ALMD-CE3F-XZx02

High Brightness SMT Round Cyan LED Lamps

AVAGO TECHNOLOGIES

Datasheet

Lead (PB) Free
RoHS 6 fully
compliant

Description

The new Avago ALMD-CE3F LED series has the same or just slightly less luminous intensity than conventional high brightness, through-hole LEDs. The new LED lamps can be assembled using common SMT assembly processes and are compatible with industrial reflow soldering processes.

The LEDs are made with an advanced optical grade epoxy for superior performance in outdoor sign applications. For easy pick and place assembly, the LEDs are shipped in tape and reel. Every reel is shipped from a single intensity and color bin for better uniformity

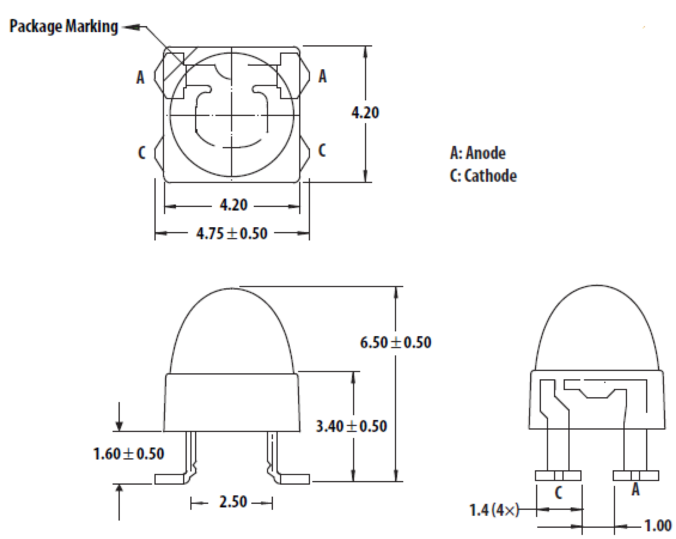
.Features

- Compact form factor
- High brightness material
- Cyan color 505nm
- Typical viewing angle: 30°
- Jedec MSL 3
- Compatible with industrial reflow soldering process
- Tinted, non-diffused

Applications

- Variable Message Signs
- Traffic Signal

Package Dimensions



Notes:

1. All dimensions in millimeters (inches).
2. Tolerance is ± 0.20 mm unless other specified.
3. Mildsteel leadframe

CAUTION: InGaN devices are ESD sensitive per JEDEC Standard. Please observe appropriate precautions during handling and processing. Refer to Application Note AN-1142 for additional details.

Caution: Customer is advised to always keep the LED in the moisture barrier bag with <5%RH when not in use as prolonged exposure to environment might cause the leads to tarnish or rust, which might cause difficulties in soldering.

Device Selection Guide

Part Number	Color and Dominant Wavelength λd (nm) Typ [3]	Luminous Intensity Iv (mcd) [1,2,5]		Viewing Angle Typ (°) [4]
		Min	Max	
ALMD-CE3F-XZ002	Cyan 505	7200	16000	30°
ALMD-CE3F-XZC02	Cyan 505	7200	16000	30°
ALMD-CE3F-XZQ02	Cyan 505	7200	16000	30°

Notes:
1. The luminous intensity is measured on the mechanical axis of the lamp package and it is tested with pulsing condition.
2. The optical axis is closely aligned with the package mechanical axis.
3. Dominant wavelength, λd, is derived from the CIE Chromaticity Diagram and represents the color of the lamp.
4. θ½ is the off-axis angle where the luminous intensity is half the on-axis intensity.
5. Tolerance for each bin limit is ± 15%

Part Numbering System

A L M D - x1 x2 x3 x4 - x5 x6 x7 x8 x9

Code	Description	Option	
x1	Package type	C	Round InGaN
x2	Color	E	Cyan
x3	Viewing angle	3	30°
x4	Product specific designation	F	
x5	Minimum intensity bin	Refer to selection guide	
x6	Maximum intensity bin	Refer to selection guide	
x7	Color bin	0	Full distribution
		C	Color bin 3 & 4
		Q	Color bin 7 & 8
x8x9	Packaging option	02	Tested 20mA, 13inch carrier tape

Absolute Maximum Rating, $T_J = 25°C$

Parameter	Cyan	Unit
DC Forward Current [1]	30	mA
Peak Forward Current	100[2]	mA
Power Dissipation	105	mW
Reverse Voltage	Not recommended for reverse bias	V
LED Junction Temperature	100	°C
Operating Temperature Range	-40 to +85	°C
Storage Temperature Range	-40 to +100	°C

Notes:
1. Derate linearly as shown in Figure 4
2. Duty Factor 10%, frequency 1KHz.

