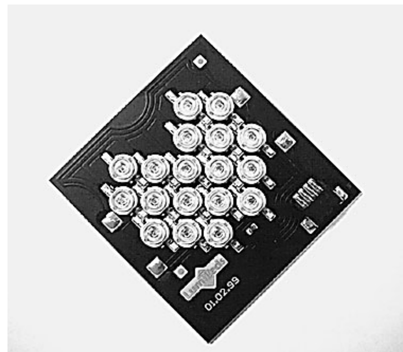
HEWLETT® PACKARD

LED Light Source

By LumiLeds A Philips Lighting & Hewlett-Packard Joint Venture

Technical Data

HPWL-MDB1
HPWL-MDA1
HPWL-MLB1
HPWL-MLA1



Features

- **High Flux Output (170 lumen at T_B = 50°C)**
- **Well Defined Spatial Radiation Pattern: "Batwing"**
- **Colors: Amber and Red**
- **High Operating Temperature: 105°C Board Temperature**
- **Superior Moisture Resistance**

Benefits

- **Highest Luminous Flux per Surface Area for any LED Source**
- **Radiation Pattern Provides Uniform Luminance across Entry Plane of Secondary Optics**
- **Colors Meet Traffic Signaling Requirements**
- **Suitable for Application in an Outdoor Signaling Device**

Applications

- **Traffic Signals**
- **Flashers and Warning Lights**
- **Barricade Lighting**
- **Automotive Exterior Lighting**
- **General Illumination**
- **Railroad Signaling Equipment**

Description

The LED Light Source is based on clustered High Flux AlInGaP LEDs in a series/parallel circuit, assembled onto a metal core printed circuit board (MCPCB). The reliable connections provide mechanical sturdiness and good electrical and thermal conductivity. This component is designed and manufactured by LumiLeds Lighting, and sold and supported by Hewlett-Packard.

Designers who are seeking a reliable solid state light source offering a very high luminous output will experience reduced design time and enhanced reliability by this preassembled LED array. While the LED Light Source is optimized for use in traffic signals, its small size and versatility make it a good choice for many applications.

New generation Hewlett-Packard High Flux LED lamps found in the LED Light Source capitalize on new packaging technology and large LED chip sizes. These lamps offer greater efficiency and reliability at high current than traditional LEDs.

Built with the same aluminum indium gallium phosphide (AlInGaP) LED technology as Hewlett-Packard's Precision Optical Performance lamps, these products deliver a luminous efficiency of approximately 18 lumen per watt. Superior temperature and moisture resistance result from an advanced LED package design.

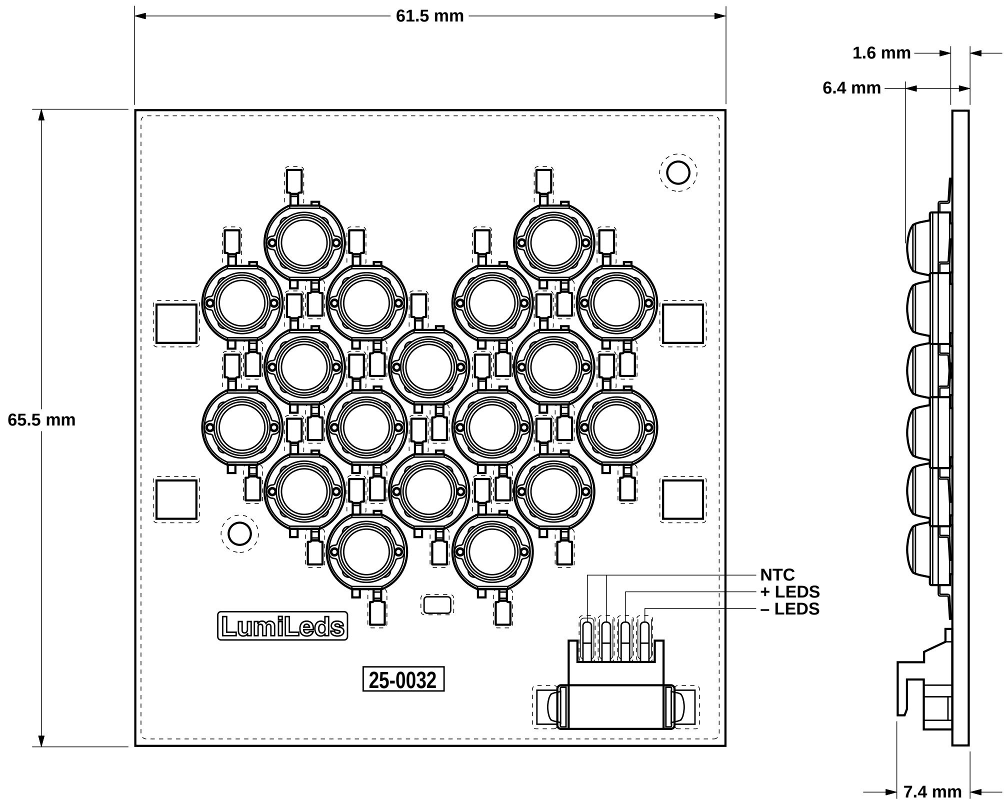
The LED Light Source has a NTC (Negative Temperature Coefficient) or thermister to monitor the board temperature.[1]

