BEC INCORPORATED

CERTIFICATION APPLICATION TEST REPORT

TEST STANDARDS:
FCC Part 15 Subpart C
DTS Intentional Radiator

Lutron JPZ0148
LED Lighting Controller with 802.15.4 Radio

FCC ID: JPZ0148

REPORT BEC-2259-01A

TEST DATES: 06/12/2023 – 08/25/2023

CUSTOMER:
Lutron Electronics Company Incorporated
7200 Suter Road
Coopersburg, PA 18036

PREPARED BY: Thomas Koester

Thomas Koester, Test Engineer

REVIEWED and APPROVED BY:

Steve Fanella, Quality Manager

ACCREDITED
Testing Cert #2957.01

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Notice to Customer

This report and any recommendations it contain represent the result of BEC's testing and assessment on behalf of your company. Testing has been conducted according to accepted engineering standards and practices. This report reflects testing and assessment of product samples provided by your company and may not reflect the characteristics of other samples, especially those produced at different times. This report and its findings and recommendations, if implemented, should not be construed as an assurance or implied warranty for the continuing electromagnetic compatibility (EMC) of the product. **BEC shall not be liable for incidental or consequential damages, even if advised of the possibility thereof.**

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The BEC Decision Rule: Measurement Uncertainty is not applied to any testing measurements or test results provided to the customer by BEC Incorporated at this time.

Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	07/27/2023
1	Re-test of Maximum Output Power at Channel 11 2.405 GHz CW and with Modulation. Updated the tables and screen captures in Sections 4.8.2, 4.8.3 and 4.8.4	08/04/2023	08/04/2023
2	Removed any RSS references from Section 1.5. Added Radiated Restricted Band-Edge data in Section 4.5.4. Replaced data in Section 4.9.1 Conducted Band-Edge	08/25/2023	08/28/2023

1.0 Administrative Information

1.1 Project Details

Project Number	BEC-2259	
EUT Manufacturer	Lutron Electronics	
EUT Model Number	JPZ0148	
EUT Description	LED Lighting Controller with 802.15.4 Radio	
EUT Sample Types	Unmodified Sample (Radiated Emissions Test Samples)	Modified with SMA connector on transmitter output port (Antenna Conducted Test Sample)
EUT Sample Numbers	2259-01	2259-03
EUT Serial Numbers	02F2571A	02F25720
Power Supply Sample Number	2259-05	
Power Supply Manufacturer	Lutron Electronics	
Power Supply Model Number	T120-24DC-15	
Power Supply Serial Number	U4A222502583	
Power Supply Sample Number	2259-06	
Power Supply Manufacturer	Lutron Electronics	
Power Supply Model Number	T120-24DC-15	
Power Supply Serial Number	U4A223400056	
FCC ID	JPZ0148	
Frequency of Operation	2400 – 2480 MHz	
Frequencies Tested	Low (2405 MHz), Middle (2440 MHz), High (2480 MHz)	
Antenna Gain	+ 4.3 dBi or + 2.15 dBd	
Antenna Type	Planar Inverted-F PCB Trace Antenna (PIFA)	
Modulation	O-QPSK	
Classification	Digital Transmission System (DTS)	
Date Samples Received	06/05/2023	
EUT Firmware Version	lorikeet_app_001.037.003	

Sample Types	Production Units Suitable for Test
Applicable FCC Rules	FCC Rules Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System

1.2 Preface

This report documents product testing conducted to verify compliance of the specified EUT with applicable standards and requirements as identified herein. EUT, test instrument configurations, test procedures, and recorded data are generally described in this report. The reader is referred to the applicable test standards for detailed procedures. The following table summarizes the test results obtained during this evaluation.

1.3 Laboratory and Customer Information

Test Laboratory Location	BEC Incorporated 970 East High Street Pottstown, PA 19464
BEC Test Personnel	Tom Koester / Steve Fanella
BEC Laboratory Number FCC Registration	US1118
Test Performed For	Lutron Electronics Company Incorporated 7200 Suter Road Coopersburg, PA 18036
Customer Technical Contacts	Keith Kennedy
Customer Reference Number	PO # 5299727

1.4 Measurement Uncertainty

Measurement	Measurement Distance	Frequency Range	Measurement Limit	Expanded Uncertainty
Radiated Disturbance	3 Meter	30 MHz – 1 GHz	Class B	4.63
Conducted Disturbance AC Mains	N/A	150 kHz – 30 MHz	Class A or B	2.69

No adjustments to measured data presented in this report are required because all values of uncertainty are less that the CISPR 16-4-2:2018 recommendations. These uncertainties have a coverage factor of *k = 2*, which yields approximately a 95% level of confidence for the near-normal distribution typical of most measurement results.

FCC Registered Test Site Number: US1118
ISED Registered Test Site Number: 7342A-1

Test Measurement	ETSI TR 100 028 and CISPR 16-4-2 Limits	BEC Value
Radio Frequency	±0.5 ppm	±0.027 ppm
RF Power, Conducted	±1.5 dB	±1.45 dB
Conducted Spurious Emission of Transmitter, Valid up to 6 GHz	±3 dB	±0.9 dB
Radiated Emission of Transmitter, Valid up to 6 GHz	±5.2 dB	±4.87 dB
Radiated Emission of Receiver, Valid up to 6 GHz	±5.2 dB	±4.87 dB
Radiated Emission of Transmitter, Valid up to 18 GHz	±5.5 dB	±4.90 dB
Radiated Emission of Receiver, Valid up to 18 GHz	±5.5 dB	±4.90 dB
Occupied Bandwidth	±5 %	±2 %
Temperature	±2.5 ° C	±0.5 ^{o}C
Humidity	±10 %	±2.5%

These uncertainties have a coverage factor of k = 1.96 or k = 2, (which provide confidence levels of respectively 95 % and 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). Principles for the calculation of measurement uncertainty are contained in ETSI TR 100 028 [i.3], in particular in annex D of ETSI TR 100 028-2 [i.3].

1.5 Test Result Summary Table

The Lutron Model JPZ0148 LED Lighting Controller was tested and found to be compliant to the sections of the FCC Part 15 Subpart C standards listed below:

Report Section	FCC Part 15, Subpart C			Test Description	Result
4.1	15.203			Antenna Requirement	**PASS**
4.2	15.204			External RF power amplifiers and antenna modifications	**PASS**
4.3	ANSI C63.10, Section 11.6			Duty Cycle	**Measured by Manufacturer**
4.4	15.247(d)			DTS Emissions in non-restricted frequency Bands 30 MHz to 25 GHz Conducted Spurious Emission	**PASS**
4.5	15.205, 15.209 15.35(b)			DTS Emissions in restricted frequency Bands 30 MHz to 25 GHz Radiated Spurious Emission	**PASS**
4.6	15.247(a)(2)			6 dB Occupied Bandwidth	**PASS**
4.7	2.1049(h)			99% Occupied Bandwidth	**PASS**
4.8	15.247(b)(3)			Maximum Conducted Output Power and EIRP	**PASS**
4.9	15.247(e)			Antenna Port, Power Spectral Density	**PASS**
4.10	15.247(d)			Band Edge Measurement	**PASS**
4.11	15.207			AC Mains Conducted Emissions	**PASS**

1.6 Condition of Received Sample

An evaluation of the EUT was conducted in order to verify test subject identity and condition and to ensure suitability for testing. No evidence of physical damage was noted. The test item condition was deemed acceptable for the performance of the requested test services.

1.7 Climatic Environment

The following were the general environmental conditions inside the laboratory during testing:

Temperature: 22°C ± 5° C
Humidity: 50% ± 20%
Barometric Pressure: 1010 – 1050 mb ± 20%

1.8 Test Equipment

All test equipment is checked to manufacturer's specifications and, when applicable, have current N.I.S.T. traceable, ISO 9002 conforming certificates of calibration. Test equipment used for the tests described herein is listed in Appendix A.

2.0 Equipment Under Test

Unless otherwise noted in the individual test results sections, testing was performed on the EUT as follows.

2.1 EUT Description

The Lutron Model JPZ0148 is a LED Lighting Controller. The controller is powered by a Lutron Electronics Model T120-24DC-15 AC to DC power supply.

2.2 Product Category

FCC Part 15, Subpart C (Section 15.247)

2.3 Product Classification

Intentional Radiator Testing Requirements, DTS Operation within the band of 2400 – 2483.5 MHz.

2.4 Test Configuration

The Lutron Model JPZ0148 LED Lighting Controller was powered at 24 V DC by a Lutron Electronics Model T120-24DC-15 AC to DC power supply with an input voltage of 120 VAC / 60 Hz. The Lutron Model JPZ0148 LED Lighting Controller Sample # 2259-03 with Sample # 2259-05 was tested for all antenna conducted measurements. The Lutron Model JPZ0148 LED Lighting Controller Sample # 2259-01 with Sample # 2259-05 was tested for all conducted emission tests. The Lutron Model JPZ0148 LED Lighting Controller Sample # 2259-01 with Sample # 2259-06 was tested for all radiated emissions tests. The radio test software allowed the tester to choose the 802.15.4 transmissions of low Channel 11 (2405 MHz), middle Channel 18 (2440 MHz) or high Channel 26 (2480 MHz). The transmission was tested in maximum output power with the choice of transmitting with O-QPSK Modulation or without Modulation.

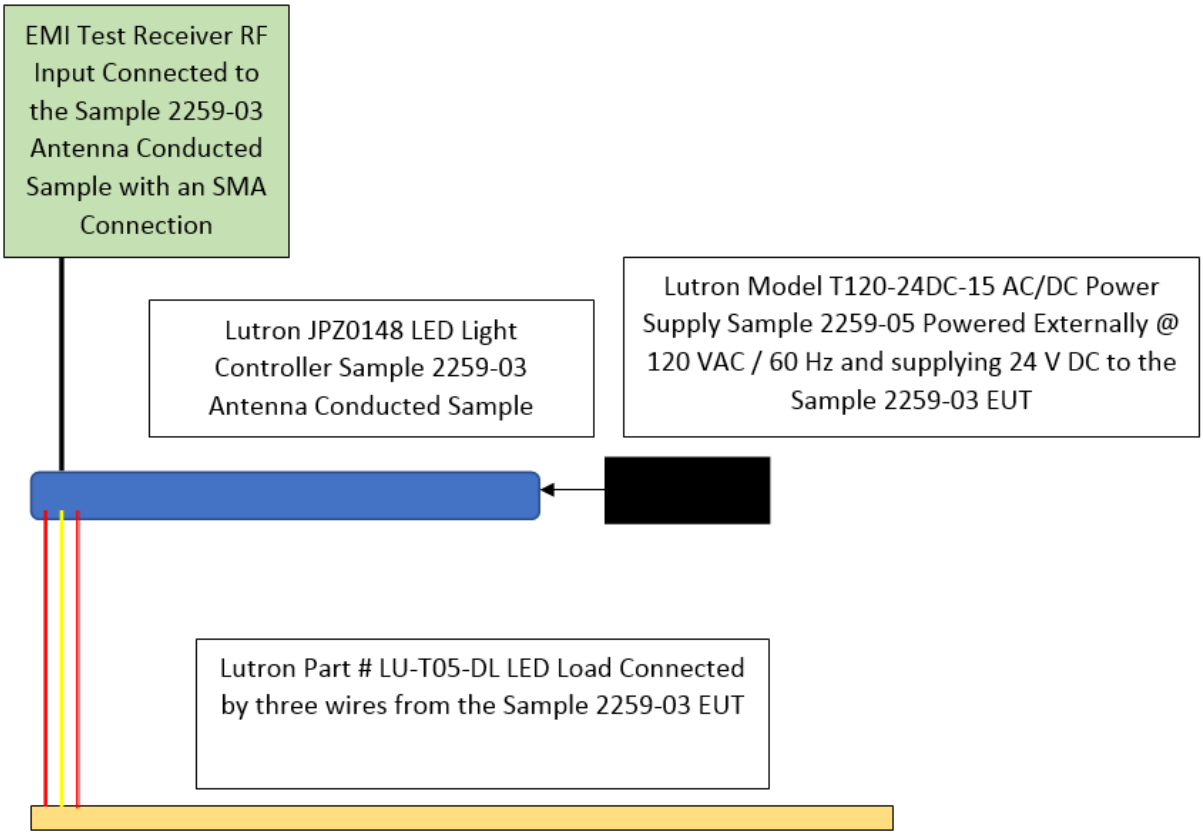
2.5 Test Configuration Rationale

The modified radio of the Lutron Model JPZ0148 LED Lighting Controller allows direct access to the output of the radio without a transmission antenna. The unmodified unit is factory produced with modified software for EMI test purposes.

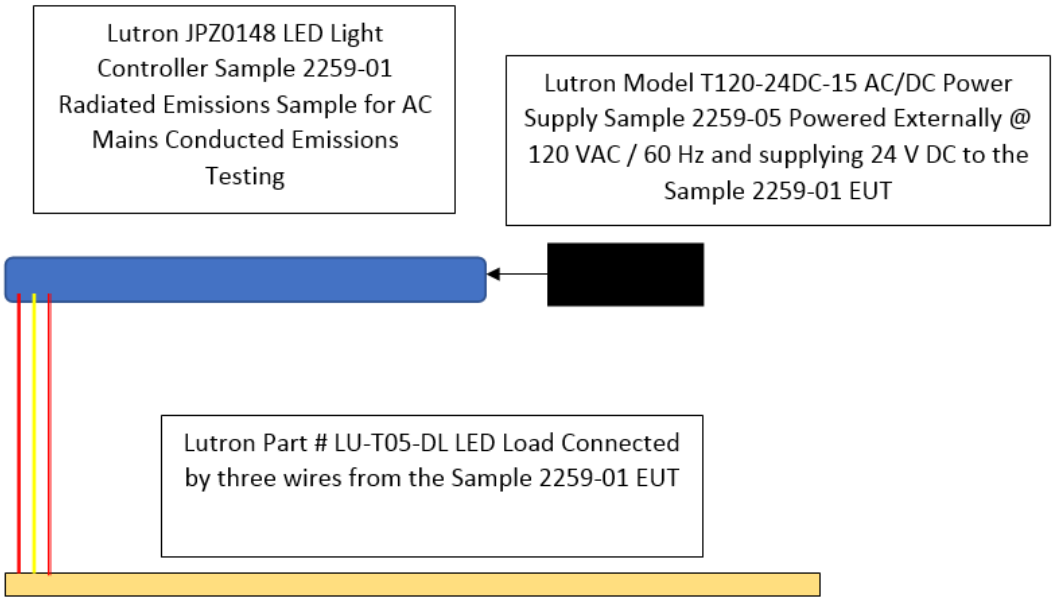
2.6 Test Configuration Diagrams

Block diagrams of the EUT configuration showing interconnection cables are illustrated below. The drawing shows the physical hardware layout used for the tests along with I/O cables and AC power distribution.

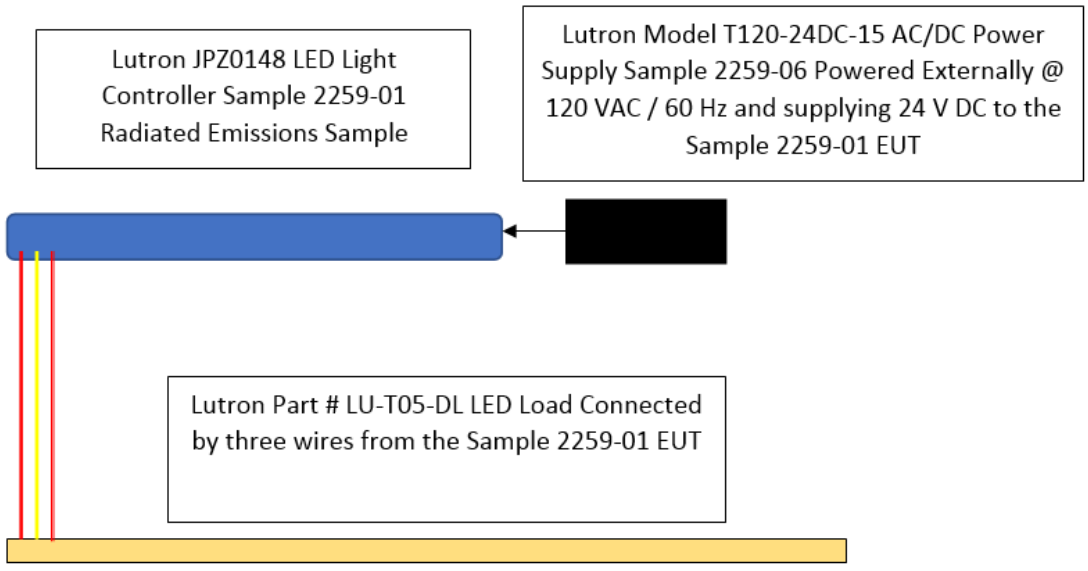
Antenna Conducted Test Configuration (modified with SMA connector in place of antenna)



Conducted Emission AC Mains Test Configuration (un-modified EUT)



Radiated Emission Test Configuration (un-modified EUT)



2.7 EUT Information, Interconnection Cabling and Support Equipment

EUT Hardware

Description	Manufacturer	Model	Serial Number	Sample Number
LED Lighting Controller Radiated Emissions Sample	Lutron	JPZ0148	02F2571A	2259-01
LED Lighting Controller Antenna Conducted Sample	Lutron	JPZ0148	02F25720	2259-03
AC/DC Power Supply	Lutron Electronics	T120-24DC-15	U4A222502583	2259-05
AC/DC Power Supply	Lutron Electronics	T120-24DC-15	U4A223400056	2259-06

Interconnection Cable List

Manufacturer	Model	Type	Shielding	Length	Description
Unknown	Unknown	Unknown	None	20 cm	Power Control Red Wire From JPZ0148 to the LED Light Strip
Unknown	Unknown	Unknown	None	20 cm	Power Control Yellow Wire From JPZ0148 to the LED Light Strip
Unknown	Unknown	Unknown	None	20 cm	Power Control Red/White Wire From JPZ0148 to the LED Light Strip

Support Equipment

Description	Manufacturer	Model	Serial Number
120 Piece LED Strip Light	Lutron Electronics	LU-T05-DL	No Serial Number
Laptop Computer-Programming the EUT Radio Transmitter Software	Dell	Inspiron 15-3567	E4B4B16C-F475-4A3F-9795-A06C5CB4AB43

2.8 Test Signals and Test Modulation

By design this product does not have an external Modulation input connector, therefore, normal operating modulation was used for all testing reported herein. The only test where modulation was not active was during testing of the Maximum Peak Power Output FCC Section 15.247(b) (3) (Section 4.6 of this report) to ensure that the un-modulated carrier was not higher than the modulated carrier.

The control unit in this product is a digital frequency transmitter. The EUT transmits to a discrete frequency on a specific channel. The Lutron Model JPZ0148 LED Lighting Controller has 16 Channels available. The 16 Channels and frequencies that can be transmitted by the EUT are as follows:

802.15.4 Channel Info	Frequency (MHz)		802.15.4 Channel Info	Frequency (MHz)
11	2405		19	2445
12	2410		20	2450
13	2415		21	2455
14	2420		22	2460
15	2425		23	2465
16	2430		24	2470
17	2435		25	2475
18	2440		26	2480

For the required testing, the EUT was configured to transmit at low Channel 11 (2405 MHz), middle Channel 18 (2440 MHz) and high Channel 26 (2480 MHz). The EUT operates with a 2.3 MHz Operational Channel Bandwidth. The EUT has the option to be programmed to operate with maximum output power with O-QPSK modulation or with Constant Wave (CW) signal.

2.9 Antenna Gain

The antenna gain was documented by Lutron at + 4.3 dBi or + 2.15 dBd.

2.10 Grounding

The EUT ground is provide by the Lutron Electronics Model T120-24DC-15 AC/DC Power Supply.

2.11 EUT Modifications

An SMA connector was added to replace the antenna on the PCB of the Lutron Model JPZ0148 LED Lighting Controller Antenna Conducted Test Sample 2259-02. No other modifications were done on any of the other samples.

