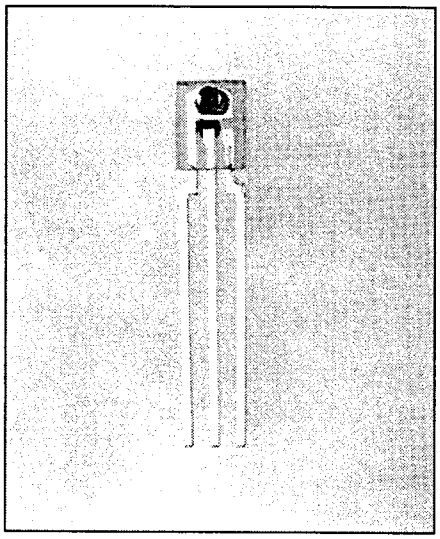
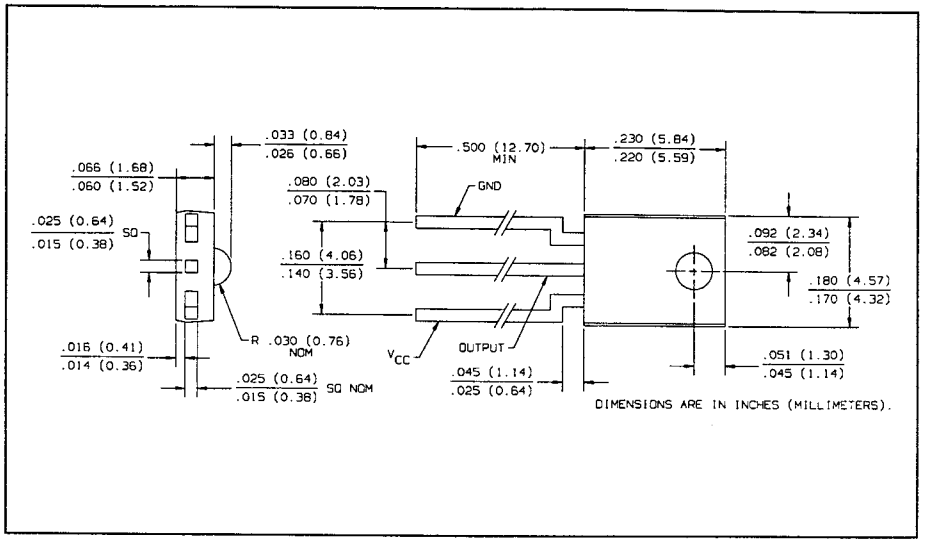
Photologic® Plastic Sensors
Types OPL550, OPL551 Series





Features

- Four output options
- High noise immunity
- Direct TTL/LSTTL interface
- Low cost plastic side-looking package
- Mechanically and spectrally matched to OP140 and OP240 series LEDs
- Data rates to 250 kBaud

Description

The OPL550, OPL550-OC, OPL551, and OPL551-OC contain a monolithic integrated circuit which incorporates a photodiode, a linear amplifier and a Schmitt trigger on a single silicon chip. The devices feature TTL/LSTTL compatible logic level output which can drive up to 8 TTL loads without additional circuitry. Also featured are medium speed data rates to 250 kBaud with typical rise and fall times of 25 nsec. The Schmitt trigger's hysteresis characteristics provide high immunity to noise on input and V_{CC}. The Photologic® chip is encapsulated in a molded plastic package which has an integral lens for enhanced optical coupling. These devices are mechanically and spectrally matched to OP140 and OP240 infrared emitting diodes.

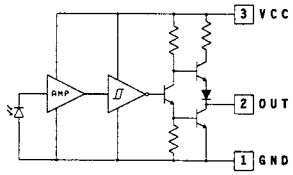
Absolute Maximum Ratings (T_A = 25° C unless otherwise noted)

Supply Voltage, V_{CC} (not to exceed 3 seconds)	+10 V
Storage Temperature Range	-40° C to +100° C
Operating Temperature Range	-40° C to +85° C
Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 sec. with soldering iron]	260° C(1)
Power Dissipation	200 mW(2)
Duration of Output Short to V_{CC} or Ground (OPL550, OPL551)	1.00 sec.
Duration of Output Short to V_{CC} (OPL550-OC, OPL551-OC)	1.00 sec.
Voltage at Output Lead (OPL550-OC, OPL551-OC)	35 V
Low Level Output Current	16 mA
High Level Output Current (OPL550, OPL551)	1 mA
Irradiance	10 mW/cm²

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 leads when soldering.
(2) Derate linearly 2.5 mW/° C above 25° C.
(3) Irradiance measurements are made with λ_i = 935 nm.

