HLMP-CYxx

Precision Optical Performance 5mm Round Warm White LED Lamps

AVAGO TECHNOLOGIES

Data Sheet

Description

These high intensity white LED lamps are based on InGaN material technology. A blue LED die is coated by phosphor to produce white.

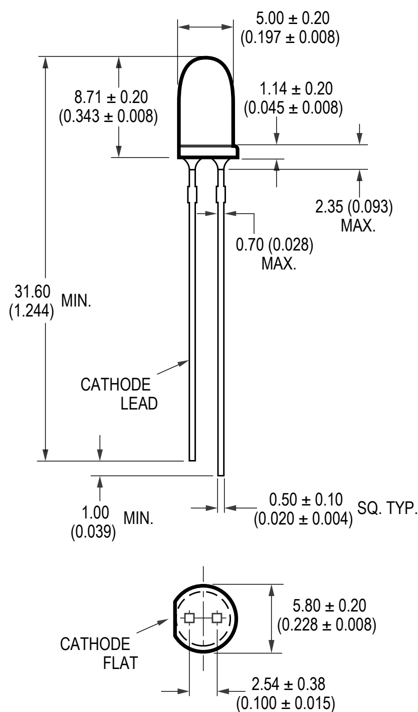
The typical resulting color is described by the coordinates x= 0.41, y = 0.39 using the CIE 1931 Chromaticity Diagram. These T-1¾ lamps are untinted, non-diffused, and incorporate precise optics which produce well-defined spatial radiation patterns at specific viewing cone angle.

Features

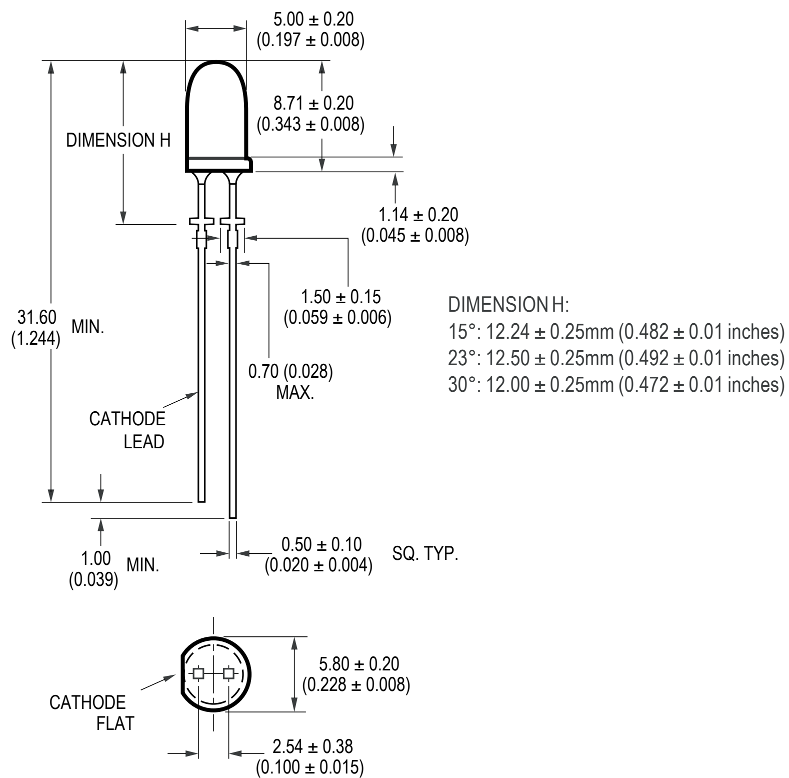
- Well defined spatial radiation pattern
- High luminous white emission
- Viewing angle: 15°, 23°, 30° and 50°
- Standoff or non-standoff leads

Package Dimensions

Package Dimension A



Package Dimension B



Caution: InGaN devices are Class 1C HBM ESD sensitive per JEDEC Standard. Please observe appropriate during handling and processing. Refer to Application Note AN-1142 for additional details.

