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

## Technical Data

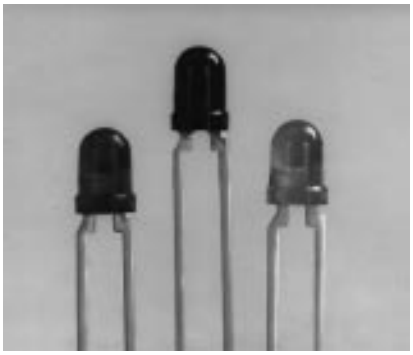
**HLMP-132X Series**
**HLMP-142X Series**
**HLMP-152X Series**

### Features

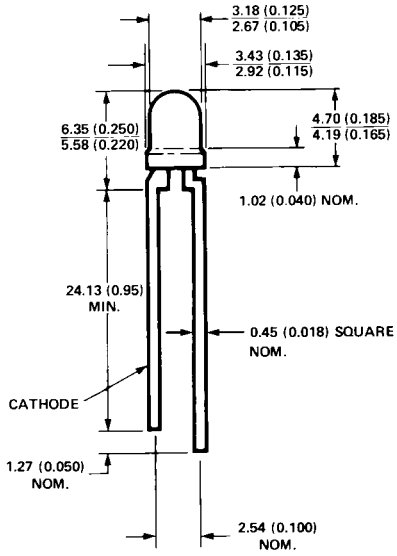
- **High Intensity**
- **Choice of 3 Bright Colors**
  High Efficiency Red
  Yellow
  High Performance Green
- **Popular T-1 Diameter Package**
- **Selected Minimum Intensities**
- **Narrow Viewing Angle**
- **General Purpose Leads**
- **Reliable and Rugged**
- **Available on Tape and Reel**

### Description

This family of T-1 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.



### Package Dimensions




NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES (INCHES).
2. AN EPOXY MENISCUS MAY EXTEND ABOUT 1mm (0.040") DOWN THE LEADS.

### Selection Guide

| Part Number HLMP- | Description | Minimum Intensity (mcd) at 10 mA | Color (Material) |
|---|---|---|---|
| 1320 | Untinted Nondiffused | 8.6 | High Efficiency Red (GaAsP on GaP) |
| 1321 | Tinted Nondiffused | 8.6 | |
| 1420 | Untinted Nondiffused | 9.2 | Yellow (GaAsP on GaP) |
| 1421 | Tinted Nondiffused | 9.2 | |
| 1520 | Untinted Nondiffused | 6.7 | Green (GaP) |
| 1521 | Tinted Nondiffused | 6.7 | |



5964-9373E

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

| Parameter | Red | Yellow | Green | 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.

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

| Symbol | Description | Device HLMP- | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|---|
| $I_V$ | Luminous Intensity | 1320<br>1321 | 8.6<br>8.6 | 30<br>30 | | mcd | $I_F$ = 10 mA<br>(Figure 3) |
| | | 1420<br>1421 | 9.2<br>9.2 | 15<br>15 | | mcd | $I_F$ = 10 mA<br>(Figure 8) |
| | | 1520<br>1521 | 6.7<br>6.7 | 22<br>22 | | mcd | $I_F$ = 10 mA<br>(Figure 3) |
| $2\theta^1/_2$ | Including Angle Between Half Luminous Intensity Points | All | | 45 | | Deg. | $I_F$ = 10 mA<br>See Note 1<br>(Figures 6, 11, 16, 21) |
| $\lambda_{PEAK}$ | Peak Wavelength | 132X<br>142X<br>152X | | 635<br>583<br>565 | | nm | Measurement at Peak (Figure 1) |
| $\Delta\lambda_{1/2}$ | Spectral Line Halfwidth | 132X<br>142X<br>152X | | 40<br>36<br>28 | | nm | |
| $\lambda_d$ | Dominant Wavelength | 132X<br>142X<br>152X | | 626<br>585<br>569 | | nm | See Note 2<br>(Figure 1) |
| $\tau_s$ | Speed of Response | 132X<br>142X<br>152X | | 90<br>90<br>500 | | ns | |
| C | Capacitance | 132X<br>142X<br>152X | | 11<br>15<br>18 | | pF | $V_F$ = 0; f = 1 MHz |
| $R\theta_{J\text{-}PIN}$ | Thermal Resistance | All | | 290 | | °C/W | Junction to Cathode Lead |
| $V_F$ | Forward Voltage | 132X<br>142X<br>152X | | 1.9<br>2.0<br>2.1 | 2.4<br>2.4<br>2.7 | V | $I_F$ = 10 mA |
| $V_R$ | Reverse Breakdown Voltage | All | 5.0 | | | V | $I_R$ = 100 μA |
| $\eta_V$ | Luminous Efficacy | 132X<br>142X<br>152X | | 145<br>500<br>595 | | $\frac{\text{lumens}}{\text{Watt}}$ | 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 $I_e = l_v/\eta_v$, where $l_v$ is the luminous intensity in candelas and $\eta_v$ is the luminous efficacy in lumens/watt.

