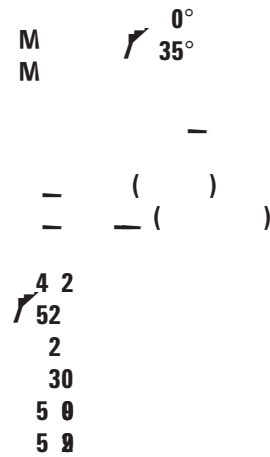


LED Data Sheet

These Precision Optical Performance Oval LEDs are specifically designed for full color/video and passenger information signs. The oval shaped radiation pattern (35° x 70°) and high luminous intensity ensure that these devices are excellent for wide field of view outdoor application where a wide viewing angle and readability in sunlight are essential. These lamps have very smooth, matched radiation patterns ensuring consistent color mixing in full color applications, message uniformity across the viewing angle of the sign.

High efficiency LED material is used in these lamps: Aluminum Indium Gallium Phosphide (AlInGaP) for amber and red, and Indium Gallium Nitride (InGaN) for blue and green. Each lamp is made with an advance optical grade epoxy offering superior high temperature and high moisture resistance in outdoor applications. The package epoxy contains both UV-A and UV-B inhibitors to reduce the effects of long term exposure to direct sunlight.

Designers can select parallel or perpendicular orientation. Both lamps are available in tinted version.



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

	λ ()	20 M	20 M	M			
HLMP-AD06-P00xx	Red 630	880			2.4	No	Parallel A
HLMP-AD06-P0Txx	Red 630	880			2.6	No	Parallel A
HLMP-AD16-P00xx	Red 630	880			2.4	Yes	Parallel B
HLMP-AD16-P0Txx	Red 630	880			2.6	Yes	Parallel B
HLMP-AD16-RS0xx	Red 630	1500	2500		2.6	Yes	Parallel B
HLMP-AD16-RSTxx	Red 630	1500	2500		2.6	Yes	Parallel B
HLMP-AD16-RU0xx	Red 630	1500	4200		2.4	Yes	Parallel B
HLMP-AD16-RUTxx	Red 630	1500	4200		2.6	Yes	Parallel B
HLMP-AD16-ST0xx	Red 630	1900	3200		2.4	Yes	Parallel B
HLMP-AD16-STTxx	Red 630	1900	3200		2.6	Yes	Parallel B
HLMP-AL06-L00xx	Amber 592	400			2.4	No	Parallel A
HLMP-AL06-L0Rxx	Amber 592	400			2.6	No	Parallel A
HLMP-AL06-N00xx	Amber 592	680			2.4	No	Parallel A
HLMP-AL06-N0Rxx	Amber 592	680			2.6	No	Parallel A
HLMP-AL16-N00xx	Amber 592	680			2.4	Yes	Parallel B
HLMP-AL16-N0Rxx	Amber 592	680			2.6	Yes	Parallel B
HLMP-AL16-PSRxx	Amber 592	880	2500		2.6	Yes	Parallel B
HLMP-AL16-QR0xx	Amber 592	1150	1900		2.4	Yes	Parallel B
HLMP-AL16-QRRxx	Amber 592	1150	1900		2.6	Yes	Parallel B
HLMP-BD06-P00xx	Red 630	880			2.4	No	Perpendicular C
HLMP-BD06-P0Txx	Red 630	880			2.6	No	Perpendicular C
HLMP-BD06-RS0xx	Red 630	1500	2500		2.4	No	Perpendicular C
HLMP-BD06-RSTxx	Red 630	1500	2500		2.6	No	Perpendicular C
HLMP-BD16-P00xx	Red 630	880			2.4	Yes	Perpendicular D
HLMP-BD16-P0Txx	Red 630	880			2.6	Yes	Perpendicular D
HLMP-BD16-RU0xx	Red 630	1500	4200		2.4	Yes	Perpendicular D
HLMP-BD16-RUTxx	Red 630	1500	4200		2.6	Yes	Perpendicular D
HLMP-BD16-ST0xx	Red 630	1900	3200		2.4	Yes	Perpendicular D
HLMP-BD16-STTxx	Red 630	1900	3200		2.6	Yes	Perpendicular D
HLMP-BL06-N00xx	Amber 592	680			2.4	No	Perpendicular C
HLMP-BL06-N0Rxx	Amber 592	680			2.6	No	Perpendicular C
HLMP-BL06-QRKxx	Amber 592	1150	1900		2.4	No	Perpendicular C
HLMP-BL06-QRSxx	Amber 592	1150	1900		2.6	No	Perpendicular C
HLMP-BL16-N00xx	Amber 592	680			2.4	Yes	Perpendicular D
HLMP-BL16-N0Rxx	Amber 592	680			2.6	Yes	Perpendicular D
HLMP-BL16-PS0xx	Amber 592	880	2500		2.4	Yes	Perpendicular D
HLMP-BL16-PSRxx	Amber 592	880	2500		2.6	Yes	Perpendicular D

