

# Handling of Silicone Resin LEDs

## Application Note

---

### Introduction

In recent years, the brightness of LEDs has continually increased, allowing them to be used in completely new application areas. Due to the strong increase in brightness, the bonded system of chip and housing takes on increased significance.

Generally, the lifetime of an LED is not due to the actual semiconductor chip itself, but primarily determined by the housing. 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 OS 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.

### 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.



Figure 1

In general, LEDs should only be handled from the side. By the way, this also applies to LEDs without a silicone sealant, since the surface can also become scratched.

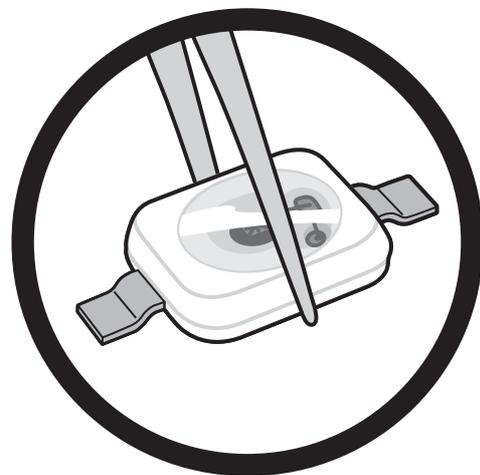


Figure 2

**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.

In figure 3 you can see an example of a pick-up nozzle for the LED types TOPLED® and Power TOPLED®. As the vertical cut of the nozzle shows the inner diameter of the tool is larger than 2.3 mm. To due that the frontal area of the nozzle contacts only the package surface direct and doesn't touch the silicone encapsulation.

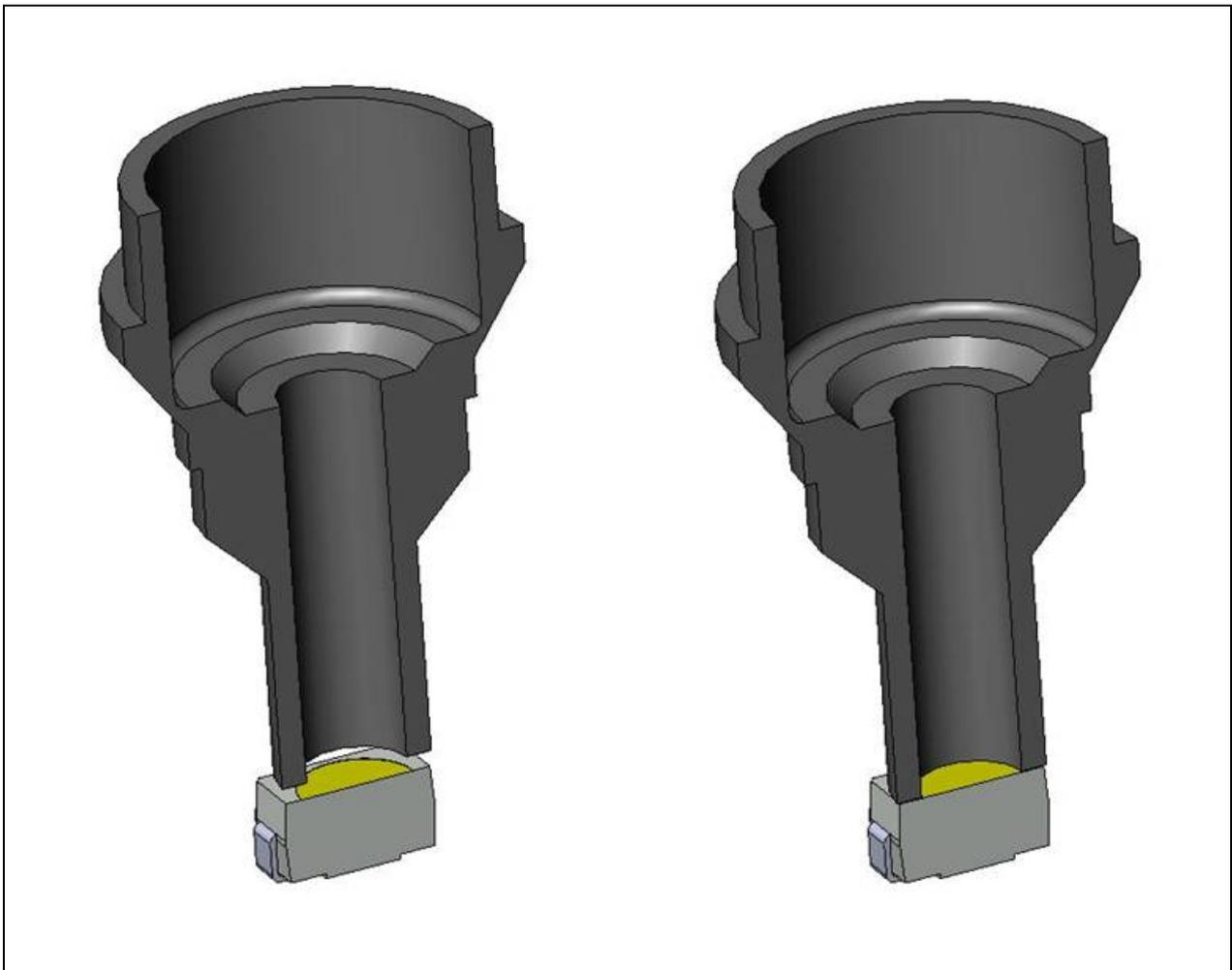
The silicone material used by OSRAM OS is especially qualified for use within semiconductor devices, and is suitable for automotive applications. In particular, the material used has an extremely low level of volatile content.

