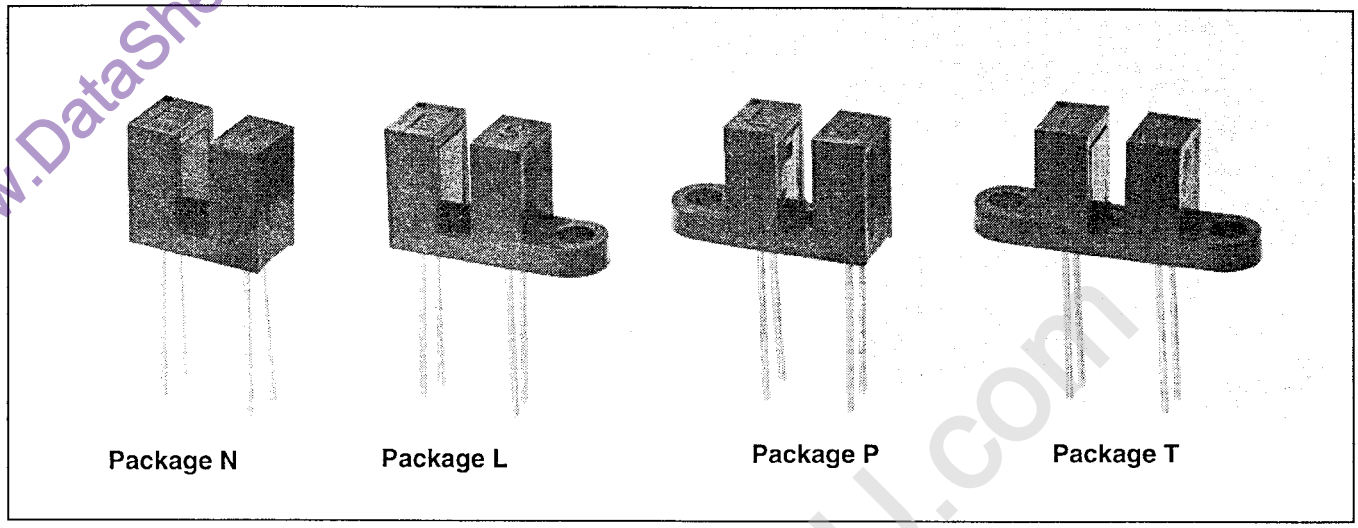
Hi-Rel Slotted Optical Switches
Types OPB870N, OPB870L, OPB870P, OPB870T Series



Package N | Package L | Package P | Package T

Features

- Non-contact switching
- Choice of apertures
- Choice of minimum $I_{C(ON)}$
- Hermetically sealed components
- Components processed to Optek's screening program patterned after MIL-PRF-19500 for TX and TXV devices
- S level processing available
- Plastic meets NASA publication 1124

Description

The OPB870 series slotted optical switch consists of a gallium aluminum arsenide LED and a silicon phototransistor soldered into a printed circuit board then mounted in a high temperature plastic housing on opposite sides of a 0.125 inch (3.18 mm) wide slot. Phototransistor switching takes place whenever an opaque object passes through the slot. Options include phototransistor aperture widths of 0.050 inches (1.27 mm) or 0.010 inches (0.25 mm) for high resolution positioning sensing.

The OPB870 hi-rel series uses optoelectronic components that have been processed and tested as either TX or TXV components per MIL-PRF-19500. Typical screening and lot acceptance tests are provided on page 13-4.

Absolute Maximum Ratings (T_A = 25° C unless otherwise noted)

Operating Temperature Range	-65° C to +125° C
Storage Temperature Range	-65° C to +150° C
Lead Soldering Temperature [1/16 inch (1.6 mm) from case 5 sec. with soldering iron]	240° C
Input Diode	
Forward DC Current	50 mA
Reverse Voltage	2.0 V
Power Dissipation	100 mW(2)
Output Phototransistor	
Collector-Emitter Voltage	50 V
Emitter-Collector Voltage	7.0 V
Power Dissipation	100 mW(2)

Notes:
(1) Duration can be extended to 10 sec. max. when flow soldering.
(2) Derate linearly 1.00 mW/° C above 25° C.
(3) Methanol or isopropanol are recommended as cleaning agents.

