HLMP-WL02, HLMP-WG02
High Intensity AlInGaP LED Lamps

AVAGO TECHNOLOGIES

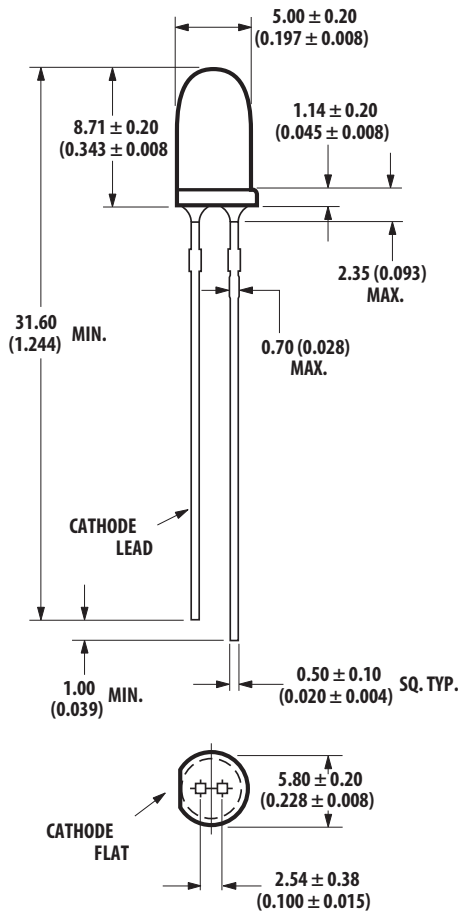
Data Sheet

Lead (Pb) Free
RoHS 6 fully
compliant

Description

This 5 mm LED lamps is specially designed for applications requiring higher levels of intensity than is achieved with a standard lamp. The 5 mm lamp is available with 65 degree viewing angle.

Package Dimensions



Features

- T-1 3/4 (5 mm) General Purpose LED Lamps
- AlInGaP SunPower Intensity
- High Light Output
- Tinted Diffused Lens
- Amber and Red
- Available on Tape and Reel

Applications

- General Purpose
- Consumer Goods
- Indicator Lights

Device Selection Guide

T-1 ¾ (5 mm) Lamp		Luminous Intensity Min. mcd, I_f @ 20 mA	Viewing Angle $2\theta_{1/2}$ (Degrees)
Color	**Part Number**		
Amber	HLMP-WL02	35	65
Red	HLMP- WG02	26	65

Notes:
1. Dominant Wavelength, λd, is derived from the CIE Chromaticity Diagram, and represents the color of the lamp.
2. $\theta_{1/2}$ is the off-axis angle where the luminous intensity is one half the on-axis intensity.
3. The luminous intensity is measured on the mechanical axis of the lamp package.
4. The optical axis is closely aligned with the package mechanical axis.

Absolute Maximum Ratings at $T_A = 25°C$

Parameter	5 mm
DC Forward Current [1,2,3]	50 mA
Peak Pulsed Forward Current	70 mA
Average Forward Current	30 mA
Reverse Voltage (I_R = 100 μA)	5 V
LED Junction Temperature	130°C
Operating Temperature	-40°C to + 100°C
Storage Temperature	-40°C to + 100°C

Notes:
1. Derate linearly as shown in Figure 4.
2. For long term performance with minimal light output degradation, drive currents between 10 and 30 mA are recommended.
3. Please contact your Avago Technologies sales representative about operating currents below 10 mA.

Electrical/Optical Characteristics at $T_A = 25°C$

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Voltage	V_F				V	I_F = 20 mA
Amber (λ_d = 590 nm)			2.02	2.4		
Red (λ_d = 626 nm)			1.90			
Reverse Voltage	V_R	5	20		V	I_R = 100 μA
Peak Wavelength	λ_{PEAK}				nm	Peak of Wavelength of Spectral
Amber			592			Distribution at I_F = 20 mA
Red			635			
Spectral Halfwidth	$\Delta\lambda$½		17		nm	Wavelength Width at Spectral Distribution ½ Power point at I_F = 20 mA
Speed of Response	τ_s		20		ns	Exponential Time Constant, $e^{-t/\tau s}$
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
Luminous Efficacy [1]	ηv				lm/W	Emitted Luminous Power/Emitted
Amber			500			RadiantPower
Red			155			

Note:
1. The radiant intensity, Ie, in watts per steridian, may be found from the equation Ie = Iv/ηv, where Iv is the luminous intensity in candelas and ηv is the luminous efficacy in lumens/watt.

