

# NORTHWEST EMC

## Payrange

Blukey Module

FCC 15.207:2016

FCC 15.247:2016

Bluetooth Low Energy Radio

Report # PAYR0003.1



NVLAP Lab Code: 200630-0

*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: March 10, 2016**

**Payrange**

**Model: Blukey Module**

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.207:2016	ANSI C63.10:2013
FCC 15.247:2016	

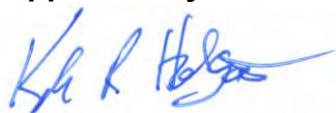
### Results

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	
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.2.2.4	Output Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	

### Deviations From Test Standards

None

### Approved By:



Kyle Holgate, 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

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## 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

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## Canada

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

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## 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.

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## Australia/New Zealand

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

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## Korea

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

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## Japan

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

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## 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.

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## Singapore

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

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## Israel

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

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## Hong Kong

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

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## Vietnam

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

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## 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

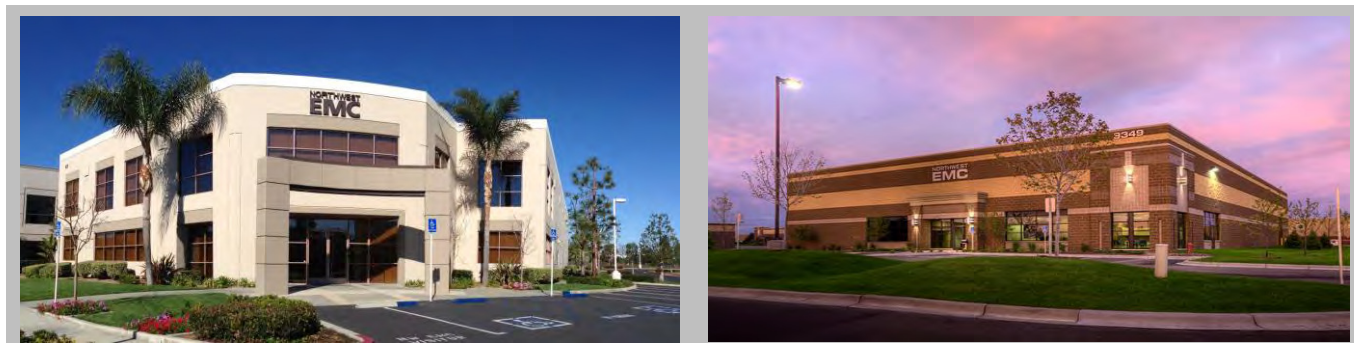
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement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

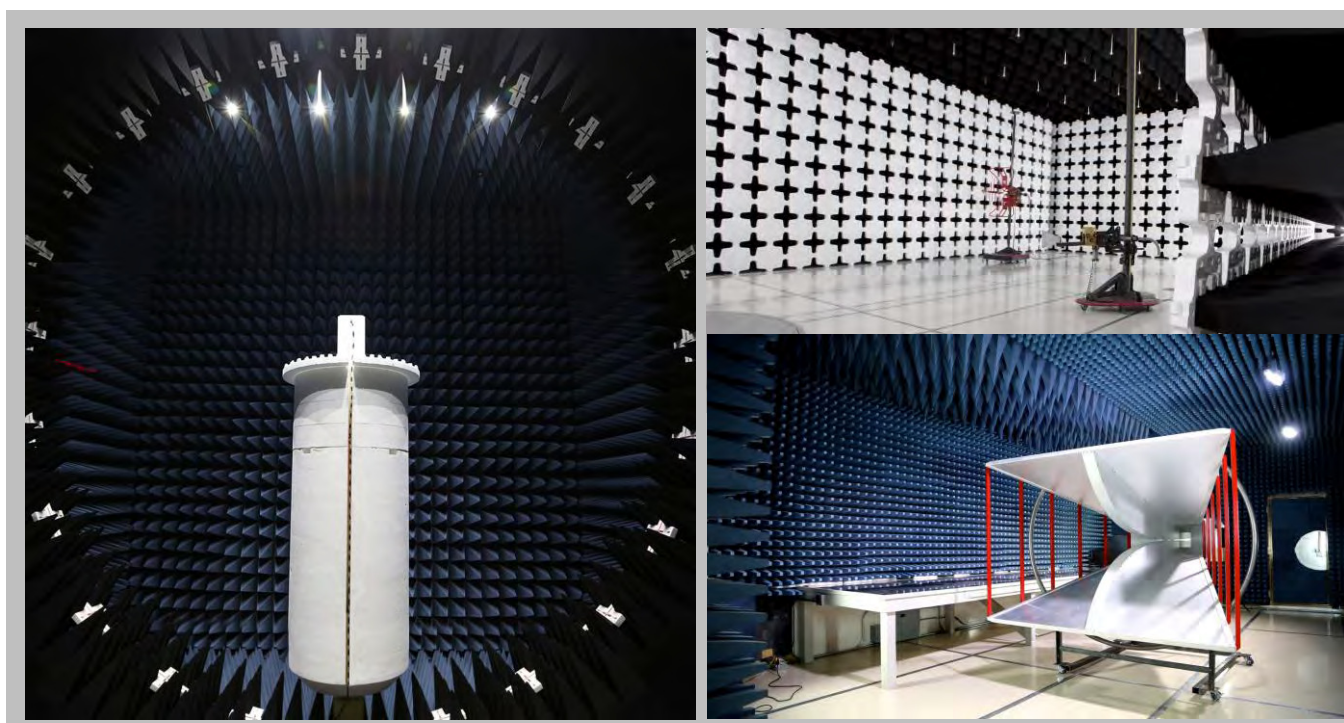
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

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

# FACILITIES



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



# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

<b>Company Name:</b>	Payrange
<b>Address:</b>	700 NE Multnomah Street Suite 1400
<b>City, State, Zip:</b>	Portland, OR 97232
<b>Test Requested By:</b>	Mike Mitchell
<b>Model:</b>	Blukey Module
<b>First Date of Test:</b>	March 09, 2016
<b>Last Date of Test:</b>	March 10, 2016
<b>Receipt Date of Samples:</b>	March 09, 2016
<b>Equipment Design Stage:</b>	Preproduction
<b>Equipment Condition:</b>	No Damage

## Information Provided by the Party Requesting the Test

<b>Functional Description of the EUT:</b>
Blukey Module is a mPCIe card for wireless payment over Bluetooth 4.0 Low Energy. It can be used in any general computer with mPCIe
<b>Testing Objective:</b>
To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements.



# CONFIGURATIONS

## Configuration PAYR0003- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth Low Energy Payment Controller	Payrange	Bluekey Module	1

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
BK Module Programmer	Payrange	None	PDX1

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Sony	SVE141L11L	2755608330002108

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB	Yes	1.2m	No	BK Module Programmer	Laptop

## Configuration PAYR0003- 2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth Low Energy Payment Controller	Payrange	Bluekey Module	2

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
DC Power Supply	Topward Electric Instruments Co. Inc	TPS-2000	946425

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	4.5m	No	DC Power Supply	Bluetooth Low Energy Payment Controller
AC Power	No	1.8m	No	AC Mains	DC Power Supply



# MODIFICATIONS

## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	3/9/2016	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.
2	3/9/2016	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	3/9/2016	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.
4	3/9/2016	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.
5	3/9/2016	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.
6	3/9/2016	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
7	3/10/2016	Powerline 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	3/10/2016	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

## TEST DESCRIPTION

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10-2013.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4407B	AAU	1/12/2015	1/12/2017
LISN	Solar Electronics	9252-50-R-24-BNC	LIP	1/27/2015	1/27/2017
Cable - Conducted Cable Assembly	Northwest EMC	EVG, HHD, RKA	EVGA	5/12/2015	5/12/2016

## MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

## CONFIGURATIONS INVESTIGATED

PAYR0003-2

## MODES INVESTIGATED

Continuous BTLE Tx, high channel, GFSK, 2480MHz.  
Continuous BTLE Tx, low channel, GFSK, 2402MHz.  
Continuous BTLE Tx, mid channel, GFSK, 2442MHz.

# POWERLINE CONDUCTED EMISSIONS

EUT:	Blukey Module	Work Order:	PAYR0003
Serial Number:	2	Date:	03/10/2016
Customer:	Payrange	Temperature:	22.3°C
Attendees:	Mike Mitchell	Relative Humidity:	43.2%
Customer Project:	None	Bar. Pressure:	1007.7 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	3VDC	Configuration:	PAYR0003-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

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

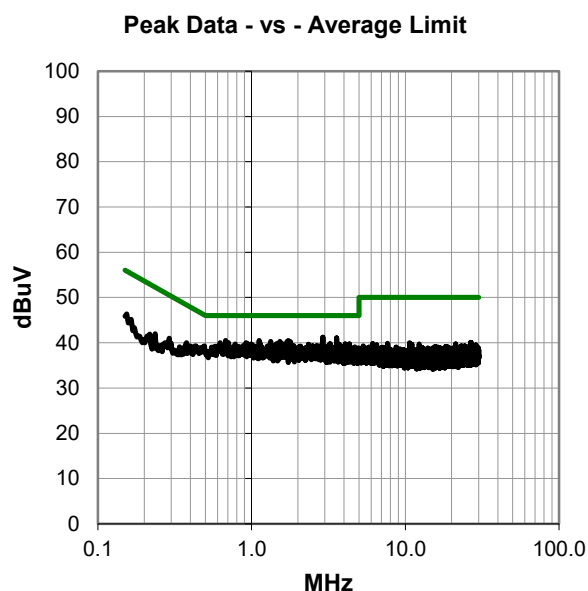
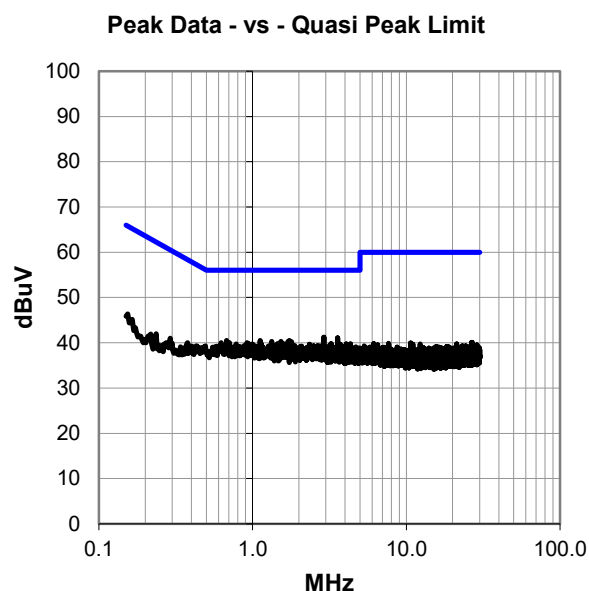
Measure the 120VAC/60Hz input to the linear DC supply.

## EUT OPERATING MODES

Continuous BTLE Tx, low channel, GFSK, 2402MHz.

## 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)
2.907	21.0	20.2	41.2	56.0	-14.8
3.575	20.9	20.2	41.1	56.0	-14.9
0.676	20.5	20.0	40.5	56.0	-15.5
1.120	20.4	20.1	40.5	56.0	-15.5
1.736	20.4	20.1	40.5	56.0	-15.5
1.329	20.2	20.1	40.3	56.0	-15.7
1.527	20.2	20.1	40.3	56.0	-15.7
1.702	20.2	20.1	40.3	56.0	-15.7
1.792	20.1	20.1	40.2	56.0	-15.8
0.919	19.9	20.1	40.0	56.0	-16.0
1.571	19.8	20.1	39.9	56.0	-16.1
3.239	19.6	20.2	39.8	56.0	-16.2
1.452	19.7	20.1	39.8	56.0	-16.2
1.721	19.7	20.1	39.8	56.0	-16.2
3.247	19.5	20.2	39.7	56.0	-16.3
3.687	19.5	20.2	39.7	56.0	-16.3
4.064	19.5	20.2	39.7	56.0	-16.3
4.328	19.5	20.2	39.7	56.0	-16.3
2.344	19.5	20.2	39.7	56.0	-16.3
3.638	19.4	20.2	39.6	56.0	-16.4
3.739	19.4	20.2	39.6	56.0	-16.4
2.665	19.2	20.2	39.4	56.0	-16.6
3.161	19.2	20.2	39.4	56.0	-16.6
2.079	19.1	20.1	39.2	56.0	-16.8
4.690	18.9	20.2	39.1	56.0	-16.9
4.362	18.7	20.2	38.9	56.0	-17.1

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
2.907	21.0	20.2	41.2	46.0	-4.8
3.575	20.9	20.2	41.1	46.0	-4.9
0.676	20.5	20.0	40.5	46.0	-5.5
1.120	20.4	20.1	40.5	46.0	-5.5
1.736	20.4	20.1	40.5	46.0	-5.5
1.329	20.2	20.1	40.3	46.0	-5.7
1.527	20.2	20.1	40.3	46.0	-5.7
1.702	20.2	20.1	40.3	46.0	-5.7
1.792	20.1	20.1	40.2	46.0	-5.8
0.919	19.9	20.1	40.0	46.0	-6.0
1.571	19.8	20.1	39.9	46.0	-6.1
3.239	19.6	20.2	39.8	46.0	-6.2
1.452	19.7	20.1	39.8	46.0	-6.2
1.721	19.7	20.1	39.8	46.0	-6.2
3.247	19.5	20.2	39.7	46.0	-6.3
3.687	19.5	20.2	39.7	46.0	-6.3
4.064	19.5	20.2	39.7	46.0	-6.3
4.328	19.5	20.2	39.7	46.0	-6.3
2.344	19.5	20.2	39.7	46.0	-6.3
3.638	19.4	20.2	39.6	46.0	-6.4
3.739	19.4	20.2	39.6	46.0	-6.4
2.665	19.2	20.2	39.4	46.0	-6.6
3.161	19.2	20.2	39.4	46.0	-6.6
2.079	19.1	20.1	39.2	46.0	-6.8
4.690	18.9	20.2	39.1	46.0	-6.9
4.362	18.7	20.2	38.9	46.0	-7.1

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Blukey Module	Work Order:	PAYR0003
Serial Number:	2	Date:	03/10/2016
Customer:	Payrange	Temperature:	22.3°C
Attendees:	Mike Mitchell	Relative Humidity:	43.2%
Customer Project:	None	Bar. Pressure:	1007.7 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	3VDC	Configuration:	PAYR0003-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

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

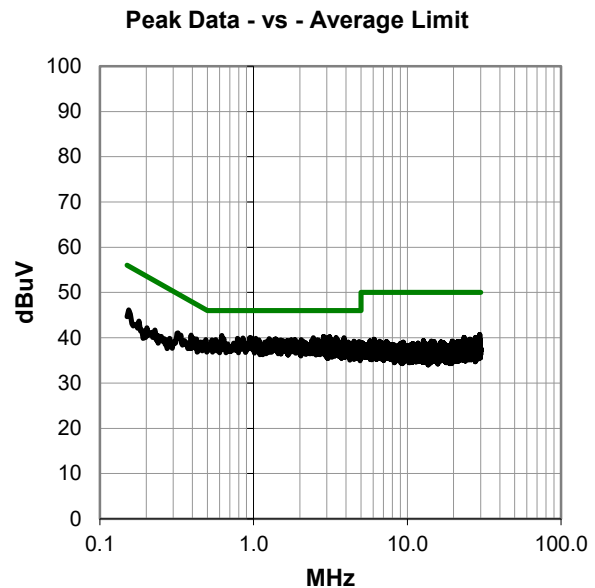
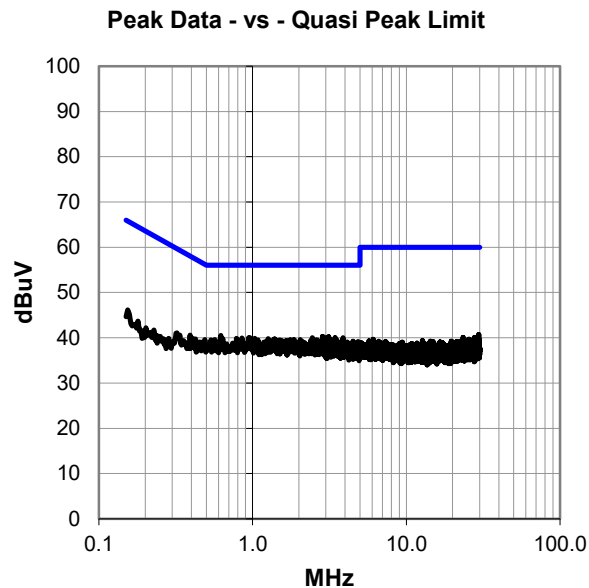
Measure the 120VAC/60Hz input to the linear DC supply.

