

# Agilent HLMP-Cxxx T-1<sup>3</sup>/<sub>4</sub> (5 mm) Extra Bright Precision Optical Performance InGaN LED Lamps

## Data Sheet

HLMP-CB11, HLMP-CB12, HLMP-CM11, HLMP-CM12, HLMP-CE11, HLMP-CE12, HLMP-CB26, HLMP-CB27, HLMP-CM26, HLMP-CM27, HLMP-CE26, HLMP-CE27, HLMP-CB36, HLMP-CB37, HLMP-CM36, HLMP-CM37, HLMP-CE36, HLMP-CE37

### Description

These high intensity blue and green LEDs are based on the most efficient and cost effective InGaN material technology. The 470 nm typical dominant wavelength for blue and 521 nm typical wavelength for green is well suited to color mixing in full color signs. The 505 nm typical dominant wavelength for cyan is suitable for traffic signal application.

These LED lamps are untinted, non-diffused, T-1<sup>3</sup>/<sub>4</sub> packages

incorporating second generation optics which produce 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 high maximum LED junction temperature limit of +110°C enables high temperature operation in bright sunlight conditions.

### Features

- Well defined spatial radiation pattern
- High luminous output
- Available in blue, green, and cyan color
- Viewing angle: 15°, 23° and 30°
- Standoff or non-standoff leads
- Superior resistance to moisture

### Applications

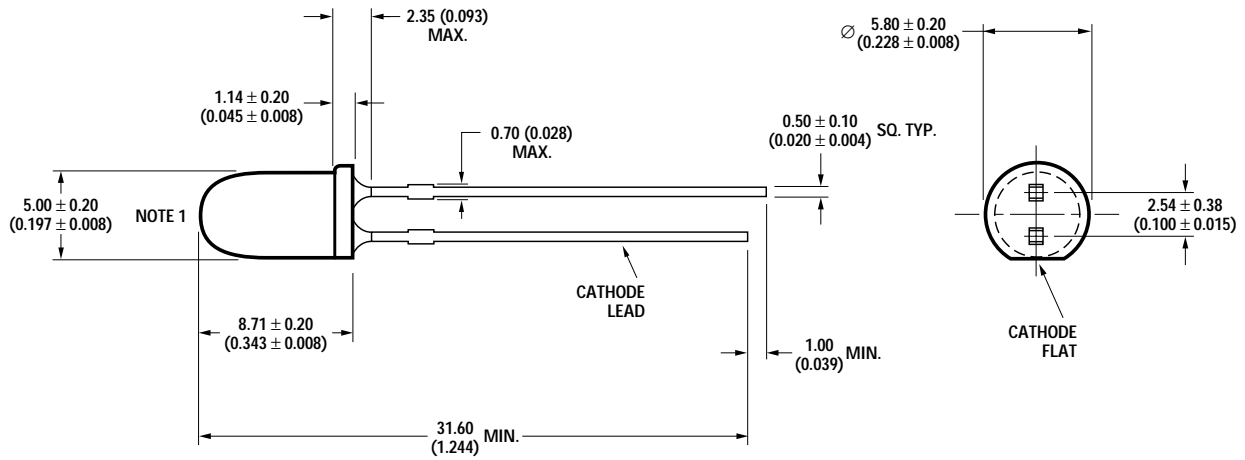
- Traffic signals
- Commercial outdoor advertising
- Front panel backlighting
- Front panel indicator

**CAUTION: Devices are Class I ESD sensitive. Please observe appropriate precautions during handling and processing. Refer to Application Note AN-1142 for additional details.**

