

Specification for white LED



Tyranno L

- ✧ 0.5W maximum power capability
- ✧ High brightness LED
- ✧ Dimension : 3.5 x 3.6 x 1.9 mm
- ✧ Precondition : JEDEC Level 2a
- ✧ Lead-free reflow soldering application
- ✧ RoHS compliant

Vendor		Customer
Written	Approval	Approval

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1. Product description

(1) Description

- The Tyranno L series LED is designed for the low power operation to get the high flux output applications.
- Tyranno L, L means Low Power LED.
- It incorporates the state of the art SMD design and high reliable material.
- It is ideal for the light source for general illumination applications, custom designed solutions.

(2) Features

- Maximum drive current up to 150mA
- Low thermal resistance as low as 13°C/W
- Wide viewing angle of 140 degrees
- Precondition JEDEC Level 2a
- RoHS compliant

(3) Applications

- Indoor lighting, Outdoor lighting, Industrial lighting

2. Absolute maximum ratings

Parameters	Symbol	Value	Unit
Power dissipated	Pd	0.5	W
Rated forward current	If	150	mA
Allowable peak forward current(1)	Ip	170	mA
Maximum junction temperature capability(2)	Tj	110	°C
Electrostatic discharge threshold	ESD	≤ 5KV	V
Operating temperature	Top	-40~85	°C
Storage temperature	Tst	-40~85	°C
Soldering temperature (Reflow)	Tsor	260°C, 10s	°C, s
Soldering temperature (Hand)	Tsoh	350°C, 3s	°C, s

(1) Ip measured at 1/10 duty cycle, 0.1ms pulse width.

(2) Proper current derating must be observed to maintain junction temperature below the maximum.

3. Electro-optical characteristics (Ta=25°C)

Parameters	Symbol	Condition	Min.	Typ.	Max.	Unit
Peak wavelength	λ_p	If=150mA	445	-	455	nm
Dominant wavelength	λ_d	If=150mA	450	-	460	nm
Radiant output	Po	If=150mA	185	220	230	mW
Radiant efficacy(1) WPE(wall plug efficiency)	Wrad/Pd	If=150mA	-	49.05	-	%
Forward voltage	Vf	If=150mA	2.9	2.99	3.2	V
.Spectral line width	$\Delta\lambda_{1/2}$	If=150mA	-	18	-	nm
Viewing angle FWHM	$2\theta_{1/2}$	If=150mA	-	140	-	deg
Thermal resistance junction to solder pad	Rthj-s	If=150mA	-	13	-	°C/W

- Parameters are measured by CAS-140 of Instrument System CO.,LTD.
- Lumens maintains a tolerance of $\pm 0.1V$ on forward voltage measurements.

