

NORTHWEST EMC

PayRange Inc.

BluKey Modem in BluKey and BluKey USB Hosts

FCC 15.207:2016

FCC 15.247:2016

Bluetooth Radio Module

Report # PAYR0010.3



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: July 19, 2016

PayRange Inc.

Model: BluKey Modem in BluKey and BluKey USB Hosts

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	No	N/A	Completed for LMA under PAYR0005.1
11.8.2	Occupied Bandwidth	No	N/A	Completed for LMA under PAYR0005.1
11.9.2.2.4	Output Power	No	N/A	Completed for LMA under PAYR0005.1
11.10.2	Power Spectral Density	No	N/A	Completed for LMA under PAYR0005.1
11.11	Band Edge Compliance	No	N/A	Completed for LMA under PAYR0005.1
11.11	Spurious Conducted Emissions	No	N/A	Completed for LMA under PAYR0005.1

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

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 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

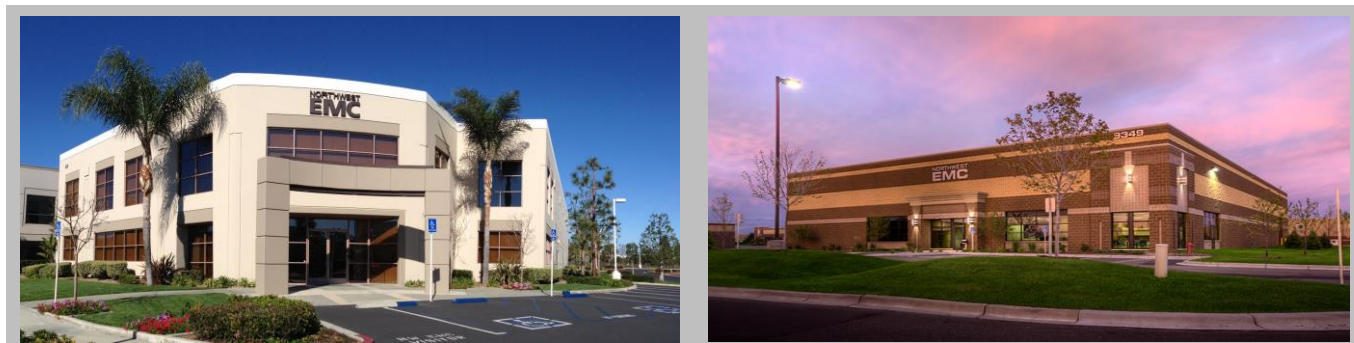
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement 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 QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty ($K=2$) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

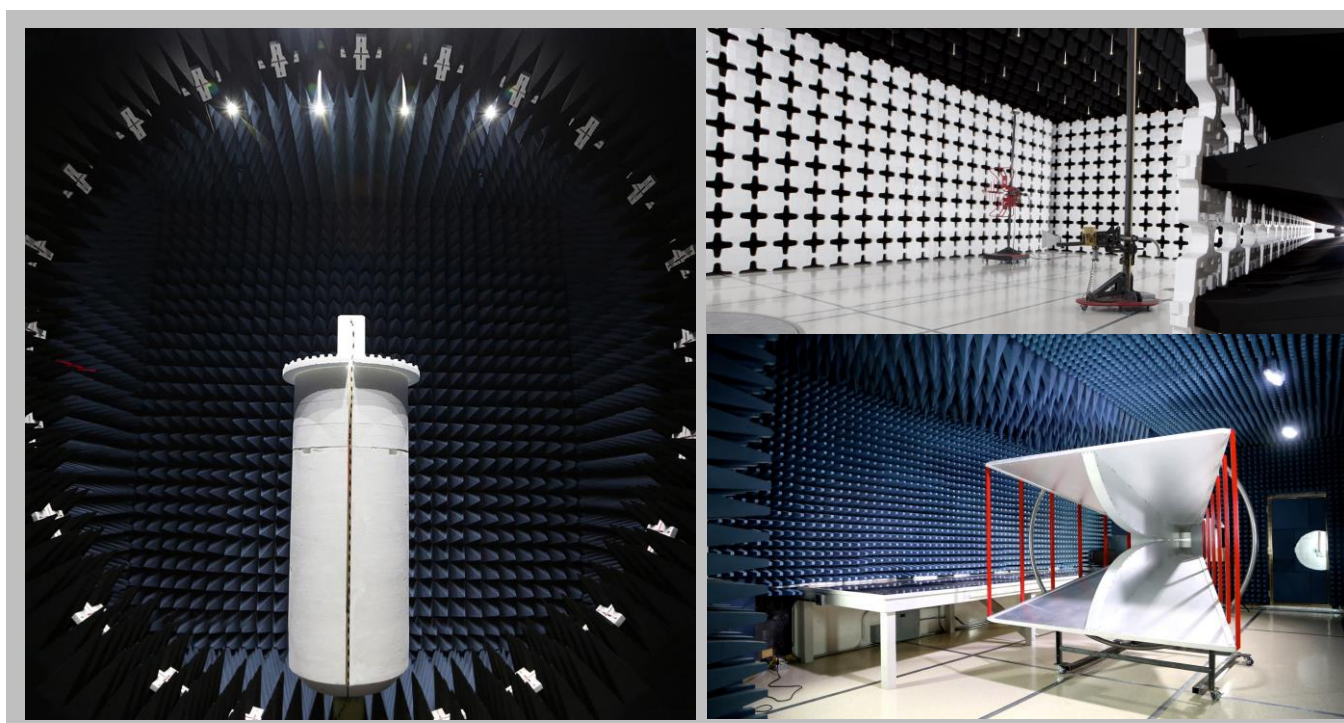
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

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

FACILITIES



California Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Oregon Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	PayRange Inc.
Address:	919 SW Taylor St. Suite 500
City, State, Zip:	Portland, OR 97205
Test Requested By:	Mike Mitchell
Model:	BluKey Modem in BluKey and BluKey USB Hosts
First Date of Test:	July 12, 2016
Last Date of Test:	July 19, 2016
Receipt Date of Samples:	July 12, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

Wireless Payment Device using a Bluetooth Low Energy 4.1 radio module.

The client, Mike Mitchell of Payrange, Inc. attests that the maximum possible source based duty cycle is 20.1%. This is based upon the following:

- The Bluetooth Low Energy protocol limits transmit to 6 packets of 376uS each in a 7.5mS interval. Therefore, the maximum duty cycle is 30%.
- For compatibility reasons, the radio SoC is programmed to further limit the duty cycle to 4 packets within a 7.5ms period. Therefore, the maximum duty cycle is actually 20.1%.

The source based duty cycle correction factor is: $20 \cdot \log(0.201) = -13.9 \text{ dB}$.

Testing Objective:

To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements for a limited modular approval. Testing of the antenna port conducted direct connect requirements was completed under PAYR0005.1.

CONFIGURATIONS

Configuration PAYR0010- 1

Software/Firmware Running during test	
Description	Version
UEnergytest	2.4.4.333

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Blukey	PayRange Inc.	None	10020647

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Remote Laptop	SONY	SVE141L11L	275560833002108
CTX MDB Simulator	SEM Inc.	A00887	S041478

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
I/O Cable	No	3.5m	No	CTX MDB Simulator	Blukey

Configuration PAYR0010- 2

Software/Firmware Running during test	
Description	Version
UEnergytest	2.4.4.333

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Blukey USB	PayRange Inc.	None	15000022

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Remote Laptop	SONY	SVE141L11L	275560833002108
Power Supply Adapter	Samsung	EPTA20JWE	R37F9J66971SE3

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB Cable	Yes	1.0m	No	USB Extension	Blukey USB
USB Extension	Yes	3.0m	No	Blukey USB Cable	Power Adapter

CONFIGURATIONS

Configuration PAYR0010- 4

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Blukey	PayRange Inc.	None	10020647

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
CTX MDB Simulator	SEM Inc.	A00887	S041478
Coin acceptor	Mars Electronics	TRC-6512 MDB	119546012

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
I/O Cable	No	3.5m	No	CTX MDB Simulator	Blukey
I/O Cable	No	3.5m	No	Blukey	Coin Acceptor

Configuration PAYR0010- 6

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Blukey USB	PayRange Inc.	None	15000022

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Power Supply Adapter	Samsung	EPTA20JWE	R37F9J66971SE3

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB Cable	Yes	1.0m	No	BluKey USB	Power Adapter

CONFIGURATIONS

Configuration PAYR0010- 7

Software/Firmware Running during test					
Description				Version	
UEnergytest				2.4.4.333	

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Blukey USB	PayRange Inc.	None	15000022

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC Adapter	Sony	VGP-AC19V48	1489078112727498

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Remote Laptop	SONY	SVE141L11L	275560833002108

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.5m	No	AC Mains	AC Adapter
DC Power	No	1.7m	No	AC Adapter	Remote Laptop
USB Cable	Yes	1.0m	No	BluKey USB	Remote Laptop

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	7/12/2016	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
2	7/19/2016	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. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. 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 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. 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	ARH	3/21/2016	3/21/2017
Cable - Conducted Cable Assembly	Northwest EMC	EVG, HHD, RKA	EVGA	5/10/2016	5/10/2017
LISN	Solar Electronics	9252-50-R-24-BNC	LIP	1/27/2015	1/27/2017
LISN	Solar Electronics	9252-50-R-24-BNC	LIR	10/22/2015	10/22/2016

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

PAYR0010-4
PAYR0010-6
PAYR0010-7

MODES INVESTIGATED

On, running BKUSB, client software. Transmitting mid channel 2442 MHz
On, transmitting mid channel 2442 MHz

POWERLINE CONDUCTED EMISSIONS

EUT:	BluKey	Work Order:	PAYR0010
Serial Number:	See Configuration	Date:	07/19/2016
Customer:	PayRange Inc.	Temperature:	23.3°C
Attendees:	Mike Mitchell	Relative Humidity:	45.6%
Customer Project:	None	Bar. Pressure:	1022 mb
Tested By:	Jeff Alcoke	Job Site:	EV07
Power:	24VDC via 110VAC/60Hz	Configuration:	PAYR0010-4