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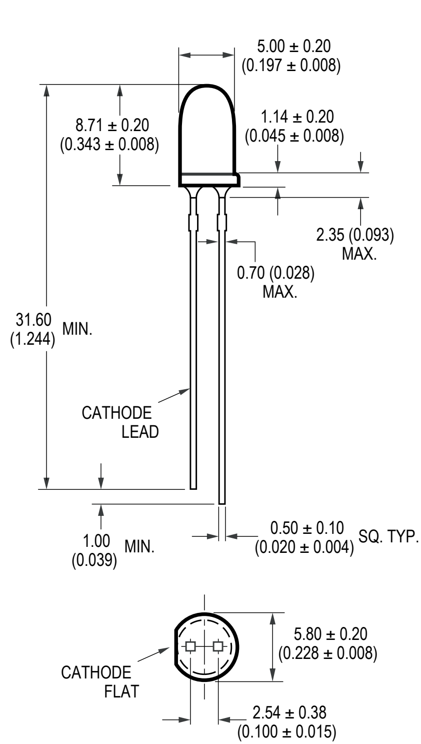
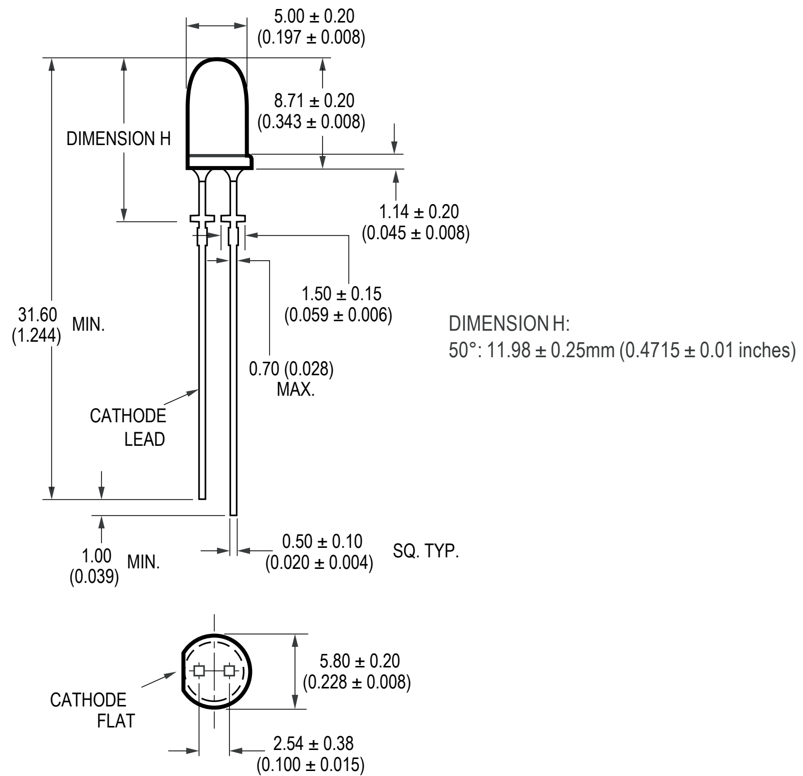
HLMP-CY46/47 Package drawing

Package Dimension C



Package Dimension D



Note:
1. All dimensions are in millimeters/ inches.
2. Epoxy meniscus may extend about 1mm (0.040") down the leads.
3. If heat sinking application is required, the terminal for heat sink is anode.

Device Selection Guide

Part Number	Typical Viewing Angle (°)	Luminous Intensity (mcd) at 20mA Min.	Luminous Intensity (mcd) at 20mA Max.	Standoff	Package Dimension
HLMP-CY11-WZ0DD	15	5500	16000	No	A
HLMP-CY12-WZ0DD	15	5500	16000	Yes	B
HLMP-CY26-VY0DD	23	4200	12000	No	A
HLMP-CY27-VY0DD	23	4200	12000	Yes	B
HLMP-CY36-UX0DD	30	3200	9300	No	A
HLMP-CY37-UX0DD	30	3200	9300	Yes	B
HLMP-CY46-TW0DD	50	2500	5500	No	C
HLMP-CY47-TW0DD	50	2500	5500	Yes	D

Tolerance for each intensity limit is ± 15%.