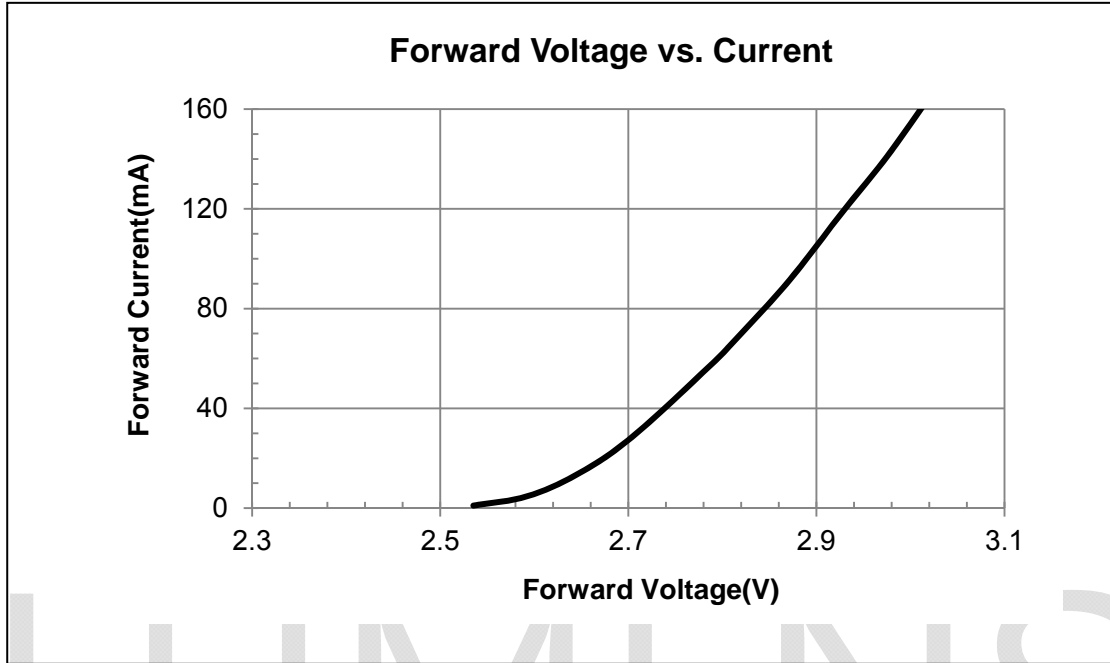
4. Ranks

Item	Symbol	Rank	Min.	Typ.	Max.	Unit	Condition
Radiant Power	Po	A	185	-	200	mW	150mA
		B	200	-	215		
		C	215	-	230		
Forward Voltage	Vf	1	2.9	-	3.0	V	
		2	3.0	-	3.1		
		3	3.1	-	3.2		
Dominant Wavelength	λ_d	W	450	-	452.5	nm	
		X	452.5	-	450		
		Y	450	-	457.5		
		Z	457.5	-	460		

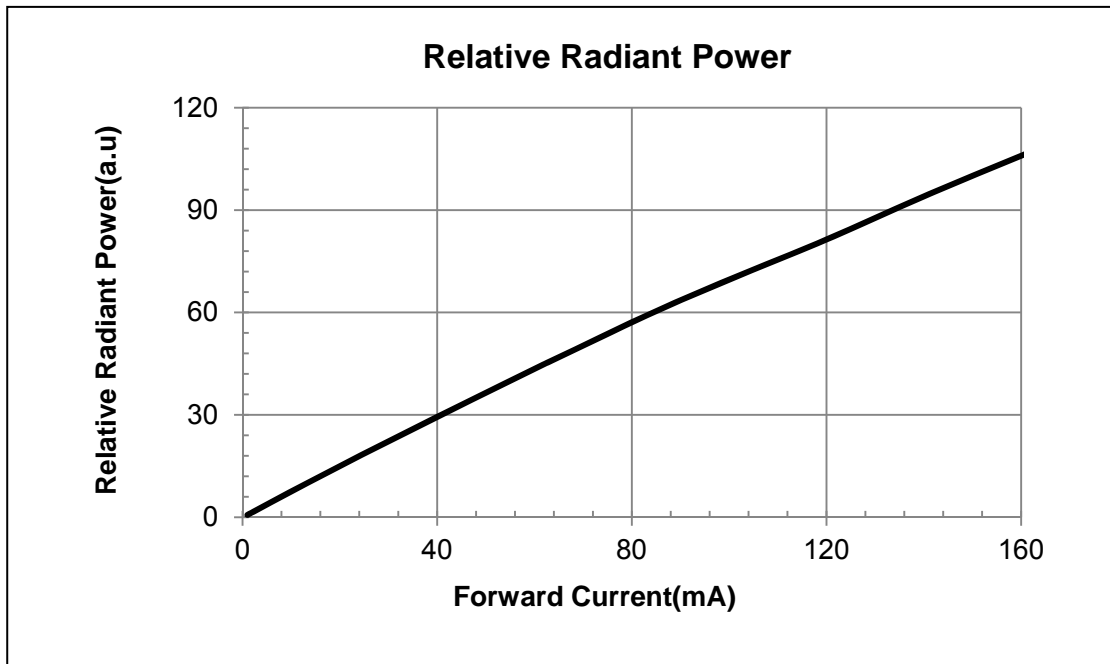
- Parameters are measured by CAS-140 of Instrument System CO.,LTD.
- Lumens maintains a tolerance of $\pm 7\%$ on Radiant Power measurements.
- Lumens maintains a tolerance of $\pm 0.1V$ on forward voltage measurements.

