

NORTHWEST EMC

SmartGuard, LLC

MyGrid Switch/MG11AZ

FCC 15.207:2015

FCC 15.247:2015

802.15.4 2.4GHz radio

Report # SMTG0001.3



NVLAP Lab Code: 200881-0

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

CERTIFICATE OF TEST

Last Date of Test: December 11, 2015
SmartGuard, LLC
Model: MyGrid Switch/MG11AZ

Radio Equipment Testing

Standards

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

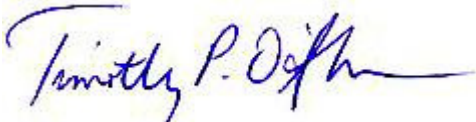
Results

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

Deviations From Test Standards

None

Approved By:



Tim O'Shea, Operations Manager

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

REVISION HISTORY

Revision Number		Description	Date	Page Number
00		None		

ACCREDITATIONS AND AUTHORIZATIONS

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

Measurement Uncertainty

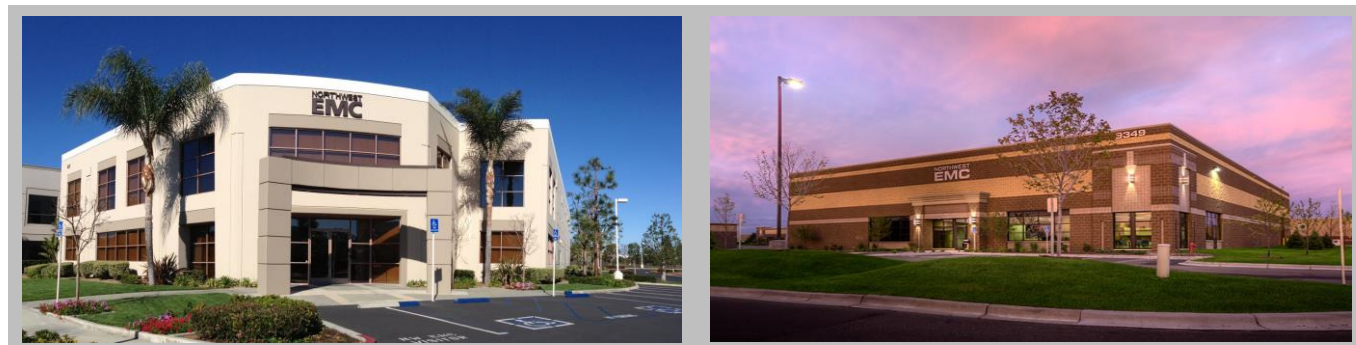
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement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

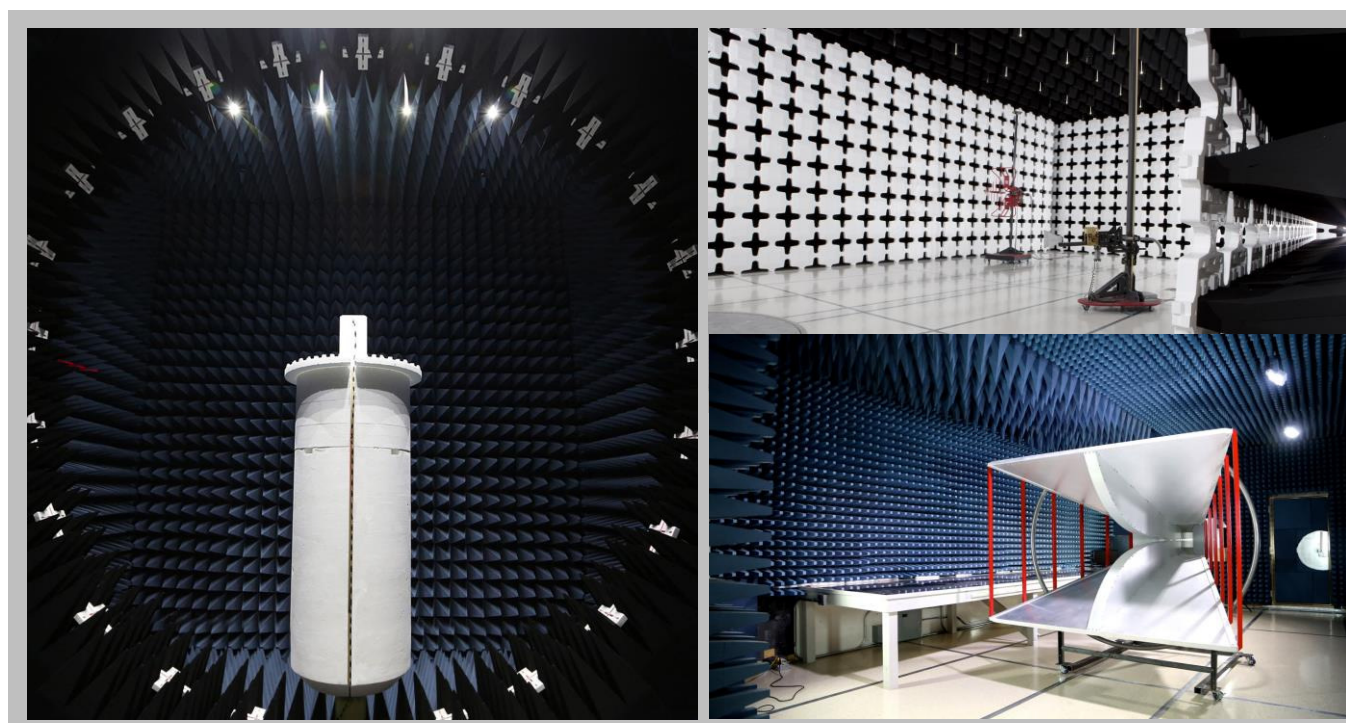
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

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)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

FACILITIES



California Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Oregon Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th 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/RRR, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	SmartGuard, LLC
Address:	3660 Technology Drive NE
City, State, Zip:	Minneapolis, MN 55418
Test Requested By:	Michael Maas
Model:	MyGrid Switch/MG11AZ
First Date of Test:	December 10, 2015
Last Date of Test:	December 11, 2015
Receipt Date of Samples:	November 12, 2015
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
The device is a wallwart form factor smart plug with an 802.15.4 2.4GHz radio. It is powered directly from the wall and contains a switching power supply.
Testing Objective:
To demonstrate compliance of the 2.4 GHz ISM radio to FCC 15.247 requirements

CONFIGURATIONS

Configuration SMTG0001- 4

EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
Smart Plug	SmartGuard, LLC	MyGrid Switch/MG11AZ	12031501033		

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Extension Cable	No	>3m	No	Smart Plug	AC Mains

Configuration SMTG0001- 5

EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
Smart Plug	SmartGuard, LLC	MyGrid Switch/MG11AZ	12031501033		

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Extension Cable	No	1.8m	No	Smart Plug	AC Mains

Configuration SMTG0001- 6

EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
Smart Plug	SmartGuard, LLC	MyGrid Switch/MG11AZ	12031501024		

Peripherals in test setup boundary					
Description	Manufacturer	Model/Part Number	Serial Number		
Isolated AC Power Supply	BK Precision	1653A	198B15		

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.8m	No	Smart Plug	Isolated AC Power Supply
AC Power	No	1.8m	No	Isolated AC Power Supply	AC Mains

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	12/10/2015	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
2	12/11/2015	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
3	12/11/2015	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
4	12/11/2015	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
5	12/11/2015	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
6	12/11/2015	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
7	12/11/2015	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

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.

OCCUPIED BANDWIDTH

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

TEST EQUIPMENT

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

TEST DESCRIPTION

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

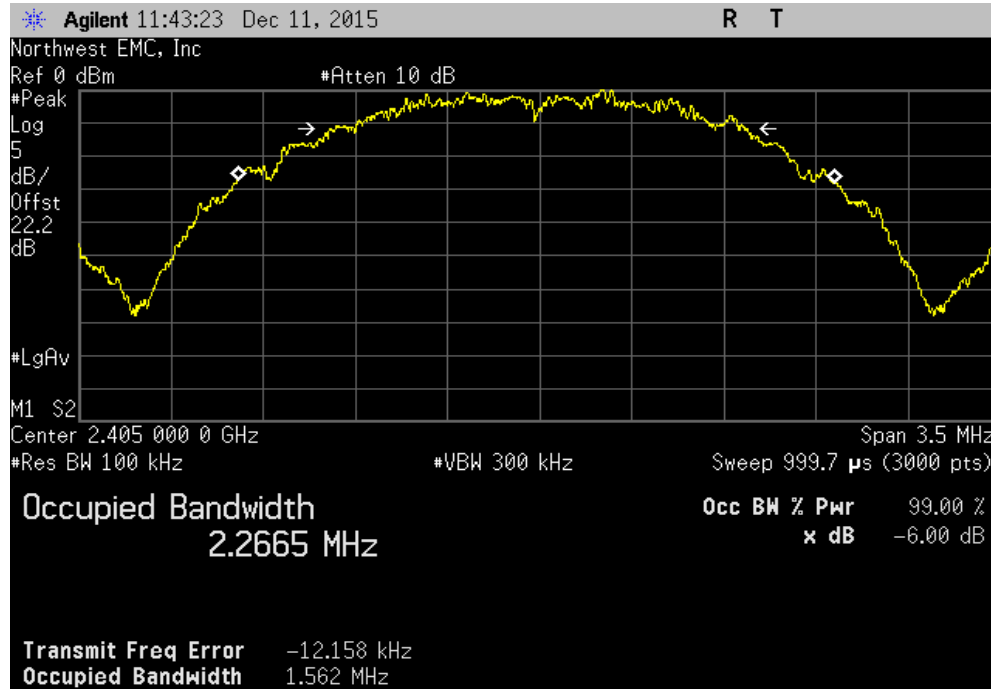
The EUT was set to the channels and modes listed in the datasheet. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer.

OCCUPIED BANDWIDTH

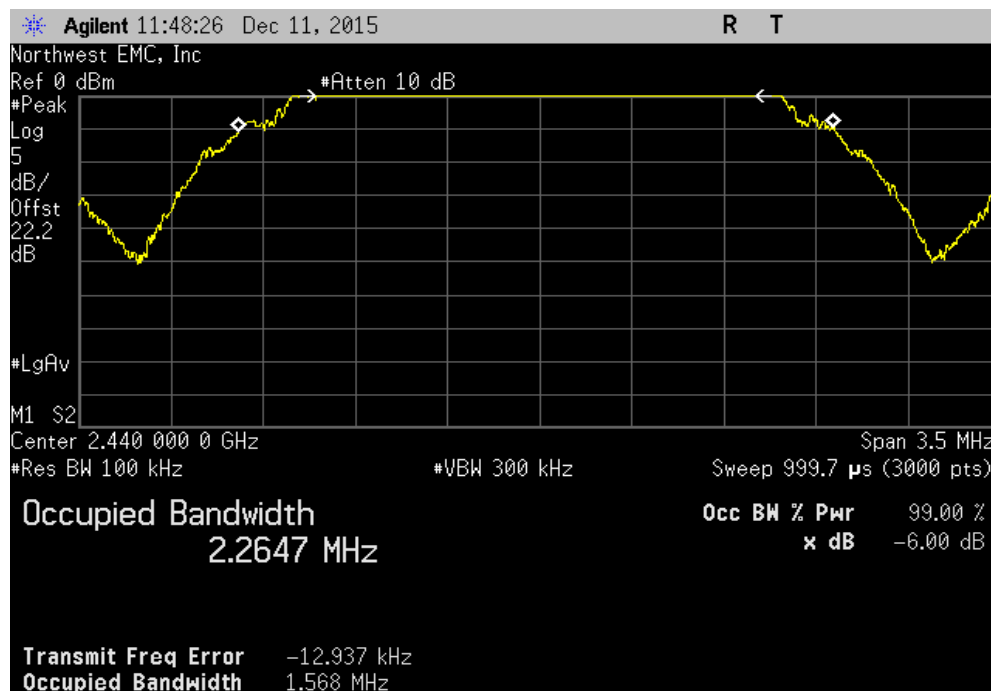
EUT: MyGrid Switch/MG11AZ		Work Order: SMTG0001	
Serial Number: 12031501024		Date: 12/11/15	
Customer: SmartGuard, LLC		Temperature: 21.7°C	
Attendees: Mike Maas, Matt Kiesow, Amy Baker		Humidity: 30%	
Project: None		Barometric Pres.: 978.4	
Tested by: Trevor Buls	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS			
FCC 15.247:2015		Test Method	
		ANSI C63.10:2013	
COMMENTS			
Power settings Low Ch: 11, Mid Ch: 16, High Ch: 5.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	6	Signature <i>Trevor Buls</i>	
		Value	Limit (>)
Low Channel, 2405 MHz		1.562 MHz	500 kHz
Mid Channel, 2440 MHz		1.568 MHz	500 kHz
High Channel, 2480 MHz		1.659 MHz	500 kHz
			Result
			Pass
			Pass
			Pass

OCCUPIED BANDWIDTH

Low Channel, 2405 MHz						
				Value	Limit (>)	Result
				1.562 MHz	500 kHz	Pass

