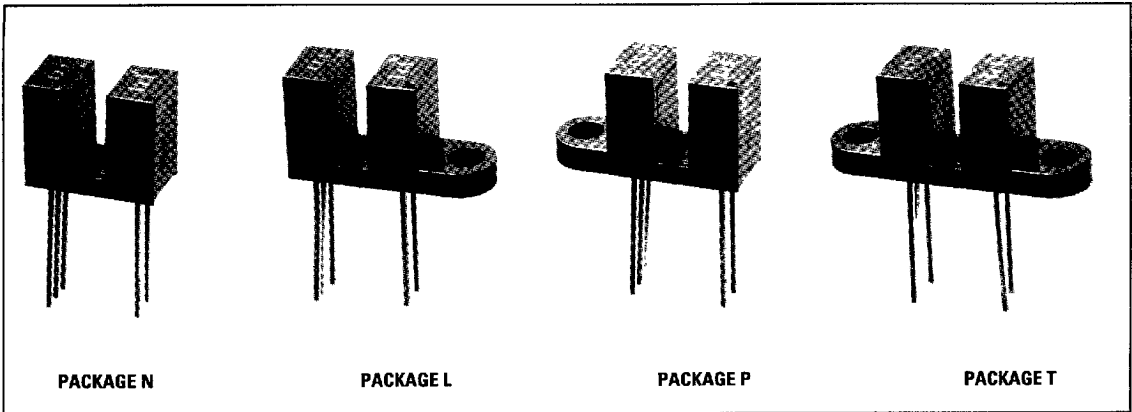


# Photologic™ Slotted Optical Switches

## Types OPB960, OPB970 Series



### Features

- Choice of mounting configuration
- Choice of aperture
- Choice of output configuration
- Choice of opaque or IR transmissive shell material
- Data rates to 250 kBaud
- 0.320" lead spacing for PC board mount

### Description

The OPB960 and OPB970 series of Photologic™ Photo Integrated Circuit Switches provide optimum flexibility for the design engineer. Building from a standard housing with a .125" wide slot, the user can specify (1) type and polarity of TTL output, (2) discrete shell material, (3) aperture width, and (4) type of mounting configuration. Available with 24", 26AWG wire leads as OPB980/OPB990 series.

The electrical output can be specified as either TTL totem pole or TTL open collector. Either may be supplied with inverter or buffer output polarity. All have added stability of a built-in hysteresis amplifier.

### Replaces

KT960/970 series, KLT160/170 series.  
Upgrades OPB960/970 series.

### Absolute Maximum Ratings (T<sub>A</sub> = 25°C unless otherwise noted)

Supply Voltage, V <sub>CC</sub> (Not to exceed 3 sec.)	10V
Storage Temperature Range	-40°C to +85°C
Operating Temperature Range	-40°C to +70°C
Lead Soldering Temperature [1/16 inch (1.6mm) from case for 5 sec. with soldering iron]	240°C <sup>(1)</sup>
Input Diode Power Dissipation	100mW <sup>(2)</sup>
Output Photologic™ Power Dissipation	200mW <sup>(3)</sup>
Total Device Power Dissipation	300mW <sup>(4)</sup>
Voltage at Output Lead (Open Collector Output)	35V
Diode Forward D.C. Current	40mA
Diode Reverse D.C. Voltage	2V

### Notes:

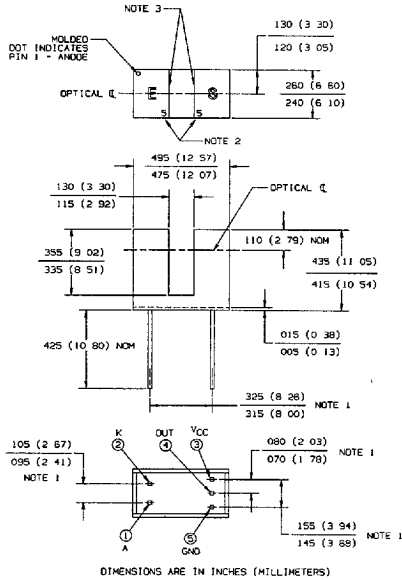
- (1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering.
- (2) Derate linearly 2.22mW/°C above 25°C.
- (3) Derate linearly 4.44mW/°C above 25°C.
- (4) Derate linearly 6.66mW/°C above 25°C.
- (5) The OPB960/OPB970 series are terminated with .020" square leads designed for printed circuit board mounting.
- (6) Normal application would be with light source blocked, simulated by I<sub>F</sub> = 0mA.
- (7) All parameters tested using pulse technique.

