



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 Model DS-6WCL
Vogelkop RF Wireless Dimmer**

REPORT BEC-2185-01 REV1

TEST DATES: 01/27/2022 – 02/10/2022

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

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Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	02/16/2022
1	Revised Table in Section 4.3.5.1 Field Strength of Fundamental Emissions to Reflect the Corrected Ave Measurement	03/24/2022	03/24/2022



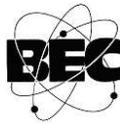
1.0 Administrative Information

1.1 General Project Details

Project Number	BEC-2185
Manufacturer	Lutron Electronics
Model Number Tested	DS-6WCL
EUT Sample Type	FCC Test Code Radiated Sample
EUT Serial Number	030A55C1
EUT Sample Number	2185-01
EUT Firmware Version	2.01
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	01/26/2022
Sample Type and Condition Received	Production Unit Ready for Test
EUT Description	Vogelkop Wireless RF Dimmer
FCC ID	JPZ0139
ISED ID	2851A- JPZ0139
ISED HVIN	WCL-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 # 5261121



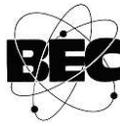
1.4 Measurement Uncertainty

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 than 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.

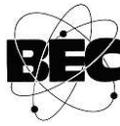


1.5 Test Result Summary Table

The Lutron DS-6WCL Eagle Owl Remote Blind Controller 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:

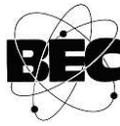
Temperature: $22^{\circ}\text{C} \pm 5^{\circ}\text{C}$

Humidity: $50\% \pm 20\%$

Barometric Pressure: $1010 - 1050\text{ mb} \pm 20\%$

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 DS-6WCL is a wall-mounted, AC lighting control. The device can control LED and CFL lights up to 150 Watts. Also, Halogen and Incandescent lights up to 600 Watts. The dimmer can be controlled from a smartphone when used with the Lutron Smart Bridge.

The Lutron Model DS-6WCL uses a Lutron Designed Transceiver Radio which operates momentarily in the 431 MHz to 437 MHz frequency range.

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 Configuration

The Lutron Model DS-6WCL 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.

Continuous Packet was used during occupied bandwidth measurements.

Streaming Data 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.

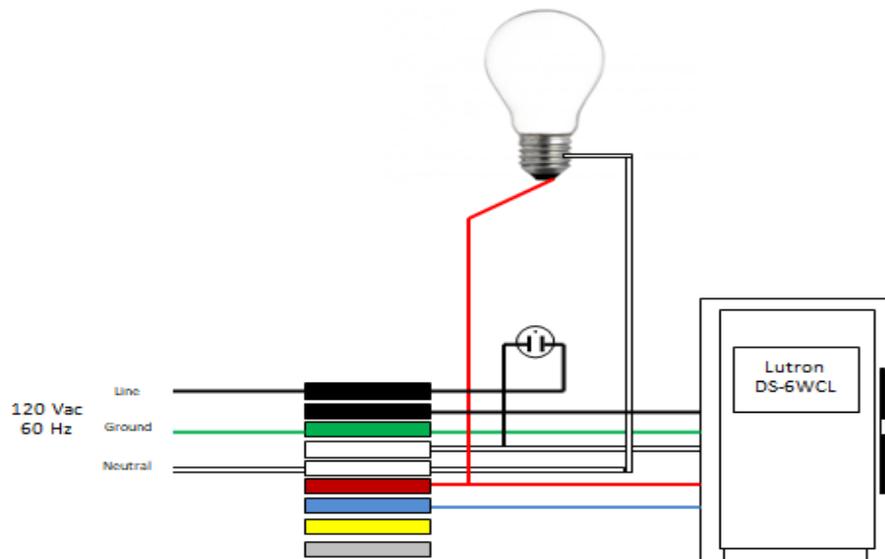


2.5 Test Configuration Rationale

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-6WCL	030A55C1	2.01	2185-01

Support Equipment

EUT Description	Manufacturer	Model	Serial Number
Porcelain Bulb Socket	Lutron	NOM05	None
Light Bulb	MaxLite	E15A19027/4P/WS1	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 or 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 Model DS-6WCL 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 Model DS-6WCL 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

¹Linear 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 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 an 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 (dB μ V/m) = Meter Reading (dB μ V) + 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 Model DS-6WCL transmitting at low frequency of 431.5 MHz and high frequency of 436.6 MHz. The transmit frequencies were configured in Continuous Constant Packet Test 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 RF Dimmer		
Manufacturer/Model	Lutron Model DS-6WCL		
Sample Number	2185-01		
Port Tested	Enclosure		
Test Date(s)	02/01/2022	01/27/2022	01/31/2022
Temperature	20°C	20°C	21°C
Humidity	33% RH	34% RH	39% RH
EUT Power	120 Vac / 60 Hz		

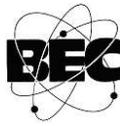
4.3.4 Radiated Emissions 9 kHz – 30 MHz Test Results (02/01/2022)

Measurements were made in the frequency range of 9 kHz to 30 MHz with the Lutron Model DS-6WCL 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 were noise floor measurements. The table below depicts the highest measured levels, with antenna perpendicular to the EUT, transmitting at 431.5 MHz. All other polarizations and transmit frequencies and receive modes showed noise floor measurements.

Frequency	Peak Level	QP Level	Azimuth	Ant Height	Corr. Factor	Limit	QP Margin	Result
MHz	dBuV/m	dBuV/m	degrees	cm	dB	dBuV/m	db	
1.3693	35.62	36.49	000	100	-19.15	71.49	-35.00	Pass
1.5196	32.19	31.26	000	100	-19.14	67.67	-36.41	Pass
1.5977	30.24	30.59	001	100	-19.13	65.69	-35.11	Pass
1.6584	30.26	30.36	000	100	-19.13	64.15	-33.79	Pass
1.6895	28.56	30.14	001	100	-19.12	63.36	-33.22	Pass
1.7046	29.03	30.24	000	100	-19.12	62.98	-32.74	Pass

Test Results: The Lutron, Model DS-6WCL Vogelkop Wireless RF Dimmer, 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 32.74 dB.



