

APPLICATION NOTES:
Surface Mounting Guideline for SpicePlus 2520
(SVx-series)

Introduction:

Like spice, its diminutive size is a stark contrast to its standout performance in terms of brightness, durability and reliability. Despite being the smallest in size yet the SpicePlus packs a powerful performance and is a highly reliable design device.



SpicePlus 2520
SVx-series

- Super high brightness surface mount LED for automotive exterior applications.
- 120° viewing angle.
- Compact package outline (LxW) of 2.5 x 2.0mm.
- Ultra low package profile - 0.7mm.
- Low thermal resistance.
- Superior corrosion robustness.
- Compatible to IR reflow soldering.
- Compliance to automotive standard; AEC-Q102.
- Environmental friendly; RoHS compliance.

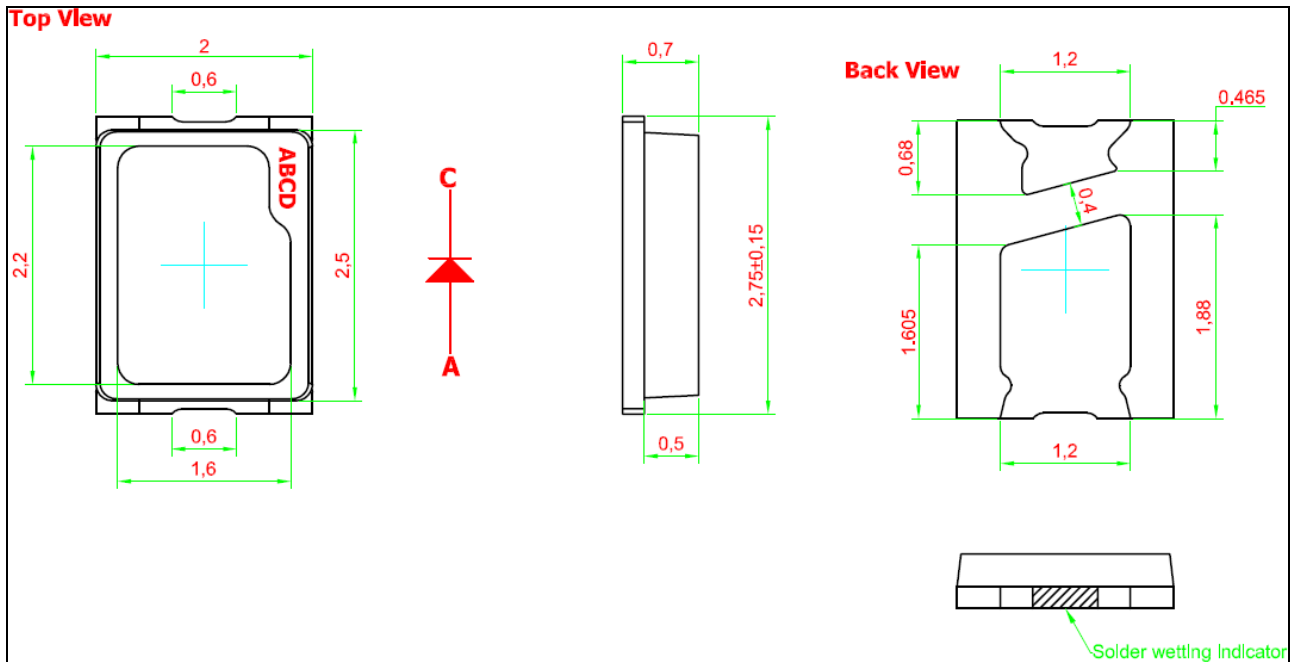
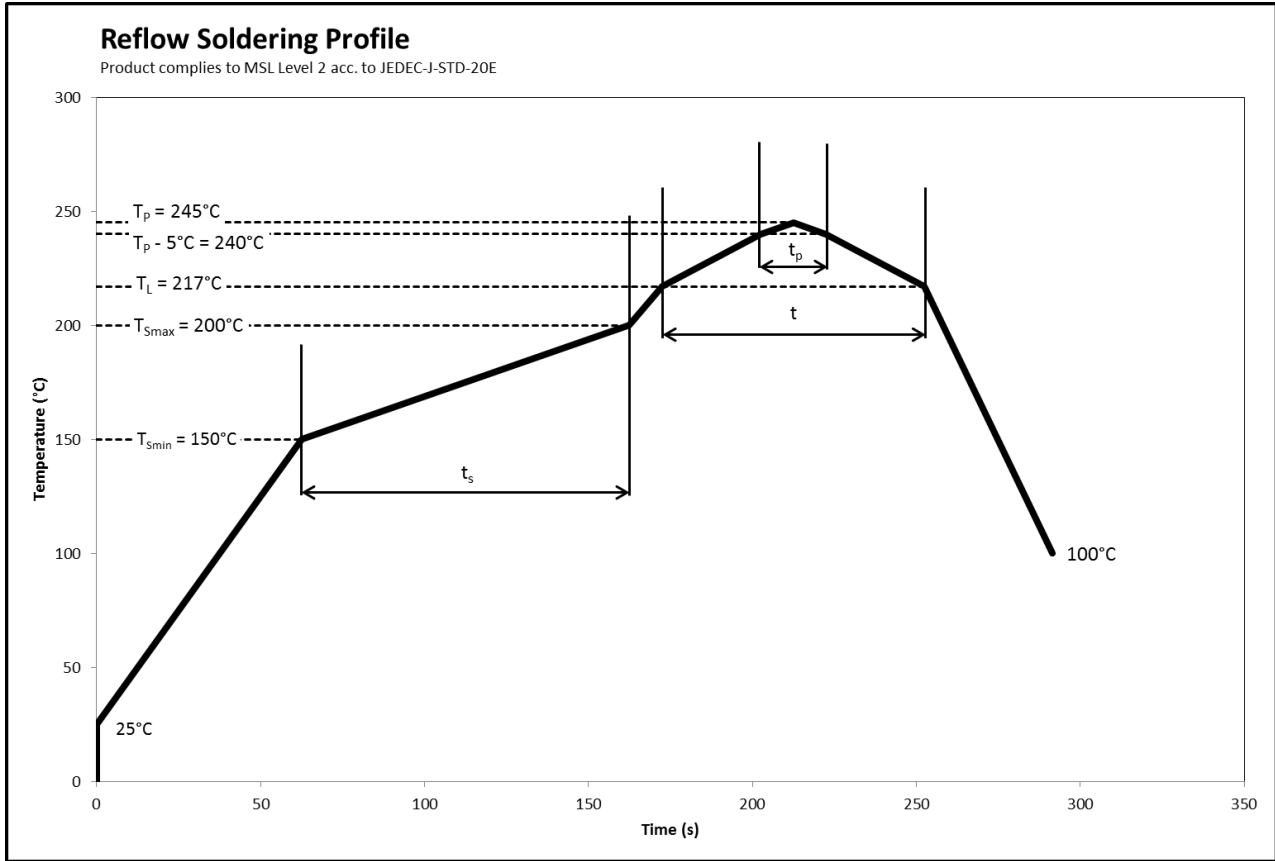


