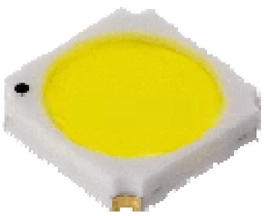
Handling Ceramic Package (CLCC) Products

1. Introduction

Stanley offers LED products that use ceramic in their packages. While ceramic refers to inorganic, nonmetallic items in general, the ceramic used in LED packages is basically made of metal oxide, and refers to a sintered solid hardened by heat treatment at high temperatures. Compared to resins such as plastic, ceramic packages have excellent properties, such as outstanding heat resistance and radiation performance, and minimum deterioration from ultraviolet substances output from blue LED elements. Stanley exploits these advantages to produce LEDs for general lighting and LCD backlights that require long service life. Below we provide detailed explanations about handling products with ceramic packages.

2. Product Variations and Selection of Devices

Stanley offers the following lineup of ceramic package products.



GSPW16☐3JTE For general lighting

GSPW11☐1JTE For general lighting

BSPW11☐1JTE For backlights

Optical characteristics

Each product has different optical characteristics according to their application. Some of the representative characteristics are introduced below.

Light distribution

Stanley's products incorporate white LED and have Lambertian light distribution characteristics resembling that shown in Fig. 1. Please refer to separate materials for information on their detailed properties.

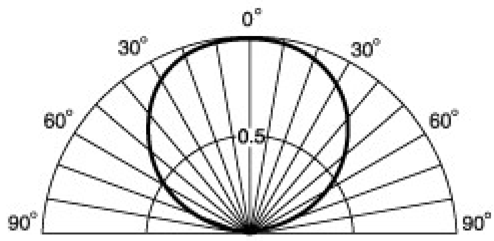


Fig. 1

Radiant intensity and radiant flux

The brightness performance of conventional LEDs is regulated by luminosity values, but Stanley's products are regulated by radiant flux values. Brightness is dependent on a product's color tone and color temperature.

Chromaticity (color temperature) and color tone

GSPW16☐3JTE and GSPW11☐1JTE are products for general lighting applications, and are available in variations of color temperature in compliance with ANSI standards that govern LEDs for illumination. They are also available in variations of color rendering properties for each color temperature. BSPW11☐1JTE is a product intended for use as an LCD backlight, and is compatible with the standard chromaticity range that is generally required of backlights. Fig. 2 shows the color temperatures and chromaticity range of each product. Please refer to separate data sheets for detailed specifications of each product.

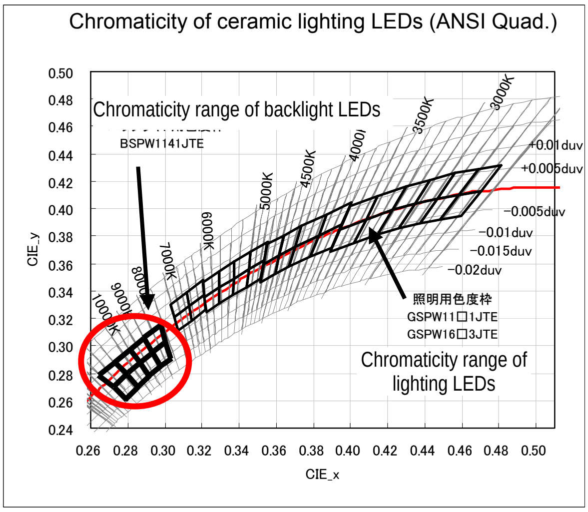


Fig. 2

3. Basic Design

3-1. Safety design

Design is conducted to endure that LED devices do not breakdown under the conditions recommended for their use. However, optical semiconductor products can malfunction and break down. Please take safety design such as the use of failsafes into consideration to ensure that no fires, injuries, or property damage results from the malfunctioning or breakdown of an LED device.

3-2. Absolute maximum ratings

There is a danger that LED devices will break if subjected to excessive stresses (temperature, current, voltage, etc.). Because of this they are limited to their absolute maximum ratings. These are limit values that should not be exceeded even for an instant. LED devices should be employed in such a way as to ensure that not even a single one of these rating values is exceeded.

3-3. Applications

The production of visible light LED devices is predicated on their use in display and lighting applications. There are cases in which these devices are unsuited to functional applications other than displays and lightings, and such applications are therefore not recommended. Please consult with Stanley prior to using these devices in functional applications (sensors, light sources for communications devices, etc.).

