

T-1 (3 mm) High Intensity LED Lamps

Technical Data

HLMP-1340-G0000
HLMP-1321
HLMP-142x Series
HLMP-152x Series

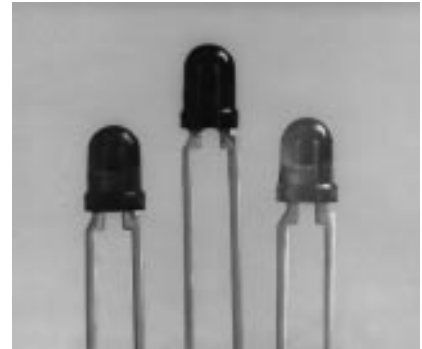
Features

- **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**

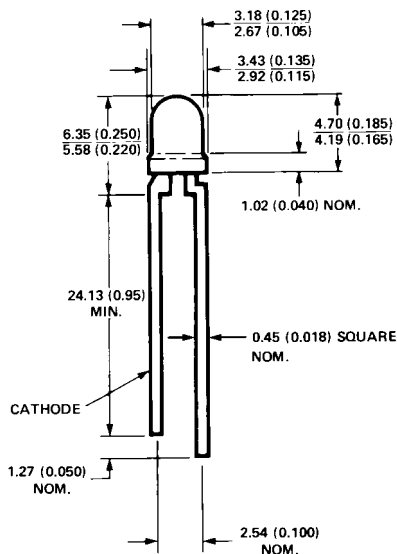
- **General Purpose Leads**
- **Reliable and Rugged**
- **Available on Tape and Reel**

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)
1340-G0000	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	

Absolute Maximum Ratings at $T_A = 25^\circ\text{C}$

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 ($I_R = 100 \mu\text{A}$)	5	5	5	V
Transient Forward Current ^[4] (10 μsec Pulse)	500	500	500	mA
LED Junction Temperature	110	110	110	$^\circ\text{C}$
Operating Temperature Range	-55 to +100	-55 to +100	-20 to +100	$^\circ\text{C}$
Storage Temperature Range			-55 to +100	
Lead Soldering Temperature [1.6 mm (0.063 in.) from body]	260 $^\circ\text{C}$ 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 $^\circ\text{C}$ at 0.5 mA/ $^\circ\text{C}$. For Yellow series derate linearly from 50 $^\circ\text{C}$ at 0.2 mA/ $^\circ\text{C}$.
3. For Red and Green series derate power linearly from 25 $^\circ\text{C}$ at 1.8 mW/ $^\circ\text{C}$. For Yellow series derate power linearly from 50 $^\circ\text{C}$ at 1.6 mW/ $^\circ\text{C}$.
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 $T_A = 25^\circ\text{C}$

Symbol	Description	Device HLMP-	Min.	Typ.	Max.	Units	Test Conditions
I_V	Luminous Intensity	1340-G0000 1321	8.6 8.6	30 30		mcd	$I_F = 10\text{ mA}$ (Figure 3)
		1420 1421	9.2 9.2	15 15		mcd	$I_F = 10\text{ mA}$ (Figure 8)
		1520 1521	6.7 6.7	22 22		mcd	$I_F = 10\text{ mA}$ (Figure 3)
$2\theta^{1/2}$	Including Angle Between Half Luminous Intensity Points	All		45		Deg.	$I_F = 10\text{ mA}$ See Note 1 (Figures 6, 11, 16, 21)
λ_{PEAK}	Peak Wavelength	1340-G0000 1321-G0000		635		nm	Measurement at Peak (Figure 1)
		142X 152X		583 565			
$\Delta\lambda_{1/2}$	Spectral Line Halfwidth	1340-G0000 1321-G0000		40		nm	
		142X 152X		36 28			
λ_d	Dominant Wavelength	1340-G0000 1321-G0000		626		nm	See Note 2 (Figure 1)
		142X 152X		585 569			
τ_s	Speed of Response	1340-G0000 1321-G0000		90		ns	
		142X 152X		90 500			
C	Capacitance	1340-G0000 1321-G0000		11		pF	$V_F = 0$; $f = 1\text{ MHz}$
		142X 152X		15 18			
$R\theta_{\text{J-PIN}}$	Thermal Resistance	All		290		$^\circ\text{C/W}$	Junction to Cathode Lead
V_F	Forward Voltage	1340-G0000 1321-G0000		1.9	2.4	V	$I_F = 10\text{ mA}$
		142X 152X		2.0 2.1	2.4 2.7		
V_R	Reverse Breakdown Voltage	All	5.0			V	$I_R = 100\ \mu\text{A}$
η_V	Luminous Efficacy	1340-G0000 1321-G0000		145		<u>lumens</u>	See Note 3
		142X 152X		500 595		Watt	

Notes:

- $\theta^{1/2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
- The dominant wavelength, λ_d , is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
- 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 η_V is the luminous efficacy in lumens/watt.

