

HOA696X/697X

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

DESCRIPTION

The HOA696X/697X 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 HOA696X 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.

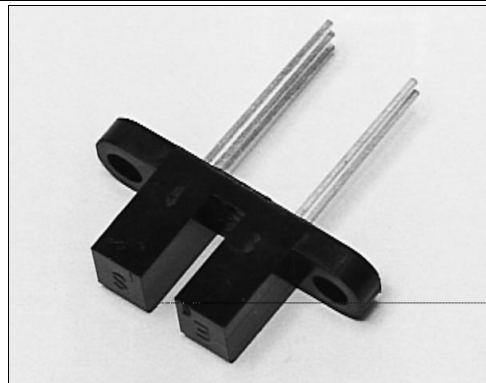
The HOA697X series employs an opaque polysulfone housing with aperture openings for use in applications in which maximum rejection of ambient light is important, and situations in which maximum position resolution is desired. The HOA696X/697X series employs plastic molded components. For additional component 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 optical path is blocked.
- Inverter - Output is HI when optical path is blocked.

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

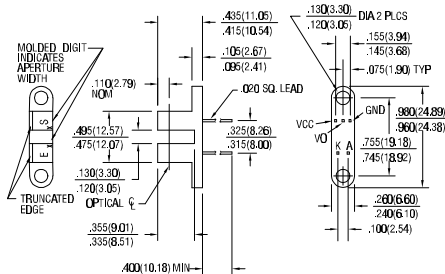


INFRA-32.TIF

OUTLINE DIMENSIONS in inches (mm)

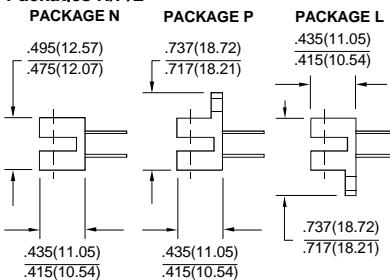
Tolerance 3 plc decimals ±0.010(0.25)
2 plc decimals ±0.020(0.51)

Package T



DIM_066a.cdr

Packages N/P/L



DIM_41b.d54

HOA696X/697X

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 | | 1.6 | | 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 | $V_{CC}=4.75\text{ V}$, $I_{OL}=12.8\text{ mA}$ $I_F=0\text{ mA}$ $I_F=15\text{ mA}$ |
| HOA6960/6970 | | | 0.4 | | | |
| HOA6962/6972 | | | 0.4 | | | |
| High Level Output Voltage | V_{OH} | | | | V | $V_{CC}=4.75\text{ V}$, $I_{OH}=800\text{ }\mu\text{A}$, $I_F=15\text{ mA}$ $I_F=0\text{ mA}$ |
| HOA6960/6970 | | 2.4 | | | | |
| HOA6962/6972 | | 2.4 | | | | |
| Short Circuit Output Current | I_{OS} | | | | mA | $V_{CC}=5.25\text{ V}$, Output=GND $I_F=15\text{ mA}$ $I_F=0\text{ mA}$ |
| HOA6960/6970 | | -20 | | -100 | | |
| HOA6962/6972 | | -20 | | -100 | | |
| Hysteresis ⁽²⁾ | HYST | | 50 | | % | |
| Propagation Delay, Low-High, High-Low | t_{PLH} , t_{PHL} | | 5 | | μs | $V_{CC}=5\text{ V}$, $I_F=0$ or 15 mA $R_L=8\text{ TTL Loads}$ |
| 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 | | | | | | |
| IREDD Trigger Current | I_{FT} | | 15 | | mA | $V_{CC}=5\text{ V}$ |

Notes

1. It is recommended that a bypass capacitor, 0.1 μF 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 ⁽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_{CC} or Ground | 1.0 sec. |

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.

Honeywell reserves the right to make changes in order to improve design and supply the best products possible.