5. Characteristic Graphs(Ta=25°C)

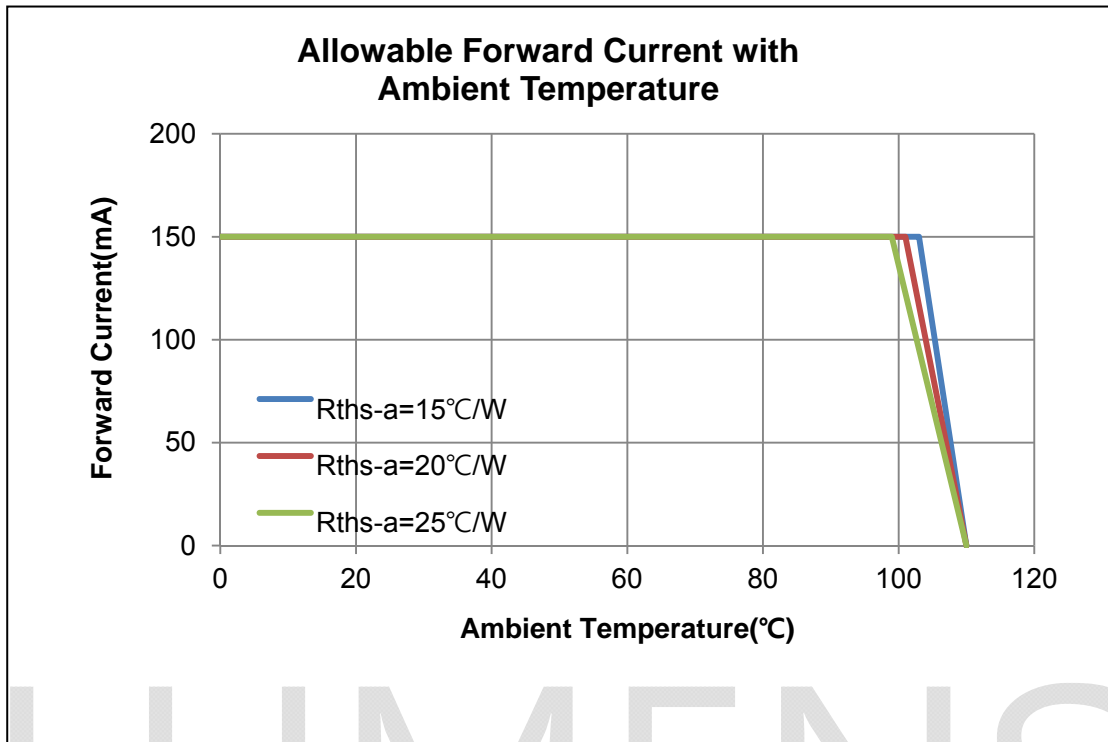
(1) Typical Forward Current vs. Forward Voltage



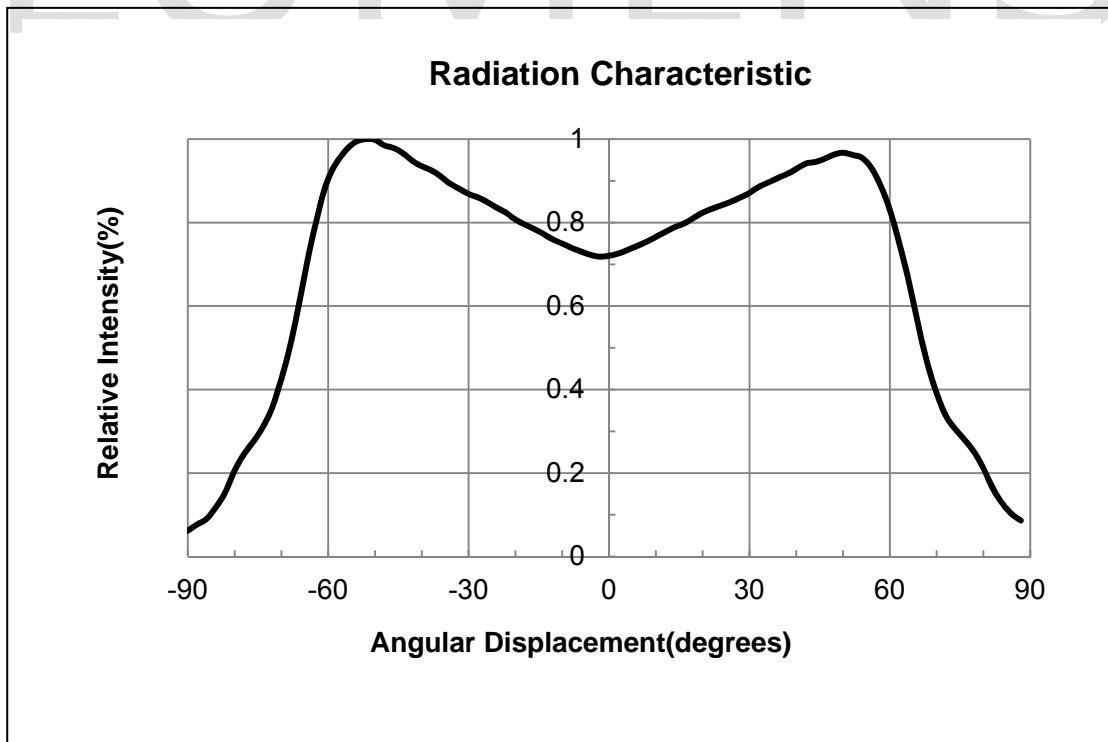
(2) Typical Relative Radiant Power vs. Forward Current