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

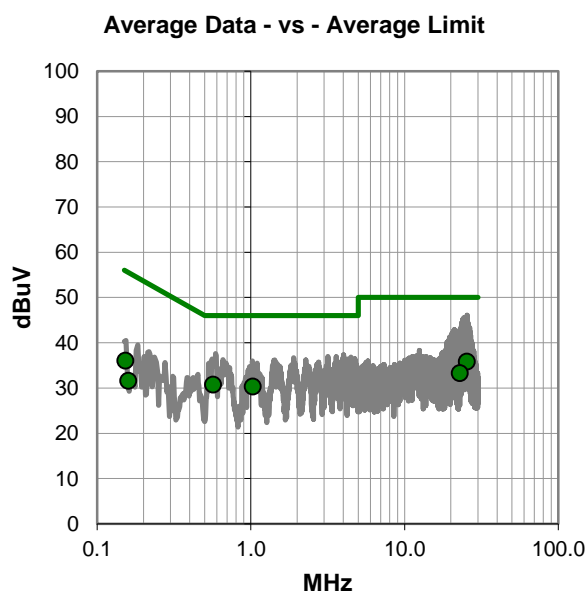
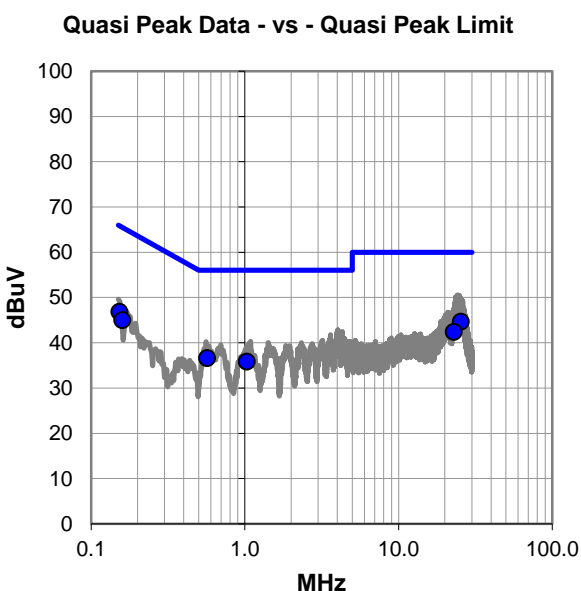
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EUT OPERATING MODES

On, transmitting mid channel 2442 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #3

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
25.505	23.6	21.0	44.6	60.0	-15.4
22.900	21.6	20.8	42.4	60.0	-17.6
0.153	26.9	19.9	46.8	65.8	-19.0
0.568	16.9	19.7	36.6	56.0	-19.4
1.029	16.0	19.8	35.8	56.0	-20.2
0.160	25.2	19.8	45.0	65.5	-20.5

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
25.505	14.8	21.0	35.8	50.0	-14.2
0.568	11.0	19.7	30.7	46.0	-15.3
1.029	10.5	19.8	30.3	46.0	-15.7
22.900	12.5	20.8	33.3	50.0	-16.7
0.153	16.1	19.9	36.0	55.8	-19.8
0.160	11.8	19.8	31.6	55.5	-23.9

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	BluKey	Work Order:	PAYR0010
Serial Number:	See Configuration	Date:	07/19/2016
Customer:	PayRange Inc.	Temperature:	23.3°C
Attendees:	Mike Mitchell	Relative Humidity:	45.6%
Customer Project:	None	Bar. Pressure:	1022 mb
Tested By:	Jeff Alcoke	Job Site:	EV07
Power:	24VDC via 110VAC/60Hz	Configuration:	PAYR0010-4

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

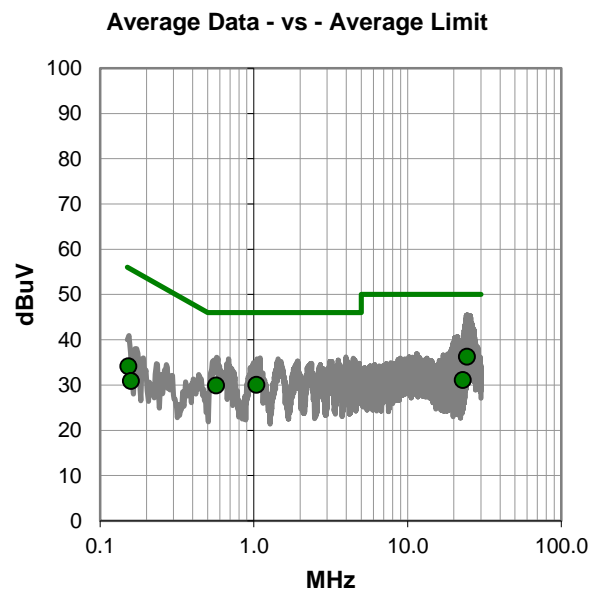
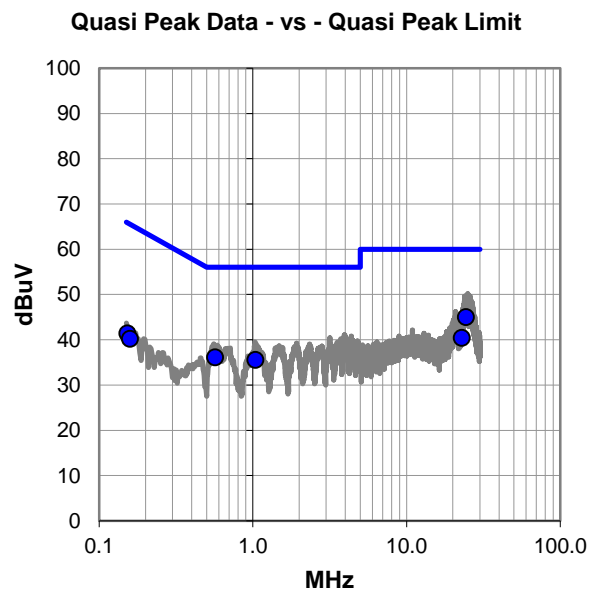
None

EUT OPERATING MODES

On, transmitting mid channel 2442 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #4

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
24.399	24.0	21.0	45.0	60.0	-15.0
22.908	19.6	20.8	40.4	60.0	-19.6
0.570	16.4	19.7	36.1	56.0	-19.9
1.040	15.7	19.8	35.5	56.0	-20.5
0.153	21.5	19.9	41.4	65.9	-24.5
0.159	20.4	19.8	40.2	65.5	-25.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
24.399	15.2	21.0	36.2	50.0	-13.8
1.040	10.2	19.8	30.0	46.0	-16.0
0.570	10.2	19.7	29.9	46.0	-16.1
22.908	10.3	20.8	31.1	50.0	-18.9
0.153	14.2	19.9	34.1	55.9	-21.8
0.159	11.1	19.8	30.9	55.5	-24.6

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	BluKey USB	Work Order:	PAYR0010
Serial Number:	See Configuration	Date:	07/19/2016
Customer:	PayRange Inc.	Temperature:	23.3°C
Attendees:	Mike Mitchell	Relative Humidity:	45.6%
Customer Project:	None	Bar. Pressure:	1022 mb
Tested By:	Jeff Alcoke	Job Site:	EV07
Power:	5VDC via 110VAC/60Hz	Configuration:	PAYR0010-6

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

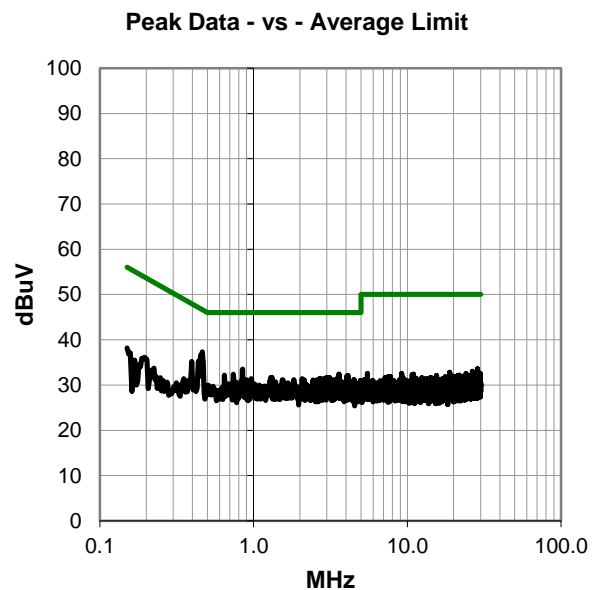
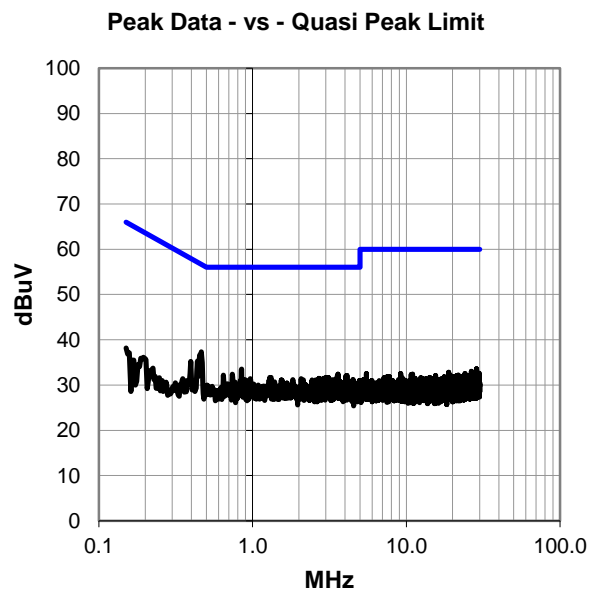
None

