NORTHWEST EMC

SmartGuard L.L.C.

Bridge Router

FCC 15.247:2015

Report # NRTH0006

NVLAP Lab Code: 200881-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: March 27, 2015
SmartGuard L.L.C.
Model: Bridge Router

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2015	ANSI C63.10:2009

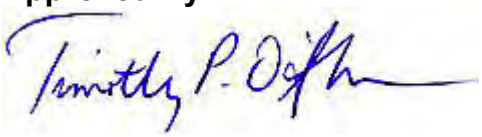
Results

Method Clause	Test Description	Applied	Results	Comments
6.2	AC Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
6.7	Band Edge Compliance	Yes	Pass	
6.7	Spurious Conducted Emissions	Yes	Pass	
6.9.1	Occupied Bandwidth	Yes	Pass	
6.10.2	Output Power	Yes	Pass	
6.11.2	Power Spectral Density	Yes	Pass	
7.5	Duty Cycle	Yes	N/A	Characterization of radio operation.

Deviations From Test Standards

None

Approved By:



Tim O'Shea, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

REVISION HISTORY

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

NORTHWEST EMC
REV 2015.2.19

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 Conformity Assessment Body (CAB) under the EMC directive and 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.2014.12.03

Measurement Uncertainty

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

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

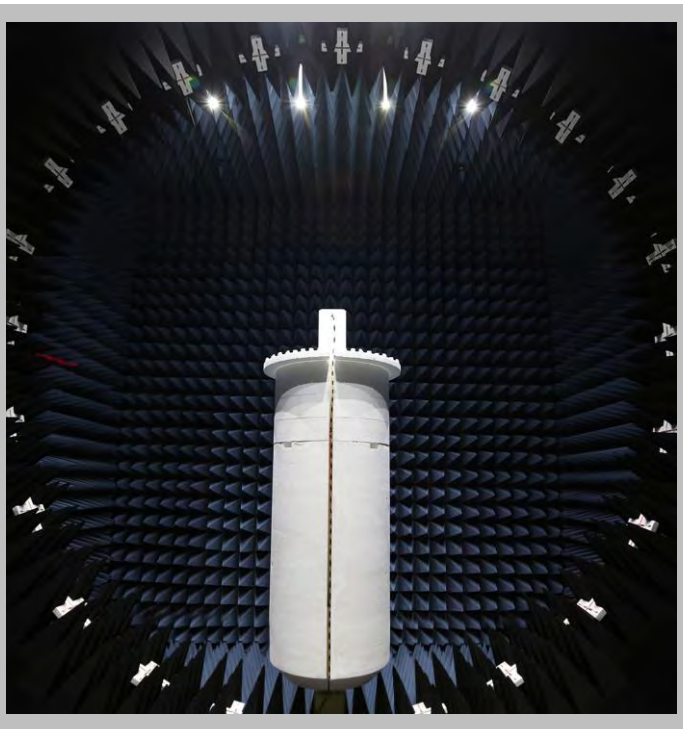
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

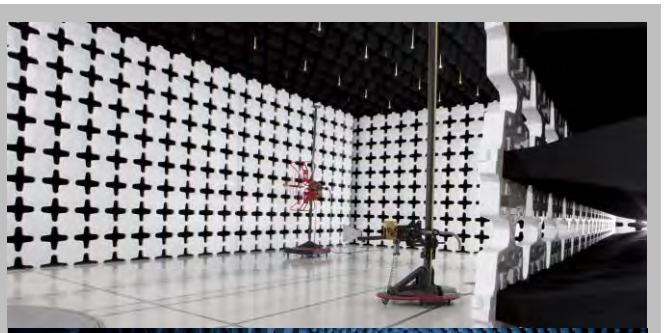
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	4.7 dB	-4.7 dB
AC Powerline Conducted Emissions (dB)	2.9 dB	-2.9 dB

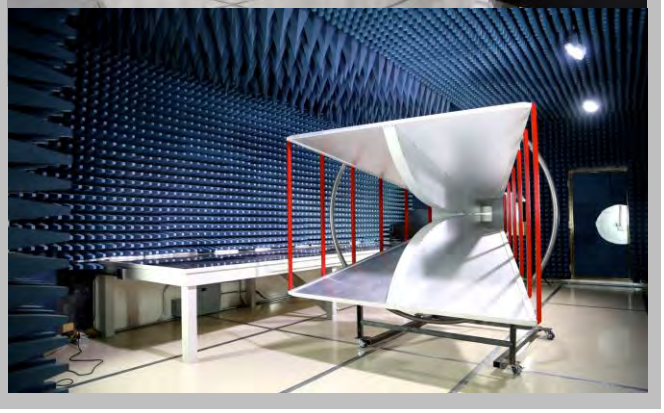
FACILITIES

NORTHWEST EMC
REV 2015.2.19

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 9801 (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

NORTHWEST EMC
2014-12-10

Client and Equipment Under Test (EUT) Information

Company Name:	SmartGuard L.L.C.
Address:	3660 Technology Drive NE
City, State, Zip:	Minneapolis, MN 55418
Test Requested By:	David Heim
Model:	Bridge Router
First Date of Test:	March 24, 2015
Last Date of Test:	March 27, 2015
Receipt Date of Samples:	March 24, 2015
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Router with ZigBee on board chip set. The system can also be configured with either a pre-approved Wi-Fi module or a pre-approved cellular module.

Testing Objective:
To demonstrate compliance of the 2.4 GHz ISM radio to FCC 15.247 requirements.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration NRTH0006- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bridge Router	SmartGuard L.L.C.	Demo	GPP10002B0006
DC Power Supply	Triad	WSU050-2000	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	Latitude D520	49738B1
Programmer Board	Texas Instruments	Smart RF05	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	No	1.80m	No	DC Power Supply	Bridge Router
Ethernet	No	1.80m	No	Loopback	Bridge Router
USB	Yes	1.80m	No	Unterminated	Bridge Router
RS-485	No	5.00m	No	Unterminated	Bridge Router
USB	Yes	1.80m	No	Laptop	Smart RF 05 Board

Configuration NRTH0006- 3

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
DC Power Supply	Triad	WSU050-2000	None
Bridge Router	SmartGuard L.L.C.	Demo	GPP10002B0007

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	No	1.80m	No	DC Power Supply	Bridge Router
Ethernet	No	1.80m	No	Loopback	Bridge Router
USB	Yes	1.80m	No	Unterminated	Bridge Router
RS-485	No	5.00m	No	Unterminated	Bridge Router

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration NRTH0006- 4

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
DC Power Supply	Triad	WSU050-2000	None
Bridge Router	SmartGuard L.L.C.	Demo	GPP10002B0007

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	Latitude D520	49738B1
Programmer Board	Texas Instruments	Smart RF05	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	No	1.80m	No	DC Power Supply	Bridge Router
Ethernet	No	1.80m	No	Loopback	Bridge Router
USB	Yes	1.80m	No	Unterminated	Bridge Router
RS-485	No	5.00m	No	Unterminated	Bridge Router
USB	Yes	1.80m	No	Laptop	Smart RF 05 Board

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	3/24/2015	AC Powerline Conducted Emissions	Tested as delivered to Test Station.	Ferrite added to Ethernet cable close to RJ45 jack. Modification authorized by Charlie Anderson.	EUT remained at Northwest EMC following the test.
2	3/24/2015	Band Edge Compliance	Modified from delivered configuration.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	3/24/2015	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	3/24/2015	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	3/27/2015	Spurious Radiated Emissions	Modified from delivered configuration.	RF shield added to Zigbee module and 0.1 uF capacitor added to C909.Modification authorized by Charlie Anderson.	EUT remained at Northwest EMC following the test.
6	3/27/2015	Output power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
7	3/27/2015	Power spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

AC POWERLINE CONDUCTED EMISSIONS

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50 Ω measuring port is terminated by a 50 Ω EMI meter or a 50 Ω resistive load. All 50 Ω measuring ports of the LISN are terminated by 50Ω.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESR7	ARI	05/06/2014	05/06/2015
Attenuator 20dB, BNC	Fairview Microwave	SA01B-20	AQP	07/22/2014	07/22/2015
High Pass Filter	TTE	H97-100K-50-720B	HGN	05/23/2014	05/23/2015
MN03 Cables	ESM Cable Corp.	Conducted Cables	MNC	11/20/2014	11/20/2015
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	03/23/2015	03/23/2016

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

NRTH0006-2

MODES INVESTIGATED

Transmitting High Channel
Transmitting Low Channel
Transmitting Mid Channel

AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

EUT:	Bridge Router	Work Order:	NRTH0006
Serial Number:	GP10002B0006	Date:	03/24/2015
Customer:	SmartGuard L.L.C.	Temperature:	22.8°C
Attendees:	Dean Eriksson, Peter Edwards, Anthony Sorvary, Charlie Anderson	Relative Humidity:	18.8%
Customer Project:	None	Bar. Pressure:	1021.1 mb
Tested By:	Johnathan Lee	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	NRTH0006-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

TEST PARAMETERS

Run #:	6	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

Ferrite added to Ethernet cable close to RJ45 jack

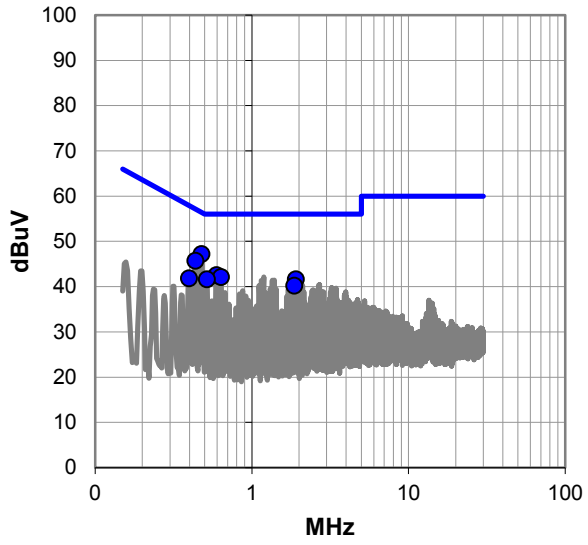
EUT OPERATING MODES

Transmitting Low Channel

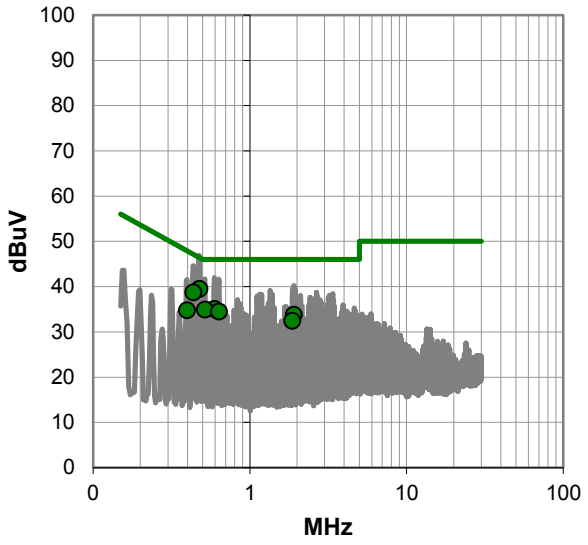
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

RESULTS - Run #6

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.477	27.0	20.2	47.2	56.4	-9.2
0.438	25.5	20.2	45.7	57.1	-11.4
0.596	22.3	20.2	42.5	56.0	-13.5
0.636	21.9	20.2	42.1	56.0	-13.9
0.517	21.4	20.2	41.6	56.0	-14.4
1.910	21.3	20.3	41.6	56.0	-14.4
1.870	19.9	20.3	40.2	56.0	-15.8
0.398	21.6	20.2	41.8	57.9	-16.1

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.477	19.3	20.2	39.5	46.4	-6.9
0.438	18.5	20.2	38.7	47.1	-8.4
0.596	14.8	20.2	35.0	46.0	-11.0
0.517	14.7	20.2	34.9	46.0	-11.1
0.636	14.3	20.2	34.5	46.0	-11.5
1.910	13.5	20.3	33.8	46.0	-12.2
0.398	14.6	20.2	34.8	47.9	-13.1
1.870	12.1	20.3	32.4	46.0	-13.6

CONCLUSION

Pass

Tested By

AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

EUT:	Bridge Router	Work Order:	NRTH0006
Serial Number:	GP10002B0006	Date:	03/24/2015
Customer:	SmartGuard L.L.C.	Temperature:	22.8°C
Attendees:	Dean Eriksson, Peter Edwards, Anthony Sorvary, Charlie Anderson	Relative Humidity:	18.8%
Customer Project:	None	Bar. Pressure:	1021.1 mb
Tested By:	Johnathan Lee	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	NRTH0006-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