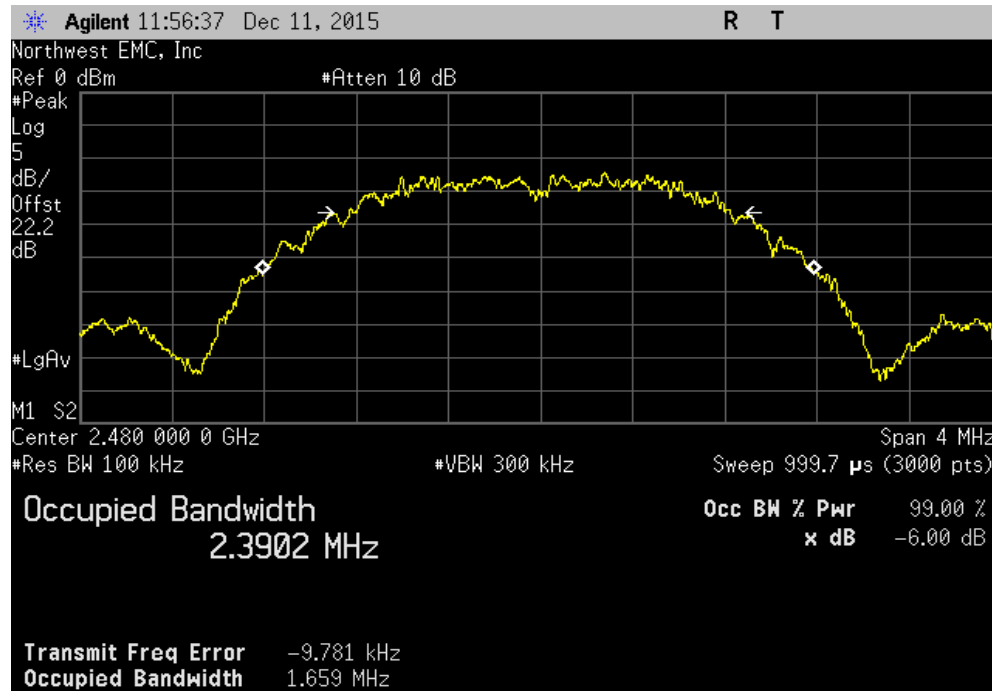


Mid Channel, 2440 MHz						
				Value	Limit (>)	Result
				1.568 MHz	500 kHz	Pass



OCCUPIED BANDWIDTH

High Channel, 2480 MHz						
				Value	Limit (>)	Result
				1.659 MHz	500 kHz	Pass



OUTPUT POWER

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

TEST EQUIPMENT

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

TEST DESCRIPTION

The 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 ANSI C63.10:2013 Section 11.10.2 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio..

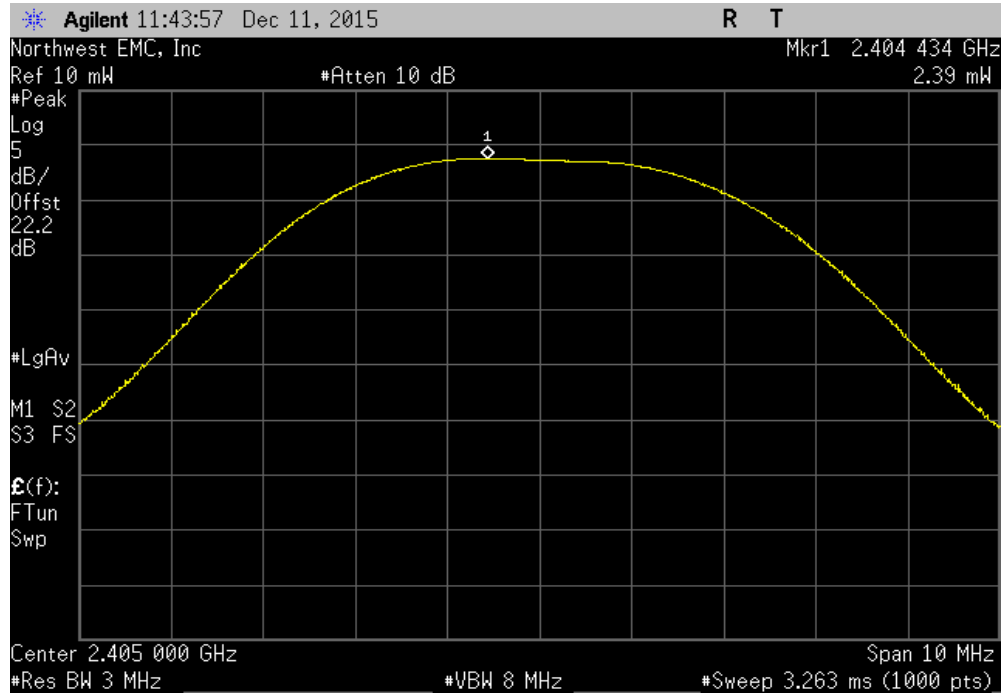
De Facto EIRP Limit: Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36 dBm.

OUTPUT POWER

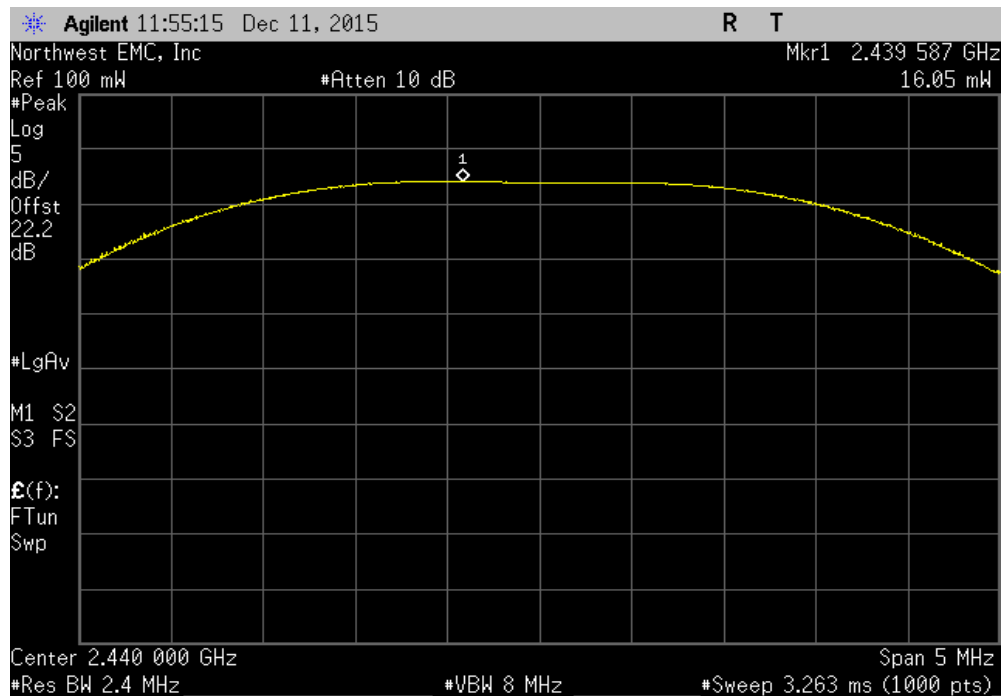
EUT: MyGrid Switch/MG11AZ		Work Order: SMTG0001	
Serial Number: 12031501024		Date: 12/11/15	
Customer: SmartGuard, LLC		Temperature: 21.7°C	
Attendees: Mike Maas, Matt Kiesow, Amy Baker		Humidity: 30%	
Project: None		Barometric Pres.: 978.4	
Tested by: Trevor Buls	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS			
FCC 15.247:2015		Test Method	
		ANSI C63.10:2013	
COMMENTS			
Power settings Low Ch: 11, Mid Ch: 16, High Ch: 5.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	6	Signature <i>Trevor Buls</i>	
		Value	Limit (<) Result
Low Channel, 2405 MHz		2.389 mW	1 W Pass
Mid Channel, 2440 MHz		16.051 mW	1 W Pass
High Channel, 2480 MHz		168.85 uW	1 W Pass

OUTPUT POWER

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

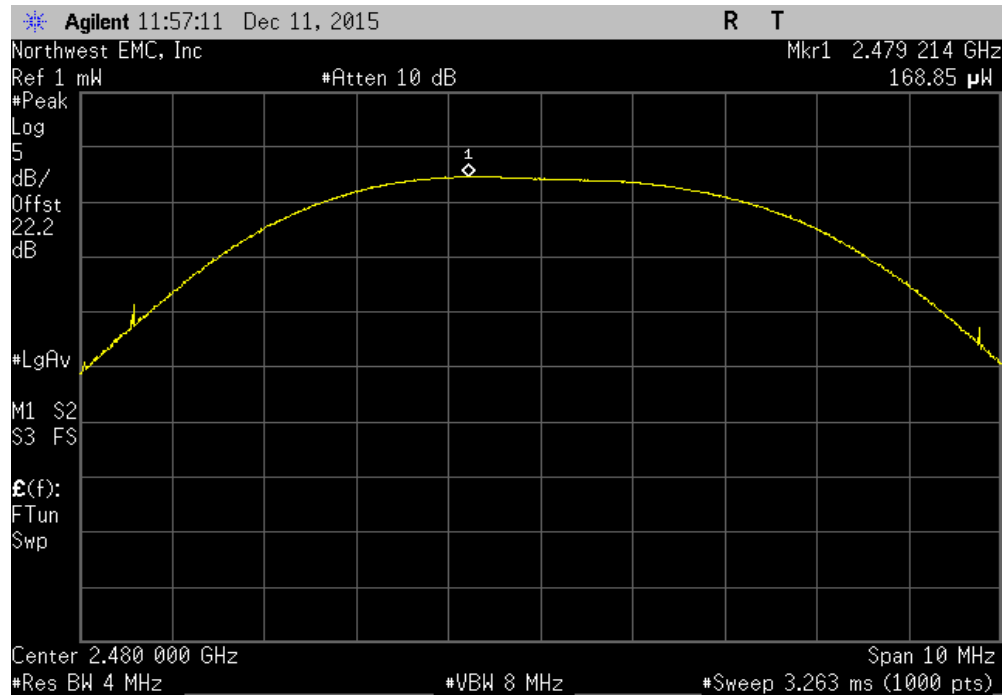


Mid Channel, 2440 MHz						
				Value	Limit (<)	Result
				16.051 mW	1 W	Pass



OUTPUT POWER

High Channel, 2480 MHz						
				Value	Limit (<)	Result
				168.85 uW	1 W	Pass



POWER SPECTRAL DENSITY

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

TEST EQUIPMENT

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

TEST DESCRIPTION

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

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

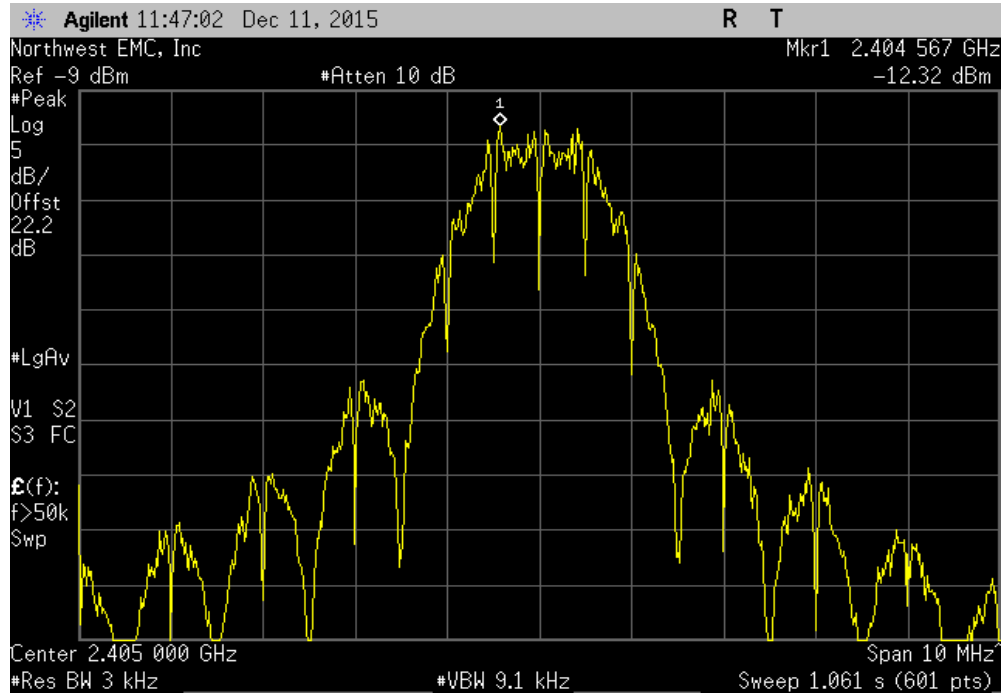
Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

POWER SPECTRAL DENSITY

EUT: MyGrid Switch/MG11AZ		Work Order: SMTG0001	
Serial Number: 12031501024		Date: 12/11/15	
Customer: SmartGuard, LLC		Temperature: 21.7°C	
Attendees: Mike Maas, Matt Kiesow, Amy Baker		Humidity: 30%	
Project: None		Barometric Pres.: 978.4	
Tested by: Trevor Buls	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS			
FCC 15.247:2015		Test Method	
		ANSI C63.10:2013	
COMMENTS			
Power settings Low Ch: 11, Mid Ch: 16, High Ch: 5.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	6	Signature <i>Trevor Buls</i>	
		Value dBm/3kHz	Limit < dBm/3kHz
Low Channel, 2405 MHz		-12.325	8
Mid Channel, 2440 MHz		-2.783	8
High Channel, 2480 MHz		-22.82	8
			Results
			Pass
			Pass
			Pass

