BEC INCORPORATED

CERTIFICATION APPLICATION TEST REPORT

TEST STANDARDS:
FCC Part 15 Subpart C Section 15.231
RSS-Gen/RSS-210 Annex A
Intentional Radiator

Lutron Models DS-5ANS / DVRF-5NS
Vogelkop In-wall Lighting Switch

REPORT# BEC-2197-01

TEST DATES: 03/30/2022 – 04/14/2022

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

PREPARED BY: _____
Paul Banker**,** Test Engineer

REVIEWED and APPROVED BY: _____
Steve Fanella**,** Quality Manager

ACCREDITED

TABLE OF CONTENTS

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Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	04/25/2022

1.0 Administrative Information

1.1 General Project Details

Project Number	BEC-2197	
Manufacturer	Lutron Electronics	
Model Numbers Tested	DS-5ANS / DVRF-5NS	
EUT Sample Type	FCC Test Code Test Sample	Shipping Code Test Sample
EUT Serial Number	030A56E8	030A5744
EUT Sample Number	2197-01	2197-02
EUT Firmware Version	Test Code: Version 2.01 Shipping Code: Firmware Version 2.002	
Frequency of Operation	431 MHz to 437 MHz	
Antenna Gain	-14.85 dBi	
Antenna Type	Loop	
Modulation	FSK	
FCC Classification	DSR, Part 15 Remote Control/Security Device Transceiver	
Date Samples Received	03/16/2022	
Sample Type and Condition Received	Production Unit Ready for Test	
EUT Description	Vogelkop Wireless In-wall Lighting Switch	
FCC ID	JPZ0140	
ISED ID	2851A-JPZ0140	
ISED HVIN	ANS-A	
Applicable FCC and ISED Rules	FCC Rules Part 15.231: Periodic operation in the band 40.66-40.70 MHz and above 70 MHz. RSS-210 Annex A: Momentarily operated and remote-control devices.	

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
Test Personnel	Paul Banker / Steve Fanella / JR Fanella
BEC Laboratory Number FCC Registration	US1118
BEC Laboratory Number ISED Registration	7342A-1
Test Performed For	Lutron Electronics Co Incorporated 7200 Suter Road Coopersburg, PA 18036
Customer Technical Contact	Geri Gonzalez
Customer Reference Number	PO # 5265895

1.4 Measurement Uncertainty

Test Measurement	ETSI EN 300 220-1 Limit	BEC Value
Radio Frequency	±0.5 ppm	±0.027 ppm
RF Power, Conducted	±1.5 dB	±1.45 dB
Radiated Emission of Transmitter, Valid up to 6 GHz	±6 dB	±4.87 dB
Radiated Emission of Receiver, Valid up to 6 GHz	±6 dB	±4.87 dB
RF Level Uncertainty for a given BER	±1.5 dB	N/A
Occupied Bandwidth	±5 %	±2 %
Temperature	±2.5 °C	±0.5 °C
Humidity	±10 %	±2.5%

These uncertainties, provided for informational purposes, 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].

Measurement	Measurement Distance	Frequency Range	Measurement Limit	Expanded Uncertainty
Radiated Disturbance Open Area Test Site	3 Meter	30 MHz – 1 GHz	Class A or B	4.27
Radiated Disturbance Fully Anechoic Chamber	3 Meter	1 GHz – 18 GHz	Class A or B	4.90
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.

1.5 Test Result Summary Table

The Lutron Model DS-5ANS / Model DVRF-5NS Vogelkop Wireless In-wall Lighting Switch was tested and found to be compliant to the sections of the FCC Part 15 Subpart C and RSS-210/RSS-Gen standard listed below:

BEC Report Section	FCC: 47 CFR Part	RSS-210	RSS-Gen	IEEE / ANSI C63.10	Test Description	Result
4.1	15.203	-	6.8	-	Antenna Requirement	Compliant
4.2	15.203	-	6.8	-	Antenna Construction	Compliant
4.3	FCC 15.205, 15.209, 15.231(b)	A.1.2	6.13, 7.3 and 8.10	-	Radiated Emissions	**PASS**
4.4	IEEE/ANSI C63.10	-	-	11.6	Duty Cycle Measurement	Measured
4.5	FCC 15.231(c)	A.1.3	-	-	20 dB Bandwidth	**PASS**
4.6	-	-	6.7	-	99% Occupied Bandwidth	**PASS**
4.7	FCC 15.231(a)(1)	A.1.1 (a)	-	-	Deactivation Testing	**PASS**
4.8	15.207(a)	-	7.2	-	AC Mains Conducted Emissions	**PASS**

Interpretation of Test Results: The EUT was tested using typical radio modulation. The resultant data is presented by showing the worst-case levels for each modulation type and/or frequency. All recorded results are maintained at BEC Incorporated and are available upon request.

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 Models DS-5ANS / DVRF-5NS Vogelkop Wireless In-wall Lighting Switches are wall-mounted, AC lighting control. The devices can control LED and CFL lights up to 150 Watts; also, halogen and incandescent lights ranging to 600 Watts. The switch can be controlled from a smart-phone when used with the Lutron Smart Bridge.

The Lutron Models DS-5ANS / DVRF-5NS use a Lutron Designed Transceiver Radio which operates momentarily in the 431 MHz to 437 MHz frequency range.

Note that there are no construction or component differences between the Lutron Model DS-5ANS and the Lutron Model DVRF-5NS. The two models are identical and the model numbers are for marketing purposes only.

2.2 Product Category Standards

47 CFR, Part 15 Subpart C – Section 15.231
RSS-210 Annex A-Momentarily operated and remote-control devices.

2.3 Product Classification

Intentional Radiator Testing Requirements, Periodic operation in the band 40.66 MHz - 40.70 MHz and above 70 MHz. The EUT is a momentarily operated transmitter and receiver, and/or remote-control device.

2.4 Test Configurations

The Lutron Models DS-5ANS / DVRF-5NS sample was programmed to provide control of the radio to enable transmission at Low Channel Frequency of 431.5 MHz or at High Channel Frequency of 436.6 MHz in multiple modes. Available transmission modes in the Standard FCC Mode were Constant Wave, Continuous Packet and Streaming Data when transmitting. Receive Mode was also available in the Standard FCC Mode. Transmit Packet Mode provided a Single Packet Transmission.

Shipping Code Software was used during Conducted AC Mains Rx testing.

Continuous Packet Mode was used during Occupied Bandwidth measurements and Conducted AC Mains Tx testing.

Streaming Data Mode was used during the measurement of the transmitter fundamental frequency and spurious emissions.

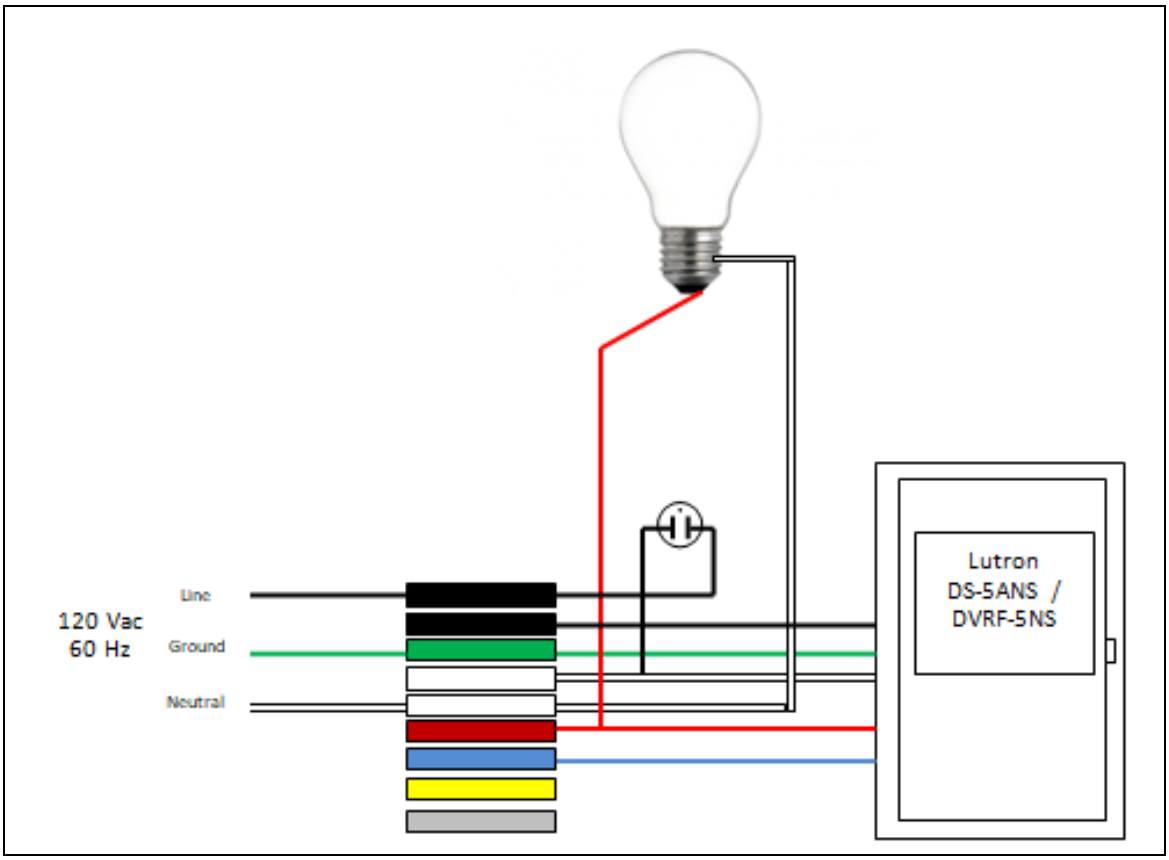
The Transmit Packet Mode was used during duty-cycle and 5 second shut-off tests.

2.5 Test Configuration Rationale

The tested configurations are based on the signal types required to make proper measurements for the testing to FCC Part 15.231 and RSS-210.

2.6 Test Setup Configuration Block Diagram

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



2.7 EUT Information, Interconnection Cabling and Support Equipment

EUT Hardware and Software/Firmware

EUT Description	Manufacturer	Model	Serial Number	Software Firmware Version	Sample Number
EUT Radiated Sample with FCC Test Code	Lutron	DS-5ANS and DVRF-5NS	030A56E8	2.002	2197-01

Support Equipment

EUT Description	Manufacturer	Model	Serial Number
Porcelain Bulb Socket	Lutron	NOM057	None
660-Watt Keyless Twin-Socket Lamp Holder Adapter	Leviton Co.	R52-00128-00W	None
Light Bulbs	Unknown	130V 300W	None

Interconnection Cable List

Wiring Description	Manufacturer	Model	Wire Size	Quantity	Length
AC Input Lines	Apollo	205585	14 AWG	3	8’
EUT to Load	AWM	-	18 AWG	9	1’

2.8 Test Signals and Test Modulation

Testing was performed at either 431.5 MHz Low Transmit or 436.6 MHz High Transmit or both Low and High Transmit Frequencies. Specific signal type configurations tested are detailed in the sections within this report. Continuous Wave, Continuous Packet Mode, Streaming Data and Transmit Packet Mode were used during specific testing as detailed in Section 2.4 of this Report (Test Configuration). Transmission Modulation for this product utilizes FSK.

