



**BRIGHTTEK**  
**BRIGHTTEK (EUROPE) LIMITED**

*Brighten Up The World With LED!*



ISO/TS 16949:2009



BS EN ISO 14001:2004



QC 080000 IECQ HSPM

## PRODUCT DATASHEET

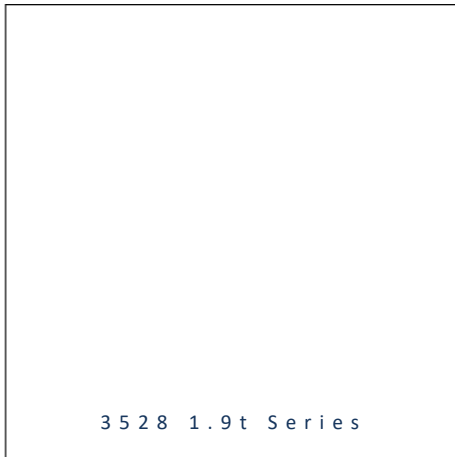


- ▶ PLCC4 SMD
- ▶ 3528 1.9t Series
- ▶ Red (615nm)

# NOR32S93-70MA



Release Date: 04 June 2022 Version: A1.1



### 3528 1.9t Series

**RoHS**  
Compliant



**AUTOMOTIVE**  
AEC-Q101

#### FEATURES:

- **Package:** PLCC4 Top View White SMT Package
- **Forward Current:** 70mA
- **Forward Voltage (typ.):** 2.2V
- **Luminous Intensity (typ.):** 3300mcd@70mA
- **Colour:** Red
- **Wavelength:** 610~620nm
- **Viewing angle:** 120°
- **Materials:**
  - Resin: Silicon (Water Clear)
  - L/T Finish: Ag plated
- **Operating Temperature:** -40~+85°C
- **Storage Temperature:** -40~+100°C
- **ESD (HBM):** 2kV
- **Grouping parameters:**
  - Forward voltage
  - Luminous intensity
  - Dominant Wavelength
- **Soldering methods:** IR Reflow
- **MSL:** acc. to JEDEC Level 2a (J-STD20D)
- **Packing:** 8mm tape with max.2000/reel, ø180mm (7")

#### APPLICATIONS:

- Automotive
- Decorative Lighting
- Indicator
- Backlighting
- Dashboard
- Display
- Information Board
- Light Strip

## CHARACTERISTICS:

### Absolute Maximum Characteristics (Ta=25°C)

Parameter	Symbol	Ratings	Unit
Forward Current	I <sub>F</sub>	70	mA
Pulse Forward Current Duty 1/10, width 0.1mS	I <sub>PF</sub>	150	mA
Reverse Voltage	V <sub>R</sub>	10	V
Reverse Current @10V	I <sub>R</sub>	10	μA
Junction Temperature	T <sub>J</sub>	110	°C
Electrostatics Discharge (HBM)	ESD	2000	V
Operating Temperature	T <sub>OPR</sub>	-40~+85	°C
Storage Temperature	T <sub>STG</sub>	-40~+100	°C
Soldering Temperature	T <sub>SD</sub>	260	°C