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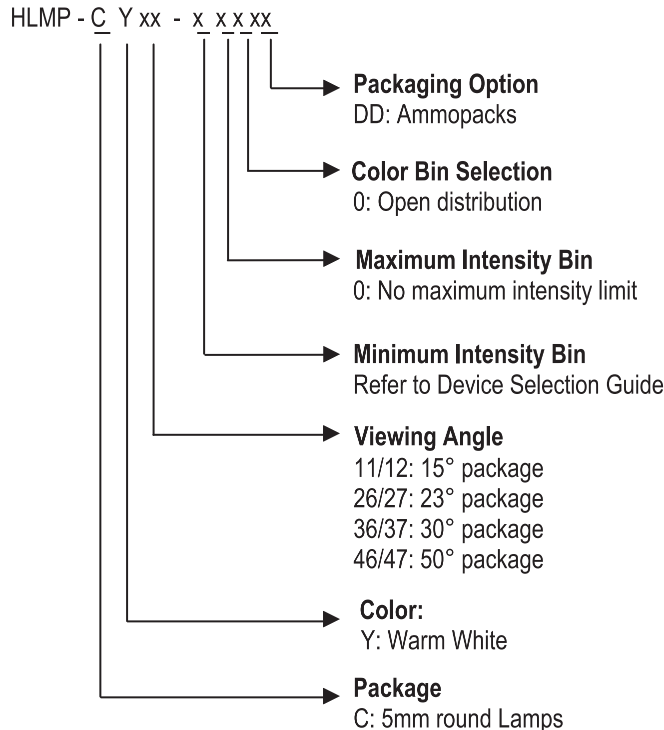
Part Numbering System



Absolute Maximum Rating $T_A = 25°C$

Parameter	White	Unit
DC Forward Current	30	mA
Peak Forward Current	100[1]	mA
Power Dissipation	116	mW
Reverse Voltage	5 (I_R = 10 µA)	V
LED Junction Temperature	110	°C
Operating Temperature Range	-40 to +85	°C
Storage Temperature Range	-40 to +100	°C

Notes:
1. Derate linearly as shown in Figure 2
2. Duty Factor 10%, frequency 1kHz.

Optical/ Electrical Performance at 25°C

Parameter	Symbol	Min	Typ	Max	Units	Test Condition
Forward Voltage	V_F	2.8	3.2	3.8	V	I_F = 20 mA
Reverse Voltage	V_R	5.0			V	I_R = 10 µA
Thermal Resistance	$R\theta_{J\text{-}PIN}$		240		°C/W	LED junction to anode lead
Chromaticity Coordinate	X y		0.41 0.39			I_F = 20 mA

Notes:
1. The reverse voltage of the product is equivalent to the forward voltage of the protective chip at IR = 10 µA
2. The chromaticity coordinates are derived from the CIE 1931 Chromaticity Diagram and represent the perceived color of the device.

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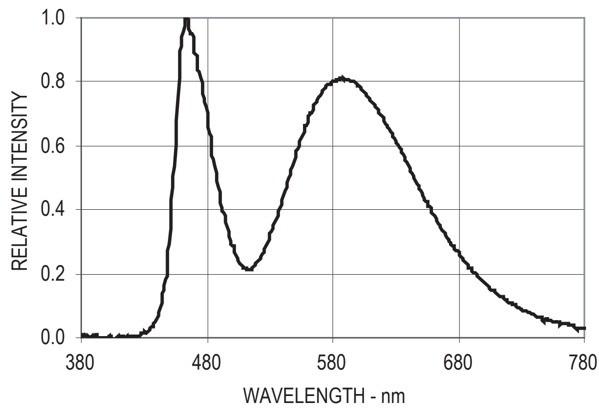