EUT OPERATING MODES

On, transmitting mid channel 2442 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #7

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.463	17.6	19.7	37.3	56.6	-19.3
0.437	15.6	19.7	35.3	57.1	-21.8
0.848	13.8	19.7	33.5	56.0	-22.5
0.396	15.5	19.7	35.2	57.9	-22.7
0.739	12.7	19.7	32.4	56.0	-23.6
3.590	12.5	19.9	32.4	56.0	-23.6
0.646	12.5	19.7	32.2	56.0	-23.8
4.105	12.2	19.9	32.1	56.0	-23.9
4.056	12.1	19.9	32.0	56.0	-24.0
3.549	11.9	19.9	31.8	56.0	-24.2
1.292	11.9	19.8	31.7	56.0	-24.3
1.318	11.9	19.8	31.7	56.0	-24.3
3.008	11.8	19.9	31.7	56.0	-24.3
4.026	11.8	19.9	31.7	56.0	-24.3
3.123	11.7	19.9	31.6	56.0	-24.4
2.706	11.7	19.8	31.5	56.0	-24.5
2.896	11.7	19.8	31.5	56.0	-24.5
0.967	11.6	19.8	31.4	56.0	-24.6
2.071	11.6	19.8	31.4	56.0	-24.6
0.892	11.5	19.7	31.2	56.0	-24.8
1.829	11.4	19.8	31.2	56.0	-24.8
3.347	11.3	19.9	31.2	56.0	-24.8
4.493	11.3	19.9	31.2	56.0	-24.8
1.534	11.3	19.8	31.1	56.0	-24.9
1.545	11.3	19.8	31.1	56.0	-24.9
2.139	11.3	19.8	31.1	56.0	-24.9

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.463	17.6	19.7	37.3	46.6	-9.3
0.437	15.6	19.7	35.3	47.1	-11.8
0.848	13.8	19.7	33.5	46.0	-12.5
0.396	15.5	19.7	35.2	47.9	-12.7
0.739	12.7	19.7	32.4	46.0	-13.6
3.590	12.5	19.9	32.4	46.0	-13.6
0.646	12.5	19.7	32.2	46.0	-13.8
4.105	12.2	19.9	32.1	46.0	-13.9
4.056	12.1	19.9	32.0	46.0	-14.0
3.549	11.9	19.9	31.8	46.0	-14.2
1.292	11.9	19.8	31.7	46.0	-14.3
1.318	11.9	19.8	31.7	46.0	-14.3
3.008	11.8	19.9	31.7	46.0	-14.3
4.026	11.8	19.9	31.7	46.0	-14.3
3.123	11.7	19.9	31.6	46.0	-14.4
2.706	11.7	19.8	31.5	46.0	-14.5
2.896	11.7	19.8	31.5	46.0	-14.5
0.967	11.6	19.8	31.4	46.0	-14.6
2.071	11.6	19.8	31.4	46.0	-14.6
0.892	11.5	19.7	31.2	46.0	-14.8
1.829	11.4	19.8	31.2	46.0	-14.8
3.347	11.3	19.9	31.2	46.0	-14.8
4.493	11.3	19.9	31.2	46.0	-14.8
1.534	11.3	19.8	31.1	46.0	-14.9
1.545	11.3	19.8	31.1	46.0	-14.9
2.139	11.3	19.8	31.1	46.0	-14.9

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	BluKey USB	Work Order:	PAYR0010
Serial Number:	See Configuration	Date:	07/19/2016
Customer:	PayRange Inc.	Temperature:	23.3°C
Attendees:	Mike Mitchell	Relative Humidity:	45.6%
Customer Project:	None	Bar. Pressure:	1022 mb
Tested By:	Jeff Alcoke	Job Site:	EV07
Power:	5VDC via 110VAC/60Hz	Configuration:	PAYR0010-6

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

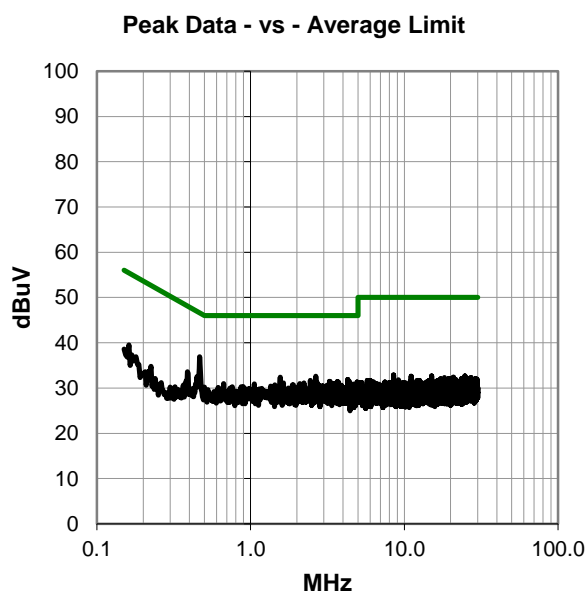
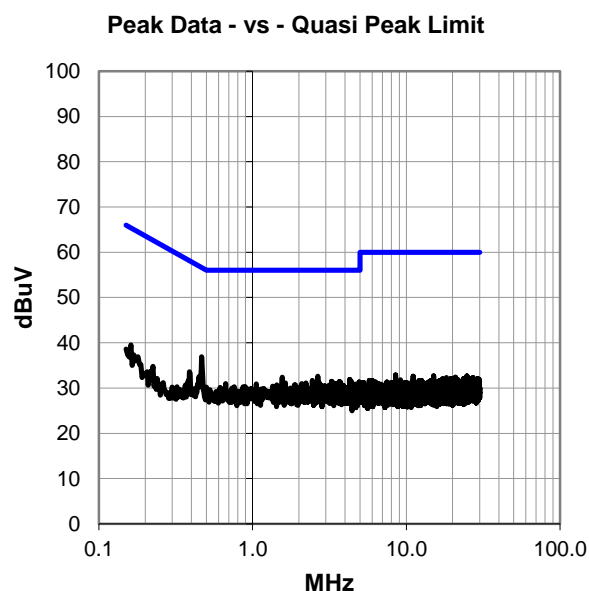
None

EUT OPERATING MODES

On, transmitting mid channel 2442 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #8

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.467	17.2	19.7	36.9	56.6	-19.7
2.657	12.8	19.8	32.6	56.0	-23.4
1.557	12.6	19.8	32.4	56.0	-23.6
4.291	12.0	19.9	31.9	56.0	-24.1
2.452	11.9	19.8	31.7	56.0	-24.3
0.389	13.9	19.7	33.6	58.1	-24.5
3.261	11.6	19.9	31.5	56.0	-24.5
4.373	11.6	19.9	31.5	56.0	-24.5
3.661	11.5	19.9	31.4	56.0	-24.6
3.291	11.4	19.9	31.3	56.0	-24.7
3.713	11.4	19.9	31.3	56.0	-24.7
4.933	11.3	20.0	31.3	56.0	-24.7
4.280	11.3	19.9	31.2	56.0	-24.8
1.635	11.3	19.8	31.1	56.0	-24.9
2.221	11.3	19.8	31.1	56.0	-24.9
2.504	11.3	19.8	31.1	56.0	-24.9
2.724	11.3	19.8	31.1	56.0	-24.9
0.669	11.3	19.7	31.0	56.0	-25.0
2.094	11.2	19.8	31.0	56.0	-25.0
3.463	11.1	19.9	31.0	56.0	-25.0
1.057	11.1	19.8	30.9	56.0	-25.1
4.437	10.9	19.9	30.8	56.0	-25.2
4.649	10.9	19.9	30.8	56.0	-25.2
1.441	10.9	19.8	30.7	56.0	-25.3
1.874	10.9	19.8	30.7	56.0	-25.3
2.784	10.8	19.8	30.6	56.0	-25.4

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.467	17.2	19.7	36.9	46.6	-9.7
2.657	12.8	19.8	32.6	46.0	-13.4
1.557	12.6	19.8	32.4	46.0	-13.6
4.291	12.0	19.9	31.9	46.0	-14.1
2.452	11.9	19.8	31.7	46.0	-14.3
0.389	13.9	19.7	33.6	48.1	-14.5
3.261	11.6	19.9	31.5	46.0	-14.5
4.373	11.6	19.9	31.5	46.0	-14.5
3.661	11.5	19.9	31.4	46.0	-14.6
3.291	11.4	19.9	31.3	46.0	-14.7
3.713	11.4	19.9	31.3	46.0	-14.7
4.933	11.3	20.0	31.3	46.0	-14.7
4.280	11.3	19.9	31.2	46.0	-14.8
1.635	11.3	19.8	31.1	46.0	-14.9
2.221	11.3	19.8	31.1	46.0	-14.9
2.504	11.3	19.8	31.1	46.0	-14.9
2.724	11.3	19.8	31.1	46.0	-14.9
0.669	11.3	19.7	31.0	46.0	-15.0
2.094	11.2	19.8	31.0	46.0	-15.0
3.463	11.1	19.9	31.0	46.0	-15.0
1.057	11.1	19.8	30.9	46.0	-15.1
4.437	10.9	19.9	30.8	46.0	-15.2
4.649	10.9	19.9	30.8	46.0	-15.2
1.441	10.9	19.8	30.7	46.0	-15.3
1.874	10.9	19.8	30.7	46.0	-15.3
2.784	10.8	19.8	30.6	46.0	-15.4

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	BluKey and BluKey USB	Work Order:	PAYR0010
Serial Number:	See Configuration	Date:	07/19/2016
Customer:	PayRange Inc.	Temperature:	23.3°C
Attendees:	Mike Mitchell	Relative Humidity:	45.6%
Customer Project:	None	Bar. Pressure:	1022 mb
Tested By:	Jeff Alcock	Job Site:	EV07
Power:	5VDC via 110VAC/60Hz	Configuration:	PAYR0010-7

