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

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**

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.

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.*

Device Selection Guide

Part Number	Color and Dominant Wavelength λ_d Typ. (nm)	Viewing Angle $2\theta_{1/2}$ Typ. (deg)	Luminous Intensity I_V (mcd) at 20 mA Min.	Max.	Stand-Off
HLMP-CE15-TWCxx	505	15	2500	7200	No
HLMP-CE16-TWCxx	505	15	2500	7200	Yes
HLMP-CE23-SVCxx	505	23	1900	5500	No
HLMP-CE23-SVQxx	505	23	1900	5500	No
HLMP-CE24-SVCxx	505	23	1900	5500	Yes
HLMP-CE24-SVQxx	505	23	1900	5500	Yes
HLMP-CE30-QTCxx	505	30	1150	3200	No
HLMP-CE30-QTQxx	505	30	1150	3200	No
HLMP-CE31-QTCxx	505	30	1150	3200	Yes
HLMP-CE31-QTQxx	505	30	1150	3200	Yes
HLMP-CE23-P0Cxx	505	23	880	-	No
HLMP-CE23-TVQxx	505	23	2500	5500	No
HLMP-CE24-TVQxx	505	23	2500	5500	Yes
HLMP-CE30-N00xx	505	30	680	-	No
HLMP-CE30-RUQxx	505	30	1500	4200	No
HLMP-CE31-N00xx	505	30	680	-	Yes
HLMP-CE31-RUQxx	505	30	1500	4200	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

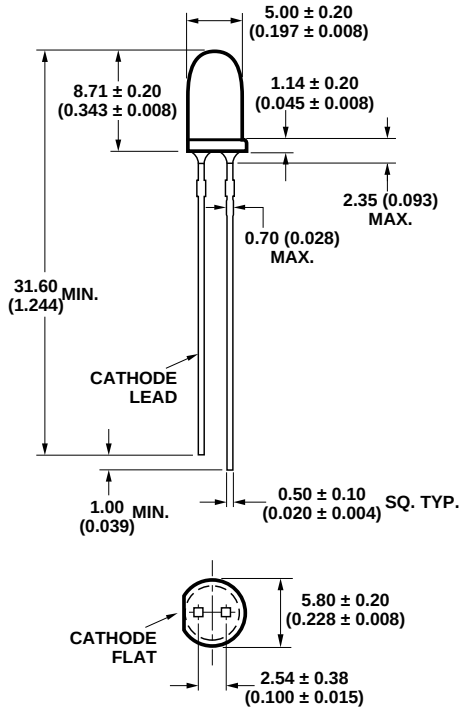
Minimum Intensity Bin

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

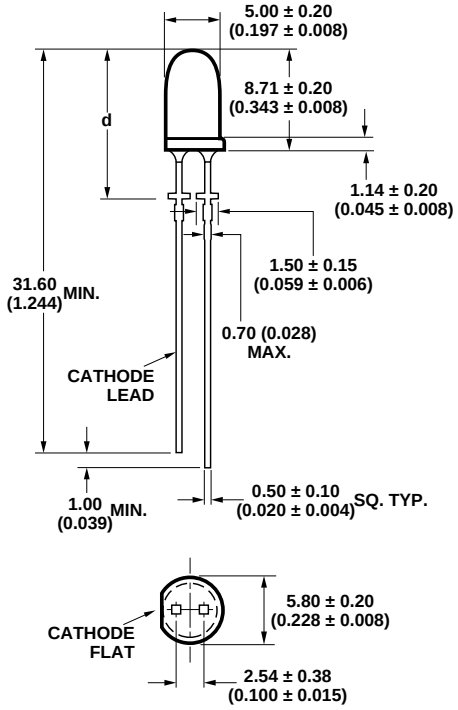
Color
E: 505 nm Bluish-Green

Package
C: 5 mm InGaN

Package Dimensions



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



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

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)

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

Absolute Maximum Ratings at T_A = 25°C

Parameter	Value	Units
DC Forward Current[1]	30	mA
Peak Forward Current	100	mA
Average Forward Current	30	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.

Electrical/Optical Characteristics at $T_A = 25^{\circ}C$

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				$I_R = 100\ \mu A$
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	λ_{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.

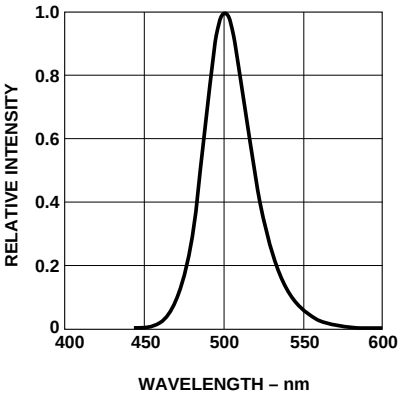


Figure 1. Relative intensity vs. wavelength.

