

**Technical Data Sheet**  
**High Power LED – 0.5W****EHP-A09/SUG31-PU5/TR****Features**

- Feature of the device: small package with high efficiency
- Typical view angle: 120°
- ESD protection.
- Soldering methods: SMT
- Grouping parameter: luminous Intensity, wavelength, forward voltage.
- Typical optical efficiency: 50 lm/W.
- Thermal resistance (junction to sink): 80 K/W
- The product itself will remain within RoHS compliant version.

**Applications**

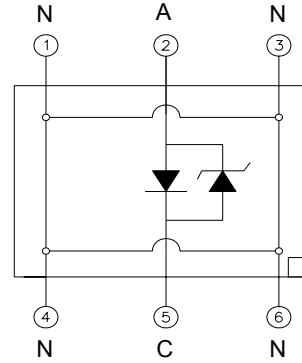
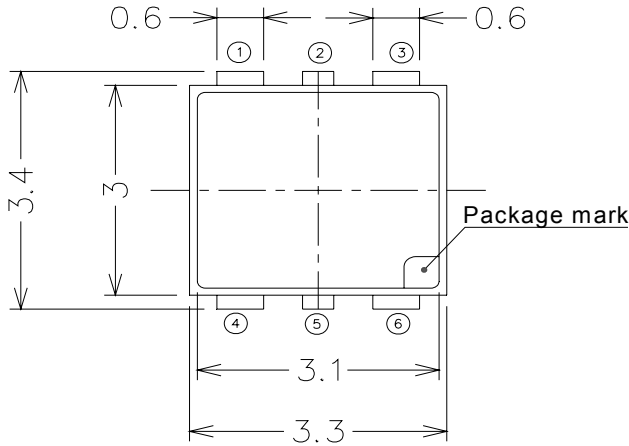
- Interior automotive lighting (e.g. dashboard backlighting)
- backlighting (illuminated advertising, general lighting)
- Signal and symbol luminaries
- Marker lights (e.g. steps, exit ways, etc.)
- Scanner

**Materials**

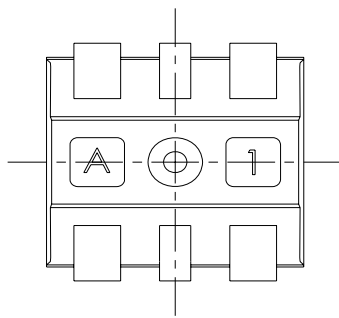
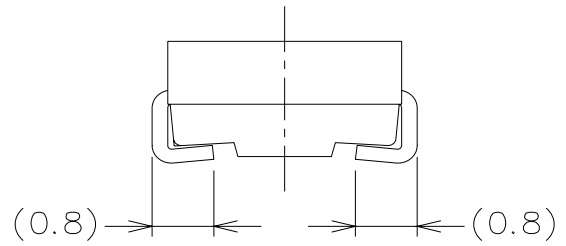
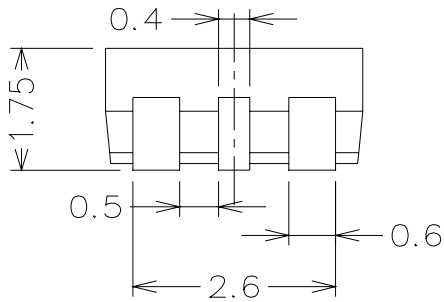
| Items               | Description            |
|---------------------|------------------------|
| Reflector           | Heat resistant polymer |
| Encapsulating Resin | Colorless clear resin  |
| Electrodes          | Ag plating             |
| Die attach          | Silver paste           |
| Chip                | InGaN                  |

