NORTHWEST EMC

Pulsar Informatics

STARwatch

FCC 15.207:2015
FCC 15.247:2015

Report # PLSR0001.2

NVLAP Lab Code: 200629-0

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

NORTHWEST EMC
2014-12-10

Last Date of Test: July 15, 2015
Pulsar Informatics
Model: STARwatch

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2015	ANSI C63.10:2009
FCC 15.247:2015	ANSI C63.10:2009

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	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	

Deviations From Test Standards

None

Approved By:

Rod Munro, 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

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

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.2015.07.10

Measurement Uncertainty

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

A measurement uncertainty estimation has been performed for each test per our internal quality document 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.

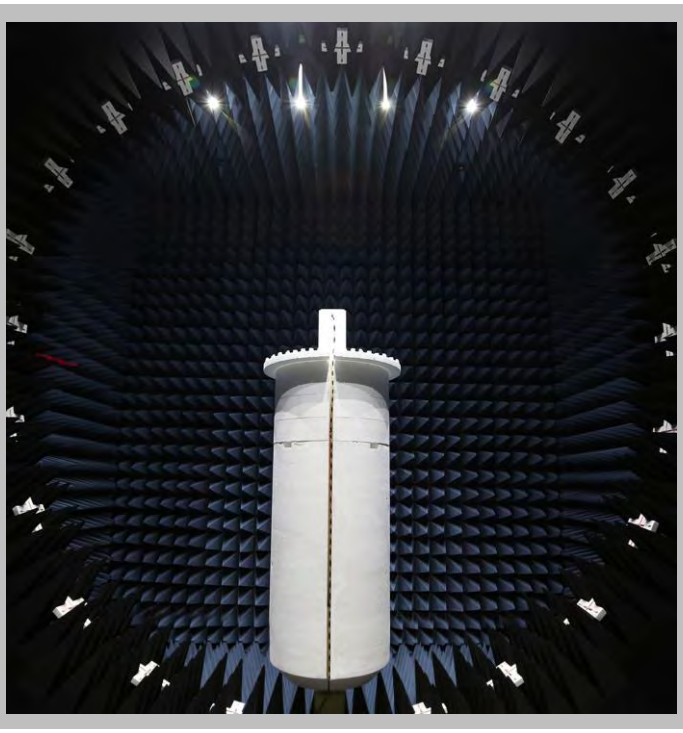
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

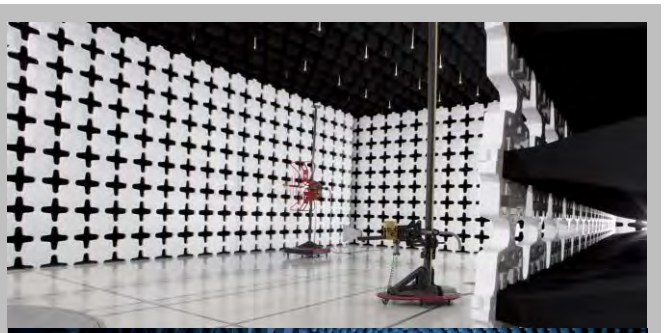
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.0 dB	-5.0 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

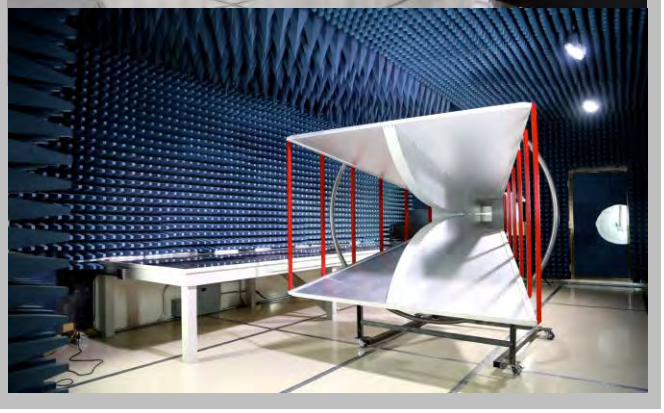
FACILITIES

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

2014-12-10

Client and Equipment Under Test (EUT) Information

Company Name:	Pulsar Informatics
Address:	1424 Fourth Avenue STE 414
City, State, Zip:	Seattle, WA 98101
Test Requested By:	Aaron Unice
Model:	STARwatch
First Date of Test:	July 14, 2015
Last Date of Test:	July 15, 2015
Receipt Date of Samples:	July 14, 2015
Equipment Design Stage:	Preproduction
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Wearable watch that senses acceleration. It contains a battery, OLED display and printed circuit board that communicate via Bluetooth with a chip antenna.

Testing Objective:
To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration PLSR0001- 1

Software/Firmware Running during test	
Description	**Version**
BTLE Test App	Rev 337

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wearable Data Logger	Pulsar Informatics	STARwatch	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Docking Station	Pulsar Informatics	STARdock	None
Laptop PC	Lenovo	ThinkPad T5200	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Cable	Yes	0.95m	No	Docking Station	Laptop PC

Configuration PLSR0001- 2

Software/Firmware Running during test	
Description	**Version**
BTLE Test App	Rev 337

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wearable Data Logger	Pulsar Informatics	STARwatch	Proto 1

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Docking Station	Pulsar Informatics	STARdock	None
AC USB Charger	Samsung	ETA0U60JBE	RT1ZB20CS/7-E

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Cable	Yes	0.95m	No	Docking Station	Laptop PC

MODIFICATIONS

NORTHWEST EMC 2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	7/14/2015	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	7/14/2015	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	7/14/2015	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	7/14/2015	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	7/14/2015	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	7/14/2015	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.
7	7/14/2015	AC Power Line 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.
8	7/15/2015	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

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	ESCI	ARE	6/6/2014	12/06/2015
Conducted Emissions Cable Assembly	ESM Cable Corp.	NC4/RKD/HHF	NC4A	2/11/2015	02/11/2016
LISN	Solar Electronics	9252-50-R-24-BNC	LIM	12/9/2014	12/09/2015

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

PLSR0001-2

MODES INVESTIGATED

Transmitting BTLE, Low Channel 0, 2402 MHz
Transmitting BTLE, Mid Channel 20, 2442 MHz
Transmitting BTLE, High Channel 39, 2480 MHz

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

EUT:	STARwatch	Work Order:	PLSR0001
Serial Number:	Proto 1	Date:	07/14/2015
Customer:	Pulsar Informatics	Temperature:	24°C
Attendees:	Levi Danzer	Relative Humidity:	47%
Customer Project:	None	Bar. Pressure:	1019 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	PLSR0001-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2009

TEST PARAMETERS

Run #:	3	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

None

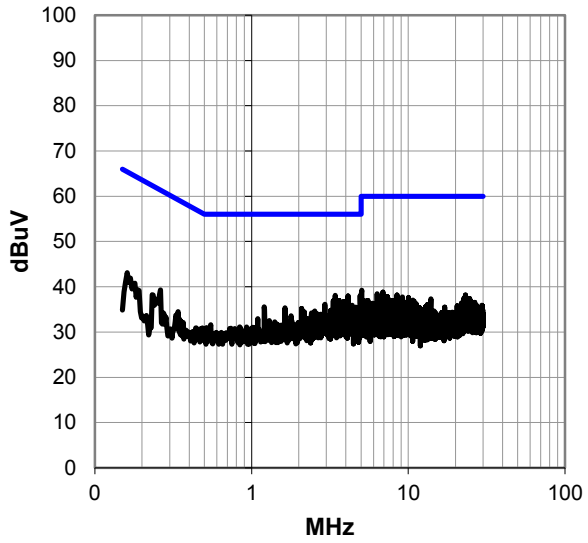
EUT OPERATING MODES

Transmitting BTLE, Low Channel 0, 2402 MHz

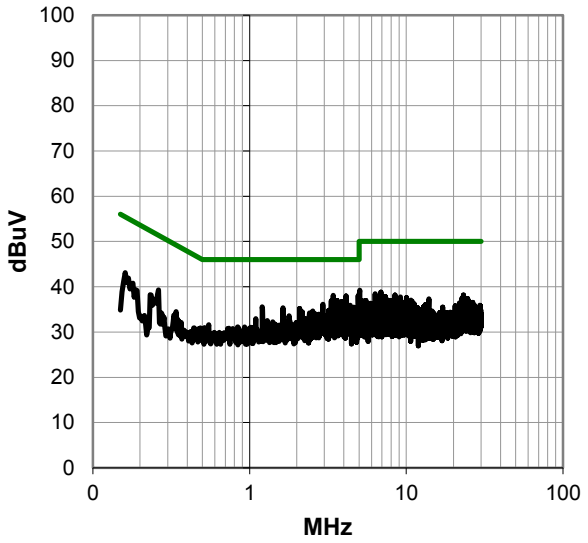
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

RESULTS - Run #3

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
3.426	17.6	20.5	38.1	56.0	-17.9
4.940	17.4	20.6	38.0	56.0	-18.0
4.127	17.4	20.6	38.0	56.0	-18.0
3.616	16.4	20.6	37.0	56.0	-19.0
3.321	16.4	20.5	36.9	56.0	-19.1
3.862	16.1	20.6	36.7	56.0	-19.3
4.067	16.0	20.6	36.6	56.0	-19.4
2.937	15.7	20.4	36.1	56.0	-19.9
4.396	15.3	20.6	35.9	56.0	-20.1
3.832	15.1	20.6	35.7	56.0	-20.3
3.769	15.1	20.6	35.7	56.0	-20.3
4.276	15.0	20.6	35.6	56.0	-20.4
1.206	15.2	20.3	35.5	56.0	-20.5
4.612	14.9	20.6	35.5	56.0	-20.5
3.340	15.0	20.5	35.5	56.0	-20.5
4.101	14.9	20.6	35.5	56.0	-20.5
4.709	14.8	20.6	35.4	56.0	-20.6
4.586	14.8	20.6	35.4	56.0	-20.6
4.045	14.8	20.6	35.4	56.0	-20.6
1.631	15.0	20.4	35.4	56.0	-20.6
3.459	14.8	20.5	35.3	56.0	-20.7
2.086	14.8	20.4	35.2	56.0	-20.8
3.407	14.7	20.5	35.2	56.0	-20.8
5.045	18.6	20.6	39.2	60.0	-20.8
4.172	14.6	20.6	35.2	56.0	-20.8
4.605	14.4	20.6	35.0	56.0	-21.0

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
3.426	17.6	20.5	38.1	46.0	-7.9
4.940	17.4	20.6	38.0	46.0	-8.0
4.127	17.4	20.6	38.0	46.0	-8.0
3.616	16.4	20.6	37.0	46.0	-9.0
3.321	16.4	20.5	36.9	46.0	-9.1
3.862	16.1	20.6	36.7	46.0	-9.3
4.067	16.0	20.6	36.6	46.0	-9.4
2.937	15.7	20.4	36.1	46.0	-9.9
4.396	15.3	20.6	35.9	46.0	-10.1
3.832	15.1	20.6	35.7	46.0	-10.3
3.769	15.1	20.6	35.7	46.0	-10.3
4.276	15.0	20.6	35.6	46.0	-10.4
1.206	15.2	20.3	35.5	46.0	-10.5
4.612	14.9	20.6	35.5	46.0	-10.5
3.340	15.0	20.5	35.5	46.0	-10.5
4.101	14.9	20.6	35.5	46.0	-10.5
4.709	14.8	20.6	35.4	46.0	-10.6
4.586	14.8	20.6	35.4	46.0	-10.6
4.045	14.8	20.6	35.4	46.0	-10.6
1.631	15.0	20.4	35.4	46.0	-10.6
3.459	14.8	20.5	35.3	46.0	-10.7
2.086	14.8	20.4	35.2	46.0	-10.8
3.407	14.7	20.5	35.2	46.0	-10.8
5.045	18.6	20.6	39.2	50.0	-10.8
4.172	14.6	20.6	35.2	46.0	-10.8
4.605	14.4	20.6	35.0	46.0	-11.0

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

EUT:	STARwatch	Work Order:	PLSR0001
Serial Number:	Proto 1	Date:	07/14/2015
Customer:	Pulsar Informatics	Temperature:	24°C
Attendees:	Levi Danzer	Relative Humidity:	47%
Customer Project:	None	Bar. Pressure:	1019 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	PLSR0001-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2009

TEST PARAMETERS

Run #:	4	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

None

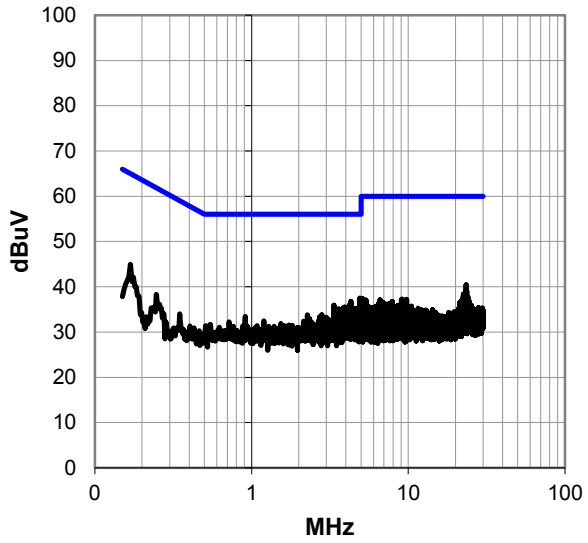
EUT OPERATING MODES

Transmitting BTLE, Low Channel 0, 2402 MHz

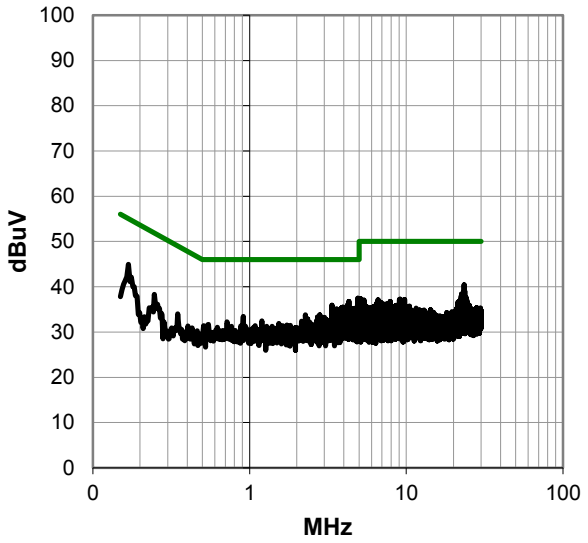
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

