

Features

- Far Ultraviolet LED
- Mercury Free
- 30 degree collimated source
- ESD protection
- Protected by US Patents 9,691,938: 9,871,165: 10,153,395

Applications

- Chemical and biological analysis
- Water quality monitoring
- Gas Sensing
- Liquid Chromatography
- Disinfection

Product overview

The SF1-3U8P3L1 is a powerful, small-footprint Far UV-C emitting device. A peak wavelength of 235nm LED creates new feasibility for a variety of applications. 235nm LED is effective for Water Quality Detection of Nitrate (NO₃), Gas Detection of Carbon dioxide (CO₂) and Liquid Chromatography. The 30 degree collimated source design has higher irradiance to enhance resolution for sensing application.

LEDs have an environmental advantage in that they contain no mercury and LEDs are more robust compared to lamps. The SMD packaged device design is flexible for design application and assembly.

An ESD protection is integrated in the small footprint package of 3.80 x 3.80mm with industrial standard footprint.

Table 1. Ordering information

Part Number	Rank	Wavelength ¹ (nm)	Radiant Flux ² (mW)	Description
SF1-3U8P3L1-TR	S	Typ. 233	Typ. 0.13	Packing in Tape & Reel Packing in Tape & Reel
	L	Typ. 237	Typ. 0.3	
SF1-3U8P3L1-GB	S	Typ. 233	Typ. 0.13	Packing in Gel Box
	L	Typ. 237	Typ. 0.3	
SF1-3U8P3L1-SB	S	Typ. 233	Typ. 0.13	LED solder on Star Board
	L	Typ. 237	Typ. 0.3	

1. Wavelength measurement is @ 20mA forward current, accuracy is ±2.0 nm
2. Radiant flux measurement is @20mA forward current, accuracy is ±10%

Table 2. LED characteristics

Parameter	Symbol	Min	Typ	Max	Units	Test Conditions
Peak Wavelength	λ_p	230	-	240	nm	1, 2, 3
Radiant Flux	Φ_e	0.08	-	-	mw	1, 2, 4
Radiant Intensity	I	0.16	-	-	mw/Sr	1, 2, 4
Viewing Angle	$2\theta_{50\%}$	-	33	-		1
Spectrum Half Width (FWHM)	$\Delta\lambda$	-	9	18	nm	1, 2
Forward Voltage	V_F	5	-	8	V	1, 5
Thermal Resistance Junction-Solder Point	R_{TH}	-	5	-	°C/w	
Power Dissipation	P_D	-	0.12	-	w	1

1. T = 25°C ambient, T_{solder point} = 25°C with Peltier controlled heatsink, forward current = 20mA DC
2. Spectrometer measurement with integrating sphere (radiant flux) or tube (radiant intensity)
3. Wavelength measurement accuracy is ±2.0 nm
4. Radiant flux/intensity measurement accuracy is ±10%
5. Forward voltage accuracy is ±0.2 V

Table 3. Absolute maximum ratings

Parameter	Symbol	Value	Units	Test Conditions
Storage temperature range	T _{STG}	-40 to +100	°C	
Operating temperature range	T _A	5 to 60	°C	
Forward current	I _F	100	mA	
Junction temperature	T _J	85	°C	
ESD classification		2		JEDEC # JS-001-2010

6. Driving these UVLEDs from a current source is strongly recommended to avoid overdrive damage. The current flowing in a UVLED is an exponential function of the voltage applied and the use of voltage sources to drive a UVLED is likely to exceed the Absolute Maximum Ratings and lead to damage or failure of the UVLED.
7. Stresses beyond those listed in “Absolute Maximum Ratings” may cause permanent damage to the device. The exposure to the absolute maximum rated conditions may affect device reliability.

