BROADCOM®

Data Sheet

HLMP-Yxxx

T-1 (3 mm) GaP/GaAsP LED Lamps

Description

This family of T-1 lamps is widely used in general-purpose indicator and back lighting applications. The optical design is balanced to yield superior light output and wide viewing angles. Several intensity choices are available in each color for increased design flexibility.

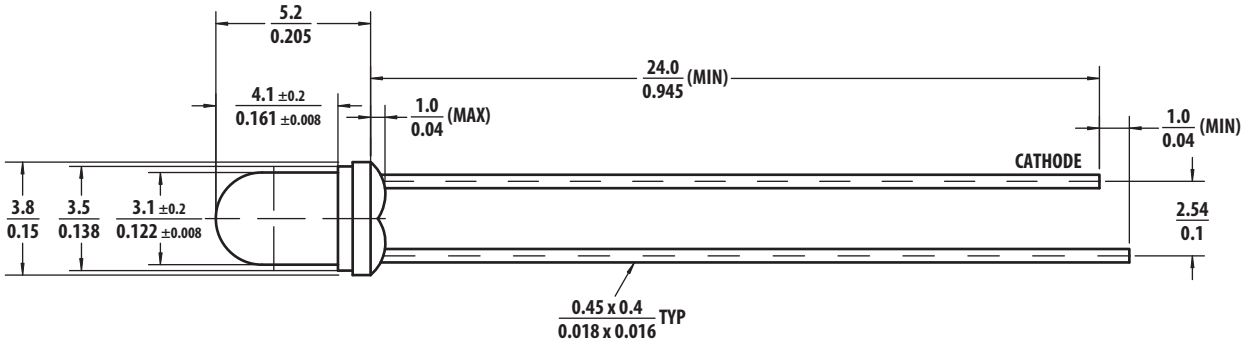
Features

- Low power consumption
- High efficiency
- Versatile mounting on PCB or panel
- I.C. compatible/low current requirement
- Popular T-1 package
- RoHS compliant

Applications

- Status indicator
- Backlighting front panels
- Light pipe sources
- Lighted switches

Figure 1: Package Dimension



NOTE:

1. All dimensions are in millimeter (inches).
2. Tolerance is ±0.25 mm (.010 in.) unless otherwise stated.
3. Lead spacing is measured where the leads emerge from the package.

Selection Guide

Part Number	Color	Package Description	Luminous Intensity, Iv (mcd) at10 mA			Viewing Angle, 2θ½ (°)
			Min.	Typ.	Max.	
HLMP-Y301-F00xx	GaAsP HER	Tinted, Non-diffused	6.1	19	—	45
HLMP-Y402-G00xx	GaAsP Orange		9.7	29	—	45
HLMP-Y502-F00xx	GaP Green		12	40	—	55

Absolute Maximum Ratings at T_A = 25°C

Parameter	HLMP-Y301	HLMP-Y402	HLMP-Y502	Units
DC Forward Current[a]	20	20	20	mA
Peak Forward Current (1/10 Duty Cycle, 0.1 ms Pulse Width)	90	60	120	mA
Reverse Voltage (I_R = 100 µA)	5	5	5	V
Junction Temperature	110	110	110	°C
Power Dissipation	52	52	52	mW
Storage Temperature Range	–40 to +100			°C
Operating Temperature Range	–40 to +100			°C

a. Derate linearly as shown in Figure 4.

Electrical/Optical Characteristics at T_A = 25°C

Parameter	Symbol	Part Number	Min.	Typ.	Max.	Units	Test Conditions
Peak Wavelength	λ_{PEAK}	HLMP-Y301	—	635	—	nm	Peak of wavelength of spectral distribution at I_F = 10 mA
		HLMP-Y402	—	610	—		
		HLMP-Y502	—	565	—		
Dominant Wavelength[a]	λ_d	HLMP-Y301	615	626	632	nm	I_F = 10 mA
		HLMP-Y402	599.5	605	613.5		
		HLMP-Y502	561.5	573	576.5		
Spectrum Half Width	$\Delta\lambda$	HLMP-Y301	—	40	—	nm	
		HLMP-Y402	—	35	—		
		HLMP-Y502	—	30	—		
Forward Voltage	V_F	HLMP-Y301	—	2.1	2.6	V	I_F = 10 mA (Figure 2)
		HLMP-Y402	—	2.1	2.6		
		HLMP-Y502	—	2.2	2.6		
Reverse Voltage	V_R	HLMP-Y301	5	—	—	V	I_R = 100 µA
		HLMP-Y402	5	—	—		
		HLMP-Y502	5	—	—		
Thermal Resistance	$R_{\theta J\text{-}PIN}$	HLMP-Y301	—	310	—	°C/W	Junction to Cathode Lead
		HLMP-Y402	—	310	—		
		HLMP-Y502	—	310	—		