2. —

	λ ()	λ ()	λ ()			
		20 M	20 M			
HLMP-AG01-K00xx	Red 626	310		No	Parallel	A
HLMP-AG11-KN0xx	Red 626	310	880	Yes	Parallel	B
HLMP-AL01-K00xx	Amber 590	310		No	Parallel	A
HLMP-AL01-LP0xx	Amber 590	400	1150	No	Parallel	A
HLMP-AL01-NR0xx	Amber 590	680	1900	No	Parallel	A
HLMP-AL11-KN0xx	Amber 590	310	880	Yes	Parallel	B
HLMP-AL11-NR0xx	Amber 590	680	1900	Yes	Parallel	B
HLMP-BG01-LM0xx	Red 626	400	520	No	Perpendicular	C
HLMP-BG01-MN0xx	Red 626	520	880	No	Perpendicular	C
HLMP-BG11-KN0xx	Red 626	310	880	Yes	Perpendicular	D
HLMP-BL01-NR0xx	Amber 590	680	1900	No	Perpendicular	C
HLMP-BL11-KN0xx	Amber 590	310	880	Yes	Perpendicular	D
HLMP-BL11-NR0xx	Amber 590	680	1900	Yes	Perpendicular	D

3. —

	λ ()	λ ()	λ ()			
		20 M				
HLMP-AB01-J00xx	Blue 472	240		No	Parallel	A
HLMP-BB11-J00xx	Blue 472	240		Yes	Perpendicular	D
HLMP-BB11-K00xx	Blue 472	310		Yes	Perpendicular	D
HLMP-BM11-L00xx	Green 526	400		Yes	Perpendicular	D
HLMP-BM11-Q00xx	Green 526	1150		Yes	Perpendicular	D
HLMP-AB11-J00xx	Blue 472	240		Yes	Parallel	B
HLMP-AM01-Q00xx	Green 526	1150		No	Parallel	A
HLMP-BB01-J0Bxx	Blue 472	240		No	Perpendicular	C
HLMP-BB11-KN0xx	Blue 472	310		Yes	Perpendicular	D
HLMP-BM01-L00xx	Green 526	400		No	Perpendicular	C

Tolerance for intensity range limit is $\pm 15\%$.

HLMP-X X X X - X X X XX

Mechanical Options

00: Bulk Packaging
DD: Ammo Pack
YY: Flexi-Bin; Bulk Packaging
ZZ: Flexi-Bin; Ammo Pack

Color Bin

0: No Color Bin Limitation
R: Color Bins 1, 2, 4, and 6 with V_F max of 2.6 V
T: Red Color with V_F max of 2.6 V
B: Color bin 2 and 3 only
K: Color bins 2 and 4 only
S: Color bins 2 and 4 with V_F max of 2.6 V

