

# NORTHWEST EMC

## Digi International Inc

Sigma Pumps Gen IV 802.11abgn Module

FCC 15.247:2015

FCC 15.207:2016

FCC 15.247:2016

802.11 bgn Radio

Report # DGII0152.3



NVLAP Lab Code: 200881-0

*This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America. This Report may only be duplicated in its entirety*

# CERTIFICATE OF TEST

Last Date of Test: January 04, 2016  
Digi International Inc  
Model: Sigma Pumps Gen IV 802.11abgn Module

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.247:2015	ANSI C63.10:2013
FCC 15.207:2016	ANSI C63.10:2013
FCC 15.247:2016	ANSI C63.10:2013

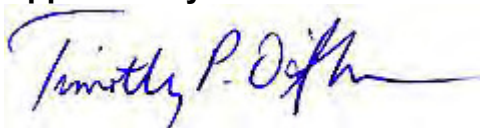
### Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6, 11.12.1, 11.13.2	Spurious Radiated Emissions	Yes	Pass	
11.6	Duty Cycle	Yes	N/A	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.2.2.4	Output Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	

### Deviations From Test Standards

None

### Approved By:



Tim O'Shea, Operations Manager

*Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.*

# REVISION HISTORY

Revision Number	Description	Date	Page Number
00	None		

# ACCREDITATIONS AND AUTHORIZATIONS

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## United States

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**FCC** - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

**A2LA** - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

**NVLAP** - Each laboratory is accredited by NVLAP to ISO 17025

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## Canada

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**IC** - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

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## European Union

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**European Commission** – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

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## Australia/New Zealand

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**ACMA** - Recognized by ACMA as a CAB for the acceptance of test data.

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## Korea

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**MSIP / RRA** - Recognized by KCC's RRA as a CAB for the acceptance of test data.

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## Japan

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**VCCI** - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

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## Taiwan

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**BSMI** – Recognized by BSMI as a CAB for the acceptance of test data.

**NCC** - Recognized by NCC as a CAB for the acceptance of test data.

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## Singapore

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**IDA** – Recognized by IDA as a CAB for the acceptance of test data.

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## Israel

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**MOC** – Recognized by MOC as a CAB for the acceptance of test data.

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## Hong Kong

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**OFCA** – Recognized by OFCA as a CAB for the acceptance of test data.

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## Vietnam

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**MIC** – Recognized by MIC as a CAB for the acceptance of test data.

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## SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>

<http://gsi.nist.gov/global/docs/cabs/designations.html>

# MEASUREMENT UNCERTAINTY

## Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

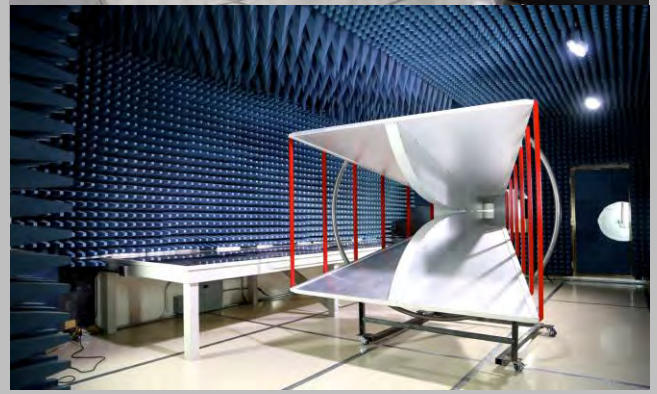
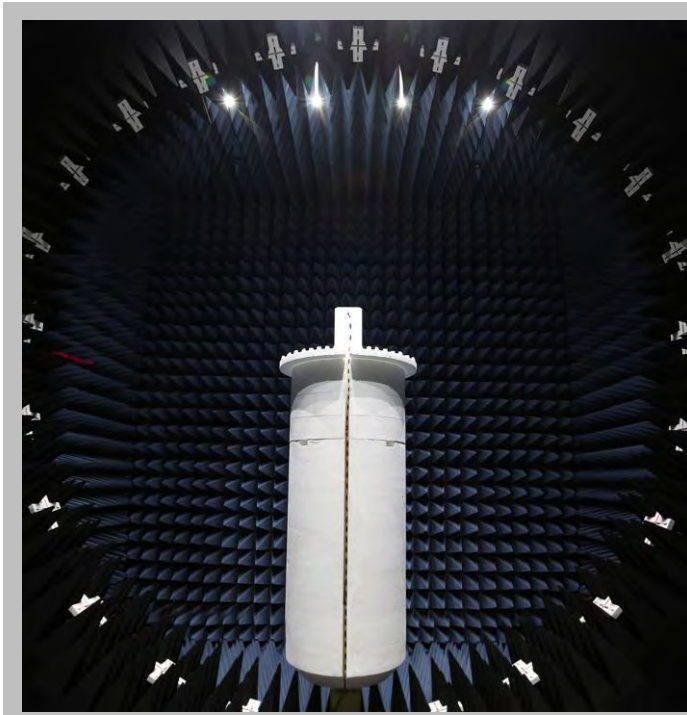
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

<b>Test</b>	<b>+ MU</b>	<b>- MU</b>
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

# FACILITIES



<b>California</b> Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	<b>Minnesota</b> Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	<b>New York</b> Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	<b>Oregon</b> Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	<b>Texas</b> Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	<b>Washington</b> Labs NC01-05 19201 120 <sup>th</sup> Ave NE Bothell, WA 98011 (425)984-6600
<b>NVLAP</b>					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
<b>Industry Canada</b>					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
<b>BSMI</b>					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
<b>VCCI</b>					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
<b>Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA</b>					
US0158	US0175	N/A	US0017	US0191	US0157



# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

<b>Company Name:</b>	Digi International Inc
<b>Address:</b>	11001 Bren Road E.
<b>City, State, Zip:</b>	Minnetonka, MN 55343
<b>Test Requested By:</b>	Slava Gekht
<b>Model:</b>	Sigma Pumps Gen IV 802.11abgn Module
<b>First Date of Test:</b>	November 20, 2015
<b>Last Date of Test:</b>	January 04, 2016
<b>Receipt Date of Samples:</b>	November 19, 2015
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No Damage

## Information Provided by the Party Requesting the Test

<b>Functional Description of the EUT:</b>
Sigma Pump Radio Module
<b>Testing Objective:</b>
To demonstrate compliance of the 802.11 radio under FCC 15.247 for operation in the 2.4 GHz band.

# CONFIGURATIONS

## Configuration DGII0152- 1

<b>EUT</b>			
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>
Sigma Pump Radio Module	Digi International Inc	50001857-1	UUT #7 (55001769-1 rev. 1P)
Development Board	Digi International Inc	55001610-2 rev. 01	None

<b>Peripherals in test setup boundary</b>			
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>
AC Adapter (Development Board)	Bobbintron Electrical Corporation	VEG20C-120F	None

<b>Remote Equipment Outside of Test Setup Boundary</b>			
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>
Laptop	Hewlett-Packard	Compaq nc6320	CNU7D62VS5
AC Adapter (Laptop)	Hewlett-Packard	PPP014L-S	W97950EBMVYB2Z

<b>Cables</b>					
<b>Cable Type</b>	<b>Shield</b>	<b>Length (m)</b>	<b>Ferrite</b>	<b>Connection 1</b>	<b>Connection 2</b>
Serial Cable	Yes	>3m	Yes	Development Board	Laptop
DC Cable (Development Board)	No	1.6m	Yes	Development Board	AC Adapter (Development Board)
AC Cable (Development Board)	No	2.3m	No	AC Mains	AC Adapter (Development Board)
DC Cable (Laptop)	No	1.8m	No	Laptop	AC Adapter (Laptop)
AC Cable (Laptop)	No	1.8m	No	AC Adapter (Laptop)	AC Mains



# CONFIGURATIONS

## Configuration DGII0152- 2

<b>EUT</b>			
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>
Sigma Pump Radio Module	Digi International Inc	50001857-1	UUT #7 (55001769-1 rev. 1P)
Development Board	Digi International Inc	55001610-2 rev. 01	None

<b>Peripherals in test setup boundary</b>			
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>
DC Power Supply	Agilent	U8002A	TPZ

<b>Remote Equipment Outside of Test Setup Boundary</b>			
<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>
Laptop	Hewlett-Packard	Compaq nc6320	CNU7D62VS5
AC Adapter (Laptop)	Hewlett-Packard	PPP014L-S	W97950EBMVYB2Z

<b>Cables</b>					
<b>Cable Type</b>	<b>Shield</b>	<b>Length (m)</b>	<b>Ferrite</b>	<b>Connection 1</b>	<b>Connection 2</b>
Serial Cable	Yes	>3m	Yes	Development Board	Laptop
DC Cable (Laptop)	No	1.8m	No	Laptop	AC Adapter (Laptop)
AC Cable (Laptop)	No	1.8m	No	AC Adapter (Laptop)	AC Mains
DC Cable (DC Power Supply)	No	1.0m	No	DC Power Supply	Development Board

# MODIFICATIONS

## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	11/20/2015	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	11/20/2015	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	11/20/2015	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	11/20/2015	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	11/20/2015	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	1/4/2016	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
7	1/4/2016	AC Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

# AC POWERLINE CONDUCTED EMISSIONS



WTD: 2015.12.01  
PSA-ESCI 2015.07.01, EmIR5 2015.11.06

## TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESR7	ARI	5/21/2015	5/21/2016
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	3/23/2015	3/23/2016
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, AQP	MNCA	5/13/2015	5/13/2016

## MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

## CONFIGURATIONS INVESTIGATED

DGII0152-1

## MODES INVESTIGATED

Transmitting 802.11 channel 6, 1 Mbps

# AC POWERLINE CONDUCTED EMISSIONS



WTD: 2015.12.01  
PSA-ESCI 2015.07.01, EmiR5 2015.11.08

EUT:	Sigma Pumps Gen IV 802.11abgn Module	Work Order:	DGII0152
Serial Number:	UUT #7 (55001769-1 rev. 1P)	Date:	01/04/2016
Customer:	Digi International Inc	Temperature:	22.5°C
Attendees:	Slava Gehkt	Relative Humidity:	18.9%
Customer Project:	None	Bar. Pressure:	1004.2 mb
Tested By:	Dustin Sparks	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	DGII0152-1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	7	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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## COMMENTS

None

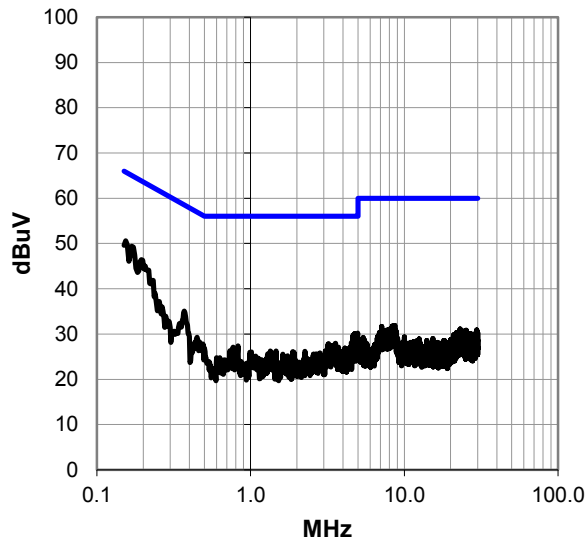
## EUT OPERATING MODES

Transmitting 802.11 channel 6, 1 Mbps

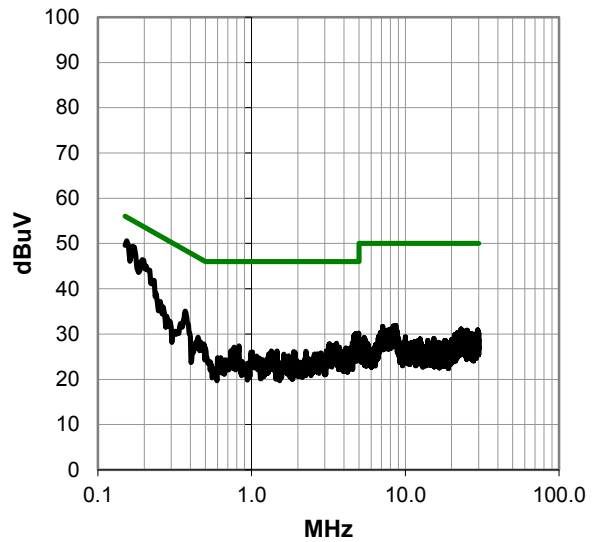
## DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



# AC POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #7

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.154	30.2	20.4	50.6	65.8	-15.2
0.169	29.0	20.4	49.4	65.0	-15.6
0.370	14.8	20.2	35.0	58.5	-23.5
4.966	9.7	20.5	30.2	56.0	-25.8
4.743	9.6	20.5	30.1	56.0	-25.9
4.903	9.3	20.5	29.8	56.0	-26.2
4.657	9.2	20.5	29.7	56.0	-26.3
4.638	9.1	20.5	29.6	56.0	-26.4
4.828	8.4	20.5	28.9	56.0	-27.1
4.612	8.4	20.5	28.9	56.0	-27.1
0.448	9.1	20.2	29.3	56.9	-27.6
4.843	7.9	20.5	28.4	56.0	-27.6
4.705	7.6	20.5	28.1	56.0	-27.9
4.534	7.6	20.5	28.1	56.0	-27.9
3.567	7.6	20.4	28.0	56.0	-28.0
8.686	11.2	20.7	31.9	60.0	-28.1
3.224	7.5	20.3	27.8	56.0	-28.2
8.455	11.1	20.7	31.8	60.0	-28.2
8.354	11.1	20.7	31.8	60.0	-28.2
3.191	7.4	20.3	27.7	56.0	-28.3
7.123	11.1	20.6	31.7	60.0	-28.3
4.769	7.1	20.5	27.6	56.0	-28.4
3.358	7.1	20.3	27.4	56.0	-28.6
0.829	7.2	20.2	27.4	56.0	-28.6
3.426	7.0	20.3	27.3	56.0	-28.7
8.223	10.6	20.7	31.3	60.0	-28.7

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.154	30.2	20.4	50.6	55.8	-5.2
0.169	29.0	20.4	49.4	55.0	-5.6
0.370	14.8	20.2	35.0	48.5	-13.5
4.966	9.7	20.5	30.2	46.0	-15.8
4.743	9.6	20.5	30.1	46.0	-15.9
4.903	9.3	20.5	29.8	46.0	-16.2
4.657	9.2	20.5	29.7	46.0	-16.3
4.638	9.1	20.5	29.6	46.0	-16.4
4.828	8.4	20.5	28.9	46.0	-17.1
4.612	8.4	20.5	28.9	46.0	-17.1
0.448	9.1	20.2	29.3	46.9	-17.6
4.843	7.9	20.5	28.4	46.0	-17.6
4.705	7.6	20.5	28.1	46.0	-17.9
4.534	7.6	20.5	28.1	46.0	-17.9
3.567	7.6	20.4	28.0	46.0	-18.0
8.686	11.2	20.7	31.9	50.0	-18.1
3.224	7.5	20.3	27.8	46.0	-18.2
8.455	11.1	20.7	31.8	50.0	-18.2
8.354	11.1	20.7	31.8	50.0	-18.2
3.191	7.4	20.3	27.7	46.0	-18.3
7.123	11.1	20.6	31.7	50.0	-18.3
4.769	7.1	20.5	27.6	46.0	-18.4
3.358	7.1	20.3	27.4	46.0	-18.6
0.829	7.2	20.2	27.4	46.0	-18.6
3.426	7.0	20.3	27.3	46.0	-18.7
8.223	10.6	20.7	31.3	50.0	-18.7

## CONCLUSION

Pass



Tested By

# AC POWERLINE CONDUCTED EMISSIONS



WTD: 2015.12.01  
PSA-ESCI 2015.07.01, EmIR5 2015.11.08

EUT:	Sigma Pumps Gen IV 802.11abgn Module	Work Order:	DGII0152
Serial Number:	UUT #7 (55001769-1 rev. 1P)	Date:	01/04/2016
Customer:	Digi International Inc	Temperature:	22.5°C
Attendees:	Slava Gehkt	Relative Humidity:	18.9%
Customer Project:	None	Bar. Pressure:	1004.2 mb
Tested By:	Dustin Sparks	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	DGII0152-1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	8	Line:	High Line	Add. Ext. Attenuation (dB):	0
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## COMMENTS

None

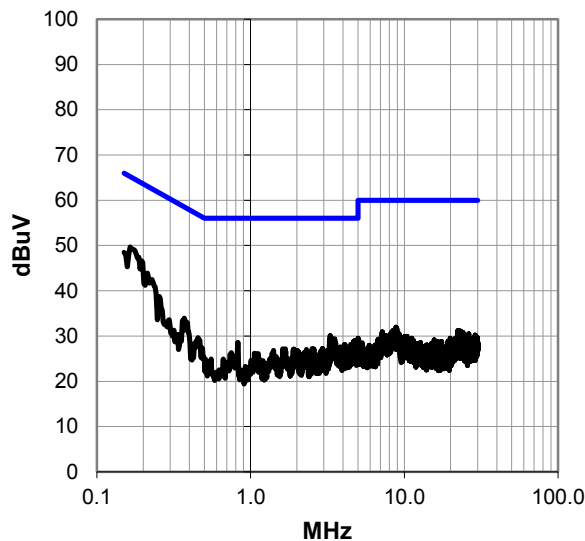
## EUT OPERATING MODES

Transmitting 802.11 channel 6, 1 Mbps

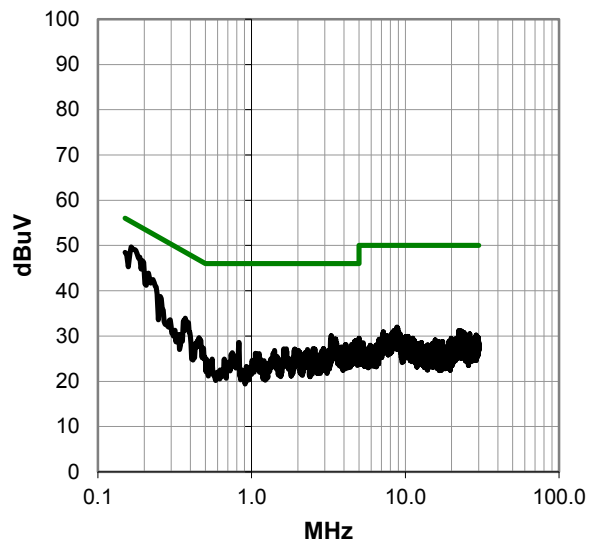
## DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



# AC POWERLINE CONDUCTED EMISSIONS



WTD 2015.12.01  
PSA-ESCI 2015.07.01, EmiR5 2015.11.06

## RESULTS - Run #8

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.165	29.3	20.4	49.7	65.2	-15.5
0.150	28.1	20.4	48.5	66.0	-17.5
0.254	18.5	20.3	38.8	61.6	-22.8
0.370	13.7	20.2	33.9	58.5	-24.6
3.299	9.7	20.3	30.0	56.0	-26.0
4.996	9.0	20.5	29.5	56.0	-26.5
3.515	9.0	20.4	29.4	56.0	-26.6
3.444	8.9	20.3	29.2	56.0	-26.8
3.258	8.9	20.3	29.2	56.0	-26.8
4.769	8.5	20.5	29.0	56.0	-27.0
0.456	9.4	20.2	29.6	56.8	-27.2
4.840	8.3	20.5	28.8	56.0	-27.2
4.683	8.3	20.5	28.8	56.0	-27.2
0.825	8.4	20.2	28.6	56.0	-27.4
4.899	8.1	20.5	28.6	56.0	-27.4
3.470	8.2	20.3	28.5	56.0	-27.5
4.944	8.0	20.5	28.5	56.0	-27.5
4.474	7.7	20.5	28.2	56.0	-27.8
4.108	7.6	20.5	28.1	56.0	-27.9
4.075	7.6	20.5	28.1	56.0	-27.9
8.828	11.3	20.7	32.0	60.0	-28.0
4.631	7.3	20.5	27.8	56.0	-28.2
8.899	11.1	20.7	31.8	60.0	-28.2
8.921	11.0	20.7	31.7	60.0	-28.3
3.847	7.2	20.4	27.6	56.0	-28.4
3.623	7.2	20.4	27.6	56.0	-28.4

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.165	29.3	20.4	49.7	55.2	-5.5
0.150	28.1	20.4	48.5	56.0	-7.5
0.254	18.5	20.3	38.8	51.6	-12.8
0.370	13.7	20.2	33.9	48.5	-14.6
3.299	9.7	20.3	30.0	46.0	-16.0
4.996	9.0	20.5	29.5	46.0	-16.5
3.515	9.0	20.4	29.4	46.0	-16.6
3.444	8.9	20.3	29.2	46.0	-16.8
3.258	8.9	20.3	29.2	46.0	-16.8
4.769	8.5	20.5	29.0	46.0	-17.0
0.456	9.4	20.2	29.6	46.8	-17.2
4.840	8.3	20.5	28.8	46.0	-17.2
4.683	8.3	20.5	28.8	46.0	-17.2
0.825	8.4	20.2	28.6	46.0	-17.4
4.899	8.1	20.5	28.6	46.0	-17.4
3.470	8.2	20.3	28.5	46.0	-17.5
4.944	8.0	20.5	28.5	46.0	-17.5
4.474	7.7	20.5	28.2	46.0	-17.8
4.108	7.6	20.5	28.1	46.0	-17.9
4.075	7.6	20.5	28.1	46.0	-17.9
8.828	11.3	20.7	32.0	50.0	-18.0
4.631	7.3	20.5	27.8	46.0	-18.2
8.899	11.1	20.7	31.8	50.0	-18.2
8.921	11.0	20.7	31.7	50.0	-18.3
3.847	7.2	20.4	27.6	46.0	-18.4
3.623	7.2	20.4	27.6	46.0	-18.4

## CONCLUSION

Pass

Tested By

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

## MODES OF OPERATION

Transmitting 802.11 - low channel (2412 MHz), mid channel (2437 MHz), and high channel (2462 MHz); 1 Mbps, 6 Mbps, 11 Mbps, 36 Mbps, 54 Mbps, MCS0, and MCS7 data rates.

## POWER SETTINGS INVESTIGATED

110VAC/60Hz

## CONFIGURATIONS INVESTIGATED

DGII0152 - 1

## FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz
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## SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	10/21/2015	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	LFN	10/21/2015	12 mo
Attenuator	Fairview Microwave	SA18E-20	TWZ	10/21/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	9/18/2015	12 mo
Cable	Northwest EMC	18-26GHz Standard Gain Horn Cable	MNP	9/18/2015	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	0 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	12/7/2015	12 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	12/7/2015	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	3/2/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	3/2/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	3/10/2015	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	6/3/2014	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	12/10/2015	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	12/7/2015	12 mo
Antenna - Biconilog	ETS Lindgren	3142D	AXO	12/11/2015	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2015	12 mo

## MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0



## TEST DESCRIPTION

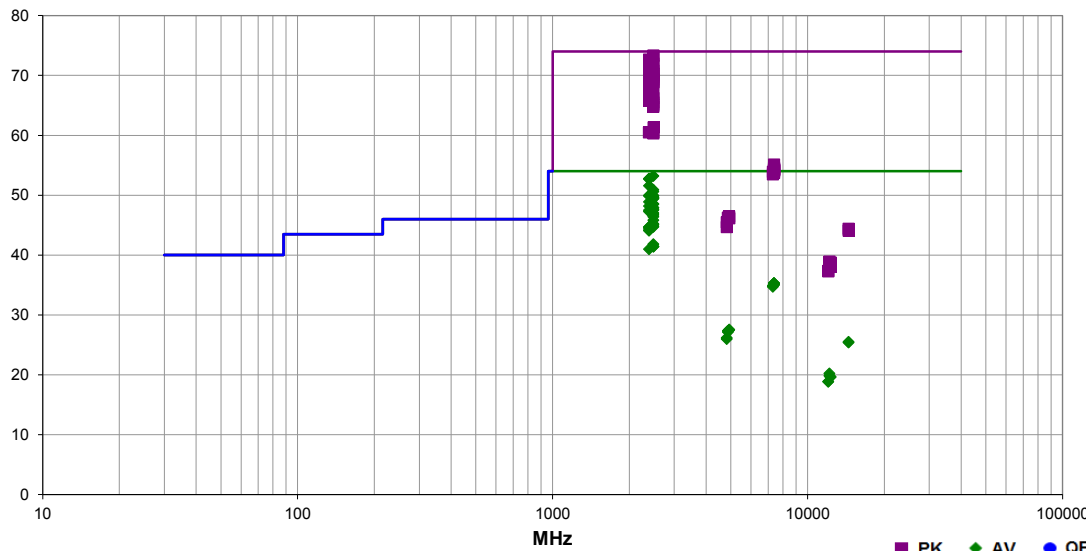
The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

## SPURIOUS RADIATED EMISSIONS

Work Order:	DGI0152	Date:	01/04/16	
Project:	None	Temperature:	22.5 °C	
Job Site:	MN05	Humidity:	19.2% RH	
Serial Number:	UUT #7 (55001769-1 rev. 1P)	Barometric Pres.:	1005 mbar	
EUT:		Sigma Pumps Gen IV 802.11abgn Module		
Configuration:	1			
Customer:	Digi International Inc			
Attendees:	Slava Gehkt			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting 802.11 - low channel (2412 MHz), mid channel (2437 MHz), and high channel (2462 MHz); 1 Mbps, 6 Mbps, 11 Mbps, 36 Mbps, 54 Mbps, MCS0, and MCS7 data rates.			
Deviations:	None			
Comments:	DCCF = -7.7dB. DCCF = 20 log10 (DC), duty cycle = 40.9%			

Test Specifications	Test Method
FCC 15.247:2016	ANSI C63.10:2013

Run #	15	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2484.417	55.2	-1.9	1.0	17.0	0.0	20.0	Horz	PK	0.0	73.3	74.0	-0.7	High ch, 6 Mbps, EUT on side, pwr 18
2483.833	55.2	-1.9	1.0	17.0	0.0	20.0	Horz	PK	0.0	73.3	74.0	-0.7	High ch, 6 Mbps, EUT on side, pwr 16
2483.550	42.8	-1.9	1.2	346.0	-7.7	20.0	Horz	AV	0.0	53.2	54.0	-0.8	High ch, MCS0, EUT on side, pwr 26
2389.958	42.7	-2.2	1.1	355.9	-7.7	20.0	Horz	AV	0.0	52.8	54.0	-1.2	Low ch, MCS7, EUT on side, pwr 16
2389.942	42.6	-2.2	1.0	351.9	-7.7	20.0	Horz	AV	0.0	52.7	54.0	-1.3	Low ch, 36 Mbps, EUT on side, pwr 26
2389.983	54.9	-2.2	1.0	351.9	0.0	20.0	Horz	PK	0.0	72.7	74.0	-1.3	Low ch, 36 Mbps, EUT on side, pwr 26
2484.092	53.9	-1.9	1.4	99.0	0.0	20.0	Vert	PK	0.0	72.0	74.0	-2.0	High ch, 6 Mbps, EUT horz, pwr 14
2389.817	54.1	-2.2	1.1	355.9	0.0	20.0	Horz	PK	0.0	71.9	74.0	-2.1	Low ch, MCS7, EUT on side, pwr 12
2389.992	54.1	-2.2	1.0	234.0	0.0	20.0	Horz	PK	0.0	71.9	74.0	-2.1	Low ch, 54 Mbps, EUT on side, pwr 26
2484.583	53.5	-1.9	1.0	351.0	0.0	20.0	Horz	PK	0.0	71.6	74.0	-2.4	High ch, 6 Mbps, EUT on side, pwr 14
2389.975	41.5	-2.2	1.0	234.0	-7.7	20.0	Horz	AV	0.0	51.6	54.0	-2.4	Low ch, 54 Mbps, EUT on side, pwr 26
2389.967	53.7	-2.2	1.0	4.1	0.0	20.0	Horz	PK	0.0	71.5	74.0	-2.5	Low ch, MCS0, EUT on side, pwr 14
2389.908	53.5	-2.2	1.1	355.9	0.0	20.0	Horz	PK	0.0	71.3	74.0	-2.7	Low ch, MCS7, EUT on side, pwr 14
2483.533	40.5	-1.9	1.0	351.0	-7.7	20.0	Horz	AV	0.0	50.9	54.0	-3.1	High ch, 6 Mbps, EUT on side, pwr 14
2483.650	52.7	-1.9	1.0	218.0	0.0	20.0	Horz	PK	0.0	70.8	74.0	-3.2	High ch, 6 Mbps, EUT on side, pwr 23
2483.517	40.2	-1.9	1.0	8.1	-7.7	20.0	Horz	AV	0.0	50.6	54.0	-3.4	High ch, 6 Mbps, EUT on side, pwr 20
2484.667	52.2	-1.9	1.0	10.0	0.0	20.0	Vert	PK	0.0	70.3	74.0	-3.7	High ch, 6 Mbps, EUT on side, pwr 14
2484.258	52.2	-1.9	1.0	347.0	0.0	20.0	Horz	PK	0.0	70.3	74.0	-3.7	High ch, 6 Mbps, EUT on side, pwr 14
2389.867	52.5	-2.2	1.3	353.0	0.0	20.0	Horz	PK	0.0	70.3	74.0	-3.7	Low ch, MCS0, EUT on side, pwr 12
2483.542	51.9	-1.9	1.0	151.0	0.0	20.0	Horz	PK	0.0	70.0	74.0	-4.0	High ch, 6 Mbps, EUT vert, pwr 14
2390.000	39.9	-2.2	1.1	355.9	-7.7	20.0	Horz	AV	0.0	50.0	54.0	-4.0	Low ch, MCS7, EUT on side, pwr 12
2483.508	39.5	-1.9	1.0	64.0	-7.7	20.0	Vert	AV	0.0	49.9	54.0	-4.1	High ch, 6 Mbps, EUT vert, pwr 14
2483.500	39.5	-1.9	1.0	218.0	-7.7	20.0	Horz	AV	0.0	49.9	54.0	-4.1	High ch, 6 Mbps, EUT on side, pwr 23
2389.950	39.8	-2.2	1.1	355.9	-7.7	20.0	Horz	AV	0.0	49.9	54.0	-4.1	Low ch, MCS7, EUT on side, pwr 14
2483.567	51.6	-1.9	1.0	350.0	0.0	20.0	Horz	PK	0.0	69.7	74.0	-4.3	High ch, 36 Mbps, EUT on side, pwr 14
2483.517	39.2	-1.9	1.0	61.0	-7.7	20.0	Horz	AV	0.0	49.6	54.0	-4.4	High ch, 6 Mbps, EUT horz, pwr 14
2483.517	39.1	-1.9	1.0	10.0	-7.7	20.0	Vert	AV	0.0	49.5	54.0	-4.5	High ch, 6 Mbps, EUT on side, pwr 14
2483.500	39.1	-1.9	1.0	17.0	-7.7	20.0	Horz	AV	0.0	49.5	54.0	-4.5	High ch, 6 Mbps, EUT on side, pwr 18
2483.525	39.0	-1.9	1.0	151.0	-7.7	20.0	Horz	AV	0.0	49.4	54.0	-4.6	High ch, 6 Mbps, EUT vert, pwr 14
2483.525	51.2	-1.9	1.0	353.0	0.0	20.0	Horz	PK	0.0	69.3	74.0	-4.7	High ch, 36 Mbps, EUT on side, pwr 26
2389.908	51.5	-2.2	1.0	0.0	0.0	20.0	Horz	PK	0.0	69.3	74.0	-4.7	Low ch, 54 Mbps, EUT on side, pwr 14
2389.833	51.3	-2.2	1.0	358.9	0.0	20.0	Horz	PK	0.0	69.1	74.0	-4.9	Low ch, 36 Mbps, EUT on side, pwr 14
2483.983	50.8	-1.9	1.0	4.1	0.0	20.0	Horz	PK	0.0	68.9	74.0	-5.1	High ch, MCS0, EUT on side, pwr 14
2483.675	50.8	-1.9	1.0	8.1	0.0	20.0	Horz	PK	0.0	68.9	74.0	-5.1	High ch, 36 Mbps, EUT on side, pwr 20
2389.967	38.8	-2.2	1.0	358.9	-7.7	20.0	Horz	AV	0.0	48.9	54.0	-5.1	Low ch, 36 Mbps, EUT on side, pwr 14
2483.575	50.7	-1.9	1.0	234.0	0.0	20.0	Horz	PK	0.0	68.8	74.0	-5.2	High ch, 6 Mbps, EUT on side, pwr 26

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.517	38.1	-1.9	1.0	353.0	-7.7	20.0	Horz	AV	0.0	48.5	54.0	-5.5	High ch, 36 Mbps, EUT on side, pwr 26
2483.508	38.1	-1.9	1.0	350.0	-7.7	20.0	Horz	AV	0.0	48.5	54.0	-5.5	High ch, 36 Mbps, EUT on side, pwr 18
2390.000	38.1	-2.2	1.0	4.1	-7.7	20.0	Horz	AV	0.0	48.2	54.0	-5.8	Low ch, MCS0, EUT on side, pwr 14
2483.567	37.5	-1.9	1.0	234.0	-7.7	20.0	Horz	AV	0.0	47.9	54.0	-6.1	High ch, 6 Mbps, EUT on side, pwr 26
2483.500	37.5	-1.9	1.0	17.0	-7.7	20.0	Horz	AV	0.0	47.9	54.0	-6.1	High ch, 6 Mbps, EUT on side, pwr 16
2389.933	50.0	-2.2	1.1	355.9	0.0	20.0	Horz	PK	0.0	67.8	74.0	-6.2	Low ch, MCS7, EUT on side, pwr 10
2483.500	37.2	-1.9	1.0	8.1	-7.7	20.0	Horz	AV	0.0	47.6	54.0	-6.4	High ch, 36 Mbps, EUT on side, pwr 20
2389.950	37.4	-2.2	1.0	0.0	-7.7	20.0	Horz	AV	0.0	47.5	54.0	-6.5	Low ch, 54 Mbps, EUT on side, pwr 14
2389.925	37.2	-2.2	1.3	353.0	-7.7	20.0	Horz	AV	0.0	47.3	54.0	-6.7	Low ch, MCS0, EUT on side, pwr 12
2389.717	49.3	-2.2	1.3	353.0	0.0	20.0	Horz	PK	0.0	67.1	74.0	-6.9	Low ch, MCS0, EUT on side, pwr 10
2483.508	36.6	-1.9	1.0	4.1	-7.7	20.0	Horz	AV	0.0	47.0	54.0	-7.0	High ch, MCS0, EUT on side, pwr 14
2483.658	48.8	-1.9	1.0	339.0	0.0	20.0	Horz	PK	0.0	66.9	74.0	-7.1	High ch, 36 Mbps, EUT on side, pwr 16
2483.558	36.3	-1.9	1.4	99.0	-7.7	20.0	Vert	AV	0.0	46.7	54.0	-7.3	High ch, 6 Mbps, EUT horz, pwr 14
2483.625	36.0	-1.9	1.0	339.0	-7.7	20.0	Horz	AV	0.0	46.4	54.0	-7.6	High ch, 6 Mbps, EUT on side, pwr 16
2484.383	48.1	-1.9	1.2	350.0	0.0	20.0	Horz	PK	0.0	66.2	74.0	-7.8	High ch, MCS0, EUT on side, pwr 12
2389.908	48.4	-2.2	1.0	358.9	0.0	20.0	Horz	PK	0.0	66.2	74.0	-7.8	Low ch, 6 Mbps, EUT on side, pwr 12
2389.792	48.1	-2.2	1.0	234.0	0.0	20.0	Horz	PK	0.0	65.9	74.0	-8.1	Low ch, 54 Mbps, EUT on side, pwr 12
2483.575	35.4	-1.9	1.0	347.0	-7.7	20.0	Horz	AV	0.0	45.8	54.0	-8.2	High ch, 6 Mbps, EUT on side, pwr 14
2389.858	48.0	-2.2	1.0	234.0	0.0	20.0	Horz	PK	0.0	65.8	74.0	-8.2	Low ch, 36 Mbps, EUT on side, pwr 12
2483.633	47.4	-1.9	1.1	0.0	0.0	20.0	Horz	PK	0.0	65.5	74.0	-8.5	High ch, 54 Mbps, EUT on side, pwr 14
2483.508	34.8	-1.9	1.0	351.0	-7.7	20.0	Horz	AV	0.0	45.2	54.0	-8.8	High ch, 36 Mbps, EUT on side, pwr 14
2483.825	47.0	-1.9	1.0	9.0	0.0	20.0	Horz	PK	0.0	65.1	74.0	-8.9	High ch, MCS7, EUT on side, pwr 14
2483.683	34.7	-1.9	1.0	9.0	-7.7	20.0	Horz	AV	0.0	45.1	54.0	-8.9	High ch, MCS7, EUT on side, pwr 14
2483.558	46.7	-1.9	1.0	351.0	0.0	20.0	Horz	PK	0.0	64.8	74.0	-9.2	High ch, 36 Mbps, EUT on side, pwr 14
2483.517	34.4	-1.9	1.2	350.0	-7.7	20.0	Horz	AV	0.0	44.8	54.0	-9.2	High ch, MCS0, EUT on side, pwr 12
2483.525	34.3	-1.9	1.1	0.0	-7.7	20.0	Horz	AV	0.0	44.7	54.0	-9.3	High ch, 54 Mbps, EUT on side, pwr 14
2389.917	34.6	-2.2	1.0	234.0	-7.7	20.0	Horz	AV	0.0	44.7	54.0	-9.3	Low ch, 36 Mbps, EUT on side, pwr 12
2390.000	34.6	-2.2	1.0	358.9	-7.7	20.0	Horz	AV	0.0	44.7	54.0	-9.3	Low ch, 6 Mbps, EUT on side, pwr 12
2389.992	34.4	-2.2	1.0	234.0	-7.7	20.0	Horz	AV	0.0	44.5	54.0	-9.5	Low ch, 54 Mbps, EUT on side, pwr 12
2389.992	34.1	-2.2	1.3	353.0	-7.7	20.0	Horz	AV	0.0	44.2	54.0	-9.8	Low ch, MCS0, EUT on side, pwr 10
2389.975	34.0	-2.2	1.1	355.9	-7.7	20.0	Horz	AV	0.0	44.1	54.0	-9.9	Low ch, MCS7, EUT on side, pwr 10
2486.033	31.4	-1.9	1.0	358.9	-7.7	20.0	Horz	AV	0.0	41.8	54.0	-12.2	High ch, 11 Mbps, EUT on side, pwr 26
2486.783	31.0	-1.9	1.0	143.0	-7.7	20.0	Horz	AV	0.0	41.4	54.0	-12.6	High ch, 1 Mbps, EUT on side, pwr 26
2483.642	31.0	-1.9	1.0	93.0	-7.7	20.0	Horz	AV	0.0	41.4	54.0	-12.6	High ch, 6 Mbps, EUT on side, pwr 10
2487.108	43.2	-1.9	1.0	358.9	0.0	20.0	Horz	PK	0.0	61.3	74.0	-12.7	High ch, 11 Mbps, EUT on side, pwr 26
2388.467	30.9	-2.2	1.0	242.0	-7.7	20.0	Horz	AV	0.0	41.0	54.0	-13.0	Low ch, 11 Mbps, EUT on side, pwr 26
2485.267	42.4	-1.9	1.0	143.0	0.0	20.0	Horz	PK	0.0	60.5	74.0	-13.5	High ch, 1 Mbps, EUT on side, pwr 26
2385.000	42.7	-2.2	1.0	242.0	0.0	20.0	Horz	PK	0.0	60.5	74.0	-13.5	Low ch, 11 Mbps, EUT on side, pwr 26
2485.733	42.2	-1.9	1.0	93.0	0.0	20.0	Horz	PK	0.0	60.3	74.0	-13.7	High ch, 6 Mbps, EUT on side, pwr 10
2483.500	79.5	-2.0	1.1	354.9	-7.7	20.0	Horz	AV	0.0	47.5	54.0	-14.2	High ch, 6 Mbps, EUT on side, pwr 16, MD
7385.417	29.0	14.0	1.0	253.0	-7.7	0.0	Horz	AV	0.0	35.3	54.0	-18.7	High ch, 1 Mbps, EUT horz, pwr 14
7387.975	29.0	14.0	1.0	136.0	-7.7	0.0	Horz	AV	0.0	35.3	54.0	-18.7	High ch, 6 Mbps, EUT horz, pwr 14
7385.792	28.9	14.0	1.0	168.0	-7.7	0.0	Horz	AV	0.0	35.2	54.0	-18.8	High ch, 1 Mbps, EUT on side, pwr 14
7386.283	28.9	14.0	1.0	126.0	-7.7	0.0	Horz	AV	0.0	35.2	54.0	-18.8	High ch, 1 Mbps, EUT vert, pwr 14
7386.333	28.8	14.0	3.4	279.0	-7.7	0.0	Vert	AV	0.0	35.1	54.0	-18.9	High ch, 1 Mbps, EUT vert, pwr 14
7386.442	41.1	14.0	1.0	136.0	0.0	0.0	Horz	PK	0.0	55.1	74.0	-18.9	High ch, MCS7, EUT horz, pwr 14
7386.458	28.8	14.0	1.0	71.0	-7.7	0.0	Vert	AV	0.0	35.1	54.0	-18.9	High ch, 1 Mbps, EUT horz, pwr 14
7387.383	28.8	14.0	1.0	136.0	-7.7	0.0	Horz	AV	0.0	35.1	54.0	-18.9	High ch, 11 Mbps, EUT horz, pwr 14
7387.583	28.8	14.0	1.0	136.0	-7.7	0.0	Horz	AV	0.0	35.1	54.0	-18.9	High ch, 54 Mbps, EUT horz, pwr 14
7387.558	28.8	14.0	1.0	136.0	-7.7	0.0	Horz	AV	0.0	35.1	54.0	-18.9	High ch, MCS0, EUT horz, pwr 14
7387.683	28.8	14.0	1.0	136.0	-7.7	0.0	Horz	AV	0.0	35.1	54.0	-18.9	High ch, 36 Mbps, EUT horz, pwr 14
7387.808	28.8	14.0	1.0	136.0	-7.7	0.0	Horz	AV	0.0	35.1	54.0	-18.9	High ch, MCS7, EUT horz, pwr 14
7388.025	28.7	14.0	1.0	297.0	-7.7	0.0	Vert	AV	0.0	35.0	54.0	-19.0	High ch, 1 Mbps, EUT on side, pwr 14
7313.000	28.5	14.1	3.8	89.0	-7.7	0.0	Vert	AV	0.0	34.9	54.0	-19.1	Mid ch, 1 Mbps, EUT horz, pwr 14
7308.975	28.3	14.1	1.0	189.0	-7.7	0.0	Horz	AV	0.0	34.7	54.0	-19.3	Mid ch, 1 Mbps, EUT horz, pwr 14
7386.125	40.6	14.0	1.0	126.0	0.0	0.0	Horz	PK	0.0	54.6	74.0	-19.4	High ch, 1 Mbps, EUT vert, pwr 14
7384.517	40.4	14.0	1.0	136.0	0.0	0.0	Horz	PK	0.0	54.4	74.0	-19.6	High ch, 6 Mbps, EUT horz, pwr 14
7386.317	40.3	14.0	1.0	136.0	0.0	0.0	Horz	PK	0.0	54.3	74.0	-19.7	High ch, 11 Mbps, EUT horz, pwr 14
7386.942	40.3	14.0	1.0	136.0	0.0	0.0	Horz	PK	0.0	54.3	74.0	-19.7	High ch, 54 Mbps, EUT horz, pwr 14
7387.767	40.3	14.0	1.0	136.0	0.0	0.0	Horz	PK	0.0	54.3	74.0	-19.7	High ch, MCS0, EUT horz, pwr 14
7388.300	40.2	14.0	1.0	71.0	0.0	0.0	Vert	PK	0.0	54.2	74.0	-19.8	High ch, 1 Mbps, EUT horz, pwr 14
7385.092	40.1	14.0	1.0	253.0	0.0	0.0	Horz	PK	0.0	54.1	74.0	-19.9	High ch, 1 Mbps, EUT horz, pwr 14
7386.000	40.1	14.0	1.0	168.0	0.0	0.0	Horz	PK	0.0	54.1	74.0	-19.9	High ch, 1 Mbps, EUT on side, pwr 14
7388.367	40.1	14.0	1.0	136.0	0.0	0.0	Horz	PK	0.0	54.1	74.0	-19.9	High ch, 36 Mbps, EUT horz, pwr 14
7383.683	39.9	14.0	3.4	279.0	0.0	0.0	Vert	PK	0.0	53.9	74.0	-20.1	High ch, 1 Mbps, EUT vert, pwr 14
7309.583	39.8	14.1	3.8	89.0	0.0	0.0	Vert	PK	0.0	53.9	74.0	-20.1	Mid ch, 1 Mbps, EUT horz, pwr 14
7387.017	39.7	14.0	1.0	297.0	0.0	0.0	Vert	PK	0.0	53.7	74.0	-20.3	High ch, 1 Mbps, EUT on side, pwr 14
7312.525	39.4	14.1	1.0	189.0	0.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	Mid ch, 1 Mbps, EUT horz, pwr 14
4926.100	29.3	6.0	1.0	265.9	-7.7	0.0	Horz	AV	0.0	27.6	54.0	-26.4	High ch, 1 Mbps, EUT horz, pwr 14
4925.633	29.2	6.0	1.0	193.0	-7.7	0.0	Vert	AV	0.0	27.5	54.0	-26.5	High ch, 1 Mbps, EUT horz, pwr 14
4873.933	29.3	5.7	1.0	160.1	-7.7	0.0	Vert	AV	0.0	27.3	54.0	-26.7	Mid ch, 1 Mbps, EUT horz, pwr 14
4873.975	29.1	5.7	2.3	351.0	-7.7	0.0	Horz	AV	0.0	27.1	54.0	-26.9	Mid ch, 1 Mbps, EUT horz, pwr 14
4925.308	40.5	6.0	1.0	265.9	0.0	0.0	Horz	PK	0.0	46.5	74.0	-27.5	High ch, 1 Mbps, EUT horz, pwr 14
4873.950	40.5	5.7	2.3	351.0	0.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	Mid ch, 1 Mbps, EUT horz, pwr 14
4872.892	40.5	5.7	1.0	160.1	0.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	Mid ch, 1 Mbps, EUT horz, pwr 14
4822.092	28.4	5.5	1.0	81.0	-7.7	0.0	Vert	AV	0.0	26.2	54.0	-27.8	Low ch, 1 Mbps, EUT horz, pwr 14
4925.900	40.2	6.0	1.0	193.0	0.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	High ch, 1 Mbps, EUT horz, pwr 14
4821.992	28.2	5.5	1.0	347.9	-7.7	0.0	Horz	AV	0.0	26.0	54.0	-28.0	Low ch, 1 Mbps, EUT horz, pwr 14
14470.000	25.6	7.6	1.0	311.9	-7.7	0.0	Vert	AV	0.0	25.5	54.0	-28.5	Low ch, 1 Mbps, EUT horz, pwr 14
4821.908	40.0	5.5	1.0	347.9	0.0	0.0	Horz	PK	0.0	45.5	74.0	-28.5	Low ch, 1 Mbps, EUT horz, pwr 14
14470.040	25.5	7.6	1.0	358.0	-7.7	0.0	Horz	AV	0.0	25.4	54.0	-28.6	Low ch, 1 Mbps, EUT horz, pwr 14
4821.942	39.2	5.5	1.0	81.0	0.0	0.0	Vert	PK	0.0	44.7	74.0	-29.3	Low ch, 1 Mbps, EUT horz, pwr 14
14471.220	36.8	7.6	1.0	358.0	0.0	0.0	Horz	PK	0.0	44.4	74.0	-29.6	Low ch, 1 Mbps, EUT horz, pwr 14
14473.920	36.5	7.6	1.0	311.9	0.0	0.0	Vert	PK	0.0	44.1	74.0	-29.9	Low ch, 1 Mbps, EUT horz, pwr 14
12185.980	28.5	-0.6	4.0	22.1	-7.7	0.0	Horz	AV	0.0	20.2	54.0	-33.8	Mid ch, 1 Mbps, EUT horz, pwr 14
12185.410	28.1	-0.6	1.3	199.1	-7.7	0.0	Vert	AV	0.0	19.8	54.0	-34.2	Mid ch, 1 Mbps, EUT horz, pwr 14
12311.340	27.6	-0.2	1.0	167.1	-7.7	0.0	Vert	AV	0.0	19.7	54.0	-34.3	High ch, 1 Mbps, EUT horz, pwr 14
12309.890	27.6	-0.3	1.0	322.9	-7.7	0.0	Horz	AV	0.0				

# DUTY CYCLE

## **TEST DESCRIPTION**

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The manufacturer does not have software to simulate actual usage allowing a measurement of the duty cycle. They specified a duty cycle correction factor of 7.7 dB based on the actual use of the equipment. The manufacturer has provided an attestation that is included in this report.

