

# MAGIC LED

## PLW13D003 Series

### Advanced Datasheet



#### Description

Plessey MAGIC PLW13D003 ultra-thin SMT white 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 pale yellow 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 <sup>[1]</sup>	$I_{FP}$	-	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	$\mu\text{A}$
Chromaticity co-ordinates	x	$I_F = 5\text{mA}$	-	0.280	-	
	y		-	0.270	-	
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
PLW13D003000	A1, A2, A3 & A4	1L & 2L	V1 & V2
PLW13D003001	A1 & A2	1L & 2L	V1 & V2
PLW13D003002	A2 & A3	1L & 2L	V1 & V2
PLW13D003003	A3 & A4	1L & 2L	V1 & V2

## Intensity Bin Groups

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

Group	Luminous Intensity <sup>[1]</sup> (mcd)	
	Min.	Max.
1L	100	150
2L	150	200
3L <sup>[2]</sup>	200	250

<sup>[1]</sup> Tolerance  $\pm 11\%$ . <sup>[2]</sup> Not available yet.

## Forward Voltage Bin Groups

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

Group	$V_F$ <sup>[1]</sup> (V)	
	Min.	Max.
V1	2.80	3.30
V2	3.30	3.50

<sup>[1]</sup> Tolerance  $\pm 0.05\text{V}$

### Relative Spectral Emission (Typical)

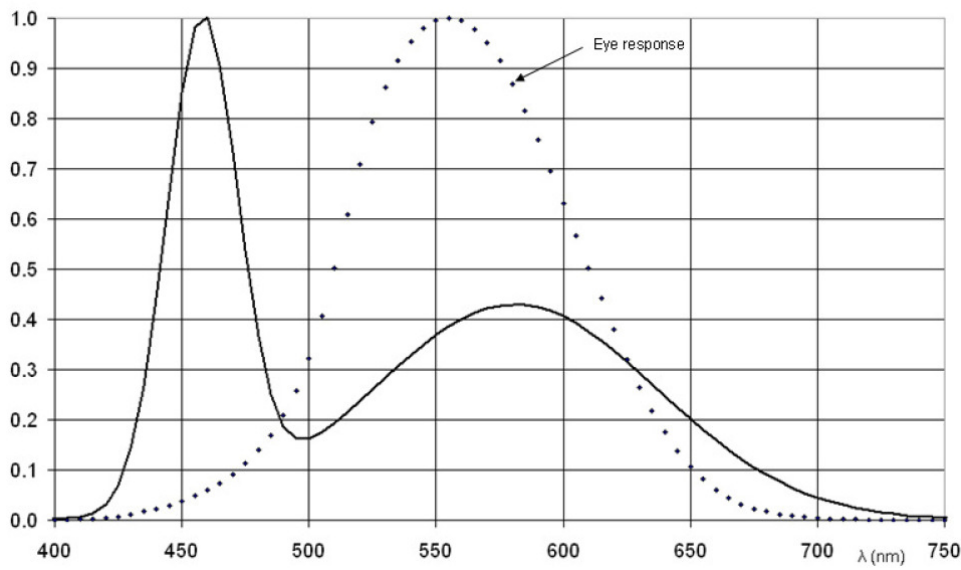


Figure 1. Normalised spectral power distribution

### Angular Light Distribution

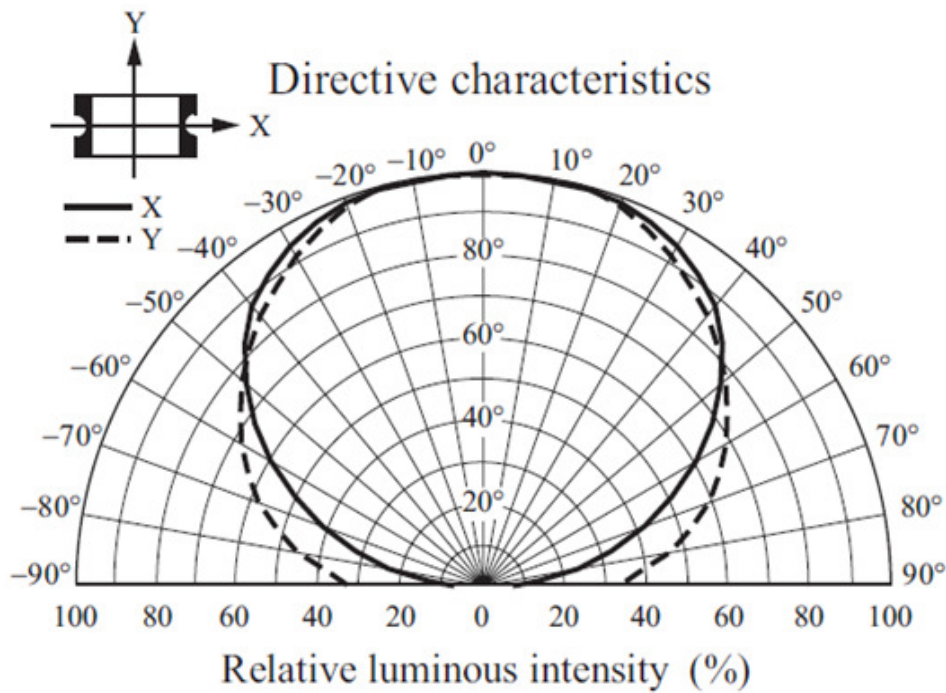


Figure 2. Angular distribution pattern of emitted light

## Colour Chromaticity

A1		A2		A3		A4	
x	y	x	y	x	y	x	y
0.243	0.24	0.262	0.266	0.284	0.295	0.305	0.323
0.262	0.266	0.284	0.295	0.305	0.323	0.327	0.354
0.278	0.245	0.295	0.269	0.311	0.29	0.329	0.314
0.259	0.216	0.278	0.245	0.295	0.269	0.311	0.29

