HLMP-HD57

5 mm Standard Oval

Precision Optical Performance Red LED

Data Sheet

Lead (Pb) Free
RoHS 6 fully
compliant

Description

This Precision Optical Performance Oval LED is specifically designed for Full Color/Video and Passenger Information Signs. The Oval shaped radiation pattern and high luminous intensity ensure that this device is excellent for wide field of view outdoor applications where a wide viewing angle and readability in sunlight are essential. This lamp has very smooth, matched radiation patterns ensuring consistent color mixing in full color applications, message uniformity across the viewing angle of the sign. High efficiency LED material is used in this lamp: Aluminium Indium Gallium Phosphide (AlInGaP) for Red Color. The higher performance AlInGaP II is used.

The package epoxy contains both UV-A and UV-B inhibitors to reduce the effects of long term exposure to direct sunlight.

Features

- Well defined spatial radiation pattern
- High brightness material
- Red AlInGaP 630 nm
- Tinted and diffused
- Typical viewing angle 40°x100°

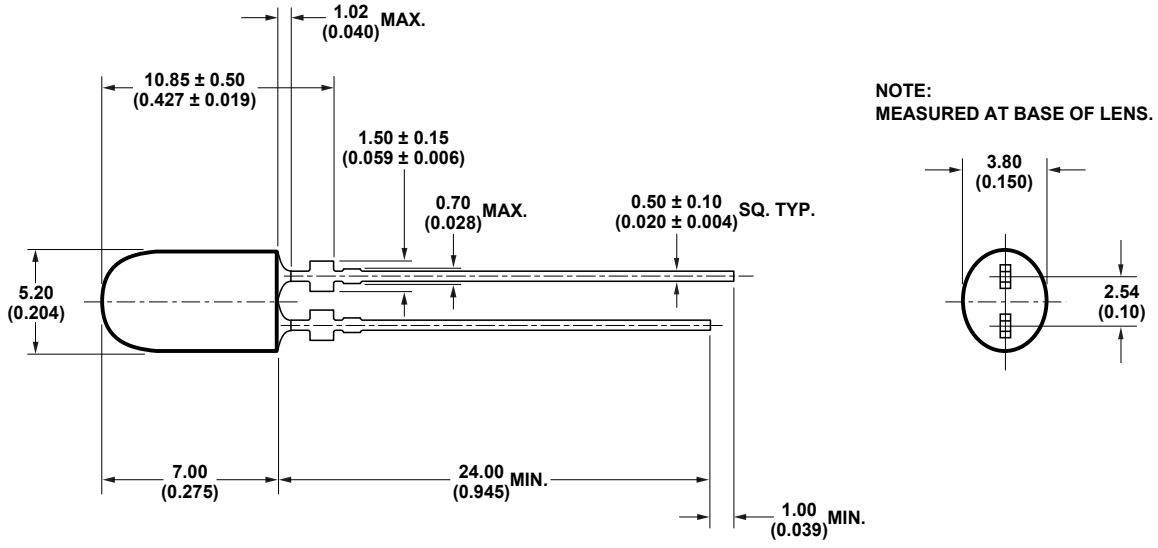
Benefits

- Viewing angle designed for wide field of view applications
- Superior performance for outdoor environments

Applications

- Full color signs
- Commercial outdoor advertising

Package Dimensions



NOTES:
1. DIMENSIONS IN MILLIMETERS (INCHES).
2. TOLERANCE ± 0.25 mm UNLESS OTHERWISE NOTED.

Device Selection Guide

Part Number	Color and Dominant Wavelength λ_d (nm) Typ.	Luminous Intensity Iv (mcd) at 20 mA Min.	Luminous Intensity Iv (mcd) at 20 mA Max.	Tinting Type
HLMP-HD57-NR0xx	Red 630	680	1900	Red

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.
3. The dominant wavelength, λ_d, is derived from the Chromaticity Diagram and represents the color of the lamp.
4. Tolerance for luminous intensity is ± 15%.