Device Selection Guide

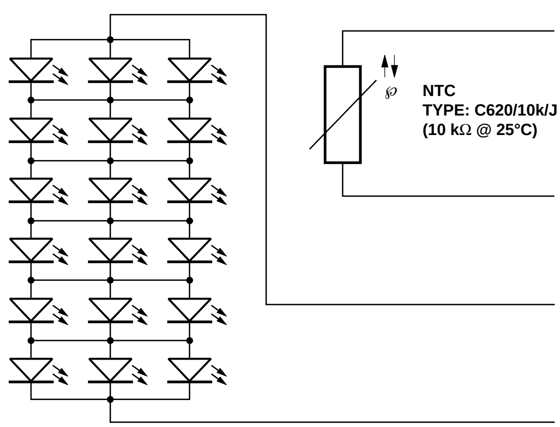
Part Number	Color	Dominant Wavelength, λ_D (nm) Typ.	Total Flux (lm) Typ. at T_B = 25 °C
HPWL-MDB1 HPWL-MDA1	Red	629	230 155
HPWL-MLB1 HPWL-MLA1	Amber	590[2]	230 155

Notes: 1. NTC: Siemens Matsushita Components type C620/10k/J. Connector: AMP CT 173977-4.
2. Projected value. Tested typical value to be announced at a later time.

Package Dimensions



Circuit Diagram



Absolute Maximum Ratings at T_B = 105°C[1]

DC Forward Current .... 1155 mA
Peak Pulsed Forward Current .... 1155 mA
Average Forward Current .... 750 mA
Reverse Voltage (I_R = 100 μA) .... 30 V
LED Junction Temperature .... 120°C
Metal Core Printed Circuit Board Temperature .... 105°C
Operating Temperature .... -40°C to + 105°C
Storage Temperature .... -40°C to +120°C

Note:
1. T_B is the temperature of the metal core printed circuit board (MCPCB). This temperature value can be measured on either side of the board.

Electrical Characteristics at T_B = 50℃[1], [2] (unless otherwise noted)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Voltage	V_F	11	14.6	17	V	I_F = 750 mA
Reverse Voltage[3]	V_R	30	-	-	V	I_R = 100 µA
Speed of Response	τ_S		20		ns	Exponential Time Constant, e^{-t/τ_S}
Capacitance	C		175		pF	V_F = 100 mV, f=1 MHz
Temperature Coefficient of Forward Voltage Amber Red	dV_F/dT_J		 -13.2[4] -10.8		mV/℃	I_F = 5 mA 25℃ ≤ T_J ≤ 70℃
Thermal Resistance, Junction to Board	$R\theta_{J-B}$		0.9		℃/W	Measured to back side of MCPCB
Dynamic Resistance	R_D	2	5	9	Ohms	