RESULTS - Run #4

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
4.907	16.9	20.6	37.5	56.0	-18.5
4.306	16.2	20.6	36.8	56.0	-19.2
23.445	17.6	22.8	40.4	60.0	-19.6
4.198	15.4	20.6	36.0	56.0	-20.0
0.169	24.5	20.4	44.9	65.0	-20.1
3.358	15.4	20.5	35.9	56.0	-20.1
4.933	15.2	20.6	35.8	56.0	-20.2
4.866	15.1	20.6	35.7	56.0	-20.3
3.411	15.0	20.5	35.5	56.0	-20.5
3.940	14.9	20.6	35.5	56.0	-20.5
4.217	14.8	20.6	35.4	56.0	-20.6
3.862	14.8	20.6	35.4	56.0	-20.6
4.567	14.6	20.6	35.2	56.0	-20.8
4.623	14.5	20.6	35.1	56.0	-20.9
4.060	14.5	20.6	35.1	56.0	-20.9
3.605	14.5	20.6	35.1	56.0	-20.9
23.620	16.2	22.8	39.0	60.0	-21.0
4.728	14.4	20.6	35.0	56.0	-21.0
3.635	14.4	20.6	35.0	56.0	-21.0
4.981	14.3	20.6	34.9	56.0	-21.1
4.097	14.1	20.6	34.7	56.0	-21.3
23.083	15.9	22.8	38.7	60.0	-21.3
4.377	14.0	20.6	34.6	56.0	-21.4
4.608	13.8	20.6	34.4	56.0	-21.6
22.550	15.7	22.7	38.4	60.0	-21.6
4.243	13.8	20.6	34.4	56.0	-21.6

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
4.907	16.9	20.6	37.5	46.0	-8.5
4.306	16.2	20.6	36.8	46.0	-9.2
23.445	17.6	22.8	40.4	50.0	-9.6
4.198	15.4	20.6	36.0	46.0	-10.0
0.169	24.5	20.4	44.9	55.0	-10.1
3.358	15.4	20.5	35.9	46.0	-10.1
4.933	15.2	20.6	35.8	46.0	-10.2
4.866	15.1	20.6	35.7	46.0	-10.3
3.411	15.0	20.5	35.5	46.0	-10.5
3.940	14.9	20.6	35.5	46.0	-10.5
4.217	14.8	20.6	35.4	46.0	-10.6
3.862	14.8	20.6	35.4	46.0	-10.6
4.567	14.6	20.6	35.2	46.0	-10.8
4.623	14.5	20.6	35.1	46.0	-10.9
4.060	14.5	20.6	35.1	46.0	-10.9
3.605	14.5	20.6	35.1	46.0	-10.9
23.620	16.2	22.8	39.0	50.0	-11.0
4.728	14.4	20.6	35.0	46.0	-11.0
3.635	14.4	20.6	35.0	46.0	-11.0
4.981	14.3	20.6	34.9	46.0	-11.1
4.097	14.1	20.6	34.7	46.0	-11.3
23.083	15.9	22.8	38.7	50.0	-11.3
4.377	14.0	20.6	34.6	46.0	-11.4
4.608	13.8	20.6	34.4	46.0	-11.6
22.550	15.7	22.7	38.4	50.0	-11.6
4.243	13.8	20.6	34.4	46.0	-11.6

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

EUT:	STARwatch	Work Order:	PLSR0001
Serial Number:	Proto 1	Date:	07/14/2015
Customer:	Pulsar Informatics	Temperature:	24°C
Attendees:	Levi Danzer	Relative Humidity:	47%
Customer Project:	None	Bar. Pressure:	1019 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	PLSR0001-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2009

TEST PARAMETERS

Run #:	5	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

None

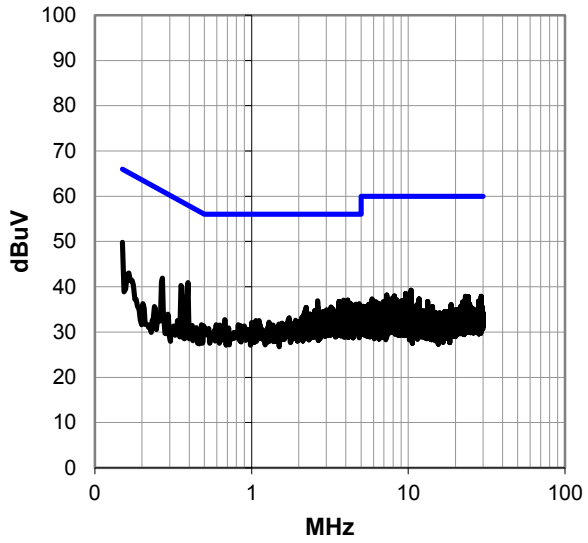
EUT OPERATING MODES

Transmitting BTLE, Mid Channel 20, 2442 MHz

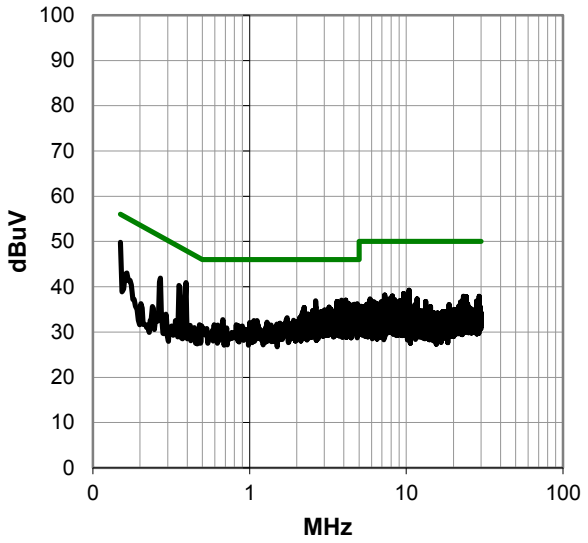
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

RESULTS - Run #5

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	29.4	20.5	49.9	66.0	-16.2
0.393	20.6	20.3	40.9	58.0	-17.1
0.355	20.0	20.3	40.3	58.8	-18.5
4.108	16.5	20.6	37.1	56.0	-18.9
3.858	16.5	20.6	37.1	56.0	-18.9
2.646	16.5	20.4	36.9	56.0	-19.1
0.269	21.6	20.3	41.9	61.1	-19.2
3.616	16.2	20.6	36.8	56.0	-19.2
4.877	15.7	20.6	36.3	56.0	-19.7
4.287	15.7	20.6	36.3	56.0	-19.7
4.653	15.5	20.6	36.1	56.0	-19.9
4.496	15.3	20.6	35.9	56.0	-20.1
4.265	15.2	20.6	35.8	56.0	-20.2
2.635	15.2	20.4	35.6	56.0	-20.4
4.955	15.0	20.6	35.6	56.0	-20.4
4.605	14.9	20.6	35.5	56.0	-20.5
3.724	14.9	20.6	35.5	56.0	-20.5
3.217	15.0	20.5	35.5	56.0	-20.5
2.228	15.0	20.4	35.4	56.0	-20.6
3.899	14.7	20.6	35.3	56.0	-20.7
3.825	14.7	20.6	35.3	56.0	-20.7
10.417	18.1	21.1	39.2	60.0	-20.8
4.157	14.6	20.6	35.2	56.0	-20.8
4.731	14.4	20.6	35.0	56.0	-21.0
3.306	14.5	20.5	35.0	56.0	-21.0
3.679	14.4	20.6	35.0	56.0	-21.0

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	29.4	20.5	49.9	56.0	-6.2
0.393	20.6	20.3	40.9	48.0	-7.1
0.355	20.0	20.3	40.3	48.8	-8.5
4.108	16.5	20.6	37.1	46.0	-8.9
3.858	16.5	20.6	37.1	46.0	-8.9
2.646	16.5	20.4	36.9	46.0	-9.1
0.269	21.6	20.3	41.9	51.1	-9.2
3.616	16.2	20.6	36.8	46.0	-9.2
4.877	15.7	20.6	36.3	46.0	-9.7
4.287	15.7	20.6	36.3	46.0	-9.7
4.653	15.5	20.6	36.1	46.0	-9.9
4.496	15.3	20.6	35.9	46.0	-10.1
4.265	15.2	20.6	35.8	46.0	-10.2
2.635	15.2	20.4	35.6	46.0	-10.4
4.955	15.0	20.6	35.6	46.0	-10.4
4.605	14.9	20.6	35.5	46.0	-10.5
3.724	14.9	20.6	35.5	46.0	-10.5
3.217	15.0	20.5	35.5	46.0	-10.5
2.228	15.0	20.4	35.4	46.0	-10.6
3.899	14.7	20.6	35.3	46.0	-10.7
3.825	14.7	20.6	35.3	46.0	-10.7
10.417	18.1	21.1	39.2	50.0	-10.8
4.157	14.6	20.6	35.2	46.0	-10.8
4.731	14.4	20.6	35.0	46.0	-11.0
3.306	14.5	20.5	35.0	46.0	-11.0
3.679	14.4	20.6	35.0	46.0	-11.0

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

EUT:	STARwatch	Work Order:	PLSR0001
Serial Number:	Proto 1	Date:	07/14/2015
Customer:	Pulsar Informatics	Temperature:	24°C
Attendees:	Levi Danzer	Relative Humidity:	47%
Customer Project:	None	Bar. Pressure:	1019 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	PLSR0001-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2009

TEST PARAMETERS

Run #:	6	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

None

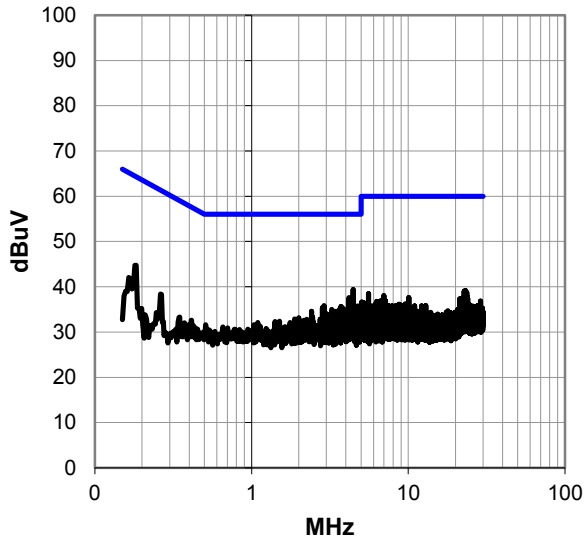
EUT OPERATING MODES

Transmitting BTLE, Mid Channel 20, 2442 MHz

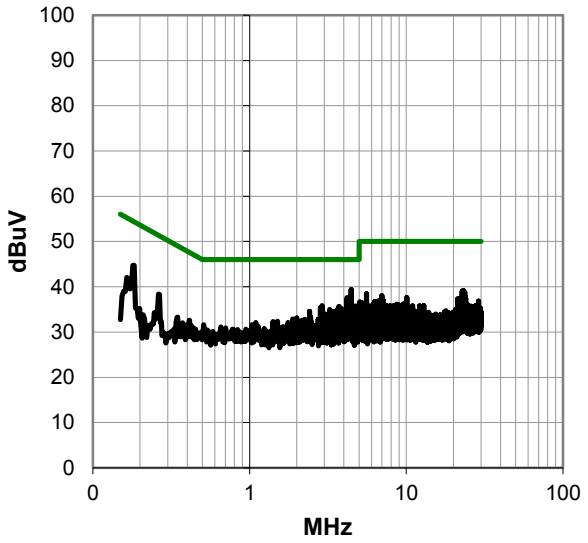
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

RESULTS - Run #6

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
4.452	18.8	20.6	39.4	56.0	-16.6
4.194	17.0	20.6	37.6	56.0	-18.4
0.180	24.3	20.4	44.7	64.5	-19.8
2.907	15.4	20.4	35.8	56.0	-20.2
4.761	15.2	20.6	35.8	56.0	-20.2
3.720	15.1	20.6	35.7	56.0	-20.3
2.832	14.9	20.4	35.3	56.0	-20.7
3.821	14.7	20.6	35.3	56.0	-20.7
23.232	16.4	22.8	39.2	60.0	-20.8
4.116	14.6	20.6	35.2	56.0	-20.8
22.803	16.3	22.7	39.0	60.0	-21.0
3.254	14.5	20.5	35.0	56.0	-21.0
3.612	14.4	20.6	35.0	56.0	-21.0
22.837	16.2	22.7	38.9	60.0	-21.1
23.680	15.9	22.9	38.8	60.0	-21.2
2.415	14.2	20.4	34.6	56.0	-21.4
3.414	14.1	20.5	34.6	56.0	-21.4
5.586	17.8	20.7	38.5	60.0	-21.5
4.149	13.8	20.6	34.4	56.0	-21.6
3.661	13.8	20.6	34.4	56.0	-21.6
23.441	15.5	22.8	38.3	60.0	-21.7
4.978	13.7	20.6	34.3	56.0	-21.7
4.508	13.7	20.6	34.3	56.0	-21.7
4.336	13.7	20.6	34.3	56.0	-21.7
4.037	13.7	20.6	34.3	56.0	-21.7
3.881	13.7	20.6	34.3	56.0	-21.7

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
4.452	18.8	20.6	39.4	46.0	-6.6
4.194	17.0	20.6	37.6	46.0	-8.4
0.180	24.3	20.4	44.7	54.5	-9.8
2.907	15.4	20.4	35.8	46.0	-10.2
4.761	15.2	20.6	35.8	46.0	-10.2
3.720	15.1	20.6	35.7	46.0	-10.3
2.832	14.9	20.4	35.3	46.0	-10.7
3.821	14.7	20.6	35.3	46.0	-10.7
23.232	16.4	22.8	39.2	50.0	-10.8
4.116	14.6	20.6	35.2	46.0	-10.8
22.803	16.3	22.7	39.0	50.0	-11.0
3.254	14.5	20.5	35.0	46.0	-11.0
3.612	14.4	20.6	35.0	46.0	-11.0
22.837	16.2	22.7	38.9	50.0	-11.1
23.680	15.9	22.9	38.8	50.0	-11.2
2.415	14.2	20.4	34.6	46.0	-11.4
3.414	14.1	20.5	34.6	46.0	-11.4
5.586	17.8	20.7	38.5	50.0	-11.5
4.149	13.8	20.6	34.4	46.0	-11.6
3.661	13.8	20.6	34.4	46.0	-11.6
23.441	15.5	22.8	38.3	50.0	-11.7
4.978	13.7	20.6	34.3	46.0	-11.7
4.508	13.7	20.6	34.3	46.0	-11.7
4.336	13.7	20.6	34.3	46.0	-11.7
4.037	13.7	20.6	34.3	46.0	-11.7
3.881	13.7	20.6	34.3	46.0	-11.7

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

EUT:	STARwatch	Work Order:	PLSR0001
Serial Number:	Proto 1	Date:	07/14/2015
Customer:	Pulsar Informatics	Temperature:	24°C
Attendees:	Levi Danzer	Relative Humidity:	47%
Customer Project:	None	Bar. Pressure:	1019 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	PLSR0001-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2009

