Project 15398-15

Plum
Light Pad Dimmer
WiFi Radio Section

Wireless Certification Report
(1 of 2)

Prepared for:

Rich Warwick
Plum
9800 N. Lamar Blvd.
Suite 310
Austin, TX 78753

By

Professional Testing (EMI), Inc.
1601 North A.W. Grimes Blvd., Suite B
Round Rock, Texas 78665

6 Aug 2015

Reviewed by	Written by
	
Larry Finn Chief Technical Officer	Eric Lifsey EMC Engineer

Revision History

Revision Number	Description	Date
00	Draft for client and internal review.	July 27, 2015
01	Revised.	July 31, 2015
02	Revised to correct RSS-Gen clause references.	6 Aug 2015

Corrections:

Where witness Russ is shown the full name Russ Troxel applies.

Table of Contents

Compliance Certificate

Applicant	Device & Test Identification	
Plum (Rich Warwick)	FCC ID:	2AFB9P1000
9800 N. Lamar Blvd.	Industry Canada ID:	20409-P1000
Suite 310	Model(s):	Light Pad Dimmer
Austin, TX 78701		WiFI Radio Section
Certificate Date: 6 Aug 2015	Laboratory Project ID:	15398-15

The device named above was tested utilizing the following documents and found to be in compliance with the required criteria:

Requirement**	Reference	Detail
FCC 47 CFR Part 15 C	15.247	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
FCC 47 CFR Part 15 C	15.209	Radiated emission limits; general requirements.
FCC 47 CFR Part 15 C	15.107, 15.207	Conducted emission limits.
FCC 47 CFR Part 15 C	15.205	Restricted Bands of Operation
KDB 558074 D01	DR01	DTS Measurement Guidance v03r02
KDB 412172	D01	Guidelines for Determining the ERP and EIRP of an RF Transmitting System
OET Bulletin 65*	Edition 97-01, and Supplement C, Ed. 01-01	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
RSS-247	Issue 1	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS-Gen	Issue 4	General Requirements and Information for the Certification of Radio Apparatus
RSS-102	Issue 4	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

*MPE is reported separately from this document. **Corresponding RSS references are listed in the body of the report.

I, Eric Lifsey, for Professional Testing (EMI), Inc., being familiar with the above requirements and test procedures have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.

Eric Lifsey
EMC Engineer

This report has been reviewed and accepted by the Applicant**.** The undersigned is responsible for ensuring that this device will continue to comply with the requirements listed above.

_____
Representative of Applicant

1.0 Introduction

1.1 Scope

This report describes the extent to which the equipment under test (EUT) conformed to the intentional radiator requirements of the United States and Canada.

Professional Testing (EMI), Inc., (PTI) follows the guidelines of National Institute of Standards and Technology (NIST) for all uncertainty calculations, estimates, and expressions thereof for electromagnetic compatibility testing.

1.2 EUT Description

Table 1.2.1: Equipment Under Test

Manufacturer / Model	Serial #	Description
Plum / Light Pad Dimmer	1600019	2400-2483.5 MHz DSSS transceiver; applies to WiFi radio section 802.11 b, g, and n.

Table 1.2.2: Support Equipment

Manufacturer / Model	Serial #	Description
Plum	N/A	Incandescent lamp (200W) and cable assembly.

The EUT designed as a module for use in individual lighting assemblies to control lighting level.

The EUT measures approximately 10.5 cm x 5.4 cm x 3.8 cm. It is powered by a 3.3 VDC derived from 120 VAC 60 Hz mains.

1.3 EUT Operation

The EUT was exercised in a manner consistent with normal operations.

The WiFi radio section is paired with a Bluetooth Low Energy radio section. Each utilize the same antenna but with a common antenna-switch arrangement. Therefore, only one radio may transmit or receive at a time.

The Bluetooth Low Energy radio is the sole means of initially configuring the WiFi section. Once configured, the Bluetooth Low Energy section currently remains unused until a change in configuration is required.

1.4 Modifications to Equipment

No modifications were made to the EUT during the performance of the test program.

1.5 Test Site

Measurements were made at the PTI semi-anechoic facility designated Site 45 (FCC 459644, IC 3036B-1) in Austin, Texas. The site is registered with the FCC under Section 2.948 and Industry Canada per RSS-GEN, and is subsequently confirmed by laboratory accreditation (NVLAP). The test site is located at 11400 Burnet Road, Austin, Texas 78758, while the main office is located at 1601 North A.W. Grimes Boulevard, Suite B, Round Rock, Texas, 78665.

1.6 Radiated Measurements

Radiated levels are determined as follows:

Raw Measured Level + Antenna Factor + Cable Losses – Amplifier Gain = Corrected Level

Conducted RF levels are determined as follows:

Raw Measured Level + Attenuator Factor + Cable Losses = Corrected Level

Conducted mains levels are determined as follows:

Raw Measured Level + LISN Factor + Cable/Filter/Limiter Losses = Corrected Level

Additionally, measurement distance extrapolation factors are applied and documented where used.

1.7 Applicable Documents and Clauses

Table 1.7.1: Applicable Documents	
Document	**Title**
47 CFR	Part 15 – Radio Frequency Devices Subpart C -Intentional Radiators
RSS-247 Issue 1	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS-Gen Issue 4	General Requirements and Information for the Certification of Radio Apparatus
ANSI C63.4 2009	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment

Table 1.7.2: Applicable Clauses		
Parameter	**FCC Part 15 Rule Paragraphs**	**IC RSS References**
Transmitter Characteristics	15.247(a)(2)	RSS-247 5.2 (DTS) & 5.4, RSS-Gen 6
Power Spectral Density	15.247(e)	RSS-247 5.2 (DTS)
Bandwidth	15.247(a)(2), 2.1049, KDB 558074 D01	RSS-247 5.2 (DTS), RSS-Gen 6.6
Spurious Emission	15.247, 15.209, 15.205	RSS-247 5.5, RSS-GEN 6.13, 7.1
Band Edge	15.247, 15.205	RSS-247 5.5, RSS-Gen 6.13
Antenna Requirement	15.203	RSS-Gen 8.3
Conducted Emissions, Mains	15.207	RSS-Gen 8.8

2.0 Fundamental Power

2.1 Test Procedure

Modulation is enabled and peak power is measured using conducted means. The output was coupled directly to a spectrum analyzer with no cable or attenuation to consider. The supported data rates were checked and the maximum output rate was selected for measurement for each mode of operation/modulation.

2.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date
15.247(a)(2) // RSS-247 5.2	Fundamental Power Conducted Limit: 1 Watt	10 Jul 2015

2.3 Test Results

Table 2.3.1 Mode b; 11 megabit rate	
Frequency MHz	**Measured Peak Power dBm**
2412	17.73
2437	18.01
2462	18.22

Measured in 10 MHz RBW, 10 MHz VBW.

Table 2.3.2 Mode g; 54 megabit rate	
Frequency MHz	**Measured Peak Power dBm**
2412	21.36
2437	21.64
2462	21.24

Measured in 10 MHz RBW, 10 MHz VBW.

Table 2.3.3 Mode n; 65 megabit rate	
Frequency MHz	**Measured Peak Power dBm**
2412	21.18
2437	20.99
2462	21.21

Measured in 10 MHz RBW, 10 MHz VBW.

Highest recorded power (21.64 dBm) in linear terms is: 145.9 mW

The EUT was found to be in compliance with the applicable criteria.

3.0 Power Spectral Density

3.1 Test Procedure

The EUT is directly connected to a spectrum analyzer and is then adjusted to record in max-hold mode for a time sufficient to capture all transmit products.

3.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date
15.247(e) // RSS-247 5.2	Power Spectral Density Conducted Limit: 8 dBm / 3 kHz	10 Jul 2015

3.3 Test Results

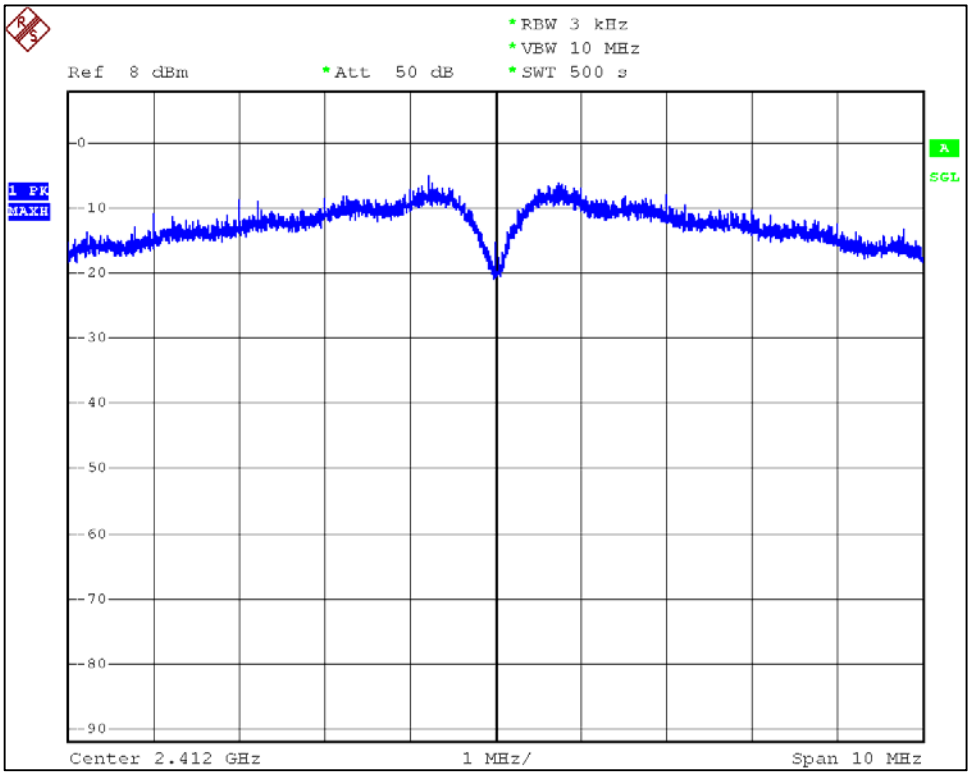
Sweep time 500 seconds. The spectrum analyzer reference level is set to the PSD limit. Though markers were not placed in all plots, it can be seen by inspection that all of the measurements were below -5 dBm leaving a margin of at least -10 dB.

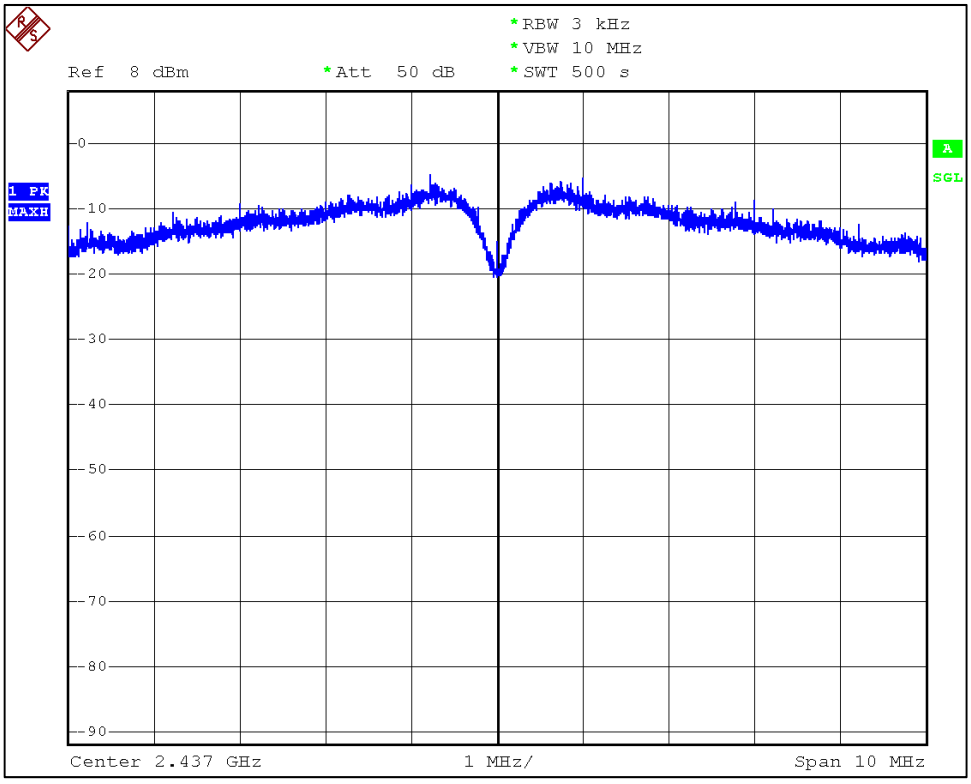
The previously established highest output data rate was selected.

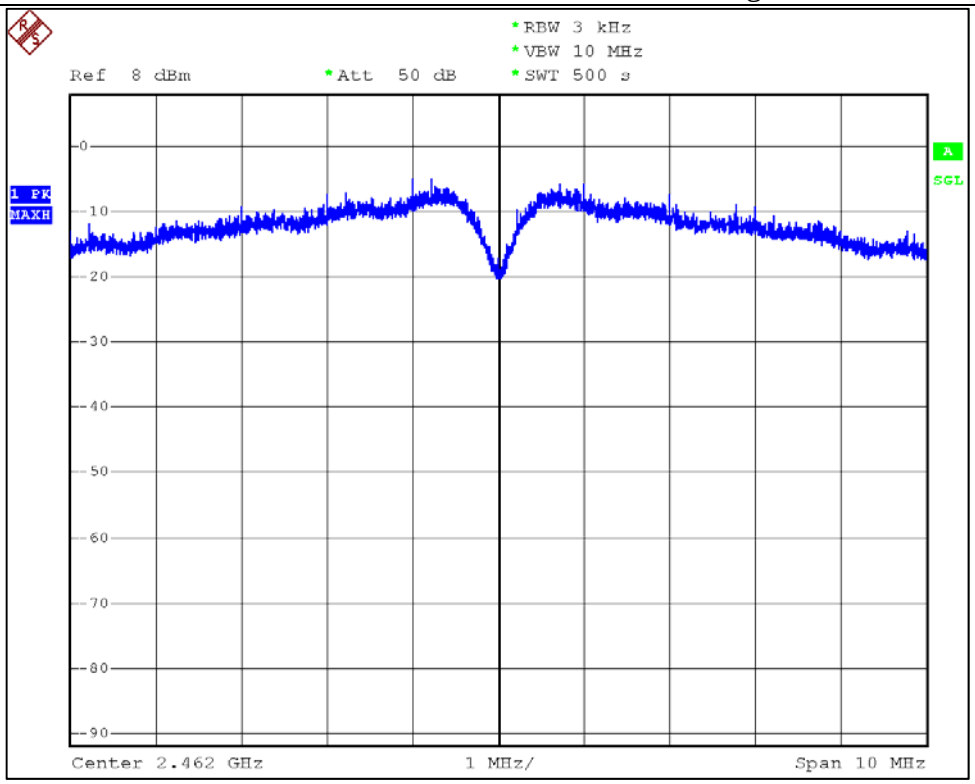
The EUT was found to be in compliance with the applicable criteria.

Plotted measurements appear below.

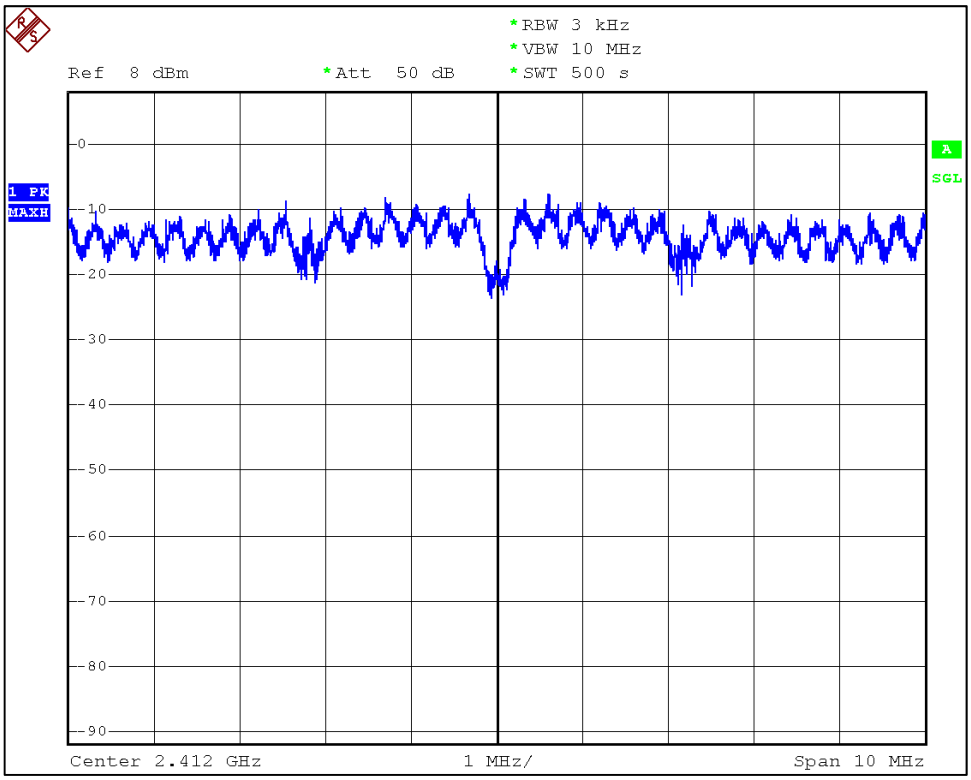
3.3.1 Mode B

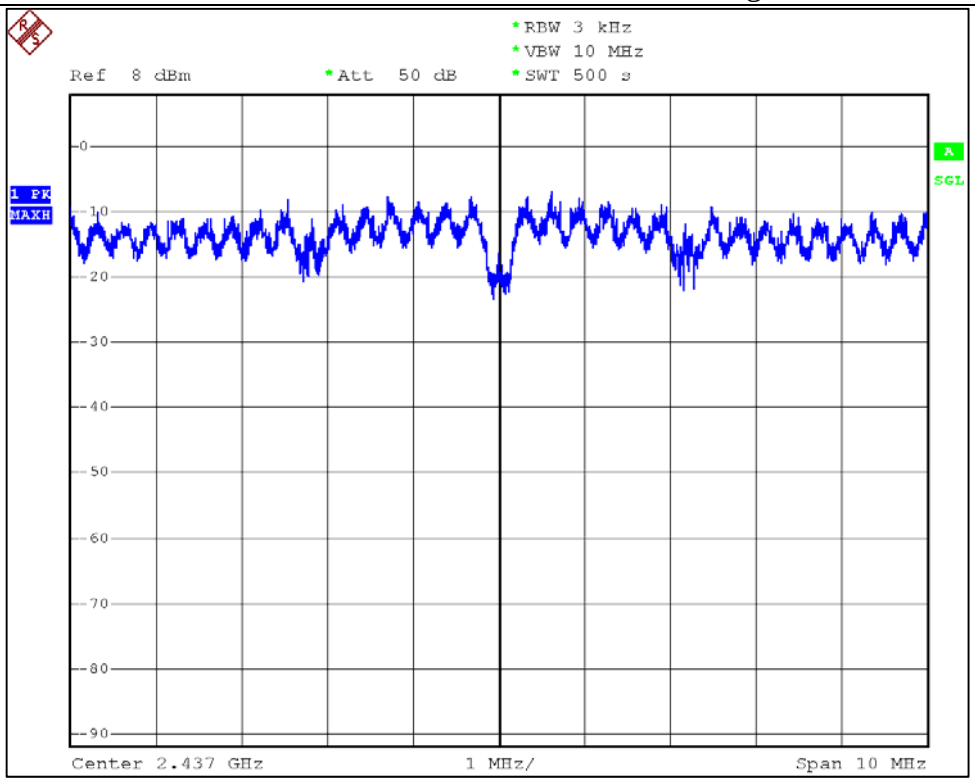

*RBW 3 kHz
*VBW 10 MHz
Ref 8 dBm
*Att 50 dB
*SWT 500 s
1 PK
MAXH
A
SGL
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.412 GHz
1 MHz/
Span 10 MHz

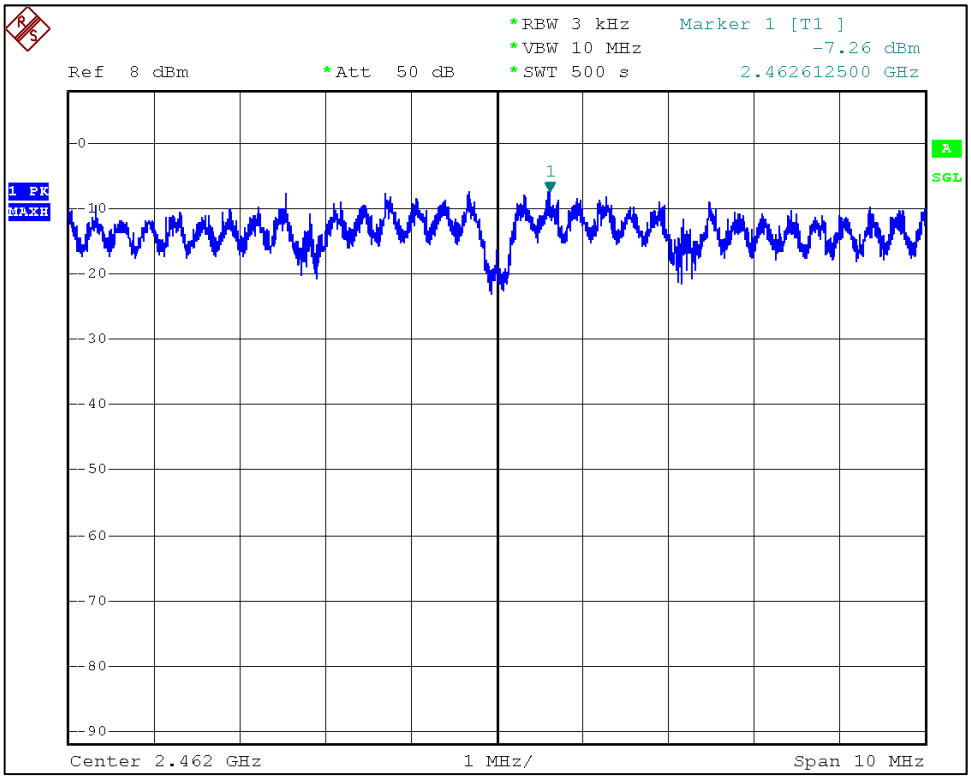

*RBW 3 kHz
*VBW 10 MHz
Ref 8 dBm
*Att 50 dB
*SWT 500 s
1 PK
MAXH
A
SGL
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.437 GHz
1 MHz/
Span 10 MHz


RBW 3 kHz
VBW 10 MHz
SWT 500 s
Ref 8 dBm
Att 50 dB
1 PK
MAXH
A
SGL
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.462 GHz
1 MHz/
Span 10 MHz

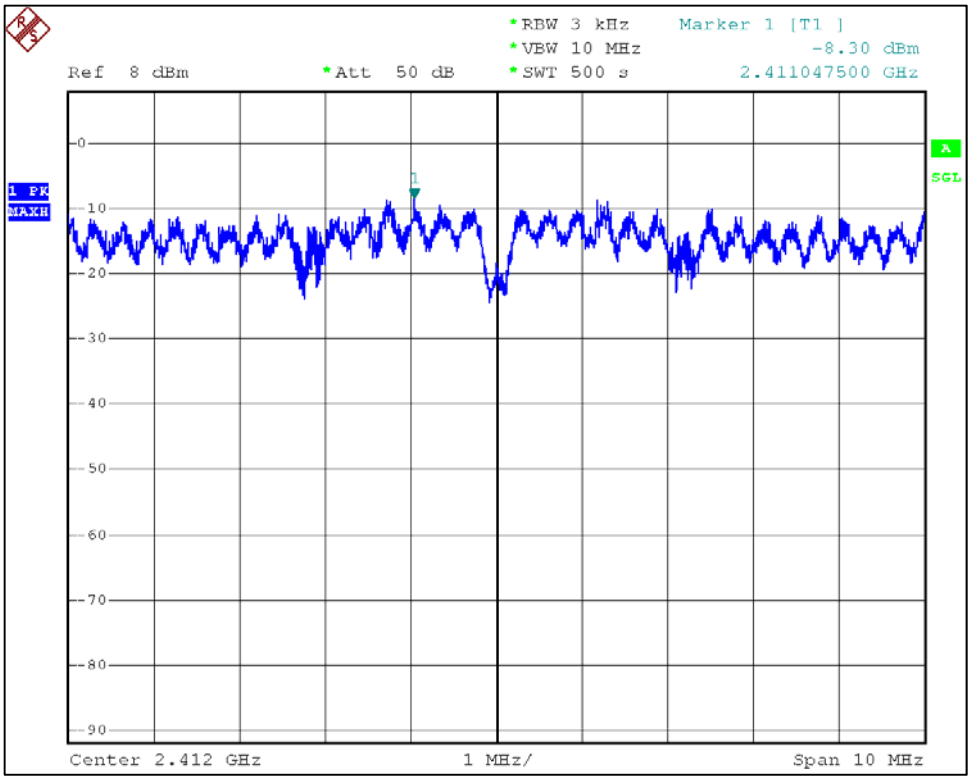
3.3.2 Mode G


RBW 3 kHz
VBW 10 MHz
SWT 500 s
Ref 8 dBm
Att 50 dB
1 PK
MAXH
A
SGL
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.412 GHz
1 MHz/
Span 10 MHz


*RBW 3 kHz
*VBW 10 MHz
Ref 8 dBm
*Att 50 dB
*SWT 500 s
1 PK
MAXH
A
SGL
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.437 GHz
1 MHz/
Span 10 MHz


*RBW 3 kHz
Marker 1 [T1]
*VBW 10 MHz
-7.26 dBm
Ref 8 dBm
*Att 50 dB
*SWT 500 s
2.462612500 GHz
1 PK
MAXH
A
SGL
1
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.462 GHz
1 MHz/
Span 10 MHz

3.3.3 Mode N


*RBW 3 kHz
*VBW 10 MHz
*SWT 500 s
Marker 1 [T1]
-8.30 dBm
2.411047500 GHz
Ref 8 dBm
*Att 50 dB
1 PK
MAXH
A
SGL
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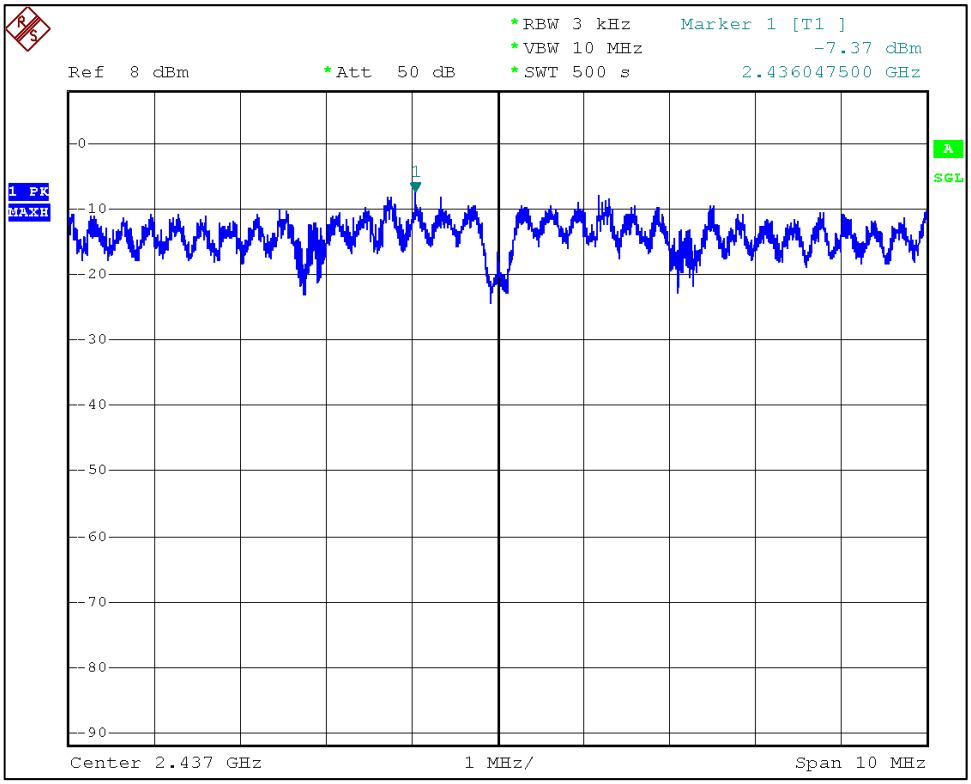
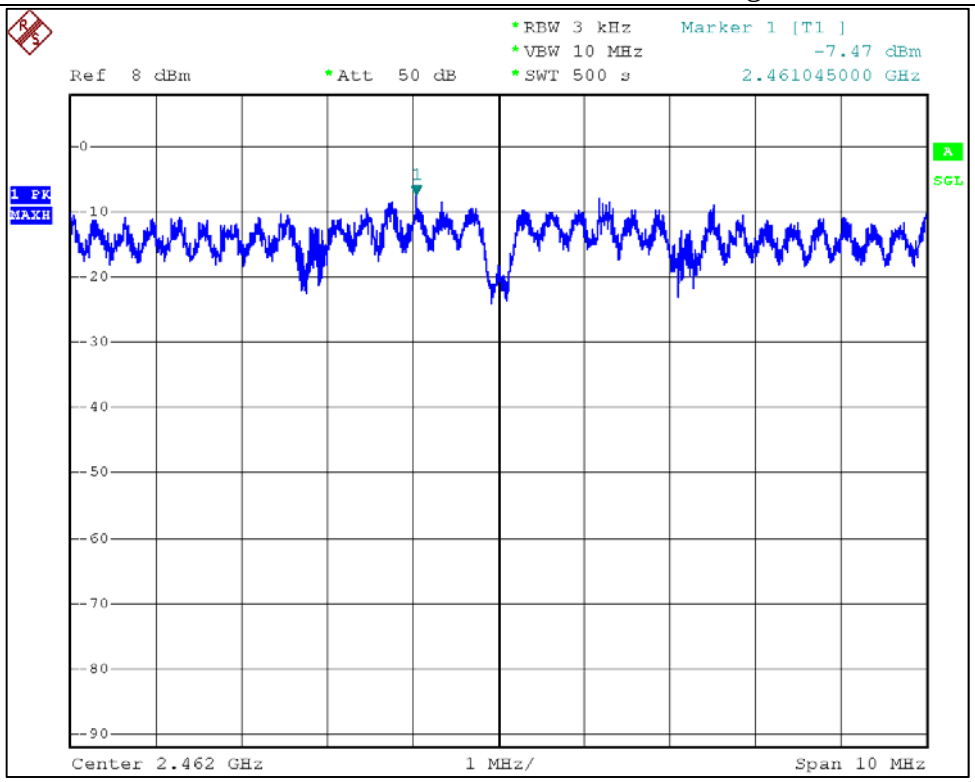
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.412 GHz
1 MHz/
Span 10 MHz


*RBW 3 kHz
*VBW 10 MHz
*SWT 500 s
Marker 1 [T1]
-7.37 dBm
2.436047500 GHz
Ref 8 dBm
*Att 50 dB
1 PK
MAXH
A
SGL
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.437 GHz
1 MHz/
Span 10 MHz


*RBW 3 kHz
Marker 1 [T1]
*VBW 10 MHz
-7.47 dBm
Ref 8 dBm
*Att 50 dB
*SWT 500 s
2.461045000 GHz
1 PK
MAXH
A
SGL
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.462 GHz
1 MHz/
Span 10 MHz

4.0 Transmitter Duty Cycle

4.1 Test Procedure

EUT is placed into worse-case transmit operation (WiFi mode b, 1 megabit rate) to observe and record transmitter time domain performance.

4.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.247 // RSS-247, RSS-Gen 6.10	Transmit Duty Cycle	16 Jul 2015

Measurement is based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement.

