



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



- ▶ PLCC2 SMD
- ▶ 3528 1.9t Series
- ▶ Deep Red (660nm)

NOR13S11



Release Date: 04 June 2022 Version: A1.1



3528 1.9t Series

RoHS
Compliant



FEATURES:

- **Package:** PLCC2 Top View SMT Package
- **Forward Current:** 20mA
- **Forward Voltage (typ.):** 1.9V
- **Luminous Intensity (typ.):** 210mcd@20mA
- **Colour:** Deep Red
- **Peak Wavelength:** 650~670nm
- **Viewing angle:** 120°
- **Materials:**
 - Resin: Silicon (Water Clear)
 - L/T Finish: Ag plated
- **Operating Temperature:** -40~+80°C
- **Storage Temperature:** -40~+100°C
- **ESD (HBM):** 2kV
- **Grouping parameters:**
 - Forward voltage
 - Luminous intensity
 - Peak Wavelength
- **Soldering methods:** IR Reflow
- **MSL:** acc. to JEDEC Level 2a (J-STD20D)
- **Packing:** 8mm tape with max.2000/reel, ø180mm (7")

APPLICATIONS:

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

CHARACTERISTICS:

Absolute Maximum Characteristics (Ta=25°C)

| Parameter | Symbol | Ratings | Unit |
|--|------------------|----------|------|
| Forward Current | I _F | 30 | mA |
| Pulse Forward Current Duty 1/10, width 0.1mS | I _{PF} | 80 | mA |
| Reverse Voltage | V _R | 5 | V |
| Reverse Current @5V | I _R | 10 | μA |
| Junction Temperature | T _J | 110 | °C |
| Electrostatics Discharge (HBM) | ESD | 2000 | V |
| Operating Temperature | T _{OPR} | -40~+80 | °C |
| Storage Temperature | T _{STG} | -40~+100 | °C |
| Soldering Temperature | T _{SD} | 260 | °C |

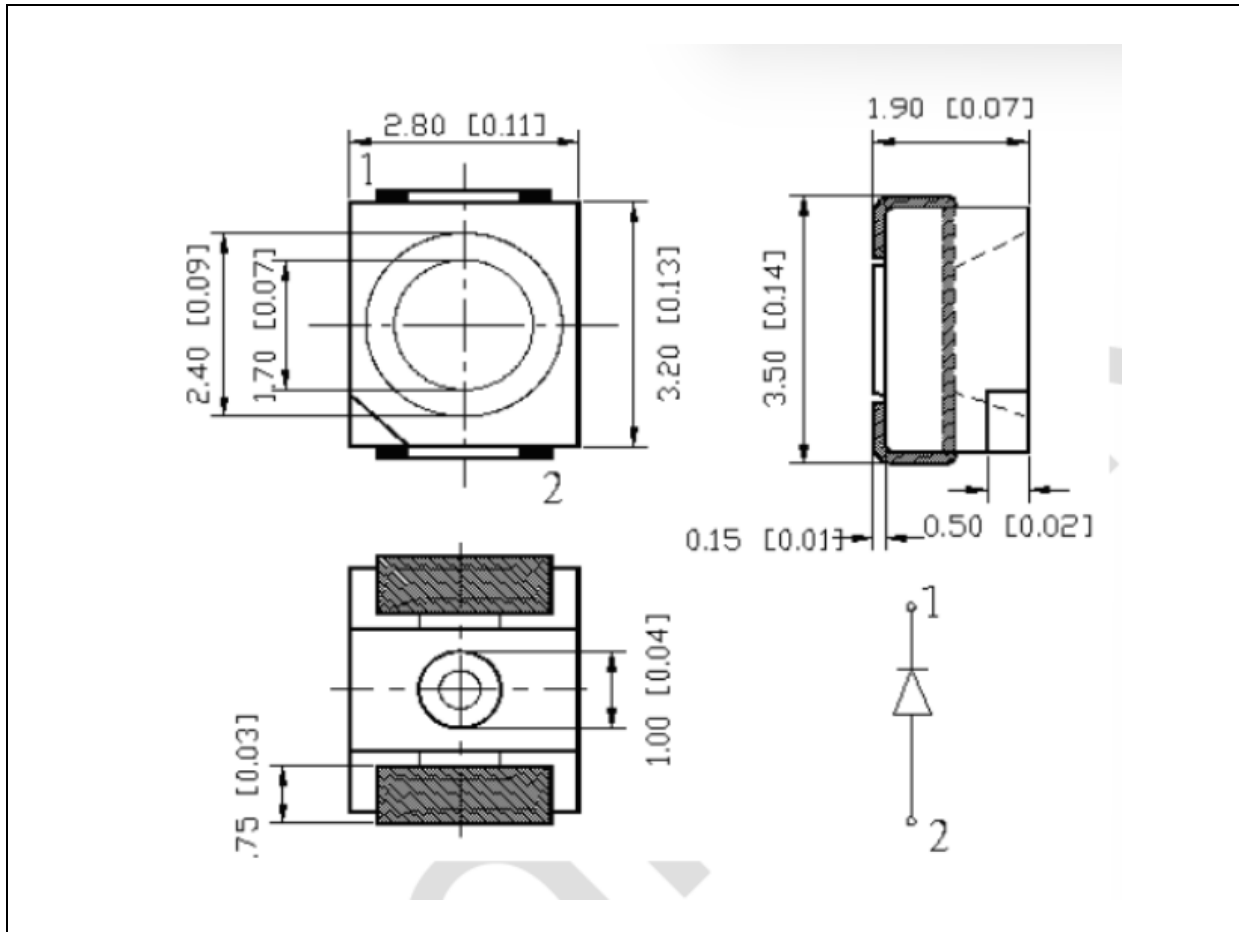
Electrical & Optical Characteristics (Ta=25°C)

