Data Sheet

HSMW-C230

White Color Side-Mount ChipLED

Description

The Broadcom® HSMW-C230 is a side-emitting surface-mount ChipLED. This ChipLED comes in a small package footprint of 1.0 mm × 0.55 mm. Its small form factor allows flexible board design, and the LED can be closely mounted, thus offering maximum miniaturization benefits to the user.

The low package height of 0.3 mm makes it an ideal solution for an application that has limited head room, such as wearables and small portable handheld devices.

By using efficient and high brightness InGaN LED materials, this product is capable of delivering high light output. It is compatible with industry-standard automatic machine placement and reflow soldering.

Features

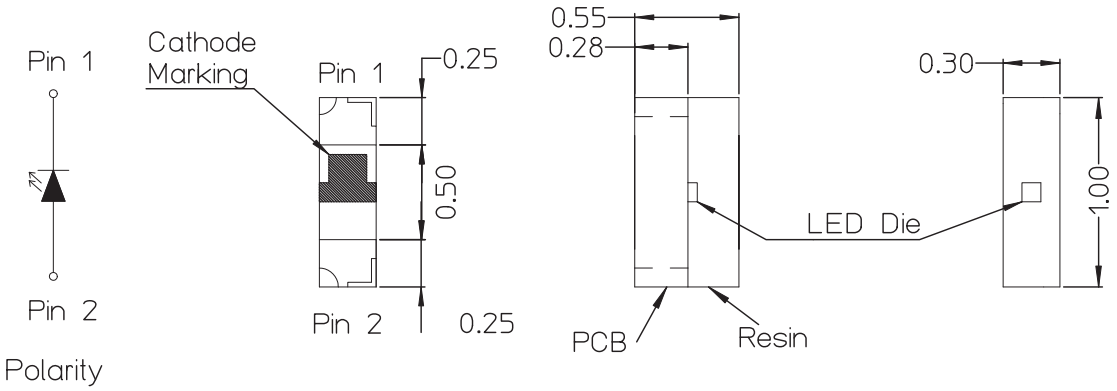
- LEDs with an InGaN die
- Surface-mount device with a height of 0.30 mm
- Compatible with reflow soldering
- Tape in an 8-mm carrier tape on a 7-in. diameter reel

Applications

- Backlighting
- Indicator

CAUTION! LEDs are class 1A ESD sensitive per ANSI/ESDA/JEDEC JS-001. Observe appropriate precautions during handling and processing. Refer to *Premium InGaN LEDs* (Application Note 1142) for additional details.

Figure 1: Package Dimensions



NOTE:

1. All dimensions are in millimeters.
2. Tolerance ±0.1 mm unless otherwise specified.
3. Encapsulant: clear epoxy.

Absolute Maximum Value at T_J = 25°C

Parameter	Rating	Units
DC Forward Current[a]	10	mA
Peak Forward Current[b]	40	mA
Power Dissipation	31	mW
LED Junction Temperature	95	°C
Operating Temperature	–40 to +85	°C
Storage Temperature	–40 to +85	°C

a. Derate as shown in Figure 11.

b. Duty factor = 10%, frequency = 1 kHz.

Optical/Electrical Characteristics at T_J = 25°C, I_F = 5 mA

Parameter	Min.	Typ.	Max.	Units
Luminous Intensity, Iv[a]	45.0	—	—	mcd
Viewing Angle, $2\theta_{1/2}$[b]	—	175	—	degree
Forward Voltage, V_F	2.55	—	3.15	V
Reverse Current, I_R (at V_R = 5V)[c]	—	—	100	µA
Thermal Resistance, $R\theta_{J-S}$	—	320	—	°C/W

a. The luminous intensity is measured at the mechanical axis of the LED package. The actual peak of the spatial radiation pattern may not be aligned with the axis.

b. The viewing angle is the off-axis angle where the luminous intensity is ½ the peak intensity.

c. Indicates the product final test condition. Long-term reverse bias is not recommended.

Bin Information

Intensity Bins (CAT)

Bin ID	Luminous Intensity (mcd)	
	Min.	Max.
P	45.0	71.5
Q	71.5	112.5
R	112.5	180.0
S	180.0	285.0
T	285.0	450.0
U	450.0	715.0
V	715.0	1125.0
W	1125.0	1800.0
X	1800.0	2850.0
Y	2850.0	4500.0

Tolerance ±15%.

