

# H22L Series OPTOLOGIC® Optical Interrupter Switch

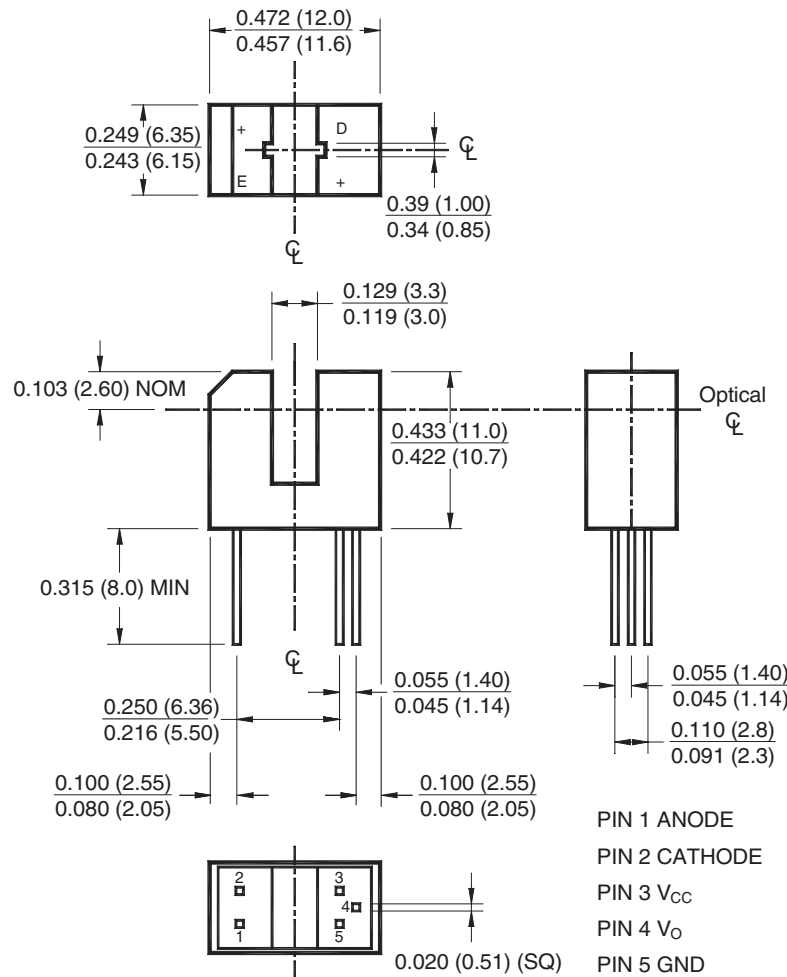
## Features

- Black plastic housing
- Choice of inverter or buffer output functions
- Choice of open-collector or totem-pole output configuration
- No contact switching
- TTL/CMOS compatible output functions

## Part Number Definitions

- H22LTB, Totem-pole, buffer output
- H22LTI, Totem-pole, inverter output
- H22LOB, Open-collector, buffer output
- H22LOI, Open-collector, inverter output

## Package Dimensions



### Notes:

1. Dimensions for all drawings are in inches (millimeters).
2. Tolerance of  $\pm .010$  (.25) on all non-nominal dimensions unless otherwise specified.
3. Lead cross section is controlled between .050 (1.27) from the seating plane and the end of the leads.

**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
<b>TOTAL DEVICE</b>			
$T_{\text{OPR}}$	Operating Temperature	-40 to +85	$^\circ\text{C}$
$T_{\text{STG}}$	Storage Temperature	-40 to +85	$^\circ\text{C}$
$T_{\text{SOL-I}}$	Soldering Temperature (Iron) <sup>(6)(7)(8)(9)</sup>	240 for 5 sec	$^\circ\text{C}$
$T_{\text{SOL-F}}$	Soldering Temperature (Flow) <sup>(6)(7)(9)</sup>	260 for 10 sec	$^\circ\text{C}$
<b>EMITTER</b>			
$I_F$	Continuous Forward Current	50	mA
$V_R$	Reverse Voltage	5	V
$P_D$	Power Dissipation <sup>(4)</sup>	100	mW
<b>SENSOR</b>			
$I_F$	Continuous Forward Current	50	mA
$I_O$	Output Current	50	mA
$V_{\text{CC}}$	Supply Voltage	4.0 to 16	V
$V_O$	Output Voltage	30	V
$P_D$	Power Dissipation <sup>(5)</sup>	150	mW

