FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

Proxfinity

MODEL NUMBER: PinV10

FCC ID: 2AFPT00P010

REPORT NUMBER: 10932099B

ISSUE DATE: 9/21/2015

Prepared for

Proxfinity Inc.
222 W Merchandise Mart, Floor 12, Suite 1871
Chicago
IL, 60654, USA

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	9/21/2015	Initial Issue	V Sabalvaro

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Proxfinity Inc.
222 W Merchandise Mart, Floor 12, Suite 1871
Chicago, IL 60654, USA

EUT DESCRIPTION: Wearable tradeshow radio

MODEL: PinV10

DATE TESTED: August 25, 2015 – September 9, 2015

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL LLC By:

BART MUCHA
WiSE STAFF ENGINEER
UL LLC

Tested By:

Vincent Sabalvaro
WISE Laboratory Engineer
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 333 Pfingsten Road, Northbrook, IL 60062 USA.

UL NBK is accredited by NVLAP, Laboratory Code 100414-0. The full scope of accreditation can be viewed at http://ts.nist.gov/Standards/scopes/1004140.htm

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Sample Calculations
Radiated Field Strength and Conducted Emissions data contained within this report is calculated on the following basis:
Field Strength (dBuV/m) = Meter Reading (dBuV) + AF (dB/m) - Gain (dB) + Cable Loss (dB)
Conducted Voltage (dBuV) = Meter Reading (dBuV) + Cable Loss (dB) + LISN IL (dB)
Conducted Current (dBuA) = Meter Reading (dBuV) + Cable Loss (dB) - Transducer Factor (dBohms)

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test	Range	Equipment	Uncertainty k=2
Radiated Emissions	30-200MHz	Bicon 10m Horz	4.27dB
Radiated Emissions	30-200MHz	Bicon 10m Vert	4.28dB
Radiated Emissions	200-1000MHz	LogP 10m Horz	3.33dB
Radiated Emissions	200-1000MHz	LogP 10m Vert	3.39dB
Radiated Emissions	30-200MHz	Bicon 3m Horz	3.30dB
Radiated Emissions	30-130MHz	Bicon 3m Vert	4.84dB
Radiated Emissions	130-200MHz	Bicon 3m Vert	4.94dB
Radiated Emissions	200-1000MHz	LogP 3m Horz	3.46dB
Radiated Emissions	200-1000MHz	LogP 3m Vert	4.98dB
Radiated Emissions	1-6GHz	Horn	5.02dB
Radiated Emissions	6-18GHz	Horn	5.34dB
Radiated Emissions	18-26GHz	Horn	6.60dB
Conducted Ant Port	30MHz-26GHz	Spectrum Analyzer	2.94

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Wearable device for use at tradeshows. Devices talk to each other using an 802.15.4 radio in 2.4Ghz band. Devices talk to smartphone using Bluetooth Low Energy radio in 2.4Ghz band.

The device is manufactured by Proxfinity, Inc.

5.2. MAXIMUM OUTPUT E-FIELD STRENGTH

The transmitter has a maximum output peak E-field as follows:

Frequency Range (MHz)	Mode	Output AV E-field Strength (dBuV/m)
2402-2480	BTLE	86.29
2402-2480	BTLE & 802.15.4	91.3

* Only one single channel from each respective radio on the EUT are overlapping. This measurement, from the overlapping channels, was included to demonstrate worst-case scenario.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Chip antenna, with a maximum gain of 0.5 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was PinV10 RF Test Software Version 3.0

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case mode is determined as the simultaneous transmission of both available radios at their overlapping channels due to the combined outputs producing the highest power levels. The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
EUT	Proxfinity, Inc.	PinV10	non-serialized	2AFPT00P010

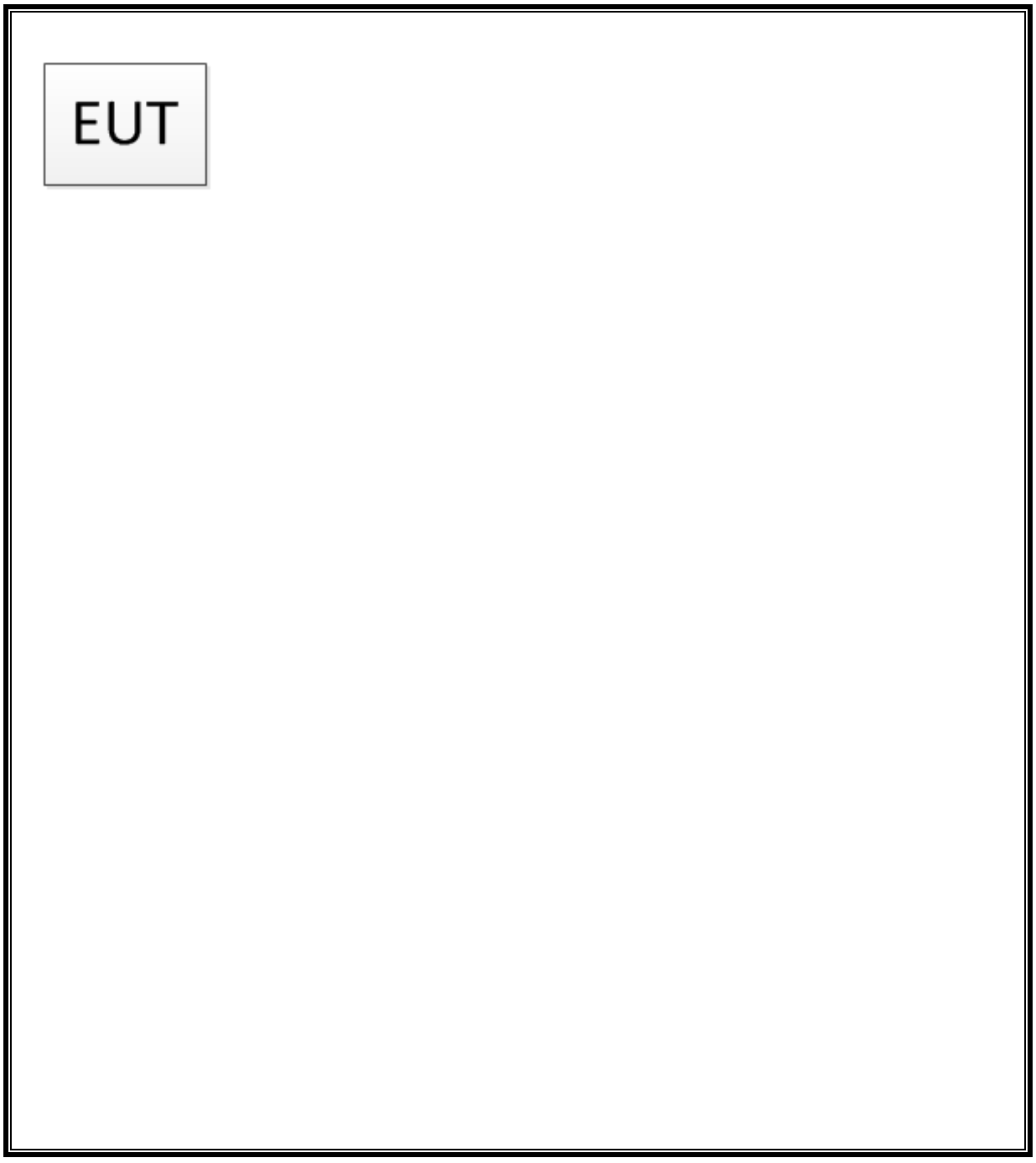
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	MicroUSB	1	MicroUSB	MicroUSB	1	Charger

TEST SETUP

The EUT is battery operated and was tested in normal operating mode. The test units were programed for lowest, middle, highest channel operation, and overlapping channels of the two radios.

SETUP DIAGRAM FOR TESTS



SETUP FOR DIGITAL DEVICE TESTS

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
EUT	Proxfinity, Inc.	PinV10	non-seralized	2AFPT00P010