POWER SPECTRAL DENSITY

Low Channel, 2405 MHz				Value	Limit	Results
				dBm/3kHz	< dBm/3kHz	
				-12.325	8	Pass

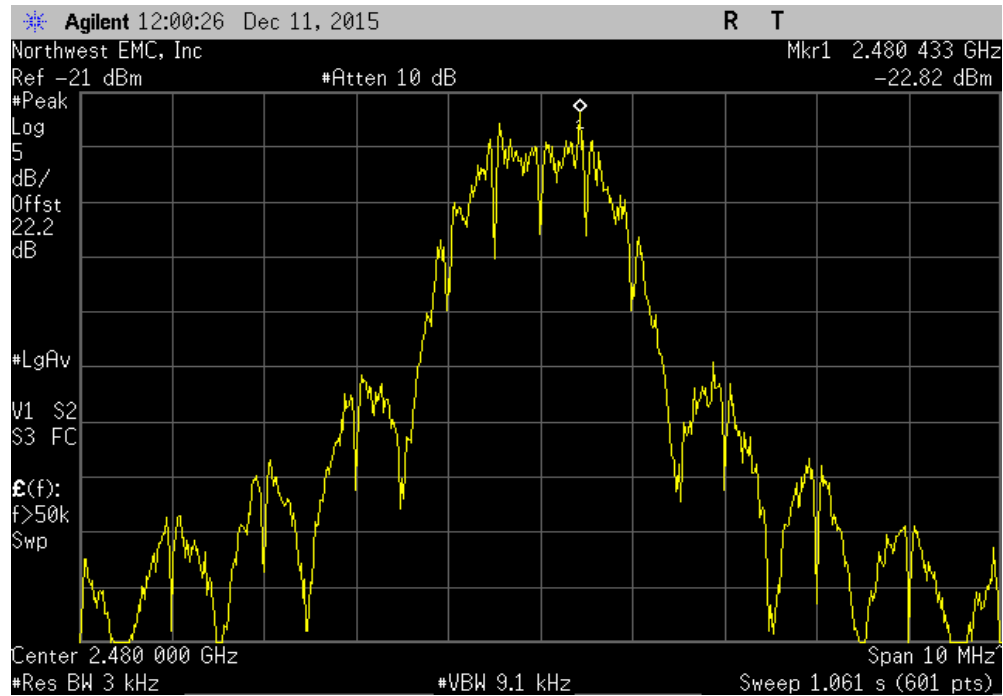


Mid Channel, 2440 MHz				Value	Limit	Results
				dBm/3kHz	< dBm/3kHz	
				-2.783	8	Pass



POWER SPECTRAL DENSITY

High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-22.82	8	Pass



BAND EDGE COMPLIANCE

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

TEST EQUIPMENT

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

TEST DESCRIPTION

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

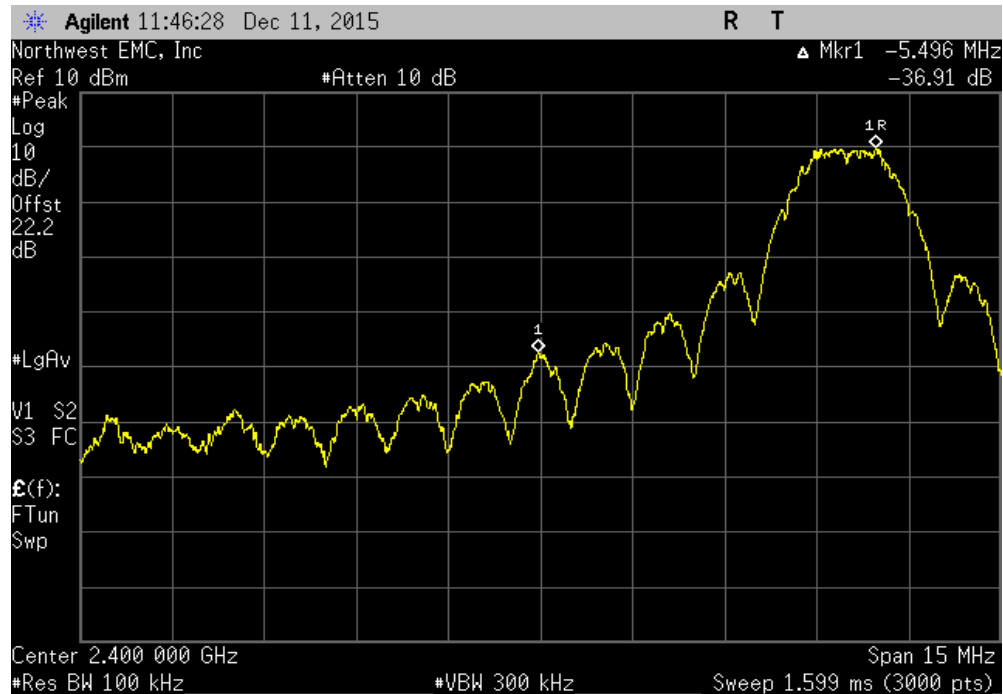
The spectrum was scanned below the lower band edge and above the higher band edge.

BAND EDGE COMPLIANCE

EUT: MyGrid Switch/MG11AZ		Work Order: SMTG0001	
Serial Number: 12031501024		Date: 12/11/15	
Customer: SmartGuard, LLC		Temperature: 21.7°C	
Attendees: Mike Maas, Matt Kiesow, Amy Baker		Humidity: 30%	
Project: None		Barometric Pres.: 978.4	
Tested by: Trevor Buls	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS			
FCC 15.247:2015		Test Method	
		ANSI C63.10:2013	
COMMENTS			
Power settings Low Ch: 11, Mid Ch: 16, High Ch: 5.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	6	Signature <i>Trevor Buls</i>	
		Value (dBc)	Limit ≤ (dBc) Result
Low Channel, 2405 MHz		-36.91	-20 Pass
High Channel, 2480 MHz		-35.03	-20 Pass

BAND EDGE COMPLIANCE

Low Channel, 2405 MHz				Value (dBc)	Limit ≤ (dBc)	Result
				-36.91	-20	Pass



High Channel, 2480 MHz				Value (dBc)	Limit ≤ (dBc)	Result
				-35.03	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

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

TEST EQUIPMENT

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

TEST DESCRIPTION

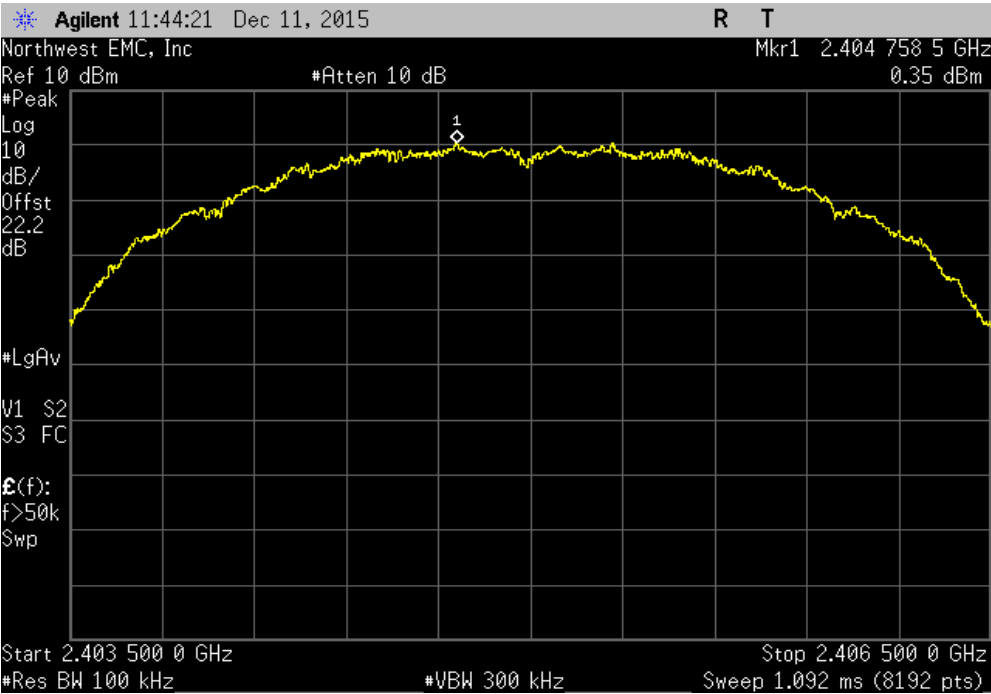
The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet. For each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

SPURIOUS CONDUCTED EMISSIONS

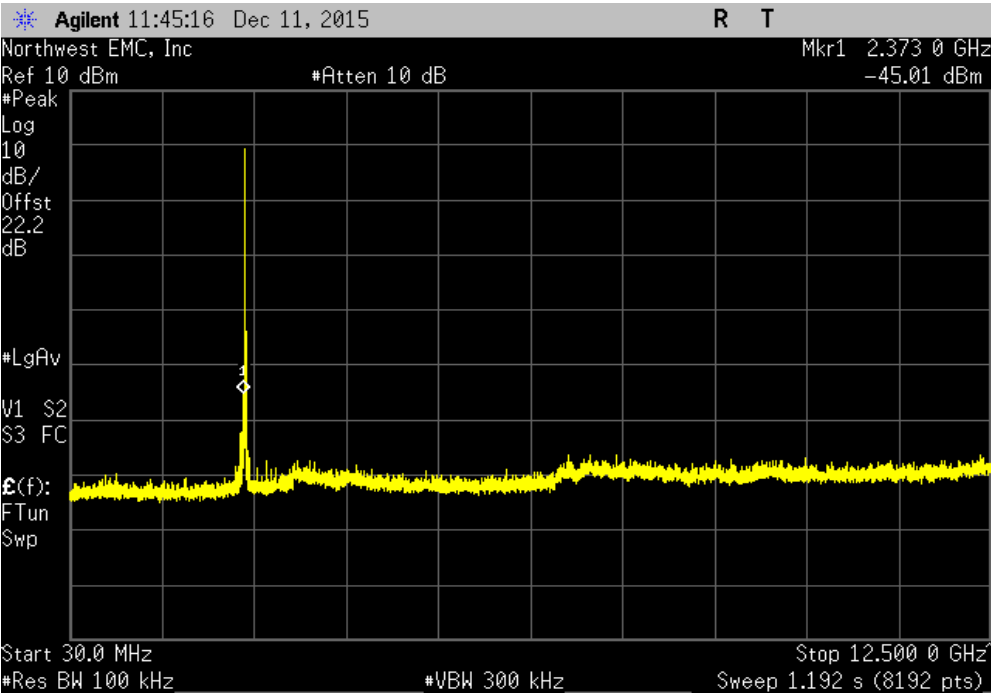
EUT: MyGrid Switch/MG11AZ		Work Order: SMTG0001	
Serial Number: 12031501024		Date: 12/11/15	
Customer: SmartGuard, LLC		Temperature: 21.7°C	
Attendees: Mike Maas, Matt Kiesow, Amy Baker		Humidity: 30%	
Project: None		Barometric Pres.: 978.4	
Tested by: Trevor Buls	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS			
FCC 15.247:2015		Test Method	
		ANSI C63.10:2013	
COMMENTS			
Power settings Low Ch: 11, Mid Ch: 16, High Ch: 5.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	6	Signature <i>Trevor Buls</i>	
		Frequency Range	Max Value (dBc)
			Limit ≤ (dBc)
			Result
Low Channel, 2405 MHz		Fundamental	N/A
Low Channel, 2405 MHz		30 MHz - 12.5 GHz	-45.36
Low Channel, 2405 MHz		12.5 GHz - 25 GHz	-52.29
Mid Channel, 2440 MHz		Fundamental	N/A
Mid Channel, 2440 MHz		30 MHz - 12.5 GHz	-57.7
Mid Channel, 2440 MHz		12.5 GHz - 25 GHz	-60.23
High Channel, 2480 MHz		Fundamental	N/A
High Channel, 2480 MHz		30 MHz - 12.5 GHz	-44.43
High Channel, 2480 MHz		12.5 GHz - 25 GHz	-40.01

SPURIOUS CONDUCTED EMISSIONS

Low Channel, 2405 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
Fundamental		N/A		N/A	N/A	