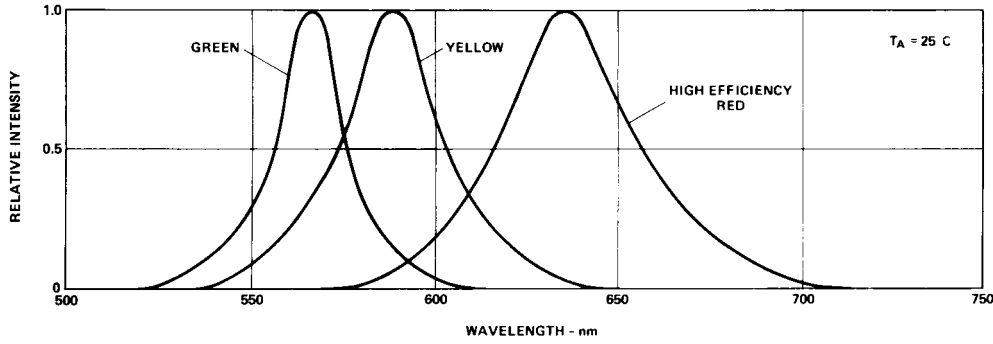


Figure 1. Relative Intensity vs. Wavelength.

T-1 High Efficiency Red Non-Diffused

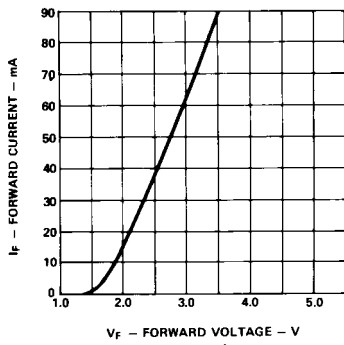


Figure 2. Forward Current vs. Forward Voltage Characteristics.

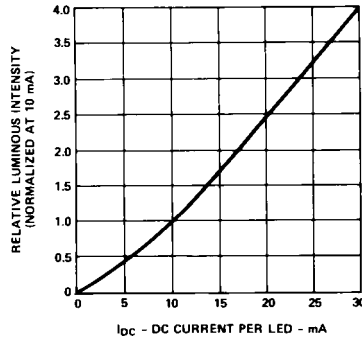


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

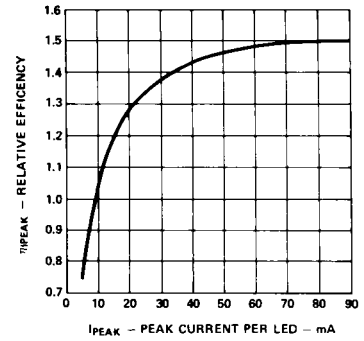


Figure 4. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.

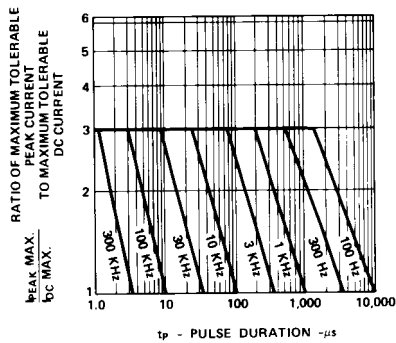


Figure 5. Maximum Tolerable Peak Current vs. Pulse Duration. (I_{DC} MAX as per MAX Ratings).

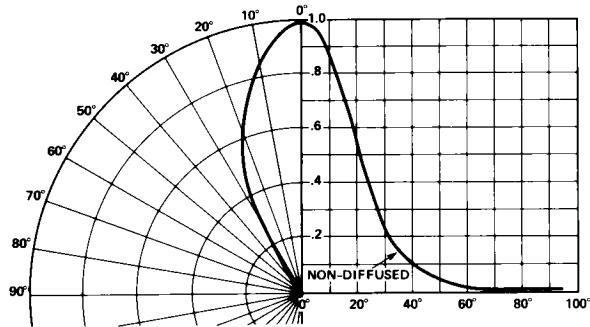


Figure 6. Relative Luminous Intensity vs. Angular Displacement.

