HLMP-HG70/71, HLMP-HL70/71

5 mm Standard Oval Red and Amber LEDs

AVAGO
TECHNOLOGIES

Data Sheet

Lead (Pb) Free
RoHS 6 fully
compliant

Description

These Precision Optical Performance Oval LEDs are specifically designed for full color/video 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. The package epoxy contains UV inhibitors to reduce the effects of long term exposure to direct sunlight.

Applications

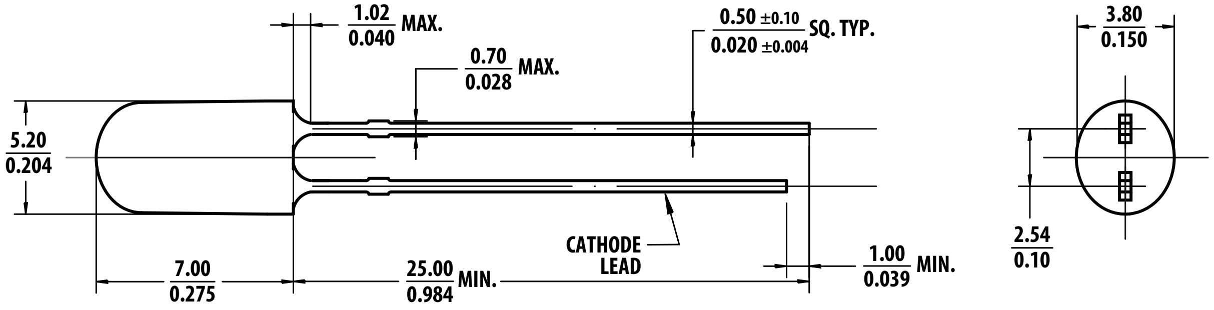
- Gas Price Signs
- Mono Color Signs – Marquee

Features

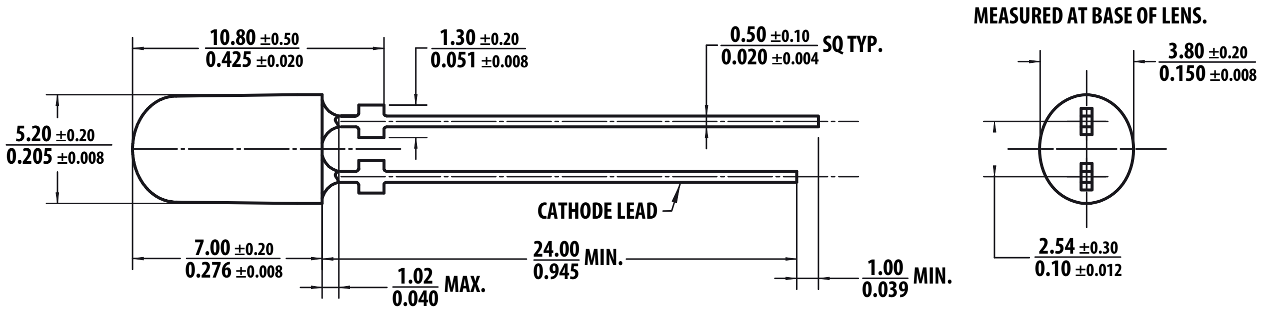
- Well defined spatial radiation pattern
- High brightness material
- Available in Red and Amber
  - Red AlInGaP 626 nm
  - Amber AlInGaP 590 nm
- Superior resistance to moisture
- Standoff and non-standoff Package
- Tinted and diffused
- Typical viewing angle 40° x100°

Package Dimensions

A



B



Notes:
All dimensions in millimeters (inches).
Tolerance is ± 0.20 mm unless other specified

