



# HOA698X/699X

Transmissive Optoschmitt Sensor

Totem-Pole Output

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

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
<b>IR EMITTER</b>						
Forward Voltage	V <sub>F</sub>		1.6		V	I <sub>F</sub> =20 mA, T <sub>A</sub> =25°C
Reverse Leakage Current	I <sub>R</sub>		10		µA	V <sub>R</sub> =3 V, T <sub>A</sub> =25°C
<b>DETECTOR</b>						
Operating Supply Voltage	V <sub>CC</sub>	4.5	7.0		V	T <sub>A</sub> =25°C
Low Level Supply Current	I <sub>CC</sub> L		15		mA	V <sub>CC</sub> =5.25 V
High Level Supply Current	I <sub>CC</sub> H		15		mA	V <sub>CC</sub> =5.25 V
Low Level Output Voltage	V <sub>OL</sub>				V	V <sub>CC</sub> =4.75 V, I <sub>OL</sub> =12.8 mA
HOA6980/6990			0.4			I <sub>F</sub> =0 mA
HOA6982/6992			0.4			I <sub>F</sub> =15 mA
High Level Output Voltage	V <sub>OH</sub>				V	V <sub>CC</sub> =4.75 V, I <sub>OH</sub> =800 µA,
HOA6980/6990		2.4				I <sub>F</sub> =15 mA
HOA6982/6992		2.4				I <sub>F</sub> =0 mA
Short Circuit Output Current	I <sub>OS</sub>				mA	V <sub>CC</sub> =5.25 V, Output=GND
HOA6980/6990		-20		-100		I <sub>F</sub> =15 mA
HOA6982/6992		-20		-100		I <sub>F</sub> =0 mA
Hysteresis (2)	HYST		50		%	
Propagation Delay, Low-High, High-Low	t <sub>PLH</sub> , t <sub>PHL</sub>		5		µs	V <sub>CC</sub> =5 V, I <sub>F</sub> =0 or 15 mA
						R <sub>L</sub> =8 TTL Loads
Output Rise Time, Output Fall Time	t <sub>r</sub> , t <sub>f</sub>		70		ns	V <sub>CC</sub> =5 V, I <sub>F</sub> =0 or 15 mA
						R <sub>L</sub> =8 TTL Loads
<b>COUPLED CHARACTERISTICS</b>						
IRED Trigger Current	I <sub>FT</sub>			15	mA	V <sub>CC</sub> =5 V

### Notes

- It is recommended that a bypass capacitor, 0.1 µF typical, be added between V<sub>CC</sub> and GND near the device in order to stabilize power supply line.
- Hysteresis is defined as the difference between the operating and release threshold intensities, expressed as a percentage of the operate threshold intensity.

### 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
All Others	12 V (2)
Duration of Output	
Short to V <sub>CC</sub> or Ground	1.0 sec.

### Notes

- Derate linearly at 0.78 mW/°C above 25°C.
- Derate linearly from 25°C to 5.5 V at 70°C.

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# HOA698X/699X

## Transmissive Optoschmitt Sensor Open-Collector Output

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

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
<b>IR EMITTER</b>						
Forward Voltage	V <sub>F</sub>			1.6	V	I <sub>F</sub> =20 mA, T <sub>A</sub> =25°C
Reverse Leakage Current	I <sub>R</sub>			10	μA	V <sub>R</sub> =3 V, T <sub>A</sub> =25°C
<b>DETECTOR</b>						
Operating Supply Voltage	V <sub>CC</sub>	4.5		12	V	T <sub>A</sub> =25°C
Low Level Supply Current	I <sub>CC(L)</sub>			15	mA	V <sub>CC</sub> =5.25 V
High Level Supply Current	I <sub>CC(H)</sub>			15	mA	V <sub>CC</sub> =5.25 V
Low Level Output Voltage	V <sub>OL</sub>				V	V <sub>CC</sub> =4.75 V, I <sub>OL</sub> =12.8 mA
HOA6981/6991				0.4		I <sub>F</sub> =0 mA
HOA6983/6993				0.4		I <sub>F</sub> =15 mA
High Level Output Current	I <sub>OH</sub>				μA	V <sub>CC</sub> =4.75 V V <sub>OH</sub> =30 V
HOA6981/6991				100		I <sub>F</sub> =15 mA
HOA6983/6993				100		I <sub>F</sub> =0 mA
Hysteresis (2)	HYST		50		%	
Propagation Delay, Low-High, High-Low	t <sub>PLH</sub> , t <sub>PHL</sub>		5		μs	V <sub>CC</sub> =5 V, I <sub>F</sub> =0 or 15 mA
						R <sub>L</sub> =390 Ω
Output Rise Time, Output Fall Time	t <sub>r</sub> , t <sub>f</sub>		70		ns	V <sub>CC</sub> =5 V, I <sub>F</sub> =0 or 15 mA
						R <sub>L</sub> =390 Ω
<b>COUPLED CHARACTERISTICS</b>						
IREL Trigger Current	I <sub>FT</sub>			15	mA	V <sub>CC</sub> =5 V