Part Numbering System

HLMP - x x xx - x x x xx

Mechanical Options
00: Bulk Packaging
zz: Flexi-bin; Ammo Packs

Color Bin Selections
0: No Color Bin Limitation

Maximum Intensity Bin
0: No Iv Bin Limitation

Minimum Intensity Bin

Refer to Device Selection Guide

Color
D: 630 nm Red

Package
H: 5 mm Oval 40° x 100°

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

Absolute Maximum Ratings at $T_A = 25^\circ C$

Parameter	Value
DC Forward Current[1]	50 mA
Peak Pulsed Forward Current [2]	100 mA
Average Forward Current	30 mA
Power Dissipation	120 mW
Reverse Voltage	5 V (I_R = 100 µA)
LED Junction Temperature	130°C
Operating Temperature Range	–40°C to +100°C
Storage Temperature Range	–40°C to +100°C

Notes:
1. Derate linearly as shown in Figure 3.
2. Duty Factor 30%, Frequency 1 KHz.

Electrical/Optical Characteristics
$T_A = 25^\circ C$

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Voltage	V_F		2.2	2.4	V	$I_F = 20$ mA
Reverse Voltage	V_R	5				$I_R = 100$ µA
Capacitance	C		40		pF	$V_F = 0$, f = 1 MHz
Thermal Resistance	$R\theta_{J\text{-}PIN}$		240		°C/W	LED Junction-to-Cathode Lead
Dominant Wavelength [1]	λ_d	622	630	634	nm	$I_F = 20$ mA
Peak Wavelength	λ_p		639		nm	Peak of Wavelength of Spectral Distribution at $I_F = 20$ mA
Spectral Halfwidth	$\Delta\lambda_{1/2}$		17		nm	Wavelength Width at Spectral Distribution $^1/_2$ Power Point at $I_F = 20$ mA
Luminous Efficacy [2]	η_v		155		lm/W	Emitted luminous power/ Emitted radiant power
Luminous Flux	φ_V		1300		mlm	$I_F = 20$ mA
Luminous Efficiency [3]	ηe		30		lm/W	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, Ie in watts per steradian, may be found from the equation $Ie = Iv/\eta_v$ where Iv 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, IF is electrical forward current and VF is the forward voltage.

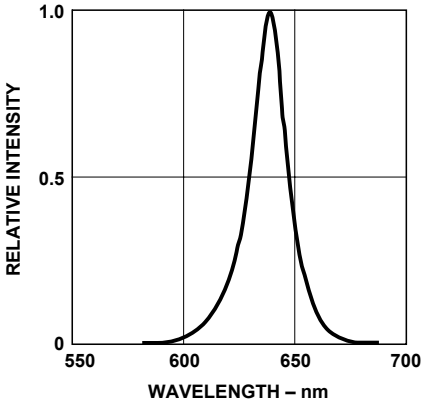


Figure 1. Relative intensity vs. wavelength.

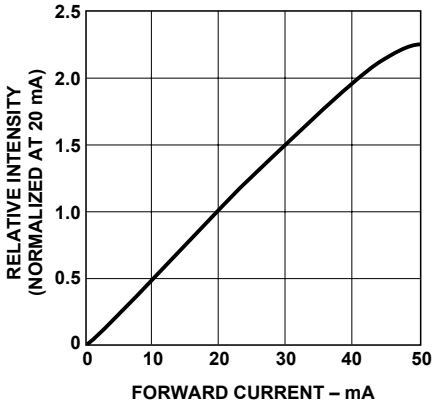


Figure 2. Relative luminous intensity vs. forward current.