2.9 Grounding

Ground provided by AC Line cord connected to metal mounting bracket of EUT.

2.10 EUT Power

The Lutron Models DS-5ANS / DVRF-5NS was powered by 120 Vac / 60 Hz.

2.11 EUT Modifications

No physical modifications were made to the EUTs tested to achieve compliance.

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 and ISED 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
15.231 Periodic operation in the band 40.66-40.70 MHz and above 70 MHz

RSS-210 Issue 10 December 2019 Licence-Exempt Radio Apparatus: Annex A-Momentarily operated and remote control devices.

RSS-Gen Issue 5 April 2018, General Requirements for Compliance of Radio Apparatus

TRC-43 Issue 3 November 2012, Designation of Emissions, Class of Station and Nature of Service

3.1.2 Basic Test Methods and Test Procedures

IEEE/ANSI C63.4: 2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

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

3.2 Deviations or Exclusions from the Requirements

No deviations or exclusions were made.

4.0 Test Results

4.1 Antenna Requirement (47 CFR 15.203) (RSS-Gen, 6.2)

According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The antenna used by the Lutron Models DS-5ANS / DVRF-5NS is a loop antenna mounted perpendicular to the PCB inside the enclosure. The Lutron Designed Transceiver Radio operates momentarily in the 431 MHz to 437 MHz frequency range. There are no detachable parts of the antenna. The antenna is not replaceable, nor changeable, and therefore complies with the antenna requirements of FCC Part 15 C Section 15.203.

4.2 Antenna Construction (47 CFR 15.203) (RSS-Gen, 6.2)

The device is equipped with permanent attached antenna, which is not displaced by any other antenna. The Antenna gain of the EUT is -14.85 dBi. Therefore, the equipment complies with the antenna requirements of FCC Part 15 C Section 15.203.

4.3 Radiated Emissions (47 CFR 15.209 and 15.231 (b) and 15.35(b)) (RSS-210 A.1.2)

According to FCC Part 15 C Section 15.231(b) and RSS-210 Annex A.1.2 the field strength of emissions from the intentional radiators operated under this section shall not exceed the following limits:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	[1]1,250 to 3,750	[1]125 to 375
174-260	3,750	375
260-470	[1]3,750 to 12,500	[1]375 to 1,250
Above 470	12,500	1,250

[1]Linear interpolations.

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

4.3.1 Radiated Emissions 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 site 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 at a height of 80 cm for measurement of signals below 1 GHz and a table of 150 cm for measurement of signals above 1 GHz.

The test site complies with the attenuation measurements specified in ANSI C63.4.

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. This 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 tables 80 cm high (9 kHz – 1 GHz) and 150 cm high (1 – 18 GHz) for tabletop equipment or directly on the turntable surface for floor standing equipment.

The test site complies with the attenuation measurements specified in ANSI C63.4.

See Appendix B and Appendix C for Test Site Diagrams.

4.3.2 Restricted and Non-restricted Bands Radiated Emissions Test Procedure

Radiated Emissions 9 kHz – 40 GHz

The EMI receiver was set to quasi-peak mode for frequencies from 9 kHz to 1000 MHz 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. 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) - Duty Cycle Correction Factor

The Duty Cycle measurement and calculation of the Duty Cycle Correction Factor are contained in Section 4.4 of this report.

Measurements were made with the Lutron Models DS-5ANS / DVRF-5NS transmitting at low frequency of 431.5 MHz and high frequency of 436.6 MHz. The transmit frequencies were configured in Continuous Packet Mode.

The following tables are the highest emissions recorded and summarized. The emissions are separated into signals in the restricted bands, described in FCC Part 15.205 and RSS-Gen, and signals not within restricted bands subject to the limits specified in 15.231 and RSS-210 A.1.2.

4.3.3 Radiated Emissions General Test Information

The following information is related to the testing performed for Radiated Emissions in the frequency range of 30 MHz to 1000 MHz.

Frequency Range	9 kHz to 5 GHz			
Test Standards	FCC Part 15.209, FCC Part 15.231 (b) and RSS-210			
Class Limits	FCC Part 15.209, FCC Part 15.231 (b) and RSS-210 A.1.2			
EUT Type	Vogelkop Wireless In-wall Switch			
Manufacturer/Model	Lutron Models DS-5ANS / DVRF-5NS			
Sample Number	2197-01			
Port Tested	Enclosure			
Test Date(s)	04/06/2022	04/11/2022	04/12/2022	04/13/2022
Temperature	21ºC	21ºC	21ºC	21ºC
Humidity	42% RH	33% RH	42% RH	42% RH
EUT Power	120 Vac / 60 Hz			

4.3.4 Radiated Emissions 9 kHz – 30 MHz Test Results (04/13/2022)

Measurements were made in the frequency range of 9 kHz to 30 MHz, at three orthogonal axes, with the Lutron Models DS-5ANS / DVRF-5NS transmitting at low frequency of 431.5 MHz and high frequency of 436.6 MHz. The transmit frequencies were configured in Streaming Data Mode.

The measured signals from the EUT are noise floor measurements. The table below depicts the highest measured levels, with the Z axis of the loop antenna. The modulated carrier was transmitting at 436.6 MHz. All other polarizations and transmit frequencies and receive modes showed noise floor measurements.

Frequency	Peak Level	QP Level	Azimuth	Ant Height	Corr. Factor	FCC Part 15.231(e) & RSS-Gen 8.9		Result
						QP Limit	Margin	
MHz	dBuV/m	dBuV/m	degrees	cm	dB	dBuV/m	dB	
1.3491	31.57	32.00	000	100	-19.15	72.00	-40.00	Pass
1.3904	32.38	31.69	000	100	-19.15	70.95	-39.26	Pass
1.5244	30.98	30.64	000	100	-19.14	67.55	-36.92	Pass
1.6327	29.57	30.16	000	100	-19.13	64.81	-34.65	Pass
1.6724	30.52	29.97	000	100	-19.13	63.80	-33.83	Pass
1.7044	30.05	29.67	000	100	-19.12	62.99	-33.31	Pass

Test Results: The Lutron, Model DS-5ANS / DVRF-5NS Vogelkop Wireless RF Switch, complies with the requirements of 47 CFR Part 15.205, RSS-Gen Sections 6.13 and 7.3 and 47 CFR Part 15.231 RSS-210 A.1.2 for radiated emissions in the frequency range of 9 kHz to 30 MHz. The margin of compliance is 33.31 dB.

4.3.5 Radiated Emissions 30 – 6000 MHz Test Results

Measurements were made in the frequency range of 30 MHz to 6000 MHz with the Lutron Models DS-5ANS / DVRF-5NS transmitting at low frequency of 431.5 MHz and high frequency of 436.6 MHz. The transmit frequencies were configured in Streaming Data Mode.

4.3.5.1 Field Strength of Fundamental Emissions (04/06/2022)

The tables below show the measured field strength of the fundamental frequencies. Comparison measurements were made with no modulation and Streaming Data Mode with FSK modulation. The application of the Duty Cycle Correction Factor was required to demonstrate compliance. The signals are compared to the limits of 47 CFR Part 15.231(b) and RSS-210 A.1.2 for Fundamental Emissions.

Transmit Mode	Fundamental Frequency	Peak	Polarity	TT angle	Ant Height	Antenna Amplifier Cable C/F	Duty Cycle Correction Factor	Corrected Average	FCC Part 15.231 Limit	Margin	Result
	MHz	dBuV/m	H/V	degrees	cm	dB	dB	dBuV/m	dBuV/m	(dB)	
CW	431.5	100.40	H	130	100	-3.034	-19.98	77.39	80.75	-3.36	Pass
CW	431.5	101.10	V	200	107	-3.034	-19.98	78.09	80.75	-2.66	Pass
Constant Stream	431.5	100.60	H	141	100	-3.034	-19.98	77.59	80.75	-3.16	Pass
Constant Stream	431.5	101.60	V	198	101	-3.034	-19.98	78.59	80.75	-2.16	Pass
CW	436.6	95.36	H	112	100	-2.85	-19.98	72.53	80.91	-8.38	Pass
CW	436.6	99.60	V	192	119	-2.85	-19.98	76.77	80.91	-4.14	Pass
Constant Stream	436.6	95.55	H	117	100	-2.85	-19.98	72.72	80.91	-8.19	Pass
Constant Stream	436.6	99.74	V	204	118	-2.85	-19.98	76.91	80.91	-4.00	Pass

Test Results: The Lutron Models DS-5ANS / DVRF-5NS Vogelkop Wireless RF Switch, BEC Sample #2197-01, complies with the requirements of 47 CFR Part 15.231 RSS-210 A.1.2 for fundamental radiated emissions in the frequency range of 30 MHz to 1000 MHz. The measured levels of the fundamental emissions compared to the Limits of 15.231 and RSS-210 A1.2 Table A1 have a margin of 2.16 dB.

4.3.5.2 Field Strength of Spurious Emissions (04/06/2022)

Measurements were made in the frequency range of 30 MHz to 1000 MHz with the Lutron Models DS-5ANS / DVRF-5NS transmitting at low frequency of 431.5 MHz and high frequency of 436.6 MHz. The transmit frequencies were configured in Streaming Data Mode. Also, the EUT was measured in Receive Mode.

The following tables show the second harmonic signals of the low and high channel transmission frequencies. There were no other spurious signals between 30 MHz and 1000 MHz. The signals are compared to the limits of 47 CFR Part 15.231(b) and RSS-210 A.1.2 for spurious Emissions.

TX FREQUENCY OF 431.5 MHZ LIMIT: FCC PART 15.231 and RSS-102 A.1.2

Frequency	Peak Level	QP Level	Polarity	TT angle	Ant Height	Antenna Amplifier Cable C/F	FCC Part 15.231 and RSS-102 A.1.2 Limit	Margin	Result
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	
863.069	49.29	48.27	H	234	100	3.37	61.94	-13.67	Pass
863.064	45.10	43.17	V	168	168	3.37	61.94	-18.77	Pass

TX FREQUENCY OF 436.6 MHZ LIMIT: FCC PART 15.231 and RSS-102 A.1.2

Frequency	Peak Level	QP Level	Polarity	TT angle	Ant Height	Antenna Amplifier Cable C/F	FCC Part 15.231 and RSS-102 A.1.2 Limit	Margin	Result
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	(dB)	
873.10	39.35	36.29	H	079	100	3.44	61.94	-25.65	Pass
873.29	46.71	34.54	V	345	117	3.44	61.94	-27.40	Pass

Test Results: The Lutron Models DS-5ANS / DVRF-5NS Vogelkop Wireless RF Switch, BEC Sample #2197-01, complies with the requirements of 47 CFR Part 15.231 RSS-210 A.1.2 for spurious radiated emissions in the frequency range of 30 MHz to 1000 MHz. The measured levels of the spurious emissions compared to the Quasi-Peak limits of 15.231 and RSS-210 A1.2 Table A1 have a margin of 13.67 dB.