4.3.5 Radiated Emissions 30 – 6000 MHz Test Results (01/27/2022 to 01/31/2022)

Measurements were made in the frequency range of 30 MHz to 1000 MHz with the Lutron Model DS-6WCL 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 (01/27/2022)

The tables below show the measured field strength of the fundamental frequencies. Comparison measurements were made with no modulation and Streaming Data 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 Ave	FCC Part 15.231 Limit	Margin	Result
	MHz	dBuV/m	H/V	degrees	cm	dB	dB	dBuV/m	dBuV/m	(dB)	
CW	431.5	98.07	H	281	260	-3.034	-19.94	78.13	80.75	-2.62	Pass
CW	431.5	99.17	V	342	100	-3.034	-19.94	79.23	80.75	-1.52	Pass
Cstream	431.5	98.47	H	280	260	-3.034	-19.94	78.53	80.75	-2.22	Pass
Cstream	431.5	99.47	V	342	106	-3.034	-19.94	79.53	80.75	-1.22	Pass
CW	436.6	94.69	H	276	260	-2.85	-19.94	74.75	80.91	-6.16	Pass
CW	436.6	97.35	V	348	109	-2.85	-19.94	77.41	80.91	-3.50	Pass
Cstream	436.6	95.21	H	276	260	-2.85	-19.94	75.27	80.91	-5.64	Pass
Cstream	436.6	97.55	V	331	108	-2.85	-19.94	77.61	80.91	-3.30	Pass

Test Results: The Lutron Model DS-6WCL Vogelkop Wireless RF Dimmer, BEC Sample #2185-01, 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 1.22 dB.



4.3.5.2 Field Strength of Spurious Emissions, 2nd Harmonic (01/28/2022 and 01/31/2022)

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)	
862.958	31.82	28.81	H	208	136	3.37	61.94	-33.13	Pass
863.045	29.50	28.88	V	132	136	3.37	61.94	-33.06	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)	
873.112	36.43	35.45	H	110	102	3.44	61.94	-26.49	Pass
873.104	46.1	45.46	V	341	115	3.44	61.94	-16.48	Pass

Test Results: The Lutron Model DS-6WCL Vogelkop Wireless RF Dimmer, BEC Sample #2185-01, 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 16.48 dB.



4.3.5.3 Spurious Radiated Emissions 1 – 5 GHz Test Results (01/31/2022)

Measurements were made in the frequency range of 1 GHz to 5 GHz with the Lutron Model DS-6WCL transmitting at low frequency of 431.5 MHz and high frequency of 436.6 MHz. The transmit frequencies were configured in Streaming Data Mode.

Only the spurious harmonic signals, related to the transmit frequency, were detected in the range between 1.0 and 5.0 GHz. 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	Peak Level	Average Level	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC 15.231 or 15.205 Limit		Margin		Result
							Peak	Average	Peak	Average	
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dBuV/m	dB	dB	
1.2946	42.36	39.92	V	194	192	-11.64	81.94	61.94	-39.58	-22.02	Pass
1.2947	44.80	42.39	H	064	121	-11.64	81.94	61.94	-37.14	-19.55	Pass
2.1576	39.58	34.94	H	227	243	-6.63	81.94	61.94	-42.36	-27.00	Pass
2.1699	33.01	23.73	V	350	100	-6.61	81.94	61.94	-48.93	-38.21	Pass
3.88327*	45.79	40.72	H	026	101	0.42	73.98	53.98	-28.19	-13.26	Pass

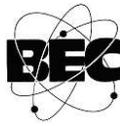
*Restricted Band Signal

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

Frequency	Peak Level	Average Level	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	FCC 15.231 or 15.205 Limit		Margin		Result
							Peak	Average	Peak	Average	
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dBuV/m	dB	dB	
1.30988*	42.57	39.66	V	305	101	-11.56	73.98	53.98	-31.41	-14.32	Pass
2.1832	45.21	41.61	V	174	161	-6.58	81.94	61.94	-36.73	-20.33	Pass
3.92971*	54.30	49.43	H	016	151	0.57	73.98	53.98	-19.68	-4.55	Pass
4.34631*	37.12	26.95	H	324	211	0.32	73.98	53.98	-36.86	-27.03	Pass
4.36379*	36.82	26.88	V	360	104	0.36	73.98	53.98	-37.16	-27.10	Pass

*Restricted Band Signal

Test Results: The Lutron Model DS-6WCL Eagle Owl Remote Blind Controller BEC Sample #2185-01 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 4.55 dB at 3.92971 GHz.



4.4 Duty Cycle Measurement (ANSI C63.10)

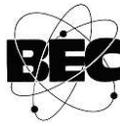
4.4.1 Duty Cycle Measurement – Test Procedure

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 Model DS-6WCL 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-6WCL Sample 2185-01.

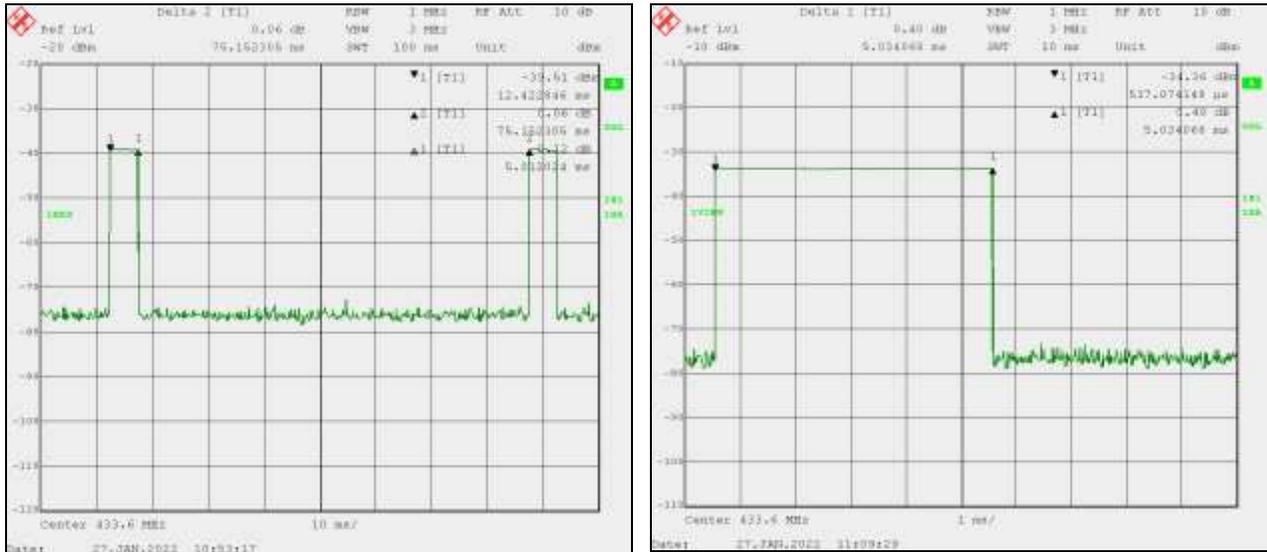
4.4.2 Duty Cycle Measurement General Test Information