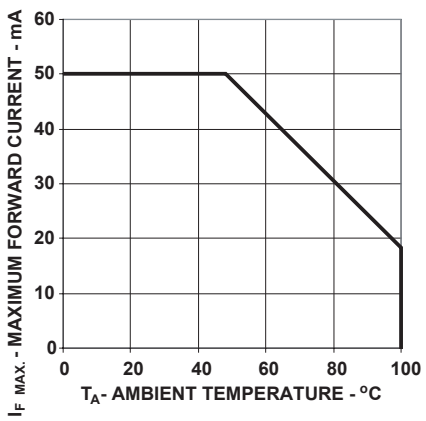


Figure 3. Forward current vs. ambient temperature.

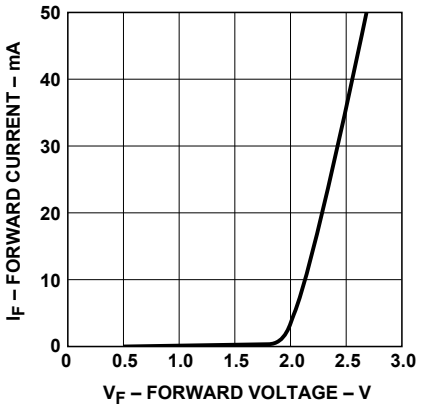


Figure 4. Forward current vs. forward voltage.

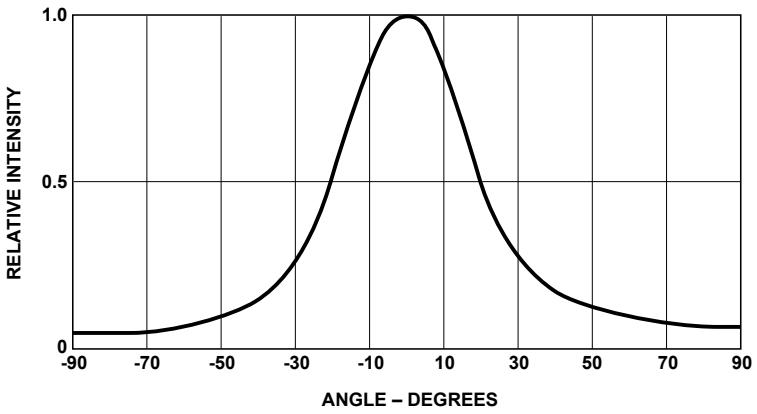


Figure 5. Spatial radiation pattern-minor axis.

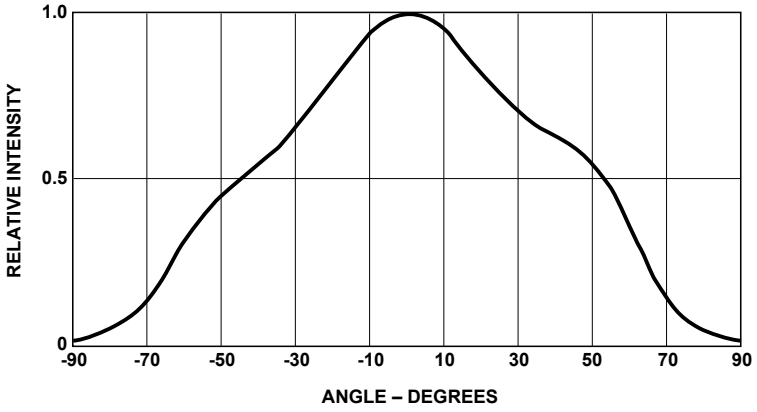


Figure 6. Spatial radiation pattern-major axis.

Intensity Bin Limits (mcd at 20 mA)

Bin Name	Min.	Max.
N	680	880
P	880	1150
Q	1150	1500
R	1500	1900

Tolerance will be ± 15% of these limits.