## EUT OPERATING MODES

Continuous BTLE Tx, low channel, GFSK, 2402MHz.

## DEVIATIONS FROM TEST STANDARD

None



# 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)
0.620	20.5	20.0	40.5	56.0	-15.5
2.851	20.1	20.2	40.3	56.0	-15.7
3.123	20.0	20.2	40.2	56.0	-15.8
2.941	19.9	20.2	40.1	56.0	-15.9
0.941	19.9	20.1	40.0	56.0	-16.0
2.452	19.8	20.2	40.0	56.0	-16.0
3.444	19.8	20.2	40.0	56.0	-16.0
3.870	19.8	20.2	40.0	56.0	-16.0
0.851	19.9	20.0	39.9	56.0	-16.1
0.784	19.9	20.0	39.9	56.0	-16.1
1.034	19.8	20.1	39.9	56.0	-16.1
1.262	19.7	20.1	39.8	56.0	-16.2
1.844	19.5	20.1	39.6	56.0	-16.4
2.038	19.5	20.1	39.6	56.0	-16.4
2.586	19.3	20.2	39.5	56.0	-16.5
2.642	19.3	20.2	39.5	56.0	-16.5
3.220	19.3	20.2	39.5	56.0	-16.5
4.489	19.0	20.2	39.2	56.0	-16.8
4.847	18.9	20.2	39.1	56.0	-16.9
3.273	18.9	20.2	39.1	56.0	-16.9
3.601	18.9	20.2	39.1	56.0	-16.9
3.948	18.9	20.2	39.1	56.0	-16.9
4.131	18.8	20.2	39.0	56.0	-17.0
4.899	18.7	20.3	39.0	56.0	-17.0
4.623	18.6	20.2	38.8	56.0	-17.2
4.746	18.5	20.2	38.7	56.0	-17.3

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.620	20.5	20.0	40.5	46.0	-5.5
2.851	20.1	20.2	40.3	46.0	-5.7
3.123	20.0	20.2	40.2	46.0	-5.8
2.941	19.9	20.2	40.1	46.0	-5.9
0.941	19.9	20.1	40.0	46.0	-6.0
2.452	19.8	20.2	40.0	46.0	-6.0
3.444	19.8	20.2	40.0	46.0	-6.0
3.870	19.8	20.2	40.0	46.0	-6.0
0.851	19.9	20.0	39.9	46.0	-6.1
0.784	19.9	20.0	39.9	46.0	-6.1
1.034	19.8	20.1	39.9	46.0	-6.1
1.262	19.7	20.1	39.8	46.0	-6.2
1.844	19.5	20.1	39.6	46.0	-6.4
2.038	19.5	20.1	39.6	46.0	-6.4
2.586	19.3	20.2	39.5	46.0	-6.5
2.642	19.3	20.2	39.5	46.0	-6.5
3.220	19.3	20.2	39.5	46.0	-6.5
4.489	19.0	20.2	39.2	46.0	-6.8
4.847	18.9	20.2	39.1	46.0	-6.9
3.273	18.9	20.2	39.1	46.0	-6.9
3.601	18.9	20.2	39.1	46.0	-6.9
3.948	18.9	20.2	39.1	46.0	-6.9
4.131	18.8	20.2	39.0	46.0	-7.0
4.899	18.7	20.3	39.0	46.0	-7.0
4.623	18.6	20.2	38.8	46.0	-7.2
4.746	18.5	20.2	38.7	46.0	-7.3

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Blukey Module	Work Order:	PAYR0003
Serial Number:	2	Date:	03/10/2016
Customer:	Payrange	Temperature:	22.3°C
Attendees:	Mike Mitchell	Relative Humidity:	43.2%
Customer Project:	None	Bar. Pressure:	1007.7 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	3VDC	Configuration:	PAYR0003-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

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

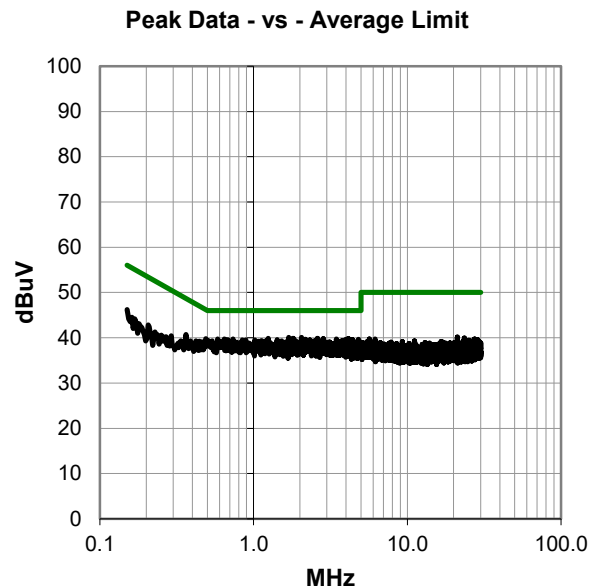
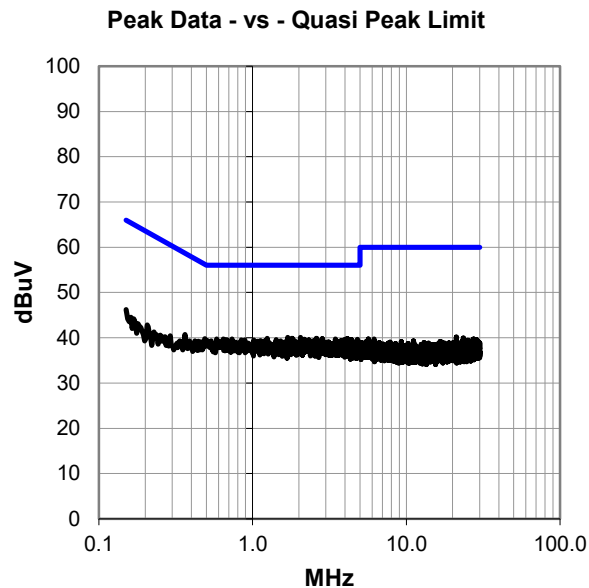
Measure the 120VAC/60Hz input to the linear DC supply.

## EUT OPERATING MODES

Continuous BTLE Tx, mid channel, GFSK, 2442MHz.

## DEVIATIONS FROM TEST STANDARD

None





# 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)
1.691	20.0	20.1	40.1	56.0	-15.9
2.045	20.0	20.1	40.1	56.0	-15.9
1.243	19.8	20.1	39.9	56.0	-16.1
1.810	19.8	20.1	39.9	56.0	-16.1
2.605	19.7	20.2	39.9	56.0	-16.1
2.840	19.6	20.2	39.8	56.0	-16.2
4.153	19.6	20.2	39.8	56.0	-16.2
3.463	19.5	20.2	39.7	56.0	-16.3
4.041	19.5	20.2	39.7	56.0	-16.3
4.802	19.4	20.2	39.6	56.0	-16.4
2.172	19.5	20.1	39.6	56.0	-16.4
1.426	19.5	20.1	39.6	56.0	-16.4
3.944	19.4	20.2	39.6	56.0	-16.4
4.392	19.4	20.2	39.6	56.0	-16.4
1.019	19.4	20.1	39.5	56.0	-16.5
2.463	19.1	20.2	39.3	56.0	-16.7
3.720	19.1	20.2	39.3	56.0	-16.7
4.892	19.0	20.3	39.3	56.0	-16.7
1.620	19.0	20.1	39.1	56.0	-16.9
4.496	18.7	20.2	38.9	56.0	-17.1
4.996	18.5	20.3	38.8	56.0	-17.2
0.363	20.7	20.0	40.7	58.7	-18.0
0.150	26.0	20.2	46.2	66.0	-19.8
21.162	19.1	21.0	40.1	60.0	-19.9
23.535	18.7	21.2	39.9	60.0	-20.1
5.657	19.4	20.3	39.7	60.0	-20.3

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.691	20.0	20.1	40.1	46.0	-5.9
2.045	20.0	20.1	40.1	46.0	-5.9
1.243	19.8	20.1	39.9	46.0	-6.1
1.810	19.8	20.1	39.9	46.0	-6.1
2.605	19.7	20.2	39.9	46.0	-6.1
2.840	19.6	20.2	39.8	46.0	-6.2
4.153	19.6	20.2	39.8	46.0	-6.2
3.463	19.5	20.2	39.7	46.0	-6.3
4.041	19.5	20.2	39.7	46.0	-6.3
4.802	19.4	20.2	39.6	46.0	-6.4
2.172	19.5	20.1	39.6	46.0	-6.4
1.426	19.5	20.1	39.6	46.0	-6.4
3.944	19.4	20.2	39.6	46.0	-6.4
4.392	19.4	20.2	39.6	46.0	-6.4
1.019	19.4	20.1	39.5	46.0	-6.5
2.463	19.1	20.2	39.3	46.0	-6.7
3.720	19.1	20.2	39.3	46.0	-6.7
4.892	19.0	20.3	39.3	46.0	-6.7
1.620	19.0	20.1	39.1	46.0	-6.9
4.496	18.7	20.2	38.9	46.0	-7.1
4.996	18.5	20.3	38.8	46.0	-7.2
0.363	20.7	20.0	40.7	48.7	-8.0
0.150	26.0	20.2	46.2	56.0	-9.8
21.162	19.1	21.0	40.1	50.0	-9.9
23.535	18.7	21.2	39.9	50.0	-10.1
5.657	19.4	20.3	39.7	50.0	-10.3

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Blukey Module	Work Order:	PAYR0003
Serial Number:	2	Date:	03/10/2016
Customer:	Payrange	Temperature:	22.3°C
Attendees:	Mike Mitchell	Relative Humidity:	43.2%
Customer Project:	None	Bar. Pressure:	1007.7 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	3VDC	Configuration:	PAYR0003-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

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

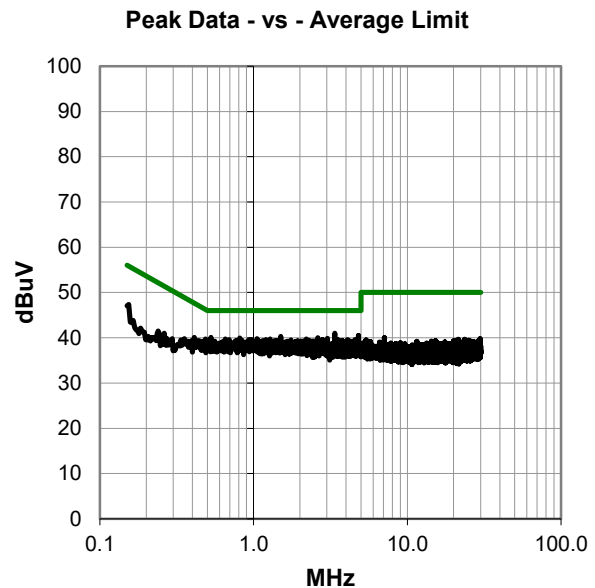
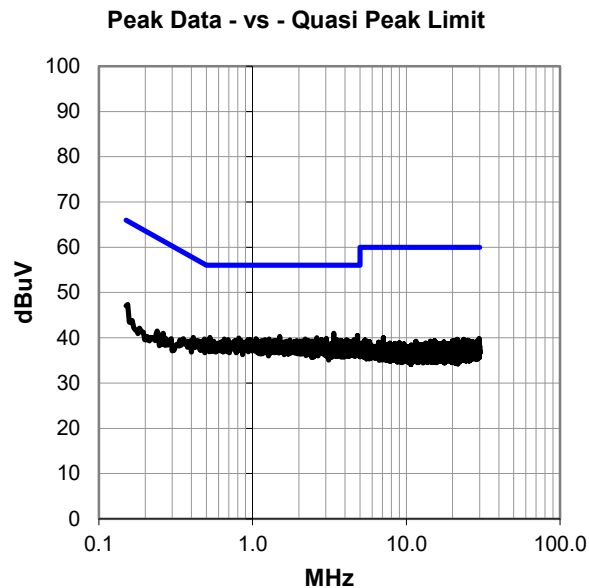
Measure the 120VAC/60Hz input to the linear DC supply.

## EUT OPERATING MODES

Continuous BTLE Tx, mid channel, GFSK, 2442MHz.

## DEVIATIONS FROM TEST STANDARD

None



# 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)
3.370	20.8	20.2	41.0	56.0	-15.0
4.806	20.3	20.2	40.5	56.0	-15.5
1.504	20.2	20.1	40.3	56.0	-15.7
0.527	20.1	20.0	40.1	56.0	-15.9
2.612	19.8	20.2	40.0	56.0	-16.0
0.814	19.9	20.0	39.9	56.0	-16.1
3.019	19.7	20.2	39.9	56.0	-16.1
1.053	19.7	20.1	39.8	56.0	-16.2
2.206	19.6	20.1	39.7	56.0	-16.3
1.284	19.6	20.1	39.7	56.0	-16.3
4.575	19.4	20.2	39.6	56.0	-16.4
1.202	19.5	20.1	39.6	56.0	-16.4
2.814	19.4	20.2	39.6	56.0	-16.4
3.523	19.4	20.2	39.6	56.0	-16.4
4.097	19.4	20.2	39.6	56.0	-16.4
1.747	19.4	20.1	39.5	56.0	-16.5
2.295	19.3	20.2	39.5	56.0	-16.5
3.672	19.2	20.2	39.4	56.0	-16.6
3.810	19.1	20.2	39.3	56.0	-16.7
2.471	19.0	20.2	39.2	56.0	-16.8
4.250	19.0	20.2	39.2	56.0	-16.8
3.713	18.9	20.2	39.1	56.0	-16.9
3.862	18.9	20.2	39.1	56.0	-16.9
0.411	20.1	20.0	40.1	57.6	-17.5
0.154	27.2	20.2	47.4	65.8	-18.4
7.104	19.6	20.4	40.0	60.0	-20.0

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
3.370	20.8	20.2	41.0	46.0	-5.0
4.806	20.3	20.2	40.5	46.0	-5.5
1.504	20.2	20.1	40.3	46.0	-5.7
0.527	20.1	20.0	40.1	46.0	-5.9
2.612	19.8	20.2	40.0	46.0	-6.0
0.814	19.9	20.0	39.9	46.0	-6.1
3.019	19.7	20.2	39.9	46.0	-6.1
1.053	19.7	20.1	39.8	46.0	-6.2
2.206	19.6	20.1	39.7	46.0	-6.3
1.284	19.6	20.1	39.7	46.0	-6.3
4.575	19.4	20.2	39.6	46.0	-6.4
1.202	19.5	20.1	39.6	46.0	-6.4
2.814	19.4	20.2	39.6	46.0	-6.4
3.523	19.4	20.2	39.6	46.0	-6.4
4.097	19.4	20.2	39.6	46.0	-6.4
1.747	19.4	20.1	39.5	46.0	-6.5
2.295	19.3	20.2	39.5	46.0	-6.5
3.672	19.2	20.2	39.4	46.0	-6.6
3.810	19.1	20.2	39.3	46.0	-6.7
2.471	19.0	20.2	39.2	46.0	-6.8
4.250	19.0	20.2	39.2	46.0	-6.8
3.713	18.9	20.2	39.1	46.0	-6.9
3.862	18.9	20.2	39.1	46.0	-6.9
0.411	20.1	20.0	40.1	47.6	-7.5
0.154	27.2	20.2	47.4	55.8	-8.4
7.104	19.6	20.4	40.0	50.0	-10.0

