

MAGIC LED

PLB13D003 Series

Advanced Datasheet



Description

Plessey MAGIC PLB13D003 ultra-thin SMT blue LEDs are designed for symbol backlight applications. The light is emitted in wide emission angles and hence this SMT package is suitable for indicators in mobile devices. The LEDs are packed in reels containing 3000 pieces; each individual reel will be shipped in single intensity and colour bin, to provide close uniformity.

Features

- Ultra-thin 1005 footprint
- Moisture sensitivity level 2a
- Diffused clear resin
- 130 degree wide viewing angle
- GaN-on-Si die technology

Applications

- Decoration Lighting
- Instrument panel backlighting
- Illumination symbols
- Miniature dot-matrix displays
- Wearable devices

Absolute Maximum Ratings

$T_{amb} = +25^{\circ}\text{C}$ unless otherwise stated

| Parameter | Symbol | Minimum | Maximum | Unit |
|---|-----------|---------|---------|--------------------|
| DC Forward Current | I_F | - | 10 | mA |
| Peak Pulse Forward Current ^[1] | I_{FP} | - | 50 | mA |
| Reverse Voltage | V_R | - | 5 | V |
| Storage Temperature | T_{stg} | -40 | +85 | $^{\circ}\text{C}$ |
| Junction Temperature | T_j | - | +89 | $^{\circ}\text{C}$ |

^[1] Pulse width 1ms, duty cycle $\leq 10\%$

Electro-optical Characteristics

$T_{amb} = +25^{\circ}\text{C}$ unless otherwise stated

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------|-----------------|--------------------|------|------|------|---------------|
| Forward Voltage | V_F | $I_F = 5\text{mA}$ | 2.80 | 3.10 | 3.50 | V |
| Reverse Current | I_R | $V_R = 5\text{V}$ | - | - | 100 | μA |
| Dominant Wavelength | λ_d | $I_F = 5\text{mA}$ | 460 | - | 470 | nm |
| | | | 470 | - | 480 | |
| Thermal Resistance | R_{thj-sp} | - | - | 650 | - | K/W |
| Half-Intensity Angle | $2\Theta_{1/2}$ | $I_F = 5\text{mA}$ | - | 130 | - | deg |

Recommended Operating Conditions

In typical applications, for optimum LED performance

| Parameter | Symbol | Minimum | Maximum | Unit |
|-------------------------------|-----------|---------|---------|--------------------|
| Operating Ambient Temperature | T_{opr} | -40 | +85 | $^{\circ}\text{C}$ |

Ordering Information

| Order code | Colour range | Luminous intensity range | Forward voltage |
|---------------|----------------|--------------------------|-----------------|
| PLB13D003F000 | P1, P2, T1, T2 | 2M, 3M, 4M, 5M | V1 & V2 |
| PLB13D003P000 | P1, P2 | 2M, 3M, 4M | V1 & V2 |
| PLB13D003P001 | P1, P2 | 3M, 4M, 5M | V1 & V2 |
| PLB13D003T000 | T1, T2 | 2M, 3M, 4M | V1 & V2 |
| PLB13D003T001 | T1, T2 | 3M, 4M, 5M | V1 & V2 |

Intensity Bin Groups

$I_F = 5\text{mA}$, $T_{\text{amb}} = +25^\circ\text{C}$, unless otherwise stated

| Group | Luminous intensity ^[1] (mcd) | |
|-------|---|------|
| | Min. | Max. |
| 2M | 20 | 30 |
| 3M | 30 | 40 |
| 4M | 40 | 65 |
| 5M | 65 | 80 |

^[1] Tolerance $\pm 11\%$

Colour Chromaticity

$I_F = 5\text{mA}$, $T_{\text{amb}} = +25^\circ\text{C}$, unless otherwise stated

| Group | Dominant Wavelength λ_d (nm) | |
|-------|--------------------------------------|------|
| | Min. | Max. |
| P1 | 460 | 465 |
| P2 | 465 | 470 |
| T1 | 470 | 475 |
| T2 | 475 | 480 |

Forward Voltage Bin Groups

$I_F = 5\text{mA}$, $T_{\text{amb}} = +25^\circ\text{C}$, unless otherwise stated

| Group | V_F ^[1] (V) | |
|-------|--------------------------|------|
| | Min. | Max. |
| V1 | 2.80 | 3.30 |
| V2 | 3.30 | 3.50 |