a. The dominant wavelength, λ_d, is derived from the Chromaticity Diagram and represents the color of the lamp.

Part Numbering System

H	L	M	P	-	x_1	x_2	x_3	x_4	-	x_5	x_6	x_7	x_8	x_9

Code	Description	Option	
x_1	Package type	Y	T-1 (3mm)
x_2 x_3 x_4	Color	301	GaAsP HER
		402	GaAsP Orange
		502	GaP Green
x_5	Minimum intensity bin	Refer to Intensity Bin Limits Table	
x_6	Maximum intensity bin		
x_7	Color bin selection	0	Full range
x_8 x_9	Packaging option	00	Bulk packaging

Bin Information

Intensity Bin Limits

Color	Bin	Intensity Range (mcd)	
		Min.	Max.
HER/Orange	F	6.1	9.7
	G	9.7	15.5
	H	15.5	24.8
	I	24.8	39.6
	J	39.6	63.4
	K	63.4	101.5
	L	101.5	162.4
	M	162.4	234.6
	N	234.6	340.0
	O	340.0	540.0
	P	540.0	850.0
Green	F	12.0	19.1
	G	19.1	30.7
	H	30.7	49.1
	I	49.1	78.5
	J	78.5	125.7
	K	125.7	201.1
	L	201.1	289.0
	M	289.0	417.0
	O	417.0	680.0

Tolerance for each bin limit is ±15%.

Color Bin Limits Table

Color	Cat.	Lambda (nm)	
		Min.	Max.
Orange	2	599.5	602.0
	3	602.0	604.5
	4	604.5	607.5
	5	607.5	610.5
	6	610.5	613.5
Green	6	561.5	564.5
	5	564.5	567.5
	4	567.5	570.5
	3	570.5	573.5
	2	573.5	576.5

Tolerance for each bin limit is ±1.0 nm.