EHP-A09/SUG31-PU5/TR

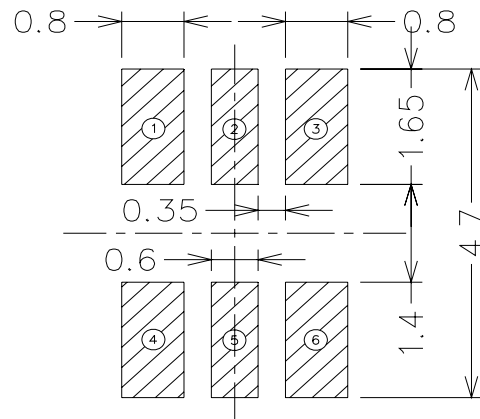
Dimensions



Polarity



Bot. view



Soldering patterns

**Notes: 1. Dimensions are in millimeters.**

**2. Tolerances unless dimensions  $\pm 0.25\text{mm}$ .**

**EHP-A09/SUG31-PU5/TR**
**Maximum Ratings ( $T_{Ambient}=25^{\circ}C$ )**

| Parameter                                | Symbol    | Rating     | Unit        |
|--|-----------|------------|-------------|
| DC Operating Current                     | $I_F$     | 150        | mA          |
| Pulsed Forward Current                   | $I_F$     | 300        | mA          |
| ESD Sensitivity                          | ESD       | 2000       | V           |
| Junction Temperature                     | $T_j$     | 125        | $^{\circ}C$ |
| Operating Temperature                    | $T_{opr}$ | -40 ~ +100 | $^{\circ}C$ |
| Storage Temperature                      | $T_{stg}$ | -40 ~ +100 | $^{\circ}C$ |
| Power Dissipation                        | $P_d$     | 1          | W           |
| Junction To Heat-Sink Thermal Resistance | $R_{th}$  | 80         | K/W         |

**Electro-Optical Characteristics ( $T_{Ambient}=25^{\circ}C$ )**

| Parameter                         | Bin  | Symbol          | Min  | Typ. | Max   | Unit | Condition   |
|-----------------------------------|------|-----------------|------|------|-------|------|-------------|
| Luminous Intensity <sub>(1)</sub> | C2   | $I_v$           | 3550 | ---- | 4500  | mcd  | $I_F=150mA$ |
|                                   | D1   |                 | 4500 | ---- | 5600  |      |             |
|                                   | D2   |                 | 5600 | ---- | 7100  |      |             |
|                                   | E1   |                 | 7100 | ---- | 9000  |      |             |
|                                   | E2   |                 | 9000 | ---- | 11200 |      |             |
| Wavelength <sub>(2)</sub>         | G1   | $\lambda_d$     | 520  | ---- | 525   | nm   |             |
|                                   | G2   |                 | 525  | ---- | 530   |      |             |
|                                   | G3   |                 | 530  | ---- | 535   |      |             |
| Forward Voltage <sub>(3)</sub>    | V2   | $V_F$           | 3.25 | ---- | 3.55  | V    |             |
|                                   | V3   |                 | 3.55 | ---- | 3.85  |      |             |
|                                   | V4   |                 | 3.85 | ---- | 4.15  |      |             |
| Viewing Angle <sub>(4)</sub>      | ---- | $2\theta_{1/2}$ | ---- | 120  | ----  | deg  |             |

Note. 1. Luminous Intensity measurement tolerance:  $\pm 10\%$

2. Wavelength measurement tolerance :  $\pm 1nm$

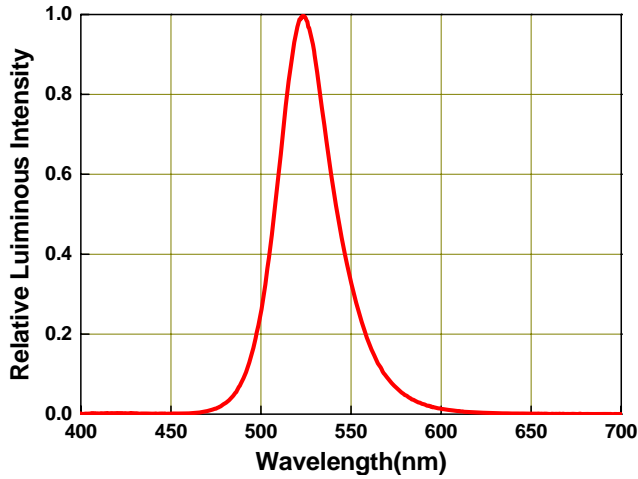
3. Forward Voltage measurement tolerance:  $\pm 0.1V$

4.  $2\theta_{1/2}$  is the off axis angle from lamp centerline where the luminous intensity is 1/2 of the peak value.