3.0 Applicable Requirements, Methods, and Procedures

3.1 Applicable Requirements

The results of the measurement of the radio disturbance characteristics of the EUT described herein may be applied and where appropriate, provide a presumption of compliance to one or more of the following requirements or to other requirements at the discretion of the customer, regulatory agencies, or other entities.

3.1.1 FCC Requirements

Code of Federal Regulations: Title 47 – Telecommunication
Chapter I - Federal Communications Commission
Sub-chapter A – General
Part 15 – Radio Frequency Devices
Subpart C - Intentional Radiators
15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

3.1.2 Basic Test Methods and Test Procedures

KDB Document 558074 D01 15.247 Meas Guidance v05r02, Guidance for Performing Compliance Measurements on Digital Transmission Systems, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of the FCC Rules.

ANSI C63.10-2020, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

3.1.3 Deviations or Exclusions from the Requirements

No deviations or exclusions were made.

4.0 Test Results

4.1 Antenna Requirement (47 CFR 15.203)

The antenna used by the Lutron Model JPZ0148 LED Lighting Controller is a Planar Inverted-F PCB Trace Antenna (PIFA). There are no detachable parts of the antenna. The antenna is not replaceable, nor changeable, and therefore complies with the requirements of this section.

4.2 External RF power amps/antenna modifications (47 CFR 15.204)

There are no RF power amplifier kits available to be used with the Lutron Model JPZ0148 LED Lighting Controller. There are no detachable parts of the antenna. The antenna is not replaceable, nor changeable, and therefore complies with the requirements of this section.

4.3 Duty Cycle of the DTS Fundamental Transmission

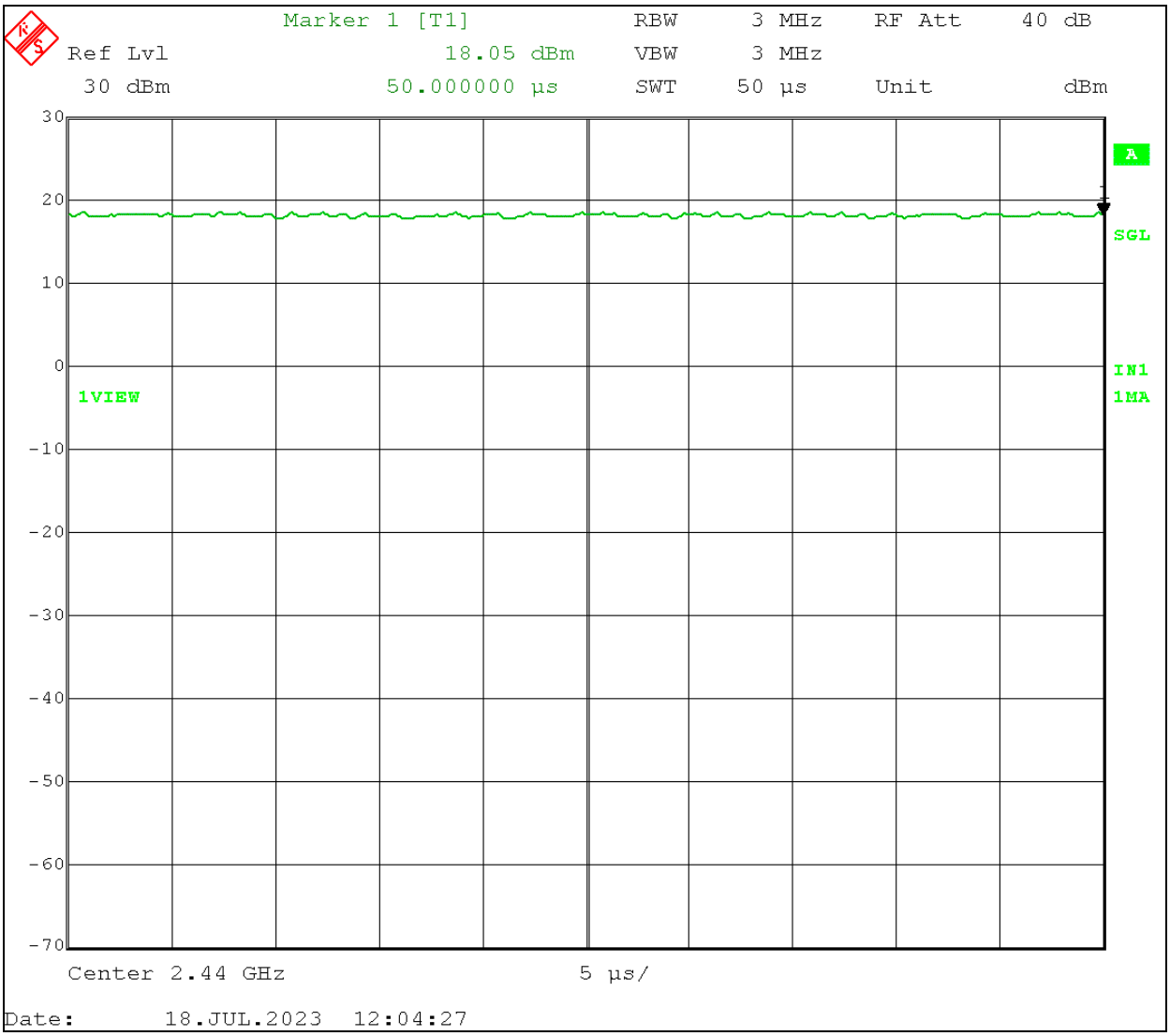
The duty cycle of the DTS transmission shall be greater than or equal to 98%. This ensures that the various emissions measured for this certification test will be made with the transmitter fully active. Duty cycles less than 98% can be used and a duty cycle correction factor can be calculated to reduce the peak level of the emission for radiated emission tests. The procedure of ANSI C63.10, Section 11.6 can be used to evaluate the duty cycle of this device.

Spectrum Analyzer Settings

OBW	2.3	MHz	
RBW	3	MHz	(RBW≥OBW or as close to this as possible)
VBW	3	MHz	(VBW=RBW)
Span	Zero	MHz	(Zero)
Sweep Time	50	us	
Attenuation	40	dB	
Reference Level	30	dBm	

4.3.1 Duty Cycle Measurement Results (07/18/2023)

BEC Incorporated tested the duty cycle of the 802.15.4 Radio from the Lutron Model JPZ0148 LED Lighting Controller. Transmission was set to maximum output at middle channel of 2440 MHz with O-QPSK modulation using the radio control test software. The Duty Cycle of the transmitter was measured to be 100% and no duty cycle correction factor was required to be calculated.



4.4 DTS Conducted Spurious Emissions in Non-restricted Frequency Bands (FCC Section 15.247(d))

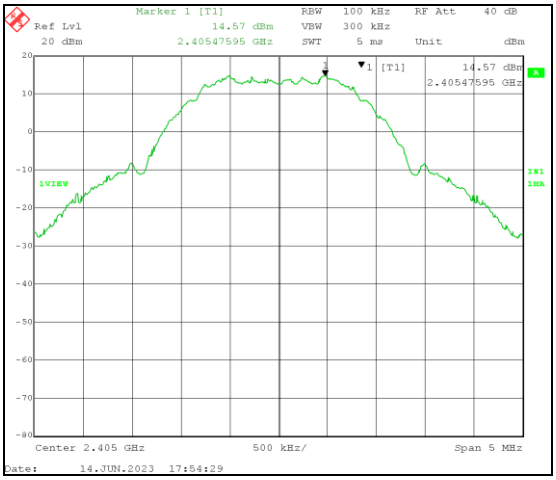
4.4.1 DTS Conducted Spurious Emissions in Non-restricted Frequency Bands Test Procedure

A measurement of the emissions in non-restricted frequency bands was made at the low Frequency 2405.0 MHz (Channel 11), middle Frequency 2440.0 MHz (Channel 18) and high Frequency 2480.0 MHz (Channel 26). The EUT was set to transmit a signal at maximum output power with O-QPSK modulation. The procedure for the test is ANSI C63.10, Section 11.11. The frequency spectrum from 30 MHz to 25 GHz was divided into three bands: 30-1000 MHz, 1 – 10 GHz and 10 – 25 GHz. Each of the three fundamental test frequencies was measured for the reference value to determine the -20 dBc value.

Spectrum Analyzer Settings

Emission Level: Zigbee Radio, O-QPSK modulation			
Spectrum Analyzer Settings			ANSI C63.10 requirement
Span	Varies	-	Encompass spectrum divided into bands
RBW	100 kHz		47 CFR Part 15.247 (d)
VBW	300 kHz		≥ 3 X RBW
Sweep	Varies		Auto

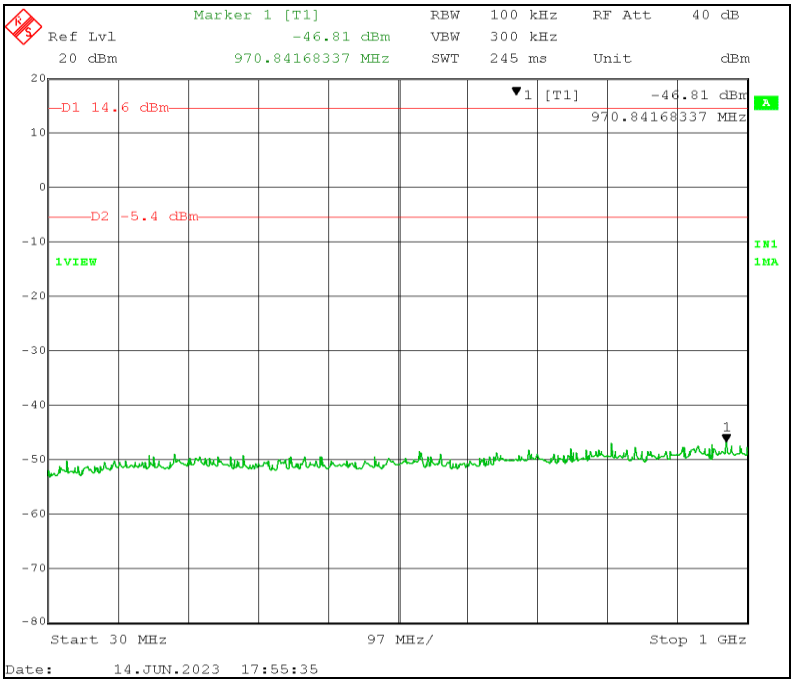
4.4.2 DTS Conducted Spurious Emissions in Non-restricted Frequency Bands Reference Measurement Channel 11 (06/14/2023)



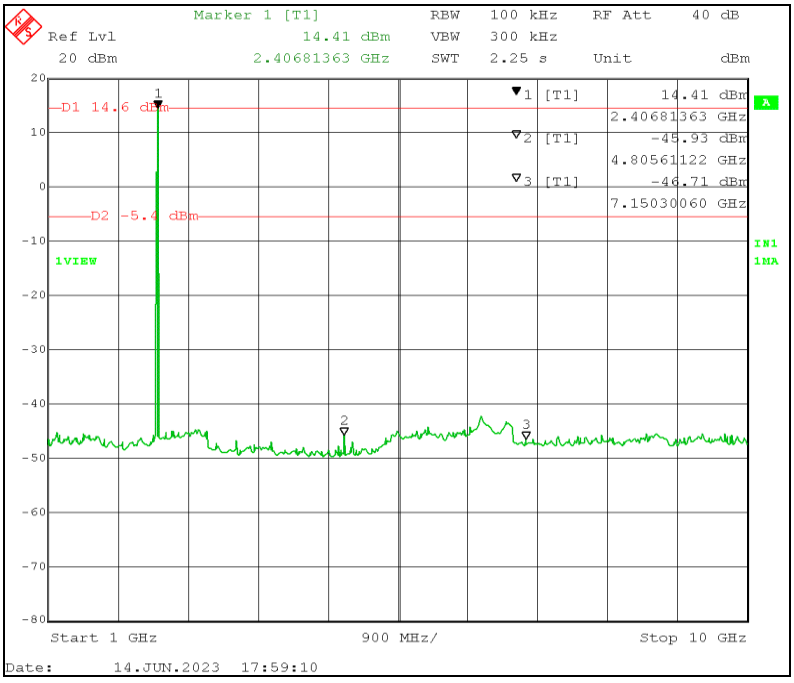
The peak level of 14.6 dBm is the maximum peak output of the Lutron Model JPZ0148 LED Lighting Controller. The conducted spurious emissions from the antenna port must be 20 dB down from this peak. The resultant limit is therefore -5.4 dBm and is displayed on the plots below.

4.4.3 DTS Conducted Spurious Emissions in Non-restricted Frequency Bands Channel 11 Test Results (06/14/2023)

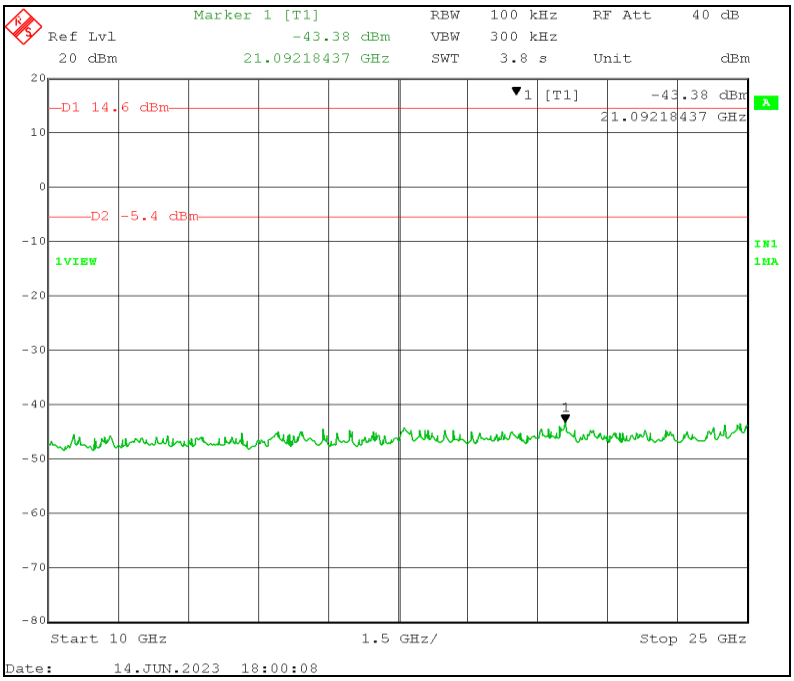
30 MHz – 1000 MHz



1 GHz – 10 GHz



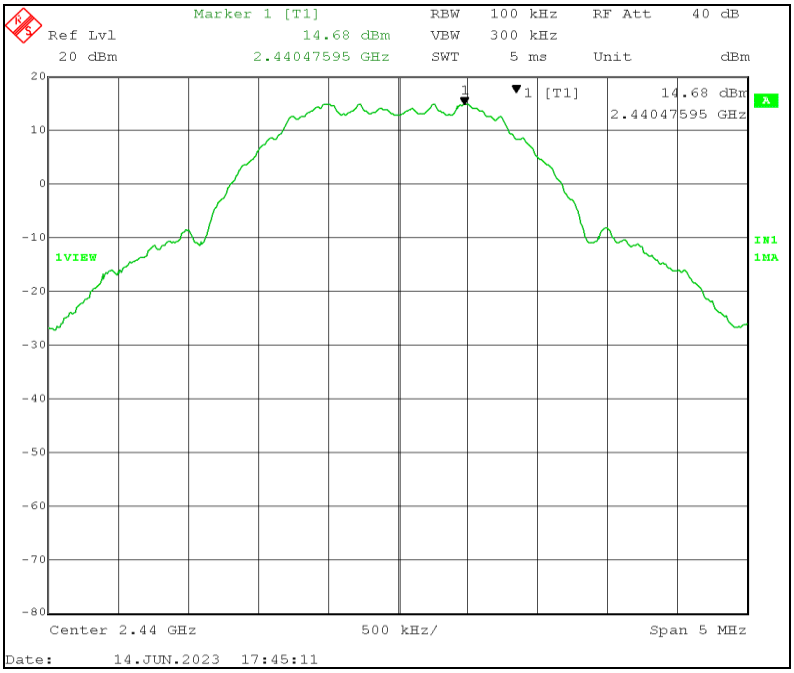
10 GHz – 25 GHz



Test Results of Highest Emissions: Channel 11 (Frequency 2405.0 MHz)

Channel Frequency	Frequency	Peak	20 dB below Max Peak Reference	Margin	Result
MHz	MHz	dBm	dBc	dB	
2405.0	970.841	-46.81	-5.40	-41.41	Pass
	4805.611	-45.93	-5.40	-40.53	Pass
	7150.301	-46.71	-5.40	-41.31	Pass
	21092.184	-43.38	-5.40	-37.98	Pass

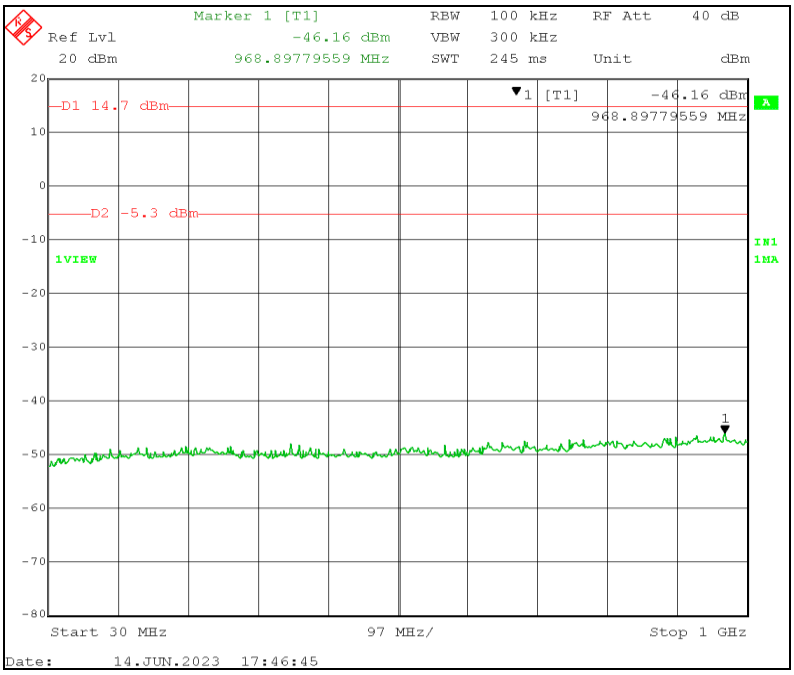
4.4.4 DTS Conducted Spurious Emissions in Non-restricted Frequency Bands Reference Measurement Channel 18 (06/14/2023)



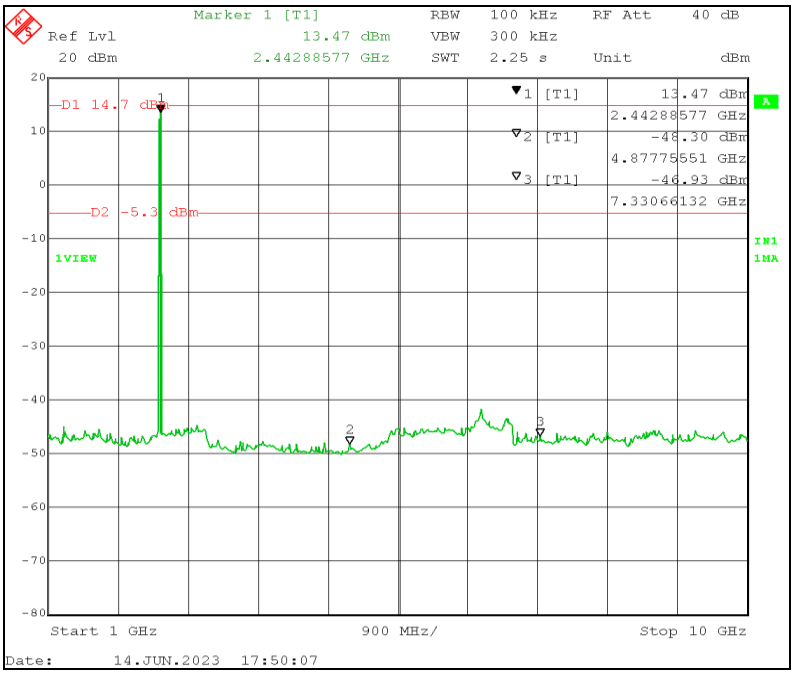
The peak level of 14.7 dBm is the maximum peak output of the Lutron Model JPZ0148 LED Lighting Controller. The conducted spurious emissions from the antenna port must be 20 dB down from this peak. The resultant limit is therefore -5.3 dBm and is displayed on the plots below.