^[1] Tolerance $\pm 0.05\text{V}$

Relative Spectral Emission (Typical)

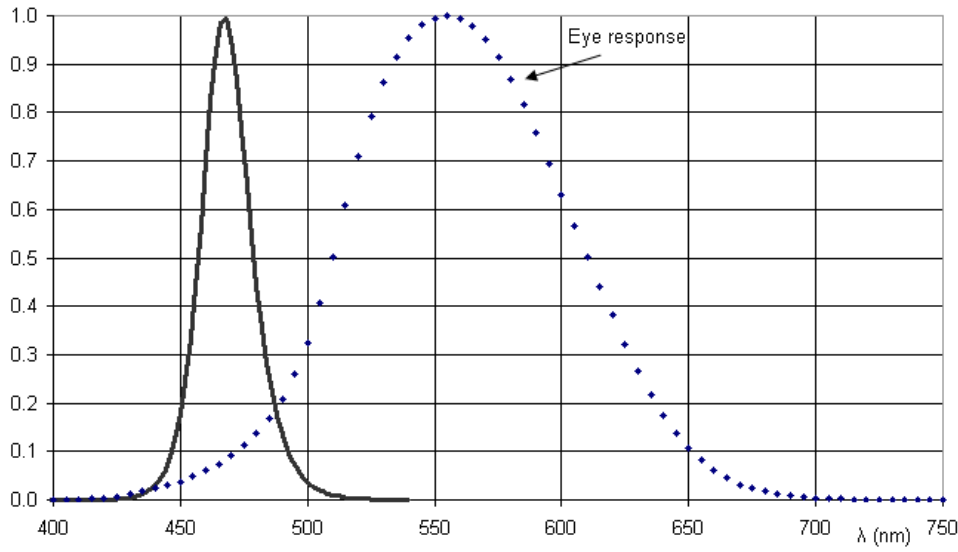


Figure 1. Normalised spectral power distribution

Angular Light Distribution

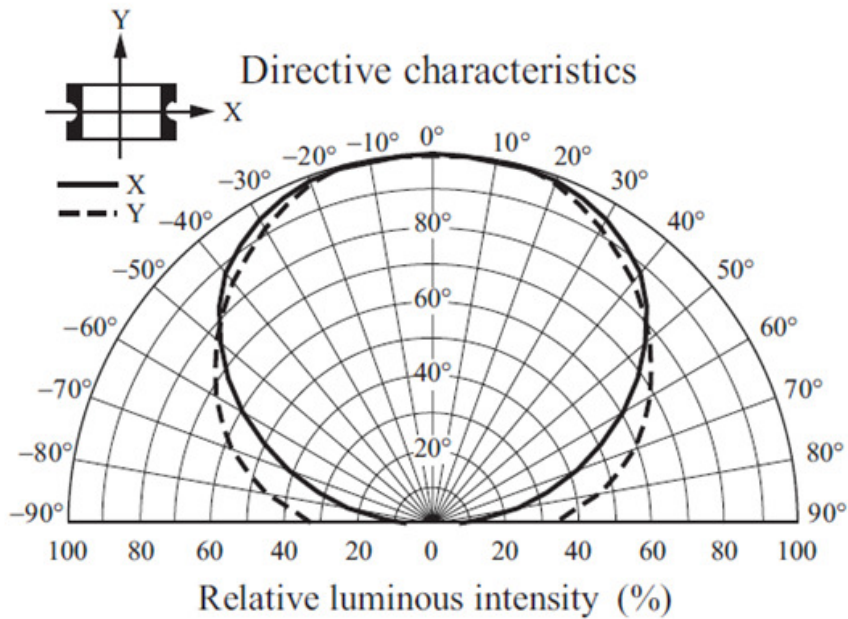


Figure 2. Angular distribution pattern of emitted light

Derating Curve

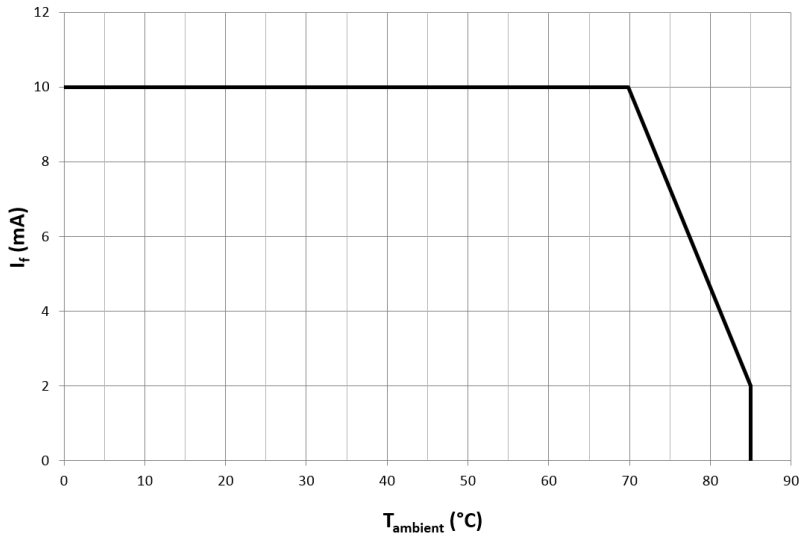