TEST PARAMETERS

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

COMMENTS

None

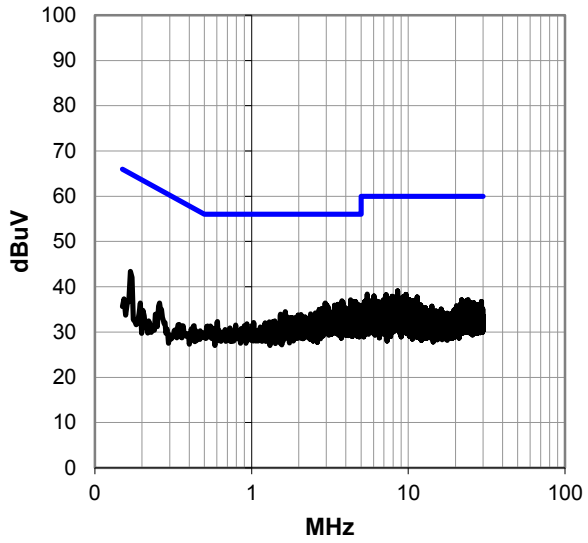
EUT OPERATING MODES

Transmitting BTLE, High Channel 39, 2480 MHz

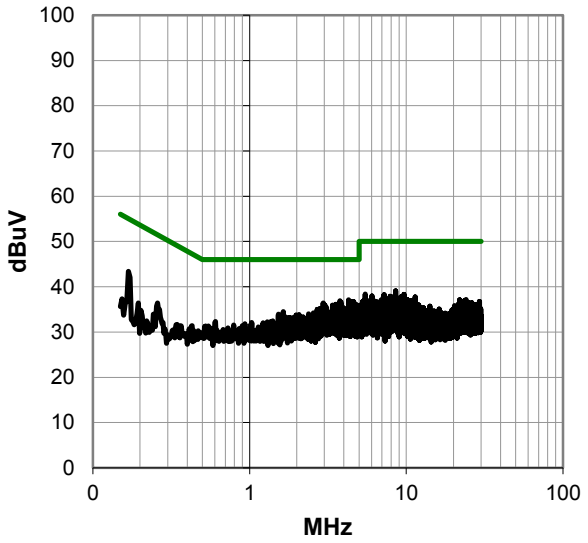
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

RESULTS - Run #7

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
4.276	16.5	20.6	37.1	56.0	-18.9
3.769	16.3	20.6	36.9	56.0	-19.1
4.511	16.2	20.6	36.8	56.0	-19.2
4.627	16.1	20.6	36.7	56.0	-19.3
4.500	16.0	20.6	36.6	56.0	-19.4
3.840	16.0	20.6	36.6	56.0	-19.4
2.952	16.0	20.4	36.4	56.0	-19.6
4.690	15.6	20.6	36.2	56.0	-19.8
3.806	15.6	20.6	36.2	56.0	-19.8
3.545	15.6	20.5	36.1	56.0	-19.9
4.821	15.4	20.6	36.0	56.0	-20.0
3.026	15.5	20.4	35.9	56.0	-20.1
3.519	15.4	20.5	35.9	56.0	-20.1
4.571	15.3	20.6	35.9	56.0	-20.1
3.388	15.4	20.5	35.9	56.0	-20.1
4.985	15.2	20.6	35.8	56.0	-20.2
4.672	15.1	20.6	35.7	56.0	-20.3
3.870	15.0	20.6	35.6	56.0	-20.4
3.933	14.9	20.6	35.5	56.0	-20.5
3.885	14.9	20.6	35.5	56.0	-20.5
3.105	15.0	20.5	35.5	56.0	-20.5
4.963	14.8	20.6	35.4	56.0	-20.6
3.829	14.8	20.6	35.4	56.0	-20.6
4.586	14.7	20.6	35.3	56.0	-20.7
2.847	14.8	20.4	35.2	56.0	-20.8
2.803	14.8	20.4	35.2	56.0	-20.8

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
4.276	16.5	20.6	37.1	46.0	-8.9
3.769	16.3	20.6	36.9	46.0	-9.1
4.511	16.2	20.6	36.8	46.0	-9.2
4.627	16.1	20.6	36.7	46.0	-9.3
4.500	16.0	20.6	36.6	46.0	-9.4
3.840	16.0	20.6	36.6	46.0	-9.4
2.952	16.0	20.4	36.4	46.0	-9.6
4.690	15.6	20.6	36.2	46.0	-9.8
3.806	15.6	20.6	36.2	46.0	-9.8
3.545	15.6	20.5	36.1	46.0	-9.9
4.821	15.4	20.6	36.0	46.0	-10.0
3.026	15.5	20.4	35.9	46.0	-10.1
3.519	15.4	20.5	35.9	46.0	-10.1
4.571	15.3	20.6	35.9	46.0	-10.1
3.388	15.4	20.5	35.9	46.0	-10.1
4.985	15.2	20.6	35.8	46.0	-10.2
4.672	15.1	20.6	35.7	46.0	-10.3
3.870	15.0	20.6	35.6	46.0	-10.4
3.933	14.9	20.6	35.5	46.0	-10.5
3.885	14.9	20.6	35.5	46.0	-10.5
3.105	15.0	20.5	35.5	46.0	-10.5
4.963	14.8	20.6	35.4	46.0	-10.6
3.829	14.8	20.6	35.4	46.0	-10.6
4.586	14.7	20.6	35.3	46.0	-10.7
2.847	14.8	20.4	35.2	46.0	-10.8
2.803	14.8	20.4	35.2	46.0	-10.8

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

EUT:	STARwatch	Work Order:	PLSR0001
Serial Number:	Proto 1	Date:	07/14/2015
Customer:	Pulsar Informatics	Temperature:	24°C
Attendees:	Levi Danzer	Relative Humidity:	47%
Customer Project:	None	Bar. Pressure:	1019 mb
Tested By:	Richard Mellroth	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	PLSR0001-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2009

TEST PARAMETERS

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

COMMENTS

None

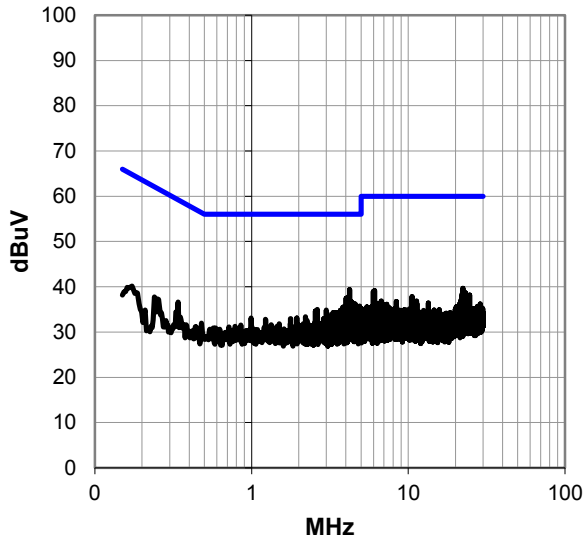
EUT OPERATING MODES

Transmitting BTLE, High Channel 39, 2480 MHz

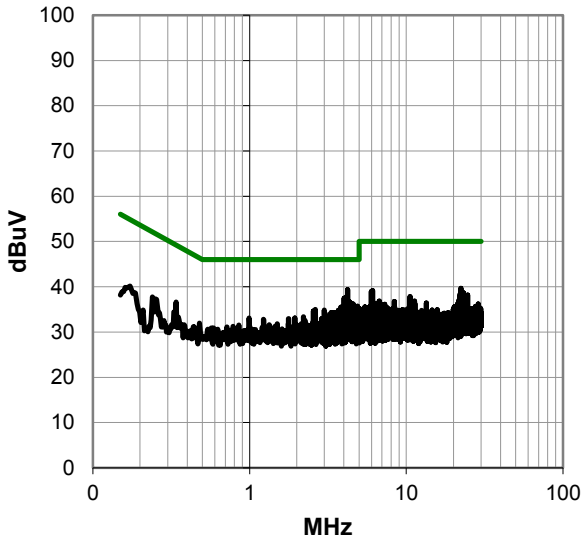
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.05.29

RESULTS - Run #8

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
4.220	18.8	20.6	39.4	56.0	-16.6
4.120	17.2	20.6	37.8	56.0	-18.2
4.008	16.9	20.6	37.5	56.0	-18.5
4.362	16.0	20.6	36.6	56.0	-19.4
4.250	15.9	20.6	36.5	56.0	-19.5
4.575	15.6	20.6	36.2	56.0	-19.8
4.896	15.1	20.6	35.7	56.0	-20.3
22.333	17.0	22.7	39.7	60.0	-20.3
3.825	14.9	20.6	35.5	56.0	-20.5
4.694	14.7	20.6	35.3	56.0	-20.7
6.097	18.4	20.7	39.1	60.0	-20.9
2.631	14.6	20.4	35.0	56.0	-21.0
4.653	14.4	20.6	35.0	56.0	-21.0
5.977	18.2	20.7	38.9	60.0	-21.1
4.869	14.3	20.6	34.9	56.0	-21.1
3.004	14.4	20.4	34.8	56.0	-21.2
22.505	16.1	22.7	38.8	60.0	-21.2
3.687	14.2	20.6	34.8	56.0	-21.2
4.847	14.1	20.6	34.7	56.0	-21.3
4.500	14.1	20.6	34.7	56.0	-21.3
23.169	15.9	22.8	38.7	60.0	-21.3
2.556	14.2	20.4	34.6	56.0	-21.4
22.165	15.9	22.6	38.5	60.0	-21.5
4.194	13.9	20.6	34.5	56.0	-21.5
3.754	13.8	20.6	34.4	56.0	-21.6
3.467	13.8	20.5	34.3	56.0	-21.7

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
4.220	18.8	20.6	39.4	46.0	-6.6
4.120	17.2	20.6	37.8	46.0	-8.2
4.008	16.9	20.6	37.5	46.0	-8.5
4.362	16.0	20.6	36.6	46.0	-9.4
4.250	15.9	20.6	36.5	46.0	-9.5
4.575	15.6	20.6	36.2	46.0	-9.8
4.896	15.1	20.6	35.7	46.0	-10.3
22.333	17.0	22.7	39.7	50.0	-10.3
3.825	14.9	20.6	35.5	46.0	-10.5
4.694	14.7	20.6	35.3	46.0	-10.7
6.097	18.4	20.7	39.1	50.0	-10.9
2.631	14.6	20.4	35.0	46.0	-11.0
4.653	14.4	20.6	35.0	46.0	-11.0
5.977	18.2	20.7	38.9	50.0	-11.1
4.869	14.3	20.6	34.9	46.0	-11.1
3.004	14.4	20.4	34.8	46.0	-11.2
22.505	16.1	22.7	38.8	50.0	-11.2
3.687	14.2	20.6	34.8	46.0	-11.2
4.847	14.1	20.6	34.7	46.0	-11.3
4.500	14.1	20.6	34.7	46.0	-11.3
23.169	15.9	22.8	38.7	50.0	-11.3
2.556	14.2	20.4	34.6	46.0	-11.4
22.165	15.9	22.6	38.5	50.0	-11.5
4.194	13.9	20.6	34.5	46.0	-11.5
3.754	13.8	20.6	34.4	46.0	-11.6
3.467	13.8	20.5	34.3	46.0	-11.7

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.

MODES OF OPERATION

Bluetooth Low Energy

CHANNELS TESTED

Low Channel 0, 2402 MHz
Mid Channel 20, 2442 MHz
High Channel 39, 2480 MHz

POWER SETTINGS INVESTIGATED

USB via 110VAC/60Hz

CONFIGURATIONS INVESTIGATED

PLSR0001 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26 GHz

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 (mos)
Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	12 mo
Attenuator	Fairview Microwave	SA18E-20	AQV	10/13/2014	12 mo
High Pass Filter, 2.8 - 18 GHz	Micro-Tronics	HPM50111	HHI	12/9/2014	12 mo
Low Pass Filter, 0 - 1000 MHz	Micro-Tronics	LPM50004	LFF	3/6/2015	12 mo
Antenna, Bilog	Teseq	CBL 6144	AYG	3/5/2015	24 mo
Pre-Amplifier	Miteq	AM-1616-1000	PAB	9/8/2014	12 mo
NC01 Cables	Northwest EMC	Bilog Cables	NC1	9/8/2014	12 mo
Antenna, Horn	EMCO	3115	AHM	6/3/2014	24 mo
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVZ	9/8/2014	12 mo
NC01 Cables	Northwest EMC	3115 Horn Cable	NC2	6/17/2015	12 mo
Antenna, Horn	EMCO	3160-07	AHP	NCR	0 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOK	10/13/2014	12 mo
Antenna, Horn	EMCO	3160-08	AHO	NCR	0 mo
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOJ	10/13/2014	12 mo
NC01 Cables	Northwest EMC	Standard Gain Horn Cable	NC3	6/17/2015	12 mo
Antenna, Horn	ETS Lindgren	3160-09	AIY	NCR	0 mo
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AOD	6/6/2015	12 mo
18-26GHz Horn Antenna Cable	Northwest EMC	N/A	NC8	6/6/2015	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:	PLSR0001	**Date:**	07/15/15		
Project:	None	**Temperature:**	23 °C		
Job Site:	NC01	**Humidity:**	47% RH		
Serial Number:	Proto 1	**Barometric Pres.:**	1018 mbar	**Tested by:**	Richard Mellroth
EUT:	STARwatch				
Configuration:	2				
Customer:	Pulsar Informatics				
Attendees:	Levi Danzer				
EUT Power:	USB via 110VAC/60Hz				
Operating Mode:	Transmitting BTLE, See comments next to data points for EUT channel and orientation.				
Deviations:	None				
Comments:	2.4 GHz Band Edge Measurements				