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

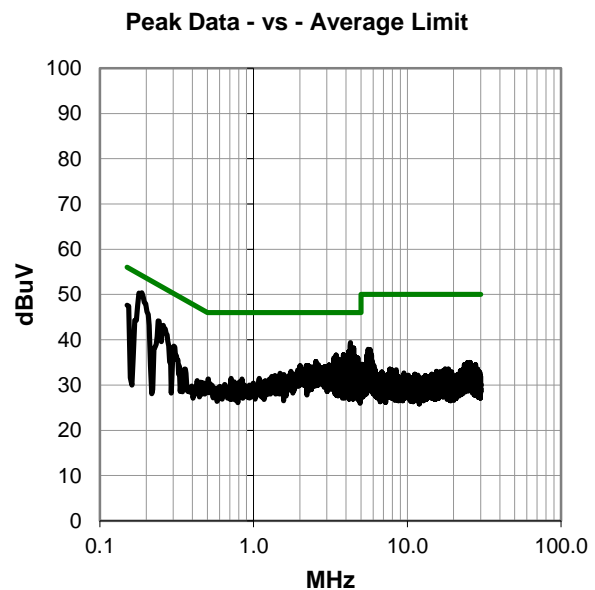
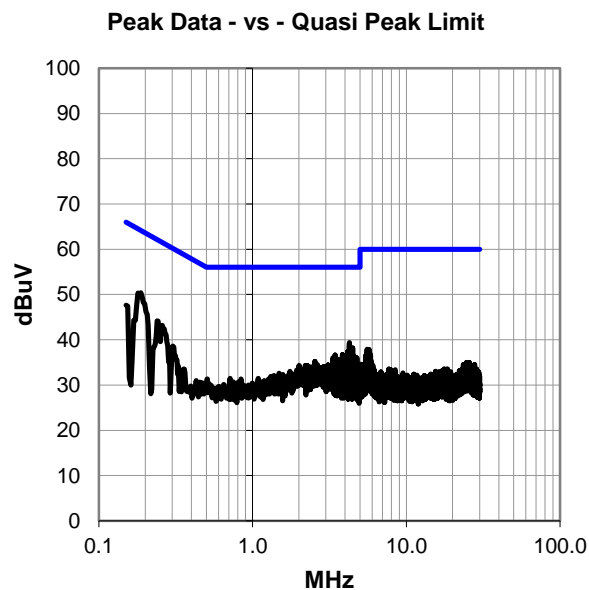
None

EUT OPERATING MODES

On, running BKUSB, client software. Transmitting mid channel 2442 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #11

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.187	30.6	19.8	50.4	64.2	-13.8
4.261	19.5	19.9	39.4	56.0	-16.6
4.478	18.3	19.9	38.2	56.0	-17.8
0.240	24.4	19.8	44.2	62.1	-17.9
0.258	23.5	19.7	43.2	61.5	-18.3
0.150	27.7	19.9	47.6	66.0	-18.4
4.149	17.4	19.9	37.3	56.0	-18.7
4.351	17.4	19.9	37.3	56.0	-18.7
4.134	16.9	19.9	36.8	56.0	-19.2
3.840	16.8	19.9	36.7	56.0	-19.3
4.291	16.8	19.9	36.7	56.0	-19.3
3.441	16.7	19.9	36.6	56.0	-19.4
4.526	16.6	19.9	36.5	56.0	-19.5
4.332	16.5	19.9	36.4	56.0	-19.6
3.970	16.3	19.9	36.2	56.0	-19.8
3.321	16.1	19.9	36.0	56.0	-20.0
4.772	16.1	19.9	36.0	56.0	-20.0
3.597	15.8	19.9	35.7	56.0	-20.3
4.064	15.8	19.9	35.7	56.0	-20.3
4.649	15.5	19.9	35.4	56.0	-20.6
4.403	15.4	19.9	35.3	56.0	-20.7
2.541	15.4	19.8	35.2	56.0	-20.8
4.034	14.9	19.9	34.8	56.0	-21.2
2.579	14.7	19.8	34.5	56.0	-21.5
2.638	14.7	19.8	34.5	56.0	-21.5
4.601	14.6	19.9	34.5	56.0	-21.5

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.187	30.6	19.8	50.4	54.2	-3.8
4.261	19.5	19.9	39.4	46.0	-6.6
4.478	18.3	19.9	38.2	46.0	-7.8
0.240	24.4	19.8	44.2	52.1	-7.9
0.258	23.5	19.7	43.2	51.5	-8.3
0.150	27.7	19.9	47.6	56.0	-8.4
4.149	17.4	19.9	37.3	46.0	-8.7
4.351	17.4	19.9	37.3	46.0	-8.7
4.134	16.9	19.9	36.8	46.0	-9.2
3.840	16.8	19.9	36.7	46.0	-9.3
4.291	16.8	19.9	36.7	46.0	-9.3
3.441	16.7	19.9	36.6	46.0	-9.4
4.526	16.6	19.9	36.5	46.0	-9.5
4.332	16.5	19.9	36.4	46.0	-9.6
3.970	16.3	19.9	36.2	46.0	-9.8
3.321	16.1	19.9	36.0	46.0	-10.0
4.772	16.1	19.9	36.0	46.0	-10.0
3.597	15.8	19.9	35.7	46.0	-10.3
4.064	15.8	19.9	35.7	46.0	-10.3
4.649	15.5	19.9	35.4	46.0	-10.6
4.403	15.4	19.9	35.3	46.0	-10.7
2.541	15.4	19.8	35.2	46.0	-10.8
4.034	14.9	19.9	34.8	46.0	-11.2
2.579	14.7	19.8	34.5	46.0	-11.5
2.638	14.7	19.8	34.5	46.0	-11.5
4.601	14.6	19.9	34.5	46.0	-11.5

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	BluKey and BluKey USB	Work Order:	PAYR0010
Serial Number:	See Configuration	Date:	07/19/2016
Customer:	PayRange Inc.	Temperature:	23.3°C
Attendees:	Mike Mitchell	Relative Humidity:	45.6%
Customer Project:	None	Bar. Pressure:	1022 mb
Tested By:	Jeff Alcoke	Job Site:	EV07
Power:	5VDC via 110VAC/60Hz	Configuration:	PAYR0010-7

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

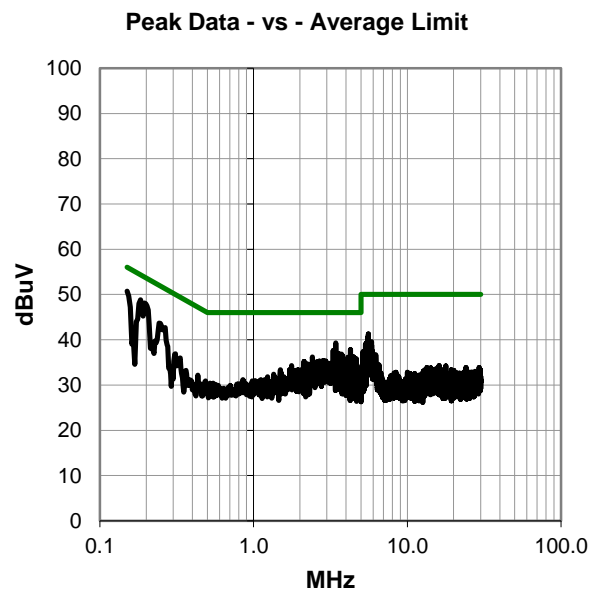
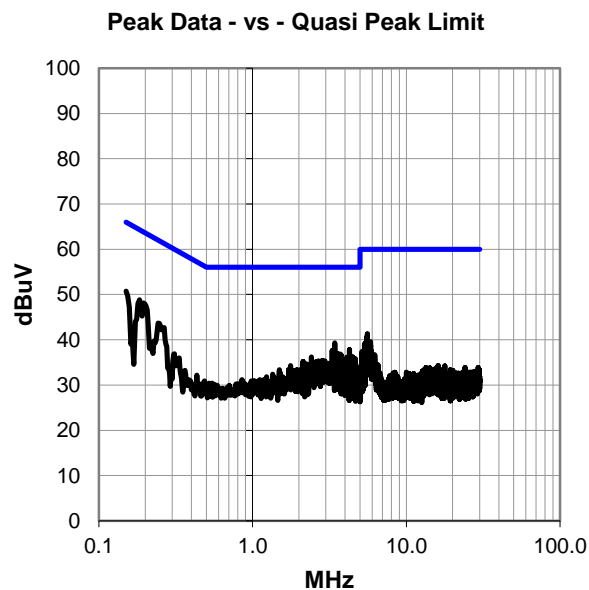
None

EUT OPERATING MODES

On, running BKUSB, client software. Transmitting mid channel 2442 MHz

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #12

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	30.8	19.9	50.7	66.0	-15.3
0.184	29.0	19.8	48.8	64.3	-15.5
3.426	19.4	19.9	39.3	56.0	-16.7
4.269	17.9	19.9	37.8	56.0	-18.2
0.243	23.9	19.8	43.7	62.0	-18.3
3.291	17.7	19.9	37.6	56.0	-18.4
3.414	17.6	19.9	37.5	56.0	-18.5
5.589	21.4	19.9	41.3	60.0	-18.7
3.590	17.0	19.9	36.9	56.0	-19.1
3.724	16.9	19.9	36.8	56.0	-19.2
5.560	20.8	19.9	40.7	60.0	-19.3
3.336	16.6	19.9	36.5	56.0	-19.5
3.799	16.6	19.9	36.5	56.0	-19.5
2.418	16.4	19.8	36.2	56.0	-19.8
4.474	16.3	19.9	36.2	56.0	-19.8
3.467	16.2	19.9	36.1	56.0	-19.9
4.123	16.2	19.9	36.1	56.0	-19.9
3.735	16.1	19.9	36.0	56.0	-20.0
4.097	16.0	19.9	35.9	56.0	-20.1
3.493	15.9	19.9	35.8	56.0	-20.2
4.653	15.9	19.9	35.8	56.0	-20.2
4.019	15.8	19.9	35.7	56.0	-20.3
4.056	15.8	19.9	35.7	56.0	-20.3
5.843	19.6	20.0	39.6	60.0	-20.4
2.840	15.6	19.8	35.4	56.0	-20.6
2.679	15.5	19.8	35.3	56.0	-20.7