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

Frequency Range	433.6 MHz
Test Standards	ANSI C63.10, 11.6
Class Limits	None
EUT Type	Vogelkop Wireless RF Dimmer
Manufacturer/Model	Lutron Model DS-6WCL
Sample Number	2185-01
Temperature	20°C
Humidity	33% RH
EUT Power	120 Vac / 60 Hz
Test Date(s)	01/27/2022



4.4.3 Duty Cycle Measurement Test Results (01/27/2022)



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	5.034	ms
Repetition (within 100 ms window)	2	
Total (in 100 ms)	10.068	ms
Period (T)	100	ms
Duty Cycle = On Time / T (100 ms)	0.1007	
	10.07	%
Duty Cycle Correction = $20 \cdot \log(\text{On Time}/\text{Period})$	-19.94	dB

Test Results: The duty cycle measurement of the Lutron Model DS-6WCL Eagle Owl Remote Blind Controller BEC Sample #2185-01 produces a value of 10.07 %. The calculated Duty Cycle Correction Factor is 19.94 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

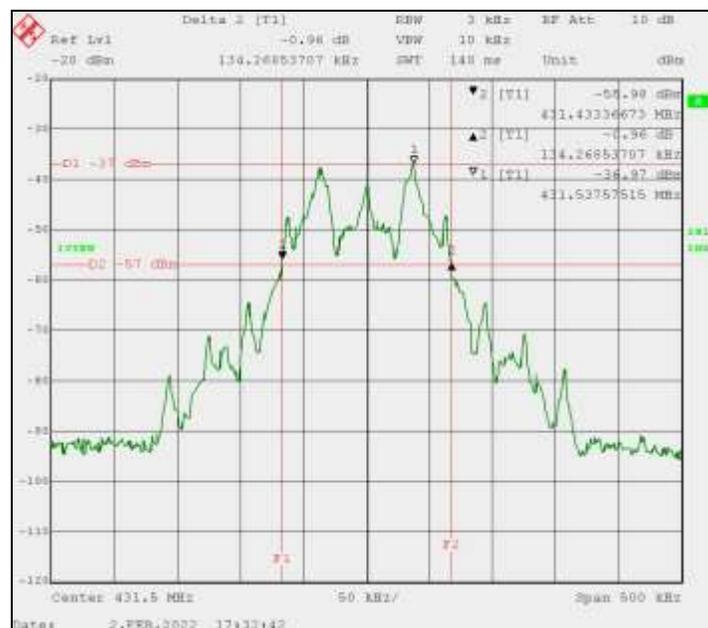
The 20 dB Bandwidth was measured by using the methods called out for in FCC Part 15.231(c) and RSS-210 A.1.23. The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. The Transmit frequencies of 431.5 MHz and 436.6 MHz were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

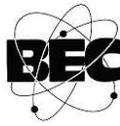
4.5.2 20 dB Bandwidth Measurement General Test Information

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 RF Dimmer
Manufacturer/Model	Lutron Model DS-6WCL
Sample Number	2185-01
Temperature / Humidity	23°C / 32%
EUT Power	120 Vac / 60 Hz
Test Date	02/02/2022

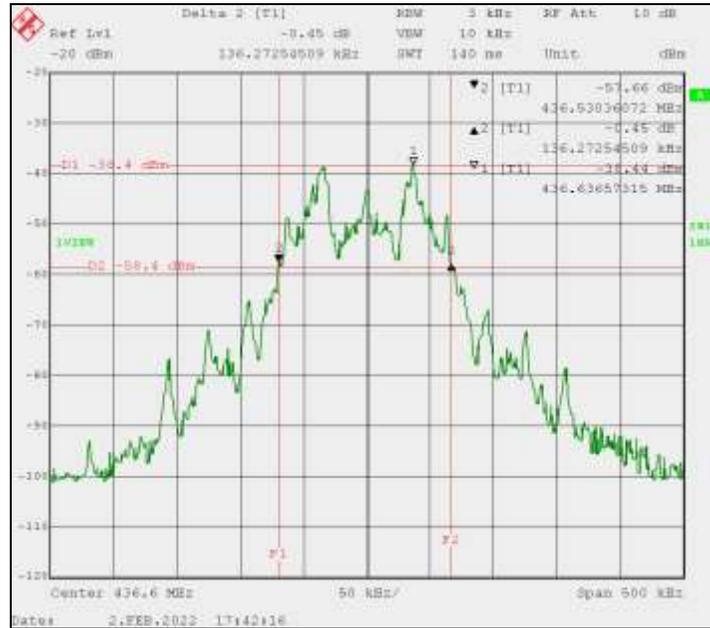
4.5.3 20 dB Bandwidth Measurement Test Results (02/02/2022)

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



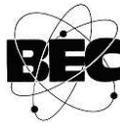


TX FREQUENCY OF 436.6 MHZ, (CP) CONSTANT PACKET MODE



Frequency	Modulation	Measured BW	FCC 15.231 20 dB BW Limit	BW Margin	Result
MHz		kHz	kHz	kHz	
431.5	Constant Packet	134.26	1078.75	-944.49	Pass
436.6		136.27	1091.5	-955.23	Pass

Test Results: The Lutron Model DS-6WCL Vogelkop RF Wireless Dimmer, BEC Sample #2185-01 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