4.3.5.3 Spurious Radiated Emissions 1 – 5 GHz Test Results (04/11/2022 - 04/12/2022)

Measurements were made in the frequency range of 1 GHz to 5 GHz with the Lutron Models DS-5ANS / DVRF-5NS transmitting at low frequency of 431.5 MHz and high frequency of 436.6 MHz. The transmit frequencies were configured in Streaming Data Mode. Also, the EUT was measured in Receive Mode.

The tables below show the measured levels of non-restricted, spurious emissions compared to Table 1 of 47CFR Part 15.231 and RSS A.1.2. The measured levels of restricted, spurious emissions (marked with an asterisk) compared to the average limit of 15.209, as directed by 15.205.

TX FREQUENCY OF 431.5 MHZ FCC PART 15.231 RSS-210 A.1.2 LIMITS

Frequency	Measured Level		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC 15.231 RSS-210 A.1		FCC 15.205/15.35(b) RSS-GEN 8.1, 8.9, 8.10		Result
	Peak	Average					Limit		Margin		
							Peak	Average	Peak	Average	
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dBuV/m	dB	dB	
1.2945	42.45	40.26	H	236	235	-11.64	80.75	60.75	-38.30	-20.49	Pass
1.2945	40.36	36.60	V	177	184	-11.64	80.75	60.75	-40.39	-24.15	Pass
2.1474	34.39	23.95	V	161	136	-6.64	80.75	60.75	-46.36	-36.80	Pass
2.1573	48.22	43.36	H	328	184	-6.63	80.75	60.75	-32.53	-17.39	Pass
2.4022	34.13	24.14	V	332	128	-5.51	80.75	60.75	-46.62	-36.61	Pass
3.8833*	50.80	44.30	H	036	145	0.42	73.98	53.98	-23.18	-9.68	Pass
3.8839*	48.17	42.06	V	020	100	0.43	73.98	53.98	-25.81	-11.92	Pass
4.7468*	46.12	39.62	H	356	104	1.36	73.98	53.98	-27.86	-14.36	Pass

*Restricted Band (compared to 15.205/15.35(b) limits)(RSS-GEN 8.1, 8.9, 8.10

Non-restricted Band (compared to 15.231 RSS-210

TX FREQUENCY OF 436.6 MHZ FCC PART 15.231 RSS-210 A.1.2 LIMITS

Frequency	Measured Level		Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC 15.231 RSS-210 A.1		FCC 15.205/15.35(b) RSS-GEN 8.1, 8.9, 8.10		Result
	Peak	Average					Limit		Margin		
							Peak	Average	Peak	Average	
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dBuV/m	dB	dB	
1.3097*	39.39	34.86	H	247	208	-11.56	73.98	53.98	-34.59	-19.12	Pass
1.3100*	39.87	37.22	V	144	158	-11.56	73.98	53.98	-34.11	-16.76	Pass
2.1827	50.84	48.77	H	324	177	-6.58	80.91	60.91	-30.07	-12.14	Pass
2.1833	47.65	44.86	V	157	197	-6.58	80.91	60.91	-33.27	-16.05	Pass
3.9290*	51.66	45.43	V	009	104	0.57	73.98	53.98	-22.32	-8.55	Pass
3.9297*	58.07	52.97	H	018	101	0.57	73.98	53.98	-15.91	-1.01	Pass
4.8027*	56.82	52.33	H	289	142	1.49	73.98	53.98	-17.16	-1.65	Pass
4.8030*	54.76	48.95	V	300	139	1.49	73.98	53.98	-26.15	-11.96	Pass

*Restricted Band (compared to 15.205/15.35(b) limits)(RSS-GEN 8.1, 8.9, 8.10

Non-restricted Band (compared to 15.231 RSS-210

RECEIVE MODE (RX) PART 15.205 AND RSS-GEN 8.9

Frequency	Peak Level	Average Level	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC 15.205 Limit		Peak Margin	Average Margin
							/15.31 Peak Limit	/RSS-GEN 7.3 Average Limit		
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dBuV/m	dB	dB
1.2149	30.67	20.98	V	225	188	-12.17	73.98	53.98	-43.32	-33.00
1.2590	33.74	21.24	H	001	115	-11.68	73.98	53.98	-40.24	-32.74
1.8683	33.84	23.64	V	229	105	-7.57	73.98	53.98	-40.14	-30.34
1.8793	34.47	23.91	H	285	114	-7.48	73.98	53.98	-39.51	-30.07
2.6463	35.09	24.23	H	206	100	-4.83	73.98	53.98	-38.89	-29.75
3.9495	38.16	28.35	H	214	204	0.64	73.98	53.98	-35.82	-25.63
3.9652	36.76	27.72	V	329	187	0.62	73.98	53.98	-37.22	-26.26
4.7704	37.76	28.22	V	233	170	1.41	73.98	53.98	-36.22	-25.76
4.7848	39.78	28.60	H	232	148	1.44	73.98	53.98	-34.20	-25.38

Test Results: The Lutron Models DS-5ANS / DVRF-5NS BEC Sample #2197-01 complies with the requirements of 47 CFR Part 15.231 RSS-210 A.1.2 for non-restricted radiated emissions and Part 47 CFR Part 15.209 RSS-Gen restricted radiated emissions in the frequency range of 1 GHz to 5 GHz. The measured levels of restricted, spurious emissions (marked with an asterisk) were compared to the average limit of 15.209, as directed by 15.205. The margin, from the spurious emission limit is 1.01 dB at 3.9297 GHz.

4.4 Duty Cycle Measurement (ANSI C63.10)

4.4.1 Duty Cycle Measurement – Test Procedure

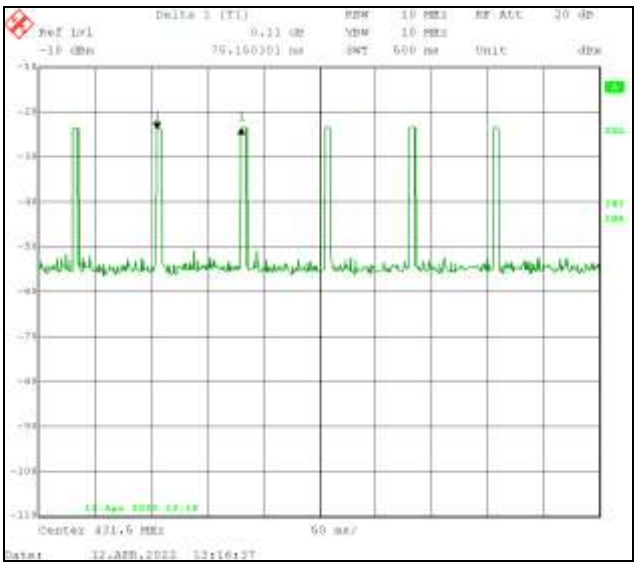
The duty cycle was measured by using the methods of ANSI C63.10. The spectrum analyzer screen images and tables related to the duty cycle measurements are shown below. The Lutron Models DS-5ANS / DVRF-5NS transmitted at 433.6 MHz using Transmit Packet Mode of the FCC Test Software and activating the EUT transmitter by tapping the OFF button located on the Model DS-5ANS / DVRF-5NS Sample 2197-01.

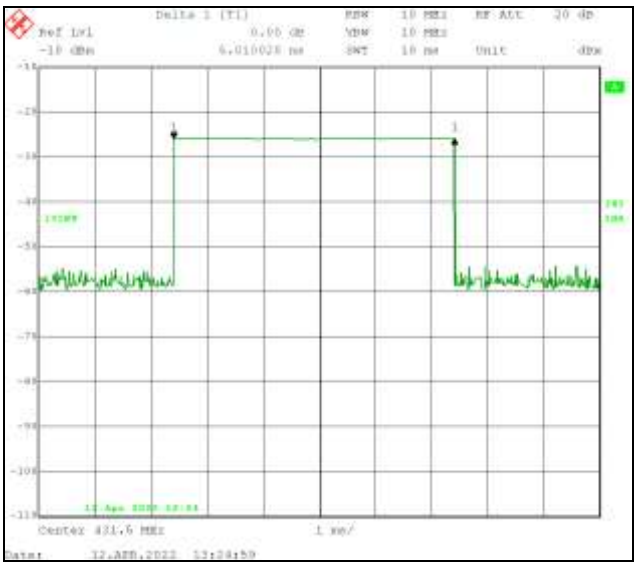
4.4.2 Duty Cycle Measurement General Test Information

The following information is related to the testing performed for Duty Cycle.

Frequency Range	431.5 MHz
Test Standards	ANSI C63.10, 11.6
Class Limits	None
EUT Type	Vogelkop Wireless RF Switch
Manufacturer/Model	Lutron Models DS-5ANS / DVRF-5NS
Sample Number	2197-01
Temperature	21°C
Humidity	44% RH
EUT Power	120 Vac / 60 Hz

4.4.3 Duty Cycle Measurement Test Results (04/12/2022)





The measured on-times depicted on the spectrum analyzer screens above are used to calculate the Duty Cycle Correction Factor. This factor is used to reduce the emission level of spurious emissions measured and displayed in Section 4.3.

4.4.4 Duty Cycle Correction Factor Calculation

On Time	5.01	ms
Repitition (within 100 ms window)	2	
Total (in 100 ms)	10.02	ms
Period (T)	100	ms
Duty Cycle = On Time / T (100 ms)	0.1002	
	10.02	%
Duty Cycle Correction = 20*Log(On Time/Period)	-19.98	dB

Test Results: The duty cycle measurement of the Lutron Models DS-5ANS / DVRF-5NS Eagle Owl Remote Blind Controller BEC Sample #2197-01 produces a value of 10.02 %. The calculated Duty Cycle Correction Factor is 19.98 dB.

4.5 20 dB Bandwidth (47 CFR 15.231(c) RSS-210 A.1.3)

4.5.1 20 dB Bandwidth Measurement – Test Procedure

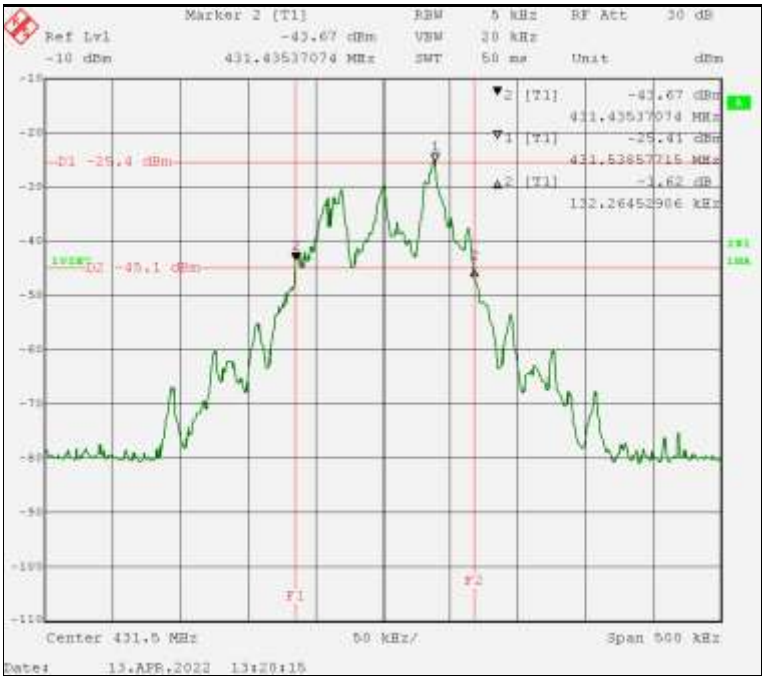
The 20 dB Bandwidth was measured by using the methods called out for in FCC Part 15.231(c) and RSS-210 A.1.23. The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. The Transmit frequencies of 431.5 MHz and 436.6 MHz were tested with the radio programmed to transmit in Continuous Packet Mode.