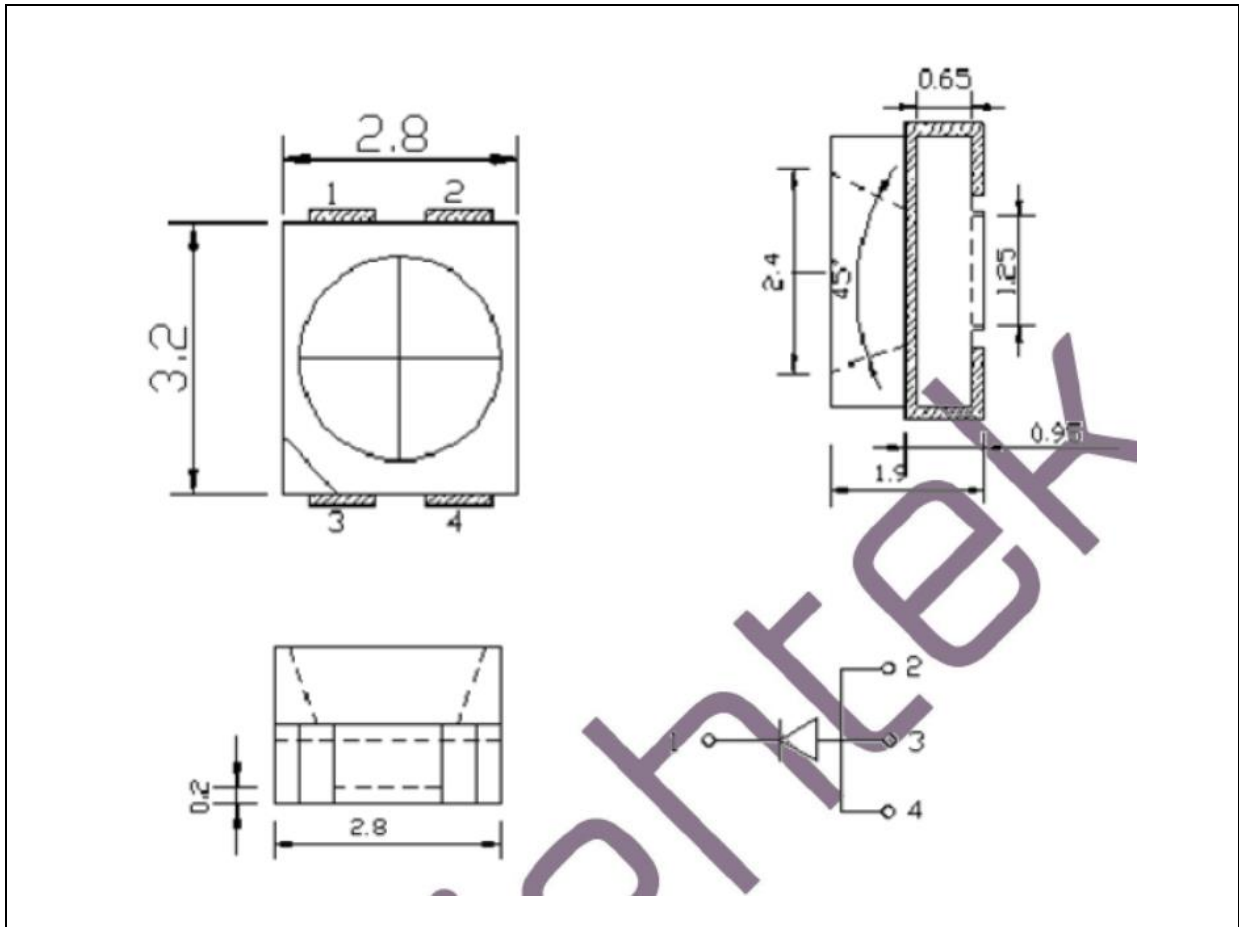
### Electrical & Optical Characteristics (Ta=25°C)

Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Forward Voltage	V <sub>F</sub>	2.0	2.2	2.8	V	I <sub>F</sub> =70mA
Luminous Intensity	I <sub>V</sub>	2200	3300	---	mcd	I <sub>F</sub> =70mA
Dominant Wavelength	λ <sub>D</sub>	610	---	620	nm	I <sub>F</sub> =70mA
Viewing Angle	2θ <sub>1/2</sub>	---	120	---	deg	I <sub>F</sub> =70mA

1. Luminous intensity (I<sub>V</sub>) ±10%, Forward Voltage (V<sub>F</sub>) ±0.1V, Viewing angle(2θ<sub>1/2</sub>) ±5%, Wavelength ±1nm

