Agilent Technologies

# T-1 3/4 (5 mm) High Intensity LED Lamps

## Technical Data

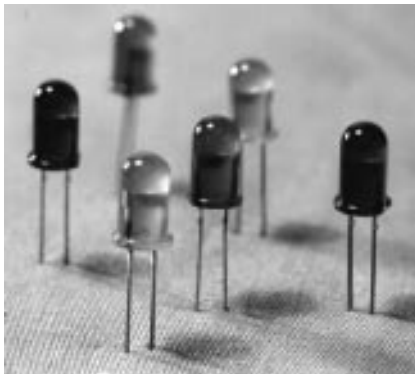
**HLMP-331x Series**
**HLMP-341x Series**
**HLMP-351x Series**

### Features

- **High Intensity**
- **Choice of 3 Bright Colors**
  High Efficiency Red
  Yellow
  High Performance Green
- **Popular T-1 3/4 Diameter Package**
- **Selected Minimum Intensities**
- **Narrow Viewing Angle**
- **General Purpose Leads**
- **Reliable and Rugged**
- **Available on Tape and Reel**

### Description

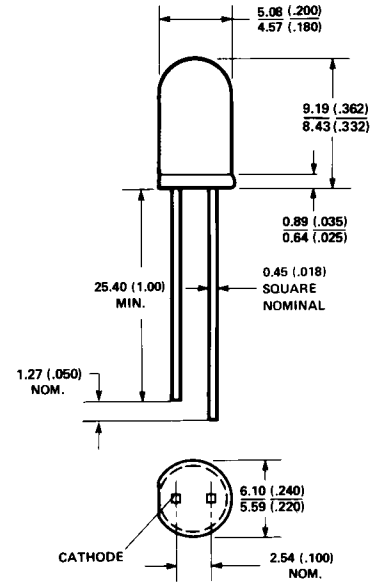
This family of T-1 3/4 nondiffused LED lamps is specially designed for applications requiring higher on-axis intensity than is achievable with a standard lamp. The light generated is focused to a narrow beam to achieve this effect.



### Selection Guide

| Color | Part Number | Luminous Intensity Iv (mcd) @ 10 mA | |
|---|---|---|---|
| | | Min. | Max. |
| Red | HLMP-3315 | 13.8 | - |
| | HLMP-3317 | 22.00 | - |
| | HLMP-3316-I00xx | 22.0 | - |
| | HLMP-3316-IJ0xx | 22.0 | 70.4 |
| Yellow | HLMP-3415 | 9.2 | - |
| | HLMP-3416 | 14.7 | - |
| | HLMP-3416-G00xx | 14.7 | - |
| | HLMP-3416-IJ0xx | 37.6 | 120.2 |
| Green | HLMP-3517 | 6.7 | - |
| | HLMP-3519 | 10.6 | - |
| | HLMP-3519-F00xx | 10.6 | - |
| | HLMP-3519-IJ0xx | 43.6 | 139.6 |

## Package Dimensions




NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES (INCHES).
2. AN EPOXY MENISCUS MAY EXTEND ABOUT 1mm (.040") DOWN THE LEADS.

## Part Numbering System

HLMP - 3 x 1 x - x x x xx

**Mechanical Option**
00: Bulk
01: Tape & Reel, Crimped Leads
02: Tape & Reel, Straight Leads
B1: Right Angle Housing, Uneven Leads
B2: Right Angle Housing, Even Leads

