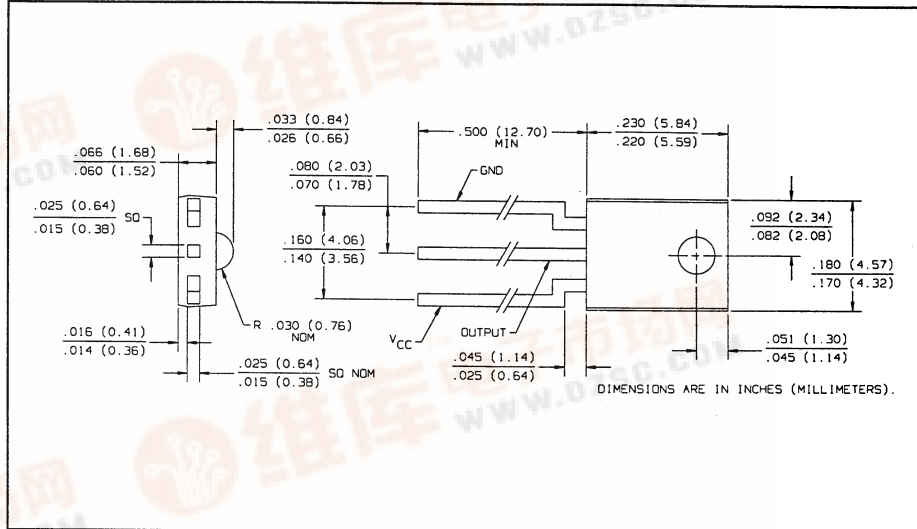
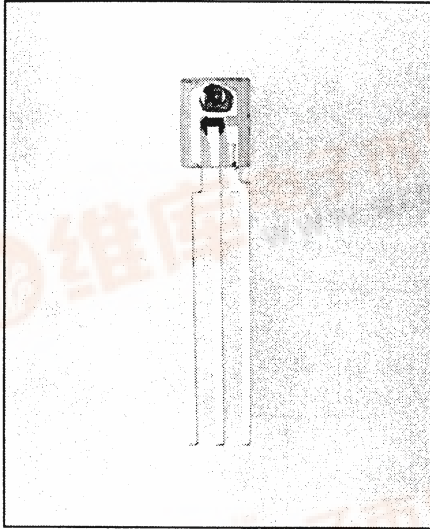




Product Bulletin OPL560
July 1996

Photologic[®] Sensors

Types OPL560, OPL561, OPL562, OPL563 Series



Features

- Four output options
- High noise immunity
- Direct TTL/LSTTL interface
- Low cost plastic side-looking package
- Mechanically and spectrally matched to the OP140 and OP240 series LED's
- Data rates to 200 kBaud
- Two sensitivity options

Description

The OPL560, OPL560-OC, OPL561, OPL561-OC, OPL562, OPL562-OC, OPL563, and OPL563-OC contain a monolithic integrated circuit which incorporates a photodiode, a linear amplifier, 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 4.5 V to 16 V. The Photologic[®] chip is encapsulated in a molded plastic package which has an integral lens for enhanced optical coupling.

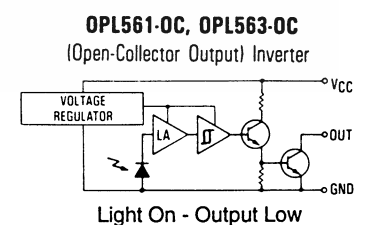
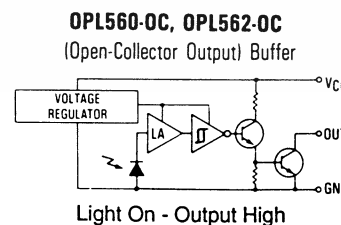
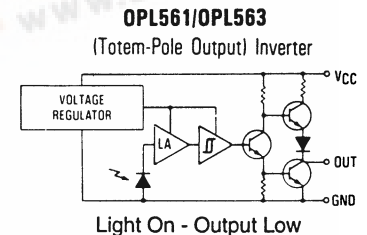
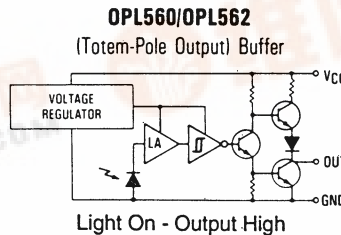
Absolute Maximum Ratings (T_A = 25° C unless otherwise noted)