### Housing

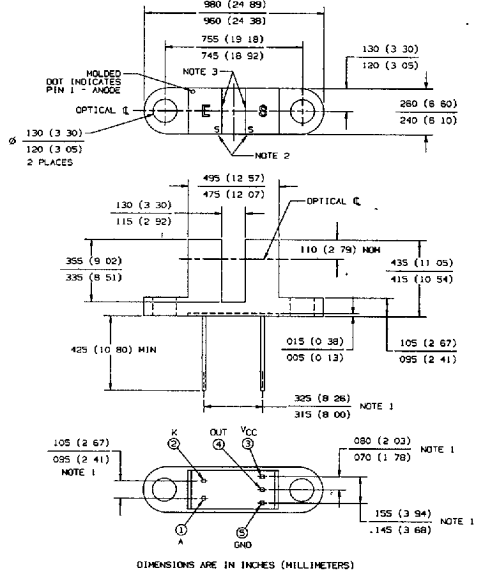
All housings are an opaque grade of injection-molded plastic to minimize the assembly's sensitivity to ambient radiation, both visible and near-infrared. Discrete shells (exposed on the parallel faces inside the device throat) are either IR transmissive plastic for applications where aperture contamination may occur or opaque plastic for maximum protection against ambient light.

# Types OPB960, OPB970 Series

## Package N

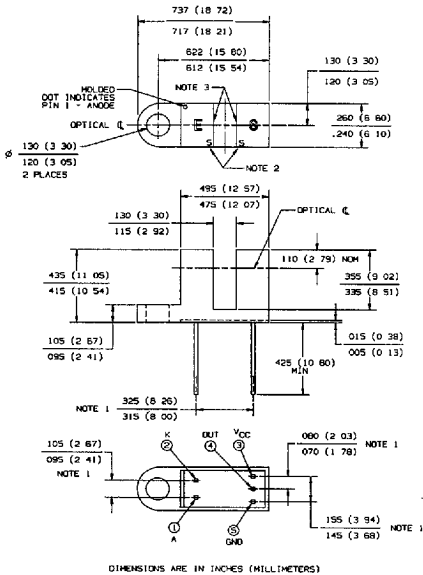


## Package T

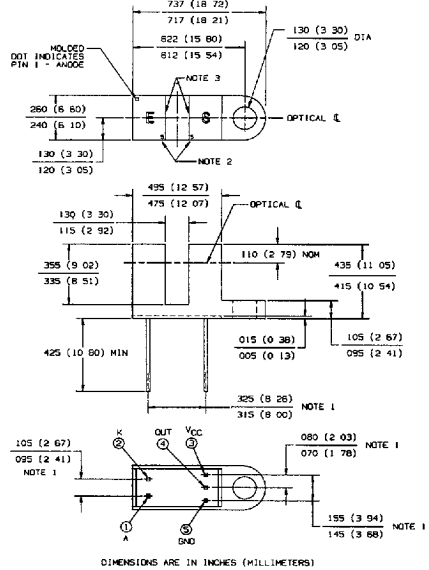


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## Package L



## Package P



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# Types OPB960, OPB970 Series