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Blukey Module	Work Order:	PAYR0003
Serial Number:	2	Date:	03/10/2016
Customer:	Payrange	Temperature:	22.3°C
Attendees:	Mike Mitchell	Relative Humidity:	43.2%
Customer Project:	None	Bar. Pressure:	1007.7 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	3VDC	Configuration:	PAYR0003-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

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

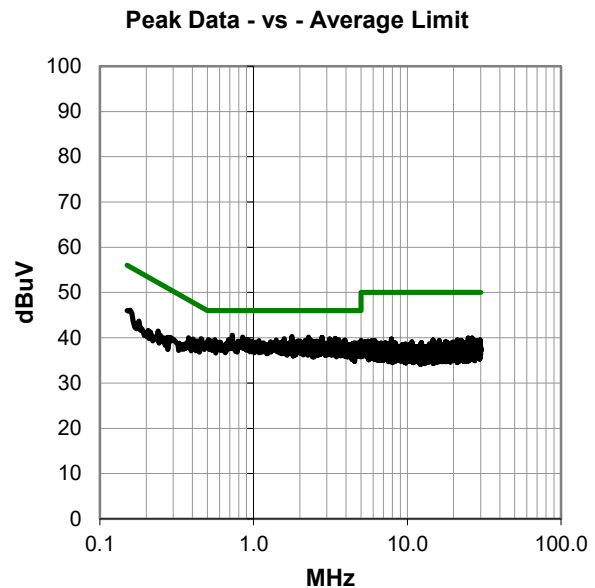
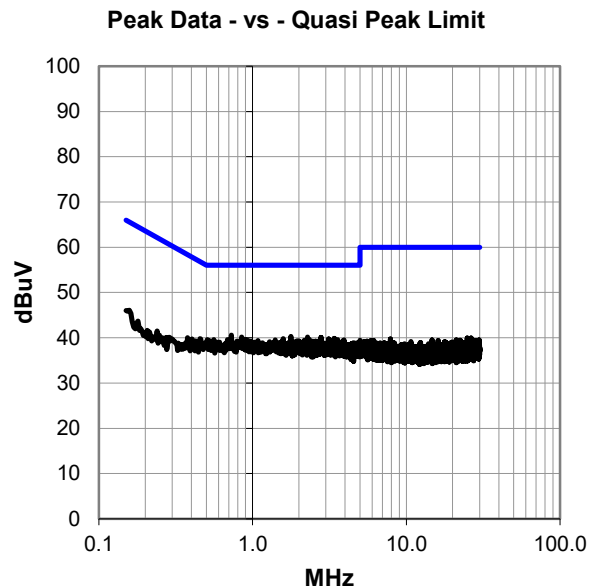
Measure the 120VAC/60Hz input to the linear DC supply.

## EUT OPERATING MODES

Continuous BTLE Tx, high channel, GFSK, 2480MHz.

## DEVIATIONS FROM TEST STANDARD

None



# 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)
0.728	20.6	20.0	40.6	56.0	-15.4
1.773	20.2	20.1	40.3	56.0	-15.7
2.273	20.0	20.2	40.2	56.0	-15.8
0.848	20.1	20.0	40.1	56.0	-15.9
2.784	19.9	20.2	40.1	56.0	-15.9
3.400	19.7	20.2	39.9	56.0	-16.1
1.579	19.7	20.1	39.8	56.0	-16.2
3.123	19.5	20.2	39.7	56.0	-16.3
3.582	19.4	20.2	39.6	56.0	-16.4
3.940	19.3	20.2	39.5	56.0	-16.5
2.168	19.3	20.1	39.4	56.0	-16.6
3.870	19.2	20.2	39.4	56.0	-16.6
1.948	19.2	20.1	39.3	56.0	-16.7
2.456	19.0	20.2	39.2	56.0	-16.8
2.568	19.0	20.2	39.2	56.0	-16.8
4.888	18.7	20.3	39.0	56.0	-17.0
4.504	18.6	20.2	38.8	56.0	-17.2
0.157	25.9	20.2	46.1	65.6	-19.5
26.441	18.6	21.4	40.0	60.0	-20.0
24.926	18.6	21.3	39.9	60.0	-20.1
25.613	18.5	21.3	39.8	60.0	-20.2
7.880	19.3	20.4	39.7	60.0	-20.3
21.169	18.5	21.0	39.5	60.0	-20.5
14.711	18.8	20.7	39.5	60.0	-20.5
29.769	17.9	21.6	39.5	60.0	-20.5
5.011	19.2	20.3	39.5	60.0	-20.5

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.728	20.6	20.0	40.6	46.0	-5.4
1.773	20.2	20.1	40.3	46.0	-5.7
2.273	20.0	20.2	40.2	46.0	-5.8
0.848	20.1	20.0	40.1	46.0	-5.9
2.784	19.9	20.2	40.1	46.0	-5.9
3.400	19.7	20.2	39.9	46.0	-6.1
1.579	19.7	20.1	39.8	46.0	-6.2
3.123	19.5	20.2	39.7	46.0	-6.3
3.582	19.4	20.2	39.6	46.0	-6.4
3.940	19.3	20.2	39.5	46.0	-6.5
2.168	19.3	20.1	39.4	46.0	-6.6
3.870	19.2	20.2	39.4	46.0	-6.6
1.948	19.2	20.1	39.3	46.0	-6.7
2.456	19.0	20.2	39.2	46.0	-6.8
2.568	19.0	20.2	39.2	46.0	-6.8
4.888	18.7	20.3	39.0	46.0	-7.0
4.504	18.6	20.2	38.8	46.0	-7.2
0.157	25.9	20.2	46.1	55.6	-9.5
26.441	18.6	21.4	40.0	50.0	-10.0
24.926	18.6	21.3	39.9	50.0	-10.1
25.613	18.5	21.3	39.8	50.0	-10.2
7.880	19.3	20.4	39.7	50.0	-10.3
21.169	18.5	21.0	39.5	50.0	-10.5
14.711	18.8	20.7	39.5	50.0	-10.5
29.769	17.9	21.6	39.5	50.0	-10.5
5.011	19.2	20.3	39.5	50.0	-10.5

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	Blukey Module	Work Order:	PAYR0003
Serial Number:	2	Date:	03/10/2016
Customer:	Payrange	Temperature:	22.3°C
Attendees:	Mike Mitchell	Relative Humidity:	43.2%
Customer Project:	None	Bar. Pressure:	1007.7 mb
Tested By:	Cole Ghizzone	Job Site:	EV07
Power:	3VDC	Configuration:	PAYR0003-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

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

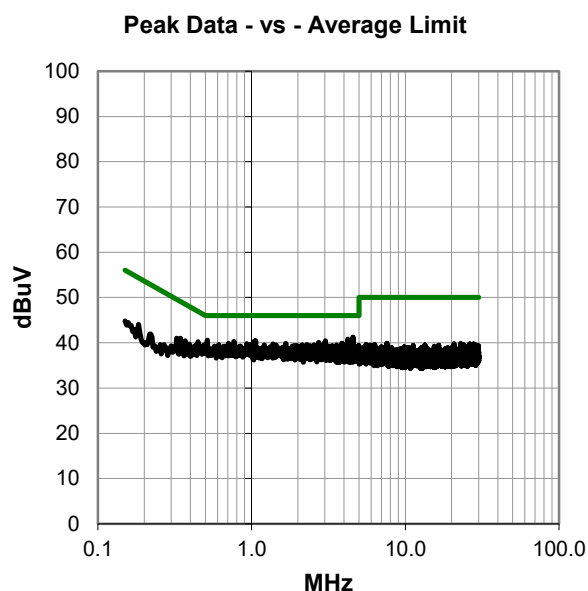
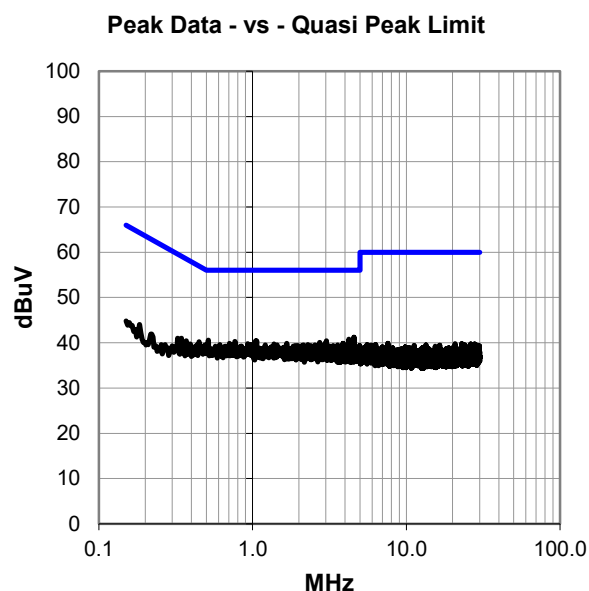
Measure the 120VAC/60Hz input to the linear DC supply.

## EUT OPERATING MODES

Continuous BTLE Tx, high channel, GFSK, 2480MHz.

## DEVIATIONS FROM TEST STANDARD

None



# 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)
4.567	21.0	20.2	41.2	56.0	-14.8
4.220	20.6	20.2	40.8	56.0	-15.2
0.516	20.6	20.0	40.6	56.0	-15.4
1.045	20.3	20.1	40.4	56.0	-15.6
1.064	20.3	20.1	40.4	56.0	-15.6
3.019	20.2	20.2	40.4	56.0	-15.6
0.766	20.3	20.0	40.3	56.0	-15.7
2.739	19.9	20.2	40.1	56.0	-15.9
1.668	19.8	20.1	39.9	56.0	-16.1
3.877	19.7	20.2	39.9	56.0	-16.1
1.374	19.6	20.1	39.7	56.0	-16.3
2.284	19.4	20.2	39.6	56.0	-16.4
2.139	19.4	20.1	39.5	56.0	-16.5
2.538	19.3	20.2	39.5	56.0	-16.5
3.582	19.3	20.2	39.5	56.0	-16.5
3.090	19.2	20.2	39.4	56.0	-16.6
3.347	19.2	20.2	39.4	56.0	-16.6
4.978	19.1	20.3	39.4	56.0	-16.6
4.120	19.0	20.2	39.2	56.0	-16.8
3.549	18.9	20.2	39.1	56.0	-16.9
3.720	18.9	20.2	39.1	56.0	-16.9
3.754	18.7	20.2	38.9	56.0	-17.1
0.370	20.4	20.0	40.4	58.5	-18.1
0.344	21.0	20.0	41.0	59.1	-18.1
0.325	21.0	20.0	41.0	59.6	-18.6
7.593	19.5	20.4	39.9	60.0	-20.1

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
4.567	21.0	20.2	41.2	46.0	-4.8
4.220	20.6	20.2	40.8	46.0	-5.2
0.516	20.6	20.0	40.6	46.0	-5.4
1.045	20.3	20.1	40.4	46.0	-5.6
1.064	20.3	20.1	40.4	46.0	-5.6
3.019	20.2	20.2	40.4	46.0	-5.6
0.766	20.3	20.0	40.3	46.0	-5.7
2.739	19.9	20.2	40.1	46.0	-5.9
1.668	19.8	20.1	39.9	46.0	-6.1
3.877	19.7	20.2	39.9	46.0	-6.1
1.374	19.6	20.1	39.7	46.0	-6.3
2.284	19.4	20.2	39.6	46.0	-6.4
2.139	19.4	20.1	39.5	46.0	-6.5
2.538	19.3	20.2	39.5	46.0	-6.5
3.582	19.3	20.2	39.5	46.0	-6.5
3.090	19.2	20.2	39.4	46.0	-6.6
3.347	19.2	20.2	39.4	46.0	-6.6
4.978	19.1	20.3	39.4	46.0	-6.6
4.120	19.0	20.2	39.2	46.0	-6.8
3.549	18.9	20.2	39.1	46.0	-6.9
3.720	18.9	20.2	39.1	46.0	-6.9
3.754	18.7	20.2	38.9	46.0	-7.1
0.370	20.4	20.0	40.4	48.5	-8.1
0.344	21.0	20.0	41.0	49.1	-8.1
0.325	21.0	20.0	41.0	49.6	-8.6
7.593	19.5	20.4	39.9	50.0	-10.1

## CONCLUSION

Pass



Tested By



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

Low channel, 2402MHz, GFSK modulation  
Mid channel, 2442MHz, GFSK modulation  
High channel, 2480MHz, GFSK modulation

## POWER SETTINGS INVESTIGATED

3VDC

## CONFIGURATIONS INVESTIGATED

PAYR0003 - 2

## FREQUENCY RANGE INVESTIGATED

Start Frequency | 30 MHz | Stop Frequency | 26500 MHz

## SAMPLE CALCULATIONS

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

## TEST EQUIPMENT


Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	ESM Cable Corp.	KMKM-72	EVY	11/4/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	11/4/2015	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	4/16/2015	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	12 mo
Cable	None	Standard Gain Horns Cable	EVF	4/20/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	4/20/2015	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HFO	3/31/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	4/16/2015	12 mo
Antenna - Double Ridge	EMCO	3115	AHC	6/13/2014	12 mo
Attenuator	Coaxicom	3910-20	AXZ	5/24/2015	24 mo
Cable	N/A	Bilog Cables	EVA	1/29/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	1/29/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	3/10/2015	24 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

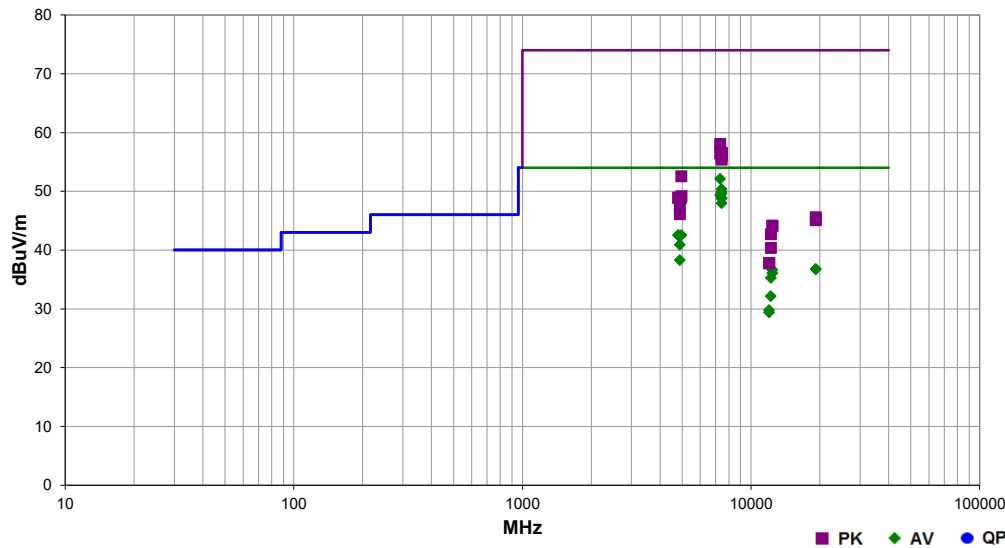
## TEST DESCRIPTION

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. The average measurements were adjusted to account for the duty cycle using the methods described in ANSI C63.10:2013, Section 11.12.2.5.2. The Duty Cycle correction factor was calculated as follows: DC Correction=10\*LOG(0.634), DC Correction = 1.98dB

Work Order:	PAYR0003	Date:	03/10/16	
Project:	None	Temperature:	20.6 °C	
Job Site:	EV01	Humidity:	43.9% RH	
Serial Number:	2	Barometric Pres.:	1007.7 mbar	
EUT:	Blukey Module			Tested by: Cole Ghizzone
Configuration:	2			
Customer:	Payrange			
Attendees:	Mike Mitchell			
EUT Power:	3VDC			
Operating Mode:	Continuous BTLE Tx, reference the data comments for channel, frequency and modulation.			
Deviations:	None			
Comments:	See data comments for EUT orientation			


