

ULN-3390D AND ULN-3390T
OPTOELECTRONIC SWITCHES

ULN-3390D AND ULN-3390T

OPTOELECTRONIC SWITCHES—TWILIGHT SENSORS

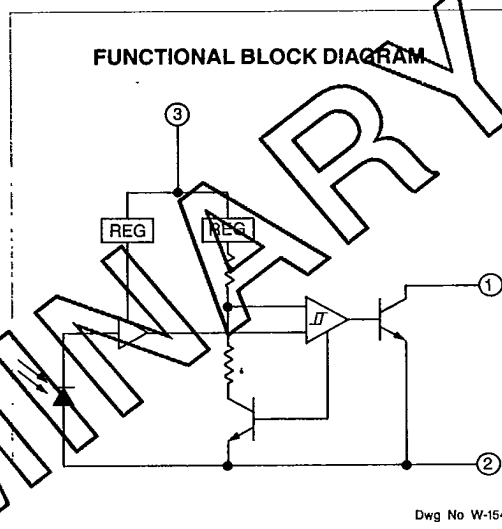
FEATURES

- Photodiode with On-Chip Amplifier
- Comparator
- Output Driver
- Voltage Regulator
- $20 \mu\text{W}/\text{cm}^2$ and $10 \mu\text{W}/\text{cm}^2$ Trip Points
- 50% Hysteresis
- Temperature Compensation
- Operation to 30 kHz
- Plastic or Hermetic Package

Designed for use in twilight sensing applications and in emergency and outdoor lighting, the Type 3390 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 ULN-3390 represents a significant design improvement over previous optoelectronic switches. The integrated sensors are more stable over time and temperature than cadmium sulfide cell assemblies, require fewer components, and have calibrated switching characteristics.

The ULN-3390D and ULN-3390T switches typically turn 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.



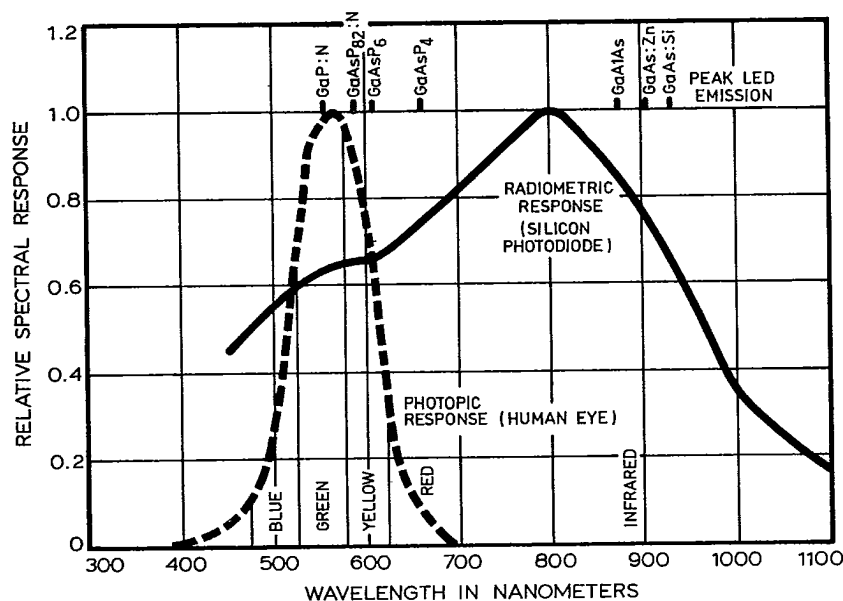
The ULN-3390D is furnished in a hermetically sealed metal package with a glass end cap. The "D" package conforms to JEDEC outline TO-52 (TO-206AC). ULN-3390T is supplied in a three-lead clear plastic package 0.080" (2.03 mm) thick.

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	
(ULN-3390D)	-55°C to +125°C
(ULN-3390T)	-55°C to +110°C

ULN-3390D AND ULN-3390T
OPTOELECTRONIC SWITCHESELECTRICAL CHARACTERISTICS at $T_A = +25^\circ\text{C}$ (unless otherwise noted)

Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Unit
Supply Voltage Range	V_{CC}	$-40^\circ\text{C} < T_A < +85^\circ\text{C}$	4.0	—	16	V
Supply Current	I_{CC}	$-40^\circ\text{C} < T_A < +85^\circ\text{C}$, $V_{CC} = 5\text{V}$, $E > 20\mu\text{W}/\text{cm}^2$	—	3.0	10	mA
Output Saturation Voltage	$V_{CE(sat)}$	$I_{OUT} = 15\text{mA}$, $E \leq 6\mu\text{W}/\text{cm}^2$, $-40^\circ\text{C} < T_A < +85^\circ\text{C}$	—	300	400	mV
Output Leakage Current	I_{OUT}	$V_{OUT} = 15\text{V}$, $E > 20\mu\text{W}/\text{cm}^2$, $-40^\circ\text{C} < T_A < +85^\circ\text{C}$	—	0.1	10	μA
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}	Output On, $V_{CC} = 5\text{V}$, $\lambda = 880\text{nm}$	6.0	10	14	$\mu\text{W}/\text{cm}^2$
	E_{OFF}	Output Off, $V_{CC} = 5\text{V}$, $\lambda = 880\text{nm}$	—	20	—	$\mu\text{W}/\text{cm}^2$
Hysteresis	ΔE	$(E_{OFF} - E_{ON})/E_{OFF}$	45	50	55	%

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

Dwg No. A-12, 135A

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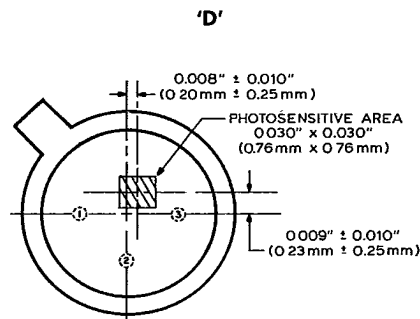
8514019 SPRAGUE/ SEMICONDUCTORS/ICS

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ULN-3390D AND ULN-3390T
OPTOELECTRONIC SWITCHES**ULN-3390D**

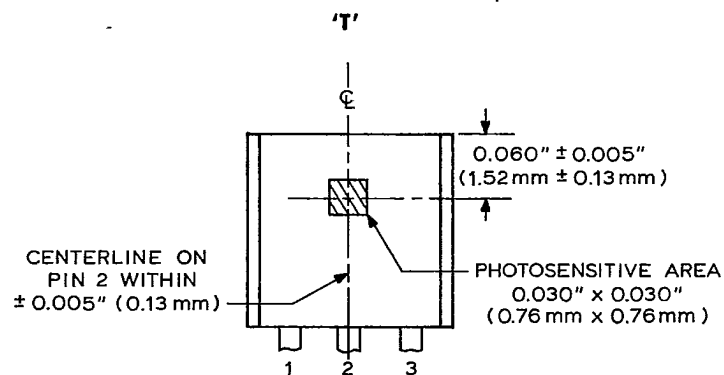
SENSOR-CENTER LOCATION



Dwg. No. A-13.302

ULN-3390T

SENSOR-CENTER LOCATION



Dwg. No A-13.301A