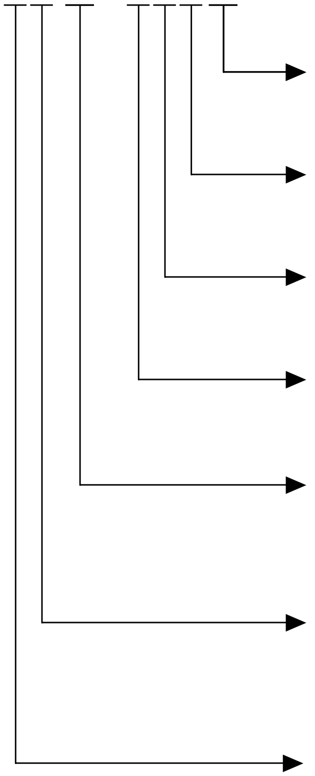
Device Selection Guide

Part Number	Color and Dominant Wavelength λ_d (nm) Typ [3]	Luminous Intensity Iv (mcd) at 20 mA [1,2,5]		Standoff	Package Drawing	Typical Viewing angle (°) [4]
		Min	Max			
HLMP-HG70-VX0DD	Red 626	1150	1990	No	A	40 x 100
HLMP-HG71-VX0DD	Red 626	1150	1990	Yes	B	
HLMP-HL70-WY0DD	Amber 590	1380	2400	No	A	
HLMP-HL71-WY0DD	Amber 590	1380	2400	Yes	B	

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, λ_d, is derived from the CIE Chromaticity Diagram and represents the color of the lamp.
4. $\theta_{1/2}$ 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

HLMP – H x xx – x x x xx



Packaging Option
DD: Ammopack

Color Bin Selection
0 : Full Distribution

Maximum Intensity Bin
Refer to Device Selection Guide

Minimum Intensity Bin
Refer to Device Selection Guide

Standoff/Non Standoff
70 : Without Standoff
71 : With Standoff

Color
G: Red
L : Amber

Package
H: 5 mm Standard Oval 40° x 100°

Absolute Maximum Ratings ($T_J = 25° C$)

Parameter	Red/ Amber	Unit
DC Forward Current [1]	50	mA
Peak Forward Current	100 [2]	mA
Power Dissipation	120	mW
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 1 kHz.

Electrical / Optical Characteristics ($T_J = 25° C$)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Voltage Red & Amber	V_F	1.8	2.1	2.4	V	$I_F = 20$ mA
Reverse Voltage [3] Red & Amber	V_R	5			V	$I_R = 100$ μA
Dominant Wavelength [1]	λ_d				nm	$I_F = 20$ mA
Red		618.0	626.0	630.0		
Amber		584.5	590.0	594.5		
Peak Wavelength	λ_{PEAK}				nm	Peak of Wavelength of Spectral Distribution at $I_F = 20$ mA
Red			634			
Amber			594			
Thermal resistance	$R\theta_{J\text{-}PIN}$		240		°C/W	LED Junction-to pin
Luminous Efficacy [2]	η_v				lm/W	Emitted Luminous Power/ Emitted Radiant Power
Red			190			
Amber			490			
Thermal coefficient of λd					nm/°C	$I_F = 20$ mA; $+25° C \le T_J \le +100° C$
Red			0.05			
Amber			0.09			

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, maybe found from the equation $I_e = I_v / \eta_V$ where I_v is the luminous intensity in candela and η_V is the luminous efficacy in lumens/ watt.
3. Indicates product final testing condition, long term reverse bias is not recommended.