TEST PARAMETERS

Run #:	7	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

Ferrite added to Ethernet cable close to RJ45 jack

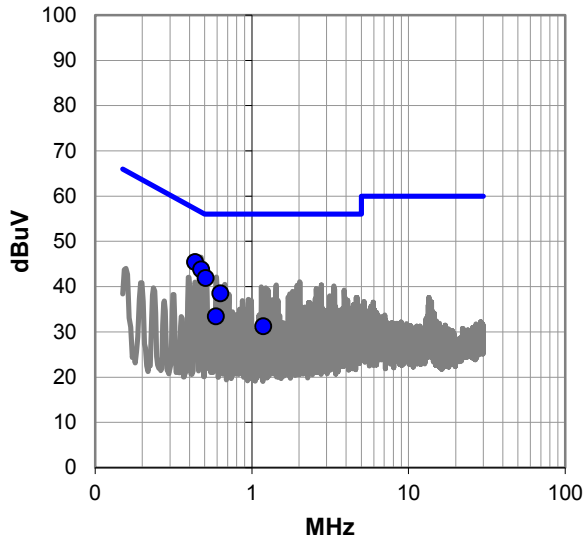
EUT OPERATING MODES

Transmitting Low Channel

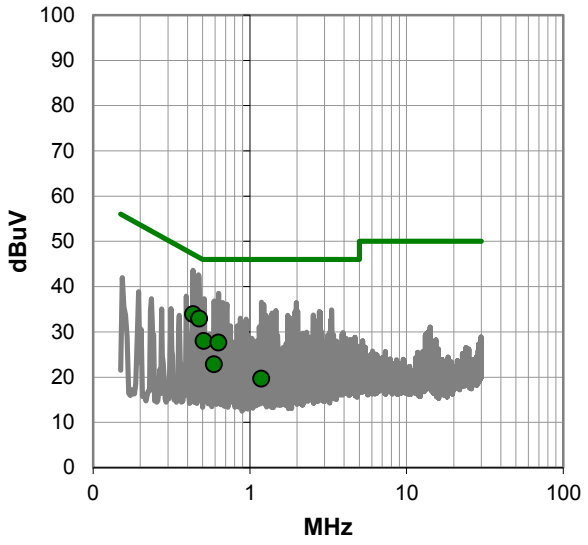
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

RESULTS - Run #7

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.435	25.2	20.2	45.4	57.2	-11.8
0.475	23.6	20.2	43.8	56.4	-12.6
0.508	21.7	20.2	41.9	56.0	-14.1
0.632	18.3	20.2	38.5	56.0	-17.5
0.591	13.2	20.2	33.4	56.0	-22.6
1.186	11.0	20.2	31.2	56.0	-24.8

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.435	13.7	20.2	33.9	47.2	-13.3
0.475	12.7	20.2	32.9	46.4	-13.5
0.508	7.8	20.2	28.0	46.0	-18.0
0.632	7.4	20.2	27.6	46.0	-18.4
0.591	2.6	20.2	22.8	46.0	-23.2
1.186	-0.6	20.2	19.6	46.0	-26.4

CONCLUSION

Pass

Tested By

AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

EUT:	Bridge Router	Work Order:	NRTH0006
Serial Number:	GP10002B0006	Date:	03/24/2015
Customer:	SmartGuard L.L.C.	Temperature:	22.8°C
Attendees:	Dean Eriksson, Peter Edwards, Anthony Sorvary, Charlie Anderson	Relative Humidity:	18.8%
Customer Project:	None	Bar. Pressure:	1021.1 mb
Tested By:	Johnathan Lee	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	NRTH0006-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

TEST PARAMETERS

Run #:	8	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

Ferrite added to Ethernet cable close to RJ45 jack

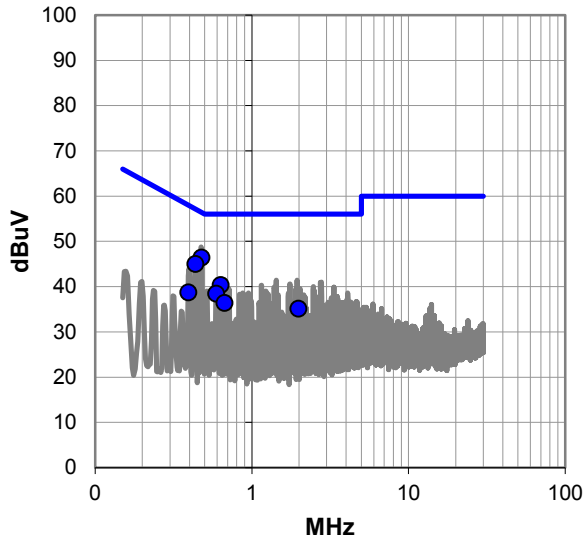
EUT OPERATING MODES

Transmitting Mid Channel

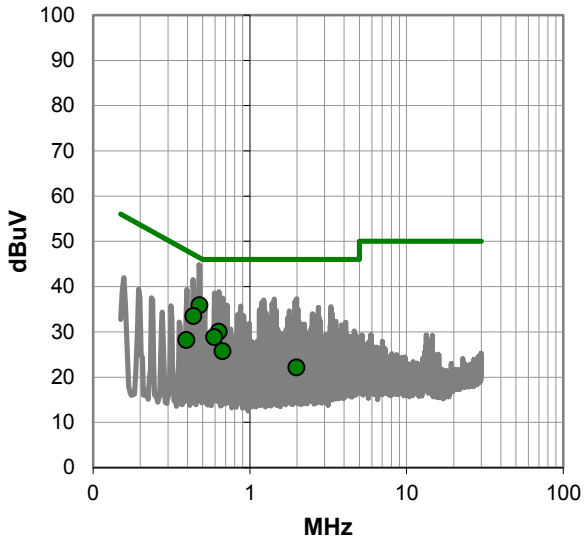
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

RESULTS - Run #8

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.477	26.2	20.2	46.4	56.4	-10.0
0.436	24.8	20.2	45.0	57.1	-12.2
0.634	20.1	20.2	40.3	56.0	-15.7
0.595	18.2	20.2	38.4	56.0	-17.6
0.395	18.5	20.2	38.7	58.0	-19.3
0.672	16.2	20.2	36.4	56.0	-19.6
1.982	14.8	20.3	35.1	56.0	-20.9

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.477	15.7	20.2	35.9	46.4	-10.5
0.436	13.3	20.2	33.5	47.1	-13.7
0.634	9.8	20.2	30.0	46.0	-16.0
0.595	8.6	20.2	28.8	46.0	-17.2
0.395	8.0	20.2	28.2	48.0	-19.8
0.672	5.5	20.2	25.7	46.0	-20.3
1.982	1.8	20.3	22.1	46.0	-23.9

CONCLUSION

Pass

Tested By

AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

EUT:	Bridge Router	Work Order:	NRTH0006
Serial Number:	GP10002B0006	Date:	03/24/2015
Customer:	SmartGuard L.L.C.	Temperature:	22.8°C
Attendees:	Dean Eriksson, Peter Edwards, Anthony Sorvary, Charlie Anderson	Relative Humidity:	18.8%
Customer Project:	None	Bar. Pressure:	1021.1 mb
Tested By:	Johnathan Lee	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	NRTH0006-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

TEST PARAMETERS

Run #:	9	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

Ferrite added to Ethernet cable close to RJ45 jack

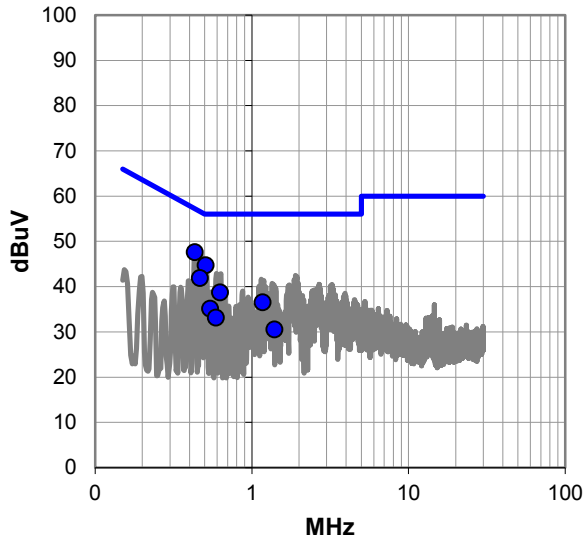
EUT OPERATING MODES

Transmitting Mid Channel

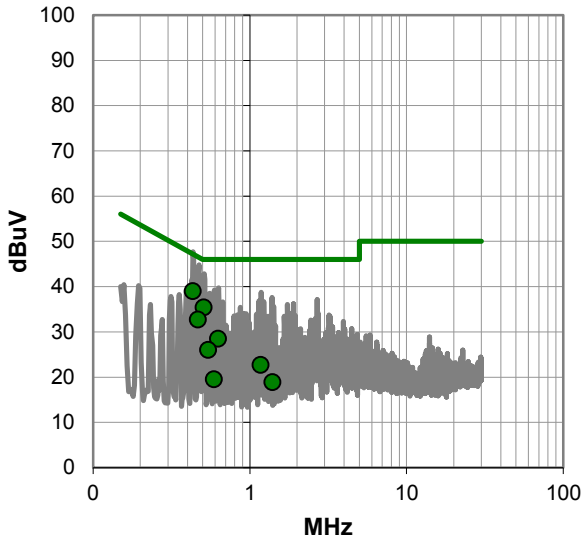
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

RESULTS - Run #9

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.433	27.4	20.2	47.6	57.2	-9.6
0.508	24.5	20.2	44.7	56.0	-11.3
0.467	21.7	20.2	41.9	56.6	-14.7
0.626	18.5	20.2	38.7	56.0	-17.3
1.175	16.3	20.2	36.5	56.0	-19.5
0.543	14.9	20.2	35.1	56.0	-20.9
0.591	12.9	20.2	33.1	56.0	-22.9
1.399	10.3	20.2	30.5	56.0	-25.5

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.433	18.8	20.2	39.0	47.2	-8.2
0.508	15.2	20.2	35.4	46.0	-10.6
0.467	12.5	20.2	32.7	46.6	-13.9
0.626	8.3	20.2	28.5	46.0	-17.5
0.543	5.8	20.2	26.0	46.0	-20.0
1.175	2.5	20.2	22.7	46.0	-23.3
0.591	-0.7	20.2	19.5	46.0	-26.5
1.399	-1.4	20.2	18.8	46.0	-27.2

CONCLUSION

Pass

Tested By

AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

EUT:	Bridge Router	Work Order:	NRTH0006
Serial Number:	GP10002B0006	Date:	03/24/2015
Customer:	SmartGuard L.L.C.	Temperature:	22.8°C
Attendees:	Dean Eriksson, Peter Edwards, Anthony Sorvary, Charlie Anderson	Relative Humidity:	18.8%
Customer Project:	None	Bar. Pressure:	1021.1 mb
Tested By:	Johnathan Lee	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	NRTH0006-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

TEST PARAMETERS

Run #:	10	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

Ferrite added to Ethernet cable close to RJ45 jack

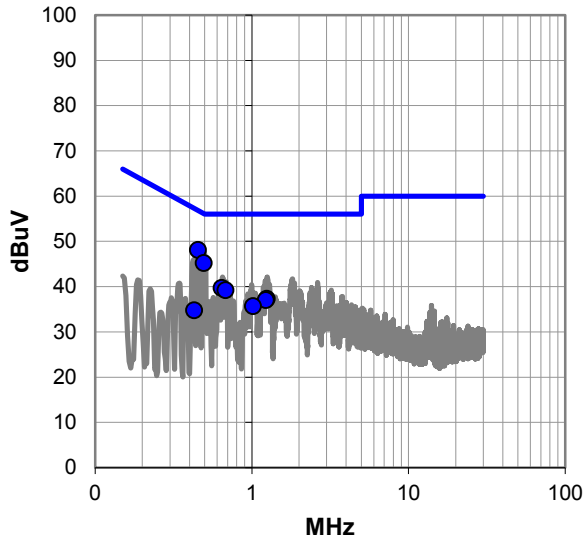
EUT OPERATING MODES

Transmitting High Channel

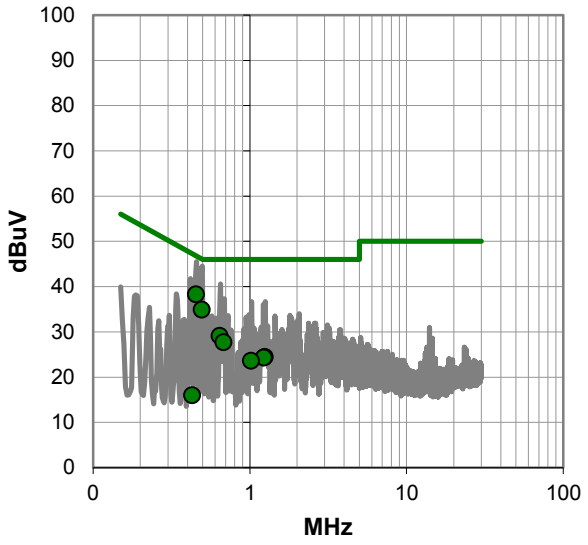
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