Figure 1: SpicePlus 2520 (SVx-series) Package Dimension

Standard Soldering Process:

The SpicePlus 2520 (SVx-series) package soldering surfaces are plated with Tin (Sn) and are therefore RoHs compliant. The component is designed to be compatible to the existing industry SMT process and IR-reflow.

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



Profile Feature	Symbol	Pb-Free Assembly			Unit
		Minimum	Recommended	Maximum	
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 $T_P - 5^\circ\text{C}$	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

Figure 2: Recommended Reflow Soldering Profile

Surface Mounting – Factors to Consider:

This application note provides a guideline for the surface mounting of SpicePlus 2520 (SVx-series). The following parameters have to be considered in order to optimize the surface mounting performance.

- > Solder pad size
- > Solder pad design
- > Solder stencil size
- > Solder paste thickness
- > Nozzle
- > Solder quality check

Solder Pad Size

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

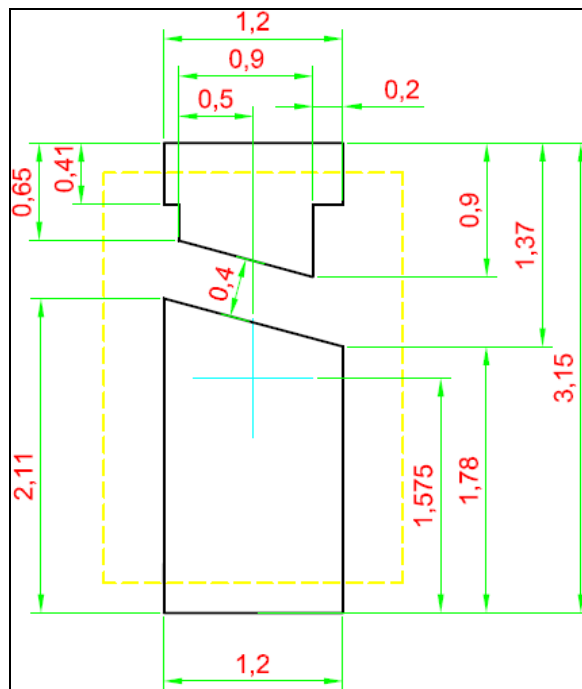


Figure 3: Recommended solder pad size

Solder Pad Design

It is recommended to include additional copper area covered by solder resist for improved heat dissipation especially at anode lead of the package as illustrated below.

