Electric Imp, Inc.

IMP003

EN 300 328 V1.9.1:2015

802.11bgn SISO Radio Module

Report # ELIM0011

NVLAP Lab Code: 200630-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: June 29, 2016
Electric Imp, Inc.
Model: IMP003

Radio Equipment Testing

Standards

Specification	Method
EN 300 328 V1.9.1:2015	EN 300 328 V1.9.1:2015

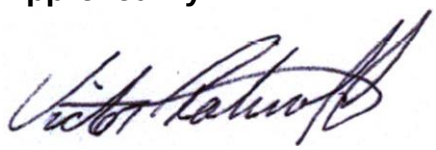
Results

Method Clause	Test Description	Applied	Results	Comments
5.3.2	RF Output Power	Yes	Pass	
5.3.2	Medium Utilization	No	N/A	Not required for adaptive equipment.
5.3.3	Power Spectral Density	Yes	Pass	
5.3.4	Duty Cycle, Tx-Sequence, Tx-Gap	No	N/A	Not required for adaptive equipment.
5.3.4	Accumulated Transmit Time, Frequency Occupation, Hopping Sequence	No	N/A	Not required unless EUT is a FHSS device.
5.3.5	Hopping Frequency Separation	No	N/A	Not required unless EUT is a FHSS device.
5.3.7	Adaptivity	Yes	Pass	
5.3.8	Occupied Channel Bandwidth	Yes	Pass	
5.3.7	Receiver Blocking	Yes	Pass	Receiver Blocking is tested as part of the requirements for Adaptivity. Data can be found in that section of the report
5.3.9	Transmitter Unwanted Emissions in the OOB Domain	Yes	Pass	
5.3.10	Transmitter Unwanted Emissions in the Spurious Domain	Yes	Pass	
5.3.11	Receiver Spurious Emissions	Yes	Pass	
N/A	Geo-Location Capability	No	N/A	Not required – Manufacturers declaration if implemented.

Deviations From Test Standards

None

Approved By:



Victor Ratinoff, 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

NORTHWEST EMC
REV 2016.3.22

United States

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

Canada

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

European Union

European Commission – Validated by the European Commission as a Notified Body under the R&TTE Directive.

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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.

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

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

TMU.2015.07.10

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.

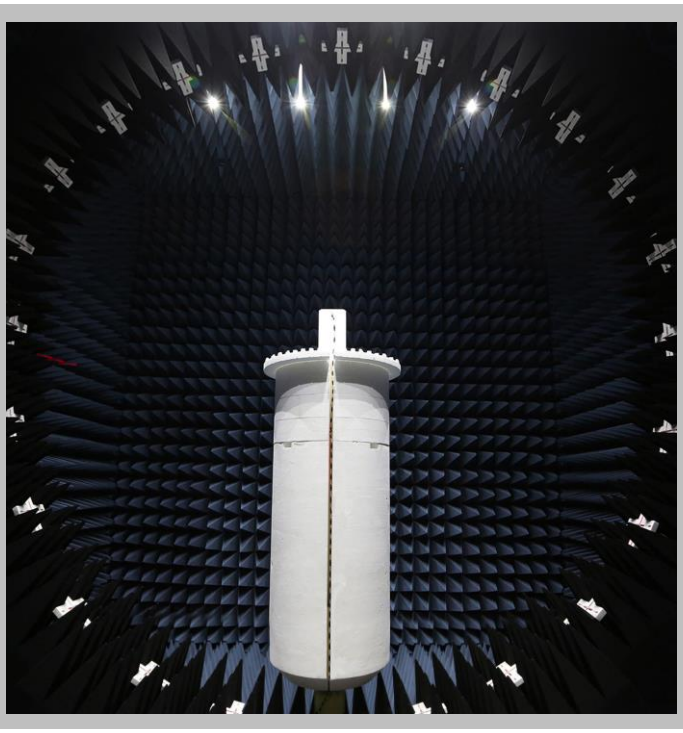
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. 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.

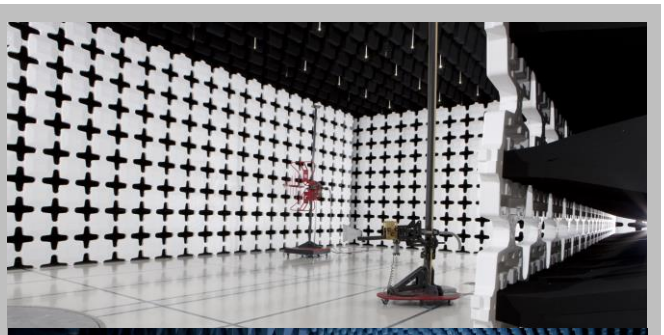
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

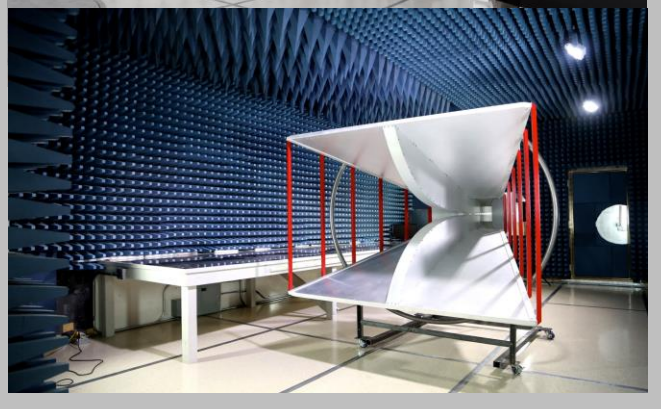
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%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

FACILITIES

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







PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Electric Imp, Inc.
Address:	5150 El Camino Real, Ste C-31
City, State, Zip:	Los Altos, CA 94022
Test Requested By:	Lolo Fong
Model:	IMP003
First Date of Test:	June 27, 2016
Last Date of Test:	June 29, 2016
Receipt Date of Samples:	June 27, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

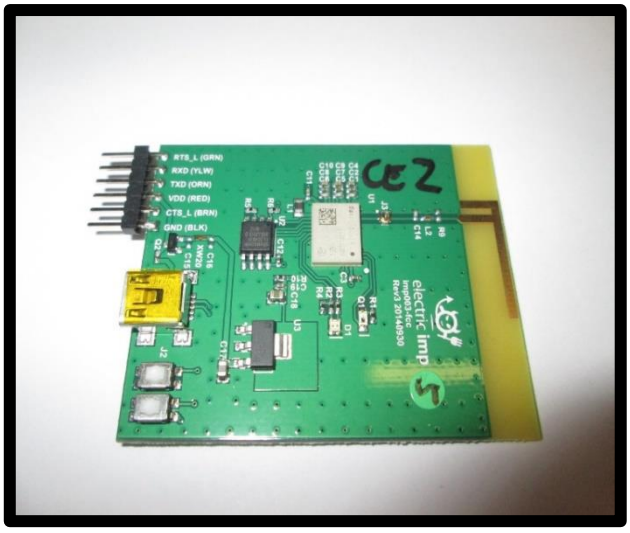
Functional Description of the EUT:

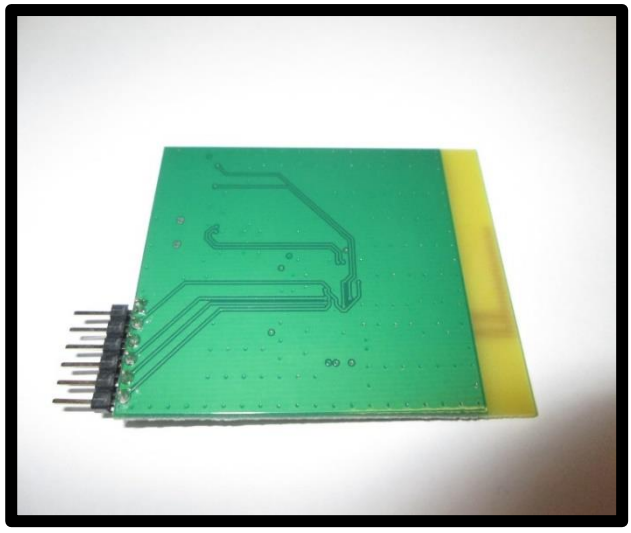
802.11bgn SISO radio WiFi module, with embedded OS that works with the Electric Imp cloud to allow internet connectivity for devices that use this WiFi module.

Testing Objective:

To demonstrate compliance of the 802.11 radio to the requirements of Annex 3.2 of the R&TTE Directive in the 2.4 GHz band.

EUT Photo





CONFIGURATIONS

Configuration ELIM0011- 1

Software/Firmware Running during test	
Description	**Version**
Imp OS	33.29

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
WiFi Radio Module	Electric Imp, Inc.	IMP0003	Barcode:2000000590

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Host Laptop	Lenovo	G560 0679	CB07171536
Laptop Power Supply	Lenovo	APD-65KH B	11S36001646ZZ10012A7AA

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Cable	No	2.0m	No	Host Laptop	WiFi Radio Module
AC Cable	No	1.8m	No	AC Mains	Laptop Power Supply
DC Cable	No	2.0m	Yes	Host Laptop	Laptop Power Supply

Configuration ELIM0011- 2

Software/Firmware Running during test	
Description	**Version**
Imp OS	33.29

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
WiFi Radio Module	Electric Imp, Inc.	IMP0003	00:02:D7:5A:4D:01

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Host Laptop	Lenovo	G560 0679	CB07171536
Laptop Power Supply	Lenovo	APD-65KH B	11S36001646ZZ10012A7AA

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Cable	No	2.0m	No	Host Laptop	WiFi Radio Module
AC Cable	No	1.8m	No	AC Mains	Laptop Power Supply
DC Cable	No	2.0m	Yes	Host Laptop	Laptop Power Supply

CONFIGURATIONS

Configuration ELIM0011- 3

Software/Firmware Running during test	
Description	**Version**
Imp OS	33.29

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
WiFi Radio Module	Electric Imp, Inc.	IMP0003	Barcode:2000000534

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Host Laptop	Lenovo	G560 0679	CB07171536
Laptop Power Supply	Lenovo	APD-65KH B	11S36001646ZZ10012A7AA

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Cable	No	2.0m	No	Host Laptop	WiFi Radio Module
AC Cable	No	1.8m	No	AC Mains	Laptop Power Supply
DC Cable	No	2.0m	Yes	Host Laptop	Laptop Power Supply

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	6/27/2016	RF 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.
2	6/27/2016	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.
3	6/27/2016	Occupied Bandwidth Channel	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	6/27/2016	Transmitter Unwanted Emissions in the OOB Domain	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	6/28/2016	Transmitter Unwanted Emissions in the Spurious Domain	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	6/28/2016	Adaptivity	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	6/29/2016	Receiver Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

RF OUTPUT POWER

XMit 2016.05.06

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.	Cal. Due
Meter - Power	ETS Lindgren	7002-006	SRB	12/14/2015	12/14/2016
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	2/5/2018
Attenuator	Fairview Microwave	SA18E-20	TKS	4/4/2016	4/4/2017
Block - DC	Aeroflex	INMET 8535	AMO	4/4/2016	4/4/2017
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	NCR
Thermometer	Omega Engineering, Inc.	HH311	DUC	10/3/2014	10/3/2017
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPHS-32-3.5-SCT/AC	TBE	NCR	NCR

TEST DESCRIPTION

This was used to verify the cable offset. The power measurement was then made using a direct connection between the RF output of the EUT and an ETSI EN 300 328 compliant RF Power Sensor which only measures across the high time of the burst of the carrier.

The RF output power was measured with the EUT set to the channels and modes called out in the data sheets.

The observed duty cycle was noted but not needed to calculate the EiRP.

EiRP = Max Measured Power + Antenna gain (dBi)

The measurements were made under normal test and extreme test conditions.

RF OUTPUT POWER

NORTHWEST EMC

XMit 2016.05.06

EUT:	IMP0003	Work Order:	ELIM0011
Serial Number:	Barcode:2000000590	Date:	06/27/16
Customer:	Electric Imp, Inc.	Temperature:	24 °C
Attendees:	Hugo Fiennes	Humidity:	52.7% RH
Project:	None	Barometric Pres.:	1015 mbar
Tested by:	Johnny Candelas	Job Site:	OC13
Power:	5 VDC via USB		

TEST SPECIFICATIONS	Test Method
EN 300 328 V1.9.1:2015	EN 300 328 V1.9.1:2015

COMMENTS

Total Offset 23.1dB (20dB pad + DC Block + coax cable + client prvided patch cable) at 2.4GHz

DEVIATIONS FROM TEST STANDARD

None

Configuration #	1	Signature

	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
Normal Temperature Conditions						
802.11(b) 1 Mbps						
Low Channel, 1, 2412 MHz	15.42	99.83	2.24	17.7	20	Pass
Mid Channel, 7, 2442 MHz	15.4	99.83	2.24	17.6	20	Pass
High Channel, 13, 2472 MHz	15.51	99.838	2.24	17.8	20	Pass
802.11(b) 11 Mbps						
Low Channel, 1, 2412 MHz	15.87	98.304	2.24	18.1	20	Pass
Mid Channel, 7, 2442 MHz	15.85	98.328	2.24	18.1	20	Pass
High Channel, 13, 2472 MHz	15.8	98.391	2.24	18	20	Pass
802.11(g) 6 Mbps						
Low Channel, 1, 2412 MHz	15.7	98.627	2.24	17.9	20	Pass
Mid Channel, 7, 2442 MHz	15.96	98.62	2.24	18.2	20	Pass
High Channel, 13, 2472 MHz	15.71	98.628	2.24	18	20	Pass
802.11(g) 36 Mbps						
Low Channel, 1, 2412 MHz	15.8	92.899	2.24	18	20	Pass
Mid Channel, 7, 2442 MHz	15.72	92.846	2.24	18	20	Pass
High Channel, 13, 2472 MHz	15.86	92.728	2.24	18.1	20	Pass
802.11(g) 54 Mbps						
Low Channel, 1, 2412 MHz	15.91	90.118	2.24	18.2	20	Pass
Mid Channel, 7, 2442 MHz	15.95	90.071	2.24	18.2	20	Pass
High Channel, 13, 2472 MHz	15.98	89.812	2.24	18.2	20	Pass
802.11(n) MCS0						
Low Channel, 1, 2412 MHz	14.77	98.615	2.24	17	20	Pass
Mid Channel, 7, 2442 MHz	14.58	98.611	2.24	16.8	20	Pass
High Channel, 13, 2472 MHz	14.71	98.606	2.24	17	20	Pass
802.11(n) MCS7						
Low Channel, 1, 2412 MHz	14.77	89.353	2.24	17	20	Pass
Mid Channel, 7, 2442 MHz	14.81	89.365	2.24	17.1	20	Pass
High Channel, 13, 2472 MHz	14.78	89.365	2.24	17	20	Pass
Extreme Temperature, +85°C						
802.11(b) 1 Mbps						
Low Channel, 1, 2412 MHz	15.39	99.831	2.24	17.6	20	Pass
Mid Channel, 7, 2442 MHz	15.35	99.837	2.24	17.6	20	Pass
High Channel, 13, 2472 MHz	15.48	99.838	2.24	17.7	20	Pass
802.11(b) 11 Mbps						
Low Channel, 1, 2412 MHz	15.35	98.389	2.24	17.6	20	Pass
Mid Channel, 7, 2442 MHz	15.51	98.385	2.24	17.8	20	Pass
High Channel, 13, 2472 MHz	15.65	98.404	2.24	17.9	20	Pass
802.11(g) 6 Mbps						
Low Channel, 1, 2412 MHz	15.38	98.686	2.24	17.6	20	Pass
Mid Channel, 7, 2442 MHz	15.41	98.683	2.24	17.7	20	Pass
High Channel, 13, 2472 MHz	15.43	98.617	2.24	17.7	20	Pass
802.11(g) 36 Mbps						
Low Channel, 1, 2412 MHz	15.48	92.94	2.24	17.7	20	Pass
Mid Channel, 7, 2442 MHz	15.39	92.949	2.24	17.6	20	Pass
High Channel, 13, 2472 MHz	15.4	92.63	2.24	17.6	20	Pass
802.11(g) 54 Mbps						
Low Channel, 1, 2412 MHz	15.45	90.099	2.24	17.7	20	Pass
Mid Channel, 7, 2442 MHz	15.63	90.096	2.24	17.9	20	Pass
High Channel, 13, 2472 MHz	15.54	89.917	2.24	17.8	20	Pass
802.11(n) MCS0						
Low Channel, 1, 2412 MHz	14.21	98.618	2.24	16.5	20	Pass
Mid Channel, 7, 2442 MHz	14.23	98.624	2.24	16.5	20	Pass
High Channel, 13, 2472 MHz	14.22	98.532	2.24	16.5	20	Pass
802.11(n) MCS7						
Low Channel, 1, 2412 MHz	14.26	89.349	2.24	16.5	20	Pass
Mid Channel, 7, 2442 MHz	14.69	89.374	2.24	16.9	20	Pass
High Channel, 13, 2472 MHz	14.45	89.3	2.24	16.7	20	Pass
Extreme Temperature, -40°C						
802.11(b) 1 Mbps						
Low Channel, 1, 2412 MHz	15.72	99.838	2.24	18	20	Pass
Mid Channel, 7, 2442 MHz	15.87	99.837	2.24	18.1	20	Pass
High Channel, 13, 2472 MHz	16.02	99.838	2.24	18.3	20	Pass
802.11(b) 11 Mbps						
Low Channel, 1, 2412 MHz	16	98.411	2.24	18.2	20	Pass
Mid Channel, 7, 2442 MHz	16.12	98.391	2.24	18.4	20	Pass
High Channel, 13, 2472 MHz	16.31	98.416	2.24	18.5	20	Pass
802.11(g) 6 Mbps						
Low Channel, 1, 2412 MHz	16	98.69	2.24	18.2	20	Pass
Mid Channel, 7, 2442 MHz	15.92	98.694	2.24	18.2	20	Pass
High Channel, 13, 2472 MHz	16.02	98.625	2.24	18.3	20	Pass

RF OUTPUT POWER

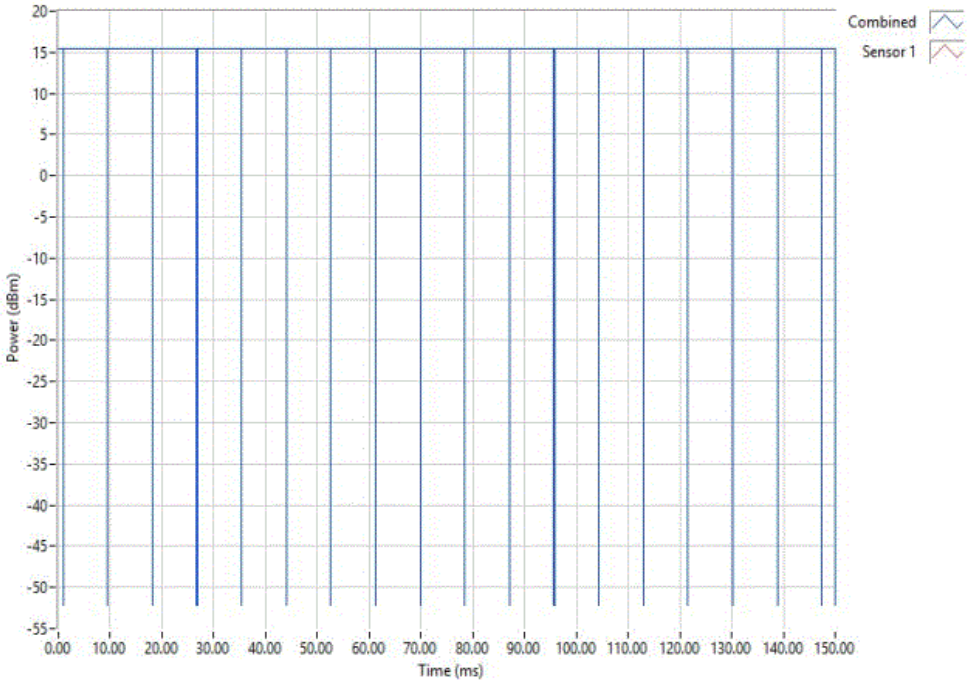
XMit 2016.05.06

802.11(g) 36 Mbps						
Low Channel, 1, 2412 MHz	15.75	92.949	2.24	18	20	Pass
Mid Channel, 7, 2442 MHz	16.04	92.934	2.24	18.3	20	Pass
High Channel, 13, 2472 MHz	16.25	92.524	2.24	18.5	20	Pass
802.11(g) 54 Mbps						
Low Channel, 1, 2412 MHz	16.02	90.103	2.24	18.3	20	Pass
Mid Channel, 7, 2442 MHz	16.01	90.12	2.24	18.3	20	Pass
High Channel, 13, 2472 MHz	16.11	89.876	2.24	18.4	20	Pass
802.11(n) MCS0						
Low Channel, 1, 2412 MHz	14.85	98.622	2.24	17.1	20	Pass
Mid Channel, 7, 2442 MHz	14.83	98.625	2.24	17.1	20	Pass
High Channel, 13, 2472 MHz	15.13	98.603	2.24	17.4	20	Pass
802.11(n) MCS7						
Low Channel, 1, 2412 MHz	14.83	89.368	2.24	17.1	20	Pass
Mid Channel, 7, 2442 MHz	14.93	89.155	2.24	17.2	20	Pass
High Channel, 13, 2472 MHz	15.31	89.199	2.24	17.6	20	Pass

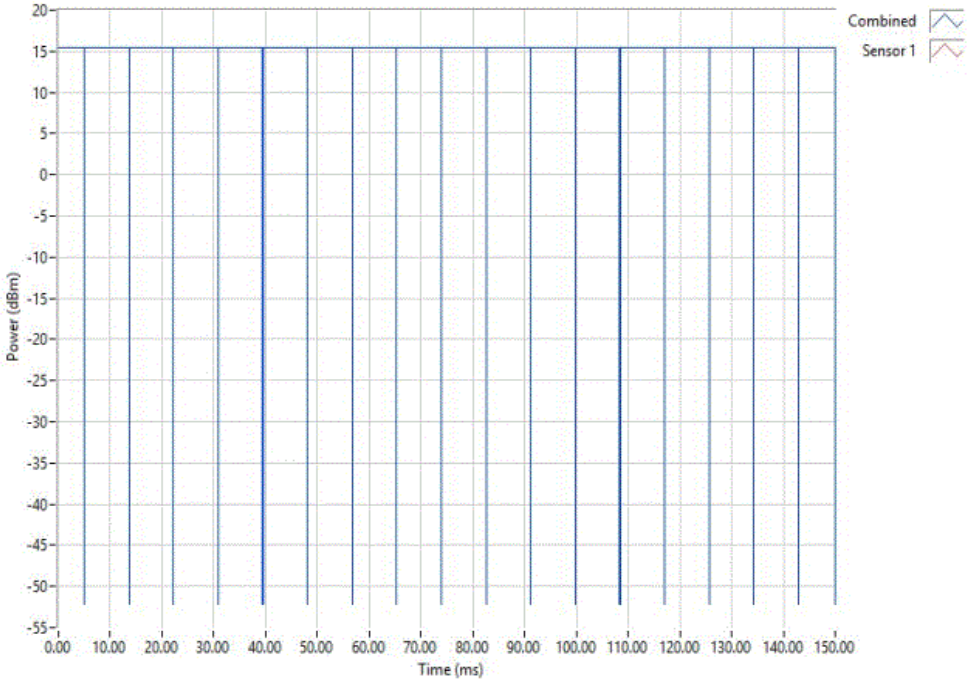
RF OUTPUT POWER

XMit 2016.05.06

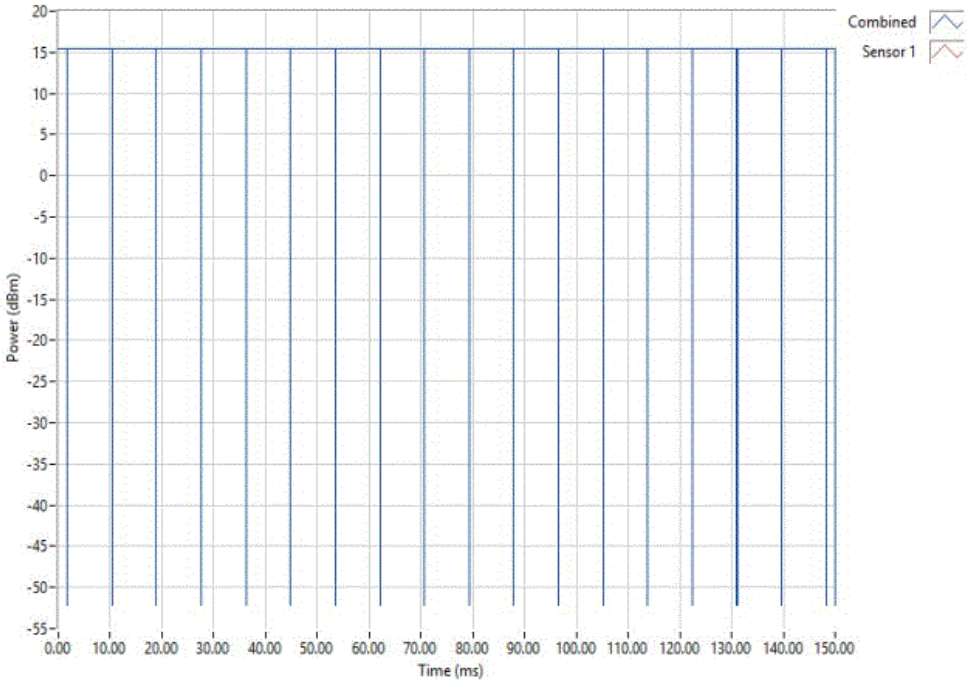
Normal Temperature Conditions, 802.11(b) 1 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.42	99.83	2.24	17.7	20	Pass



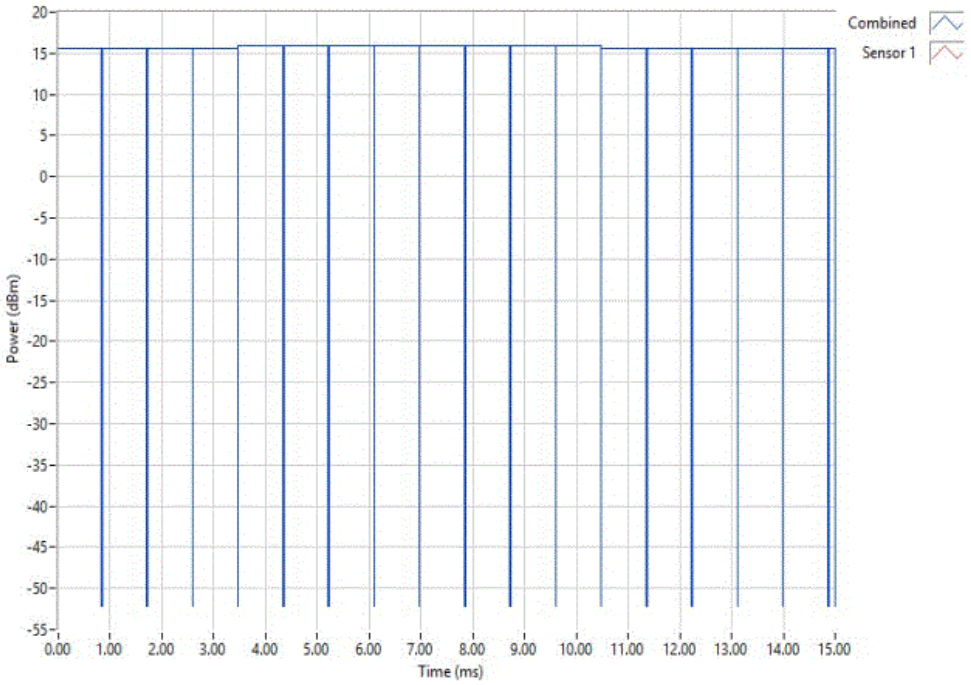
Normal Temperature Conditions, 802.11(b) 1 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.4	99.83	2.24	17.6	20	Pass



Normal Temperature Conditions, 802.11(b) 1 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.51	99.838	2.24	17.8	20	Pass



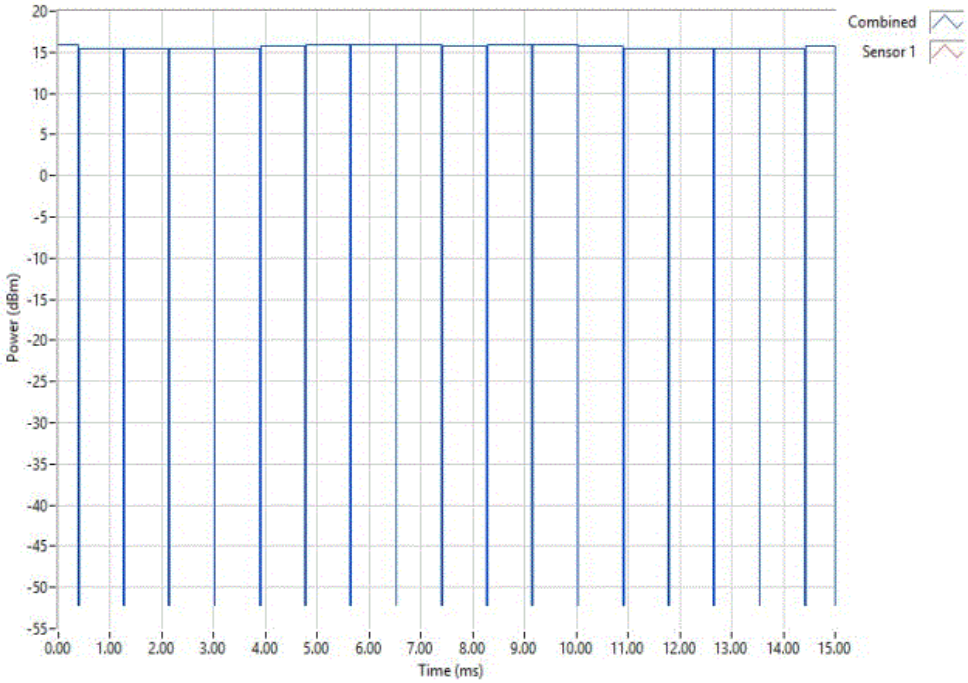
Normal Temperature Conditions, 802.11(b) 11 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.87	98.304	2.24	18.1	20	Pass



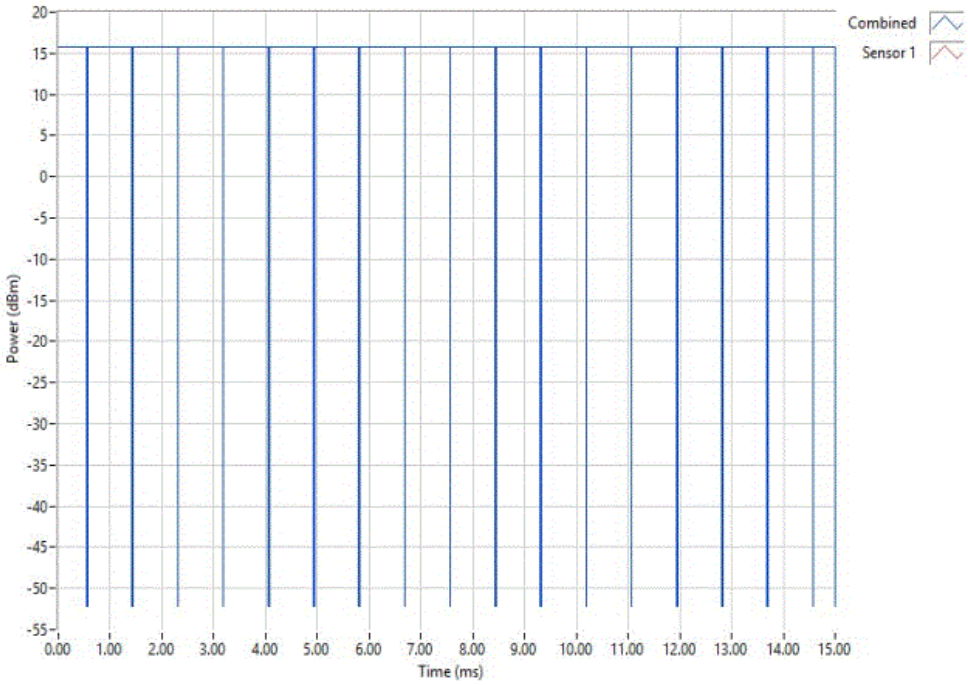
RF OUTPUT POWER

XMit 2016.05.06

Normal Temperature Conditions, 802.11(b) 11 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.85	98.328	2.24	18.1	20	Pass



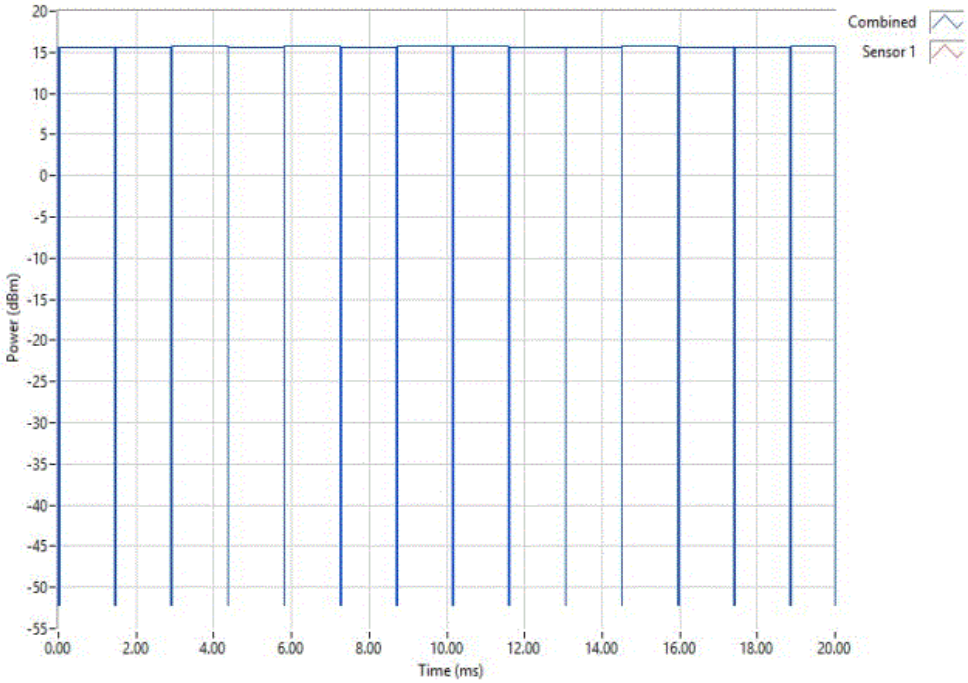
Normal Temperature Conditions, 802.11(b) 11 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.8	98.391	2.24	18	20	Pass



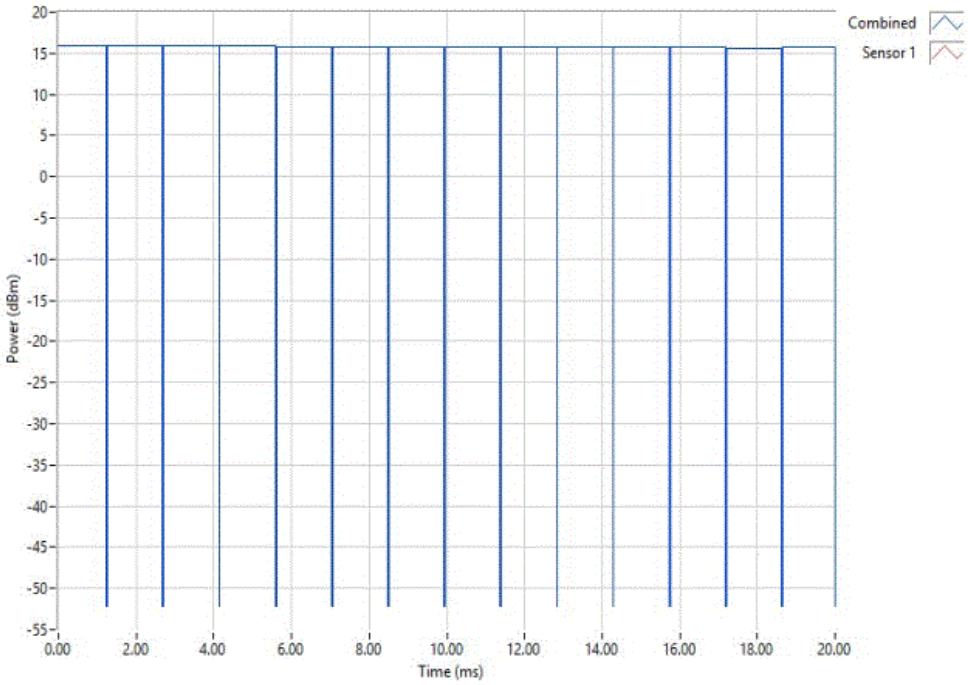
RF OUTPUT POWER

XMit 2016.05.06

Normal Temperature Conditions, 802.11(g) 6 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.7	98.627	2.24	17.9	20	Pass



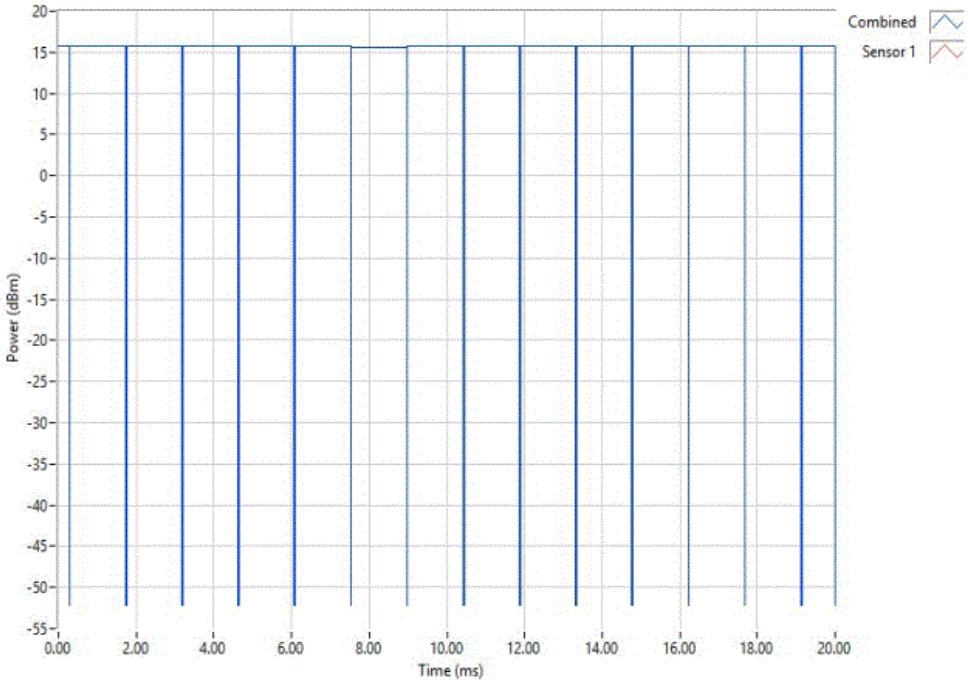
Normal Temperature Conditions, 802.11(g) 6 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.96	98.62	2.24	18.2	20	Pass



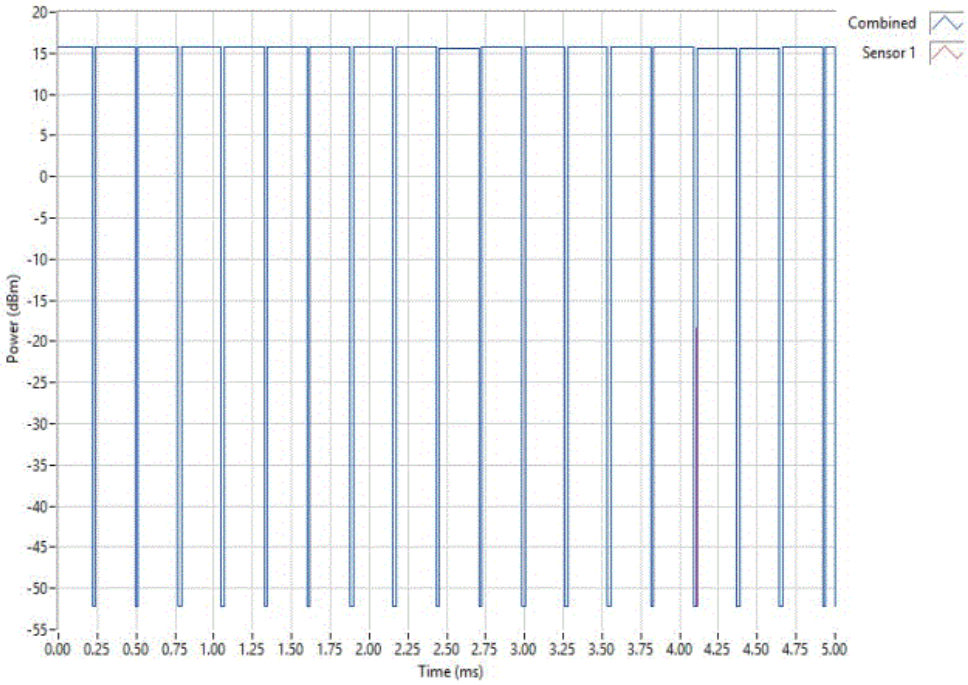
RF OUTPUT POWER

XMit 2016.05.06

Normal Temperature Conditions, 802.11(g) 6 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.71	98.628	2.24	18	20	Pass



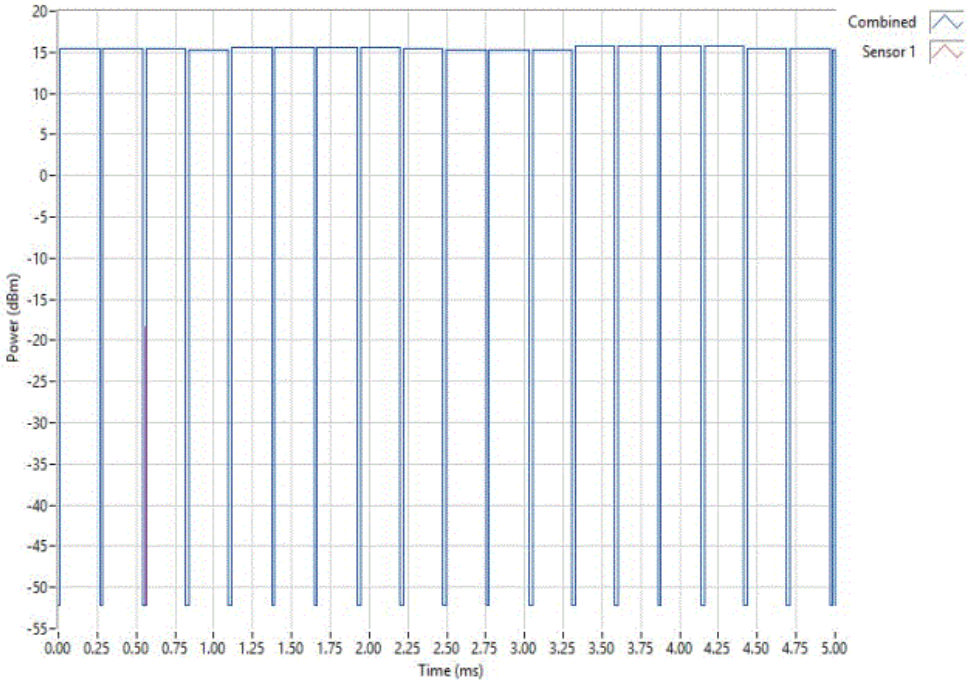
Normal Temperature Conditions, 802.11(g) 36 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.8	92.899	2.24	18	20	Pass



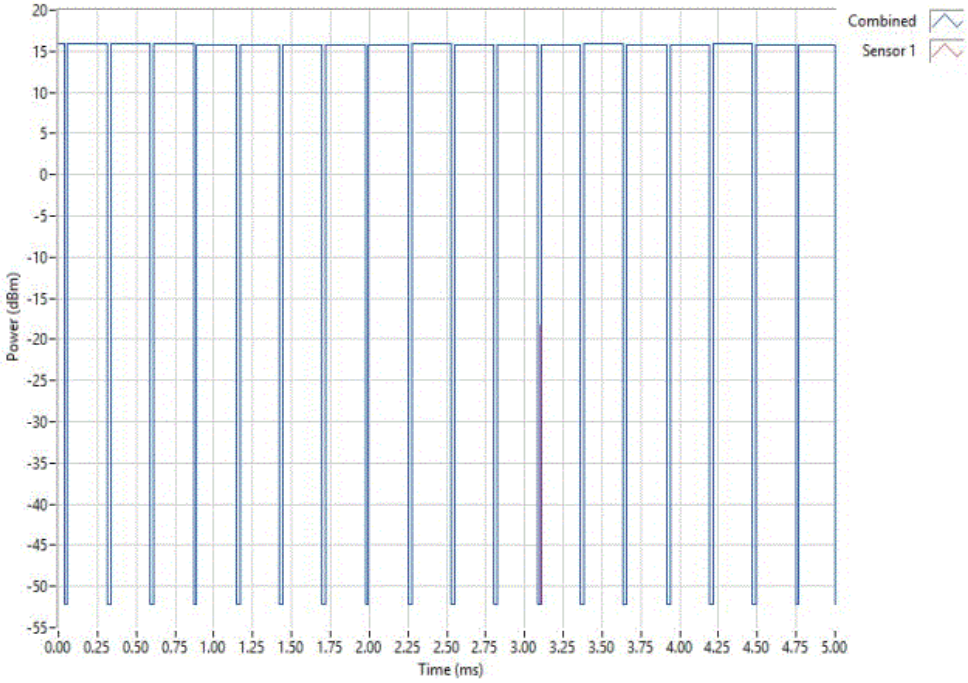
RF OUTPUT POWER

XMit 2016.05.06

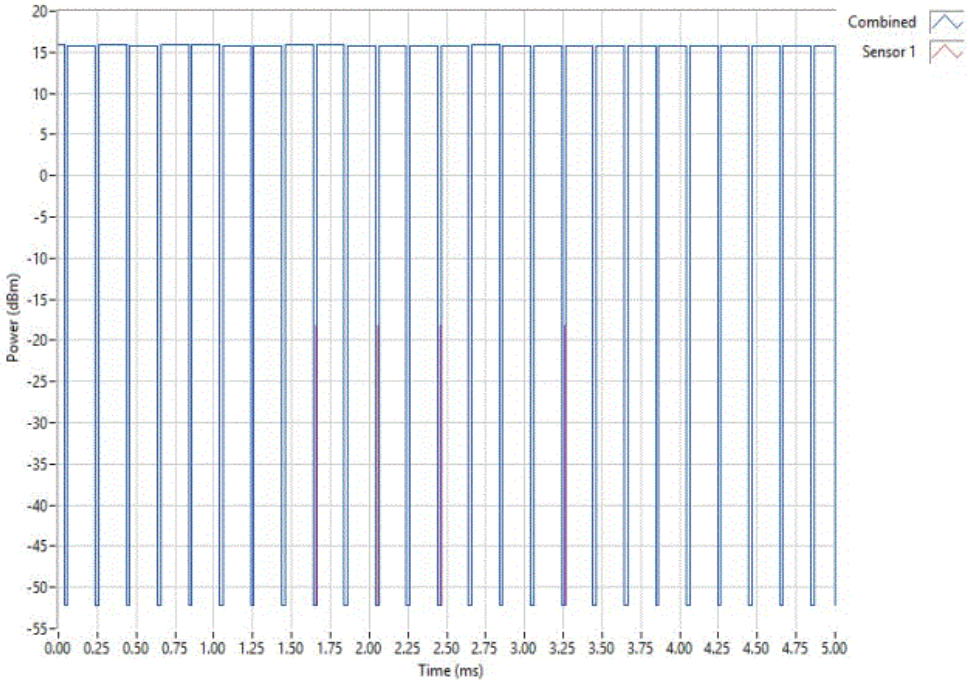
Normal Temperature Conditions, 802.11(g) 36 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.72	92.846	2.24	18	20	Pass



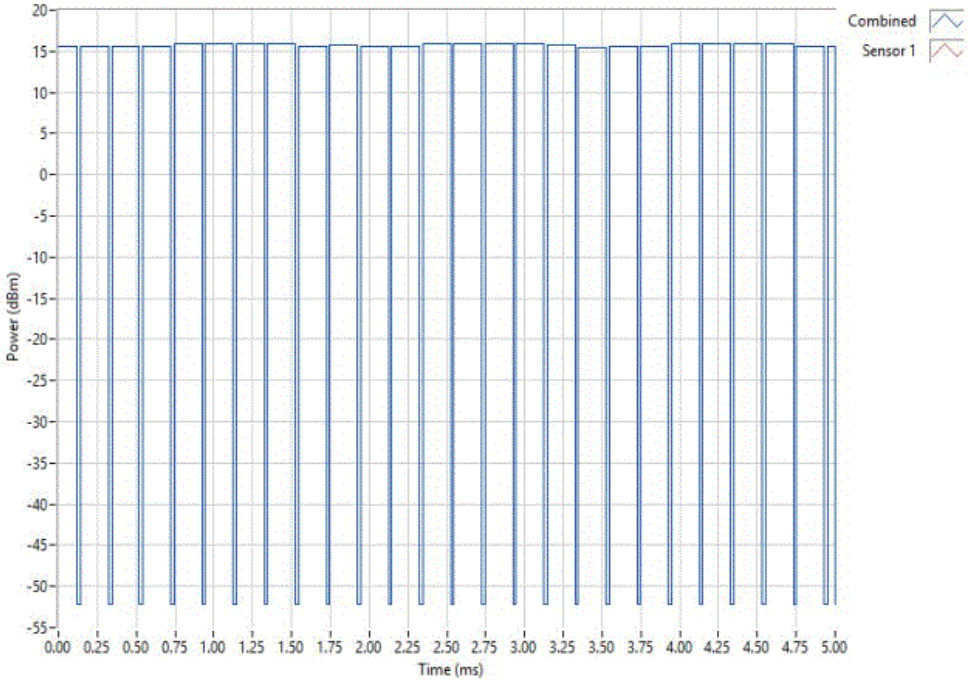
Normal Temperature Conditions, 802.11(g) 36 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.86	92.728	2.24	18.1	20	Pass



Normal Temperature Conditions, 802.11(g) 54 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.91	90.118	2.24	18.2	20	Pass



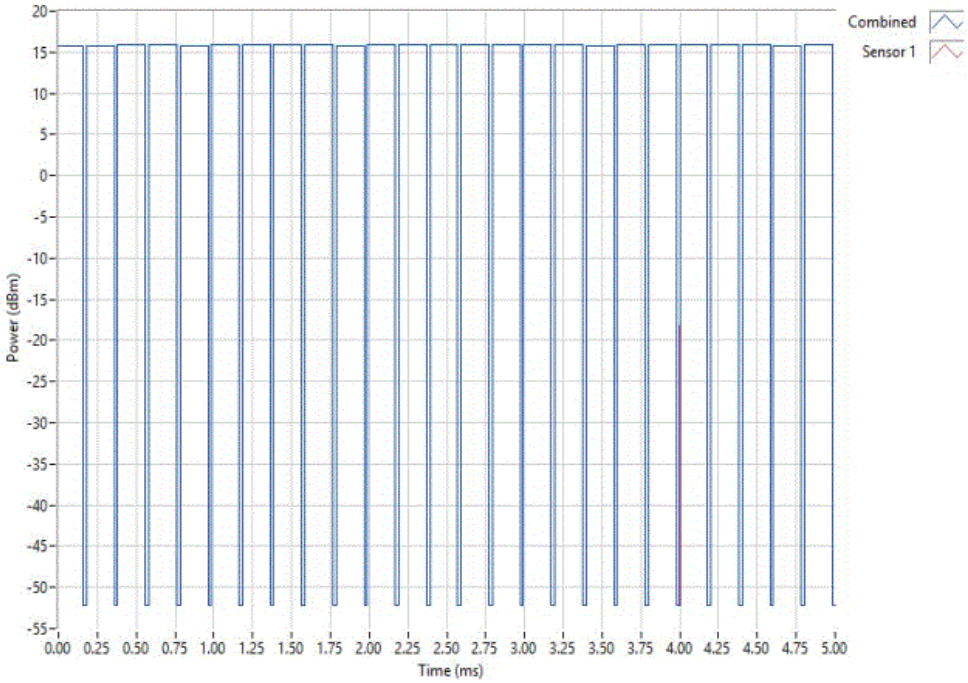
Normal Temperature Conditions, 802.11(g) 54 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.95	90.071	2.24	18.2	20	Pass



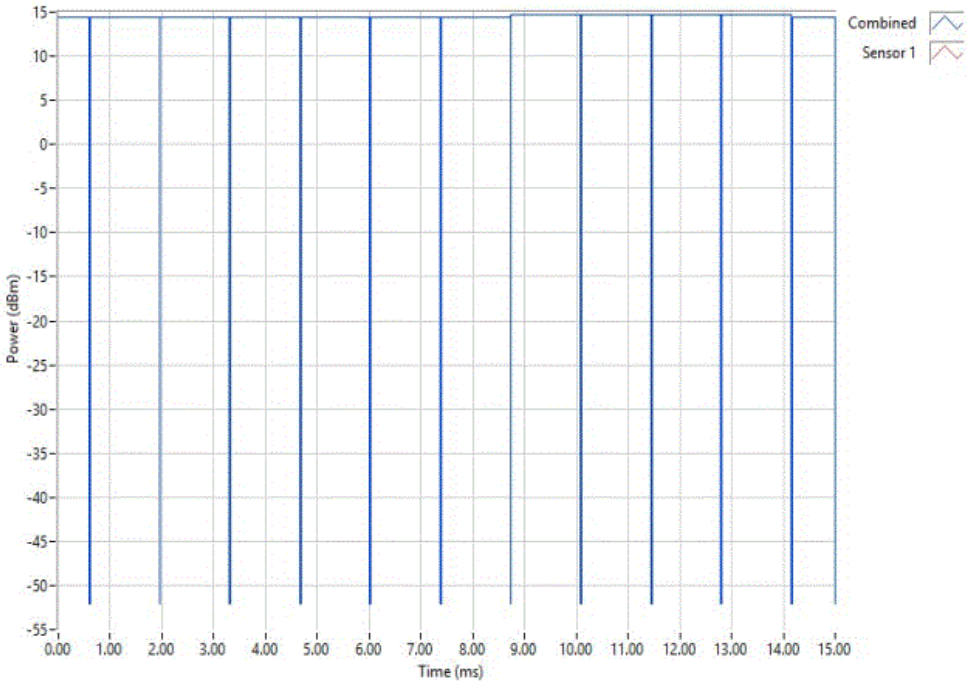
RF OUTPUT POWER

XMit 2016.05.06

Normal Temperature Conditions, 802.11(g) 54 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.98	89.812	2.24	18.2	20	Pass



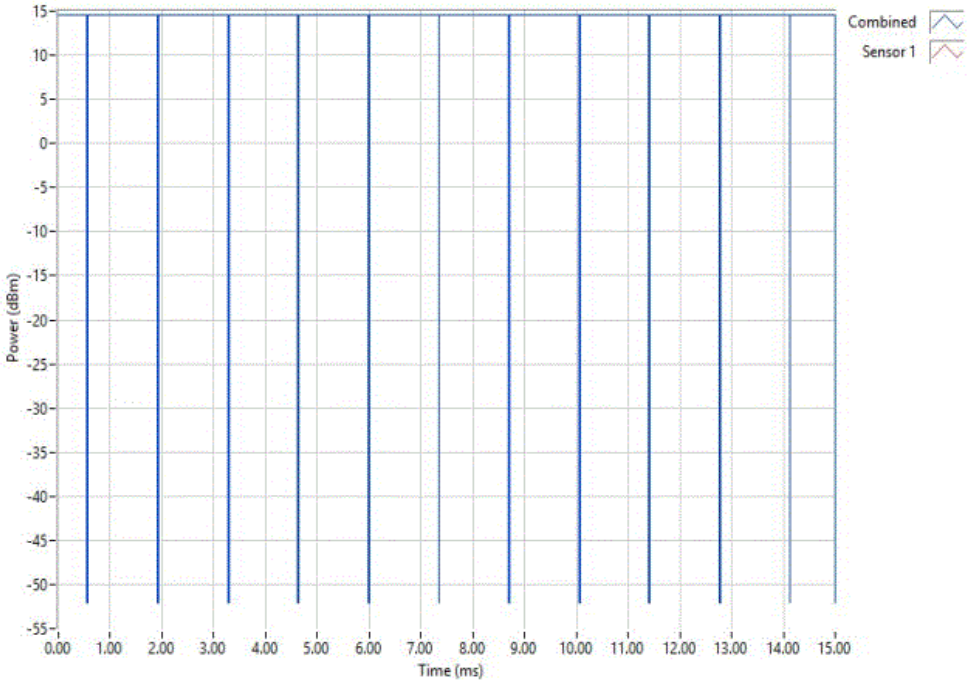
Normal Temperature Conditions, 802.11(n) MCS0, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.77	98.615	2.24	17	20	Pass



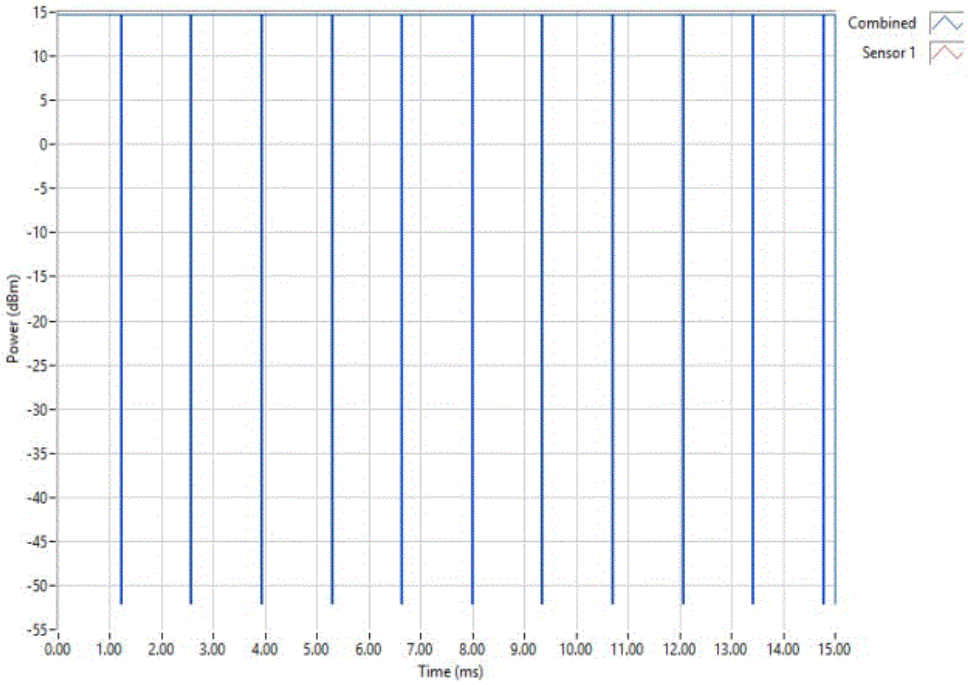
RF OUTPUT POWER

XMit 2016.05.06

Normal Temperature Conditions, 802.11(n) MCS0, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.58	98.611	2.24	16.8	20	Pass



