

SINGLE 3W LED MODULE

APPLICATIONS MANUAL



WARNING

- **Direct LED emission can seriously damage the eyes. Never view a LED emission directly.**
- **Never use a disassembled LED module.**
- **The LED module becomes hot during illumination. Pay attention not to be burned while handling it.**
- **Do not touch, bend or twist the terminals.**

INTRODUCTION

This Application Manual is produced for engineers who intend to design lighting items using the Stanley Single 3W LED Modules.

Through the use of this Application Manual, the lighting items can use their unique characteristics effectively. Safety precautions and notes on the necessary quality conditions for design are described in this manual. Before the LED lighting item is designed, be sure to read this manual thoroughly and understand the functions of LED modules.

For performance and quality specifications of LED modules, refer to specifications (separately supplied).

SPECIAL FEATURES OF SINGLE 3W LED MODULE

The Single 3W Series (Stanley detachable LED module) is the latest and most unique LED module which has the following special characteristics.

- Connector connection type without welding. (Use optional power supply.)
- As the LED core is not affected by soldering temperatures, it has high reliability and long life.
- The LED heat is dissipated through the product's aluminum base (aluminum plate) to the additional user provided heat sink. (Its simple construction gives the user design freedom.)
- High luminous intensity: 2.5W 80lm (typ)
- Long life and high performance and sharp luminous flux of LED will be provided.
- High color rendering performance (Average color rendering evaluation: Ra=95 or higher)
- Lens variations can be selected from the color temperature variation (3300K or 5000K), narrow angle (25°) or wide angle (45°).
- A DC constant current power supply for connecting up to two Single 3W modules is provided.
- The Single 3W conforms to the RoHS Directive.
- The following options are provided.

① Power distribution circuit board

• SICC101

(Protection circuit installed 24DCV constant current power supply (also applicable to CCM4512X))

• SICC111

(Protection circuit installed 24DCV constant voltage power supply)



② DC Constant current power supply

(12mA, Max 45V) (Type: CCM4512X)



TABLE OF CONTENTS

1. CHARACTERISTICS AND VARIATIONS	1
2. SINGLE 3W SERIES HEAT SINK CONSTRUCTION	1
3. OPTICAL DESIGN	2
4. SINGLE 3W HEAT SINK AND MOUNT DESIGN	3
5. SINGLE 3W HEAT DISSIPATION MEASUREMENT METHOD	4
6. SINGLE 3W POWER SUPPLY AND CIRCUIT DESIGN	4
7. SINGLE 3W SERIES APPLICATION EXAMPLES	5~7
8. CAUTION FOR USAGE	8