4.5.2 20 dB Bandwidth Measurement General Test Information

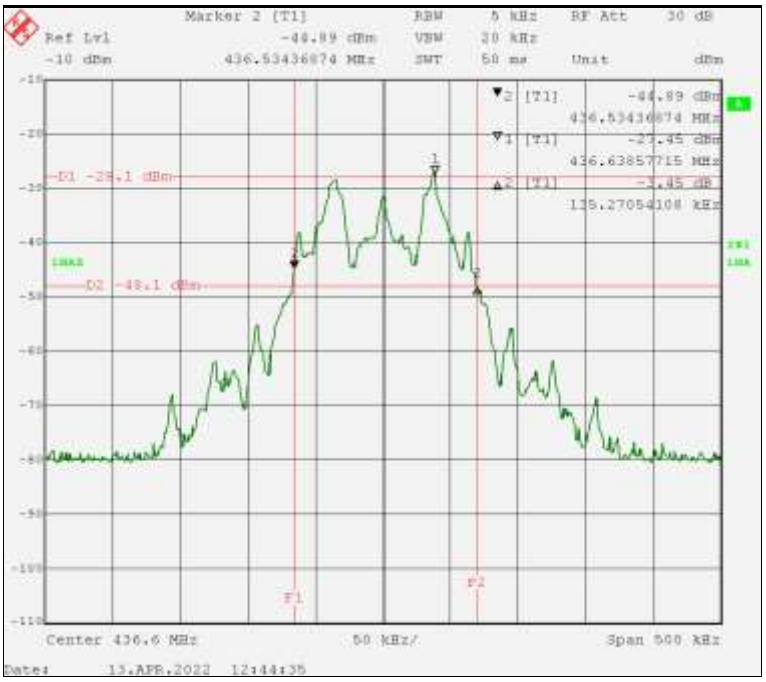
Fundamental Frequencies	431.5 MHz and 436.6 MHz
Test Standards	47 CFR 15.231(c) and RSS-210 A.1.3
Limit	.25 % of Fundamental Center Frequency
EUT Type	Vogelkop Wireless In-wall Lighting Switch
Manufacturer/Model	Lutron Models DS-5ANS / DVRF-5NS
Sample Number	2197-01
Temperature / Humidity	23°C / 41% RH
EUT Power	120 Vac / 60 Hz

4.5.3 20 dB Bandwidth Measurement Test Results (04/13/2022)

TX FREQUENCY OF 431.5 MHZ, (CP) CONTINUOUS PACKET MODE



TX FREQUENCY OF 436.6 MHZ, (CP) CONTINUOUS PACKET MODE



Frequency	Modulation	Meaured BW	FCC 15.23120 dB BW Limit	BW Margin	Result
MHz		kHz	kHz	kHz	
431.5	Constant Packet	132.26	1078.75	-946.49	Pass
436.6		135.27	1091.5	-956.23	Pass

Test Results: The Lutron Models DS-5ANS / DVRF-5NS, BEC Sample #2197-01, complies with the requirements of 47 CFR Part 15.231 RSS-210 A.1.3 for 20 dB Bandwidth Measurement.

4.6 99% Occupied Bandwidth (RSS-Gen 6.7)

4.6.1 99% Occupied Bandwidth Measurement – Test Procedure

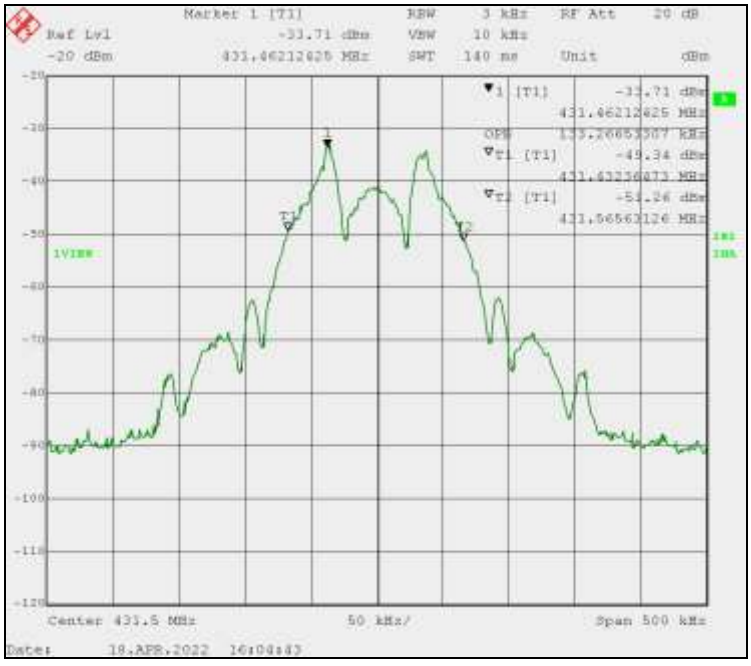
The 99% Occupied Bandwidth was measured using the specifications of RSS-Gen Section 6.7. Below are the screen captures and tables related to the 99% Occupied Bandwidth measurements. The Transmit frequencies of 431.5 MHz and 436.6 MHz were tested with the radio programmed to transmit in Continuous Packet Mode.

4.6.2 99% Occupied Bandwidth Measurement General Test Information

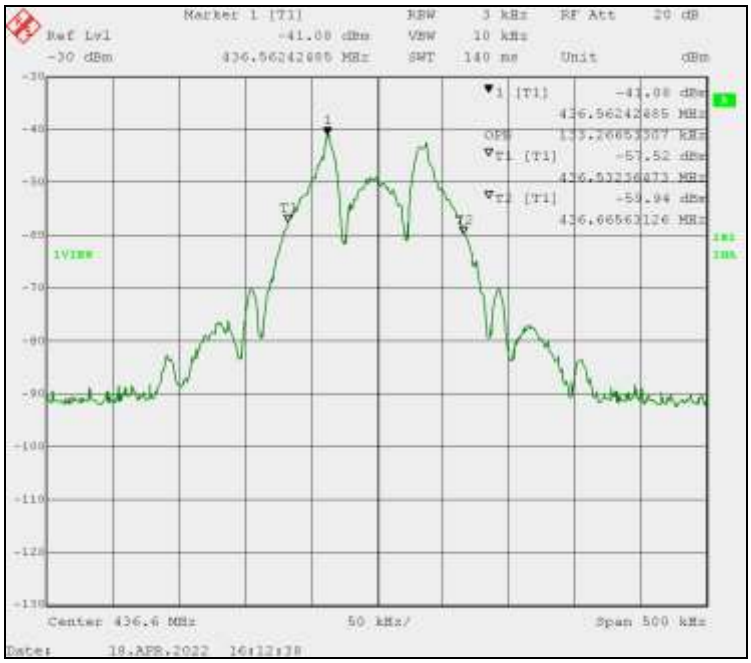
Channel Frequencies	431.5 MHz and 436.6 MHz
Test Standards	RSS-Gen Section 6.7, ANSI C63.10, 6.9.3
EUT Type	Vogelkop Wireless RF Switch
Manufacturer/Model	Lutron Models DS-5ANS / DVRF-5NS
Sample Number	2197-01
Temperature / Humidity	20°C / 50% RH
EUT Power	120 Vac / 60 Hz
Test Date	04/13/2022

4.6.3 99% Occupied Bandwidth Measurement Test Results (04/13/2022)

TX FREQUENCY OF 431.5 MHz, (CP) CONTINUOUS PACKET MODE



TX FREQUENCY OF 436.6 MHz, (CP) CONTINUOUS PACKET MODE



Frequency	Modulation	99% Meaured
MHz		kHz
431.5	Constant	133.27
436.6	Stream	133.27

Test Results: The Lutron Models DS-5ANS / DVRF-5NS, BEC Sample #2197-01 has a maximum 99% Occupied Bandwidth of 133.27 kHz.

4.7 Automatic Deactivation Testing (FCC Section 15.231(a)(1) RSS-210 A.1.1 (a))

4.7.1 Automatic Deactivation Testing Test Procedure

The Automatic Deactivation Testing was measured by using the methods called out for in FCC Part 15.231(a)(1) and RSS-210 A.1.1 (a).

FCC Part 15.231(a)(1)
A manually operated transmitter shall employ a switch that will automatically deactivated the transmitter within not more than 5 seconds of being released.

RSS-210 A.1.1 (a).
A manually operated transmitter shall be equipped with a push-to-operate switch and be under manual control at all times during transmission. When released, the transmitter shall cease transmission within no more than 5 seconds of being released.

The Lutron Models DS-5ANS / DVRF-5NS transmitted at 431.5 MHz and 436.6 MHz using the Transmit Packet Mode of the FCC Test Software and activating the EUT transmitter by tapping the OFF button located on the Model DS-5ANS / DVRF-5NS Sample 2197-01.

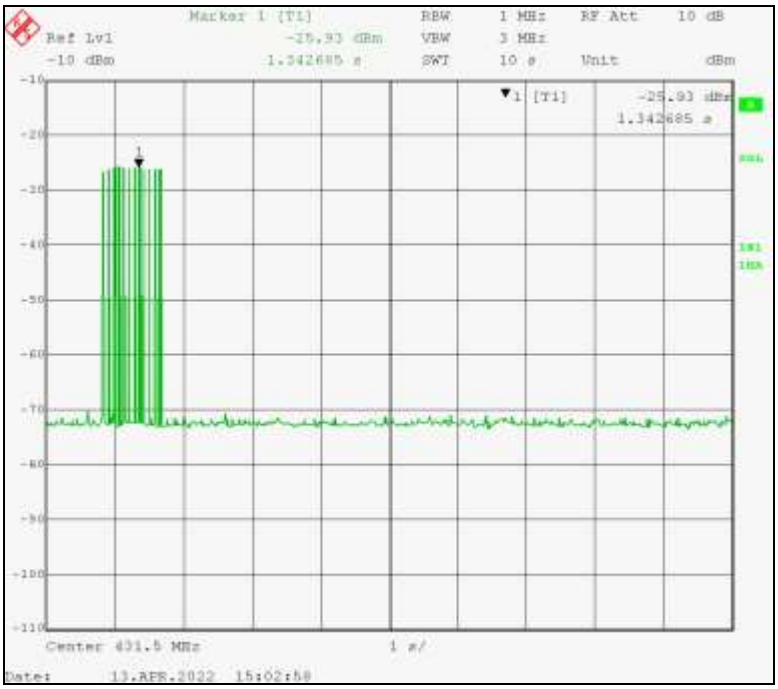
4.7.2 Automatic Deactivation Testing General Test Information

The following information is related to the testing performed for Automatic Deactivation.

