Agilent HLMP-CE15, HLMP-CE16, HLMP-CE23, HLMP-CE24, HLMP-CE30, HLMP-CE31 T-1 3/4 (5 mm) Precision Optical Performance InGaN Bluish-Green LED Lamps

Data Sheet

Description

These high intensity bluish-green LEDs are based on InGaN material technology. InGaN is the most efficient and cost effective material for LEDs in the blue and green region of the spectrum. The 505 nm typical dominant wavelength matches international specifications for green traffic signals.

These LED lamps are untinted, nondiffused, T-1 3/4 packages incorporating second generation optics producing well defined spatial radiation patterns at specific viewing cone angles.

These lamps are made with an advanced optical grade epoxy, offering superior temperature and moisture resistance in outdoor signal and sign applications. The package epoxy contains both UV-a and UV-b inhibitors to reduce the effects of long term exposure to direct sunlight.

These lamps are available in three viewing angle options and two package options to give the designer flexibility with optical design and device mounting.

Features

- **Smooth, consistent spatial radiation patterns**
- **High luminous output**
- **Viewing angles 15°, 23°, and 30°**
- **Superior resistance to moisture**

Benefits

- **Viewing angles match traffic signal requirements**
- **Superior performance in outdoor environments**
- **Suitable for autoinsertion onto PC boards**

Applications

- **Traffic signals**
- **Railroad signals**
- **Commercial outdoor signs**
- **Automotive interior lights**

CAUTION: HLMP-CExx LEDs are Class 1 ESD sensitive. Please observe appropriate precautions during handling and processing. Refer to Agilent Application Note AN-1142 for additional details.

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Device Selection Guide

Part Number	Color and Dominant Wavelength λd Typ. (nm)	Viewing Angle $2\theta_{1/2}$ Typ. (deg)	Luminous Intensity Iv (mcd) at 20 mA		Standoff
			Min.	Max.	
HLMP-CE15-WZCxx	505	15	5500	16000	No
HLMP-CE15-WZQxx	505	15	5500	16000	No
HLMP-CE16-UXQxx	505	15	3200	9300	Yes
HLMP-CE16-WZCxx	505	15	5500	16000	Yes
HLMP-CE16-WZQxx	505	15	5500	16000	Yes
HLMP-CE23-UVQxx	505	23	3200	5500	No
HLMP-CE23-UXCxx	505	23	3200	9300	No
HLMP-CE23-UXQxx	505	23	3200	9300	No
HLMP-CE23-VWQxx	505	23	4200	7200	No
HLMP-CE24-UXCxx	505	23	3200	9300	Yes
HLMP-CE24-UXQxx	505	23	3200	9300	Yes
HLMP-CE30-RSCxx	505	30	1500	2500	No
HLMP-CE30-SVCxx	505	30	1900	5500	No
HLMP-CE30-SVQxx	505	30	1900	5500	No
HLMP-CE31-SVCxx	505	30	1900	5500	Yes
HLMP-CE31-SVQxx	505	30	1900	5500	Yes

Notes:
1. The luminous intensity is measured on the mechanical axis of the lamp package.
2. The optical axis is closely aligned with the package mechanical axis.
3. The dominant wavelength, λ_d, is derived from the CIE Chromaticity Diagram and represents the perceived color of the device.
4. All InGaN LEDs represented here are IEC825 Class 2. See Application Brief 1-009 and 1-015 for details.
5. Tolerance for intensity limit is ± 15%.

Part Numbering System

HLMP - X X X X - X X X X X

Mechanical Options
- 00: Bulk Packaging
- DD: Ammo Pack

Color Bin Selections
- C: Color Bins 3 and 4 only
- Q: Color Bins 7 and 8 only

Maximum Intensity Bin
- 0: No Iv Bin Limitation

Minimum Intensity Bin

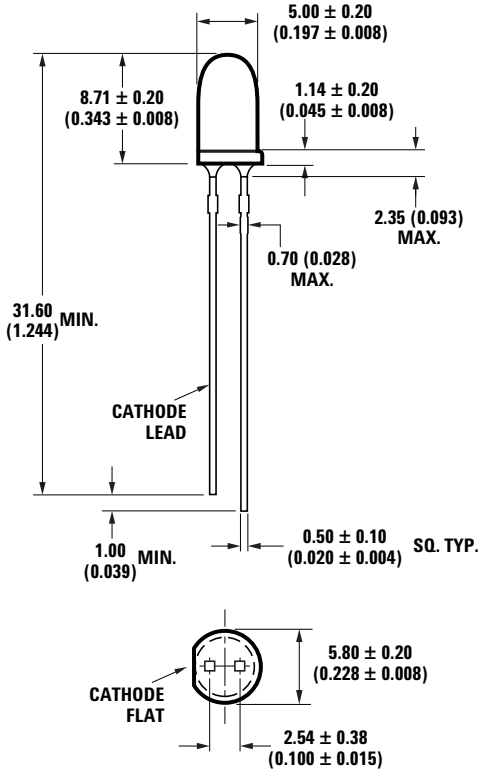
Viewing Angle and Stand-Off
- 15: 15 deg, without stand-off
- 16: 15 deg, with stand-off
- 23: 23 deg, without stand-off
- 24: 23 deg, with stand-off
- 30: 30 deg, without stand-off
- 31: 30 deg, with stand-off