#### Notes

- It is recommended that a bypass capacitor, 0.1 μF typical, be added between V<sub>CC</sub> and GND near the device in order to stabilize power supply line.
- Hysteresis is defined as the difference between the operating and release threshold intensities, expressed as a percentage of the operate threshold intensity.

### 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 70°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)
Duration of Output	
Short to V <sub>CC</sub> or Ground	1.0 sec
Applied Output Voltage	35 V

#### Notes

- Derate linearly at 0.78 mW/°C above 25°C.
- Derate linearly from 25°C to 5.5 V at 70°C.

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# HOA698X/699X

Transmissive Optoschmitt Sensor

10 kOhm Pull-Up Output

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

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
<b>IR EMITTER</b>						
Forward Voltage	$V_F$			1.8	V	$I_F=20\text{ mA}$ , $T_A=25^\circ\text{C}$
Reverse Leakage Current	$I_R$			10	$\mu\text{A}$	$V_R=3\text{ V}$ , $T_A=25^\circ\text{C}$
<b>DETECTOR</b>						
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	$V_{CC}=4.75\text{ V}$ , $I_{OL}=12.8\text{ mA}$
HOA6984/6994				0.4		$I_F=0\text{ mA}$
				0.4		$I_F=15\text{ mA}$
High Level Output Voltage	$V_{OH}$				V	$V_{CC}=4.75\text{ V}$ , $I_{OH}=100\text{ }\mu\text{A}$
HOA6984/6994		2.4				$I_F=15\text{ mA}$
HOA6985/6995		2.4				$I_F=0\text{ mA}$
Hysteresis <sup>(2)</sup>	HYST		50		%	
Propagation Delay, Low-High, High-Low	$t_{PLH}$ , $t_{PHL}$		5		$\mu\text{s}$	$V_{CC}=5\text{ V}$ , $I_F=0\text{ or }15\text{ mA}$
Output Rise Time, Output Fall Time	$t_r$ , $t_f$		70		ns	$R_L=390\text{ }\Omega$
						$V_{CC}=5\text{ V}$ , $I_F=0\text{ or }15\text{ mA}$
						$R_L=390\text{ }\Omega$
<b>COUPLED CHARACTERISTICS</b>						
IREd Trigger Current	$I_{FT}$			15	mA	$V_{CC}=5\text{ V}$

### Notes

1. It is recommended that a bypass capacitor, 0.1  $\mu\text{F}$  typical, be added between  $V_{CC}$  and GND near the device in order to stabilize power supply line.
2. Hysteresis is defined as the difference between the operating and release threshold intensities, expressed as a percentage of the operate threshold intensity.

## 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 <sup>(1)</sup>
Reverse Voltage	3 V
Continuous Forward Current	50 mA

### DETECTOR

Supply Voltage:

Totem-Pole Output	7 V <sup>(2)</sup>
All Others	12 V <sup>(2)</sup>

Duration of Output

Short to $V_{CC}$ or Ground	1.0 sec
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### Notes

1. Derate linearly at 0.78 mW/°C above 25°C.
2. Derate linearly from 25°C to 5.5 V at 70°C.

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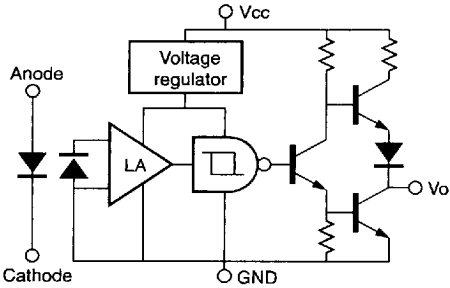
# HOA698X/699X

Transmissive Optoschmitt Sensor

## SCHEMATIC FOR HOA698X/699X

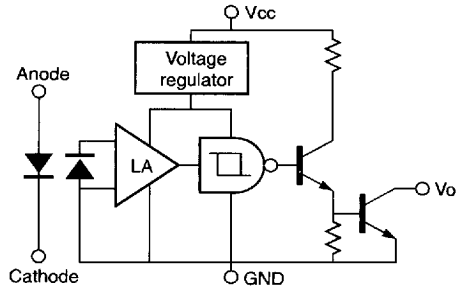
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HOA69X0 BUFFER, TOTEM-POLE