# OCCUPIED BANDWIDTH

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	RFW	3/10/2015	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	4/20/2015	12

## TEST DESCRIPTION

The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.9% (approximate 26 dB) emission bandwidth (EBW) was also measured at the same time.

The EUT was set to the channels and modes listed in the datasheet. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer.

# OCCUPIED BANDWIDTH

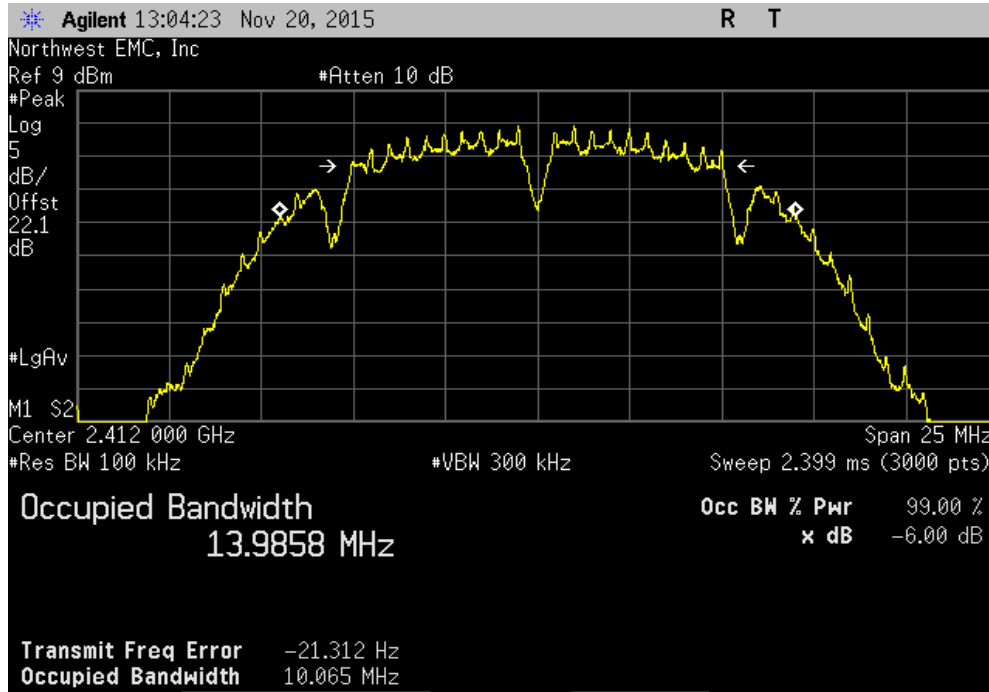


XMR 2015.01.14

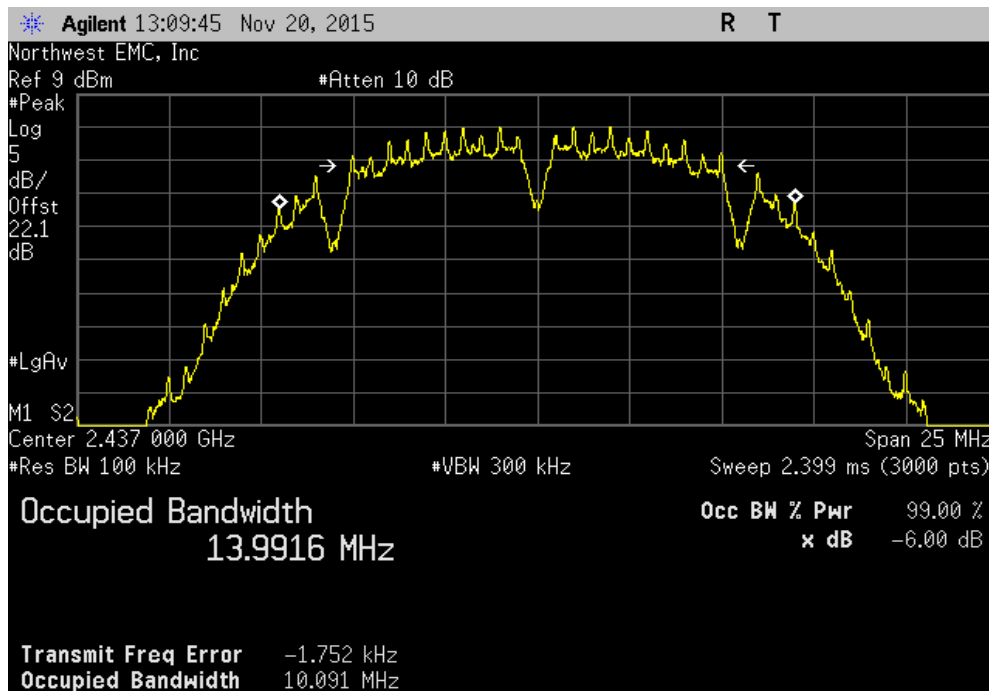
EUT: Sigma Pumps Gen IV 802.11abqn Module		Work Order: DGII0146	
Serial Number: None		Date: 11/20/15	
Customer: Digi International Inc		Temperature: 22.6°C	
Attendees: Slava Gehkt		Humidity: 23%	
Project: None		Barometric Pres.: 994.5	
Tested by: Trevor Buls	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS			
FCC 15.247:2015		Test Method: ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	DGII0152-2	Signature <i>Trevor Buls</i>	
		Value	Limit (>)
2400 MHz - 2483.5 MHz Band			
802.11(b) 1 Mbps			
	Low Channel 1, 2412 MHz	10.065 MHz	500 kHz
	Mid Channel 6, 2437 MHz	10.091 MHz	500 kHz
	High Channel 11, 2462 MHz	10.034 MHz	500 kHz
802.11(b) 11 Mbps			
	Low Channel 1, 2412 MHz	10.046 MHz	500 kHz
	Mid Channel 6, 2437 MHz	9.948 MHz	500 kHz
	High Channel 11, 2462 MHz	9.927 MHz	500 kHz
802.11(g) 6 Mbps			
	Low Channel 1, 2412 MHz	16.521 MHz	500 kHz
	Mid Channel 6, 2437 MHz	16.442 MHz	500 kHz
	High Channel 11, 2462 MHz	16.514 MHz	500 kHz
802.11(g) 36 Mbps			
	Low Channel 1, 2412 MHz	16.495 MHz	500 kHz
	Mid Channel 6, 2437 MHz	16.518 MHz	500 kHz
	High Channel 11, 2462 MHz	16.514 MHz	500 kHz
802.11(g) 54 Mbps			
	Low Channel 1, 2412 MHz	16.487 MHz	500 kHz
	Mid Channel 6, 2437 MHz	16.498 MHz	500 kHz
	High Channel 11, 2462 MHz	16.5 MHz	500 kHz
802.11(n) MCS0			
	Low Channel 1, 2412 MHz	17.673 MHz	500 kHz
	Mid Channel 6, 2437 MHz	17.69 MHz	500 kHz
	High Channel 11, 2462 MHz	17.731 MHz	500 kHz
802.11(n) MCS7			
	Low Channel 1, 2412 MHz	17.717 MHz	500 kHz
	Mid Channel 6, 2437 MHz	17.739 MHz	500 kHz
	High Channel 11, 2462 MHz	17.69 MHz	500 kHz

# OCCUPIED BANDWIDTH

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz						
				Value	Limit	Result
				10.065 MHz	500 kHz	Pass

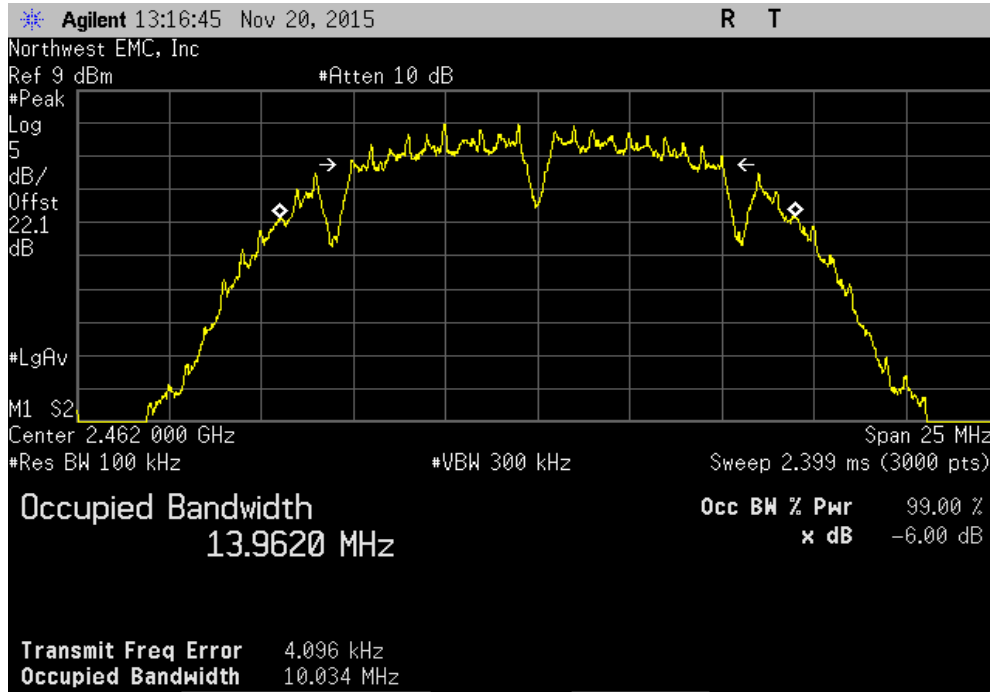


2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz						
				Value	Limit	Result
				10.091 MHz	500 kHz	Pass

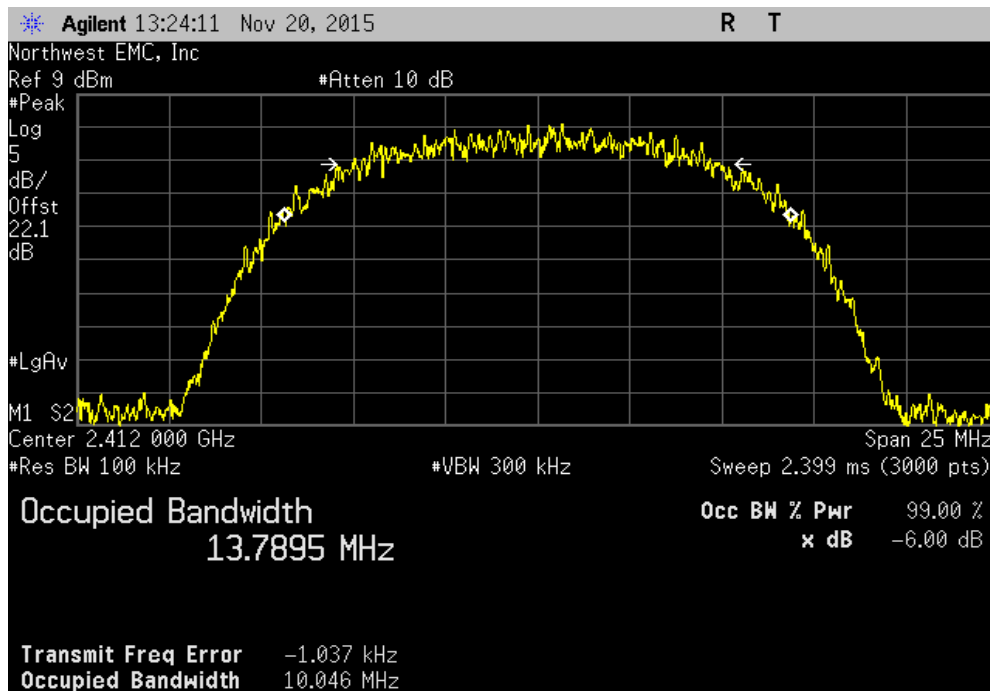


# OCCUPIED BANDWIDTH

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz						
			Value	Limit	Result	
				(>)		
			10.034 MHz	500 kHz	Pass	



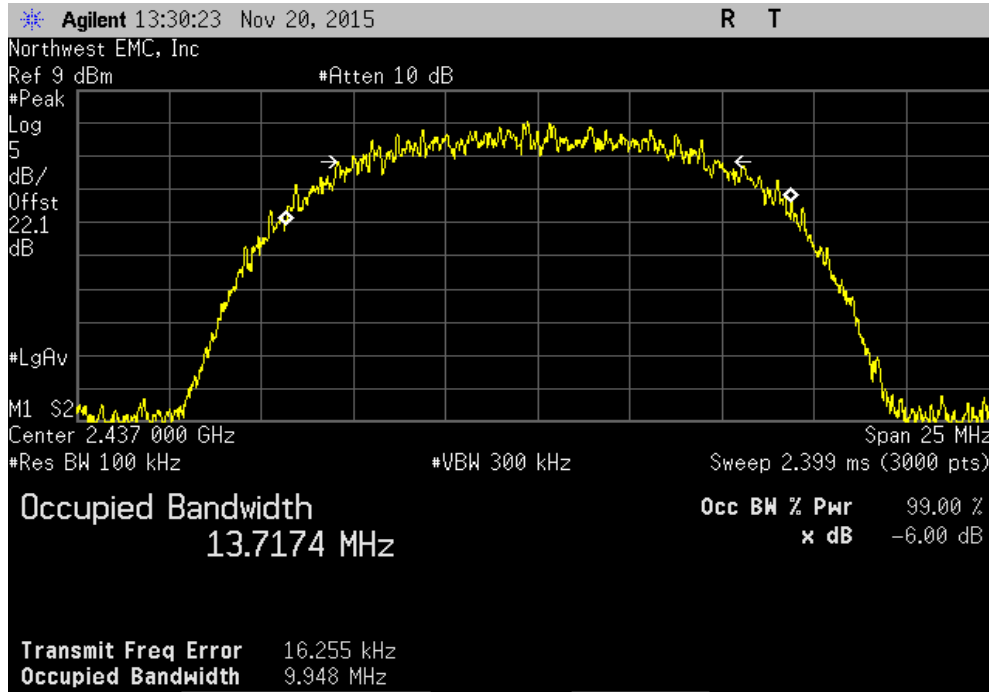
2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz						
			Value	Limit	Result	
				(>)		
			10.046 MHz	500 kHz	Pass	



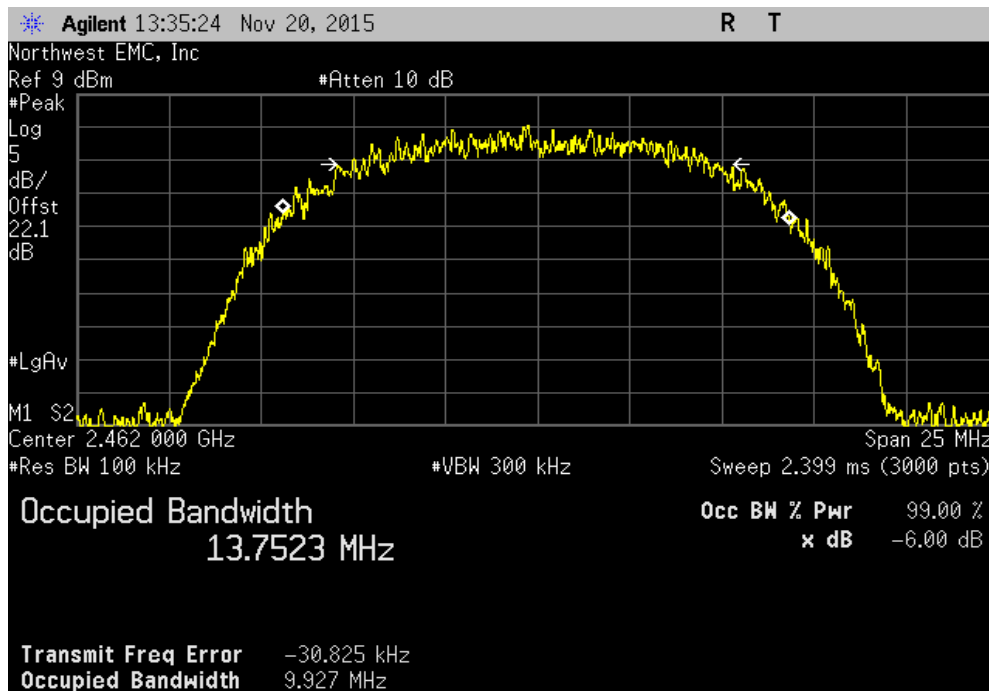


# OCCUPIED BANDWIDTH

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz						
				Value	Limit	Result
					(>)	
				9.948 MHz	500 kHz	Pass

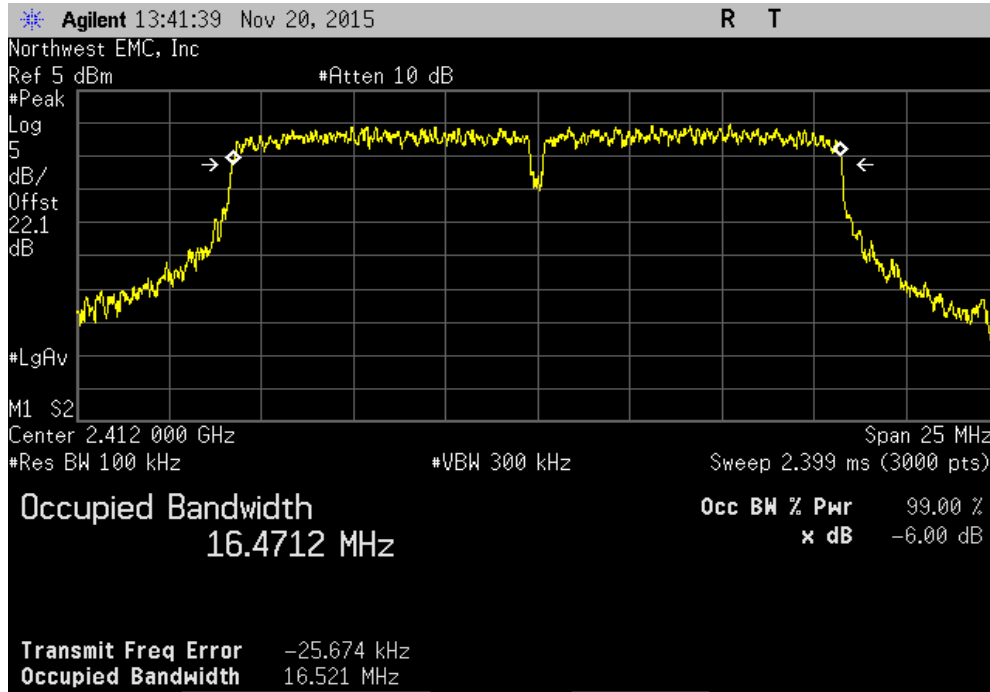


2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz						
				Value	Limit	Result
					(>)	
				9.927 MHz	500 kHz	Pass

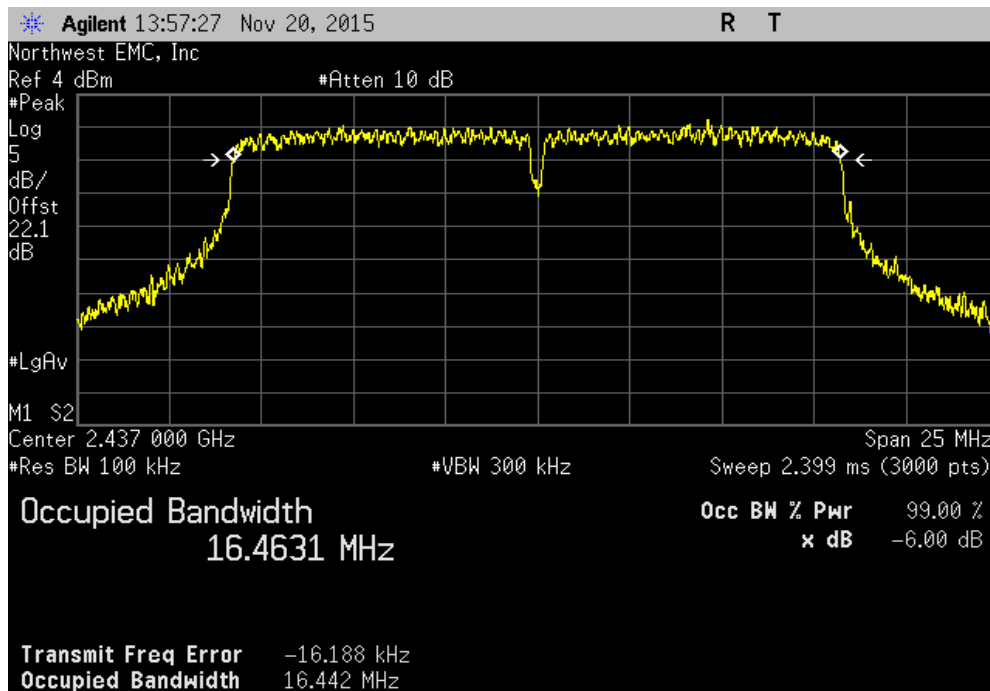


# OCCUPIED BANDWIDTH

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit (>)	Result
	16.521 MHz	500 kHz	Pass

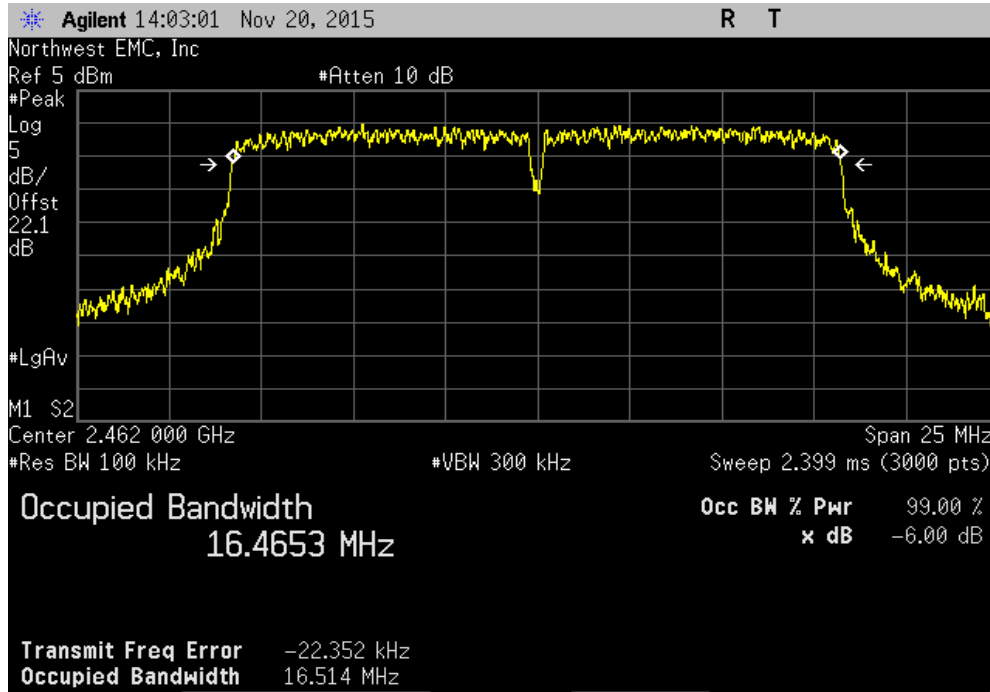


2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit (>)	Result
	16.442 MHz	500 kHz	Pass

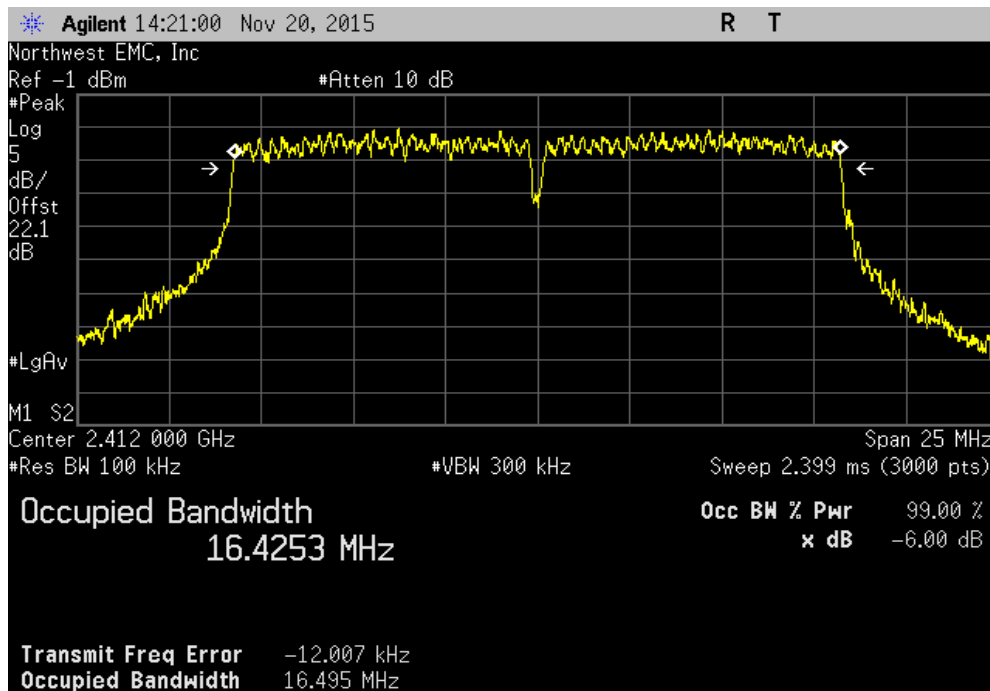


# OCCUPIED BANDWIDTH

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz						
				Value	Limit	Result
				16.514 MHz	500 kHz	Pass

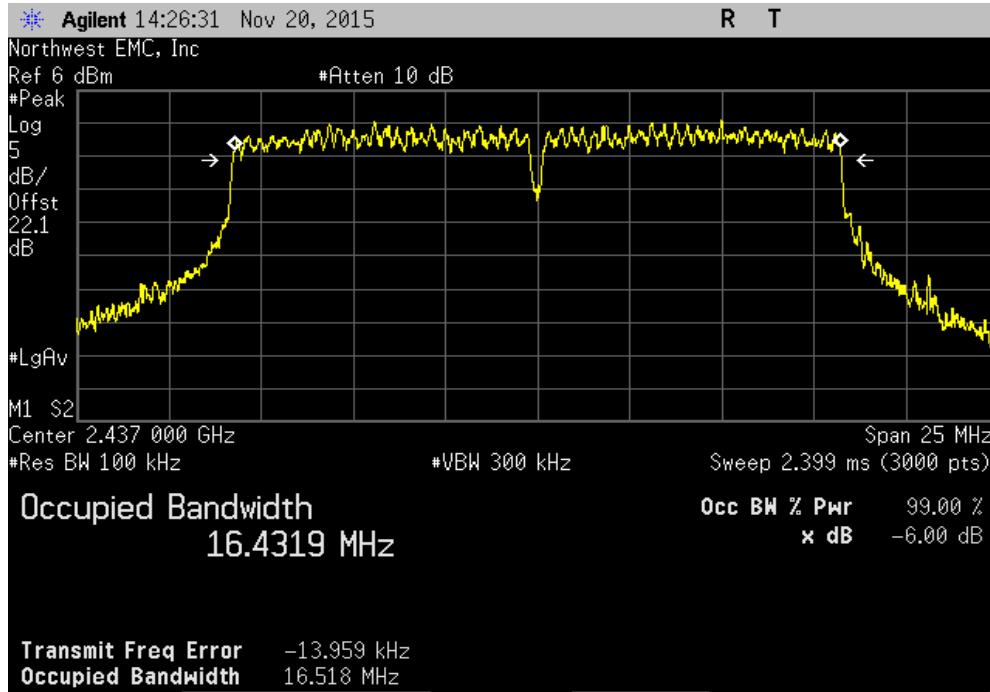


2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz						
				Value	Limit	Result
				16.495 MHz	500 kHz	Pass

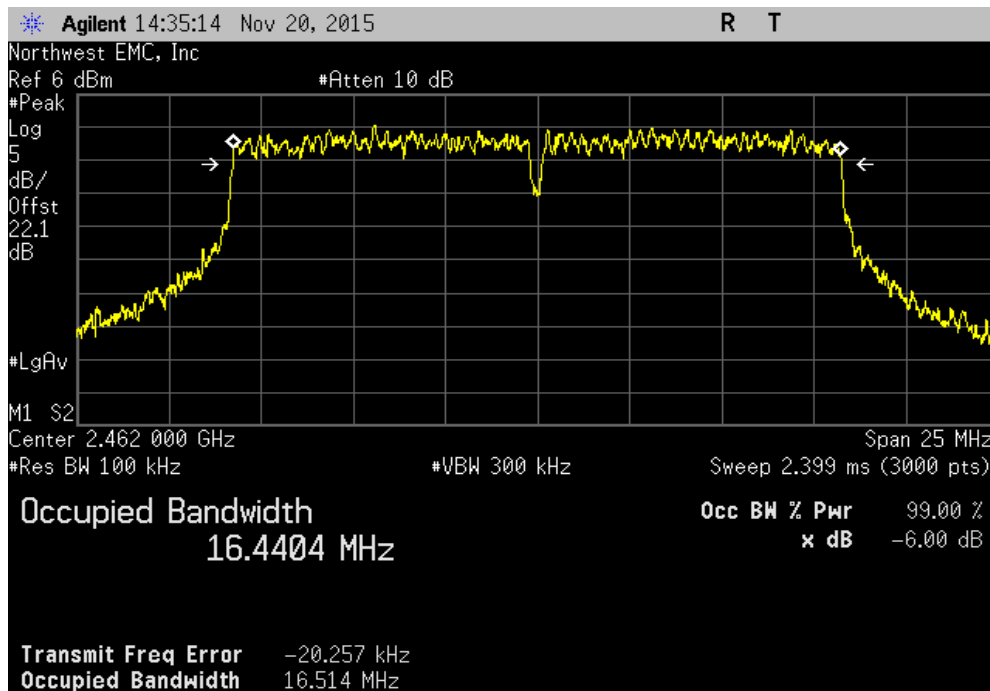


# OCCUPIED BANDWIDTH

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz						
				Value	Limit	Result
				16.518 MHz	500 kHz	Pass

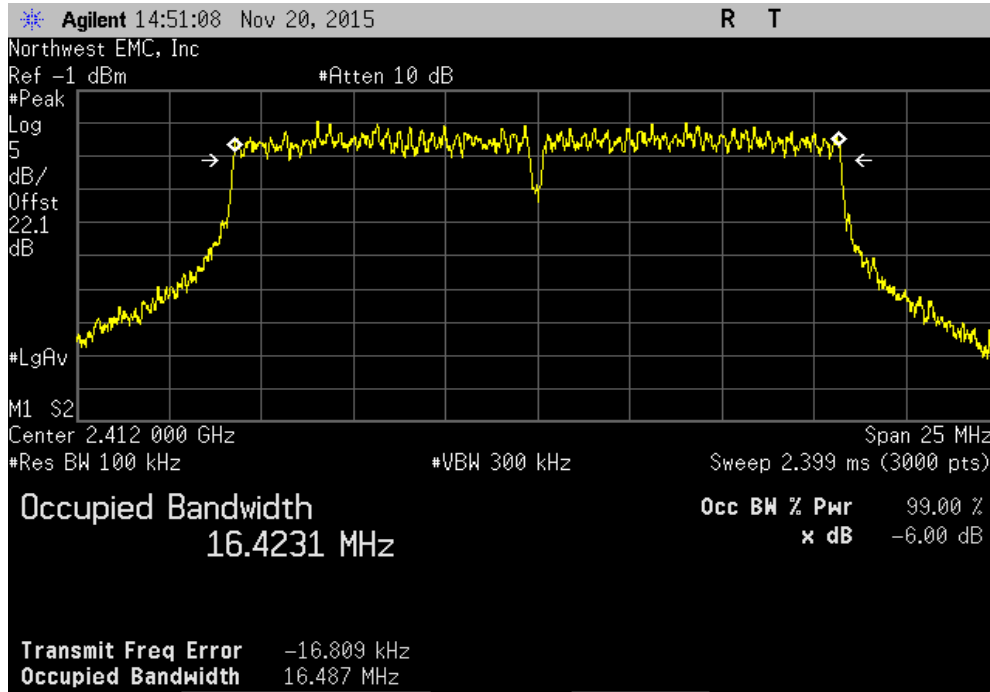


2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz						
				Value	Limit	Result
				16.514 MHz	500 kHz	Pass

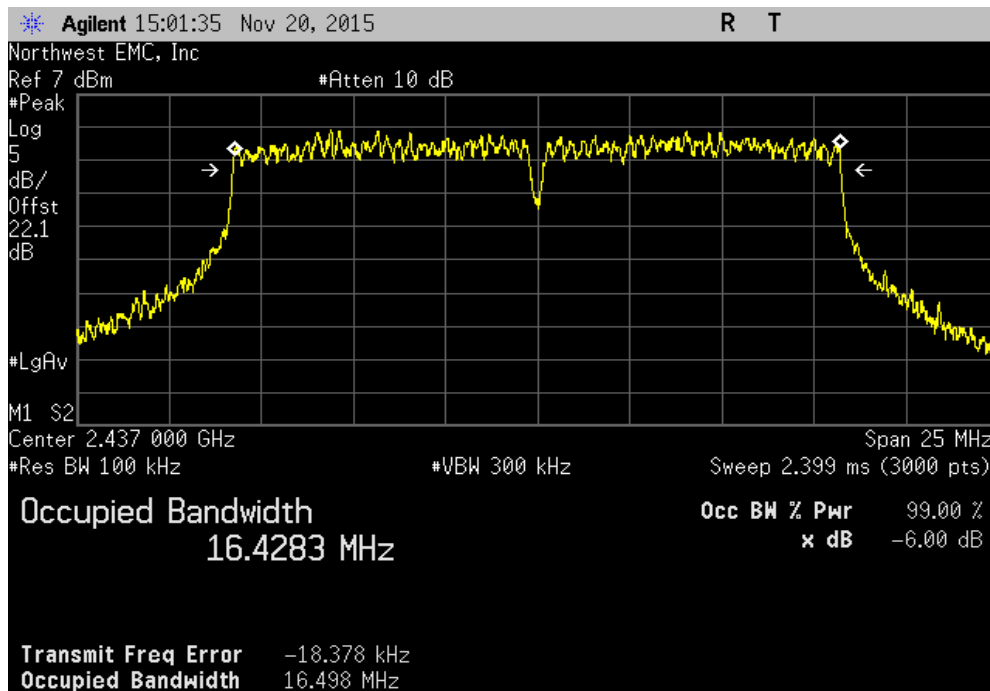


# OCCUPIED BANDWIDTH

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz						
				Value	Limit	Result
				16.487 MHz	500 kHz	Pass

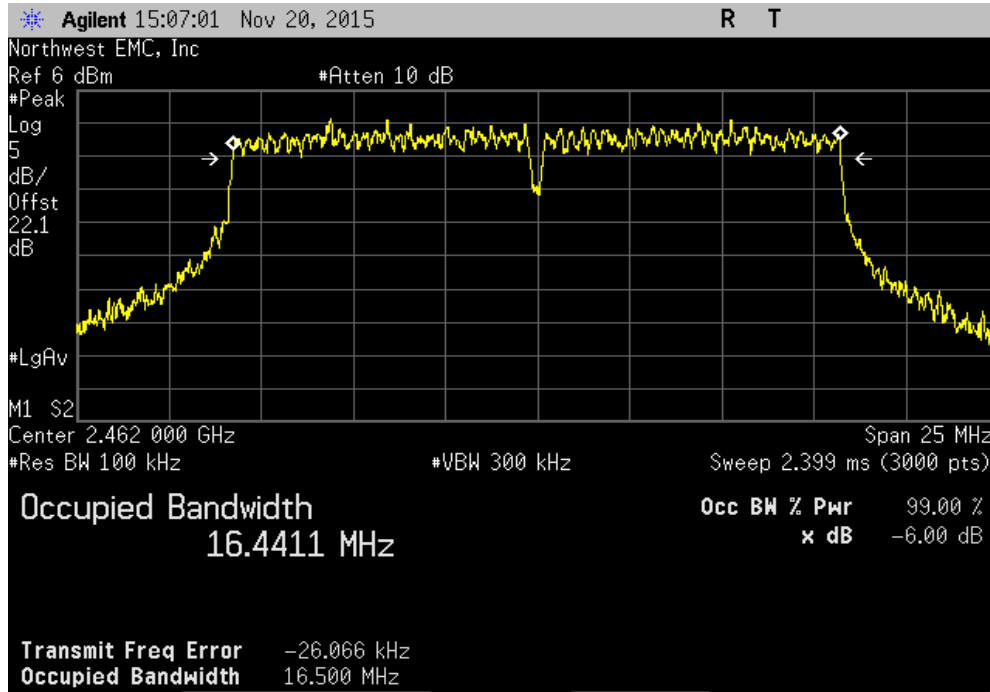


2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz						
				Value	Limit	Result
				16.498 MHz	500 kHz	Pass

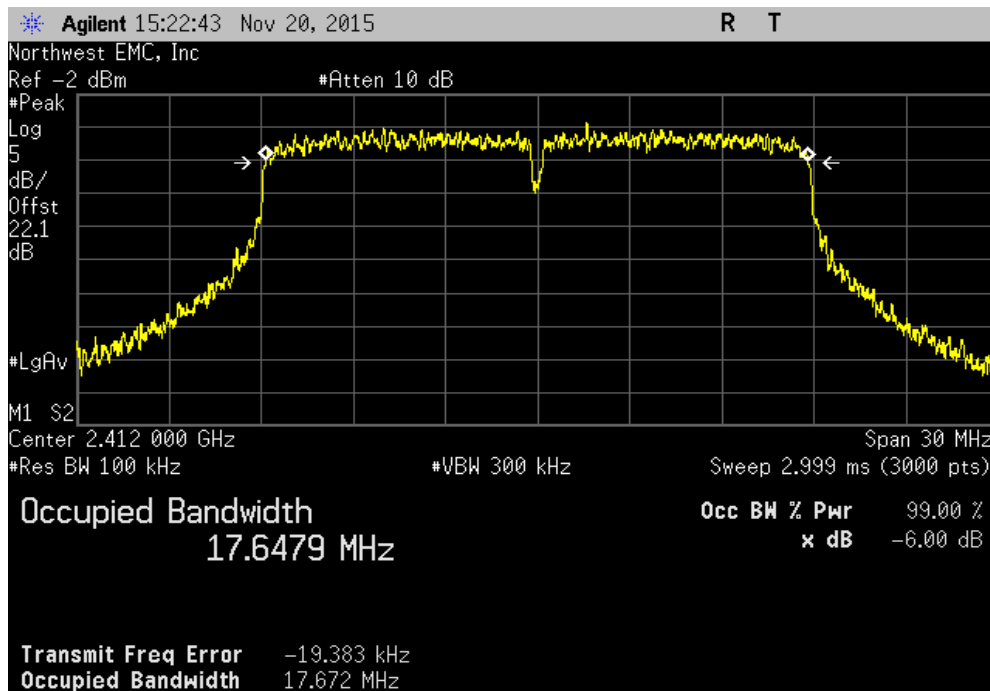


# OCCUPIED BANDWIDTH

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz						
				Value	Limit	Result
				16.5 MHz	500 kHz	Pass

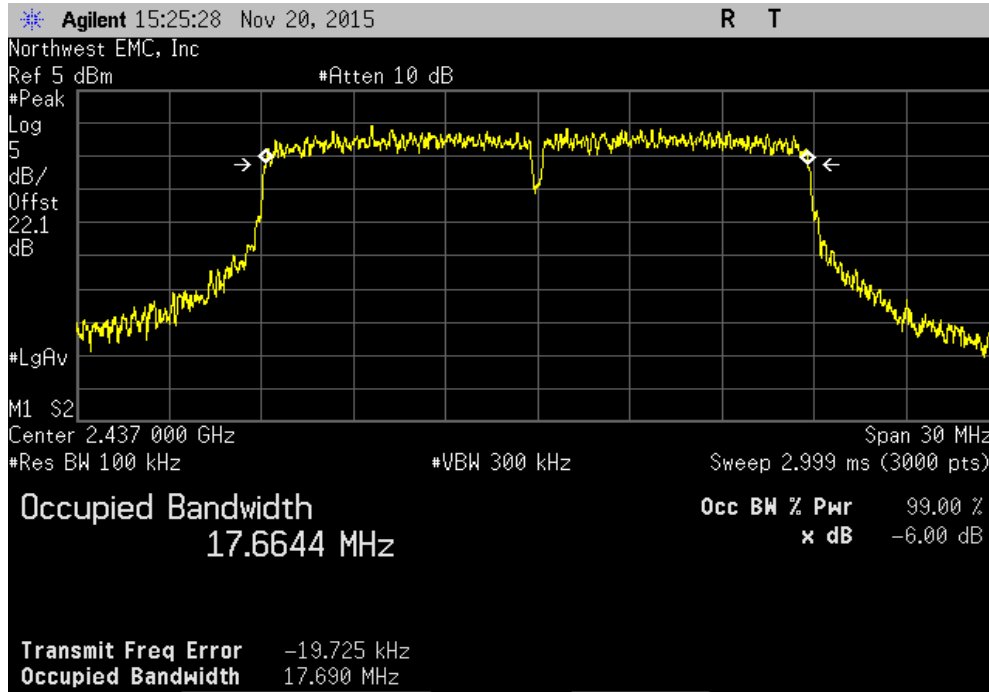


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz						
				Value	Limit	Result
				17.673 MHz	500 kHz	Pass

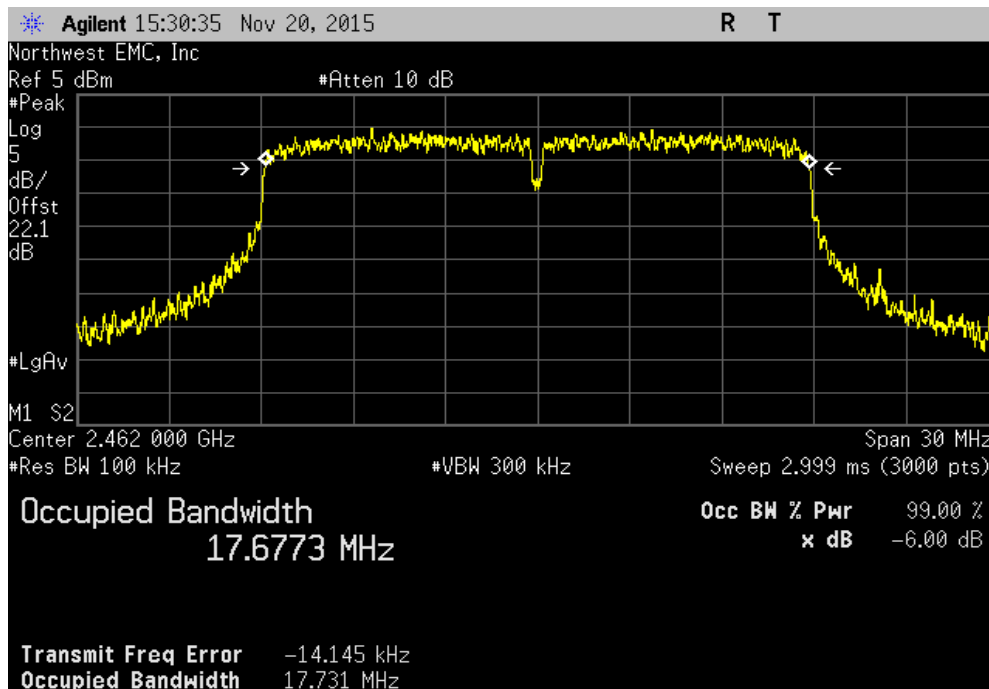


# OCCUPIED BANDWIDTH

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz						
				Value	Limit	Result
				17.69 MHz	500 kHz	Pass

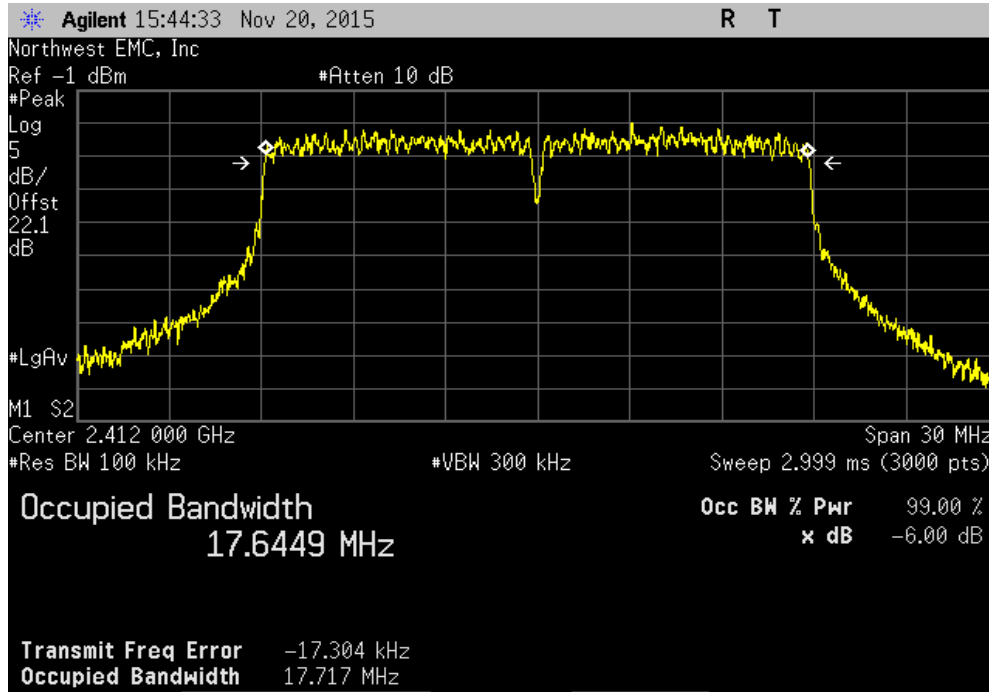


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz						
				Value	Limit	Result
				17.731 MHz	500 kHz	Pass

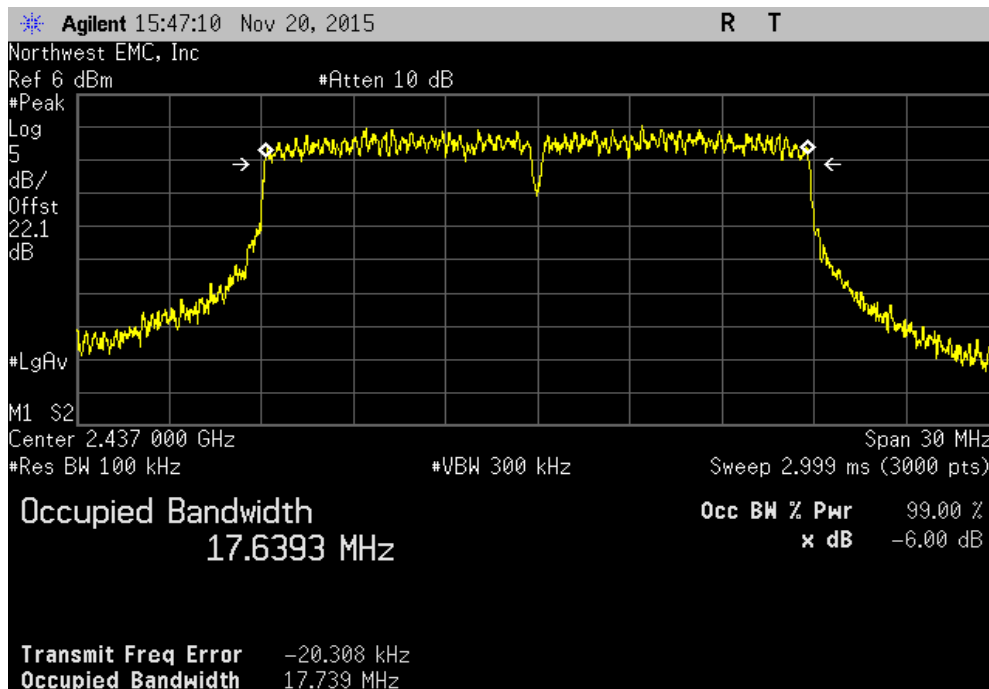


# OCCUPIED BANDWIDTH

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz						
				Value	Limit	Result
				17.717 MHz	500 kHz	Pass



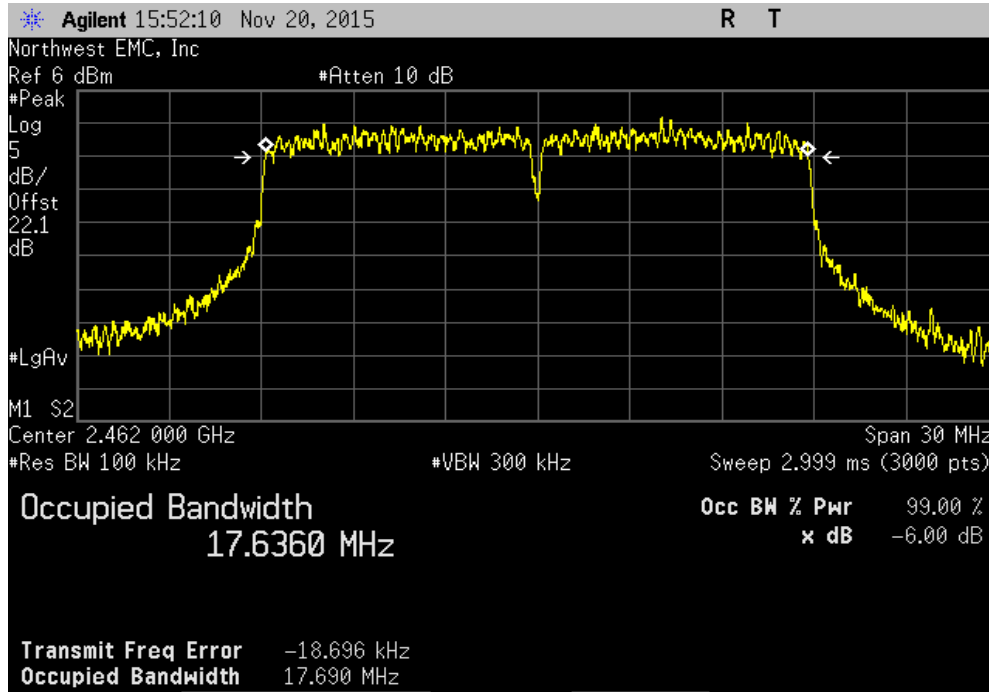
2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz						
				Value	Limit	Result
				17.739 MHz	500 kHz	Pass





# OCCUPIED BANDWIDTH

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz						
			Value	Limit	Result	
				(>)		
			17.69 MHz	500 kHz	Pass	



# OUTPUT POWER

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	RFW	3/10/2015	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	4/20/2015	12

## TEST DESCRIPTION

The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. External attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

Prior to measuring output power; the emission bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.

