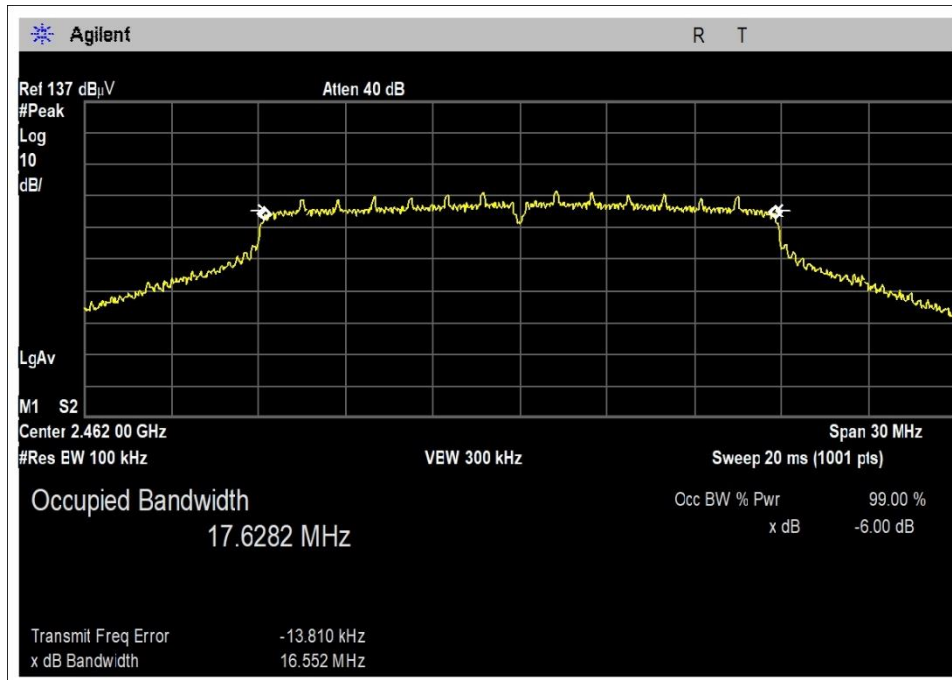
OBW High Channel AP0



OBW Low Channel AP1

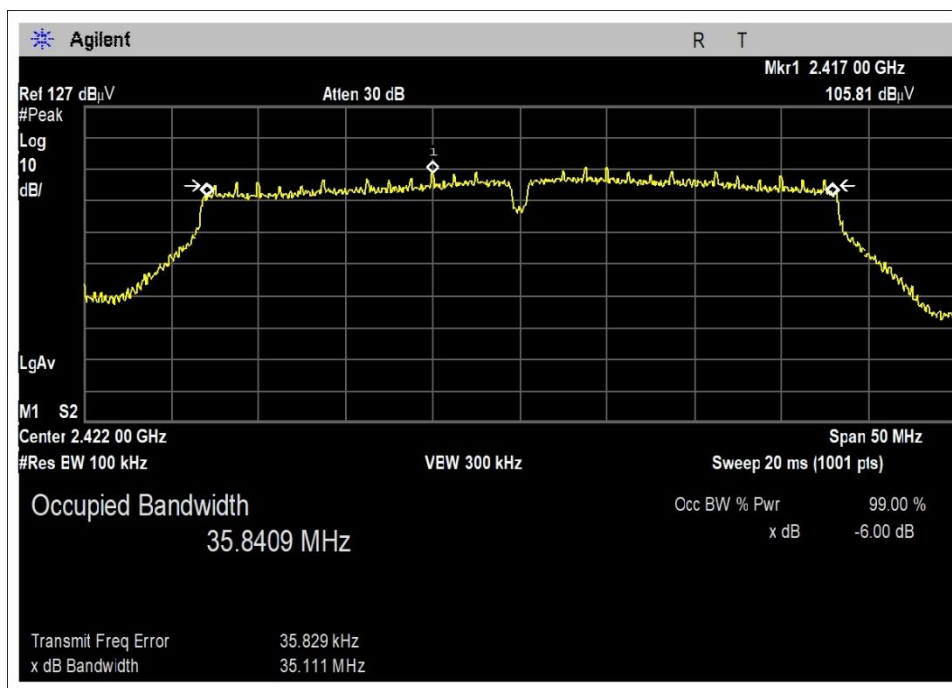


OBW Middle Channel AP1

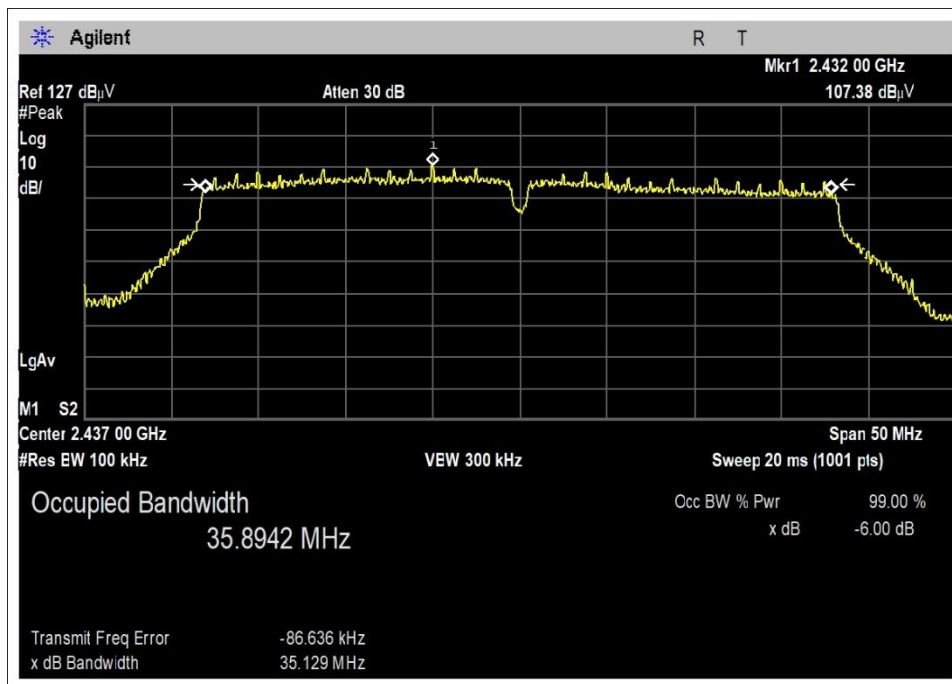


OBW High Channel AP1

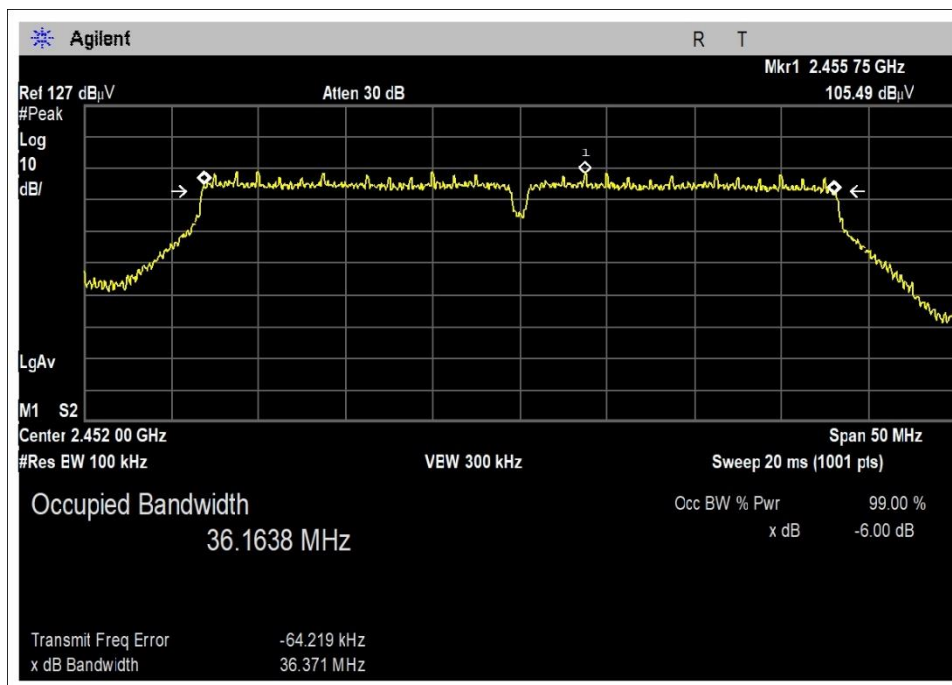
802.11n40 Plot(s)



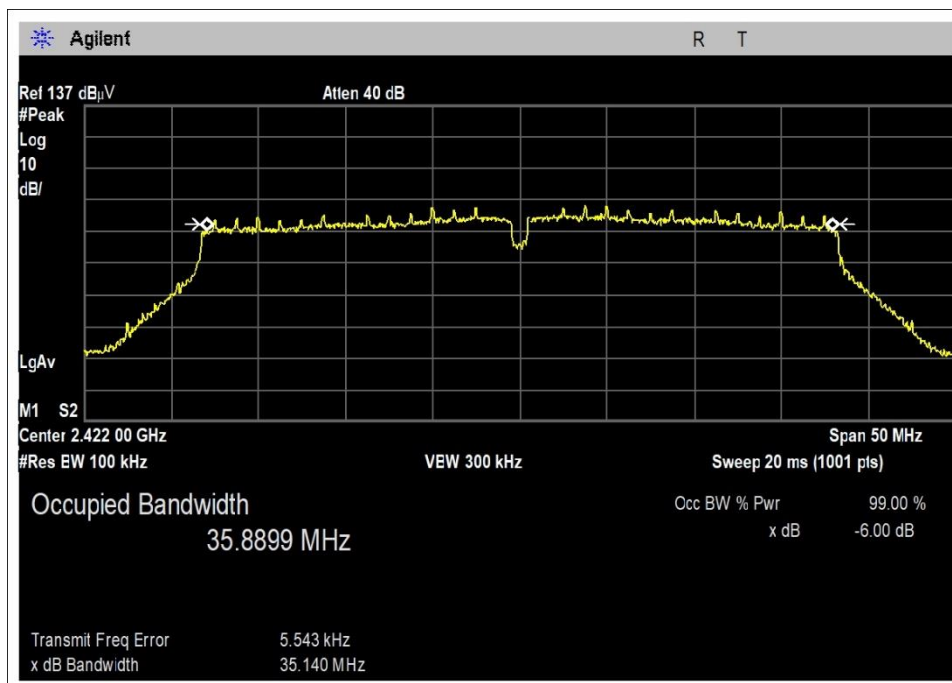
OBW Low Channel APO



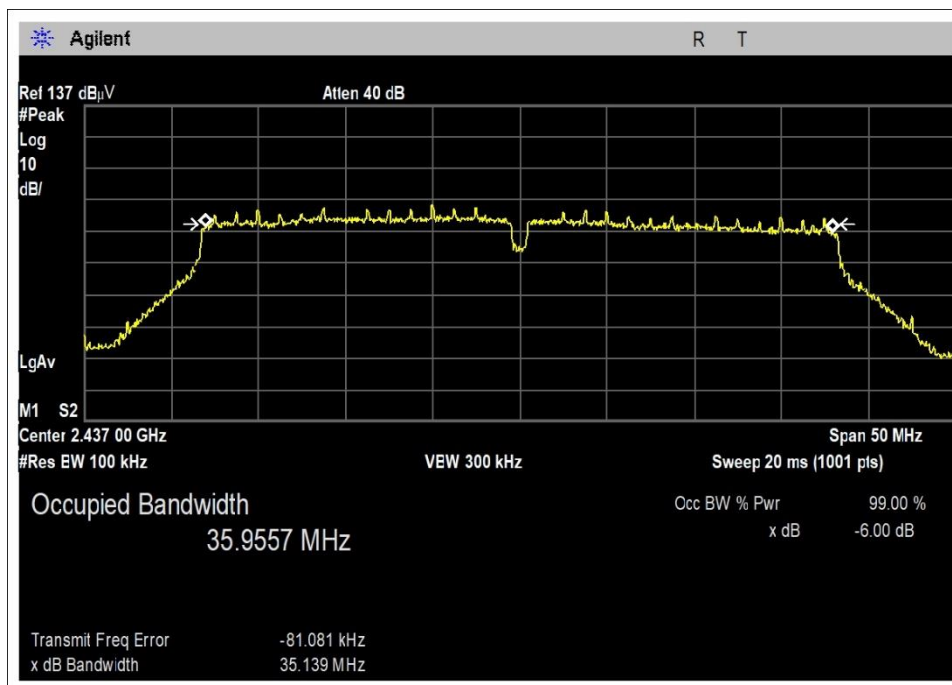
OBW Middle Channel APO



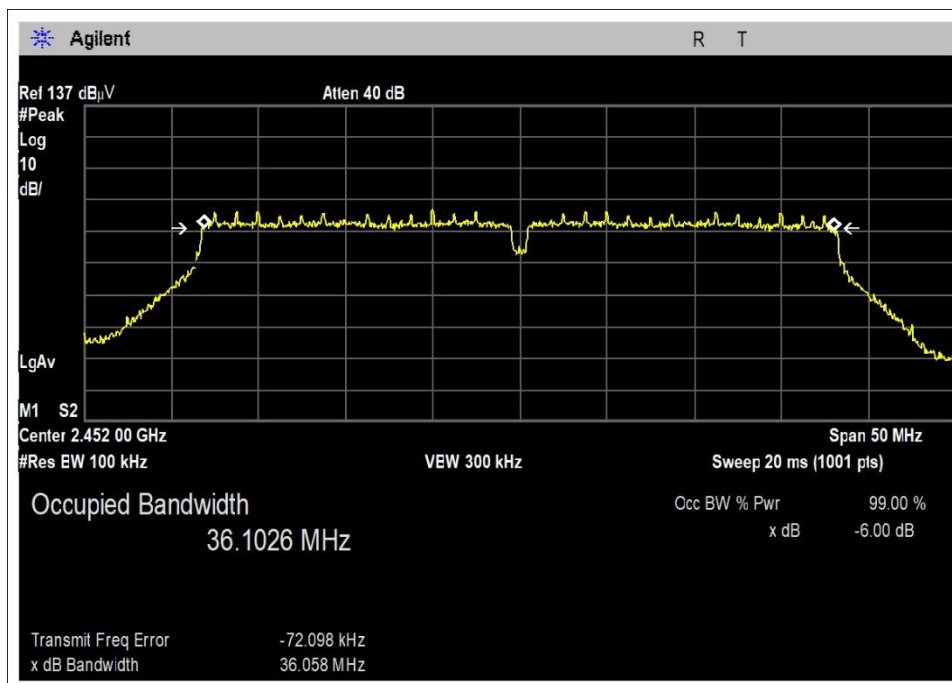
OBW High Channel APO



OBW Low Channel AP1



OBW Middle Channel AP1



OBW High Channel AP1

Test Setup Photo(s)