4.3 Test Results

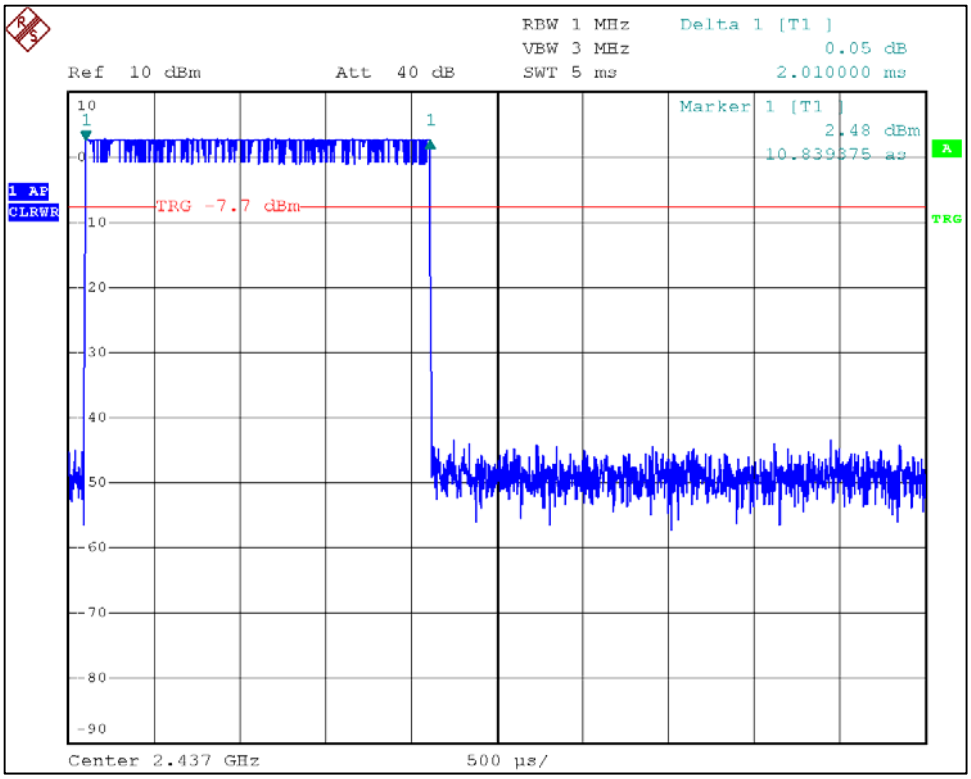
Table 4.2.1 Duty Cycle Factor Result

Measured On Time (msec)	Measured Time Interval (msec)	Duty Cycle Factor Calculation	Result (dB)	Duty Cycle Factor Allowed (dB)
2.01	49.95	20 Log_{10} (2.01 msec / 49.95 msec) =	-27.9	-20

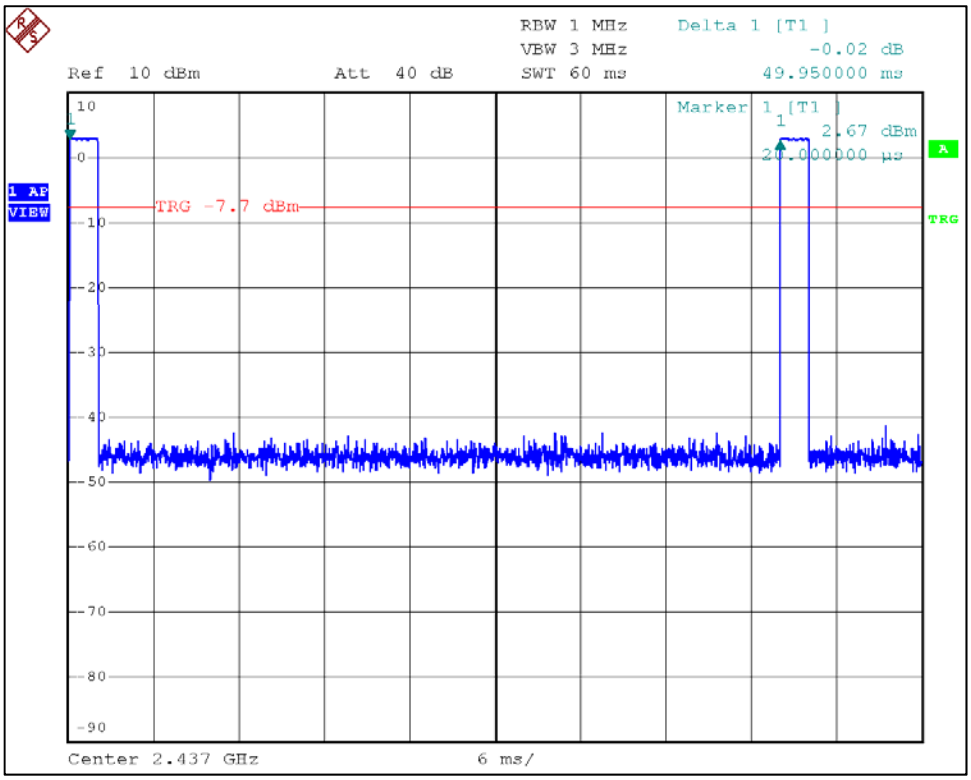
The allowed duty cycle factor is applied to peak measured fundamental and harmonic signals to find average levels.

Plotted results appear on the following page.

4.3.1 Transmit On Time



4.3.2 Transmit Interval Time



5.0 Occupied Bandwidth

5.1 Test Procedure

Bandwidth is measured by conducted means. A recording of the results is included.

5.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
14.247(a)(2), 2.1049 // RSS-Gen 5.2, RSS-Gen 6.6	Bandwidth, 6 dB, 20 dB	10 Jul 2015

5.3 Test Results

Bandwidth 6 dB was measured at the lowest data rate of each modulation mode as worse-case. Bandwidth 20 dB was measured at the highest data mode of each modulation mode as worse-case.

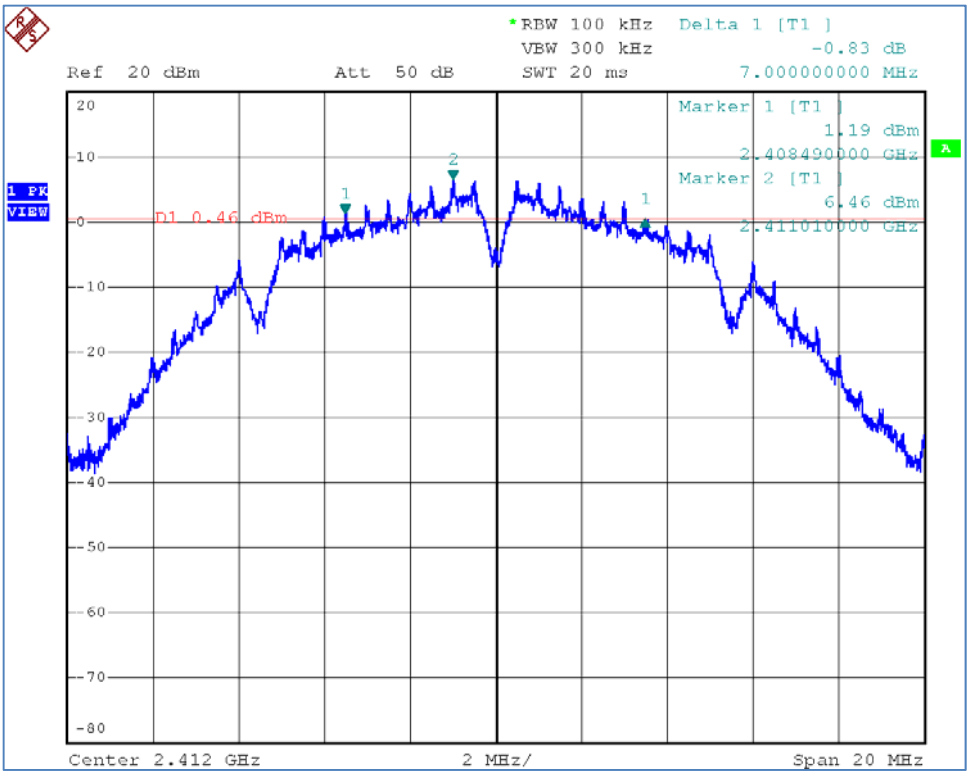
EUT was found to be in compliance with applicable requirements.

Table 5.3.1 Bandwidth 6 dB, Minimum 500 kHz			
Low Channel Measured BW (kHz)	Mid Channel Measured BW (kHz)	High Channel Measured BW (kHz)	**Minimum BW (kHz)**
Modulation b			
7000	6960	7040	**6960**
Modulation g			
15040	15040	14995	**14995**
Modulation n			
15025	15015	15005	**15005**

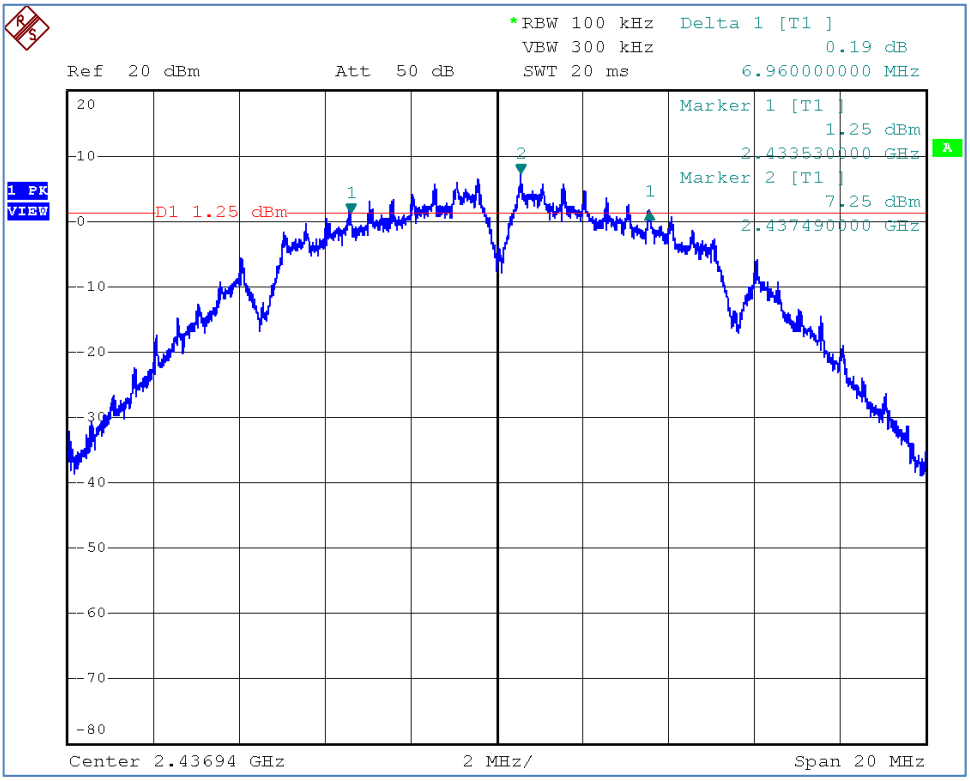
Table 5.3.2 Bandwidth 20 dB, Measure and Report			
Low Channel Measured BW (kHz)	Mid Channel Measured BW (kHz)	High Channel Measured BW (kHz)	**Reported Maximum BW (kHz)**
Modulation b			
13480	13760	13640	**13760**
Modulation g			
17800	17880	17920	**17920**
Modulation n			
18640	18600	18600	**18640**

Plotted measurements appear on the following pages.