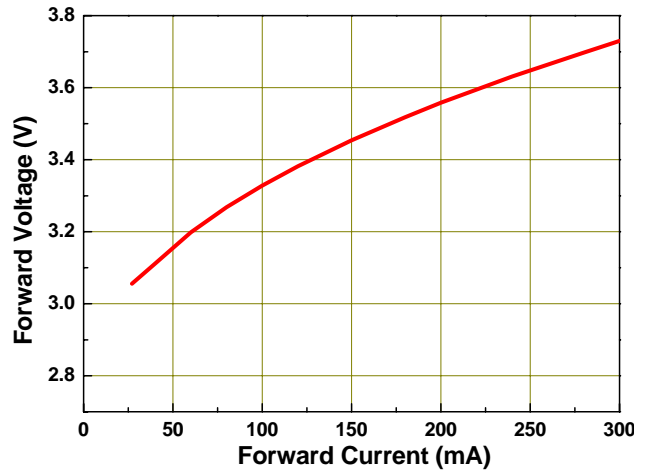
**EHP-A09/SUG31-PU5/TR**

Typical Electro-Optical Characteristics Curves

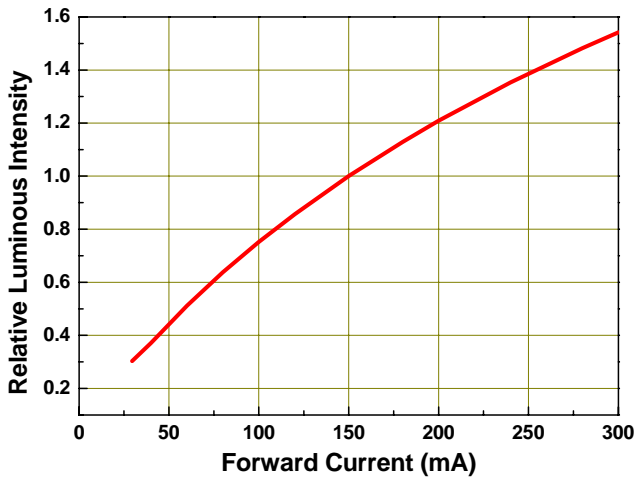
Relative Spectral Distribution,  
 $I_f=150\text{mA}$ ,  $T_{\text{Ambient}}=25^\circ\text{C}$



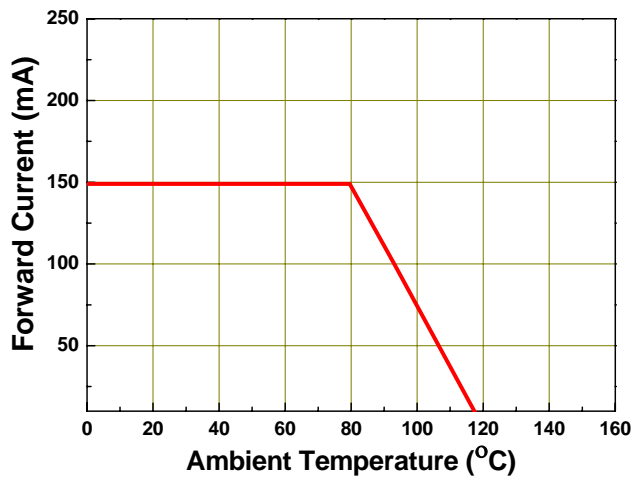
Forward Voltage vs Forward Current,  
 $T_{\text{Ambient}}=25^\circ\text{C}$

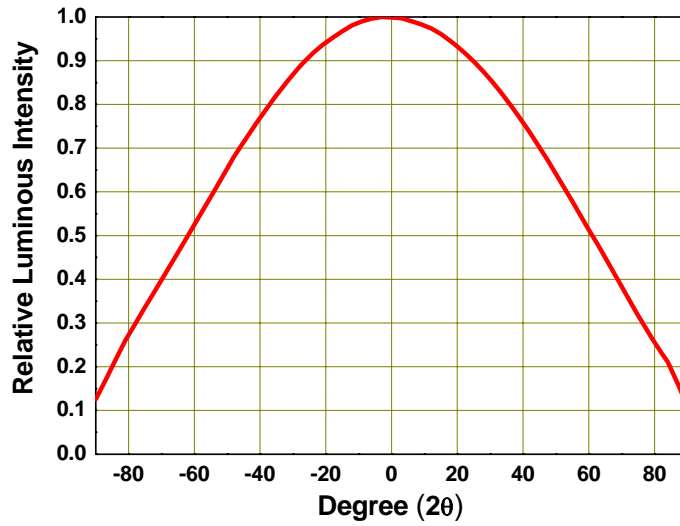


Relative Luminous Intensity vs Forward Current,  
 $T_{\text{Ambient}}=25^\circ\text{C}$