Electrical / Optical Characteristics, $T_J = 25°C$

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Voltage	V_F	2.8	3.0	3.5	V	$I_F = 20$ mA
Reverse Voltage [2]	V_R	5			V	$I_R = 10\ \mu A$
Dominant Wavelength[1]	λ_d	490	505	510		$I_F = 20$ mA
Peak Wavelength	λ_{PEAK}		501		nm	Peak of Wavelength of Spectral Distribution at $I_F = 20$ mA
Thermal Resistance	$R\theta_{J\text{-}PIN}$		380		°C/W	LED Junction-to-Pin

Notes:

1. The dominant wavelength is derived from the chromaticity Diagram and represents the color of the lamp.
2. Indicates product final testing condition. Long term reverse bias is not recommended

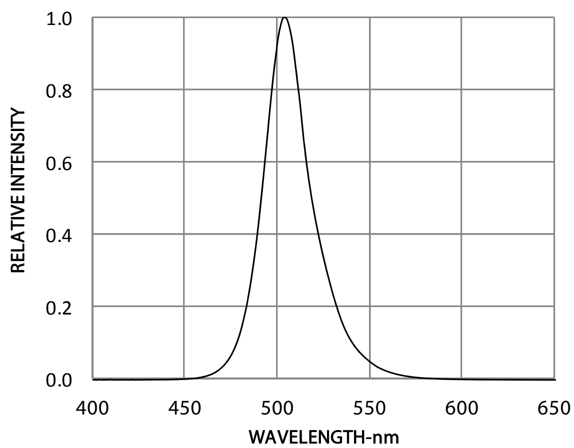


Figure 1: Relative Intensity vs Wavelength