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

Run #	17	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass

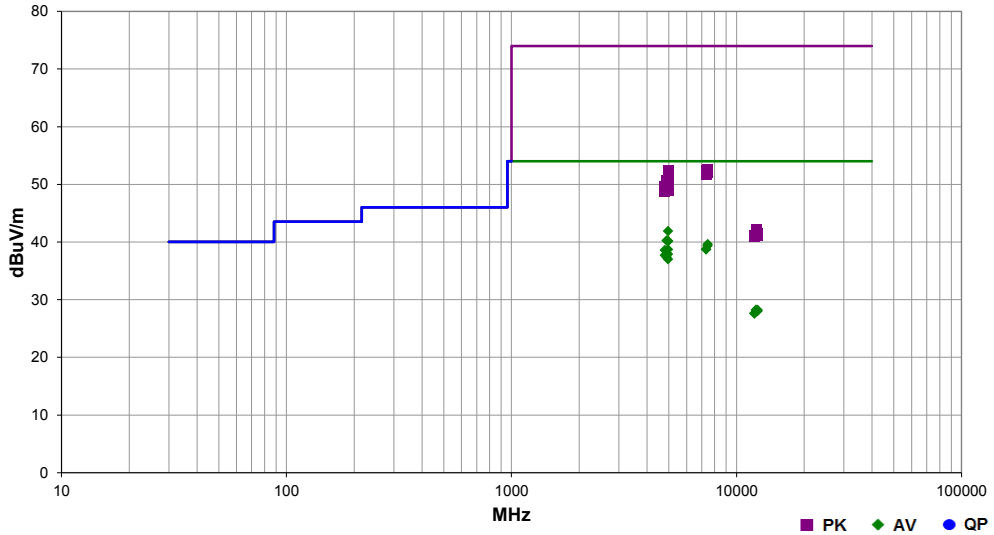
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2485.223	26.9	-2.1	1.9	149.0	3.0	20.0	Vert	AV	0.0	44.8	54.0	-9.2	High Ch 39, EUT Display Up
2484.847	26.9	-2.1	1.3	36.0	3.0	20.0	Vert	AV	0.0	44.8	54.0	-9.2	High Ch 39, EUT Vert
2484.713	26.9	-2.1	1.3	94.0	3.0	20.0	Horz	AV	0.0	44.8	54.0	-9.2	High Ch 39, EUT Flat
2483.980	26.9	-2.1	1.3	0.0	3.0	20.0	Horz	AV	0.0	44.8	54.0	-9.2	High Ch 39, EUT Display Up
2483.957	26.9	-2.1	3.8	281.0	3.0	20.0	Vert	AV	0.0	44.8	54.0	-9.2	High Ch 39, EUT Flat
2483.570	26.9	-2.1	1.3	227.0	3.0	20.0	Horz	AV	0.0	44.8	54.0	-9.2	High Ch 39, EUT Vert
2389.683	26.8	-2.3	2.5	231.0	3.0	20.0	Horz	AV	0.0	44.5	54.0	-9.5	Low Ch 0, EUT Flat
2388.317	26.8	-2.3	1.3	228.0	3.0	20.0	Vert	AV	0.0	44.5	54.0	-9.5	Low Ch 0, EUT Display Up
2485.290	40.8	-2.1	3.8	281.0	3.0	20.0	Vert	PK	0.0	58.7	74.0	-15.3	High Ch 39, EUT Flat
2485.423	40.6	-2.1	1.3	94.0	3.0	20.0	Horz	PK	0.0	58.5	74.0	-15.5	High Ch 39, EUT Flat
2485.327	40.6	-2.1	1.9	149.0	3.0	20.0	Vert	PK	0.0	58.5	74.0	-15.5	High Ch 39, EUT Display Up
2485.053	40.6	-2.1	1.3	0.0	3.0	20.0	Horz	PK	0.0	58.5	74.0	-15.5	High Ch 39, EUT Display Up
2389.797	40.7	-2.3	1.3	228.0	3.0	20.0	Vert	PK	0.0	58.4	74.0	-15.6	Low Ch 0, EUT Display Up
2483.643	40.4	-2.1	1.3	36.0	3.0	20.0	Vert	PK	0.0	58.3	74.0	-15.7	High Ch 39, EUT Vert
2484.093	40.2	-2.1	1.3	227.0	3.0	20.0	Horz	PK	0.0	58.1	74.0	-15.9	High Ch 39, EUT Vert
2388.597	40.4	-2.3	2.5	231.0	3.0	20.0	Horz	PK	0.0	58.1	74.0	-15.9	Low Ch 0, EUT Flat

SPURIOUS RADIATED EMISSIONS

Work Order:	PLSR0001	**Date:**	07/15/15		
Project:	None	**Temperature:**	23 °C		
Job Site:	NC01	**Humidity:**	47% RH		
Serial Number:	Proto 1	**Barometric Pres.:**	1018 mbar	**Tested by:**	Richard Mellroth
EUT:	STARwatch				
Configuration:	2				
Customer:	Pulsar Informatics				
Attendees:	Levi Danzer				
EUT Power:	USB via 110VAC/60Hz				
Operating Mode:	Transmitting BTLE, See comments next to data points for EUT channel and orientation.				
Deviations:	None				
Comments:	None				

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

Run #	18-19	**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
4960.125	33.4	8.5	1.1	110.0	3.0	0.0	Horz	AV	0.0	41.9	54.0	-12.1	High Ch 39, EUT Flat
4884.095	31.7	8.6	1.3	106.0	3.0	0.0	Horz	AV	0.0	40.3	54.0	-13.7	Mid Ch 20, EUT Flat
4960.125	31.7	8.5	3.2	150.0	3.0	0.0	Vert	AV	0.0	40.2	54.0	-13.8	High Ch 39, EUT Vert
4960.085	31.6	8.5	1.0	17.0	3.0	0.0	Vert	AV	0.0	40.1	54.0	-13.9	High Ch 39, EUT Display Up
7439.815	25.4	14.2	1.3	12.0	3.0	0.0	Vert	AV	0.0	39.6	54.0	-14.4	High Ch 39, EUT Vert
7438.505	25.1	14.2	4.0	172.0	3.0	0.0	Horz	AV	0.0	39.3	54.0	-14.7	High Ch 39, EUT Flat
7325.085	25.3	13.4	1.3	118.0	3.0	0.0	Horz	AV	0.0	38.7	54.0	-15.3	Mid Ch 20, EUT Flat
7324.500	25.3	13.4	1.3	62.0	3.0	0.0	Vert	AV	0.0	38.7	54.0	-15.3	Mid Ch 20, EUT Vert
4960.095	30.2	8.5	1.6	185.0	3.0	0.0	Vert	AV	0.0	38.7	54.0	-15.3	High Ch 39, EUT Flat
4804.105	30.5	8.1	1.3	107.0	3.0	0.0	Horz	AV	0.0	38.6	54.0	-15.4	Low Ch 0, EUT Flat
4960.095	29.4	8.5	1.3	178.0	3.0	0.0	Horz	AV	0.0	37.9	54.0	-16.1	High Ch 39, EUT Vert
4804.105	29.6	8.1	2.8	142.0	3.0	0.0	Vert	AV	0.0	37.7	54.0	-16.3	Low Ch 0, EUT Vert
4884.080	28.8	8.6	1.4	118.0	3.0	0.0	Vert	AV	0.0	37.4	54.0	-16.6	Mid Ch 20, EUT Vert
4960.075	28.5	8.5	3.7	114.0	3.0	0.0	Horz	AV	0.0	37.0	54.0	-17.0	High Ch 39, EUT Display Up
7439.530	38.3	14.2	1.3	12.0	3.0	0.0	Vert	PK	0.0	52.5	74.0	-21.5	High Ch 39, EUT Vert
7325.835	39.0	13.5	1.3	62.0	3.0	0.0	Vert	PK	0.0	52.5	74.0	-21.5	Mid Ch 20, EUT Vert
4959.565	43.9	8.5	1.1	110.0	3.0	0.0	Horz	PK	0.0	52.4	74.0	-21.6	High Ch 39, EUT Flat
7440.450	37.8	14.2	4.0	172.0	3.0	0.0	Horz	PK	0.0	52.0	74.0	-22.0	High Ch 39, EUT Flat
7326.370	38.3	13.5	1.3	118.0	3.0	0.0	Horz	PK	0.0	51.8	74.0	-22.2	Mid Ch 20, EUT Flat
4959.505	42.5	8.5	3.2	150.0	3.0	0.0	Vert	PK	0.0	51.0	74.0	-23.0	High Ch 39, EUT Vert
4960.310	42.2	8.5	1.0	17.0	3.0	0.0	Vert	PK	0.0	50.7	74.0	-23.3	High Ch 39, EUT Display Up
4884.070	42.0	8.6	1.3	106.0	3.0	0.0	Horz	PK	0.0	50.6	74.0	-23.4	Mid Ch 20, EUT Flat
4959.625	41.5	8.5	1.6	185.0	3.0	0.0	Vert	PK	0.0	50.0	74.0	-24.0	High Ch 39, EUT Flat
4803.810	41.5	8.1	1.3	107.0	3.0	0.0	Horz	PK	0.0	49.6	74.0	-24.4	Low Ch 0, EUT Flat
4960.835	40.6	8.5	3.7	114.0	3.0	0.0	Horz	PK	0.0	49.1	74.0	-24.9	High Ch 39, EUT Display Up
4959.625	40.5	8.5	1.3	178.0	3.0	0.0	Horz	PK	0.0	49.0	74.0	-25.0	High Ch 39, EUT Vert
4884.295	40.3	8.6	1.4	118.0	3.0	0.0	Vert	PK	0.0	48.9	74.0	-25.1	Mid Ch 20, EUT Vert
4804.480	40.7	8.1	2.8	142.0	3.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	Low Ch 0, EUT Vert
12211.070	29.0	-0.8	1.3	145.0	3.0	0.0	Horz	AV	0.0	28.2	54.0	-25.8	Mid Ch 20, EUT Flat
12210.480	29.0	-0.8	1.3	57.0	3.0	0.0	Vert	AV	0.0	28.2	54.0	-25.8	Mid Ch 20, EUT Vert
12399.310	29.1	-0.9	1.3	6.0	3.0	0.0	Vert	AV	0.0	28.2	54.0	-25.8	High Ch 39, EUT Vert
12399.990	28.9	-0.9	1.3	59.0	3.0	0.0	Horz	AV	0.0	28.0	54.0	-26.0	High Ch 39, EUT Flat
12008.950	29.4	-1.7	1.3	219.0	3.0	0.0	Horz	AV	0.0	27.7	54.0	-26.3	Low Ch 0, EUT Flat
12010.760	29.3	-1.7	1.3	161.0	3.0	0.0	Vert	AV	0.0	27.6	54.0	-26.4	Low Ch 0, EUT Vert
12210.280	43.0	-0.8	1.3	57.0	3.0	0.0	Vert	PK	0.0	42.2	74.0	-31.8	Mid Ch 20, EUT Vert
12210.430	42.3	-0.8	1.3	145.0	3.0	0.0	Horz	PK	0.0	41.5	74.0	-32.5	Mid Ch 20, EUT Flat
12399.040	42.4	-0.9	1.3	6.0	3.0	0.0	Vert	PK	0.0	41.5	74.0	-32.5	High Ch 39, EUT Vert
12399.310	42.1	-0.9	1.3	59.0	3.0	0.0	Horz	PK	0.0	41.2	74.0	-32.8	High Ch 39, EUT Flat
12009.100	42.8	-1.7	1.3	219.0	3.0	0.0	Horz	PK	0.0	41.1	74.0	-32.9	Low Ch 0, EUT Flat
12010.790	42.7	-1.7	1.3	161.0	3.0	0.0	Vert	PK	0.0	41.0	74.0	-33.0	Low Ch 0, EUT Vert

BAND EDGE COMPLIANCE

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)
Spectrum Analyzer	Agilent	E4446A	AAT	9/27/2014	12
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Attenuator	Fairview Microwave	SA4014-20	TKE	1/16/2015	12
DC Block, 40 GHz	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Signal Generator	Agilent	N5183A	TIA	4/7/2014	36

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:	STARwatch			**Work Order:**	PLSR0001
Serial Number:	None			**Date:**	07/14/15
Customer:	Pulsar Informatics			**Temperature:**	23°C
Attendees:	Levi Danzer			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1019 mbar
Tested by:	Richard Mellroth	**Power:**	USB	**Job Site:**	NC02

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

COMMENTS

None

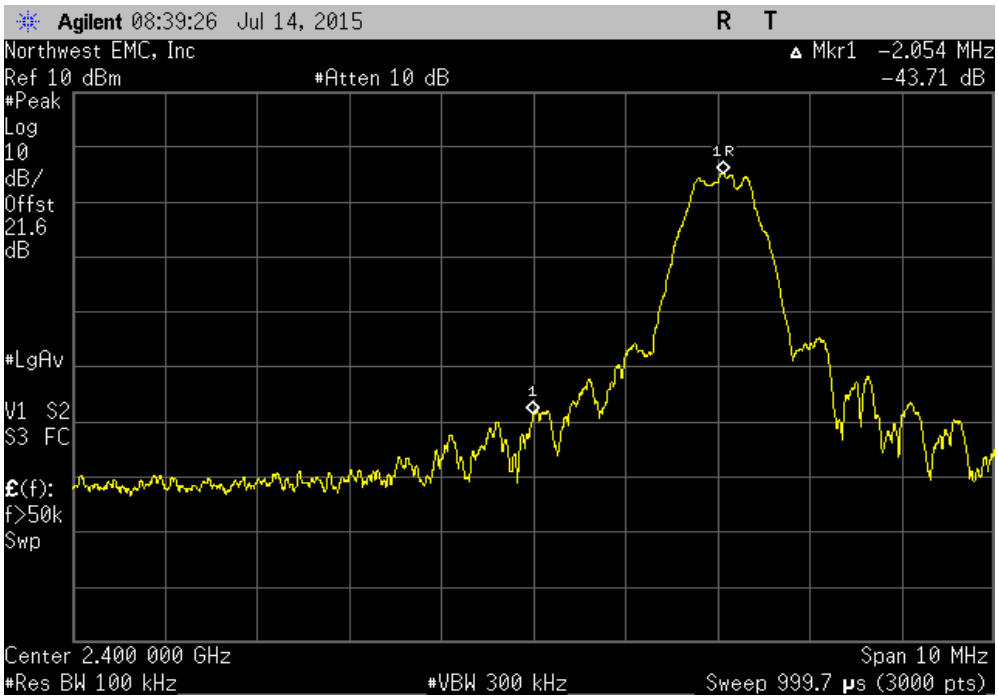
DEVIATIONS FROM TEST STANDARD

None

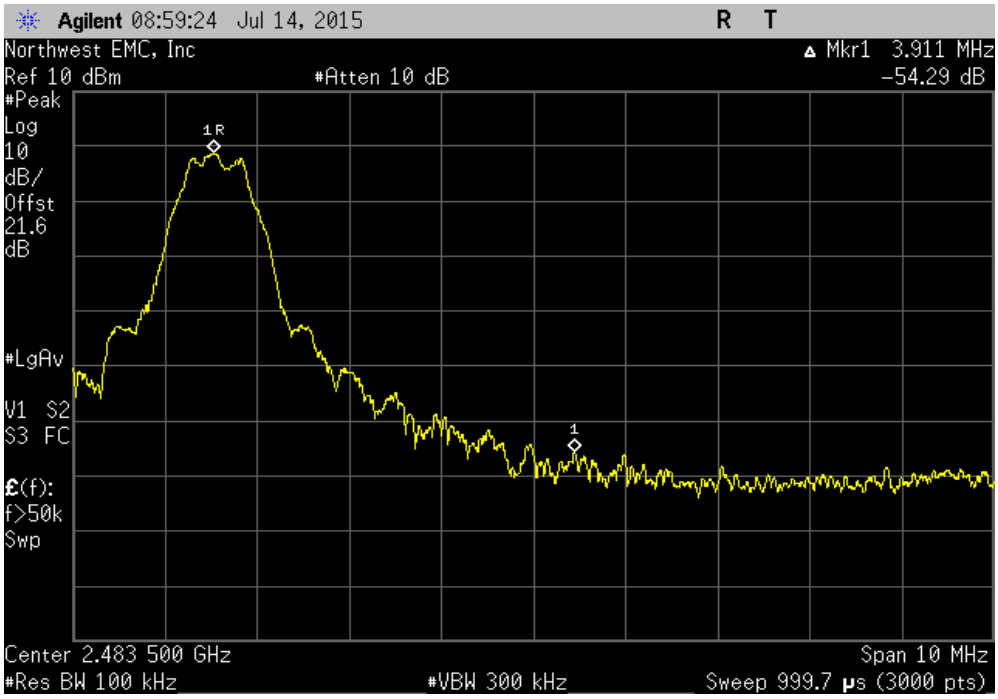
Configuration #	1	Signature

	Value (dBc)	Limit ≤ (dBc)	Result
BLE			
Low Channel 0, 2402 MHz	-43.71	-20	Pass
High Channel 39, 2480 MHz	-54.29	-20	Pass