Figure 1. Relative Intensity vs. Wavelength

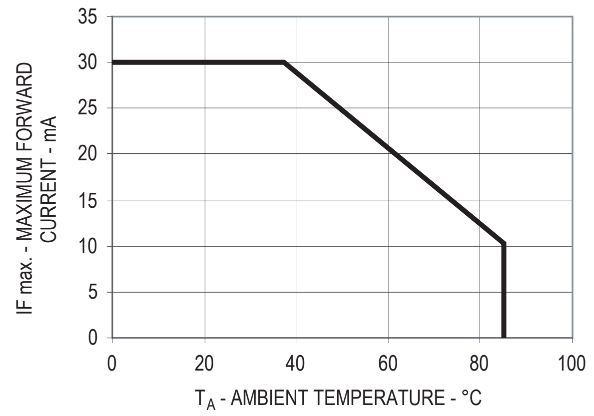

Figure 2. Forward current vs Ambient Temperature

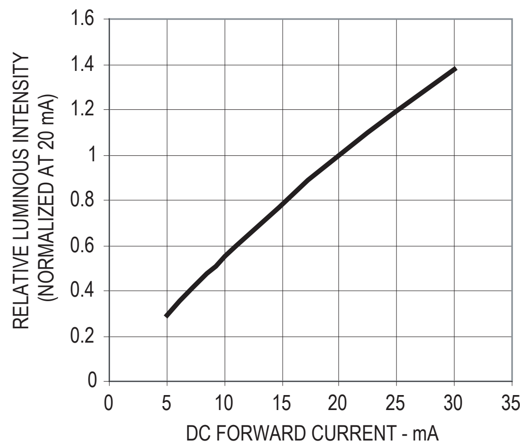

Figure 3. Relative Intensity vs Forward Current

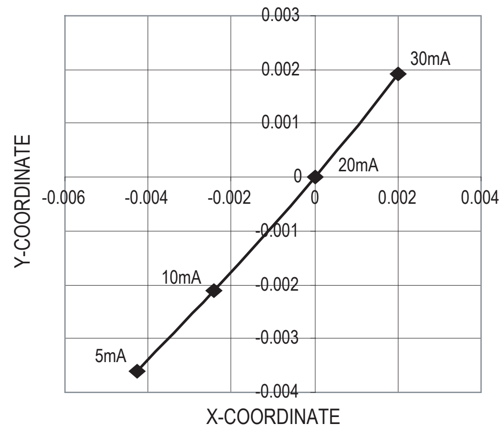

Figure 4. Chromaticity shift vs forward current

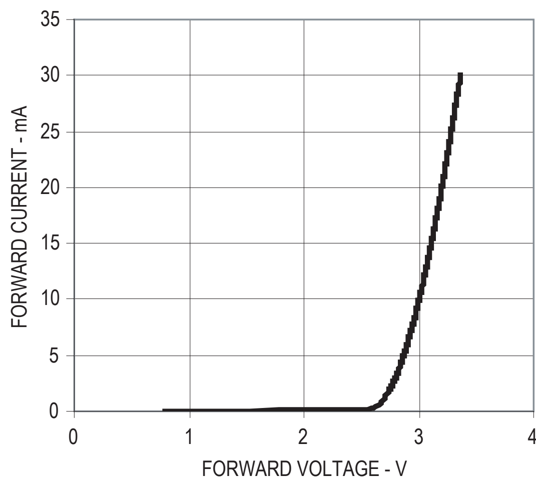

Figure 5. Forward current vs forward voltage

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Radiation Pattern

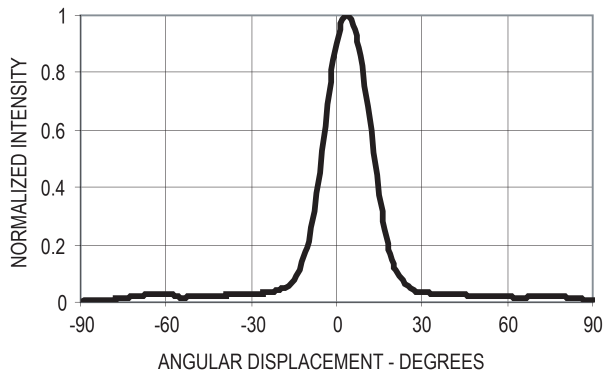