3-4. Actual use temperatures

LED devices are positioned in sealed spaces, and when heat-emitting parts such as coils and transformers are mounted close to the devices, the ambient temperature of the LED (=the actual use temperature) may become higher than the actual ambient temperature. In such cases, the current and voltage for the LED should be set on the basis of the actual use temperature.

Additionally, if the LED circuit is such that a reverse voltage would be applied in an environment where the LED device could get wet or exposed to moisture, exercise proper caution, as the silver used in the lead plating may migrate and leak.

4. Circuit Design

4-1. Set current and voltage

- Because LED devices use different derating settings for forward current and power consumption depending on actual use temperature (Fig. 3), current and voltage should be set on this basis. In addition, it is also necessary to take into consideration a margin for these fluctuations, as brightness is dependent on ambient temperature (Fig. 4).

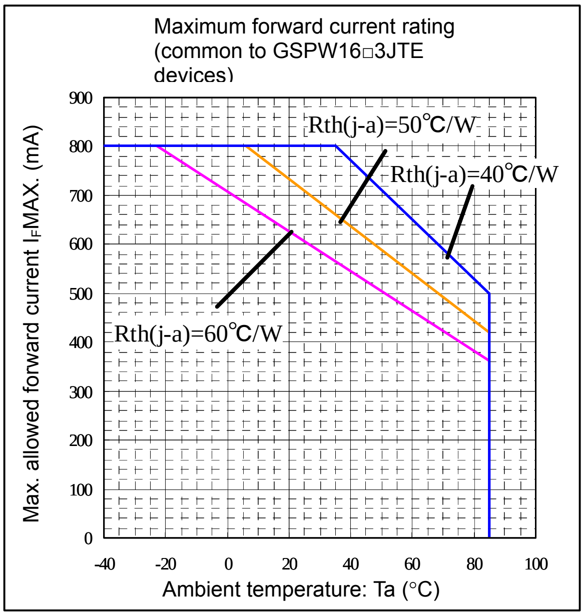


Fig. 3

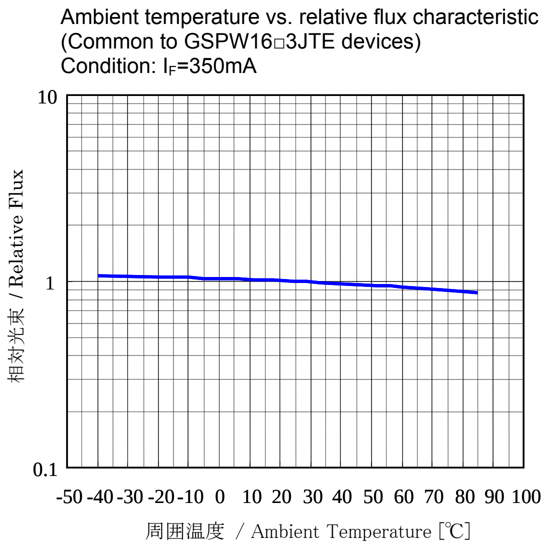
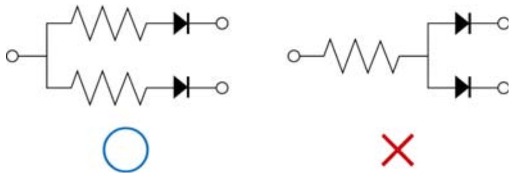


Fig. 4

- LED devices are assumed to be operated at currents of at least 2 mA. At currents lower than 2 mA, variations in brightness, color tone and forward current represent a concern. Please consult with Stanley if intending to use LED devices at currents of less than 2 mA.
- A standard current is set for each LED device, and brightness, color tone, and forward current are selected and specified based on this value. If you use an LED device at currents other than the standard current, note that the proper range of brightness, color tone, and forward voltage may shift, and their degree of fluctuations might also change.

4-2. Protective resistance

- In order to ensure that LED devices operate stably, and to protect the devices from burnout due to excess current, a series protective resistance should be built into the circuit. If the devices will be used in dynamic mode in a matrix circuit, please consult with Stanley in advance.
- When multiple LED devices are used in a parallel circuit, we recommend using a series protective resistance for each line in order to reduce the instance of variations (however, there are cases in which variations occur in resistance values and VF).



