BEC INCORPORATED

MAXIMUM PERMISSABLE EXPOSURE (MPE) REPORT

TEST STANDARDS:
U.S. Title 47 Chapter 1 Subchapter A Part 2 Subpart J

Lutron Model QSERJ-EDU
Wireless Battery-Operated Motor Drive

FCC ID: JPZ0147

REPORT# BEC-2312-02

CUSTOMER:
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ACCREDITED
Testing Cert #2957.01

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Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	04/01/2024
1	Clarified the measurement method and data for MPE calculation in Section 3.3 of this report	06/10/2024	06/10/2024

1.0 Administrative Information

1.1 General Information Table

Project Number	BEC-2312
Manufacturer	Lutron Electronics Company, Inc.
Model Numbers Tested	QSERJ-EDU
EUT Description	Wireless Battery-operated Motor Drive
EUT Sample Type	Antenna Conducted Sample with Test Code
EUT Serial Number	04BC03EB
EUT Sample Number	2312-02
Date Samples Received	03/18/2024
Condition of Sample Received	Suitable for test
Sample Version	Protype Unit
Frequency of Operation	431 MHz to 437 MHz
Antenna Gain	-6 dBi (-8.15 dBd)
Antenna Type	Monopole Antenna
EUT Firmware Version	Basenji 2.0 RF Test Code
FCC ID	JPZ0147
FCC Classification	DSR, Part 15 Remote Control / Security Device Transceiver
Applicable FCC Rules	47 CFR Part 2.1091, OET Bulletin 65

2.0 Product Description

The Lutron Model QSERJ-EDU Wireless Battery-operated Motor Drive is a battery-powered shade solution. The Lutron Model QSERJ-EDU Wireless Battery-operated Motor Drive uses a Lutron Designed Transceiver Radio which operates momentarily in the 431 MHz to 437 MHz frequency range.

2.1 Test Configuration

The Lutron Model QSERJ-EDU Wireless Battery-operated Motor Drive samples were 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 Basenji 2.0 RF Test Code were Constant Wave, Constant Packet or Continuous Constant Packet when transmitting.

Basenji 2.0 RF Test Code, Standard Mode 2, State 3. Continuous Constant Packet was used during the measurement of the fundamental frequency transmitter output.

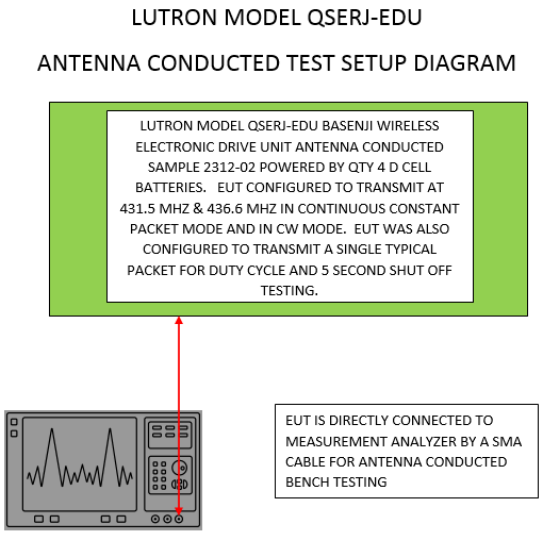
2.2 Test Configuration Rationale.

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

2.3 Test Configuration Diagram Antenna Conducted Measurements

Block diagram of the EUT configuration showing interconnection cables are illustrated below.

Antenna Conducted Test Setup Diagram



2.4 EUT Information, Interconnection Cabling and Support Equipment

EUT Hardware and Software/Firmware

Description	Manufacturer	Model	Serial Number	Software Firmware Version	Sample Number
QSERJ-EDU Wireless Battery-operated Motor Drive Antenna Conducted Test Sample with Basenji 2.0 RF Test Code	Lutron	QSERJ-EDU	04BC03EB	2.010	2312-02

Interconnection Cable List (Antenna Conducted Test Setup)

Manufacturer	Model	Type	Shielding	Length	Description
Suhner	S 04272B	Coax Cable with SMA	Double Braid	1 Meter	Measurement Cable BEC-962

3.0 MPE (Maximum Permissible Exposure)

3.1 Minimum Separation Distance

The manufacturer declares a minimum separation distance of 20 cm between user and device. This device is designed to be mounted on a wall at a height for traditional window blinds. The highest output power, based upon the measurements below, is used to compute the exemption limit for Routine Evaluation.

3.2 Maximum Permissible Exposure Calculation

§1.1307 Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.

(b)(1) *Requirements.* (i) With respect to the limits on human exposure to RF provided in §1.1310 of this chapter, applicants to the Commission for the grant or modification of construction permits, licenses or renewals thereof, temporary authorities, equipment authorizations, or any other authorizations for radiofrequency sources must either:

(A) Determine that they qualify for an exemption pursuant to §1.1307(b)(3);

(B) Prepare an evaluation of the human exposure to RF radiation pursuant to §1.1310 and include in the application a statement confirming compliance with the limits in §1.1310; or

(C) Prepare an Environmental Assessment if those RF sources would cause human exposure to levels of RF radiation in excess of the limits in §1.1310

§1.1310 Radiofrequency radiation exposure limits.