The method AVGSA-2 in section 11.9.2.2.4 of ANSI C63.10:2013 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding  $[10 \log (1 / D)]$ , where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

**De Facto EIRP Limit:** Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36 dBm.

# OUTPUT POWER

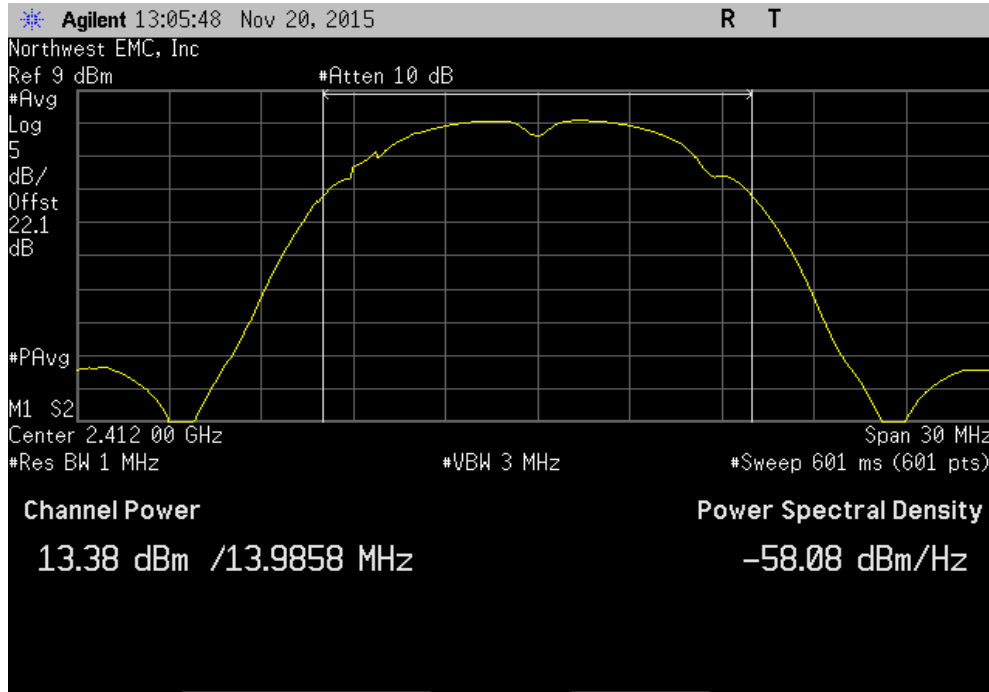


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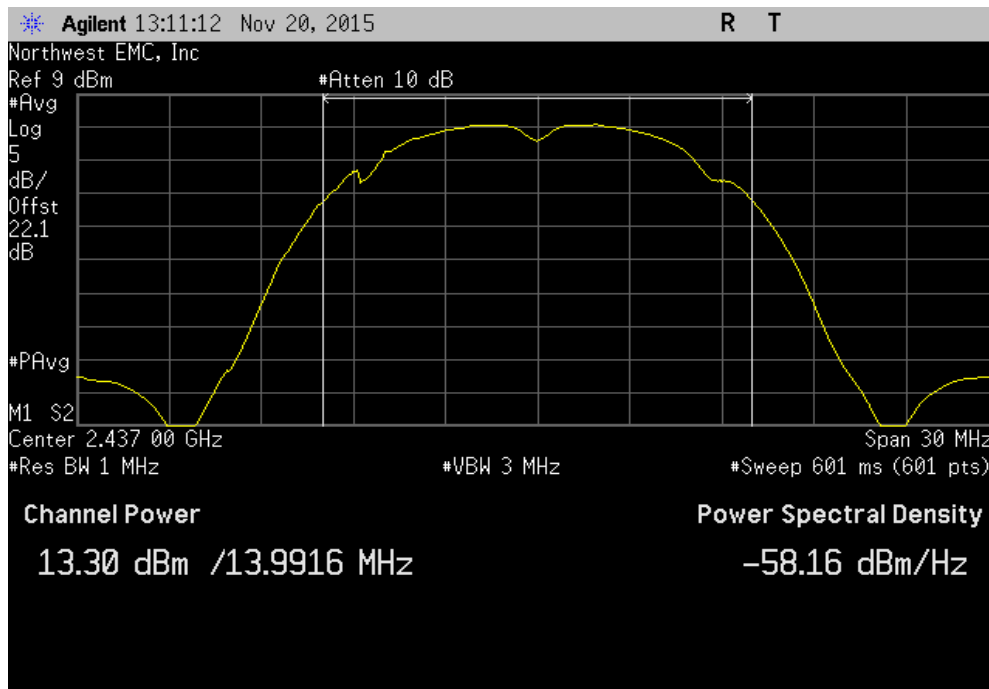
EUT: Sigma Pumps Gen IV 802.11abqn Module		Work Order: DGII0146				
Serial Number: None		Date: 11/20/15				
Customer: Digi International Inc		Temperature: 22.6°C				
Attendees: Slava Gehkt		Humidity: 23%				
Project: None		Barometric Pres.: 994.5				
Tested by: Trevor Buls	Power: 110VAC/60Hz	Job Site: MN08				
TEST SPECIFICATIONS						
FCC 15.247:2015		ANSI C63.10:2013				
TEST METHOD						
COMMENTS						
None						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	DGII0152-2	Signature <i>Trevor Buls</i>				
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (dBm)	Results
2400 MHz - 2483.5 MHz Band						
802.11(b) 1 Mbps						
	Low Channel 1, 2412 MHz	13.38	0	13.4	30	Pass
	Mid Channel 6, 2437 MHz	13.301	0	13.3	30	Pass
	High Channel 11, 2462 MHz	13.499	0	13.5	30	Pass
802.11(b) 11 Mbps						
	Low Channel 1, 2412 MHz	13.548	0	13.5	30	Pass
	Mid Channel 6, 2437 MHz	13.261	0	13.3	30	Pass
	High Channel 11, 2462 MHz	13.408	0	13.4	30	Pass
802.11(g) 6 Mbps						
	Low Channel 1, 2412 MHz	8.874	0	8.9	30	Pass
	Mid Channel 6, 2437 MHz	13.845	0	13.8	30	Pass
	High Channel 11, 2462 MHz	13.872	0	13.9	30	Pass
802.11(g) 36 Mbps						
	Low Channel 1, 2412 MHz	6.442	0	6.4	30	Pass
	Mid Channel 6, 2437 MHz	13.901	0	13.9	30	Pass
	High Channel 11, 2462 MHz	13.803	0	13.8	30	Pass
802.11(g) 54 Mbps						
	Low Channel 1, 2412 MHz	6.34	0	6.3	30	Pass
	Mid Channel 6, 2437 MHz	13.867	0	13.9	30	Pass
	High Channel 11, 2462 MHz	13.804	0	13.8	30	Pass
802.11(n) MCS0						
	Low Channel 1, 2412 MHz	6.626	0	6.6	30	Pass
	Mid Channel 6, 2437 MHz	13.754	0	13.8	30	Pass
	High Channel 11, 2462 MHz	13.745	0	13.7	30	Pass
802.11(n) MCS7						
	Low Channel 1, 2412 MHz	6.322	0	6.3	30	Pass
	Mid Channel 6, 2437 MHz	13.813	0	13.8	30	Pass
	High Channel 11, 2462 MHz	13.619	0	13.6	30	Pass

# OUTPUT POWER

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
13.38	0	13.4	30	Pass	

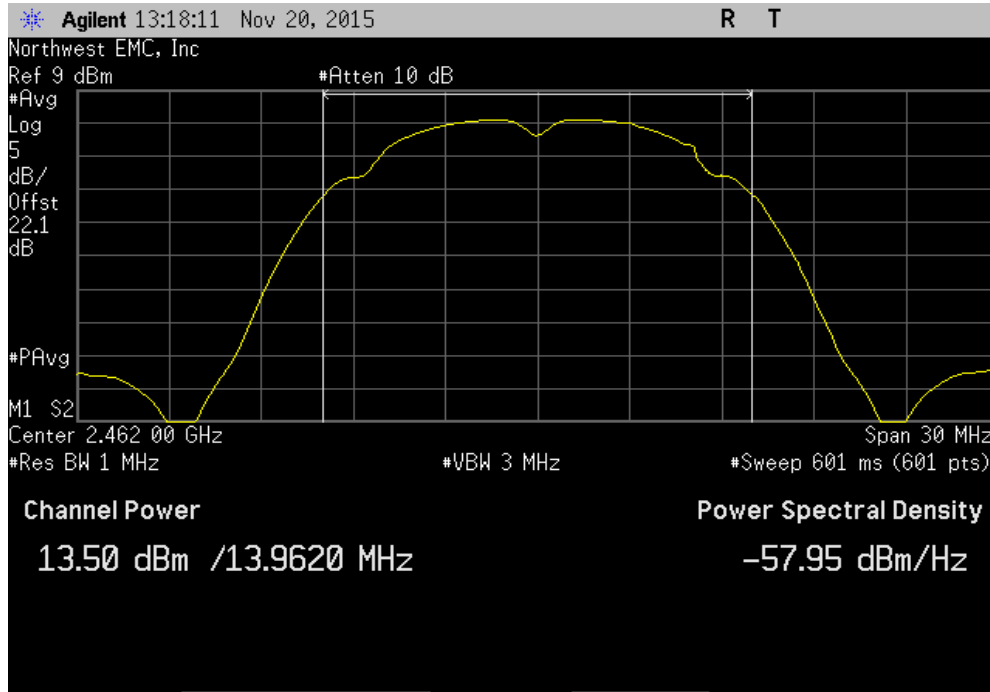


2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
13.301	0	13.3	30	Pass	

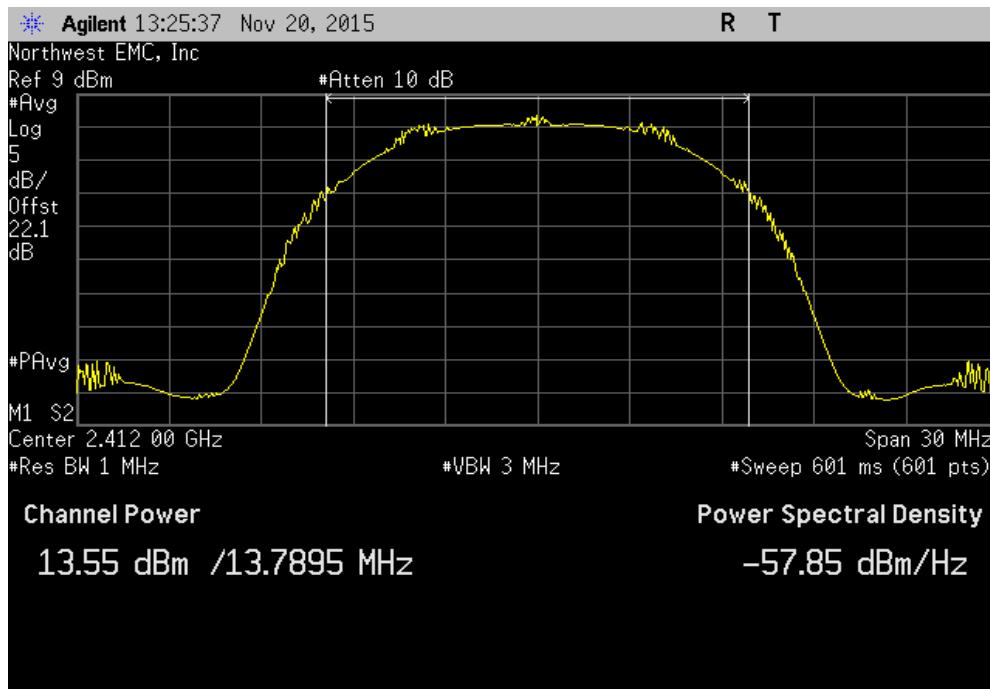


# OUTPUT POWER

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
13.499	0	13.5	30	Pass	

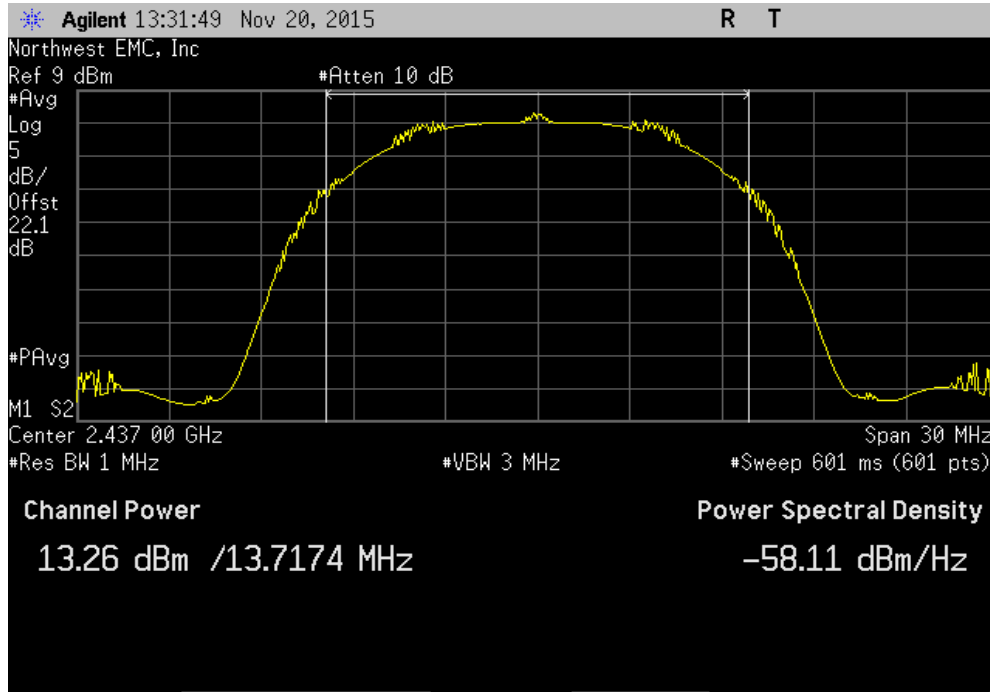


2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
13.548	0	13.5	30	Pass	

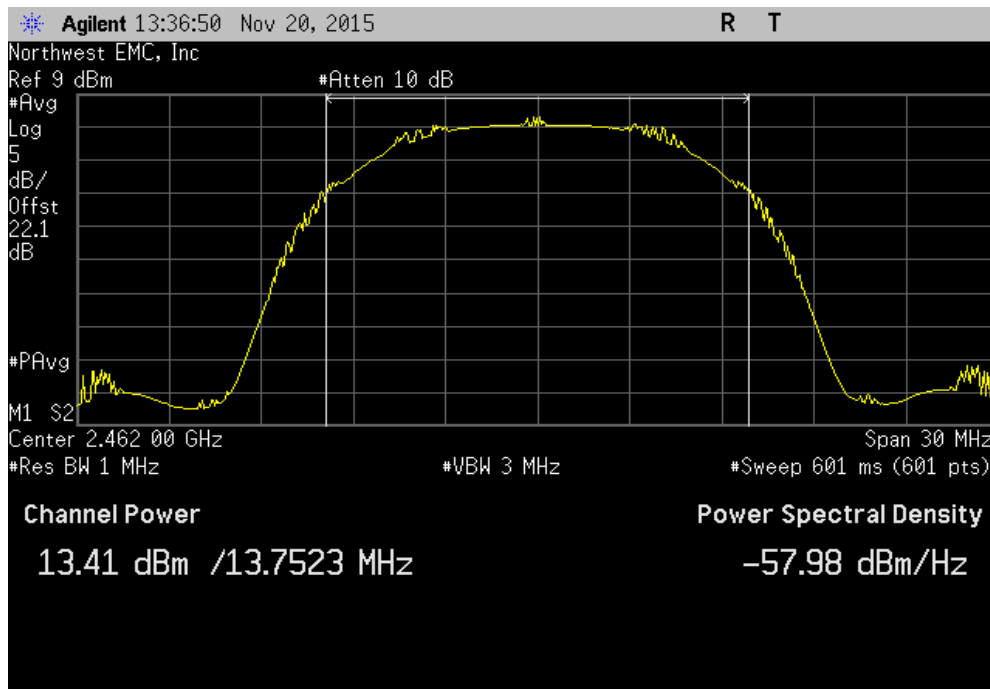


# OUTPUT POWER

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
13.261	0	13.3	30	Pass	

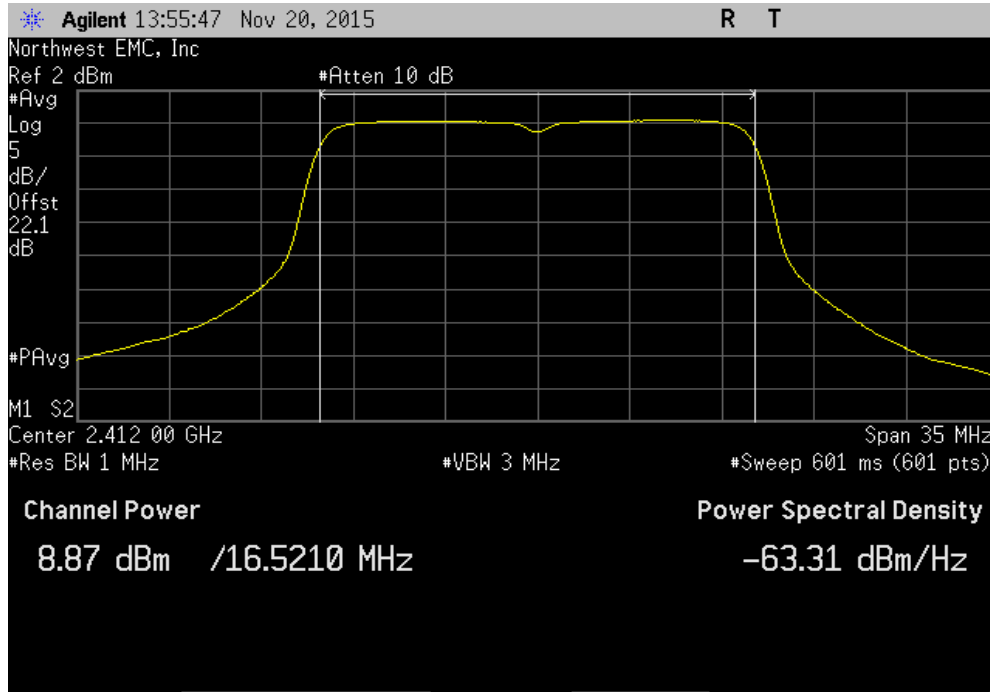


2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
13.408	0	13.4	30	Pass	

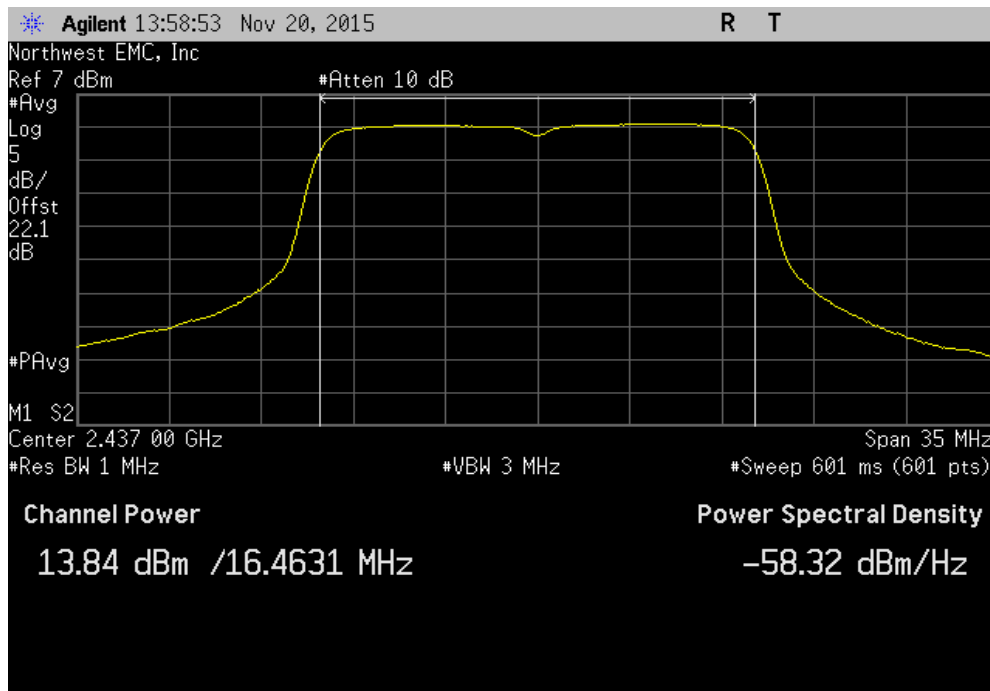


# OUTPUT POWER

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
8.874	0	8.9	30	Pass	

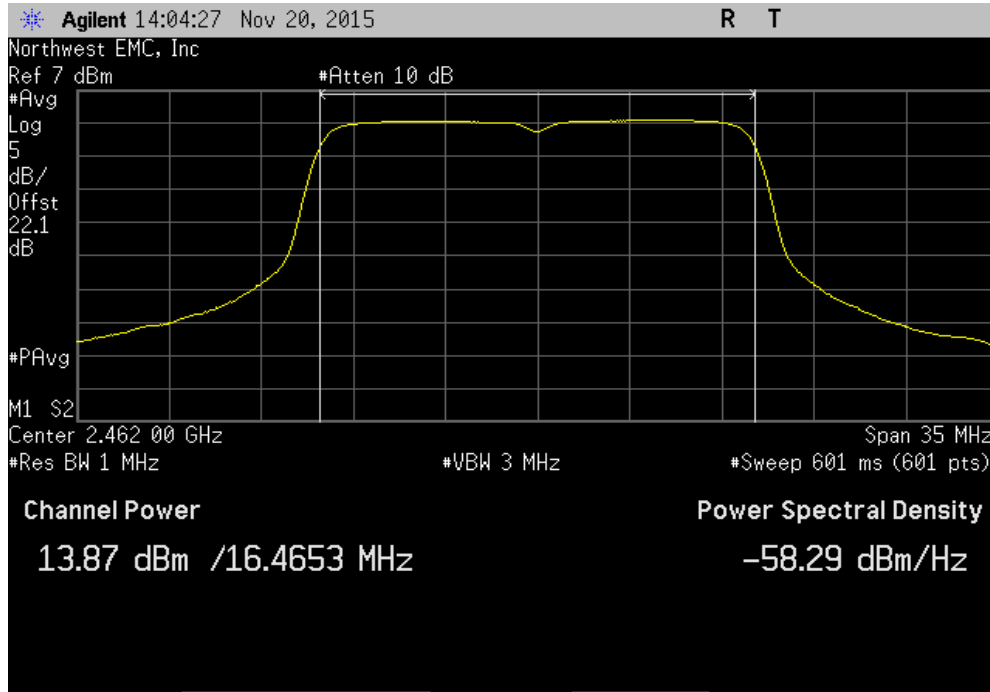


2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
13.845	0	13.8	30	Pass	

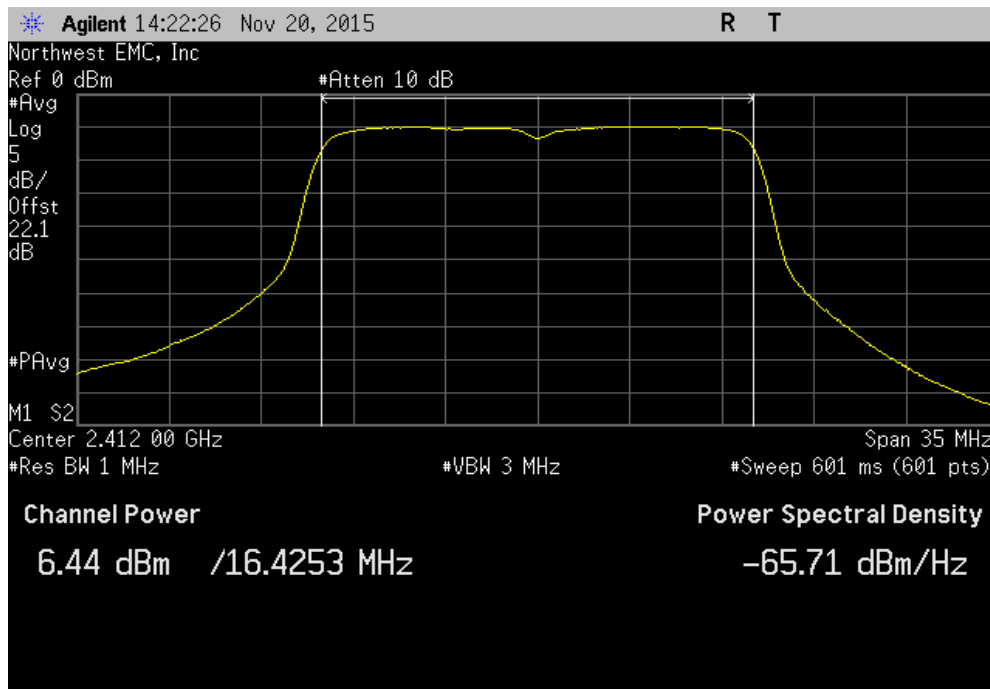


# OUTPUT POWER

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
13.872	0	13.9	30	Pass	



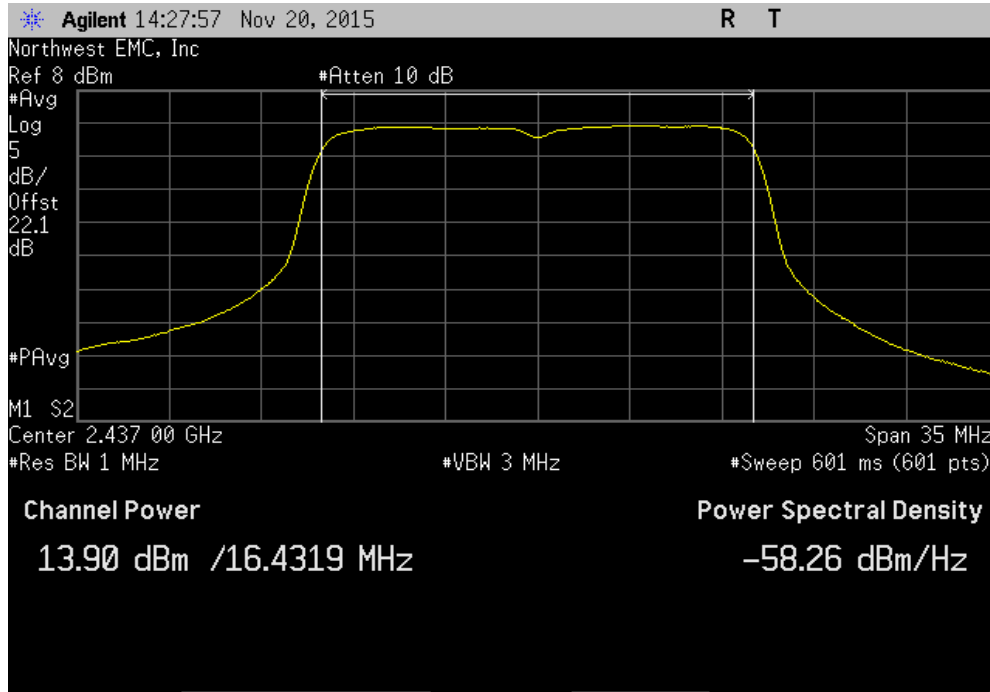
2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
6.442	0	6.4	30	Pass	



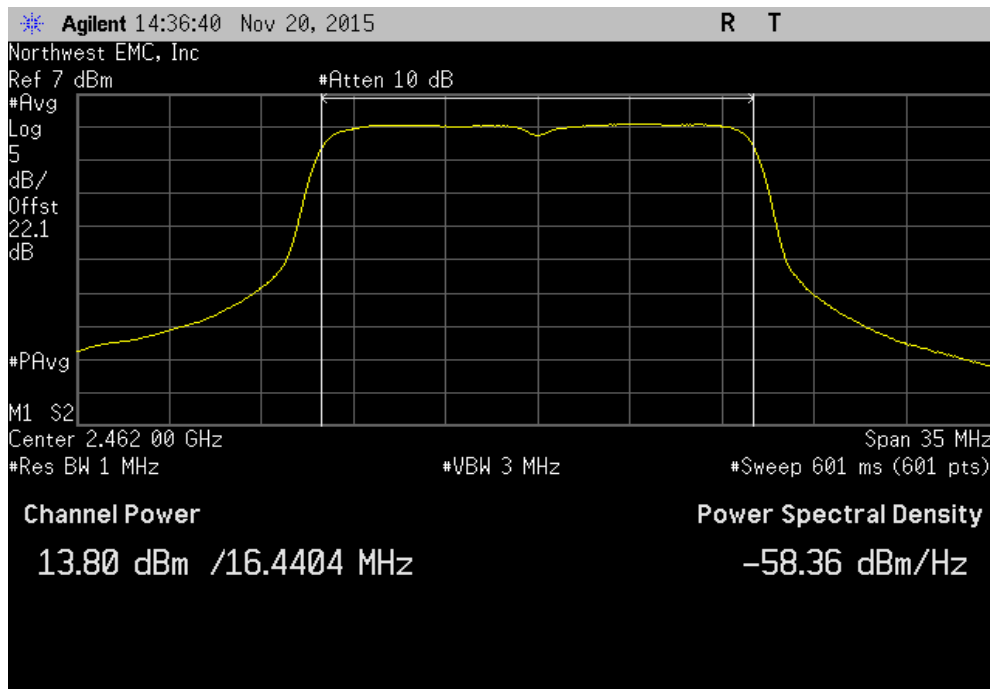


# OUTPUT POWER

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz						
Avg Cond	Duty Cycle		Value	Limit	Results	
Pwr (dBm)	Factor (dB)		(dBm)	(dBm)		
13.901	0		13.9	30	Pass	

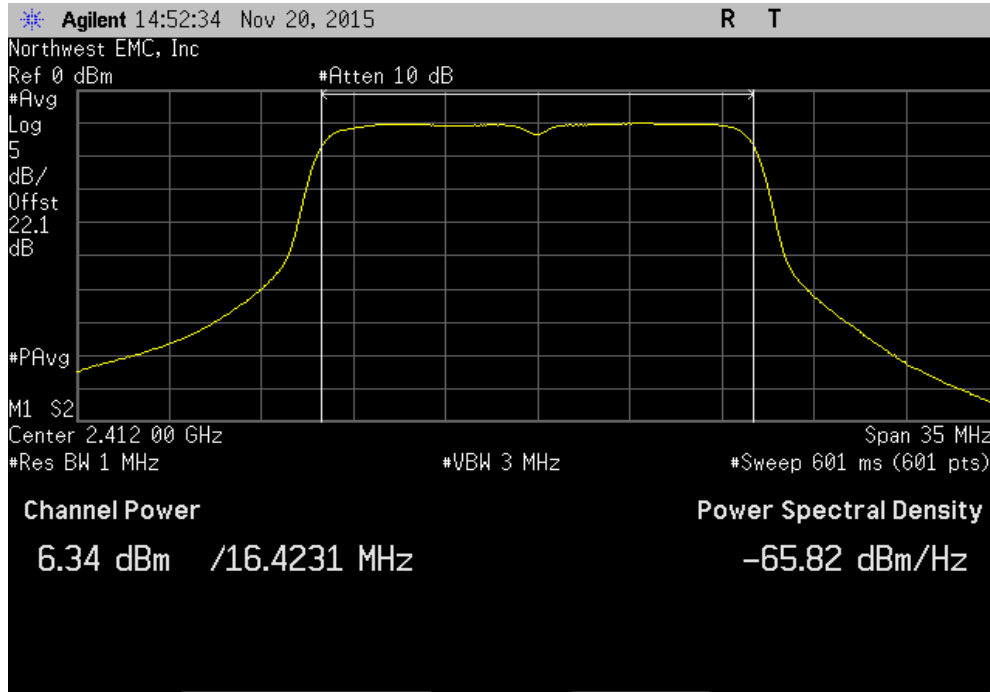


2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz						
Avg Cond	Duty Cycle		Value	Limit	Results	
Pwr (dBm)	Factor (dB)		(dBm)	(dBm)		
13.803	0		13.8	30	Pass	

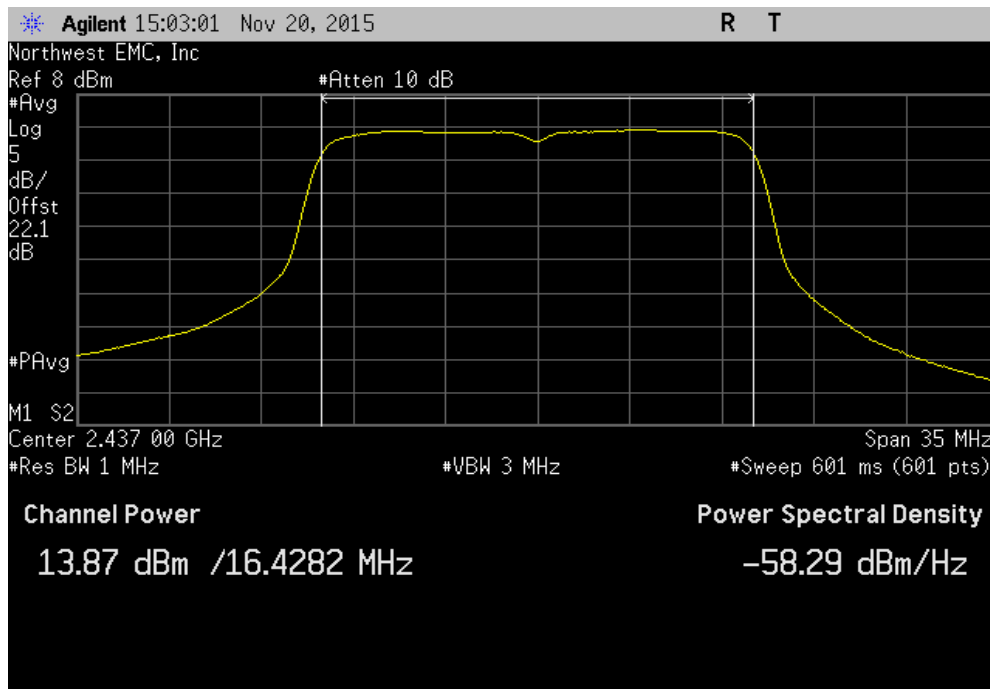


# OUTPUT POWER

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz						
Avg Cond	Duty Cycle		Value	Limit	Results	
Pwr (dBm)	Factor (dB)		(dBm)	(dBm)		
6.34	0		6.3	30	Pass	

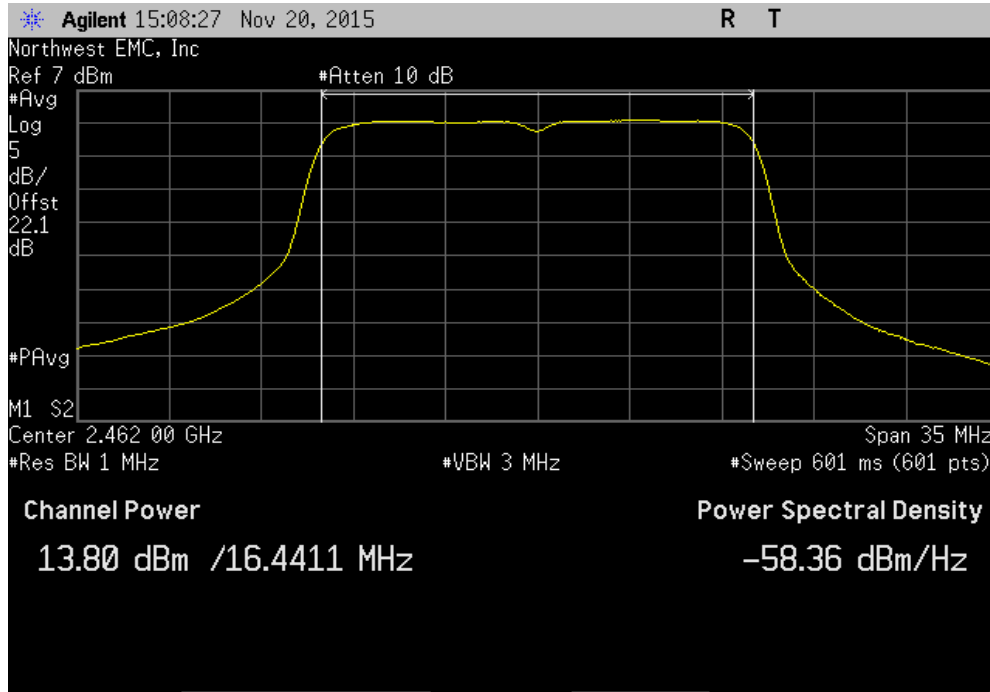


2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz						
Avg Cond	Duty Cycle		Value	Limit	Results	
Pwr (dBm)	Factor (dB)		(dBm)	(dBm)		
13.867	0		13.9	30	Pass	

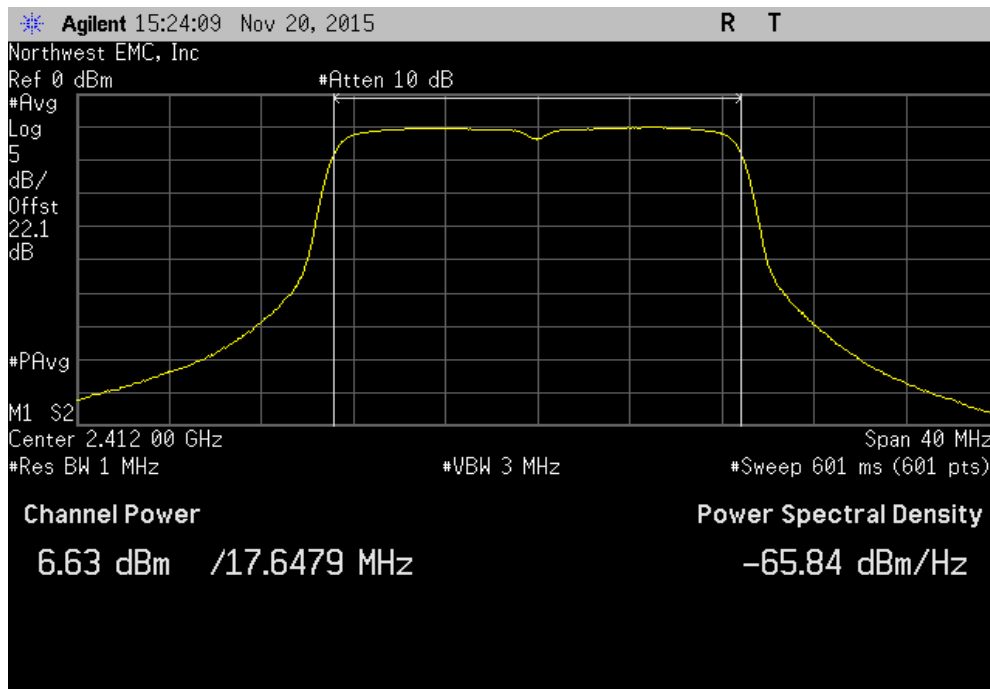


# OUTPUT POWER

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz					
Avg Cond	Duty Cycle		Value	Limit	Results
Pwr (dBm)	Factor (dB)		(dBm)	(dBm)	
13.804	0		13.8	30	Pass

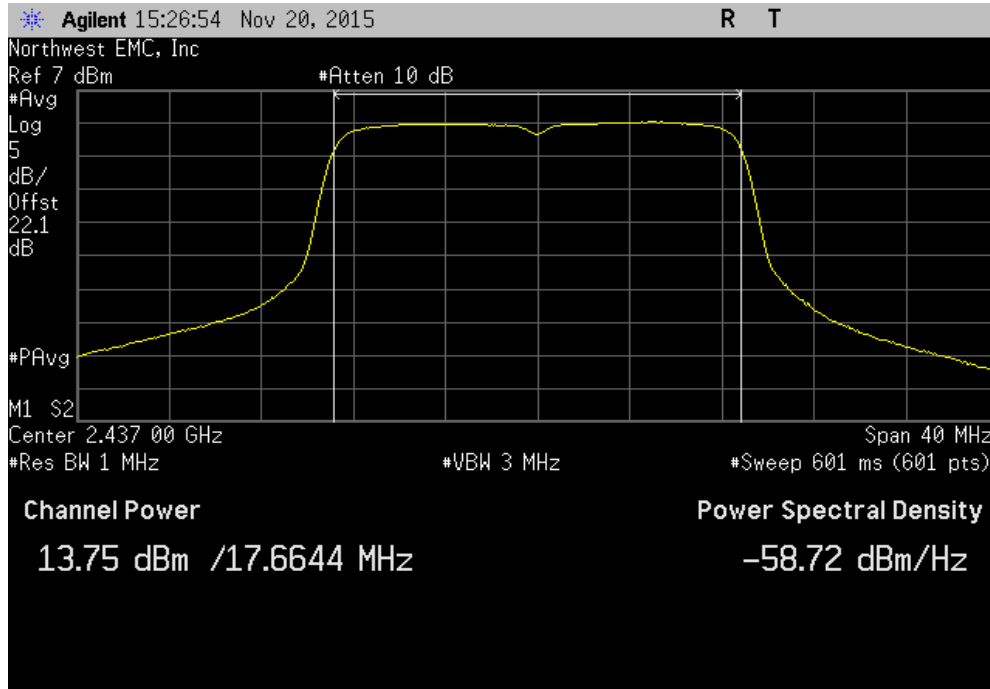


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz					
Avg Cond	Duty Cycle		Value	Limit	Results
Pwr (dBm)	Factor (dB)		(dBm)	(dBm)	
6.626	0		6.6	30	Pass