| Parameter | Symbol | Values | | | Unit | Test Condition |
|---------------------|-------------------|--------|------|------|------|----------------------|
| | | Min. | Typ. | Max. | | |
| Forward Voltage | V _F | 1.7 | 1.9 | 2.6 | V | I _F =20mA |
| Luminous Intensity | I _V | 120 | 210 | --- | mcd | I _F =20mA |
| Dominant Wavelength | λ _D | 635 | --- | 655 | nm | I _F =20mA |
| Peak Wavelength | λ _P | 650 | --- | 670 | nm | I _F =20mA |
| Viewing Angle | 2θ _{1/2} | --- | 120 | --- | deg | I _F =20mA |

1. Luminous intensity (I_V) ±10%, Forward Voltage (V_F) ±0.1V, Viewing angle(2θ_{1/2}) ±5%, Wavelength ±1nm

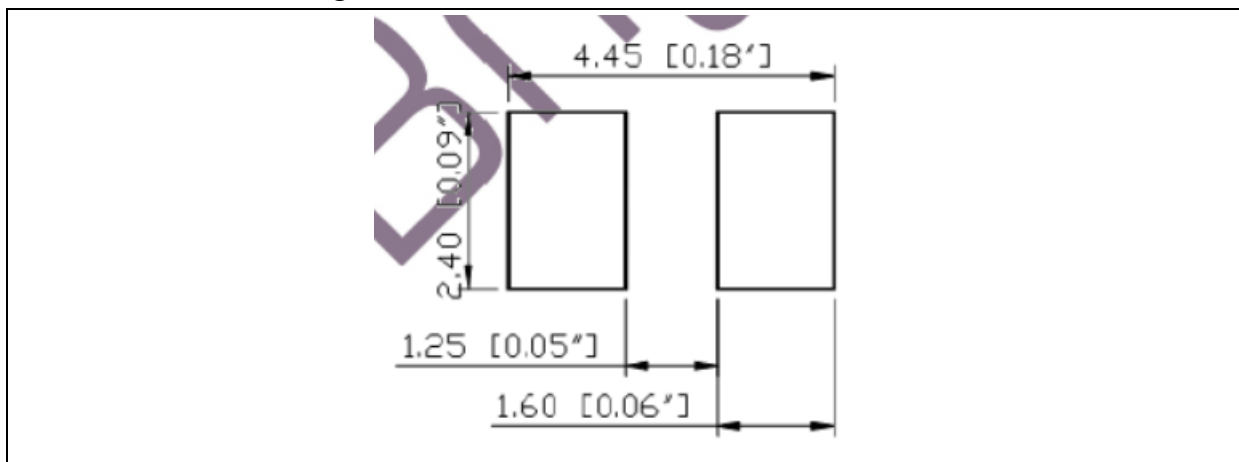
OUTLINE DIMENSION:

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:

 Forward Voltage Classifications ($I_F = 20\text{mA}$):

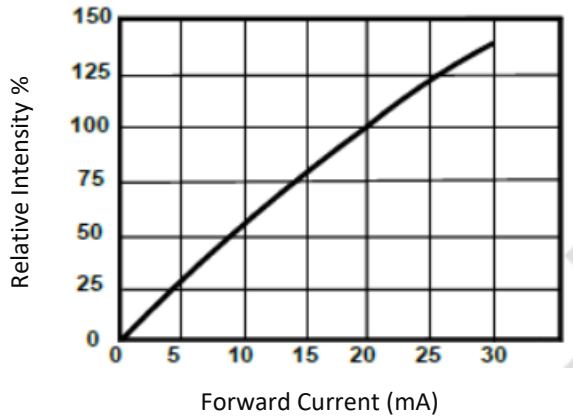
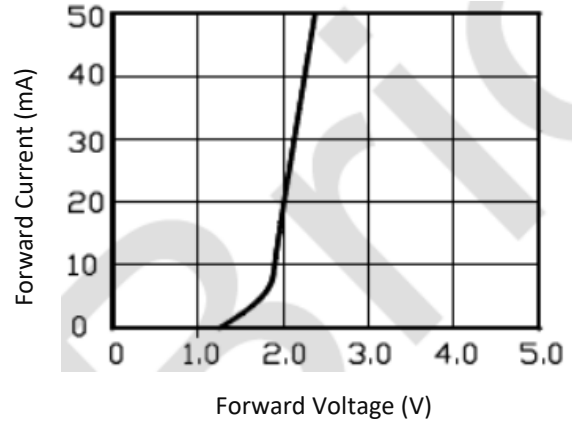
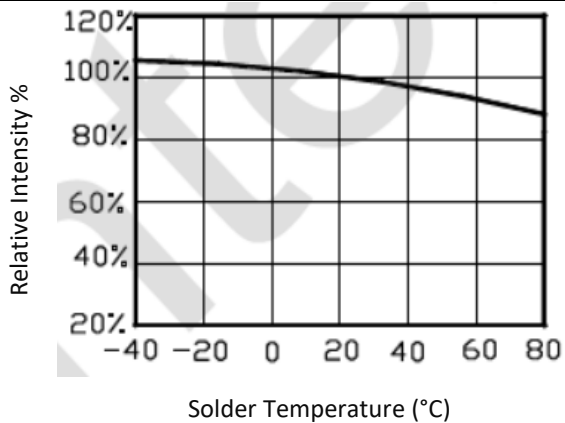
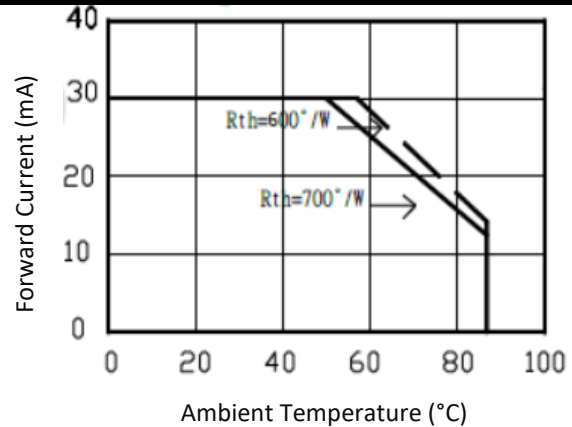
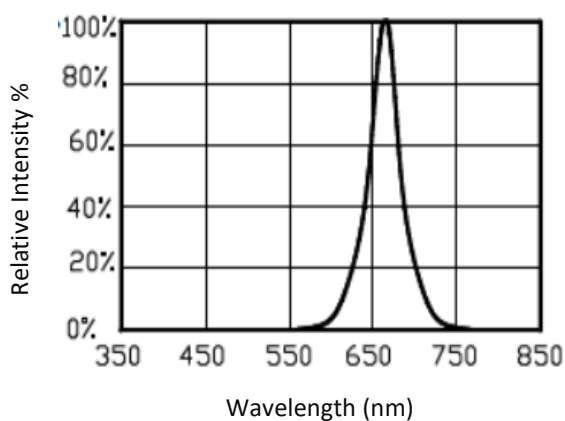
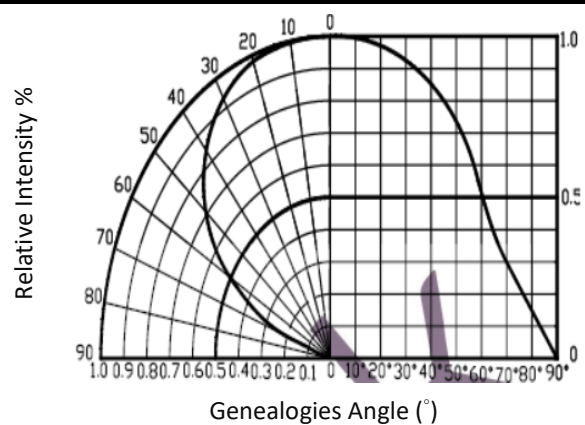
| Code | Min. | Max. | Unit |
|------|------|------|------|
| A | 1.7 | 1.8 | V |
| B | 1.8 | 1.9 | |
| C | 1.9 | 2.0 | |
| D | 2.0 | 2.1 | |
| E | 2.1 | 2.2 | |
| F | 2.2 | 2.3 | |
| G | 2.3 | 2.4 | |
| H | 2.4 | 2.5 | |
| I | 2.5 | 2.6 | |