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HOA696X/697X

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 | | | 1.6 | 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 | $V_{CC}=4.75\text{ V}$, $I_{OL}=12.8\text{ mA}$ |
| HOA6961/6971 | | | | 0.4 | | $I_F=0\text{ mA}$ |
| HOA6963/6973 | | | | 0.4 | | $I_F=15\text{ mA}$ |
| High Level Output Current | I_{OH} | | | | μA | $V_{CC}=4.75\text{ V}$, $V_{OH}=30\text{ V}$ |
| HOA6961/6971 | | | | 100 | | $I_F=15\text{ mA}$ |
| HOA6963/6973 | | | | 100 | | $I_F=0\text{ mA}$ |
| Hysteresis ⁽²⁾ | HYST | | | 50 | % | |
| Propagation Delay, Low-High, High-Low | t_{PLH} , t_{PHL} | | | 5 | μs | $V_{CC}=5\text{ V}$, $I_F=0$ or 15 mA $R_L=390\ \Omega$ |
| Output Rise Time, Output Fall Time | t_r , t_f | | | 70 | ns | $V_{CC}=5\text{ V}$, $I_F=0$ or 15 mA $R_L=390\ \Omega$ |
| COUPLED CHARACTERISTICS | | | | | | |
| IRED Trigger Current | I_{FT} | | | 15 | mA | $V_{CC}=5\text{ V}$ |

Notes

- It is recommended that a bypass capacitor, 0.1 μF typical, be added between V_{CC} 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_{CC} 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.

HOA696X/697X

Transmissive Optoschmitt Sensor
10 kOhm 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 | | 1.6 | | 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 HOA6964/6974 HOA6965/6975 | V_{OL} | | 0.4 0.4 | | V | $V_{CC}=4.75\text{ V}$, $I_{OL}=12.8\text{ mA}$ $I_F=0\text{ mA}$ $I_F=15\text{ mA}$ |
| High Level Output Voltage HOA6964/6974 HOA6965/6975 | V_{OH} | 2.4 2.4 | | | V | $V_{CC}=4.75\text{ V}$, $I_{OH}=100\text{ }\mu\text{A}$, $I_F=15\text{ mA}$ $I_F=0\text{ mA}$ |
| Hysteresis ⁽²⁾ | HYST | | 50 | | % | |
| Propagation Delay, Low-High, High-Low | t_{PLH} , t_{PHL} | | 5 | | μs | $V_{CC}=5\text{ V}$, $I_F=0$ or 15 mA $R_L=390\text{ }\Omega$ |
| Output Rise Time, Output Fall Time | t_r , t_f | | 70 | | ns | $V_{CC}=5\text{ V}$, $I_F=0$ or 15 mA $R_L=390\text{ }\Omega$ |
| COUPLED CHARACTERISTICS | | | | | | |
| IRED Trigger Current | I_{FT} | | 15 | | mA | $V_{CC}=5\text{ V}$ |

Notes

- It is recommended that a bypass capacitor, 0.1 μF typical, be added between V_{CC} 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 ⁽²⁾ |
| All Others | 12 V ⁽²⁾ |
| Duration of Output | |
| Short to V_{CC} 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.

