HLMP-RL20, HLMP-SL20

Precision Optical Performance Amber
New 4mm Superwide Oval LED

Data Sheet

Lead (Pb) Free
RoHS 6 fully
compliant

Description

The Precision Optical Performance Oval LED is specifically designed for variable message signs and passenger information signs. The oval shaped radiation pattern and high luminous intensity ensure that these devices are excellent for wide field of view outdoor applications where a wide viewing angle and readability in sunlight are essential.

Features

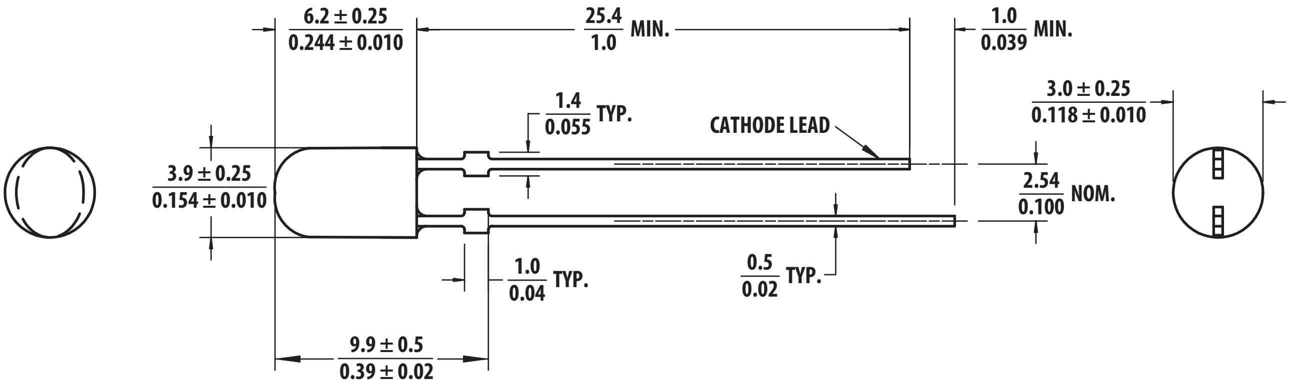
- Well defined spatial radiation pattern
- High brightness material
- Available in amber
  – Amber AlInGaP 590nm
- Superior resistance to moisture
- Typical viewing angle 60° x 120°
- Standoff Package

Applications

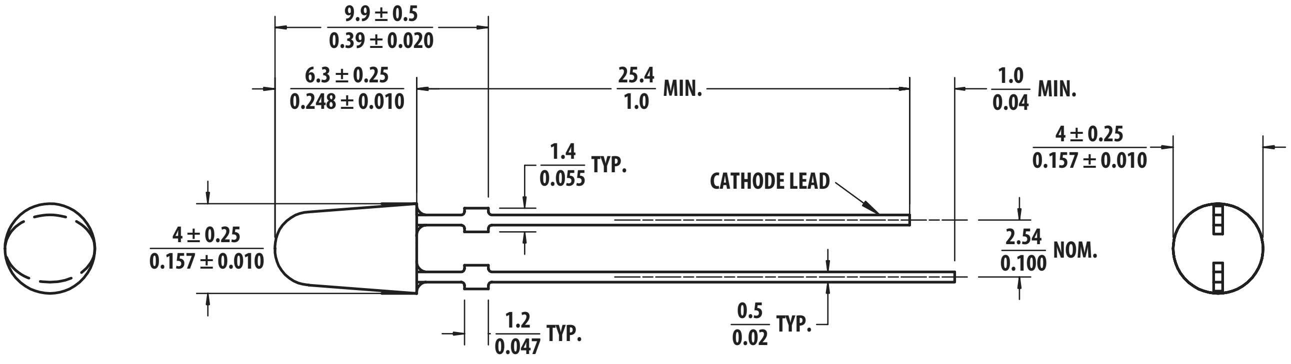
- Variable message signs
- Commercial outdoor advertising

Package Dimensions

Package Drawing A



Package Drawing B



Notes:
All dimensions in millimeters (inches).

