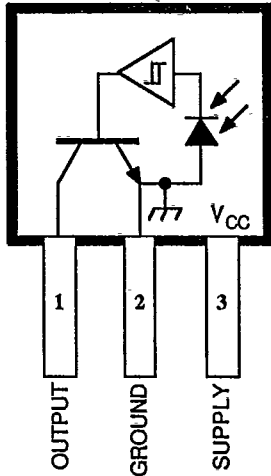


# 3390

T-41-67

## OPTOELECTRONIC SWITCH —TWILIGHT SENSOR



Dwg. PH-009

Designed for use in twilight sensing applications and in emergency and outdoor lighting, the ULN3390T optoelectronic switch is a monolithic integrated circuit containing a photodiode, low-level amplifier, comparator, voltage regulator, and output driver. The comparator is fabricated to give the sensor a built-in typical hysteresis value of 50 percent.

With temperature-compensated trip points, protection against damage by bright light, and increased hysteresis values, the ULN3390T represents a significant design improvement over previous optoelectronic switches. The integrated sensor is more stable over time and temperature than cadmium sulfide cell assemblies, requires fewer components, and has calibrated switching characteristics.

The UNL3390T switch typically turns ON as illumination falls below  $10 \mu\text{W}/\text{cm}^2$  at 880 nm. Internal hysteresis prevents deactivation until illumination exceeds  $20 \mu\text{W}/\text{cm}^2$ . The switching points can be factory-adjusted to customer specifications.

### FEATURES

- Photodiode with On-Chip Amplifier  
Comparator  
Output Driver  
Voltage Regulator
- 50% Hysteresis
- Temperature Compensation

### ABSOLUTE MAXIMUM RATINGS

|                                 |                 |
|---------------------------------|-----------------|
| Supply Voltage, $V_{CC}$ .....  | 25 V            |
| Output Voltage, $V_{OUT}$ ..... | 25 V            |
| Output Current, $I_{OUT}$ ..... | 25 mA           |
| Operating Temperature Range,    |                 |
| $T_A$ .....                     | -40°C to +85°C  |
| Storage Temperature Range,      |                 |
| $T_S$ .....                     | -55°C to +110°C |

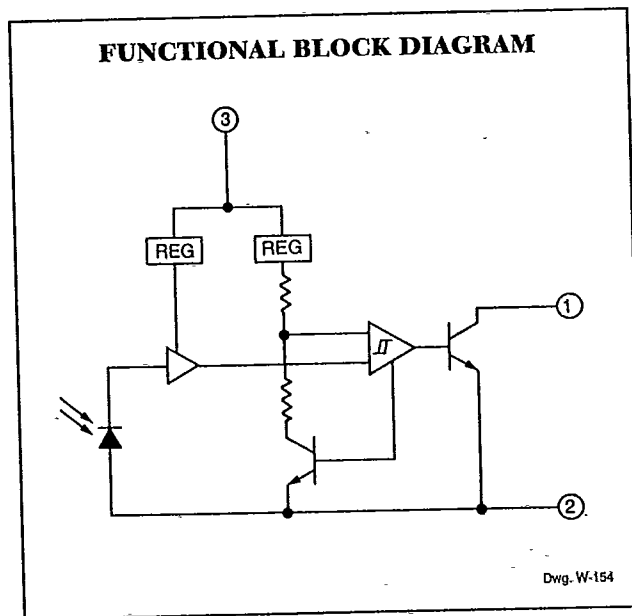
Always order by complete part number: **ULN3390T**.