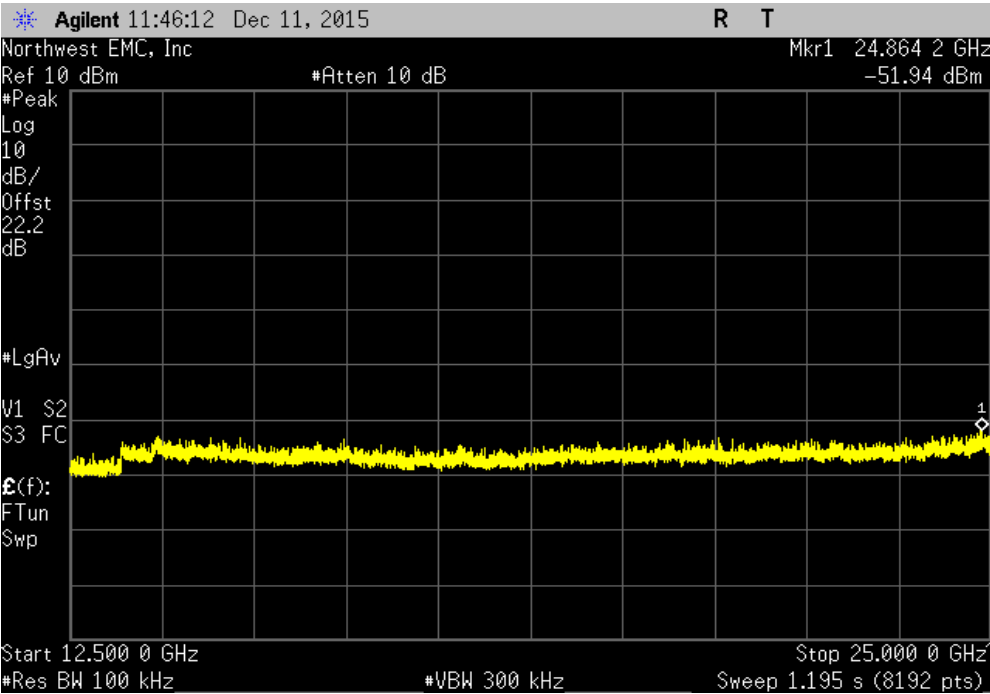


Low Channel, 2405 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-45.36		-20	Pass	

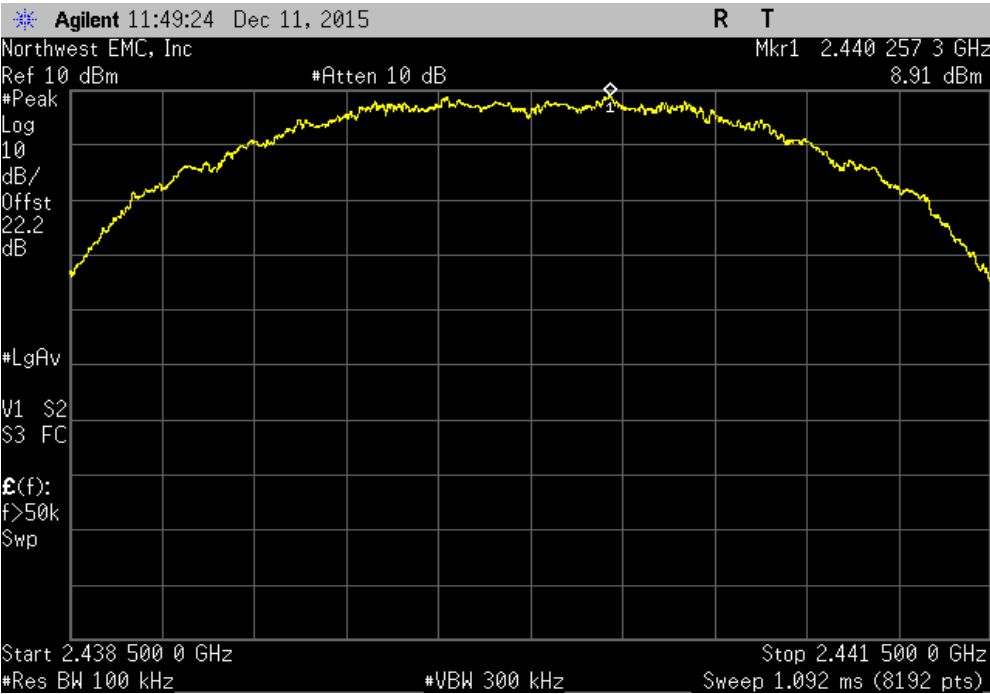


SPURIOUS CONDUCTED EMISSIONS

Low Channel, 2405 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-52.29	-20	Pass	

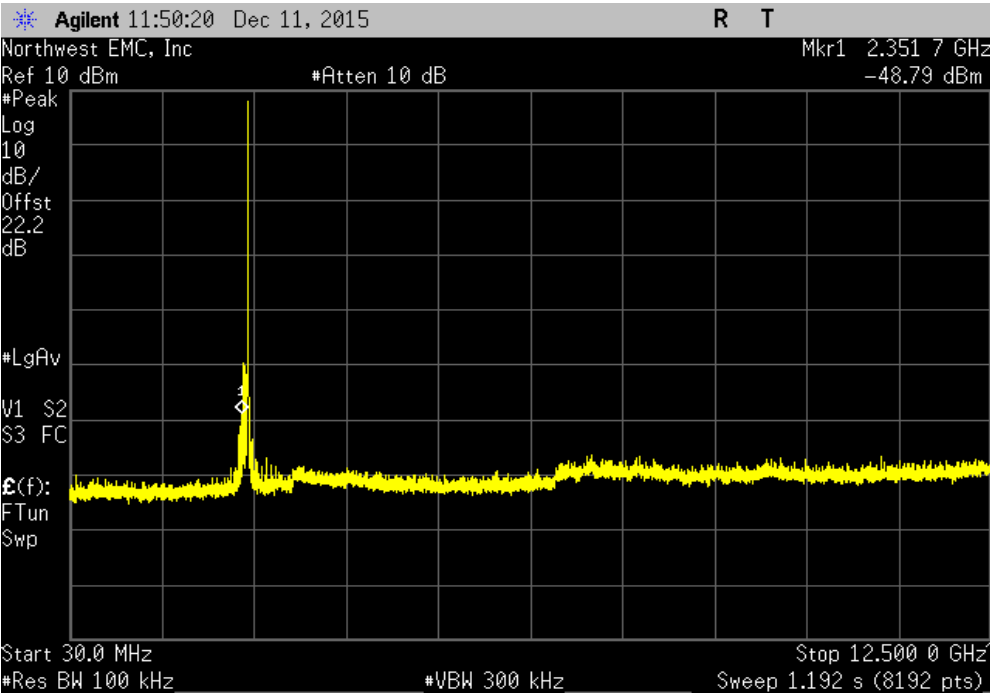


Mid Channel, 2440 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

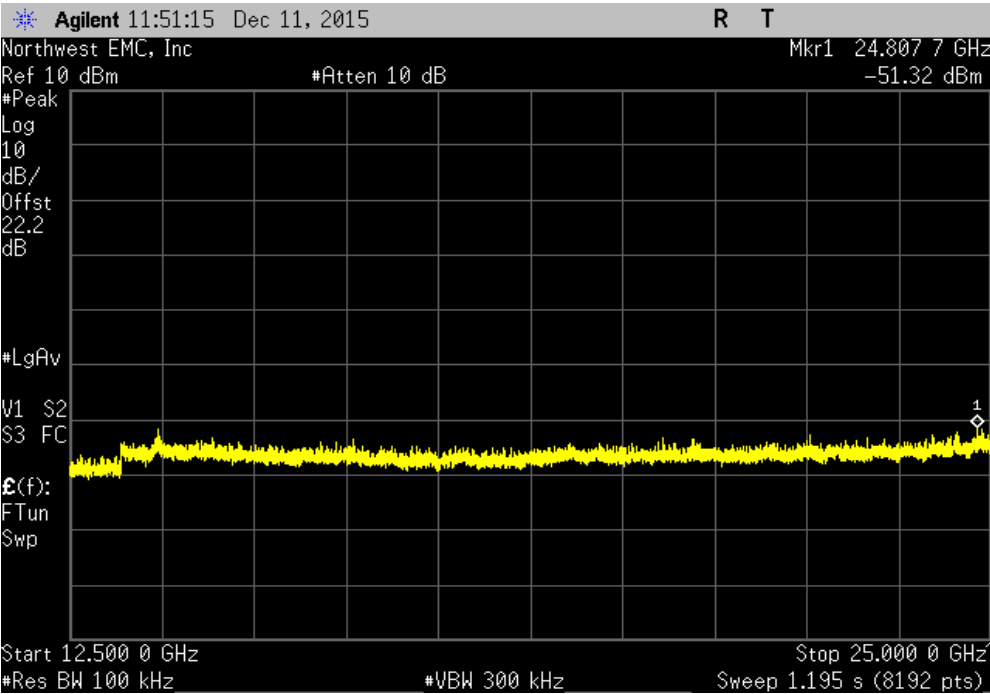


SPURIOUS CONDUCTED EMISSIONS

Mid Channel, 2440 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-57.7	-20	Pass	

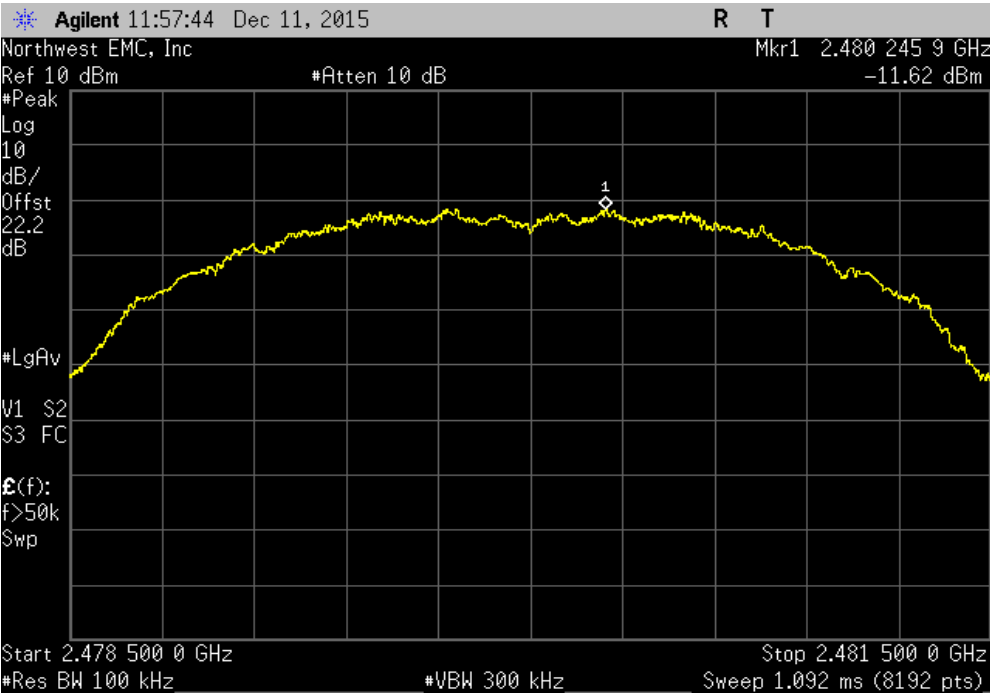


Mid Channel, 2440 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-60.23	-20	Pass	

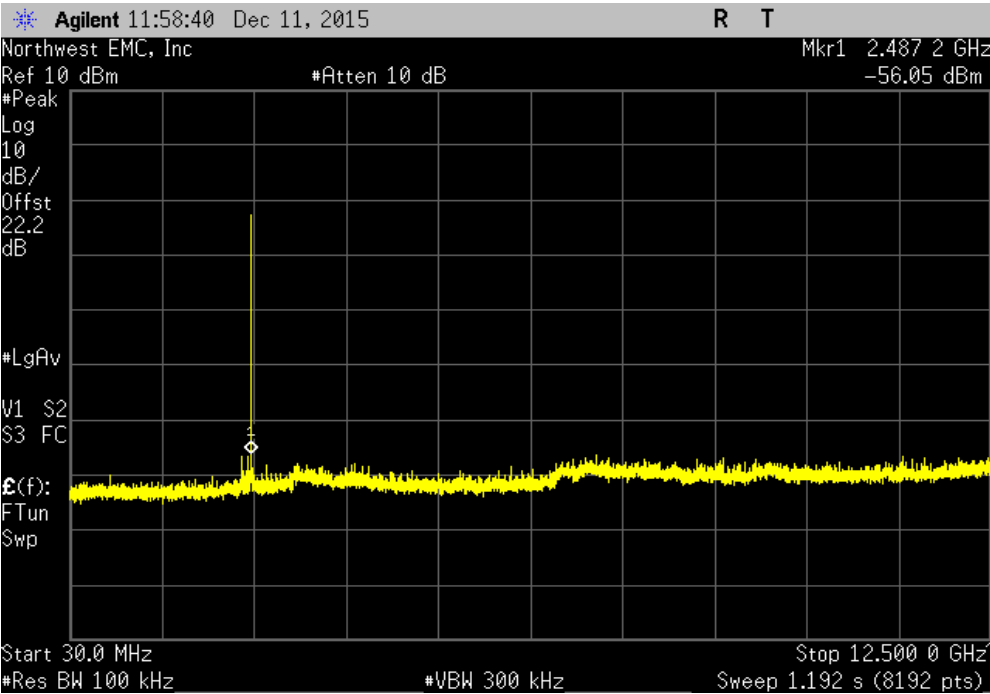


SPURIOUS CONDUCTED EMISSIONS

High Channel, 2480 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
Fundamental		N/A		N/A	N/A	

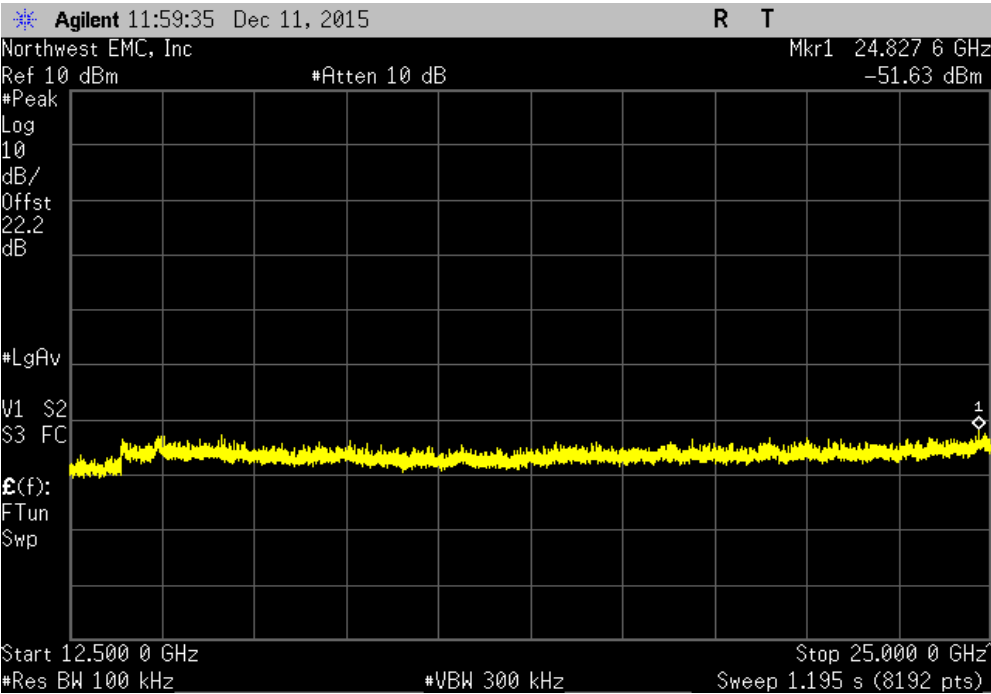


High Channel, 2480 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-44.43		-20	Pass	



SPURIOUS CONDUCTED EMISSIONS

High Channel, 2480 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-40.01	-20	Pass	



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.