Test Specifications	FCC 15.247:2016	Test Method	ANSI C63.10:2013
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Run #	12	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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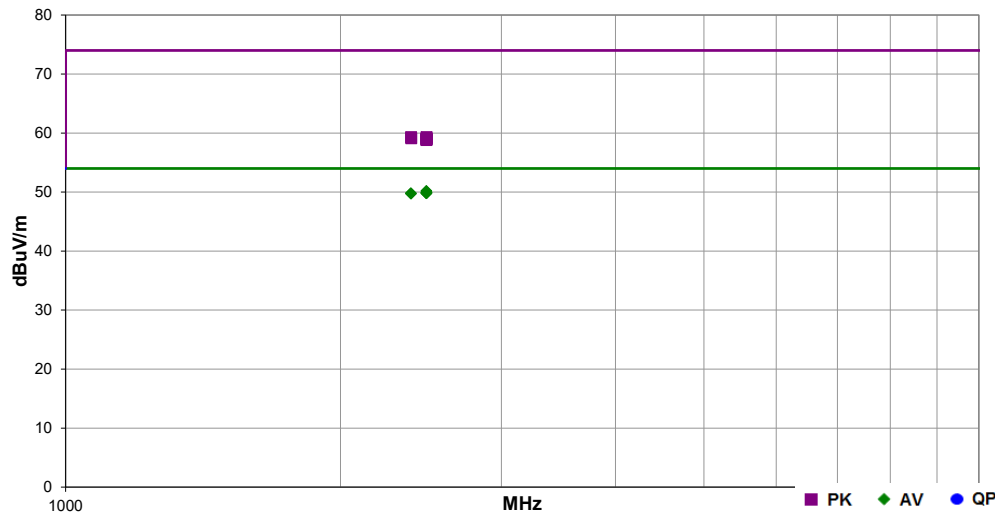


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	Duty Cycle Correction (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7326.400	35.8	14.3	2.7	95.0	3.0	2.0	Vert	AV	0.0	52.1	54.0	-1.9	Mid channel, 2442MHz, GFSK modulation EUT Vert
7439.333	33.8	14.6	1.0	262.0	3.0	2.0	Horz	AV	0.0	50.4	54.0	-3.6	High channel, 2480MHz, GFSK modulation EUT Horz
7439.250	33.3	14.6	1.0	70.0	3.0	2.0	Vert	AV	0.0	49.9	54.0	-4.1	High channel, 2480MHz, GFSK modulation EUT Vert
7439.392	33.0	14.6	1.0	32.0	3.0	2.0	Vert	AV	0.0	49.6	54.0	-4.4	High channel, 2480MHz, GFSK modulation EUT On Side
7326.500	33.0	14.3	1.0	296.0	3.0	2.0	Horz	AV	0.0	49.3	54.0	-4.7	Mid channel, 2442MHz, GFSK modulation EUT Horz
7439.408	32.3	14.6	1.0	27.0	3.0	2.0	Horz	AV	0.0	48.9	54.0	-5.1	High channel, 2480MHz, GFSK modulation EUT Vert
7439.358	32.2	14.6	2.2	325.0	3.0	2.0	Horz	AV	0.0	48.8	54.0	-5.2	High channel, 2480MHz, GFSK modulation EUT On Side
4959.825	38.3	7.8	1.0	265.0	3.0	2.0	Horz	AV	0.0	48.0	54.0	-6.0	High channel, 2480MHz, GFSK modulation EUT Horz
7439.242	31.4	14.6	1.0	27.0	3.0	2.0	Vert	AV	0.0	48.0	54.0	-6.0	High channel, 2480MHz, GFSK modulation EUT Horz
4959.750	32.8	7.8	1.0	354.0	3.0	2.0	Vert	AV	0.0	42.5	54.0	-11.5	High channel, 2480MHz, GFSK modulation EUT Vert
4803.950	33.0	7.5	1.0	322.0	3.0	2.0	Horz	AV	0.0	42.5	54.0	-11.5	Low channel, 2402MHz, GFSK modulation EUT Horz
4803.817	33.0	7.5	1.0	77.0	3.0	2.0	Vert	AV	0.0	42.5	54.0	-11.5	Low channel, 2402MHz, GFSK modulation EUT Vert
4883.925	31.2	7.7	1.0	270.0	3.0	2.0	Horz	AV	0.0	40.9	54.0	-13.1	Mid channel, 2442MHz, GFSK modulation EUT Horz
7326.600	43.7	14.3	2.7	95.0	3.0	0.0	Vert	PK	0.0	58.0	74.0	-16.0	Mid channel, 2442MHz, GFSK modulation EUT Vert
7440.408	42.0	14.6	1.0	262.0	3.0	0.0	Horz	PK	0.0	56.6	74.0	-17.4	High channel, 2480MHz, GFSK modulation EUT Horz
7440.650	41.9	14.6	1.0	32.0	3.0	0.0	Vert	PK	0.0	56.5	74.0	-17.5	High channel, 2480MHz, GFSK modulation EUT On Side
7327.000	42.1	14.3	1.0	296.0	3.0	0.0	Horz	PK	0.0	56.4	74.0	-17.6	Mid channel, 2442MHz, GFSK modulation EUT Horz
7439.233	41.8	14.6	1.0	70.0	3.0	0.0	Vert	PK	0.0	56.4	74.0	-17.6	High channel, 2480MHz, GFSK modulation EUT Vert
4883.967	28.6	7.7	1.0	11.0	3.0	2.0	Vert	AV	0.0	38.3	54.0	-15.7	Mid channel, 2442MHz, GFSK modulation EUT Vert
7439.150	41.4	14.6	2.2	325.0	3.0	0.0	Horz	PK	0.0	56.0	74.0	-18.0	High channel, 2480MHz, GFSK modulation EUT On Side
7439.258	41.4	14.6	1.0	27.0	3.0	0.0	Horz	PK	0.0	56.0	74.0	-18.0	High channel, 2480MHz, GFSK modulation EUT Vert
7440.367	40.8	14.6	1.0	27.0	3.0	0.0	Vert	PK	0.0	55.4	74.0	-18.6	High channel, 2480MHz, GFSK modulation EUT Horz
19215.740	34.1	0.7	1.6	212.0	3.0	2.0	Vert	AV	0.0	36.8	54.0	-17.2	Low channel, 2402MHz, GFSK modulation EUT Vert
19213.870	34.1	0.7	1.6	240.0	3.0	2.0	Horz	AV	0.0	36.8	54.0	-17.2	Low channel, 2402MHz, GFSK modulation EUT Horz
12398.750	32.8	1.9	1.0	268.0	3.0	2.0	Horz	AV	0.0	36.7	54.0	-17.3	High channel, 2480MHz, GFSK modulation EUT Horz
12398.780	32.2	1.9	1.0	243.0	3.0	2.0	Vert	AV	0.0	36.1	54.0	-17.9	High channel, 2480MHz, GFSK modulation EUT Vert
12210.890	32.1	1.2	3.1	270.0	3.0	2.0	Horz	AV	0.0	35.3	54.0	-18.7	Mid channel, 2442MHz, GFSK modulation EUT Horz
4959.292	44.8	7.8	1.0	265.0	3.0	0.0	Horz	PK	0.0	52.6	74.0	-21.4	High channel, 2480MHz, GFSK modulation EUT Horz
12208.750	29.0	1.2	2.0	234.0	3.0	2.0	Vert	AV	0.0	32.2	54.0	-21.8	Mid channel, 2442MHz, GFSK modulation EUT Vert
4959.842	41.4	7.8	1.0	354.0	3.0	0.0	Vert	PK	0.0	49.2	74.0	-24.8	High channel, 2480MHz, GFSK modulation EUT Vert
4803.250	41.4	7.5	1.0	322.0	3.0	0.0	Horz	PK	0.0	48.9	74.0	-25.1	Low channel, 2402MHz, GFSK modulation EUT Horz
4803.475	41.3	7.5	1.0	77.0	3.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	Low channel, 2402MHz, GFSK modulation EUT Vert
12008.870	27.7	0.1	1.0	360.0	3.0	2.0	Horz	AV	0.0	29.8	54.0	-24.2	Low channel, 2402MHz, GFSK modulation EUT Horz
4884.158	39.8	7.7	1.0	270.0	3.0	0.0	Horz	PK	0.0	47.5	74.0	-26.5	Mid channel, 2442MHz, GFSK modulation EUT Horz
12007.840	27.3	0.1	1.0	86.0	3.0	2.0	Vert	AV	0.0	29.4	54.0	-24.6	Low channel, 2402MHz, GFSK modulation EUT Vert
4883.767	38.4	7.7	1.0	11.0	3.0	0.0	Vert	PK	0.0	46.1	74.0	-27.9	Mid channel, 2442MHz, GFSK modulation EUT Vert
19215.990	44.9	0.7	1.6	240.0	3.0	0.0	Horz	PK	0.0	45.6	74.0	-28.4	Low channel, 2402MHz, GFSK modulation EUT Horz
19216.200	44.4	0.7	1.6	212.0	3.0	0.0	Vert	PK	0.0	45.1	74.0	-28.9	Low channel, 2402MHz, GFSK modulation EUT Vert

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	Duty Cycle Correction (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12398.370	42.3	1.9	1.0	268.0	3.0	0.0	Horz	PK	0.0	44.2	74.0	-29.8	High channel, 2480MHz, GFSK modulation EUT Horz
12398.530	42.2	1.9	1.0	243.0	3.0	0.0	Vert	PK	0.0	44.1	74.0	-29.9	High channel, 2480MHz, GFSK modulation EUT Vert
12211.280	41.5	1.2	3.1	270.0	3.0	0.0	Horz	PK	0.0	42.7	74.0	-31.3	Mid channel, 2442MHz, GFSK modulation EUT Horz
12208.880	39.2	1.2	2.0	234.0	3.0	0.0	Vert	PK	0.0	40.4	74.0	-33.6	Mid channel, 2442MHz, GFSK modulation EUT Vert
12007.680	37.7	0.1	1.0	360.0	3.0	0.0	Horz	PK	0.0	37.8	74.0	-36.2	Low channel, 2402MHz, GFSK modulation EUT Horz
12012.480	37.6	0.1	1.0	86.0	3.0	0.0	Vert	PK	0.0	37.7	74.0	-36.3	Low channel, 2402MHz, GFSK modulation EUT Vert

<b>Work Order:</b>	PAYR0003	<b>Date:</b>	03/10/16	
<b>Project:</b>	None	<b>Temperature:</b>	20.6 °C	
<b>Job Site:</b>	EV01	<b>Humidity:</b>	43.9% RH	
<b>Serial Number:</b>	2	<b>Barometric Pres.:</b>	1007.7 mbar	
<b>EUT:</b> Blukey Module				<b>Tested by:</b> Cole Ghizzone
<b>Configuration:</b> 2				
<b>Customer:</b> Payrange				
<b>Attendees:</b> Mike Mitchell				
<b>EUT Power:</b> 3VDC				
<b>Operating Mode:</b>	Continuous BTLE Tx, reference the data comments for channel, frequency and modulation.			
<b>Deviations:</b>	None			
<b>Comments:</b>	See data comments for EUT orientation			

Test Specifications				Test Method	
FCC 15.247:2016				ANSI C63.10:2013	
<b>Run #</b>	14	<b>Test Distance (m)</b>	3	<b>Antenna Height(s)</b>	1 to 4(m)
				<b>Results</b>	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Duty Cycle Correction (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.513	30.7	-2.5	1.0	109.0	3.0	20.0	Vert	AV	2.0	50.2	54.0	-3.8	High channel, 2480MHz, GFSK modulation EUT On Side
2484.670	30.5	-2.5	1.0	76.0	3.0	20.0	Horz	AV	2.0	50.0	54.0	-4.0	High channel, 2480MHz, GFSK modulation EUT On Side
2484.750	30.4	-2.5	1.0	96.0	3.0	20.0	Horz	AV	2.0	49.9	54.0	-4.1	High channel, 2480MHz, GFSK modulation EUT Vert
2483.543	30.4	-2.5	1.0	261.0	3.0	20.0	Vert	AV	2.0	49.9	54.0	-4.1	High channel, 2480MHz, GFSK modulation EUT Vert
2388.523	30.5	-2.7	2.5	0.0	3.0	20.0	Horz	AV	2.0	49.8	54.0	-4.2	Low channel, 2402MHz, GFSK modulation EUT On Side
2484.330	30.3	-2.5	3.7	225.0	3.0	20.0	Vert	AV	2.0	49.8	54.0	-4.2	High channel, 2480MHz, GFSK modulation EUT Horz
2483.833	30.3	-2.5	1.0	104.0	3.0	20.0	Horz	AV	2.0	49.8	54.0	-4.2	High channel, 2480MHz, GFSK modulation EUT Horz
2389.220	30.4	-2.7	1.0	360.0	3.0	20.0	Vert	AV	2.0	49.7	54.0	-4.3	Low channel, 2402MHz, GFSK modulation EUT On Side
2389.100	42.0	-2.7	2.5	0.0	3.0	20.0	Horz	PK	0.0	59.3	74.0	-14.7	Low channel, 2402MHz, GFSK modulation EUT On Side
2484.160	41.8	-2.5	1.0	109.0	3.0	20.0	Vert	PK	0.0	59.3	74.0	-14.7	High channel, 2480MHz, GFSK modulation EUT On Side
2389.893	41.8	-2.7	1.0	360.0	3.0	20.0	Vert	PK	0.0	59.1	74.0	-14.9	Low channel, 2402MHz, GFSK modulation EUT On Side
2484.240	41.6	-2.5	1.0	96.0	3.0	20.0	Horz	PK	0.0	59.1	74.0	-14.9	High channel, 2480MHz, GFSK modulation EUT Vert
2484.483	41.5	-2.5	1.0	104.0	3.0	20.0	Horz	PK	0.0	59.0	74.0	-15.0	High channel, 2480MHz, GFSK modulation EUT Horz
2483.503	41.5	-2.5	1.0	261.0	3.0	20.0	Vert	PK	0.0	59.0	74.0	-15.0	High channel, 2480MHz, GFSK modulation EUT Vert
2484.613	41.4	-2.5	3.7	225.0	3.0	20.0	Vert	PK	0.0	58.9	74.0	-15.1	High channel, 2480MHz, GFSK modulation EUT Horz
2483.823	41.3	-2.5	1.0	76.0	3.0	20.0	Horz	PK	0.0	58.8	74.0	-15.2	High channel, 2480MHz, GFSK modulation EUT On Side

# 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 (mo)
Attenuator	S.M. Electronics	SA18N-06/SM4032	REE	10/1/2015	12
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Power Sensor	Gigatronics	80701A	SPL	5/25/2015	12
Meter - Power	Gigatronics	8651A	SPM	5/25/2015	12
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AWU	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	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 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 may have been used during some of the other tests in this report to only take the measurement during the burst duration.

