

November 18, 2019

Lutron Electronics Co., Inc.  
7200 Suter Road  
Coopersburg, PA 18036

Dear Geri Gonzalez,

Enclosed is the EMC Wireless test report for compliance testing of the Lutron Electronics Co., Inc., QSFC-EDU-B-J as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), FCC Part 15 Subpart C for Intentional Radiators.

Thank you for using the services of Eurofins MET Labs, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,  
EUROFINS MET LABS, INC.



Michelle Tawmging  
Documentation Department

Reference: (\Lutron Electronics Co., Inc.\EMC105905-FCC231 Rev. 1)

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**Electromagnetic Compatibility Criteria  
Test Report**

for the

**Lutron Electronics Co., Inc.  
QSFC-EDU-B-J**

**Tested under**  
the FCC Certification Rules  
contained in  
Title 47 of the CFR, Part 15.231 Subpart C  
for Intentional Radiators

**MET Report: EMC105905-FCC231 Rev. 1**

November 18, 2019

**Prepared For:**

**Lutron Electronics Co., Inc.  
7200 Suter Road  
Coopersburg, PA 18036**

**Prepared By:**  
**Eurofins MET Labs, Inc.**  
914 W. Patapsco Avenue  
Baltimore, MD 21230

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the FCC Certification Rules  
contained in  
Title 47 of the CFR, Part 15.231 Subpart C  
for Intentional Radiators



Donald Salguero, Project Engineer  
Electromagnetic Compatibility Lab



Michelle Tawmging  
Documentation Department

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of FCC Rules Part 15.231 under normal use and maintenance.



Deepak Giri,  
Manager, Wireless Lab

## Report Status Sheet

Revision	Report Date	Reason for Revision
∅	November 14, 2019	Initial Issue
1	November 18, 2019	Updated EUT Name Throughout Updated Antenna Gain Updated Section I Updated Section J

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## List of Terms and Abbreviations

<b>AC</b>	Alternating Current
<b>ACF</b>	Antenna Correction Factor
<b>Cal</b>	Calibration
<b>d</b>	Measurement Distance
<b>dB</b>	Decibels
<b>dB<math>\mu</math>A</b>	Decibels above one <b>microamp</b>
<b>dB<math>\mu</math>V</b>	Decibels above one <b>microvolt</b>
<b>dB<math>\mu</math>A/m</b>	Decibels above one <b>microamp per meter</b>
<b>dB<math>\mu</math>V/m</b>	Decibels above one <b>microvolt per meter</b>
<b>DC</b>	Direct Current
<b>E</b>	Electric Field
<b>EUT</b>	Equipment Under Test
<b>f</b>	Frequency
<b>FCC</b>	Federal Communications Commission
<b>GRP</b>	Ground Reference Plane
<b>H</b>	Magnetic Field
<b>HCP</b>	Horizontal Coupling Plane
<b>Hz</b>	Hertz
<b>kHz</b>	kilohertz
<b>kPa</b>	kilopascal
<b>kV</b>	kilovolt
<b>LISN</b>	Line Impedance Stabilization Network
<b>MHz</b>	Megahertz
<b><math>\mu</math>H</b>	<b>microhenry</b>
<b><math>\mu</math></b>	<b>microfarad</b>
<b><math>\mu</math>s</b>	<b>microseconds</b>
<b>PRF</b>	Pulse Repetition Frequency
<b>RF</b>	Radio Frequency
<b>RMS</b>	Root-Mean-Square
<b>TWT</b>	Traveling Wave Tube
<b>V/m</b>	<b>Volts per meter</b>
<b>VCP</b>	Vertical Coupling Plane



Lutron Electronics Co., Inc.  
QSFC-EDU-B-J

MET Labs

Electromagnetic Compatibility  
Executive Summary  
CFR Title 47, Part 15.231

## I. Executive Summary

**A. Purpose of Test**

An EMC evaluation was performed to determine compliance of the Lutron Electronics Co., Inc. QSFC-EDU-B-J, with the requirements of Part 15, §15.231. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the QSFC-EDU-B-J. Lutron Electronics Co., Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the QSFC-EDU-B-J, has been **permanently** discontinued.

**B. Executive Summary**

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.231, in accordance with Lutron Electronics Co., Inc., purchase order number 5204016. All tests were conducted using measurement procedure ANSI C63.10-2013.

FCC Reference	Description	Results
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conducted Emission Limits	Compliant
§15.231(a)	Periodic Operation Requirements	Compliant
§15.231(b)	Field Strength of Fundamentals and Harmonics	Compliant
§15.231(c)	20dB Bandwidth	Compliant

**Figure 1: Executive Summary of EMC Part 15.231 Compliance Testing**



Lutron Electronics Co., Inc.  
QSFC-EDU-B-J

MET Labs

Electromagnetic Compatibility  
Equipment Configuration  
CFR Title 47, Part 15.231

## II. Equipment Configuration

## A. Overview

Eurofins MET Labs, Inc. was contracted by Lutron Electronics Co., Inc. to perform testing on the QSFC-EDU-B-J, under Lutron Electronics Co., Inc.'s purchase order number 5204016.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Lutron Electronics Co., Inc., QSFC-EDU-B-J.

The results obtained relate only to the item(s) tested.

<b>Model Tested:</b>	QSFC-EDU-B-J
<b>Model Covered:</b>	QSFC-EDU-B-J
<b>EUT Specifications:</b>	Primary Power: 6 – 12 VDC FCC ID: <b>Max Field Strength:</b> 71.51 dB $\mu$ V/m @ 3m <b>EUT Frequency Ranges:</b> 431.5 MHz – 436.6 MHz <b>Antenna Gain</b> -5dBi
<b>Analysis:</b>	The results obtained relate only to the item(s) tested.
<b>Environmental Test Conditions:</b>	Temperature: 15-35° C Relative Humidity: 30-60% Barometric Pressure: 860-1060 mbar
<b>Evaluated by:</b>	Donald Salguero
<b>Report Date:</b>	November 18, 2019

**Figure 2: EUT Summary Table**

## B. References

<b>CFR 47, Part 15, Subpart C</b>	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
<b>ANSI C63.4:2014</b>	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
<b>ISO/IEC 17025:2017</b>	General Requirements for the Competence of Testing and Calibration Laboratories
<b>ANSI C63.10-2013</b>	American National Standard for Testing Unlicensed Wireless Devices

**Figure 3: References**

## C. Test Site

All testing was performed at Eurofins MET Labs, Inc., 914 W. Patapsco Avenue, Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at Eurofins MET Labs.