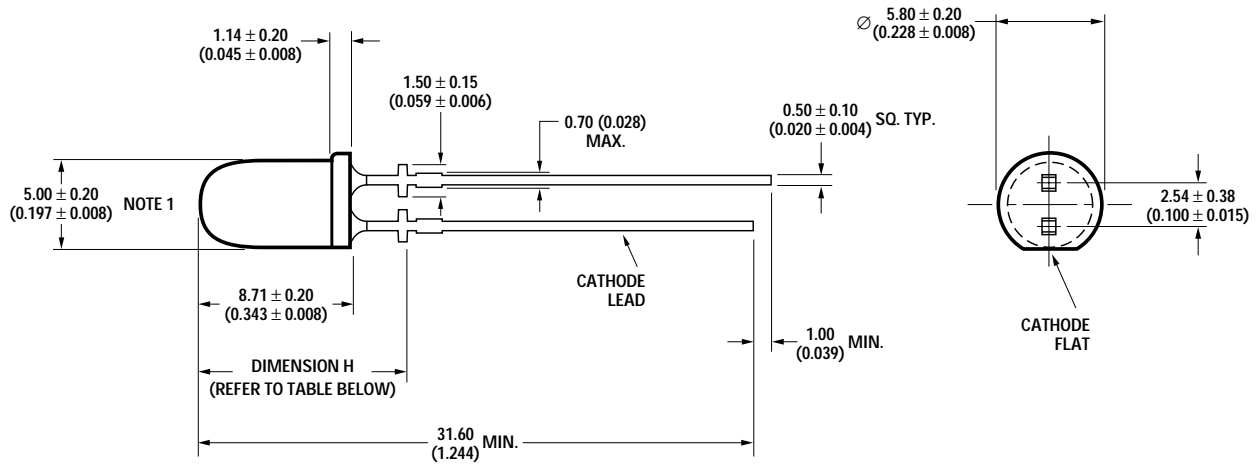


# Package Dimensions

## Package A



## Package B



DIMENSION H:	
23 & 30 DEGREE	= 11.71 ± 0.25 mm (0.461 ± 0.01 INCH)
15 DEGREE	= 11.96 ± 0.25 mm (0.471 ± 0.01 INCH)

**NOTES:**

1. MEASURED JUST ABOVE FLANGE.
2. ALL DIMENSIONS ARE IN MILLIMETERS (INCHES).
3. EPOXY MENISCUS MAY EXTEND ABOUT 1 mm (0.040") DOWN THE LEADS.
4. IF HEAT SINKING APPLICATION IS REQUIRED, THE TERMINAL FOR HEAT SINK IS ANODE.