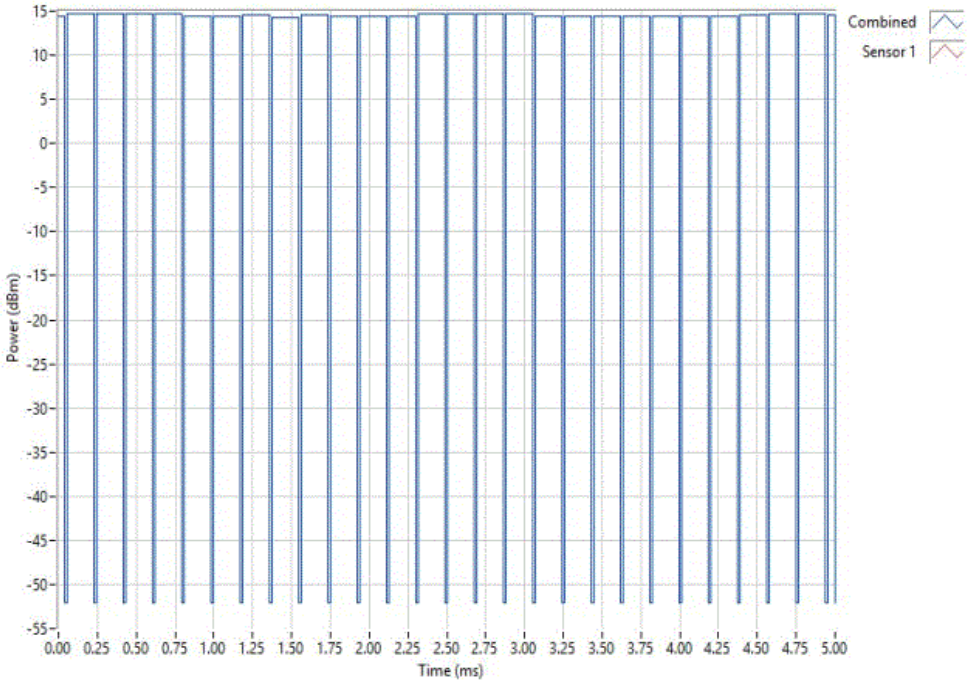
Normal Temperature Conditions, 802.11(n) MCS0, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.71	98.606	2.24	17	20	Pass



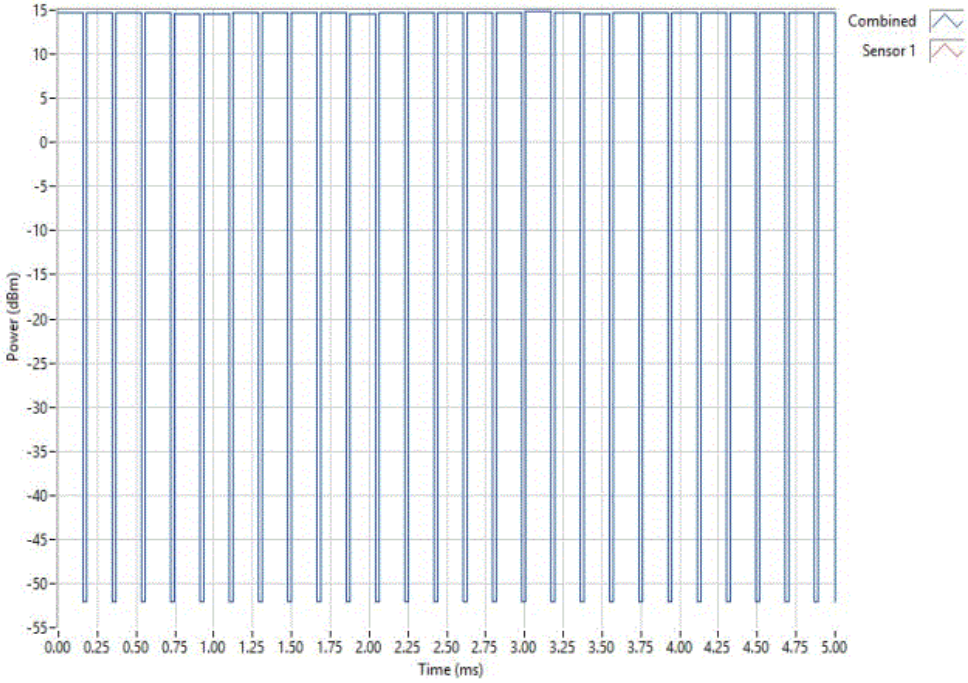
RF OUTPUT POWER

XMit 2016.05.06

Normal Temperature Conditions, 802.11(n) MCS7, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.77	89.353	2.24	17	20	Pass



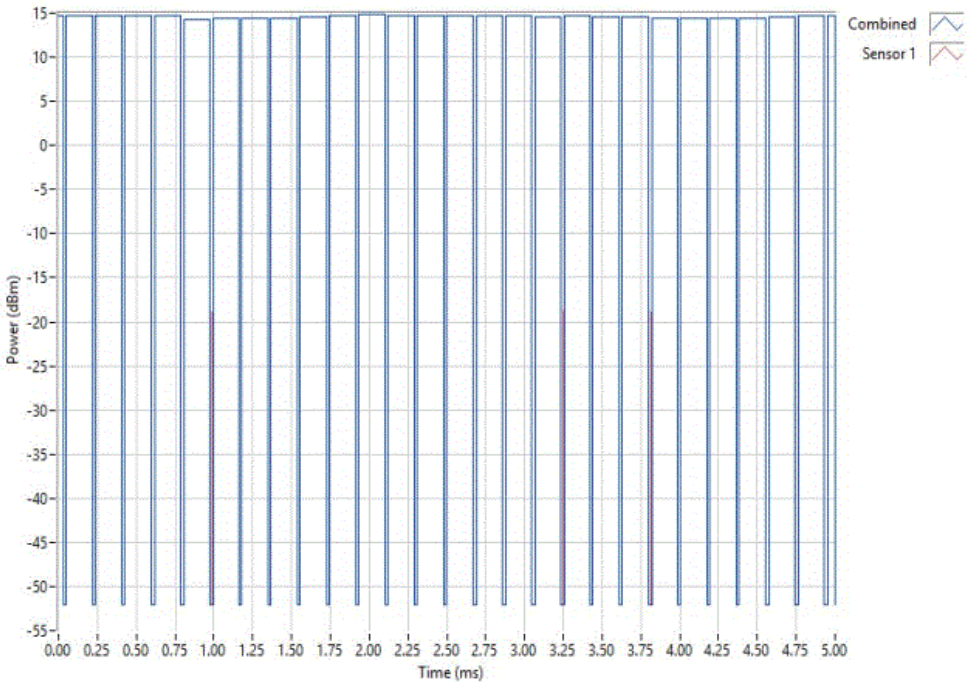
Normal Temperature Conditions, 802.11(n) MCS7, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.81	89.365	2.24	17.1	20	Pass



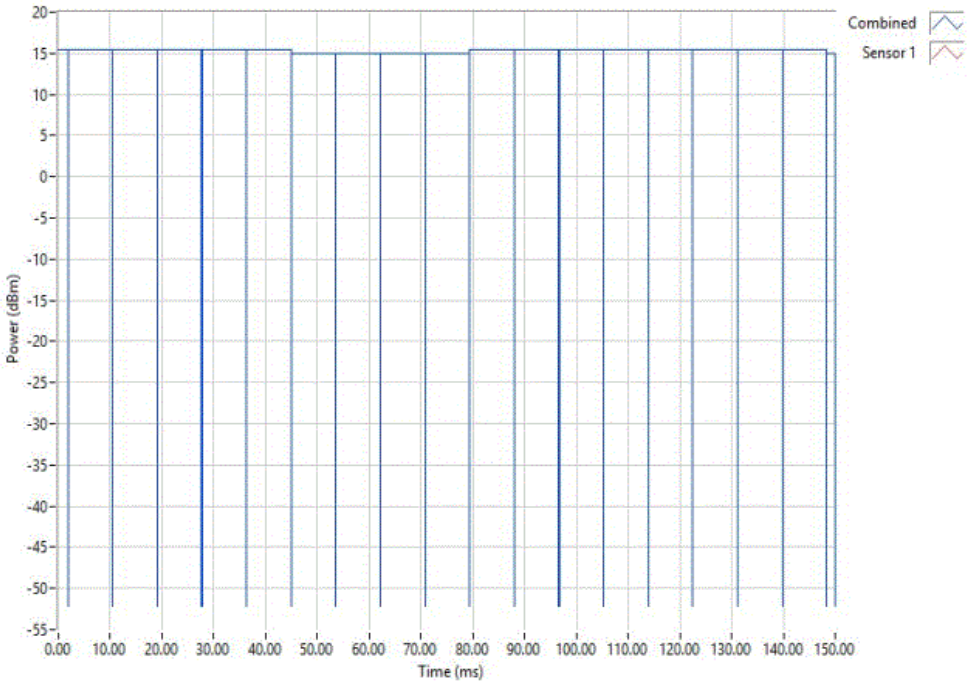
RF OUTPUT POWER

XMit 2016.05.06

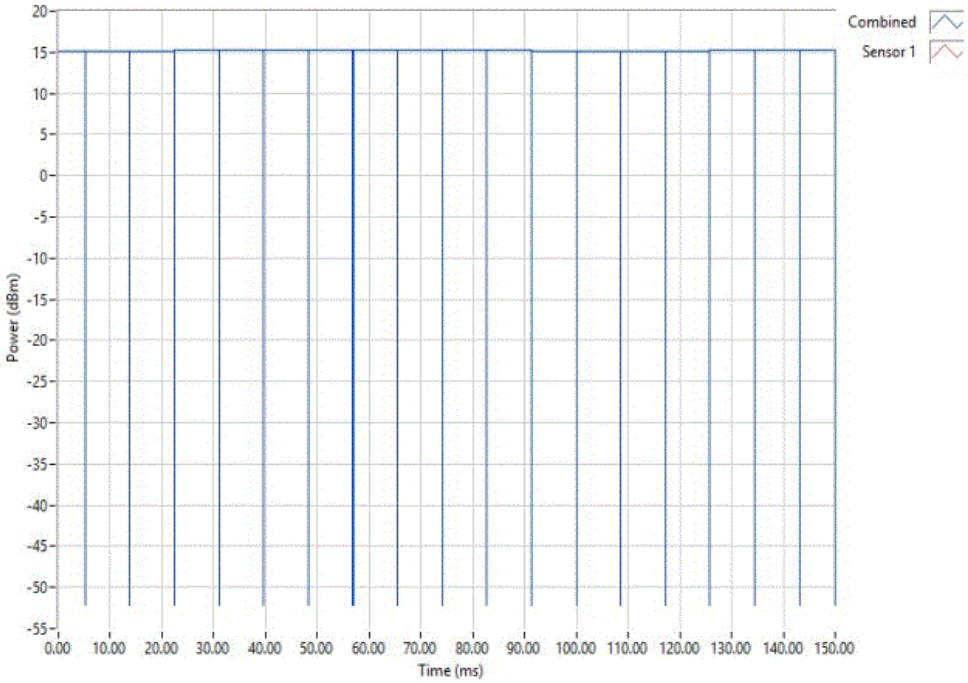
Normal Temperature Conditions, 802.11(n) MCS7, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.78	89.365	2.24	17	20	Pass



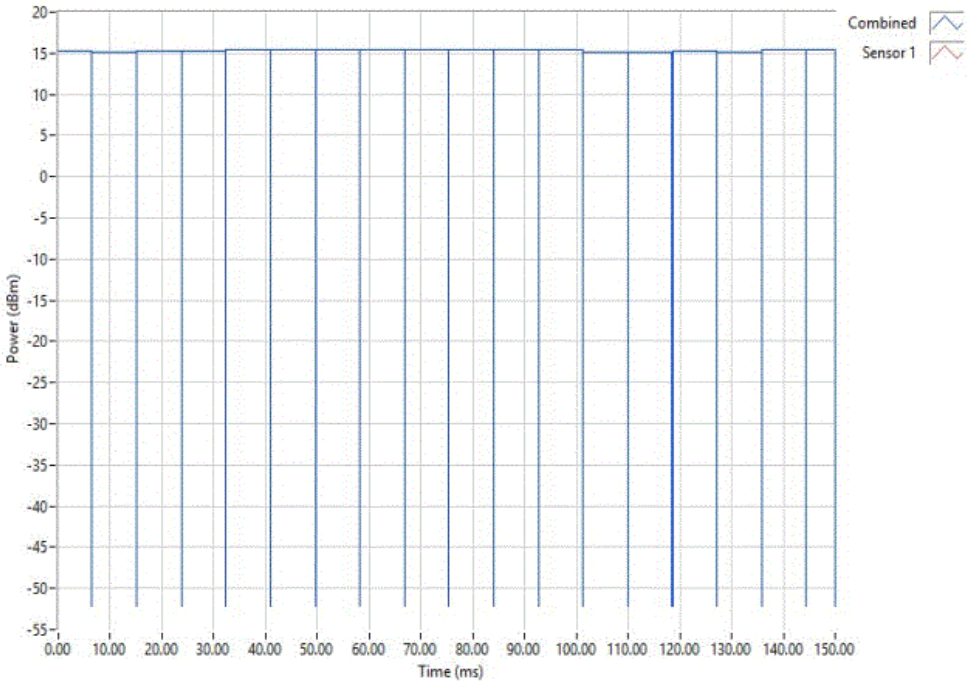
Extreme Temperature, +85°C, 802.11(b) 1 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.39	99.831	2.24	17.6	20	Pass



Extreme Temperature, +85°C, 802.11(b) 1 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.35	99.837	2.24	17.6	20	Pass



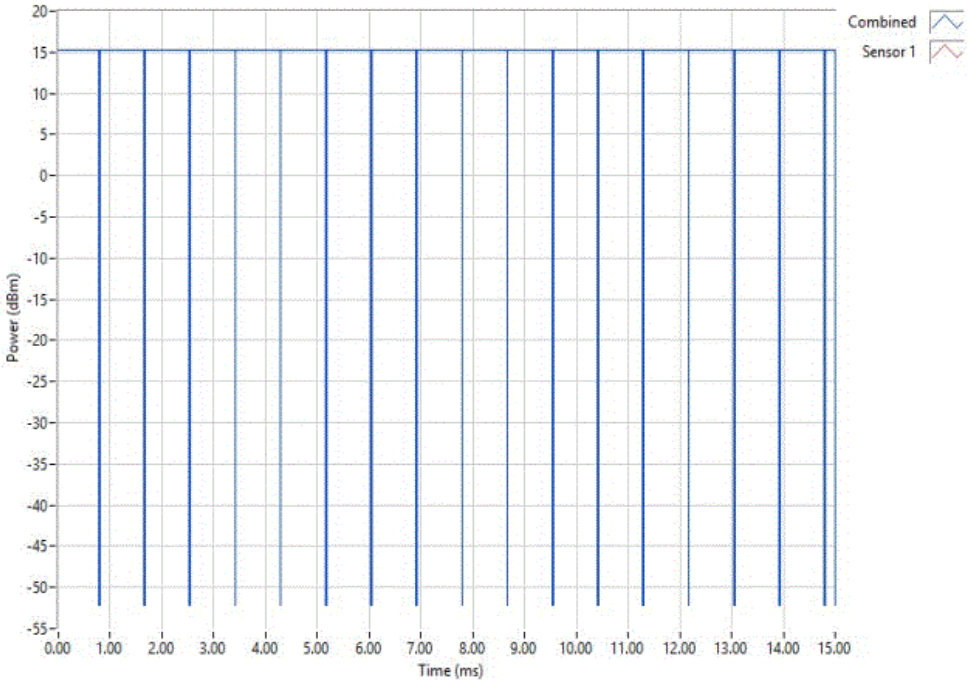
Extreme Temperature, +85°C, 802.11(b) 1 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.48	99.838	2.24	17.7	20	Pass



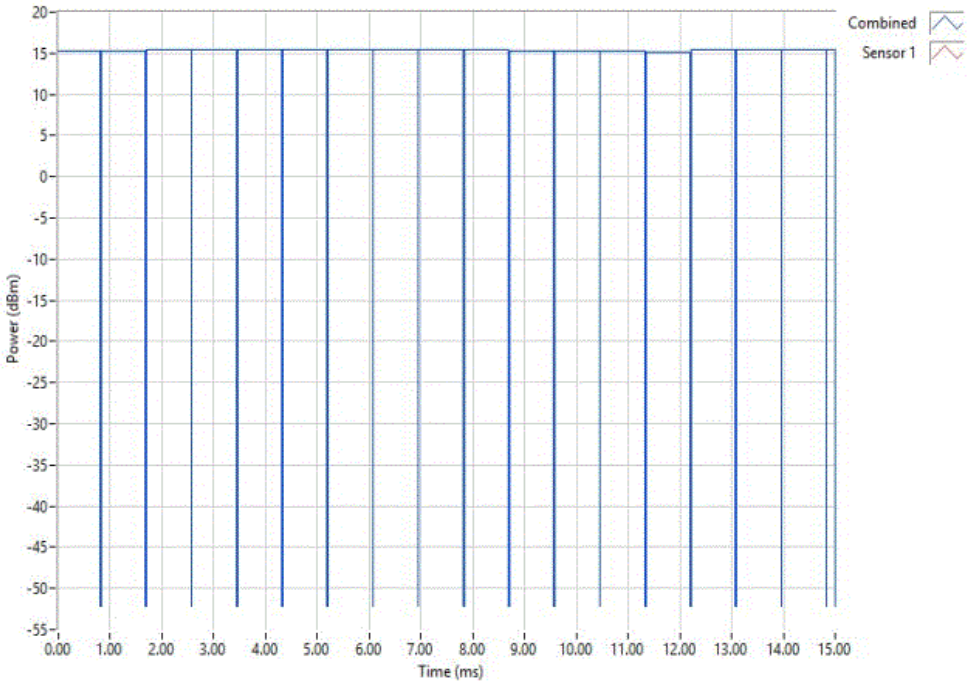
RF OUTPUT POWER

XMit 2016.05.06

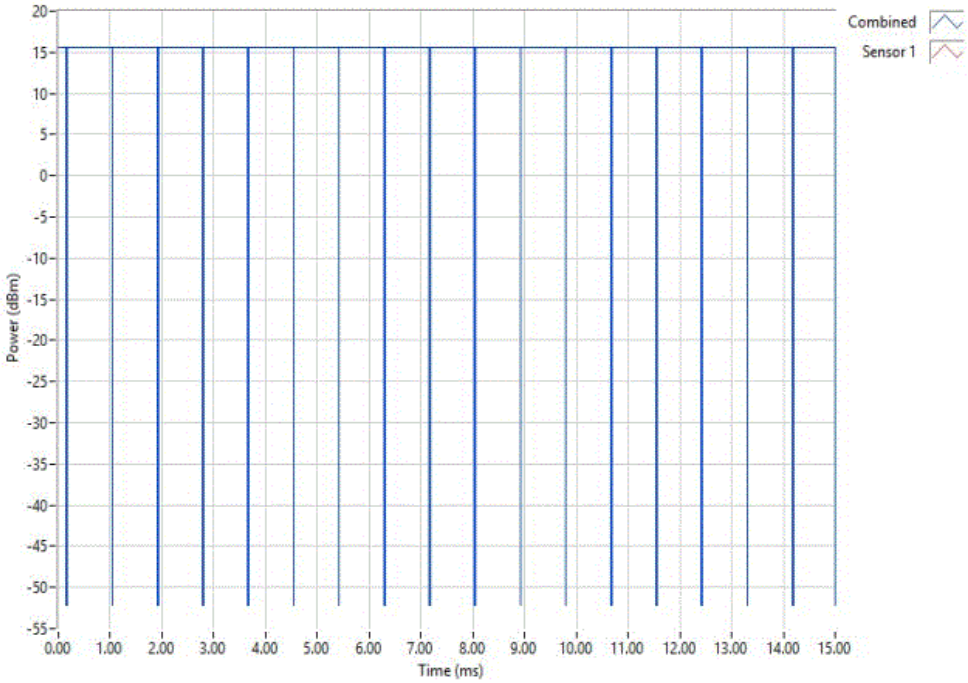
Extreme Temperature, +85°C, 802.11(b) 11 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.35	98.389	2.24	17.6	20	Pass



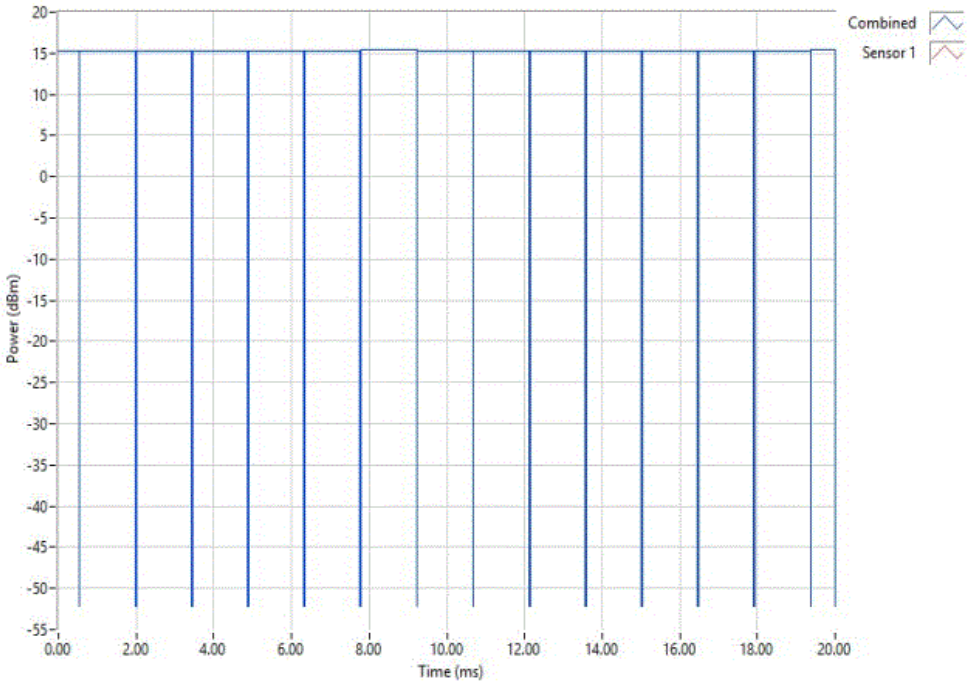
Extreme Temperature, +85°C, 802.11(b) 11 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.51	98.385	2.24	17.8	20	Pass



Extreme Temperature, +85°C, 802.11(b) 11 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.65	98.404	2.24	17.9	20	Pass



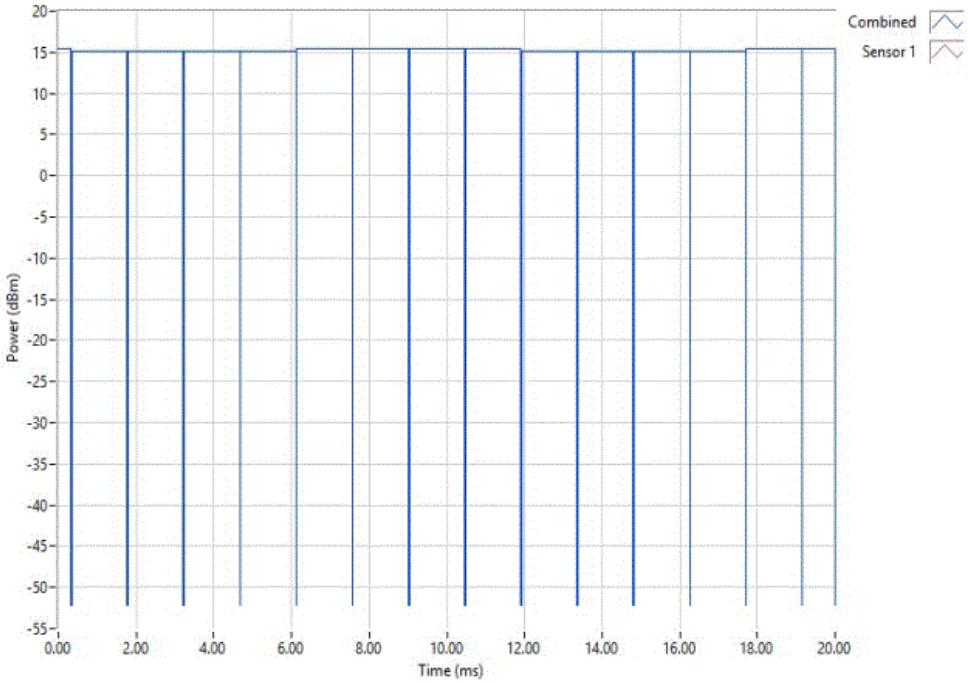
Extreme Temperature, +85°C, 802.11(g) 6 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.38	98.686	2.24	17.6	20	Pass



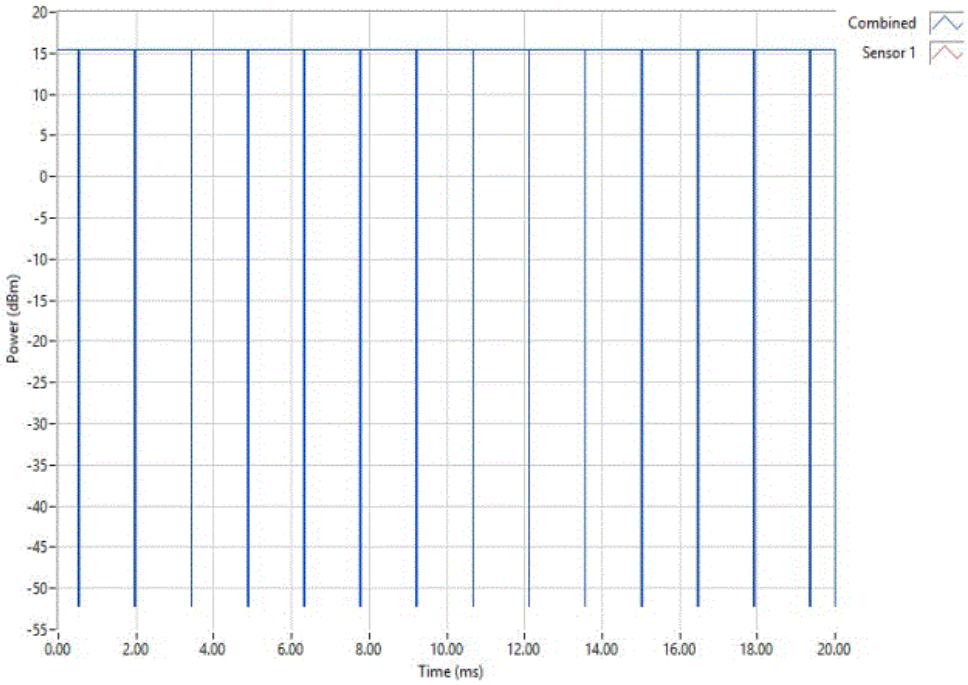
RF OUTPUT POWER

XMit 2016.05.06

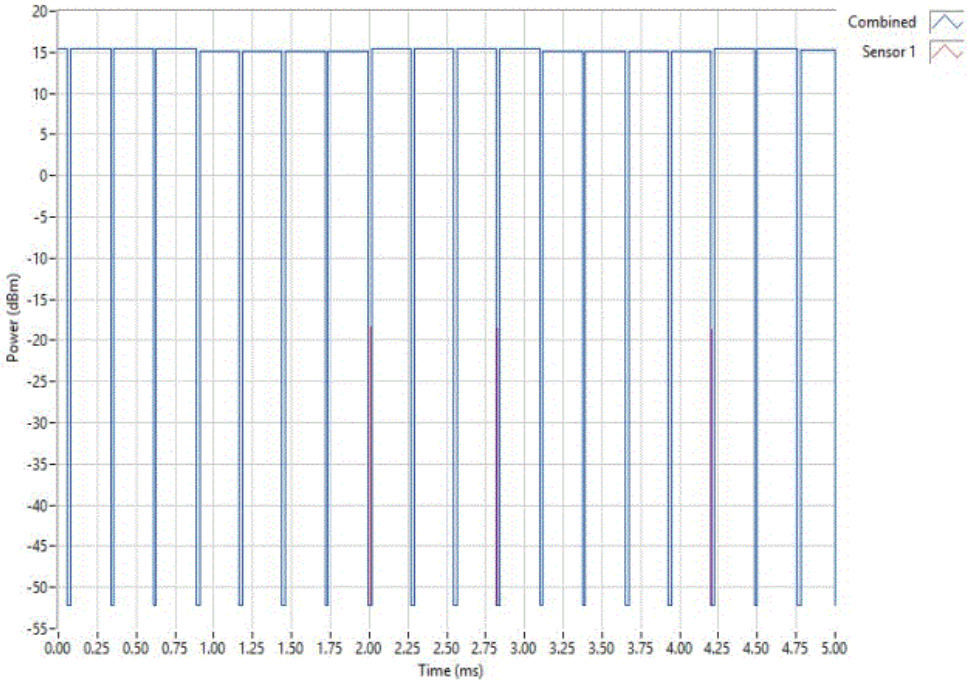
Extreme Temperature, +85°C, 802.11(g) 6 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.41	98.683	2.24	17.7	20	Pass



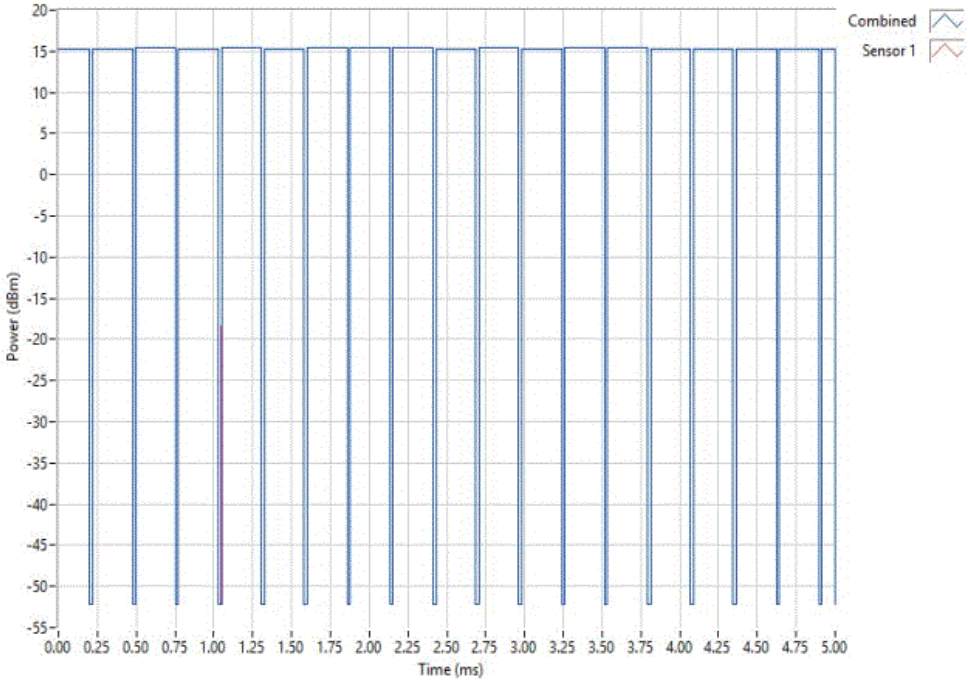
Extreme Temperature, +85°C, 802.11(g) 6 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.43	98.617	2.24	17.7	20	Pass



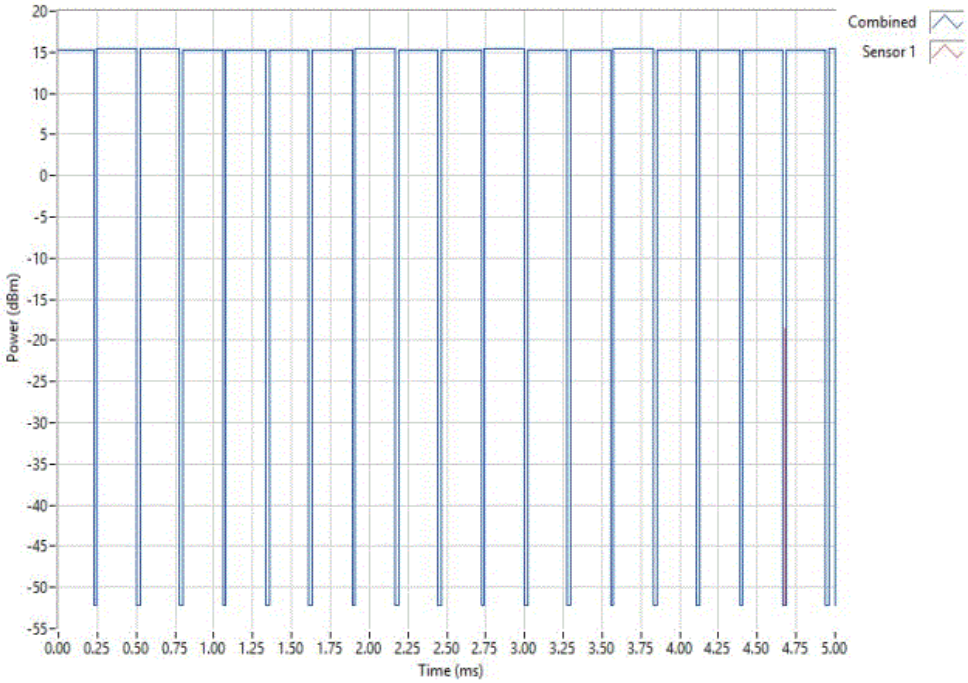
Extreme Temperature, +85°C, 802.11(g) 36 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.48	92.94	2.24	17.7	20	Pass



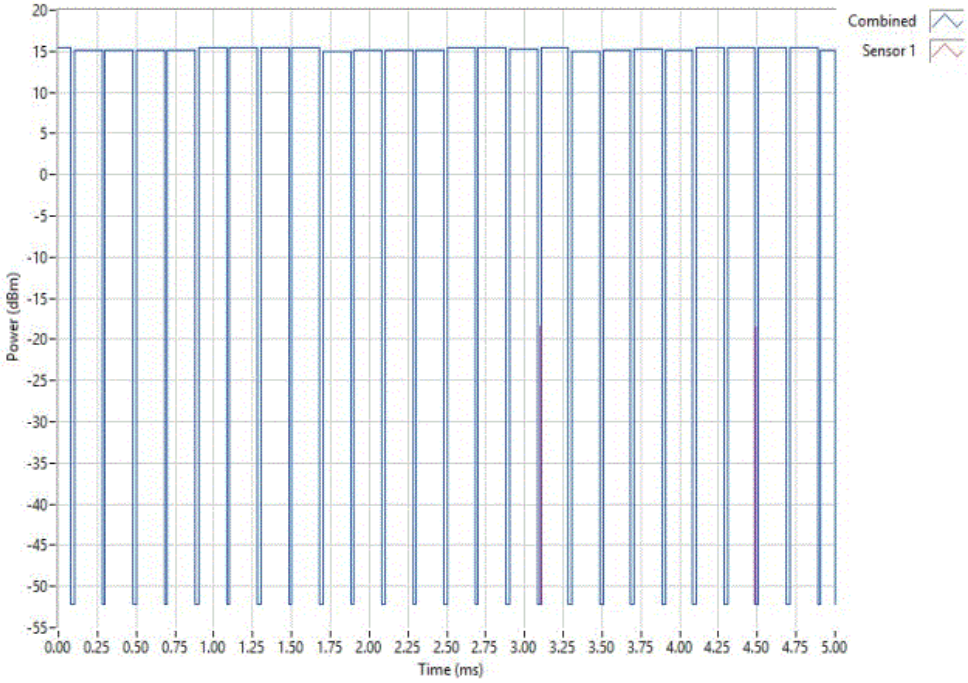
Extreme Temperature, +85°C, 802.11(g) 36 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.39	92.949	2.24	17.6	20	Pass



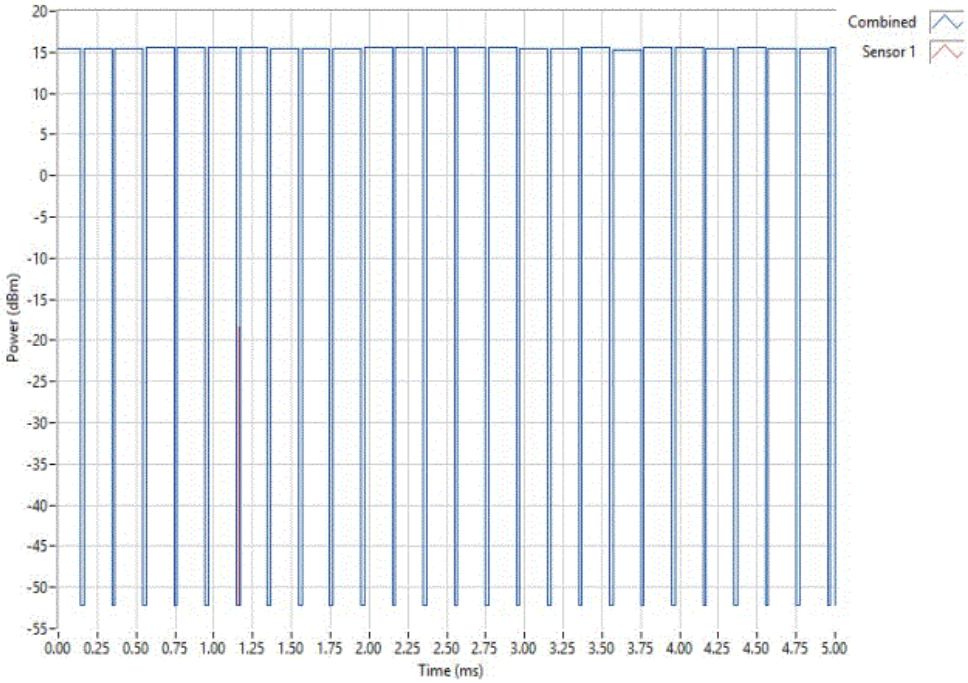
Extreme Temperature, +85°C, 802.11(g) 36 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.4	92.63	2.24	17.6	20	Pass



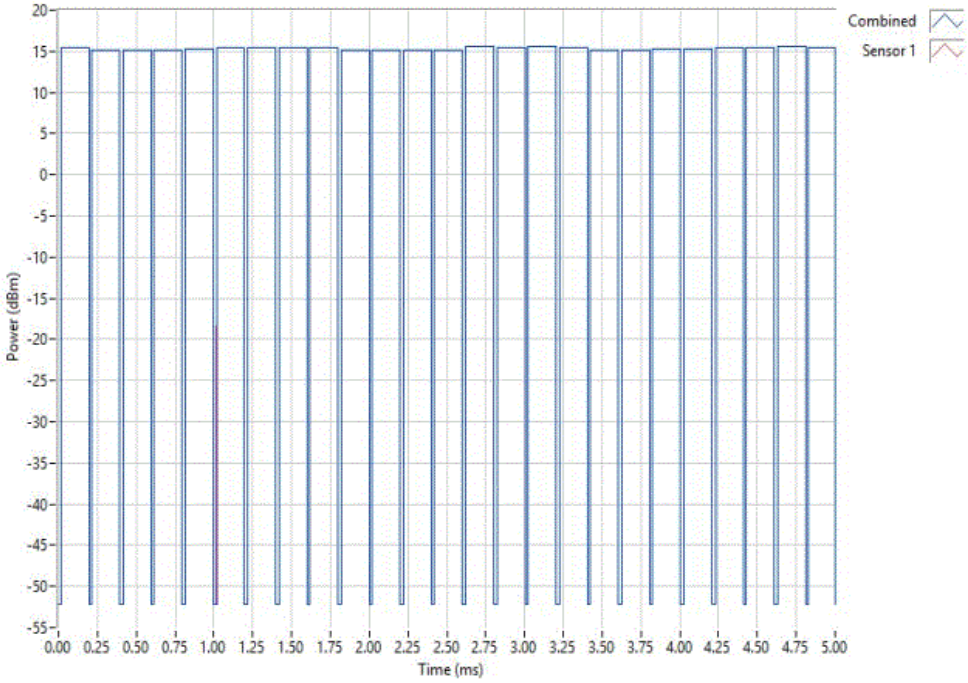
Extreme Temperature, +85°C, 802.11(g) 54 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.45	90.099	2.24	17.7	20	Pass



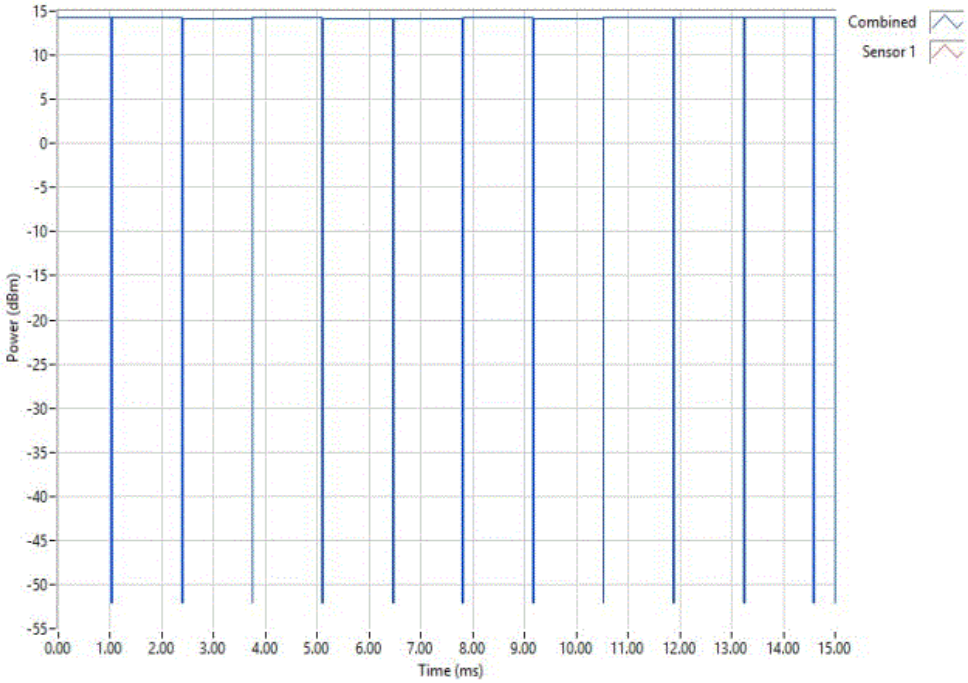
Extreme Temperature, +85°C, 802.11(g) 54 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.63	90.096	2.24	17.9	20	Pass



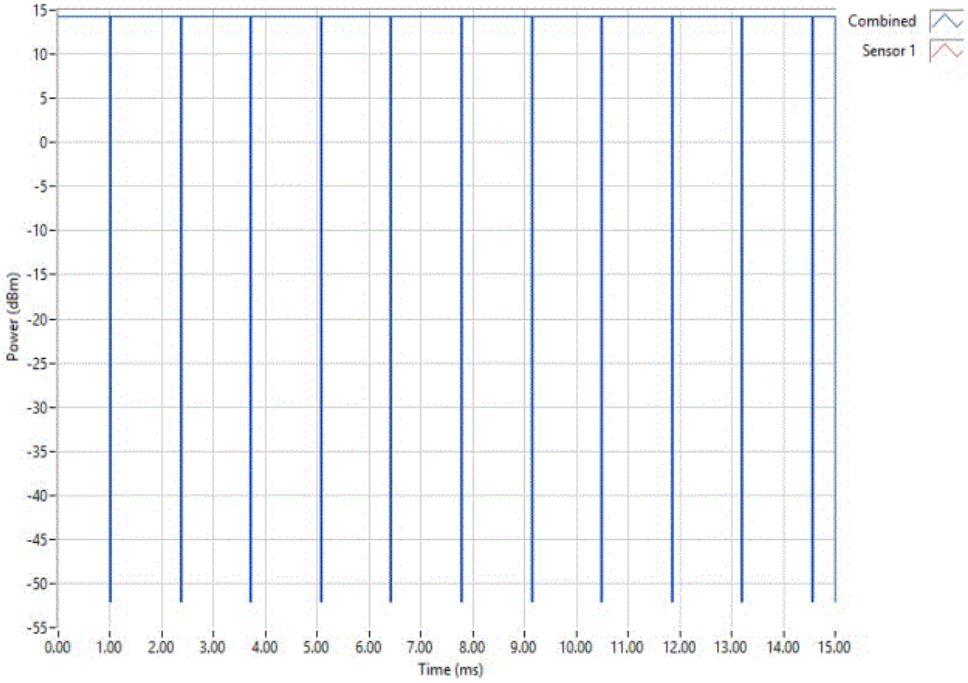
Extreme Temperature, +85°C, 802.11(g) 54 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.54	89.917	2.24	17.8	20	Pass



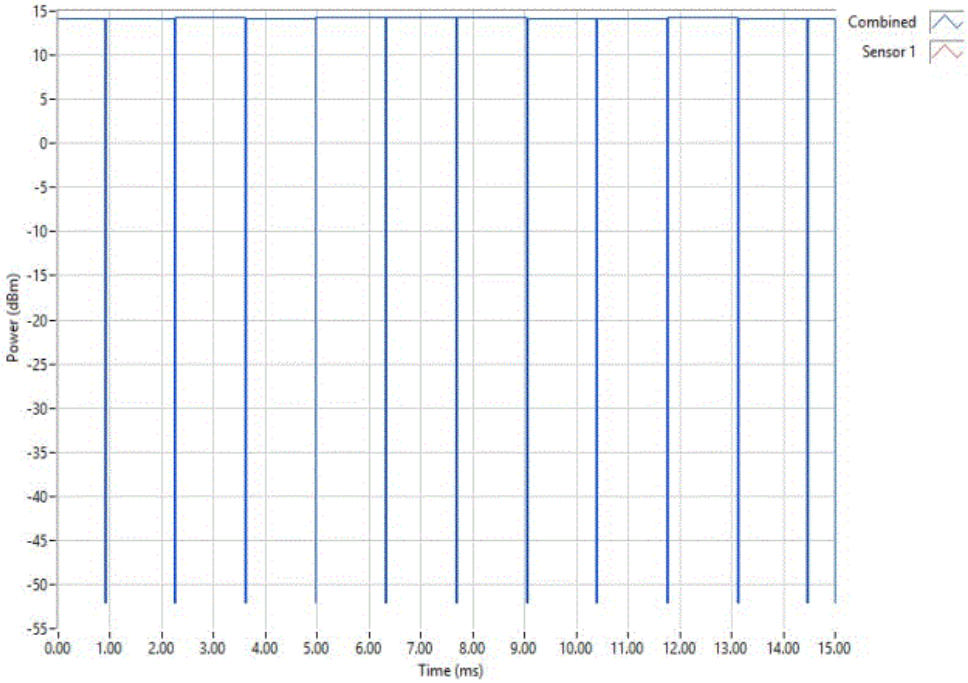
Extreme Temperature, +85°C, 802.11(n) MCS0, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.21	98.618	2.24	16.5	20	Pass



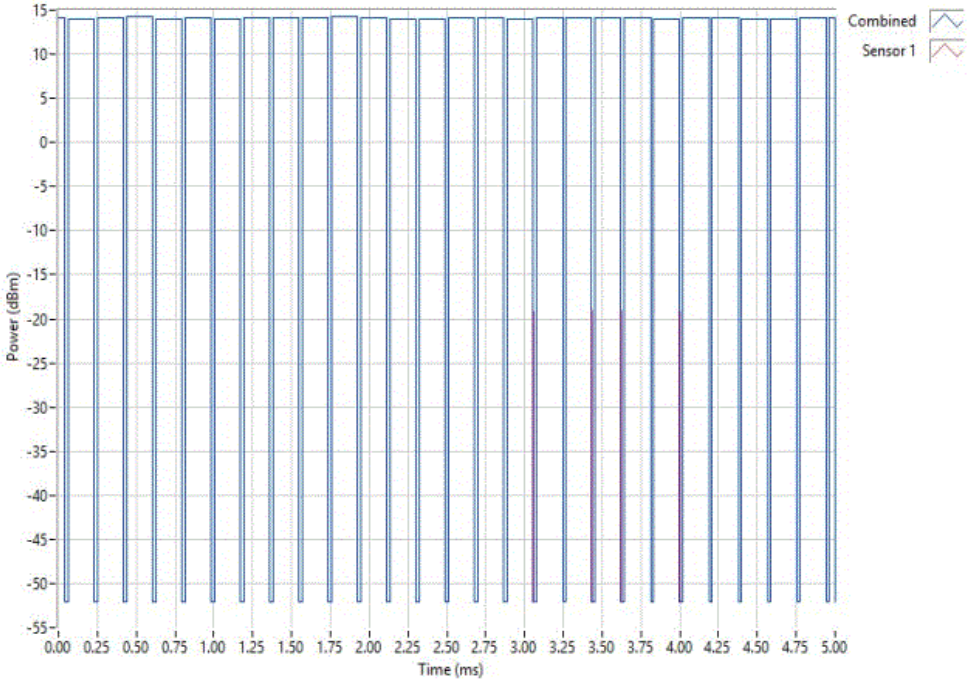
Extreme Temperature, +85°C, 802.11(n) MCS0, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.23	98.624	2.24	16.5	20	Pass



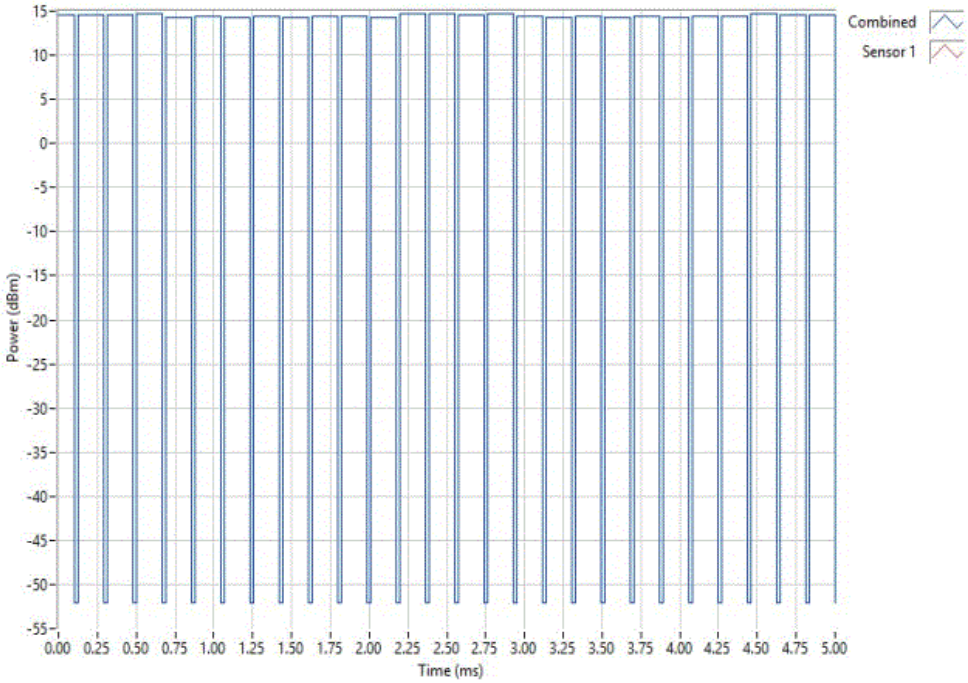
Extreme Temperature, +85°C, 802.11(n) MCS0, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.22	98.532	2.24	16.5	20	Pass



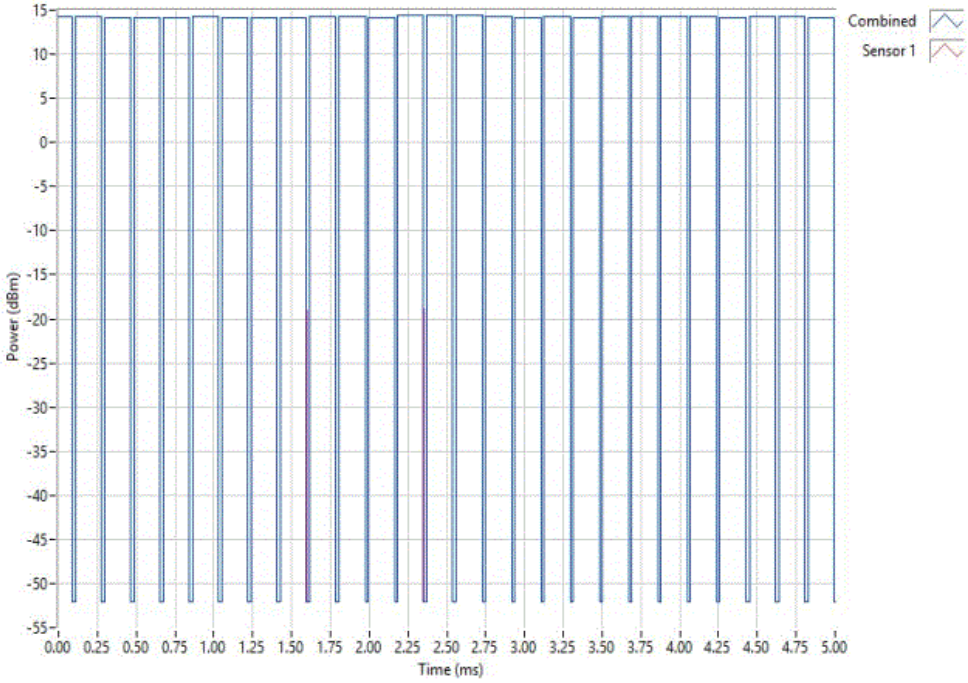
Extreme Temperature, +85°C, 802.11(n) MCS7, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.26	89.349	2.24	16.5	20	Pass



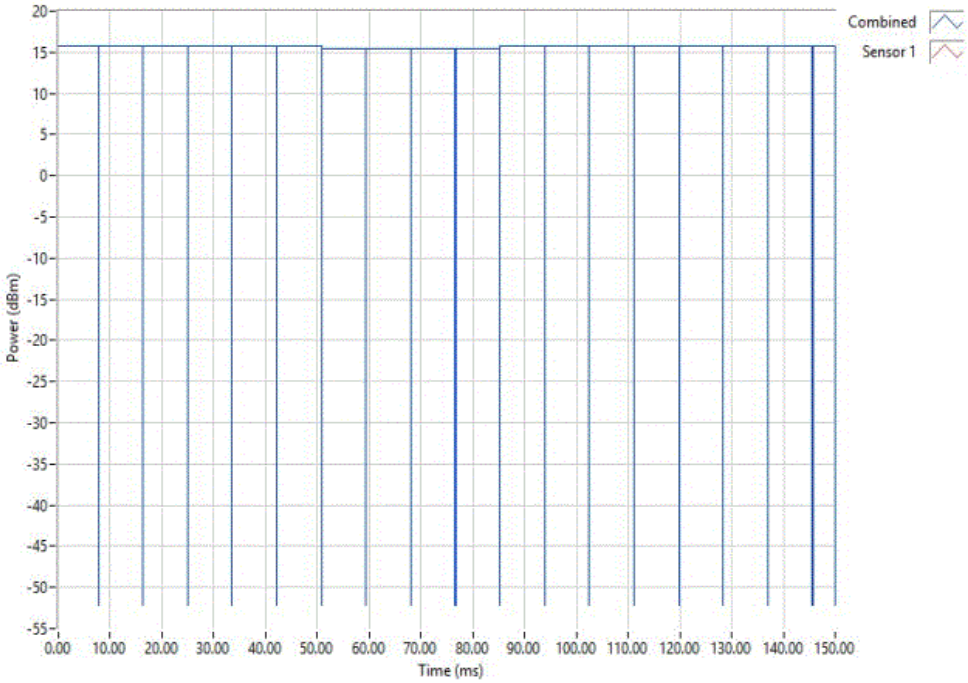
Extreme Temperature, +85°C, 802.11(n) MCS7, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.69	89.374	2.24	16.9	20	Pass



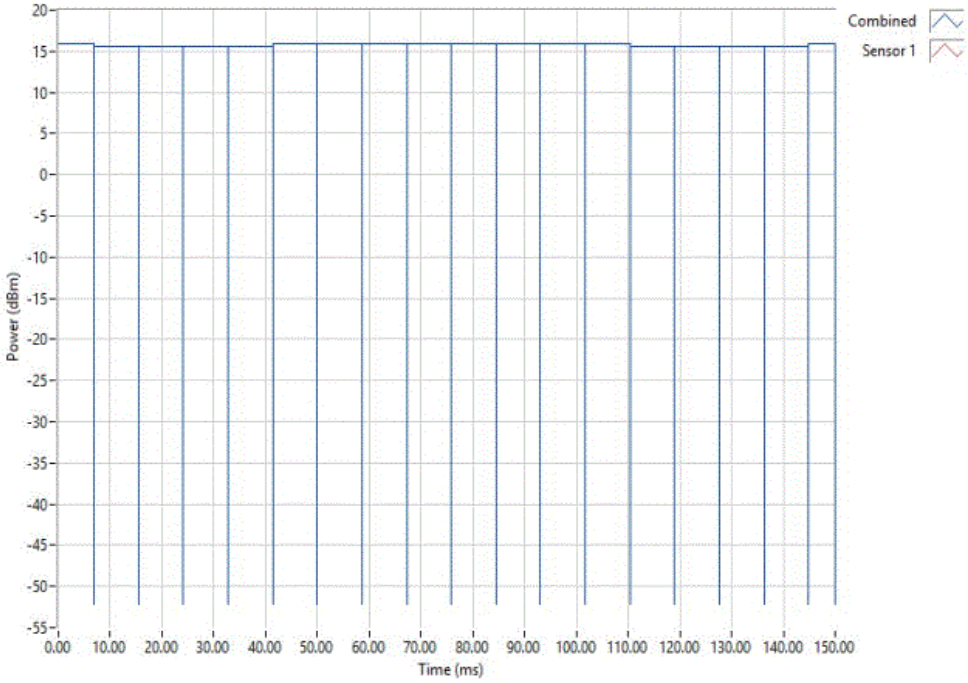
Extreme Temperature, +85°C, 802.11(n) MCS7, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.45	89.3	2.24	16.7	20	Pass



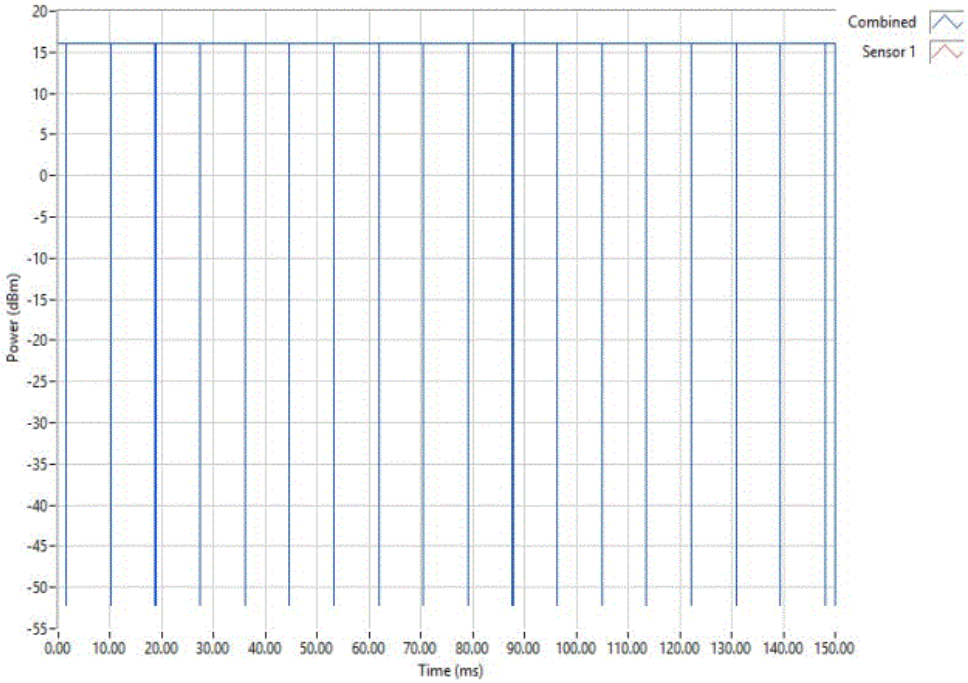
Extreme Temperature, -40°C, 802.11(b) 1 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.72	99.838	2.24	18	20	Pass