Note:

1. Bin categories are established for classification of products. Products may not be available in all bin categories.

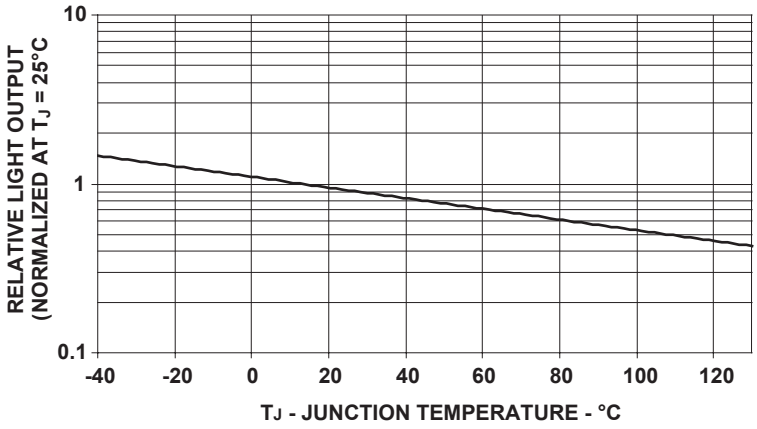


Figure 7. Relative Light Output vs Junction Temperature

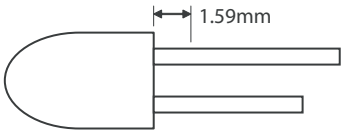
Precautions:

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:

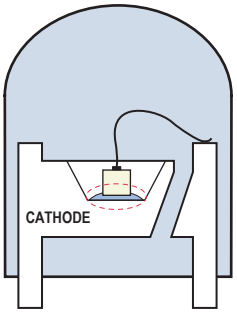
	Wave Soldering [1, 2]	Manual Solder Dipping
Pre-heat temperature	105 °C Max.	-
Preheat time	60 sec Max	-
Peak temperature	250 °C Max.	260 °C Max.
Dwell time	3 sec Max.	5 sec Max

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.

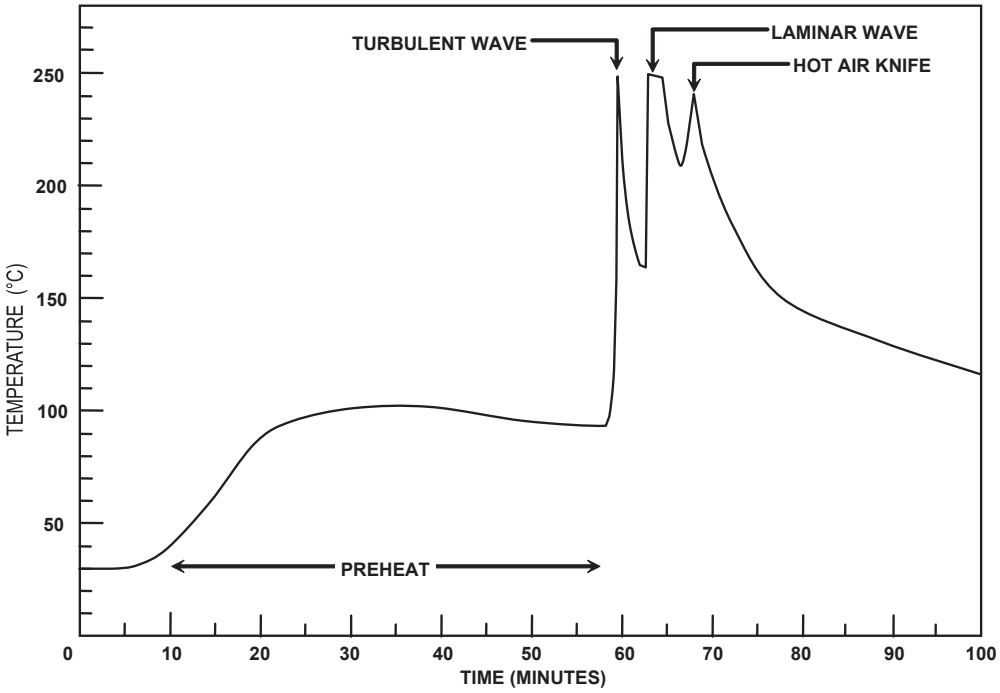
- Any alignment fixture that is being applied during wave soldering should be loosely fitted and should not apply weight or force on LED. Non metal material is recommended as it will absorb less heat during wave soldering process.
- At elevated temperature, LED is more susceptible to mechanical stress. 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)