RESULTS - Run #10

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.454	27.9	20.2	48.1	56.8	-8.7
0.494	25.0	20.2	45.2	56.1	-10.9
0.642	19.5	20.2	39.7	56.0	-16.3
0.679	19.0	20.2	39.2	56.0	-16.8
1.249	17.1	20.2	37.3	56.0	-18.7
1.228	16.8	20.2	37.0	56.0	-19.0
1.017	15.5	20.2	35.7	56.0	-20.3
0.429	14.6	20.2	34.8	57.3	-22.5

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.454	18.1	20.2	38.3	46.8	-8.5
0.494	14.7	20.2	34.9	46.1	-11.2
0.642	8.9	20.2	29.1	46.0	-16.9
0.679	7.5	20.2	27.7	46.0	-18.3
1.249	4.2	20.2	24.4	46.0	-21.6
1.228	4.1	20.2	24.3	46.0	-21.7
1.017	3.4	20.2	23.6	46.0	-22.4
0.429	-4.2	20.2	16.0	47.3	-31.3

CONCLUSION

Pass

Tested By

AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

EUT:	Bridge Router	Work Order:	NRTH0006
Serial Number:	GP10002B0006	Date:	03/24/2015
Customer:	SmartGuard L.L.C.	Temperature:	22.8°C
Attendees:	Dean Eriksson, Peter Edwards, Anthony Sorvary, Charlie Anderson	Relative Humidity:	18.8%
Customer Project:	None	Bar. Pressure:	1021.1 mb
Tested By:	Johnathan Lee	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	NRTH0006-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

TEST PARAMETERS

Run #:	11	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

Ferrite added to Ethernet cable close to RJ45 jack

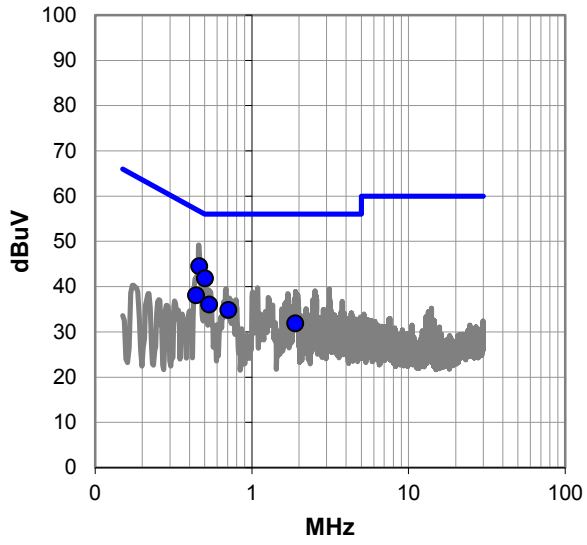
EUT OPERATING MODES

Transmitting High Channel

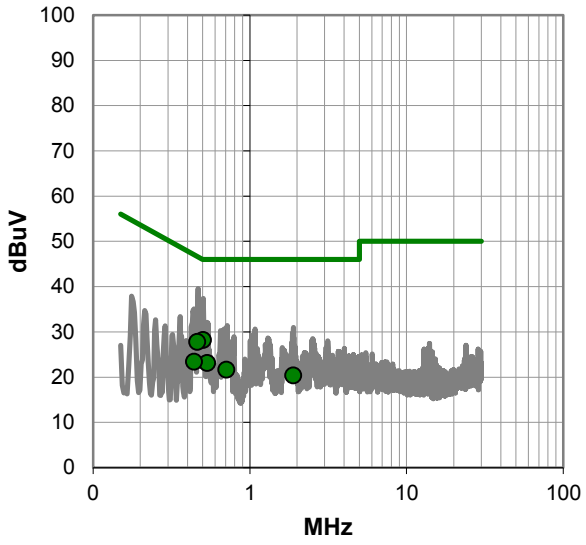
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.03.10
PSA-ESCI 2015.03.03, EmiR5 2014.11.19.2

RESULTS - Run #11

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.463	24.3	20.2	44.5	56.6	-12.1
0.503	21.6	20.2	41.8	56.0	-14.2
0.442	17.9	20.2	38.1	57.0	-18.9
0.534	15.8	20.2	36.0	56.0	-20.0
0.710	14.6	20.2	34.8	56.0	-21.2
1.897	11.6	20.3	31.9	56.0	-24.1

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.503	8.0	20.2	28.2	46.0	-17.8
0.463	7.6	20.2	27.8	46.6	-18.8
0.534	2.9	20.2	23.1	46.0	-22.9
0.442	3.2	20.2	23.4	47.0	-23.6
0.710	1.4	20.2	21.6	46.0	-24.4
1.897	0.1	20.3	20.4	46.0	-25.6

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED 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.

CHANNELS TESTED

Low Channel, 2405 MHz
Mid Channel, 2440 MHz
High Channel, 2480 MHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

NRTH0006 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 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
Low Pass Filter, 0 - 1000 MHz	Micro-Tronics	LPM50004	HGK	3/2/2015	12 mo
High Pass Filter, 2.8 - 18 GHz	Micro-Tronics	HPM50111	HGQ	3/2/2015	12 mo
Attenuator, 20 dB, 'SMA'	SM Electronics	SA6-20	REO	3/2/2015	12 mo
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	10/3/2014	12 mo
MN05 Cable	N/A	18-26GHz Standard Gain Horn Cable	MNP	10/3/2014	12 mo
Antenna, Horn	ETS	3160-09	AHG	NCR	0 mo
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	3/2/2015	12 mo
Antenna, Horn	ETS Lindgren	3160-08	AIQ	NCR	0 mo
MN05 Cables	ESM Cable Corp.	Standard Gain Horn	MNJ	3/2/2015	12 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	3/2/2015	12 mo
Antenna, Horn	ETS	3160-07	AXP	NCR	0 mo
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	3/2/2015	12 mo
MN05 Cables	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	3/2/2015	12 mo
Antenna, Horn	ETS	3115	AJA	6/3/2014	24 mo
Pre-Amplifier	Miteq	AM-1616-1000	PAD	3/2/2015	12 mo
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	3/2/2015	12 mo
Antenna, Biconilog	Teseq	CBL 6141B	AYD	12/17/2013	24 mo
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2015	12 mo

MEASUREMENT BANDWIDTHS

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

TEST DESCRIPTION

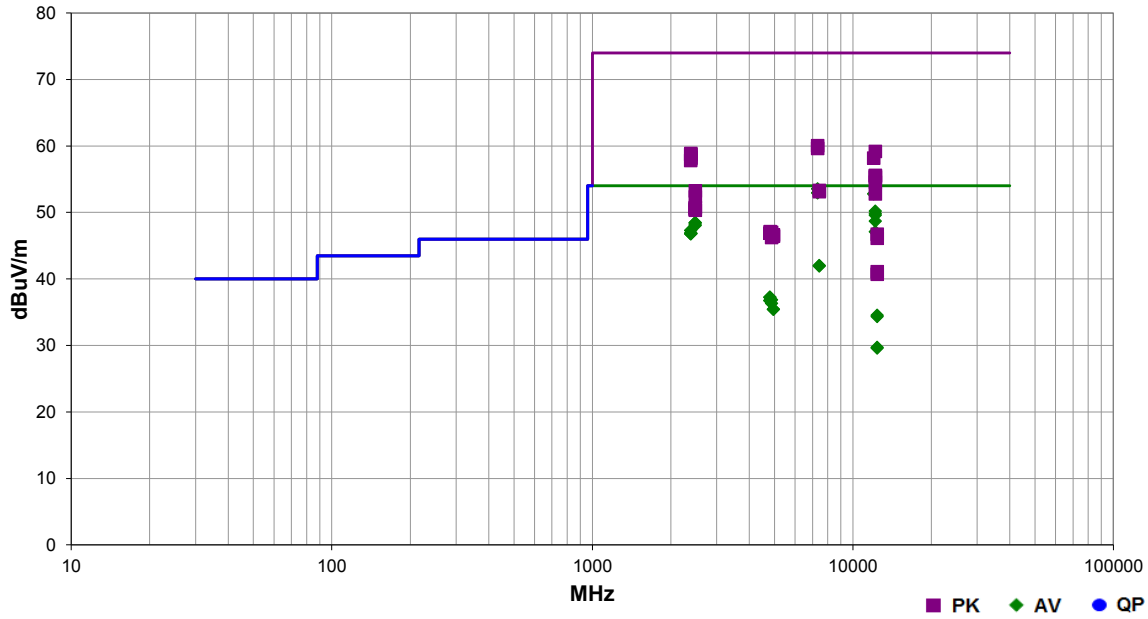
The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify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

SPURIOUS RADIATED EMISSIONS

Work Order:	NRTH0006	**Date:**	03/27/15		
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN05	**Humidity:**	15.7% RH		
Serial Number:	GP10002B0007	**Barometric Pres.:**	1028.4 mbar	**Tested by:**	Trevor Buls, Dustin Sparks
EUT:	Bridge Router				
Configuration:	3				
Customer:	SmartGuard L.L.C.				
Attendees:	Dean Eriksson, Anthony Sorvary, Charlie Anderson				
EUT Power:	110VAC/60Hz				
Operating Mode:	Default modulation. See comments for transmitter power levels set during testing				
Deviations:	None				
Comments:	RF shield added to zigbee module. 0.1uf cap added to C909.				

Test Specifications	**Test Method**
FCC 15.247:2015	ANSI C63.10:2009

Run #	45	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12196.820	58.1	-4.2	1.0	139.0	3.0	0.0	Horz	AV	0.0	53.9	54.0	-0.1	EUT on Side, Mid Ch, Pwr 20
7321.500	40.5	13.0	1.2	182.0	3.0	0.0	Horz	AV	0.0	53.5	54.0	-0.5	EUT on Side, Mid Ch, Pwr 20
7321.550	39.9	13.0	1.2	311.0	3.0	0.0	Vert	AV	0.0	52.9	54.0	-1.1	EUT Horizontal, Mid Ch, Pwr 20
12027.720	57.5	-4.7	1.0	160.1	3.0	0.0	Horz	AV	0.0	52.8	54.0	-1.2	EUT on Side, Low Ch, Pwr 19
2483.500	83.1	-3.5	1.0	24.9	3.0	20.0	Vert	AV	0.0	50.9	54.0	-3.1	EUT vert, Pwr 6, high ch MD
12202.720	54.4	-4.2	1.3	71.0	3.0	0.0	Horz	AV	0.0	50.2	54.0	-3.8	EUT Horizontal, Mid Ch, Pwr 20
2483.500	82.3	-3.5	1.0	246.9	3.0	20.0	Vert	AV	0.0	50.1	54.0	-3.9	EUT on side, Pwr 6, high ch MD
12202.750	54.0	-4.2	1.0	196.1	3.0	0.0	Vert	AV	0.0	49.8	54.0	-4.2	EUT Horizontal, Mid Ch, Pwr 20
12202.720	53.8	-4.2	1.0	205.0	3.0	0.0	Vert	AV	0.0	49.6	54.0	-4.4	EUT on Side, Mid Ch, Pwr 20
12196.870	52.9	-4.2	1.0	214.1	3.0	0.0	Horz	AV	0.0	48.7	54.0	-5.3	EUT Vertical, Mid Ch, Pwr 20
2483.500	80.6	-3.5	1.2	317.0	3.0	20.0	Horz	AV	0.0	48.4	54.0	-5.6	EUT on side, Pwr 6, high ch MD
2479.967	80.6	-3.5	1.0	18.0	3.0	20.0	Vert	AV	0.0	48.4	54.0	-5.6	EUT horz, Pwr 6, high ch MD
2480.000	80.4	-3.5	1.0	77.1	3.0	20.0	Horz	AV	0.0	48.2	54.0	-5.8	EUT horz, Pwr 6, high ch MD
2483.500	80.2	-3.5	1.7	42.0	3.0	20.0	Horz	AV	0.0	48.0	54.0	-6.0	EUT vert, Pwr 6, high ch MD
2387.025	31.1	-3.8	1.0	340.9	3.0	20.0	Vert	AV	0.0	47.3	54.0	-6.7	EUT on Side, Low Ch, Pwr 19
12196.850	51.3	-4.2	1.0	164.0	3.0	0.0	Vert	AV	0.0	47.1	54.0	-6.9	EUT Vertical, Mid Ch, Pwr 20
2389.275	30.7	-3.8	1.0	293.0	3.0	20.0	Horz	AV	0.0	46.9	54.0	-7.1	EUT Vertical, Low Ch, Pwr 19
2389.325	30.7	-3.8	1.0	127.1	3.0	20.0	Horz	AV	0.0	46.9	54.0	-7.1	EUT on Side, Low Ch, Pwr 19
2386.000	30.6	-3.8	1.0	12.1	3.0	20.0	Vert	AV	0.0	46.8	54.0	-7.2	EUT Vertical, Low Ch, Pwr 19
2388.767	30.6	-3.8	3.0	336.0	3.0	20.0	Horz	AV	0.0	46.8	54.0	-7.2	EUT Horizontal, Low Ch, Pwr 19
2388.817	30.6	-3.8	1.3	300.0	3.0	20.0	Vert	AV	0.0	46.8	54.0	-7.2	EUT Horizontal, Low Ch, Pwr 19
7438.475	28.4	13.6	3.6	215.0	3.0	0.0	Horz	AV	0.0	42.0	54.0	-12.0	EUT on side, Pwr 6, high ch
7437.650	28.3	13.6	1.0	169.0	3.0	0.0	Vert	AV	0.0	41.9	54.0	-12.1	EUT horz, Pwr 6, high ch
7321.900	47.0	13.0	1.2	182.0	3.0	0.0	Horz	PK	0.0	60.0	74.0	-14.0	EUT on Side, Mid Ch, Pwr 20
7321.417	46.6	13.0	1.2	311.0	3.0	0.0	Vert	PK	0.0	59.6	74.0	-14.4	EUT Horizontal, Mid Ch, Pwr 20