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	30.8	19.9	50.7	56.0	-5.3
0.184	29.0	19.8	48.8	54.3	-5.5
3.426	19.4	19.9	39.3	46.0	-6.7
4.269	17.9	19.9	37.8	46.0	-8.2
0.243	23.9	19.8	43.7	52.0	-8.3
3.291	17.7	19.9	37.6	46.0	-8.4
3.414	17.6	19.9	37.5	46.0	-8.5
5.589	21.4	19.9	41.3	50.0	-8.7
3.590	17.0	19.9	36.9	46.0	-9.1
3.724	16.9	19.9	36.8	46.0	-9.2
5.560	20.8	19.9	40.7	50.0	-9.3
3.336	16.6	19.9	36.5	46.0	-9.5
3.799	16.6	19.9	36.5	46.0	-9.5
2.418	16.4	19.8	36.2	46.0	-9.8
4.474	16.3	19.9	36.2	46.0	-9.8
3.467	16.2	19.9	36.1	46.0	-9.9
4.123	16.2	19.9	36.1	46.0	-9.9
3.735	16.1	19.9	36.0	46.0	-10.0
4.097	16.0	19.9	35.9	46.0	-10.1
3.493	15.9	19.9	35.8	46.0	-10.2
4.653	15.9	19.9	35.8	46.0	-10.2
4.019	15.8	19.9	35.7	46.0	-10.3
4.056	15.8	19.9	35.7	46.0	-10.3
5.843	19.6	20.0	39.6	50.0	-10.4
2.840	15.6	19.8	35.4	46.0	-10.6
2.679	15.5	19.8	35.3	46.0	-10.7

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS

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

MODES OF OPERATION

On, Tx Continuous Low Ch. 2402MHz BLE
On, Tx Continuous Mid Ch. 2442 MHz BLE
On, Tx Continuous High Ch. 2480 MHz BLE

POWER SETTINGS INVESTIGATED

24VDC

CONFIGURATIONS INVESTIGATED

PAYR0010 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz
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SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	4/22/2016	12 mo
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	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	3/11/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	7/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	3/11/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Cable	N/A	Double Ridge Horn Cables	EVB	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	3/11/2016	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	2/3/2016	24 mo
Attenuator	Coaxicom	3910-20	AXZ	5/18/2016	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HFO	3/22/2016	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFD	5/18/2016	12 mo
Cable	N/A	Bilog Cables	EVA	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	3/11/2016	12 mo
Antenna - Biconilog	EMCO	3141	AXE	8/29/2014	24 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.

The source based duty cycle correction factor is: $20 \cdot \log(0.201) + 13.9$ dB. Please see Product Description for details.

SPURIOUS RADIATED EMISSIONS

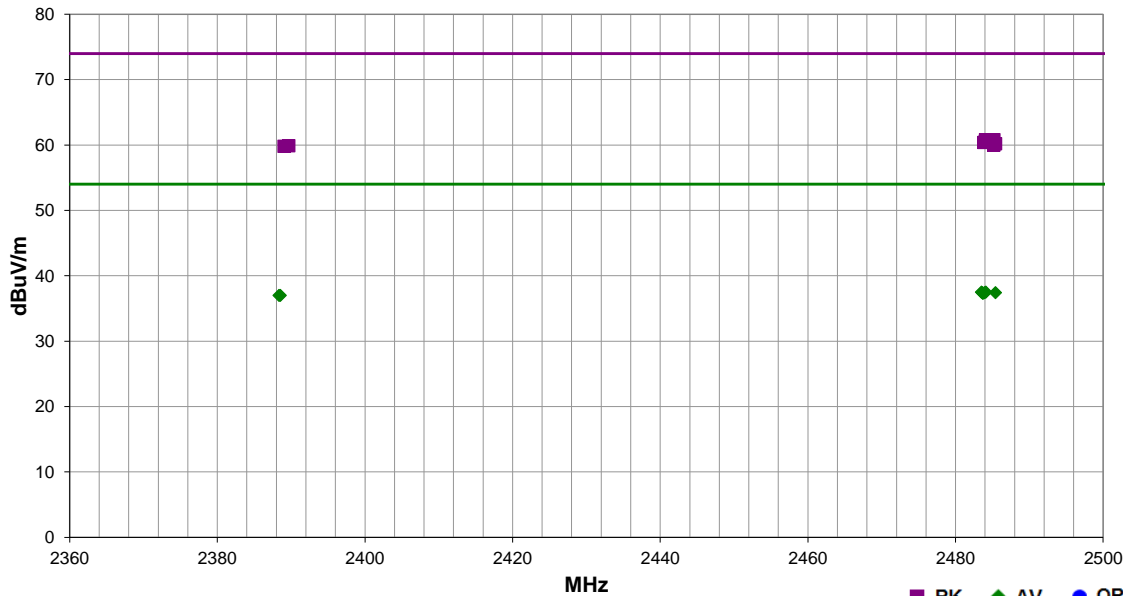


PSA-ESCI 2016.04.26.1
EmiR5 2016.04.26.1

Work Order:	PAYR0010	Date:	07/12/16		
Project:	None	Temperature:	23.8 °C		
Job Site:	EV01	Humidity:	44.8% RH		
Serial Number:	See Configuration	Barometric Pres.:	1025 mbar	Tested by:	Brandon Hobbs
EUT:	BluKey				
Configuration:	1				
Customer:	PayRange Inc.				
Attendees:	Mike Mitchell				
EUT Power:	24VDC				
Operating Mode:	On, Tx Continuous BLE				
Deviations:	None				
Comments:	Please reference the data comments for EUT orientation, frequency and channel. The client attested to a normal operating duty cycle of 20%. Per ANSI C63.10:2013 the Duty Cycle was adjusted upward to correct for operating at a measured 63% duty cycle while under test and downward for a 20% duty cycle normal operating condition.				

Test Specifications	FCC 15.247:2016	Test Method	ANSI C63.10:2013
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Run #	41	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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■ PK ◆ AV ● QP

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2484.067	41.9	-1.1	1.0	341.0	0.0	20.0	Horz	PK	0.0	60.8	74.0	-13.2	High Ch. 2480 MHz, EUT Horiz
2485.210	41.9	-1.1	2.6	57.0	0.0	20.0	Vert	PK	0.0	60.8	74.0	-13.2	High Ch. 2480 MHz, EUT Vertical
2484.040	41.7	-1.1	1.0	98.0	0.0	20.0	Vert	PK	0.0	60.6	74.0	-13.4	High Ch. 2480 MHz, EUT Horiz
2483.837	41.5	-1.1	3.7	357.0	0.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	High Ch. 2480 MHz, EUT On Side
2485.410	41.3	-1.1	1.0	337.0	0.0	20.0	Horz	PK	0.0	60.2	74.0	-13.8	High Ch. 2480 MHz, EUT Vertical
2485.187	41.1	-1.1	1.0	33.0	0.0	20.0	Vert	PK	0.0	60.0	74.0	-14.0	High Ch. 2480 MHz, EUT On Side
2389.677	41.5	-1.6	1.0	263.0	0.0	20.0	Horz	PK	0.0	59.9	74.0	-14.1	Low Ch. 2402 MHz, EUT Horiz
2389.033	41.4	-1.6	1.0	343.0	0.0	20.0	Vert	PK	0.0	59.8	74.0	-14.2	Low Ch. 2402 MHz, EUT Horiz
2483.507	30.5	-1.1	1.0	341.0	-13.9	20.0	Horz	AV	2.0	37.5	54.0	-16.5	High Ch. 2480 MHz, EUT Horiz
2484.100	30.5	-1.1	1.0	98.0	-13.9	20.0	Vert	AV	2.0	37.5	54.0	-16.5	High Ch. 2480 MHz, EUT Horiz
2485.430	30.4	-1.1	3.7	357.0	-13.9	20.0	Horz	AV	2.0	37.4	54.0	-16.6	High Ch. 2480 MHz, EUT On Side
2483.933	30.4	-1.1	1.0	337.0	-13.9	20.0	Horz	AV	2.0	37.4	54.0	-16.6	High Ch. 2480 MHz, EUT Vertical
2483.637	30.4	-1.1	2.6	57.0	-13.9	20.0	Vert	AV	2.0	37.4	54.0	-16.6	High Ch. 2480 MHz, EUT Vertical
2483.720	30.3	-1.1	1.0	33.0	-13.9	20.0	Vert	AV	2.0	37.3	54.0	-16.7	High Ch. 2480 MHz, EUT On Side
2388.543	30.5	-1.6	1.0	263.0	-13.9	20.0	Horz	AV	2.0	37.0	54.0	-17.0	Low Ch. 2402 MHz, EUT Horiz
2388.357	30.5	-1.6	1.0	343.0	-13.9	20.0	Vert	AV	2.0	37.0	54.0	-17.0	Low Ch. 2402 MHz, EUT Horiz