**Notes:**

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

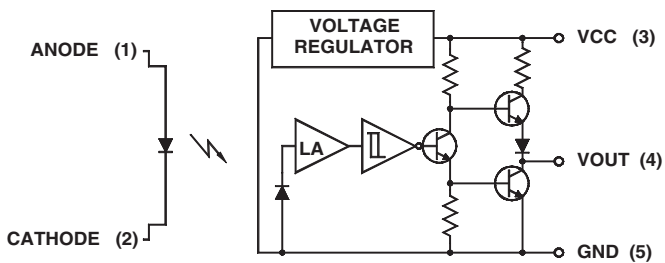
**Electrical/Optical Characteristics** ( $T_A = 25^\circ\text{C}$ )

Symbol	Part Number	Test Conditions	Min.	Typ.	Max	Units
$V_{CC}$	Operating Supply Voltage	$V_{CC}$	4.5		16	V
<b>INPUT DIODE</b>						
$V_F$	Forward Voltage	$I_F = 20\text{mA}$			1.7	V
$I_R$	Reverse Leakage Current	$V_R = 5\text{V}$			10	$\mu\text{A}$
<b>COUPLED</b>						
$I_{CC}$	Operating Supply Current	$I_F = 15\text{mA}$ or $0\text{ mA}$ , $V_{CC} = 16\text{V}$			5	$\text{mA}$
$V_{OL}$	Low Level Output Voltage H22LTB, H22LOB	$I_F = 0\text{mA}$ , $V_{CC} = 5\text{V}$ , $I_{OL} = 16\text{mA}$			0.4	V
	Low Level Output Voltage H22LTI, H22LOI	$I_F = 15\text{mA}$ , $V_{CC} = 5\text{V}$ , $I_{OL} = 16\text{mA}$			0.4	
$V_{OH}$	High Level Output Voltage H22LTB	$I_F = 15\text{mA}$ , $V_{CC} = 5\text{V}$ , $I_{OH} = -1\text{mA}$	2.4			V
	High Level Output Voltage H22LTI	$I_F = 0\text{mA}$ , $V_{CC} = 5\text{V}$ , $I_{OH} = -1\text{mA}$	2.4			
$I_{OH}$	High Level Output Current H22LOB	$I_F = 15\text{mA}$ , $V_{CC} = 5\text{V}$ , $V_{OH} = 30\text{V}$			100	$\mu\text{A}$
	High Level Output Current H22LOI	$I_F = 0\text{mA}$ , $V_{CC} = 5\text{V}$ , $V_{OH} = 30\text{V}$	—		100	
$I_F(+)$	Turn on Threshold Current	$V_{CC} = 5\text{V}$	—		15	$\text{mA}$
$I_F(-)$	Turn off Threshold Current	$V_{CC} = 5\text{V}$	0.50			$\text{mA}$
$I_F(+)$ / $I_F(-)$	Hysteresis Ratio			1.3		
$t_{PLH}$ , $t_{PHL}$	Propagation Delay, H22LOI, H22LOB	$V_{CC} = 5\text{V}$ , $R_L = 300\Omega$		6		$\mu\text{s}$
	Propagation Delay, H22LTI, H22LTB	$V_{CC} = 5\text{V}$ , $R_L = 10\text{ TTL Loads}$		6		
$t_r$ , $t_f$	Output Rise and Fall Time, H22LOI, H22LOB	$V_{CC} = 5\text{V}$ , $R_L = 300\Omega$		100		ns
	Output Rise and Fall Time, H22LTI, H22LTB	$V_{CC} = 5\text{V}$ , $R_L = 10\text{ TTL Loads}$		70		