Part Number Guide

OPB 87X X 5X XX

- Optek Assembly Prefix
- Electrical Specification Variation
  0 = Electrical Parameter A
  1 = Electrical Parameter B
  2 = Electrical Parameter C
- Mounting Configuration
  T = Both mounting tabs
  N = No tabs
  L = Single mounting tab, LED side
  P = Single mounting tab, phototransistor side
- Component Product Assurance Level
  TX = Patterned Around TX of MIL-PRF-19500
  TV = Patterned Around TXV of MIL-PRF-19500
- Aperture width in front of phototransistor
  5 = 0.050" (1.27 mm)
  1 = 0.010" (0.25 mm)*
  Aperture length is 0.060" (1.52 mm)
- Aperture width in front of LED
  5 = 0.050" (1.27 mm)
  Aperture length is 0.060" (1.52 mm)

*Parameter "A" only

Type OPB870 Series

Electrical Characteristics (T_A = 25° C unless otherwise noted)

Symbol	Parameter		Min	Typ	Max	Units	Test Conditions
Input Diode							
V_F	Forward Voltage[4]		1.00	1.35	1.70	V	I_F = 20.0 mA
			1.20	1.55	1.90	V	I_F = 20.0 mA, T_A = -55° C
			0.80	1.20	1.60	V	I_F = 20.0 mA, T_A = 100° C
I_R	Reverse Current			0.1	10	µA	V_R = 2.0 V
Output Phototransistor							
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage		50	110		V	I_C = 1.0 mA, I_F = 0
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage		7.0	10.0		V	I_E = 100 µA, I_F = 0
$I_{C(off)}$	Collector-Emitter Dark Current			0.2	100	nA	V_{CE} = 10.0 V, I_F = 0
				10	100	µA	V_{CE} = 10.0 V, I_F = 0, T_A = 100° C
Coupled							
$I_{C(ON)}$	On-State Collector Current[4]						
	Parameter A	OPB870	500			µA	V_{CE} = 10.0 V, I_F = 20.0 mA
		OPB870	200			µA	V_{CE} = 10.0 V, I_F = 20.0 mA, T_A = -55° C
		OPB870	200			µA	V_{CE} = 10.0 V, I_F = 20.0 mA, T_A = 100° C
	Parameter B	OPB871	1000			µA	V_{CE} = 5.0 V, I_F = 10.0 mA
		OPB871	400			µA	V_{CE} = 5.0 V, I_F = 10.0 mA, T_A = -55° C
		OPB871	400			µA	V_{CE} = 5.0 V, I_F = 10.0 mA, T_A = 100° C
	Parameter C	OPB872	1800			µA	V_{CE} = 0.4 V, I_F = 20.0 mA
		OPB872	800			µA	V_{CE} = 0.4 V, I_F = 20.0 mA, T_A = -55° C
		OPB872	800			µA	V_{CE} = 0.4 V, I_F = 20.0 mA, T_A = 100° C
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	OPB870		0.20	0.30	V	I_C = 400 µA, I_F = 20.0 mA
		OPB871		0.20	0.30	V	I_C = 800 µA, I_F = 10.0 mA
		OPB872		0.20	0.30	V	I_C = 1800 µA, I_F = 20.0 mA
t_r	Output Rise Time	OPB870		8.0	15.0	µs	V_{CC} = 10.0 V, I_F = 20.0 mA, R_L = 1000 Ω
		OPB871		12.0	20.0	µs	
		OPB872		12.0	20.0	µs	
t_f	Output Fall Time	OPB870		8.0	15.0	µs	V_{CC} = 10.0 V, I_F = 20.0 mA, R_L = 1000 Ω
		OPB871		12.0	20.0	µs	
		OPB872		12.0	20.0	µs	

(4) Measurement is taken during the last 500 µs of a single 1.0 ms test pulse. Heating due to increased pulse rate or pulse width can cause change in measurement results.

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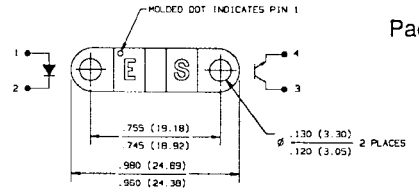
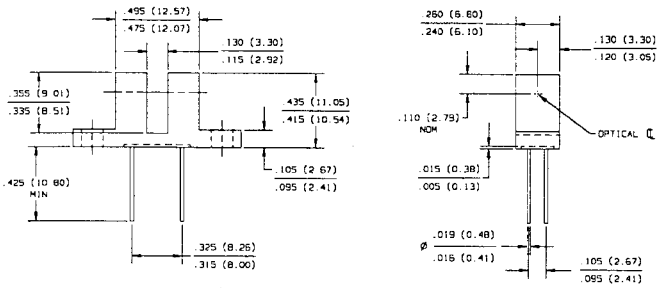
Type OPB870 Series

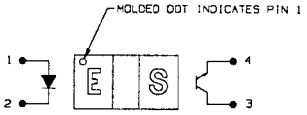
Package Configuration T

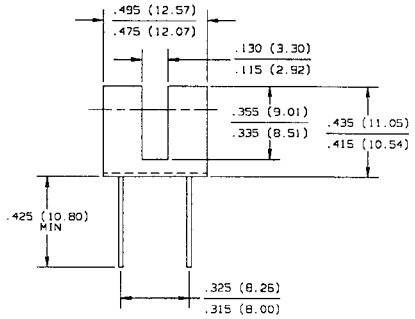


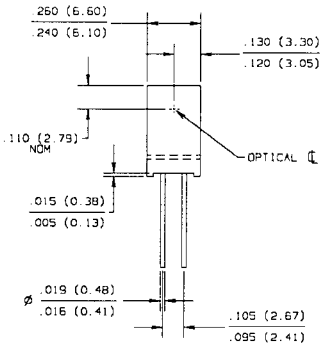


DIMENSIONS ARE IN INCHES (MILLIMETERS)