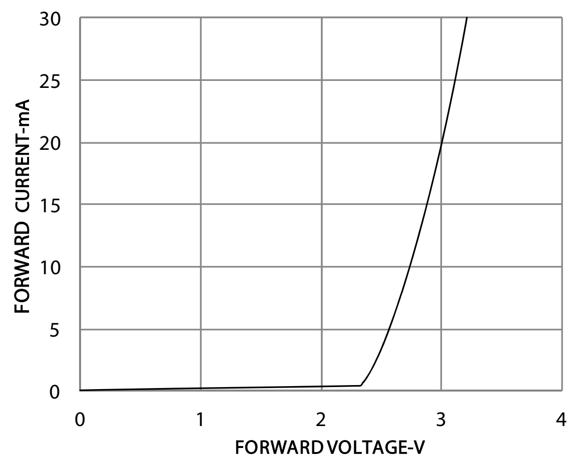


Figure 2: Forward Current vs Forward Voltage

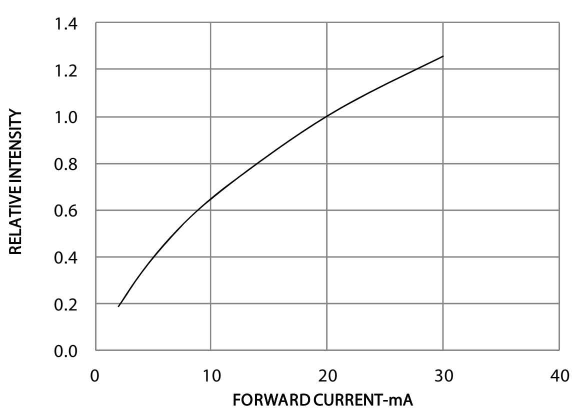


Figure3: Relative Intensity vs Forward Current

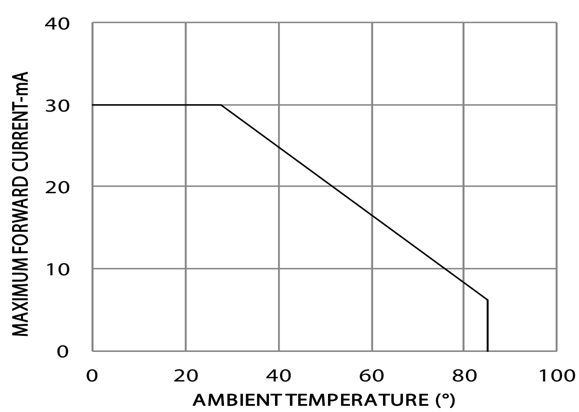


Figure 4: Maximum Forward Current vs Ambient Temperature

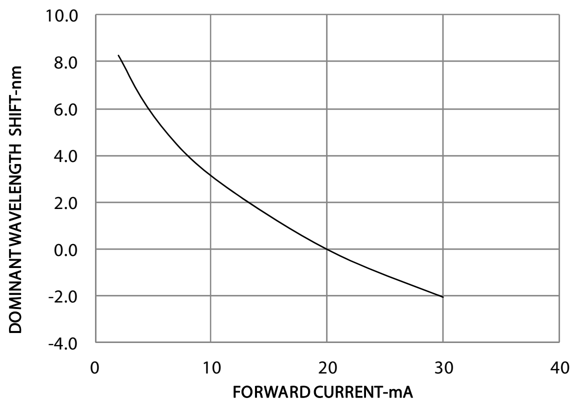


Figure 5: Dominant Wavelength Shift vs Forward Current

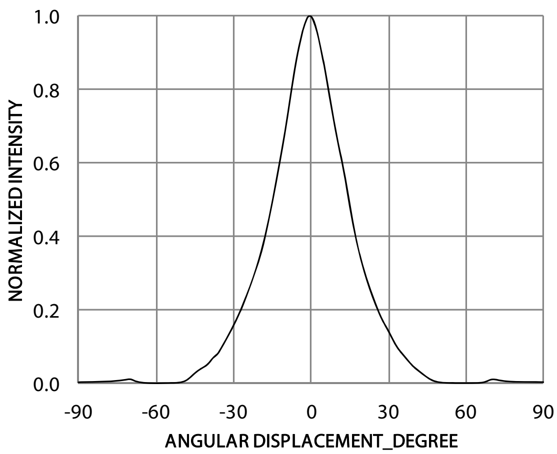


Figure 6a: Radiation Pattern for X axis

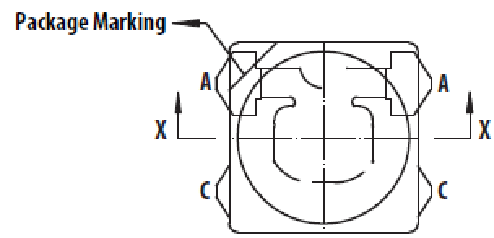


Figure 6b: Component Axis for Radiation Pattern

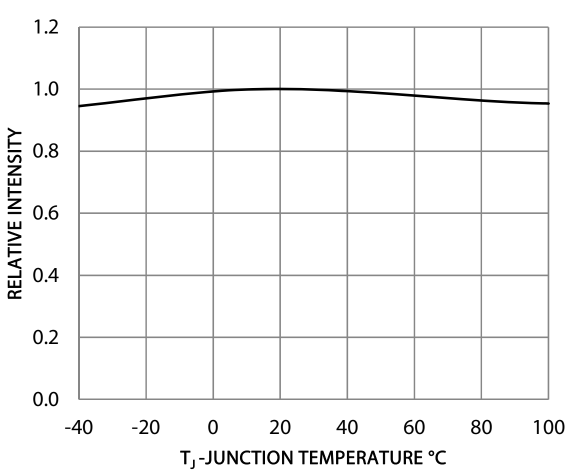


Figure 7: Relative Intensity Shift vs Junction Temperature

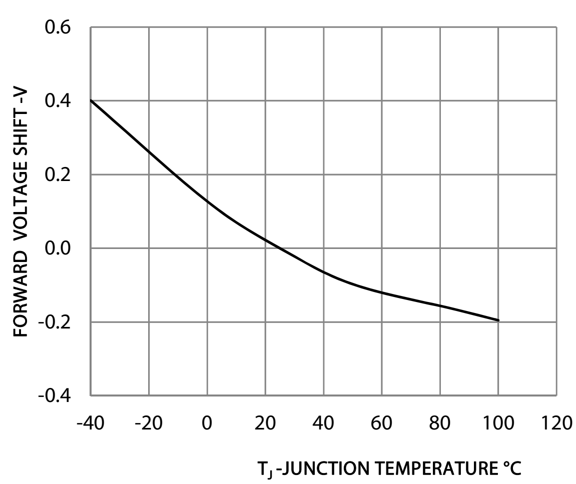
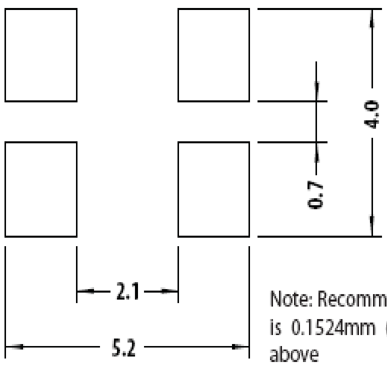