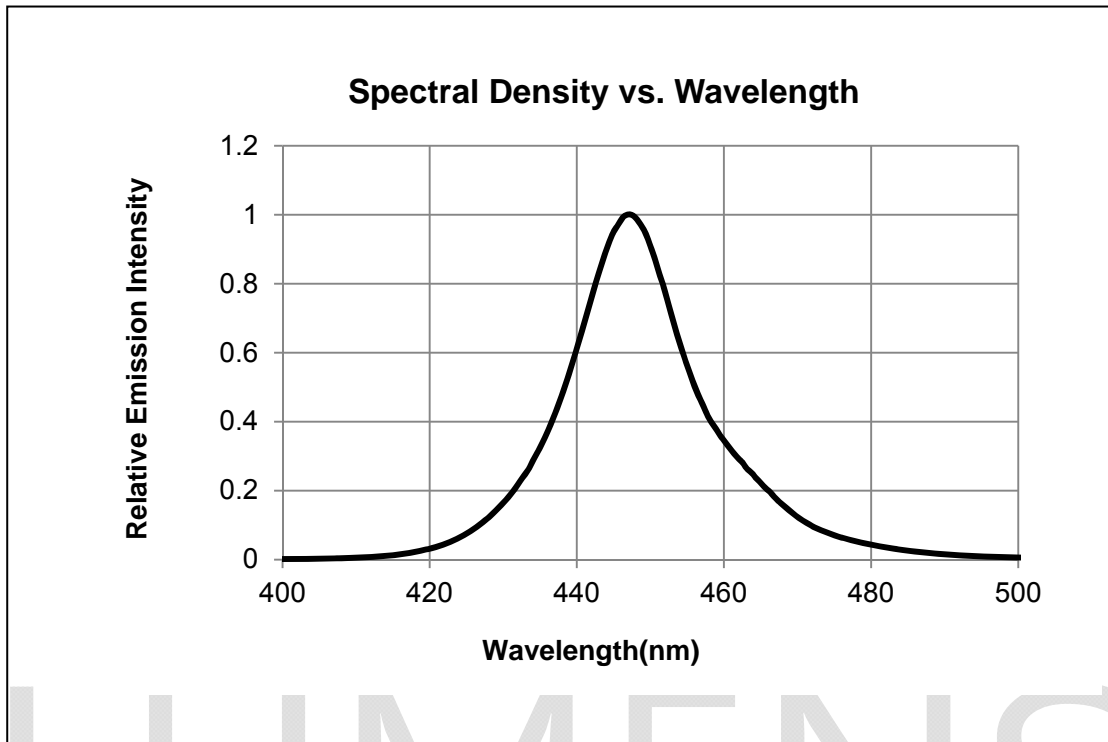
(3) Typical Allowable Forward Current with Ambient Temperature



(4) Typical Spatial Radiation Characteristic



(5) Spectrum



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6. Outline Dimensions

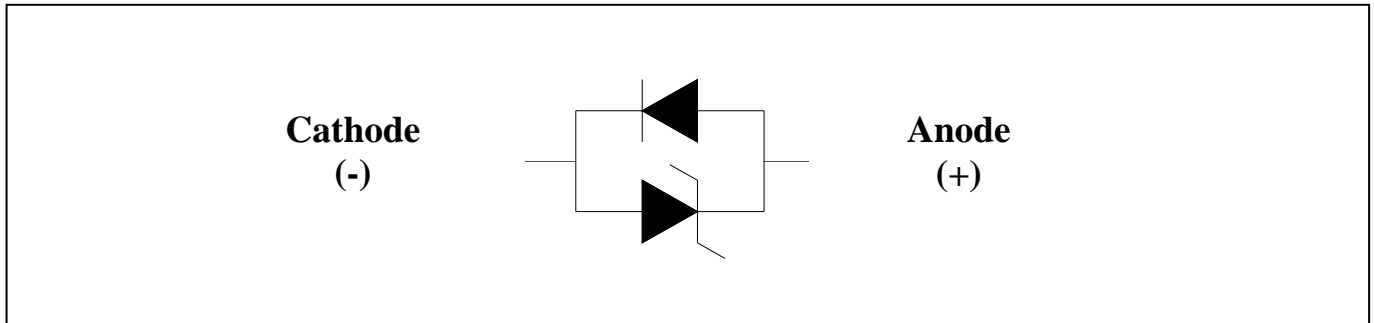
- Package outline (Width x Length x Height) of 3.5 x 3.6 x 1.9mm
- Undefined tolerance is ± 0.1 mm

