

HOA698X/699X

Transmissive Optoschmitt Sensor

FEATURES

- Direct TTL interface
- Buffer or inverting logic available
- Three device output options
- Four mounting configurations
- Choice of detector aperture
- 0.125 in. (3.18 mm) slot width
- 24.0 in. (610 mm) min. 26 AWG PVC insulated lead wires

DESCRIPTION

The HOA698X/699X series consists of an infrared emitting diode facing an Optoschmitt detector encased in a black thermoplastic housing. Detector switching takes place whenever an opaque object passes through the slot between emitter and detector. The photodetector consists of a photodiode, amplifier, voltage regulator, Schmitt trigger and various output configurations. The user can choose from available options: (1) detector aperture, (2) mounting tab configuration, (3) detector output configuration, and (4) housing material.

The HOA698X series utilizes an IR transmissive polysulfone housing which features smooth optical faces without external aperture openings; this feature is desirable when aperture blockage from airborne contaminants is a possibility. The HOA699X series employs an opaque polysulfone housing with aperture openings for use in applications in which maximum rejection of ambient light is important, and situations in which maximum position resolution is desired. The HOA698X/699X series employs plastic molded components. For additional component information see SEP8506 and SDP8XX4.

Housing material is polysulfone. Housings are soluble in chlorinated hydrocarbons and ketones. Recommended cleaning agents are methanol and isopropanol.

Device Polarity:

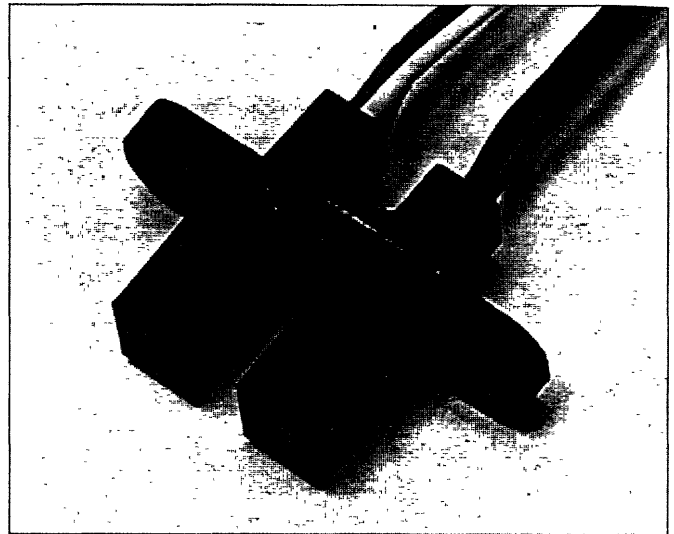
- Buffer - Output is LO when input excitation is zero.
- Inverter - Output is HI when input excitation is zero.

Wire color code and functions are:

- Red - IRED Anode
- White - Detector VCC
- Black - IRED Cathode
- Blue - Detector Output
- Green - Detector Ground

To specify the complete product characteristics, see PART NUMBER GUIDE.

All Performance Curves Show Typical Values

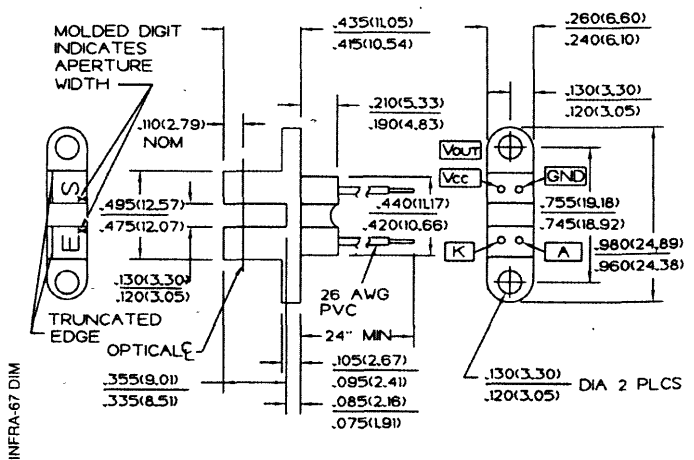


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OUTLINE DIMENSIONS in inches (mm)