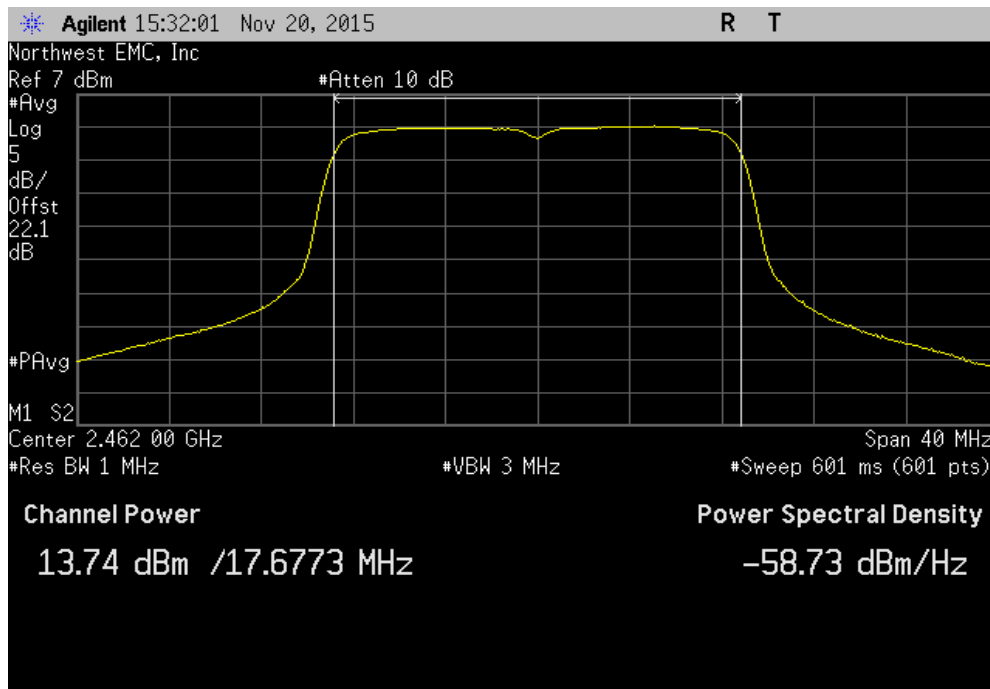


# OUTPUT POWER

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
13.754	0	13.8	30	Pass	

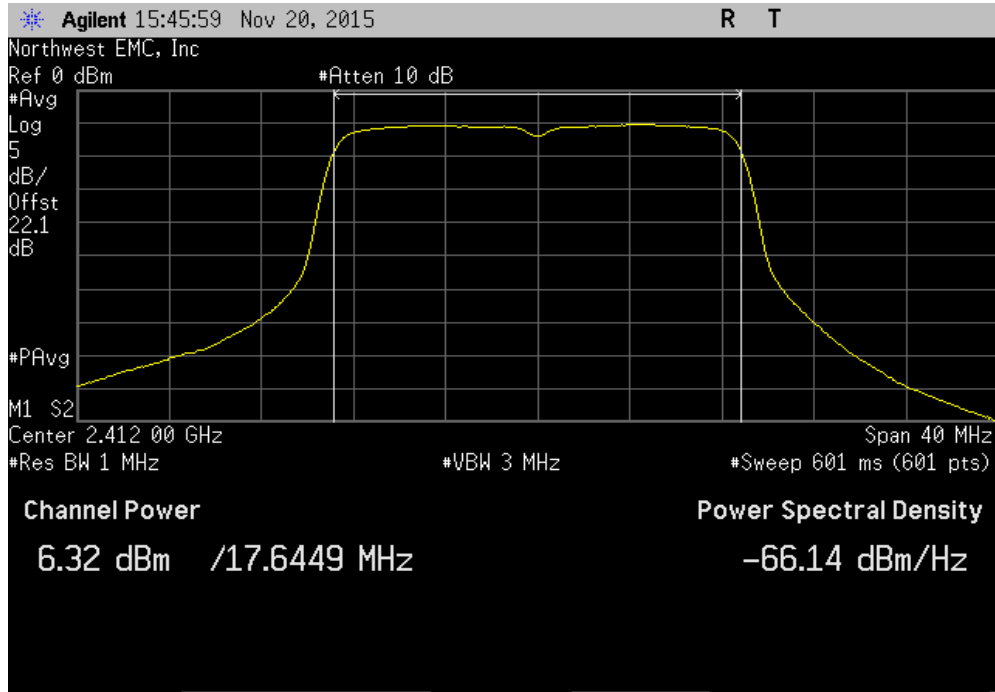


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
13.745	0	13.7	30	Pass	

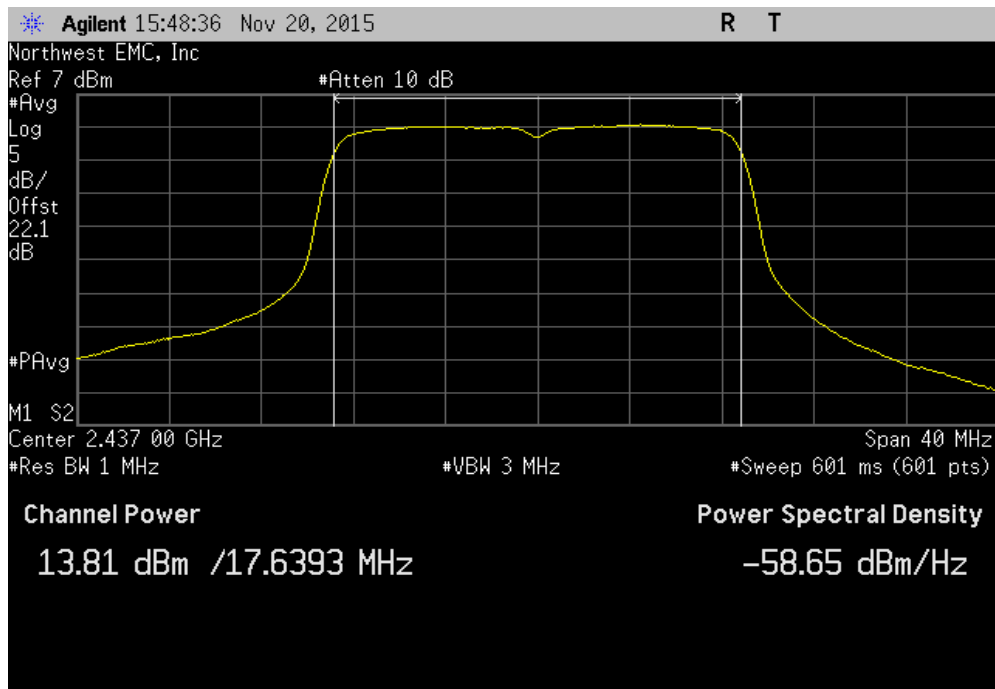


# OUTPUT POWER

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz						
Avg Cond	Duty Cycle	Value	Limit	Results		
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)			
6.322	0	6.3	30	Pass		

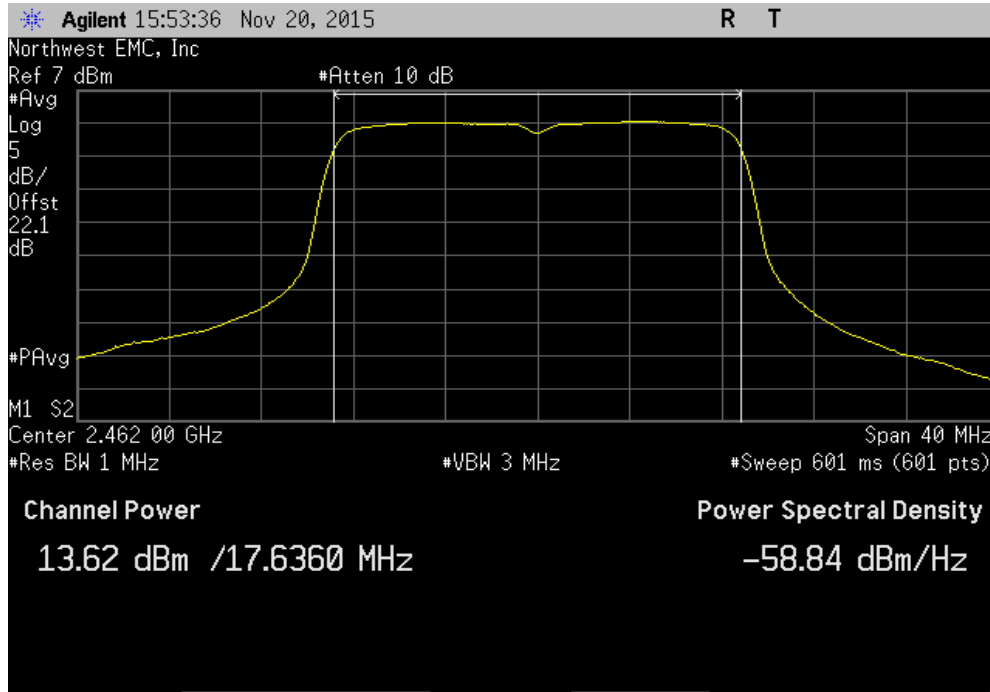


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz						
Avg Cond	Duty Cycle	Value	Limit	Results		
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)			
13.813	0	13.8	30	Pass		



# OUTPUT POWER

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz					
Avg Cond	Duty Cycle	Value	Limit	Results	
Pwr (dBm)	Factor (dB)	(dBm)	(dBm)		
13.619	0	13.6	30	Pass	



# POWER SPECTRAL DENSITY

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	RFW	3/10/2015	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	4/20/2015	12

## TEST DESCRIPTION

The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. External attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

# POWER SPECTRAL DENSITY



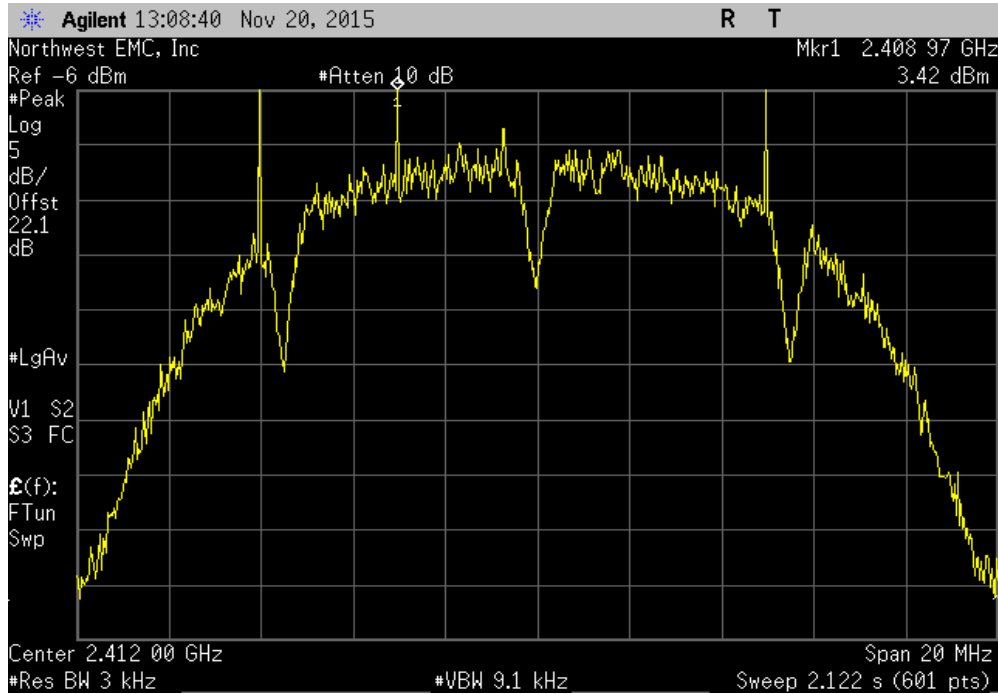
XMR 2015.01.14

EUT: Sigma Pumps Gen IV 802.11abqn Module		Work Order: DGII0146		
Serial Number: None		Date: 11/20/15		
Customer: Digi International Inc		Temperature: 22.6°C		
Attendees: Slava Gehkt		Humidity: 23%		
Project: None		Barometric Pres.: 994.5		
Tested by: Trevor Buls	Power: 110VAC/60Hz	Job Site: MN08		
TEST SPECIFICATIONS				
FCC 15.247:2015		ANSI C63.10:2013		
COMMENTS				
None				
DEVIATIONS FROM TEST STANDARD				
None				
Configuration #	DGII0152-2	Signature <i>Trevor Buls</i>		
		Value dBm/3kHz	Limit < dBm/3kHz	Results
2400 MHz - 2483.5 MHz Band				
802.11(b) 1 Mbps				
	Low Channel 1, 2412 MHz	3.424	8	Pass
	Mid Channel 6, 2437 MHz	4.067	8	Pass
	High Channel 11, 2462 MHz	-10.191	8	Pass
802.11(b) 11 Mbps				
	Low Channel 1, 2412 MHz	-4.86	8	Pass
	Mid Channel 6, 2437 MHz	-1.268	8	Pass
	High Channel 11, 2462 MHz	-0.459	8	Pass
802.11(g) 6 Mbps				
	Low Channel 1, 2412 MHz	-15.242	8	Pass
	Mid Channel 6, 2437 MHz	-10.977	8	Pass
	High Channel 11, 2462 MHz	-11.733	8	Pass
802.11(g) 36 Mbps				
	Low Channel 1, 2412 MHz	-18.244	8	Pass
	Mid Channel 6, 2437 MHz	-11.866	8	Pass
	High Channel 11, 2462 MHz	-11.997	8	Pass
802.11(g) 54 Mbps				
	Low Channel 1, 2412 MHz	-19.144	8	Pass
	Mid Channel 6, 2437 MHz	-11.423	8	Pass
	High Channel 11, 2462 MHz	-11.672	8	Pass
802.11(n) MCS0				
	Low Channel 1, 2412 MHz	-18.162	8	Pass
	Mid Channel 6, 2437 MHz	-11.958	8	Pass
	High Channel 11, 2462 MHz	-12.085	8	Pass
802.11(n) MCS7				
	Low Channel 1, 2412 MHz	-19.22	8	Pass
	Mid Channel 6, 2437 MHz	-10.837	8	Pass
	High Channel 11, 2462 MHz	-12.274	8	Pass

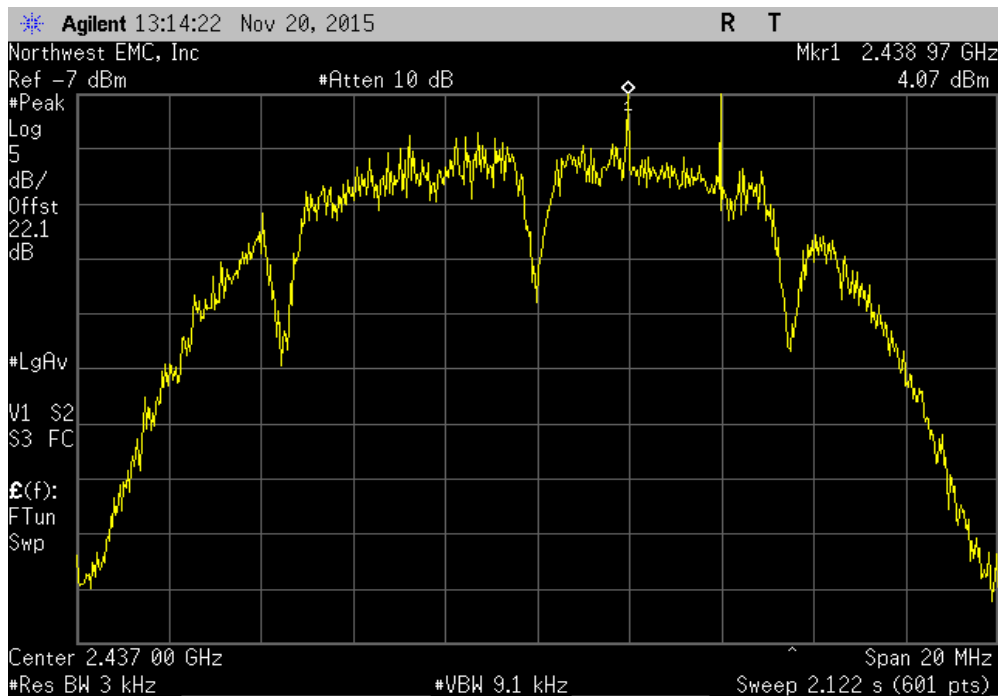


# POWER SPECTRAL DENSITY

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	3.424	8	Pass

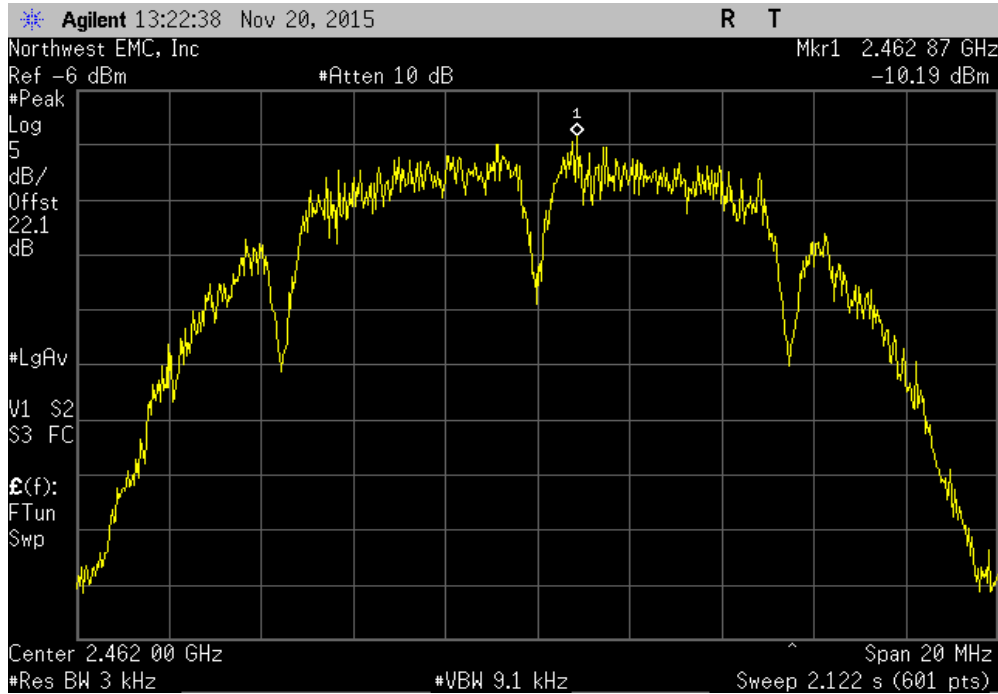


2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	4.067	8	Pass

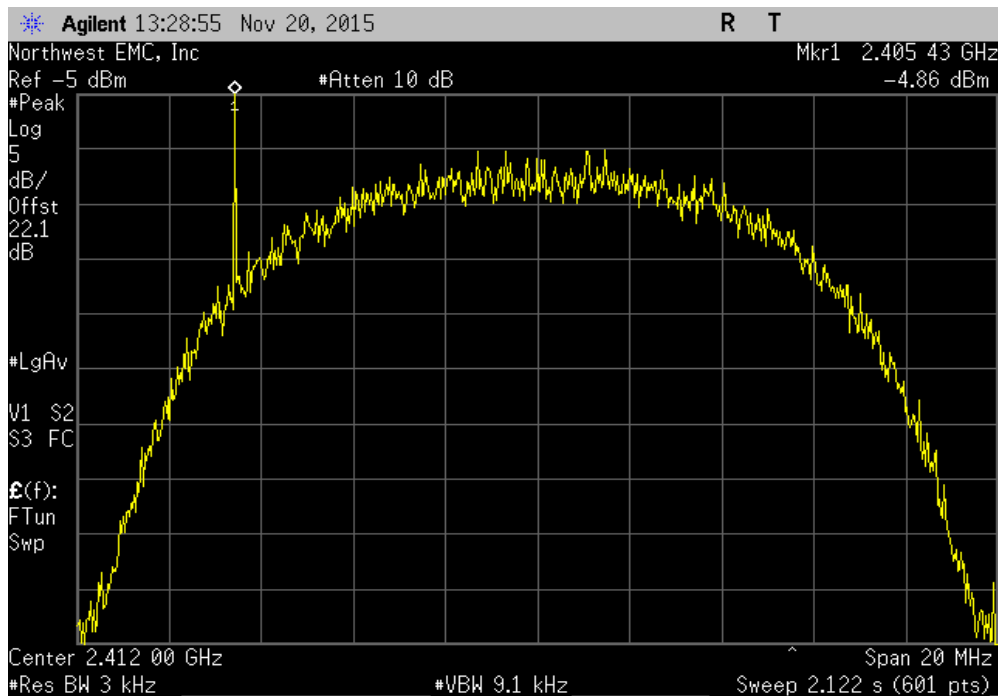


# POWER SPECTRAL DENSITY

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-10.191	8	Pass

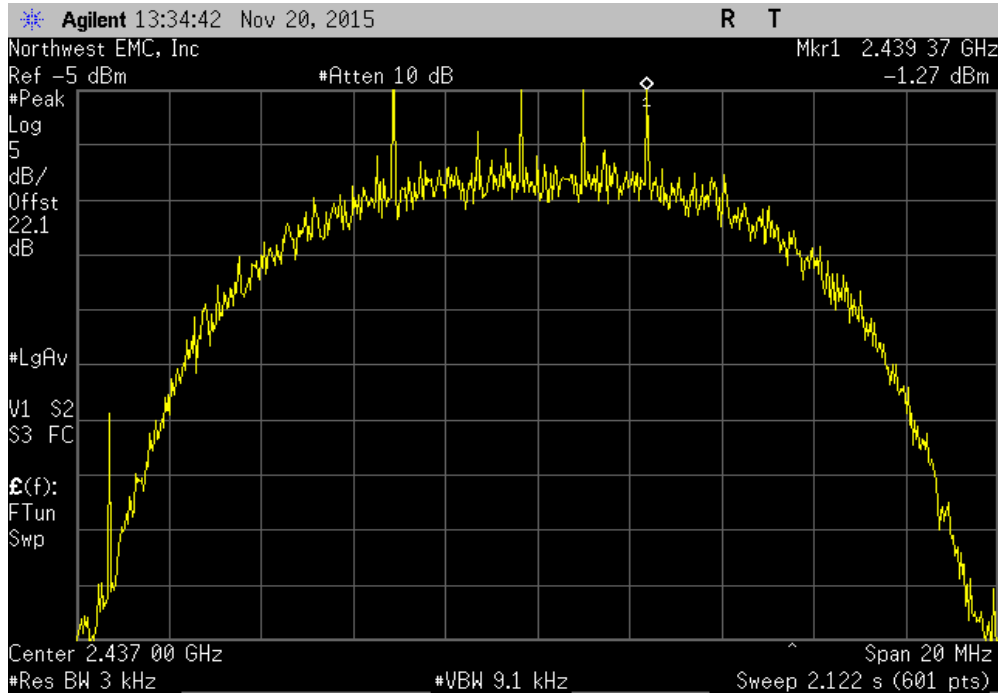


2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-4.86	8	Pass

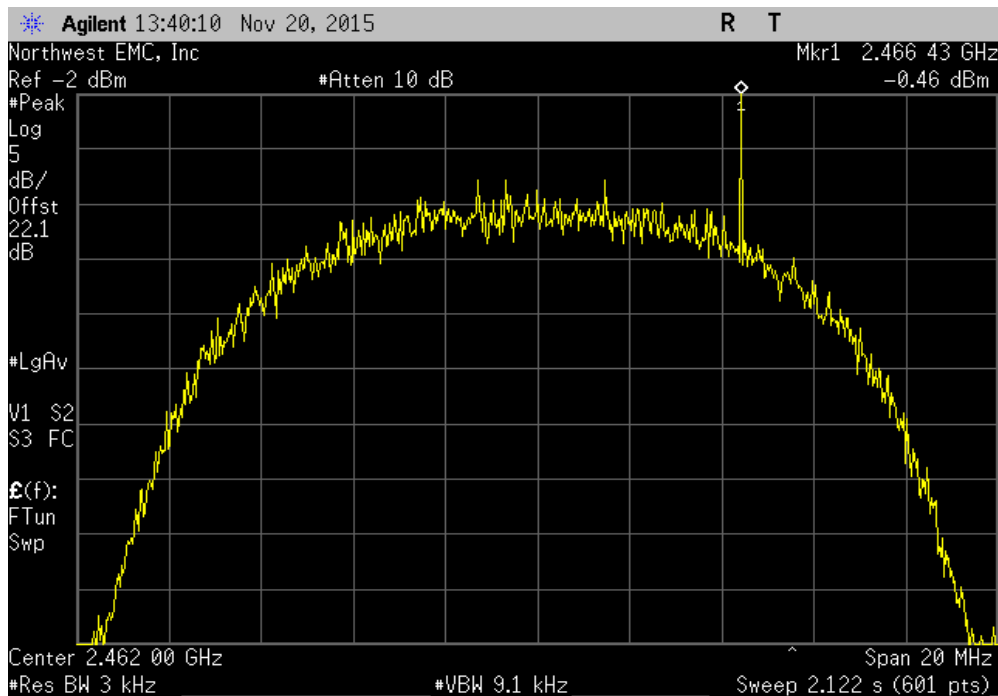


# POWER SPECTRAL DENSITY

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-1.268	8	Pass

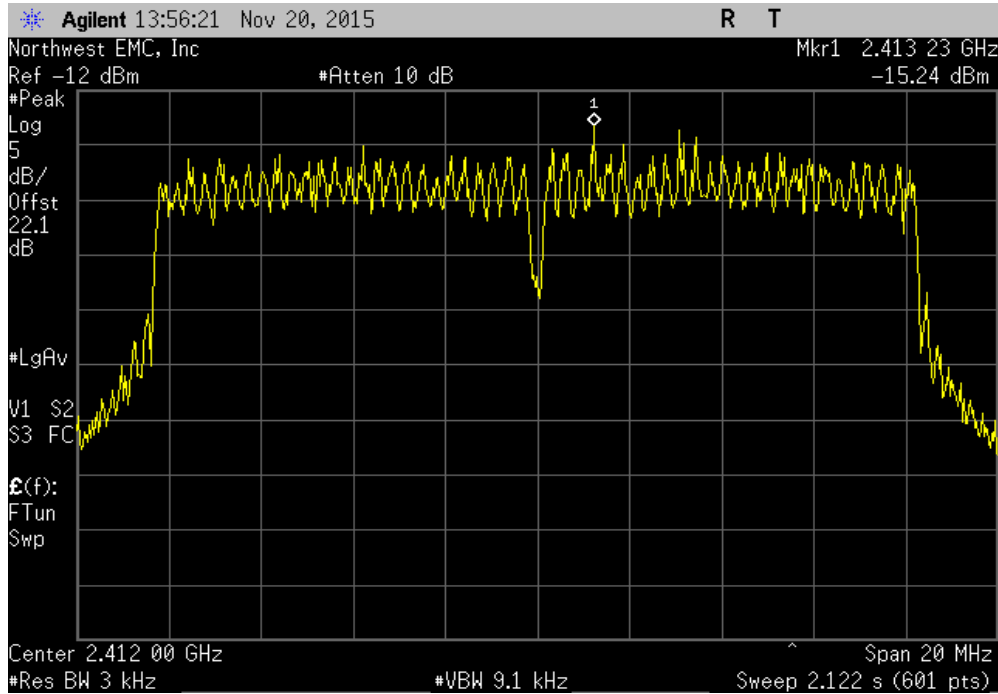


2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-0.459	8	Pass

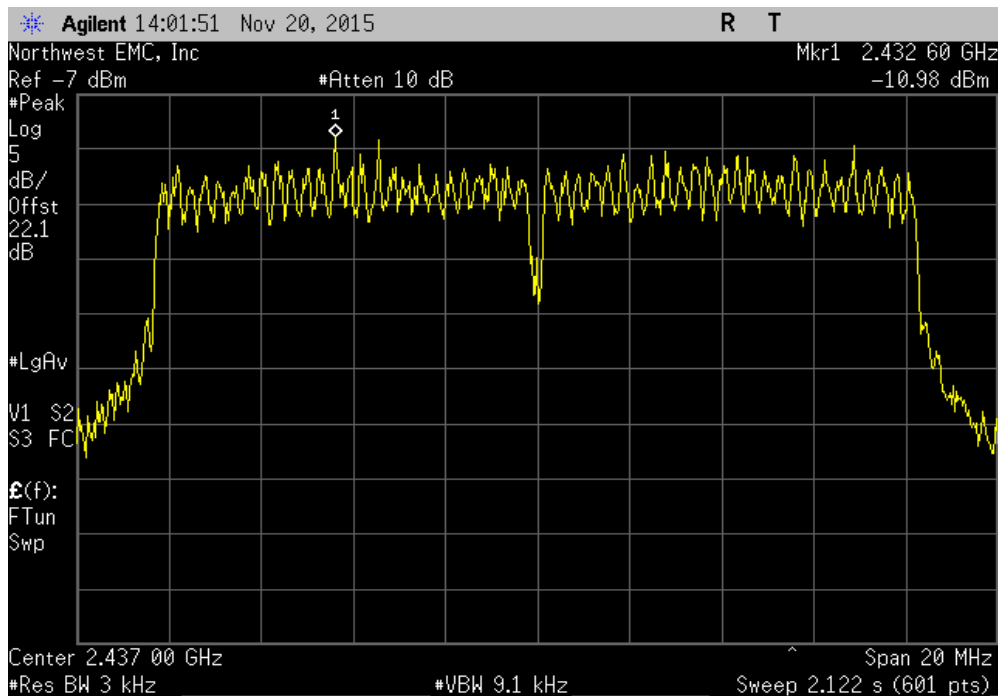


# POWER SPECTRAL DENSITY

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-15.242	8	Pass

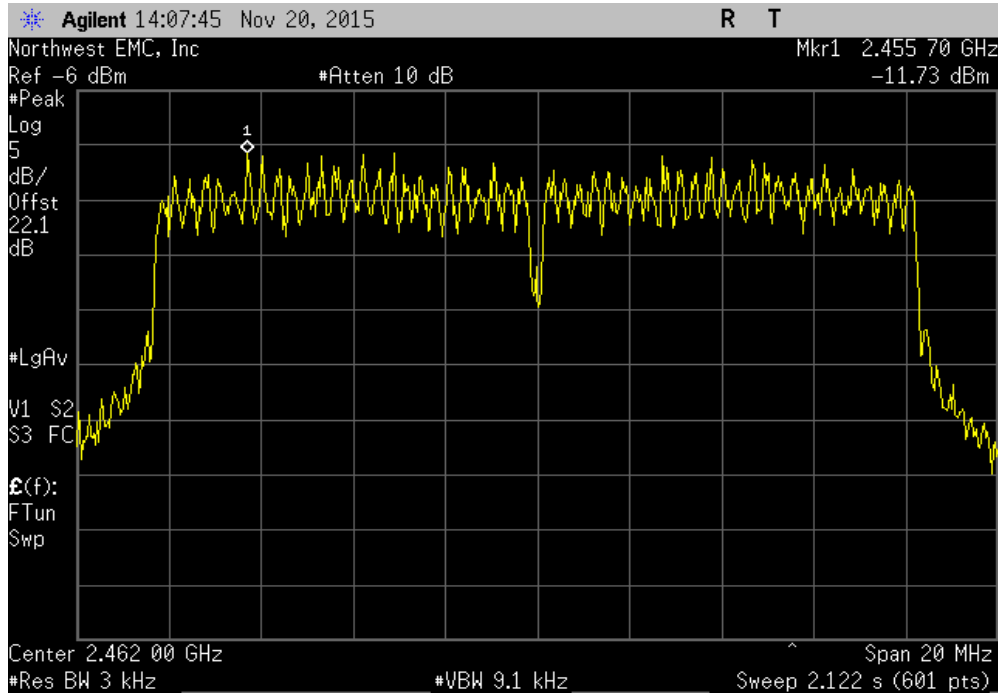


2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-10.977	8	Pass

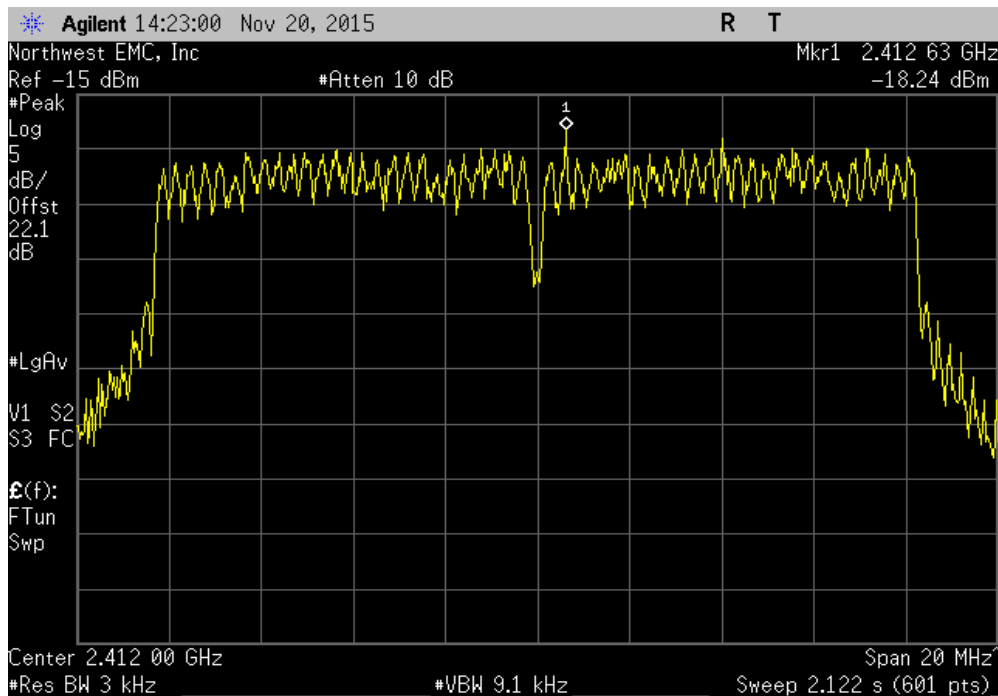


# POWER SPECTRAL DENSITY

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-11.733	8	Pass

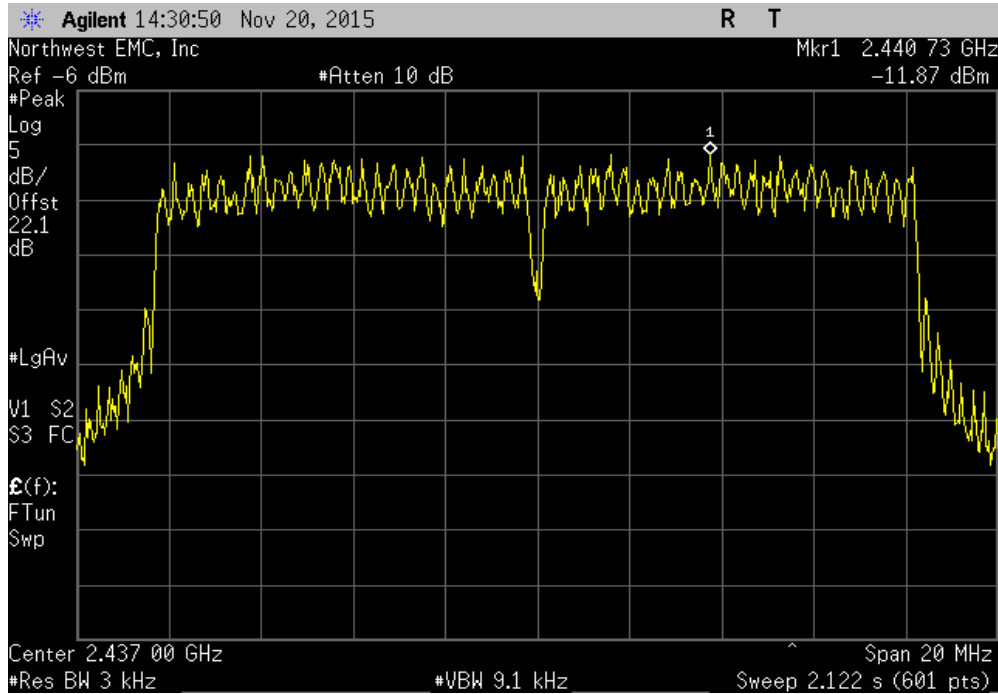


2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-18.244	8	Pass

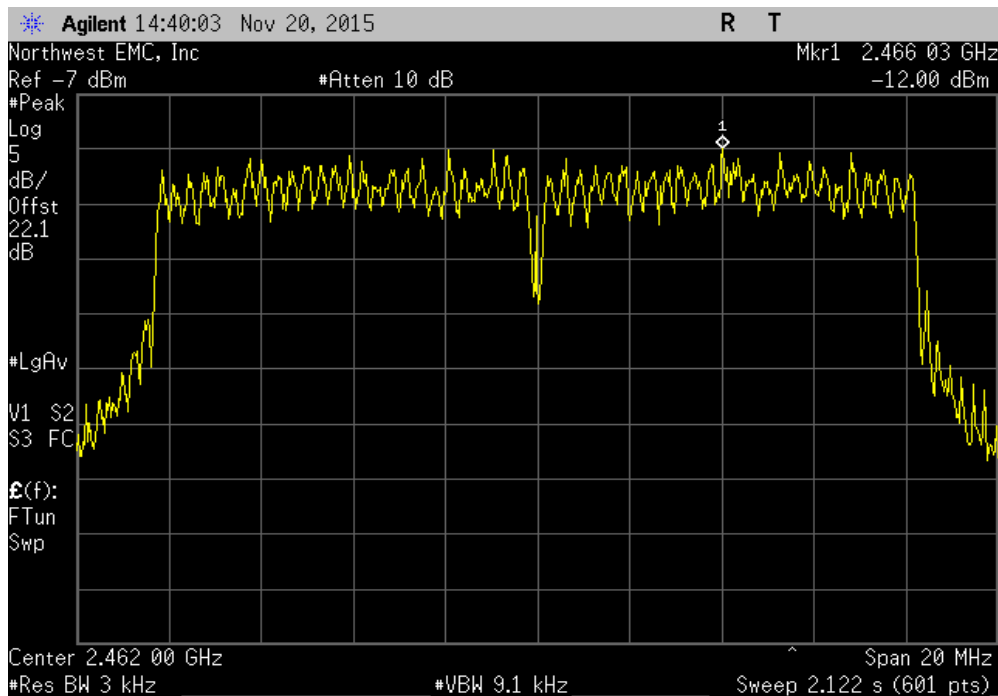


# POWER SPECTRAL DENSITY

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-11.866	8	Pass

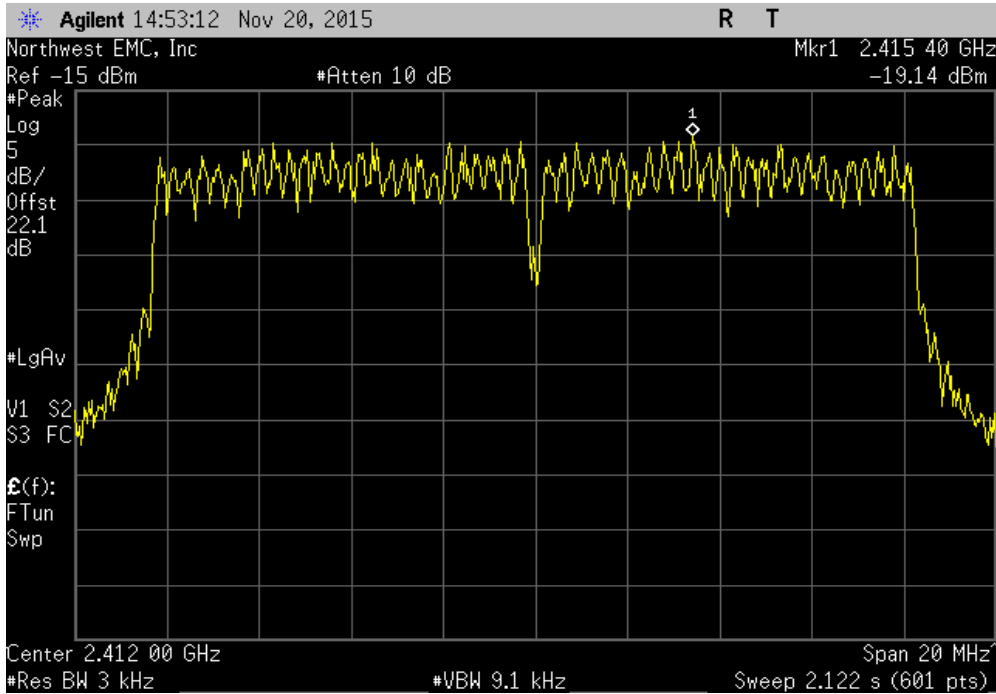


2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-11.997	8	Pass

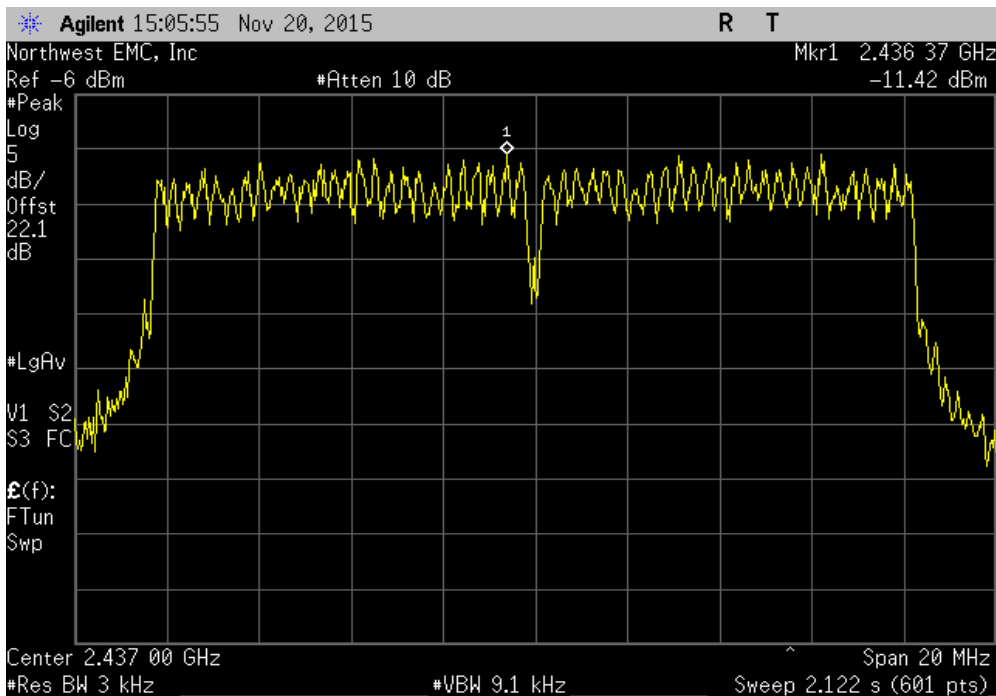


# POWER SPECTRAL DENSITY

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-19.144	8	Pass

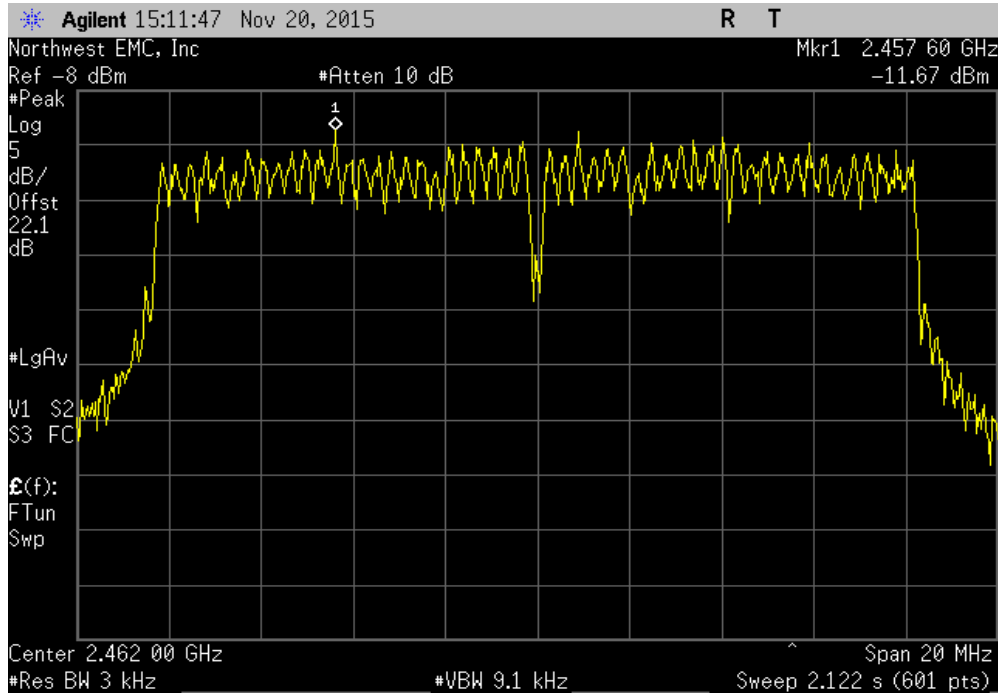


2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-11.423	8	Pass

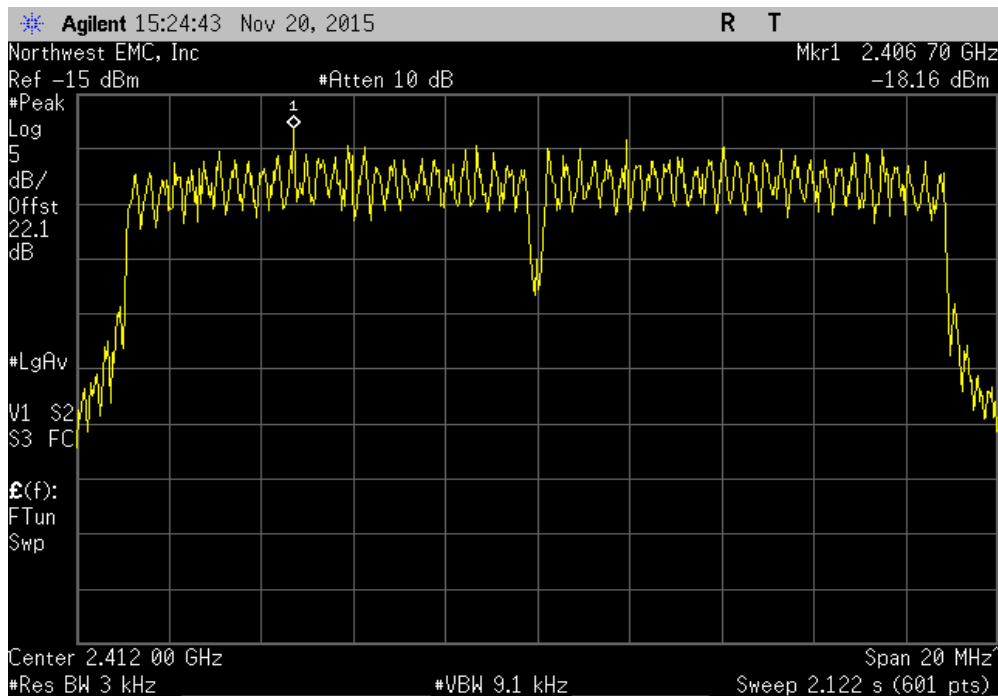


# POWER SPECTRAL DENSITY

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-11.672	8	Pass



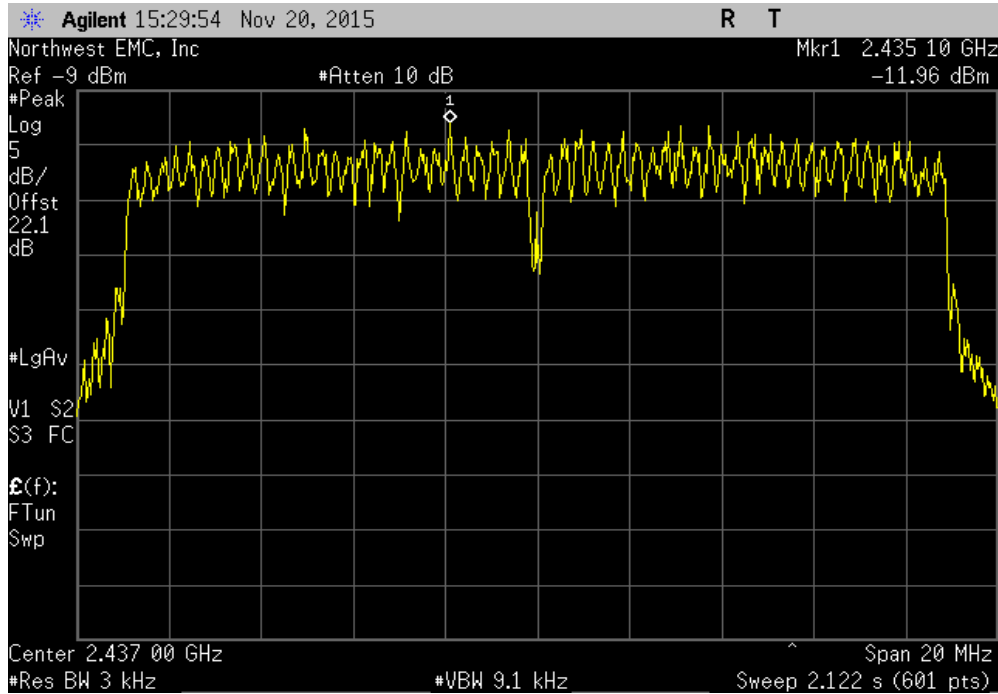
2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-18.162	8	Pass