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12197.000	63.4	-4.2	1.0	139.0	3.0	0.0	Horz	PK	0.0	59.2	74.0	-14.8	EUT on Side, Mid Ch, Pwr 20
2389.550	42.7	-3.8	1.0	127.1	3.0	20.0	Horz	PK	0.0	58.9	74.0	-15.1	EUT on Side, Low Ch, Pwr 19
2386.442	42.5	-3.8	1.0	340.9	3.0	20.0	Vert	PK	0.0	58.7	74.0	-15.3	EUT on Side, Low Ch, Pwr 19
2389.650	42.5	-3.8	1.3	300.0	3.0	20.0	Vert	PK	0.0	58.7	74.0	-15.3	EUT Horizontal, Low Ch, Pwr 19
2389.258	42.1	-3.8	3.0	336.0	3.0	20.0	Horz	PK	0.0	58.3	74.0	-15.7	EUT Horizontal, Low Ch, Pwr 19
12027.270	62.9	-4.7	1.0	160.1	3.0	0.0	Horz	PK	0.0	58.2	74.0	-15.8	EUT on Side, Low Ch, Pwr 19
2389.642	41.9	-3.8	1.0	12.1	3.0	20.0	Vert	PK	0.0	58.1	74.0	-15.9	EUT Vertical, Low Ch, Pwr 19
2385.717	41.6	-3.8	1.0	293.0	3.0	20.0	Horz	PK	0.0	57.8	74.0	-16.2	EUT Vertical, Low Ch, Pwr 19
4809.067	30.7	6.5	1.4	182.0	3.0	0.0	Horz	AV	0.0	37.2	54.0	-16.8	EUT on Side, Low Ch, Pwr 20
4809.067	30.7	6.5	1.4	182.0	3.0	0.0	Horz	AV	0.0	37.2	54.0	-16.8	EUT on Side, Low Ch, Pwr 19
4879.133	31.1	5.7	1.0	199.1	3.0	0.0	Horz	AV	0.0	36.8	54.0	-17.2	EUT on Side, Mid Ch, Pwr 20
4809.033	30.2	6.5	2.1	87.2	3.0	0.0	Vert	AV	0.0	36.7	54.0	-17.3	EUT on Side, High Ch, Pwr 20
4809.033	30.2	6.5	2.1	87.2	3.0	0.0	Vert	AV	0.0	36.7	54.0	-17.3	EUT on Side, High Ch, Pwr 19
4881.000	30.6	5.7	1.2	265.9	3.0	0.0	Vert	AV	0.0	36.3	54.0	-17.7	EUT Horizontal, Mid Ch, Pwr 20
12203.030	59.8	-4.2	1.0	196.1	3.0	0.0	Vert	PK	0.0	55.6	74.0	-18.4	EUT Horizontal, Mid Ch, Pwr 20
12203.230	59.7	-4.2	1.3	71.0	3.0	0.0	Horz	PK	0.0	55.5	74.0	-18.5	EUT Horizontal, Mid Ch, Pwr 20
4960.183	29.8	5.6	1.0	126.0	3.0	0.0	Horz	AV	0.0	35.4	54.0	-18.6	EUT on side, Pwr 6, high ch
4957.875	29.8	5.6	1.9	196.1	3.0	0.0	Vert	AV	0.0	35.4	54.0	-18.6	EUT horz, Pwr 6, high ch
12203.080	59.5	-4.2	1.0	205.0	3.0	0.0	Vert	PK	0.0	55.3	74.0	-18.7	EUT on Side, Mid Ch, Pwr 20
12196.700	58.8	-4.2	1.0	214.1	3.0	0.0	Horz	PK	0.0	54.6	74.0	-19.4	EUT Vertical, Mid Ch, Pwr 20
12400.450	33.4	1.1	3.8	172.0	3.0	0.0	Horz	AV	0.0	34.5	54.0	-19.5	EUT on side, Pwr 6, high ch
12400.480	33.2	1.1	1.2	250.9	3.0	0.0	Vert	AV	0.0	34.3	54.0	-19.7	EUT horz, Pwr 6, high ch
7441.267	39.7	13.6	3.6	215.0	3.0	0.0	Horz	PK	0.0	53.3	74.0	-20.7	EUT on side, Pwr 6, high ch
2483.500	85.4	-3.5	1.0	24.9	3.0	20.0	Vert	PK	0.0	53.2	74.0	-20.8	EUT vert, Pwr 6, high ch MD
7439.325	39.5	13.6	1.0	169.0	3.0	0.0	Vert	PK	0.0	53.1	74.0	-20.9	EUT horz, Pwr 6, high ch
12197.000	57.0	-4.2	1.0	164.0	3.0	0.0	Vert	PK	0.0	52.8	74.0	-21.2	EUT Vertical, Mid Ch, Pwr 20
2483.500	84.5	-3.5	1.0	246.9	3.0	20.0	Vert	PK	0.0	52.3	74.0	-21.7	EUT on side, Pwr 6, high ch MD
2483.500	82.9	-3.5	1.2	317.0	3.0	20.0	Horz	PK	0.0	50.7	74.0	-23.3	EUT on side, Pwr 6, high ch MD
2479.558	82.8	-3.5	1.0	18.0	3.0	20.0	Vert	PK	0.0	50.6	74.0	-23.4	EUT horz, Pwr 6, high ch MD
2479.567	82.6	-3.5	1.0	77.1	3.0	20.0	Horz	PK	0.0	50.4	74.0	-23.6	EUT horz, Pwr 6, high ch MD
2483.500	82.5	-3.5	1.7	42.0	3.0	20.0	Horz	PK	0.0	50.3	74.0	-23.7	EUT vert, Pwr 6, high ch MD
12397.700	33.5	-3.8	3.8	162.0	3.0	0.0	Horz	AV	0.0	29.7	54.0	-24.3	EUT on side, Pwr 6, high ch
12398.210	33.4	-3.8	1.0	152.1	3.0	0.0	Vert	AV	0.0	29.6	54.0	-24.4	EUT horz, Pwr 6, high ch
4811.483	40.6	6.5	1.4	182.0	3.0	0.0	Horz	PK	0.0	47.1	74.0	-26.9	EUT on Side, Low Ch, Pwr 19
4881.467	41.3	5.7	1.0	199.1	3.0	0.0	Horz	PK	0.0	47.0	74.0	-27.0	EUT on Side, Mid Ch, Pwr 20
4805.483	40.3	6.6	2.1	87.2	3.0	0.0	Vert	PK	0.0	46.9	74.0	-27.1	EUT Horizontal, Low Ch, Pwr 19
12401.100	45.6	1.1	1.2	250.9	3.0	0.0	Vert	PK	0.0	46.7	74.0	-27.3	EUT horz, Pwr 6, high ch
4961.358	41.0	5.6	1.0	126.0	3.0	0.0	Horz	PK	0.0	46.6	74.0	-27.4	EUT on side, Pwr 6, high ch
4959.908	40.8	5.6	1.9	196.1	3.0	0.0	Vert	PK	0.0	46.4	74.0	-27.6	EUT horz, Pwr 6, high ch
4880.933	40.5	5.7	1.2	265.9	3.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	EUT Horizontal, Mid Ch, Pwr 20
12402.490	45.0	1.1	3.8	172.0	3.0	0.0	Horz	PK	0.0	46.1	74.0	-27.9	EUT on side, Pwr 6, high ch
12397.920	44.9	-3.8	3.8	162.0	3.0	0.0	Horz	PK	0.0	41.1	74.0	-32.9	EUT on side, Pwr 6, high ch
12399.110	44.5	-3.8	1.0	152.1	3.0	0.0	Vert	PK	0.0	40.7	74.0	-33.3	EUT horz, Pwr 6, high ch

BAND EDGE COMPLIANCE

XMit 2015.01.14

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mos)
Signal Generator	Agilent	E4422B	TGQ	3/23/2013	36
MN08 Direct Connect Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	10/2/2014	12
Attenuator, 20db, 'SMA'	SM Electronics	SA26B-20	RFW	3/10/2015	12
DC Block, 40 GHz	Fairview Microwave	SD3379	AMI	10/2/2014	12
Spectrum Analyzer	Agilent	E4440A	AAX	4/28/2014	12

TEST DESCRIPTION

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

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

BAND EDGE COMPLIANCE

NORTHWEST EMC

XMit 2015.01.14

EUT:	**Bridge Router**			**Work Order:**	**NRTH0006**
Serial Number:	**GP10002B0006**			**Date:**	**03/24/15**
Customer:	**SmartGuard L.L.C.**			**Temperature:**	**22.8°C**
Attendees:	**Dean Eriksson, Peter Edwards, Anthony Sorvary, Charlie Anderson**			**Humidity:**	**19%**
Project:	**None**			**Barometric Pres.:**	**1021.1**
Tested by:	**Johnathan Lee**	**Power:**	**110VAC/60Hz**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2015	ANSI C63.10:2009

COMMENTS

Ferrite added to Ethernet cable close to RJ45 jack

DEVIATIONS FROM TEST STANDARD

None

Configuration #	**2**	*Signature*

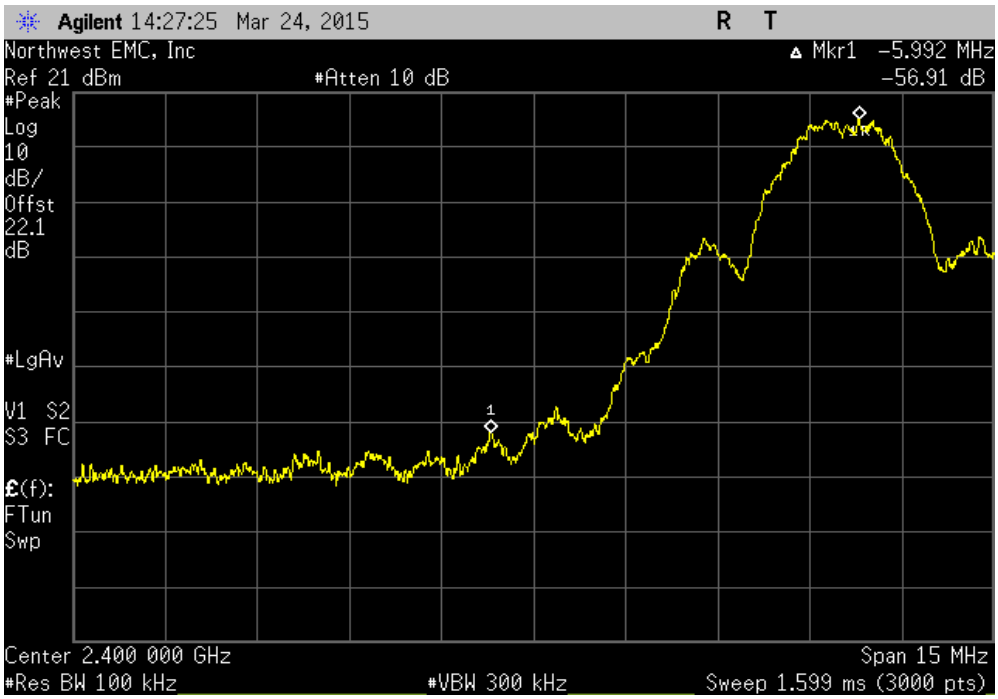
	Value (dBc)	**Limit ≤ (dBc)**	**Result**
2400 MHz - 2483.5 MHz Band			
Low Channel 2405 MHz	-56.92	-20	Pass
High Channel 2480 MHz	-36.54	-20	Pass

