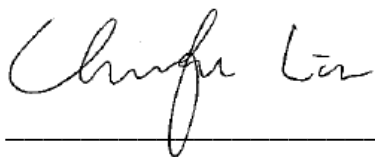
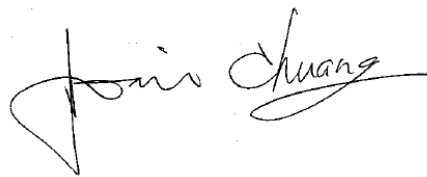


Harvatek Surface Mount CHIP LEDs Approval Sheet
Model No.: HT-311FCH5**Acknowledged by****Section Manager**
Production Engineering Dept.**Manager**
Production Engineering Dept.

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Tentative Product	*****	*****		HDS-311-K212
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Introduction

- *The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by HARVATEK for any infringements of intellectual property or other rights of the third parties which may result from its use.*
- *Harvatek is continually effort to improve the quality of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing HARVATEK products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such HARATEK products cause loss of human life, bodily injury or damage to property.*
- *The HARVATEK products listed in this document are intended for usage in general electronics (computer, personal equipment, office equipment, industrial robotics, domestic, etc...) These products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury.*
- *In developing your designs, please ensure that HARVATEK products are used within specified operating ranges as set forth in the most recent HARVATEK products specifications.*
- *Also, please keep in mind the precautions listed in this document.*


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Product Specification

	Specification	Material	Quantity
Iv	Red:18-45mcd Green:28-72mcd Blue:11.2-45mcd @5mA/ Ta= 25° C		
Lambda(λ_D)	Red: 615-635 nm Green: 515-540 nm Blue: 470-485nm @5mA/ Ta= 25° C		
Vf	Red: 1.55-2.0 V Green: 2.3-3.2 V Blue: 2.3-3.2 V @5mA/ Ta= 25° C		
Ir	< 100 μ A @ $V_R = 5$ V		
Resin	Diffused	Epoxy resin	
Carrier tape	According to EIA 481-1A specs	Conductive Black Tape	1000pcs per reel
Reel	According to EIA 481-1A specs	Conductive Black	
Label	HT standard	Paper	
Packing bag	220x240mm	Aluminum laminated bag/ no-zipper	One reel one bag
Carton	HT standard	Paper	Non-specified
	<p>ESD protection for GaP and AlGaAs chips are still necessary even though they are safety in low static-electric discharge. Material in AlInGaP, GaN, or/and InGaN chips are STATIC SENSITIVE device. ESD protection shall be considered and taken in the initial design stage. If manual work/process is needed, please ensure the device is well protective from ESD within all the process.</p>		

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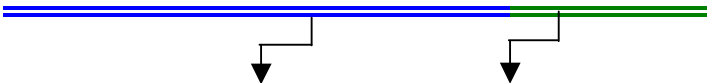
Label Spec.:

HARVATEK		Date: yyyy/mm/dd
CUSTOMER P/N: 		
HARVATEK P/N: 	QTY: PCS 	
LOT NO: 		QC
IV BIN: COLOR BIN: VF:		

■ Customer P/N: To Be Defined

■ Harvatek P/N

H T - 3 1 1 F C H5



Series Name	Emitting Color
HT-311: 3.2x1.5x1.0mm	Full Color: Red, Green and Blue@5mA

■ Lot No.

1 2 3 4 5 6 7 8 9 10
P 1 2 2 3 0 A - D T

Code 1	Code 2	Code 3	Code 4, 5	Code 6, 7	Code 9	Code 10
	Mfg. Year	Mfg. Month	Mfg. Date	Lots	Resin Color	Packaging
Internal Tracing Code	1: 2001 2: 2002 3: 2003 4: 2004	1: Jan. 2: Feb. 9: Sep. A: Oct. B: Nov. C: Dec.	1~31/ (30)	01~99, A,B,C...	D: Milky White	T: Taped Reel

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■ Iv Bin: Red / Green / Blue

Color	Bin Code	Spec. Range
Red	M	18-28 mcd
	N	28-45 mcd
Green	N	28-45 mcd
	P	45-72 mcd
Blue	L	11.2-18 mcd
	M	18-28 mcd
	N	28-45 mcd