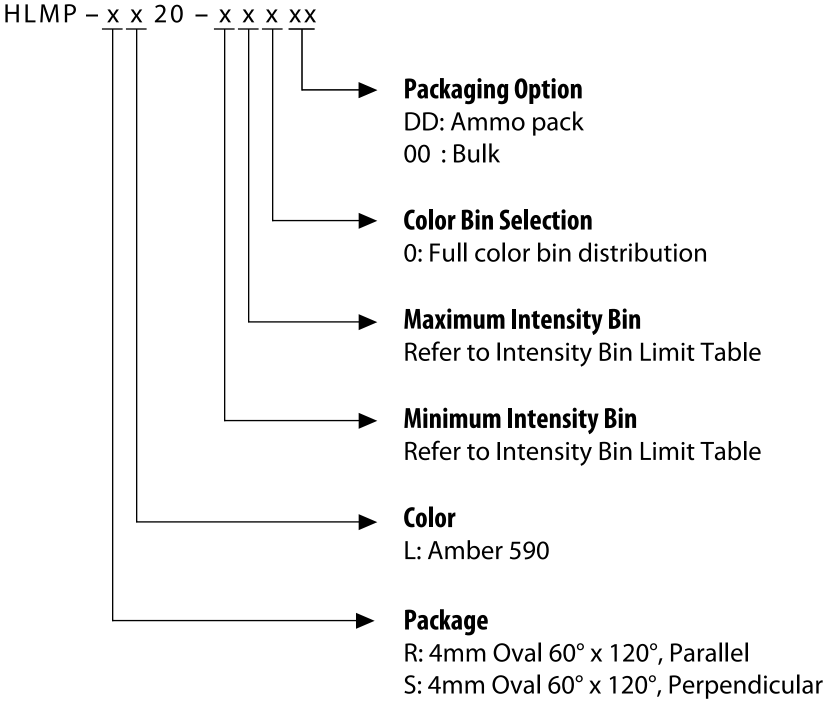
Device Selection Guide

Part Number	Color and Dominant Wavelength λd (nm) Typ	Luminous Intensity Iv (mcd) at 20 mA-Min	Luminous Intensity Iv (mcd) at 20 mA-Max	Package Drawing
HLMP-RL20-MP0DD	Amber 590	520	1150	A
HLMP-SL20-MP0DD	Amber 590	520	1150	B

Tolerance for each intensity limit is ± 15%.

Notes:
1. The luminous intensity is measured on the mechanical axis of the lamp package.
2. The optical axis is closely aligned with the package mechanical axis.

Part Numbering System


HLMP – x x 20 – x x x xx

Packaging Option
DD: Ammo pack
00 : Bulk

Color Bin Selection
0: Full color bin distribution

Maximum Intensity Bin
Refer to Intensity Bin Limit Table

Minimum Intensity Bin
Refer to Intensity Bin Limit Table

Color
L: Amber 590

Package
R: 4mm Oval 60° x 120°, Parallel
S: 4mm Oval 60° x 120°, Perpendicular

Note:
Please refer to AB 5337 for complete information about part numbering system.

Absolute Maximum Ratings

$T_A = 25°C$

Parameter	Amber	Unit
DC Forward Current [1]	50	mA
Peak Forward Current [2]	100	mA
Average Forward Current	30	mA
Reverse Voltage (I_R = 100 μA)	5	V
LED Junction Temperature	130	°C
Operating Temperature Range	-40 to +100	°C
Storage Temperature Range	-40 to +100	°C

Notes:

1. Derate linearly as shown in Figure 4.
2. Duty Factor 30%, frequency 1KHz.

Electrical / Optical Characteristics

$T_A = 25°C$

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Voltage	V_F	1.80	2.02	2.40	V	I_F = 20 mA
Reverse Voltage	V_R	5			V	I_R = 100 μA
Dominant Wavelength[1]	λ_d	584.5		594.5	nm	I_F = 20 mA
Peak Wavelength	λ_{PEAK}		594		nm	Peak of Wavelength of Spectral Distribution at I_F = 20 mA
Thermal Resistance	$R\theta_{J-PIN}$		240		°C/W	LED Junction-to-Cathode Lead
Luminous Efficacy [2] Amber	η_V		480		lm/W	Emitted Luminous Flux/Emitted Radiant Flux
Luminous Flux	φ_V		500		mlm	I_F = 20 mA
Luminous Efficiency [3]	η_e		12		lm/W	Emitted Luminous Flux/Electrical Power I_F = 20 mA

Notes:

1. The dominant wavelength is derived from the chromaticity Diagram and represents the color of the lamp.
2. The radiant intensity, I_e in watts per steradian, may be found from the equation $Ie = I_V/\eta_V$ where I_V is the luminous intensity in candelas and η_V is the luminous efficacy in lumens/watt.
3. $\eta_e = \varphi_V / I_F \times V_F$, where φ_V is the emitted luminous flux, I_F is electrical forward current and V_F is the forward voltage.