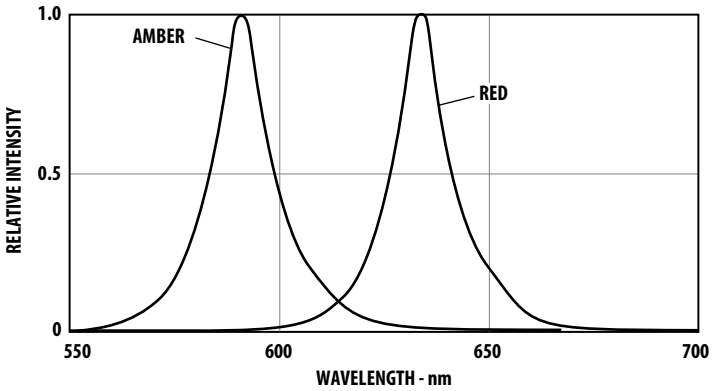


Figure 1. Relative Intensity vs. Peak Wavelength.

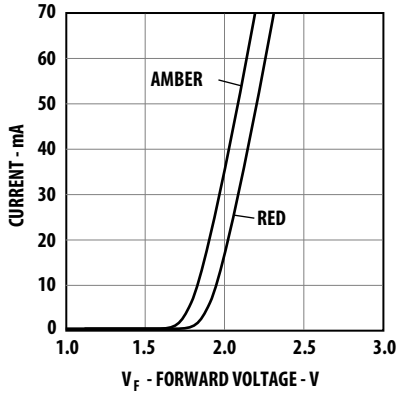


Figure 2. Forward Current vs. Forward Voltage.

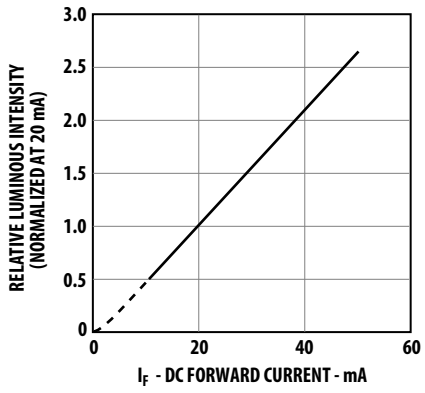


Figure 3. Relative Luminous Intensity vs. Forward Current.

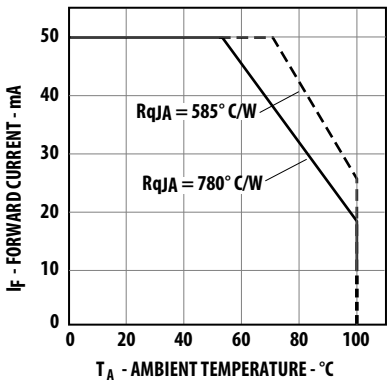


Figure 4. Maximum Forward Current vs. Ambient Temperature. Derating Based on T_JMAX = 130°C.

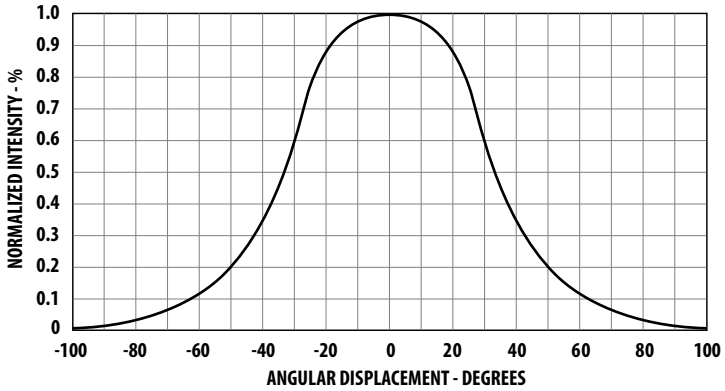


Figure 5. Representative Spatial Radiation Pattern for 65°

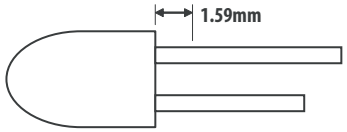
Precautions:

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:

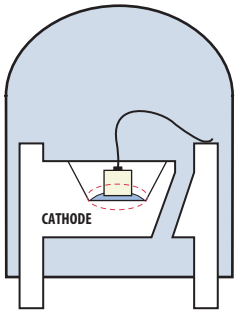
	Wave Soldering [1, 2]	Manual Solder Dipping
Pre-heat temperature	105 °C Max.	-
Preheat time	60 sec Max	-
Peak temperature	250 °C Max.	260 °C Max.
Dwell time	3 sec Max.	5 sec Max