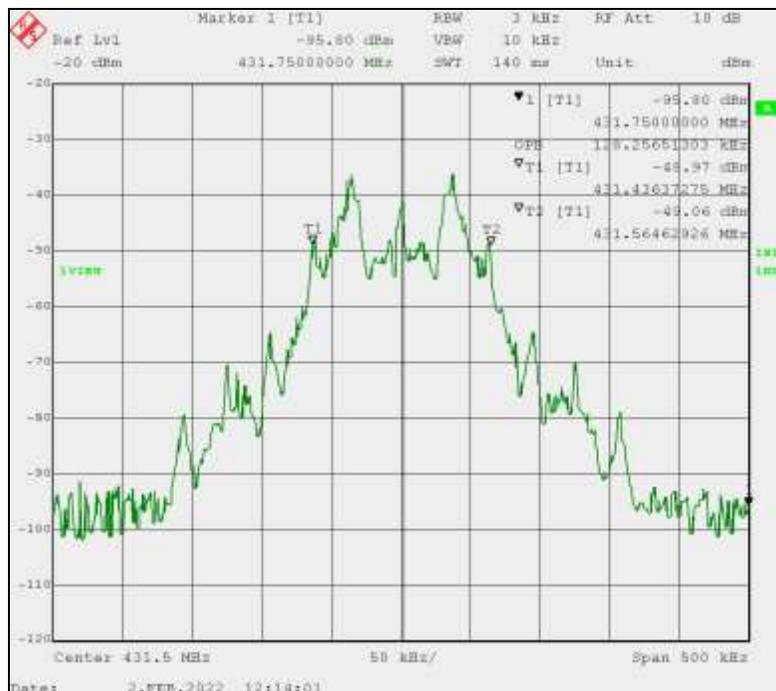
The 99% Occupied Bandwidth was measured using the specifications of RSS-Gen Section 6.7. Below are the screen captures and tables related to the 99% Occupied Bandwidth measurements. The Transmit frequencies of 431.5 MHz and 436.6 MHz were tested with the radio programmed to transmit in Continuous Packet 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 Dimmer
Manufacturer/Model	Lutron Model DS-6WCL
Sample Number	2185-01
Temperature / Humidity	23°C / 32%
EUT Power	120 Vac / 60 Hz
Test Date	02/02/2022

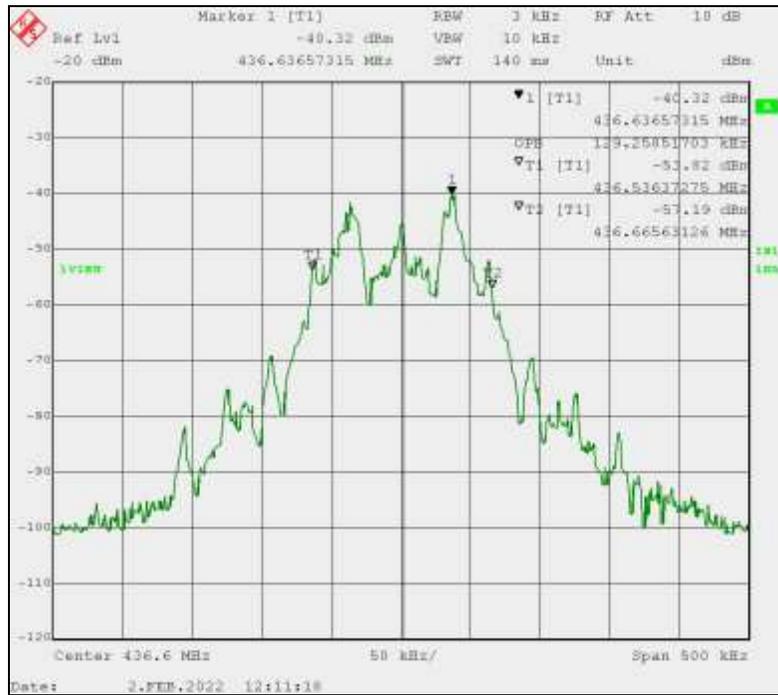
4.6.3 99% Occupied Bandwidth Measurement Test Results (02/02/2022)

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





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



Frequency	Modulation	99% Measured BW
MHz		kHz
431.5	Constant	128.26
436.6	Packet	129.26

Test Results: The Lutron Model DS-6WCL Vogelkop RF Wireless Dimmer, BEC Sample #2185-01 has a maximum 99% Occupied Bandwidth of 129.26 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 deactivate 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 Model DS-6WCL 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-6WCL Sample 2185-01.

4.7.2 Automatic Deactivation Testing General Test Information

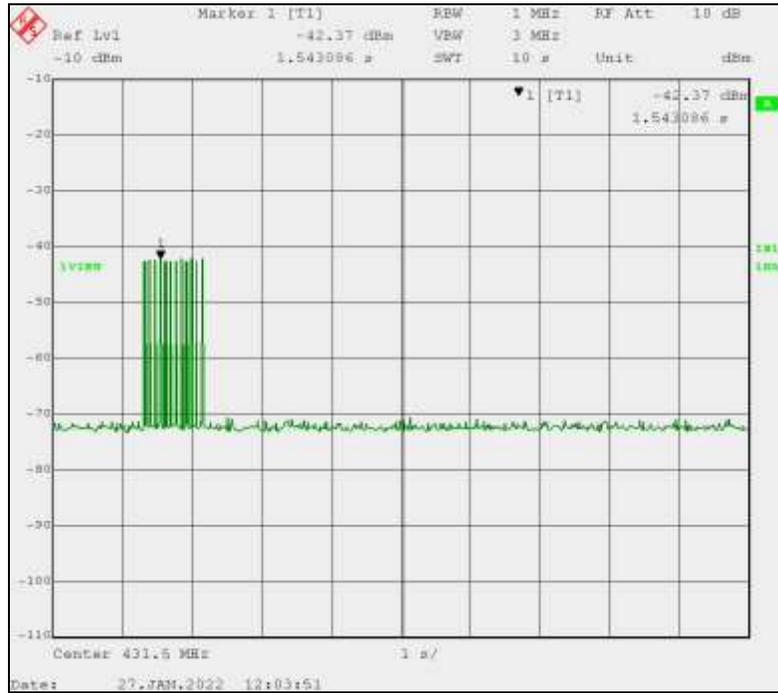
The following information is related to the testing performed for Automatic Deactivation.