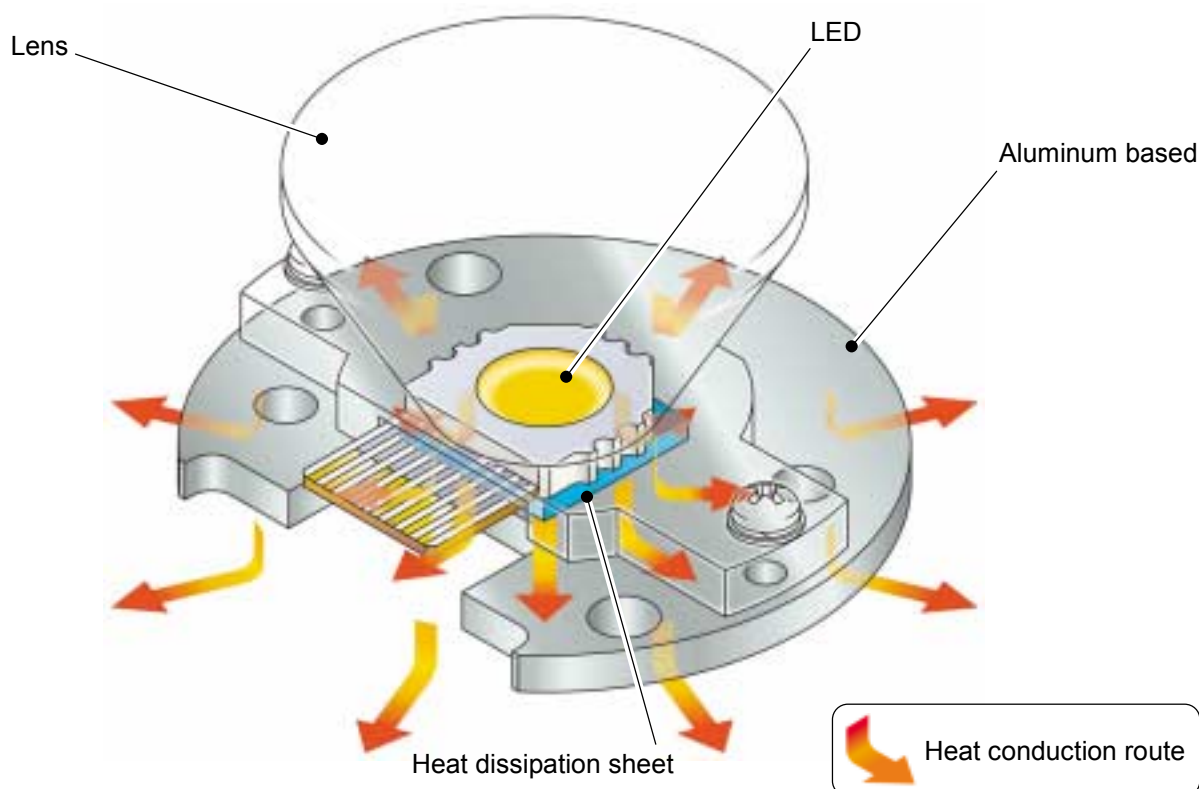
1. CHARACTERISTICS AND VARIATIONS

Model	Color Temperature (K)	Shape	Forward Current/Voltage (mA/V)	Luminous Flux TYP (lm)	Central Illumination H=1m (lx)	Color rendition (Ra)	Half Intensity Angle
SIW3121N	3,300	25°	120mA/21V	64	200	95 or above (typ95)	25°
SIW3141N		45°			50		45°
SIN3121N	5,000	25°		80	220		25°
SIN3141N		45°			57		45°

NOTE: The luminous intensity is measured at 1 m from the light source.

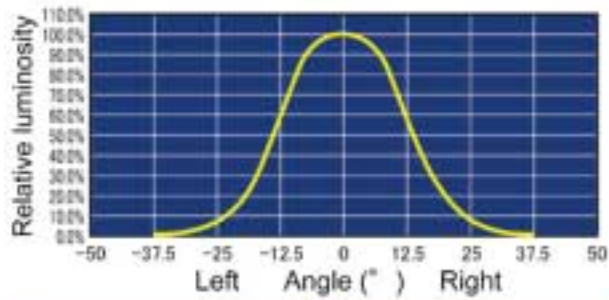
2. SINGLE 3W SERIES HEAT SINK CONSTRUCTION

- The Single 3W itself has not sufficient heat dissipation capacity.
- Be sure to provide the appropriate and high efficient heat sink/material (aluminum, etc.) as per this Application Manual. The heat sink can be also used as a cabinet.
- After the Single 3W is installed to the heat sink, check that the temperature at the check point is with the rated temperature range.
- If sufficient heat dissipation performance is not ensured, the LED element temperature will increase and will result in short life and lesser reliability.