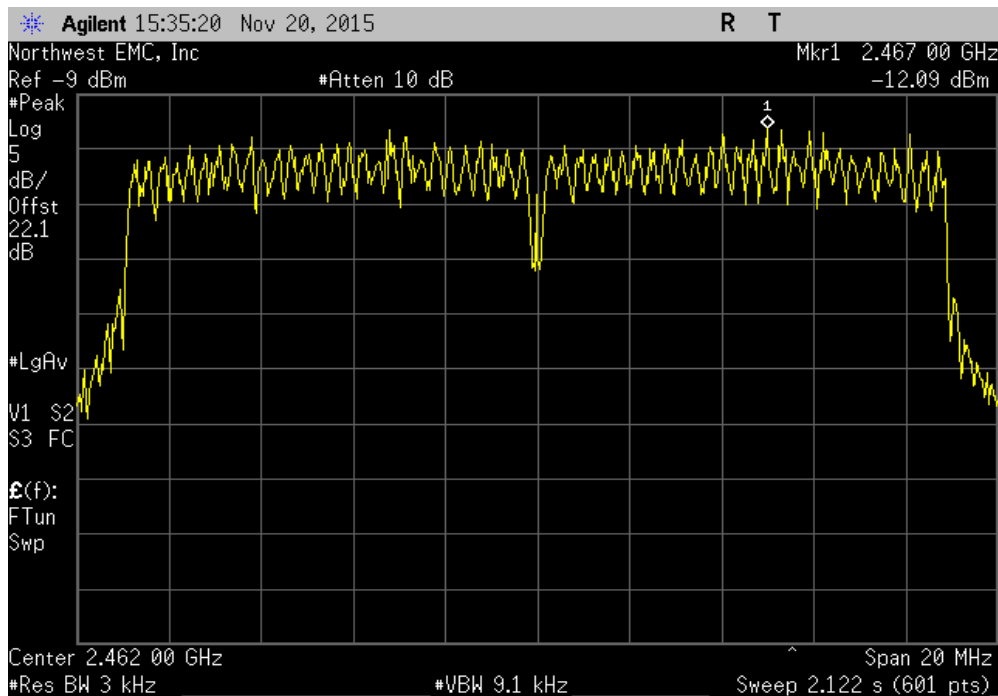


# POWER SPECTRAL DENSITY

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-11.958	8	Pass

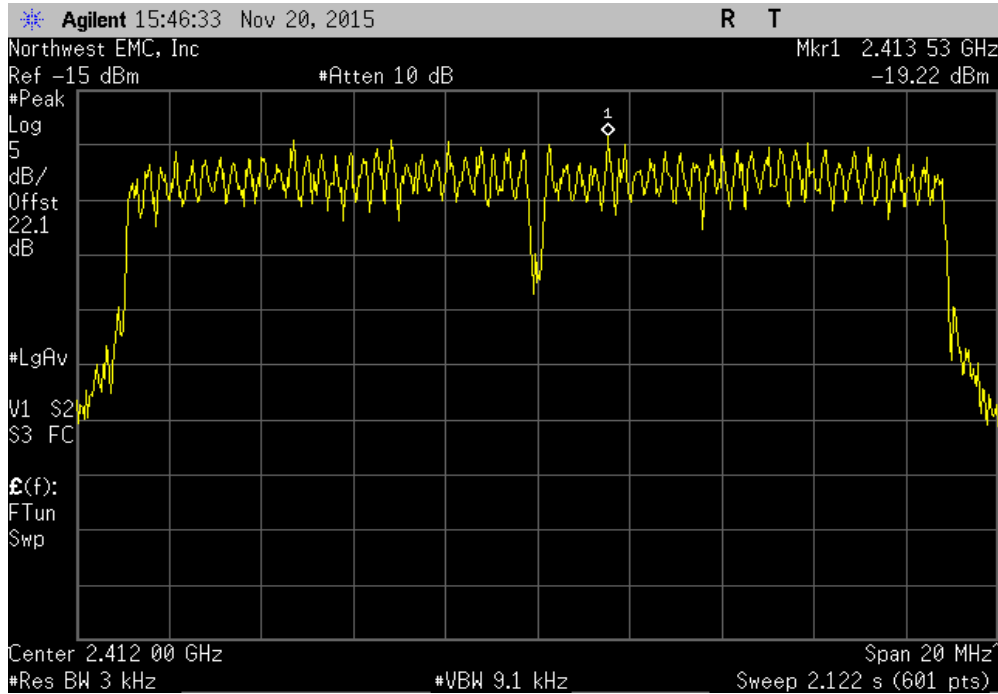


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-12.085	8	Pass

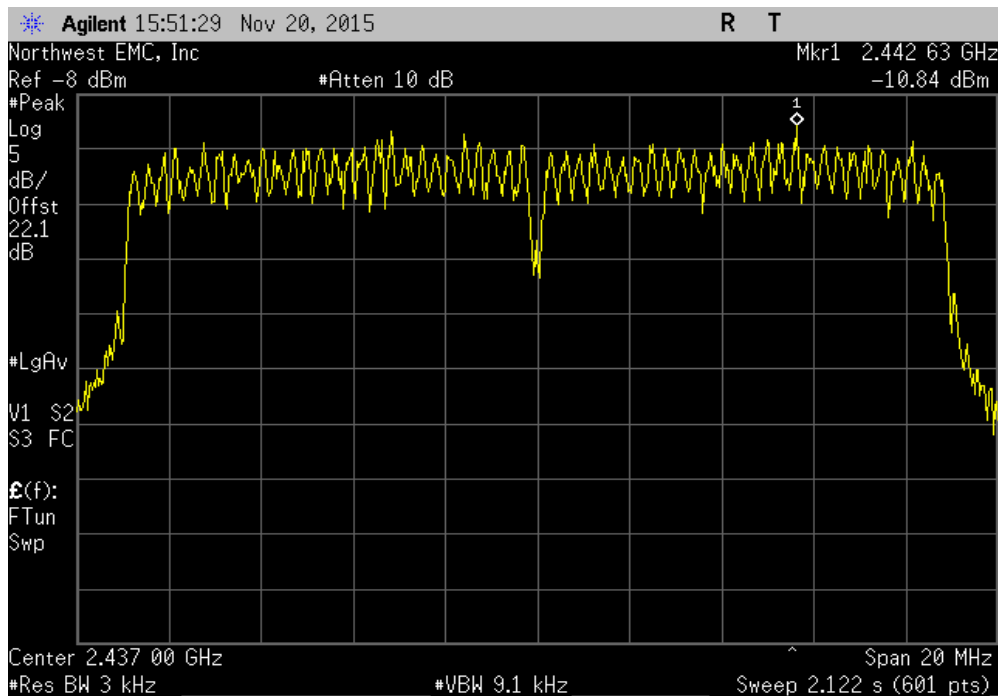


# POWER SPECTRAL DENSITY

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-19.22	8	Pass

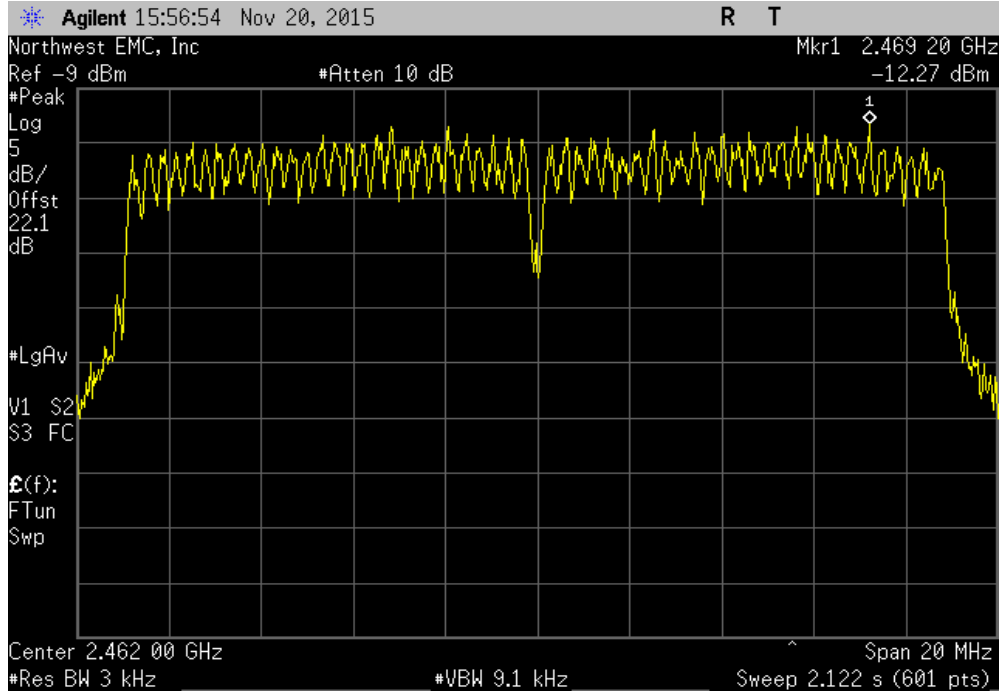


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-10.837	8	Pass



# POWER SPECTRAL DENSITY

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-12.274	8	Pass



# BAND EDGE COMPLIANCE

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	RFW	3/10/2015	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	4/20/2015	12

## TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

An RMS detector was used to match the method called out for Output Power. Because the reference level was taken with an RMS detector, the attenuation requirement is -30 dBc.

# BAND EDGE COMPLIANCE

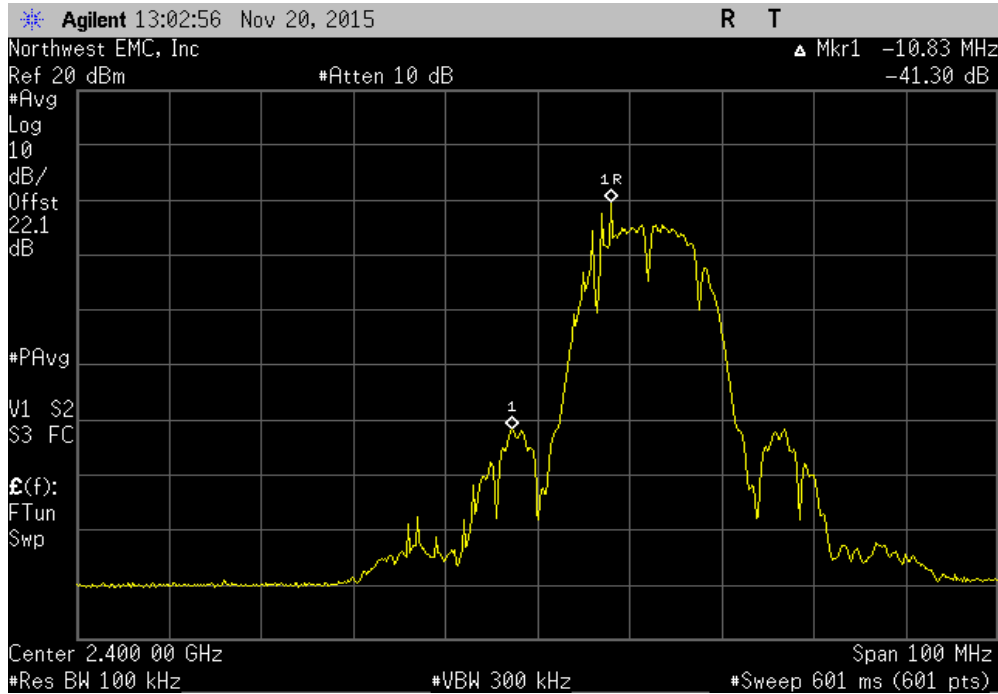


XMR 2015.01.14

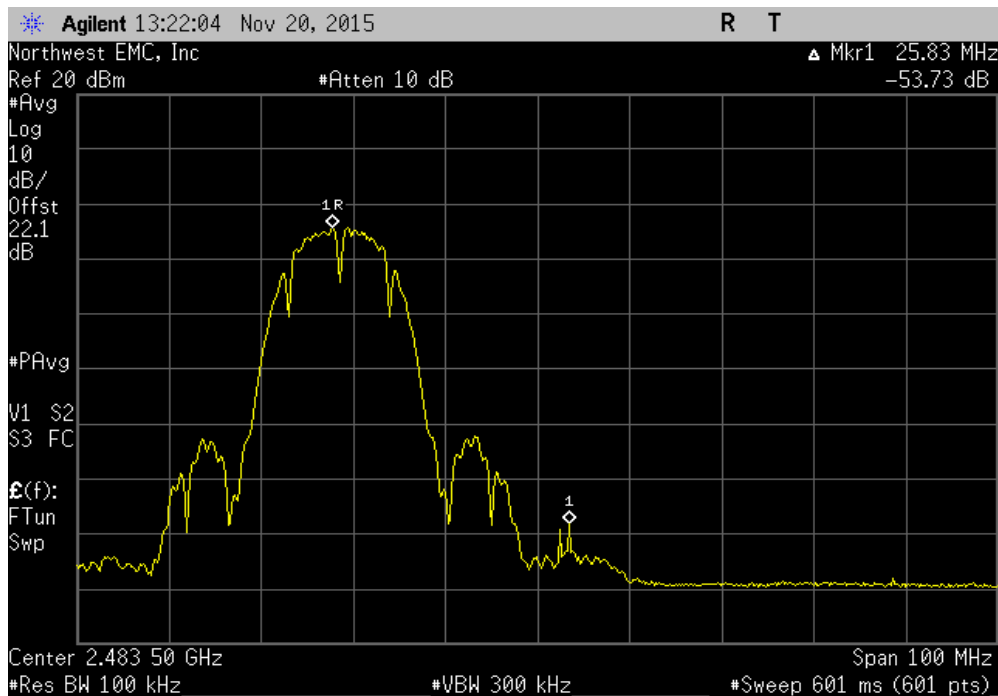
EUT: Sigma Pumps Gen IV 802.11abgn Module		Work Order: DGII0146	
Serial Number: None		Date: 11/20/15	
Customer: Digi International Inc		Temperature: 22.6°C	
Attendees: Slava Gehkt		Humidity: 23%	
Project: None		Barometric Pres.: 994.5	
Tested by: Trevor Buls	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS			
FCC 15.247:2015		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	DGII0152-2	Signature <i>Trevor Buls</i>	
		Value (dBc)	Limit ≤ (dBc) Result
2400 MHz - 2483.5 MHz Band			
802.11(b) 1 Mbps			
	Low Channel 1, 2412 MHz	-41.3	-30 Pass
	High Channel 11, 2462 MHz	-53.73	-30 Pass
802.11(b) 11 Mbps			
	Low Channel 1, 2412 MHz	-30.15	-30 Pass
	High Channel 11, 2462 MHz	-64.34	-30 Pass
802.11(g) 6 Mbps			
	Low Channel 1, 2412 MHz	-30.98	-30 Pass
	High Channel 11, 2462 MHz	-42.15	-30 Pass
802.11(g) 36 Mbps			
	Low Channel 1, 2412 MHz	-30.26	-30 Pass
	High Channel 11, 2462 MHz	-44.18	-30 Pass
802.11(g) 54 Mbps			
	Low Channel 1, 2412 MHz	-30.95	-30 Pass
	High Channel 11, 2462 MHz	-44.51	-30 Pass
802.11(n) MCS0			
	Low Channel 1, 2412 MHz	-31.1	-30 Pass
	High Channel 11, 2462 MHz	-38.62	-30 Pass
802.11(n) MCS7			
	Low Channel 1, 2412 MHz	-30.53	-30 Pass
	High Channel 11, 2462 MHz	-42.18	-30 Pass

# BAND EDGE COMPLIANCE

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-41.3	-30	Pass

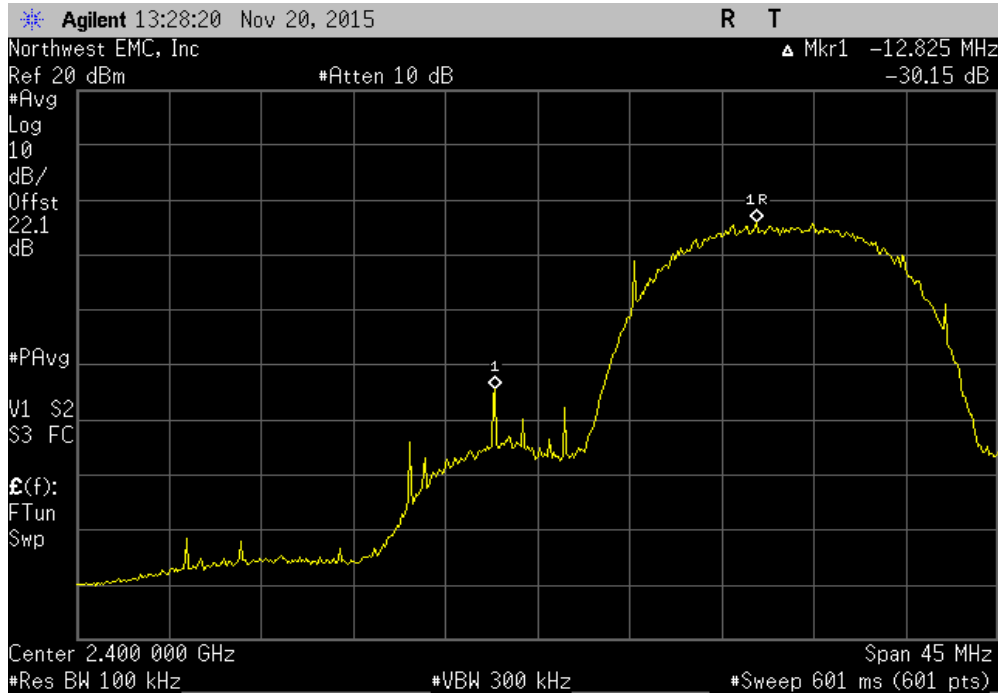


2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-53.73	-30	Pass

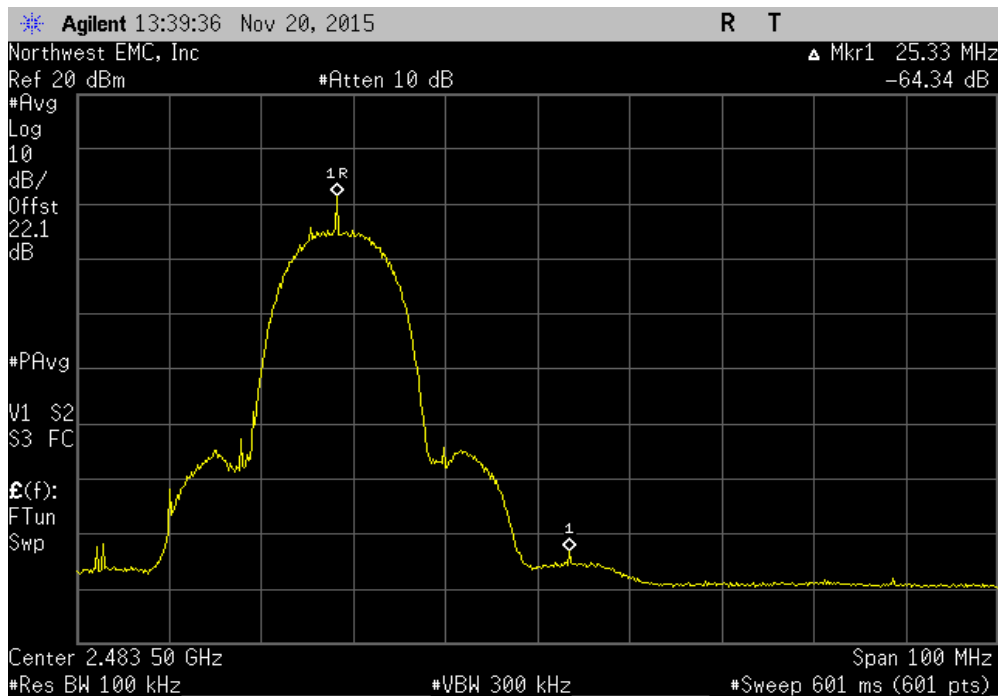


# BAND EDGE COMPLIANCE

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-30.15	-30	Pass

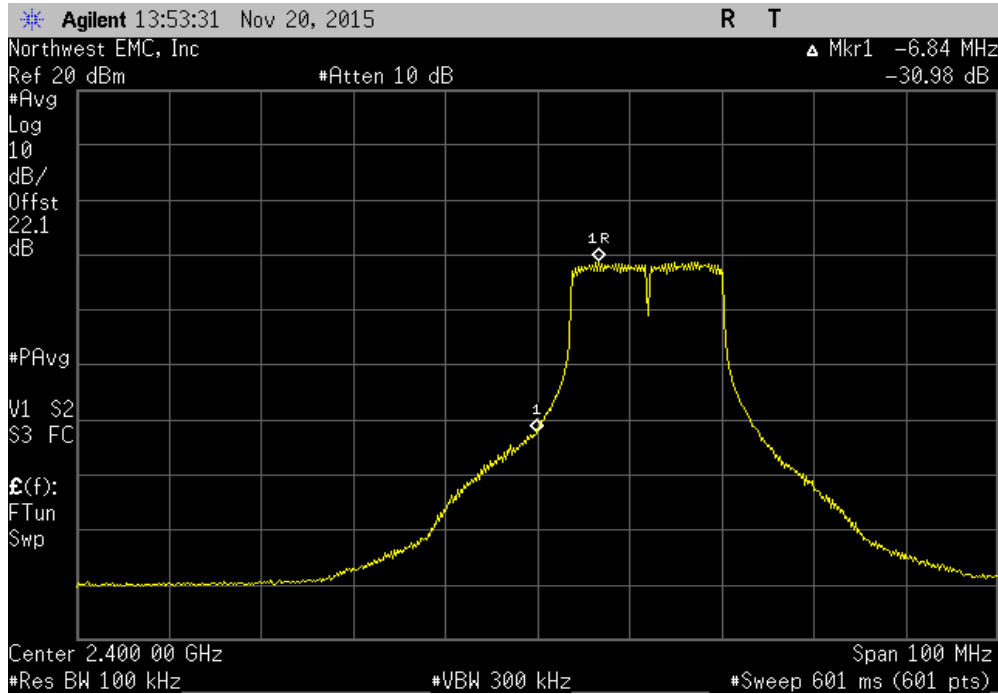


2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-64.34	-30	Pass

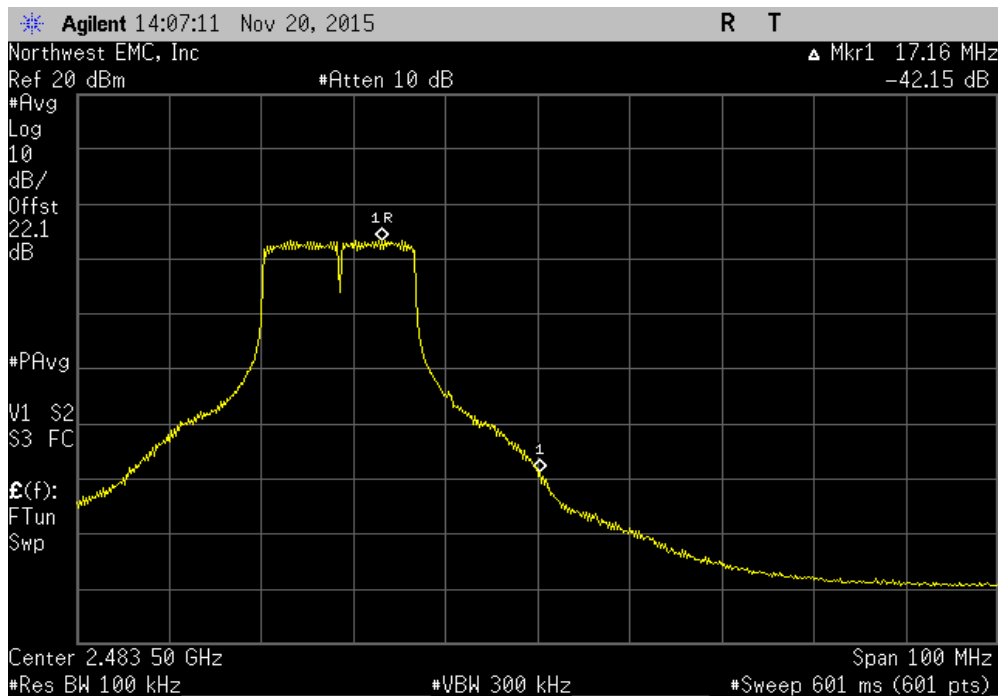


# BAND EDGE COMPLIANCE

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-30.98	-30	Pass



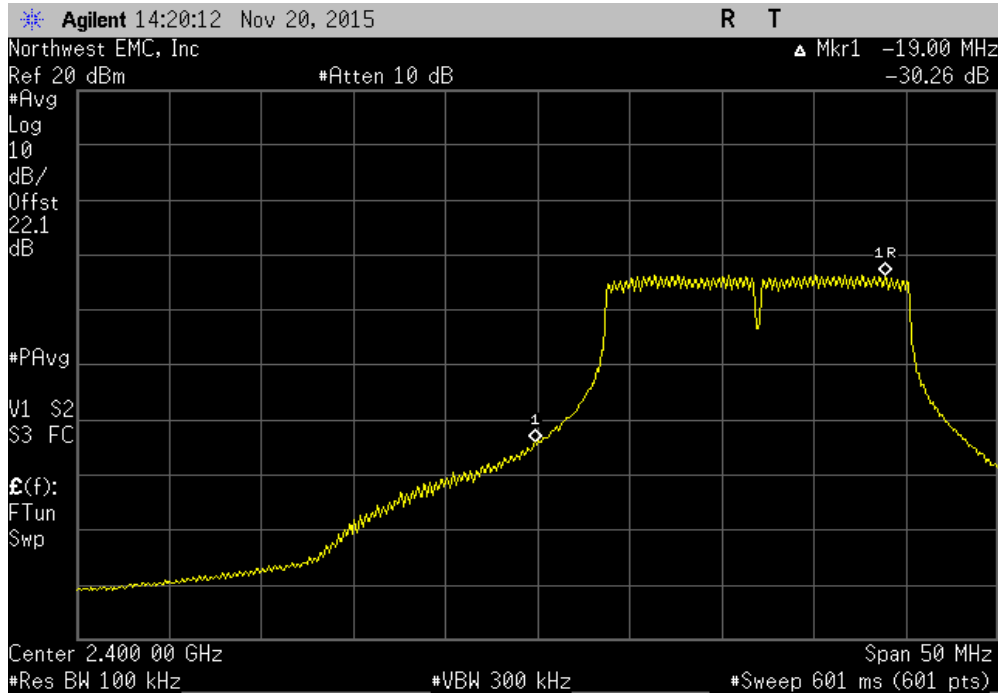
2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-42.15	-30	Pass



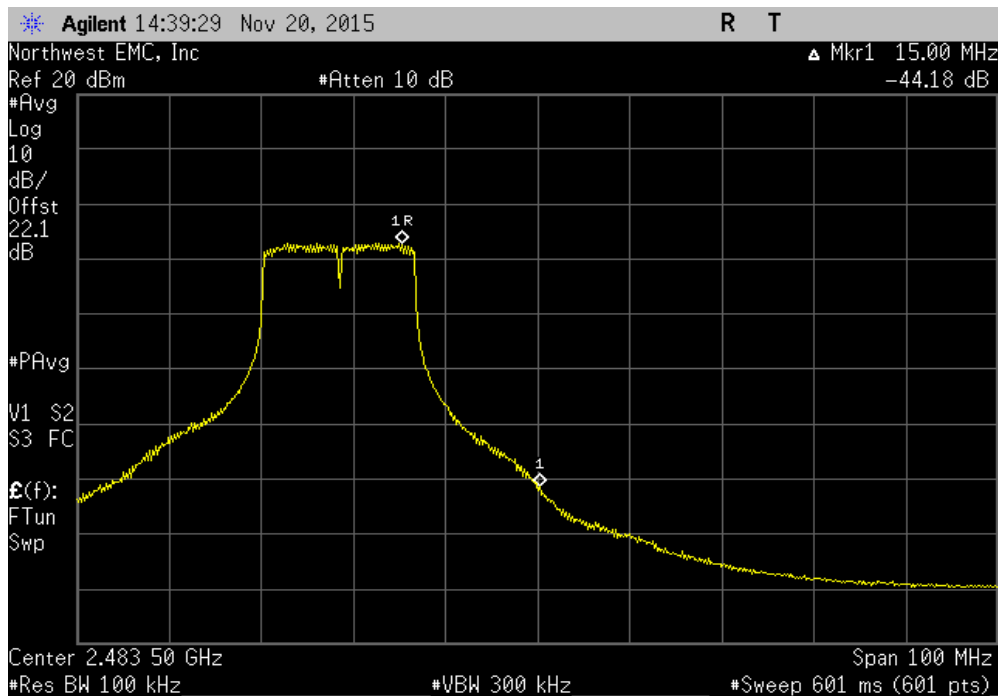


# BAND EDGE COMPLIANCE

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-30.26	-30	Pass

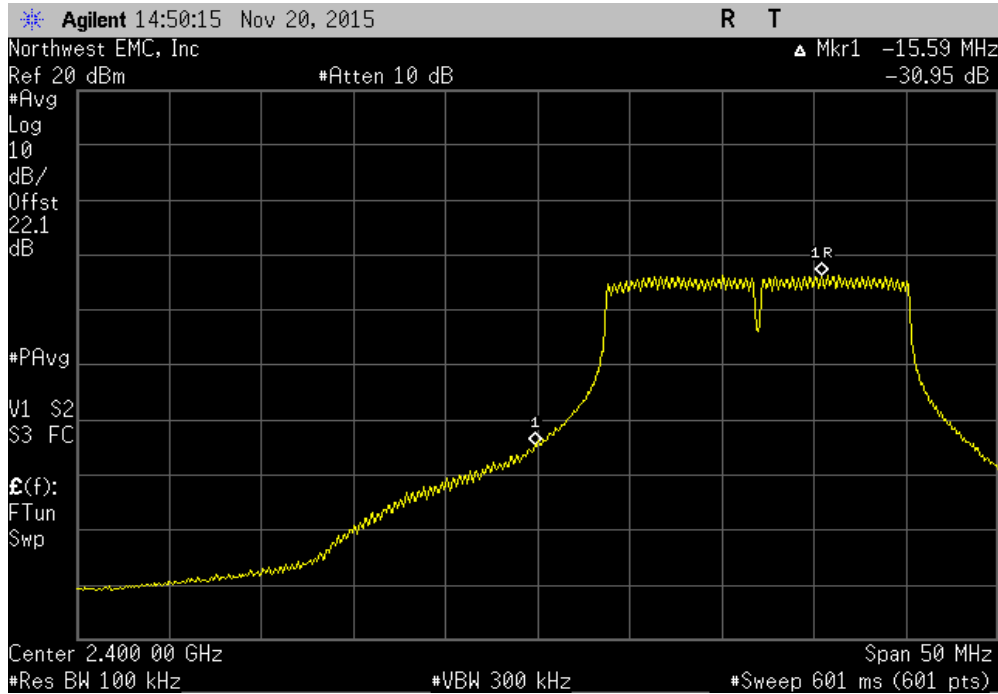


2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-44.18	-30	Pass

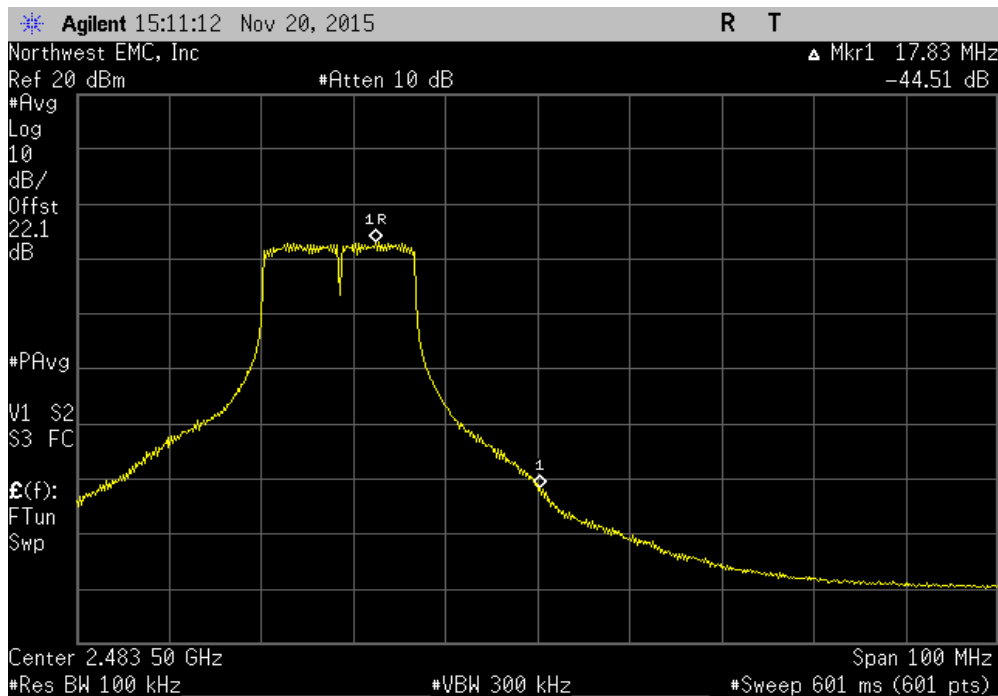


# BAND EDGE COMPLIANCE

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-30.95	-30	Pass

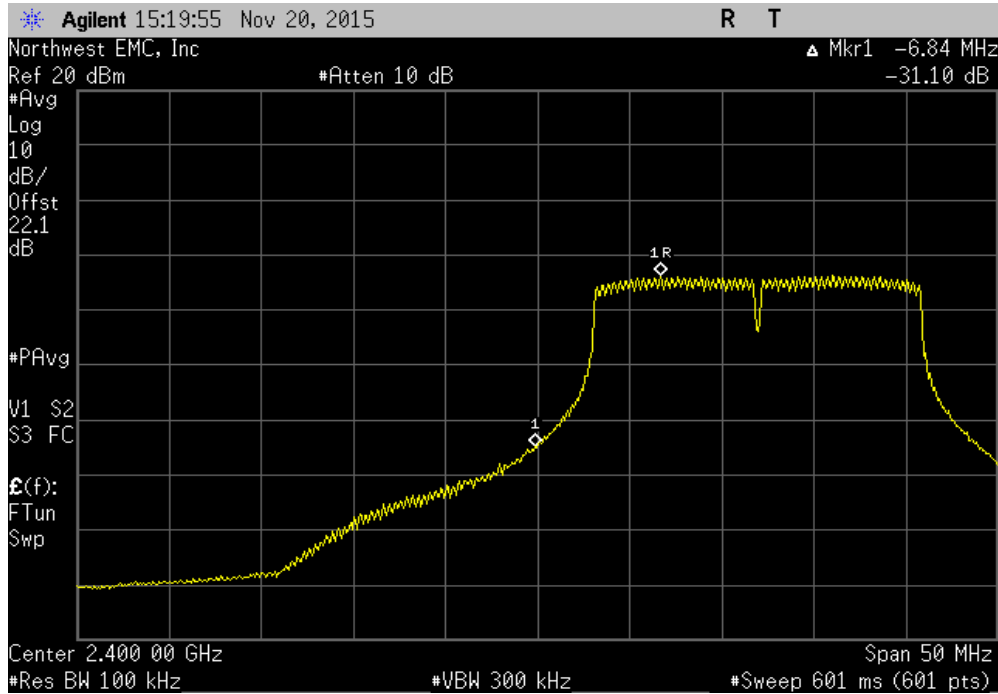


2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-44.51	-30	Pass

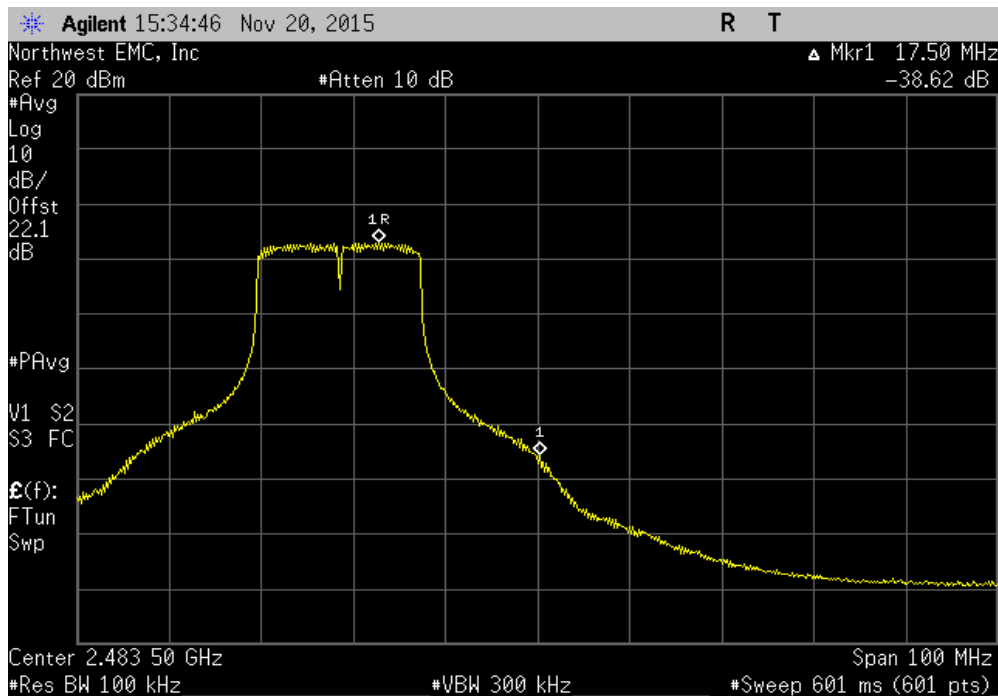


# BAND EDGE COMPLIANCE

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-31.1	-30	Pass

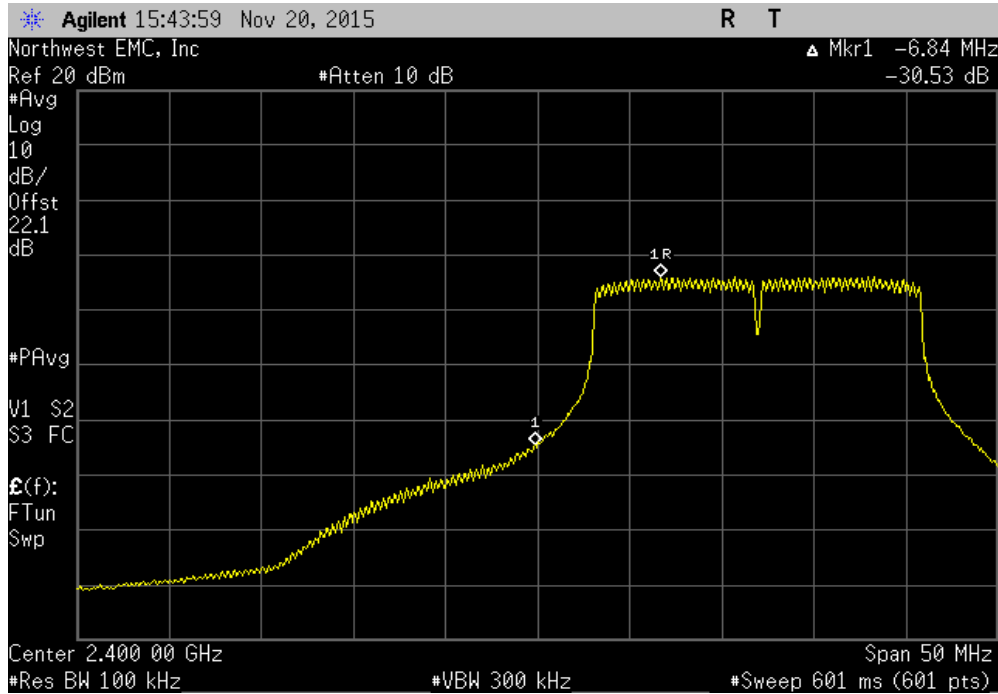


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-38.62	-30	Pass

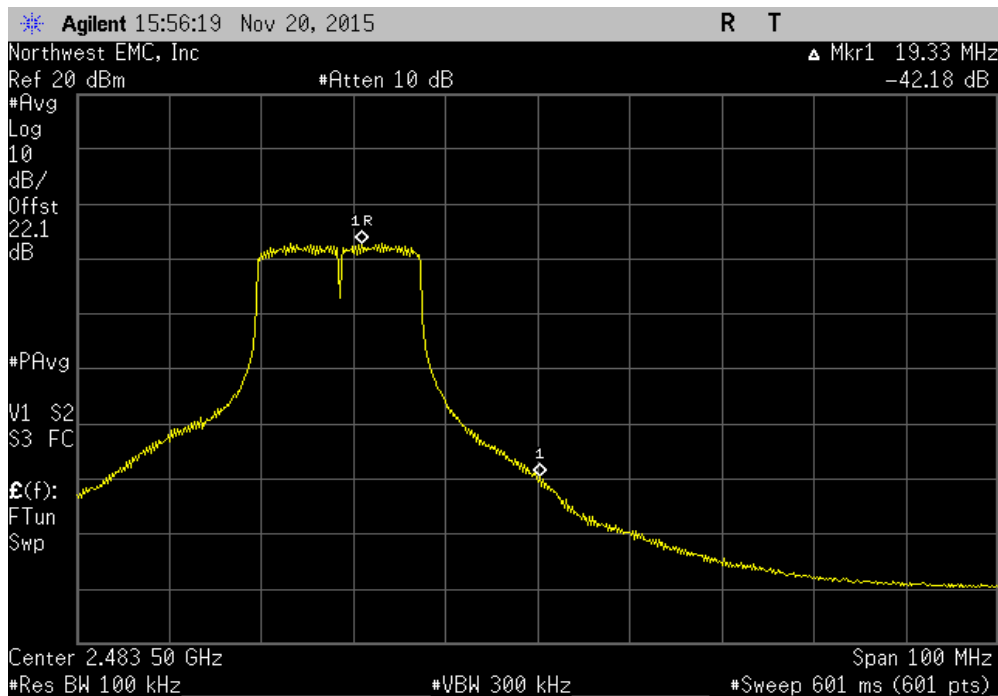


# BAND EDGE COMPLIANCE

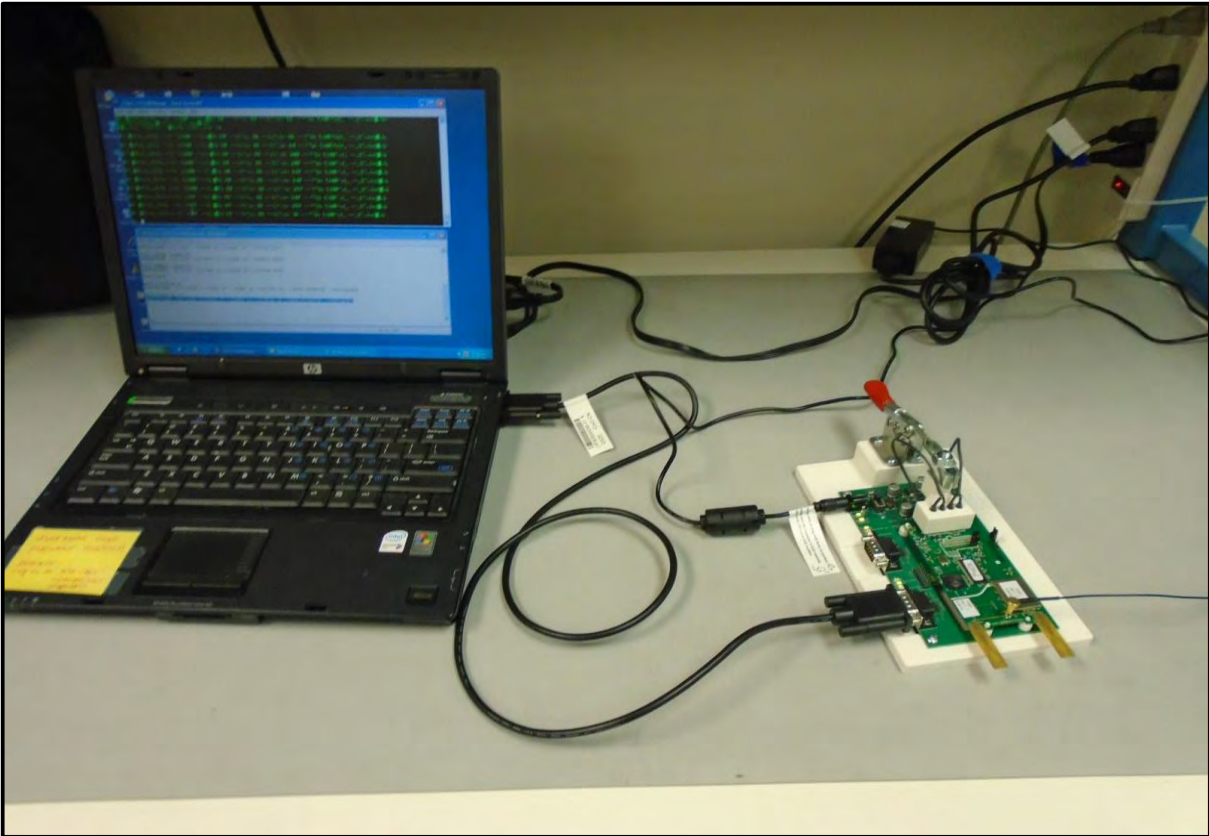
2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-30.53	-30	Pass



2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-42.18	-30	Pass



# BAND EDGE COMPLIANCE



# SPURIOUS CONDUCTED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	RFW	3/10/2015	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	36
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	4/20/2015	12

## TEST DESCRIPTION

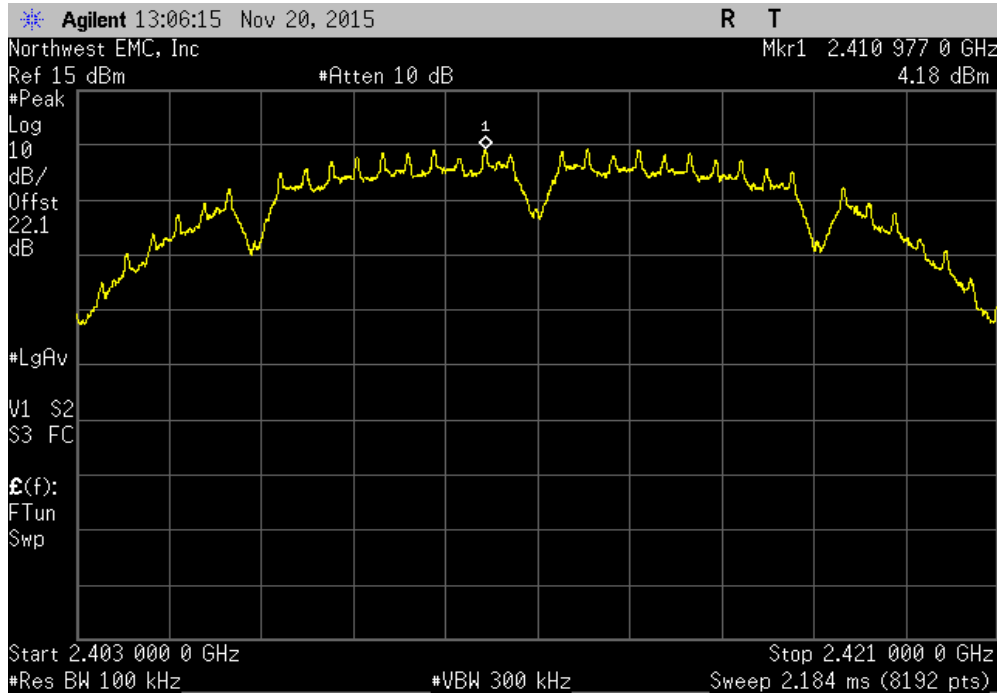
The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