15.247(b)(3) Output Power

Test Setup / Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013), KDB 558074 (v05r02 APRIL 2, 2019) KDB 662911 (v02r01 10/31/2013)	Test Date(s):	3/24/2020
Configuration:	1		
Test Setup:	Duty Cycle: 100% (Test Mode) Test Mode: Continuously transmitting Test Setup: The EUT is transmitting through the antenna port connector and is attached to the spectrum analyzer. 802.11n is and MIMO Summed using KDB662911 (E)(1)		

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

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
03530	Power Sensor	ETS	7002-006	6/6/2019	6/6/2021
P05748	Attenuator	Pasternack	PE7004-20	3/4/2020	3/4/2022
02673	Spectrum Analyzer	Agilent	E4446A	2/22/2019	2/22/2021
03514	Multimeter	Fluke	87	12/7/2018	12/7/2020
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)
2412	CCK / AP0	17.45	17.45	17.4	0.05
2437	CCK / AP0	17.33	17.33	17.33	0
2462	CCK / AP0	17.01	17	17	0.01
2412	CCK / AP1	15.55	15.5	15.49	0.1
2437	CCK / AP1	15.33	15.3	15.36	0.1
2462	CCK / AP1	15	15.07	15	0.07
2412	OFDM / AP0	14.58	14.5	14.57	0.03
2437	OFDM / AP0	16.36	16.4	16.36	0.04
2462	OFDM / AP0	15.99	16	15.92	0.08
2412	OFDM / AP1	12.76	12.72	12.72	0.04
2437	OFDM / AP1	14.39	14.41	14.39	0.02
2462	OFDM / AP1	14.07	14.09	14.11	0.02
2412	MCS 20 / AP0	13.25	13.26	13.25	0.01
2437	MCS 20 / AP0	15.23	15.25	15.22	0.03
2462	MCS 20 / AP0	14.96	15.02	14.97	0.06
2412	MCS 20 / AP1	11.59	11.6	11.61	0.01
2437	MCS 20 / AP1	13.41	13.4	13.41	0.01
2462	MCS 20 / AP1	13.12	13.08	13.13	0.05
2422	MCS 40 / AP0	12.89	12.9	12.89	0.01
2437	MCS 40 / AP0	15.66	15.66	15.65	0.01
2452	MCS 40 / AP0	13.35	13.4	13.37	0.05
2422	MCS 40 / AP1	10.71	10.75	10.72	0.04
2437	MCS 40 / AP1	13.82	13.84	13.81	0.02
2452	MCS 40 / AP1	11.43	11.44	11.43	0.01

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
2412	CCK / AP0	Linear Polarized / 3.7	17.45	≤30	Pass
2437	CCK / AP0	Linear Polarized / 3.7	17.33	≤30	Pass
2462	CCK / AP0	Linear Polarized / 3.7	17	≤30	Pass
2412	CCK / AP1	Linear Polarized / 3.6	15.5	≤30	Pass
2437	CCK / AP1	Linear Polarized / 3.6	15.3	≤30	Pass
2462	CCK / AP1	Linear Polarized / 3.6	15.07	≤30	Pass
2412	OFDM / AP0	Linear Polarized / 3.7	14.5	≤30	Pass
2437	OFDM / AP0	Linear Polarized / 3.7	16.4	≤30	Pass
2462	OFDM / AP0	Linear Polarized / 3.7	16	≤30	Pass
2412	OFDM / AP1	Linear Polarized / 3.6	12.72	≤30	Pass
2437	OFDM / AP1	Linear Polarized / 3.6	14.41	≤30	Pass
2462	OFDM / AP1	Linear Polarized / 3.6	14.09	≤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
2412	MCS 20 / AP0	Linear Polarized / 3.7	13.26	15.5	≤30	Pass
2412	MCS 20 / AP1	Linear Polarized / 3.6	11.6			
2437	MCS 20 / AP0	Linear Polarized / 3.7	15.25	17.4	≤30	Pass
2437	MCS 20 / AP1	Linear Polarized / 3.6	13.4			
2462	MCS 20 / AP0	Linear Polarized / 3.7	15.02	17.2	≤30	Pass
2462	MCS 20 / AP1	Linear Polarized / 3.6	13.08			
2422	MCS 40 / AP0	Linear Polarized / 3.7	12.9	15.0	≤30	Pass
2422	MCS 40 / AP1	Linear Polarized / 3.6	10.75			
2437	MCS 40 / AP0	Linear Polarized / 3.7	15.66	17.9	≤30	Pass
2437	MCS 40 / AP1	Linear Polarized / 3.6	13.84			
2452	MCS 40 / AP0	Linear Polarized / 3.7	13.4	15.5	≤30	Pass
2452	MCS 40 / AP1	Linear Polarized / 3.6	11.44			

For fixed point-to-point antennas, the limit is calculated in accordance with 15.247(c)(1):

$$Limit = 30 - Roundup\left(\frac{G-6}{3}\right)$$

For directional beamforming antennas, the limit is calculated in accordance with 15.247(c)(2) and KDB 662911.

Test Setup Photo(s)



15.247(e) Power Spectral Density

Test Data Summary - RF Conducted Measurement

Measurement Method: PKPSD

* Per 11.10.2 Method PKPSD (peak PSD) of ANSI 63.10(2013), Peak PSD method is optional if the maximum conducted (average) output power was used to determine compliance.

Measured Peak PSD is below the Limit. Peak PSD should be slightly higher than Aver PSD.

Frequency (MHz)	Modulation	Measured (dBμV /3kHz)	Limit (dBμV/3kHz)	Results
2412	CCK AP0	101.8	≤115	Pass
2437	CCK AP0	101.9	≤115	Pass
2462	CCK AP0	101.2	≤115	Pass
2412	CCK AP1	101.3	≤115	Pass
2437	CCK AP1	100.1	≤115	Pass
2462	CCK AP1	100.4	≤115	Pass
2412	OFDM AP0	97.9	≤115	Pass
2437	OFDM AP0	100.2	≤115	Pass
2462	OFDM AP0	98.8	≤115	Pass
2412	OFDM AP1	98	≤115	Pass
2437	OFDM AP1	98.1	≤115	Pass
2462	OFDM AP1	97.6	≤115	Pass

Test Data Summary - RF Conducted Measurement

Measurement Method: PKPSD

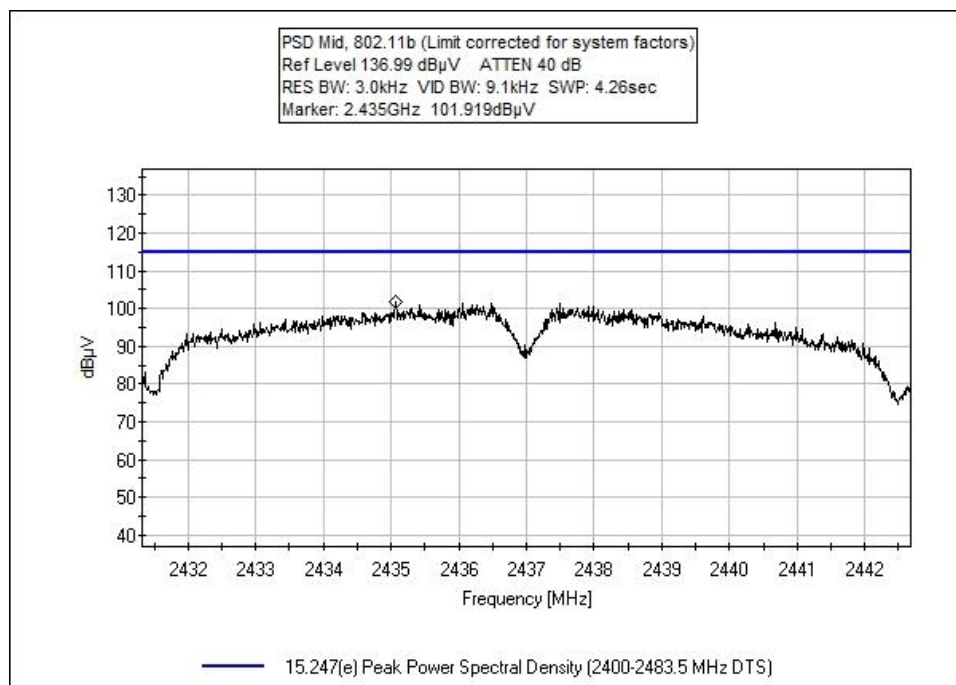
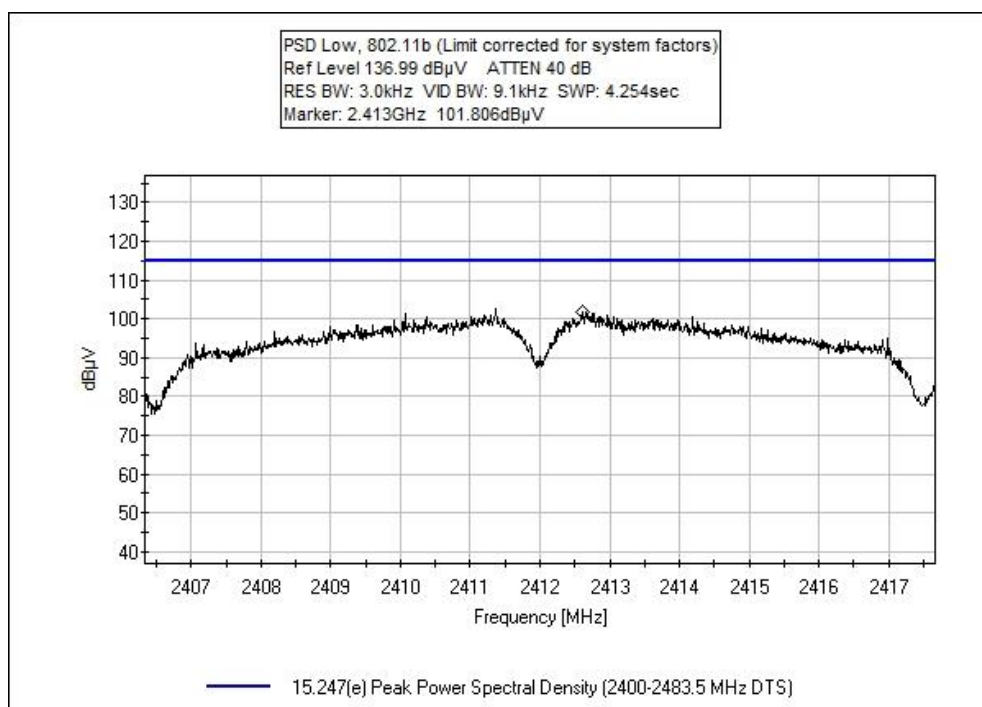
802.11n is and MIMO Summed using KDB662911 (E)(2)(b)

