

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant: PIN GENIE, INC. DBA LOCKLY
Address of applicant: 676 Transfer Rd., St. Paul, MN 55114

Manufacturer: Smart Electronic Industrial (Dong Guan) Co., Ltd.
Address of manufacturer: Qing Long Road, Long Jian Tian Village, Huang Jiang Town, Dong Guan, Guang Dong, China

General Description of EUT:

Product Name: Lockly Vision Elite
Trade Name: LOCKLY
Model No.: PGD798NV
Adding Model(s): /
Rated Voltage: Battery:DC3.7V
FCC ID: 2ASIVPGD798NV
Equipment Type: Fixed

Technical Characteristics of EUT:

2.4GHz

Frequency Range: 2403.01-2471.01MHz
RF Output Power: 19.27dBm (Conducted)
Modulation: GFSK
Quantity of Channels: 18
Channel Separation: 4MHz
Type of Antenna: Integral Antenna
Antenna Gain: 2.0dBi
Frequency Range: 2403.01-2471.01MHz
RF Output Power: 19.27dBm (Conducted)

Bluetooth

Bluetooth Version: V5.0 (BLE mode)
Frequency Range: 2402-2480MHz
RF Output Power: -4.91dBm (Conducted)
Data Rate: 1Mbps
Modulation: GFSK
Quantity of Channels: 40
Channel Separation: 2MHz
Type of Antenna: FPC Antenna
Antenna Gain: 3.4dBi

1.2 Standard Applicable

According to § 1.1307(b)(1) and KDB 447498 D01 General RF Exposure Guidance v06, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

(a) Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz; * = Plane-wave equivalents power density

1.3 MPE Calculation Method

$$S = (30 * P * G) / (377 * R^2)$$

S = power density (in appropriate units, e.g., mw/cm²)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator,
the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

1.4 MPE Calculation Result

For 2.4GHz

Maximum Tune-Up output power: 19.27(dBm)

Maximum peak output power at antenna input terminal: 84.53(mW)

Prediction distance: >20(cm)

Prediction frequency: 2403.01 (MHz)

Antenna gain: 2.0 (dBi)

Directional gain (numeric gain): 1.58

The worst case is power density at prediction frequency at 20cm: 0.027(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

For Bluetooth

Maximum Tune-Up output power: -4.91 (dBm)

Maximum peak output power at antenna input terminal: 0.32(mW)

Prediction distance: >20(cm)

Prediction frequency: 2480(MHz)

Antenna gain: 3.4 (dBi)

Directional gain (numeric gain): 2.19

The worst case is power density at prediction frequency at 20cm: 0.0001(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Mode for Simultaneous Multi-band Transmission

The worst case is 2.4GHz + Bluetooth

Evaluation Result: $0.027/1 + 0.0001/1 = 0.0271(mw/cm^2)$

Limit: 1

Result: Pass