Electrical Characteristics ( $T_A = -40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
<b>Input Diode</b>						
$V_F$	Forward Voltage			1.7	V	$I_F = 20\text{mA}$ , $T_A = 25^{\circ}\text{C}$
$I_R$	Reverse Current			100	$\mu\text{A}$	$V_R = 2.0\text{V}$ , $T_A = 25^{\circ}\text{C}$
<b>Output Photologic™ Sensor</b>						
$V_{CC}$	Operating D.C. Supply Voltage	4.75		5.25	V	
$I_{CCL}$	Low Level Supply Current: Buffered Totem-Pole Output Buffered Open-Collector Output			15	mA	$V_{CC} = 5.25\text{V}$ , $I_F = 0\text{mA}^{(6)}$
	Inverted Totem-Pole Output Inverted Open-Collector Output			15	mA	$V_{CC} = 5.25\text{V}$ , $I_F = 15\text{mA}$
$I_{CCH}$	High Level Supply Current: Buffered Totem-Pole Output Buffered Open-Collector Output			15	mA	$V_{CC} = 5.25\text{V}$ , $I_F = 15\text{mA}$
	Inverted Totem-Pole Output Inverted Open-Collector Output			15	mA	$V_{CC} = 5.25\text{V}$ , $I_F = 0\text{mA}^{(6)}$
$V_{OL}$	Low Level Output Voltage: Buffered Totem-Pole Output Buffered Open-Collector Output			0.4	V	$V_{CC} = 4.75\text{V}$ , $I_{OL} = 12.8\text{mA}$ $I_F = 0\text{mA}^{(6)}$
	Inverted Totem-Pole Output Inverted Open-Collector Output			0.4	V	$V_{CC} = 4.75\text{V}$ , $I_{OL} = 12.8\text{mA}$ $I_F = 15\text{mA}^{(6)}$
$V_{OH}$	High Level Output Voltage: Buffered Totem-Pole Output	2.4			V	$V_{CC} = 4.75\text{V}$ , $I_{OH} = -800\mu\text{A}$ $I_F = 15\text{mA}$
	Inverted Totem-Pole Output	2.4			V	$V_{CC} = 4.75\text{V}$ , $I_{OH} = -800\mu\text{A}$ $I_F = 0\text{mA}^{(6)}$
$I_{OH}$	High Level Output Current: Buffered Open-Collector Output			100	$\mu\text{A}$	$V_{CC} = 4.75\text{V}$ , $V_{OH} = 30\text{V}$ $I_F = 15\text{mA}$ , $T_A = 25^{\circ}\text{C}$
	Inverted Open-Collector Output			100	$\mu\text{A}$	$V_{CC} = 4.75\text{V}$ , $V_{OH} = 30\text{V}$ , $I_F = 0\text{mA}$ , $T_A = 25^{\circ}\text{C}$
$I_F(+)$	LED Positive-Going Threshold Current			15	mA	$V_{CC} = 5.0\text{V}$ , $T_A = 25^{\circ}\text{C}$
$I_F(+)/I_F(-)$	Hysteresis		2.0			$V_{CC} = 5.0\text{V}$
$I_{OS}$	Short Circuit Output Current: Buffered Totem-Pole Output "11" Series	-30 -15		-100 -60	mA	$V_{CC} = 5.25\text{V}$ , $I_F = 15\text{mA}$ Output = GND
	Inverted Totem-Pole Output "11" Series	-30 -15		-100 -60	mA	$V_{CC} = 5.25\text{V}$ , $I_F = 0\text{mA}$ Output = GND
$t_r, t_f$	Output Rise Time, Output Fall Time		70		ns	$V_{CC} = 5.0\text{V}$ , $T_A = 25^{\circ}\text{C}$ $I_F = 0$ or $15\text{mA}$
$t_{PLH}, t_{PHL}$	Propagation Delay Low-High & High-Low		5.0		$\mu\text{s}$	$R_L = 8\text{TTL Loads (Totem Pole)}$ $R_L = 360\Omega$ (Open Collector)

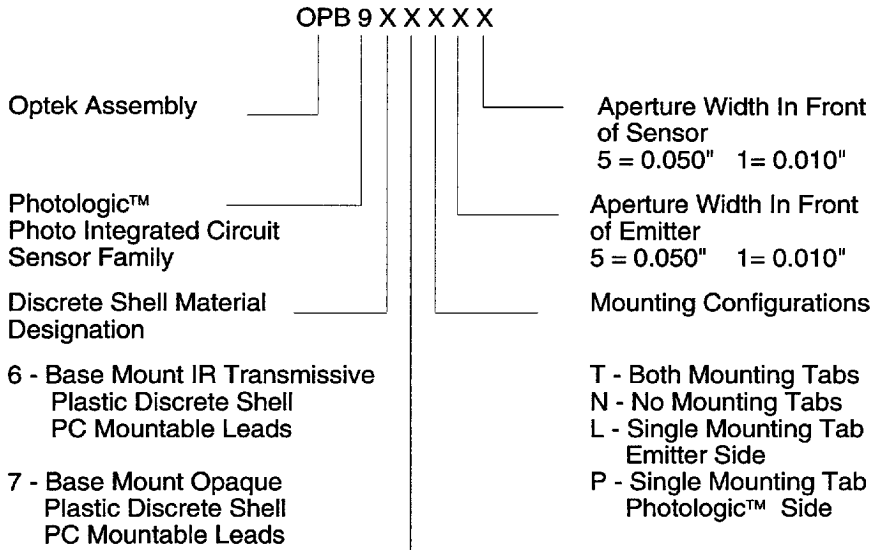
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# Types OPB960, OPB970 Series

## PART NUMBER GUIDE

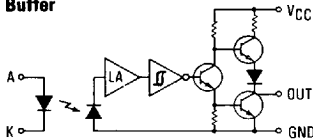


### Electrical Specification Variations

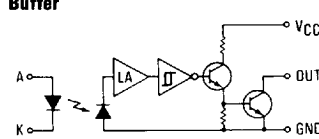
- 0 - Buffered Totem-Pole Output
- 1 - Buffered Open-Collector Output
- 2 - Inverted Totem-Pole Output
- 3 - Inverted Open-Collector Output

### Schematics

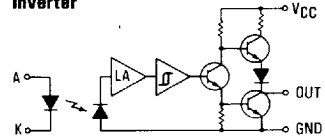
**OPB960/OPB970**  
(Totem-Pole Output)  
Buffer



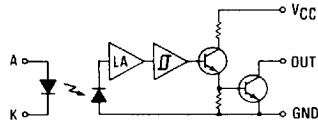
**OPB961/OPB971**  
(Open-Collector Output)  
Buffer