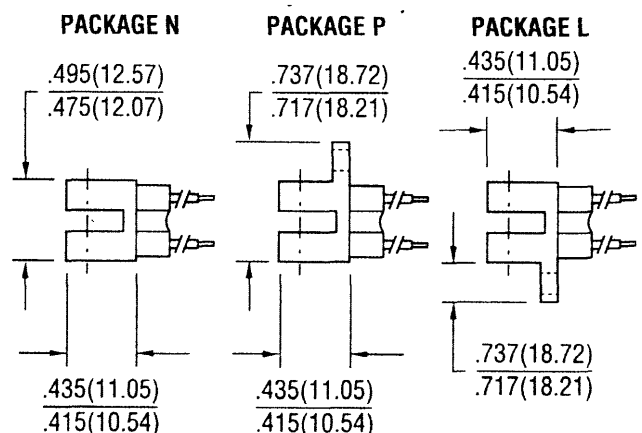
Tolerance 3 plc decimals $\pm 0.005(0.12)$
2 plc decimals $\pm 0.020(0.51)$

Package T



INFRA-67 DIM

Packages N/P/L



HOA698X/699X

Transmissive Optoschmitt Sensor Totem-Pole Output

ELECTRICAL CHARACTERISTICS (-40°C to +70°C unless otherwise noted)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
IR EMITTER						
Forward Voltage	V_F			1.5	V	$I_F=20\text{ mA}$, $T_A=25^\circ\text{C}$
Reverse Leakage Current	I_R			10	μA	$V_R=3\text{ V}$, $T_A=25^\circ\text{C}$
DETECTOR						
Operating Supply Voltage	V_{CC}	4.5		7.0	V	$T_A=25^\circ\text{C}$
Low Level Supply Current	I_{CCL}			15	mA	$V_{CC}=5.25\text{ V}$
High Level Supply Current	I_{CCH}			15	mA	$V_{CC}=5.25\text{ V}$
Low Level Output Voltage	V_{OL}				V	$V_{CC}=4.75\text{ V}$, $I_{OL}=12.8\text{ mA}$
HOA6980/6990				0.4		$I_F=0\text{ mA}$
HOA6982/6992				0.4		$I_F=15\text{ mA}$
High Level Output Voltage	V_{OH}				V	$V_{CC}=4.75\text{ V}$, $I_{OH}=800\text{ }\mu\text{A}$
HOA6980/6990		2.4				$I_F=15\text{ mA}$
HOA6982/6992		2.4				$I_F=0\text{ mA}$
Short Circuit Output Current	I_{OS}				mA	$V_{CC}=5.25\text{ V}$, Output=GND
HOA6980/6990		-30		-100		$I_F=15\text{ mA}$
HOA6982/6992		-30		-100		$I_F=0\text{ mA}$
Propagation Delay	t_{PLH} , t_{PHL}		5		μs	$V_{CC}=5\text{ V}$, $I_F=0$ or 15 mA
Low-High, High-Low						$R_L=8\text{ TTL Loads}$
Output Rise Time, Output Fall Time	t_r , t_f		70		ns	$V_{CC}=5\text{ V}$, $I_F=0$ or 15 mA
						$R_L=8\text{ TTL Loads}$
COUPLED CHARACTERISTICS						
IRE Trigger Current	I_{FT}			15	mA	$V_{CC}=5\text{ V}$

ABSOLUTE MAXIMUM RATINGS

(25°C Free-Air Temperature unless otherwise noted)

Operating Temperature Range	-40°C to 70°C
Storage Temperature Range	-40°C to 85°C
Soldering Temperature (5 sec)	240°C

IR EMITTER

Power Dissipation	100 mW ⁽¹⁾
Reverse Voltage	3 V
Continuous Forward Current	50 mA

DETECTOR

Supply Voltage	
Totem-Pole Output	7 V ⁽²⁾
All Others	12 V ⁽²⁾

Notes

1. Derate linearly at 0.75 mW/°C above 25°C.
2. Derate linearly from 25°C to 5.5 V at 70°C.

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Transmissive Optoschmitt Sensor Open-Collector Output