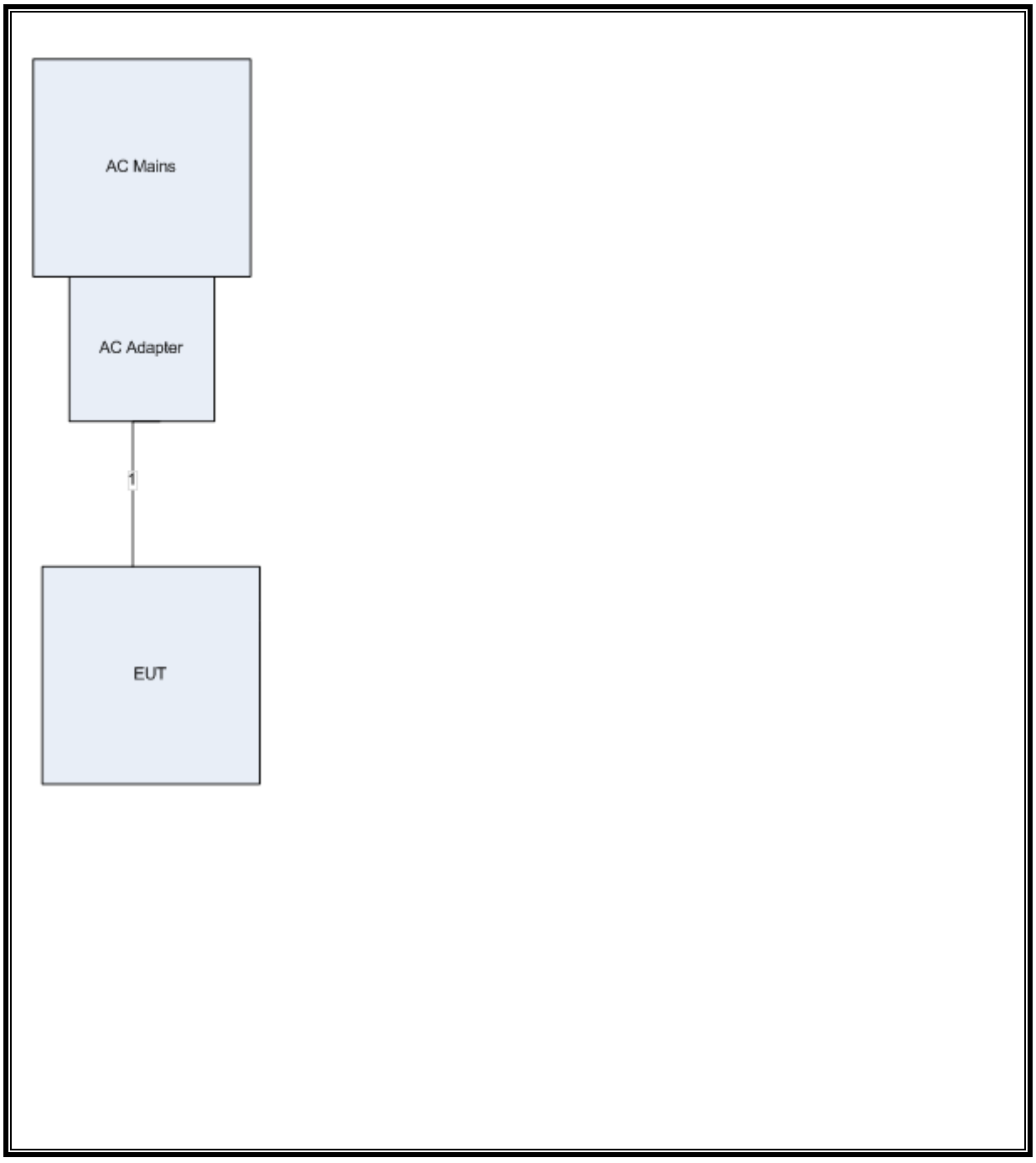
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	MicroUSB	1	MicroUSB	MicroUSB	1	Charger

TEST SETUP

The EUT is battery operated and was tested in receive mode and charge mode.

SETUP DIAGRAM FOR DIGITAL DEVICE TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List					
Description	**Manufacturer**	**Model**	**T No.**	**Cal Date**	**Cal Due**
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014		
Conducted Software	UL	UL EMC	Ver 9.5, May 17 2012		
EMI Test Receiver	Rohde & Schwarz	ESR	EMC4377	4/20/2015	4/20/2016
Transient Limiter	Electro-Metrics	EM7600-2	EMC4224	N/A	N/A
HighPass Filter	Solar Electronics	2803-150	EMC4327	N/A	N/A
Attenuator	HP	8494B	2831A0083	N/A	N/A
LISN - L1	Solar	8602-50-TS-50-N	EMC4052	1/15/2015	1/15/2016
LISN - L2	Solar	8602-50-TS-50-N	EMC4064	1/9/2015	1/9/2016
Signal Analyzer	Agilent	PXA	EMC4360	12/19/2014	12/19/2015
Near Field Probe	EMCO	7405	1270	N/A	N/A
Test Receiver	Rhode & Schwarz	ESCI	EMC4328	12/18/2014	12/30/2015
Log-P Antenna	Chase	UPA6112A	EMC4313	11/19/2014	11/19/2015
Bicon Antenna	Electro-Metrics	UPA6109	EMC4323	12/18/2014	12/31/2015
Antenna Array	UL	BOMS	EMC4276	12/1/2014	12/31/2015
Test Receiver	Rhode & Schwarz	ESU	EMC4323	12/16/2014	12/30/2015

7. TEST RESULTS

7.1. 20dB & 99% BANDWIDTH

7.1.1. LIMITS

None; for reporting purposes only.

7.1.2. TEST PROCEDURE

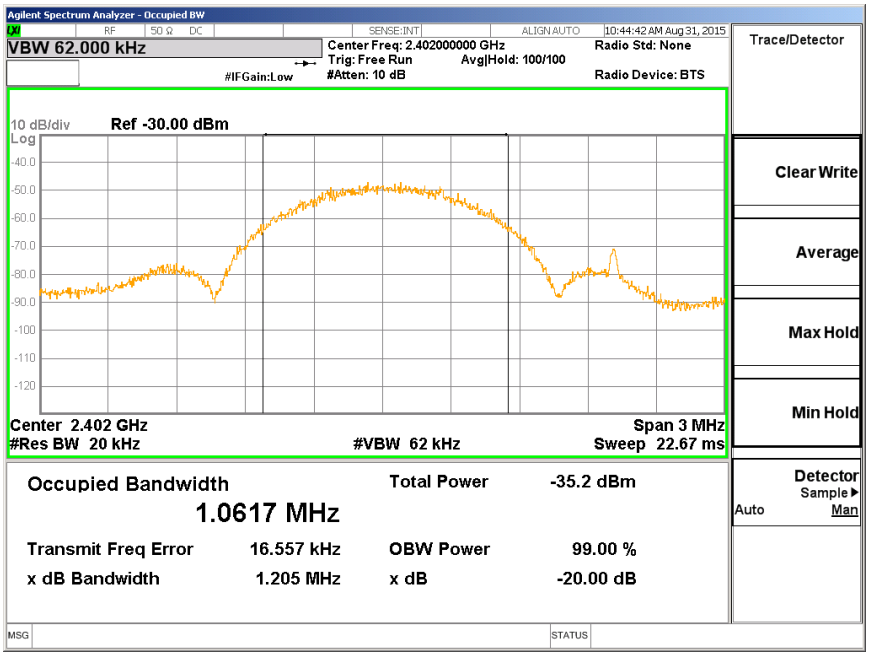
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

7.1.3. RESULTS

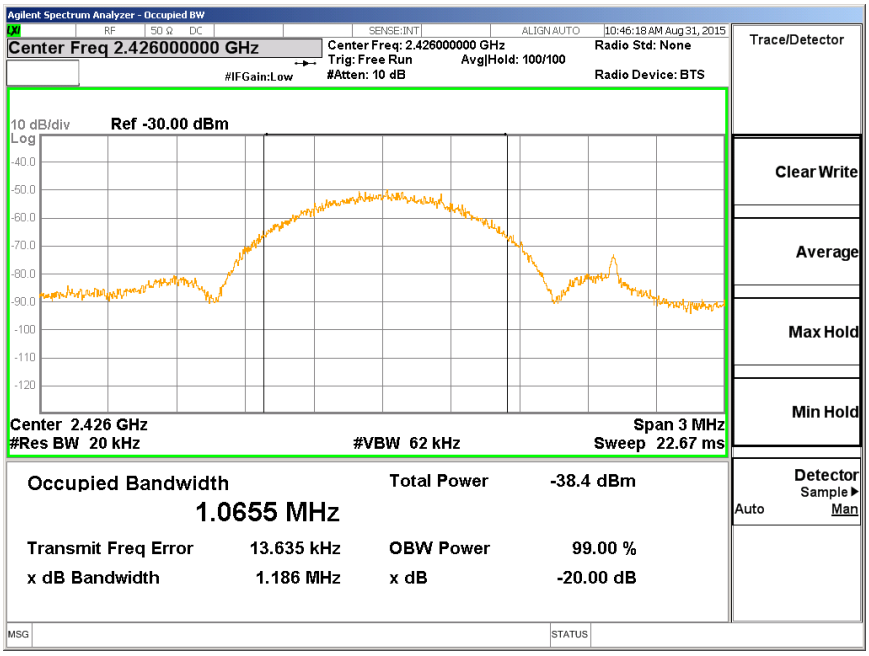
Channel	Frequency (MHz)	99% Bandwidth (MHz)	20dB Bandwidth (MHz)
Low	2402	1.0617	1.187
Middle	2426	1.0655	1.184
High	2480	1.1837	1.199

