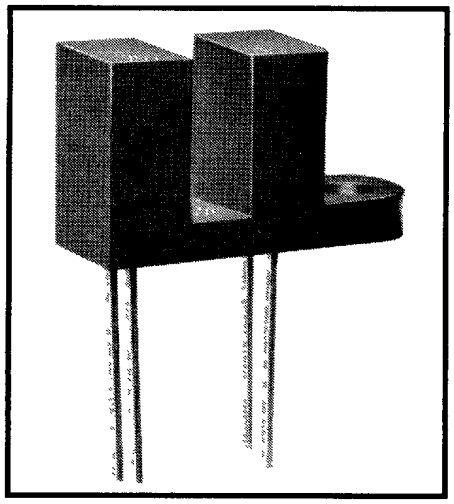
Product Bulletin
May 1989

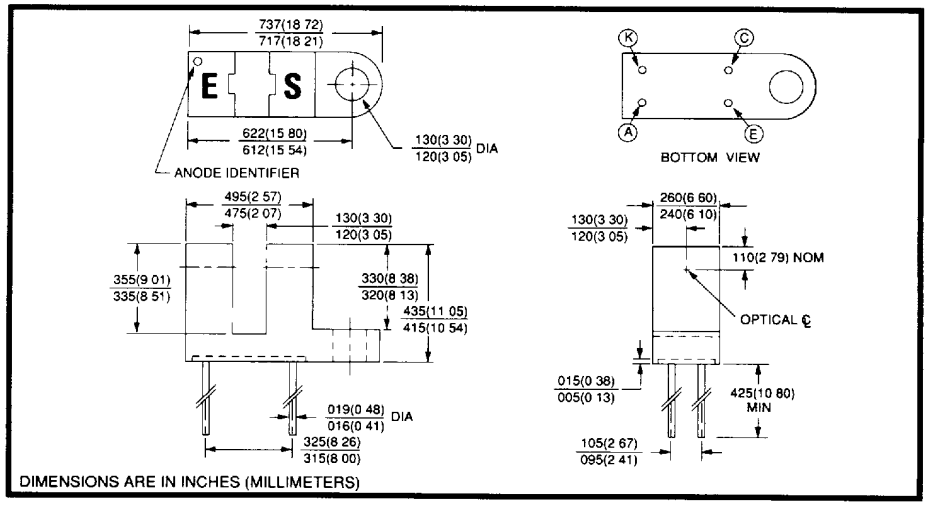
OPTEK

T-41-73

Hi-Rel Slotted Optical Switches

Type OPB870P Series





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 OPB870P 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 OPB870P 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°C unless otherwise noted)

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

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-S-19500
TV = Patterned Around TXV of MIL-S-19500

Aperture width in front of phototransistor
5 = .050" (1.27 mm) 1 = .010" (0.25 mm)
Aperture length is .060" (1.52 mm)

Aperture width in front of LED
5 = .050" (1.27 mm)
Aperture length is .060" (1.52 mm)

Optek Technology, Inc., 1215 West Crosby Road, Carrollton, Texas 75006 (214) 323-2200 TLX 215849 Fax (214) 323-2396

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Type OPB870P Series

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

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
Input Diode							
V_F	Forward Voltage		1.00		1.70	V	I_F = 20.0 mA
			1.20		1.90	V	I_F = 20.0 mA, T_A = -55°C
			0.80		1.60	V	I_F = 20.0 mA, T_A = 100°C
I_R	Reverse Current				100	µA	V_R = 2.0 V
Output Phototransistor							
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage		50			V	I_C = 1.0 mA, I_F = 0
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage		7.0			V	I_E = 100 µA, I_F = 0
$I_{C(OFF)}$	Collector-Emitter Dark Current				100	nA	V_{CE} = 10 V, I_F = 0
					100	µA	V_{CE} = 10 V, I_F = 0, T_A = 100°C
Coupled							
$I_{C(ON)}$	On-State Collector Current[5]						
	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		3000	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			0.30	V	I_C = 400 µA, I_F = 20.0 mA
		OPB871			0.30	V	I_C = 800 µA, I_F = 10.0 mA
		OPB872			0.30	V	I_C = 1800 µA, I_F = 20.0 mA
t_r	Output Rise Time	OPB870			15.0	µs	V_{CC} = 10.0 V,
		OPB871			20.0	µs	I_F = 20.0 mA,
		OPB872			20.0	µs	R_L = 1,000 Ω
t_f	Output Fall Time	OPB870			15.0	µs	V_{CC} = 10.0 V,
		OPB871			20.0	µs	I_F = 20.0 mA,
		OPB872			20.0	µs	R_L = 1,000 Ω

(5) Measurement is taken during the last 500µs 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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