Supply Voltage, V _{CC}	18 V
Storage Temperature Range	-40° C to +100° C
Operating Temperature Range	-40° C to +85° C
Lead Soldering Temperature Range [1/16 inch (1.6 mm) from case for 5 sec. with soldering iron]	240° C
Power Dissipation	200 mW ⁽¹⁾
Duration of Output Short to V _{CC} (OPL560, OPL561, OPL562, OPL563)	1.00 sec.
Duration of Output Short to V _{CC} (OPL560-OC, OPL561-OC, OPL562-OC, OPL563-OC)	1.00 sec.
Voltage at Output Lead (OPL560-OC, OPL561-OC, OPL562-OC, OPL563-OC)	35 V
Sinking Current	50 mA
Sourcing Current (OPL560, OPL561, OPL562, OPL563)	10 mA
Irradiance (OPL560, OPL560-OC, OPL561, OPL561-OC)	9 mW/cm ²
Irradiance (OPL562, OPL562-OC, OPL563, OPL563-OC)	3 mW/cm ²

Notes:

- (1) Derate linearly 2.50 mW/° C above 25° C.
- (2) RMA flux is recommended. Duration can be extended to 10 sec. maximum when flow soldering. Max 20 grams force may be applied to the leads when soldering.
- (3) Irradiance measurements are made with λ_i = 953 nm.

Schematics



Types OPL560, OPL561 Series

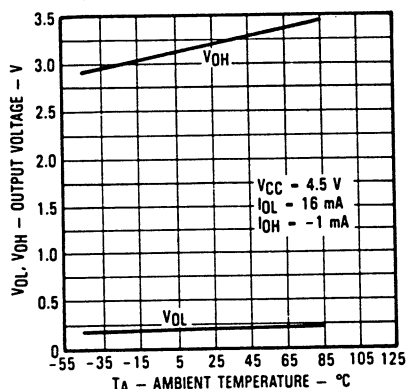
Electrical Characteristics (-40° C to +85° C unless otherwise noted) V_{CC} = 4.5 V to 16 V

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			2	V	f = DC to 50 MHz
E _{eT} (+)	Positive-Going Threshold Irradiance ⁽³⁾ OPL560, OPL560-OC, OPL561, OPL561-OC OPL560A, OPL560-OCA, OPL561A, OPL561-OCA	0.09 0.09		0.55 0.36	mW/cm ² mW/cm ²	T _A = 25° C T _A = 25° C
E _{eT} (+)/E _{eT} (-)	Hysteresis Ratio	1.20	1.55	2.00		
I _{CC}	Supply Current		8.0	12.0	mA	E _e = 0 or 1 mW/cm ²
OPL560 (Buffer, Totem-Pole)						
V _{OH}	High Level Output Voltage	V _{CC} -2.1			V	I _{OH} = -1 μA, E _e = 1 mW/cm ²
V _{OL}	Low Level Output Voltage			0.40	V	I _{OL} = 16 mA, E _e = 0
OPL560-OC (Buffer, Open-Collector)						
I _{OH}	High Level Output Current			100	μA	V _{OH} = 30 V, E _e = 1 mW/cm ²
V _{OL}	Low Level Output Voltage			0.40	V	I _{OL} = 16 mA, E _e = 0
OPL561 (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 = 1 mW/cm ²
OPL561-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 = 1 mW/cm ²
OPL560, OPL561						
t _r , t _f	Output Rise Time, Output Fall Time			70	ns	T _A = 25° C, E _e = 0 or 1 mW/cm ² , f = 10 kHz
t _{PHL} , t _{PHL}	Propagation Delay, Low-High, High-Low		5.0		μs	DC = 50%, R _L = 10 TTL Loads
OPL560-OC, OPL561-OC						
t _r , t _f	Output Rise Time, Output Fall Time			100	ns	T _A = 25° C, E _e = 0 or 1 mW/cm ² , f = 10 kHz
t _{PLH} , t _{PHL}	Propagation Delay, Low-High, High-Low		5.0		μs	DC = 50%, R _L = 300 Ω

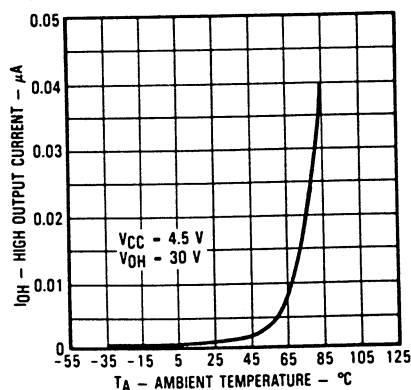
PHOTOLOGIC®
SENSORS

Typical Performance Curves

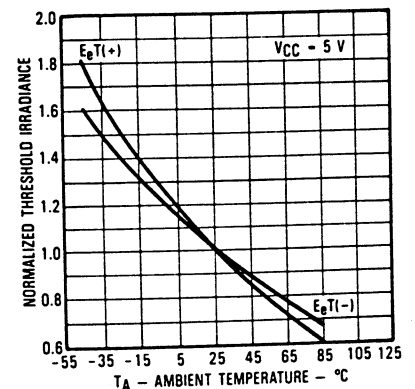
OPL560, OPL561, OPL562, OPL563
Output Voltage vs. Ambient Temp.