**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**
5, 7: Less Brightness
6, 9: Higher Brightness

**Color Options**
3: GaP HER
4: GaP Yellow
5: GaP Green

## Electrical Characteristics at $T_A$ = 25°C

| Symbol | Description | Device HLMP- | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|---|
| $I_V$ | Luminous Intensity | 3315<br>3316 | 13.8<br>22 | 40.0<br>60.0 | | mcd | $I_F$ = 10 mA (Figure 3) |
| | | 3415<br>3416 | 9.2<br>14.7 | 40.0<br>50.0 | | mcd | $I_F$ = 10 mA (Figure 8) |
| | | 3517<br>3519 | 6.7<br>10.6 | 50.0<br>70.0 | | mcd | $I_F$ = 10 mA (Figure 13) |
| $2\theta 1/2$ | Including Angle Between Half Luminous Intensity Points | 3315<br>3316 | | 35<br>35 | | Deg. | $I_F$ = 10 mA<br>See Note 1 (Figure 6) |
| | | 3415<br>3416 | | 35<br>35 | | Deg. | $I_F$ = 10 mA<br>See Note 1 (Figure 11) |
| | | 3517<br>3519 | | 24<br>24 | | Deg. | $I_F$ = 10 mA<br>See Note 1 (Figure 16) |
| $\lambda_{PEAK}$ | Peak Wavelength | 331X<br>341X<br>351X | | 635<br>583<br>565 | | nm | Measurement at Peak (Figure 1) |
| $\Delta\lambda_{1/2}$ | Spectral Line Halfwidth | 331X<br>341X<br>351X | | 40<br>36<br>28 | | nm | |
| $\lambda_d$ | Dominant Wavelength | 331X<br>341X<br>351X | | 626<br>585<br>569 | | nm | See Note 2 (Figure 1) |
| $\tau_s$ | Speed of Response | 331X<br>341X<br>351X | | 90<br>90<br>500 | | ns | |
| C | Capacitance | 331X<br>341X<br>351X | | 11<br>15<br>18 | | pF | $V_F$ = 0; f = 1 MHz |
| $R\theta_{J\text{-}PIN}$ | Thermal Resistance | 331X<br>341X<br>351X | | 260 | | °C/W | Junction to Cathode Lead |
| $V_F$ | Forward Voltage | 331X<br>341X<br>351X | | 1.9<br>2.0<br>2.1 | 2.4<br>2.4<br>2.7 | V | $I_F$ = 10 mA (Figure 2)<br>$I_F$ = 10 mA (Figure 7)<br>$I_F$ = 10 mA (Figure 12) |
| $V_R$ | Reverse Breakdown Volt. | All | 5.0 | | | V | $I_R$ = 100 µA |
| $\eta_V$ | Luminous Efficacy | 331X<br>341X<br>351X | | 145<br>500<br>595 | | lumens Watt | See Note 3 |

**Notes:**

1. $\theta_{1/2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
2. The dominant wavelength, $\lambda_d$, is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
3. 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.

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

| Parameter | 331X Series | 341X Series | 351X Series | Units |
|---|---|---|---|---|
| Peak Forward Current | 90 | 60 | 90 | mA |
| Average Forward Current[1] | 25 | 20 | 25 | mA |
| DC Current[2] | 30 | 20 | 30 | mA |
| Power Dissipation[3] | 135 | 85 | 135 | mW |
| Reverse Voltage ($I_R$ = 100 µA) | 5 | 5 | 5 | V |
| Transient Forward Current[4] (10 µsec Pulse) | 500 | 500 | 500 | mA |
| LED Junction Temperature | 110 | 110 | 110 | °C |
| Operating Temperature Range | -55 to +100 | -55 to +100 | -20 to +100 | °C |
| Storage Temperature Range | | | -55 to +100 | |
| Lead Soldering Temperature [1.6 mm (0.063 in.) from body] | 260°C for 5 seconds | | | |

**Notes:**

1. See Figure 5 (Red), 10 (Yellow), or 15 (Green) to establish pulsed operating conditions.
2. For Red and Green series derate linearly from 50°C at 0.5 mA/°C. For Yellow series derate linearly from 50°C at 0.2 mA/°C.
3. For Red and Green series derate power linearly from 25°C at 1.8 mW/°C. For Yellow series derate power linearly from 50°C at 1.6 mW/°C.
4. The transient peak current is the maximum non-recurring peak current that can be applied to the device without damaging the LED die and wirebond. It is not recommended that the device be operated at peak currents beyond the peak forward current listed in the Absolute Maximum Ratings.