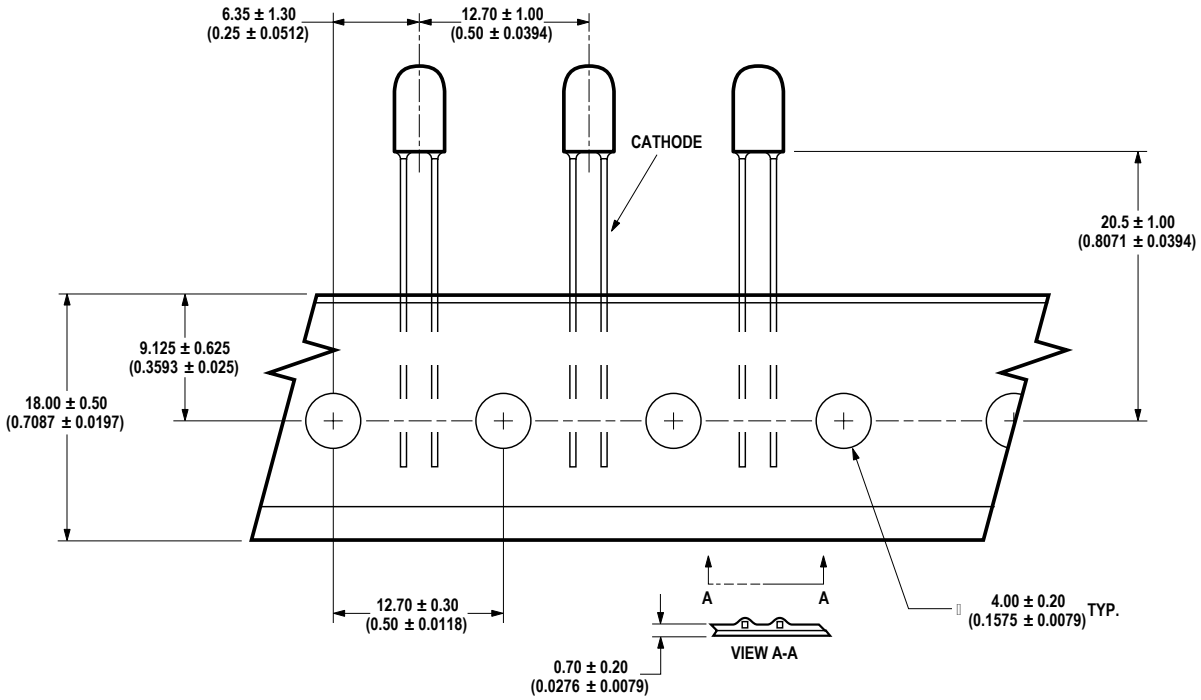
Flux: Rosin flux

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.

