



BEC INCORPORATED

SAR EXEMPTION REPORT

**TEST STANDARDS:
FCC Part 15 Subpart C Intentional Radiator**

**Lutron Model XXX-MWCL
LED Lighting Controller with 802.15.4 Radio**

FCC ID: JPZ0155

REPORT BEC-2328-05

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

Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	08/15/2024



1.0 Administrative Information

1.1 General Information Table

Project Number	BEC-2328
Manufacturer	Lutron Electronics
Model Number	RRL-MWCL
EUT Description	LED Lighting Controller with 802.15.4 Radio
Sample Type	Modified with SMA connector on transmitter output port (Antenna Conducted Test Sample)
Sample Number	2328-01
Serial Numbers	02F257C5
FCC ID	JPZ0155
Frequency of Operation	2400 – 2480 MHz
Frequencies Tested	Low (2405 MHz), Middle (2440 MHz), High (2480 MHz)
Antenna Gain	+ 4.0 dBi / + 1.85 dBd
Tune Up Tolerance	+/- 1.0 dBm
Antenna Type	Planar Inverted-F PCB Trace Antenna (PIFA)
Modulation	O-QPSK
FCC Classification	Digital Transmission System (DTS)
Date Samples Received	07/02/2024
EUT Firmware Version	2.005.004
Applicable FCC Rules	47 CFR Part 2.1093
KDB Guidance Document	447498 D04 Interim General RF Exposure Guidance v01
Separation Distance	The separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm.
Device Type	Mobile Device



2.0 Applicable Requirements, Methods, and Procedures

2.1 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.

2.2 Referenced Documents

The following are documents referenced in the SAR Exemption Calculation for this device.

KDB Document KDB 447498 D04 Interim General RF Exposure Guidance v01

FCC eCFR 47 Chapter 1, Subchapter A, Part 1, Section § 1.1310(d)(2) MPE limits in § 1.1310(e)(1) -Table 1

2.3 Limits for Exemption

Table 1 – Synopsis of FCC RF Exposure Limits for Mobile and Portable Devices

Frequency f	FCC RF Exposure Limits	
$f \leq 100$ kHz	All devices assessed case-by-case (guidelines for wireless power transfer devices are provided KDB Pub. 680106)	
100 kHz $< f \leq 300$ kHz	SAR limits in § 1.1310 (b), (c), (d)	
300 kHz $< f \leq 6$ GHz	Portable device	SAR limits in § 1.1310 (b), (c), (d)
	Mobile device	Per § 2.1093(d) SAR limits in § 1.1310 (b), (c), (d) OR Per § 1.1310(d)(2) MPE limits in § 1.1310(e)(1) - Table 1
$f > 6$ GHz	For all devices, MPE limits in § 1.1310(e)(1) - Table 1	

2.4 Separation Distance Rationale

The Lutron RRL-MWCL is a LED lighting controller which is installed in an area away from the user and is controlled remotely by a different product. 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 of traditional lighting control devices. The highest output power, based upon the measurements below, is used to compute the exemption limit for Routine Evaluation.



3.0 Maximum Permissible Exposure

3.1 Maximum Permissible Exposure Calculation Referenced Sections Used

§15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

- (i) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. *See* §1.1307(b)(1) of this chapter.

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

(b)(1) The appropriate exposure limits in §§1.1310 and 2.1093 of this chapter are generally applicable to all facilities, operations and transmitters regulated by the Commission.

§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>



§2.1093 Radiofrequency radiation exposure evaluation: portable devices.

(b) For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

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

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

where: S = Power Density (in appropriate units, e.g., mW/cm²)
P = Power input to the antenna (in appropriate units, e.g., mW)
G = Power Gain of the antenna (numeric) 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:
$$S = \frac{EIRP}{4\pi R^2} \quad (4)$$

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



3.2 Maximum Permissible Exposure Calculation Results

Using Limits Per § 1.1310(d)(2) MPE limits in § 1.1310(e)(1) -Table 1

Calculation

1. $P(\text{dBm}) = \text{Maximum conducted output power (dBm)} + \text{Tune-up Tolerance (dB)}$
2. $P(\text{dBm})$ is converted to $P(\text{mW})$
3. $P(\text{mW}) = 1\text{mW} * 10^{(P(\text{dBm})/10)}$
4. $G(\text{numeric}) = 10^{(\text{Antenna Gain}/10)}$
5. Calculate S (Power Density) using Equation (3)

Channel	Modulation	Frequency (MHz)	Measured Level Peak (dBm)	Cable BEC-962 Loss (dB)	Corrected Measured Level Peak		Limit		Margin	
					dBm	Watts	dBm	Watts	dBm	Watts
11	O-QPSK	2405.0	19.66	0.38	20.04	0.101	30.00	1.000	-9.96	-0.899
18		2440.0	19.91	0.38	20.29	0.107	30.00	1.000	-9.72	-0.893
26		2480.0	19.66	0.38	20.04	0.101	30.00	1.000	-9.96	-0.899

EUT Transmission Signal Type	Frequency	Max Power Input P(dBm)-Maximum Output Power with Tune Up Tolerance of + 1.0 dBm	Converted Power Input P(mW)	G = Power Gain (numeric)	S = Power Density @ 20 cm	1.1310 Radio Frequency Radiation Exposure Limits (Tx Frequency 1500 to 100000 MHz)	Margin
	MHz	dBm	mW	dBd	mW/cm ²	mW/cm ²	
DTS - 802.15.4 Modulated with O-QPSK	2440.0	21.29	0.1346	2.512	0.0673	1.00	-0.9327

Antenna power shown in the above table reflect the highest measured levels among the low, middle and high frequencies for the DTS transmitter.

Results: The maximum calculated Power Density of the measurements for the DTS transmitter contained in the Lutron RRL-MWCL LED lighting controller is 0.0673 mW/cm². This complies with the limit of 1.0 mW/cm² from Table 1(ii) of 47 CFR Part 1.1310(e)(1). Therefore, 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	12/09/22	3 Years	12/09/25