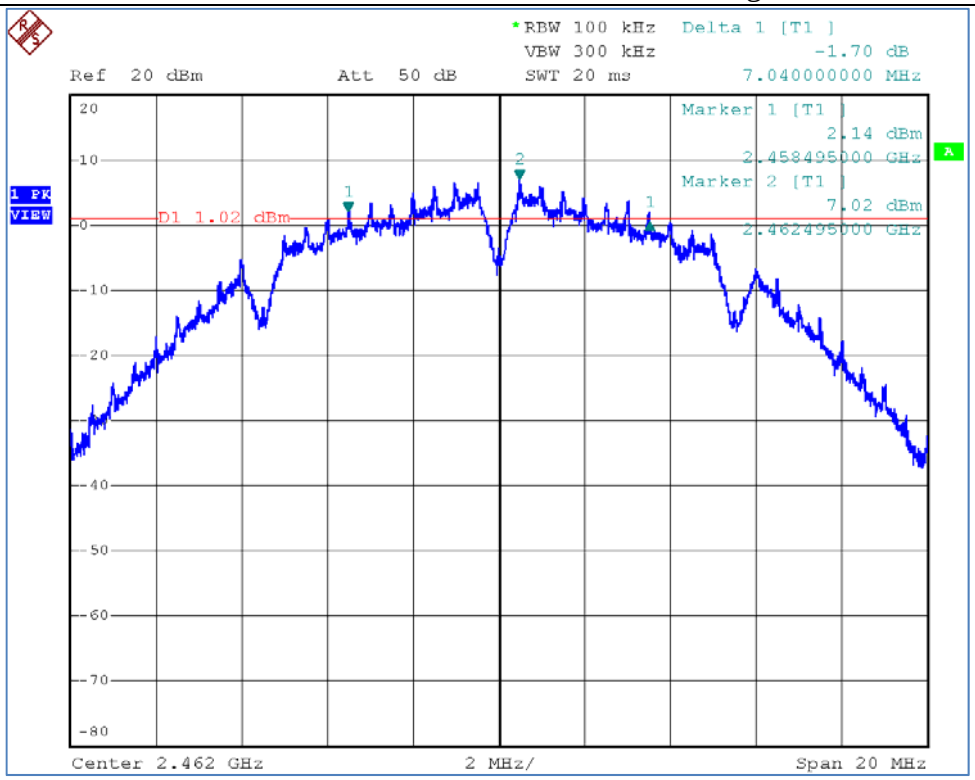
5.3.1 Bandwidth Plots, b, 6 dB



6 dB, Low Channel

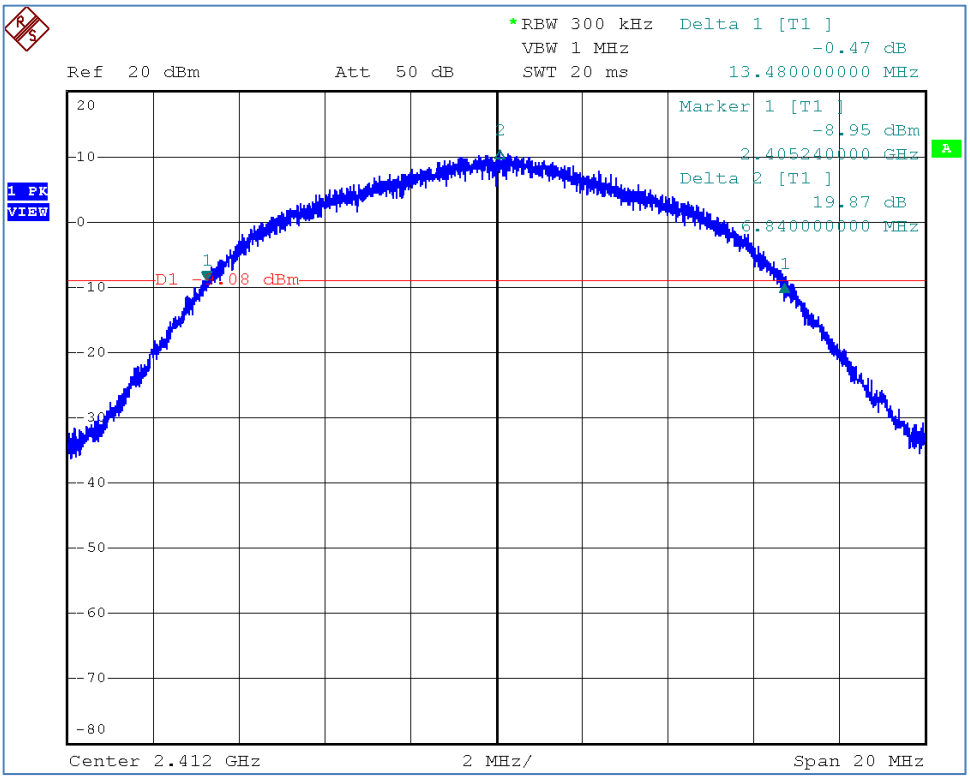


6 dB, Middle Channel

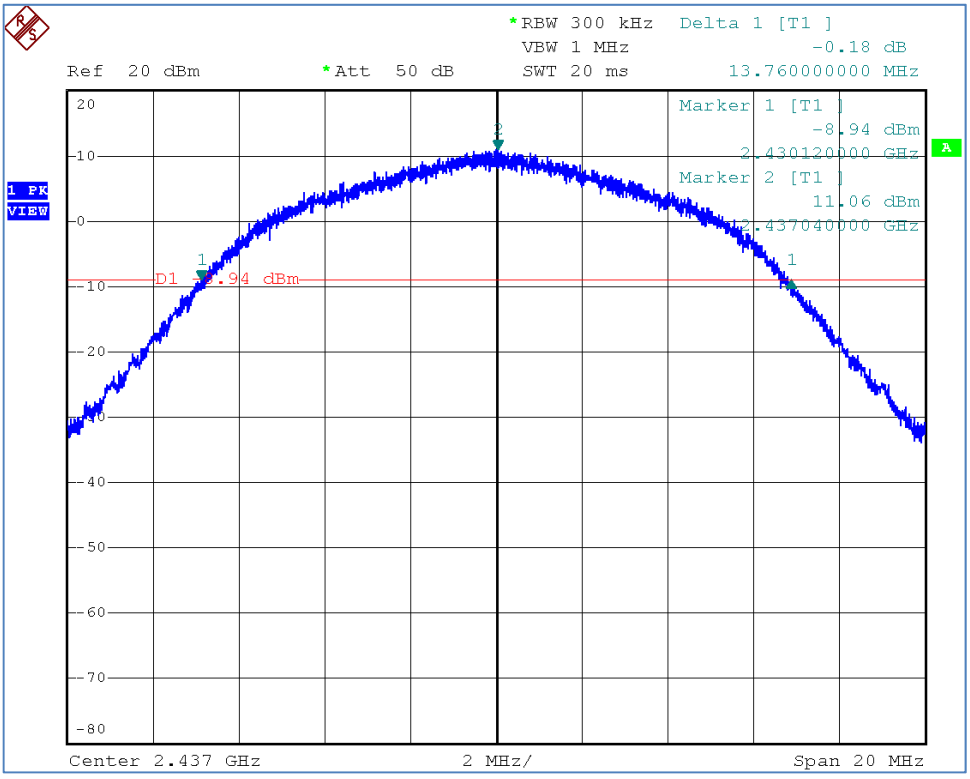


6 dB, High Channel

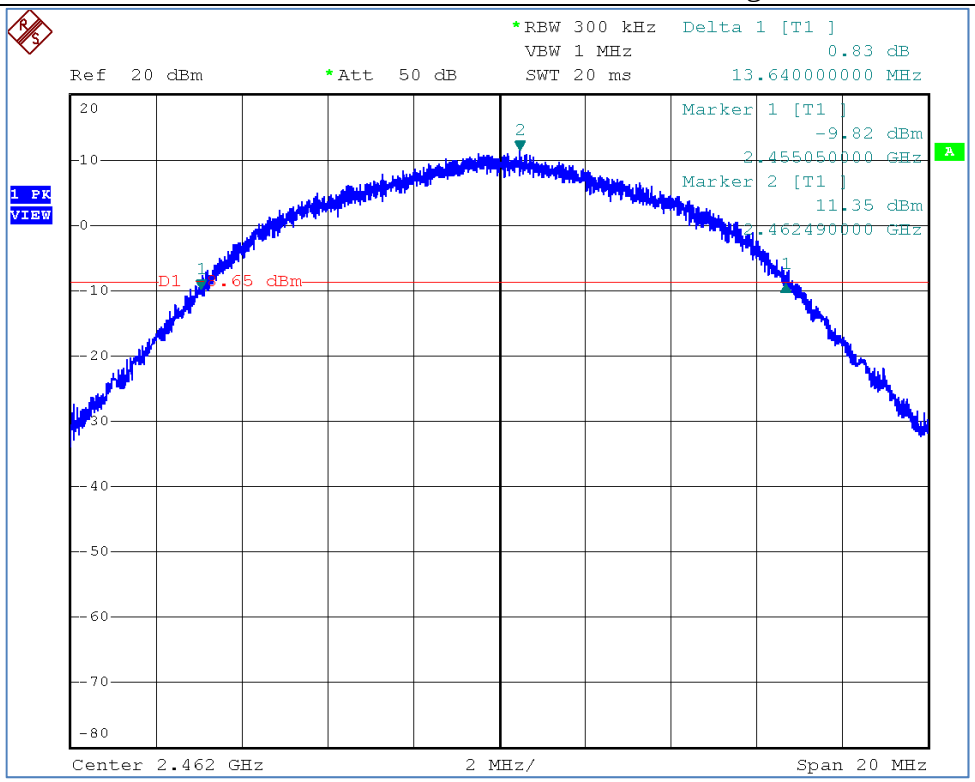
5.3.2 Bandwidth Plots, b, 20 dB



20 dB, Low Channel

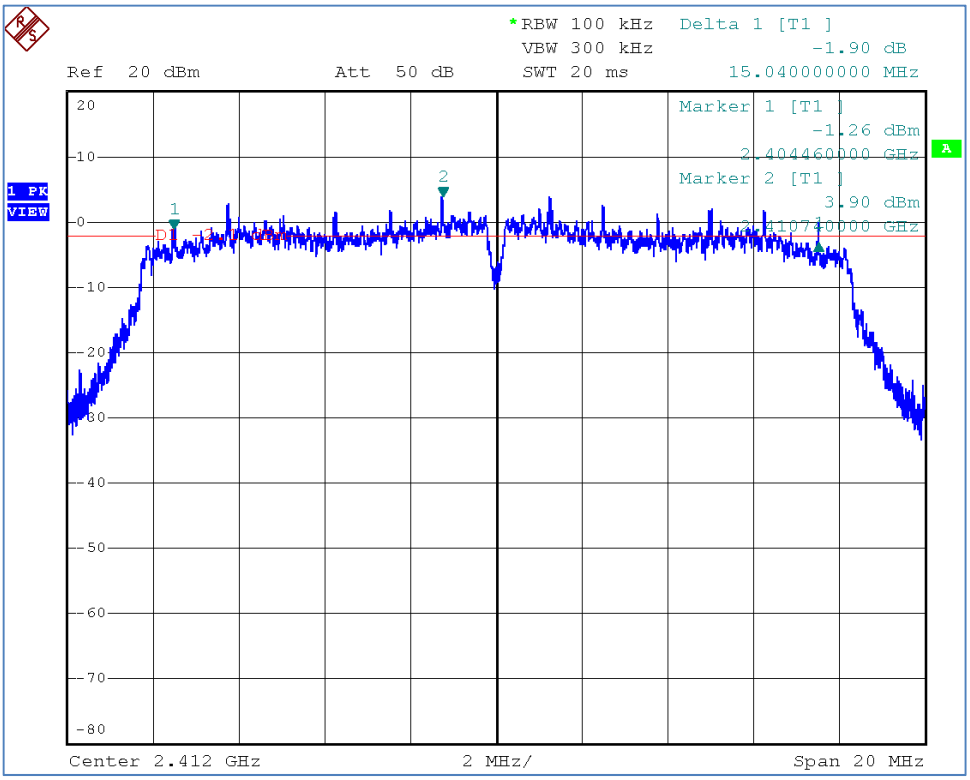


20 dB, Middle Channel

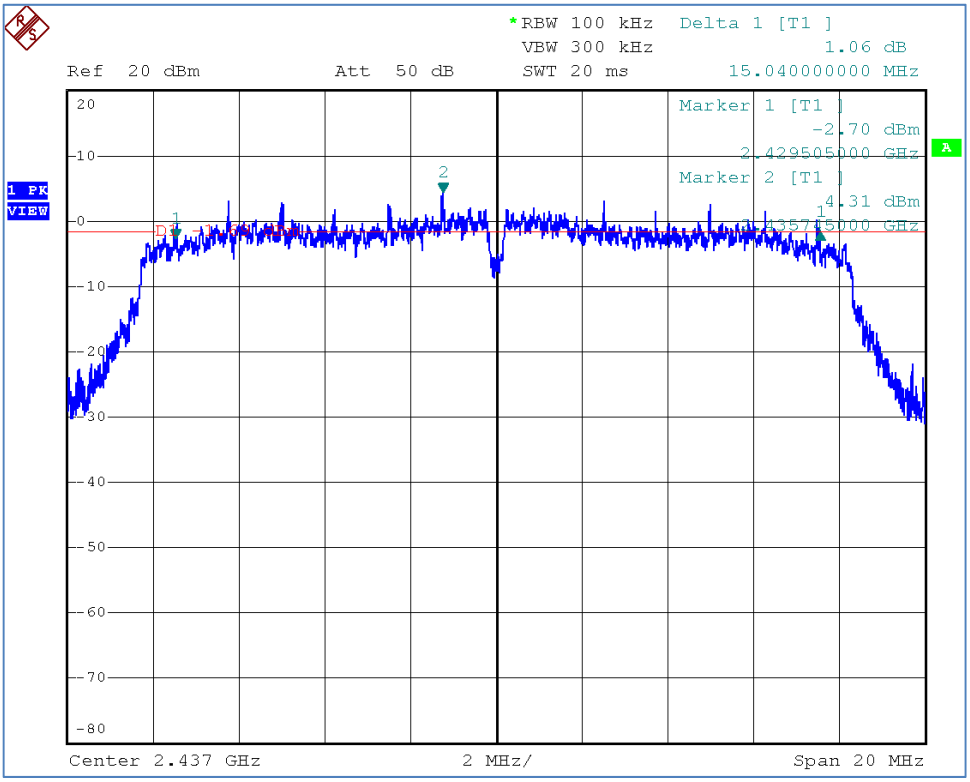


20 dB, High Channel

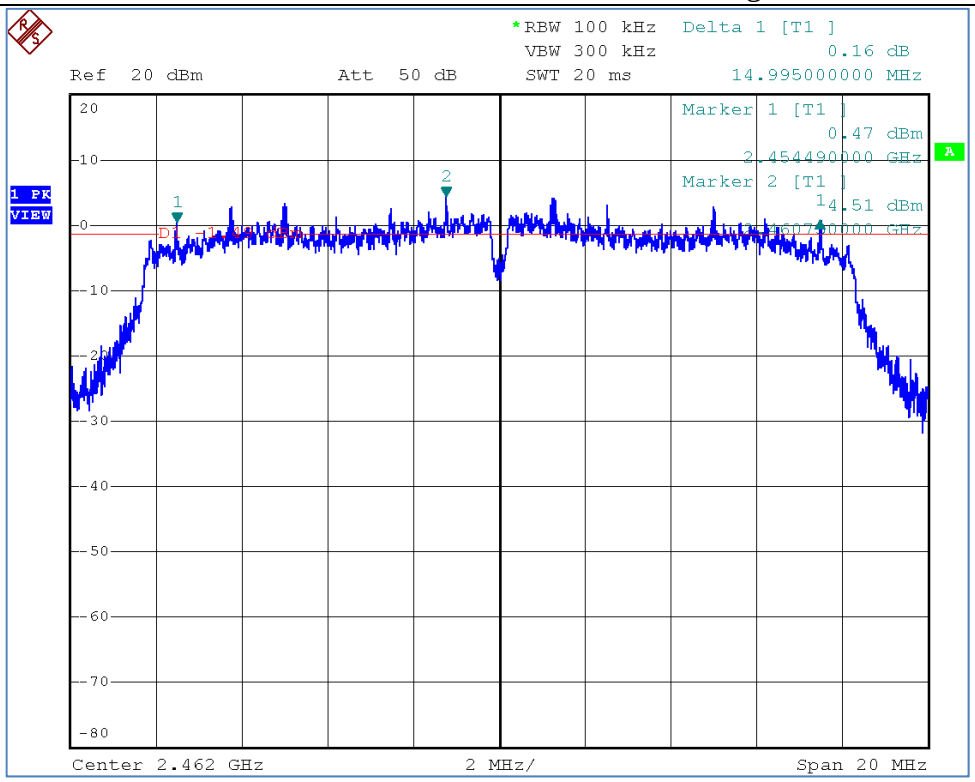
5.3.3 Bandwidth Plots, g, 6 dB



6 dB, Low Channel

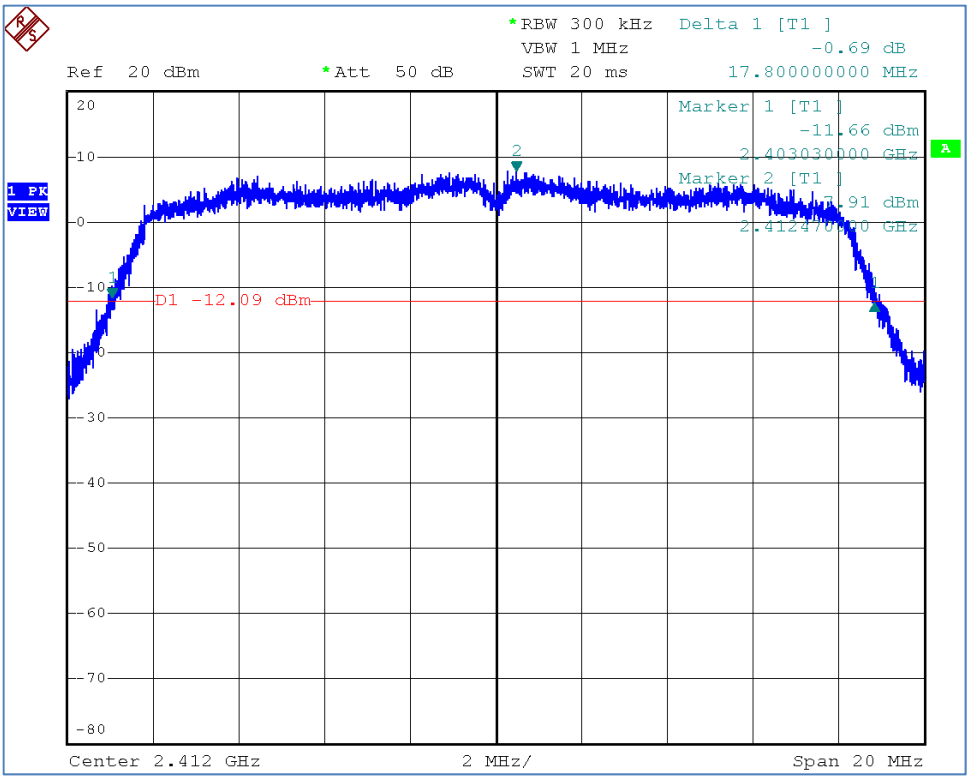


6 dB, Middle Channel

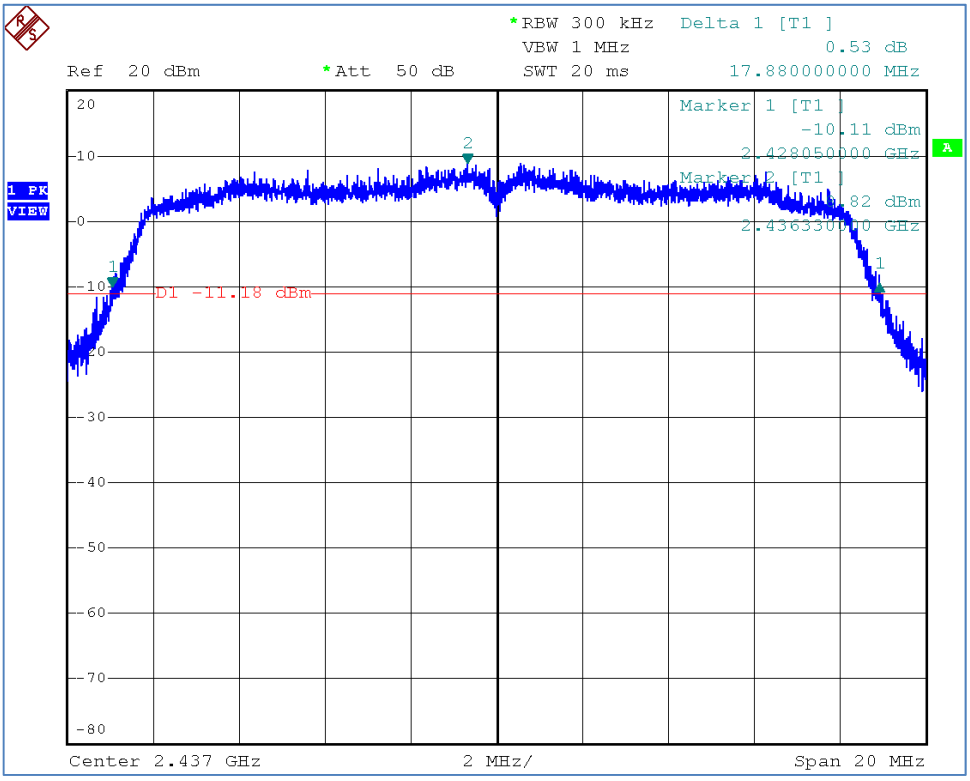


6 dB, High Channel

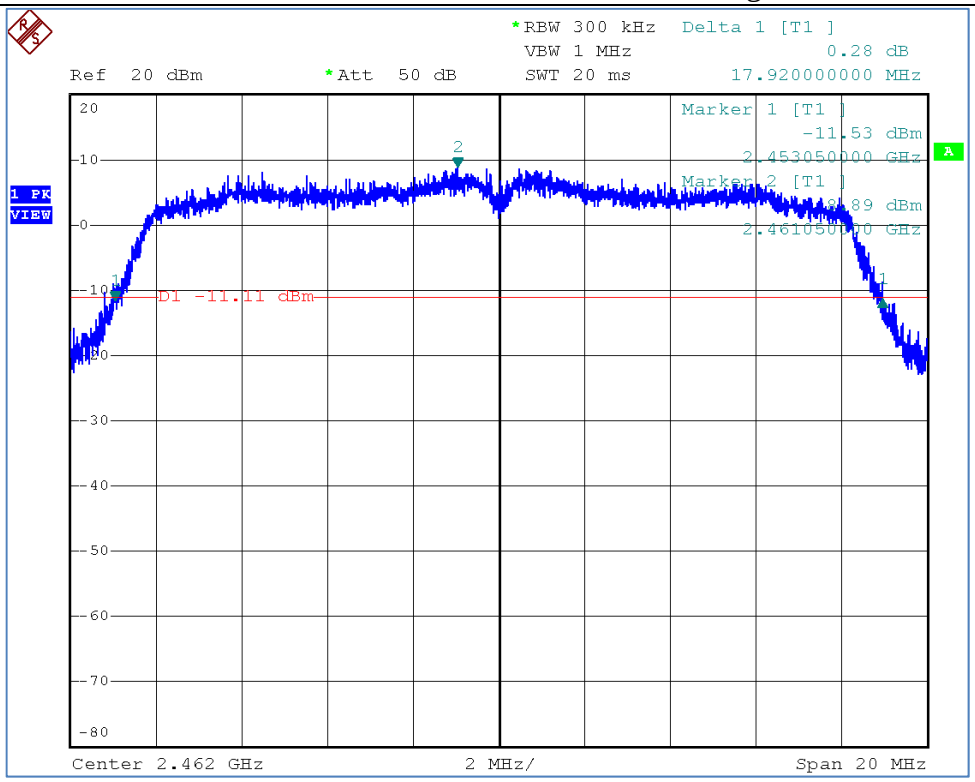
5.3.4 Bandwidth Plots, g, 20 dB



20 dB, Low Channel

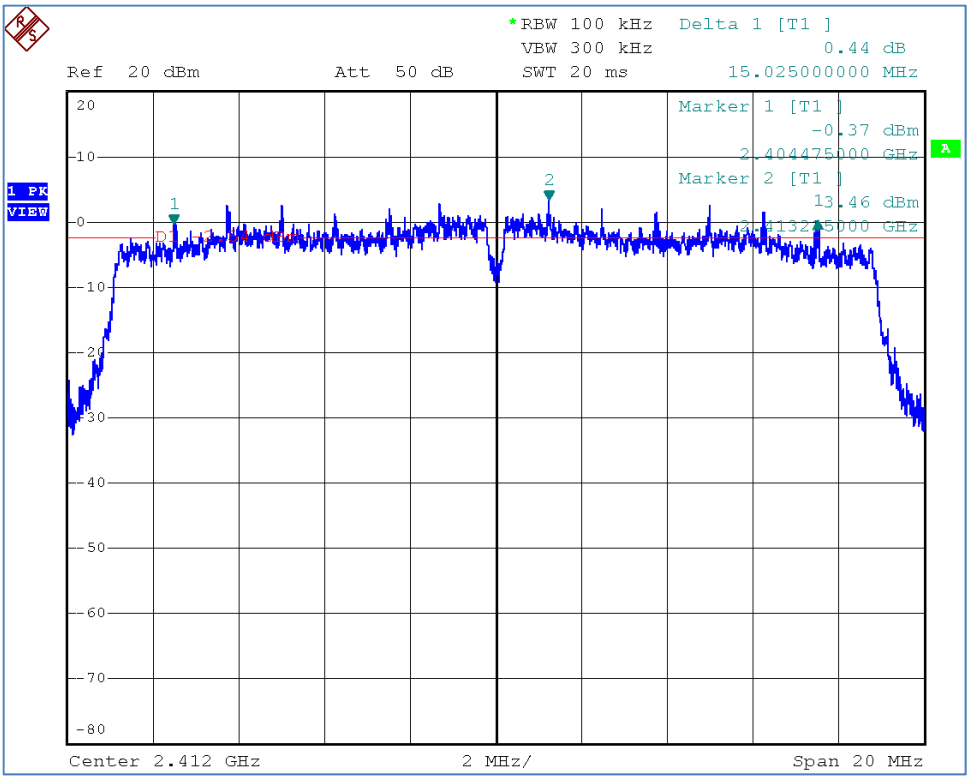


20 dB, Middle Channel

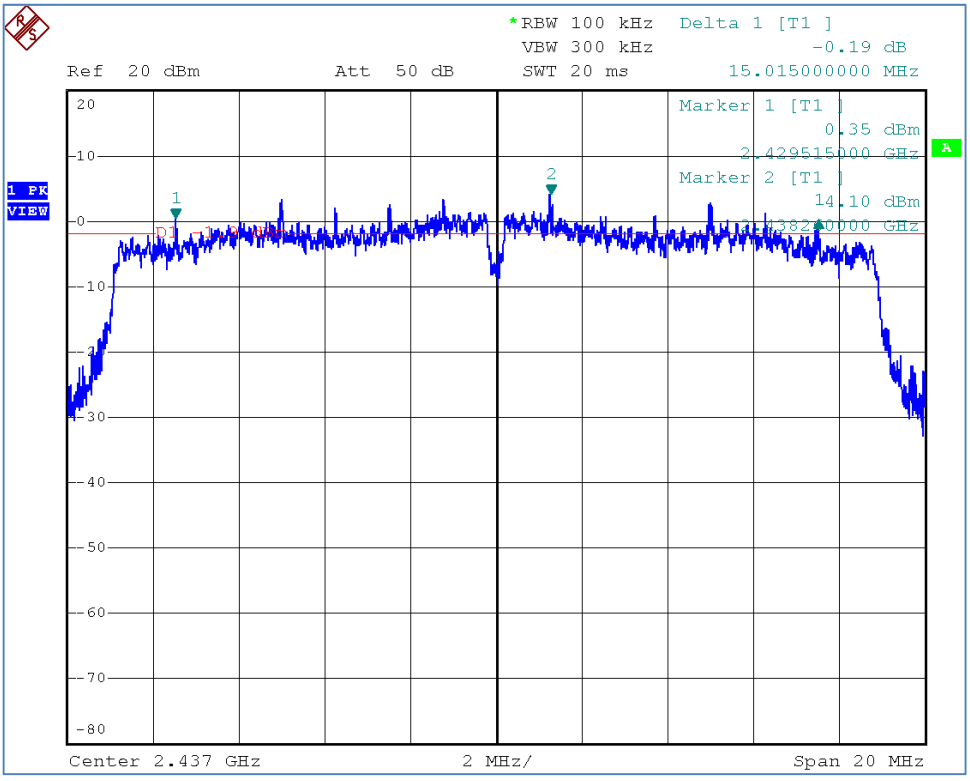


20 dB, High Channel

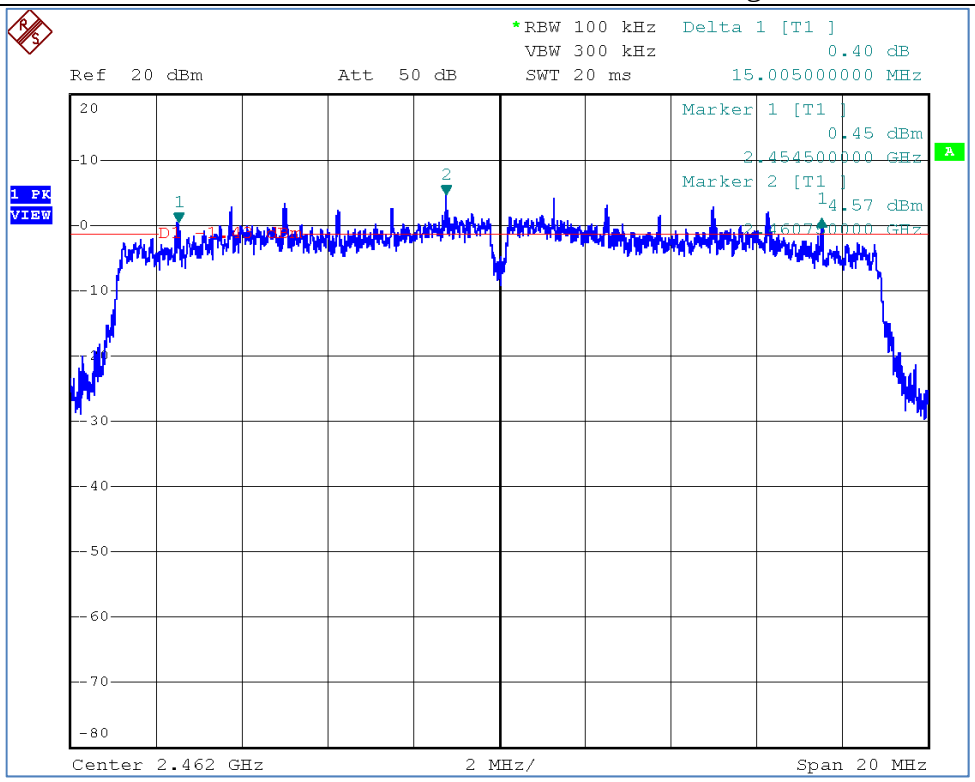
5.3.5 Bandwidth Plots, n, 6 dB



6 dB, Low Channel

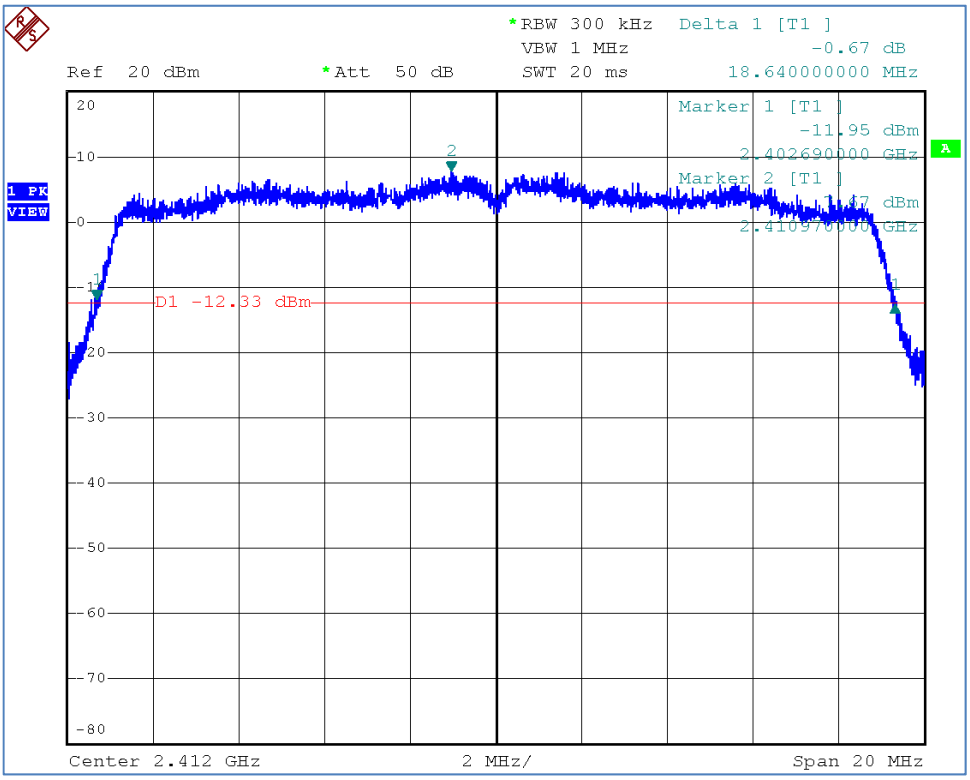


6 dB, Middle Channel

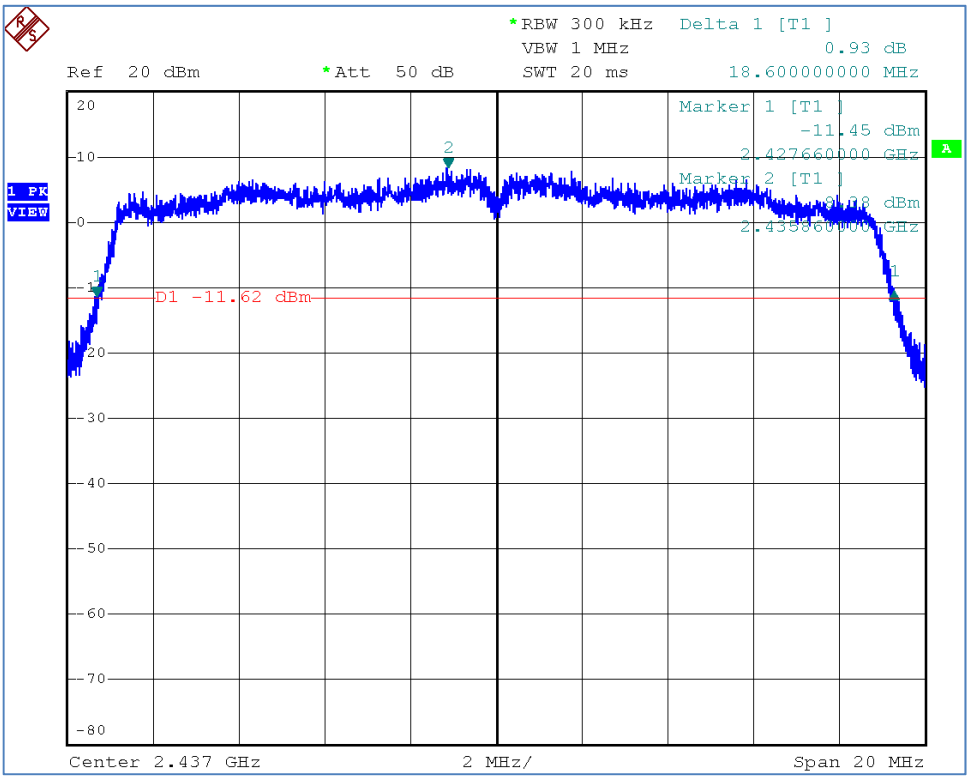


6 dB, High Channel

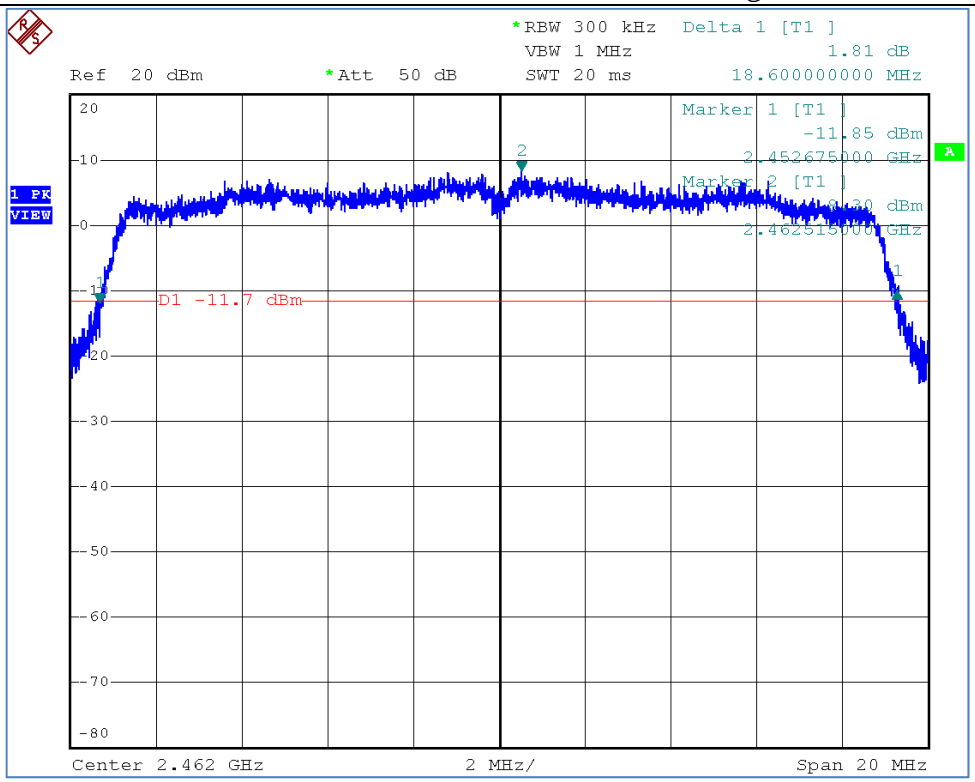
5.3.6 Bandwidth Plots, n, 20 dB



20 dB, Low Channel



20 dB, Middle Channel



20 dB, High Channel

6.0 Band Edge

6.1 Test Procedure

EUT is placed into normal transmit operation on the nearest band edge channel. The spectrum analyzer is centered on the band edge frequency with span sufficient to include the peak of the adjacent fundamental signal. Measurement includes at least two standard bandwidths from the respective band edge. If required, the band-edge marker-delta method of C63.4 is utilized.

6.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.205, 15.209 // RSS-247 5.5, RSS-Gen 6.13	Unwanted Emissions Adjacent to Authorized Band, Radiated	9 Jul 2015

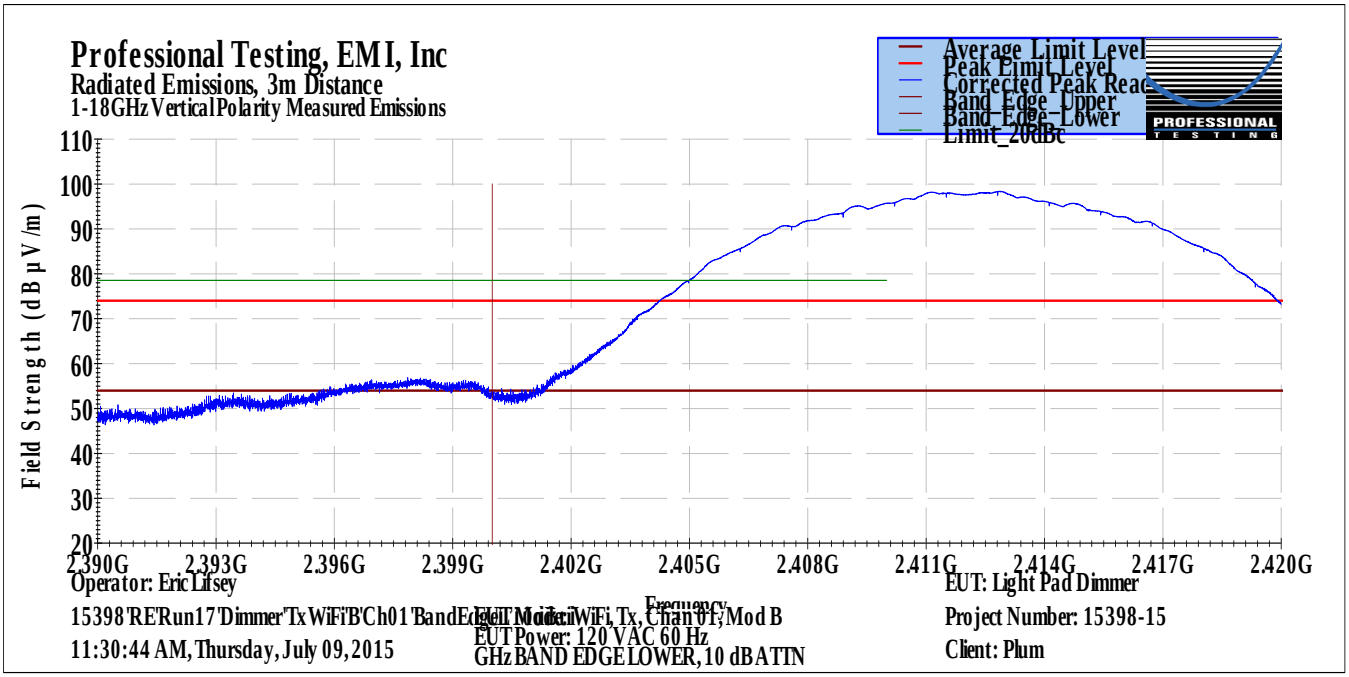
6.3 Test Results

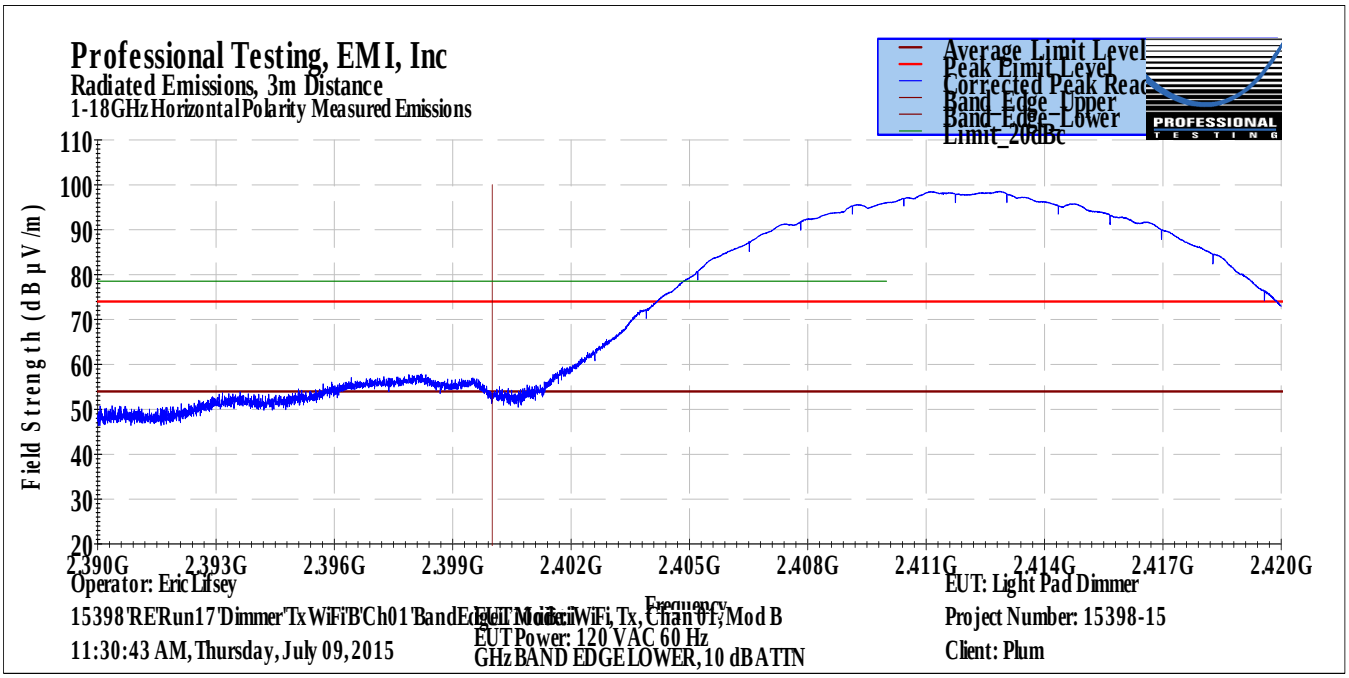
EUT is placed into normal transmit operation on the nearest band edge channel. The spectrum analyzer is approximately centered on the band edge frequency with span sufficient to include the peak of the adjacent fundamental signal. Using peak detection, the analyzer measured emissions in max-hold mode. The measurement range includes two standard bandwidths from the respective band edge and some beyond to see the emission profile clearly. If required, the band-edge marker-delta method of C63.4 is utilized. A vertical marker line is placed on the band edge frequency. Where the -20 dBc limit applies at the low band edge, a horizontal green marker line is added.

Peak detection is utilized. Peak emissions at band edges remained below the FCC 15.209 general emission peak limits except in cases of low band edge where the emission satisfied the -20 dBc limit indicated. The duty cycle factor for averaging was determined to be -20 dB. So where applicable the average detection levels also satisfied the average limits.

The EUT satisfied the criteria. Plotted results appear on the following pages.

