Arovast Corporation

# TEST REPORT

**SCOPE OF WORK**
FCC TESTING–LAP-C202S-WUSR

**REPORT NUMBER**
210520010SZN-004

**ISSUE DATE** **[REVISED DATE]**

June 23, 2021 [----------]

**PAGES**
73

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FCC ID 247_b

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**TEST REPORT**

Intertek Report No.: 210520010SZN-004

# Arovast Corporation

Application
For
Certification

## FCC ID: 2ARBY-C202S-WUSR

## Smart True HEPA Air Purifier

## Model: LAP-C202S-WUSR

## 2.4GHz Wi-Fi Transceiver

Report No.: 210520010SZN-004

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-19]

**Prepared and Checked by:**

**Rode Liu**
**Project Engineer**

**Approved by:**

**Peter Kang**
**Senior Technical Supervisor**
**Date: June 23, 2021**

# MEASUREMENT/TECHNICAL REPORT

This report concerns (check one) Original Grant ___X___ Class II Change _____

Equipment Type: DTS - Part 15 Digital Transmission Systems (Wi-Fi transmitter portion)

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Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes _____ No ___X___

If yes, defer until : _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

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Transition Rules Request per 15.37? Yes _____ No ___X___

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-01-19] Edition] provision.

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Report prepared by:

**Rode Liu**
**Intertek Testing Services Shenzhen Ltd. Longhua Branch**
101, 201, Building B, No. 308 Wuhe Avenue,
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## 1.0 Summary of Test results

Applicant: Arovast Corporation
Applicant Address: 1202 N. Miller St. Suite A, Anaheim, CA 92806, USA
Manufacturer: Arovast Corporation
Manufacturer Address: 1202 N. Miller St. Suite A, Anaheim, CA 92806, USA

Model: LAP-C202S-WUSR
FCC ID: 2ARBY-C202S-WUSR

| TEST ITEM | REFERENCE | RESULTS |
|---|---|---|
| Max. Output power | 15.247(b)(3) | Pass |
| 6 dB Bandwidth | 15.247(a)(2) | Pass |
| Max. Power Density | 15.247(e) | Pass |
| Out of Band Antenna Conducted Emission | 15.247(d) | Pass |
| Radiated Emission in Restricted Bands | 15.247(d), 15.209, FCC 15.205 | Pass |
| AC Conducted Emission | 15.207 | Pass |
| Antenna Requirement | 15.203 | Pass (See Notes) |

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

## 2.0 General Description

### 2.1 Product Description

The Equipment Under Test (EUT) is a Smart True HEPA Air Purifier with Wi-Fi function operating at 2412-2462MHz for 802.11b/g/n-HT20, 11 channels with 5MHz channel spacing and 2422-2452MHz for 802.11n-HT40, 7 channels with 5MHz channel spacing. The EUT is powered by AC 120V, 60Hz. For more detailed features description, please refer to the user's manual.

Type of Modulation: BPSK, QPSK, 16QAM, 64QAM for OFDM; CCK, DQPSK, DBPSK for DSSS.
Antenna Type: PCB Layout
Antenna Gain: 3.7dBi

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

### 2.2 Related Submittal(s) Grants

This is an application for certification of:
DTS- Part 15 Digital Transmission Systems (2.4GHz Wi-Fi transmitter portion).

Remaining portions are subject to the following procedures:
1. Receiver portion of WiFi: exempt from technical requirement of this Part.
2. Other Digital Function: The Bluettoth EDR function is recorded in the test report: 210520010SZN-002. The Bluettoth BLE function is recorded in the test report: 210520010SZN-003, and related report for FCC SDOC is subjected to report number: 210520010SZN-001.

### 2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013) and KDB 558074 D01 v05r02. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

### 2.4 Test Facility

The Semi-anechoic chamber and shielded room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Longhua Branch** and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China. This test facility and site measurement data have been fully placed on file with File Number: CN1188.

## 3.0 System Test Configuration

### 3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. The EUT was powered by AC 120V, 60Hz during the test.

On 802.11b/g/n-HT20/n-HT40 mode, only one antenna is used, and all data rate were tested and only the worst case data is shown in the report.

For maximizing emissions, the EUT was rotated through 360°, the EUT was placed on the styrene turntable with 0.8m up to 1GHz and 1.5 m above 1GHz. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

The EUT and transmitting antenna was centered on the turntable.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

### 3.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

The parameters of test software setting:
During the test, Channel and power controlling software provided by the applicant was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the application and is going to be fixed on the firmware of the end product.

### 3.3 Special Accessories

N/A.

## 3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

## 3.5 Equipment Modification

Any modifications installed previous to testing by Arovast Corporation will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Longhua Branch.

## 3.6 Support Equipment List and Description

| Description | Manufacturer | Model No. |
|---|---|---|
| USB cable (Provided by applicant) | Provided by applicant | unshielded, 0.8m |
| Notebook | DELL | / |

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR

## 4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

The antenna power of the EUT was connected to the input of a broadband peak RF power meter. The power meter have a video bandwidth that is greater than DTS bandwidth and utilize a fast-responding diode detector. Power was read directly at the EUT antenna terminals with cable loss added.

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm).

| IEEE 802.11b (Antenna Gain = 3.7dBi) (CCK, 1Mbps) | | |
|---|---|---|
| Frequency (MHz) | Output in dBm (Peak Reading) | Output in mWatt |
| Low Channel: 2412 | 15.2 | 33.11 |
| Middle Channel: 2437 | 14.8 | 30.20 |
| High Channel: 2462 | 14.5 | 28.18 |

| IEEE 802.11g (Antenna Gain = 3.7dBi) (16QAM, 6Mbps) | | |
|---|---|---|
| Frequency (MHz) | Output in dBm (Peak Reading) | Output in mWatt |
| Low Channel: 2412 | 14.1 | 25.70 |
| Middle Channel: 2437 | 14.6 | 28.84 |
| High Channel: 2462 | 14.4 | 27.54 |

| IEEE 802.11n-HT20 (Antenna Gain = 3.7dBi) (64QAM, 6Mbps) | | |
|---|---|---|
| Frequency (MHz) | Output in dBm (Peak Reading) | Output in mWatt |
| Low Channel: 2412 | 14.7 | 29.51 |
| Middle Channel: 2437 | 15.2 | 33.11 |
| High Channel: 2462 | 14.9 | 30.91 |

| IEEE 802.11n-HT40 (Antenna Gain = 3.7dBi) (64QAM, 13.5Mbps) | | |
|---|---|---|
| Frequency (MHz) | Output in dBm (Peak Reading) | Output in mWatt |
| Low Channel: 2422 | 14.1 | 25.71 |
| Middle Channel: 2437 | 14.4 | 27.54 |
| High Channel: 2452 | 14.5 | 28.18 |

Cable loss: 0.5 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

EUT max. output level = 15.2dBm
EUT max. E.I.R.P = 15.2dBm + 3.7dBi = 18.9dBm = 77.62mW

For RF Exposure, the information is saved with filename: RF exposure.pdf.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR

4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a) (2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 KHz according to FCC KDB 558074 D01 v05r02. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Limit: The 6 dB Bandwidth is at least 500 kHz.

| IEEE 802.11b (CCK, 1Mbps) | |
|---|---|
| Frequency (MHz) | 6 dB Bandwidth (MHz) |
| 2412 | 9.120 |
| 2437 | 9.120 |
| 2462 | 9.150 |

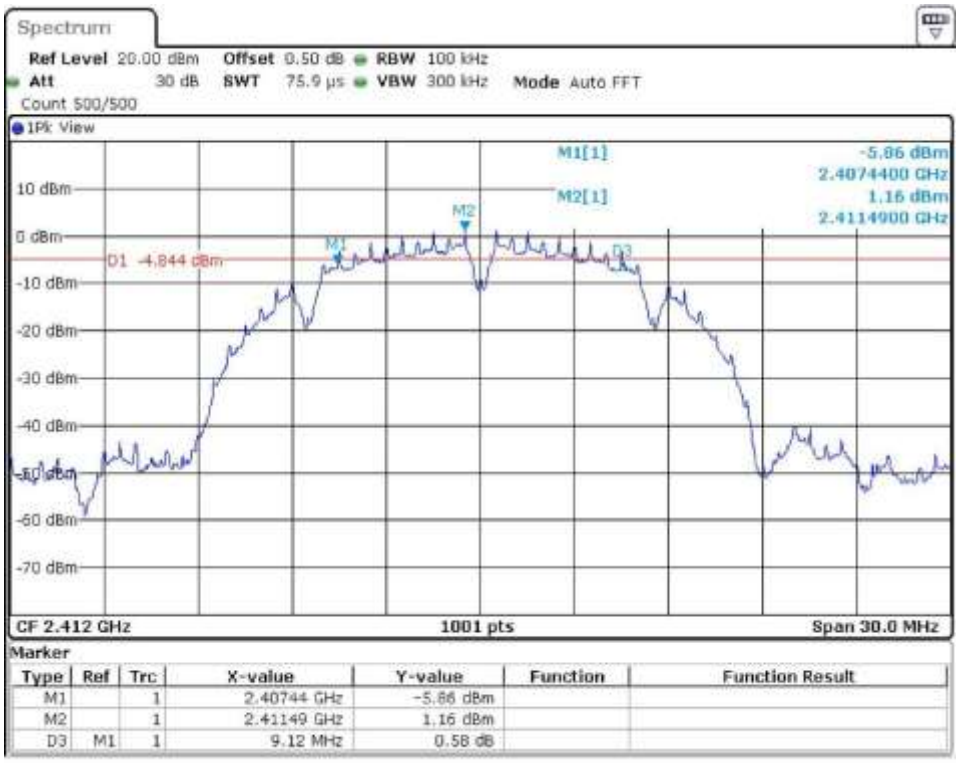
| IEEE 802.11g (16QAM, 6Mbps) | |
|---|---|
| Frequency (MHz) | 6 dB Bandwidth (MHz) |
| 2412 | 16.440 |
| 2437 | 16.440 |
| 2462 | 16.470 |

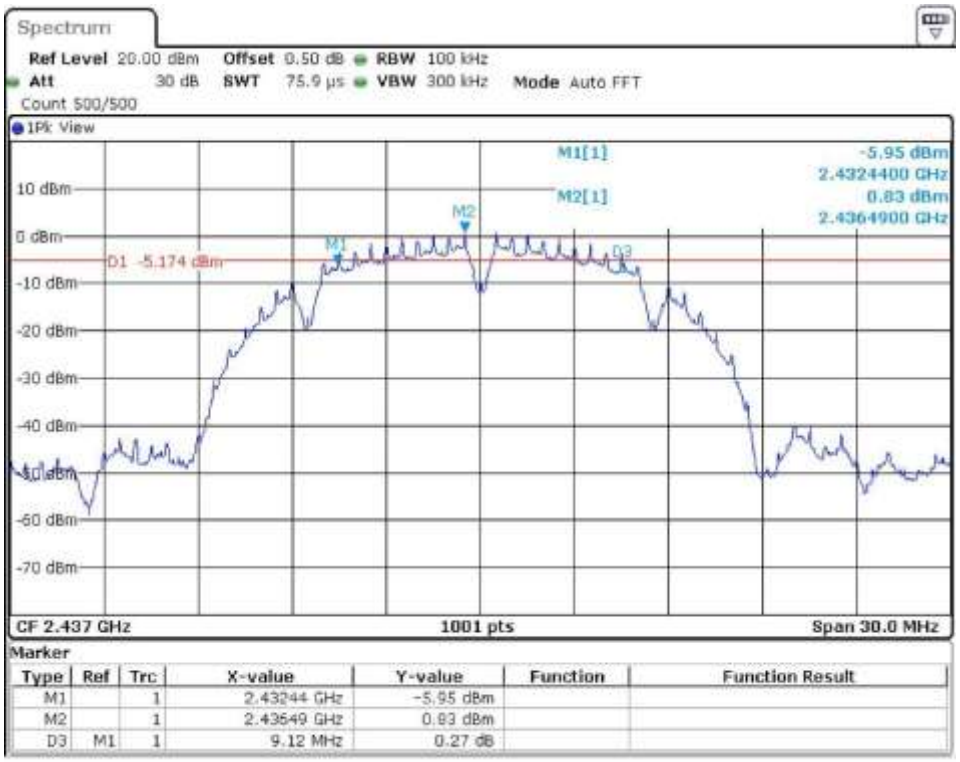
| IEEE 802.11n-HT20 (64QAM, 6Mbps) | |
|---|---|
| Frequency (MHz) | 6 dB Bandwidth (MHz) |
| 2412 | 17.040 |
| 2437 | 17.100 |
| 2462 | 17.400 |

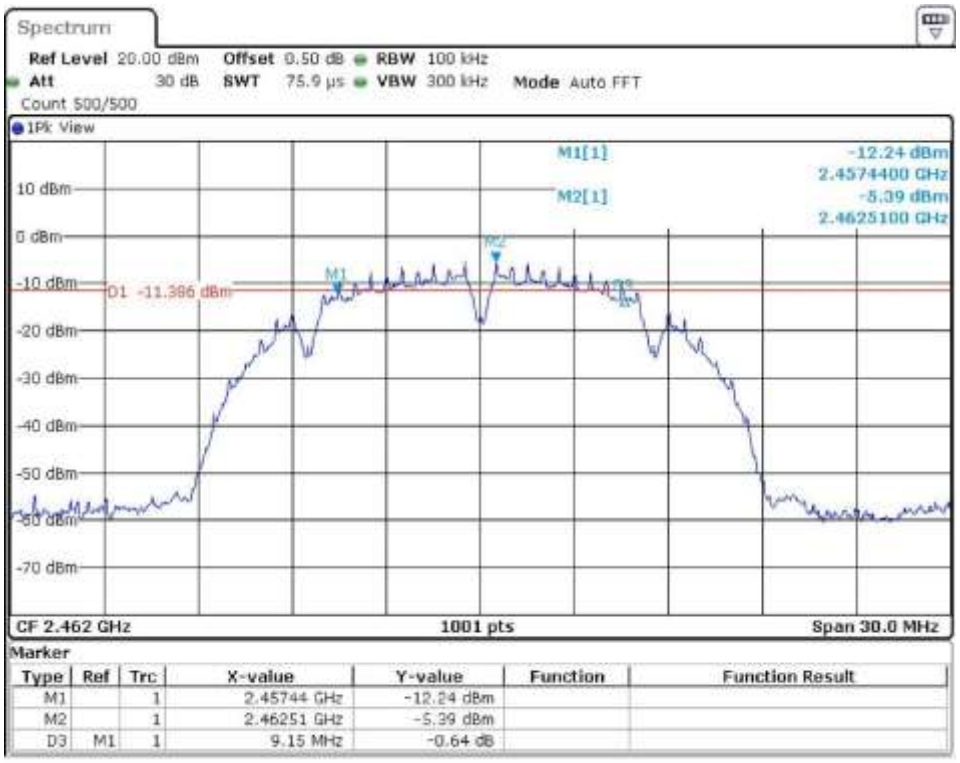
| IEEE 802.11n-HT40 (64QAM, 13.5Mbps) | |
|---|---|
| Frequency (MHz) | 6 dB Bandwidth (MHz) |
| 2422 | 32.640 |
| 2437 | 32.460 |
| 2452 | 32.940 |

The test plots are attached as below.

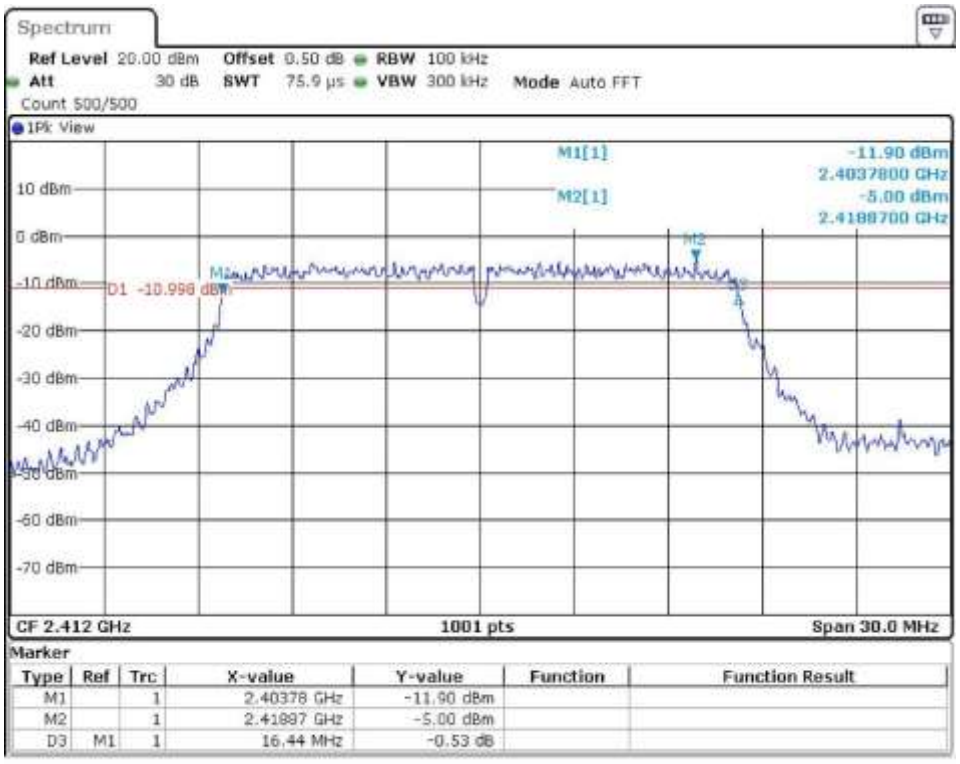
802.11b

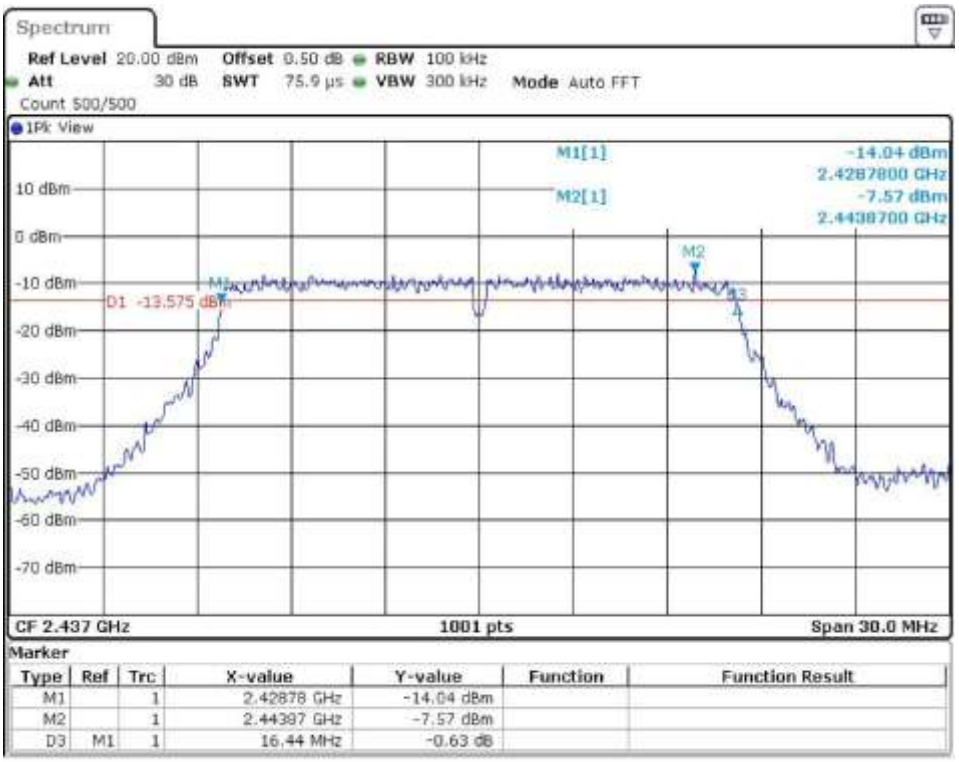

Spectrum
Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
Count 500/500
1Pk View
M1[1] -5.86 dBm
2.4074400 GHz
M2[1] 1.16 dBm
2.4114900 GHz
D1 -4.844 dBm
CF 2.412 GHz
1001 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.40744 GHz -5.86 dBm
M2 1 2.41149 GHz 1.16 dBm
D3 M1 1 9.12 MHz 0.58 dB


Spectrum
Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
Count 500/500
1Pk View
M1[1] -5.95 dBm
2.4324400 GHz
M2[1] 0.83 dBm
2.4364900 GHz
D1 -5.174 dBm
CF 2.437 GHz
1001 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.43244 GHz -5.95 dBm
M2 1 2.43649 GHz 0.83 dBm
D3 M1 1 9.12 MHz 0.27 dB


Spectrum
Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
Count 500/500
1Pk View
M1[1] -12.24 dBm
2.4574400 GHz
M2[1] -5.39 dBm
2.4625100 GHz
D1 -11.386 dBm
CF 2.462 GHz
1001 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.45744 GHz -12.24 dBm
M2 1 2.46251 GHz -5.39 dBm
D3 M1 1 9.15 MHz -0.64 dB

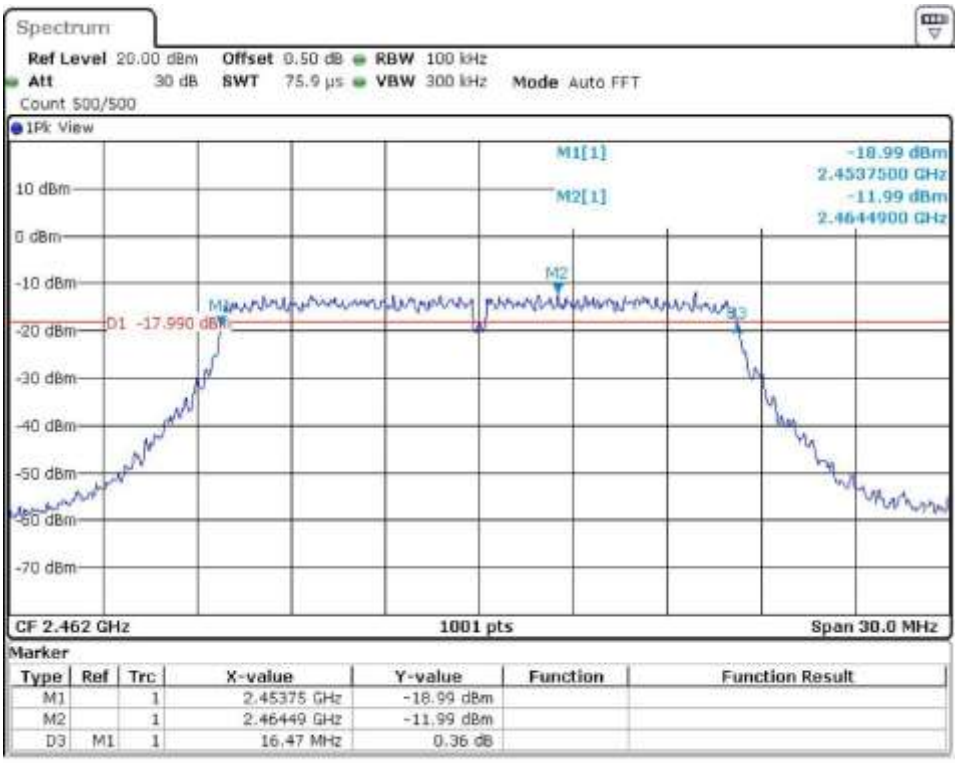
802.11g


Spectrum
Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
Count 500/500
1Pk View
M1[1] -11.90 dBm
2.4037800 GHz
M2[1] -5.00 dBm
2.4188700 GHz
D1 -10.998 dBm
CF 2.412 GHz
1001 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.40378 GHz -11.90 dBm
M2 1 2.41897 GHz -5.00 dBm
D3 M1 1 16.44 MHz -0.53 dB




Marker

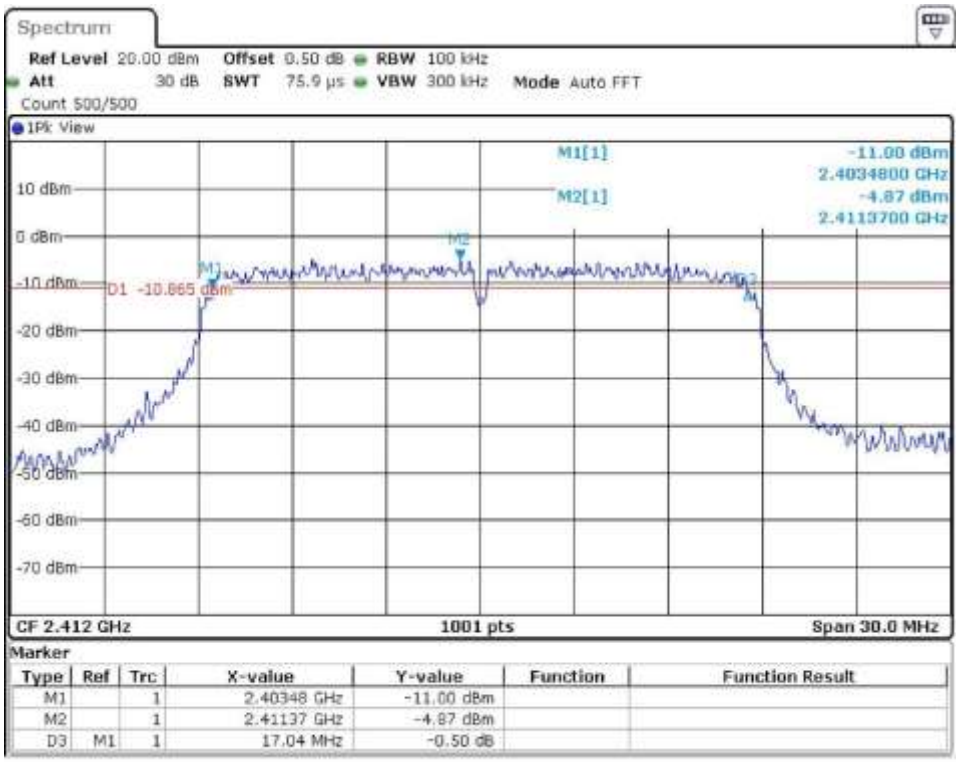
| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.42878 GHz | -14.04 dBm | | |
| M2 | | 1 | 2.44397 GHz | -7.57 dBm | | |
| D3 | M1 | 1 | 16.44 MHz | -0.63 dB | | |

