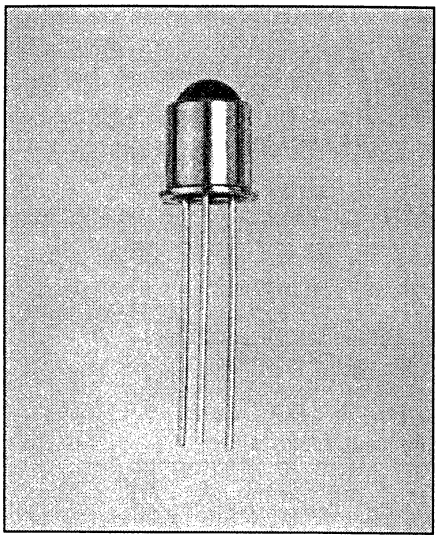
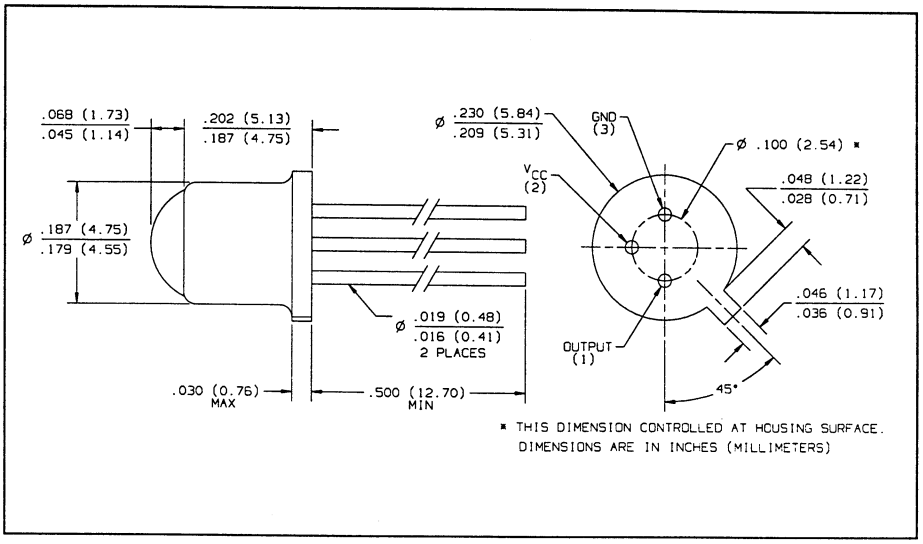
Photologic® Hermetic Sensors
Types OPL810, OPL811, OPL812, OPL813 Series





Features

- Four output options
- High noise immunity
- Direct TTL/LSTTL interface
- TO-18 hermetic package
- Mechanically and spectrally matched to the OP130 and OP230 series devices
- Two sensitivity options
- Data rate to 200 kBaud

Description

The OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812, OPL812-OC, OPL813, and OPL813-OC contain a monolithic integrated circuit which incorporates a photodiode, a linear amplifier, a voltage regulator, and a Schmitt trigger on a single silicon chip. The devices feature TTL/LSTTL compatible logic level output which can drive up to 10 TTL loads over supply voltages ranging from 4.5V to 16V. The Schmitt trigger's hysteresis characteristics provide high immunity to noise on input and V_{CC}. The Photologic® chip is mounted on a standard TO-18 header which is hermetically sealed in a lensed metal can.

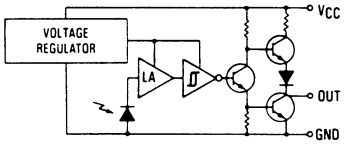
Absolute Maximum Ratings (T_A = 25° C unless otherwise noted)

Supply Voltage, V_{CC}	18 V
Storage Temperature Range	-65° C to +125° C
Operating Temperature Range	-55° C to +105° C
Lead Soldering Temperature Range [1/16 inch (1.6 mm) from case for 5 sec. with soldering iron]	260° C(1)
Power Dissipation	250 mW(2)
Duration of Output Short to V_{CC} (OPL810, OPL811, OPL812, OPL813)	1sec.
Duration of Output Short to V_{CC} (OPL810-OC, OPL811-OC, OPL812-OC, OPL813-OC)	1sec.
Voltage at Output Lead (OPL810-OC, OPL811-OC, OPL812-OC, OPL813-OC)	35 V
Sinking Current	50 mA
Sourcing Current (OPL810, OPL811, OPL812, OPL813)	10 mA
Irradiance (OPL810, OPL810-OC, OPL811, OPL811-OC)	2 mW/cm^2
Irradiance (OPL812, OPL812-OC, OPL813, OPL813-OC)	1 mW/cm^2

Notes:
(1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. Max 20 grams force may be applied to the leads when soldering.
(2) Derate linearly 2.5 mW/° C above 25° C.
(3) Light measurements are made with λi = 935 nm.

