

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant: LEEDARSON LIGHTING CO., LTD.
Address of applicant: Xingda Road, Xingtai Industrial Zone, Changtai County, Zhangzhou, Fujian, China

Manufacturer: LEEDARSON LIGHTING CO., LTD.
Address of manufacturer: Xingda Road, Xingtai Industrial Zone, Changtai County, Zhangzhou, Fujian, China

General Description of EUT:

Product Name: Smart Downlight
Trade Name: /
Model No.: NS01RA13FR12591, NS01RA13FR125zx (x replaced by one digital numbers range 1 to 9 to denote different package style; z replaced by one digital numbers 8/9 to denote different CRI)
FCC ID: 2AB2QNS01RA13FR125
Rated Voltage: AC120V/60Hz

Technical Characteristics of EUT:

Support Standards: IEEE802.15.4
Frequency Range: 2405-2480MHz
RF Output Power: 12.85dBm (Conducted)
Type of Modulation: OQPSK
Quantity of Channels: 16
Channel Separation: 5MHz
Type of Antenna: PCB Antenna
Antenna Gain: 1.3dBi
Antenna Gain: 2.0dBi

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

Maximum Tune-Up output power: 13 (dBm)

Maximum peak output power at antenna input terminal: 19.95 (mW)

Prediction distance: >20(cm)

Prediction frequency: 2480 (MHz)

Antenna gain: 1.3 (dBi)

Directional gain (numeric gain): 1.35

The worst case is power density at prediction frequency at 20cm: 0.005(mw/cm²)

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

Result: Pass