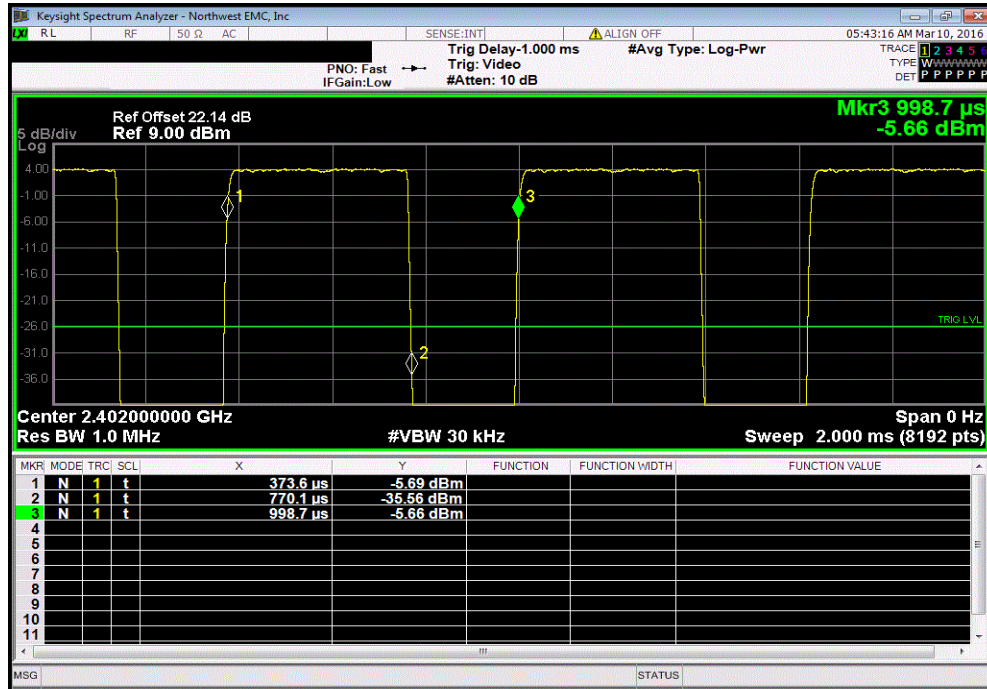
## DUTY CYCLE

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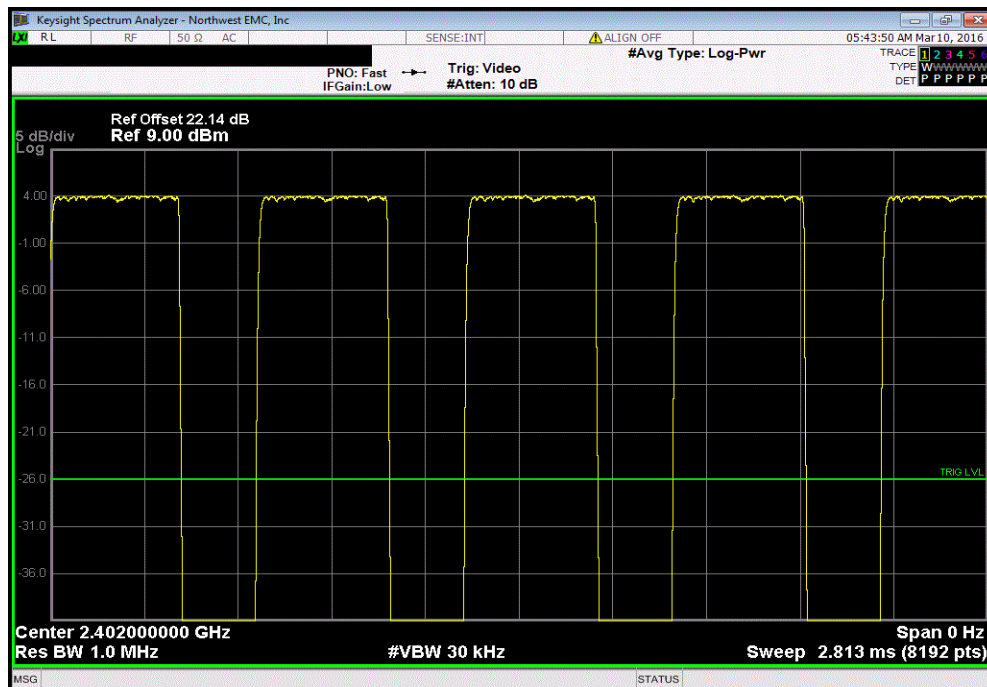
<b>EUT:</b> Blukey Module						<b>Work Order:</b> PAYR0003	
<b>Serial Number:</b> 1						<b>Date:</b> 03/09/16	
<b>Customer:</b> Payrange						<b>Temperature:</b> 23.3°C	
<b>Attendees:</b> Mike Mitchell, Chris Vondracek						<b>Humidity:</b> 40%	
<b>Project:</b> None						<b>Barometric Pres.:</b> 1014.8	
<b>Tested by:</b> Cole Ghizzone, Rod Peloquin				<b>Power:</b> 3.3VDC	<b>Job Site:</b> EV06		
<b>TEST SPECIFICATIONS</b>				<b>Test Method</b>			
FCC 15.247:2016				ANSI C63.10:2013			
<b>COMMENTS</b>							
None							
<b>DEVIATIONS FROM TEST STANDARD</b>							
None							
<b>Configuration #</b>	1	Signature 					
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
BLE/GFSK Low Channel, 2402 MHz	396.5 us	625.1 us	1	63.4	N/A	N/A	
BLE/GFSK Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A	
BLE/GFSK Mid Channel, 2442 MHz	396.5 us	625.1 us	1	63.4	N/A	N/A	
BLE/GFSK Mid Channel, 2442 MHz	N/A	N/A	5	N/A	N/A	N/A	
BLE/GFSK High Channel, 2480 MHz	396.3 us	624.8 us	1	63.4	N/A	N/A	
BLE/GFSK High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A	

# DUTY CYCLE

BLE/GFSK Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
396.5 us	625.1 us	1	63.4	N/A	N/A	



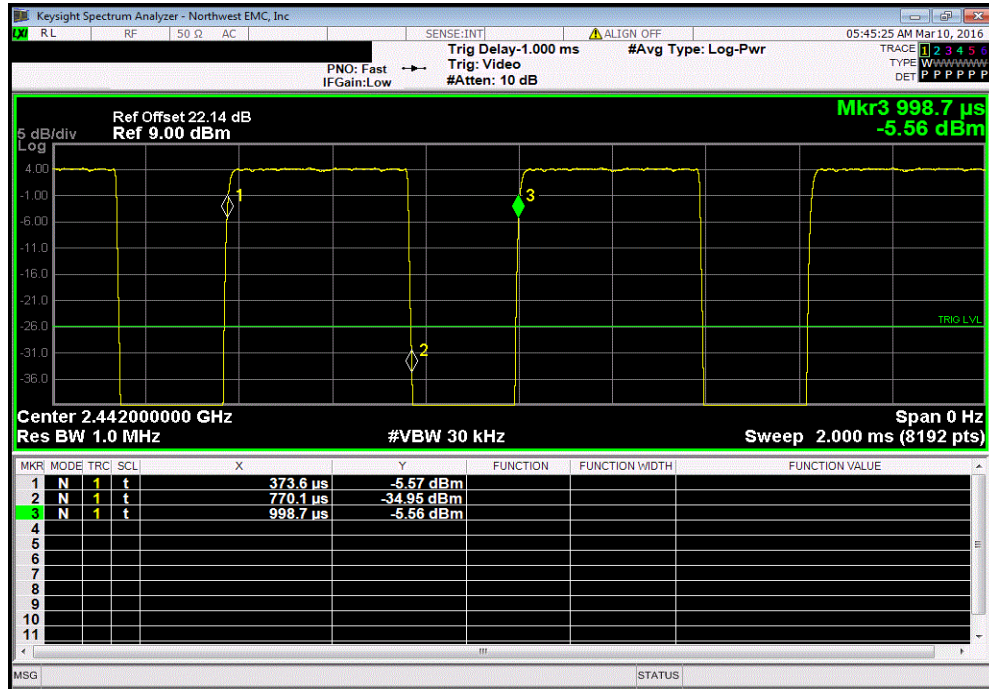
BLE/GFSK Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	



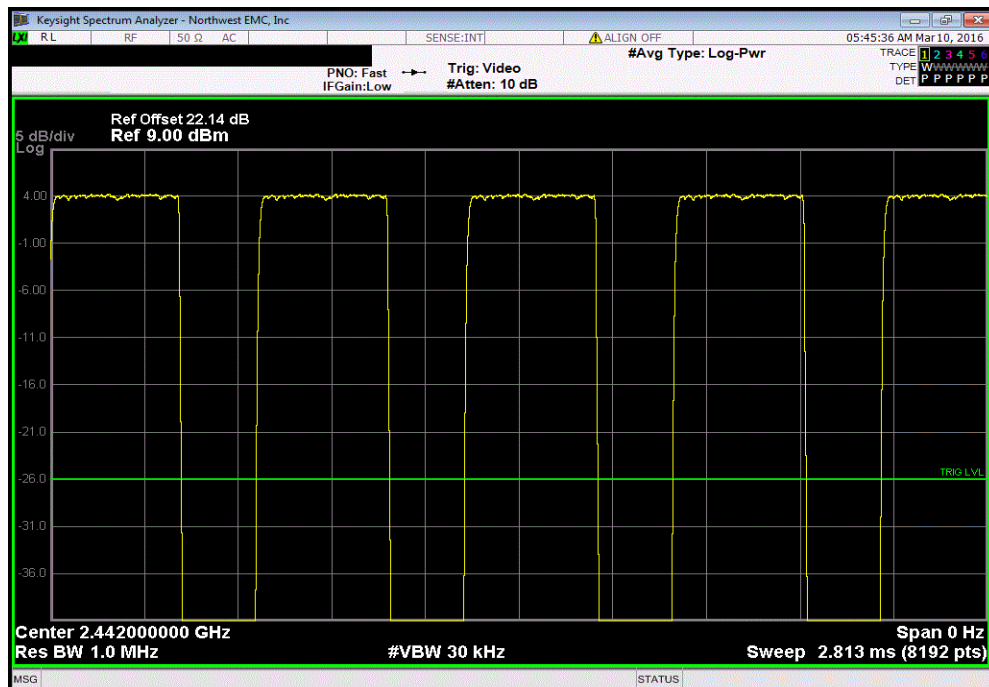


# DUTY CYCLE

BLE/GFSK Mid Channel, 2442 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
396.5 us	625.1 us	1	63.4	N/A	N/A	

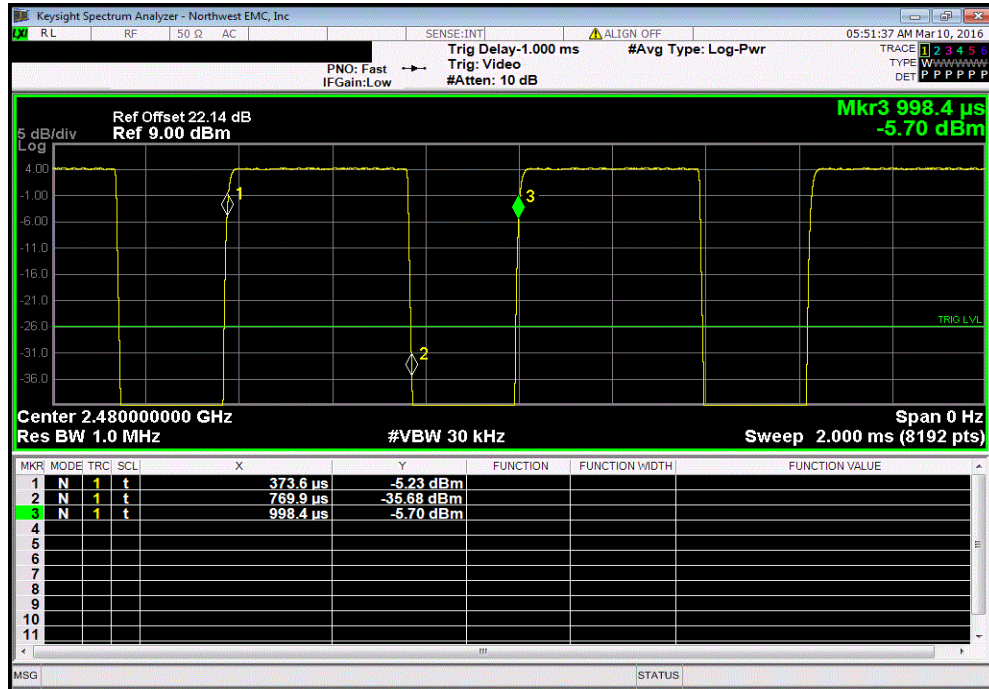


BLE/GFSK Mid Channel, 2442 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

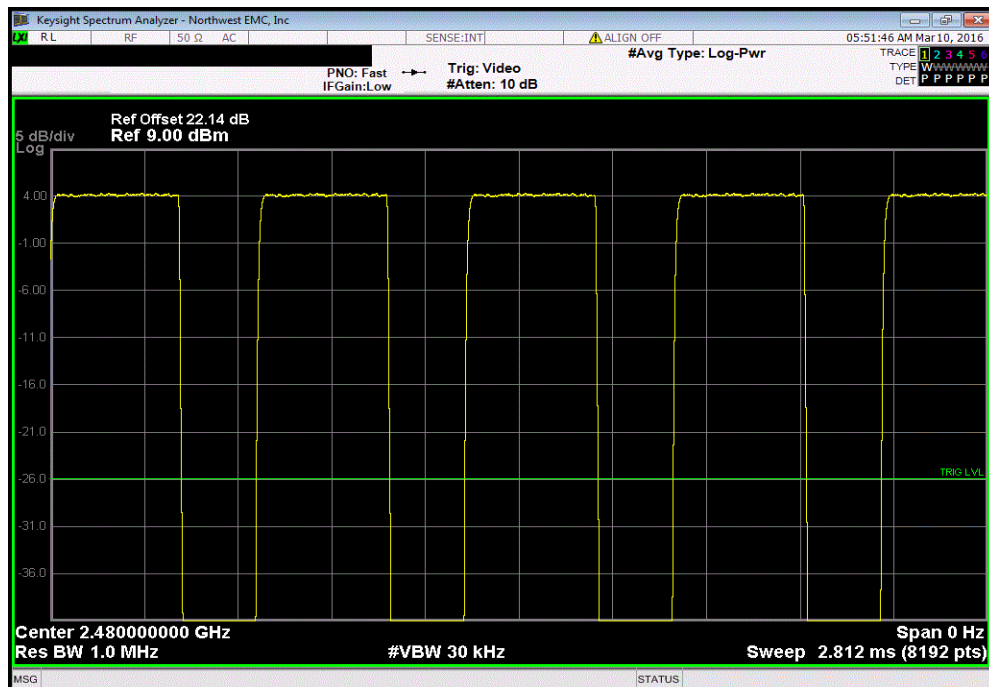


# DUTY CYCLE

BLE/GFSK High Channel, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
396.3 $\mu$ s	624.8 $\mu$ s	1	63.4	N/A	N/A	



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



# 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

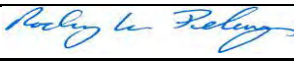
Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Attenuator	S.M. Electronics	SA18N-06/SM4032	REE	10/1/2015	12
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Power Sensor	Gigatronics	80701A	SPL	5/25/2015	12
Meter - Power	Gigatronics	8651A	SPM	5/25/2015	12
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AWU	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	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.

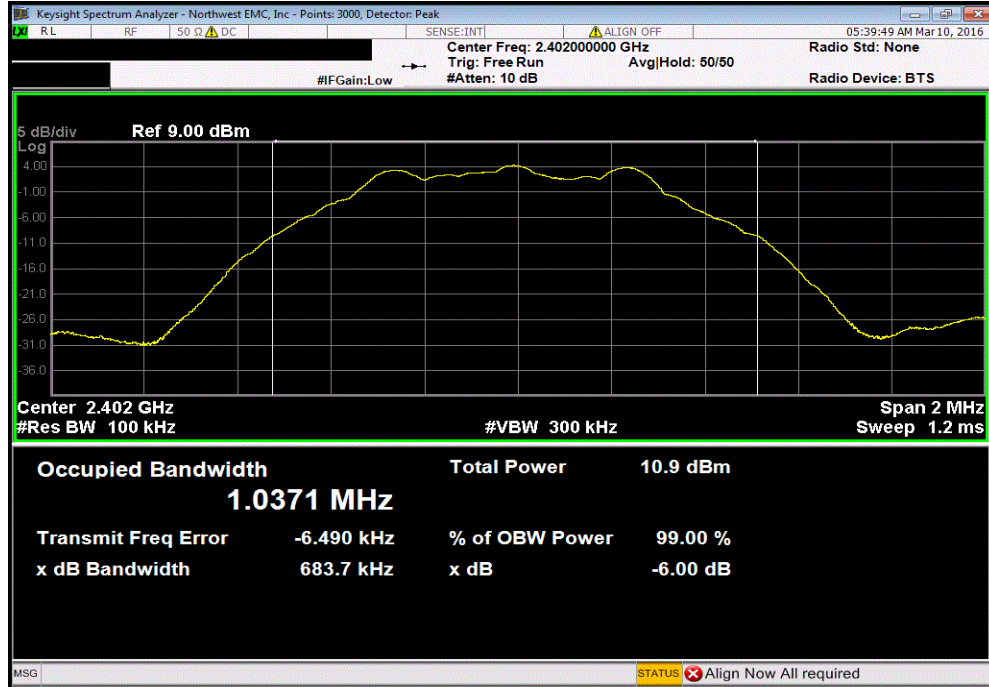
The EUT was set to the channels and modes listed in the datasheet. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer.