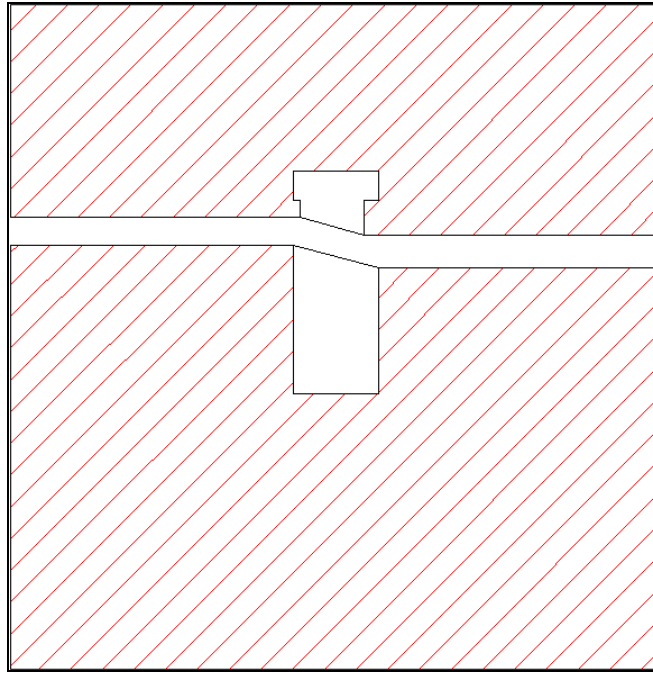


Figure 4: Recommended solder pad design

Solder Stencil Size

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. It is recommended that the aperture is reduced to 50% of the recommended solder pad design.

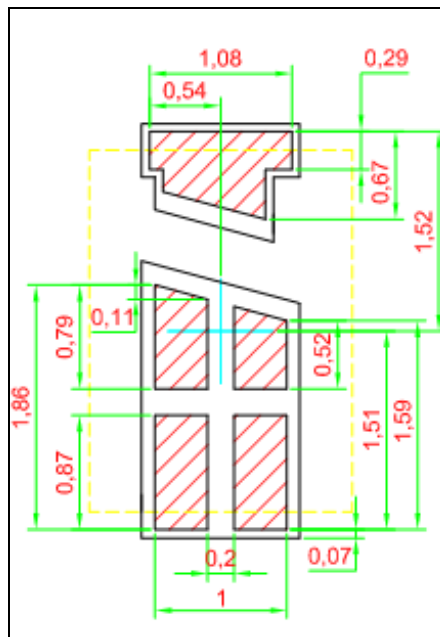


Figure 5: Recommended solder stencil size

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.

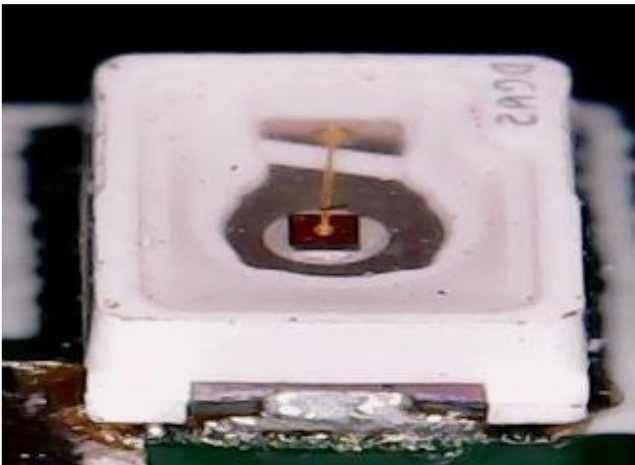
Nozzle

Pick and place machine should be able to process SpicePlus 2520 (SVx-series) devices with the required placement accuracy. Care should be observed that the surface of the nozzle which is in contact with the LED is flat and smooth. Parameter settings for the pick and place process should also be evaluated to ensure no damage to the LEDs. For recommended nozzle design, please refer to our *Recommended Pick and Place Tools for LEDs from DOMINANT Opto Technologies* application note.

Solder Quality Check after SMT Process

For SpicePlus 2520 (SVx-series), there are solder tunnels with solderable surface. The purpose is for solder wetting check after SMT process. It has excellent solderability and solder fillet can be observed at this section after SMT process. Areas which are copper exposed that are not plated will only be partially solderable. Anyway this feature will not impact the product quality & reliability in any aspect. Below pictures are the examples of LED lead with good solderability.

