

NORTHWEST EMC

Fatigue Science

ReadiBand4

FCC 15.207:2015

FCC 15.247:2015

Bluetooth Radio

Report # DOTY0009.2



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

Last Date of Test: October 14, 2015

Fatigue Science
Model: ReadiBand4

Radio Equipment Testing

Standards

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

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6, 11.12.1, 11.13.2	Spurious Radiated Emissions	Yes	Pass	
6.10.4	Band Edge Compliance	Yes	Pass	
11.6	Duty Cycle	Yes	Pass	
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:



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

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)	0	0
AC Powerline Conducted Emissions (dB)	0	0

FACILITIES



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



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Fatigue Science
Address:	730-1133 Melville St
City, State, Zip:	Vancouver, BC V6E 4E5
Test Requested By:	Chris Doughty of Doughty Designs
Model:	ReadiBand4 (FSRB4B)
First Date of Test:	October 12, 2015
Last Date of Test:	October 14, 2015
Receipt Date of Samples:	October 12, 2015
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Body worn sensor system with BLE radio and USB.
Testing Objective:
To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements.

CONFIGURATIONS

Configuration DOTY0009- 1

EUT					
Description	Manufacturer	Model/Part Number		Serial Number	
ReadiBand4	Fatigue Science	V4		DNZ3X20G	

Peripherals in test setup boundary					
Description	Manufacturer	Model/Part Number		Serial Number	
USB Power Supply	Apple	A1385		None	

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Extension Cord	No	2.0m	No	AC Mains	USB Power Supply

Configuration DOTY0009- 2

EUT					
Description	Manufacturer	Model/Part Number		Serial Number	
ReadiBand4	Fatigue Science	V4		DNZ3U41F	

Peripherals in test setup boundary					
Description	Manufacturer	Model/Part Number		Serial Number	
USB Power Supply	Apple	A1385		None	

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Extension Cord	No	2.0m	No	AC Mains	USB Power Supply

CONFIGURATIONS

Configuration DOTY0009- 3

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
ReadiBand4	Fatigue Science	V4	DNZ3X20G

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
USB Power Supply	Apple	A1385	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Tablet	Samsung	SM-T230MU	R52G31SBJYN

Configuration DOTY0009- 4

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
ReadiBand4	Fatigue Science	V4	Unknown

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
USB Power Supply	Apple	A1385	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Tablet	Samsung	SM-T230MU	R52G31SBJYN

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	10/12/2015	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	10/13/2015	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.
3	10/13/2015	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.
4	10/13/2015	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.
5	10/13/2015	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.
6	10/13/2015	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.
7	10/13/2015	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.
8	10/14/2015	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS

TEST DESCRIPTION

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

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESCI	ARE	8/5/2015	8/5/2016
Cable - Conducted Cable Assembly	Northwest EMC	NC4, HHF, RKD	NC4A	2/11/2015	2/11/2016
LISN	Solar Electronics	9252-50-R-24-BNC	LIM	12/9/2014	12/9/2015

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

DOTY0009-1

MODES INVESTIGATED

BLE Transmit on Low Channel, 2402 MHz
BLE Transmit on Mid Channel, 2440 MHz
BLE Transmit on High Channel, 2480 MHz

POWERLINE CONDUCTED EMISSIONS

EUT:	ReadiBand4	Work Order:	DOTY0009
Serial Number:	DNZ3X20G	Date:	10/14/2015
Customer:	Fatigue Science	Temperature:	22.5°C
Attendees:	Chris Doughty, Hunter Downs	Relative Humidity:	47.5%
Customer Project:	None	Bar. Pressure:	1024 mb
Tested By:	Matthew Barnes	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	DOTY0009-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	1	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

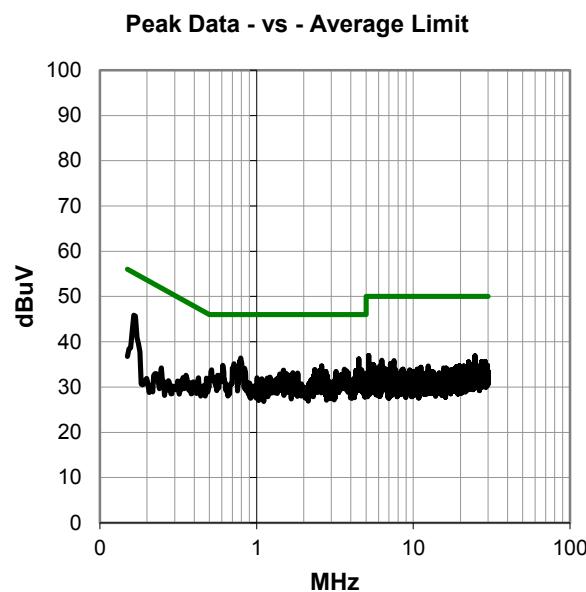
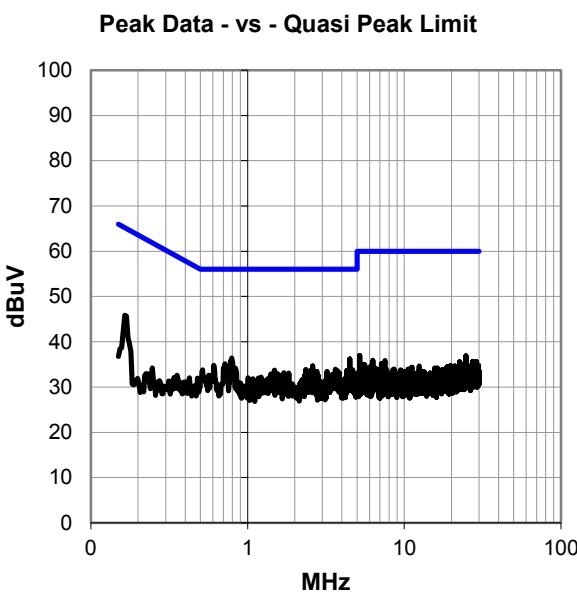
None

EUT OPERATING MODES

BLE Transmit on Low Channel, 2402 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #1

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.165	25.4	20.4	45.8	65.2	-19.4
0.792	16.1	20.3	36.4	56.0	-19.6
4.493	15.6	20.6	36.2	56.0	-19.8
0.717	14.8	20.3	35.1	56.0	-20.9
0.609	14.5	20.3	34.8	56.0	-21.2
2.605	14.2	20.4	34.6	56.0	-21.4
0.836	13.8	20.3	34.1	56.0	-21.9
4.537	13.4	20.6	34.0	56.0	-22.0
3.631	13.4	20.6	34.0	56.0	-22.0
2.351	13.5	20.4	33.9	56.0	-22.1
4.608	13.3	20.6	33.9	56.0	-22.1
2.564	13.4	20.4	33.8	56.0	-22.2
4.694	13.2	20.6	33.8	56.0	-22.2
4.567	13.2	20.6	33.8	56.0	-22.2
0.516	13.5	20.3	33.8	56.0	-22.2
1.486	13.4	20.4	33.8	56.0	-22.2
4.623	13.1	20.6	33.7	56.0	-22.3
4.306	13.1	20.6	33.7	56.0	-22.3
2.512	13.2	20.4	33.6	56.0	-22.4
4.384	13.0	20.6	33.6	56.0	-22.4
3.765	13.0	20.6	33.6	56.0	-22.4
3.213	13.0	20.5	33.5	56.0	-22.5
2.769	13.0	20.4	33.4	56.0	-22.6
2.679	13.0	20.4	33.4	56.0	-22.6
0.851	12.9	20.3	33.2	56.0	-22.8
1.702	12.8	20.4	33.2	56.0	-22.8

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.165	25.4	20.4	45.8	55.2	-9.4
0.792	16.1	20.3	36.4	46.0	-9.6
4.493	15.6	20.6	36.2	46.0	-9.8
0.717	14.8	20.3	35.1	46.0	-10.9
0.609	14.5	20.3	34.8	46.0	-11.2
2.605	14.2	20.4	34.6	46.0	-11.4
0.836	13.8	20.3	34.1	46.0	-11.9
4.537	13.4	20.6	34.0	46.0	-12.0
3.631	13.4	20.6	34.0	46.0	-12.0
2.351	13.5	20.4	33.9	46.0	-12.1
4.608	13.3	20.6	33.9	46.0	-12.1
2.564	13.4	20.4	33.8	46.0	-12.2
4.694	13.2	20.6	33.8	46.0	-12.2
4.567	13.2	20.6	33.8	46.0	-12.2
0.516	13.5	20.3	33.8	46.0	-12.2
1.486	13.4	20.4	33.8	46.0	-12.2
4.623	13.1	20.6	33.7	46.0	-12.3
4.306	13.1	20.6	33.7	46.0	-12.3
2.512	13.2	20.4	33.6	46.0	-12.4
4.384	13.0	20.6	33.6	46.0	-12.4
3.765	13.0	20.6	33.6	46.0	-12.4
3.213	13.0	20.5	33.5	46.0	-12.5
2.769	13.0	20.4	33.4	46.0	-12.6
2.679	13.0	20.4	33.4	46.0	-12.6
0.851	12.9	20.3	33.2	46.0	-12.8
1.702	12.8	20.4	33.2	46.0	-12.8

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	ReadiBand4	Work Order:	DOTY0009
Serial Number:	DNZ3X20G	Date:	10/14/2015
Customer:	Fatigue Science	Temperature:	22.5°C
Attendees:	Chris Doughty, Hunter Downs	Relative Humidity:	47.5%
Customer Project:	None	Bar. Pressure:	1024 mb
Tested By:	Matthew Barnes	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	DOTY0009-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	2	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

None

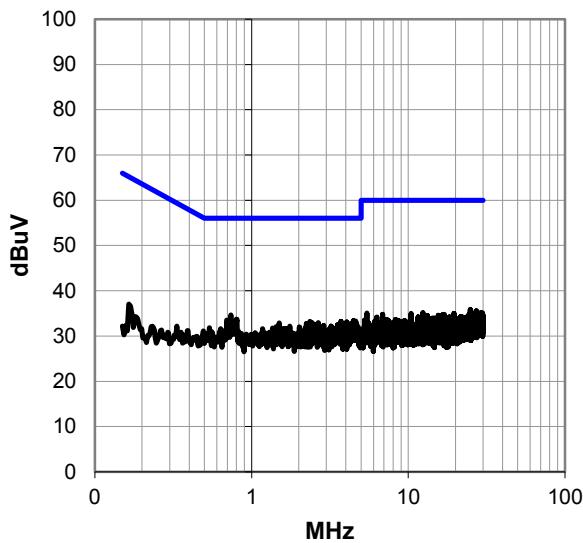
EUT OPERATING MODES

BLE Transmit on Low Channel, 2402 MHz

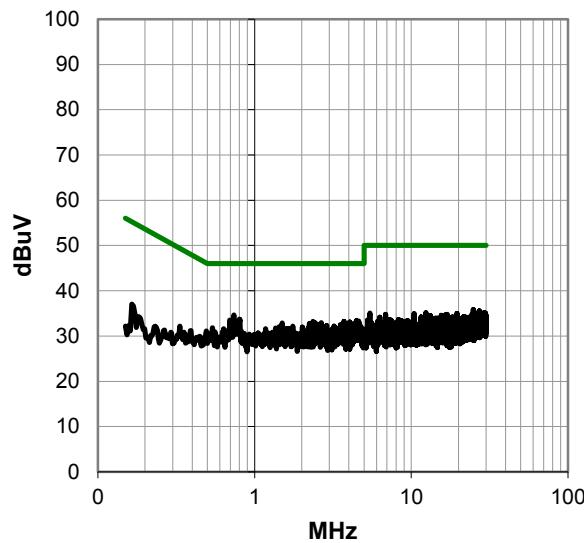
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #2

Peak Data - vs - Quasi Peak Limit

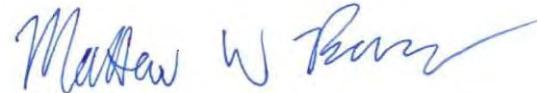
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.739	14.3	20.3	34.6	56.0	-21.4
0.799	13.4	20.3	33.7	56.0	-22.3
0.695	13.2	20.3	33.5	56.0	-22.5
4.474	12.8	20.6	33.4	56.0	-22.6
4.631	12.7	20.6	33.3	56.0	-22.7
3.720	12.7	20.6	33.3	56.0	-22.7
2.355	12.8	20.4	33.2	56.0	-22.8
4.056	12.5	20.6	33.1	56.0	-22.9
2.668	12.5	20.4	32.9	56.0	-23.1
2.437	12.5	20.4	32.9	56.0	-23.1
1.501	12.5	20.4	32.9	56.0	-23.1
4.343	12.2	20.6	32.8	56.0	-23.2
2.239	12.3	20.4	32.7	56.0	-23.3
4.549	12.1	20.6	32.7	56.0	-23.3
4.687	12.0	20.6	32.6	56.0	-23.4
2.519	12.1	20.4	32.5	56.0	-23.5
3.534	11.9	20.5	32.4	56.0	-23.6
3.623	11.8	20.6	32.4	56.0	-23.6
2.885	11.9	20.4	32.3	56.0	-23.7
4.273	11.7	20.6	32.3	56.0	-23.7
1.758	11.8	20.4	32.2	56.0	-23.8
3.220	11.7	20.5	32.2	56.0	-23.8
1.437	11.7	20.3	32.0	56.0	-24.0
2.019	11.6	20.4	32.0	56.0	-24.0
3.885	11.4	20.6	32.0	56.0	-24.0
24.878	12.8	23.0	35.8	60.0	-24.2