# OCCUPIED BANDWIDTH

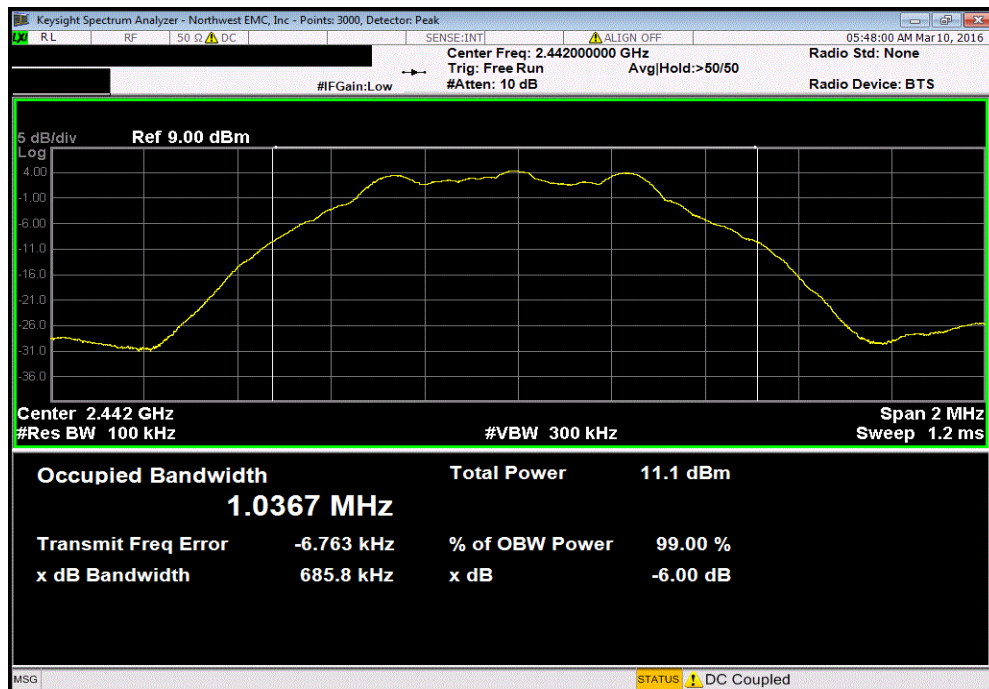
EUT: Blukey Module		Work Order: PAYR0003	
Serial Number: 1		Date: 03/09/16	
Customer: Payrange		Temperature: 23.3°C	
Attendees: Mike Mitchell, Chris Vondracheck		Humidity: 40%	
Project: None		Barometric Pres.: 1014.8	
Tested by: Cole Ghizzone, Rod Peloquin		Power: 3.3VDC	
Job Site: EV06			
TEST SPECIFICATIONS			
FCC 15.247:2016		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value	Limit (±) Result
BLE/GFSK Low Channel, 2402 MHz		683.684 kHz	500 kHz Pass
BLE/GFSK Mid Channel, 2442 MHz		685.823 kHz	500 kHz Pass
BLE/GFSK High Channel, 2480 MHz		694.301 kHz	500 kHz Pass

# OCCUPIED BANDWIDTH

BLE/GFSK Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				683.684 kHz	500 kHz	Pass

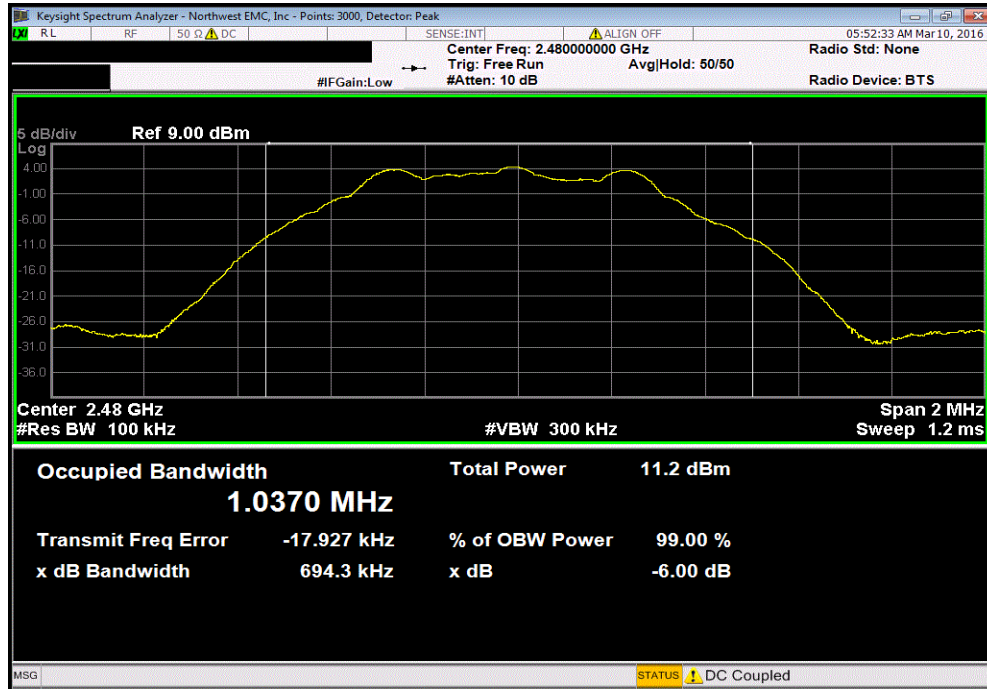


BLE/GFSK Mid Channel, 2442 MHz						
				Value	Limit (≥)	Result
				685.823 kHz	500 kHz	Pass



# OCCUPIED BANDWIDTH

BLE/GFSK High Channel, 2480 MHz						
Value				Limit	Result	
694.301 kHz				500 kHz	Pass	



# OUTPUT POWER

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Attenuator	S.M. Electronics	SA18N-06/SM4032	REE	10/1/2015	12
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Power Sensor	Gigatronics	80701A	SPL	5/25/2015	12
Meter - Power	Gigatronics	8651A	SPM	5/25/2015	12
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AWU	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

## TEST DESCRIPTION

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

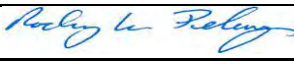
Prior to measuring peak transmit power the DTS bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see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

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

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

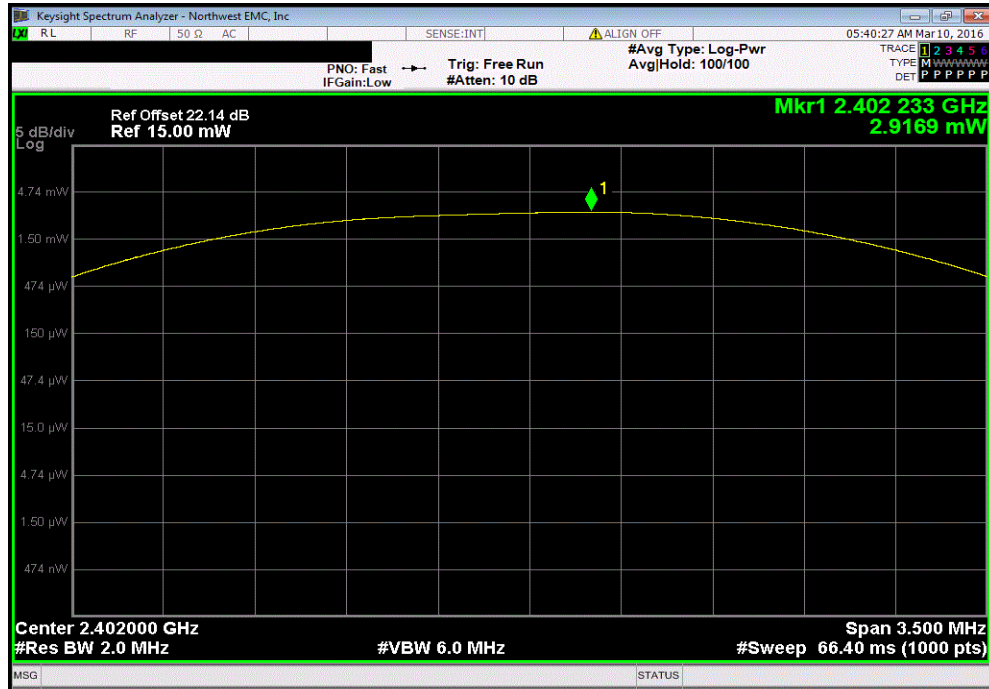


# OUTPUT POWER

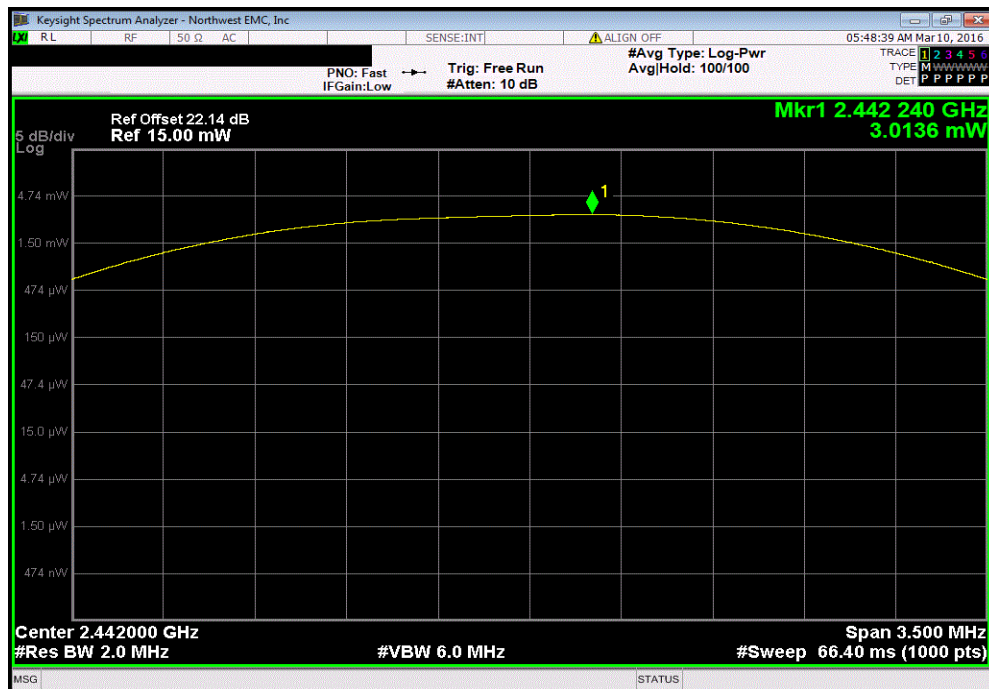
EUT: Blukey Module		Work Order: PAYR0003	
Serial Number: 1		Date: 03/09/16	
Customer: Payrange		Temperature: 23.3°C	
Attendees: Mike Mitchell, Chris Vondracheck		Humidity: 40%	
Project: None		Barometric Pres.: 1014.8	
Tested by: Cole Ghizzone, Rod Peloquin		Power: 3.3VDC	
Job Site: EV06			
TEST SPECIFICATIONS			
FCC 15.247:2016		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value	Limit (<)
BLE/GFSK Low Channel, 2402 MHz		2.917 mW	1 W
BLE/GFSK Mid Channel, 2442 MHz		3.014 mW	1 W
BLE/GFSK High Channel, 2480 MHz		3.068 mW	1 W
			Result
			Pass
			Pass
			Pass

# OUTPUT POWER

BLE/GFSK Low Channel, 2402 MHz						
				Value	Limit (<)	Result
				2.917 mW	1 W	Pass

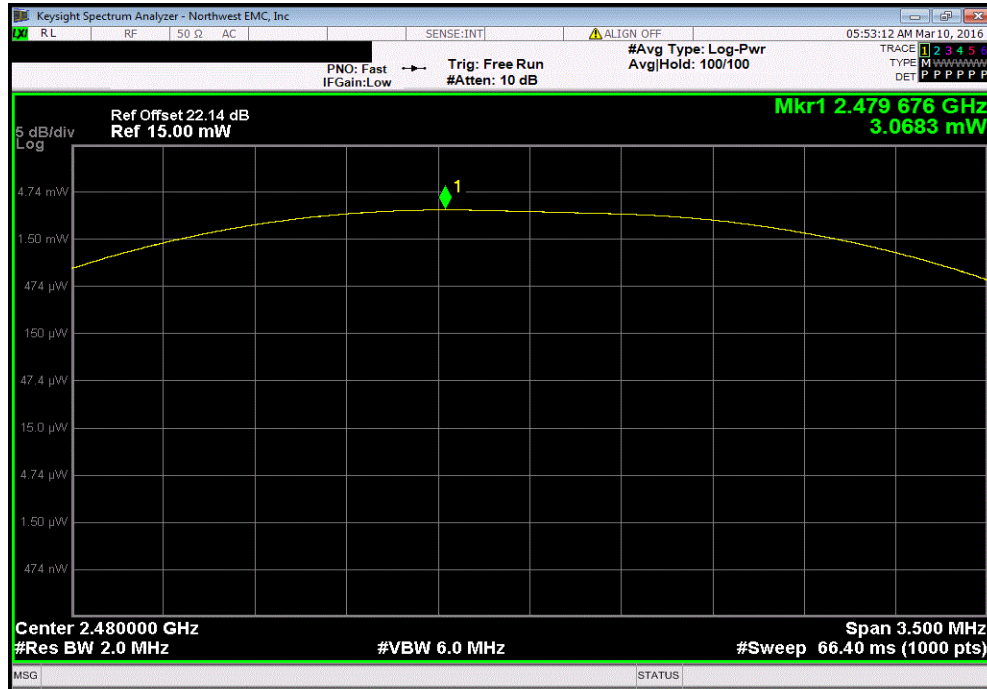


BLE/GFSK Mid Channel, 2442 MHz						
				Value	Limit (<)	Result
				3.014 mW	1 W	Pass



# OUTPUT POWER

BLE/GFSK High Channel, 2480 MHz						
				Value	Limit (<)	Result
				3.068 mW	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 (mo)
Attenuator	S.M. Electronics	SA18N-06/SM4032	REE	10/1/2015	12
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Power Sensor	Gigatronics	80701A	SPL	5/25/2015	12
Meter - Power	Gigatronics	8651A	SPM	5/25/2015	12
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AWU	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12


## TEST DESCRIPTION

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

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

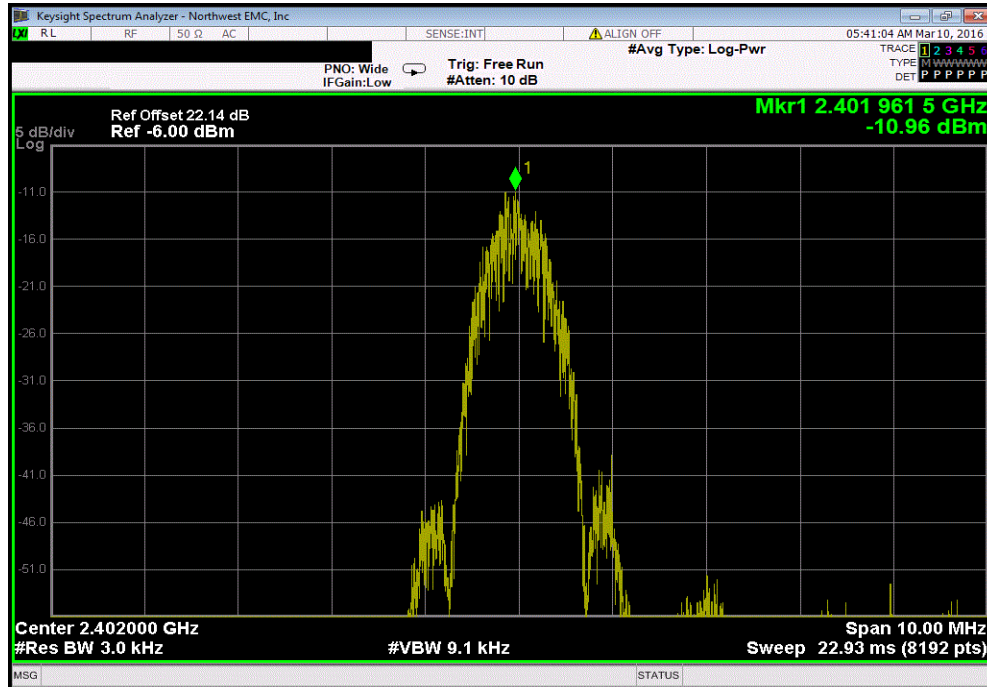
Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