MODES OF OPERATION

Transmitting Zigbee continuous modulated - low channel (2405 MHz), mid channel (2440 MHz), and high channel (2480 MHz)

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

SMTG0001 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz
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SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Attenuator	Fairview Microwave	SA18E-20	TWZ	10/21/2015	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	10/21/2015	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	LFN	10/21/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	9/18/2015	12 mo
Cable	Northwest EMC	18-26GHz Standard Gain Horn Cable	MNP	9/18/2015	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	3/2/2015	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	12/7/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	3/2/2015	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	3/10/2015	12 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	12/7/2015	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	6/3/2014	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	12/10/2015	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	12/7/2015	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	12/17/2013	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2015	12 mo

MEASUREMENT BANDWIDTHS

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

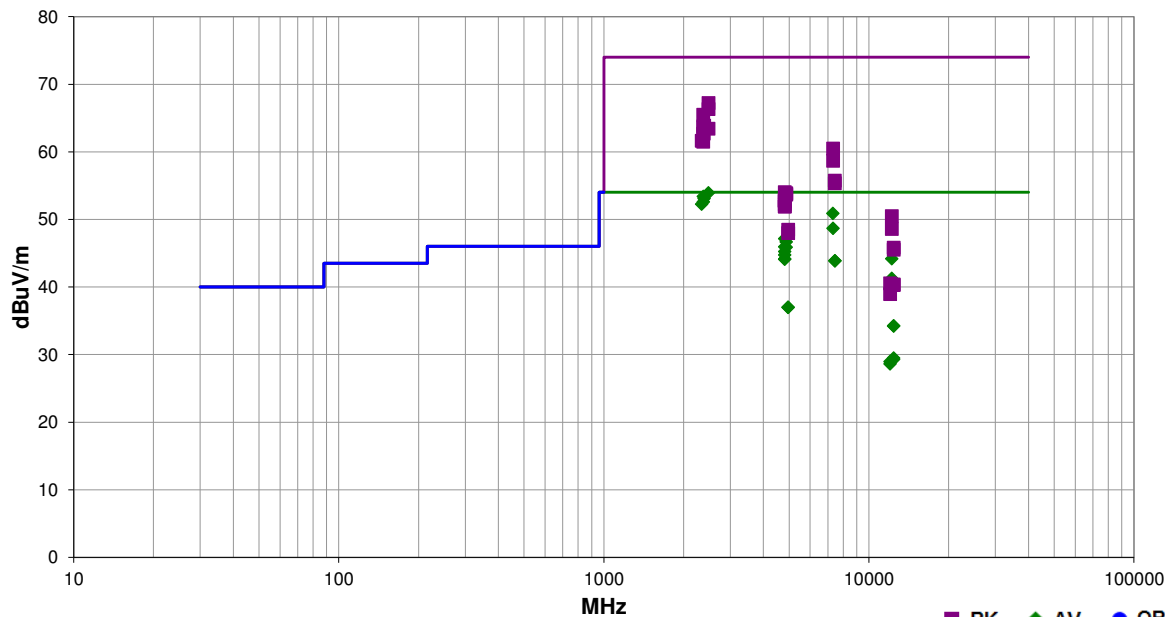
TEST DESCRIPTION

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

Work Order:	SMTG0001	Date:	12/10/15	
Project:	None	Temperature:	20.6 °C	
Job Site:	MN05	Humidity:	35.3% RH	
Serial Number:	12031501033	Barometric Pres.:	962.3 mbar	
EUT:	MyGrid Switch/MG11AZ			
Configuration:	4			
Customer:	SmartGuard, LLC			
Attendees:	Mike Maas, Matt Kiesow, Amy Baker			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting Zigbee continuous modulated - low channel (2405 MHz), mid channel (2440 MHz), and high channel (2480 MHz)			
Deviations:	None			
Comments:	None			

Test Specifications	Test Method
FCC 15.247:2015	ANSI C63.10:2013

Run #	82	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	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
2483.500	36.9	-3.0	1.0	307.9	3.0	20.0	Horz	AV	0.0	53.9	54.0	-0.1	High ch, EUT horz, pwr 5
2376.017	36.6	-3.2	1.0	346.0	3.0	20.0	Horz	AV	0.0	53.4	54.0	-0.6	Mid ch, EUT horz, pwr 16
2389.908	36.3	-3.2	1.0	311.0	3.0	20.0	Horz	AV	0.0	53.1	54.0	-0.9	Low ch, EUT horz, pwr 16
2372.967	35.8	-3.2	1.0	343.0	3.0	20.0	Horz	AV	0.0	52.6	54.0	-1.4	Low ch, EUT horz, pwr 11
2341.042	35.4	-3.2	1.0	312.9	3.0	20.0	Horz	AV	0.0	52.2	54.0	-1.8	Low ch, EUT horz, pwr 16
7318.550	36.8	14.1	2.4	23.1	3.0	0.0	Vert	AV	0.0	50.9	54.0	-3.1	Mid ch, EUT vert, pwr 16
7321.300	34.6	14.1	1.0	27.0	3.0	0.0	Horz	AV	0.0	48.7	54.0	-5.3	Mid ch, EUT horz, pwr 16
2483.542	50.2	-3.0	1.0	307.9	3.0	20.0	Horz	PK	0.0	67.2	74.0	-6.8	High ch, EUT horz, pwr 9
4810.983	41.7	5.4	3.8	103.0	3.0	0.0	Horz	AV	0.0	47.1	54.0	-6.9	Low ch, EUT horz, pwr 11
4879.083	40.9	5.8	1.0	73.1	3.0	0.0	Vert	AV	0.0	46.7	54.0	-7.3	Mid ch, EUT vert, pwr 16
2483.617	49.3	-3.0	1.0	311.0	3.0	20.0	Horz	PK	0.0	66.3	74.0	-7.7	High ch, EUT horz, pwr 8
4810.942	40.5	5.4	2.0	5.1	3.0	0.0	Horz	AV	0.0	45.9	54.0	-8.1	Low ch, EUT on side, pwr 11
4879.042	40.1	5.8	1.0	114.0	3.0	0.0	Horz	AV	0.0	45.9	54.0	-8.1	Mid ch, EUT horz, pwr 16
2372.433	48.7	-3.2	1.1	314.0	3.0	20.0	Horz	PK	0.0	65.5	74.0	-8.5	Low ch, EUT horz, pwr 16
4810.900	39.8	5.4	2.2	42.0	3.0	0.0	Vert	AV	0.0	45.2	54.0	-8.8	Low ch, EUT vert, pwr 11
4810.883	39.3	5.4	1.0	135.0	3.0	0.0	Vert	AV	0.0	44.7	54.0	-9.3	Low ch, EUT horz, pwr 11
12197.500	44.7	-0.5	1.0	2.0	3.0	0.0	Vert	AV	0.0	44.2	54.0	-9.8	Mid ch, EUT vert, pwr 16
4810.983	38.7	5.4	1.0	66.1	3.0	0.0	Horz	AV	0.0	44.1	54.0	-9.9	Low ch, EUT vert, pwr 11
4810.908	38.7	5.4	2.3	23.1	3.0	0.0	Vert	AV	0.0	44.1	54.0	-9.9	Low ch, EUT on side, pwr 11
2389.567	47.1	-3.2	1.0	311.0	3.0	20.0	Horz	PK	0.0	63.9	74.0	-10.1	Low ch, EUT horz, pwr 16
7442.450	29.7	14.2	1.0	177.1	3.0	0.0	Horz	AV	0.0	43.9	54.0	-10.1	High ch, EUT horz, pwr 5
7442.117	29.7	14.2	1.0	64.0	3.0	0.0	Vert	AV	0.0	43.9	54.0	-10.1	High ch, EUT vert, pwr 5
2373.408	47.0	-3.2	1.0	311.9	3.0	20.0	Horz	PK	0.0	63.8	74.0	-10.2	Low ch, EUT horz, pwr 13
2372.350	46.8	-3.2	1.0	42.0	3.0	20.0	Horz	PK	0.0	63.6	74.0	-10.4	Low ch, EUT horz, pwr 14

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
2483.842	46.4	-3.0	1.0	307.9	3.0	20.0	Horz	PK	0.0	63.4	74.0	-10.6	High ch, EUT horz, pwr 5
2372.550	45.9	-3.2	1.1	311.9	3.0	20.0	Horz	PK	0.0	62.7	74.0	-11.3	Low ch, EUT horz, pwr 12
2376.658	45.9	-3.2	1.0	346.0	3.0	20.0	Horz	PK	0.0	62.7	74.0	-11.3	Mid ch, EUT horz, pwr 16
2341.000	44.8	-3.2	1.0	312.9	3.0	20.0	Horz	PK	0.0	61.6	74.0	-12.4	Low ch, EUT horz, pwr 16
2372.392	44.7	-3.2	1.0	343.0	3.0	20.0	Horz	PK	0.0	61.5	74.0	-12.5	Low ch, EUT horz, pwr 11
12197.540	41.8	-0.5	1.0	175.0	3.0	0.0	Horz	AV	0.0	41.3	54.0	-12.7	Mid ch, EUT horz, pwr 16
7321.058	46.4	14.1	2.4	23.1	3.0	0.0	Vert	PK	0.0	60.5	74.0	-13.5	Mid ch, EUT vert, pwr 16
7321.483	44.6	14.1	1.0	27.0	3.0	0.0	Horz	PK	0.0	58.7	74.0	-15.3	Mid ch, EUT horz, pwr 16
4962.500	30.9	6.1	1.0	306.0	3.0	0.0	Vert	AV	0.0	37.0	54.0	-17.0	High ch, EUT vert, pwr 5
4962.375	30.9	6.1	1.0	129.0	3.0	0.0	Horz	AV	0.0	37.0	54.0	-17.0	High ch, EUT horz, pwr 5
7438.433	41.6	14.1	1.0	177.1	3.0	0.0	Horz	PK	0.0	55.7	74.0	-18.3	High ch, EUT horz, pwr 5
7439.075	41.2	14.1	1.0	64.0	3.0	0.0	Vert	PK	0.0	55.3	74.0	-18.7	High ch, EUT vert, pwr 5
12400.550	29.1	5.1	1.0	272.9	3.0	0.0	Horz	AV	0.0	34.2	54.0	-19.8	High ch, EUT horz, pwr 5
12401.910	29.1	5.1	1.0	209.1	3.0	0.0	Vert	AV	0.0	34.2	54.0	-19.8	High ch, EUT vert, pwr 5
4810.958	48.6	5.4	3.8	103.0	3.0	0.0	Horz	PK	0.0	54.0	74.0	-20.0	Low ch, EUT horz, pwr 11
4878.933	48.1	5.8	1.0	73.1	3.0	0.0	Vert	PK	0.0	53.9	74.0	-20.1	Mid ch, EUT vert, pwr 16
4879.025	47.9	5.8	1.0	114.0	3.0	0.0	Horz	PK	0.0	53.7	74.0	-20.3	Mid ch, EUT horz, pwr 16
4808.975	47.4	5.4	2.0	5.1	3.0	0.0	Horz	PK	0.0	52.8	74.0	-21.2	Low ch, EUT on side, pwr 11
4810.900	47.2	5.4	2.2	42.0	3.0	0.0	Vert	PK	0.0	52.6	74.0	-21.4	Low ch, EUT vert, pwr 11
4810.933	46.8	5.4	1.0	135.0	3.0	0.0	Vert	PK	0.0	52.2	74.0	-21.8	Low ch, EUT horz, pwr 11
4810.883	46.5	5.4	1.0	66.1	3.0	0.0	Horz	PK	0.0	51.9	74.0	-22.1	Low ch, EUT vert, pwr 11
4810.817	46.5	5.4	2.3	23.1	3.0	0.0	Vert	PK	0.0	51.9	74.0	-22.1	Low ch, EUT on side, pwr 11
12197.600	51.0	-0.5	1.0	2.0	3.0	0.0	Vert	PK	0.0	50.5	74.0	-23.5	Mid ch, EUT vert, pwr 16
12396.670	29.3	0.2	1.0	232.0	3.0	0.0	Vert	AV	0.0	29.5	54.0	-24.5	High ch, EUT vert, pwr 5
12395.680	29.1	0.2	1.0	60.0	3.0	0.0	Horz	AV	0.0	29.3	54.0	-24.7	High ch, EUT horz, pwr 5
12027.600	30.6	-1.6	1.0	123.1	3.0	0.0	Horz	AV	0.0	29.0	54.0	-25.0	Low ch, EUT horz, pwr 11
12023.280	30.3	-1.7	1.0	239.9	3.0	0.0	Vert	AV	0.0	28.6	54.0	-25.4	Low ch, EUT vert, pwr 11
12202.300	49.1	-0.5	1.0	175.0	3.0	0.0	Horz	PK	0.0	48.6	74.0	-25.4	Mid ch, EUT horz, pwr 16
4959.967	42.4	6.1	1.0	306.0	3.0	0.0	Vert	PK	0.0	48.5	74.0	-25.5	High ch, EUT vert, pwr 5
4961.658	41.9	6.1	1.0	129.0	3.0	0.0	Horz	PK	0.0	48.0	74.0	-26.0	High ch, EUT horz, pwr 5
12400.450	40.7	5.1	1.0	209.1	3.0	0.0	Vert	PK	0.0	45.8	74.0	-28.2	High ch, EUT vert, pwr 5
12402.200	40.4	5.1	1.0	272.9	3.0	0.0	Horz	PK	0.0	45.5	74.0	-28.5	High ch, EUT horz, pwr 5
12026.550	42.2	-1.7	1.0	239.9	3.0	0.0	Vert	PK	0.0	40.5	74.0	-33.5	Low ch, EUT vert, pwr 11
12397.180	40.2	0.2	1.0	232.0	3.0	0.0	Vert	PK	0.0	40.4	74.0	-33.6	High ch, EUT vert, pwr 5
12396.290	40.1	0.2	1.0	60.0	3.0	0.0	Horz	PK	0.0	40.3	74.0	-33.7	High ch, EUT horz, pwr 5
12028.300	40.6	-1.6	1.0	123.1	3.0	0.0	Horz	PK	0.0	39.0	74.0	-35.0	Low ch, EUT horz, pwr 11