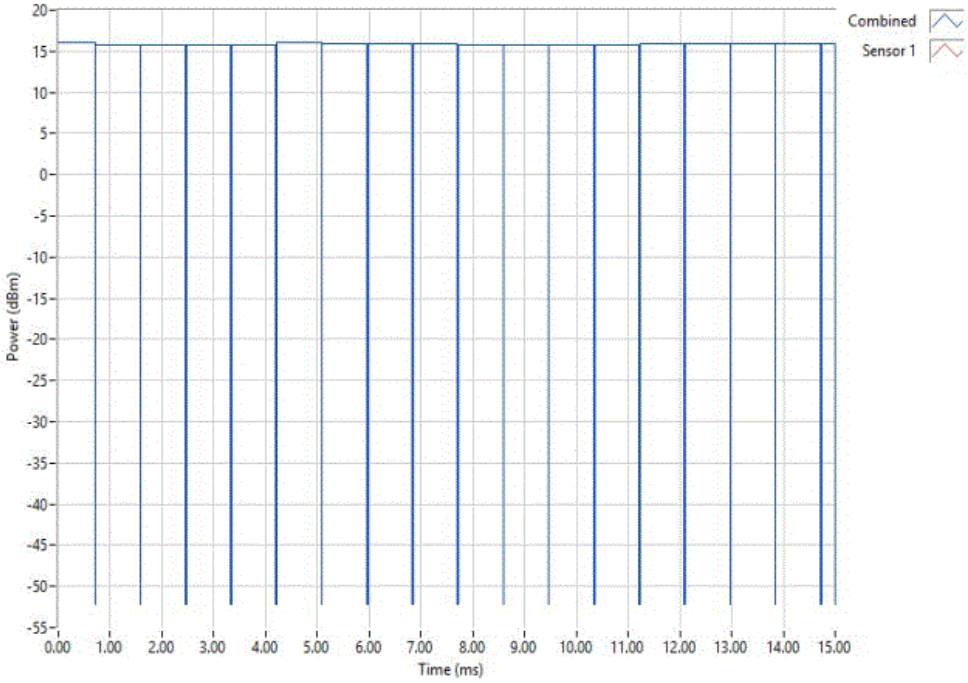
Extreme Temperature, -40°C, 802.11(b) 1 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.87	99.837	2.24	18.1	20	Pass



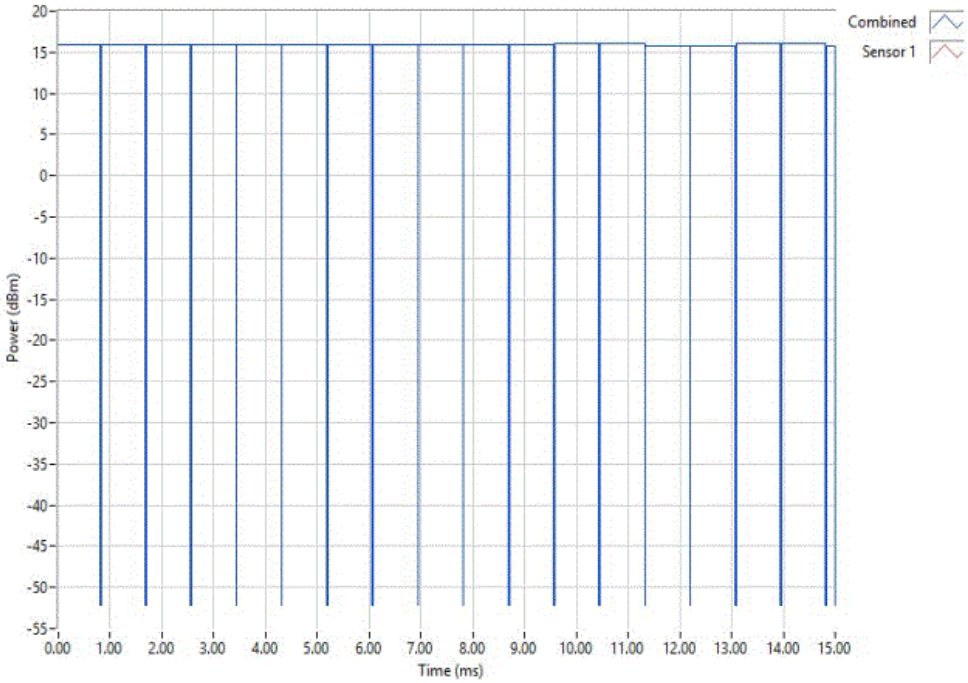
Extreme Temperature, -40°C, 802.11(b) 1 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	16.02	99.838	2.24	18.3	20	Pass



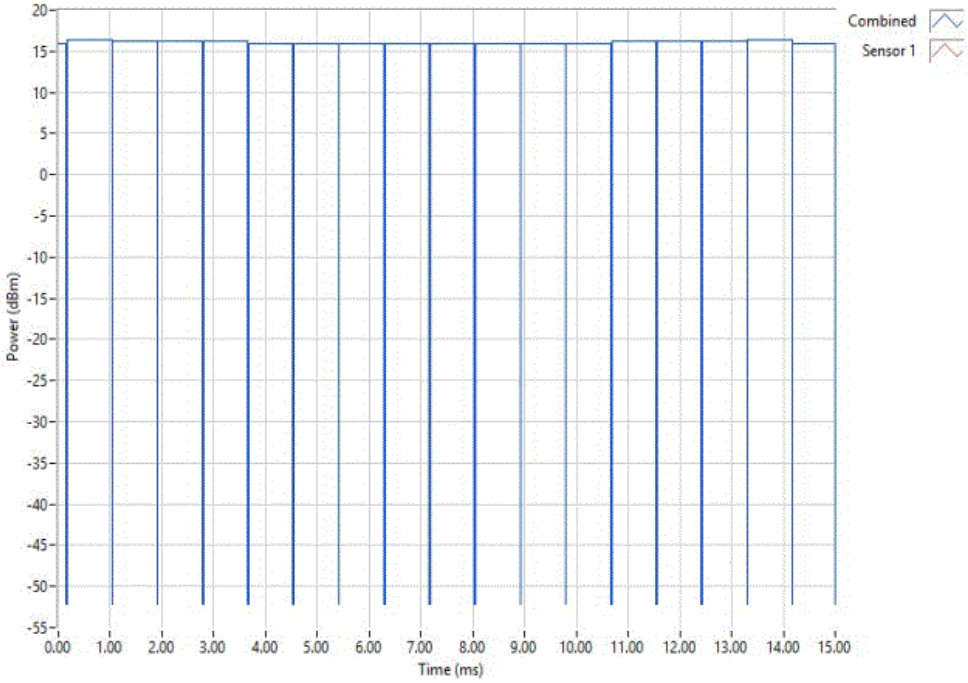
Extreme Temperature, -40°C, 802.11(b) 11 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	16	98.411	2.24	18.2	20	Pass



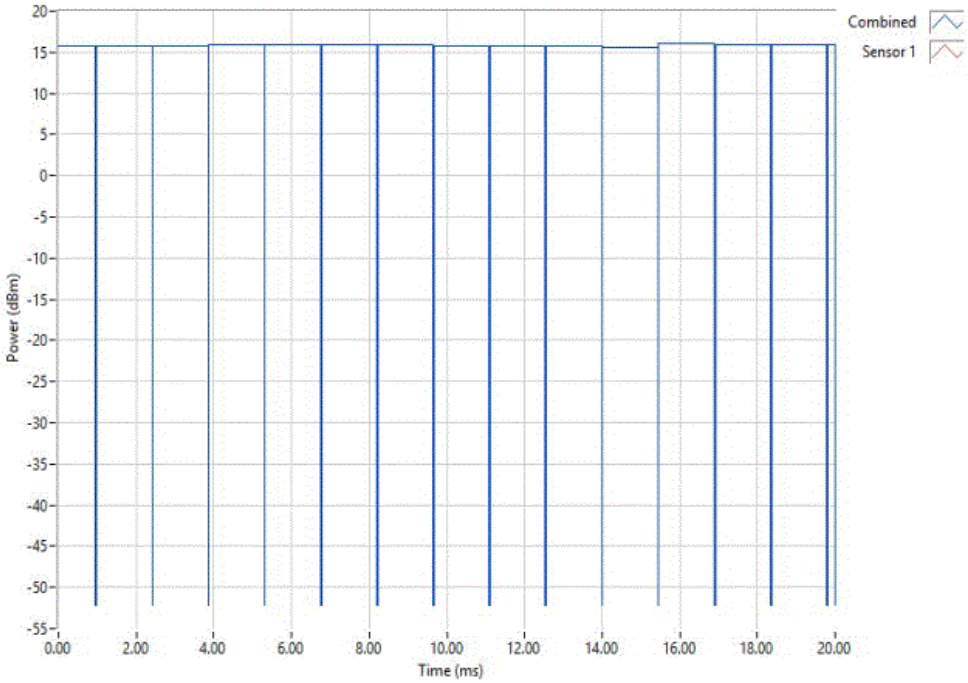
Extreme Temperature, -40°C, 802.11(b) 11 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	16.12	98.391	2.24	18.4	20	Pass



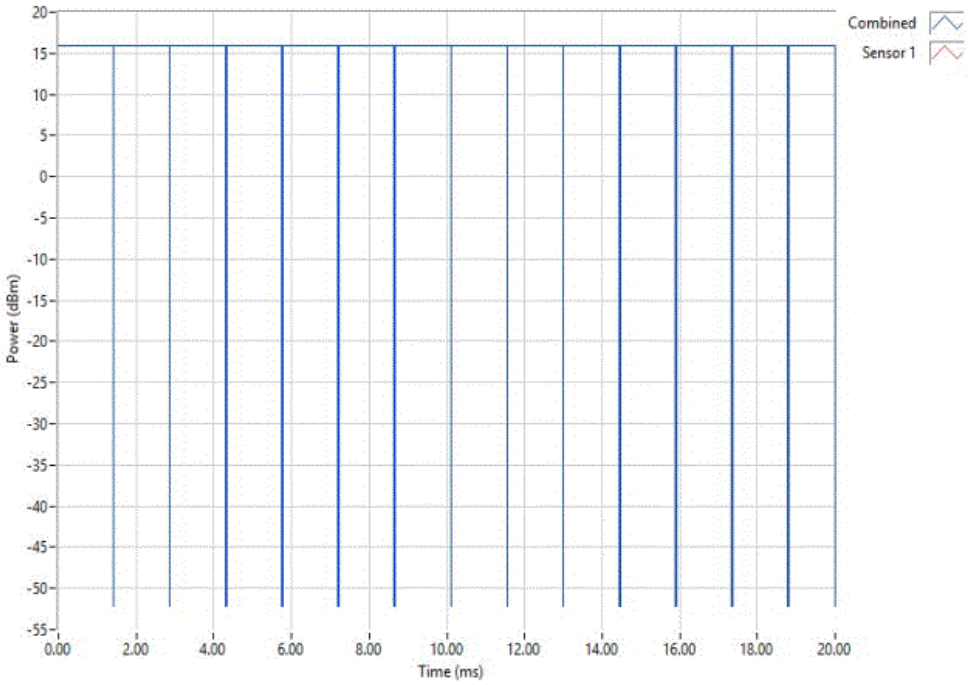
Extreme Temperature, -40°C, 802.11(b) 11 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	16.31	98.416	2.24	18.5	20	Pass



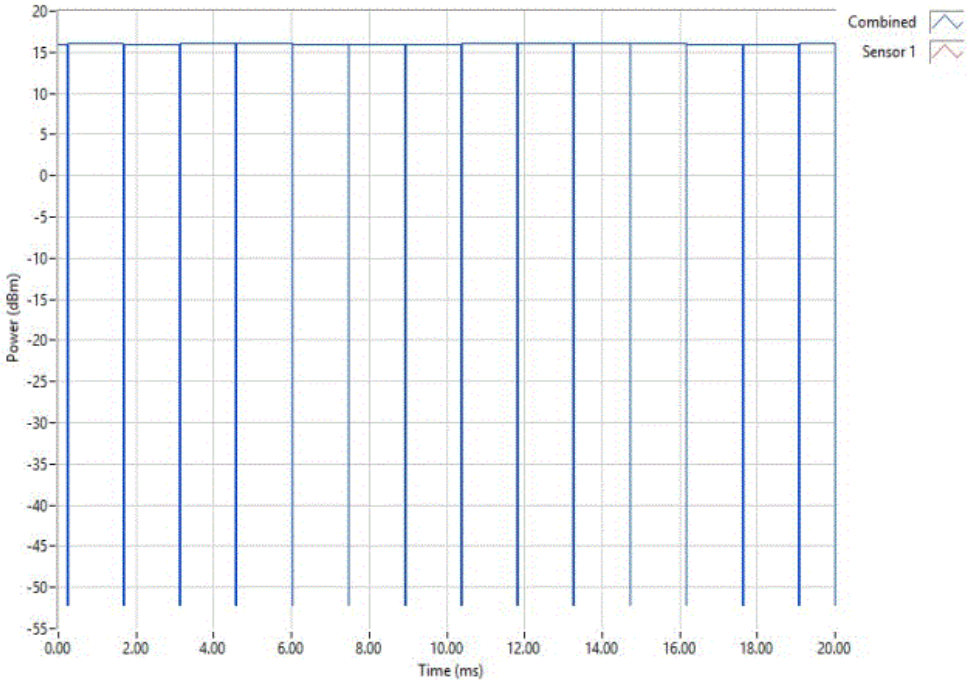
Extreme Temperature, -40°C, 802.11(g) 6 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	16	98.69	2.24	18.2	20	Pass



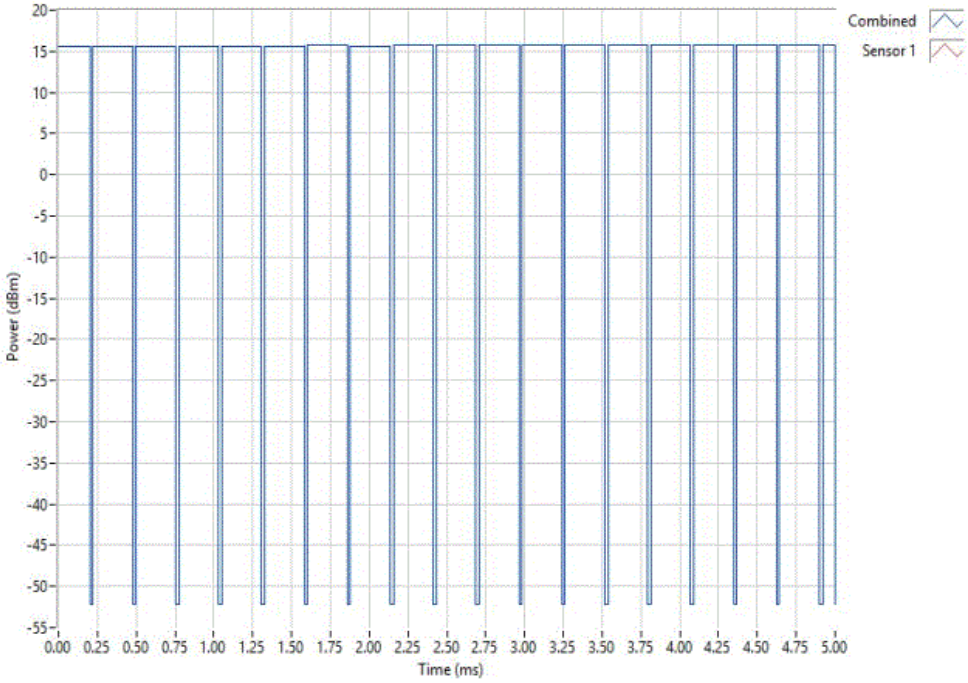
Extreme Temperature, -40°C, 802.11(g) 6 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.92	98.694	2.24	18.2	20	Pass



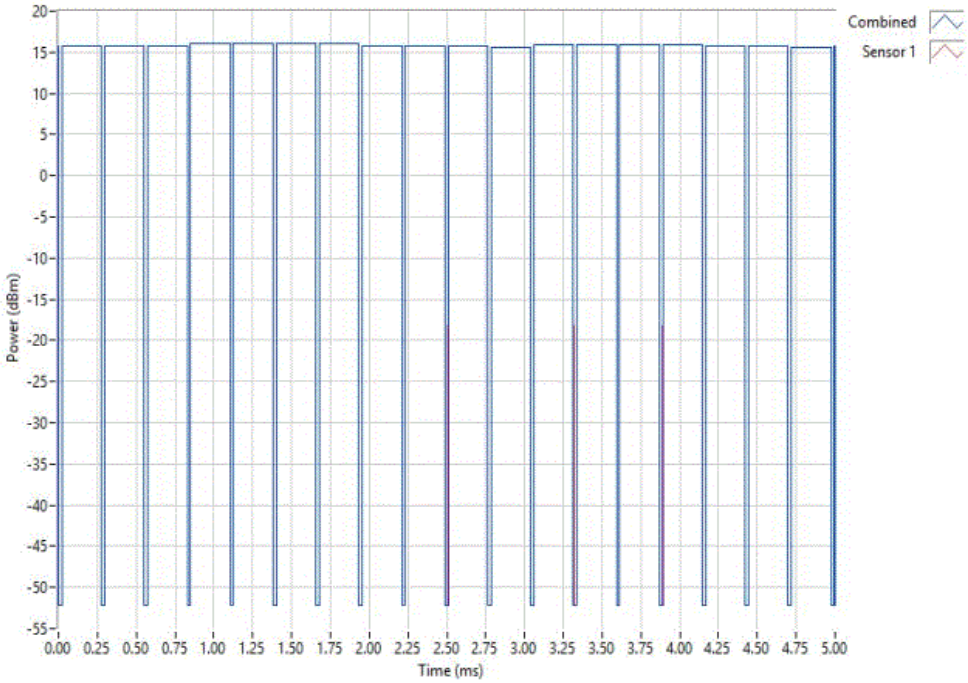
Extreme Temperature, -40°C, 802.11(g) 6 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	16.02	98.625	2.24	18.3	20	Pass



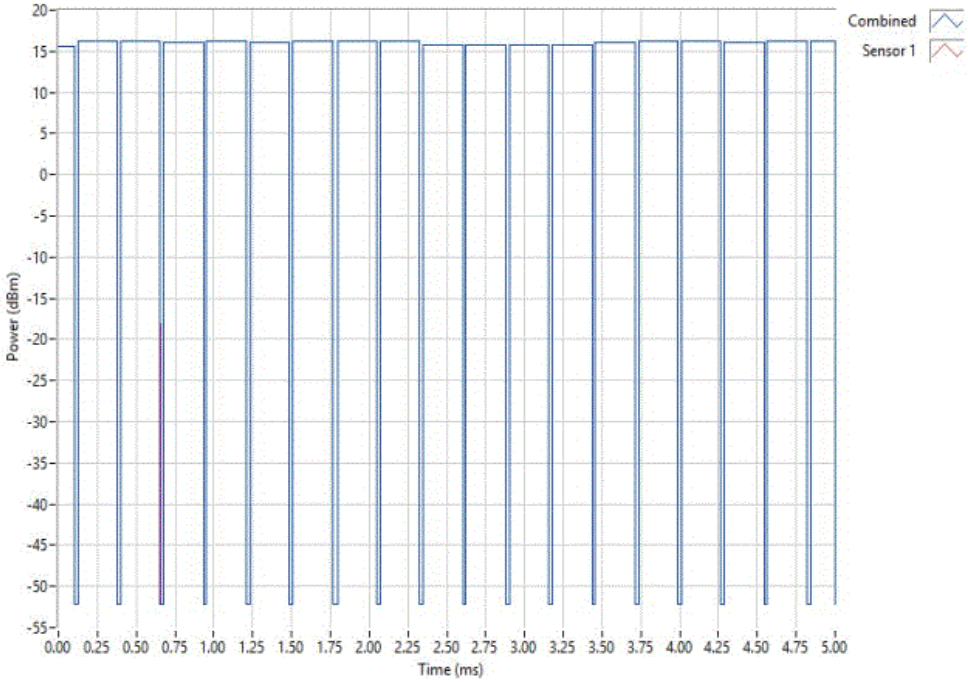
Extreme Temperature, -40°C, 802.11(g) 36 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.75	92.949	2.24	18	20	Pass



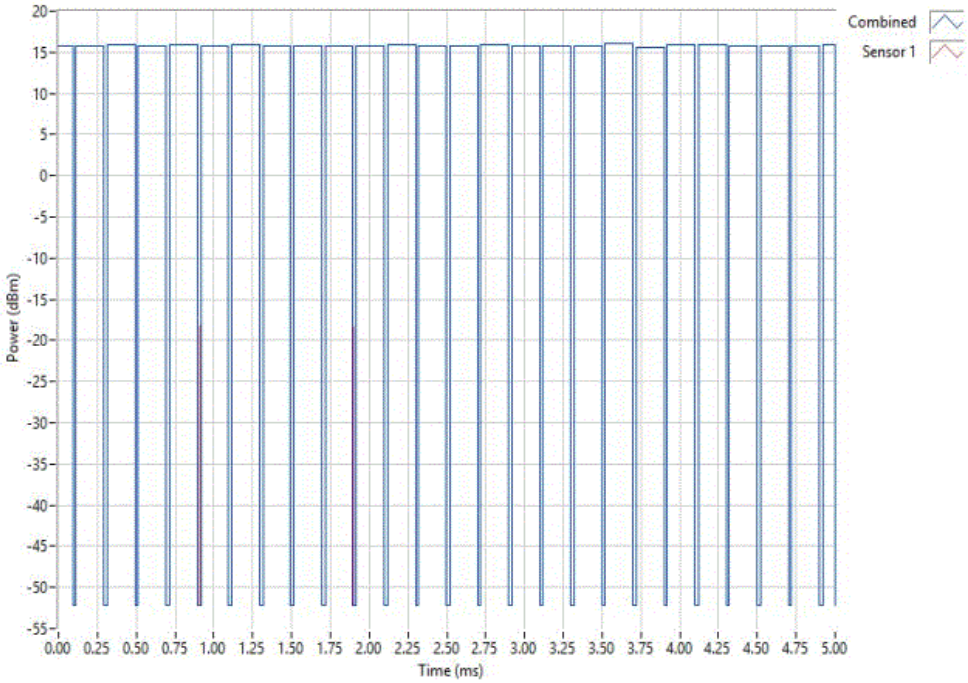
Extreme Temperature, -40°C, 802.11(g) 36 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	16.04	92.934	2.24	18.3	20	Pass



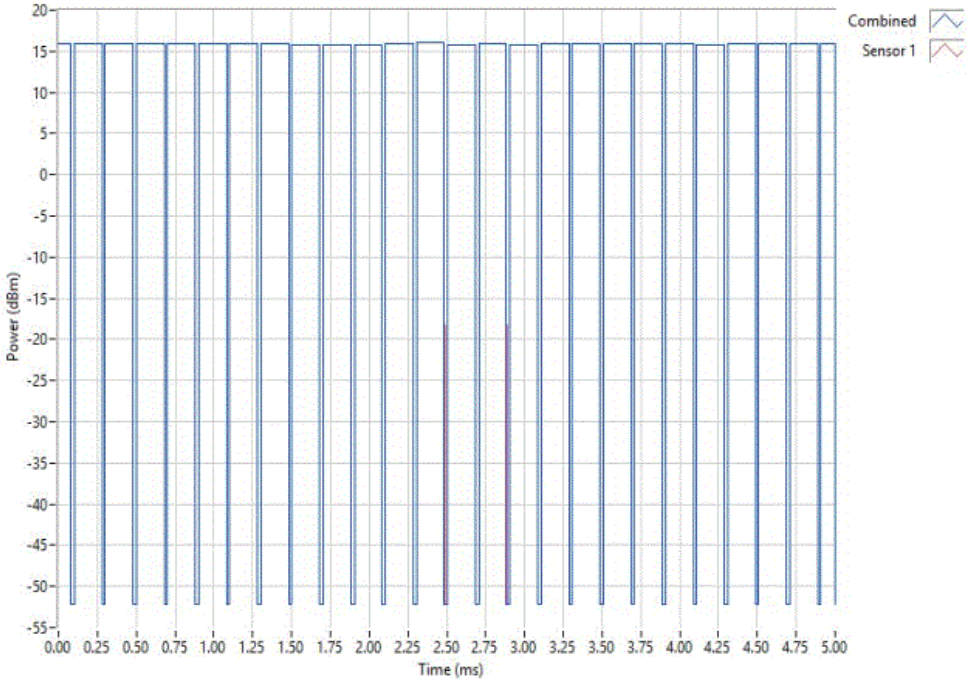
Extreme Temperature, -40°C, 802.11(g) 36 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	16.25	92.524	2.24	18.5	20	Pass



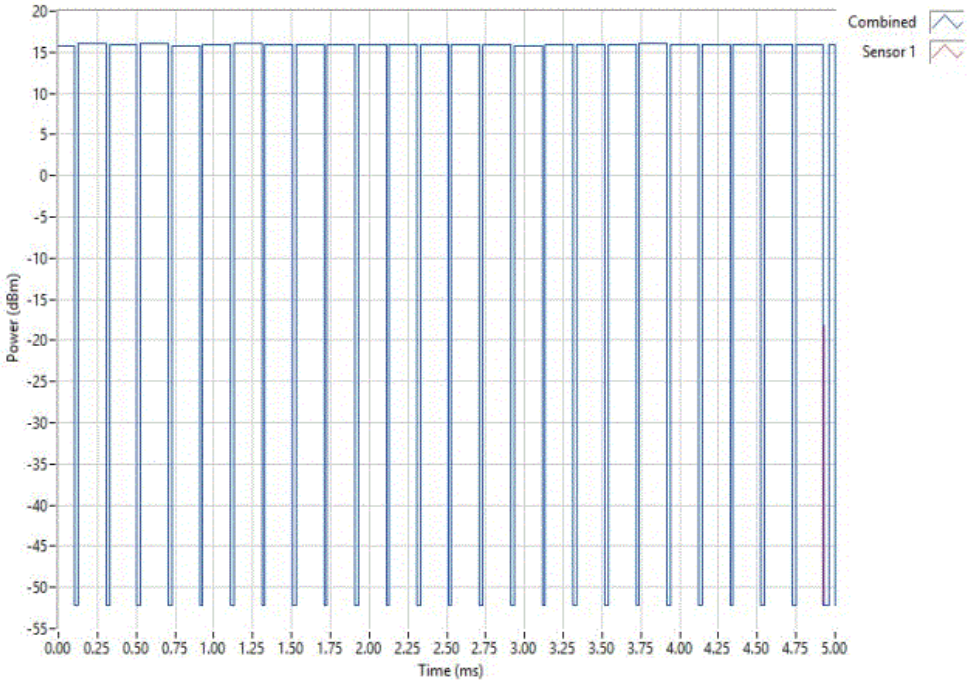
Extreme Temperature, -40°C, 802.11(g) 54 Mbps, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	16.02	90.103	2.24	18.3	20	Pass



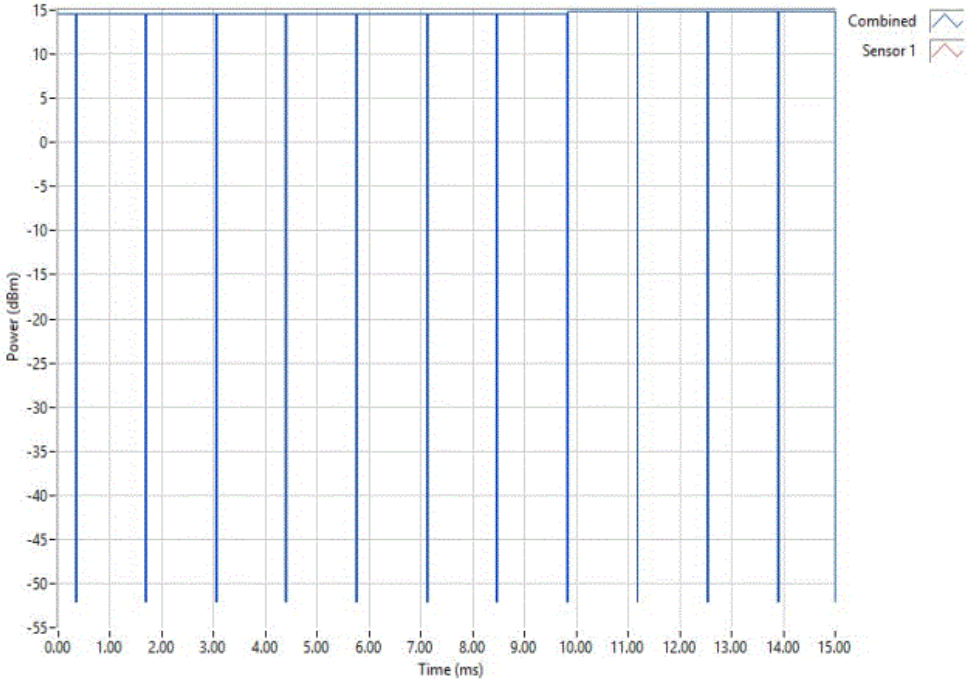
Extreme Temperature, -40°C, 802.11(g) 54 Mbps, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	16.01	90.12	2.24	18.3	20	Pass



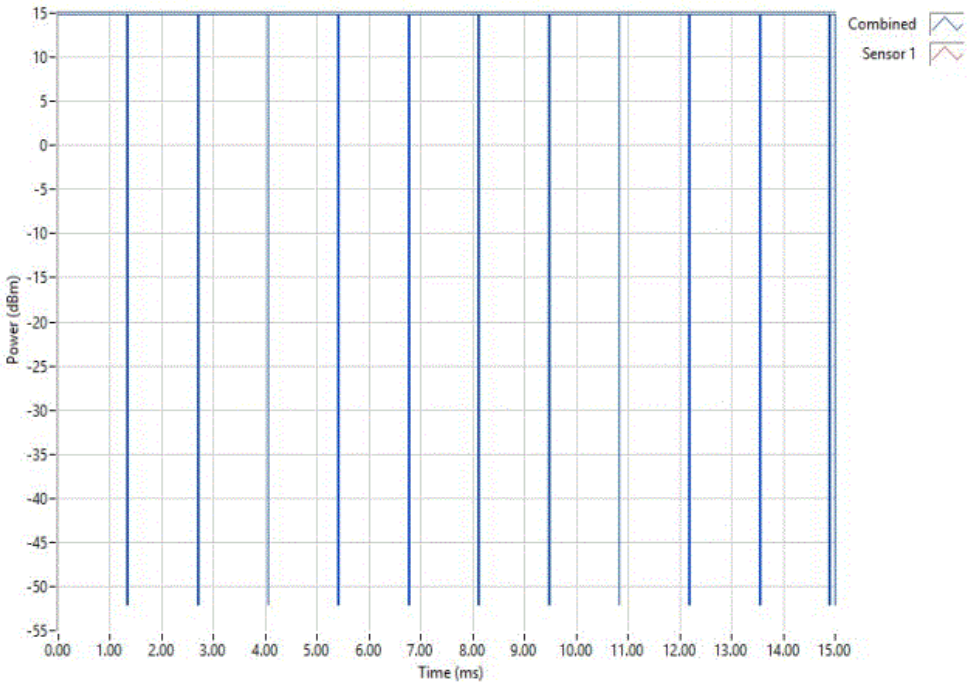
Extreme Temperature, -40°C, 802.11(g) 54 Mbps, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	16.11	89.876	2.24	18.4	20	Pass



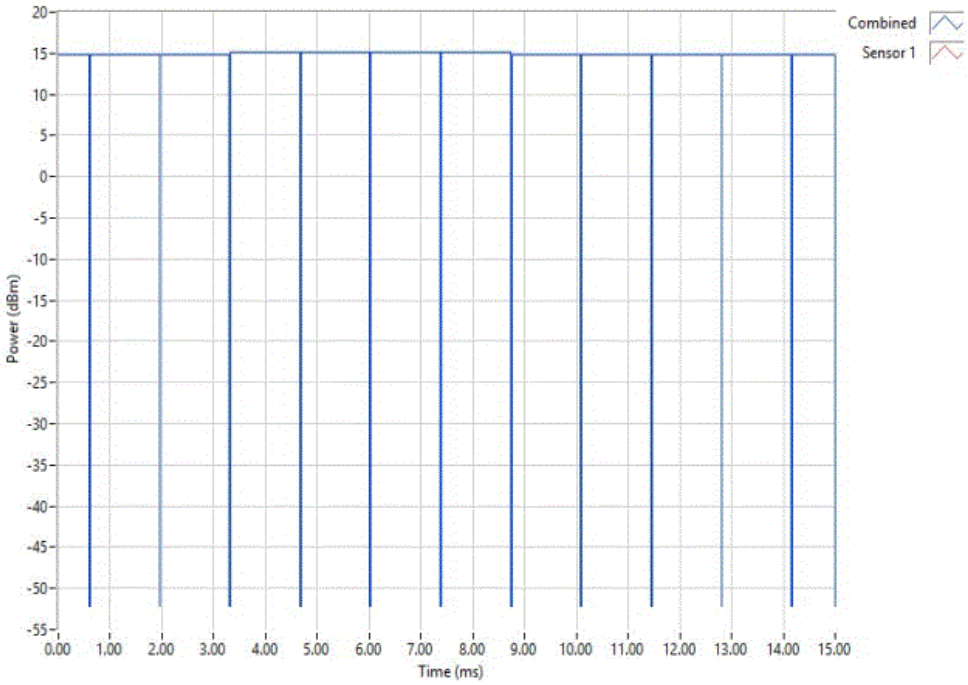
Extreme Temperature, -40°C, 802.11(n) MCS0, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.85	98.622	2.24	17.1	20	Pass



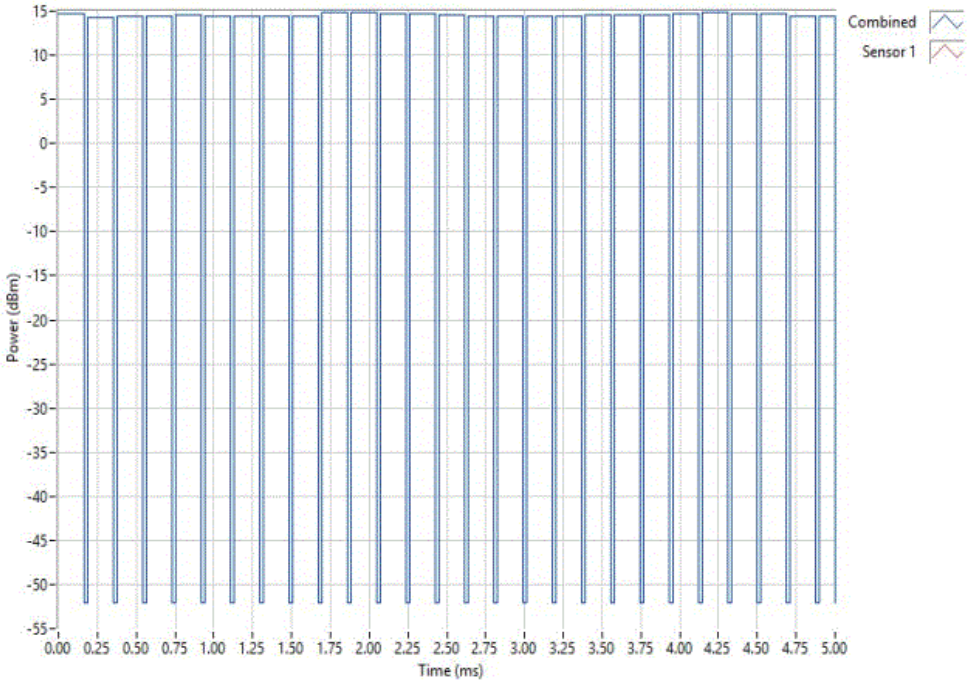
Extreme Temperature, -40°C, 802.11(n) MCS0, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.83	98.625	2.24	17.1	20	Pass



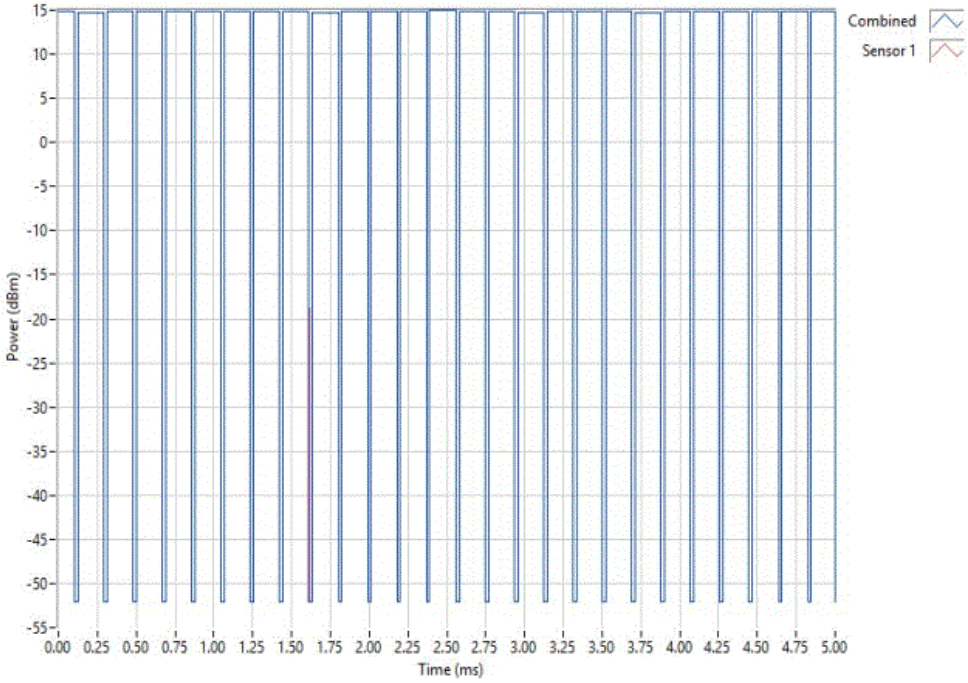
Extreme Temperature, -40°C, 802.11(n) MCS0, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.13	98.603	2.24	17.4	20	Pass



Extreme Temperature, -40°C, 802.11(n) MCS7, Low Channel, 1, 2412 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.83	89.368	2.24	17.1	20	Pass



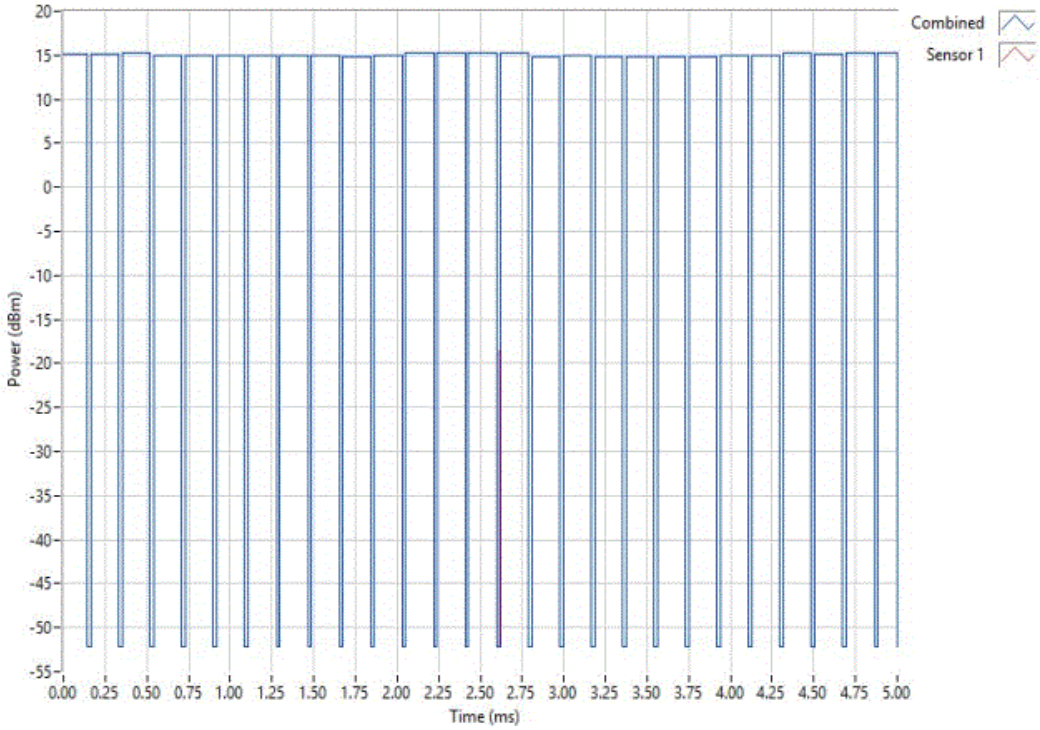
Extreme Temperature, -40°C, 802.11(n) MCS7, Mid Channel, 7, 2442 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	14.93	89.155	2.24	17.2	20	Pass



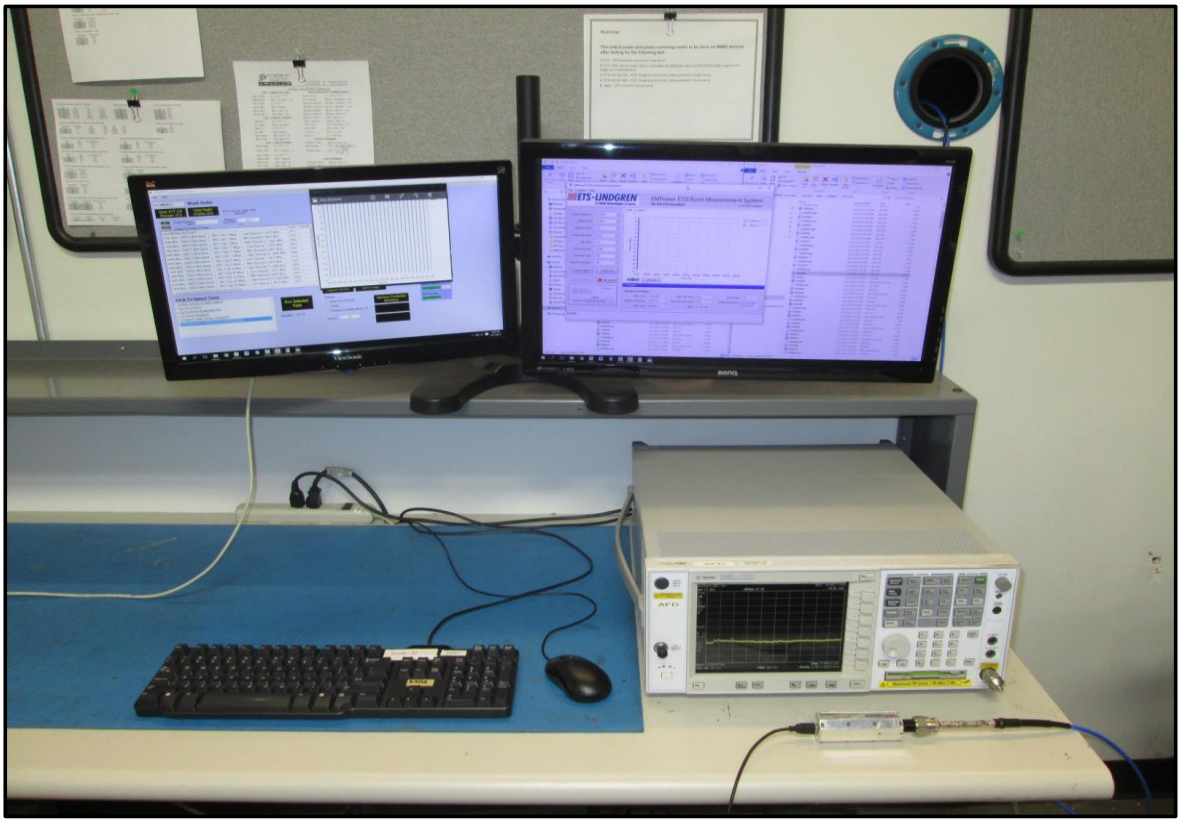
RF OUTPUT POWER

XMit 2016.05.06

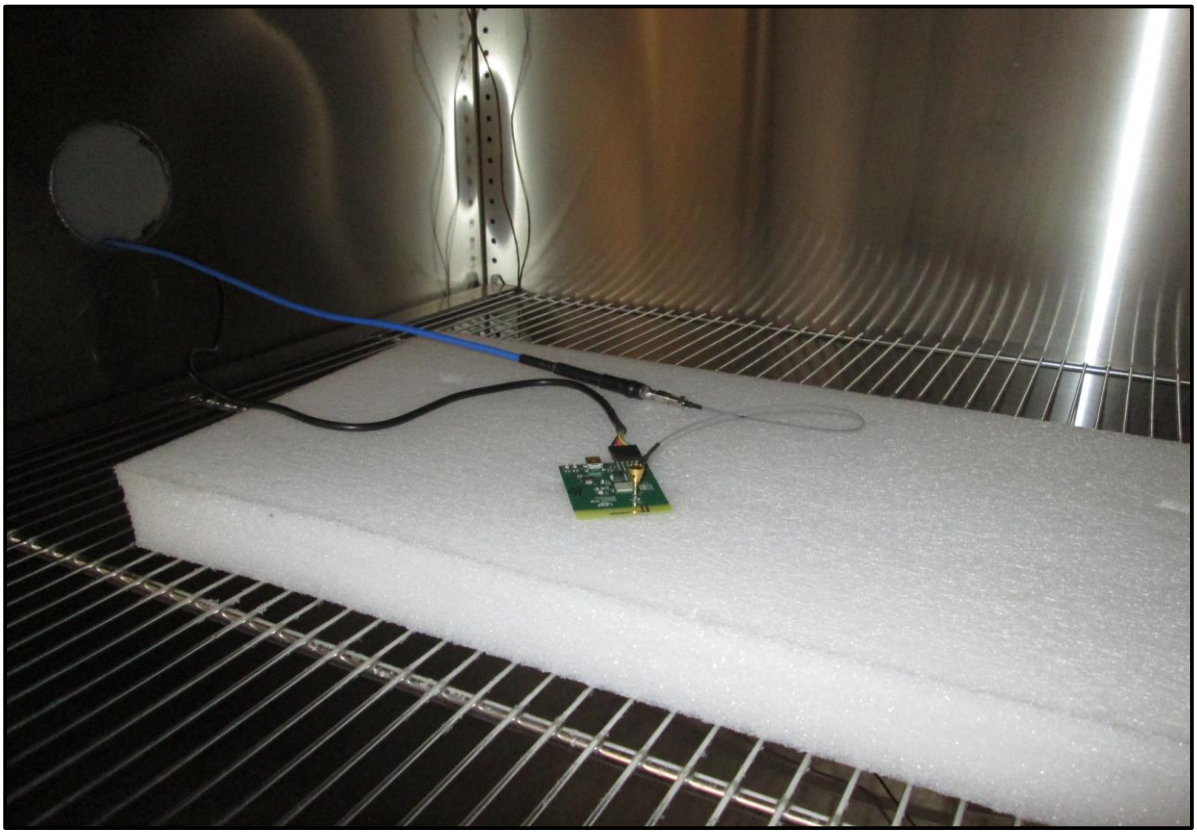
Extreme Temperature, -40°C, 802.11(n) MCS7, High Channel, 13, 2472 MHz						
	Avg Cond Pwr (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Results
	15.31	89.199	2.24	17.6	20	Pass

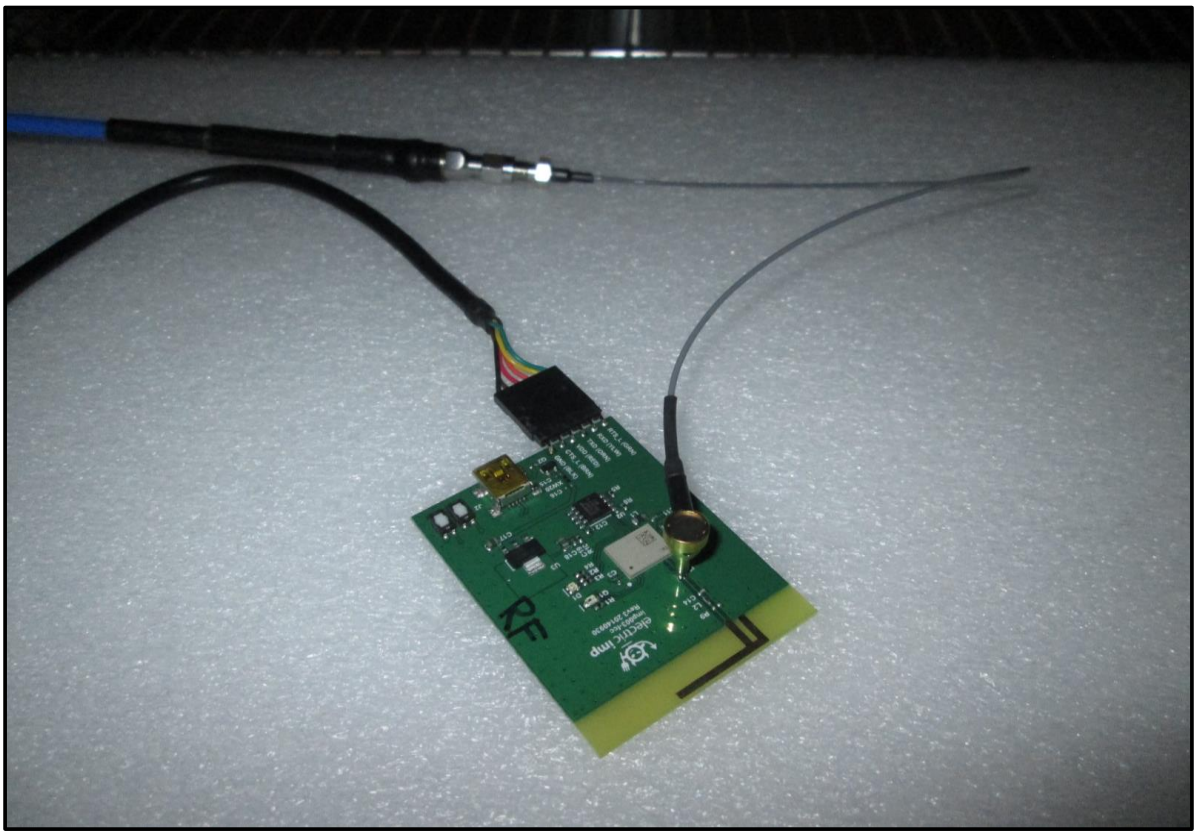


RF OUTPUT POWER



RF OUTPUT POWER





POWER SPECTRAL DENSITY

XMit 2016.05.06

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.	Cal. Due
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	2/5/2018
Attenuator	Fairview Microwave	SA18E-10	TKS	4/4/2016	4/4/2017
Block - DC	Aeroflex	INMET 8535	AMO	4/4/2016	4/4/2017
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	NCR
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	7/23/2015	7/23/2016

TEST DESCRIPTION

The Power Spectral Density was measured with the EUT set to the channels and modes called out in the data sheets.

The EUT antenna gain and duty cycle were used to calculate the output power of the EUT, and included in the calculations for Power Spectral Density. The measurements were made under normal test conditions.

The spectrum analyzer was set to a 10kHz RBW and 30kHz VBW, while utilizing an RMS detector. A total of 8350 points were captured across the spectrum. The traces were captured both graphically and in point format. The data points were normalized based on antenna power measurements located elsewhere in this report.

The reported Power Spectral Density is the highest sum for any 1MHz window in the specified spectrum.