Chromaticity co-ordinate tolerance for each bin is  $\pm 0.01$

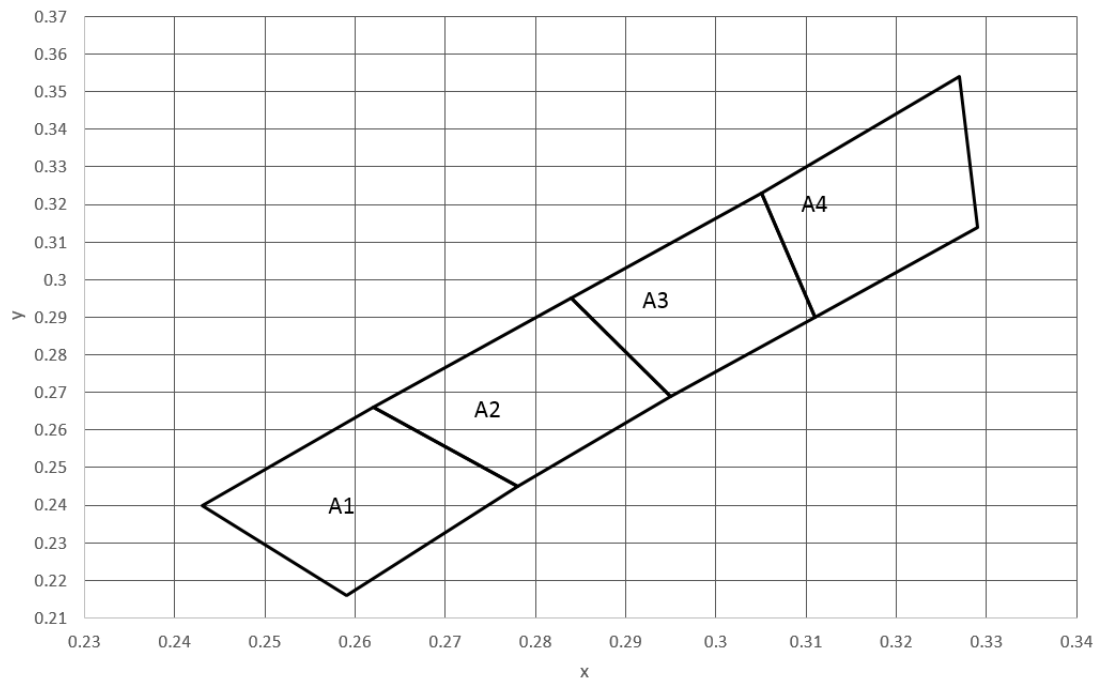


Figure 3. CIE1931 chromaticity diagram

## Derating Curve

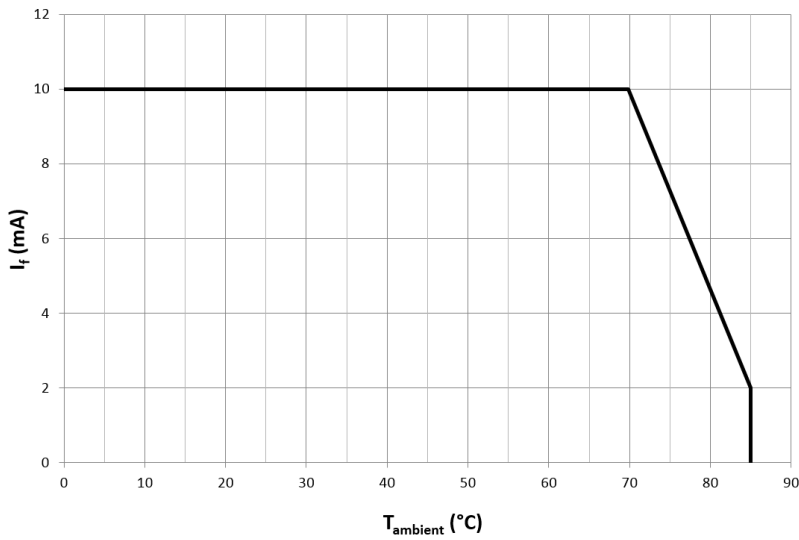


Figure 4. Maximum forward current versus ambient temperature

## Package Outline Dimensions

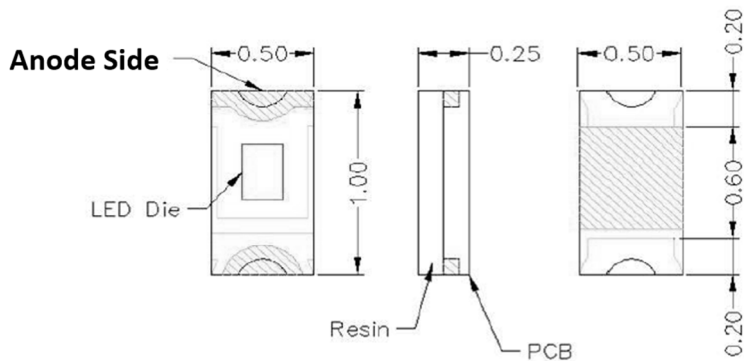


Figure 5. Mechanical drawings of the 1005 package (unit in mm)

## Recommended Solder Pad

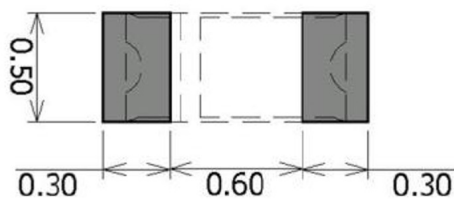


Figure 6. Diagram of soldering pad (unit in mm)

Note: Increased PCB Cu area will reduce the T<sub>j</sub> and increase reliability