■ Color Bin: Red / Green / Blue

Color	Bin Code	Spec. Range
Red	-	615-635 nm
Green	G	515-525 nm
	H	525-535 nm
	E	535-540 nm
Blue	C	470-475 nm
	D	475-480 nm
	E	480-485 nm

■ Vf Bin: Red / Green / Blue

Color	Bin Code	Spec. Range
Red	-	1.55-2.00 V
Green	F4R	2.30-2.45 V
	G2R	2.45-2.60 V
	G3R	2.6-2.75 V
	G8L	2.75-2.90 V
	H2R	2.9-3.050 V
	H6L	3.05-3.20 V
Blue	F4R	2.30-2.45 V
	G2R	2.45-2.60 V
	G3R	2.6-2.75 V
	G8L	2.75-2.90 V
	H2R	2.9-3.050 V
	H6L	3.05-3.20 V

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Electro-Optical Characteristics

(I_F @ 5mA, T_a 25°C)

Code for parts	Lighting Color			V_F (V)		λ (nm)			I_V (mcd)
				typ	max	λ_D	λ_P	$\Delta\lambda$	Typical
HT-311FCH5	Die3	Ultra Bright Red	USD	1.9	2.3	622	636	17	28
	Die1	Green	NG	3.3	3.7	527	520	40	45
	Die2	Blue	NB	3.3	3.7	470	468	26	20

Package Outline Dimension and Recommended Soldering Pattern for Reflow Soldering

Tolerance: +/-0.05

Outline Dim.	Soldering Pattern
<ol style="list-style-type: none"> Soldering terminal may shift in x, y direction. Common anode. 	

Absolute Maximum Ratings

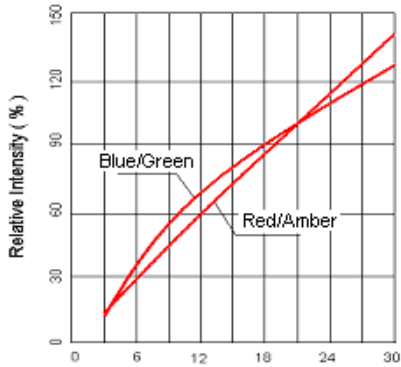
(T_a 25°C)

Series	P_d (mW)	I_F (mA)	I_{FP} (mA)	V_R (V)	I_R (uA)	T_{OP} (°C)	T_{ST} (°C)
Red	46	20	100	5	<100@ $V_R = 5$	-30~+80	-40~+85
Blue/Green	74	20	80				

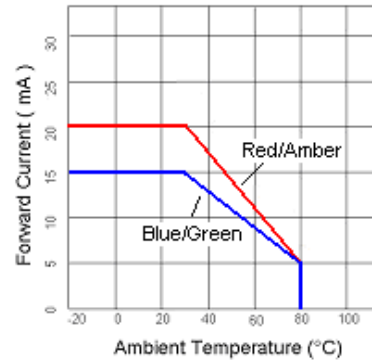
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Characteristics of HT-311 Full Color Series