POWER SPECTRAL DENSITY

NORTHWEST EMC

XMit 2016.05.06

EUT:	**IMP0003**	**Work Order:**	**ELIM0011**
Serial Number:	**Barcode:2000000590**	**Date:**	**06/27/16**
Customer:	**Electric Imp, Inc.**	**Temperature:**	**24 °C**
Attendees:	**Hugo Fiennes**	**Humidity:**	**52.7% RH**
Project:	**None**	**Barometric Pres.:**	**1015 mbar**
Tested by:	**Johnny Candelas**	**Power:** **5 VDC via USB**	**Job Site:** **OC13**

TEST SPECIFICATIONS	**Test Method**
EN 300 328 V1.9.1:2015	EN 300 328 V1.9.1:2015

COMMENTS

Total Offset 23.1dB (20dB pad + DC Block + coax cable + client prvided patch cable) at 2.4GHz

DEVIATIONS FROM TEST STANDARD

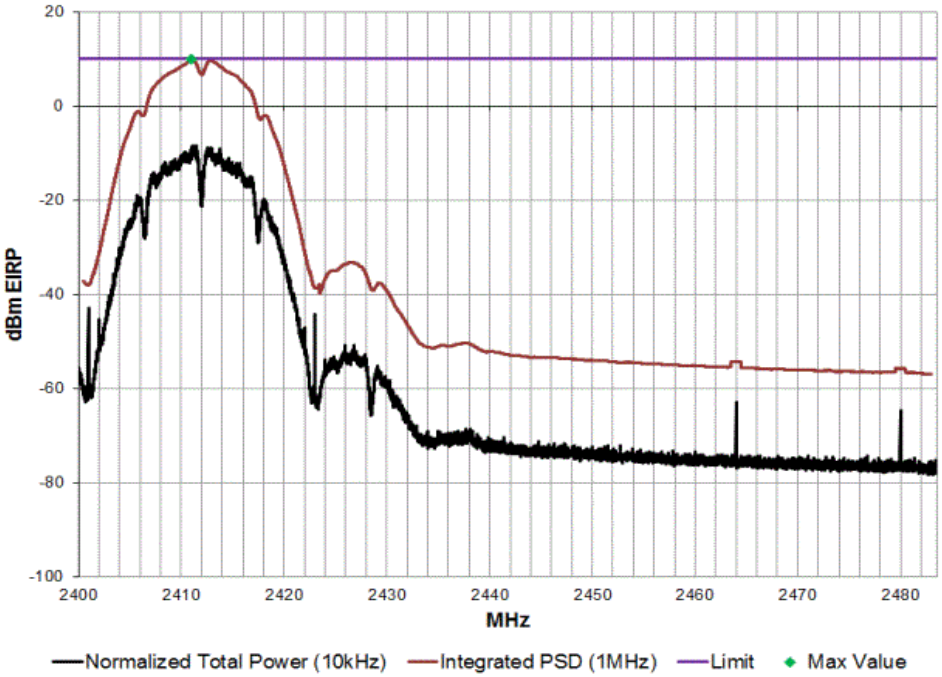
None

Configuration #	**1**	*Signature*

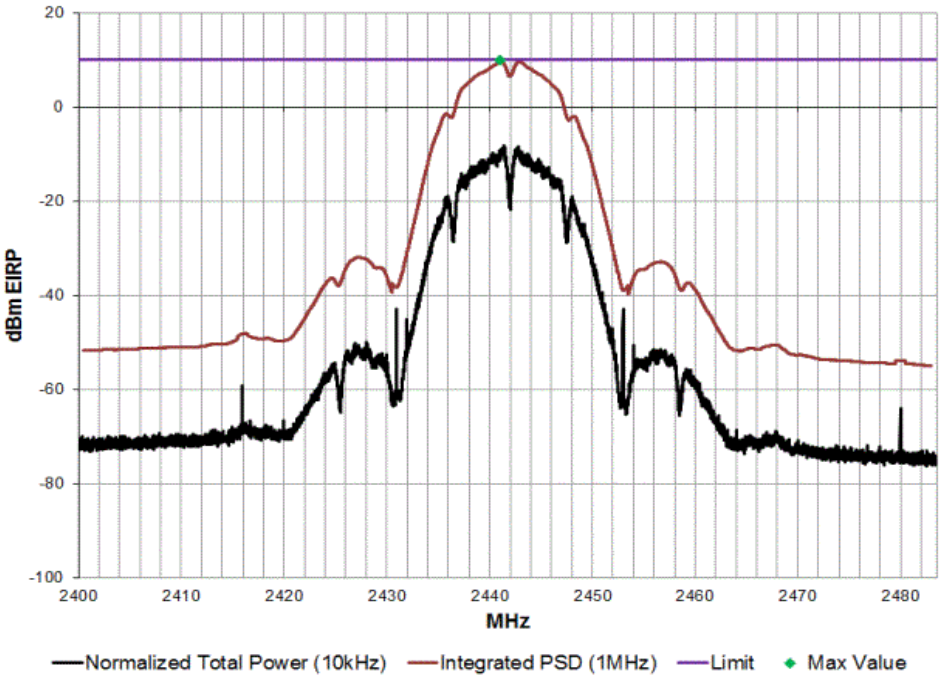
	EIRP (dBm)	EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
Normal Temperature Conditions				
802.11(b) 1 Mbps				
Low Channel, 1, 2412 MHz	17.7	9.9	10	Pass
Mid Channel, 7, 2442 MHz	17.6	9.7	10	Pass
High Channel, 13, 2472 MHz	17.8	9.8	10	Pass
802.11(b) 11 Mbps				
Low Channel, 1, 2412 MHz	18.1	9.8	10	Pass
Mid Channel, 7, 2442 MHz	18.1	9.8	10	Pass
High Channel, 13, 2472 MHz	18	9.7	10	Pass
802.11(g) 6 Mbps				
Low Channel, 1, 2412 MHz	17.9	7.7	10	Pass
Mid Channel, 7, 2442 MHz	18.2	7.8	10	Pass
High Channel, 13, 2472 MHz	18	7.6	10	Pass
802.11(g) 36 Mbps				
Low Channel, 1, 2412 MHz	18	7.9	10	Pass
Mid Channel, 7, 2442 MHz	18	8.5	10	Pass
High Channel, 13, 2472 MHz	18.1	7.9	10	Pass
802.11(g) 54 Mbps				
Low Channel, 1, 2412 MHz	18.2	8	10	Pass
Mid Channel, 7, 2442 MHz	18.2	7.9	10	Pass
High Channel, 13, 2472 MHz	18.2	8	10	Pass
802.11(n) MCS0				
Low Channel, 1, 2412 MHz	17	6.4	10	Pass
Mid Channel, 7, 2442 MHz	16.8	6.5	10	Pass
High Channel, 13, 2472 MHz	17	6.5	10	Pass
802.11(n) MCS7				
Low Channel, 1, 2412 MHz	17	6.4	10	Pass
Mid Channel, 7, 2442 MHz	17.1	6.6	10	Pass
High Channel, 13, 2472 MHz	17	6.4	10	Pass

POWER SPECTRAL DENSITY

Normal Temperature Conditions, 802.11(b) 1 Mbps, Low Channel, 1, 2412 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	17.7			9.9	10	Pass

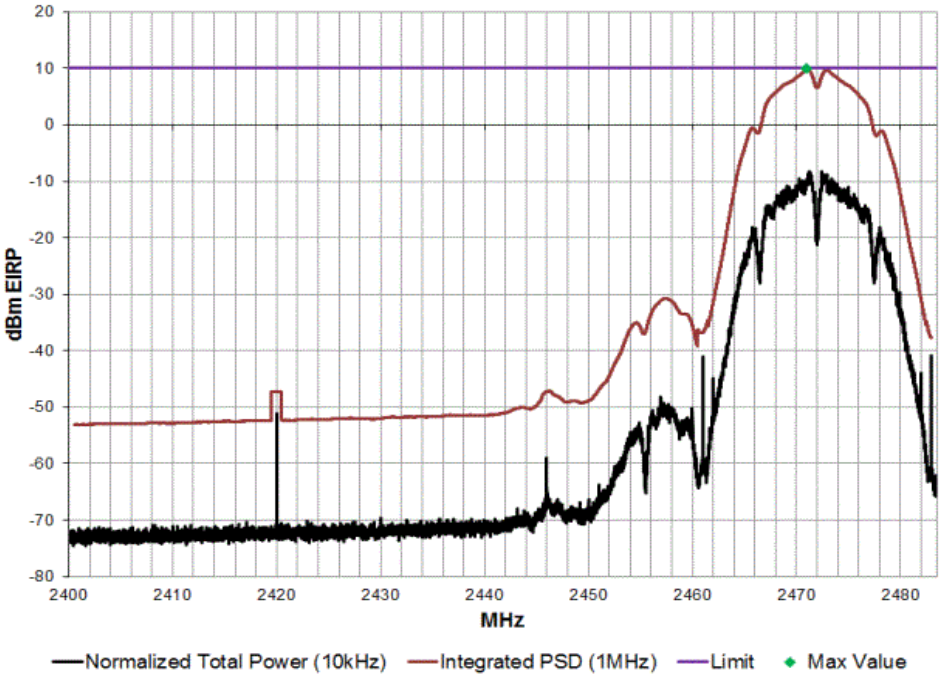


Normal Temperature Conditions, 802.11(b) 1 Mbps, Mid Channel, 7, 2442 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	17.6			9.7	10	Pass

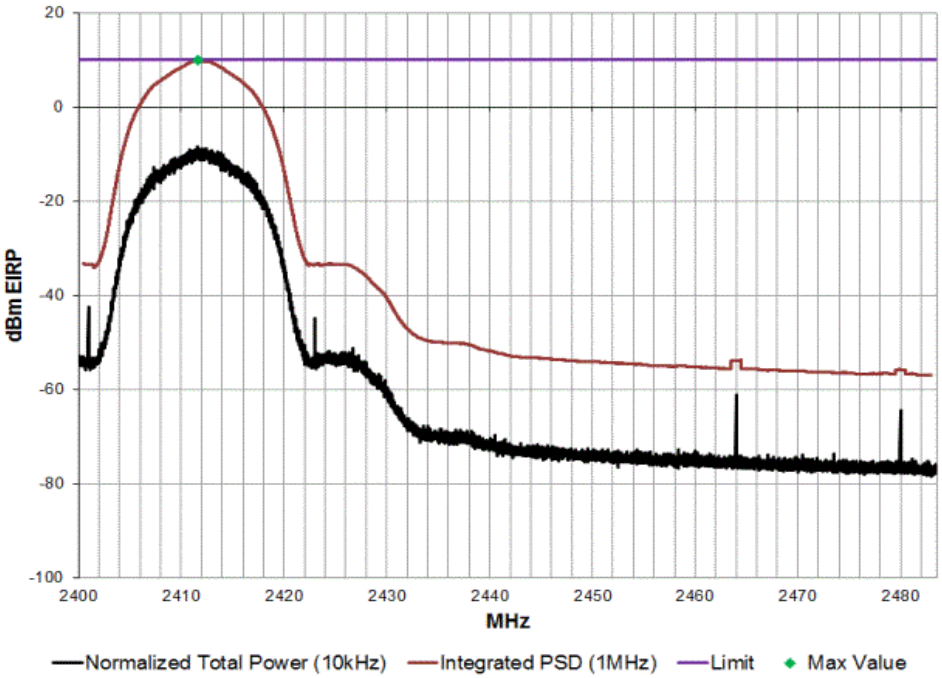


POWER SPECTRAL DENSITY

Normal Temperature Conditions, 802.11(b) 1 Mbps, High Channel, 13, 2472 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	17.8			9.8	10	Pass

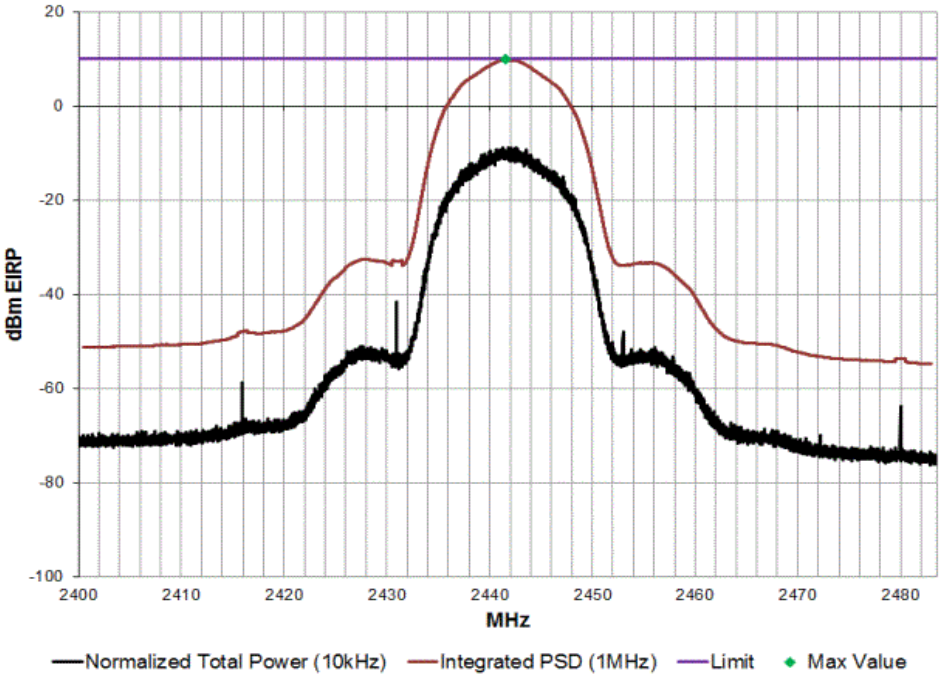


Normal Temperature Conditions, 802.11(b) 11 Mbps, Low Channel, 1, 2412 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	18.1			9.8	10	Pass

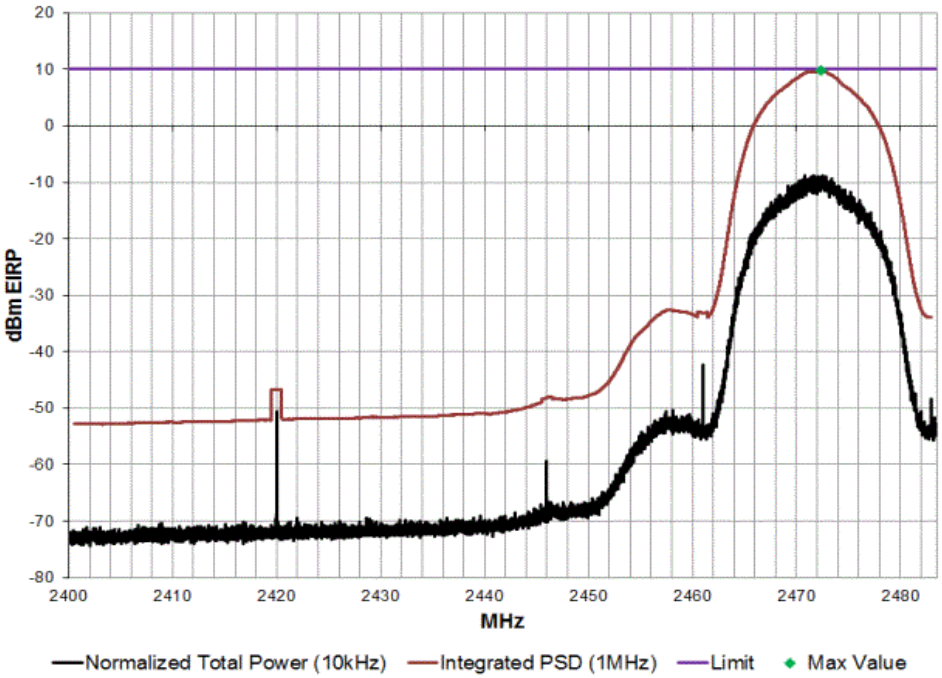


POWER SPECTRAL DENSITY

Normal Temperature Conditions, 802.11(b) 11 Mbps, Mid Channel, 7, 2442 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	18.1			9.8	10	Pass

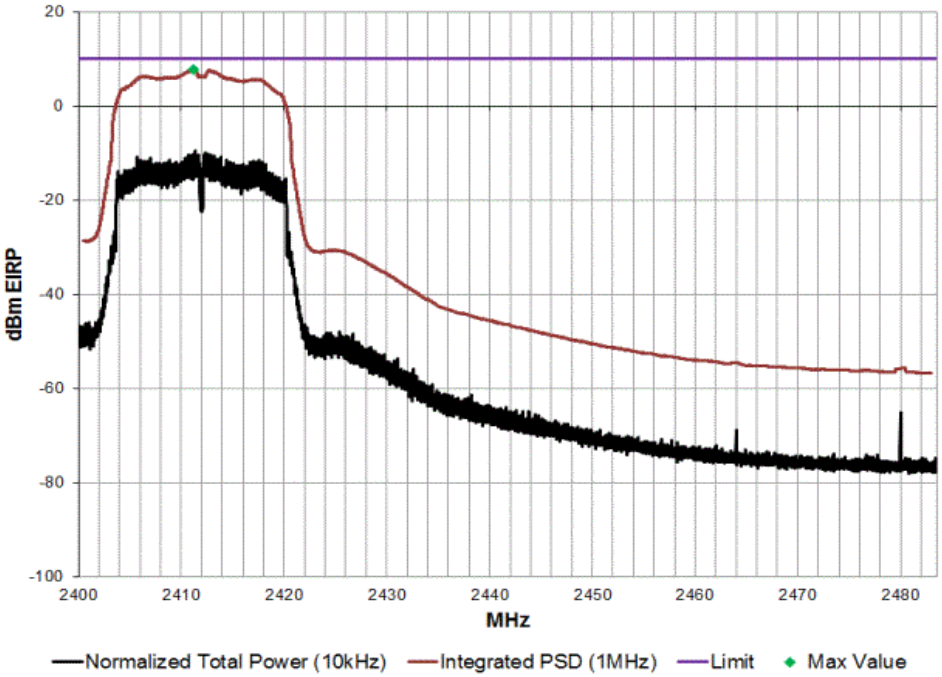


Normal Temperature Conditions, 802.11(b) 11 Mbps, High Channel, 13, 2472 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	18			9.7	10	Pass

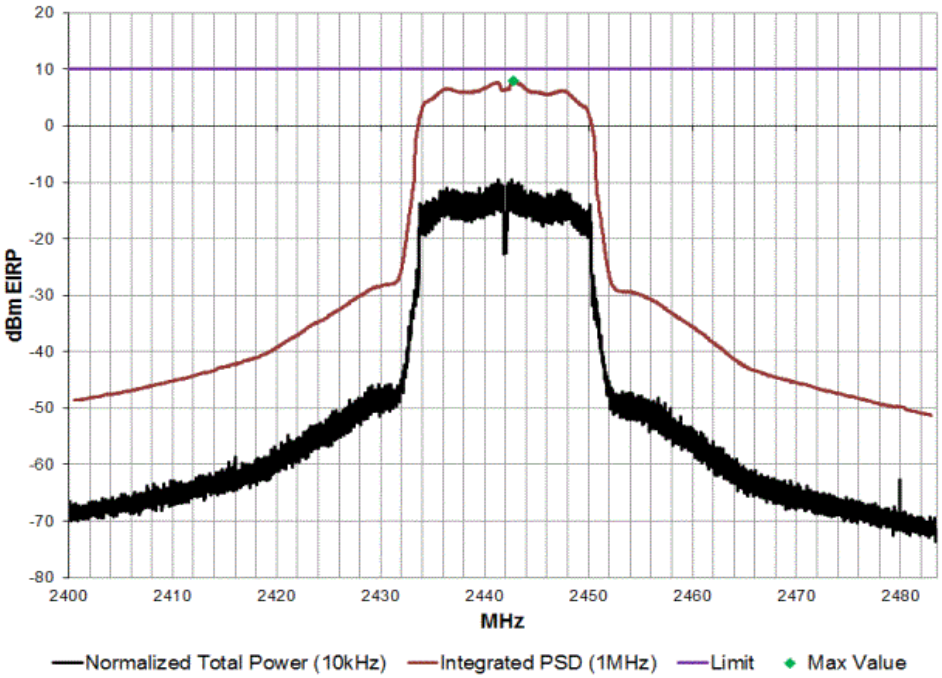


POWER SPECTRAL DENSITY

Normal Temperature Conditions, 802.11(g) 6 Mbps, Low Channel, 1, 2412 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	17.9			7.7	10	Pass

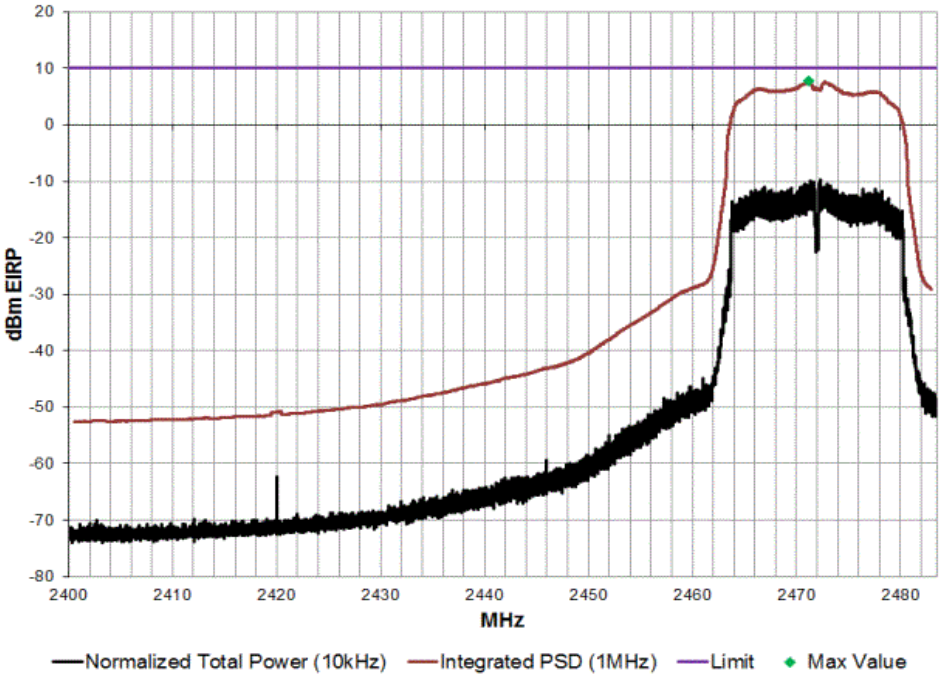


Normal Temperature Conditions, 802.11(g) 6 Mbps, Mid Channel, 7, 2442 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	18.2			7.8	10	Pass

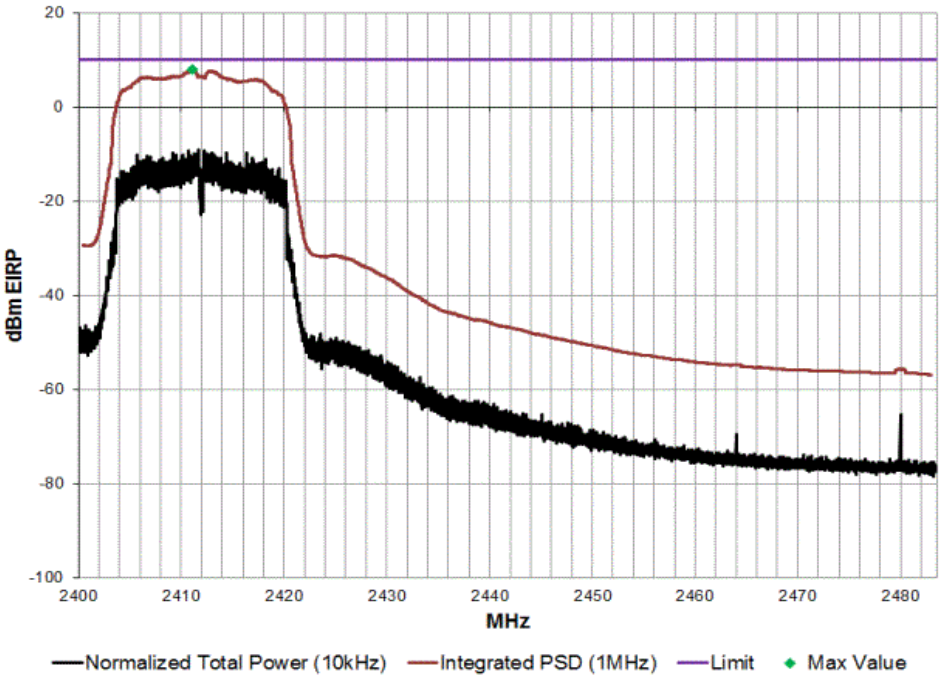


POWER SPECTRAL DENSITY

Normal Temperature Conditions, 802.11(g) 6 Mbps, High Channel, 13, 2472 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	18			7.6	10	Pass

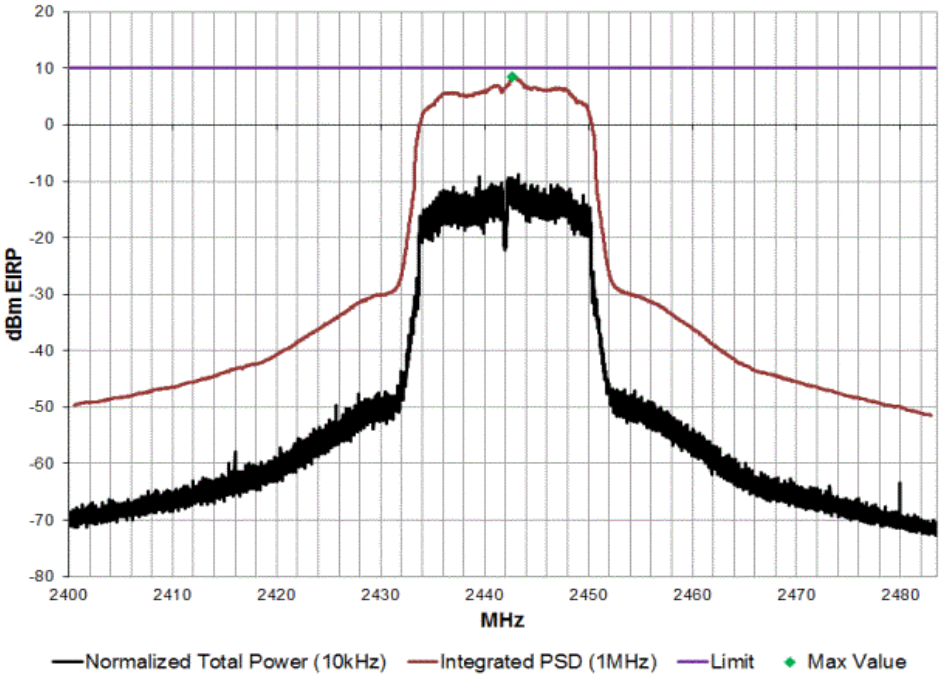


Normal Temperature Conditions, 802.11(g) 36 Mbps, Low Channel, 1, 2412 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	18			7.9	10	Pass

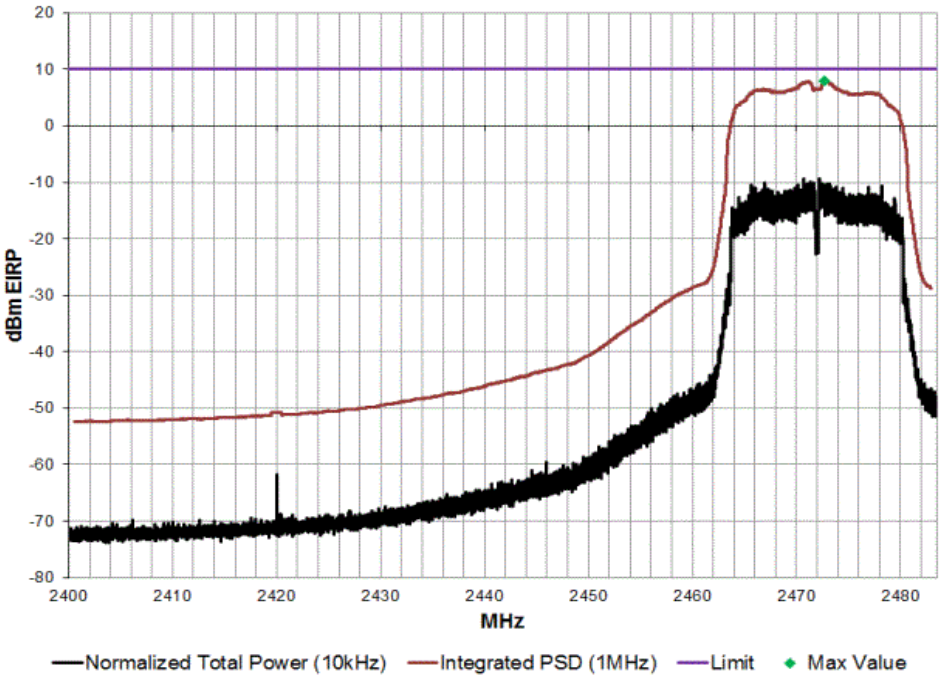


POWER SPECTRAL DENSITY

Normal Temperature Conditions, 802.11(g) 36 Mbps, Mid Channel, 7, 2442 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	18			8.5	10	Pass

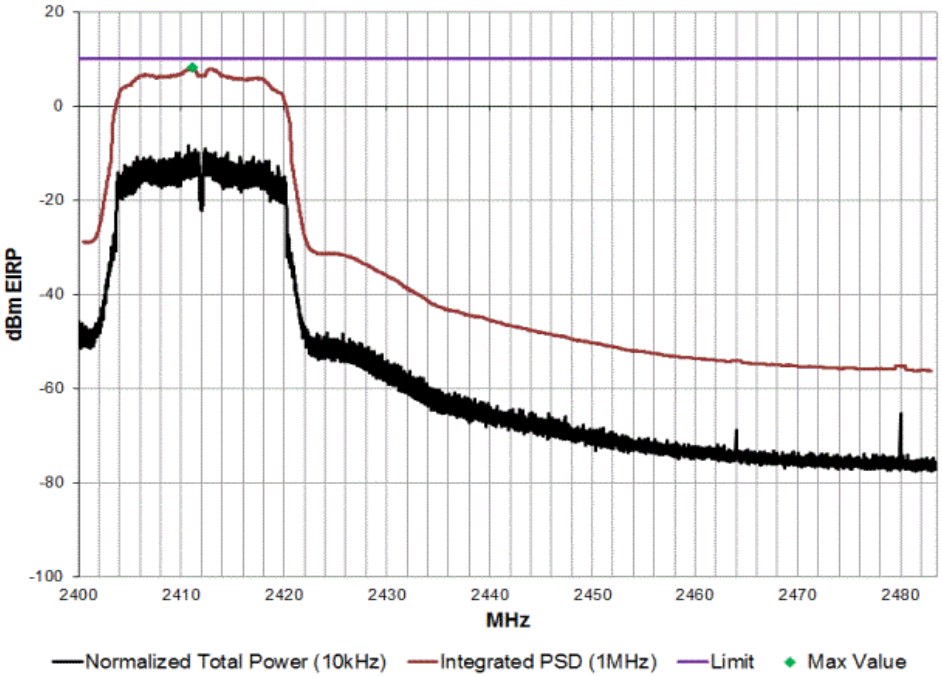


Normal Temperature Conditions, 802.11(g) 36 Mbps, High Channel, 13, 2472 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	18.1			7.9	10	Pass

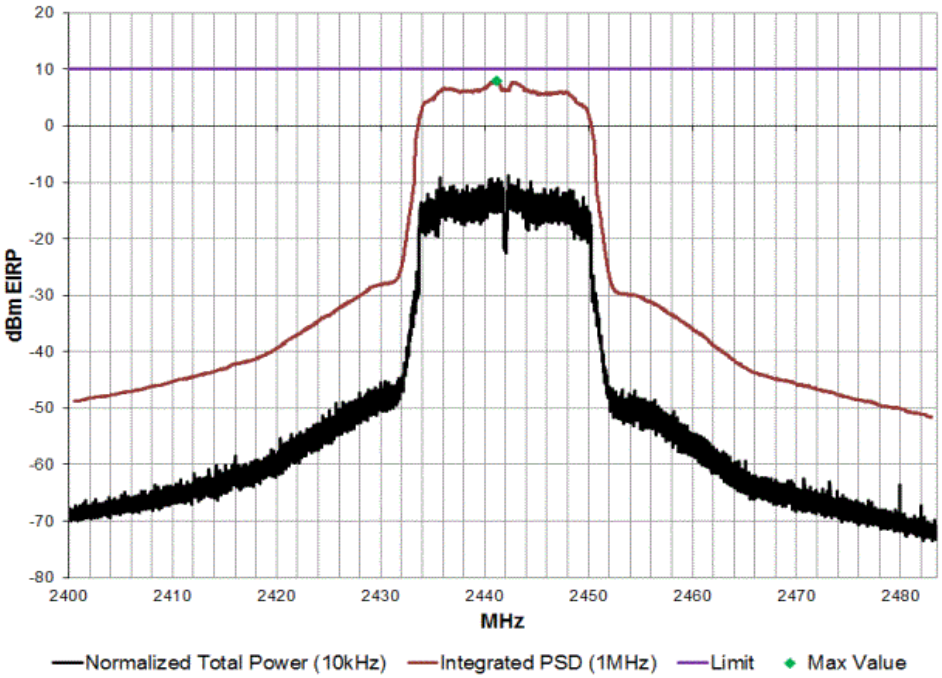


POWER SPECTRAL DENSITY

Normal Temperature Conditions, 802.11(g) 54 Mbps, Low Channel, 1, 2412 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	18.2			8	10	Pass

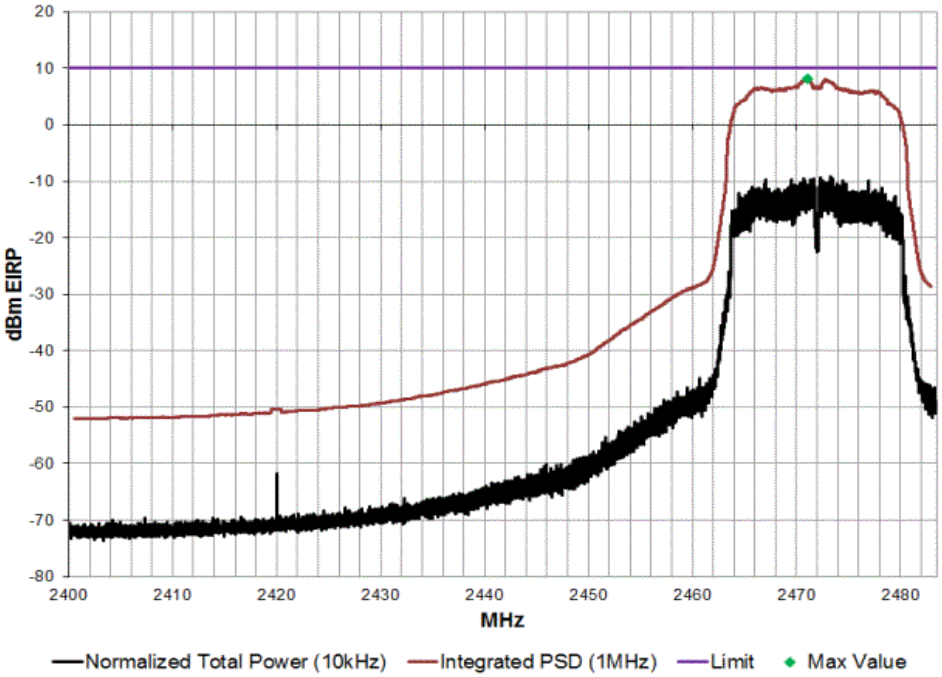


Normal Temperature Conditions, 802.11(g) 54 Mbps, Mid Channel, 7, 2442 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	18.2			7.9	10	Pass

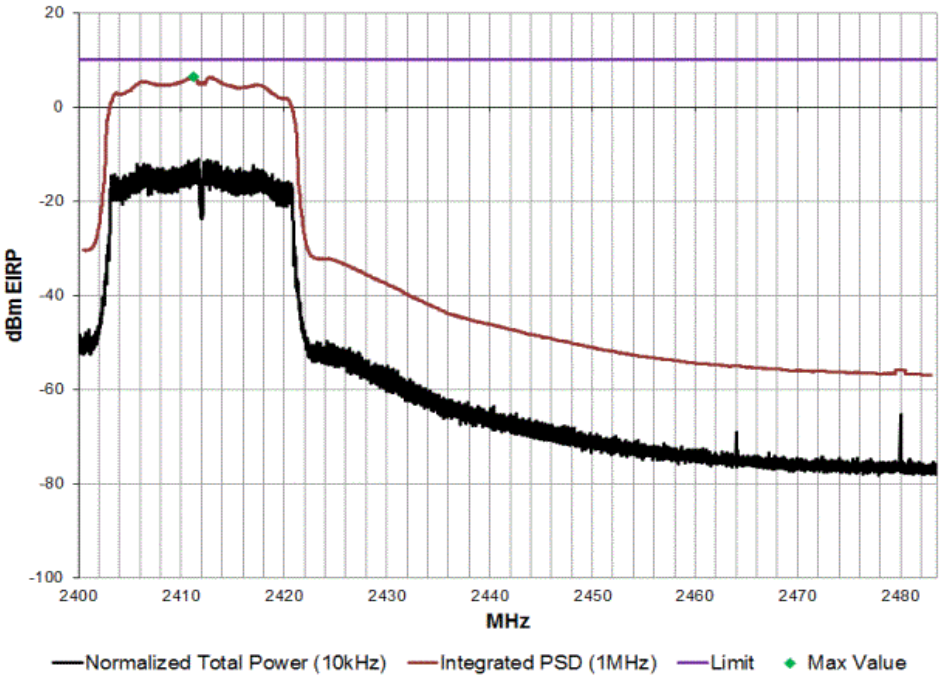


POWER SPECTRAL DENSITY

Normal Temperature Conditions, 802.11(g) 54 Mbps, High Channel, 13, 2472 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	18.2			8	10	Pass

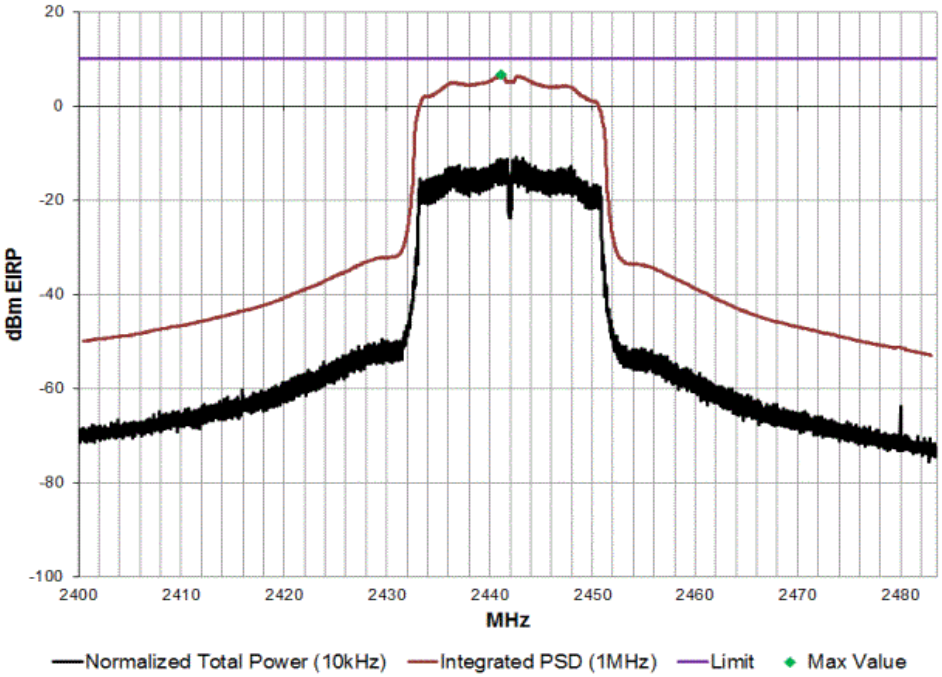


Normal Temperature Conditions, 802.11(n) MCS0, Low Channel, 1, 2412 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	17			6.4	10	Pass

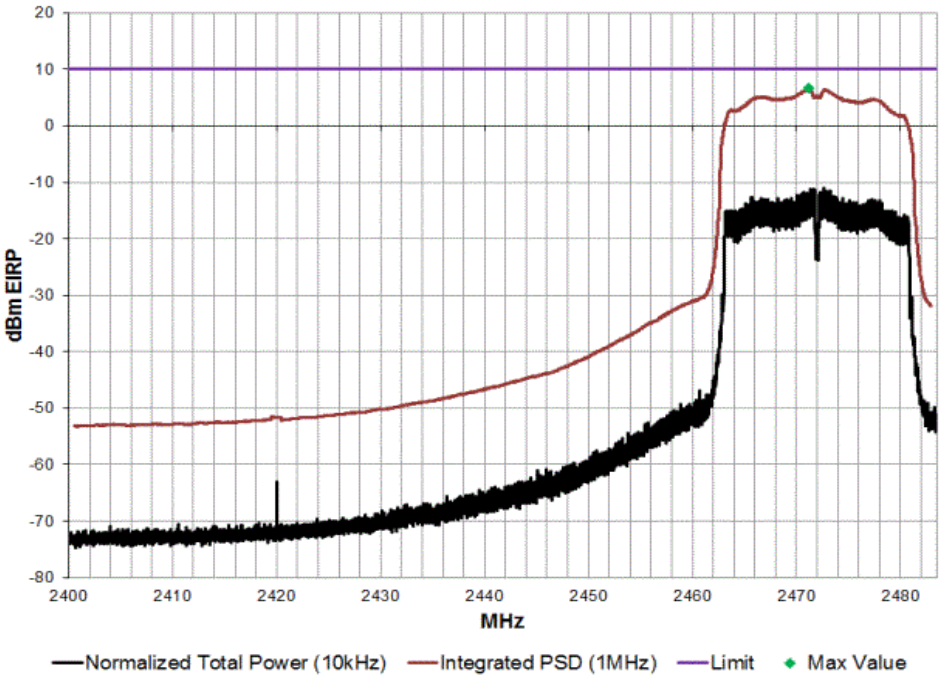


POWER SPECTRAL DENSITY

Normal Temperature Conditions, 802.11(n) MCS0, Mid Channel, 7, 2442 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	16.8			6.5	10	Pass

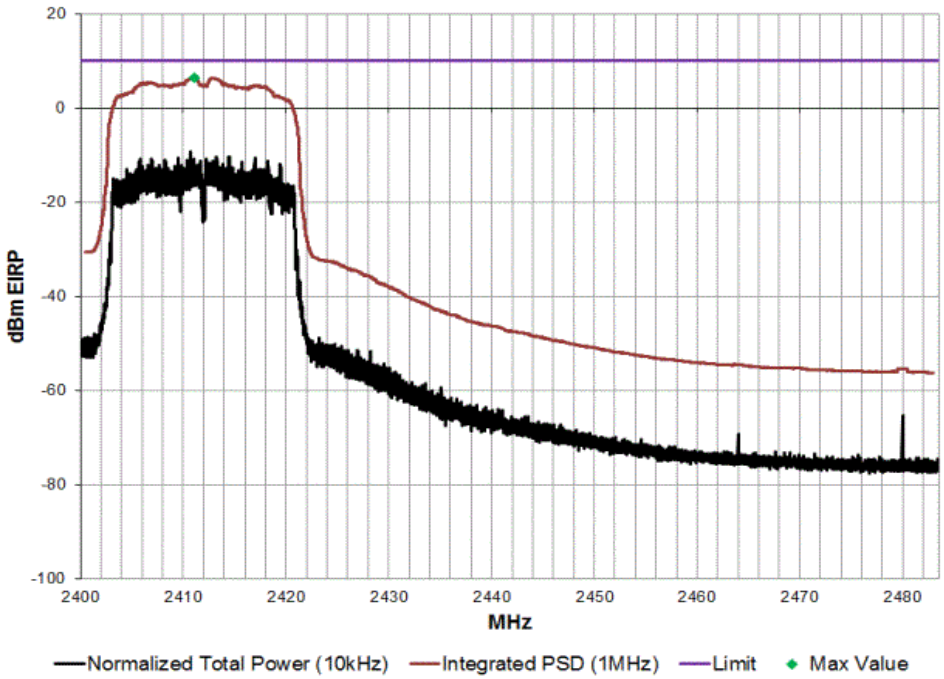


Normal Temperature Conditions, 802.11(n) MCS0, High Channel, 13, 2472 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	17			6.5	10	Pass

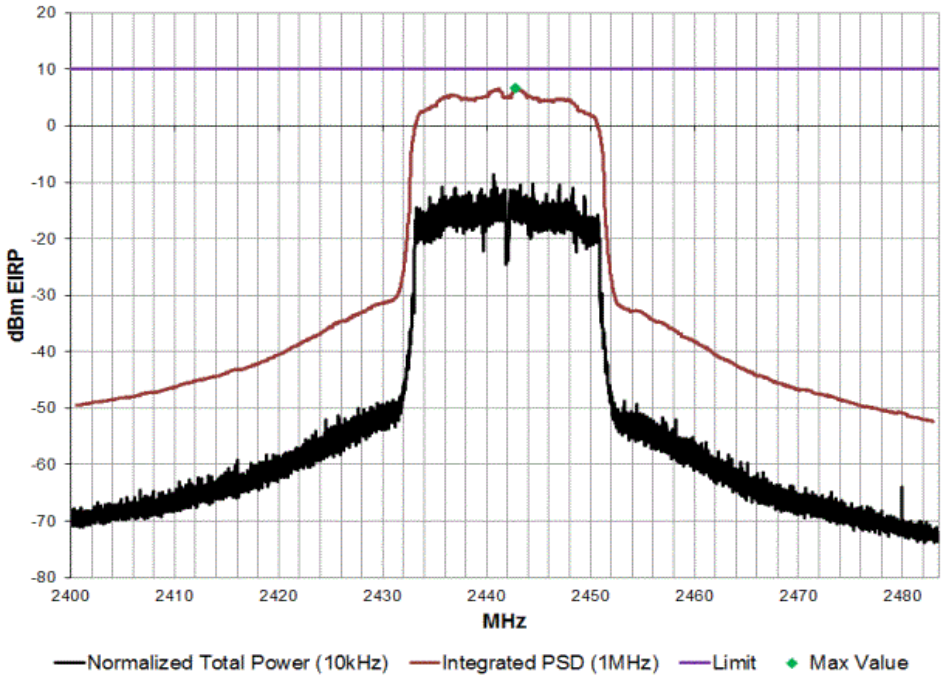


POWER SPECTRAL DENSITY

Normal Temperature Conditions, 802.11(n) MCS7, Low Channel, 1, 2412 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	17			6.4	10	Pass



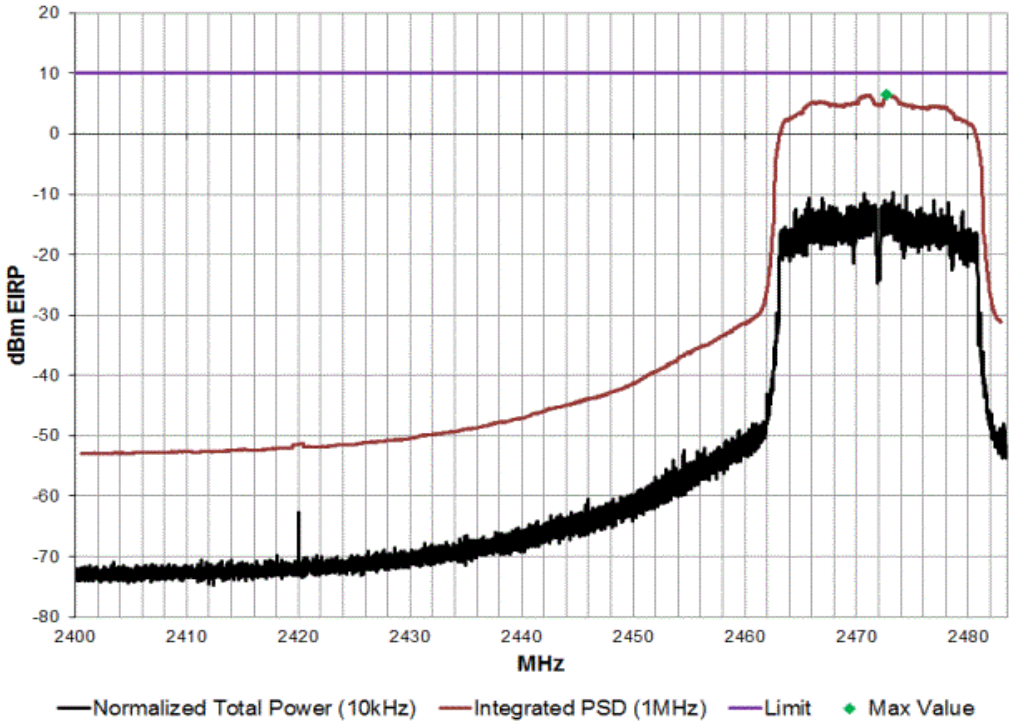
Normal Temperature Conditions, 802.11(n) MCS7, Mid Channel, 7, 2442 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	17.1			6.6	10	Pass



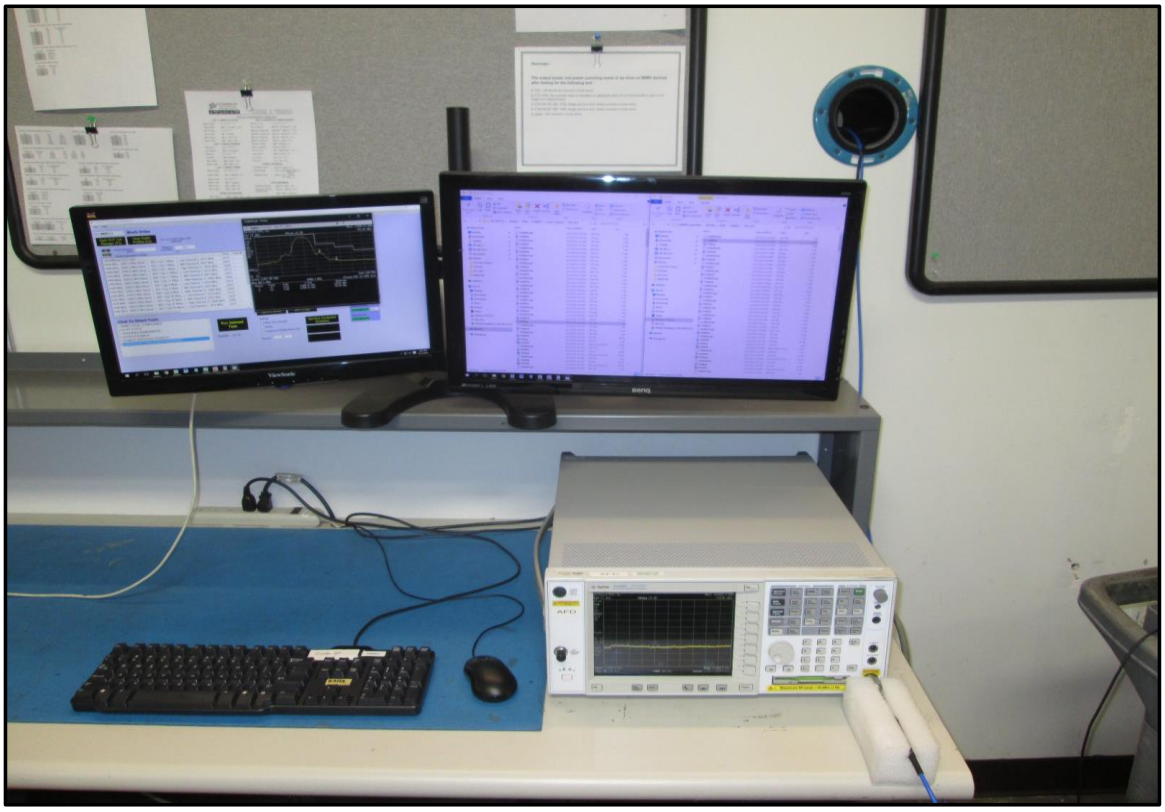
POWER SPECTRAL DENSITY

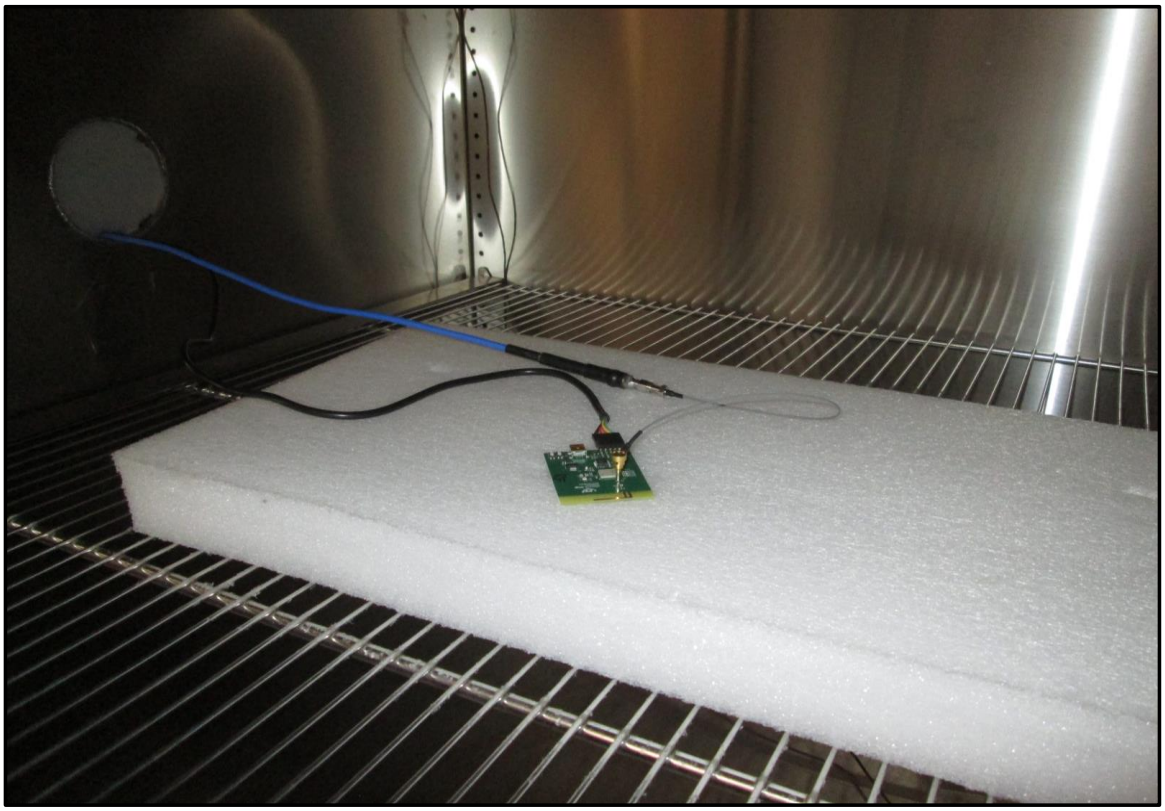
XMit 2016.05.06

Normal Temperature Conditions, 802.11(n) MCS7, High Channel, 13, 2472 MHz						
	EIRP (dBm)			EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Results
	17			6.4	10	Pass



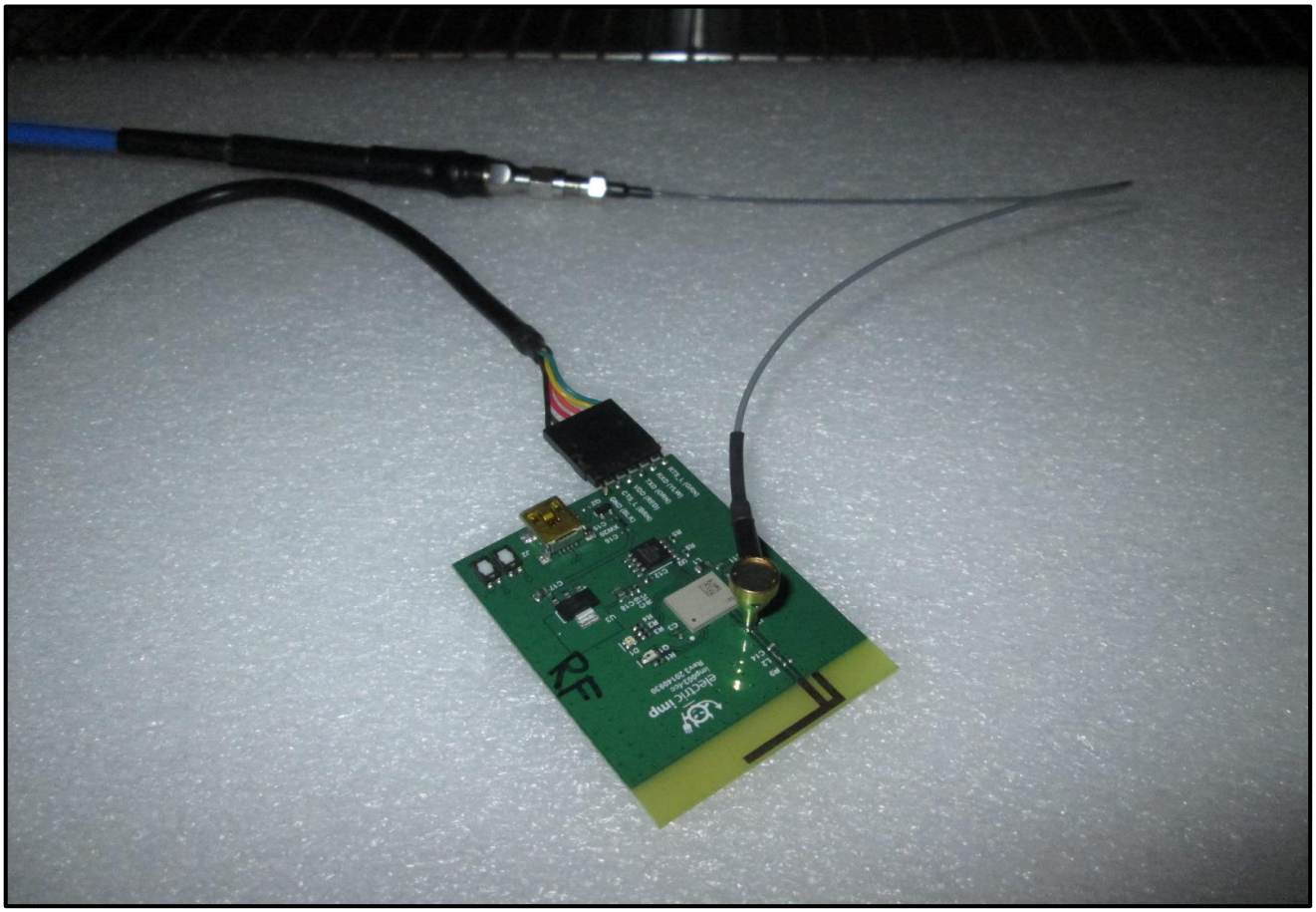
POWER SPECTRAL DENSITY





POWER SPECTRAL DENSITY

XMit 2016.05.06



ADAPTIVITY AND RECEIVER BLOCKING

XMit 2016.05.06

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.	Cal. Due
Access Point	Cisco	AIR-SAP2602E-A-K9	TIR	NCR	NCR
Attenuator	Fairview Microwave	SA18H-06	TKU	4/4/2016	4/4/2017
Attenuator	Fairview Microwave	SA18E-10	TKT	4/4/2016	4/4/2017
Directional Coupler	Fairview Microwave	MC2047-10	RGU	NCR	NCR
Power Divider/Combiner	Fairview Microwave	MP0208-2	IAJ	NCR	NCR
Power Divider/Combiner	Fairview Microwave	MP0208-2	IAK	NCR	NCR
Generator - Signal	Agilent	N5181A	TGZ	8/24/2015	8/24/2018
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	2/5/2018
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	NCR
Attenuator	Fairview Microwave	SA18E-10	TKS	4/4/2016	4/4/2017
Block - DC	Aeroflex	INMET 8535	AMO	4/4/2016	4/4/2017
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	7/23/2015	7/23/2016

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT and a link partner were connected using the conducted method described and illustrated in the procedure via a series of splitters and attenuators which allows the Adaptivity interfering signal and Receiver blocking signal to be injected into the system and monitored.

The traffic load between the master and EUT were set to the maximum possible using 802.11b 1Mbps. The EUT was connected to the Electric imp internet service via the Cisco AP connected to an internet connection. It established a TLS encrypted TCP link, and sent packets at its maximum rate - the rate was limited by buffer sizes (as this is a TCP link, every packet has to be kept until an ACK has been received from the other end) but without interference around 100 packets of 0.5kB each were sent every second.

The interfering and blocking signals were injected into both High and Low operating channels of the EUT while streaming data to the master. Each channel was monitored to verify the EUT's ability vacate the channel while the interfering and blocking signals were deployed.

Per the standard, short control signal transmissions were allowed while the interfering and blocking signals were deployed. Because of this allowance, this type of signal was also measured and defined while under test.

ADAPTIVITY AND RECEIVER BLOCKING

NORTHWEST EMC

XMit 2016.05.06

EUT:	**IMP0003**			**Work Order:**	**ELIM0011**
Serial Number:	**00:02:D7:5A:4D:01**			**Date:**	**06/28/16**
Customer:	**Electric Imp, Inc.**			**Temperature:**	**22.8 °C**
Attendees:	**Hugo Fiennen**			**Humidity:**	**48.5% RH**
Project:	**None**			**Barometric Pres.:**	**1013 mbar**
Tested by:	**Johnny Candelas**	**Power:**	**5 VDC via USB**	**Job Site:**	**OC13**

TEST SPECIFICATIONS	**Test Method**
EN 300 328 V1.9.1:2015	EN 300 328 V1.9.1:2015

COMMENTS

Tested low channel 1 - 2412MHz and high channel 11 - 2462MHz at 1Mbps
EUT operating normally, connected to Access Point which is connected to the internet.