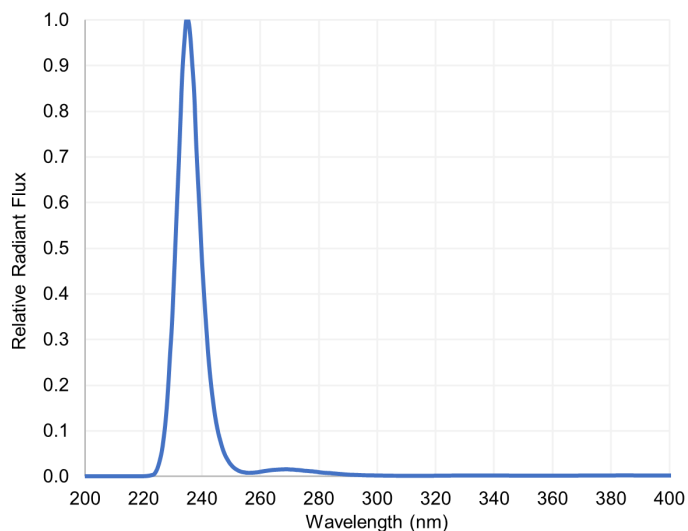


Figure 1. Relative emission intensity vs wavelength
 $T_A=25\text{ }^{\circ}\text{C}$, $I_F = 20\text{ mA}$

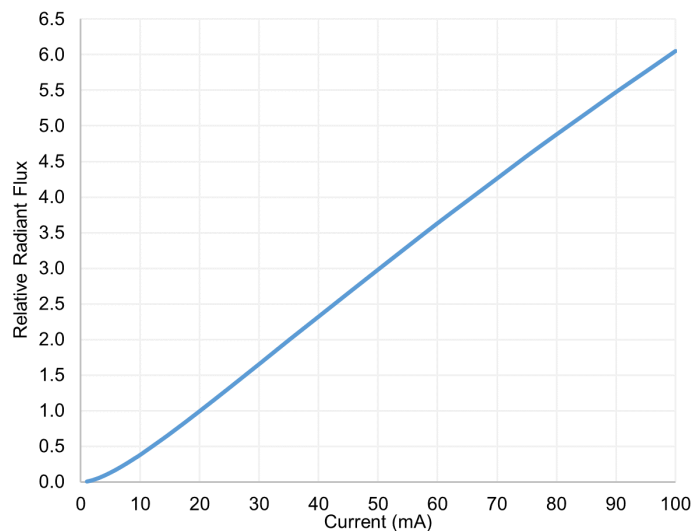


Figure 2. Relative radiant flux vs forward current
 $T_A=25\text{ }^{\circ}\text{C}$

