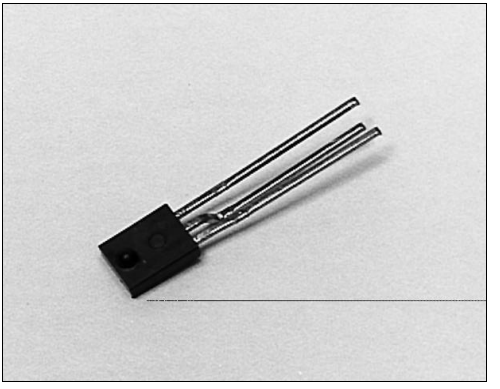
# SDP86XX

## Optoschmitt Detector

**FEATURES**

- Side-looking plastic package
- 55° (nominal) acceptance angle
- Wide sensitivity ranges
- TTL/LSTTL/CMOS compatible
- Buffer (SDP8600/8601/8602) or inverting (SDP8610/8611/8612) logic available
- Three different lead spacing arrangements
- Mechanically and spectrally matched to SEP8506 and SEP8706 infrared emitting diodes



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**DESCRIPTION**

The SDP86XX series is a family of single chip Optoschmitt IC detectors molded in a side-looking black plastic package to minimize the effect of visible ambient light. The photodetector consists of a photodiode, amplifier, voltage regulator, Schmitt trigger and an NPN output transistor with a 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. Flexibility of use is enhanced by a choice of three different lead configurations; in-line (SDP8601/8611), 0.05 in.(1.27 mm) offset pin circle (SDP8600/8610) and 0.10 in. (2.54 mm) offset center lead (SDP8602/8612).

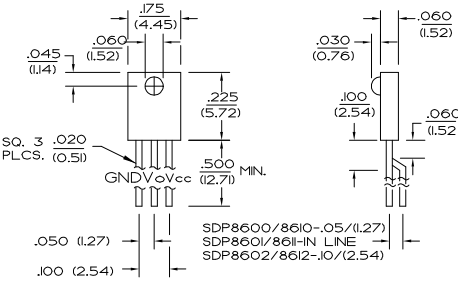
Device Polarity:

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) |




DIM_028.cdr



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**ELECTRICAL CHARACTERISTICS** (-40°C to +85°C unless otherwise noted)

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Operating Supply Voltage | $V_{CC}$ | 4.5 | | 12.0 | V | $T_A$=25°C |
| Turn-on Threshold Irradiance | $E_{ET(+)}$ | | | | mW/cm² | $V_{CC}$=5 V |
| SDP86XX-001 | | | | 2.5 | | $T_A$=25°C |
| SDP86XX-002 | | | | 1.2 | | (2) |
| SDP86XX-003 | | | | 0.6 | | |
| 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 | | $V_{CC}$=12 V |
| High Level Output Voltage | $V_{OH}$ | | | | V | $V_{CC}$=5 V, $I_{OH}$=0 |
| SDP8600/8601/8602 | | 2.4 | | | | $E_e$=3.0 mW/cm² |
| SDP8610/8611/8612 | | 2.4 | | | | $E_e$=0 |
| Low Level Output Voltage | $V_{OL}$ | | | | V | $V_{CC}$=5 V, $I_{OL}$=12.8 mA |
| SDP8600/8601/8602 | | | | 0.4 | | $E_e$=0 |
| SDP8610/8611/8612 | | | | 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**

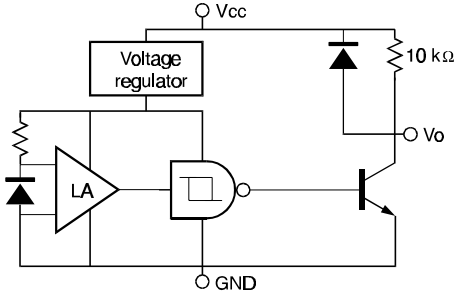
(25°C Free-Air Temperature unless otherwise noted)

| | |
|---|---|
| Supply Voltage | 12 V (1) |
| Duration of Output | |
| Short to $V_{CC}$ or Ground | 1.0 sec |
| Output Current | 18 mA |
| Operating Temperature Range | -40°C to 85°C |
| Storage Temperature Range | -40°C to 85°C |
| Soldering Temperature (5 sec) | 240°C |

Notes
1. Derate linearly from 25°C to 5.5 V at 85°C.