Forward Voltage Bins

Bin ID	Forward Voltage (V)	
	Min.	Max.
1	2.55	2.75
2	2.75	2.95
3	2.95	3.15

Tolerance ± 0.1V.

Color Bins (BIN)

Bin ID	Chromaticity Coordinates	
	x	y
C1	0.2500	0.2050
	0.2500	0.2500
	0.2700	0.2775
	0.2700	0.2325
D1	0.2900	0.2600
	0.2900	0.3025
	0.3100	0.3325
	0.3100	0.2875
C2	0.2700	0.2325
	0.2700	0.2775
	0.2900	0.3050
	0.2900	0.2600
D2	0.3100	0.2875
	0.3100	0.3325
	0.3300	0.3600
	0.3300	0.3150

Tolerance ±0.001.

Figure 2: Chromaticity Coordinates Diagram

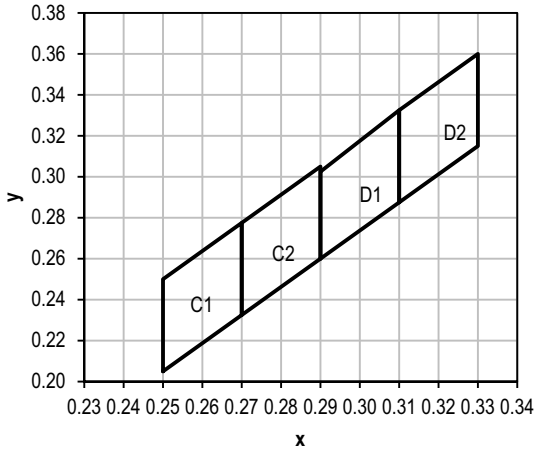


Figure 3: Intensity vs. Wavelength

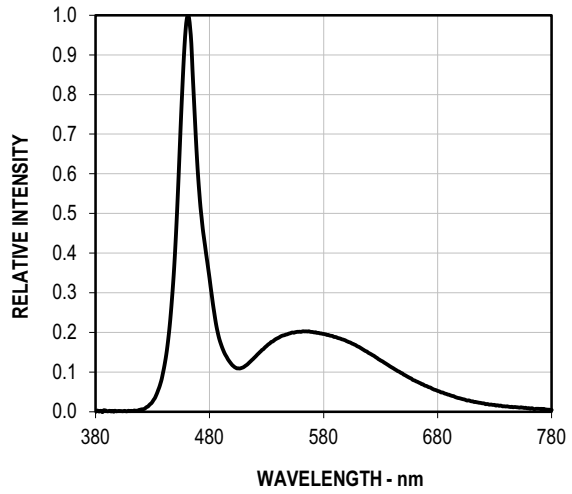


Figure 4: Forward Current vs. Forward Voltage