7.1.4. 99% BANDWIDTH

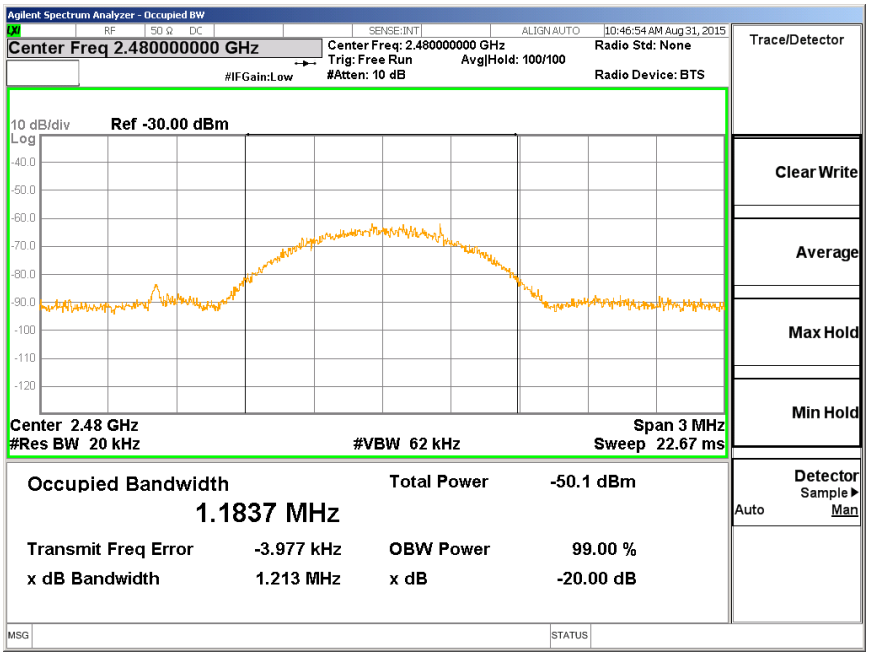
99% BANDWIDTH LOW CH



99% BANDWIDTH MID CH

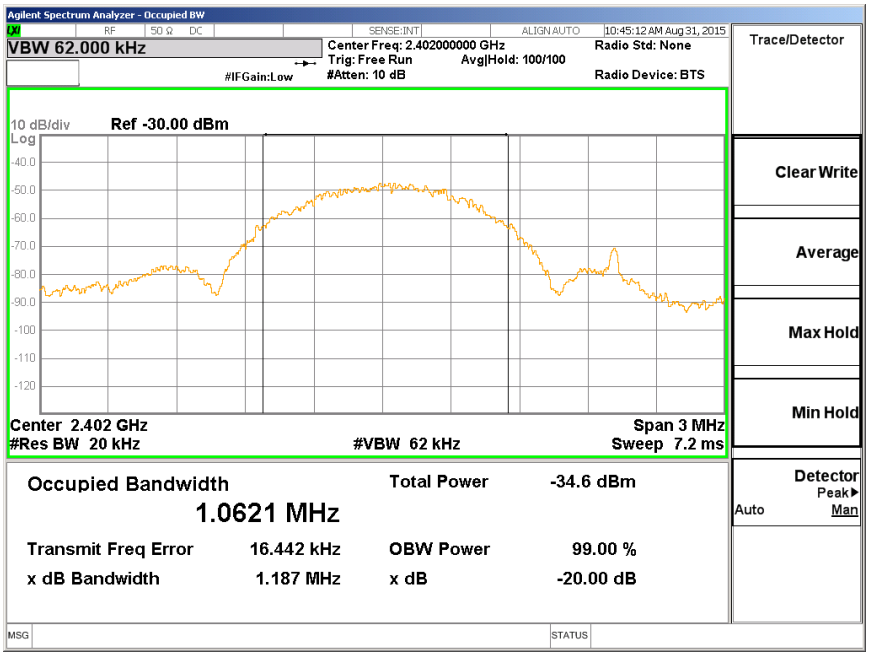


99% BANDWIDTH HIGH CH

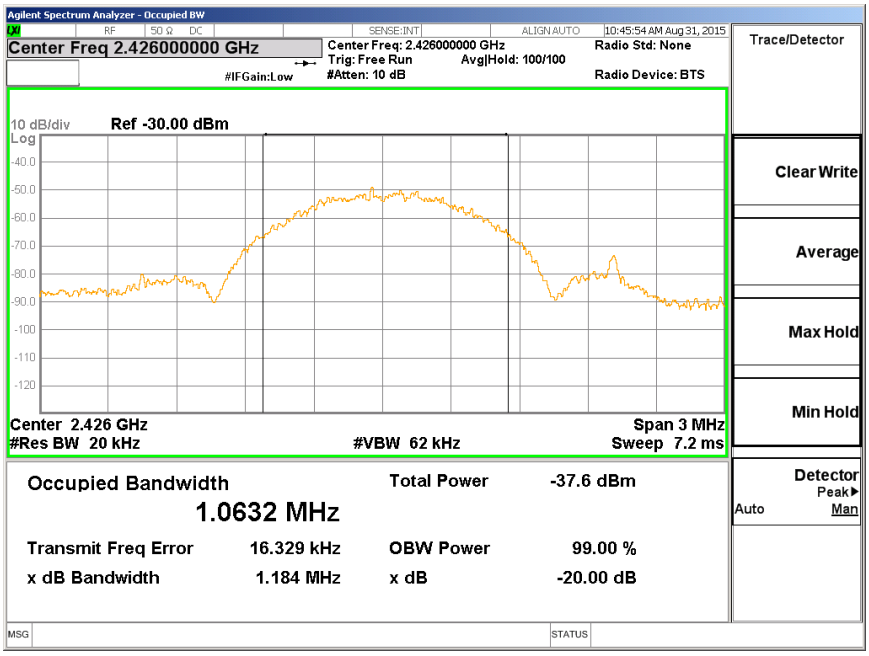


7.1.5. 20dB BANDWIDTH

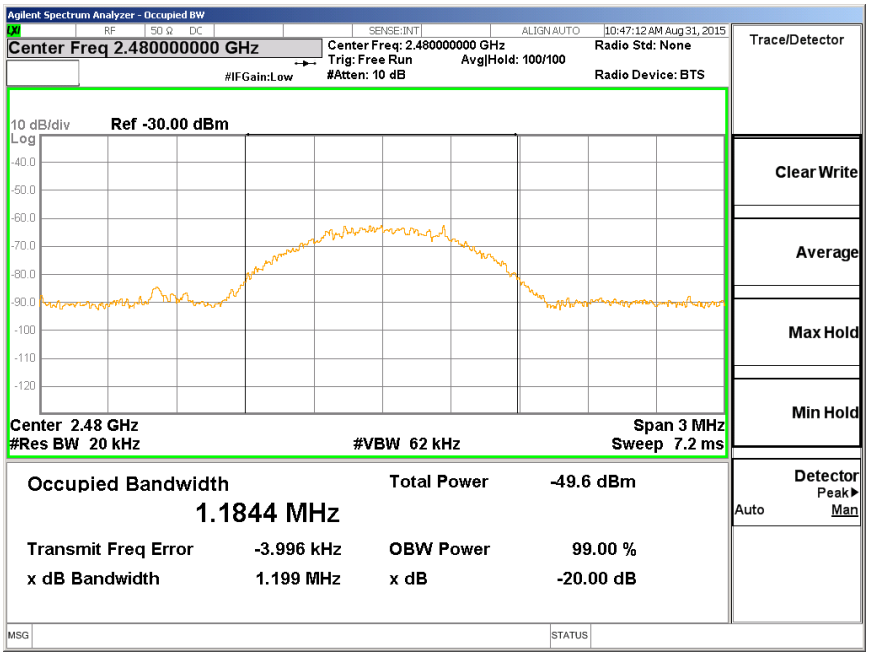
20dB BANDWIDTH LOW CH



20dB BANDWIDTH MID CH



20dB BANDWIDTH HIGH CH



7.2. RADIATED EMISSIONS

LIMIT

FCC 15.249

Operation within the bands 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHZ, and 24.0–24.25 GHz.
(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100 **	3
88–216	150 **	3
216–960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

RESULTS

7.2.1. FUNDAMENTAL FREQUENCY RADIATED EMISSION

BLE

Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor	Cable Gain/Loss (dB)	Corrected Reading dBuV/m	FCC 15.249 PK Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.4023	59.04	Pk	21.8	4.58	85.42	94	-8.58	236	108	V
2.4023	49.65	Pk	21.8	4.58	76.03	94	-17.97	68	100	H
2.4262	51.13	Pk	21.9	4.54	77.57	94	-16.43	75	259	H
2.4262	59.85	Pk	21.9	4.54	86.29	94	-7.71	240	102	V
2.4798	51.5	Pk	22	4.36	77.86	94	-16.14	217	264	H
2.4797	56.55	Pk	22	4.36	82.91	94	-11.09	239	100	V

Pk - Peak detector

*Peak levels are below Average limit, therefore average measurements are not needed.

