

**Harvatek Surface Mount CHIP LEDs Data Sheet**  
**T4331PD--H9B6401L2U1930**

Official Product	HT Part No.T4331PD--H9B6401L2U1930			
Tentative Product	*****	*****		
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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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## Product Specifications

Item	Specification	Material	Quantity
Spectral Bandwidth $\lambda_D$	700nm~1100nm @ $V_R = 5V$ ; $T_S = 25^\circ C$		
Peak Sensitivity $\lambda_P$	940nm @ $V_R = 5V$ ; $T_S = 25^\circ C$		
Light Current $I_L$	Typ: 3.1uA Tolerance: $\pm 10\%$ @ $V_R = 5V$ ; $E_e = 1mW/cm^2$ ; $\lambda_P = 940nm$		
Resin	Black	Epoxy	
Carrier tape	EIA 481-1A specs	Conductive black tape	
Reel	EIA 481-1A specs	Conductive black	
Label	HT standard	Paper	
Packing bag	250x230mm	Aluminum laminated bag/ no-zipper	One reel per bag
Carton	HT standard	Paper	Non-specified

Others:

Each immediate box consists of 5 reels. The 5 reels may not necessarily have the same lot number or the same bin combinations of  $I_V$ ,  $\lambda_D$  and  $V_f$ . Each reel has a label identifying its specification; the immediate box consists of a product label as well.

Note :This is shipped test conditions

※Remarks: This product should be operated in forward bias. If a reverse voltage is continuously applied to the product, such operation can cause migration resulting in LED damage.

### ATTENTION: Electrostatic Discharge (ESD) protection



The symbol to the left denotes that ESD precaution is needed. ESD protection for GaP and AlGaAs based chips is necessary even though they are relatively safe in the presence of low static-electric discharge. Parts built with AlGaInP, GaN, or/and InGaN based chips are **STATIC SENSITIVE devices**. ESD precaution must be taken during design and assembly.

If manual work or processing is needed, please ensure the device is adequately protected from ESD during the process.

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## Label Specifications



### ■Harvatek P/N:

**T      433      1      PD--      H9B-      6401      L2**

Product	Package	Dice Q'ty	Color	Voltage	Series Number	Taping
L/F	4.2(L)x3.3(W)x4.1(H) mm	1:Single	IR:940nm	5V	X001~XZZZ	1.Taping style 2. Q'ty

### ■ Lot No.:

1	2	3	4	5	6	7	8	9	10
<b>E</b>	<b>1</b>	<b>A</b>	<b>1</b>	<b>A</b>	<b>2</b>	<b>2</b>	<b>L</b>	<b>1</b>	<b>2</b>
Code 1 2		Code 3	Code 4	Code 5	Code 6	Code 7	Code 8	Code 9	Code 10
		Mfg. Year	Mfg. Month	Mfg. Date	Consecutive number		Special code		
Internal Tracing Code		2020-L		1:A	01~ZZ		000~ZZZ		
		2021-M		2:B					
		2022-P	1:Jan.	3:C					
		2023-Q	2:Feb.	...					
		...	...	26:Z					
		2026-T	A:Oct.	27:7					
		2027-V	B:Nov.	28:8					
		...	C:Dec.	29:9					
		2030-Y		30:3					
		2031-Z		31:4					
		...							

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## Absolute Maximum Rating at 25°C

Symbol	Parameters	Ratings	Units	Notes
$V_{BR}$	Reverse Breakdown Voltage	32	V	1
$T_{opr}$	Operating Temperature	-40 ~ +85	°C	
$T_{stg}$	Storage Temperature	-40 ~ +100	°C	
$T_{sol}$	Soldering Temperature	260	°C	2
$P_{to}$	Total Power Dissipation	150	mW	

## Notes:

- Test conditions :  $I_R=100\mu A$ ,  $E_e=0mW/cm^2$ .
- Soldering time  $\leq 5$  seconds.