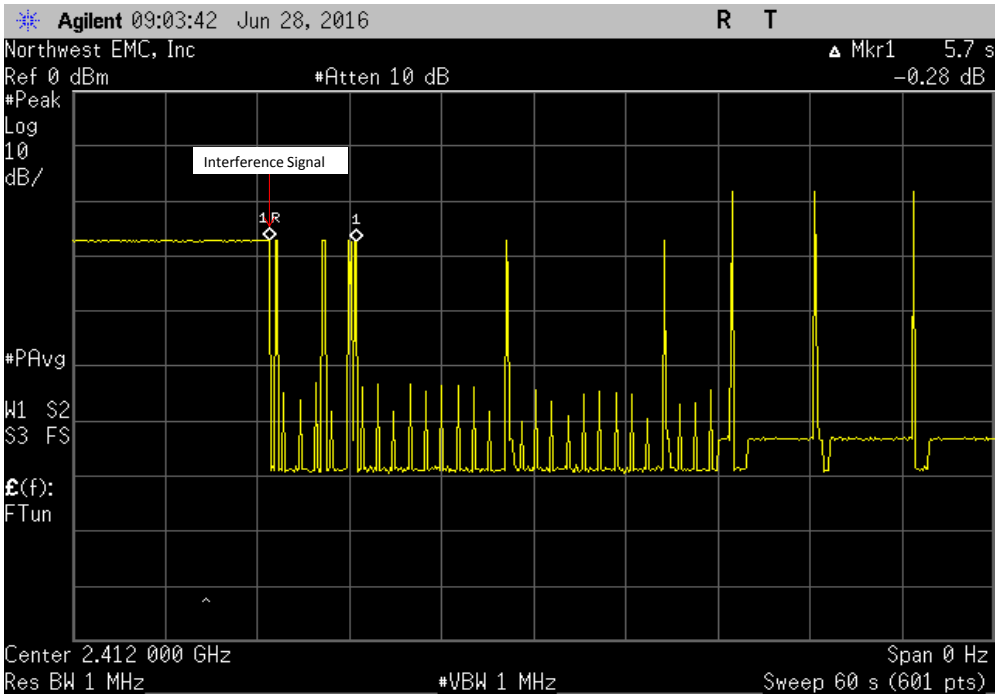
DEVIATIONS FROM TEST STANDARD

None

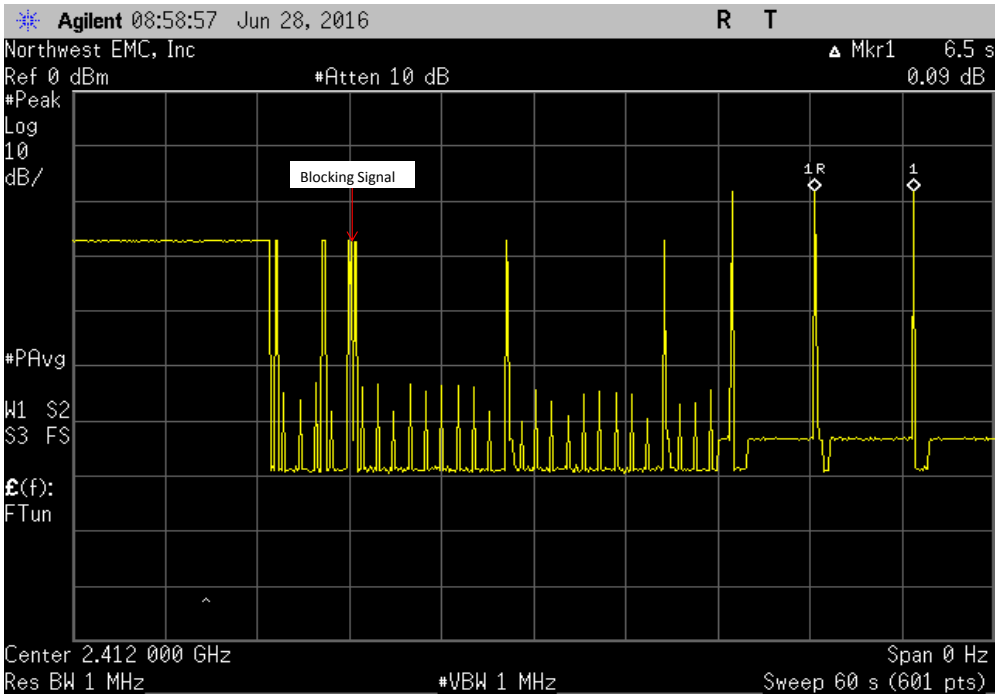
Configuration #	**2**	*Signature*

	Period (s)	Pulsewidth (ms)	Data Transfer Stoppage	Limit	Result
802.11(b), 1Mbps					
Low Channel 1, 2412 MHz					
Interference Signal	N/A	N/A	Yes	N/A	Pass
Blocking Signal	N/A	N/A	Yes	N/A	Pass
Short Control Signalling Transmission Pulse Width	3 pulses in 50ms	3.75 in 50ms	N/A	≤10% in 50ms	Pass
Short Control Signalling Transmission Period	6.5	N/A	N/A	N/A	Yes
High Channel 11, 2462 MHz					
Interference Signal	N/A	N/A	Yes	N/A	Pass
Blocking Signal	N/A	N/A	Yes	N/A	Pass
Short Control Signalling Transmission Pulse Width	3 pulses in 50ms	3.75 in 50ms	N/A	≤10% in 50ms	Pass
Short Control Signalling Transmission Period	6.5	N/A	N/A	N/A	Yes

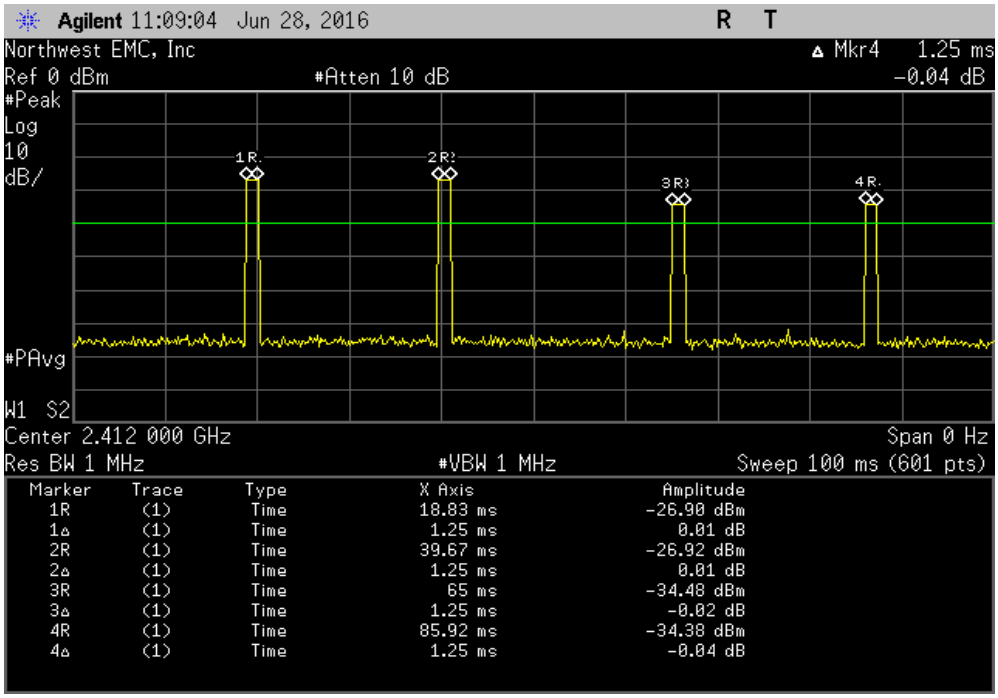
802.11(b), 1Mbps, Low Channel 1, 2412 MHz, Interference Signal						
		Period (s)	Pulsewidth (ms)	Data Transfer Stoppage	Limit	Result
		N/A	N/A	Yes	N/A	Pass



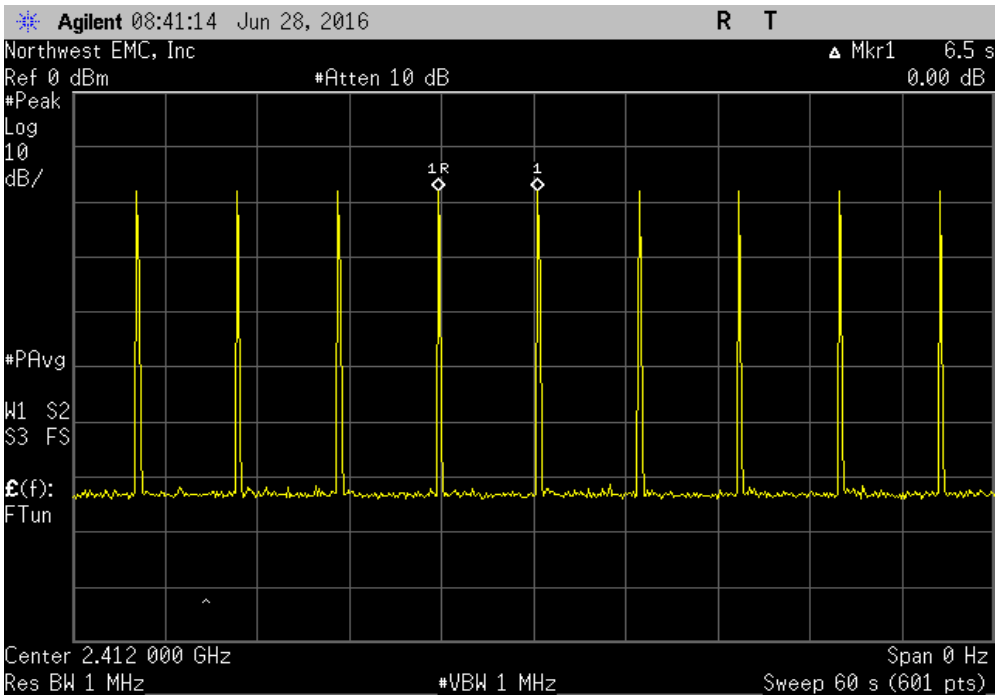
802.11(b), 1Mbps, Low Channel 1, 2412 MHz, Blocking Signal						
		Period (s)	Pulsewidth (ms)	Data Transfer Stoppage	Limit	Result
		N/A	N/A	Yes	N/A	Pass



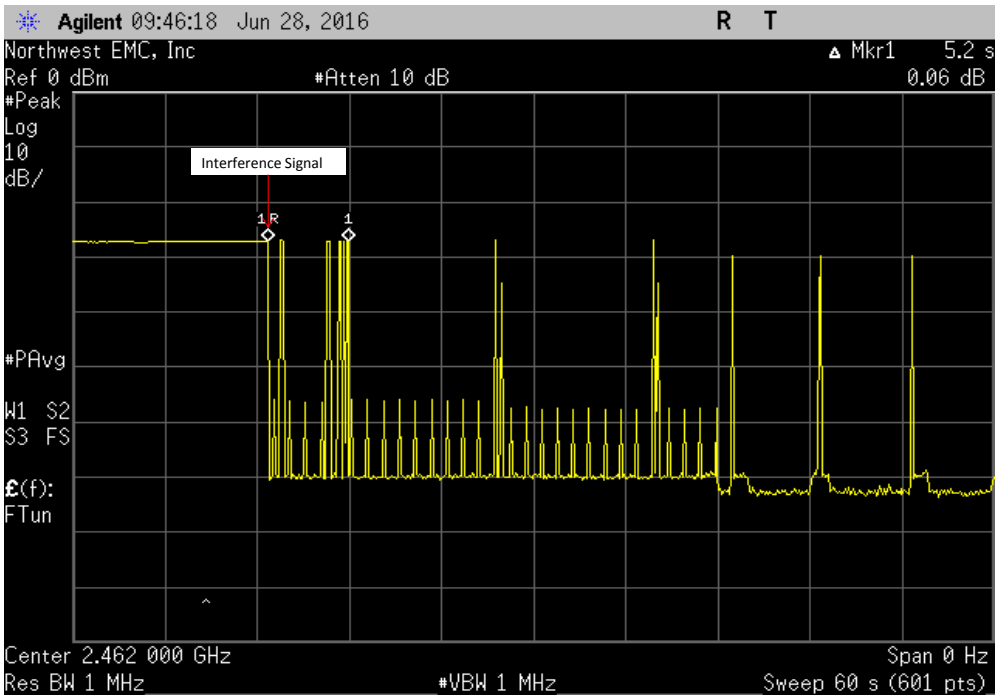
802.11(b), 1Mbps, Low Channel 1, 2412 MHz, Short Control Signalling Transmission Pulse Width						
		Period (s)	Pulsewidth (ms)	Data Transfer Stoppage	Limit	Result
		3 pulses in 50ms	3.75 in 50ms	N/A	≤10% in 50ms	Pass



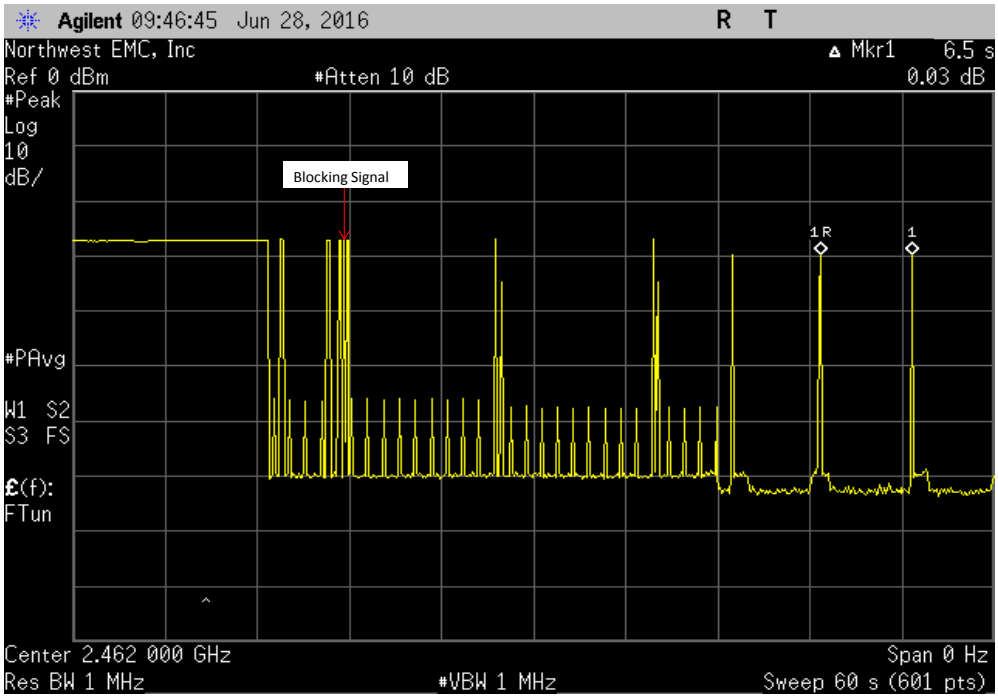
802.11(b), 1Mbps, Low Channel 1, 2412 MHz, Short Control Signalling Transmission Period						
		Period (s)	Pulsewidth (ms)	Data Transfer Stoppage	Limit	Result
		6.5	N/A	N/A	N/A	Yes



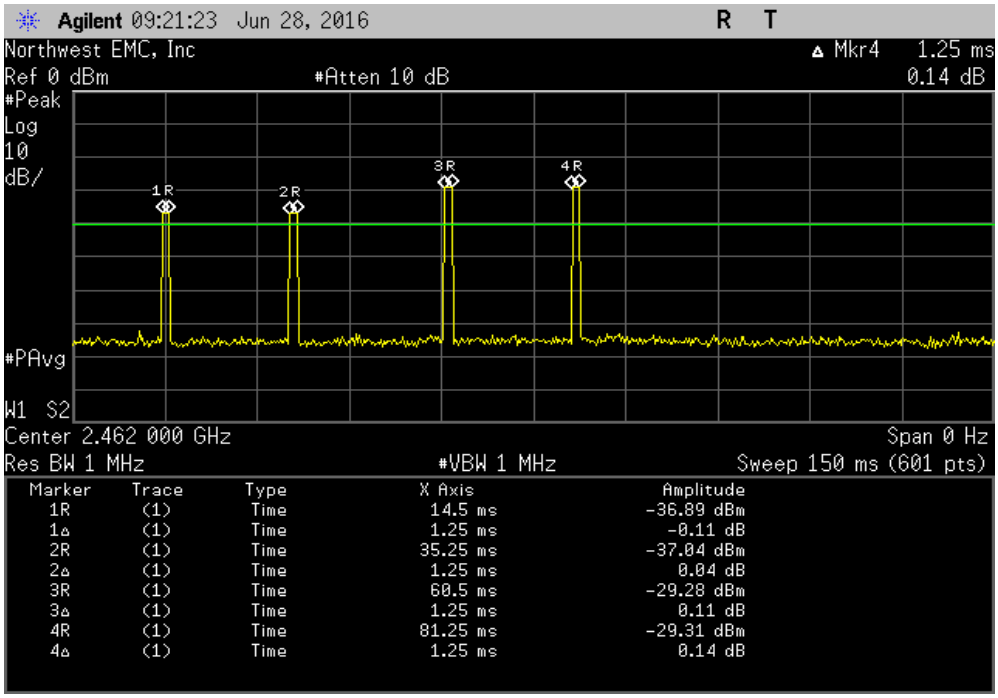
802.11(b), 1Mbps, High Channel 11, 2462 MHz, Interference Signal						
		Period (s)	Pulsewidth (ms)	Data Transfer Stoppage	Limit	Result
		N/A	N/A	Yes	N/A	Pass



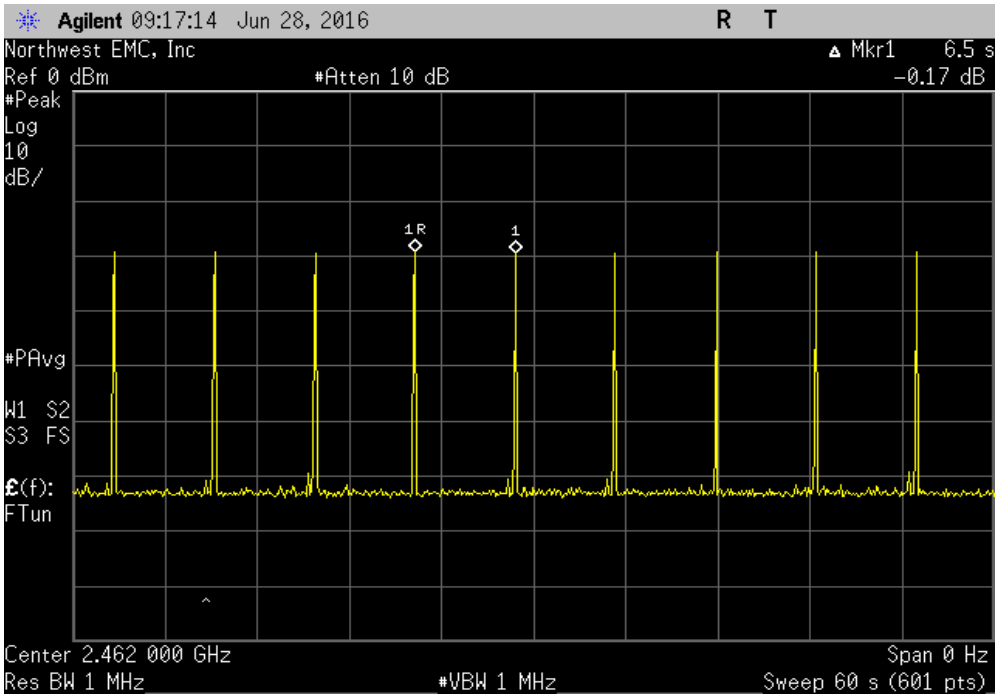
802.11(b), 1Mbps, High Channel 11, 2462 MHz, Blocking Signal						
		Period (s)	Pulsewidth (ms)	Data Transfer Stoppage	Limit	Result
		N/A	N/A	Yes	N/A	Pass

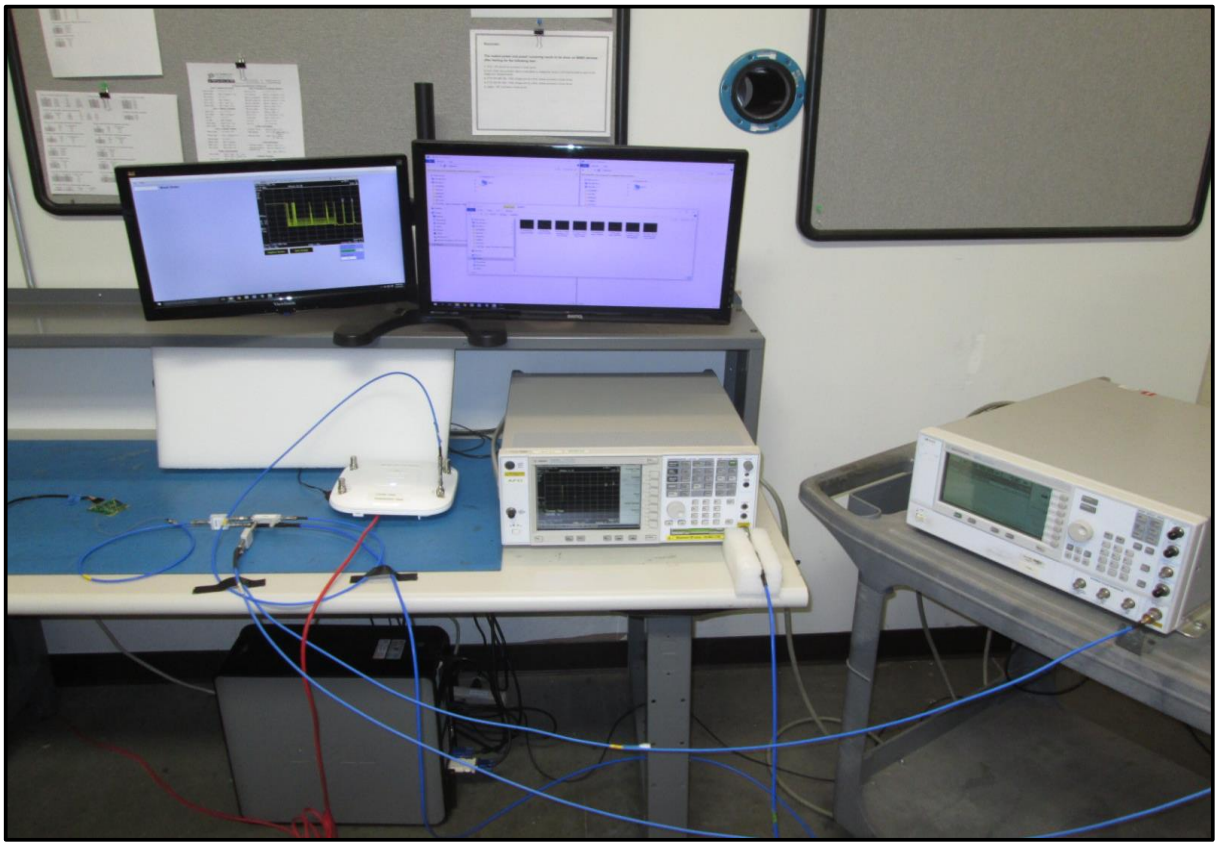


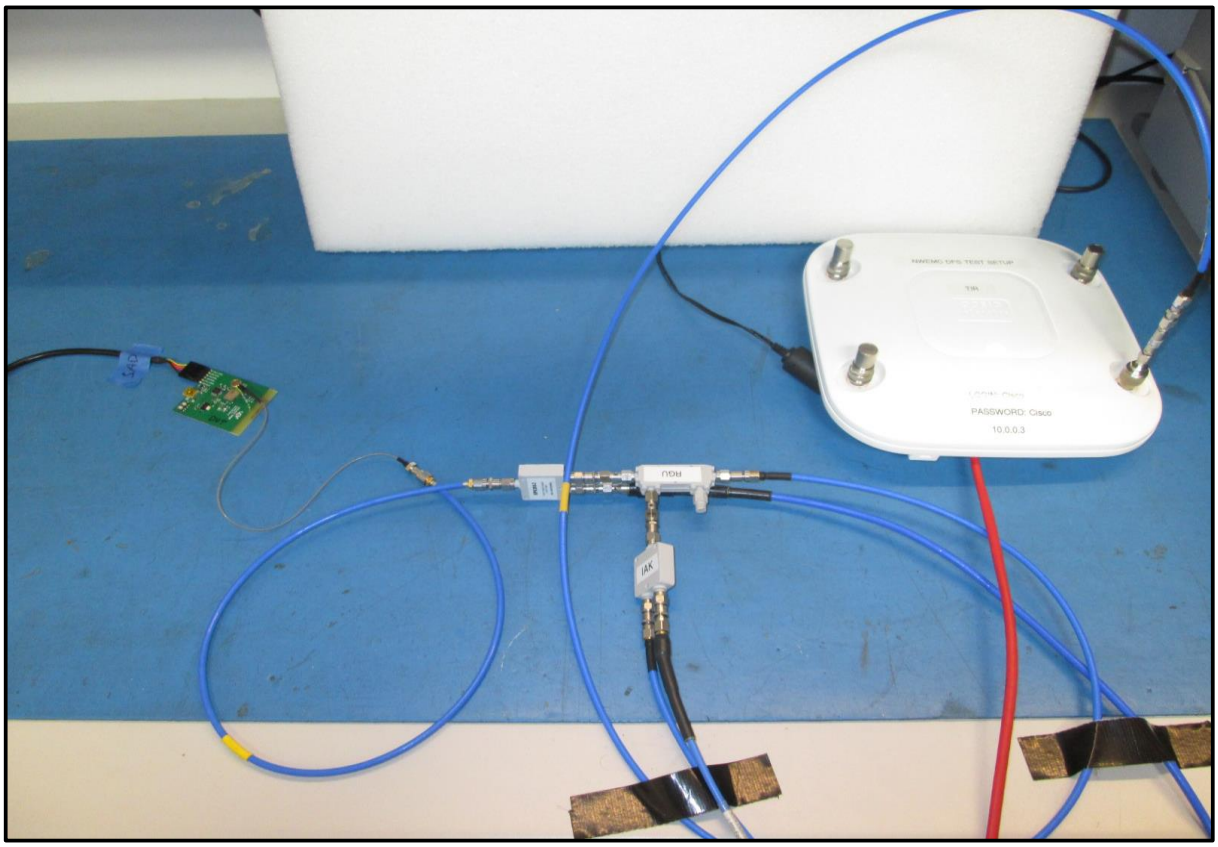
802.11(b), 1Mbps, High Channel 11, 2462 MHz, Short Control Signalling Transmission Pulse Width						
		Period (s)	Pulsewidth (ms)	Data Transfer Stoppage	Limit	Result
		3 pulses in 50ms	3.75 in 50ms	N/A	≤10% in 50ms	Pass

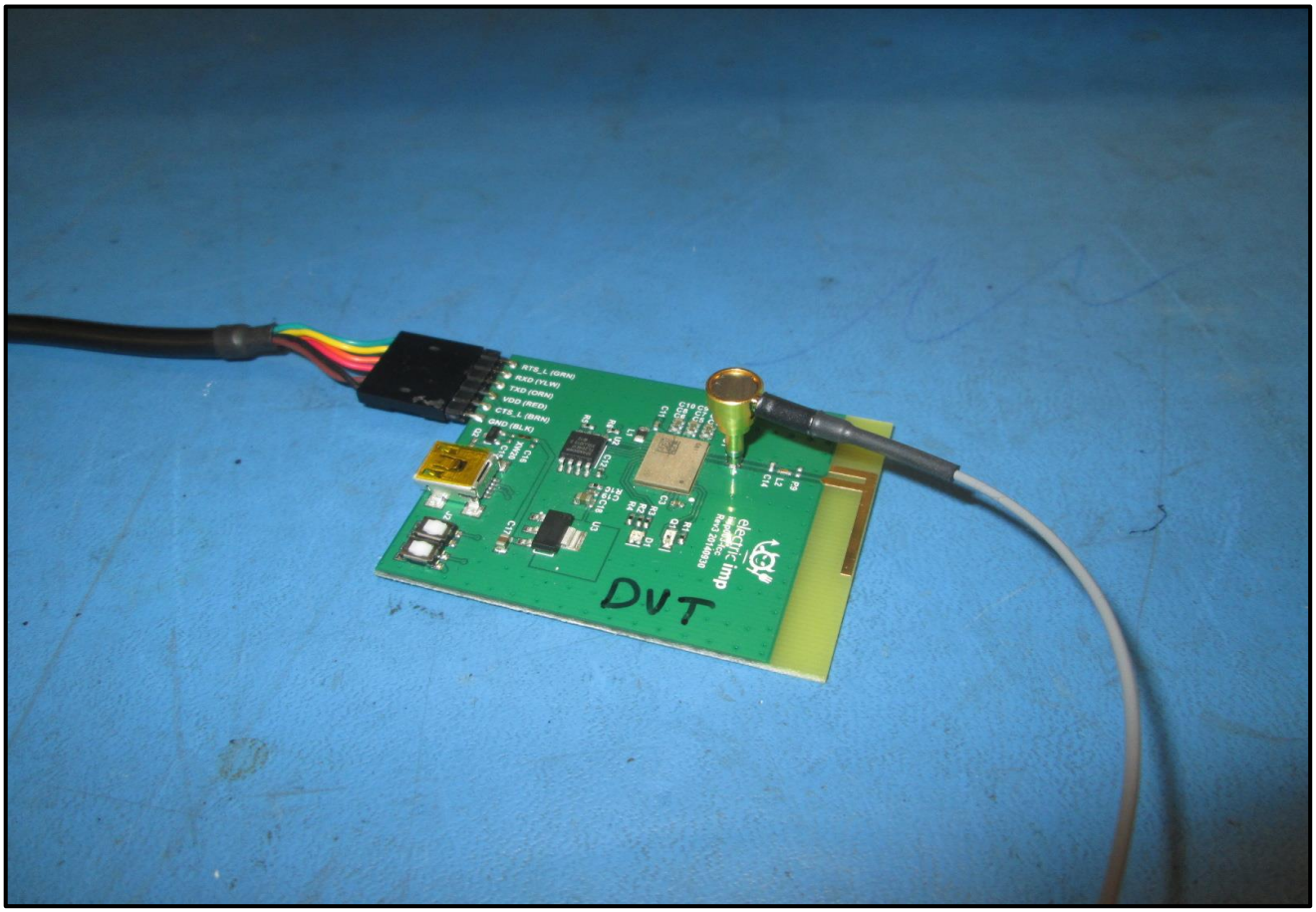


802.11(b), 1Mbps, High Channel 11, 2462 MHz, Short Control Signalling Transmission Period						
		Period (s)	Pulsewidth (ms)	Data Transfer Stoppage	Limit	Result
		6.5	N/A	N/A	N/A	Yes






PASSWORD: Cisco
10.0.0.3
ROU
IAK


RTS_L (GRN)
RXD (YLW)
TXD (ORN)
VDD (RED)
CTS_L (BRN)
GND (BLK)
DVT

OCCUPIED CHANNEL BANDWIDTH

XMit 2016.05.06

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.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	7/23/2015	7/23/2016
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	NCR
Block - DC	Aeroflex	INMET 8535	AMO	4/4/2016	4/4/2017
Attenuator	Fairview Microwave	SA18E-20	TKS	4/4/2016	4/4/2017
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	2/5/2018

TEST DESCRIPTION

The occupied channel bandwidth was measured with the EUT set to the channels and modes as listed on the data sheets. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode. The 99% occupied bandwidth measurement was made using the Agilent built in Occupied Bandwidth measurement function. The analyzer was set to a span equaling 2 times the nominal bandwidth, with a RBW of 1% of the span, VBW of 3 times the RBW, and utilizing an RMS detector.

OCCUPIED CHANNEL BANDWIDTH

NORTHWEST EMC

XMit 2016.05.06

EUT:	IMP0003	Work Order:	ELIM0011
Serial Number:	Barcode:2000000590	Date:	06/27/16
Customer:	Electric Imp, Inc.	Temperature:	24 °C
Attendees:	Hugo Fiennes	Humidity:	52.7% RH
Project:	None	Barometric Pres.:	1015 mbar
Tested by:	Johnny Candelas	Power: 5 VDC via USB	Job Site: OC13

TEST SPECIFICATIONS	Test Method
EN 300 328 V1.9.1:2015	EN 300 328 V1.9.1:2015

COMMENTS

Total Offset 23.1dB (20dB pad + DC Block + coax cable + client prvided patch cable) at 2.4GHz

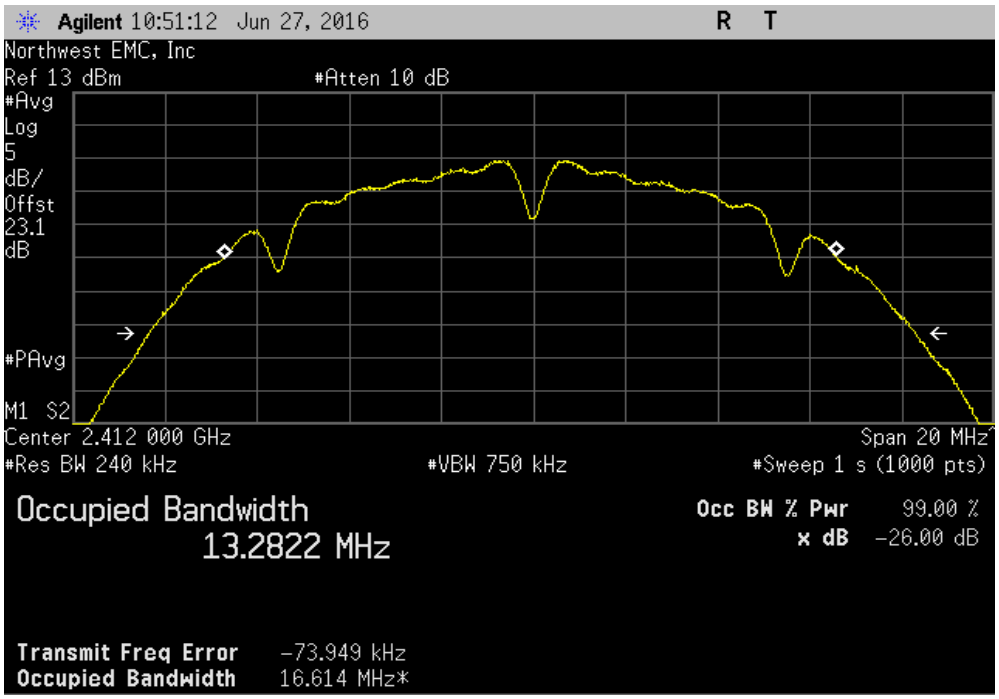
DEVIATIONS FROM TEST STANDARD

None

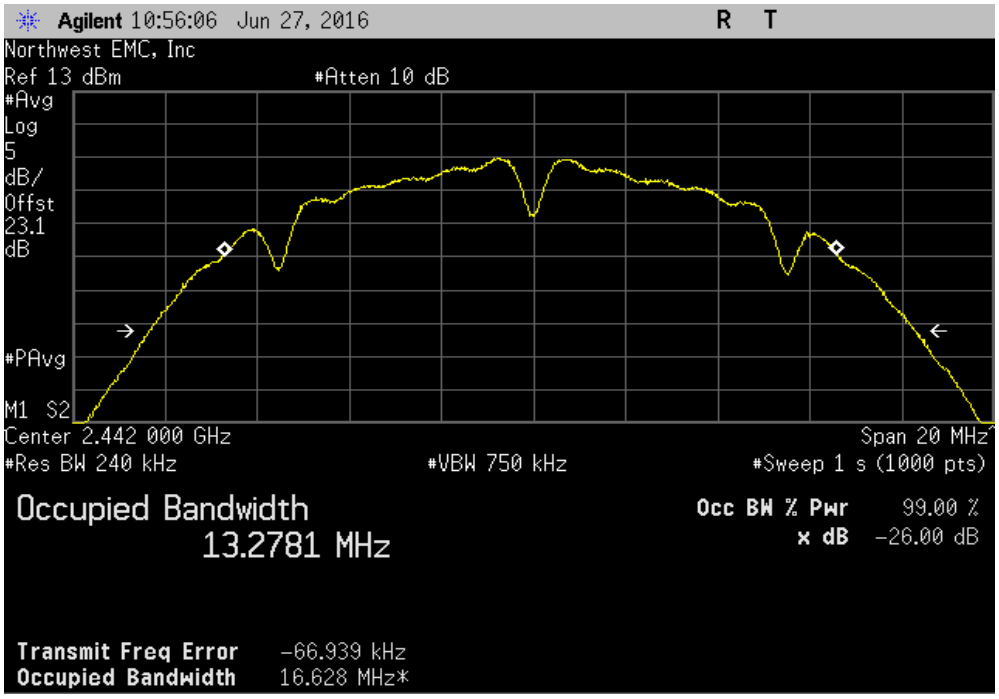
Configuration #	1	Signature

	Value	Limit (≤)	Result
Normal Temperature Conditions			
802.11(b) 1 Mbps			
Low Channel, 1, 2412 MHz	13.282 MHz	20 MHz	Pass
Mid Channel, 7, 2442 MHz	13.278 MHz	20 MHz	Pass
High Channel, 13, 2472 MHz	10.537 MHz	20 MHz	Pass
802.11(b) 11 Mbps			
Low Channel, 1, 2412 MHz	10.351 MHz	20 MHz	Pass
Mid Channel, 7, 2442 MHz	13.187 MHz	20 MHz	Pass
High Channel, 13, 2472 MHz	13.182 MHz	20 MHz	Pass
802.11(g) 6 Mbps			
Low Channel, 1, 2412 MHz	16.303 MHz	20 MHz	Pass
Mid Channel, 7, 2442 MHz	16.345 MHz	20 MHz	Pass
High Channel, 13, 2472 MHz	12.928 MHz	20 MHz	Pass
802.11(g) 36 Mbps			
Low Channel, 1, 2412 MHz	16.279 MHz	20 MHz	Pass
Mid Channel, 7, 2442 MHz	16.281 MHz	20 MHz	Pass
High Channel, 13, 2472 MHz	16.282 MHz	20 MHz	Pass
802.11(g) 54 Mbps			
Low Channel, 1, 2412 MHz	12.836 MHz	20 MHz	Pass
Mid Channel, 7, 2442 MHz	16.333 MHz	20 MHz	Pass
High Channel, 13, 2472 MHz	16.271 MHz	20 MHz	Pass
802.11(n) MCS0			
Low Channel, 1, 2412 MHz	17.54 MHz	20 MHz	Pass
Mid Channel, 7, 2442 MHz	13.841 MHz	20 MHz	Pass
High Channel, 13, 2472 MHz	13.881 MHz	20 MHz	Pass
802.11(n) MCS7			
Low Channel, 1, 2412 MHz	17.48 MHz	20 MHz	Pass
Mid Channel, 7, 2442 MHz	17.477 MHz	20 MHz	Pass
High Channel, 13, 2472 MHz	17.474 MHz	20 MHz	Pass

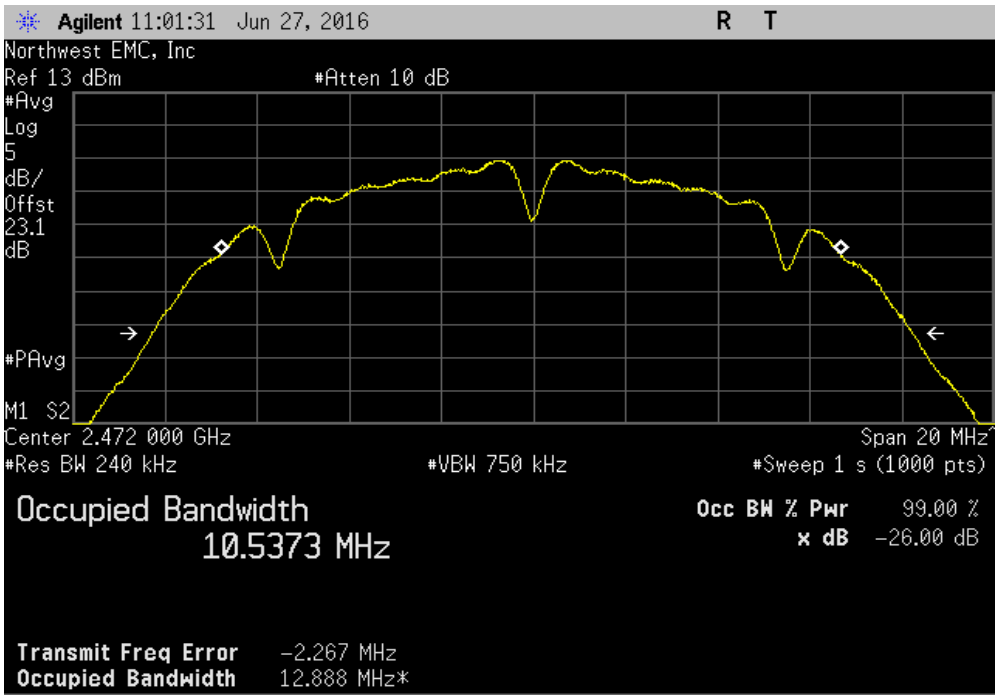
Normal Temperature Conditions, 802.11(b) 1 Mbps, Low Channel, 1, 2412 MHz						
				Value	Limit (≤)	Result
				13.282 MHz	20 MHz	Pass



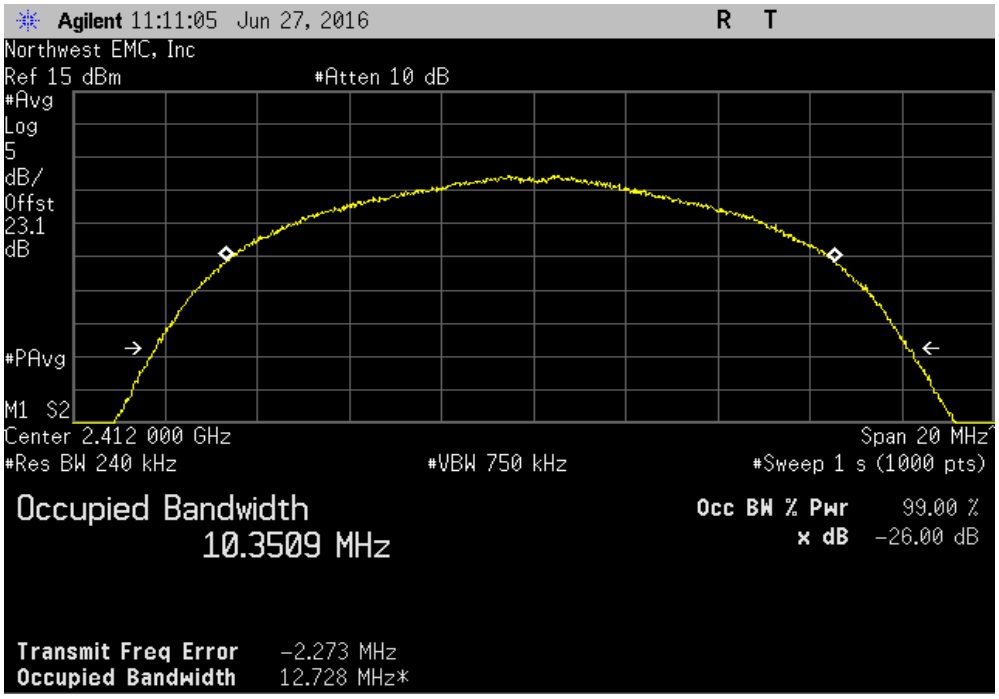
Normal Temperature Conditions, 802.11(b) 1 Mbps, Mid Channel, 7, 2442 MHz						
				Value	Limit (≤)	Result
				13.278 MHz	20 MHz	Pass



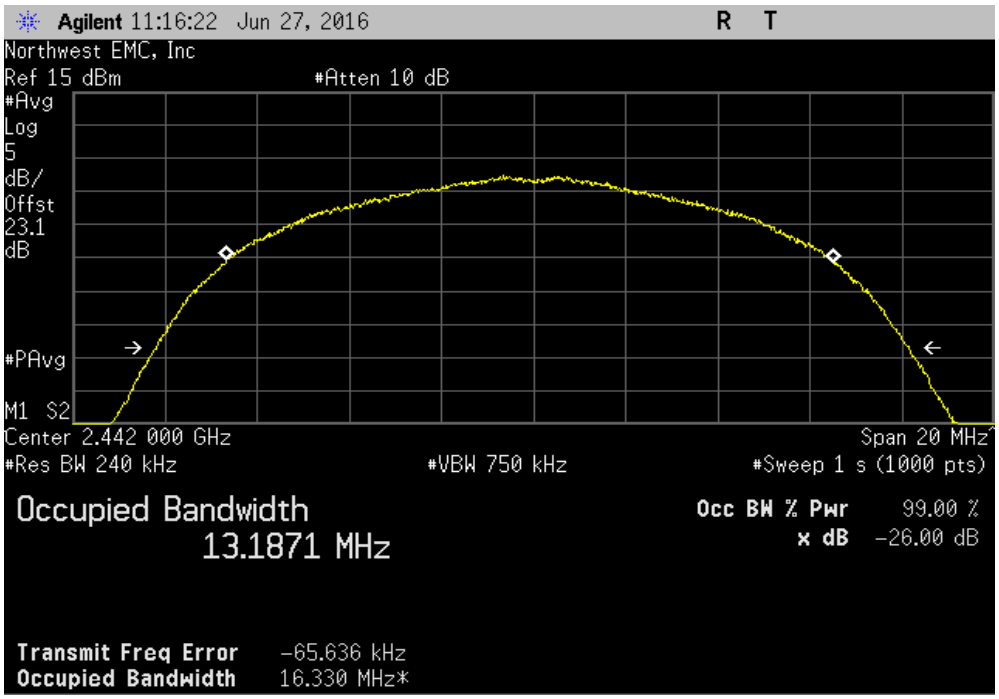
Normal Temperature Conditions, 802.11(b) 1 Mbps, High Channel, 13, 2472 MHz						
				Value	Limit (≤)	Result
				10.537 MHz	20 MHz	Pass



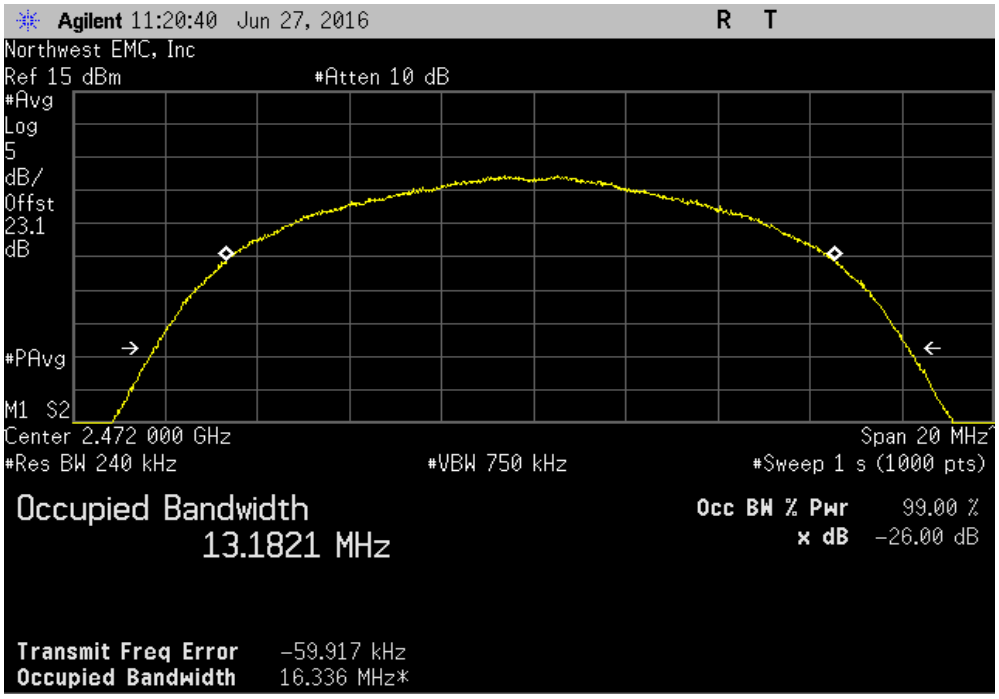
Normal Temperature Conditions, 802.11(b) 11 Mbps, Low Channel, 1, 2412 MHz						
				Value	Limit (≤)	Result
				10.351 MHz	20 MHz	Pass



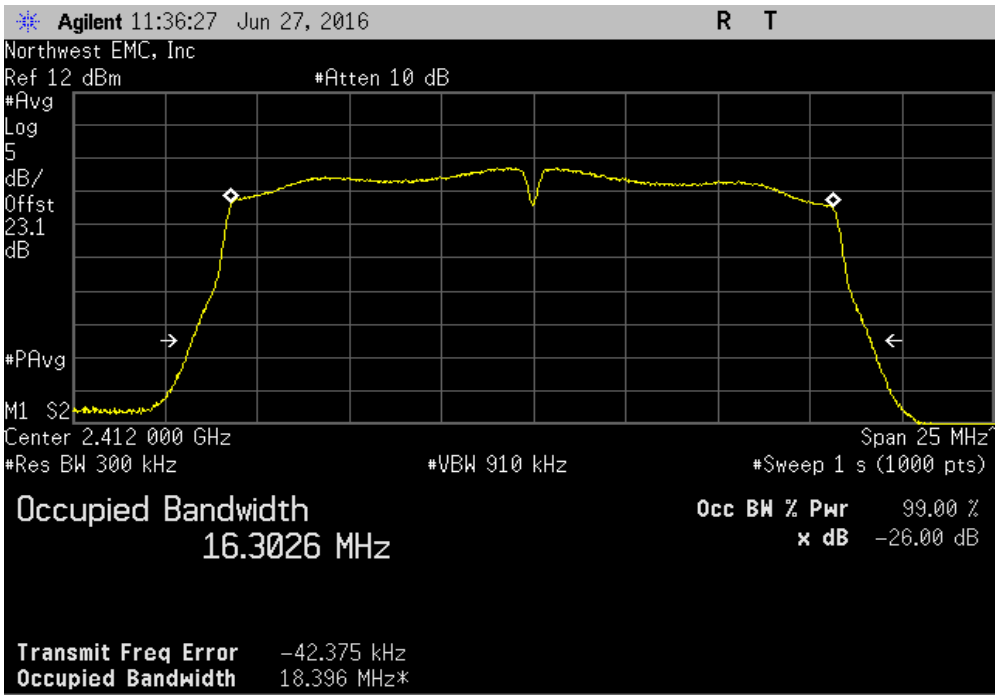
Normal Temperature Conditions, 802.11(b) 11 Mbps, Mid Channel, 7, 2442 MHz						
				Value	Limit (≤)	Result
				13.187 MHz	20 MHz	Pass



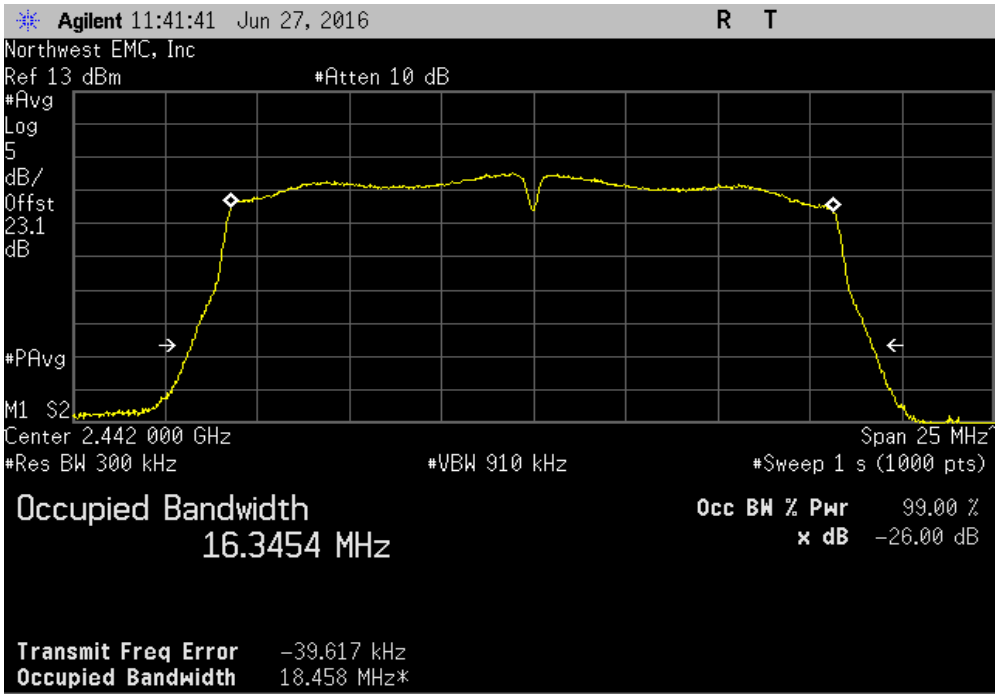
Normal Temperature Conditions, 802.11(b) 11 Mbps, High Channel, 13, 2472 MHz						
				Value	Limit (≤)	Result
				13.182 MHz	20 MHz	Pass



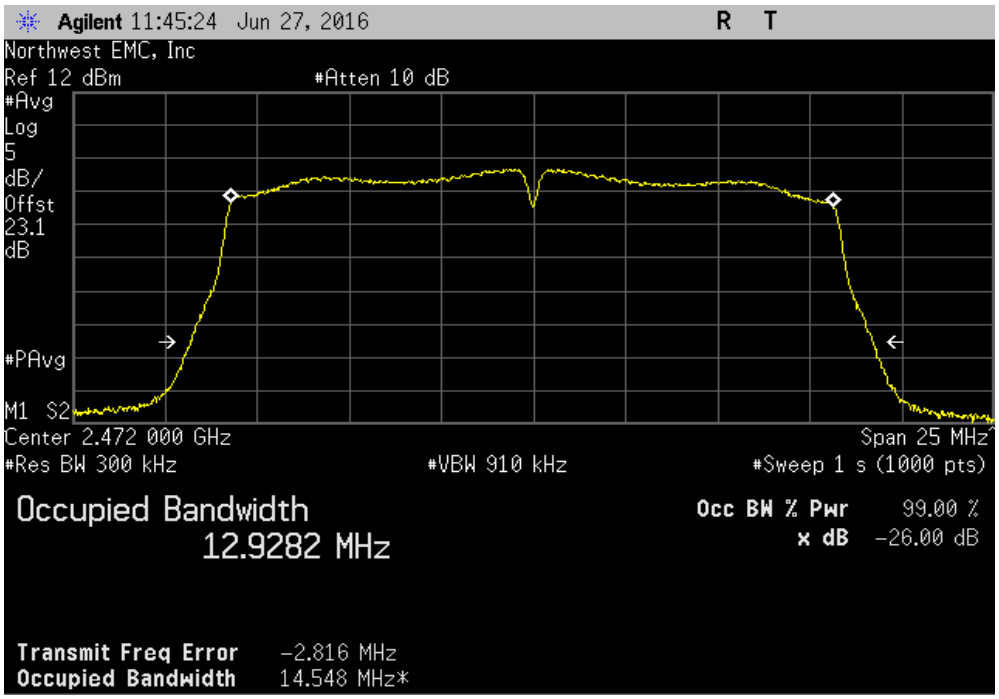
Normal Temperature Conditions, 802.11(g) 6 Mbps, Low Channel, 1, 2412 MHz						
				Value	Limit (≤)	Result
				16.303 MHz	20 MHz	Pass



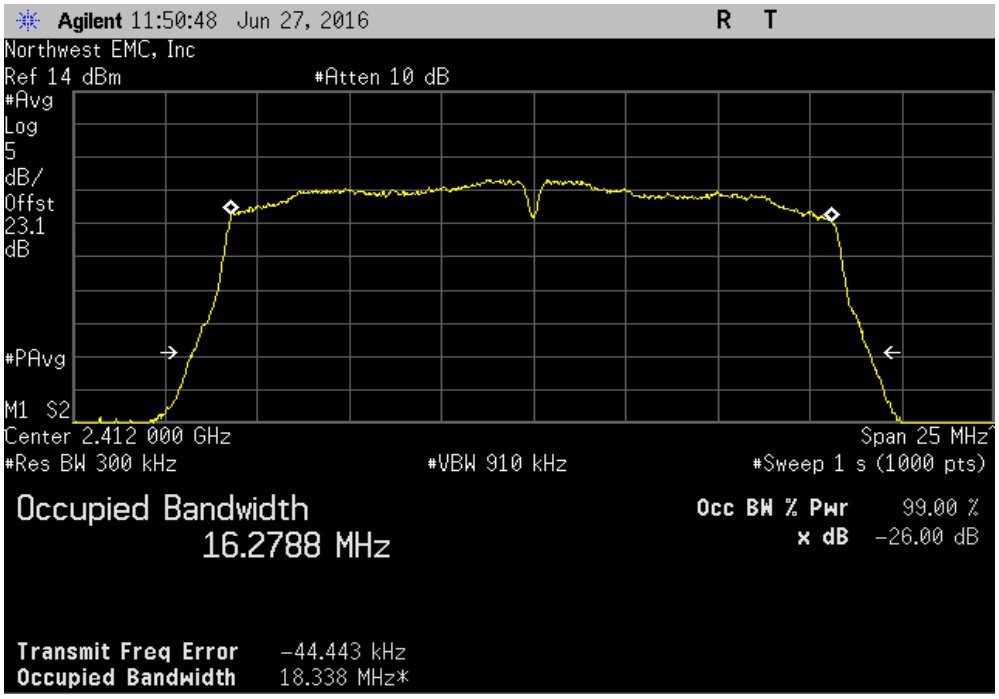
Normal Temperature Conditions, 802.11(g) 6 Mbps, Mid Channel, 7, 2442 MHz						
				Value	Limit (≤)	Result
				16.345 MHz	20 MHz	Pass



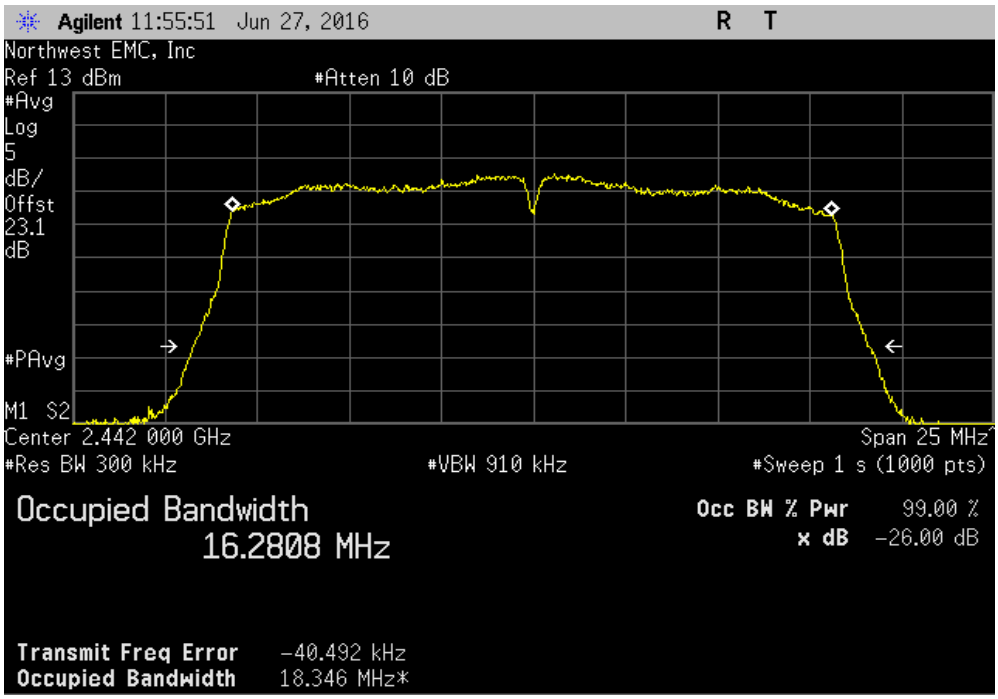
Normal Temperature Conditions, 802.11(g) 6 Mbps, High Channel, 13, 2472 MHz						
				Value	Limit (≤)	Result
				12.928 MHz	20 MHz	Pass



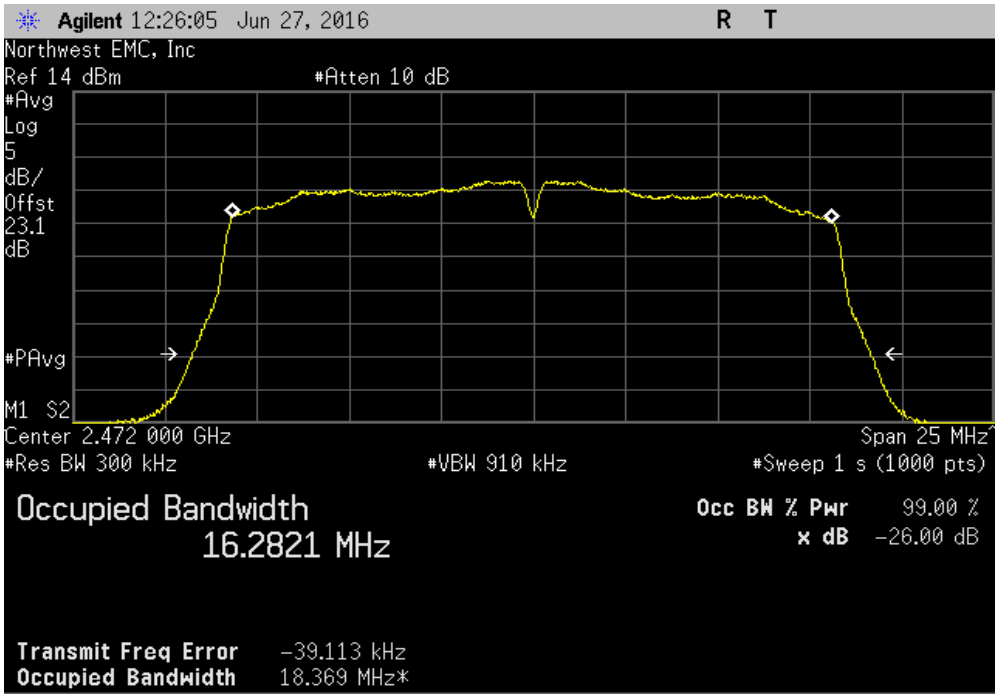
Normal Temperature Conditions, 802.11(g) 36 Mbps, Low Channel, 1, 2412 MHz						
				Value	Limit (≤)	Result
				16.279 MHz	20 MHz	Pass



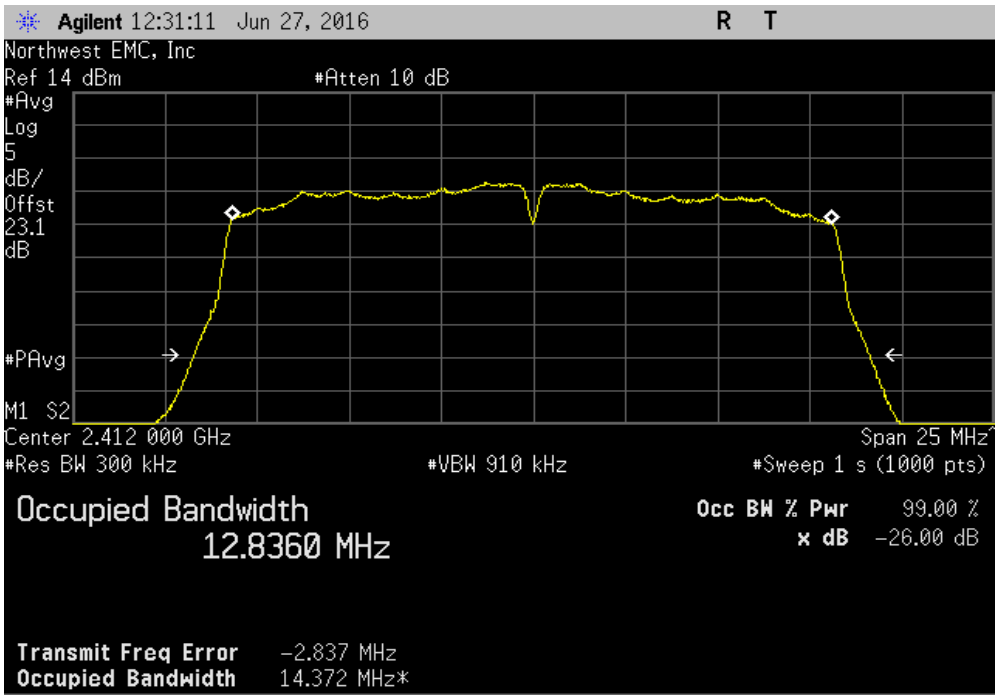
Normal Temperature Conditions, 802.11(g) 36 Mbps, Mid Channel, 7, 2442 MHz						
				Value	Limit (≤)	Result
				16.281 MHz	20 MHz	Pass