Simultaneous BLE & 802.15.4

Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor	Cable Gain/Loss (dB)	Corrected Reading dBuV/m	FCC 15.249 PK Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.4256	64.86	Pk	21.9	4.54	91.3	94	-2.7	240	101	V
2.4256	57.43	Pk	21.9	4.54	83.87	94	-10.13	76	259	H

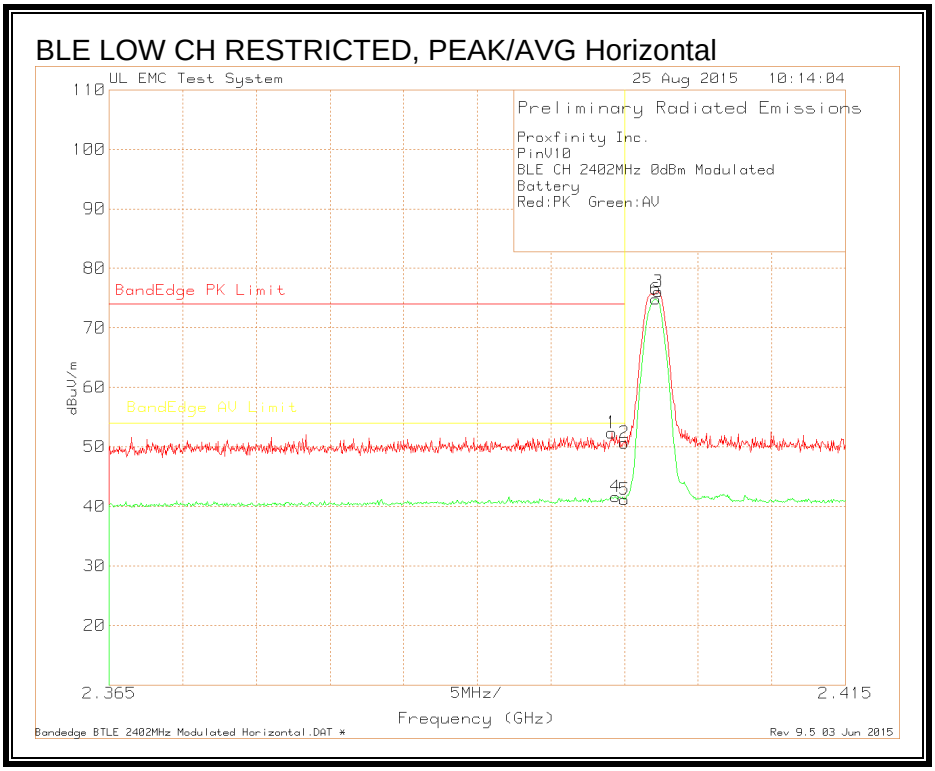
Pk - Peak detector

*Peak levels are below Average limit, therefore average measurements are not needed.

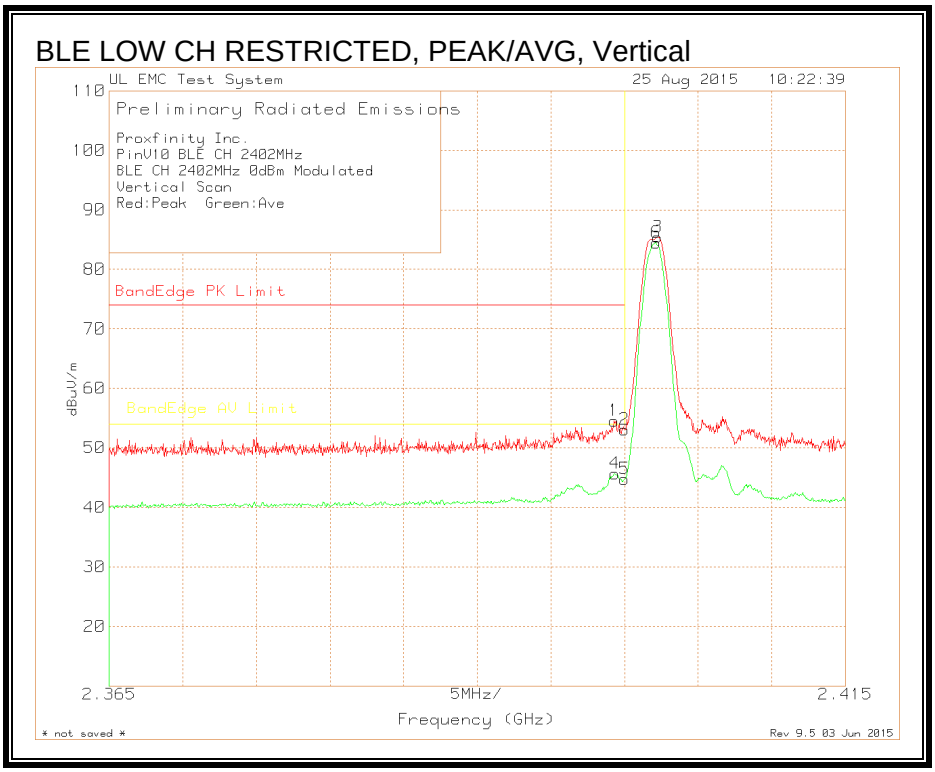
**Only one single channel from each respective radio on the EUT are overlapping. This measurement, from the overlapping channels, was included to demonstrate worst-case scenario.

7.2.2. TRANSMITTER RESTRICTED BAND EDGES

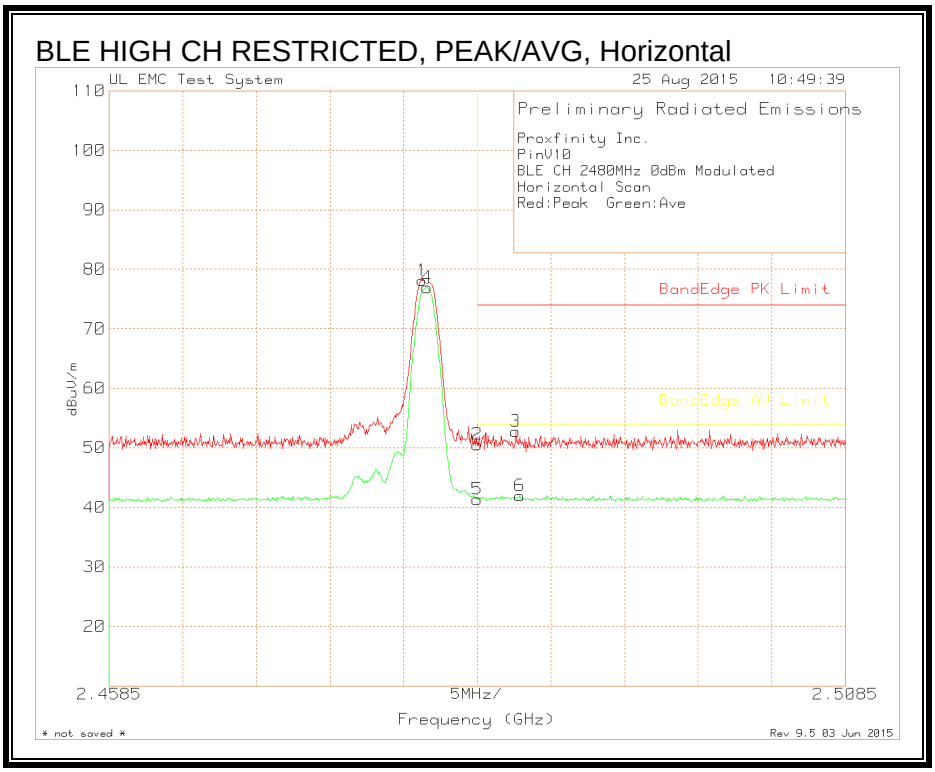
RESTRICTED BANDEDGE (BLE, LOW CHANNEL, HORIZONTAL)



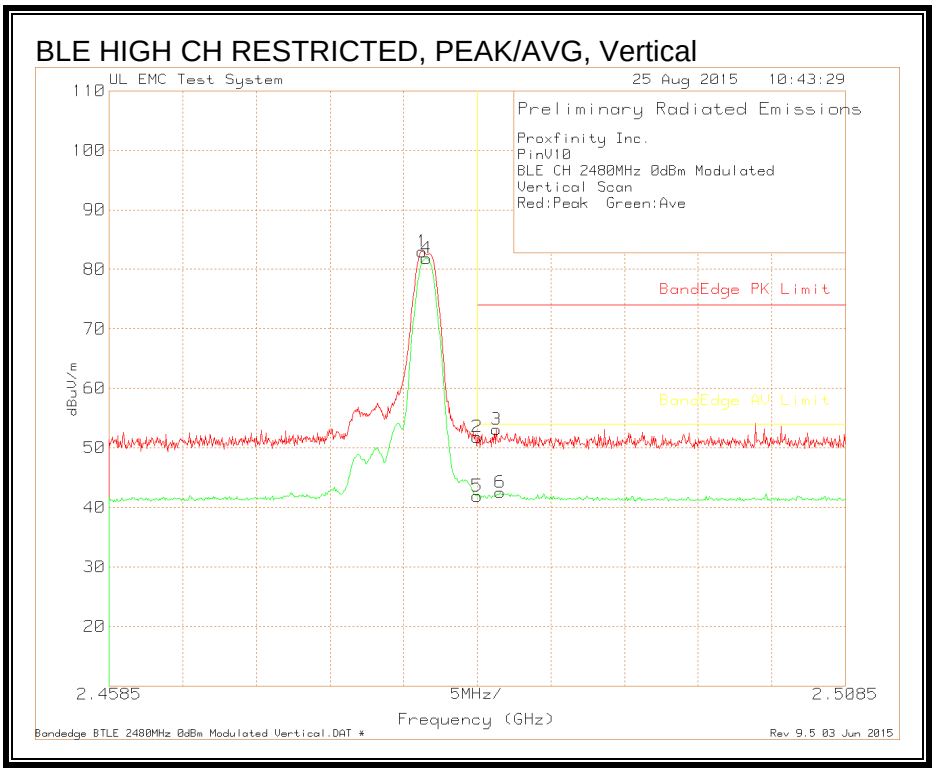
RESTRICTED BANDEDGE (BLE LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (BLE HIGH CHANNEL, HORIZONTAL)