Figure 2: Forward Current vs. Forward Voltage

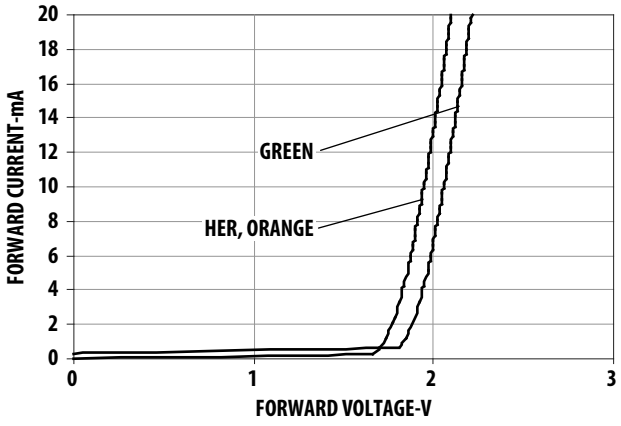


Figure 3: Relative Luminous Intensity vs. Forward Current

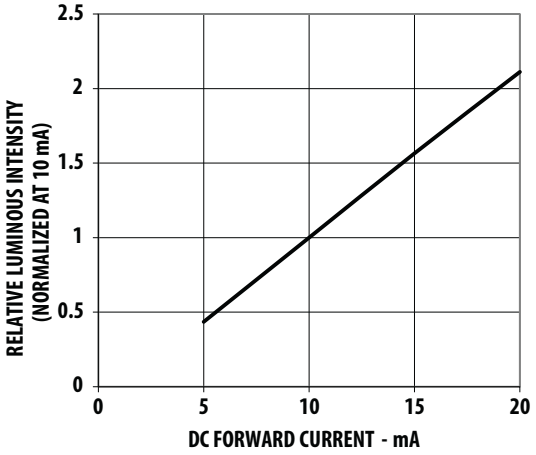


Figure 4: Ambient Temperature vs. Maximum DC Forward Current

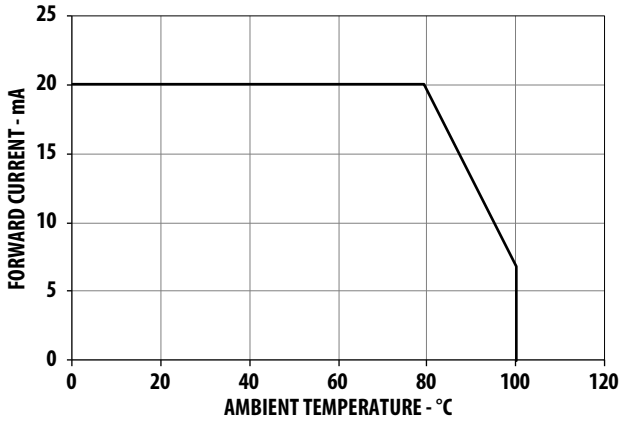


Figure 5: Representative Radiation Pattern for HLMP-Y502

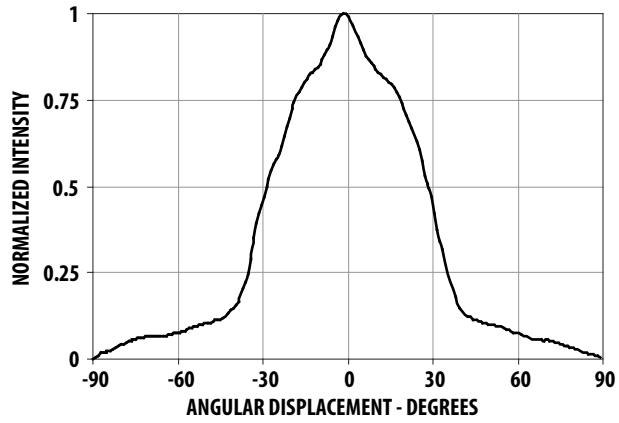


Figure 6: Representative Radiation Pattern for HLMP-Y301 and HLMP-Y402

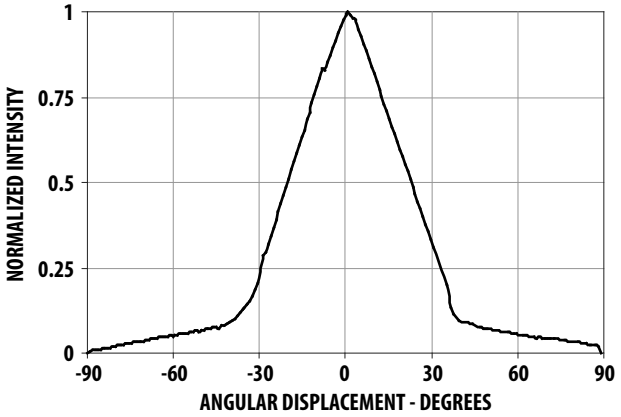
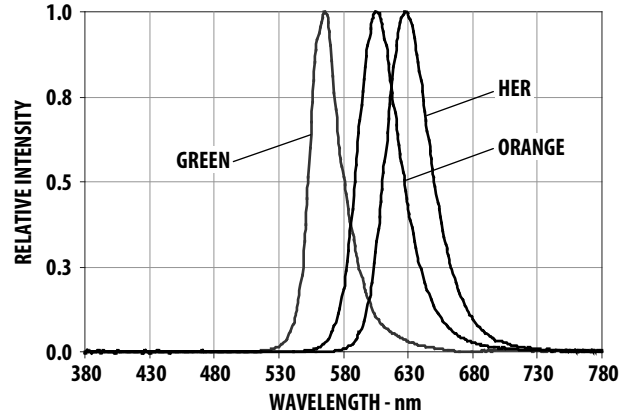


Figure 7: Relative Luminous Intensity vs. Wavelength



Precautions

Assembly Method

This product is not meant for auto-insertion.

