

Solderability of SmartLED™ devices

Application Note

Introduction

The OSRAM SmartLED™ is a compatible device to 0603 Chiplid and can be used for the same application e.g. flat backlighting, cellular phones, switches, keypads and display illumination.

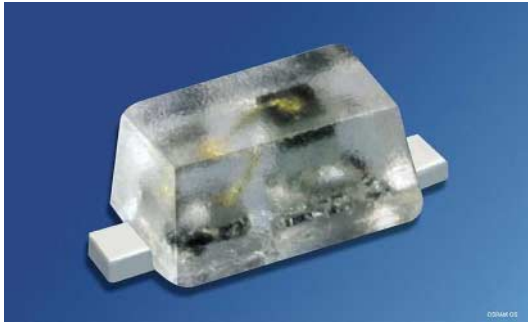


Figure 1 - SmartLED™

The main advantages of the SmartLED™ are:

- better heat dissipation given by the leadframe based package (SCD 80, see figure 1) which improves the lifetime
- wide operating temperature range from -40°C to +100°C
- low height: 0.65 mm, see figure 2
- improved homogeneity due to the defined distance from the die to package surface

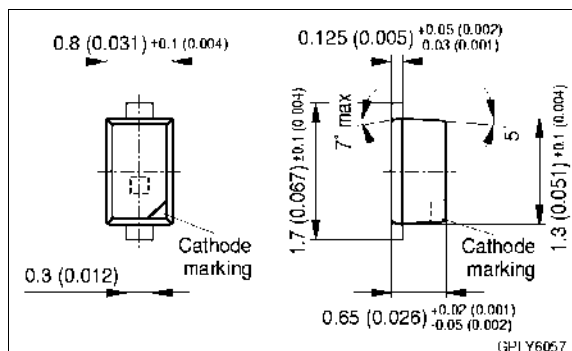


Figure 2 - Dimensions in mm (inch)

Intention of this application note is to describe the solderability of SmartLED™ by the use of

- SmartLED™ solder pads
- Chiplid solder pads
- SmartLED™-Chiplid combination solder pads

Following clues are seen as recommendations to reach the best solder quality. Therefore, it could be necessary to adjust the following parameters

- thickness and design of solder stencil
- solder pad design
- pipette from the pick and place machine

Recommendations

Solder stencil:

We recommend to design the dimensions of the solder stencil 10% smaller than the solder pad dimensions. Reason for this is that no solder paste residues remain on the PCB when the solder paste mask is removed.

Furthermore, the solder volume is very important for good solder results. The SmartLED™ could be lifted upwards if the solder volume is too much.

Due to the same reason the solder stencil thickness should be $\leq 125 \mu\text{m}$ (5 mil).

In figure 3 is shown a good solder result.

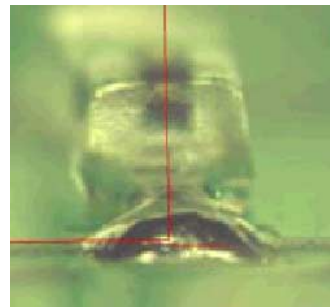


Figure 3

The solder paste covers the pin of the SmartLED™ without tilting or shifting the device.

Figure 4 shows what can happen if a SmartLED™ device is soldered with too much solder paste:



Figure 4

The device tilts or shifts on one side from the solder points.

Insufficient solder paste however can result in conductivity problems: electrical as well as thermal.

Pipette (Nozzle):

The pick and place machine should be capable to process 0603 devices. Important for a good positioning is a proper nozzle. Each machine has its own equipment, e.g. for a Si-Place machine we recommend to use a conventional 911 pipette.

SmartLED™ on SmartLED™ solder pad

If the SmartLED™ is not used in combination with Chiplid we recommend the following solder pad design:

As mentioned in the recommendations the solder stencil should be 10% smaller than the solder pad dimension and the solder stencil thickness should be ≤125 µm (5 mil).