**3390 OPTOELECTRONIC SWITCH**

T-41-69

**ELECTRICAL CHARACTERISTICS at  $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 6\text{ V}$  (unless otherwise noted).**

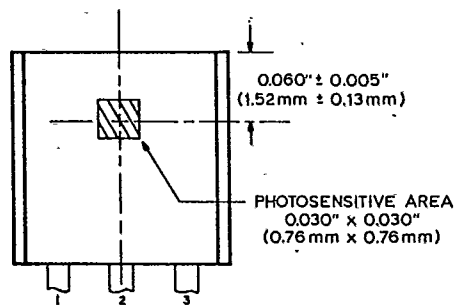
| Characteristic            | Symbol         | Test Conditions  | Limits |      |      | Units                     |
|---------------------------|----------------|--|--------|------|------|---------------------------|
|                           |                |  | Min.   | Typ. | Max. |                           |
| Supply Voltage Range      | $V_{CC}$       | Operating  | 4.0    | —    | 16   | V                         |
| Supply Current            | $I_{CC}$       | $E > E_{OFF}$  | —      | 3.0  | 10   | mA                        |
| Output Saturation Voltage | $V_{OUT(sat)}$ | $I_{OUT} = 15\text{ mA}$ , $E \leq 6\ \mu\text{W}/\text{cm}^2$ | —      | 300  | 500  | mV                        |
| Output Leakage Current    | $I_{OFF}$      | $V_{OUT} = 15\text{ V}$ , $E > E_{OFF}$                        | —      | 0.1  | 10   | $\mu\text{A}$             |
| Output Rise Time          | $t_r$          | 10% to 90%   | —      | 200  | 500  | ns                        |
| Output Fall Time          | $t_f$          | 90% to 10%   | —      | 200  | 500  | ns                        |
| Light Threshold Level     | $E_{ON}$       | $\lambda = 880\text{ nm}$                                      | 6.0    | 10   | 14   | $\mu\text{W}/\text{cm}^2$ |
|                           | $E_{OFF}$      | $\lambda = 880\text{ nm}$                                      | —      | 20   | —    | $\mu\text{W}/\text{cm}^2$ |
| Hysteresis                | $\Delta E$     | $(E_{OFF} - E_{ON})/E_{OFF}$                                   | 45     | 50   | 65   | %                         |



**3390 OPTOELECTRONIC SWITCH**

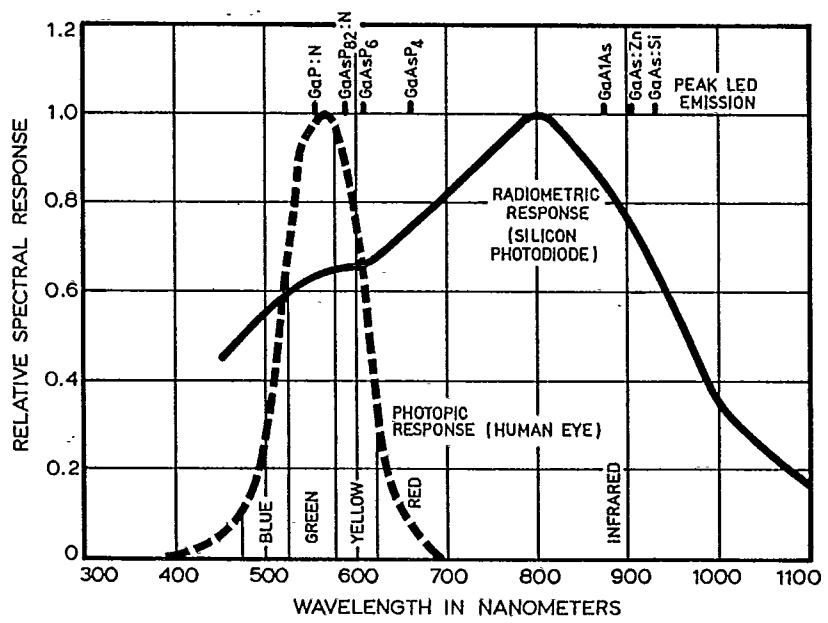
T-41-67

**SENSOR-CENTER LOCATION**



Dwg. No. A-13,301

**RELATIVE SPECTRAL RESPONSE AT  $T_A = +25^\circ\text{C}$  AS A FUNCTION OF WAVELENGTH OF LIGHT**



Dwg No. A-12,135A