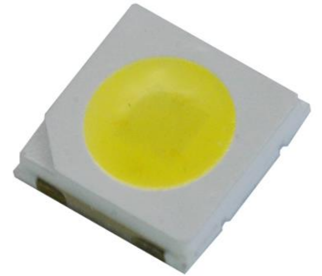
DOMINANT™
Opto Technologies
Innovating Illumination

APPLICATION NOTES:

Surface Mounting Guide for PrimaxPlus

Introduction:

PrimaxPlus is a newly release LED package by Dominant with 120 degree viewing angle, it has the following attractive characteristic compare to comparable footprint LED package in the market:



- Super high brightness surface mount LED.
- 120° viewing angle.
- Compact package outline (LxW) of 3.7 x 3.5 mm.
- Ultra low height profile - 0.8mm.
- Low thermal resistance.
- Compatible to IR reflow soldering.
- Environmental friendly; RoHS compliance.

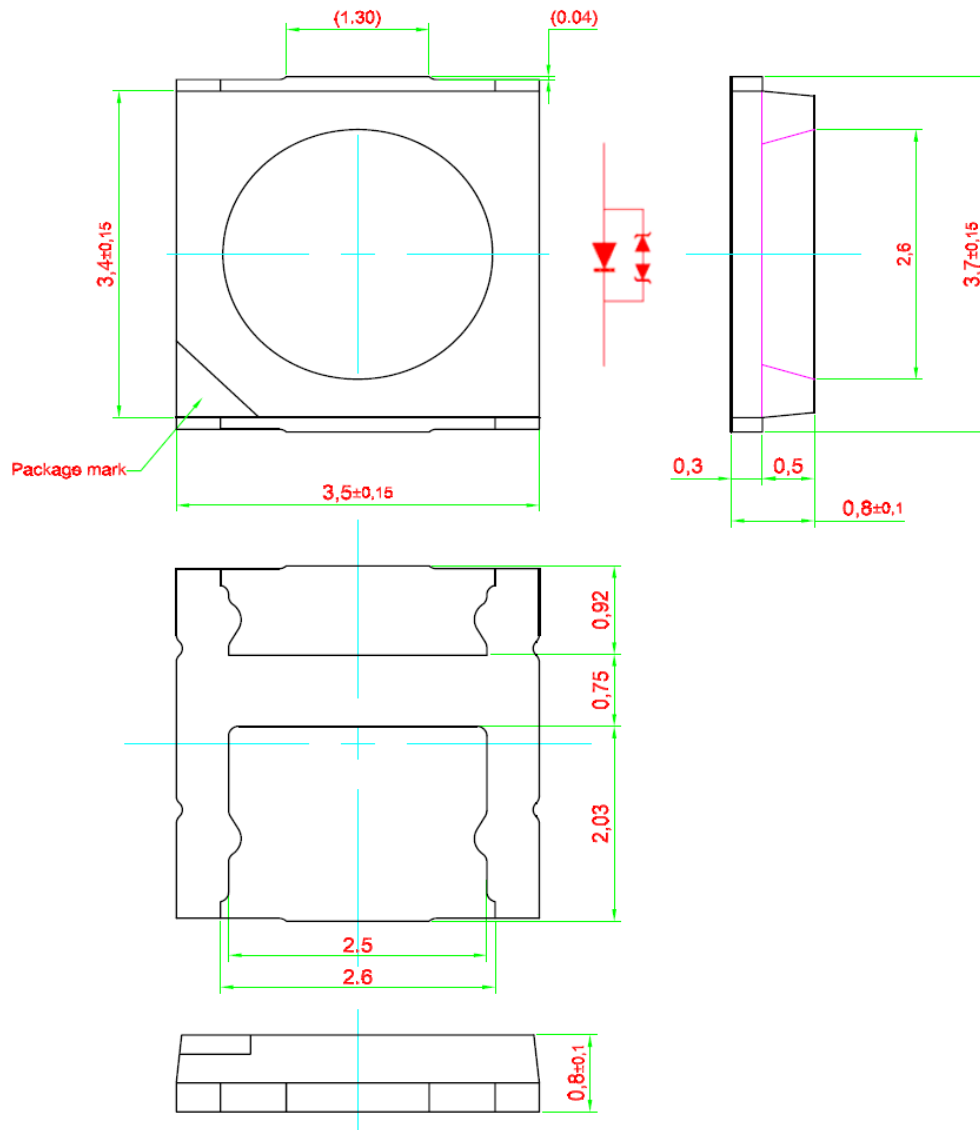


Figure 1: PrimaxPlus package dimension

Standard Soldering Process:

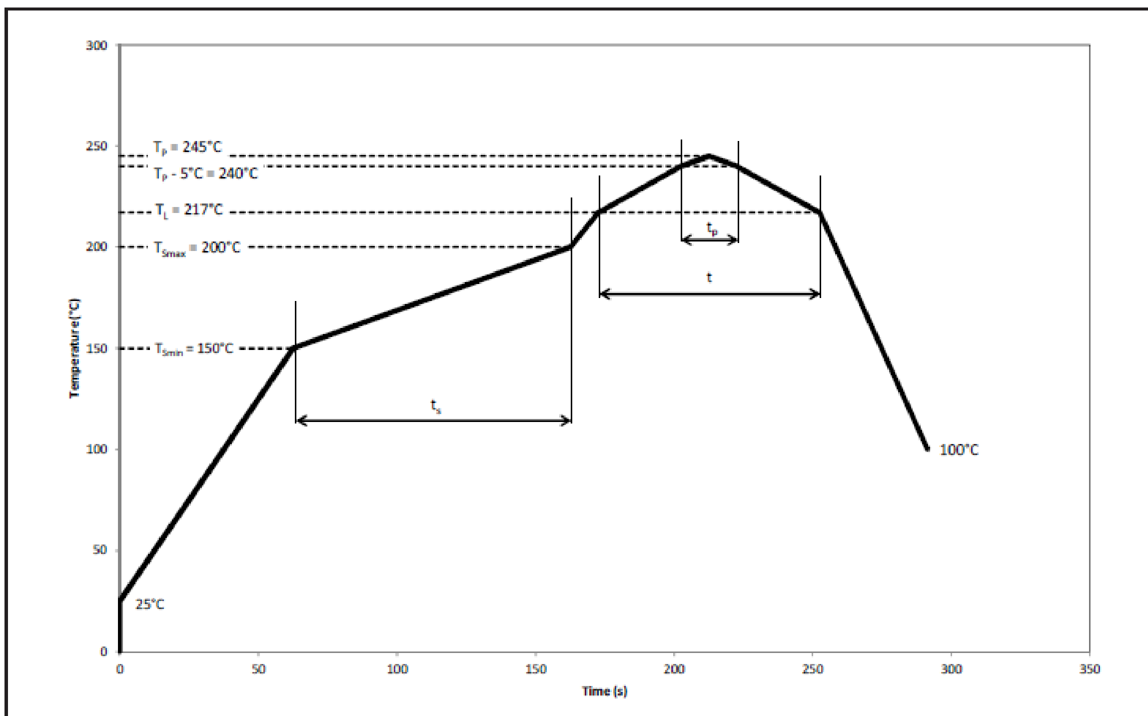
The PrimaxPlus soldering surfaces are plated with gold (Au) and are therefore RoHs compliant. The component is designed to be compatible to the existing industry SMT process and IR-reflow. There are no special processes or equipment required for the mounting of the components onto applications. Both the thermal and electrical connections are provided by the conventional process. Therefore, there is no need to provide for additional process or material to take care for the thermal connection.

However, due to the unique design, all the soldering terminals are located at the bottom surface of the component. This greatly reduces the space required and also enhances the thermal dissipation capability of the component. Heat from the LED chip is directly conducted via the soldering terminals to the external environment. Thermal path is kept to the very minimum.

As for the soldering process, the component is qualified for Pb-free soldering profile. The profiles as per described in the datasheet.