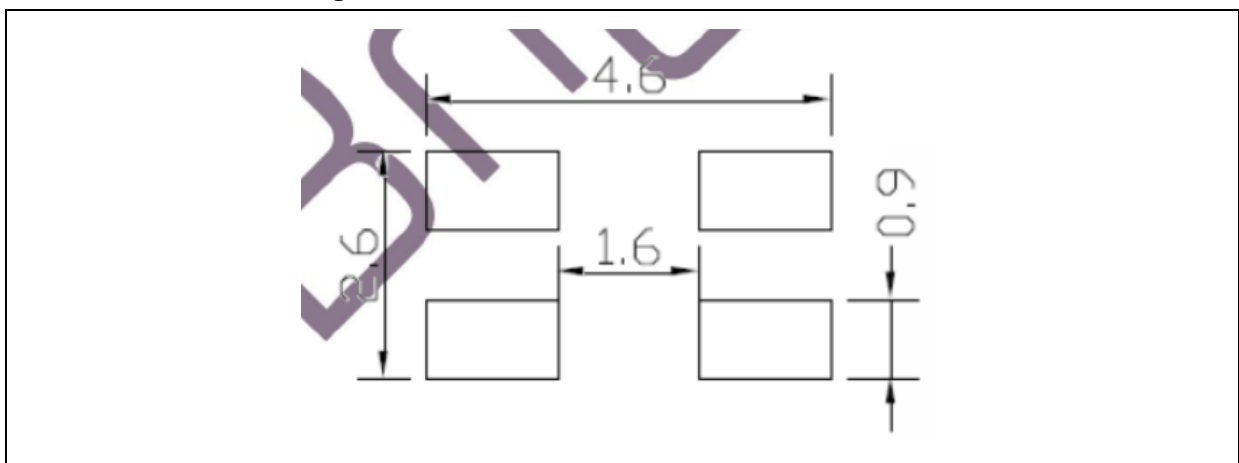
**OUTLINE DIMENSION:**

Package Dimension:



1. All dimensions are in millimetre (mm).
2. Tolerance  $\pm 0.2\text{mm}$ , unless otherwise noted.

Recommended Soldering Pad Dimension:



1. Dimensions are in millimetre (mm).
2. Tolerance  $\pm 0.1\text{mm}$  with angle tolerance  $\pm 0.5^\circ$ .

**BINNING GROUPS:**


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 Forward Voltage Classifications ( $I_F = 70\text{mA}$ ):

Code	Min.	Max.	Unit
D	2.0	2.1	V
E	2.1	2.2	
F	2.2	2.3	
G	2.3	2.4	
H	2.4	2.5	
I	2.5	2.6	
J	2.6	2.7	
K	2.7	2.8	

 Luminous Intensity Classifications ( $I_F = 70\text{mA}$ ):

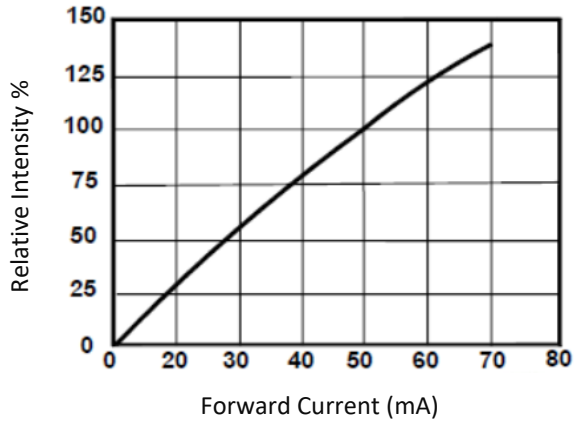
Code	Min.	Max.	Unit
18	2200	2800	mcd
19	2800	3600	
20	3600	4600	

 Dominant Wavelength Classifications ( $I_F = 70\text{mA}$ ):

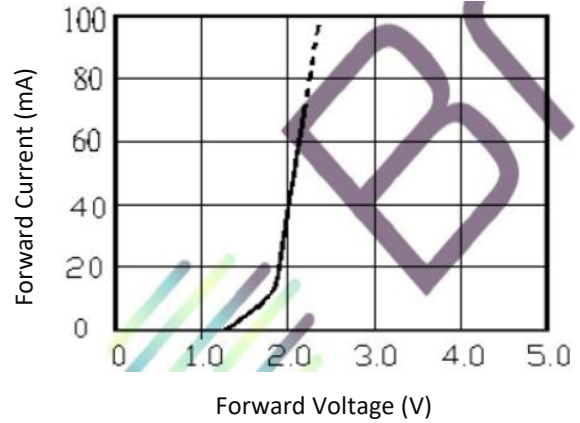
Code	Min.	Max.	Unit
A	610	615	nm
B	615	620	