## 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 glob top, 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.



**Figure 3: Pick-up nozzle for the LED types TOPLED® and Power TOPLED® with an inner diameter >2.3mm**

OSRAM OS suggests using isopropyl alcohol for cleaning. In case other solvents are used, it must be assured that these solvents do not dissolve the package, resin or silicone.

We recommend rinsing the LEDs after soldering for 5-10 seconds, at most 15 seconds.

Ultrasonic cleaning is not recommended, because it may cause damage to the LED.

## Foreign Particle Limits

A small amount of particles on the LEDs does not affect 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 Figures 4 and 5 are examples of possible contamination levels which can be neglected.

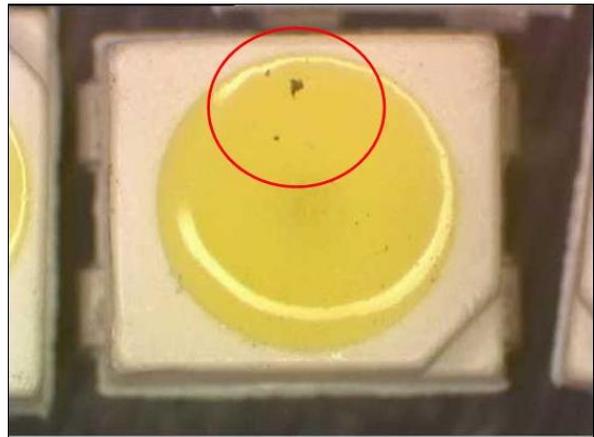


Figure 4: Contaminants on the surface

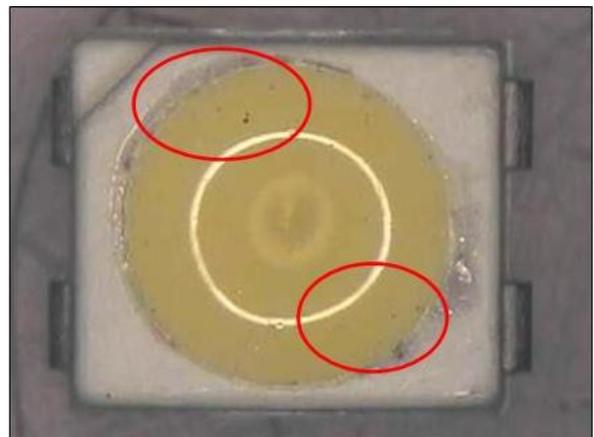


Figure 5: Deposits on the rim

## Summary

This application note describes the advantages of OSRAM OS LEDs with a silicone sealing compound. The processing indications should help our customers to avoid incorrect handling. This will help to prevent unnecessary damages to the LEDs. We also would like to make the customer aware that certain foreign particles, although noticeable from a cosmetic standpoint, do not influence the quality, lifetime and brightness of the LEDs.

## Appendix



**Don't forget:** LED Light for you is your place to be whenever you are looking for information or worldwide partners for your LED Lighting project.

[www.ledlightforyou.com](http://www.ledlightforyou.com)

**Authors:** Axel Schwab, Andreas Stich, Kurt-Jürgen Lang

### About Osram Opto Semiconductors

Osram Opto Semiconductors GmbH, Regensburg, is a wholly owned subsidiary of Osram GmbH, one of the world's three largest lamp manufacturers, and offers its customers a range of solutions based on semiconductor technology for lighting, sensor and visualisation applications. The company operates facilities in Regensburg (Germany), San José (USA) and Penang (Malaysia). Further information is available at [www.osram-os.com](http://www.osram-os.com).

All information contained in this document has been checked with the greatest care. OSRAM Opto Semiconductors GmbH can however, not be made liable for any damage that occurs in connection with the use of these contents.