Recommended IR Reflow Profile:

Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



Profile Feature	Symbol	Min.	Pb-Free Assembly Recommended	Max.	Unit
Ramp-up rate to preheat 25°C to T_{smin}	-	-	2	3	°C/s
Time t_S T_{smin} to T_{smax}	t_S	60	100	120	s
Ramp-up rate to peak T_L to T_P	-	-	2	3	°C/s
Liquidous temperature	T_L	-	217	-	°C
Time above liquidous temperature	t	60	80	150	s
Peak temperature	T_P	-	245	260	°C
Time within 5°C of the specified peak temperature T_P - 5°C	T_P	10	20	30	s
Ramp-down rate T_P to 100°C	-	-	3	6	°C/s
Time 25°C to T_P	-	-	-	480	s

Surface Mounting – Factors to Consider:

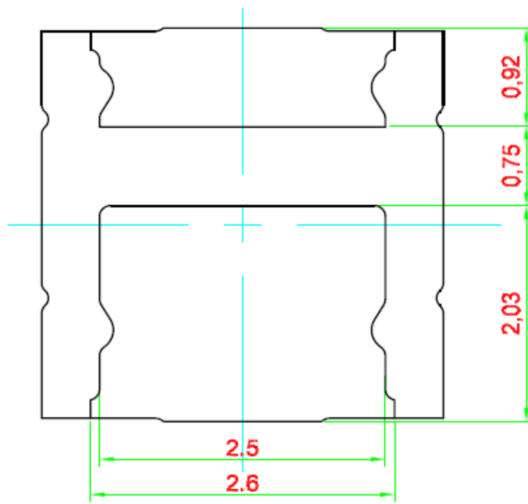
This application note provides a guideline for the surface mounting of PrimaxPlus. The following parameters have to be considered in order to optimize the surface mounting performance.

- Solder pad size
- Solder stencil size
- Solder paste thickness
- Pipette (nozzle)

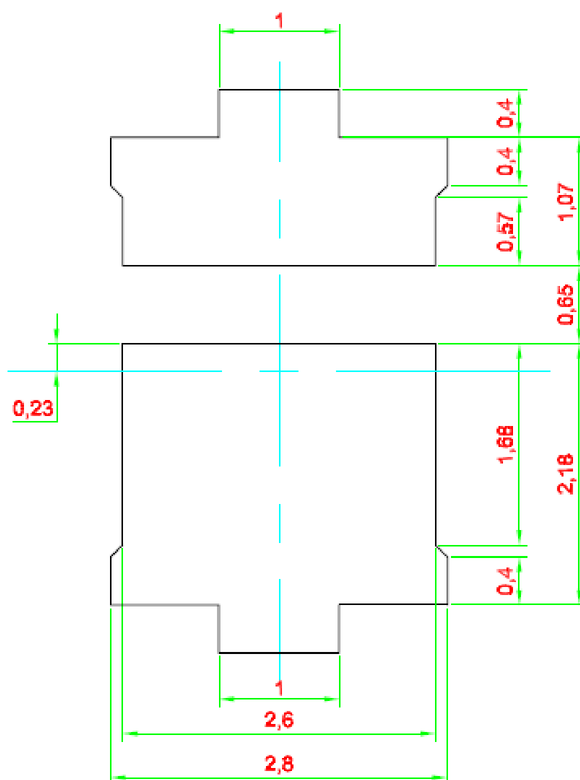
Solder pad size

The recommended solder pad design is as illustrated in the data-sheet.

PrimaxPlus solder lead design:



A typical recommended solder pad design:



Solder Stencil

In order to minimize solder bridging problems, it is common to design stencil aperture size smaller than the recommended solder pad. Excessive amount of solder paste deployed will result to tilted parts and inaccurate placement position. Figure 2 shows the dimension of the stencil apertures for the recommended solder pad of the PrimaxPlus.