Figure 6. Radiation pattern for HLMP-CY11/12

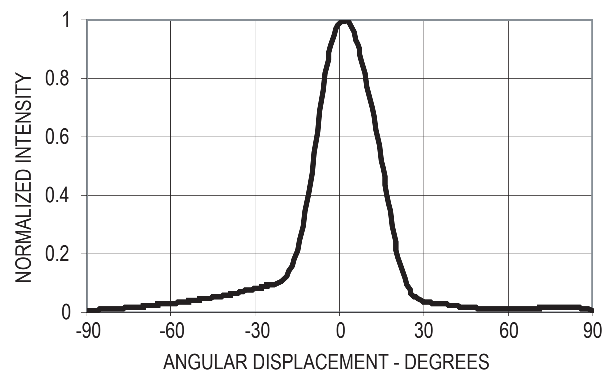

Figure 7. Radiation pattern for HLMP-CY26/27

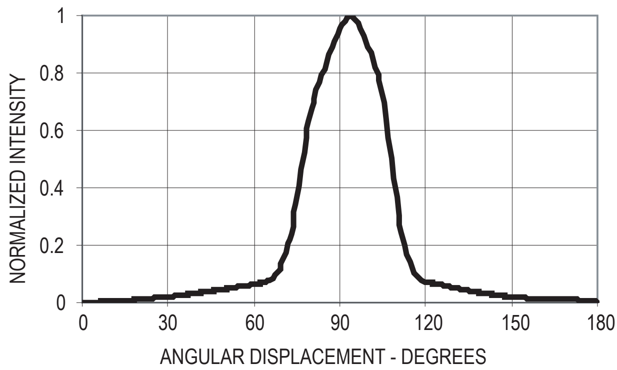

Figure 8. Radiation pattern for HLMP-CY36/37

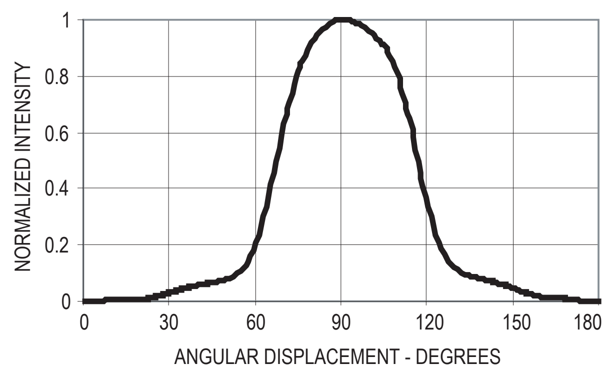

Figure 9. Radiation pattern for HLMP-CY46/47

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Intensity Bin Limit Table at 20mA

	Intensity (mcd) at 20 mA	
Bin	Min	Max
T	2500	3200
U	3200	4200
V	4200	5500
W	5500	7200
X	7200	9300
Y	9300	12000
Z	12000	16000