**ELECTRO-OPTICAL CHARACTERISTICS:**

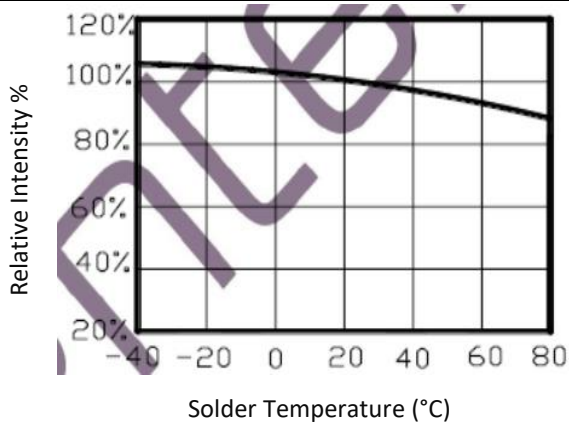
Relative Intensity v.s. Forward Current



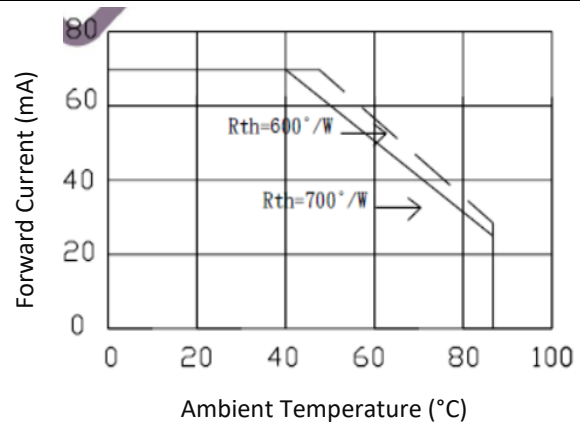
Forward Current v.s. Forward Voltage



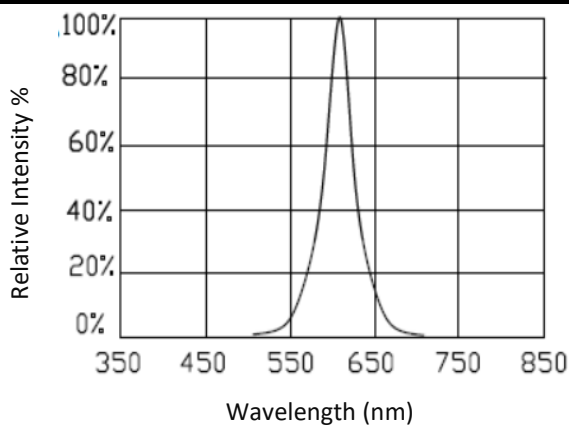
Relative Intensity v.s. Temperature



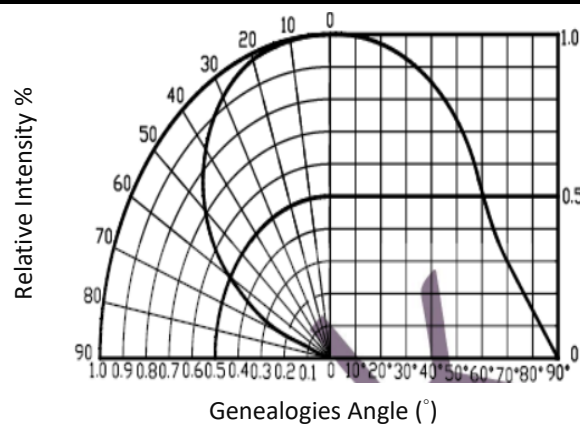