 Luminous Intensity Classifications ($I_F = 20\text{mA}$):

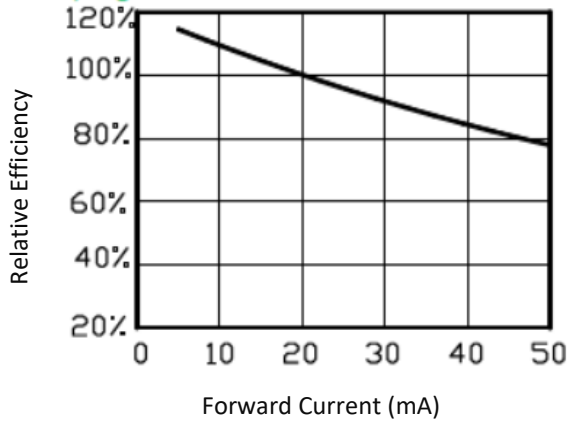
| Code | Min. | Max. | Unit |
|------|------|------|------|
| 7 | 120 | 160 | mcd |
| 8 | 160 | 210 | |
| 9 | 210 | 270 | |
| 10 | 270 | 350 | |
| 11 | 350 | 460 | |

 Peak Wavelength Classifications ($I_F = 20\text{mA}$):

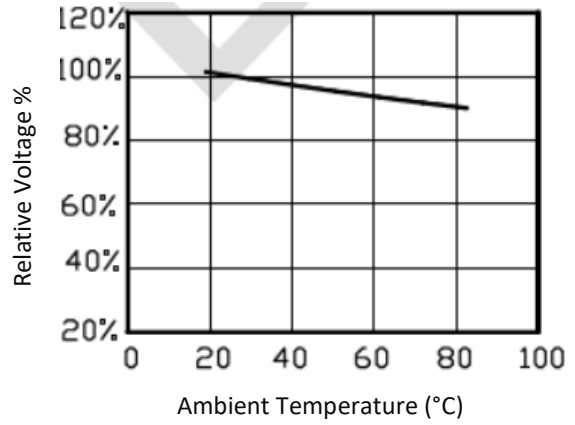
| Code | Min. | Max. | Unit |
|------|------|------|------|
| C | 650 | 655 | nm |
| D | 655 | 660 | |
| E | 660 | 665 | |
| f | 665 | 670 | |

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


Light Efficiency v.s. Forward Current

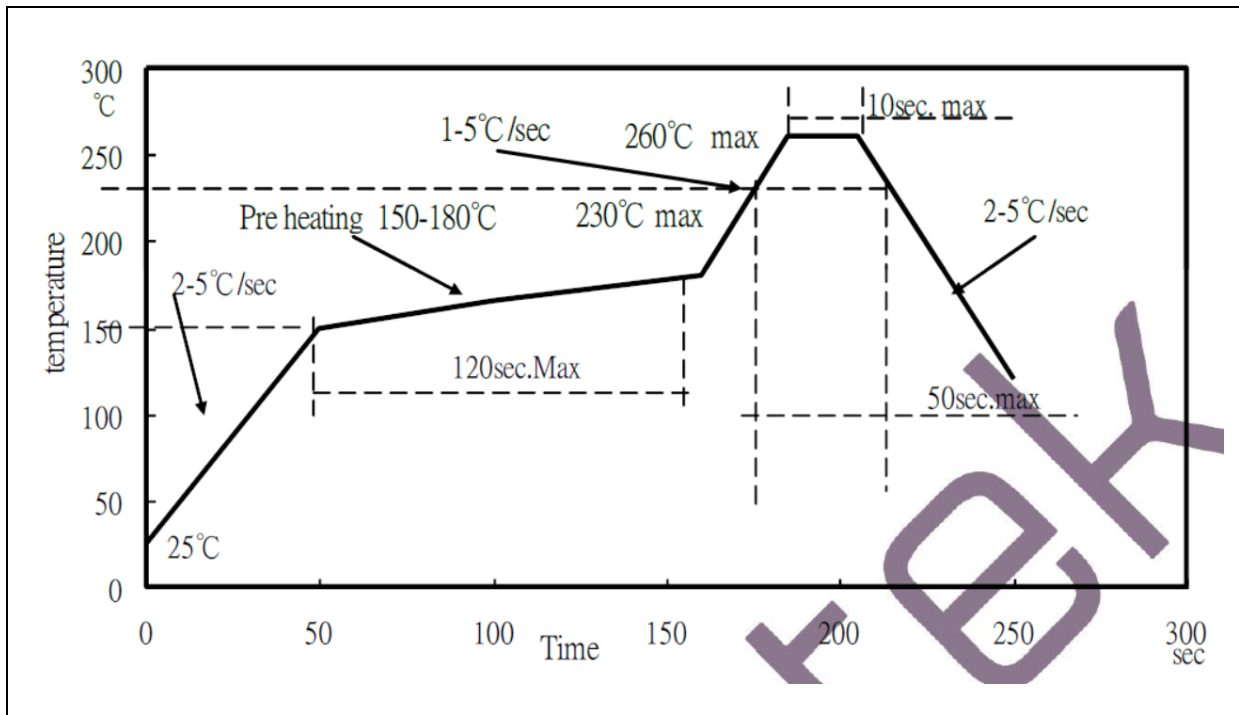


Relative Voltage v.s. Temperature



RECOMMENDED SOLDERING PROFILE:

IR Reflow Lead-free Solder:

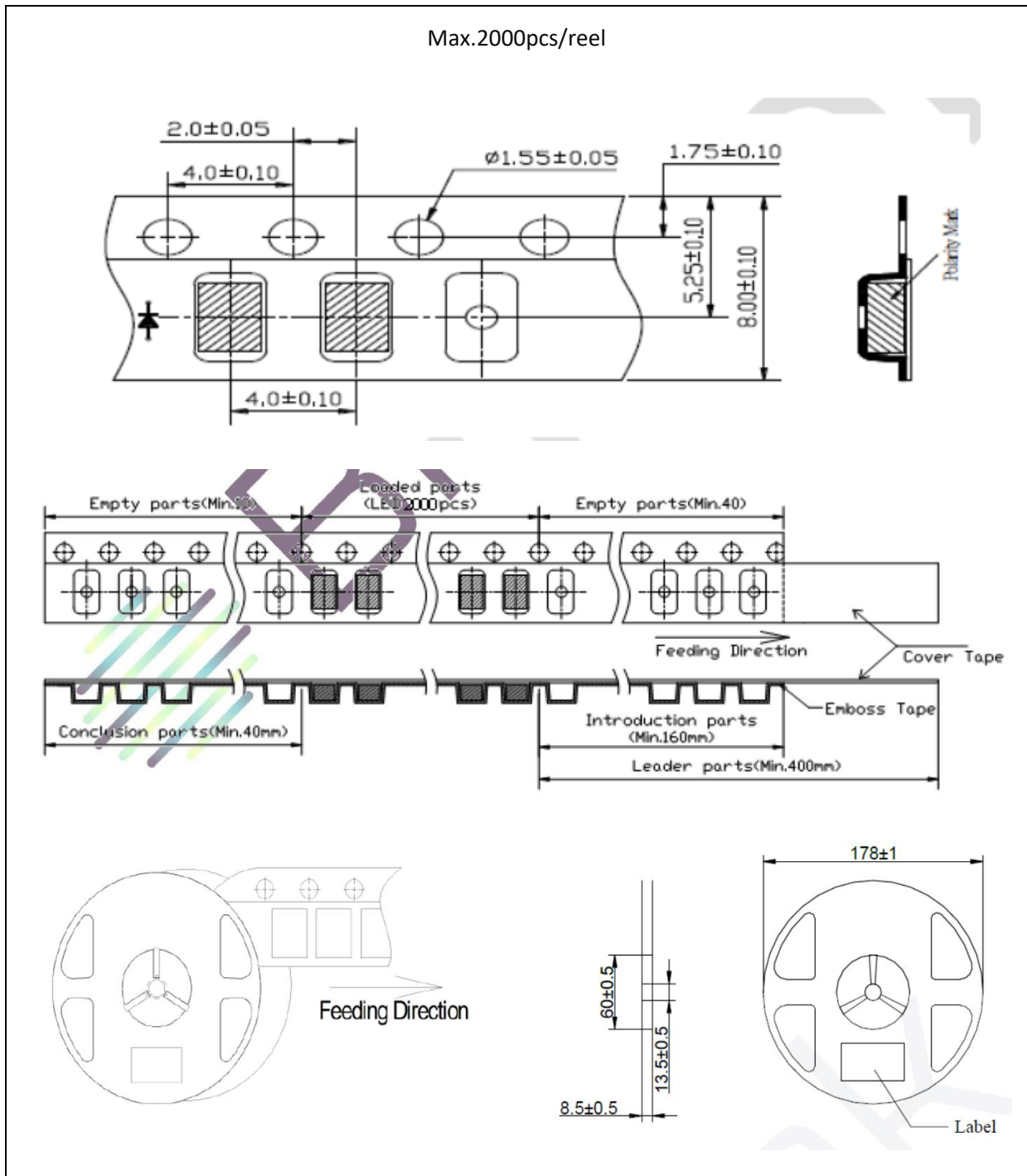


Note:

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:

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 6hrs 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-electrostatic 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:

| Version | Date | Summary of Revision |
|---------|------------|-----------------------|
| A1.0 | 20/05/2016 | Datasheet set-up. |
| A1.1 | 04/06/2022 | New datasheet format. |