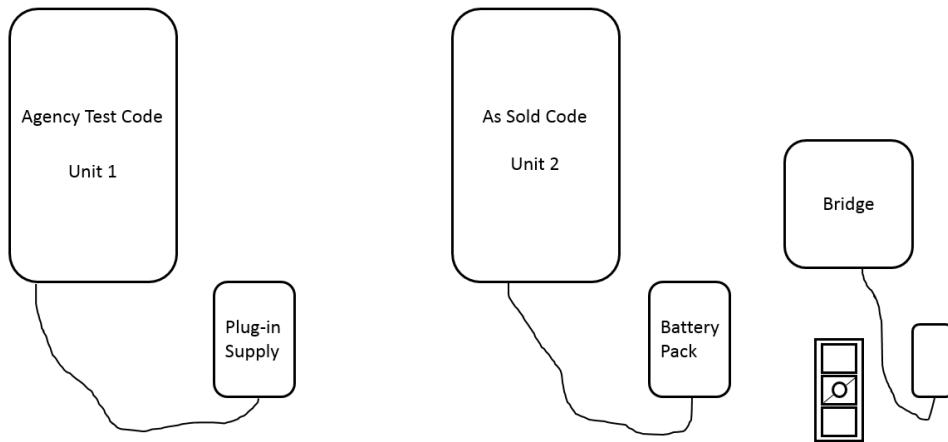
## D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
<b>RF Frequencies</b>	$\pm 4.52 \text{ Hz}$	2	95%
<b>RF Power Conducted Emissions</b>	$\pm 2.32 \text{ dB}$	2	95%
<b>RF Power Conducted Spurious Emissions</b>	$\pm 2.25 \text{ dB}$	2	95%
<b>RF Power Radiated Emissions</b>	$\pm 3.01 \text{ dB}$	2	95%

**Figure 4: Uncertainty Calculations Summary**

## E. Description of Test Sample

The Lutron Electronics Co., Inc. QSFC-EDU-B-J, Equipment Under Test (EUT), is intended to allow wireless control of the tilt function of a window venetian shade.



**Figure 5: Block Diagram of Test Configuration**

## F. Equipment Configuration

Ref. ID	Slot #	Name / Description	Model Number	Part Number	Serial Number	Rev. #
Unit 1		Agency Test Code Unit	QSFC-J-EDU-PS			
Unit 2		As Sold Code Unit	QSFC-EDU-B-J			

**Figure 6: Equipment Configuration**

## G. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name / Description	Manufacturer	Model Number	*Customer Supplied Calibration Data
	Power Supply	Lutron	CSPS-P1-1-6-WH	
	Battery Pack	Lutron	N/A	
	Bridge	Lutron	L-BDGP02	
	Power supply	Lutron	T-5DC-USB-WH	
	Pico	Lutron	PJ2-3BRL	

**Figure 7: Support Equipment**

## H. Ports and Cabling Information

None.

## **I. Mode of Operation**

There are two units: one marked “standard code” and the other marked “FCC code”. The standard code is the functional code that will be used in our blind’s actual operation. The “FCC code” has constant packet transmission and constant wave transmission at the bottom, middle, and top of our frequency band (431.5-436.6 MHz).

The normal operation of our EUT will be with “Standard code” which allows the user to connect the drive to a remote and/or a system and control the motor via brief RF packets of commands.

## **J. Monitoring Method**

Standard Code: Power the drive by connecting the power cable into the port. Once powered, the LEDs in the opening blink red and green three times. Press the button, the green LED should light. Press the button again, the green LED turns off. If the drive is already connected to a system (the units we provide should be connected) and a remote, one should be able to use the buttons on the remote to control the motor CW and CCW.

FCC Code: Power the drive by connecting the power cable into the port. Once powered, the LEDs in the opening blink red and green three times. Each following button press will cycle through the 6 configurations of 431.5, 433.6, 436.6 MHz constant packet and constant wave.

## **K. Modifications**

### **a) Modifications to EUT**

No modifications were made to the EUT.

### **b) Modifications to Test Standard**

No modifications were made to the test standard.

## **L. Disposition of EUT**

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Lutron Electronics Co., Inc. upon completion of testing.

### III. Electromagnetic Compatibility Criteria for Intentional Radiators

**Electromagnetic Compatibility Criteria for Intentional Radiators****§ 15.203 Antenna Requirement****Test Requirement:**

**§ 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 use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

- a.) Antenna must be permanently attached to the unit.
- b.) Antenna must use a unique type of connector to attach to the EUT.
- c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

**Test Results:**

The EUT as tested is **compliant** the criteria of §15.203. EUT uses built-in antenna.  
Quarterwave monopole  
-5dBi Gain

**Test Engineer:**

Donald Salguero

**Test Date:**

November 1, 2019

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.207(a) Conducted Emissions Limits

**Test Requirement(s):**

**§ 15.207 (a):** For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50  $\Sigma$  line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dB $\mu$ V)	
	Quasi-Peak	Average
* 0.15 - 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

**Figure 8: Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)**

Note: \*Decreases with the logarithm of the frequency.

**Test Procedure:**

The EUT was placed on a 0.8 m-high wooden table inside a screen room. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50  $\Omega$ /50  $\mu$ H Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.10-2013*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50  $\Omega$ /50  $\mu$ H LISN as the input transducer to an EMC/field intensity meter.

**Test Results:**

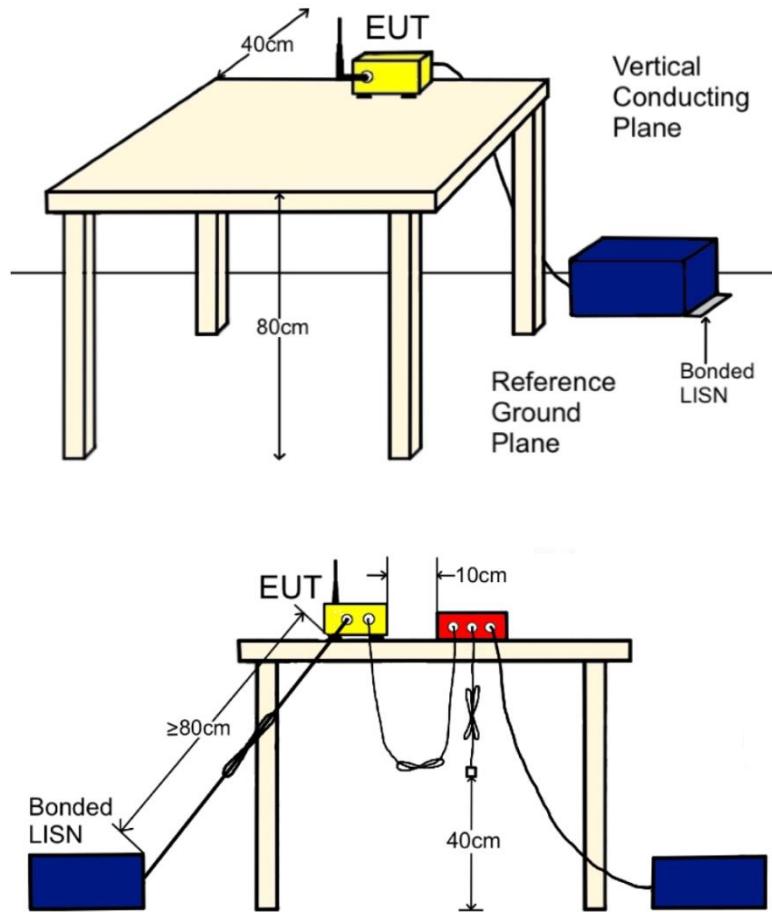
The EUT was **compliant** with this requirement. Measured emissions were below applicable limits.