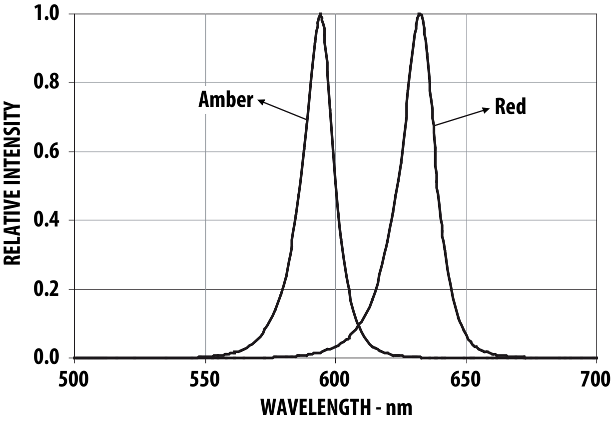


Figure 1. Relative Intensity vs Wavelength

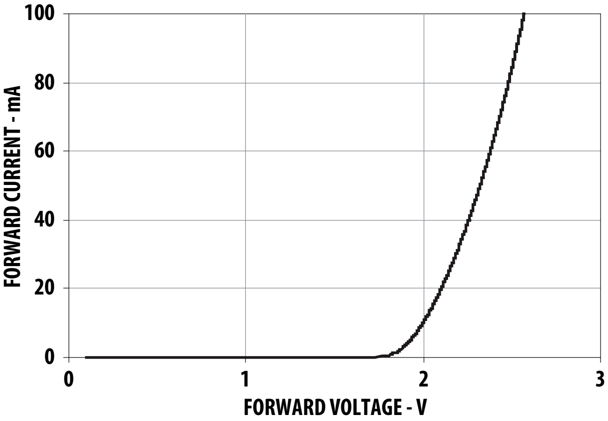


Figure 2. Forward Current vs Forward Voltage

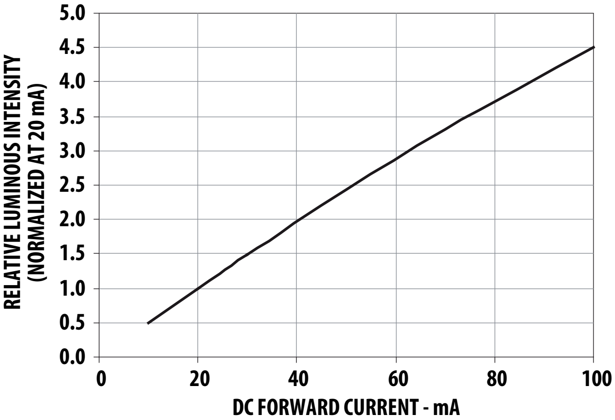


Figure 3. Relative Intensity vs Forward Current

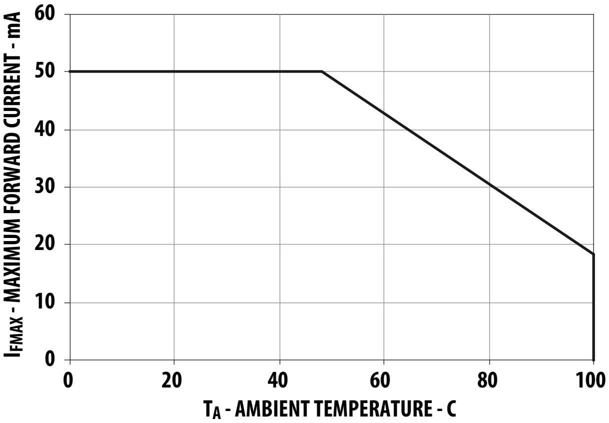


Figure 4. Maximum Forward Current vs Ambient Temperature

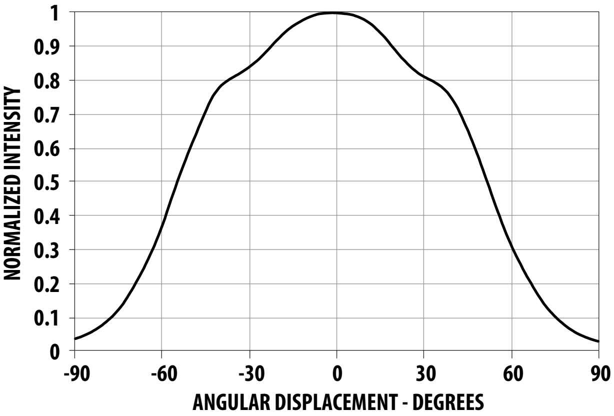


Figure 5. Radiation pattern for RED - Major Axis

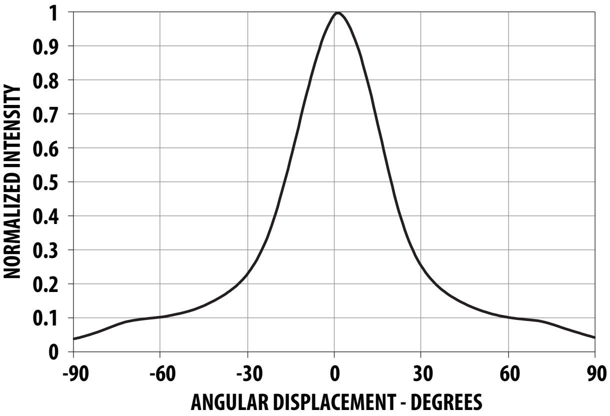