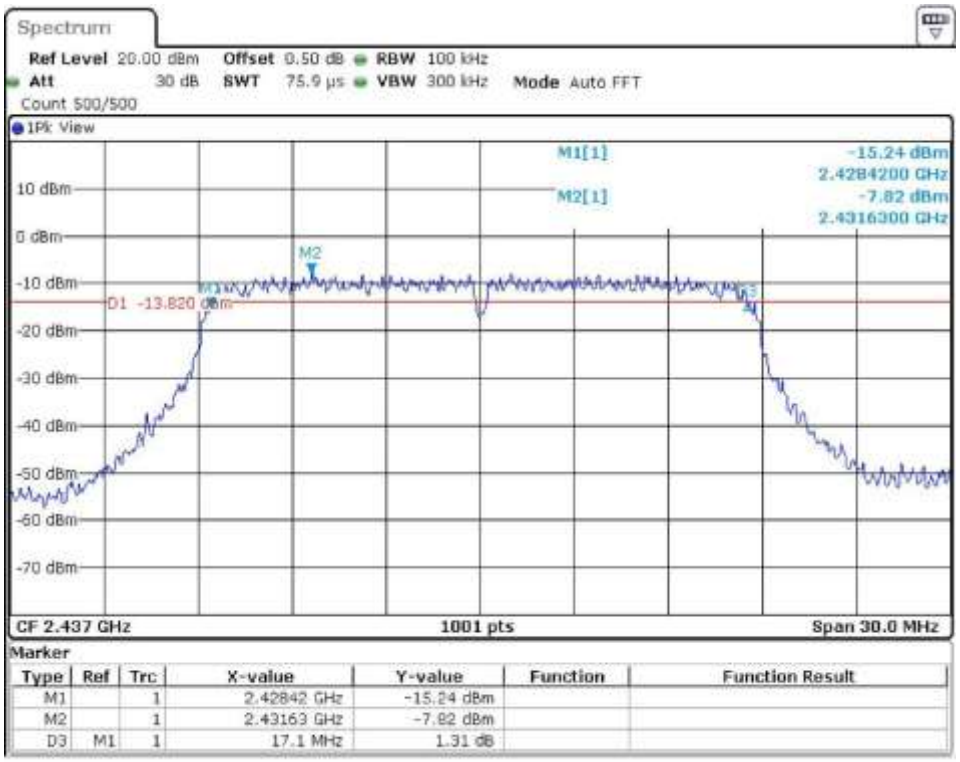


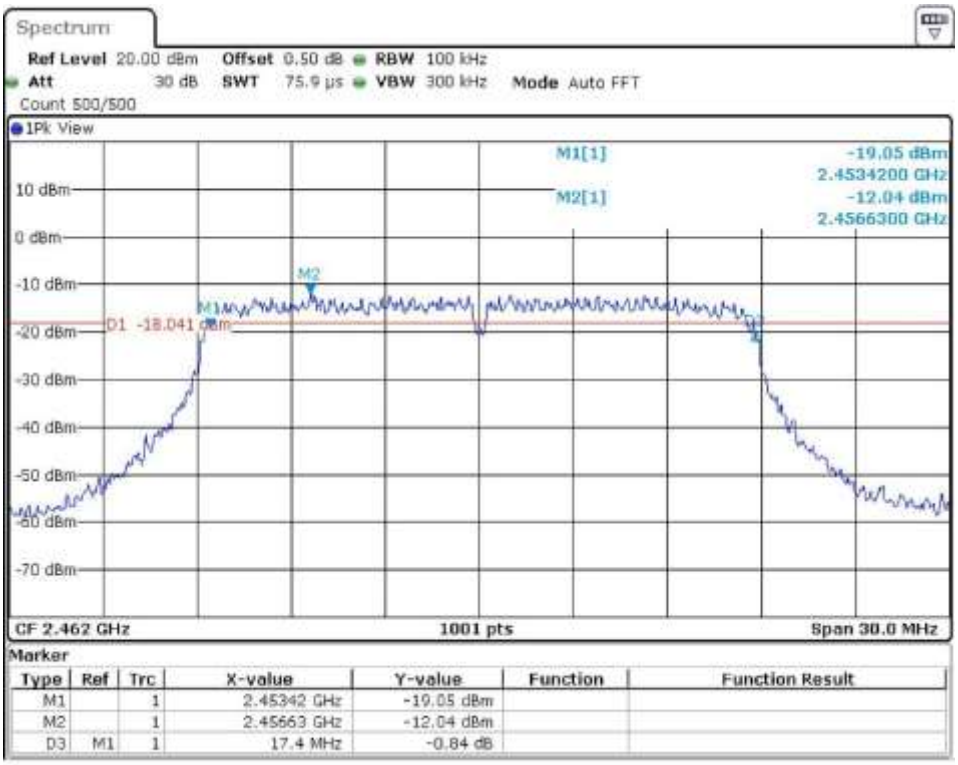

Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.45375 GHz | -18.99 dBm | | |
| M2 | | 1 | 2.46449 GHz | -11.99 dBm | | |
| D3 | M1 | 1 | 16.47 MHz | 0.36 dB | | |

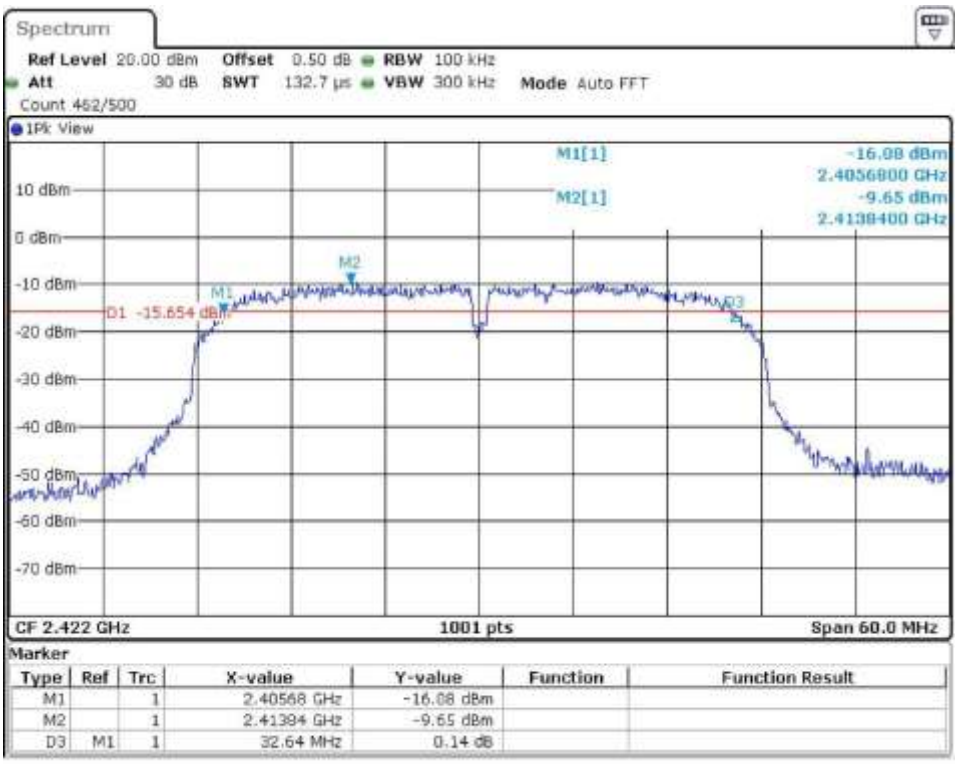
802.11n-HT20

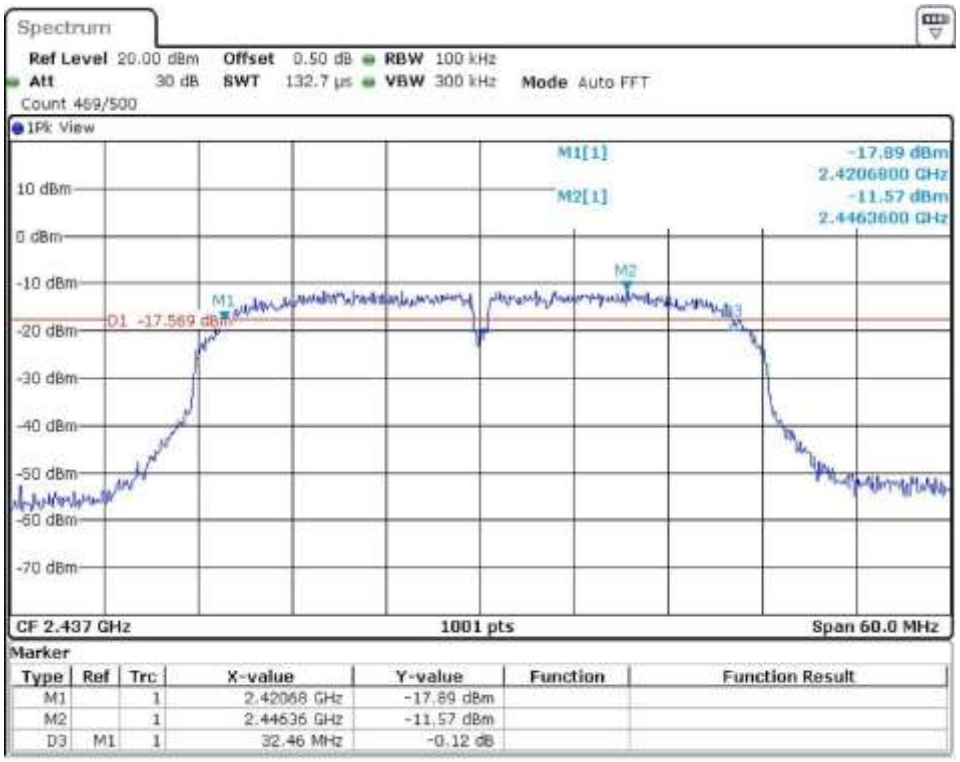

Spectrum
Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
Count 500/500
1Pk View
M1[1] -11.00 dBm
2.4034800 GHz
M2[1] -4.87 dBm
2.4113700 GHz
D1 -10.865 dBm
CF 2.412 GHz
1001 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.40348 GHz -11.00 dBm
M2 1 2.41137 GHz -4.87 dBm
D3 M1 1 17.04 MHz -0.50 dB


Spectrum
Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
Count 500/500
1Pk View
M1[1] -15.24 dBm
2.4284200 GHz
M2[1] -7.82 dBm
2.4316300 GHz
D1 -13.820 dBm
CF 2.437 GHz
1001 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.42842 GHz -15.24 dBm
M2 1 2.43163 GHz -7.82 dBm
D3 M1 1 17.1 MHz 1.31 dB


Spectrum
Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
Count 500/500
1Pk View
M1[1] -19.05 dBm
2.4534200 GHz
M2[1] -12.04 dBm
2.4566300 GHz
D1 -18.041 dBm
CF 2.462 GHz
1001 pts
Span 30.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.45342 GHz -19.05 dBm
M2 1 2.45663 GHz -12.04 dBm
D3 M1 1 17.4 MHz -0.84 dB

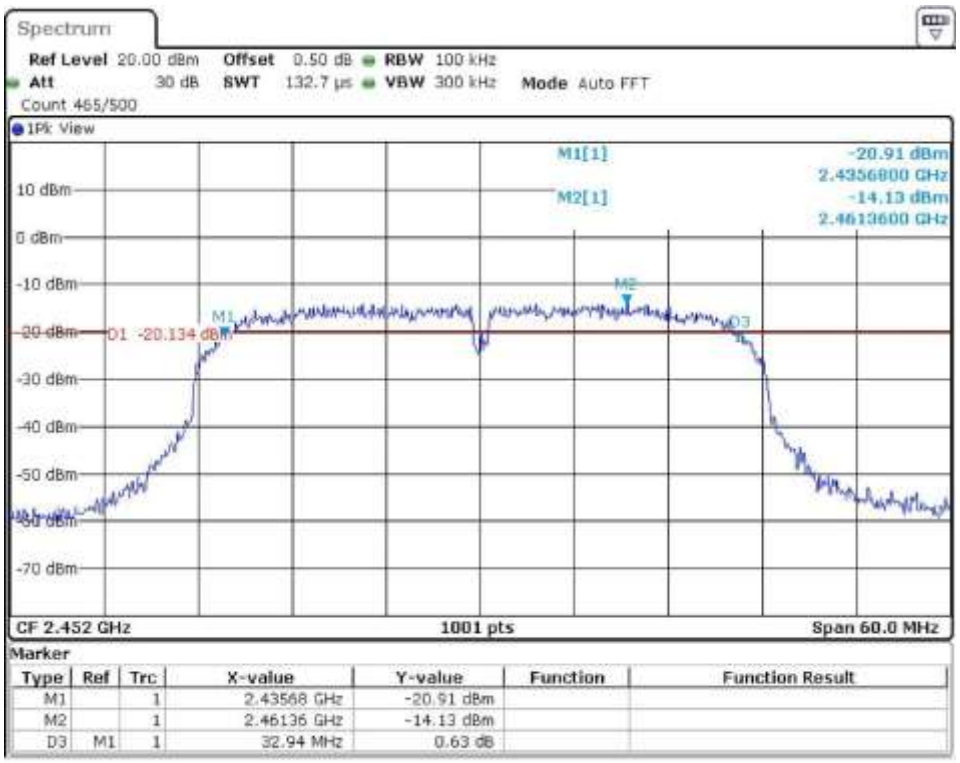
802.11n-HT40


Spectrum
Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 132.7 µs VBW 300 kHz Mode Auto FFT
Count 462/500
1Pk View
M1[1] -16.08 dBm
2.4056800 GHz
M2[1] -9.65 dBm
2.4138400 GHz
D1 -15.654 dBm
CF 2.422 GHz
1001 pts
Span 60.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.40568 GHz -16.08 dBm
M2 1 2.41394 GHz -9.65 dBm
D3 M1 1 32.64 MHz 0.14 dB




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.42068 GHz | -17.89 dBm | | |
| M2 | | 1 | 2.44636 GHz | -11.57 dBm | | |
| D3 | M1 | 1 | 32.46 MHz | -0.12 dB | | |




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.43568 GHz | -20.91 dBm | | |
| M2 | | 1 | 2.46136 GHz | -14.13 dBm | | |
| D3 | M1 | 1 | 32.94 MHz | 0.63 dB | | |

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR

4.3 Maximum Power Density Reading, FCC Rule 15.247(e):

The Measurement Procedure PKPSD was set according to the FCC KDB 558074 D01 v05r02.

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

Limit: The Power Density does not exceed 8dBm/3 kHz.

| IEEE 802.11b (CCK, 1Mbps) | |
|---|---|
| Frequency (MHz) | Power Density with RBW 3KHz |
| 2412 | -15.23 |
| 2437 | -15.49 |
| 2462 | -21.73 |

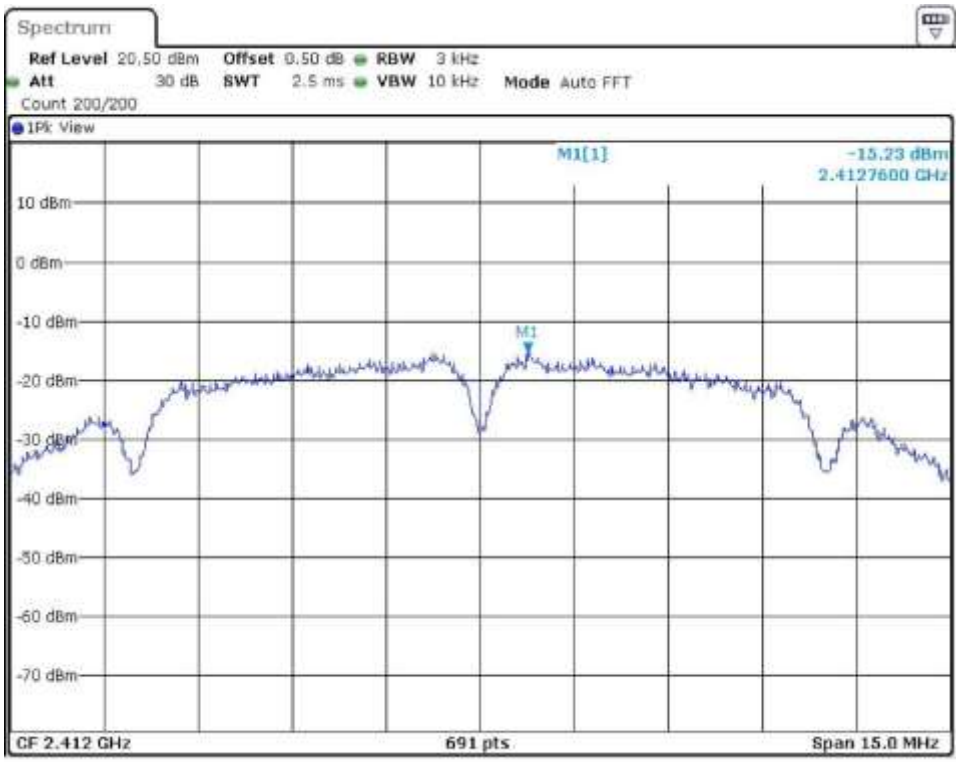
| IEEE 802.11g (16QAM, 6Mbps) | |
|---|---|
| Frequency (MHz) | Power Density with RBW 3KHz |
| 2412 | -20.16 |
| 2437 | -22.9 |
| 2462 | -24.85 |

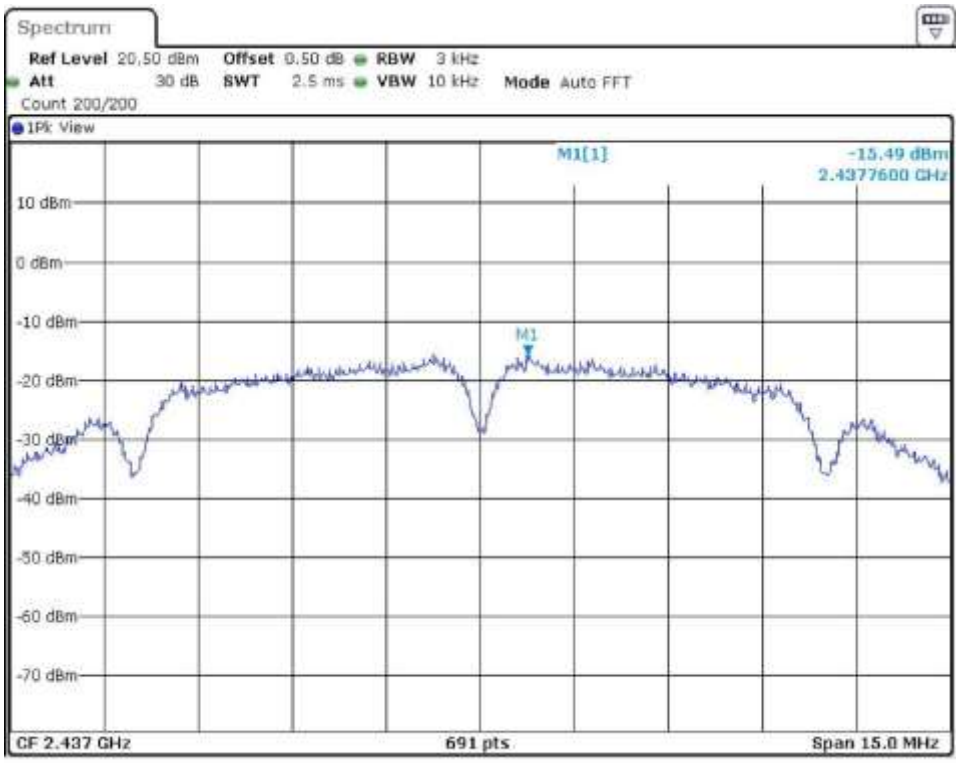
| IEEE 802.11n-HT20 (64QAM, 6Mbps) | |
|---|---|
| Frequency (MHz) | Power Density with RBW 3KHz |
| 2412 | -19.98 |
| 2437 | -22.59 |
| 2462 | -25.2 |

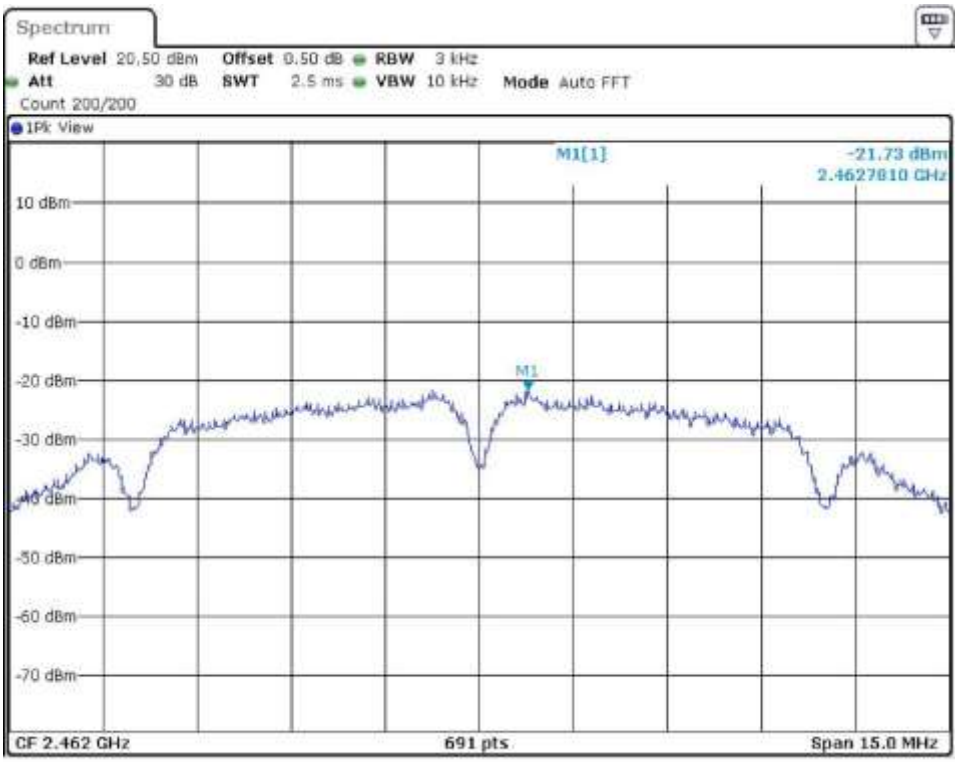
| IEEE 802.11n-HT40 (64QAM, 13.5Mbps) | |
|---|---|
| Frequency (MHz) | Power Density with RBW 3KHz |
| 2422 | -30.32 |
| 2437 | -32.16 |
| 2452 | -34.64 |

The test plots are attached as below.