Maximum Intensity Bin

0: No Iv Bin Limitation

Minimum Intensity Bin

Tint Option

1 or 6: Matching Color Tints

Standoff Option

0: Without
1: With

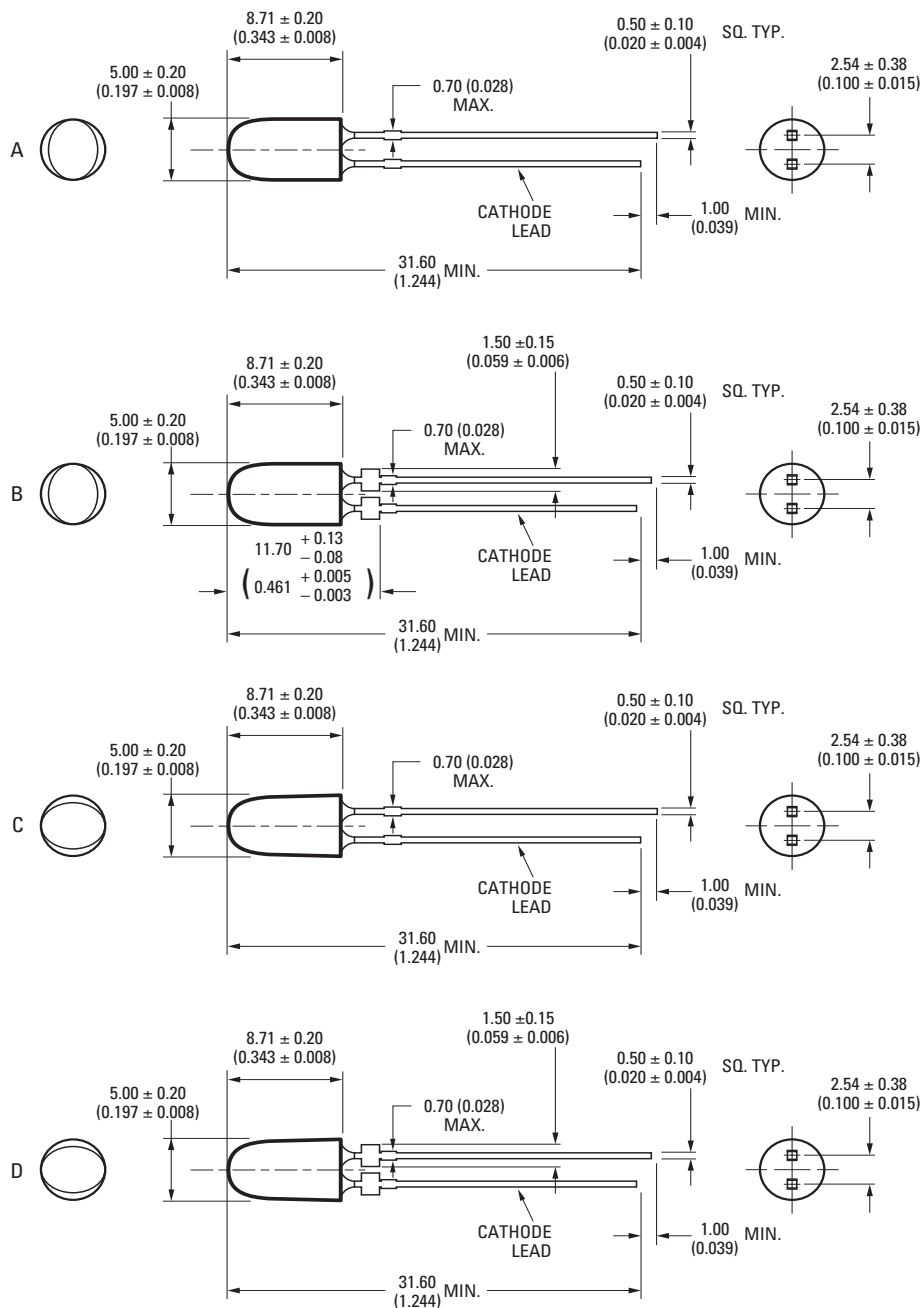
Color

B: 472 nm Blue
D: 630 nm Red
G: 626 nm Red
L: 590 or 592 nm Amber
M: 526 nm Green

Package

A: 5 mm 35° x 70° Oval, Parallel
B: 5 mm 35° x 70° Oval, Perpendicular

Package Dimensions



NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS (INCHES).
- LEADS ARE MILD STEEL, SOLDER DIPPED.
- TAPERS SHOWN AT TOP OF LEADS (BOTTOM OF LAMP PACKAGE) INDICATE AN EPOXY MENISCUS THAT MAY EXTEND ABOUT 1 mm (0.040 IN.) DOWN THE LEADS.
- RECOMMENDED PC BOARD HOLE DIAMETERS:
 - LAMP PACKAGES A AND C WITHOUT STAND-OFFS: FLUSH MOUNTING AT BASE OF LAMP PACKAGE = 1.143/1.067 mm (0.044/0.042 IN.).
 - LAMP PACKAGES B AND D WITH STAND-OFFS: MOUNTING AT LEAD STAND-OFFS.