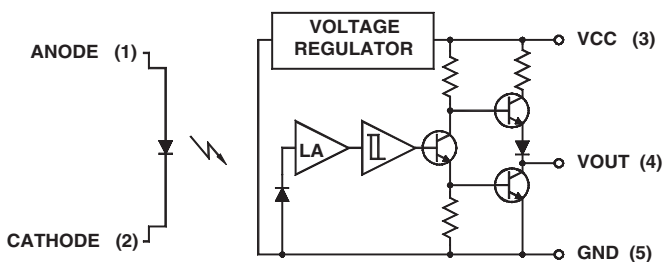
**Input/Output Table**

Part Number	LED	Output
H22LTB	On	High
H22LTB	Off	Low
H22LTI	On	Low
H22LTI	Off	High
H22LOB	On	High
H22LOB	Off	Low
H22LOI	On	Low
H22LOI	Off	High

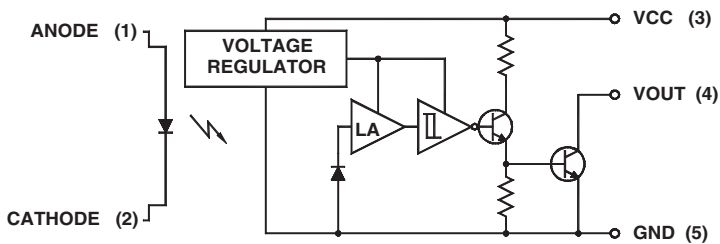
**Circuit Schematics**



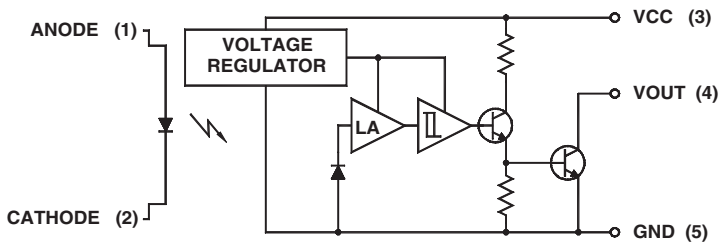
**H22LTB**  
Totem-Pole Output Buffer



**H22LTI**  
Totem-Pole Output Inverter

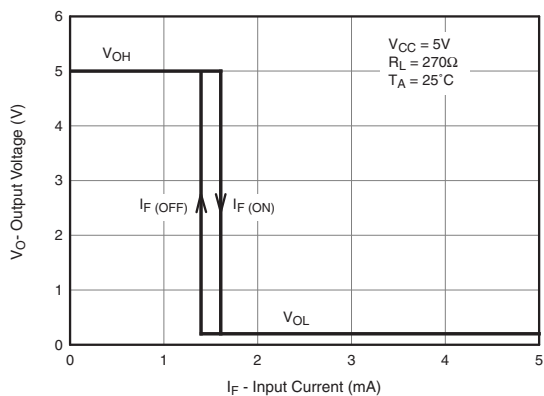


**H22LOB**  
Open-Collector Output Buffer

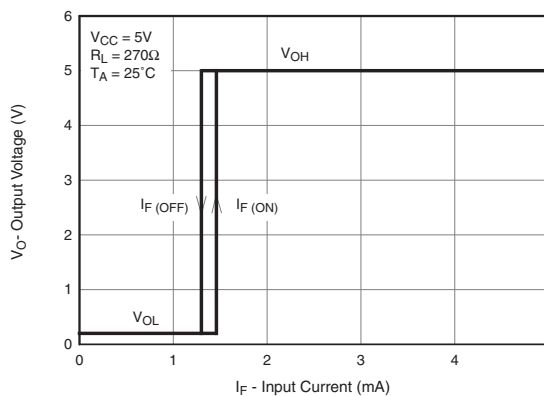


**H22LOI**  
Open-Collector Output Inverter

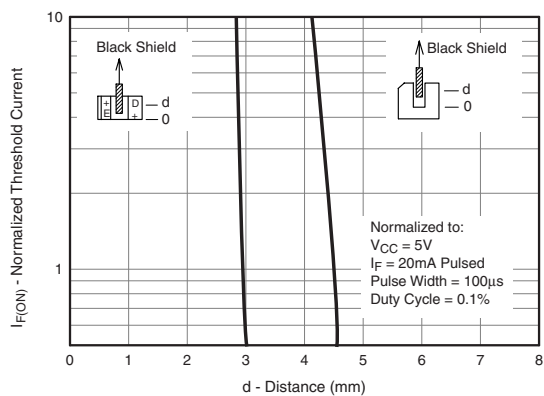
## Typical Performance Characteristics



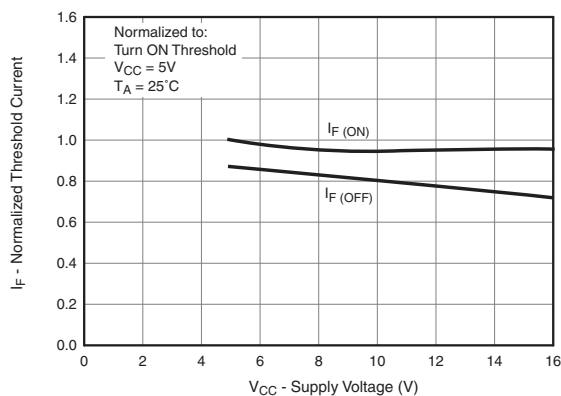
**Figure 1. Output Voltage vs. Input Current (Inverters)**



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



**Figure 3. Normalized Threshold Current vs. Shield Distance**



**Figure 3. Normalized Threshold Current vs. Supply Voltage**

Typical Performance Characteristics (Continued)

