

# H21L Series OPTOLOGIC® Optical Interrupter Switch

## Features

- Low cost
- 0.035" apertures
- Black plastic opaque housing
- Mounting tabs on housing
- Choice of inverter or buffer output functions
- Choice of open-collector or totem-pole output configuration
- TTL/CMOS compatible output functions

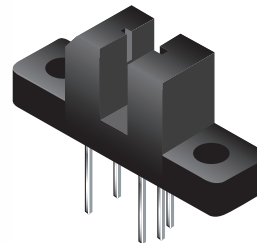
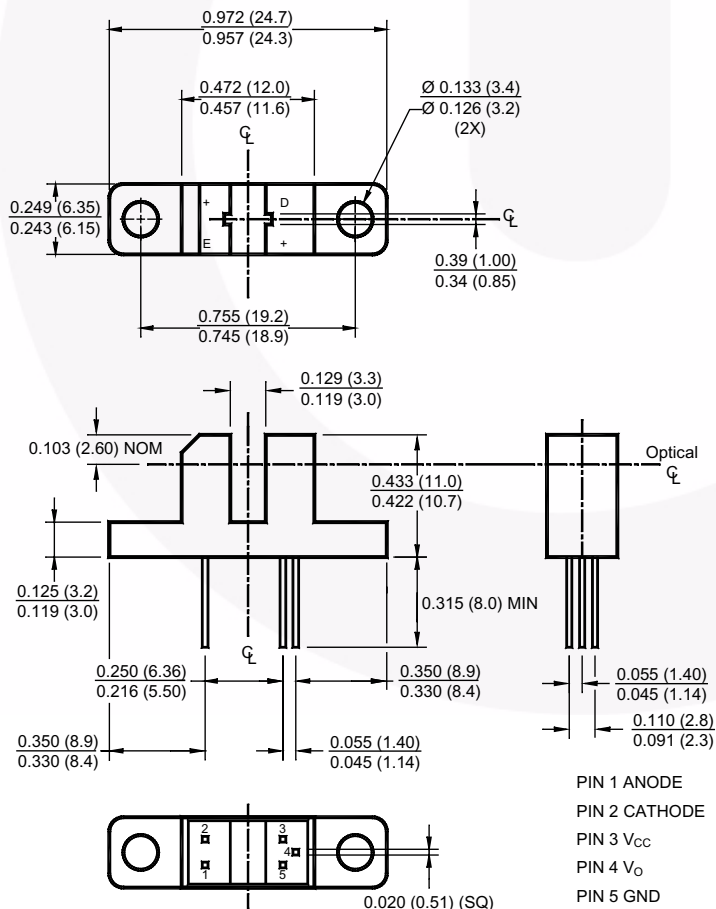
## Description

The H21L series are slotted optical switches designed for multipurpose non contact sensing. They consist of a GaAs LED and a silicon OPTOLOGIC® sensor packaged in an injection molded housing and facing each other across a .124" (3.15 mm) gap. The output is either inverting or non-inverting, with a choice of totem-pole or open-collector configuration for TTL/CMOS compatibility.

## Part Number Definitions

H21LTB, Totem-pole, buffer output  
 H21LTI, Totem-pole, inverter output  
 H21LOB, Open-collector, buffer output  
 H21LOI, Open-collector, inverter output

## Package Dimensions



## Notes:

1. Dimensions for all drawings are in inches (mm).
2. Tolerance of  $\pm .010$  (.25) on all non-nominal dimensions unless otherwise specified.

