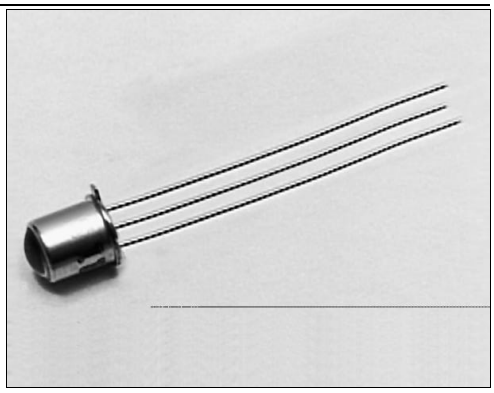
# SD5600/5610

## Optoschmitt Detector

**FEATURES**

- TO-46 metal can package
- 6° (nominal) acceptance angle
- High noise immunity output
- TTL/LSTTL/CMOS compatible
- Buffer (SD5600) or inverting (SD5610) logic available
- Mechanically and spectrally matched to SE3450/5450, SE3455/5455 and SE3470/5470 infrared emitting diodes



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**DESCRIPTION**

The SD5600/5610 series is a family of single chip Optoschmitt IC detectors mounted in a TO-46 metal can package. The photodetector consists of a photodiode, amplifier, voltage regulator, Schmitt trigger and an NPN output transistor with 10 kΩ (nominal) pull-up resistor. Output rise and fall times are independent of the rate of change of incident light. Detector sensitivity has been internally temperature compensated. The TO-46 package is ideally suited for operation in hostile environments.

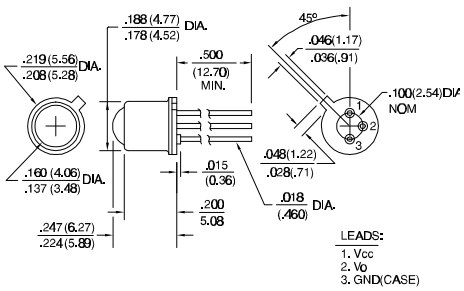
Device Polarity:

Buffer - Output is HI when incident light intensity is above the turn- on threshold level.

Inverter - Output is LO when incident light intensity is above the turn- on threshold level.

**OUTLINE DIMENSIONS** in inches (mm)

| | | |
|---|---|---|
| Tolerance | 3 plc decimals | ±0.005(0.12) |
| | 2 plc decimals | ±0.020(0.51) |

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**ELECTRICAL CHARACTERISTICS** (-40°C to +100°C unless otherwise noted)

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Operating Supply Voltage | $V_{CC}$ | 4.5 | | 16.0 | V | $T_A$=25°C |
| Turn-on Threshold Irradiance (2) | $E_{eT(+)}$ | | | | mW/cm² | $V_{CC}$=5 V |
| SD5600-001, SD5610-001 | | | | 2.50 | | $T_A$=25°C |
| Hysteresis (3) | HYST | 5 | | 30 | % | |
| Supply Current | $I_{CC}$ | | | | mA | $E_e$=0 Or 3.0 mW/cm² |
| | | | | 12.0 | | $V_{CC}$=5 V |
| | | | | 15.0 | | $V_{CC}$=16 V |
| High Level Output Voltage | $V_{OH}$ | | | | V | $V_{CC}$=5 V, $I_{OH}$=0 |
| SD5600 | | 2.4 | | | | $E_e$=0 |
| SD5610 | | 2.4 | | | | $E_e$=3.0 mW/cm² |
| Low Level Output Voltage | $V_{OL}$ | | | | V | $V_{CC}$=5 V, $I_{OL}$=12.8 mA |
| SD5600 | | | | 0.4 | | $E_e$=0 |
| SD5610 | | | | 0.4 | | $E_e$=3.0 mW/cm² |
| Internal Pull-Up Resistor | $R_{INT}$ | 5.0 | 10.0 | 20.0 | kΩ | |
| Operate Point Temperature Coefficient | $O_{PTC}$ | | -0.76 | | %/°C | Emitter @ Constant Temperature |
| Output Rise Time | $t_r$ | | 60 | | ns | $R_L$=390 Ω, $C_L$=50 pF |
| Output Fall Time | $t_f$ | | 15 | | ns | $R_L$=390 Ω, $C_L$=50 pF |
| Propagation Delay, Low-High, High-Low | $t_{PLH}$, $t_{PHL}$ | | 5.0 | | µs | $R_L$=390 Ω, $C_L$=50 pF |
| Clock Frequency | | | | 100 | kHz | $R_L$=390 Ω, $C_L$=50 pF |

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. The radiation source is an IRED with a peak wavelength of 935 nm.
3. 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**

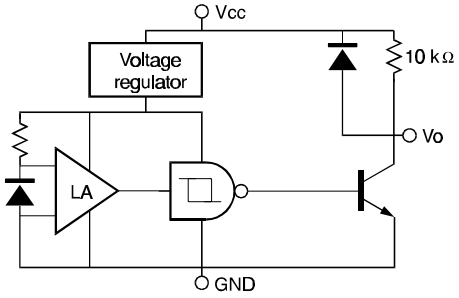
(25°C Free-Air Temperature unless otherwise noted)

| | |
|---|---|
| Supply Voltage | 16 V (1) |
| Duration of Output | |
| Short to $V_{CC}$ or Ground | 1.0 sec |
| Output Current | 18 mA |
| Operating Temperature Range | -40°C to 100°C |
| Storage Temperature Range | -55°C to 125°C |
| Soldering Temperature (10 sec) | 260°C |

Notes
1. Derate linearly from 25°C to 7 V at 100°C.