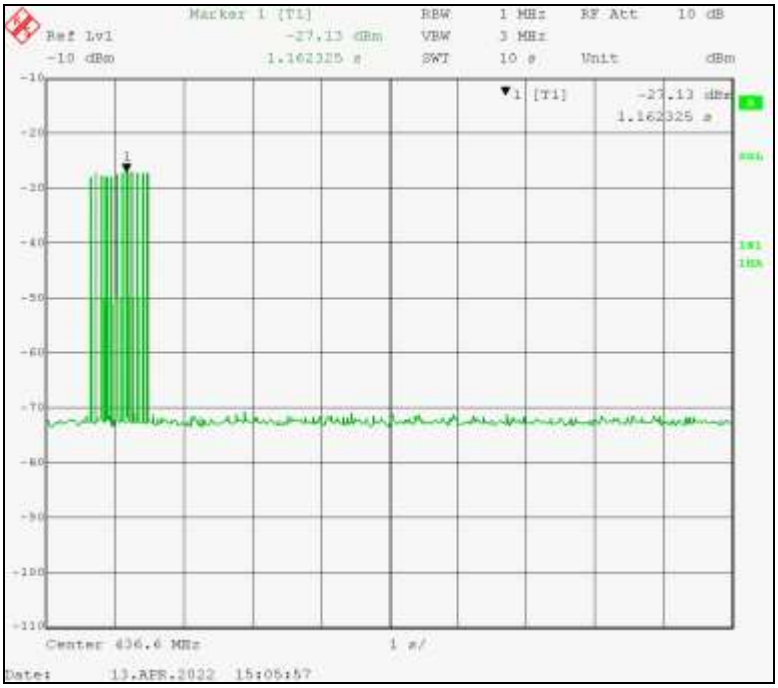
Frequency Range	431.5 MHz and 436.6 MHz
Test Standards	47 CFR 15.231(a)(1) and RSS-210 A.1.1 (a)
Limits	Automatic Deactivation 5 Seconds
EUT Type	Vogelkop Wireless RF Switch
Manufacturer/Model	Lutron Models DS-5ANS / DVRF-5NS
Sample Number	2197-01
Temperature	20°C
Humidity	50% RH
EUT Power	120 Vac / 60 Hz

4.7.3 Deactivation Testing Test Results (04/13/2022)

TX FREQUENCY 431.5 MHZ FCC PART 15.231(a)(1) RSS-210 A.1.1(a) 5 SECOND DEACTIVATION



TX FREQUENCY 436.6 MHZ FCC PART 15.231(a)(1) RSS-210 A.1.1(a) 5 SECOND DEACTIVATION



Test Results: The Lutron Models DS-5ANS / DVRF-5NS Vogelkop RF Wireless Switch, BEC Sample #2197-01 complies with the 5 second deactivation requirements of 47 CFR Part 15.231 (a)(1) for Automatic Deactivation Measurement.

4.8 Conducted Emissions

4.8.1 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 DS-5ANS / DVRF-5NS was powered by 120 Vac / 60 Hz. The Test Sample 2197-01 actively transmitted on the low channel of 431.5 MHz and high channel of 436.6 MHz using Continuous Packet Mode. Test Sample 2197-02, with shipping code, operated in Receive Mode (Rx).

Fundamental Frequencies	Tx Low and High Channels at 431.5 and 436.6 MHz	Receive Mode (Rx)
Test Standards / Limits	47 CFR 15.207 and RSS-Gen, 8.8	
EUT Type	Vogelkop Wireless In-wall Lighting Switch, Continuous Packet Mode Test Code	Vogelkop Wireless In-wall Lighting Switch, Shipping Code
Manufacturer Model	Lutron Models DS-5ANS / DVRF-5NS	
Sample Numbers	2197-01	2197-02
EUT Power	120 Vac / 60 Hz	
Test Date	03/30/2022	04/12/2022
Temperature / Humidity	21°C / 31% RH	21°C / 43% RH

4.8.2 Conducted Emissions AC Power Port Test Results (03/30/2022 and 04/12/2022)

Tx @ Low Channel, 431.5 MHz, Neutral Line

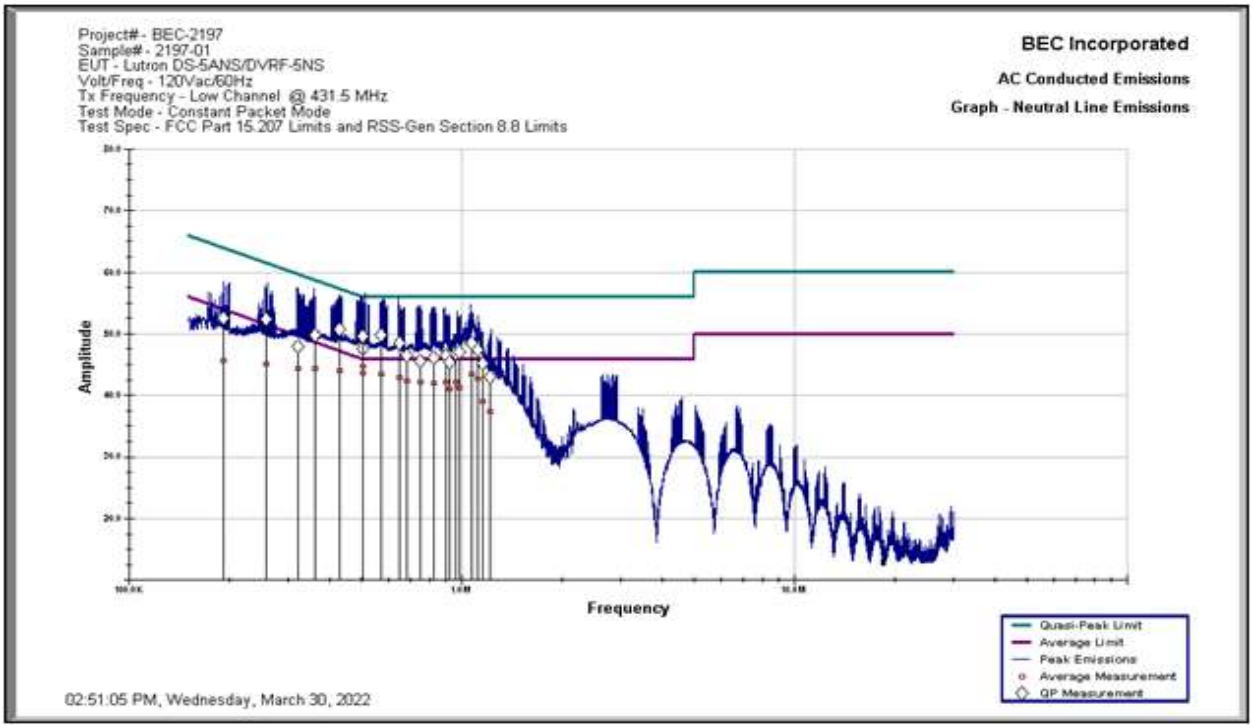
BEC Incorporated
Neutral Line Conducted Emissions
02:42:23 PM, Wednesday, March 30, 2022

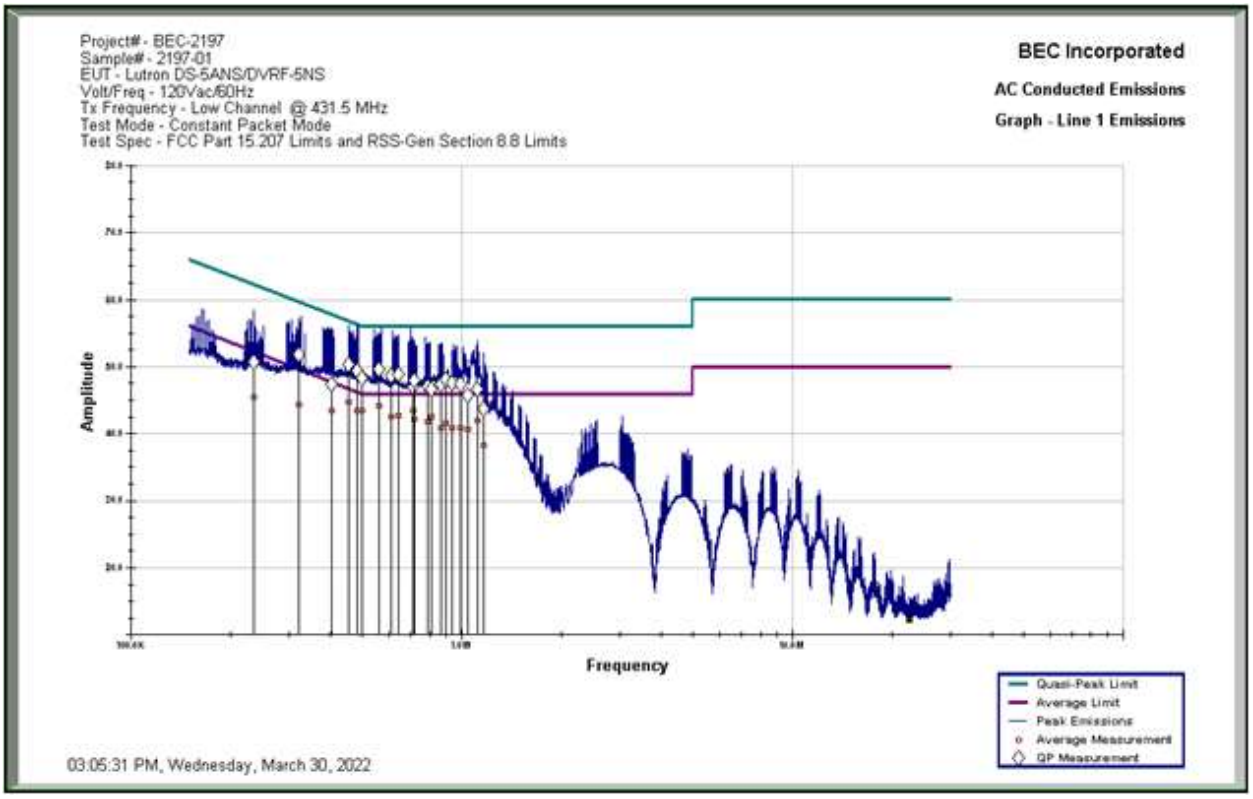
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
191.768 KHz	45.72	54.81	-9.08	52.57	64.81	-12.24	10.170
258.510 KHz	45.13	52.90	-7.77	52.35	62.90	-10.55	10.170
323.089 KHz	44.41	51.05	-6.64	48.00	61.05	-13.05	10.170
363.172 KHz	44.37	49.91	-5.54	49.85	59.91	-10.06	10.173
427.594 KHz	44.10	48.07	-3.97	50.72	58.07	-7.35	10.180
501.985 KHz	43.76	46.00	-2.24	47.61	56.00	-8.39	10.170
504.772 KHz	44.86	46.00	-1.14	49.60	56.00	-6.40	10.170
574.378 KHz	43.50	46.00	-2.50	49.73	56.00	-6.27	10.182
649.928 KHz	42.88	46.00	-3.12	48.40	56.00	-7.60	10.190
680.930 KHz	42.45	46.00	-3.55	46.43	56.00	-9.57	10.190
750.090 KHz	42.22	46.00	-3.78	45.60	56.00	-10.40	10.195
824.800 KHz	42.08	46.00	-3.92	46.11	56.00	-9.89	10.200
895.600 KHz	42.24	46.00	-3.76	46.41	56.00	-9.59	10.200
921.630 KHz	41.11	46.00	-4.89	45.31	56.00	-10.69	10.200
962.100 KHz	42.19	46.00	-3.81	46.87	56.00	-9.13	10.200
985.700 KHz	41.34	46.00	-4.66	46.99	56.00	-9.01	10.200
1.068 MHz	43.60	46.00	-2.40	48.48	56.00	-7.52	10.201
1.119 MHz	42.84	46.00	-3.16	47.30	56.00	-8.70	10.202
1.154 MHz	39.16	46.00	-6.84	45.20	56.00	-10.80	10.203
1.215 MHz	37.50	46.00	-8.50	42.94	56.00	-13.06	10.204
Project# - BEC-2197							
Sample# - 2197-01							
EUT - Lutron DS-5ANS/DVRF-5NS							
Volt/Freq - 120Vac/60Hz							
Tx Frequency - Low Channel @ 431.5 MHz							