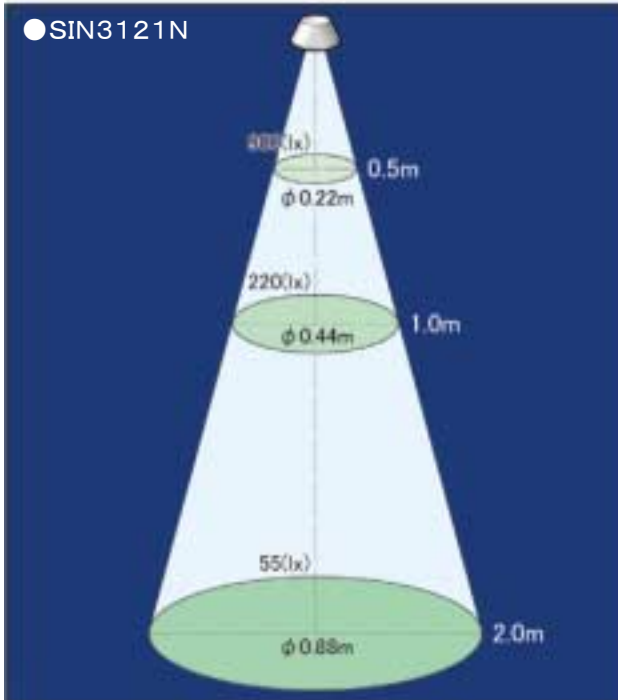


3. OPTICAL DESIGN

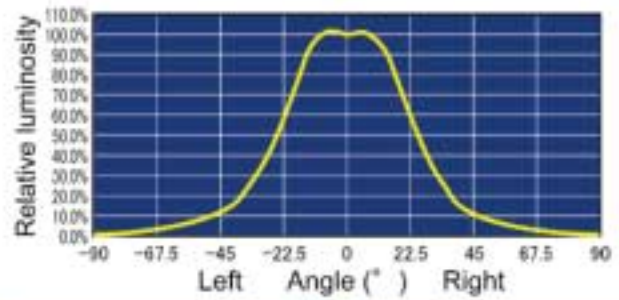
1) Optical spatial distribution characteristics (25° lens)



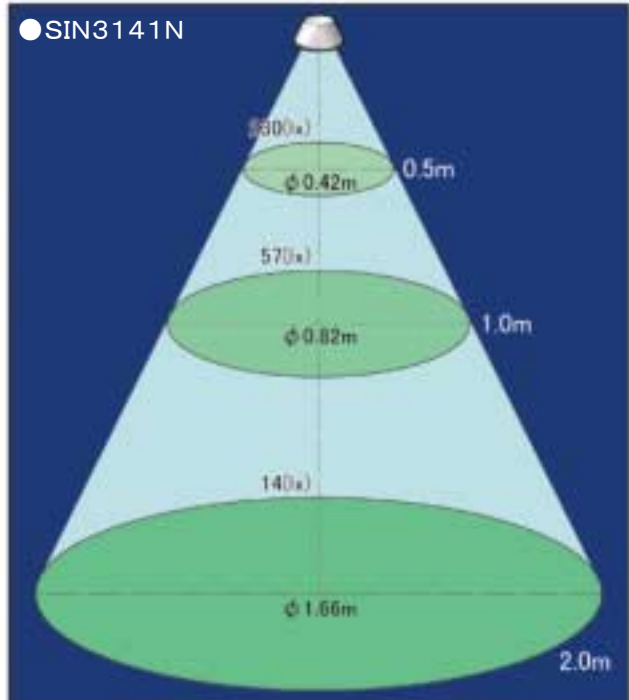
● SIN3121N



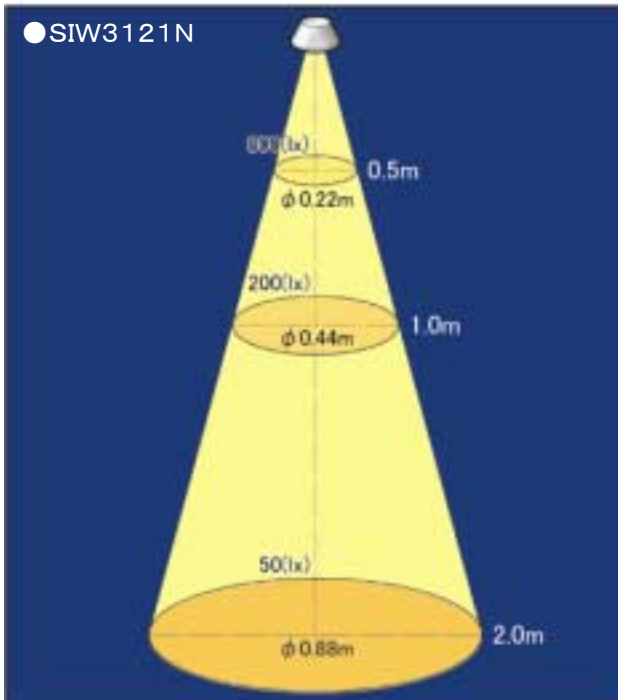
2) Optical spatial distribution characteristics (45° lens)