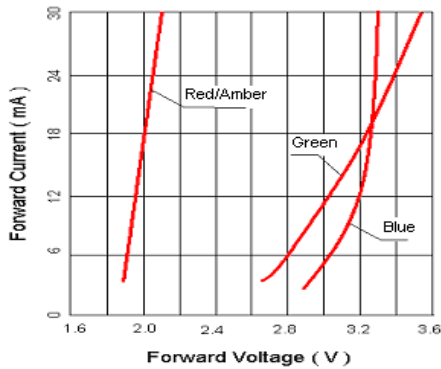
Relative Intensity vs. Forward Current



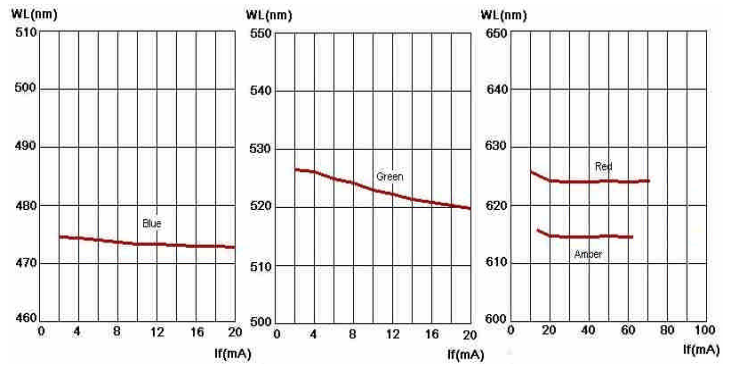
Forward Current vs. Ambient Temperature



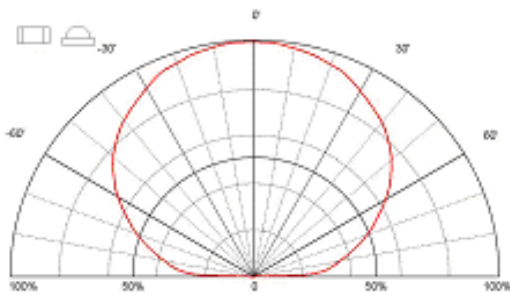
Forward Voltage vs. Forward Current



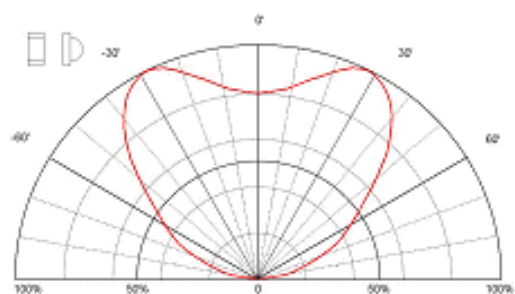
Wavelength vs. Forward Current



Directive Characteristics

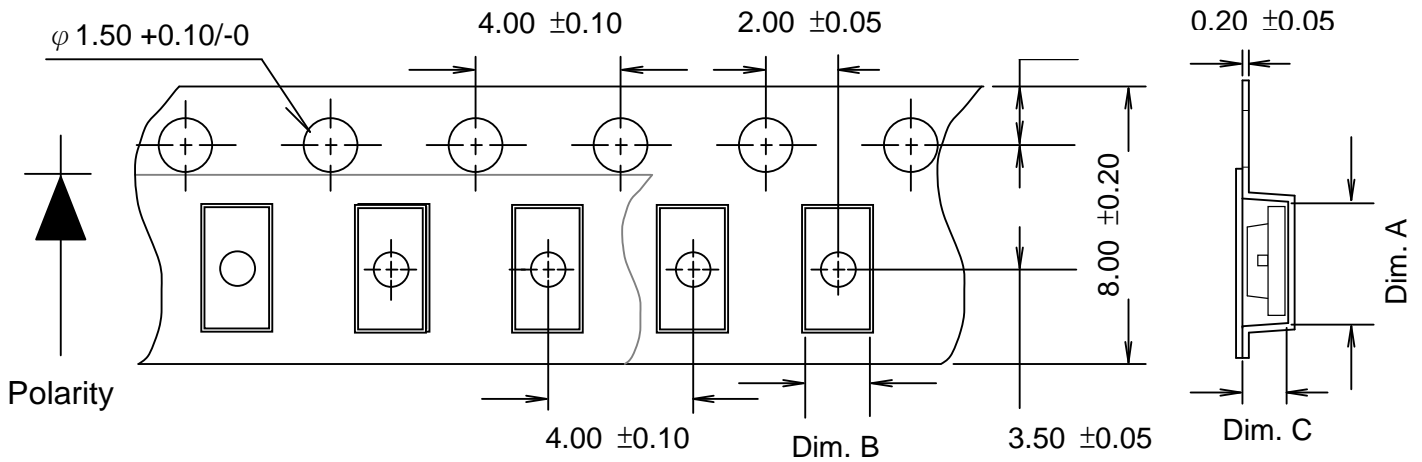


Directive Characteristics



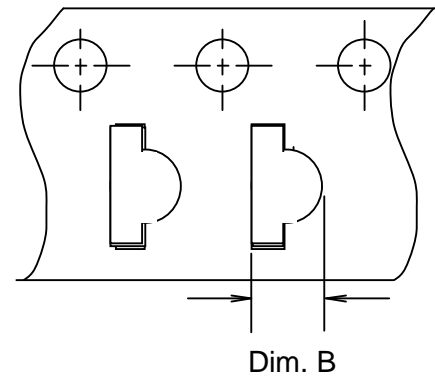
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Packaging Tape, Reel, and Packing Model Tape Dimension