Ambient Temperature & Operating Current Derating based on  $T_{\text{JMAX}} = 125^\circ\text{C}$



**Typical Representative Spatial Radiation Pattern**

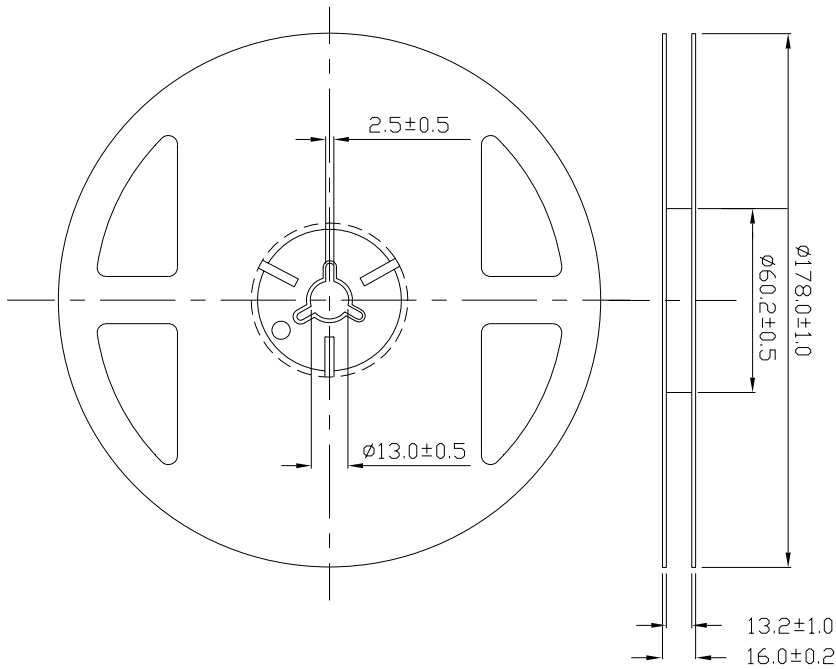
**EHP-A09/SUG31-PU5/TR**

**Label explanation**

- CPN: Customer's Production Number**
- P/N : Production Number**
- QTY: Packing Quantity**
- CAT: Ranks**
- HUE: Domain Wavelength**
- REF: Reference**
- LOT No: Lot Number**
- MADE IN TAIWAN: Production Place**