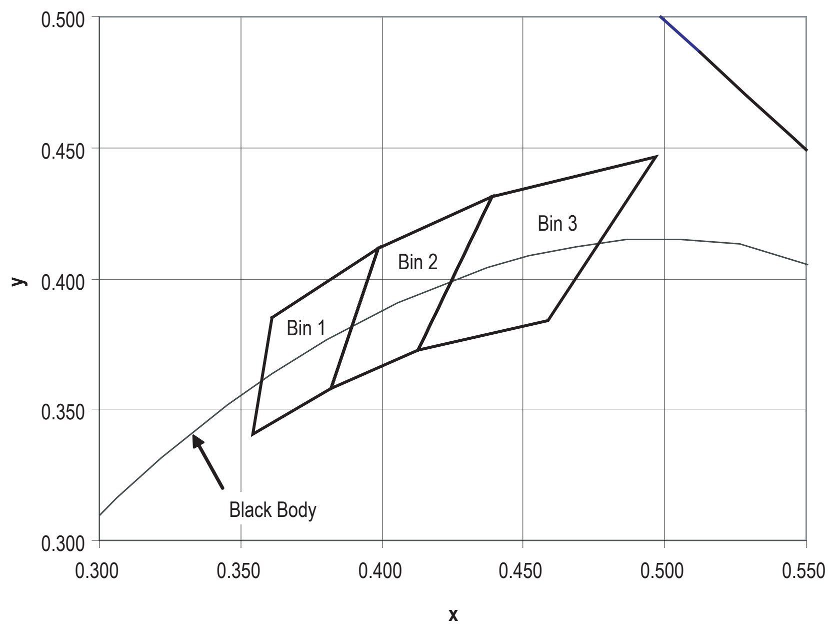
Tolerance for each bin limit is ± 15%

Color bin limits

Rank	Chromaticity Coordinates Limits					
1	X	0.3610	0.3988	0.3822	0.3545	0.3610
	Y	0.3850	0.4116	0.3580	0.3408	0.3850
2	X	0.3988	0.4390	0.4129	0.3822	0.3988
	Y	0.4116	0.4310	0.3725	0.3580	0.4116
3	X	0.4390	0.4970	0.4588	0.4129	0.4390
	Y	0.4310	0.4466	0.3838	0.3725	0.4310

Tolerance for each bin limit is ± 0.01

Avago Warm white binning on CIE 1931 Chromaticity Diagram



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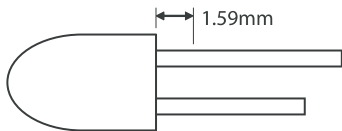
Precautions:

Lead Forming:

- The leads of an LED lamp may be performed or cut to length prior to insertion and soldering on PC board.
- If lead forming is required before soldering, care must be taken to avoid any excessive mechanical stress that induced into the LED package. Otherwise, cut the leads to applicable length after soldering process at room temperature. The solder joint formed will absorb the mechanical stress, due to the lead cutting, from traveling to the LED chip die attach and wirebond.
- 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.

Soldering condition:

- Care must be taken during PCB assembly and soldering process to prevent damage to the LED component.
- The closest manual soldering distance of the soldering heat source (soldering iron's tip) to the body is 1.59mm. Soldering the LED closer than 1.59mm might damage the LED.



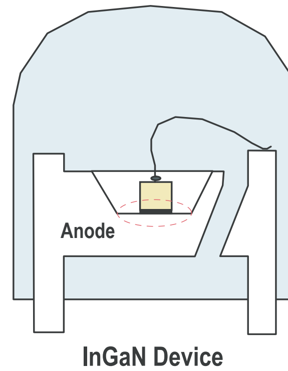
- Recommended soldering condition:

	Wave Soldering	Manual Solder Dipping
Pre-heat temperature	105 °C Max.	-
Preheat time	30 sec Max	-
Peak temperature	250 °C Max.	260 °C Max.
Dwell time	3 sec Max.	5 sec Max

- Wave soldering parameter must be set and maintain according to the recommended temperature and dwell time. Customer is advised to daily check on the soldering profile to ensure that the soldering profile is always conforming to recommended soldering condition.

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 is not exceeding 250°C. 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 material through conductive paste of solder.

- If necessary, use fixture to hold the LED component in proper orientation with respect to the PCB during soldering process.
- At elevated temperature, the LED is more susceptible to mechanical stress. Therefore, PCB must allowed to cool down to room temperature prior to handling, which includes removal of jigs, fixtures or pallet.
- Special attention must be given to board fabrication, solder masking, surface platting and lead holes size and component orientation to assure the solderability.
- Recommended PC board plated through holes size for LED component leads.

LED component lead size	Diagonal	Plated through hole diameter
0.457 x 0.457 mm (0.018 x 0.018 inch)	0.646 mm (0.025 inch)	0.976 to 1.078 mm (0.038 to 0.042 inch)
0.508 x 0.508 mm (0.020 x 0.020 inch)	0.718 mm (0.028 inch)	1.049 to 1.150 mm (0.041 to 0.045 inch)

- Under sizing of plated through hole can lead to twisting or improper LED placement during auto insertion. Over sizing plated through hole can lead to mechanical stress on the epoxy lens during clinching.

Note: Refer to application note AN1027 for more information on soldering LED components.