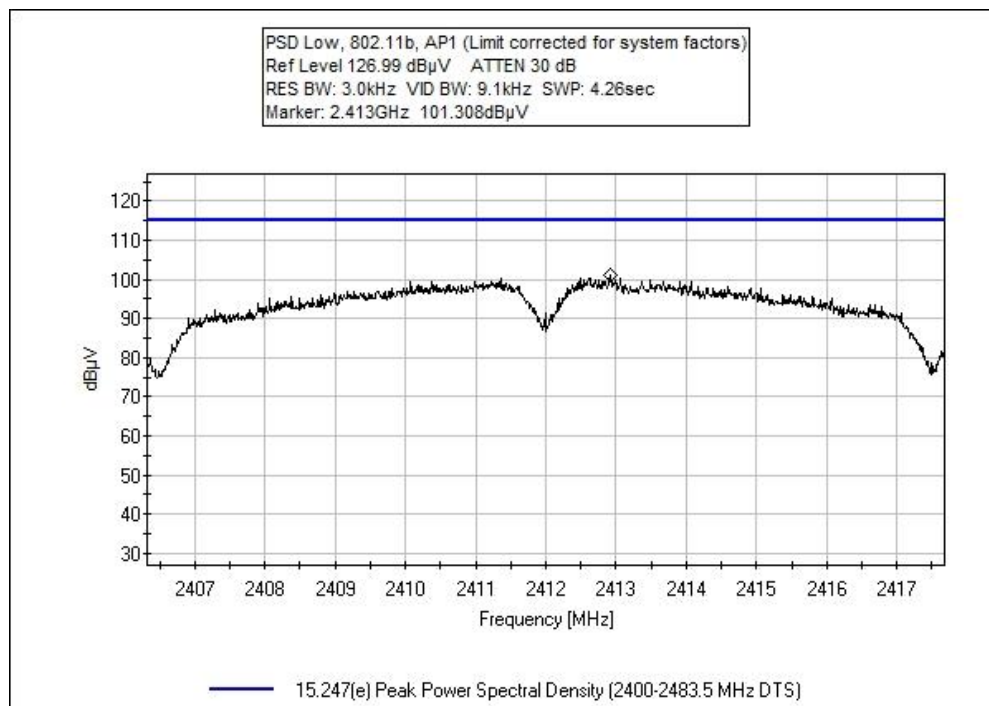
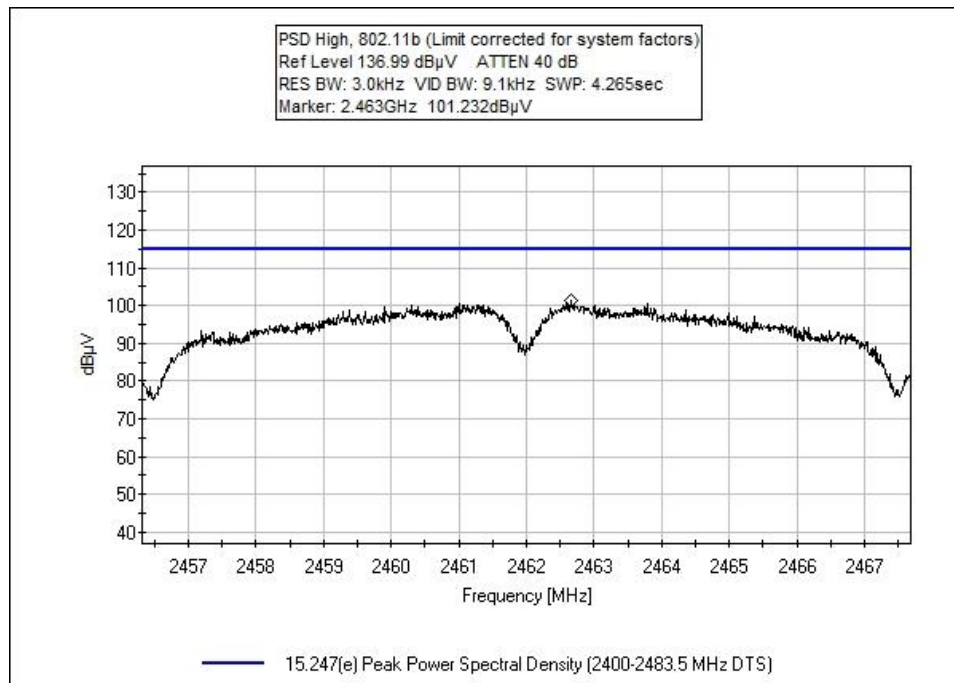
* Per 11.10.2 Method PKPSD (peak PSD) of ANSI 63.10(2013), Peak PSD method is optional if the maximum conducted (average) output power was used to determine compliance.

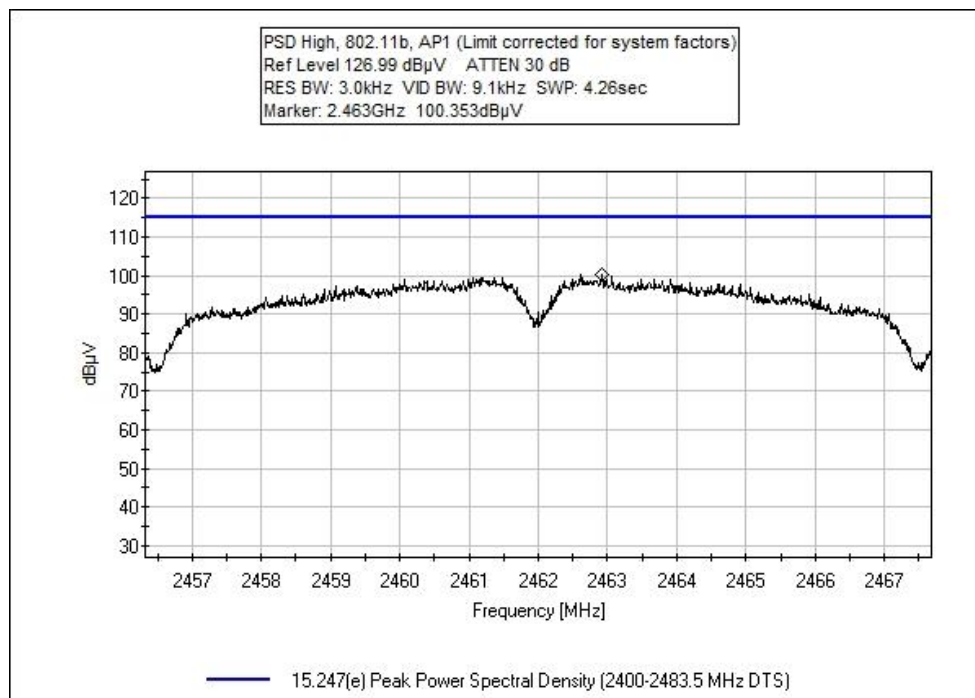
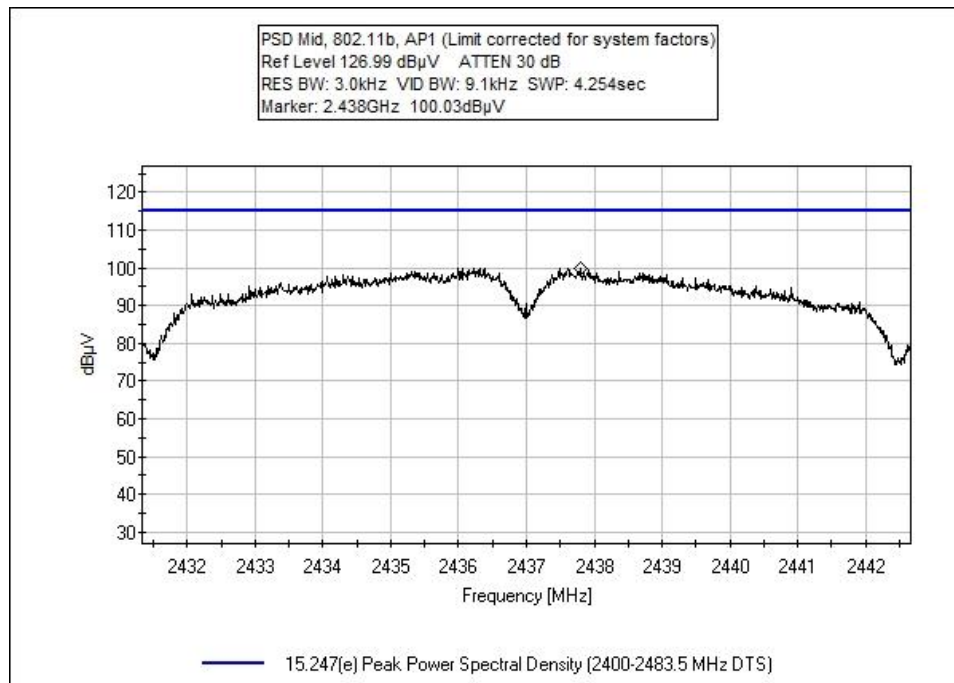
Measured Peak PSD is below the Limit. Peak PSD should be slightly higher than Aver PSD.

Frequency (MHz)	Modulation	Measured (dBμV /3kHz)	Summed PSD (dBm)	Limit (dBμV/3kHz)	Results
2412	MCS 20 / AP0	95.1	97.9	≤115	Pass
2412	MCS 20 / AP1	94.7			
2437	MCS 20 / AP0	97.5	100.1	≤115	Pass
2437	MCS 20 / AP1	96.7			
2462	MCS 20 / AP0	97.6	99.4	≤115	Pass
2462	MCS 20 / AP1	94.6			
2422	MCS 40 / AP0	93.1	95.3	≤115	Pass
2422	MCS 40 / AP1	91.3			
2437	MCS 40 / AP0	95.5	97.2	≤115	Pass
2437	MCS 40 / AP1	92.4			
2452	MCS 40 / AP0	92.8	94.8	≤115	Pass

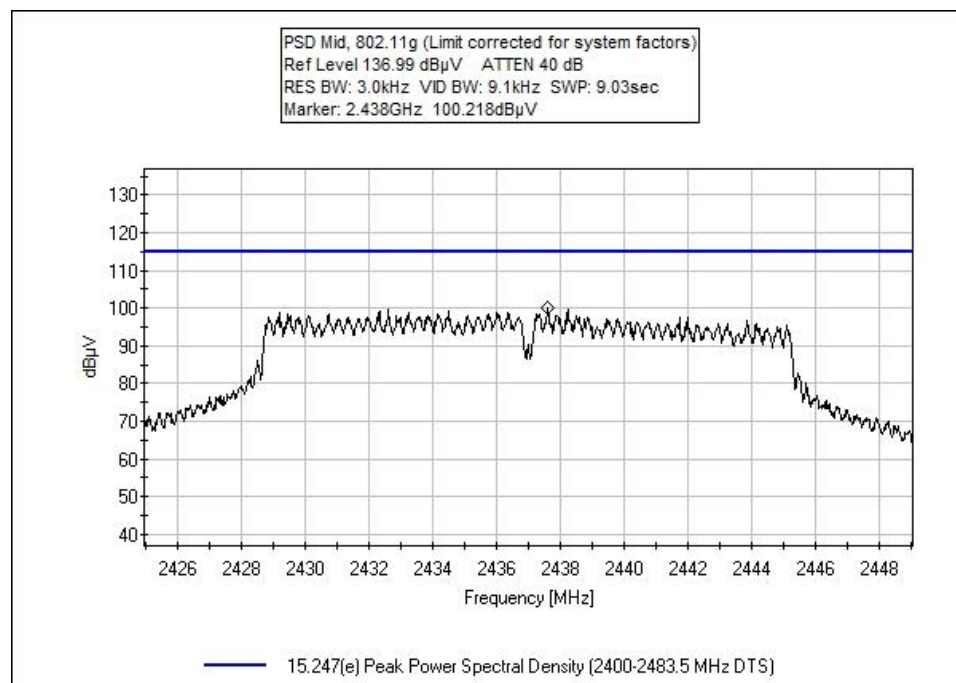
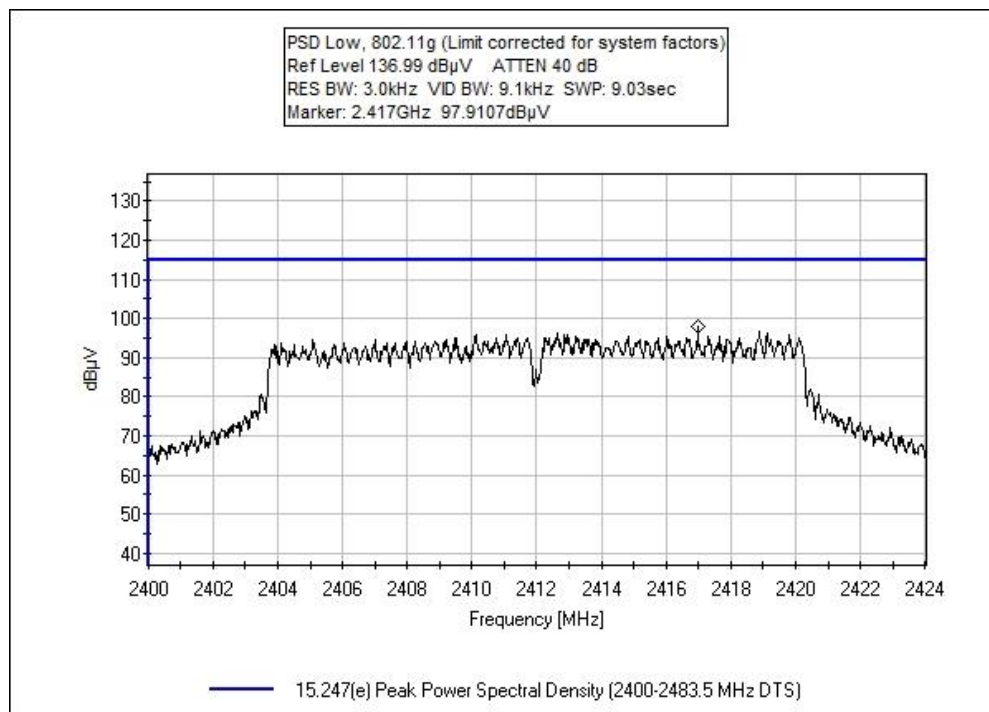
802.11b Plots