4.4.5 DTS Conducted Spurious Emissions in Non-restricted Frequency Bands Channel 18 Test Results (06/14/2023)

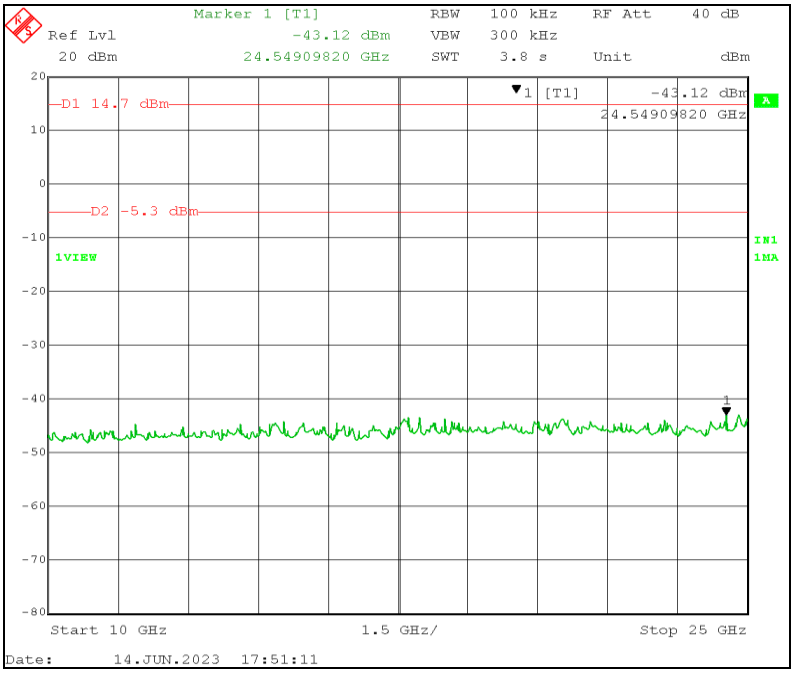
30 MHz – 1000 MHz



1 GHz – 10 GHz



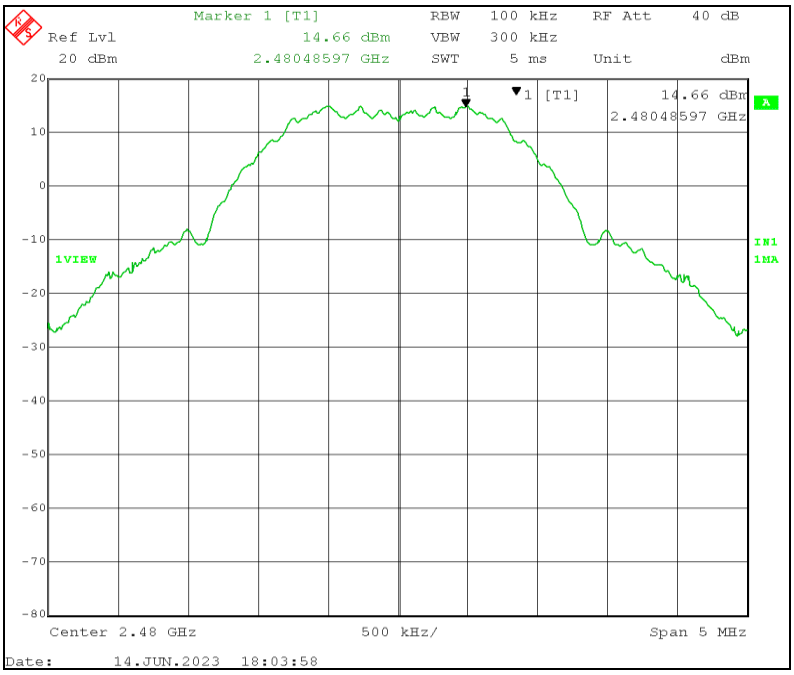
10 GHz – 25 GHz



Test Results Table Highest Emissions: Channel 18 (2440.0 MHz)

Channel Frequency	Frequency	Peak	20 dB below Max Peak Reference	Margin	Result
MHz	MHz	dBm	dBc	dB	
2440.0	968.898	-46.16	-5.30	-40.86	Pass
	4877.755	-48.30	-5.30	-43.00	Pass
	7330.661	-46.93	-5.30	-41.63	Pass
	24549.098	-43.12	-5.30	-37.82	Pass

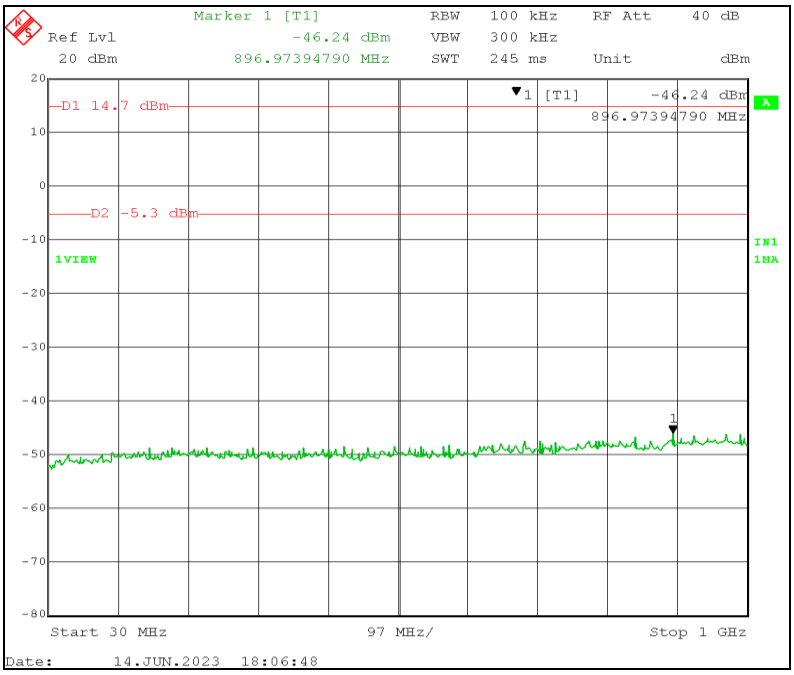
4.4.6 DTS Conducted Spurious Emissions in Non-restricted Frequency Bands Reference Measurement Channel 26 (06/14/2023)



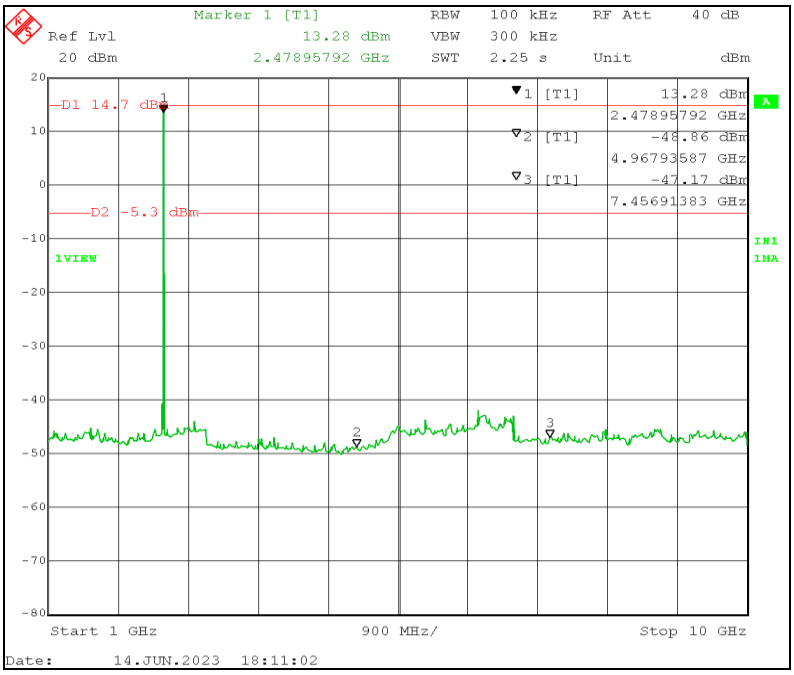
The peak level of 14.7 dBm is the maximum peak output of the Lutron Model JPZ0148 LED Lighting Controller. The conducted spurious emissions from the antenna port must be 20 dB down from this peak. The resultant limit is therefore -5.3 dBm and is displayed on the plots below.

4.4.7 DTS Conducted Spurious Emissions in Non-restricted Frequency Bands Channel 26 Test Results (06/14/2023)

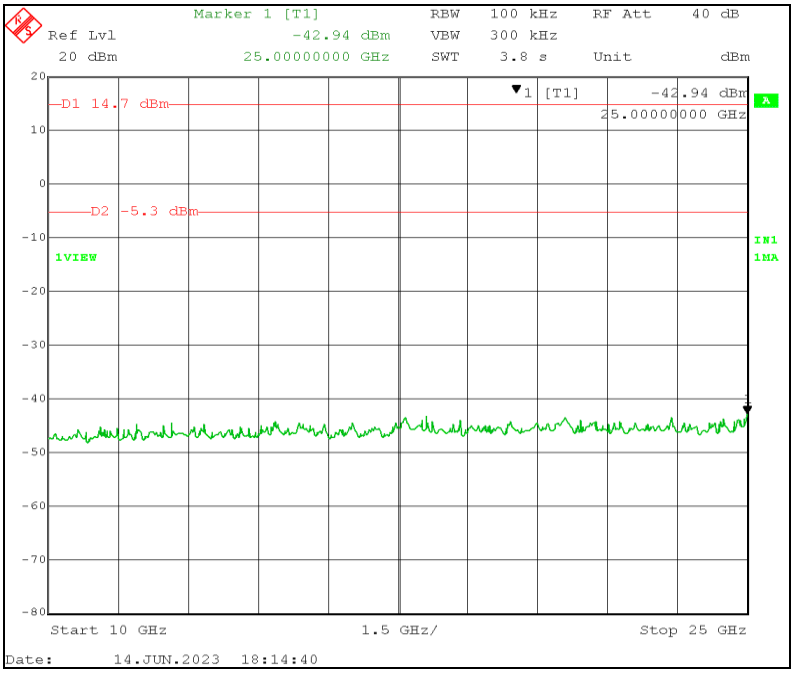
30 MHz – 1000 MHz



1 GHz – 10 GHz



10 GHz – 25 GHz

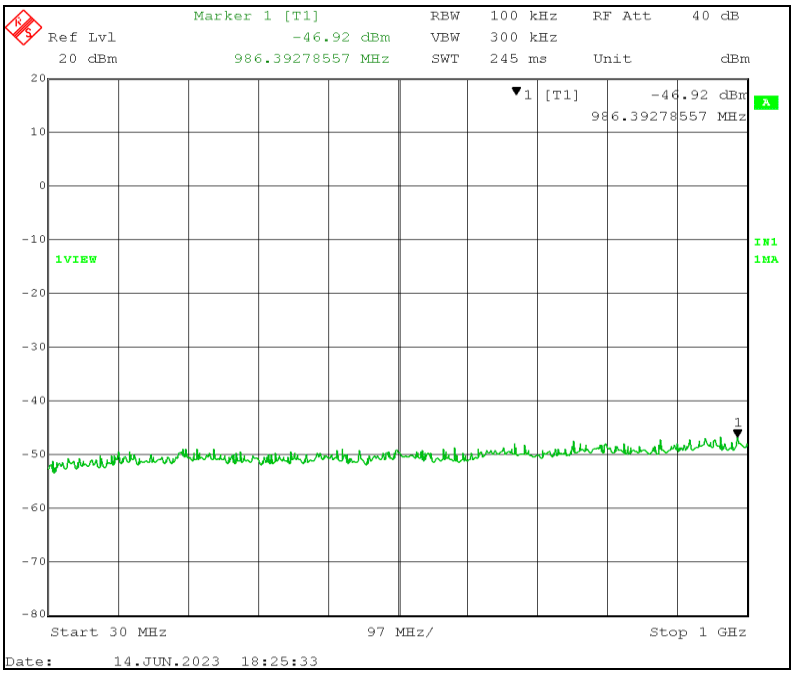


Test Results of Highest Emissions: Channel 26 (Frequency 2480.0 MHz)

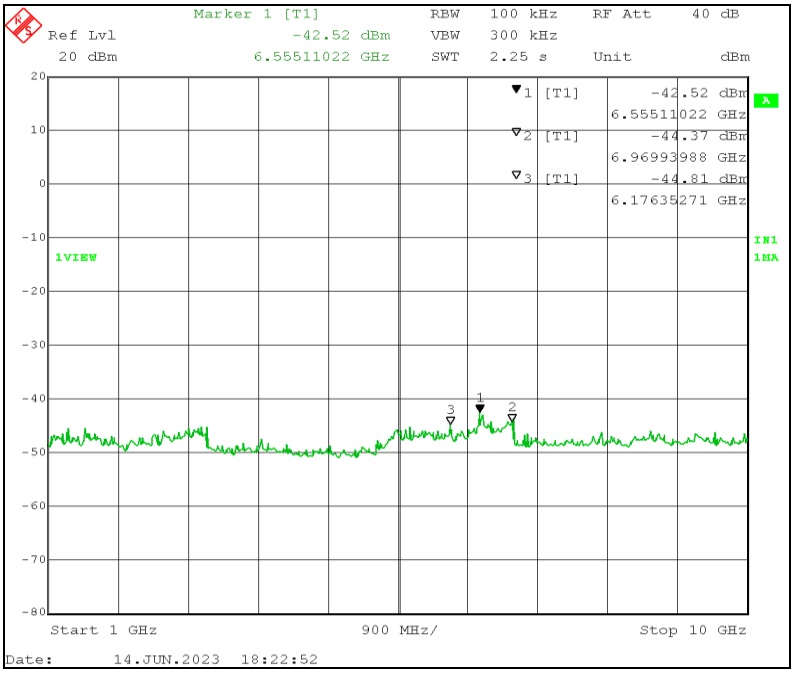
Channel Frequency	Frequency	Peak	20 dB below Max Peak Reference	Margin	Result
MHz	MHz	dBm	dBc	dB	
2480.0	896.973	-46.24	-5.30	-40.94	Pass
	4967.936	-48.86	-5.30	-43.56	Pass
	7456.913	-47.17	-5.30	-41.87	Pass
	25000.000	-42.94	-5.30	-37.64	Pass

4.4.8 DTS Conducted Spurious Emissions in Non-restricted Frequency Bands Rx Mode Test Results (06/14/2023)

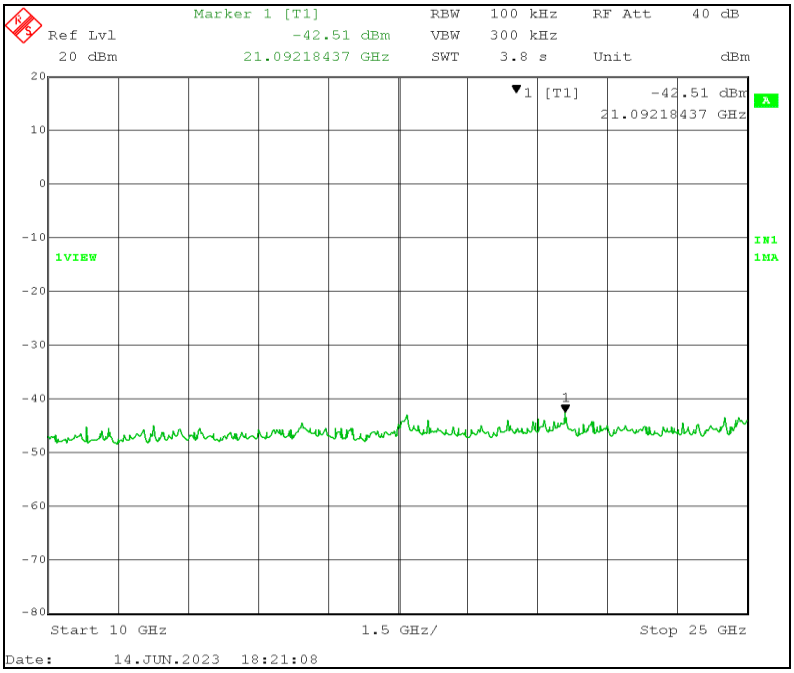
30 MHz – 1000 MHz



1 GHz – 10 GHz



10 GHz – 25 GHz



Test Results: The Antenna Conducted Spurious Emissions of the Lutron Model JPZ0148 LED Lighting Controller, at Low, Middle and High Frequencies, are below the carrier 20 dBc limit and therefore compliant with the limits specified in FCC Section 15.247(d).

4.5 DTS Radiated Spurious Emissions in Non-restricted and Restricted Frequency Bands, 30 MHz – 25 GHz (47 CFR 15.205 & 15.209)

The emissions from the Lutron Model JPZ0148 LED Lighting Controller, which fall in the restricted bands of operation and unrestricted bands of operation, detailed in this section, comply with the limits of 15.209. The Lutron Model JPZ0148 LED Lighting Controller was tested at three frequencies: low Frequency 2405.0 MHz (Channel 11), middle Frequency 2440.0 MHz (Channel 18) and high Frequency 2480.0 MHz (Channel 26). The EUT was set to transmit a signal at maximum output power with O-QPSK modulation. The EUT was also tested in the Rx Mode.

Measurement of the signals was performed with the EUT on a turntable and a variable height antenna mast at 3 meters distance. The signals residing in restricted bands of operation are indicated in the tables below.

4.5.1 Non-Restricted and Restricted Bands Test Facility

OATS

The Open Area Test Site (OATS) is an all-weather facility with a wooden enclosure that contains a ground level 4-foot diameter turntable capable of rotating equipment 360 degrees. The enclosure is free of reflective metallic objects and extraneous electromagnetic signals. This non-metallic enclosure and the 3 meter and 10 meter test range existing outside the enclosure rest upon a protective insulating material, which in turn covers a flat, metal, continuous ground plane.

Instrumentation for remote control of the antenna mast, turntable, and other equipment are controlled by personnel indoors. The EUT and support peripherals required for EUT operation were placed on a table 80 cm high for tabletop equipment or directly on the turntable surface for floor standing equipment. The test site complies with the requirements of ANSI C63.4 and ANSI C63.10.

SR#1

The Semi-Anechoic Shielded Room (SR#1) is a ferrite and absorber lined chamber which houses a 5-foot diameter turntable capable of rotating equipment 360 degrees and antenna mast for Horizontal and Vertical polarity measurements. The enclosure is free of reflective metallic objects and extraneous electromagnetic signals. The 3 meter shielded enclosure has a raised computer floor with metal tile bottoms providing a continuous ground plane.

Instrumentation for remote control of the antenna mast, turntable, and other equipment are controlled by personnel outside the chamber. The EUT and support peripherals required for EUT operation were placed on a table 80 cm high for tabletop equipment or directly on the turntable surface for floor standing equipment.

The chamber complies with the requirements of ANSI C63.4 and ANSI C63.10.

4.5.2 Non-restricted and Restricted Bands Radiated Spurious Emissions Test Procedure

Radiated Emissions 30 MHz – 40 GHz
The EMI receiver was set to quasi-peak mode for frequencies from 30 MHz to 1 GHz and the appropriate CISPR bandwidths were employed. The receiver was set to average mode for frequencies above 1 GHz with the appropriate CISPR bandwidths were employed.

Three orthogonal positions of the EUT were evaluated for maximum emissions. The position of the EUT, with the base of the trap placed on the horizontal surface of the 80-cm table, was determined to be the axis that produced the highest emissions.

Significant emissions found during the preliminary scans were maximized by rotating the turntable and varying the antenna height. Both horizontal and vertical antenna polarities were also investigated for suspect emissions. The signals are maximized and measured using the in house generated RADE or off the shelf TILE software. The support equipment and test item(s) were powered off in turn to determine the source of the emissions where appropriate.

