HL3P-Nx45/HL3P-Bx60

3-mm LED Lamps

Data Sheet

Description

This family of 3-mm LED lamps is capable of withstanding automatic insertion process. It is ideal for the use as status indicators.

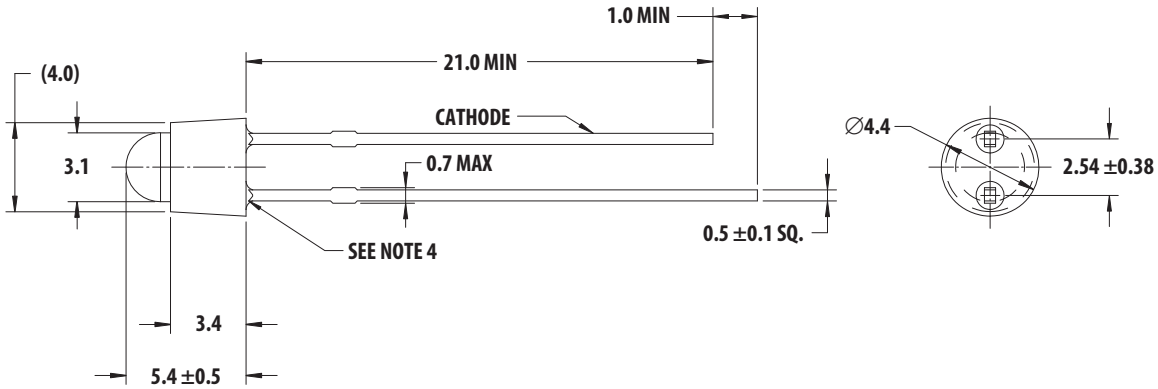
Features

- Auto-insertable 3-mm LED lamps
- Low power consumption

Application

- Status indicator

Figure 1 Package Drawing



NOTE

1. All dimensions are in millimeters (mm).
2. Dimension in bracket is for reference only.
3. Tolerance is ±0.3 mm unless otherwise specified.
4. Epoxy meniscus may extend maximum 1 mm down the leads.
5. Lead spacing is measured where the leads emerge from the package.

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

Part Number	Color	Package Description	Luminous Intensity, I_V (mcd)[a, b, c]		Viewing Angle, $2\theta_{1/2}$ (°) [d]
			Min.	Typ.	Typ.
HL3P-NF45-D00xx	AlInGaP Yellow Green	Untinted, Non diffused	65.0	200.0	45
HL3P-NA45-J00xx	AlInGaP Amber	Untinted, Non diffused	240.0	600.0	45
HL3P-NJ45-J00xx	AlInGaP Orange	Untinted, Non diffused	240.0	600.0	45
HL3P-NR45-J00xx	AlInGaP Red	Untinted, Non diffused	240.0	500.0	45
HL3P-BF60-C00xx	AlInGaP Yellow Green	Tinted, Diffused	50.0	100.0	60
HL3P-BA60-J00xx	AlInGaP Amber	Tinted, Diffused	240.0	450.0	60
HL3P-BJ60-J00xx	AlInGaP Orange	Tinted, Diffused	240.0	450.0	60
HL3P-BR60-J00xx	AlInGaP Red	Tinted, Diffused	240.0	380.0	60

a. The luminous intensity is measured at the mechanical axis of the package 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

Parameter	AlInGaP Yellow Green	AlInGaP Others	Units
DC Forward Current [a]	30	30	mA
Power Dissipation	72	72	mW
Peak Forward Current (1/10 Duty Cycle, 0.1-ms Pulse Width)	50	60	mA
LED Junction Temperature	105	105	°C
Operating Temperature Range	–40 to +85	–40 to +85	°C
Storage Temperature Range	–40 to +100	–40 to +100	°C

a. Derate linearly as shown in Figure 5.

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

Color	Dominant Wavelength, λ_D (nm)[a]			Peak Wavelength, λ_P (nm)
	Min.	Typ.	Max.	Typ.
AlInGaP Red	620.0	627.0	635.0	638.0
AlInGaP Orange	599.5	605.0	610.5	607.5
AlInGaP Amber	584.5	587.0	597.0	590.5
AlInGaP Yellow Green	564.5	570.0	576.5	571.0

a. Dominant wavelength, λ_D, is derived from the CIE Chromaticity Diagram and represents the color of the lamp.

Electrical Characteristics (T_J = 25°C)

Color	Forward Voltage, V_F (V) at I_F = 20 mA[a]			Reverse Voltage, V_R (V) at I_R = 10 µA[b]	Thermal Resistance, $R\theta_{J-P}$ (°C/W)[c]
	Min.	Typ.	Max.	Min.	Typ.
AlInGaP Red	1.70	2.00	2.40	5	270
AlInGaP Orange	1.70	2.00	2.40	5	270
AlInGaP Amber	1.70	2.00	2.40	5	270
AlInGaP Yellow Green	1.70	2.00	2.40	5	430

a. Forward voltage tolerance is ±0.1V.