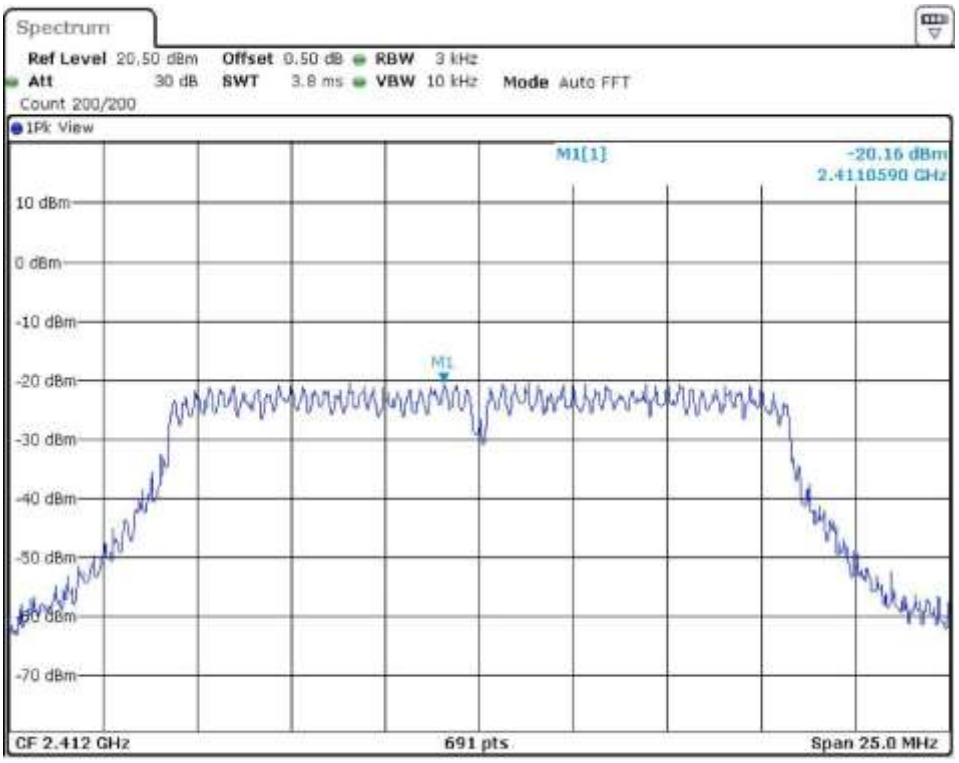
802.11b

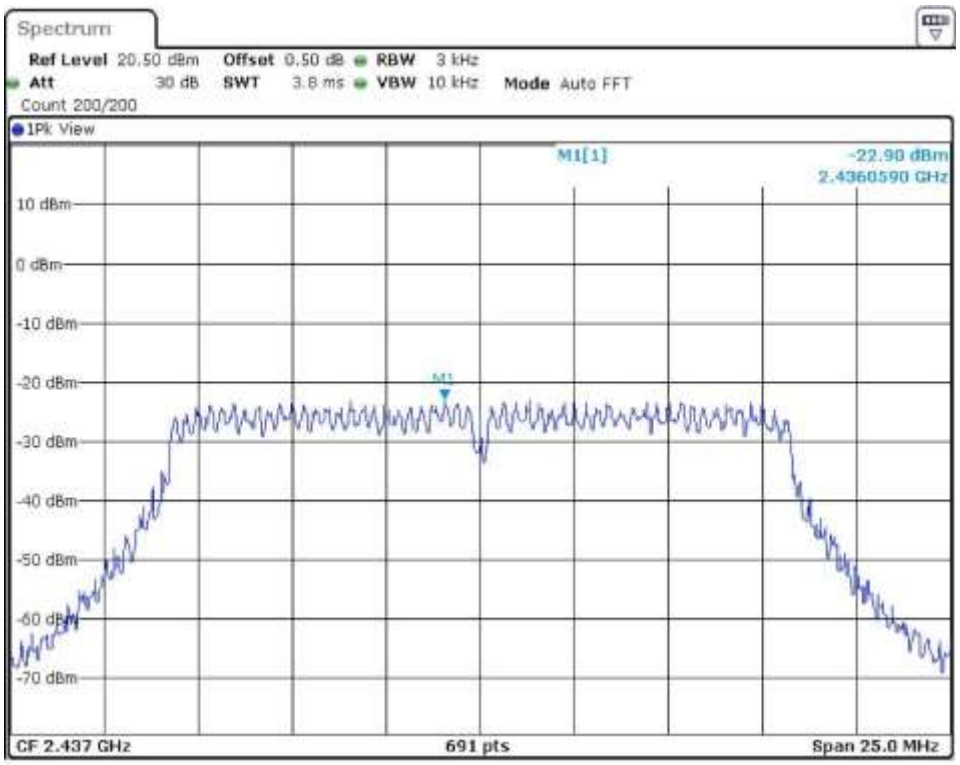

Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 3 kHz
Att 30 dB SWT 2.5 ms VBW 10 kHz Mode Auto FFT
Count 200/200
1Pk View
M1[1] -15.23 dBm
2.4127600 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.412 GHz
691 pts
Span 15.0 MHz

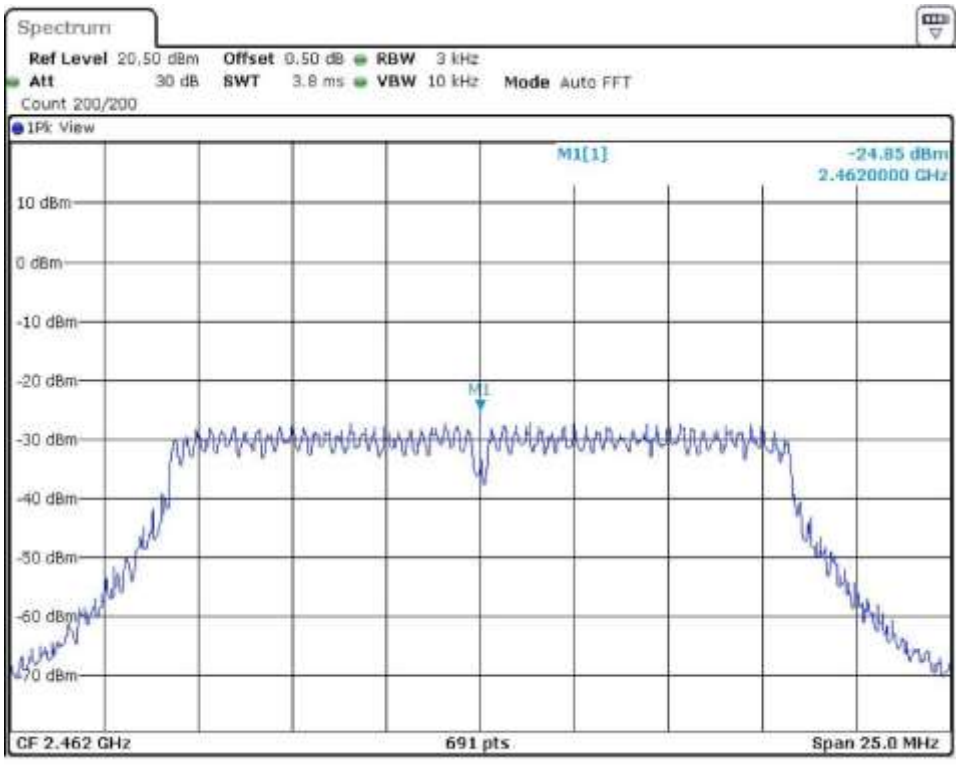

Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 3 kHz
Att 30 dB SWT 2.5 ms VBW 10 kHz Mode Auto FFT
Count 200/200
1Pk View
M1[1] -15.49 dBm
2.4377600 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.437 GHz
691 pts
Span 15.0 MHz


Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 3 kHz
Att 30 dB SWT 2.5 ms VBW 10 kHz Mode Auto FFT
Count 200/200
1Pk View
M1[1] -21.73 dBm
2.4627810 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.462 GHz
691 pts
Span 15.0 MHz

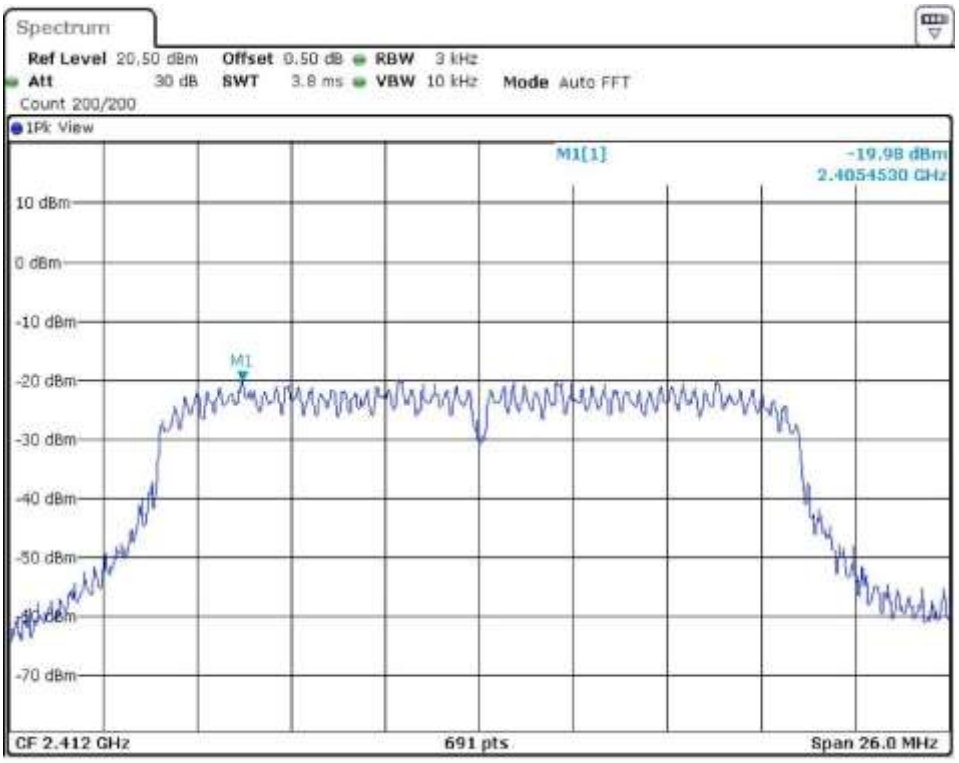
802.11g

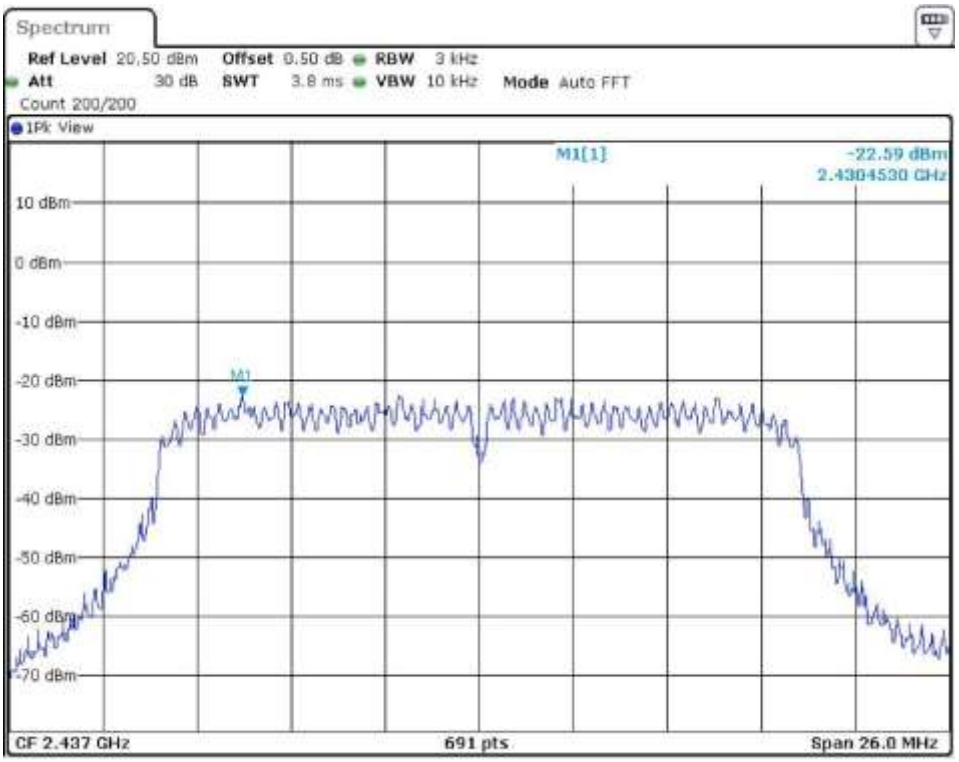

Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 3 kHz
Att 30 dB SWT 3.8 ms VBW 10 kHz Mode Auto FFT
Count 200/200
1Pk View
M1[1] -20.16 dBm
2.4110590 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.412 GHz
691 pts
Span 25.0 MHz

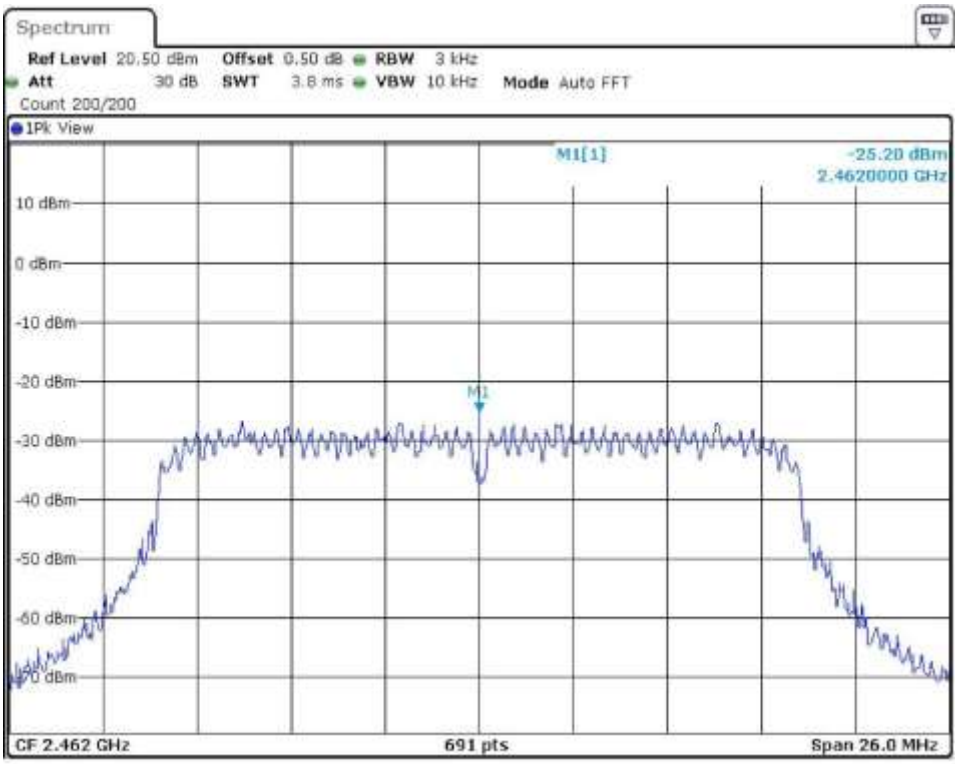

Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 3 kHz
Att 30 dB SWT 3.8 ms VBW 10 kHz Mode Auto FFT
Count 200/200
1Pk View
M1[1] -22.90 dBm
2.4360590 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.437 GHz
691 pts
Span 25.0 MHz


Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 3 kHz
Att 30 dB SWT 3.8 ms VBW 10 kHz Mode Auto FFT
Count 200/200
1Pk View
M1[1] -24.85 dBm
2.4620000 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.462 GHz
691 pts
Span 25.0 MHz

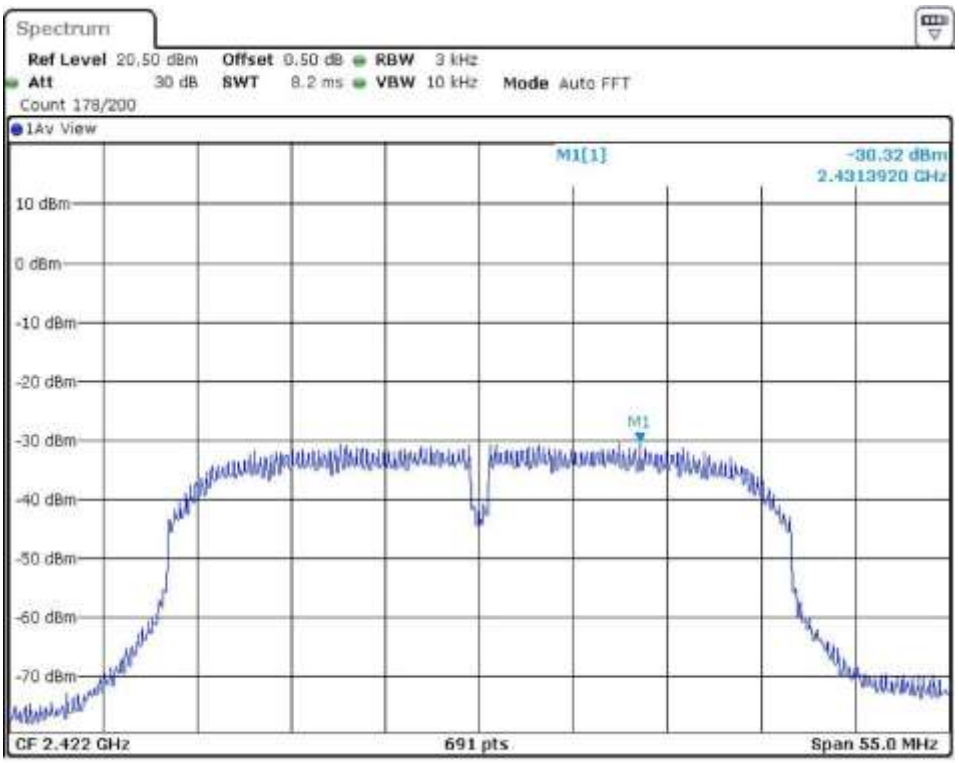
802.11n-HT20

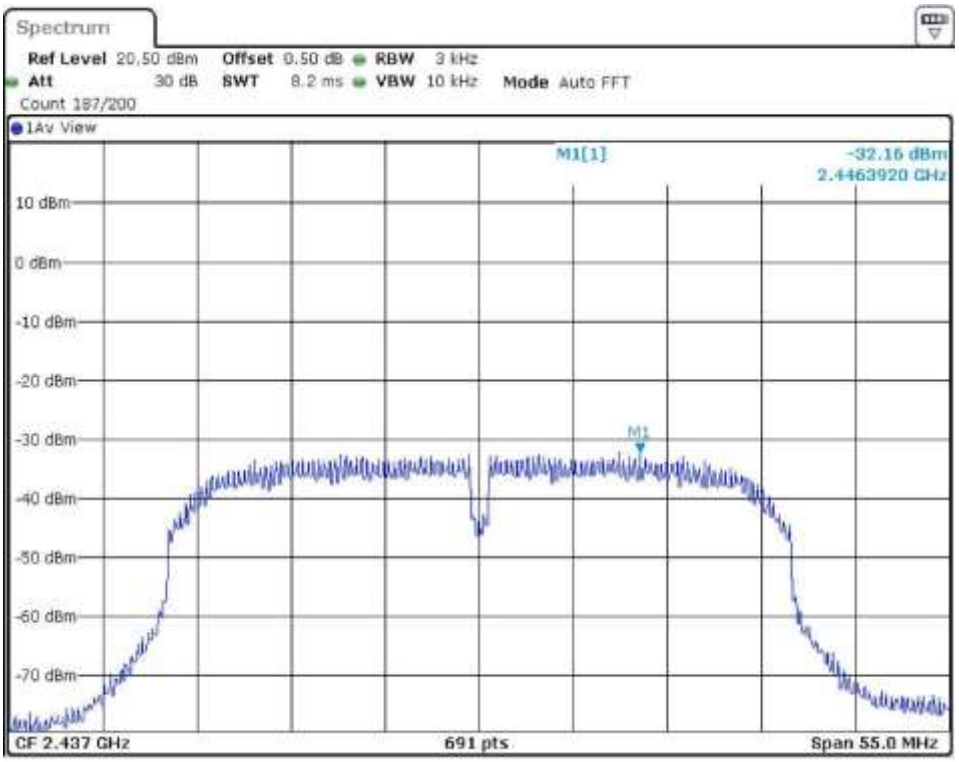

Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 3 kHz
Att 30 dB SWT 3.8 ms VBW 10 kHz Mode Auto FFT
Count 200/200
1Pk View
M1[1] -19.98 dBm
2.4054530 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-70 dBm
M1
CF 2.412 GHz
691 pts
Span 26.0 MHz

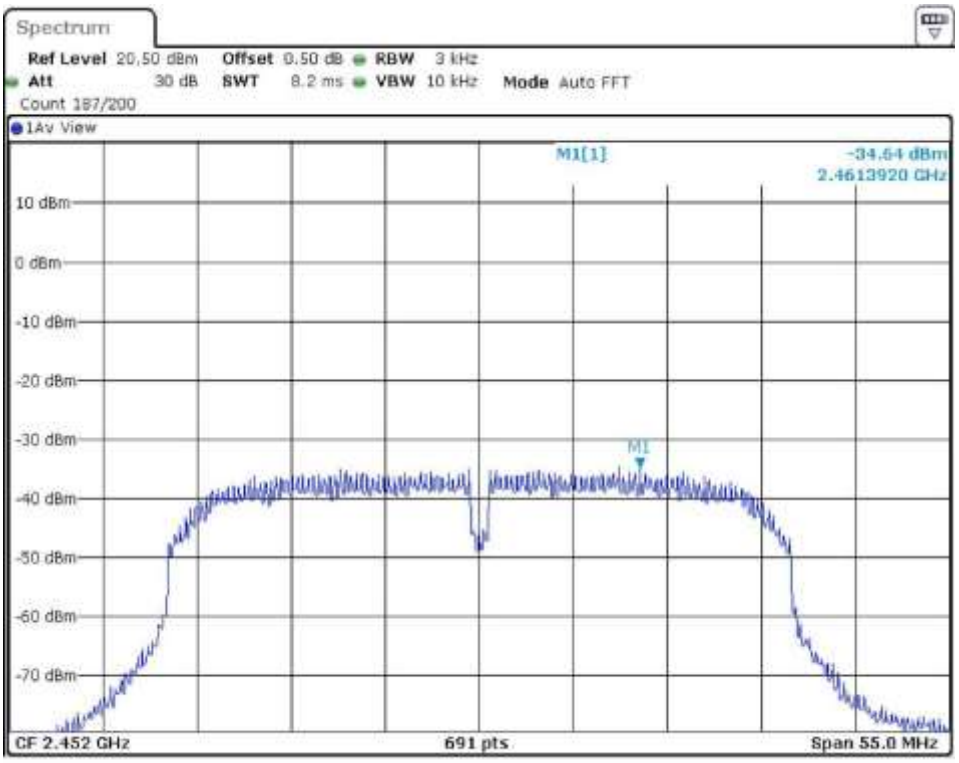

Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 3 kHz
Att 30 dB SWT 3.8 ms VBW 10 kHz Mode Auto FFT
Count 200/200
1Pk View
M1[1] -22.59 dBm
2.4304530 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.437 GHz
691 pts
Span 26.0 MHz


Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 3 kHz
Att 30 dB SWT 3.8 ms VBW 10 kHz Mode Auto FFT
Count 200/200
1Pk View
M1[1] -25.20 dBm
2.4620000 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
M1
CF 2.462 GHz
691 pts
Span 26.0 MHz

802.11n-HT40


Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 3 kHz
Att 30 dB SWT 8.2 ms VBW 10 kHz Mode Auto FFT
Count 178/200
1Av View
M1[1] -30.32 dBm
2.4313920 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.422 GHz
691 pts
Span 55.0 MHz


Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 3 kHz
Att 30 dB SWT 8.2 ms VBW 10 kHz Mode Auto FFT
Count 187/200
1Av View
M1[1] -32.16 dBm
2.4463920 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.437 GHz
691 pts
Span 55.0 MHz


Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 3 kHz
Att 30 dB SWT 8.2 ms VBW 10 kHz Mode Auto FFT
Count 187/200
1Av View
M1[1] -34.64 dBm
2.4613920 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.452 GHz
691 pts
Span 55.0 MHz

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR

## 4.4 Out of Band Conducted Emissions, FCC Rule 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. The Measurement Procedure was set according to the FCC KDB 558074 D01 v05r02.

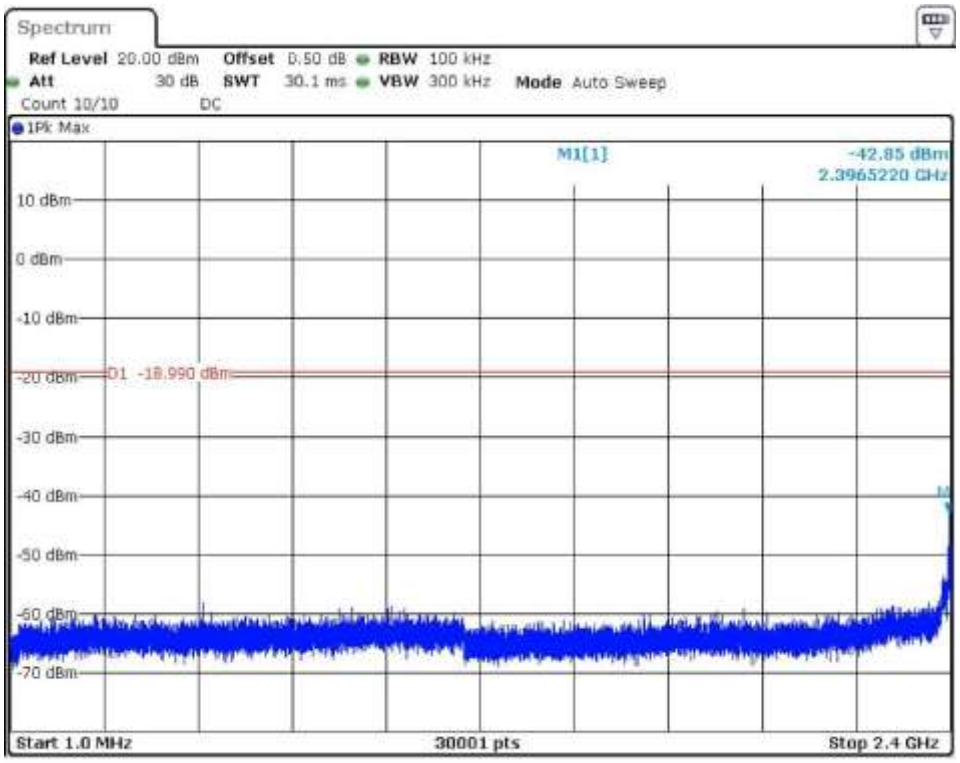
All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

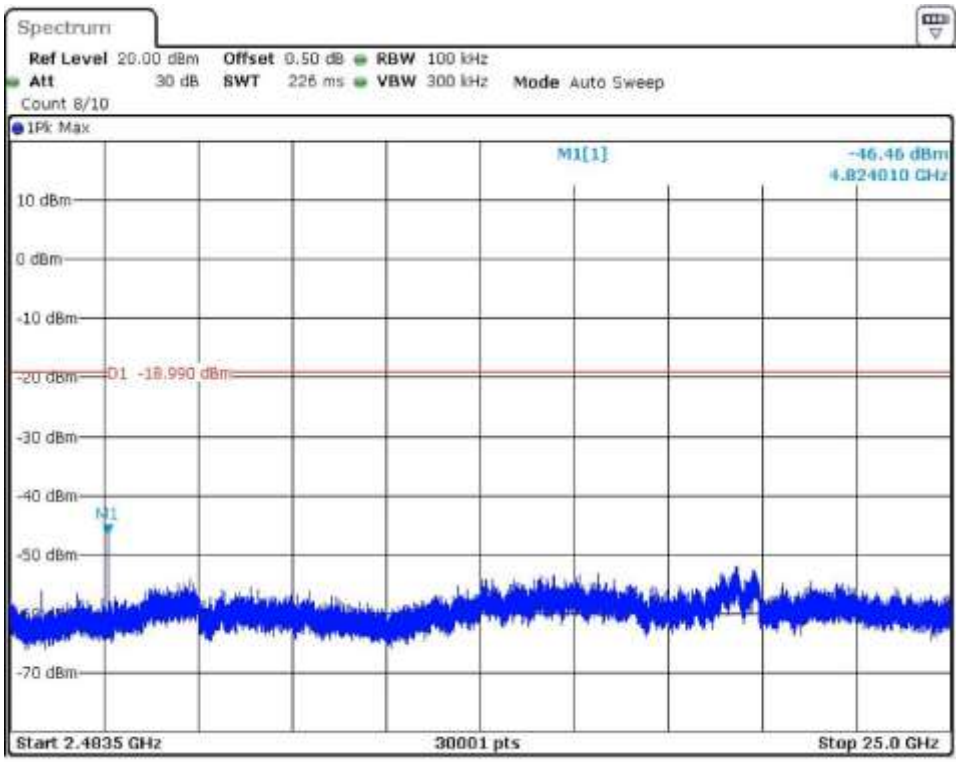
Refer to the attached test plots for out of band conducted emissions data with rate of 1Mbps for 802.11b and 6Mbps for 802.11g and 6Mbps for 802.11n-HT20 and 13.5Mbps for 802.11n-HT40.