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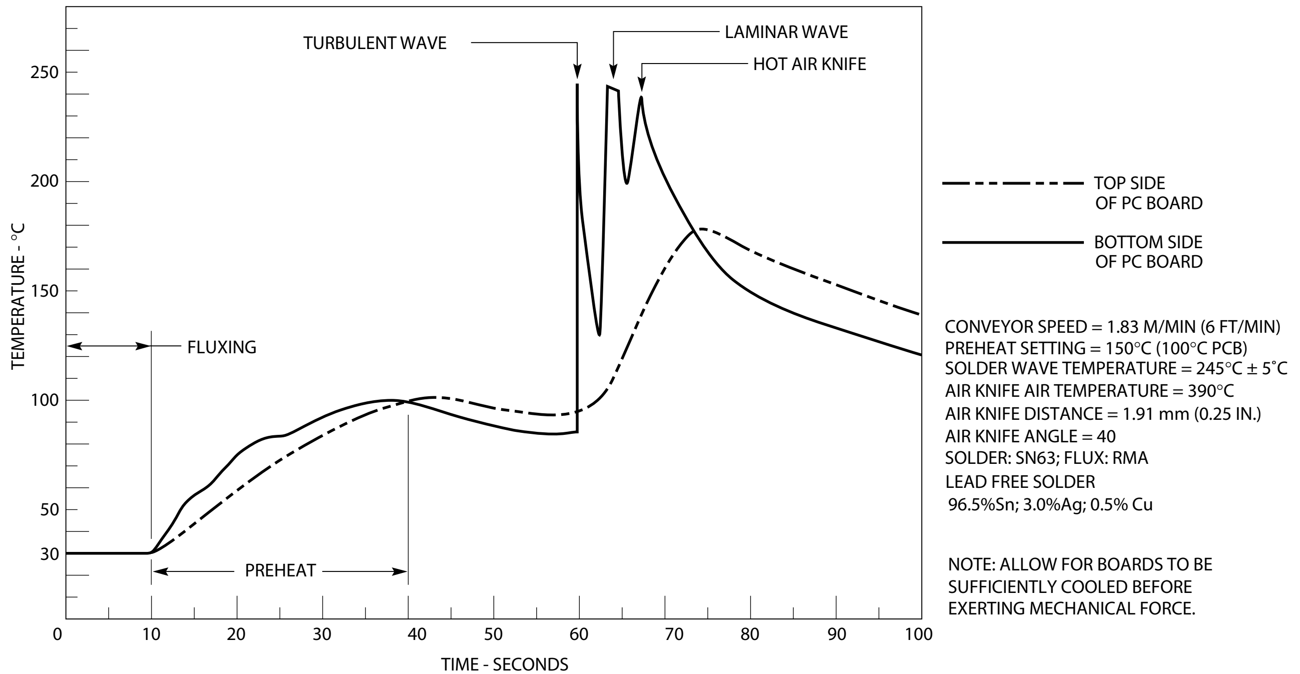
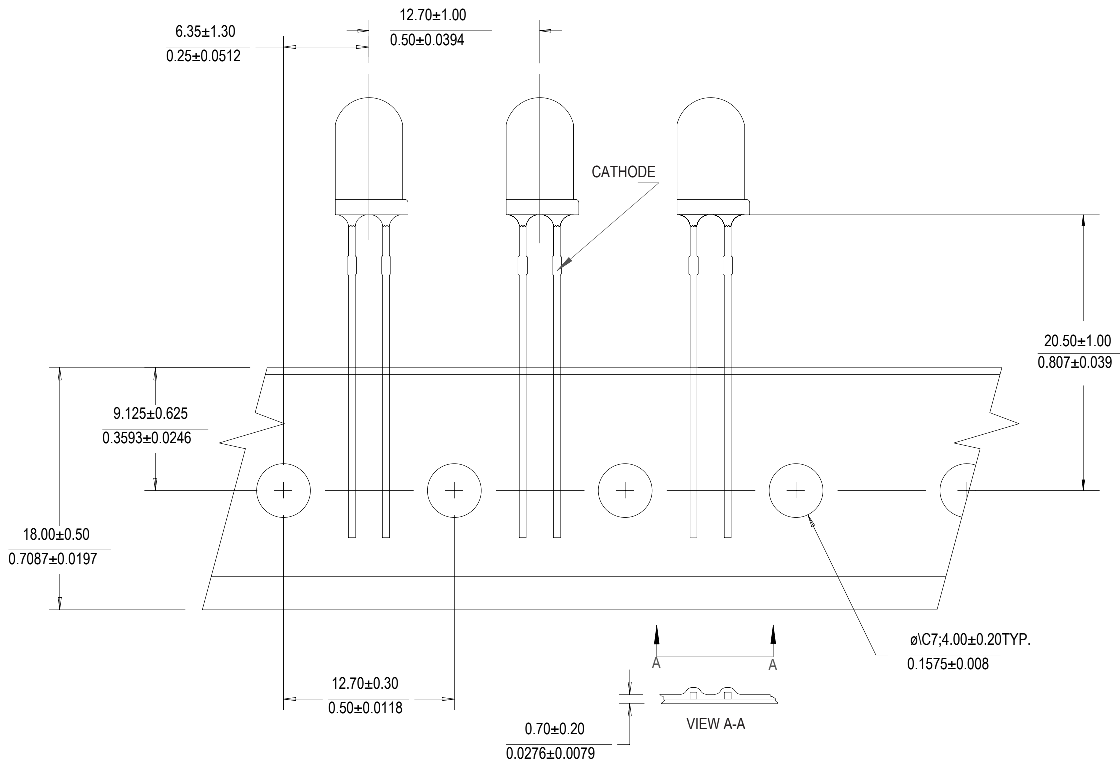
Recommended Wave Soldering Profile