Figure 8: Forward Voltage Shift vs Junction Temperature



Note: Recommended stencil thickness is 0.1524mm (6 mils) minimum and above

Figure 9: Recommended Soldering Land Pattern

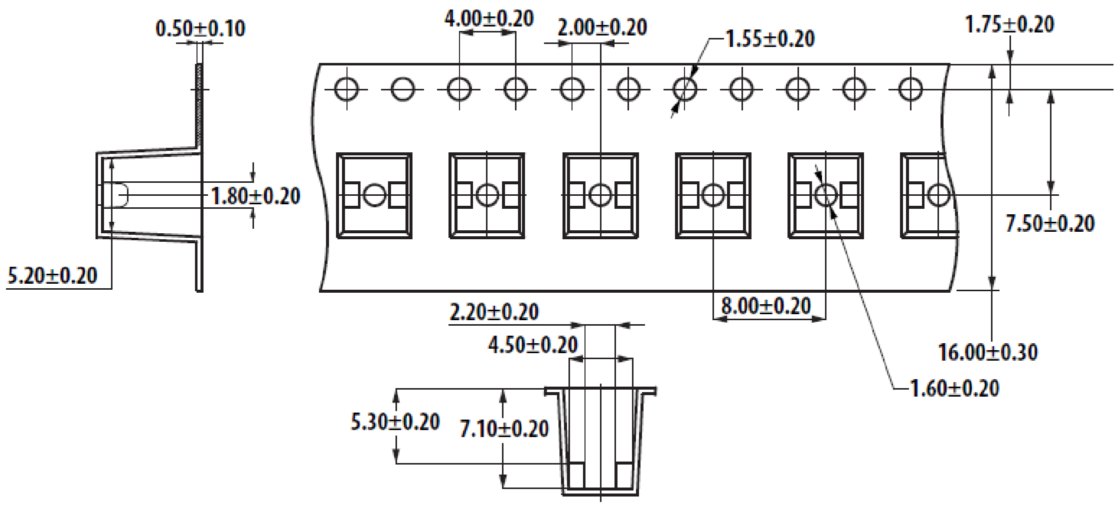


Figure 10 Carrier Tape Dimension

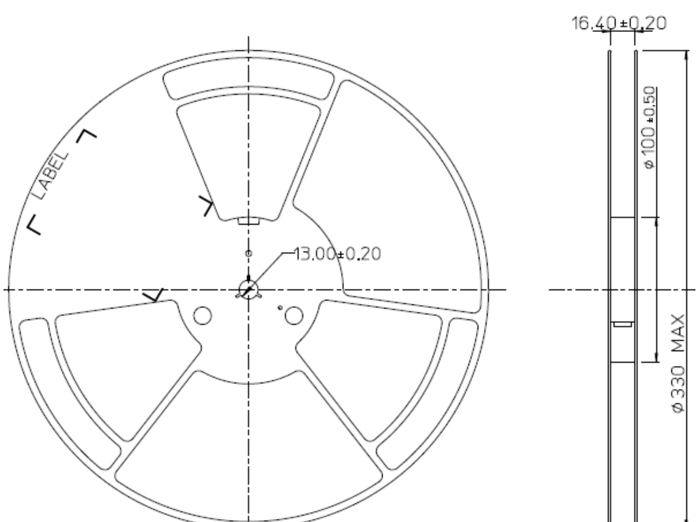