BLE, Low Channel 0, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-43.71	-20	Pass



BLE, High Channel 39, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-54.29	-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)
Spectrum Analyzer	Agilent	E4446A	AAT	9/27/2014	12
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Attenuator	Fairview Microwave	SA4014-20	TKE	1/16/2015	12
DC Block, 40 GHz	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Signal Generator	Agilent	N5183A	TIA	4/7/2014	36

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:	STARwatch			**Work Order:**	PLSR0001
Serial Number:	None			**Date:**	07/14/15
Customer:	Pulsar Informatics			**Temperature:**	23°C
Attendees:	Levi Danzer			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1019 mbar
Tested by:	Richard Mellroth	**Power:**	USB	**Job Site:**	NC02

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

COMMENTS

None

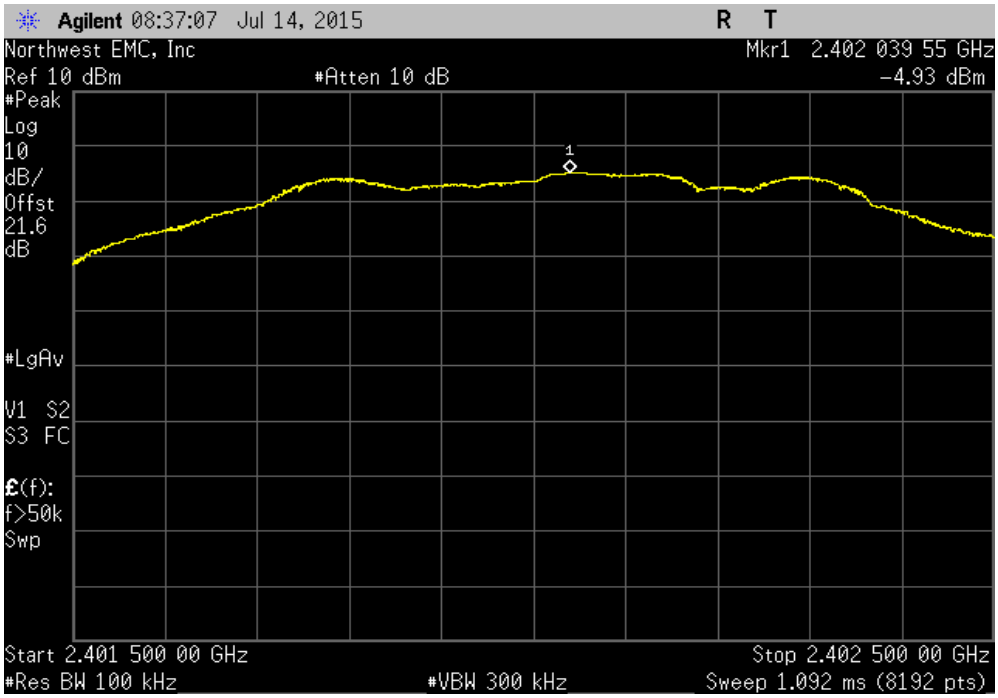
DEVIATIONS FROM TEST STANDARD

None

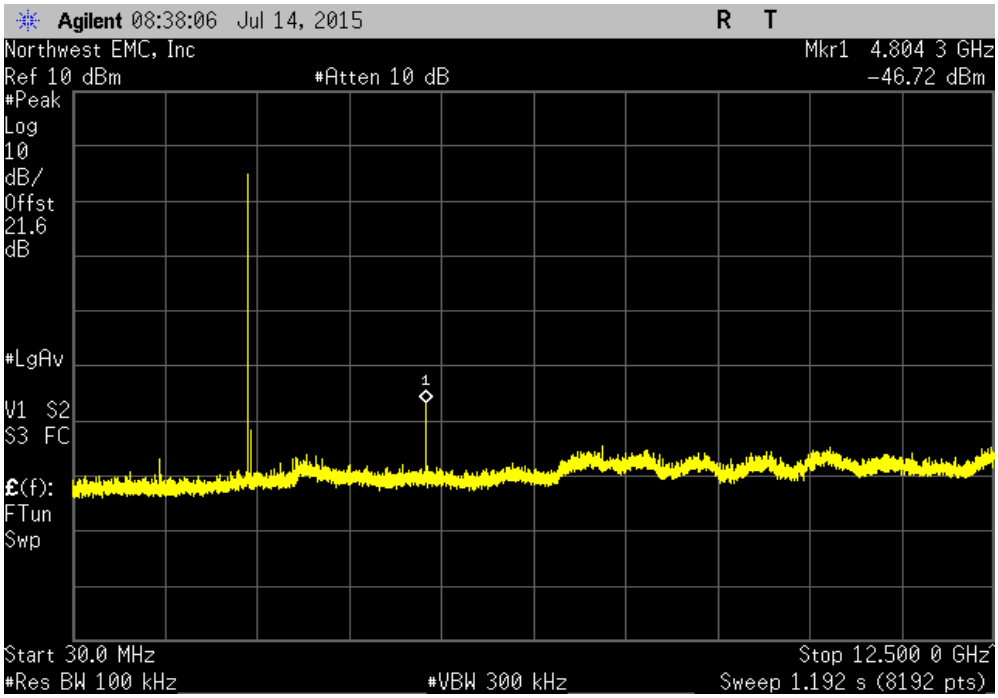
Configuration #	1	*Signature*

		Frequency Range	Value (dBc)	Limit ≤ (dBc)	Result
BLE					
	Low Channel 0, 2402 MHz	Fundamental	N/A	N/A	N/A
	Low Channel 0, 2402 MHz	30 MHz - 12.5 GHz	-41.79	-20	Pass
	Low Channel 0, 2402 MHz	12.5 GHz - 25 GHz	-44.89	-20	Pass
	Mid Channel 20, 2442 MHz	Fundamental	N/A	N/A	N/A
	Mid Channel 20, 2442 MHz	30 MHz - 12.5 GHz	-44.58	-20	Pass
	Mid Channel 20, 2442 MHz	12.5 GHz - 25 GHz	-46.54	-20	Pass
	High Channel 39, 2480 MHz	Fundamental	N/A	N/A	N/A
	High Channel 39, 2480 MHz	30 MHz - 12.5 GHz	-46.8	-20	Pass
	High Channel 39, 2480 MHz	12.5 GHz - 25 GHz	-47.33	-20	Pass

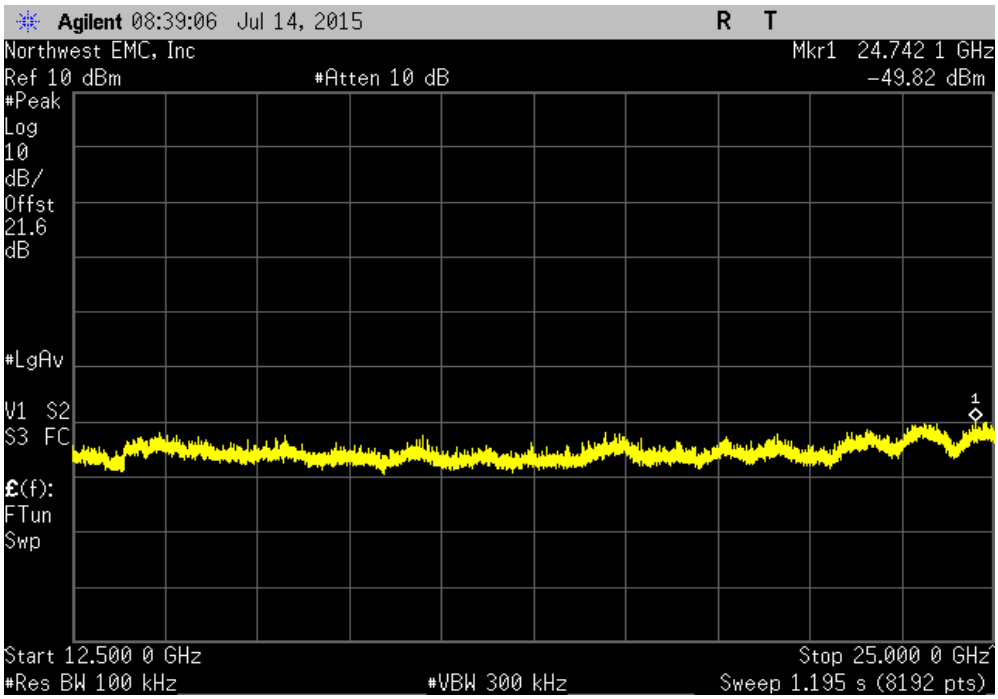
BLE, Low Channel 0, 2402 MHz						
	Frequency Range			Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



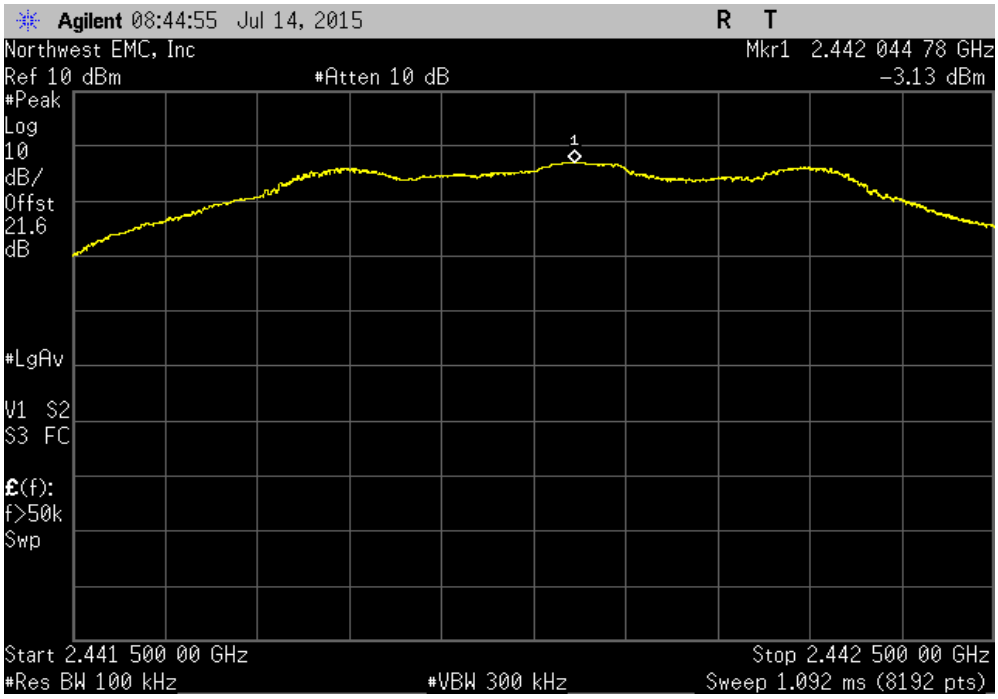
BLE, Low Channel 0, 2402 MHz					
Frequency Range			Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz			-41.79	-20	Pass



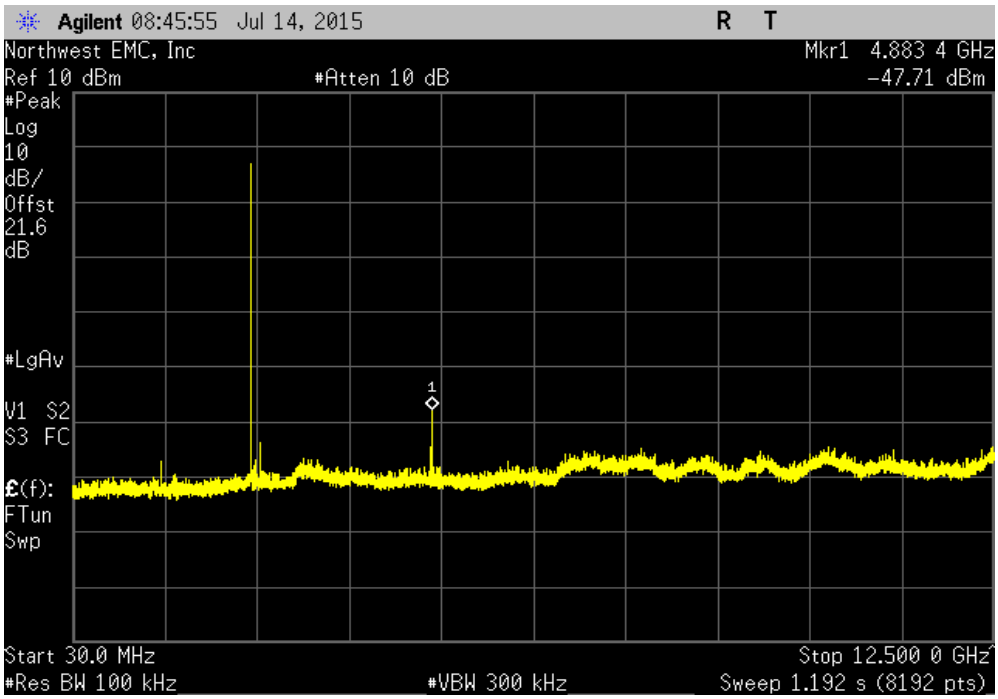
BLE, Low Channel 0, 2402 MHz				
Frequency Range		Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz		-44.89	-20	Pass



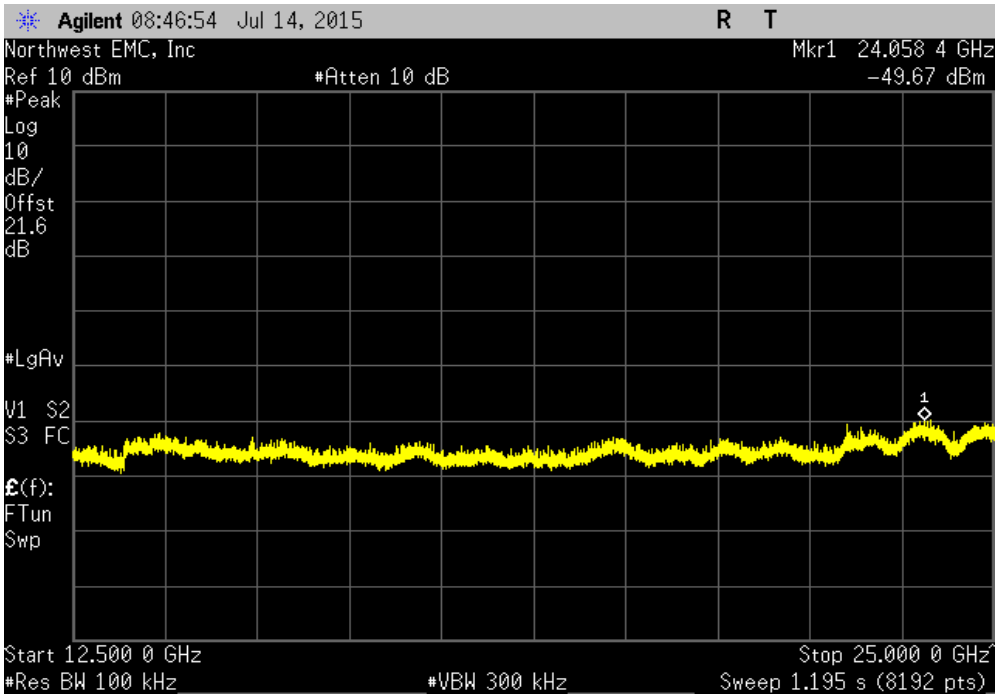
BLE, Mid Channel 20, 2442 MHz						
	Frequency Range			Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