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.739	14.3	20.3	34.6	46.0	-11.4
0.799	13.4	20.3	33.7	46.0	-12.3
0.695	13.2	20.3	33.5	46.0	-12.5
4.474	12.8	20.6	33.4	46.0	-12.6
4.631	12.7	20.6	33.3	46.0	-12.7
3.720	12.7	20.6	33.3	46.0	-12.7
2.355	12.8	20.4	33.2	46.0	-12.8
4.056	12.5	20.6	33.1	46.0	-12.9
2.668	12.5	20.4	32.9	46.0	-13.1
2.437	12.5	20.4	32.9	46.0	-13.1
1.501	12.5	20.4	32.9	46.0	-13.1
4.343	12.2	20.6	32.8	46.0	-13.2
2.239	12.3	20.4	32.7	46.0	-13.3
4.549	12.1	20.6	32.7	46.0	-13.3
4.687	12.0	20.6	32.6	46.0	-13.4
2.519	12.1	20.4	32.5	46.0	-13.5
3.534	11.9	20.5	32.4	46.0	-13.6
3.623	11.8	20.6	32.4	46.0	-13.6
2.885	11.9	20.4	32.3	46.0	-13.7
4.273	11.7	20.6	32.3	46.0	-13.7
1.758	11.8	20.4	32.2	46.0	-13.8
3.220	11.7	20.5	32.2	46.0	-13.8
1.437	11.7	20.3	32.0	46.0	-14.0
2.019	11.6	20.4	32.0	46.0	-14.0
3.885	11.4	20.6	32.0	46.0	-14.0
24.878	12.8	23.0	35.8	50.0	-14.2

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	ReadiBand4	Work Order:	DOTY0009
Serial Number:	DNZ3X20G	Date:	10/14/2015
Customer:	Fatigue Science	Temperature:	22.5°C
Attendees:	Chris Doughty, Hunter Downs	Relative Humidity:	47.5%
Customer Project:	None	Bar. Pressure:	1024 mb
Tested By:	Matthew Barnes	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	DOTY0009-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

None

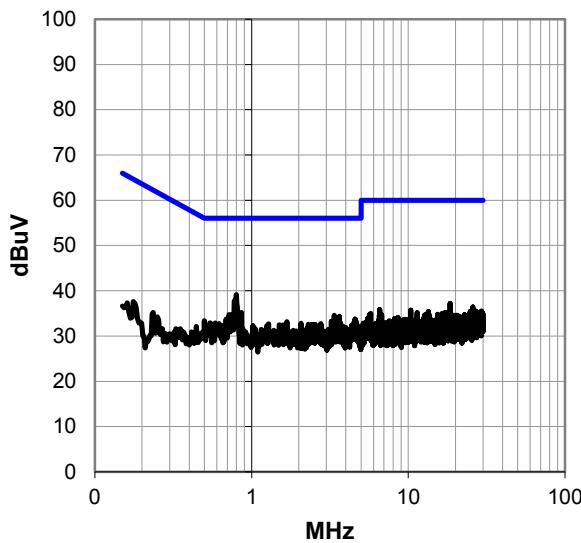
EUT OPERATING MODES

BLE Transmit on Mid Channel, 2440 MHz

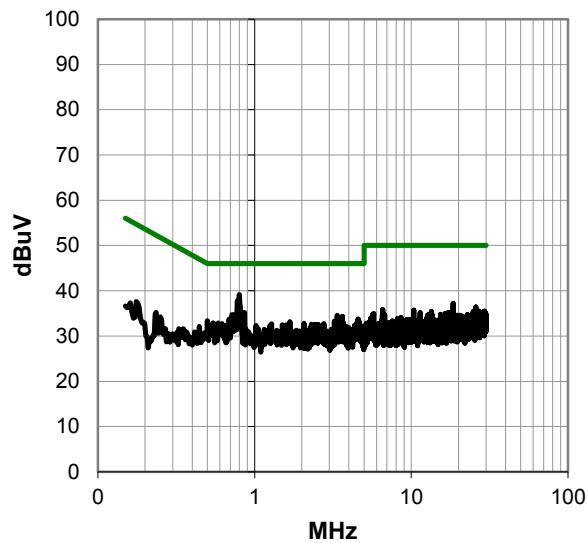
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #3

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.799	18.8	20.3	39.1	56.0	-16.9
0.777	17.5	20.3	37.8	56.0	-18.2
0.863	14.9	20.3	35.2	56.0	-20.8
0.758	14.4	20.3	34.7	56.0	-21.3
0.721	14.4	20.3	34.7	56.0	-21.3
3.366	14.1	20.5	34.6	56.0	-21.4
3.638	13.7	20.6	34.3	56.0	-21.7
3.519	13.2	20.5	33.7	56.0	-22.3
0.687	13.4	20.3	33.7	56.0	-22.3
4.582	13.1	20.6	33.7	56.0	-22.3
4.605	12.8	20.6	33.4	56.0	-22.6
0.501	13.1	20.3	33.4	56.0	-22.6
3.235	12.8	20.5	33.3	56.0	-22.7
1.680	12.8	20.4	33.2	56.0	-22.8
18.491	15.0	22.2	37.2	60.0	-22.8
4.657	12.5	20.6	33.1	56.0	-22.9
3.273	12.6	20.5	33.1	56.0	-22.9
4.515	12.4	20.6	33.0	56.0	-23.0
0.587	12.6	20.3	32.9	56.0	-23.1
0.545	12.6	20.3	32.9	56.0	-23.1
3.687	12.3	20.6	32.9	56.0	-23.1
2.071	12.4	20.4	32.8	56.0	-23.2
2.773	12.3	20.4	32.7	56.0	-23.3
1.280	12.3	20.3	32.6	56.0	-23.4
2.306	12.2	20.4	32.6	56.0	-23.4
2.545	12.1	20.4	32.5	56.0	-23.5

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.799	18.8	20.3	39.1	46.0	-6.9
0.777	17.5	20.3	37.8	46.0	-8.2
0.863	14.9	20.3	35.2	46.0	-10.8
0.758	14.4	20.3	34.7	46.0	-11.3
0.721	14.4	20.3	34.7	46.0	-11.3
3.366	14.1	20.5	34.6	46.0	-11.4
3.638	13.7	20.6	34.3	46.0	-11.7
3.519	13.2	20.5	33.7	46.0	-12.3
0.687	13.4	20.3	33.7	46.0	-12.3
4.582	13.1	20.6	33.7	46.0	-12.3
4.605	12.8	20.6	33.4	46.0	-12.6
0.501	13.1	20.3	33.4	46.0	-12.6
3.235	12.8	20.5	33.3	46.0	-12.7
1.680	12.8	20.4	33.2	46.0	-12.8
18.491	15.0	22.2	37.2	50.0	-12.8
4.657	12.5	20.6	33.1	46.0	-12.9
3.273	12.6	20.5	33.1	46.0	-12.9
4.515	12.4	20.6	33.0	46.0	-13.0
0.587	12.6	20.3	32.9	46.0	-13.1
0.545	12.6	20.3	32.9	46.0	-13.1
3.687	12.3	20.6	32.9	46.0	-13.1
2.071	12.4	20.4	32.8	46.0	-13.2
2.773	12.3	20.4	32.7	46.0	-13.3
1.280	12.3	20.3	32.6	46.0	-13.4
2.306	12.2	20.4	32.6	46.0	-13.4
2.545	12.1	20.4	32.5	46.0	-13.5

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	ReadiBand4	Work Order:	DOTY0009
Serial Number:	DNZ3X20G	Date:	10/14/2015
Customer:	Fatigue Science	Temperature:	22.5°C
Attendees:	Chris Doughty, Hunter Downs	Relative Humidity:	47.5%
Customer Project:	None	Bar. Pressure:	1024 mb
Tested By:	Matthew Barnes	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	DOTY0009-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

None

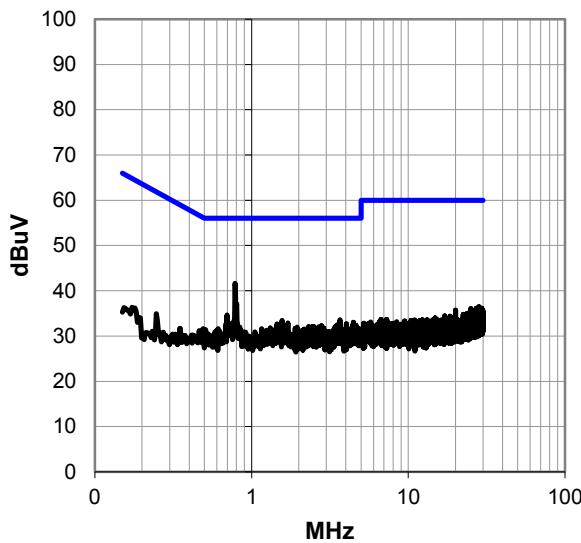
EUT OPERATING MODES

BLE Transmit on Mid Channel, 2440 MHz

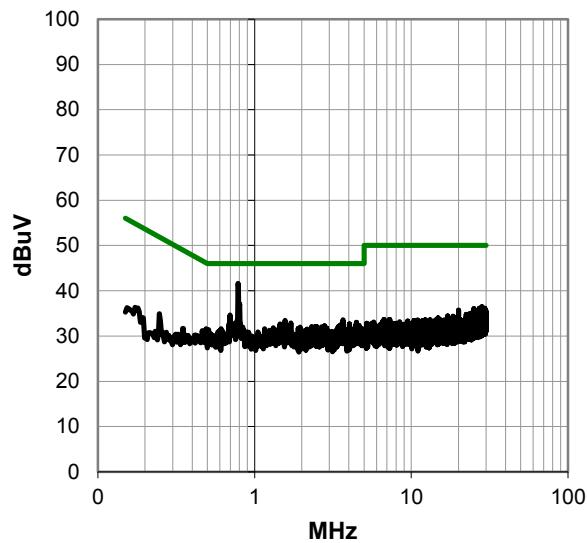
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #4

Peak Data - vs - Quasi Peak Limit

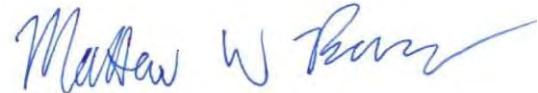
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.784	21.3	20.3	41.6	56.0	-14.4
0.698	14.3	20.3	34.6	56.0	-21.4
3.664	13.0	20.6	33.6	56.0	-22.4
1.564	13.1	20.4	33.5	56.0	-22.5
0.769	13.0	20.3	33.3	56.0	-22.7
4.467	12.4	20.6	33.0	56.0	-23.0
1.702	12.5	20.4	32.9	56.0	-23.1
4.034	12.1	20.6	32.7	56.0	-23.3
1.456	12.3	20.3	32.6	56.0	-23.4
0.684	12.3	20.3	32.6	56.0	-23.4
3.556	12.0	20.5	32.5	56.0	-23.5
4.455	11.9	20.6	32.5	56.0	-23.5
28.295	12.8	23.7	36.5	60.0	-23.5
4.567	11.8	20.6	32.4	56.0	-23.6
1.489	12.0	20.4	32.4	56.0	-23.6
4.646	11.7	20.6	32.3	56.0	-23.7
4.418	11.7	20.6	32.3	56.0	-23.7
2.795	11.8	20.4	32.2	56.0	-23.8
3.448	11.7	20.5	32.2	56.0	-23.8
29.515	12.2	23.9	36.1	60.0	-23.9
27.161	12.7	23.4	36.1	60.0	-23.9
3.523	11.6	20.5	32.1	56.0	-23.9
2.500	11.7	20.4	32.1	56.0	-23.9
2.448	11.7	20.4	32.1	56.0	-23.9
2.318	11.7	20.4	32.1	56.0	-23.9
25.094	13.0	23.1	36.1	60.0	-23.9

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.784	21.3	20.3	41.6	46.0	-4.4
0.698	14.3	20.3	34.6	46.0	-11.4
3.664	13.0	20.6	33.6	46.0	-12.4
1.564	13.1	20.4	33.5	46.0	-12.5
0.769	13.0	20.3	33.3	46.0	-12.7
4.467	12.4	20.6	33.0	46.0	-13.0
1.702	12.5	20.4	32.9	46.0	-13.1
4.034	12.1	20.6	32.7	46.0	-13.3
1.456	12.3	20.3	32.6	46.0	-13.4
0.684	12.3	20.3	32.6	46.0	-13.4
3.556	12.0	20.5	32.5	46.0	-13.5
4.455	11.9	20.6	32.5	46.0	-13.5
28.295	12.8	23.7	36.5	50.0	-13.5
4.567	11.8	20.6	32.4	46.0	-13.6
1.489	12.0	20.4	32.4	46.0	-13.6
4.646	11.7	20.6	32.3	46.0	-13.7
4.418	11.7	20.6	32.3	46.0	-13.7
2.795	11.8	20.4	32.2	46.0	-13.8
3.448	11.7	20.5	32.2	46.0	-13.8
29.515	12.2	23.9	36.1	50.0	-13.9
27.161	12.7	23.4	36.1	50.0	-13.9
3.523	11.6	20.5	32.1	46.0	-13.9
2.500	11.7	20.4	32.1	46.0	-13.9
2.448	11.7	20.4	32.1	46.0	-13.9
2.318	11.7	20.4	32.1	46.0	-13.9
25.094	13.0	23.1	36.1	50.0	-13.9