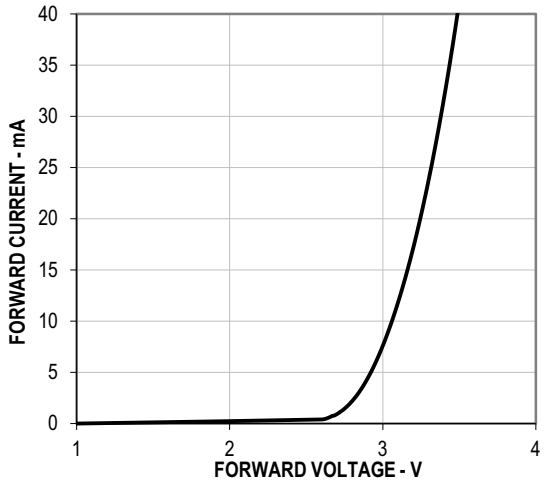


Figure 5: Intensity vs. Forward Current

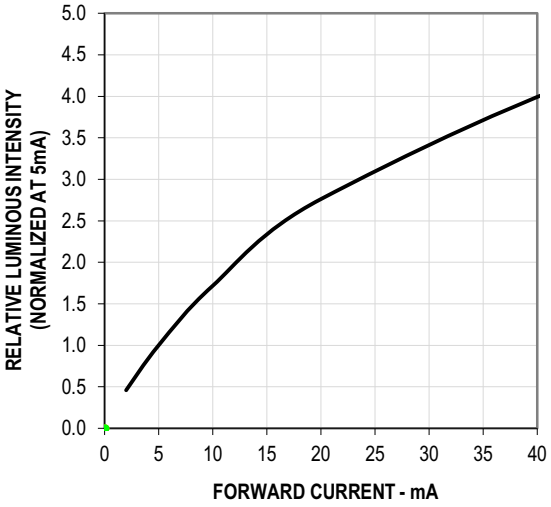


Figure 6: Intensity vs. Angle

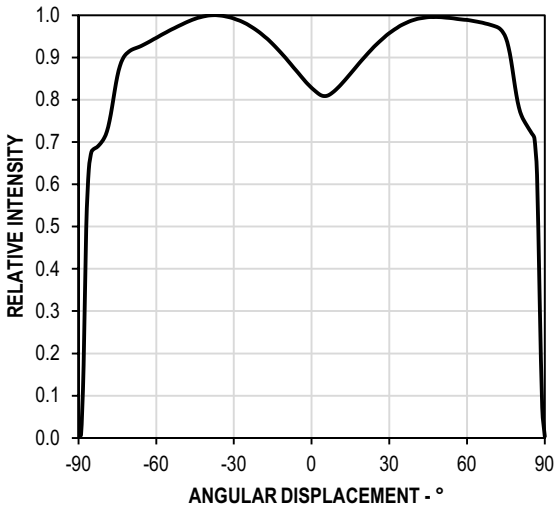


Figure 7: Wavelength vs. Forward Current

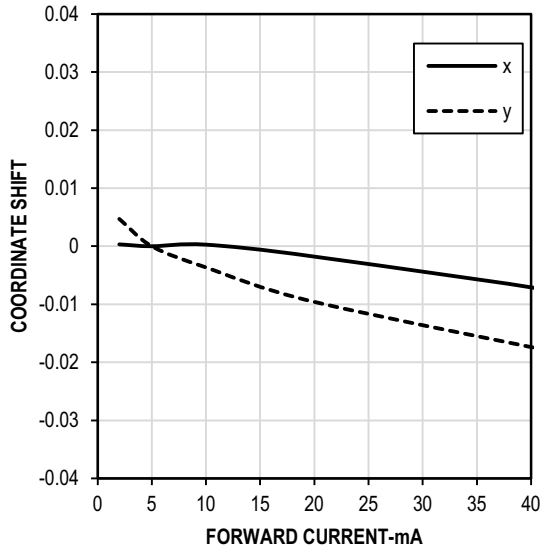


Figure 8: Intensity vs. Temperature

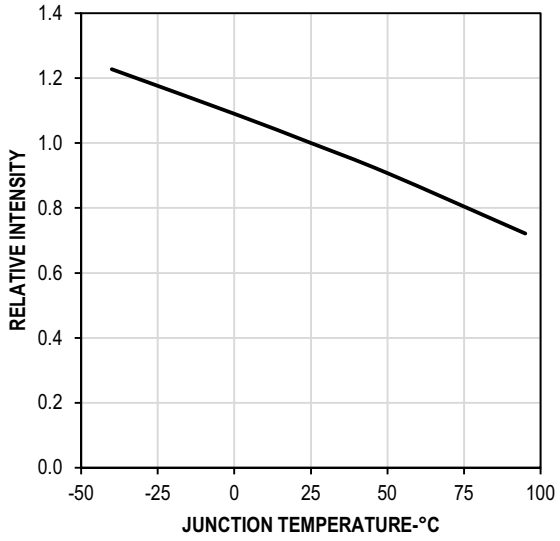


Figure 9: Wavelength vs. Temperature

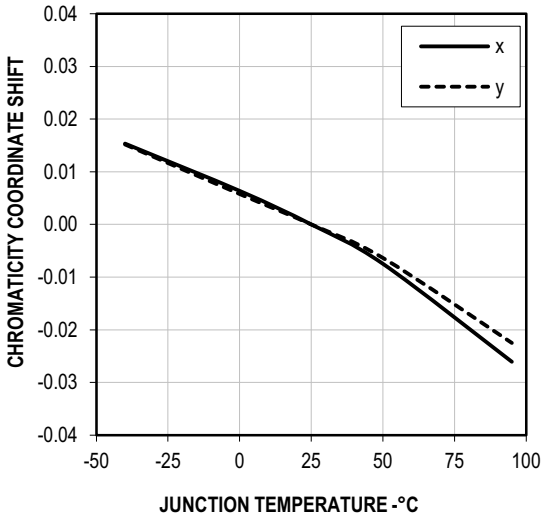


Figure 10: Forward Voltage vs. Temperature

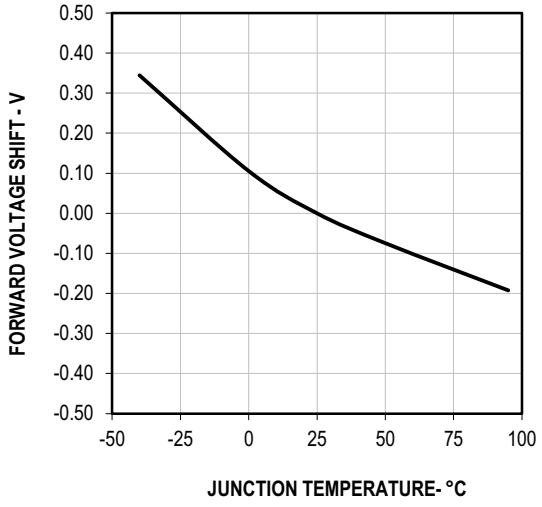


Figure 11: Forward Current vs. Temperature

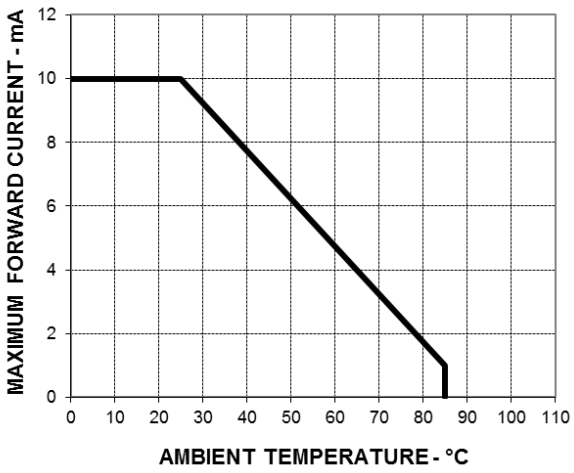


Figure 12: Recommended Solder Pad (Units: mm)