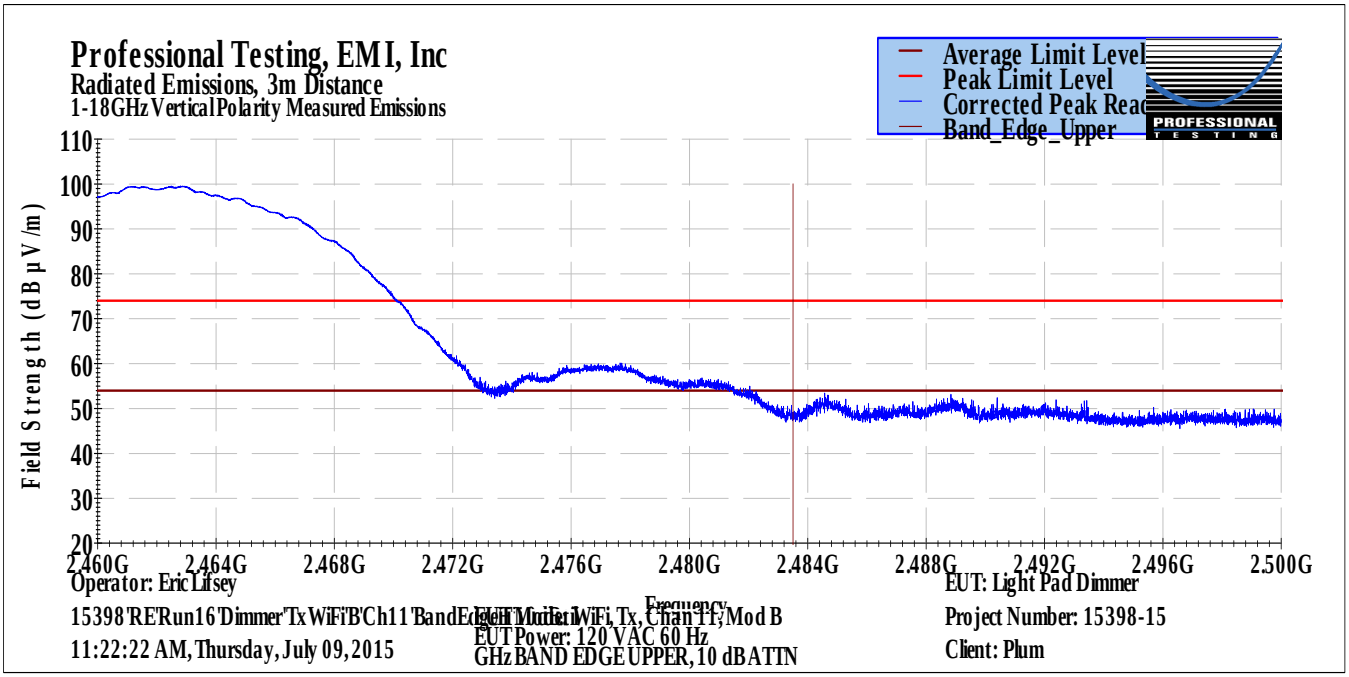
6.3.1 Low Channel Band Edge, b

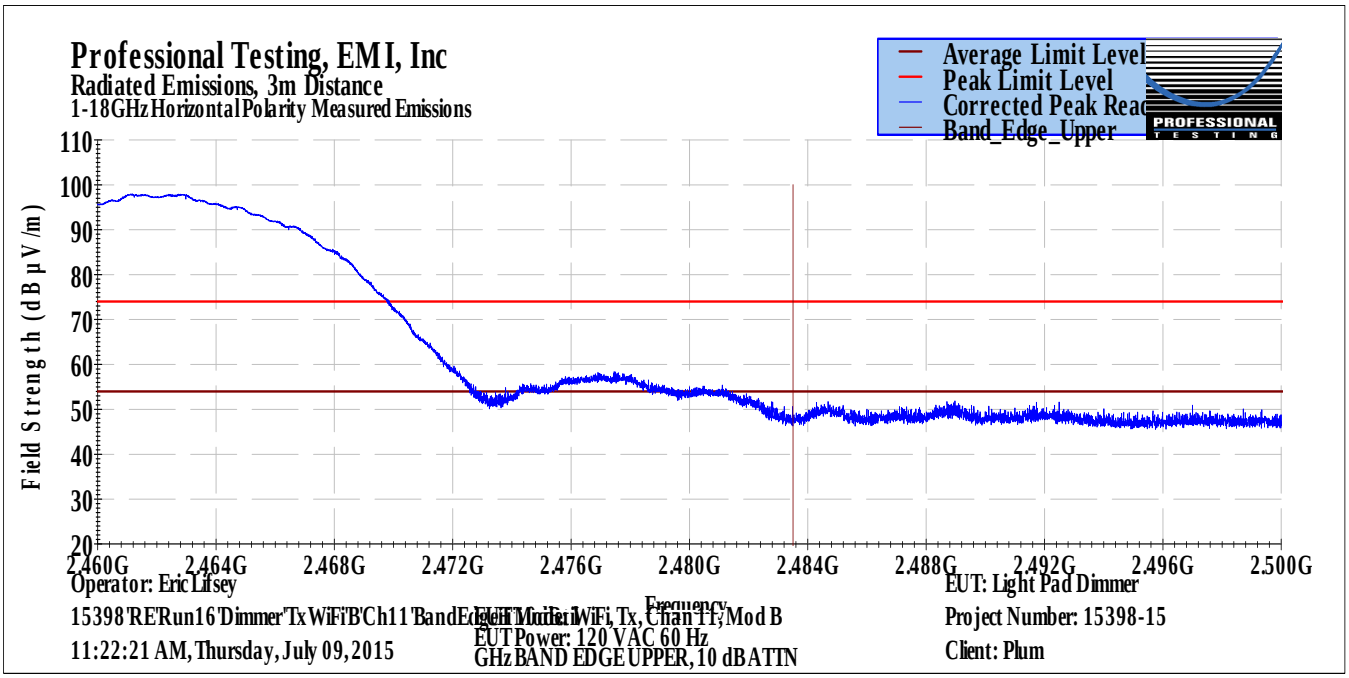




Band Edge Emission, Satisfies -20dBc and 15.209 Criteria

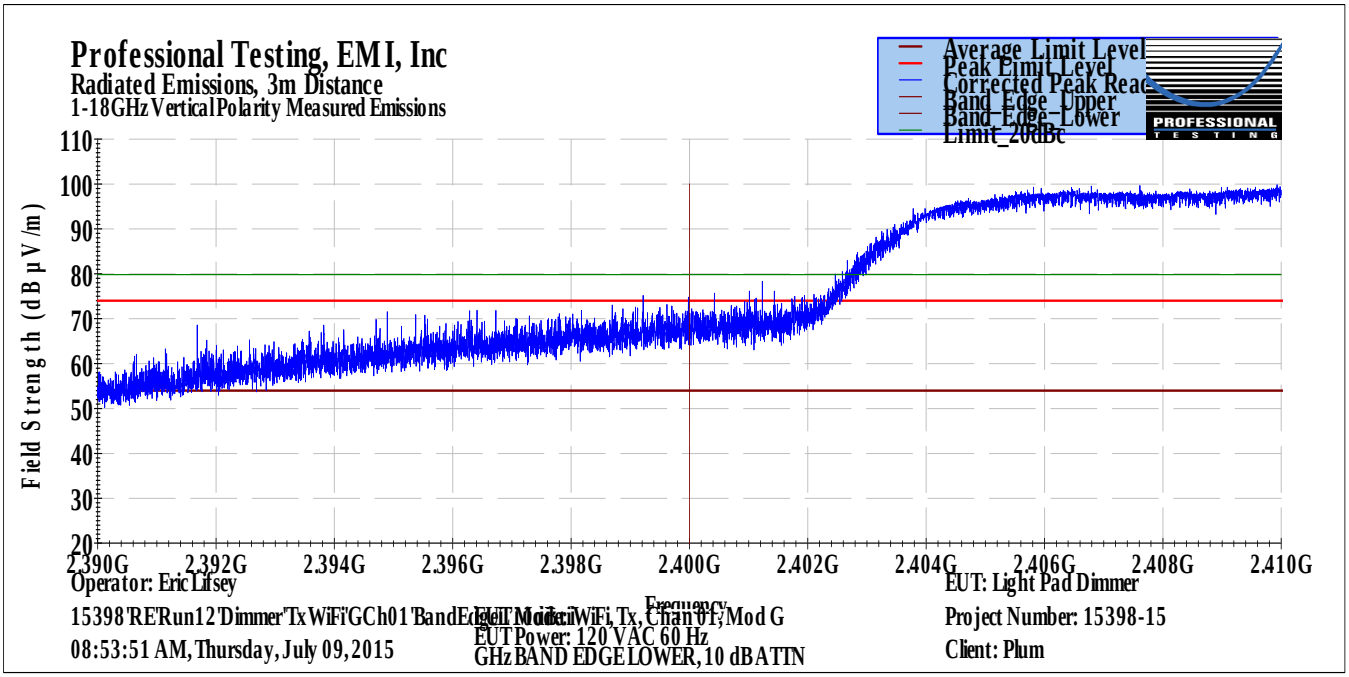
6.3.2 High Channel Band Edge, b

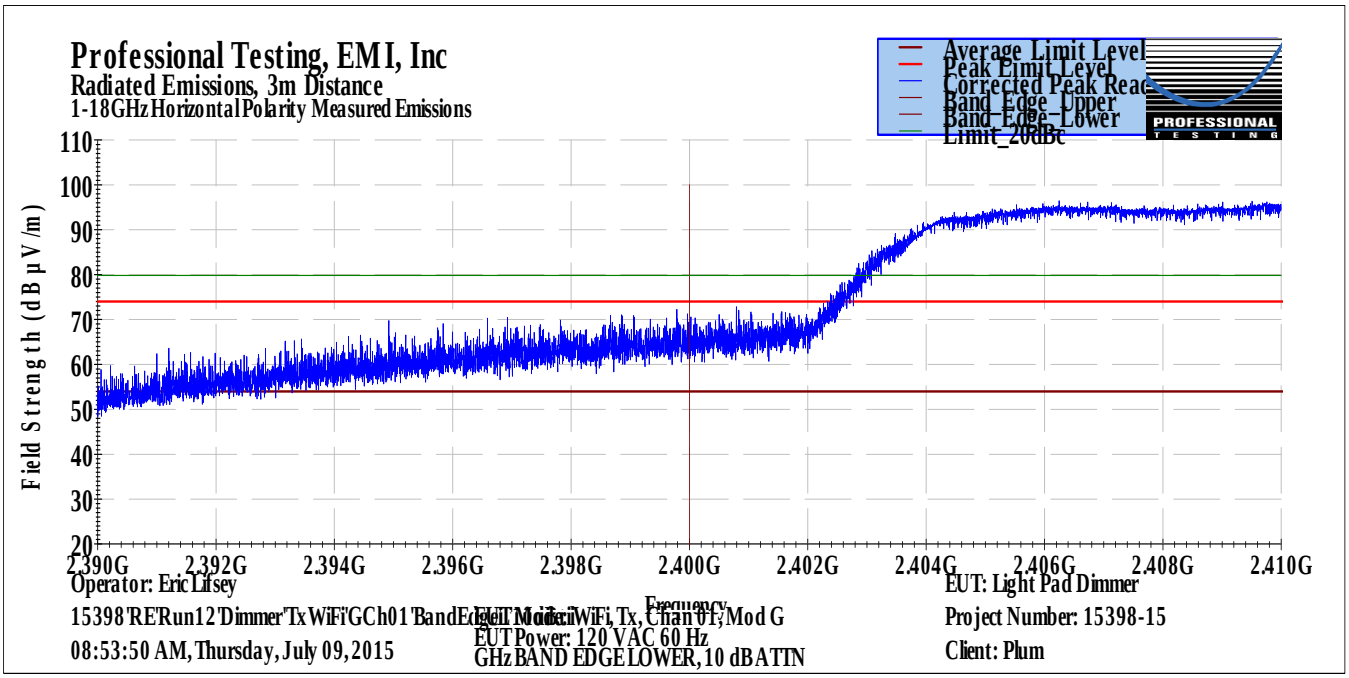




Band Edge Emission, Satisfies -20dBc and 15.209 Criteria

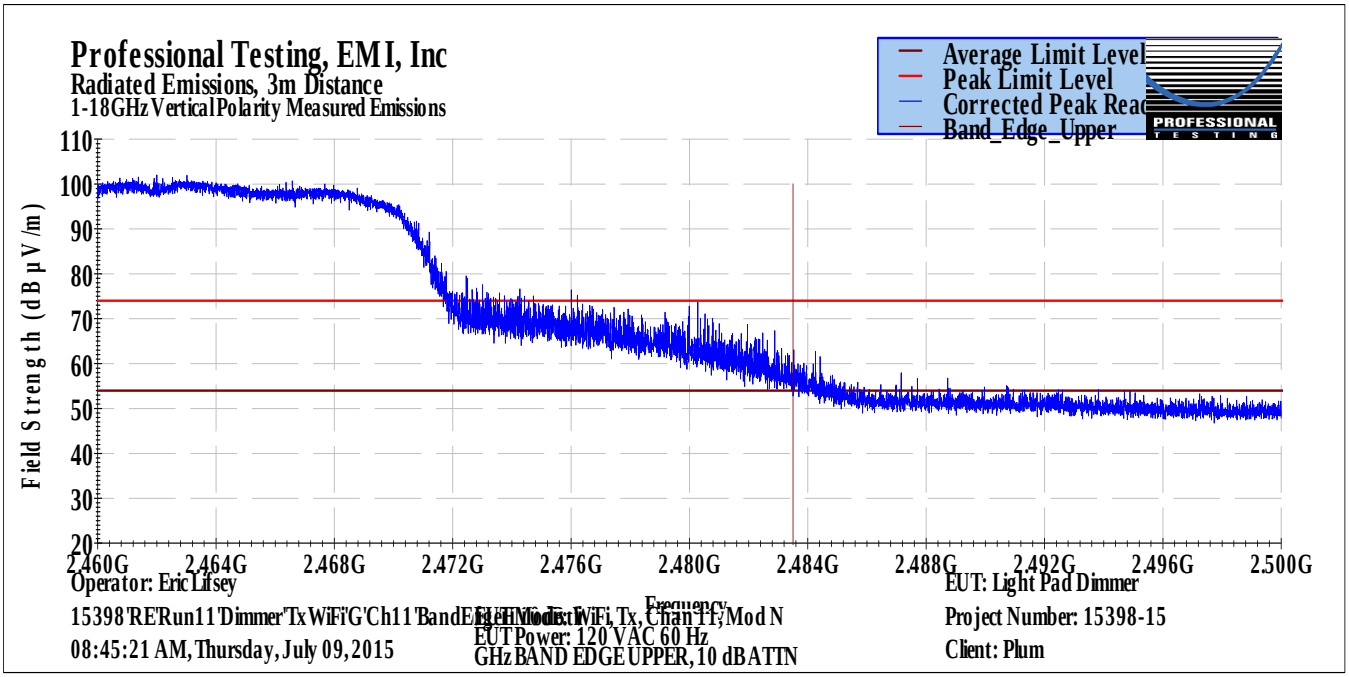
6.3.3 Low Channel Band Edge, g

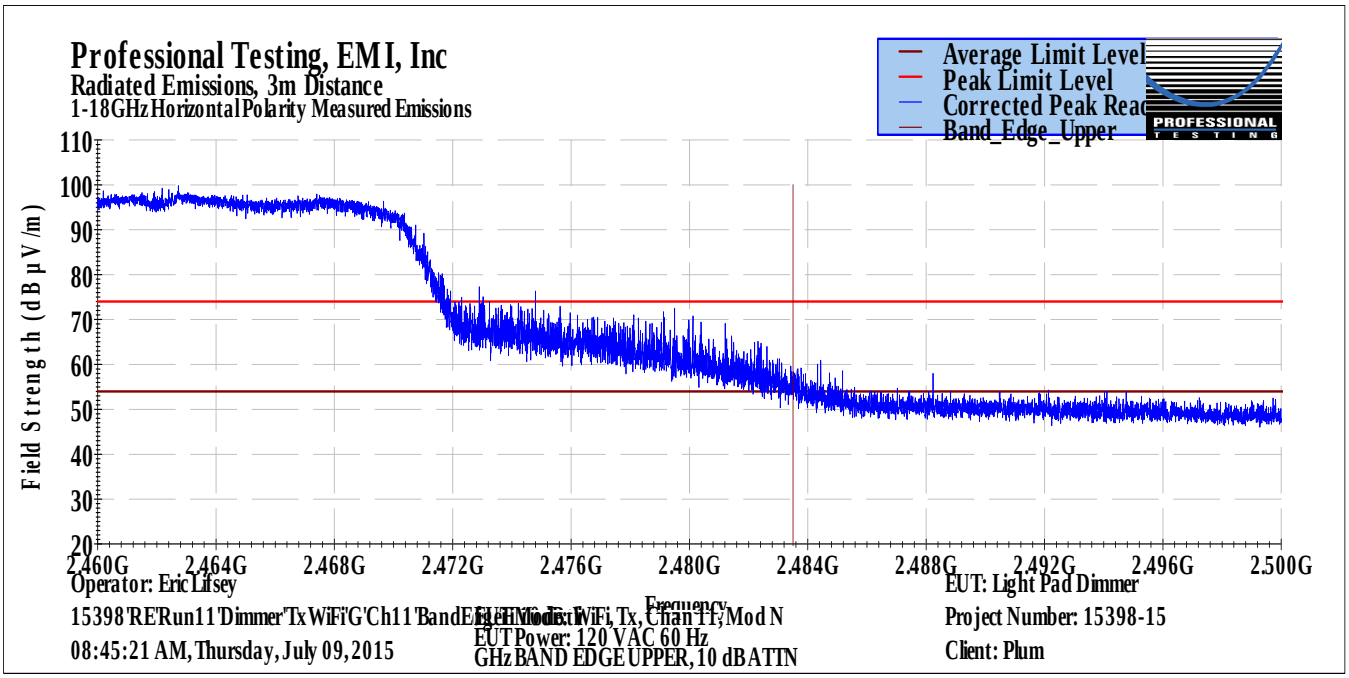




Band Edge Emission, Satisfies -20dBc Criteria

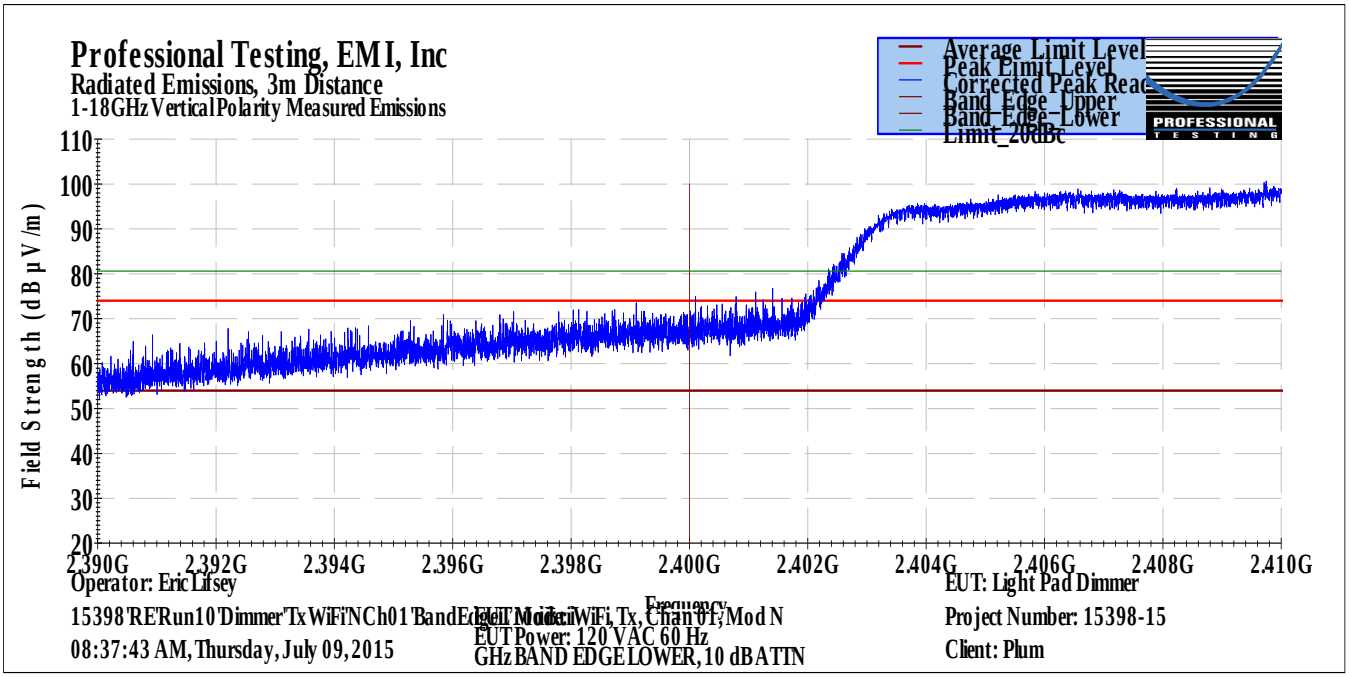
6.3.4 High Channel Band Edge, g

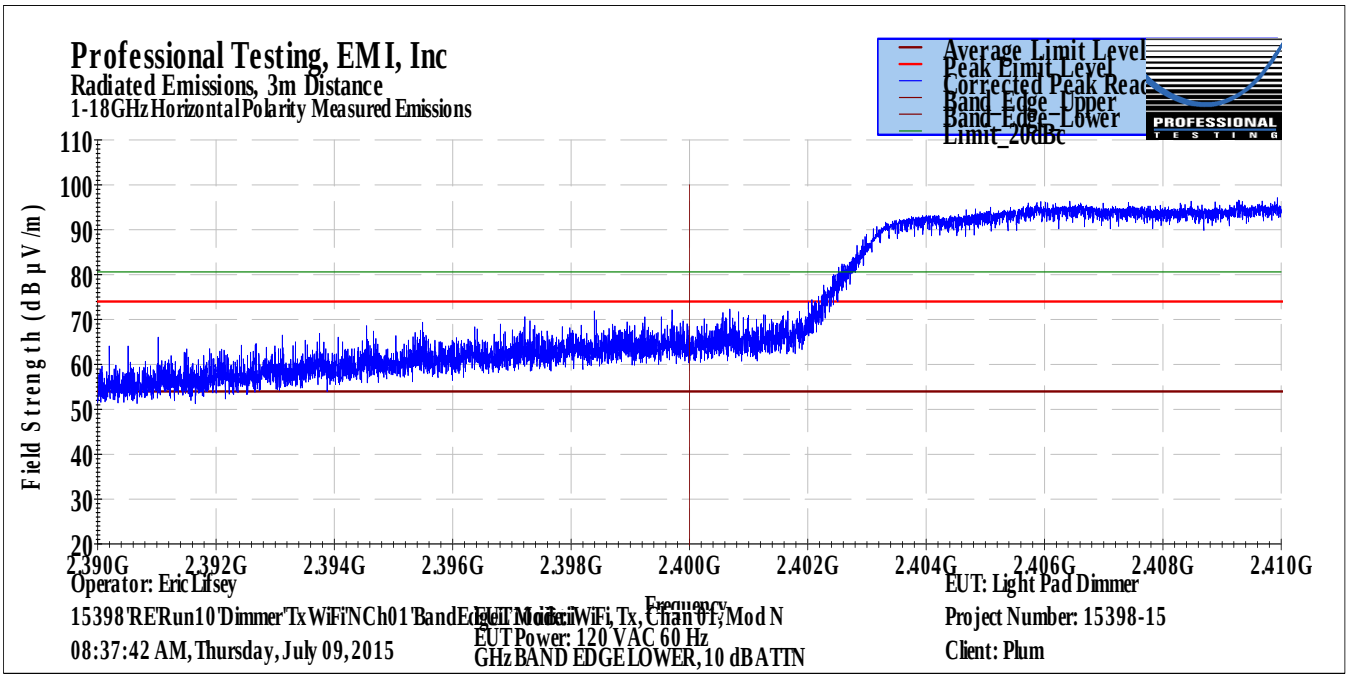




Band Edge Emission, Satisfies -20dBc and 15.209 Criteria

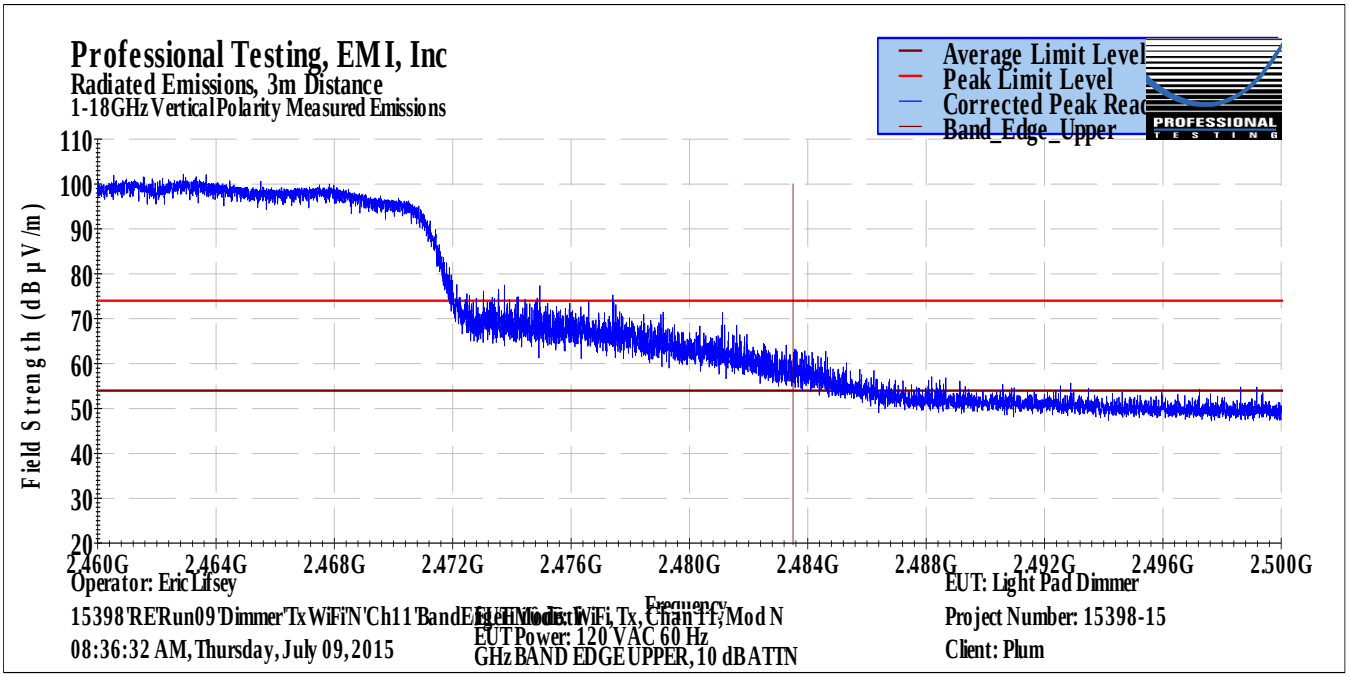
6.3.5 Low Channel Band Edge, n

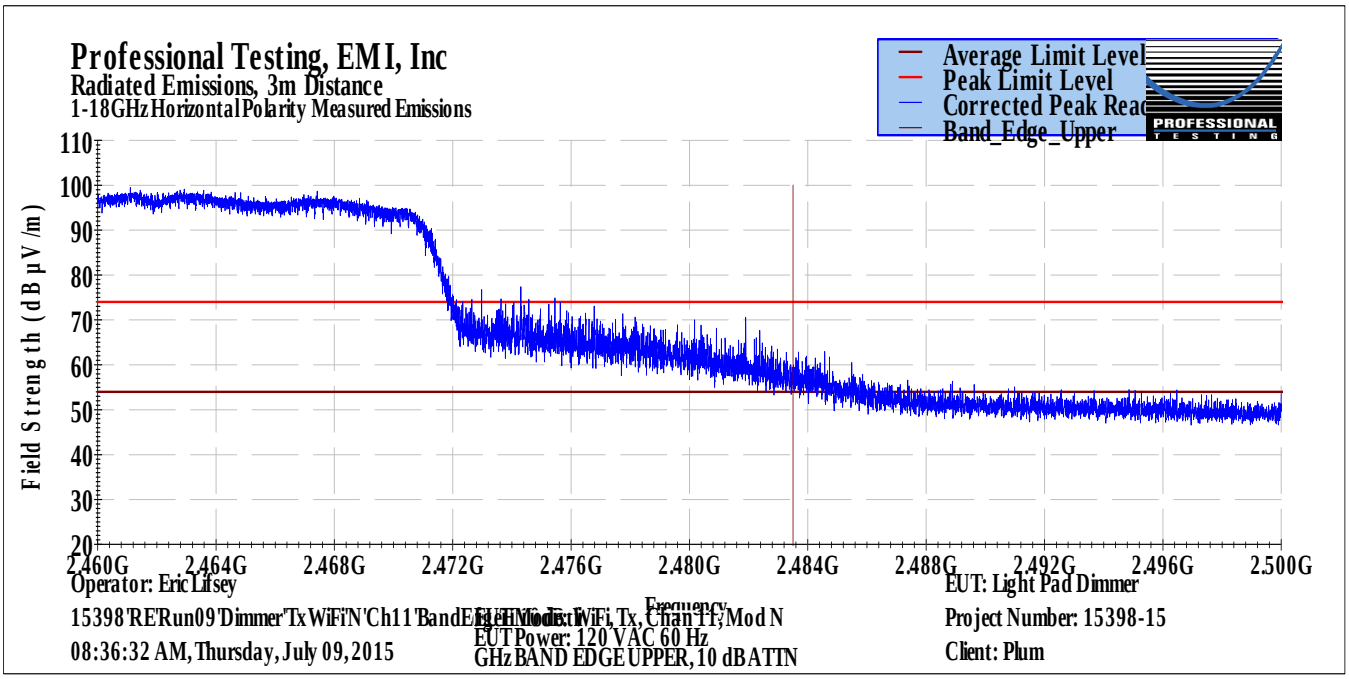




Band Edge Emission, Satisfies -20dBc Criteria

6.3.6 High Channel Band Edge, n





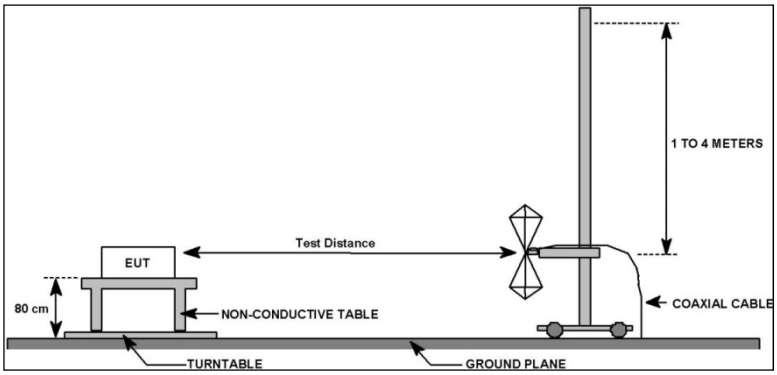
Band Edge Emission, Satisfies -20dBc and 15.209 Criteria

7.0 Radiated Spurious Emissions, Receive Mode

7.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The EUT was centered on a rotating turntable. Measurements below 1 GHz were taken at a test distance of 10 meters from the measurement antenna. Above 1 GHz the measurement distance was 3 meters.

Spurious emissions below 1 GHz were measured with quasi-peak detection with a resolution bandwidth of 120 kHz. Above 1 GHz peak measurements were taken and average measured where appropriate. A diagram showing the test setup appears below.



7.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.247, 15.209 // RSS-247 5.5, RSS-Gen 7.1	Field Strength of Radiated Spurious/Harmonic Emissions Receive Mode	6 Jul 2015

7.3 Test Results

The EUT was tuned to the middle channel and placed in receive mode.

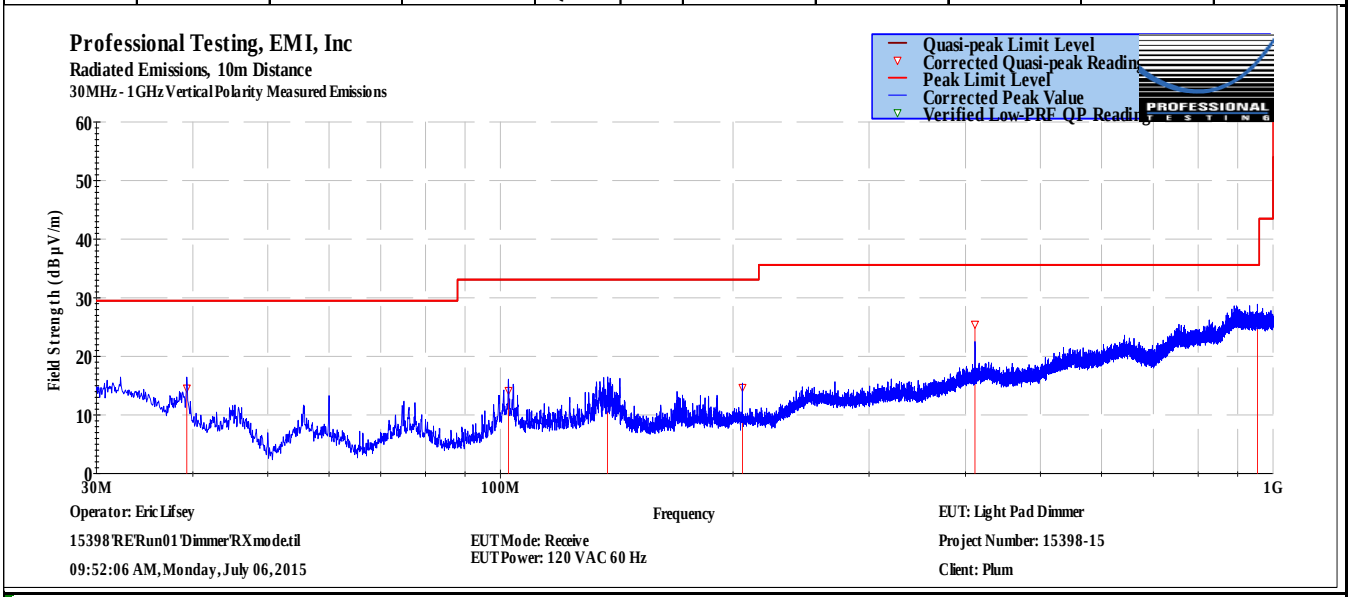
The EUT satisfied the criteria. Recorded data is presented below.

Table 7.3.1: Radiated Spurious Emissions, Receive Mode, Below 1 GHz, Vertical Polarity

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	EUT Serial #:	1600019
Customer:	Plum	EUT Part #:	0
Project Number:	15398-15	Test Technician:	Eric Lifsey
Purchase Order #:	NA	Supervisor:	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	Witness' Name:	Russ

Radiated Emissions Test Results Data Sheet			Page: 1 of 1
EUT Line Voltage:	120 VAC	EUT Power Frequency:	60 Hz
Antenna Orientation:	Vertical	Frequency Range:	30MHz to 1GHz
EUT Mode of Operation:		Receive Mode	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
39.279	10	141	1.37	Quasi-peak	31.8	14.577	29.5	-14.9	Pass
102.461	10	320	1.4	Quasi-peak	30.6	14.19	33.1	-18.9	Pass
137.598	10	308	1.2	Quasi-peak	28.3	11.085	33.1	-22.0	Pass
205.727	10	42	1.25	Quasi-peak	29	14.71	33.1	-18.4	Pass
411.461	10	91	1.17	Quasi-peak	32	25.493	35.6	-10.1	Pass
954.825	10	340	3.08	Quasi-peak	21.1	26.325	35.6	-9.3	Pass



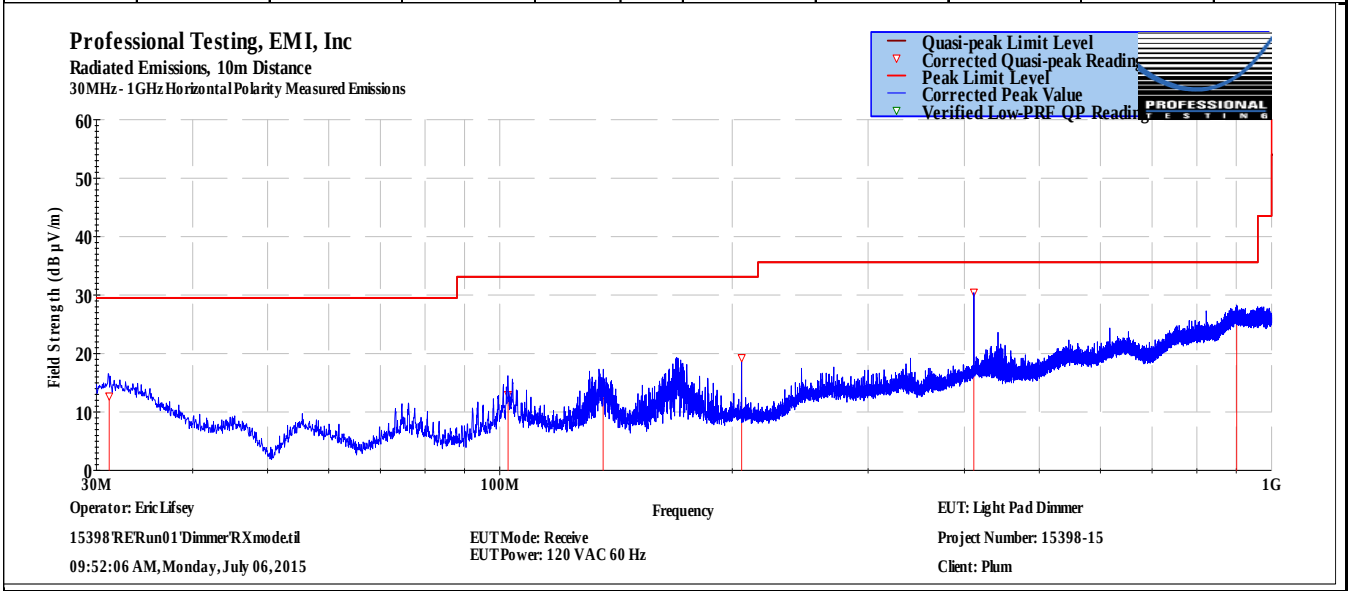
≤ 1GHz Vertical Antenna Polarity Measured Emissions

Table 7.3.2: Radiated Spurious Emissions, Receive Mode, Below 1 GHz, Horizontal Polarity

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet			Page: 1 of 1
EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Horizontal	**Frequency Range:**	30MHz to 1GHz
EUT Mode of Operation:		Receive Mode	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
31.1808	10	291	1.38	Quasi-peak	24.2	12.73	29.5	-16.8	Pass
102.478	10	313	3.51	Quasi-peak	29.4	12.98	33.1	-20.1	Pass
136.095	10	255	3.97	Quasi-peak	30.2	12.896	33.1	-20.2	Pass
205.726	10	47	3.53	Quasi-peak	33.6	19.299	33.1	-13.8	Pass
411.447	10	237	1.42	Quasi-peak	37	30.483	35.6	-5.1	Pass
901.084	10	290	1.2	Quasi-peak	21.2	26.498	35.6	-9.1	Pass



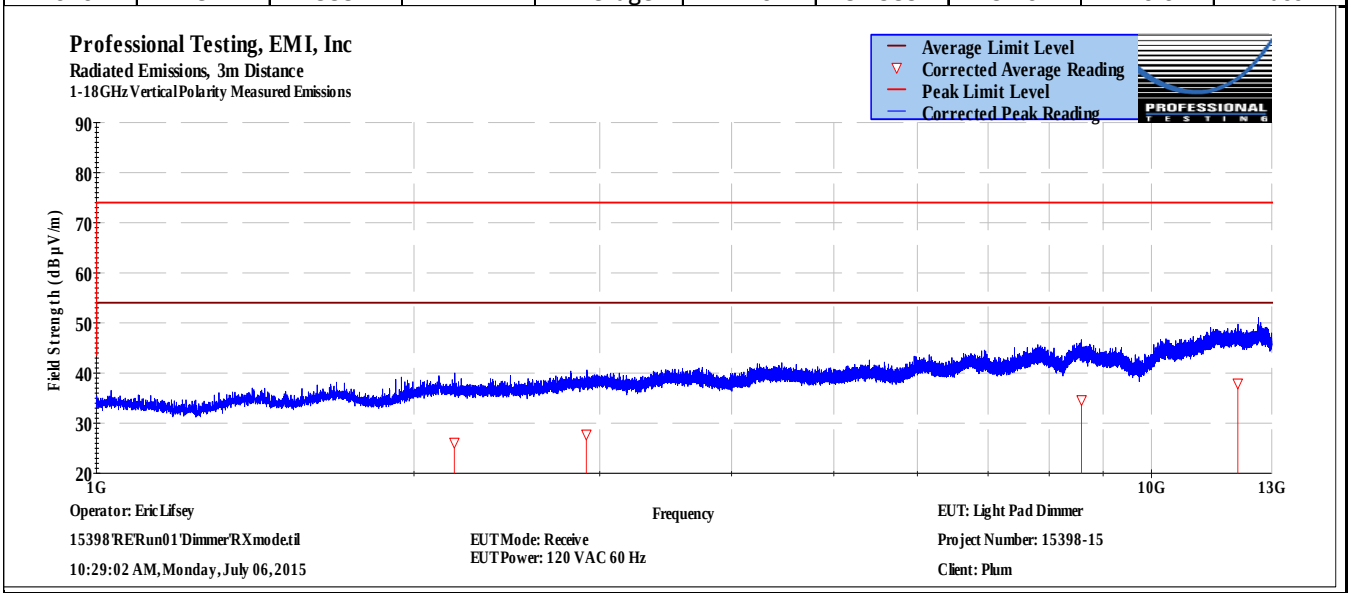
≤ 1GHz Horizontal Antenna Polarity Measured Emissions

Table 7.3.3: Radiated Spurious Emissions, Receive Mode, Above 1 GHz, Vertical Polarity

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	EUT Serial #:	1600019
Customer:	Plum	EUT Part #:	0
Project Number:	15398-15	Test Technician:	Eric Lifsey
Purchase Order #:	NA	Supervisor:	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	Witness' Name:	Russ

Radiated Emissions Test Results Data Sheet			Page: 1 of 1
EUT Line Voltage:	120 VAC	EUT Power Frequency:	60 Hz
Antenna Orientation:	Vertical	Frequency Range:	Above 1GHz
EUT Mode of Operation:		Receive Mode	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
2184.42	3	176	1	Average	35.2	26.133	54.0	-27.8	Pass
2913.39	3	96	1	Average	34.7	27.759	54.0	-26.2	Pass
8586.06	3	219	1	Average	27.5	34.657	54.0	-19.3	Pass
12070.2	3	333	1	Average	27.6	37.939	54.0	-16.0	Pass



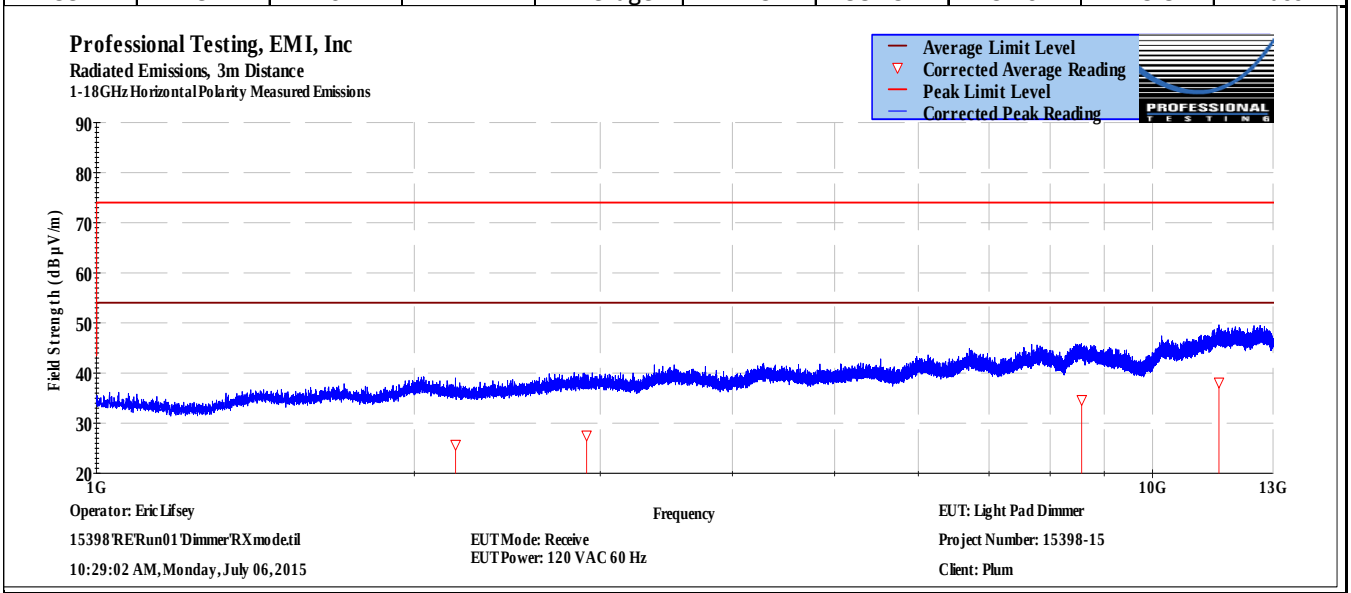
> 1GHz Vertical Antenna Polarity Measured Emissions

Table 7.3.4: Radiated Spurious Emissions, Receive Mode, Above 1 GHz, Vertical Polarity

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	EUT Serial #:	1600019
Customer:	Plum	EUT Part #:	0
Project Number:	15398-15	Test Technician:	Eric Lifsey
Purchase Order #:	NA	Supervisor:	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	Witness' Name:	Russ

Radiated Emissions Test Results Data Sheet			Page: 1 of 1
EUT Line Voltage:	120 VAC	EUT Power Frequency:	60 Hz
Antenna Orientation:	Horizontal	Frequency Range:	Above 1GHz
EUT Mode of Operation:		Receive Mode	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
2188.05	3	16	1	Average	34.8	25.738	54.0	-28.2	Pass
2911.38	3	351	1	Average	34.5	27.594	54.0	-26.4	Pass
8567.39	3	352	1	Average	27.5	34.672	54.0	-19.3	Pass
11557.4	3	262	1	Average	27.5	38.152	54.0	-15.8	Pass



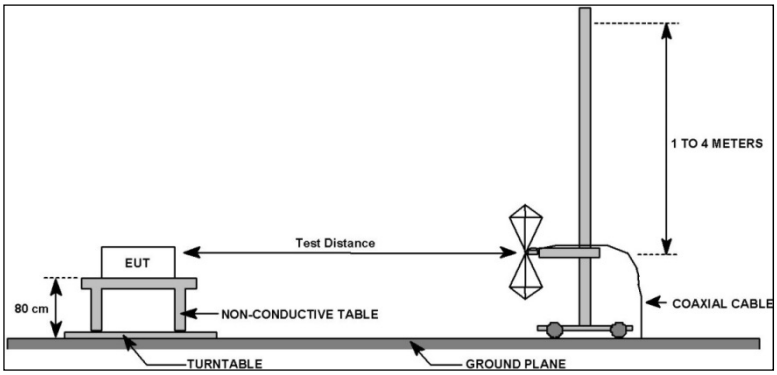
> 1GHz Horizontal Antenna Polarity Measured Emissions

8.0 Radiated Spurious Emissions, Transmit Mode

8.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The EUT was centered on a rotating turntable. Measurements below 1 GHz were taken at a test distance of 10 meters from the measurement antenna. Above 1 GHz the measurement distance was 3 meters.