# SPURIOUS CONDUCTED EMISSIONS

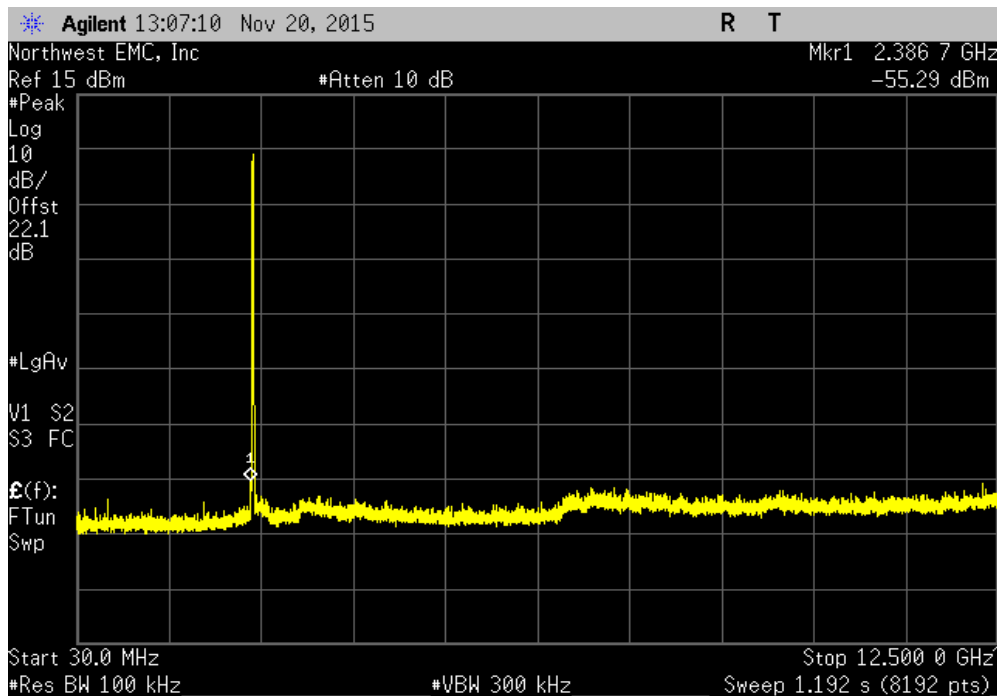
EUT: Sigma Pumps Gen IV 802.11abgn Module		Work Order: DGII0146	
Serial Number: None		Date: 11/20/15	
Customer: Digi International Inc		Temperature: 22.6°C	
Attendees: Slava Gehkt		Humidity: 23%	
Project: None		Barometric Pres.: 994.5	
Tested by: Trevor Buls		Power: 110VAC/60Hz	
		Job Site: MN08	
TEST SPECIFICATIONS			
FCC 15.247:2015		Test Method: ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	DGII0152-2	Signature: <i>Trevor Buls</i>	
		Frequency Range	Max Value (dBc) Limit ≤ (dBc) Result
2400 MHz - 2483.5 MHz Band			
802.11(b) 1 Mbps			
	Low Channel 1, 2412 MHz	Fundamental	N/A N/A N/A
	Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	-59.47 -20 Pass
	Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	-56.48 -20 Pass
	Mid Channel 6, 2437 MHz	Fundamental	N/A N/A N/A
	Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	-60.88 -20 Pass
	Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	-56.48 -20 Pass
	High Channel 11, 2462 MHz	Fundamental	N/A N/A N/A
	High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	-60.79 -20 Pass
	High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	-56.46 -20 Pass
802.11(b) 11 Mbps			
	Low Channel 1, 2412 MHz	Fundamental	N/A N/A N/A
	Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	-60.47 -20 Pass
	Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	-56.67 -20 Pass
	Mid Channel 6, 2437 MHz	Fundamental	N/A N/A N/A
	Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	-60.68 -20 Pass
	Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	-56 -20 Pass
	High Channel 11, 2462 MHz	Fundamental	N/A N/A N/A
	High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	-60.26 -20 Pass
	High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	-56.49 -20 Pass
802.11(g) 6 Mbps			
	Low Channel 1, 2412 MHz	Fundamental	N/A N/A N/A
	Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	-38.64 -20 Pass
	Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	-52.05 -20 Pass
	Mid Channel 6, 2437 MHz	Fundamental	N/A N/A N/A
	Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	-56.71 -20 Pass
	Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	-52.06 -20 Pass
	High Channel 11, 2462 MHz	Fundamental	N/A N/A N/A
	High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	-56.41 -20 Pass
	High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	-52.62 -20 Pass
802.11(g) 36 Mbps			
	Low Channel 1, 2412 MHz	Fundamental	N/A N/A N/A
	Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	-40.7 -20 Pass
	Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	-53.97 -20 Pass
	Mid Channel 6, 2437 MHz	Fundamental	N/A N/A N/A
	Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	-56.98 -20 Pass
	Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	-53.35 -20 Pass
	High Channel 11, 2462 MHz	Fundamental	N/A N/A N/A
	High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	-57.24 -20 Pass
	High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	-53.26 -20 Pass
802.11(g) 54 Mbps			
	Low Channel 1, 2412 MHz	Fundamental	N/A N/A N/A
	Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	-40.86 -20 Pass
	Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	-53.99 -20 Pass
	Mid Channel 6, 2437 MHz	Fundamental	N/A N/A N/A
	Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	-58.91 -20 Pass
	Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	-54.95 -20 Pass
	High Channel 11, 2462 MHz	Fundamental	N/A N/A N/A
	High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	-58.03 -20 Pass
	High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	-53.7 -20 Pass
802.11(n) MCS0			
	Low Channel 1, 2412 MHz	Fundamental	N/A N/A N/A
	Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	-39.91 -20 Pass
	Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	-51.83 -20 Pass
	Mid Channel 6, 2437 MHz	Fundamental	N/A N/A N/A
	Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	-56.34 -20 Pass
	Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	-52.19 -20 Pass
	High Channel 11, 2462 MHz	Fundamental	N/A N/A N/A
	High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	-56.24 -20 Pass
	High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	-52.21 -20 Pass
802.11(n) MCS7			
	Low Channel 1, 2412 MHz	Fundamental	N/A N/A N/A
	Low Channel 1, 2412 MHz	30 MHz - 12.5 GHz	-39.38 -20 Pass
	Low Channel 1, 2412 MHz	12.5 GHz - 25 GHz	-54.05 -20 Pass
	Mid Channel 6, 2437 MHz	Fundamental	N/A N/A N/A
	Mid Channel 6, 2437 MHz	30 MHz - 12.5 GHz	-58.17 -20 Pass
	Mid Channel 6, 2437 MHz	12.5 GHz - 25 GHz	-53.63 -20 Pass
	High Channel 11, 2462 MHz	Fundamental	N/A N/A N/A
	High Channel 11, 2462 MHz	30 MHz - 12.5 GHz	-57.52 -20 Pass
	High Channel 11, 2462 MHz	12.5 GHz - 25 GHz	-53.37 -20 Pass

# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		N/A	N/A	N/A	



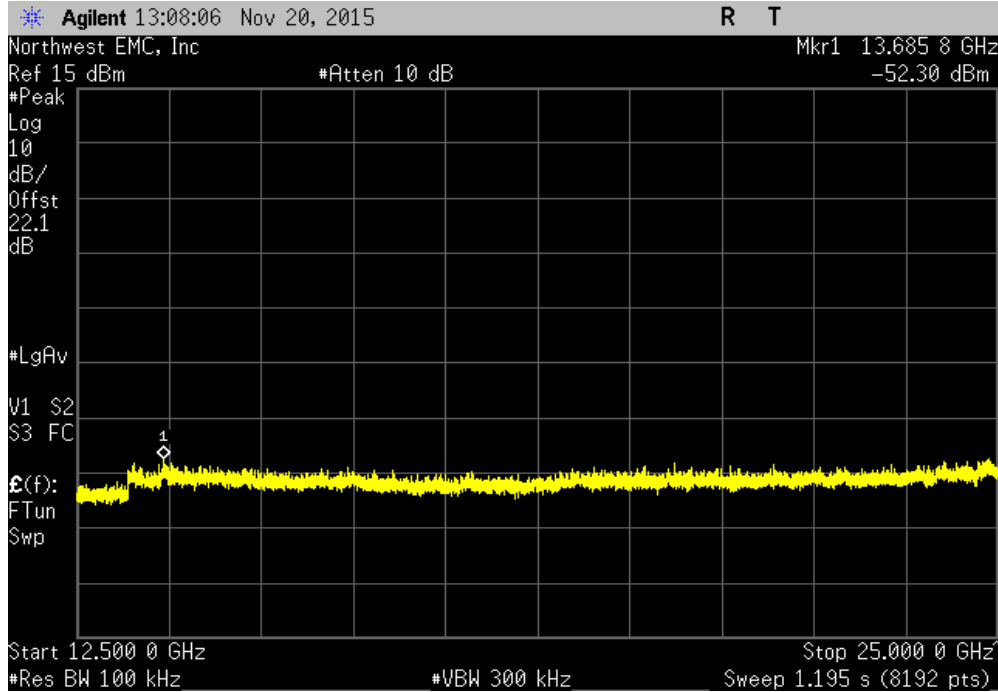
2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-59.47	-20	Pass	



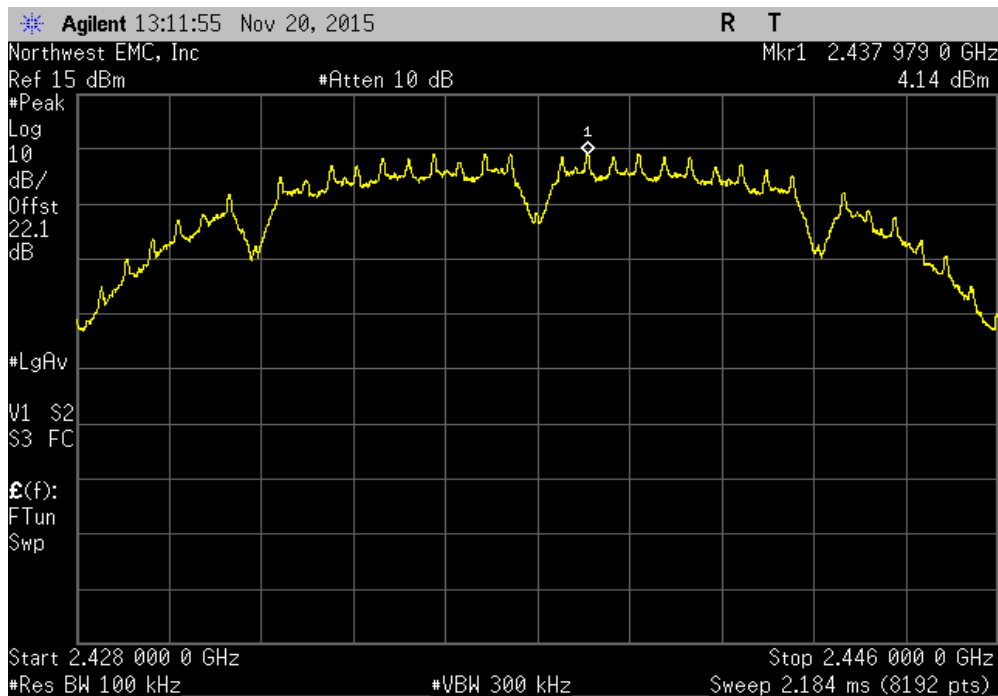


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-56.48	-20	Pass	

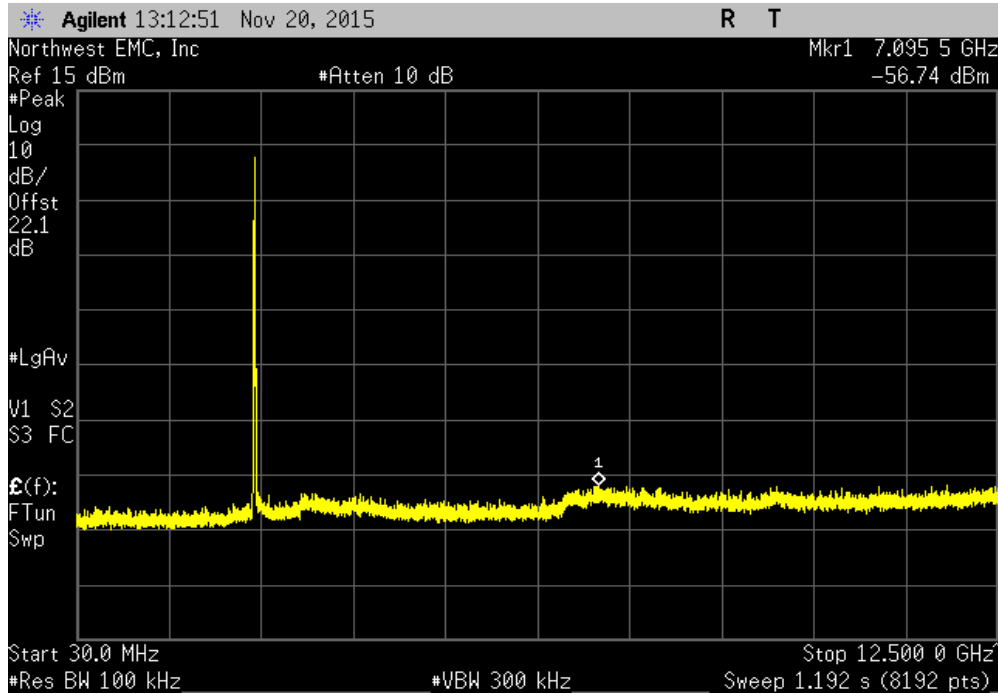


2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

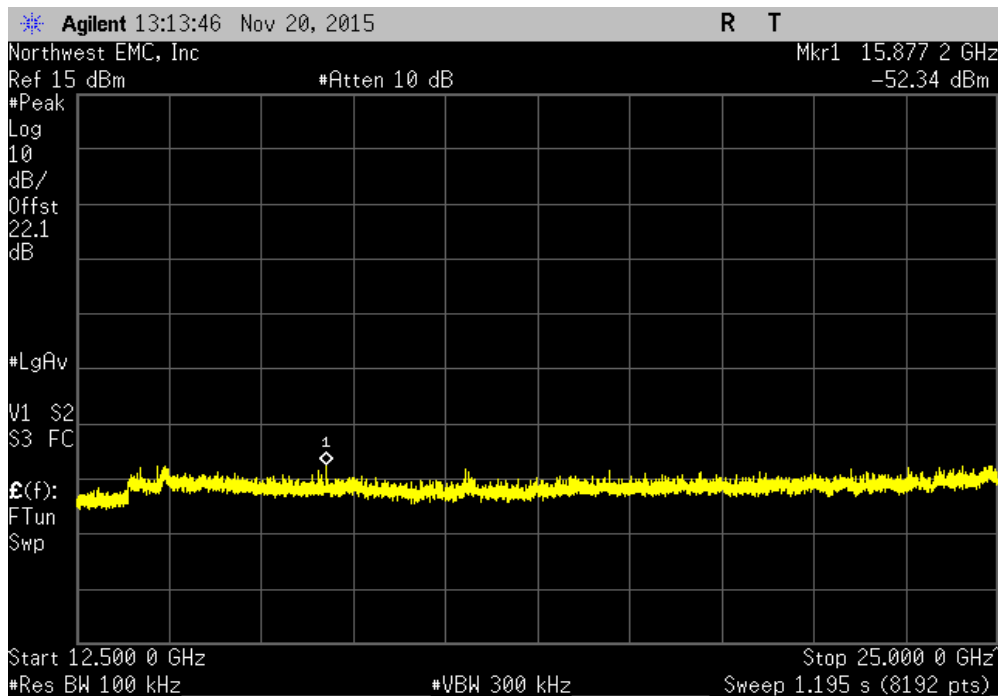


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-60.88	-20	Pass	

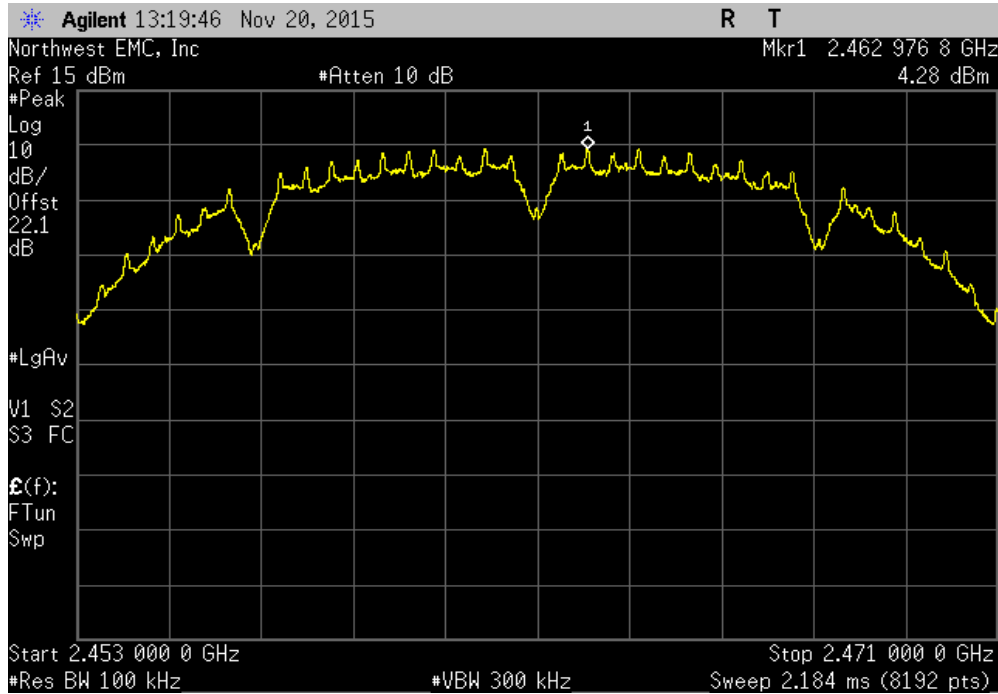


2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-56.48	-20	Pass	

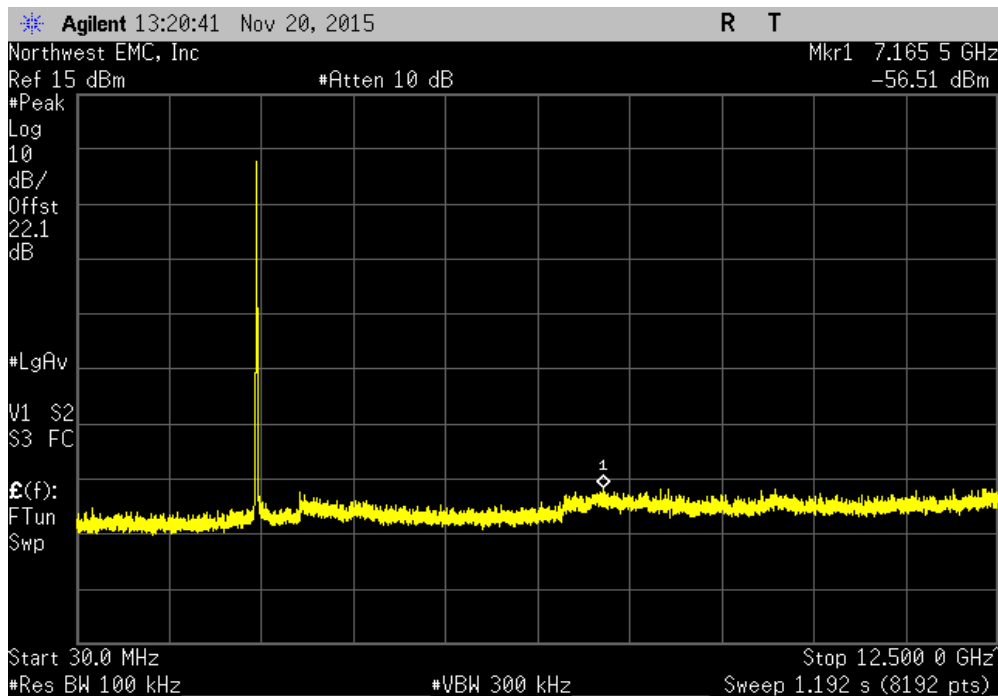


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		N/A	N/A	N/A	

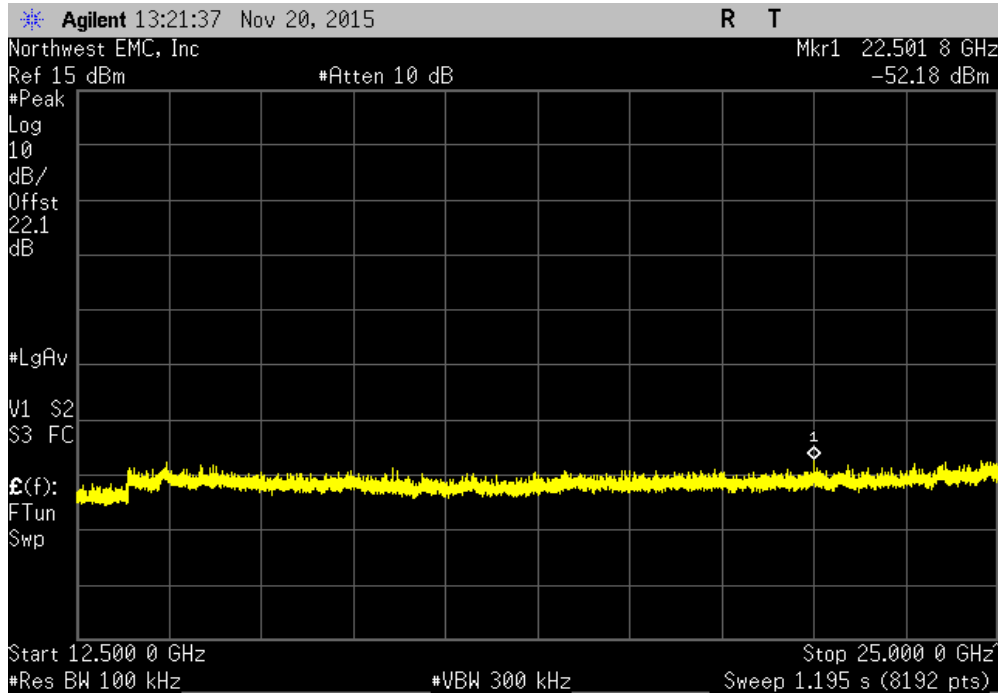


2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-60.79	-20	Pass	

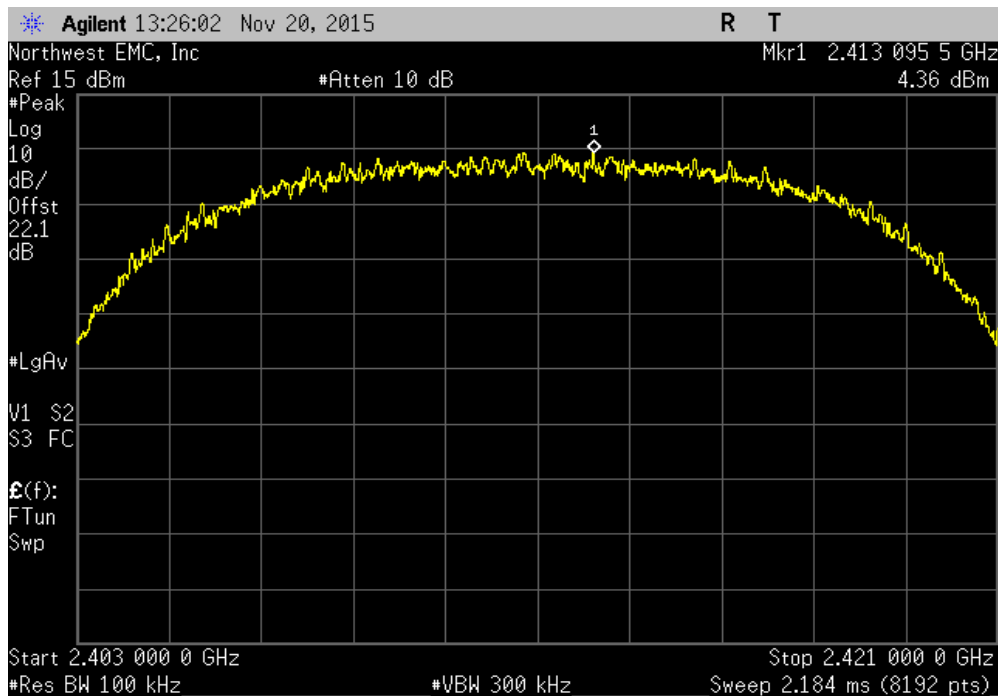


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(b) 1 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-56.46	-20	Pass	

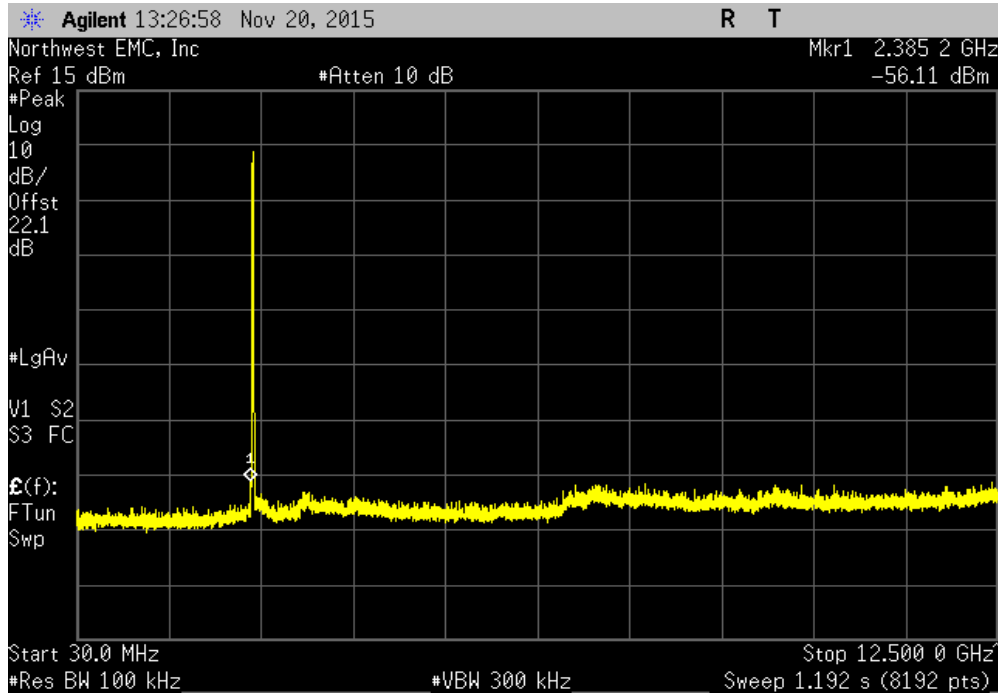


2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

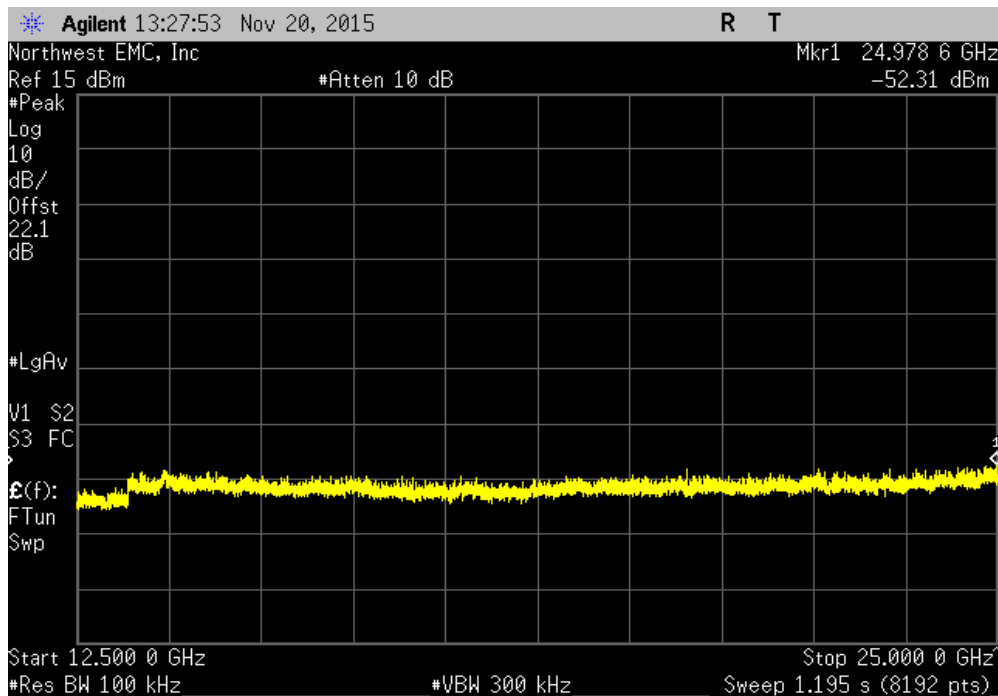


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-60.47	-20	Pass	

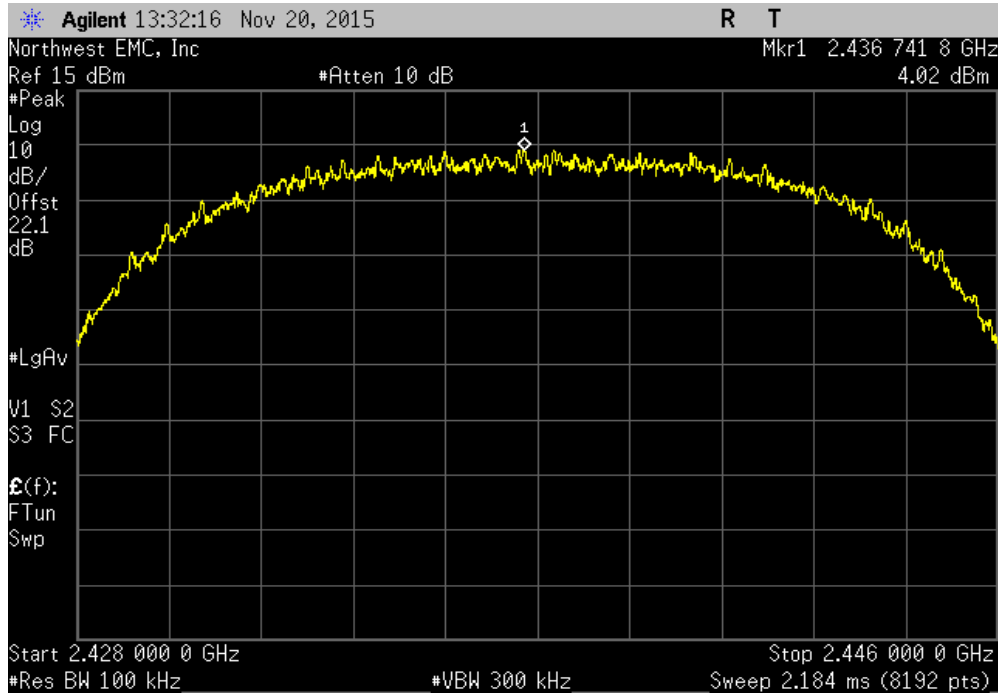


2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-56.67	-20	Pass	

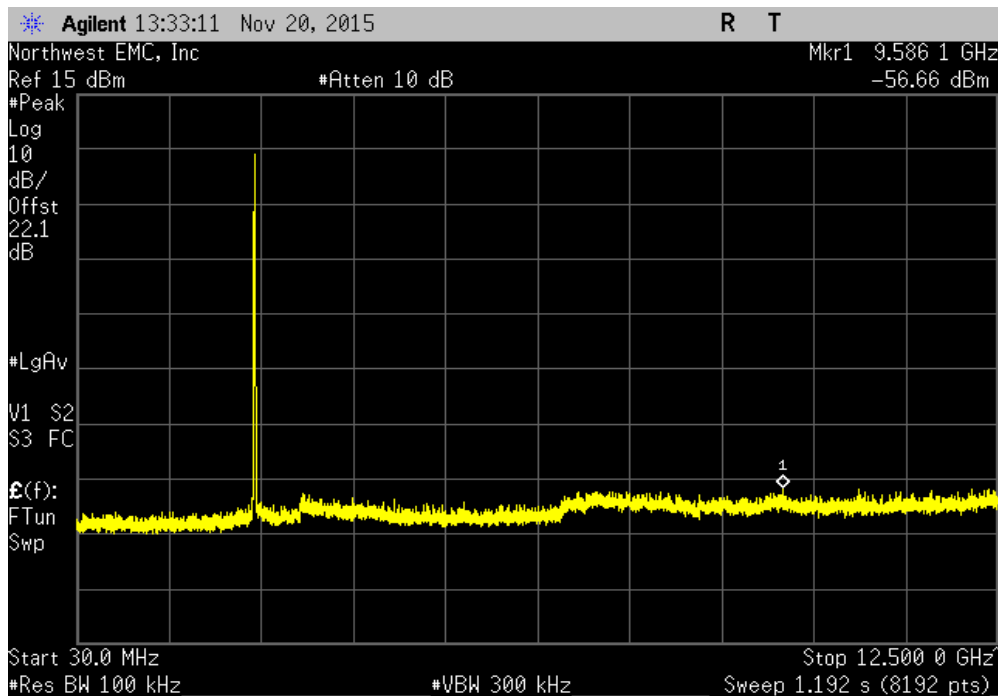


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		N/A	N/A	N/A	

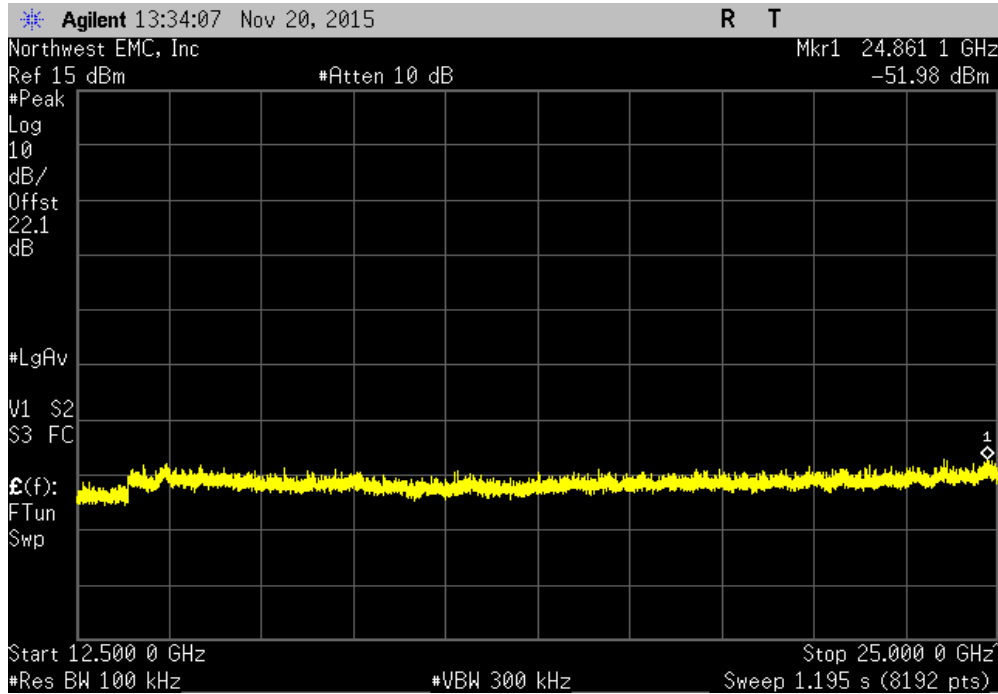


2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-60.68	-20	Pass	

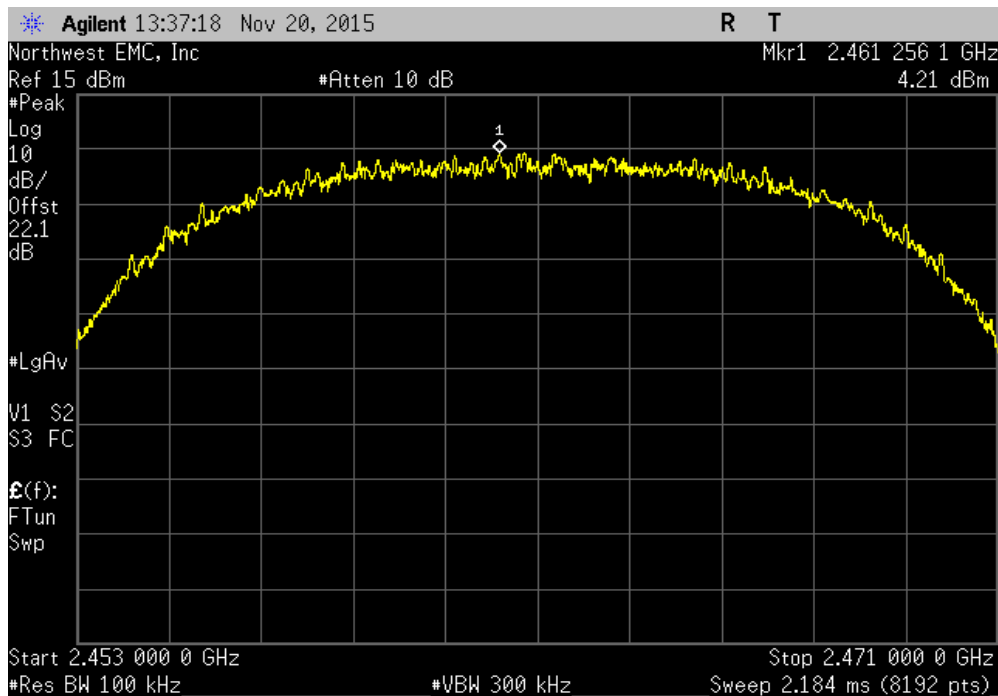


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-56	-20	Pass	

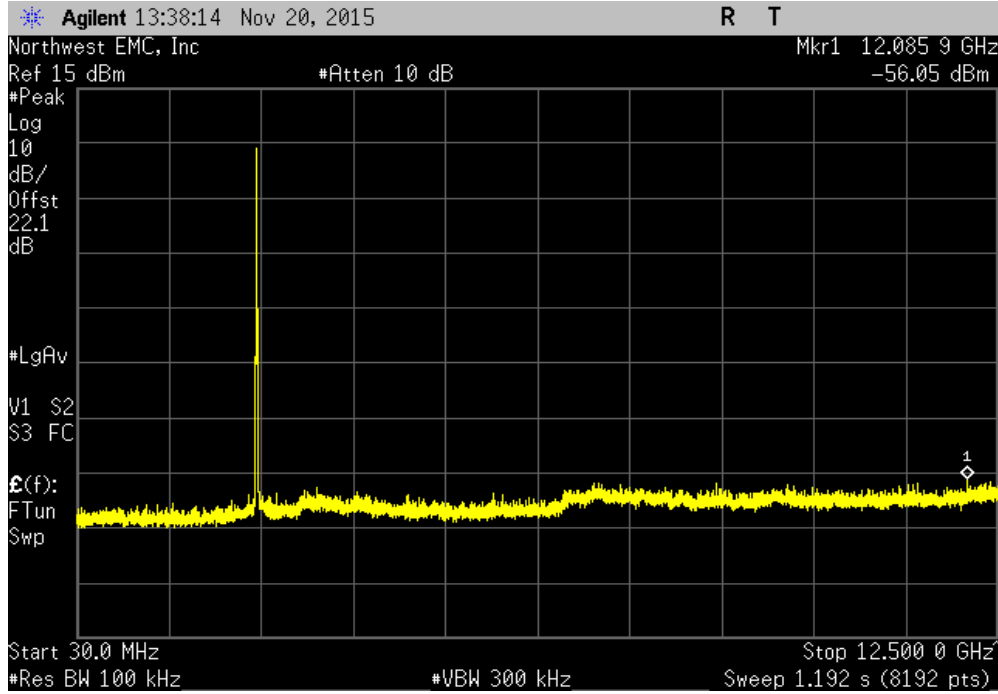


2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

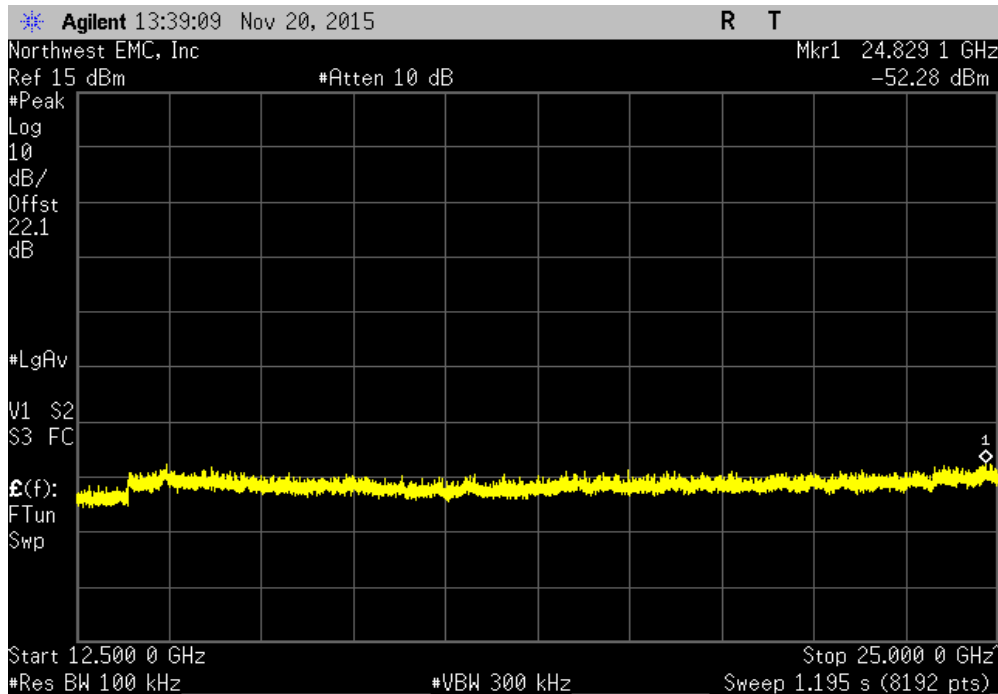


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-60.26	-20	Pass	



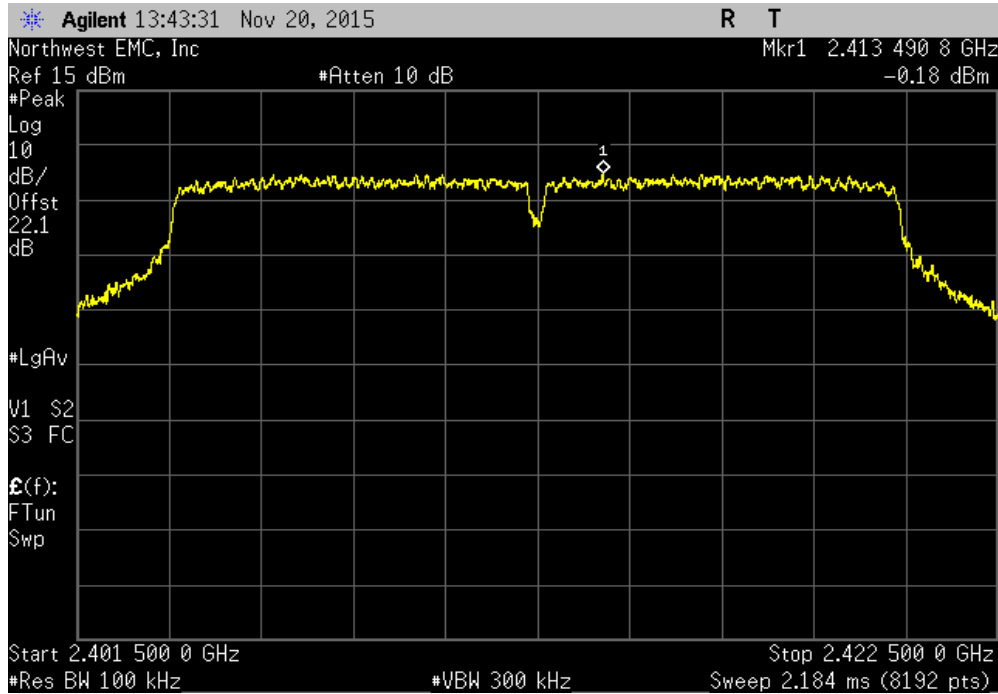
2400 MHz - 2483.5 MHz Band, 802.11(b) 11 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-56.49	-20	Pass	