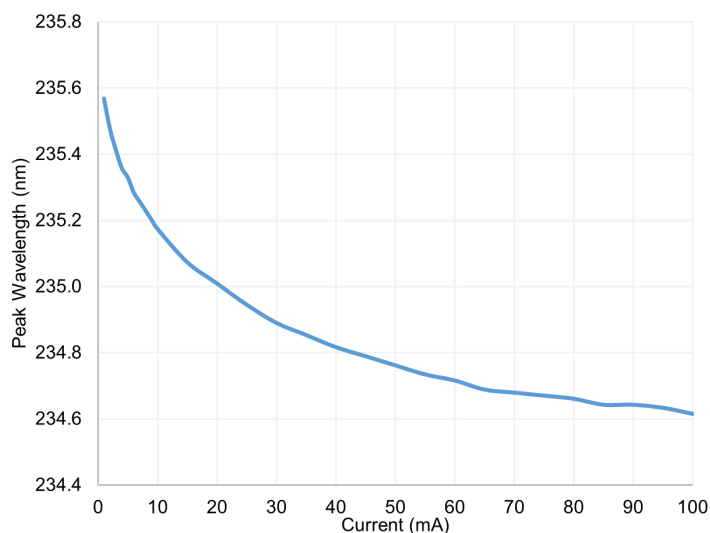


Figure 3. Peak wavelength vs forward current
 $T_A=25\text{ }^{\circ}\text{C}$

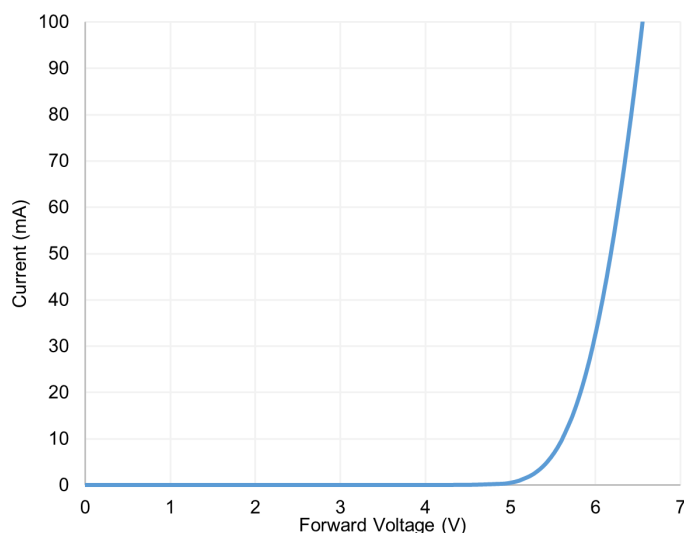


Figure 4. Forward current vs forward voltage
 $T_A=25\text{ }^{\circ}\text{C}$

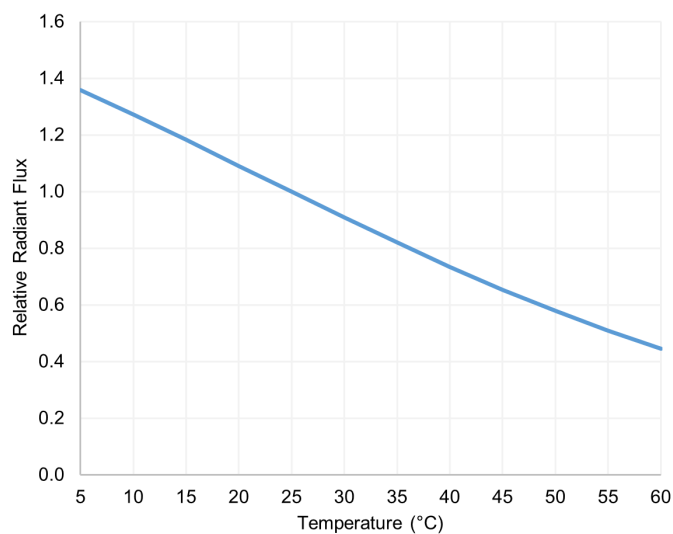


Figure 5. Relative radiant flux vs temperature (Tsolder)

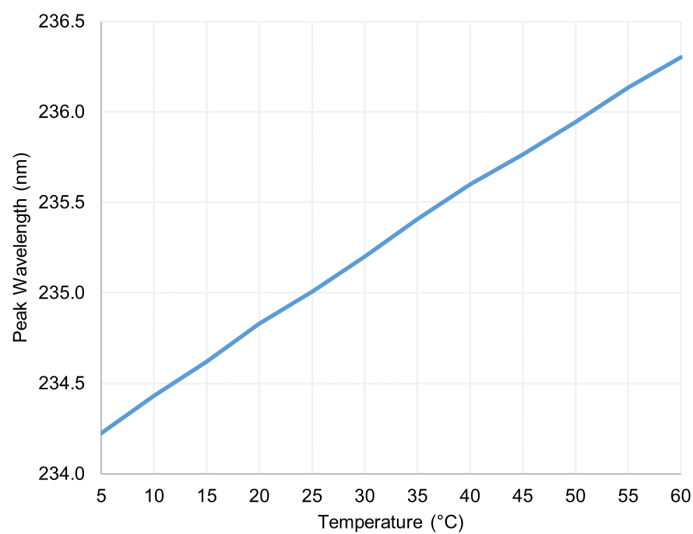


Figure 6. Peak wavelength vs temperature (Tsolder)