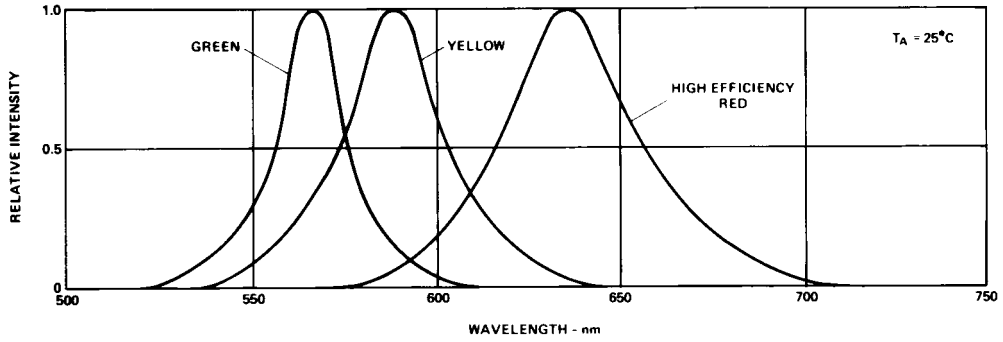



**Figure 1. Relative Intensity vs. Wavelength.**

## High Efficiency Red HLMP-331X Series

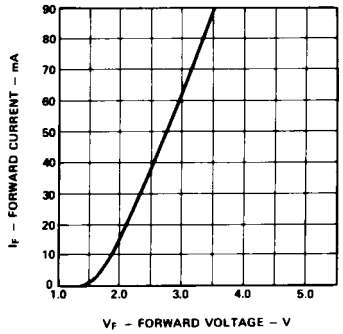



**Figure 2. Forward Current vs. Forward Voltage Characteristics.**

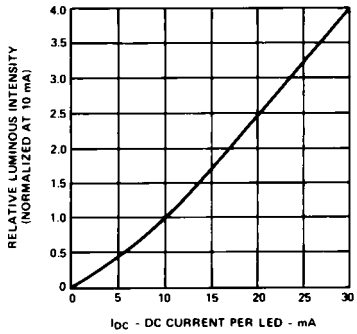



**Figure 3. Relative Luminous Intensity vs. DC Forward Current.**

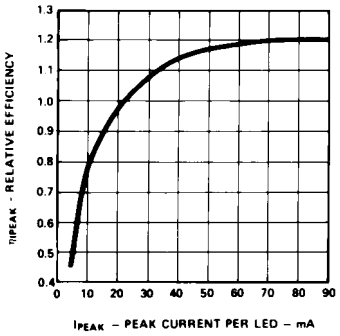



**Figure 4. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.**

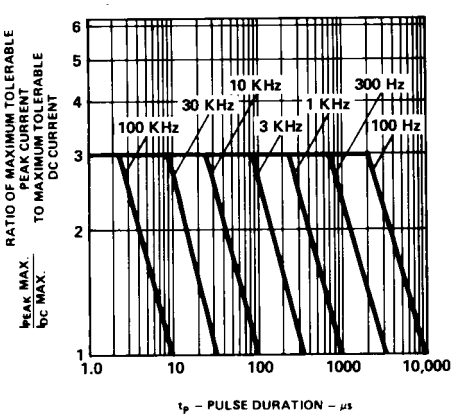



**Figure 5. Maximum Tolerable Peak Current vs. Pulse Duration ($I_{DC}$ MAX as per MAX Ratings).**

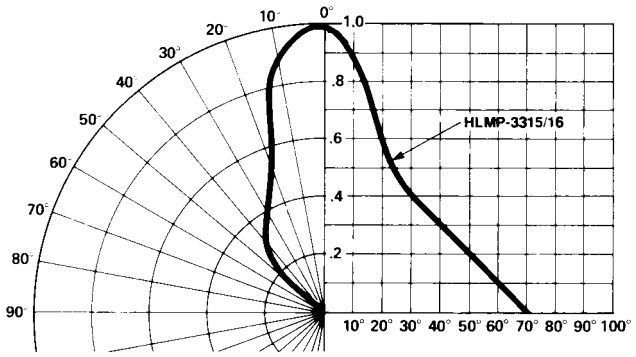



**Figure 6. Relative Luminous Intensity vs. Angular Displacement.**

## Yellow HLMP-341X Series

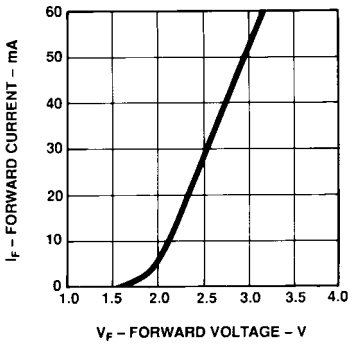



**Figure 7. Forward Current vs. Forward Voltage Characteristics.**

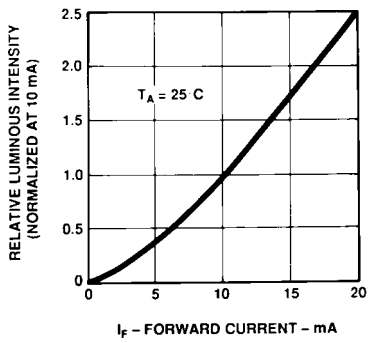



**Figure 8. Relative Luminous Intensity vs. DC Forward Current.**

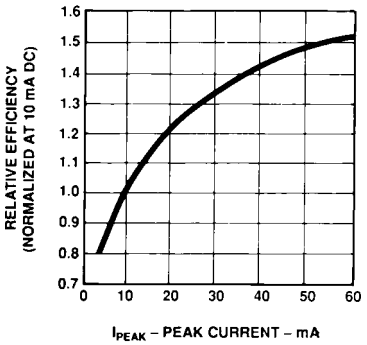



**Figure 9. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.**

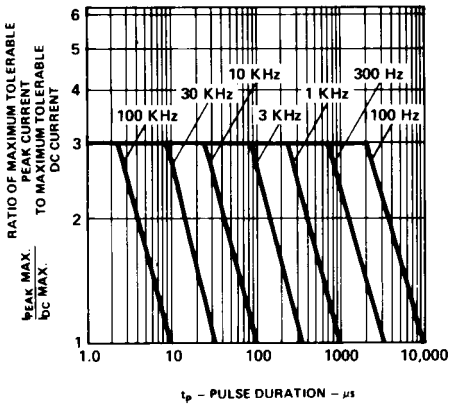



**Figure 10. Maximum Tolerable Peak Current vs. Pulse Duration ($I_{DC}$ MAX as per MAX Ratings).**

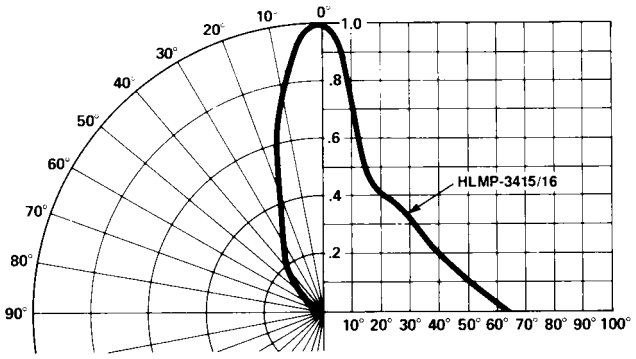



**Figure 11. Relative Luminous Intensity vs. Angular Displacement.**

## Green HLMP-351X Series

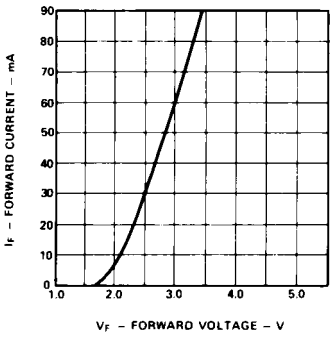



**Figure 12. Forward Current vs. Forward Voltage Characteristics.**

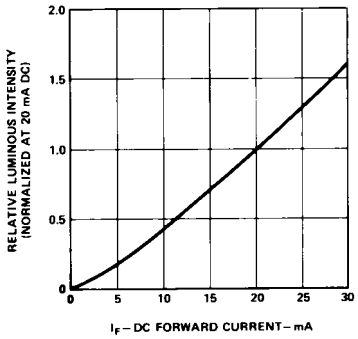



**Figure 13. Relative Luminous Intensity vs. DC Forward Current.**

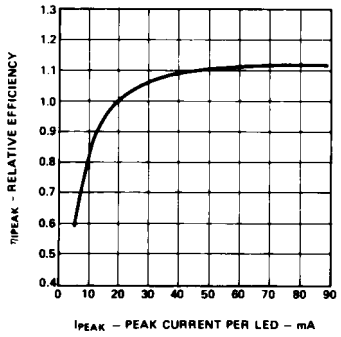