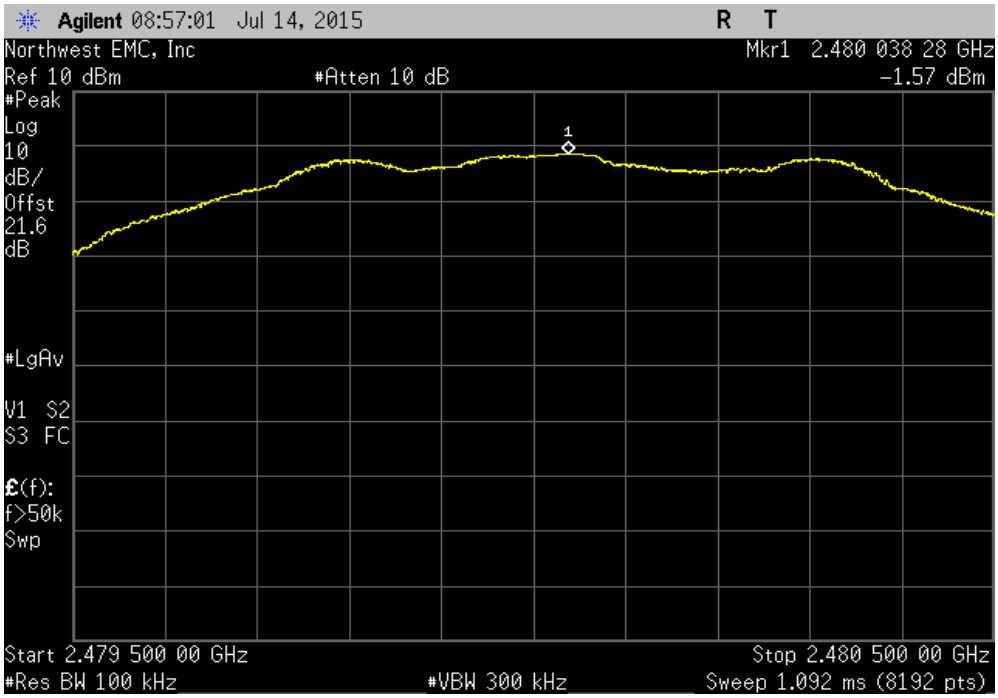
BLE, Mid Channel 20, 2442 MHz				
Frequency Range		**Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz		-44.58	-20	Pass



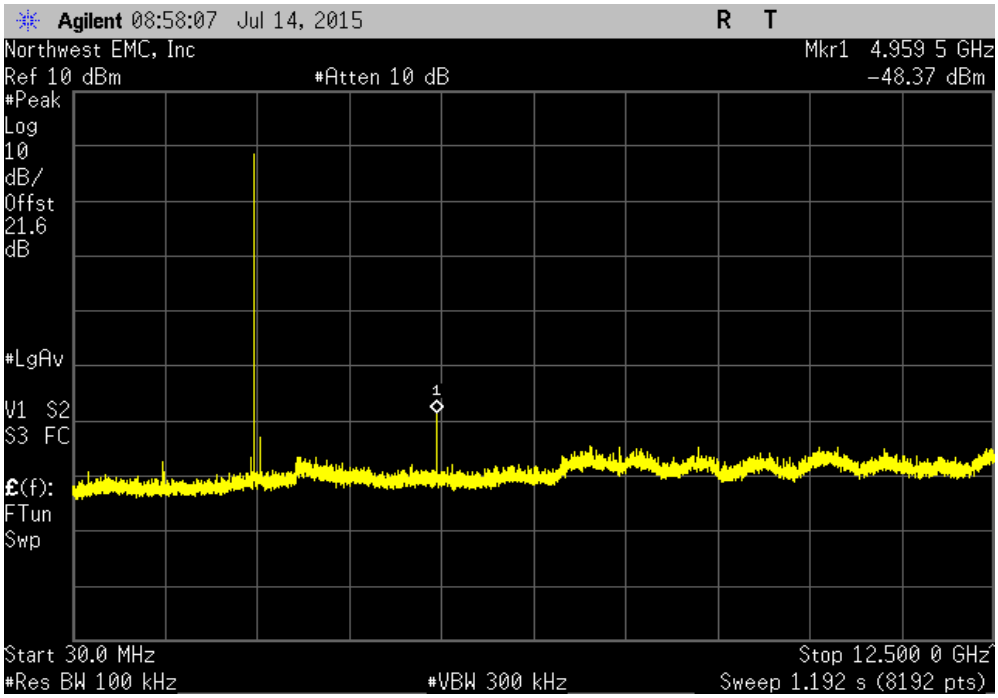
BLE, Mid Channel 20, 2442 MHz				
Frequency Range		**Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-46.54	-20	Pass



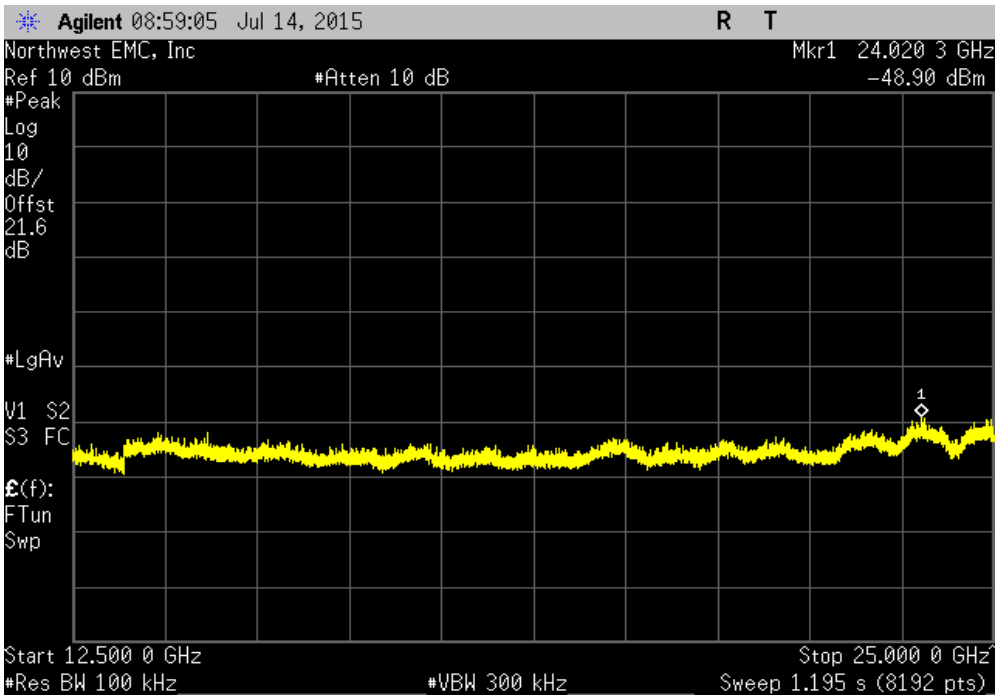
BLE, High Channel 39, 2480 MHz						
	Frequency Range			Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



BLE, High Channel 39, 2480 MHz					
Frequency Range			Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz			-46.8	-20	Pass



BLE, High Channel 39, 2480 MHz				
Frequency Range		Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz		-47.33	-20	Pass



OCCUPIED BANDWIDTH

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)
Spectrum Analyzer	Agilent	E4446A	AAT	9/27/2014	12
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Attenuator	Fairview Microwave	SA4014-20	TKE	1/16/2015	12
DC Block, 40 GHz	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Signal Generator	Agilent	N5183A	TIA	4/7/2014	36

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:	STARwatch			**Work Order:**	PLSR0001
Serial Number:	None			**Date:**	07/14/15
Customer:	Pulsar Informatics			**Temperature:**	23°C
Attendees:	Levi Danzer			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1019 mbar
Tested by:	Richard Mellroth	**Power:**	USB	**Job Site:**	NC02

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

COMMENTS

None

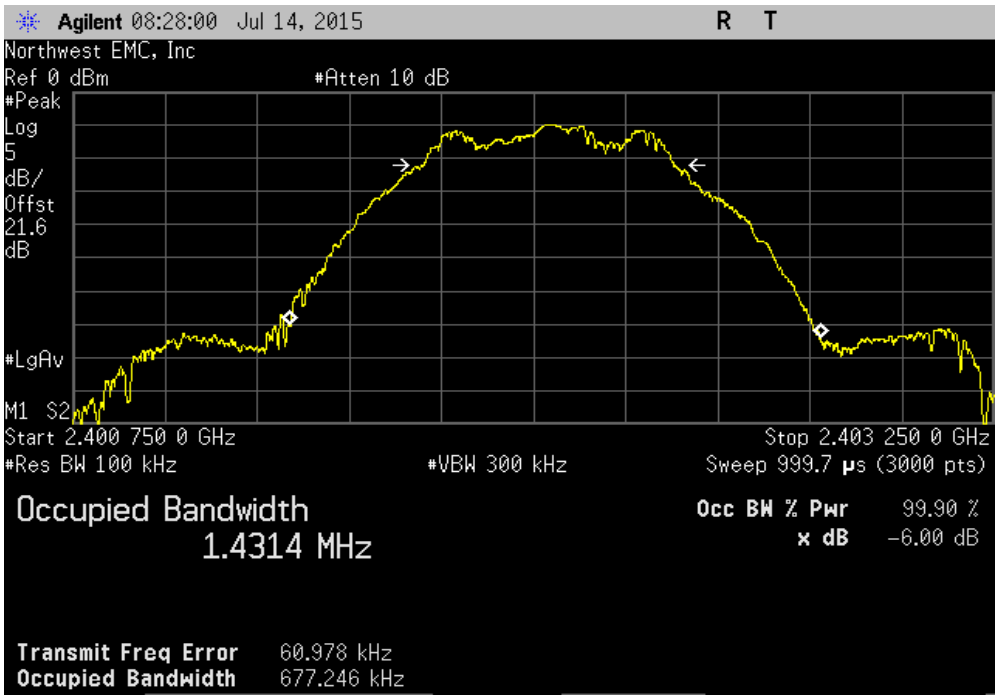
DEVIATIONS FROM TEST STANDARD

None

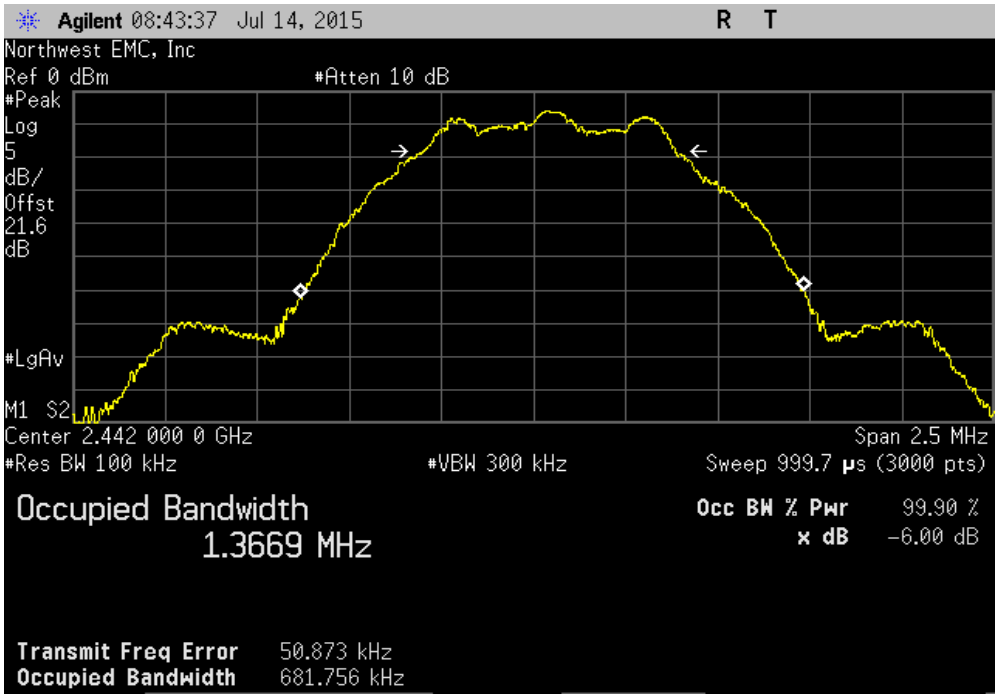
Configuration #	1	Signature

	Value	Limit (≥)	Result
BLE			
Low Channel 0, 2402 MHz	677.246 kHz	500 kHz	Pass
Mid Channel 20, 2442 MHz	681.757 kHz	500 kHz	Pass
High Channel 39, 2480 MHz	684.986 kHz	500 kHz	Pass

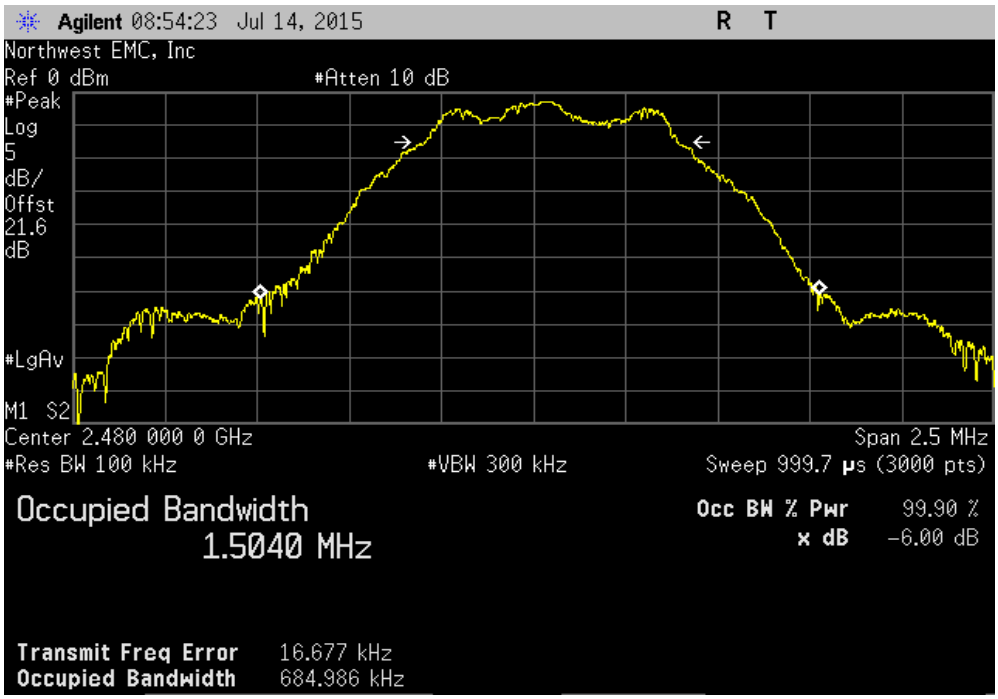
BLE, Low Channel 0, 2402 MHz						
				Value	Limit (≥)	Result
				677.246 kHz	500 kHz	Pass