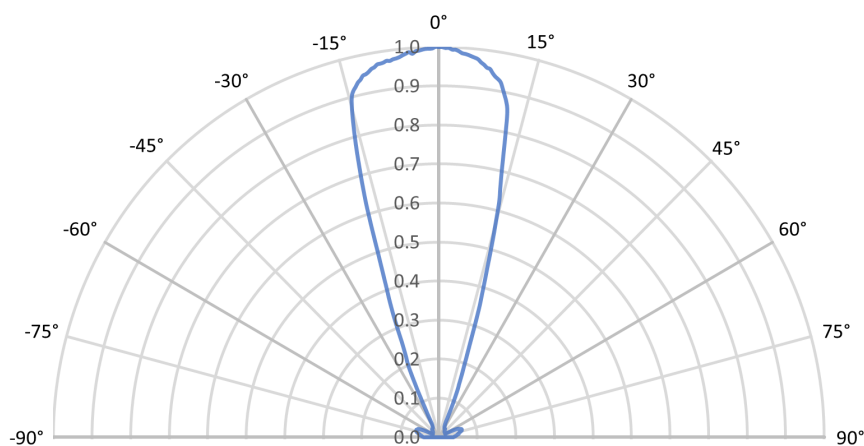


Figure 7. Radiation pattern
 $T_A = 25^\circ\text{C}$, $I_F = 20\text{ mA}$

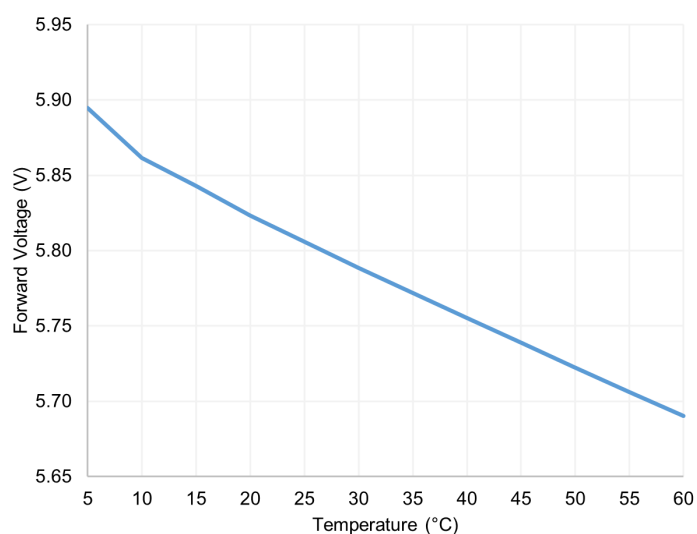


Figure 8. Forward voltage vs temperature (Tsolder)