## Device Selection Guide

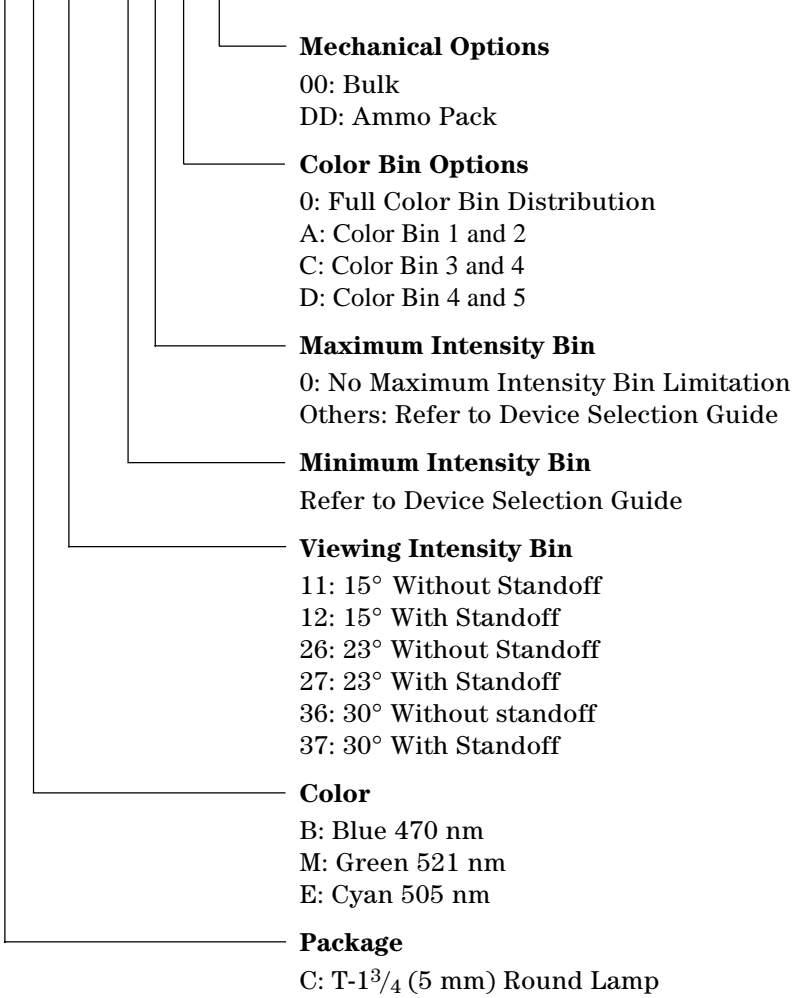
Part Number	Color	Typical Viewing Angle, $2\theta_{1/2}$ (Degree)	Intensity (cd) at 20 mA		Standoff	Package Dimension	Lens
			Min.	Max.			
HLMP-CB11-TW0xx	Blue	15	2.5	7.2	No	A	Clear
HLMP-CB11-UVAxx	Blue	15	3.2	5.5	No	A	Clear
HLMP-CB12-TW0xx	Blue	15	2.5	7.2	Yes	B	Clear
HLMP-CM11-Y20xx	Green	15	9.3	27.0	No	A	Clear
HLMP-CM11-Z1Cxx	Green	15	12.0	21.0	No	A	Clear
HLMP-CM12-Y20xx	Green	15	9.3	27.0	Yes	B	Clear
HLMP-CE11-X10xx	Cyan	15	7.2	21.0	No	A	Clear
HLMP-CE12-X10xx	Cyan	15	7.2	21.0	Yes	B	Clear
HLMP-CB26-SV0xx	Blue	23	1.9	5.5	No	A	Clear
HLMP-CB26-TUDxx	Blue	23	2.5	4.2	No	A	Clear
HLMP-CB27-SV0xx	Blue	23	1.9	5.5	Yes	B	Clear
HLMP-CM26-X10xx	Green	23	7.2	21.0	No	A	Clear
HLMP-CM26-YZCxx	Green	23	9.3	16.0	No	A	Clear
HLMP-CM27-X10xx	Green	23	7.2	21.0	Yes	B	Clear
HLMP-CE26-WZ0xx	Cyan	23	5.5	16.0	No	A	Clear
HLMP-CE27-WZ0xx	Cyan	23	5.5	16.0	Yes	B	Clear
HLMP-CB36-QT0xx	Blue	30	1.15	3.2	No	A	Clear
HLMP-CB36-RSAxx	Blue	30	1.5	2.5	No	A	Clear
HLMP-CB37-RU0xx	Blue	30	1.5	4.2	Yes	B	Clear
HLMP-CB37-RSDxx	Blue	30	1.5	2.5	Yes	B	Clear
HLMP-CM36-X10xx	Green	30	7.2	21.0	No	A	Clear
HLMP-CM36-XYCxx	Green	30	7.2	12.0	No	A	Clear
HLMP-CM37-X10xx	Green	30	7.2	21.0	Yes	B	Clear
HLMP-CM37-XYCxx	Green	30	7.2	12.0	Yes	B	Clear
HLMP-CM37-XYDxx	Green	30	7.2	12.0	Yes	B	Clear
HLMP-CE36-WZ0xx	Cyan	30	5.5	16.0	No	A	Clear
HLMP-CE37-WZ0xx	Cyan	30	5.5	16.0	Yes	B	Clear

### Notes:

1. Tolerance for luminous intensity measurement is  $\pm 15\%$ .
2. The luminous intensity is measured on the mechanical axis of the lamp package.
3. The optical axis is closely aligned with the package mechanical axis.
4. LED light output is bright enough to cause injuries to the eyes. Precautions must be taken to prevent looking directly at the LED without proper safety equipment.
5.  $2\theta_{1/2}$  is the off-axis angle where the luminous intensity is 1/2 the on-axis intensity.