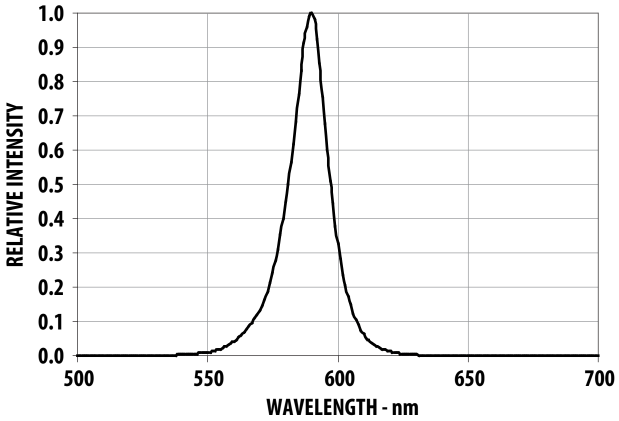


Figure 1. Relative Intensity vs Wavelength

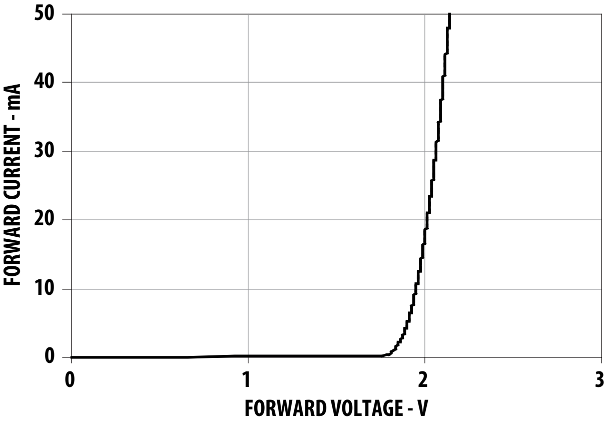


Figure 2. Forward Current vs Forward Voltage

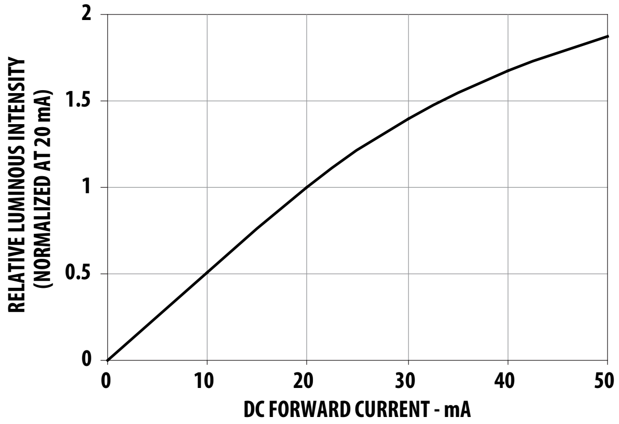


Figure 3. Relative Intensity vs Forward Current

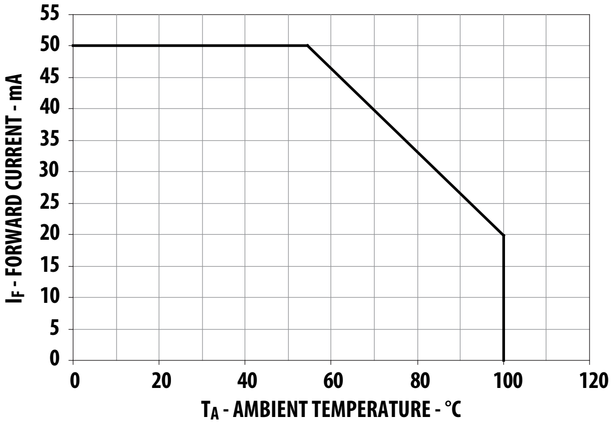


Figure 4. Maximum Forward Current vs Ambient Temperature

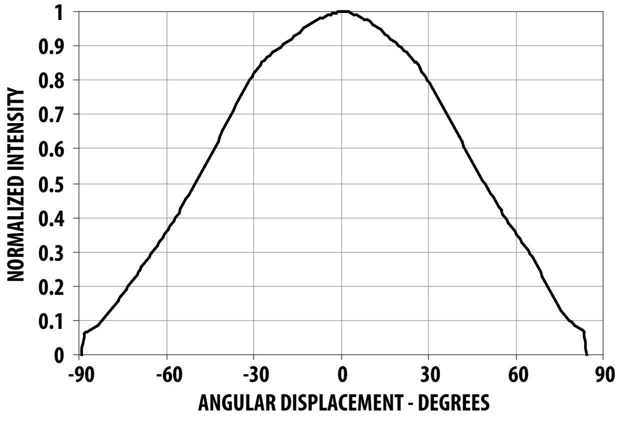


Figure 5. Representative Radiation Pattern – Major Axis

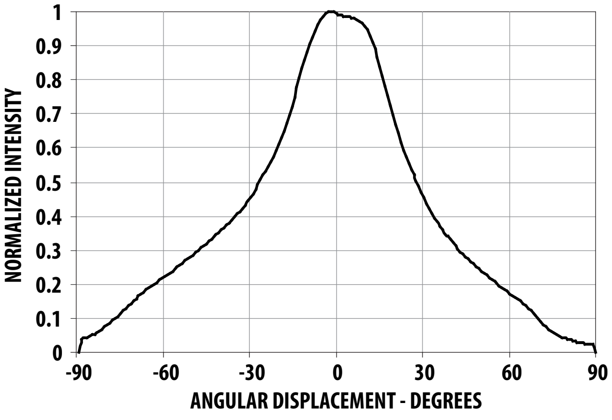


Figure 6. Representative Radiation Pattern – Minor Axis

Intensity Bin Limit Table

Bin Name	Min.	Max.
M	520	680
N	680	880
P	880	1150
Q	1150	1500

Tolerance for each bin limit is ± 15%

Color Bin Limit

Bin ID	Min.	Max.
1	584.5	587.0
2	587.0	589.5
4	589.5	592.0
6	592.0	594.5

Tolerance for each bin limit is ±1.0 nm

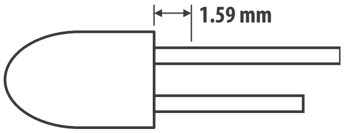
Precautions:

Lead Forming:

- The leads of an LED lamp may be preformed or cut to length prior to insertion and soldering on PC board.
- For better control, it is recommended to use proper tool to precisely form and cut the leads to applicable length rather than doing it manually.
- If manual lead cutting is necessary, cut the leads after the soldering process. The solder connection forms a mechanical ground which prevents mechanical stress due to lead cutting from traveling into LED package. This is highly recommended for hand solder operation, as the excess lead length also acts as small heat sink.