Tx @ Low Channel, 431.5 MHz, Phase Line

BEC Incorporated
Line 1 Conducted Emissions
02:56:33 PM, Wednesday, March 30, 2022

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
234.850 KHz	45.48	53.58	-8.10	50.67	63.58	-12.91	10.180
322.548 KHz	44.51	51.07	-6.56	51.81	61.07	-9.26	10.180
402.987 KHz	43.61	48.77	-5.16	47.40	58.77	-11.37	10.191
454.146 KHz	44.76	47.31	-2.55	50.26	57.31	-7.05	10.199
483.701 KHz	43.42	46.47	-3.04	49.44	56.47	-7.02	10.193
499.343 KHz	43.47	46.02	-2.55	48.34	56.02	-7.68	10.190
563.790 KHz	44.30	46.00	-1.70	49.61	56.00	-6.39	10.196
612.338 KHz	42.54	46.00	-3.46	48.65	56.00	-7.35	10.200
645.183 KHz	42.81	46.00	-3.19	48.92	56.00	-7.08	10.200
710.470 KHz	43.43	46.00	-2.57	47.04	56.00	-8.96	10.201
720.840 KHz	42.20	46.00	-3.80	47.88	56.00	-8.12	10.202
786.620 KHz	41.78	46.00	-4.22	47.05	56.00	-8.95	10.209
808.430 KHz	42.67	46.00	-3.33	46.64	56.00	-9.36	10.210
863.980 KHz	40.91	46.00	-5.09	47.43	56.00	-8.57	10.213
899.440 KHz	41.74	46.00	-4.26	48.09	56.00	-7.91	10.220
934.570 KHz	40.92	46.00	-5.08	47.59	56.00	-8.41	10.220
995.780 KHz	40.93	46.00	-5.07	47.38	56.00	-8.62	10.220
1.047 MHz	40.75	46.00	-5.25	45.79	56.00	-10.21	10.221
1.118 MHz	42.08	46.00	-3.92	46.58	56.00	-9.42	10.222
1.160 MHz	38.33	46.00	-7.67	43.63	56.00	-12.37	10.223
Project# - BEC-2197							
Sample# - 2197-01							
EUT - Lutron DS-5ANS/DVRF-5NS							
Volt/Freq - 120Vac/60Hz							
Tx Frequency - Low Channel @ 431.5 MHz							


Project#- BEC-2197
Sample# - 2197-01
EUT - Lutron DS-5ANS/DVRF-5NS
Volt/Freq - 120Vac/60Hz
Tx Frequency - Low Channel @ 431.5 MHz
Test Mode - Constant Packet Mode
Test Spec - FCC Part 15.207 Limits and RSS-Gen Section 8.8 Limits
BEC Incorporated
AC Conducted Emissions
Graph - Neutral Line Emissions
Amplitude
Frequency
Quasi-Peak Limit
Average Limit
Peak Emissions
Average Measurement
QP Measurement
02:51:05 PM, Wednesday, March 30, 2022


Project#- BEC-2197
Sample# - 2197-01
EUT - Lutron DS-5ANS/DVRF-5NS
Volt/Freq - 120Vac/60Hz
Tx Frequency - Low Channel @ 431.5 MHz
Test Mode - Constant Packet Mode
Test Spec - FCC Part 15.207 Limits and RSS-Gen Section 8.8 Limits
BEC Incorporated
AC Conducted Emissions
Graph - Line 1 Emissions
Amplitude
Frequency
Quasi-Peak Limit
Average Limit
Peak Emissions
Average Measurement
QP Measurement
03:05:31 PM, Wednesday, March 30, 2022

Tx @ High Channel, 436.6 MHz, Neutral Line

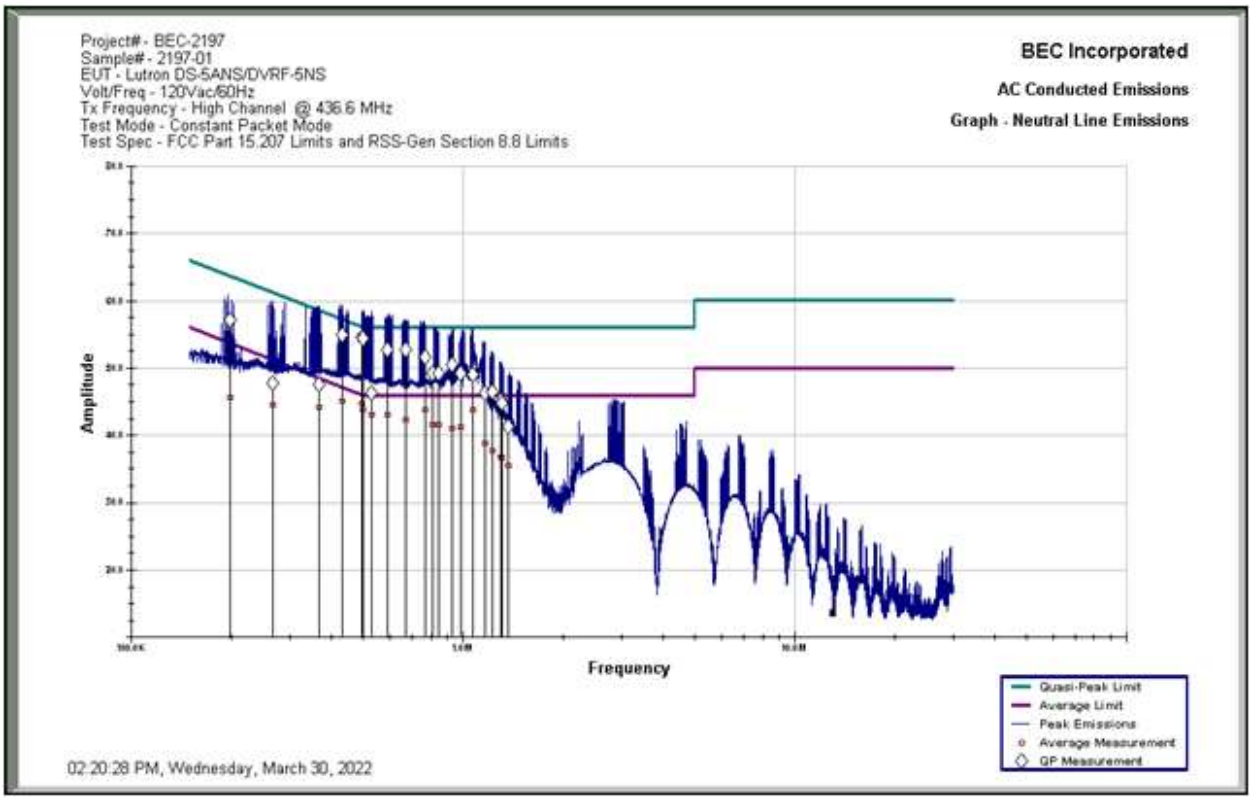
BEC Incorporated
Neutral Line Conducted Emissions
02:11:47 PM, Wednesday, March 30, 2022

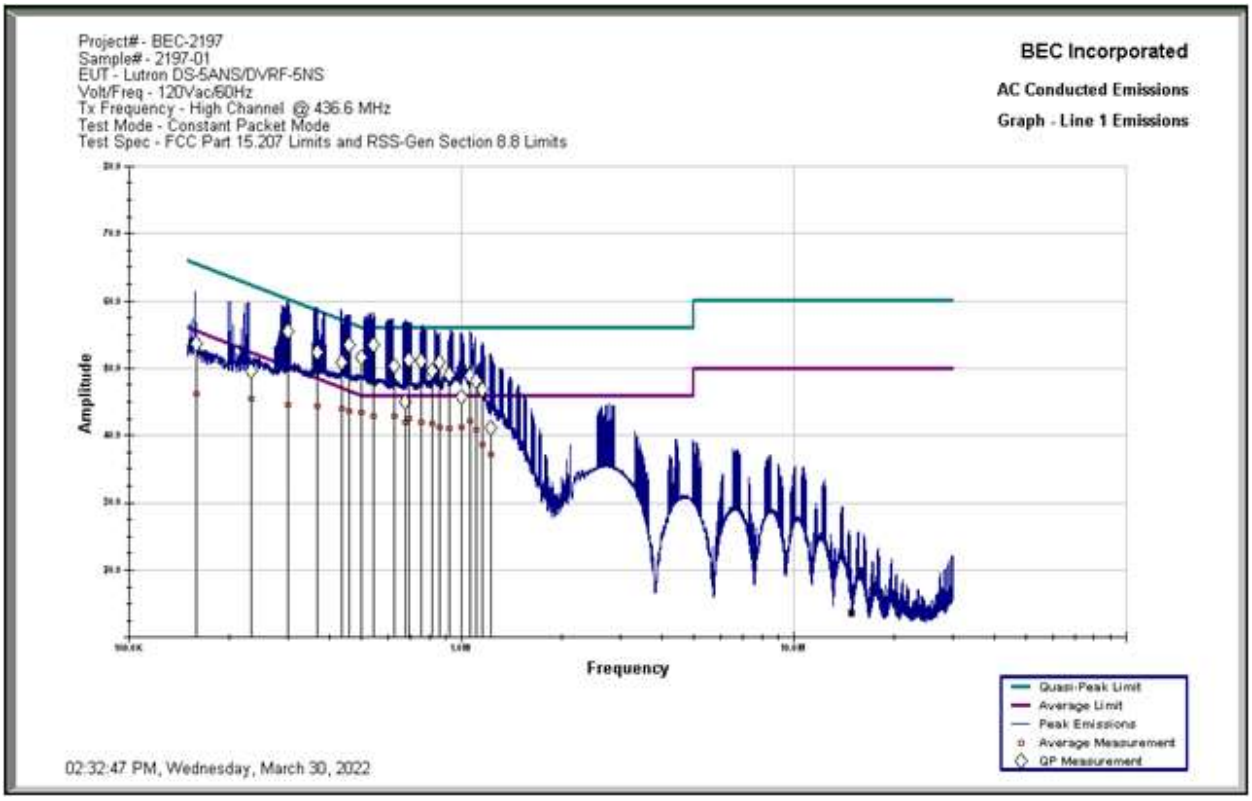
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
198.312 KHz	45.77	54.62	-8.85	57.13	64.62	-7.49	10.170
268.013 KHz	44.61	52.63	-8.02	47.69	62.63	-14.94	10.170
368.740 KHz	44.16	49.75	-5.59	47.54	59.75	-12.21	10.174
430.886 KHz	45.15	47.97	-2.82	54.98	57.97	-2.99	10.180
496.774 KHz	44.84	46.09	-1.25	54.63	56.09	-1.46	10.171
500.396 KHz	43.90	46.00	-2.10	54.30	56.00	-1.70	10.170
531.977 KHz	43.15	46.00	-2.85	46.23	56.00	-9.77	10.173
591.184 KHz	43.14	46.00	-2.86	52.72	56.00	-3.28	10.187
673.840 KHz	42.43	46.00	-3.57	52.63	56.00	-3.37	10.190
768.420 KHz	43.82	46.00	-2.18	51.53	56.00	-4.47	10.197
811.450 KHz	41.70	46.00	-4.30	49.30	56.00	-6.70	10.200
845.160 KHz	41.72	46.00	-4.28	49.27	56.00	-6.73	10.200
924.810 KHz	41.04	46.00	-4.96	50.43	56.00	-5.57	10.200
984.730 KHz	41.33	46.00	-4.67	49.21	56.00	-6.79	10.200
1.071 MHz	43.95	46.00	-2.05	49.10	56.00	-6.90	10.201
1.163 MHz	38.85	46.00	-7.15	46.25	56.00	-9.75	10.203
1.228 MHz	37.80	46.00	-8.20	46.55	56.00	-9.45	10.205
1.306 MHz	36.93	46.00	-9.07	45.23	56.00	-10.77	10.206
1.311 MHz	36.74	46.00	-9.26	44.87	56.00	-11.13	10.206
1.365 MHz	35.55	46.00	-10.45	41.38	56.00	-14.62	10.207
Project# - BEC-2197							
Sample# - 2197-01							
EUT - Lutron DS-5ANS/DVRF-5NS							
Volt/Freq - 120Vac/60Hz							
Tx Frequency - High Channel @ 436.6 MHz							