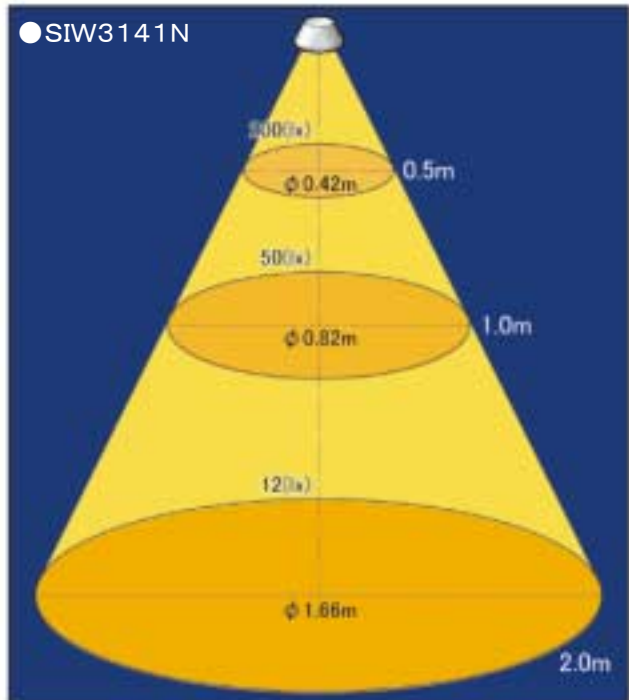
● SIN3141N



● SIW3121N



● SIW3141N



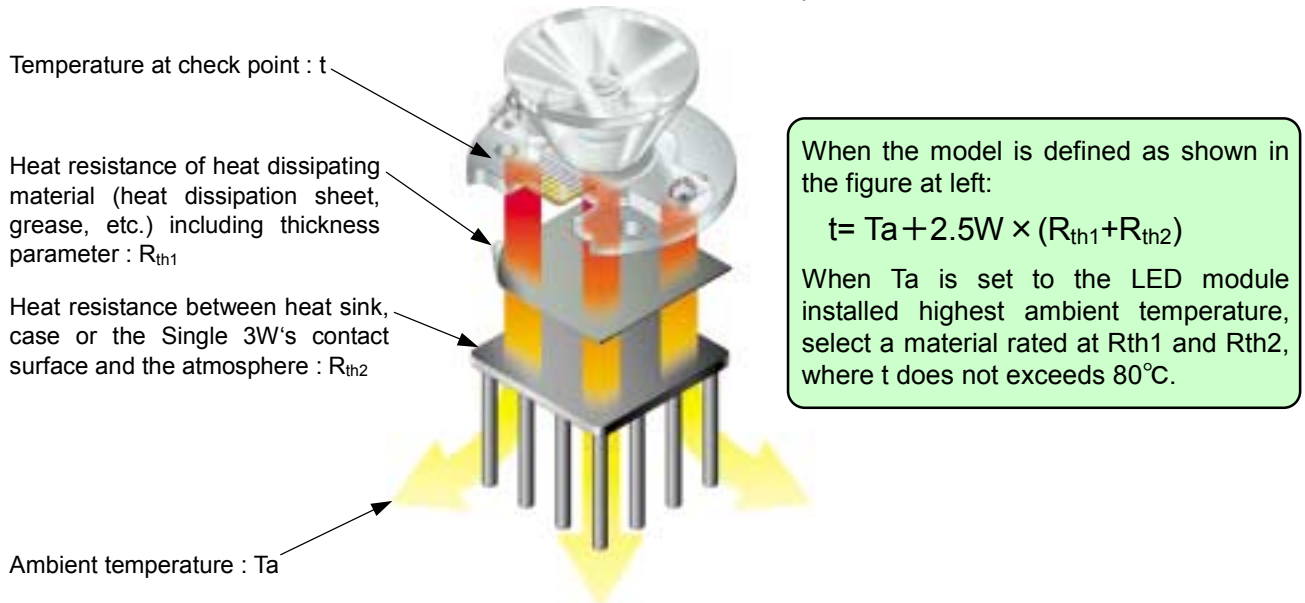
4. SINGLE 3W HEAT SINK AND MOUNT DESIGN

● Heat dissipation sheet and heat dissipation grease usage:

The heat dissipation performance depends on the surface contact conditions between the Single 3W's aluminum base and the customer prepared heat sink. The Single 3W's aluminum base surface is known to have sufficient flatness. However, if the Single 3W has insufficient contact with the heat sink due to uneven heat sink surface, the measuring point temperature will exceed 80°C (approved upper temperature limit). In case of the upper temperature limit being exceeded, be sure to decrease the measured temperature below 80°C by inserting a heat dissipation sheet or applying heat dissipation paste between the aluminum base and the heat sink.

