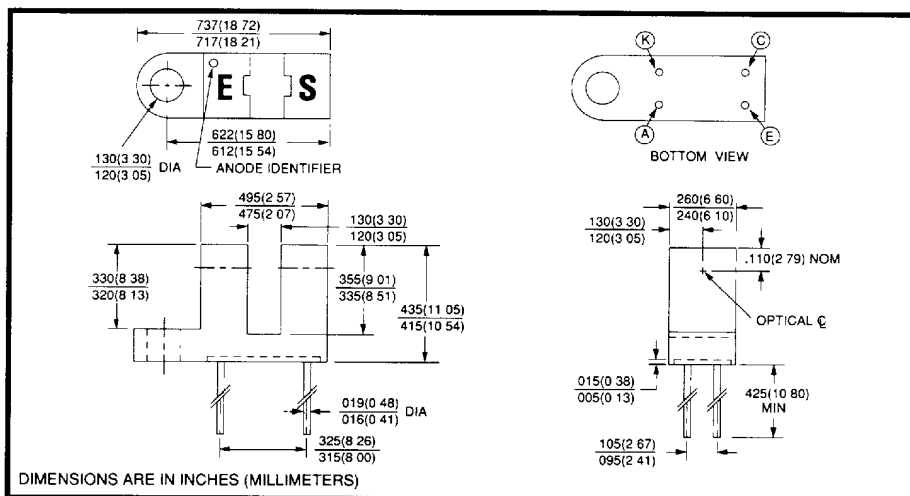
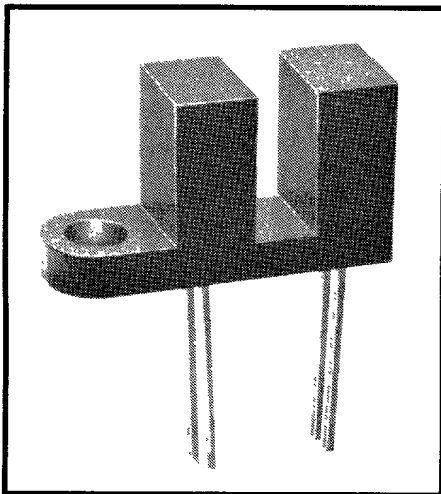


Hi-Rel Slotted Optical Switches

Type OPB870L Series

T-41.73



Features

- Non-contact switching
- Choice of apertures
- Choice of minimum $I_{C(ON)}$
- Soldering per MIL-S-45743
- Hermetically sealed components
- Components processed to Optek's screening program patterned after MIL-S-19500 for TX and TXV devices
- Leads are hot solder dipped

Description

The OPB870L series of slotted optical switches consists of a gallium aluminum arsenide LED and a silicon phototransistor soldered into a printed circuit board, then mounted in a high temperature black 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 0.100 inches (0.25 mm) for high resolution positioning sensing.

The OPB870L series of slotted optical switches utilize optoelectronic components that have been processed and tested as either TX or TXV components per MIL-S-19500.

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Operating Temperature	-65°C to $+125^\circ\text{C}$
Storage Temperature	-65°C to $+150^\circ\text{C}$
Lead Soldering Temperature [1/16 inch (1.6 mm) from case 5 sec. with soldering iron]	$240^\circ\text{C}^{(1)}$

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) RMA flux is recommended. Duration can be extended to 10 sec. max. when wave soldering.
- (2) Derate linearly 1.00 mW/ $^\circ\text{C}$ above 25°C .
- (3) Methanol or isopropyl alcohols are recommended as cleaning agents.
- (4) Plastic housings and symbolization will meet Resistance to Solvents test per MIL-STD-750, Method 1022 provided (1) ethylbenzene is omitted from solution A, (2) solution B is omitted, and (3) Freon TMC and methylene chloride is omitted from solution C.