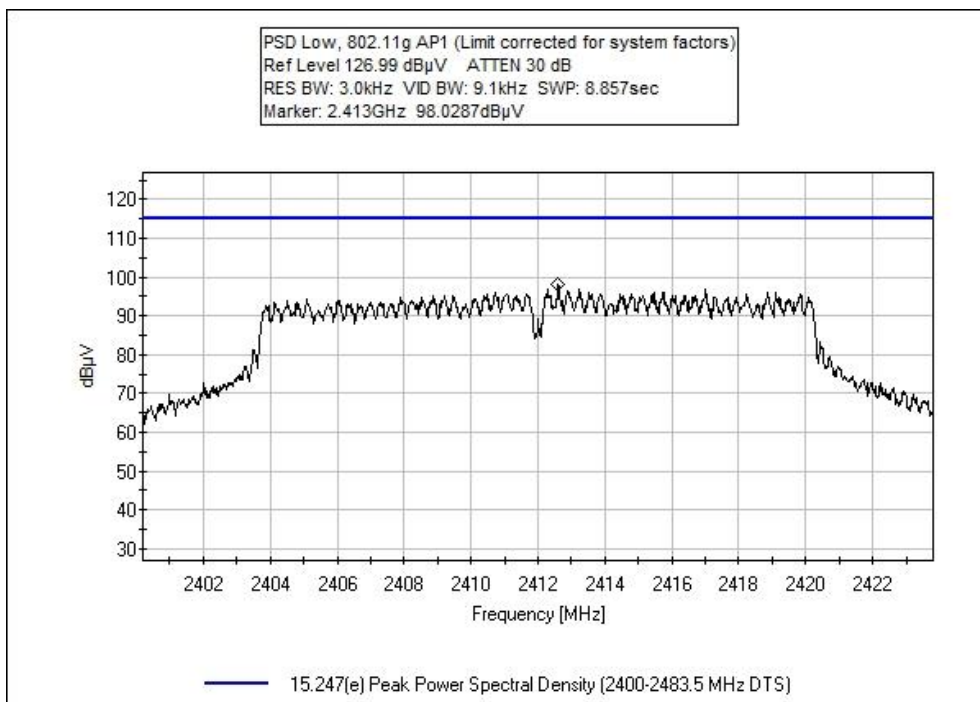
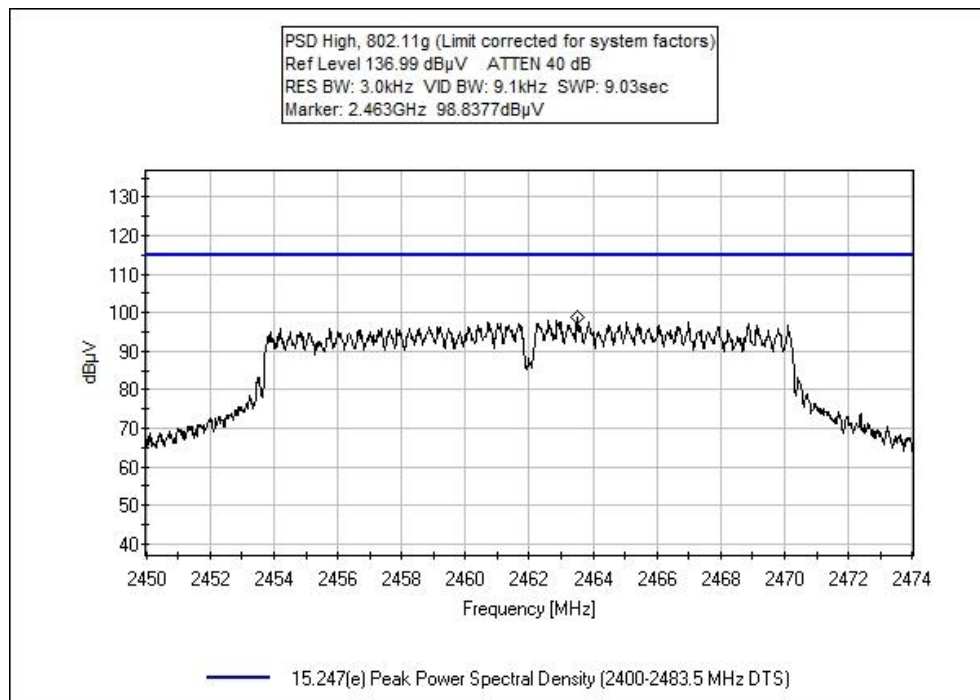


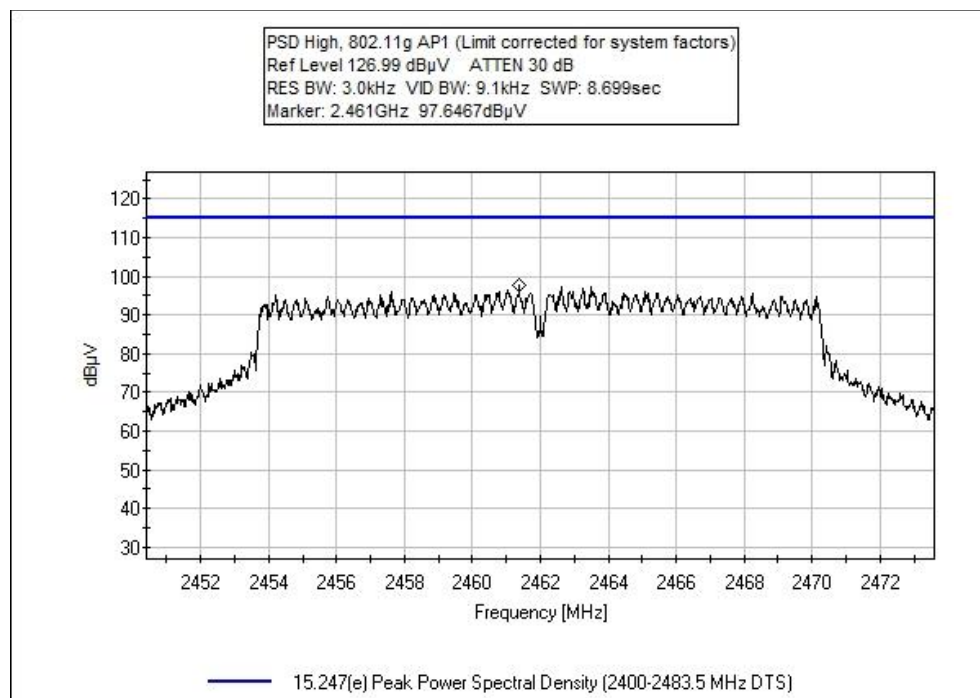
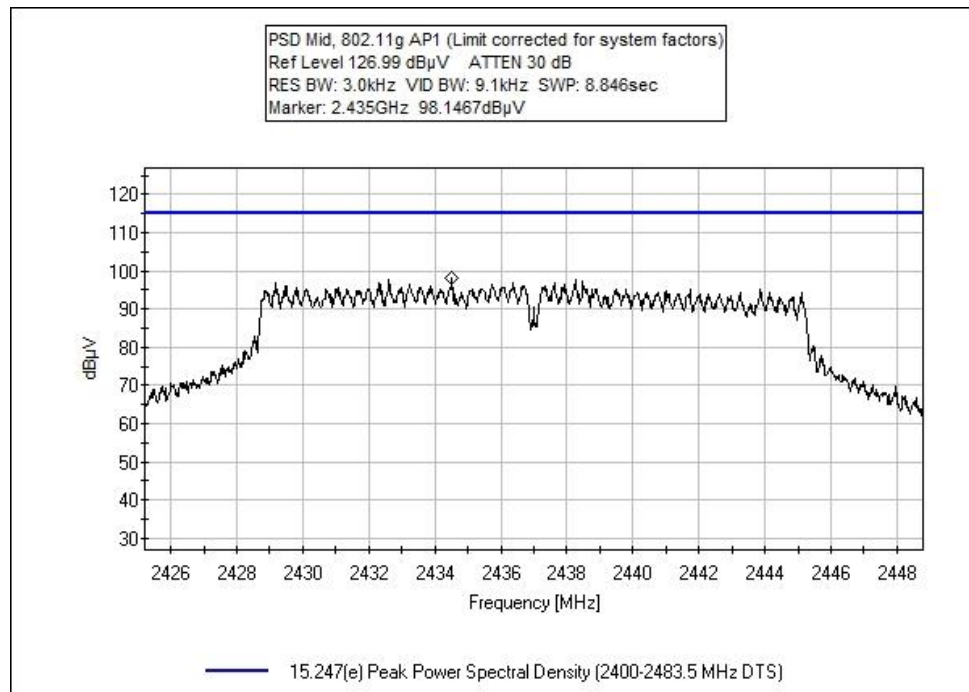




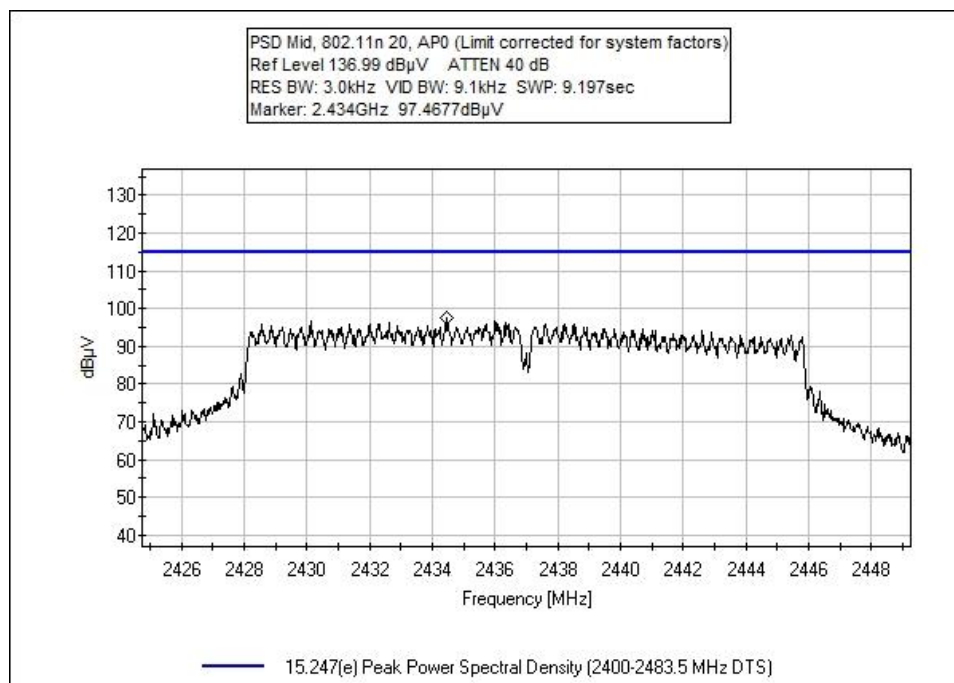
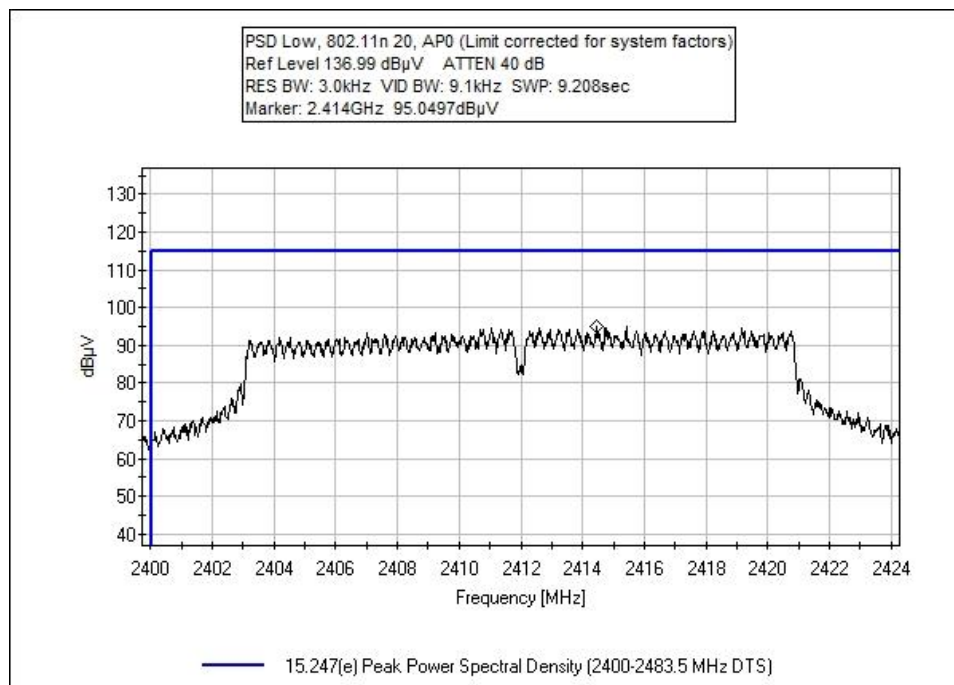
802.11g Plots