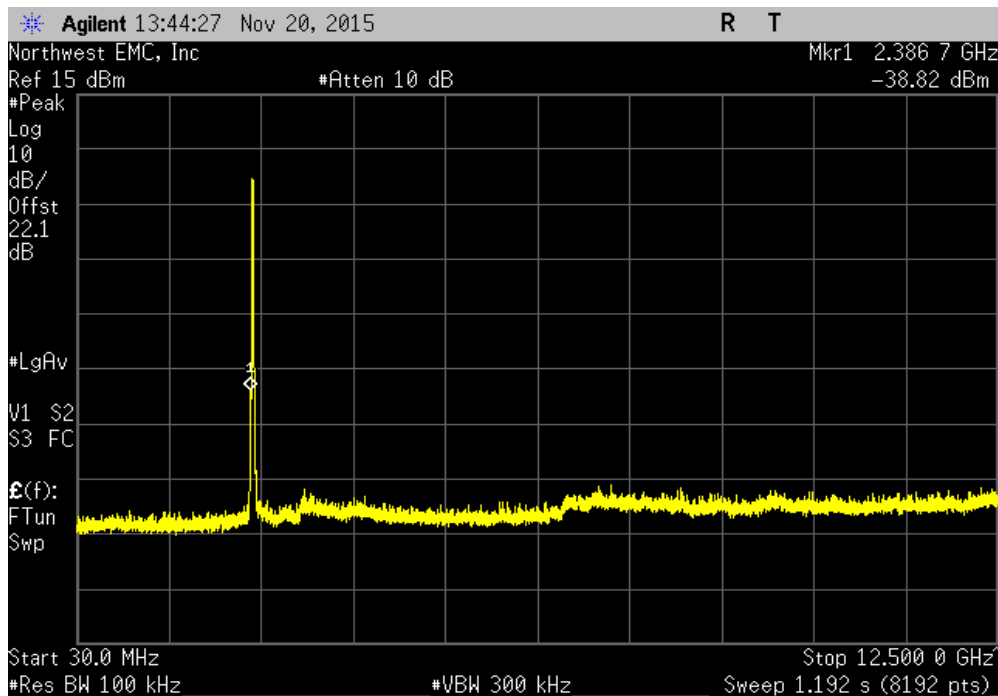


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		N/A	N/A	N/A	

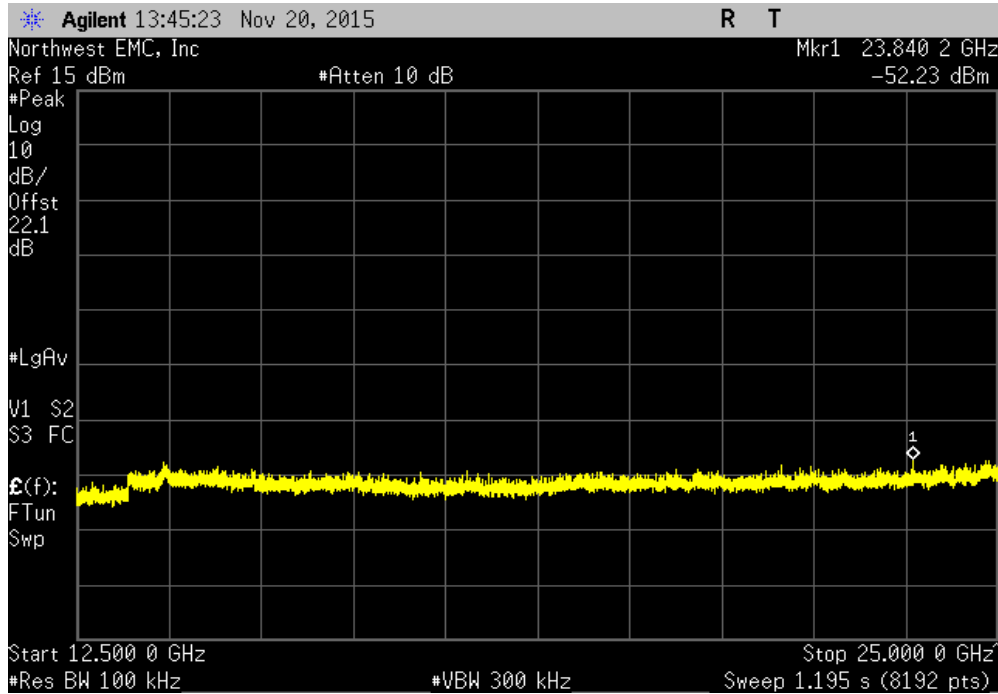


2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-38.64	-20	Pass	

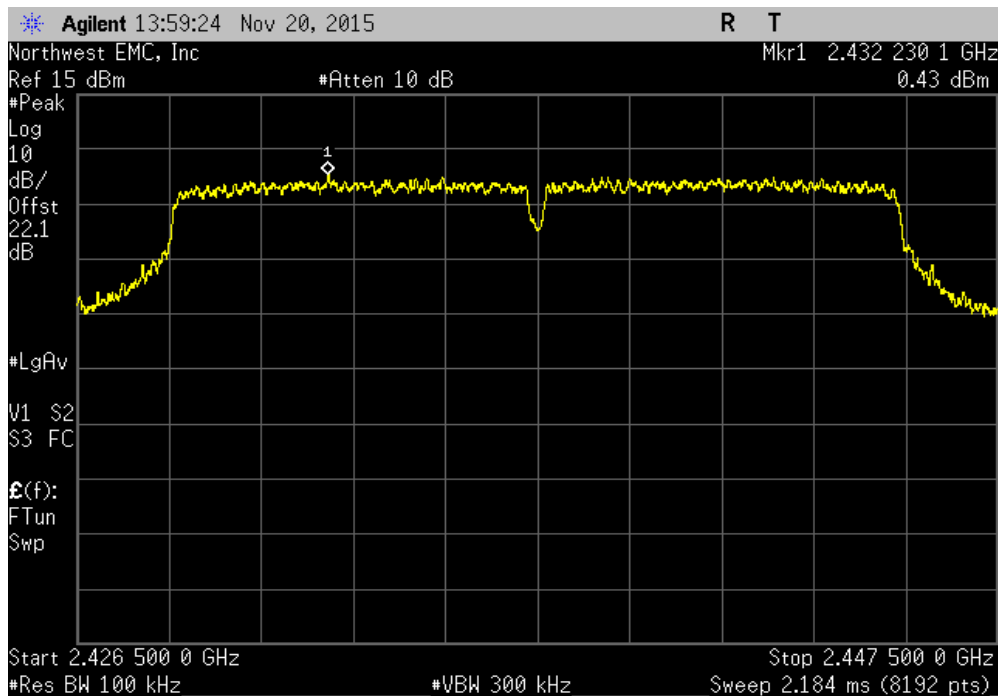


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-52.05	-20	Pass	

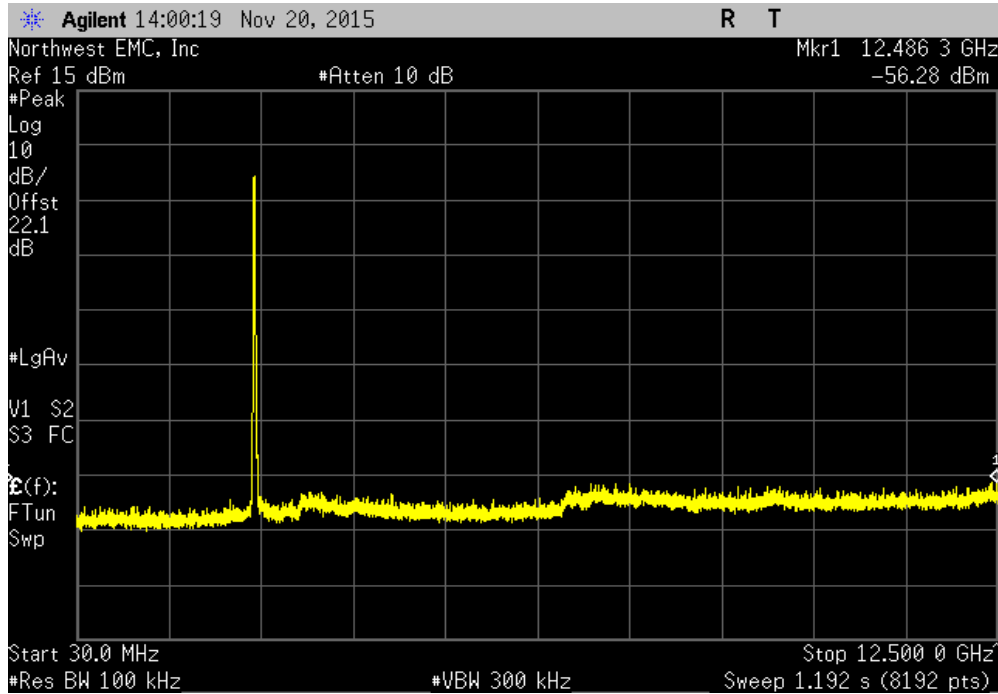


2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

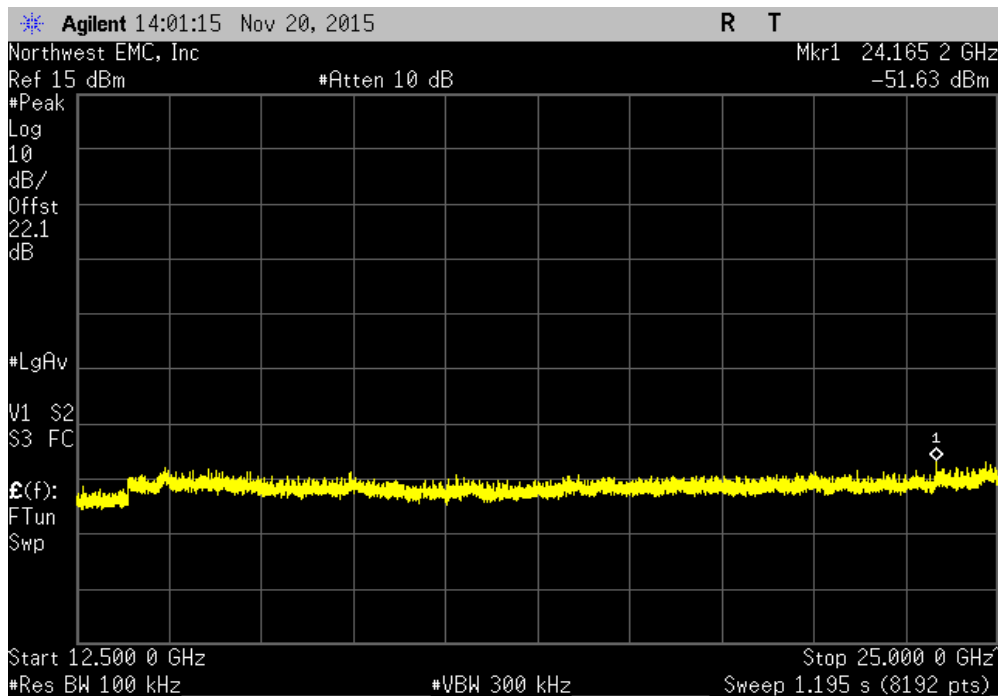


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-56.71	-20	Pass	

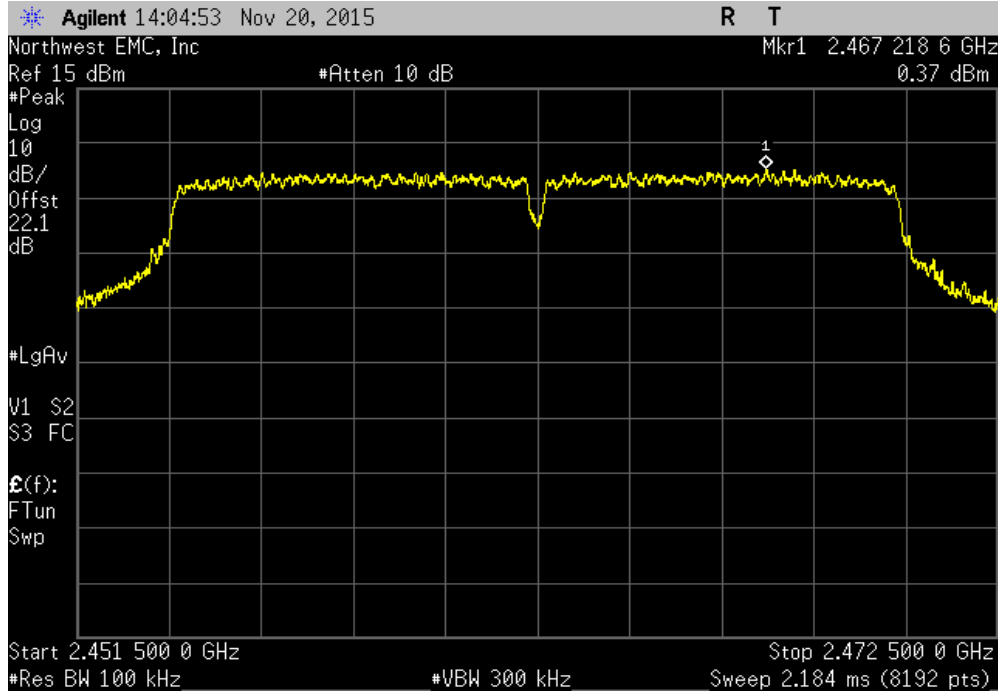


2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-52.06	-20	Pass	

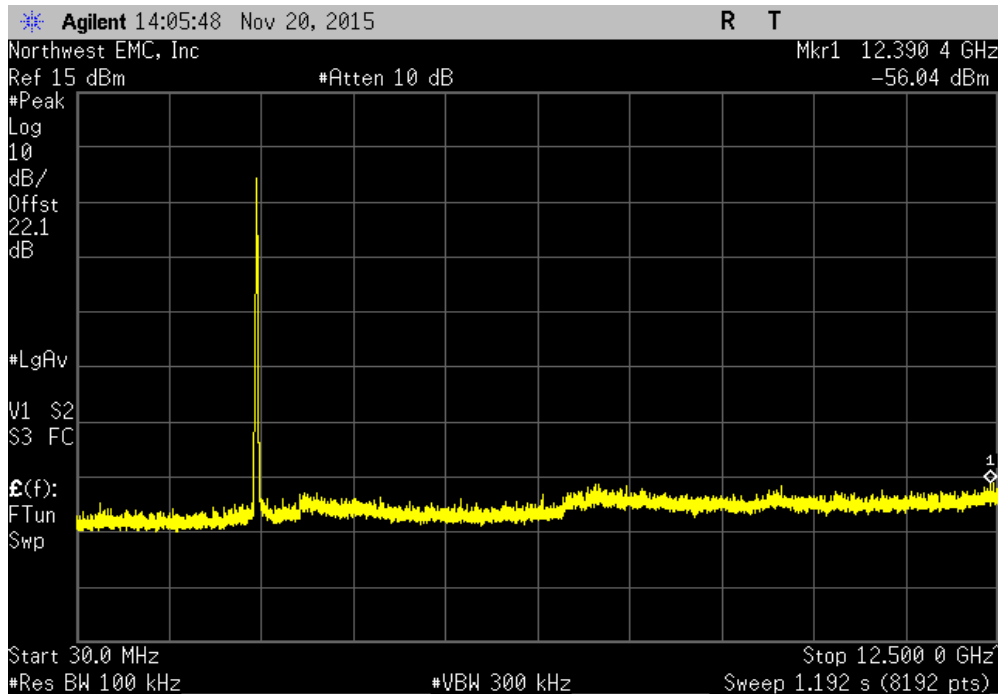


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		N/A	N/A	N/A	

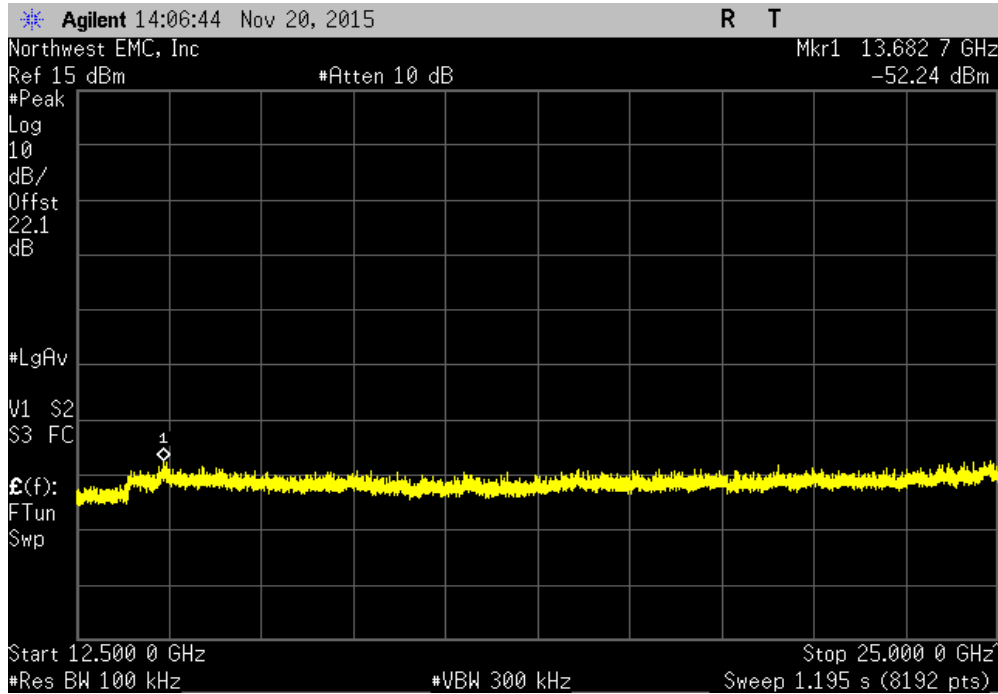


2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-56.41	-20	Pass	

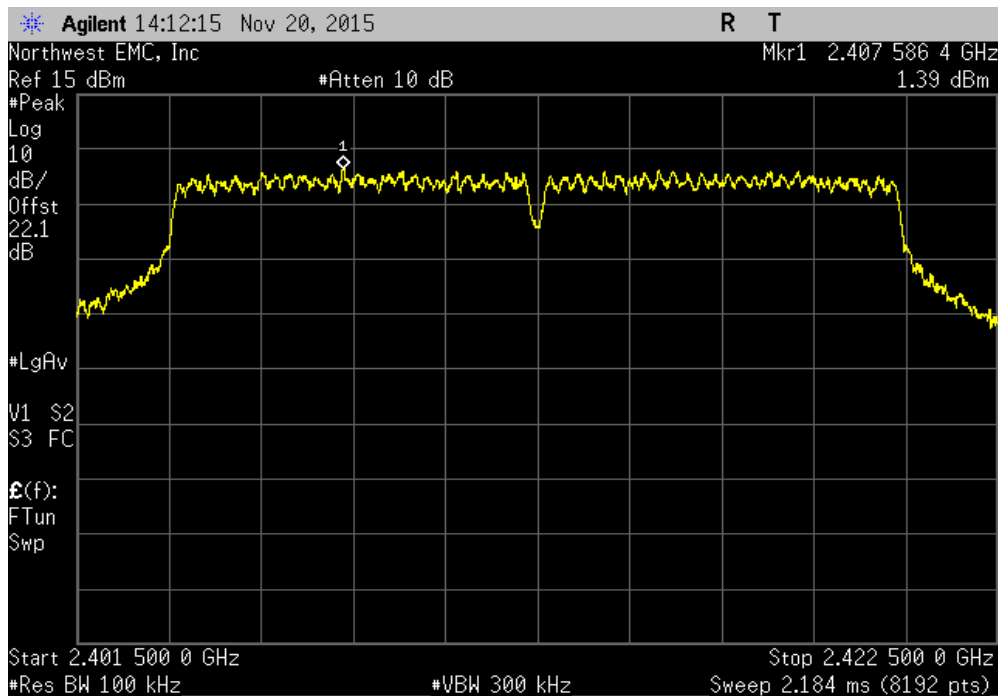


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 6 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-52.62	-20	Pass	

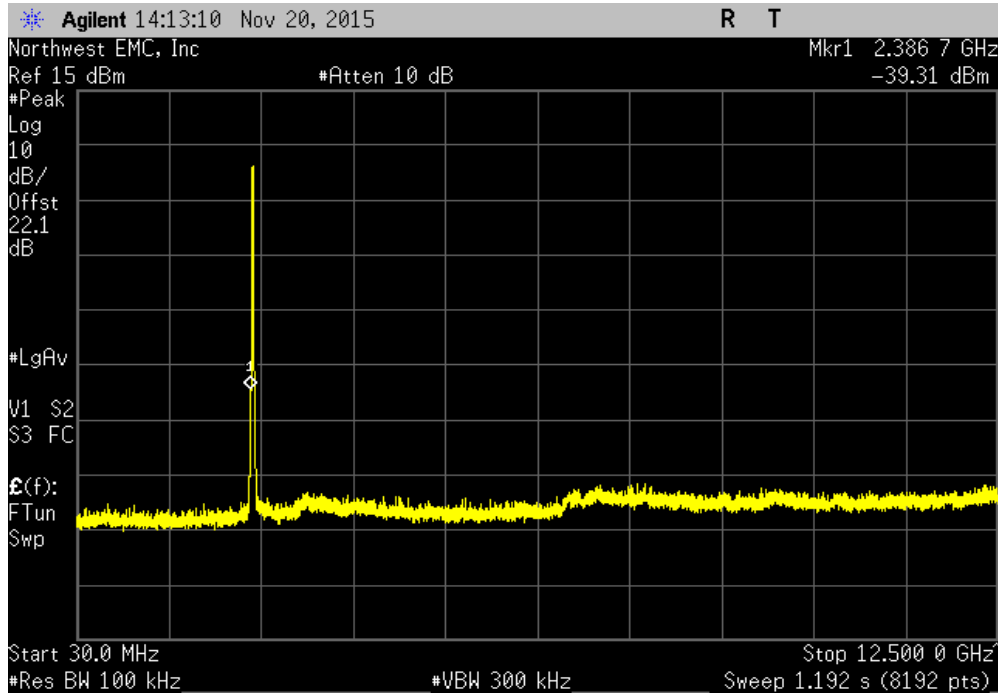


2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

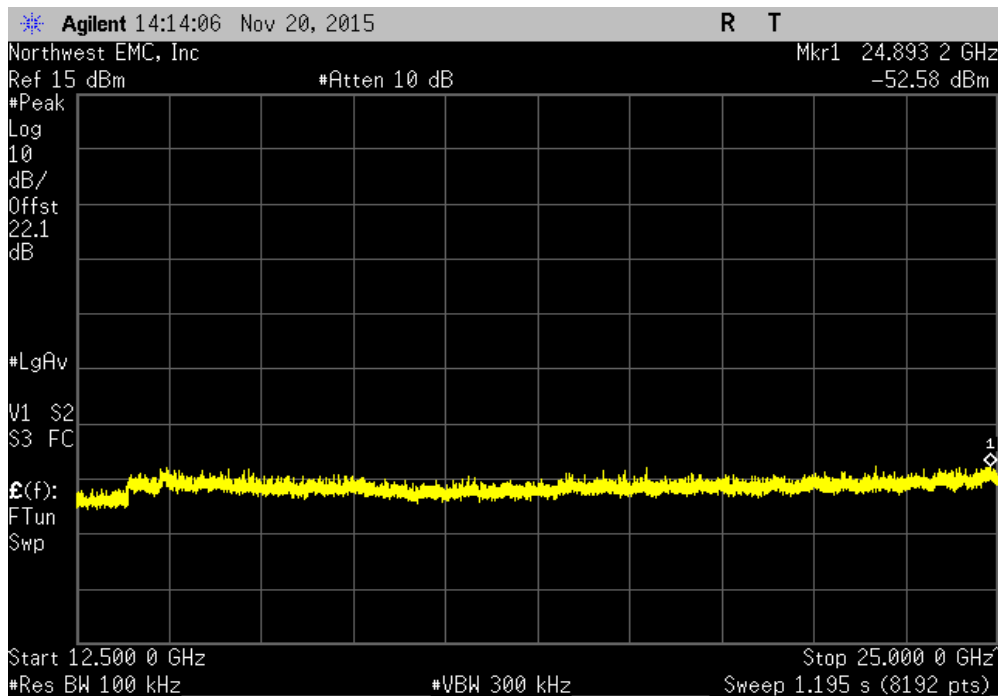


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-40.7	-20	Pass	

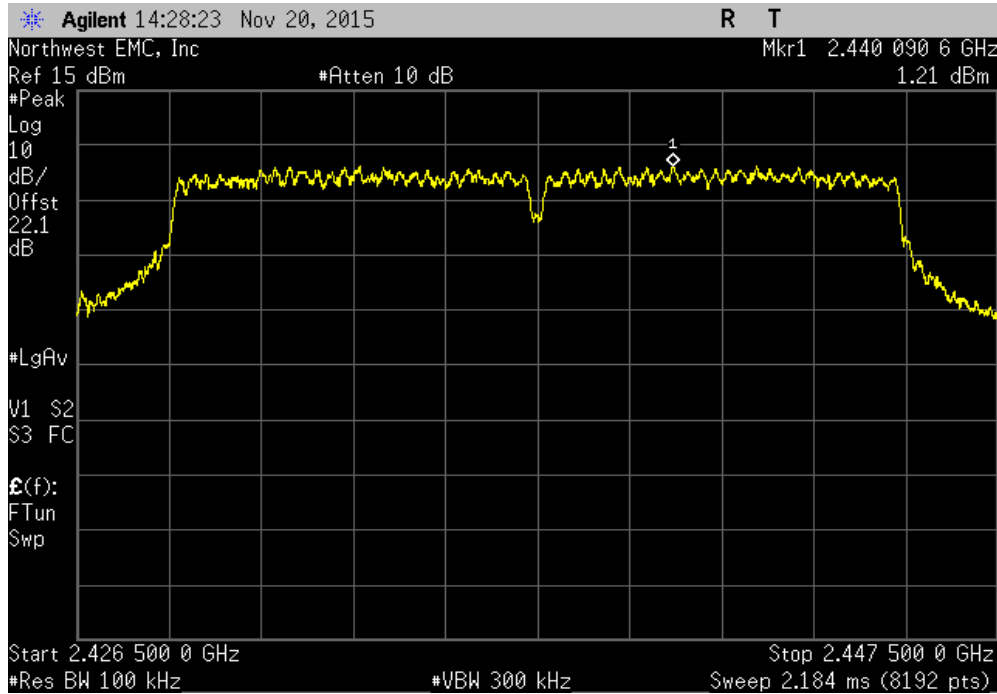


2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-53.97	-20	Pass	

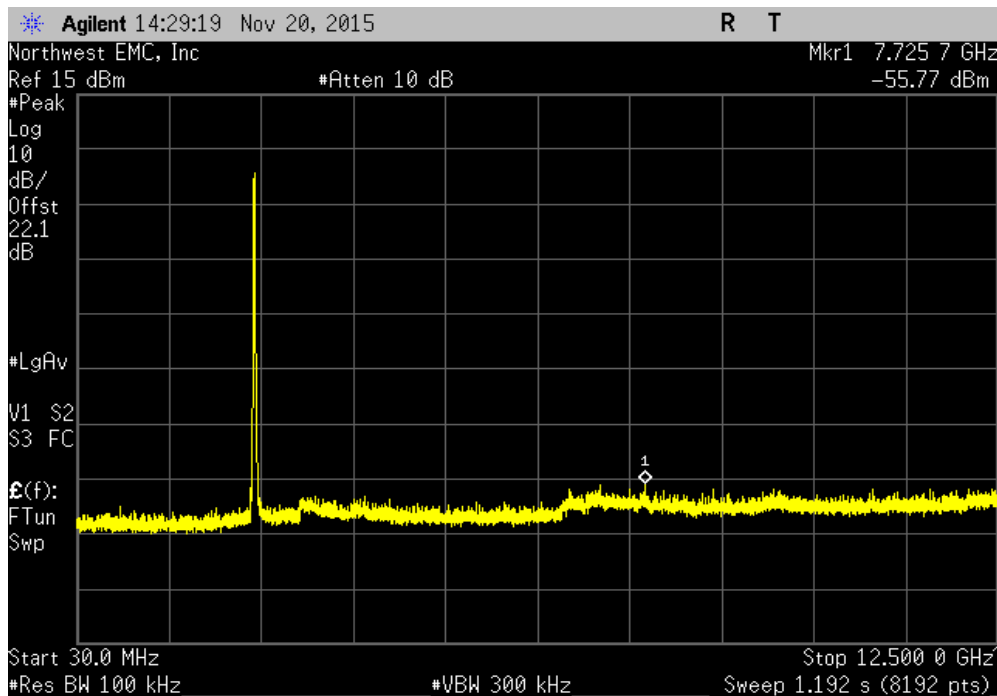


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		N/A	N/A	N/A	

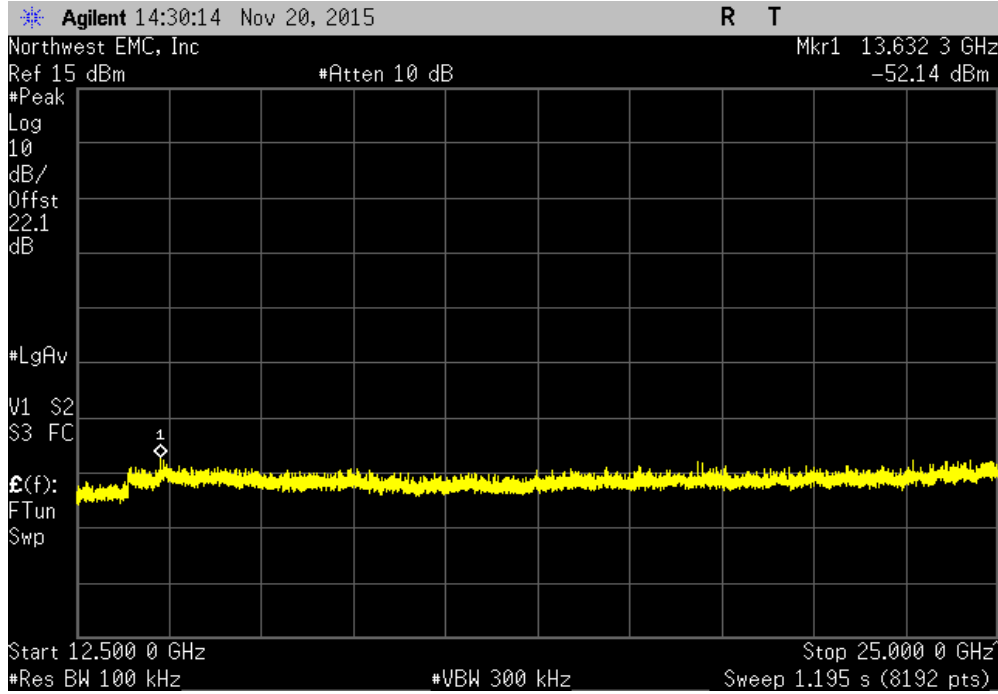


2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-56.98	-20	Pass	

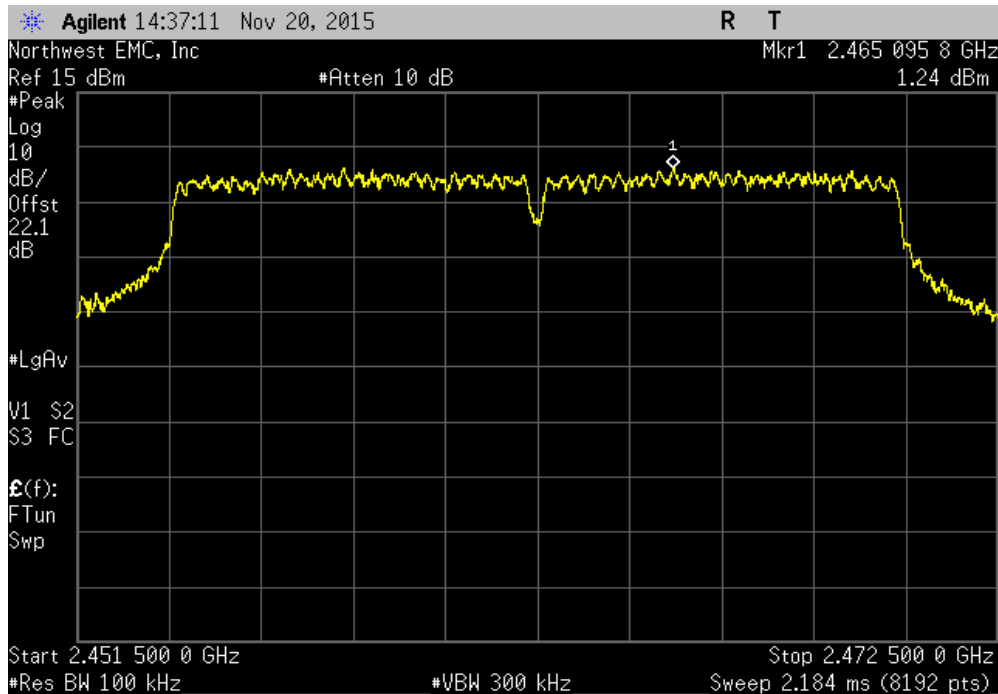


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-53.35	-20	Pass	



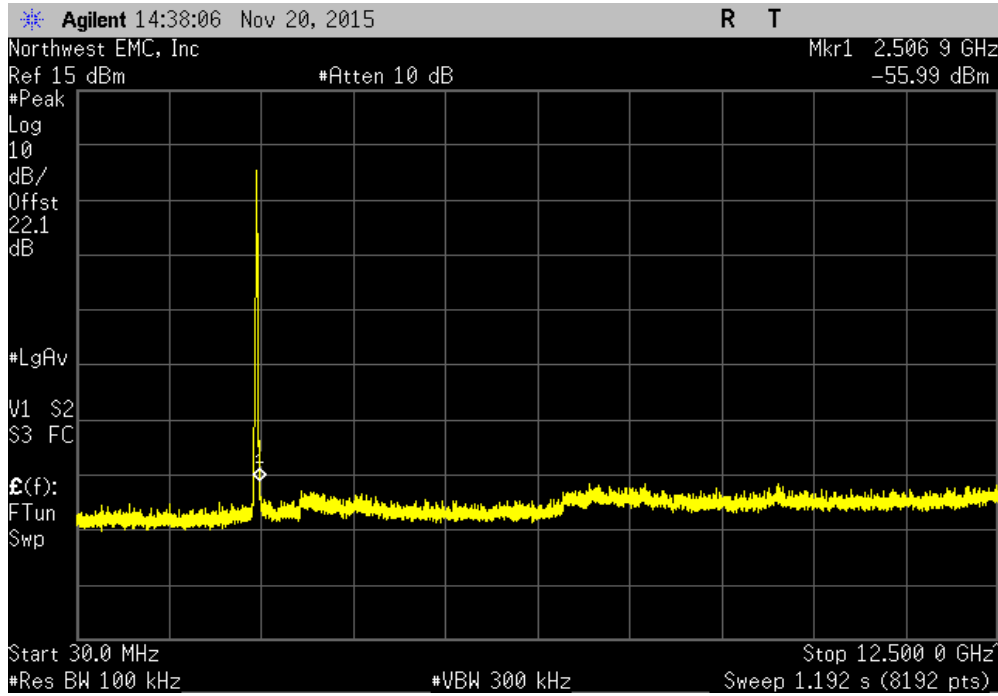
2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	