BAND EDGE COMPLIANCE

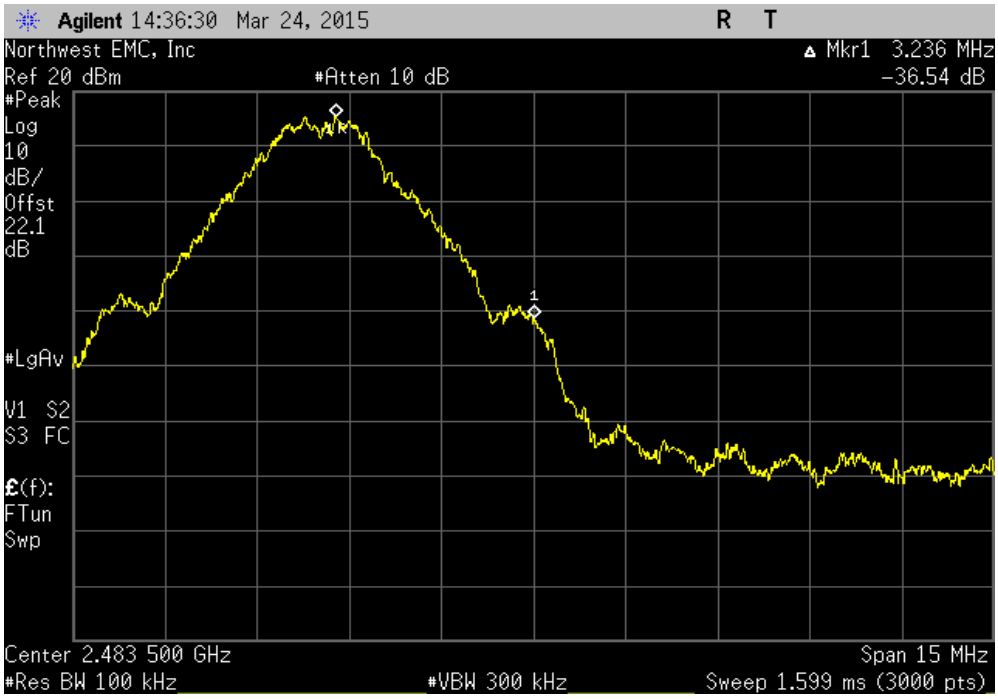
NORTHWEST EMC

XMit 2015.01.14

2400 MHz - 2483.5 MHz Band, Low Channel 2405 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-56.92	-20	Pass



2400 MHz - 2483.5 MHz Band, High Channel 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-36.54	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

XMit 2015.01.14

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mos)
Signal Generator	Agilent	E4422B	TGQ	3/23/2013	36
Attenuator, 20db, 'SMA'	SM Electronics	SA26B-20	RFW	3/10/2015	12
MN08 Direct Connect Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	10/2/2014	12
DC Block, 40 GHz	Fairview Microwave	SD3379	AMI	10/2/2014	12
Spectrum Analyzer	Agilent	E4440A	AAX	4/28/2014	12

TEST DESCRIPTION

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

SPURIOUS CONDUCTED EMISSIONS

NORTHWEST EMC

XMit 2015.01.14

EUT:	**Bridge Router**			**Work Order:**	**NRTH0006**
Serial Number:	**GP10002B0006**			**Date:**	**03/24/15**
Customer:	**SmartGuard L.L.C.**			**Temperature:**	**22.8°C**
Attendees:	**Dean Eriksson, Peter Edwards, Anthony Sorvary, Charlie Anderson**			**Humidity:**	**19%**
Project:	**None**			**Barometric Pres.:**	**1021.1**
Tested by:	**Johnathan Lee**	**Power:**	**110VAC/60Hz**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2015	ANSI C63.10:2009

COMMENTS

Ferrite added to Ethernet cable close to RJ45 jack

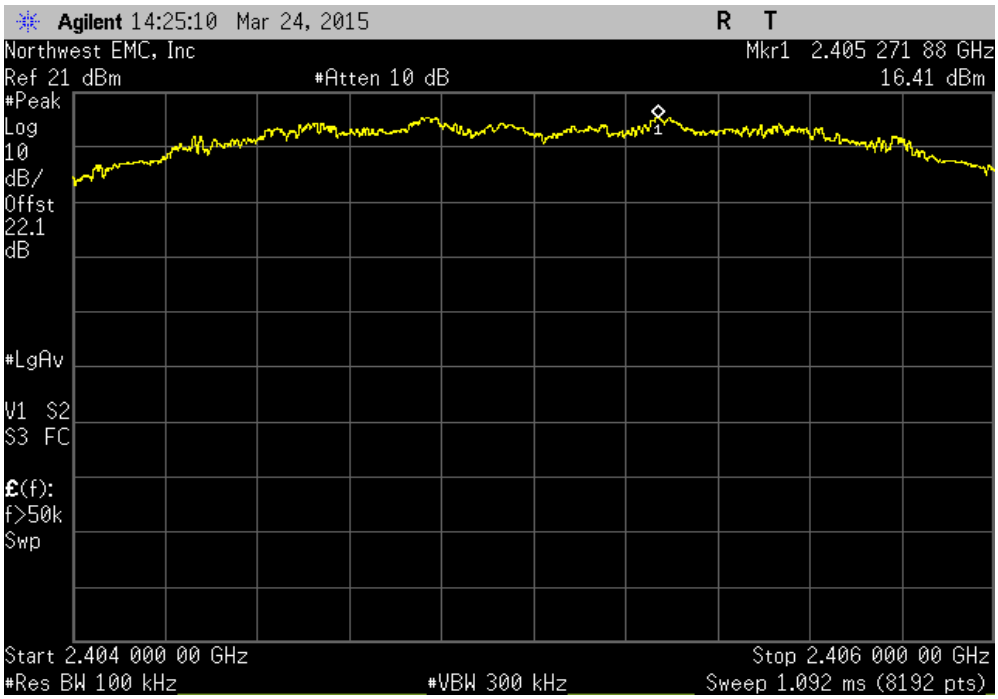
DEVIATIONS FROM TEST STANDARD

None

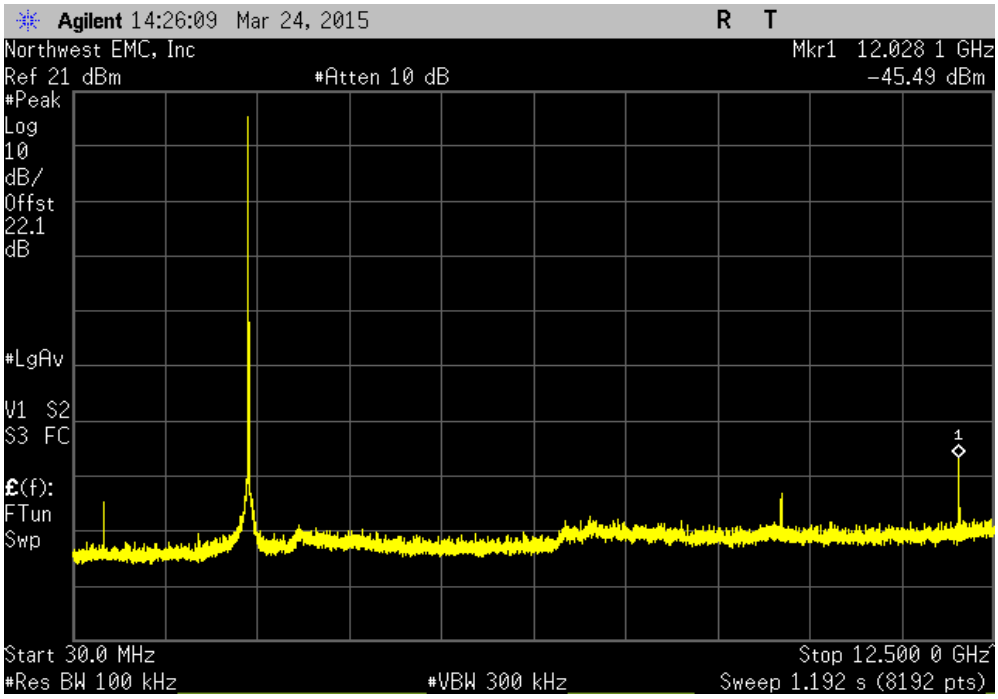
Configuration #	**2**	*Signature*

	Frequency Range	Value (dBc)	Limit ≤ (dBc)	Result
2400 MHz - 2483.5 MHz Band				
Low Channel 2405 MHz	Fundamental	N/A	N/A	N/A
Low Channel 2405 MHz	30 MHz - 12.5 GHz	-61.9	-20	Pass
Low Channel 2405 MHz	12.5 GHz - 25 GHz	-68.29	-20	Pass
Mid Channel 2440 MHz	Fundamental	N/A	N/A	N/A
Mid Channel 2440 MHz	30 MHz - 12.5 GHz	-60.07	-20	Pass
Mid Channel 2440 MHz	12.5 GHz - 25 GHz	-68.49	-20	Pass
High Channel 2480 MHz	Fundamental	N/A	N/A	N/A
High Channel 2480 MHz	30 MHz - 12.5 GHz	-56.24	-20	Pass
High Channel 2480 MHz	12.5 GHz - 25 GHz	-67.21	-20	Pass

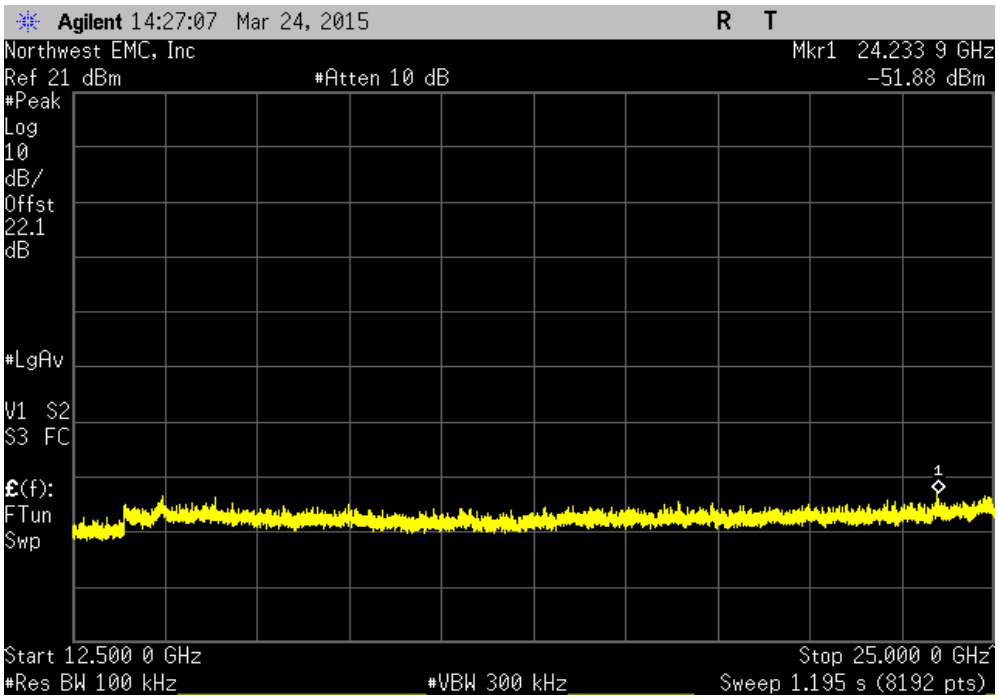
2400 MHz - 2483.5 MHz Band, Low Channel 2405 MHz						
	Frequency Range			Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