**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Rating	Units
$T_{OPR}$	Operating Temperature	-40 to +85	$^\circ\text{C}$
$T_{STG}$	Storage Temperature	-40 to +85	$^\circ\text{C}$
$T_{SOL-I}$	Soldering Temperature (Iron) <sup>(5)(6)(7)(8)</sup>	240 for 5 sec	$^\circ\text{C}$
$T_{SOL-F}$	Soldering Temperature (Flow) <sup>(5)(6)(8)</sup>	260 for 10 sec	$^\circ\text{C}$
<b>INPUT (Emitter)</b>			
$I_F$	Continuous Forward Current	50	mA
$V_R$	Reverse Voltage	6	V
$P_D$	Power Dissipation <sup>(3)</sup>	100	mW
<b>OUTPUT (Sensor)</b>			
$I_O$	Output Current	50	mA
$V_{CC}$	Supply Voltage	4.0 to 16	V
$V_O$	Output Voltage	30	V
$P_D$	Power Dissipation <sup>(4)</sup>	150	mW

**Notes:**

3. Derate power dissipation linearly 1.67mW/ $^\circ\text{C}$  above 25 $^\circ\text{C}$ .
4. Derate power dissipation linearly 2.50mW/ $^\circ\text{C}$  above 25 $^\circ\text{C}$ .
5. RMA flux is recommended.
6. Methanol or isopropyl alcohols are recommended as cleaning agents.
7. Soldering iron 1/16" (1.6mm) from housing.
8. As long as leads are not under any stress or spring tension.

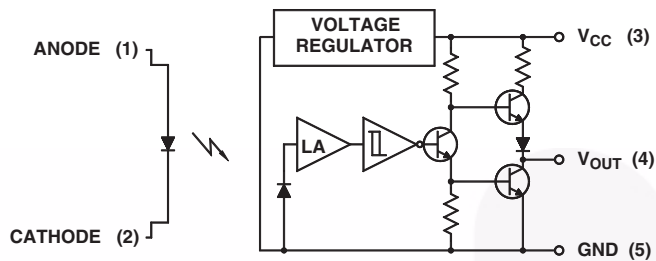
**Electrical/Optical Characteristics** ( $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Test Conditions	Min.	Typ	Max.	Units
<b>INPUT (Emitter)</b>						
$V_F$	Forward Voltage	$I_F = 20\text{mA}$			1.5	V
$I_R$	Reverse Leakage Current	$V_R = 5\text{V}$			10	$\mu\text{A}$
<b>OUTPUT (Sensor)</b>						
$I_{CC}$	Supply Current	$V_{CC} = 5\text{V}$			5	mA
<b>COUPLED</b>						
$V_{OL}$	Low Level Output Voltage H21LTB, H21LOB	$I_F = 0\text{mA}, V_{CC} = 5\text{V}, I_{OL} = 16\text{mA}$			0.4	V
	Low Level Output Voltage H21LTI, H21LOI	$I_F = 15\text{mA}, V_{CC} = 5\text{V}, I_{OL} = 16\text{mA}$			0.4	
$V_{OH}$	High Level Output Voltage H21LTB	$I_F = 15\text{mA}, V_{CC} = 5\text{V}, I_{OH} = -1\text{mA}$	2.4			V
	High Level Output Voltage H21LTI	$I_F = 0\text{mA}, V_{CC} = 5\text{V}, I_{OH} = -1\text{mA}$	2.4			
$I_{OH}$	High Level Output Current H21LOB	$I_F = 15\text{mA}, V_{CC} = 5\text{V}, V_{OH} = 30\text{V}$			100	$\mu\text{A}$
	High Level Output Current H21LOI	$I_F = 0\text{mA}, V_{CC} = 5\text{V}, V_{OH} = 30\text{V}$			100	
$I_{F(+)}$	Turn on Threshold Current	$V_{CC} = 5\text{V}$			15	mA
$I_{F(-)}$	Turn off Threshold Current	$V_{CC} = 5\text{V}$	0.50			mA
$I_{F(+)} / I_{F(-)}$	Hysteresis Ratio			1.2		
$t_{PLH}, t_{PHL}$	Propagation Delay, H21LOI, H21LOB	$V_{CC} = 5\text{V}, R_L = 300\Omega$ (Fig. 9)		6		$\mu\text{s}$
	Propagation Delay, H21LTI, H21LTB	$V_{CC} = 5\text{V}, R_L = 300\Omega$ (Fig. 9)		6		
$t_r, t_f$	Output Rise and Fall Time, H21LOI, H21LOB	$V_{CC} = 5\text{V}, R_L = 300\Omega$ (Fig. 9)		100		ns
	Output Rise and Fall Time, H21LTI, H21LTB	$V_{CC} = 5\text{V}, R_L = 300\Omega$ (Fig. 9)		70		