Figure 11 Reel Dimension

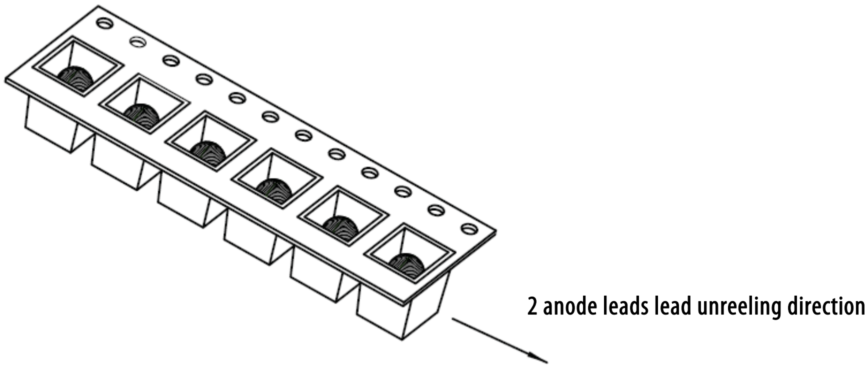
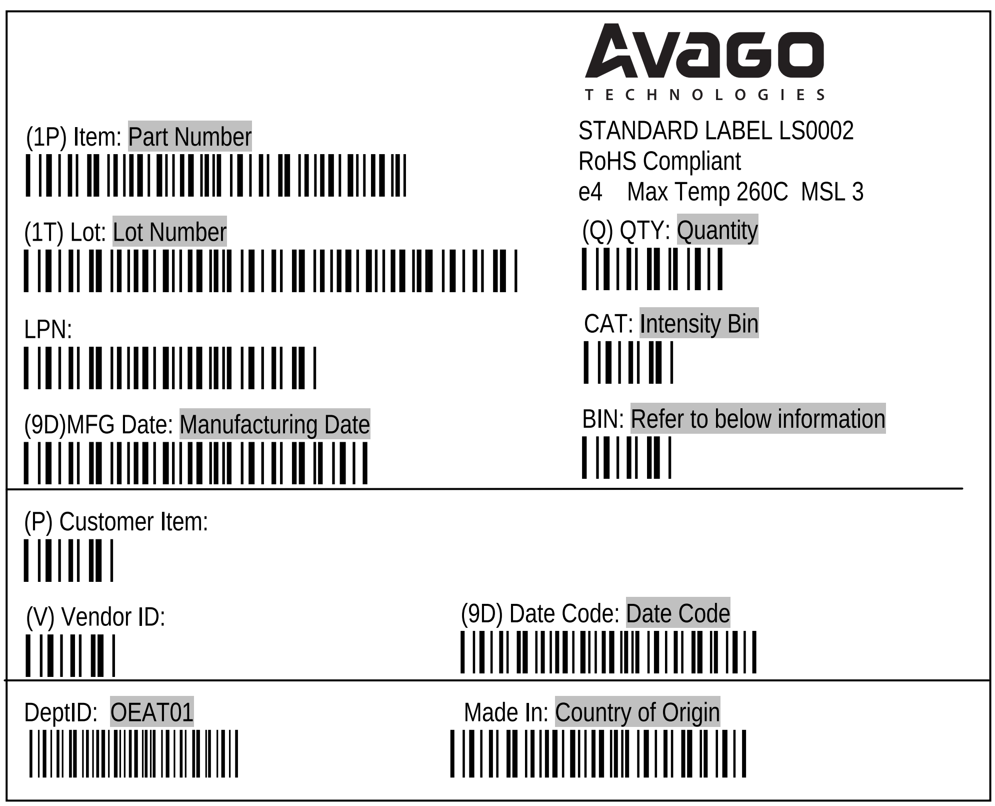


Figure 12 Unit Orientation From Reel

Packing Label

(i) Mother label (available on moisture barrier bag)



(ii) Baby label (available on plastic reel)

