DOMINANT™
Opto Technologies
Innovating Illumination

APPLICATION NOTES:

Manual Soldering and De-Soldering Guideline for SpiceLED

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 SpiceLED™ packs a powerful performance and is a highly reliable design device. Its versality enables its application in automotive appliances, key-pad illumination, hand-held devices such as PDAs, notebooks, compact back-lighting applications, consumer appliances, office equipment, audio and video equipment. It is equivalent to the industry standard 0603 chipled with additional improvement as stated below:

- Copper lead-frame construction for better moisture resistance and lower thermal resistance.
- Enlarge cathode base to enhance heat dissipation, which allows maximum driving current up to 20mA in order to provide higher brightness
- NiPdAu plating for better solderability

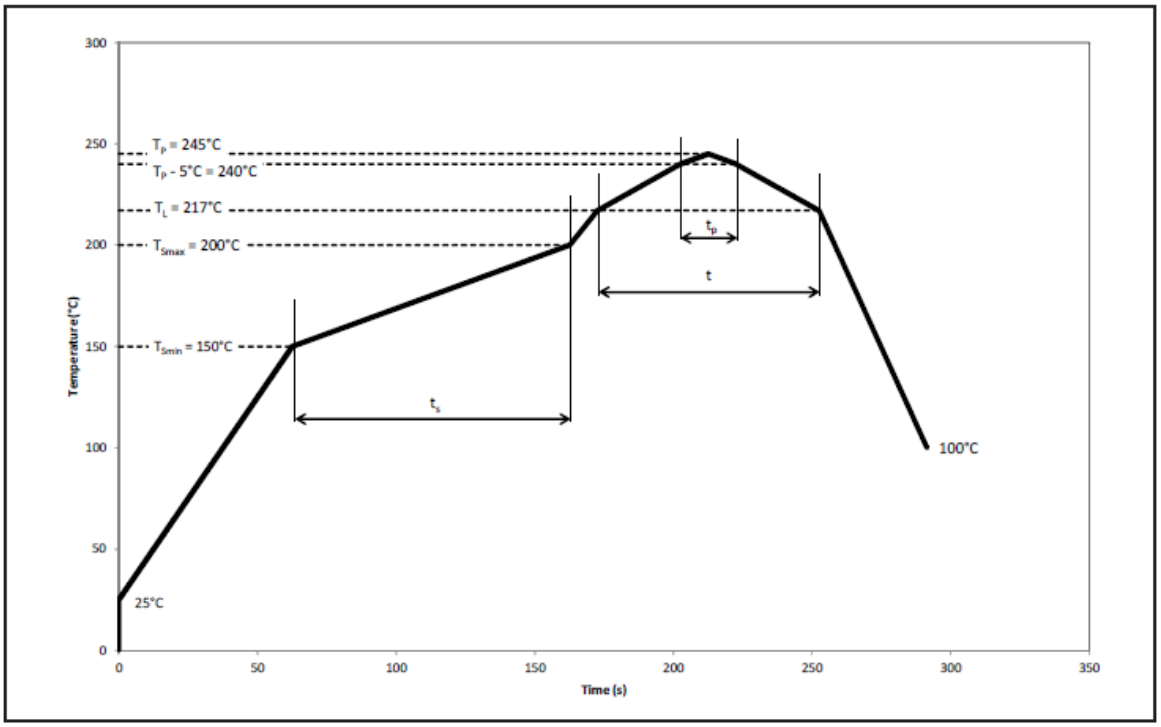
Standard Soldering Process:

The SpiceLED™ component is designed to be compatible to the existing SMT process and standard IR-reflow as per the industry standard 0603 chipled package. There is no special process or equipment required for the mounting of the components onto boards. Both the thermal and electrical connections are provided by the conventional mounting process. Therefore, there is no need to provide for additional process to take care for the thermal connection. This is significantly superior compared to other competitor parts.

As for the soldering process, the component is qualified for both Pb and Pb-free soldering profile. This is 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	Pb-Free Assembly			Unit
		Min.	Recommended	Max.	
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

Manual Soldering Process:

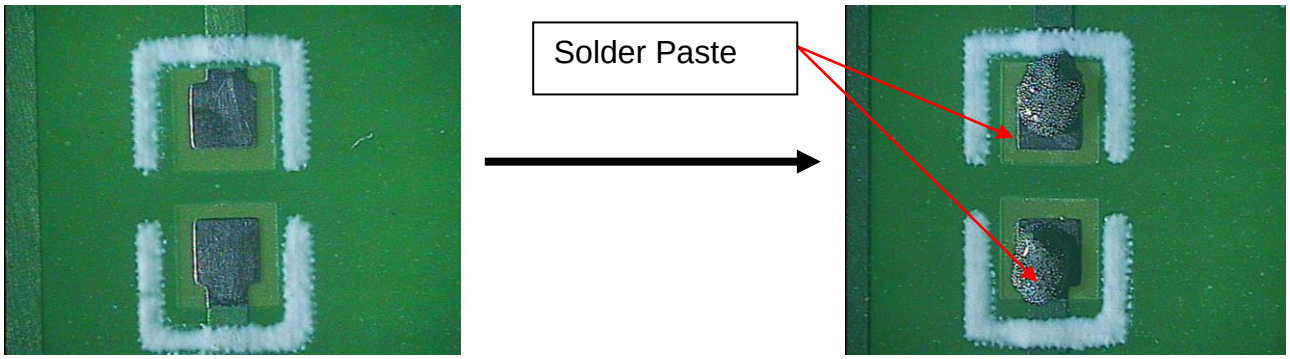
In cases of engineering evaluations, manual soldering may be required. DOMINANT **strongly do not recommend** such process as the process control is typically poor. Spikes of over temperature or prolong time of exposure to high heat may damage the component. Moreover, due to the package size is very small for SpiceLED™, there is high risk to damage the package by manual handling. Improper unit placement or excessive solder paste on pad might cause continuity short between the cathodes to anode.

SpiceLED™ is unique as the soldering terminals are located at the bottom side of the component. There are no soldering surfaces available at the side of the component.

This application note intends to provide guidelines for manual soldering technique for SpiceLED™ by using hot air blow. Using this method, solder paste is first applied onto the board. The solder paste that may be used is common to that used in the SMT industry. Once the paste is applied, SpiceLED™ may be placed into position. Due to the small package size of SpiceLED™, the solder paste dispensing and unit placement should be done under scope with minimum 5X magnification to ensure good alignment. A hot air gun is then used to blow heated air onto the component in order to melt the solder paste and provide for connection. The hot air gun is set to approximately 350°C and is kept at a distance of approximately 1cm from the component. The hot air blow is carried out for about 15 to 20 seconds to complete the soldering. Tweezers is use to hold the unit in place to prevent the unit from blown away by the hot air gun.

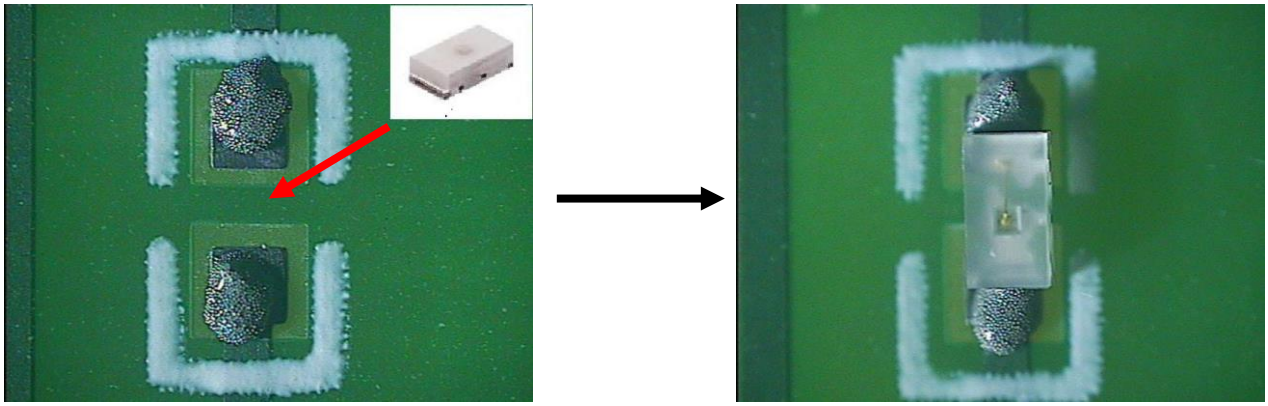
Please refer to the following illustrations for the process steps.

Figure 1: Apply specific amount of solder paste to the pad on PC board



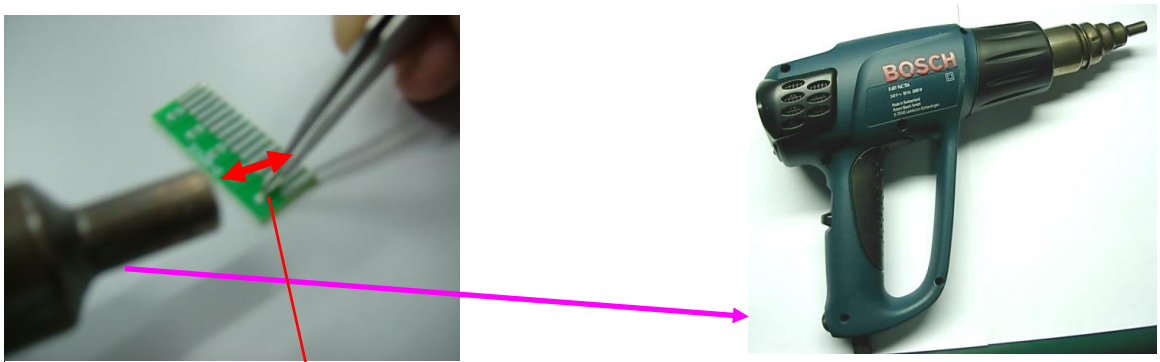
Then place the component onto the board. Please refer to figure 2.