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 Dimmer
Manufacturer/Model	Lutron Model DS-6WCL
Sample Number	2185-02
Temperature	20°C
Humidity	33%
EUT Power	120 Vac / 60 Hz
Test Date	01/27/2022



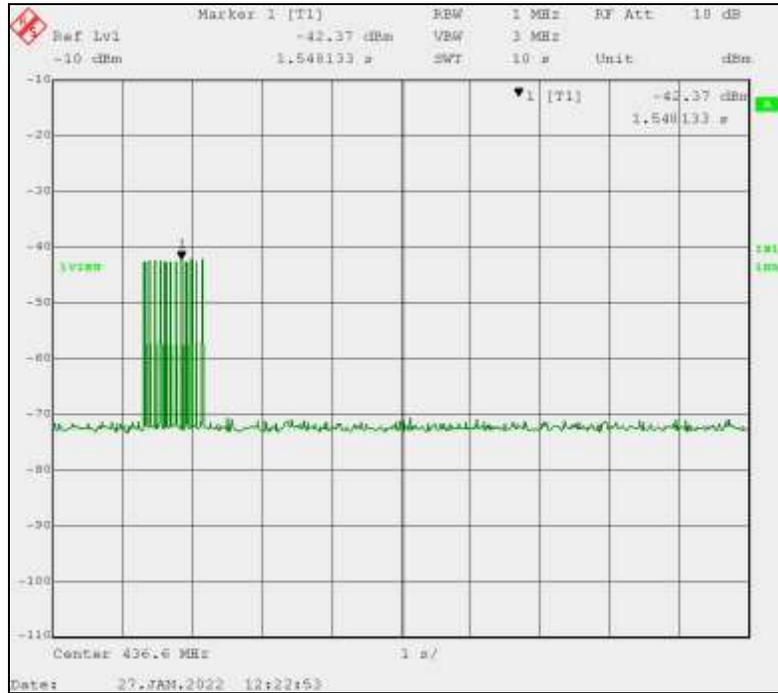
4.7.3 Deactivation Testing Test Results (01/27/2022)

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 Model DS-6WCL Vogelkop RF Wireless Dimmer, BEC Sample #2185-02 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 μ H 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 (dB μ V) = Meter Reading (dB μ v) + Cable Loss (dB) + LISN Factor (dB) + Limiter Loss (dB)

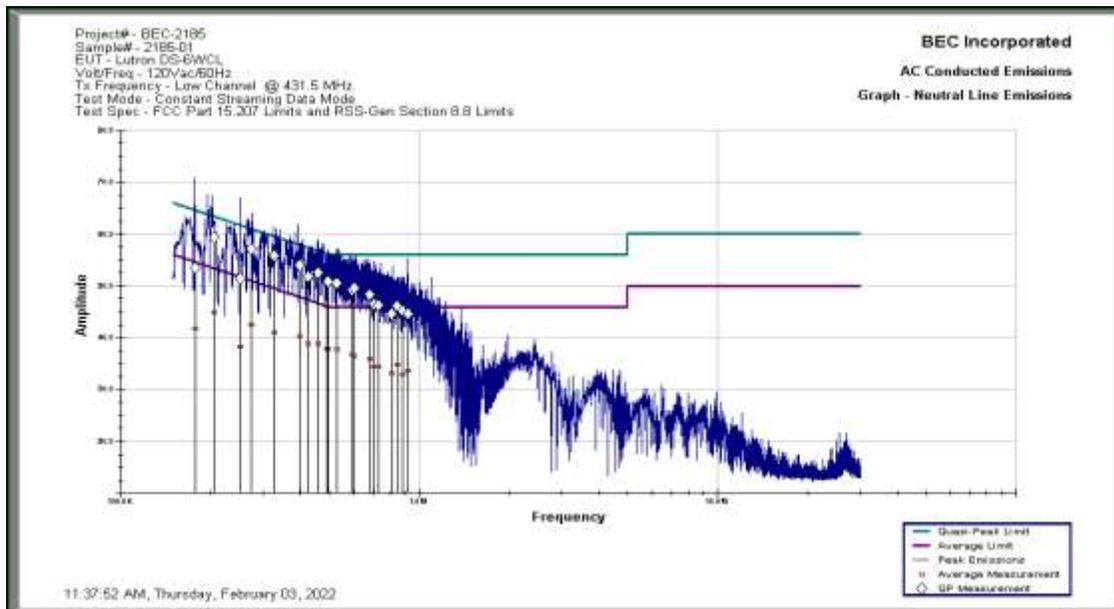
The Lutron DS-6WCL was powered by 120 Vac / 60 Hz. The Transmit frequencies of 431.5 MHz and 436.6 MHz were tested with the radio programmed to transmit in Continuous Packet Mode.

Fundamental Frequencies	431.5 MHz and 436.6 MHz
Test Standards / Limits	47 CFR 15.207 and RSS-Gen, 8.8
EUT Type	Vogelkop Wireless RF Dimmer
Manufacturer/Model	Lutron Model DS-6WCL
Sample Number	2185-01
Temperature / Humidity	21°C / 37%
EUT Power	120 Vac / 60 Hz
Test Date	02/03/2022