T-1 Yellow Non-Diffused

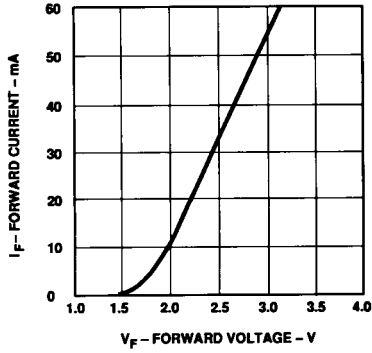


Figure 7. Forward Current vs. Forward Voltage Characteristics.

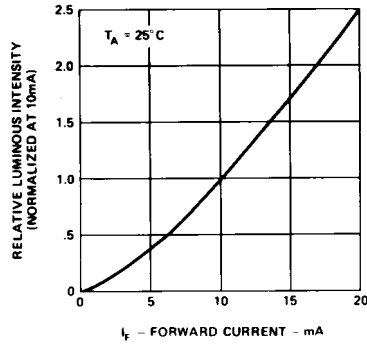


Figure 8. Relative Luminous Intensity vs. Forward Current.

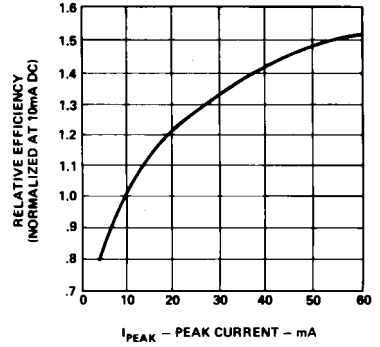


Figure 9. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.

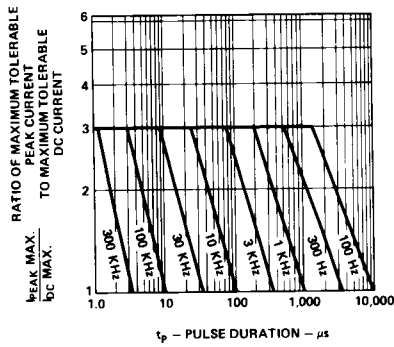


Figure 10. Maximum Tolerable Peak Current vs. Pulse Duration. ($I_{DC}MAX$ as per MAX Ratings).

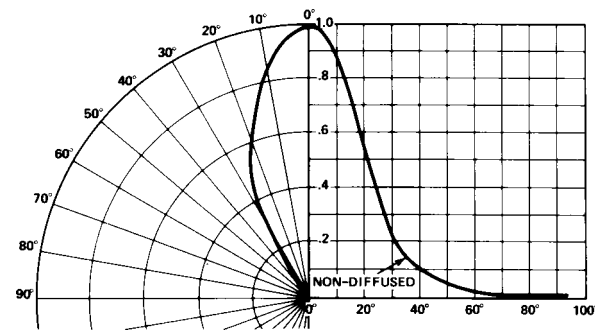


Figure 11. Relative Luminous Intensity vs. Angular Displacement.

T-1 Green Non-Diffused

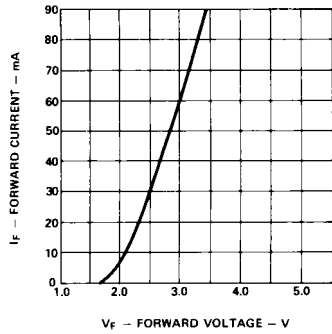


Figure 12. Forward Current vs. Forward Voltage Characteristics.

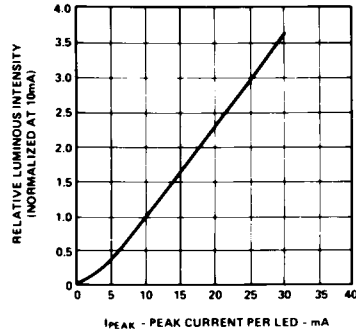


Figure 13. Relative Luminous Intensity vs. Forward Current.

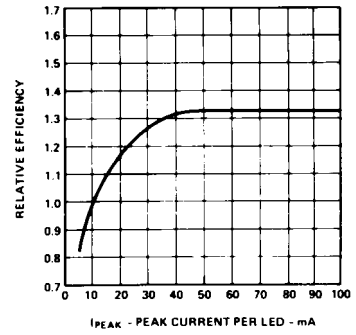


Figure 14. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.

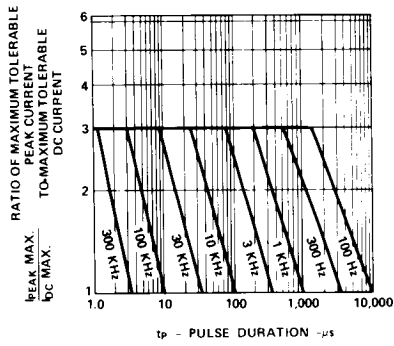


Figure 15. Maximum Tolerable Peak Current vs. Pulse Duration. (I_{DCMAX} as per MAX Ratings).