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	ReadiBand4	Work Order:	DOTY0009
Serial Number:	DNZ3X20G	Date:	10/14/2015
Customer:	Fatigue Science	Temperature:	22.5°C
Attendees:	Chris Doughty, Hunter Downs	Relative Humidity:	47.5%
Customer Project:	None	Bar. Pressure:	1024 mb
Tested By:	Matthew Barnes	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	DOTY0009-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

None

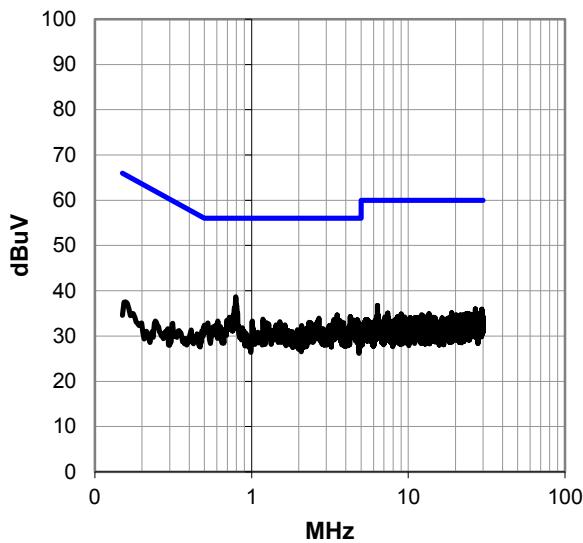
EUT OPERATING MODES

BLE Transmit on High Channel, 2480 MHz

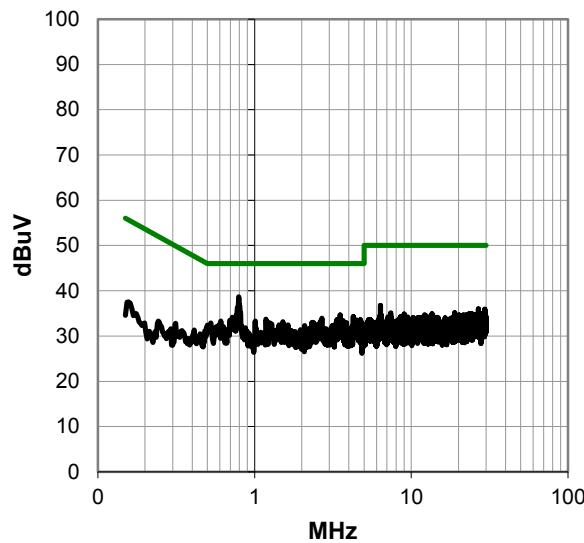
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #5

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.792	18.3	20.3	38.6	56.0	-17.4
0.766	14.4	20.3	34.7	56.0	-21.3
3.515	14.1	20.5	34.6	56.0	-21.4
4.269	13.7	20.6	34.3	56.0	-21.7
2.687	13.5	20.4	33.9	56.0	-22.1
1.183	13.4	20.3	33.7	56.0	-22.3
3.351	13.2	20.5	33.7	56.0	-22.3
4.728	13.0	20.6	33.6	56.0	-22.4
4.470	12.9	20.6	33.5	56.0	-22.5
3.594	12.9	20.6	33.5	56.0	-22.5
3.672	12.8	20.6	33.4	56.0	-22.6
3.620	12.8	20.6	33.4	56.0	-22.6
1.012	13.0	20.3	33.3	56.0	-22.7
0.609	13.0	20.3	33.3	56.0	-22.7
2.631	12.8	20.4	33.2	56.0	-22.8
4.601	12.6	20.6	33.2	56.0	-22.8
4.776	12.6	20.6	33.2	56.0	-22.8
1.519	12.8	20.4	33.2	56.0	-22.8
3.463	12.6	20.5	33.1	56.0	-22.9
4.743	12.5	20.6	33.1	56.0	-22.9
3.325	12.6	20.5	33.1	56.0	-22.9
2.321	12.6	20.4	33.0	56.0	-23.0
3.403	12.5	20.5	33.0	56.0	-23.0
1.243	12.6	20.3	32.9	56.0	-23.1
2.392	12.5	20.4	32.9	56.0	-23.1
0.527	12.6	20.3	32.9	56.0	-23.1

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.792	18.3	20.3	38.6	46.0	-7.4
0.766	14.4	20.3	34.7	46.0	-11.3
3.515	14.1	20.5	34.6	46.0	-11.4
4.269	13.7	20.6	34.3	46.0	-11.7
2.687	13.5	20.4	33.9	46.0	-12.1
1.183	13.4	20.3	33.7	46.0	-12.3
3.351	13.2	20.5	33.7	46.0	-12.3
4.728	13.0	20.6	33.6	46.0	-12.4
4.470	12.9	20.6	33.5	46.0	-12.5
3.594	12.9	20.6	33.5	46.0	-12.5
3.672	12.8	20.6	33.4	46.0	-12.6
3.620	12.8	20.6	33.4	46.0	-12.6
1.012	13.0	20.3	33.3	46.0	-12.7
0.609	13.0	20.3	33.3	46.0	-12.7
2.631	12.8	20.4	33.2	46.0	-12.8
4.601	12.6	20.6	33.2	46.0	-12.8
4.776	12.6	20.6	33.2	46.0	-12.8
1.519	12.8	20.4	33.2	46.0	-12.8
3.463	12.6	20.5	33.1	46.0	-12.9
4.743	12.5	20.6	33.1	46.0	-12.9
3.325	12.6	20.5	33.1	46.0	-12.9
2.321	12.6	20.4	33.0	46.0	-13.0
3.403	12.5	20.5	33.0	46.0	-13.0
1.243	12.6	20.3	32.9	46.0	-13.1
2.392	12.5	20.4	32.9	46.0	-13.1
0.527	12.6	20.3	32.9	46.0	-13.1

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	ReadiBand4	Work Order:	DOTY0009
Serial Number:	DNZ3X20G	Date:	10/14/2015
Customer:	Fatigue Science	Temperature:	22.5°C
Attendees:	Chris Doughty, Hunter Downs	Relative Humidity:	47.5%
Customer Project:	None	Bar. Pressure:	1024 mb
Tested By:	Matthew Barnes	Job Site:	NC05
Power:	110VAC/60Hz	Configuration:	DOTY0009-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

None

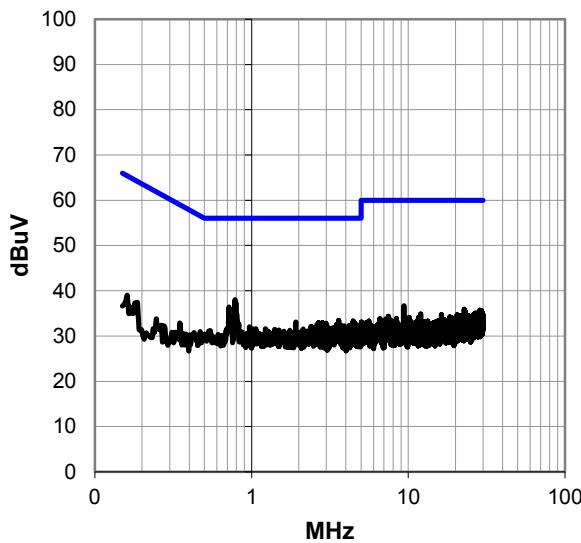
EUT OPERATING MODES

BLE Transmit on High Channel, 2480 MHz

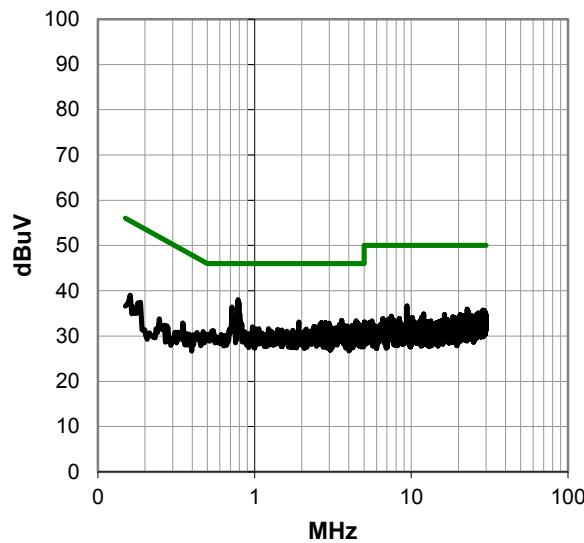
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #6

Peak Data - vs - Quasi Peak Limit

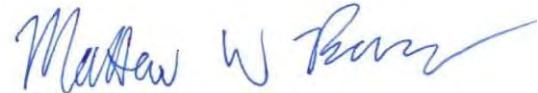
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.784	17.7	20.3	38.0	56.0	-18.0
0.717	16.1	20.3	36.4	56.0	-19.6
3.601	12.9	20.6	33.5	56.0	-22.5
4.459	12.8	20.6	33.4	56.0	-22.6
1.915	12.7	20.4	33.1	56.0	-22.9
4.515	12.4	20.6	33.0	56.0	-23.0
2.836	12.5	20.4	32.9	56.0	-23.1
2.679	12.5	20.4	32.9	56.0	-23.1
2.985	12.4	20.4	32.8	56.0	-23.2
9.380	15.7	21.0	36.7	60.0	-23.3
4.605	12.1	20.6	32.7	56.0	-23.3
3.545	12.1	20.5	32.6	56.0	-23.4
2.620	12.2	20.4	32.6	56.0	-23.4
2.732	12.1	20.4	32.5	56.0	-23.5
4.698	11.7	20.6	32.3	56.0	-23.7
4.813	11.7	20.6	32.3	56.0	-23.7
4.205	11.7	20.6	32.3	56.0	-23.7
3.914	11.7	20.6	32.3	56.0	-23.7
3.758	11.7	20.6	32.3	56.0	-23.7
3.683	11.7	20.6	32.3	56.0	-23.7
3.034	11.8	20.4	32.2	56.0	-23.8
2.415	11.7	20.4	32.1	56.0	-23.9
2.396	11.7	20.4	32.1	56.0	-23.9
0.971	11.7	20.3	32.0	56.0	-24.0
3.455	11.5	20.5	32.0	56.0	-24.0
4.273	11.4	20.6	32.0	56.0	-24.0

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.784	17.7	20.3	38.0	46.0	-8.0
0.717	16.1	20.3	36.4	46.0	-9.6
3.601	12.9	20.6	33.5	46.0	-12.5
4.459	12.8	20.6	33.4	46.0	-12.6
1.915	12.7	20.4	33.1	46.0	-12.9
4.515	12.4	20.6	33.0	46.0	-13.0
2.836	12.5	20.4	32.9	46.0	-13.1
2.679	12.5	20.4	32.9	46.0	-13.1
2.985	12.4	20.4	32.8	46.0	-13.2
9.380	15.7	21.0	36.7	50.0	-13.3
4.605	12.1	20.6	32.7	46.0	-13.3
3.545	12.1	20.5	32.6	46.0	-13.4
2.620	12.2	20.4	32.6	46.0	-13.4
2.732	12.1	20.4	32.5	46.0	-13.5
4.698	11.7	20.6	32.3	46.0	-13.7
4.813	11.7	20.6	32.3	46.0	-13.7
4.205	11.7	20.6	32.3	46.0	-13.7
3.914	11.7	20.6	32.3	46.0	-13.7
3.758	11.7	20.6	32.3	46.0	-13.7
3.683	11.7	20.6	32.3	46.0	-13.7
3.034	11.8	20.4	32.2	46.0	-13.8
2.415	11.7	20.4	32.1	46.0	-13.9
2.396	11.7	20.4	32.1	46.0	-13.9
0.971	11.7	20.3	32.0	46.0	-14.0
3.455	11.5	20.5	32.0	46.0	-14.0
4.273	11.4	20.6	32.0	46.0	-14.0

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

BLE Transmit on Low Ch, 2402 MHz

BLE Transmit on Mid Ch, 2440 MHz

BLE Transmit on High Ch, 2480 MHz

POWER SETTINGS INVESTIGATED

Using USB Power Supply to keep unit powered on and transmitting continuously

CONFIGURATIONS INVESTIGATED

DOTY0009 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26000 MHz
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SAMPLE CALCULATIONS

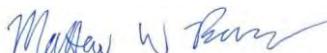
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