## Reflow Soldering Profile

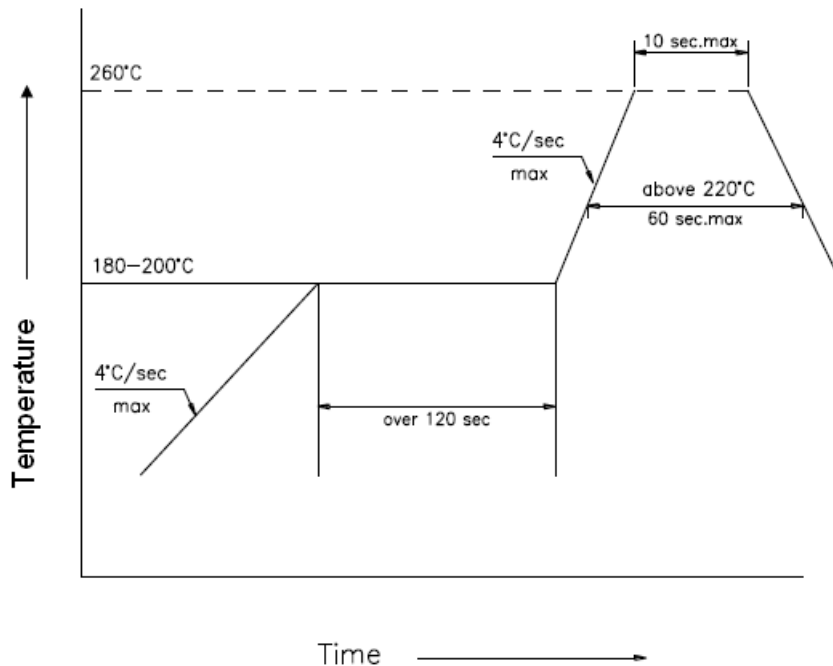


Figure 7. Reflow soldering profile

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

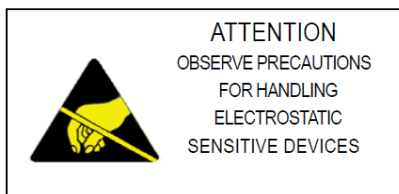
### Soldering iron

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.

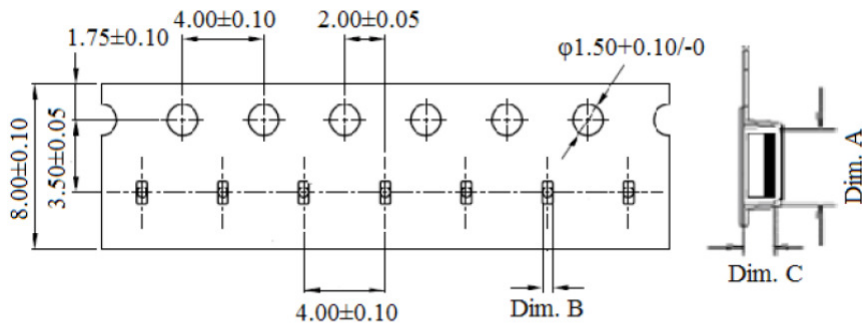
Precautions are required to prevent reverse bias in applications and during handling.



## Moisture Sensitivity

JEDEC Level	Floor life		Bake	
	Time	Conditions	Time	Conditions
2a	4 weeks	$\leq 30^{\circ}\text{C}$ / 60% RH	$\geq 58$ 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 taping specifications (unit in mm)