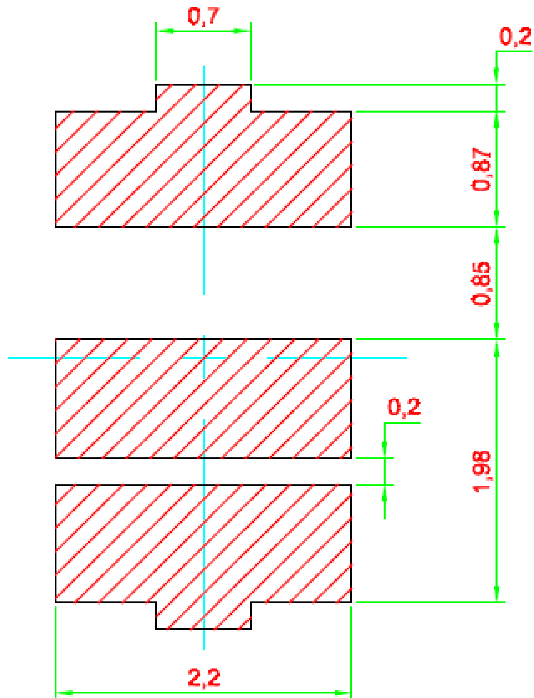


Figure 2: Dimensions of the stencil openings

Solder paste thickness

We recommend using minimum solder paste in order to achieve a good solder formation. A solder paste thickness of 0.125 mm will be optimum. However, the used stencil thickness may also depend on the other SMD components on the PCB.

Pipette

Pick and place machine should be able to process PrimaxPlus devices with the required placement accuracy. Care should be observed that the surface of the pipette which is in contact with the LED is flat and smooth. The pick and place nozzle use must be bigger than the LED emission area. This would prevent LED from sticking to the pick and place nozzle. Parameter settings for the pick and place process should also be evaluated to ensure no damage to the LEDs.

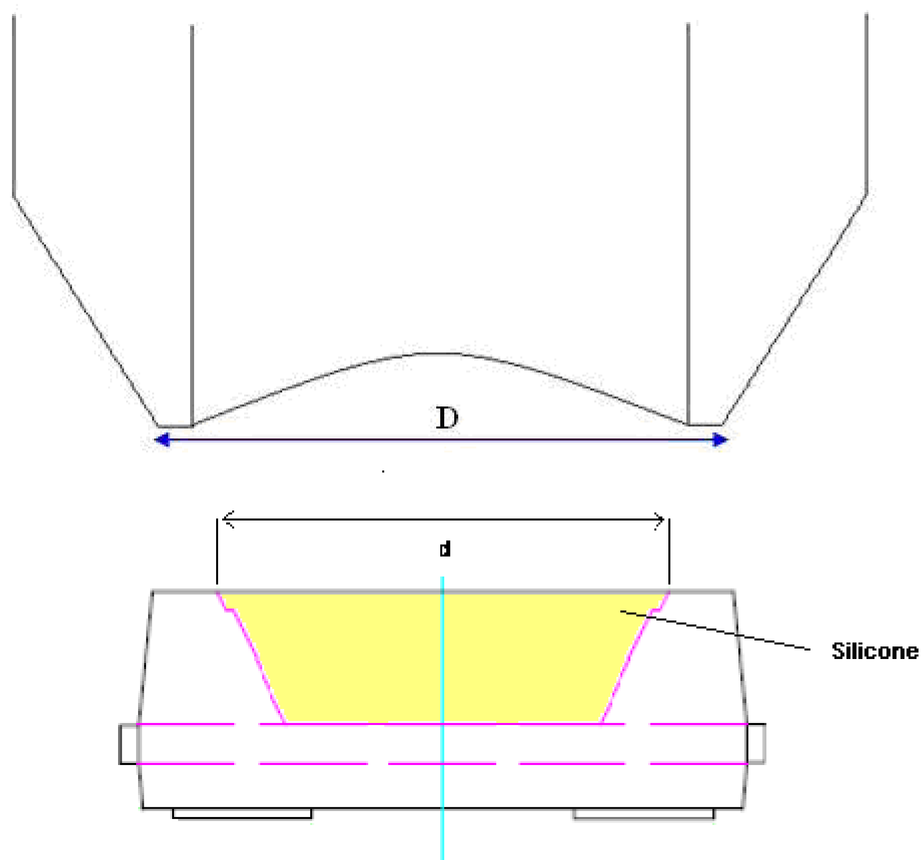


Figure 3: Pick & place nozzle diameter (D) should be larger than the opening (d)

Method of Solder Quality Check After SMT

PrimaxPlus features solderable side lead extension that allow the solder wetting between the PCB and the device to be visible for inspection. To support the visual inspection of the solder wetting after reflow soldering, a so called "solder wetting indicator" could be designed within the solder pad. A visual inspection of the solder joints should be carried out according to the IPC standard J-STD-001D 7.6.6 [Minimum fillet height should equal to the solder thickness plus 25%].