Figure 6. Radiation pattern for RED - Minor Axis

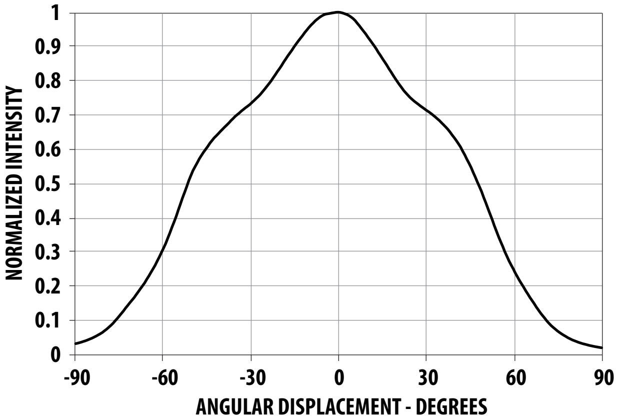


Figure 7. Radiation pattern for AMBER - Major Axis

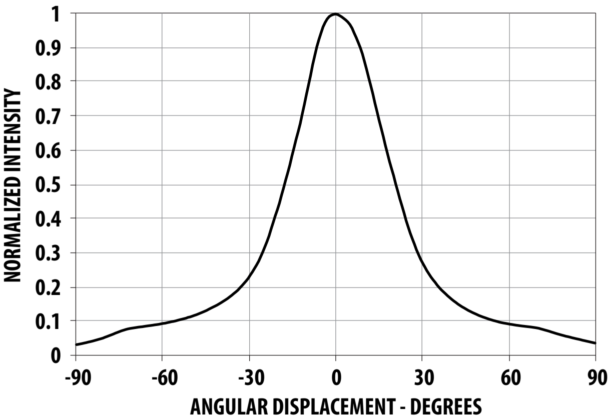


Figure 8. Radiation pattern for AMBER - Minor Axis

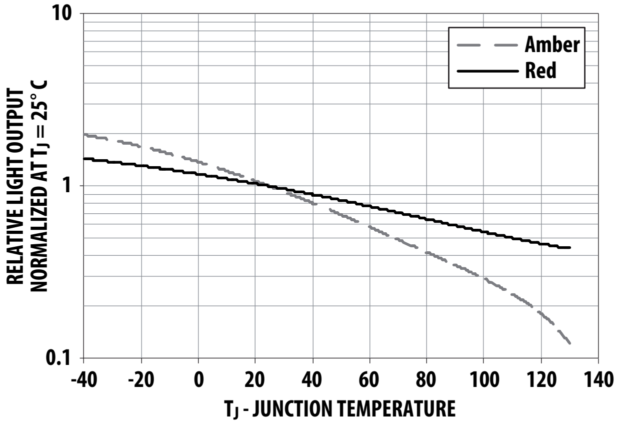


Figure 9. Relative Light Output vs Junction Temperature

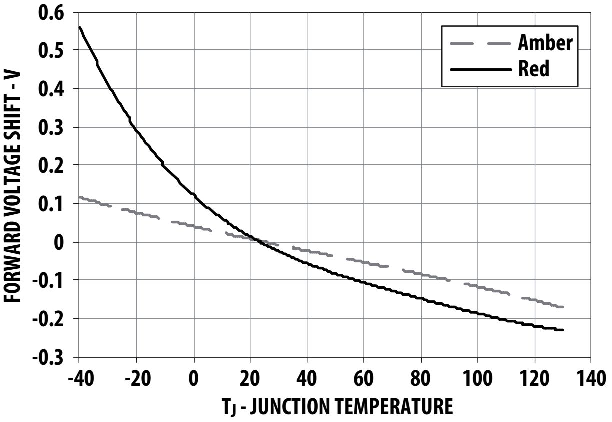


Figure 10. Forward Voltage Shift vs Junction Temperature

Intensity Bin Limit Table (1.2 : 1 Iv Bin Ratio)