Ammo Packs Drawing



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

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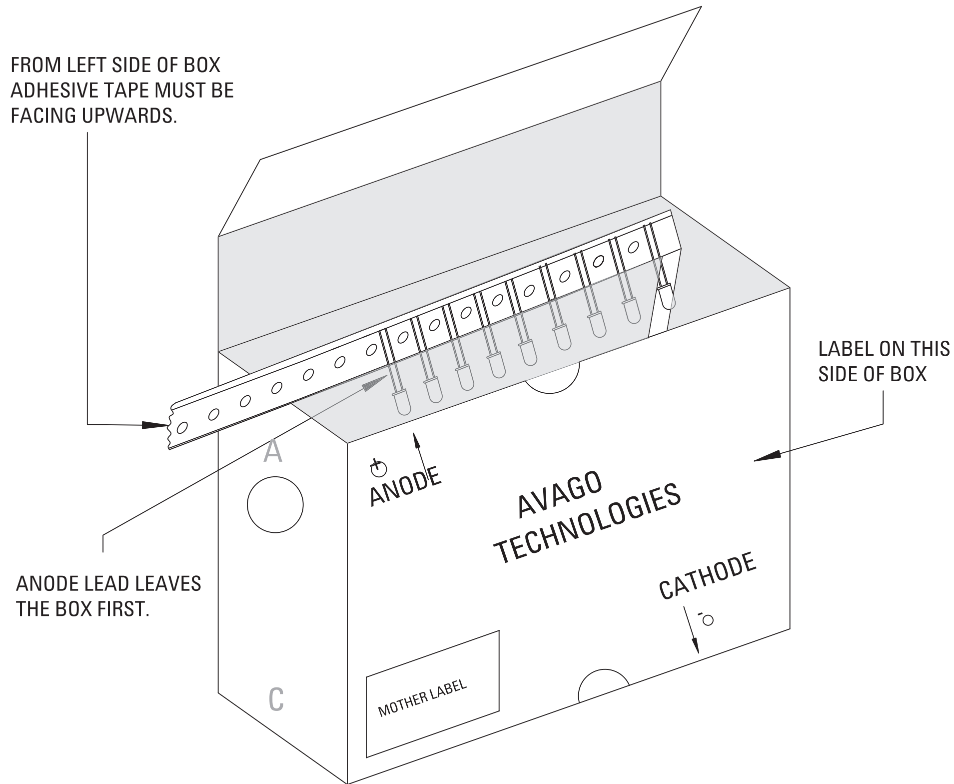
Packaging Box for Ammo Packs



Note: For InGaN device, the ammo pack packaging box contain ESD logo

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