Figure 4. Maximum forward current versus ambient temperature

Package Outline Dimensions

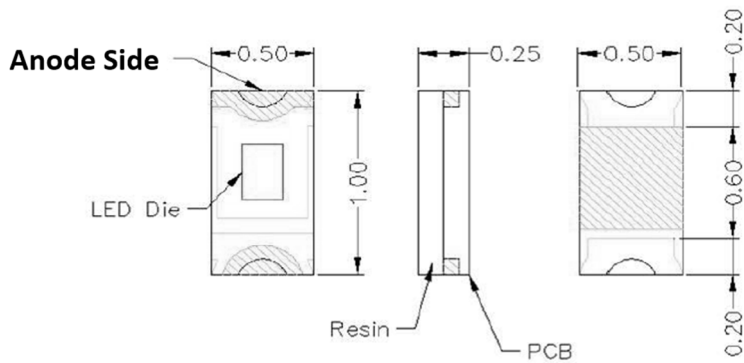


Figure 5. Mechanical drawings of the 1005 package (unit in mm)

Recommended Solder Pad

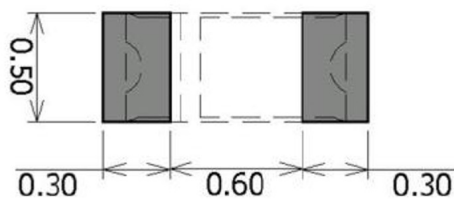


Figure 6. Diagram of soldering pad (unit in mm)