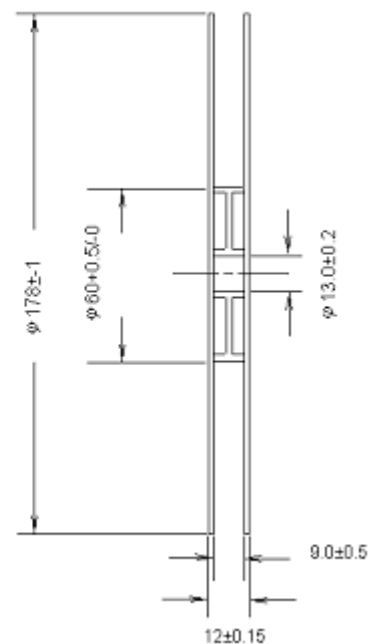
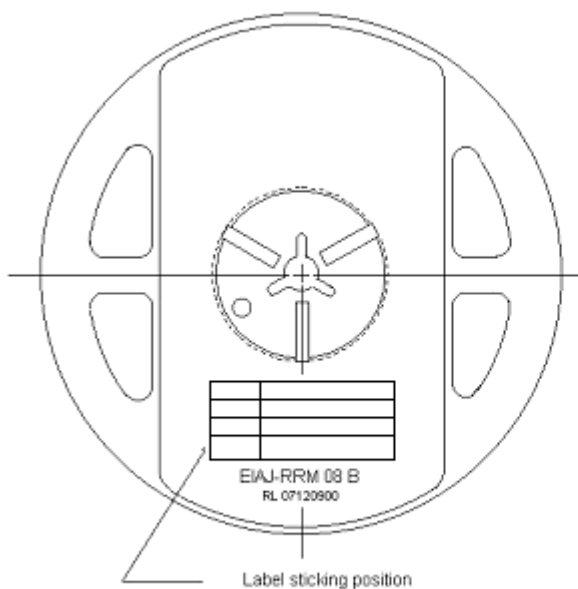


Part No.	Dim. A	Dim. B	Dim. C	Q'ty/Reel
HT-311	3.40 ± 0.10	1.70 ± 0.10	1.20 ± 0.10	1K