**SCHEMATIC**

SD5600 BUFFER, 10 kΩ PULL-UP



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**SCHEMATIC**

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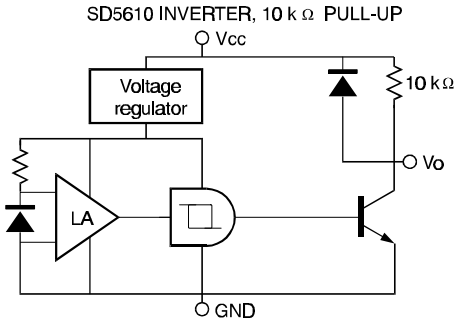


**SWITCHING TIME TEST CIRCUIT**

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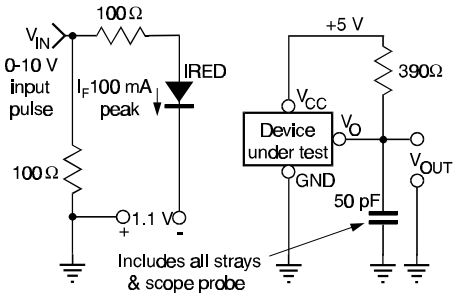
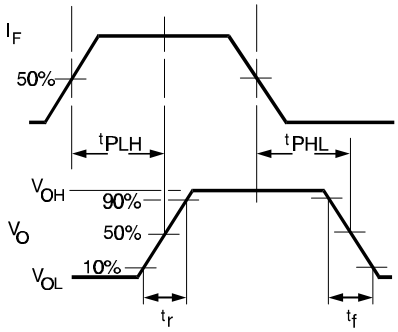



**SWITCHING WAVEFORM FOR BUFFERS**

cir_013.cdr




**SWITCHING WAVEFORM FOR INVERTERS**

cir_011.cdr

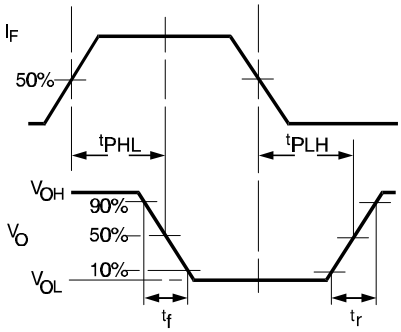



Fig. 1 Responsivity vs Angular Displacement

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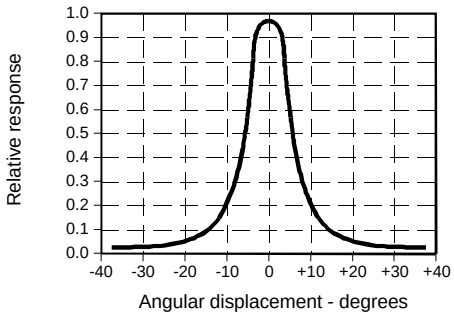


Fig. 2 Threshold Irradiance vs Temperature

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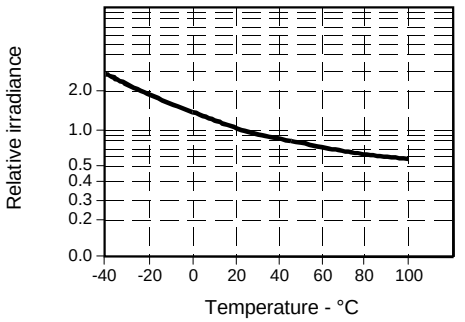




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Fig. 3 Output Rise Time ($t_r$) and Output Fall Time ($t_f$) vs Temperature

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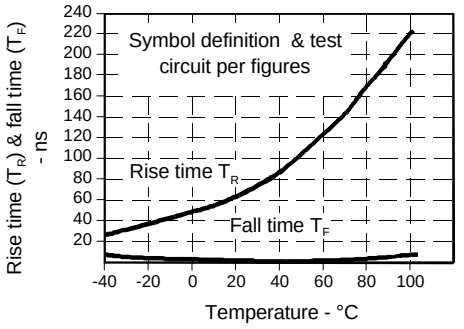


Fig. 4 Delay Time vs Temperature

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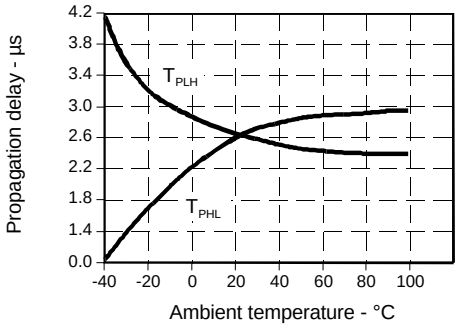


Fig. 5 Spectral Responsivity

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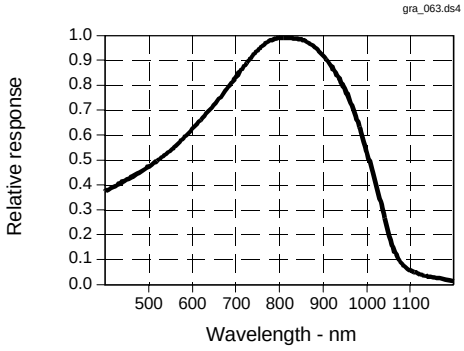


All Performance Curves Show Typical Values