**Figure 14. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.**

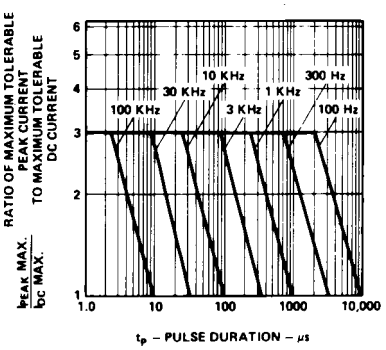



**Figure 15. Maximum Tolerable Peak Current vs. Pulse Duration ($I_{DC}$ MAX as per MAX Ratings).**

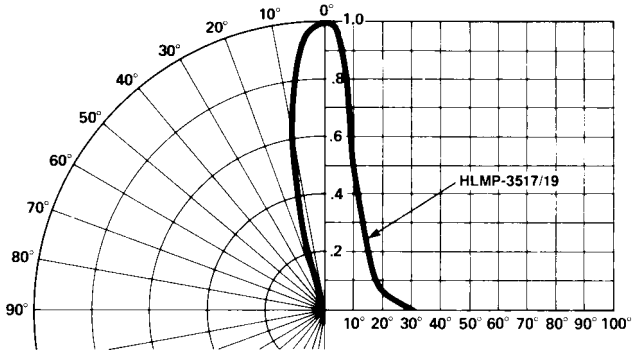



**Figure 16. Relative Luminous Intensity vs. Angular Displacement. T-1 3/4 Lamp.**

**Table 2. Intensity Bin Limit**

| Color | Bin | Intensity Range (mcd) | |
|---|---|---|---|
| | | Min. | Max. |
| Red | H | 15.5 | 24.8 |
| | I | 24.8 | 39.6 |
| | J | 39.6 | 63.4 |
| | K | 63.4 | 101.5 |
| | L | 101.5 | 162.4 |
| | M | 162.4 | 234.6 |
| | N | 234.6 | 340.0 |
| | O | 340.0 | 540.0 |
| | 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 |

**Table 2. (Cont'd)**

| Color | Bin | Intensity Range (mcd) | |
|---|---|---|---|
| | | Min. | Max. |
| Yellow | G | 16.6 | 26.5 |
| | H | 26.5 | 42.3 |
| | I | 42.3 | 67.7 |
| | J | 67.7 | 108.2 |
| | K | 108.2 | 173.2 |
| | L | 173.2 | 250.0 |
| | M | 250.0 | 360.0 |
| | N | 360.0 | 510.0 |
| | O | 510.0 | 800.0 |
| | P | 800.0 | 1250.0 |
| | Q | 1250.0 | 1800.0 |
| | R | 1800.0 | 2900.0 |
| | S | 2900.0 | 4700.0 |
| | T | 4700.0 | 7200.0 |
| | U | 7200.0 | 11700.0 |
| | V | 11700.0 | 18000.0 |
| | W | 18000.0 | 27000.0 |

**Table 2. (Cont'd)**

| Color | Bin | Intensity Range (mcd) | |
|---|---|---|---|
| | | Min. | Max. |
| Green | E | 7.6 | 12.0 |
| | F | 12.0 | 19.1 |
| | G | 19.1 | 30.7 |
| | H | 30.7 | 49.1 |
| | I | 49.1 | 78.5 |
| | J | 78.5 | 125.7 |
| | K | 125.7 | 201.1 |
| | L | 201.1 | 289.0 |
| | M | 289.0 | 417.0 |