Spurious emissions below 1 GHz were measured with quasi-peak detection with a resolution bandwidth of 120 kHz. Above 1 GHz peak measurements were taken and average measured where appropriate. A diagram showing the test setup appears below.



8.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.247, 15.209 // RSS-247 5.5, RSS-Gen 6.13	Field Strength of Radiated Spurious/Harmonic Emissions Transmit Mode	6 Jul 2015 10 Jul 2015 14 Jul 2015 15 Jul 2015

8.3 Test Results

Below 1 GHz measurements were taken for the middle channel and employed quasi-peak detection if required. Above 1 GHz measurements were taken for the three standard channels of the band and employed peak detection. A high pass filter was employed to allow measurement of harmonics without overload of preamp or analyzer.

Modulation was enabled and the transmitter was placed into continuous transmit mode.

The duty cycle factor for averaging above 1 GHz was determined in other measurements to be -20 dB. Therefore, margins below the peak limit apply equally to the averages.

Above 1 GHz measurements were taken for all three transmit modes: b, g, and n.

The EUT satisfied the requirements.

Plot 8.3.1: Below 1 GHz, Vertical Polarity, Middle Channel

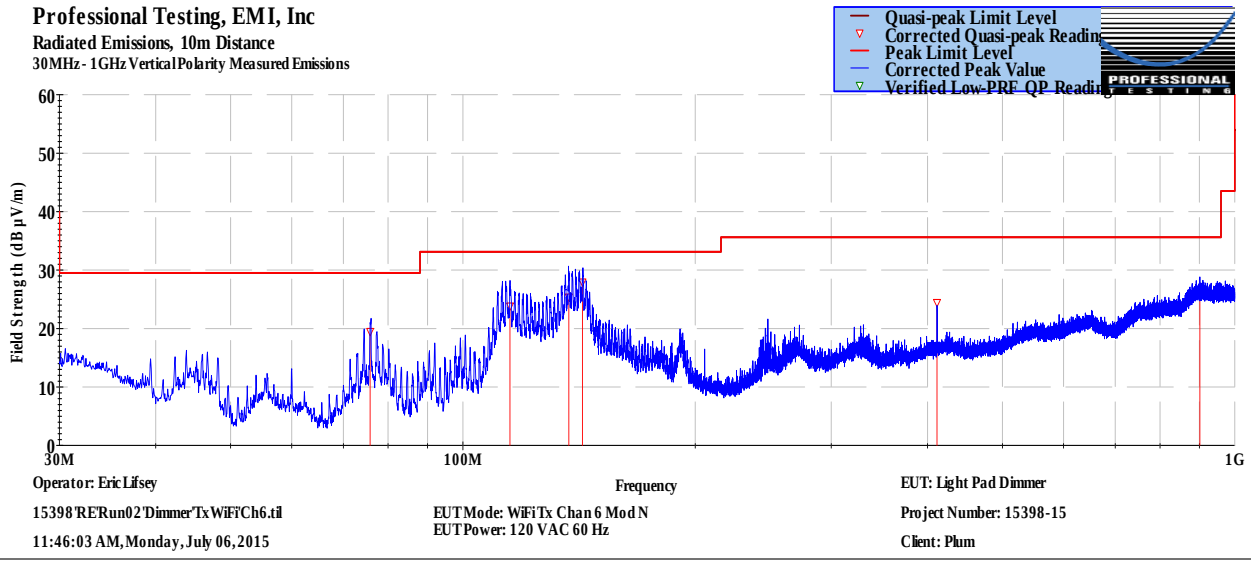
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — **Page: 1 of 1**

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Vertical	**Frequency Range:**	30MHz to 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi N, Middle Channel, < 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
75.832	10	20	1.31	Quasi-peak	37.5	19.487	29.5	-10.0	Pass
115.085	10	142	2.23	Quasi-peak	40.8	23.843	33.1	-9.3	Pass
137.158	10	29	1.27	Quasi-peak	42.6	25.378	33.1	-7.7	Pass
142.853	10	11	1.64	Quasi-peak	45	27.947	33.1	-5.2	Pass
411.428	10	105	1.46	Quasi-peak	31	24.441	35.6	-11.2	Pass
901.22	10	28	1.77	Quasi-peak	21.2	26.509	35.6	-9.1	Pass



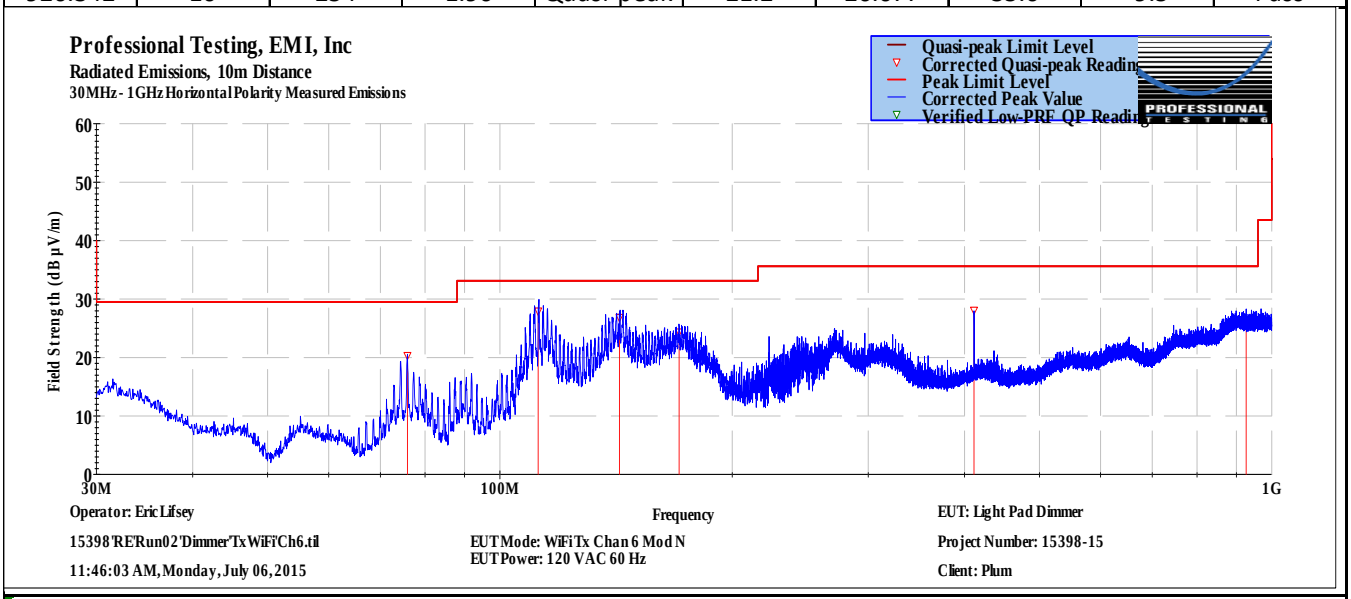
≤ 1GHz Vertical Antenna Polarity Measured Emissions

Plot 8.3.2: Below 1 GHz, Horizontal Polarity, Middle Channel

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	EUT Serial #:	1600019
Customer:	Plum	EUT Part #:	0
Project Number:	15398-15	Test Technician:	Eric Lifsey
Purchase Order #:	NA	Supervisor:	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	Witness' Name:	Russ

Radiated Emissions Test Results Data Sheet			Page: 1 of 1
EUT Line Voltage:	120 VAC	EUT Power Frequency:	60 Hz
Antenna Orientation:	Horizontal	Frequency Range:	30MHz to 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi N, Middle Channel, < 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
75.895	10	181	3.83	Quasi-peak	38.4	20.335	29.5	-9.2	Pass
112.111	10	59	3.86	Quasi-peak	44.6	27.933	33.1	-5.2	Pass
142.863	10	128	3.75	Quasi-peak	43.9	26.831	33.1	-6.3	Pass
170.671	10	32	3.64	Quasi-peak	39.8	24.341	33.1	-8.8	Pass
411.44	10	52	1.74	Quasi-peak	34.6	28.081	35.6	-7.5	Pass
926.342	10	254	1.96	Quasi-peak	21.2	26.077	35.6	-9.5	Pass



≤ 1GHz Horizontal Antenna Polarity Measured Emissions

Plot 8.3.3: Mode B; 1-18 GHz, Vertical Polarity, Low Channel

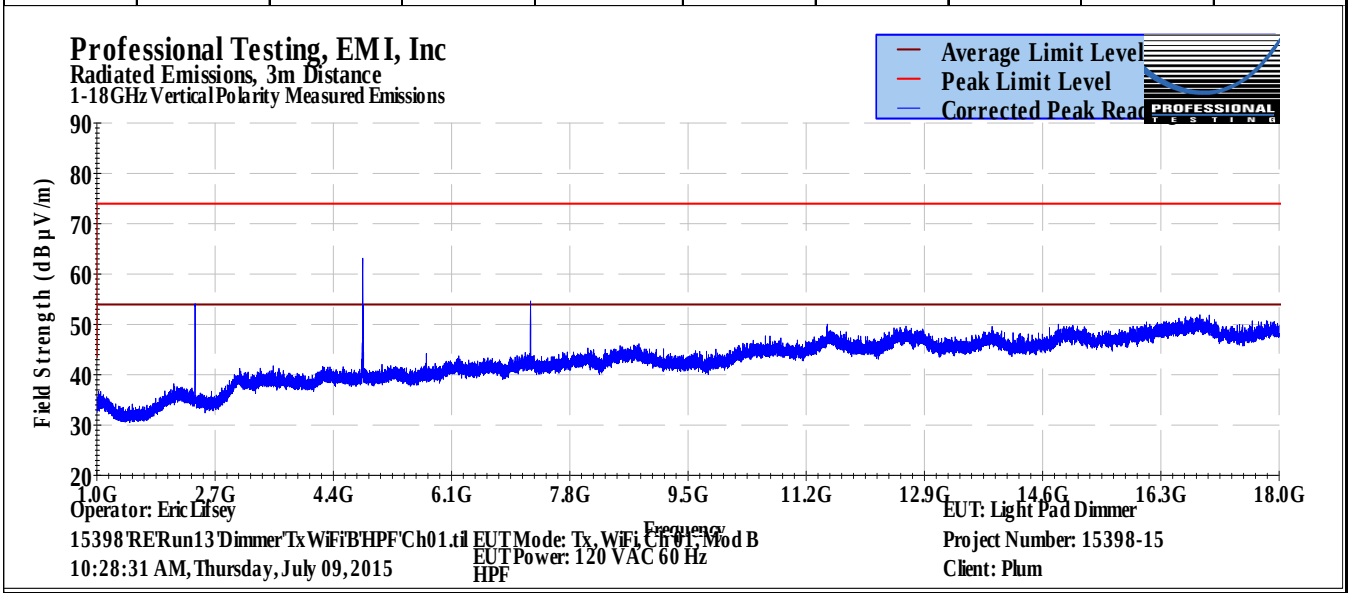
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015, 7/10/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — **Page: 1 of 1**

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Vertical	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi B, Low Channel, > 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4823.98	3	281	0	Peak	68	63.986	74.0	-10.0	Pass
7235.7	3	228	0	Peak	53.3	56.457	74.0	-17.5	Pass



> 1GHz Vertical Antenna Polarity Measured Emissions

Plot 8.3.4: Mode B; 1-18 GHz, Horizontal Polarity, Low Channel

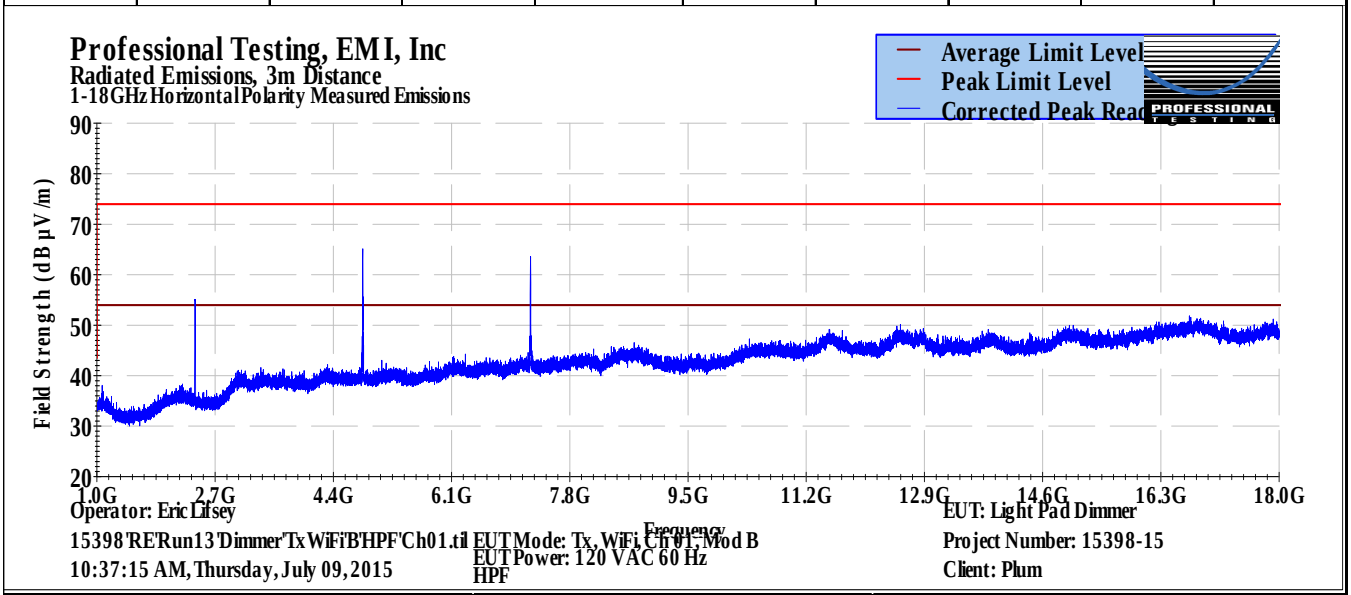
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015, 7/10/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — **Page: 1 of 1**

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Horizontal	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi B, Low Channel, > 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4823.93	3	262	0	Peak	68.9	64.945	74.0	-9.0	Pass
7236.96	3	252	0	Peak	60.8	63.935	74.0	-10.0	Pass



> 1GHz Horizontal Antenna Polarity Measured Emissions

Plot 8.3.5: Mode B; 1-18 GHz, Vertical Polarity, Middle Channel

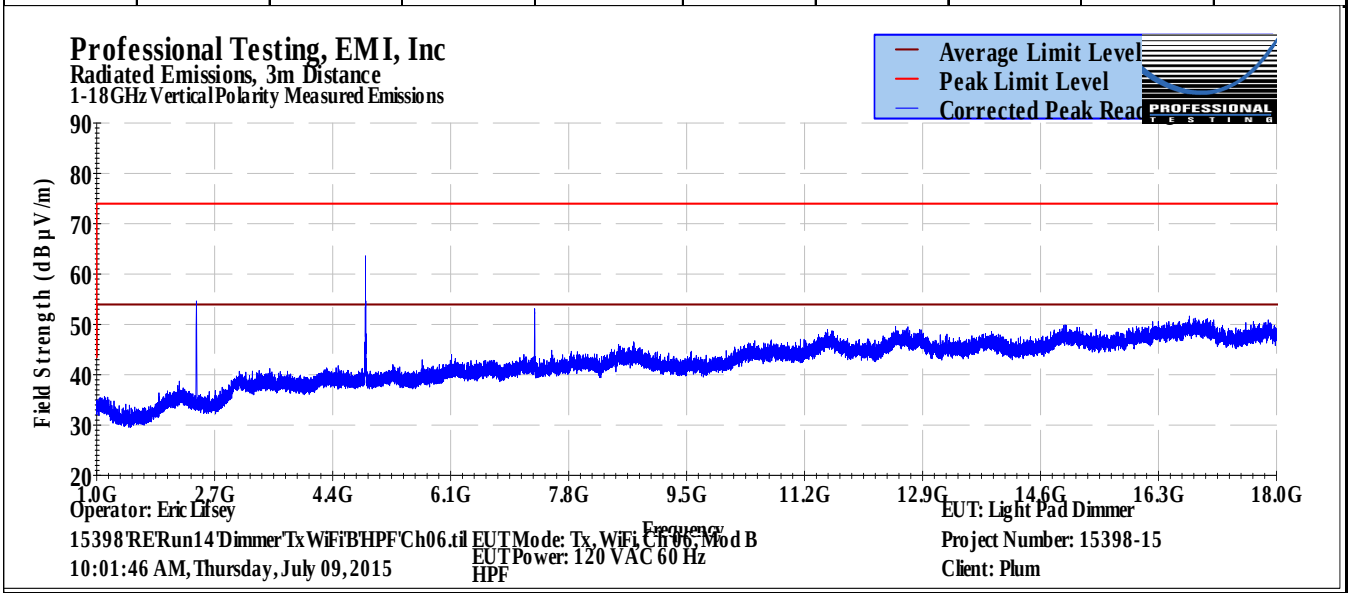
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015, 7/10/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — Page: 1 of 1

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Vertical	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi B, Middle Channel, > 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4873.94	3	236	0	Peak	68	64.188	74.0	-9.8	Pass
7311.73	3	68	0	Peak	47.6	50.986	74.0	-23.0	Pass



> 1GHz Vertical Antenna Polarity Measured Emissions

Plot 8.3.6: Mode B; 1-18 GHz, Horizontal Polarity, Middle Channel

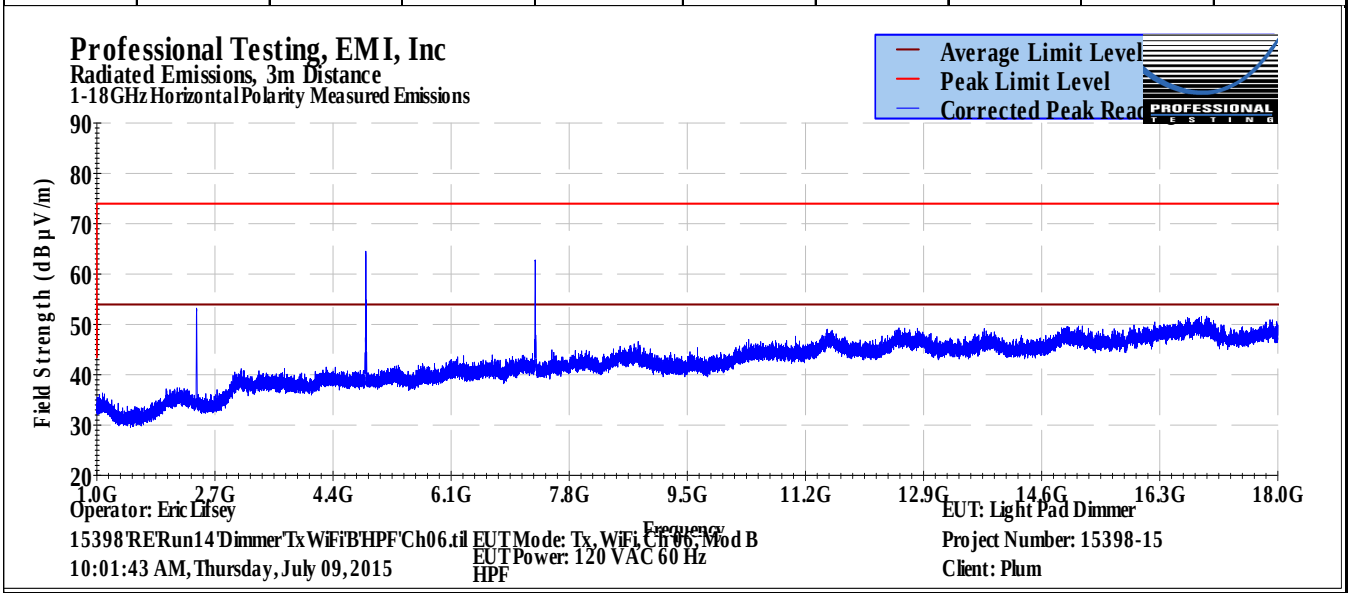
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015, 7/10/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — Page: 1 of 1

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Horizontal	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi B, Middle Channel, > 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4873.94	3	266	0	Peak	70.6	66.818	74.0	-7.1	Pass
7310.19	3	246	0	Peak	60.2	63.619	74.0	-10.3	Pass



> 1GHz Horizontal Antenna Polarity Measured Emissions

Plot 8.3.7: Mode B; 1-18 GHz, Vertical Polarity, High Channel

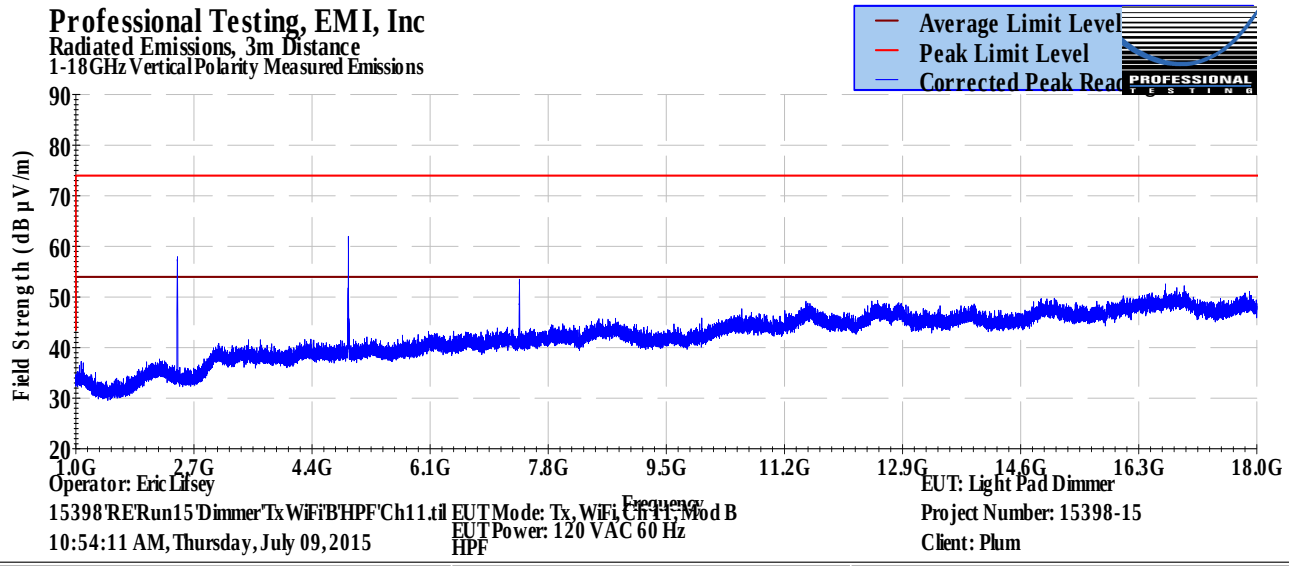
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015, 7/10/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — Page: 1 of 1

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Vertical	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi B, HIgh Channel, > 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4924.11	3	218	0	Peak	64.3	60.736	74.0	-13.2	Pass
7386.32	3	239	0	Peak	50.7	54.414	74.0	-19.5	Pass



> 1GHz Vertical Antenna Polarity Measured Emissions

Plot 8.3.8: Mode B; 1-18 GHz, Horizontal Polarity, High Channel

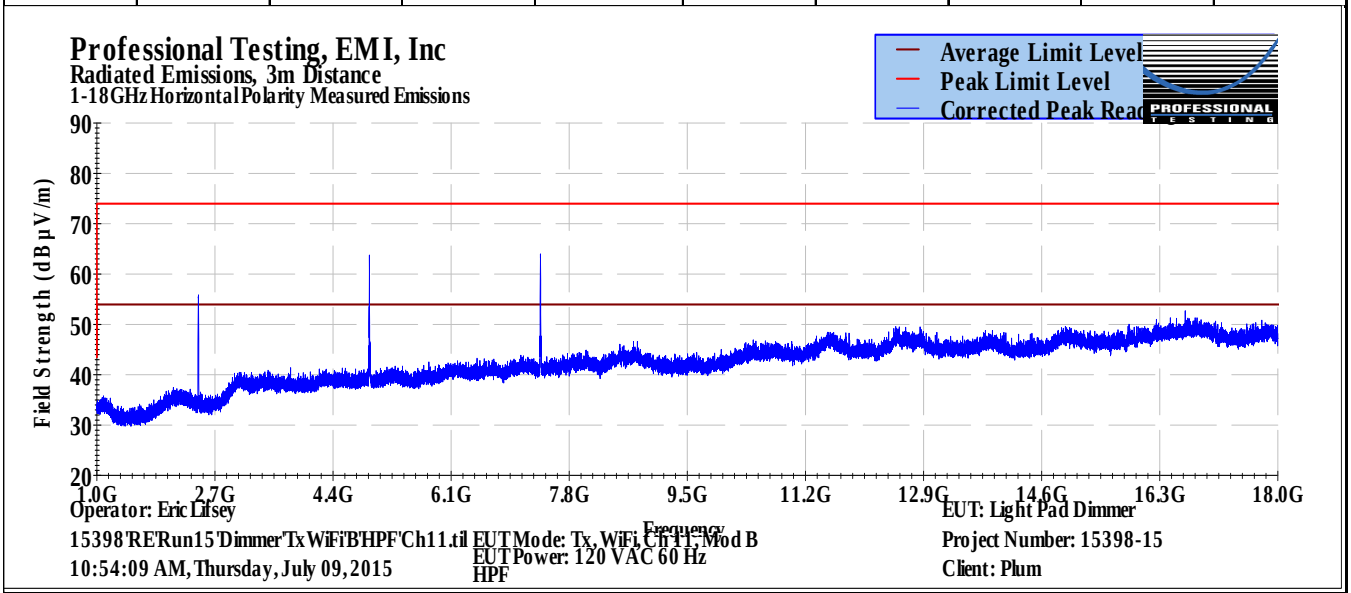
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015, 7/10/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — Page: 1 of 1

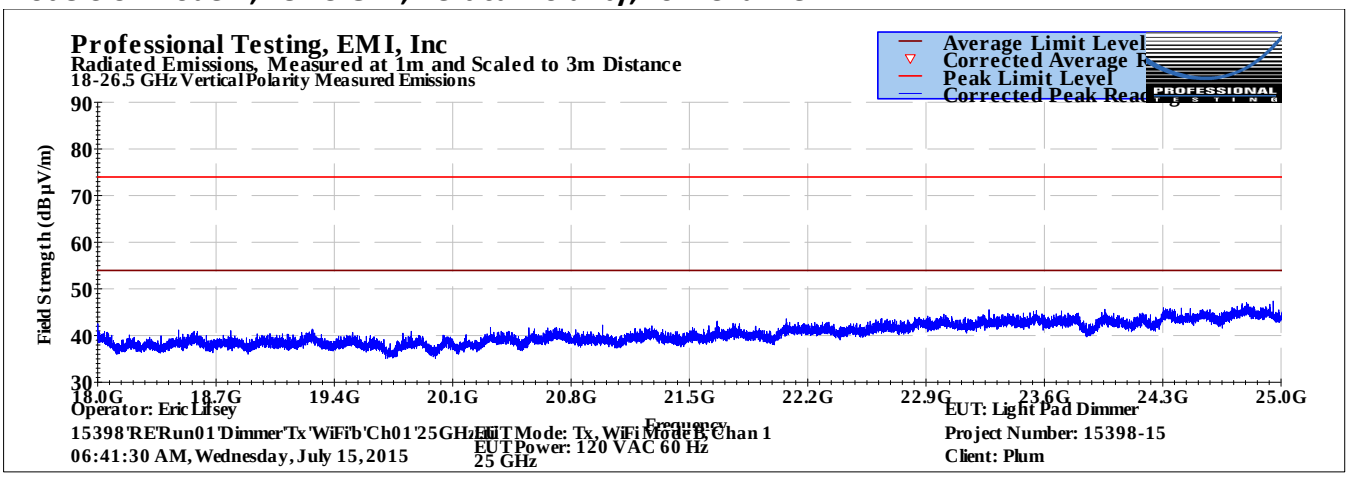
EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Horizontal	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi B, HIgh Channel, > 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4923.88	3	267	0	Peak	68.3	64.683	74.0	-9.3	Pass
7385.38	3	241	0	Peak	60.1	63.772	74.0	-10.2	Pass

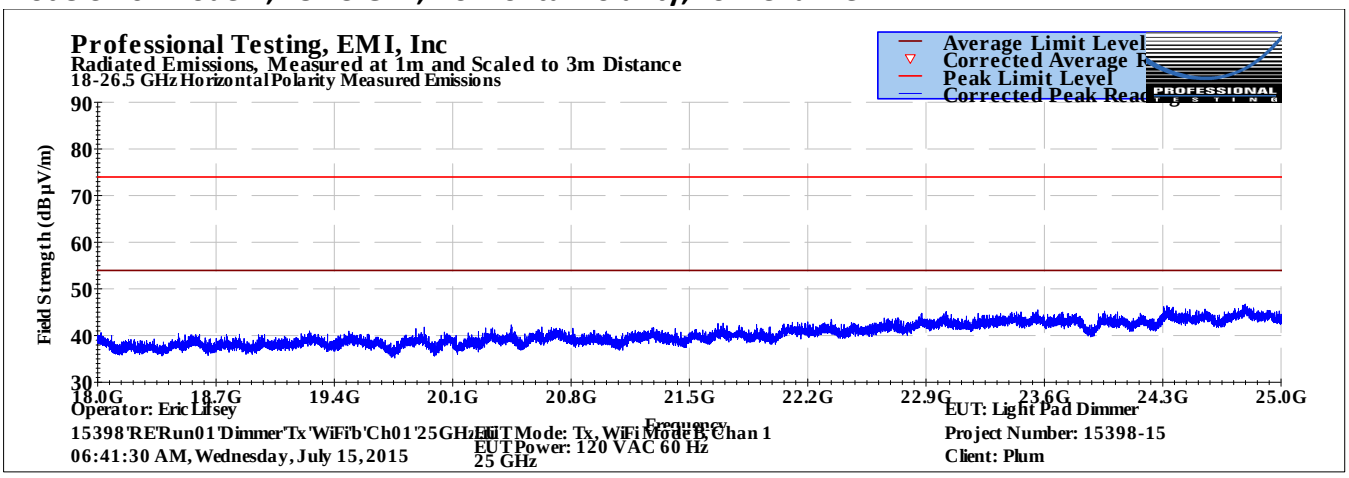


> 1GHz Horizontal Antenna Polarity Measured Emissions

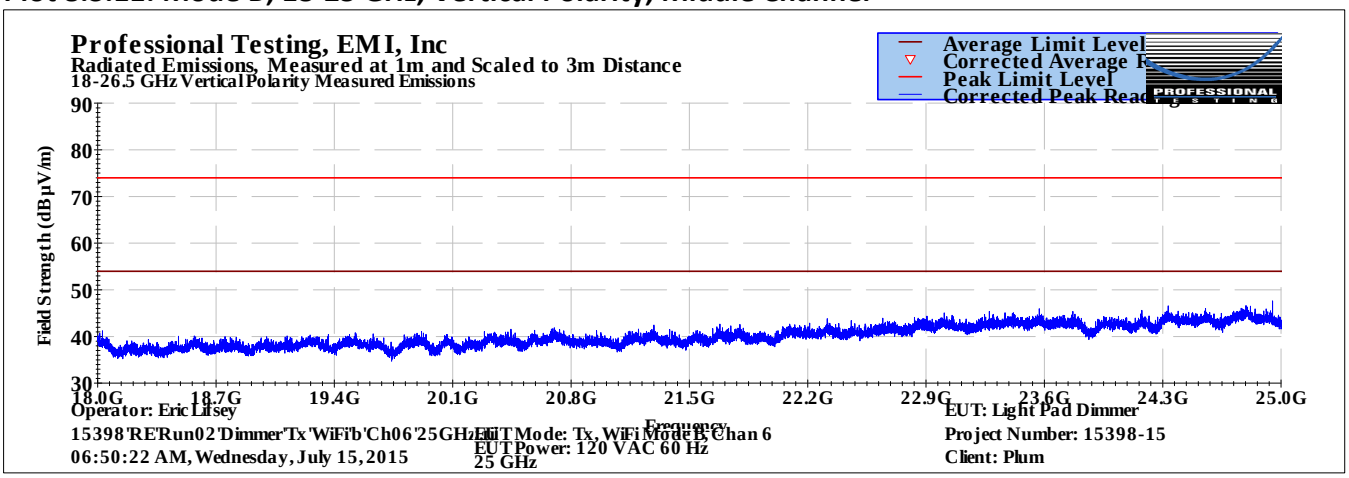
Plot 8.3.9: Mode B; 18-25 GHz, Vertical Polarity, Low Channel