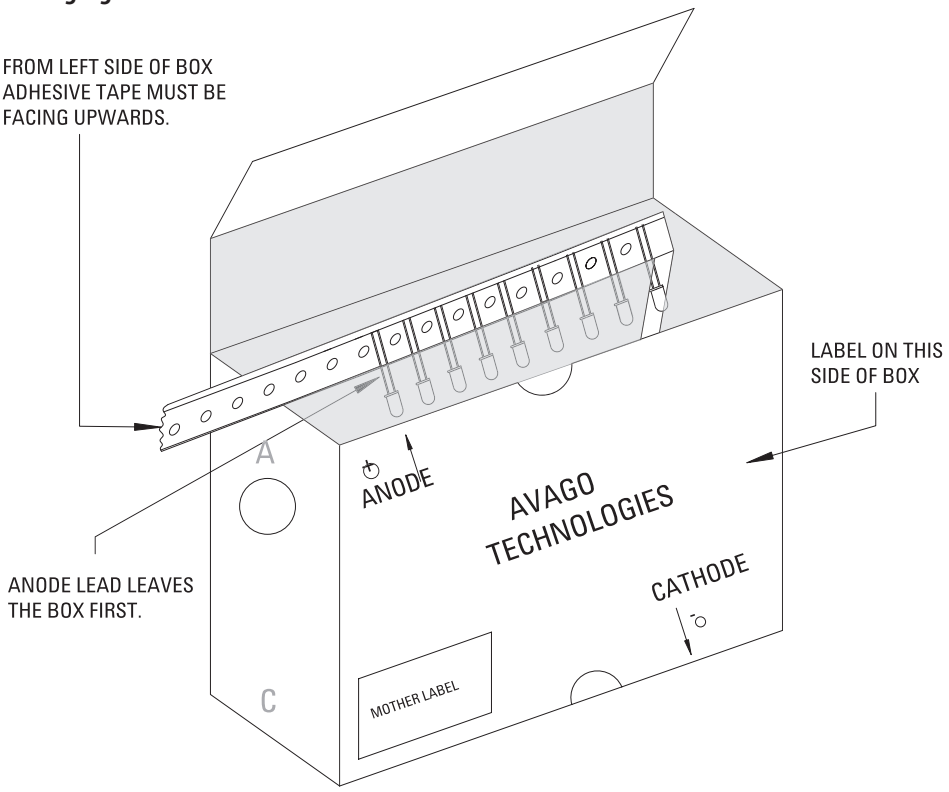
Ammo Packs Drawing



ALL DIMENSIONS IN MILLIMETERS (INCHES).

Note: The ammo-packs drawing is applicable for packaging option -DD & -ZZ and regardless of standoff or non-standoff.

Packaging Box for Ammo Packs



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:

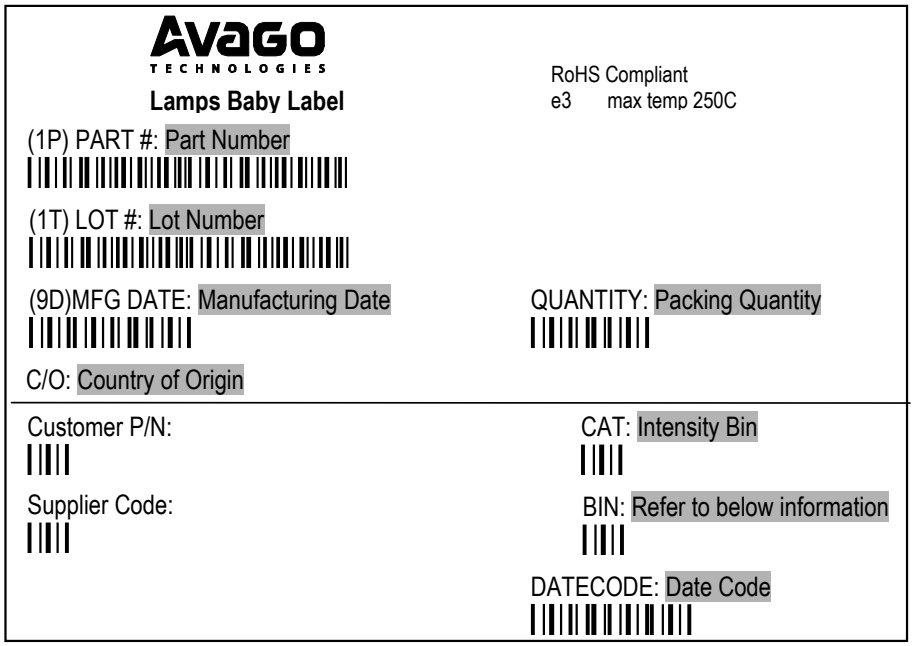
(V) Vendor ID:

(9D) Date Code: Date Code

DeptID:

Made In: Country of Origin

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



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

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

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