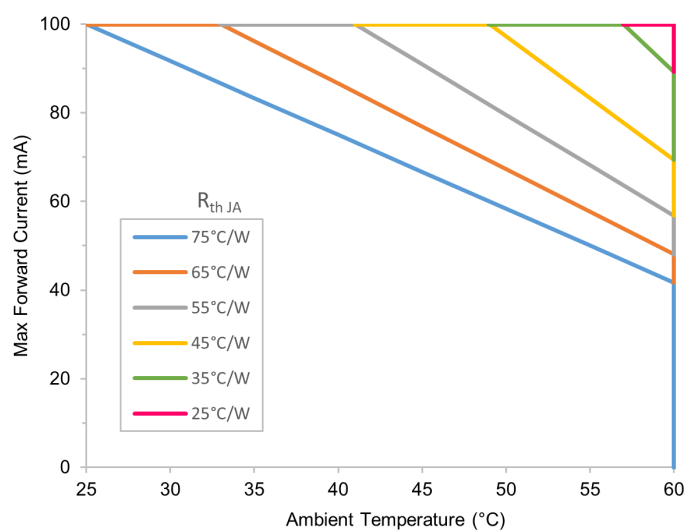


Figure 9. Max forward current de-rating

Package and layout information

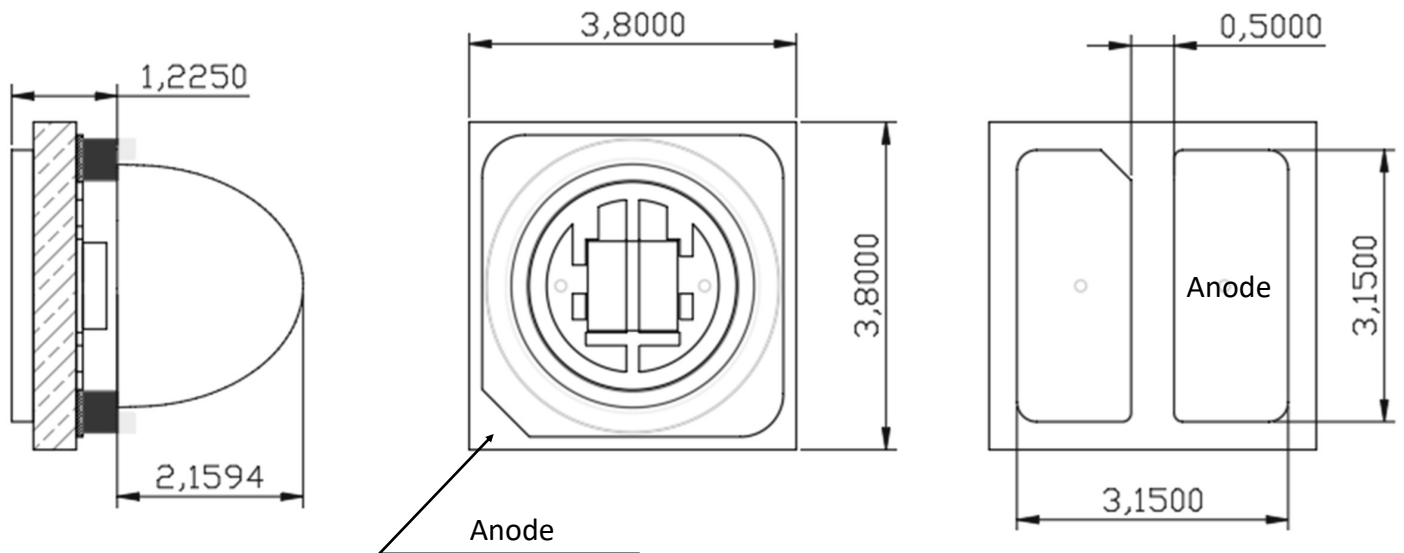


Figure 10. Package dimensions

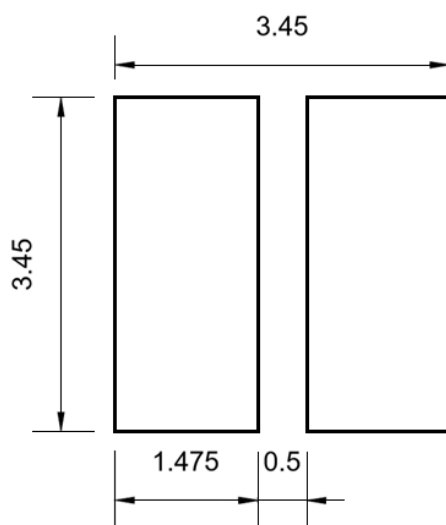


Figure 11. Recommended solder pad pattern

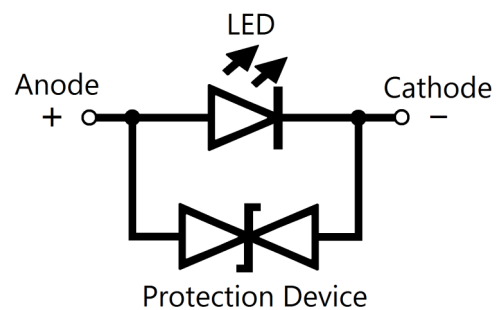


Figure 12. Equivalent circuit

Evaluation board information

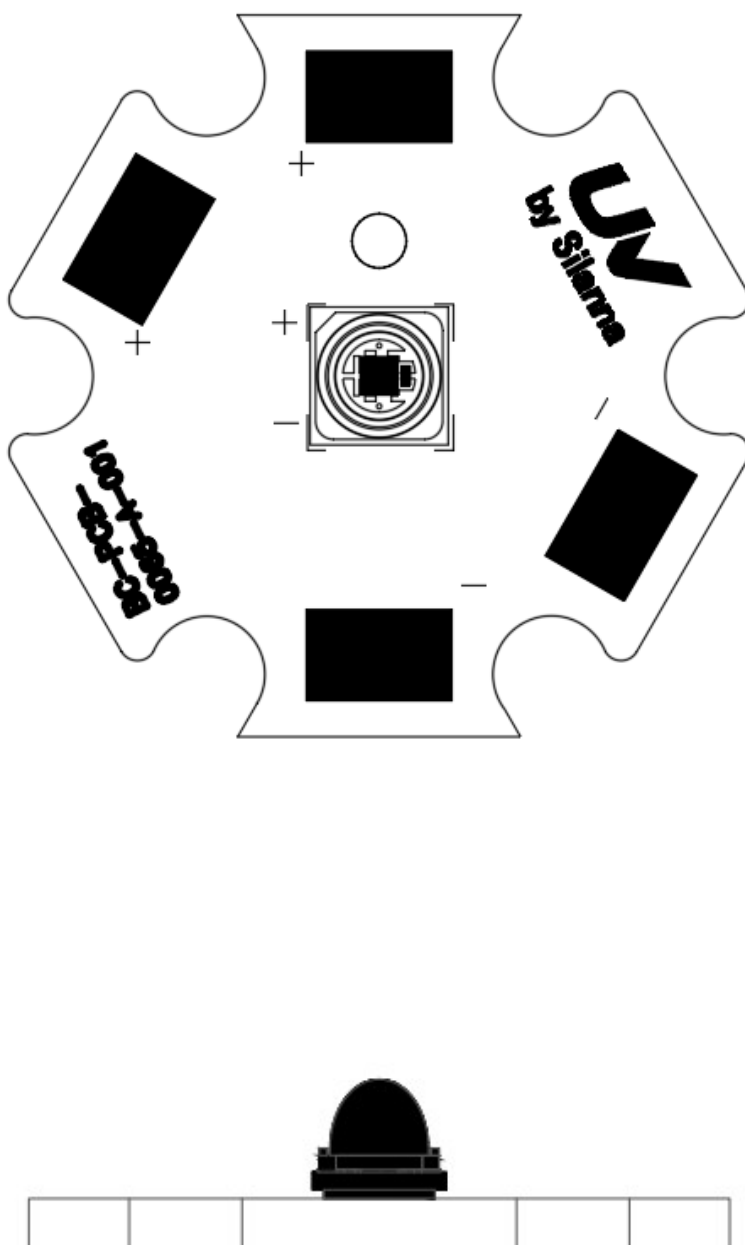


Figure 13. Evaluation board drawing

Soldering

1. The Silanna LED is compatible with JEDEC J-STD-020C, using the parameters listed in Table 4.

Table 4. Soldering conditions

Profile Feature	Lead-based assembly	Lead-free assembly
Average ramp-up rate ($T_{S_{max}}$ to T_p)	3° C/second max.	3° C/second max.
Preheat: -Temperature min. ($T_{S_{min}}$) -Temperature Max ($T_{S_{max}}$) -Time ($T_{S_{min}}$ to $T_{S_{max}}$) (t_s)	100 °C 150 °C 60-120 seconds	150 °C 200 °C 60-180 seconds
Time maintained above: -Temperature (T_L) -Time (t_L)	183 °C 60-150 seconds	217 °C 60-150 seconds
Peak temperature (T_p)	240 °C	260 °C
Time within 5°C of actual peak temperature (t_p)	10-30 seconds	20-40 seconds
Ramp-down rate	6 °C/second max.	6 °C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.

