



RF Exposure Evaluation Report

For:
Light Guard LLC.

Model:
WT01

Product Description:
The Wireless Trigger activates and de-activates the Lightguard system by sending a signal over BLE technology.

FCC ID: 2A9AAWT01

Per:
CFR Part Part1 (1.1307 & 1.1310), Part 2 (2.1091),
FCC KDB 447498 D04 Interim General RF Exposure Guidance v01
ISED RSS-102 Issue 6

Report number: EMC_MPCON_006_22001_FCC_ISED_RF_Exposure_Rev2

DATE: 2024-07-30



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1 **Assessment**

This RF Exposure evaluation report provides evidence for compliance of the equipment (as identified in section 3 of this test report) with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1.1307, Part 2 (2.1091) and ISED standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power including tune-up tolerance, antenna gain, the distance towards the human body, multiple transmitter information as presented by the applicant).

In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits stipulated by the above given FCC and ISED rule parts based on available specifications for worst-case conditions at a separation distance greater than 20cm to the body.

Company	Description	Model No.
LightGuard, LLC	The Wireless Trigger activates and de-activates the Lightguard system by sending a signal over BLE technology	WT01

Responsible for the Report:

2024-07-30		Compliance	Art Thammanavarat (Senior EMC Engineer)
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section3.

CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
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EMC Lab Manager:	Issa Ghama
Responsible Project Leader:	Sangeetha Sivaraman

2.2 Identification of the Client

Client Firm/Name:	Light Guard LLC.
Street Address:	820 Harbor Dr., Key Biscayne
City/Zip Code	Key Biscayne 33149
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No	WT01
HW Version	WT01
SW Version	1.0
PMN	Wireless Trigger
FCC ID:	2A9AAWT01
Operating Voltage Range	3.5VDC-4.5VDC INPUT (3xType N batteries)
Operating Temperature Range	T min: -15°C / T Nom: 20°C / T max: 85 °C
Radios included in the device	Bluetooth & Wi-Fi Modules Model Name : Expressif Systems Model Number : ESP32-WROOM-32E-N16 FCC ID : 2AC7Z-ESP32WROOM32E IC : 21098-ESPWROOM32E Wireless Technologies Bluetooth LE Wi-Fi-2.4GHz
Sample Revision	<input type="checkbox"/> Prototype <input checked="" type="checkbox"/> Production <input type="checkbox"/> Pre-Production
EUT Dimensions	43.8mm(W)x18.7mm(D)x87.8mm(H)
Weight	70 g with batteries
EUT Diameter	<input checked="" type="checkbox"/> < 60 cm <input type="checkbox"/> Other _____

4 RF Exposure Limits and FCC and ISSED Basic Rules

4.1 FCC

4.1.1 § 2.1091(c)(1)

Evaluation of compliance with the exposure limits in § 1.1310 of this chapter, and preparation of an EA if the limits are exceeded, is necessary for mobile devices with single RF sources having either more than an available maximum time-averaged power of 1 mW or more than the ERP listed in Table 1 to § 1.1307(b)(3)(i)(C), whichever is greater. For mobile devices not exempt by § 1.1307(b)(3)(i)(C) at distances from 20 centimeters to 40 centimeters and frequencies from 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in § 1.1310 of this chapter is necessary if the ERP of the device is greater than ERP_{20cm} in the formula below. If the ERP of a single RF source at distances from 20 centimeters to 40 centimeters and frequencies from 0.3 GHz to 6 GHz is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP) in comparison with the following formula only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

$$P_{th}(\text{mW}) = ERP_{20\text{ cm}}(\text{mW}) = \begin{cases} 2040f & 0.3\text{ GHz} \leq f < 1.5\text{ GHz} \\ 3060 & 1.5\text{ GHz} \leq f \leq 6\text{ GHz} \end{cases}$$

4.1.2 § 2.1091(c)(2)

For multiple mobile or portable RF sources within a device operating in the same time averaging period, routine environmental evaluation is required if the formula in § 1.1307(b)(3)(ii)(B) of this chapter is applied to determine the exemption ratio and the result is greater than 1.

4.1.3 § 1.1307(b)(3)(ii)(B)

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

4.2 ISSED RSS 102

4.1.4 Clause 2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

5 Evaluations

Per the manufacturer: The wireless trigger is in sleep mode by default, hence it is not transmitting or receiving anything RF in this state. When the trigger button is pressed, it starts scanning the nearest Command Modules to send the triggering signal, this process has a timeout of 3 seconds and a duty cycle of 40%. Normally, this scanning process is achieved in 250 milliseconds. Then, a connection between the wireless trigger and the command module is established. This connection has a 10.61% of duty cycle in a timeout of 2 seconds. Normally, the connection process takes two intervals of 7.5 milliseconds to transmit the required information. Using the very worst case conceivable where

- A user presses the button every 3 seconds and a scanning process is repeated repeatedly to give a TX Duty cycle of 40%.
- According to the Module Test Report No.: RSHD200218007-00A from Bay Area Compliance Laboratories Corp. (Kunshan), the device has a maximum power of 7.56 dBm conducted with a target power of 8 dBm.
- The target power is higher and is used for the analysis. The analysis also uses the extremity exposure levels as the Wireless Trigger device will only operate/activate when the button is pushed.

5.1 FCC RF Exposure (Standalone)

Radio	Tech-Band	Freq-Low _[GHz]	Pwr _[dBm]	Duty Cycle (%)	Power _[W]	Ant-G _[dBi]	ERP _[W]	ERP _[mW]	Threshold ERP _[W] Limit	ERP < Threshold ERP _[W]
BT	LE	2.4800	8.00	40%	0.0025	3.40	0.00337	3.366	6.79	Yes

5.2 ISED RF Exposure (Standalone)

									0.005 Meter	
									SAR	
									RSS-102 6.3 D≤20 cm (300 ≤ Freq ≤ 5800 MHz)	
Radio	Tech-Band	Freq-Low [MHz]	Pwr _F [dBm]	Duty Cycle (%)	Power _F [W]	Ant-G [dBi]	EIRP _F [W]	EIRP _{mW}	Exemption limit for Routine Evaluation	Exemption (Y/N)
BT	LE	2480.00	8.00	40%	0.0025	3.40	0.0055	5.52	7.43	Yes

Conclusion:

- The maximum RF emissions from this equipment fulfill the SAR exclusion threshold limits for the separation distance between the antenna and the human extremity of 5 mm. SAR is not required.
- Simultaneous transmission with other radios is not supported.



6 Revision History

Date	Report Name	Changes to report	Prepared by
2024-06-07	EMC_MPCON_006_22001_FCC_ISED_RF_Exposure	Initial Version	Art Thammanavarat
2024-06-11	EMC_MPCON_006_22001_FCC_ISED_RF_Exposure_Rev1	1. Updated Header. 2. Section 5.2: Updated note.	Art Thammanavarat
2024-07-30	EMC_MPCON_006_22001_FCC_ISED_RF_Exposure_Rev2	Used Max module power for calculation to limb exposure with 40% duty cycle	Art Thammanavarat

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