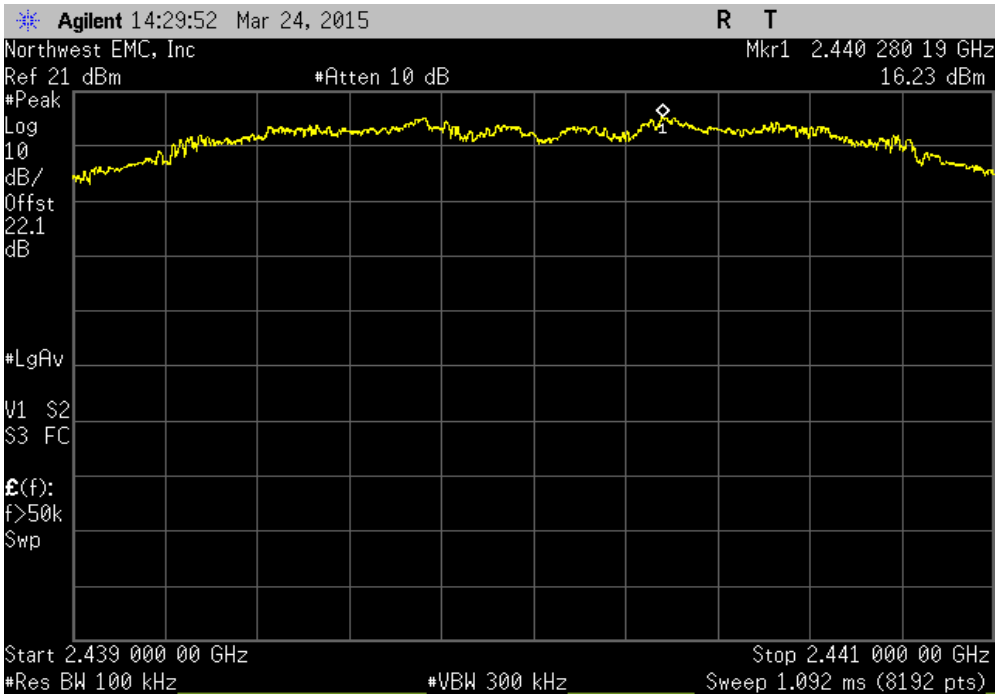
2400 MHz - 2483.5 MHz Band, Low Channel 2405 MHz					
Frequency Range		Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-61.9	-20	Pass	



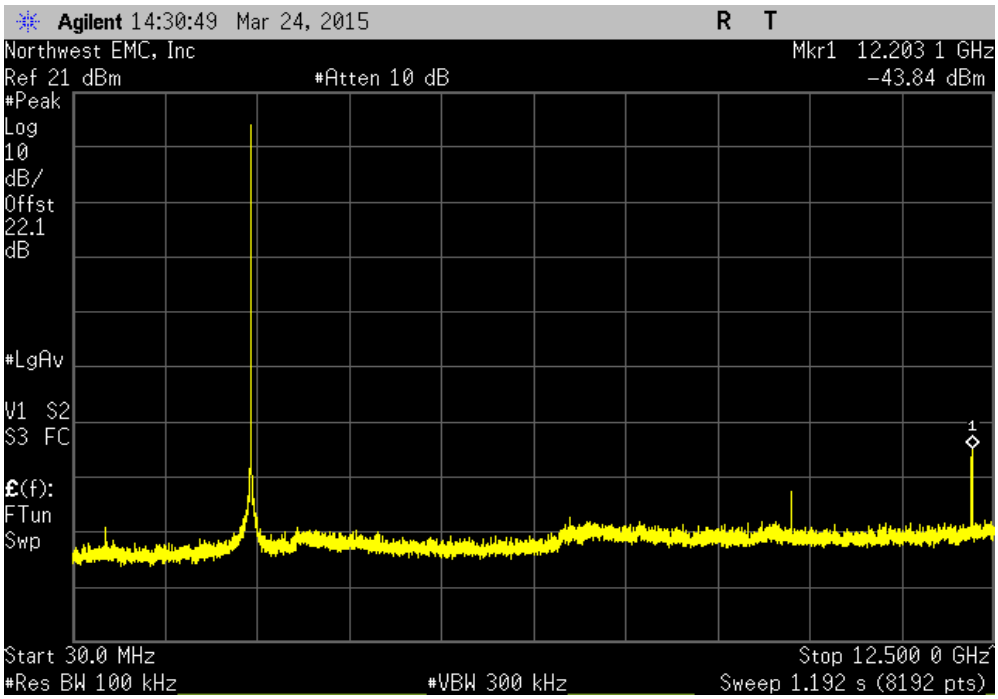
2400 MHz - 2483.5 MHz Band, Low Channel 2405 MHz				
Frequency Range		Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz		-68.29	-20	Pass



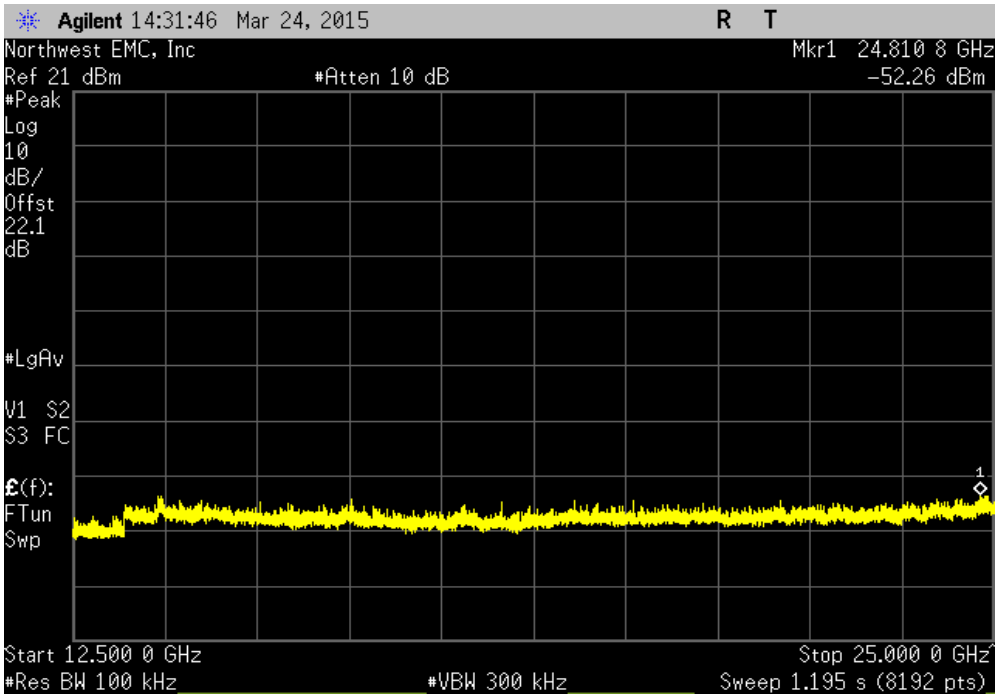
2400 MHz - 2483.5 MHz Band, Mid Channel 2440 MHz						
	Frequency Range			Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



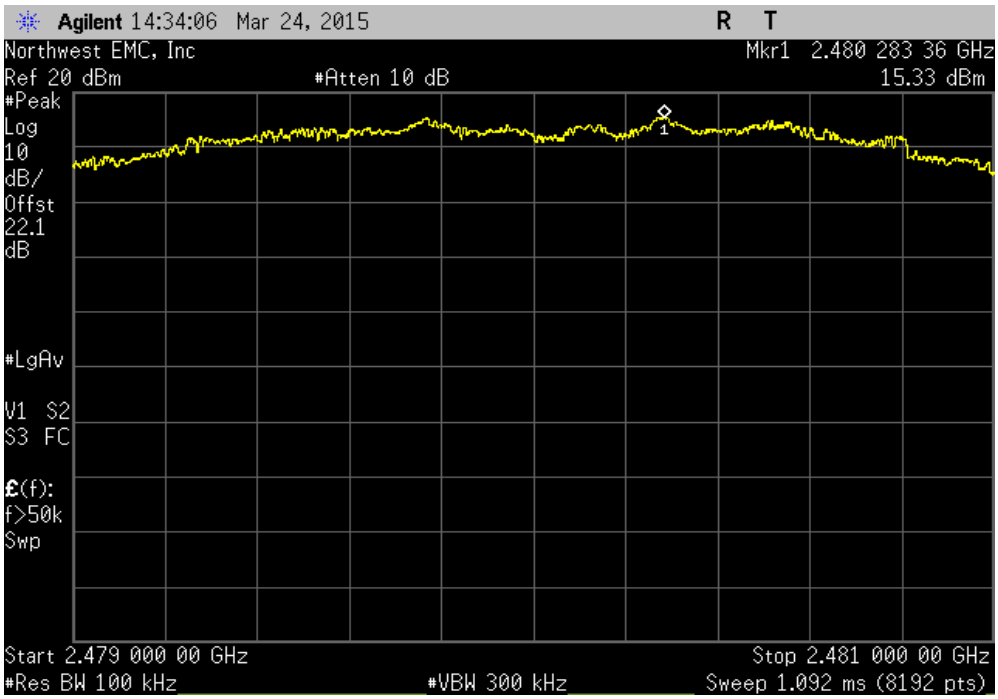
2400 MHz - 2483.5 MHz Band, Mid Channel 2440 MHz				
Frequency Range		Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz		-60.07	-20	Pass



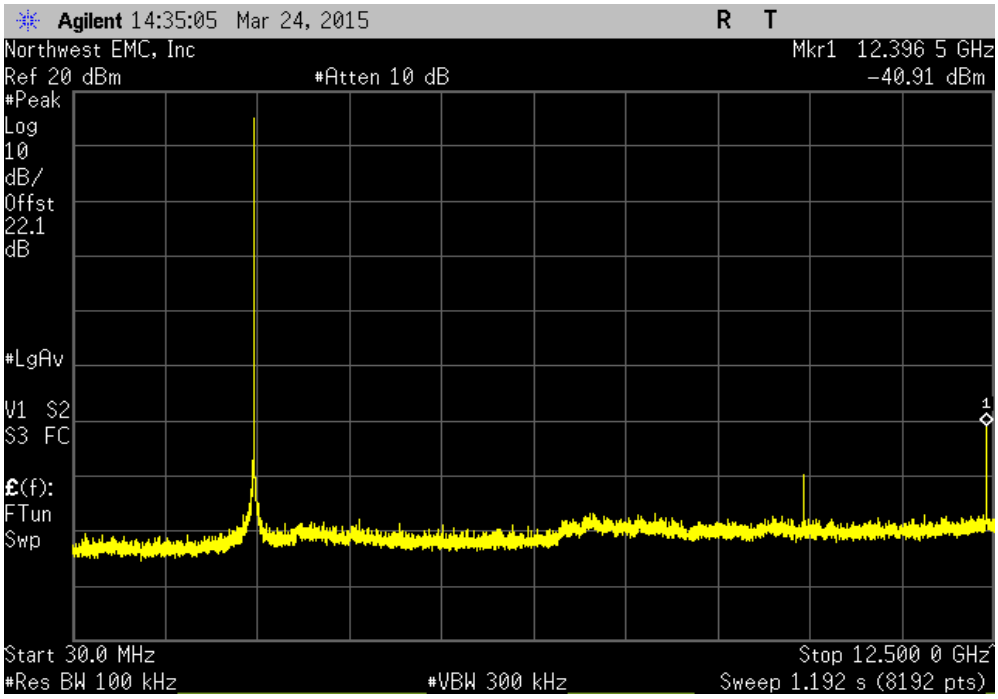
2400 MHz - 2483.5 MHz Band, Mid Channel 2440 MHz				
Frequency Range		Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz		-68.49	-20	Pass



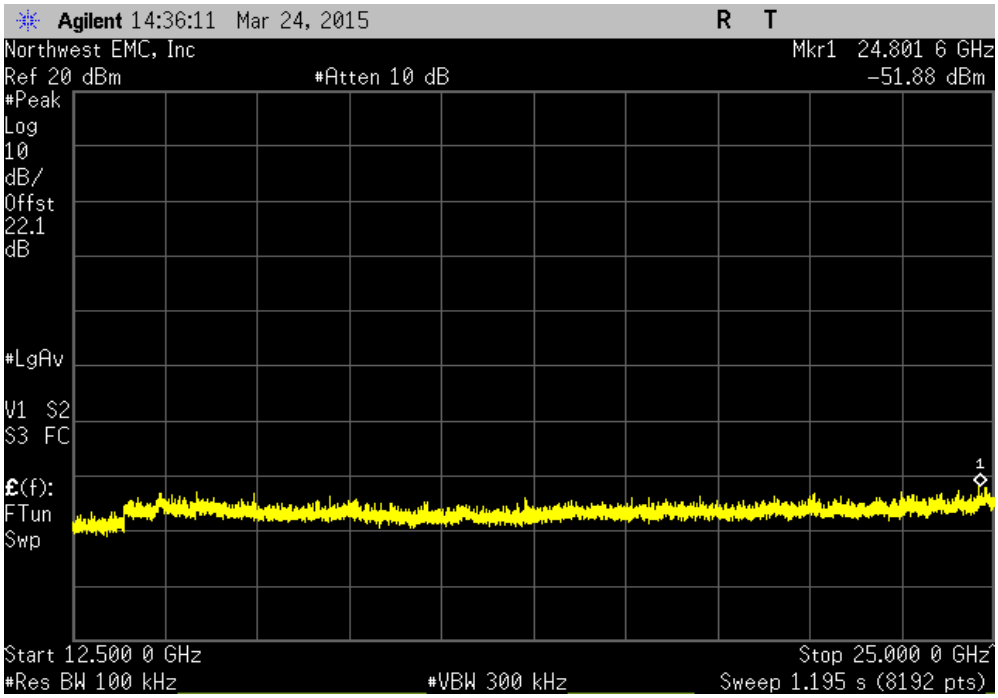
2400 MHz - 2483.5 MHz Band, High Channel 2480 MHz						
	Frequency Range			Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