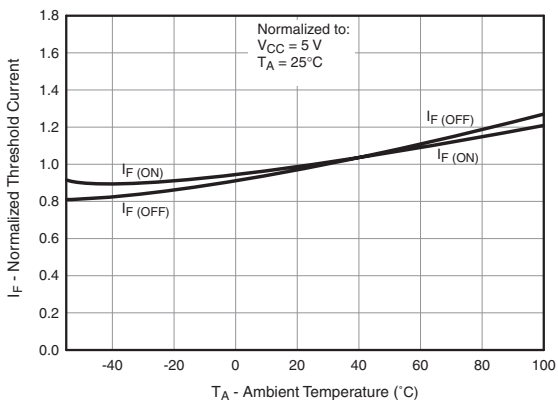


Figure 5. Normalized Threshold Current vs. Ambient Temperature

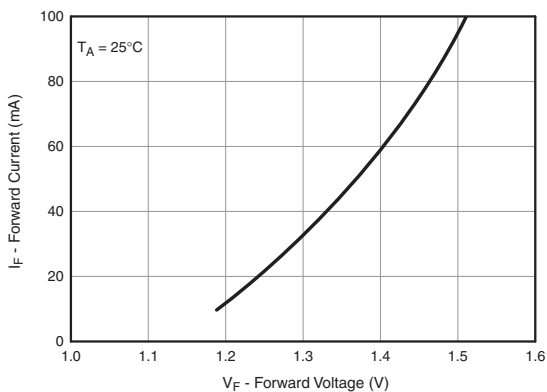


Figure 6. Forward Current vs. Forward Voltage

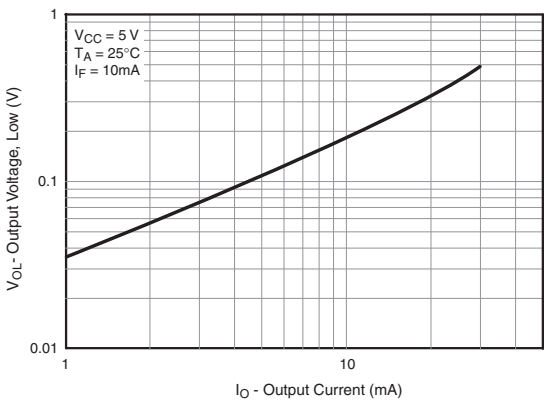


Figure 7. Low Output Voltage vs. Output Current

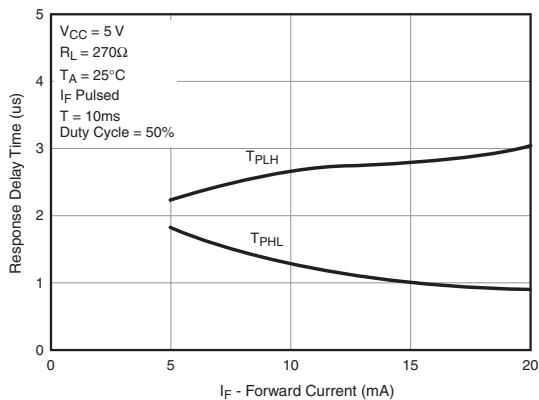
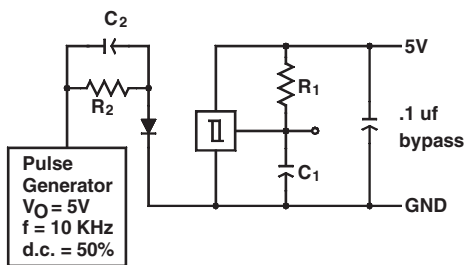


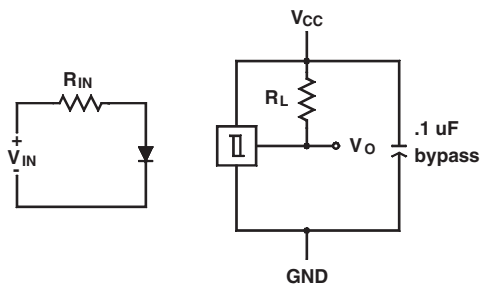
Figure 8. Response Time vs. Forward Current