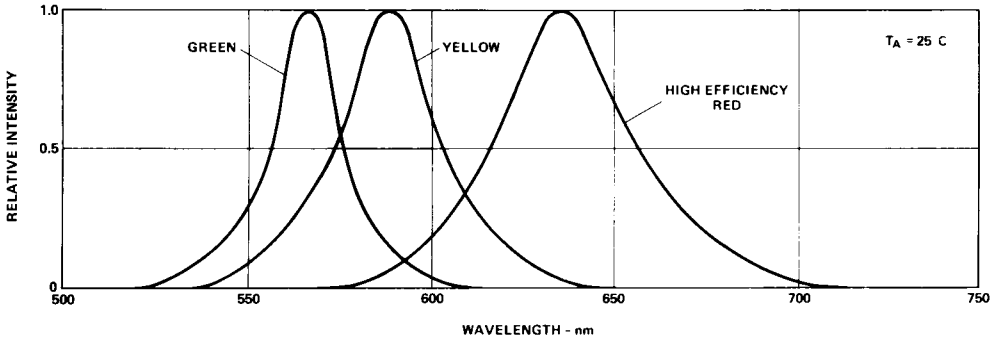



**Figure 1. Relative Intensity vs. Wavelength.**

## T-1 High Efficiency Red Non-Diffused

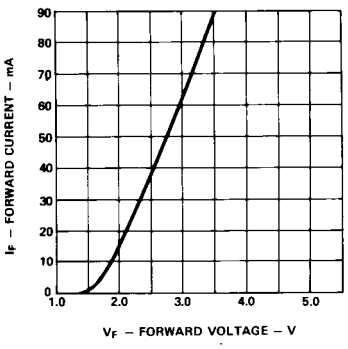



**Figure 2. Forward Current vs. Forward Voltage Characteristics.**

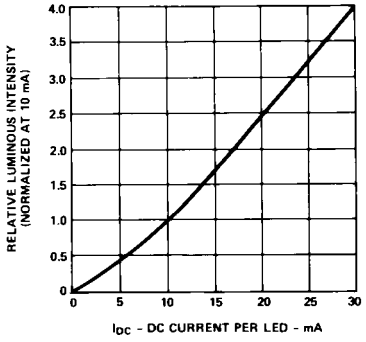



**Figure 3. Relative Luminous Intensity vs. DC Forward Current.**

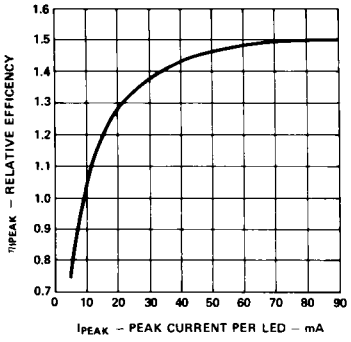



**Figure 4. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.**

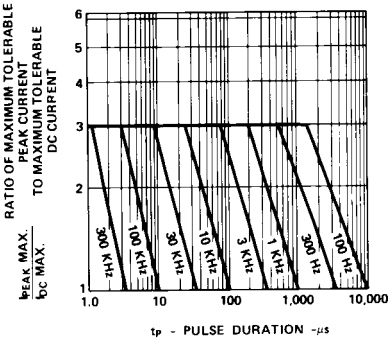



**Figure 5. Maximum Tolerable Peak Current vs. Pulse Duration. ($I_{DC}$ MAX as per MAX Ratings).**

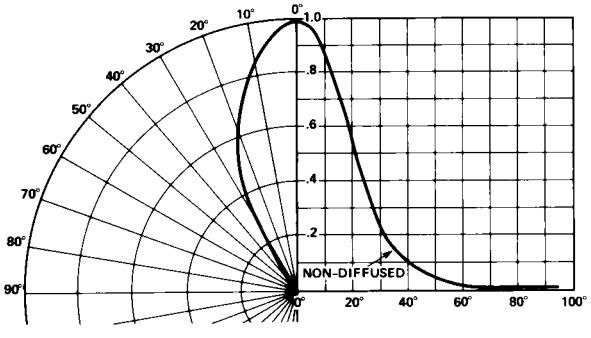



**Figure 6. Relative Luminous Intensity vs. Angular Displacement.**

## T-1 Yellow Non-Diffused

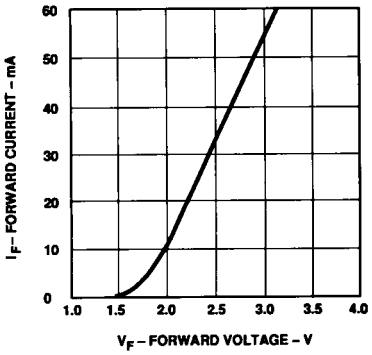



**Figure 7. Forward Current vs. Forward Voltage Characteristics.**

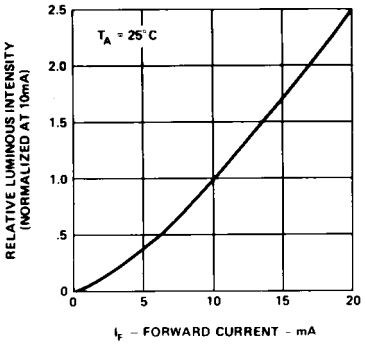



**Figure 8. Relative Luminous Intensity vs. Forward Current.**

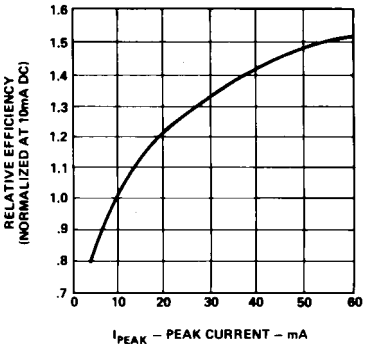