TX Frequency 431.5 MHz: Neutral Line

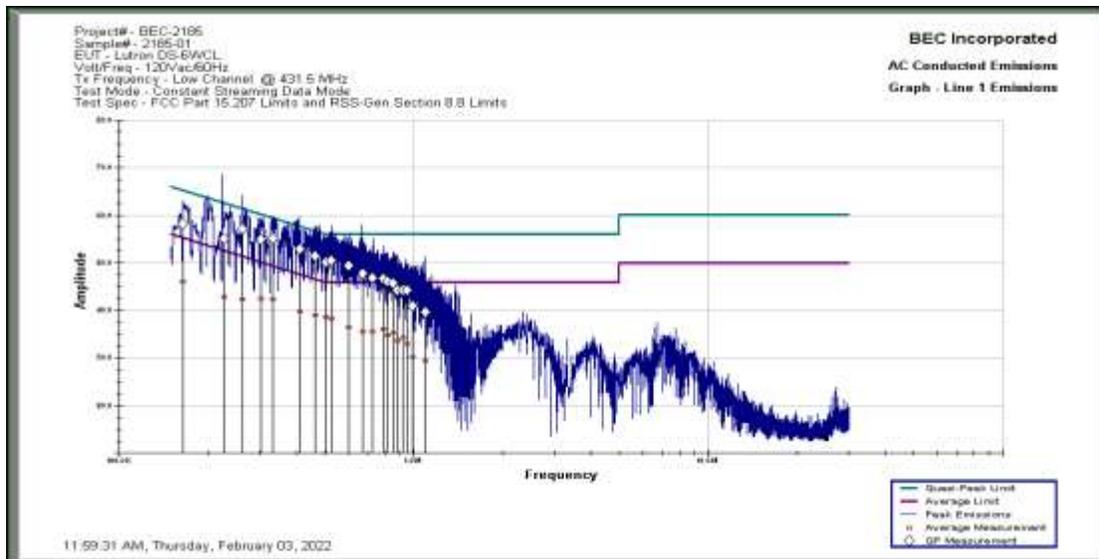
BEC Incorporated							
Neutral Line Conducted Emissions							
11:37:52 AM, Thursday, February 03, 2022							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
177.560 KHz	41.81	55.21	-13.40	53.46	65.21	-11.75	10.170
204.937 KHz	45.05	54.43	-9.38	59.38	64.43	-5.05	10.170
251.314 KHz	38.36	53.11	-14.74	51.43	63.11	-11.68	10.170
273.809 KHz	42.65	52.46	-9.81	57.08	62.46	-5.38	10.170
327.386 KHz	41.13	50.93	-9.80	55.90	60.93	-5.03	10.170
396.077 KHz	40.45	48.97	-8.52	54.06	58.97	-4.91	10.179
425.177 KHz	38.84	48.14	-9.30	51.84	58.14	-6.30	10.180
460.245 KHz	38.98	47.14	-8.15	52.62	57.14	-4.52	10.178
493.235 KHz	37.98	46.19	-8.21	50.85	56.19	-5.34	10.171
494.544 KHz	37.88	46.16	-8.28	50.94	56.16	-5.21	10.171
530.894 KHz	37.89	46.00	-8.11	50.52	56.00	-5.48	10.173
594.280 KHz	36.92	46.00	-9.08	49.21	56.00	-6.79	10.188
609.459 KHz	36.53	46.00	-9.47	49.54	56.00	-6.46	10.190
682.900 KHz	35.96	46.00	-10.04	48.32	56.00	-7.68	10.190
705.560 KHz	34.43	46.00	-11.57	46.48	56.00	-9.52	10.191
732.430 KHz	34.52	46.00	-11.48	46.33	56.00	-9.67	10.193
809.540 KHz	33.18	46.00	-12.82	44.66	56.00	-11.34	10.200
847.220 KHz	34.95	46.00	-11.05	46.04	56.00	-9.96	10.200
882.430 KHz	33.09	46.00	-12.91	45.19	56.00	-10.81	10.200
919.540 KHz	33.71	46.00	-12.29	44.61	56.00	-11.39	10.200

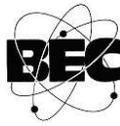




TX Frequency 431.5 MHz: Phase Line

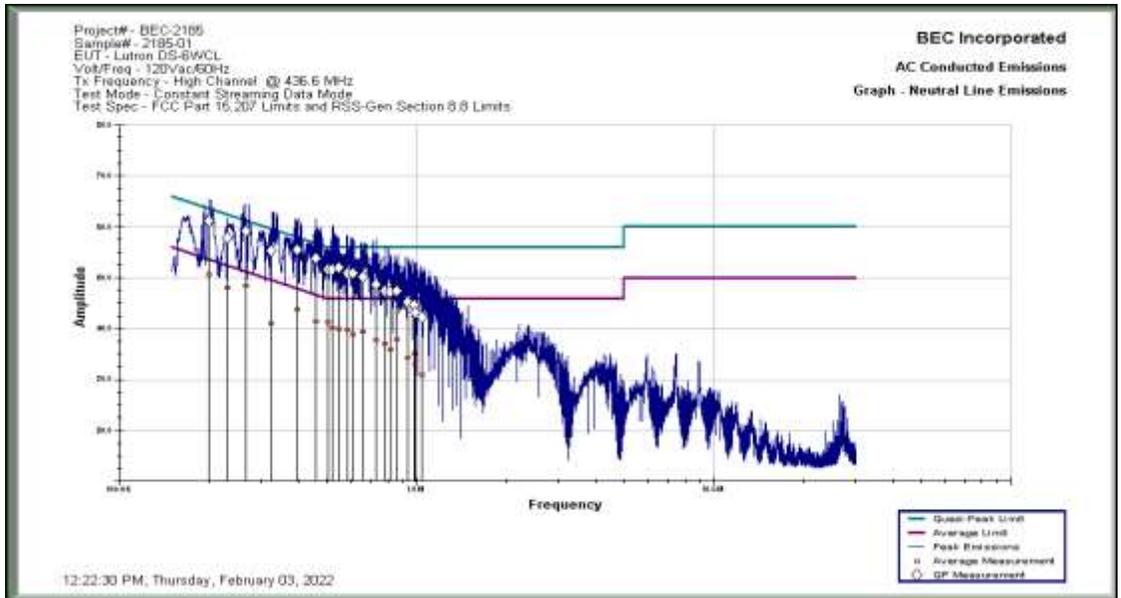
BEC Incorporated							
Line 1 Conducted Emissions							
11:59:31 AM, Thursday, February 03, 2022							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
164.851 KHz	46.07	55.58	-9.51	58.27	65.58	-7.31	10.180
226.384 KHz	43.03	53.82	-10.78	55.10	63.82	-8.72	10.180
261.832 KHz	42.36	52.80	-10.44	57.21	62.80	-5.59	10.180
303.950 KHz	42.64	51.60	-8.97	54.88	61.60	-6.72	10.180
333.876 KHz	42.46	50.75	-8.29	55.15	60.75	-5.60	10.180
410.855 KHz	39.81	48.55	-8.73	52.87	58.55	-5.67	10.192
464.726 KHz	39.10	47.01	-7.90	51.45	57.01	-5.56	10.197
504.094 KHz	38.75	46.00	-7.25	50.08	56.00	-5.92	10.190
526.034 KHz	38.42	46.00	-7.58	50.55	56.00	-5.45	10.193
602.606 KHz	36.58	46.00	-9.42	49.40	56.00	-6.60	10.200
669.932 KHz	35.55	46.00	-10.45	47.75	56.00	-8.25	10.200
727.370 KHz	35.68	46.00	-10.32	46.89	56.00	-9.11	10.203
786.010 KHz	36.10	46.00	-9.90	46.67	56.00	-9.33	10.209
816.750 KHz	34.80	46.00	-11.20	46.05	56.00	-9.95	10.210
848.660 KHz	35.41	46.00	-10.59	45.73	56.00	-10.27	10.210
884.350 KHz	33.74	46.00	-12.26	44.28	56.00	-11.72	10.217
922.280 KHz	34.26	46.00	-11.74	44.28	56.00	-11.72	10.220
951.680 KHz	32.95	46.00	-13.05	44.35	56.00	-11.65	10.220
995.160 KHz	30.31	46.00	-15.69	40.87	56.00	-15.13	10.220
1.099 MHz	29.44	46.00	-16.56	39.65	56.00	-16.35	10.222