Note: Increased PCB Cu area will reduce the T_j and increase reliability

Reflow Soldering Profile

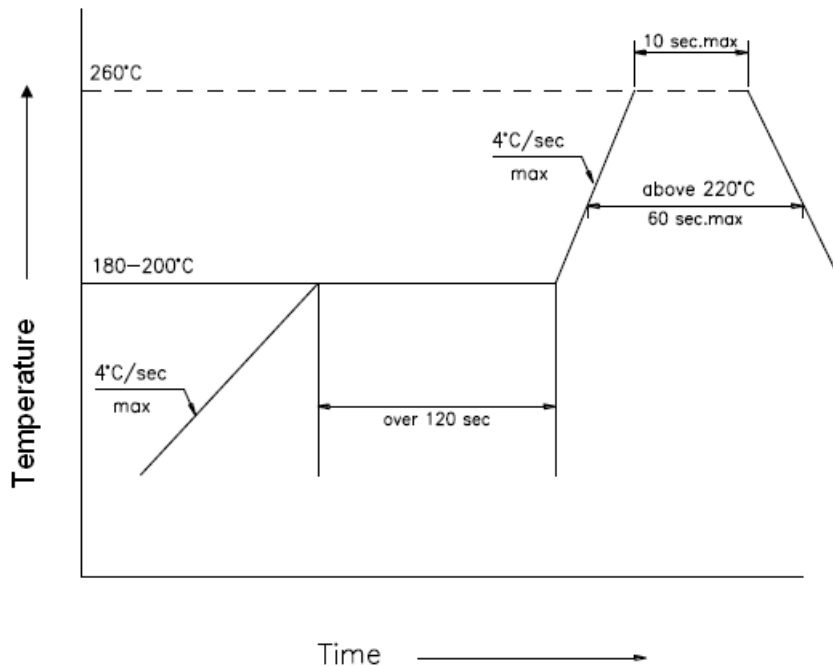


Figure 7. Reflow soldering profile

1. Reflow soldering should not be done more than twice
2. When soldering, do not put stress on the LEDs during heating

Soldering iron

1. When hand soldering, the temperature of the iron must be $\leq 300^{\circ}\text{C}$ for 3 seconds
2. Hand soldering should be performed only once.

Handling Instructions

Plessey LEDs are not designed to operate with reverse bias.

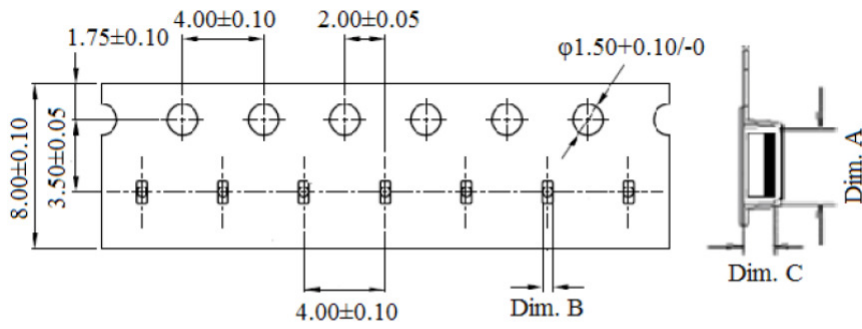
Precautions are required to prevent reverse bias in applications and during handling.



Moisture Sensitivity

| JEDEC Level | Floor life | | Bake | |
|-------------|------------|------------------------------------|-----------------|--|
| | Time | Conditions | Time | Conditions |
| 2a | 4 weeks | $\leq 30^{\circ}\text{C}$ / 60% RH | ≥ 58 hours | $60^{\circ}\text{C} \pm 5^{\circ}\text{C}$ / 5% RH |

Packing Information



| Dim. A | Dim. B | Dim. C | Q'ty/Reel |
|-----------|-----------|-----------|-----------|
| 1.11±0.03 | 0.60±0.03 | 0.38±0.03 | 3K |

Figure 8. Embossed tapping specifications (unit in mm)

