

4 Precautions and Usage Considerations Specific to Each Product Group

This section describes matters specific to each product group that need to be taken into consideration when using devices. If the same item is described in Sections 3 and 4, the description in Section 4 takes precedence.

4.1 Optical Semiconductor Devices

Handling precautions common to all optical semiconductor devices are described in Section 4.1.1. Handling precautions for devices classified by product group are described in Sections 4.4.2 to 4.4.6. When using this brochure, please be sure to read the precautions common to all devices in Section 4.1.1 and those specific to the types of device used in your design.

- 4.1.1 Precautions Common to All Optical Semiconductor Devices
- 4.1.2 Visible LEDs (LED lamps, LED displays, LED matrix modules)
- 4.1.3 Photosensors (infrared LEDs, photodetectors, photointerrupters, photoreflective Sensors)
- 4.1.4 Photocouplers
- 4.1.5 Fiber-Optic Devices (TOSLINK®)
- 4.1.6 Visible Semiconductor Lasers

4.1.1 Precautions Common to All Optical Semiconductor Devices

4.1.1.1 Moisture-Proof Packing

- (1) Once unpacked, keep devices in storage at a temperature of between 5°C and 30°C, and at 60% humidity or less. Mount the devices on the circuit board within 48 hours of unpacking.
- (2) If 48 hours has elapsed after unpacking or the period of effectiveness for the moisture-proofing has expired, bake the devices before use under the conditions described below:

Recommended baking conditions: 50°C for 48 hours or more. Do not bake devices at temperatures above 50°C as taping packages may be adversely affected.

4.1.1.2 Design

- (1) Derating
The life characteristics of optical semiconductor devices are closely associated with the operating temperature, case temperature and operating humidity environment. This requires that in addition to ordinary derating, the relationship between the fluctuation and degradation rates for each of the device's primary characteristics (e.g. luminous intensity, radiant power and current conversion efficiency) and the operating and environment conditions be fully taken into consideration at the design stage.

(2) Fail-safe implementation

If there is a possibility that failure in optical semiconductor devices, degradation of characteristics (e.g. luminous intensity, radiant power, current conversion efficiency or laser light output power) or functional abnormality will impair the safe operation of the system, design a fail-safe measure in accordance with the system's intended use.

4.1.1.3 Inspection, Testing and Evaluation

(1) When inspecting devices, be sure to observe the specifications laid down in the individual datasheets and databooks for the devices used. In particular, the reverse voltage/reverse current characteristics differ between different types of light-emitting material, so if current is forced to flow in the reverse polarity, the rate of failure in device characteristics may be high.

4.1.1.4 Safety Standards

The resin used in packages where light transmissivity is an important characteristic does not meet the combustion resistance requirements set forth in safety standards. Because resin is not self-extinguishing, it not only generates poisonous gases, but will also cause secondary ignition if it burns. The possibility of risk to devices and their packaging material must be taken into account when specifying the ambient environment in which mounting will be performed.

4.1.1.5 Disposal Precautions

For details of the precautions which must be taken when disposing of a particular device, refer to the relevant databook for the device concerned.

4.1.2 Visible LEDs

4.1.2.1 Impact and Vibration

(1) Matrix modules

If an excessive impact is applied to the packing, the relative positions of the display and the drive substrates may shift. In such cases it will not be possible to mount the device on the board at the designated pitch.

4.1.2.2 Design

(1) Uses

LED lamps are designed for display purposes. Using an LED lamp as a light source for a photosensor is prohibited. If a light source for a photosensor is required, choose a device designed specifically for that purpose.

(2) Heat radiation

For display systems configured with an array of multiple visible LED devices, ensure that sufficient heat radiation measures are incorporated. Partial unbalanced heat generation must be taken into consideration, as this may reduce the luminous intensity of LED devices due to their temperature dependency. A reduction in luminous intensity will impair the device's display quality. Moreover, it may give rise to differences in the luminous intensity degradation characteristics between devices.