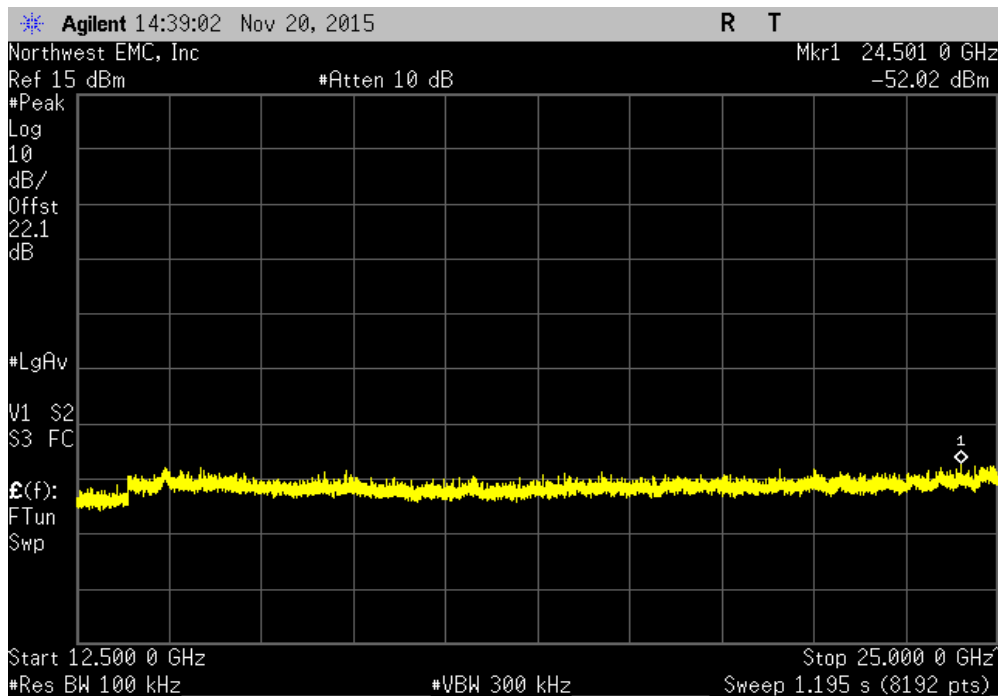


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-57.24	-20	Pass	

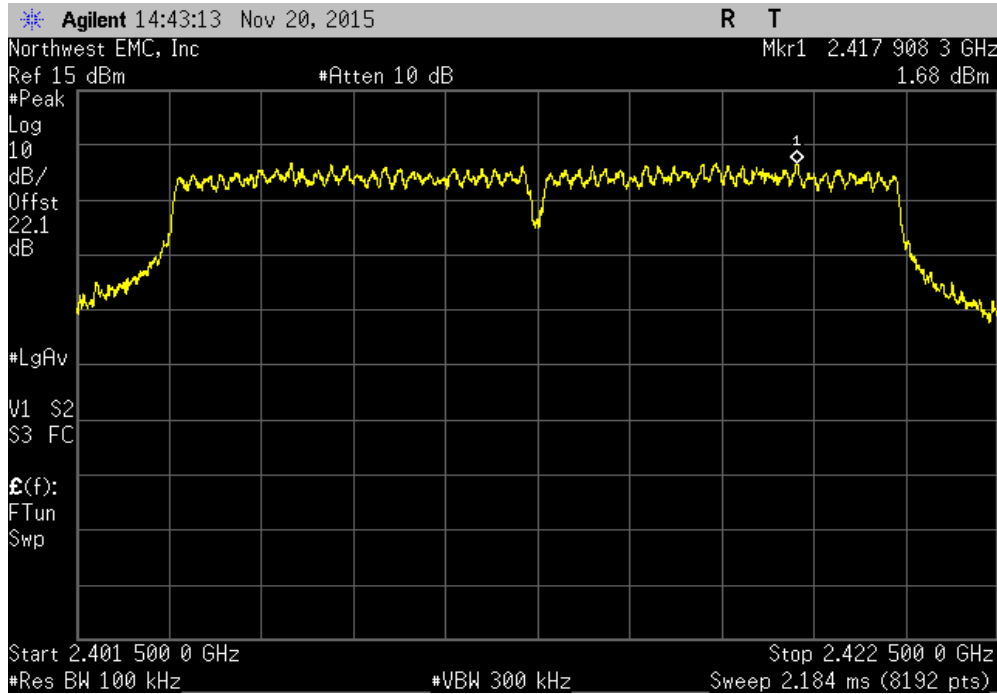


2400 MHz - 2483.5 MHz Band, 802.11(g) 36 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-53.26	-20	Pass	

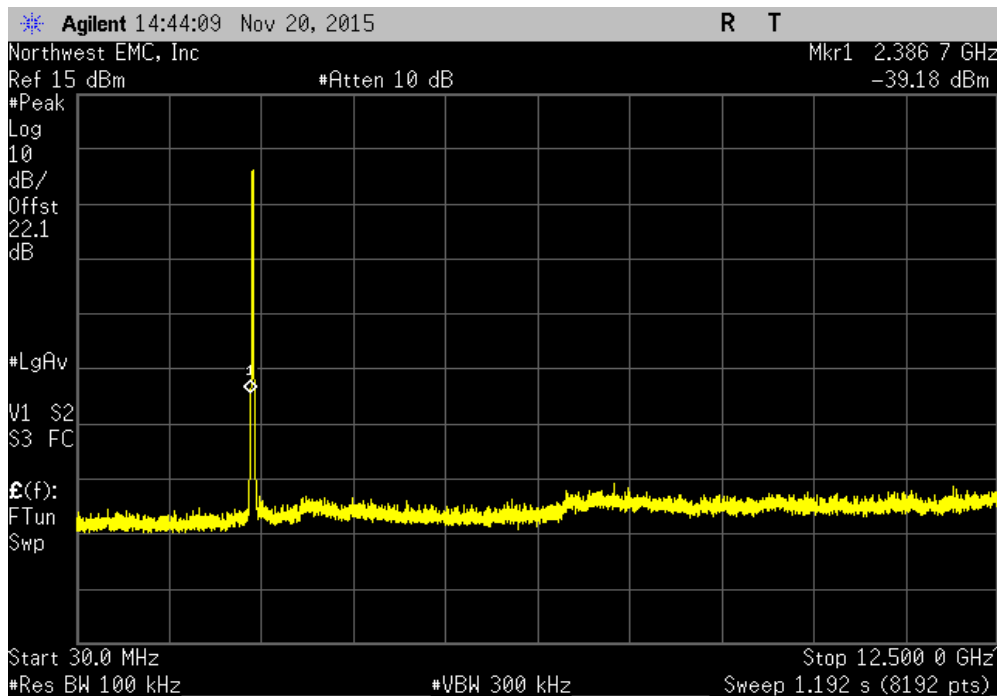


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		N/A	N/A	N/A	

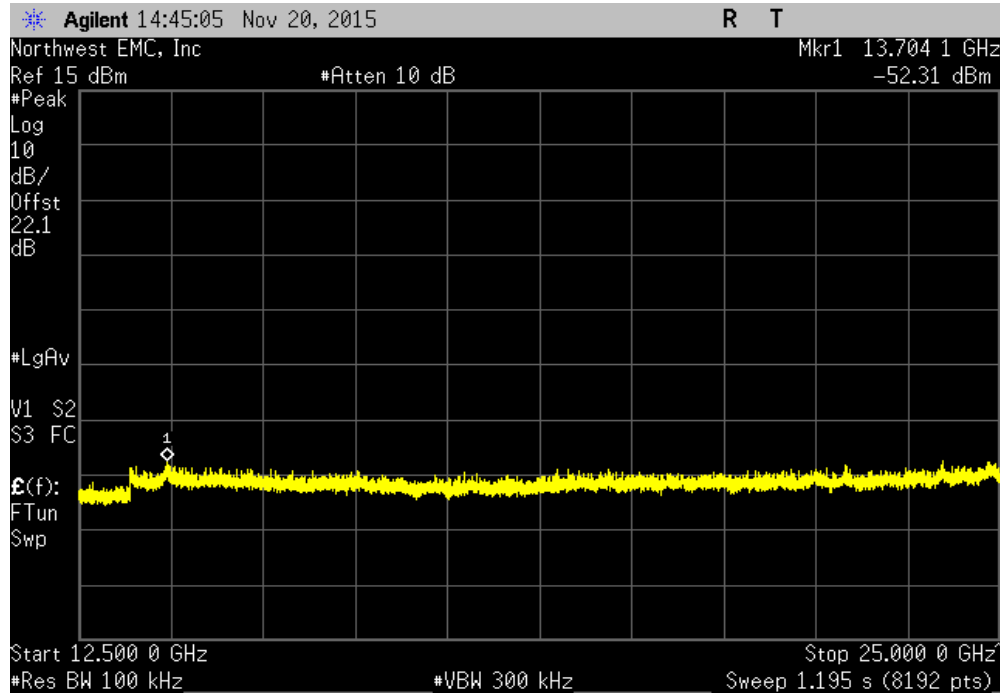


2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-40.86	-20	Pass	

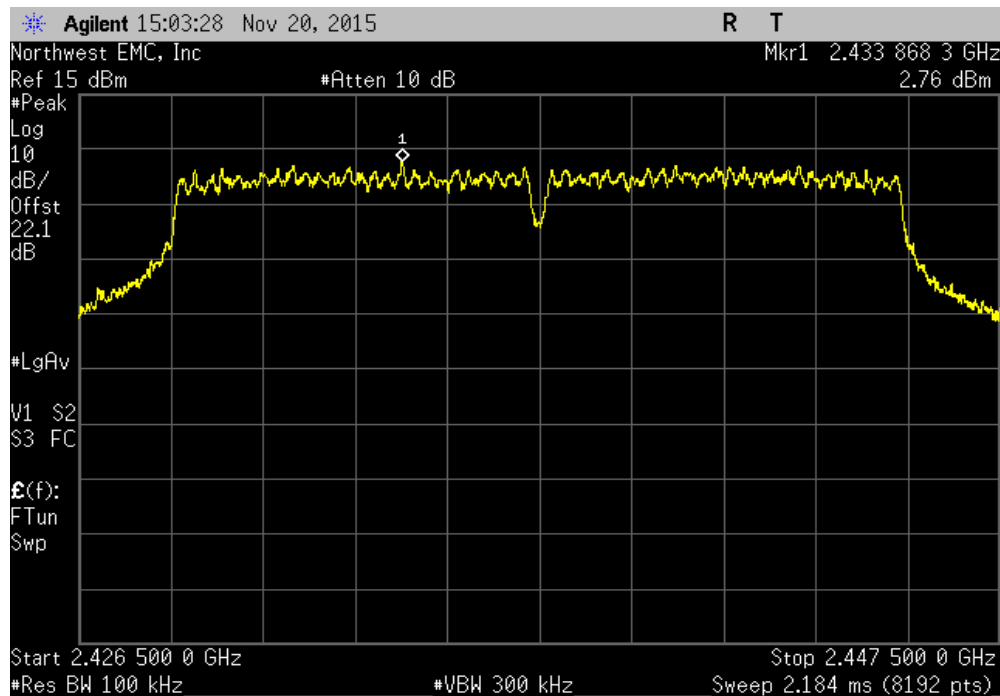


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-53.99	-20	Pass	

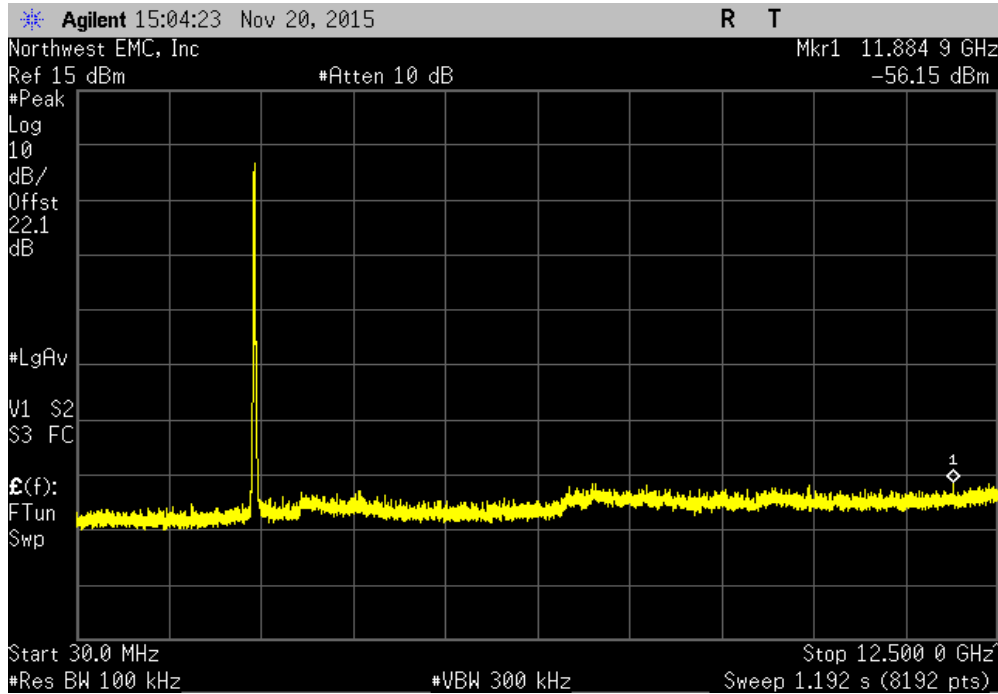


2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

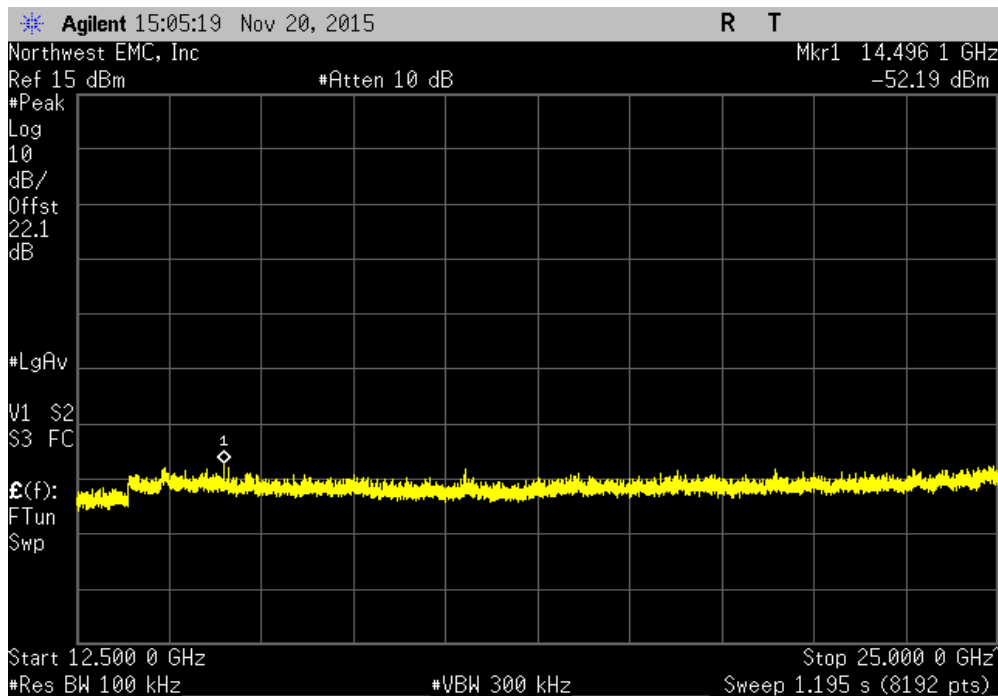


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-58.91	-20	Pass	

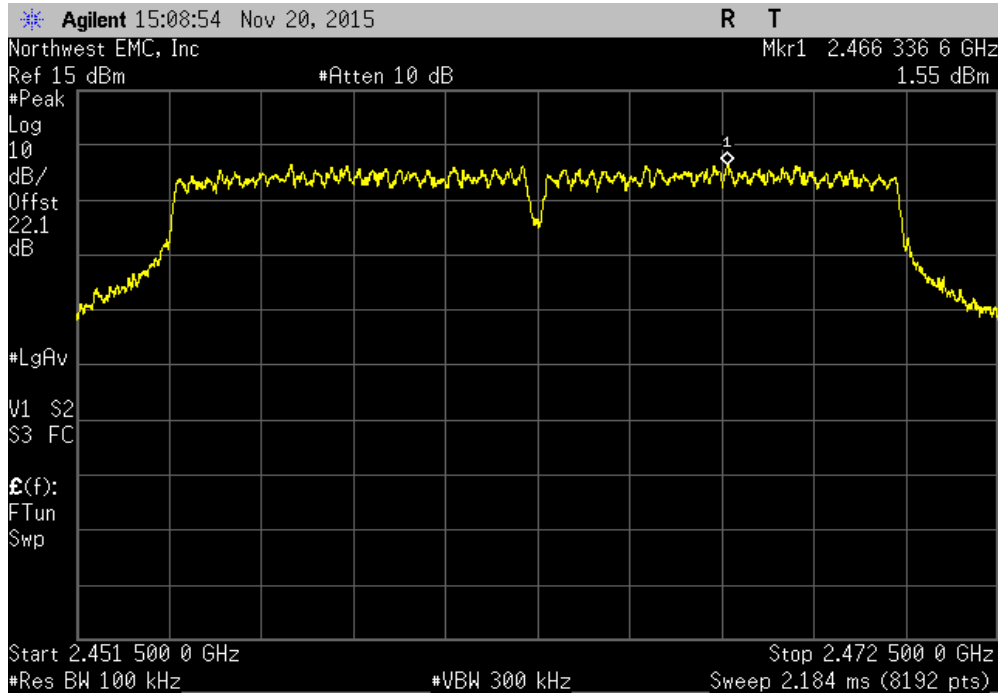


2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-54.95	-20	Pass	

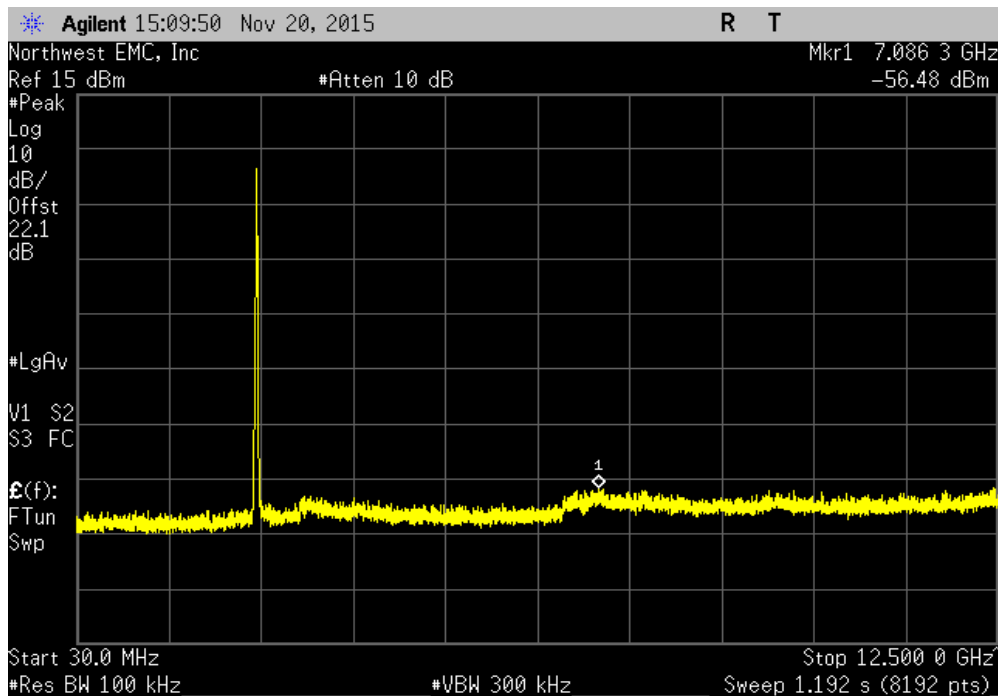


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		N/A	N/A	N/A	

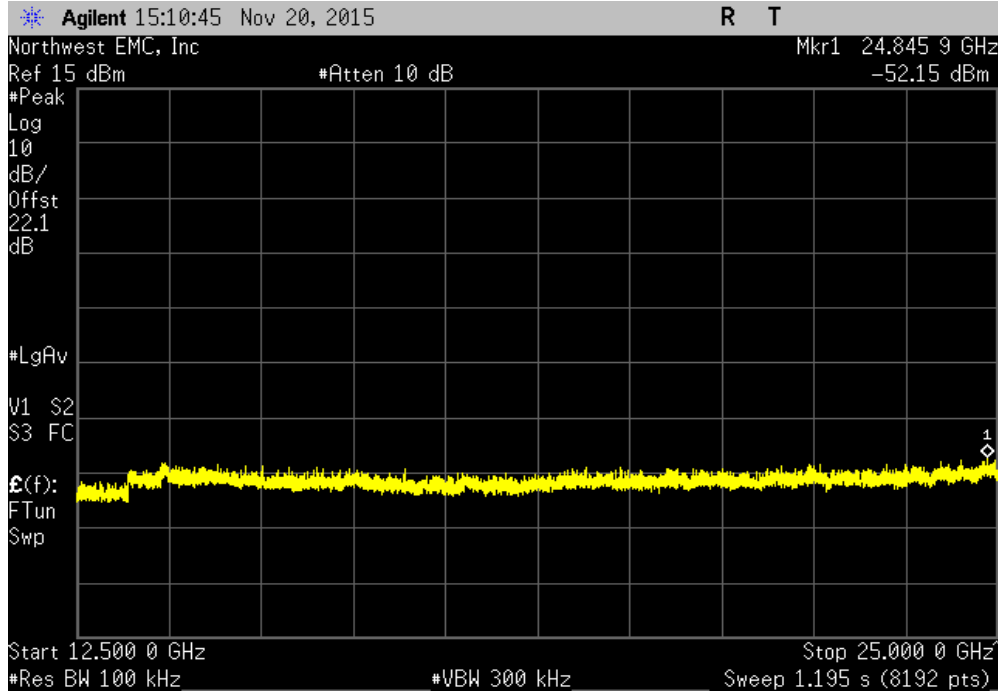


2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-58.03	-20	Pass	

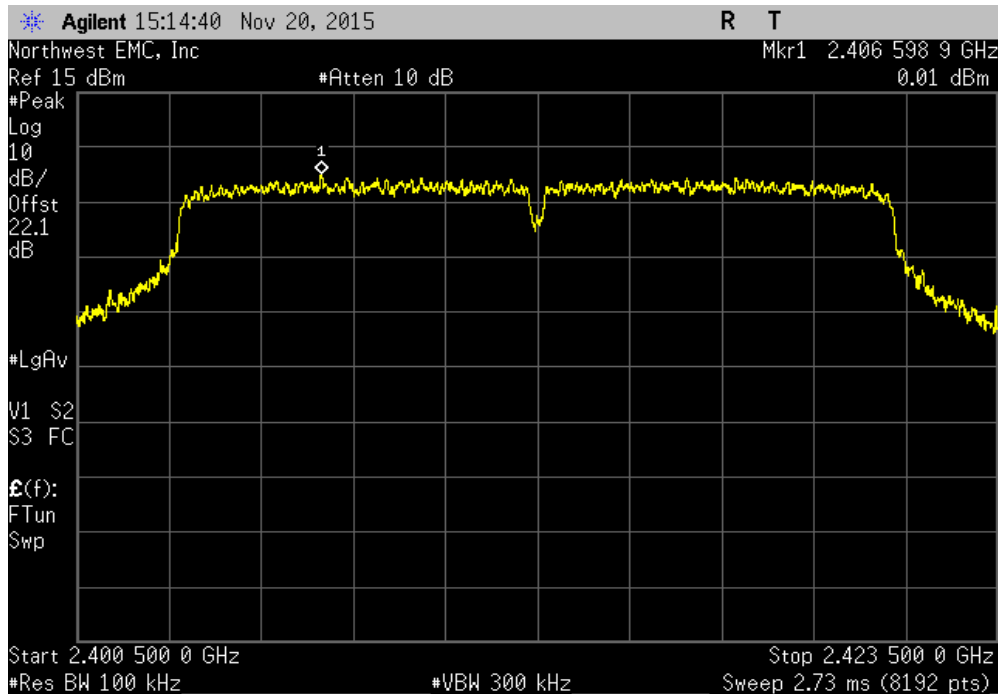


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(g) 54 Mbps, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-53.7	-20	Pass	

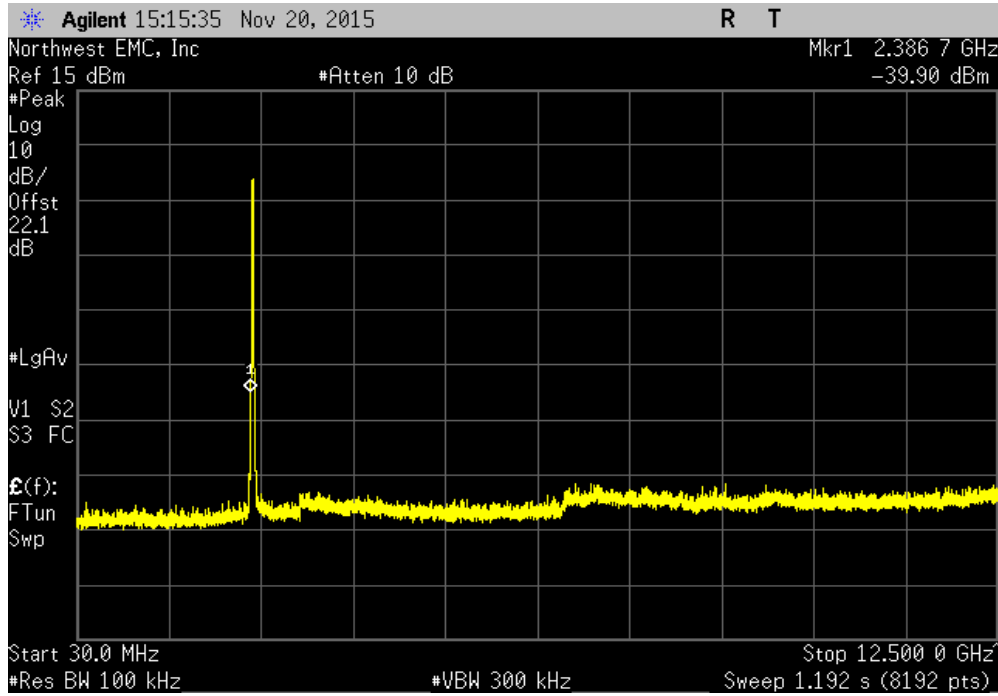


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

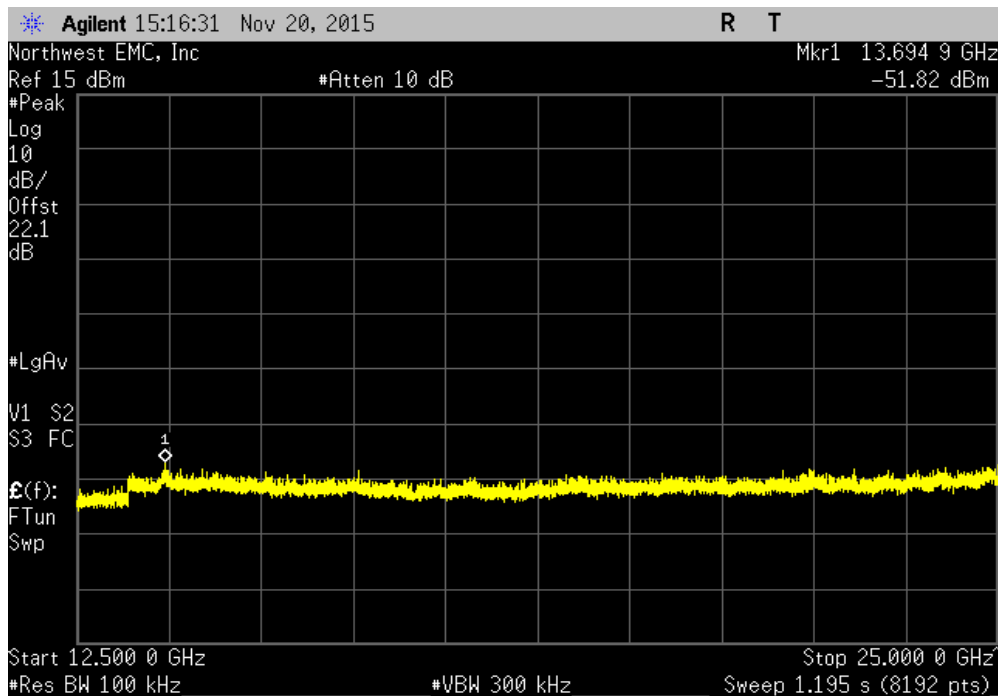


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-39.91	-20	Pass	

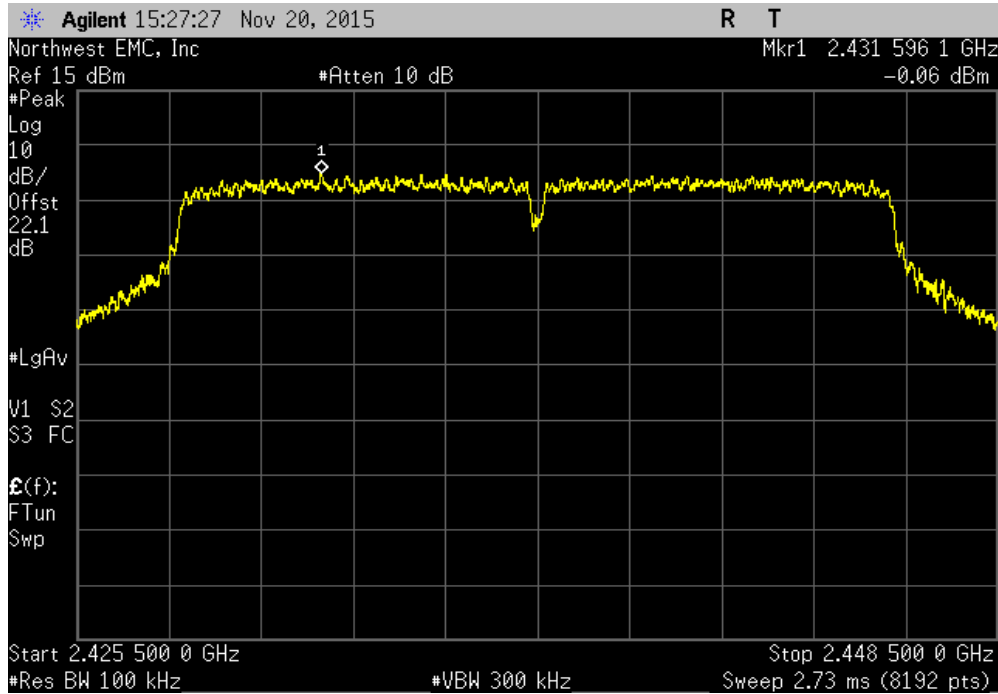


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-51.83	-20	Pass	

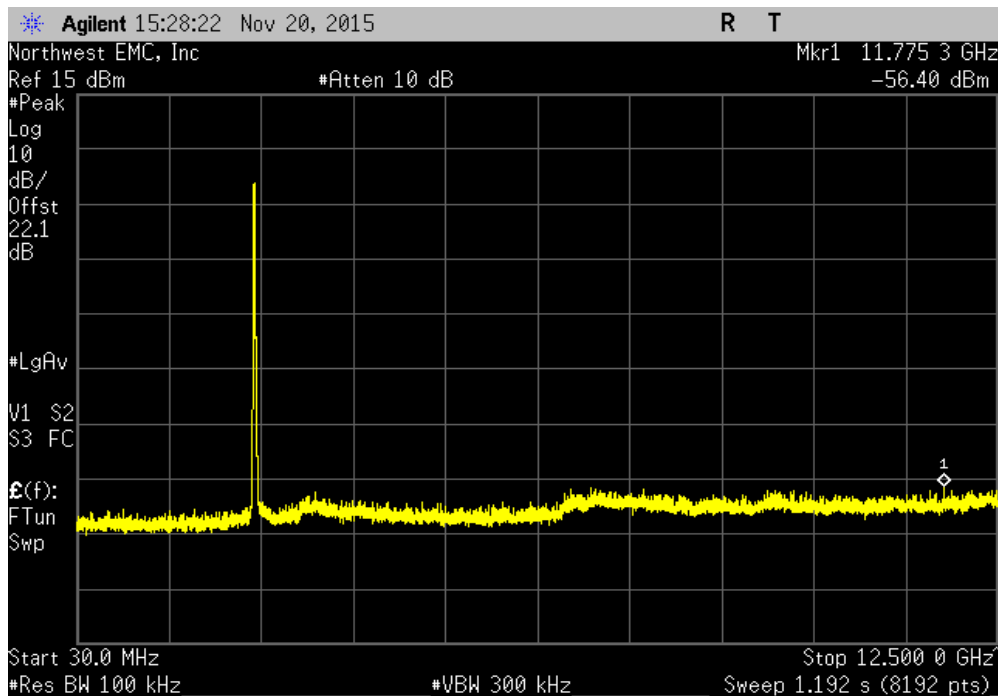


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		N/A	N/A	N/A	



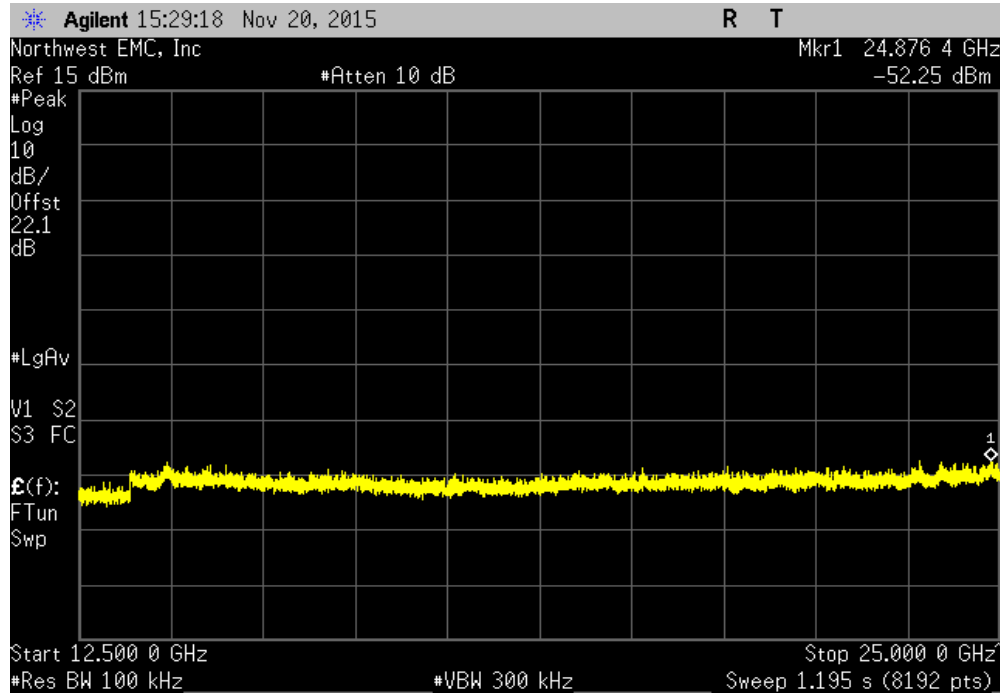
2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-56.34	-20	Pass	



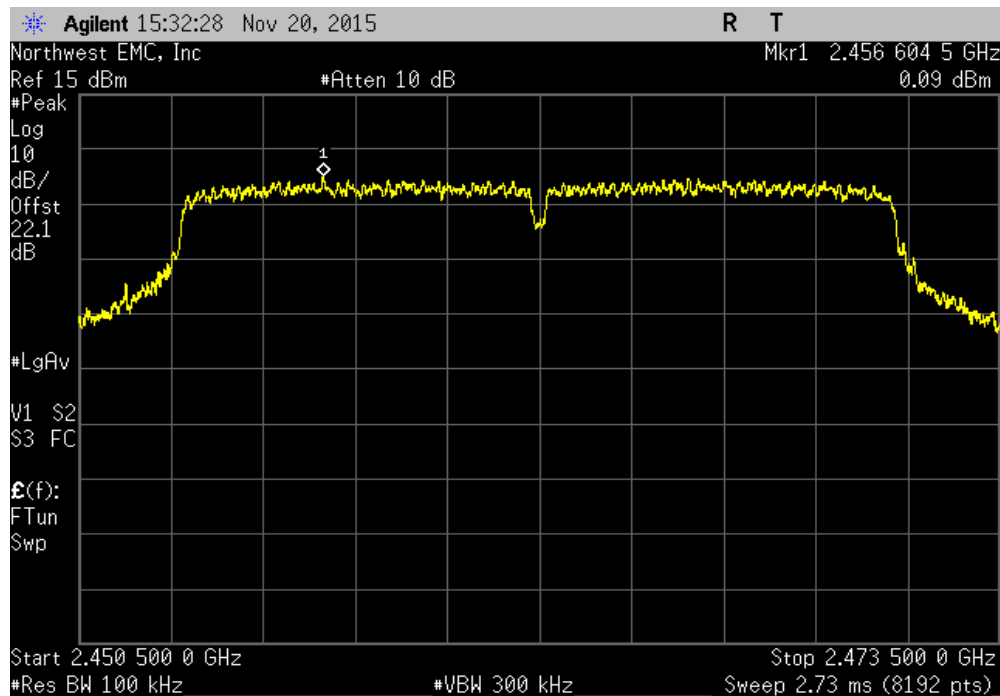


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-52.19	-20	Pass	

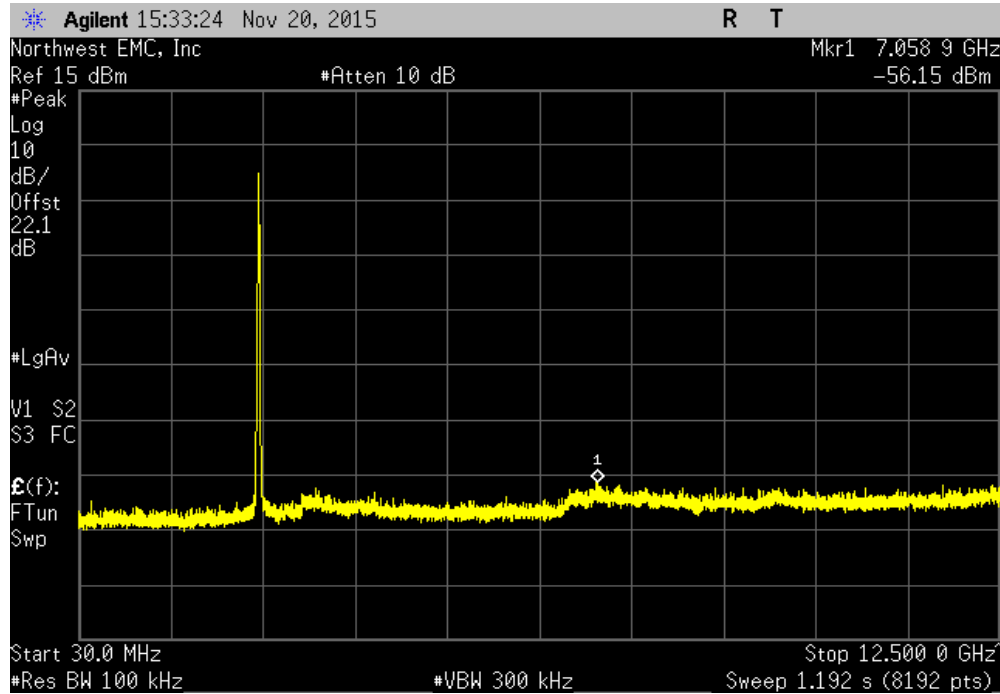


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

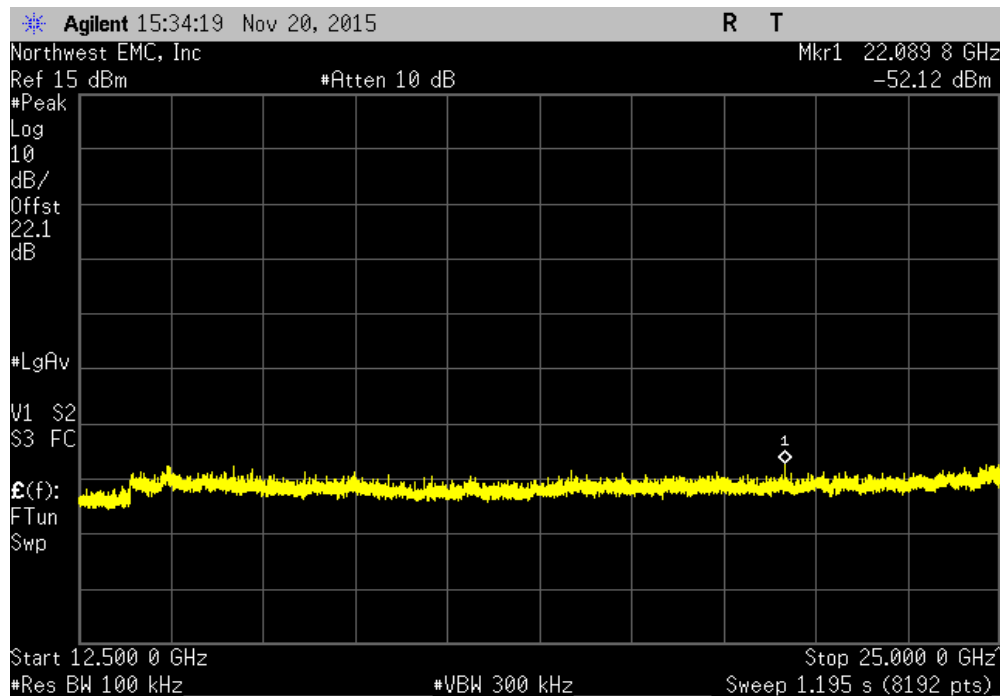


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-56.24	-20	Pass	

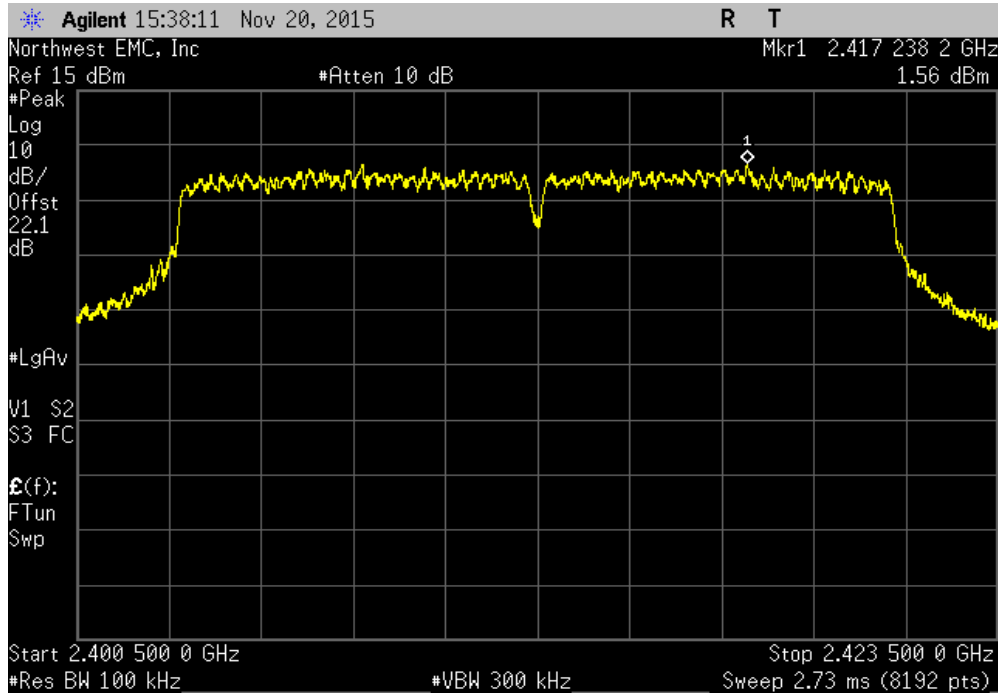


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS0, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-52.21	-20	Pass	

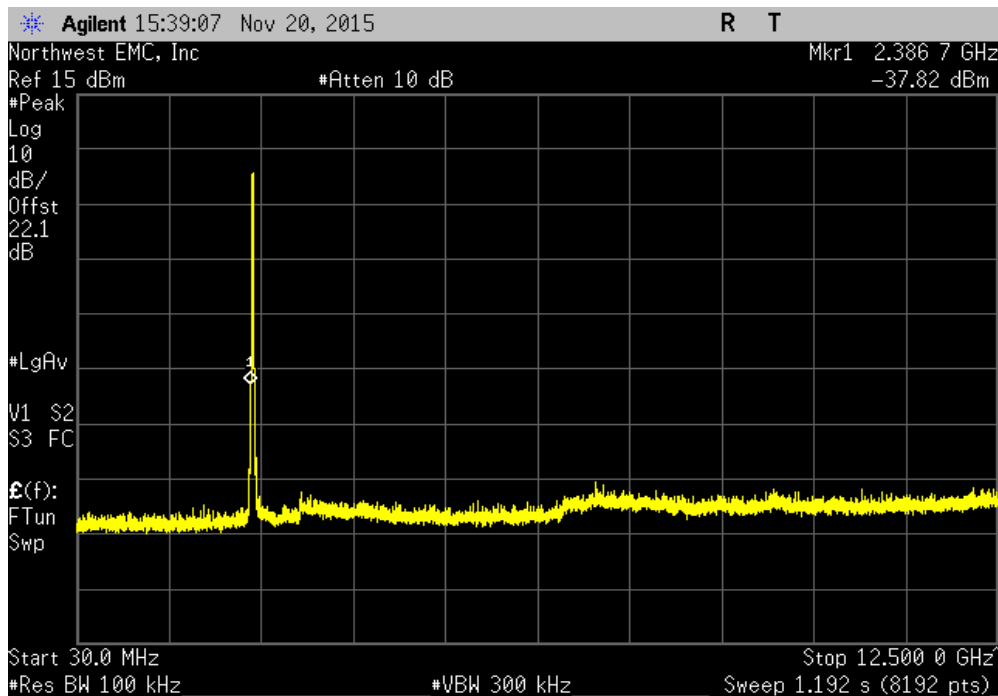


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		N/A	N/A	N/A	

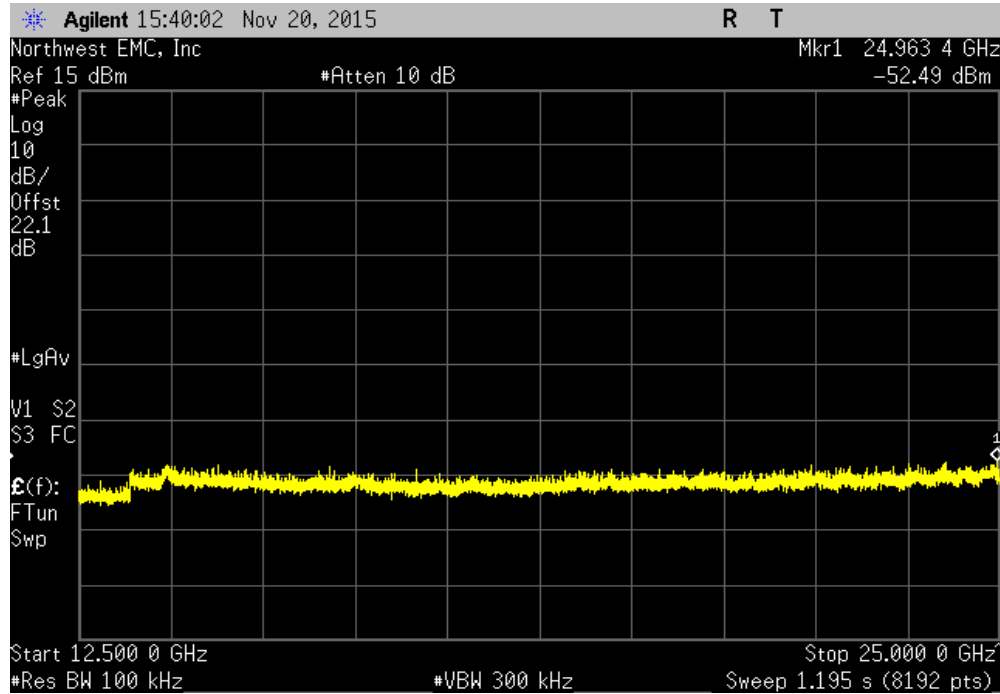


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-39.38	-20	Pass	

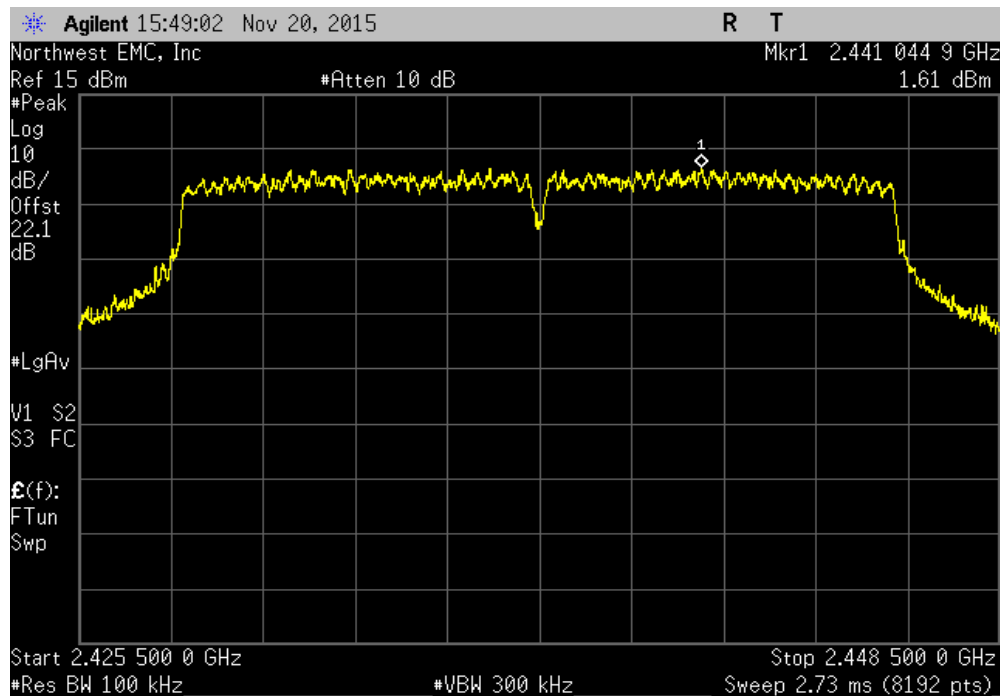


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Low Channel 1, 2412 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-54.05	-20	Pass	

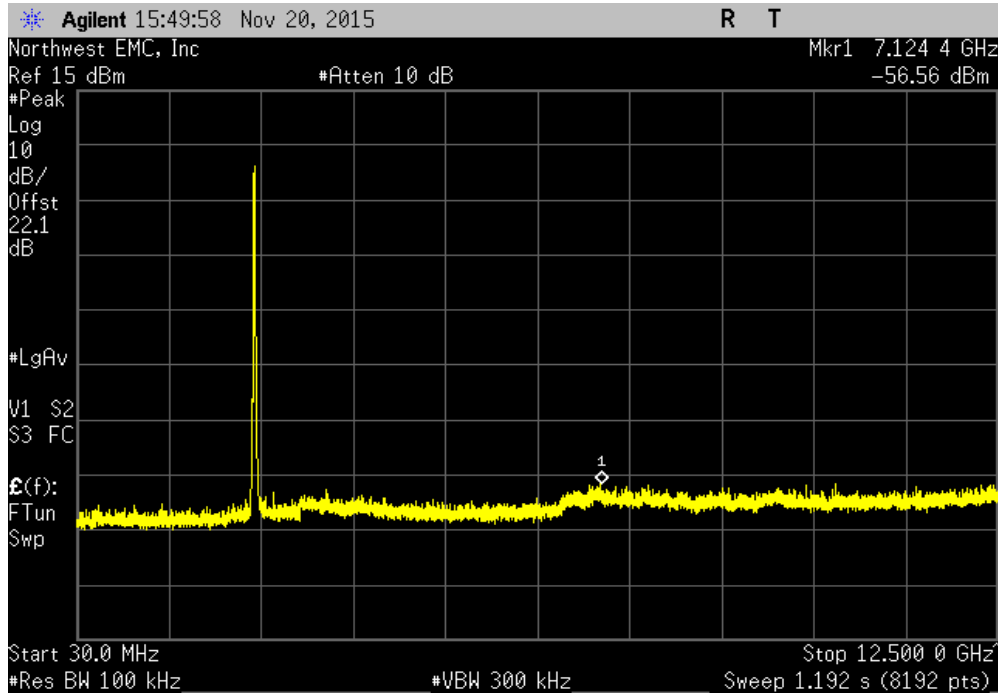


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

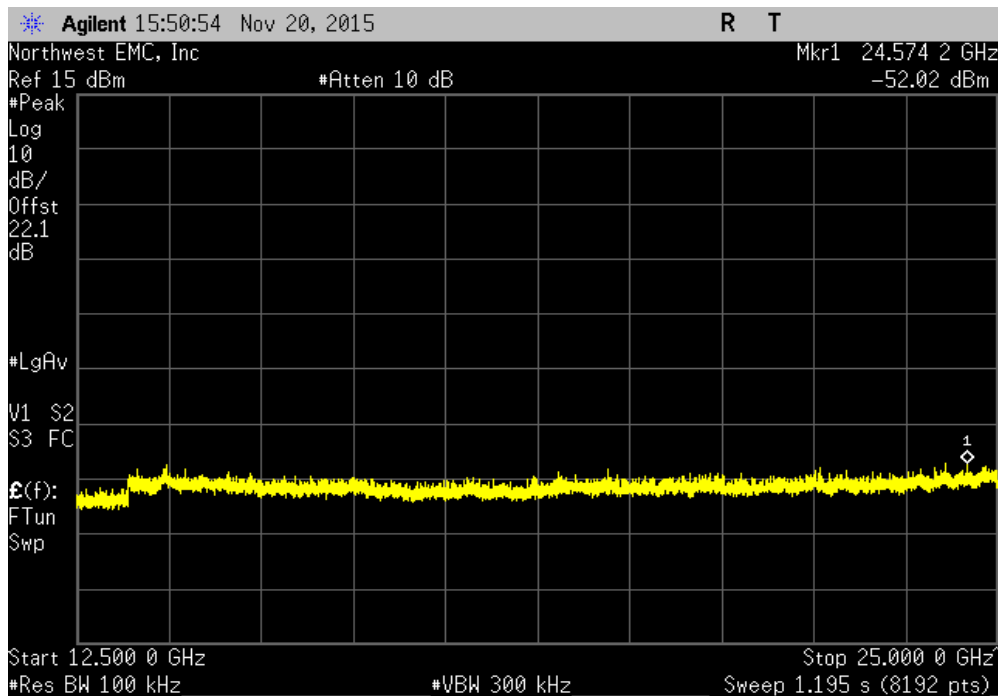


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-58.17	-20	Pass	

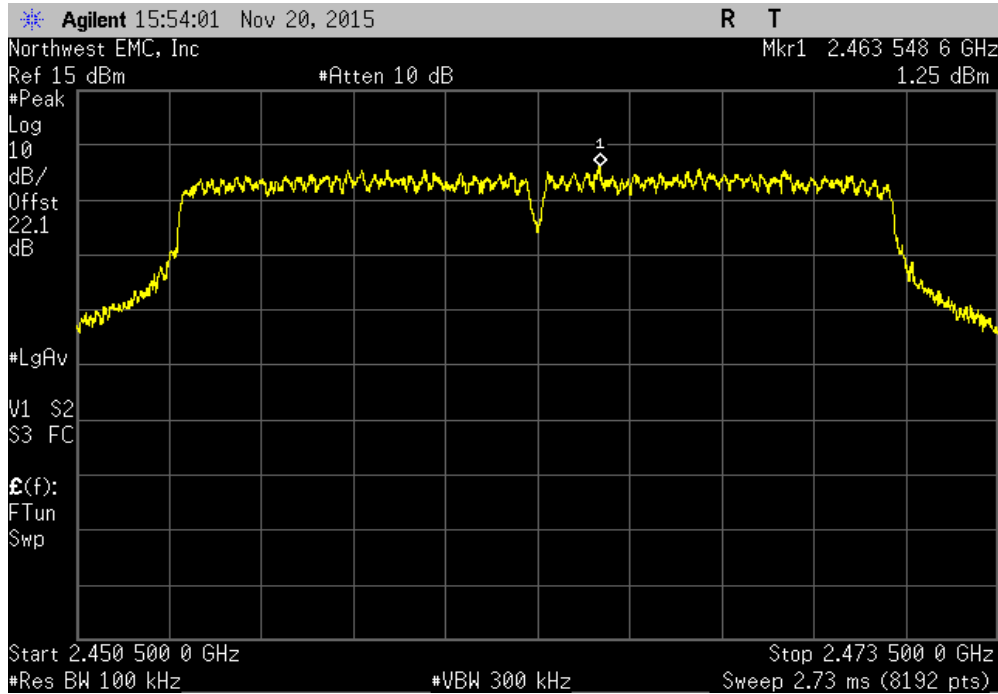


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, Mid Channel 6, 2437 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-53.63	-20	Pass	

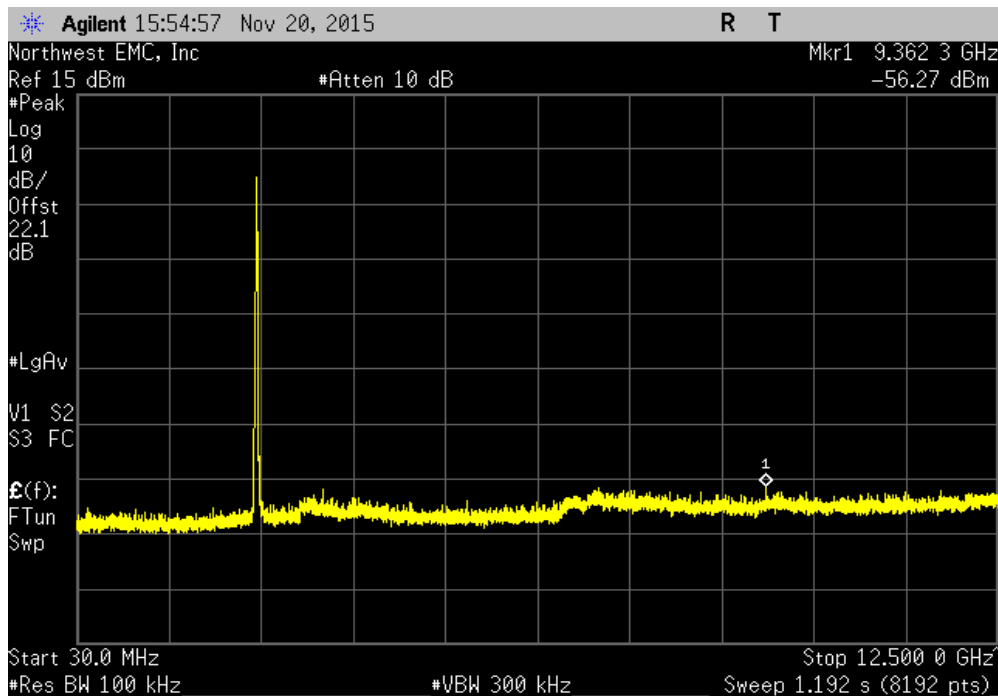


# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental		N/A	N/A	N/A	

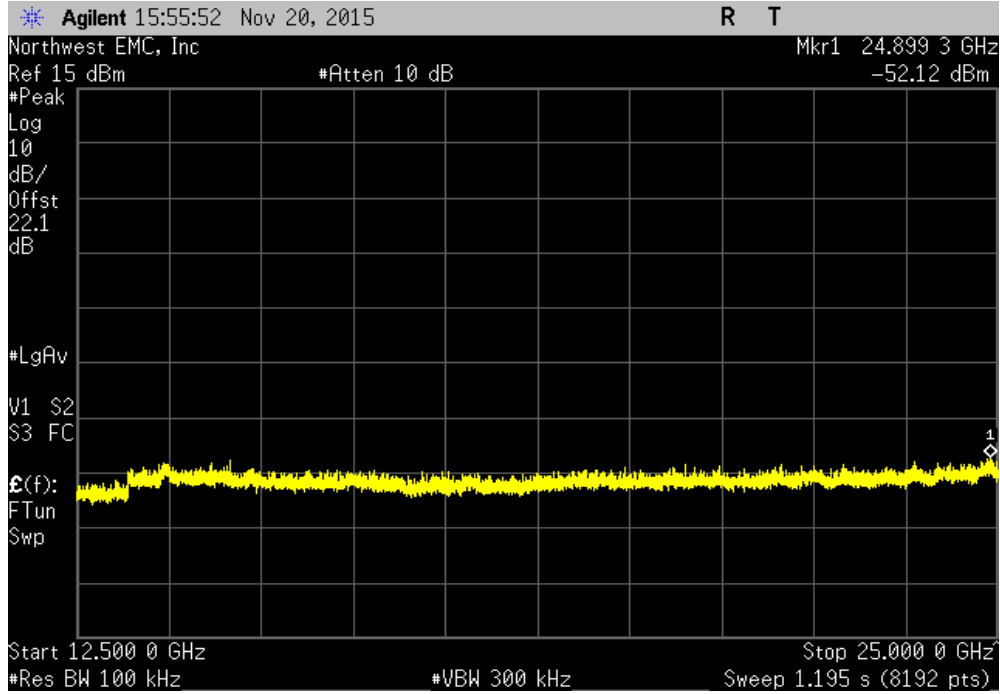


2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-57.52	-20	Pass	



# SPURIOUS CONDUCTED EMISSIONS

2400 MHz - 2483.5 MHz Band, 802.11(n) MCS7, High Channel 11, 2462 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-53.37	-20	Pass	



# **APPENDIX**

# **DUTY CYCLE DECLARATION**





Digi International Inc  
11001 Bren Road East  
Minnetonka, MN 55343  
952-912-3444 tel  
952-912-4991 central fax

Date: February 4, 2016

Subject: Duty Cycle

**FCC ID: MCQ-50M1768**  
**IC: 1846A-50M1857**  
**Applicant: Digi International Inc.**  
**FRN: 0010283307**

To Whom It May Concern:

We hereby attest that Digi's Sigma Pumps Gen IV 802.11abgn Module operates at or below 20% Duty Cycle during Transmit Mode.

Sincerely,

Scott McCall  
Mgr, Hardware Engineering  
Digi International Inc.  
[scott.mccall@digicom](mailto:scott.mccall@digicom)  
office: 952-912-4248