Tx @ High Channel, 436.6 MHz, Phase Line

BEC Incorporated
Line 1 Conducted Emissions
02:24:07 PM, Wednesday, March 30, 2022

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
159.147 KHz	46.35	55.74	-9.38	53.68	65.74	-12.06	10.180
232.477 KHz	45.54	53.64	-8.10	49.52	63.64	-14.12	10.180
300.539 KHz	44.63	51.70	-7.06	55.54	61.70	-6.16	10.180
367.401 KHz	44.36	49.79	-5.43	52.44	59.79	-7.35	10.183
436.264 KHz	44.06	47.82	-3.76	50.81	57.82	-7.01	10.197
458.728 KHz	43.79	47.18	-3.39	53.48	57.18	-3.70	10.198
501.391 KHz	43.46	46.00	-2.54	51.64	56.00	-4.36	10.190
544.284 KHz	43.04	46.00	-2.96	53.37	56.00	-2.63	10.194
630.594 KHz	43.03	46.00	-2.97	50.26	56.00	-5.74	10.200
676.700 KHz	42.01	46.00	-3.99	45.01	56.00	-10.99	10.200
696.950 KHz	42.57	46.00	-3.43	51.16	56.00	-4.84	10.200
758.670 KHz	42.14	46.00	-3.86	51.04	56.00	-4.96	10.206
818.890 KHz	41.85	46.00	-4.15	49.62	56.00	-6.38	10.210
858.810 KHz	41.22	46.00	-4.78	50.93	56.00	-5.07	10.212
918.990 KHz	41.09	46.00	-4.91	48.95	56.00	-7.05	10.220
1.003 MHz	41.38	46.00	-4.62	45.75	56.00	-10.25	10.220
1.063 MHz	42.15	46.00	-3.85	48.84	56.00	-7.16	10.221
1.105 MHz	40.88	46.00	-5.12	48.06	56.00	-7.94	10.222
1.156 MHz	38.67	46.00	-7.33	46.88	56.00	-9.12	10.223
1.222 MHz	37.33	46.00	-8.67	41.16	56.00	-14.84	10.224
Project# - BEC-2197							
Sample# - 2197-01							
EUT - Lutron DS-5ANS/DVRF-5NS							
Volt/Freq - 120Vac/60Hz							
Tx Frequency - High Channel @ 436.6 MHz							


Project# - BEC-2197
Sample# - 2197-01
EUT - Lutron DS-5ANS/DVRF-5NS
Volt/Freq - 120Vac/60Hz
Tx Frequency - High Channel @ 436.6 MHz
Test Mode - Constant Packet Mode
Test Spec - FCC Part 15.207 Limits and RSS-Gen Section 8.8 Limits
BEC Incorporated
AC Conducted Emissions
Graph - Neutral Line Emissions
Amplitude
Frequency
Quasi-Peak Limit
Average Limit
Peak Emissions
Average Measurement
QP Measurement
02:20:28 PM, Wednesday, March 30, 2022


Project# - BEC-2197
Sample# - 2197-01
EUT - Lutron DS-5ANS/DVRF-5NS
Volt/Freq - 120Vac/60Hz
Tx Frequency - High Channel @ 436.6 MHz
Test Mode - Constant Packet Mode
Test Spec - FCC Part 15.207 Limits and RSS-Gen Section 8.8 Limits
BEC Incorporated
AC Conducted Emissions
Graph - Line 1 Emissions
Amplitude
Frequency
Quasi-Peak Limit
Average Limit
Peak Emissions
Average Measurement
QP Measurement
02:32:47 PM, Wednesday, March 30, 2022

Rx Mode Neutral Line

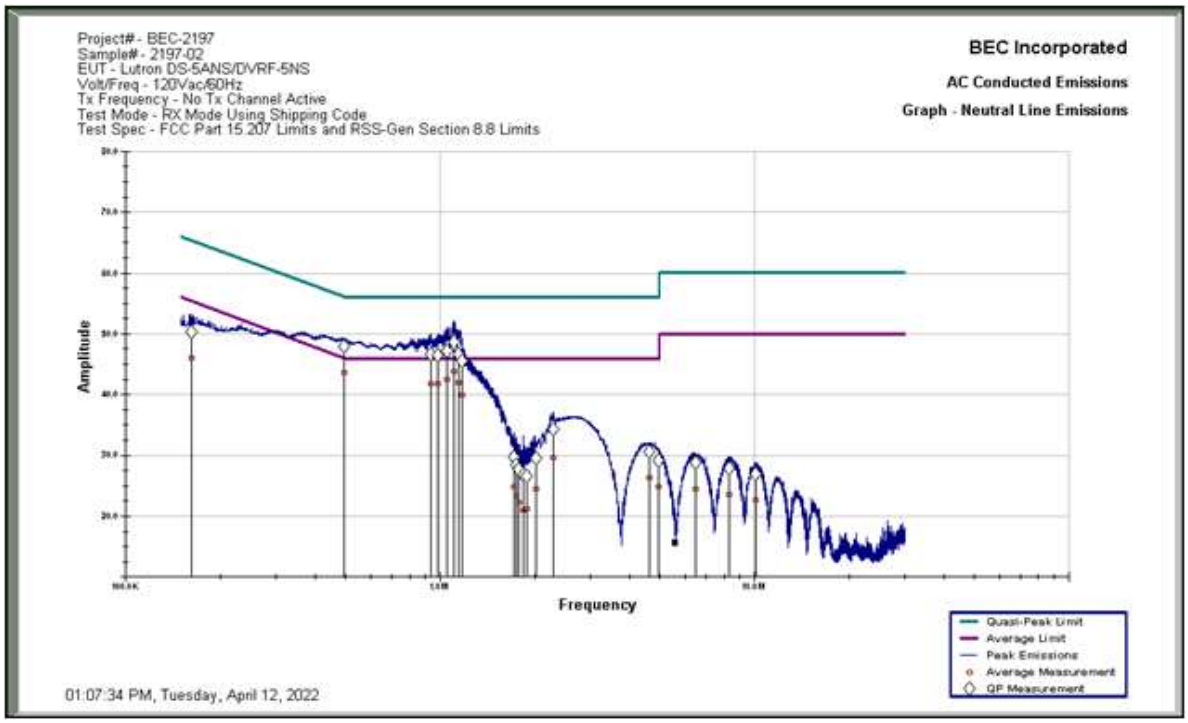
BEC Incorporated
Neutral Line Conducted Emissions
12:59:32 PM, Tuesday, April 12, 2022