	Intensity (mcd) at 20 mA	
Bin	**Min**	**Max**
V	1150	1380
W	1380	1660
X	1660	1990
Y	1990	2400

Tolerance for each bin limit is ± 15%

V_F Bin Table (V at 20 mA)

Bin ID	Min	Max
VD	1.8	2.0
VA	2.0	2.2
VB	2.2	2.4

Notes:
1. Tolerance for each bin limit is ±0.05 V.
2. V_F binning only applicable to Red and Amber color.

Red Color Range

Min Dom	Max Dom		Chromaticity Coordinate			
618.0	630.0	x	0.6872	0.3126	0.6890	0.2943
		y	0.6690	0.3149	0.7080	0.2920

Tolerance for each bin limit is ± 0.5 nm

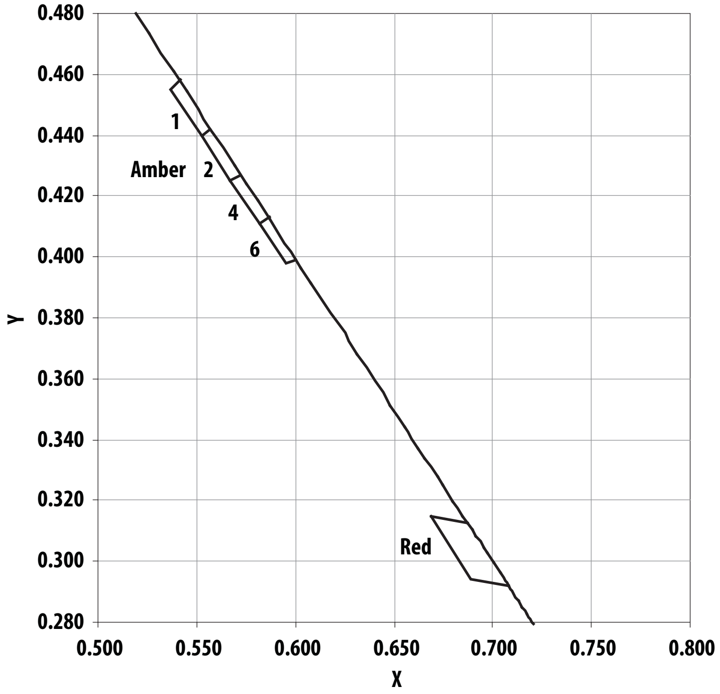
Amber Color Range

Bin	Min Dom	Max Dom		Chromaticity Coordinate			
1	584.5	587.0	x	0.5420	0.4580	0.5530	0.4400
			y	0.5370	0.4550	0.5570	0.4420
2	587.0	589.5	x	0.5570	0.4420	0.5670	0.4250
			y	0.5530	0.4400	0.5720	0.4270
4	589.5	592.0	x	0.5720	0.4270	0.5820	0.4110
			y	0.5670	0.4250	0.5870	0.4130
6	592.0	594.5	x	0.5870	0.4130	0.5950	0.3980
			y	0.5820	0.4110	0.6000	0.3990

Tolerance for each bin limit is ± 0.5 nm

Note:
1. All bin categories are established for classification of products. Products may not be available in all bin categories. Please contact your Avago representative for further information.

Avago Color Bin on CIE 1931 Chromaticity Diagram



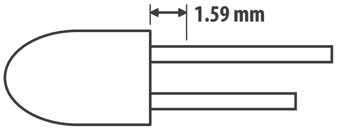
Precautions:

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	260 °C Max.	260 °C Max.
Dwell time	5 sec Max.	5 sec Max

Note:

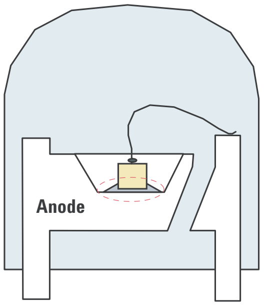
1) Above conditions refers to measurement with thermocouple mounted at the bottom of PCB.
2) It is recommended to use only bottom preheaters in order to reduce thermal stress experienced by LED.