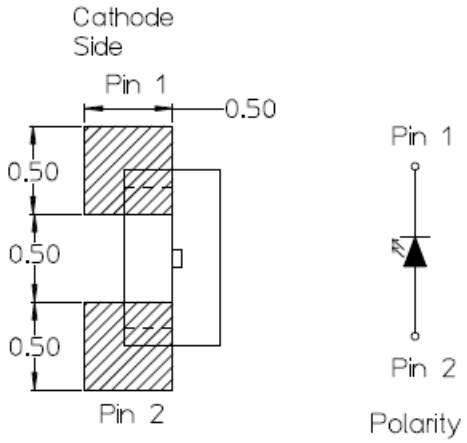
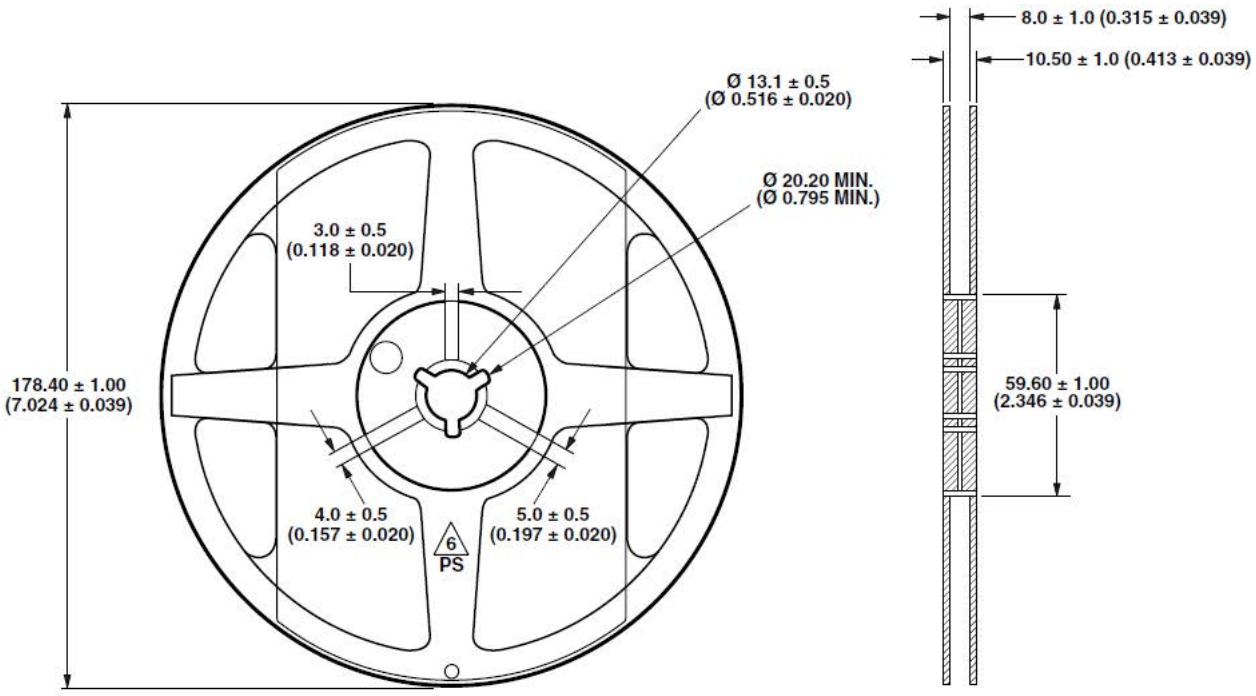
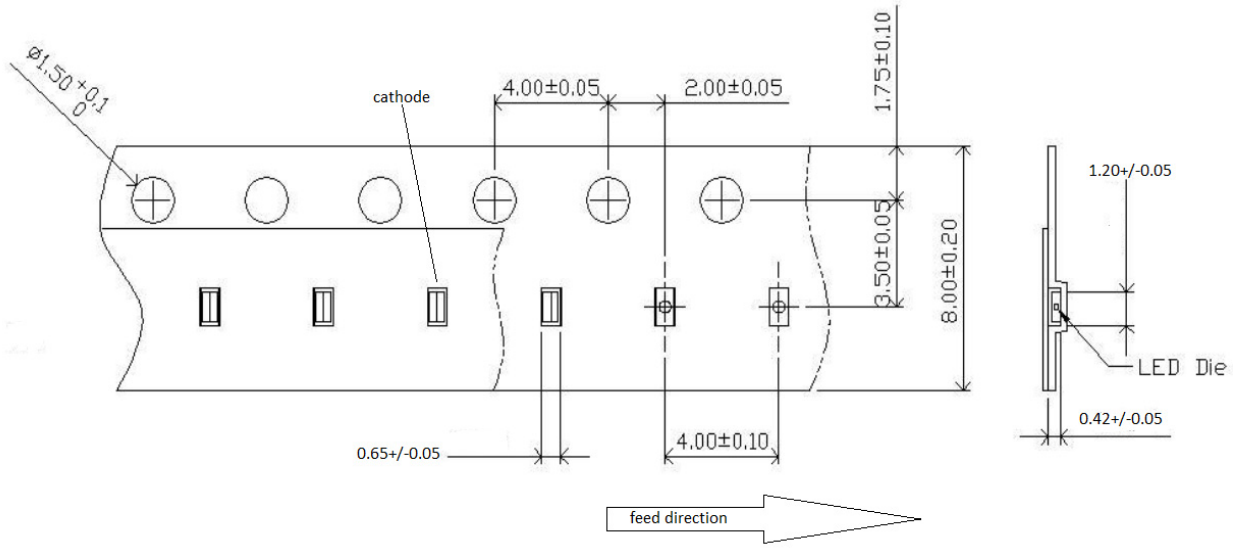


Figure 13: Reel Dimensions



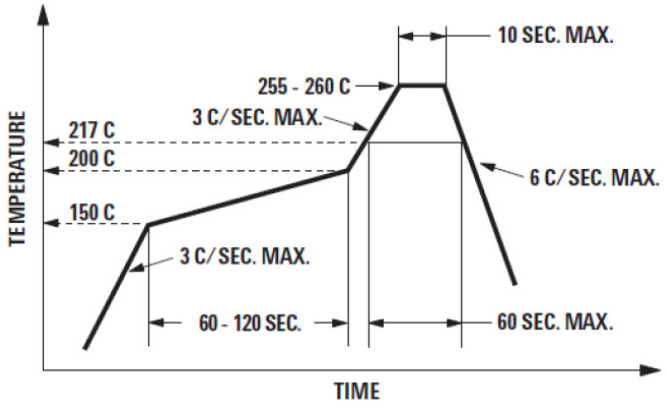
NOTE:
1. ALL DIMENSIONS IN MILLIMETERS (INCHES).