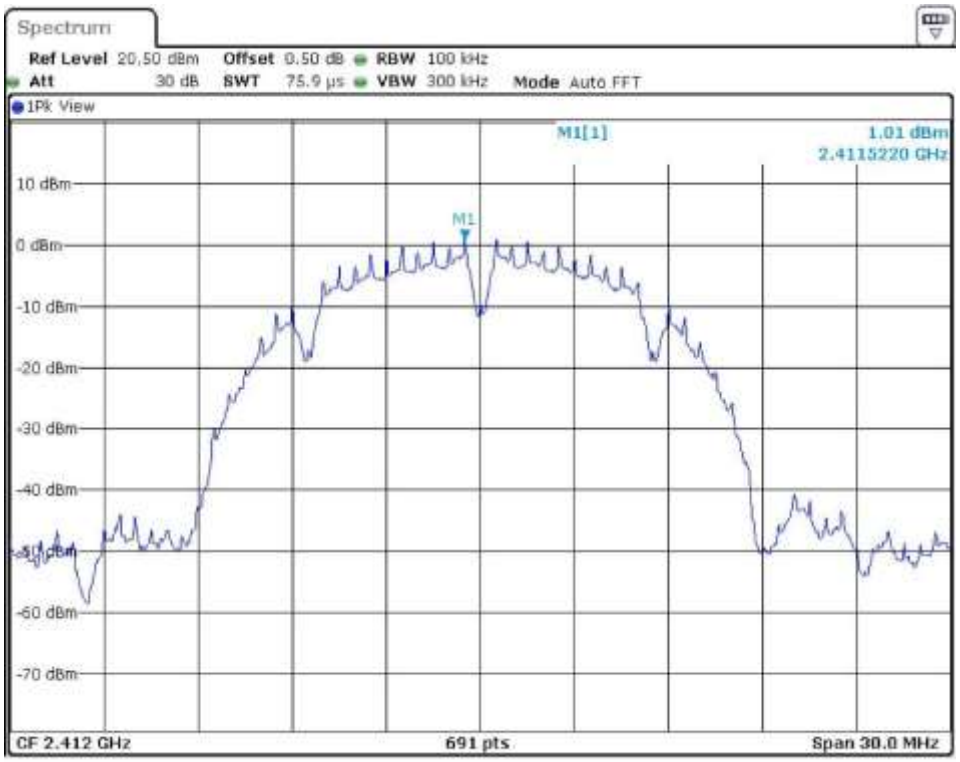
The test plots showed all spurious emission up to the tenth harmonic were measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

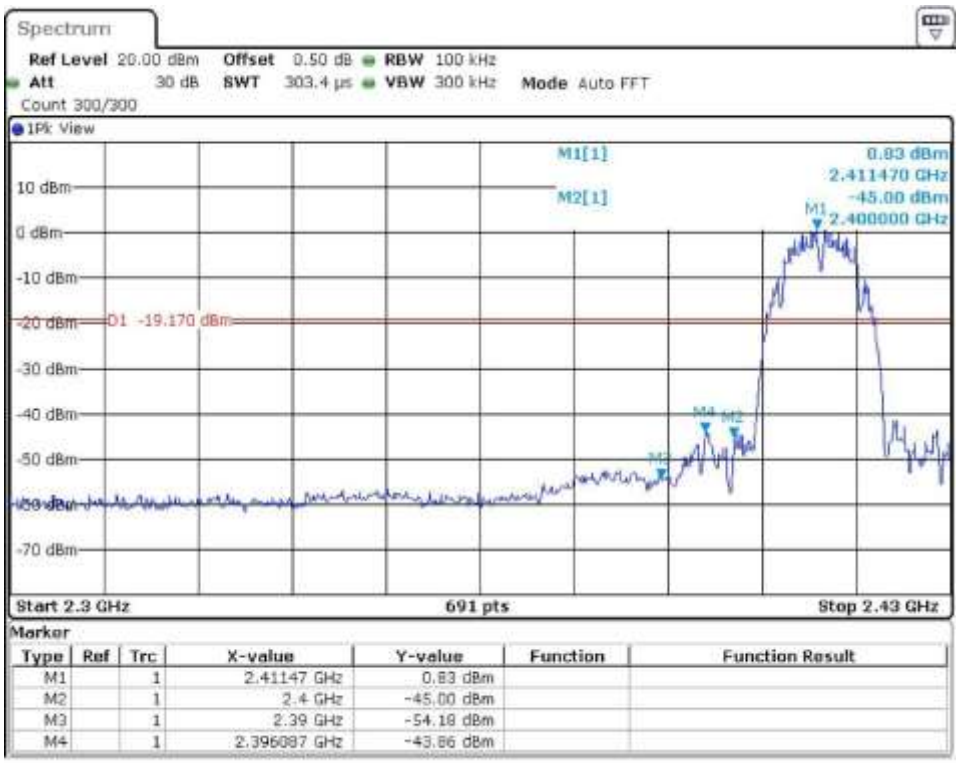
The test plots are attached as below.

802.11b
Channel 01 (2412MHz) Reference Level: 1.01dBm



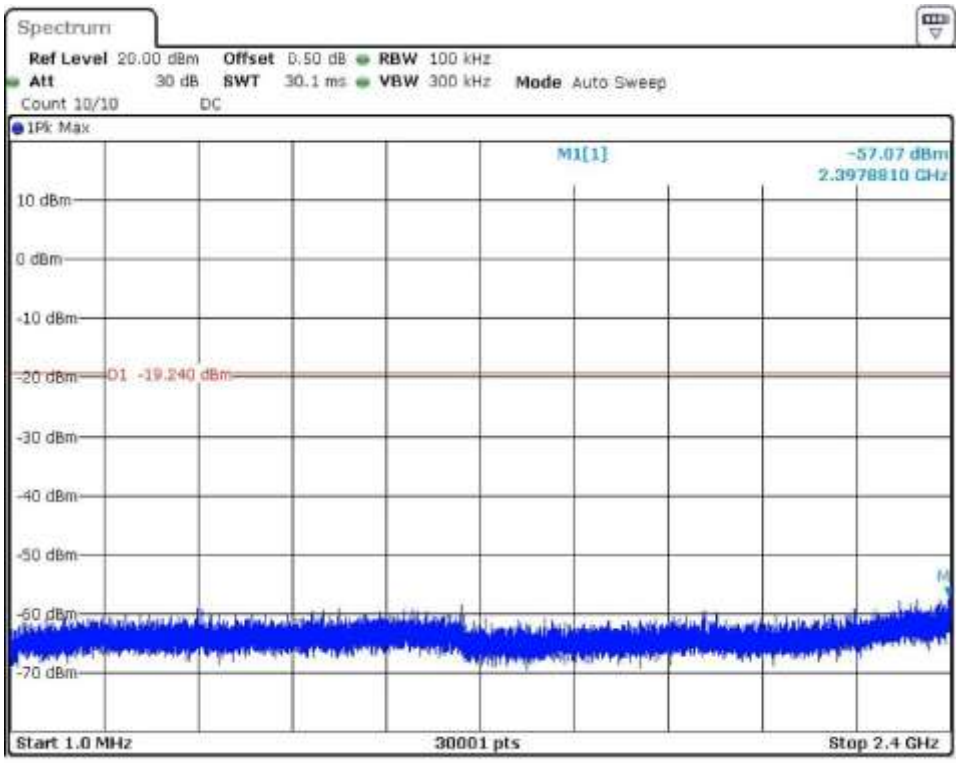


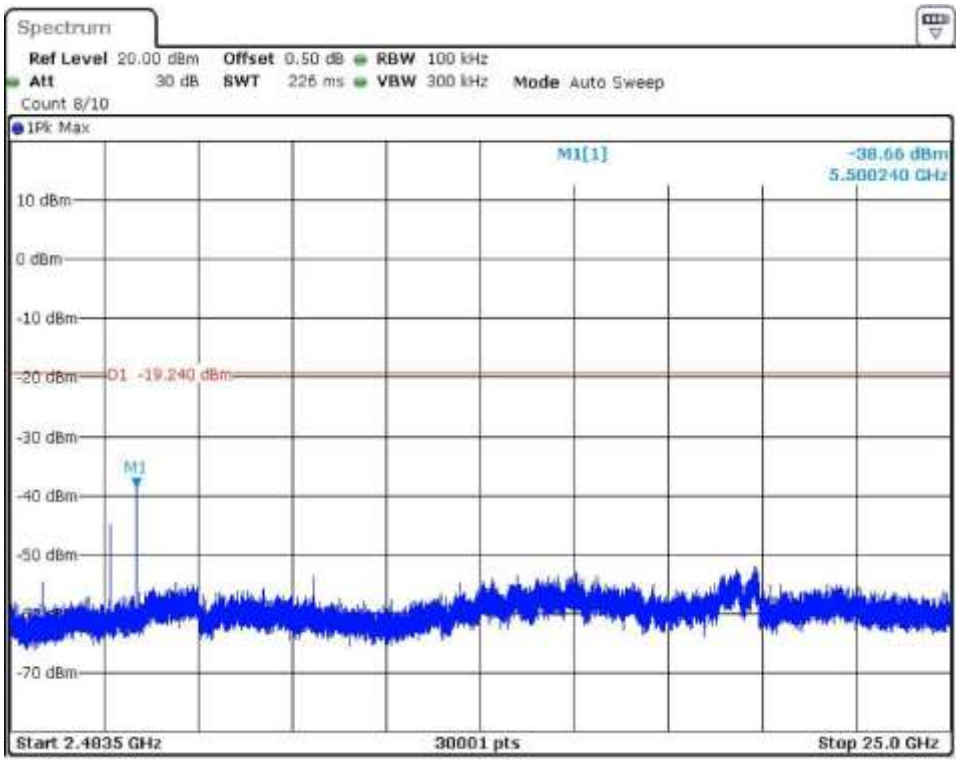



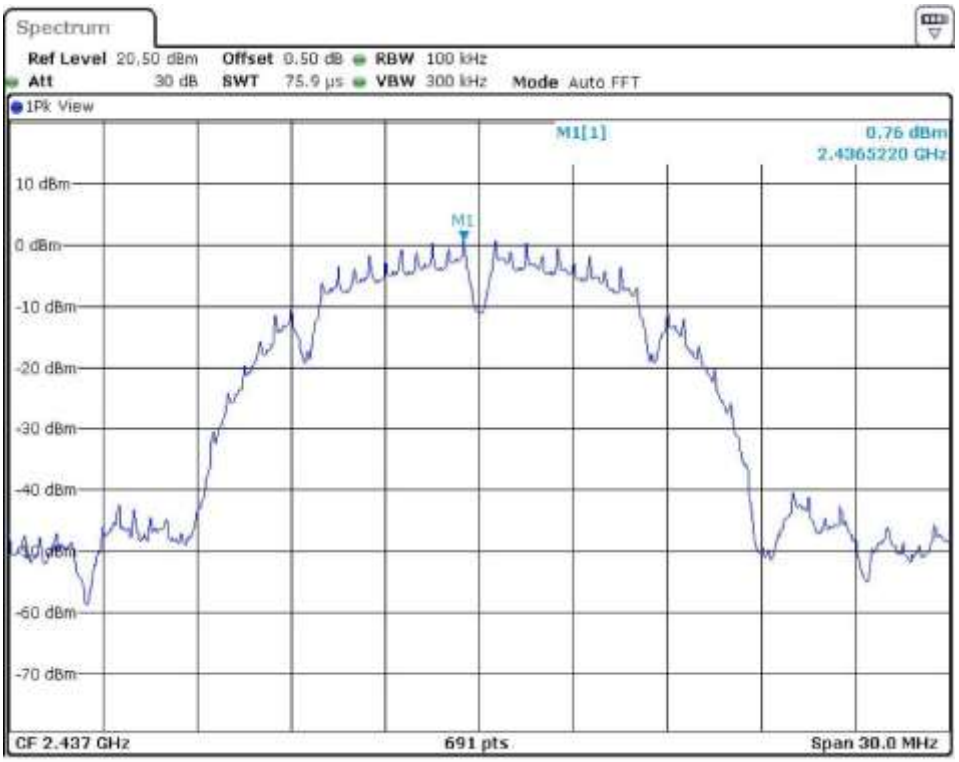

Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.41147 GHz | 0.83 dBm | | |
| M2 | | 1 | 2.4 GHz | -45.00 dBm | | |
| M3 | | 1 | 2.39 GHz | -54.18 dBm | | |
| M4 | | 1 | 2.396087 GHz | -43.86 dBm | | |

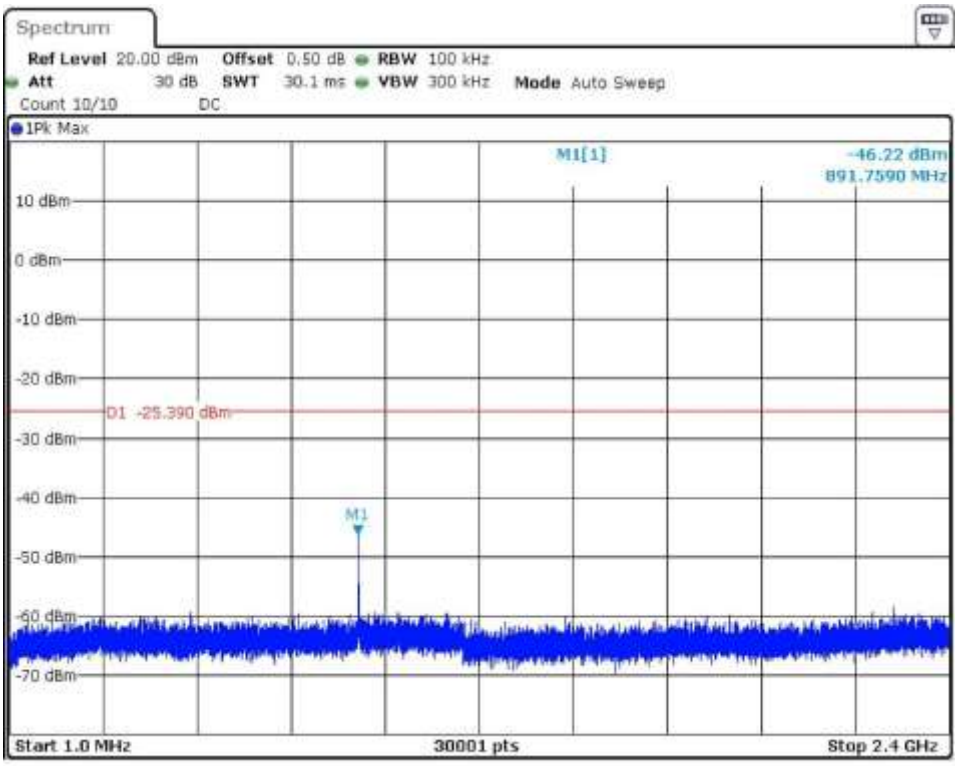
Channel 06 (2437MHz) Reference Level: 0.76dBm

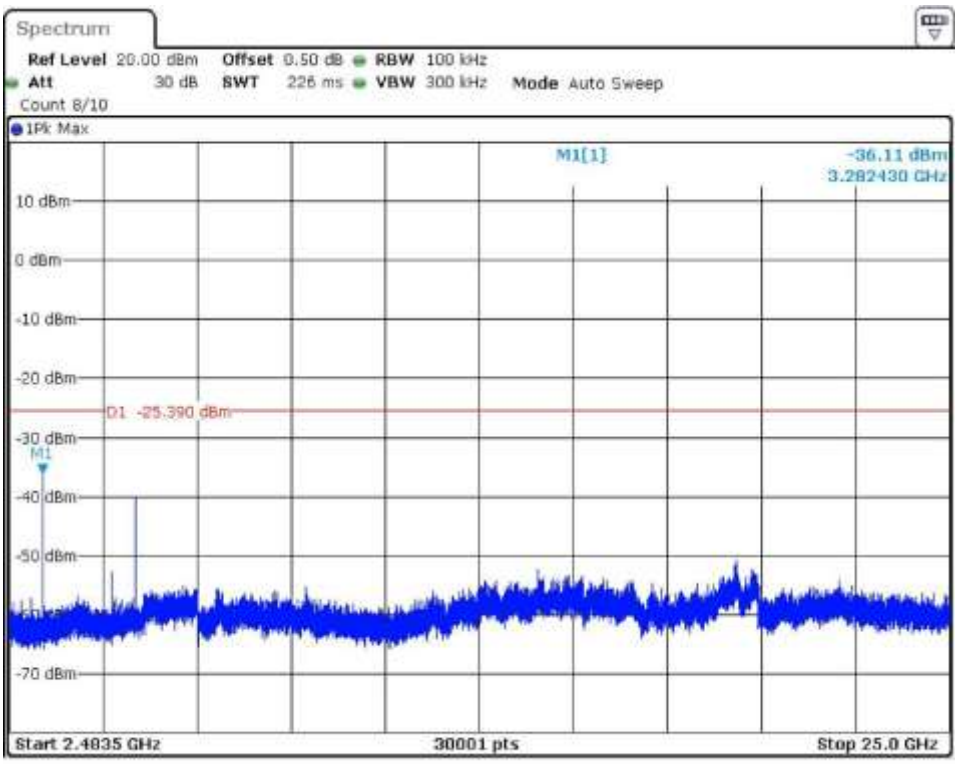


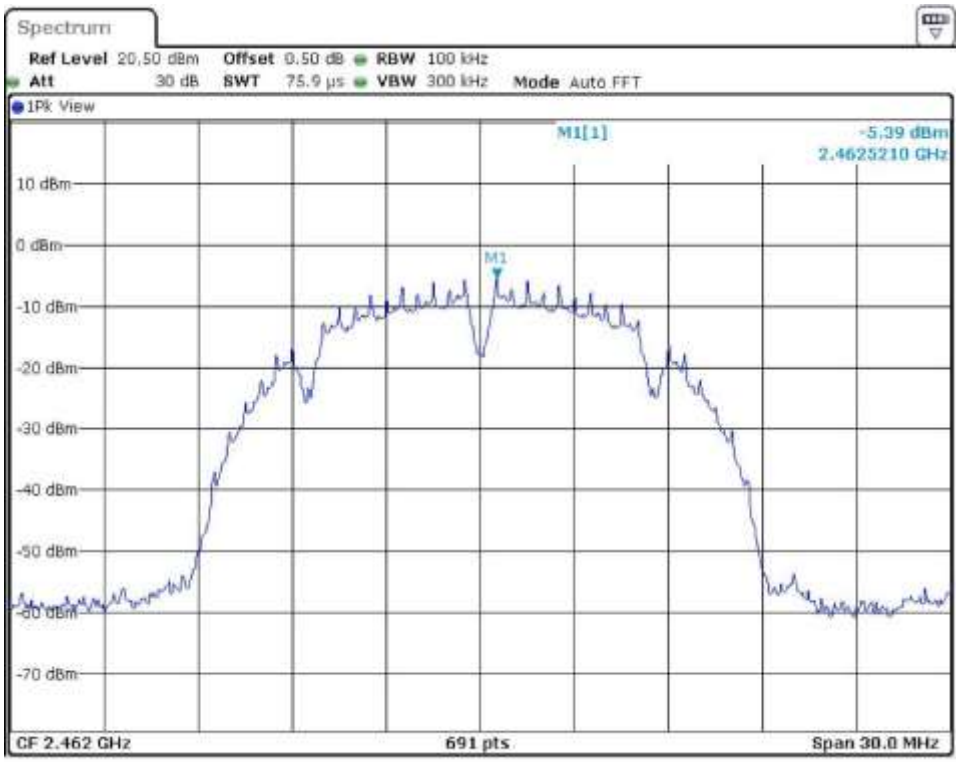



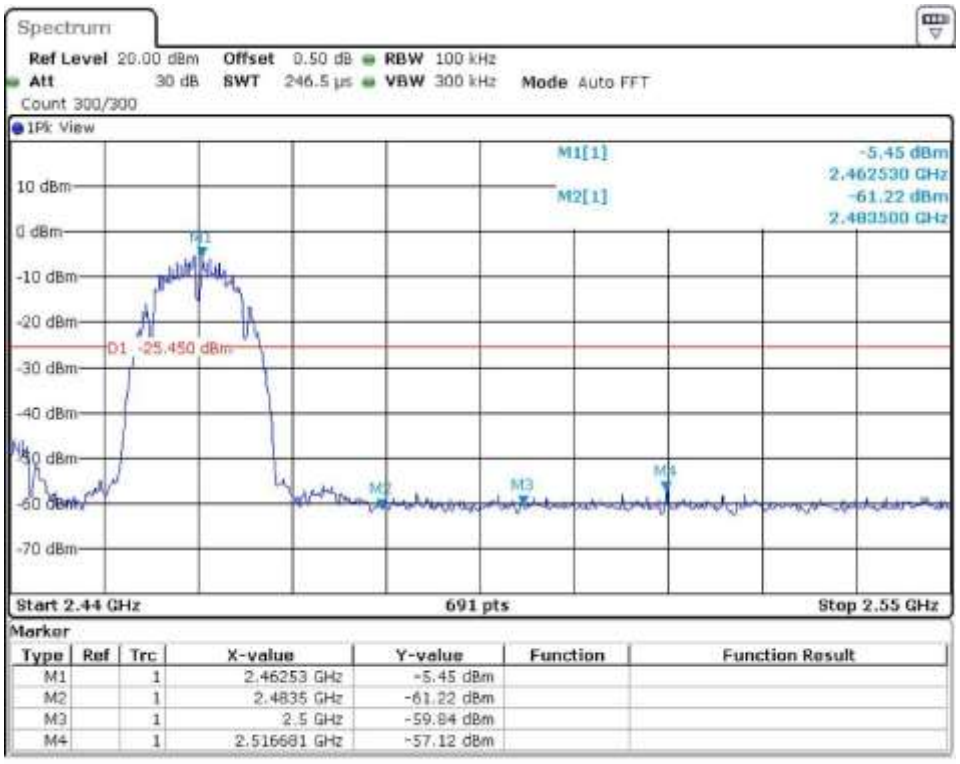

Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
1Pk View
M1[1]
0.76 dBm
2.4365220 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.437 GHz
691 pts
Span 30.0 MHz