Figure below shows an example and the scheme of a well formed solder joint at the electrical terminal of the LED package.

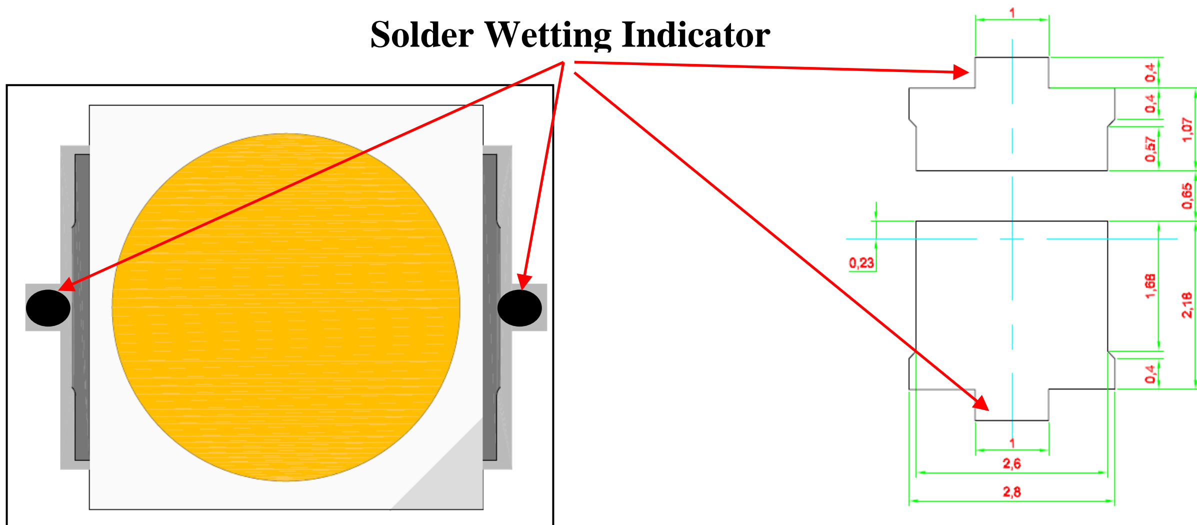


Figure 4.1: Solder Wetting Indicator on solder pad

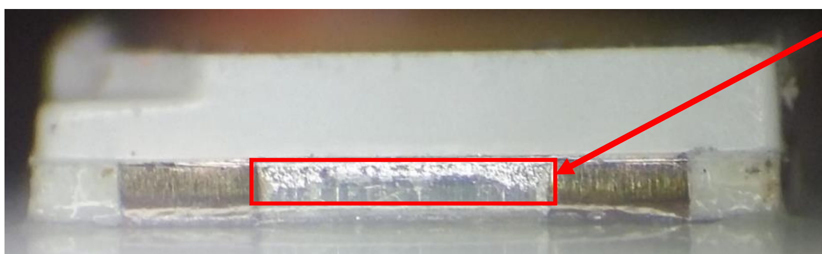


Figure 4.2: Side view of package

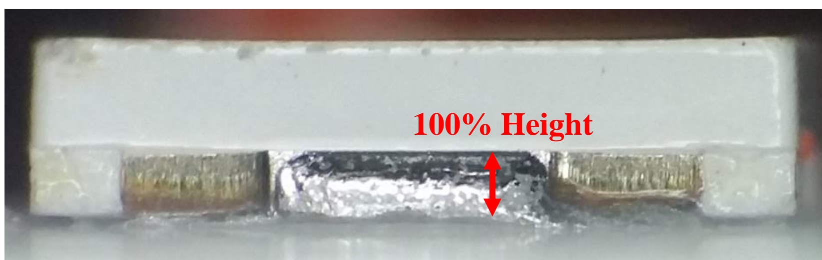


Figure 4.3: Good solder joint