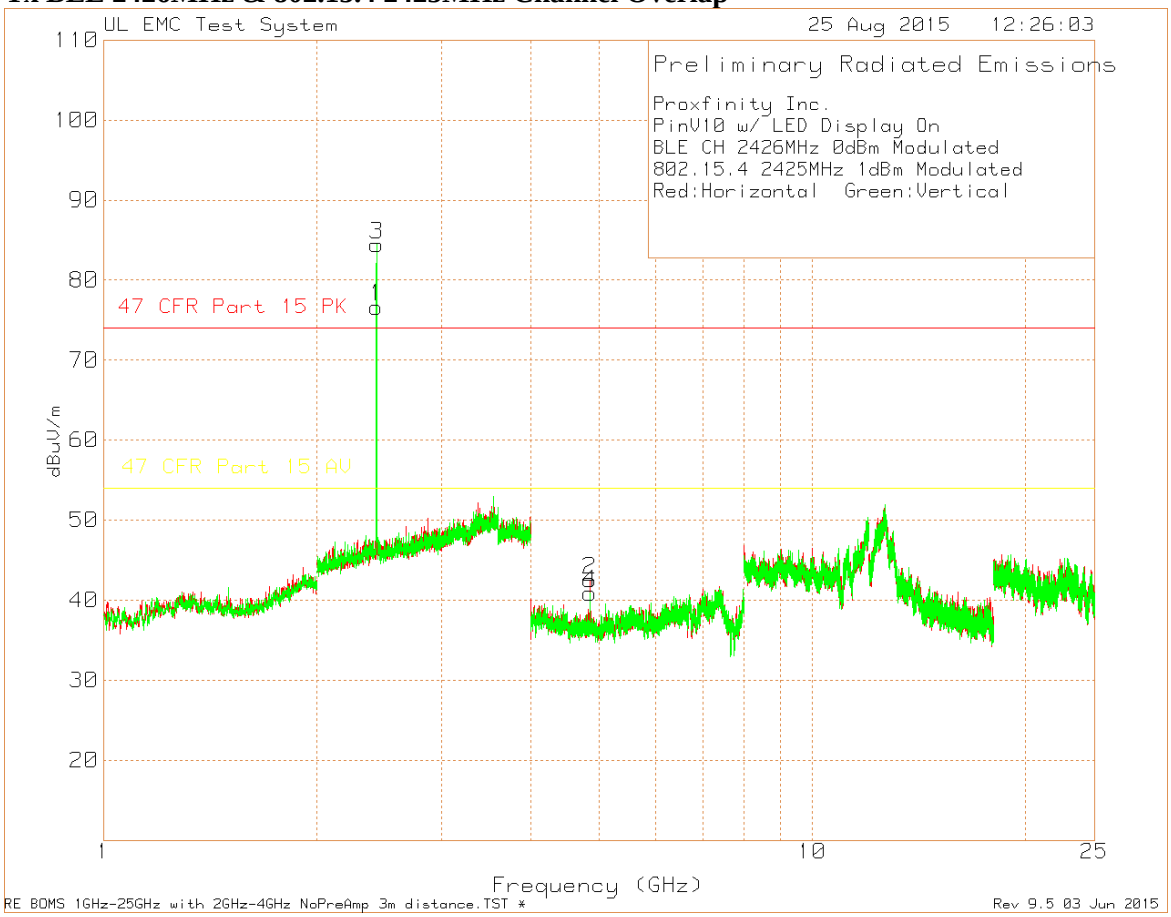


RESTRICTED BANDEDGE (BLE HIGH CHANNEL, VERTICAL)



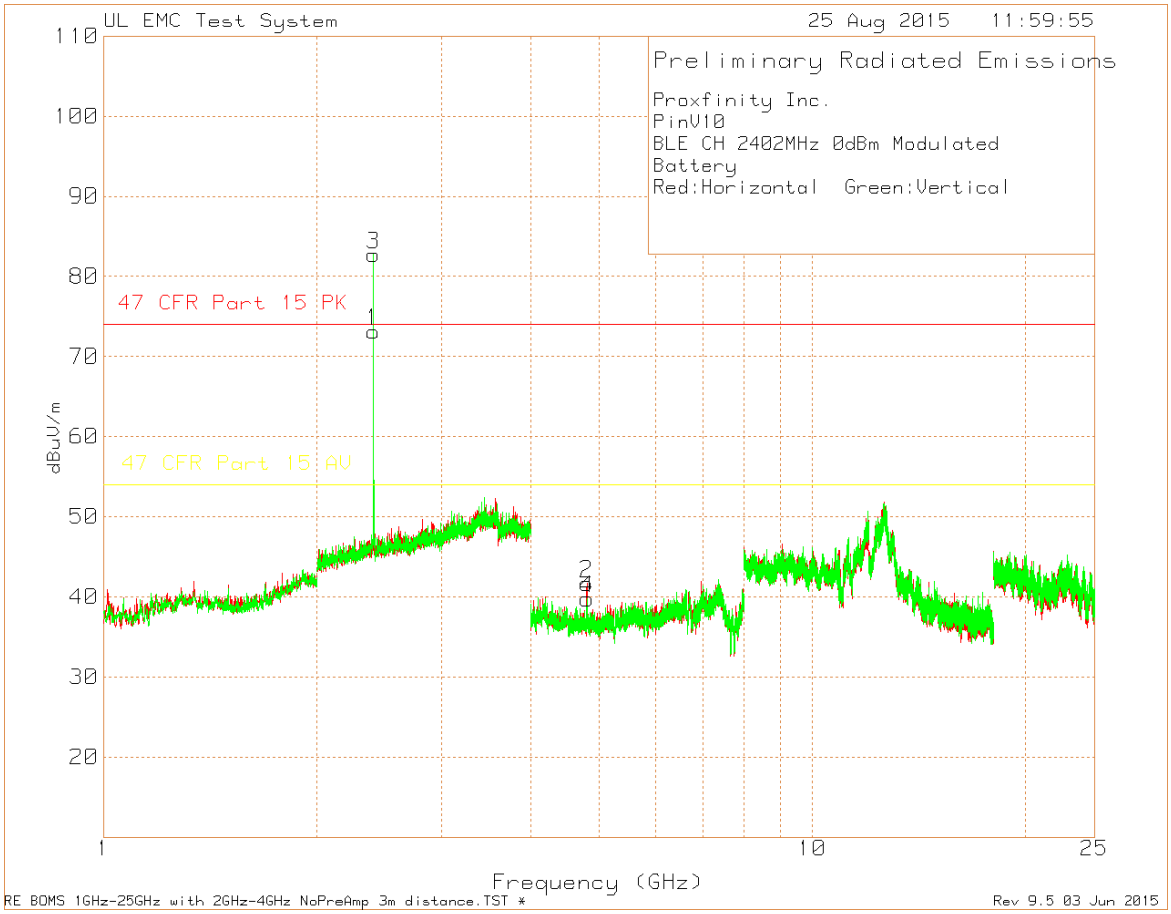
7.2.3. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz

Tx BLE 2426MHz & 802.15.4 2425MHz Channel Overlap



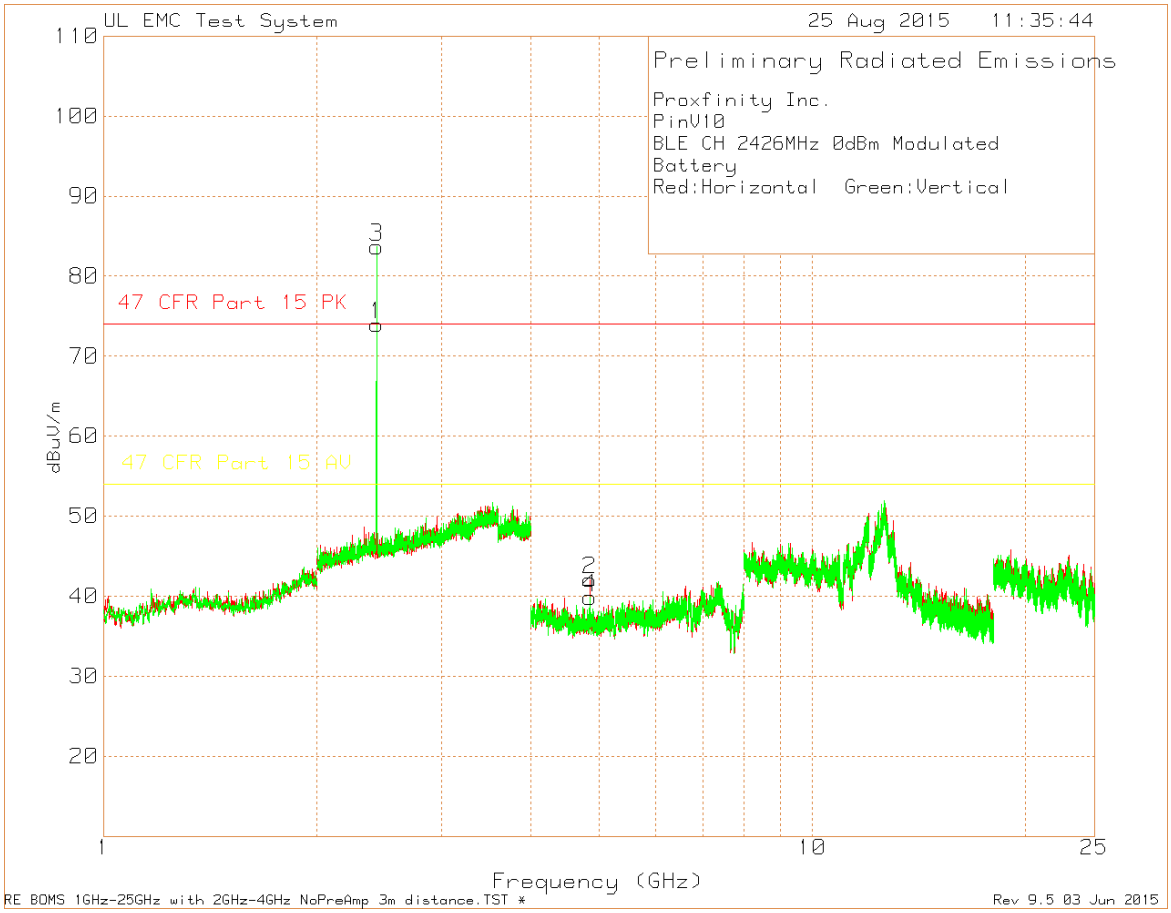
All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