Field strengths were calculated as follows:

Field Strength (dBµV/m) = Meter Reading (dBµV) + Antenna Factor (dB/m) + Cable Loss (dB) – Amplifier Gain (dB)

Measurements were made with the Lutron Model JPZ0148 LED Lighting Controller transmitting at the low Frequency 2405.0 MHz (Channel 11), middle Frequency 2440.0 MHz (Channel 18) and high Frequency 2480.0 MHz (Channel 26). The EUT was configured to transmit a signal at its maximum output power in the Constant Stream mode. During the testing process, it was determined that the X-axis was the worst-case orientation for the EUT. Therefore, all the tests were carried out with the EUT positioned in the X-axis. The following tables are the highest emissions recorded and summarized. Restricted band signals are marked with an asterisk. Other spurious emissions are shown to demonstrate compliance of the EUT to 15.209 limits.

4.5.3 DTS Radiated Spurious Emissions in Non-restricted and Restricted Bands of Operation, 30 MHz – 1000 MHz Test Results (06/13/2023 and 06/20/2023)

Low Channel 11 (2405.0 MHz)

Frequency	Corrected		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC Part15.205/209 RSS-GEN/247				Result
	Peak Level	QP Level					Peak Limit	Peak Margin	QP Limit	QP Margin	
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
32.738	21.71	19.04	H	353	230	-1.82	60.00	-38.29	40.00	-20.96	Pass
37.340	22.87	22.64	V	183	116	-5.08	60.00	-37.13	40.00	-17.36	Pass
61.530	31.79	31.73	V	290	109	-13.06	60.00	-28.21	40.00	-8.27	Pass
88.923	25.86	23.27	V	004	128	-12.58	63.52	-37.66	43.52	-20.25	Pass
*109.95	24.79	23.34	V	025	137	-7.60	63.52	-38.73	43.52	-20.18	Pass
*114.049	22.30	23.67	H	090	251	-6.96	63.52	-41.22	43.52	-19.85	Pass
*119.61	22.05	22.46	H	262	120	-6.56	63.52	-41.47	43.52	-21.06	Pass
200.927	15.23	14.35	V	261	137	-6.97	63.52	-48.29	43.52	-29.17	Pass
*242.477	25.68	23.55	H	360	105	-7.34	66.02	-40.34	46.02	-22.47	Pass
*277.552	23.11	22.76	H	309	110	-5.41	66.02	-42.91	46.02	-23.26	Pass
394.180	17.23	17.85	V	311	169	-3.75	66.02	-48.79	46.02	-28.17	Pass
491.235	24.14	22.99	H	042	219	-1.80	66.02	-41.88	46.02	-23.03	Pass
640.319	23.66	22.18	H	001	183	0.37	66.02	-42.36	46.02	-23.84	Pass
644.755	24.44	22.21	V	231	237	0.49	66.02	-41.58	46.02	-23.81	Pass
929.078	25.65	25.40	H	148	208	4.42	66.02	-40.37	46.02	-20.62	Pass
956.729	25.97	25.81	V	322	136	4.66	66.02	-40.05	46.02	-20.21	Pass

*Restricted Band Signal

Middle Channel 18 (2440.0 MHz)

Frequency	Corrected		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC Part15.205/209 RSS-GEN/247				Result
	Peak Level	QP Level					Peak Limit	Peak Margin	QP Limit	QP Margin	
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
32.953	20.40	18.96	H	138	124	-1.92	60.00	-39.60	40.00	-21.04	Pass
37.323	24.21	22.58	V	176	127	-5.07	60.00	-35.79	40.00	-17.42	Pass
61.400	33.60	32.49	V	291	101	-13.07	60.00	-26.40	40.00	-7.51	Pass
61.430	20.08	19.33	H	354	188	-13.07	60.00	-39.92	40.00	-20.67	Pass
88.869	24.93	23.22	V	013	151	-12.59	63.52	-38.59	43.52	-20.30	Pass
*109.344	22.27	22.33	V	053	120	-7.66	63.52	-41.25	43.52	-21.19	Pass
*114.052	24.70	22.64	H	189	121	-6.96	63.52	-38.82	43.52	-20.88	Pass
*119.52	23.18	22.17	H	237	124	-6.57	63.52	-40.34	43.52	-21.35	Pass
197.958	15.75	14.33	V	086	105	-7.11	63.52	-47.77	43.52	-29.19	Pass
*242.398	24.20	22.37	H	360	120	-7.35	66.02	-41.82	46.02	-23.65	Pass
*276.412	22.07	22.93	H	026	152	-5.42	66.02	-43.95	46.02	-23.09	Pass
412.769	22.95	19.73	V	131	245	-3.44	66.02	-43.07	46.02	-26.29	Pass
481.478	24.30	22.19	H	102	163	-1.97	66.02	-41.72	46.02	-23.83	Pass
691.440	23.86	22.92	V	103	235	0.91	66.02	-42.16	46.02	-23.10	Pass
742.310	23.88	24.42	H	141	116	1.73	66.02	-42.14	46.02	-21.60	Pass
943.500	25.65	25.41	H	286	173	4.49	66.02	-40.37	46.02	-20.61	Pass
957.732	25.76	25.96	V	073	184	4.74	66.02	-40.26	46.02	-20.06	Pass

*Restricted Band Signal

High Channel 26 (2480.0 MHz)

Frequency	Corrected		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC Part15.205/209 RSS-GEN/247				Result
	Peak Level	QP Level					Peak Limit	Peak Margin	QP Limit	QP Margin	
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
32.165	20.20	19.33	H	063	101	-1.53	60.00	-39.80	40.00	-20.67	Pass
37.313	22.50	22.05	V	244	131	-5.06	60.00	-37.50	40.00	-17.95	Pass
61.470	33.61	31.69	V	298	111	-13.07	60.00	-26.39	40.00	-8.31	Pass
*73.583	19.13	18.91	H	073	256	-12.58	60.00	-40.87	40.00	-21.09	Pass
88.984	21.99	23.13	V	360	127	-12.58	63.52	-41.53	43.52	-20.39	Pass
*108.475	24.84	23.77	V	032	171	-7.81	63.52	-38.68	43.52	-19.75	Pass
*114.196	24.96	21.13	H	174	110	-6.95	63.52	-38.56	43.52	-22.39	Pass
*118.595	25.99	23.91	H	266	225	-6.67	63.52	-37.53	43.52	-19.61	Pass
199.518	16.56	14.60	V	008	148	-6.94	63.52	-46.96	43.52	-28.92	Pass
206.539	21.67	18.71	H	071	156	-8.68	63.52	-41.85	43.52	-24.81	Pass
*242.712	25.10	23.99	H	012	114	-7.32	66.02	-40.92	46.02	-22.03	Pass
*276.602	25.84	23.08	H	331	131	-5.42	66.02	-40.18	46.02	-22.94	Pass
383.355	23.88	22.88	H	224	101	-4.06	66.02	-42.14	46.02	-23.14	Pass
*406.559	21.31	17.96	V	115	125	-3.57	66.02	-44.71	46.02	-28.06	Pass
489.920	23.72	21.98	H	053	193	-1.80	66.02	-42.30	46.02	-24.04	Pass
595.144	23.98	21.26	V	142	178	-0.38	66.02	-42.04	46.02	-24.76	Pass
755.354	26.21	24.74	H	137	104	1.84	66.02	-39.81	46.02	-21.28	Pass
812.240	25.01	24.57	V	194	193	3.11	66.02	-41.01	46.02	-21.45	Pass
849.538	26.04	24.82	H	344	101	3.43	66.02	-39.98	46.02	-21.20	Pass
*Restricted Band Signal											

Receive Mode

Frequency	Corrected		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC Part15.205/209 RSS-GEN/247				Result
	Peak Level	QP Level					Peak Limit	Peak Margin	QP Limit	QP Margin	
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
36.160	19.02	18.48	V	278	101	-4.31	60.00	-40.98	40.00	-21.52	Pass
55.918	24.69	21.25	V	221	101	-13.35	60.00	-35.31	40.00	-18.75	Pass
*109.937	15.66	15.15	H	248	157	-7.60	63.52	-47.86	43.52	-28.37	Pass
*110.732	19.79	16.52	V	068	189	-7.44	63.52	-43.73	43.52	-27.00	Pass
200.742	15.64	13.11	V	344	205	-6.96	63.52	-47.88	43.52	-30.41	Pass
223.548	14.29	12.97	H	097	151	-8.25	66.02	-51.73	46.02	-33.05	Pass
308.120	17.43	17.09	H	046	163	-4.99	66.02	-48.59	46.02	-28.93	Pass
317.168	18.45	15.72	H	065	226	-4.83	66.02	-47.57	46.02	-30.30	Pass
*404.755	21.80	17.05	V	007	120	-3.63	66.02	-44.22	46.02	-28.97	Pass
487.953	21.55	19.52	V	062	173	-1.80	66.02	-44.47	46.02	-26.50	Pass
527.203	20.06	20.20	H	356	170	-1.42	66.02	-45.96	46.02	-25.82	Pass
645.137	22.91	21.84	V	342	111	0.48	66.02	-43.11	46.02	-24.18	Pass
692.405	24.58	22.19	H	357	102	0.92	66.02	-41.44	46.02	-23.83	Pass
797.555	24.87	24.17	V	111	115	2.92	66.02	-41.15	46.02	-21.85	Pass
851.758	25.60	24.50	H	055	230	3.48	66.02	-40.42	46.02	-21.52	Pass
*964.360	26.61	25.67	V	187	173	4.81	73.98	-47.37	53.98	-28.31	Pass
*974.227	27.03	25.55	H	001	220	4.76	73.98	-46.95	53.98	-28.43	Pass
*Restricted Band Signal											

Test Results: The Lutron Model JPZ0148 LED Lighting Controller, operating in DTS mode and receive mode, comply with the requirements of 47 CFR Part 15.205 for restricted bands of operation with a margin of 7.51 dB.

4.5.4 DTS Radiated Spurious Emissions in Non-Restricted and Restricted Bands of Operation, 1 GHz – 18 GHz Test Results (06/15/2023 and 06/16/2023)

Low Channel 11 (2405.0 MHz)

CONFIGURATION TESTED	EUT Orientation (X Axis) Tx at Low Channel of 2405 MHz at 250 kbps and Max Output Power, Constant Stream

Frequency	Peak Level	Average Measured	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC 15.205/209: RSS-GEN/RSS-247 Average Limit	FCC 15.205/209: RSS-GEN/RSS-247 Average Margin	FCC 15.205/209: RSS-GEN/RSS-247 Peak Limit	FCC 15.205/209: RSS-GEN/RSS-247 Peak Margin	Result
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
*4.8107	39.65	29.96	H	353	240	1.68	53.98	-24.02	73.98	-34.33	PASS
*4.8111	46.01	37.49	V	235	155	1.68	53.98	-16.49	73.98	-27.97	PASS
7.2466	43.80	33.38	V	294	171	4.38	53.98	-20.60	73.98	-30.18	PASS
*7.2596	43.72	33.43	H	320	226	4.46	53.98	-20.55	73.98	-30.26	PASS
*8.0698	44.34	35.98	V	305	107	5.29	53.98	-18.00	73.98	-29.64	PASS
9.6809	45.40	35.65	H	227	237	6.25	53.98	-18.33	73.98	-28.58	PASS
14.5703	55.76	46.15	V	352	138	12.42	53.98	-7.83	73.98	-18.22	PASS
14.6510	55.65	46.19	H	046	105	12.31	53.98	-7.79	73.98	-18.33	PASS

*Restricted Band Signal

Middle Channel 18 (2440.0 MHz)

CONFIGURATION TESTED	EUT Orientation (X Axis) Tx at Mid Channel of 2440 MHz at 250 kbps and Max Output Power, Constant Stream

Frequency	Peak Level	Average Measured	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC 15.205/209: RSS-GEN/RSS-247 Average Limit	FCC 15.205/209: RSS-GEN/RSS-247 Average Margin	FCC 15.205/209: RSS-GEN/RSS-247 Peak Limit	FCC 15.205/209: RSS-GEN/RSS-247 Peak Margin	Result
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
3.2104	33.80	24.95	H	251	121	-2.08	53.98	-29.03	73.98	-40.18	PASS
*4.8709	38.75	27.94	H	059	226	1.87	53.98	-26.04	73.98	-35.23	PASS
*4.8809	43.23	35.88	V	205	117	1.89	53.98	-18.10	73.98	-30.75	PASS
*7.3123	43.09	33.20	V	359	237	4.72	53.98	-20.78	73.98	-30.89	PASS
*7.3179	43.81	33.46	H	142	203	4.74	53.98	-20.52	73.98	-30.17	PASS
*8.1929	47.22	35.93	V	127	170	5.44	53.98	-18.05	73.98	-26.76	PASS
10.1227	46.47	36.53	H	210	186	6.31	53.98	-17.45	73.98	-27.51	PASS
*11.1587	46.98	37.68	H	186	239	6.46	53.98	-16.30	73.98	-27.00	PASS
15.1081	53.74	43.54	V	256	101	10.31	53.98	-10.44	73.98	-20.24	PASS
16.6695	54.95	44.35	H	255	182	11.14	53.98	-9.63	73.98	-19.03	PASS

*Restricted Band Signal

High Channel 26 (2480.0 MHz)

CONFIGURATION TESTED	EUT Orientation (X Axis) Tx at High Channel of 2480 MHz at 250 kbps and Max Output Power, Constant Stream

Frequency	Peak Level	Average Measured	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC 15.205/209: RSS-GEN/RSS-247 Average Limit	FCC 15.205/209: RSS-GEN/RSS-247 Average Margin	FCC 15.205/209: RSS-GEN/RSS-247 Peak Limit	FCC 15.205/209: RSS-GEN/RSS-247 Peak Margin	Result
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
*4.9609	40.87	30.24	H	159	150	1.83	53.98	-23.74	73.98	-33.11	PASS
*4.9612	44.27	36.61	V	206	139	1.83	53.98	-17.37	73.98	-29.71	PASS
*7.4000	44.23	33.57	H	000	155	4.75	53.98	-20.41	73.98	-29.76	PASS
*7.4093	43.42	33.79	V	341	100	4.75	53.98	-20.19	73.98	-30.56	PASS
*8.4996	46.01	36.41	V	326	169	6.04	53.98	-17.57	73.98	-27.97	PASS
9.8838	46.32	36.29	H	121	102	6.26	53.98	-17.69	73.98	-27.66	PASS
*11.2975	47.02	37.90	H	203	228	6.51	53.98	-16.08	73.98	-26.96	PASS
14.7141	55.52	45.47	V	147	208	12.09	53.98	-8.51	73.98	-18.46	PASS

*Restricted Band Signal

Receive Mode

CONFIGURATION TESTED	EUT Orientation (X Axis) EUT in Rx Mode

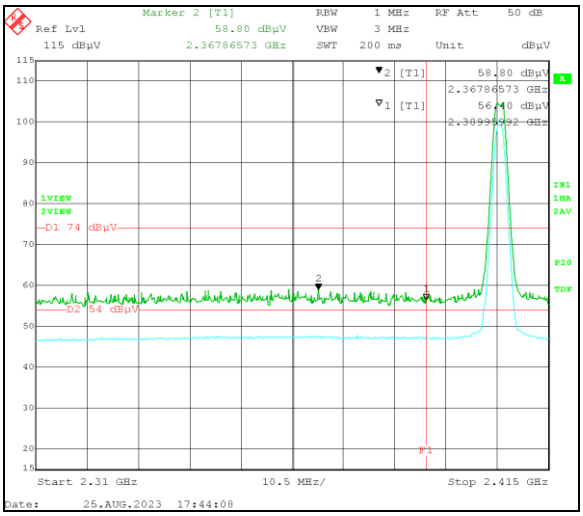
Frequency	Peak Level	Average Measured	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC 15.205/209: RSS-GEN/RSS-247 Average Limit	FCC 15.205/209: RSS-GEN/RSS-247 Average Margin	FCC 15.205/209: RSS-GEN/RSS-247 Peak Limit	FCC 15.205/209: RSS-GEN/RSS-247 Peak Margin	Result
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB	
1.2907	29.70	19.94	V	155	101	-11.46	53.98	-34.04	73.98	-44.28	PASS
1.8566	31.38	21.74	H	050	155	-7.58	53.98	-32.25	73.98	-42.60	PASS
6.9147	44.51	32.86	V	001	103	3.67	53.98	-21.12	73.98	-29.47	PASS
7.8832	44.81	34.90	H	000	198	5.03	53.98	-19.08	73.98	-29.17	PASS
*11.1314	47.96	37.69	V	321	200	6.43	53.98	-16.29	73.98	-26.02	PASS
*11.2904	47.80	37.83	H	021	137	6.51	53.98	-16.15	73.98	-26.18	PASS

*Restricted Band Signal

Test Results: The Lutron Model JPZ0148 LED Lighting Controller, operating in DTS and receive modes, comply with the requirements of 47 CFR Part 15.205 with a margin of 7.79 dB.

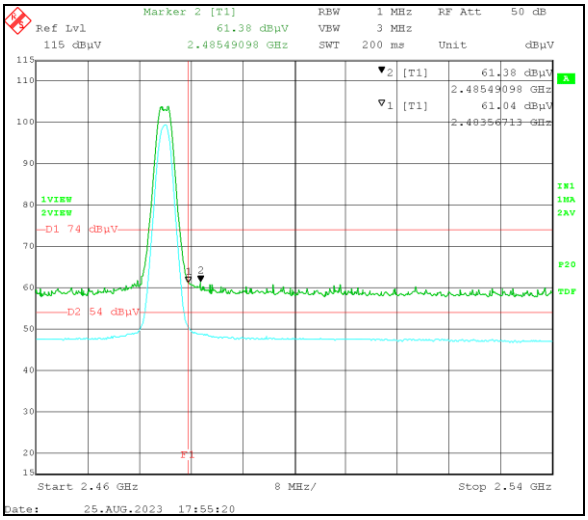
Radiated Band-Edge Low Channel 11 (2405.0 MHz)

Transmit Channel and Frequency (GHz)	Frequency Measured	Modulation	Peak Measured	Average Measured	Peak Corrected	Average Corrected	Correction Factor	FCC Part 15.205/15/209 Peak Limit	FCC Part 15.205/15/209 Average Limit	Peak Margin	Average Margin
			dBuV	dBuV	dBuV	dBuV	dB	dBuV	dBuV	dBuV	dBuV
2.405 (Channel 11)	2.390	O-QPSK	56.40	47.06	51.00	41.66	-5.40	73.98	53.98	-22.98	-12.32
2.405 (Channel 11)	2.367		58.80	47.27	53.40	41.87	-5.40	73.98	53.98	-20.58	-12.11



Radiated Band-Edge High Channel 26 (2480.0 MHz)

Transmit Channel and Frequency (GHz)	Band Edge / Freq (GHz)	Modulation	Peak Measured	Average Measured	Peak Corrected	Average Corrected	Correction Factor	FCC Part 15.205/15/209 Peak Limit	FCC Part 15.205/15/209 Average Limit	Peak Margin	Average Margin
			dBuV	dBuV	dBuV	dBuV	dB	dBuV	dBuV	dBuV	dBuV
2.480 (Channel 26)	2.4835	O-QPSK	61.38	50.56	55.98	45.16	-5.40	73.98	53.98	-18.00	-8.82
2.480 (Channel 26)	2.4854		61.04	48.52	55.64	43.12	-5.40	73.98	53.98	-18.34	-10.86



4.5.5 DTS Radiated Spurious Emissions in Non-Restricted and Restricted Bands of Operation, 18 GHz – 25 GHz Test Results (06/19/2023)

Measurements were made in the frequency range of 18 GHz to 25 GHz for the Lutron Model JPZ0148 LED Lighting Controller. The sample was programmed to transmit at the low Frequency 2405.0 MHz (Channel 11), middle Frequency 2440.0 MHz (Channel 18) and high Frequency 2480.0 MHz (Channel 26) and in the Rx Mode. There were no significant signals found when testing the EUT in this frequency range. Test results for all configurations tested are available upon request.