OPL560-OC, OPL561-OC, OPL562-OC, OPL563-OC
High Output Current vs. Ambient Temp.



OPL560, OPL560-OC, OPL561, OPL561-OC
Normalized Threshold Irradiance vs. T_A



Circle K reserves the right to make changes at any time in order to improve design and to supply the best product possible.

Types OPL562, OPL563 Series

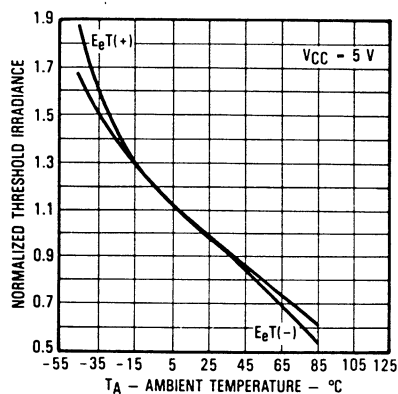


Electrical Characteristics (-40° C to +85° C unless otherwise noted) $V_{CC} = 4.5 \text{ V to } 16 \text{ V}$

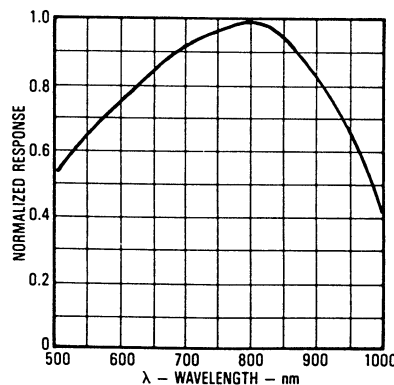
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
V_{CC}	Operating Supply Voltage	4.5		16.0	V	
	Peak-to-Peak V_{CC} Ripple Necessary to Cause False Triggering of Output			2	V	$f = \text{DC to } 50 \text{ MHz}$
$E_{eT(+)}$	Positive-Going Threshold Irradiance ⁽³⁾ OPL562, OPL562-OC, OPL563, OPL563-OC OPL562A, OPL562-OCA, OPL563A, OPL563-OCA	0.025 0.025		0.230 0.140	mW/cm^2 mW/cm^2	$T_A = 25^\circ \text{ C}$ $T_A = 25^\circ \text{ C}$
$E_{eT(+)} / E_{eT(-)}$	Hysteresis Ratio	1.20	1.55	2.00		
I_{CC}	Supply Current		8.0	12.0	mA	$E_e = 0 \text{ or } 0.3 \text{ mW/cm}^2$
OPL562 (Buffer, Totem-Pole)						
V_{OH}	High Level Output Voltage	$V_{CC}-2.1$			V	$I_{OH} = -1 \mu\text{A}$, $E_e = 0.3 \text{ mW/cm}^2$
V_{OL}	Low Level Output Voltage			0.40	V	$I_{OL} = 16 \text{ mA}$, $E_e = 0$
OPL562-OC (Buffer, Open-Collector)						
I_{OH}	High Level Output Current			100	μA	$V_{OH} = 30 \text{ V}$, $E_e = 0.3 \text{ mW/cm}^2$
V_{OL}	Low Level Output Voltage			0.40	V	$I_{OL} = 16 \text{ mA}$, $E_e = 0$
OPL563 (Inverter, Totem-Pole)						
V_{OH}	High Level Output Voltage	$V_{CC}-2.1$			V	$I_{OH} = -1 \text{ mA}$, $E_e = 0$
V_{OL}	Low Level Output voltage			0.40	V	$I_{OL} = 16 \text{ mA}$, $E_e = 0.3 \text{ mW/cm}^2$
OPL563-OC (Inverter, Open-Collector)						
I_{OH}	High Level Output Current			100	μA	$V_{OH} = 30 \text{ V}$, $E_e = 0$
V_{OL}	Low Level Output Voltage			0.40	V	$I_{OL} = 16 \text{ mA}$, $E_e = 0.3 \text{ mW/cm}^2$
OPL562, OPL563						
t_r, t_f	Output Rise Time, Output Fall Time			70	ns	$T_A = 25^\circ \text{ C}$, $E_e = 0 \text{ or } 0.3 \text{ mW/cm}^2$, $f = 10 \text{ kHz}$, DC = 50%, $R_L = 10 \text{ TTL Loads}$
t_{PLH}, t_{PHL}	Propagation Delay, Low-High, High-Low		6.0		μs	
OPL562-OC, OPL563-OC						
t_r, t_f	Output Rise Time, Output Fall Time			100	ns	$T_A = 25^\circ \text{ C}$, $E_e = 0 \text{ or } 0.3 \text{ mW/cm}^2$, $f = 10 \text{ kHz}$, DC = 50%, $R_L = 300 \Omega$
t_{PLH}, t_{PHL}	Propagation Delay, Low-High, High-Low		6.0		μs	