BLE, Mid Channel 20, 2442 MHz						
				Value	Limit (≥)	Result
				681.757 kHz	500 kHz	Pass



BLE, High Channel 39, 2480 MHz						
				Value	Limit (≥)	Result
				684.986 kHz	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)
Spectrum Analyzer	Agilent	E4446A	AAT	9/27/2014	12
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Attenuator	Fairview Microwave	SA4014-20	TKE	1/16/2015	12
DC Block, 40 GHz	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Signal Generator	Agilent	N5183A	TIA	4/7/2014	36

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:	**STARwatch**			**Work Order:**	**PLSR0001**
Serial Number:	**None**			**Date:**	**07/14/15**
Customer:	**Pulsar Informatics**			**Temperature:**	**23°C**
Attendees:	**Levi Danzer**			**Humidity:**	**48%**
Project:	**None**			**Barometric Pres.:**	**1019 mbar**
Tested by:	**Richard Mellroth**	**Power:**	**USB**	**Job Site:**	**NC02**

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

COMMENTS

None

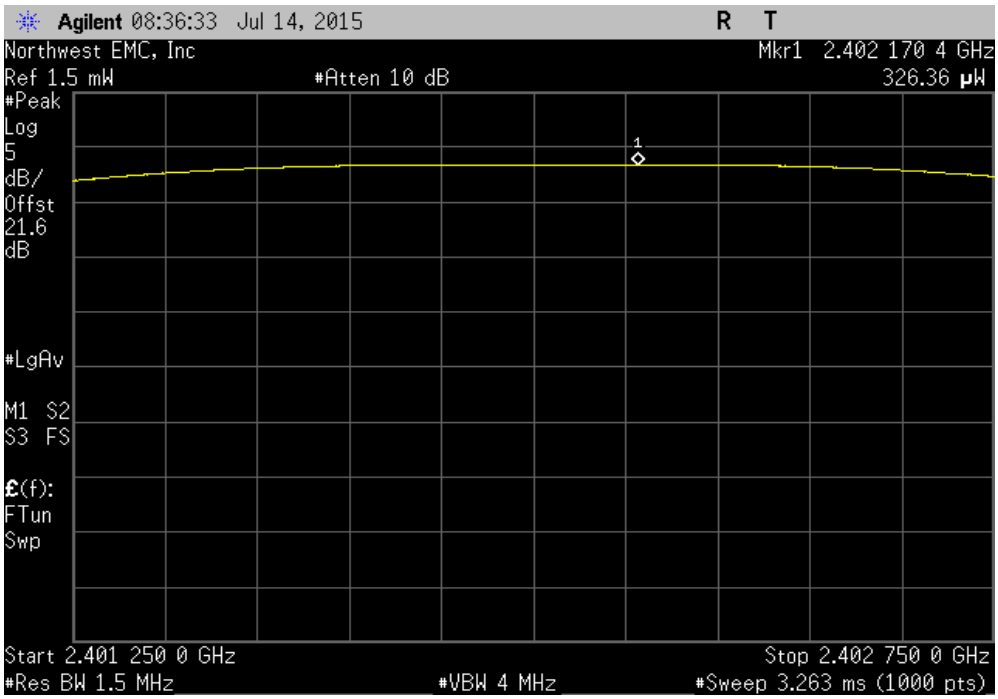
DEVIATIONS FROM TEST STANDARD

None

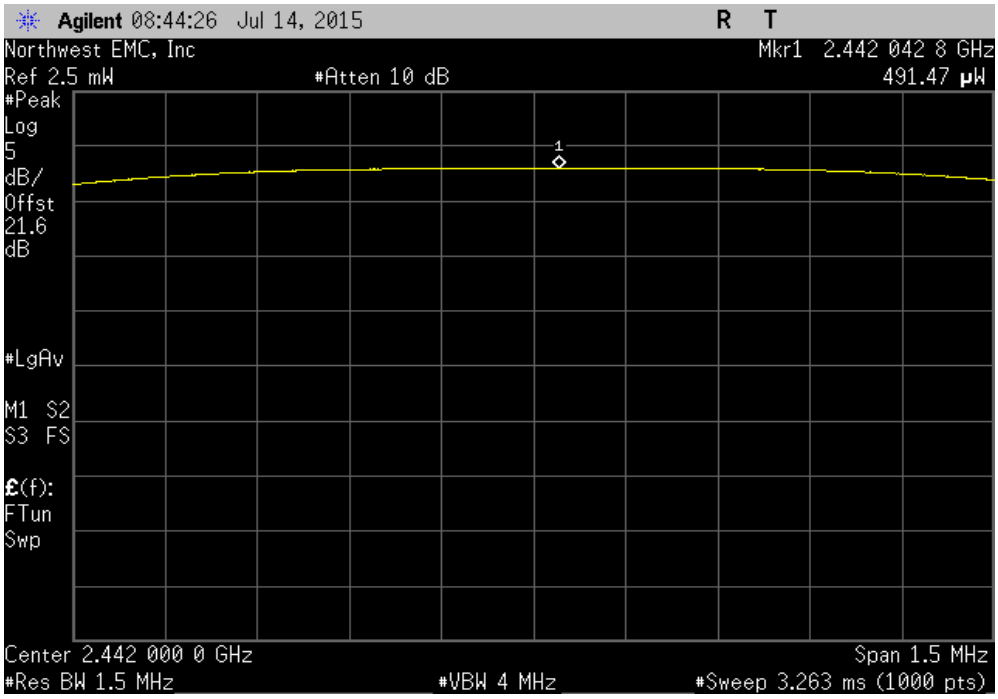
Configuration #	**1**	*Signature*

	Value	**Limit (<)**	**Result**
BLE			
Low Channel 0, 2402 MHz	326.362 uW	1 W	Pass
Mid Channel 20, 2442 MHz	491.473 uW	1 W	Pass
High Channel 39, 2480 MHz	703.396 uW	1 W	Pass

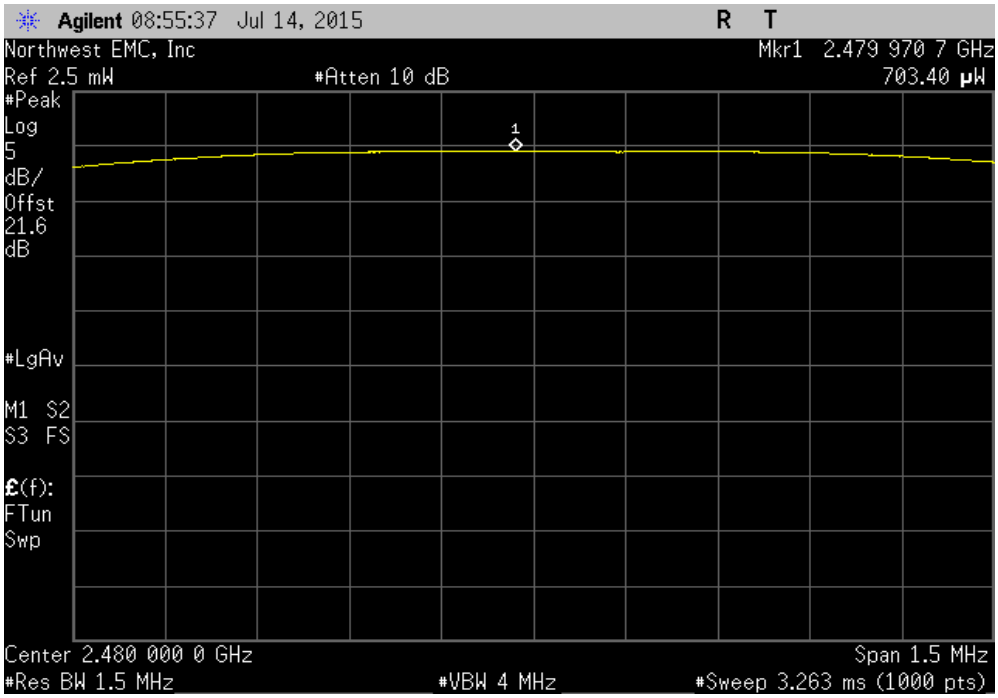
BLE, Low Channel 0, 2402 MHz						
				Value	Limit (<)	Result
				326.362 uW	1 W	Pass



BLE, Mid Channel 20, 2442 MHz						
				Value	Limit (<)	Result
				491.473 uW	1 W	Pass



BLE, High Channel 39, 2480 MHz						
				Value	Limit (<)	Result
				703.396 uW	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)
Spectrum Analyzer	Agilent	E4446A	AAT	9/27/2014	12
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Attenuator	Fairview Microwave	SA4014-20	TKE	1/16/2015	12
DC Block, 40 GHz	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Signal Generator	Agilent	N5183A	TIA	4/7/2014	36

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:	STARwatch			Work Order:	PLSR0001
Serial Number:	None			Date:	07/14/15
Customer:	Pulsar Informatics			Temperature:	23°C
Attendees:	Levi Danzer			Humidity:	48%
Project:	None			Barometric Pres.:	1019 mbar
Tested by:	Richard Mellroth	Power:	USB	Job Site:	NC02

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

COMMENTS

None

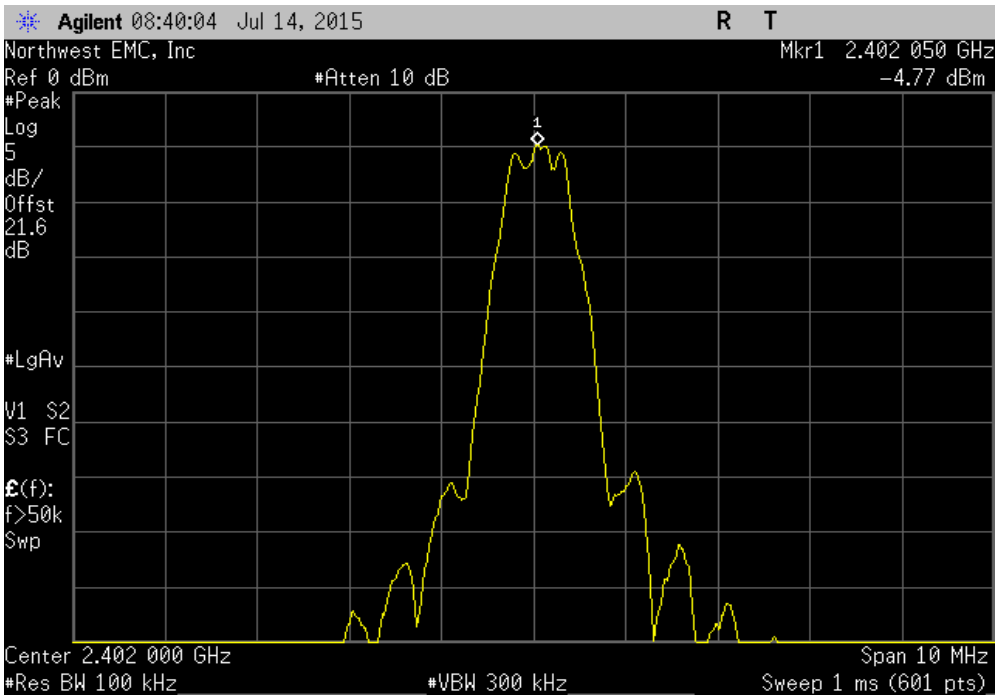
DEVIATIONS FROM TEST STANDARD

None

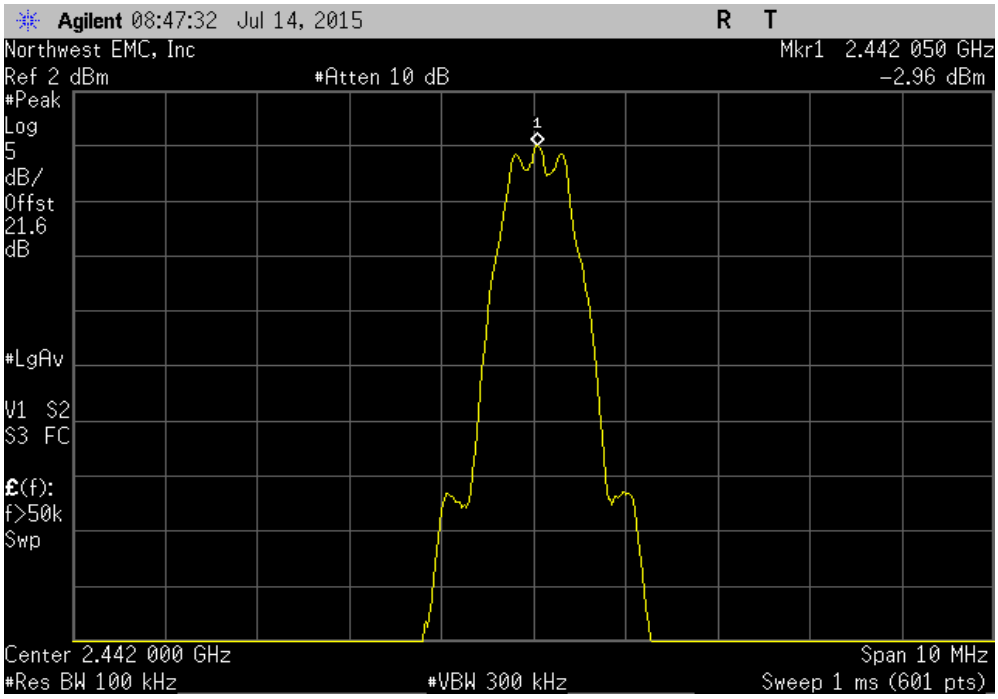
Configuration #	1	Signature

	Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Results
BLE					
Low Channel 0, 2402 MHz	-4.766	-15.2	-19.966	8	Pass
Mid Channel 20, 2442 MHz	-2.96	-15.2	-18.16	8	Pass
High Channel 39, 2480 MHz	-1.212	-15.2	-16.412	8	Pass