**OPB962/OPB972**  
(Totem-Pole Output)  
Inverter



**OPB963/OPB973**  
(Open-Collector Output)  
Inverter



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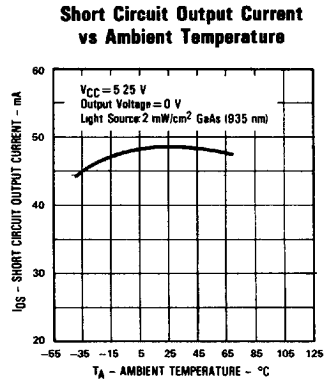
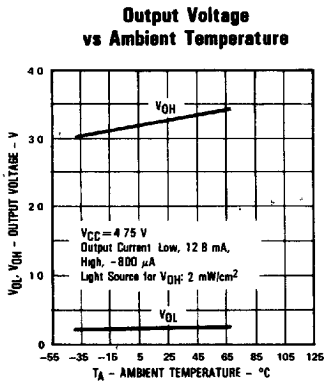
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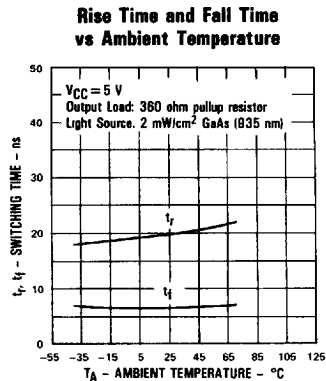
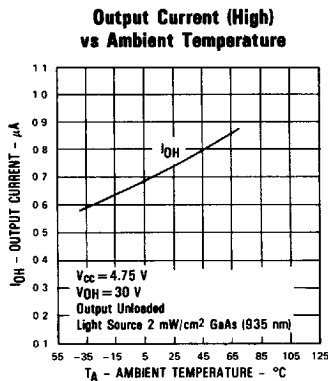
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## Typical Performance Curves

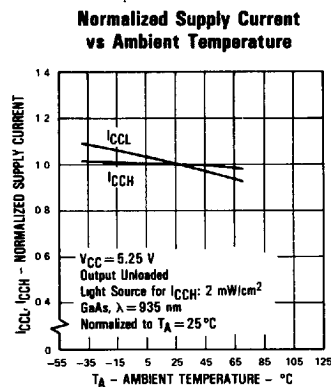
### OPB960, OPB962, OPB970, OPB972



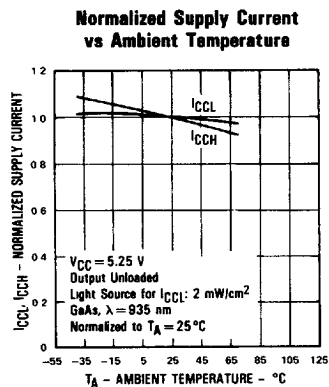
### OPB961, OPB963, OPB971, OPB973



### OPB960, OPB961, OPB970, OPB971



### OPB962, OPB963, OPB972, OPB973

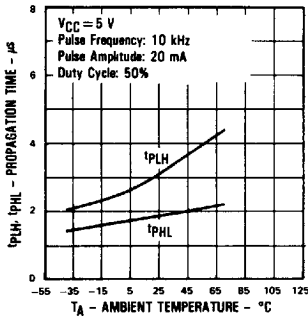


# Types OPB960, OPB970 Series

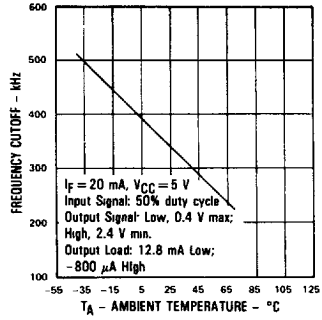
## Typical Performance Curves

### All Assemblies

**Propagation Time vs Ambient Temperature**

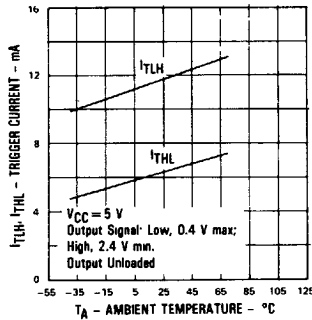


**Data Rate vs Ambient Temperature**

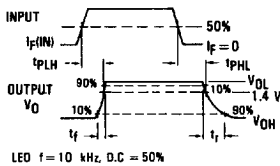


### All Assemblies

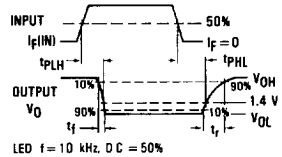
**Trigger Current vs Ambient Temperature**



**Switching Test Curve for Buffers**



**Switching Test Curve for Inverters**



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