# POWER SPECTRAL DENSITY

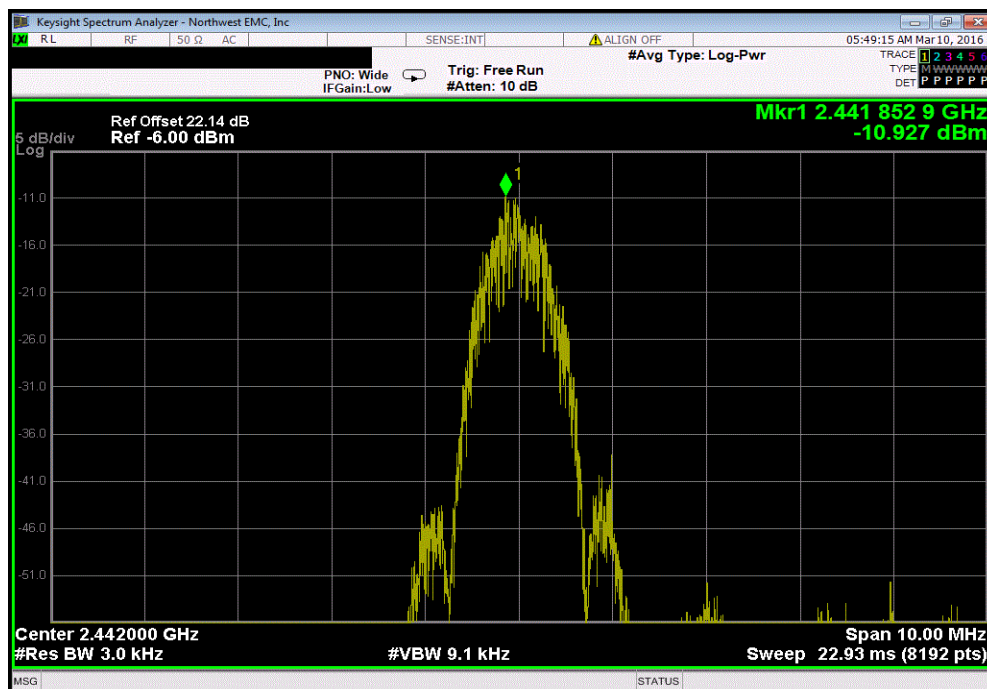
EUT: Blukey Module		Work Order: PAYR0003	
Serial Number: 1		Date: 03/09/16	
Customer: Payrange		Temperature: 23.3°C	
Attendees: Mike Mitchell, Chris Vondracheck		Humidity: 40%	
Project: None		Barometric Pres.: 1014.8	
Tested by: Cole Ghizzone, Rod Peloquin		Power: 3.3VDC	
Job Site: EV06			
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2016		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value dBm/3kHz	Limit < dBm/3kHz
BLE/GFSK Low Channel, 2402 MHz		-10.957	8
BLE/GFSK Mid Channel, 2442 MHz		-10.927	8
BLE/GFSK High Channel, 2480 MHz		-10.675	8
			Results
			Pass
			Pass
			Pass

# POWER SPECTRAL DENSITY

BLE/GFSK Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-10.957	8	Pass

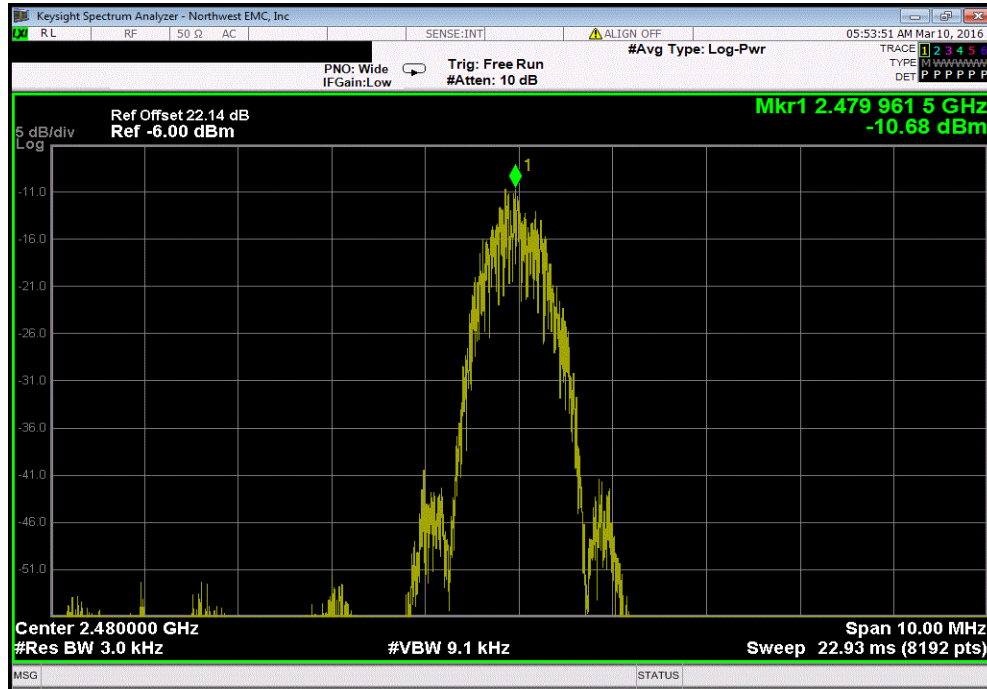


BLE/GFSK Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-10.927	8	Pass



# POWER SPECTRAL DENSITY

BLE/GFSK High Channel, 2480 MHz						
				Value	Limit	Results
				dBm/3kHz	< dBm/3kHz	
				-10.675	8	Pass



# BAND EDGE COMPLIANCE

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Attenuator	S.M. Electronics	SA18N-06/SM4032	REE	10/1/2015	12
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Power Sensor	Gigatronics	80701A	SPL	5/25/2015	12
Meter - Power	Gigatronics	8651A	SPM	5/25/2015	12
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AWU	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	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.

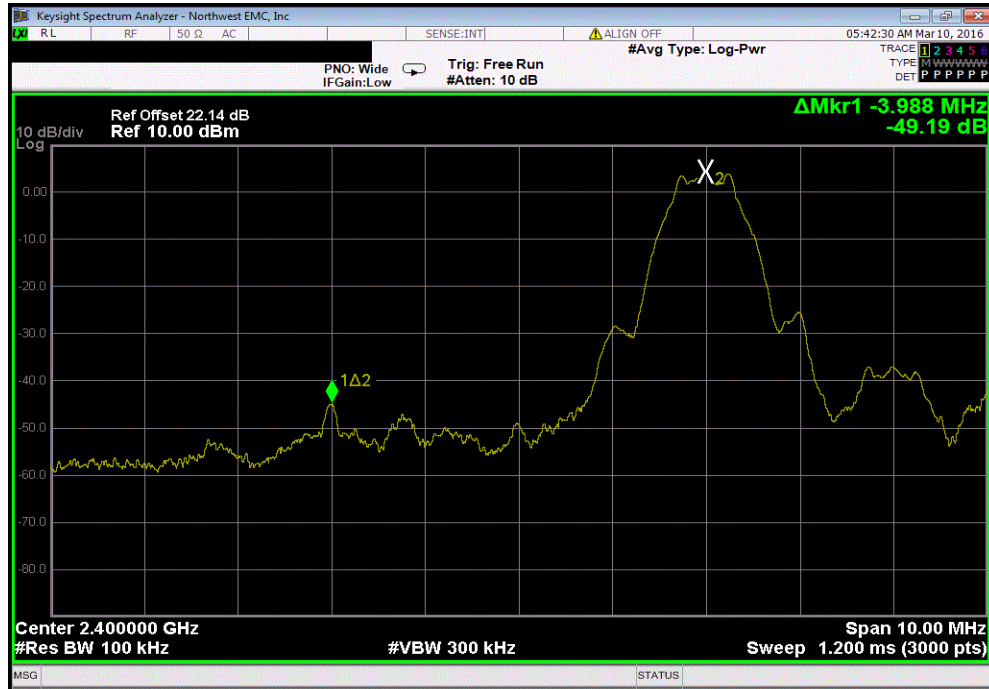


# BAND EDGE COMPLIANCE

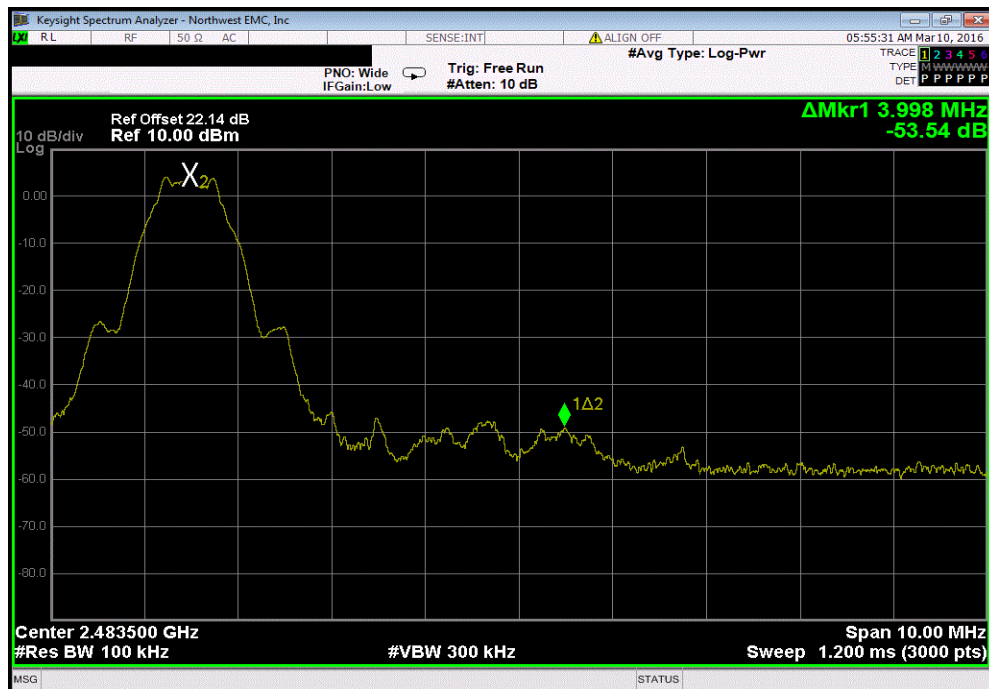
EUT: Blukey Module		Work Order: PAYR0003	
Serial Number: 1		Date: 03/09/16	
Customer: Payrange		Temperature: 23.3°C	
Attendees: Mike Mitchell, Chris Vondracheck		Humidity: 40%	
Project: None		Barometric Pres.: 1014.8	
Tested by: Cole Ghizzone, Rod Peloquin		Power: 3.3VDC	
Job Site: EV06			
TEST SPECIFICATIONS			
FCC 15.247:2016		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value (dBc)	Limit ≤ (dBc) Result
BLE/GFSK Low Channel, 2402 MHz		-49.19	-20 Pass
BLE/GFSK High Channel, 2480 MHz		-53.54	-20 Pass

# BAND EDGE COMPLIANCE

BLE/GFSK Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-49.19	-20	Pass



BLE/GFSK High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-53.54	-20	Pass



# SPURIOUS CONDUCTED EMISSIONS

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

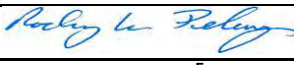
## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Attenuator	S.M. Electronics	SA18N-06/SM4032	REE	10/1/2015	12
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Power Sensor	Gigatronics	80701A	SPL	5/25/2015	12
Meter - Power	Gigatronics	8651A	SPM	5/25/2015	12
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AWU	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

## TEST DESCRIPTION

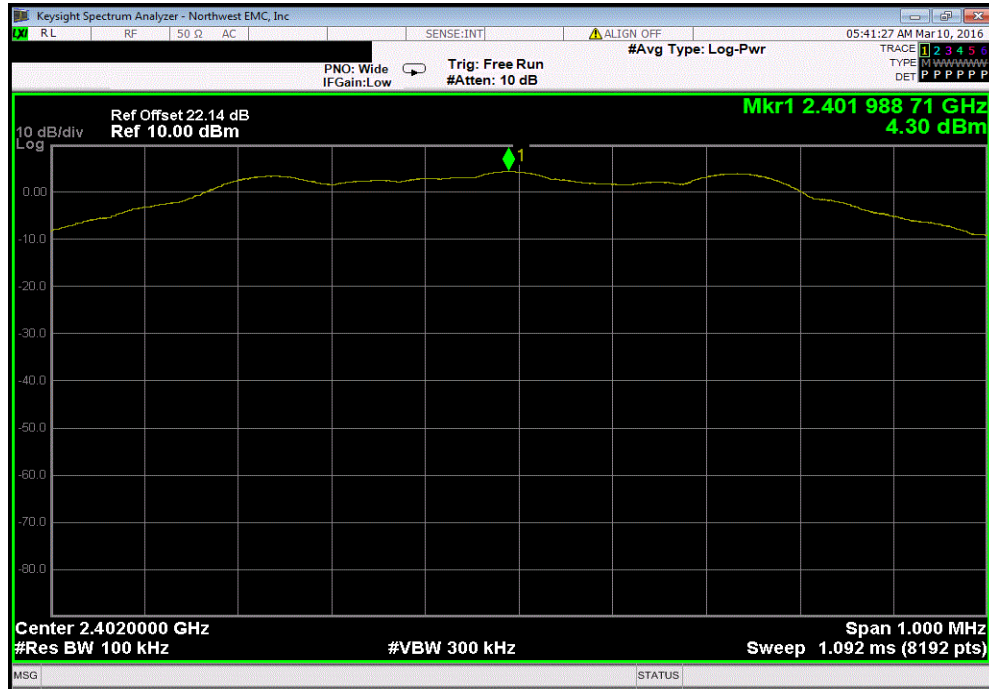
The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the data rate(s) listed in the datasheet. For each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