4.6 DTS 6 dB Occupied Bandwidth (FCC Section 15.247(a)(2))

4.6.1 6 dB Occupied Bandwidth – Test Procedure

The minimum DTS (6 dB) bandwidth, specified in FCC Section 15.247(a) (2) was measured using a Spectrum Analyzer with 100 kHz resolution bandwidth and 300 kHz video bandwidth. Transmission frequencies at low (Channel 11, Frequency 2405.0 MHz), middle (Channel 18, Frequency 2440.0 MHz) and high (Channel 26, Frequency 2480.0 MHz) were measured while using maximum output and O-QPSK modulation. The test procedure of ANSI C63.10, Section 11.8, Option 1, was used.

Spectrum Analyzer Settings:

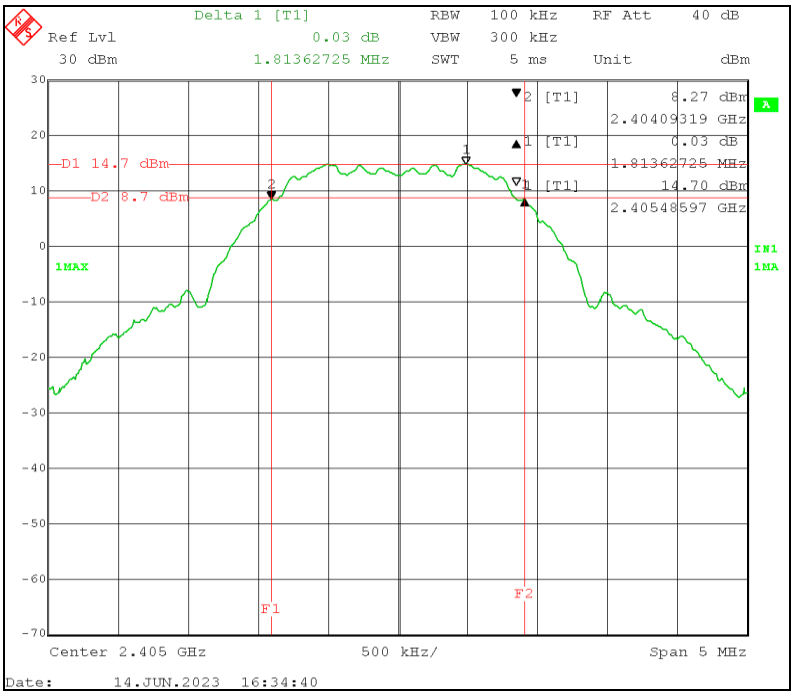
RBW	100	kHz
VBW	300	kHz
Span	5	MHz
Sweep Time (Auto)	5	ms

4.6.2 DTS (6 dB) Occupied Bandwidth Test Results (06/14/2023)

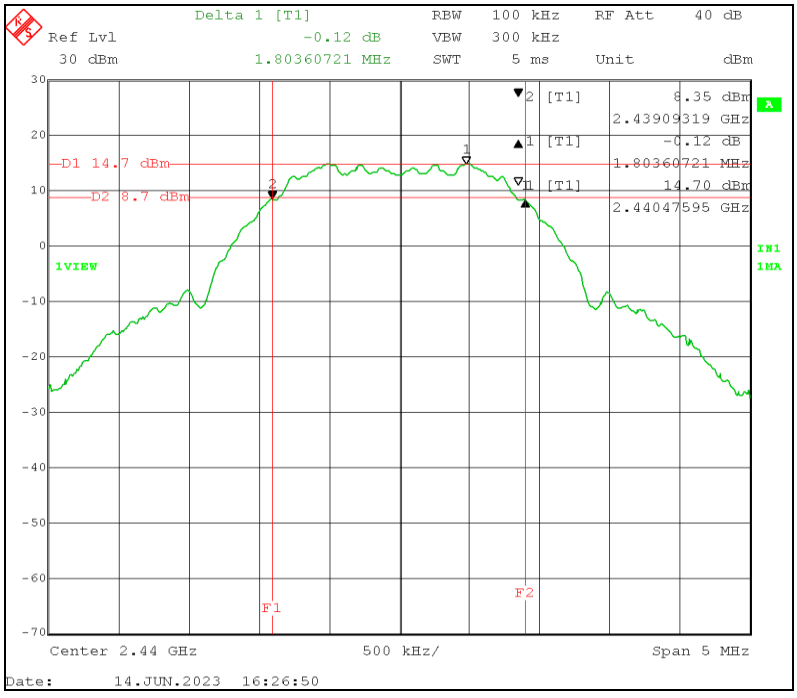
Channel	Frequency	Measured 6 dB BW	47 CFR 15.247(a)(2) Minimum Limit	Margin	Result
	MHz	kHz	kHz	kHz	
11	2405.0	1814.0	500.00	1314.00	PASS
18	2440.0	1803.0	500.00	1303.00	PASS
26	2480.0	1743.0	500.00	1243.00	PASS

4.6.3 DTS (6 dB) Occupied Bandwidth Analyzer Screen Captures

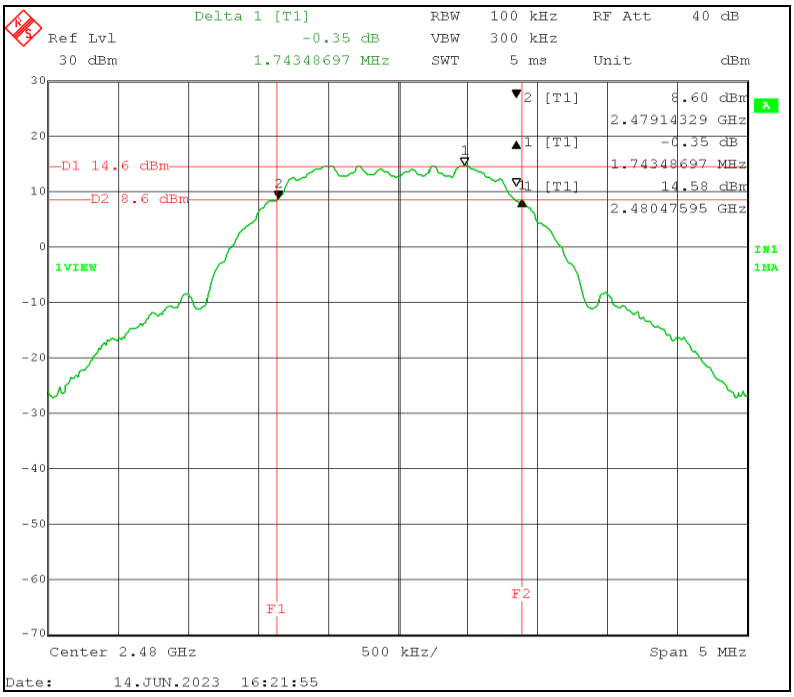
Channel 11: 2405.0 MHz



Channel 18: 2440.0 MHz



Channel 26: 2480.0 MHz



Test Results: The DTS, 6 dB Occupied Bandwidth measurements for the Lutron Model JPZ0148 LED Lighting Controller were measured and are compliant to FCC requirements.

4.7 Maximum Conducted Output Power (FCC Part 15.247(b)(3))

4.7.1 Maximum Conducted Output Power Test Procedure

A conducted power measurement of the output frequency was measured according to ANSI C63.10, Section 11.9.1.1. Spectrum Analyzer Resolution Bandwidth and Frequency Span were based upon the Operating Bandwidth (OBW) measured in the previous section. Transmission frequencies at low (Channel 11, Frequency 2405.0 MHz), middle (Channel 18, Frequency 2440.0 MHz) and high (Channel 26, Frequency 2480.0 MHz) were measured with no modulation and with O-QPSK modulation.

Spectrum Analyzer Settings:

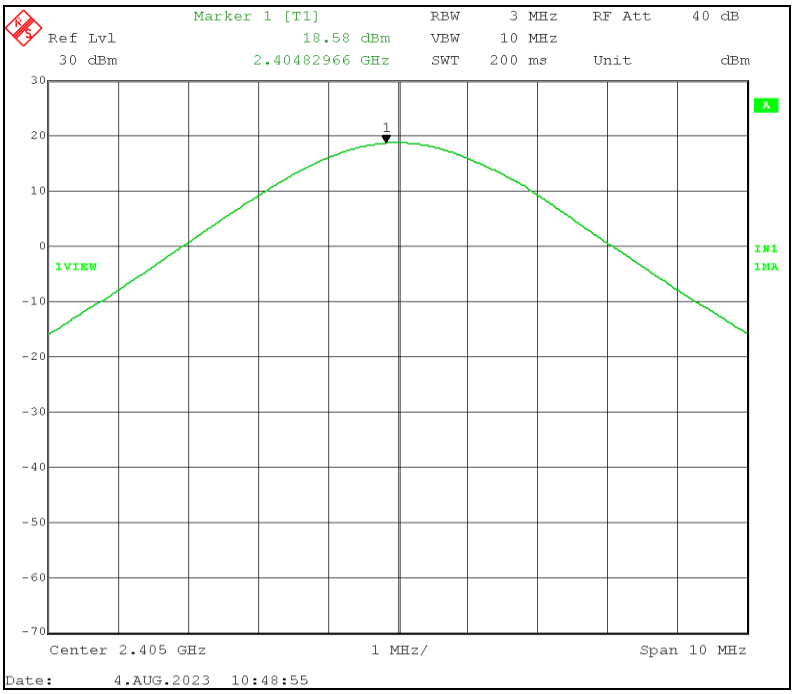
Measurement Analyzer Settings	
Span	10 MHz
RBW	3 MHz
VBW	10 MHz
Sweep Time (Auto)	5 ms

4.7.2 Maximum Conducted Output Power Test Results (06/14/2023 and 08/04/2023)

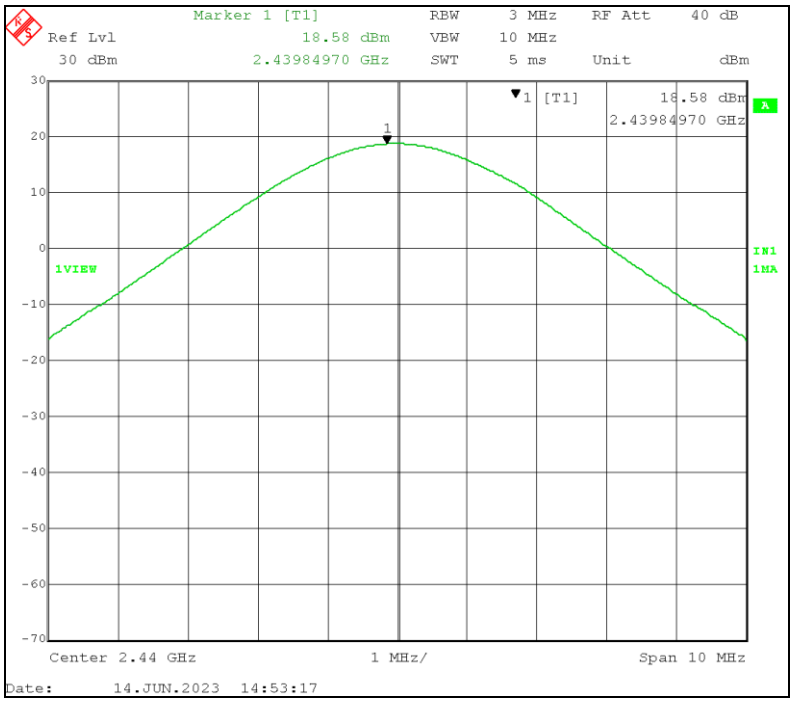
802.15.4 Tx Channel	Modulation	Frequency (MHz)	Measured Level (dBm)	Cable # 962 Loss (dB)	Corrected Measured Level		Limit		Margin	
					dBm	Watts	dBm	Watts	dBm	Watts
11	None	2405.0	18.58	0.377	18.96	0.079	30.00	1.000	-11.04	-0.921
18		2440.0	18.58	0.375	18.96	0.079	30.00	1.000	-11.05	-0.921
26		2480.0	18.58	0.377	18.96	0.079	30.00	1.000	-11.04	-0.921
11	O-QPSK	2405.0	18.58	0.377	18.96	0.079	30.00	1.000	-11.04	-0.921
18		2440.0	18.58	0.375	18.96	0.079	30.00	1.000	-11.05	-0.921
26		2480.0	18.58	0.377	18.96	0.079	30.00	1.000	-11.04	-0.921

4.7.3 Maximum Conducted Output Power Analyzer Screen Captures

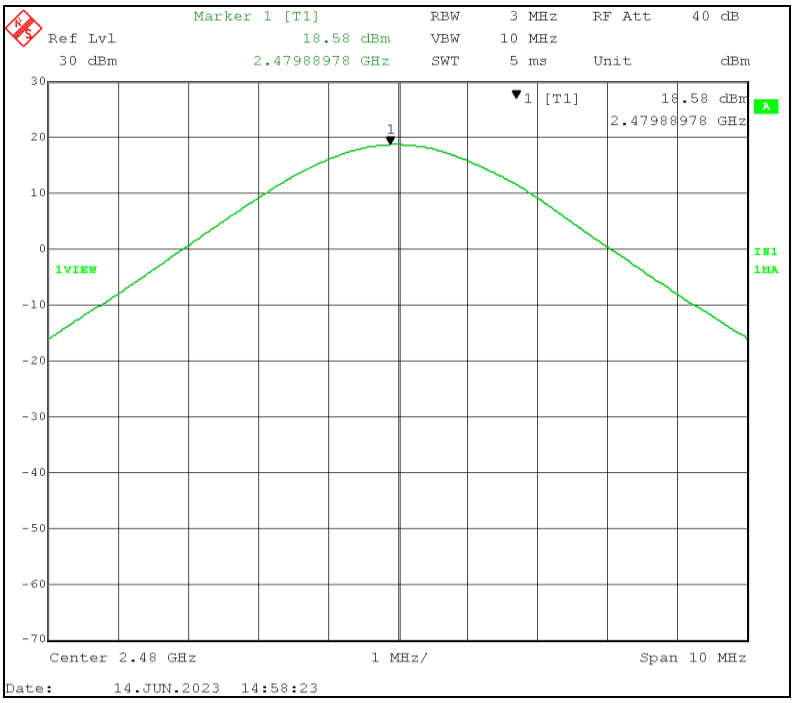
Channel 11: 2405.0 MHz No Modulation



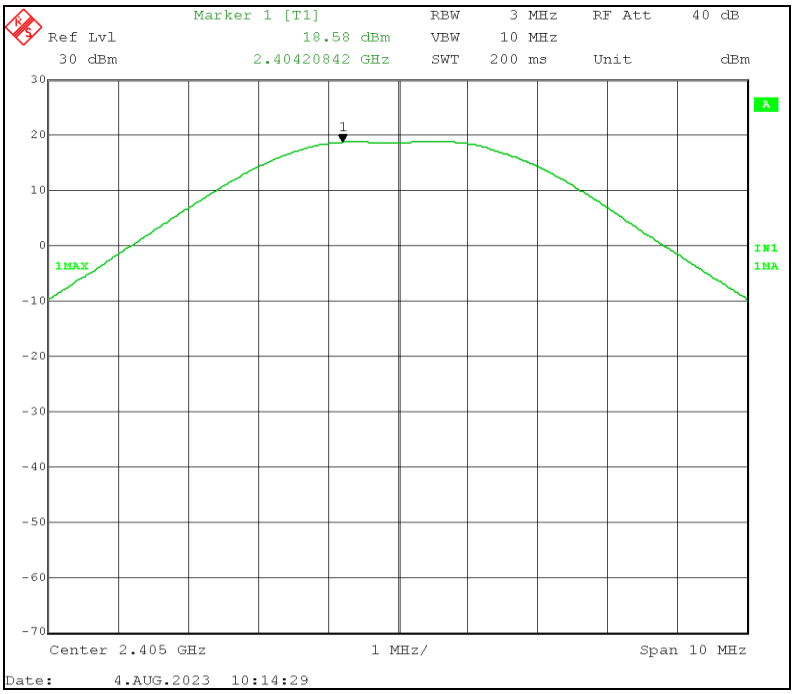
Channel 18: 2440.0 MHz No Modulation



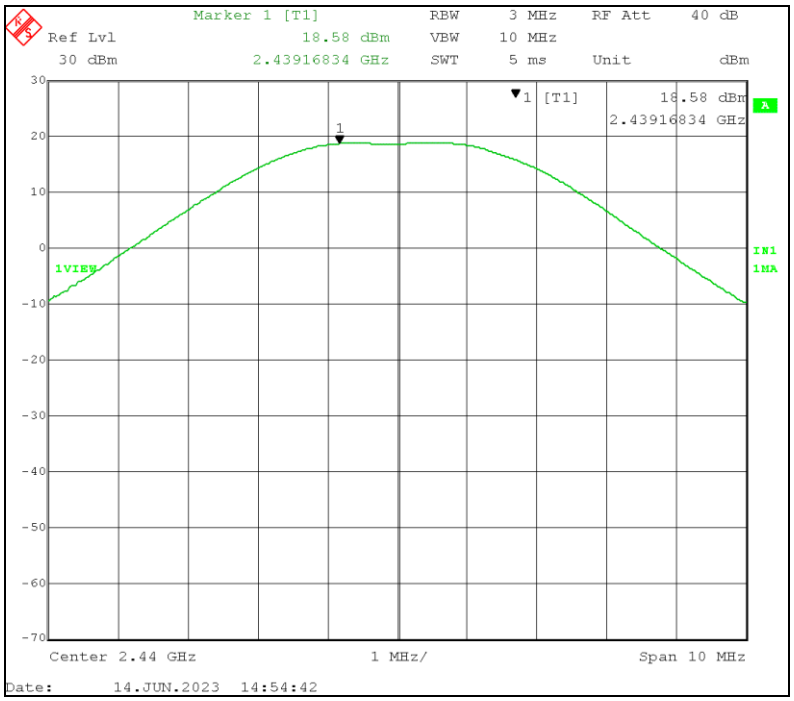
Channel 26: 2480.0 MHz No Modulation



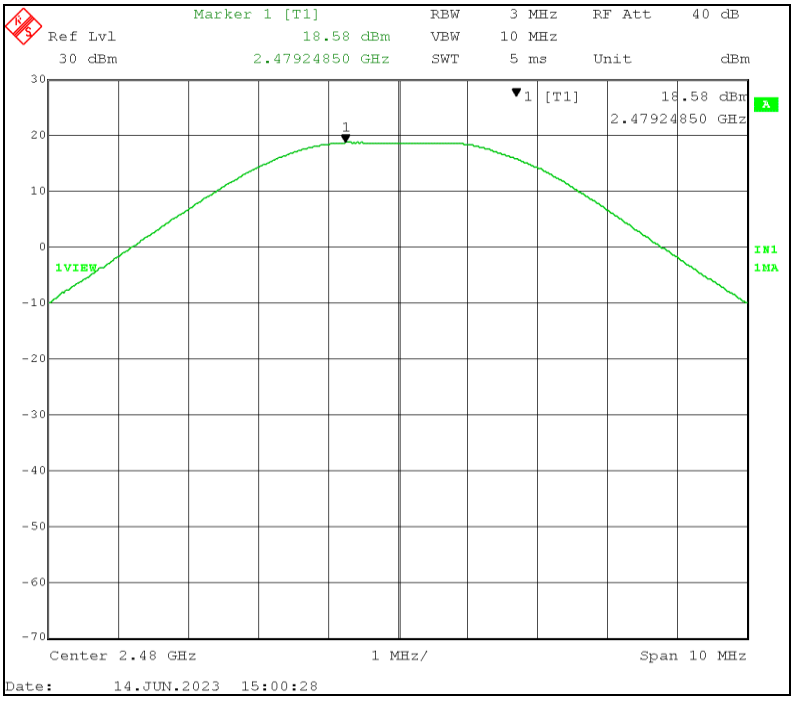
Channel 11: 2405.0 MHz O-QPSK Modulation



Channel 18: 2440.0 MHz O-QPSK Modulation



Channel 26: 2480.0 MHz O-QPSK Modulation



Test Results: The Maximum Conducted Output Power peak measurements for the Lutron Model JPZ0148 LED Lighting Controller, with and without modulation, are compliant with the limits specified in FCC Section 15.247(b)(3).