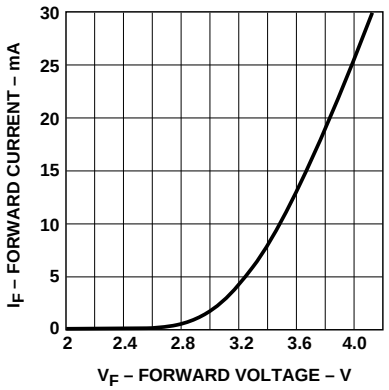


Figure 2. Forward current vs. forward voltage.

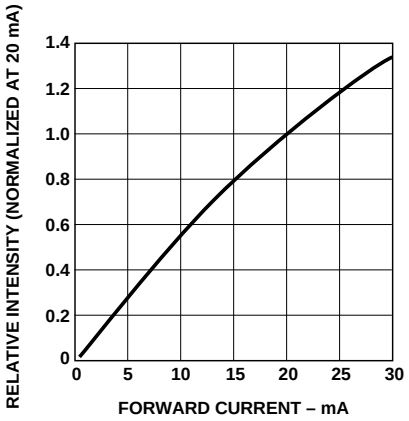


Figure 3. Relative luminous intensity vs. forward current.

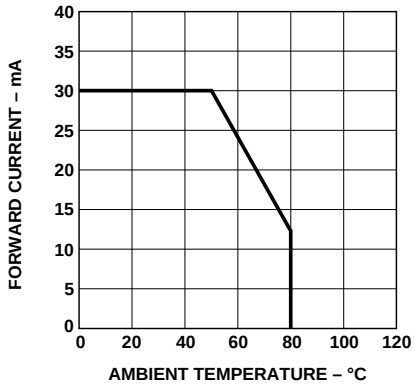


Figure 4. Maximum forward current vs. ambient temperature.

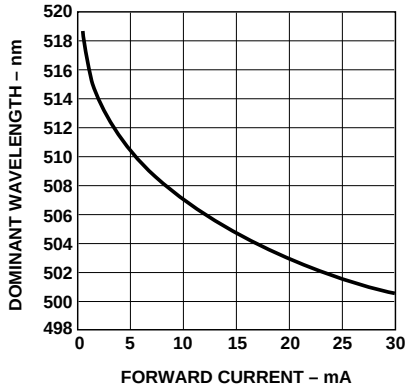


Figure 5. Color vs. forward current.

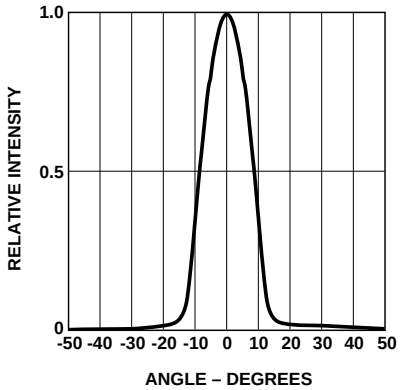


Figure 6. Spatial radiation pattern – 15° lamps.

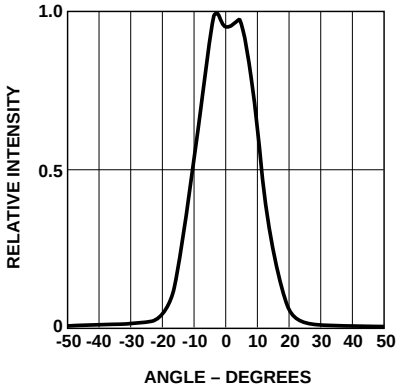


Figure 7. Spatial radiation pattern – 23° lamps.

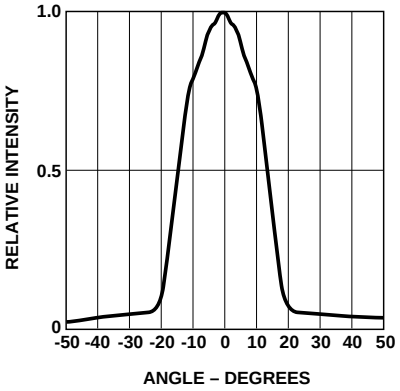


Figure 8. Spatial radiation pattern – 30° lamps.

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

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.

www.agilent.com/semiconductors

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Data subject to change.

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