# SPURIOUS CONDUCTED EMISSIONS

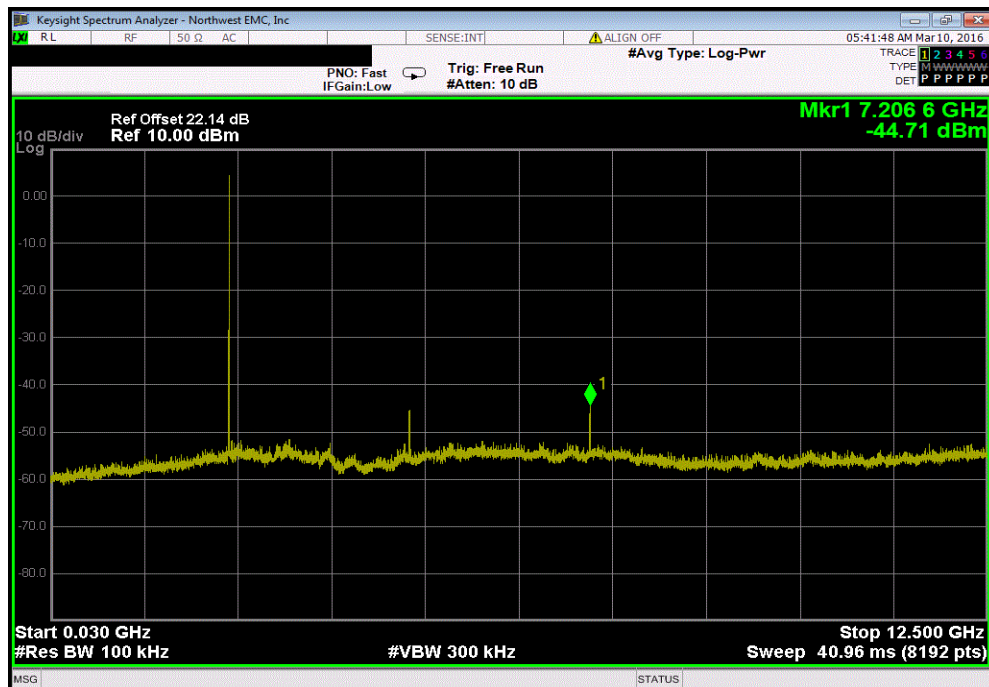
EUT: Blukey Module		Work Order: PAYR0003	
Serial Number: 1		Date: 03/09/16	
Customer: Payrange		Temperature: 23.3°C	
Attendees: Mike Mitchell, Chris Vondracheck		Humidity: 40%	
Project: None		Barometric Pres.: 1014.8	
Tested by: Cole Ghizzone, Rod Peloquin		Power: 3.3VDC	
Job Site: EV06			
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2016		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
	Frequency Range	Max Value (dBc)	Limit ≤ (dBc) Result
BLE/GFSK Low Channel, 2402 MHz	Fundamental	N/A	N/A N/A
BLE/GFSK Low Channel, 2402 MHz	30 MHz - 12.5 GHz	-49.01	-20 Pass
BLE/GFSK Low Channel, 2402 MHz	12.5 GHz - 25 GHz	-42.65	-20 Pass
BLE/GFSK Mid Channel, 2442 MHz	Fundamental	N/A	N/A N/A
BLE/GFSK Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	-47.14	-20 Pass
BLE/GFSK Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	-42.3	-20 Pass
BLE/GFSK High Channel, 2480 MHz	Fundamental	N/A	N/A N/A
BLE/GFSK High Channel, 2480 MHz	30 MHz - 12.5 GHz	-44.76	-20 Pass
BLE/GFSK High Channel, 2480 MHz	12.5 GHz - 25 GHz	-42	-20 Pass

# SPURIOUS CONDUCTED EMISSIONS

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

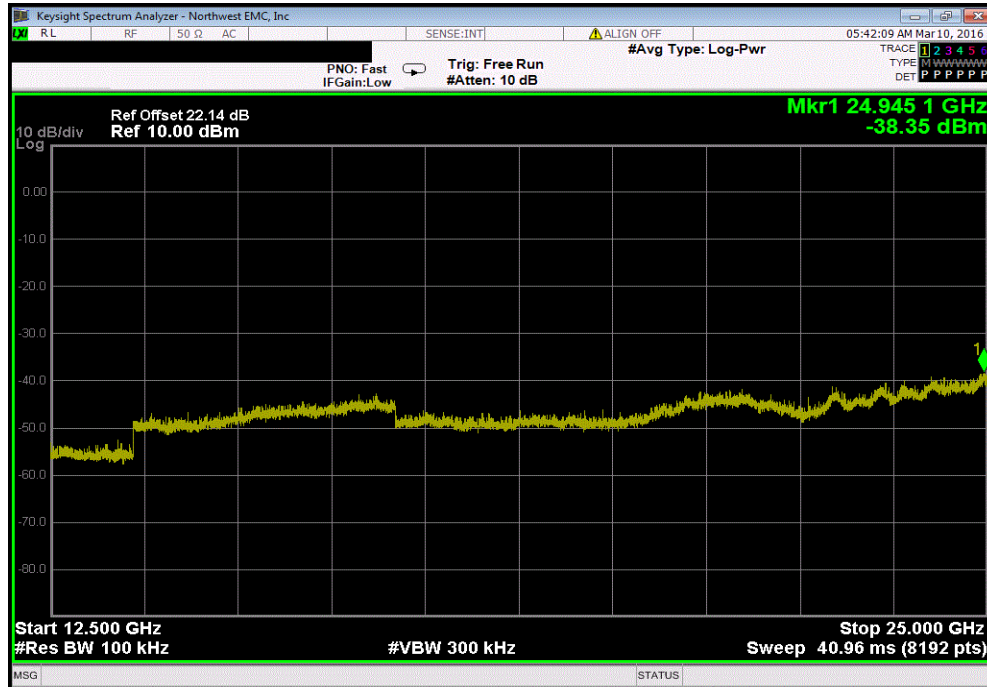


BLE/GFSK Low Channel, 2402 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-49.01		-20	Pass	

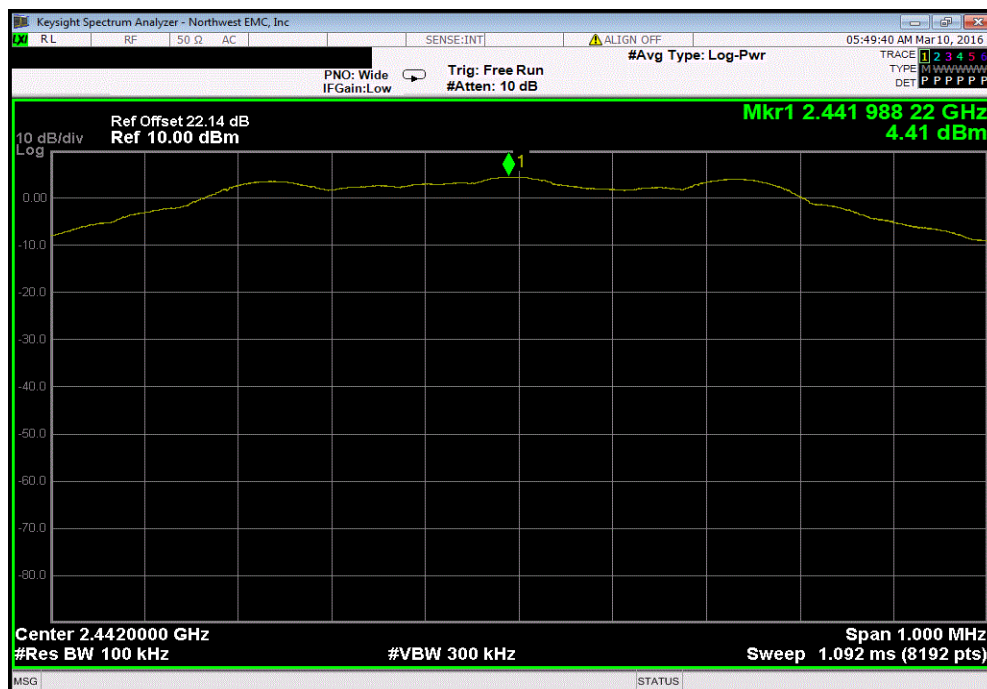


# SPURIOUS CONDUCTED EMISSIONS

BLE/GFSK Low Channel, 2402 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-42.65	-20	Pass	

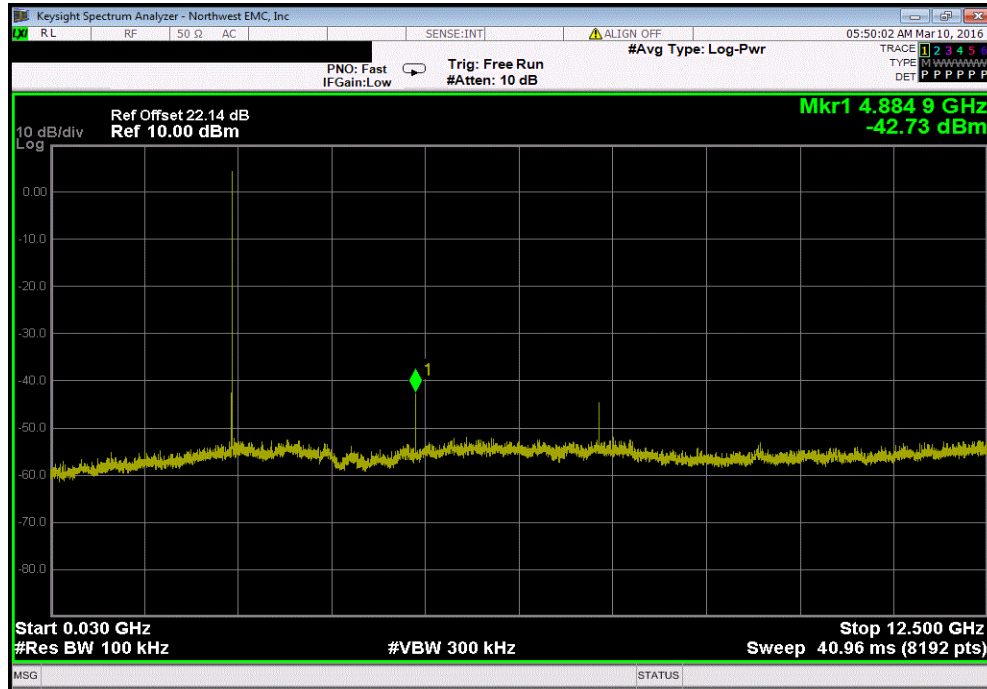


BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

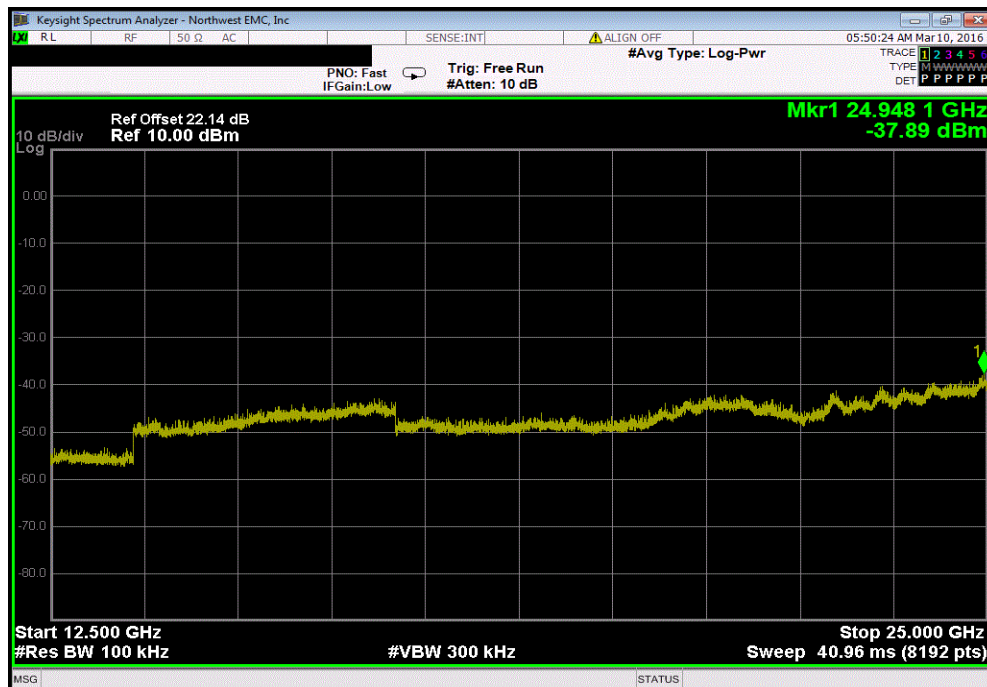


# SPURIOUS CONDUCTED EMISSIONS

BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-47.14	-20	Pass	



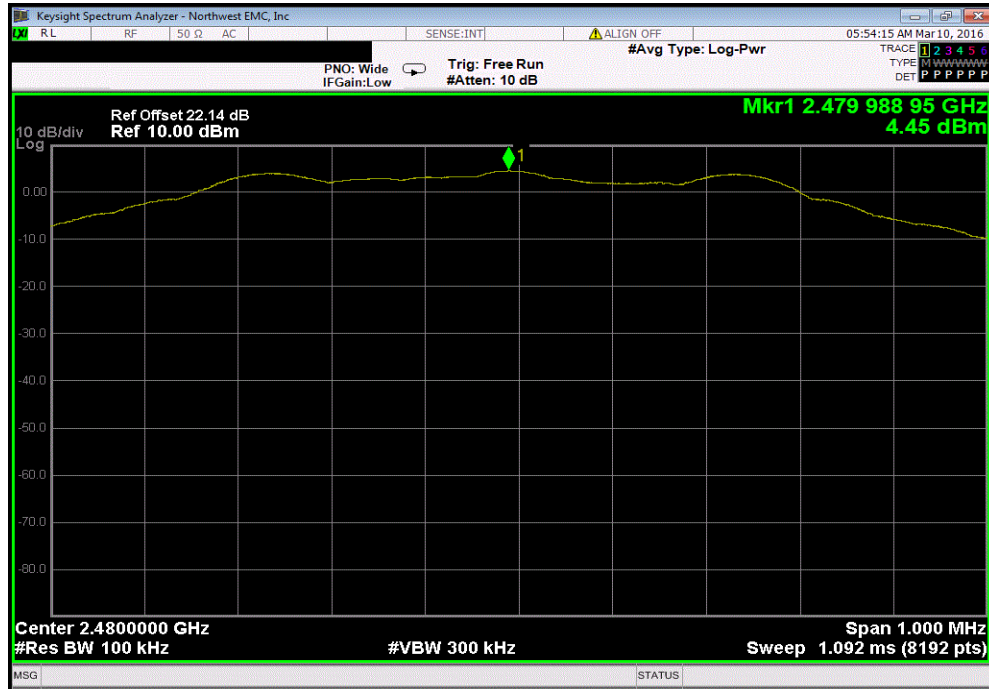
BLE/GFSK Mid Channel, 2442 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-42.3	-20	Pass	



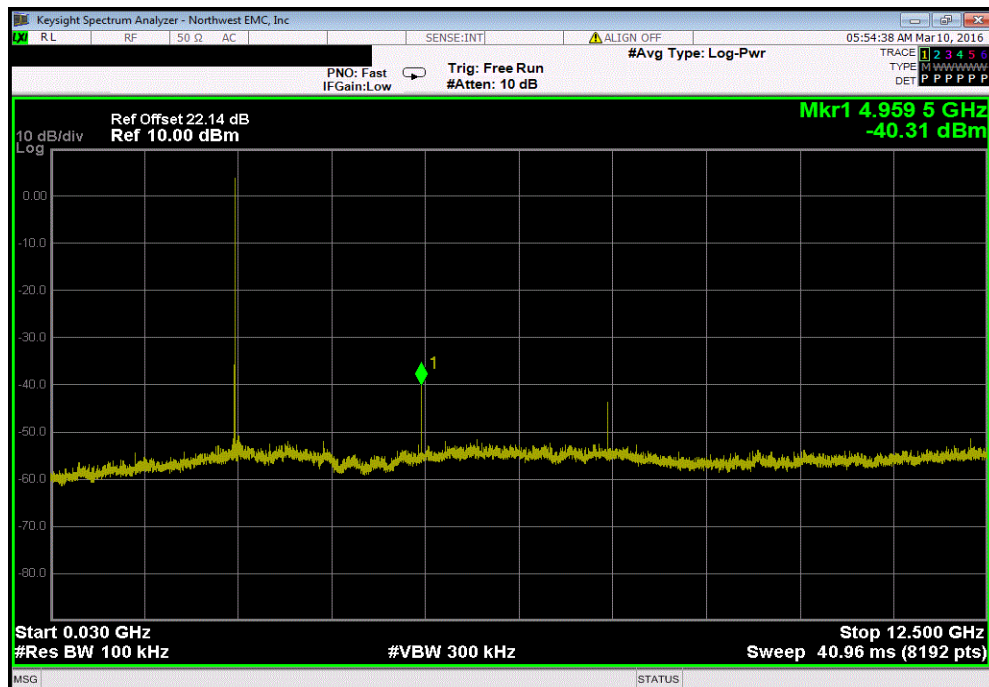


# SPURIOUS CONDUCTED EMISSIONS

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



BLE/GFSK High Channel, 2480 MHz						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-44.76		-20	Pass	





SPURIOUS CONDUCTED EMISSIONS

BLE/GFSK High Channel, 2480 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-42	-20	Pass	