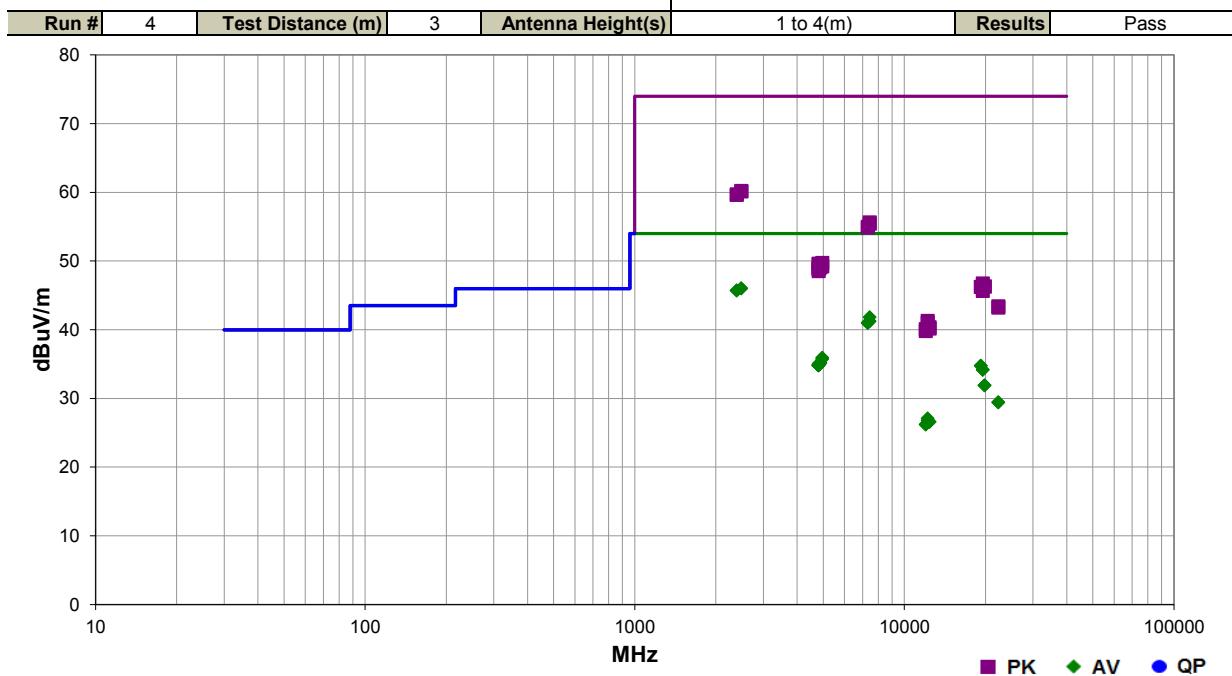
Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	N/A	NC8	6/6/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AOD	6/6/2015	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIY	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOJ	9/21/2015	12 mo
Antenna - Standard Gain	EMCO	3160-08	AHO	NCR	0 mo
Cable	Northwest EMC	Standard Gain Horn Cable	NC3	6/17/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOK	9/21/2015	12 mo
Antenna - Standard Gain	EMCO	3160-07	AHP	NCR	0 mo
Filter - High Pass	Micro-Tronics	HPM50111	HHI	12/9/2014	12 mo
Attenuator	Fairview Microwave	SA18E-20	AQV	9/28/2015	12 mo
Cable	Northwest EMC	3115 Horn Cable	NC2	6/17/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVZ	7/31/2015	12 mo
Antenna - Double Ridge	EMCO	3115	AHM	6/3/2014	24 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFF	3/6/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAB	7/31/2015	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYL	7/30/2015	24 mo
Cable	Northwest EMC	Bilog Cables	NC1	8/27/2015	12 mo
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	6/23/2015	12 mo

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:	DOTY0009	Date:	10/12/15	
Project:	None	Temperature:	22.1 °C	
Job Site:	NC01	Humidity:	50.2% RH	
Serial Number:	DNZ3X20G	Barometric Pres.:	1019 mbar	
EUT:	ReadiBand4	Tested by:	Matthew Barnes	
Configuration:	1			
Customer:	Fatigue Science			
Attendees:	Chris Doughty, Hunter Downs			
EUT Power:	Using USB Power Supply to keep unit powered on and transmitting continuously			
Operating Mode:	BLE Transmit on Low (2402 MHz), Mid (2440 MHz) and High (2480 MHz) Channels			
Deviations:	None			
Comments:	See comments section in data below for Channel and EUT Orientation information.			

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



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
2484.343	26.8	-0.8	1.0	224.0	3.0	20.0	Vert	AV	0.0	46.0	54.0	-8.0	High Ch, EUT Flat
2483.607	26.8	-0.8	1.0	115.0	3.0	20.0	Horz	AV	0.0	46.0	54.0	-8.0	High Ch, EUT Flat
2389.263	26.7	-1.0	2.6	88.0	3.0	20.0	Vert	AV	0.0	45.7	54.0	-8.3	Low Ch, EUT Flat
2388.750	26.7	-1.0	3.0	100.0	3.0	20.0	Horz	AV	0.0	45.7	54.0	-8.3	Low Ch, EUT Flat
7440.383	25.5	16.3	1.0	15.0	3.0	0.0	Vert	AV	0.0	41.8	54.0	-12.2	High Ch, EUT Flat
7439.233	24.9	16.3	1.0	56.0	3.0	0.0	Horz	AV	0.0	41.2	54.0	-12.8	High Ch, EUT Flat
7319.925	25.4	15.6	1.0	39.0	3.0	0.0	Horz	AV	0.0	41.0	54.0	-13.0	Mid Ch, EUT Flat
7319.808	25.4	15.6	1.9	236.0	3.0	0.0	Vert	AV	0.0	41.0	54.0	-13.0	Mid Ch, EUT Flat
2483.917	41.0	-0.8	1.0	224.0	3.0	20.0	Vert	PK	0.0	60.2	74.0	-13.8	High Ch, EUT Flat
2485.223	40.9	-0.8	1.0	115.0	3.0	20.0	Horz	PK	0.0	60.1	74.0	-13.9	High Ch, EUT Flat
2389.717	40.7	-1.0	3.0	100.0	3.0	20.0	Horz	PK	0.0	59.7	74.0	-14.3	Low Ch, EUT Flat
2388.647	40.6	-1.0	2.6	88.0	3.0	20.0	Vert	PK	0.0	59.6	74.0	-14.4	Low Ch, EUT Flat
4960.042	25.6	10.3	1.0	68.0	3.0	0.0	Horz	AV	0.0	35.9	54.0	-18.1	High Ch, EUT Flat
4959.808	25.4	10.3	1.0	231.0	3.0	0.0	Vert	AV	0.0	35.7	54.0	-18.3	High Ch, EUT Flat
7439.142	39.3	16.3	1.0	15.0	3.0	0.0	Vert	PK	0.0	55.6	74.0	-18.4	High Ch, EUT Flat
7440.383	39.1	16.3	1.0	56.0	3.0	0.0	Horz	PK	0.0	55.4	74.0	-18.6	High Ch, EUT Flat
4877.658	24.9	10.3	1.0	240.0	3.0	0.0	Horz	AV	0.0	35.2	54.0	-18.8	Mid Ch, EUT Flat
4877.508	24.9	10.2	1.0	340.0	3.0	0.0	Vert	AV	0.0	35.1	54.0	-18.9	Mid Ch, EUT Flat
4803.575	25.2	9.8	1.0	33.0	3.0	0.0	Vert	AV	0.0	35.0	54.0	-19.0	Low Ch, EUT Flat
7319.533	39.4	15.6	1.0	39.0	3.0	0.0	Horz	PK	0.0	55.0	74.0	-19.0	Mid Ch, EUT Flat
7319.033	39.3	15.6	1.9	236.0	3.0	0.0	Vert	PK	0.0	54.9	74.0	-19.1	Mid Ch, EUT Flat
4803.783	25.0	9.8	4.0	169.0	3.0	0.0	Vert	AV	0.0	34.8	54.0	-19.2	Low Ch, EUT End

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
4803.700	25.0	9.8	1.0	0.0	3.0	0.0	Horz	AV	0.0	34.8	54.0	-19.2	Low Ch, EUT Side
4803.000	25.0	9.8	1.0	258.0	3.0	0.0	Horz	AV	0.0	34.8	54.0	-19.2	Low Ch, EUT End
4802.100	25.0	9.8	2.2	149.0	3.0	0.0	Vert	AV	0.0	34.8	54.0	-19.2	Low Ch, EUT Side
4801.517	25.0	9.8	1.0	303.0	3.0	0.0	Horz	AV	0.0	34.8	54.0	-19.2	Low Ch, EUT Flat
19216.830	34.5	0.2	1.5	336.0	3.0	0.0	Vert	AV	0.0	34.7	54.0	-19.3	Low Ch, EUT Flat
19214.400	34.5	0.2	1.5	339.0	3.0	0.0	Horz	AV	0.0	34.7	54.0	-19.3	Low Ch, EUT Flat
19520.640	34.3	-0.1	1.5	297.0	3.0	0.0	Horz	AV	0.0	34.2	54.0	-19.8	Mid Ch, EUT Flat
19517.910	34.3	-0.1	1.5	268.0	3.0	0.0	Vert	AV	0.0	34.2	54.0	-19.8	Mid Ch, EUT Flat
19839.230	32.1	-0.2	1.5	253.0	3.0	0.0	Horz	AV	0.0	31.9	54.0	-22.1	High Ch, EUT Flat
19841.590	32.1	-0.2	1.5	155.0	3.0	0.0	Vert	AV	0.0	31.9	54.0	-22.1	High Ch, EUT Flat
4960.933	39.4	10.3	1.0	68.0	3.0	0.0	Horz	PK	0.0	49.7	74.0	-24.3	High Ch, EUT Flat
4804.592	39.8	9.8	1.0	33.0	3.0	0.0	Vert	PK	0.0	49.6	74.0	-24.4	Low Ch, EUT End
4804.808	39.7	9.8	2.2	149.0	3.0	0.0	Vert	PK	0.0	49.5	74.0	-24.5	Low Ch, EUT Side
22317.930	32.5	-3.1	1.5	0.0	3.0	0.0	Horz	AV	0.0	29.4	54.0	-24.6	High Ch, EUT Flat
22318.480	32.5	-3.1	1.5	349.0	3.0	0.0	Vert	AV	0.0	29.4	54.0	-24.6	High Ch, EUT Flat
4879.833	39.0	10.3	1.0	240.0	3.0	0.0	Horz	PK	0.0	49.3	74.0	-24.7	Mid Ch, EUT Flat
4959.708	38.9	10.3	1.0	231.0	3.0	0.0	Vert	PK	0.0	49.2	74.0	-24.8	High Ch, EUT Flat
4879.275	38.8	10.3	1.0	340.0	3.0	0.0	Vert	PK	0.0	49.1	74.0	-24.9	Mid Ch, EUT Flat
4806.292	39.2	9.8	1.0	303.0	3.0	0.0	Horz	PK	0.0	49.0	74.0	-25.0	Low Ch, EUT Flat
4805.158	39.1	9.8	1.0	0.0	3.0	0.0	Horz	PK	0.0	48.9	74.0	-25.1	Low Ch, EUT Side
4803.775	39.0	9.8	1.0	258.0	3.0	0.0	Horz	PK	0.0	48.8	74.0	-25.2	Low Ch, EUT End
4804.683	38.7	9.8	4.0	169.0	3.0	0.0	Vert	PK	0.0	48.5	74.0	-25.5	Low Ch, EUT Flat
12198.820	29.6	-2.5	1.0	245.0	3.0	0.0	Horz	AV	0.0	27.1	54.0	-26.9	Mid Ch, EUT Flat
12199.050	29.3	-2.5	1.0	80.0	3.0	0.0	Vert	AV	0.0	26.8	54.0	-27.2	Mid Ch, EUT Flat
19521.570	46.9	-0.1	1.5	297.0	3.0	0.0	Horz	PK	0.0	46.8	74.0	-27.2	Mid Ch, EUT Flat
12399.230	28.9	-2.3	1.0	120.0	3.0	0.0	Horz	AV	0.0	26.6	54.0	-27.4	High Ch, EUT Flat
12399.240	28.9	-2.3	1.0	46.0	3.0	0.0	Vert	AV	0.0	26.6	54.0	-27.4	High Ch, EUT Flat
19841.080	46.5	-0.2	1.5	155.0	3.0	0.0	Vert	PK	0.0	46.3	74.0	-27.7	High Ch, EUT Flat
19841.530	46.5	-0.2	1.5	253.0	3.0	0.0	Horz	PK	0.0	46.3	74.0	-27.7	High Ch, EUT Flat
19217.590	46.0	0.2	1.5	339.0	3.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	Low Ch, EUT Flat
19213.620	46.0	0.2	1.5	336.0	3.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	Low Ch, EUT Flat
12008.340	29.2	-3.0	1.0	43.0	3.0	0.0	Horz	AV	0.0	26.2	54.0	-27.8	Low Ch, EUT Flat
12007.810	29.2	-3.0	1.0	285.0	3.0	0.0	Vert	AV	0.0	26.2	54.0	-27.8	Low Ch, EUT Flat
19521.180	45.8	-0.1	1.5	268.0	3.0	0.0	Vert	PK	0.0	45.7	74.0	-28.3	Mid Ch, EUT Flat
22320.530	46.5	-3.1	1.5	349.0	3.0	0.0	Vert	PK	0.0	43.4	74.0	-30.6	High Ch, EUT Flat
22319.330	46.3	-3.1	1.5	0.0	3.0	0.0	Horz	PK	0.0	43.2	74.0	-30.8	High Ch, EUT Flat
12198.170	43.8	-2.5	1.0	245.0	3.0	0.0	Horz	PK	0.0	41.3	74.0	-32.7	Mid Ch, EUT Flat
12198.800	43.5	-2.5	1.0	80.0	3.0	0.0	Vert	PK	0.0	41.0	74.0	-33.0	Mid Ch, EUT Flat
12397.710	42.7	-2.3	1.0	120.0	3.0	0.0	Horz	PK	0.0	40.4	74.0	-33.6	High Ch, EUT Flat
12399.180	42.5	-2.3	1.0	46.0	3.0	0.0	Vert	PK	0.0	40.2	74.0	-33.8	High Ch, EUT Flat
12010.160	43.1	-3.0	1.0	43.0	3.0	0.0	Horz	PK	0.0	40.1	74.0	-33.9	Low Ch, EUT Flat
12010.340	42.8	-3.0	1.0	285.0	3.0	0.0	Vert	PK	0.0	39.8	74.0	-34.2	Low Ch, EUT Flat

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 (mos)
Generator - Signal	Agilent	N5183A	TIA	4/7/2014	24
Block - DC	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Attenuator	Fairview Microwave	SA4014-20	TKE	1/16/2015	12
Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	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.