Forward Current Derating Curve



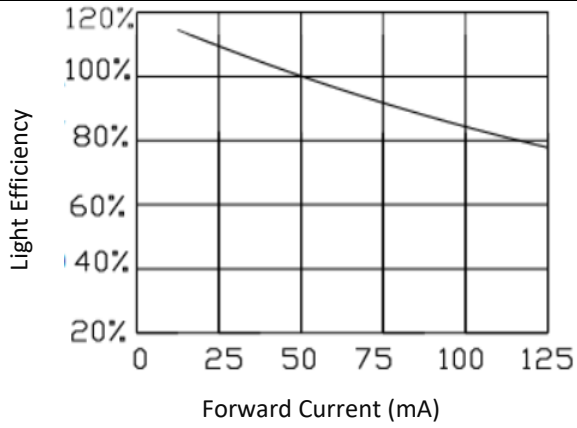
Relative Intensity v.s. Wavelength



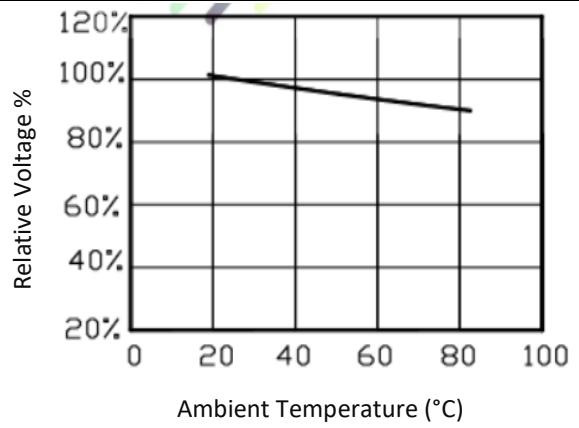
Directive Radiation



Efficiency v.s. Forward Current

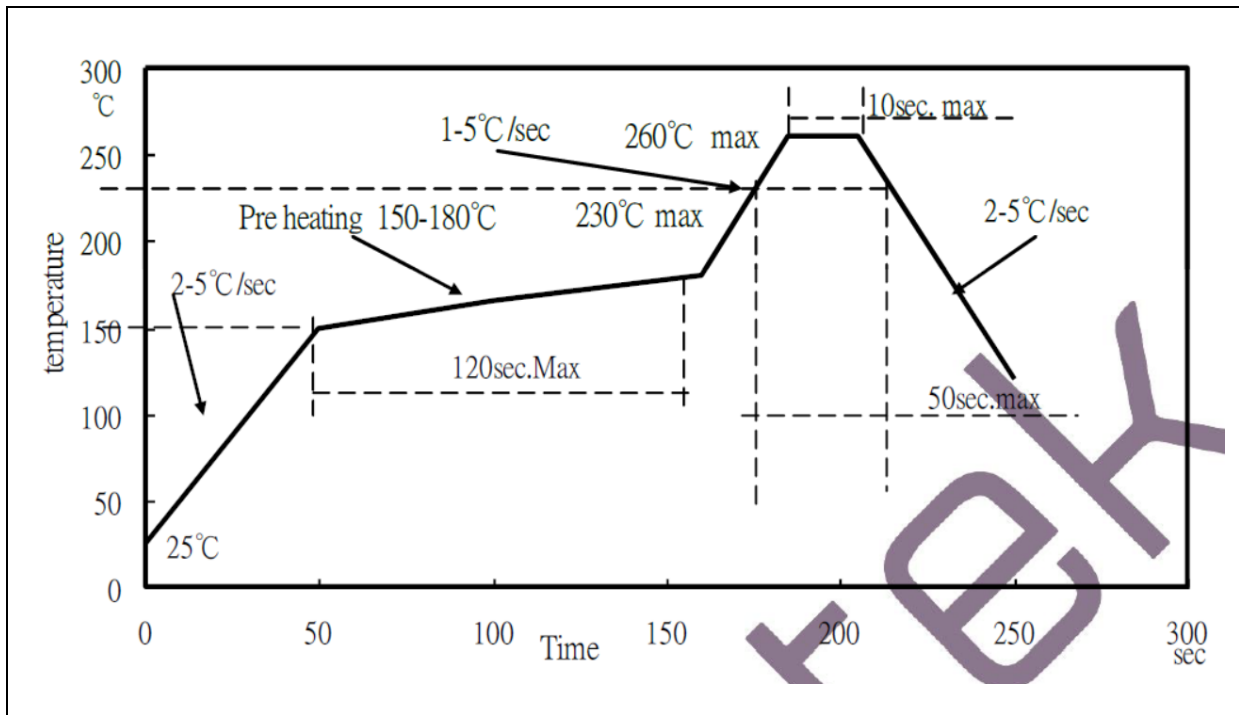


Relative Voltage v.s. Temperature



## RECOMMENDED SOLDERING PROFILE:

IR Reflow Lead-free Solder:

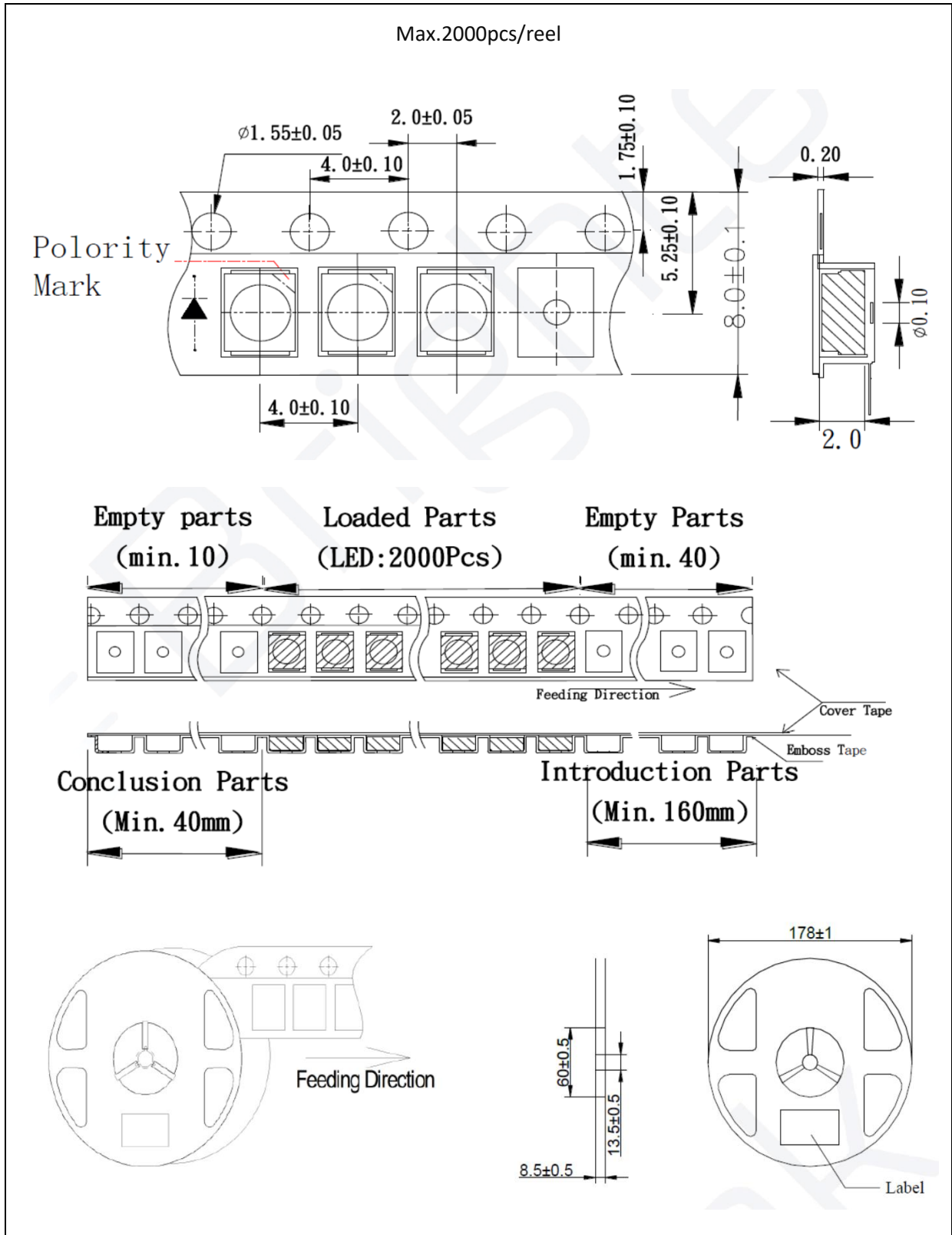


Note:

1. Maximum reflow soldering: 3 times.
2. Recommended reflow temperature 240°C. The maximum soldering temperature should be limited to 260°C.
3. Before, during, and after soldering, should not apply stress on the components and PCB board.

**PACKING SPECIFICATION:**

Reel Dimension:





## PRECAUTIONS OF USE:

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### Storage:

It is recommended to store the products in the following conditions:

- Humidity: 60% R.H. Max.
- Temperature: 5°C~30°C (41°F ~86°F).

Shelf life in sealed bag: 12 months at 5°C~30°C and <60% R.H.

Once the package is opened, the products should be used within a week. Otherwise, they should be kept in a damp-proof box with desiccating agent <10% R.H. and apply baking before use.

### Baking:

It is recommended to bake the LED before soldering if the pack has been unsealed for longer than 24hrs. The suggested baking conditions are as followings:

- 60±3°C x 24hrs and <5%RH, for reel package.

It's normal to see slight color fading of carrier (light yellow) after baking in process.

### Testing Circuit:



Must apply resistor(s) for protection (over current proof).

### Cleaning:

Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LED carrier / package. Avoid putting any stress force directly on to the LED lens.

### ESD (Electrostatic Discharge):

Static Electricity or power surge will damage the LED. Use of a conductive wrist band or anti-electrosatic glove is recommended when handling the LED all time. All devices, equipment, machinery, work tables, and storage racks must be properly grounded.

In the events of manual working in process, make sure the devices are well protected from ESD at any time.

**REVISION RECORD:**

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Version	Date	Summary of Revision
A1.0	26/04/2017	Datasheet set-up.
A1.1	04/06/2022	New datasheet format.