Tx BLE 2402MHz Channel



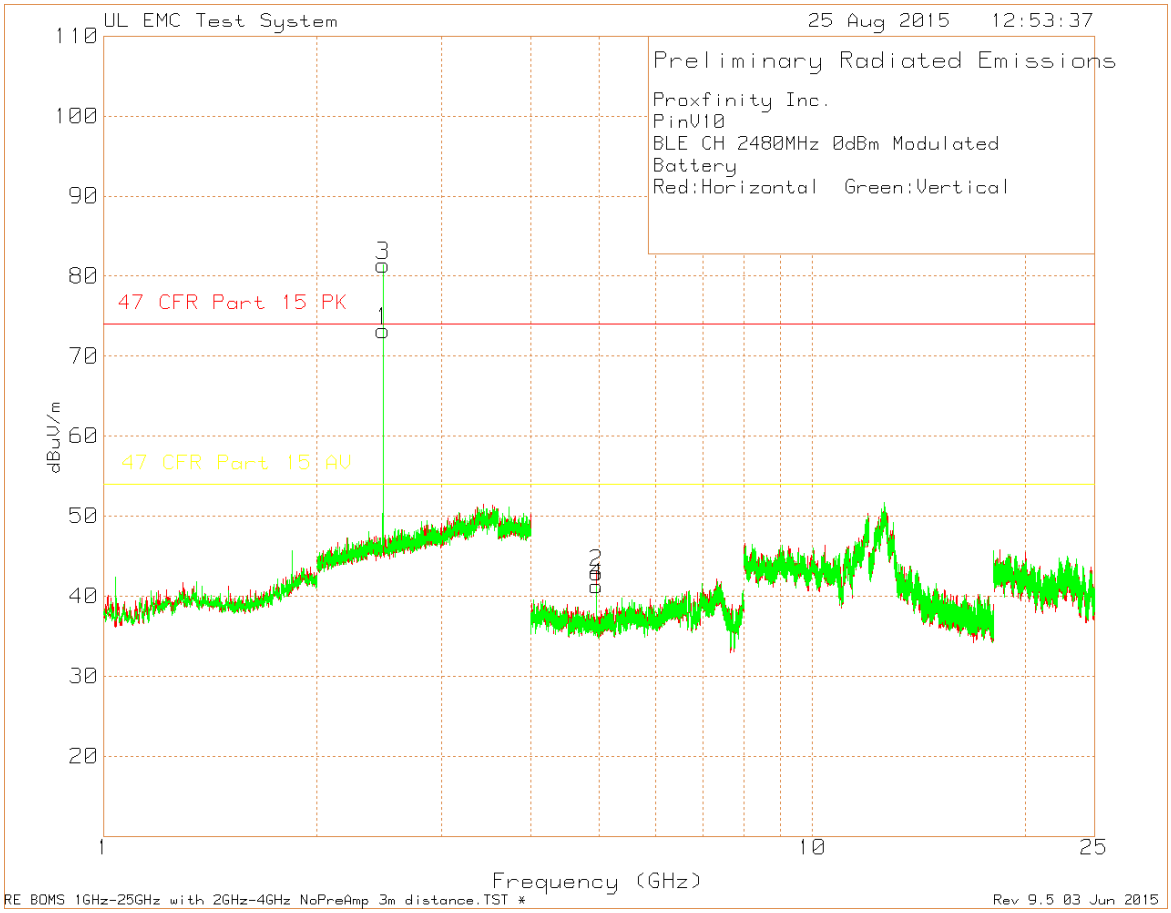
All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