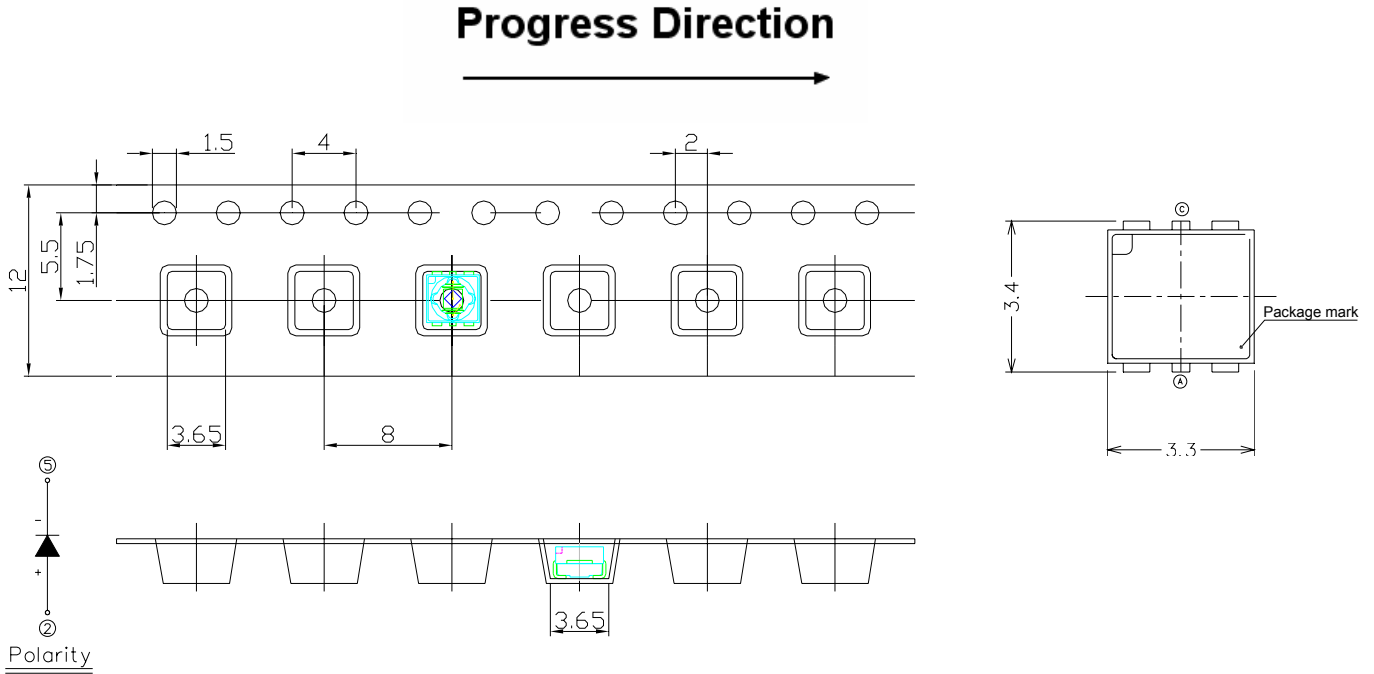
**Reel Dimensions**



- Note: 1. Dimensions are in millimeters.**
- 2. The tolerances unless mentioned is ±0.1mm.**

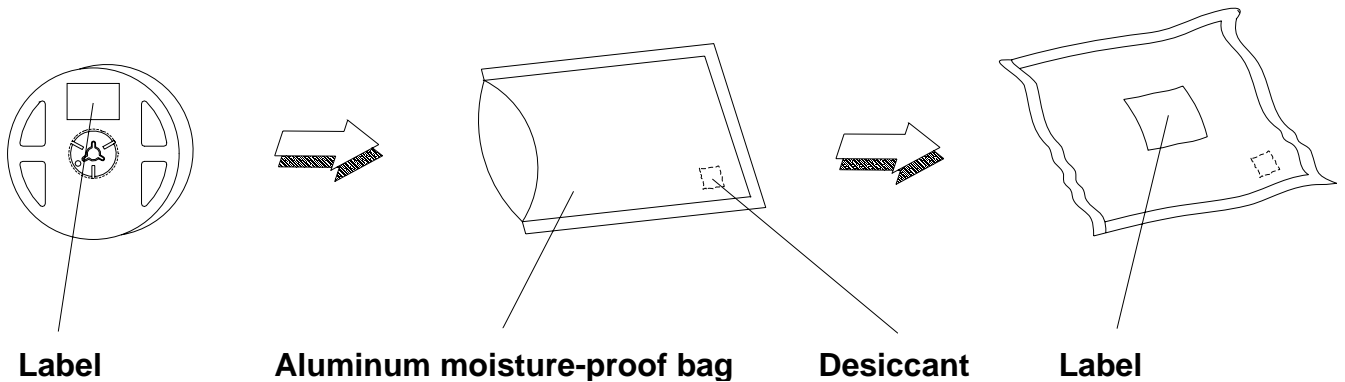
**EHP-A09/SUG31-PU5/TR**

Carrier Tape Dimensions: Loaded quantity 1000 PCS per reel



- Note:**
1. Dimensions are in millimeters.
  2. The tolerances unless mentioned is  $\pm 0.1\text{mm}$ .