Soldering and Handling:

- Care must be taken during PCB assembly and soldering process to prevent damage to the LED component.
- LED component may be effectively hand soldered to PCB. However, it is only recommended under unavoidable circumstances such as rework. The closest manual soldering distance of the soldering heat source (soldering iron's tip) to the body is 1.59mm. Soldering the LED using soldering iron tip closer than 1.59mm might damage the LED.



- ESD precaution must be properly applied on the soldering station and personnel to prevent ESD damage to the LED component that is ESD sensitive. Do refer to Avago application note AN 1142 for details. The soldering iron used should have grounded tip to ensure electrostatic charge is properly grounded.
- Recommended soldering condition:

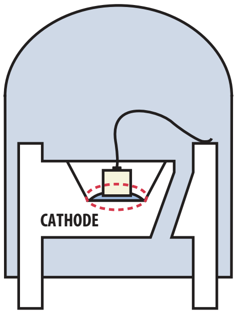
	Wave Soldering [1, 2]	**Manual Solder Dipping**
Pre-heat temperature	105°C Max.	–
Preheat time	60 sec Max	–
Peak temperature	250°C Max.	260°C Max.
Dwell time	3 sec Max.	5 sec Max

Note:
1) Above conditions refers to measurement with thermocouple mounted at the bottom of PCB.
2) It is recommended to use only bottom preheaters in order to reduce thermal stress experienced by LED.

- Wave soldering parameters must be set and maintained according to the recommended temperature and dwell time. Customer is advised to perform daily check on the soldering profile to ensure that it is always conforming to recommended soldering conditions.

Note:
1. PCB with different size and design (component density) will have different heat mass (heat capacity). This might cause a change in temperature experienced by the board if same wave soldering setting is used. So, it is recommended to re-calibrate the soldering profile again before loading a new type of PCB.
2. Avago Technologies' high brightness LED are using high efficiency LED die with single wire bond as shown below. Customer is advised to take extra precaution during wave soldering to ensure that the maximum wave temperature does not exceed 250°C and the solder contact time does not exceeding 3sec. Over-stressing the LED during soldering process might cause premature failure to the LED due to delamination.

Avago Technologies LED Configuration



Note: Electrical connection between bottom surface of LED die and the lead frame is achieved through conductive paste.