- 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 260°C and the solder contact time does not exceeding 5sec. 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.

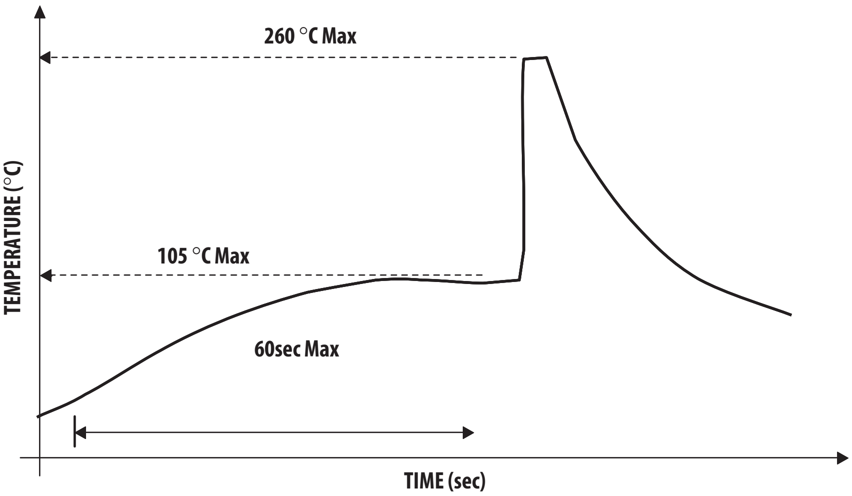
- Any alignment fixture that is being applied during wave soldering should be loosely fitted and should not apply weight or force on LED. Non metal material is recommended as it will absorb less heat during wave soldering process.

  Note: In order to further assist customer in designing jig accurately that fit Avago Technologies' product, 3D model of the product is available upon request.
- 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.