**Test Engineer:**

Donald Salguero

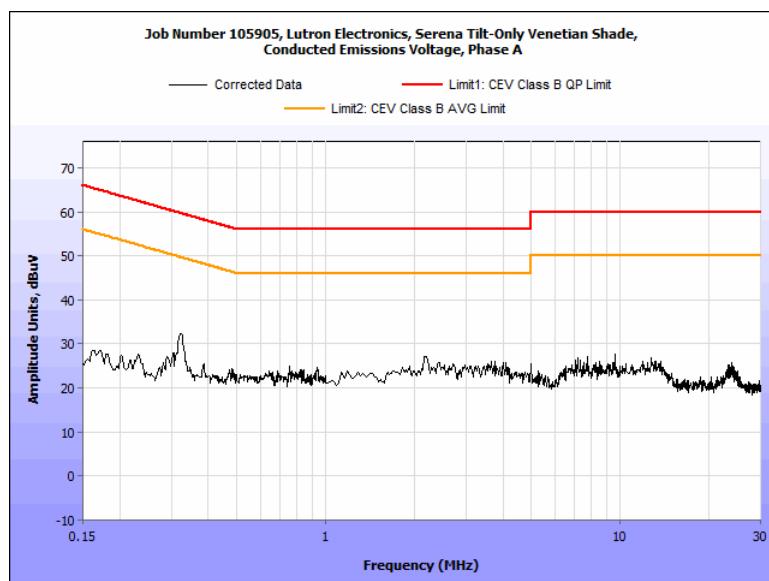
**Test Date:**

November 1, 2019

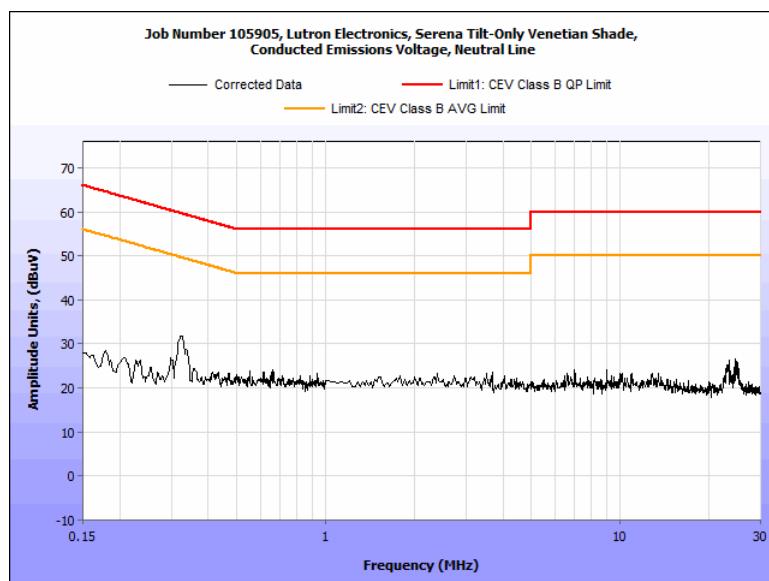


**Figure 9: Conducted Emissions Test Setup**

Frequency (MHz)	Uncorrected Meter Reading (dB $\mu$ V) QP	Cable Loss (dB)	Corrected Measurement (dB $\mu$ V) QP	Limit (dB $\mu$ V) QP	Pass/ Fail QP	Margin (dB) QP	Uncorrected Meter Reading (dB $\mu$ V) Avg.	Cable Loss (dB)	Corrected Measurement (dB $\mu$ V) Avg.	Limit (dB $\mu$ V) Avg.	Pass/ Fail Avg.	Margin (dB) Avg.
0.324	15.41	0	25.41	59.6	PASS	-34.19	4.5	0	14.5	49.6	PASS	-35.1
2.17	8.92	0	18.92	56	PASS	-37.08	1.5	0	11.5	46	PASS	-34.5
3.74	7.12	0	17.12	56	PASS	-38.88	0.7	0	10.7	46	PASS	-35.3
23.8	7.335	0.12	17.455	60	PASS	-42.545	-0.01	0.12	10.11	50	PASS	-39.89
0.15	10.45	0	20.45	66	PASS	-45.55	3.4	0	13.4	56	PASS	-42.6
1	6.51	0	16.51	56	PASS	-39.49	0.95	0	10.95	46	PASS	-35.05

**Figure 10: Conducted Emissions, Phase Line, Test Results**

**Figure 11: Conducted Emissions, Phase Line, Prescan**

Frequency (MHz)	Uncorrected Meter Reading (dB $\mu$ V) QP	Cable Loss (dB)	Corrected Measurement (dB $\mu$ V) QP	Limit (dB $\mu$ V) QP	Pass/ Fail QP	Margin (dB) QP	Uncorrected Meter Reading (dB $\mu$ V) Avg.	Cable Loss (dB)	Corrected Measurement (dB $\mu$ V) Avg.	Limit (dB $\mu$ V) Avg.	Pass/ Fail Avg.	Margin (dB) Avg.
0.324	15.3	0	25.3	59.6	PASS	-34.3	3.11	0	13.11	49.6	PASS	-36.49
23.15	6.52	0.12	16.64	60	PASS	-43.36	-0.85	0.12	9.27	50	PASS	-40.73
24.65	6.31	0.11	16.42	60	PASS	-43.58	-0.47	0.11	9.64	50	PASS	-40.36
0.95	6.68	0	16.68	56	PASS	-39.32	1.21	0	11.21	46	PASS	-34.79
4	5.73	0	15.73	56	PASS	-40.27	0.04	0	10.04	46	PASS	-35.96
7	5.07	0	15.07	60	PASS	-44.93	-0.75	0	9.25	50	PASS	-40.75