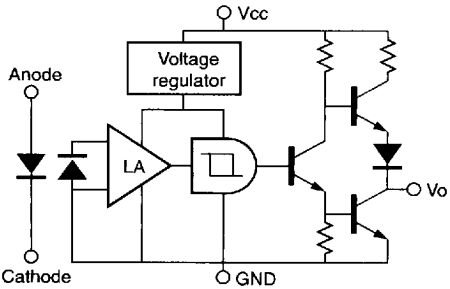
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HOA69X1 BUFFER, OPEN-COLLECTOR



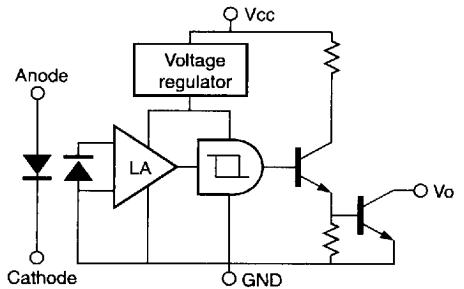
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HOA69X2 INVERTER, TOTEM-POLE



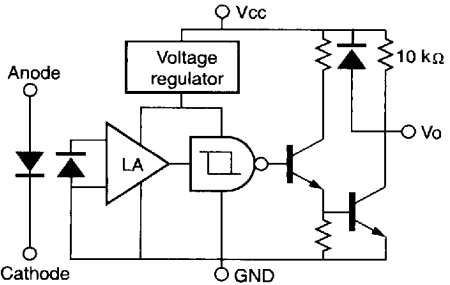
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HOA69X3 INVERTER, OPEN-COLLECTOR



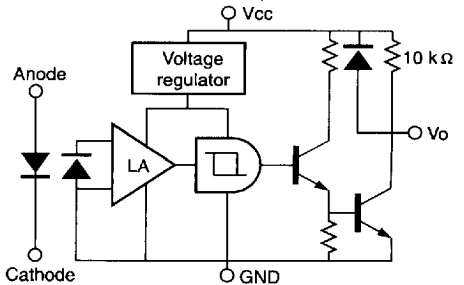
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HOA69X4 BUFFER, 10 k  $\Omega$  PULL-UP



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HOA69X5 INVERTER, 10 k  $\Omega$  PULL-UP



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# HOA698X/699X

## Transmissive Optoschmitt Sensor

### SWITCHING WAVEFORM FOR BUFFERS

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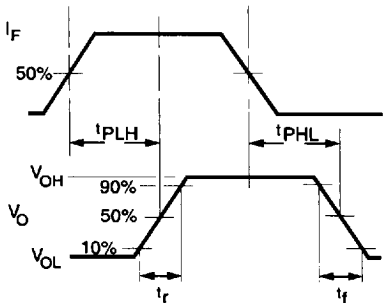
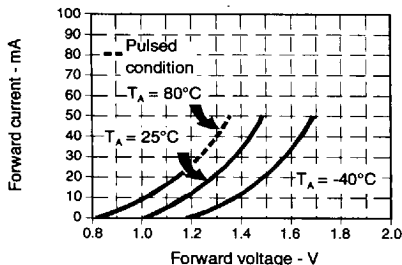


Fig. 1 IRED Forward Bias Characteristics

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All Performance Curves Show Typical Values

### PART NUMBER GUIDE

## HOA69XX-XXX

#### 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

#### 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

dir\_011.cdr

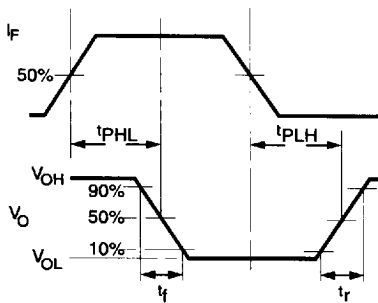
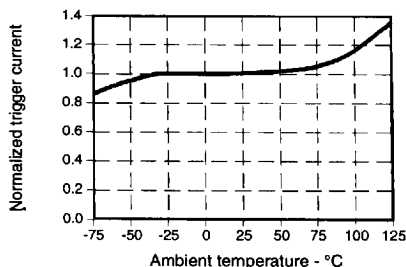


Fig. 2 IRED Trigger Current vs Temperature

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