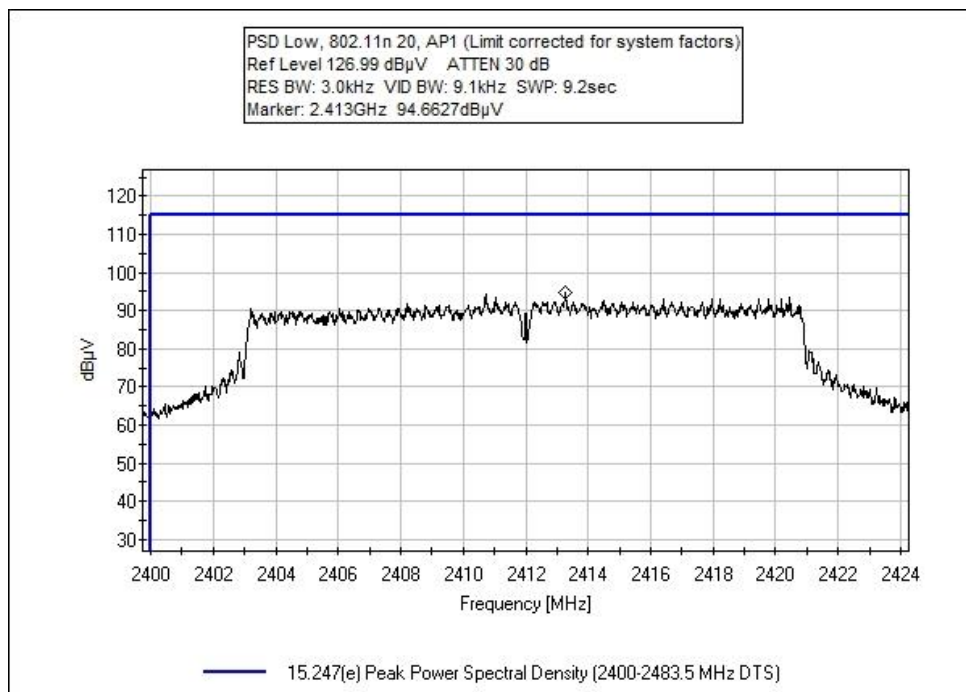
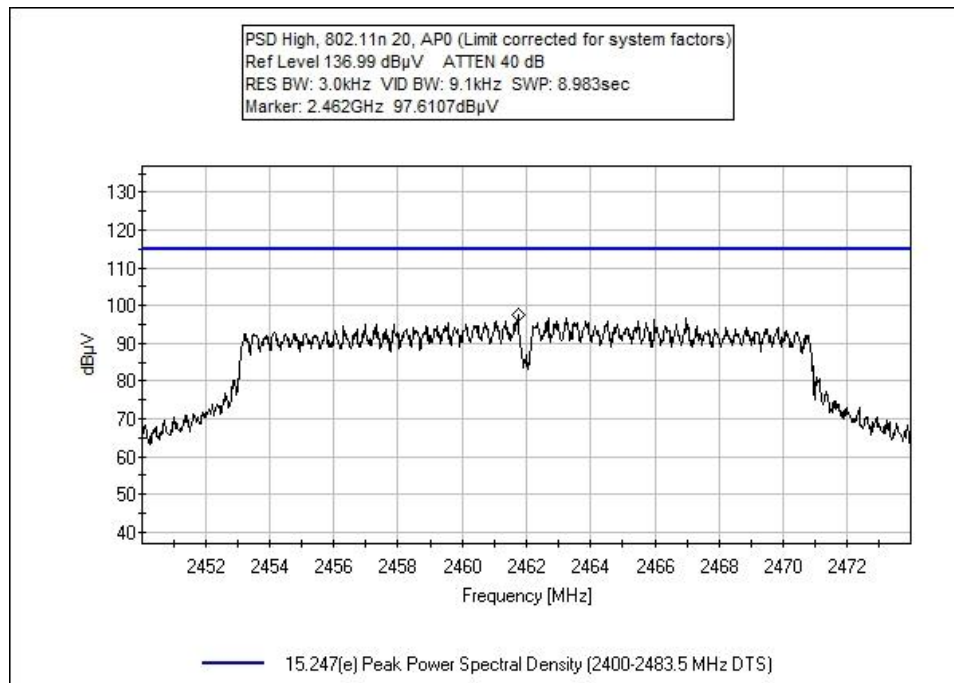


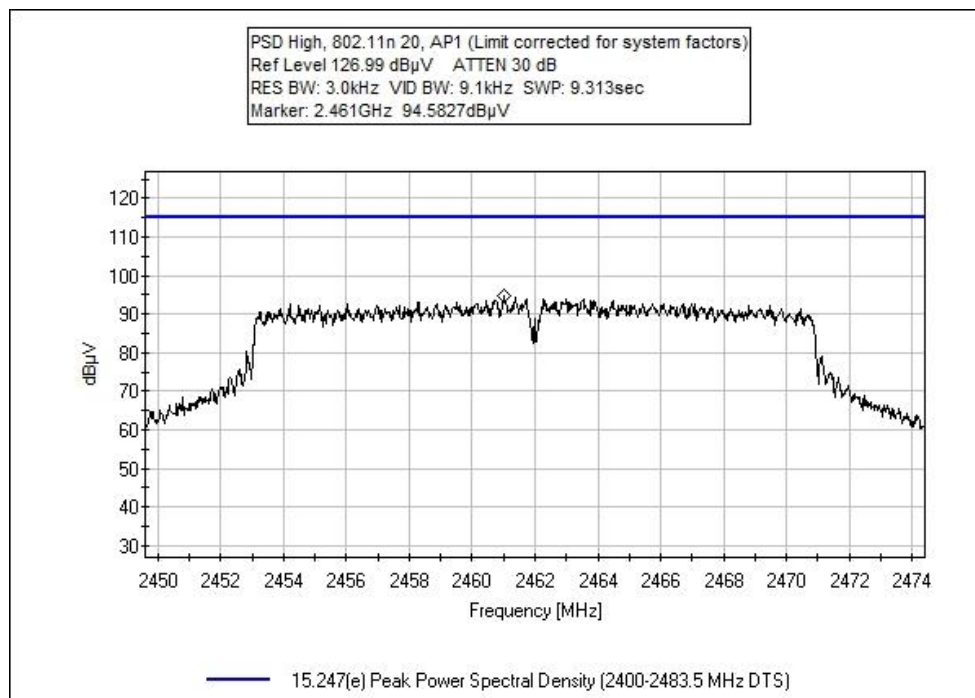
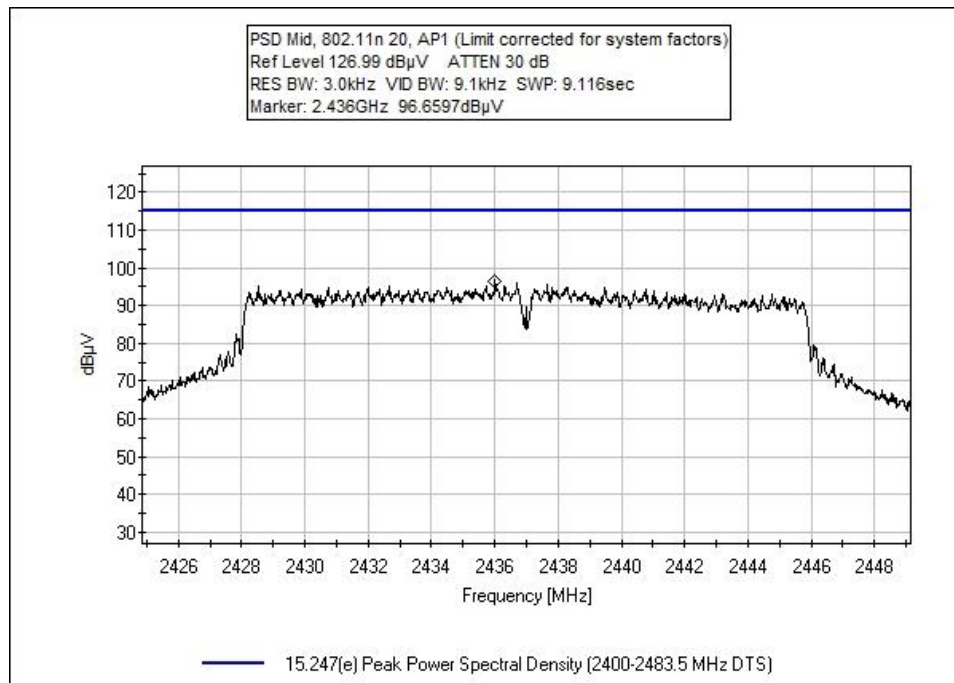




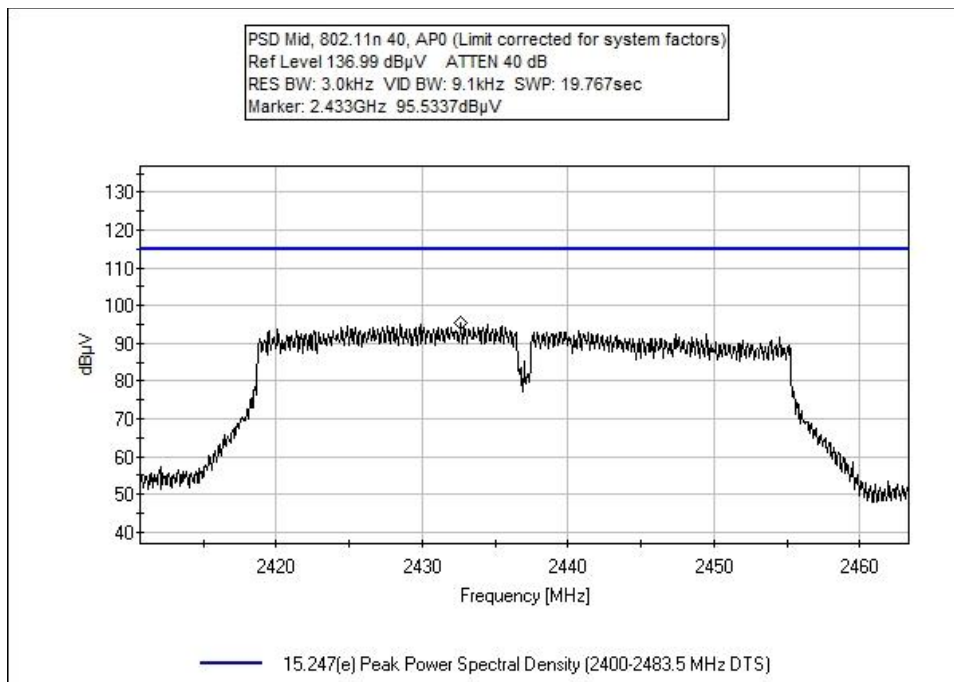
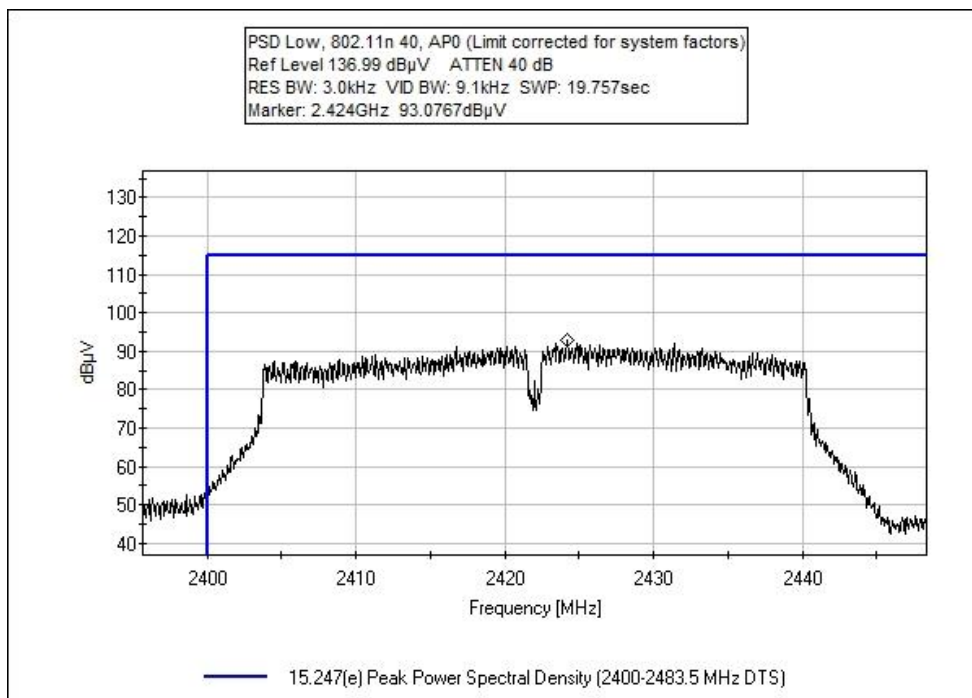
802.11n20 Plots