Part Numbering Guide

Optek Assembly Prefix	OPB 87X X 5X XX	Component Product Assurance Level TX = Patterned Around TX of MIL-S-19500 TV = Patterned Around TXV of MIL-S-19500
Electrical Specification Variation	0 = Electrical Parameter A 1 = Electrical Parameter B 2 = Electrical Parameter C	Aperture width in front of phototransistor 5 = .050" (1.27 mm) 1 = .010" (0.25 mm) Aperture length is .060" (1.52 mm)
Mounting Configuration	T = Both mounting tabs N = No tabs L = Single mounting tab, LED side P = Single mounting tab, phototransistor side	Aperture width in front of LED 5 = .050" (1.27 mm) Aperture length is .060" (1.52 mm)

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Type OPB870L Series

Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
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Input Diode

V_F	Forward Voltage	1.00		1.70	V	$I_F = 20.0\text{ mA}$
		1.20		1.90	V	$I_F = 20.0\text{ mA}, T_A = -55^\circ\text{C}$
		0.80		1.60	V	$I_F = 20.0\text{ mA}, T_A = 100^\circ\text{C}$
I_R	Reverse Current			100	μA	$V_R = 2.0\text{ V}$

Output Phototransistor

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	50			V	$I_C = 1.0\text{ mA}, I_F = 0$
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage	7.0			V	$I_E = 100\text{ }\mu\text{A}, I_F = 0$
$I_{C(OFF)}$	Collector-Emitter Dark Current			100	nA	$V_{CE} = 10\text{ V}, I_F = 0$
				100	μA	$V_{CE} = 10\text{ V}, I_F = 0, T_A = 100^\circ\text{C}$

Coupled

$I_{C(ON)}$	On-State Collector Current ⁽⁵⁾					
	Parameter A	OPB870	500		μA	$V_{CE} = 10.0\text{ V}, I_F = 20.0\text{ mA}$
		OPB870	200		μA	$V_{CE} = 10.0\text{ V}, I_F = 20.0\text{ mA}, T_A = -55^\circ\text{C}$
		OPB870	200		μA	$V_{CE} = 10.0\text{ V}, I_F = 20.0\text{ mA}, T_A = 100^\circ\text{C}$
	Parameter B	OPB871	1000		μA	$V_{CE} = 5.0\text{ V}, I_F = 10.0\text{ mA}$
		OPB871	400		μA	$V_{CE} = 5.0\text{ V}, I_F = 10.0\text{ mA}, T_A = -55^\circ\text{C}$
		OPB871	400		μA	$V_{CE} = 5.0\text{ V}, I_F = 10.0\text{ mA}, T_A = 100^\circ\text{C}$
	Parameter C	OPB872	1800		μA	$V_{CE} = 0.4\text{ V}, I_F = 20.0\text{ mA}$
		OPB872	800		μA	$V_{CE} = 0.4\text{ V}, I_F = 20.0\text{ mA}, T_A = -55^\circ\text{C}$
		OPB872	800		μA	$V_{CE} = 0.4\text{ V}, I_F = 20.0\text{ mA}, T_A = 100^\circ\text{C}$
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	OPB870		0.30	V	$I_C = 400\text{ }\mu\text{A}, I_F = 20.0\text{ mA}$
		OPB871		0.30	V	$I_C = 800\text{ }\mu\text{A}, I_F = 10.0\text{ mA}$
		OPB872		0.30	V	$I_C = 1800\text{ }\mu\text{A}, I_F = 20.0\text{ mA}$
t_r	Output Rise Time	OPB870		15.0	μs	$V_{CC} = 10.0\text{ V},$ $I_F = 20.0\text{ mA},$ $R_L = 1,000\text{ }\Omega$
		OPB871		20.0	μs	
		OPB872		20.0	μs	
t_f	Output Fall Time	OPB870		15.0	μs	$V_{CC} = 10.0\text{ V},$ $I_F = 20.0\text{ mA},$ $R_L = 1,000\text{ }\Omega$
		OPB871		20.0	μs	
		OPB872		20.0	μs	

(5) 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.

Optek reserves the right to make changes at any time in order to improve design and to supply the best product possible.

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