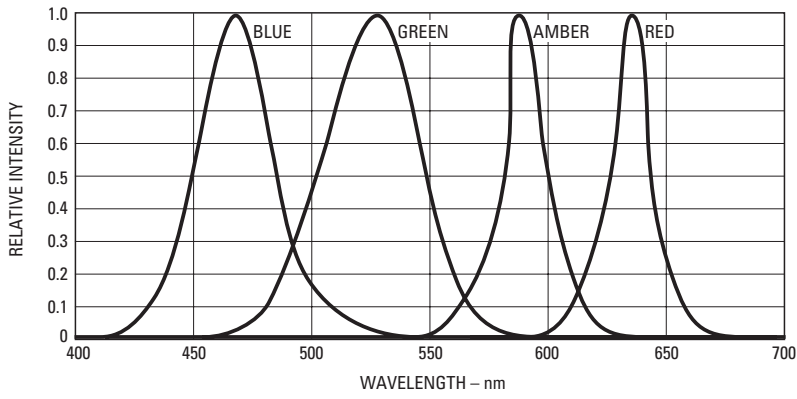
M**= 25**

DC Forward Current ^[1]	30 mA	50 mA
Peak Pulsed Forward Current ^[2]	100 mA	100 mA
Average Forward Current	30 mA	30 mA
Reverse Voltage (I _R = 100 μ A)		5 V
Reverse Voltage (I _R = 10 μ A)	5 V	
Power Dissipation	120 mW	120 mW
LED Junction Temperature	130°C	130°C
Operating Temperature Range	-40°C to +80°C	-40°C to +100°C
Storage Temperature Range	-40°C to +100°C	-40°C to +120°C
Wave Soldering Temperature ^[3]	250°C for 3 seconds	250°C for 3 seconds

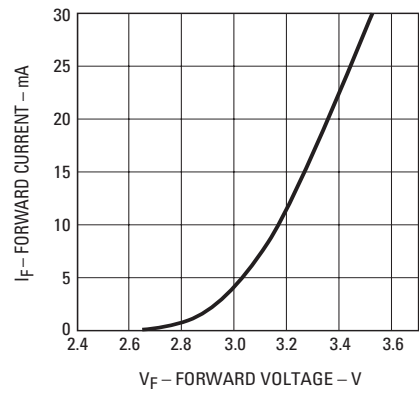
1. Derate linearly from Figure 7.
2. Duty Factor 30% KHz.
3. 1.59 mm (0.060 in.) below body.

		= 25°			
		M	M		
Typical Viewing Angle					
Major	$2\theta_{1/2}$		70		deg
Minor			35		
Forward Voltage					
	V_F			V	$I_F = 20 \text{ mA}$
Red ($\lambda_d = 626 \text{ nm}$)			2.0	2.4	
Red ($\lambda_d = 630 \text{ nm}$)					
Option xx0xx			2.2	2.4	
Option xxTxx			2.3	2.6	
Amber ($\lambda_d = 590 \text{ nm}$)			2.0	2.4	
Amber ($\lambda_d = 592 \text{ nm}$)					
Option xx0xx			2.2	2.4	
Option xxRxx, xxSxx			2.3	2.6	
Blue ($\lambda_d = 472 \text{ nm}$)			3.5	4.0	
Green ($\lambda_d = 526 \text{ nm}$)			3.5	4.0	
Reverse Voltage					
Amber, Red	V_R	5	20	V	$I_R = 100 \mu\text{A}$
Blue, Green		5	–		$I_R = 10 \mu\text{A}$
Peak Wavelength					
	λ_{peak}			nm	Peak of Wavelength of Spectral Distribution at $I_F = 20 \text{ mA}$
Amber ($\lambda_d = 592 \text{ nm}$)			594		
Red ($\lambda_d = 630 \text{ nm}$)			639		
Blue ($\lambda_d = 472 \text{ nm}$)			470		
Green ($\lambda_d = 526 \text{ nm}$)			524		
Spectral Halfwidth					
	$\Delta\lambda_{1/2}$			nm	Wavelength Width at Spectral Distribution 1/2 Power Point at $I_F = 20 \text{ mA}$
Amber ($\lambda_d = 592 \text{ nm}$)			17		
Red ($\lambda_d = 630 \text{ nm}$)			17		
Blue ($\lambda_d = 472 \text{ nm}$)			35		
Green ($\lambda_d = 526 \text{ nm}$)			47		
Capacitance					
	C			pF	$V_F = 0, F = 1 \text{ MHz}$
Amber, Red			40		
Blue, Green			43		
Luminous Efficacy					
	η_v			lm/W	Emitted Luminous Power/Emitted Radiant Power at $I_F = 20 \text{ mA}$
Amber ($\lambda_d = 592 \text{ nm}$)			500		
Red ($\lambda_d = 630 \text{ nm}$)			155		
Blue ($\lambda_d = 472 \text{ nm}$)			75		
Green ($\lambda_d = 526 \text{ nm}$)			520		
Thermal Resistance					
	$R\theta_{J-PIN}$		240	°C/W	LED Junction-to-Cathode Lead