Color
- E: 505 nm Bluish-Green

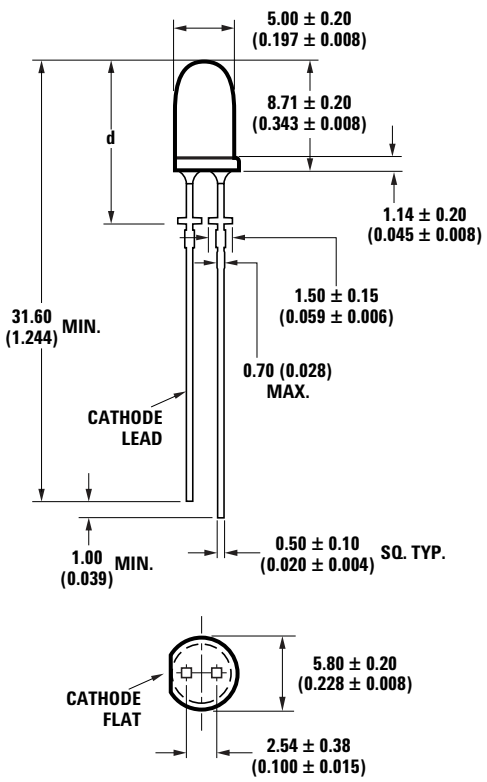
Package
- C: 5 mm InGaN

Package Dimensions

HLMP-CE15, HLMP-CE23, and HLMP-CE30



HLMP-CE16, HLMP-CE24, and HLMP-CE31



Notes:
1. Dimensions in mm.
2. Tolerance ± 0.1 mm unless otherwise noted.

HLMP-CE16	HLMP-CE24	HLMP-CE31
d = 12.6 ± 0.18 (0.496 ± 0.007)	d = 12.40 ± 0.25 (0.488 ± 0.010)	d = 12.22 ± 0.50 (0.481 ± 0.020)

Absolute Maximum Ratings at T_A = 25°C

Parameter	Value	Units
DC Forward Current[1]	30	mA
Peak Forward Current	100	mA
Power Dissipation	120	mW
Reverse Voltage (I_R = 100 µA)	5	V
LED Junction Temperature	130	°C
Operating Temperature Range	-40 to +80	°C
Storage Temperature Range	-40 to +100	°C

Note:
1. Derate linearly as shown in Figure 4 for temperatures above 50°C.
2. Duty Factor 10%, 1kHz

Electrical/Optical Characteristics at T_A = 25°C

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Voltage	V_F		3.8	4.0	V	I_F = 20 mA
Reverse Voltage	V_R	10				I_R = 100 µA
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
Dominant Wavelength	λ_d		505		nm	I_F = 20 mA
Peak Wavelength	I_{PEAK}		502		nm	Peak of Wavelength of Spectral Distribution at I_F = 20 mA
Spectral Halfwidth	$\Delta\lambda_{1/2}$		35		nm	Wavelength Width at Spectral Distribution Power Point at I_F = 20 mA
Luminous Efficacy	η_V		350		lm/W	Emitted luminous power/ Emitted radiant power

Notes:
1. The dominant wavelength, λ_d, is derived from the CIE Chromaticity Diagram and represents the perceived color of the device.
2. The radiant intensity, Ie in watts per steradian, may be found from the equation Ie = Iv/η_V, where Iv is the luminous intensity in candelas and ηV is the luminous efficacy in lumens/watt.

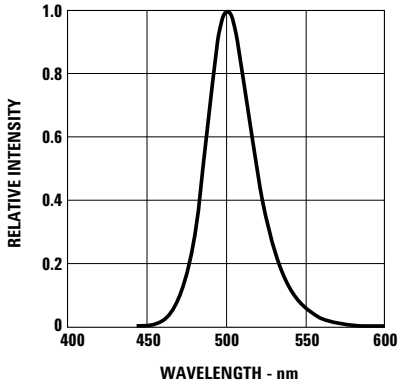


Figure 1. Relative intensity vs. wavelength.