SPURIOUS RADIATED EMISSIONS

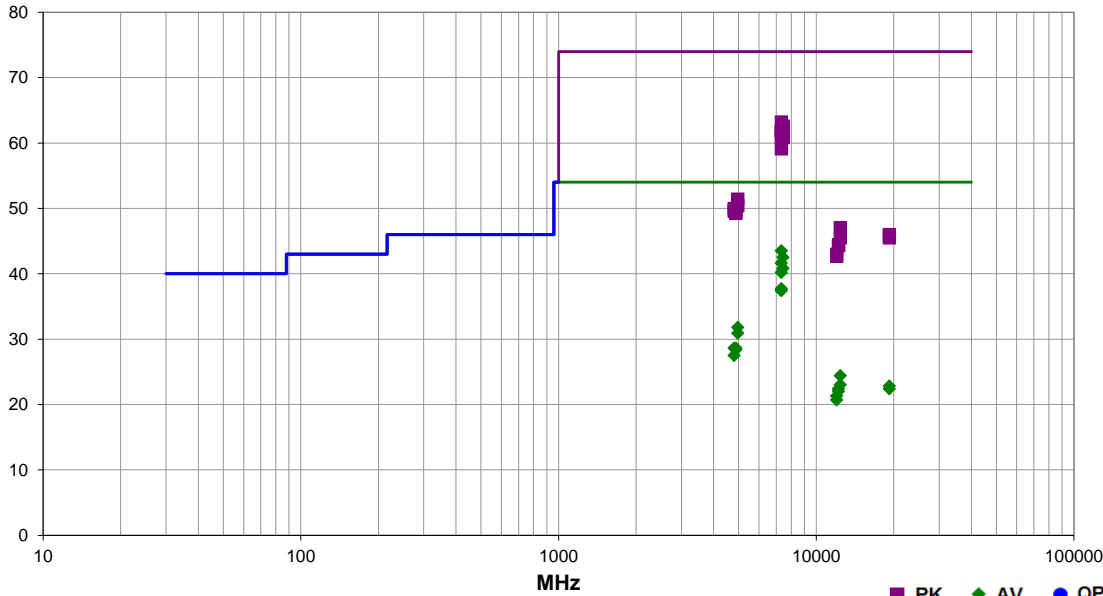


PSA-ESCI 2016.04.26.1
EmiR5 2016.04.26.1

Work Order:	PAYR0010	Date:	07/12/16	
Project:	None	Temperature:	22.8 °C	
Job Site:	EV01	Humidity:	45.8% RH	
Serial Number:	See Configuration	Barometric Pres.:	1019 mbar	
EUT: BluKey				Tested by: Brandon Hobbs
Configuration:	1			
Customer:	PayRange Inc.			
Attendees:	Mike Mitchell			
EUT Power:	24VDC			
Operating Mode:	On, Tx Continuous BLE			
Deviations:	None			
Comments:	Please reference the data comments for EUT orientation, frequency and channel. The client attested to a normal operating duty cycle of 20%. Per ANSI C63.10:2013 the Duty Cycle was adjusted upward to correct for operating at a measured 63% duty cycle while under test and downward for a 20% duty cycle normal operating condition.			

Test Specifications	Test Method
FCC 15.247:2016	ANSI C63.10:2013

Run #	18	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)	Duty Cycle Correction Factor (dB)	Correction Factor for RMS (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7326.425	37.5	17.9	2.2	167.0	-13.9	2.0	Horz	AV	0.0	43.5	54.0	-10.5	Mid Ch. 2442 MHz, EUT Vertical
7326.445	45.3	17.9	2.2	167.0	0.0	0.0	Horz	PK	0.0	63.2	74.0	-10.8	Mid Ch. 2442 MHz, EUT Vertical
7439.165	44.1	18.5	1.6	172.0	0.0	0.0	Horz	PK	0.0	62.6	74.0	-11.4	High Ch. 2480 Mhz, EUT Vertical
7439.450	35.9	18.5	1.6	172.0	-13.9	2.0	Horz	AV	0.0	42.5	54.0	-11.5	High Ch. 2480 Mhz, EUT Vertical
7325.130	44.0	17.9	1.2	185.0	0.0	0.0	Horz	PK	0.0	61.9	74.0	-12.1	Mid Ch. 2442 MHz, EUT Horizontal
7326.580	43.9	17.9	2.4	179.0	0.0	0.0	Horz	PK	0.0	61.8	74.0	-12.2	Mid Ch. 2442 MHz, EUT Horizontal
7326.470	35.6	17.9	1.2	185.0	-13.9	2.0	Horz	AV	0.0	41.6	54.0	-12.4	Mid Ch. 2442 MHz, EUT Horizontal
7326.430	43.6	17.9	1.0	215.0	0.0	0.0	Vert	PK	0.0	61.5	74.0	-12.5	Mid Ch. 2442 MHz, EUT On Side
7325.225	43.0	17.9	1.0	224.0	0.0	0.0	Vert	PK	0.0	60.9	74.0	-13.1	Mid Ch. 2442 MHz, EUT On Side
7439.333	34.2	18.5	3.1	197.0	-13.9	2.0	Vert	AV	0.0	40.8	54.0	-13.2	High Ch. 2480 Mhz, EUT Horizontal
7438.975	42.3	18.5	3.1	197.0	0.0	0.0	Vert	PK	0.0	60.8	74.0	-13.2	High Ch. 2480 Mhz, EUT Horizontal
7326.425	34.2	17.9	1.0	224.0	-13.9	2.0	Vert	AV	0.0	40.2	54.0	-13.8	Mid Ch. 2442 MHz, EUT Horizontal
7324.875	41.3	17.8	1.0	298.0	0.0	0.0	Vert	PK	0.0	59.1	74.0	-14.9	Mid Ch. 2442 MHz, EUT Vertical
7326.485	31.7	17.9	2.4	179.0	-13.9	2.0	Horz	AV	0.0	37.7	54.0	-16.3	Mid Ch. 2442 MHz, EUT On Side
7326.520	31.5	17.9	1.0	298.0	-13.9	2.0	Vert	AV	0.0	37.5	54.0	-16.5	Mid Ch. 2442 MHz, EUT Vertical
7326.545	31.4	17.9	1.0	215.0	-13.9	2.0	Vert	AV	0.0	37.4	54.0	-16.6	Mid Ch. 2442 MHz, EUT On Side
4959.850	34.3	9.4	2.3	320.0	-13.9	2.0	Horz	AV	0.0	31.8	54.0	-22.2	High Ch. 2480 Mhz, EUT Vertical
4959.100	42.0	9.4	2.3	320.0	0.0	0.0	Horz	PK	0.0	51.4	74.0	-22.6	High Ch. 2480 Mhz, EUT Vertical
4959.892	33.4	9.4	1.0	153.0	-13.9	2.0	Vert	AV	0.0	30.9	54.0	-23.1	High Ch. 2480 Mhz, EUT Horizontal
4960.450	41.0	9.4	1.0	153.0	0.0	0.0	Vert	PK	0.0	50.4	74.0	-23.6	High Ch. 2480 Mhz, EUT Horizontal
4804.308	41.0	9.0	2.1	331.0	0.0	0.0	Horz	PK	0.0	50.0	74.0	-24.0	Low Ch. 2402 MHz, EUT Vertical
4884.695	40.4	9.2	1.0	154.0	0.0	0.0	Vert	PK	0.0	49.6	74.0	-24.4	Mid Ch. 2442 MHz, EUT Vertical
4804.585	40.6	9.0	1.0	147.0	0.0	0.0	Vert	PK	0.0	49.6	74.0	-24.4	Low Ch. 2402 MHz, EUT Horizontal

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	Correction Factor for RMS (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4884.145	40.1	9.2	2.3	355.0	0.0	0.0	Horz	PK	0.0	49.3	74.0	-24.7	Mid Ch. 2442 MHz, EUT Vertical
4883.915	31.3	9.2	2.3	355.0	-13.9	2.0	Horz	AV	0.0	28.6	54.0	-25.4	Mid Ch. 2442 MHz, EUT Vertical
4803.942	31.5	9.0	2.1	331.0	-13.9	2.0	Horz	AV	0.0	28.6	54.0	-25.4	Low Ch. 2402 MHz, EUT Vertical
4883.995	31.1	9.2	1.0	154.0	-13.9	2.0	Vert	AV	0.0	28.4	54.0	-25.6	Mid Ch. 2442 MHz, EUT Vertical
4804.075	30.4	9.0	1.0	147.0	-13.9	2.0	Vert	AV	0.0	27.5	54.0	-26.5	Low Ch. 2402 MHz, EUT Horizontal
12398.670	42.0	5.0	1.9	87.0	0.0	0.0	Horz	PK	0.0	47.0	74.0	-27.0	High Ch. 2480 Mhz, EUT Vertical
19215.620	45.4	0.6	1.6	143.0	0.0	0.0	Horz	PK	0.0	46.0	74.0	-28.0	Low Ch. 2402 MHz, EUT Vertical
12398.400	40.5	5.0	2.0	126.0	0.0	0.0	Vert	PK	0.0	45.5	74.0	-28.5	High Ch. 2480 Mhz, EUT Horizontal
19215.040	44.9	0.6	1.6	231.0	0.0	0.0	Vert	PK	0.0	45.5	74.0	-28.5	Low Ch. 2402 MHz, EUT Horizontal
12398.900	31.3	5.0	1.9	87.0	-13.9	2.0	Horz	AV	0.0	24.4	54.0	-29.6	High Ch. 2480 Mhz, EUT Vertical
12210.970	40.0	4.4	2.1	132.0	0.0	0.0	Vert	PK	0.0	44.4	74.0	-29.6	Mid Ch. 2442 Mhz, EUT Horizontal
12209.830	39.9	4.4	1.6	151.0	0.0	0.0	Horz	PK	0.0	44.3	74.0	-29.7	Mid Ch. 2442 MHz, EUT Vertical
12398.810	29.9	5.0	2.0	126.0	-13.9	2.0	Vert	AV	0.0	23.0	54.0	-31.0	High Ch. 2480 Mhz, EUT Horizontal
12009.520	39.7	3.3	2.0	150.0	0.0	0.0	Vert	PK	0.0	43.0	74.0	-31.0	Low Ch.2402 MHz, EUT Horizontal
19215.130	34.1	0.6	1.6	143.0	-13.9	2.0	Horz	AV	0.0	22.8	54.0	-31.2	Low Ch. 2402 MHz, EUT Vertical
12008.680	39.4	3.3	1.0	175.0	0.0	0.0	Horz	PK	0.0	42.7	74.0	-31.3	Low Ch.2402 MHz, EUT Vertical
19216.370	33.7	0.6	1.6	231.0	-13.9	2.0	Vert	AV	0.0	22.4	54.0	-31.6	Low Ch. 2402 MHz, EUT Horizontal
12208.930	29.9	4.4	2.1	132.0	-13.9	2.0	Vert	AV	0.0	22.4	54.0	-31.6	Mid Ch. 2442 Mhz, EUT Horizontal
12208.800	29.5	4.4	1.6	151.0	-13.9	2.0	Horz	AV	0.0	22.0	54.0	-32.0	Mid Ch. 2442 MHz, EUT Vertical
12008.810	29.9	3.3	2.0	150.0	-13.9	2.0	Vert	AV	0.0	21.3	54.0	-32.7	Low Ch.2402 MHz, EUT Horizontal
12008.750	29.3	3.3	1.0	175.0	-13.9	2.0	Horz	AV	0.0	20.7	54.0	-33.3	Low Ch.2402 MHz, EUT Vertical