Channel 11 (2462MHz) Reference Level: -5.39dBm



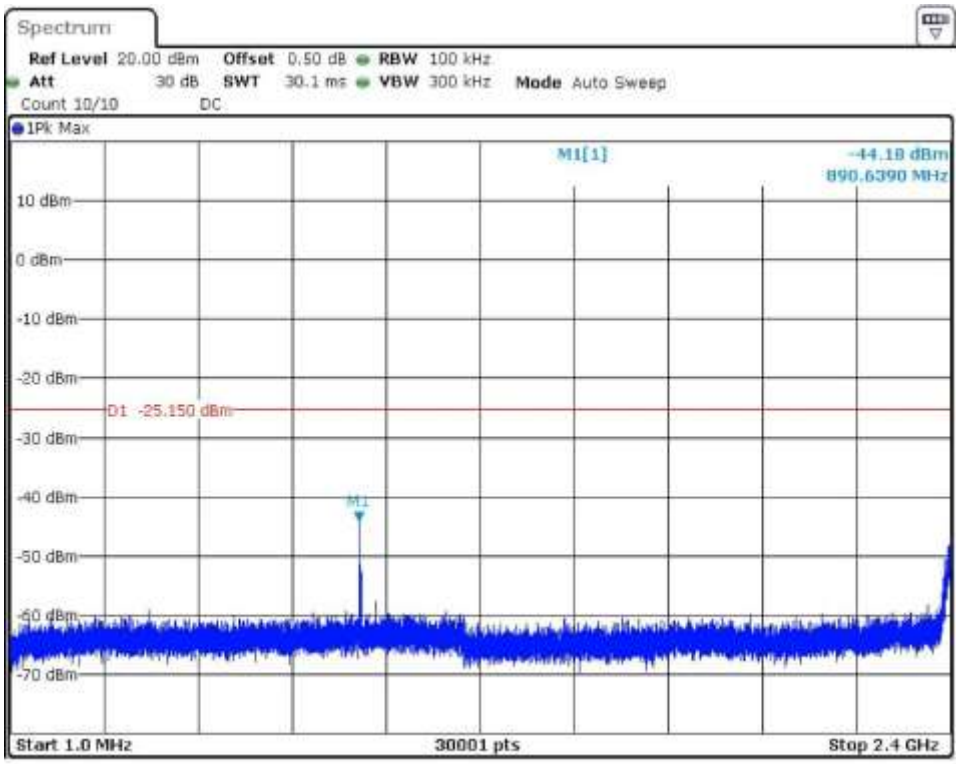


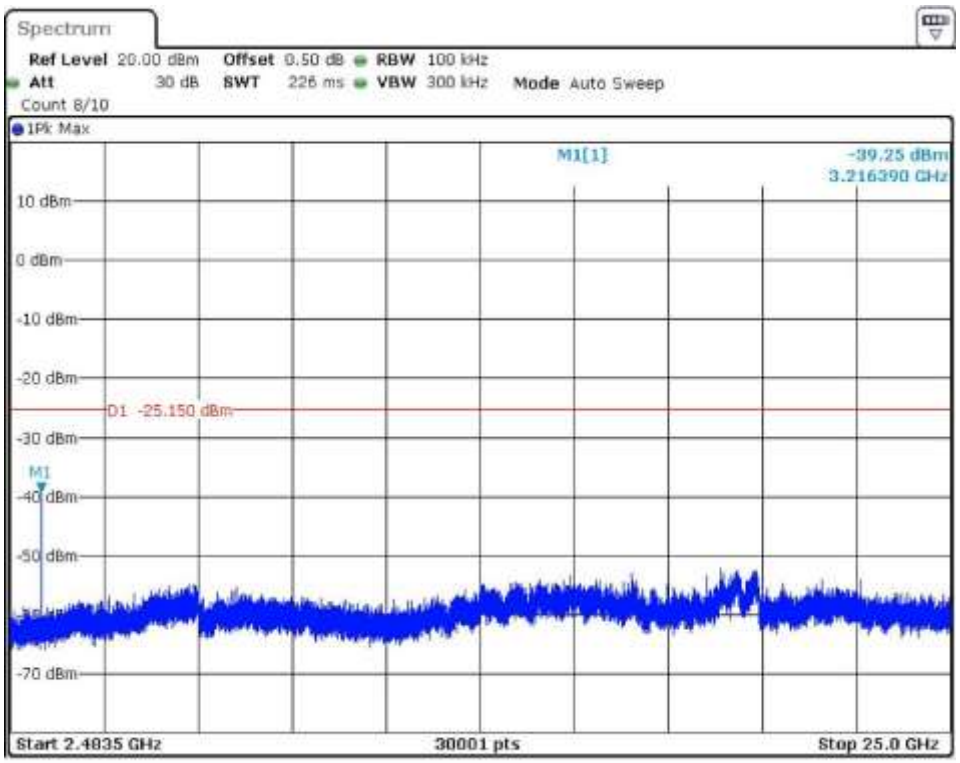



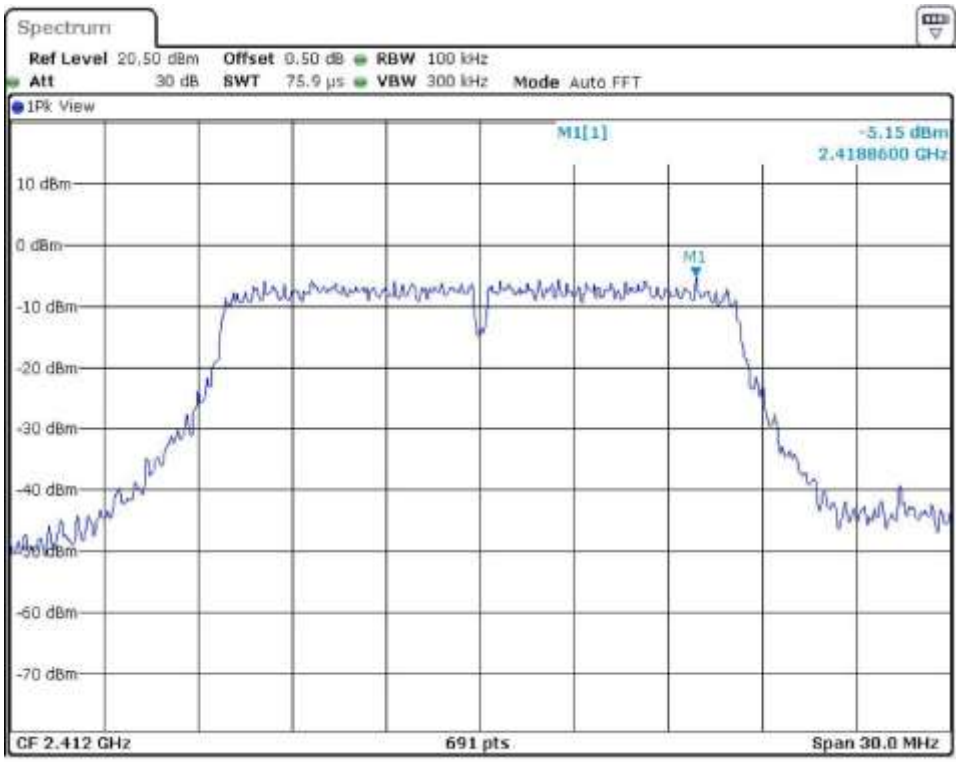

Marker

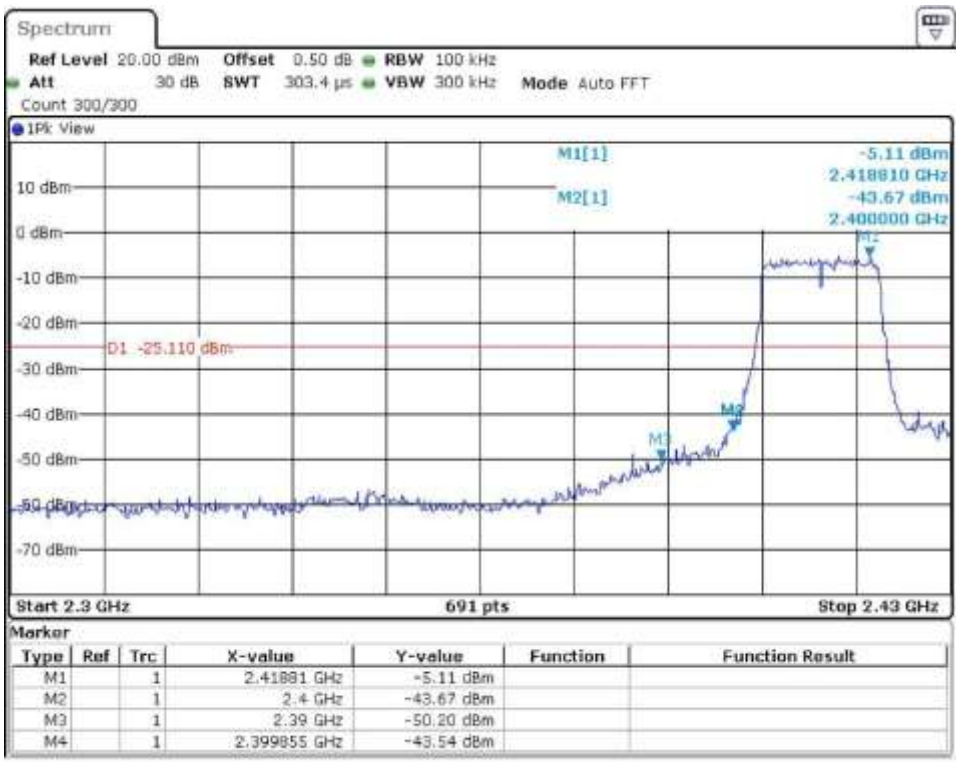
| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.46253 GHz | -5.45 dBm | | |
| M2 | | 1 | 2.4835 GHz | -61.22 dBm | | |
| M3 | | 1 | 2.5 GHz | -59.84 dBm | | |
| M4 | | 1 | 2.516681 GHz | -57.12 dBm | | |

802.11g
Channel 01 (2412MHz) Reference Level: -5.15dBm



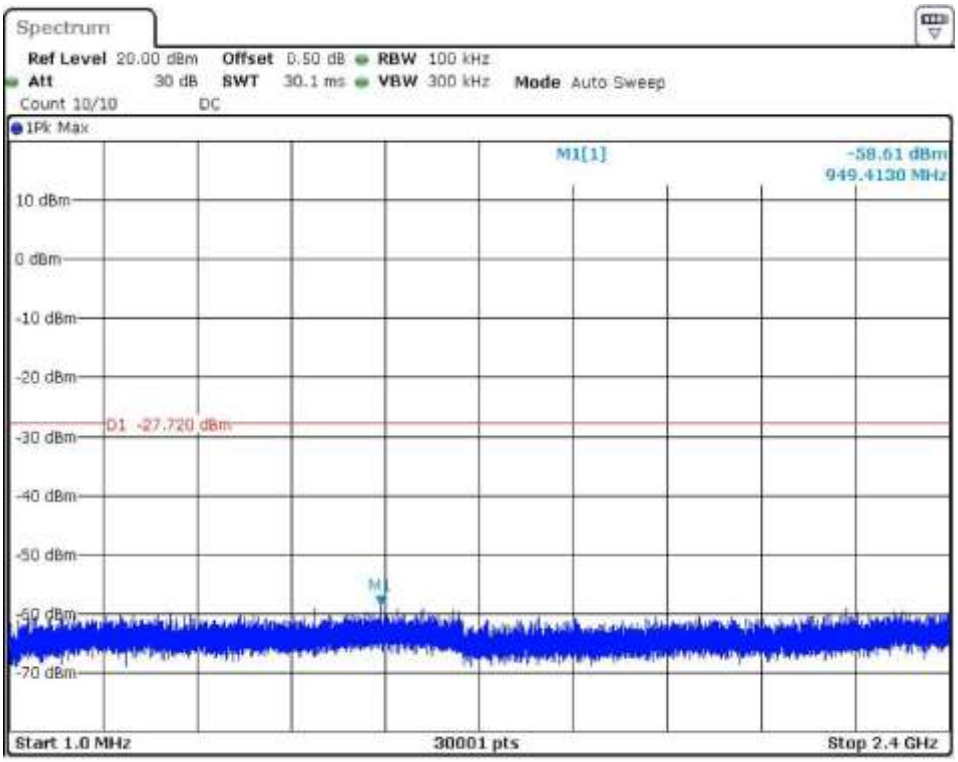


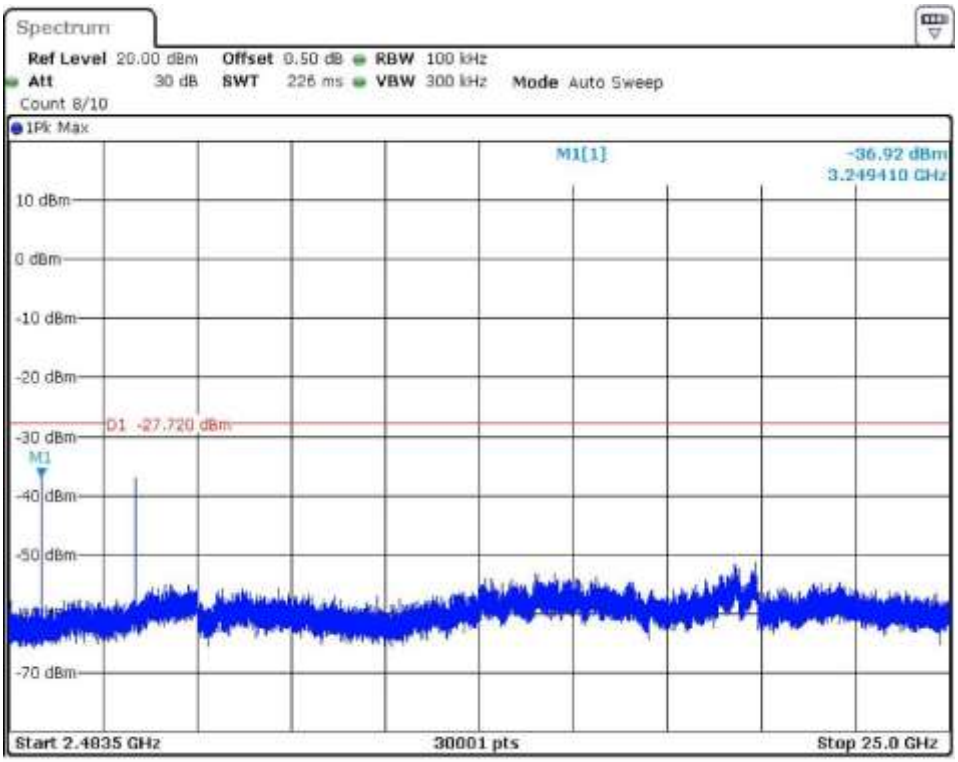



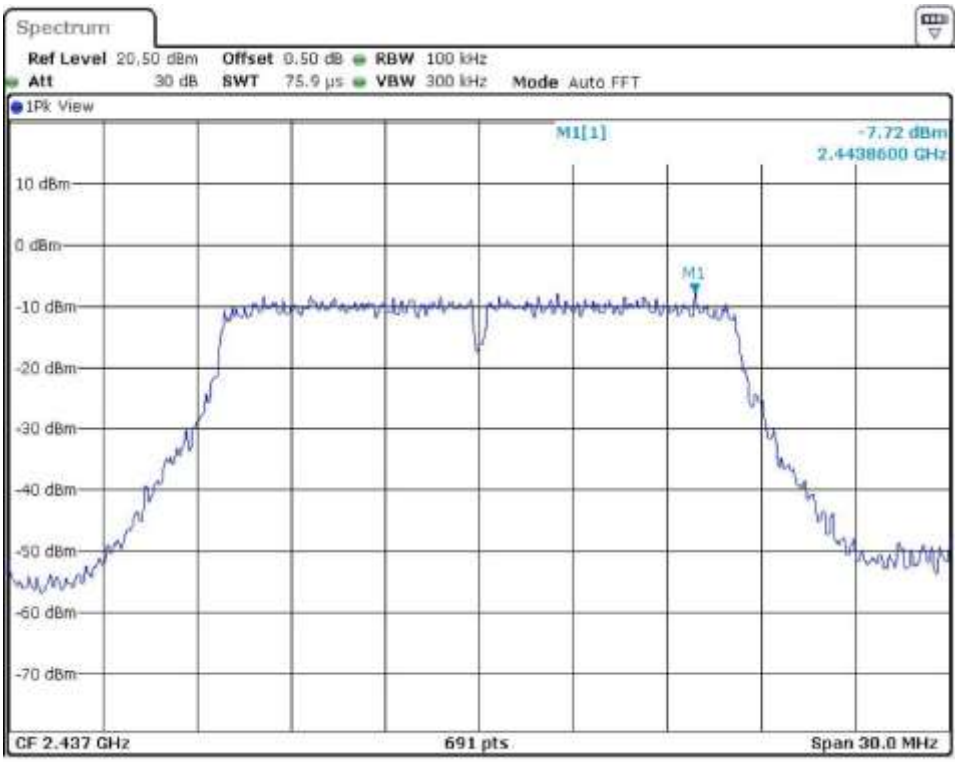

Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.41881 GHz | -5.11 dBm | | |
| M2 | | 1 | 2.4 GHz | -43.67 dBm | | |
| M3 | | 1 | 2.39 GHz | -50.20 dBm | | |
| M4 | | 1 | 2.399855 GHz | -43.54 dBm | | |

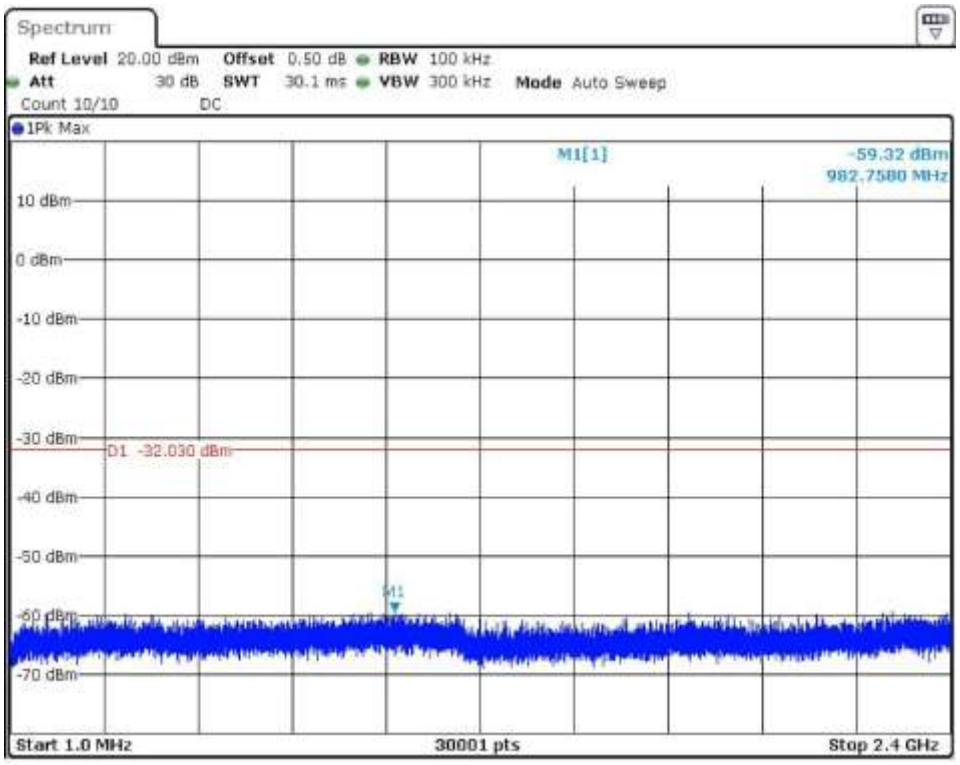
Channel 06 (2437MHz) Reference Level: -7.72dBm

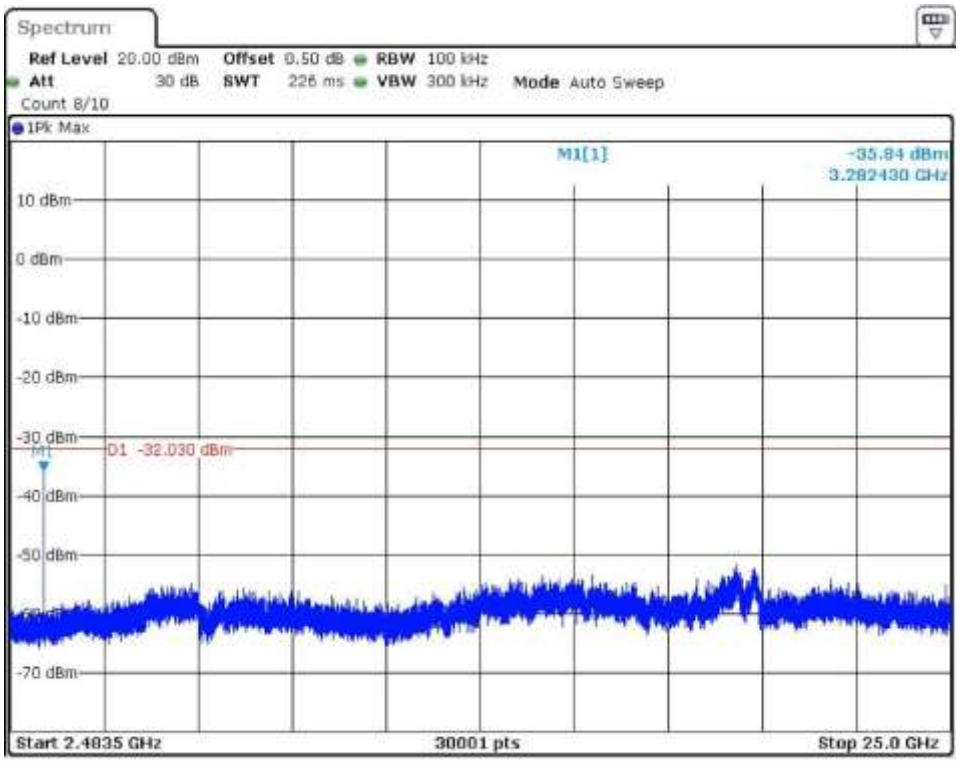


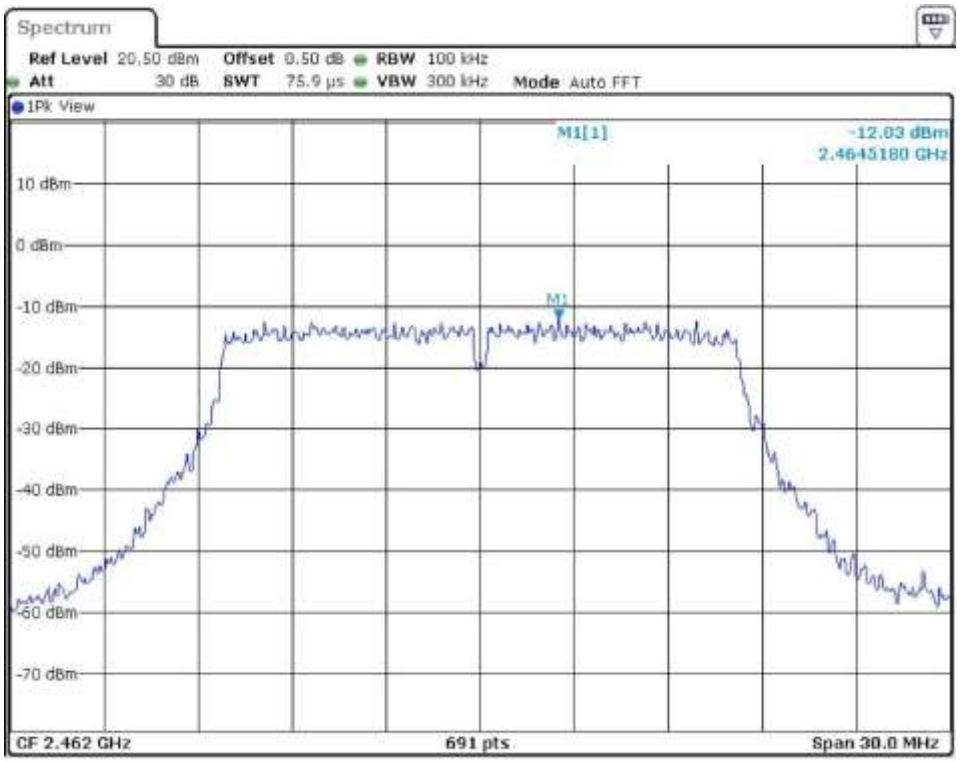



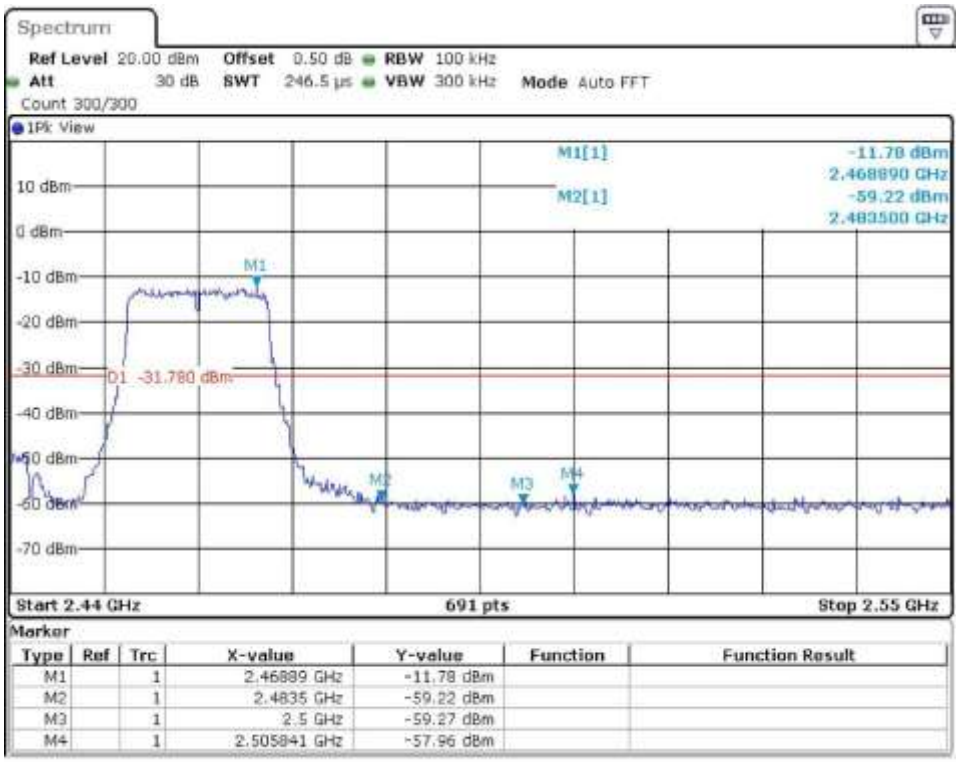

Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
1Pk View
M1[1] -7.72 dBm
2.4438600 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.437 GHz
691 pts
Span 30.0 MHz