(Unit : mm)

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- Recommended Solder Pad

7. Circuit Design



8. Reliability test items and conditions

Item	Reference	Test Conditions	Duration Cycle	Number of Damaged
Thermal Shock	EIAJ ED-4701	Ta = -40°C (30min) ~ 100°C (30min)	150 Cycle	0/30
Operating Endurance Test	Internal Reference	Ta = 25°C, IF = 150mA	1000 Hours	0/30
High Temperature High Humidity Life Test	Internal Reference	Ta = 60°C, RH=90%, IF = 150mA	500 Hours	0/30
High Temperature Life Test	Internal Reference	Ta = 85°C, IF = 150mA	500 Hours	0/30
ESD	-	Up to 5KV	3 Time	0/30
Reflow	Tsor	260°C < 10sec, Reflow Soldering	3 Time	0/30

(1) Criteria for judging the damage

Item	Symbol	Condition	Criteria for Judgment	
			MIN	MAX
Forward Voltage	Vf	If = 150mA	-	USL (1) × 1.1
Radiant Power	Po	If = 150mA	LSL (2) × 0.7	-

- USL : Upper Standard Level
- LSL : Lower Standard Level

9. Recommended soldering temperature – time profile for reflow soldering

(1) Reflow Conditions (Pb Free)

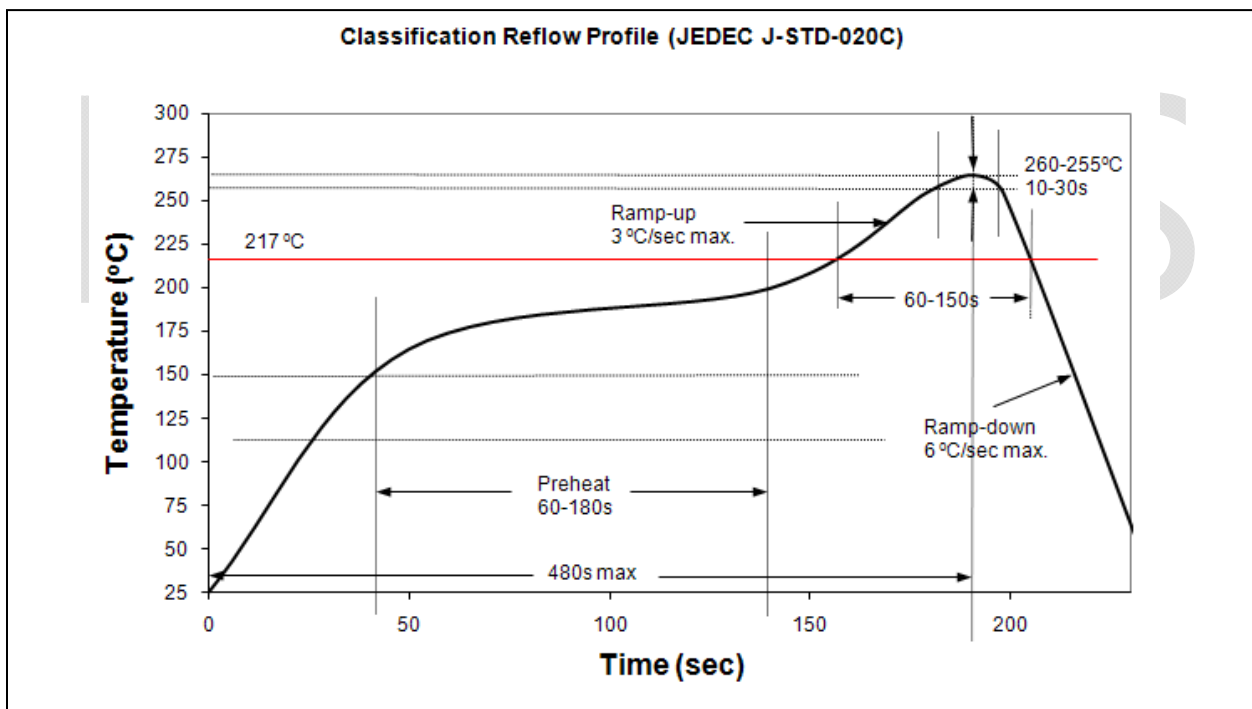
Surface Mounting Condition

- In automatic mounting of the SMD LEDs on printed circuit boards, any bending, expanding and pulling forces or shock against the SMD LEDs should be kept minimum to prevent them from electrical failures and mechanical damages of the devices.

Soldering Reflow

- Soldering of the SMD LEDs should conform to the soldering condition in the individual specifications.
- SMD LEDs are designed for reflow soldering.
- In the reflow soldering, too high temperature and too large temperature gradient such as rapid heating/cooling may cause electrical & optical failures and damages of the devices.
- Lumens cannot guarantee the LEDs after they have been assembled using the solder dipping method.

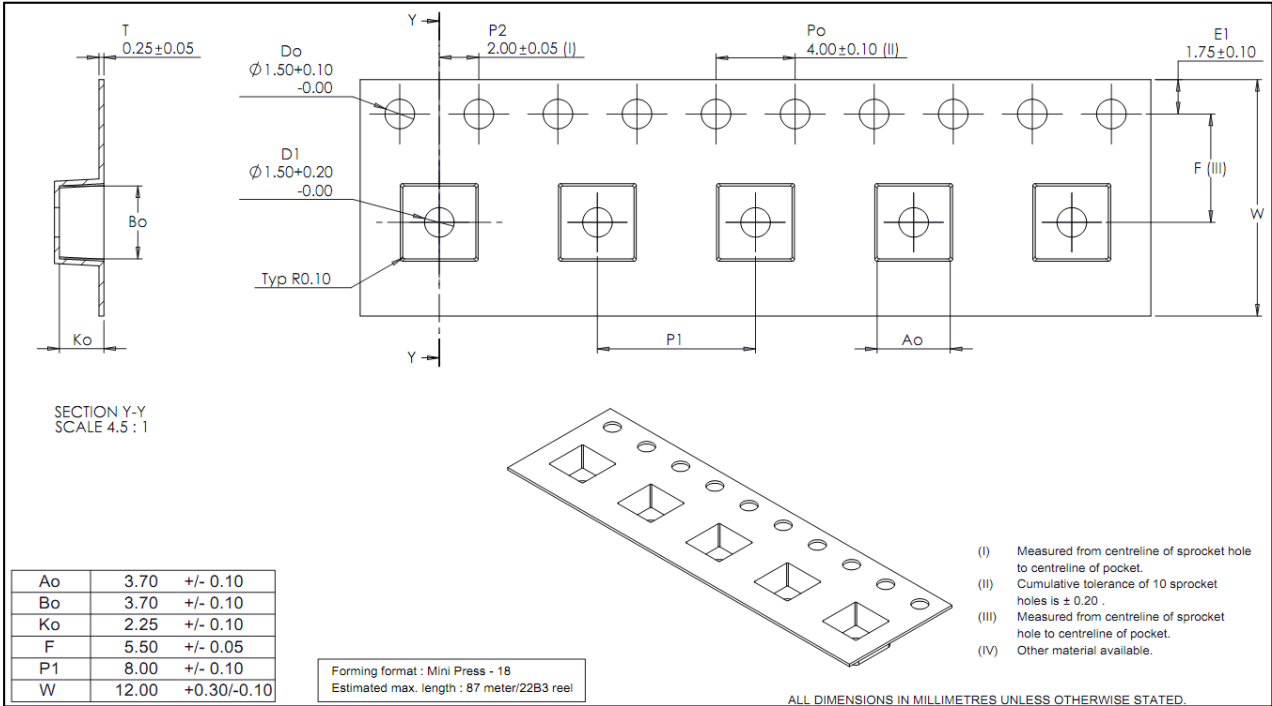
(2) Recommended Reflow Profile.