ELECTRICAL CHARACTERISTICS (-40°C to +70°C unless otherwise noted)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
IR EMITTER						
Forward Voltage	V_F			1.5	V	$I_F=20\text{ mA}, T_A=25^\circ\text{C}$
Reverse Leakage Current	I_R			10	μA	$V_R=3\text{ V}, T_A=25^\circ\text{C}$
DETECTOR						
Operating Supply Voltage	V_{CC}	4.5		12	V	$T_A=25^\circ\text{C}$
Low Level Supply Current	I_{CCL}			15	mA	$V_{CC}=5.25\text{ V}$
High Level Supply Current	I_{CCH}			15	mA	$V_{CC}=5.25\text{ V}$
Low Level Output Voltage	V_{OL}				V	$V_{CC}=4.75\text{ V}, I_{OL}=12.8\text{ mA}$
HOA6981/6991				0.4		$I_F=0\text{ mA}$
HOA6983/6993				0.4		$I_F=15\text{ mA}$
High Level Output Current	I_{OH}				μA	$V_{CC}=4.75\text{ V}, V_{OH}=30\text{ V}$
HOA6981/6991				100		$I_F=15\text{ mA}$
HOA6983/6993				100		$I_F=0\text{ mA}$
Propagation Delay	t_{PLH}, t_{PHL}		5		μs	$V_{CC}=5\text{ V}, I_F=0\text{ or }15\text{ mA}$
Low-High, High-Low						$R_L=390\ \Omega$
Output Rise Time, Output Fall Time	t_r, t_f		70		ns	$V_{CC}=5\text{ V}, I_F=0\text{ or }15\text{ mA}$
						$R_L=390\ \Omega$
COUPLED CHARACTERISTICS						
IRE Trigger Current	I_{FT}			15	mA	$V_{CC}=5\text{ V}$

ABSOLUTE MAXIMUM RATINGS

(25°C Free-Air Temperature unless otherwise noted)

Operating Temperature Range	-40°C to 70°C
Storage Temperature Range	-40°C to 85°C
Soldering Temperature (5 sec)	240°C

IR EMITTER

Power Dissipation	100 mW ⁽¹⁾
Reverse Voltage	3 V
Continuous Forward Current	50 mA

DETECTOR

Supply Voltage	
Totem-Pole Output	7 V ⁽²⁾
All Others	12 V ⁽²⁾

Notes

- Derate linearly at 0.75 mW/°C above 25°C.
- Derate linearly from 25°C to 5.5 V at 70°C

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Transmissive Optoschmitt Sensor 10 k Ω Pull-Up Output

ELECTRICAL CHARACTERISTICS (-40°C to +70°C unless otherwise noted)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
IR EMITTER						
Forward Voltage	V _F			1.5	V	I _F =20 mA, T _A =25°C
Reverse Leakage Current	I _R			10	μ A	V _R =3 V, T _A =25°C
DETECTOR						
Operating Supply Voltage	V _{CC}	4.5		12	V	T _A =25°C
Low Level Supply Current	I _{CC(L)}			15	mA	V _{CC} =5.25 V
High Level Supply Current	I _{CC(H)}			15	mA	V _{CC} =5.25 V
Low Level Output Voltage	V _{OL}				V	V _{CC} =4.75 V, I _{OL} =12.8 mA
HOA6984/6994				0.4		I _F =0 mA
HOA6985/6995				0.4		I _F =15 mA
High Level Output Voltage	V _{OH}				V	V _{CC} =4.75 V, I _{OH} =100 μ A
HOA6984/6994		2.4				I _F =15 mA
HOA6985/6995		2.4				I _F =0 mA
Propagation Delay	t _{PLH} , t _{PHL}		5		μ s	V _{CC} =5 V, I _F =0 or 15 mA
Low-High, High-Low						R _L =390 Ω
Output Rise Time, Output Fall Time	t _r , t _f		70		ns	V _{CC} =5 V, I _F =0 or 15 mA
						R _L =390 Ω
COUPLED CHARACTERISTICS						
IRED Trigger Current	I _{FT}			15	mA	V _{CC} =5 V

ABSOLUTE MAXIMUM RATINGS

(25°C Free-Air Temperature unless otherwise noted)

Operating Temperature Range	-40°C to 70°C
Storage Temperature Range	-40°C to 85°C
Soldering Temperature (5 sec)	240°C
IR EMITTER	
Power Dissipation	100 mW ⁽¹⁾
Reverse Voltage	3 V
Continuous Forward Current	50 mA
DETECTOR	
Supply Voltage	
Totem-Pole Output	7 V ⁽²⁾
All Others	12 V ⁽²⁾