Package Perspective View
(Anode Lead Is Shown)



Package Perspective View
(Cathode Lead Is Shown)

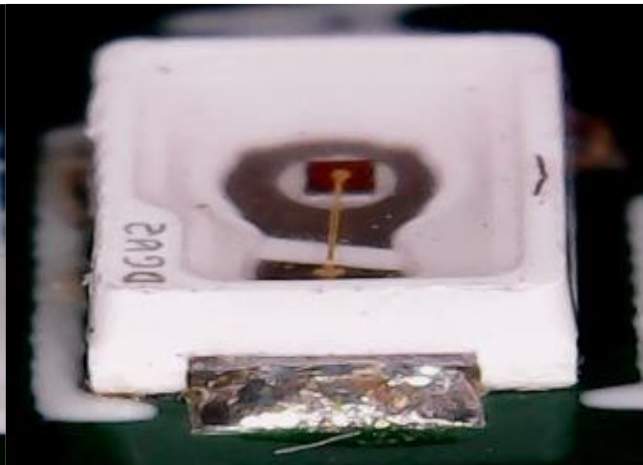


Figure 6: Example of good solder formation on lead

Solder Paste Type

Dominant has tested the SAC305 solder paste with satisfactory results. However, since application environments vary widely, we recommend that customers perform their own solder paste evaluation in order to ensure it is suitable for the targeted application.

Storage Method after SMT

For PCB assembly that mounted with SpicePlus 2520 (SVx-series), it should not be stack together after IR reflow, else it would have high chance of damaging the LED. Recommended method is having a dedicated carrier so that each PCB assembly is with at least 5mm away from each other.



Figure 7: Example of carrier to store the PCB after SMT

Handling Precautions

1. Mechanical forces exerted onto the emitting window of SpicePlus 2520 (SVx-series) could cause sagging wire and should be minimized.

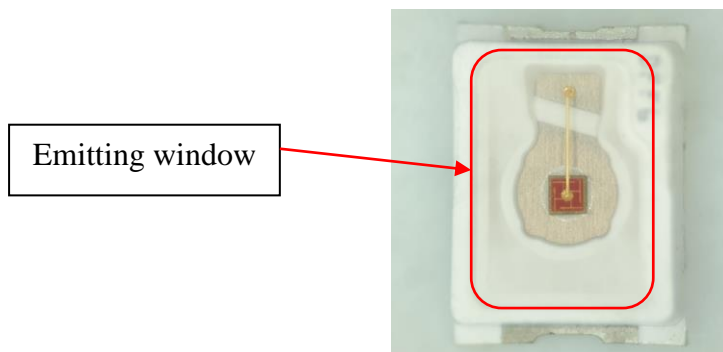


Figure 8: Top view of SpicePlus 2520 (SVx-series)

2. For manual handling, anti-static/conductive plastic tweezers should be use to pick up SpicePlus 2520 (SVx-series). Avoid touching sensitive area such as the emitting window area during pick up.

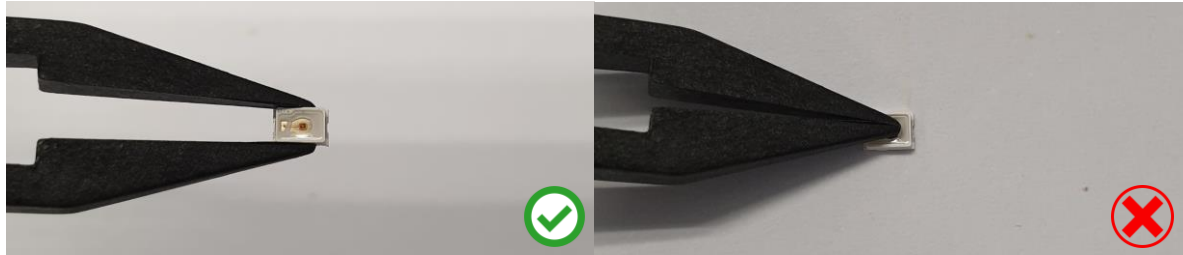


Figure 9: Example of correct and wrong method on LED handling

3. A better alternative for manual handling of SpicePlus 2520 (SVx-series) package is using vacuum suction pen. The suction tip should be made of a soft material such as rubber to minimize the mechanical force exerted onto sensitive area. Care should be taken to avoid the soft material from contaminating the top side surface of the LED emitting area.



Figure 10: Example of vacuum suction pen