Optical Characteristics at T_B = 50℃[1], [2] (unless otherwise noted)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Dominant Wavelength Amber Red	λ_d		 590[4] 629		nm	I_F = 750 mA
Spectral Halfwidth	$\Delta\lambda_{1/2}$		19		nm	I_F = 750 mA Wavelength Width at Spectral Distribution 1/2 Power Point
Luminous Flux[5]					lm	T_B = 50℃ (T_B = 25℃)
HPWL-MDB1		135 (175)	170 (230)	210 (275)	lm	
HPWL-MLB1		110 (175)	145 (230)	175 (275)	lm	
HPWL-MDA1		90 (120)	120 (155)	145 (185)	lm	
HPWL-MLA1		75 (120)	100 (155)	120 (185)	lm	
Luminous Efficacy Amber Red	η_V		 500 155		lm/W	Emitted Luminous Power/Emitted Radiant Power
Characteristic Temperature[6] Amber Red	T_0		 65[4] 95		℃	25℃ ≤ T_J ≤ 70℃

Notes:

1. T_B is the temperature of the metal core printed circuit board (MCPCB). This temperature value can be measured on either side of the board.
2. Board temperature of 50°C is equivalent to an ambient temperature of 25℃, with a power dissipation of 11.25 W (750 mA) and a thermal resistance of 2.2°C/W from board to ambient.
3. Always protect device against reverse voltage.
4. Projected value. Tested typical value to be announced at a later time.
5. In the United States, HPWL-MDB1 is targeted for a 12 inch traffic signal and HPWL-MDA1 is for an 8 inch traffic signal.
6. Characteristic temperature predicts light output at LED junction temperatures other than 25℃ with constant current through the equation:

$$LOP(T_j) \cong LOP(25°C) \times \exp\left[\frac{-(T_j - 25℃)}{T_0}\right]$$

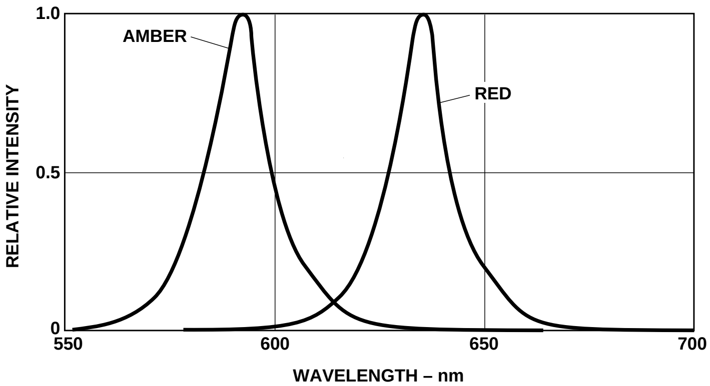


Figure 1. Relative Intensity vs. Wavelength.

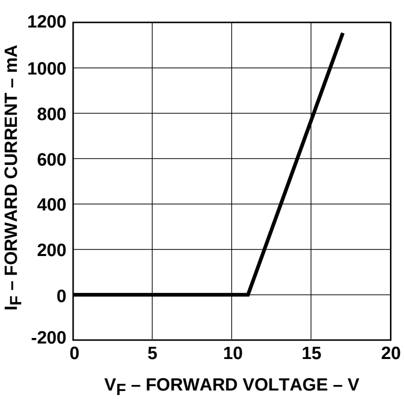


Figure 2. Forward Current vs. Forward Voltage.