(1P) PART #: Part Number

(1T) Lot #: Lot Number

(9D)MFG Date: Manufacturing Date

C/0: Country of Origin

(1T) TAPE DATE: Taping Date

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BABY LABEL COSBOO1B V0.0

(Q) QTY: Quantity

(9D) Date Code: Date Code

CAT Intensity Bin

BIN Refer to Below information

Acronyms and Definition:
BIN: Color bin only

Intensity Bin Limit Table (1.3:1 Iv bin ratio)

Bin	Intensity (mcd) at 20mA Min	Intensity (mcd) at 20mA Max
X	7200	9300
Y	9300	12000
Z	12000	16000

Tolerance for each bin limit is ± 15%

Cyan Color Range

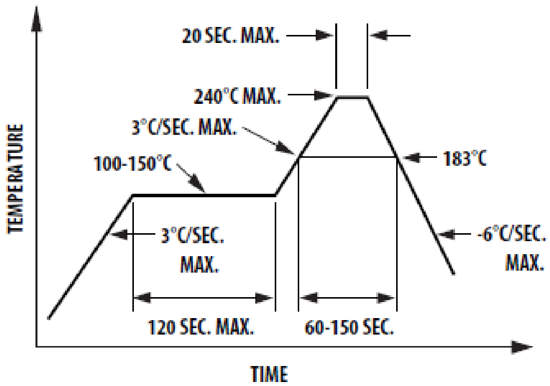
Bin	Min Dom	Max Dom		Chromaticity Coordinate			
			x	0.0454	0.1318	0.1164	0.0235
1	490.0	495.0	y	0.2950	003065	0.3889	0.4127
			x	0.0235	0.1164	0.1057	0.0082
2	495.0	500.0	y	0.4127	0.3889	0.4769	0.5384
			x	0.0082	0.1057	0.1027	0.0039
3	500.0	505.0	y	0.5384	0.4769	0.5584	0.6548
			x	0.0039	0.1030	0.1097	0.0139
4	505.0	510.0	y	0.6548	0.5580	0.6251	0.7502
			x	0.0132	0.1092	0.1028	0.0040
7	498.0	503.0	y	0.4882	0.4417	0.5273	0.6104
			x	0.0040	0.1028	0.1056	0.0080
8	503.0	508.0	y	0.6104	0.5273	0.6007	0.7153

Tolerance for each bin limit is ± 0.5nm

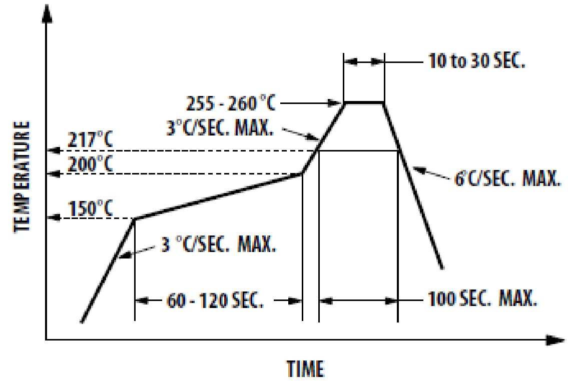
Soldering

Recommended reflow soldering condition:

(i) Leaded reflow soldering:

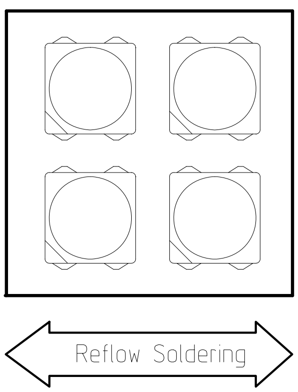


(ii) Lead-free reflow soldering:



(a) Reflow soldering must not be done more than 2 times. Do observe necessary precautions of handling moisture sensitive device as stated in below section.

(b) Recommended board reflow direction:



(c) Do not apply any pressure or force on the LED during reflow and after reflow when the LED is still hot.

