# Agilent HLMP-4100 / 4101
# T-1 3/4 (5 mm)
# Double Heterojunction AlGaAs
# Very High Intensity Red LED Lamps
## Data Sheet

### Description

These solid state LED lamps utilize newly developed double heterojunction (DH) AlGaAs/GaAs material technology. This LED material has outstanding light output efficiency over a wide range of drive currents. The lamp package has a tapered lens designed to concentrate the luminous flux into a narrow radiation pattern to achieve a very high intensity. The LED color is deep red at the dominant wavelength of 637 nanometers. These lamps may be DC or pulse driven to achieve desired light output.

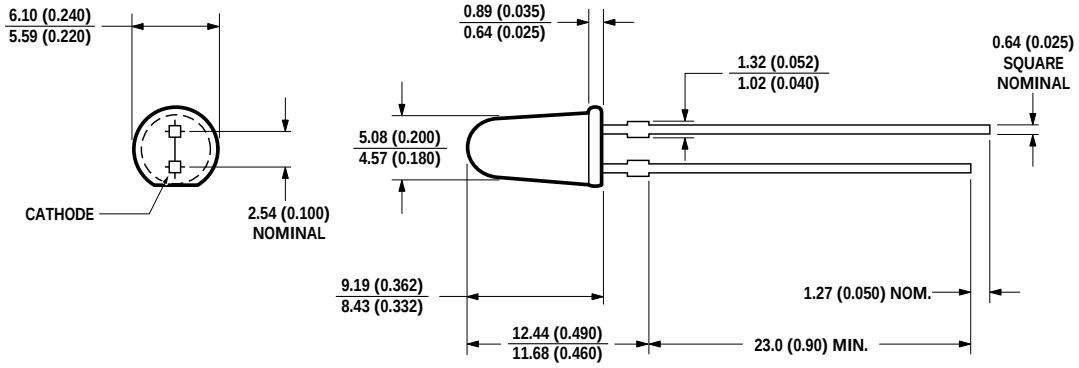
### Features

- 1000 mcd at 20 mA
- Very high intensity at low drive currents
- Narrow viewing angle
- Outstanding material efficiency
- Low forward voltage
- CMOS / MOS compatible
- TTL compatible
- Deep red color

### Applications

- Bright ambient lighting conditions
- Emitter / detector and signaling applications
- General use

### Package Dimensions

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## Selection Guide

| Device HLMP- | Luminous Intensity Iv (mcd) at 20 mA Min. | Typ. | Max. | $2\theta_{1/2}$ [1] Degree |
|---|---|---|---|---|
| 4100 | 500.0 | 750.0 | – | 8 |
| 4101 | 700.0 | 1000.0 | – | 8 |
| 4101-ST0xx | 1400.0 | 2700.0 | 4000.0 | 8 |

**Note:**
1. $\theta^1/_2$ is the angle from optical centerline where the luminous intensity is $^1/_2$ the optical centerline value.

## Part Numbering System

HLMX - 4 1 XX - X X X XX

**Mechanical Option**
00: Bulk

**Color Bin Options**
0: Full color bin distribution

**Maximum Iv Bin Options**
0: Open (No. max. limit)
Others: Please refer to the Iv bin Table

**Minimum Iv Bin Options**
Please refer to the Iv bin Table

**Brightness Level**
00: Lower brightness
01: Higher brightness

**Notes:**
1. '0' indicates no maximum intensity limit.
2. '0' indicates full color distribution.

**Absolute Maximum Ratings at $T_A$ = 25°C**

| Parameter | Maximum Rating | Units |
|---|---|---|
| Peak Forward Current[1, 2] | 300 | mA |
| Average Forward Current[2] | 20 | mA |
| DC Current[3] | 30 | mA |
| Power Dissipation | 87 | mW |
| Reverse Voltage ($I_R$ = 100 μA) | 5 | V |
| Transient Forward Current (10 μs Pulse)[4] | 500 | mA |
| Operating Temperature Range | -20 to +100 | °C |
| Storage Temperature Range | -55 to +100 | °C |
| Wave Soldering Temperature [1.59 mm (0.063 in.) from body] | 250°C for 3 seconds | |
| Lead Solder Dipping Temperature [1.59 mm (0.063 in.) from body] | 260°C for 5 seconds | |

**Notes:**
1. Maximum $I_{PEAK}$ at f = 1 kHz, DF = 6.7%.
2. Refer to Figure 6 to establish pulsed operating conditions.
3. Derate linerally as shown in Figure 5.
4. The transient peak current is the maximum non-recurring peak current the device can withstand without damaging the LED die and wire bonds. It is not recommended that the device be operated at peak currents beyond the Absolute Maximum Peak Forward Current.