Figure 2: The component is attached to the PCB.



Finally use hot air gun set at 350°C to blow it at a distance of approximately 1cm. This will take about 15 to 20 seconds for the solder paste to melt and form the connections. Please refer to figure 3.

Figure 3: Use hot air gun to blow it for 18 to 20 seconds.



≈ 1cm

Hot Air Gun

Summary Of Process Flow:

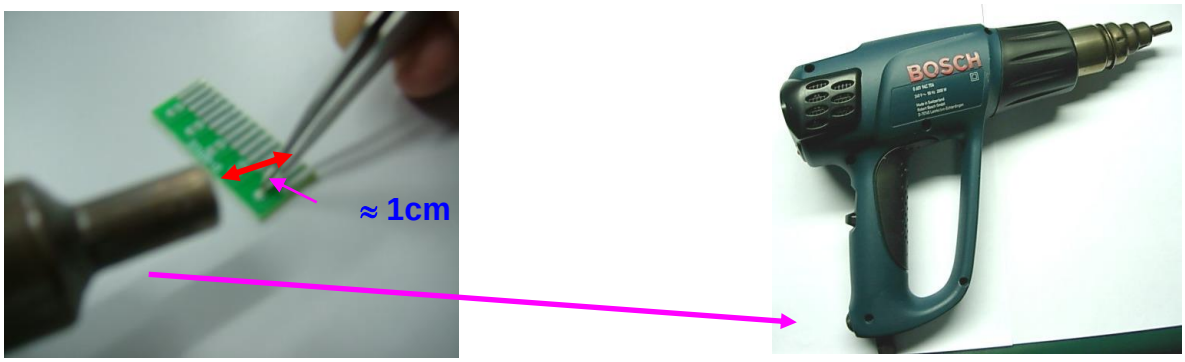
Apply solder paste → Place SMD LED → Apply hot air blow

Manual De-Soldering Process:

As like soldering process, hot air blow is using to manual de-solder SpiceLED™. Using this method, a hot air gun is then used to blow heated air onto the component in order to disconnect the connection. The hot air gun is set to approximately 350°C and is kept at a distance of approximately 1cm from the component. The hot air blow is carried out for about 15 to 20 seconds to complete the de-soldering process.

Please refer to the following illustrations for the process steps.

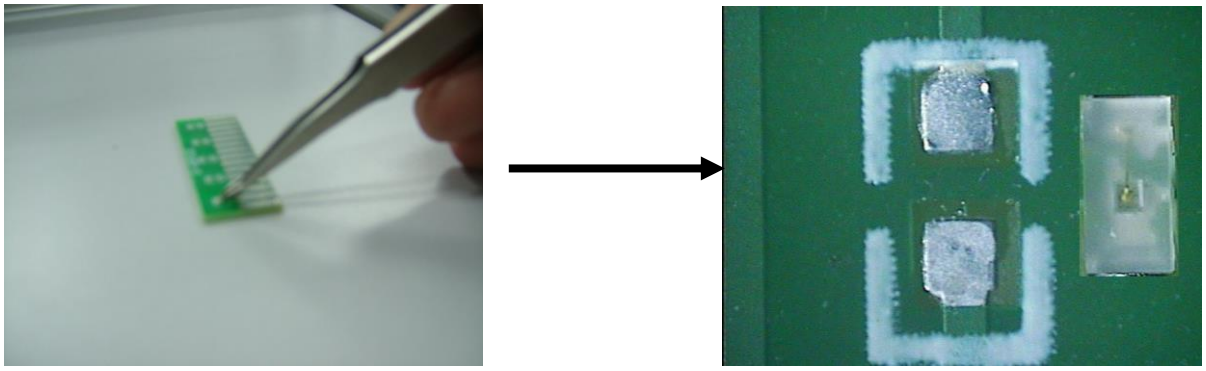
Figure 4: Use hot air gun to blow it for 18 to 20 seconds.



Hot Air Gun

Use hot air gun set at 350°C to blow it at a distance of approximately 1cm. This will take about 15 to 20 seconds to disconnect the connections.

Figure 5: Use tweezers to take up SMD LED from PCB.



Summary of Process Flow:

Apply hot air blow	→	Taking up SMD LED from board by using tweezers

Note: Baking the PCB and SpiceLED™ at 125 Deg C for 4 hours is recommended prior to any manual soldering/de-soldering process. Doing this removes any residual moisture from the system, preventing moisture induced cracking or PCB delamination during the soldering process.

Replacement/ Rework For Normal Production Environment:

DOMINANT recommend customer to use Chip Scale Package Compatible SMT rework system to rework SpiceLED™. The advantages of such system are:

- Directing the thermal energy through the component body to solder without over-heating the adjacent components
- Interchangeable nozzles designed with different geometries will accommodate different applications to direct the airflow path
- Using a convective bottom side pre-heater to maximize temperature uniformity
- Automated pick and place feature for accurate placement and alignment.