4-3. Protection diodes

Devices using InGaN elements are extremely sensitive to discharges of static electricity and surges occurring when the device is switched on and off. The elements can be damaged and reliability can decline. We recommend the incorporation of protective diodes in the circuit as a measure to prevent this. Stanley also offers packages that already come incorporated with a protective diode in the device. Please consult with the relevant department for further details.

5. Mounting Design

5-1. Solder pad

Figs. 5 and 6 show recommended soldering pads when designing mounting substrates.

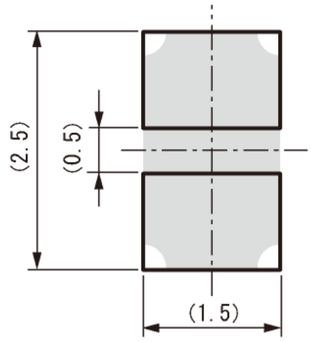


Fig. 5 Soldering pad for GSPW11□1JTE and BSPW11□1JTE

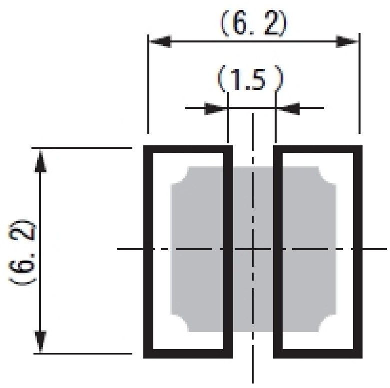


Fig. 6 Soldering pad for GSPW16□3JTE

5-2. Mounts

Picking up a device by the lens (silicon resin portion) when mounting could damage the inside of the package, so be careful to pick up the device by the area shown in Figs. 7 and 8.

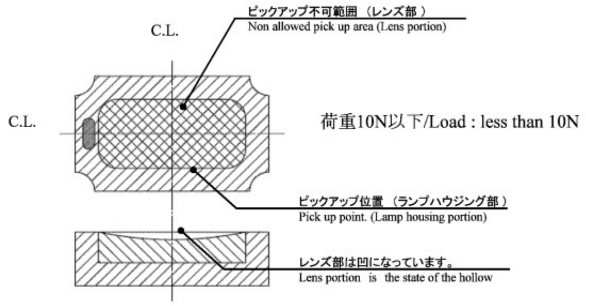


Fig. 7 Pick-up area on GSPW11☐1JTE and BSPW11☐1JTE

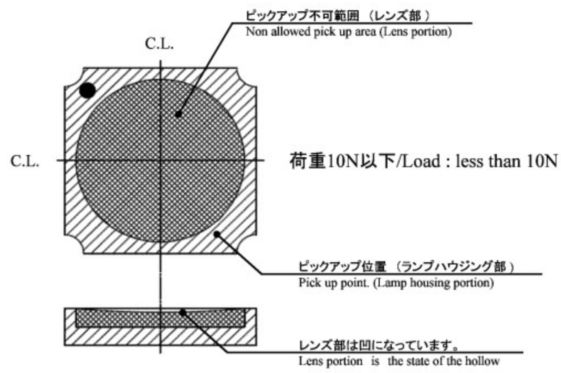


Fig. 8 Pick-up area on GSPW16☐3JTE

6. Other

6-1. Eye safety

Be careful not to look directly into an increased output of a visible-light LED, as you may hurt your eyes.

6-2. Safety of chemical substances

- The main substances incorporated in a ceramic-package LED are as follows.

Constituent part or material	Main substances
LED element	InGaN、GaN
LED element fixing agent	Silicon or epoxy resin, Ag, AuSn
Bonding wire	Au
Package	Al2O3、AlN
Sealing resin	Silicon resin, phosphor

- All vertical LED lamp are RoHS- and ELV-compliant. The chemical substances and their standard values specified by these directives are shown below.

<Standard values for chemical substances in RoHS and ELV Directives>

Substance group	Standard value
Lead and its compounds	1,000ppm or less
Cadmium and its compounds	100ppm or less
Mercury and its compounds	1,000ppm or less
Hexavalent chromium compounds	1,000ppm or less
Polybrominated biphenyls	1,000ppm or less
Polybrominated diphenyl ethers	1,000ppm or less

6-3. Product lot number

In the case of a product failure, Stanley might be able to help you address and remedy the failure more quickly if you retain a copy of the lot number printed on the product label.