Lead Forming

- The leads of an LED lamp may be preformed or cut to length prior to insertion and soldering into PC board.
- If lead forming is required before soldering, take care to avoid any excessive mechanical stress induced to LED package. Otherwise, cut the leads of LED to length after soldering process at room temperature. The solder joint formed will absorb the mechanical stress of the lead cutting from traveling to the LED chip die attach and wirebond.
- During lead forming, the leads should be bent at a point at least 3 mm from the base of the lens. Do not use the base of the lead frame as a fulcrum during forming. Do lead forming before soldering at normal temperature.
- Make tooling to precisely form and cut the leads to length rather than rely upon hand operation.

Soldering Conditions

- Take care during the PCB assembly and soldering process to prevent damage to the LED component.
- The closest LED is allowed to solder on board is 1.59 mm below the body (encapsulant epoxy) for those parts without standoff.
- The recommended soldering conditions follow.

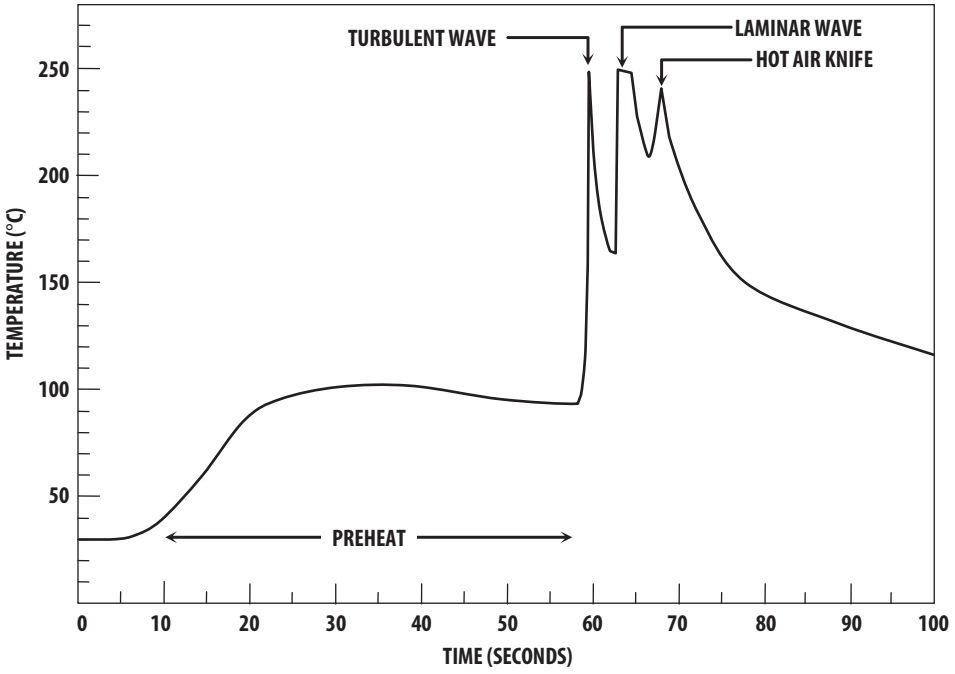
	Wave Soldering	Manual Solder Dipping
Pre-heat Temperature	105°C max.	—
Preheat Time	60s max	—
Peak Temperature	250°C max.	260°C max.
Dwell Time	3s max.	5s max

- Set and maintain the wave soldering parameter according to the recommended temperature and dwell time in the solder wave. Periodically check on the soldering profile to ensure the soldering profile used always conforms to the recommended soldering condition.
- If necessary, use a fixture to hold the LED component in the proper orientation with respect to the PCB during the soldering process.
- Proper handling is imperative to avoid excessive thermal stresses to LED components when heated. Therefore, the soldered PCB must be allowed to cool to room temperature, 25°C, before handling.
- Pay special attention to board fabrication, solder masking, surface plating and lead holes size, and component orientation to assure solderability.
- Recommended PC board plated through-hole sizes for LED component leads follow.

Led Component Lead Size	Diagonal	Plated Through Hole Diameter
0.457 mm × 0.457 mm (0.018 in. × 0.018 in.)	0.646 mm (0.025 in.)	0.976 mm to 1.078 mm (0.038 in. to 0.042 in.)
0.508 mm × 0.508 mm (0.020 in. × 0.020 in.)	0.718 mm (0.028 in.)	1.049 mm to 1.150 mm (0.041 in. to 0.045 in.)

NOTE: Refer to application note AN1027 for more information on soldering LED component.

Figure 8: Recommended Wave Soldering Profile



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: 1.5s - 3.0s (maximum = 3s)

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

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