Notes

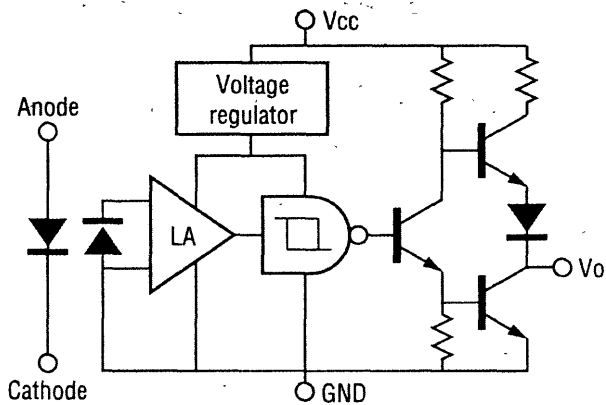
- Derate linearly at 0.75 mW/°C above 25°C.
- Derate linearly from 25°C to 5.5 V at 70°C

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Transmissive Optoschmitt Sensor

SCHEMATICS FOR HOA698X/699X

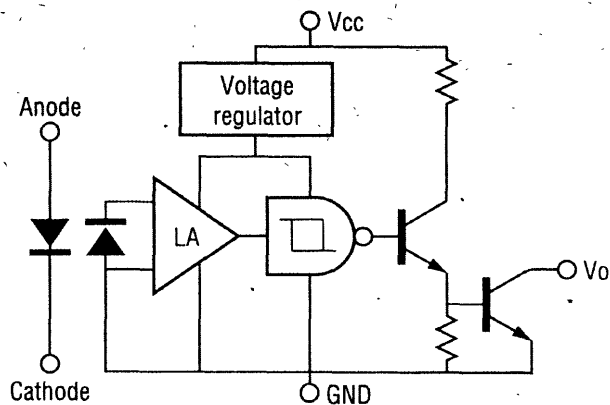
HOA69X0 BUFFER, TOTEM-POLE



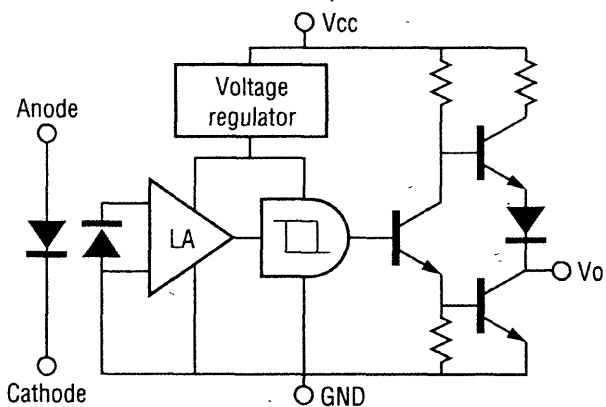
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INFRA-33.SCH