## Electro-Optical Characteristics

Symbol	Parameters	Test conditions	Min	Typ	Max	Units	Notes
$\lambda_D$	Rang Of Spectral Bandwidth	---	700	-	1100	nm	
$\lambda_P$	Wavelength Of Peak Sensitivity	---	-	940	-	nm	
$V_{BR}$	Reverse Breakdown Voltage	$E_e=0mW/cm^2$ $I_R=100uA$	32	-	-	V	
$V_{OC}$	Open-Circuit Voltage	$E_e=1mW/cm^2$	-	0.44	-	V	
$I_{SC}$	Short-Circuit Current	$\lambda_P=940nm$	-	2.9	-	uA	
$I_D$	Dark Current	$E_e=0mW/cm^2$ $V_R=20V$	-	-	100	nA	
$I_L$	Reverse Light Current	$E_e=1mW/cm^2$ $\lambda_P=940nm$ , $V_R=5V$	-	3.1	-	uA	3
$t_r$	Rise Time	$V_R = 5V$ ,	-	10	-	ns	4
$t_f$	Fall Time	$R_L=1k\Omega$	-	10	-		
$C_T$	Transition Capacitance	$E_e=0mW/cm^2$ $f=1MHz$ , $V_R=5V$	-	4.2	-	pF	

## Notes:

- $I_L$  Bin Rank : :

Bin Code	K-4	L-5
Min	2.5	3.0
Max	3.0	3.5

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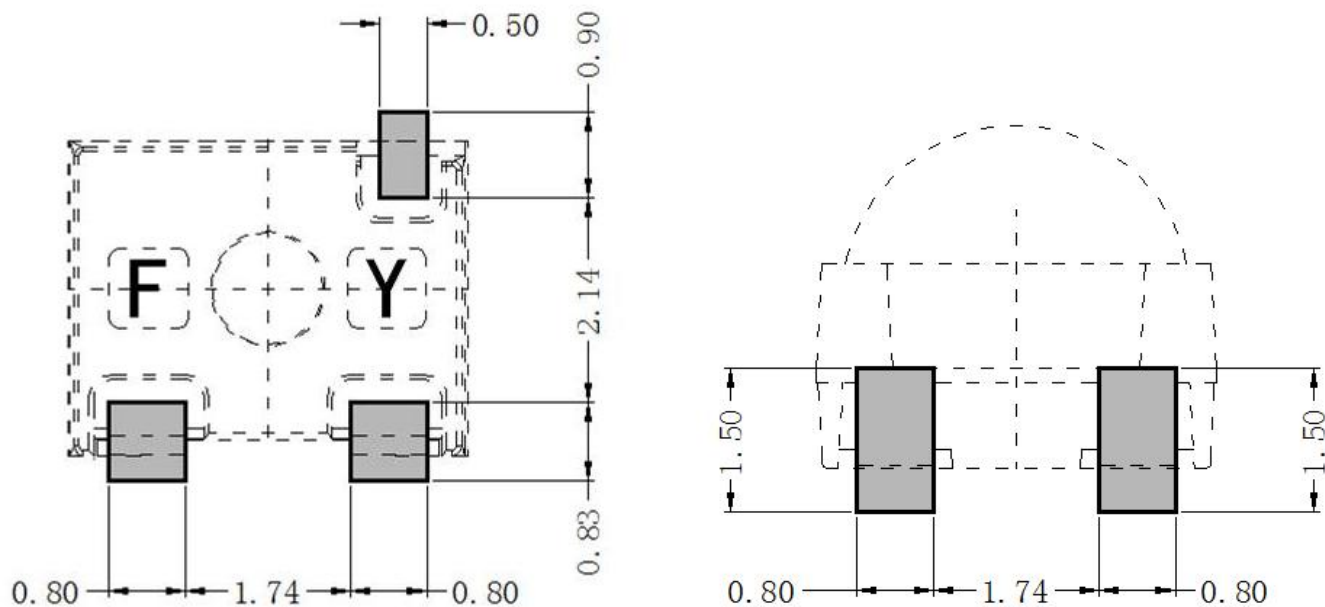
## Package Outline Dimension and Recommended Soldering Pattern for Reflow Soldering

(Unit:mm Tolerance: +/-0.1)

Outline Dim.	Soldering Pattern
<p>① Anode ② Cathode</p>	<p>open</p>

Soldering terminals may shift in the Wd direction.