(2) At operating frequencies less than or equal to 6 GHz, the limits for maximum permissible exposure (MPE), derived from whole-body Specific Absorption Rate (SAR) limits and listed in Table 1 of paragraph (e) of this section, may be used instead of whole-body SAR limits as set forth in paragraph (a) through (c) of this section to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b), except for portable devices as defined in §2.1093 as these evaluations shall be performed according to the SAR provisions in §2.1093 of this chapter.

(4) Both the MPE limits listed in Table 1 of paragraph (e) of this section and the SAR limits as set forth in paragraph (a) through (c) of this section and in §2.1093 of this chapter are for continuous exposure, that is, for indefinite time periods. Exposure levels higher than the limits are permitted for shorter exposure times, as long as the average exposure over the specified averaging time in Table 1 is less than the limits. Detailed information on our policies regarding procedures for evaluating compliance with all of these exposure limits can be found in the FCC's *OET Bulletin 65,* "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields," and in supplements to *Bulletin 65,* all available at the FCC's Internet Web site: *http://www.fcc.gov/oet/rfsafety*.

§2.1091 Radiofrequency radiation exposure evaluation: mobile devices.

(b) For purposes of this section, the definitions in §1.1307(b)(2) of this chapter shall apply. A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the RF source's radiating structure(s) and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location while transmitting. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal desktop computer, are considered to be mobile devices if they meet the 20-centimeter separation requirement.

The Lutron Model QSERJ-EDU is categorized as a fixed RF source as defined by 47 CFR Part 1.1307. Although the device is not mobile or portable, the fixed RF source will be evaluated at a distance of 20 cm. This distance is much less than probable exposure distance. The device will be mounted at the top of a window or door. Therefore, the limits of Section 1.1310, Table 1 "Limits for Maximum Permissible Exposure (MPE)" Section (ii) "Limits for General Population / Uncontrolled Exposure are applicable.

The use of OET Bulletin 65 was used to calculate the Power Density based upon EIRP levels of the QSERJ-EDU device measured and reported by this laboratory during testing for compliance to 47 CFR Part 15C.

From: OET Bulletin 65 Edition 97-02, page 19.

$$S = \frac{PG}{4\pi R^2} \qquad (3)$$

where: S = Power Density (in appropriate units, e.g., mW/cm^2)
P = Power input to the antenna (in appropriate units, e.g., mW)
G = Power Gain of the antenna in the direction of interest to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

or:
$$S = \frac{EIRP}{4\pi R^2} \qquad (4)$$

where: EIRP = equivalent (or effective) isotropically radiated power (mw)

3.3 Maximum Permissible Exposure (MPE) 03/29/2024

Antenna power is the highest measured level among the low and high frequencies of the transmitter contained in each model identified above. The measurements below were taken from an antenna conducted test sample of the Lutron QSERJ-EDU with an SMA connector attached to the transmitter output with the EUT antenna disconnected. The table below identifies the transmitter output level to achieve the EIRP level. The Power Density is then calculated using Formula (4) of OET Bulletin 65.

EIRP Measurement and Calculation

Effective Isotropic Radiated Power (EIRP) =

Antenna Power Output (dBm) + antenna gain (dBi)

Modulation	Frequency (MHz)	Transmitter Output Total		Antenna Gain		EIRP Total	
		dBm	Watts	Isotropic	Numeric	dBm	Watts
None	431.5	4.770	0.0030	-6	0.251	-1.23	0.0008
	436.6	4.400	0.0028	-6	0.251	-1.60	0.0007
FSK	431.5	4.770	0.0030	-6	0.251	-1.23	0.0008
	436.6	4.460	0.0028	-6	0.251	-1.54	0.0007

Power Density Calculation

Formula (4) above: S or Power Density = $\frac{EIRP}{4\pi R^2}$

Modulation	Frequency	Peak Output Power Corrected	EIRP	Power Density @ 20 cm	47 CFR Part 1.1310 Limit	Margin
	MHz	dBm	dBm	mW/cm^2	mW/cm^2	mW/cm^2
None	431.5	4.77	-1.23	0.0001499	0.288	-0.2875
	436.6	4.4	-1.60	0.0001376	0.291	-0.2909
FSK	431.5	4.77	-1.23	0.0001499	0.288	-0.2875
	436.6	4.46	-1.54	0.0001396	0.291	-0.2909

Results: The highest calculated Power Density, based upon the measurements for the Lutron Model QSERJ-EDU is 0.000149 mW/cm^2. This complies with the limit of 0.288 mW/cm^2 from Table 1(B) of 47 CFR Part 1.1310 at a separation distance of 20 cm. Therefore, the SAR exposure evaluation is not required.

Appendix A – Test Equipment

Equipment	Manufacturer	Model #	Serial #	BEC #	Calibration Date	Calibration Cycle	Calibration Due Date
EMI Receiver (20 Hz – 26.5 GHz)	Rohde & Schwarz	ESIB 26	836119/006	1010	12/09/2022	3 Years	12/09/2025