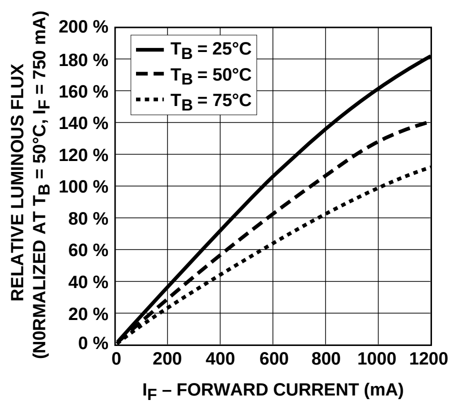


Figure 3. Relative Luminous Flux vs. Forward Current for Red. HPML-MDx1[1]

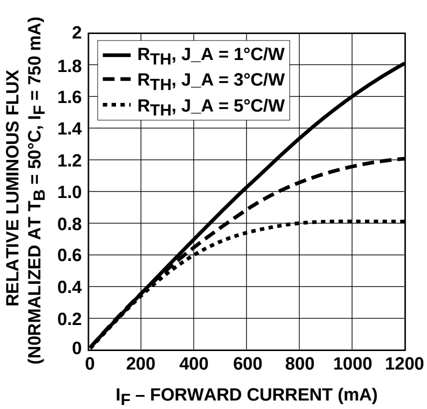


Figure 4. Relative Luminous Flux vs. Forward Current for Red. HPWL-MDx1

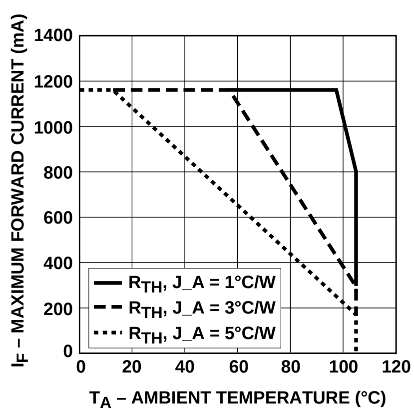


Figure 5. Maximum Forward Current vs. Ambient Temperature. Derating Based on T_{JMAX} = 120°C.

Note:

1. Relative Luminous Flux vs. Forward Current curve for amber to be determined.

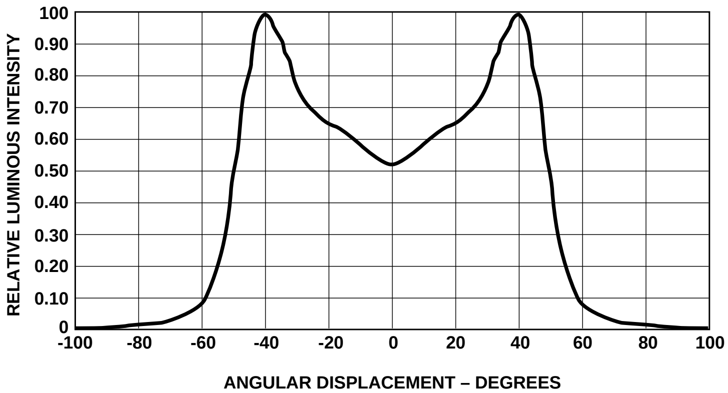


Figure 6. Representative Spatial Radiation Pattern.

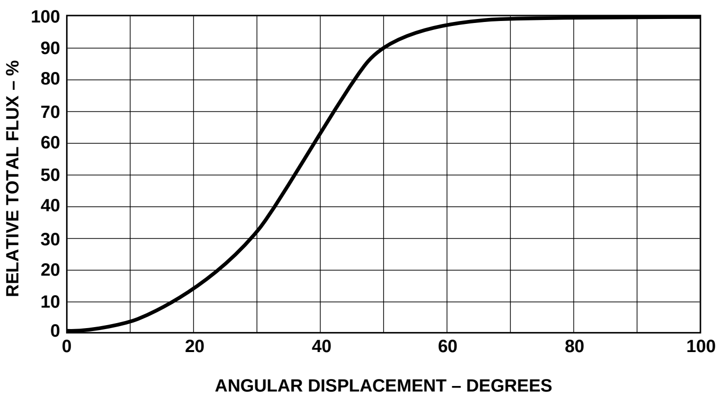


Figure 7. Relative Total Flux vs. Angular Displacement.

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Data subject to change.

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