## Part Numbering System

HLMP - x x xx - x x x xx



### Absolute Maximum Rating at $T_A = 25^\circ\text{C}$

Parameters	Value	Unit
DC Forward Current [1]	30	mA
Peak Pulsed Forward Current[3]	100	mA
Average Forward Current	30	mA
Power Dissipation	120	mW
LED Junction Temperature	110	$^\circ\text{C}$
Operating Temperature Range	-40 to +85	$^\circ\text{C}$
Storage Temperature Range	-40 to +100	$^\circ\text{C}$
Wave Soldering Temperature[2]	250 for 3 secs	$^\circ\text{C}$

**Notes:**

1. Derate linearly as shown in Figure 2.
2. 1.59 mm (0.060 inch) below body.
3. Duty factor 10%, frequency 1 KHz.

### Electrical/Optical Characteristics

$T_A = 25^\circ\text{C}$

Parameters	Symbol	Blue			Green			Cyan			Units	Test Condition
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
Forward Voltage	$V_F$	3.5	4.0		3.6	4.0		3.5	4.0		V	$I_F = 20\text{ mA}$
Reverse Voltage[1]	$V_R$	5.0			5.0			5.0			V	$I_R = 10\ \mu\text{A}$
Thermal Resistance	$R\theta_{J-PIN}$	240			240			240			$^\circ\text{C}/\text{W}$	LED Junction to Cathode Lead
Dominant Wavelength[2]	$\lambda_d$	460	470	480	520	521	540	490	505	510	nm	$I_F = 20\text{ mA}$
Peak Wavelength	$\lambda_{PEAK}$	464			516			501			nm	Peak of Wavelength of Spectral Distribution at $I_F = 20\text{ mA}$
Spectral Half Width	$\Delta\lambda_{1/2}$	23			32			30			nm	Wavelength Width at Spectral Distribution Power Point at $I_F = 20\text{ mA}$
Luminous Efficacy[3]	$\eta_v$	74			484			319			lm/W	Emitted Luminous Power/Emitted Radiant Power

**Notes:**

1. The reverse voltage of the product is equivalent to the forward voltage of the protective chip at  $I_R = 10\ \mu\text{A}$ .
2. The dominant wavelength,  $\lambda_d$ , is derived from the Chromaticity Diagram and represents the color of the lamp.
3. The radiant intensity,  $I_e$  in watts/steradian, may be found from the equation  $I_e = I_v/\eta_v$ , where  $I_v$  is the luminous intensity in candelas and  $\eta_v$  is the luminous efficacy in lumens/watt.

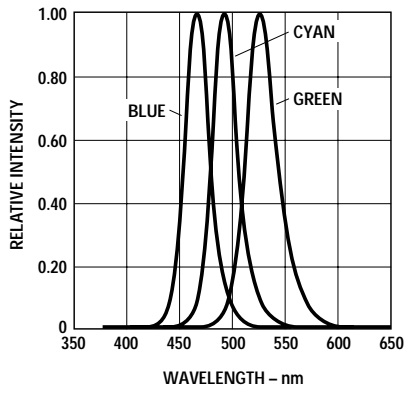


Figure 1. Relative intensity vs. wavelength.

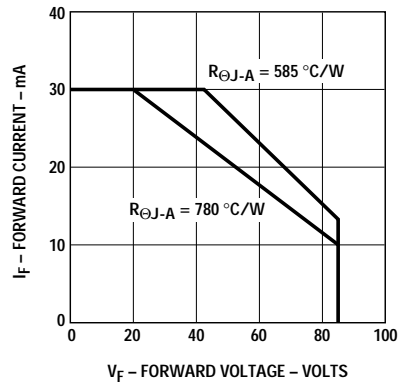


Figure 2. Forward current vs. ambient temperature.