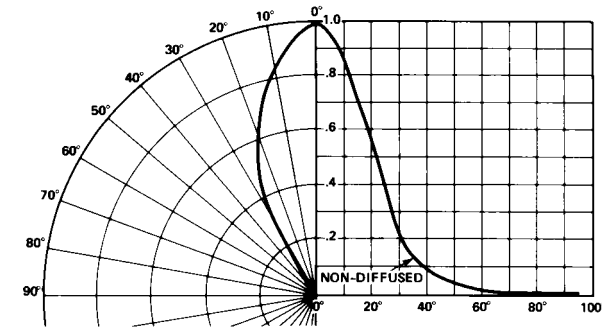
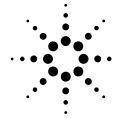


Figure 16. Relative Luminous Intensity vs. Angular Displacement.



Tape and Reel Options for T-1^{3/4} (5 mm), T-1 (3 mm), LED Lamps

Technical Data

Option 01 Option 02

Features

- **Compatible with Radial Lead Automatic Insertion Equipment**
- **Meets Dimensional Specifications of IEC Publication 286 and ANSI/EIA Standard RS-468 for Tape and Reel**
- **Reel Packaging Simplifies Handling and Testing**
- **T-1 and T-1^{3/4} LED Lamps Available Packaged on Tape and Reel**
- **5 mm (0.197 inch) Formed Lead and 2.54 mm (0.100 inch) Straight Lead Spacing Available**

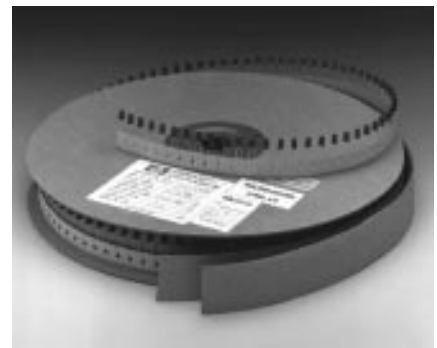
Description

T-1 and T-1^{3/4} LED lamps are available on tape and reel as specified by the IEC Publication 286 and ANSI/EIA Standard RS-468. The Option 01 lamp devices have formed leads with 5 mm (0.197 inch) spacing for automatic insertion into PC boards by radial lead insertion equipment. The Option 02 lamp devices have straight leads with 2.54 mm (0.100 inch) spacing, packaged on tape and reel for ease of handling. T-1 lamps are packaged 1800/reel. T-1^{3/4} lamps are packaged 1300/reel.

Ordering Information

To order LED lamps packaged on tape and reel, include the appropriate option code along with the device catalog part number. Example: to order the HLMP-3300 on tape and reel with formed leads (5 mm lead spacing) order as follows: HLMP-3300 Option 01. Minimum order quantities vary by part number. Orders must be placed in reel increments. Please contact your local Agilent sales office or franchised Agilent distributor for a complete list of lamps available on tape and reel.

LED lamps with 0.46 mm (0.018 inch) square leads with 5 mm (0.197 inch) lead spacing are recommended for use with automatic insertion equipment.



Caution: Agilent does not recommend T-1 package, option 02 LEDs for auto-insertion. The force exerted on the LED lead frame during the cut and clinch operation of auto-insertion may result in cracking of the lamp epoxy dome which results in catastrophic failure. It is suggested that insertion machine compatibility be confirmed.

Device Selection Guide

Option	Description
01	Tape and reel, 5 mm (0.197 inch) formed leads.
02	Tape and reel, 2.54 mm (0.100 inch) straight leads.

Package	Quantity/Reel	Order Increments
T-1	1800	1800
T-1 ^{3/4}	1300	1300

Absolute Maximum Ratings and Electrical/Optical Characteristics

The absolute maximum ratings, mechanical dimension tolerances and electrical/optical characteristics for lamps packaged on tape and reel are identical to the basic catalog device. Refer to the basic data sheet for the specified values.

Notes:

1. Minimum leader length at either end of tape is 3 blank part spaces.
2. Silver saver paper is used as the interlayer for silver plated lead devices.
3. The maximum number of consecutive missing lamps is 3.
4. In accordance with EIA and IEC specs, the anode lead leaves the reel first.
5. Drawings apply to devices with 0.46 mm (0.018 inch) square leads only. Contact Agilent Sales Office for dimensions of 0.635 mm (0.025 inch) square lead devices.