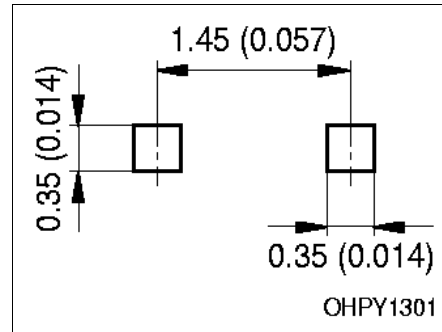


Figure 5 - Dimensions in mm (inch)

SmartLED™ on Chiplid solder pad

To achieve good results some points have to be taken into account.

A typical solderpad for Chiplid 0603 is shown in figure 6.

Due to the five times larger Chiplid solder pad the solder paste volume for the SmartLED™ will be too much.

Therefore if SmartLED™ and Chiplid are to be used for the same application, we

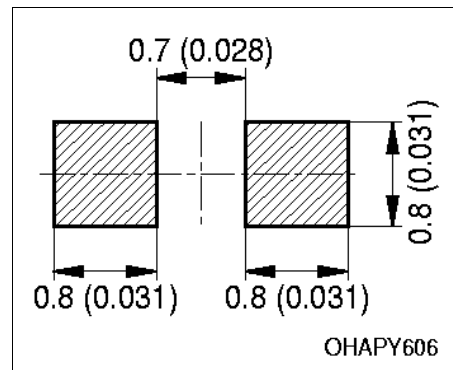


Figure 6 - Dimensions in mm (inch)

recommend to reduce the dimension of the solder stencil by 40% and to use a ≤125 µm (5 mil) solder stencil thickness.

SmartLED™ on SmartLED™-Chipped combination solder pad

The following SmartLED™-Chipped

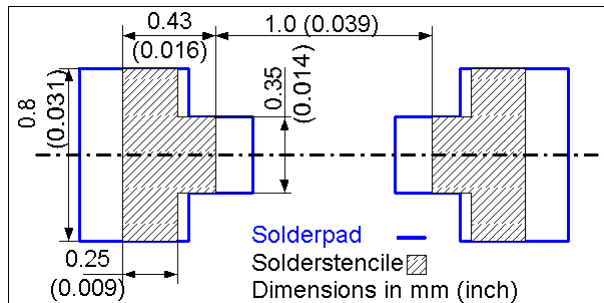


Figure 7

combination solder pad (figure 7) is optimized for the use of SmartLED™ and Chipped on the same solder pad. Due to the different pin dimension we recommend to reduce the dimension of the solder stencil in the length to 0.43 mm (0.016"), the dimension and the position is described in figure 8. Once more we advice to use a $\leq 125 \mu\text{m}$ (5 mil) solder stencil thickness.

Summary

- If only the SmartLED™ is used in the application we recommend to use the SmartLED™ solder pad
- If the SmartLED™ is used in combination with Chipped we recommend to use the SmartLED™-Chipped combination pad
- If the SmartLED™ is used as a replacement for Chipped and has to be

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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.

mounted on a Chipped solder pad we recommend to design the solder stencil 40% smaller and reduce the solder stencil thickness to $\leq 125 \mu\text{m}$ height

The SmartLED™ is based on the experience from the SCD 80 package which was produced and soldered a several billion times. Furthermore this leadframe based package provides the best heat dissipation and due to the moulded device a optimized optical behavior.

Therefore we could combine all advantages in an improved 0603 package which we have realised with our SmartLED™.

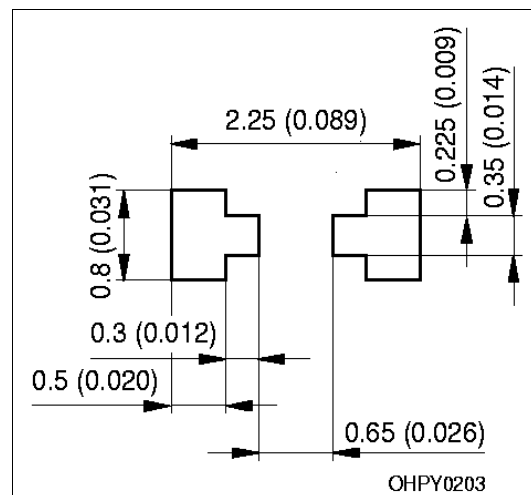


Figure 8 - Dimensions in mm (inch)