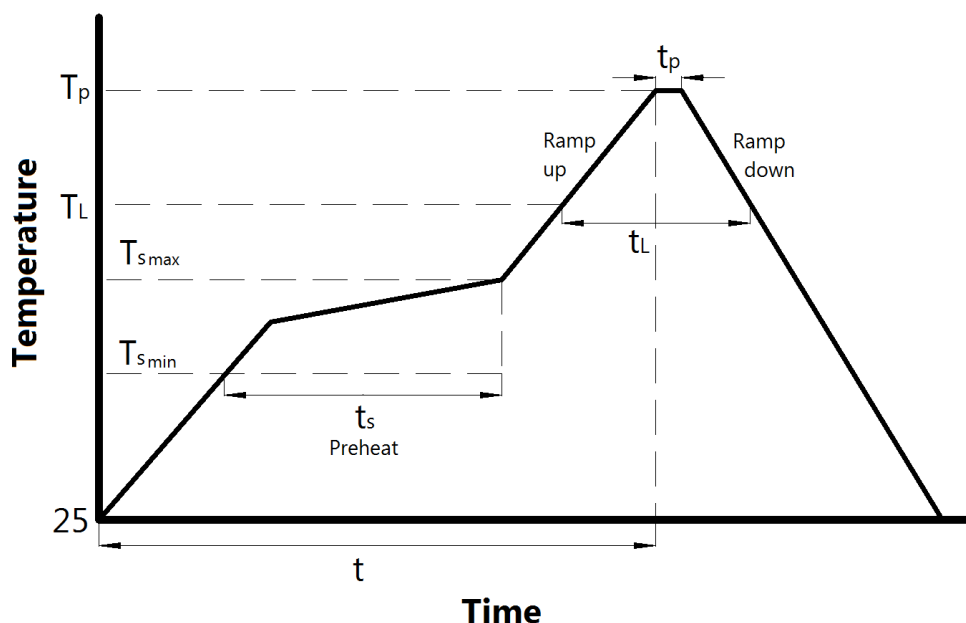


Figure 14. Reflow soldering temperature profile

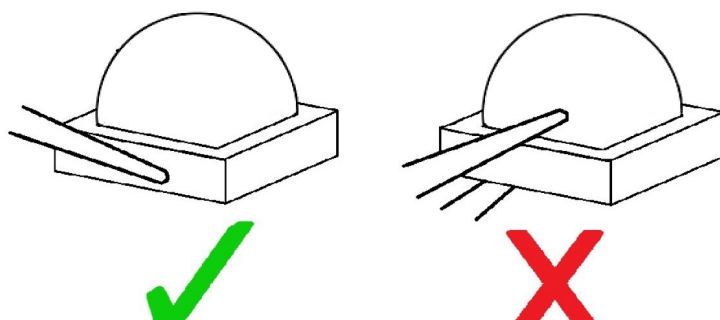
Recommended usage instructions

Storage

1. Store in a moisture free environment (< 60%RH).
2. Store between 5°C and 30°C.
3. After storing, clean with isopropyl alcohol. Do not use acetone, MKS or ultrasonic baths to clean.

Handling

1. Use ESD tweezers to hold the LED by the sides of the package.
2. Do not touch the optical surface of the LED.
3. Observe appropriate ESD precautions when handling the LED.



Circuit

1. Driving circuits must be designed to operate the LEDs in forward bias only.
2. A driver IC delivering constant current operation is recommended.
3. The recommended circuit for multiple LEDs involves driving individual load resistances. Each LED can have different forward voltages for the same current.

Safety information

The LED emits invisible UV light during operation. UV light is hazardous to eyes and skin. Long term exposure to UV light increases the risk of skin and eye cancer. Always ensure adequate control measures are in place to prevent exposure to UV light when the LED is operational.

Compliance

RoHS Compliant.