4.8 Power Spectral Density (FCC Section 15.247(e))

4.8.1 Power Spectral Density Test Procedure

A conducted power measurement of the output frequency was measured using a peak detector for the Lutron Model JPZ0148 LED Lighting Controller for each of the low (Channel 11, Frequency 2405.0 MHz), middle (Channel 18, Frequency 2440.0 MHz) and high (Channel 26, Frequency 2480.0 MHz) channel frequencies. The EUT was set to transmit a signal at maximum output power with O-QPSK modulation. The test procedure of ANSI C63.10, Section 11.10.2 (PKPSD) was used.

Spectrum Analyzer Settings:

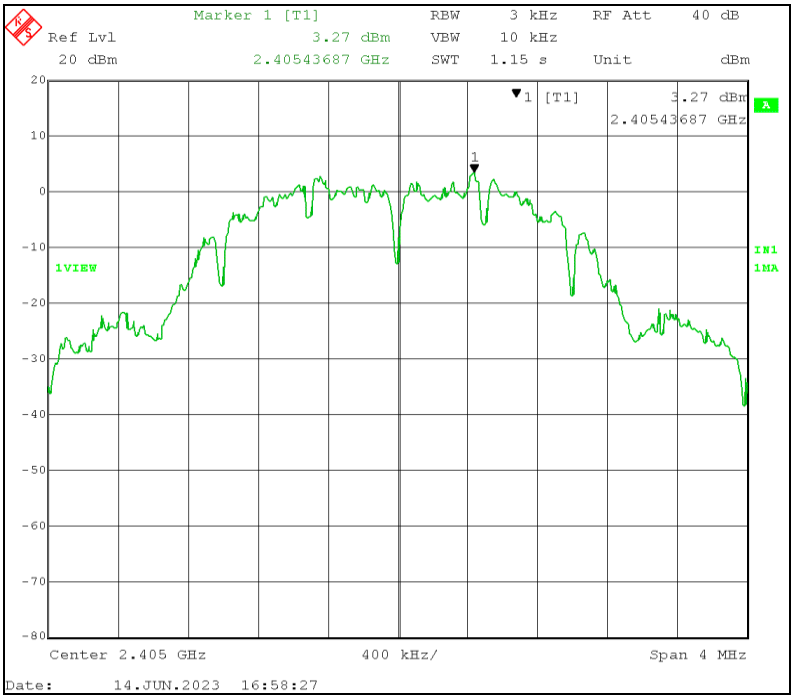
Measurement Analyzer Settings		
RBW (Between 3 kHz and 100 kHz)	3	kHz
VBW (3 X RBW)	10	kHz
Span (>1.5 X the DTS Bandwidth)	4	MHz
Sweep (Auto)	1.15	sec
Attenuation	40	dB
Ref Level	20	dBm

4.8.2 Power Spectral Density Test Results (06/14/2023)

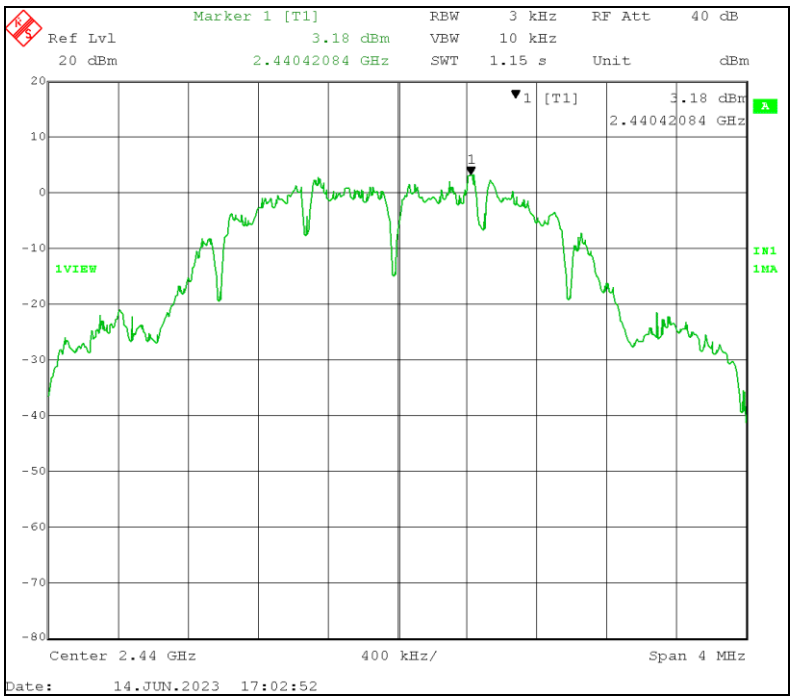
Channel	Modulation Information	Frequency (MHz)	Measured Level	Cable #BEC-962 Correction Factor	Total	Limit	Margin
			dBm	dB	dBm	dBm	dBm
11	O-QPSK	2405.0	3.27	0.377	3.65	8.00	-4.35
18		2440.0	3.18	0.375	3.56	8.00	-4.45
26		2480.0	3.10	0.377	3.48	8.00	-4.52

4.8.3 Power Spectral Density Analyzer Screen Captures

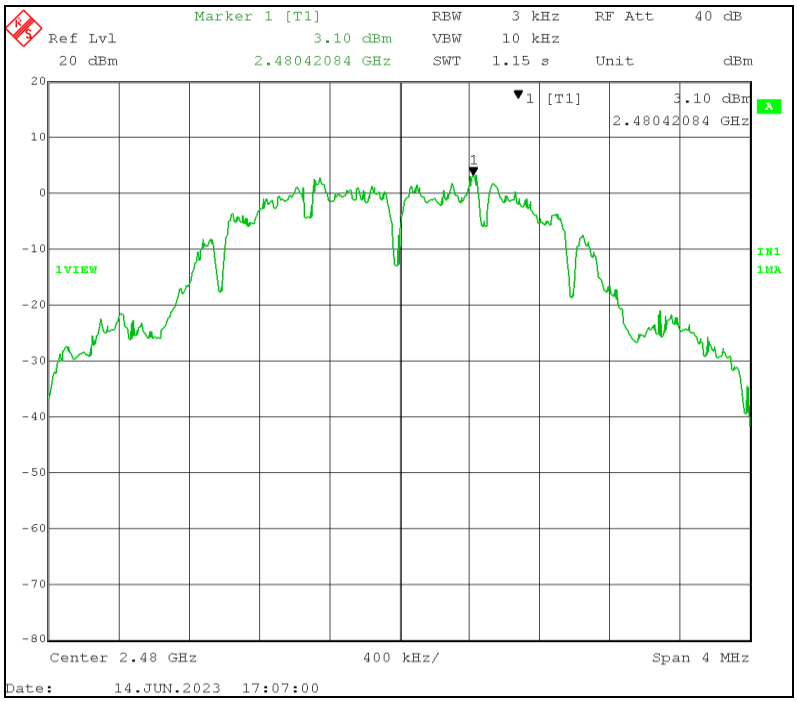
Channel 11, 2405.0 MHz, O-QPSK Modulation



Channel 18, 2440.0 MHz, O-QPSK Modulation



Channel 26, 2480.0 MHz, O-QPSK Modulation



Test Results: The Power Spectral Density measurements of the Lutron Model JPZ0148 LED Lighting Controller are compliant with the limits specified in FCC Section 15.247(e).

4.9 Band Edge Measurement (FCC Part 15.247(d))

4.9.1 Band Edge Measurement Test Procedure

Band edge measurements were recorded on the EUT while operating with a modulated carrier at 2405.0 MHz (Channel 11) and 2480.0 MHz (Channel 26). The Authorized Band Edge measurements were made using the Relative Method of Section 6.10.4 of ANSI C63.10. The Spectrum Analyzer Screens below show emissions between the modulated carrier, at low and high frequencies and the lower and upper band edges.

Spectrum Analyzer Settings:

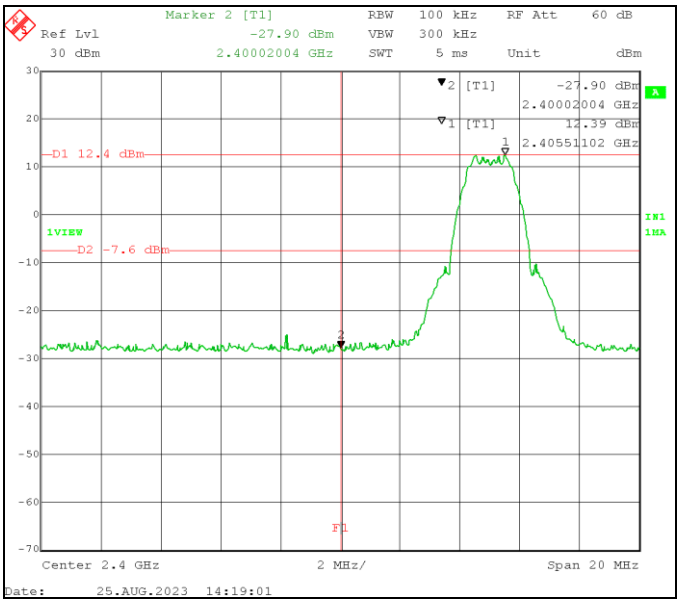
Measurement Analyzer Settings	
RBW	100 kHz
VBW	300 kHz
Span	20 MHz (Low Band) & 15 MHz (High Band)
Sweep	5 ms

4.9.2 Band Edge Measurement Test Results (08/25/2023)

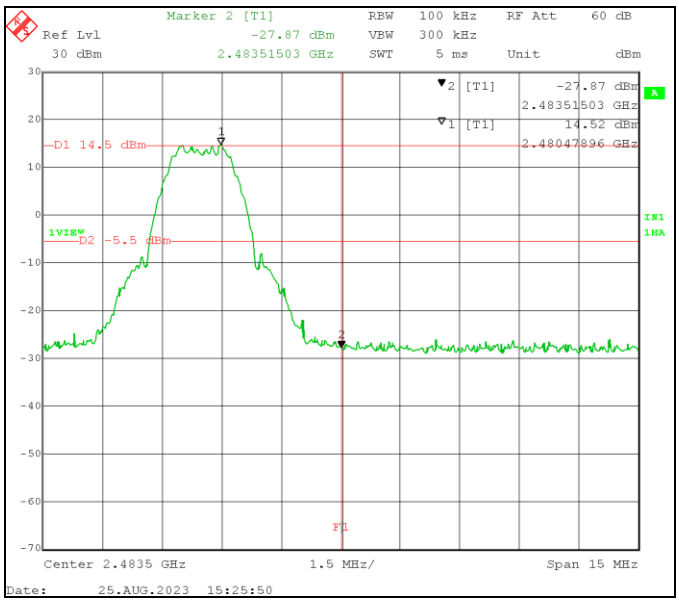
Test Mode	Frequency (MHz)	Peak Transmit	Band Edge Measurement				Result
			Peak Level @ 100 kHz Below the Lower Band or Peak Level @ 100 kHz Above the Higher Band	Limit (dB)	Delta	Margin	
Tx at Maximum Output Power	2405.0	12.39	-27.90	20.00	40.29	-20.29	PASS
Tx at Maximum Output Power	2480.0	14.50	-27.87	20.00	42.37	-22.37	PASS

4.9.3 Band Edge Measurement Analyzer Screen Captures

Low Channel 11, 2405.0 MHz



High Channel 26, 2480.0 MHz



Test Results: The Band Edge measurements of the Lutron Model JPZ0148 LED Lighting Controller show that emissions at the band edges of the Operating Frequency Bandwidth are below the Carrier Peak Level – 20 dBc required by 47 CFR Part 15.247(d).

4.10 Conducted Emissions

4.10.1 Conducted Emissions AC Power Port Test Procedure

AC Power Line

Conducted emissions at the power line input of the EUT were measured with an EMI receiver set to the appropriate detector and CISPR bandwidth, which was connected to the RF output of a 50 Ω, 50 µH Line Impedance Stabilization Network (LISN) installed in each power line. Measurements were made over the frequency range of 150 kHz to 30 MHz while the EUT was operating as described in the EUT section of this report. The significant amplitudes of emissions measured on the AC power lines of the EUT were recorded as follows:

Emission (dBµV) = Meter Reading (dBµv) + Cable Loss (dB) + LISN Factor (dB) + Limiter Loss (dB)

The Lutron JPZ0148 Sample 2259-01 was powered by the Lutron Electronics Model T120-24DC-15 Sample 2259-05 at 120 Vac / 60 Hz. The Test Sample 2259-01 actively transmitted on the low channel of 2405 MHz, middle channel of 2440 MHz and high channel of 2480 MHz using Constant Stream Mode at Max Output With O-QPSK Modulation for 802.15.4 Radio and tested while operated in Receive Mode (Rx).

Fundamental Frequencies	Tx Low, Middle and High Channels at 2405 MHz, 2440 MHz and 2480 MHz	Receive Mode (Rx)
Test Standards / Limits	47 CFR 15.207	
EUT Type	Radiated Sample transmitting in Constant Stream Mode	Radiated Sample in Receive Mode
Manufacturer	Lutron Electronics	
Model	T120-24DC-15	
Sample Number	2259-05	
EUT Power	120 Vac / 60 Hz	
Test Date	06/14/2023	
Temperature / Humidity	24°C / 42% RH	
Test Configuration	Lutron Model JPZ0148 Sample 2259-01 was powered by the Lutron Electronics AC/DC Power Supply. EUT was configured to be either in a transmit mode or the receive mode during testing.	

4.10.2 Conducted Emissions AC Power Port Test Results (06/14/2023)

Tx @ Low Channel, 2405 MHz, Neutral Line

BEC Incorporated
Neutral Line Conducted Emissions
04:25:56 PM, Tuesday, June 13, 2023

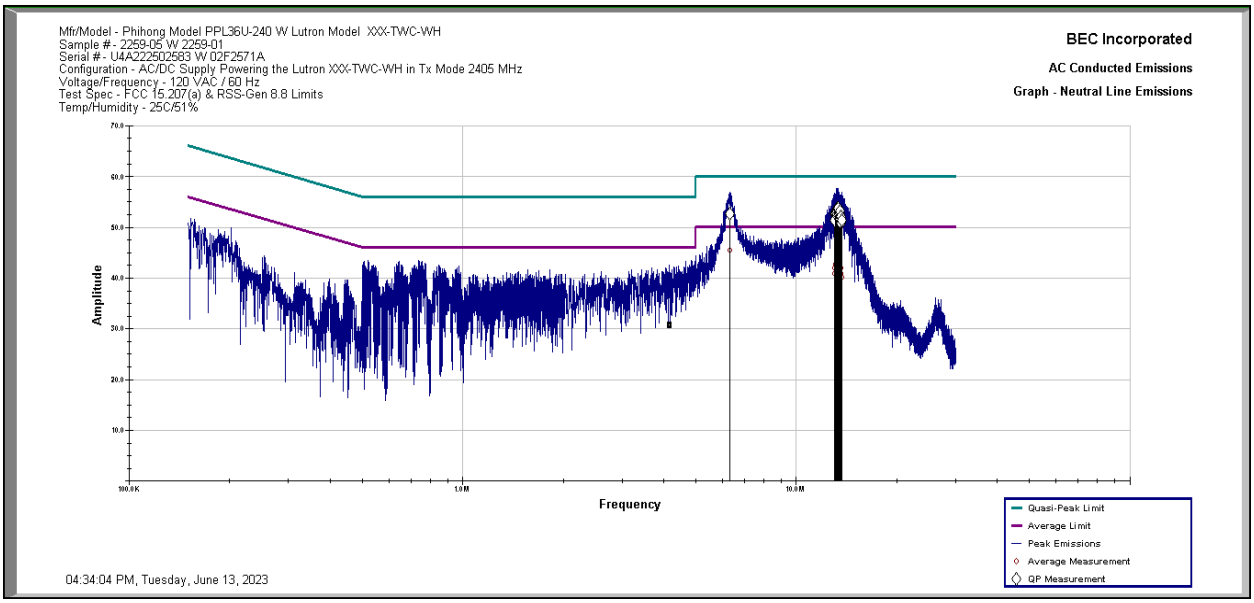
	1	2	3	4	5	6	7	
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr	
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor	
6.316 MHz	45.47	50.00	-4.53	52.66	60.00	-7.34	10.34	
12.973 MHz	41.97	50.00	-8.03	52.69	60.00	-7.31	10.50	
13.029 MHz	40.88	50.00	-9.12	51.31	60.00	-8.69	10.50	
13.113 MHz	42.70	50.00	-7.30	52.62	60.00	-7.38	10.50	
13.147 MHz	43.24	50.00	-6.76	53.44	60.00	-6.56	10.50	
13.155 MHz	41.99	50.00	-8.01	52.43	60.00	-7.57	10.50	
13.165 MHz	41.54	50.00	-8.46	52.98	60.00	-7.02	10.50	
13.168 MHz	41.27	50.00	-8.73	52.78	60.00	-7.22	10.50	
13.276 MHz	43.38	50.00	-6.62	53.70	60.00	-6.30	10.50	
13.300 MHz	42.51	50.00	-7.49	52.89	60.00	-7.11	10.50	
13.344 MHz	42.88	50.00	-7.12	53.72	60.00	-6.28	10.50	
13.414 MHz	42.32	50.00	-7.68	52.81	60.00	-7.19	10.50	
13.438 MHz	42.48	50.00	-7.52	52.39	60.00	-7.61	10.50	
13.475 MHz	42.01	50.00	-7.99	52.67	60.00	-7.33	10.50	
13.526 MHz	40.50	50.00	-9.50	51.61	60.00	-8.39	10.50	
13.536 MHz	42.53	50.00	-7.47	52.68	60.00	-7.32	10.50	
13.542 MHz	41.99	50.00	-8.01	53.17	60.00	-6.83	10.50	
13.560 MHz	40.95	50.00	-9.05	50.73	60.00	-9.27	10.50	
13.567 MHz	41.94	50.00	-8.06	52.16	60.00	-7.84	10.50	
13.657 MHz	40.13	50.00	-9.87	51.31	60.00	-8.69	10.50	
Mfr/Model - Phihong Model PPL36U-240 W Lutron Model XXX-TWC-WH								
Sample # - 2259-05 W 2259-01								
Serial # - U4A222502583 W 02F2571A								
Configuration - AC/DC Supply Powering the Lutron XXX-TWC-WH in Tx Mode 2405 MHz Zigbee w Load								
Voltage/Frequency - 120 VAC / 60 Hz								