**Figure 12: Conducted Emissions, Neutral Line, Test Results**

**Figure 13: Conducted Emissions, Neutral Line, Prescan**

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.231 (a) Periodic Operation Requirements

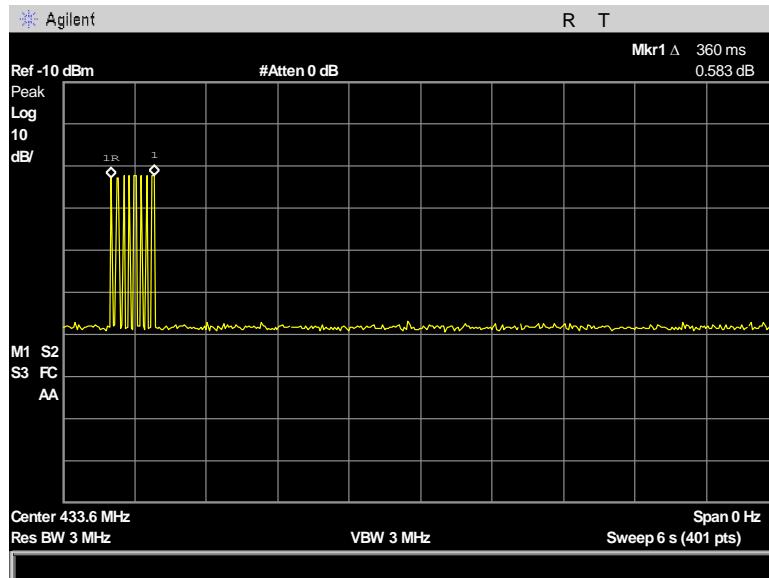
**Test Requirement(s):** **§ 15.231 (a):** (a) The provisions of this section are restricted to periodic operation within the band 40.66–40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous trans-missions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation: (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

**Test Procedure:** The EUT transmitter activates automatically. Delta Marker shows the duration of transmission.

**Test Results:** The EUT was **compliant** with the requirements of this section. No anomalies noted.

**Test Engineer:** Donald Salguero

**Test Date:** October 29, 2019



**Figure 14: Periodic Operation Requirements, Test Results**

**Electromagnetic Compatibility Criteria for Intentional Radiators****§ 15.231(b) Field Strength of Fundamental and Harmonics**

**Test Requirements:** **§15.231(b):** In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

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	1,250* to 3,750	125* to 375
174–260	3,750	375
260–470	3,750* to 12,500	375* to 1,250
Above 470	12,500	1,250

**Note:** \* 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.

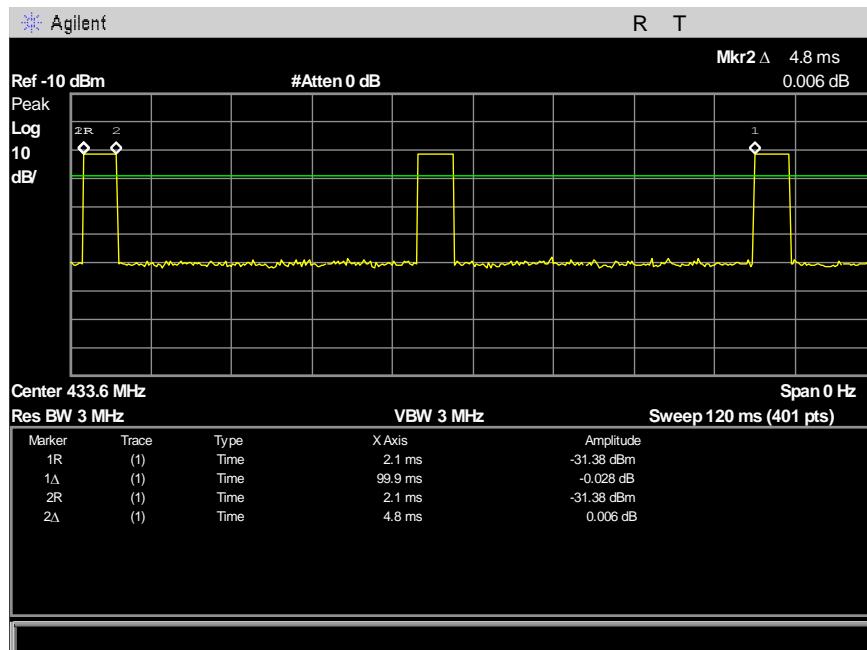
**Test Procedure:** The EUT was placed in a 3m semi anechoic chamber. A log periodic antenna was placed 3m from the EUT and used to measure the field strength of the fundamental. The EUT was rotated about all three orthogonal axis. The peak field strength was measured and then the average was calculated from the peak value by correcting for duty cycle.

For harmonics measurements above 1 GHz, a horn antenna was used 1m from the EUT.

**Test Results:** Equipment was **compliant** with § 15.231 (b). No anomalies noted.

**Test Engineer:** Donald Salguero

**Test Date:** October 29, 2019



**Figure 15: Field Strength of Fundamental and Harmonics, 100ms Sweep**

The duty cycle correction factor was determined by the following equation:

The EUT's transmitter on time:  $T_{on} = 2 * 4.8 = 9.6 \text{ ms}$

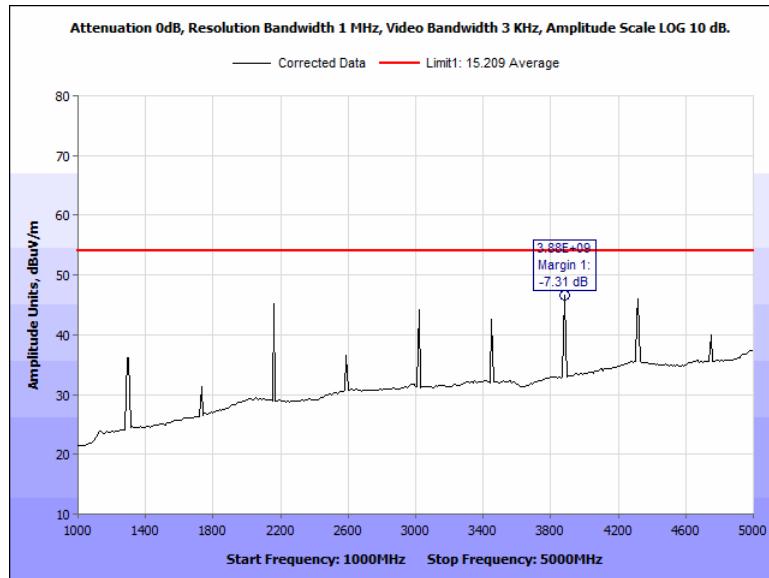
The EUT's transmitter period:  $T = T_{on} + T_{off} = 100 \text{ ms}$