Channel 11 (2462MHz) Reference Level: -12.03dBm



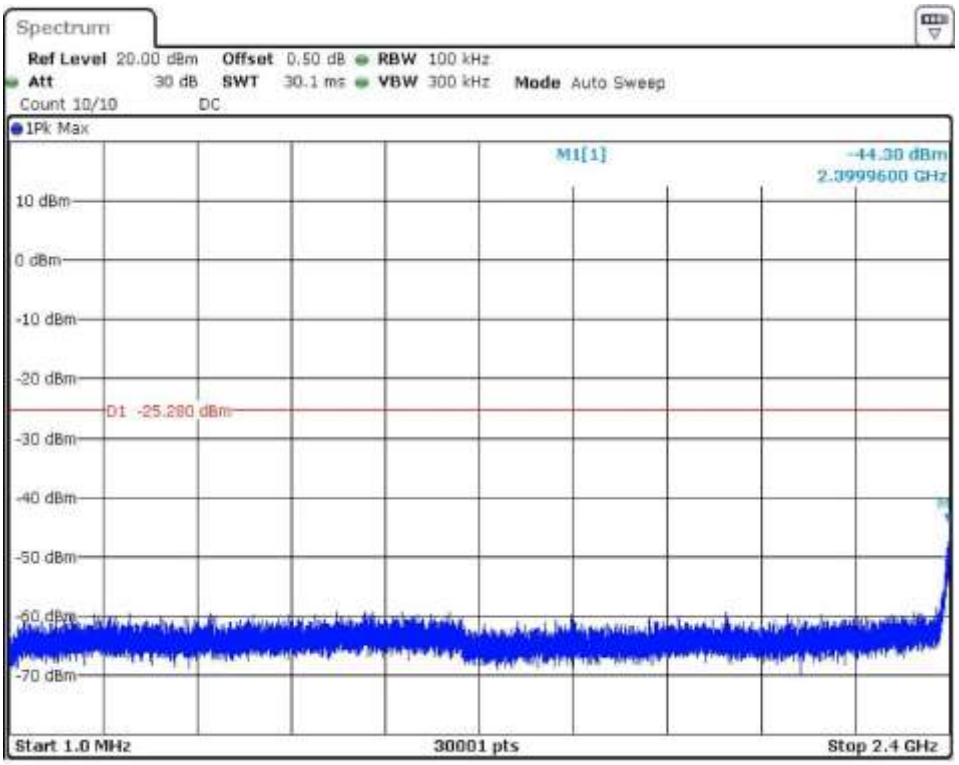


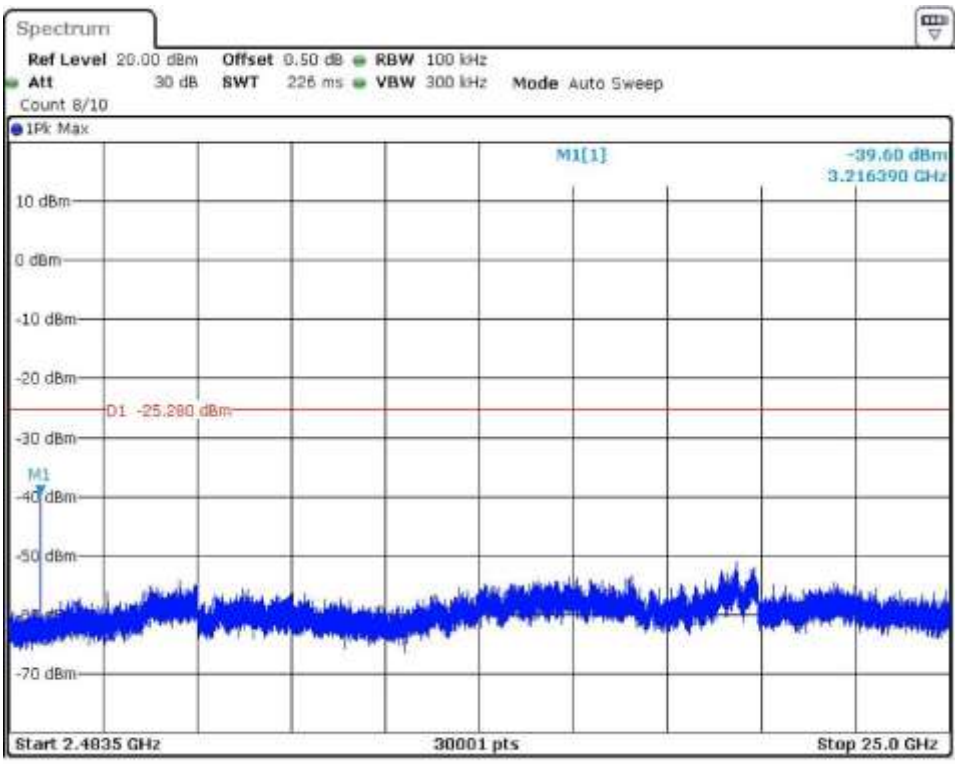



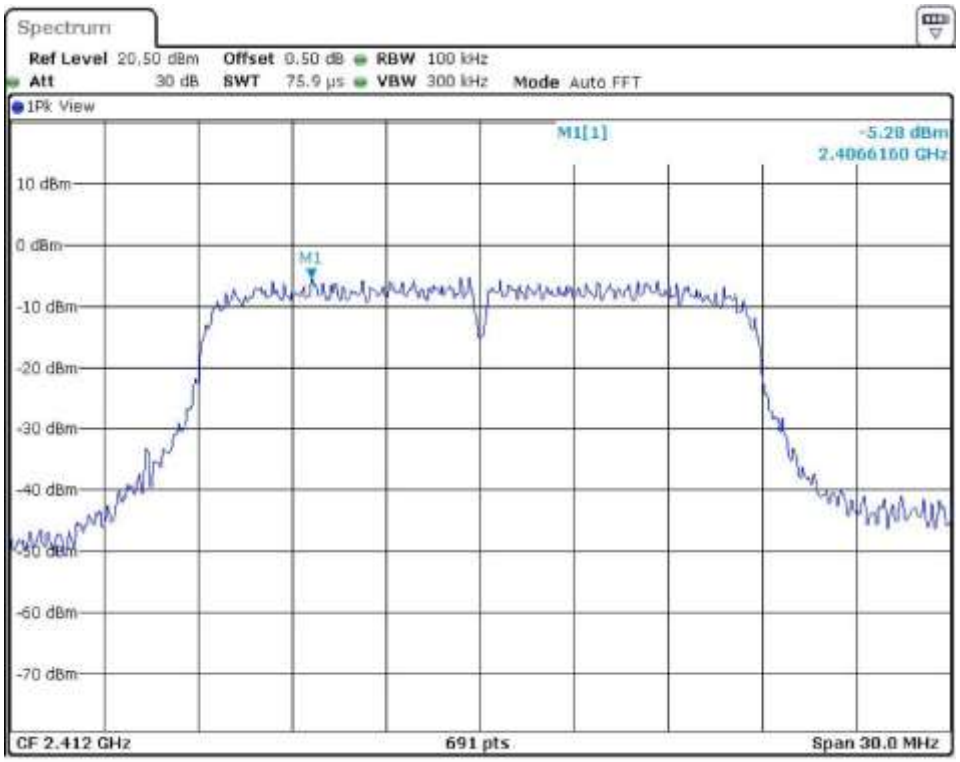

Marker

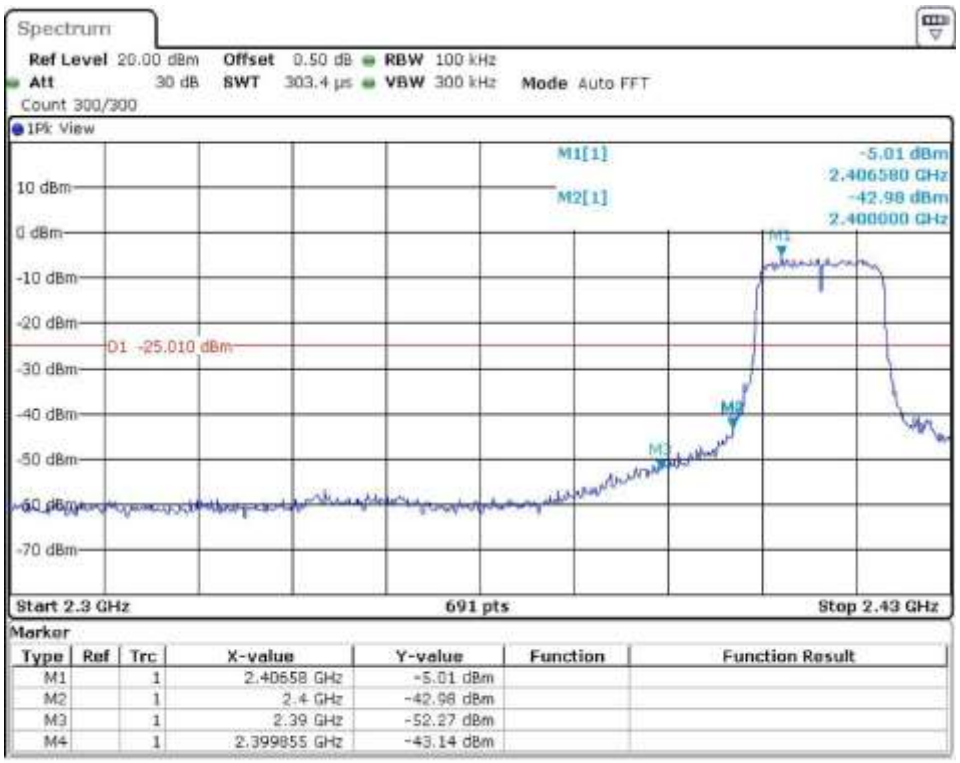
| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.46889 GHz | -11.78 dBm | | |
| M2 | | 1 | 2.4835 GHz | -59.22 dBm | | |
| M3 | | 1 | 2.5 GHz | -59.27 dBm | | |
| M4 | | 1 | 2.505841 GHz | -57.96 dBm | | |

802.11n-HT20
Channel 01 (2412MHz) Reference Level: -5.28dBm



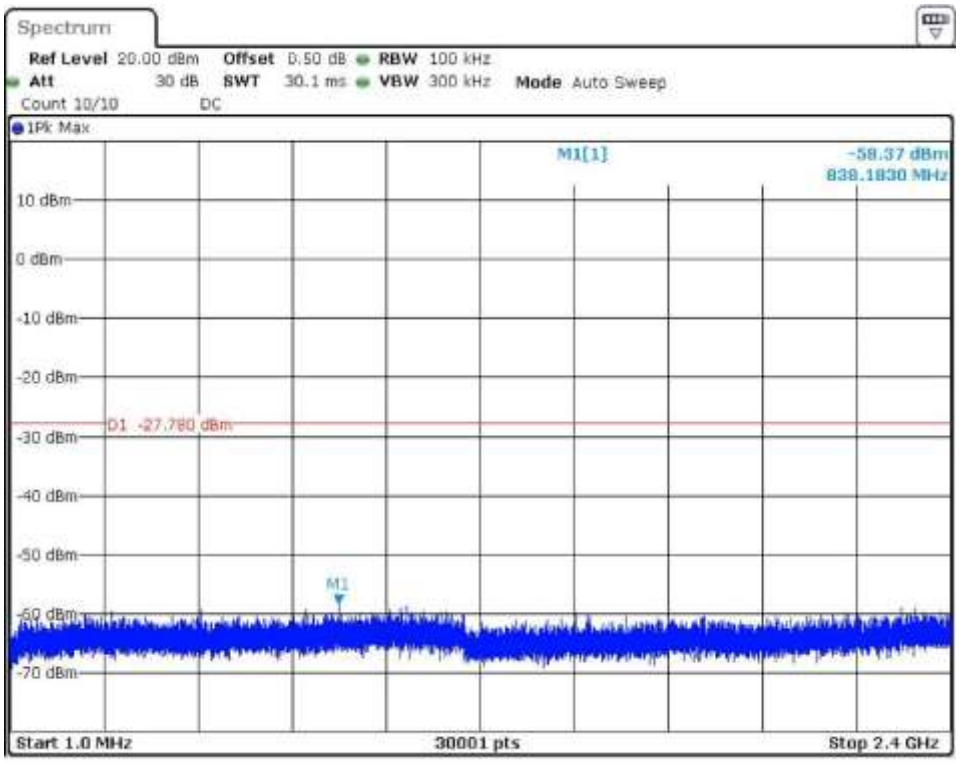


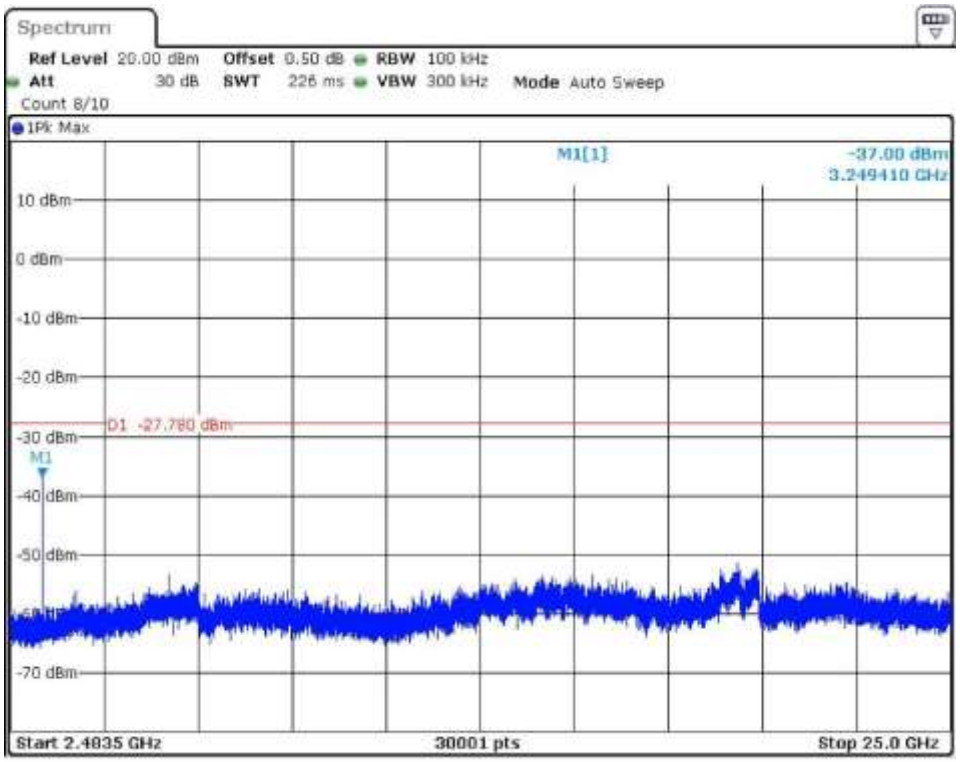



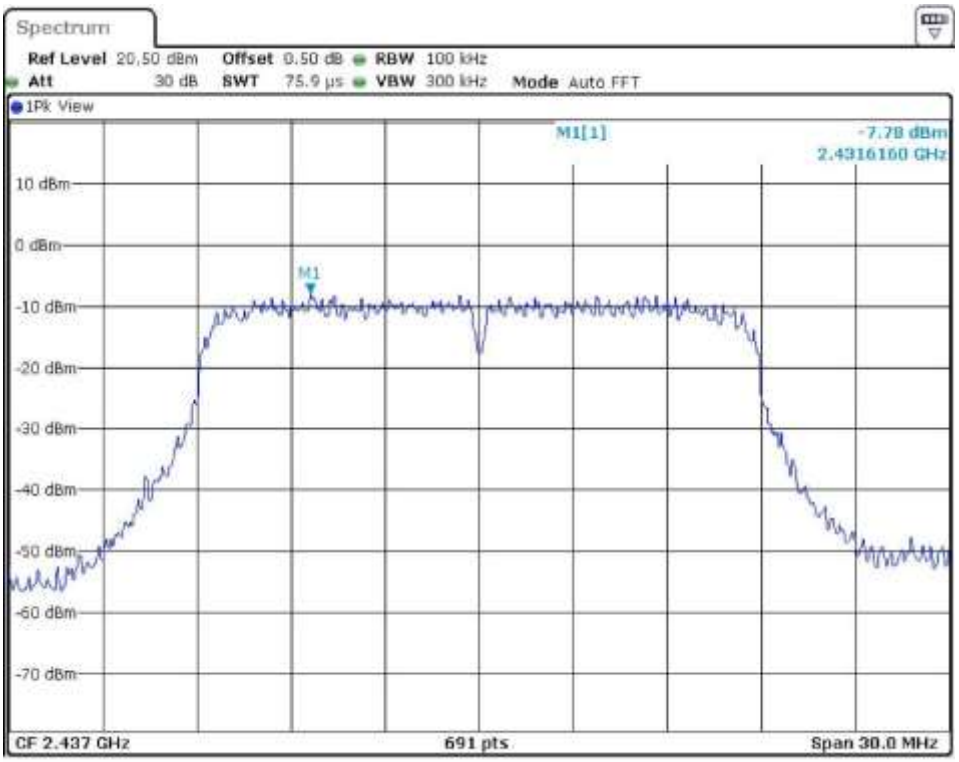

Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.40658 GHz | -5.01 dBm | | |
| M2 | | 1 | 2.4 GHz | -42.98 dBm | | |
| M3 | | 1 | 2.39 GHz | -52.27 dBm | | |
| M4 | | 1 | 2.399855 GHz | -43.14 dBm | | |

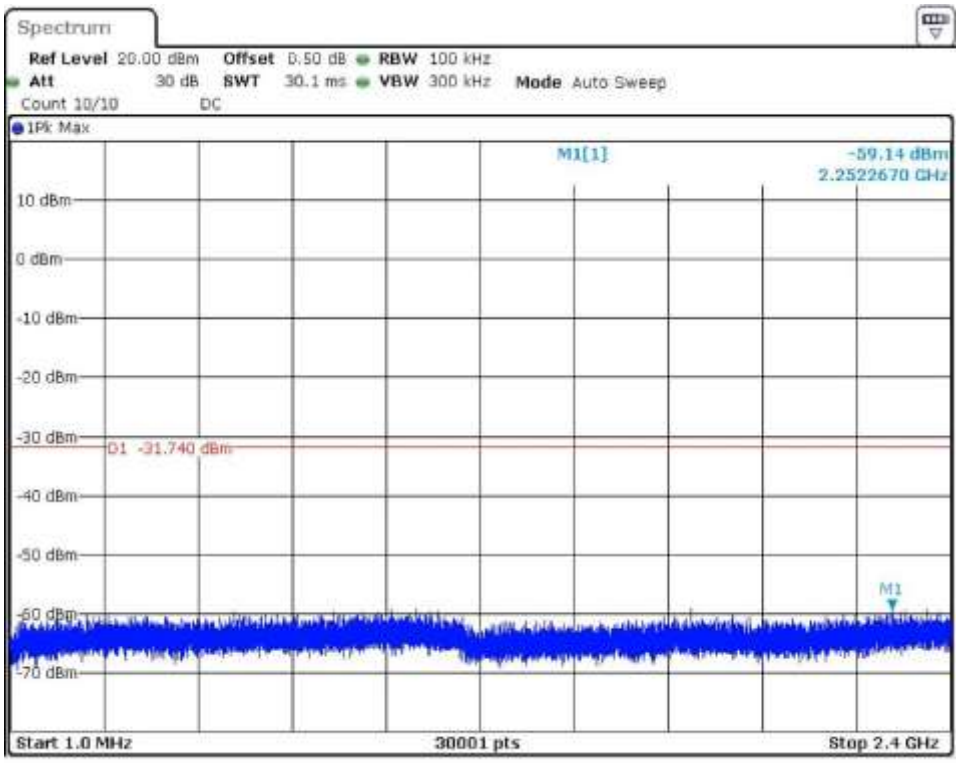
Channel 06 (2437MHz) Reference Level: -7.78dBm

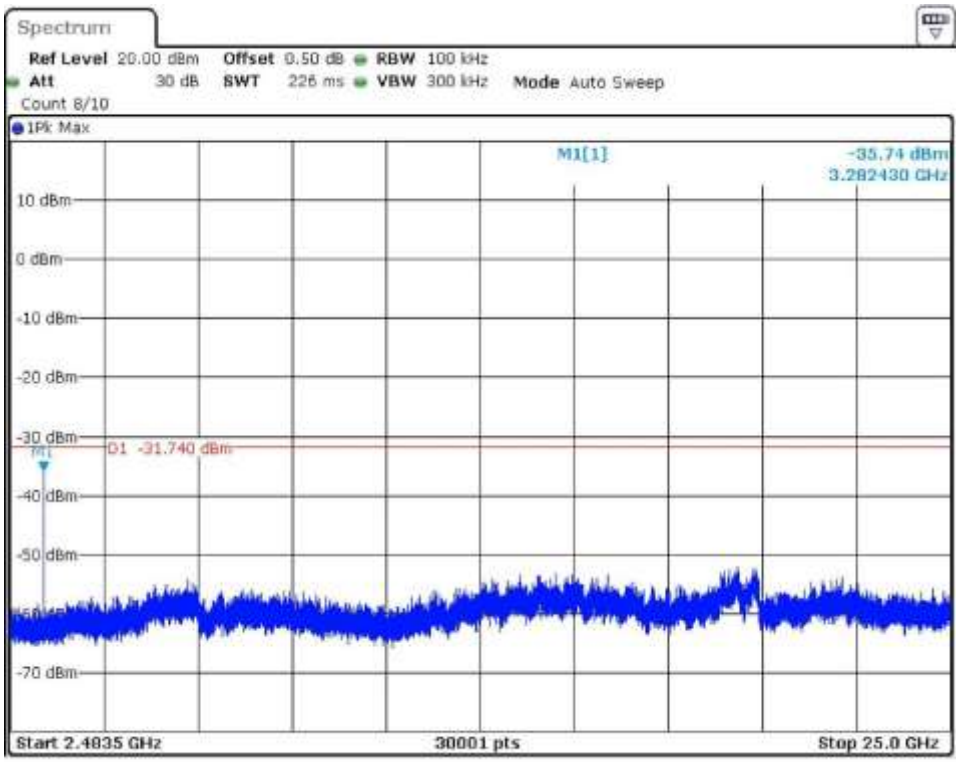


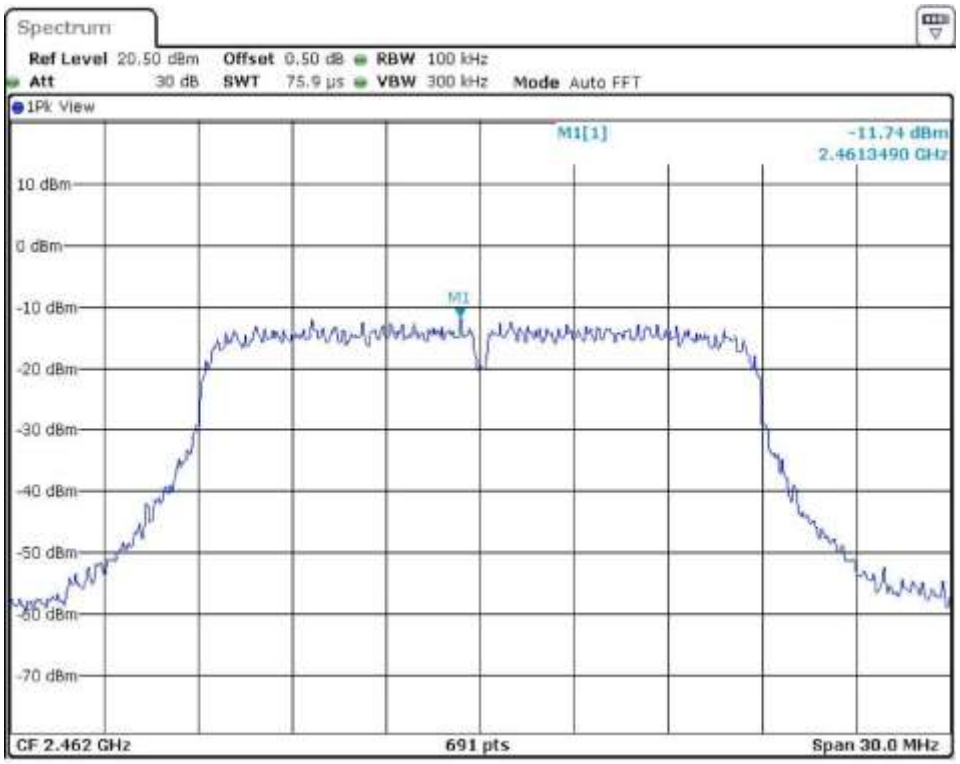



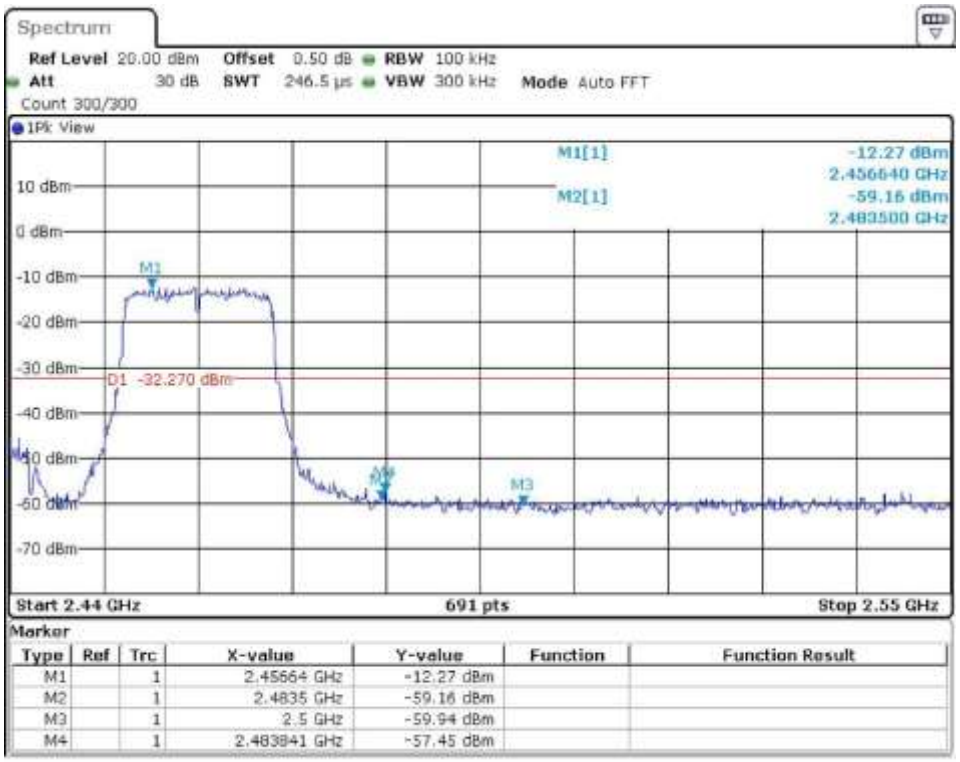

Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
1Pk View
M1[1]
-7.78 dBm
2.4316160 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.437 GHz
691 pts
Span 30.0 MHz