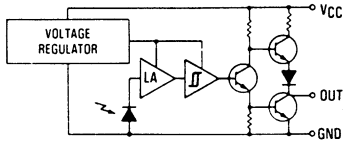
Schematics

OPL810, OPL812
(Totem-Pole Output) Buffer



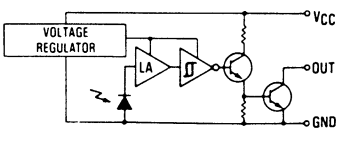
Light On - Output High

OPL811, OPL813
(Totem-Pole Output) Inverter



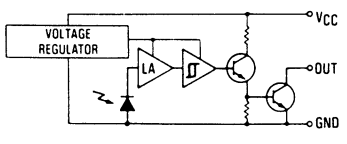
Light On - Output Low

OPL810-OC, OPL812-OC
(Open-Collector Output) Buffer



Light On - Output High

OPL811-OC, OPL813-OC
(Open-Collector Output) Inverter



Light On - Output Low

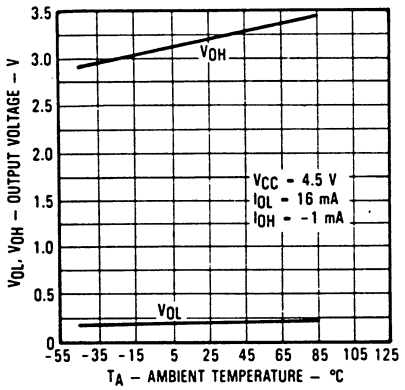
Types OPL810, OPL811 Series

Electrical Characteristics (-40° C to +100° C unless otherwise noted) V_{CC} = 4.5 V to 16 V

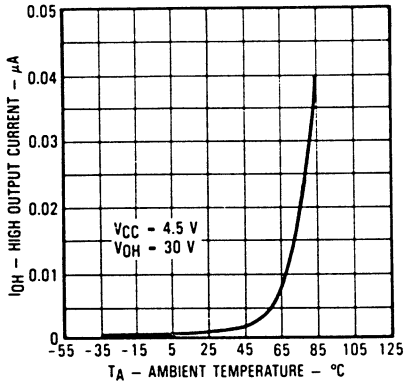
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
V_{CC}	Operating Supply Voltage	4.5		16.0	V	
	Peak-to-Peak V_{CC} Ripple Necessary to Cause False Triggering of Output			1.0	V	f = DC to 50 MHz
$E_{eT}(+)$	Positive-Going Threshold Irradiance(3)	0.015	0.06	0.20	mW/cm^2	T_A = 25° C
$E_{eT}(+)/E_{eT}(-)$	Hysteresis Ratio	1.20	1.55	2.00		
I_{CC}	Supply Current			15.0	mA	E_e = 0 or 0.4 mW/cm^2
OPL810 (Buffer, Totem-Pole)						
V_{OH}	High Level Output Voltage	V_{CC}-2.1			V	I_{OH} = -1 mA, E_e = 0.4 mW/cm^2
V_{OL}	Low Level Output Voltage			0.40	V	I_{OL} = 16 mA, E_e = 0
OPL810-OC (Buffer, Open-Collector)						
I_{OH}	High Level Output Current			100	µA	V_{OH} = 30 V, E_e = 0.4 mW/cm^2
V_{OL}	Low Level Output Voltage			0.40	V	I_{OL} = 16 mA, E_e = 0
OPL811 (Inverter, Totem-Pole)						
V_{OH}	High Level Output Voltage	V_{CC}-2.1			V	I_{OH} = -1 mA, E_e = 0
V_{OL}	Low Level Output Voltage			0.40	V	I_{OL} = 16 mA, E_e = 0.4 mW/cm^2
OPL811-OC (Inverter, Open-Collector)						
I_{OH}	High Level Output Current			100	µA	V_{OH} = 30 V, E_e = 0
V_{OL}	Low Level Output voltage			0.40	V	I_{OL} = 16 mA, E_e = 0.4 mW/cm^2
OPL810, OPL811						
t_r, t_f	Output Rise Time, Output Fall Time			70	ns	V_{CC} = 5 V, T_A = 25° C, Ee = 0 or 0.4 mW/cm^2, f = 10 kHz DC = 50%, R_L = 10 TTL Loads
t_{PLH}, t_{PHL}	Propagation Delay, Low-High, High-Low		5.0		µs	
OPL810-OC, OPL811-OC						
t_r, t_f	Output rise Time, Output Fall Time			100	ns	V_{CC} = 5 V, T_A = 25° C, Ee = 0 or 0.4 mW/cm^2, f = 10 kHz DC = 50%, R_L = 300 Ω
t_{PLH}, t_{PHL}	Propagation Delay, Low-High, High-Low		5.0		µs	