POWERLINE CONDUCTED EMISSIONS

TEST DESCRIPTION

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10.

TEST EQUIPMENT

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

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

SMTG0001-5

MODES INVESTIGATED

Transmitting Zigbee, High Ch, 2480 MHz
Transmitting Zigbee, Low Ch, 2405 MHz
Transmitting Zigbee, Mid Ch, 2440 MHz

POWERLINE CONDUCTED EMISSIONS

EUT:	MyGrid Switch/MG11AZ	Work Order:	SMTG0001
Serial Number:	12031501033	Date:	12/11/2015
Customer:	SmartGuard, LLC	Temperature:	21.9°C
Attendees:	Mike Maas, Matt Kiesow, Amy Baker	Relative Humidity:	31.3%
Customer Project:	None	Bar. Pressure:	975.9 mb
Tested By:	Trevor Buls	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	SMTG0001-5

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

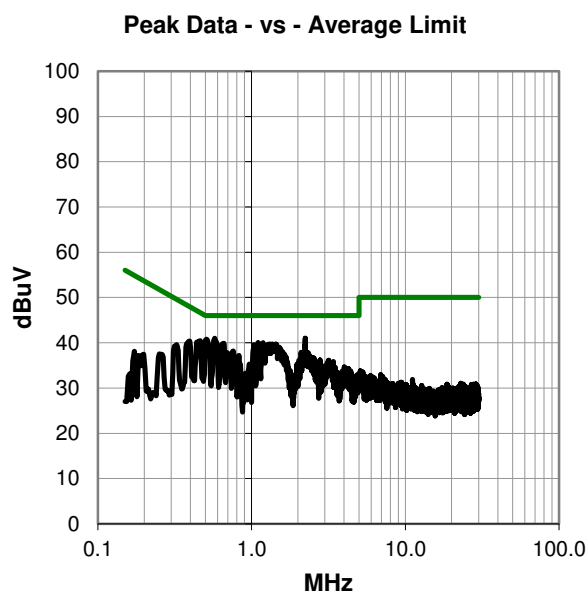
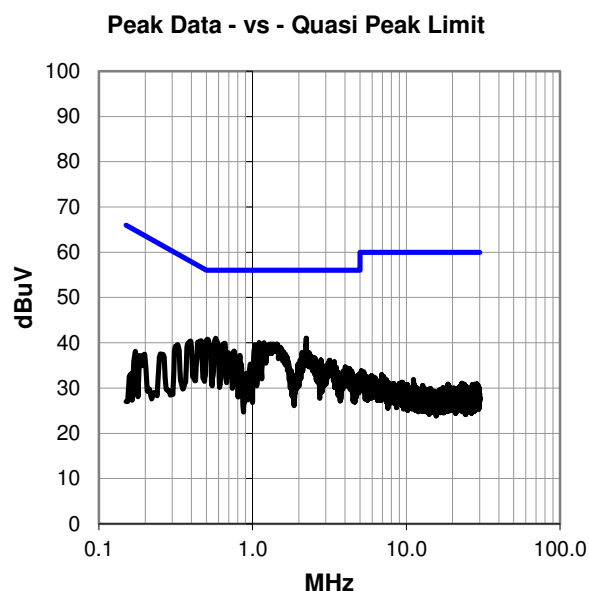
Power 16

EUT OPERATING MODES

Transmitting Zigbee, Low Ch, 2405 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #7

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
2.236	20.7	20.3	41.0	56.0	-15.0
0.575	20.8	20.2	41.0	56.0	-15.0
0.508	20.6	20.2	40.8	56.0	-15.2
1.187	19.8	20.2	40.0	56.0	-16.0
1.101	19.8	20.2	40.0	56.0	-16.0
0.657	19.7	20.2	39.9	56.0	-16.1
1.441	19.5	20.2	39.7	56.0	-16.3
0.460	20.2	20.2	40.4	56.7	-16.3
1.034	19.4	20.2	39.6	56.0	-16.4
0.393	20.1	20.2	40.3	58.0	-17.7
0.758	18.0	20.2	38.2	56.0	-17.8
2.101	17.6	20.3	37.9	56.0	-18.1
2.329	17.5	20.3	37.8	56.0	-18.2
0.695	17.6	20.2	37.8	56.0	-18.2
0.825	17.0	20.2	37.2	56.0	-18.8
2.545	16.3	20.3	36.6	56.0	-19.4
2.788	15.9	20.3	36.2	56.0	-19.8
3.168	15.8	20.3	36.1	56.0	-19.9
2.034	15.8	20.3	36.1	56.0	-19.9
0.325	19.3	20.2	39.5	59.6	-20.0
3.400	15.5	20.3	35.8	56.0	-20.2
0.967	15.1	20.2	35.3	56.0	-20.7
1.974	15.0	20.3	35.3	56.0	-20.7
2.624	14.8	20.3	35.1	56.0	-20.9
3.358	14.6	20.3	34.9	56.0	-21.1
2.866	14.6	20.3	34.9	56.0	-21.1

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
2.236	20.7	20.3	41.0	46.0	-5.0
0.575	20.8	20.2	41.0	46.0	-5.0
0.508	20.6	20.2	40.8	46.0	-5.2
1.187	19.8	20.2	40.0	46.0	-6.0
1.101	19.8	20.2	40.0	46.0	-6.0
0.657	19.7	20.2	39.9	46.0	-6.1
1.441	19.5	20.2	39.7	46.0	-6.3
0.460	20.2	20.2	40.4	46.7	-6.3
1.034	19.4	20.2	39.6	46.0	-6.4
0.393	20.1	20.2	40.3	48.0	-7.7
0.758	18.0	20.2	38.2	46.0	-7.8
2.101	17.6	20.3	37.9	46.0	-8.1
2.329	17.5	20.3	37.8	46.0	-8.2
0.695	17.6	20.2	37.8	46.0	-8.2
0.825	17.0	20.2	37.2	46.0	-8.8
2.545	16.3	20.3	36.6	46.0	-9.4
2.788	15.9	20.3	36.2	46.0	-9.8
3.168	15.8	20.3	36.1	46.0	-9.9
2.034	15.8	20.3	36.1	46.0	-9.9
0.325	19.3	20.2	39.5	49.6	-10.0
3.400	15.5	20.3	35.8	46.0	-10.2
0.967	15.1	20.2	35.3	46.0	-10.7
1.974	15.0	20.3	35.3	46.0	-10.7
2.624	14.8	20.3	35.1	46.0	-10.9
3.358	14.6	20.3	34.9	46.0	-11.1
2.866	14.6	20.3	34.9	46.0	-11.1

CONCLUSION

Pass

Trevor Buls
Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	MyGrid Switch/MG11AZ	Work Order:	SMTG0001
Serial Number:	12031501033	Date:	12/11/2015
Customer:	SmartGuard, LLC	Temperature:	21.9°C
Attendees:	Mike Maas, Matt Kiesow, Amy Baker	Relative Humidity:	31.3%
Customer Project:	None	Bar. Pressure:	975.9 mb
Tested By:	Trevor Buls	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	SMTG0001-5

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

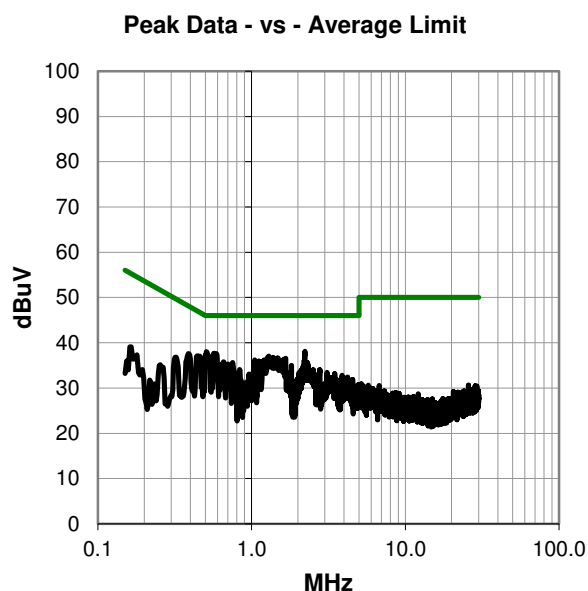
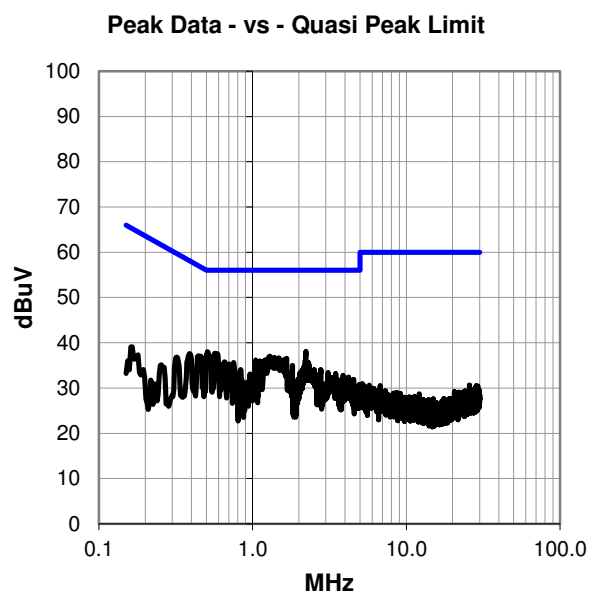
Power 16

EUT OPERATING MODES

Transmitting Zigbee, Low Ch, 2405 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #8

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
2.221	17.8	20.3	38.1	56.0	-17.9
0.508	17.8	20.2	38.0	56.0	-18.0
0.568	17.5	20.2	37.7	56.0	-18.3
1.292	16.8	20.2	37.0	56.0	-19.0
1.665	16.3	20.3	36.6	56.0	-19.4
1.616	16.1	20.3	36.4	56.0	-19.6
1.045	16.0	20.2	36.2	56.0	-19.8
0.445	16.9	20.2	37.1	57.0	-19.9
1.116	15.8	20.2	36.0	56.0	-20.0
0.654	15.6	20.2	35.8	56.0	-20.2
2.299	15.3	20.3	35.6	56.0	-20.4
0.754	15.4	20.2	35.6	56.0	-20.4
0.389	17.4	20.2	37.6	58.1	-20.5
0.698	15.1	20.2	35.3	56.0	-20.7
1.818	14.7	20.3	35.0	56.0	-21.0
0.836	13.9	20.2	34.1	56.0	-21.9
2.780	13.7	20.3	34.0	56.0	-22.0
2.097	13.7	20.3	34.0	56.0	-22.0
1.702	13.2	20.3	33.5	56.0	-22.5
3.101	13.1	20.3	33.4	56.0	-22.6
2.038	13.1	20.3	33.4	56.0	-22.6
0.322	16.6	20.3	36.9	59.7	-22.8
3.474	12.8	20.3	33.1	56.0	-22.9
0.963	12.9	20.2	33.1	56.0	-22.9
2.624	12.6	20.3	32.9	56.0	-23.1
3.885	12.4	20.4	32.8	56.0	-23.2