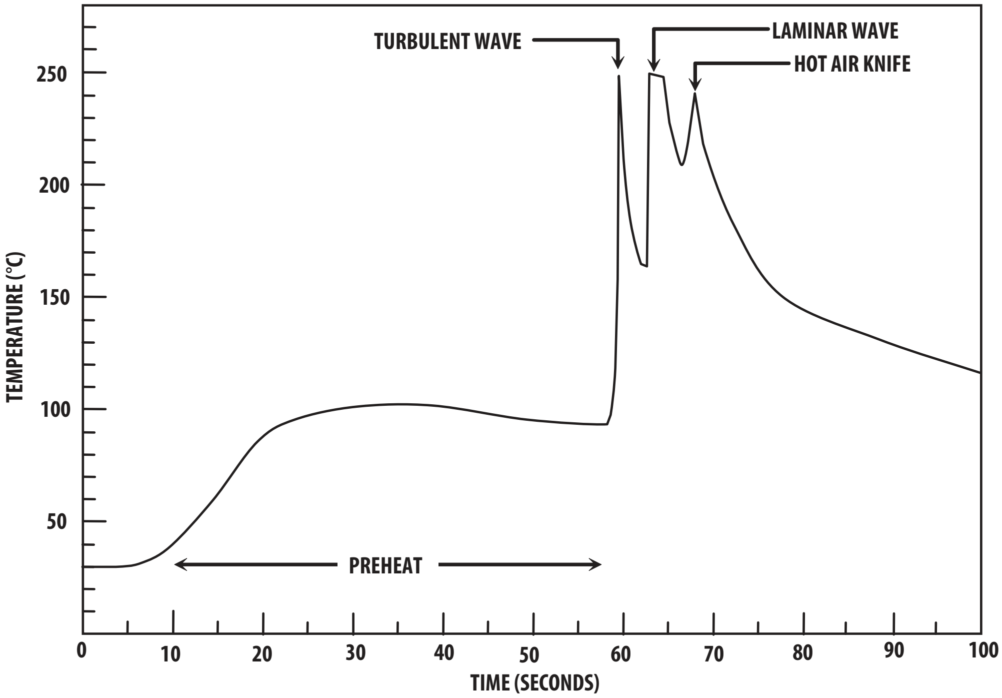
- Any alignment fixture that is being applied during wave soldering should be loosely fitted and should not apply weight or force on LED. Non metal material is recommended as it will absorb less heat during wave soldering process.
- At elevated temperature, LED is more susceptible to mechanical stress. Therefore, PCB must allowed to cool down to room temperature prior to handling, which includes removal of alignment fixture or pallet.
- If PCB board contains both through hole (TH) LED and other surface mount components, it is recommended that surface mount components be soldered on the top side of the PCB. If surface mount need to be on the bottom side, these components should be soldered using reflow soldering prior to insertion the TH LED.
- Recommended PC board plated through holes (PTH) size for LED component leads.

LED component lead size	**Diagonal**	**Plated through hole diameter**
0.45 x 0.45 mm (0.018x 0.018 inch)	0.636 mm (0.025 inch)	0.98 to 1.08 mm (0.039 to 0.043 inch)
0.50 x 0.50 mm (0.020x 0.020 inch)	0.707 mm (0.028 inch)	1.05 to 1.15 mm (0.041 to 0.045 inch)

- Over-sizing the PTH can lead to twisted LED after clinching. On the other hand under sizing the PTH can cause difficulty inserting the TH LED.

Refer to application note AN5334 for more information about soldering and handling of high brightness TH LED lamps.

Example of Wave Soldering Temperature Profile for TH LED



Recommended solder:
Sn63 (Leaded solder alloy)
SAC305 (Lead free solder alloy)