Example of Wave Soldering Temperature Profile for TH LED



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

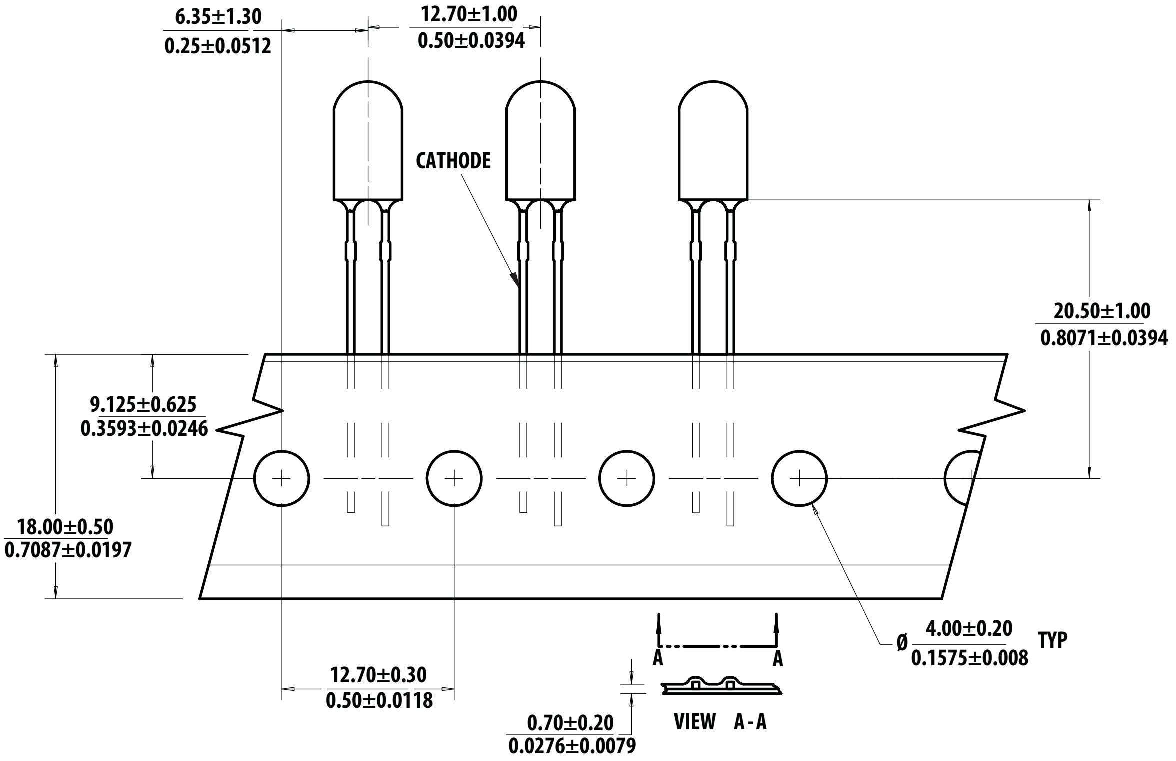
Flux: Rosin flux

Solder bath temperature: 255°C ± 5°C
(maximum peak temperature = 260°C)

Dwell time: 3.0 sec - 5.0 sec
(maximum = 5sec)

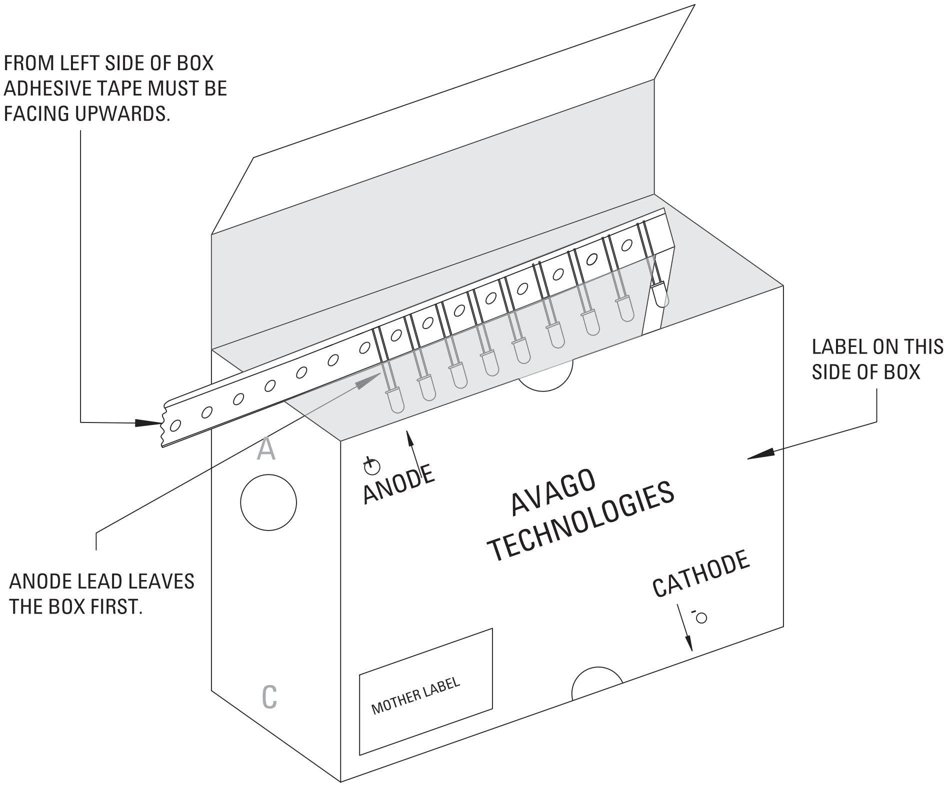
Note: Allow for board to be sufficiently cooled to room temperature before exerting mechanical force.