HOA69X1 BUFFER, OPEN-COLLECTOR



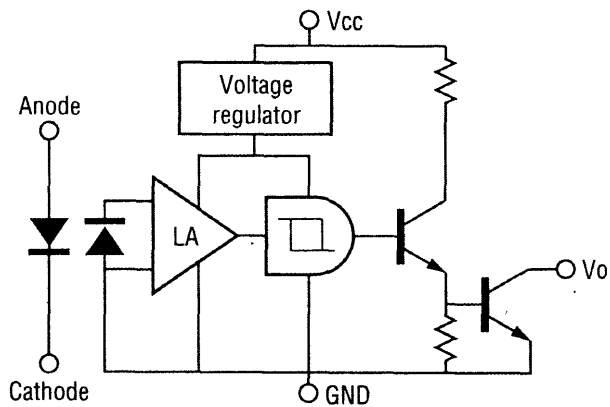
HOA69X2 INVERTER, TOTEM-POLE



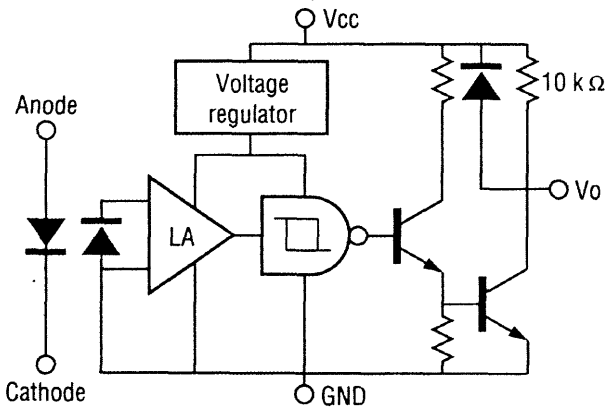
INFRA-32.SCH

INFRA-34.SCH

HOA69X3 INVERTER, OPEN-COLLECTOR



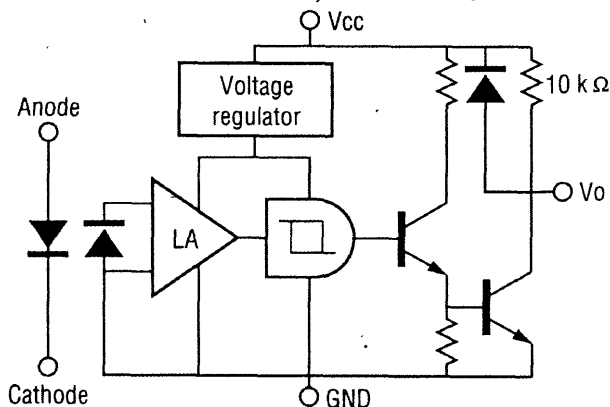
HOA69X4 BUFFER, 10 kΩ PULL-UP



INFRA-35.SCH

INFRA-36.SCH

HOA69X5 INVERTER, 10 kΩ PULL-UP



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SWITCHING WAVEFORM FOR BUFFERS

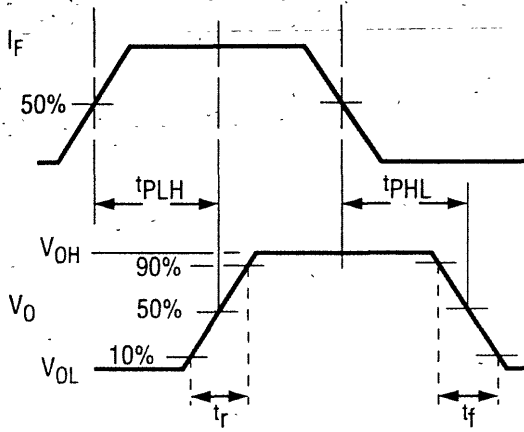
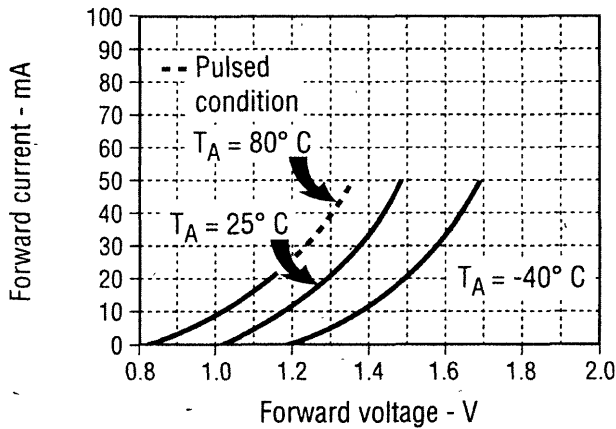


Fig. 1 IRED Forward Bias Characteristics



PART NUMBER GUIDE

Housing Material

- 8 = Polysulfone, IR transmissive
- 9 = Polysulfone, opaque

Output Configuration

- 0 = Totem-pole, buffer
- 1 = Open-collector, buffer
- 2 = Totem-pole, inverter
- 3 = Open-collector, inverter
- 4 = 10 kΩ pull-up, buffer
- 5 = 10 kΩ pull-up, inverter

HOA69XX-XXX

Aperture Width In Front Of Detector

- 1 = 0.010 in. (0.25 mm)
 - 5 = 0.050 in. (1.27 mm)
- Aperture length is 0.060 in. (1.52 mm)

Aperture Width In Front Of IRED

- 5 = 0.050 in. (1.27 mm)
- Aperture length is 0.060 in. (1.52 mm)

Mounting Configuration

- L = Single mounting tab, emitter side
- N = No mounting tabs
- P = Single mounting tab, detector side
- T = Two mounting tabs

SWITCHING WAVEFORM FOR INVERTERS

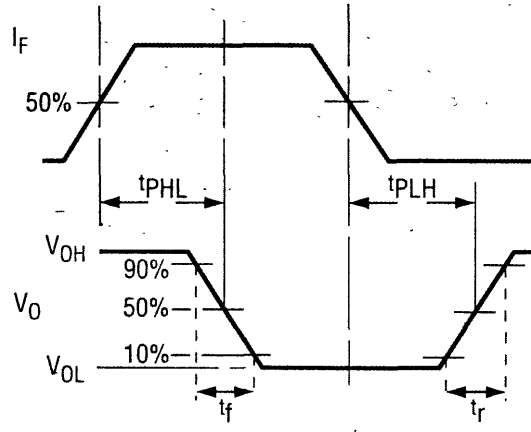


Fig. 2 IRED Trigger Current vs Temperature