**SCHEMATIC**

SDP8600/8601/8602 BUFFER, 10 kΩ PULL-UP



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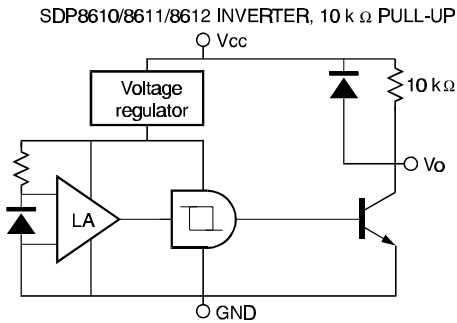
## Optoschmitt Detector

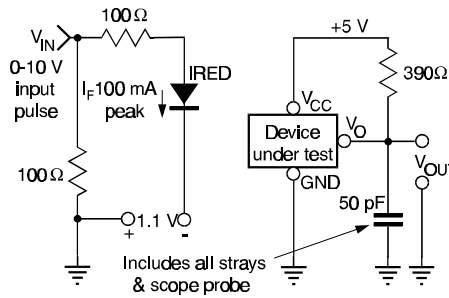
### SCHEMATIC

SCH_024.cdr



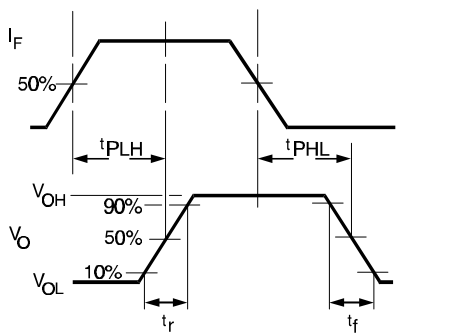

### SWITCHING TIME TEST CIRCUIT

cir_007.cdr




### SWITCHING WAVEFORM FOR BUFFERS

cir_013.cdr




### SWITCHING WAVEFORM FOR INVERTERS

cir_011.cdr

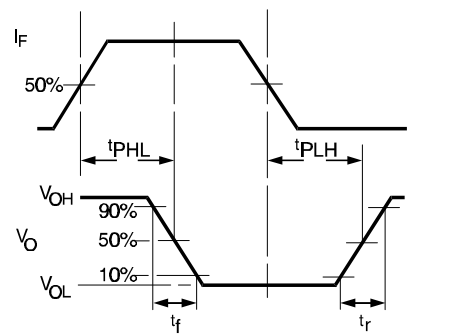



Fig. 1 Responsivity vs Angular Displacement

gra_065.ds4

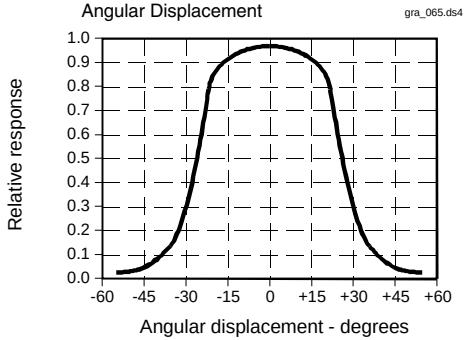



Fig. 2 Threshold Irradiance vs Temperature

gra_060.ds4

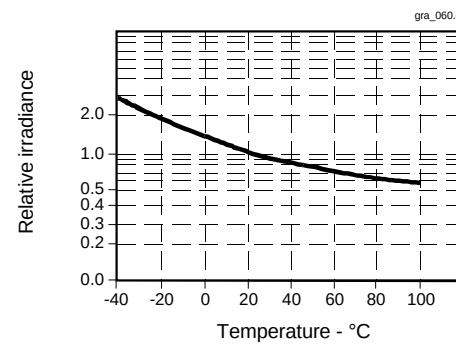





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Fig. 3 Output Rise Time ($t_r$) and Output Fall Time ($t_f$) vs Temperature

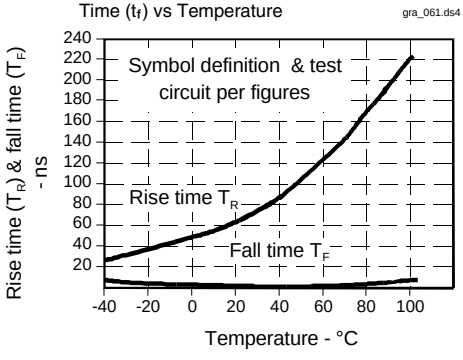



Fig. 4 Delay Time vs Temperature

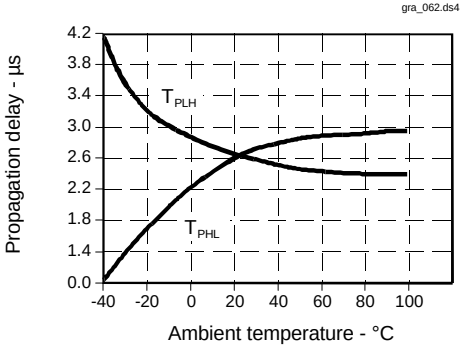
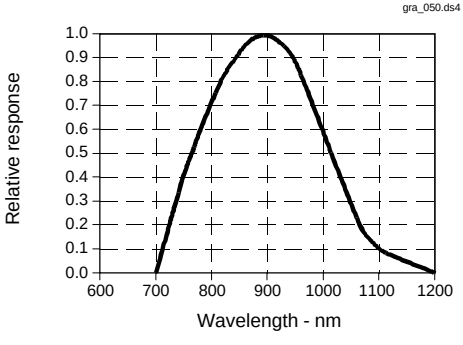



Fig. 5 Spectral Responsivity




All Performance Curves Show Typical Values