Figure 14: Carrier Tape Dimensions (Units: mm)



Soldering

Figure 15: Recommended Reflow Soldering Conditions



- Reflow soldering must not be done more than twice. Observe necessary precautions when handling the moisture-sensitive device as stated in the following section.
- Do not apply any pressure or force on the LED during reflow and after reflow when the LED is still hot.
- Use reflow soldering to solder the LED. If unavoidable (such as rework), use manual hand soldering strictly controlled to the following conditions:
  - Soldering iron tip temperature = 310°C maximum
  - Soldering duration = 2 seconds maximum
  - Number of cycles = 1 only
  - Power of soldering iron = 50W maximum
- Do not touch the LED package body with the soldering iron except for the soldering terminals because it might cause damage to the LED.
- Confirm beforehand whether the functionality and performance of the LED are affected by hand soldering.

Precautionary Notes

Handling of a Moisture-Sensitive Device

This product has a Moisture-Sensitive Level 2a rating per JEDEC J-STD-020. Refer to Broadcom Application Note 5305, *Handling Moisture-Sensitive Surface-Mount LEDs*, for additional details and a review of proper handling procedures.

- **Before Use**
  - An unopened moisture barrier bag (MBB) can be stored at < 40°C/90% RH for 12 months. If the actual shelf life exceeds 12 months and the humidity indicator card (HIC) indicates that baking is not required, it is safe to reflow the LEDs per the original MSL rating.
  - Do not open the MBB prior to assembly (for example, for IQC).
- **Control after Opening the MBB**
  - Read the HIC immediately upon opening the MBB.
  - Keep the LEDs at < 30°C/60% RH at all times; and all high-temperature-related processes, including soldering, curing, or rework, must be completed within 672 hours.
- **Control for an Unfinished Reel**

  Store unused LEDs in a sealed MBB with desiccant or desiccator at < 5% RH.
- **Control of Assembled Boards**

  If the PCB soldered with the LEDs is to be subjected to other high-temperature processes, store the PCB in a sealed MBB with desiccant or desiccator at < 5% RH to ensure that all LEDs do not exceed their floor life of 672 hours.
- **Baking Required under the Following Conditions**
  - The HIC indicator indicates a change in color for 10% and 5% as stated on the HIC.
  - The LEDs are exposed to conditions of > 30°C/60% RH at any time.
  - The LEDs' floor life exceeds 672 hours.

  The recommended baking condition is: 60°C ±5ºC for 20 hours.

  Baking should be done only once.

Application Precautions

- The drive current of the LED must not exceed the maximum allowable limit across temperatures as stated in the data sheet. Constant current driving is recommended to ensure consistent performance.
- Circuit design must cater to the whole range of forward voltage (V_F) of the LEDs to ensure that the intended drive current can always be achieved.
- The LED exhibits slightly different characteristics at different drive currents, which may result in a larger variation in performance (meaning intensity, wavelength, and forward voltage). Set the application current as close as possible to the test current to minimize these variations.
- Driving the LED at a low current (< 2 mA) will not cause functional failures to the LED (for example, open/short). However, the variation in intensity will be larger than the existing intensity bin ratio.
- If the LED is intended to be used along with an LED of another color to achieve color mixing, Broadcom does not guarantee the consistency of the resultant color. Do contact a Broadcom sale representative for such application.
- The LED is not intended for reverse bias. Use other appropriate components for such purposes. When driving the LED in matrix form, ensure that the reverse bias voltage does not exceed the allowable limit of the LED.
- Avoid a rapid change in ambient temperature, especially in high-humidity environments, because it causes condensation on the LED.
- If the LED is intended to be used in a harsh or outdoor environment, protect the LED against damages caused by rain water, water, dust, oil, corrosive gases, external mechanical stresses, and so on.

Eye Safety Precautions

LEDs may pose optical hazards when in operation. Do not look directly at operating LEDs because it might be harmful to the eyes. For safety reasons, use appropriate shielding or personal protective equipment.

Disclaimer

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