Data Sheet

HL3P-6xC0-000xx

3-mm Round, 3-Leads Auto-Insertable Bicolor LED Lamp

Overview

The Broadcom® HL3P-6xC0-000xx are bicolor LEDs available in the industry-popular T1 through-hole lamp package. These LEDs use high brightness AlInGaP chip technology and offer high light output. They are available in multiple color combinations, such as Red/Yellow-Green and Yellow/Yellow-Green.

These LEDs have an untinted, diffused epoxy body and come with a 45 degree viewing angle. They are easy to use, which makes them an ideal choice for a wide variety of applications such as status indicators in industrial and commercial segments.

These LEDs are available in ammo-packing and support machine auto-insertion.

Features

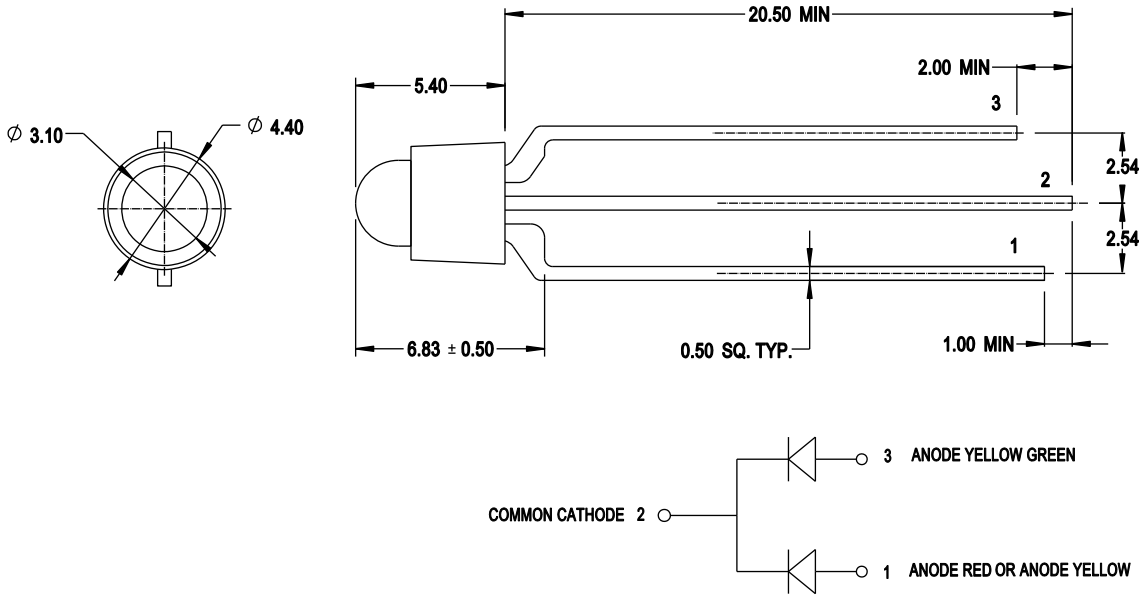
- Available in Red/Yellow-Green and Yellow/Yellow-Green color combinations
- High brightness
- Low power consumption
- Support machine auto-insertion
- Available in ammo-packing

Applications

- Status indicators
- Industrial/Consumer electronics
- Home appliances

CAUTION! This product is Class 1B HBM ESD sensitive per JEDEC Standard. Observe appropriate precautions during handling and processing. Refer to Application Note 1142 for additional details.

Figure 1: Package Drawing



NOTE:

1. All dimensions in millimeters (mm).
2. Tolerance is ±0.3 mm unless otherwise specified.
3. Epoxy meniscus may extend up to maximum 1 mm down the leads.
4. Lead spacing is measured at where the leads emerge from the body.

Device Selection Guide (T_J = 25°C, I_F = 20 mA)

Part Number	Color	Luminous Intensity, I_V (mcd)[a,b,c]			Viewing Angle, $2\theta_{1/2}$ (°)[d]
		Min.	Typ.	Max.	Typ.
HL3P-61C0-000xx	AlInGaP Red	240.0	400.0	680.0	45
	AlInGaP Yellow-Green	85.0	140.0	240.0	45
HL3P-62C0-000xx	AlInGaP Yellow	140.0	250.0	400.0	45
	AlInGaP Yellow-Green	85.0	140.0	240.0	45

a. The luminous intensity, I_V, is measured at the mechanical axis of the package, and it is tested with a single current pulse condition.

b. The optical axis is closely aligned with the mechanical axis of the package.

c. Tolerance is ±15%.

d. $\theta_{1/2}$ is the off-axis angle where the luminous intensity is half of the peak intensity.

