RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.247(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.

EUT Specification

EUT	Z-Gate
Product Description	LAN to Z-Wave / Wifi to Z-Wave
Model	FG3200 ; FG2200
RF Module	Realtek RF Module, Model Number : RTL8188EE ZWAVE RF Module, Model Number : MZM5101A-C84
Frequency band (Operating)	☒ 802.11b/g/n HT20: 2.412GHz ~ 2.462GHz 802.11gn HT40: 2.422GHz ~ 2.452GHz Z-Wave: 908.42MHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna Specification	Wifi: Antenna Gain : 2.26 dBi (Numeric gain 1.68) Z-Wave: Antenna Gain : 1.30 dBi (Numeric gain 1.35)
Maximum Average output power	IEEE 802.11b Mode: 25.07 dBm (321.366 mW) IEEE 802.11g Mode: 25.29 dBm (338.065 mW) IEEE 802.11gn HT 20 Mode: 25.55 dBm (358.922 mW) IEEE 802.11gn HT 40 Mode: 24.62 dBm (289.734 mW) Z-Wave: 94.01 dBuV/m (0.7553 mW)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	2014/09/30	Initial Issue	ALL	Michelle Chiu
01	2014/10/01	Revised Product Name & Added Product Description	ALL	Dola Hsieh
02	2014/10/08	Revised	ALL	Gloria Chang

TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ ***Equation 1***

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

Maximum Permissible Exposure

Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

IEEE 802.11b mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2412 ~ 2462	321.366	1.68	20	0.1074	1

IEEE 802.11g mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2412 ~ 2462	338.065	1.68	20	0.1130	1

IEEE 802.11gn HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2412 ~ 2462	358.922	1.68	20	0.1200	1

IEEE 802.11gn HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2422 ~ 2452	298.734	1.68	20	0.0999	1

For Z-Wave:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
908.42	0.7553	1.35	20	0.0002	0.6056