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
2.221	17.8	20.3	38.1	46.0	-7.9
0.508	17.8	20.2	38.0	46.0	-8.0
0.568	17.5	20.2	37.7	46.0	-8.3
1.292	16.8	20.2	37.0	46.0	-9.0
1.665	16.3	20.3	36.6	46.0	-9.4
1.616	16.1	20.3	36.4	46.0	-9.6
1.045	16.0	20.2	36.2	46.0	-9.8
0.445	16.9	20.2	37.1	47.0	-9.9
1.116	15.8	20.2	36.0	46.0	-10.0
0.654	15.6	20.2	35.8	46.0	-10.2
2.299	15.3	20.3	35.6	46.0	-10.4
0.754	15.4	20.2	35.6	46.0	-10.4
0.389	17.4	20.2	37.6	48.1	-10.5
0.698	15.1	20.2	35.3	46.0	-10.7
1.818	14.7	20.3	35.0	46.0	-11.0
0.836	13.9	20.2	34.1	46.0	-11.9
2.780	13.7	20.3	34.0	46.0	-12.0
2.097	13.7	20.3	34.0	46.0	-12.0
1.702	13.2	20.3	33.5	46.0	-12.5
3.101	13.1	20.3	33.4	46.0	-12.6
2.038	13.1	20.3	33.4	46.0	-12.6
0.322	16.6	20.3	36.9	49.7	-12.8
3.474	12.8	20.3	33.1	46.0	-12.9
0.963	12.9	20.2	33.1	46.0	-12.9
2.624	12.6	20.3	32.9	46.0	-13.1
3.885	12.4	20.4	32.8	46.0	-13.2

CONCLUSION

Pass

Trevor Buls

Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	MyGrid Switch/MG11AZ	Work Order:	SMTG0001
Serial Number:	12031501033	Date:	12/11/2015
Customer:	SmartGuard, LLC	Temperature:	21.9°C
Attendees:	Mike Maas, Matt Kiesow, Amy Baker	Relative Humidity:	31.3%
Customer Project:	None	Bar. Pressure:	975.9 mb
Tested By:	Trevor Buls	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	SMTG0001-5

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	9	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

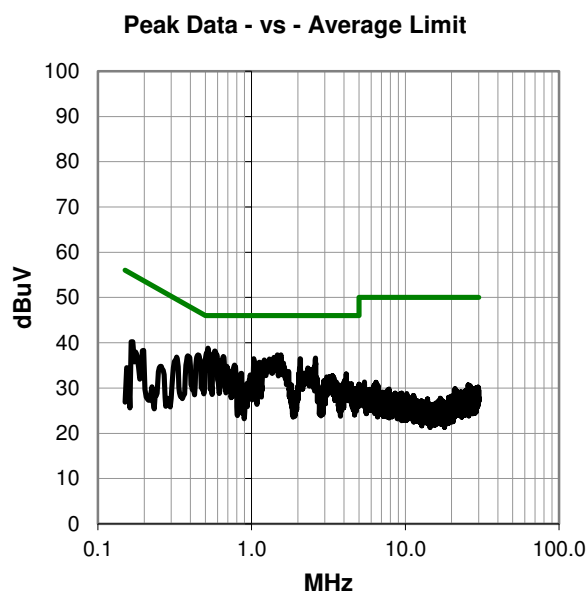
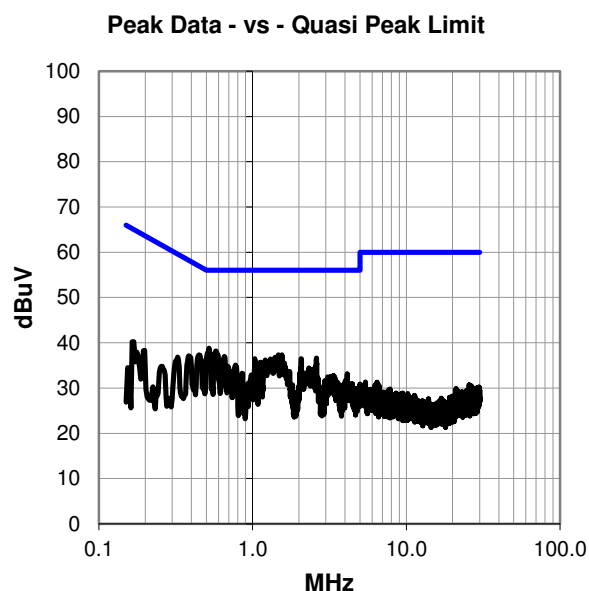
Power 16

EUT OPERATING MODES

Transmitting Zigbee, Mid Ch, 2440 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #9

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.519	18.6	20.2	38.8	56.0	-17.2
0.575	18.0	20.2	38.2	56.0	-17.8
1.549	17.1	20.3	37.4	56.0	-18.6
1.471	17.1	20.2	37.3	56.0	-18.7
0.654	16.8	20.2	37.0	56.0	-19.0
2.605	16.3	20.3	36.6	56.0	-19.4
1.034	16.3	20.2	36.5	56.0	-19.5
2.071	16.2	20.3	36.5	56.0	-19.5
1.307	16.2	20.2	36.4	56.0	-19.6
0.448	17.1	20.2	37.3	56.9	-19.6
1.210	16.0	20.2	36.2	56.0	-19.8
1.124	15.5	20.2	35.7	56.0	-20.3
0.773	14.9	20.2	35.1	56.0	-20.9
0.385	16.9	20.2	37.1	58.2	-21.0
0.691	14.6	20.2	34.8	56.0	-21.2
2.318	14.1	20.3	34.4	56.0	-21.6
2.556	14.0	20.3	34.3	56.0	-21.7
2.515	14.0	20.3	34.3	56.0	-21.7
2.049	14.0	20.3	34.3	56.0	-21.7
2.426	13.7	20.3	34.0	56.0	-22.0
2.400	13.4	20.3	33.7	56.0	-22.3
1.743	13.4	20.3	33.7	56.0	-22.3
0.325	16.6	20.2	36.8	59.6	-22.7
2.030	12.9	20.3	33.2	56.0	-22.8
0.851	13.0	20.2	33.2	56.0	-22.8
4.127	12.6	20.5	33.1	56.0	-22.9

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.519	18.6	20.2	38.8	46.0	-7.2
0.575	18.0	20.2	38.2	46.0	-7.8
1.549	17.1	20.3	37.4	46.0	-8.6
1.471	17.1	20.2	37.3	46.0	-8.7
0.654	16.8	20.2	37.0	46.0	-9.0
2.605	16.3	20.3	36.6	46.0	-9.4
1.034	16.3	20.2	36.5	46.0	-9.5
2.071	16.2	20.3	36.5	46.0	-9.5
1.307	16.2	20.2	36.4	46.0	-9.6
0.448	17.1	20.2	37.3	46.9	-9.6
1.210	16.0	20.2	36.2	46.0	-9.8
1.124	15.5	20.2	35.7	46.0	-10.3
0.773	14.9	20.2	35.1	46.0	-10.9
0.385	16.9	20.2	37.1	48.2	-11.0
0.691	14.6	20.2	34.8	46.0	-11.2
2.318	14.1	20.3	34.4	46.0	-11.6
2.556	14.0	20.3	34.3	46.0	-11.7
2.515	14.0	20.3	34.3	46.0	-11.7
2.049	14.0	20.3	34.3	46.0	-11.7
2.426	13.7	20.3	34.0	46.0	-12.0
2.400	13.4	20.3	33.7	46.0	-12.3
1.743	13.4	20.3	33.7	46.0	-12.3
0.325	16.6	20.2	36.8	49.6	-12.7
2.030	12.9	20.3	33.2	46.0	-12.8
0.851	13.0	20.2	33.2	46.0	-12.8
4.127	12.6	20.5	33.1	46.0	-12.9

CONCLUSION

Pass

Trevor Buls
Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	MyGrid Switch/MG11AZ	Work Order:	SMTG0001
Serial Number:	12031501033	Date:	12/11/2015
Customer:	SmartGuard, LLC	Temperature:	21.9°C
Attendees:	Mike Maas, Matt Kiesow, Amy Baker	Relative Humidity:	31.3%
Customer Project:	None	Bar. Pressure:	975.9 mb
Tested By:	Trevor Buls	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	SMTG0001-5

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	10	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

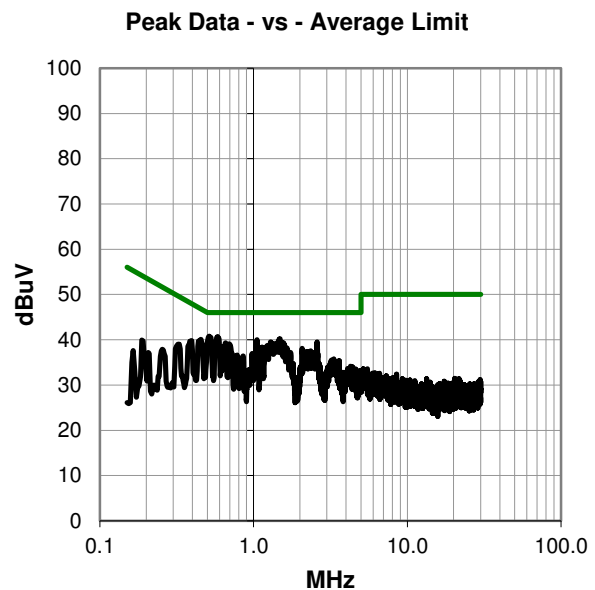
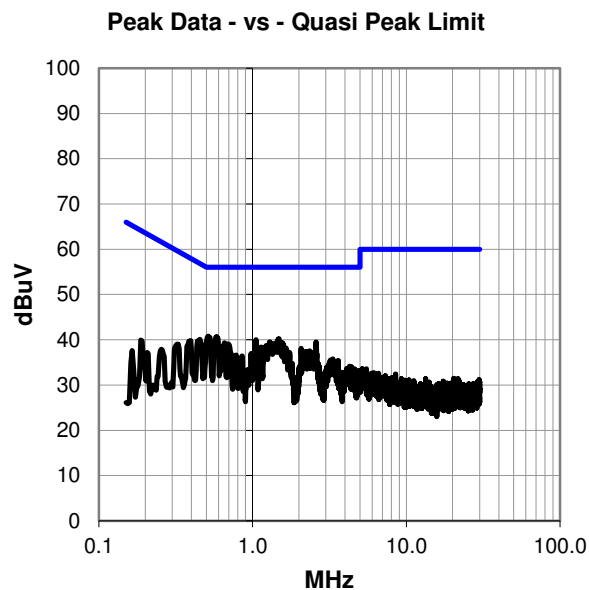
Power 16

EUT OPERATING MODES

Transmitting Zigbee, Mid Ch, 2440 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #10

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.512	20.6	20.2	40.8	56.0	-15.2
0.583	20.5	20.2	40.7	56.0	-15.3
1.486	20.0	20.2	40.2	56.0	-15.8
1.053	19.8	20.2	40.0	56.0	-16.0
2.597	19.2	20.3	39.5	56.0	-16.5
0.654	19.1	20.2	39.3	56.0	-16.7
0.452	19.9	20.2	40.1	56.8	-16.7
1.571	19.0	20.3	39.3	56.0	-16.7
0.695	18.9	20.2	39.1	56.0	-16.9
1.224	18.5	20.2	38.7	56.0	-17.3
1.139	18.2	20.2	38.4	56.0	-17.6
1.654	17.9	20.3	38.2	56.0	-17.8
2.068	17.8	20.3	38.1	56.0	-17.9
0.393	19.6	20.2	39.8	58.0	-18.2
2.351	17.2	20.3	37.5	56.0	-18.5
2.224	17.1	20.3	37.4	56.0	-18.6
2.482	16.9	20.3	37.2	56.0	-18.8
1.743	16.9	20.3	37.2	56.0	-18.8
2.295	16.8	20.3	37.1	56.0	-18.9
0.978	16.8	20.2	37.0	56.0	-19.0
2.131	16.4	20.3	36.7	56.0	-19.3
0.781	16.4	20.2	36.6	56.0	-19.4
0.851	16.2	20.2	36.4	56.0	-19.6
3.321	15.4	20.3	35.7	56.0	-20.3
3.228	15.2	20.3	35.5	56.0	-20.5
0.322	18.8	20.3	39.1	59.7	-20.6

