



**BEC INCORPORATED**

**MAXIMUM PERMISSABLE EXPOSURE (MPE) REPORT**

**TEST STANDARDS:**

**U.S. Title 47 Chapter 1 Subchapter A Part 2 Subpart J**

**Legrand Model WNRCB4 and Model WZ3RCB4  
radiant 4-Button Scene Controller**

**FCC ID: 2AU5D-WRCB4**

**REPORT# BEC-2195-02**

**CUSTOMER:**

**Pass & Seymour/Legrand  
50 Boyd Avenue  
Syracuse, NY 13209**

**PREPARED BY:**

**Paul Banker, Test Engineer**

**REVIEWED and APPROVED BY:**

**Steve Fanella, Quality Manager**

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## Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	05/23/2022
1	Edited the Report to change separation distance from 90 mm to 15 mm and adding tune-up tolerance of +/- 2 dBm	06/27/2022	06/27/2022
2	Edited the Report to change separation distance from 15 mm to 20 cm	07/05/2022	07/05/2022



## 1.0 Administrative Information

### 1.1 General Information Table

<b>Project Number</b>	BEC-2195
<b>Manufacturer</b>	Legrand
<b>EUT Test Models</b>	WNACB4 and WZ3ACB4
<b>EUT Sample Type</b>	FCC Test Code Radiated Sample
<b>EUT Serial Number</b>	None
<b>EUT Sample Number</b>	2195-01
<b>EUT Firmware Version</b>	TestRadio_WNRL63.bin
<b>Frequency of Operation</b>	2405 – 2480 MHz
<b>Antenna Gain</b>	+ 4.28 dBi
<b>Antenna Type</b>	Inverted F
<b>Modulation</b>	O-QPSK
<b>Tune Up Tolerance</b>	+/- 2 dBm
<b>FCC Classification</b>	Digital Transmission System (DTS)
<b>Date Samples Received</b>	03/10/2022
<b>Sample Type and Condition Received</b>	Production Unit Suitable for Test
<b>EUT Description</b>	radiant Wireless 4-Button Scene Controller
<b>FCC ID</b>	2AU5D-WRCB4
<b>Applicable FCC Rules</b>	47 CFR Part 2.1091, OET Bulletin 65



## 1.2 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 Legrand Model WNRCB4 and Model WZ3RCB4 are 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. 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 WNR/WZ3R 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.**

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

where: S = Power Density (in appropriate units, e.g., mW/cm<sup>2</sup>)  
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: 
$$S = \frac{\text{EIRP}}{4\pi R^2} \quad (4)$$

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



### 1.3 Maximum Permissible Exposure (MPE) 04/04/2022

Antenna power is the highest measured level among the low, middle and high frequencies of the transmitter contained in each model identified above. The measurements below were taken from a test sample of the Legrand Model WNRCB4 and WZ3RCB4. The maximum radiated field strength level of the two fundamental transmit frequencies were converted from dB $\mu$ V/m to dBm. The table below identifies the transmitter output level to achieve the EIRP level. The tune up tolerance of +/- 2 dBm was added to the Antenna Conducted Maximum Output Power for the transmitter measurements. The Power Density is then calculated using Formula (4) of OET Bulletin 65.

#### Antenna Conducted Maximum Output Power Measurement (04/04/2022):

Channel	Modulation	Frequency (GHz)	Measured Level (dBm)	Cable # 962 Loss (dB)	Tune Up Tolerance (dBm)	Maximum Conducted Output Power Total With Tune Up Tolerance		Limit		Margin		Result
						dBm	Watts	dBm	Watts	dBm	Watts	
						11	O-QPSK	2405.0	4.37	0.47	2.00	
18	2440.0	4.07	0.47	2.00	6.54	0.0045		30.00	1.000	-23.46	-0.995	Pass
26	2480.0	4.47	0.47	2.00	6.94	0.0049		30.00	1.000	-23.06	-0.995	Pass



## Power Spectral Density Calculation

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

Channel	Modulation	Frequency	Antenna Power With Tune Up Tolerance	Antenna Gain	EIRP	Power Density @ 20 cm	1.1310 Limit	Margin
		MHz	dBW	dBi	dBW	mW/cm <sup>2</sup>	mW/cm <sup>2</sup>	
11	O-QPSK	2405	-23.16	4.28	-18.88	0.0026	1.00	-0.9974
18		2440	-23.46	4.28	-19.18	0.0024	1.00	-0.9976
26		2480	-23.06	4.28	-18.78	0.0026	1.00	-0.9974

Results: The highest calculated Power Density, 0.0026 mW/cm<sup>2</sup>, is based upon the EIRP measurements for the Legrand WNRCB4 and WZ3RCB4. This level complies with the limit Table 1(ii) of 47 CFR Part 1.1310 at a separation distance of 20 cm.