Absolute Maximum Ratings

Parameters	Rating	Unit
DC Forward Current [a]	25	mA
Peak Forward Current [b]	60	mA
Power Dissipation	63	mW
LED Junction Temperature	100	°C
Operating Temperature Range	–40 to +85	°C
Storage Temperature Range	–40 to +85	°C

a. Derate linearly as shown in Figure 6.

b. Duty factor = 10%, frequency = 1 kHz.

Optical and Electrical Characteristics (T_J = 25°C, I_F = 20 mA)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward Voltage [a]	V_F				V	I_F = 20 mA
Red		—	2.1	2.5		
Yellow		—	2.0	2.5		
Yellow-Green		—	2.1	2.5		
Reverse Voltage [b]	V_R	5	—	—	V	I_R = 100 µA
Dominant Wavelength [c]	λ_d				nm	I_F = 20 mA
Red		615.0	620.0	630.0		
Yellow		584.5	591.0	597.0		
Yellow-Green		564.5	570.0	576.5		
Peak Wavelength	λ_{PEAK}				nm	I_F = 20 mA
Red		—	628.0	—		
Yellow		—	594.0	—		
Yellow-Green		—	571.0	—		
Thermal Resistance [d]	$R_{\theta J\text{-}P}$	—	560	—	°C/W	LED Junction-to-Pin

a. Forward voltage tolerance is ±0.1V.

b. Indicates product final test condition. Long-term reverse bias is not recommended.

c. The dominant wavelength, λ_d, is derived from the CIE Chromaticity Diagram and represents the perceived color of the device.

d. Thermal resistance from LED junction to pin

Part Numbering System

H L 3 P – 6 x_1 x_2 0 – 0 0 0 x_3 x_4

Code	Description	Option	
x_1	Color Combination	1	Red/Yellow-Green
		2	Yellow/Yellow-Green
x_2	Pin Configuration	C	Common Cathode
x_3x_4	Packaging Option	00	Bulk
		MC	Ammopack with Dimension H 20.0 mm