Unit: mm

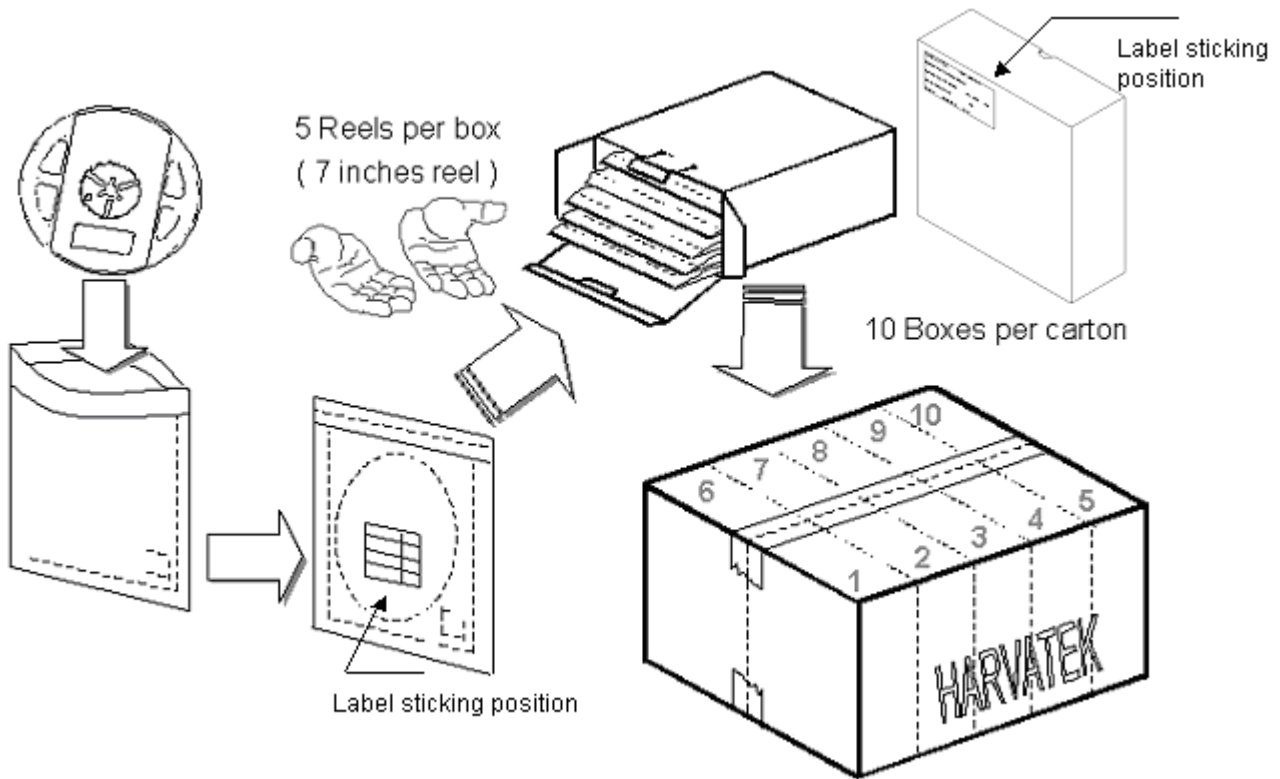


Reel Dimension



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Packing model



5 boxes per carton is available according to shipping quantity.

Precaution of Application

Designing 1: Soldering pattern

The dimensions of the recommended soldering pattern may not meet every user. Please confirm and study first before designing the soldering pattern in order to obtain the best performance of soldering.

Designing 2: Circuit layout

Due to the circuit design is not available, assuming the LED are used in parallel and one resistor that is put in series in the circuit, it may not provide an effective current-limiting function to the LEDs due to each LED has own inherent resistance, maybe the resistance each other is different. Different inherent resistance will cause different current; the LED on the different path would be driven at different power. If one LED with a higher resistance, it would be dimmer than the others.

To solve this situation, a suitable resistor is put in series with each LED to limit the current disparity through the LED will be very useful.

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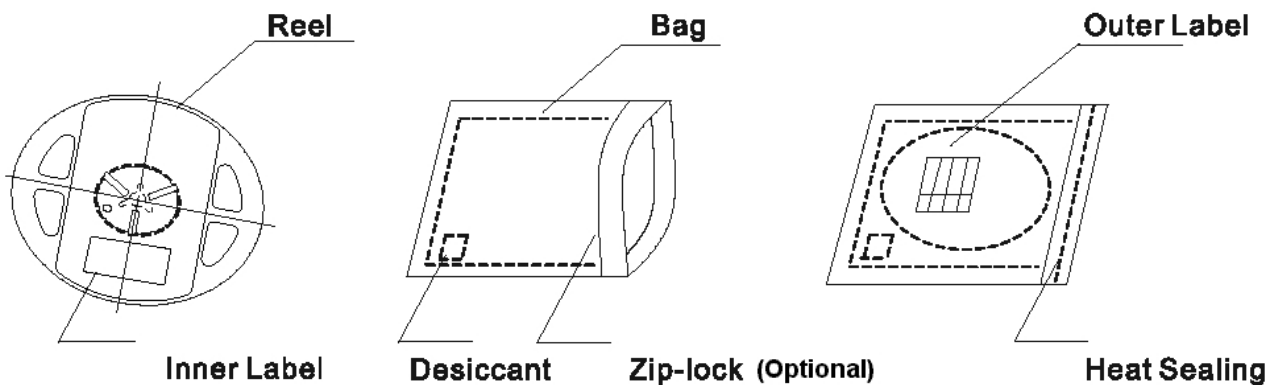
Designing 4: Max Rating

Any application should refer to the specifications of absolute maximum ratings.