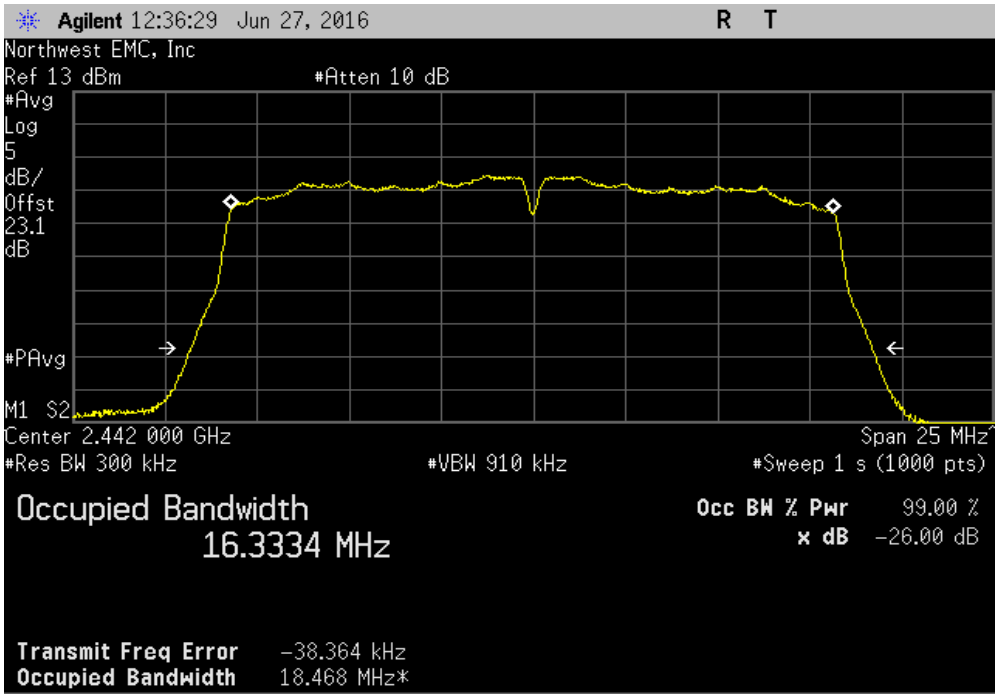
Normal Temperature Conditions, 802.11(g) 36 Mbps, High Channel, 13, 2472 MHz						
				Value	Limit (≤)	Result
				16.282 MHz	20 MHz	Pass



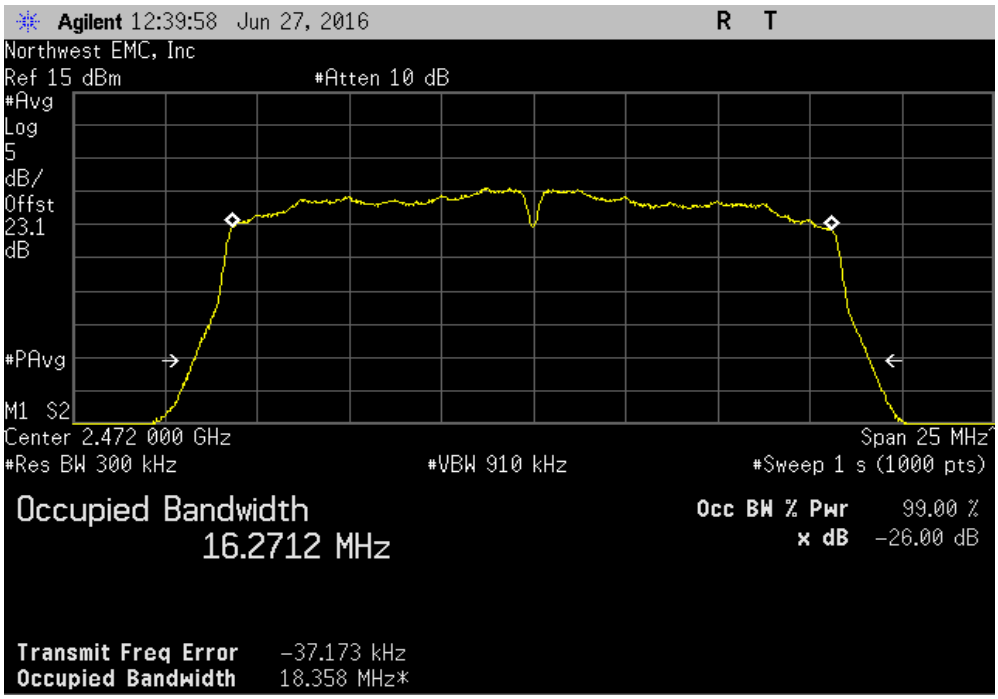
Normal Temperature Conditions, 802.11(g) 54 Mbps, Low Channel, 1, 2412 MHz						
				Value	Limit (≤)	Result
				12.836 MHz	20 MHz	Pass



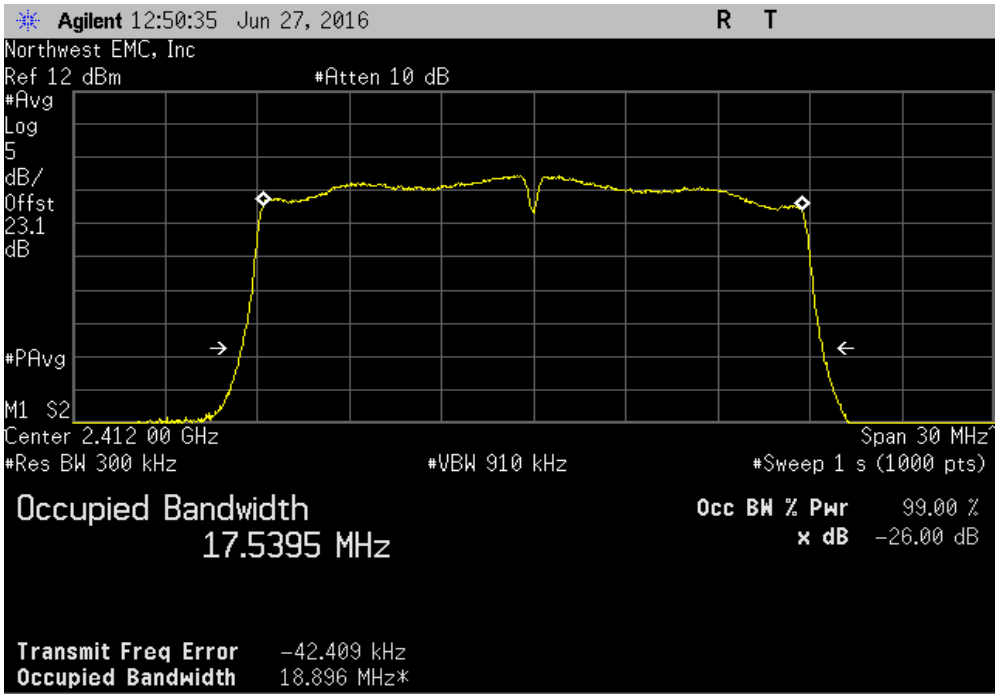
Normal Temperature Conditions, 802.11(g) 54 Mbps, Mid Channel, 7, 2442 MHz						
				Value	Limit (≤)	Result
				16.333 MHz	20 MHz	Pass



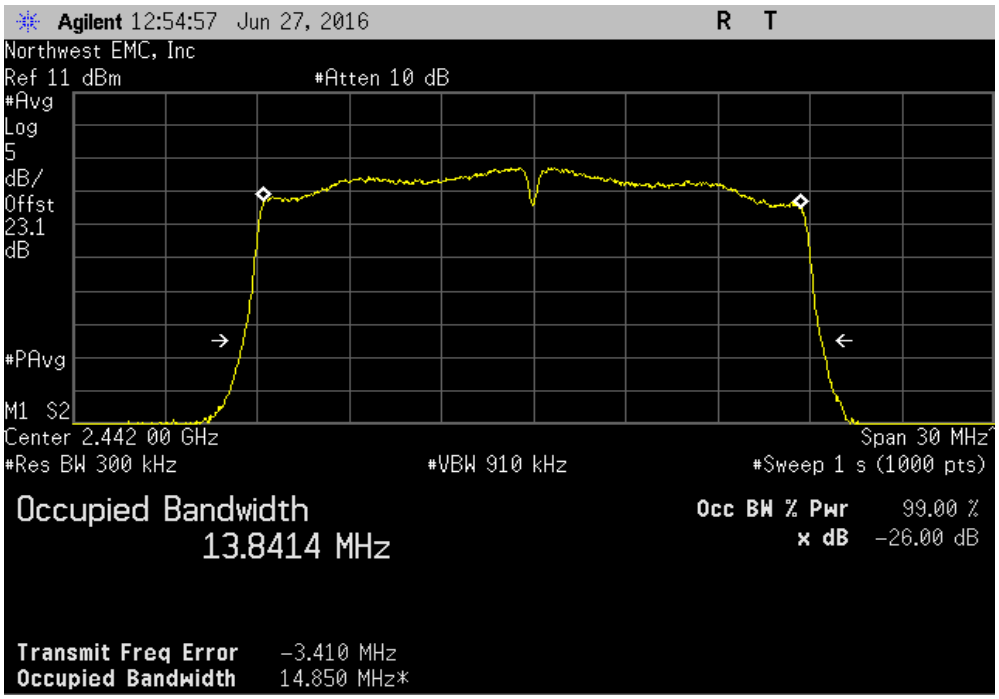
Normal Temperature Conditions, 802.11(g) 54 Mbps, High Channel, 13, 2472 MHz						
				Value	Limit (≤)	Result
				16.271 MHz	20 MHz	Pass



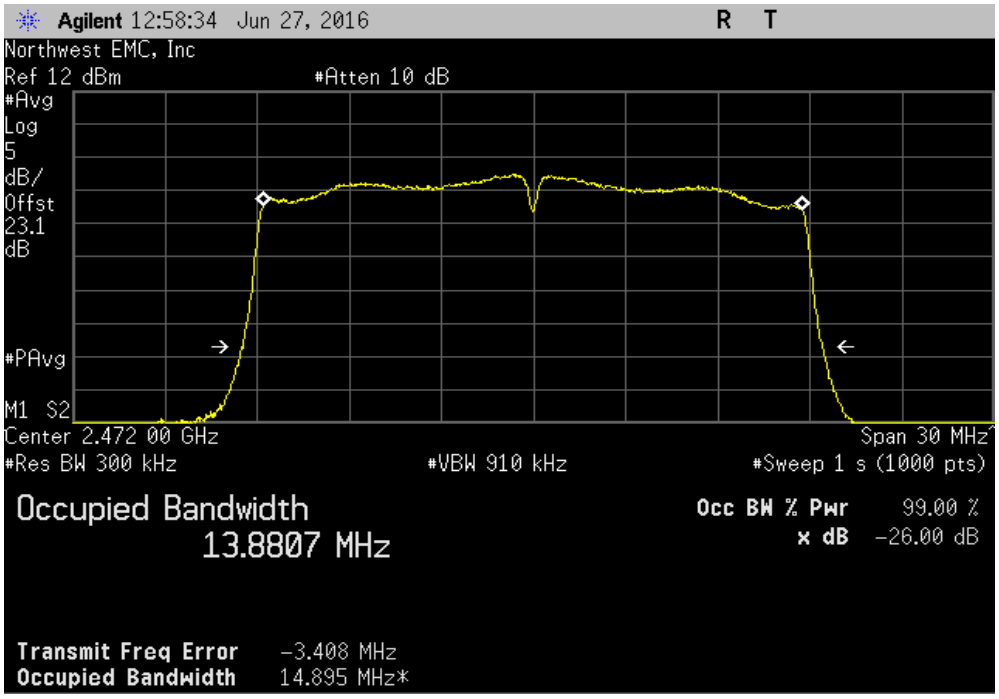
Normal Temperature Conditions, 802.11(n) MCS0, Low Channel, 1, 2412 MHz						
				Value	Limit (≤)	Result
				17.54 MHz	20 MHz	Pass



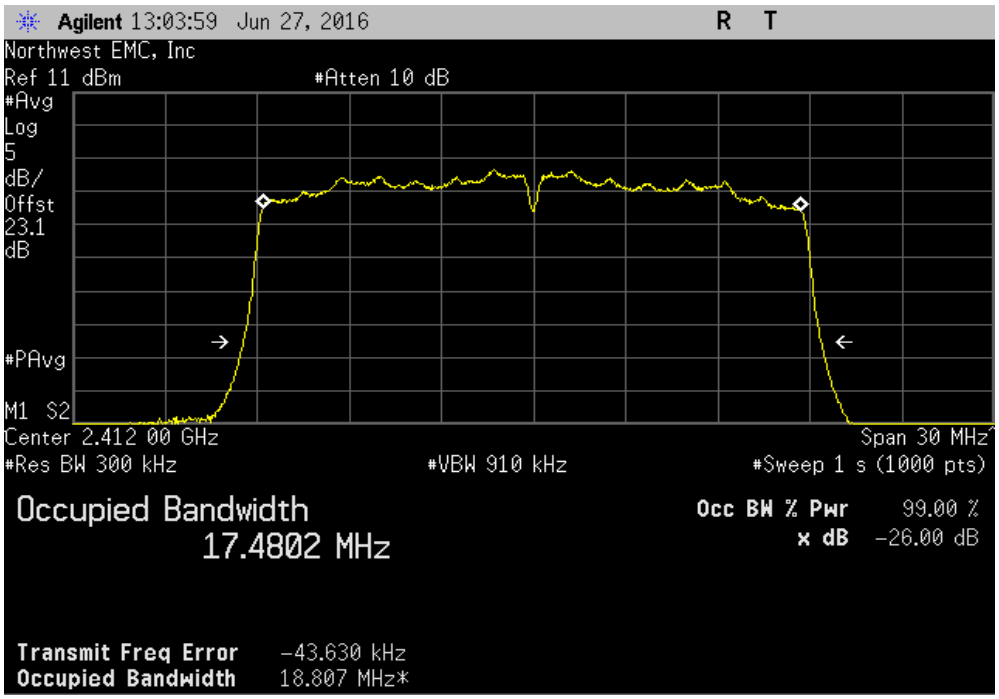
Normal Temperature Conditions, 802.11(n) MCS0, Mid Channel, 7, 2442 MHz						
				Value	Limit (≤)	Result
				13.841 MHz	20 MHz	Pass



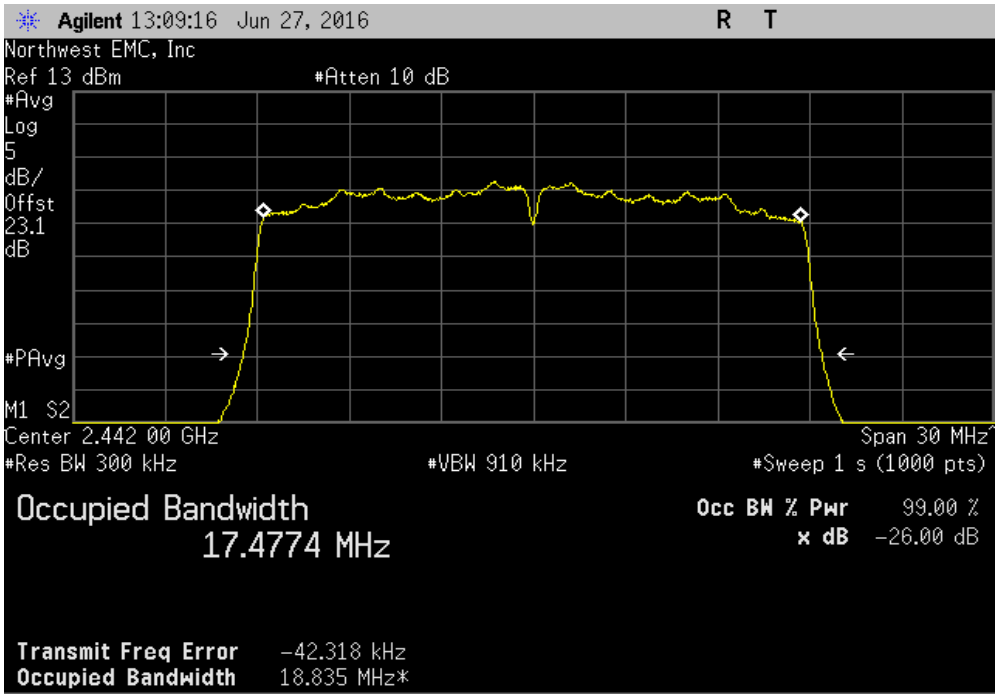
Normal Temperature Conditions, 802.11(n) MCS0, High Channel, 13, 2472 MHz						
				Value	Limit (≤)	Result
				13.881 MHz	20 MHz	Pass



Normal Temperature Conditions, 802.11(n) MCS7, Low Channel, 1, 2412 MHz						
				Value	Limit (≤)	Result
				17.48 MHz	20 MHz	Pass



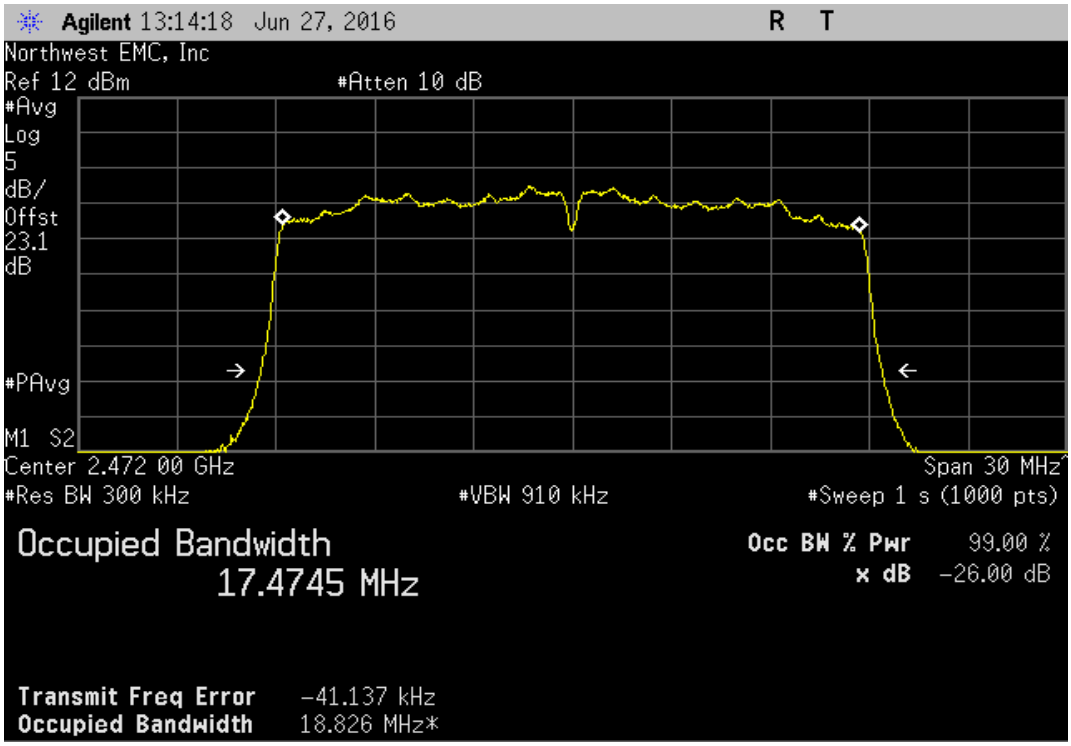
Normal Temperature Conditions, 802.11(n) MCS7, Mid Channel, 7, 2442 MHz						
				Value	Limit (≤)	Result
				17.477 MHz	20 MHz	Pass



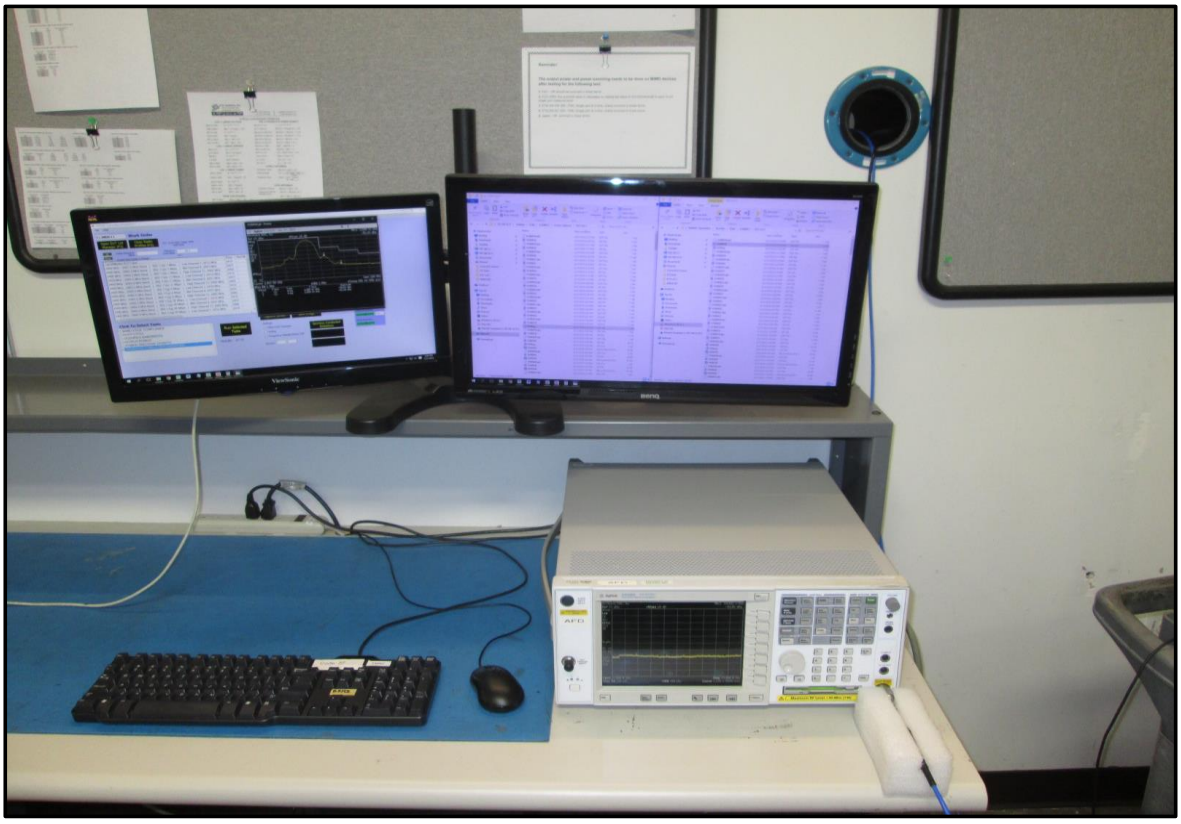
OCCUPIED CHANNEL BANDWIDTH

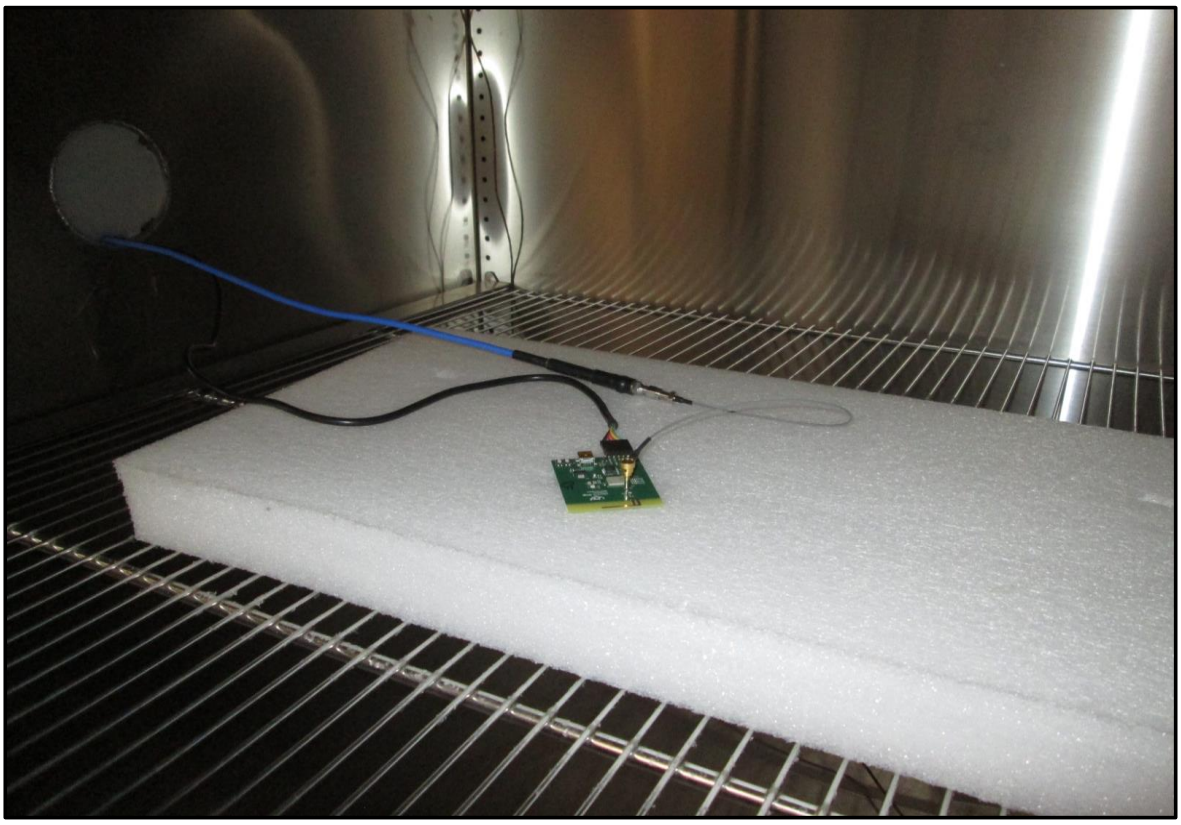
XMit 2016.05.06

Normal Temperature Conditions, 802.11(n) MCS7, High Channel, 13, 2472 MHz						
				Value	Limit (≤)	Result
				17.474 MHz	20 MHz	Pass



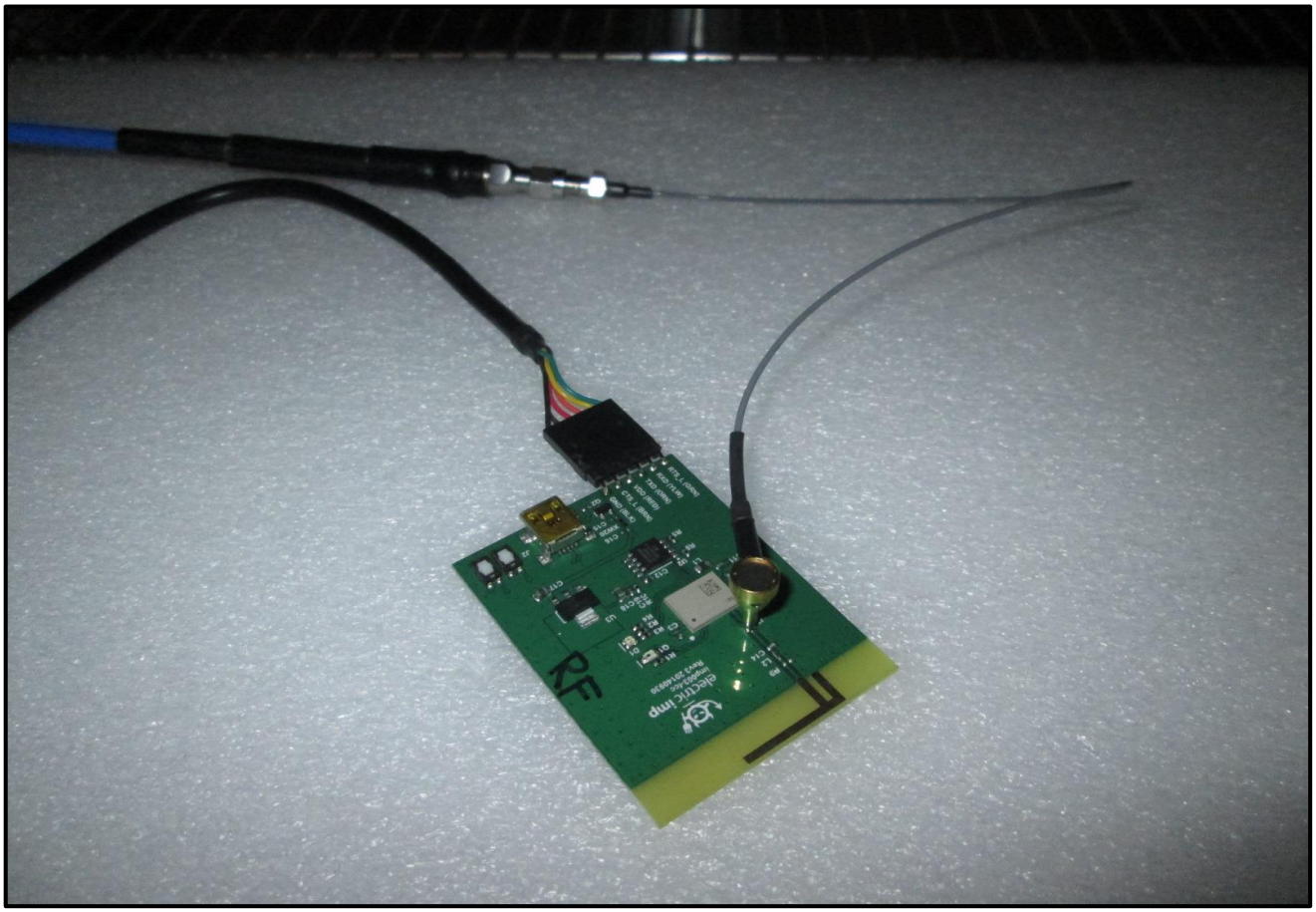
OCCUPIED CHANNEL BANDWIDTH





OCCUPIED CHANNEL BANDWIDTH

XMit 2016.05.06



TRANSMITTER UNWANTED EMISSIONS IN THE OOB DOMAIN

XMit 2016.05.06

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.	Cal. Due
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPHS-32-3.5-SCT/AC	TBE	NCR	NCR
Thermometer	Omega Engineering, Inc.	HH311	DUC	10/3/2014	10/3/2017
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	7/23/2015	7/23/2016
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	NCR
Block - DC	Aeroflex	INMET 8535	AMO	4/4/2016	4/4/2017
Attenuator	Fairview Microwave	SA18E-20	TKS	4/4/2016	4/4/2017
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	2/5/2018

TEST DESCRIPTION

The measurement was made using a RMS detector, with a 1MHz RBW and 3MHz VBW.
Steps for each range are dependent on the measured Occupied Channel Bandwidth. The declared antenna gain (dBi) is also added to the measurement. The Screen Captures show compliance to each OOB steps/spans as defined in Mask. The measurements were made under normal and extreme temperature conditions.

TRANSMITTER UNWANTED EMISSIONS IN THE OOB DOMAIN

NORTHWEST EMC

XMit 2016.05.06

EUT:	IMP0003	Work Order:	ELIM0011
Serial Number:	Barcode:2000000590	Date:	06/27/16
Customer:	Electric Imp, Inc.	Temperature:	24 °C
Attendees:	Hugo Fiennes	Humidity:	52.7% RH
Project:	None	Barometric Pres.:	1015 mbar
Tested by:	Johnny Candelas	Power: 5 VDC via USB	Job Site: OC13

TEST SPECIFICATIONS	Test Method
EN 300 328 V1.9.1:2015	EN 300 328 V1.9.1:2015

COMMENTS

Total Offset 23.1dB (20dB pad + DC Block + coax cable + client prvided patch cable) at 2.4GHz

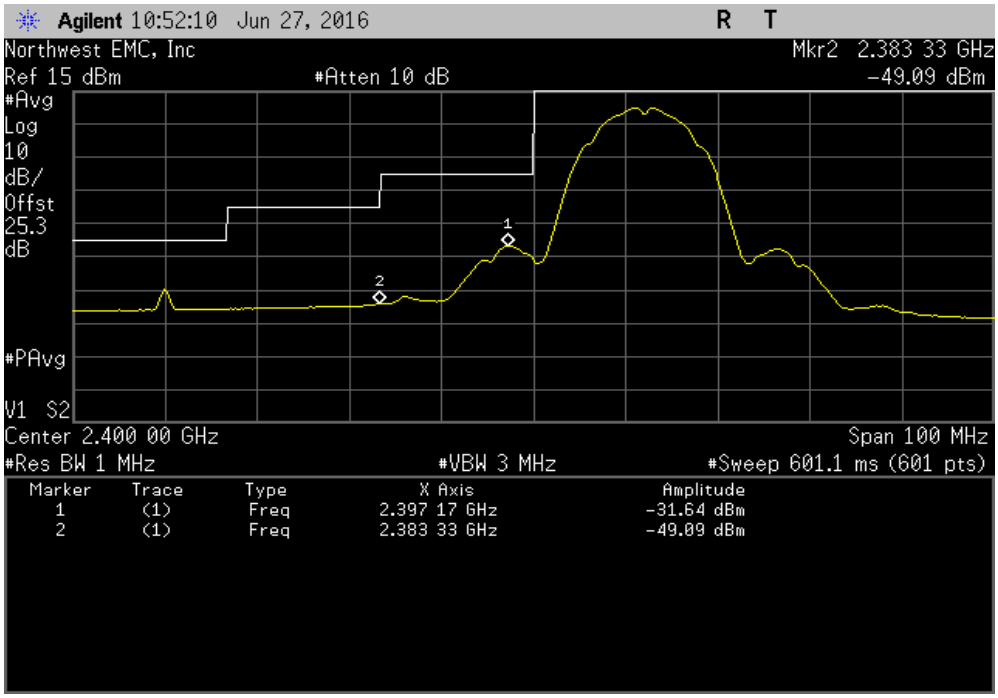
DEVIATIONS FROM TEST STANDARD

None

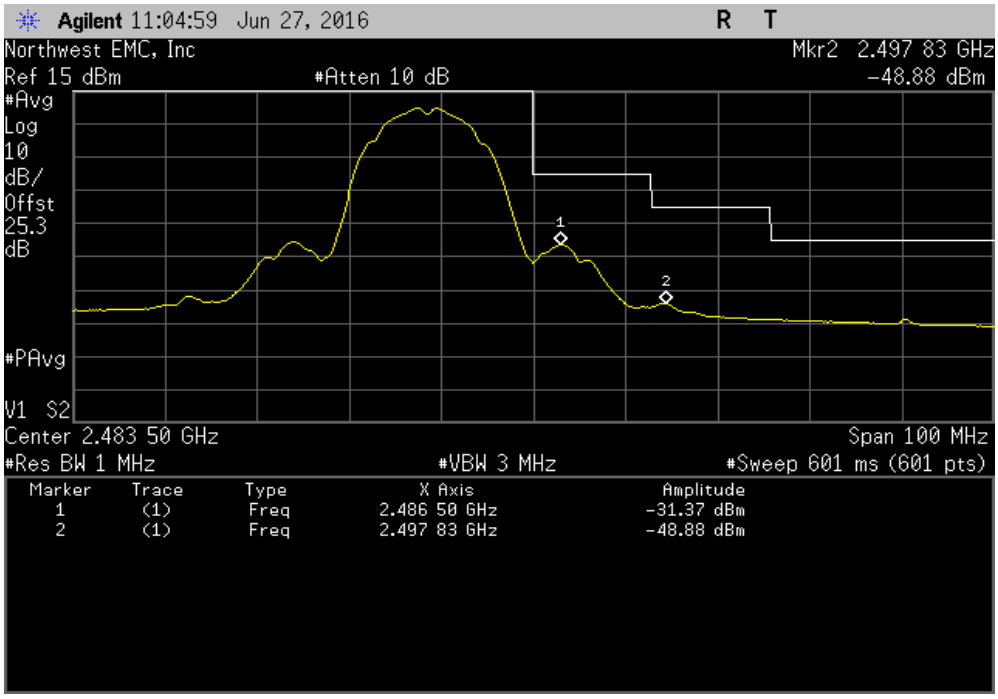
Configuration #	1	Signature

	Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
Normal Temperature Conditions					
802.11(b) 1 Mbps					
Low Channel, 1, 2412 MHz	-31.64	-10	-49.09	-20	Pass
High Channel, 13, 2472 MHz	-31.37	-10	-48.88	-20	Pass
802.11(b) 11 Mbps					
Low Channel, 1, 2412 MHz	-32.12	-10	-46.83	-20	Pass
High Channel, 13, 2472 MHz	-32.31	-10	-51.31	-20	Pass
802.11(g) 6 Mbps					
Low Channel, 1, 2412 MHz	-28.2	-10	-44.07	-20	Pass
High Channel, 13, 2472 MHz	-29.1	-10	-45.07	-20	Pass
802.11(g) 36 Mbps					
Low Channel, 1, 2412 MHz	-28.78	-10	-44.51	-20	Pass
High Channel, 13, 2472 MHz	-28.71	-10	-47.08	-20	Pass
802.11(g) 54 Mbps					
Low Channel, 1, 2412 MHz	-28.89	-10	-42.21	-20	Pass
High Channel, 13, 2472 MHz	-29.25	-10	-47.42	-20	Pass
802.11(n) MCS0					
Low Channel, 1, 2412 MHz	-29.63	-10	-44.69	-20	Pass
High Channel, 13, 2472 MHz	-31.35	-10	-45.64	-20	Pass
802.11(n) MCS7					
Low Channel, 1, 2412 MHz	-30.65	-10	-45.35	-20	Pass
High Channel, 13, 2472 MHz	-31.83	-10	-47.96	-20	Pass
Extreme Temperature, +85°C					
802.11(b) 1 Mbps					
Low Channel, 1, 2412 MHz	-30.82	-10	-49.58	-20	Pass
High Channel, 13, 2472 MHz	-30.83	-10	-51.99	-20	Pass
802.11(b) 11 Mbps					
Low Channel, 1, 2412 MHz	-31.59	-10	-49.44	-20	Pass
High Channel, 13, 2472 MHz	-31.69	-10	-51.88	-20	Pass
802.11(g) 6 Mbps					
Low Channel, 1, 2412 MHz	-26.76	-10	-44.42	-20	Pass
High Channel, 13, 2472 MHz	-26.43	-10	-46.74	-20	Pass
802.11(g) 36 Mbps					
Low Channel, 1, 2412 MHz	-26.25	-10	-44.32	-20	Pass
High Channel, 13, 2472 MHz	-26.68	-10	-46.97	-20	Pass
802.11(g) 54 Mbps					
Low Channel, 1, 2412 MHz	-26.46	-10	-44.72	-20	Pass
High Channel, 13, 2472 MHz	-27.86	-10	-47.68	-20	Pass
802.11(n) MCS0					
Low Channel, 1, 2412 MHz	-28.98	-10	-45.19	-20	Pass
High Channel, 13, 2472 MHz	-29.62	-10	-47.51	-20	Pass
802.11(n) MCS7					
Low Channel, 1, 2412 MHz	-29.46	-10	-45.59	-20	Pass
High Channel, 13, 2472 MHz	-29.98	-10	-48.11	-20	Pass
Extreme Temperature, -40°C					
802.11(b) 1 Mbps					
Low Channel, 1, 2412 MHz	-31.44	-10	-48.12	-20	Pass
High Channel, 13, 2472 MHz	-32.44	-10	-50.85	-20	Pass
802.11(b) 11 Mbps					
Low Channel, 1, 2412 MHz	-33.32	-10	-48.49	-20	Pass
High Channel, 13, 2472 MHz	-33.66	-10	-50.9	-20	Pass
802.11(g) 6 Mbps					
Low Channel, 1, 2412 MHz	-29.59	-10	-41.33	-20	Pass
High Channel, 13, 2472 MHz	-31.53	-10	-44.82	-20	Pass
802.11(g) 36 Mbps					
Low Channel, 1, 2412 MHz	-30.12	-10	-43.26	-20	Pass
High Channel, 13, 2472 MHz	-31.28	-10	-45.88	-20	Pass
802.11(g) 54 Mbps					
Low Channel, 1, 2412 MHz	-30.62	-10	-43.55	-20	Pass
High Channel, 13, 2472 MHz	-31.72	-10	-46.19	-20	Pass
802.11(n) MCS0					
Low Channel, 1, 2412 MHz	-33.49	-10	-44.2	-20	Pass
High Channel, 13, 2472 MHz	-32.89	-10	-46.64	-20	Pass
802.11(n) MCS7					
Low Channel, 1, 2412 MHz	-34.12	-10	-44.84	-20	Pass
High Channel, 13, 2472 MHz	-30.58	-10	-47.31	-20	Pass

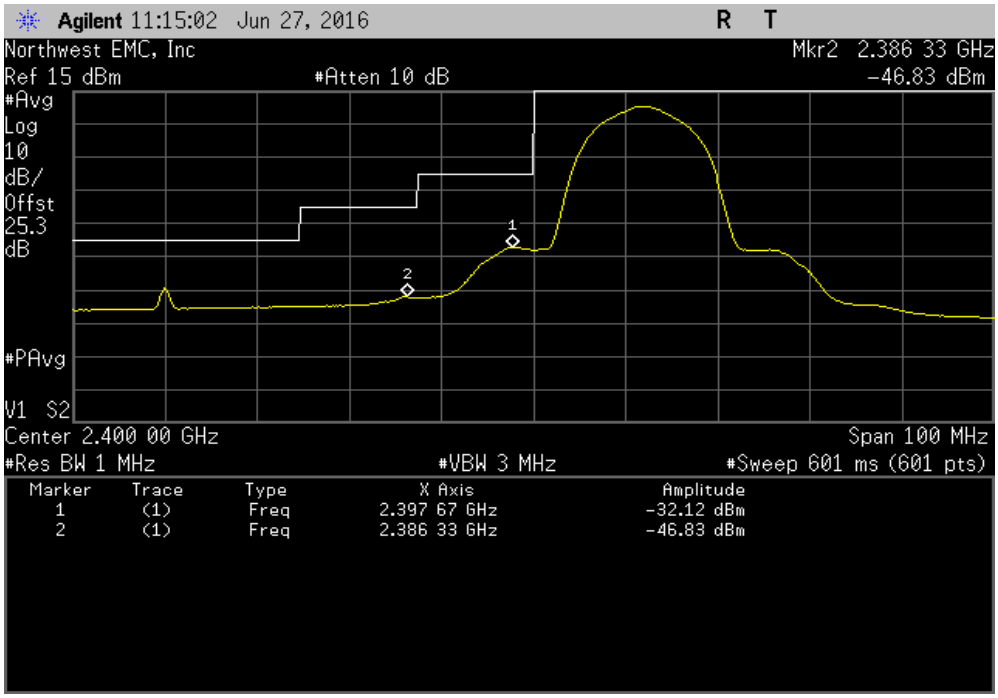
Normal Temperature Conditions, 802.11(b) 1 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-31.64	-10	-49.09	-20	Pass



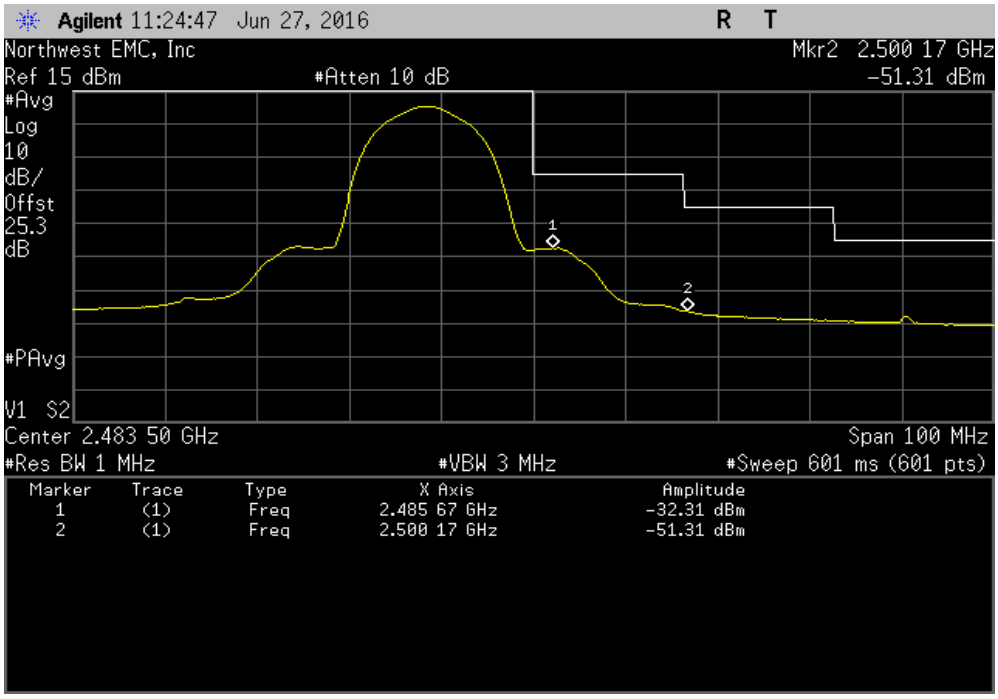
Normal Temperature Conditions, 802.11(b) 1 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-31.37	-10	-48.88	-20	Pass



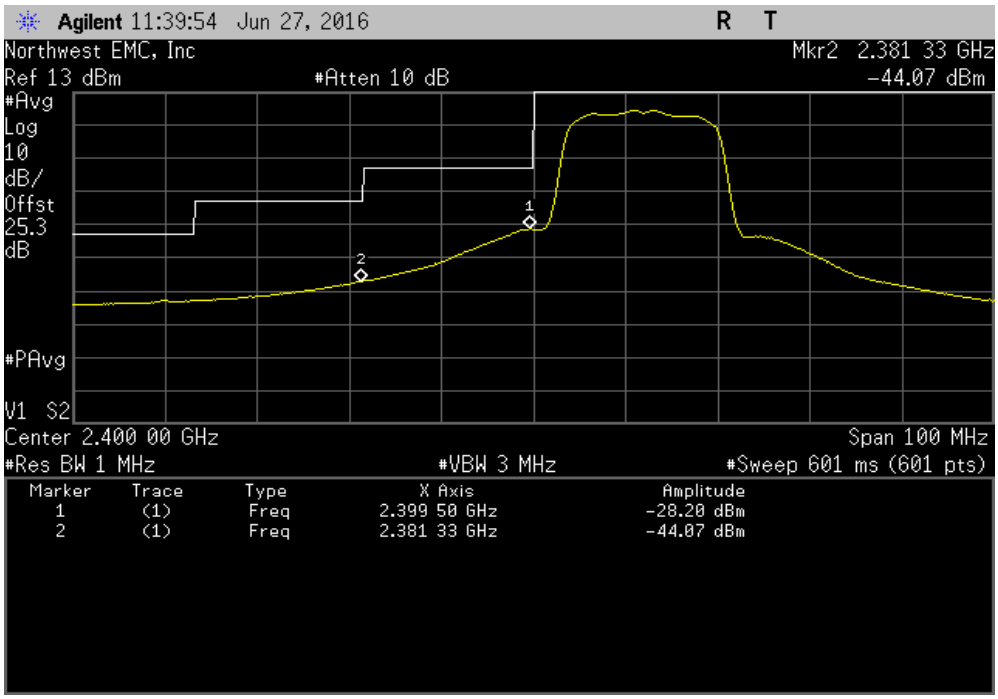
Normal Temperature Conditions, 802.11(b) 11 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-32.12	-10	-46.83	-20	Pass



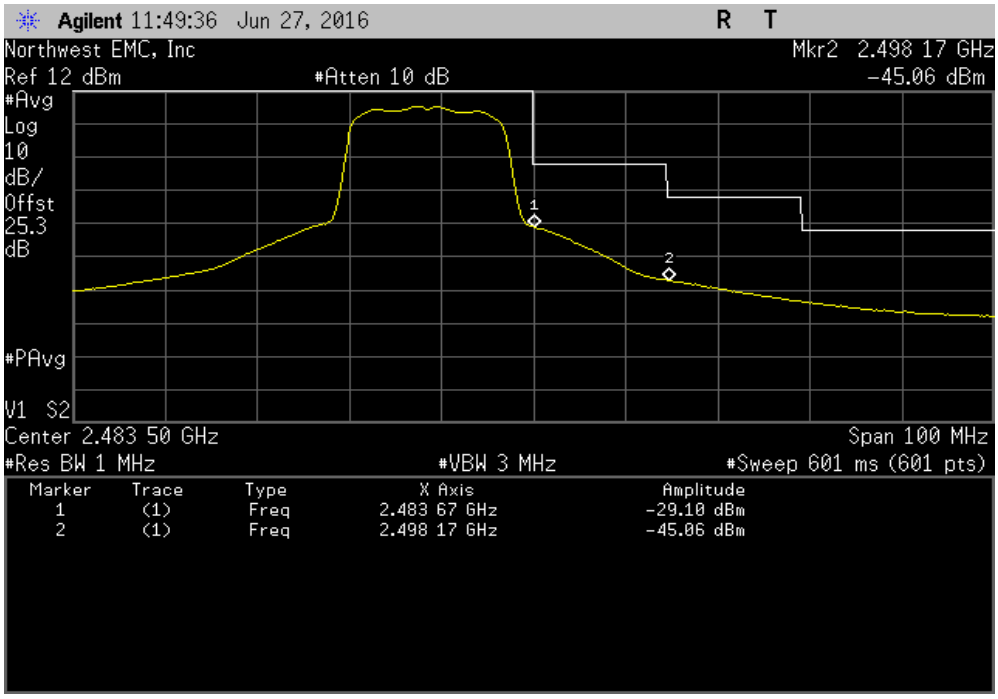
Normal Temperature Conditions, 802.11(b) 11 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-32.31	-10	-51.31	-20	Pass



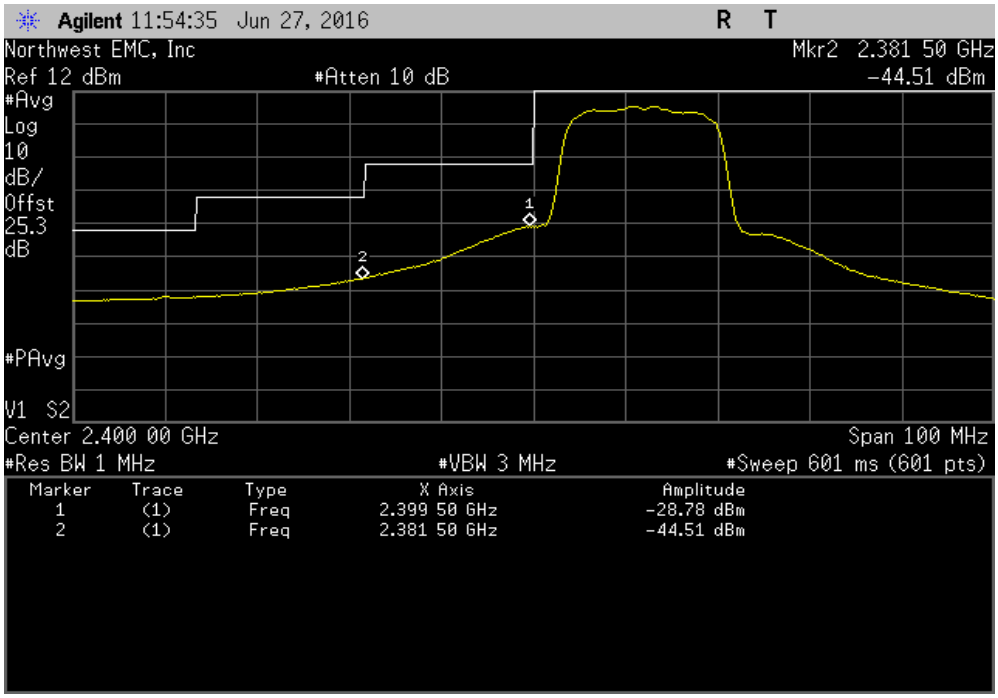
Normal Temperature Conditions, 802.11(g) 6 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-28.2	-10	-44.07	-20	Pass



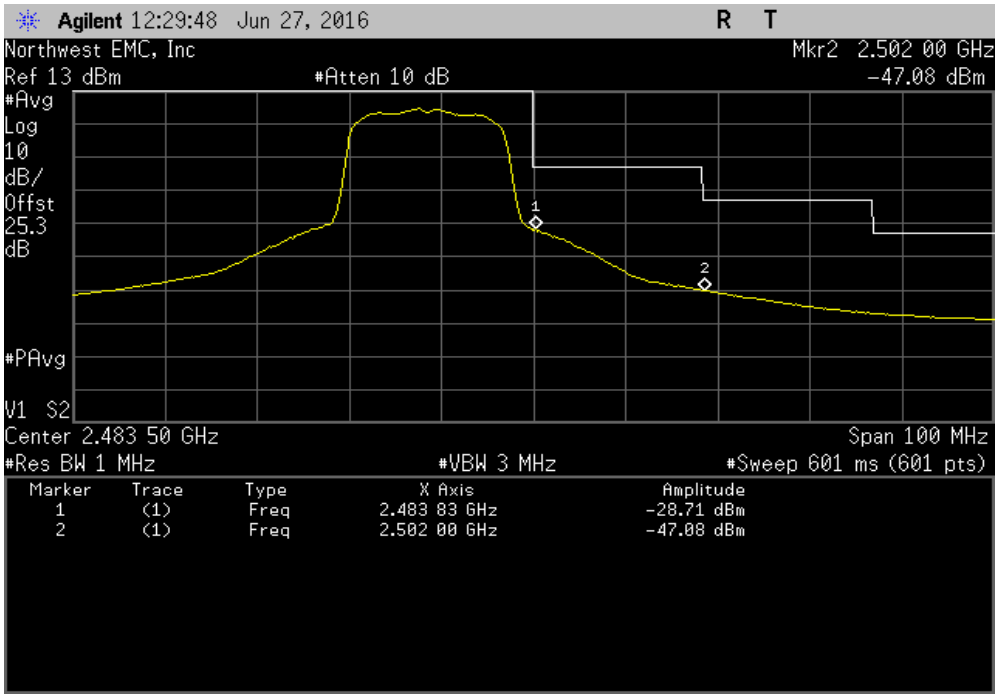
Normal Temperature Conditions, 802.11(g) 6 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-29.1	-10	-45.07	-20	Pass



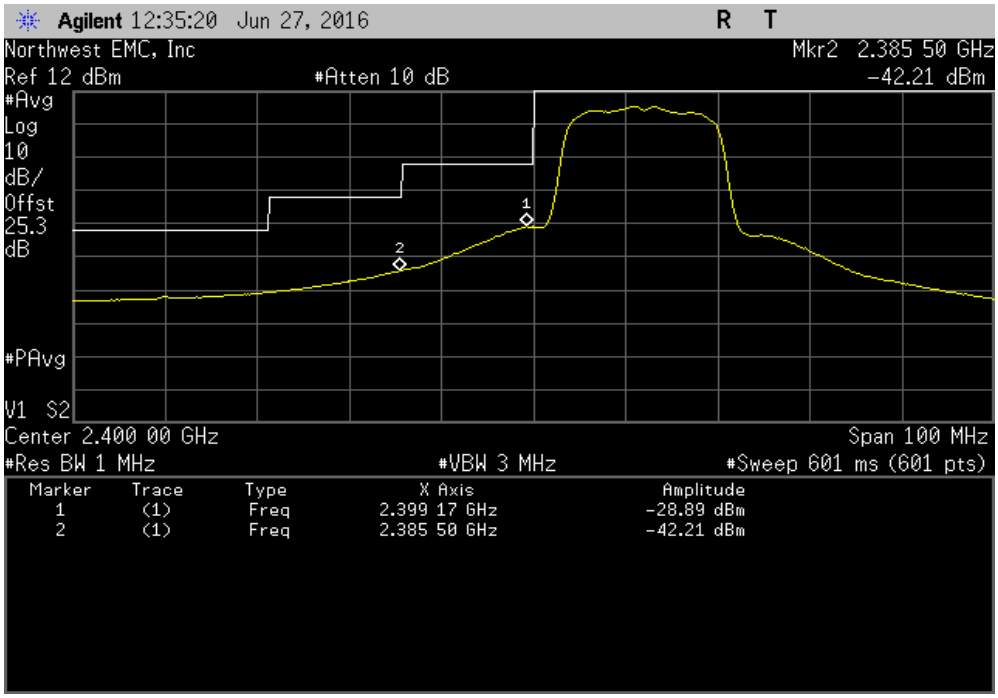
Normal Temperature Conditions, 802.11(g) 36 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-28.78	-10	-44.51	-20	Pass



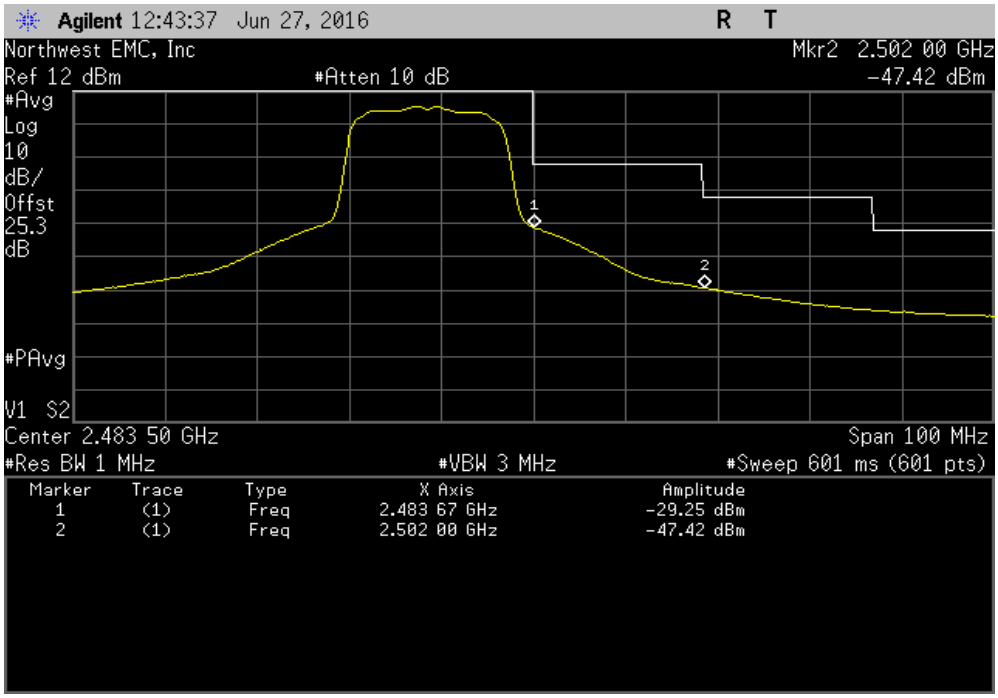
Normal Temperature Conditions, 802.11(g) 36 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-28.71	-10	-47.08	-20	Pass