Typical Performance Curves

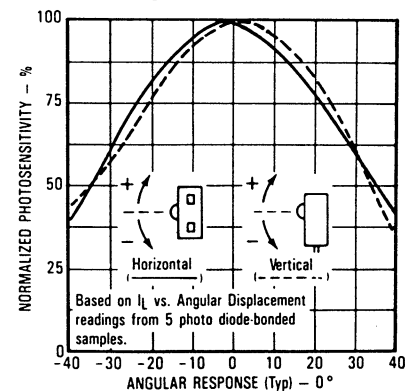
OPL562, OPL562-OC, OPL563, OPL563-OC
Normalized Threshold Irradiance vs. Amb. Temp.



Normalized Spectral Response



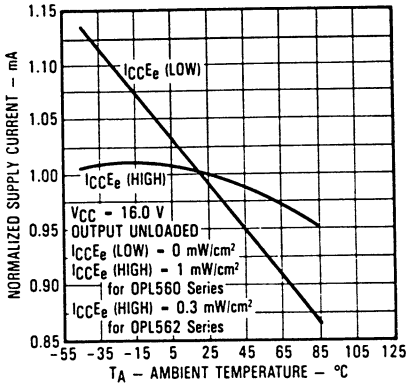
Angular Displacement from Package Mechanical Axis



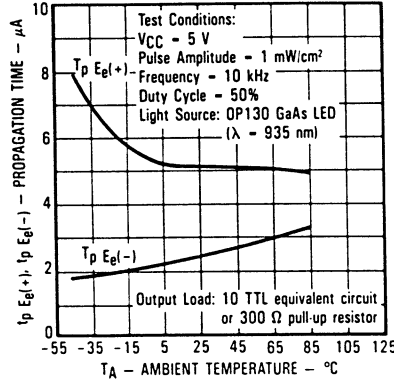
Types OPL562, OPL563 Series

Typical Performance Curves

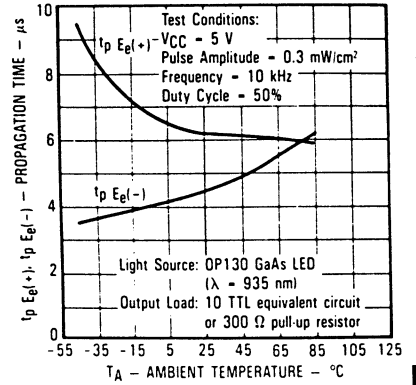
Normalized Supply Current vs. Ambient Temperature



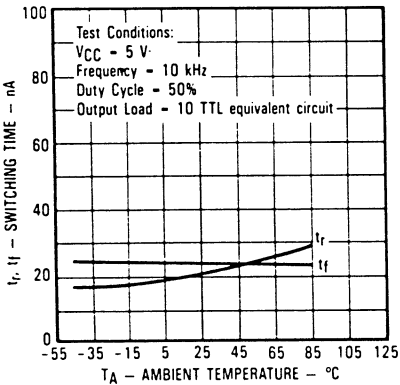
OPL560, OPL560-OC, OPL561, OPL561-OC Propagation Time vs. Amb. Temp.



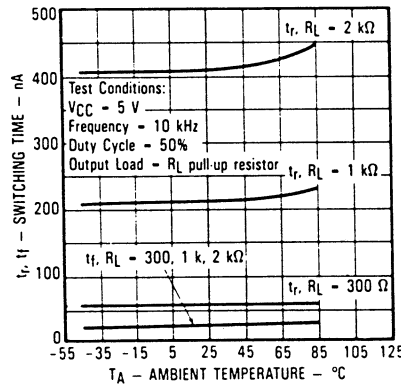
OPL562, OPL562-OC, OPL563, OPL563-OC Propagation Time vs. Amb. Temp.



OPL560, OPL561, OPL562, OPL563 Rise Time & Fall Time vs. TA

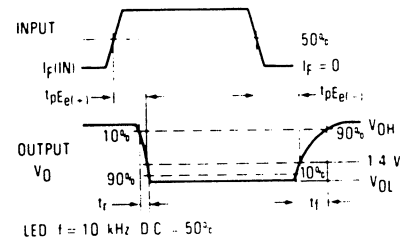


OPL560-OC, OPL561-OC, OPL562-OC, OPL563-OC Rise Time & Fall Time vs. TA vs. Output Load



Switching Test Curves

Switching Test Curve for Inverters



Switching Test Curve for Buffers