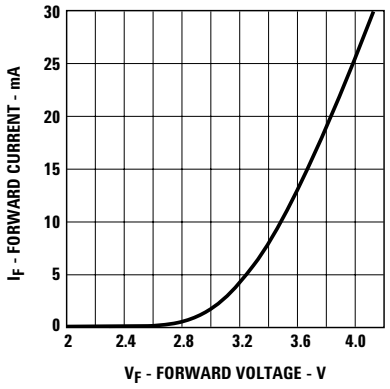


Figure 2. Forward current vs. forward voltage.

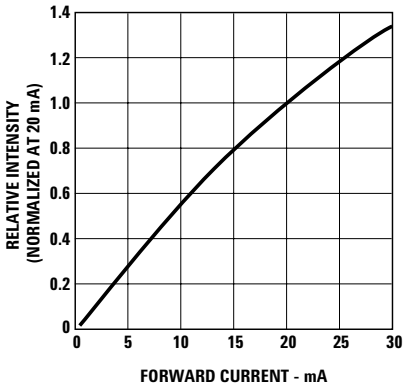


Figure 3. Relative luminous intensity vs. forward current.

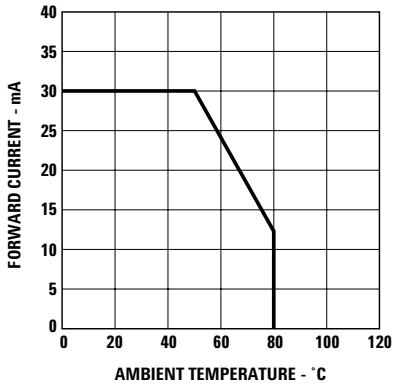


Figure 4. Maximum forward current vs. ambient temperature.

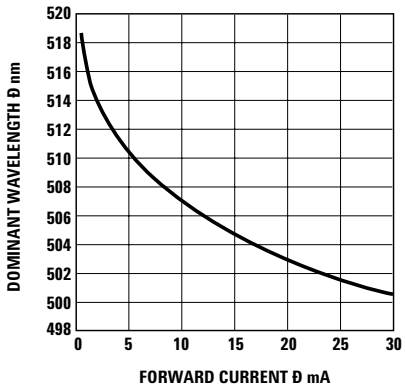


Figure 5. Color vs. forward current.

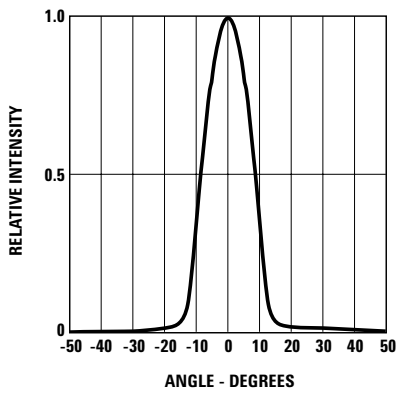


Figure 6. Spatial radiation pattern – 15° lamps.

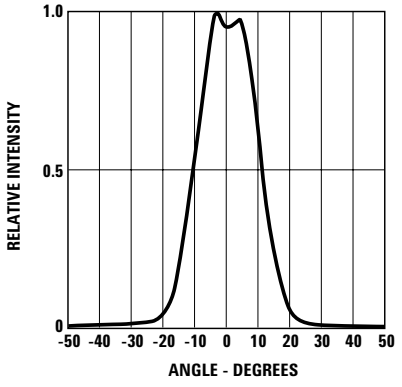


Figure 7. Spatial radiation pattern – 23° lamps.

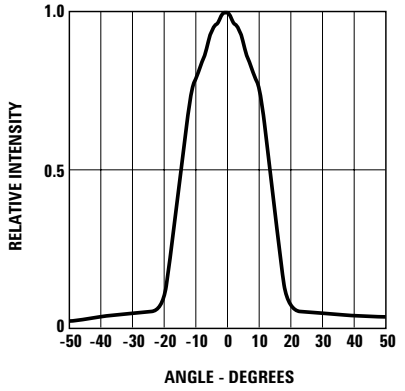


Figure 8. Spatial radiation pattern – 30° lamps.

Intensity Bin Limits (mcd at 20 mA)

Bin Name	Min.	Max.
N	680	880
P	880	1150
Q	1150	1500
R	1500	1900
S	1900	2500
T	2500	3200
U	3200	4200
V	4200	5500
W	5500	7200
X	7200	9300
Y	9300	12000
Z	12000	16000

Tolerance of each intensity bin limit is ±15%.