The EUT's transmitter duty cycle:  $D = T_{on}/T_{off} = 0.096$

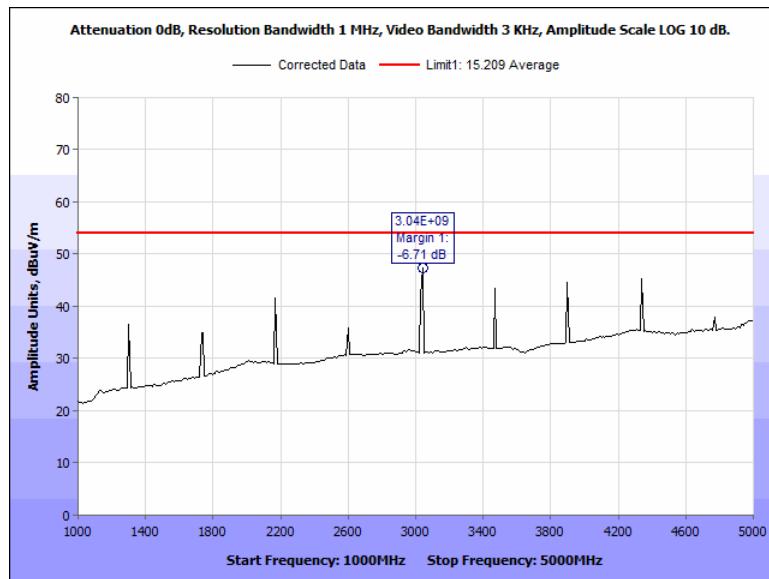
Duty Cycle Correction Factor (dB) =  $20 * \log(Duty\ Cycle) = -20.35$

Fundamental Emissions						
Channel	Frequency (MHz)	Peak Field Strength (dB $\mu$ V/m)	DCCF (dB)	AVG Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
Low	431.5	89.08	-20.35	68.73	80.74	-12.01
Mid	433.6	91.86	-20.35	71.51	80.81	-9.3
High	436.6	89.97	-20.35	69.62	80.91	-11.29

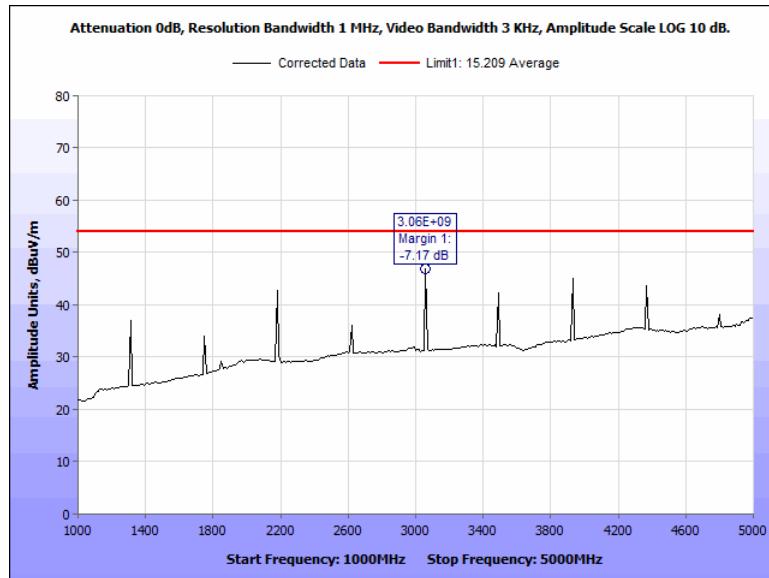
**Figure 16: Field Strength of Fundamental and Harmonics, Test Results**



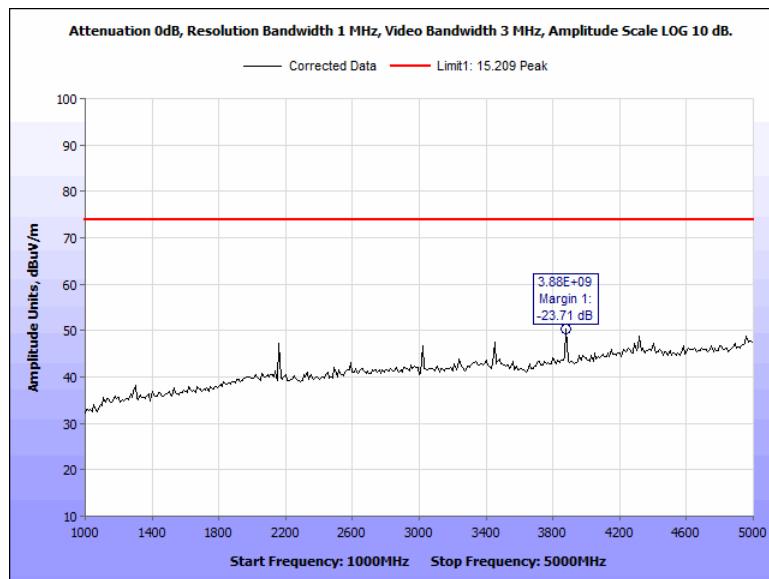
**Figure 17: Field Strength of Fundamental and Harmonics, Average, Radiated Emissions, Low Channel, 1–5 GHz**



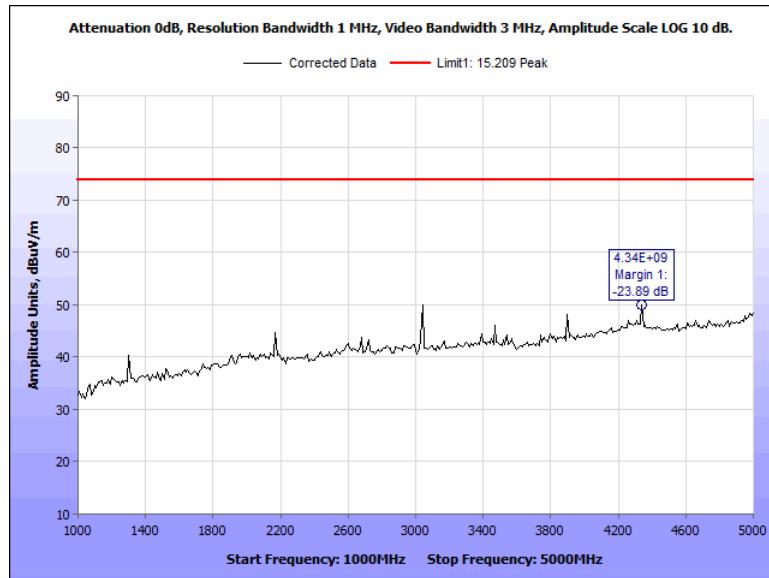
**Figure 18: Field Strength of Fundamental and Harmonics, Average, Radiated Emissions, Mid Channel, 1–5 GHz**