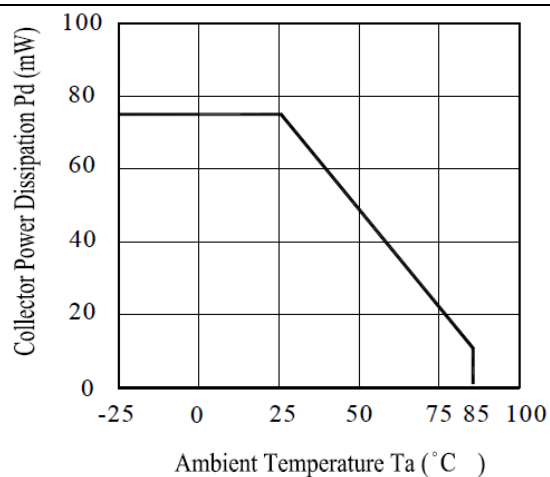
## Solder recommendations



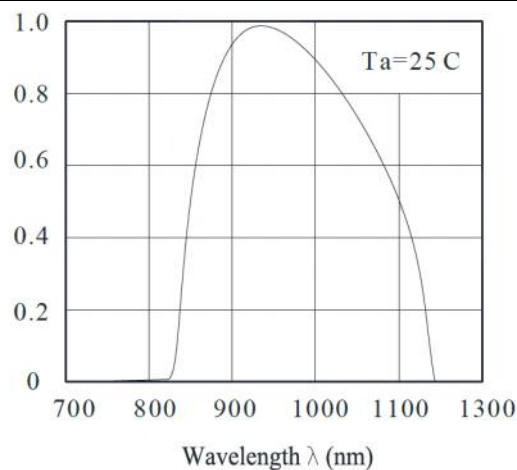
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## Characteristics of T4331PD

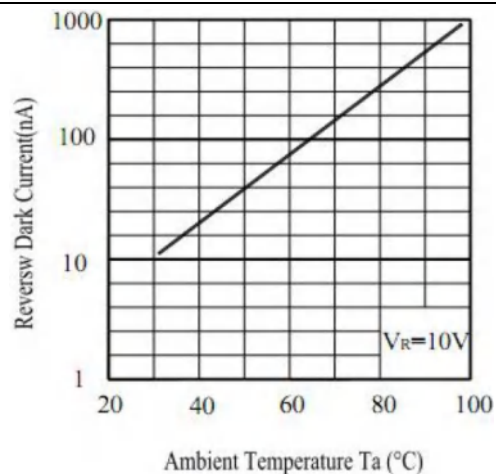
Power Dissipation V.S Ambient Temperature



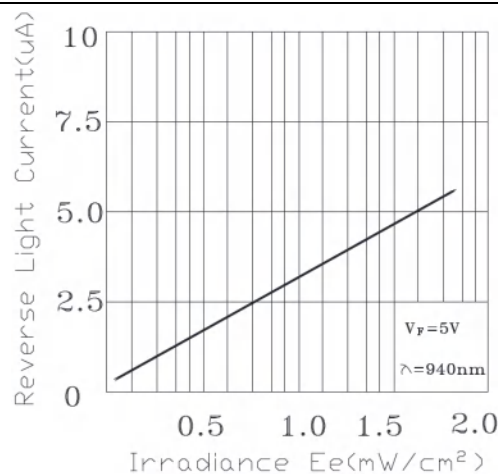
Spectral Sensitivity



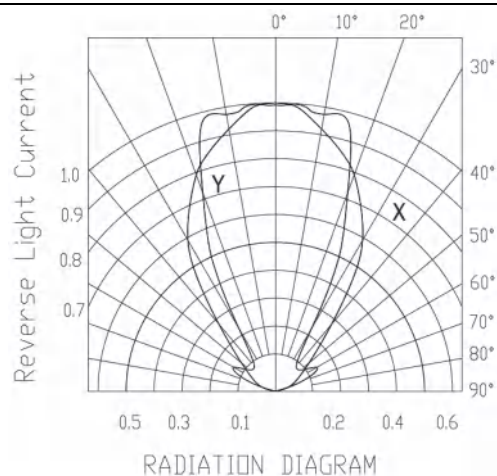
Relative Dark Current v.s Ambient Temperature