(d) It is preferred to use reflow soldering to solder the LED. Hand soldering shall only be used for rework if unavoidable but must be strictly controlled to conditions below:
- Soldering iron tip temperature = 320°C max
- Soldering duration = 3 sec max
- Number of cycle = 1 only
- Power of soldering iron = 50W max

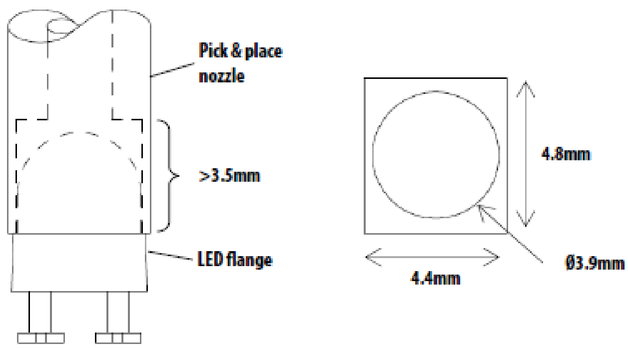
(e) Do not touch the LED body with hot soldering iron except the soldering terminals as it may cause damage to the LED.

(f) For de-soldering, it is recommended to use appropriate double head soldering iron. User is advised to confirm beforehand whether the functionality and performance of the LED is affected by hand soldering.

PRECAUTIONARY NOTES

1. Handling precautions

For automated pick and place, Avago has tested nozzle size below made with urethane material to be working fine with this LED. However, due to the possibility of variations in other parameters such as pick and place machine maker/model and other settings of the machine, customer is recommended to verify the nozzle selected.



Note:
(a) Nozzle tip should touch the LED flange during pick and place.
(b) Outer dimensions of the nozzle should be able to fit into the carrier tape pocket.

2. Handling of moisture sensitive device

This product has a Moisture Sensitive Level 3 rating per JEDEC J-STD-020. Refer to Avago Application Note AN5305*, Handling of Moisture Sensitive Surface Mount Devices,* for additional details and a review of proper handling procedures.

(a) Before use
- An unopened moisture barrier bag (MBB) can be stored at <40°C/90%RH for 12 months. If the actual shelf life has exceeded 12 months and the humidity Indicator Card (HIC) indicates that baking is not required, then it is safe to reflow the LEDs per the original MSL rating.
- It is recommended that the MBB not be opened prior to assembly (e.g. for IQC).

(b) Control after opening the MBB
- The humidity indicator card (HIC) shall be read immediately upon opening of MBB.
- The LEDs must be kept at <30°C / 60%RH at all times and all high temperature related processes including soldering, curing or rework need to be completed within 168 hours.

(c) Control for unfinished reel
- Unused LEDs must be stored in a sealed MBB with desiccant or desiccator at <5%RH.

(d) Control of assembled boards
- If the PCB soldered with the LEDs is to be subjected to other high temperature processes, the PCB need to be stored in sealed MBB with desiccant or desiccator at <5%RH to ensure that all LEDs have not exceeded their floor life of 168 hours.

(e) Baking is required if:
- The HIC indicator is not BROWN at 10% and is AZURE at 5%.
- The LEDs are exposed to condition of >30°C / 60% RH at any time.
- The LED floor life exceeded 168hrs.

The recommended baking condition is: 60±5°C for 20hrs
Baking should only be done once.

(f) Storage
- The soldering terminals of these Avago LEDs are silver plated. If the LEDs are being exposed in ambient environment for too long, the silver plating might be oxidized and thus affecting its solderability performance. As such, unused LEDs must be kept in sealed MBB with desiccant or in desiccator at <5%RH.

3. Application precautions

(a) Drive current of the LED must not exceed the maximum allowable limit across temperature as stated in the datasheet. Constant current driving is recommended to ensure consistent performance.
(b) LED is not intended for reverse bias. Do use other appropriate components for such purpose. When driving the LED in matrix form, it is crucial to ensure that the reverse bias voltage is not exceeding the allowable limit of the LED.
(c) Avoid rapid change in ambient temperature especially in high humidity environment as this will cause condensation on the LED.
(d) If the LED is intended to be used in outdoor or harsh environment, the LED leads must be protected with suitable potting material against damages caused by rain water, oil, corrosive gases etc. It is recommended to have louver or shade to reduce direct sunlight on the LEDs .

4. Eye safety precautions

LEDs may pose optical hazards when in operation. It is not advisable to view directly at operating LEDs as it may be harmful to the eyes. For safety reasons, use appropriate shielding or personal protective equipments.

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

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