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.512	20.6	20.2	40.8	46.0	-5.2
0.583	20.5	20.2	40.7	46.0	-5.3
1.486	20.0	20.2	40.2	46.0	-5.8
1.053	19.8	20.2	40.0	46.0	-6.0
2.597	19.2	20.3	39.5	46.0	-6.5
0.654	19.1	20.2	39.3	46.0	-6.7
0.452	19.9	20.2	40.1	46.8	-6.7
1.571	19.0	20.3	39.3	46.0	-6.7
0.695	18.9	20.2	39.1	46.0	-6.9
1.224	18.5	20.2	38.7	46.0	-7.3
1.139	18.2	20.2	38.4	46.0	-7.6
1.654	17.9	20.3	38.2	46.0	-7.8
2.068	17.8	20.3	38.1	46.0	-7.9
0.393	19.6	20.2	39.8	48.0	-8.2
2.351	17.2	20.3	37.5	46.0	-8.5
2.224	17.1	20.3	37.4	46.0	-8.6
2.482	16.9	20.3	37.2	46.0	-8.8
1.743	16.9	20.3	37.2	46.0	-8.8
2.295	16.8	20.3	37.1	46.0	-8.9
0.978	16.8	20.2	37.0	46.0	-9.0
2.131	16.4	20.3	36.7	46.0	-9.3
0.781	16.4	20.2	36.6	46.0	-9.4
0.851	16.2	20.2	36.4	46.0	-9.6
3.321	15.4	20.3	35.7	46.0	-10.3
3.228	15.2	20.3	35.5	46.0	-10.5
0.322	18.8	20.3	39.1	49.7	-10.6

CONCLUSION

Pass

Trevor Buls

Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	MyGrid Switch/MG11AZ	Work Order:	SMTG0001
Serial Number:	12031501033	Date:	12/11/2015
Customer:	SmartGuard, LLC	Temperature:	21.9°C
Attendees:	Mike Maas, Matt Kiesow, Amy Baker	Relative Humidity:	31.3%
Customer Project:	None	Bar. Pressure:	975.9 mb
Tested By:	Trevor Buls	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	SMTG0001-5

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	11	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

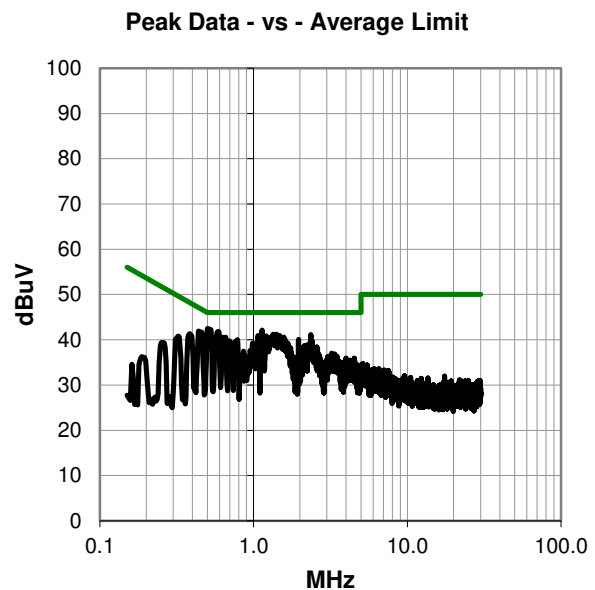
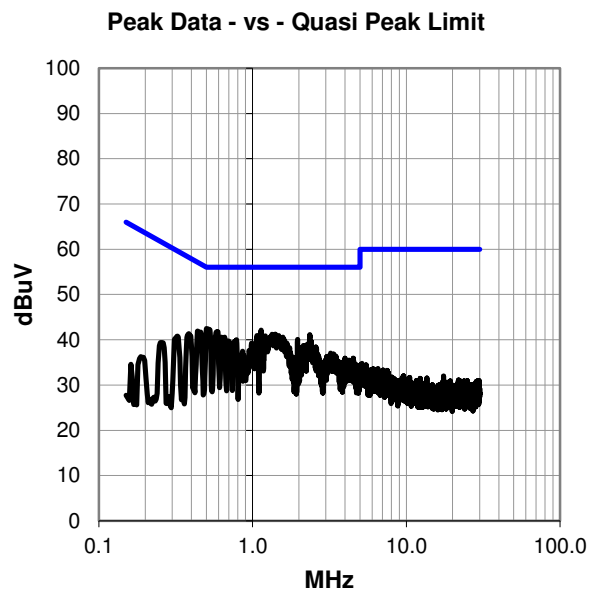
Power 16

EUT OPERATING MODES

Transmitting Zigbee, High Ch, 2480 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #11

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.501	22.3	20.2	42.5	56.0	-13.5
1.135	21.9	20.2	42.1	56.0	-13.9
0.583	21.6	20.2	41.8	56.0	-14.2
1.407	21.0	20.2	41.2	56.0	-14.8
2.351	20.8	20.3	41.1	56.0	-14.9
1.072	20.7	20.2	40.9	56.0	-15.1
1.210	20.6	20.2	40.8	56.0	-15.2
0.437	21.7	20.2	41.9	57.1	-15.2
0.628	20.4	20.2	40.6	56.0	-15.4
1.959	19.8	20.3	40.1	56.0	-15.9
0.784	19.8	20.2	40.0	56.0	-16.0
0.695	19.5	20.2	39.7	56.0	-16.3
2.415	19.3	20.3	39.6	56.0	-16.4
0.986	19.0	20.2	39.2	56.0	-16.8
0.385	21.1	20.2	41.3	58.2	-16.8
2.221	18.5	20.3	38.8	56.0	-17.2
2.139	18.4	20.3	38.7	56.0	-17.3
2.582	18.1	20.3	38.4	56.0	-17.6
2.478	18.0	20.3	38.3	56.0	-17.7
2.068	18.0	20.3	38.3	56.0	-17.7
1.739	18.0	20.3	38.3	56.0	-17.7
2.165	17.9	20.3	38.2	56.0	-17.8
2.605	17.7	20.3	38.0	56.0	-18.0
1.004	17.5	20.2	37.7	56.0	-18.3
0.859	17.3	20.2	37.5	56.0	-18.5
0.322	20.5	20.3	40.8	59.7	-18.9

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.501	22.3	20.2	42.5	46.0	-3.5
1.135	21.9	20.2	42.1	46.0	-3.9
0.583	21.6	20.2	41.8	46.0	-4.2
1.407	21.0	20.2	41.2	46.0	-4.8
2.351	20.8	20.3	41.1	46.0	-4.9
1.072	20.7	20.2	40.9	46.0	-5.1
1.210	20.6	20.2	40.8	46.0	-5.2
0.437	21.7	20.2	41.9	47.1	-5.2
0.628	20.4	20.2	40.6	46.0	-5.4
1.959	19.8	20.3	40.1	46.0	-5.9
0.784	19.8	20.2	40.0	46.0	-6.0
0.695	19.5	20.2	39.7	46.0	-6.3
2.415	19.3	20.3	39.6	46.0	-6.4
0.986	19.0	20.2	39.2	46.0	-6.8
0.385	21.1	20.2	41.3	48.2	-6.8
2.221	18.5	20.3	38.8	46.0	-7.2
2.139	18.4	20.3	38.7	46.0	-7.3
2.582	18.1	20.3	38.4	46.0	-7.6
2.478	18.0	20.3	38.3	46.0	-7.7
2.068	18.0	20.3	38.3	46.0	-7.7
1.739	18.0	20.3	38.3	46.0	-7.7
2.165	17.9	20.3	38.2	46.0	-7.8
2.605	17.7	20.3	38.0	46.0	-8.0
1.004	17.5	20.2	37.7	46.0	-8.3
0.859	17.3	20.2	37.5	46.0	-8.5
0.322	20.5	20.3	40.8	49.7	-8.9

CONCLUSION

Pass

Trevor Buls
Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	MyGrid Switch/MG11AZ	Work Order:	SMTG0001
Serial Number:	12031501033	Date:	12/11/2015
Customer:	SmartGuard, LLC	Temperature:	21.9°C
Attendees:	Mike Maas, Matt Kiesow, Amy Baker	Relative Humidity:	31.3%
Customer Project:	None	Bar. Pressure:	975.9 mb
Tested By:	Trevor Buls	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	SMTG0001-5

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	12	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

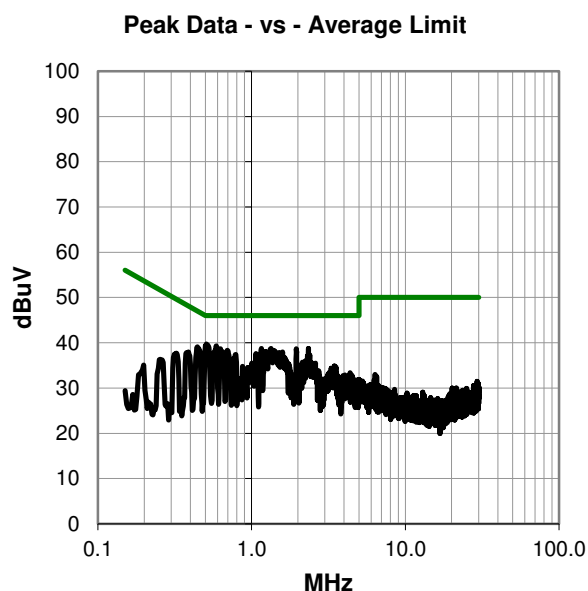
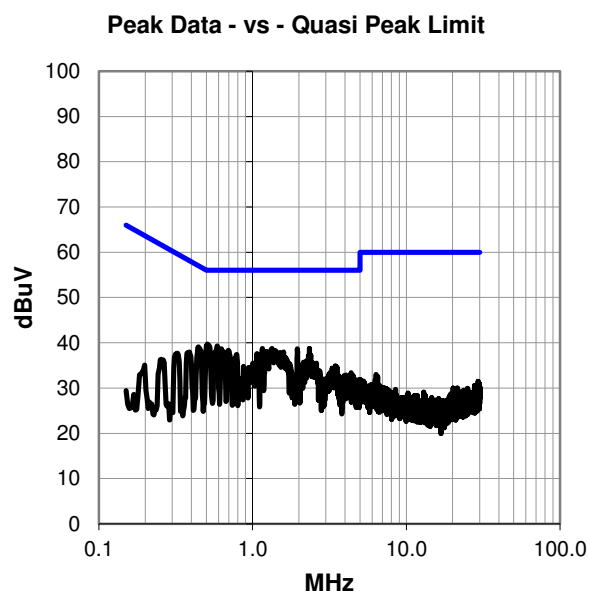
Power 16

EUT OPERATING MODES

Transmitting Zigbee, High Ch, 2480 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #12

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.508	19.5	20.2	39.7	56.0	-16.3
0.590	19.1	20.2	39.3	56.0	-16.7
1.336	18.5	20.2	38.7	56.0	-17.3
1.157	18.5	20.2	38.7	56.0	-17.3
2.344	18.4	20.3	38.7	56.0	-17.3
0.628	18.5	20.2	38.7	56.0	-17.3
1.956	18.4	20.3	38.7	56.0	-17.3
0.695	18.1	20.2	38.3	56.0	-17.7
0.445	18.9	20.2	39.1	57.0	-17.9
1.239	17.8	20.2	38.0	56.0	-18.0
1.590	17.7	20.3	38.0	56.0	-18.0
1.068	17.4	20.2	37.6	56.0	-18.4
0.784	17.2	20.2	37.4	56.0	-18.6
2.385	17.0	20.3	37.3	56.0	-18.7
0.389	17.7	20.2	37.9	58.1	-20.2
2.142	15.4	20.3	35.7	56.0	-20.3
2.448	15.3	20.3	35.6	56.0	-20.4
2.601	15.2	20.3	35.5	56.0	-20.5
1.004	15.3	20.2	35.5	56.0	-20.5
1.739	15.1	20.3	35.4	56.0	-20.6
2.105	14.8	20.3	35.1	56.0	-20.9
3.459	14.5	20.3	34.8	56.0	-21.2
0.874	14.6	20.2	34.8	56.0	-21.2
3.534	14.3	20.4	34.7	56.0	-21.3
0.941	14.3	20.2	34.5	56.0	-21.5
3.299	14.0	20.3	34.3	56.0	-21.7

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.508	19.5	20.2	39.7	46.0	-6.3
0.590	19.1	20.2	39.3	46.0	-6.7
1.336	18.5	20.2	38.7	46.0	-7.3
1.157	18.5	20.2	38.7	46.0	-7.3
2.344	18.4	20.3	38.7	46.0	-7.3
0.628	18.5	20.2	38.7	46.0	-7.3
1.956	18.4	20.3	38.7	46.0	-7.3
0.695	18.1	20.2	38.3	46.0	-7.7
0.445	18.9	20.2	39.1	47.0	-7.9
1.239	17.8	20.2	38.0	46.0	-8.0
1.590	17.7	20.3	38.0	46.0	-8.0
1.068	17.4	20.2	37.6	46.0	-8.4
0.784	17.2	20.2	37.4	46.0	-8.6
2.385	17.0	20.3	37.3	46.0	-8.7
0.389	17.7	20.2	37.9	48.1	-10.2
2.142	15.4	20.3	35.7	46.0	-10.3
2.448	15.3	20.3	35.6	46.0	-10.4
2.601	15.2	20.3	35.5	46.0	-10.5
1.004	15.3	20.2	35.5	46.0	-10.5
1.739	15.1	20.3	35.4	46.0	-10.6
2.105	14.8	20.3	35.1	46.0	-10.9
3.459	14.5	20.3	34.8	46.0	-11.2
0.874	14.6	20.2	34.8	46.0	-11.2
3.534	14.3	20.4	34.7	46.0	-11.3
0.941	14.3	20.2	34.5	46.0	-11.5
3.299	14.0	20.3	34.3	46.0	-11.7

CONCLUSION

Pass

Trevor Buls
Tested By