Ammo Packs Drawing



Note: All dimensions in millimeters (inches)

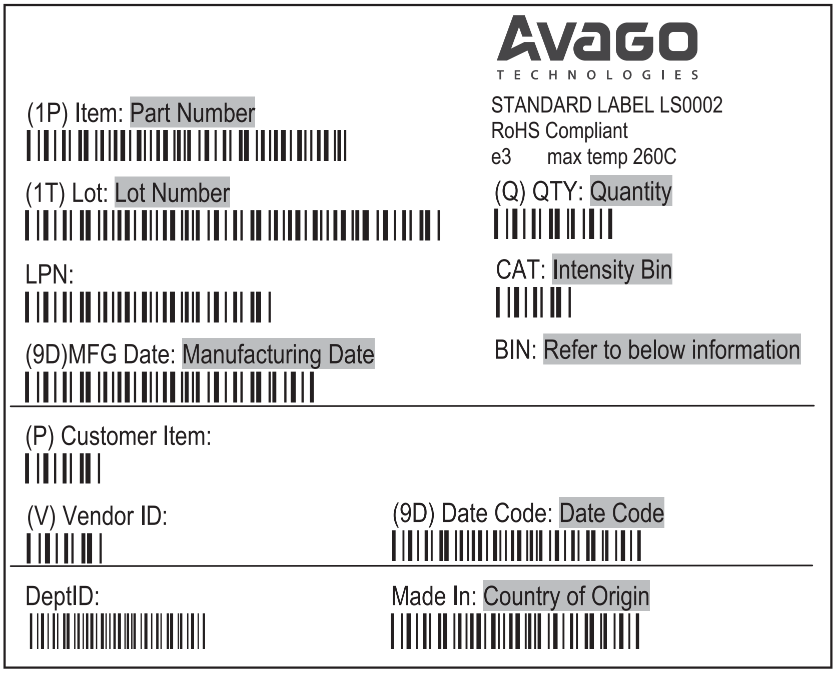
Packaging Box for Ammo Packs



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

STANDARD LABEL LS0002
RoHS Compliant
e3 max temp 260C

(1P) Item: Part Number

(1T) Lot: Lot Number

(Q) QTY: Quantity

LPN:

CAT: Intensity Bin

(9D)MFG Date: Manufacturing Date

BIN: Refer to below information

(P) Customer Item:

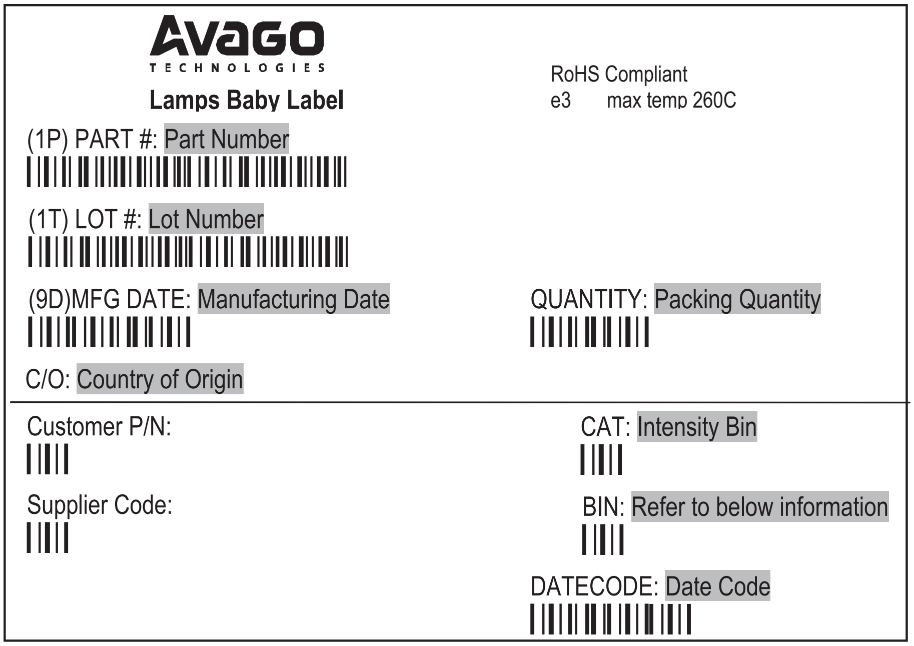
(V) Vendor ID:

(9D) Date Code: Date Code

DeptID:

Made In: Country of Origin

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



Lamps Baby Label

RoHS Compliant
e3 max temp 260C

(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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