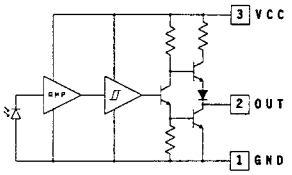
Schematics

OPL550 (Totem-Pole Output) Buffer



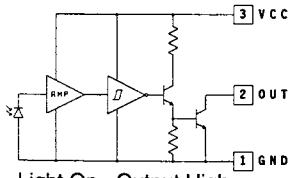
Light On - Output High

OPL551 (Totem-Pole Output) Inverter



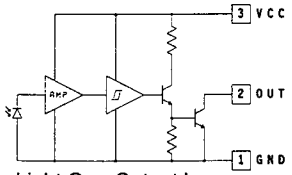
Light On - Output Low

OPL550-OC (Open-Collector Output) Buffer



Light On - Output High

OPL551-OC (Open-Collector Output) Inverter



Light On - Output Low

Types OPL550, OPL551 Series

Electrical Characteristics (-40° C to +85° C unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
V_{CC}	Operating Supply Voltage	4.5		5.5	V	
	Peak-to-Peak V_{CC} Ripple Necessary to Cause False Triggering of Output		2.0		V	V_{CC} = 5 VDC f = DC to 50 MHz
$E_{eT}(+)$	Positive-Going Threshold Irradiance OPL550, OPL550-OC, OPL551, OPL551-OC OPL550A,OPL550-OCA, OPL551A, OPL551-OCA	 0.25 0.25		 2.4 1.4	 mW/cm^2 mW/cm^2	 V_{CC} = 5 V, T_A = 25° C V_{CC} = 5 V, T_A = 25° C
$E_{eT}(+)/E_{eT}(-)$	Hysteresis Ratio	1.50	2.0	2.5		
I_{CC}	Supply Current		8.0	15.0	mA	V_{CC} = 5.5 V, E_e = 0 or 3 mW/cm^2
OPL550 (Buffer, Totem-Pole)						
V_{OH}	High Level Output Voltage	2.4	3.3		V	V_{CC} = 4.5 V, I_{OH} = -800 µA, E_e = 3 mW/cm^2
V_{OL}	Low Level Output Voltage		0.25	0.40	V	V_{CC} = 4.5 V, I_{OL} = 12.8 mA, E_e = 0
I_{OS}	Short Circuit Output Current	-20	-55	-100	mA	V_{CC} = 5.5 V, E_e = 3 mW/cm^2, Output = GND
OPL550-OC (Buffer, Open-Collector)						
I_{OH}	High Level Output Current		1.0	100	µA	V_{CC} = 4.5 V, V_{OH} = 30 V, E_e = 3 mW/cm^2
V_{OL}	Low Level Output Voltage		0.25	0.40	V	V_{CC} = 4.5 V, I_{OL} = 12.8 mA, E_e = 0
OPL551 (Inverter, Totem-Pole)						
V_{OH}	High Level Output Voltage	2.4	3.3		V	V_{CC} = 4.5 V, I_{OH} = -800 µA, E_e = 0
V_{OL}	Low Level OUtput Voltage		0.25	0.40	V	V_{CC} = 4.5 V, I_{OL} = 12.8 mA, E_e = 3 mW/cm^2
I_{OS}	Short Circuit Output Current	-20	-55	-100	mA	V_{CC} = 5.5V, E_e = 0, Output = GND
OPL551-OC (Inverter, Open-Collector)						
I_{OH}	High Level Output Current		1.0	100	µA	V_{CC} = 4.5 V, V_{OH} = 30 V, E_e = 0
V_{OL}	Low Level Output Current		0.25	0.40	V	V_{CC} = 4.5 V, I_{OL} = 12.8 mA, E_e = 3 mW/cm^2
OPL550, OPL551						
t_r, t_f	Output Rise Time, Output Fall Time		25	70	ns	V_{CC} = 5 V, T_A = 25° C, E_e = 0 or 3 mW/cm^2 f = 10 kHz, D.C. = 50%, R_L = 8 TTL Loads
t_{PLH}, t_{PHL}	Propagation Delay, Low-High, High-Low		2.5	5.0	µs	
OPL550-OC, OPL551-OC						
t_r, t_f	Output Rise Time, Output Fall Time		25	70	ns	V_{CC} = 5 V, T_A = 25° C, E_e = 0 or 3 mW/cm^2 f = 10 kHz, D.C. = 50%, R_L = 360 Ω
t_{PLH}, t_{PHL}	Propagation Delay, Low-High, High-Low		2.5	5.0	µs	