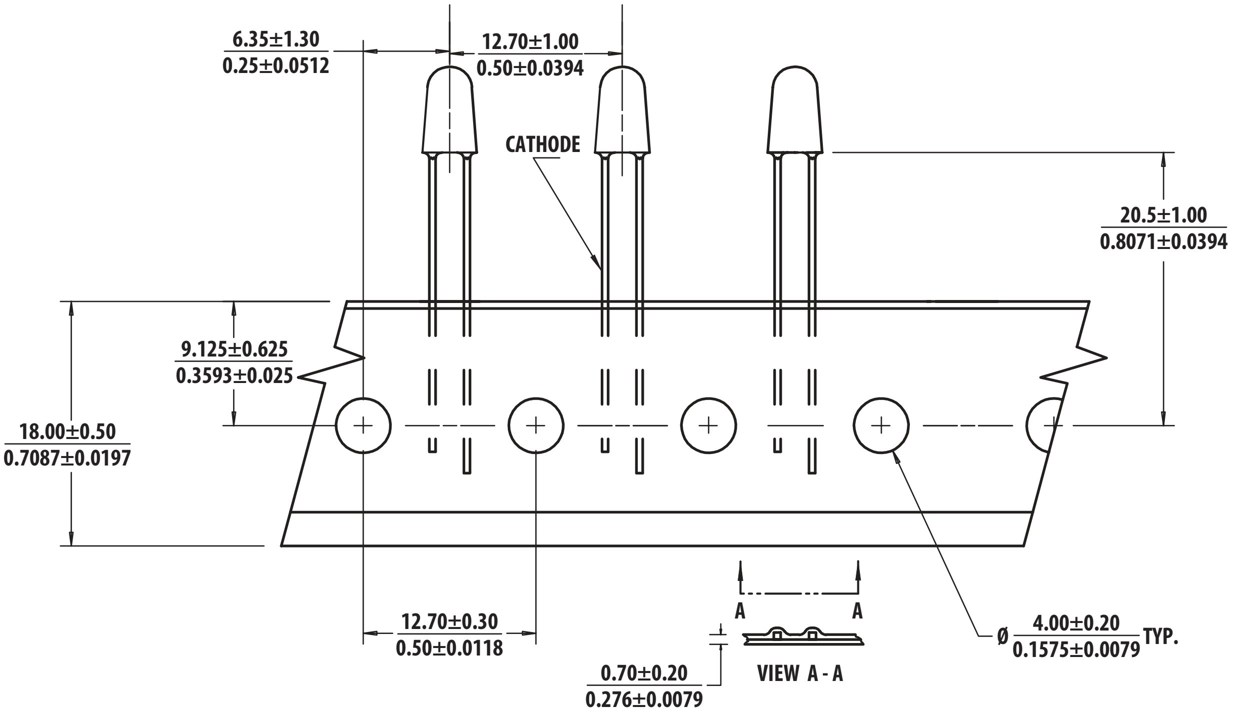
Flux: Rosin flux

Solder bath temperature:
245°C± 5°C (maximum peak temperature = 250°C)

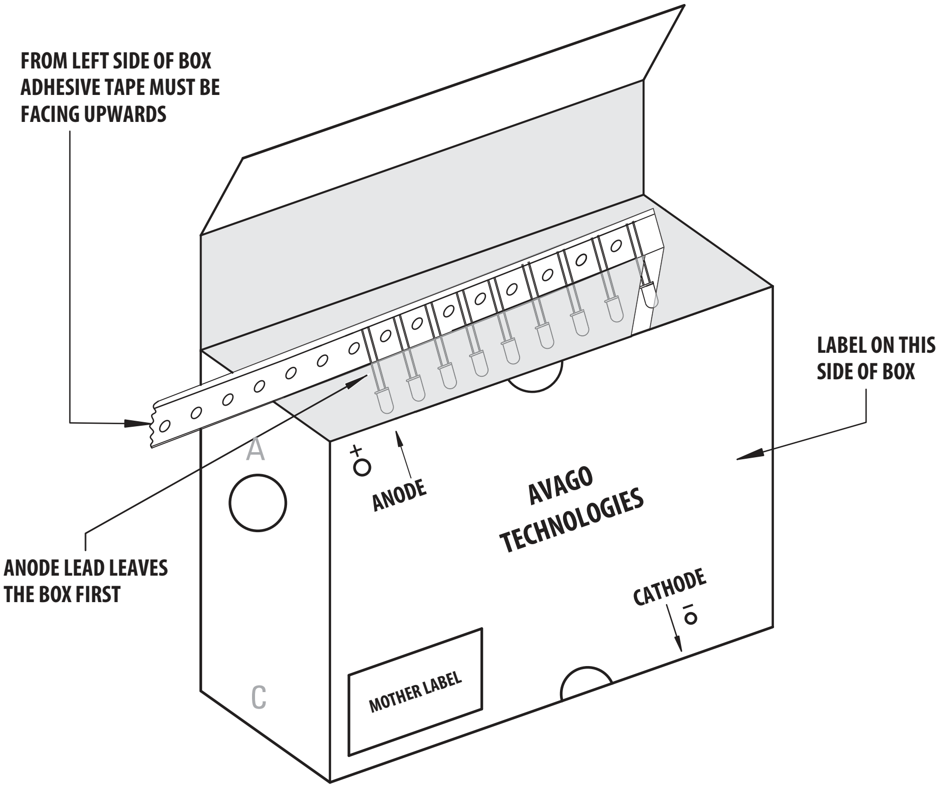
Dwell time: 1.5 sec - 3.0 sec (maximum = 3sec)

Note: Allow for board to be sufficiently cooled to room temperature before exerting mechanical force.