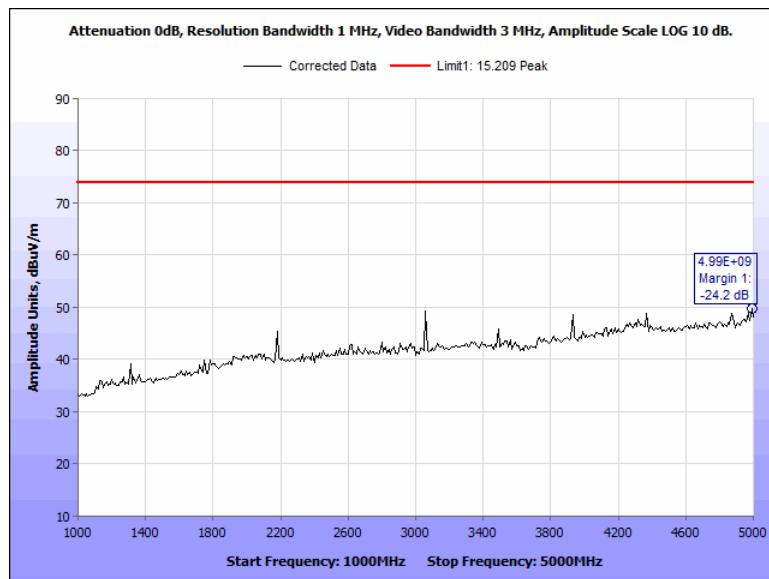
**Figure 19: Field Strength of Fundamental and Harmonics, Average, Radiated Emissions, High Channel, 1–5 GHz**



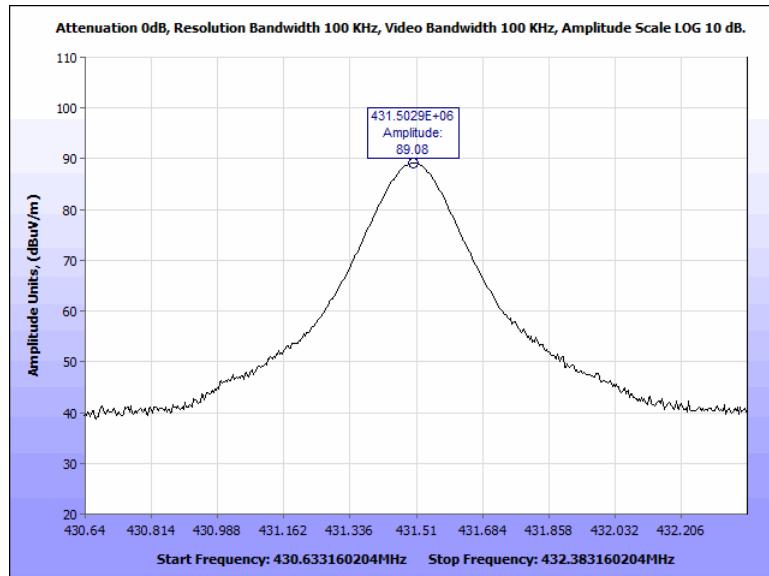
**Figure 20: Field Strength of Fundamental and Harmonics, Peak, Radiated Emissions, Low Channel, 1–5 GHz**



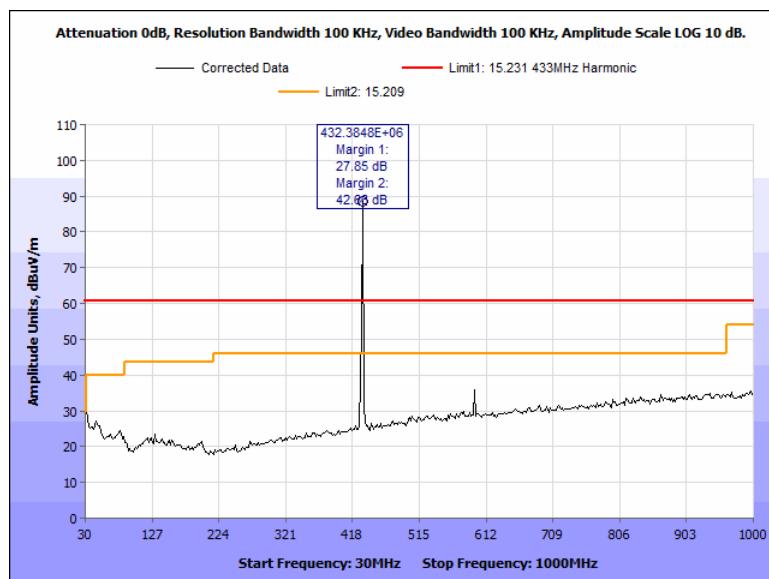
**Figure 21: Field Strength of Fundamental and Harmonics, Peak, Radiated Emissions, Mid Channel, 1–5 GHz**



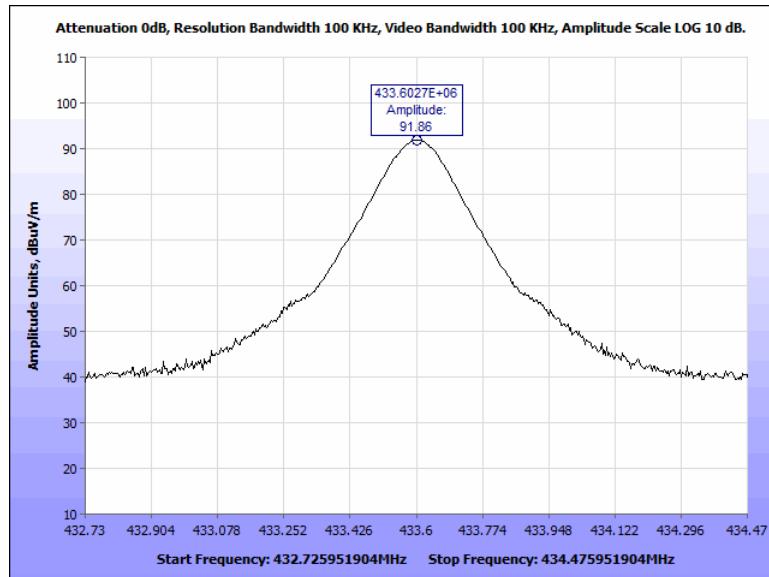
**Figure 22: Field Strength of Fundamental and Harmonics, Peak, Radiated Emissions, High Channel, 1–5 GHz**