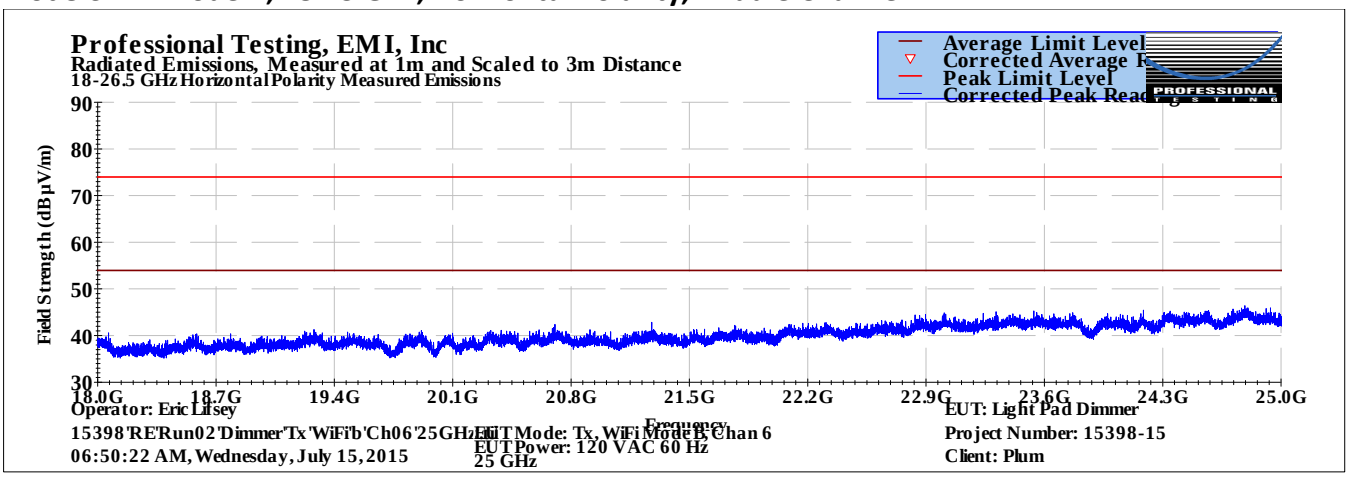
Plot 8.3.10: Mode B; 18-25 GHz, Horizontal Polarity, Low Channel



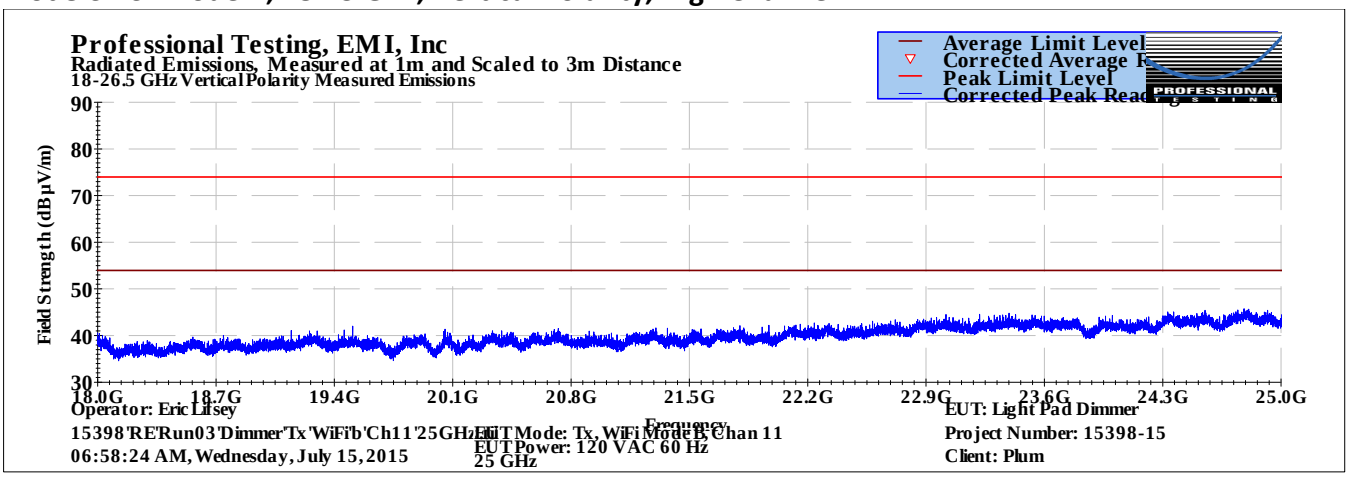
Plot 8.3.11: Mode B; 18-25 GHz, Vertical Polarity, Middle Channel



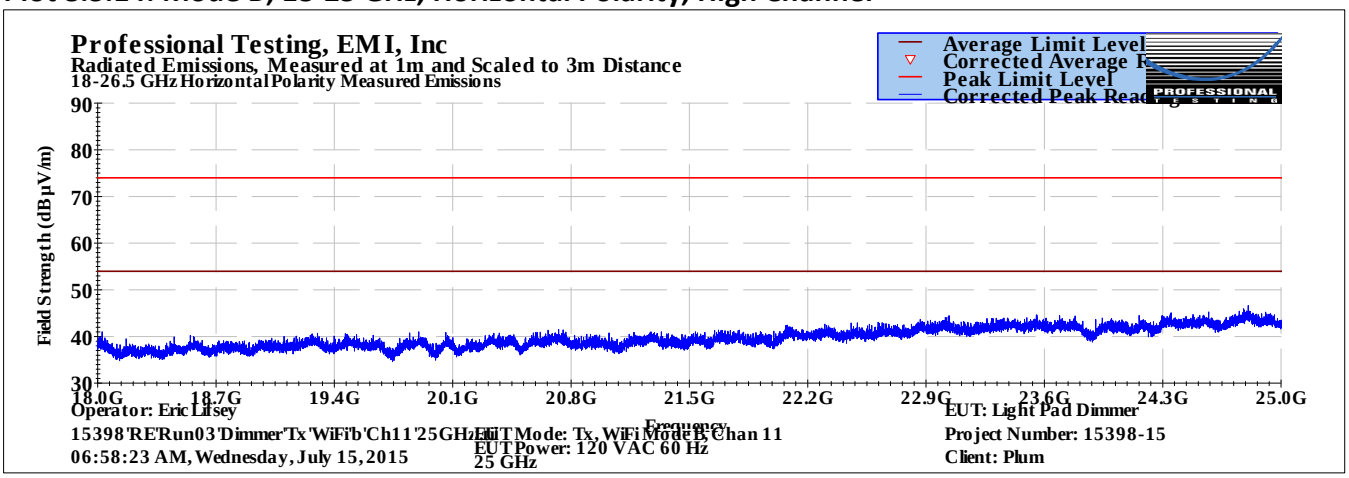
Plot 8.3.12: Mode B; 18-25 GHz, Horizontal Polarity, Middle Channel



Plot 8.3.13: Mode B; 18-25 GHz, Vertical Polarity, High Channel



Plot 8.3.14: Mode B; 18-25 GHz, Horizontal Polarity, High Channel



Plot 8.3.15: Mode G; 1-18 GHz, Vertical Polarity, Low Channel

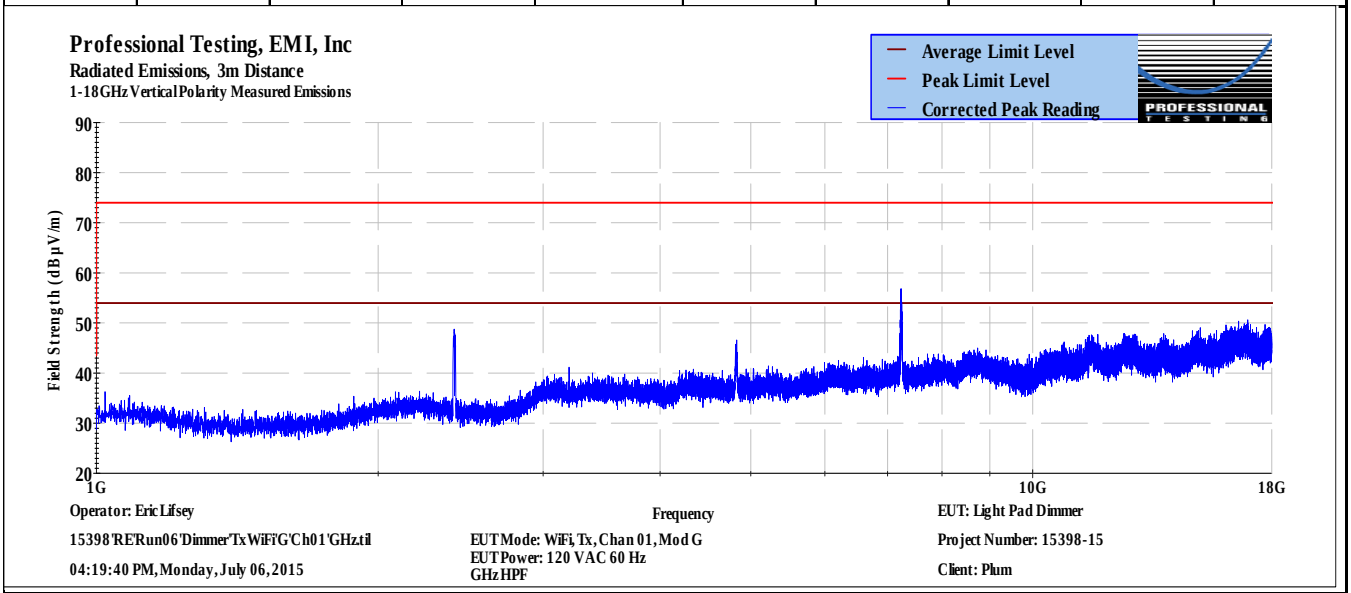
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — **Page: 1 of 1**

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Vertical	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi G, Low Channel, > 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4827.98	3	50	0	Peak	47.3	43.311	74.0	-30.6	Pass
7236.92	3	25	0	Peak	52.7	55.827	74.0	-18.1	Pass



> 1GHz Vertical Antenna Polarity Measured Emissions

Plot 8.3.16: Mode G; 1-18 GHz, Horizontal Polarity, Low Channel

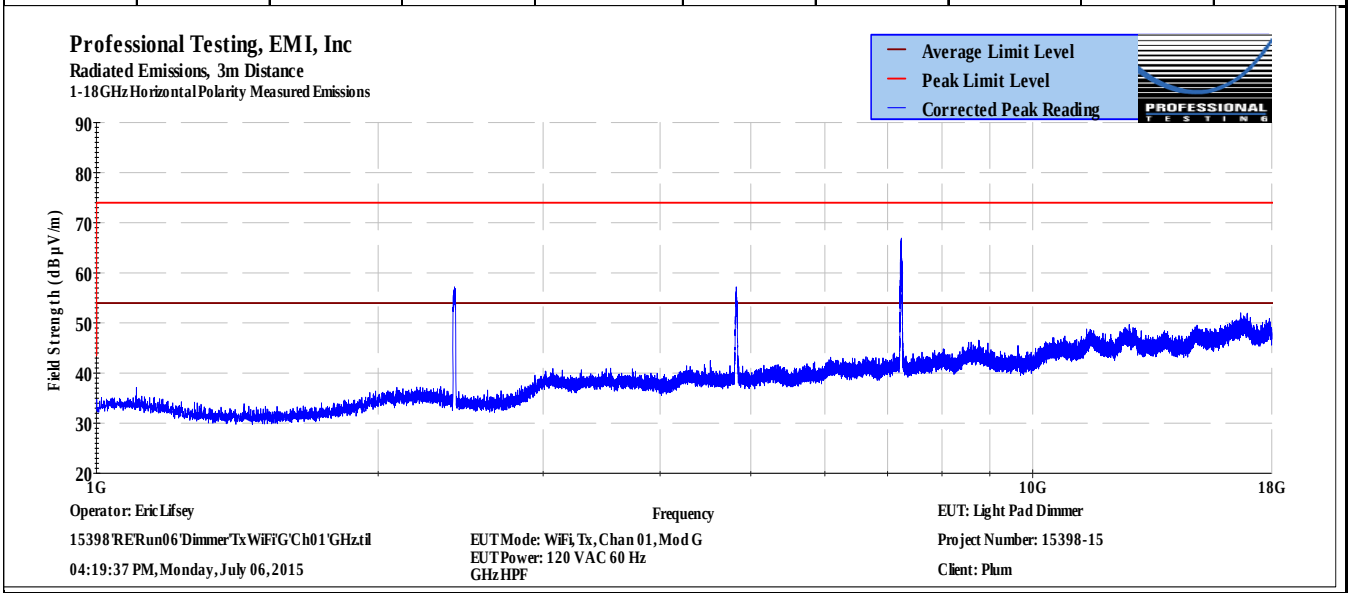
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — **Page: 1 of 1**

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Horizontal	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi G, Low Channel, > 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4825.48	3	263	0	Peak	59.6	55.663	74.0	-18.3	Pass
7234.74	3	301	0	Peak	63.5	66.68	74.0	-7.3	Pass



> 1GHz Horizontal Antenna Polarity Measured Emissions

Plot 8.3.17: Mode G; 1-18 GHz, Vertical Polarity, Middle Channel

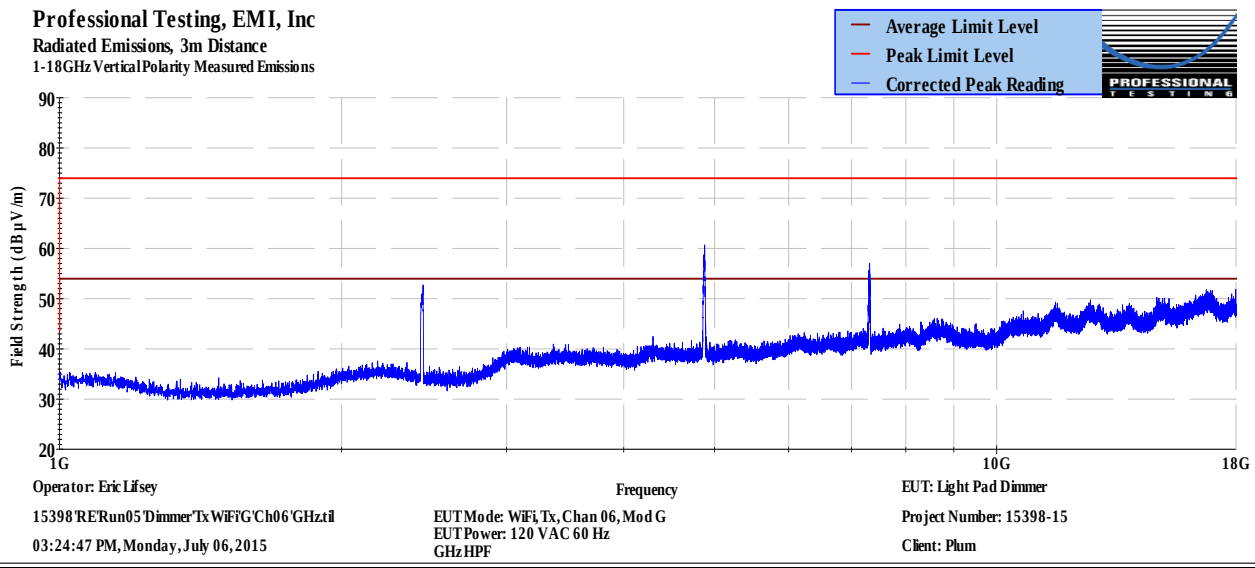
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — **Page: 1 of 1**

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Vertical	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi G, Middle Channel, > 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4875.39	3	299	0	Peak	65.4	61.655	74.0	-12.3	Pass
7315.48	3	31	0	Peak	52.5	55.964	74.0	-18.0	Pass



> 1GHz Vertical Antenna Polarity Measured Emissions

Plot 8.3.18: Mode G; 1-18 GHz, Horizontal Polarity, Middle Channel

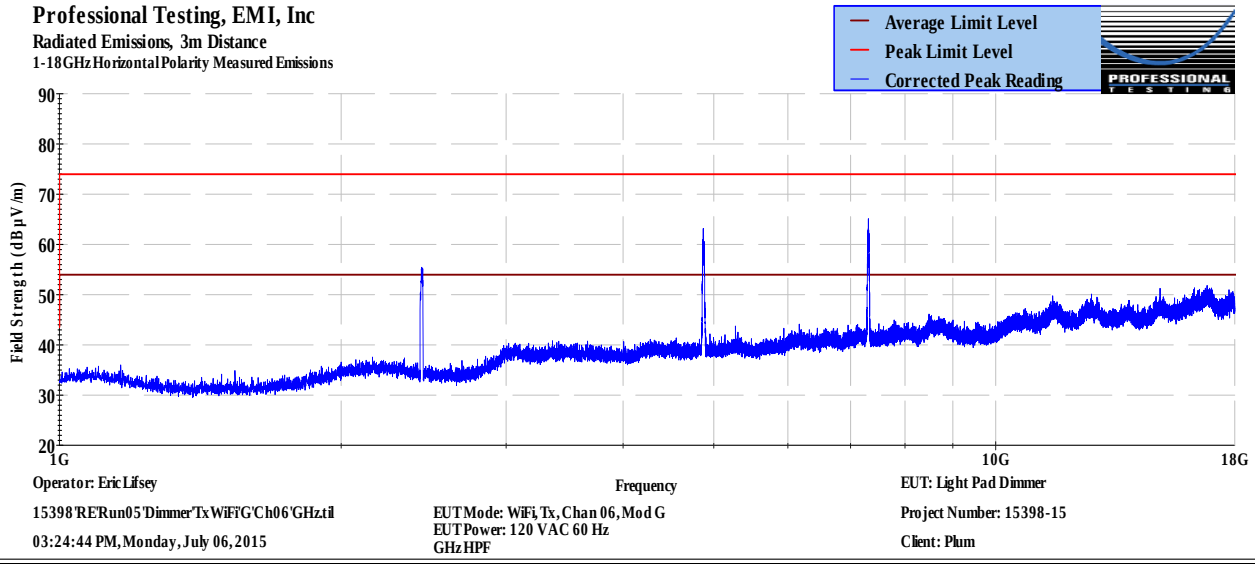
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — **Page: 1 of 1**

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Horizontal	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi G, Middle Channel, > 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4874.96	3	271	0	Peak	63.7	59.958	74.0	-14.0	Pass
7310.7	3	288	0	Peak	61.2	64.654	74.0	-9.3	Pass



> 1GHz Horizontal Antenna Polarity Measured Emissions

Plot 8.3.19: Mode G; 1-18 GHz, Vertical Polarity, High Channel

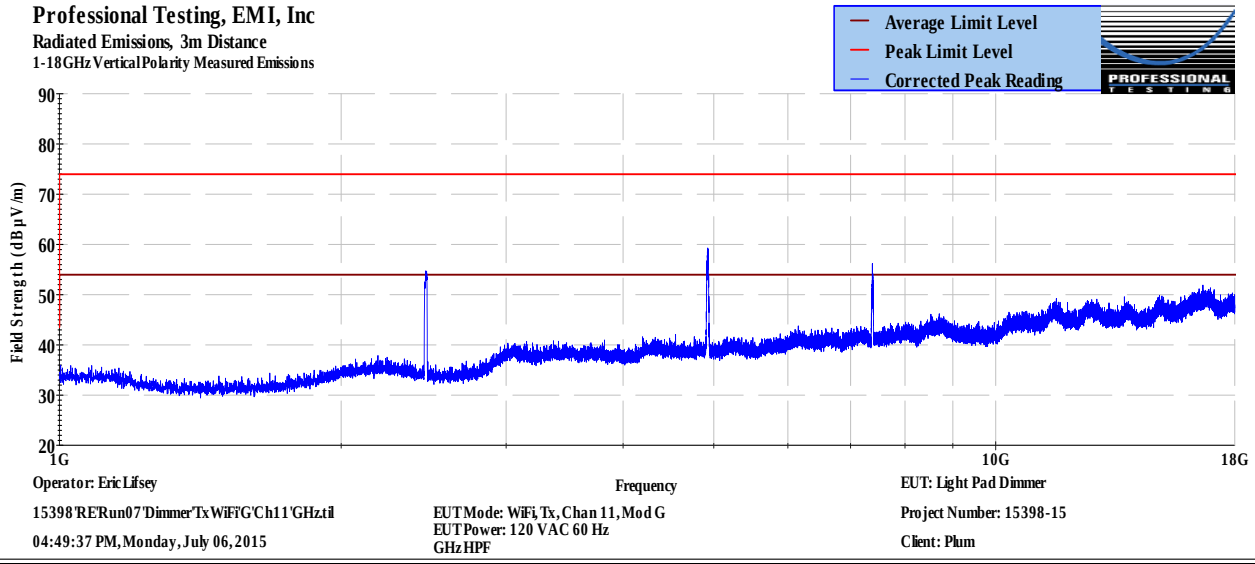
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — Page: 1 of 1

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Vertical	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi G, High Channel, > 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4922.75	3	200	0	Peak	59.1	55.52	74.0	-18.4	Pass
7390.52	3	118	0	Peak	52	55.685	74.0	-18.3	Pass



> 1GHz Vertical Antenna Polarity Measured Emissions

Plot 8.3.20: Mode G; 1-18 GHz, Horizontal Polarity, High Channel

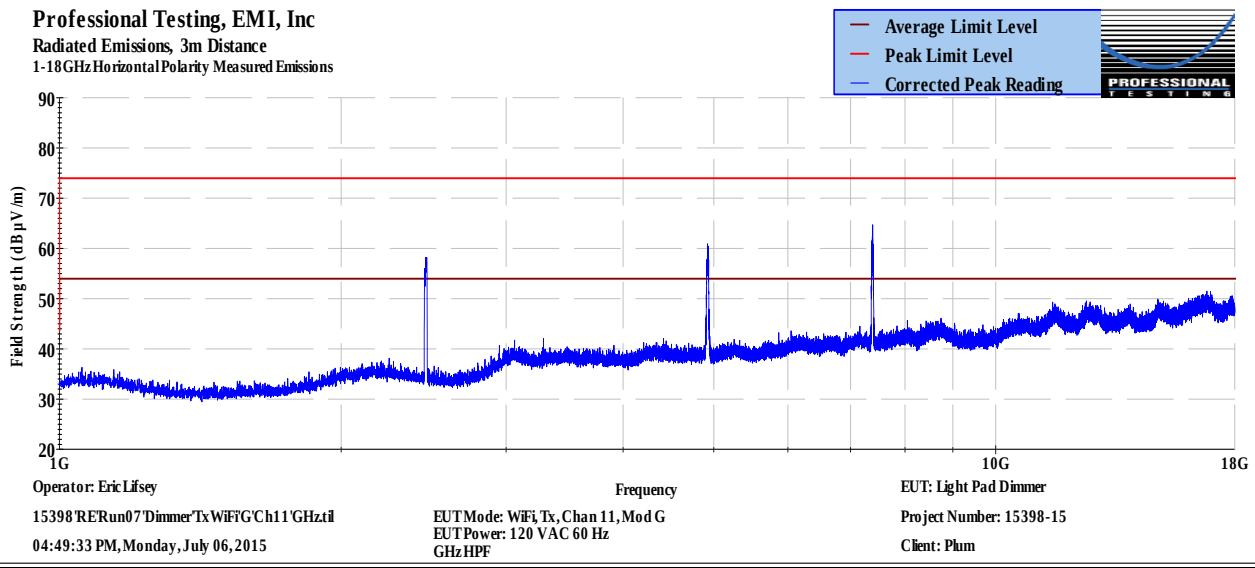
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — Page: 1 of 1

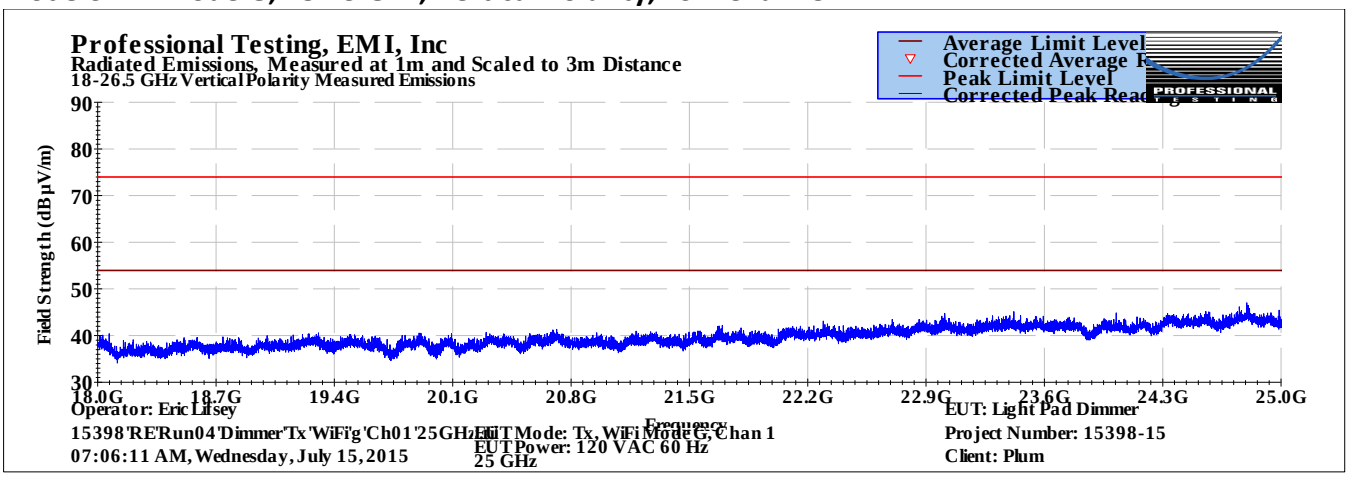
EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Horizontal	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi G, High Channel, > 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4922.85	3	200	0	Peak	62.7	59.107	74.0	-14.9	Pass
7383.68	3	254	0	Peak	60.9	64.6	74.0	-9.4	Pass

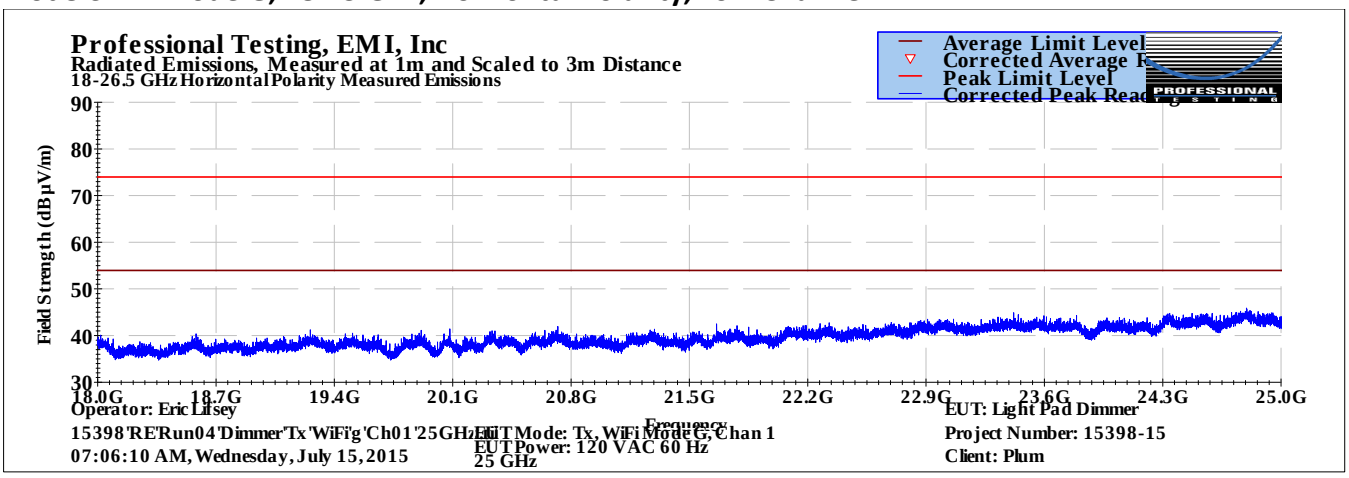


> 1GHz Horizontal Antenna Polarity Measured Emissions

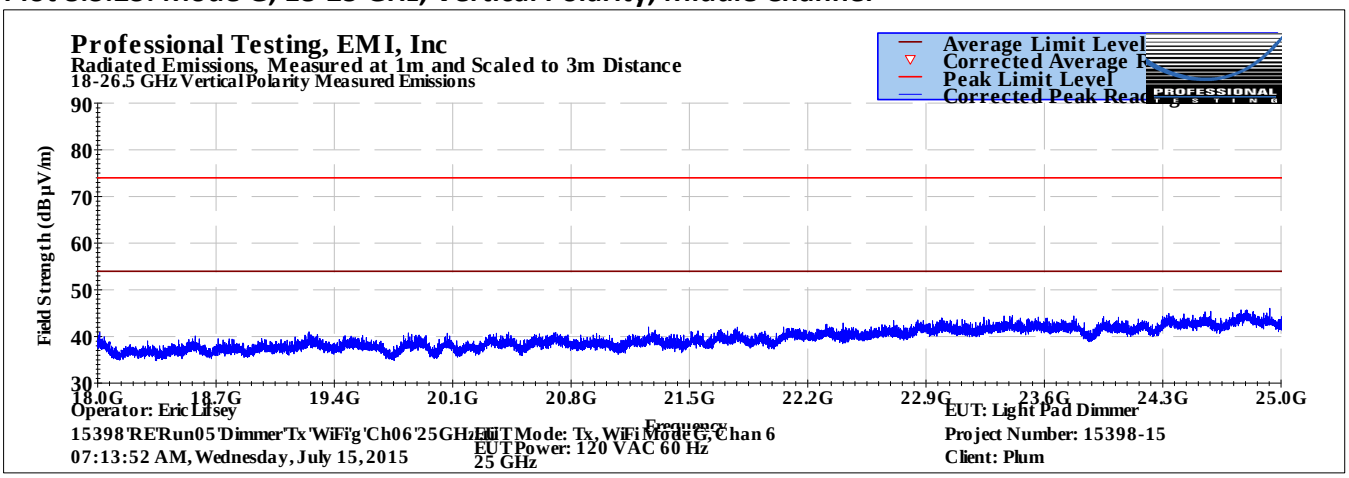
Plot 8.3.21: Mode G; 18-25 GHz, Vertical Polarity, Low Channel



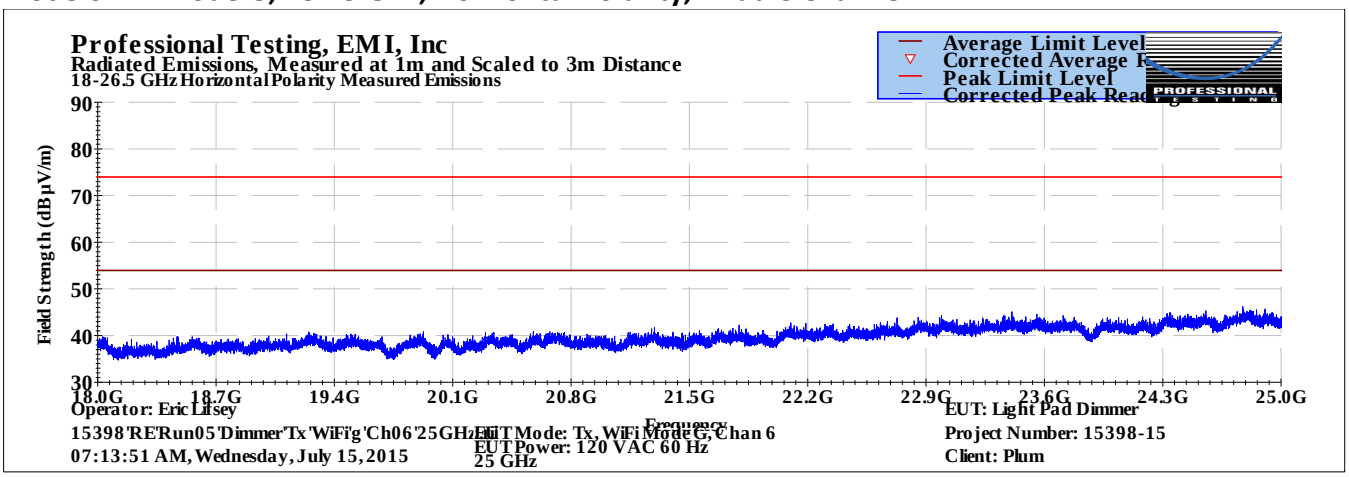
Plot 8.3.22: Mode G; 18-25 GHz, Horizontal Polarity, Low Channel



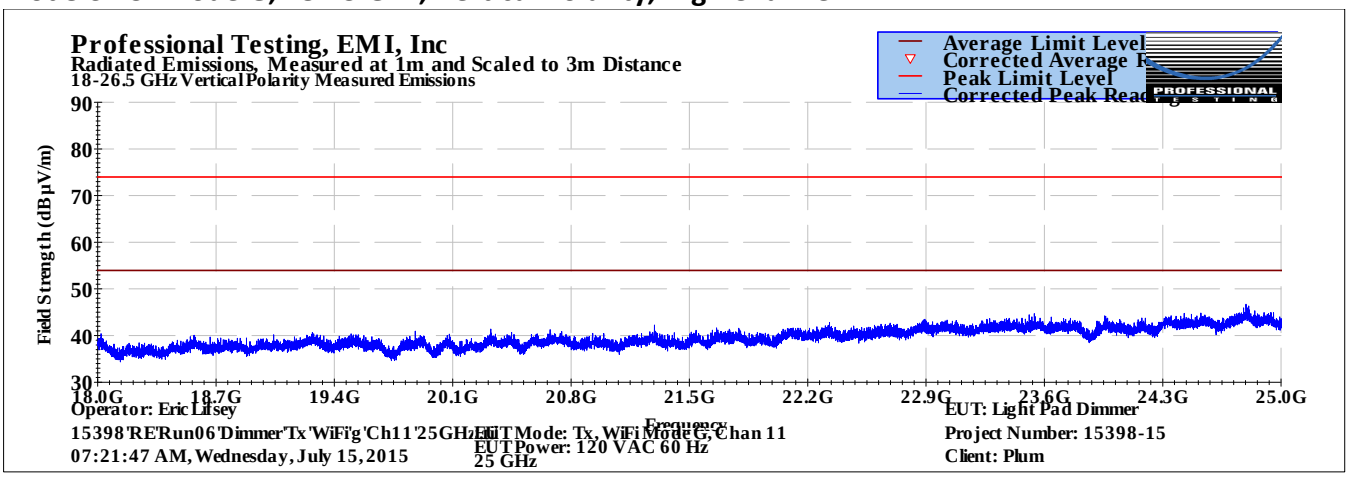
Plot 8.3.23: Mode G; 18-25 GHz, Vertical Polarity, Middle Channel