| | N | 417.0 | 680.0 |
| | O | 680.0 | 1100.0 |
| | P | 1100.0 | 1800.0 |
| | Q | 1800.0 | 2700.0 |
| | R | 2700.0 | 4300.0 |
| | S | 4300.0 | 6800.0 |
| | T | 6800.0 | 10800.0 |
| | U | 10800.0 | 16000.0 |
| | V | 16000.0 | 25000.0 |
| | W | 25000.0 | 40000.0 |

Maximum tolerance for each bin limit is ± 18%.

## Color Categories

| Color | Cat # | Lambda (nm) | |
|---|---|---|---|
| | | Min. | Max. |
| Green | 6 | 561.5 | 564.5 |
| | 5 | 564.5 | 567.5 |
| | 4 | 567.5 | 570.5 |
| | 3 | 570.5 | 573.5 |
| | 2 | 573.5 | 576.5 |
| Yellow | 1 | 582.0 | 584.5 |
| | 3 | 584.5 | 587.0 |
| | 2 | 587.0 | 589.5 |
| | 4 | 589.5 | 592.0 |
| | 5 | 592.0 | 593.0 |

Tolerance for each bin limit is ± 0.5 nm.

## Mechanical Option Matrix

| Mechanical Option Code | Definition |
|---|---|
| 00 | Bulk Packaging, minimum increment 500 pcs/bag |
| 01 | Tape & Reel, crimped leads, minimum increment 1300 pcs/bag |
| 02 | Tape & Reel, straight leads, minimum increment 1300 pcs/bag |
| B1 | Right Angle Housing, uneven leads, minimum increment 500 pcs/bag |
| B2 | Right Angle Housing, even leads, 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.

**Agilent Technologies**

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July 16, 2001
Obsoletes 5964-9293E (4/96)
5988-2146EN

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Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
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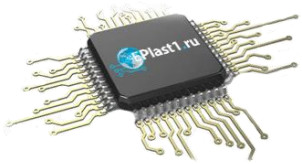
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.




**Как с нами связаться**

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