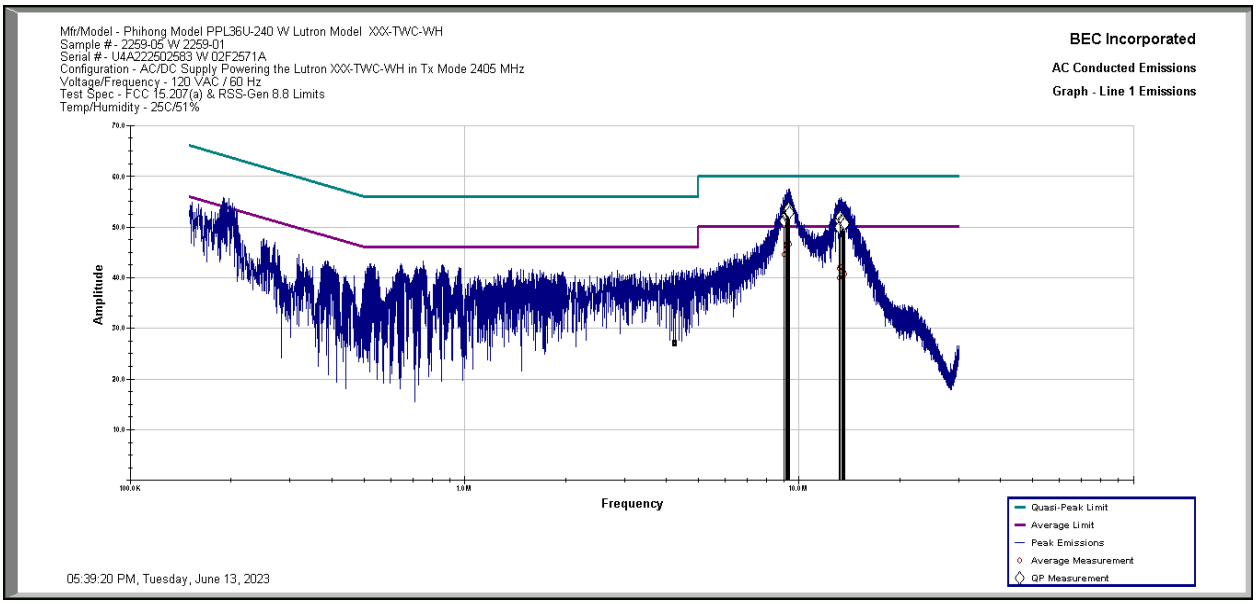
Tx @ Low Channel, 2405 MHz, Phase Line

BEC Incorporated
Line 1 Conducted Emissions
05:31:11 PM, Tuesday, June 13, 2023

	1	2	3	4	5	6	7	
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr	
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor	
9.023 MHz	44.53	50.00	-5.47	51.08	60.00	-8.92	10.45	
9.122 MHz	45.39	50.00	-4.61	52.22	60.00	-7.78	10.46	
9.126 MHz	45.49	50.00	-4.51	52.30	60.00	-7.70	10.46	
9.188 MHz	46.00	50.00	-4.00	52.48	60.00	-7.52	10.46	
9.205 MHz	46.72	50.00	-3.28	53.13	60.00	-6.87	10.46	
9.212 MHz	46.64	50.00	-3.36	52.95	60.00	-7.05	10.46	
9.247 MHz	47.21	50.00	-2.79	53.54	60.00	-6.46	10.46	
9.250 MHz	46.41	50.00	-3.59	53.13	60.00	-6.87	10.46	
9.277 MHz	46.44	50.00	-3.56	52.99	60.00	-7.01	10.46	
9.306 MHz	46.34	50.00	-3.66	52.90	60.00	-7.10	10.47	
9.309 MHz	47.01	50.00	-2.99	53.53	60.00	-6.47	10.47	
9.353 MHz	46.60	50.00	-3.40	52.91	60.00	-7.09	10.47	
9.359 MHz	46.51	50.00	-3.49	52.80	60.00	-7.20	10.47	
13.129 MHz	41.88	50.00	-8.12	51.38	60.00	-8.62	10.48	
13.174 MHz	40.00	50.00	-10.00	49.92	60.00	-10.08	10.48	
13.259 MHz	42.20	50.00	-7.80	51.87	60.00	-8.13	10.48	
13.386 MHz	41.32	50.00	-8.68	51.30	60.00	-8.70	10.48	
13.479 MHz	40.20	50.00	-9.80	51.11	60.00	-8.89	10.48	
13.557 MHz	40.98	50.00	-9.02	50.41	60.00	-9.59	10.48	
13.653 MHz	40.65	50.00	-9.35	50.62	60.00	-9.38	10.48	
Mfr/Model - Phihong Model PPL36U-240 W Lutron Model XXX-TWC-WH								
Sample # - 2259-05 W 2259-01								
Serial # - U4A222502583 W 02F2571A								
Configuration - AC/DC Supply Powering the Lutron XXX-TWC-WH in Tx Mode 2405 MHz Zigbee w Load								
Voltage/Frequency - 120 VAC / 60 Hz								

Graphs Tx @ Low Channel, 2405 MHz, Neutral & Phase Lines





Tx @ Middle Channel, 2440 MHz, Neutral Line

BEC Incorporated
Neutral Line Conducted Emissions
03:44:24 PM, Tuesday, June 13, 2023

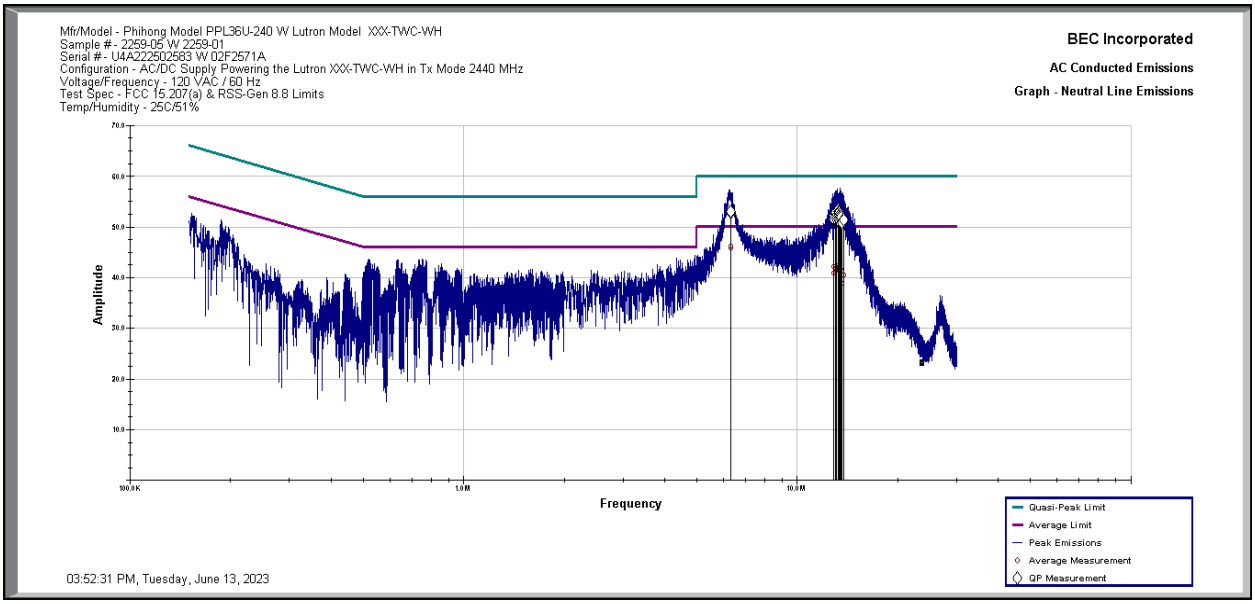
	1	2	3	4	5	6	7	
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr	
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor	
6.299 MHz	45.78	50.00	-4.22	52.79	60.00	-7.21	10.34	
6.305 MHz	46.19	50.00	-3.81	53.03	60.00	-6.97	10.34	
12.851 MHz	40.85	50.00	-9.15	51.50	60.00	-8.50	10.50	
12.872 MHz	42.21	50.00	-7.79	52.20	60.00	-7.80	10.50	
13.017 MHz	41.73	50.00	-8.27	52.63	60.00	-7.37	10.50	
13.018 MHz	41.18	50.00	-8.82	52.47	60.00	-7.53	10.50	
13.027 MHz	41.68	50.00	-8.32	52.81	60.00	-7.19	10.50	
13.091 MHz	41.34	50.00	-8.66	52.12	60.00	-7.88	10.50	
13.224 MHz	41.65	50.00	-8.35	52.95	60.00	-7.05	10.50	
13.231 MHz	41.47	50.00	-8.53	52.08	60.00	-7.92	10.50	
13.240 MHz	42.30	50.00	-7.70	53.04	60.00	-6.96	10.50	
13.291 MHz	42.04	50.00	-7.96	53.33	60.00	-6.67	10.50	
13.339 MHz	41.69	50.00	-8.31	53.03	60.00	-6.97	10.50	
13.358 MHz	42.16	50.00	-7.84	52.84	60.00	-7.16	10.50	
13.375 MHz	41.28	50.00	-8.72	52.20	60.00	-7.80	10.50	
13.409 MHz	40.89	50.00	-9.11	52.09	60.00	-7.91	10.50	
13.522 MHz	41.67	50.00	-8.33	51.94	60.00	-8.06	10.50	
13.556 MHz	41.25	50.00	-8.75	50.91	60.00	-9.09	10.50	
13.607 MHz	38.77	50.00	-11.23	50.87	60.00	-9.13	10.50	
13.732 MHz	40.41	50.00	-9.59	51.46	60.00	-8.54	10.50	
Mfr/Model - Phihong Model PPL36U-240 W Lutron Model XXX-TWC-WH								
Sample # - 2259-05 W 2259-01								
Serial # - U4A222502583 W 02F2571A								
Configuration - AC/DC Supply Powering the Lutron XXX-TWC-WH in Tx Mode 2440 MHz Zigbee w Load								
Voltage/Frequency - 120 VAC / 60 Hz								

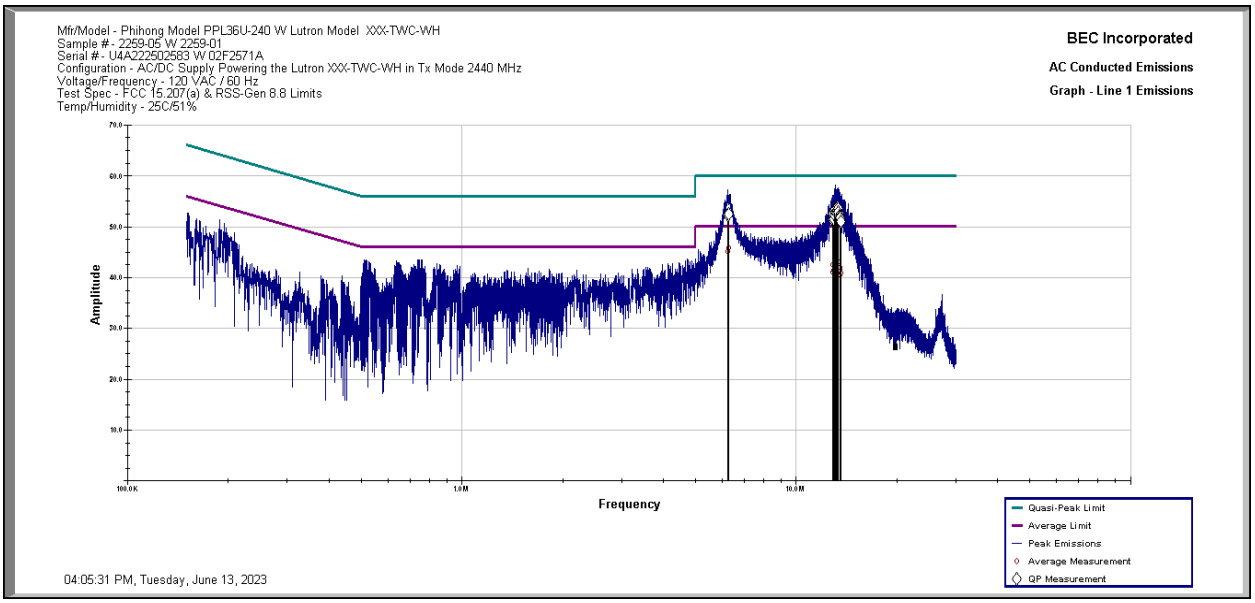
Tx @ Middle Channel, 2440 MHz, Phase Line

BEC Incorporated
Line 1 Conducted Emissions
03:57:24 PM, Tuesday, June 13, 2023

	1	2	3	4	5	6	7	
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr	
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor	
6.238 MHz	45.07	50.00	-4.93	52.33	60.00	-7.67	10.35	
6.288 MHz	45.77	50.00	-4.23	52.53	60.00	-7.47	10.36	
12.832 MHz	41.12	50.00	-8.88	51.47	60.00	-8.53	10.48	
12.857 MHz	41.08	50.00	-8.92	51.31	60.00	-8.69	10.48	
12.881 MHz	42.49	50.00	-7.51	52.41	60.00	-7.59	10.48	
12.919 MHz	41.42	50.00	-8.58	51.61	60.00	-8.39	10.48	
12.990 MHz	41.41	50.00	-8.59	52.38	60.00	-7.62	10.48	
13.014 MHz	43.49	50.00	-6.51	53.24	60.00	-6.76	10.48	
13.107 MHz	42.94	50.00	-7.06	52.86	60.00	-7.14	10.48	
13.155 MHz	42.13	50.00	-7.87	52.73	60.00	-7.27	10.48	
13.224 MHz	42.62	50.00	-7.38	53.13	60.00	-6.87	10.48	
13.276 MHz	43.15	50.00	-6.85	53.77	60.00	-6.23	10.48	
13.317 MHz	41.88	50.00	-8.12	52.80	60.00	-7.20	10.48	
13.329 MHz	42.26	50.00	-7.74	52.46	60.00	-7.54	10.48	
13.337 MHz	43.11	50.00	-6.89	53.56	60.00	-6.44	10.48	
13.381 MHz	41.86	50.00	-8.14	52.86	60.00	-7.14	10.48	
13.476 MHz	41.37	50.00	-8.63	52.19	60.00	-7.81	10.48	
13.504 MHz	41.93	50.00	-8.07	51.93	60.00	-8.07	10.48	
13.519 MHz	40.46	50.00	-9.54	51.79	60.00	-8.21	10.48	
13.556 MHz	40.84	50.00	-9.16	51.07	60.00	-8.93	10.48	
Mfr/Model - Phihong Model PPL36U-240 W Lutron Model XXX-TWC-WH								
Sample # - 2259-05 W 2259-01								
Serial # - U4A222502583 W 02F2571A								
Configuration - AC/DC Supply Powering the Lutron XXX-TWC-WH in Tx Mode 2440 MHz Zigbee w Load								
Voltage/Frequency - 120 VAC / 60 Hz								

Graphs Tx @ Middle Channel, 2440 MHz, Neutral & Phase Lines





Tx @ High Channel, 2480 MHz, Neutral Line

BEC Incorporated
Neutral Line Conducted Emissions
03:18:12 PM, Tuesday, June 13, 2023

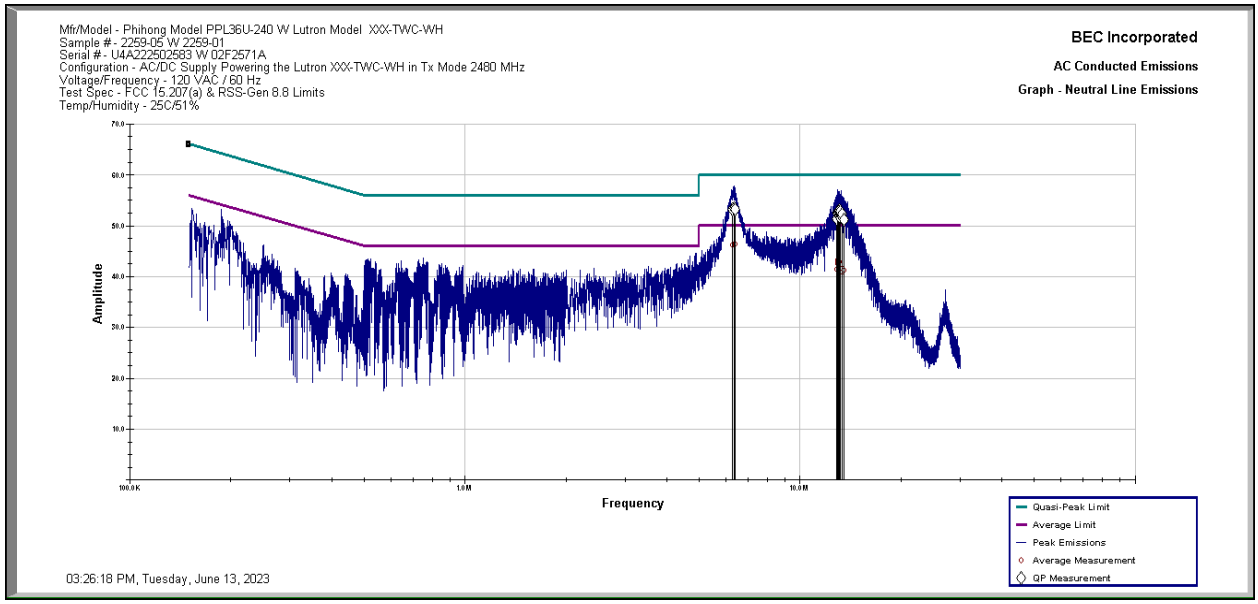
	1	2	3	4	5	6	7	
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr	
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor	
6.278 MHz	46.21	50.00	-3.79	53.29	60.00	-6.71	10.34	
6.346 MHz	46.46	50.00	-3.54	53.38	60.00	-6.62	10.34	
6.384 MHz	46.32	50.00	-3.68	53.14	60.00	-6.86	10.34	
12.862 MHz	41.49	50.00	-8.51	51.47	60.00	-8.53	10.50	
12.906 MHz	43.22	50.00	-6.78	52.44	60.00	-7.56	10.50	
12.907 MHz	43.07	50.00	-6.93	52.57	60.00	-7.43	10.50	
12.935 MHz	42.55	50.00	-7.45	52.32	60.00	-7.68	10.50	
12.977 MHz	43.23	50.00	-6.77	52.64	60.00	-7.36	10.50	
13.005 MHz	42.70	50.00	-7.30	52.51	60.00	-7.49	10.50	
13.055 MHz	41.09	50.00	-8.91	51.85	60.00	-8.15	10.50	
13.111 MHz	42.88	50.00	-7.12	53.11	60.00	-6.89	10.50	
13.132 MHz	40.99	50.00	-9.01	52.35	60.00	-7.65	10.50	
13.138 MHz	41.20	50.00	-8.80	51.59	60.00	-8.41	10.50	
13.145 MHz	42.02	50.00	-7.98	52.42	60.00	-7.58	10.50	
13.176 MHz	42.38	50.00	-7.62	52.70	60.00	-7.30	10.50	
13.193 MHz	41.71	50.00	-8.29	52.77	60.00	-7.23	10.50	
13.312 MHz	41.48	50.00	-8.52	52.21	60.00	-7.79	10.50	
13.328 MHz	40.96	50.00	-9.04	51.72	60.00	-8.28	10.50	
13.332 MHz	41.68	50.00	-8.32	52.26	60.00	-7.74	10.50	
13.541 MHz	41.18	50.00	-8.82	51.18	60.00	-8.82	10.50	
Mfr/Model - Phihong Model PPL36U-240 W Lutron Model XXX-TWC-WH								
Sample # - 2259-05 W 2259-01								
Serial # - U4A222502583 W 02F2571A								
Configuration - AC/DC Supply Powering the Lutron XXX-TWC-WH in Tx Mode 2480 MHz Zigbee w Load								
Voltage/Frequency - 120 VAC / 60 Hz								