Tape and Reel LED Configurations

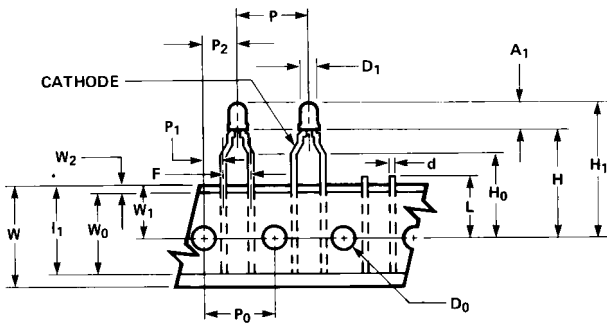


Figure 1. T-1 High Profile Lamps, Option 01.

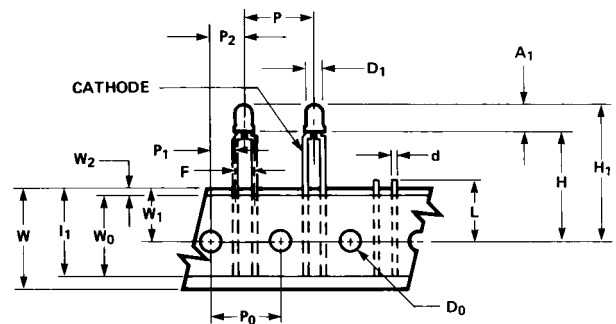


Figure 2. T-1 High Profile Lamps, Option 02.

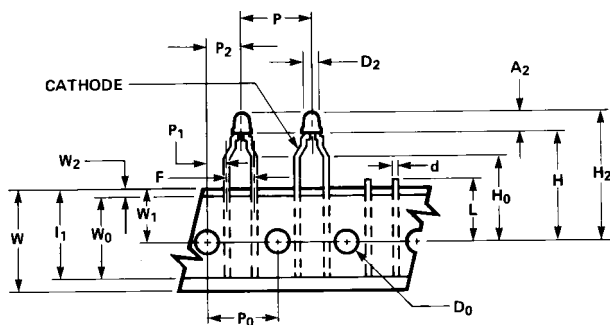


Figure 3. T-1 Low Profile Lamps, Option 01.

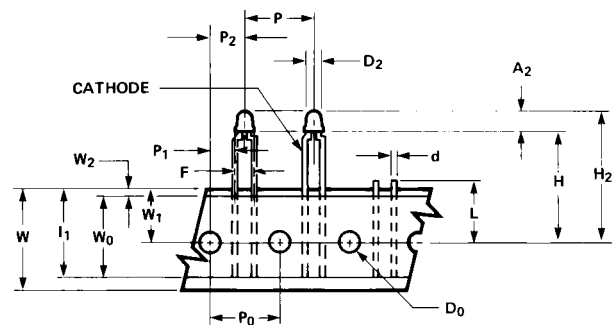


Figure 4. T-1 Low Profile Lamps, Option 02.

Tape and Reel LED Configurations (cont.)

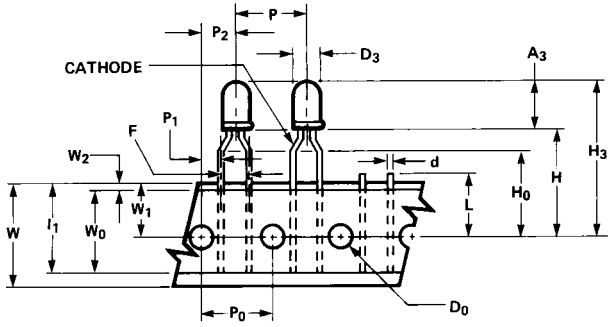


Figure 5. T-1^{3/4} High Profile Lamps, Option 01.

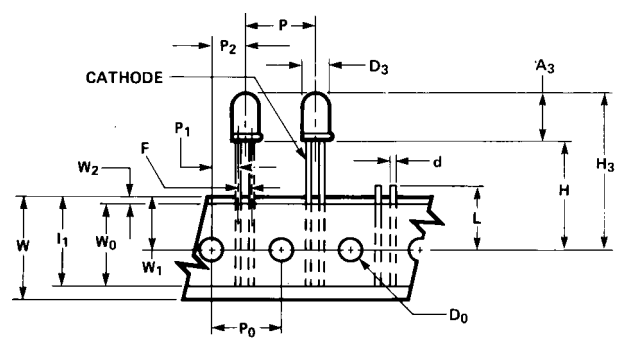


Figure 6. T-1^{3/4} High Profile Lamps, Option 02.