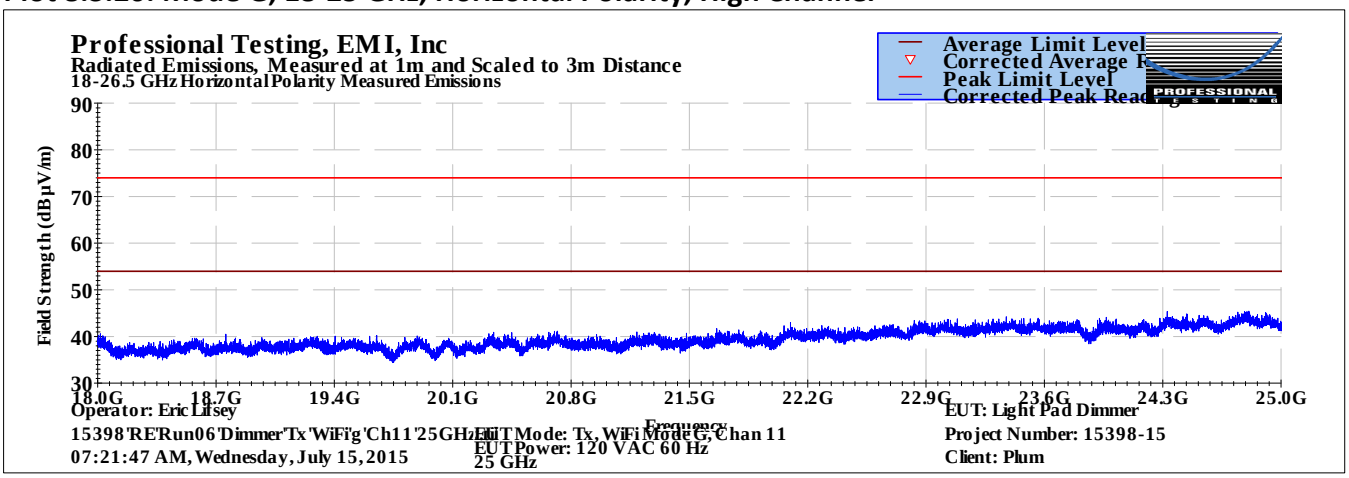
Plot 8.3.24: Mode G; 18-25 GHz, Horizontal Polarity, Middle Channel



Plot 8.3.25: Mode G; 18-25 GHz, Vertical Polarity, High Channel



Plot 8.3.26: Mode G; 18-25 GHz, Horizontal Polarity, High Channel



Plot 8.3.27: Mode N; 1-18 GHz, Vertical Polarity, Low Channel

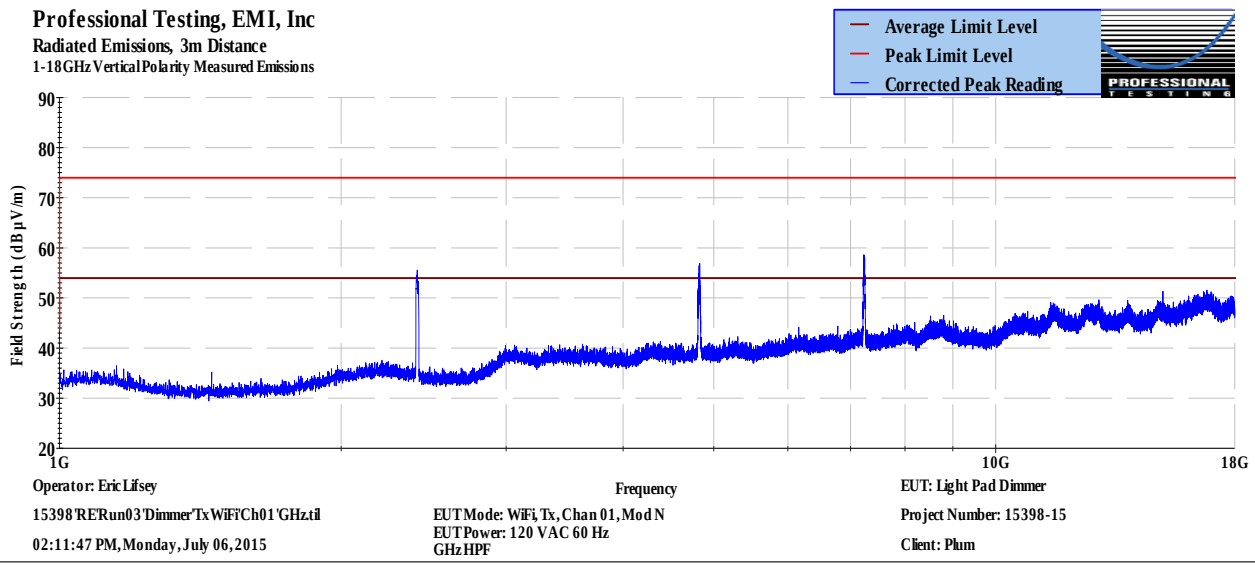
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — **Page: 1 of 1**

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Vertical	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi N, Middle Channel, < 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4827.03	3	281	0	Peak	55.9	51.987	74.0	-22.0	Pass
7232.95	3	61	0	Peak	55.1	58.306	74.0	-15.7	Pass



> 1GHz Vertical Antenna Polarity Measured Emissions

Plot 8.3.28: Mode N; 1-18 GHz, Horizontal Polarity, Low Channel

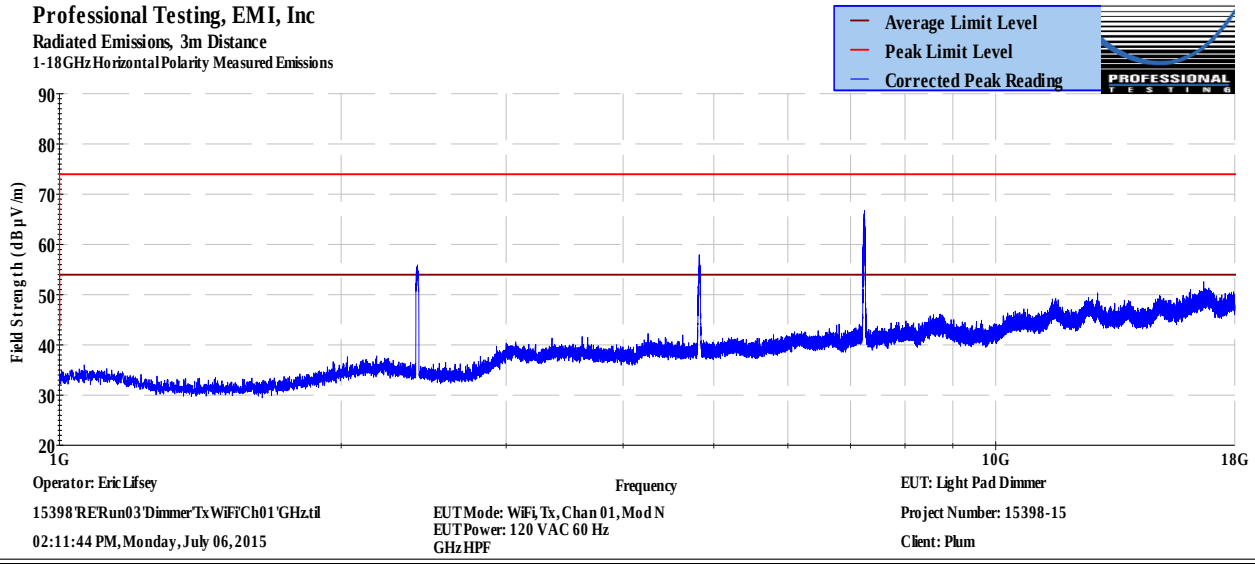
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — **Page: 1 of 1**

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Horizontal	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi N, Middle Channel, < 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4821.27	3	266	0	Peak	59.8	55.841	74.0	-18.1	Pass
7240.55	3	306	0	Peak	61.1	64.263	74.0	-9.7	Pass



> 1GHz Horizontal Antenna Polarity Measured Emissions

Plot 8.3.29: Mode N; 1-18 GHz, Vertical Polarity, Middle Channel

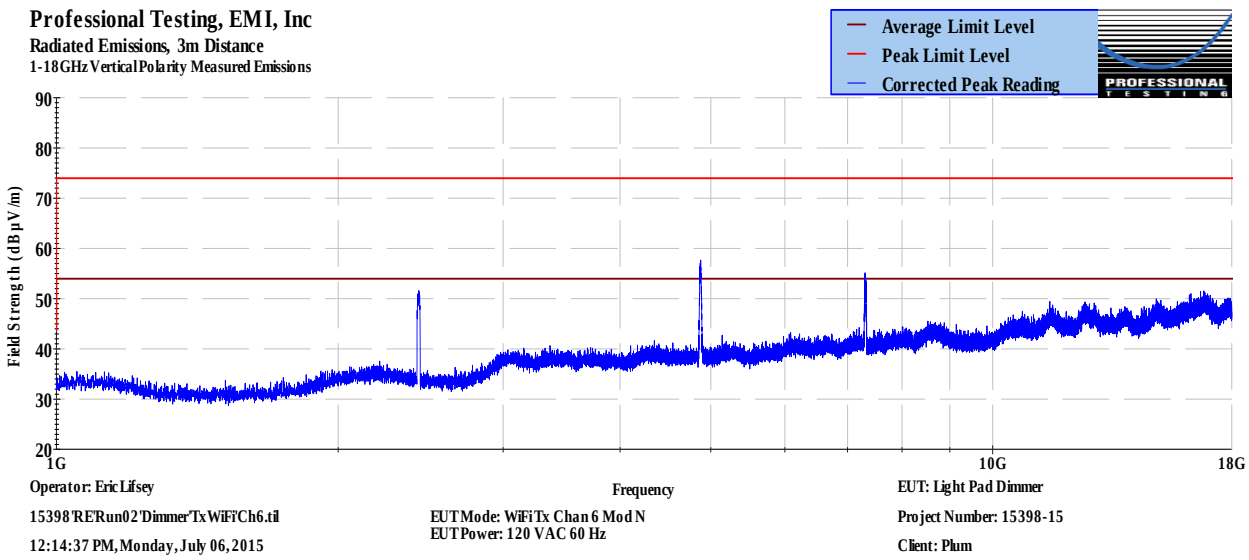
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — **Page: 1 of 1**

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Vertical	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi N, Middle Channel, < 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4878.68	3	228	0	Peak	61	57.264	74.0	-16.7	Pass
7316.81	3	74	0	Peak	52.2	55.597	74.0	-18.4	Pass



> 1GHz Vertical Antenna Polarity Measured Emissions

Plot 8.3.30: Mode N; 1-18 GHz, Horizontal Polarity, Middle Channel

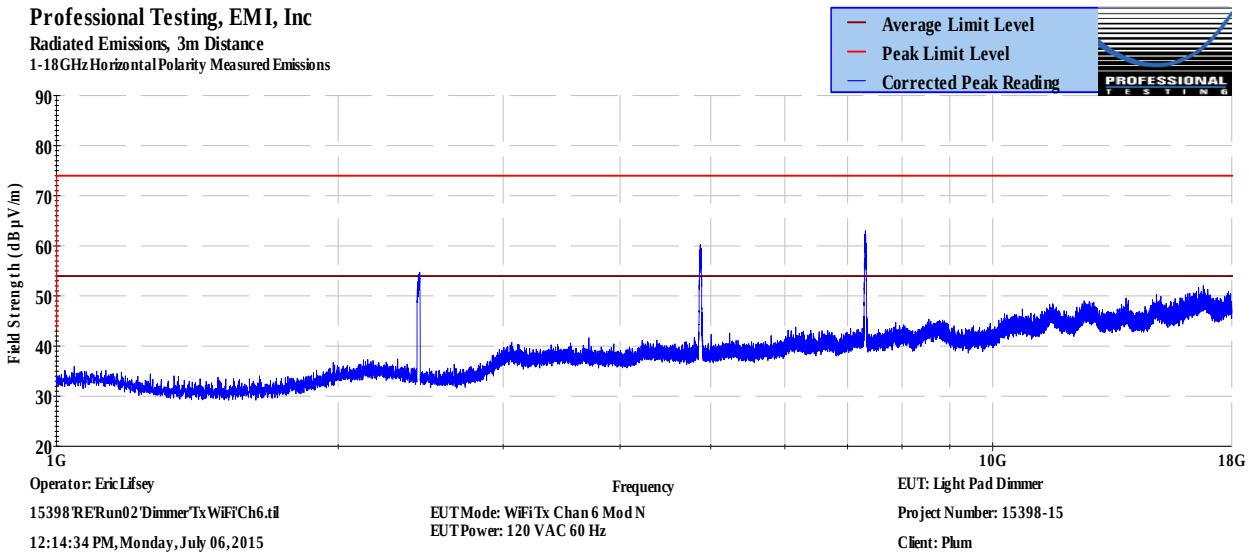
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — Page: 1 of 1

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Horizontal	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi N, Middle Channel, < 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4871.57	3	265	0	Peak	63.2	59.371	74.0	-14.6	Pass
7310.32	3	241	0	Peak	58.7	62.149	74.0	-11.8	Pass



> 1GHz Horizontal Antenna Polarity Measured Emissions

Plot 8.3.31: Mode N; 1-18 GHz, Vertical Polarity, High Channel

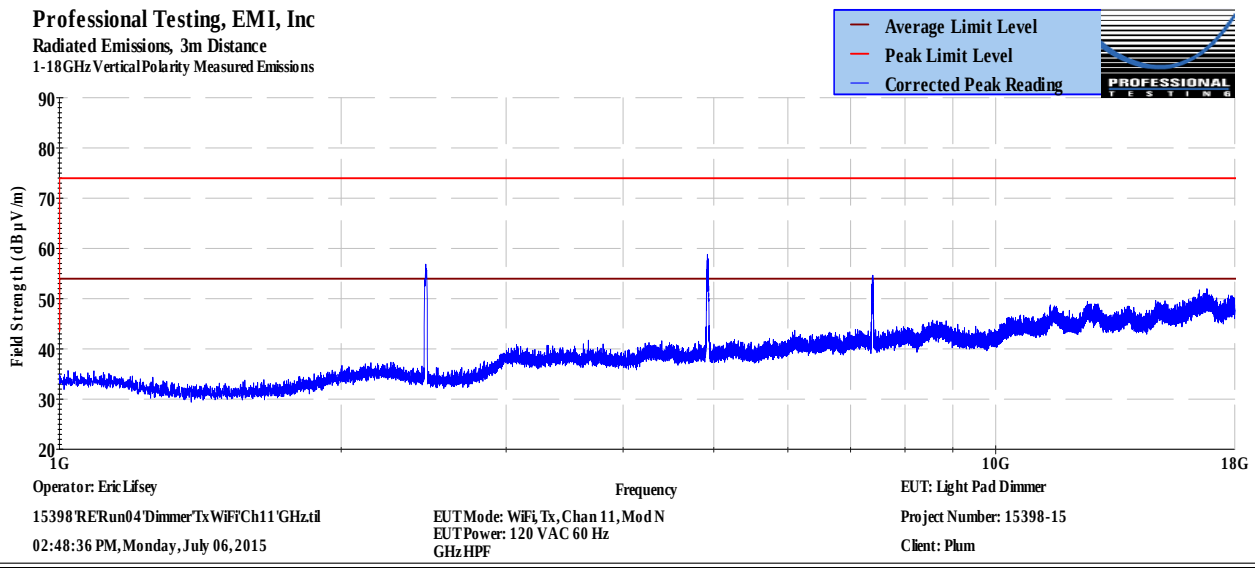
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — **Page: 1 of 1**

EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Vertical	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi N, Middle Channel, < 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4924.29	3	219	0	Peak	63.9	60.26	74.0	-13.7	Pass
7381.87	3	239	0	Peak	48.4	52.065	74.0	-21.9	Pass



> 1GHz Vertical Antenna Polarity Measured Emissions

Plot 8.3.32: Mode N; 1-18 GHz, Horizontal Polarity, High Channel

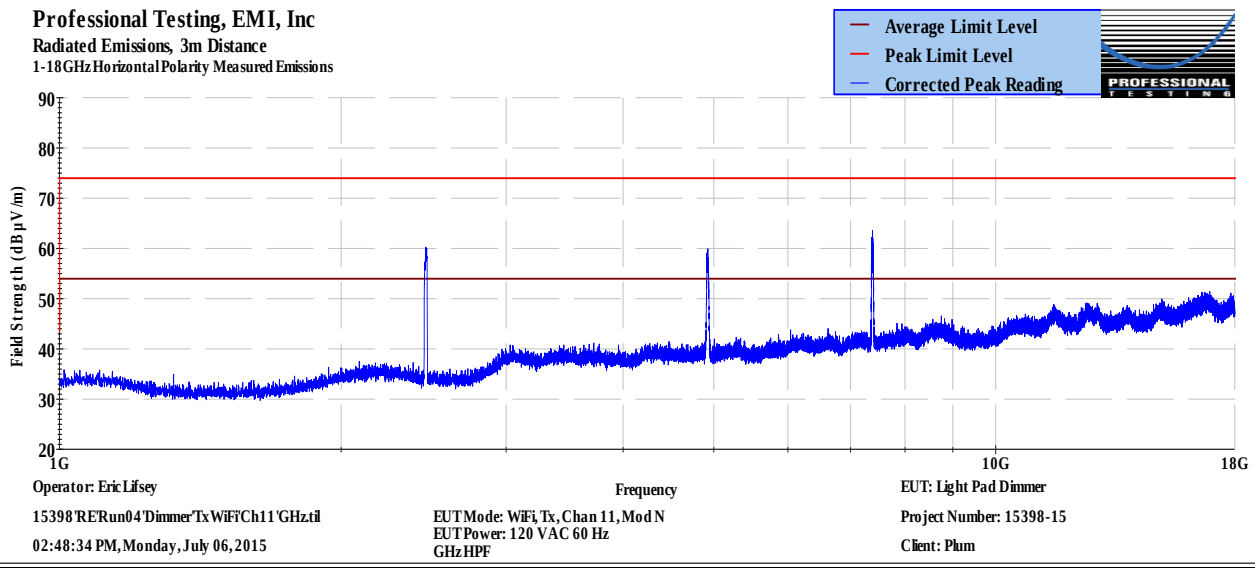
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits		
Section:	15.109		
Test Date(s):	7/6/2015	**EUT Serial #:**	1600019
Customer:	Plum	**EUT Part #:**	0
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Radiated Emissions Test Results Data Sheet — Page: 1 of 1

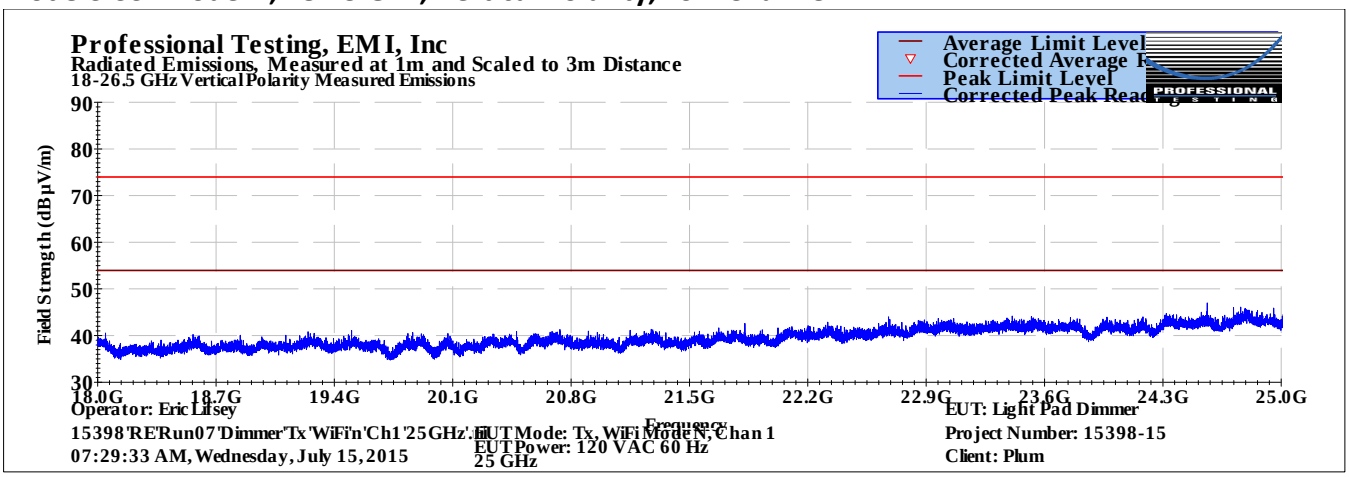
EUT Line Voltage:	120 VAC	**EUT Power Frequency:**	60 Hz
Antenna Orientation:	Horizontal	**Frequency Range:**	Above 1GHz
EUT Mode of Operation:		Transmit Mode, WiFi N, Middle Channel, < 1 GHz	

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4923.72	3	277	0	Peak	62.6	58.975	74.0	-15.0	Pass
7381.13	3	256	0	Peak	61.4	65.063	74.0	-8.9	Pass

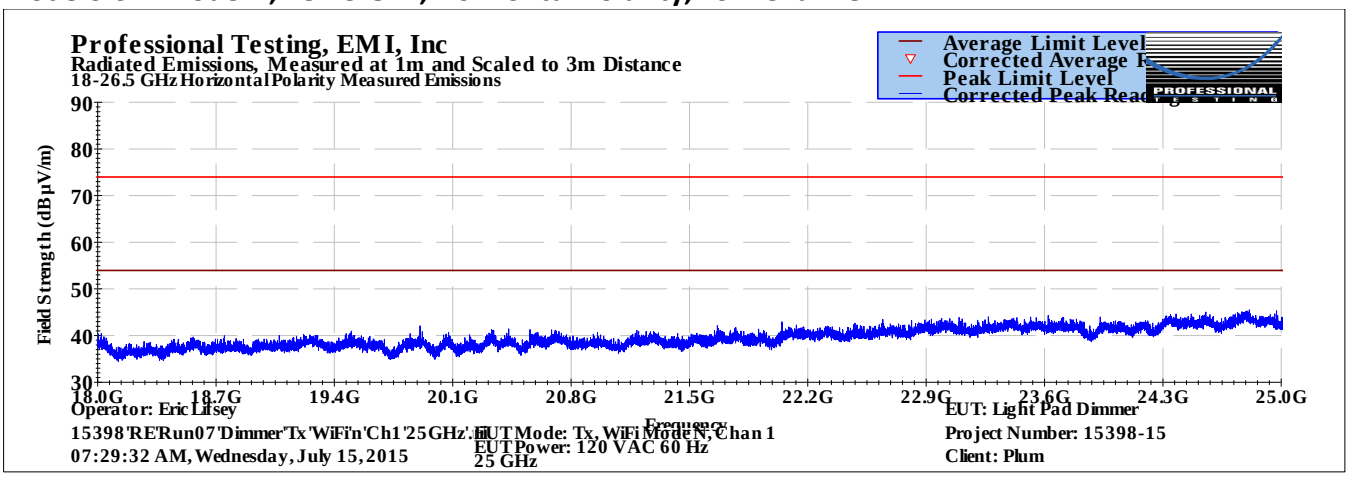


> 1GHz Horizontal Antenna Polarity Measured Emissions

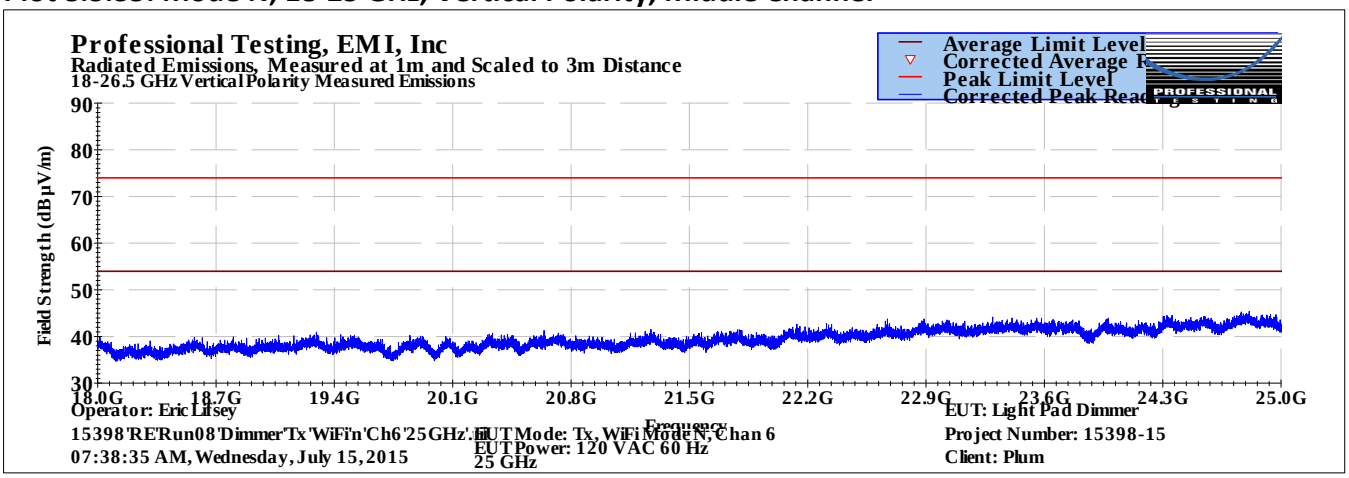
Plot 8.3.33: Mode N; 18-25 GHz, Vertical Polarity, Low Channel



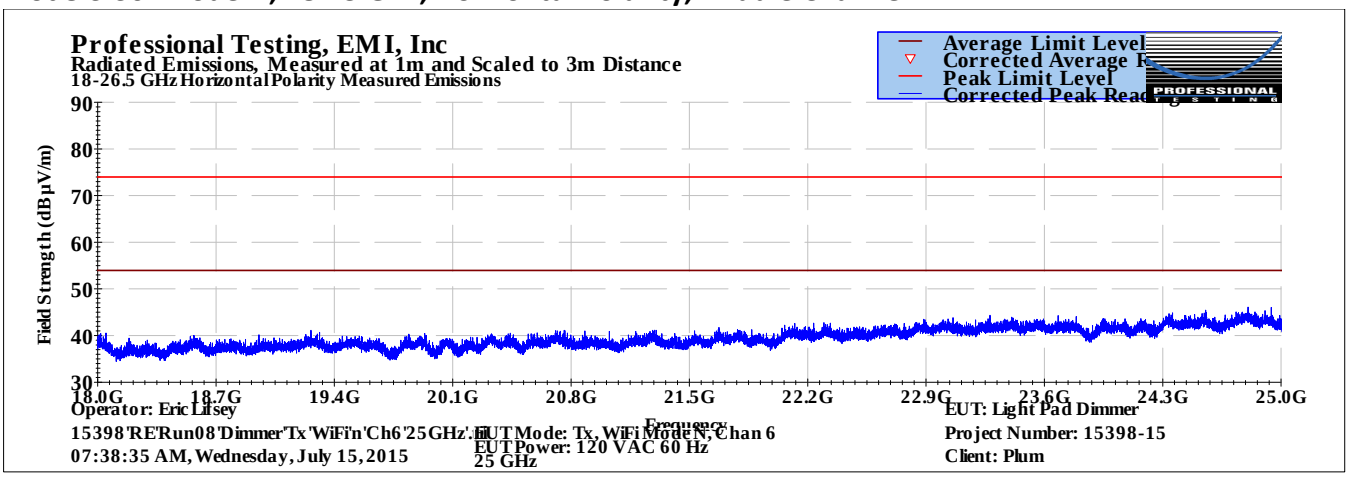
Plot 8.3.34: Mode N; 18-25 GHz, Horizontal Polarity, Low Channel



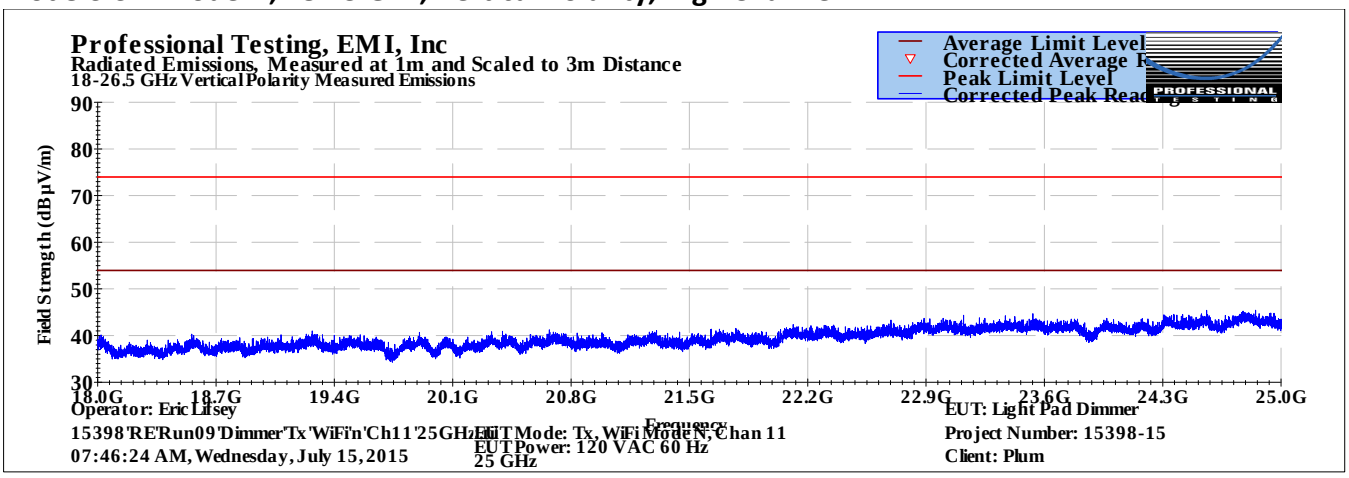
Plot 8.3.35: Mode N; 18-25 GHz, Vertical Polarity, Middle Channel



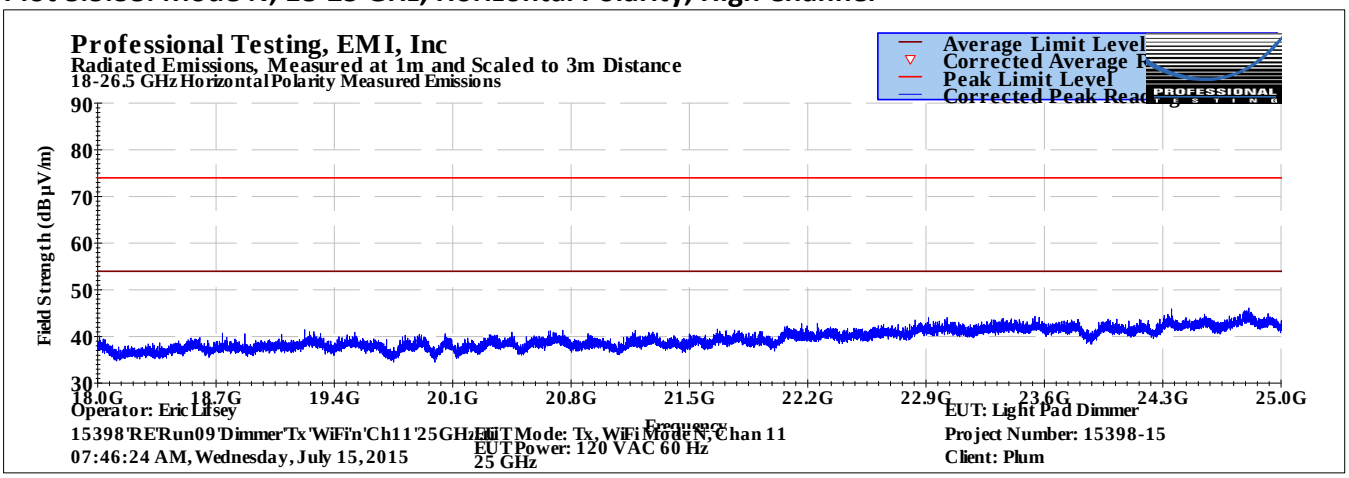
Plot 8.3.36: Mode N; 18-25 GHz, Horizontal Polarity, Middle Channel



Plot 8.3.37: Mode N; 18-25 GHz, Vertical Polarity, High Channel



Plot 8.3.38: Mode N; 18-25 GHz, Horizontal Polarity, High Channel



9.0 Conducted Antenna Port Spurious Emissions, Transmit Mode

9.1 Test Procedure

The EUT was connected directly to a spectrum analyzer and placed into transmit mode with modulation mode worse-case as determined in the fundamental power measurements.