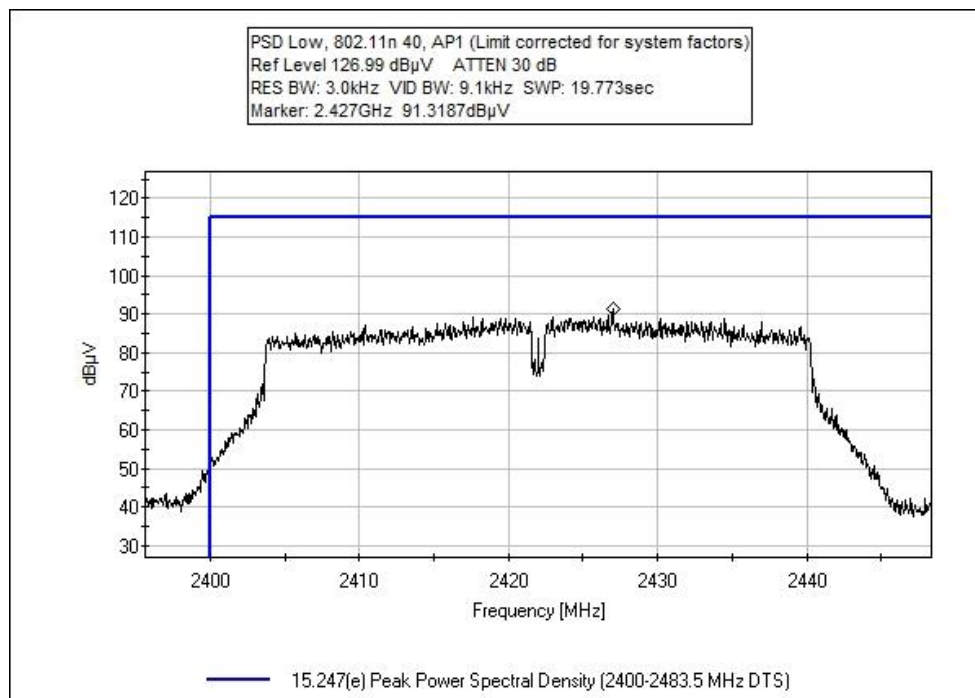
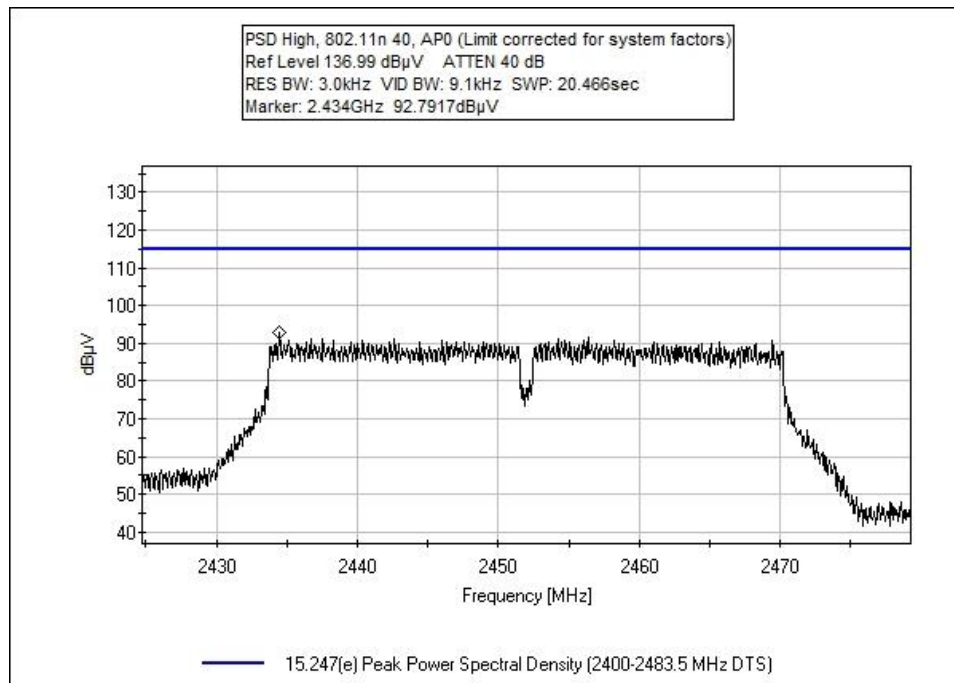


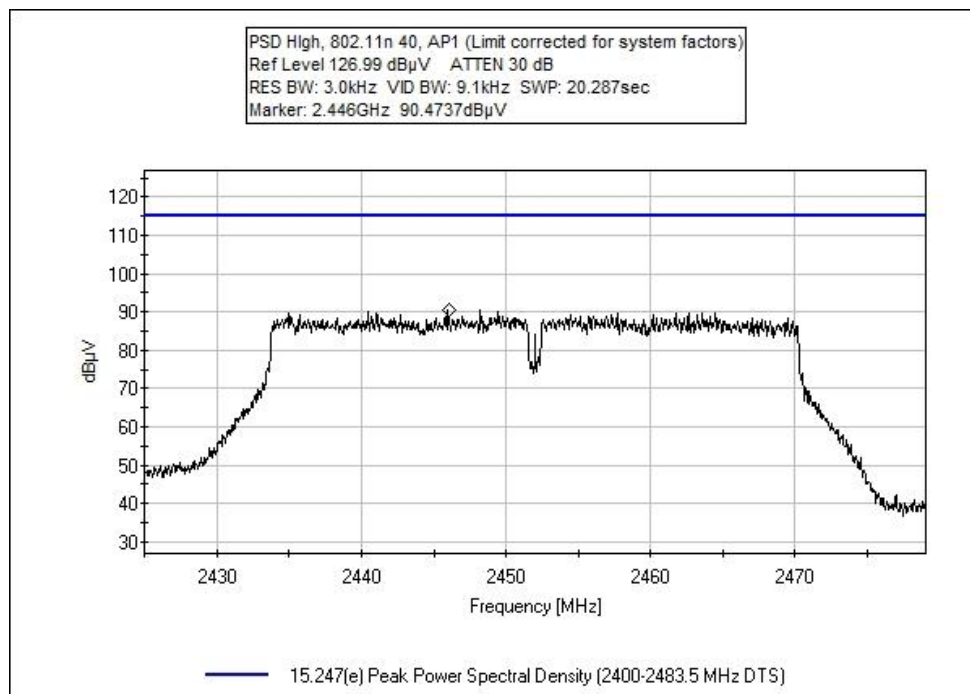
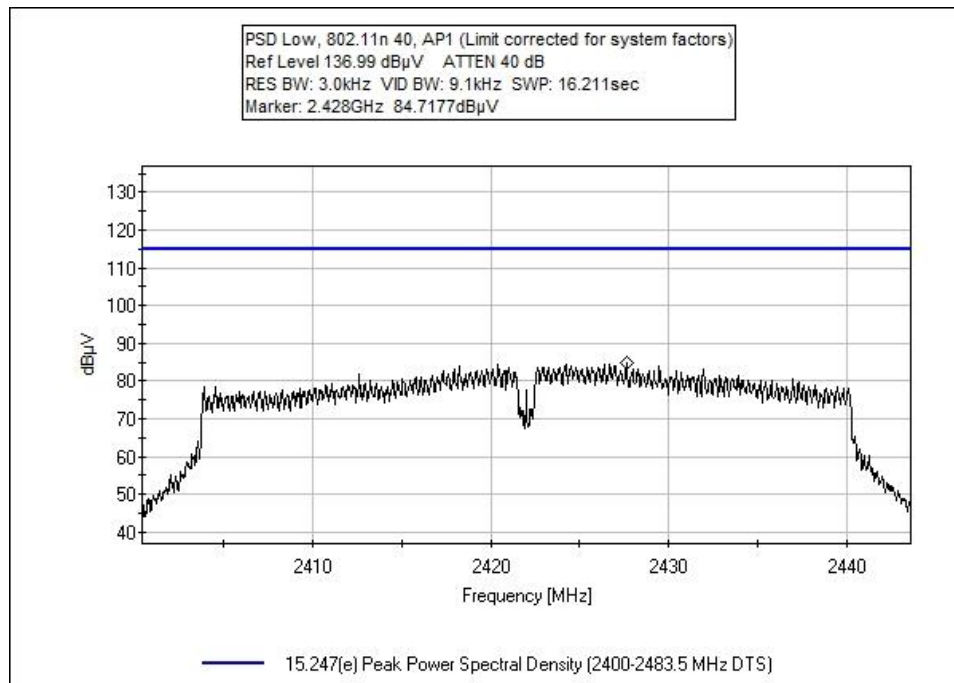




802.11n40 Plots







Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr. SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Nalloy, LLC.**
 Specification: **15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS)**
 Work Order #: **102802** Date: 4/3/2020
 Test Type: **Conducted Emissions** Time: 07:36:46
 Tested By: Matthew Harrison Sequence#: 34
 Software: EMITest 5.03.12 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

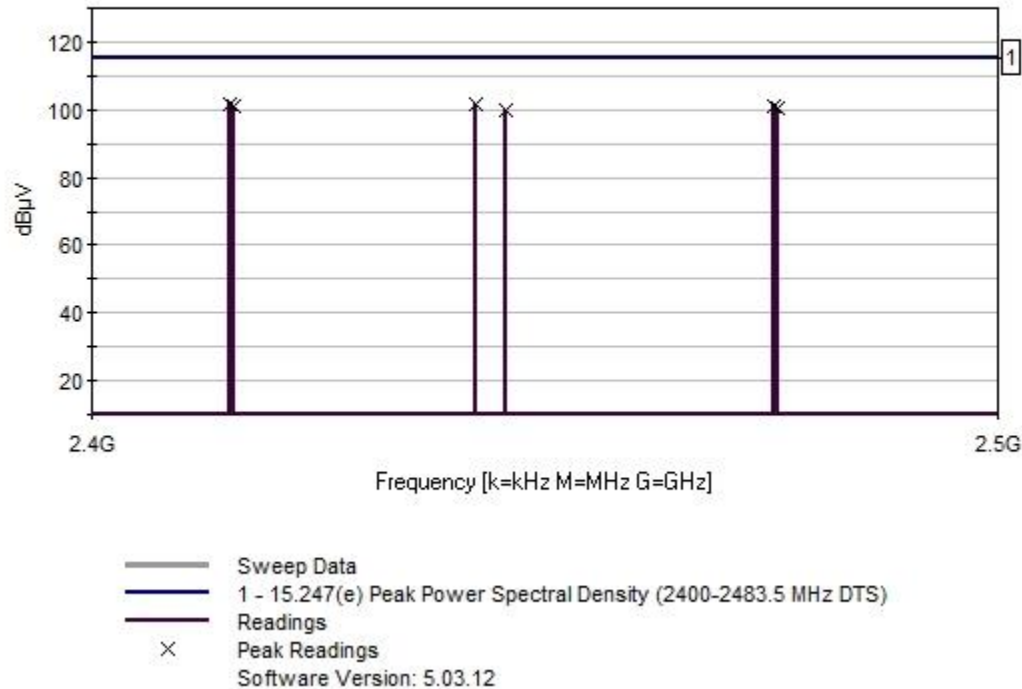
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Environmental Conditions: Temperature: 22° C Humidity: 45% Pressure: 101.3 kPa Frequency Range: 2400-2483.5 MHz Frequency tested: 2412, 2437, 2462 Firmware power setting: 15 dBm EUT Firmware: Protocol /MCS/Modulation: 802.11b, 1mbps (worst-case) Antenna type: Linear Polarized Antenna Gain: 3.7 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 KDB 558074 (v05r02 APRIL 2, 2019) KDB 662911 (v02r01 October 31, 2013) Test Mode: Transmitting Test Setup: EUT is setup for a direct connection to antenna port. Setup: EUT is connected to a Laptop via USB. Low, Mid, and High channels along with all data rates investigated, worst-case provided.
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Nalloy, LLC. WO#: 102802 Sequence#: 34 Date: 4/3/2020
15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS) Test Lead: 120V 60Hz Antenna Port 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port 1

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	2435.000M	101.9					+0.0	101.9	115.0	-13.1	Anten
2	2412.601M	101.8					+0.0	101.8	115.0	-13.2	Anten
3	2412.920M	101.3					+0.0	101.3	115.0	-13.7	Anten
4	2462.659M	101.2					+0.0	101.2	115.0	-13.8	Anten
5	2462.908M	100.4					+0.0	100.4	115.0	-14.6	Anten
6	2437.794M	100.0					+0.0	100.0	115.0	-15.0	Anten

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr. SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Nalloy, LLC.**
 Specification: **15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS)**
 Work Order #: **102802** Date: 4/3/2020
 Test Type: **Conducted Emissions** Time: 07:57:06
 Tested By: Matthew Harrison Sequence#: 35
 Software: EMITest 5.03.12 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

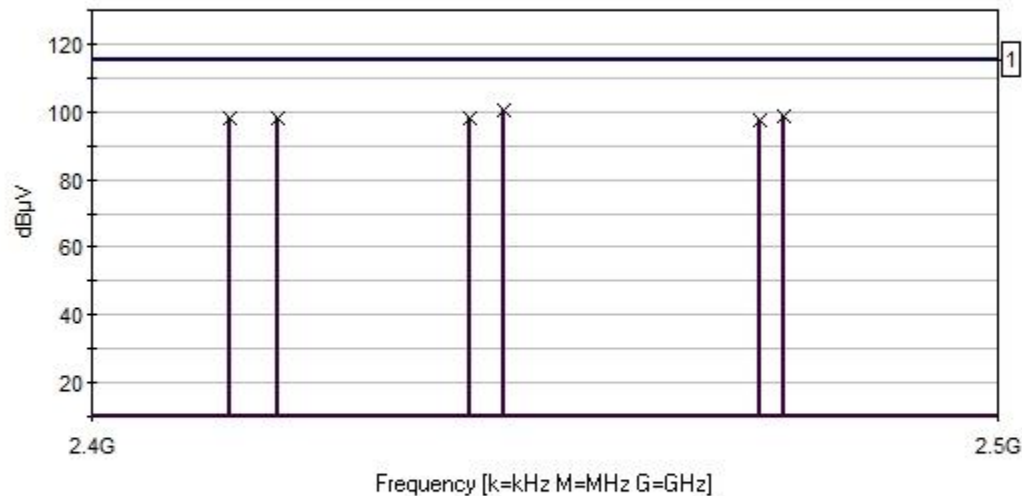
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Environmental Conditions: Temperature: 22° C Humidity: 45% Pressure: 101.3 kPa Frequency Range: 2400-2483.5 MHz Frequency tested: 2412, 2437, 2462 Firmware power setting: 13 dBm for Low Channel, 15 dBm for High Channel EUT Firmware: Protocol /MCS/Modulation: 802.11g, 6 mbps (worst-case) Antenna type: Linear Polarized Antenna Gain: 3.7 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 KDB 558074 (v05r02 APRIL 2, 2019) KDB 662911 (v02r01 October 31, 2013) Test Mode: Transmitting Test Setup: EUT is setup for a direct connection to antenna port. Setup: EUT is connected to a Laptop via USB. Low, Mid, and High channels along with all data rates investigated, worst-case provided.

