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Report No.: 1901RSU031-U4 Report Version: V01 Issue Date: 01-22-2019

# **RF Exposure Evaluation Declaration**

FCC ID: PBR-SZG3ACWC

**APPLICANT:** The Kroger Co.

**Application Type:** Certification

Product: GEN3Z Camera and WiFi\_Wave2\_Zigbee Access Point

Unit

Model No.: SZG3ACWC

FCC Classification: Digital Transmission System (DTS)

Unlicensed National Information Infrastructure (NII)

Reviewed By:

( Jame Yuan `

Approved By:

( Robin Wu )





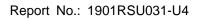
The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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# **Revision History**

| Report No.    | Version | Description    | Issue Date | Note  |
|---------------|---------|----------------|------------|-------|
| 1901RSU031-U4 | Rev. 01 | Initial Report | 01-22-2019 | Valid |
|               |         |                |            |       |



### 1. PRODUCT INFORMATION

## 1.1. Equipment Description

| Product Name:            | GEN3Z Camera and WiFi_Wave2_Zigbee Access Point Unit |  |  |
|--------------------------|--|--|--|
| Model No.:               | SZG3ACWC   |  |  |
| ZigPoo Specification:    | 802.15.4 (Module, FCC ID: PBR-SZMDLNR1)              |  |  |
| ZigBee Specification:    | 802.15.4 (Module, FCC ID: PBR-SZMDLM3BR1)            |  |  |
| Bluetooth Specification: | v5.0 single mode (Module, FCC ID: PBR-SZMDLBTNR1)    |  |  |
| Wi-Fi 1# Specification:  | 802.11b/g  |  |  |
| Wi-Fi 2# Specification:  | 802.11a/ac   |  |  |

Note: MRT test lab provide one POE adapter (Manufacturer: H3C & Model: EWPAM1UPOE2) for approval testing, it is not for sale.

### 1.2. Description of Available Antennas

| Antenna Type | Frequency   | T <sub>X</sub> | Max Antenna | BF Gain | CDD Direction | nal Gain (dBi) |
|--------------|-------------|----------------|-------------|---------|---------------|----------------|
|              | Band (MHz)  | Paths          | Gain (dBi)  | (dBi)   | For Power     | For PSD        |
| PIFA Antenna | 2412 ~ 2462 | 4              | 2.00        | 6.02    | 2.00          | 8.02           |
|              | 5150 ~ 5850 | 4              | 3.00        | 6.02    | 3.00          | 9.02           |

Note:

The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

For CDD transmissions, directional gain is calculated as follows,  $N_{ANT} = 4$ ,  $N_{SS} = 1$ .

If all antennas have the same gain,  $G_{ANT}$ , Directional gain =  $G_{ANT}$  + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,
   Array Gain = 10 log (N<sub>ANT</sub>/ N<sub>SS</sub>) dB = 6.02;
- For power measurements on IEEE 802.11 devices,
   Array Gain = 0 dB for N<sub>ANT</sub> ≤ 4;

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# 2. RF Exposure Evaluation

#### 2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency Range   | Electric Field | Magnetic Field | Power Density         | Average Time |
|---|----------------|----------------|-----------------------|--------------|
| (MHz)   | Strength (V/m) | Strength (A/m) | (mW/cm <sup>2</sup> ) | (Minutes)    |
| (A) Limits for Occupational/ Control Exposures            |                |                |                       |              |
| 300-1500  |                |                | f/300                 | 6            |
| 1500-100,000  |                |                | 5                     | 6            |
| (B) Limits for General Population/ Uncontrolled Exposures |                |                |                       |              |
| 300-1500  |                |                | f/1500                | 6            |
| 1500-100,000  |                |                | 1                     | 30           |

f= Frequency in MHz

Calculation Formula:  $Pd = (Pout*G)/(4*pi*r^2)$ 

Where

Pd = power density in mW/cm<sup>2</sup>

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

r = distance between observation point and center of the radiator in cm

Pd is the limit of MPE, 1mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

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## 2.2. Test Result of RF Exposure Evaluation

| Product   | GEN3Z Camera and WiFi_Wave2_Zigbee Access Point Unit |
|-----------|--|
| Test Item | RF Exposure Evaluation                               |

Antenna Gain: Refer to clause 1.2.

| Test Mode                                   | Frequency Band<br>(MHz) | Max Conducted Power | Antenna Gain<br>(dBi) | Maximum EIRP<br>(dBm) |
|---|-------------------------|---------------------|-----------------------|-----------------------|
|   |                         | (dBm)               |                       |                       |
| 802.11b/g                                   | 2412 ~ 2462             | 21.04               | 2                     | 23.04                 |
| 000 44 0/00                                 | 5150 ~ 5250             | 18.72               | 2                     | 22.20                 |
| 802.11a/ac                                  | 5725 ~ 5825             | 20.38               | 3                     | 23.38                 |
|   | One Bluetooth mo        | dule (FCC ID: PBR   | R-SZMDLBTNR1)         |                       |
| Bluetooth                                   | 2402 ~ 2480             | 0.57                | 2                     | 2.57                  |
| One ZigBee module (FCC ID: PBR-SZMDLNR1)    |                         |                     |                       |                       |
| 802.15.4                                    | 2405 ~ 2480             | 1.12                | 2                     | 3.12                  |
| Two ZigBee modules (FCC ID: PBR-SZMDLM3BR1) |                         |                     |                       |                       |
| 802.15.4                                    | 2405 ~ 2480             | 19.93               | 3.27                  | 23.20                 |

| Test Mode   | Frequency Band<br>(MHz) | Maximum EIRP<br>(dBm) | Power Density at $R = 20 \text{ cm}$ $(\text{mW/cm}^2)$ | Limit<br>(mW/cm²) |
|-------------|-------------------------|-----------------------|---|-------------------|
| 802.11b/g   | 2412 ~ 2462             | 23.04                 | 0.0401  | 1                 |
| 000 44 0/00 | 5150 ~ 5250             | 22.20                 | 0.0422  | 4                 |
| 802.11a/ac  | 5725 ~ 5825             | 23.38                 | 0.0433  | 1                 |
| Bluetooth   | 2402 ~ 2480             | 2.57                  | 0.0004  | 1                 |
| 802.15.4    | 2405 ~ 2480             | 3.12                  | 0.0004  | 1                 |
| 802.15.4    | 2405 ~ 2480             | 23.20                 | 0.0416  | 1                 |

### **CONCLUSION:**

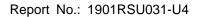
All of 2.4GHz WLAN, 5GHz WLAN, Bluetooth and ZigBee can transmit simultaneously.

The max Power Density at R (20 cm) =  $0.0401 \text{mW/cm}^2 + 0.0433 \text{mW/cm}^2 + 0.0004 \text{mW/cm}^2 + 0.0004 \text{mW/cm}^2 + 0.0416 \text{mW/cm}^2 + 0.0416 \text{mW/cm}^2 = 0.1674 \text{mW/cm}^2 < 1 \text{mW/cm}^2$ .

Therefore, the Min Safety Distance is 20cm.

| ———— The End |  |
|--------------|--|
| THE ENG      |  |

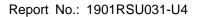
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# **Appendix A - Test Setup Photograph**

Refer to "1901RSU031-UT" file.





# Appendix B - EUT Photograph

Refer to "1901RSU031-UE" file.