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

On, Tx Continuous Low Ch. 2402MHz BLE
On, Tx Continuous Mid Ch. 2442 MHz BLE
On, Tx Continuous High Ch. 2480 MHz BLE

POWER SETTINGS INVESTIGATED

5VDC

CONFIGURATIONS INVESTIGATED

PAYR0010 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26500 MHz
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SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	4/22/2016	12 mo
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	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	3/11/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	7/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	3/11/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Cable	N/A	Double Ridge Horn Cables	EVB	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	3/11/2016	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	2/3/2016	24 mo
Attenuator	Coaxicom	3910-20	AXZ	5/18/2016	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HFO	3/22/2016	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFD	5/18/2016	12 mo
Cable	N/A	Bilog Cables	EVA	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	3/11/2016	12 mo
Antenna - Biconilog	EMCO	3141	AXE	8/29/2014	24 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.

The source based duty cycle correction factor is: $20 \cdot \log(0.201) + -13.9$ dB. Please see Product Description for details.

SPURIOUS RADIATED EMISSIONS

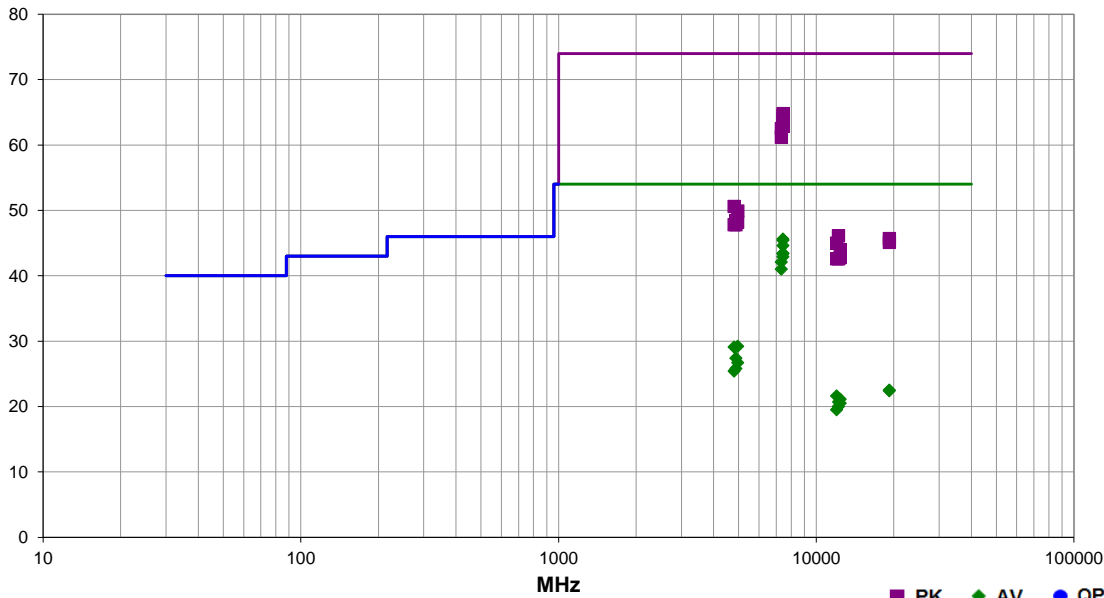


PSA-ESCI 2016.04.26.1
EmiR5 2016.04.26.1

Work Order:	PAYR0010	Date:	07/12/16	
Project:	None	Temperature:	22.8 °C	
Job Site:	EV01	Humidity:	45.8% RH	
Serial Number:	See Configuration	Barometric Pres.:	1019 mbar	Tested by: Brandon Hobbs
EUT:	BluKey USB			
Configuration:	2			
Customer:	PayRange Inc.			
Attendees:	Mike Mitchell			
EUT Power:	5VDC			
Operating Mode:	On, Tx Continuous BLE			
Deviations:	None			
Comments:	Please reference the data comments for EUT orientation, frequency and channel. The client attested to a normal operating duty cycle of 20%. Per ANSI C63.10:2013 the Duty Cycle was adjusted upward to correct for operating at a measured 63% duty cycle while under test and downward for a 20% duty cycle normal operating condition.			

Test Specifications	Test Method
FCC 15.247:2016	ANSI C63.10:2013

Run #	31	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)	Duty Cycle Correction Factor (dB)	Correction Factor for RMS (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.420	39.0	18.5	2.6	58.0	-13.9	2.0	Horz	AV	0.0	45.6	54.0	-8.4	High Ch. 2480 MHz, EUT Horizontal
7439.440	38.8	18.5	2.5	316.0	-13.9	2.0	Horz	AV	0.0	45.4	54.0	-8.6	High Ch. 2480 MHz, EUT Vertical
7439.075	46.3	18.5	2.6	58.0	0.0	0.0	Horz	PK	0.0	64.8	74.0	-9.2	High Ch. 2480 MHz, EUT Horizontal
7439.450	38.0	18.5	3.1	23.0	-13.9	2.0	Vert	AV	0.0	44.6	54.0	-9.4	High Ch. 2480 MHz, EUT Horizontal
7439.120	46.0	18.5	2.5	316.0	0.0	0.0	Horz	PK	0.0	64.5	74.0	-9.5	High Ch. 2480 MHz, EUT Vertical
7439.160	45.5	18.5	3.1	23.0	0.0	0.0	Vert	PK	0.0	64.0	74.0	-10.0	High Ch. 2480 MHz, EUT Horizontal
7439.310	36.8	18.5	1.0	266.0	-13.9	2.0	Vert	AV	0.0	43.4	54.0	-10.6	High Ch. 2480 MHz, EUT Vertical
7439.320	36.8	18.5	1.1	183.0	-13.9	2.0	Horz	AV	0.0	43.4	54.0	-10.6	High Ch. 2480 MHz, EUT On Side
7439.255	44.7	18.5	1.1	183.0	0.0	0.0	Horz	PK	0.0	63.2	74.0	-10.8	High Ch. 2480 MHz, EUT On Side
7439.190	44.6	18.5	1.0	266.0	0.0	0.0	Vert	PK	0.0	63.1	74.0	-10.9	High Ch. 2480 MHz, EUT Vertical
7439.375	36.3	18.5	1.2	177.0	-13.9	2.0	Vert	AV	0.0	42.9	54.0	-11.1	High Ch. 2480 MHz, EUT On Side
7439.075	44.4	18.5	1.2	177.0	0.0	0.0	Vert	PK	0.0	62.9	74.0	-11.1	High Ch. 2480 MHz, EUT On Side
7326.720	44.6	17.9	3.5	172.0	0.0	0.0	Horz	PK	0.0	62.5	74.0	-11.5	Mid Ch. 2442 MHz, EUT Horizontal
7326.505	36.1	17.9	3.5	172.0	-13.9	2.0	Horz	AV	0.0	42.1	54.0	-11.9	Mid Ch. 2442 MHz, EUT Horizontal
7327.065	43.3	17.9	1.0	151.0	0.0	0.0	Vert	PK	0.0	61.2	74.0	-12.8	Mid Ch. 2442 MHz, EUT Horizontal
7325.525	35.0	17.9	1.0	151.0	-13.9	2.0	Vert	AV	0.0	41.0	54.0	-13.0	Mid Ch. 2442 MHz, EUT Horizontal
4804.315	41.6	9.0	1.7	191.0	0.0	0.0	Horz	PK	0.0	50.6	74.0	-23.4	Low Ch. 2402 MHz, EUT Horizontal
4960.383	40.5	9.4	1.1	273.0	0.0	0.0	Horz	PK	0.0	49.9	74.0	-24.1	High Ch. 2480 MHz, EUT Horizontal
4959.842	31.7	9.4	1.1	273.0	-13.9	2.0	Horz	AV	0.0	29.2	54.0	-24.8	High Ch. 2480 MHz, EUT Horizontal
4803.965	32.0	9.0	1.7	191.0	-13.9	2.0	Horz	AV	0.0	29.1	54.0	-24.9	Low Ch. 2402 MHz, EUT Horizontal
4884.220	39.2	9.2	1.0	288.0	0.0	0.0	Horz	PK	0.0	48.4	74.0	-25.6	Mid Ch. 2442 MHz, EUT Horizontal
4958.017	38.8	9.4	1.3	272.0	0.0	0.0	Vert	PK	0.0	48.2	74.0	-25.8	High Ch. 2480 MHz, EUT Horizontal
4883.965	38.6	9.2	1.1	339.0	0.0	0.0	Vert	PK	0.0	47.8	74.0	-26.2	Mid Ch. 2442 MHz, EUT Horizontal