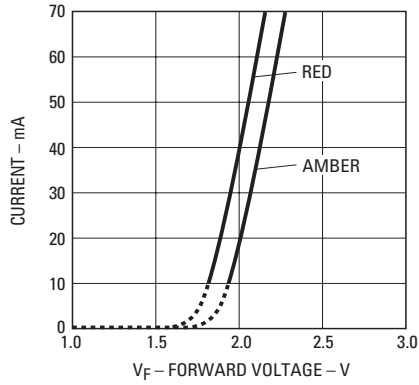
1. $2\theta_{1/2}$ is the off-axis angle where the luminous intensity is 1/2 the on-axis intensity.
2. The radiant intensity, I_e in watts per steradian, may be found from the equation $I_e = I_v/\eta_v$ where I_v is the luminous intensity in candelas and η_v is the luminous efficacy in lumens/watt.
3. The luminous intensity is measured on the mechanical axis of the lamp package.
4. The optical axis is closely aligned with the package mechanical axis.
5. The dominant wavelength, λ_d , is derived from the CIE Chromaticity Diagram and represents the color of the lamp.
6. For Options -xxRxx, -xxSxx and -xxTxx, max. forward voltage (Vf) is 2.6 V. Refer to Vf bin table.



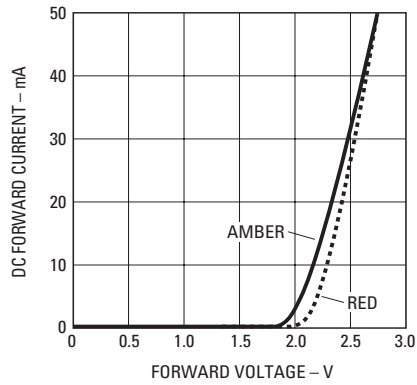
1.



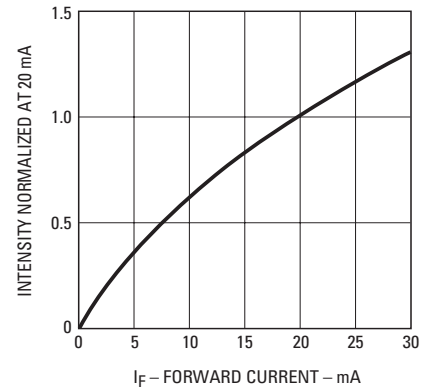
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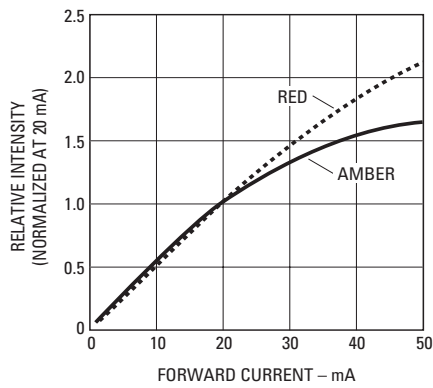
3.