2400 MHz - 2483.5 MHz Band, High Channel 2480 MHz					
Frequency Range			Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz			-56.24	-20	Pass



2400 MHz - 2483.5 MHz Band, High Channel 2480 MHz				
Frequency Range		**Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-67.21	-20	Pass



OCCUPIED BANDWIDTH

NORTHWEST EMC

XMit 2015.01.14

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mos)
Signal Generator	Agilent	E4422B	TGQ	3/23/2013	36
MN08 Direct Connect Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	10/2/2014	12
Attenuator, 20db, 'SMA'	SM Electronics	SA26B-20	RFW	3/10/2015	12
DC Block, 40 GHz	Fairview Microwave	SD3379	AMI	10/2/2014	12
Spectrum Analyzer	Agilent	E4440A	AAX	4/28/2014	12

TEST DESCRIPTION

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

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

OCCUPIED BANDWIDTH

NORTHWEST EMC

XMit 2015.01.14

EUT:	**Bridge Router**			**Work Order:**	**NRTH0006**
Serial Number:	**GP10002B0006**			**Date:**	**03/24/15**
Customer:	**SmartGuard L.L.C.**			**Temperature:**	**22.8°C**
Attendees:	**Dean Eriksson, Peter Edwards, Anthony Sorvary, Charlie Anderson**			**Humidity:**	**19%**
Project:	**None**			**Barometric Pres.:**	**1021.1**
Tested by:	**Johnathan Lee**	**Power:**	**110VAC/60Hz**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2015	ANSI C63.10:2009

COMMENTS

Ferrite added to Ethernet cable close to RJ45 jack

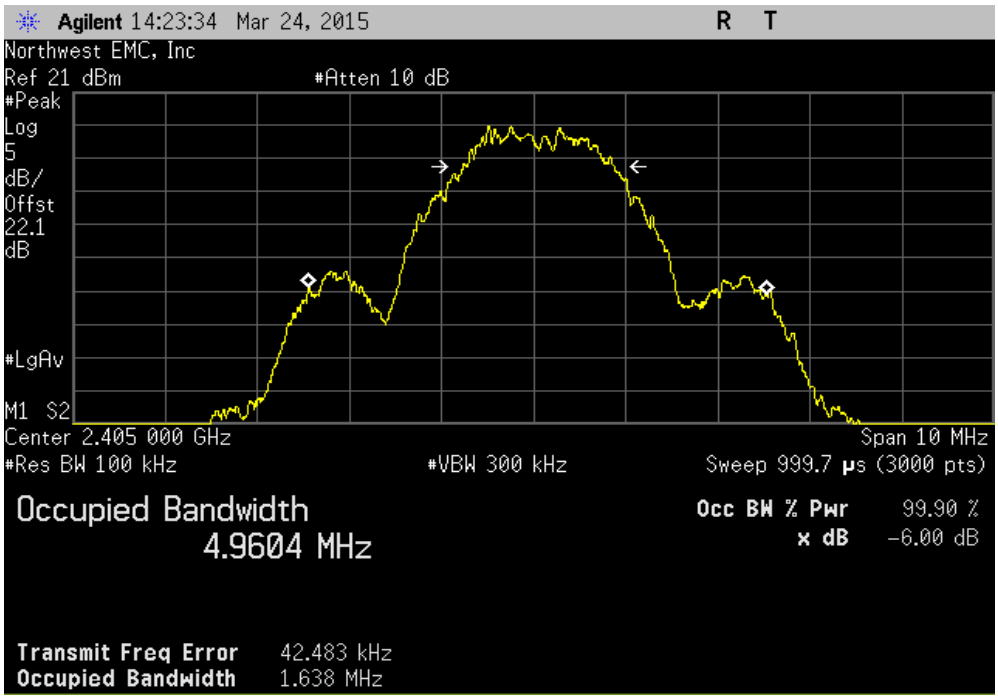
DEVIATIONS FROM TEST STANDARD

None

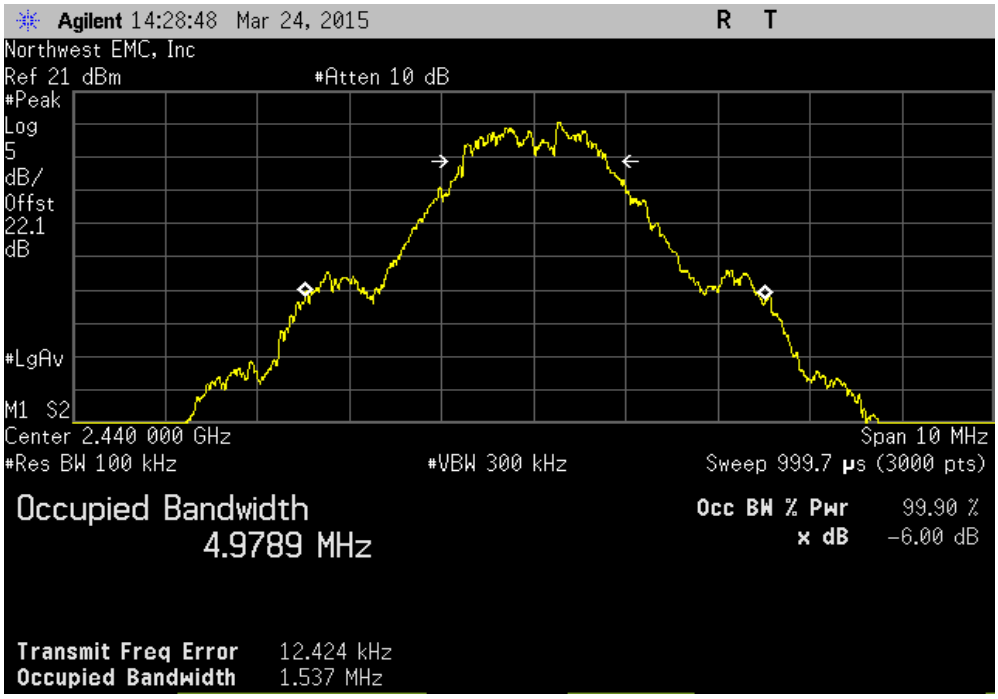
Configuration #	**2**	*Signature*

	Value	**Limit (>)**	**Result**
2400 MHz - 2483.5 MHz Band			
Low Channel 2405 MHz	1.638 MHz	500 kHz	Pass
Mid Channel 2440 MHz	1.537 MHz	500 kHz	Pass
High Channel 2480 MHz	1.671 MHz	500 kHz	Pass

2400 MHz - 2483.5 MHz Band, Low Channel 2405 MHz						
				Value	Limit (>)	Result
				1.638 MHz	500 kHz	Pass



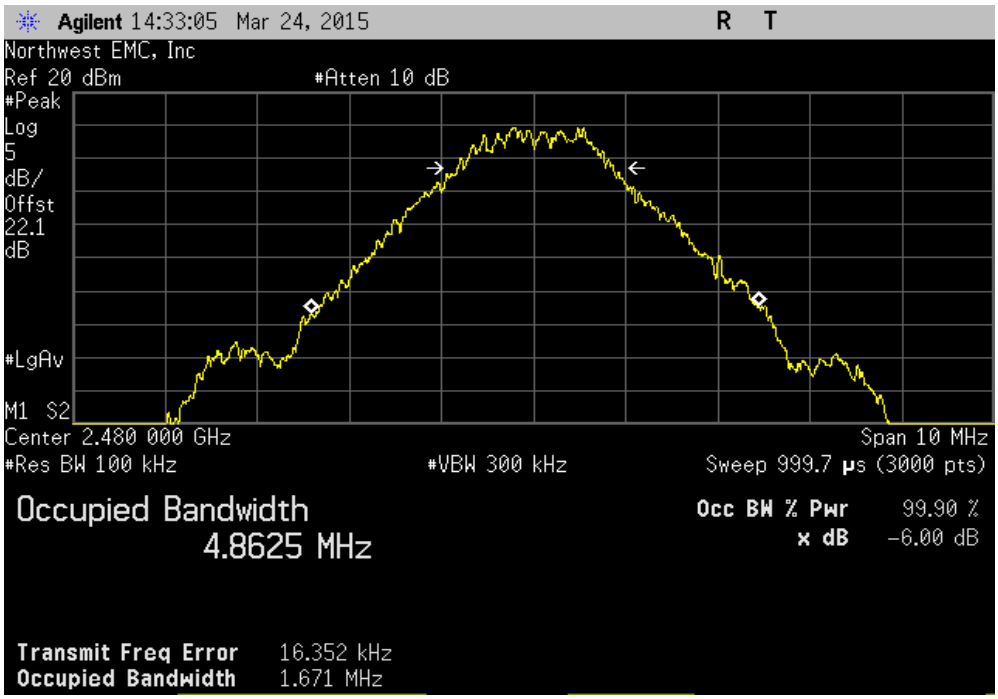
2400 MHz - 2483.5 MHz Band, Mid Channel 2440 MHz						
				Value	Limit (>)	Result
				1.537 MHz	500 kHz	Pass



OCCUPIED BANDWIDTH

XMit 2015.01.14

2400 MHz - 2483.5 MHz Band, High Channel 2480 MHz						
				Value	Limit (>)	Result
				1.671 MHz	500 kHz	Pass



OUTPUT POWER

XMit 2015.01.14

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mos)
MN08 Direct Connect Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	10/2/2014	12
Attenuator, 20db, 'SMA'	SM Electronics	SA26B-20	RFW	3/10/2015	12
DC Block, 40 GHz	Fairview Microwave	SD3379	AMI	10/2/2014	12
Signal Generator	Agilent	E4422B	TGQ	3/17/2015	36
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2015	12

TEST DESCRIPTION

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

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

The method found in KDB 558074 DTS D01 Measurement Section 9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio.

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

OUTPUT POWER

NORTHWEST EMC

XMit 2015.01.14

EUT:	**Bridge Router**			**Work Order:**	**NRTH0006**
Serial Number:	**GP10002B0007**			**Date:**	**03/27/15**
Customer:	**SmartGuard L.L.C.**			**Temperature:**	**22.4°C**
Attendees:	**Dean Eriksson, Anthony Sorvary**			**Humidity:**	**17%**
Project:	**None**			**Barometric Pres.:**	**1023.5**
Tested by:	**Trevor Buls**	**Power:**	**110VAC/60Hz**	**Job Site:**	**MN05**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2015	ANSI C63.10:2009

COMMENTS

Low Channel Pwr 19, Mid Channel Pwr 20, High Ch Pwr 6.