Ammo Packs Drawing



Packaging Box for Ammo Packs



Note: The dimension for ammo pack is applicable for the device with standoff and without standoff.

Packaging Label:

(i) Avago Mother Label: (Available on packaging box of ammo pack and shipping box)

AVAGO TECHNOLOGIES

(1P) Item: Part Number

STANDARD LABEL LS0002
RoHS Compliant
e3 max temp 250C

(1T) Lot: Lot Number

(Q) QTY: Quantity

LPN:

CAT: Intensity Bin

(9D)MFG Date: Manufacturing Date

BIN: Refer to below information

(P) Customer Item:

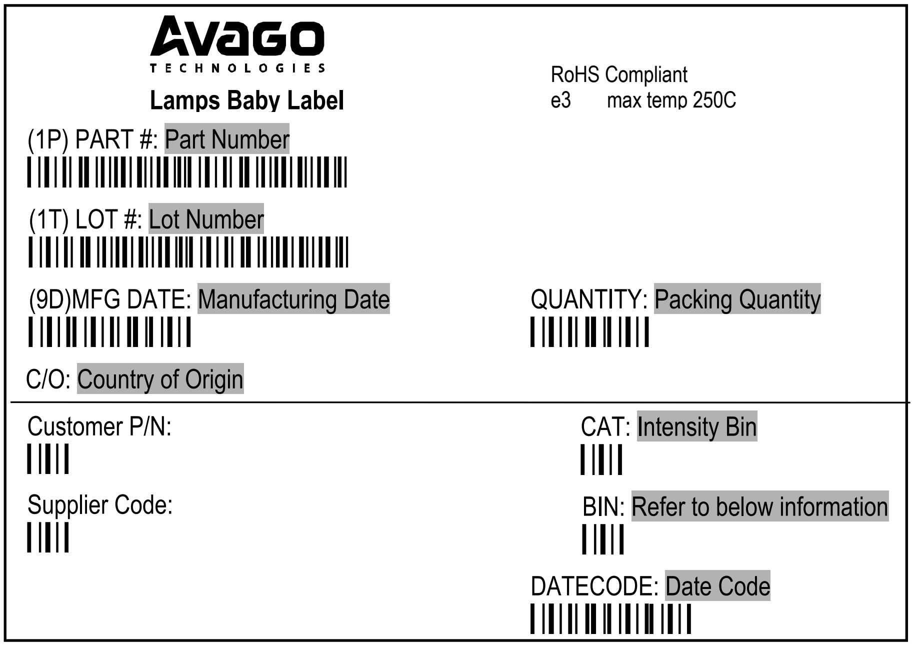
(V) Vendor ID:

(9D) Date Code: Date Code

DeptID:

Made In: Country of Origin

(ii) Avago Baby Label (Only available on bulk packaging)



AVAGO
TECHNOLOGIES

Lamps Baby Label

RoHS Compliant
e3 max temp 250C

(1P) PART #: Part Number

(1T) LOT #: Lot Number

(9D)MFG DATE: Manufacturing Date

QUANTITY: Packing Quantity

C/O: Country of Origin

Customer P/N:

Supplier Code:

CAT: Intensity Bin

BIN: Refer to below information

DATECODE: Date Code

Acronyms and Definition:

BIN:

(i) Color bin only or VF bin only

(Applicable for part number with color bins but without VF bin OR part number with VF bins and no color bin)

OR

(ii) Color bin incorporated with VF Bin

(Applicable for part number that have both color bin and VF bin)

Example:

(i) Color bin only or VF bin only

BIN: 2 (represent color bin 2 only)

BIN: VB (represent VF bin "VB" only)

(ii) Color bin incorporate with VF Bin

BIN: 2VB

VB: VF bin "VB"

2: Color bin 2 only

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