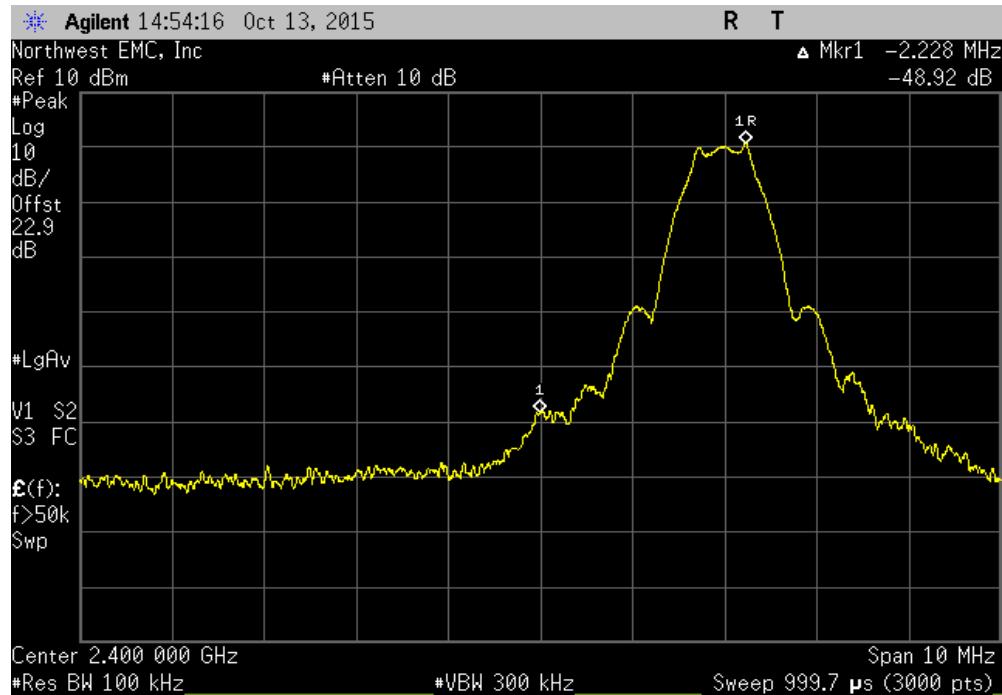
The spectrum was scanned below the lower band edge and above the higher band edge.

BAND EDGE COMPLIANCE

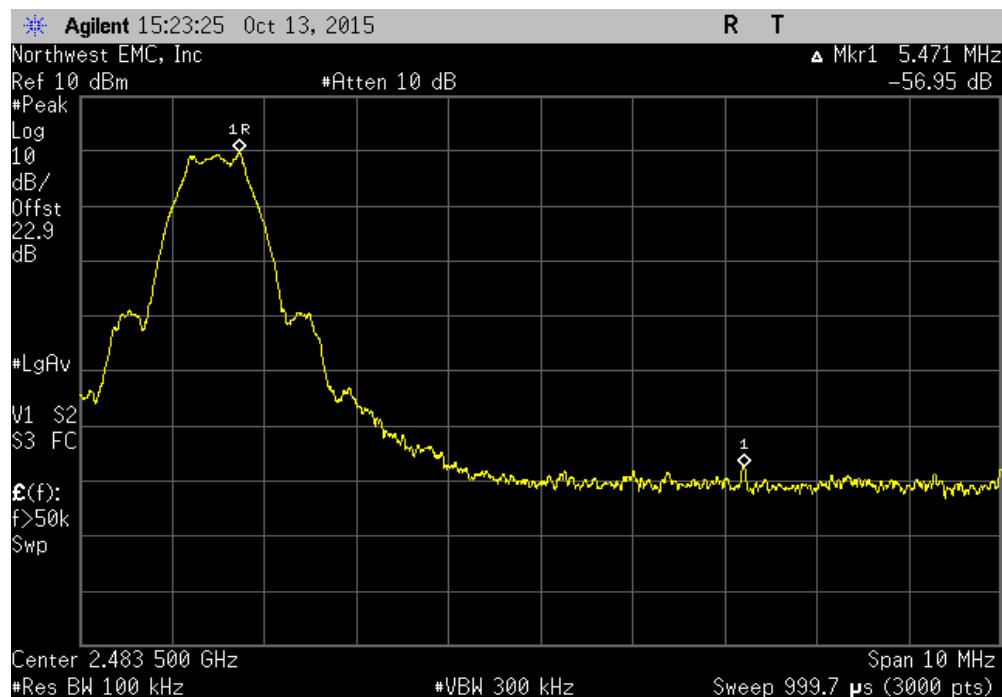
EUT:	ReadiBand4	Work Order:	DOTY0009	
Serial Number:	DN23U41F	Date:	10/13/15	
Customer:	Fatigue Science	Temperature:	23°C	
Attendees:	Chris Doughty, Hunter Downs	Humidity:	52%	
Project:	None	Barometric Pres.:	1022	
Tested by:	Matthew Barnes	Power:	5VDC - USB AC Power Supply	
TEST SPECIFICATIONS		Test Method		
FCC 15.247:2015		ANSI C63.10:2013		
COMMENTS				
None				
DEVIATIONS FROM TEST STANDARD				
None				
Configuration #	2	Signature	<i>Matthew W Barnes</i>	
		Value (dBc)	Limit ≤ (dBc)	Result
BLE - Data				
Low Channel, 2402 MHz		-48.92	-20	Pass
High Channel, 2480 MHz		-56.95	-20	Pass

BAND EDGE COMPLIANCE

BLE - Data, Low Channel, 2402 MHz			
	Value (dBc)	Limit \leq (dBc)	Result
	-48.92	-20	Pass



BLE - Data, High Channel, 2480 MHz			
	Value (dBc)	Limit \leq (dBc)	Result
	-56.95	-20	Pass



DUTY CYCLE

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)
Generator - Signal	Agilent	N5183A	TIA	4/7/2014	24
Block - DC	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Attenuator	Fairview Microwave	SA4014-20	TKE	1/16/2015	12
Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	12

TEST DESCRIPTION

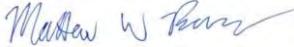
The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

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 test software provided for operation in a fixed, single channel mode allows the EUT to operate continuously at 100% Duty Cycle.

DUTY CYCLE

EUT:	ReadiBand4	Work Order:	DOTY0009
Serial Number:	DN23U41F	Date:	10/13/15
Customer:	Fatigue Science	Temperature:	23°C
Attendees:	Chris Doughty, Hunter Downs	Humidity:	52%
Project:	None	Barometric Pres.:	1022
Tested by:	Matthew Barnes	Job Site:	NC02
TEST SPECIFICATIONS		Power:	5VDC - USB AC Power Supply
FCC 15.247:2015		Test Method	ANSI C63.10:2013
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature	

Duty Cycle has been observed to be 100%.

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 (mos)
Generator - Signal	Agilent	N5183A	TIA	4/7/2014	24
Block - DC	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Attenuator	Fairview Microwave	SA4014-20	TKE	1/16/2015	12
Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	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.

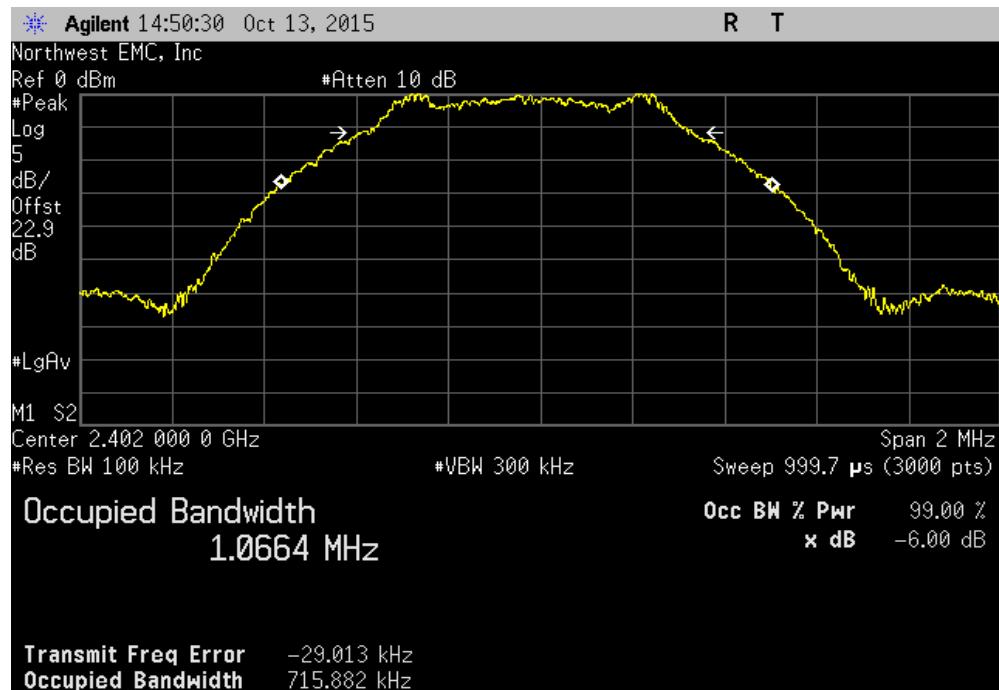
The EUT was set to the channels and modes listed in the datasheet. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer.

OCCUPIED BANDWIDTH

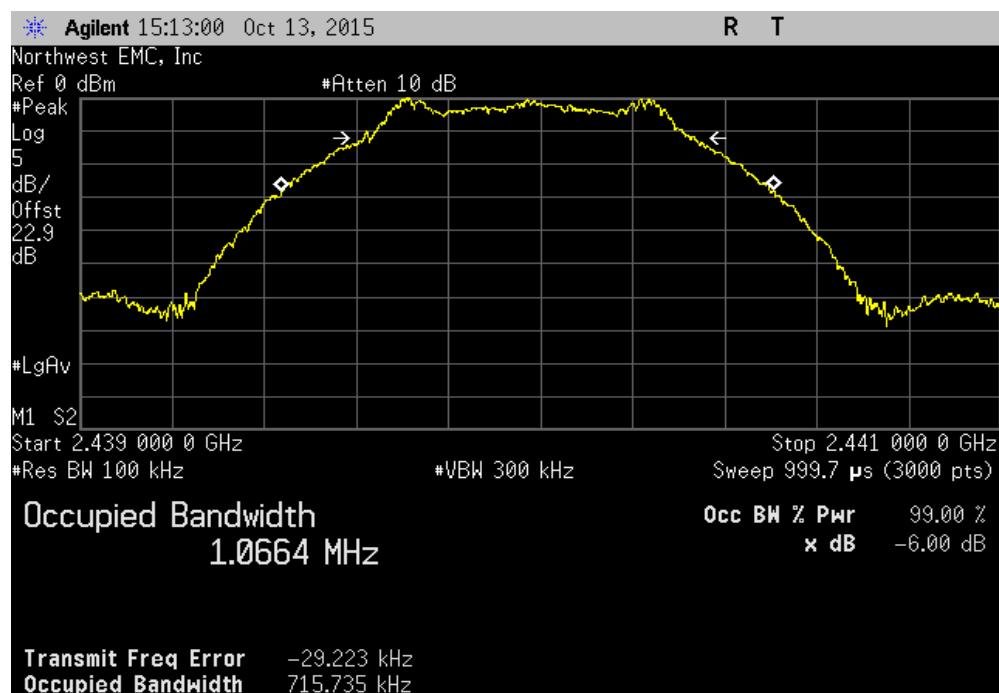
EUT:	ReadiBand4	Work Order:	DOTY0009
Serial Number:	DN23U41F	Date:	10/13/15
Customer:	Fatigue Science	Temperature:	23°C
Attendees:	Chris Doughty, Hunter Downs	Humidity:	52%
Project:	None	Barometric Pres.:	1022
Tested by:	Matthew Barnes	Power:	5VDC - USB AC Power Supply
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2015		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature	<i>Matthew W Barnes</i>
		Value	Limit (±)
		715.882 kHz	500 kHz
		715.735 kHz	500 kHz
		733.004 kHz	500 kHz
BLE - Data		Pass	
Low Channel, 2402 MHz		Pass	
Mid Channel, 2440 MHz		Pass	
High Channel, 2480 MHz		Pass	