Nalloy, LLC. WO#: 102802 Sequence#: 35 Date: 4/3/2020
15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS) Test Lead: 120V 60Hz Antenna Port 1



— Sweep Data
— 1 - 15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS)
— Readings
× Peak Readings
Software Version: 5.03.12

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port 1

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	2437.602M	100.2					+0.0	100.2	115.0	-14.8	Anten
2	2463.492M	98.8					+0.0	98.8	115.0	-16.2	Anten
3	2434.524M	98.1					+0.0	98.1	115.0	-16.9	Anten
4	2412.590M	98.0					+0.0	98.0	115.0	-17.0	Anten
5	2416.983M	97.9					+0.0	97.9	115.0	-17.1	Anten
6	2461.374M	97.6					+0.0	97.6	115.0	-17.4	Anten

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Nalloy, LLC.**
 Specification: **15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS)**
 Work Order #: **102802** Date: 4/3/2020
 Test Type: **Conducted Emissions** Time: 08:15:36
 Tested By: Matthew Harrison Sequence#: 36
 Software: EMITest 5.03.12 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

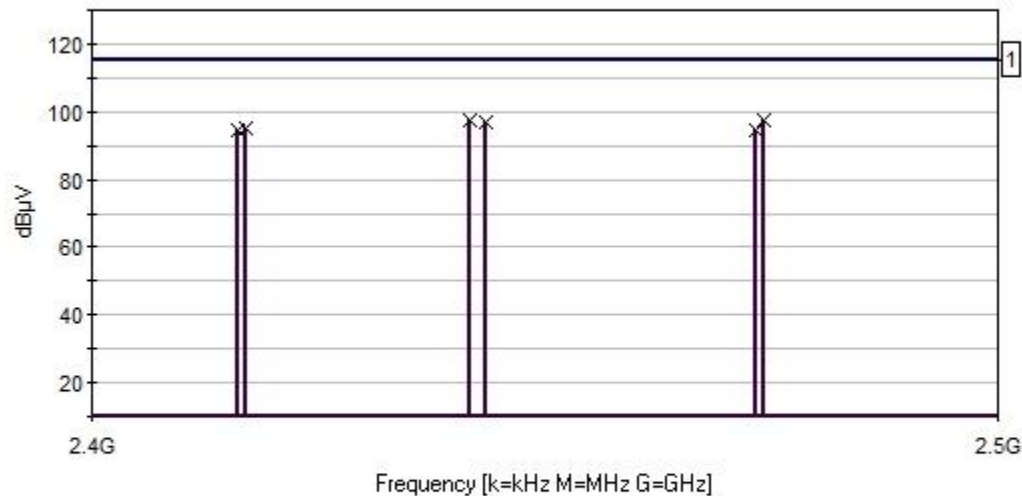
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Environmental Conditions: Temperature: 22° C Humidity: 45% Pressure: 101.3 kPa Frequency Range: 2400-2483.5 MHz Frequency tested: 2412, 2437, 2462 Firmware power setting: 12 dBm for Low Channel, 14 dBm for Middle and High Channel EUT Firmware: Protocol /MCS/Modulation: 802.11n, 20MHz BW, MCS8 (worst-case) Antenna type: Linear Polarized Antenna Gain: 3.7 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 KDB 558074 (v05r02 APRIL 2, 2019) KDB 662911 (v02r01 October 31, 2013) Test Mode: Transmitting Test Setup: EUT is setup for a direct connection to antenna port. Setup: EUT is connected to a Laptop via USB Low, Mid, and High channels along with all data rates investigated, worst-case provided.

Nalloy, LLC. WO#: 102802 Sequence#: 36 Date: 4/3/2020
15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS) Test Lead: 120V 60Hz Antenna Port 1



— Sweep Data
— 1 - 15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS)
— Readings
× Peak Readings
Software Version: 5.03.12

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port 1

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	2461.737M	97.6					+0.0	97.6	115.0	-17.4	Anten
2	2434.450M	97.5					+0.0	97.5	115.0	-17.5	Anten
3	2436.004M	96.7					+0.0	96.7	115.0	-18.3	Anten
4	2414.000M	95.0					+0.0	95.0	115.0	-20.0	Anten
5	2413.275M	94.7					+0.0	94.7	115.0	-20.3	Anten
6	2461.007M	94.6					+0.0	94.6	115.0	-20.4	Anten

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Nalloy, LLC.**
 Specification: **15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS)**
 Work Order #: **102802** Date: 4/3/2020
 Test Type: **Conducted Emissions** Time: 08:47:52
 Tested By: Matthew Harrison Sequence#: 37
 Software: EMITest 5.03.12 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

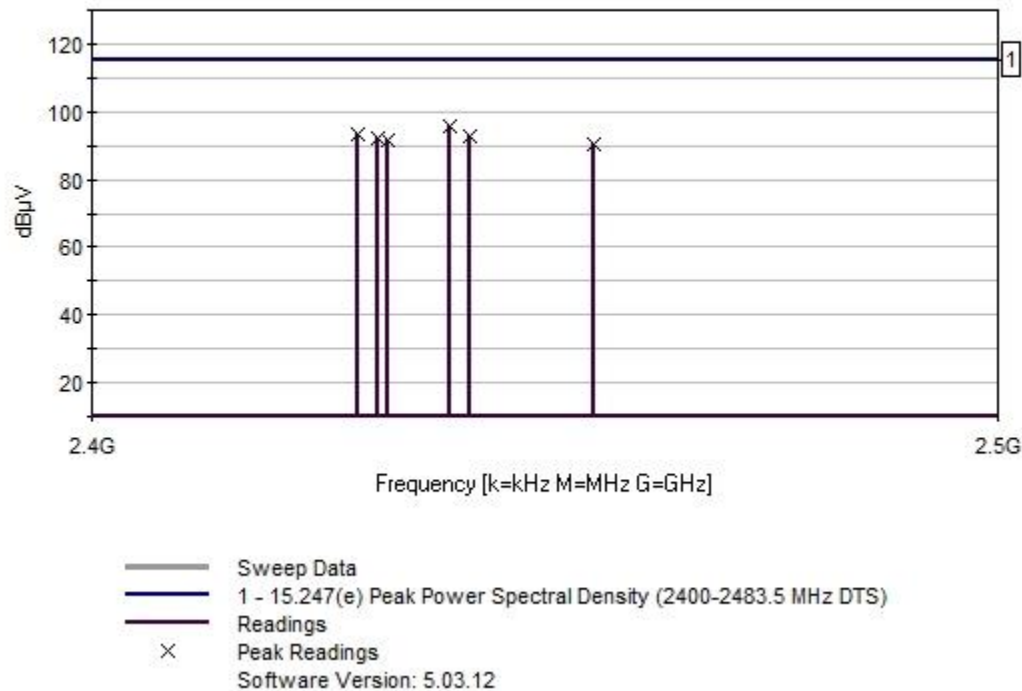
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Environmental Conditions: Temperature: 22° C Humidity: 45% Pressure: 101.3 kPa Frequency Range: 2400-2483.5 MHz Frequency tested: 2422, 2437, 2452 Firmware power setting: 11 dBm for Low Channel, 14 dBm for Middle Channel, and 12dBm High Channel EUT Firmware: Protocol /MCS/Modulation: 802.11n, 40MHz BW, MCS8 (worst-case) Antenna type: Linear Polarized Antenna Gain: 3.7 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 KDB 558074 (v05r02 APRIL 2, 2019) KDB 662911 (v02r01 October 31, 2013) Test Mode: Transmitting Test Setup: EUT is setup for a direct connection to antenna port. Setup: EUT is connected to a Laptop via USB Low, Mid, and High channels along with all data rates investigated, worst-case provided.
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Nalloy, LLC. WO#: 102802 Sequence#: 37 Date: 4/3/2020
15.247(e) Peak Power Spectral Density (2400-2483.5 MHz DTS) Test Lead: 120V 60Hz Antenna Port 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data: Reading listed by margin.

Test Lead: Antenna Port 1

#	Freq MHz	Rdng dBμV	T1 dB				Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	2432.630M	95.5	+0.0				+0.0	95.5	115.0	-19.5	Anten
2	2424.160M	93.1	+0.0				+0.0	93.1	115.0	-21.9	Anten
3	2434.490M	92.8	+0.0				+0.0	92.8	115.0	-22.2	Anten
4	2426.040M	92.4	+0.0				+0.0	92.4	115.0	-22.6	Anten
5	2427.010M	91.3	+0.0				+0.0	91.3	115.0	-23.7	Anten
6	2446.000M	90.5	+0.0				+0.0	90.5	115.0	-24.5	Anten

Test Setup Photo(s)



15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

802.11b Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Nalloy, LLC.**
 Specification: **15.247(d) Conducted Spurious Emissions**
 Work Order #: **102802** Date: 3/27/2020
 Test Type: **Conducted Emissions** Time: 11:38:04
 Tested By: Matthew Harrison Sequence#: 57
 Software: EMITest 5.03.12 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

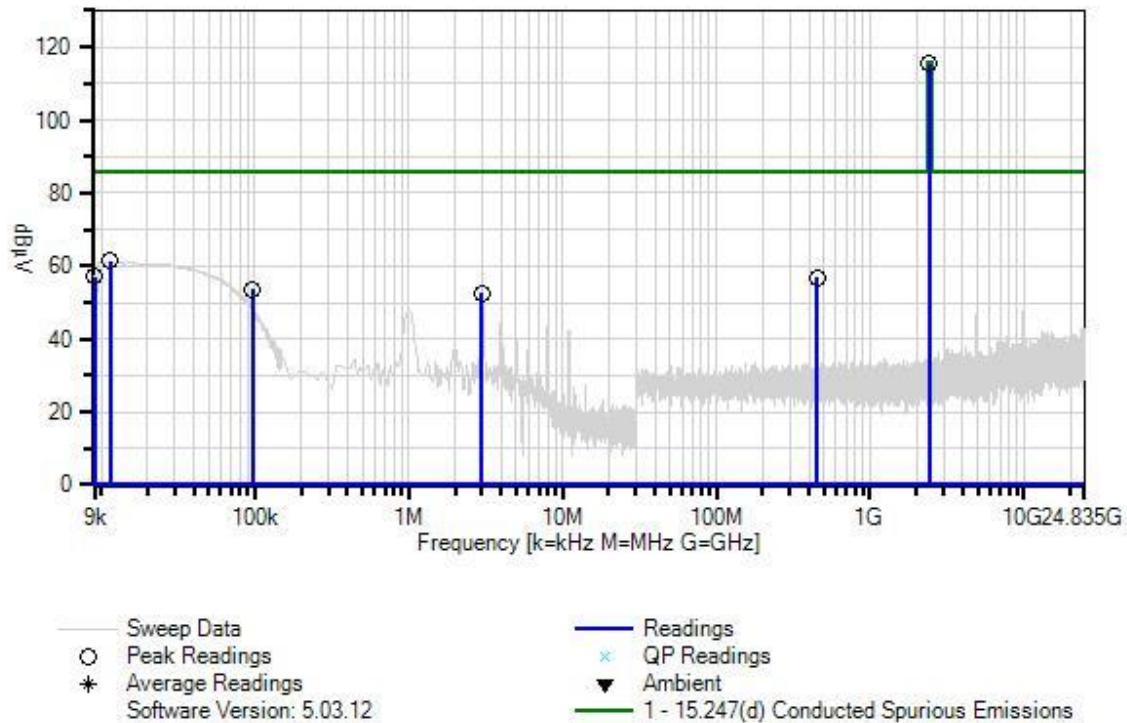
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 22° C Humidity: 28% Pressure: 101.3 kPa Frequency Range: 9kHz-25GHz Frequency tested: 2412 Firmware power setting: 15 dBm EUT Firmware: Protocol /MCS/Modulation: 802.11b, 1mbps (worst-case) Antenna type: Linear Polarized Antenna Gain : 3.7 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 Test Mode: Transmitting Test Setup: EUT is setup for conducted measurements. Modifications Added: None Setup: EUT is connected to a Laptop via USB and Audio cable. All data rates investigated, worst-case provided.