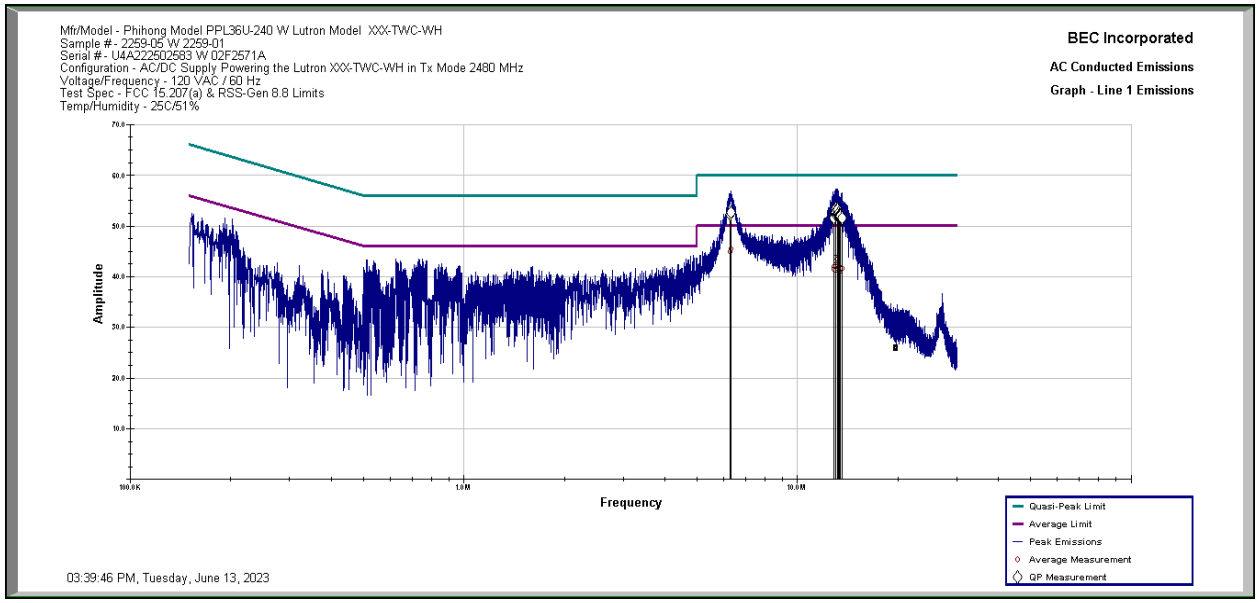
Tx @ High Channel, 2480 MHz, Phase Line

BEC Incorporated
Line 1 Conducted Emissions
03:31:40 PM, Tuesday, June 13, 2023

	1	2	3	4	5	6	7	
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr	
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor	
6.262 MHz	44.97	50.00	-5.03	52.31	60.00	-7.69	10.36	
6.312 MHz	45.51	50.00	-4.49	52.60	60.00	-7.40	10.36	
12.823 MHz	41.99	50.00	-8.01	51.82	60.00	-8.18	10.48	
12.880 MHz	41.34	50.00	-8.66	51.60	60.00	-8.40	10.48	
12.988 MHz	42.14	50.00	-7.86	52.53	60.00	-7.47	10.48	
12.990 MHz	42.71	50.00	-7.29	52.36	60.00	-7.64	10.48	
12.996 MHz	43.65	50.00	-6.35	53.42	60.00	-6.58	10.48	
12.997 MHz	43.87	50.00	-6.13	53.38	60.00	-6.62	10.48	
13.027 MHz	43.05	50.00	-6.95	52.81	60.00	-7.19	10.48	
13.043 MHz	41.32	50.00	-8.68	52.58	60.00	-7.42	10.48	
13.147 MHz	41.94	50.00	-8.06	52.25	60.00	-7.75	10.48	
13.148 MHz	41.65	50.00	-8.35	52.40	60.00	-7.60	10.48	
13.193 MHz	43.55	50.00	-6.45	53.28	60.00	-6.72	10.48	
13.240 MHz	41.81	50.00	-8.19	52.44	60.00	-7.56	10.48	
13.297 MHz	41.95	50.00	-8.05	51.95	60.00	-8.05	10.48	
13.309 MHz	41.52	50.00	-8.48	52.18	60.00	-7.82	10.48	
13.374 MHz	41.06	50.00	-8.94	52.07	60.00	-7.93	10.48	
13.401 MHz	41.01	50.00	-8.99	52.07	60.00	-7.93	10.48	
13.429 MHz	41.46	50.00	-8.54	51.95	60.00	-8.05	10.48	
13.555 MHz	41.63	50.00	-8.37	51.57	60.00	-8.43	10.48	
Mfr/Model - Phihong Model PPL36U-240 W Lutron Model XXX-TWC-WH								
Sample # - 2259-05 W 2259-01								
Serial # - U4A222502583 W 02F2571A								
Configuration - AC/DC Supply Powering the Lutron XXX-TWC-WH in Tx Mode 2480 MHz Zigbee w Load								
Voltage/Frequency - 120 VAC / 60 Hz								

Graphs Tx @ High Channel, 2480 MHz, Neutral & Phase Lines





Rx Mode Neutral Line

BEC Incorporated
Neutral Line Conducted Emissions
05:34:37 PM, Monday, June 12, 2023

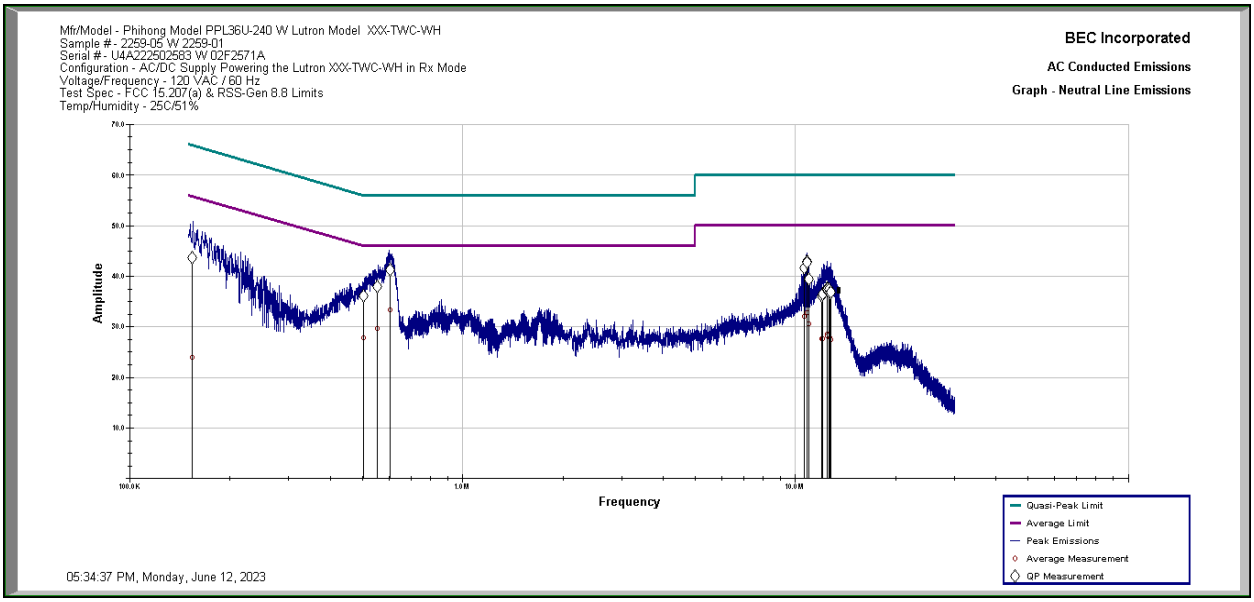
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
153.722 KHz	23.90	55.89	-31.99	43.64	65.89	-22.25	10.12
504.550 KHz	27.83	46.00	-18.17	36.07	56.00	-19.93	10.12
552.601 KHz	29.57	46.00	-16.43	37.86	56.00	-18.14	10.13
605.315 KHz	33.37	46.00	-12.63	41.23	56.00	-14.77	10.13
10.623 MHz	32.04	50.00	-17.96	41.61	60.00	-18.39	10.49
10.822 MHz	32.70	50.00	-17.30	42.75	60.00	-17.25	10.49
10.825 MHz	32.79	50.00	-17.21	42.86	60.00	-17.14	10.49
10.826 MHz	32.75	50.00	-17.25	42.81	60.00	-17.19	10.49
10.827 MHz	32.79	50.00	-17.21	42.81	60.00	-17.19	10.49
10.951 MHz	30.63	50.00	-19.37	39.45	60.00	-20.55	10.49
11.987 MHz	27.64	50.00	-22.36	36.01	60.00	-23.99	10.49
12.085 MHz	27.56	50.00	-22.44	36.45	60.00	-23.55	10.49
12.402 MHz	28.22	50.00	-21.78	37.31	60.00	-22.69	10.49
12.429 MHz	28.30	50.00	-21.70	37.34	60.00	-22.66	10.49
12.441 MHz	28.42	50.00	-21.58	37.26	60.00	-22.74	10.49
12.457 MHz	28.58	50.00	-21.42	37.59	60.00	-22.41	10.49
12.476 MHz	28.17	50.00	-21.83	37.44	60.00	-22.56	10.49
12.573 MHz	28.46	50.00	-21.54	37.31	60.00	-22.69	10.50
12.701 MHz	27.73	50.00	-22.27	36.58	60.00	-23.42	10.50
12.729 MHz	27.35	50.00	-22.65	36.78	60.00	-23.22	10.50
Mfr/Model - Phihong Model PPL36U-240 W Lutron Model XXX-TWC-WH							
Sample # - 2259-05 W 2259-01							
Serial # - U4A222502583 W 02F2571A							
Configuration - AC/DC Supply Powering the Lutron XXX-TWC-WH in Rx Mode							
Voltage/Frequency - 120 VAC / 60 Hz							

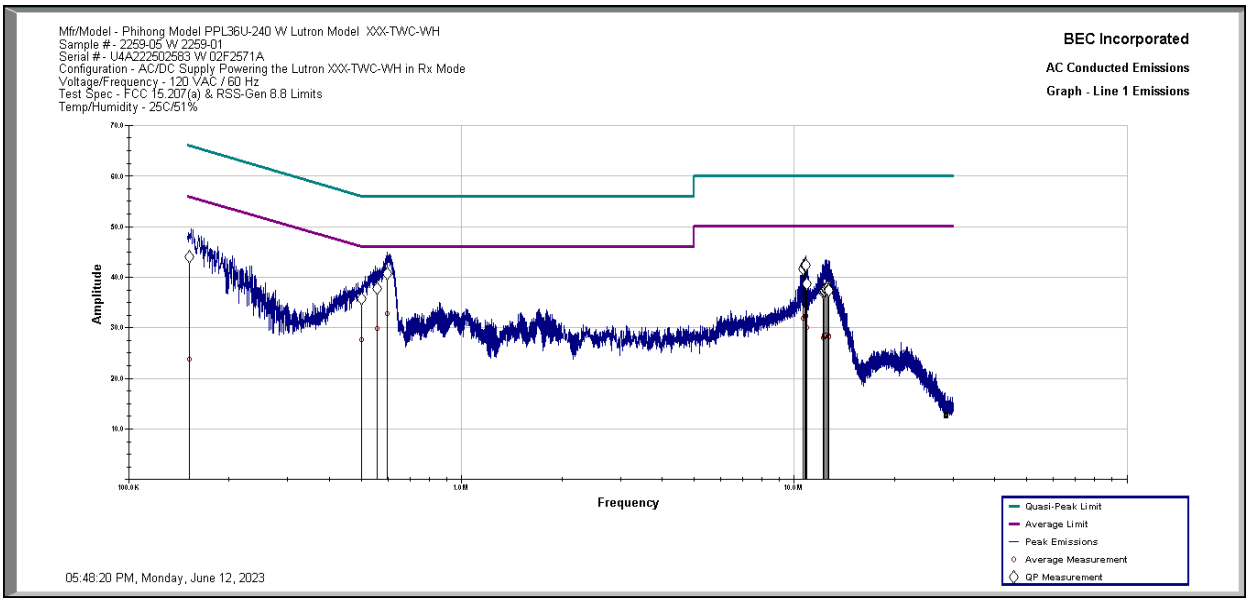
Rx Mode Phase Line

BEC Incorporated
Line 1 Conducted Emissions
05:48:20 PM, Monday, June 12, 2023

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
151.743 KHz	23.80	55.95	-32.15	43.99	65.95	-21.96	10.14
501.439 KHz	27.61	46.00	-18.39	35.70	56.00	-20.30	10.13
555.711 KHz	29.77	46.00	-16.23	37.77	56.00	-18.23	10.15
597.507 KHz	32.73	46.00	-13.27	40.75	56.00	-15.25	10.15
10.622 MHz	31.87	50.00	-18.13	41.55	60.00	-18.45	10.49
10.745 MHz	32.32	50.00	-17.68	42.27	60.00	-17.73	10.48
10.827 MHz	32.37	50.00	-17.63	42.32	60.00	-17.68	10.48
10.827 MHz	32.32	50.00	-17.68	42.29	60.00	-17.71	10.48
10.906 MHz	30.00	50.00	-20.00	38.66	60.00	-21.34	10.48
12.229 MHz	28.05	50.00	-21.95	36.93	60.00	-23.07	10.48
12.288 MHz	28.10	50.00	-21.90	37.45	60.00	-22.55	10.48
12.313 MHz	28.50	50.00	-21.50	37.13	60.00	-22.87	10.48
12.316 MHz	28.53	50.00	-21.47	37.35	60.00	-22.65	10.48
12.419 MHz	28.46	50.00	-21.54	37.64	60.00	-22.36	10.48
12.451 MHz	28.62	50.00	-21.38	37.81	60.00	-22.19	10.48
12.468 MHz	28.52	50.00	-21.48	37.67	60.00	-22.33	10.48
12.468 MHz	28.60	50.00	-21.40	37.66	60.00	-22.34	10.48
12.592 MHz	28.49	50.00	-21.51	37.85	60.00	-22.15	10.48
12.648 MHz	28.28	50.00	-21.72	37.53	60.00	-22.47	10.48
12.679 MHz	28.14	50.00	-21.86	37.45	60.00	-22.55	10.48
Mfr/Model - Phihong Model PPL36U-240 W Lutron Model XXX-TWC-WH							
Sample # - 2259-05 W 2259-01							
Serial # - U4A222502583 W 02F2571A							
Configuration - AC/DC Supply Powering the Lutron XXX-TWC-WH in Rx Mode							
Voltage/Frequency - 120 VAC / 60 Hz							

Graphs Rx Mode Neutral and Phase Lines





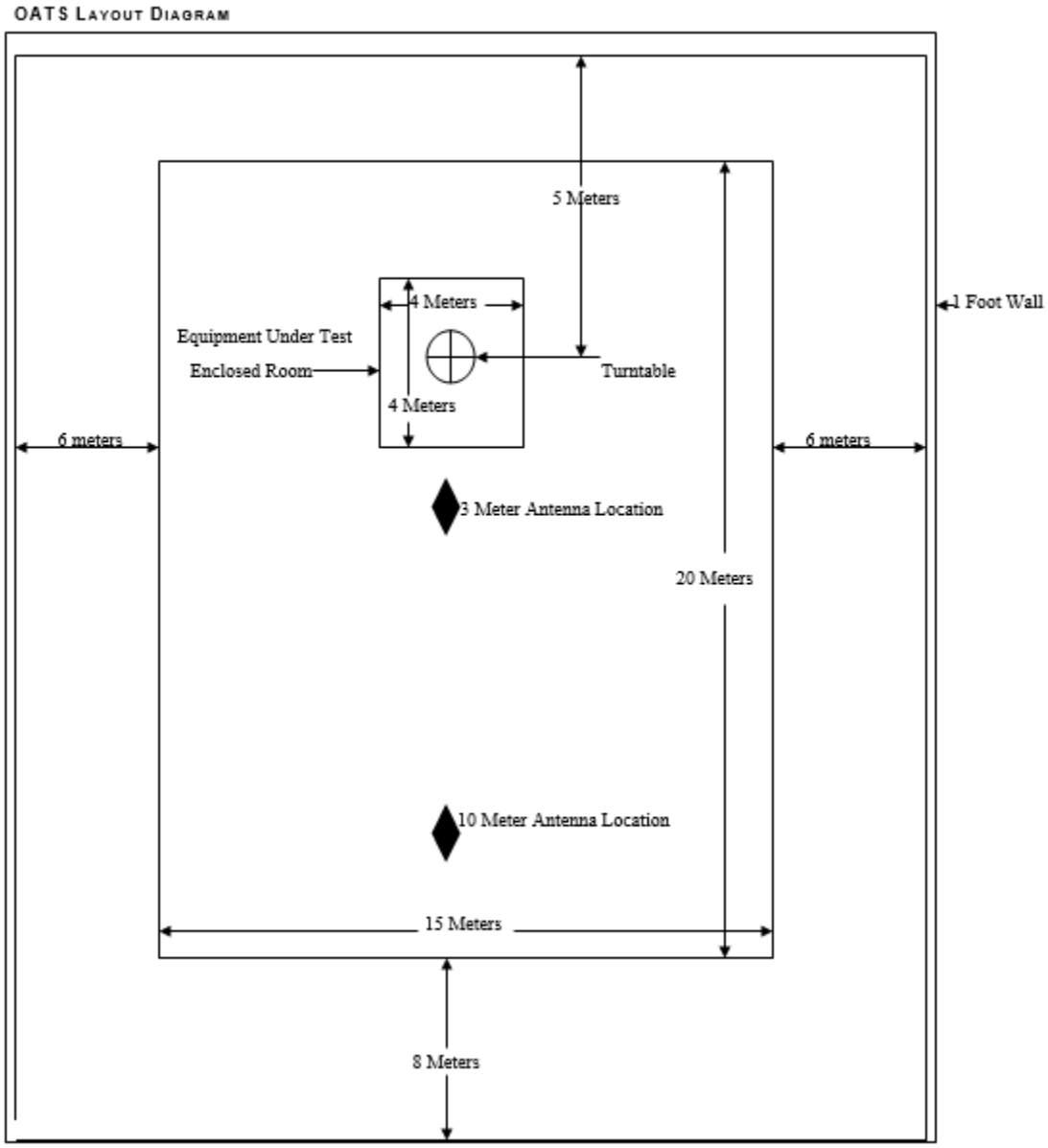
Results: The Lutron Model JPZ0148 Sample 2259-01 powered by the Lutron Electronics Model T120-24DC-15 Sample 2259-05 complies with the requirements of FCC Part 15.207. The margin is 2.79 dB @ 9.247 MHz with Sample 2259-01 transmitting Low Channel, 2405 MHz, Phase Line.

Appendix A – Test Equipment

Equipment	Manufacturer	Model #	Serial #	BEC #	Calibration Date	Calibration Cycle	Calibration Due Date
EMI Receiver (20 Hz – 26.5 GHz)	Rohde & Schwarz	ESIB 26	836119/006	1010	12/09/22	3 Years	12/09/25
Antenna (30 MHz - 6 GHz)	Sunol Sciences	JB6	A022108	712	06/21/21	3 Years	06/21/24
9kHz-3GHz EMC Analyzer	Agilent	E7402A	US39440162	883	06/21/21	3 Years	06/21/24
Antenna (30 MHz - 6 GHz)	Sunol Sciences	JB6	A020714	882	05/24/21	3 Years	05/24/24
Amplifier (.09 – 1300 MHz)	Hewlett Packard	8447F	3313A06658	807	01/13/21	3 Years	01/13/24
EMC Analyzer (9 kHz - 26.5 GHz)	Hewlett Packard	8593EM	3710A00214	1026	03/23/20	5 Years	03/23/25
Amplifier System (0.5 – 50 GHz)	Hewlett Packard	83015A 83017A	3123A00360 & 3332A00219	1027	06/16/21	3 Years	06/16/24
Double Ridged Horn Antenna (1 - 18 GHz)	EMCO	3115	9705-5225	1028	11/24/21	3 Years	11/21/24
Antenna (18 - 26.5 GHz)	Hewlett Packard	84125-80008	N/A	1056	01/18/22	3 Years	01/18/25
OATS Site (30 MHz – 1 GHz)	BEC	N/A	N/A	705	10/07/22	1 Year	10/07/23
Temp/Humidity Meter	Control Company	4096	151872672	780	07/21/22	3 Years	07/21/25

3.5GHz High Pass Filter	Hewlett Packard	84300-80038	005	779	08/04/22	3 Years	08/04/25
EMI Receiver (9 kHz - 6.5 GHz)	Hewlett Packard	8546A	3325A00158	761	03/15/23	3 Years	03/15/26
Four Line V-LISN	TESEQ	NNB 52	253551	950	12/08/22	3 Years	12/08/25
Conducted Emissions Cable	Pasternack	CE-01	N/A	802	10/15/20	3 Years	10/15/23
Software (Tile Instrument Control System)	Quantum Change/EMC Systems	Version 3	N/A	N/A	No Cal. Required	No Cal. Required	No Cal. Required
Radiated Emissions Test Software	BEC	RADE	2.2	N/A	No Cal. Required	No Cal. Required	No Cal. Required
Screen Room	ETS Lindgren	26W-2/2-0	6065	880	No Cal. Required	No Cal. Required	No Cal. Required

Appendix B – Open Area Test Site Layout Diagram



Appendix C – Emissions Shielded Room Layout Diagram

SITE DESCRIPTION

The chamber is a 3 Meter semi-anechoic chamber with the ferrite absorbers on all walls and ceiling and is re-categorized as a Fully anechoic chamber when absorbers are added in between the test area and measurement antenna. The turn-table and mast are controlled externally by the ETS Lindgren 2090 Controller. The metal computer floor provides the ground plane for the site. Inside room dimensions are 22' Long by 13' Wide by 11'5" High. Outside room dimensions are 22'8" Long by 14' Wide by 12'9" High.