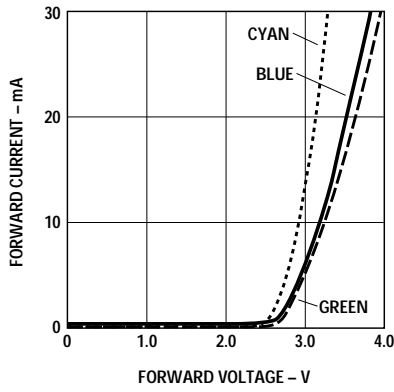


Figure 3. Forward current vs. forward voltage.

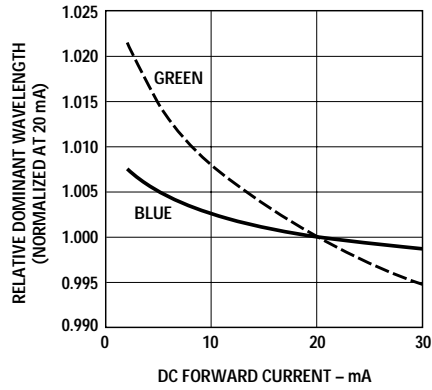


Figure 4. Relative dominant wavelength vs. DC forward current.

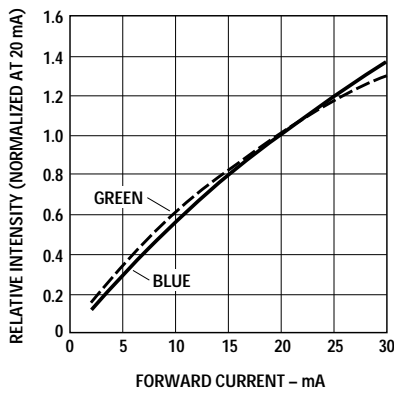


Figure 5. Relative intensity vs. DC forward current.

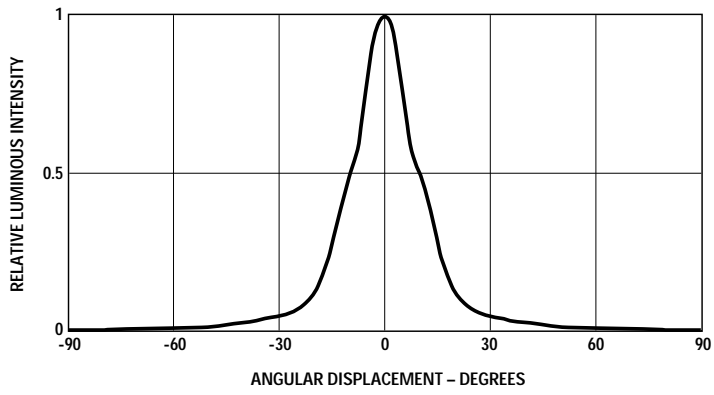


Figure 6. Spatial radiation pattern for Cx11 and Cx12.

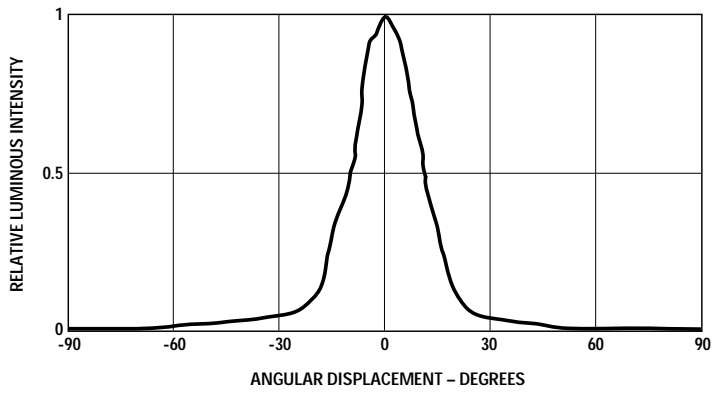


Figure 7. Spatial radiation pattern for Cx26 and Cx27.