**Electrical / Optical Characteristics at $T_A$ = 25°C**

| Symbol | Description | Min. | Typ. | Max. | Unit | Test Condition |
|---|---|---|---|---|---|---|
| $V_F$ | Forward Voltage | | 1.8 | 2.2 | V | 20 mA |
| $V_R$ | Reverse Breakdown Voltage | 5.0 | 15.0 | | V | $I_R$ = 100 μA |
| $\lambda_{PEAK}$ | Peak Wavelength | | 650 | | nm | Measurement at peak |
| $\lambda_d$ | Dominant Wavelength | | 642 | | nm | Note 1 |
| $\Delta\lambda\,{}^1/_2$ | Spectral Line Halfwidth | | 20 | | nm | |
| $\tau_S$ | Speed of Response | | 30 | | ns | Exponential Time Constant, $e^{-t/2}$ |
| C | Capacitance | | 30 | | pF | $V_F$ = 0, f = 1 MHz |
| $\theta_{JC}$ | Thermal Resistance | | 220 | | °C/W | Junction to Cathode Lead |
| $\eta_V$ | Luminous Efficacy | | 80 | | 1 m/W | Note 2 |

**Notes:**
1. The dominant wavelength, $\lambda_d$, is derived from the CIE chromaticity diagram and represents the color of the device.
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 $\eta_V$ is luminous efficacy in lumens/watt.
3. The approximate total luminous flux output within a cone angle of 2θ about the optical axis, $\phi_V(2\theta)$, may be obtained from the following formula: $\phi_V(2\theta) = [\phi_V(\theta) / I_V(0)]I_V$; Where: $\phi_V(\theta) / I_V(0)$ is obtained from Figure 7.

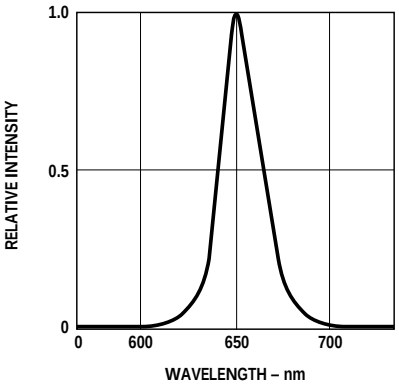


Figure 1. Relative intensity vs. wavelength.

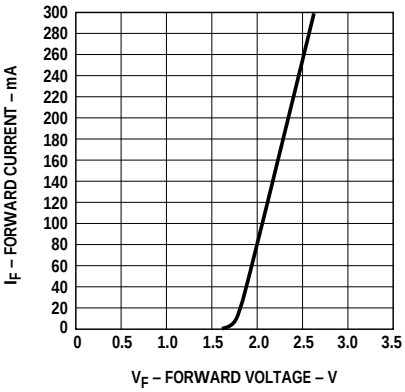


Figure 2. Forward current vs. forward voltage.

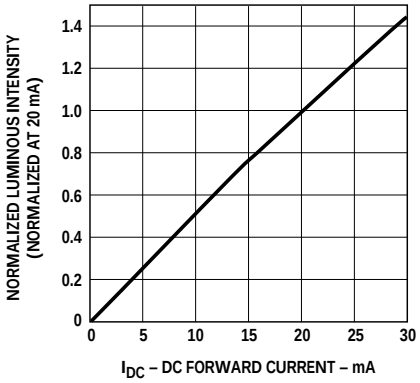


Figure 3. Relative luminous intensity vs. dc forward current.