OCCUPIED BANDWIDTH

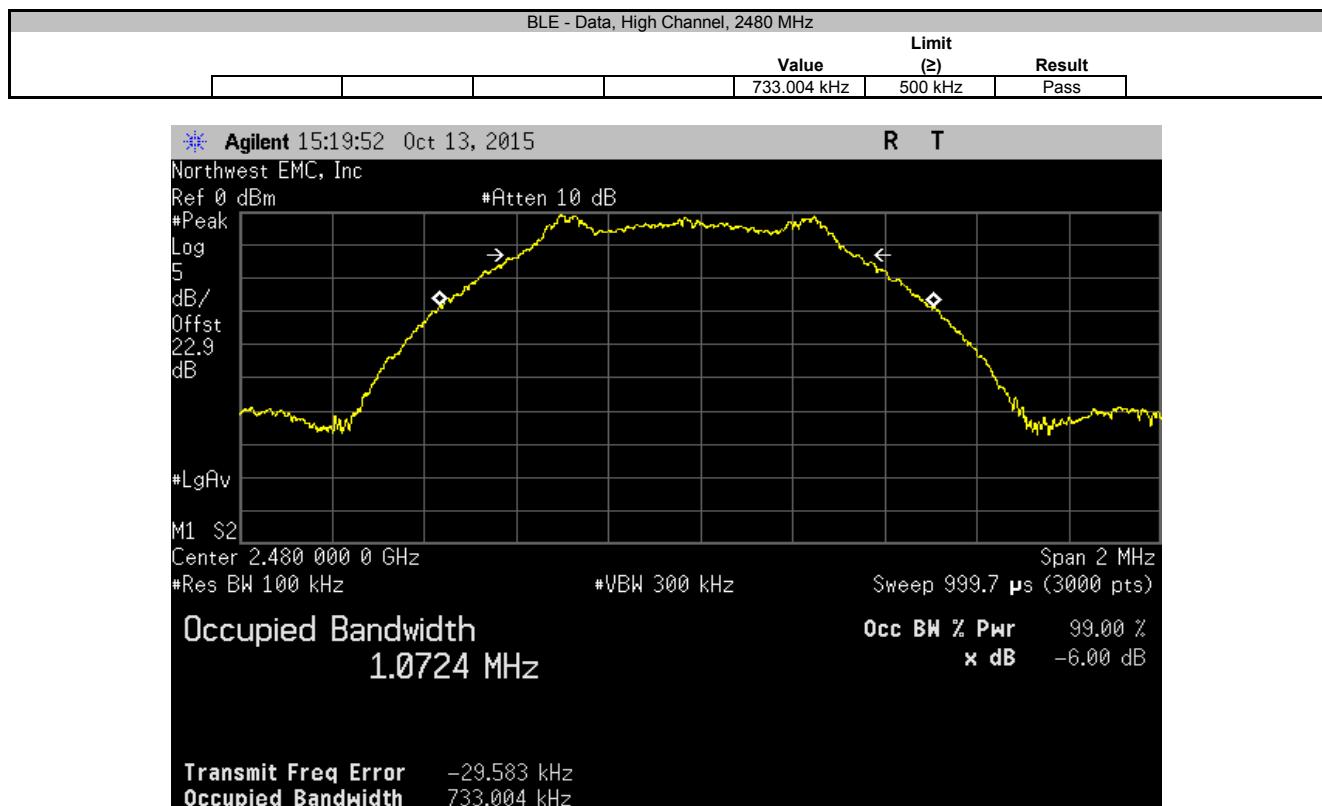
BLE - Data, Low Channel, 2402 MHz			Value	Limit (≥)	Result
			715.882 kHz	500 kHz	Pass



BLE - Data, Mid Channel, 2440 MHz			Value	Limit (≥)	Result
			715.735 kHz	500 kHz	Pass



OCCUPIED BANDWIDTH



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 (mos)
Block - DC	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Attenuator	Fairview Microwave	SA4014-20	TKE	1/16/2015	12
Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	12
Generator - Signal	Agilent	N5183A	TIA	4/7/2014	24

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..

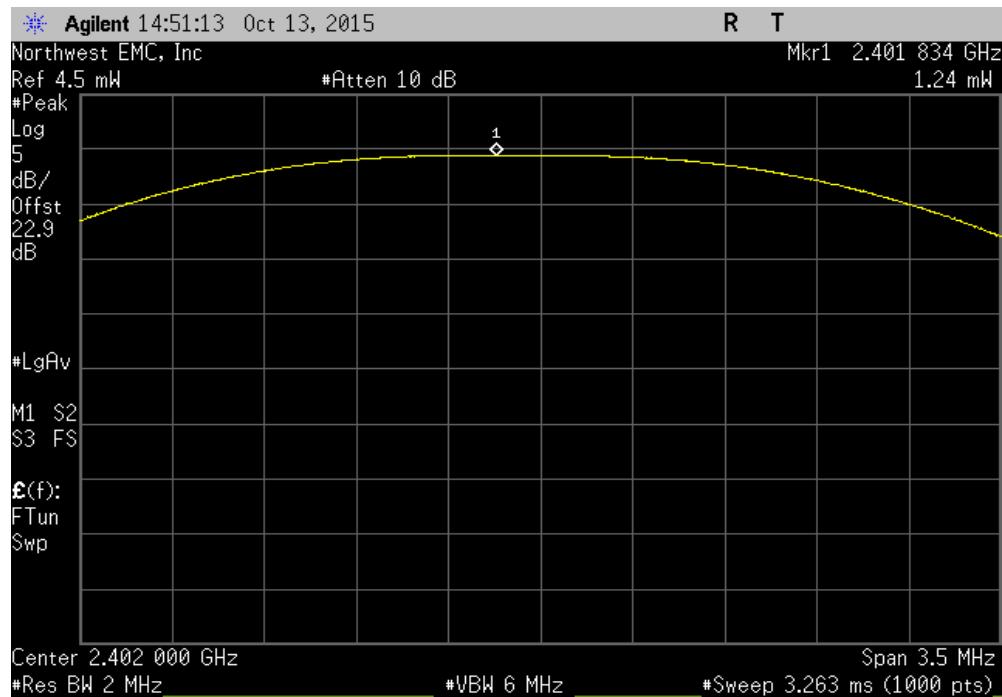
De Facto EIRP Limit: Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36 dBm.

OUTPUT POWER

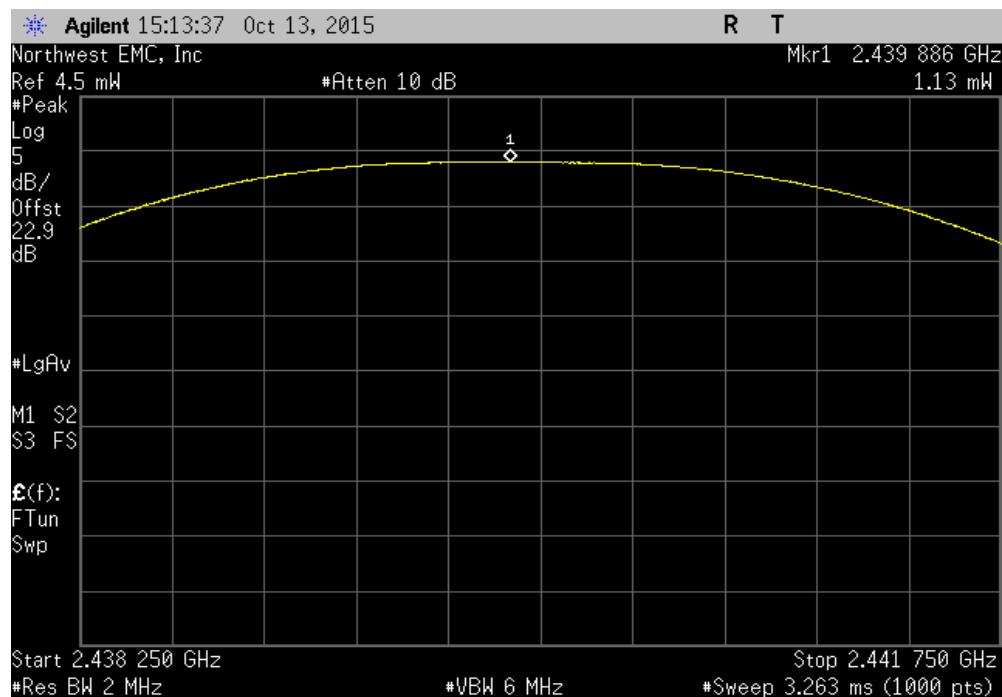
EUT:	ReadiBand4	Work Order:	DOTY0009												
Serial Number:	DN23U41F	Date:	10/13/15												
Customer:	Fatigue Science	Temperature:	22°C												
Attendees:	Chris Doughty, Hunter Downs	Humidity:	52%												
Project:	None	Barometric Pres.:	1022												
Tested by:	Matthew Barnes	Power:	5VDC - USB AC Power Supply												
TEST SPECIFICATIONS		Test Method	ANSI C63.10:2013												
FCC 15.247:2015															
COMMENTS															
None															
DEVIATIONS FROM TEST STANDARD															
None															
Configuration #	2	Signature	<i>Matthew W Barnes</i>												
<table border="1"> <thead> <tr> <th>Value</th> <th>Limit (<)</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>1.24 mW</td> <td>1 W</td> <td>Pass</td> </tr> <tr> <td>1.125 mW</td> <td>1 W</td> <td>Pass</td> </tr> <tr> <td>999.309 uW</td> <td>1 W</td> <td>Pass</td> </tr> </tbody> </table>				Value	Limit (<)	Result	1.24 mW	1 W	Pass	1.125 mW	1 W	Pass	999.309 uW	1 W	Pass
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Low Channel, 2402 MHz	1.24 mW	1 W	Pass												
Mid Channel, 2440 MHz	1.125 mW	1 W	Pass												
High Channel, 2480 MHz	999.309 uW	1 W	Pass												

OUTPUT POWER

BLE - Data, Low Channel, 2402 MHz		
	Value	Limit
	1.24 mW	(<) 1 W Result Pass

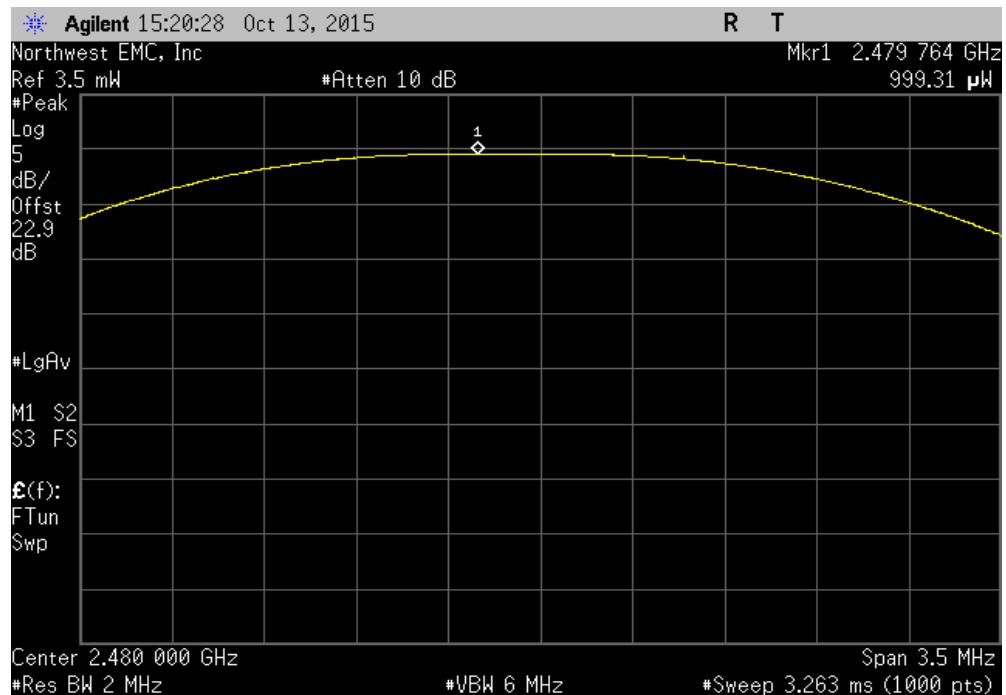


BLE - Data, Mid Channel, 2440 MHz		
	Value	Limit
	1.125 mW	(<) 1 W Result Pass



OUTPUT POWER

BLE - Data, High Channel, 2480 MHz			Value	Limit (<)	Result
			999.309 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 (mos)
Block - DC	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Attenuator	Fairview Microwave	SA4014-20	TKE	1/16/2015	12
Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	12
Generator - Signal	Agilent	N5183A	TIA	4/7/2014	24

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.