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

c. Thermal resistance from LED junction to pin.

Part Numbering System

H	L	3	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 Description	N	Untinted, Non Diffused
		B	Tinted,Diffused
x_2	Color	F	Yellow green
		A	Amber
		J	Orange
		R	Red
x_3 x_4	Viewing Angle	45	45°
		60	60°
x_5	Minimum Intensity Bin	See the Intensity Bin Limits (CAT) table	
x_6	Maximum Intensity Bin	0	Open Bin (No Maximum Limit)
x_7	Color Bin Option	0	Full Color Bin
x_8 x_9	Packaging Option	00	Bulk
		DD	Ammopack

Part Number Example

HL3P-NR45-J00DD

x_1 : N – Package is untinted, non diffused

x_2 : R – Color is red

x_3 x_4 : 45 – Viewing angle 45°

x_5 : J – Minimum intensity bin J

x_6 : 0 – Maximum intensity bin 0 (open bin)

X_7 : 0 – Full color bin

x_8 x_9 : DD – Ammopack

Bin Information

Intensity Bin Limits (CAT)

Bin ID	Luminous Intensity (mcd)	
	Min.	Max.
C	50	65
D	65	85
E	85	110
F	110	140
G	140	180
H	180	240
J	240	310
K	310	400
L	400	520
M	520	680
N	680	880
P	880	1150
Q	1150	1500
R	1500	1900
S	1900	2500
T	2500	3200

Tolerance = ±15%

Color Bin Limits (BIN)

Bin ID	Dominant Wavelength λ_D (nm)	
	Min.	Max.
Red		
—	620.0	635.0
Orange		
2	599.5	602.0
3	602.0	604.5
4	604.5	607.5
5	607.5	610.5
Amber		
1	584.5	587.0
2	587.0	589.5
4	589.5	592.0
6	592.0	594.5
7	594.5	597.0
Yellow Green		
5	564.5	567.5
4	567.5	570.5
3	570.5	573.5
2	573.5	576.5

Tolerance = ±1.0nm

Example of bin information on packaging label:

CAT : J – Intensity bin J

BIN : 1 – Color bin 1

Figure 2 Spectral Power Distribution

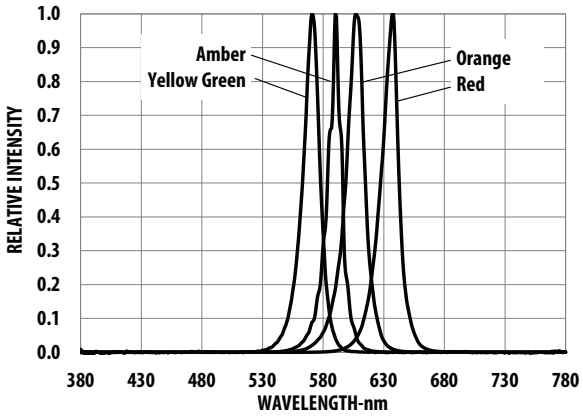


Figure 3 Forward Current vs. Forward Voltage

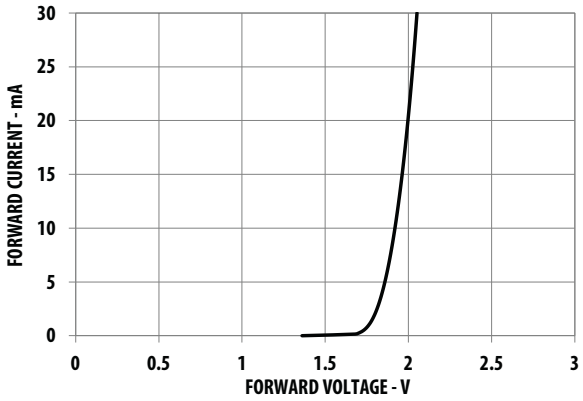


Figure 4 Relative Luminous Intensity vs. Mono Pulse Current

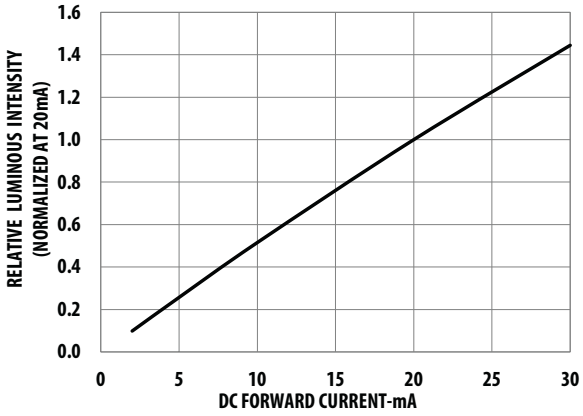


Figure 5 Maximum Forward Current vs. Ambient Temperature

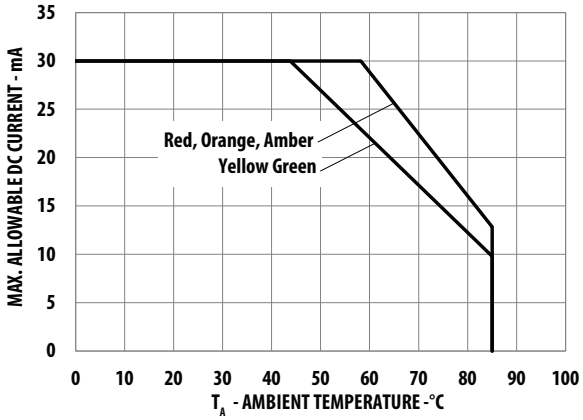


Figure 6 Radiation Pattern for Yellow Green, Amber, Orange, and Red Untinted, Non Diffused

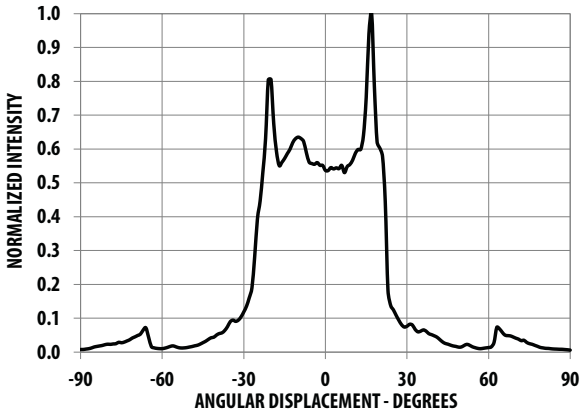


Figure 7 Radiation Pattern for Yellow Green, Amber, Orange, and Red Tinted, Diffused

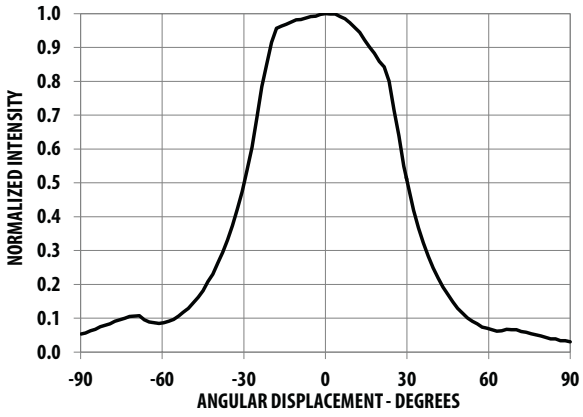
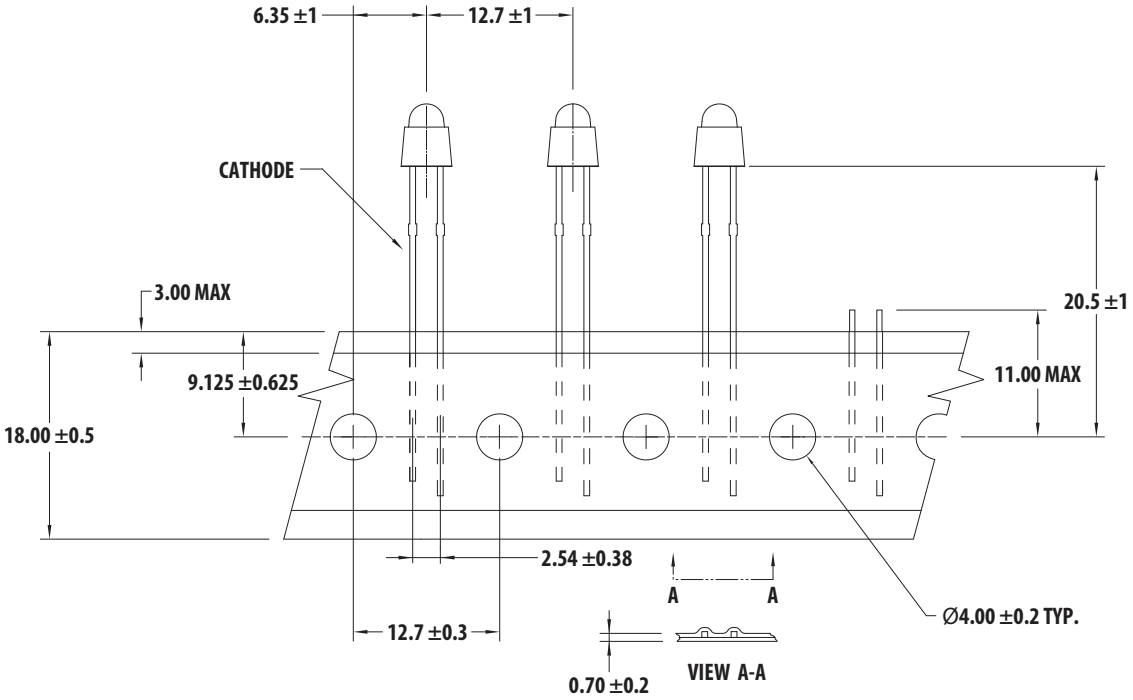
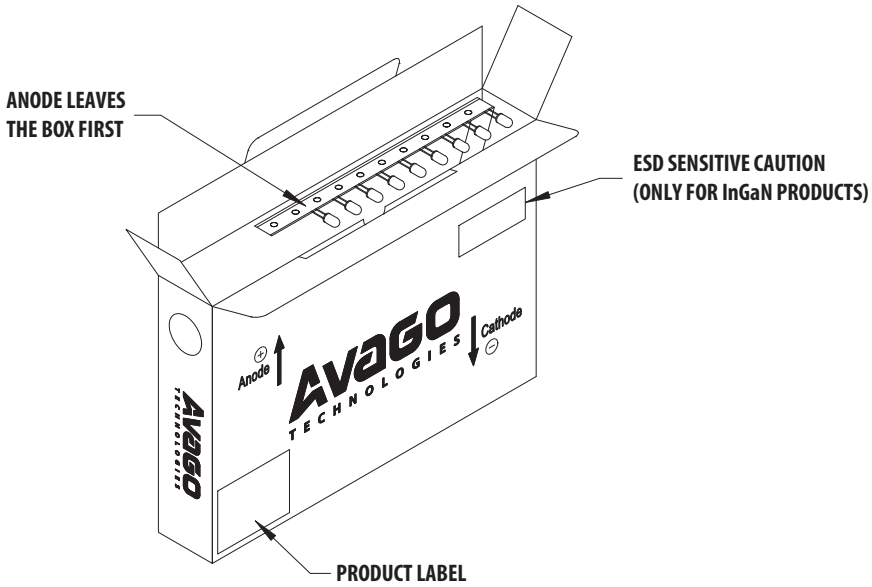