Figure 2: Spectral Power Distribution

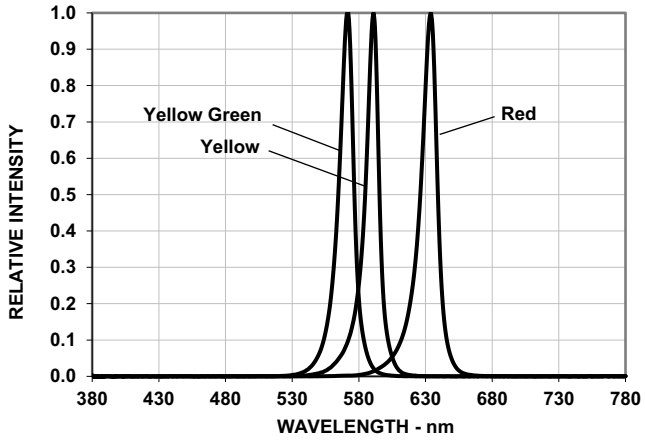


Figure 3: Forward Current vs. Forward Voltage

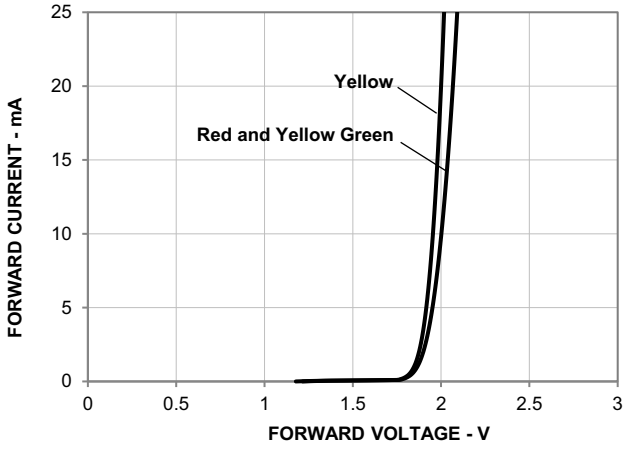


Figure 4: Relative Luminous Intensity vs. Mono Pulse Current

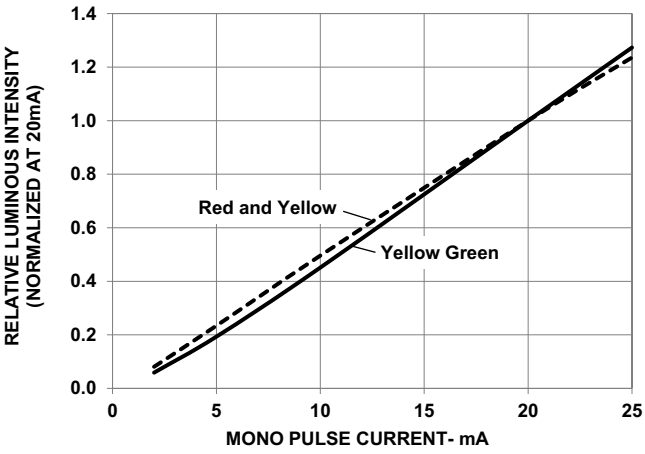


Figure 5: Radiation Pattern