Dry Pack

Any SMD optical device, like this chip LED, is **MOISTURE SENSITIVE device**. Avoid absorbing moisture at any time during transportation or storage. Every reel will be packaged in the moisture barrier anti-static bag (Specific bag material will depend upon customers' requirement or option). And the bag is well sealed before shipment.

The package is the following:



Storage

It's recommended to store the products in the following conditions:

Humidity: 60 %RH Max.

Temperature: 5 °C ~30 °C (41 °F~86 °F)

- 1 Shelf life in sealed bag: 12 month at 40°C and $90\% \text{RH}$. (Base on aluminum laminated moisture barrier bag.)
- 2 After the bag is opened, devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing must be:
 - 2.1 Mounted within 72 hours at factory conditions of $\leq 30^{\circ}\text{C} / 60\% \text{RH}$, or
 - 2.2 Stored at $\leq 20\% \text{RH}$ with zip-lock sealed.

Baking

It's recommended to bake before soldering when the pack is unsealed after 15 days. The conditions are as followings:

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

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Soldering

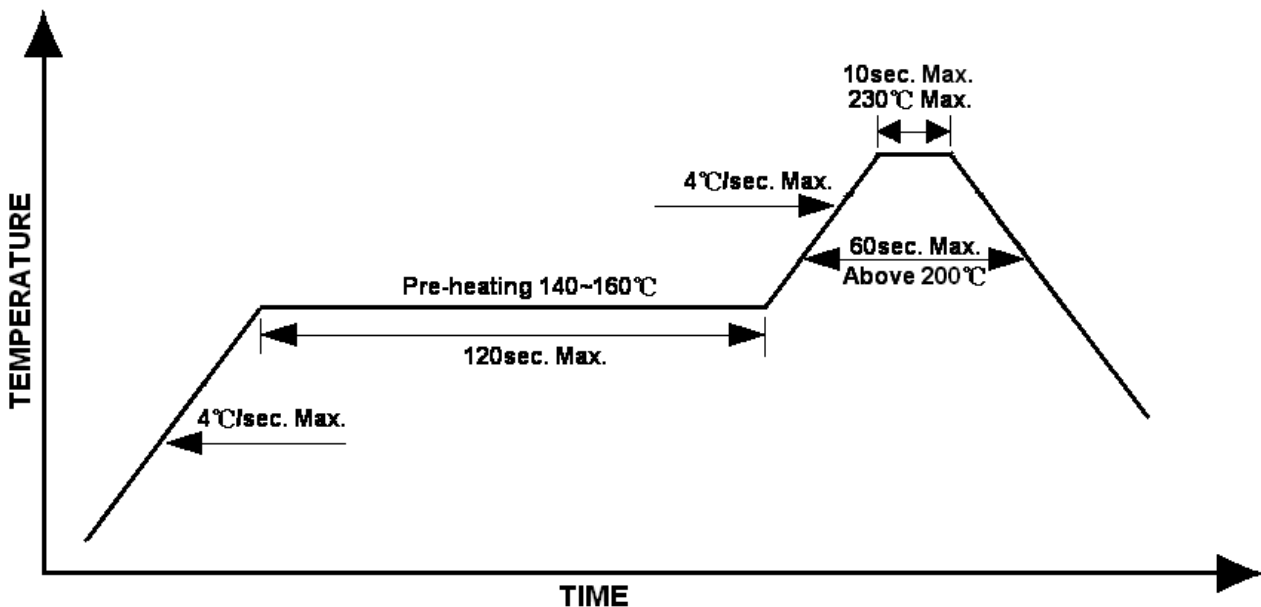
Manual soldering (We do not recommend this method strongly.)