Tx BLE 2426MHz Channel



All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

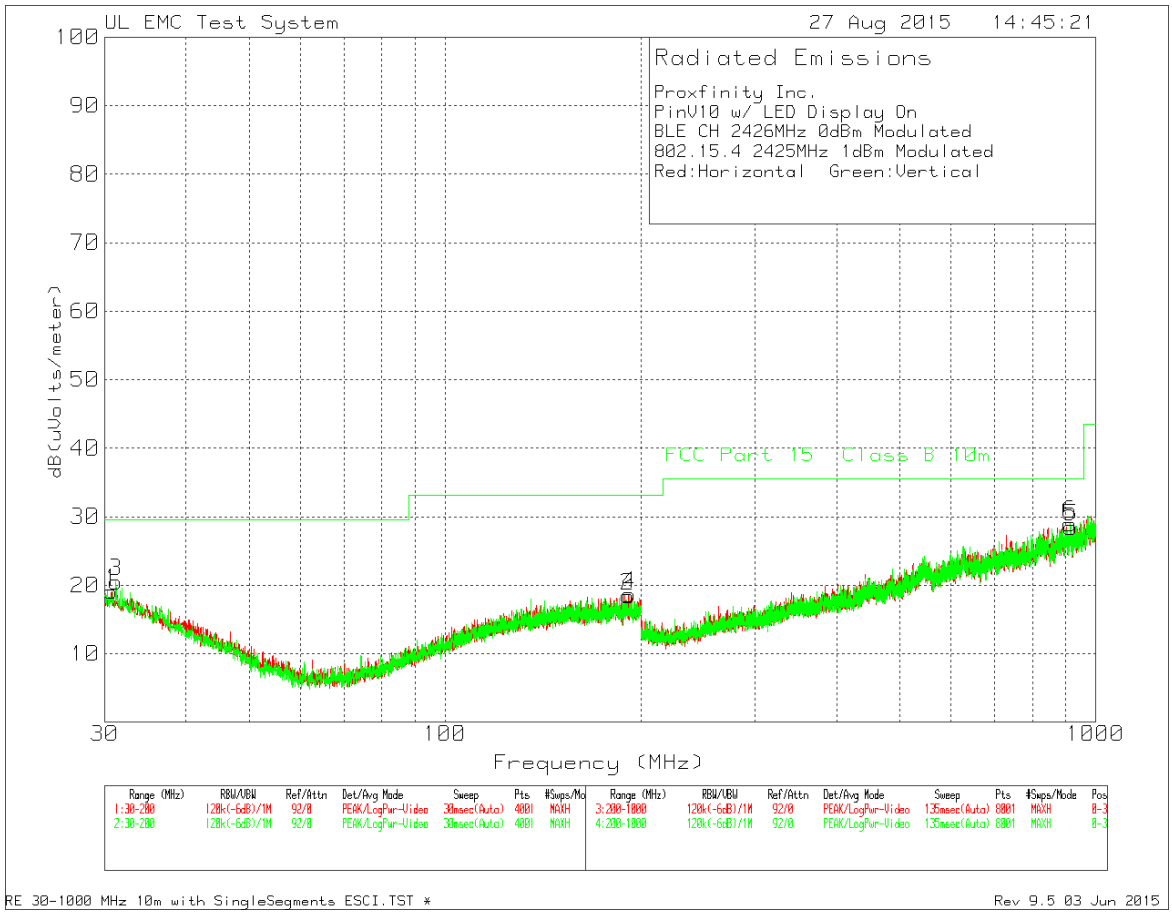
Tx BLE 2480MHz Channel



All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

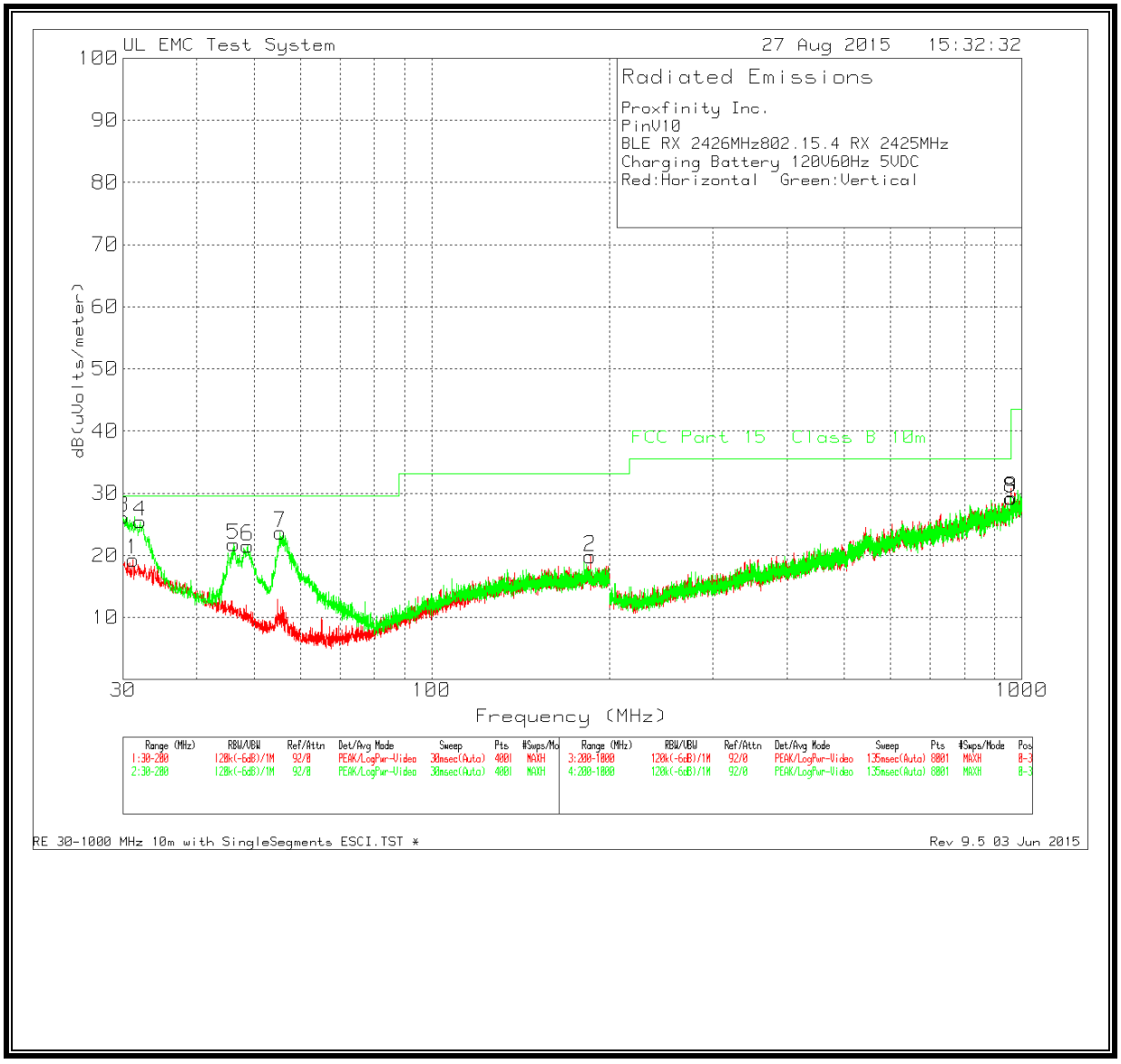
7.2.4. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (TX BLE 2426MHz & 802.15.4 2425MHz Overlap)



All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

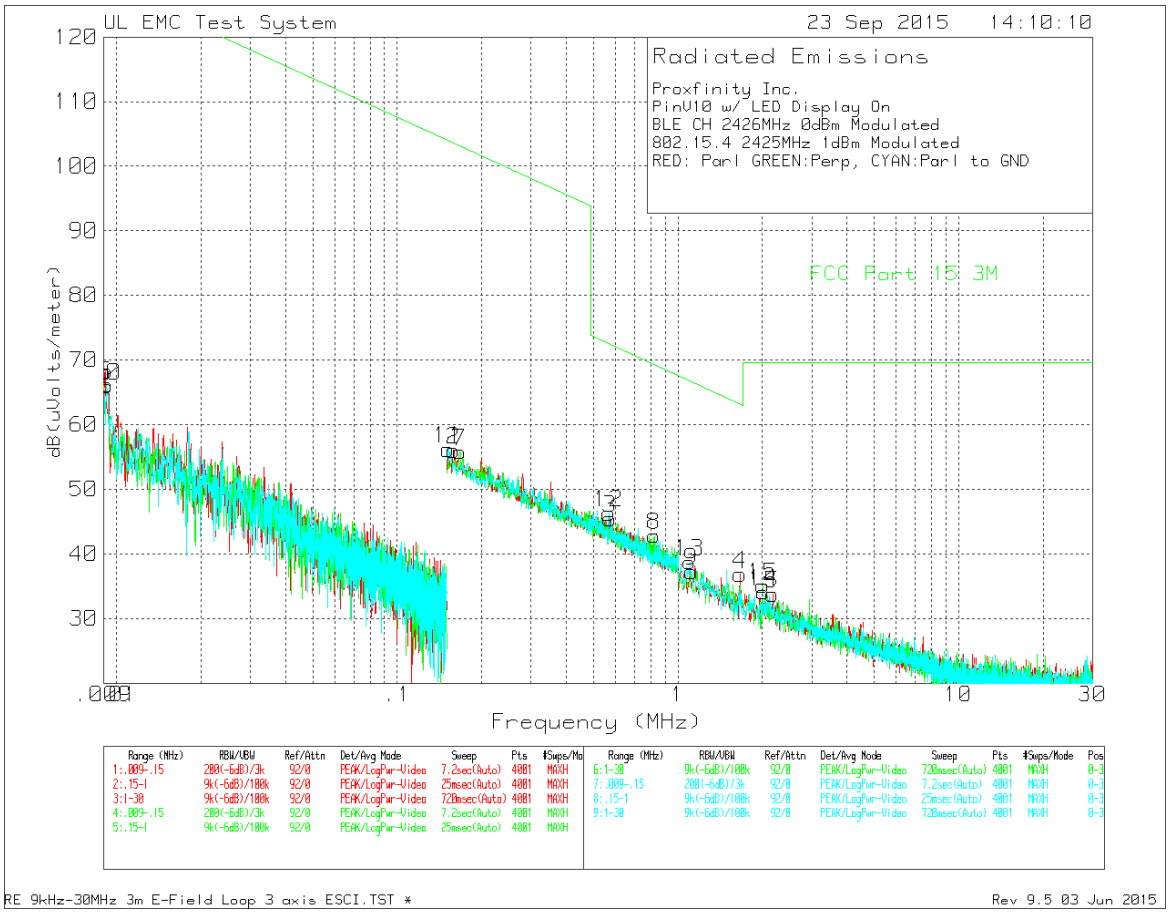
SPURIOUS EMISSIONS 30 TO 1000 MHz (RX BLE & 802.15.4 Charging)



Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Gain	Cable Loss	Corrected Reading dB(uVolts/meter)	FCC Part 15 Class B 10m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
30.1012	34.03	Qp	18.2	-30.2	22.03	29.55	-7.52	1	105	V
32.328	34.74	Qp	17.3	-30.2	21.84	29.55	-7.71	0	100	V
55.5357	41.85	Qp	7.2	-30.1	18.95	29.55	-10.6	56	224	V

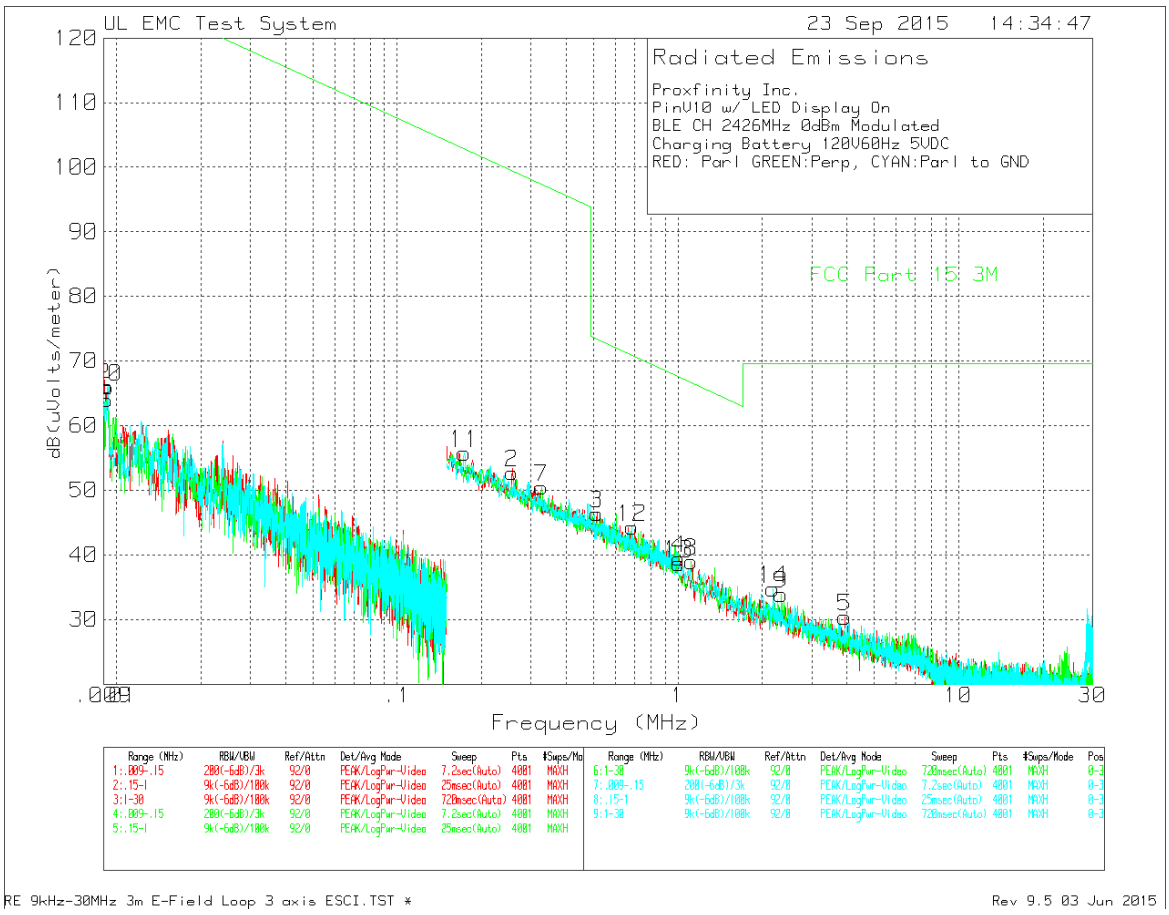
Qp - Quasi-Peak detector

SPURIOUS EMISSIONS 9 kHz TO 30 MHz (TX BLE 2426MHz & 802.15.4 2425MHz Overlap)



