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)

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
ZigBee Specification:	802.15.4 (Module, FCC ID: PBR-SZMDLNR1)
	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 Band (MHz)	T_X Paths	Max Antenna Gain (dBi)	BF Gain (dBi)	CDD Directional Gain (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_{ANT}/ N_{SS}) dB = 6.02;
- For power measurements on IEEE 802.11 devices,
  Array Gain = 0 dB for $N_{ANT} \leq 4$;

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 (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (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^2
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, $1mW/cm^2$. 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.

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 (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)
802.11b/g	2412 ~ 2462	21.04	2	23.04
802.11a/ac	5150 ~ 5250	18.72	3	23.38
	5725 ~ 5825	20.38		
One Bluetooth module (FCC ID: PBR-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 (MHz)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
802.11b/g	2412 ~ 2462	23.04	0.0401	1
802.11a/ac	5150 ~ 5250	23.38	0.0433	1
	5725 ~ 5825			
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) = 0.0401mW/cm^2 + 0.0433mW/cm^2 + 0.0004mW/cm^2 + 0.0004mW/cm^2 + 0.0416mW/cm^2 + 0.0416mW/cm^2 = 0.1674mW/cm^2 < 1mW/cm^2.

Therefore, the Min Safety Distance is 20cm.

The End

Appendix A - Test Setup Photograph

Refer to “1901RSU031-UT” file.

Appendix B - EUT Photograph

Refer to “1901RSU031-UE” file.