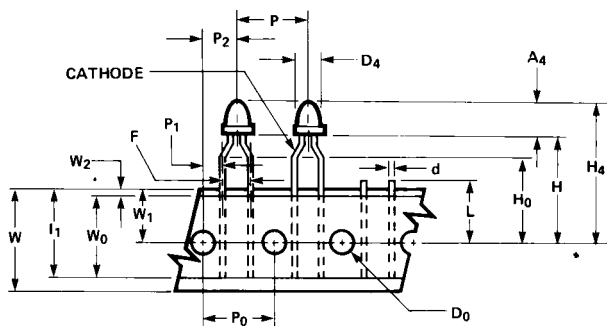


Figure 7. T-1^{3/4} Low Profile Lamps, Option 01.

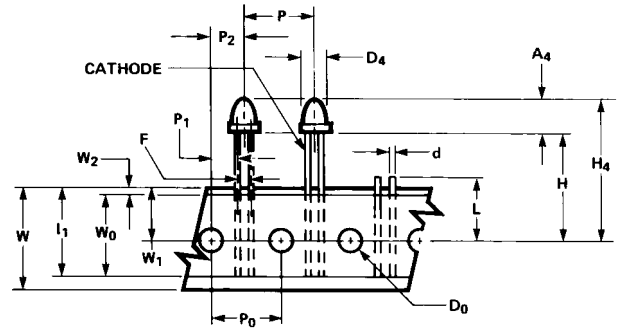










Figure 8. T-1^{3/4} Low Profile Lamps, Option 02.

Dimensional Specifications for Tape and Reel

Item	Option 01	02	Symbol	Specification	Notes
T1 High Profile Body Height			A1	$\frac{4.70 (0.185)}{4.19 (0.165)}$	
Body Diameter			D1	$\frac{3.18 (0.125)}{2.67 (0.105)}$	
Component Height			H1	25.7 (1.012) Max.	
T1 Low Profile Body Height			A2	$\frac{3.73 (0.147)}{3.23 (0.127)}$	
Body Diameter			D2	$\frac{3.05 (0.120)}{2.79 (0.110)}$	
Component Height			H2	24.7 (0.974) Max.	
T1^{3/4} High Profile Body Height			A3	$\frac{9.19 (0.362)}{8.43 (0.332)}$	
Body Diameter			D3	$\frac{5.08 (0.200)}{4.32 (0.170)}$	
Component Height			H3	30.2 (1.189) Max.	
T1^{3/4} Low Profile Body Height			A4	$\frac{6.35 (0.250)}{5.33 (0.210)}$	
Body Diameter			D4	$\frac{5.08 (0.200)}{4.32 (0.170)}$	
Component Height			H4	27.4 (1.079) Max.	
Lead Wire Thickness			d	0.45 (0.018)	Square Leads
Pitch of Component			P	$\frac{13.7 (0.539)}{11.7 (0.461)}$	
Feed Hole Pitch			P ₀	$\frac{12.9 (0.508)}{12.5 (0.492)}$	Cumulative error: 1.0 mm/20 pitches
Feed Hole Center to Lead Center			P1	$\frac{4.55 (0.179)}{3.15 (0.124)}$	Measure at crimp bottom 5.78/3.68 (0.227/0.1448) for straight leads
Hole Center to Component Center			P2	$\frac{7.35 (0.289)}{5.35 (0.211)}$	
Lead to Lead Distance			F	$\frac{5.40 (0.213)}{4.90 (0.193)}$	2.54 (0.100) nominal for straight leads
Component Alignment, Front-rear			Δh	0 ± 1.0 (0.039)	Figure 9
Tape Width			W	$\frac{18.5 (0.728)}{17.5 (0.689)}$	
Hold Down Tape Width			W ₀	$\frac{15.3 (0.602)}{12.0 (0.472)}$	
Hole Position			W1	$\frac{9.75 (0.384)}{8.50 (0.335)}$	

Dimensional Specifications for Tape and Reel (cont.)

Item	Option 01 02	Symbol	Specification	Notes
Hold Down Tape Position		W2	2.54 (0.100) Max.	
Height of Component from Hole Center		H	$\frac{21.0 (0.827)}{20.0 (0.787)}$	
Lead Clinch Height		H _O	$\frac{16.5 (0.650)}{15.5 (0.610)}$	
Feed Hole Diameter		D _O	$\frac{4.20 (0.165)}{3.80 (0.150)}$	
Total Tape Thickness		t	$\frac{0.90 (0.035)}{0.50 (0.020)}$	Paper thickness: 0.55 (0.022) 0.45 (0.018) Figure 9
Length of Snipped Lead		L	11.0 (0.433) Max.	
Lead Length Under Hold Down Tape		l1	14.5 (0.571) Min.	