Figure 8 Tape Outline Drawing – For Packaging Option DD



NOTE All dimensions are in millimeters.

Figure 9 Packaging Box for Ammopack



Precautionary Notes

Soldering and Handling

- Set and maintain the wave soldering parameters according to the recommended temperature and dwell time. Perform daily check on the profile to ensure that it is always conforming to the recommended conditions. Exceeding these conditions will over-stress 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. PCB with different size and design (component density) will have different heat capacity and might cause a change in 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 non-metal 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 be sufficiently cooled 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 following conditions:
  - Soldering iron tip temperature = 315°C max.
  - Soldering duration = 2sec max.
  - Number of cycle = 1 only
  - Power of soldering iron = 50W max.
- 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 as it may cause damage to the LED.
- Confirm beforehand whether the functionality and performance of the LED is affected by soldering with 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 problem during insertion or clinching (for auto-insertable devices).

Figure 10 Recommended PCB Through Hole Size

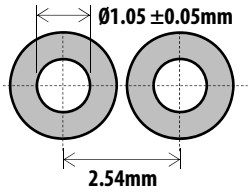
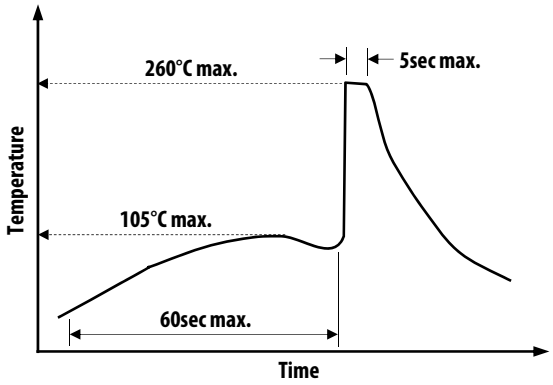


Figure 11 Recommended Wave Soldering Condition



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

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

Lead Forming

- To pre-form or cut the leads prior to insertion andsoldering onto PCB, use proper tool instead of doing itmanually.
- Do not bend the leads at location less than 3 mm from the LED body.
- Do not use the base of the LED body as fulcrum for lead bending. Secure the leads properly before bending.
- If manual lead cutting is unavoidable, cut the leads after soldering to reduce stress to the LED body.

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 the intended drive current can always be achieved..

- The LED exhibits slightly different characteristics at different drive currents, which may result in larger variation of performance (meaning: 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.

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Lead (Pb) Free
RoHS 6 fully compliant