TX Frequency 436.6 MHz: Neutral Line

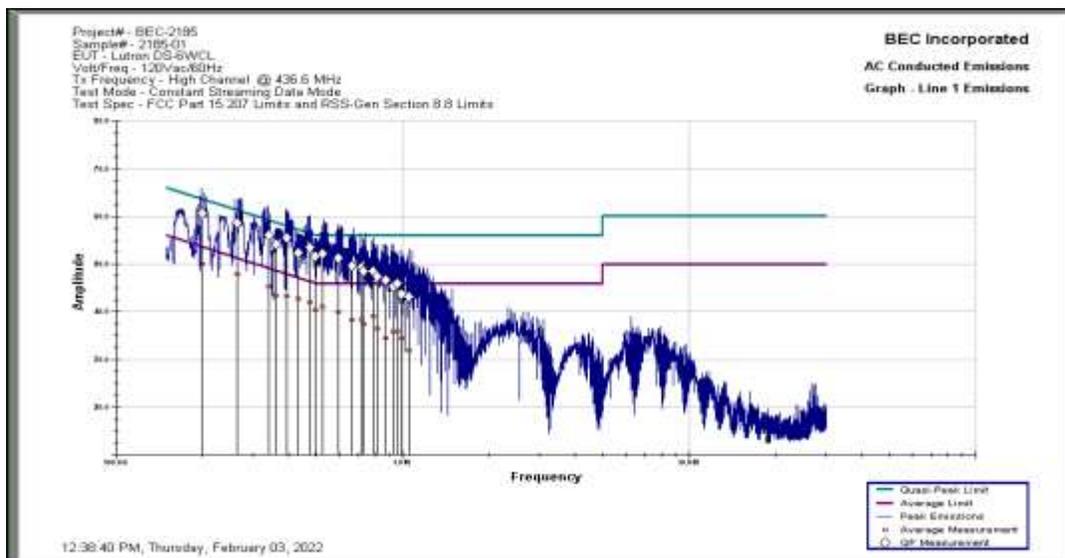
BEC Incorporated							
Neutral Line Conducted Emissions							
12:22:30 PM, Thursday, February 03, 2022							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
200.112 KHz	50.62	54.57	-3.95	61.24	64.57	-3.33	10.170
231.858 KHz	48.19	53.66	-5.47	57.94	63.66	-5.72	10.170
267.300 KHz	48.40	52.65	-4.24	59.12	62.65	-3.53	10.170
324.867 KHz	41.10	51.00	-9.90	55.37	61.00	-5.63	10.170
396.029 KHz	43.87	48.97	-5.10	55.42	58.97	-3.55	10.179
458.841 KHz	41.47	47.18	-5.70	53.84	57.18	-3.34	10.178
505.000 KHz	41.25	46.00	-4.75	51.65	56.00	-4.35	10.170
523.245 KHz	40.17	46.00	-5.83	51.60	56.00	-4.40	10.172
547.477 KHz	40.05	46.00	-5.95	51.96	56.00	-4.04	10.175
588.290 KHz	39.87	46.00	-6.13	50.97	56.00	-5.03	10.186
610.017 KHz	38.93	46.00	-7.07	50.91	56.00	-5.09	10.190
660.299 KHz	39.45	46.00	-6.55	50.14	56.00	-5.86	10.190
731.050 KHz	37.89	46.00	-8.11	48.76	56.00	-7.24	10.193
779.970 KHz	37.14	46.00	-8.86	47.43	56.00	-8.57	10.198
814.420 KHz	35.92	46.00	-10.08	47.24	56.00	-8.76	10.200
855.730 KHz	38.08	46.00	-7.92	47.44	56.00	-8.56	10.200
932.750 KHz	34.26	46.00	-11.74	45.21	56.00	-10.79	10.200
982.040 KHz	35.20	46.00	-10.80	44.59	56.00	-11.41	10.200
995.910 KHz	33.03	46.00	-12.97	43.19	56.00	-12.81	10.200
1.044 MHz	30.97	46.00	-15.03	42.21	56.00	-13.79	10.201