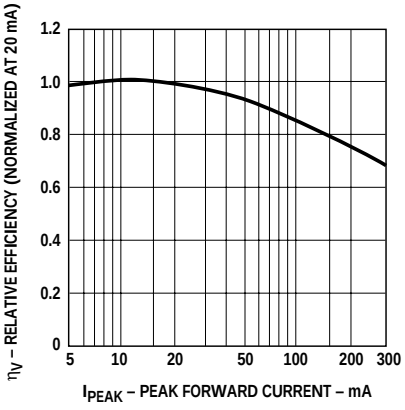


Figure 4. Relative efficiency vs. peak forward current.

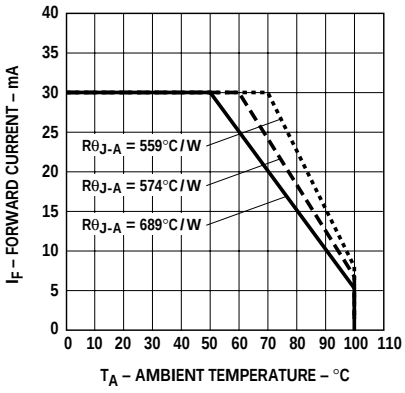


Figure 5. Maximum forward dc current vs. ambient temperature derating based on $T_J$ MAX. = 110°C.

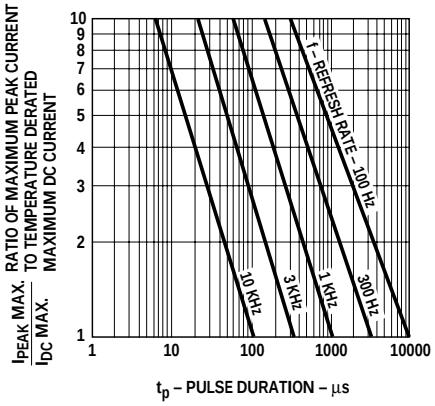


Figure 6. Maximum tolerable peak current vs. peak duration ($I_{PEAK}$ MAX. determined from temperature derated $I_{DC}$ MAX.).

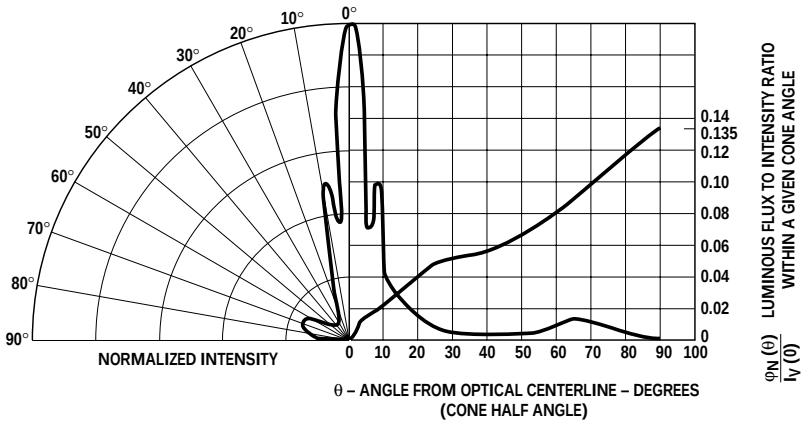


**Figure 7. Relative luminous intensity vs. angular displacement.**

## Intensity Bin Limits

| Color | Bin | Intensity Range (mcd) Min. | Max. |
|---|---|---|---|
| Red | P | 540.0 | 850.0 |
| | Q | 850.0 | 1200.0 |
| | R | 1200.0 | 1700.0 |
| | S | 1700.0 | 2400.0 |
| | T | 2400.0 | 3400.0 |
| | U | 3400.0 | 4900.0 |
| | V | 4900.0 | 7100.0 |
| | W | 7100.0 | 10200.0 |
| | X | 10200.0 | 14800.0 |
| | Y | 14800.0 | 21400.0 |
| | Z | 21400.0 | 30900.0 |

Tolerance for each bin limit is ± 18%.

## Mechanical Option Matrix

| Mechanical Option Code | Definition |
|---|---|
| 00 | Bulk Packaging, minimum increment 500 pcs/bag |

**Note:**
All categories are established for classification of products. Products may not be available in all categories. Please contact your local Agilent representative for further clarification/information.

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Data subject to change.



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