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



AlInGaP Device

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

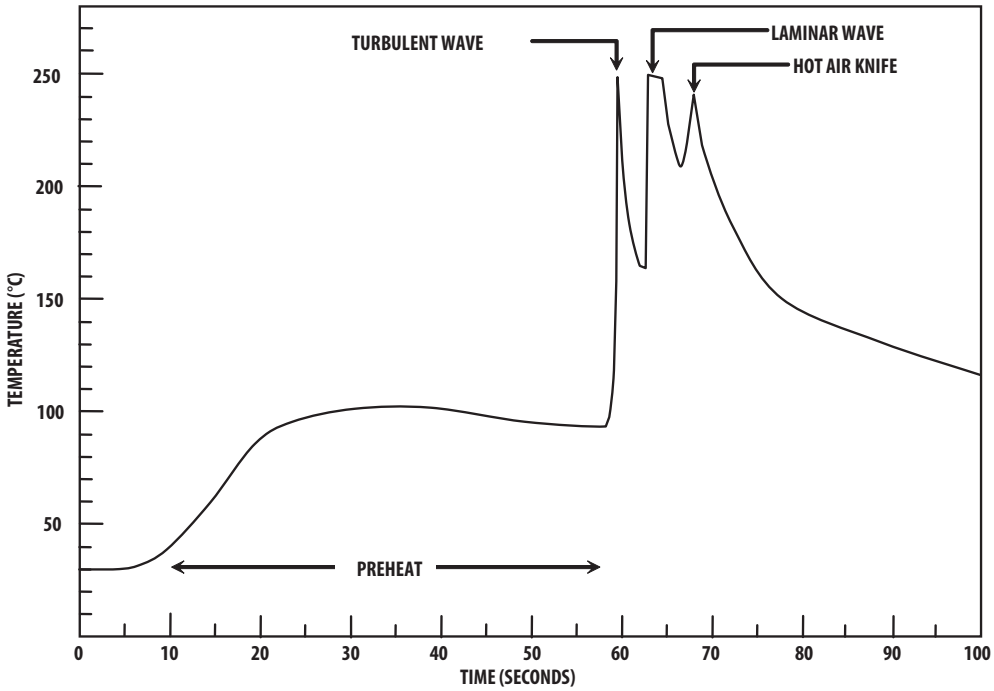
- Any alignment fixture that is being applied during wave soldering should be loosely fitted and should not apply weight or force on LED. Non metal material is recommended as it will absorb less heat during wave soldering process.
- At elevated temperature, LED is more susceptible to mechanical stress.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

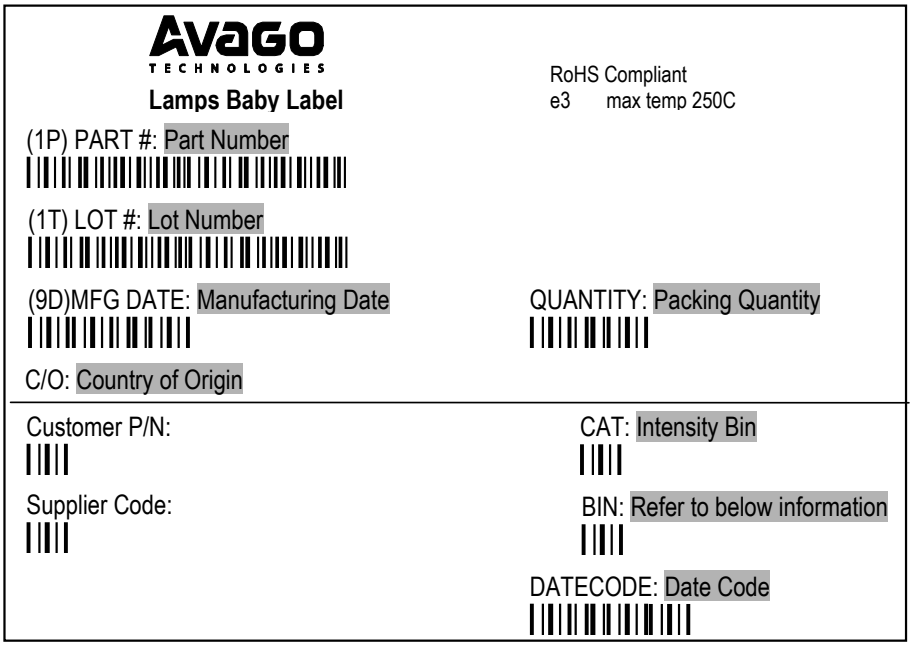
Note: Allow for board to be sufficiently cooled to room temperature before exerting mechanical force.

Figure 6. Recommended wave soldering profile

Packaging Label:

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

(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 web site: **www.avagotech.com**

AV02-1532EN - August 20, 2014

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Broadcom Limited:

HLMP-WG02 HLMP-WL02