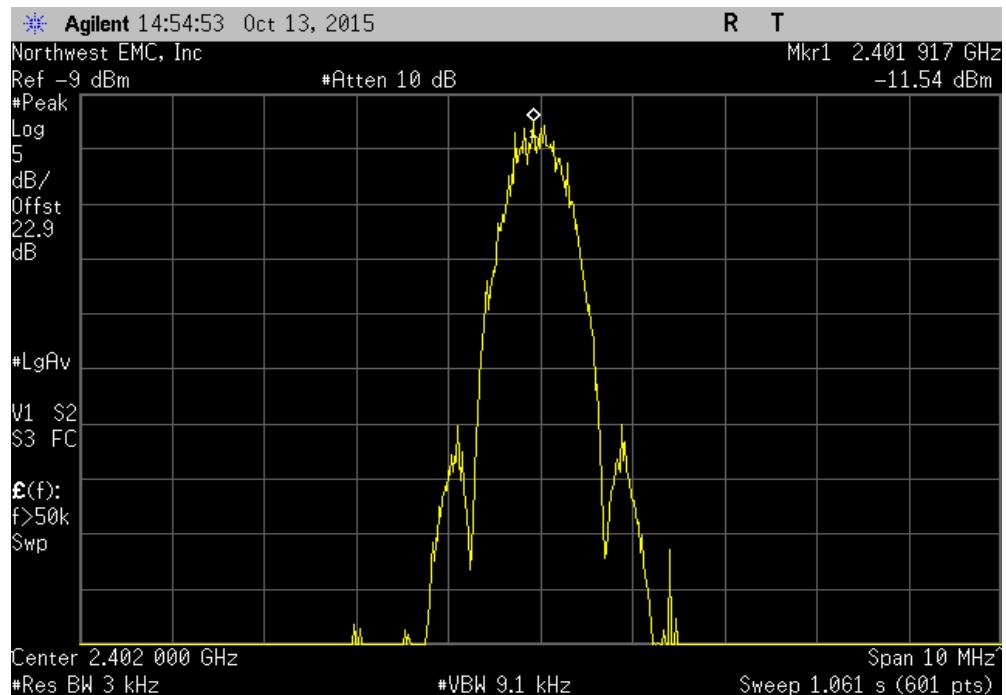
Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

POWER SPECTRAL DENSITY

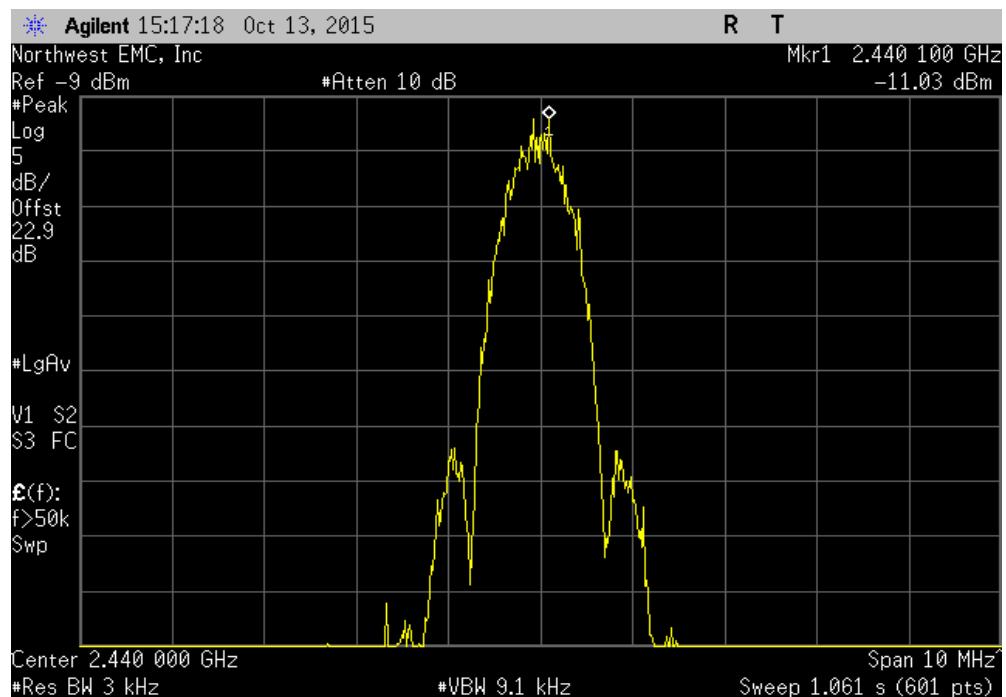
EUT:	ReadiBand4	Work Order:	DOTY0009															
Serial Number:	DN23U41F	Date:	10/13/15															
Customer:	Fatigue Science	Temperature:	23°C															
Attendees:	Chris Doughty, Hunter Downs	Humidity:	52%															
Project:	None	Barometric Pres.:	1022															
Tested by:	Matthew Barnes	Power:	5VDC - USB AC Power Supply															
TEST SPECIFICATIONS		Test Method																
FCC 15.247:2015		ANSI C63.10:2013																
COMMENTS																		
None																		
DEVIATIONS FROM TEST STANDARD																		
None																		
Configuration #	2	Signature	<i>Matthew W Barnes</i>															
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BLE - Data																		
Low Channel, 2402 MHz Mid Channel, 2440 MHz High Channel, 2480 MHz																		

POWER SPECTRAL DENSITY

BLE - Data, Low Channel, 2402 MHz				Value	Limit	Results
				dBm/3kHz	< dBm/3kHz	
				-11.542	8	Pass

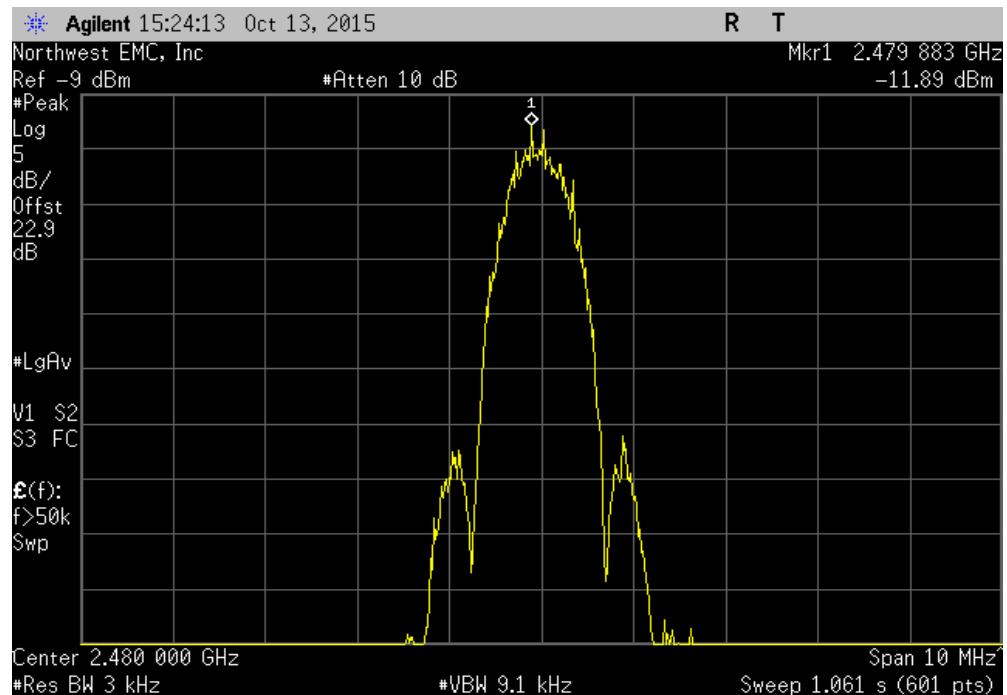


BLE - Data, Mid Channel, 2440 MHz				Value	Limit	Results
				dBm/3kHz	< dBm/3kHz	
				-11.035	8	Pass



POWER SPECTRAL DENSITY

BLE - Data, High Channel, 2480 MHz				Value	Limit	Results
				dBm/3kHz	< dBm/3kHz	
				-11.885	8	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 (mos)
Block - DC	Fairview Microwave	SD3379	AMJ	6/6/2015	12
Attenuator	Fairview Microwave	SA4014-20	TKE	1/16/2015	12
Cable	ESM Cable Corp.	TTBJ-141 KMKM-72	NC5	6/6/2015	12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	6/22/2015	12
Generator - Signal	Agilent	N5183A	TIA	4/7/2014	24

TEST DESCRIPTION

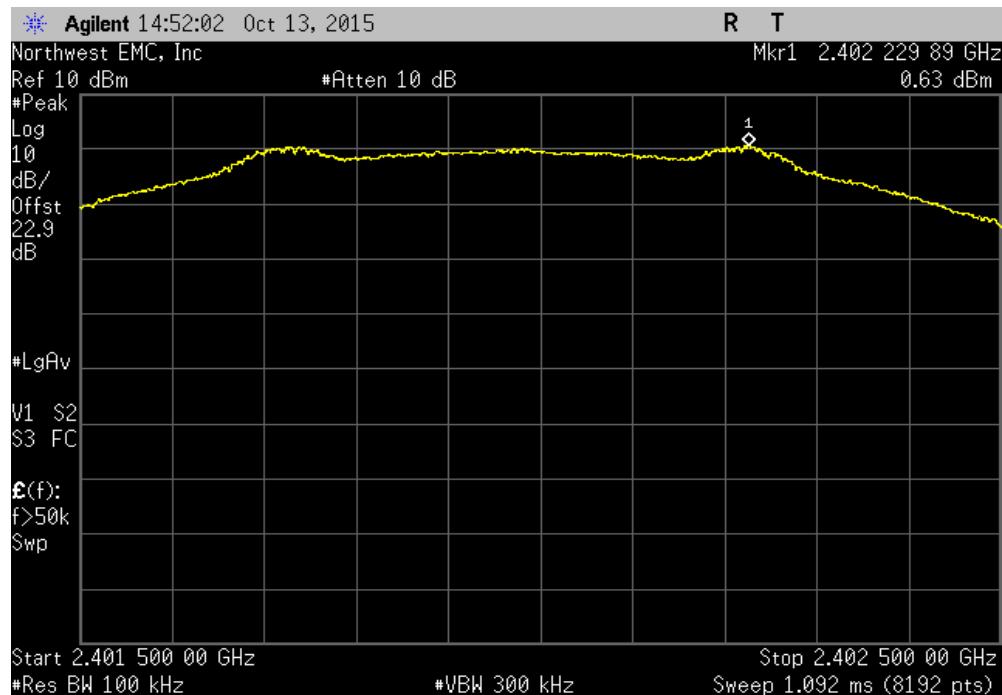
The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet. For each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

SPURIOUS CONDUCTED EMISSIONS

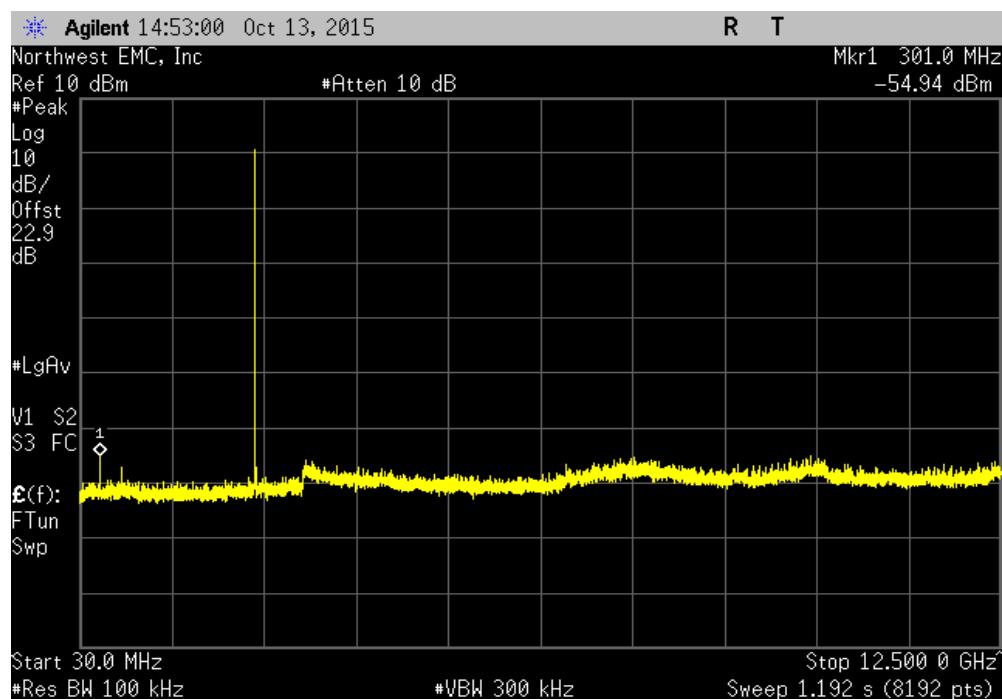
EUT:	ReadiBand4	Work Order:	DOTY0009																																								
Serial Number:	DN23U41F	Date:	10/13/15																																								
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SPURIOUS CONDUCTED EMISSIONS

Frequency Range		Max Value (dBc)	Limit \leq (dBc)	Result
Fundamental		N/A	N/A	N/A

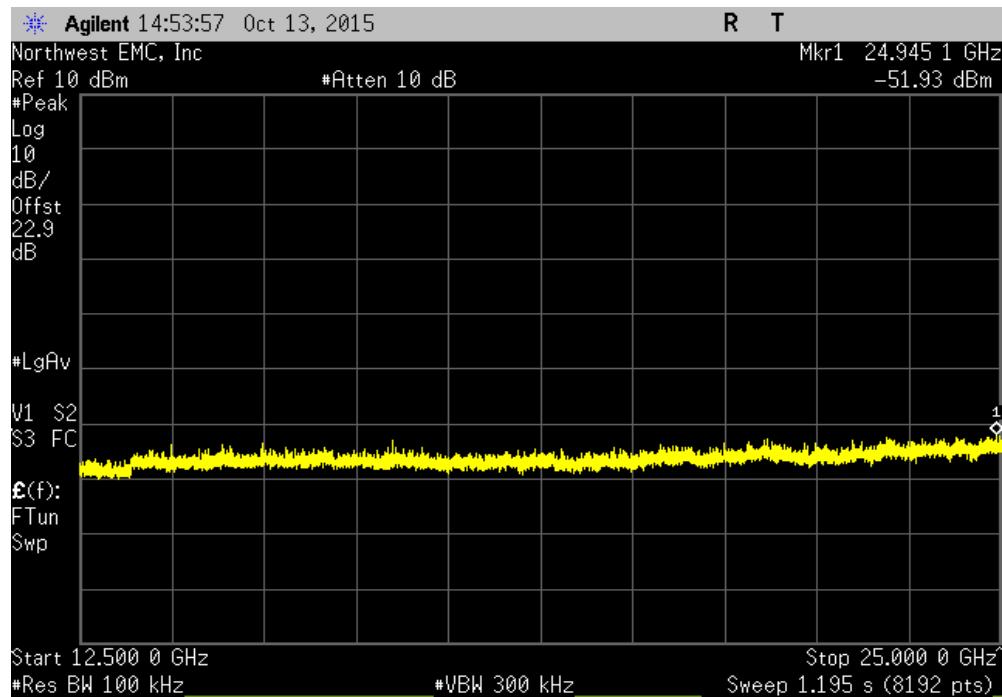


Frequency Range		Max Value (dBc)	Limit \leq (dBc)	Result
30 MHz - 12.5 GHz		-55.57	-20	Pass