Typical Performance Curves

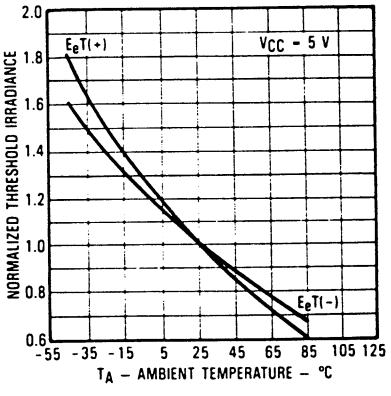
Output Voltage vs. Ambient Temp.



High Output Current vs. Ambient Temp.



Normalized Threshold Irradiance vs. T_A



PHOTOLOGIC® SENSORS

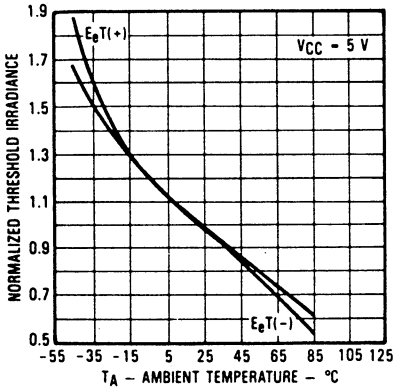
Types OPL812, OPL813 Series

Electrical Characteristics (-40° C to +100° C unless otherwise noted) V_{CC} = 4.5 V to 16 V

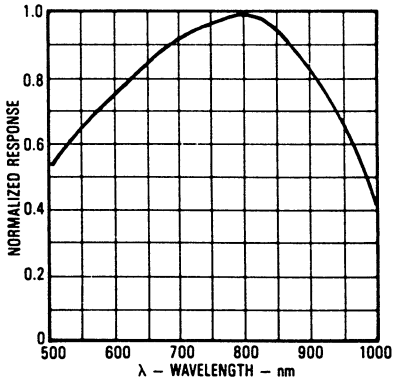
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
V_{CC}	Operating Supply Voltage	4.5		16.0	V	
	Peak-to-Peak V_{CC} Ripple Necessary to Cause False Triggering of Output			1.0	V	f = DC to 50 MHz
$E_{eT}(+)$	Positive-Going Threshold Irradiance(3)	0.005	0.025	0.10	mW/cm^2	T_A = 25° C
$E_{eT}(+)/E_{eT}(-)$	Hysteresis Ratio	1.20	1.55	2.00		
I_{CC}	Supply Current			15.0	mA	E_e = 0 or 0.2 mW/cm^2
OPL812 (Buffer, Totem-Pole)						
V_{OH}	High Level Output Voltage	V_{CC}-2.1			V	I_{OH} = -1 mA, E_e = 0.2 mW/cm^2
V_{OL}	Low Level Output Voltage			0.40	V	I_{OL} = 16 mA, E_e = 0
OPL812-OC (Buffer, Open-Collector)						
I_{OH}	High Level Output Current			100	µA	V_{OH} = 30 V, E_e = 0.2 mW/cm^2
V_{OL}	Low Level Output Voltage			0.40	V	I_{OL} = 16 mA, E_e = 0
OPL813 (Inverter, Totem-Pole)						
V_{OH}	High Level Output Voltage	V_{CC}-2.1			V	I_{OH} = -1 mA, E_e = 0
V_{OL}	Low Level Output Voltage			0.40	V	I_{OL} = 16 mA, E_e = 0.2 mW/cm^2
OPL813-OC (Inverter, Open-Collector)						
I_{OH}	High Level Output Current			100	µA	V_{OH} = 30 V, E_e = 0
V_{OL}	Low Level Output Voltage			0.40	V	I_{OL} = 16 mA, E_e = 0.2 mW/cm^2
OPL812, OPL813						
t_r, t_f	Output Rise Time, Output Fall Time			70	ns	V_{CC} = 5 V, T_A = 25° C, E_e = 0 or 0.2 mW/cm^2, f = 10 kHz DC = 50%, R_L = 10 TTL Loads
t_{PLH}, t_{PHL}	Propagation Delay, Low-High, High-Low		5.0		µs	
OPL812-OC, OPL813-OC						
t_r, t_f	Output Rise Time, Output Fall Time			100	ns	V_{CC} = 5 V, T_A = 25° C, Ee = 0 or 0.2 mW/cm^2, f = 10 kHz DC = 50%, R_L = 300 Ω
t_{PLH}, t_{PHL}	Propagation Delay, Low-High, High-Low		5.0		µs	