Note:

1. Dimensions in millimetres (inches) maximum/minimum.

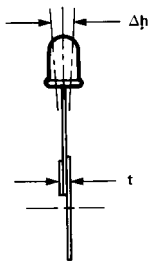


Figure 9. Front to Rear Alignment and Tape Thickness, Typical All Device Types.

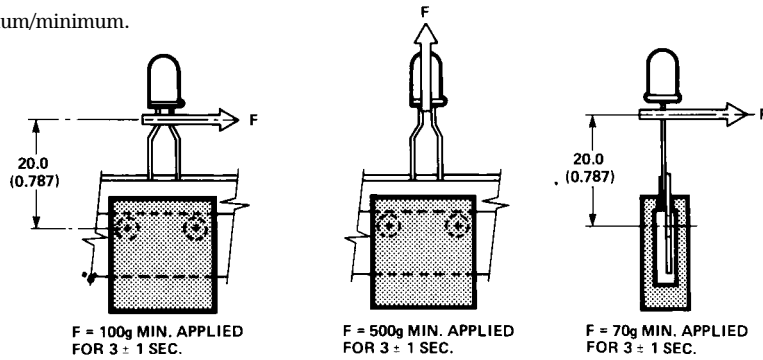


Figure 10. Device Retention Tests and Specifications.

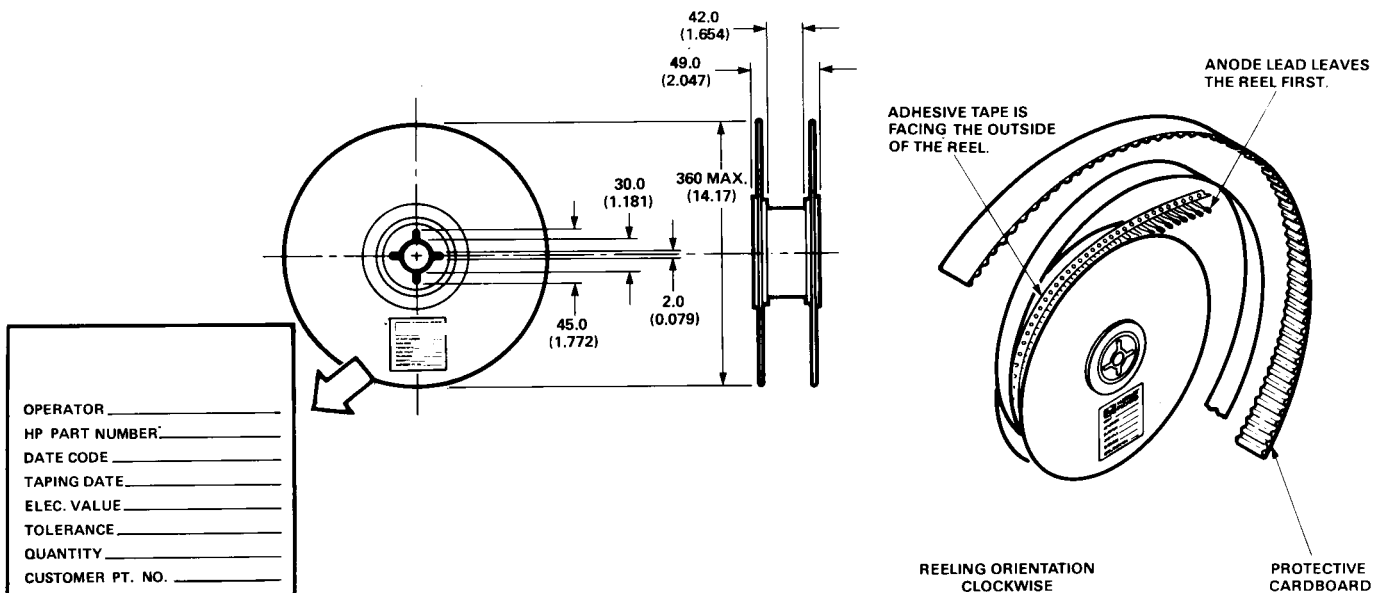
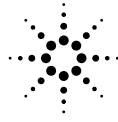


Figure 11. Reel Configuration and Labeling.