Relative Light Current v.s Irradiance



Relative Light Current v.s Angular Displacement



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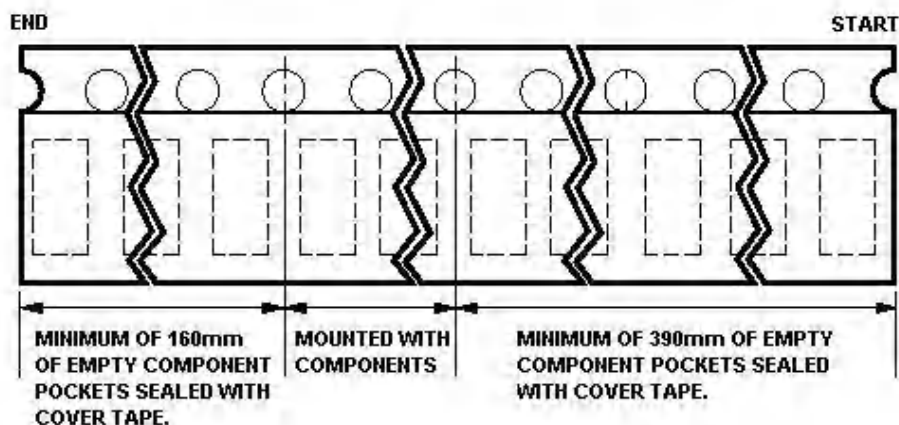
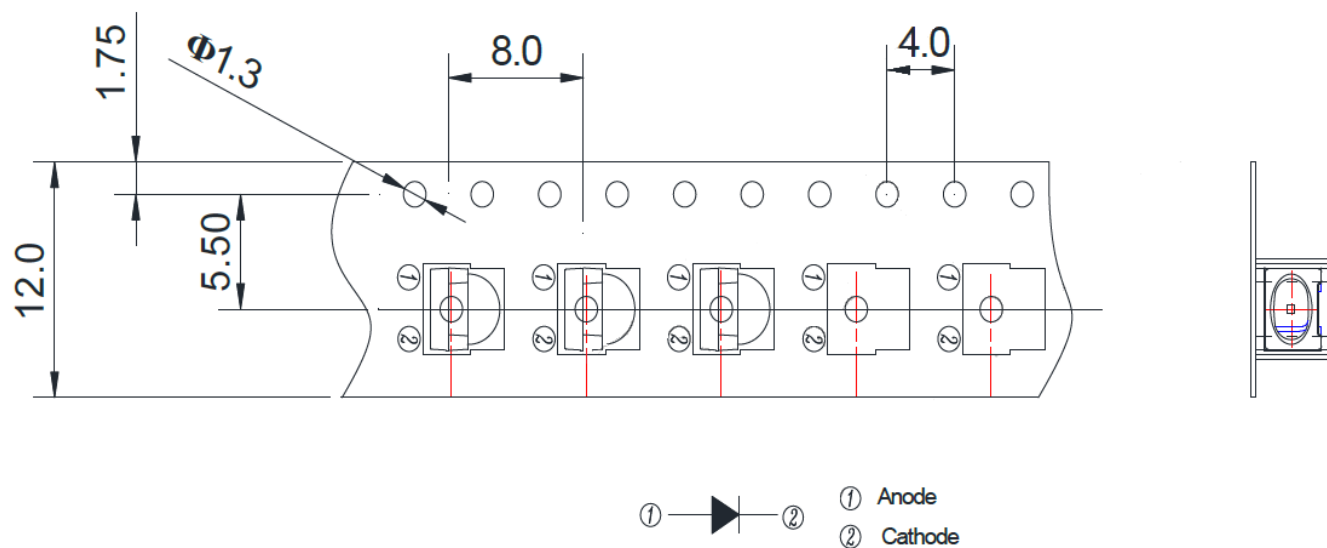
**Precaution for Use**

1. The chips should not be used directly in any type of fluid such as water, oil, organic solvent, etc.
2. When the devices are working, the maximum ambient temperature should be first considered before operation.
3. Devices must be stored in a clean environment. A sealed container with a nitrogen atmosphere is necessary if the storage period is over 3 months after shipping.
4. The devices must be used within 4 weeks after unpacked. Unused products must be repacked in an anti-electrostatic package, folded to close any opening and then stored in a dry and cool space.
5. The appearance and specifications of the products may be modified for improvement without further notice.
6. The devices are sensitive to the static electricity and surge. It is strongly recommended to use a grounded wrist band and anti-electrostatic glove when handling the devices. If a voltage over the absolute maximum rating is applied to devices, it will damage devices. Damaged devices will show some abnormal characteristics such as remarkable increase of leak current, lower turn-on voltage and getting unlit at low current.