Typical Performance Curves

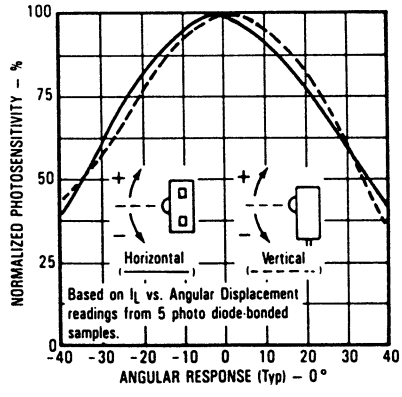
Normalized Threshold Irradiance vs. Amb. Temp.



Normalized Spectral Response

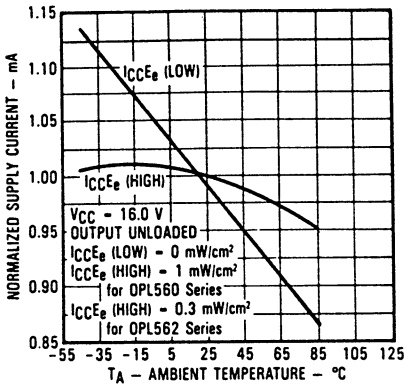


Angular Displacement from Package Mechanical Axis

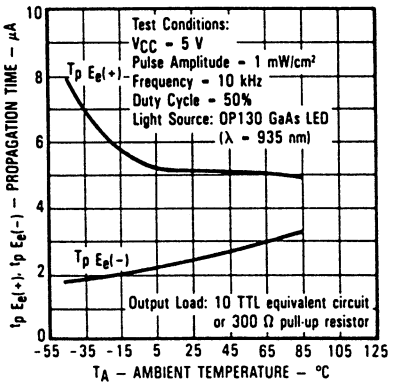


Typical Performance Curves

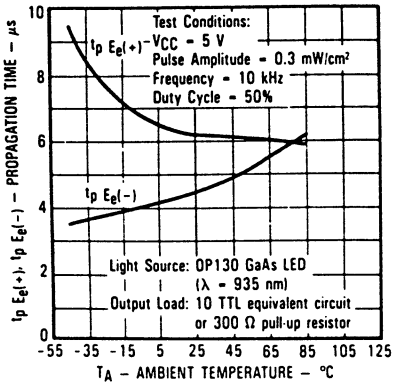
Normalized Supply Current vs. Ambient Temperature



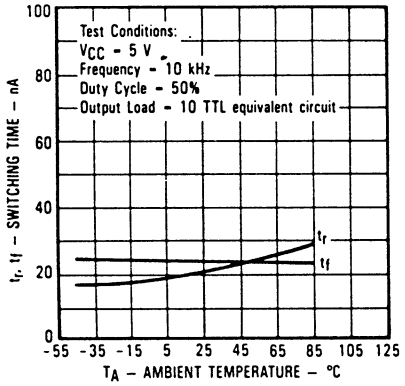
Propagation Time vs. Amb. Temp.



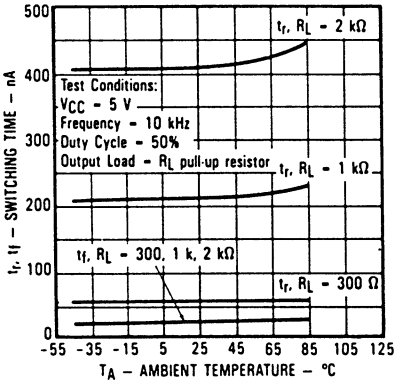
Propagation Time vs. Amb. Temp.



Rise Time & Fall Time vs. T_A

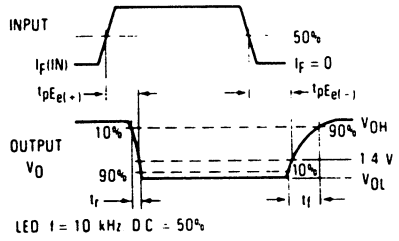


Rise Time & Fall Time vs. T_A vs. Output Load

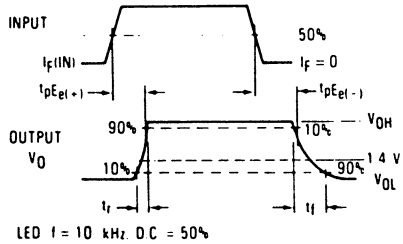


Switching Test Curves

Switching Test Curve for Inverters



Switching Test Curve for Buffers



PHOTOLOGIC® SENSORS