3.



4.



5.

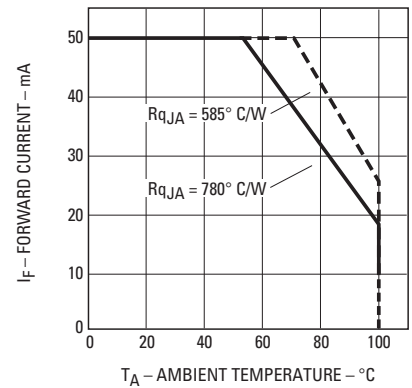
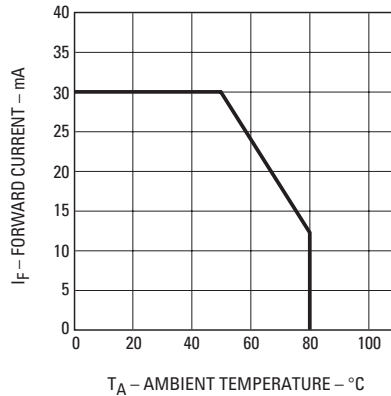
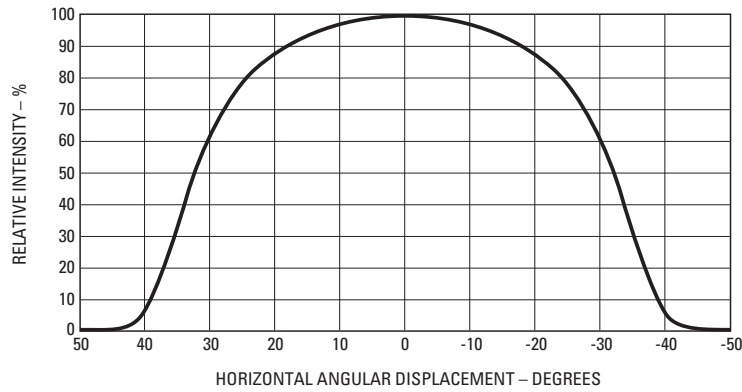
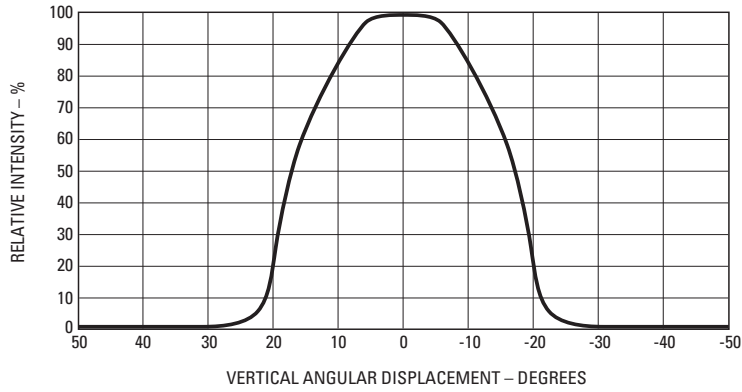


Figure 7. Amber, red maximum forward current vs. ambient temperature.



35 0

(20)	M	M
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
U	1900	2500

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

(20)	M	M
1	584.5	587.0
2	587.0	589.5
4	589.5	592.0
6	592.0	594.5

Tolerance for each bin limit is ± 0.5 nm.

(20)	M	M
1	460.0	464.0
2	464.0	468.0
3	468.0	472.0
4	472.0	476.0
5	476.0	480.0

Tolerance for each bin limit is ± 0.5 nm.

(20)	M	M
1	520.0	524.0
2	524.0	528.0
3	528.0	532.0
4	532.0	536.0
5	536.0	540.0

Tolerance for each bin limit is ± 0.5 nm.

2	M	M
VA	2.0	2.2
VB	2.2	2.4
VC	2.4	2.6

1. All bin categories are established for classification of products. Products may not be available in all bin categories. Please contact your Agilent representative for further information.
2. Vb table only available for those numbers with options -xxRxx, -xxSxx, -xxTxx.

For product information and a complete list of distributors, please go to our web site.

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