**Moisture Resistant Packaging**



**EHP-A09/SUG31-PU5/TR**
**Reliability Test Items**

| Stress Test                                  | Stress Condition  | Stress Duration |
|--|---|-----------------|
| Reflow                                       | $T_{sol}=260^{\circ}\text{C}$ , 10sec, 6min(total)                                | 2 times         |
| DC Operating Life                            | $T_a=25^{\circ}\text{C}$ , $I_F=150\text{mA}$                                     | 1000 hours      |
| High Temperature Storage                     | $T_a=100^{\circ}\text{C}$   | 1000 hours      |
| High Temperature Operation Life #1           | $T_a=55^{\circ}\text{C}$ , $I_F=150\text{mA}$                                     | 1000 hours      |
| High Temperature Operation Life #2           | $T_a=85^{\circ}\text{C}$ , $I_F=120\text{mA}$                                     | 1000hours       |
| Low Temperature Storage                      | $T_a=-40^{\circ}\text{C}$   | 1000 hours      |
| High Temperature/<br>Humidity Reverse Bias   | $T_a=85^{\circ}\text{C}$ , RH=85%   | 1000hours       |
| High Temperature/<br>Humidity Operation Life | $T_a=85^{\circ}\text{C}$ , RH=60%, $I_F=120\text{mA}$                             | 1000 hours      |
| Temperature Cycle                            | H : $+100^{\circ}\text{C}$ 15min.<br>↓ 5min.<br>'L : $-40^{\circ}\text{C}$ 15min. | 300 Cycles      |
| Power Temperature Cycle                      | H : $+85^{\circ}\text{C}$ 15min.<br>↓ 5min.<br>'L : $-40^{\circ}\text{C}$ 15min.  | 1000 Cycles     |
| Thermal Shock                                | H : $+110^{\circ}\text{C}$ 5min.<br>↓ 10sec.<br>'L : $-40^{\circ}\text{C}$ 5min.  | 300 Cycles      |
| Pulse Test                                   | $T_a=25^{\circ}\text{C}$ , $I_F=1000\text{mA}$<br>30mS on/ 2500mS off             | 30000 times     |
| ESD Human Body Model                         | 2000V, Interval:0.5sec  | 3 times         |
| ESD Machine Model                            | 200V, Interval:0.5sec   | 3 times         |

\* $I_m$ : Brightness attenuate difference(1000hrs) < 50%

\* $V_f$ : Forward voltage difference < 20%

Notes: All reliability items are tested under superior thermal management with  $1.5 \times 1.5 \text{ cm}^2$  MCPCB.



**Precautions For Use****1. Over-current-proof**

Though EHP-A09 has conducted ESD protection mechanism, customers must not use the device in reverse and should apply resistors for extra protection. Otherwise, slight voltage difference may cause enormous current shift and burn out failure would happen.

**2. Storage**

- i. Do not open the moisture proof bag before the devices are ready to use.
- ii. Before the package is opened, LEDs should be stored at temperature less than 30°C and humidity less than 90%.
- iii. LEDs should be used within a year.
- iv. After the package is opened, LEDs should be stored at temperature less than 30°C and humidity less than 70%.
- v. LEDs should be used within 168 hours (7 days) after the package is opened.
- vi. If the moisture absorbent material (silicone gel) has faded away or LEDs have exceeded the storage time, baking treatment should be implemented based on the following the conditions: pre-curing at 60±5°C for 24 hours.

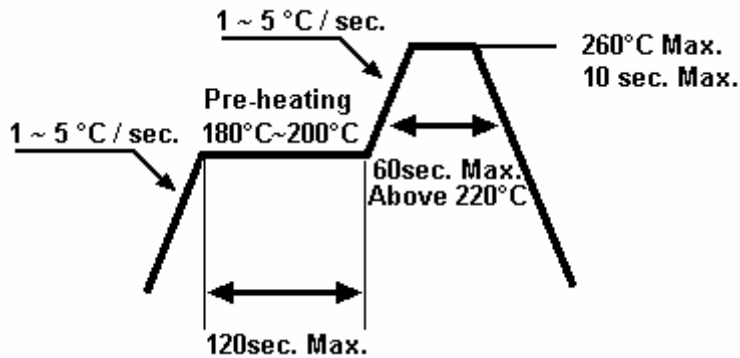
**3. Thermal Management**

- i. For maintaining the high flux output and achieving reliability, EHP-A09 series LEDs should be mounted on a metal core printed circuit board (MCPCB) or other kinds of heat sink with proper thermal connection to dissipate approximate 0.5W of thermal energy at 150mA operation.
- ii. Special thermal designs are also recommended to take in heat dissipation management, such as FR4 PCB on Aluminum with thermal vias or FPC on Aluminum with thermal conductive adhesive, etc.
- iii. Sufficient thermal management must be implemented. Otherwise, the junction temperature of dies might be over the limit at high current driving condition and LEDs' lifetime might be decreases dramatically.
- iv. For further thermal management suggestions, please consult Everlight Design Guide or local representatives for assistance.

#### 4. Soldering Condition

##### 4-1. For Reflow process

- i. EHP-A09 series are suitable for SMT process.
- ii. Lead reflow soldering temperature profile



- iii. Reflow soldering should not be done more than two times.
- iv. In soldering process, stress on the LEDs during heating should be avoided.
- v. After soldering, do not warp the circuit board.