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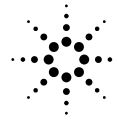
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Obsoletes 5964-9375E (4/96)

5968-4164E (11/99)



T-1 (3 mm) Right Angle LED Indicators

Technical Data

Features

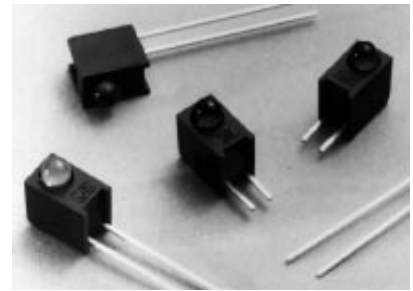
- Ideal for Card Edge Status Indication
- Package Design Allows Flush Seating on a PC Board
- May be Side Stacked on 4.57 mm (0.18") Centers
- Up to 8 Units May be Coupled for a Horizontal Array Configuration with a Common Coupling Bar (See T-1 Right Angle Array Data Sheet)
- LEDs Available in All LED Colors, With or Without Integrated Current Limiting Resistor in T-1 Packages
- Easy Flux Removal Design

- Housing Material Meets UL 94V-0 Rating
- Additional Catalog Lamps Available as Options

Description

Agilent T-1 Right Angle Indicators are industry standard status indicators that incorporate a T-1 LED lamp in a black plastic right angle mount housing. The indicators are available in Standard Red, High Efficiency Red, Orange, Yellow, and High Performance Green, with or without an integrated current limiting resistor. These products are designed to be used as back

Option A1 Option A2

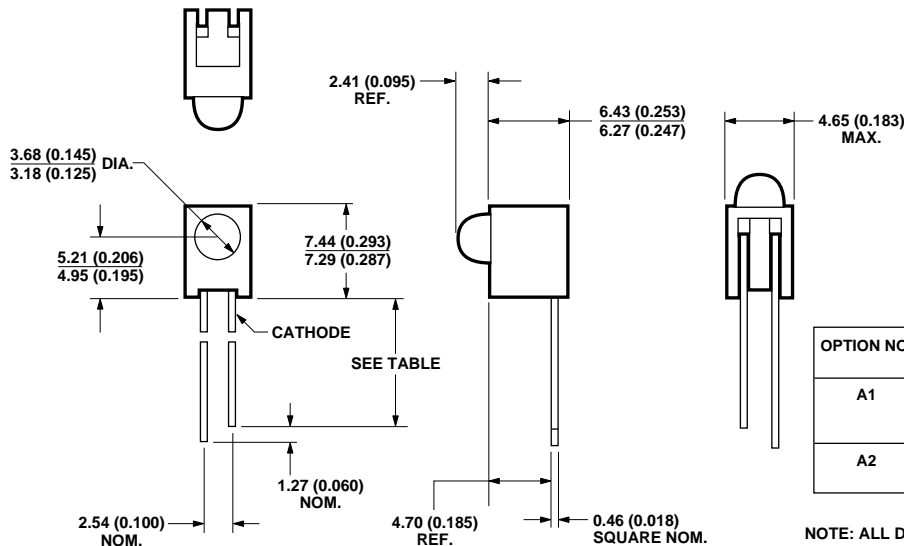


panel diagnostic indicators and card edge logic status indicators.

Ordering Information

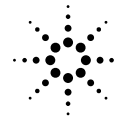
To order other T-1 High Dome Lamps in Right Angle Housings in addition to the parts indicated above, select the base part

Package Dimensions



OPTION NO.	CATHODE LEAD LENGTH	ANODE LEAD LENGTH	
A1	16.0 (0.630) MIN.	1.27 (0.050) NOM. LONGER THAN CATHODE	UNSHEARED UNEVEN LEADS
A2	3.43 (0.135) MIN.	3.43 (0.135) MIN.	SHEARED UNEVEN LEADS

NOTE: ALL DIMENSIONS ARE IN MILLIMETERS (INCHES).



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number and add the option code A1 or A2, depending on the lead length desired. For example, by ordering HLMP-1302 Option A1, you would receive the long lead option. By ordering HLMP-1302 Option A2, you would receive the short lead option.

Arrays made by connecting two to eight single Right Angle Indicators with a Common Coupling Bar are available. Ordering information for arrays may be found on the T-1 Right Angle Array data sheet.

Absolute Maximum Ratings and Other Electrical/Optical Characteristics

The absolute maximum ratings and typical device characteristics are identical to those of the T-1 LED lamps. For information about these characteristics, see the data sheets of the equivalent T-1 LED lamp.

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Obsoletes 5965-9699E (5/97)

5968-4124E (11/99)