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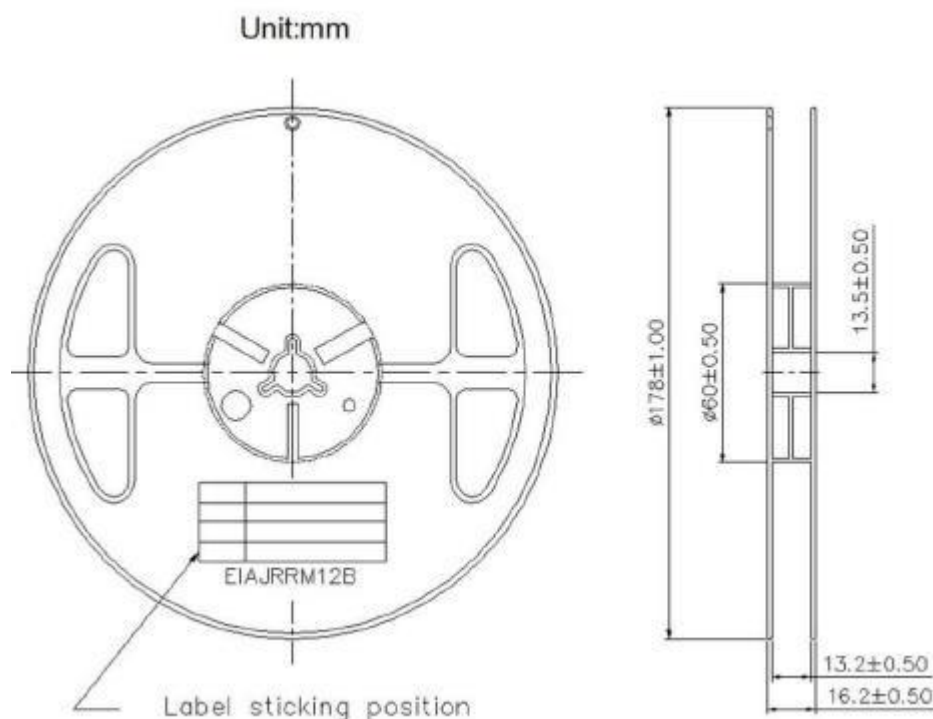
## Packaging

### Tape Dimension



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## Reel Dimension



## Packing

- 1.2000 Pcs/1 Tape, 2 Tape/1 Moisture-proof Bags
2. 10Moisture-proof Bags / 1 Outside Carton

## Dry Pack

All SMD optical devices are **MOISTURE SENSITIVE**. Avoid exposure to moisture at all times during transportation or storage. Every reel is packaged in a moisture protected anti-static bag. Each bag is properly sealed prior to shipment.

Upon request, a humidity indicator will be included in the moisture protected anti-static bag prior to shipment.

## Baking

Baking before soldering is recommended when the package has been unsealed for 24 hours.

The conditions are as followings:

1.  $60 \pm 3^{\circ}\text{C} \times (12 \sim 24\text{hrs})$  and  $< 5\% \text{RH}$ , taped reel type.
2.  $100 \pm 3^{\circ}\text{C} \times (45\text{min} \sim 1\text{hr})$ , bulk type.
3.  $130 \pm 3^{\circ}\text{C} \times (15\text{min} \sim 30\text{min})$ , bulk type.

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## Precautions

1. Avoid exposure to moisture at all times during transportation or storage.
2. Anti-Static precaution must be taken when handling GaN, InGaN, and AlInGaP products.
3. It is suggested to connect the unit with a current limiting resistor of the proper size. Avoid applying a reverse voltage beyond the specified limit.
4. Avoid operation beyond the limits as specified by the absolute maximum ratings.
5. Avoid direct contact with the surface through which the LED emits light.
6. If possible, assemble the unit in a clean room or dust-free environment.

## Handling of Silicone Resin LEDs

### Handling Indications

During processing, mechanical stress on the surface should be minimized as much as possible.

Sharp objects of all types should not be used to pierce the sealing compound.



Figure 1

In general, LEDs should only be handled from the side. By the way ,this also applies to LEDs without a silicone sealant, since the surface can also become scratched.