**Figure 9. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.**

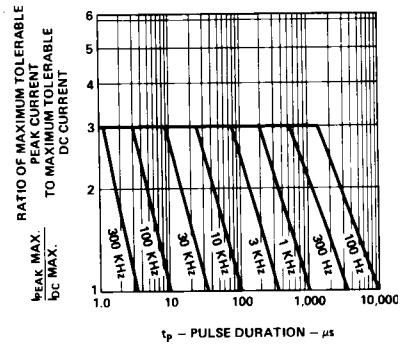



**Figure 10. Maximum Tolerable Peak Current vs. Pulse Duration. ($I_{DC}$MAX as per MAX Ratings).**

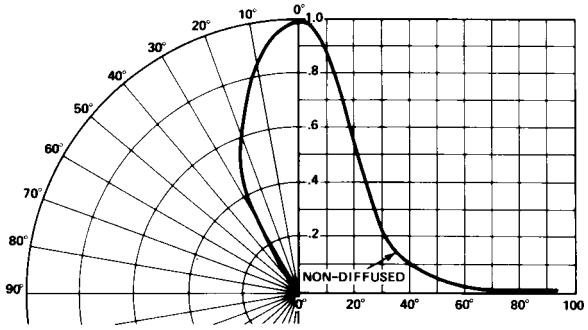



**Figure 11. Relative Luminous Intensity vs. Angular Displacement.**

## T-1 Green Non-Diffused

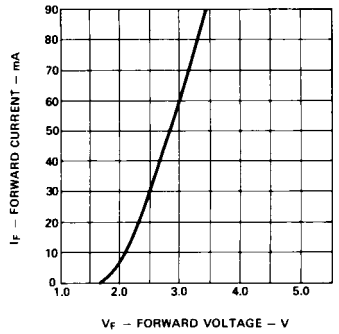



**Figure 12. Forward Current vs. Forward Voltage Characteristics.**

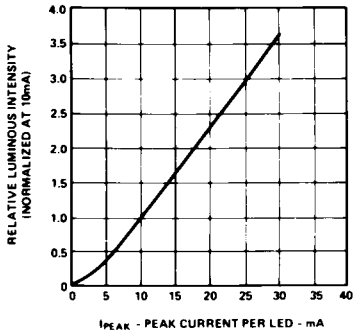



**Figure 13. Relative Luminous Intensity vs. Forward Current.**

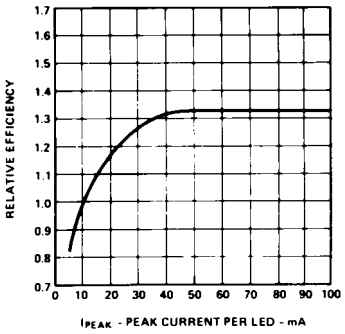



**Figure 14. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.**

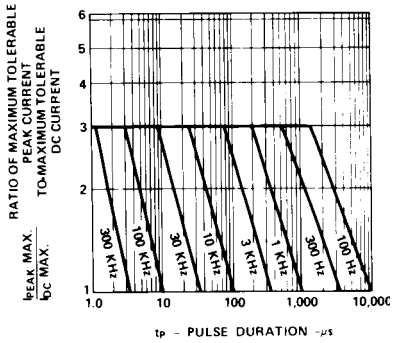



**Figure 15. Maximum Tolerable Peak Current vs. Pulse Duration. ($I_{DCMAX}$ as per MAX Ratings).**

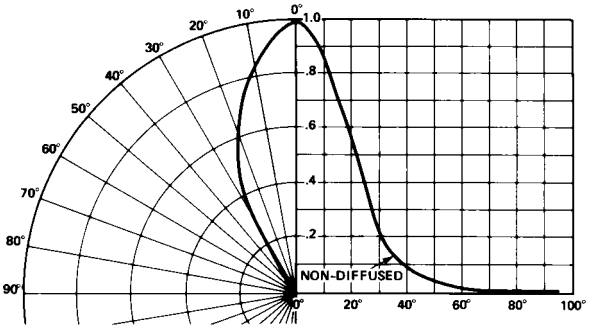



**Figure 16. Relative Luminous Intensity vs. Angular Displacement.**