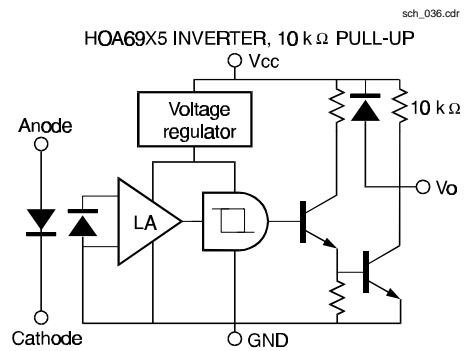
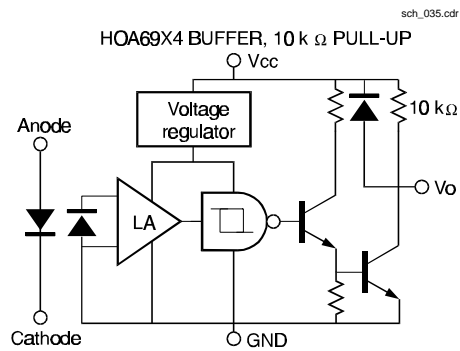
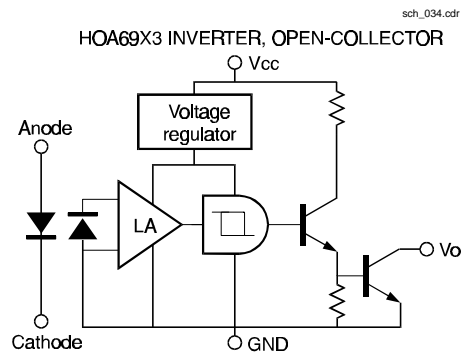
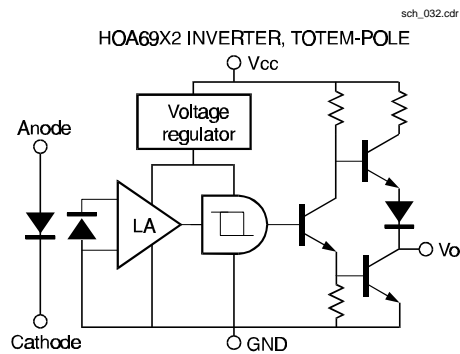
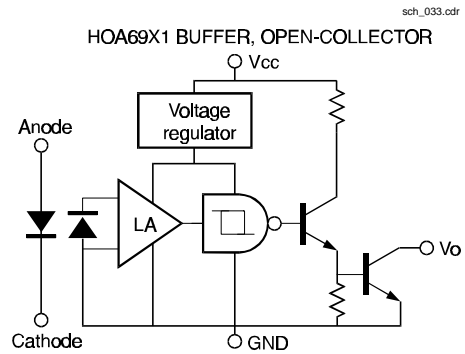
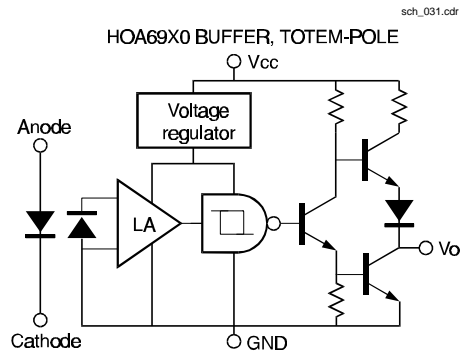
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HOA696X/697X

Transmissive Optoschmitt Sensor

SCHEMATIC FOR HOA696X/697X



HOA696X/697X

Transmissive Optoschmitt Sensor

SWITCHING WAVEFORM FOR BUFFERS

cir_013.cdr

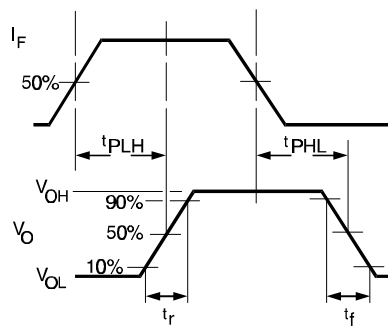
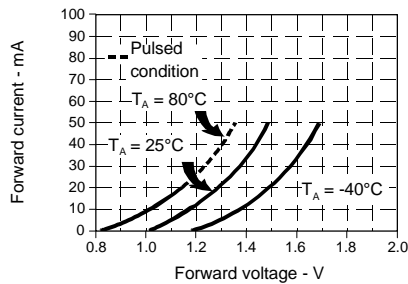


Fig. 1 IRED Forward Bias Characteristics

gra_073.ds4



SWITCHING WAVEFORM FOR INVERTERS

cir_011.cdr

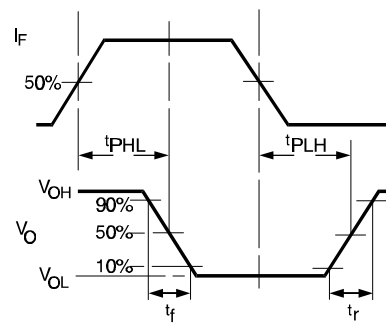
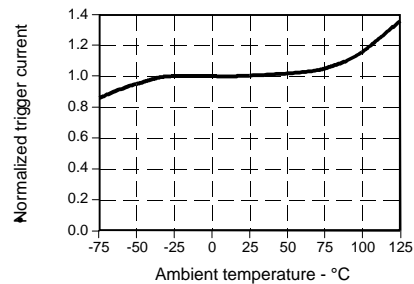


Fig. 2 IRED Trigger Current vs Temperature

gra_098.ds4



All Performance Curves Show Typical Values

PART NUMBER GUIDE

HOA69XX-XXX

Housing Material

- 6 = Polysulfone, IR transmissive
- 7 = Polysulfone, opaque

Output Configuration

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

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