● Heat dissipation calculation

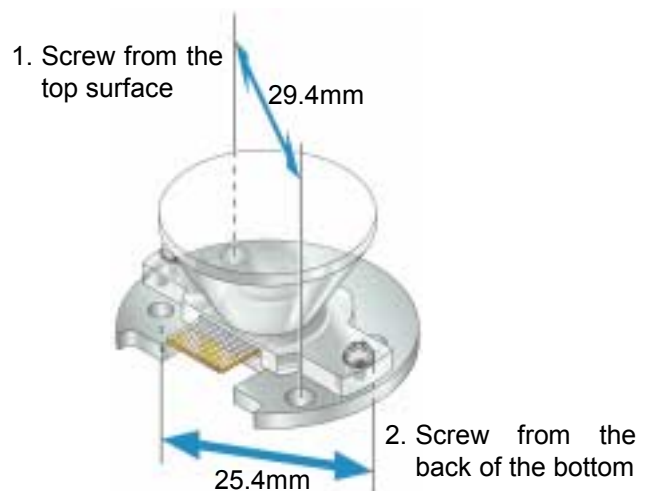
• When heat resistance between module contact surface and atmosphere is known:



● Available screws

The Single 3W installation procedure with screws is very important because proper Single 3W installation to the heat sink promotes constant heat dissipation with high efficiency.

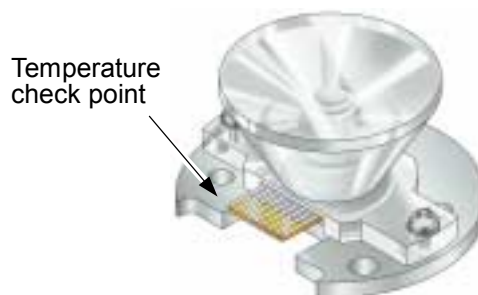
If the Single 3W is improperly installed, its life will shorten through insufficient or deteriorating heat dissipation. Proper installation of the Single 3W with reference to the table below is advised.



		Use of washer/ spring washer	Screw diameter	Screw length (thread length)	Tightening torque
1	Front side Installed from the front side (from the Single 3W's side)	Washer (preferably spring type) insertion is recommended to maintain sufficient long term tightening.	Use M3 or 3.4mm diameter or smaller screw and head (washer) diameter is 6mm or smaller.	Use screw 5mm or longer thread length so that it meshes with heat sink 2mm or deeper.	The tightening torque is about 5 N/m (kg.cm) for M3 steel screw. Tighten the two screws with the same torque.
2	Back side Installed from the back side (from the heat sink)		M3	The screw thread must protrude a little from the Single 3W's aluminum base so that the screw can support the aluminum base. Minimum length: Heat sink material thickness + 3mm Maximum length: Heat sink material thickness + 5mm	

5. SINGLE 3W HEAT DISSIPATION MEASUREMENT METHOD

- Measure the temperature by attaching the thermocouple to the Single 3W aluminum base completely until the measured temperature stabilizes.
- The temperature check point is the upper surface of the aluminum base. (See the figure below.)
- If a radiation thermometer is used for temperature measurement, pay attention to the radiation ratio.
As the need arises, use black tape or black spray whose radiation ratio is known.

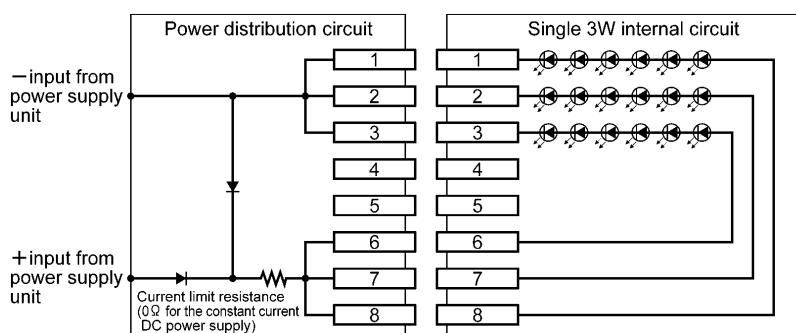


CAUTIONS

1. When Single 3W is actually used, be sure to set the forward current so that the base temperature does not exceed 80°C.
2. The Aluminum base is an essential part for heat sink and for maintaining the rigidity of the module. Never deform or damage it.