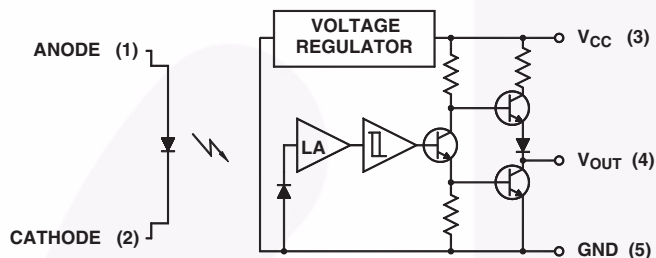
**Input/Output Table**

Part Number	LED	Output
H21LTB	On	High
H21LTB	Off	Low
H21LTI	On	Low
H21LTI	Off	High
H21LOB	On	High
H21LOB	Off	Low
H21LOI	On	Low
H21LOI	Off	High

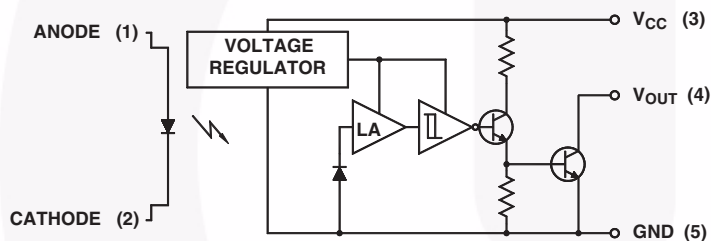
**Circuit Schematics**



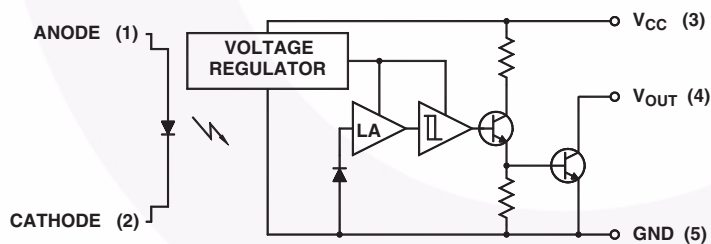
**H21LTB**  
Totem-Pole Output Buffer



**H21LTI**  
Totem-Pole Output inverter



**H21LOB**  
Open-Collector Output Buffer



**H21LOI**  
Open-Collector Output Inverter



Typical Performance Characteristics

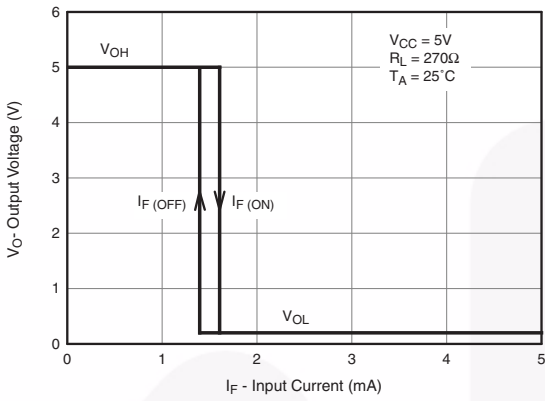


Figure 1. Output Voltage vs. Input Current (Inverters)

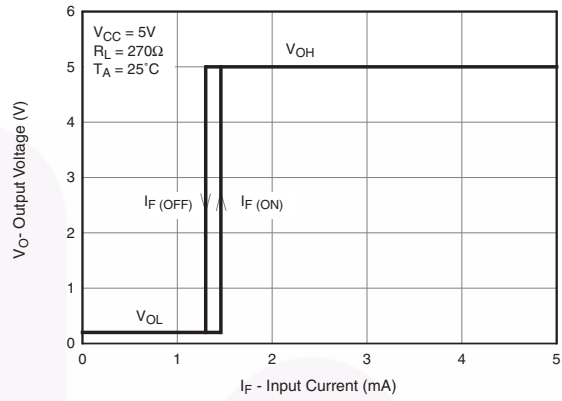


Figure 2. Output Voltage vs. Input Current (Buffers)

