

## LED, Light Emitted Diode

### DESCRIPTION

LED is a general and common type of backlight.  
 There are two types of backlight structure:  
 1. Direct lighting: LED is placed under LCD and light goes through directly.  
 2. Edge lighting: LED is placed at the edge of light guide under LCD.

### CHARACTERISTICS

**The same contents of both lighting types:**

1. Low voltage DC power to drive.
2. Very long life time.
3. As the number of dice increases, the power consumption and heat increase accordingly.
4. No noise occurrence.

**Direct lighting type:**

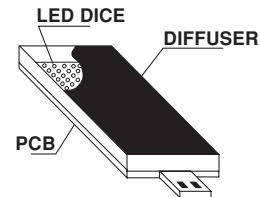
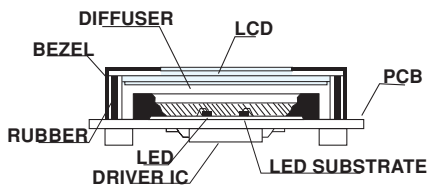
1. High brightness.
2. Used for small-size LCM.

**Edge Lighting type:**

1. Thin.
2. Less consumption of power, low brightness.

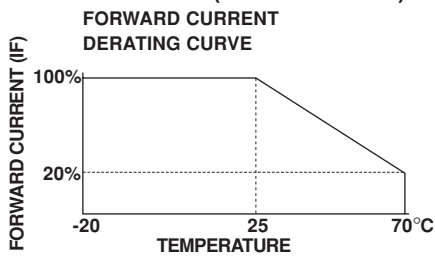
### CONSTRUCTION

**Direct lighting type:**

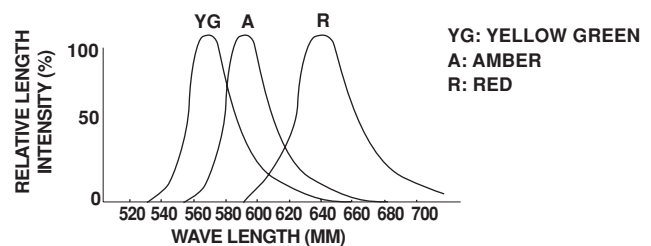


### LIFE CHARACTERISTICS

**Electrical Characteristics (Reference Data)**



**Wave Length vs Relative Light Intensity**



### APPLICATION

	LARGE TYPE	MIDDLE TYPE	SMALL TYPE	THIN TYPE
	good	good	very good	very good
Luminous Intensity	Module: 5 - 50 (cd/m <sup>2</sup> )		LED only: 30 - 400 (cd/m <sup>2</sup> )	
Emitted color	Yellow, Yellow green, Green, Amber, Red			
Driving Voltage	DC2.1V or 4.2V			
Life Time	About 100,000 hrs			
Thickness	Direct Lighting Type: 4.5mm - 5.5mm		Edge Lighting Type: 1- 3mm	
Temperature Range	-20°C to 70°C		-20°C to 70°C	

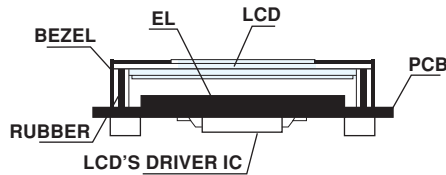
**DESCRIPTION**

The EL lamp is a thin structure type of illumination. It is formed by organic thick membrane, high conductive fluorescence substance, transparent electrode and uses AC power to drive.

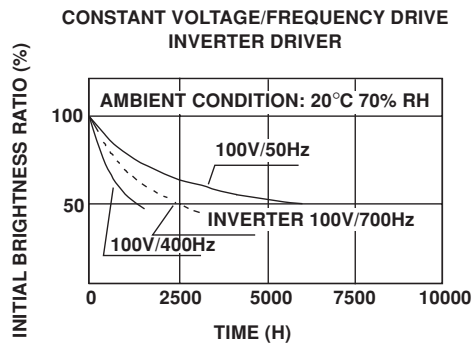
**CHARACTERISTICS**

- |  |  |
|--|--|
| 1. Uniform brightness.   | 4. Selection of colors are wide (especially for white, blue and green) |
| 2. Low electric current, power consumption, and heat generation. | 5. Needs EL inverter.  |
| 3. Thinner and lighter   |  |

**CONSTRUCTION**



**LIFE CHARACTERISTICS**



**APPLICATION**

LARGE TYPE	MIDDLE TYPE	SMALL TYPE	THIN TYPE
good	good	good	very good

Luminous Intensity	Module: 10 - 30 (cd/m <sup>2</sup> )	EL only: 40 - 150 (cd/m <sup>2</sup> )
Emitted Color	White, Blue, Green	
Driving Voltage	AC 100V/400Hz	
Life Time	3,000 - 8,000 hrs	
Thickness	0.3 - 0.7mm	
Temperature Range	Operating: 0°C to + 50°C	Storage: -20°C to + 60°C

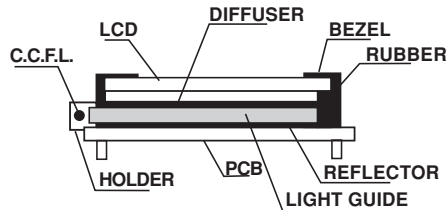
## DESCRIPTION

The CCFL backlight has a very wide application. The backlight is driven by AC, which provides a very bright and even glow. The CCFL lifetime and brightness are both better than the EL backlight. If white light, low power consumption and long lifetime are your requirements, CCFL is your choice.

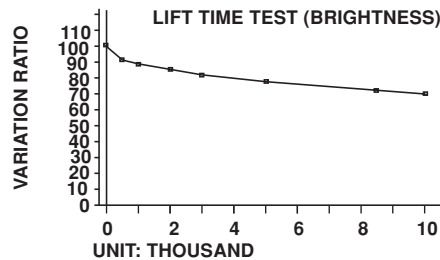
## CHARACTERISTICS

- Long life time.
- High brightness
- Low heat generation.
- Need CCFL inverter.
- Uniform brightness
- Emitted color is white

## CONSTRUCTION



## LIFE CHARACTERISTICS



## APPLICATION

LARGE TYPE	MIDDLE TYPE	SMALL TYPE	THIN TYPE
very good	very good	good	good

Luminous Intensity	Module: 50 - 100 (cd/m <sup>2</sup> )	CCFL only: 500 - 800 (cd/m <sup>2</sup> )
Emitted Color	White	
Driving Voltage	AC 1,000V Max/80kHz	
Life Time	15,000 hrs	
Thickness	Direct lighting type: 5mm	Edge lighting type: 3mm
Temperature Range	Operating: 0°C to + 50°C	Storage: -20°C to + 60°C