PHOTOLOGIC® SENSORS

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

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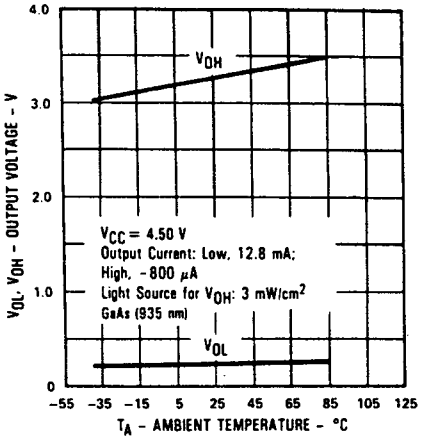
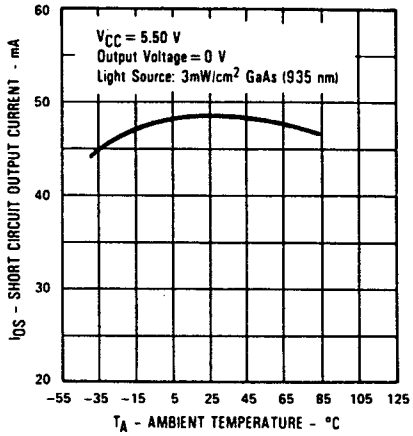
Typical Performance Curves

OPL550, OPL551

Output Voltage vs. Ambient Temperature

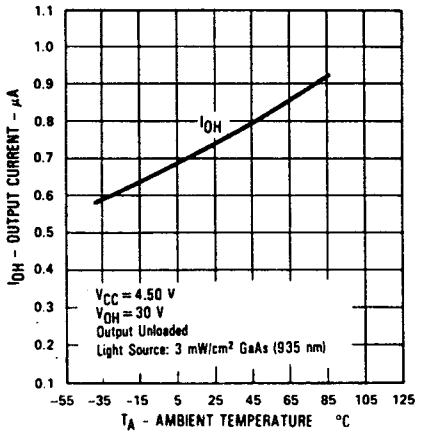


Short Circuit Output Current vs. Ambient Temperature

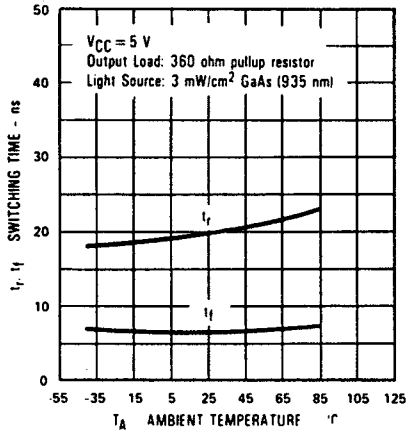


OPL550-OC, OPL551-OC

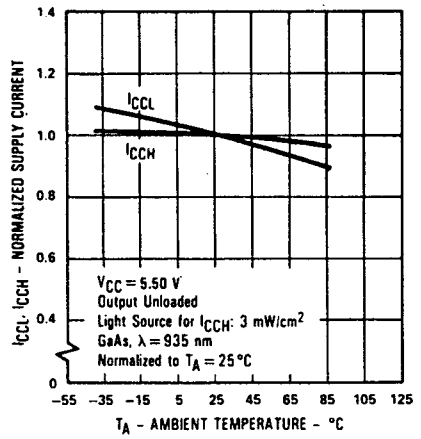
Output Current (High) vs Ambient Temperature