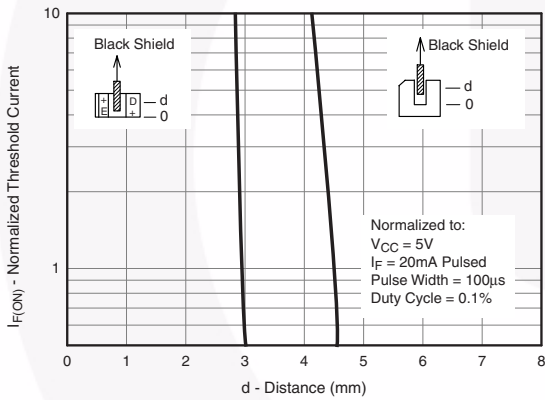


Figure 3. Normalized Threshold Current vs. Shield Distance

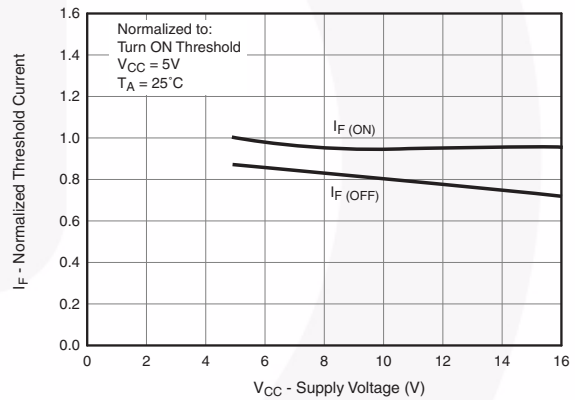


Figure 4. Normalized Threshold Current vs. Supply Voltage

Typical Performance Characteristics (Continued)