Color Bin Limits (nm at 20 mA)

Bin Name	Min.	Max.
1	490	495
2	495	500
3	500	505
4	505	510
7	498	503
8	503	508

Tolerance for each color bin limit is ± 0.5 nm.

Note:

Bin categories are established for classification of products. Products may not be available in all bin categories. Please contact your Agilent representative for information on currently available bins.

Precautions:

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, care must be taken 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.
- It is recommended that tooling made to precisely form and cut the leads to length rather than rely upon hand operation.

Soldering Condition:

- Care must be taken during PCB assembly and soldering process to prevent damage to LED component.
- The closest LED is allowed to solder on board is 1.59mm below the body (encapsulant epoxy) for those parts without standoff.
- Recommended soldering condition:

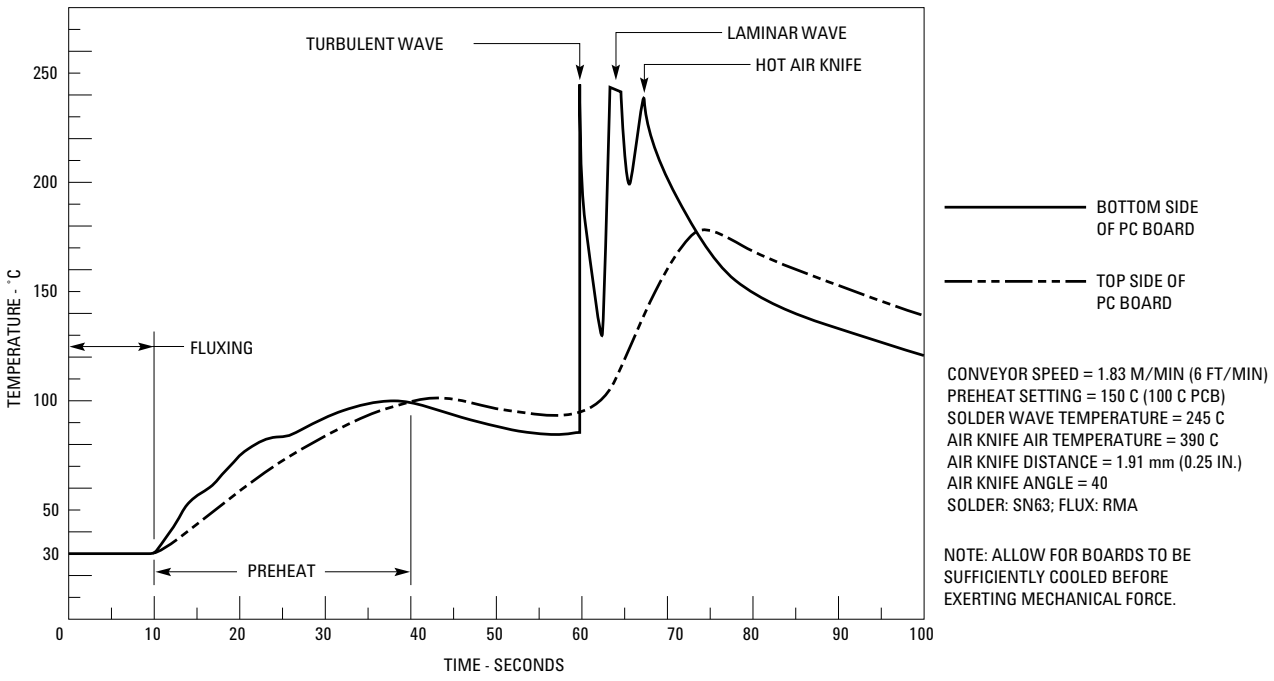
	Wave Soldering	Manual Solder Dipping
Pre-heat temperature	105 °C Max.	–
Preheat time	30 sec Max	–
Peak temperature	250 °C Max.	260 °C Max.
Dwell time	3 sec Max.	5 sec Max

- Wave soldering parameter must be set and maintain according to recommended temperature and dwell time in the solder wave. Customer is advised to periodically check on the soldering profile to ensure the soldering profile used is always conforming to recommended soldering condition.
- If necessary, use fixture to hold the LED component in proper orientation with respect to the PCB during 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.
- Special attention must be given to board fabrication, solder masking, surface plating and lead holes size and component orientation to assure solderability.
- Recommended PC board plated through holes size for LED component leads.

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

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

Recommended Wave Soldering Profile



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Data subject to change.

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