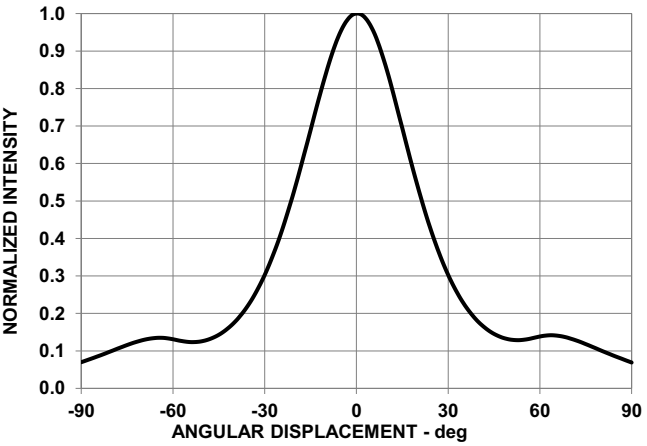


Figure 6: Maximum Forward Current vs. Ambient Temperature

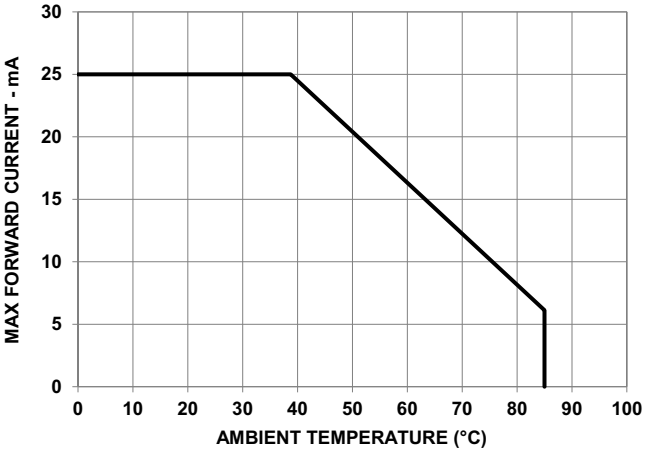
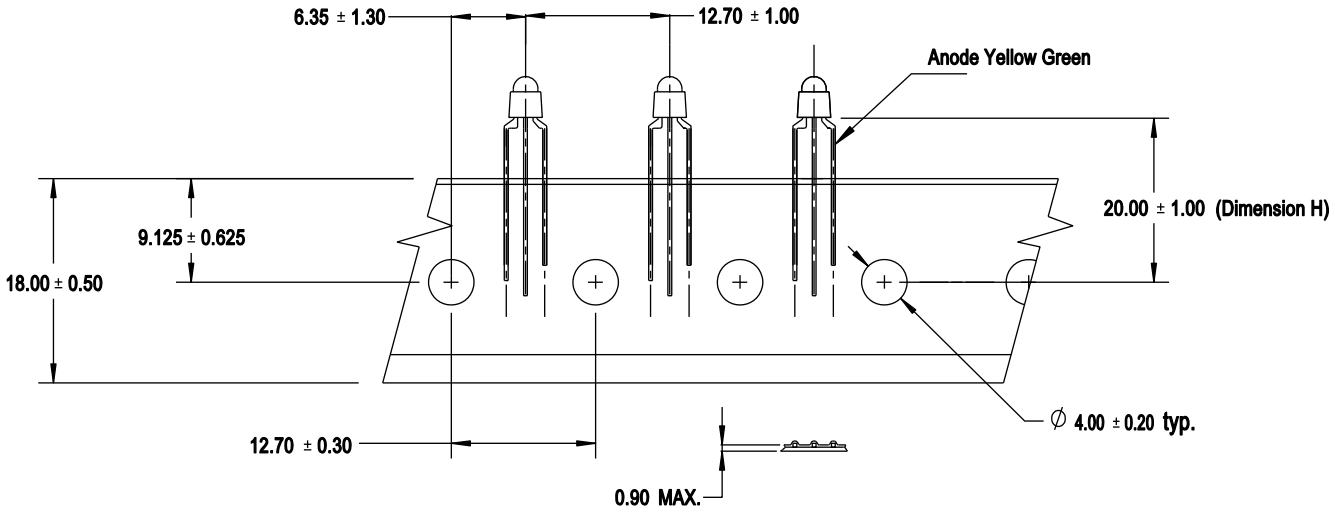
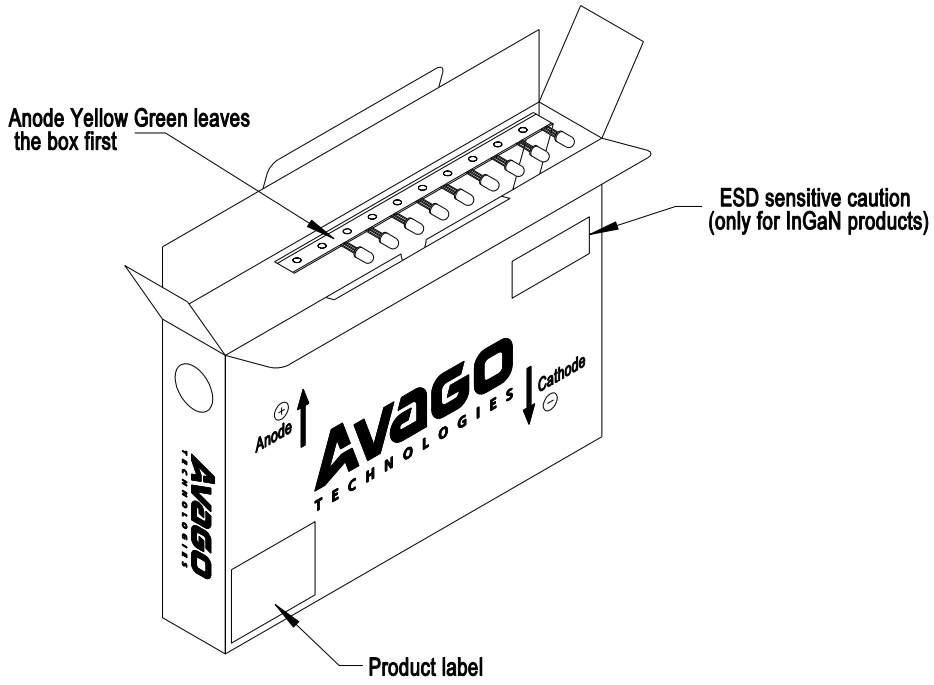


Figure 7: Tape Outline Drawing – For Packaging Option MC



NOTE: All dimensions are in millimeters.