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	Correction Factor for RMS (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4804.520	38.8	9.0	1.0	317.0	0.0	0.0	Vert	PK	0.0	47.8	74.0	-26.2	Low Ch. 2402 MHz, EUT Horizontal
4883.925	30.1	9.2	1.0	288.0	-13.9	2.0	Horz	AV	0.0	27.4	54.0	-26.6	Mid Ch. 2442 MHz, EUT Horizontal
4959.608	29.2	9.4	1.3	272.0	-13.9	2.0	Vert	AV	0.0	26.7	54.0	-27.3	High Ch. 2480 MHz, EUT Horizontal
12208.890	41.7	4.4	1.9	78.0	0.0	0.0	Horz	PK	0.0	46.1	74.0	-27.9	Mid Ch. 2440MHz, EUT Horizontal
4883.910	28.5	9.2	1.1	339.0	-13.9	2.0	Vert	AV	0.0	25.8	54.0	-28.2	Mid Ch. 2442 MHz, EUT Horizontal
19217.140	45.1	0.6	1.6	322.0	0.0	0.0	Horz	PK	0.0	45.7	74.0	-28.3	Low Ch. 2402 MHz, EUT Horizontal
4803.705	28.3	9.0	1.0	317.0	-13.9	2.0	Vert	AV	0.0	25.4	54.0	-28.6	Low Ch. 2402 MHz, EUT Horizontal
19214.580	44.5	0.6	1.6	221.0	0.0	0.0	Vert	PK	0.0	45.1	74.0	-28.9	Low Ch. 2402 MHz, EUT Horizontal
12009.910	41.7	3.3	2.9	59.0	0.0	0.0	Horz	PK	0.0	45.0	74.0	-29.0	Low Ch. 2402 MHz, EUT Horizontal
12399.660	39.0	5.0	2.7	345.0	0.0	0.0	Horz	PK	0.0	44.0	74.0	-30.0	High Ch. 2480 MHz, EUT Horizontal
12399.500	37.8	5.0	1.5	176.0	0.0	0.0	Vert	PK	0.0	42.8	74.0	-31.2	High Ch. 2480 MHz, EUT Horizontal
12211.170	38.2	4.4	1.0	196.0	0.0	0.0	Vert	PK	0.0	42.6	74.0	-31.4	Mid Ch. 2440MHz, EUT Horizontal
12009.140	39.3	3.3	1.0	138.0	0.0	0.0	Vert	PK	0.0	42.6	74.0	-31.4	Low Ch. 2402 MHz, EUT Horizontal
19214.880	33.8	0.6	1.6	322.0	-13.9	2.0	Horz	AV	0.0	22.5	54.0	-31.5	Low Ch. 2402 MHz, EUT Horizontal
19215.290	33.7	0.6	1.6	221.0	-13.9	2.0	Vert	AV	0.0	22.4	54.0	-31.6	Low Ch. 2402 MHz, EUT Horizontal
12008.800	30.2	3.3	2.9	59.0	-13.9	2.0	Horz	AV	0.0	21.6	54.0	-32.4	Low Ch. 2402 MHz, EUT Horizontal
12398.850	28.0	5.0	2.7	345.0	-13.9	2.0	Horz	AV	0.0	21.1	54.0	-32.9	High Ch. 2480 MHz, EUT Horizontal
12211.000	28.2	4.4	1.9	78.0	-13.9	2.0	Horz	AV	0.0	20.7	54.0	-33.3	Mid Ch. 2440MHz, EUT Horizontal
12398.630	27.4	5.0	1.5	176.0	-13.9	2.0	Vert	AV	0.0	20.5	54.0	-33.5	High Ch. 2480 MHz, EUT Horizontal
12209.040	27.5	4.4	1.0	196.0	-13.9	2.0	Vert	AV	0.0	20.0	54.0	-34.0	Mid Ch. 2440MHz, EUT Horizontal
12008.780	28.1	3.3	1.0	138.0	-13.9	2.0	Vert	AV	0.0	19.5	54.0	-34.5	Low Ch. 2402 MHz, EUT Horizontal

SPURIOUS RADIATED EMISSIONS

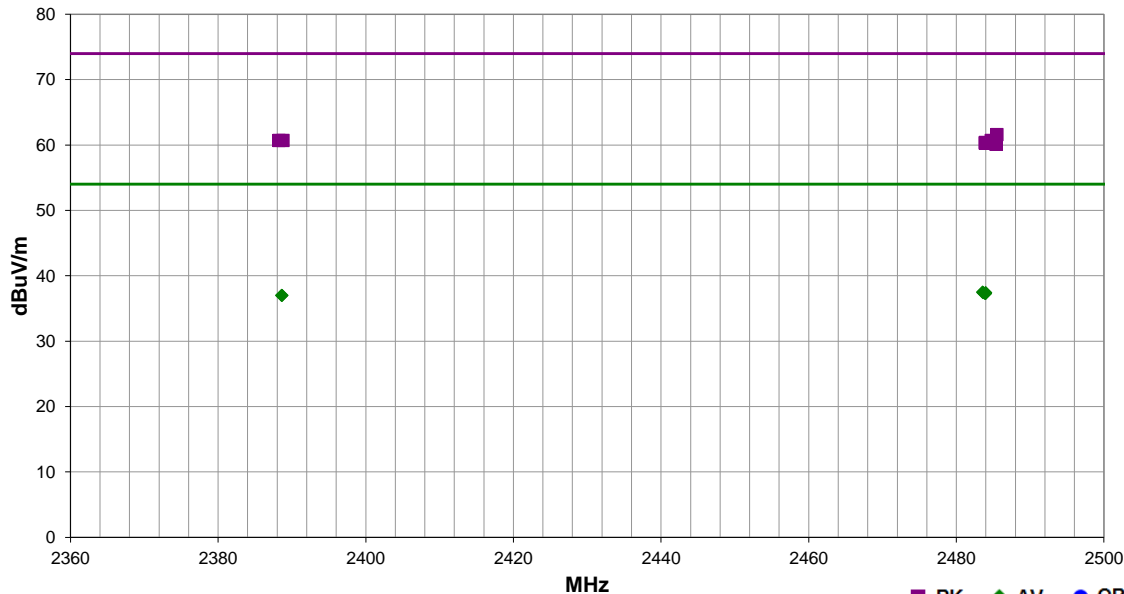


PSA-ESCI 2016.04.26.1
EmiR5 2016.04.26.1

Work Order:	PAYR0010	Date:	07/12/16	
Project:	None	Temperature:	23.8 °C	
Job Site:	EV01	Humidity:	44.8% RH	
Serial Number:	See Configuration	Barometric Pres.:	1025 mbar	Tested by: Brandon Hobbs
EUT:	BluKey USB			
Configuration:	2			
Customer:	PayRange Inc.			
Attendees:	Mike Mitchell			
EUT Power:	5VDC			
Operating Mode:	On, Tx Continuous BLE			
Deviations:	None			
Comments:	Please reference the data comments for EUT orientation, frequency and channel. The client attested to a normal operating duty cycle of 20%. Per ANSI C63.10:2013 the Duty Cycle was adjusted upward to correct for operating at a measured 63% duty cycle while under test and downward for a 20% duty cycle normal operating condition.			

Test Specifications	Test Method
FCC 15.247:2016	ANSI C63.10:2013

Run #	42	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)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Correction Factor for RMS (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2485.487	42.7	-1.1	2.0	252.0	0.0	20.0	Horz	PK	0.0	61.6	74.0	-12.4	High Ch. 2480 MHz, EUT Horizontal
2484.737	41.8	-1.1	1.0	111.0	0.0	20.0	Horz	PK	0.0	60.7	74.0	-13.3	High Ch. 2480 MHz, EUT Vertical
2388.247	42.3	-1.6	1.0	147.0	0.0	20.0	Horz	PK	0.0	60.7	74.0	-13.3	Low Ch. 2402 MHz, EUT Vertical
2388.790	42.3	-1.6	1.0	136.0	0.0	20.0	Vert	PK	0.0	60.7	74.0	-13.3	Low Ch. 2402 MHz, EUT Vertical
2483.943	41.5	-1.1	1.0	195.0	0.0	20.0	Vert	PK	0.0	60.4	74.0	-13.6	High Ch. 2480 MHz, EUT Vertical
2485.123	41.4	-1.1	1.0	0.0	0.0	20.0	Vert	PK	0.0	60.3	74.0	-13.7	High Ch. 2480 MHz, EUT On Side
2483.917	41.4	-1.1	1.0	254.0	0.0	20.0	Vert	PK	0.0	60.3	74.0	-13.7	High Ch. 2480 MHz, EUT Horizontal
2485.380	41.2	-1.1	3.2	74.0	0.0	20.0	Horz	PK	0.0	60.1	74.0	-13.9	High Ch. 2480 MHz, EUT On Side
2483.567	30.5	-1.1	1.0	111.0	-13.9	20.0	Horz	AV	2.0	37.5	54.0	-16.5	High Ch. 2480 MHz, EUT Vertical
2483.647	30.4	-1.1	1.0	0.0	-13.9	20.0	Vert	AV	2.0	37.4	54.0	-16.6	High Ch. 2480 MHz, EUT On Side
2483.987	30.4	-1.1	2.0	252.0	-13.9	20.0	Horz	AV	2.0	37.4	54.0	-16.6	High Ch. 2480 MHz, EUT Horizontal
2483.957	30.3	-1.1	1.0	195.0	-13.9	20.0	Vert	AV	2.0	37.3	54.0	-16.7	High Ch. 2480 MHz, EUT Vertical
2483.930	30.3	-1.1	3.2	74.0	-13.9	20.0	Horz	AV	2.0	37.3	54.0	-16.7	High Ch. 2480 MHz, EUT On Side
2483.923	30.3	-1.1	1.0	254.0	-13.9	20.0	Vert	AV	2.0	37.3	54.0	-16.7	High Ch. 2480 MHz, EUT Horizontal
2388.660	30.5	-1.6	1.0	147.0	-13.9	20.0	Horz	AV	2.0	37.0	54.0	-17.0	Low Ch. 2402 MHz, EUT Vertical
2388.617	30.5	-1.6	1.0	136.0	-13.9	20.0	Vert	AV	2.0	37.0	54.0	-17.0	Low Ch. 2402 MHz, EUT Vertical