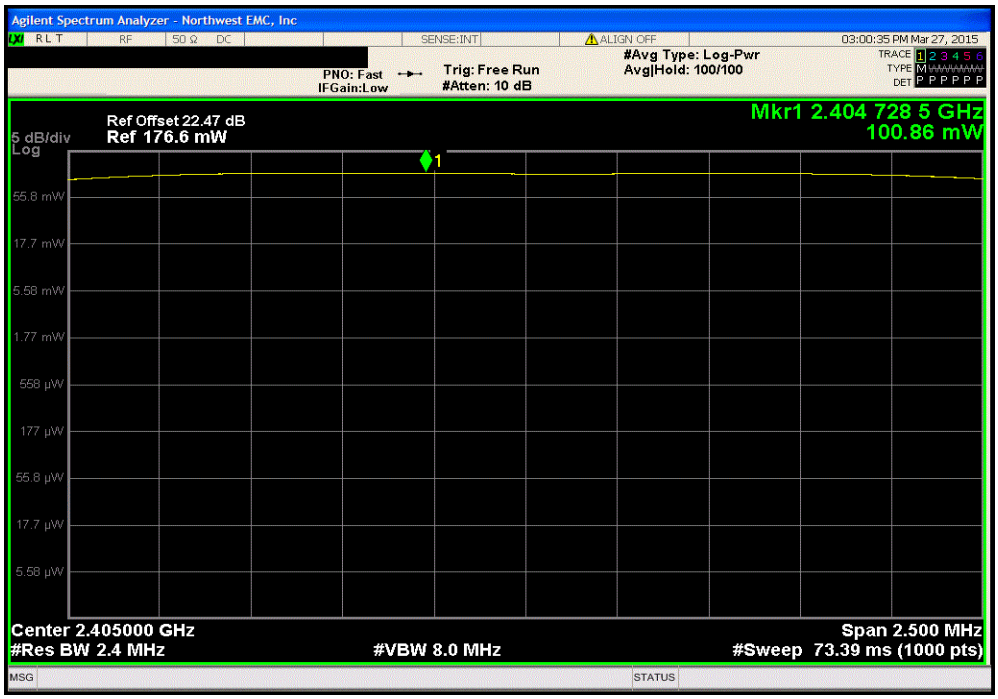
DEVIATIONS FROM TEST STANDARD

None

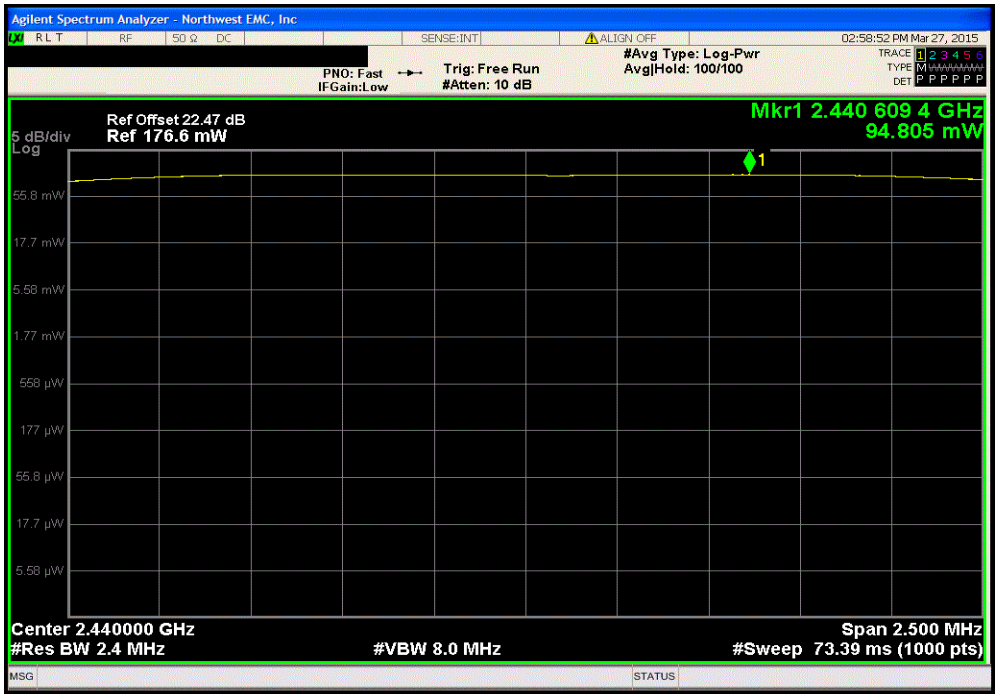
Configuration #	**4**	*Signature* Trevor Buls

	Value	**Limit (<)**	**Result**
Low Channel, 2405 MHz	100.86 mW	1 W	Pass
Mid Channel, 2440 MHz	94.805 mW	1 W	Pass
High Channel, 2480 MHz	4.878 mW	1 W	Pass

Low Channel, 2405 MHz						
				Value	Limit (<)	Result
				100.86 mW	1 W	Pass



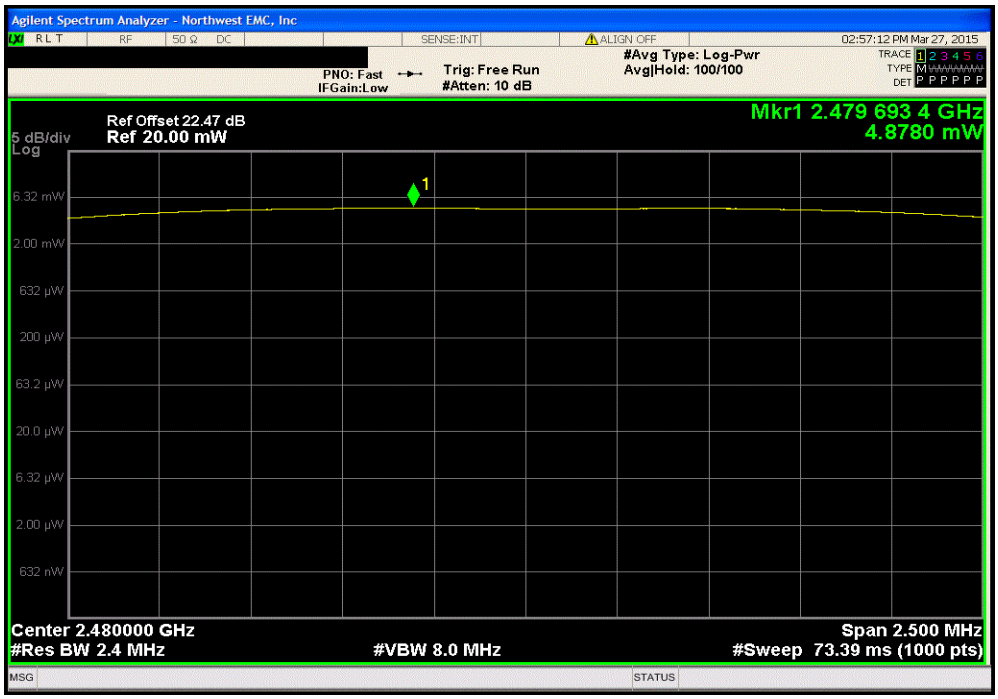
Mid Channel, 2440 MHz						
				Value	Limit (<)	Result
				94.805 mW	1 W	Pass



OUTPUT POWER

XMit 2015.01.14

High Channel, 2480 MHz						
				Value	Limit (<)	Result
				4.878 mW	1 W	Pass



POWER SPECTRAL DENSITY

XMit 2015.01.14

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mos)
Signal Generator	Agilent	E4422B	TGQ	3/17/2015	36
MN08 Direct Connect Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	10/2/2014	12
Attenuator, 20db, 'SMA'	SM Electronics	SA26B-20	RFW	3/10/2015	12
DC Block, 40 GHz	Fairview Microwave	SD3379	AMI	10/2/2014	12
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2015	12

TEST DESCRIPTION

The maximum power spectral density measurements were measured with the EUT set to the required transmit frequencies in each band. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the lowest, middle, and maximum data rate for each modulation type available.

Per the procedure outlined in FCC KDB 558074 D01 DTS Measurement Section 5.3.1, the spectrum analyzer was used as follows:

- RBW = 100 kHz
- VBW = 300 kHz
- Detector = Peak (to match method used for power measurement)
- Trace = Max hold

The observed power level is then scaled to an equivalent value in 3 kHz by adding a Bandwidth Correction Factor (BWCF) where:

BWCF = 10*LOG (3 kHz / 100 kHz) = -15.2 dB

POWER SPECTRAL DENSITY

NORTHWEST EMC

XMit 2015.01.14

EUT:	Bridge Router			**Work Order:**	NRTH0006
Serial Number:	GP10002B0007			**Date:**	03/27/15
Customer:	SmartGuard L.L.C.			**Temperature:**	22.4°C
Attendees:	Dean Eriksson, Anthony Sorvary			**Humidity:**	17%
Project:	None			**Barometric Pres.:**	1023.5
Tested by:	Trevor Buls	**Power:**	110VAC/60Hz	**Job Site:**	MN05

TEST SPECIFICATIONS	Test Method
FCC 15.247:2015	ANSI C63.10:2009

COMMENTS

Low Channel Pwr 19, Mid Channel Pwr 20, High Ch Pwr 6.

DEVIATIONS FROM TEST STANDARD

None

Configuration #	4	Signature	Trevor Buls

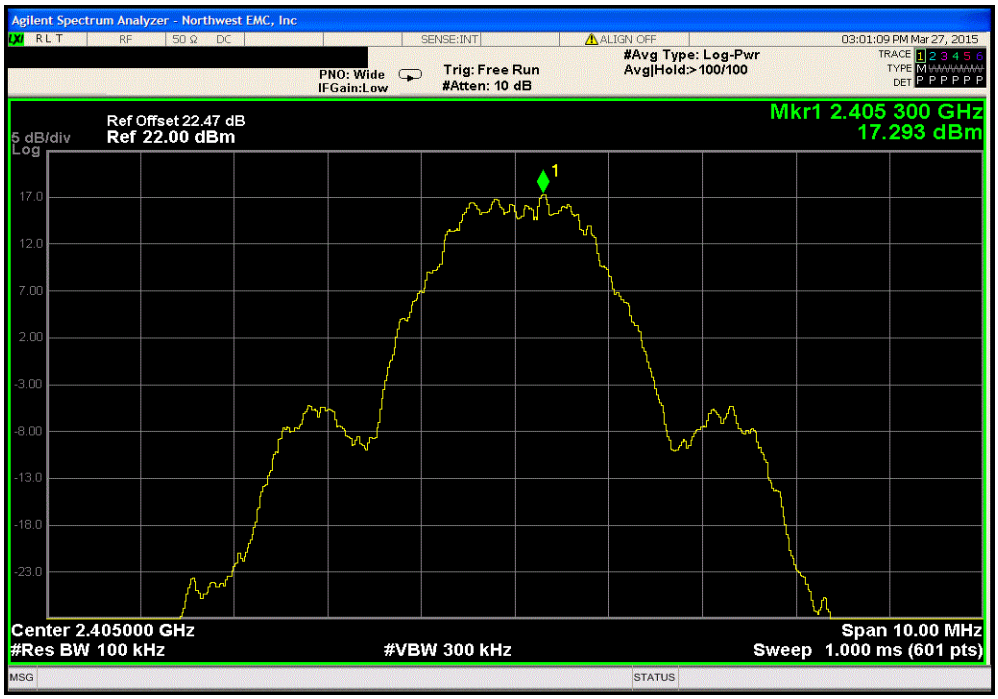
	Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Results
Low Channel, 2405 MHz	17.293	-15.2	2.093	8	Pass
Mid Channel, 2440 MHz	16.887	-15.2	1.687	8	Pass
High Channel, 2480 MHz	3.48	-15.2	-11.72	8	Pass

POWER SPECTRAL DENSITY

NORTHWEST EMC

XMit 2015.01.14

Low Channel, 2405 MHz						
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Results
		17.293	-15.2	2.093	8	Pass

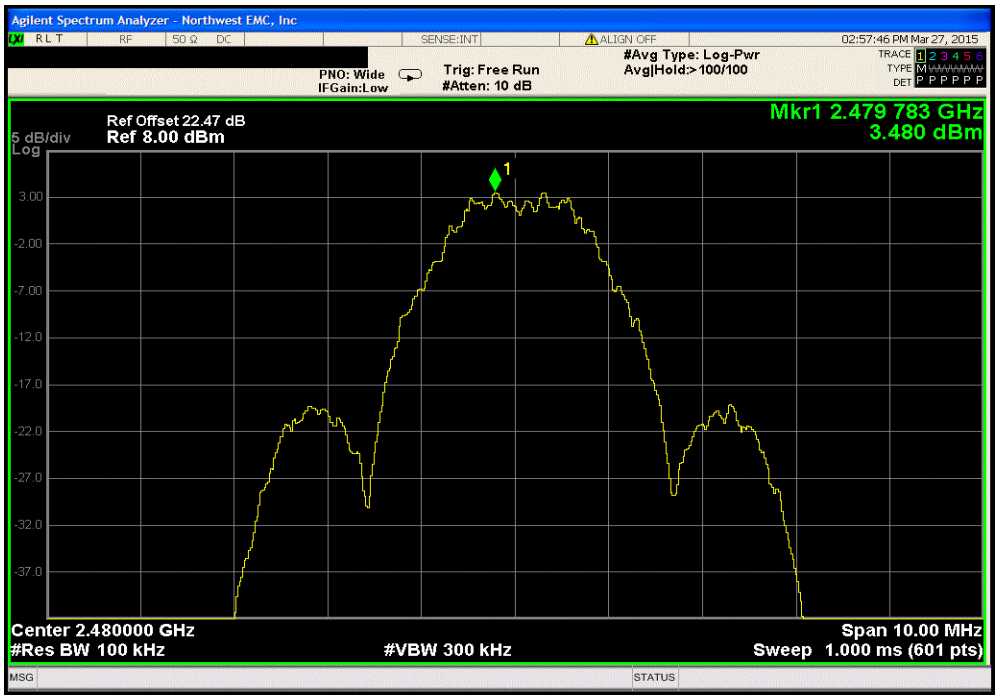


Mid Channel, 2440 MHz						
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Results
		16.887	-15.2	1.687	8	Pass

POWER SPECTRAL DENSITY

XMit 2015.01.14

High Channel, 2480 MHz						
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Results
		3.48	-15.2	-11.72	8	Pass



DUTY CYCLE

TEST DESCRIPTION

The Duty Cycle (x) were measured for each of the EUT operating modes. The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

The EUT operates at 100% Duty Cycle.