Channel 11 (2462MHz) Reference Level: -11.74dBm



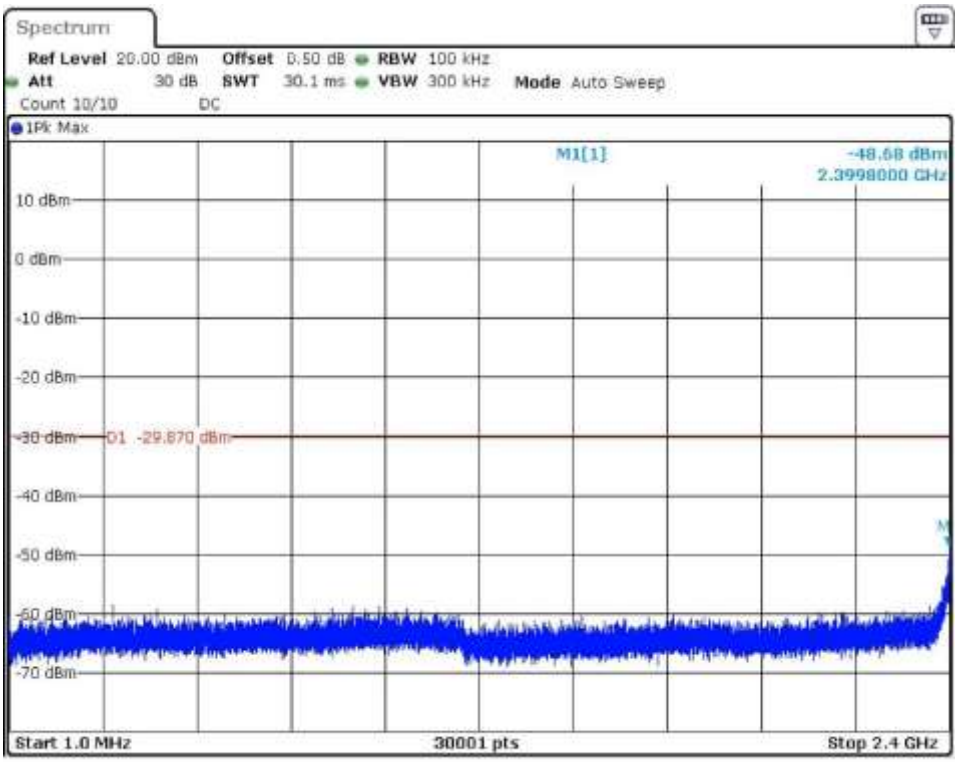


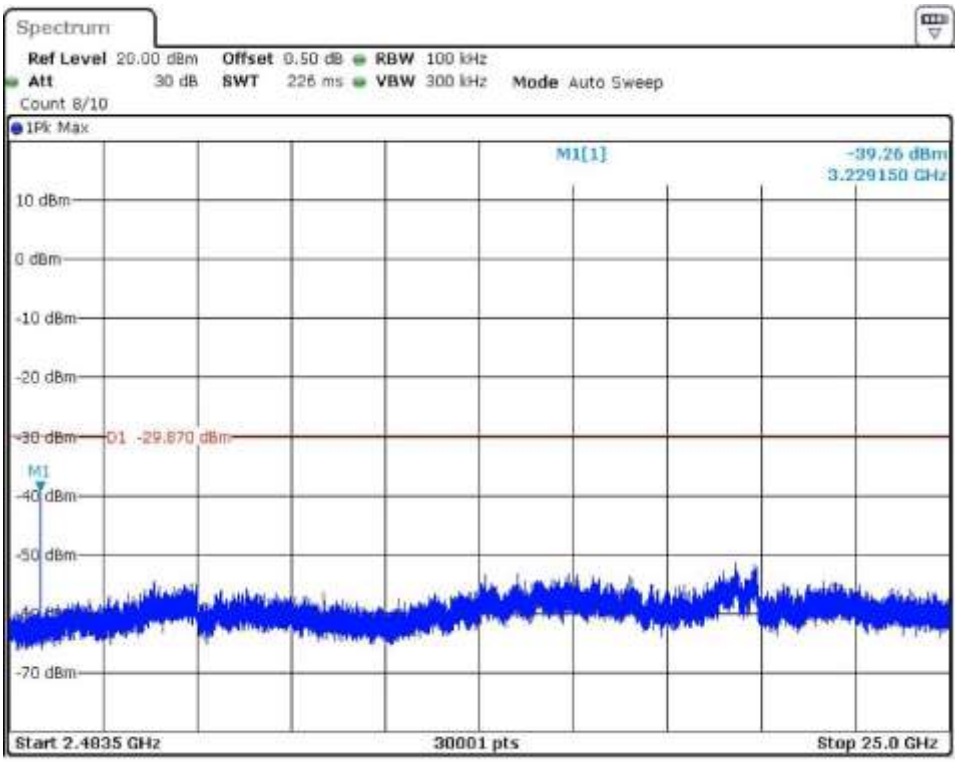



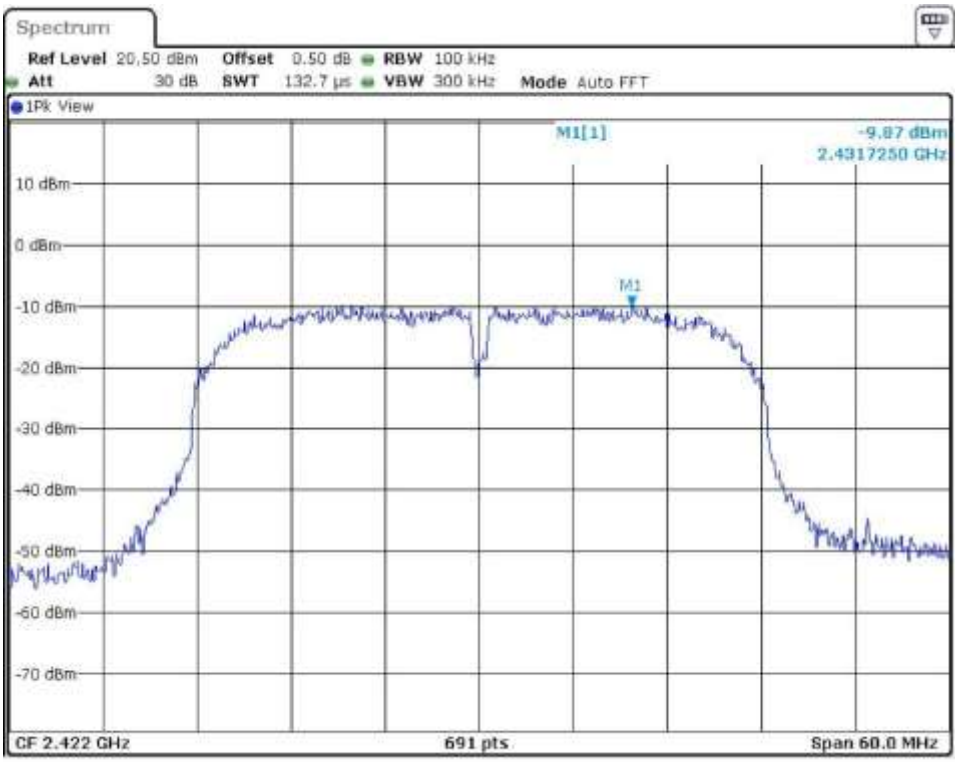

Marker

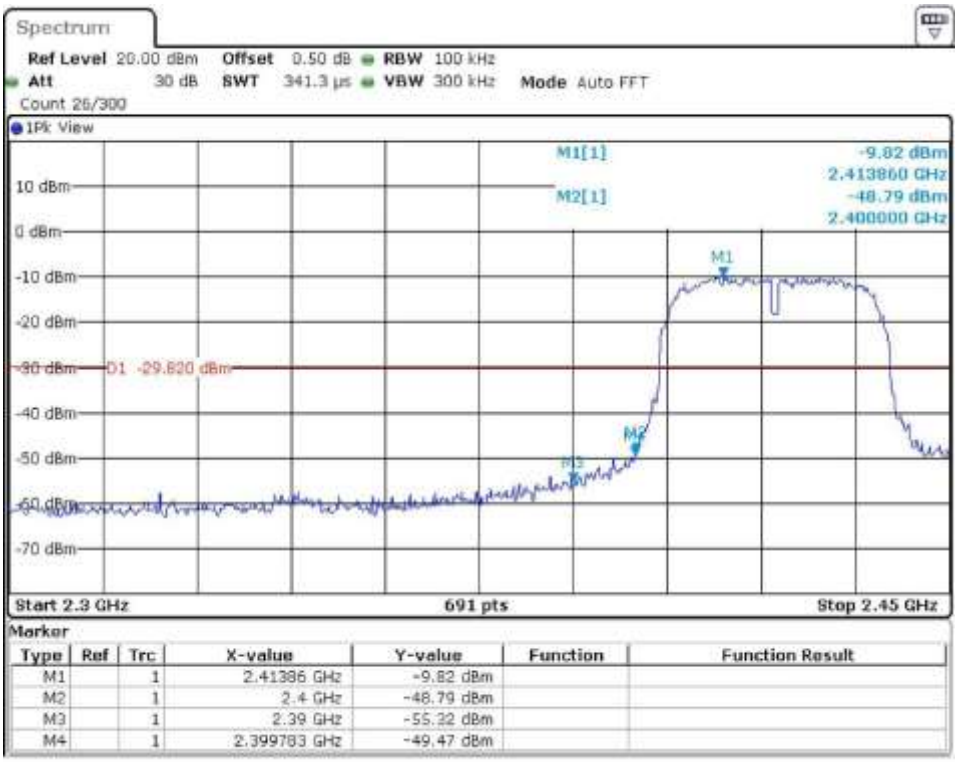
| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.45664 GHz | -12.27 dBm | | |
| M2 | | 1 | 2.4835 GHz | -59.16 dBm | | |
| M3 | | 1 | 2.5 GHz | -59.94 dBm | | |
| M4 | | 1 | 2.483841 GHz | -57.45 dBm | | |

802.11n-HT40
Channel 01 (2422MHz) Reference Level: -9.87dBm



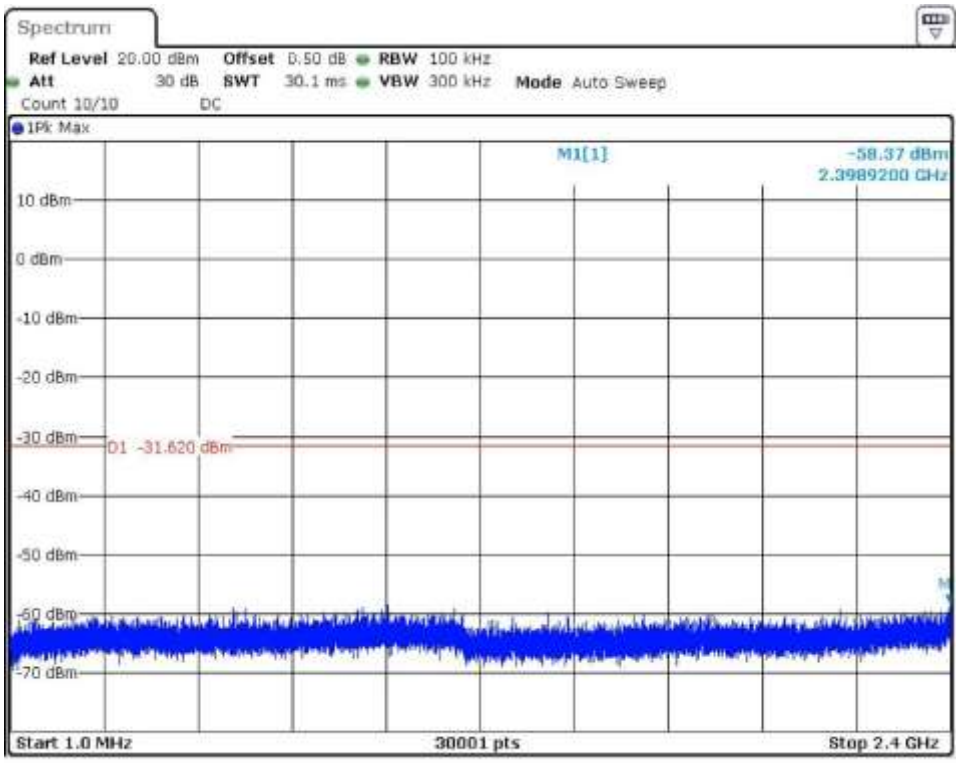


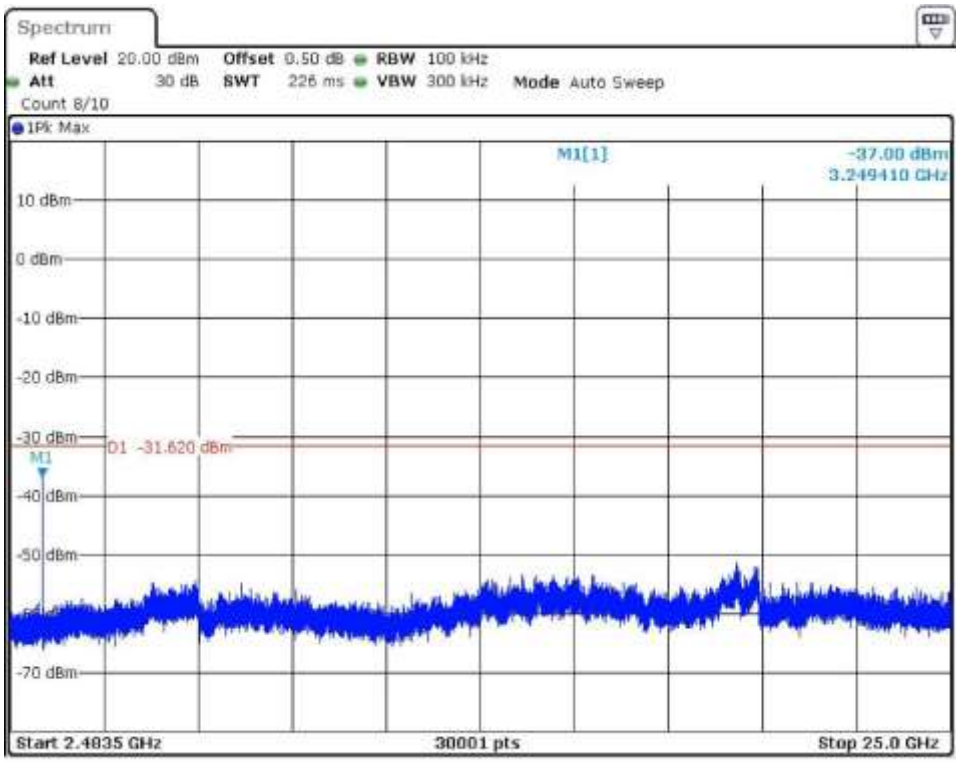



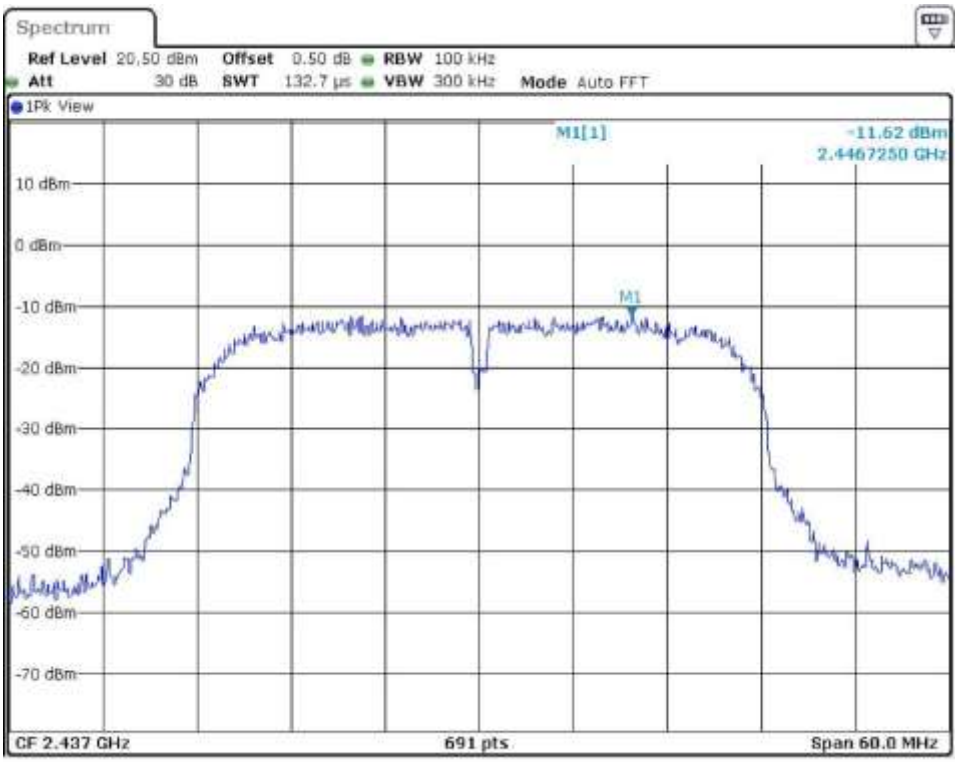

Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.41386 GHz | -9.82 dBm | | |
| M2 | | 1 | 2.4 GHz | -48.79 dBm | | |
| M3 | | 1 | 2.39 GHz | -55.32 dBm | | |
| M4 | | 1 | 2.399783 GHz | -49.47 dBm | | |

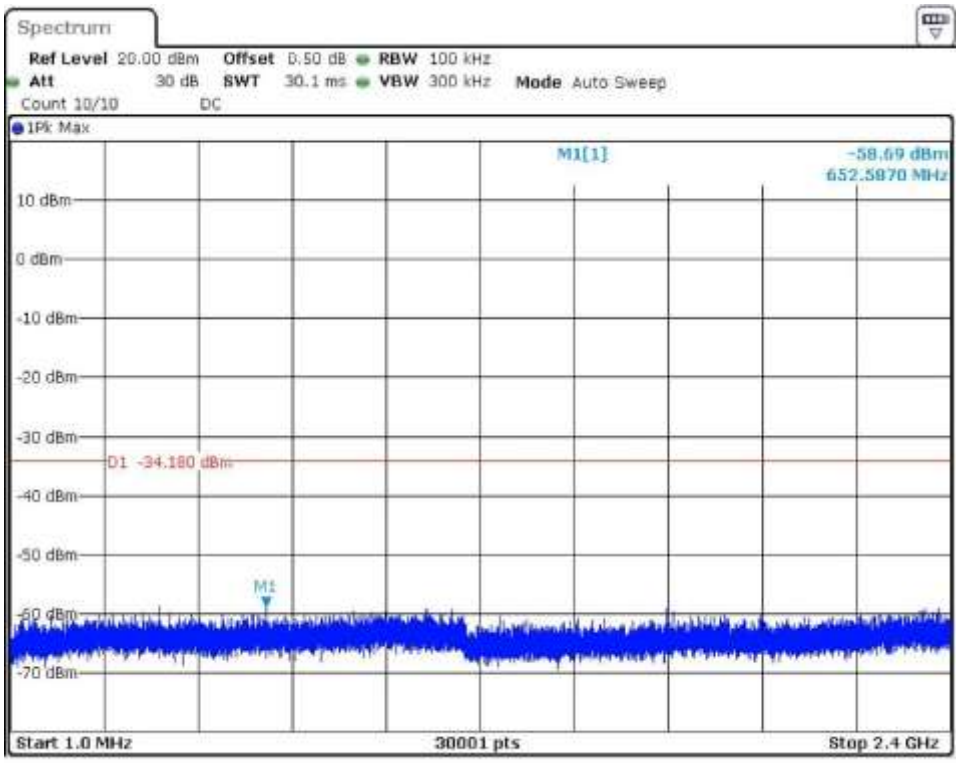
Channel 06 (2437MHz) Reference Level: -11.62dBm

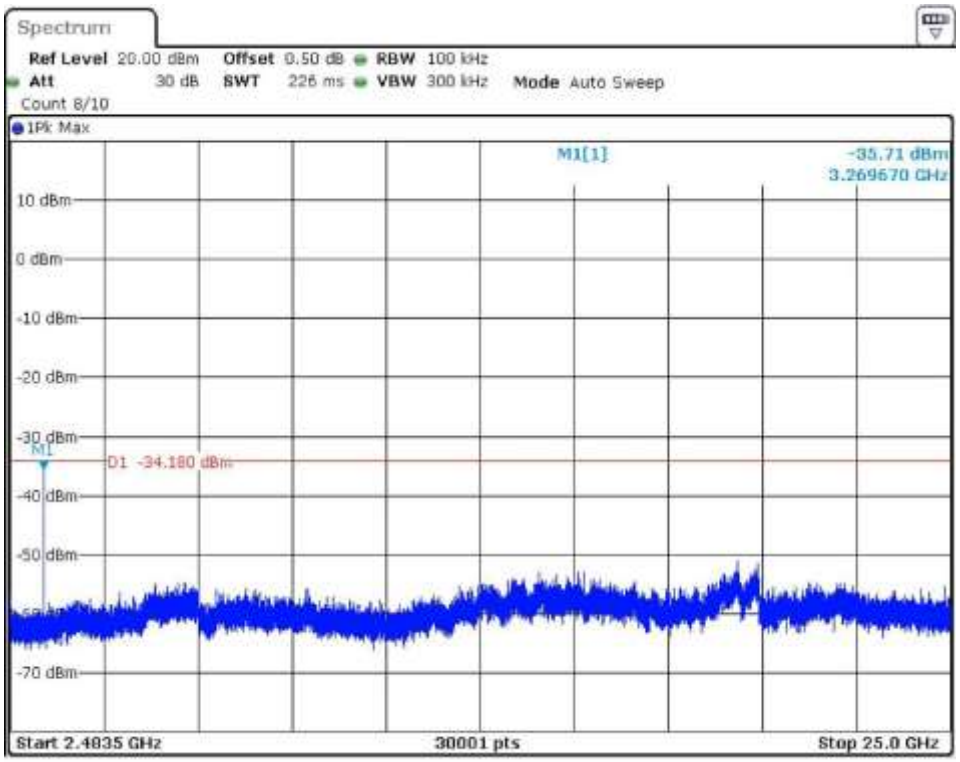


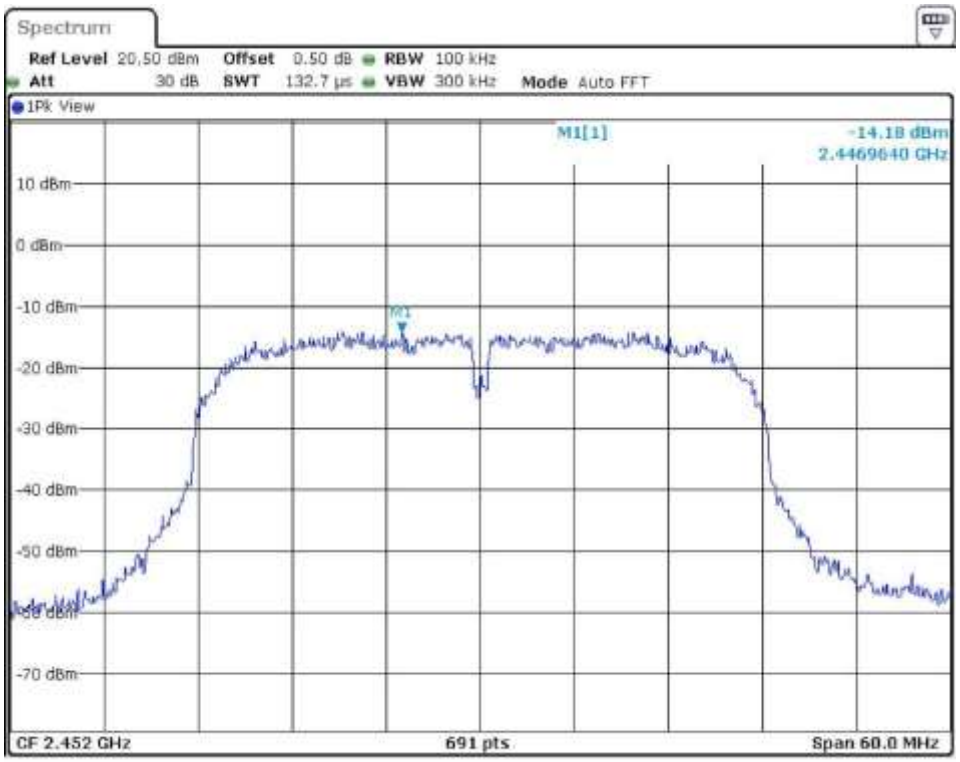



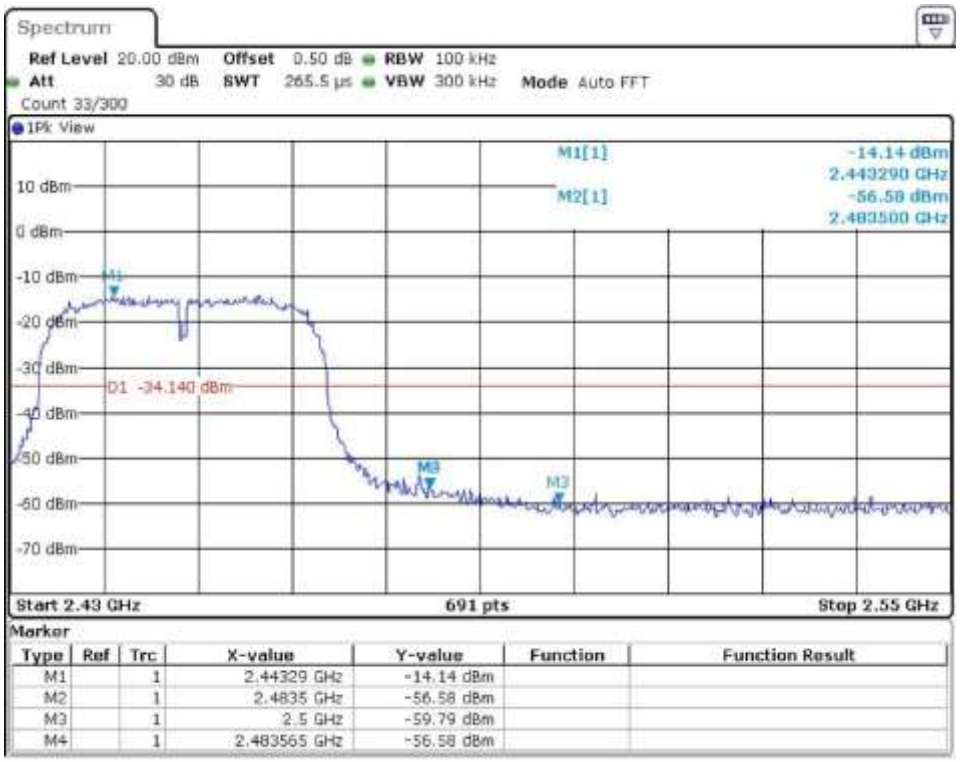

Spectrum
Ref Level 20.50 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 132.7 µs VBW 300 kHz Mode Auto FFT
1Pk View
M1[1]
-11.62 dBm
2.4467250 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.437 GHz
691 pts
Span 60.0 MHz