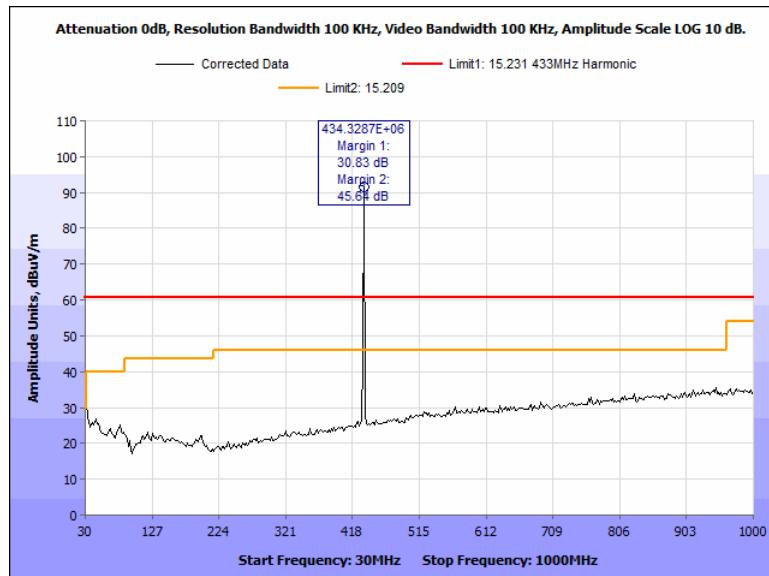
**Figure 23: Field Strength of Fundamental and Harmonics, Radiated Emissions Low Channel Fundamental**



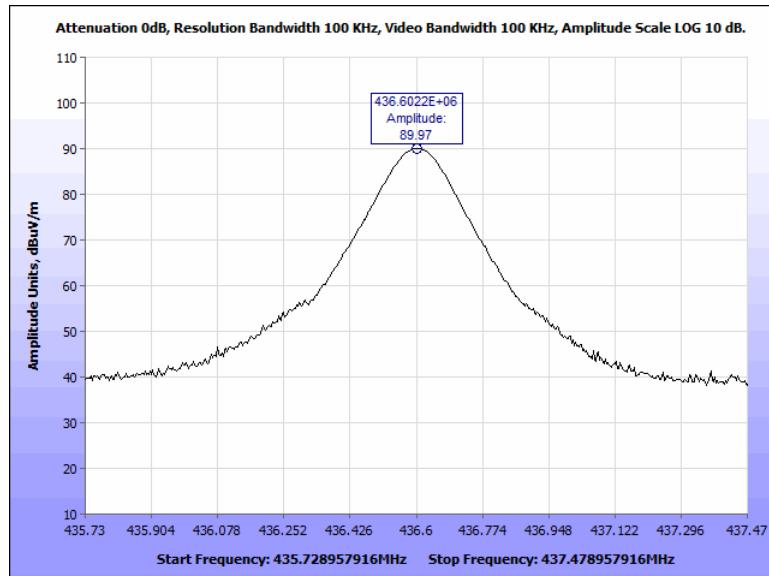
**Figure 24: Field Strength of Fundamental and Harmonics, Radiated Emissions, Harmonics, 30–1000 MHz Low Channel**



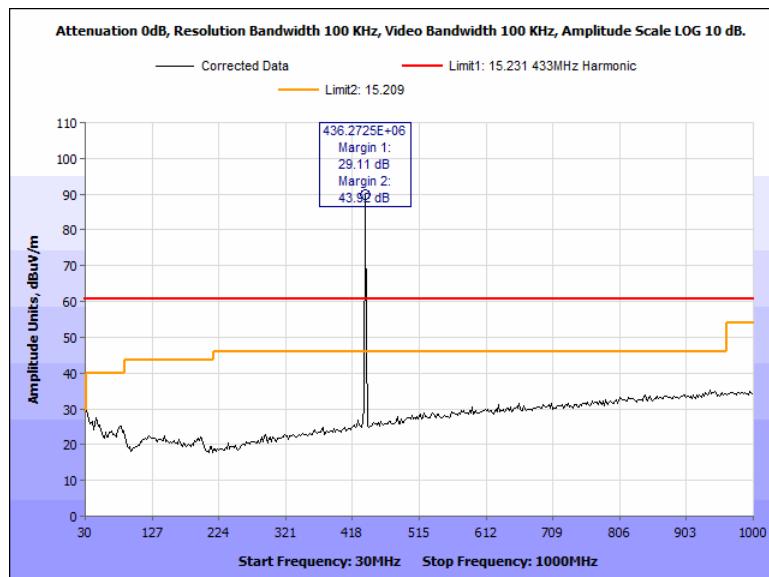
**Figure 25: Field Strength of Fundamental and Harmonics, Radiated Emissions, Mid Channel Fundamental**



**Figure 26: Field Strength of Fundamental and Harmonics, Radiated Emissions, Harmonics, 30–1000 MHz Mid Channel**



**Figure 27: Field Strength of Fundamental and Harmonics, Radiated Emissions, 3m High Channel Fundamental**



**Figure 28: Field Strength of Fundamental and Harmonics, Radiated Emissions, Harmonics, 30–1000 MHz High Channel**

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.231(c) 20dB Bandwidth

**Test Requirements:** **§15.231(c):** The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

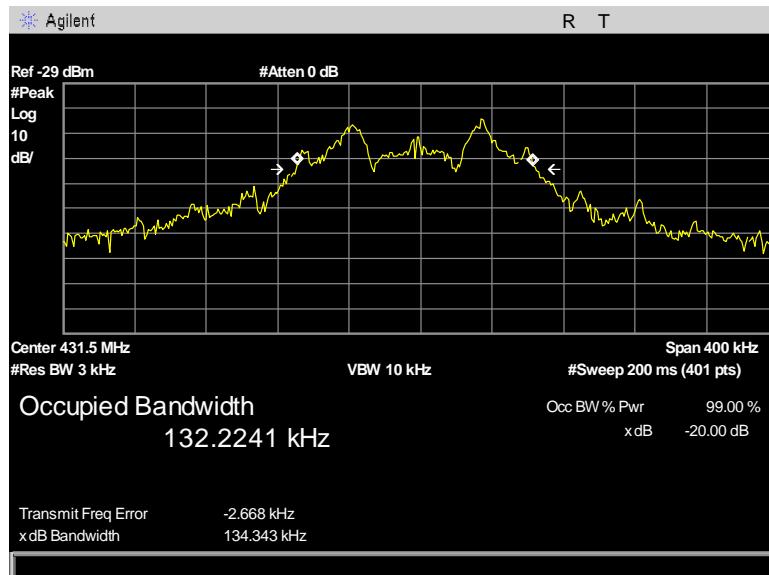
**Test Results:** Equipment was **compliant** with § 15.231(c). No anomalies noted.