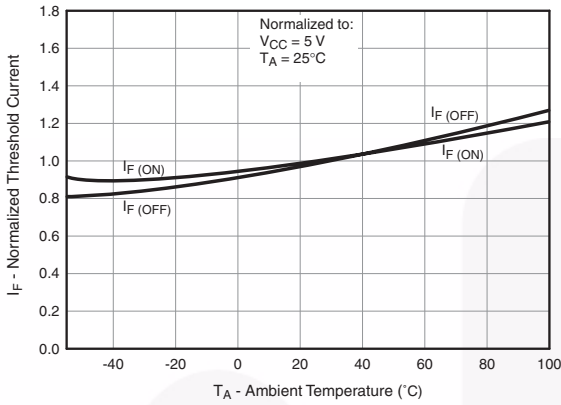


Figure 5. Normalized Threshold Current vs. Ambient Temperature

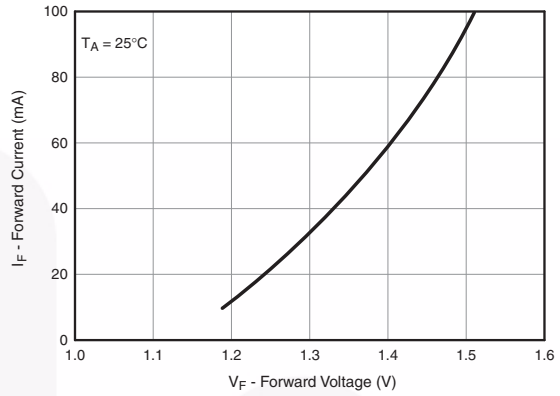


Figure 6. Forward Current vs. Forward Voltage

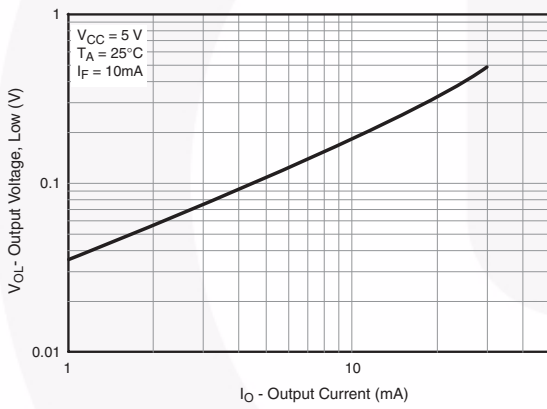


Figure 7. Low Output Voltage vs. Output Current

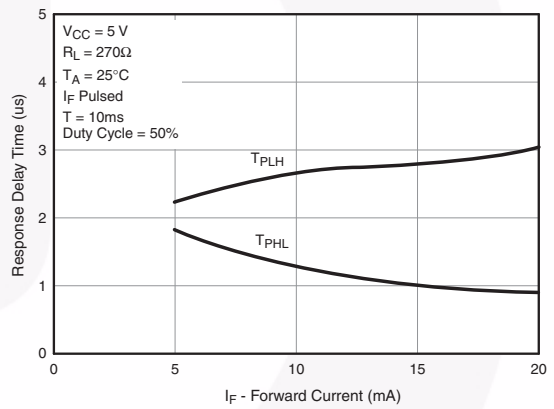


Figure 8. Response Time vs. Forward Current

Figure 9. Switching Speed Test Circuit

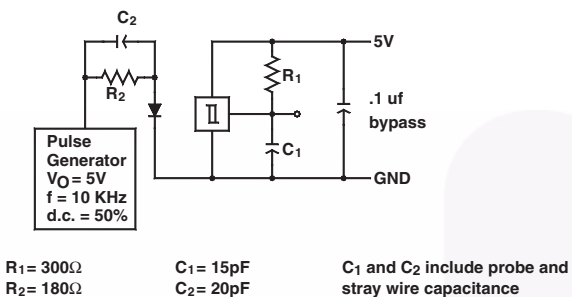


Figure 10. Typical Operating Circuit

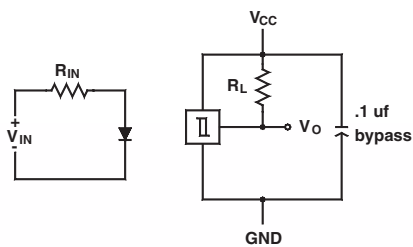


Figure 11. Switching Times Definition for Buffer

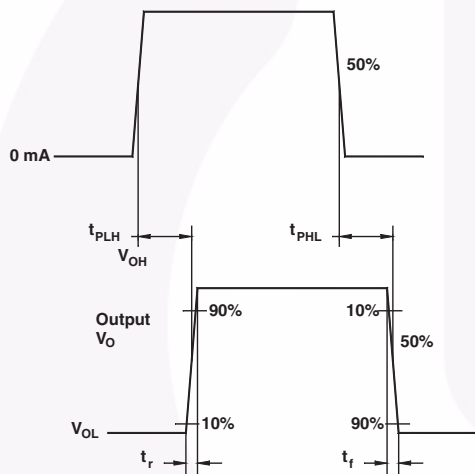
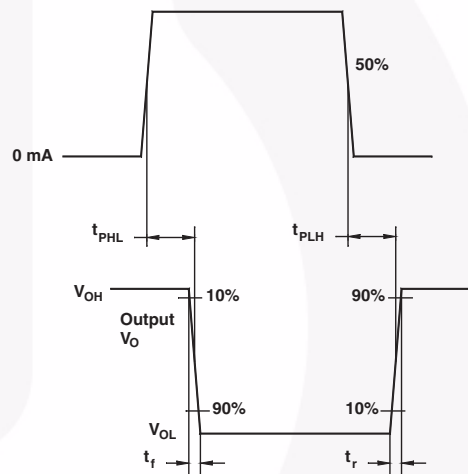




Figure 12. Switching Times Definitions for Inverters





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