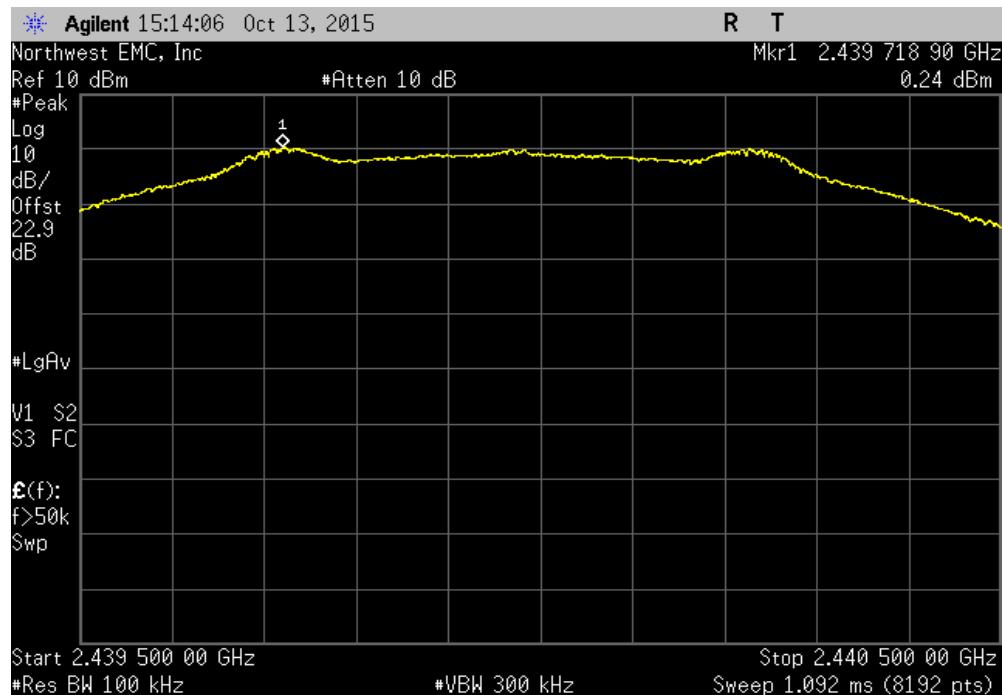


SPURIOUS CONDUCTED EMISSIONS

BLE - Data, Low Channel, 2402 MHz			
Frequency Range	Max Value (dBc)	Limit \leq (dBc)	Result
12.5 GHz - 25 GHz	-52.56	-20	Pass

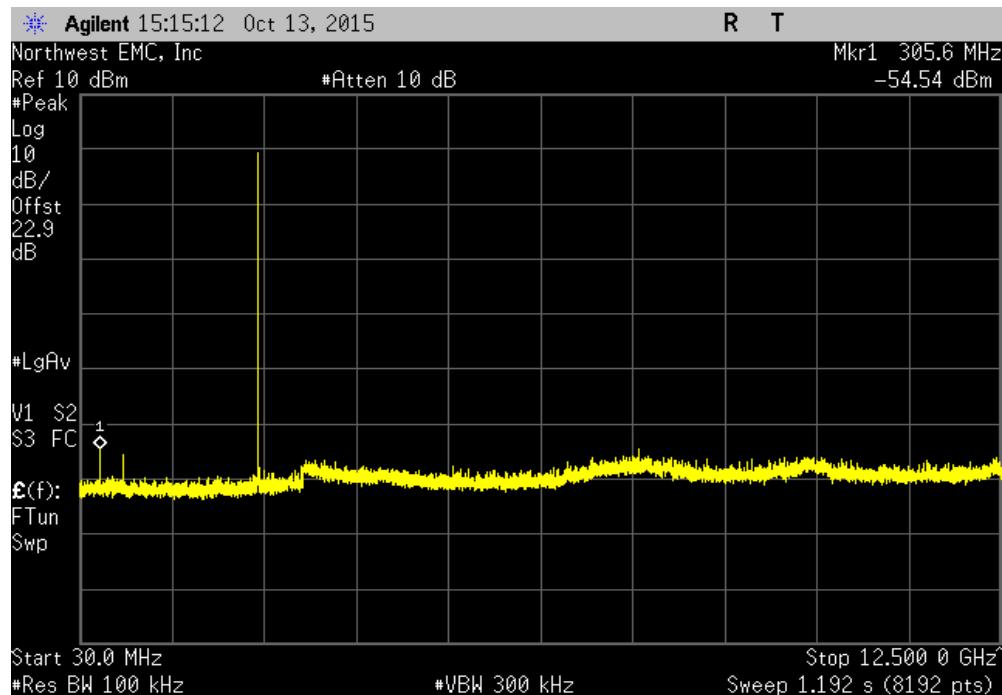


BLE - Data, Mid Channel, 2440 MHz			
Frequency Range	Max Value (dBc)	Limit \leq (dBc)	Result
Fundamental	N/A	N/A	N/A

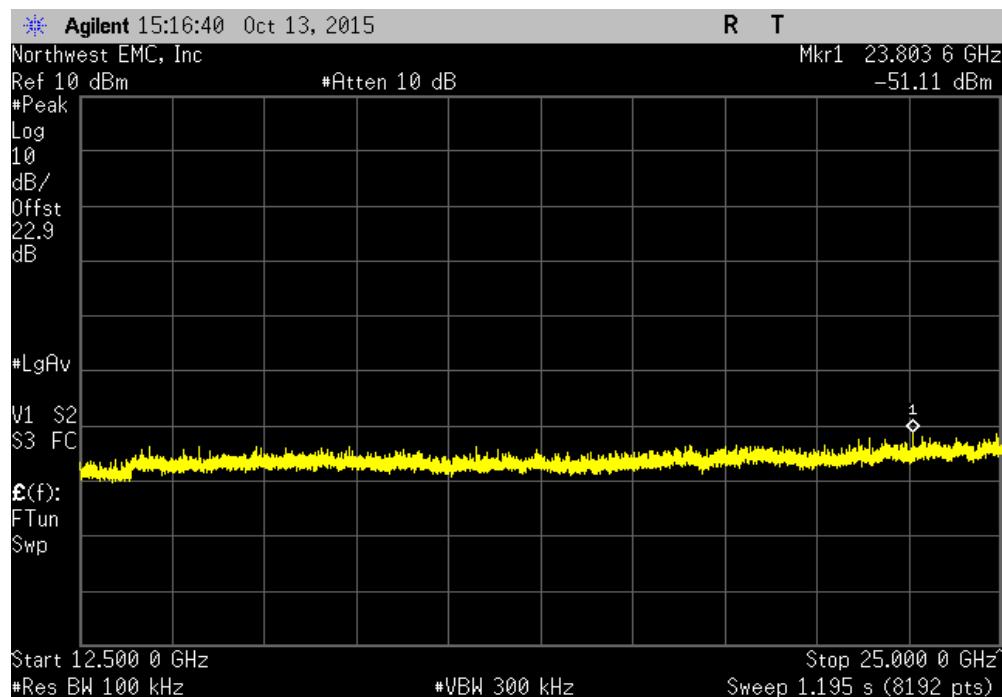


SPURIOUS CONDUCTED EMISSIONS

BLE - Data, Mid Channel, 2440 MHz				
Frequency Range		Max Value (dBc)	Limit \leq (dBc)	Result
30 MHz - 12.5 GHz		-54.78	-20	Pass

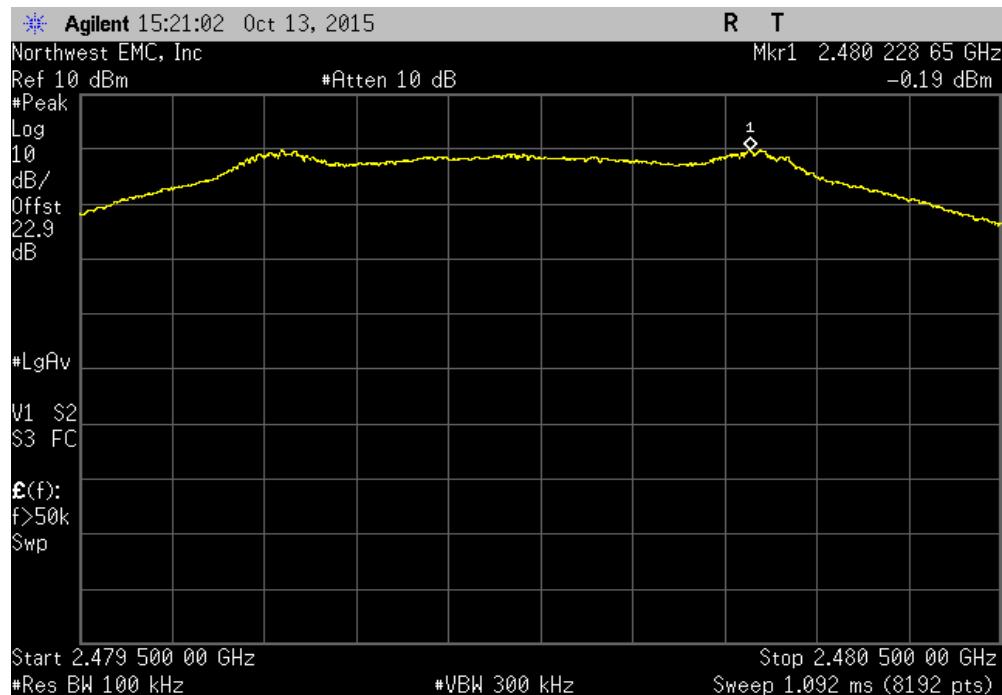


BLE - Data, Mid Channel, 2440 MHz				
Frequency Range		Max Value (dBc)	Limit \leq (dBc)	Result
12.5 GHz - 25 GHz		-51.35	-20	Pass

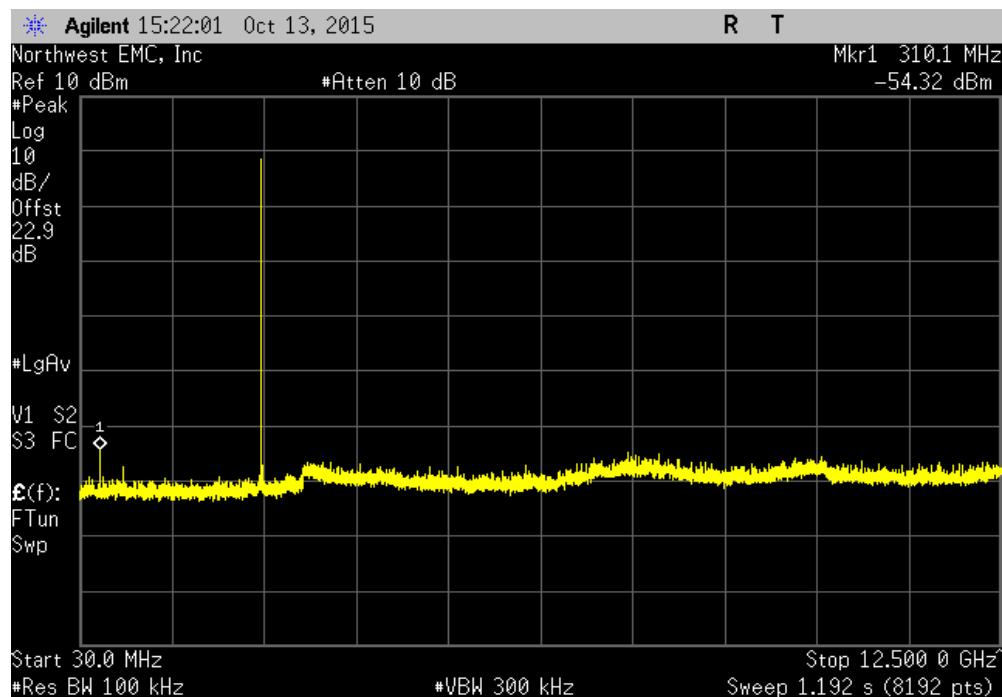


SPURIOUS CONDUCTED EMISSIONS

Frequency Range		Max Value (dBc)	Limit \leq (dBc)	Result
Fundamental		N/A	N/A	N/A



Frequency Range		Max Value (dBc)	Limit \leq (dBc)	Result
30 MHz - 12.5 GHz		-54.13	-20	Pass



SPURIOUS CONDUCTED EMISSIONS

BLE - Data, High Channel, 2480 MHz			
Frequency Range	Max Value (dBc)	Limit \leq (dBc)	Result
12.5 GHz - 25 GHz	-51.49	-20	Pass