**Test Engineer:** Donald Salguero

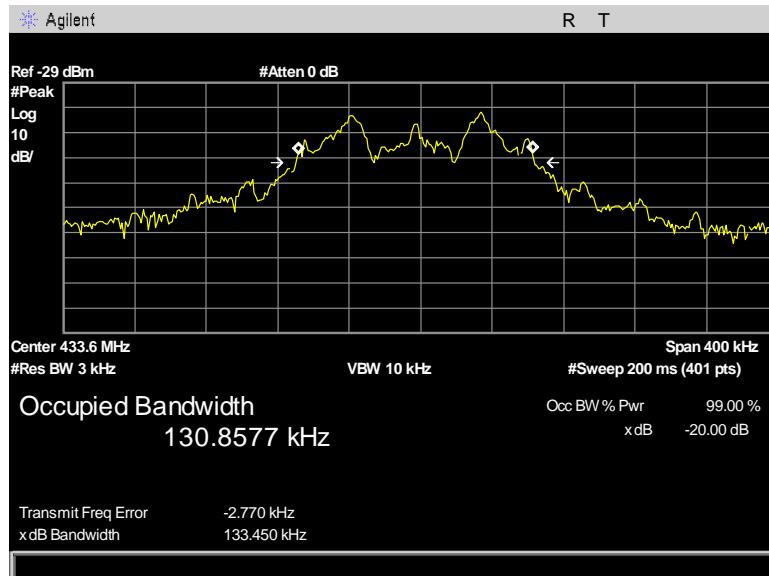
**Test Date:** October 29, 2019

Channel	Center Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)
Low	431.5	134.343	1078.75
Mid	433.6	133.45	1084
High	436.6	136.044	1091.5

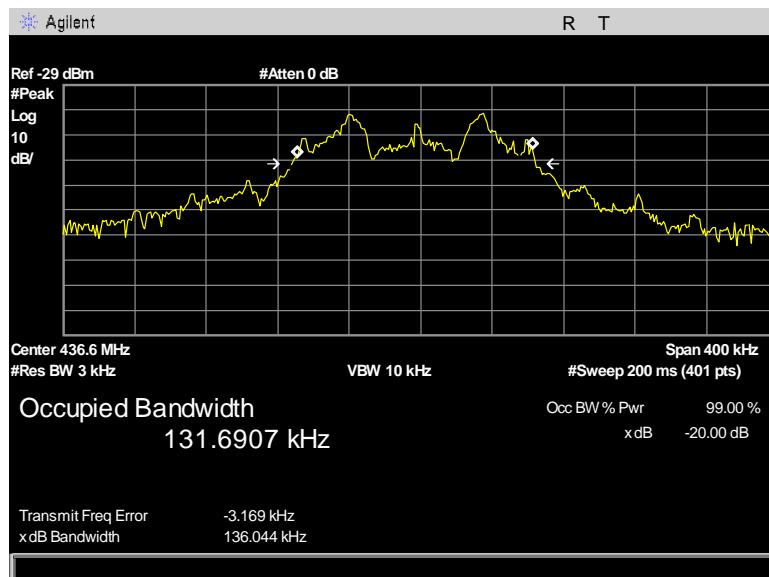
**Figure 29: Bandwidth, Test Results**



**Figure 30: Bandwidth, Low Channel 20dB BW**



**Figure 31: Bandwidth, Mid Channel 20dB BW**



**Figure 32: Bandwidth, High Channel 20dB BW**



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## IV. Test Equipment

## Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

MET ASSET #	EQUIPMENT	MANUFACTURER	MODEL	LAST CAL	CAL DUE
1T4612	SPECTRUM Hz ANALYZER	AGILENT TECHNOLOGIES	E4407B	05/15/2018	11/15/2019
1T7450	TRANSIENT LIMITER	COM-POWER	LIT-153A		NOT REQUIRED
1T4503	SHIELDED ROOM	UNIVERSAL SHIELDIN GHZ CORP	N/A		NOT REQUIRED
1T2947	LISN	SOLAR ELECTRONICS COMPANY	8028-50-TS-24-BNC	08/31/2018	02/29/2020
1T2948	LISN	SOLAR ELECTRONICS COMPANY	8028-50-TS-24-BNC	08/31/2018	02/29/2020
1T4905	HORN ANTENNA	COM-POWER	AH-118	5/7/2019	11/7/2020
1T4753	ANTENNA - BILOG	SUNOL SCIENCES	JB6	8/30/2018	2/29/2020
1T8743	PREAMPLIFIER	A.H. SYSTEMS, INC.	PAM-0118P	3/11/2015	3/11/2016
1T4300B	SEMI-ANECHOIC 3MHz CHAMBER SVSWR	EMC TEST SYSTEMS	NONE	6/30/2019	12/30/2020
1T4300	SEMI-ANECHOIC CHAMBER (NSA)	EMC TEST SYSTEMS	NONE	6/30/2019	6/30/2020
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	1/4/2019	1/4/2021

**Figure 33: Test Equipment List**

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.



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## V. Certification & User's Manual Information

## Certification & User's Manual Information

### A. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

#### **§ 2.801 Radio-frequency device defined.**

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

- (a) The various types of radio communication transmitting devices described throughout this chapter.
- (b) *The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.*
- (c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.
- (d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

#### **§ 2.803 Marketing of radio frequency devices prior to equipment authorization.**

- (a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:
  - (1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or
  - (2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.
- (d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

- (i) *Compliance testing;*
- (ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;
- (iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;
- (iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production stages; or
- (v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

## Certification & User's Manual Information

**The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:**

### **§ 2.901 Basis and Purpose**

- (a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.<sup>1</sup> *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer,* be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.
- (b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

### **§ 2.907 Certification.**

- (a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.
- (b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

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<sup>1</sup> In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.

## Certification & User's Manual Information

### § 2.948 Description of measurement facilities.

(a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.

(1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.

(i) *If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.*

(ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

(2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

## Certification & User's Manual Information

### 1. Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

#### **§ 15.19 Labeling requirements.**

(a) *In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:*

(1) Receivers associated with the operation of a licensed radio service, e.g., FMHz broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

(3) All other devices shall bear the following statement in a conspicuous location on the device:

*This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

#### **§ 15.21 Information to user.**

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## Verification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

### § 15.105 Information to the user.

(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



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