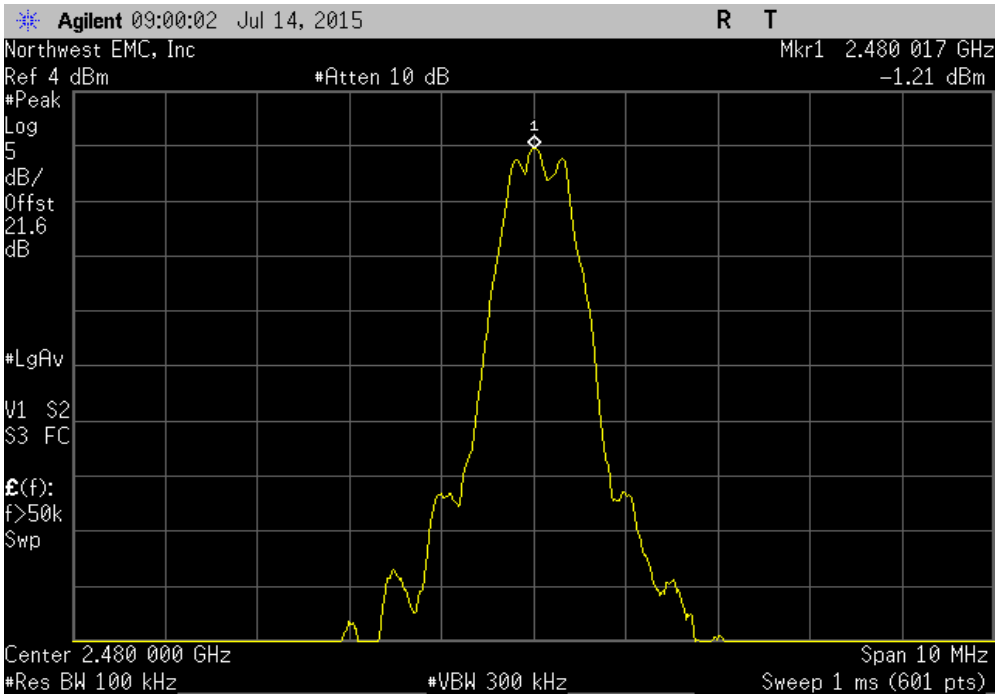
BLE, Low Channel 0, 2402 MHz						
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Results
		-4.766	-15.2	-19.966	8	Pass



BLE, Mid Channel 20, 2442 MHz						
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Results
		-2.96	-15.2	-18.16	8	Pass



BLE, High Channel 39, 2480 MHz						
		Value dBm/100kHz	dBm/100kHz To dBm/3kHz	Value dBm/3kHz	Limit dBm/3kHz	Results
		-1.212	-15.2	-16.412	8	Pass



DUTY CYCLE

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)
Spectrum Analyzer	Agilent	E4446A	AAT	9/27/2014	12
NC02 Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Attenuator	Fairview Microwave	SA4014-20	TKE	1/16/2015	12
DC Block, 40 GHz	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Signal Generator	Agilent	N5183A	TIA	4/7/2014	36

TEST DESCRIPTION

The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was 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.

If the transmit duty cycle < 98 percent, burst gating was used during some of the other tests in this report to only measure during the burst duration.

DUTY CYCLE

NORTHWEST EMC

XMit 2015.01.14

EUT:	STARwatch			**Work Order:**	PLSR0001
Serial Number:	None			**Date:**	07/14/15
Customer:	Pulsar Informatics			**Temperature:**	23°C
Attendees:	Levi Danzer			**Humidity:**	48%
Project:	None			**Barometric Pres.:**	1019 mbar
Tested by:	Richard Mellroth	**Power:**	USB	**Job Site:**	NC02

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

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

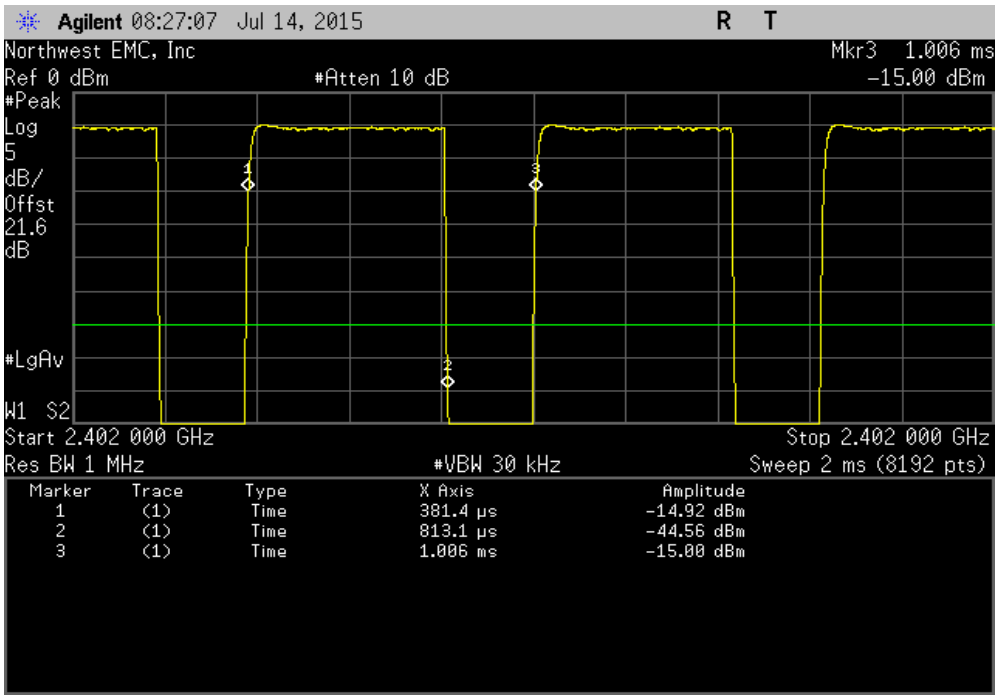
Configuration #	1	Signature

	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
BLE						
Low Channel 0, 2402 MHz	431.7 us	624.3 us	1	69.1	N/A	N/A
Low Channel 0, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
Mid Channel 20, 2442 MHz	431.2 us	624.1 us	1	69.1	N/A	N/A
Mid Channel 20, 2442 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel 39, 2480 MHz	431.4 us	623.1 us	1	69.2	N/A	N/A
High Channel 39, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A

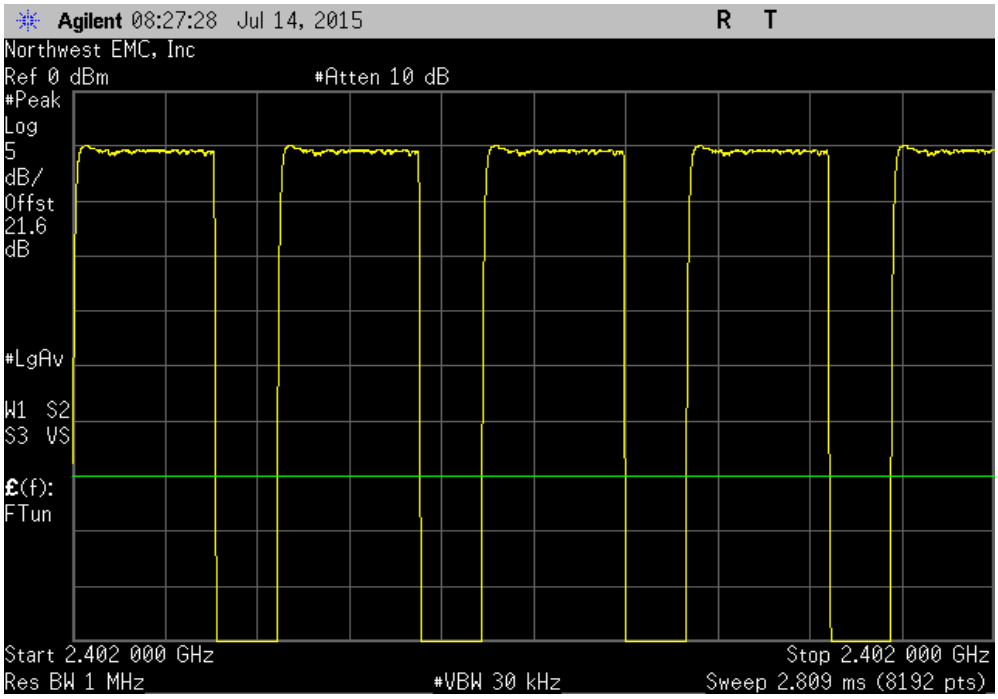
DUTY CYCLE

XMit 2015.01.14

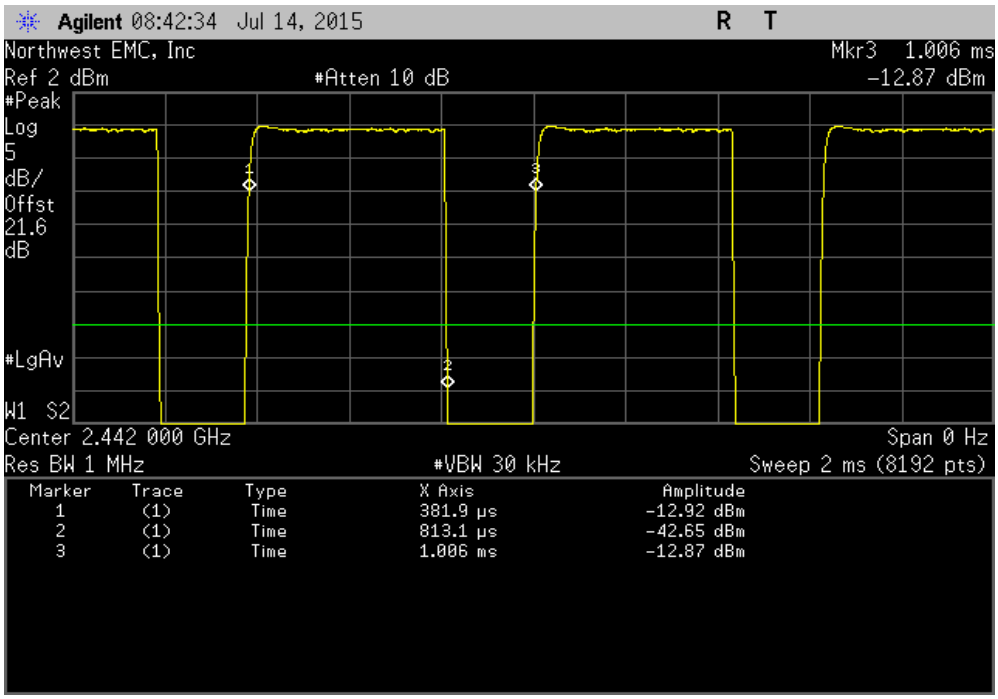
BLE, Low Channel 0, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	431.7 us	624.3 us	1	69.1	N/A	N/A



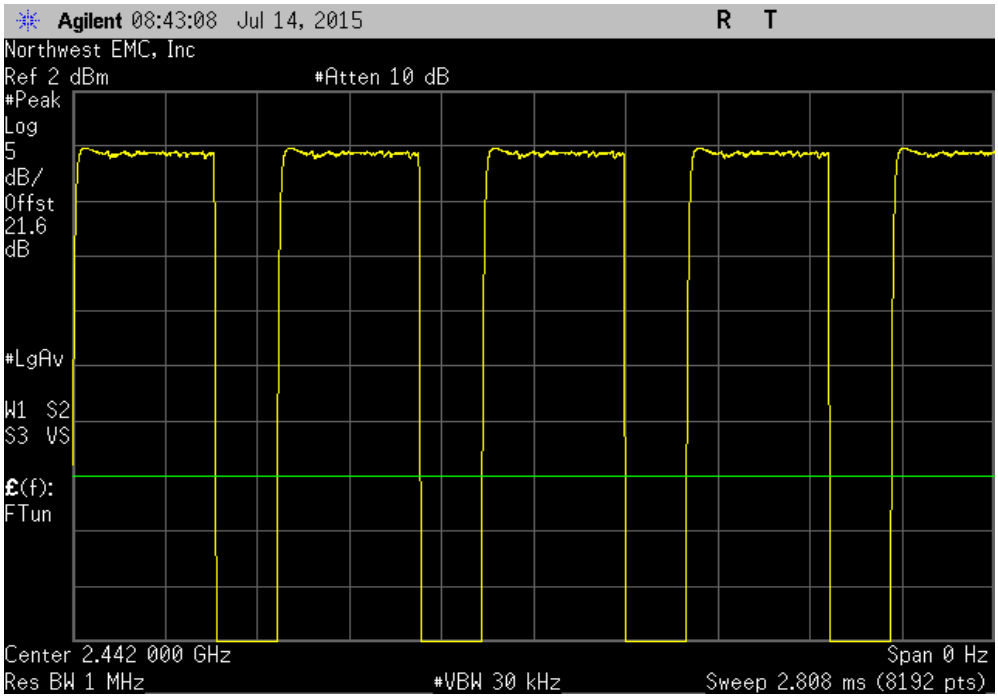
BLE, Low Channel 0, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



BLE, Mid Channel 20, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	431.2 us	624.1 us	1	69.1	N/A	N/A



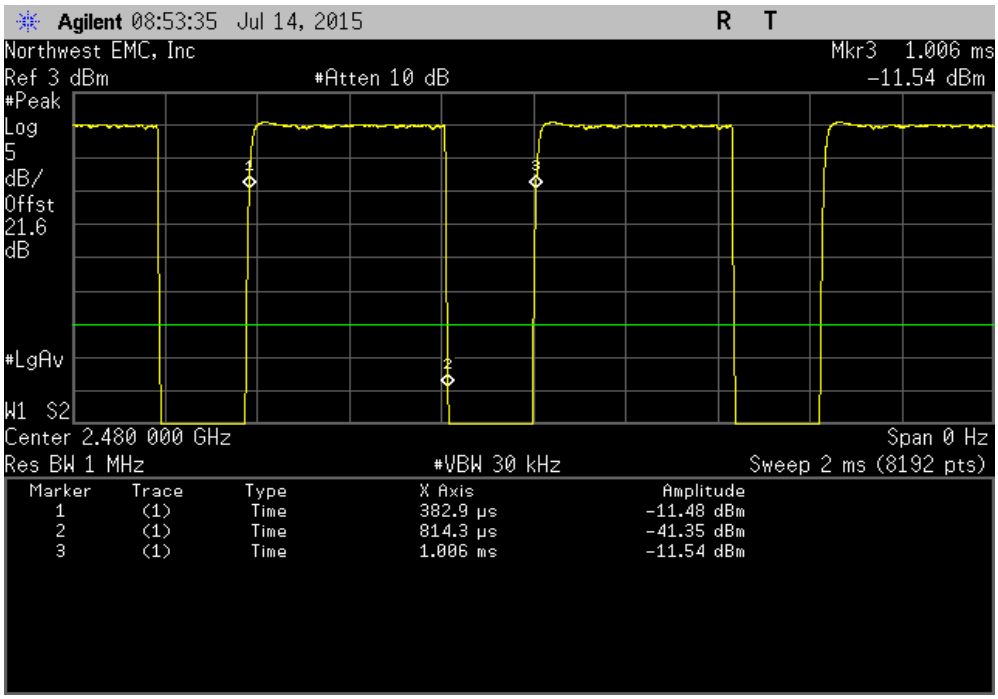
BLE, Mid Channel 20, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



DUTY CYCLE

XMit 2015.01.14

BLE, High Channel 39, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	431.4 us	623.1 us	1	69.2	N/A	N/A



BLE, High Channel 39, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A