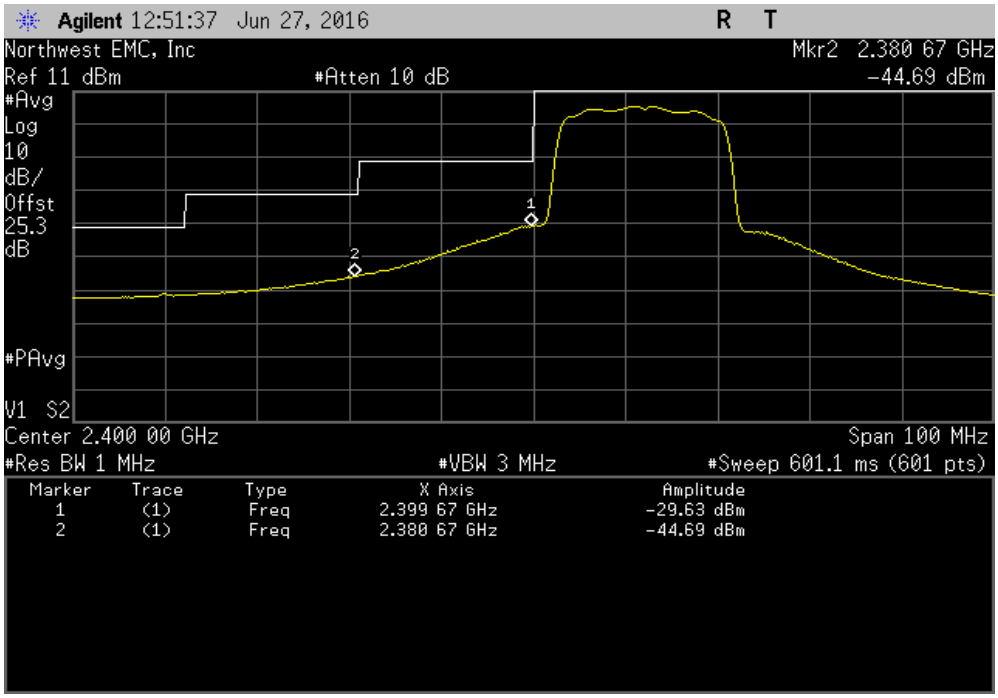
Normal Temperature Conditions, 802.11(g) 54 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-28.89	-10	-42.21	-20	Pass



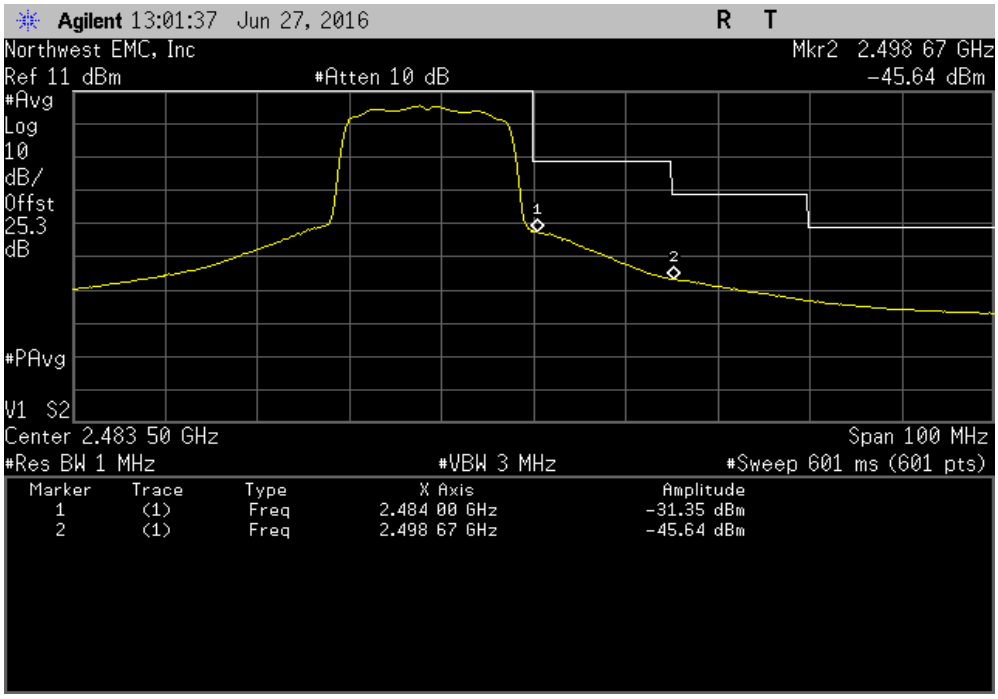
Normal Temperature Conditions, 802.11(g) 54 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-29.25	-10	-47.42	-20	Pass



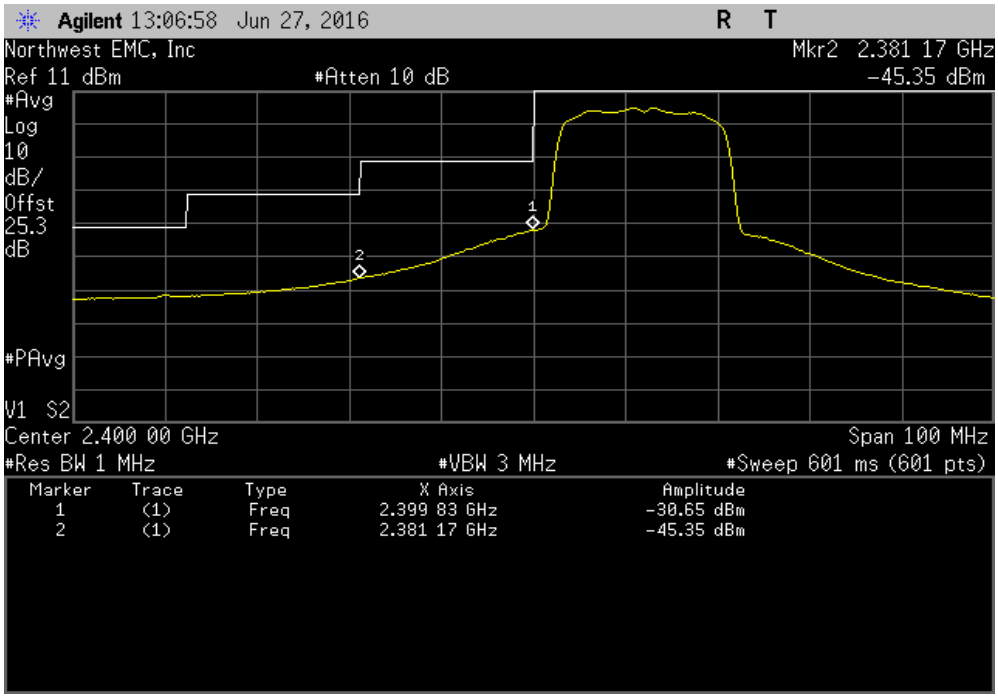
Normal Temperature Conditions, 802.11(n) MCS0, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-29.63	-10	-44.69	-20	Pass



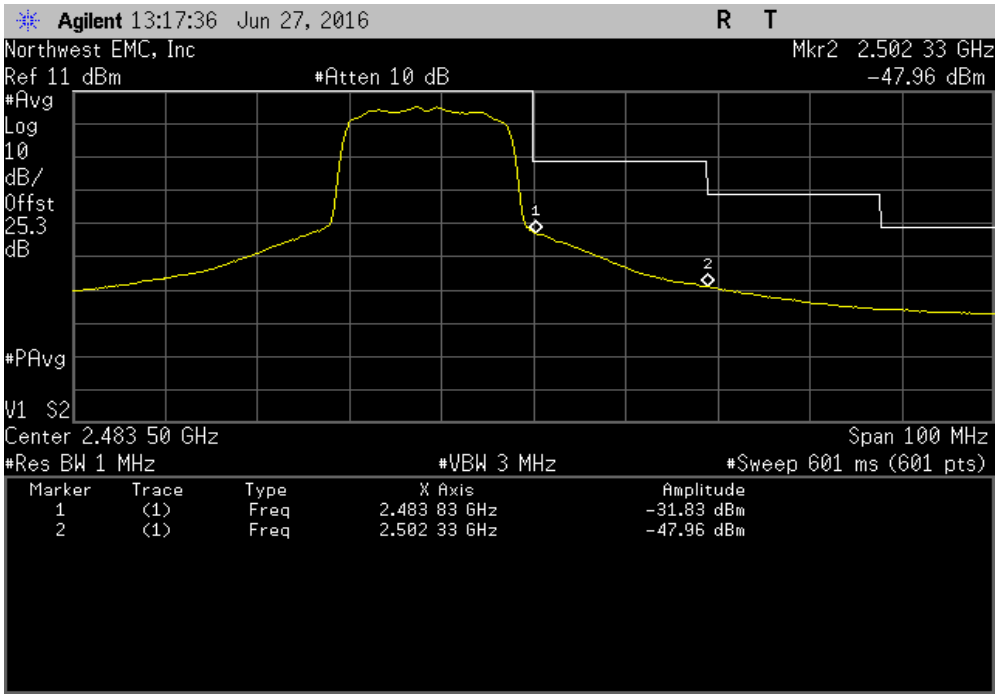
Normal Temperature Conditions, 802.11(n) MCS0, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-31.35	-10	-45.64	-20	Pass



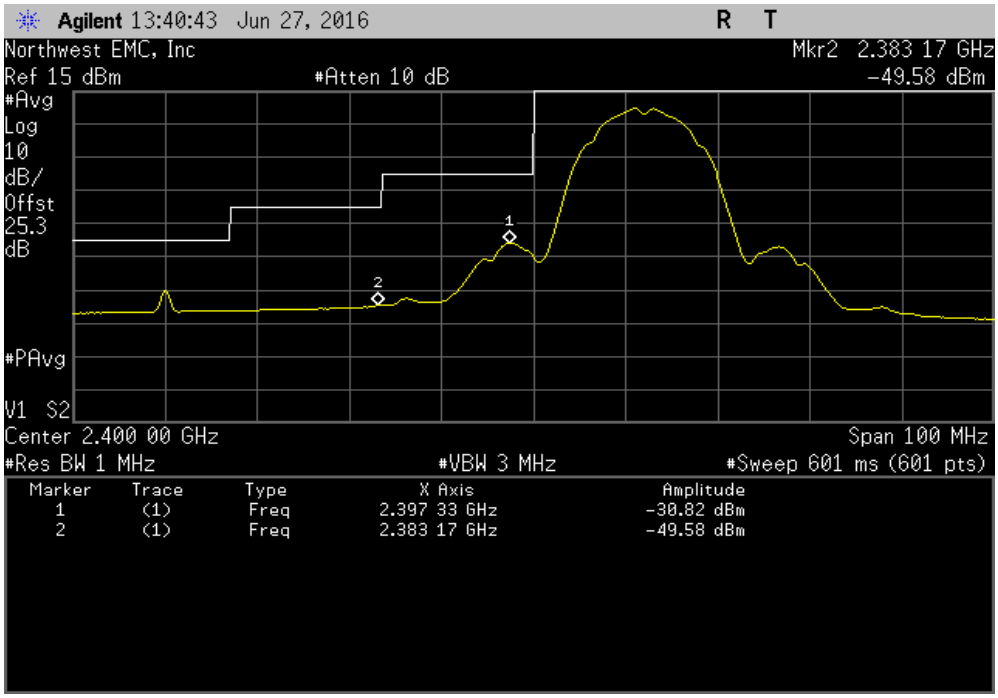
Normal Temperature Conditions, 802.11(n) MCS7, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-30.65	-10	-45.35	-20	Pass



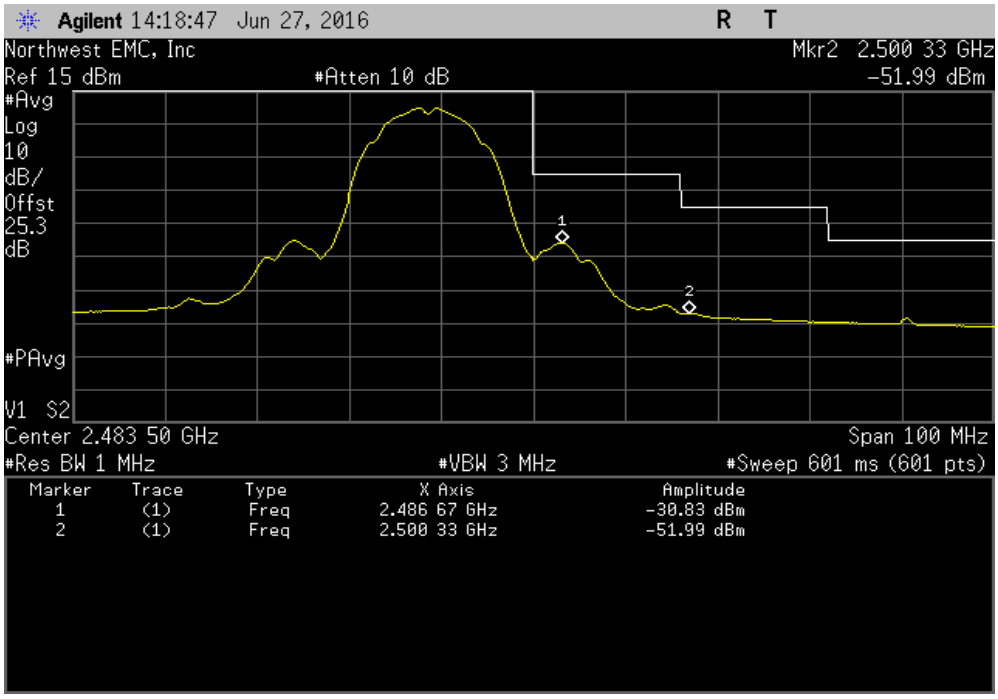
Normal Temperature Conditions, 802.11(n) MCS7, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-31.83	-10	-47.96	-20	Pass



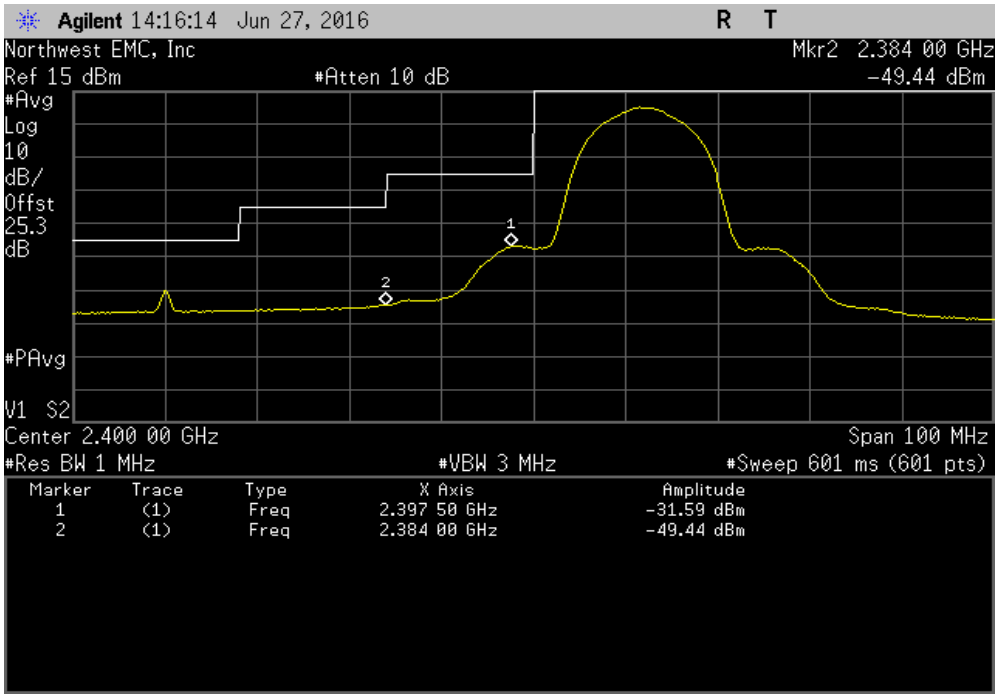
Extreme Temperature, +85°C, 802.11(b) 1 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-30.82	-10	-49.58	-20	Pass



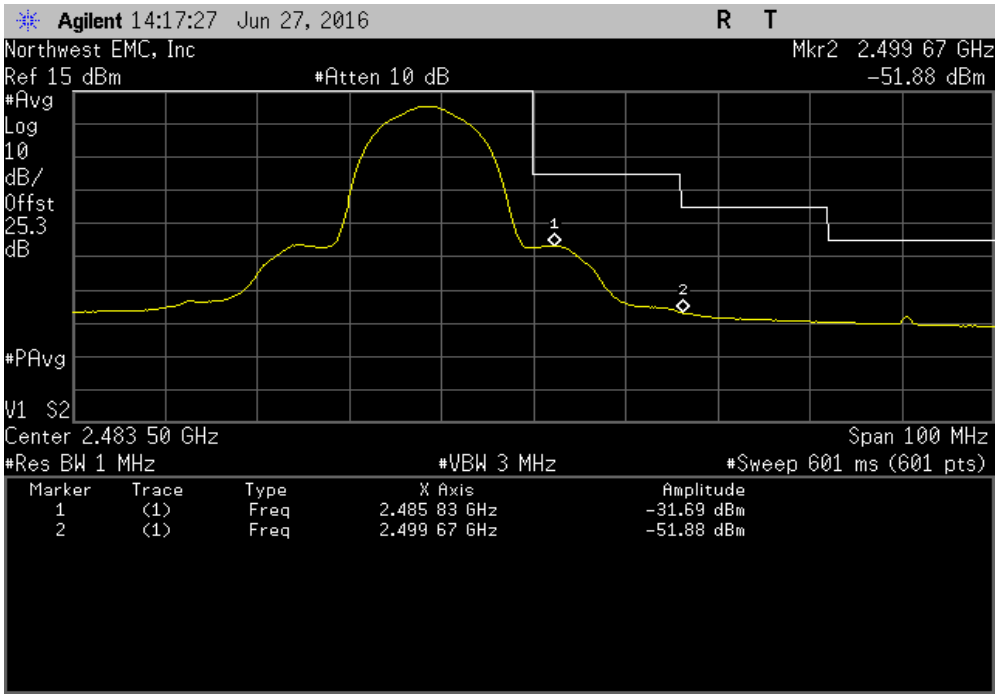
Extreme Temperature, +85°C, 802.11(b) 1 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-30.83	-10	-51.99	-20	Pass



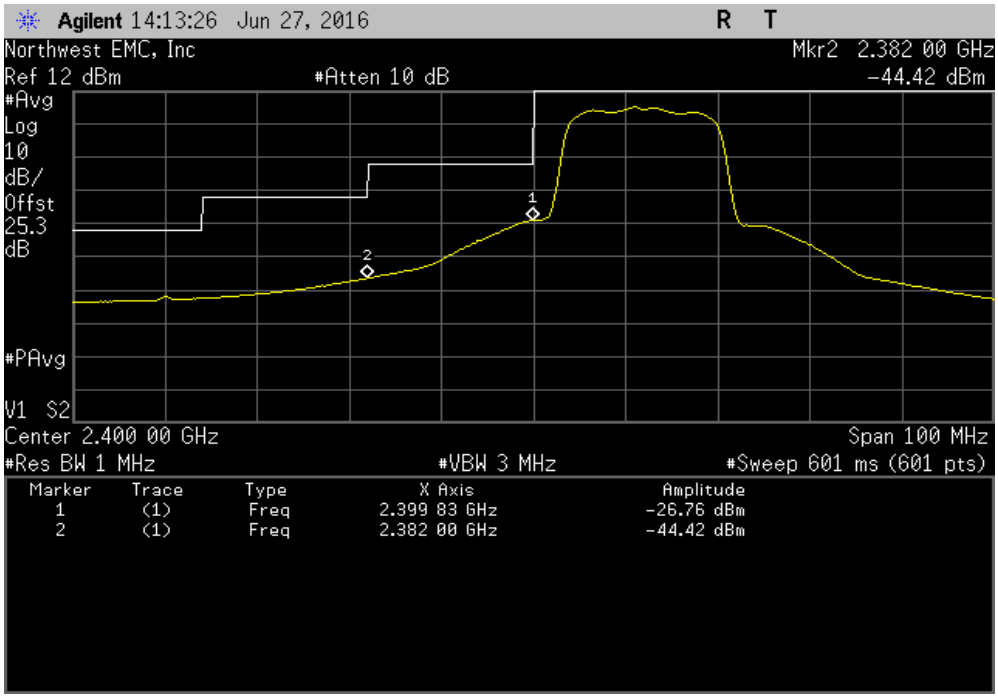
Extreme Temperature, +85°C, 802.11(b) 11 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-31.59	-10	-49.44	-20	Pass



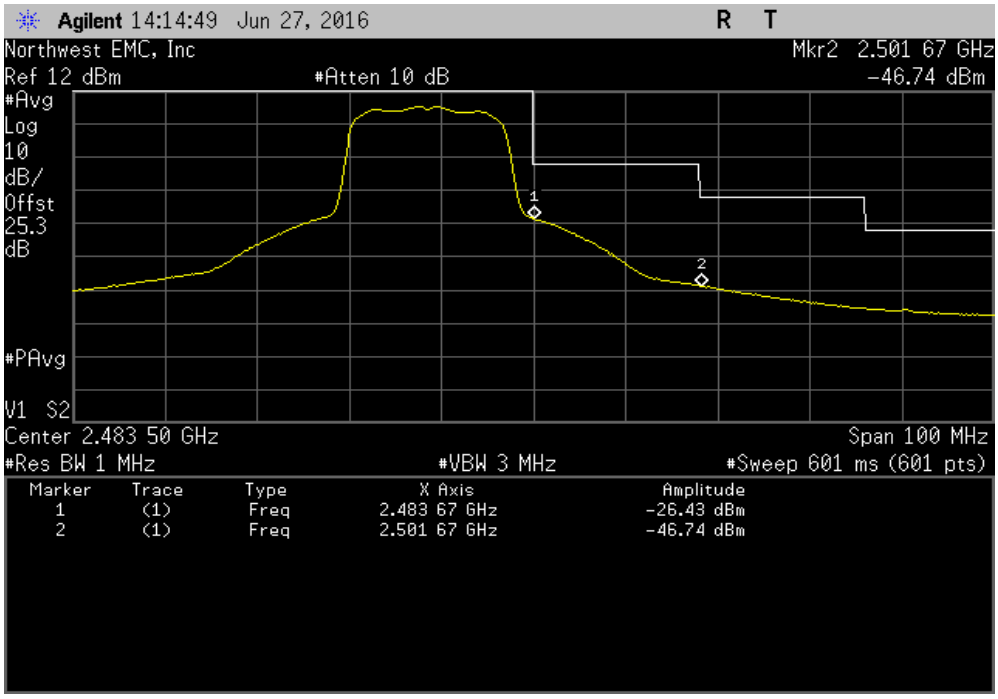
Extreme Temperature, +85°C, 802.11(b) 11 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-31.69	-10	-51.88	-20	Pass



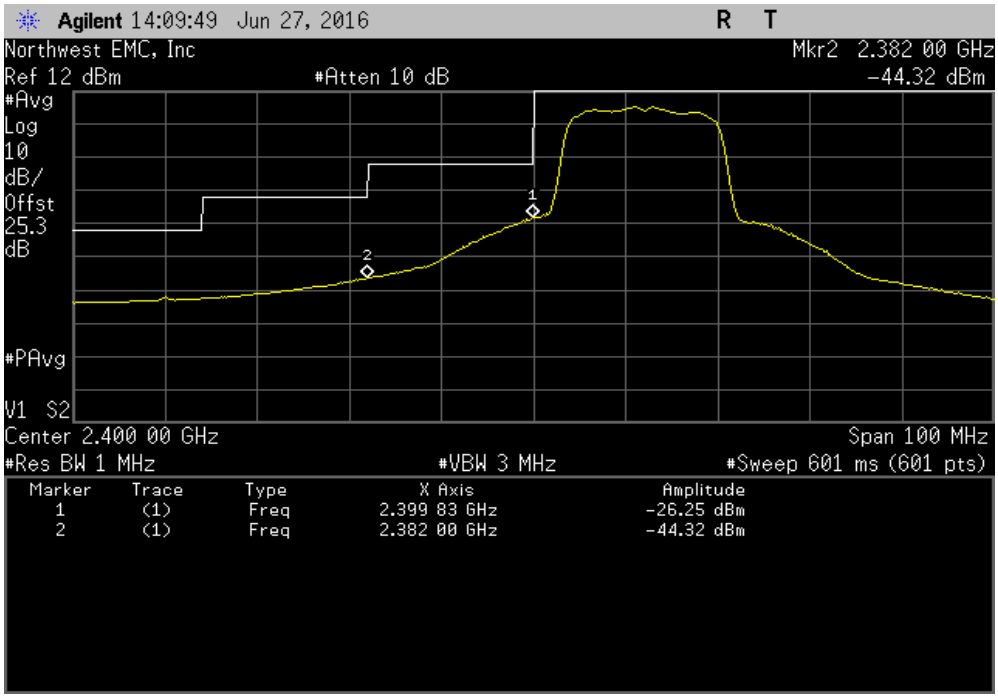
Extreme Temperature, +85°C, 802.11(g) 6 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-26.76	-10	-44.42	-20	Pass



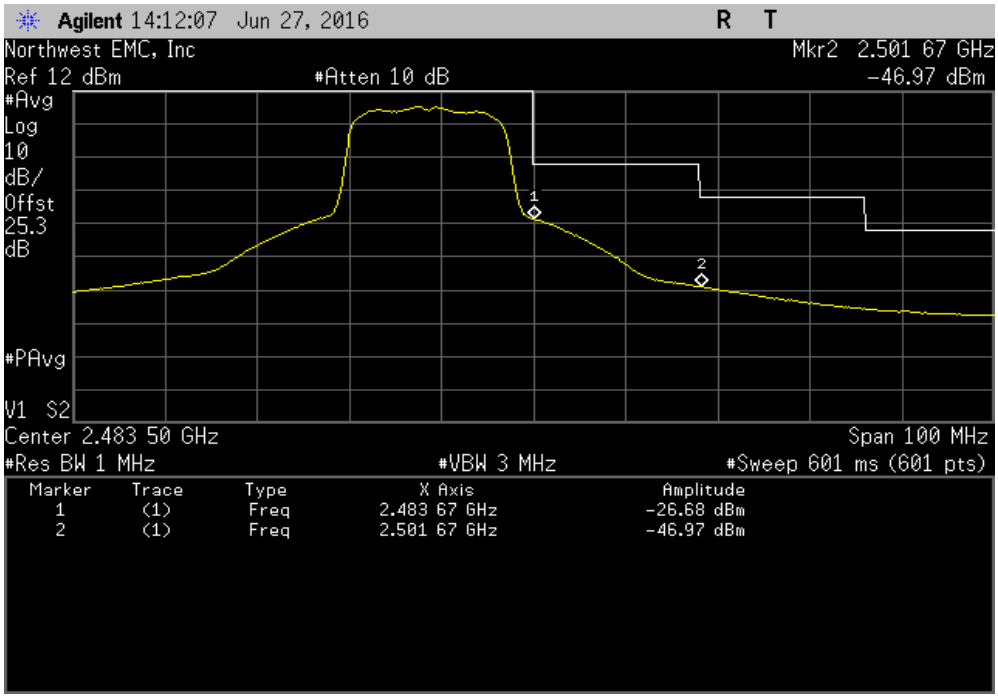
Extreme Temperature, +85°C, 802.11(g) 6 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-26.43	-10	-46.74	-20	Pass



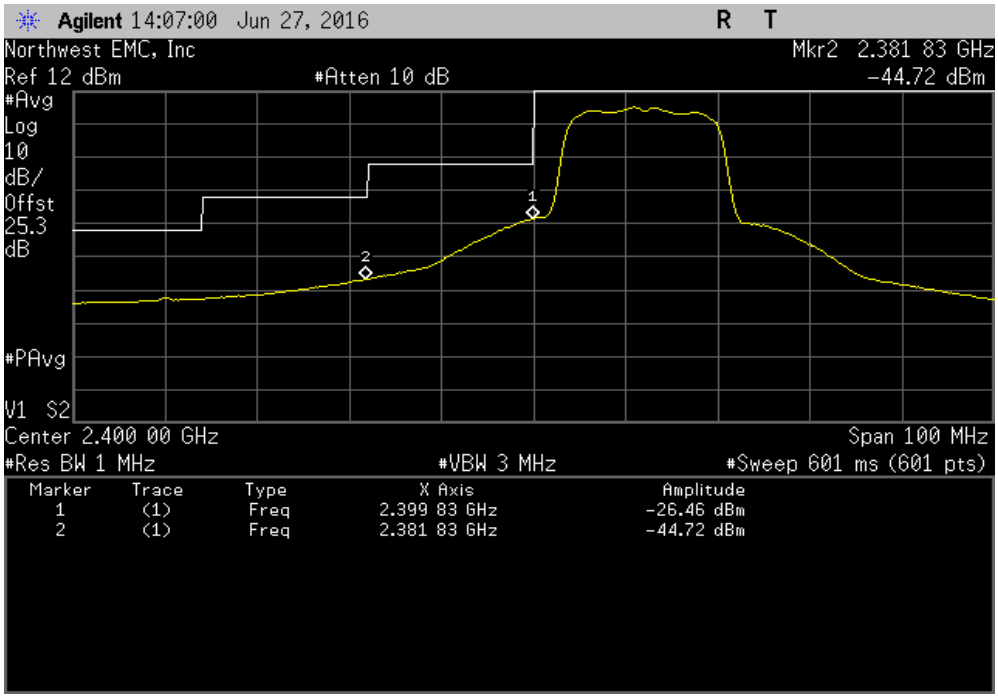
Extreme Temperature, +85°C, 802.11(g) 36 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-26.25	-10	-44.32	-20	Pass



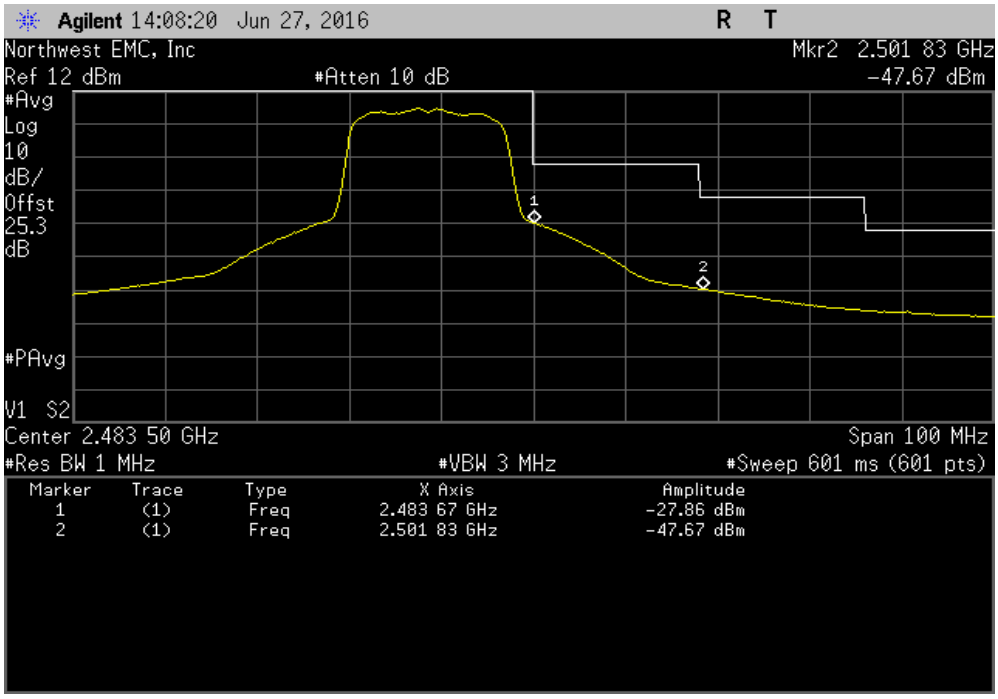
Extreme Temperature, +85°C, 802.11(g) 36 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-26.68	-10	-46.97	-20	Pass



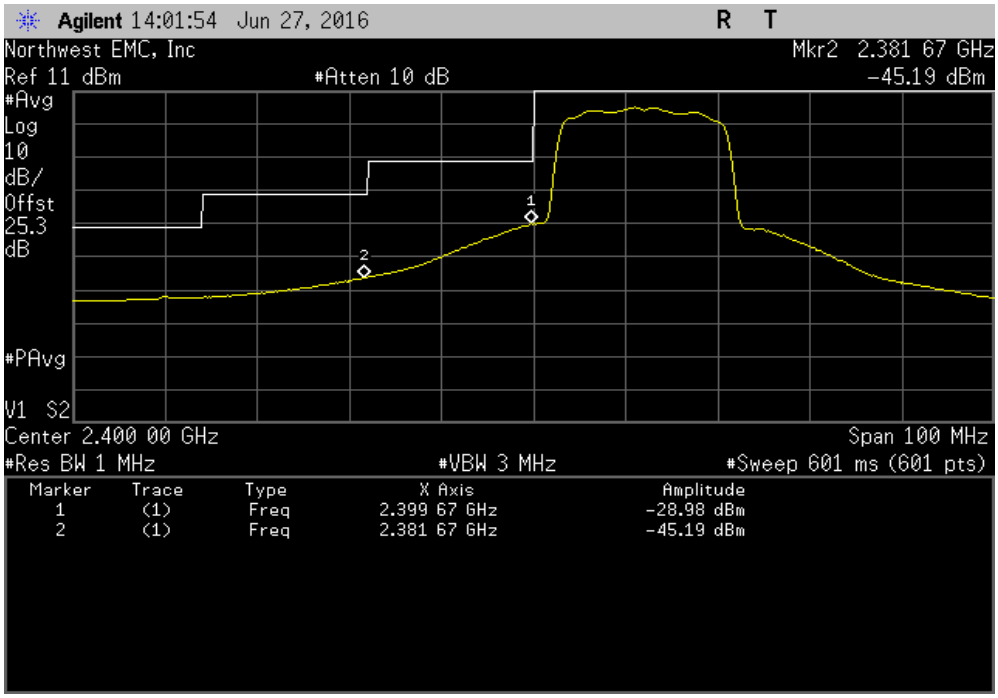
Extreme Temperature, +85°C, 802.11(g) 54 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-26.46	-10	-44.72	-20	Pass



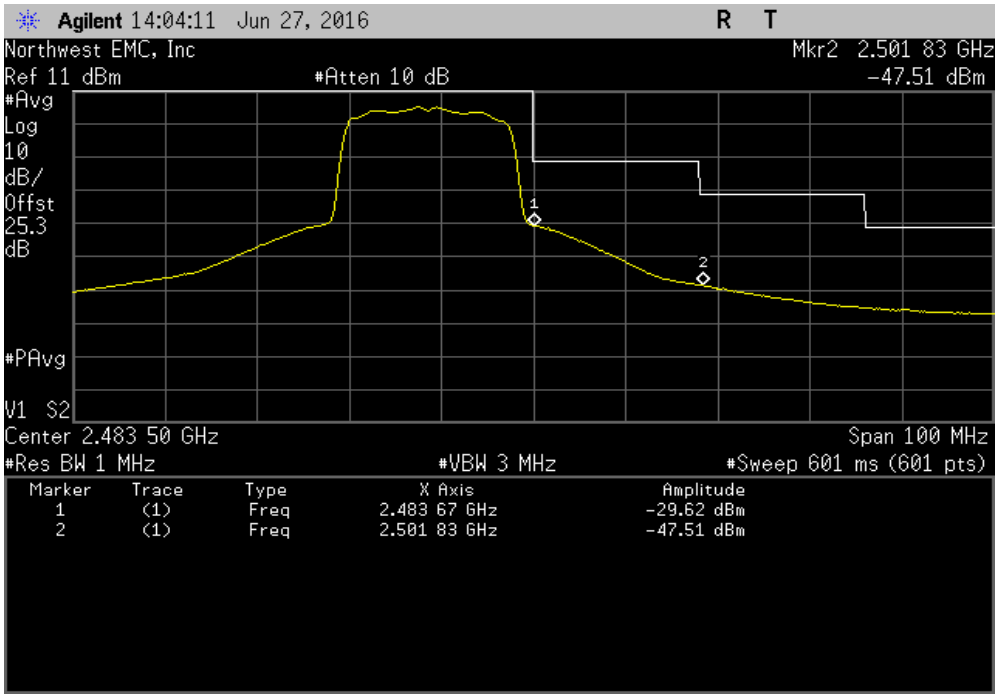
Extreme Temperature, +85°C, 802.11(g) 54 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-27.86	-10	-47.68	-20	Pass



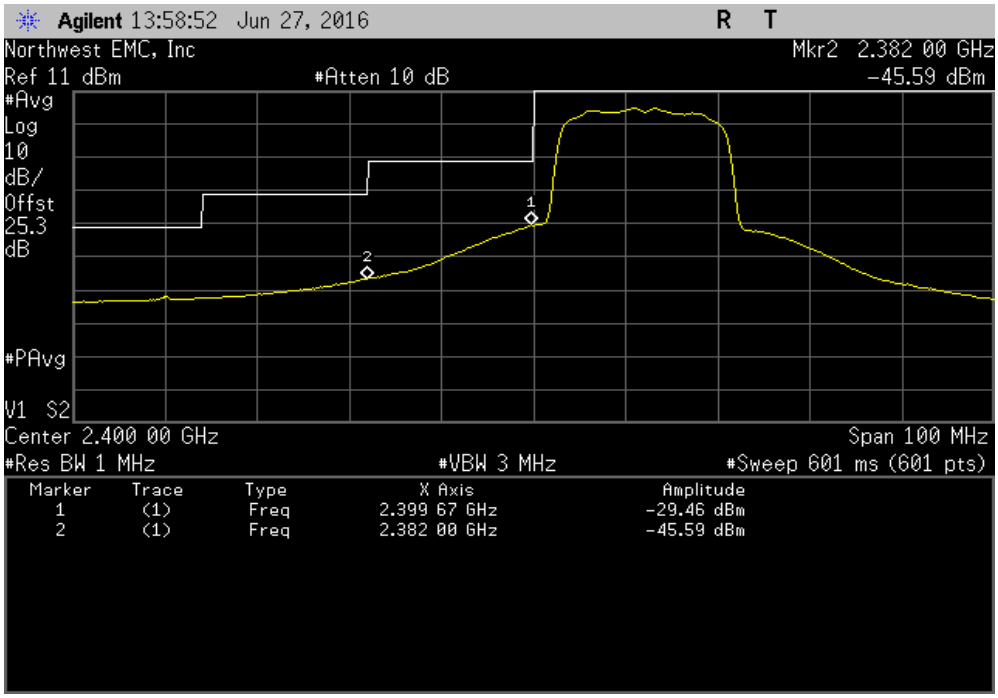
Extreme Temperature, +85°C, 802.11(n) MCS0, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-28.98	-10	-45.19	-20	Pass



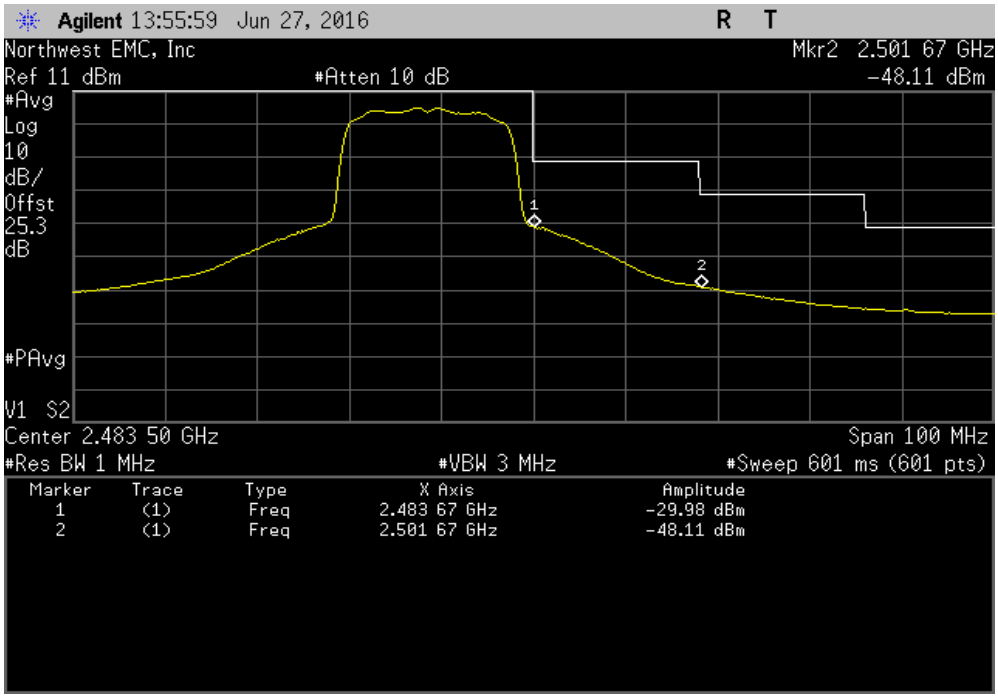
Extreme Temperature, +85°C, 802.11(n) MCS0, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-29.62	-10	-47.51	-20	Pass



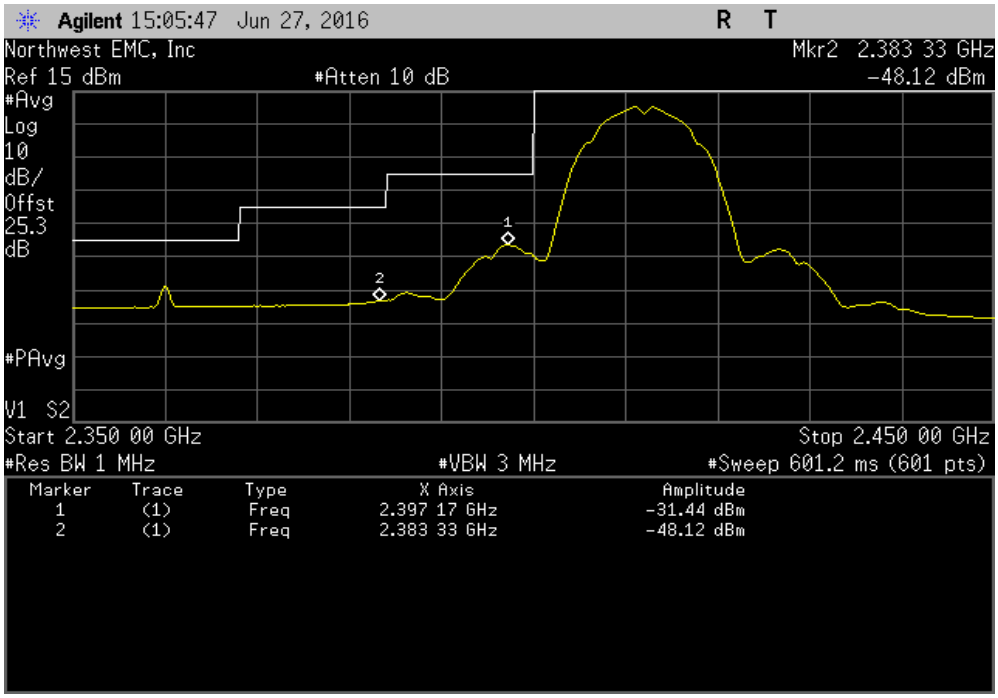
Extreme Temperature, +85°C, 802.11(n) MCS7, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-29.46	-10	-45.59	-20	Pass



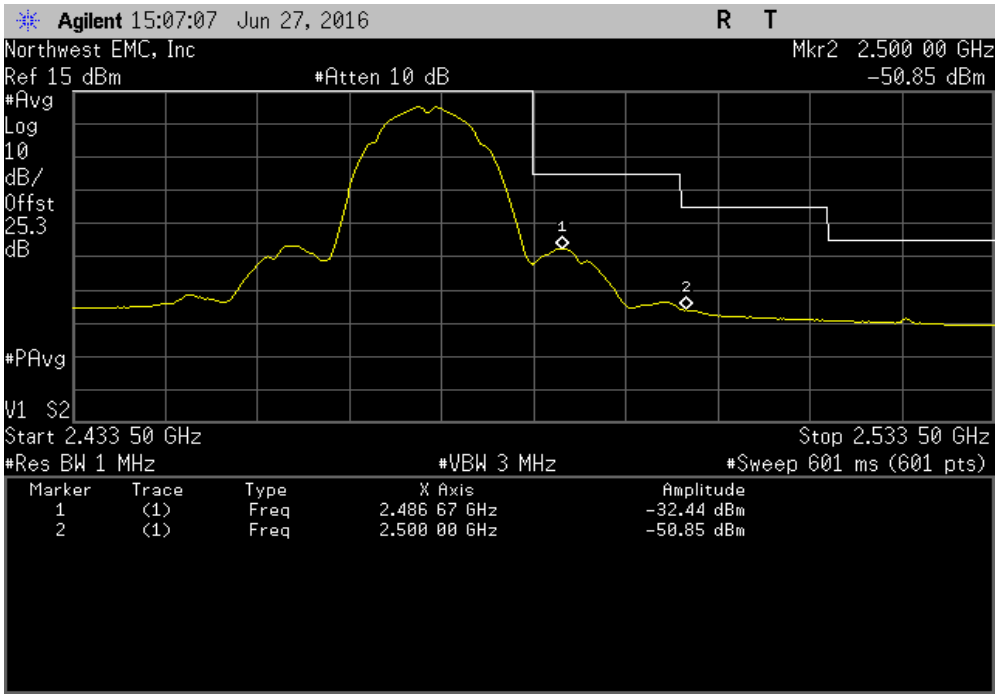
Extreme Temperature, +85°C, 802.11(n) MCS7, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-29.98	-10	-48.11	-20	Pass



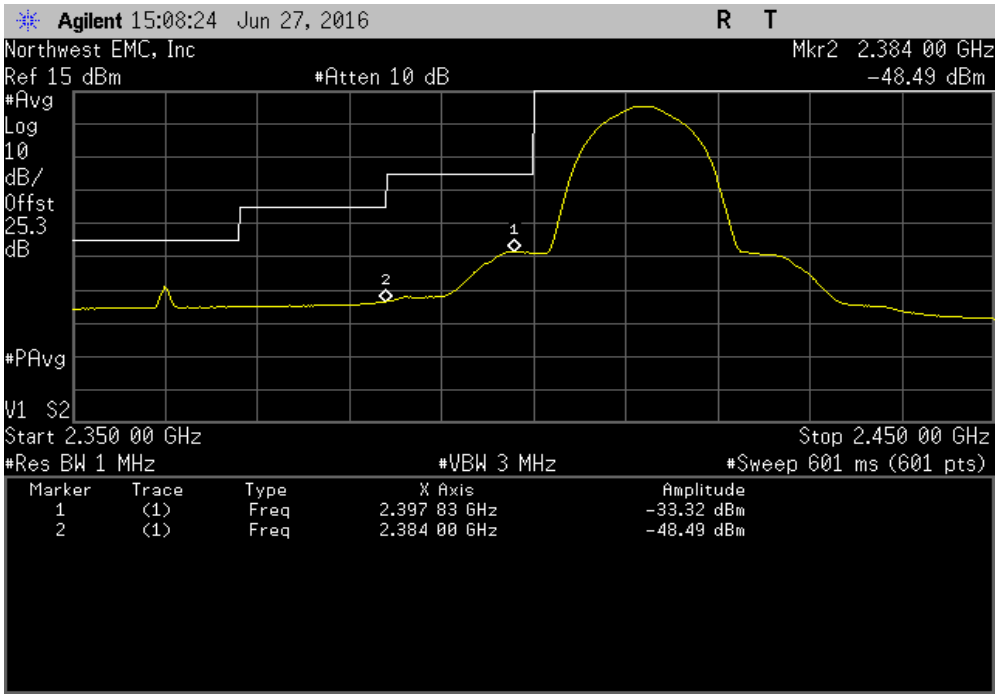
Extreme Temperature, -40°C, 802.11(b) 1 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-31.44	-10	-48.12	-20	Pass



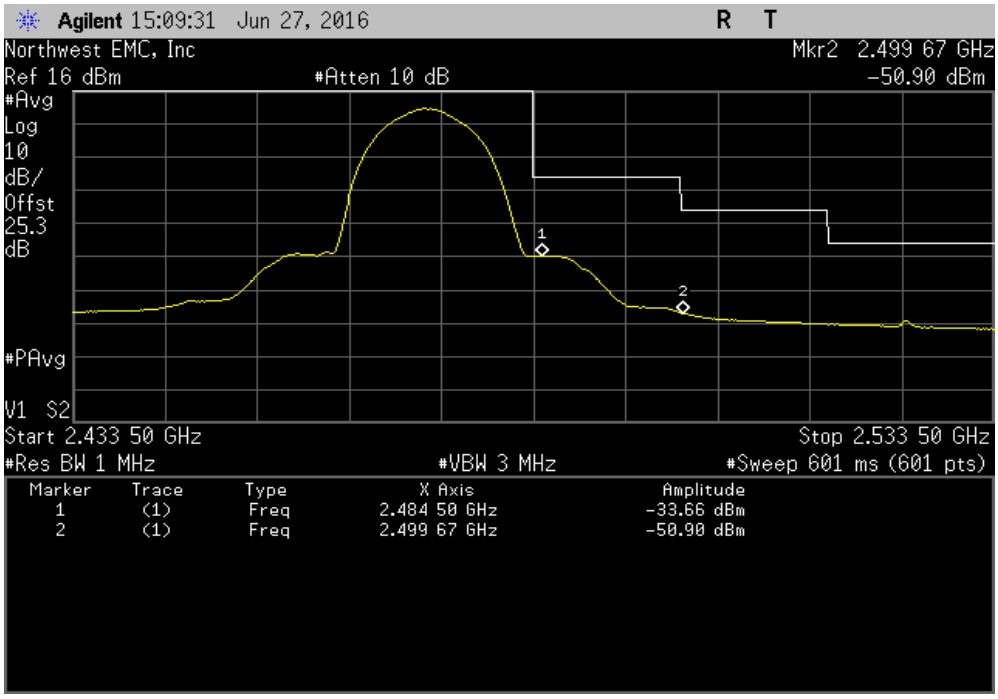
Extreme Temperature, -40°C, 802.11(b) 1 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-32.44	-10	-50.85	-20	Pass



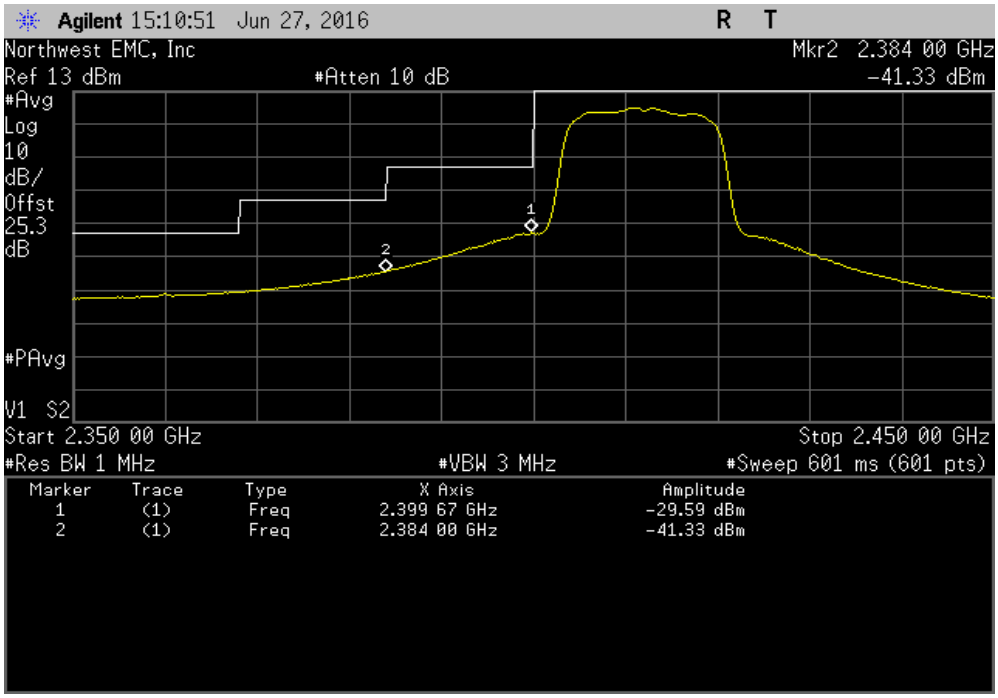
Extreme Temperature, -40°C, 802.11(b) 11 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-33.32	-10	-48.49	-20	Pass



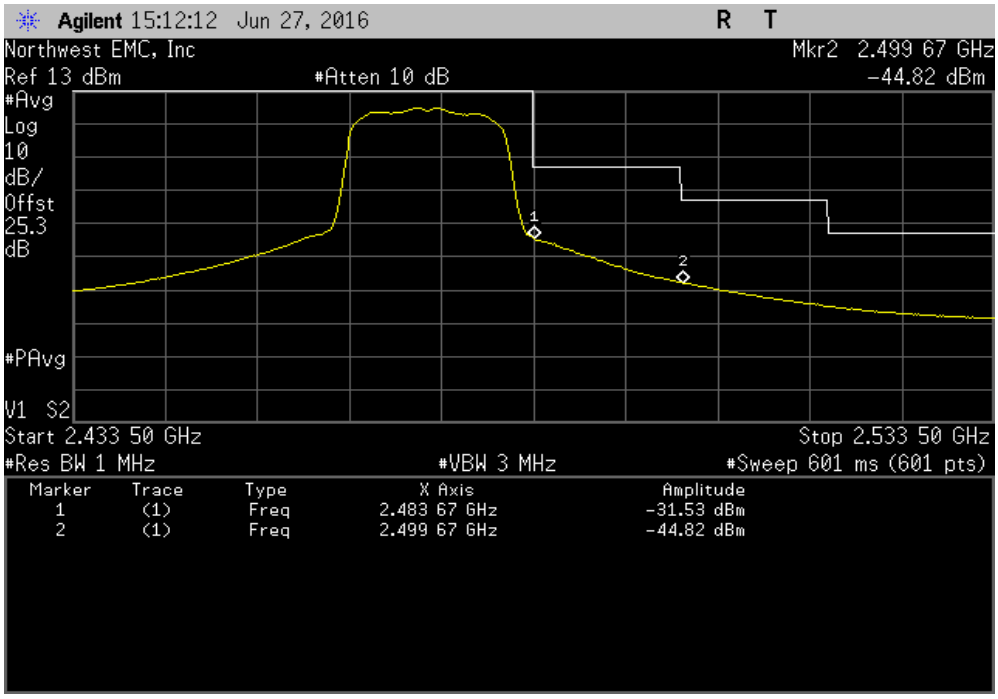
Extreme Temperature, -40°C, 802.11(b) 11 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-33.66	-10	-50.9	-20	Pass



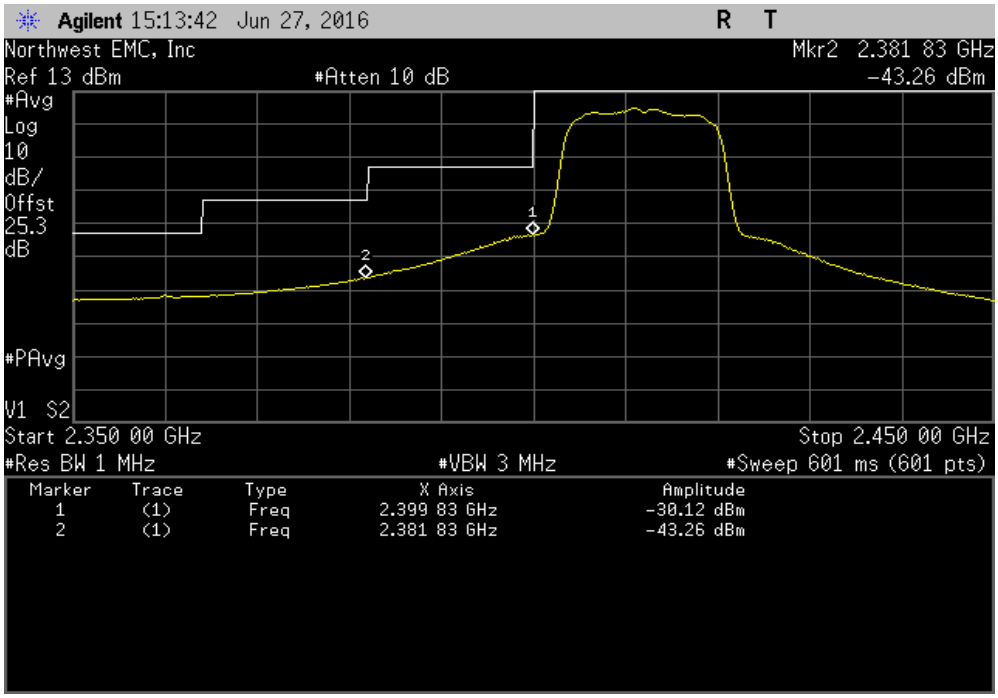
Extreme Temperature, -40°C, 802.11(g) 6 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-29.59	-10	-41.33	-20	Pass



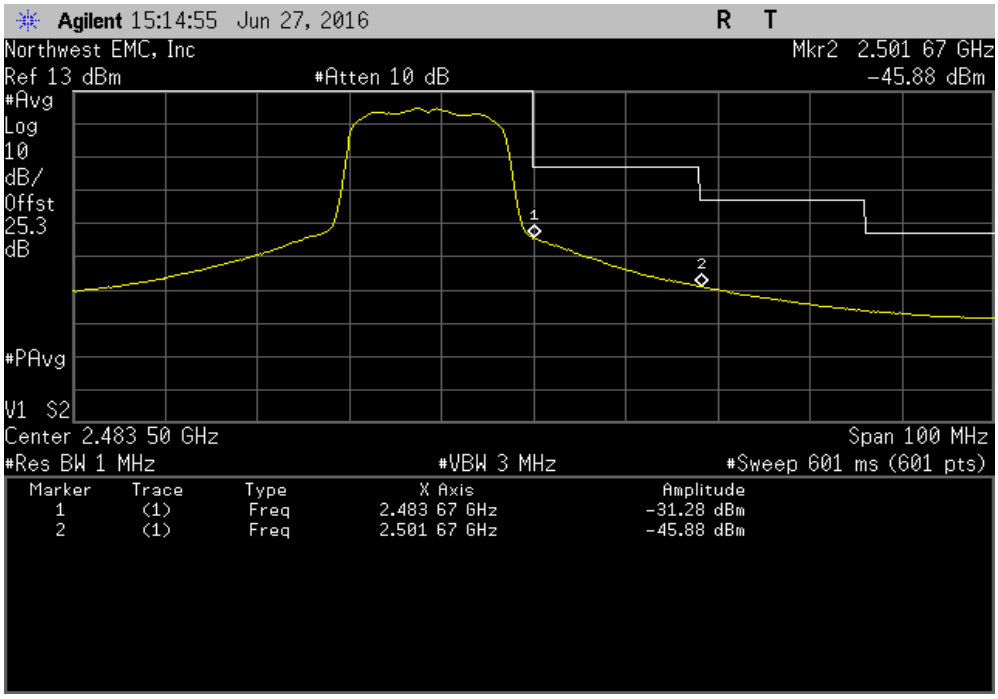
Extreme Temperature, -40°C, 802.11(g) 6 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-31.53	-10	-44.82	-20	Pass



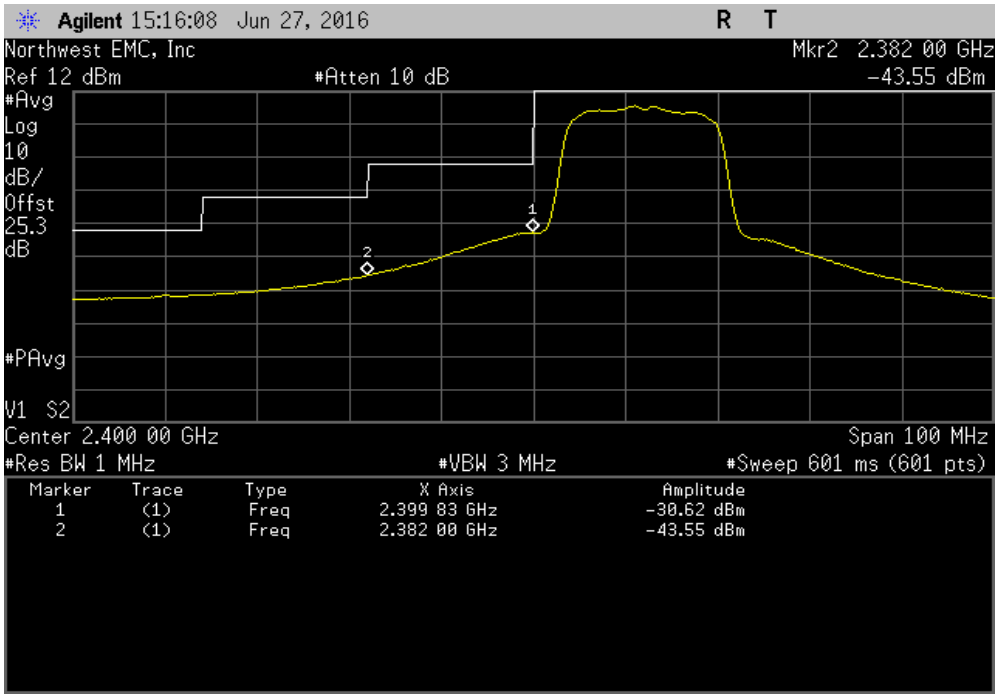
Extreme Temperature, -40°C, 802.11(g) 36 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-30.12	-10	-43.26	-20	Pass