Package Configuration N

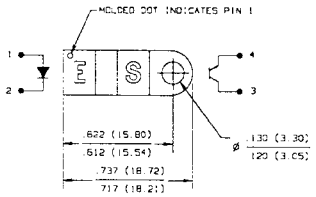


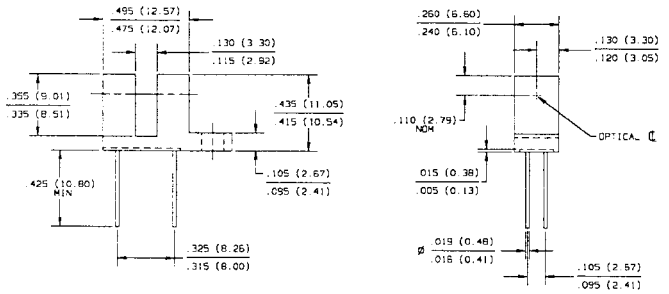




DIMENSIONS ARE IN INCHES (MILLIMETERS)

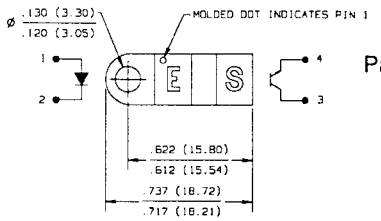
Package Configuration P

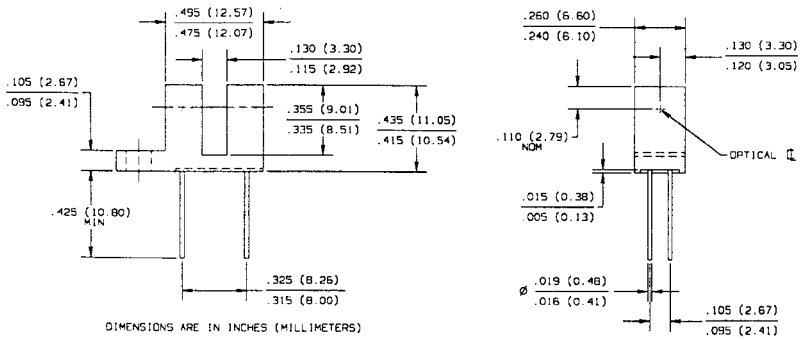




DIMENSIONS ARE IN INCHES (MILLIMETERS)

Package Configuration L





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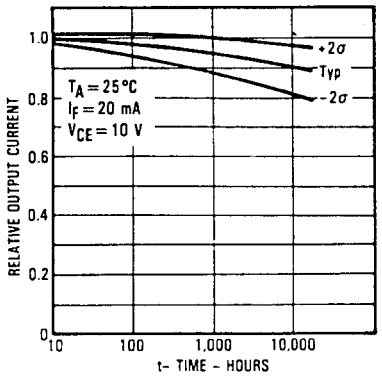
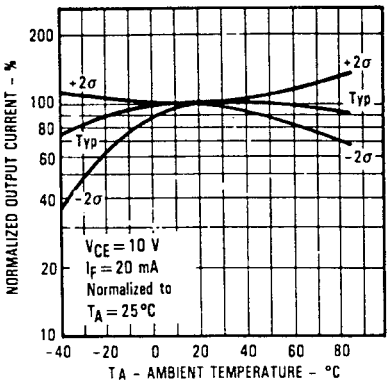
Typical Performance Curves

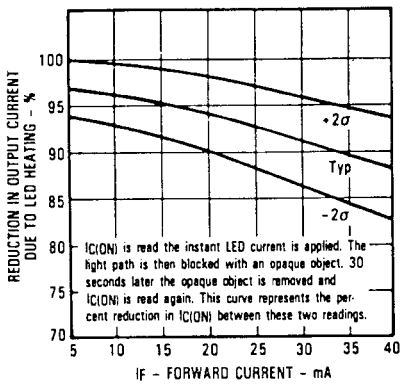
Relative Output Current vs Time



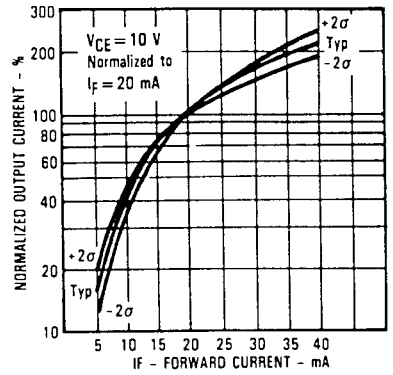
Normalized Output Current vs Ambient Temperature



Reduction in Output Current Due to LED Heating vs Forward Current



Normalized Output Current vs Input Current



Rise and Fall Time vs Load Resistance