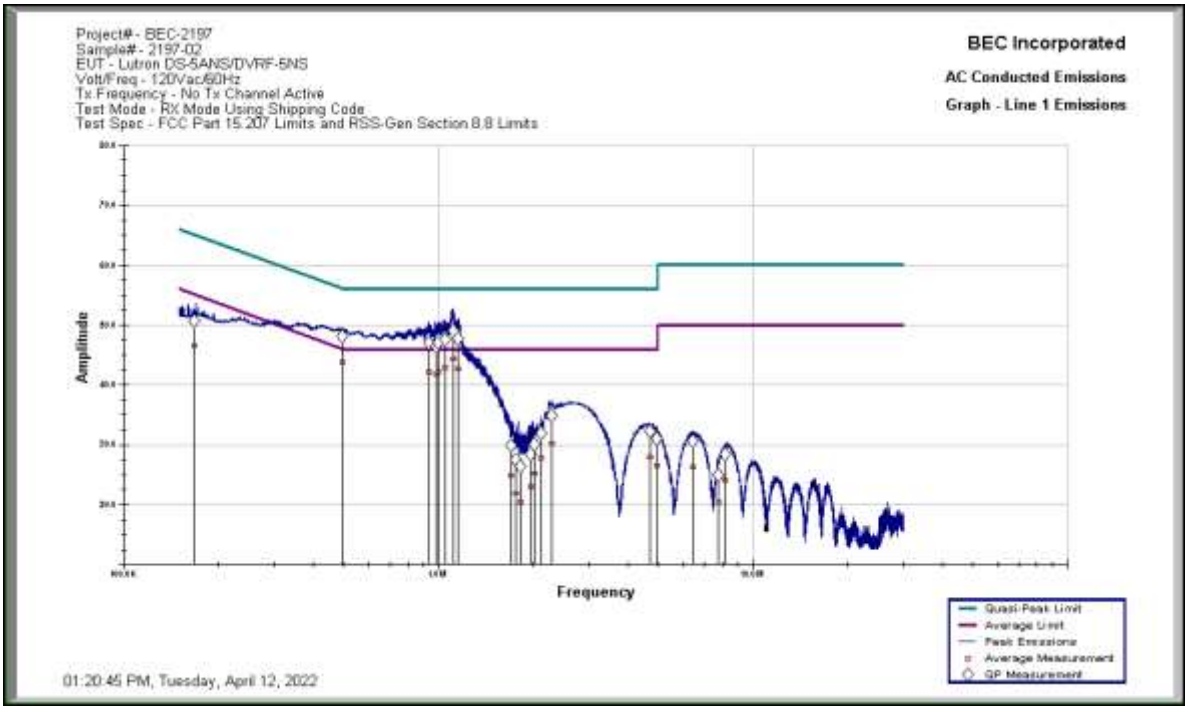
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
162.314 KHz	46.07	55.65	-9.57	50.39	65.65	-15.26	10.170
497.394 KHz	43.69	46.07	-2.39	47.90	56.07	-8.17	10.171
932.320 KHz	41.93	46.00	-4.07	46.72	56.00	-9.28	10.200
986.630 KHz	41.94	46.00	-4.06	46.52	56.00	-9.48	10.200
1.050 MHz	42.65	46.00	-3.35	47.24	56.00	-8.76	10.201
1.106 MHz	43.86	46.00	-2.14	48.61	56.00	-7.39	10.202
1.145 MHz	41.96	46.00	-4.04	46.72	56.00	-9.28	10.203
1.171 MHz	40.11	46.00	-5.89	45.54	56.00	-10.46	10.203
1.725 MHz	24.91	46.00	-21.09	29.69	56.00	-26.31	10.224
1.742 MHz	23.45	46.00	-22.55	28.46	56.00	-27.54	10.225
1.785 MHz	22.39	46.00	-23.61	27.76	56.00	-28.24	10.226
1.847 MHz	21.04	46.00	-24.96	26.71	56.00	-29.29	10.227
1.885 MHz	21.19	46.00	-24.81	26.60	56.00	-29.40	10.228
2.020 MHz	24.51	46.00	-21.49	29.46	56.00	-26.54	10.231
2.293 MHz	29.63	46.00	-16.37	34.23	56.00	-21.77	10.245
4.635 MHz	26.45	46.00	-19.55	30.69	56.00	-25.31	10.335
4.956 MHz	24.86	46.00	-21.14	29.19	56.00	-26.81	10.348
6.497 MHz	24.52	50.00	-25.48	28.83	60.00	-31.17	10.404
8.296 MHz	23.67	50.00	-26.33	27.96	60.00	-32.04	10.479
10.102 MHz	22.79	50.00	-27.21	26.99	60.00	-33.01	10.550
Project# - BEC-2197							
Sample# - 2197-02							
EUT - Lutron DS-5ANS/DVRF-5NS							
Volt/Freq - 120Vac/60Hz							
Tx Frequency - No Tx Channel Active							

Rx Mode Phase Line

BEC Incorporated
Line 1 Conducted Emissions
01:12:41 PM, Tuesday, April 12, 2022

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
167.804 KHz	46.58	55.49	-8.91	50.68	65.49	-14.81	10.180
494.855 KHz	43.94	46.15	-2.20	48.18	56.15	-7.97	10.191
932.390 KHz	42.30	46.00	-3.70	46.97	56.00	-9.03	10.220
980.720 KHz	41.87	46.00	-4.13	46.50	56.00	-9.50	10.220
1.005 MHz	42.21	46.00	-3.79	47.07	56.00	-8.93	10.220
1.049 MHz	42.95	46.00	-3.05	47.52	56.00	-8.48	10.221
1.113 MHz	44.38	46.00	-1.62	49.06	56.00	-6.94	10.222
1.157 MHz	42.87	46.00	-3.13	47.66	56.00	-8.34	10.223
1.708 MHz	24.86	46.00	-21.14	29.83	56.00	-26.17	10.234
1.763 MHz	21.98	46.00	-24.02	27.59	56.00	-28.41	10.235
1.825 MHz	20.58	46.00	-25.42	26.47	56.00	-29.53	10.239
1.969 MHz	23.14	46.00	-22.86	28.39	56.00	-27.61	10.249
2.018 MHz	25.23	46.00	-20.77	30.07	56.00	-25.93	10.251
2.129 MHz	27.80	46.00	-18.20	32.00	56.00	-24.00	10.256
2.296 MHz	30.20	46.00	-15.80	34.80	56.00	-21.20	10.265
4.692 MHz	27.99	46.00	-18.01	32.25	56.00	-23.75	10.354
4.949 MHz	26.63	46.00	-19.37	30.92	56.00	-25.08	10.359
6.431 MHz	26.47	50.00	-23.53	30.70	60.00	-29.30	10.420
7.792 MHz	20.50	50.00	-29.50	24.95	60.00	-35.05	10.471
8.175 MHz	24.13	50.00	-25.87	28.45	60.00	-31.55	10.484
Project# - BEC-2197							
Sample# - 2197-02							
EUT - Lutron DS-5ANS/DVRF-5NS							
Volt/Freq - 120Vac/60Hz							
Tx Frequency - No Tx Channel Active							





Results: The Lutron Models DS-5ANS / DVRF-5NS Samples 2197-01 and 2197-02 comply with the requirements of FCC Part 15.207 and RSS-Gen Section 8.8. The margin is 1.14 dB @ 504.772 kHz with Sample #2197-01 transmitting Low Channel, 431.5 MHz, Neutral Line.

5.0 EUT and Test Setup Pictures

5.1 EUT Pictures Are Included in The Grant Submission

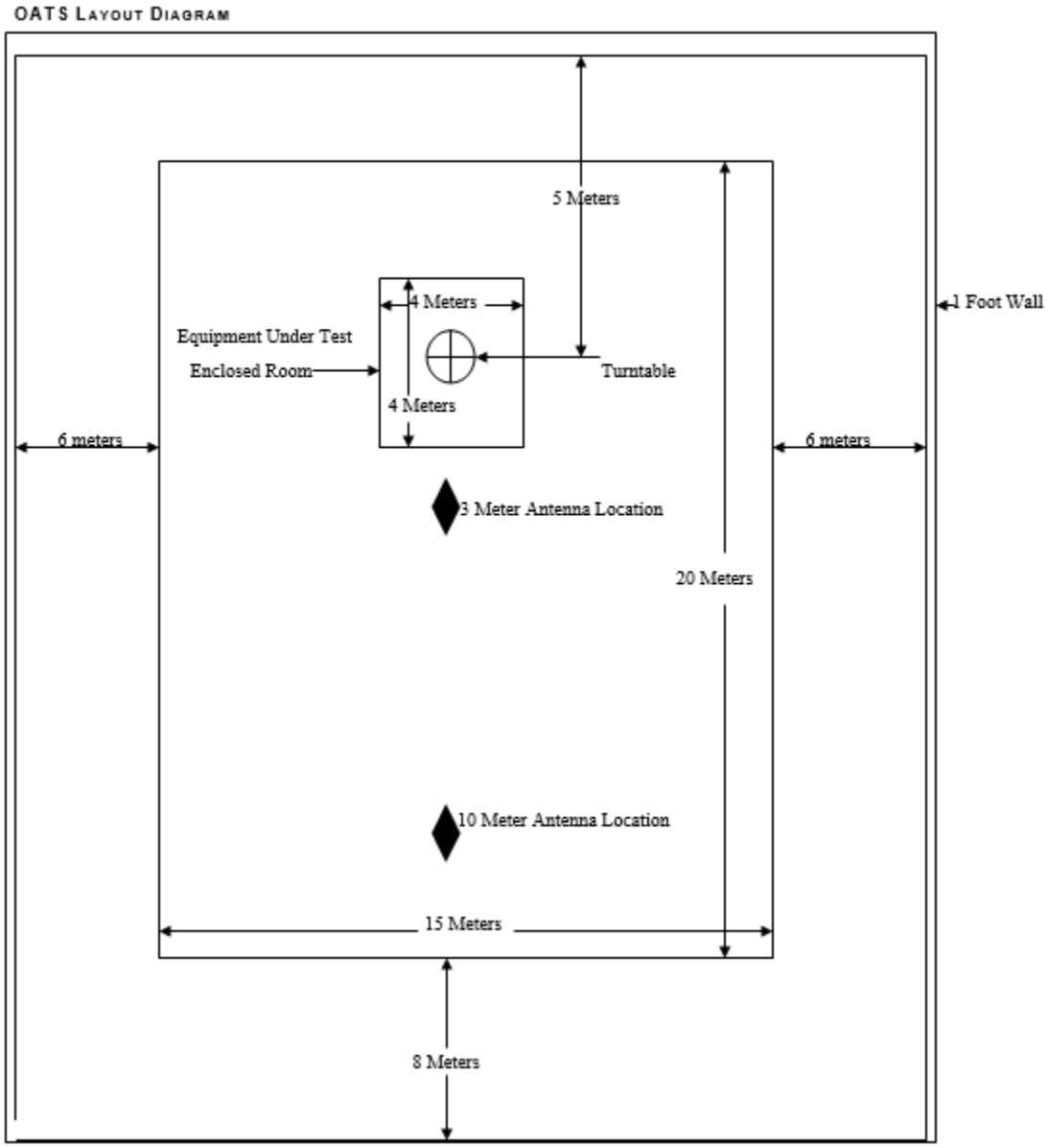
5.2 Test Setup Pictures Are Included in The Grant Submission

Appendix A – Test Equipment

Equipment	Manufacturer	Model #	Serial #	BEC #	Calibration Date	Calibration Cycle	Calibration Due Date
Antenna (30 MHz - 6 GHz)	Sunol Sciences	JB6	A022108	712	06/21/21	3 Years	06/21/24
EMI Receiver (20 Hz – 26.5 GHz)	Rohde & Schwarz	ESIB 26	836119/006	1010	07/02/19	3 Years	07/02/22
OATS Site (30 MHz – 1 GHz)	BEC	N/A	N/A	705	09/30/21	1 Year	09/30/22
Antenna (30 MHz - 6 GHz)	Sunol Sciences	JB6	A020714	882	05/24/21	3 Years	05/24/24
EMC Analyzer (9 kHz - 3 GHz)	Agilent	E7402A	US39440162	883	06/21/21	3 Years	06/21/24
Amplifier (.09 – 1300 MHz)	Hewlett Packard	8447F	3313A06658	807	01/13/21	2 Years	01/13/23
EMC Analyzer (9 kHz - 26.5 GHz)	Hewlett Packard	8593EM	3710A00214	1026	03/23/20	3 Years	03/23/23
Amplifier System (0.5 – 50 GHz)	Hewlett Packard	83015A 83017A	3123A00360 & 3332A00219	1027	10/13/20	2 Years	10/13/22
Double Ridged Horn Antenna (1 - 18 GHz)	EMCO	3115	9705-5225	1028	11/24/21	3 Years	11/24/24

EMI Receiver (9 kHz - 6.5 GHz)	Hewlett Packard	8546A	3325A00158	761	12/20/19	3 Years	12/20/22
Amplifier (.1 – 1300 MHz)	Hewlett Packard	8447D Opt 010	2944A08512	887	01/14/21	2 Years	01/14/23
Conducted Emissions Cable	Pasternack	CE-01	N/A	802	10/15/20	3 Years	10/15/23
Four Line V-LISN	TESEQ	NNB 52	253551	950	06/18/19	3 Years	06/18/22
Shielded Room #1	ETS Lindgren	12-2/2-0	4078	859	08/17/19	3 Years	08/17/22
Software (TILE)	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

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.