

Handling of silicone resin LEDs

Application Note



Valid for:
silicone encapsulated LEDs

Abstract

In recent years, the brightness of LEDs has continually increased, allowing them to be used in completely new application areas and thus leading to an increased significance of the bonded system of chip and housing. As the lifetime of an LED is not due to the actual semiconductor chip itself, but is primarily determined by the housing OSRAM Opto Semiconductors has implemented a sealing compound consisting of silicone.

Within this application note the advantages of OSRAM Opto Semiconductors LEDs with a silicone sealing compound are described. The processing indications should help our customers to avoid incorrect handling and to prevent unnecessary damages to the LEDs.

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A. Advantages of silicone resin LEDs

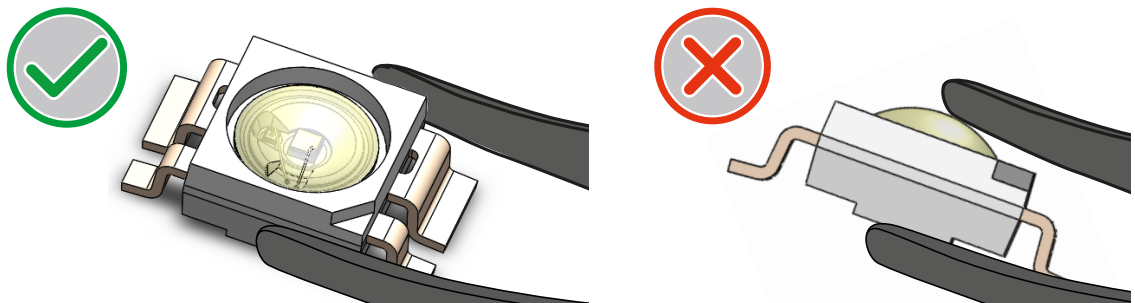
The “lifetime” refers to the period of time, whereby the brightness drops to half of its original value at a specific current. In order to achieve a lifetime in the range of 100,000 hours at room temperature for very bright LEDs, OSRAM Opto Semiconductors has implemented a new sealing compound consisting of silicone. The material properties of silicone provide many advantages which positively influence the lifetime as well as the maximum device temperature.

Housings using a silicone resin allow a higher junction temperature than housings based on epoxy resins. In addition, they exhibit high moisture and cycling reliability and are well suited for use in the automobile industry.

B. Handling indications

During processing, mechanical stress on the surface should be minimized as much as possible. Sharp objects of all types should not be used to pierce the sealing compound. In general, LEDs should only be handled at the housing. This also applies to LEDs without a silicone sealant, since the surface can also become scratched (see Figure 1).

Figure 1: Handling of the LEDs



When populating boards in SMT production there are basically no restrictions regarding the form of the pick and place nozzle, except that mechanical pressure on the surface of the resin must be prevented. This is assured by choosing a pick and place nozzle which is larger than the LED's reflector area.

The silicone material used by OSRAM Opto Semiconductors is especially qualified for use within semiconductor devices and is suitable for automotive applications. In particular, the material used has an extremely low level of volatile content.

C. Processing indications

Silicone differs from materials conventionally used for the manufacturing of LEDs. These conditions must be considered during the handling of such devices. Compared to standard encapsulants, silicone is generally softer and the surface is more likely to attract dust.

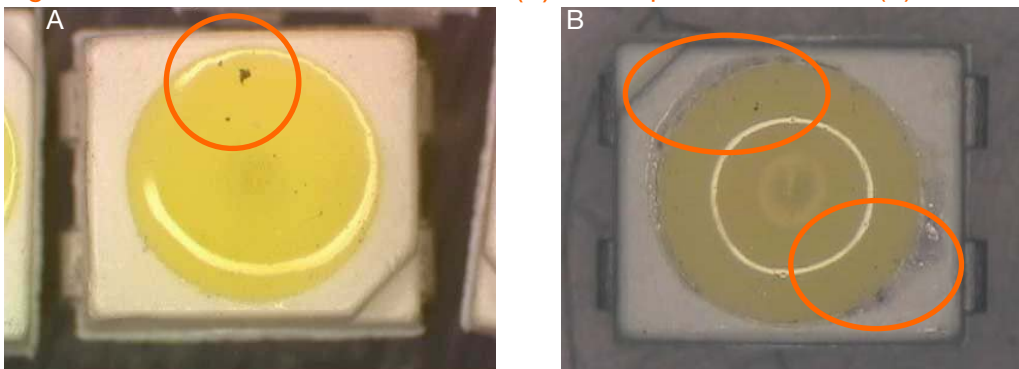
As mentioned previously, the increased sensitivity to dust requires special care during processing. In cases where a minimal level of dirt and dust particles cannot be guaranteed, a suitable cleaning solution must be applied to the surface after the soldering of components.

OSRAM Opto Semiconductors suggests using isopropyl alcohol for cleaning. In case other solvents are used, it must be assured that these solvents do not dissolve the package or resin. We recommend rinsing the LEDs after soldering for 5-10 seconds, at most 15 seconds. Ultrasonic cleaning is not recommended. Ultrasonic cleaning may cause damage to the LED.

D. Foreign particle limits

We also would like to make the customer aware that certain foreign particles on the LEDs, although noticeable from a cosmetic point of view, do not affect the quality, the lifetime or the brightness of the LEDs. Therefore, a small amount of particles on the surface of the LEDs can be ignored. The LEDs shown in Figure 2 are examples of possible contamination levels which can be neglected.

Figure 2: Contaminants on the surface (A) and deposits on the rim (B)





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ABOUT OSRAM OPTO SEMICONDUCTORS

OSRAM, Munich, Germany is one of the two leading light manufacturers in the world. Its subsidiary, OSRAM Opto Semiconductors GmbH in Regensburg (Germany), offers its customers solutions based on semiconductor technology for lighting, sensor and visualization applications. Osram Opto Semiconductors has production sites in Regensburg (Germany), Penang (Malaysia) and Wuxi (China). Its headquarters for North America is in Sunnyvale (USA), and for Asia in Hong Kong. Osram Opto Semiconductors also has sales offices throughout the world. For more information go to www.osram-os.com.

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