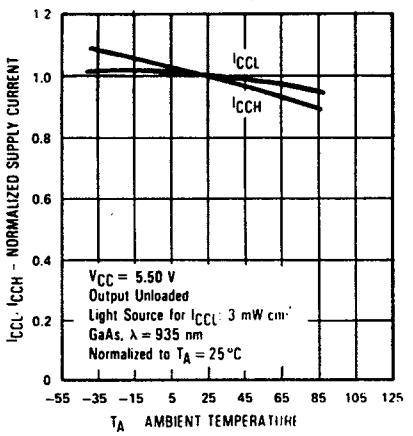
Rise Time and Fall time vs Ambient Temperature



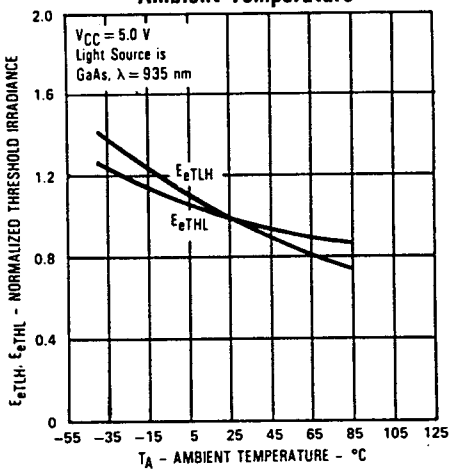
OPL550, OPL550-OC Normalized Supply Current vs Ambient Temperature



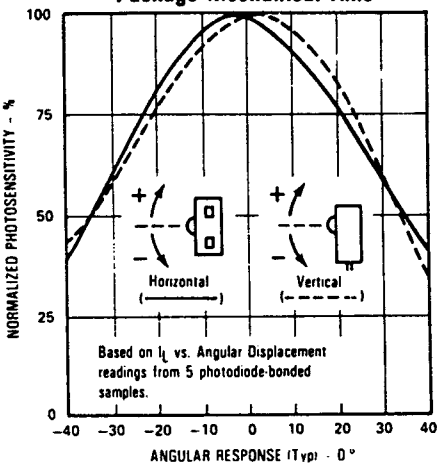
OPL551, OPL551-OC Normalized Supply Current vs Ambient Temperature



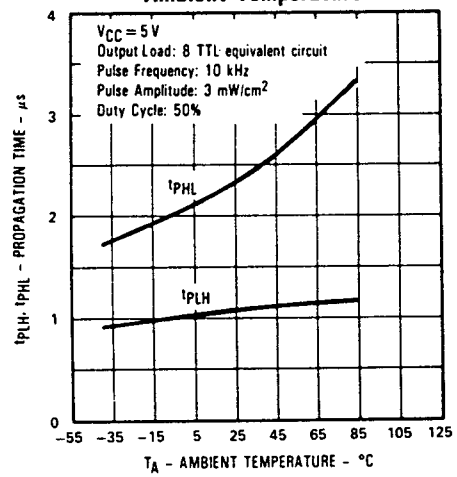
Normalized Threshold Irradiance vs Ambient Temperature



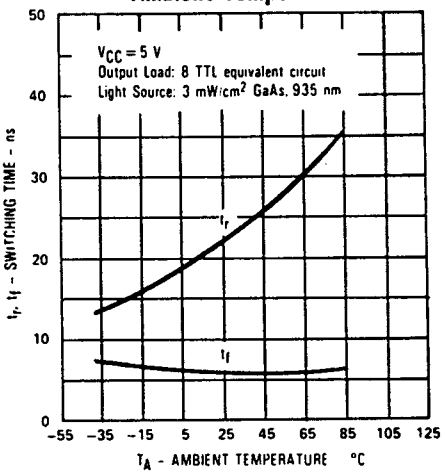
Angular Displacement from Package Mechanical Axis



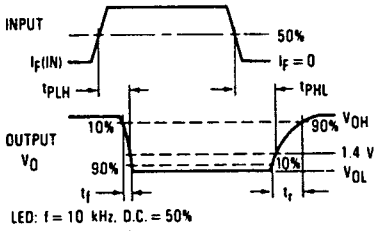
Propagation Time vs Ambient Temperature



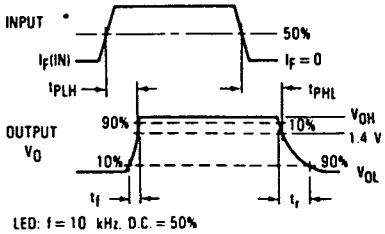
Rise Time and Fall time vs Ambient Temperature



Switching Test Curve for Inverters



Switching Test Curve for Buffers



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