Channel 11 (2452MHz) Reference Level: -14.18dBm






Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.44329 GHz | -14.14 dBm | | |
| M2 | | 1 | 2.4835 GHz | -56.58 dBm | | |
| M3 | | 1 | 2.5 GHz | -59.79 dBm | | |
| M4 | | 1 | 2.483565 GHz | -56.58 dBm | | |

4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

[×] Not required, since all emissions are more than 20dB below fundamental
[ ] See attached data sheet

4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b) (c):

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD

Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD

Example

Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 42 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dBμV/m

Level in mV/m = Common Antilogarithm [(42 dBμV/m)/20] = 125.9 μV/m

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR

## 4.8 Radiated Spurious Emission

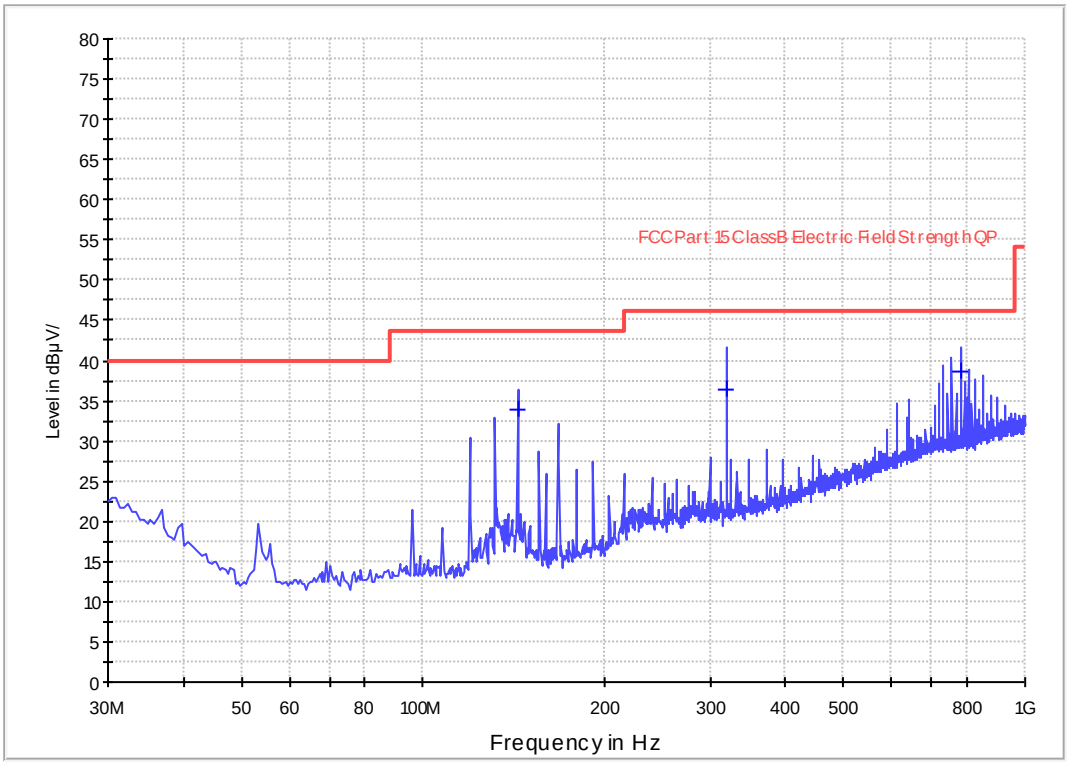
Worst Case Radiated Spurious Emission
at 7386.0MHz
is passed by 0.3dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: transmit simultaneously

ANT Polarity: Horizontal

FCC Part 15



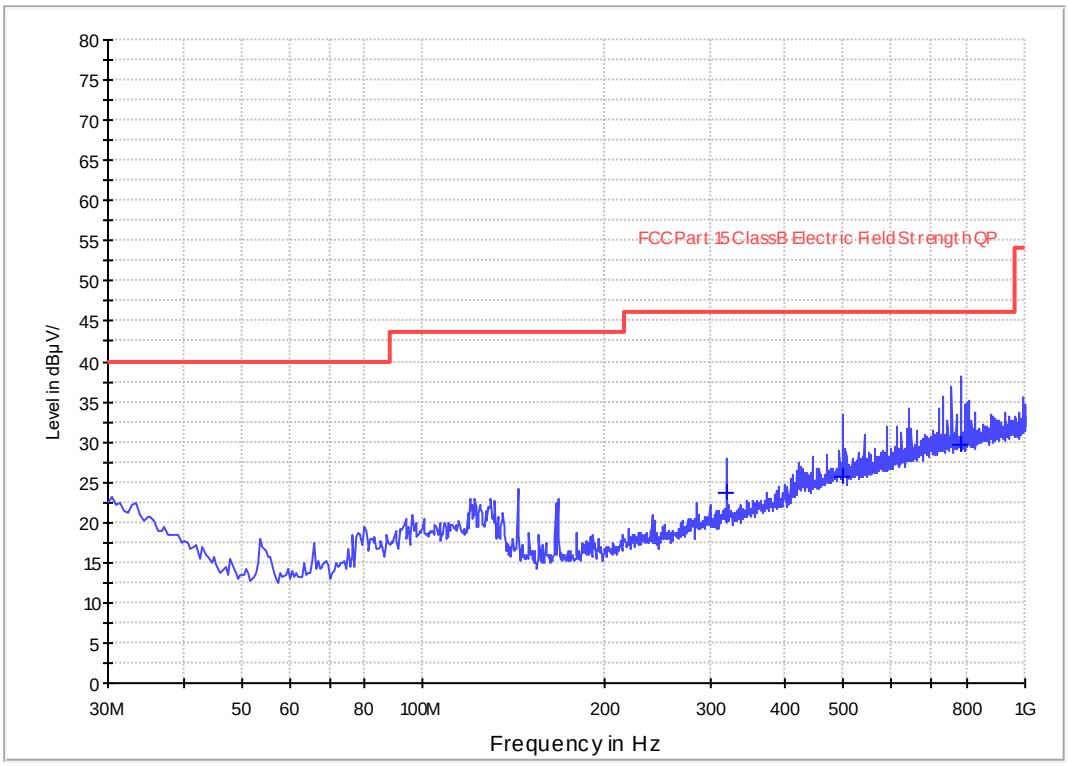

| Frequency (MHz) | QuasiPeak (dBuV/m) | Meas. Time (ms) | Bandwidth (kHz) | Polarization | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBuV/m) |
|---|---|---|---|---|---|---|---|
| 143.975000 | 33.8 | 1000.0 | 120.000 | H | 9.9 | 9.7 | 43.5 |
| 320.030000 | 36.3 | 1000.0 | 120.000 | H | 16.5 | 9.7 | 46.0 |
| 780.295000 | 38.6 | 1000.0 | 120.000 | H | 25.4 | 7.4 | 46.0 |

Remark:
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
3. Margin (dB) = Limit Line(dBµV/m) – Level (dBµV/m)

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: transmit simultaneously

ANT Polarity: Vertical

FCC Part 15




| Frequency (MHz) | QuasiPeak (dBuV/m) | Meas. Time (ms) | Bandwidth (kHz) | Polarization | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBuV/m) |
|---|---|---|---|---|---|---|---|
| 320.030000 | 23.7 | 1000.0 | 120.000 | V | 16.5 | 22.3 | 46.0 |
| 498.025000 | 25.7 | 1000.0 | 120.000 | V | 21.0 | 20.3 | 46.0 |
| 780.295000 | 29.7 | 1000.0 | 120.000 | V | 25.4 | 16.3 | 46.0 |

Remark:
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
3. Margin (dB) = Limit Line(dBµV/m) – Level (dBµV/m)

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: Transmitting (802.11b-Channel 01)

**Radiated Emissions (above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4824.000 | 55.4 | 36.8 | 33.5 | 52.1 | 74.0 | -21.9 |
| Horizontal | *2390.000 | 67.2 | 36.4 | 29.1 | 59.9 | 74.0 | -14.1 |

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4824.000 | 48.0 | 36.8 | 33.5 | 44.7 | 54.0 | -9.3 |
| Horizontal | *2390.000 | 58.4 | 36.4 | 29.1 | 51.1 | 54.0 | -2.9 |

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: Transmitting (802.11b-Channel 06)

**Radiated Emissions (above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4874.000 | 55.3 | 36.7 | 33.4 | 52.0 | 74.0 | -22.0 |
| Horizontal | *7311.000 | 61.4 | 36.6 | 35.8 | 60.6 | 74.0 | -13.4 |

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4874.000 | 44.6 | 36.7 | 33.4 | 41.3 | 54.0 | -12.7 |
| Horizontal | *7311.000 | 52.6 | 36.6 | 35.8 | 51.8 | 54.0 | -2.2 |

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: Transmitting (802.11b-Channel 11)

**Radiated Emissions (above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4924.000 | 56.0 | 36.8 | 33.3 | 52.5 | 74.0 | -21.5 |
| Horizontal | *7386.000 | 69.0 | 36.5 | 29.3 | 61.8 | 74.0 | -12.2 |

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4924.000 | 44.7 | 36.8 | 33.3 | 41.2 | 54.0 | -12.8 |
| Horizontal | *7386.000 | 60.9 | 36.5 | 29.3 | 53.7 | 54.0 | -0.3 |

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: Transmitting (802.11g-Channel 01)

**Radiated Emissions (above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4824.000 | 55.6 | 36.8 | 33.5 | 52.3 | 74.0 | -21.7 |
| Horizontal | *2390.000 | 67.4 | 36.4 | 29.1 | 60.1 | 74.0 | -13.9 |

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4824.000 | 48.6 | 36.8 | 33.5 | 45.3 | 54.0 | -8.7 |
| Horizontal | *2390.000 | 58.5 | 36.4 | 29.1 | 51.2 | 54.0 | -2.8 |

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: Transmitting (802.11g-Channel 06)

**Radiated Emissions (above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4874.000 | 55.5 | 36.7 | 33.4 | 52.2 | 74.0 | -21.8 |
| Horizontal | *7311.000 | 61.5 | 36.6 | 35.8 | 60.7 | 74.0 | -13.3 |

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4874.000 | 44.8 | 36.7 | 33.4 | 41.5 | 54.0 | -12.5 |
| Horizontal | *7311.000 | 52.1 | 36.6 | 35.8 | 51.3 | 54.0 | -2.7 |

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: Transmitting (802.11g-Channel 11)

**Radiated Emissions (above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4924.000 | 56.3 | 36.8 | 33.3 | 52.8 | 74.0 | -21.2 |
| Horizontal | *7386.000 | 69.6 | 36.5 | 29.3 | 62.4 | 74.0 | -11.6 |

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4924.000 | 45.0 | 36.8 | 33.3 | 41.5 | 54.0 | -12.5 |
| Horizontal | *7386.000 | 60.4 | 36.5 | 29.3 | 53.2 | 54.0 | -0.8 |

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: Transmitting (802.11n20-Channel 01)

**Radiated Emissions (above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4824.000 | 56.7 | 36.8 | 33.5 | 53.4 | 74.0 | -20.6 |
| Horizontal | *2390.000 | 67.6 | 36.4 | 29.1 | 60.3 | 74.0 | -13.7 |

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4824.000 | 48.7 | 36.8 | 33.5 | 45.4 | 54.0 | -8.6 |
| Horizontal | *2390.000 | 57.9 | 36.4 | 29.1 | 50.6 | 54.0 | -3.4 |

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: Transmitting (802.11n20-Channel 06)

**Radiated Emissions (above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4874.000 | 56.7 | 36.7 | 33.4 | 53.4 | 74.0 | -20.6 |
| Horizontal | *7311.000 | 62.3 | 36.6 | 35.8 | 61.5 | 74.0 | -12.5 |

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4874.000 | 45.6 | 36.7 | 33.4 | 42.3 | 54.0 | -11.7 |
| Horizontal | *7311.000 | 52.9 | 36.6 | 35.8 | 52.1 | 54.0 | -1.9 |

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: Transmitting (802.11n20-Channel 11)

**Radiated Emissions (above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4924.000 | 55.9 | 36.8 | 33.3 | 52.4 | 74.0 | -21.6 |
| Horizontal | *7386.000 | 68.3 | 36.5 | 29.3 | 61.1 | 74.0 | -12.9 |

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4924.000 | 45.4 | 36.8 | 33.3 | 41.9 | 54.0 | -12.1 |
| Horizontal | *7386.000 | 60.5 | 36.5 | 29.3 | 53.3 | 54.0 | -0.7 |

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: Transmitting (802.11n40-Channel 03)

**Radiated Emissions (above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4844.000 | 56.5 | 36.8 | 33.5 | 53.2 | 74.0 | -20.8 |
| Horizontal | *2390.000 | 67.0 | 36.4 | 29.1 | 59.7 | 74.0 | -14.3 |

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4844.000 | 48.7 | 36.8 | 33.5 | 45.4 | 54.0 | -8.6 |
| Horizontal | *2390.000 | 58.6 | 36.4 | 29.1 | 51.3 | 54.0 | -2.7 |

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: Transmitting (802.11n40-Channel 06)

**Radiated Emissions (above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4874.000 | 56.7 | 36.7 | 33.4 | 53.4 | 74.0 | -20.6 |
| Horizontal | *7311.000 | 62.3 | 36.6 | 35.8 | 61.5 | 74.0 | -12.5 |

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4874.000 | 45.7 | 36.7 | 33.4 | 42.4 | 54.0 | -11.6 |
| Horizontal | *7311.000 | 52.4 | 36.6 | 35.8 | 51.6 | 54.0 | -2.4 |

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Arovast Corporation
Date of Test: 10 June 2021 Model: LAP-C202S-WUSR
Worst Case Operating Mode: Transmitting (802.11n40-Channel 09)

**Radiated Emissions (above 1GHz)**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4904.000 | 57.8 | 36.8 | 33.3 | 54.3 | 74.0 | -19.7 |
| Horizontal | *7356.000 | 69.6 | 36.5 | 29.3 | 62.4 | 74.0 | -11.6 |

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| Horizontal | *4904.000 | 45.7 | 36.8 | 33.3 | 42.2 | 54.0 | -11.8 |
| Horizontal | *7356.000 | 60.1 | 36.5 | 29.3 | 52.9 | 54.0 | -1.1 |

NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Arovast Corporation
Date of Test: 10 June 2021
Model: LAP-C202S-WUSR

## 4.9 Conducted Emission

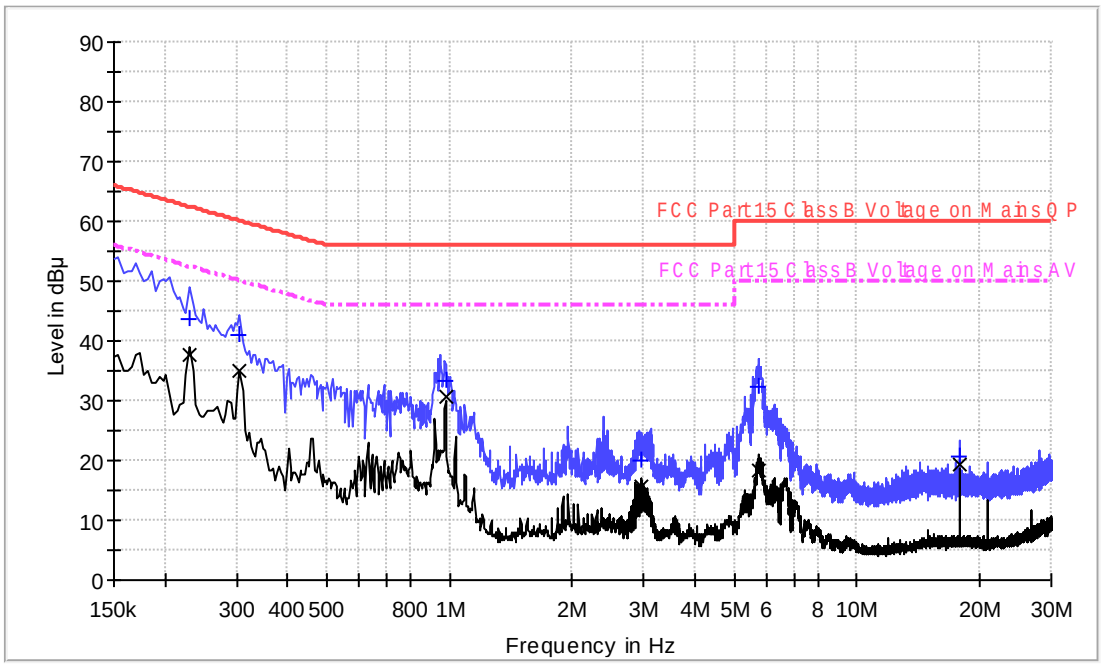
Worst Case Conducted Emission (802.11b-Channel 01)
at 0.978MHz
is passed by 14.4dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: conducted photos.pdf.

Applicant: Arovast Corporation
Date of Test: 10 June 2021
Model: LAP-C202S-WUSR
Worst Case Operating Mode: transmit simultaneously
Phase: Live

## Graphic / Data Table

### Conducted Emissions
### Pursuant to FCC 15.207: Emissions Requirement




## Limit and Margin QP

| Frequency (MHz) | QuasiPeak (dBuV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|---|---|---|---|---|---|---|
| 0.231000 | 43.5 | 9.000 | L1 | 9.6 | 18.9 | 62.4 |
| 0.306000 | 41.1 | 9.000 | L1 | 9.6 | 19.0 | 60.1 |
| 0.978000 | 33.4 | 9.000 | L1 | 9.7 | 22.6 | 56.0 |
| 2.954000 | 19.9 | 9.000 | L1 | 9.7 | 36.1 | 56.0 |
| 5.722000 | 32.2 | 9.000 | L1 | 9.7 | 27.8 | 60.0 |
| 17.946000 | 20.6 | 9.000 | L1 | 10.4 | 39.4 | 60.0 |

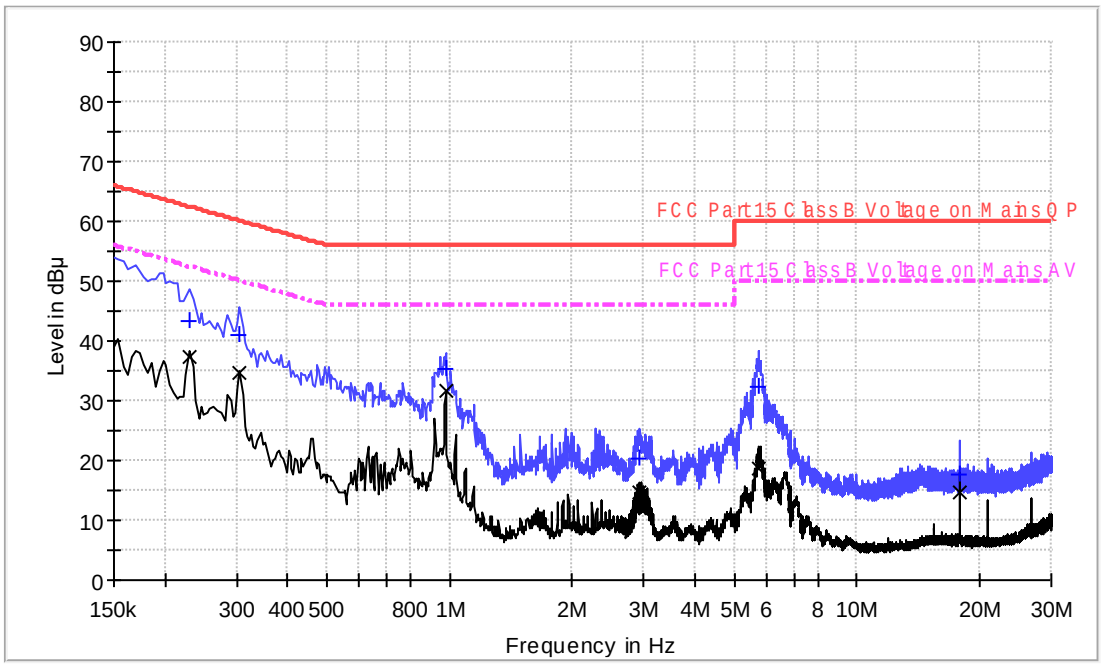
## Limit and Margin AV

| Frequency (MHz) | Average (dBuV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|---|---|---|---|---|---|---|
| 0.231000 | 37.5 | 9.000 | L1 | 9.6 | 14.9 | 52.4 |
| 0.306000 | 35.1 | 9.000 | L1 | 9.6 | 15.0 | 50.1 |
| 0.978000 | 30.6 | 9.000 | L1 | 9.7 | 15.4 | 46.0 |
| 2.954000 | 15.8 | 9.000 | L1 | 9.7 | 30.2 | 46.0 |
| 5.722000 | 18.4 | 9.000 | L1 | 9.7 | 31.6 | 50.0 |
| 17.946000 | 19.3 | 9.000 | L1 | 10.4 | 30.7 | 50.0 |

Applicant: Arovast Corporation
Date of Test: 10 June 2021
Model: LAP-C202S-WUSR
Worst Case Operating Mode: transmit simultaneously
Phase: Neutral

## Graphic / Data Table

### Conducted Emissions
### Pursuant to FCC 15.207: Emissions Requirement




## Limit and Margin QP

| Frequency (MHz) | QuasiPeak (dBuV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|---|---|---|---|---|---|---|
| 0.231000 | 43.5 | 9.000 | N | 9.5 | 18.9 | 62.4 |
| 0.306000 | 40.9 | 9.000 | N | 9.5 | 19.2 | 60.1 |
| 0.978000 | 35.3 | 9.000 | N | 9.5 | 20.7 | 56.0 |
| 2.938000 | 20.4 | 9.000 | N | 9.5 | 35.6 | 56.0 |
| 5.726000 | 32.3 | 9.000 | N | 9.6 | 27.7 | 60.0 |
| 17.942000 | 17.5 | 9.000 | N | 10.4 | 42.5 | 60.0 |

## Limit and Margin AV

| Frequency (MHz) | Average (dBuV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|---|---|---|---|---|---|---|
| 0.231000 | 37.4 | 9.000 | N | 9.5 | 15.0 | 52.4 |
| 0.306000 | 34.8 | 9.000 | N | 9.5 | 15.3 | 50.1 |
| 0.978000 | 31.6 | 9.000 | N | 9.5 | 14.4 | 46.0 |
| 2.938000 | 14.8 | 9.000 | N | 9.5 | 31.2 | 46.0 |
| 5.726000 | 18.7 | 9.000 | N | 9.6 | 31.3 | 50.0 |
| 17.942000 | 14.7 | 9.000 | N | 10.4 | 35.3 | 50.0 |

Applicant: Arovast Corporation
Date of Test: 10 June 2021
Model: LAP-C202S-WUSR

4.10 Radiated Emissions from Digital Section of Transceiver, FCC Ref: 15.109

[ ] Not required - No digital part

[ ] Test results are attached

[ x ] Included in the separated report.

Applicant: Arovast Corporation
Date of Test: 10 June 2021
Model: LAP-C202S-WUSR

## 4.11 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

| | |
|---|---|
| | See attached spectrum analyzer chart (s) for Transmitter timing |
| | See Transmitter timing diagram provided by manufacturer |
| x | Not applicable, duty cycle was not used. |

## 5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf & internal photos.pdf.

## 6.0 Product Labeling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf.

## 7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

## 8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

## 9.0 Confidentiality Request

For electronic filing, the confidentiality request of the tested EUT is saved with filename: request.pdf.

## 10.0 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF.*

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

## 11.0 Test Equipment List

| Equipment No. | Equipment | Manufacturer | Model No. | Serial No. | Cal. Date | Due Date |
|---|---|---|---|---|---|---|
| SZ061-12 | Biconilog Antenna | ETS | 3142E | 00166158 | 14-Sep-2018 | 14-Sep-2021 |
| SZ061-06 | Active Loop Antenna | Electro-Metrics | EM-6876 | 217 | 18-May-2021 | 18-May-2023 |
| SZ061-08 | Horn Antenna | ETS | 3115 | 00092346 | 07-Sep-2019 | 07-Sep-2021 |
| SZ061-07 | Pyramidal Horn Antenna | ETS | 3160-09 | 00083067 | 13-Aug -2019 | 13-Aug-2021 |
| SZ056-03 | Spectrum Analyzer | R&S | FSP30 | 101148 | 10-May-2021 | 10-May-2022 |
| SZ185-01 | EMI Receiver | R & S | ESCI | 100547 | 22-Dec-2020 | 22-Dec-2021 |
| SZ181-04 | Preamplifier | Agilent | 8449B | 3008A02474 | 10-May-2021 | 10-May-2022 |
| SZ188-01 | Anechoic Chamber | ETS | RFD-F/A-100 | 4102 | 15-Dec-2018 | 15-Dec-2021 |
| SZ062-02 | RF Cable | RADIALL | RG 213U | -- | 01-Dec-2020 | 01-Dec-2021 |
| SZ062-05 | RF Cable | RADIALL | 0.04-26.5GHz | -- | 01-Dec-2020 | 01-Dec-2021 |
| SZ062-12 | RF Cable | RADIALL | 0.04-26.5GHz | -- | 01-Dec-2020 | 01-Dec-2021 |
| SZ067-04 | Notch Filter | Micro-Tronics | BRM50702-02 | -- | 11-May-2021 | 11-May-2022 |
| SZ185-02 | EMI Test Receiver | R&S | ESCI | 100692 | 27-Oct-2020 | 27-Oct-2021 |
| SZ187-02 | Two-Line V-Network | R&S | ENV216 | 100073 | 12-May-2021 | 12-May-2022 |
| SZ188-03 | Shielding Room | ETS | RFD-100 | 4100 | 07-Jan-2020 | 07-Jan-2023 |
| SZ062-16 | RF Cable | HUBER+SUHNER | CBL2-BN-1m | 110127-2231000 | 13-Nov-2020 | 13-Nov-2021 |

********** End of Report**********