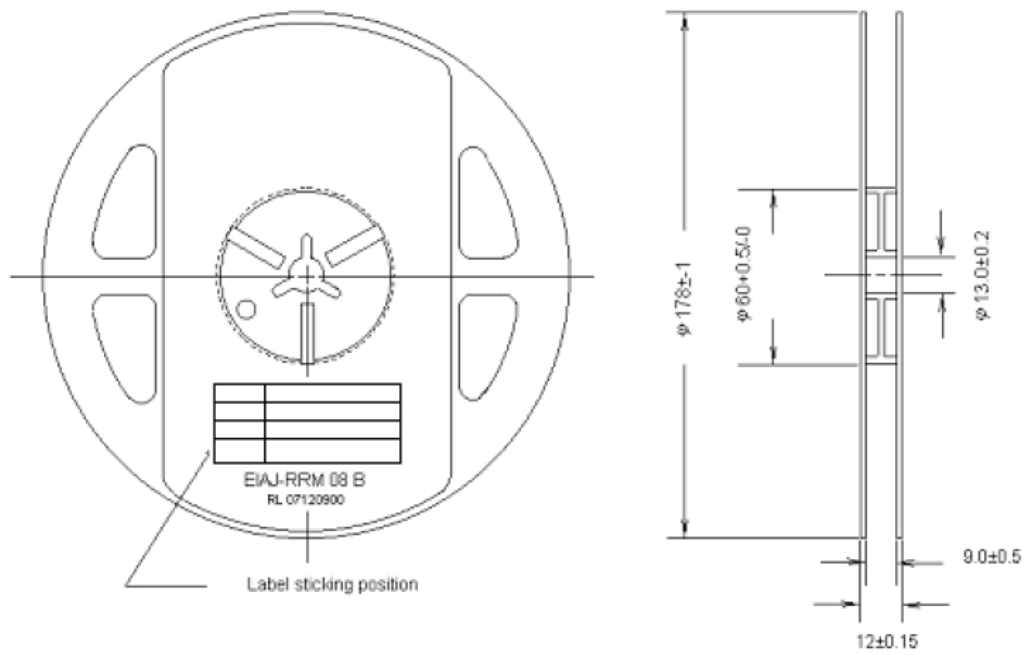
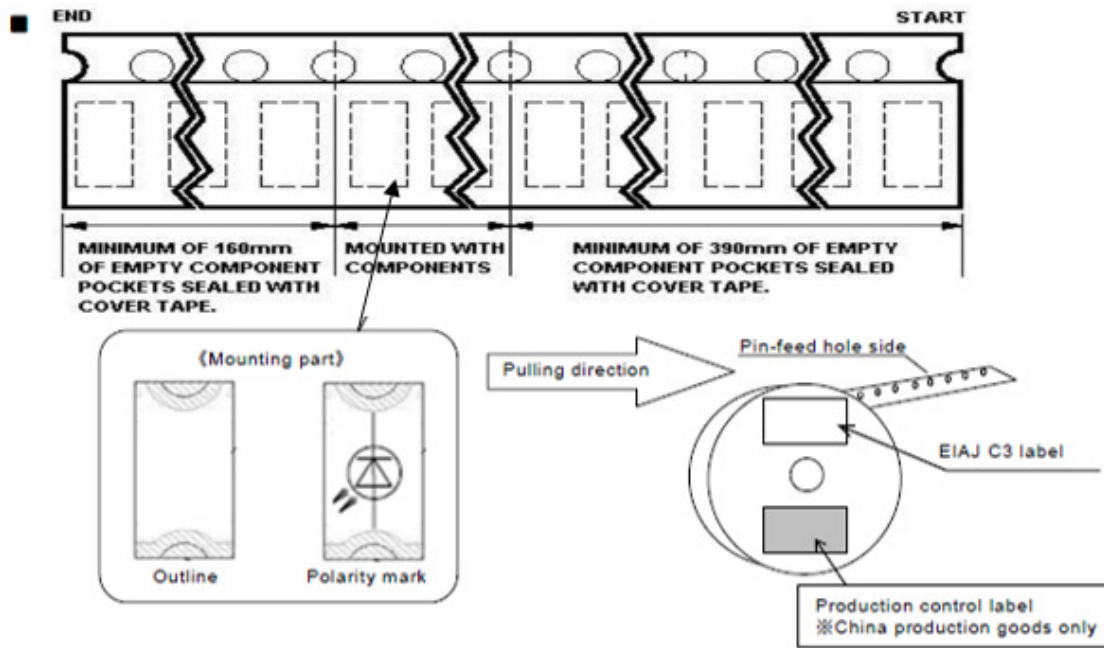


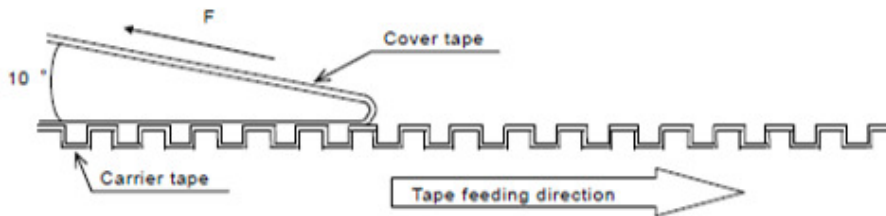
Figure 9. Reel specification (unit in mm)





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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