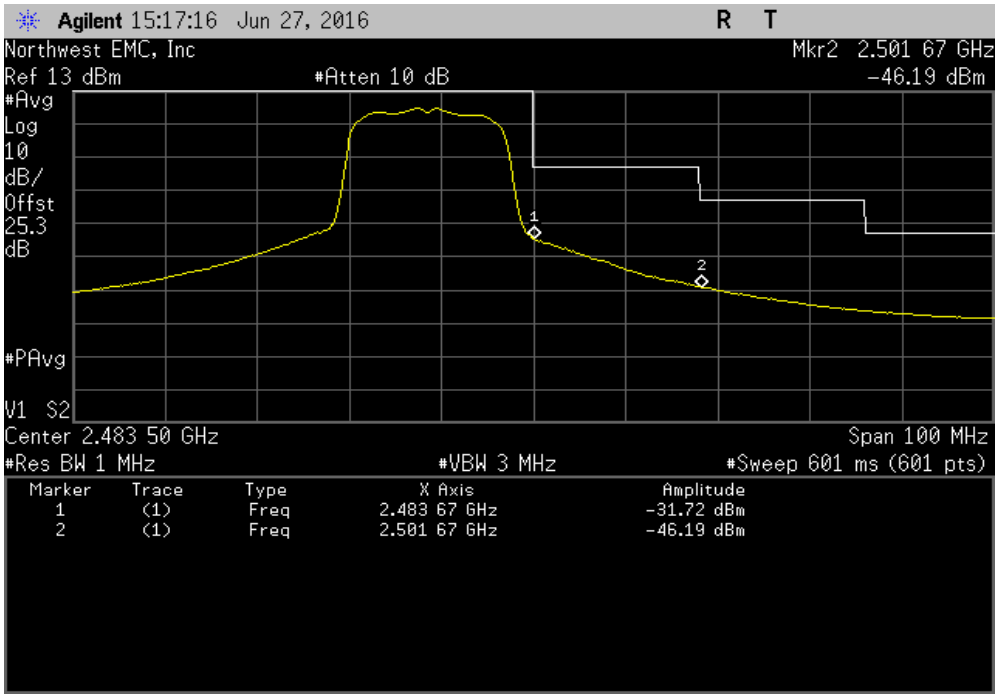
Extreme Temperature, -40°C, 802.11(g) 36 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-31.28	-10	-45.88	-20	Pass



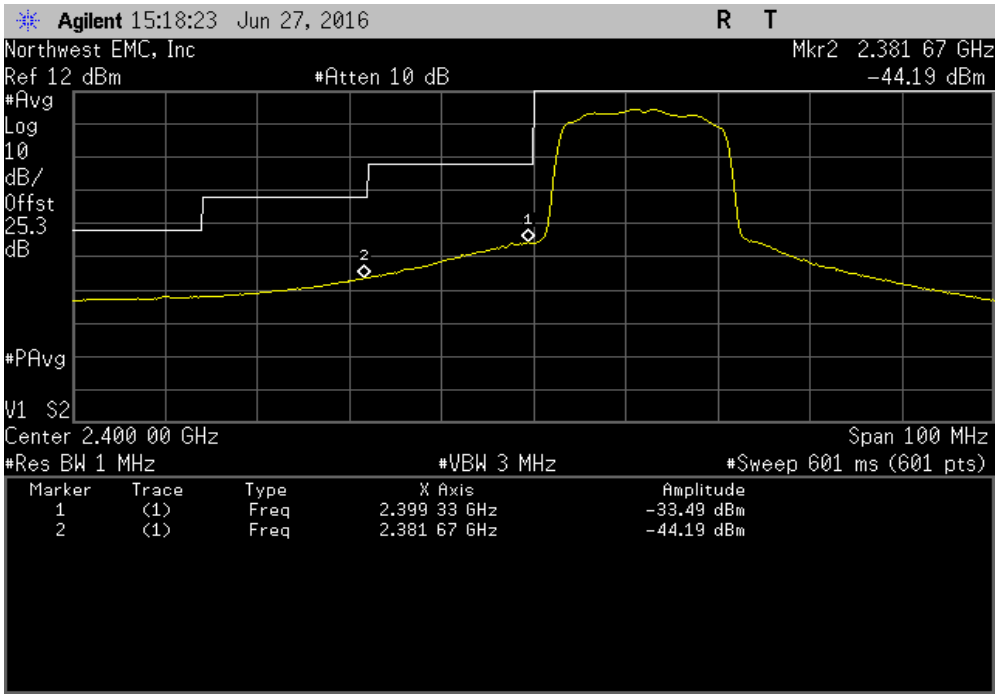
Extreme Temperature, -40°C, 802.11(g) 54 Mbps, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-30.62	-10	-43.55	-20	Pass



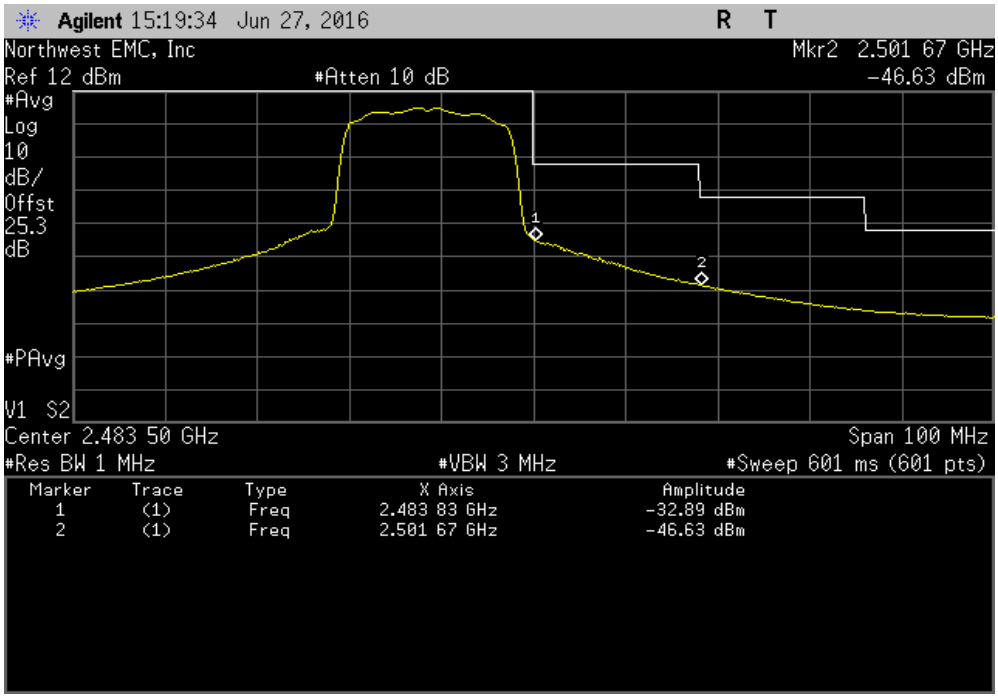
Extreme Temperature, -40°C, 802.11(g) 54 Mbps, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-31.72	-10	-46.19	-20	Pass



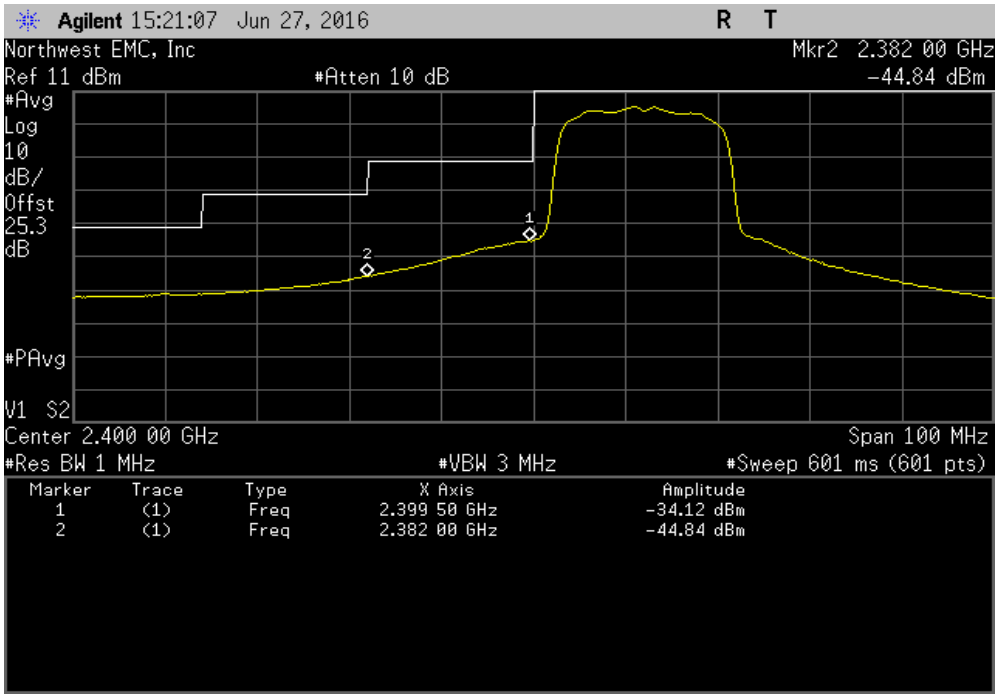
Extreme Temperature, -40°C, 802.11(n) MCS0, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-33.49	-10	-44.2	-20	Pass



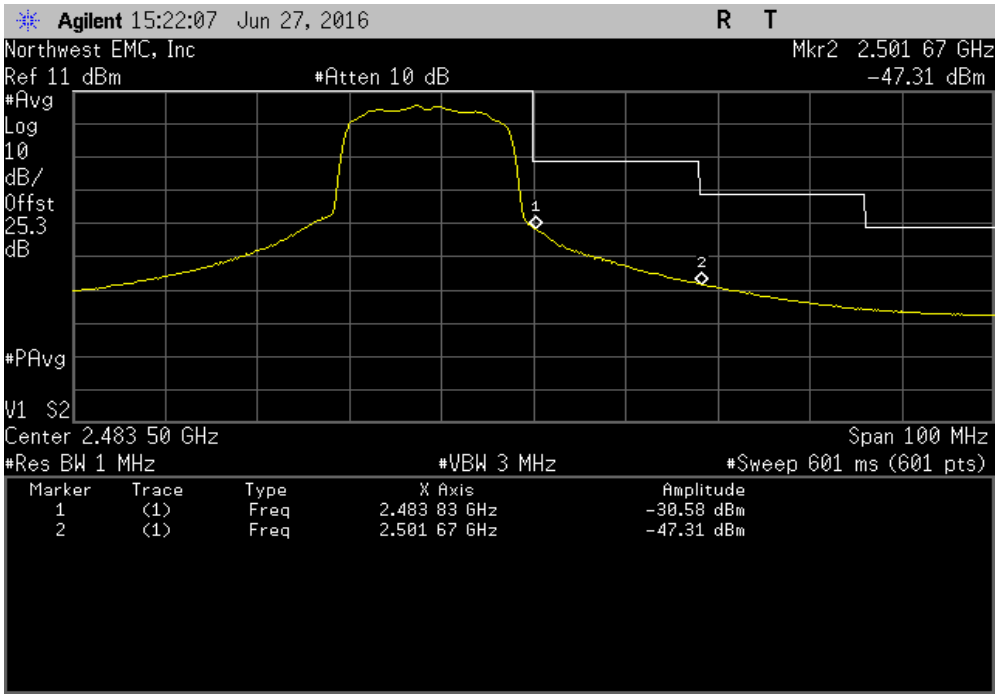
Extreme Temperature, -40°C, 802.11(n) MCS0, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-32.89	-10	-46.64	-20	Pass



Extreme Temperature, -40°C, 802.11(n) MCS7, Low Channel, 1, 2412 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-34.12	-10	-44.84	-20	Pass



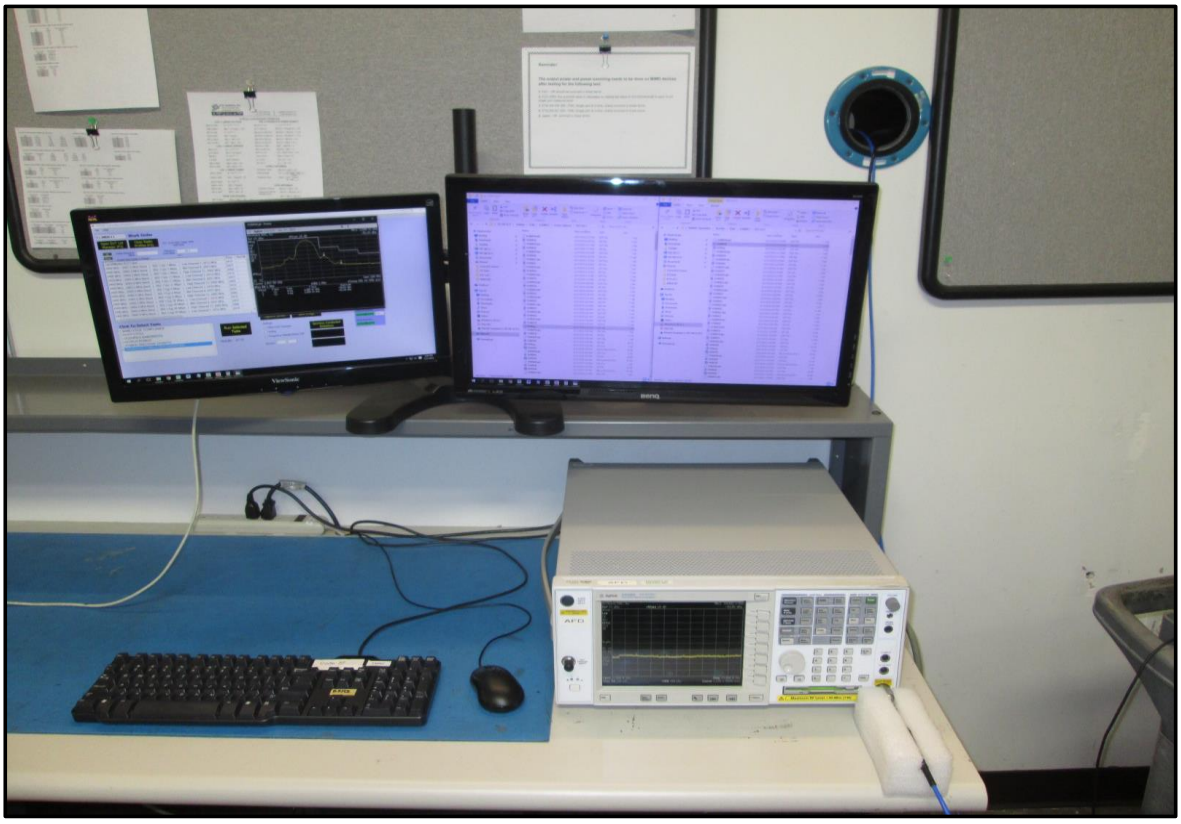
Extreme Temperature, -40°C, 802.11(n) MCS7, High Channel, 13, 2472 MHz						
		Value (dBm/MHz)	Limit (dBm/MHz)	Value (dBm/MHz)	Limit (dBm/MHz)	Result
		-30.58	-10	-47.31	-20	Pass

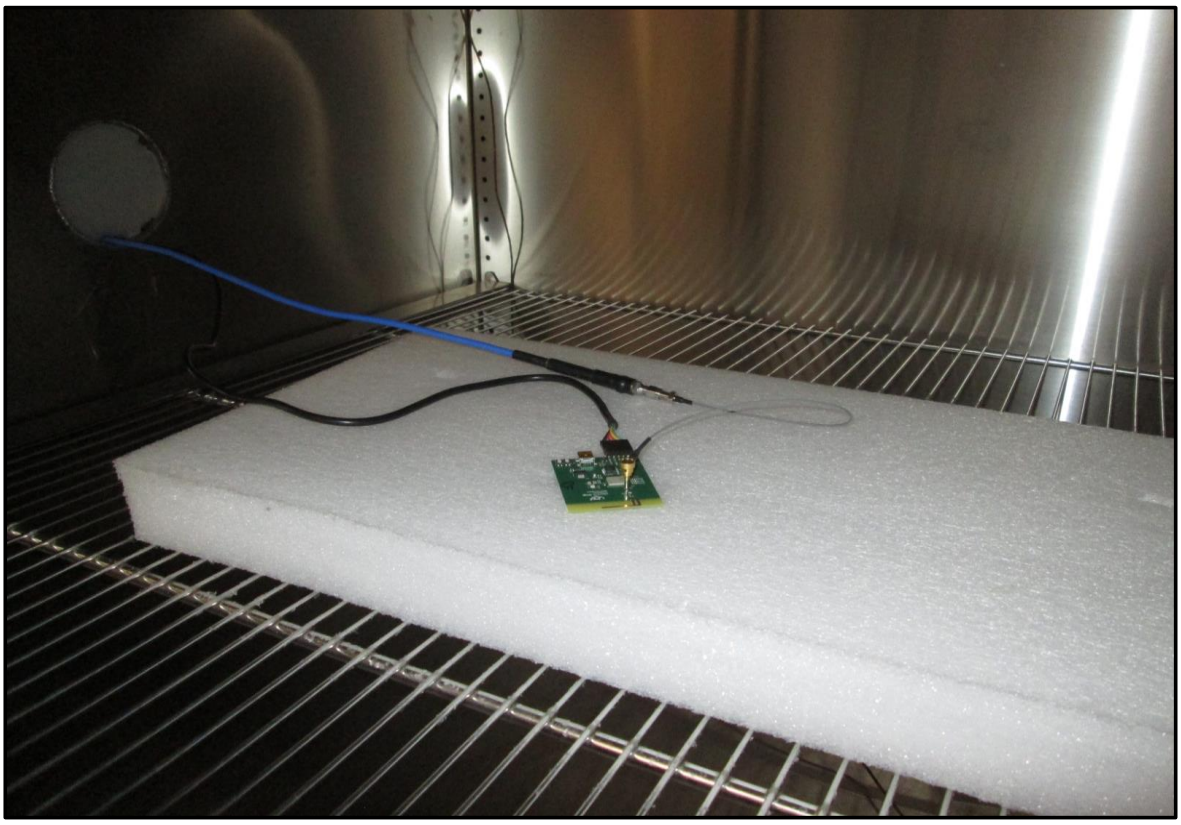


TRANSMITTER UNWANTED EMISSIONS IN THE OOB DOMAIN

NORTHWEST EMC

XMit 2016.05.06

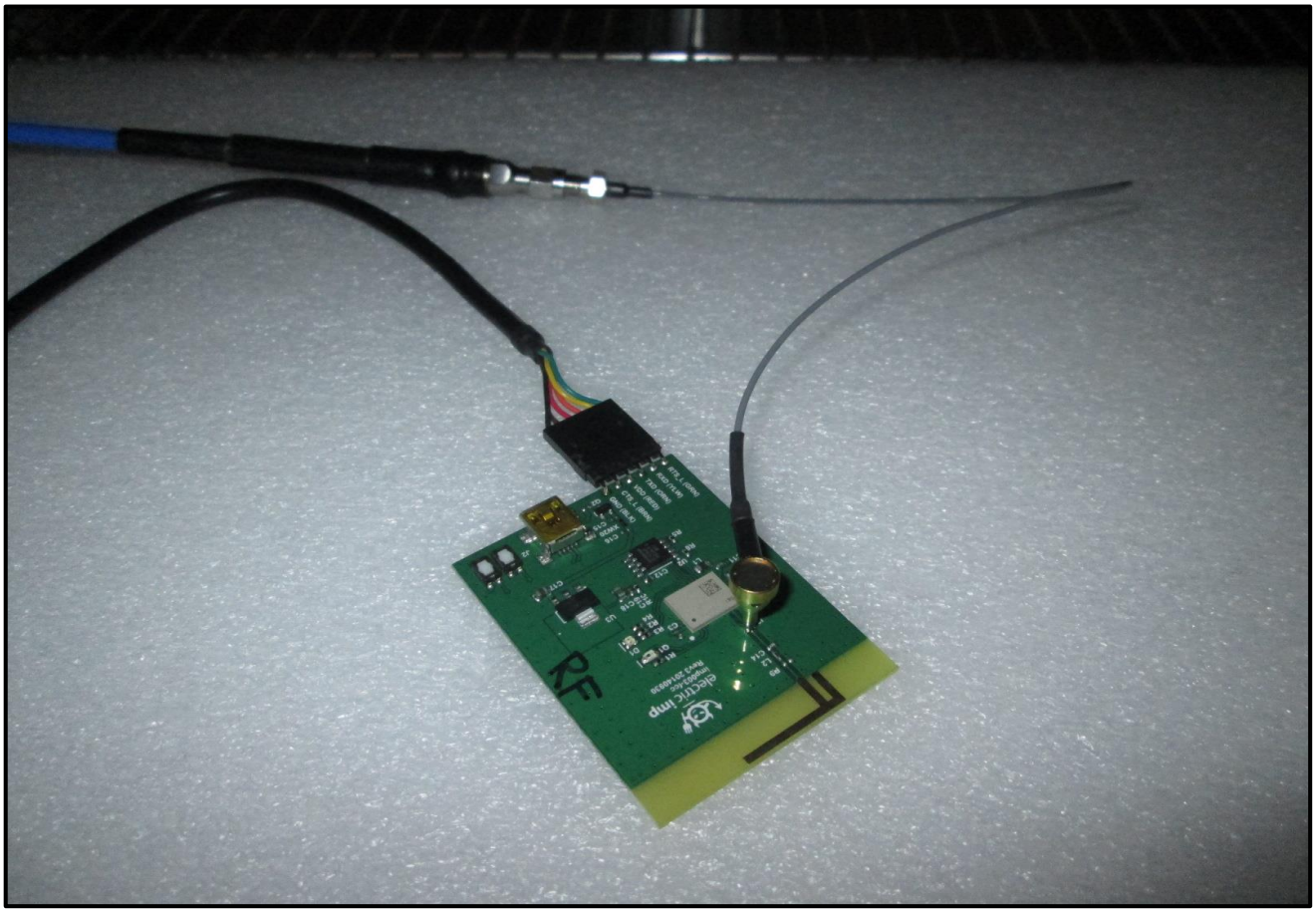




TRANSMITTER UNWANTED EMISSIONS IN THE OOB DOMAIN

NORTHWEST EMC

XMit 2016.05.06



TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

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 at Low Channel 1 - 2412MHz & High Channel 13 - 2472MHz

POWER SETTINGS INVESTIGATED

5 VDC via USB

CONFIGURATIONS INVESTIGATED

ELIM0011 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	12750 MHz

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
Power Sensor	Agilent	E4412A	SQE	2/4/2016	12 mo
Meter - Power	Hewlett Packard	E4418A	SPA	2/4/2016	12 mo
Antenna - Double Ridge	EMCO	3115	AHE	NCR	0 mo
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	36 mo
Cable	Northwest EMC	8-18GHz RE Cables	OCO	8/26/2015	12 mo
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	8/26/2015	12 mo
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	3/3/2016	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFC	11/3/2015	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HFM	2/9/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-4D-010120-30-10P-1	AOP	8/26/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079	AOO	3/3/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOF	8/31/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOE	8/31/2015	12 mo
Antenna - Biconilog	EMCO	3142B	AXK	10/6/2014	24 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHT	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHR	NCR	0 mo
Antenna - Double Ridge	EMCO	3115	AHB	3/21/2016	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2/9/2016	12 mo

TEST DESCRIPTION

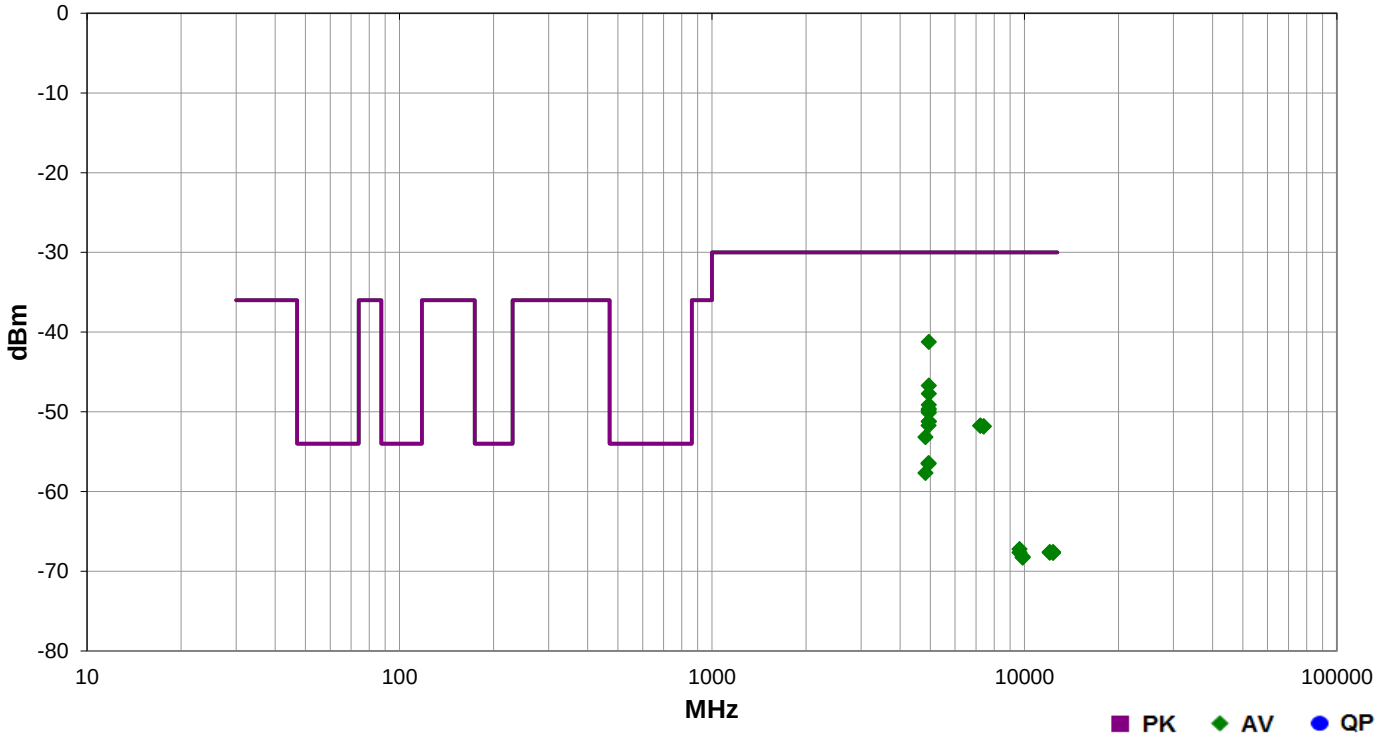
The EUT was operated in a worst-case configuration in transmit mode. The spectrum was scanned from 30 MHz to 12.75 GHz with the EUT set to low and high transmit frequencies. The EUT was transmitting at its maximum data rate. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height (1-4 meters) and polarization. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity. The amplitude and frequency of the highest emissions were noted. The EUT was then replaced with a ½ wave dipole that was successively tuned to each of the highest spurious emissions. A signal generator was connected to the dipole (horn antenna for frequencies above 1 GHz), and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded, and by factoring in the cable loss to the dipole antenna and its gain (dBi); the effective radiated power for each radiated spurious emission was determined.

TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

Work Order:	ELIM0011	**Date:**	06/28/16		
Project:	None	**Temperature:**	23.3 °C		
Job Site:	OC10	**Humidity:**	55.9% RH		
Serial Number:	Barcode:2000000534	**Barometric Pres.:**	1017 mbar	**Tested by:**	Johnny Candelas
EUT:	IMP0003				
Configuration:	3				
Customer:	Electric Imp, Inc.				
Attendees:	Hugo Fiennes				
EUT Power:	5 VDC via USB				
Operating Mode:	Transmitting at Low Channel 1 - 2412MHz & High Channel 13 - 2472MHz				
Deviations:	None				
Comments:	None				

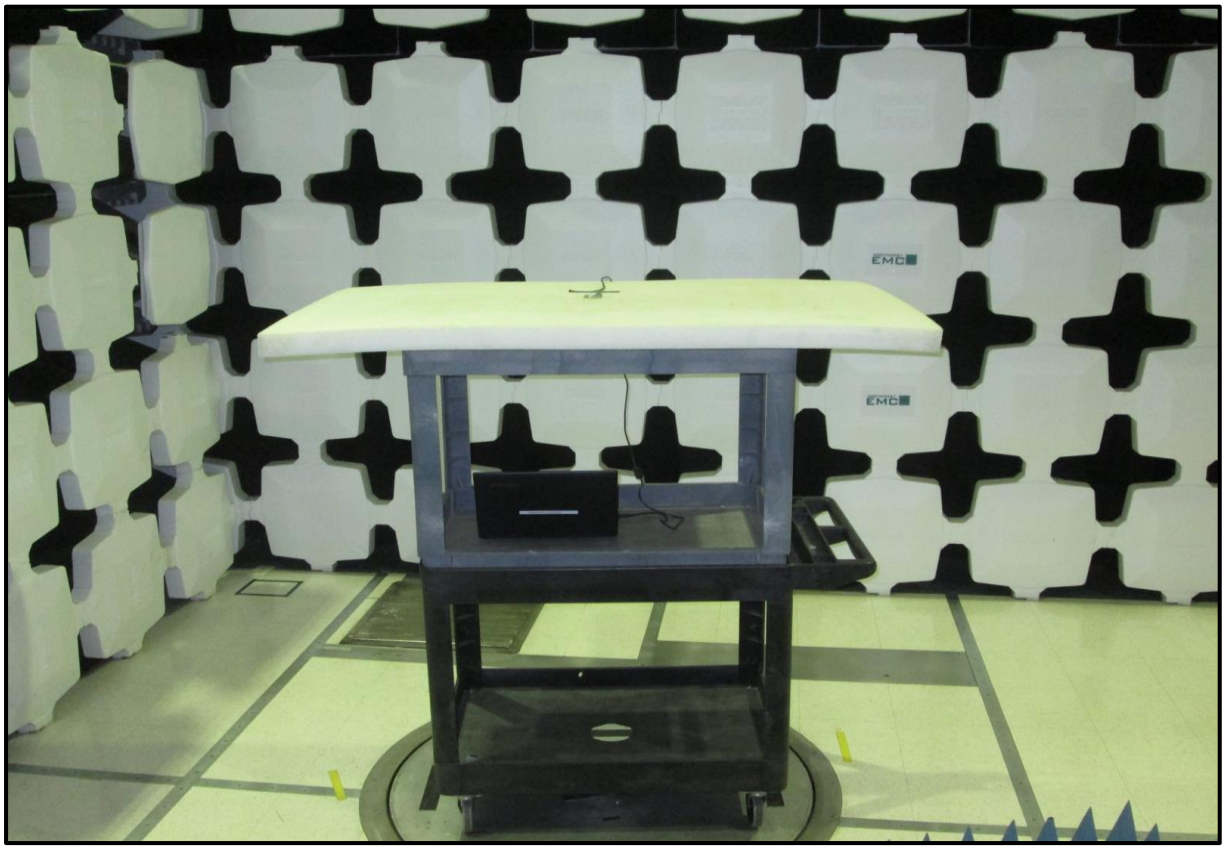
Test Specifications	**Test Method**
EN 300 328 V1.9.1:2015	EN 300 328 V1.9.1:2015

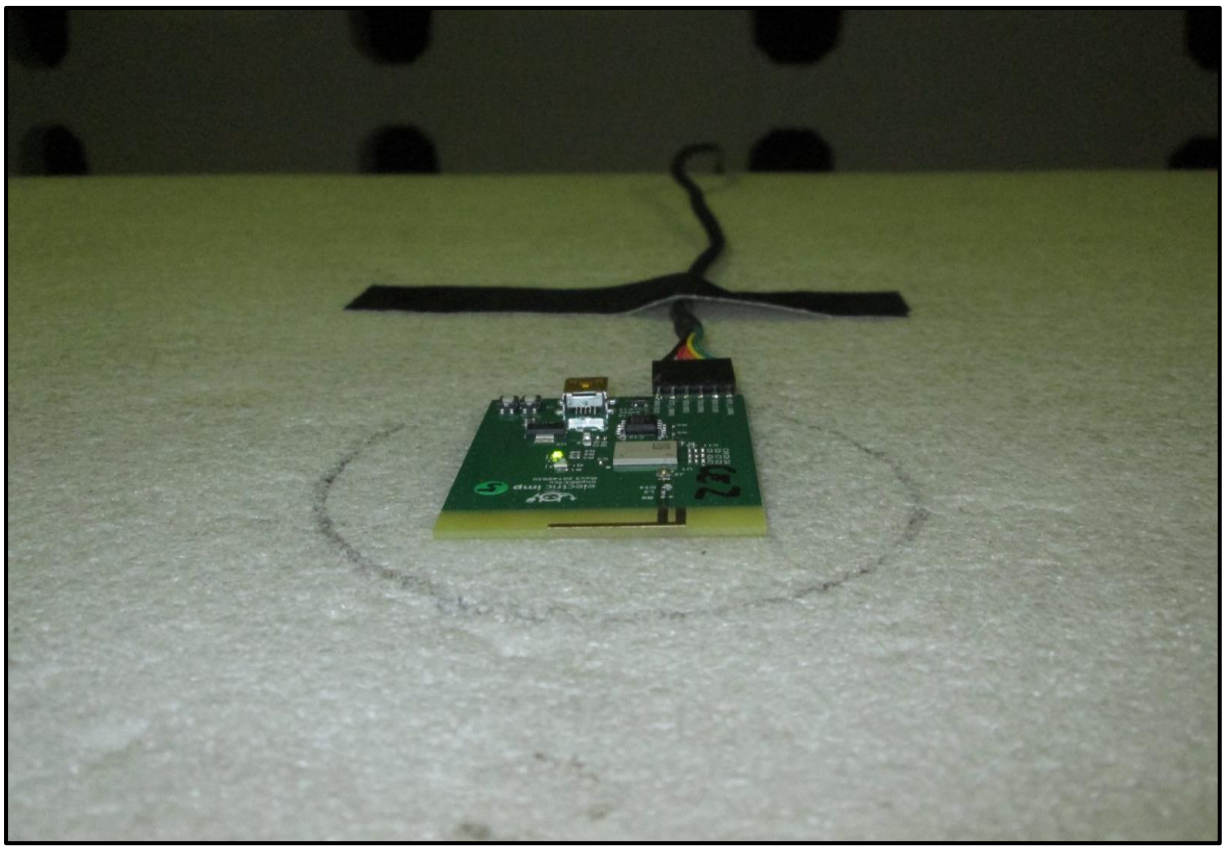
Run #	13	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass

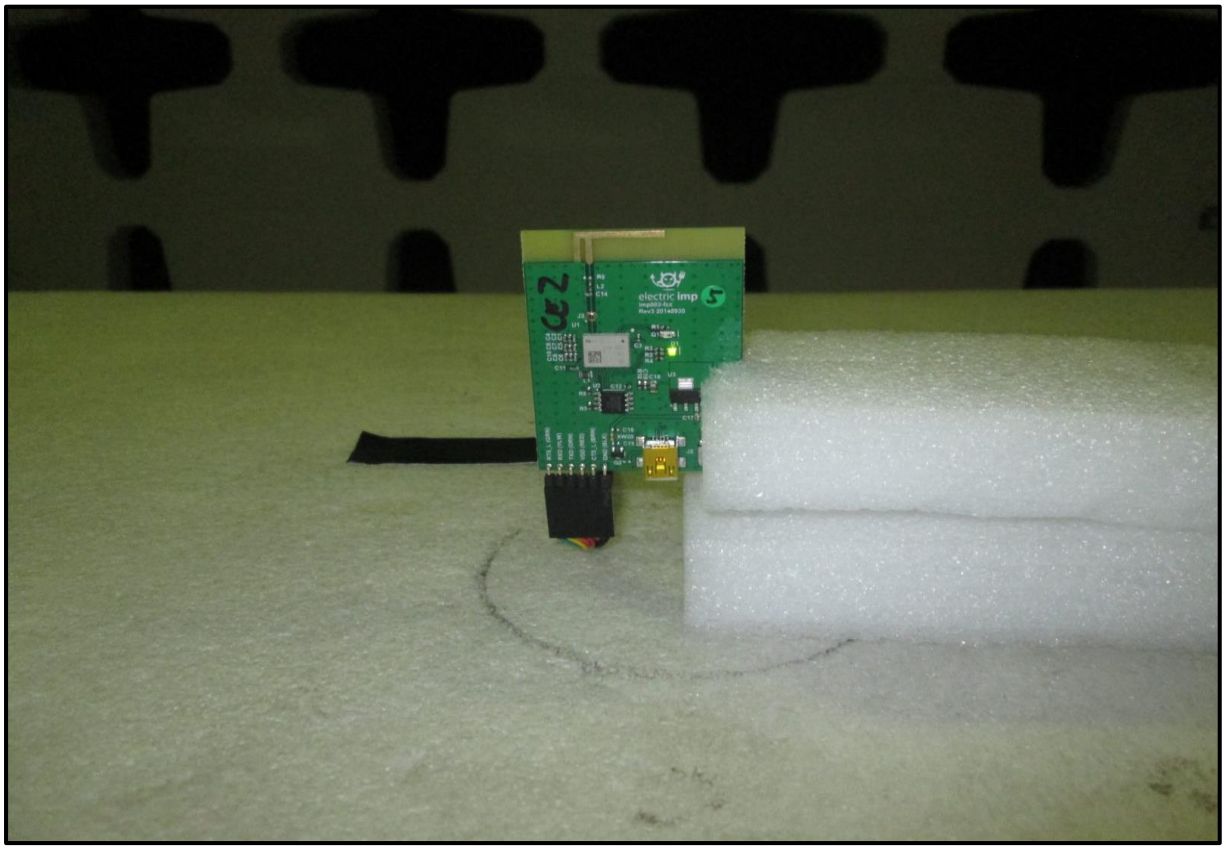


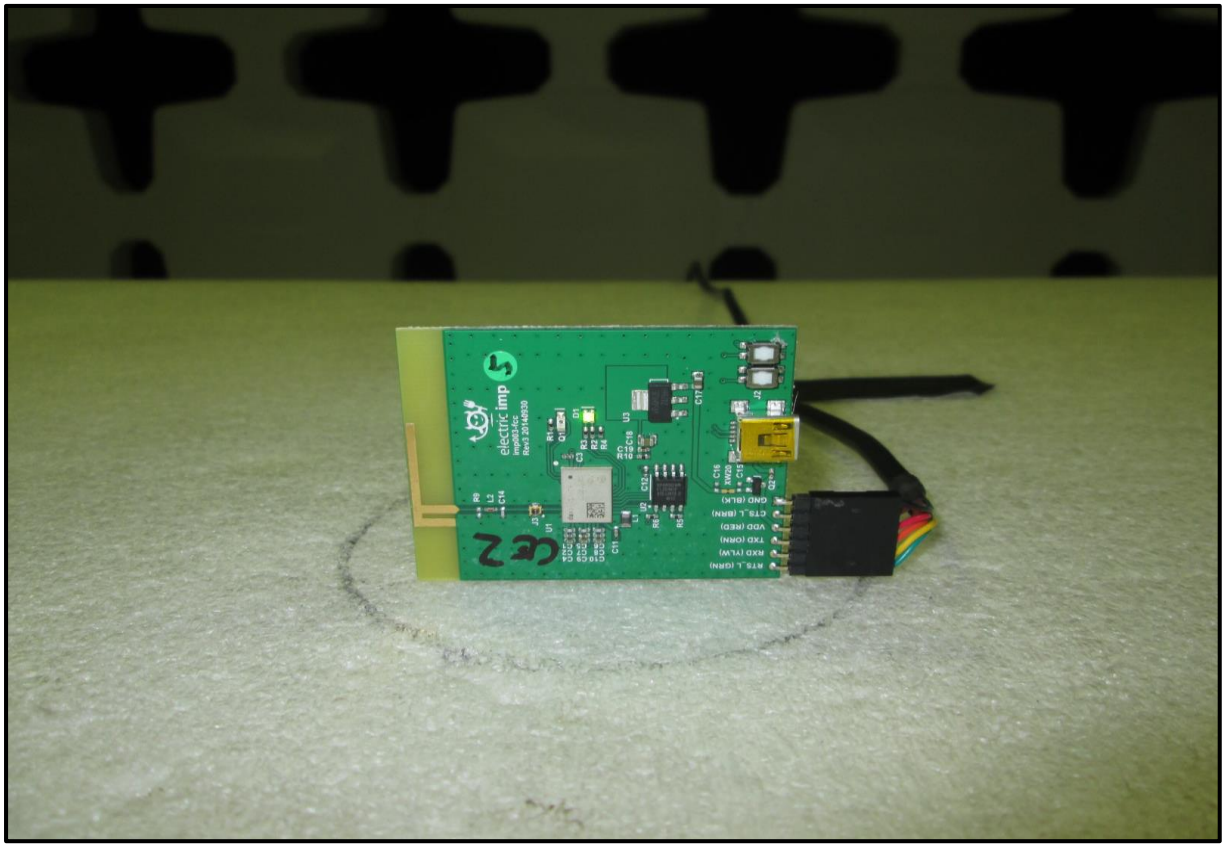
	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	4943.967	1.5	265.0	Horz	AV	7.53E-08	-41.2	-30.0	-11.2	EUT Horiz, Ch 13, 1Mbps
	4943.833	1.5	265.0	Horz	AV	2.12E-08	-46.7	-30.0	-16.7	EUT Horiz, Ch 13, 11Mbps
	4943.950	1.6	84.0	Vert	AV	1.69E-08	-47.7	-30.0	-17.7	EUT Vert, Ch 13, 1Mbps
	4943.992	1.6	350.0	Horz	AV	1.22E-08	-49.1	-30.0	-19.1	EUT Vert, Ch 13, 1Mbps
	4943.083	1.5	265.0	Horz	AV	1.09E-08	-49.6	-30.0	-19.6	EUT Horiz, Ch 13, 54Mbps
	4942.667	1.5	265.0	Horz	AV	1.04E-08	-49.8	-30.0	-19.8	EUT Horiz, Ch 13, 36Mbps
	4943.067	1.5	265.0	Horz	AV	9.70E-09	-50.1	-30.0	-20.1	EUT Horiz, Ch 13, 6Mbps
	4943.925	1.5	345.0	Horz	AV	7.53E-09	-51.2	-30.0	-21.2	EUT on Side, Ch 13, 1Mbps

	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	4943.333	1.5	265.0	Horz	AV	7.53E-09	-51.2	-30.0	-21.2	EUT Horiz, Ch 13, MCS0
	4942.350	1.5	265.0	Horz	AV	6.71E-09	-51.7	-30.0	-21.7	EUT Horiz, Ch 13, MCS7
	7235.625	1.5	123.0	Horz	AV	6.68E-09	-51.8	-30.0	-21.8	EUT Horiz, Ch 1, 1Mbps
	7234.900	1.5	7.0	Vert	AV	6.67E-09	-51.8	-30.0	-21.8	EUT Vert, Ch 1, 1Mbps
	7415.867	1.5	334.0	Horz	AV	6.57E-09	-51.8	-30.0	-21.8	EUT Horiz, Ch 13, 1Mbps
	7414.367	1.5	191.0	Vert	AV	6.57E-09	-51.8	-30.0	-21.8	EUT Vert, Ch 13, 1Mbps
	4823.950	1.5	344.0	Horz	AV	4.81E-09	-53.2	-30.0	-23.2	EUT Horiz, Ch 1, 1Mbps
	4942.375	1.5	308.0	Vert	AV	2.27E-09	-56.4	-30.0	-26.4	EUT Horiz, Ch 13, 1Mbps
	4941.833	1.5	258.0	Vert	AV	2.22E-09	-56.5	-30.0	-26.5	EUT on Side, Ch 13, 1Mbps
	4824.817	1.5	237.0	Vert	AV	1.71E-09	-57.7	-30.0	-27.7	EUT Vert, Ch 1, 1Mbps
	9647.517	1.5	353.0	Vert	AV	1.89E-10	-67.2	-30.0	-37.2	EUT Vert, Ch 1, 1Mbps
	12057.860	1.5	337.0	Horz	AV	1.74E-10	-67.6	-30.0	-37.6	EUT Horiz, Ch 1, 1Mbps
	12358.510	1.5	194.0	Vert	AV	1.73E-10	-67.6	-30.0	-37.6	EUT Vert, Ch 13, 1Mbps
	9649.742	1.5	358.0	Horz	AV	1.72E-10	-67.6	-30.0	-37.6	EUT Horiz, Ch 1, 1Mbps
	12059.100	1.5	267.0	Vert	AV	1.70E-10	-67.7	-30.0	-37.7	EUT Vert, Ch 1, 1Mbps
	12357.590	1.5	278.0	Horz	AV	1.69E-10	-67.7	-30.0	-37.7	EUT Horiz, Ch 13, 1Mbps
	9886.108	1.5	301.0	Vert	AV	1.51E-10	-68.2	-30.0	-38.2	EUT Vert, Ch 13, 1Mbps
	9886.175	1.5	261.0	Horz	AV	1.48E-10	-68.3	-30.0	-38.3	EUT Horiz, Ch 13, 1Mbps









RECEIVER SPURIOUS 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. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Receiving at Low Channel 1 - 2412MHz & High Channel 13 - 2472MHz

POWER SETTINGS INVESTIGATED

5 VDC via USB

CONFIGURATIONS INVESTIGATED

ELIM0011 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	12750 MHz

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
Power Sensor	Agilent	E4412A	SQE	2/4/2016	12 mo
Meter - Power	Hewlett Packard	E4418A	SPA	2/4/2016	12 mo
Antenna - Double Ridge	EMCO	3115	AHE	NCR	0 mo
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	36 mo
Cable	Northwest EMC	8-18GHz RE Cables	OCO	8/26/2015	12 mo
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	8/26/2015	12 mo
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	3/3/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-4D-010120-30-10P-1	AOP	8/26/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079	AOO	3/3/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOF	8/31/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOE	8/31/2015	12 mo
Antenna - Biconilog	EMCO	3142B	AXK	10/6/2014	24 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHT	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHR	NCR	0 mo
Antenna - Double Ridge	EMCO	3115	AHB	3/21/2016	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2/9/2016	12 mo

TEST DESCRIPTION

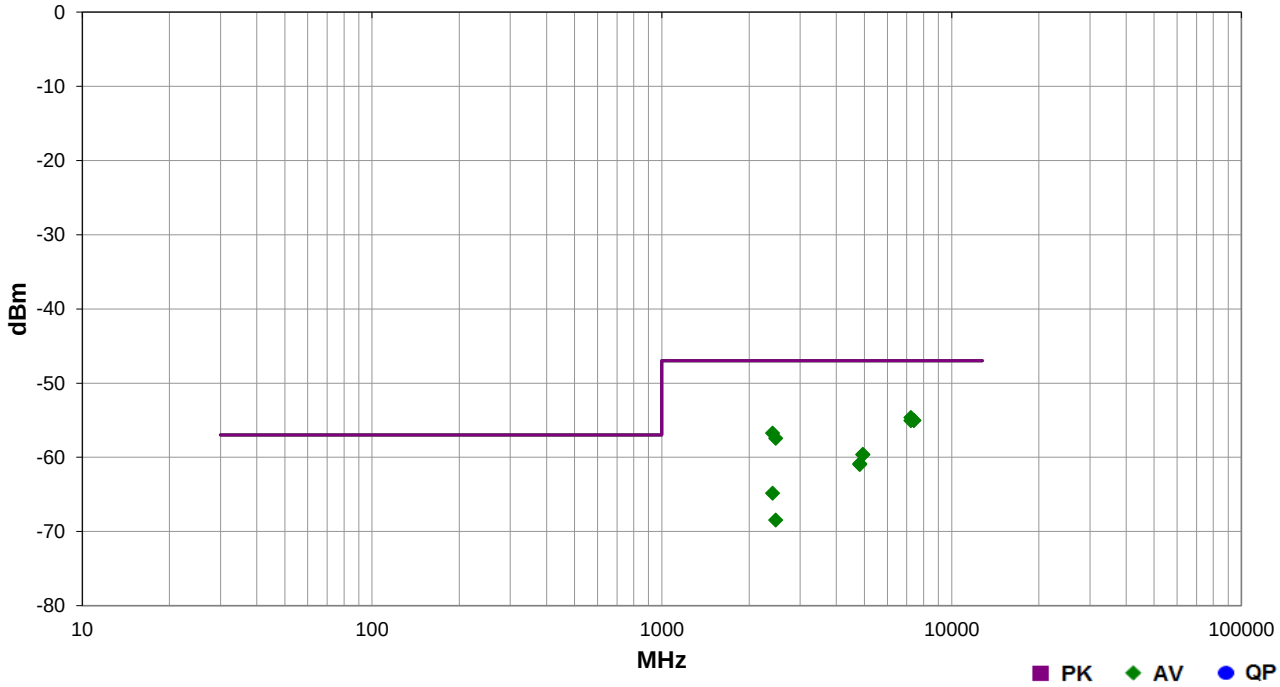
The EUT was operated in a worst-case configuration in receive mode. The spectrum was scanned from 30 MHz to 12.75 GHz with the EUT set to low and high receive frequencies. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height (1-4 meters) and polarization. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity. The amplitude and frequency of the highest emissions were noted. The EUT was then replaced with a ½ wave dipole that was successively tuned to each of the highest spurious emissions. A signal generator was connected to the dipole (horn antenna for frequencies above 1 GHz), and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded, and by factoring in the cable loss to the dipole antenna and its gain (dBi); the effective radiated power for each radiated spurious emission was determined.

RECEIVER SPURIOUS EMISSIONS

Work Order:	ELIM0011	**Date:**	06/29/16		
Project:	None	**Temperature:**	23 °C		
Job Site:	OC10	**Humidity:**	54% RH		
Serial Number:	Barcode:2000000534	**Barometric Pres.:**	1015 mbar	**Tested by:**	Johnny Candelas
EUT:	IMP0003				
Configuration:	3				
Customer:	Electric Imp, Inc.				
Attendees:	Hugo Fiennes				
EUT Power:	5 VDC via USB				
Operating Mode:	Receiving at Low Channel 1 - 2412MHz & High Channel 13 - 2472MHz				
Deviations:	None				
Comments:	None				

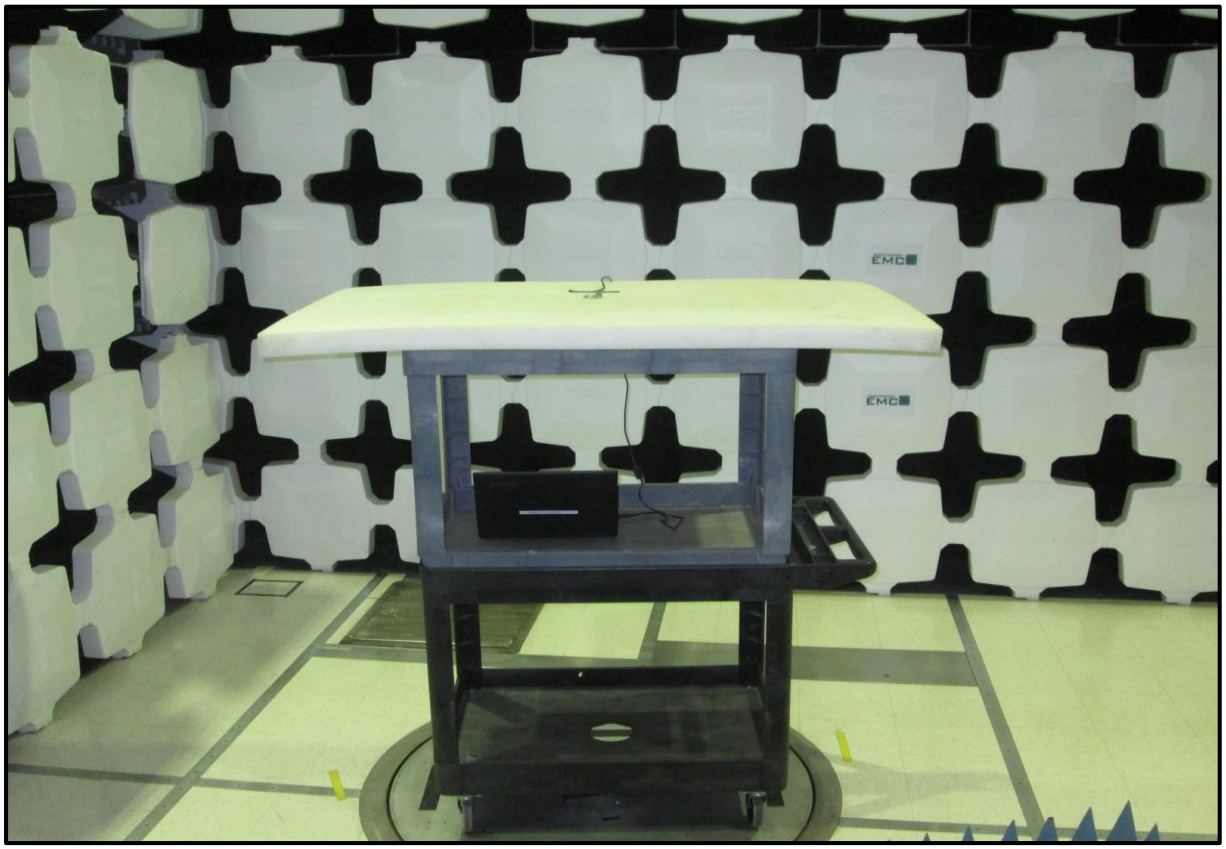
Test Specifications	**Test Method**
EN 300 328 V1.9.1:2015	EN 300 328 V1.9.1:2015

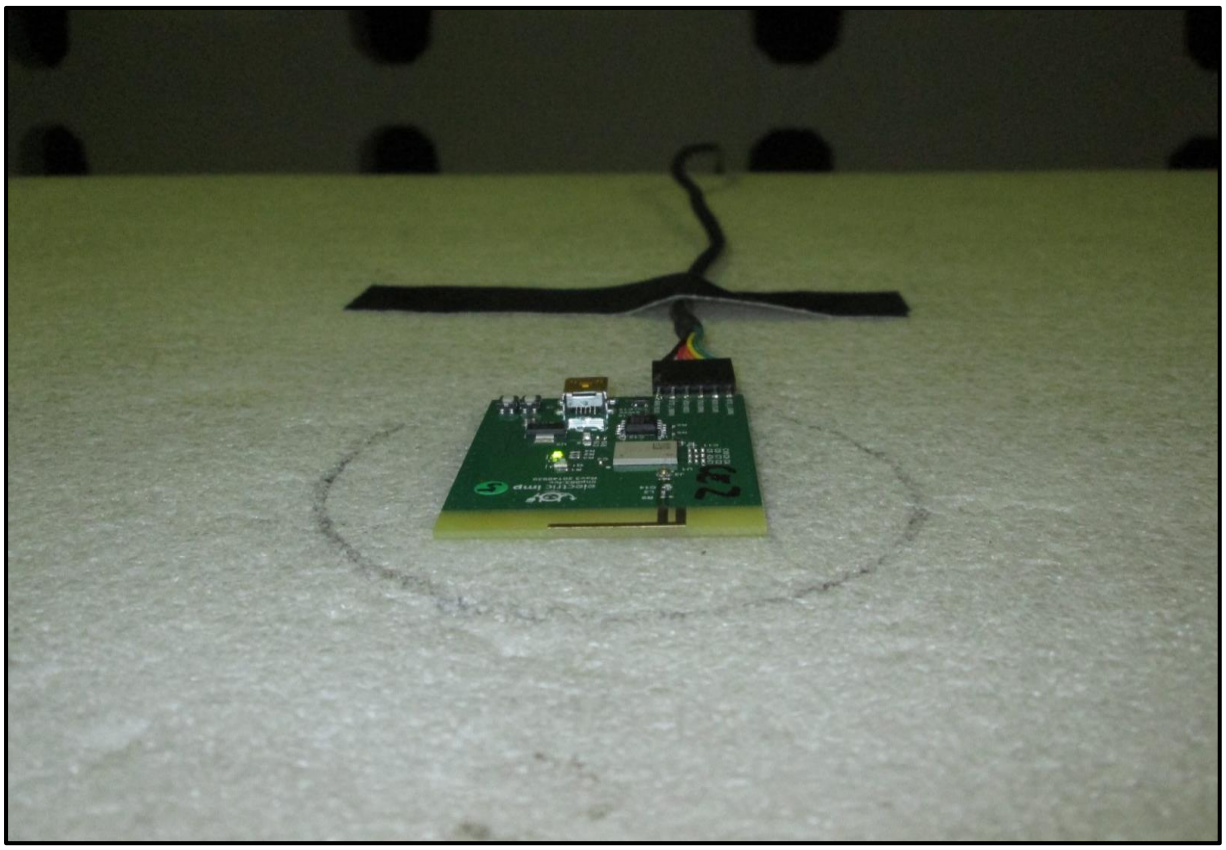
Run #	30	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	7236.175	1.5	272.0	Horz	AV	3.43E-09	-54.7	-47.0	-7.7	EUT Horiz, Ch 1
	7414.500	1.5	287.0	Vert	AV	3.14E-09	-55.0	-47.0	-8.0	EUT Vert, Ch 13
	7414.560	1.5	111.0	Horz	AV	3.14E-09	-55.0	-47.0	-8.0	EUT Horiz, Ch 13
	7234.590	1.5	141.0	Vert	AV	3.12E-09	-55.1	-47.0	-8.1	EUT Vert, Ch 1
	2411.995	1.5	260.0	Horz	AV	2.11E-09	-56.8	-47.0	-9.8	EUT Horiz, Ch 1
	2471.985	1.5	136.0	Horz	AV	1.79E-09	-57.5	-47.0	-10.5	EUT Horiz, Ch 13
	4945.450	1.5	144.0	Vert	AV	1.09E-09	-59.6	-47.0	-12.6	EUT Vert, Ch 13
	4945.085	1.5	336.0	Horz	AV	1.09E-09	-59.6	-47.0	-12.6	EUT Horiz, Ch 13
	4823.110	1.5	221.0	Vert	AV	8.17E-10	-60.9	-47.0	-13.9	EUT Vert, Ch 1
	4822.760	1.5	210.0	Horz	AV	7.98E-10	-61.0	-47.0	-14.0	EUT Horiz, Ch 1
	2411.970	1.5	185.0	Vert	AV	3.27E-10	-64.9	-47.0	-17.9	EUT Vert, Ch 1
	2471.960	1.5	271.0	Vert	AV	1.43E-10	-68.5	-47.0	-21.5	EUT Vert, Ch 13

RECEIVER SPURIOUS EMISSIONS





RECEIVER SPURIOUS EMISSIONS