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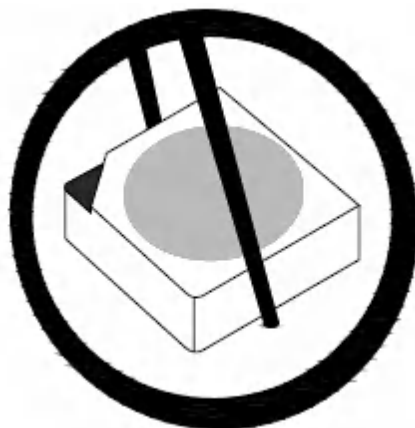


Figure 2

When populating boards in SMT production, there are basically no restrictions regarding the from of the pick and place nozzle, except that mechanical pressure on the surface of the resin must be prevented.

This is assured by choosing a pick and place nozzle which is large than LEDs reflector area.

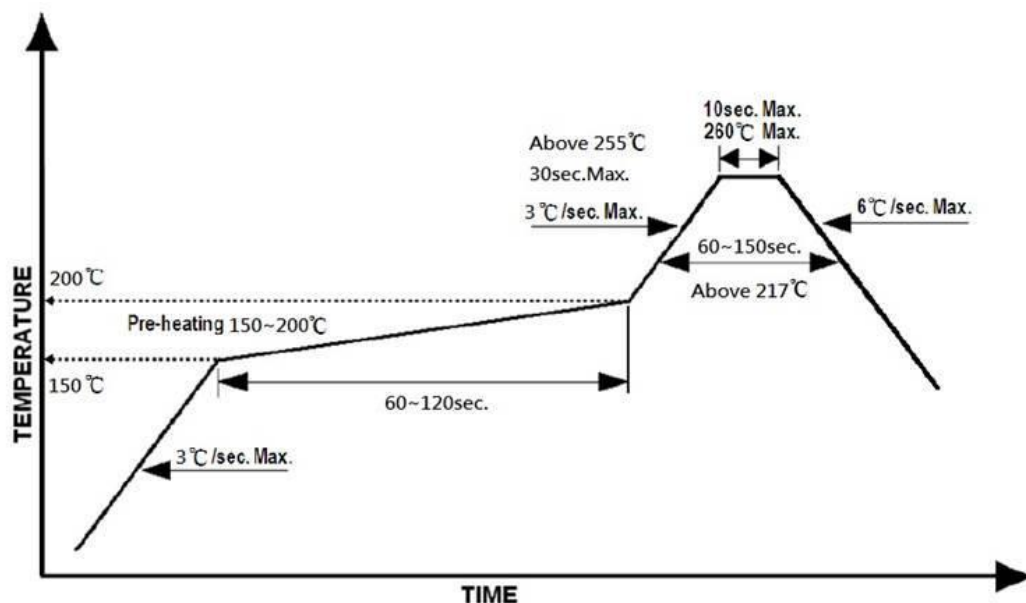
## Reflow Soldering

Recommend soldering paste specifications:

1. Operating temp.: Above 217 °C ,60~150 sec.
2. Peak temp.:260 °CMax.,10sec Max.
3. Reflow soldering should not be done more than two times.
4. Never attempt next process until the component is cooled down to room temperature after reflow.
5. The recommended reflow soldering profile (measured on the surface of the LED terminal) is as following:

Lead-free Solder Profile

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## Reworking

- Rework should be completed within 5 seconds under 260 °C.
- The iron tip must not come in contact with the copper foil.
- Twin-head type is preferred.

## Cleaning

Following are cleaning procedures after soldering:

- An alcohol-based solvent such as isopropyl alcohol (IPA) is recommended.
- Temperature x Time should be 50°C x 30sec. or <30°C x 3min
- Ultrasonic cleaning: < 15W/ bath; bath volume ≤ 1liter
- Curing: 100 °C max, <3min

## Cautions of Pick and Place

- Avoid stress on the resin at elevated temperature.
- Avoid rubbing or scraping the resin by any object.
- Electric-static may cause damage to the component. Please ensure that the equipment is properly grounded. Use of an ionizer fan is recommended.

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## Revise History

Rev.	Descriptions	Date	Page
1.0		03/03/2021	-
1.1	Modify package quantity	10/22/2021	
1.2	New Lot No.& New Form of HARVATEK P/N	06/30/2023	5

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