9.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.207 // RSS-Gen 8.8	Conducted Spurious/Harmonic Emissions Transmit Mode Limit -20 dBc In 100 kHz Bandwidth	17 Jul 2015

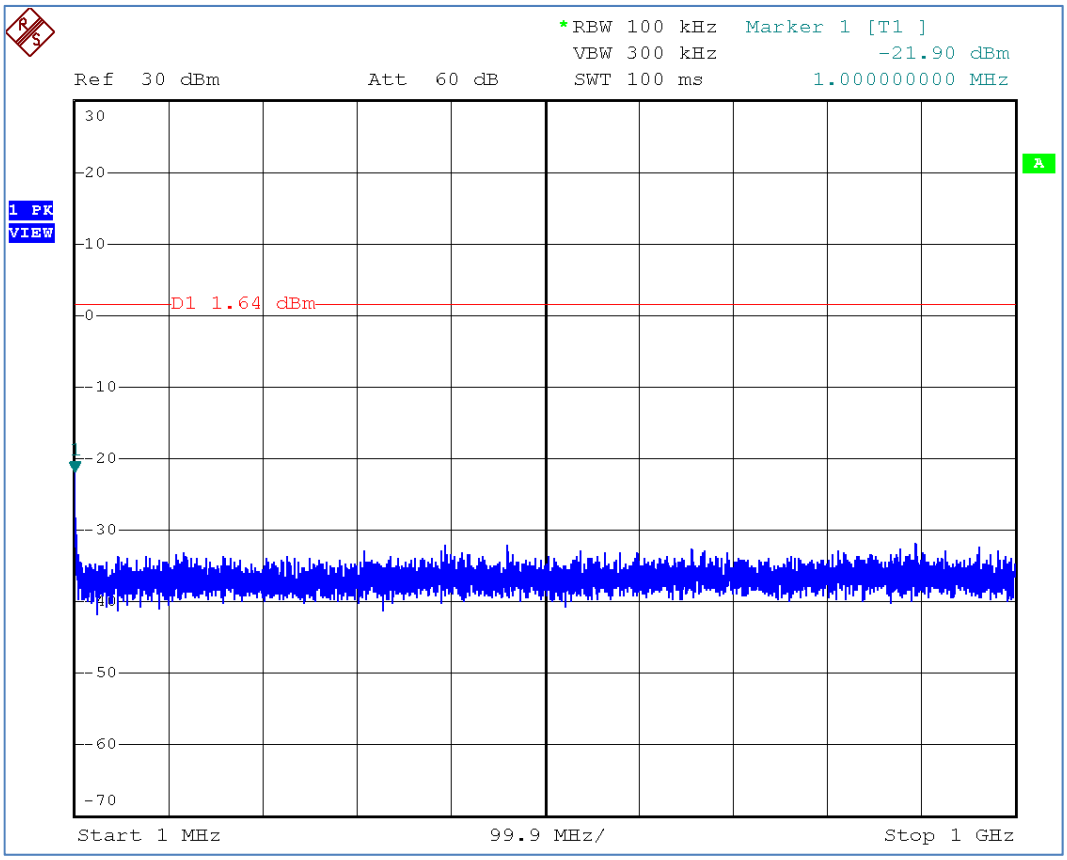
9.3 Test Results

The middle channel is measured up to the fundamental operating frequency; above which the emissions are measured for each of the essential three channels.

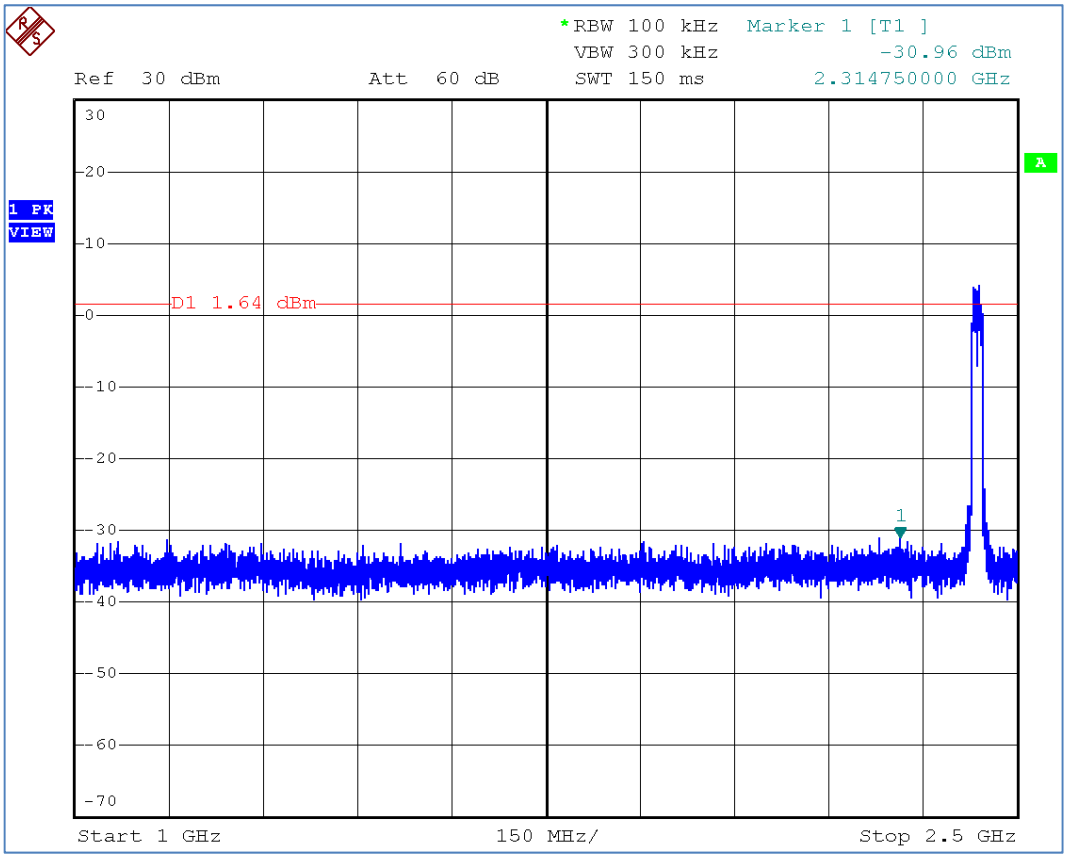
Measured with modulation applied.

The EUT satisfied the requirements. Plotted measurements appear below. The horizontal red marker line in each plot is set to the -20 dBc limit from fundamental power.

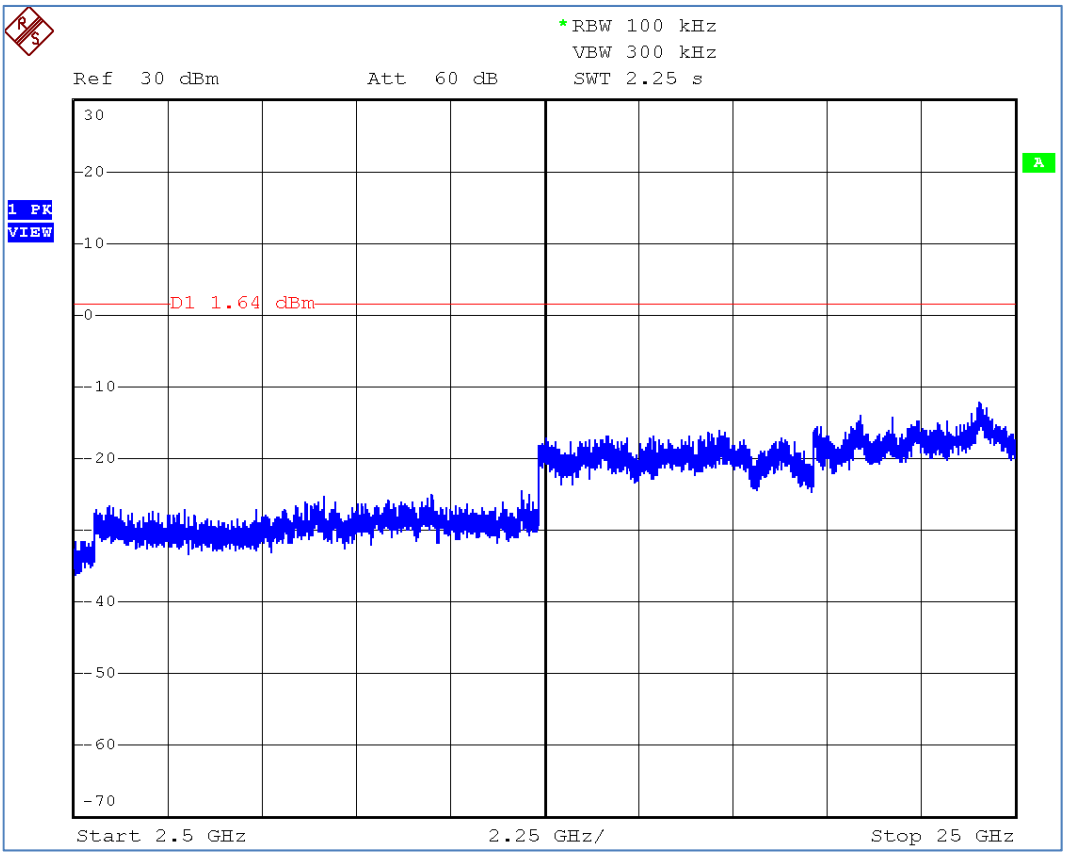
Plot 9.3.1: 1 MHz to 1 GHz, Middle Channel



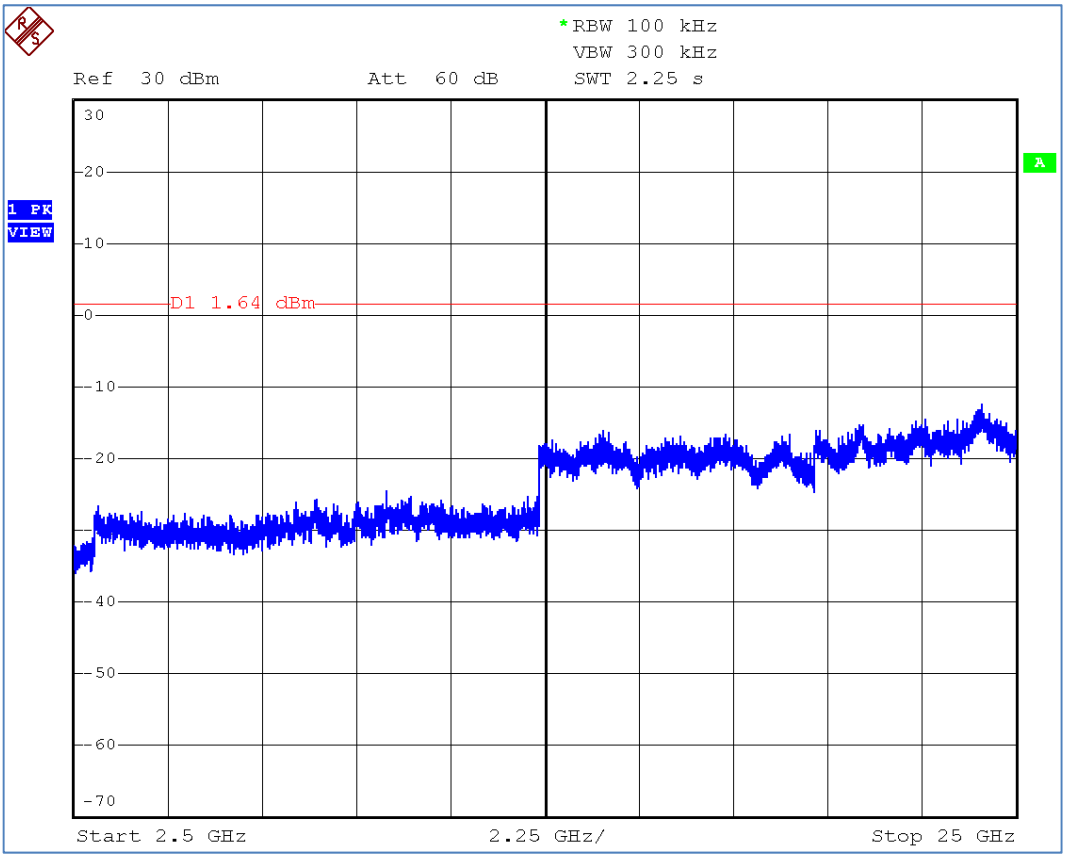
Plot 9.3.2: 1 GHz to 2.5 GHz, Middle Channel



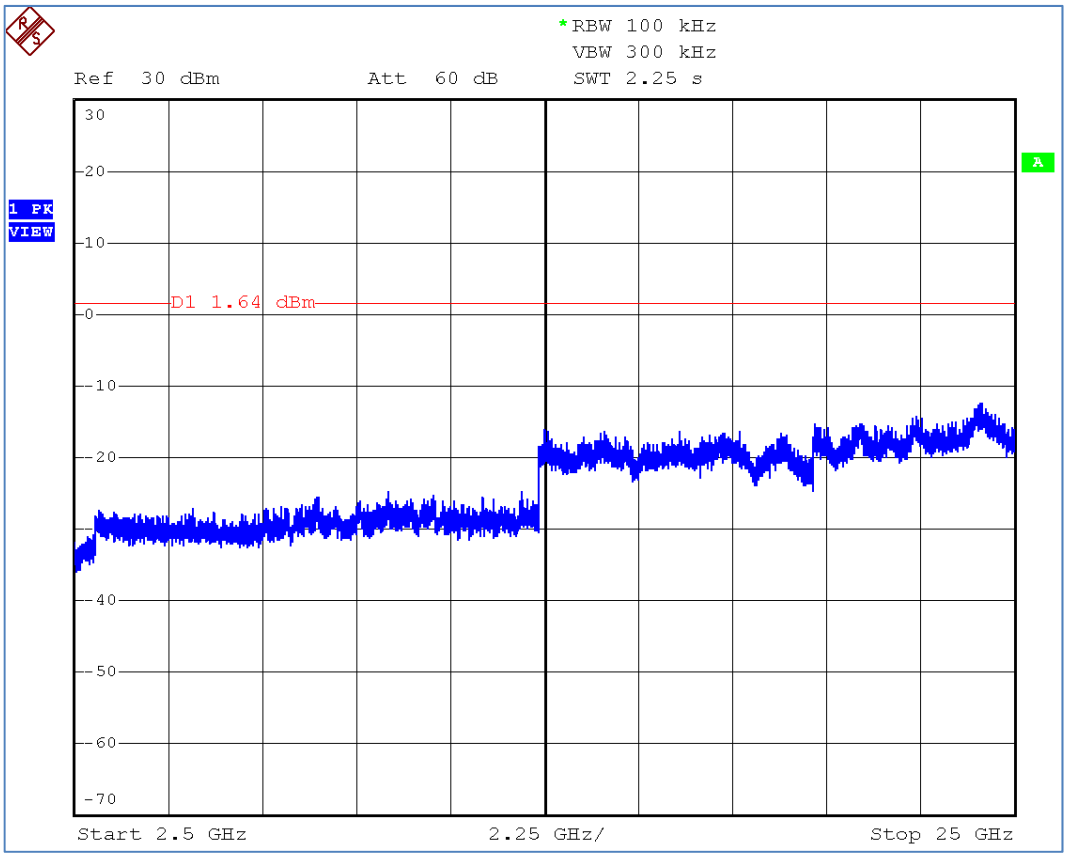
Plot 9.3.3: 2.5 GHz to 25 GHz, Low Channel



Plot 9.3.4: 2.5 GHz to 25 GHz, Middle Channel



Plot 9.3.5: 2.5 GHz to 25 GHz, High Channel



10.0 Antenna Construction Requirements

The design was investigated for meeting the antenna construction requirements of the applicable rules.

10.1 Procedure

A direct examination of the antenna construction is performed and compared to rule criteria that prevent wireless device antennas from being modified by end users in ways that would void their authorization to use the device.

10.2 Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.203 // RSS-Gen 8.3	Antenna Construction	24 Jul 2015

10.3 Results

Plot 8.3.1 Antenna Construction Details	
Antenna Manufacturer and Model	**Specifications**
Manufacturer Plum Model: N/A	Printed circuit loaded monopole.

- Antenna is internal only.
- Antenna is etched into the circuit board.
- There is no external antenna connector.

The antenna design above satisfies the requirements of the rules.

11.0 Conducted Emissions, Mains

11.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the floor and 0.4 meters from the conductive reference plane (wall). The EUT is powered through a line impedance stabilization network (LISN) that provides a measurement tap and a termination approximating 50 Ohms in the measurement range of 150 kHz to 30 MHz. A spectrum analyzer is connected, in turn, to each mains line measurement tap and the measurement is taken.

11.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.207 // RSS-Gen 8.8	Mains conducted emissions	10 Jul 2015

11.3 Test Results

The EUT satisfied the criteria.

Tabular and plotted measurements appear on the following pages.

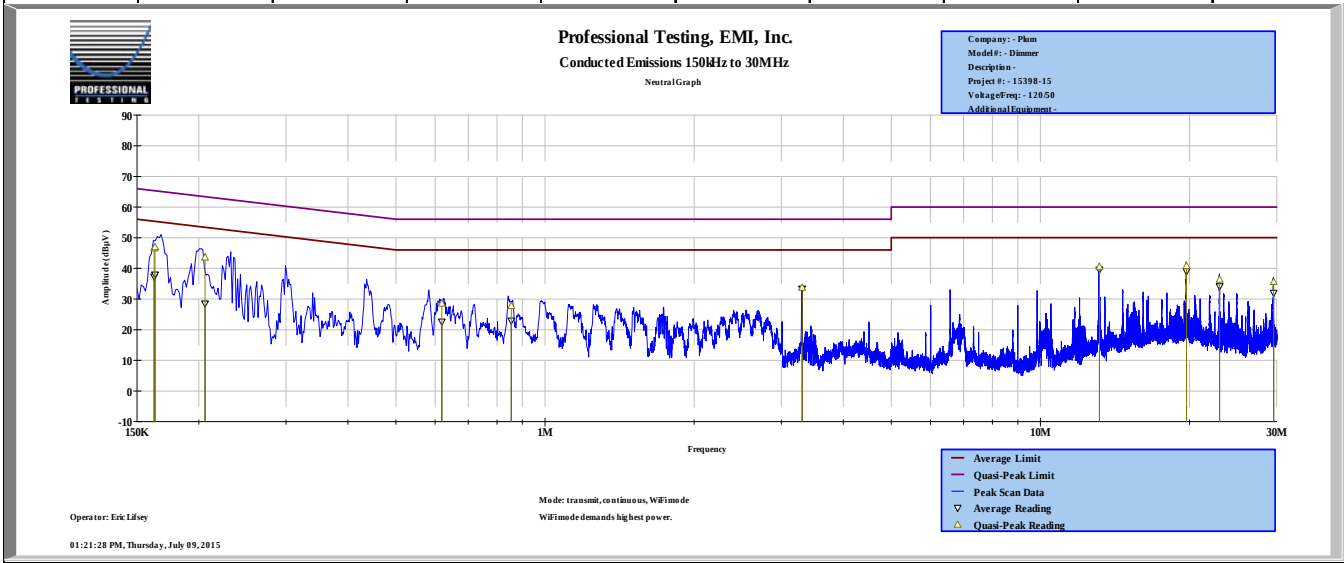
11.3.1 Mains, Neutral

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2009: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.107 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Conducted Emissions Limits		
Section:	15.107		
Test Date(s):	7/10/2015	**EUT Serial #:**	NA
Customer:	Plum	**EUT Part #:**	NA
Project Number:	15398-15	**Test Technician:**	Eric Lifsey
Purchase Order #:	NA	**Supervisor:**	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	**Witness' Name:**	Russ

Conducted Emissions Test Results Data Sheet - Neutral Lead **Page: 1 of 2**

EUT Line Voltage:	120	VAC	EUT Line Frequency:	60	Hz

Frequency Measured (MHz)	Peak Detector Reading (dBµV)	Quasi-peak Detector Reading (dBµV)	Quasi-peak Detector Limit (dBµV)	Quasi-peak Detector Margin (dB)	Quasi-peak Detector Test Results	Average Detector Reading (dBµV)	Average Detector Limit (dBµV)	Average Detector Margin (dB)	Average Detector Test Results
0.16251	52.2	46.5	65.3	-18.8	PASS	37.2	55.3	-18.1	PASS
0.16318	50.4	46.9	65.3	-18.4	PASS	37.9	55.3	-17.4	PASS
0.2059	47.9	43.6	63.4	-19.8	PASS	28.5	53.4	-24.9	PASS
0.6189	33.6	28.5	56	-27.5	PASS	22.6	46	-23.4	PASS
0.8548	30.6	27.8	56	-28.2	PASS	22.9	46	-23.1	PASS
3.3028	34.9	33.7	56	-22.3	PASS	33.3	46	-12.7	PASS
13.1558	42.2	40.5	60	-19.5	PASS	39.5	50	-10.5	PASS
19.7252	42.6	40.8	60	-19.2	PASS	39	50	-11	PASS
23.0087	38.2	36.4	60	-23.6	PASS	34.1	50	-15.9	PASS
29.58	37.8	35.6	60	-24.4	PASS	32	50	-18	PASS



Measured Conducted Emissions - Neutral Lead

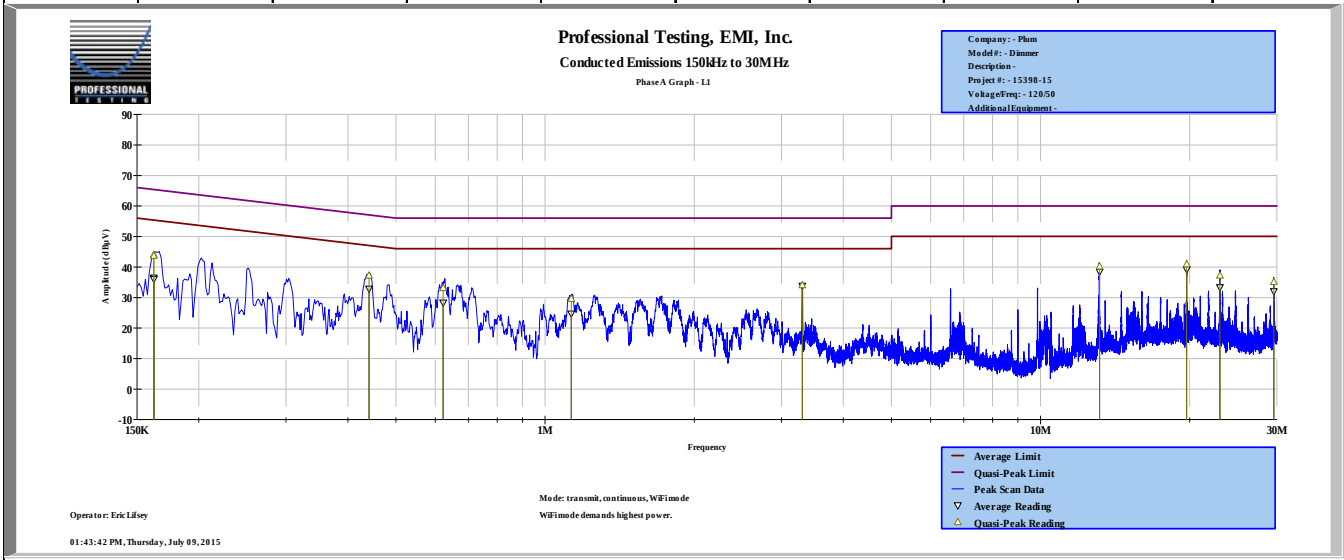
11.3.2 Mains, Phase

Professional Testing, EMI, Inc.			
Test Method:	ANSI C63.4–2009: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.107 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Conducted Emissions Limits		
Section:	15.107		
Test Date(s):	7/10/2015	EUT Serial #:	NA
Customer:	Plum	EUT Part #:	NA
Project Number:	15398-15	Test Technician:	Eric Lifsey
Purchase Order #:	NA	Supervisor:	Lisa Arndt
Equip. Under Test:	Light Pad Dimmer	Witness' Name:	Russ

Conducted Emissions Test Results Data Sheet - Phase Lead (Line 1) Page: 2 of 2

EUT Line Voltage:	120	VAC	EUT Line Frequency:	60	Hz

Frequency Measured (MHz)	Peak Detector Reading (dBµV)	Quasi-peak Detector Reading (dBµV)	Quasi-peak Detector Limit (dBµV)	Quasi-peak Detector Margin (dB)	Quasi-peak Detector Test Results	Average Detector Reading (dBµV)	Average Detector Limit (dBµV)	Average Detector Margin (dB)	Average Detector Test Results
0.16223	47.2	44	65.3	-21.3	PASS	36.5	55.3	-18.9	PASS
0.16227	47	43.7	65.3	-21.6	PASS	36	55.3	-19.4	PASS
0.44102	39.8	37.2	57	-19.8	PASS	32.8	47	-14.2	PASS
0.6226	37	33.1	56	-22.9	PASS	28.3	46	-17.7	PASS
1.1288	32.9	29.6	56	-26.4	PASS	24.7	46	-21.3	PASS
3.3049	35.1	34.1	56	-21.9	PASS	33.8	46	-12.2	PASS
13.1626	41.7	40.2	60	-19.8	PASS	38.4	50	-11.6	PASS
19.7286	42.9	40.9	60	-19.1	PASS	39.2	50	-10.8	PASS
23.0196	39.4	37.2	60	-22.8	PASS	33.3	50	-16.7	PASS
29.5822	37.4	35.1	60	-24.9	PASS	32	50	-18	PASS



Measured Conducted Emissions - Phase Lead (Line 1)

12.0 Equipment

12.1 Spurious Radiated Emissions 30 MHz to 25 GHz

Professional Testing, EMI, Inc.			
Test Method:	**ANSI C63.4–2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference,**		
In accordance with:	**FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits**		
Section:	**15.109**		
Test Date(s):	**7/6/2015, 7/10/2015**	**EUT Serial #:**	**1600019**
Customer:	**Plum**	**EUT Part #:**	**0**
Project Number:	**15398-15**	**Test Technician:**	**Eric Lifsey**
Purchase Order #:	**NA**	**Supervisor:**	**Lisa Arndt**
Equip. Under Test:	**Light Pad Dimmer**	**Witness' Name:**	**Russ**

Radiated Emissions Test Equipment List					
Tile! Software Version:		**4.2.A, May 23, 2010, 08:38:52 AM**			
Test Profile:		**Radiated Emissions_Profile Version October 12, 2011**			
Asset #	**Manufacturer**	**Model**	**Equipment Nomenclature**	**Serial Number**	**Calibration Due Date**
1509A	Braden	N/A	TDK 10M Chamber, NSA < 1 GHz	DAC-012915-005	2/5/2016
1890	HP	8447F	Preamp/Amp, 9kHz-1300MHz, 28/25dB	3313A05298	2/6/2016
1937	Agilent	E4440A	Spectrum Analyzer, 3 Hz - 26.5 GHz	MY44303298	7/29/2015
1926	ETS-Lindgren	3142D	Antenna, Biconilog, 26 MHz - 6 GHz	135454	1/26/2016
C027	N/A	RG214	Cable Coax, N-N, 25m	none	10/22/2015
1327	EMCO	1050	Controller, Antenna Mast	none	N/A
0942	EMCO	11968D	Turntable, 4ft.	9510-1835	N/A
1969	HP	11713A	Attenuator/Switch Driver	3748A04113	N/A
1509B	Braden	N/A	TDK 10M Chamber, VSWR > 1 GHz	DAC-012915-005	3/13/2016
2004	Miteq	AFS44-00101800-2S-10P-44	Amplifier, 40dB, .1-18GHz	0	12/29/2015
C030	N/A	0	Cable Coax, N-N, 30m	none	10/10/2015
1325	EMCO	1050	Controller, Antenna Mast	9003-1461	N/A
1780	ETS-Lindgren	3117	Antenna, Double Ridged Guide Horn, 1 - 18 GHz	110313	2/26/2016
2054	Mini-Circuits	VHF-3100+	Filter, High Pass	N/A	5/18/2016
1542	A.H. Systems	SAS-572	Antenna, Horn 18-26.5GHz, 20dB gain	225	N/A
1973	Agilent	83017A	Amplifier, Microwave 0.5-26.5 GHz	MY39500497	2/4/2016

Above list also applies to measurements taken on 14 Jul 2015 and 15 Jul 2015.

12.2 Bandwidth, Fundamental Power, Power Spectral Density, and Timing

Asset #	Manufacturer	Model #	Description	Calibration Due
ALN-077	Rohde & Schwarz	FSP-30	Spectrum Analyzer	29 Jan 2016

12.3 Mains Conducted Emissions

Professional Testing, EMI, Inc.			
Test Method:	**ANSI C63.4–2009: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (incorporated by reference, see §15.38).**		
In accordance with:	**FCC Part 15.107 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Conducted Emissions Limits**		
Section:	**15.107**		
Test Date(s):	**7/10/2015**	**EUT Serial #:**	**NA**
Customer:	**Plum**	**EUT Part #:**	**NA**
Project Number:	**15398-15**	**Test Technician:**	**Eric Lifsey**
Purchase Order #:	**NA**	**Supervisor:**	**Lisa Arndt**
Equip. Under Test:	**Light Pad Dimmer**	**Witness' Name:**	**Russ**

Conducted Emissions Test Equipment List	
Tile! Software Version:	**4.1.A.0, April 14, 2009, 11:01:00PM**
Test Profile:	**Profile#: CE_2014_R3.TIL, dated May 1, 2014**

Asset #	Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date
1842	HP	8568B	Spectrum Analyzer	2732A03633	10/1/2015
2113	HP	85662A	Spec Anal Dsply for A/N 1842	2403A07470	N/A
0990	HP	85685A	RF Preselector	3010A01119	9/30/2016
1281	HP	85650A	Quasi Peak Adapter	2043A00063	N/A
1173	PTI	100k HPF	Filter, High Pass, 100kHz	none	1/15/2016
1087	PTI	PTI-ALF3	Attenuator Limiter Filter	none	4/28/2016
C107	Pomona	RG-223	Cable 9 ft BNC RG-223 (black)	none	8/11/2015
C108	HP	11170 C	Cable 5 ft BNC (Grey)	none	8/11/2015
C109	HP	none	Cable 19 inch BNC (grey)	none	8/11/2015
1185	EMCO	3825/2	LISN, 10kHz-100MHz	1235	11/11/2015

13.0 Measurement Bandwidths, Spurious Emissions

Radiated Emissions Spectrum Analyzer Bandwidth and Measurement Time - Peak Scan				
Frequency Band Start (MHz)	**Frequency Band Stop (MHz)**	**6 dB Bandwidth (kHz)**	**Number of Ranges Used**	**Measurement Time per Range**
0.009	0.15	0.3	2	Multiple Sweeps
0.15	30	9	6	Multiple Sweeps
30	1000	120	2	Multiple 800 mS Sweeps
1000	6000	1000	2	Multiple Sweeps
6000	18000	300	2	Multiple Sweeps

*Notes:
1. The settings above are specifically calculated for the E4440A series of spectrum analyzers, which have 8,000 data points per range.
2. The measurement receiver resolution bandwidth setting was 300 Hz for quasi-peak measurements from 9-150 kHz.
3. The measurement receiver resolution bandwidth setting was 9 kHz for quasi-peak measurements from 0.15-30 MHz.
4. The measurement receiver resolution bandwidth setting was 120 kHz for quasi-peak measurements from 30-1000 MHz.
5. The measurement receiver resolution bandwidth setting was 1 MHz for average measurements from 1-18 GHz.

Conducted Emissions Spectrum Analyzer Bandwidth and Measurement Time				
Frequency Band Start (MHz)	**Frequency Band Stop (MHz)**	**6 dB Bandwidth (kHz)**	**Number of Ranges Used**	**Measurement Time per Range**
0.01	0.15	0.3	7	Five 1 second sweeps
0.15	30	9	20	Five 1 second sweeps

*Notes:
1. The settings above are specifically calculated for the HP856X series of spectrum analyzers, which have 1,000 data points per range.
2. The measurement receiver resolution bandwidth setting was 300 Hz for quasi-peak measurements from 10-150 kHz.
3. The measurement receiver resolution bandwidth setting was 9 kHz for quasi-peak measurements from 0.15-30 MHz.

Appendix: Policy, Rationale, and Evaluation of EMC Measurement Uncertainty

All uncertainty calculations, estimates and expressions thereof shall be in accordance with NIST policy. Since PTI operates in accordance with NIST (NVLAP) Handbook 150-11: 2007, all instrumentation having an effect on the accuracy or validity of tests shall be periodically calibrated or verified traceable to national standards by a competent calibration laboratory. The certificates of calibration or verification on this instrumentation shall include estimates of uncertainty as required by NIST Handbook 150-11.

1. Rationale and Summary of Expanded Uncertainty.

Each piece of instrumentation at PTI that is used in making measurements for determining conformance to a standard (or limit), shall be assessed to evaluate its contribution to the overall uncertainty of the measurement in which it is used. The assessment of each item will be based on either a type A evaluation or a type B evaluation. Most of the evaluations will be type B, since they will be based on the manufacturer's statements or specifications of the calibration tolerances, or uncertainty will be stated along with a brief rationale for the type of evaluation and the resulting stated uncertainties.

The individual uncertainties included in the combined standard uncertainty for a specific test result will depend on the configuration in which the item of instrumentation is used. The combination will always be based on the law of propagation of uncertainty. Any systematic effects will be accommodated by including their uncertainties, in the calculation of the combined standard uncertainty; except that if the direction and amount of the systematic effect cannot be determined and separated from its uncertainty, the whole effect will be treated as uncertainty and combined along with the other elements of the test setup.

Type A evaluations of standard uncertainty will usually be based on calculating the standard deviation of the mean of a series of independent observations, but may be based on a least-squares curve fit or the analysis of variance for unusual situations. Type B evaluations of standard uncertainty will usually be based on manufacturer's specifications, data provided in calibration reports, and experience. The type of probability distribution used (normal, rectangular, a priori, or u-shaped) will be stated for each Type B evaluation.

In the evaluation of the uncertainty of each type of measurement, the uncertainty caused by the operator will be estimated. One notable operator contribution to measurement uncertainty is the manipulation of cables to maximize the measured values of radiated emissions. The operator contribution to measurement uncertainty is evaluated by having several operators independently repeat the same test. This results in a Type A evaluation of operator-contributed measurement uncertainty.

A summary of the expanded uncertainties of PTI measurements is shown as Table 1. These are the worst-case uncertainties considering all operative influence factors.

Table 1: Summary of Measurement Uncertainties for Site 45

Type of Measurement	Frequency Range	Meas. Dist.	Expanded Uncertainty U, dB (k=2)
Mains Conducted Emissions	150 kHz to 30 MHz	N/A	2.9
Telecom Conducted Emissions	150 kHz to 30 MHz	N/A	2.8
Radiated Emissions	30 to 1,000 MHz	10 m	4.8
	1 to 18 GHz	3 m	5.7

End of Report

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