All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

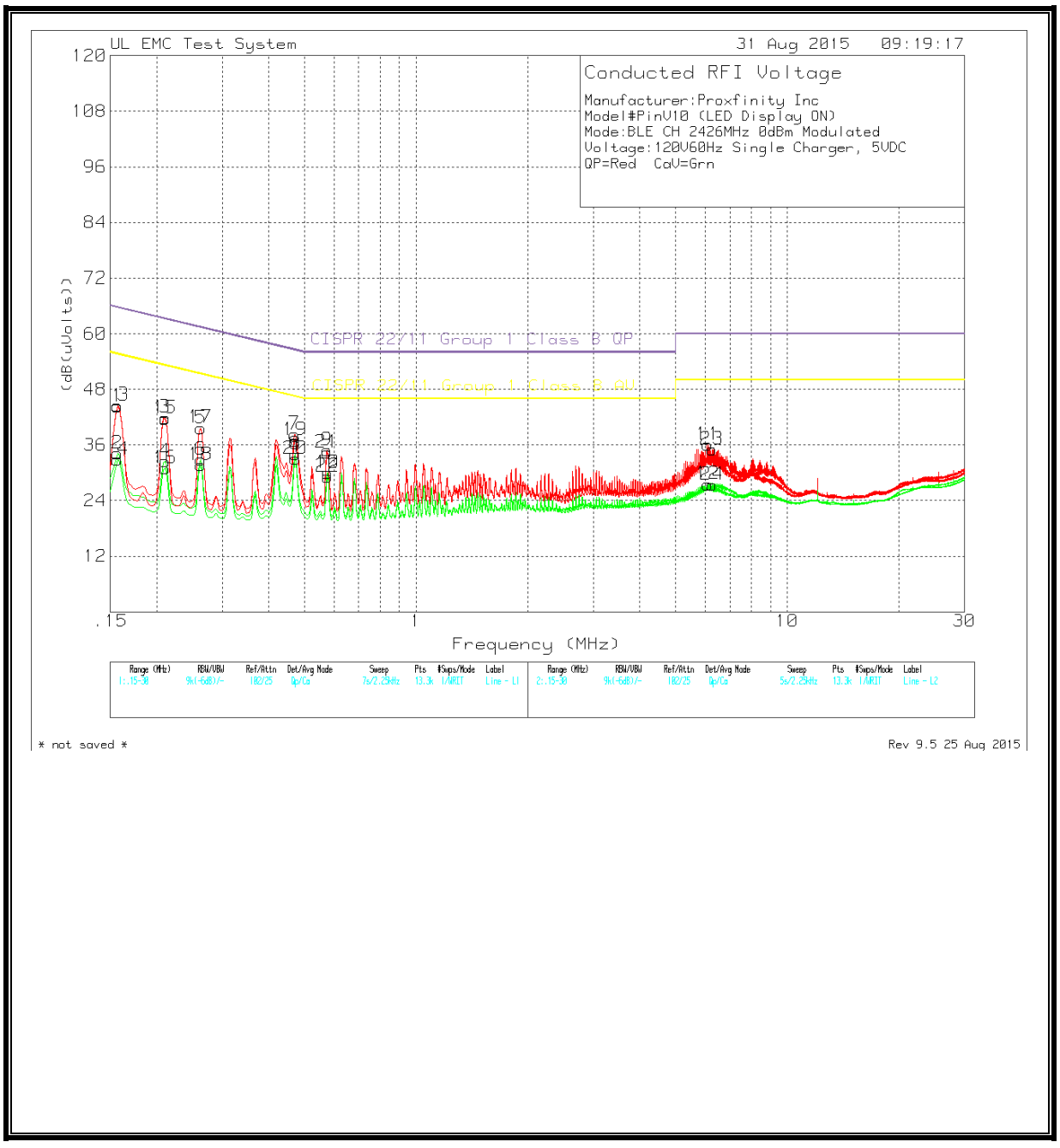
SPURIOUS EMISSIONS 9 kHz TO 30 MHz (RX BLE & 802.15.4 Charging)



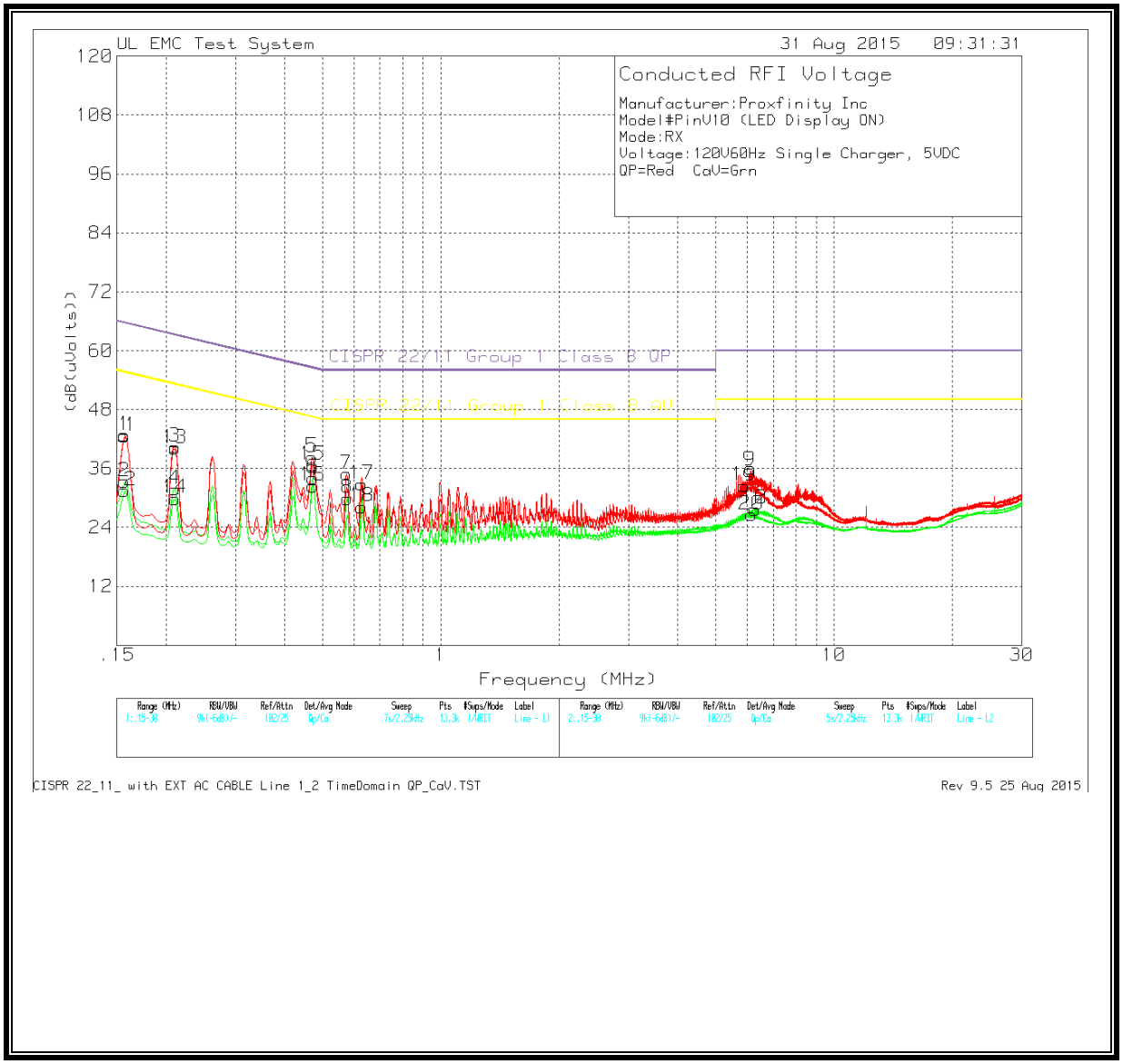
All visible emissions are at least 6dB below the limit or under the noise floor, therefore no further measurement needed.

7.2.1. CONDUCTED EMISSIONS

CONDUCTED EMISSIONS 150 kHz TO 30 MHz (TX BLE 2426MHz & 802.15.4 2425MHz Overlap)



CONDUCTED EMISSIONS 150 kHz TO 30 MHz (RX BLE & 802.15.4 Charging)



CONDUCTED EMISSIONS 150 kHz TO 30 MHz (Standby)