Nalloy, LLC. WO#: 102802 Sequence#: 57 Date: 3/27/2020
15.247(d) Conducted Spurious Emissions Test Lead: 120V 60Hz Antenna Port 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port 0

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	2412.480M	115.5					+0.0	115.5	116.0	-0.5	Anten
2	11.397k	61.3					+0.0	61.3	86.0	-24.7	Anten
3	9.000k	57.2					+0.0	57.2	86.0	-28.8	Anten
4	451.321M	56.8					+0.0	56.8	86.0	-29.2	Anten
5	96.279k	53.5					+0.0	53.5	86.0	-32.5	Anten
6	2.991M	52.6					+0.0	52.6	86.0	-33.4	Anten

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Nalloy, LLC.**
 Specification: **15.247(d) Conducted Spurious Emissions**
 Work Order #: **102802** Date: 3/27/2020
 Test Type: **Conducted Emissions** Time: 11:48:38
 Tested By: Matthew Harrison Sequence#: 58
 Software: EMITest 5.03.12 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

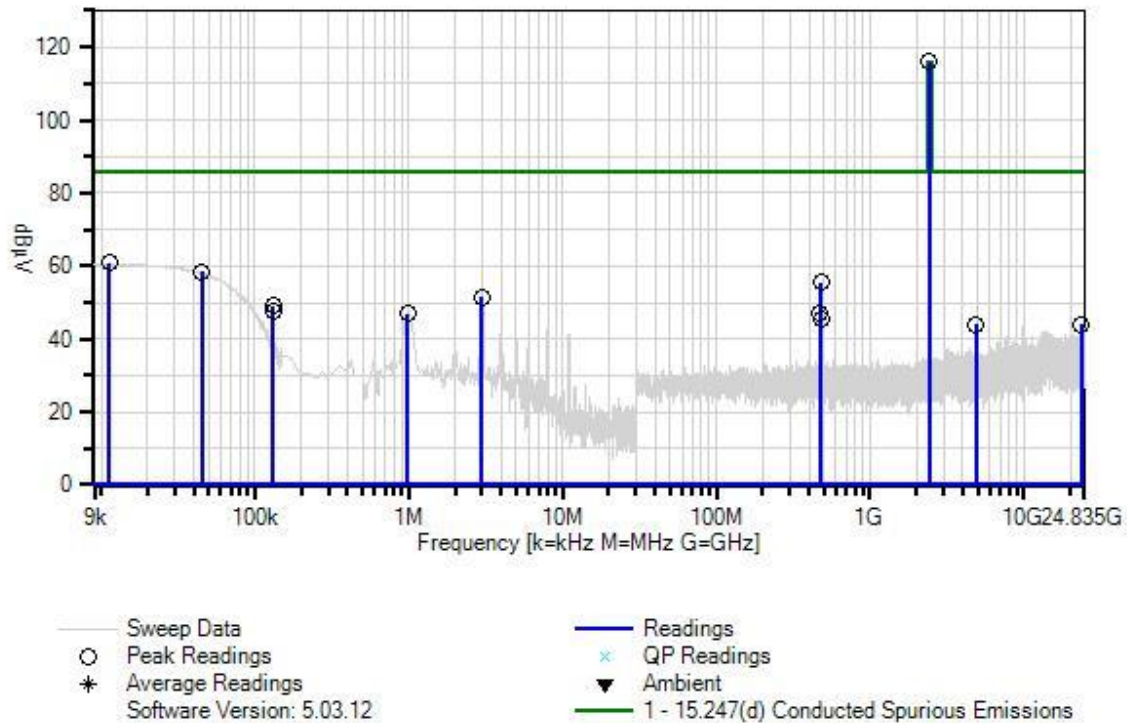
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 22° C Humidity: 28% Pressure: 101.3 kPa Frequency Range: 9kHz-25GHz Frequency tested: 2437 Firmware power setting: 15 dBm EUT Firmware: Protocol /MCS/Modulation: 802.11b, 1mbps (worst-case) Antenna type: Linear Polarized Antenna Gain : 3.7 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 Test Mode: Transmitting Test Setup: EUT is setup for conducted measurements. Modifications Added: None Setup: EUT is connected to a Laptop via USB and Audio cable. All data rates investigated, worst-case provided.

Nalloy, LLC. WO#: 102802 Sequence#: 58 Date: 3/27/2020
15.247(d) Conducted Spurious Emissions Test Lead: 120V 60Hz Antenna Port 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port 0

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	2437.503M	116.0					+0.0	116.0	116.0	+0.0	Anten
2	11.256k	60.8					+0.0	60.8	86.0	-25.2	Anten
3	45.237k	58.5					+0.0	58.5	86.0	-27.5	Anten
4	476.246M	55.6					+0.0	55.6	86.0	-30.4	Anten
5	2.991M	51.4					+0.0	51.4	86.0	-34.6	Anten
6	131.952k	49.1					+0.0	49.1	86.0	-36.9	Anten

7	131.247k	47.6	+0.0	47.6	86.0	-38.4	Anten
8	474.744M	47.0	+0.0	47.0	86.0	-39.0	Anten
9	985.573k	46.9	+0.0	46.9	86.0	-39.1	Anten
10	477.747M	45.6	+0.0	45.6	86.0	-40.4	Anten
11	23558.405 M	44.0	+0.0	44.0	86.0	-42.0	Anten
12	4873.939M	43.9	+0.0	43.9	86.0	-42.1	Anten

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Nalloy, LLC.**
 Specification: **15.247(d) Conducted Spurious Emissions**
 Work Order #: **102802** Date: 3/27/2020
 Test Type: **Conducted Emissions** Time: 11:58:53
 Tested By: Matthew Harrison Sequence#: 59
 Software: EMITest 5.03.12 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

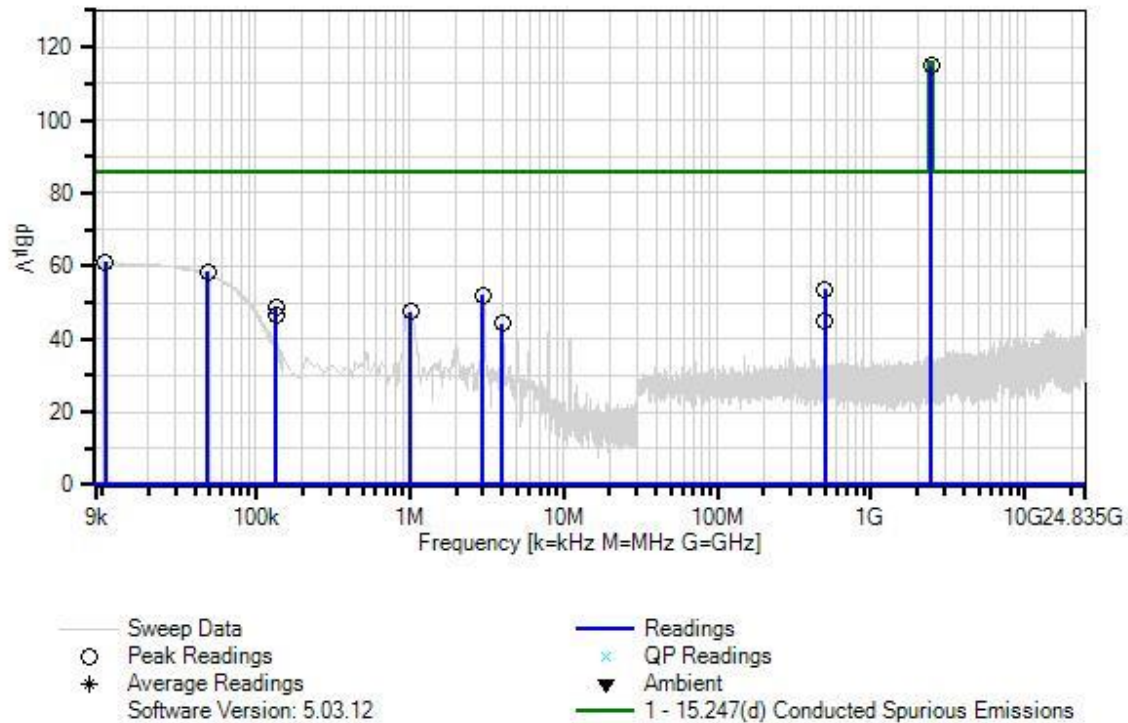
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 22° C Humidity: 28% Pressure: 101.3 kPa Frequency Range: 9kHz-25GHz Frequency tested: 2462 Firmware power setting: 15 dBm EUT Firmware: Protocol /MCS/Modulation: 802.11b, 1mbps (worst-case) Antenna type: Linear Polarized Antenna Gain : 3.7 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 Test Mode: Transmitting Test Setup: EUT is setup for conducted measurements. Modifications Added: None Setup: EUT is connected to a Laptop via USB and Audio cable. All data rates investigated, worst-case provided.

Nalloy, LLC. WO#: 102802 Sequence#: 59 Date: 3/27/2020
15.247(d) Conducted Spurious Emissions Test Lead: 120V 60Hz Antenna Port 0



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port 0

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	2460.510M	114.8					+0.0	114.8	116.0	-1.2	Anten
2	10.551k	61.1					+0.0	61.1	86.0	-24.9	Anten
3	48.480k	58.4					+0.0	58.4	86.0	-27.6	Anten
4	501.271M	53.6					+0.0	53.6	86.0	-32.4	Anten
5	2.991M	51.9					+0.0	51.9	86.0	-34.1	Anten
6	135.195k	48.7					+0.0	48.7	86.0	-37.3	Anten

7	1.006M	47.6	+0.0	47.6	86.0	-38.4	Anten
8	134.631k	46.8	+0.0	46.8	86.0	-39.2	Anten
9	499.769M	45.2	+0.0	45.2	86.0	-40.8	Anten
10	4.015M	44.2	+0.0	44.2	86.0	-41.8	Anten

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Nalloy, LLC.**
 Specification: **15.247(d) Conducted Spurious Emissions**
 Work Order #: **102802** Date: 3/27/2020
 Test Type: **Conducted Emissions** Time: 12:07:07
 Tested By: Matthew Harrison Sequence#: 60
 Software: EMITest 5.03.12 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

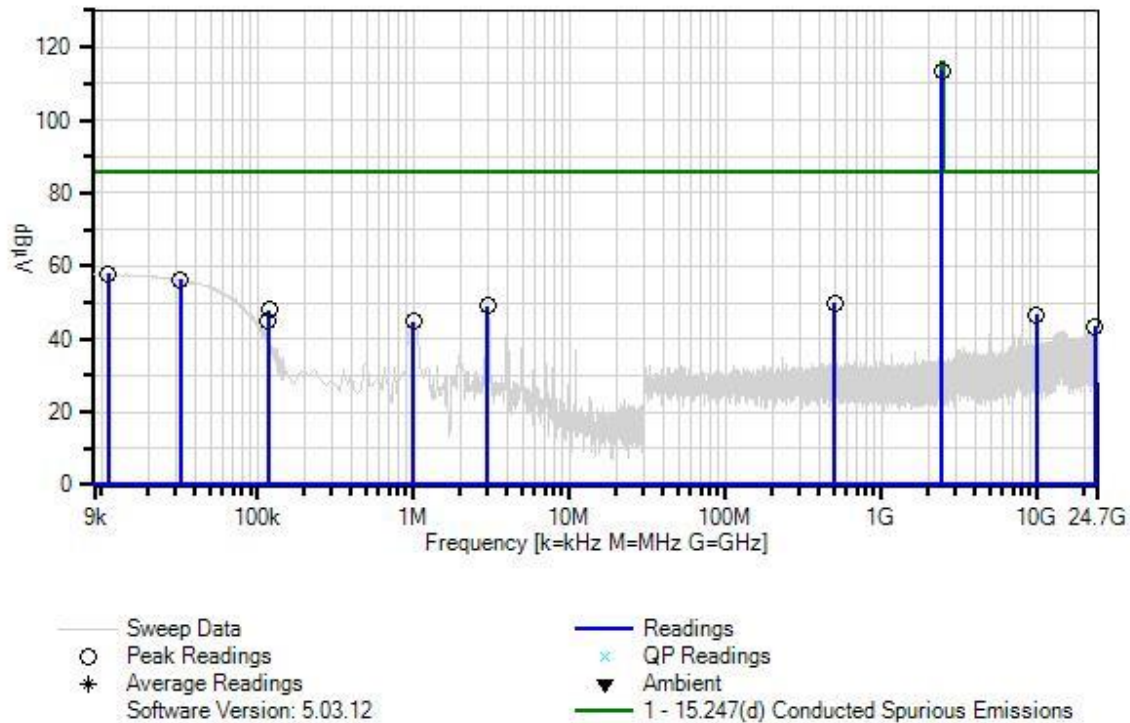
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 22° C Humidity: 28% Pressure: 101.3 kPa Frequency Range: 9kHz-25GHz Frequency tested: 2462 Firmware power setting: 15 dBm EUT Firmware: Protocol /MCS/Modulation: 802.11b, 1mbps (worst-case) Antenna type: Linear Polarized Antenna Gain : 3.7 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 Test Mode: Transmitting Test Setup: EUT is setup for conducted measurements. Modifications Added: None Setup: EUT is connected to a Laptop via USB and Audio cable. All data rates investigated, worst-case provided.

Nalloy, LLC. WO#: 102802 Sequence#: 60 Date: 3/27/2020
15.247(d) Conducted Spurious Emissions Test Lead: 120V 60Hz Antenna Port 1



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port 1

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	2461.470M	113.6					+0.0	113.6	116.0	-2.4	Anten
2	11.115k	57.9					+0.0	57.9	86.0	-28.1	Anten
3	32.265k	56.4					+0.0	56.4	86.0	-29.6	Anten
4	501.271M	49.9					+0.0	49.9	86.0	-36.1	Anten
5	3.012M	49.1					+0.0	49.1	86.0	-36.9	Anten
6	118.980k	47.9					+0.0	47.9	86.0	-38.1	Anten