Switching Speed Test Circuit

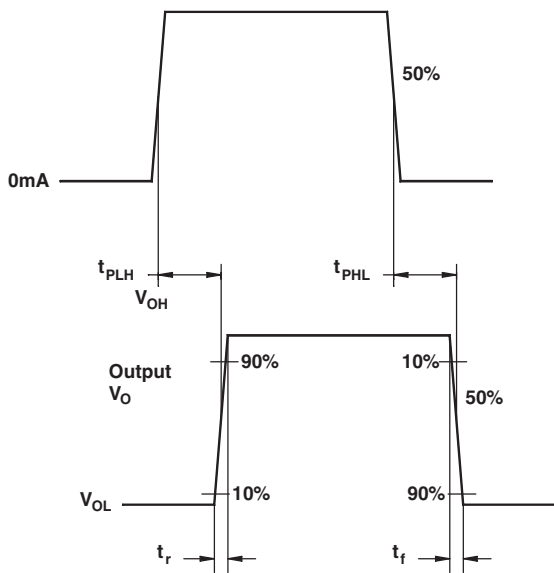


$R_1 = 300\Omega$      $C_1 = 15\text{pF}$      $C_1$  and  $C_2$  include probe and  
 $R_2 = 360\Omega$      $C_2 = 20\text{pF}$     stray wire capacitance

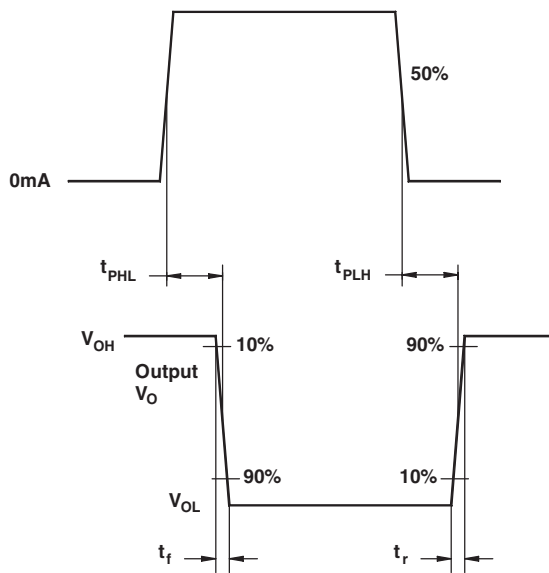
Typical Operating Circuit



Switching Test Curve for Buffers




Switching Test Curve for Inverters





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Rev. I28