- ◆ Soldering tin material: tin 6/4 alloy or contained Ag.
- ◆ To prevent cracking, please bake before manual soldering.
- ◆ Keep the temperature on the edge of iron at $300^{\circ}\text{C} \pm 5^{\circ}\text{C}$ max. (25W) and apply for 3 seconds. If the temperature become higher, apply in a shorter time (1 sec. per 10°C)
- ◆ In manual soldering, take care not to damage the package especially terminal or resin. (Do not give stress to the product when soldering)
- ◆ Do not use again if you remove the soldered product.
- ◆ It is recommended using an iron with a temperature control.

Reflow Soldering

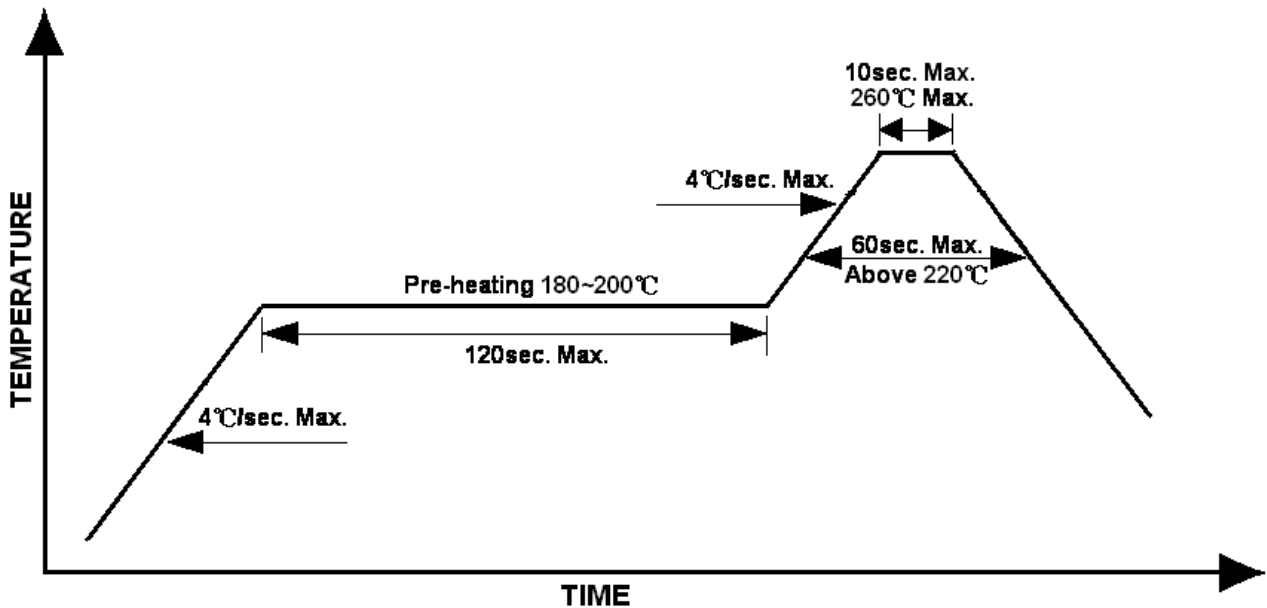
- ◆ Recommend tin glue specifications:
Melting temperature: $178 \sim 192^{\circ}\text{C}$
- ◆ Never take next process until the component is cooled down to room temperature after reflow.
- ◆ The recommended reflow soldering profile (measuring on the surface of the LED resin) is following:

Lead Solder



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Lead-free Solder



Rework

- ◆ Customer must finish rework within 5 sec. under 260 °C.
- ◆ The head of iron cannot touch copper foil.
- ◆ Twin-head type is preferred.

Cleaning

- ◆ The conditions of cleaning after soldering:
- ◆ An alcohol-based solvent such as Isopropyl Alcohol (IPA) is recommended.
- ◆ Temperature×Time: <50 °C×30sec, or <30 °C×3min
- ◆ Ultra sonic cleaning: < 15W/ bath; Bath volume: 1liter max.
- ◆ Curing: 100 °C max, <3min

Cautions of Pick and Place

- ◆ It should be avoided to load stress on the resin during high temperature.
- ◆ Avoid rubbing or scraping the resin by any object.
- ◆ Electric-static may cause damage to the component. Please confirm that the equipment is grounding well. Using an ionizer fan is recommended.

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