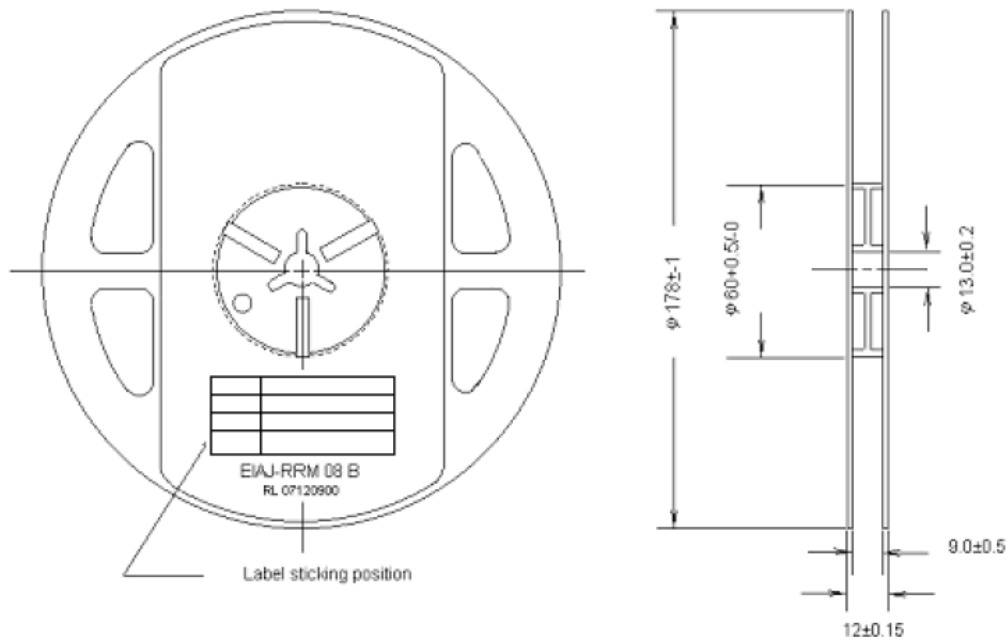
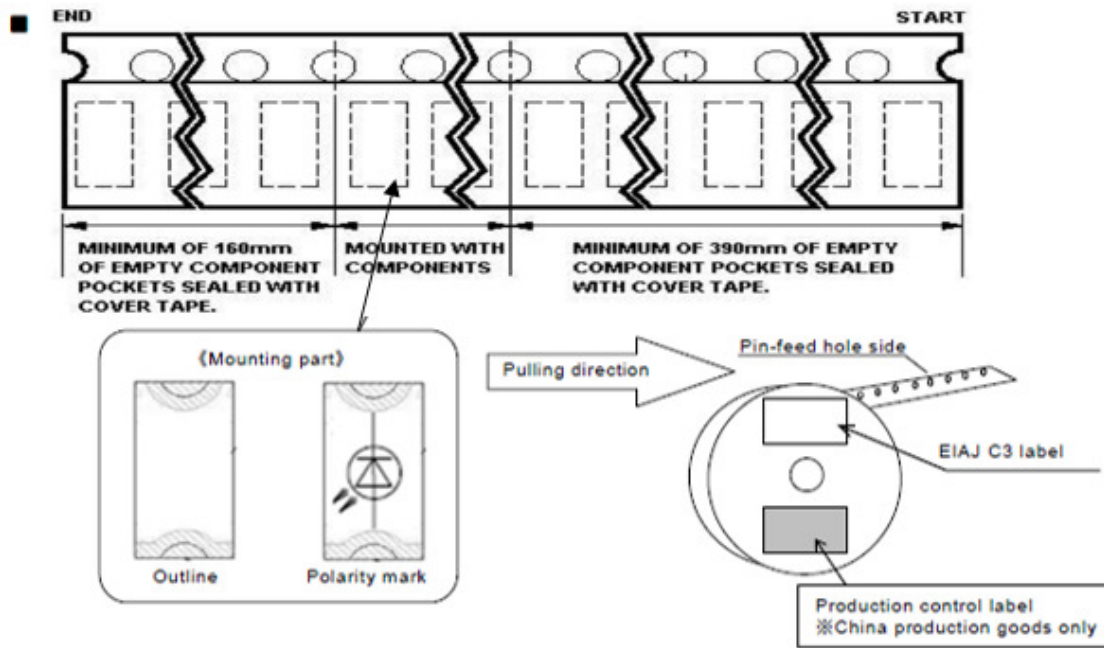
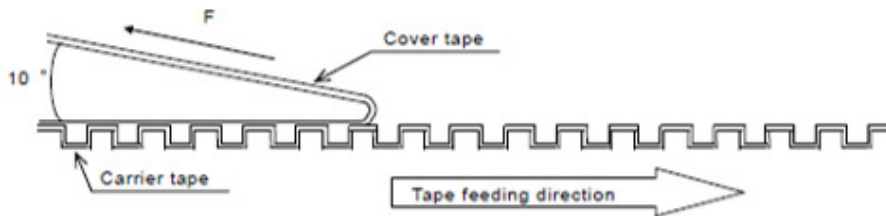


Figure 9. Reel specification (unit in mm)



1. Pin-feed holes should be on the left side on the tape in the pulling direction.
2. Chip LED taping direction.
The right side on the tape in the pulling direction is anode.
3. The leader part is saved as cover tape, which should be 200 mm or longer.
4. Keep more than 10 emboss blanks both at front and end of the taping.

■ Mechanical strength and treatment



1. Exfoliation strength of the cover tape should be 0.19 N ~ 0.69 N.
2. Tape bending strength
Tape should not be deformed by bending with a radius of 15 mm.
3. Percentage defective of enclosed
The product which was enclosed in reverse direction or with back side up should be counted as 0 piece/reel.
The number of dropped parts should be 0.1 % of entire number of parts or 1 piece, whichever larger.
There should be no continuous dropping however total number has to remain intact.
4. There should be no tape joint.

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