Figure 8: Packaging Box for Ammopack



Precautionary Notes

Soldering and Handling Precautions

- Set and maintain the wave soldering parameters according to the recommended temperature and dwell time. Perform a daily check on the profile to ensure that it always conforming to the recommended conditions. Exceeding these conditions will overstress the LEDs and cause premature failures.
- Use only bottom preheaters to reduce thermal stress experienced by the LEDs.
- Recalibrate the soldering profile before loading a new type of PCB. A PCB with a different size and design (component density) will have a different heat capacity and might cause a change in the temperature experienced by the PCB if the same wave soldering setting is used.
- Do not perform wave soldering more than once.
- Any alignment fixture used during wave soldering must be loosely fitted and must not apply stress on the LEDs. Use a nonmetal material because it will absorb less heat during the wave soldering process.
- At elevated temperature, the LEDs are more susceptible to mechanical stress. Allow the PCB to sufficiently cool to room temperature before handling. Do not apply stress to the LED when it is hot.
- Use wave soldering to solder the LED. Use hand soldering only for rework or touch-up if unavoidable, but it must be strictly controlled to the following conditions:
  - Soldering iron tip temperature = 350°C maximum
  - Soldering duration = 3 seconds maximum
  - Number of cycles = 1 only
  - Power of soldering iron = 50W maximum
- For ESD-sensitive devices, apply proper ESD precautions at the soldering station. Use only an ESD-safe soldering iron.
- Do not touch the LED package body with the soldering iron except for the soldering terminals because it might cause damage to the LED.
- Confirm beforehand whether the functionality and performance of the LED are affected by hand soldering.
- Keep the heat source at least 1.6 mm away from the LED body during soldering.
- Design an appropriate hole size to avoid problems during insertion or clinching (for auto-insertable devices).

Figure 9: Recommended PCB Through-Hole Size

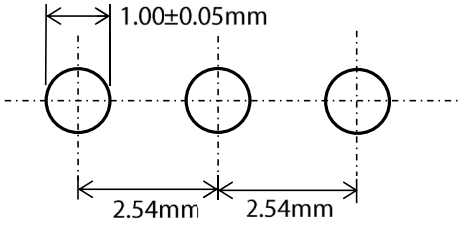
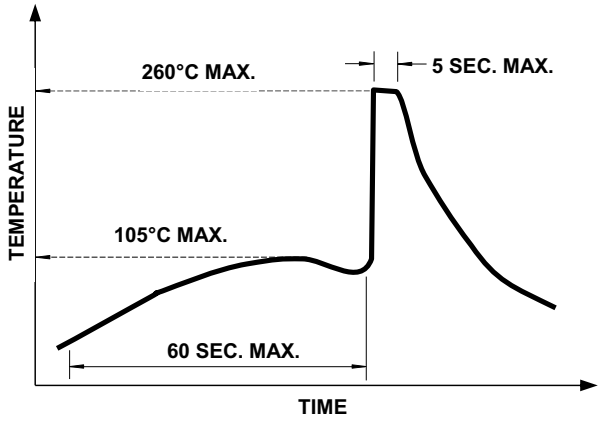


Figure 10: Recommended Wave Soldering Profile



NOTE: Refers to measurements with a thermocouple mounted at the bottom of the PCB.

Refer to Application Note 5334 for more information on soldering and handling of TH LED lamp.

Application Precautions

- The drive current of the LED must not exceed the maximum allowable limit across temperature as stated in the data sheet. Constant current driving is recommended to ensure consistent performance.
- Circuit design must cater to the whole range of forward voltage (V_F) of the LEDs to ensure that the intended drive current can always be achieved.
- The LED exhibits slightly different characteristics at different drive currents, which might result in a larger variation of performance (that is, intensity, wavelength, and forward voltage). Set the application current as close as possible to the test current to minimize these variations.
- The LED is not intended for reverse bias. Use other appropriate components for such purposes. When driving the LED in matrix form, ensure that the reverse bias voltage does not exceed the allowable limit of the LED.
- Avoid rapid changes in ambient temperature, especially in high-humidity environments, because they cause condensation on the LED.

Eye Safety Precautions

LEDs may pose optical hazards when in operation. Do not look directly at operating LEDs because it might be harmful to the eyes. For safety reasons, use appropriate shielding or personal protective equipment.

Disclaimer

Broadcom's products and software are not specifically designed, manufactured, or authorized for sale as parts, components, or assemblies for the planning, construction, maintenance, or direct operation of a nuclear facility or for use in medical devices or applications. The customer is solely responsible, and waives all rights to make claims against Broadcom or its suppliers, for all loss, damage, expense, or liability in connection with such use.

Broadcom reserves the right to make changes without further notice to any products or data herein to improve reliability, function, or design. Information furnished by Broadcom is believed to be accurate and reliable. However, Broadcom does not assume any liability arising out of the application or use of this information, nor the application or use of any product or circuit described herein, neither does it convey any license under its patent rights nor the rights of others.

BROADCOM®

Lead (Pb) Free
RoHS Compliant