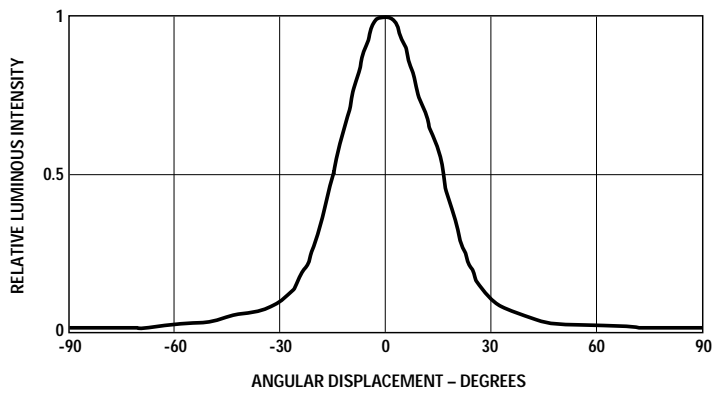


Figure 8. Spatial radiation pattern for Cx36 and Cx37.

### Intensity Bin Limit Table

Bin	Intensity (mcd) at 20 mA	
	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
1	16000	21000

Tolerance for each bin limit is  $\pm 15\%$ .

### Blue Color Bin Table

Bin	Min Dom	Max Dom	Xmin	Ymin	Xmax	Ymax
1	460.0	464.0	0.1440	0.0297	0.1766	0.0966
			0.1818	0.0904	0.1374	0.0374
2	464.0	468.0	0.1374	0.0374	0.1699	0.1062
			0.1766	0.0966	0.1291	0.0495
3	468.0	472.0	0.1291	0.0495	0.1616	0.1209
			0.1699	0.1062	0.1187	0.0671
4	472.0	476.0	0.1187	0.0671	0.1517	0.1423
			0.1616	0.1209	0.1063	0.0945
5	476.0	480.0	0.1063	0.0945	0.1397	0.1728
			0.1517	0.1423	0.0913	0.1327

Tolerance for each bin limit is  $\pm 0.5$  nm.

### Green Color Bin Table

Bin	Min Dom	Max Dom	Xmin	Ymin	Xmax	Ymax
1	520.0	524.0	0.0743	0.8338	0.1856	0.6556
			0.1650	0.6586	0.1060	0.8292
2	524.0	528.0	0.1060	0.8292	0.2068	0.6463
			0.1856	0.6556	0.1387	0.8148
3	528.0	532.0	0.1387	0.8148	0.2273	0.6344
			0.2068	0.6463	0.1702	0.7965
4	532.0	536.0	0.1702	0.7965	0.2469	0.6213
			0.2273	0.6344	0.2003	0.7764
5	536.0	540.0	0.2003	0.7764	0.2659	0.6070
			0.2469	0.6213	0.2296	0.7543

Tolerance for each bin limit is  $\pm 0.5$  nm.

### Cyan Color Bin Table

Bin	Min Dom	Max Dom	Xmin	Ymin	Xmax	Ymax
1	490.0	495.0	0.0454	0.2945	0.1164	0.3889
			0.1318	0.306	0.0235	0.4127
2	495.0	500.0	0.0345	0.4127	0.1057	0.4769
			0.1164	0.3889	0.0082	0.5384
3	500.0	505.0	0.0082	0.5384	0.1027	0.5584
			0.1057	0.4769	0.0039	0.6548
4	505.0	510.0	0.0039	0.6548	0.1097	0.6251
			0.1027	0.5584	0.0139	0.7502
7	498.0	503.0	0.0132	0.4882	0.1028	0.5273
			0.1092	0.4417	0.0040	0.6104
8	503.0	508.0	0.0040	0.6104	0.1056	0.6007
			0.1028	0.5273	0.0080	0.7153

Tolerance for each bin limit is  $\pm 0.5$  nm.

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