TX Frequency 436.6 MHz: Phase Line

BEC Incorporated							
Line 1 Conducted Emissions							
12:38:40 PM, Thursday, February 03, 2022							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
199.724 KHz	50.05	54.58	-4.53	60.72	64.58	-3.86	10.180
265.639 KHz	48.00	52.70	-4.69	58.57	62.70	-4.13	10.180
341.016 KHz	45.26	50.54	-5.28	55.95	60.54	-4.59	10.180
362.743 KHz	43.57	49.92	-6.36	54.16	59.92	-5.76	10.183
394.683 KHz	43.26	49.01	-5.75	55.46	59.01	-3.55	10.189
431.724 KHz	42.72	47.95	-5.23	52.27	57.95	-5.68	10.196
473.640 KHz	42.03	46.75	-4.73	53.51	56.75	-3.25	10.195
495.097 KHz	40.47	46.14	-5.67	51.61	56.14	-4.53	10.191
527.107 KHz	41.08	46.00	-4.92	52.15	56.00	-3.85	10.193
596.346 KHz	40.09	46.00	-5.91	51.32	56.00	-4.68	10.200
668.720 KHz	38.35	46.00	-7.65	49.68	56.00	-6.32	10.200
716.730 KHz	38.48	46.00	-7.52	49.23	56.00	-6.77	10.202
733.960 KHz	37.44	46.00	-8.56	48.41	56.00	-7.59	10.203
788.330 KHz	39.07	46.00	-6.93	48.51	56.00	-7.49	10.209
816.080 KHz	36.57	46.00	-9.43	47.42	56.00	-8.58	10.210
874.090 KHz	34.58	46.00	-11.42	46.65	56.00	-9.35	10.215
928.980 KHz	35.90	46.00	-10.10	45.32	56.00	-10.68	10.220
956.930 KHz	35.94	46.00	-10.06	45.92	56.00	-10.08	10.220
991.180 KHz	34.42	46.00	-11.58	43.63	56.00	-12.37	10.220
1.051 MHz	31.90	46.00	-14.10	43.16	56.00	-12.84	10.221



Results: The Lutron Model DS-6WCL Vogelkop RF Wireless Dimmer, BEC Sample #2185-02 complies with the requirements of FCC Part 15.207 and RSS-Gen Section 8.8. The margin is 3.25 dB @ 473.64 kHz on Line 1.



5.0 EUT and Test Setup Pictures

5.1 EUT Pictures Are Included in The Grant Submission

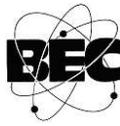
5.2 Test Setup Pictures Are Included in The Grant Submission

Appendix A – Test Equipment

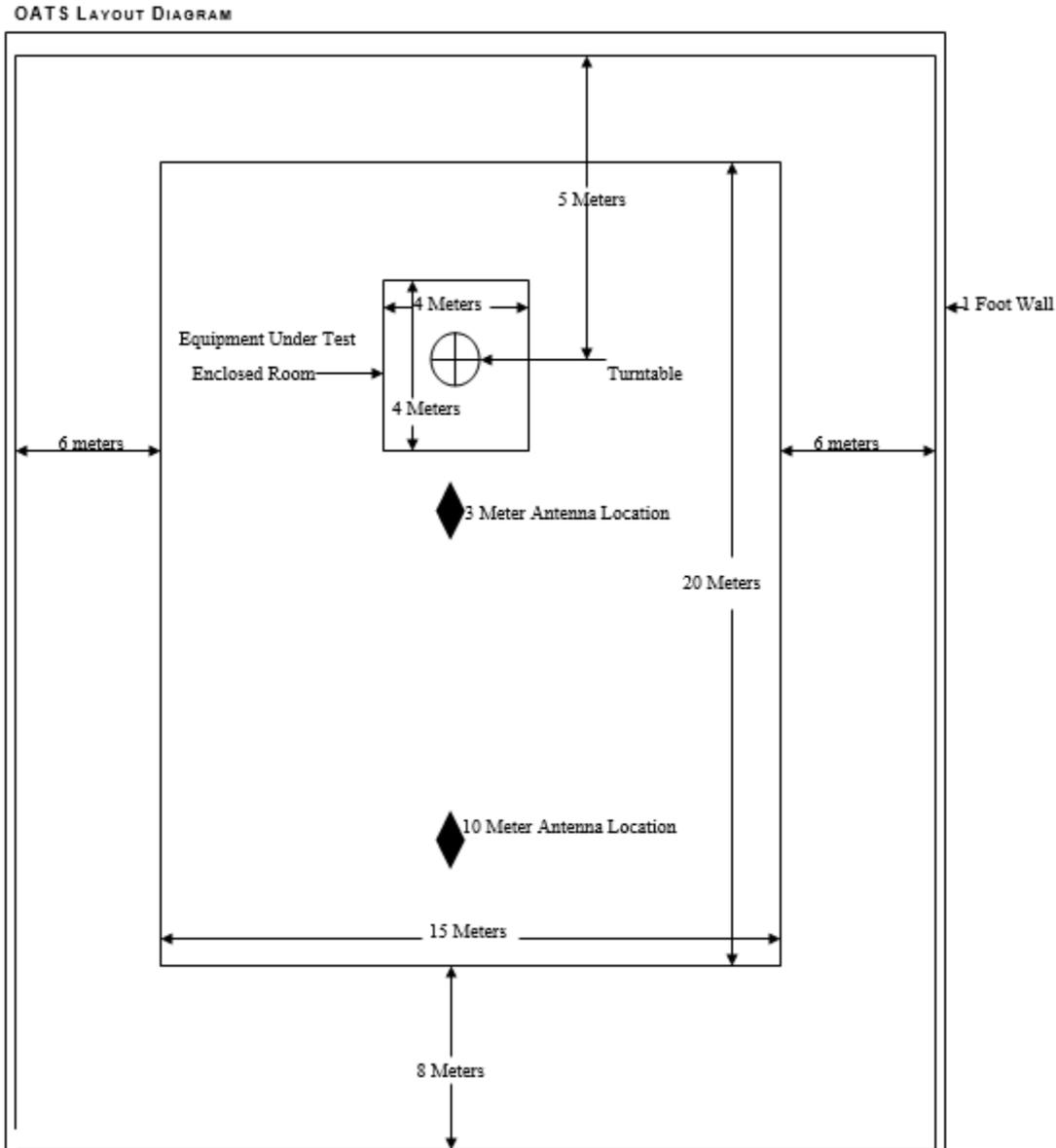
Equipment	Manufacturer	Model #	Serial #	BEC #	Calibration Date	Calibration Cycle	Calibration Due Date
Antenna (30 MHz - 6 GHz)	Sunol Sciences	JB6	A022108	712	06/21/21	3 Years	06/21/24
EMI Receiver (20 Hz – 26.5 GHz)	Rohde & Schwarz	ESIB 26	836119/006	1010	07/02/19	3 Years	07/02/22
OATS Site (30 MHz – 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.