6. POWER SUPPLY AND CIRCUIT DESIGN

1. The internal circuit (Single 3W and power supply circuit boards) is described on the circuit diagram on the right.



2. No current limit resistor is installed on the Single 3W module.
Use a constant current DC power supply or connect the appropriate current limit resistor in series in case of a constant voltage DC power supply.
3. Calculation of the current limit resistor value for constant voltage DC power supply is as follows:
Formula of the current limit resistor (R), resistor dissipating wattage (W) and the power supply voltage (V0) is

$$R = (V0 - 21) / 0.12 \quad W = 2 \times (V0 - 21) \times 0.12$$
 (the safety coefficient is set to double)
 (21V is the module's forwarding voltage for the rated condition.)
 e.g. R=25 to 27Ω, W=1.5W or higher for V0:24V
 Light Single 3W and check that the LED current is maintained below the upper limit after the LED module reaches the steady heat saturation.
 If the reverse polarity protection diode is connected, use (21+protection diode's forwarding voltage) instead of 21V.
4. When a constant voltage DV power supply is used, pay attention to the following items.
 - Be sure to connect the current limit resistor.
 - Protection circuits for surge voltage and reverse voltage are also recommended for safe installation.
 - 24V power supply circuit board including reverse voltage and surge voltage protections is available.
 - A commercially available switching DC power supply exists. Choose a power supply fulfilling current capacity for total modules and satisfying operating temperature.
 - The power supply voltage may vary immediately after delivery. Be sure to confirm the output voltage and adjust it if necessary.
 - If a power supply such as "AC adapter" is used, its life expectancy will be less than the recommended switching power supply.
5. Specifications of optional constant current DC power supply

MODEL	SIZE	Operational temperature range	ELECTRICAL CHARACTERISTICS				Connection available numbers of Single 3W	REMARKS
			Input voltage	Power Consumption	Output current	Output voltage		
CCM4512X	130 × 40 × 40	0°C ~ 50°C	AC100 / 120V	8VA or under	120mA	MAX45V	One unit or two units (connection in series)	<ul style="list-style-type: none"> • PSE is approved. • Corresponding to RoHS. • Equipped with the light intensity control function (use 100kΩ potentiometer)

For proper setting of the power supply, be sure to read the power supply's instruction manual before connecting Single 3W.

6. Light intensity control function

When light intensity is to be controlled, PWM modulation to alter duty ratio is recommended rather than current value alteration (voltage alteration for the constant voltage DC power supply). The LED's color temperature characteristics will be a little altered if the current is changed.

7. SINGLE 3W SERIES APPLICATION EXAMPLES

7-1. MINIKAMAKURA (Compact Directional Lighting Systems)



7-2. NAGAREYAMA (Modern Downlights Systems)



7-3. OYAMADAI (Modern Designed Pendant Light)



8. CAUTION FOR USAGE



CAUTIONS

- (1) Direct viewing of LED may hurt eyes. Never stare the LED emission source directly.
- (2) The aluminum base is hot while illuminating. Pay attention to avoid burns when handling the LED module.
- (3) Use a DC constant current power supply because no current limit resistance is installed on this product. If the DC constant voltage power supply is used, select appropriate current limit resistance.
- (4) This product is not water proofed. Do not install this product outdoors or in a wet place.
- (5) The luminous intensity and color tone may little disperse with time due to LED inherent characteristics.
- (6) Pay attention not to bend the CN portion while handling and storing this product. If the CN portion is warped, it will cause product malfunction. Especially pay attention to check the product is flat installed at the site.
- (7) In order to prevent electrostatic damage while installation, be sure to take the anti-static measures.
- (8) When replacing or executing maintenance, pay attention not to apply excessive stress to the installed parts (LED, lens, etc.).
- (9) When cleaning the lens unit, clean it after the light goes off with dry cloth. Never use alcohol, neutral, acid or alkaline detergent.
- (10) Before installing or removing this product, be sure to turn off power.
- (11) Pay attention to connect the same polarity when connecting this product and power supply or series connecting the same products.
- (12) If dirt adheres to the light emitting portion, it will cause decreased light intensity or unequal illumination. As the need arises, take the dust proofing measures.
- (13) Do not apply severe impact or vibration to the product or damage it with sharp blade, etc.
- (14) The operating or storage temperature and humidity environment must be observed regulated by the specifications. Avoid the product being let in organic solvent, a corrosive gas (chlorine gas, sulfide gas) atmosphere environment or near fire.
- (15) Follow the input voltage, operating environment (temperature and humidity) and other conditions regulated by the specifications. Product operation outside its specifications will not satisfy its optical and electrical characteristics.
- (16) The characteristics described in this specifications may be altered without previous notice in order to improve the performance.