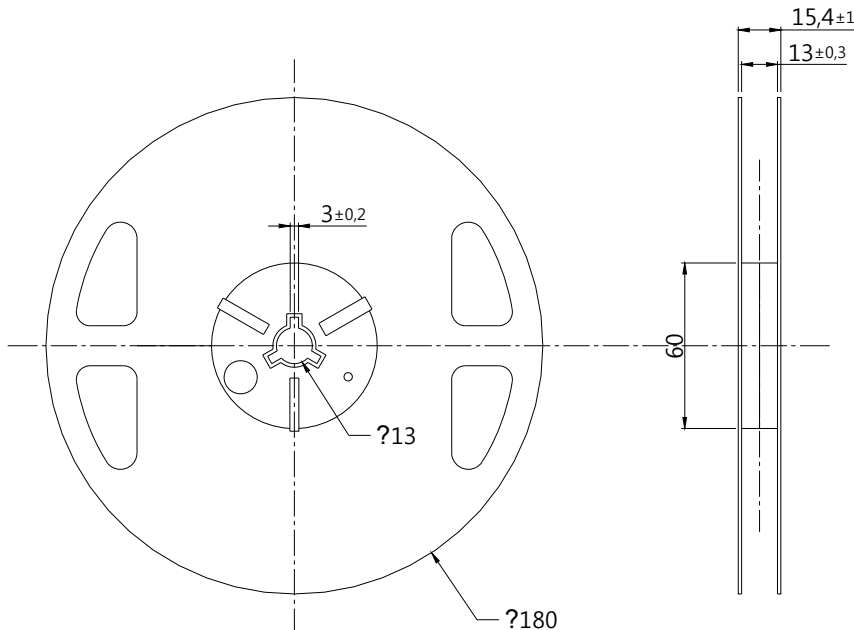
10. Taping & Orientation

- Moisture proof bag
- 1 Reel/bag
- Quantity: 800ea/Reel

- Carrier Tape Dimension



- Reel Dimension



11. Cautions

(1) Moisture-Proof Package

- 1.1 When moisture is absorbed into the LED package it may vaporize and expand products during soldering. There is a possibility that this may cause exfoliation of the contacts and damage to the optical characteristics of the LEDs. For this reason, the moisture-proof package is used to keep moisture to a minimum in the package.
- 1.2 A package of a moisture-absorbent material (silica gel) is inserted into the shielding bag. The silica gel changes its color from blue to pink as it absorbs moisture.

(2) Current limiting

A resistor should be used to limit current spikes that can be caused by voltage fluctuations. Otherwise damage could occur.

(3) Iron Soldering

- 3.1 Hand soldering is not recommended for regular production. These guidelines are for rework only.
- 3.2 Soldering iron tip should contact each terminal no more than 3 sec at 350°C, using soldering iron with nominal power less than 25W. Allow min. 2 sec. between soldering intervals.

(4) Storage Conditions

- 4.1 Before opening the package: The LEDs should be kept at 30°C or less and 90%RH or less. The LEDs should be used within a year. When storing the LEDs, moisture-proof packaging with moisture-absorbent material (silica gel) is recommended.
- 4.2 After opening the package: The LEDs should be kept at 30°C or less and 70%RH or less. The LEDs should be soldered within 168 hours (7 days) after opening the package. If unused LEDs remain, they should be stored in moisture-proof packages, such as sealed containers with packages of moisture-absorbent material (silica gel). It is also recommended to return the LEDs to the original moisture-proof bag and to reseal the moisture-proof bag again.
- 4.3 If the moisture-absorbent material (silica gel) has faded away or the LEDs have exceeded the recommended storage time, baking treatment should be performed using the following conditions.
Baking treatment: more than 24 hours at 65±5°C
- 4.4 Lumens LED electrode sections are comprised of a silver-plated copper alloy. The silver surface may be affected by environments which contain corrosive gases and so on. Please avoid condition which may cause difficulty environments during soldering operations. It is recommended that the user uses the LEDs as soon as possible.
- 4.5 Please avoid rapid transitions in ambient temperature, especially in high humidity environments where condensation can occur.

(5) Handling of Silicone (Lens) LEDs

- 5.1 Avoid silicone resin parts especially with sharp tools such as tweezers.
- 5.2 Avoid leaving fingerprints on silicone lens part.
- 5.3 Do not apply the silicone lens part with pressure especially in SMT production. So use a proper nozzle not to press the lens part of the LED to pick and place.

(6) Usage

- 6.1 Do not exceed the values given in this specification.

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