

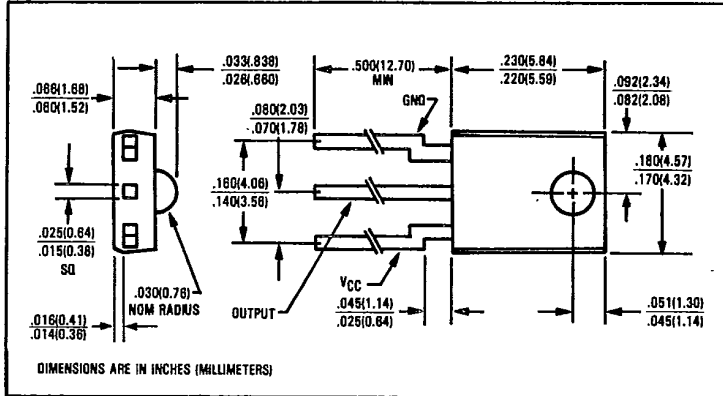
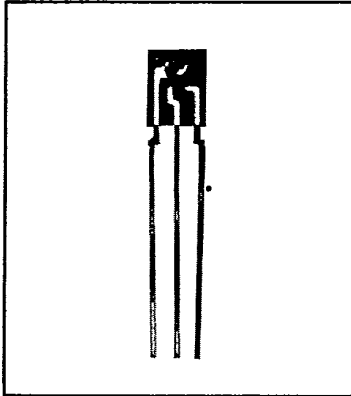
Optoelectronics Division  
TRW Electronic Components Group



Product Bulletin 5154  
January 1985

# Photologic™ Plastic Sensors

## Types OPL550, OPL550-OC, OPL551, OPL551-OC, SLB, SLA



**Features**

- Four output options
- High noise immunity
- Direct TTL/LSTTL interface
- Low cost plastic side looking package
- Mechanically and spectrally matched to OP140SL and OP240SL series LEDs
- Data rates to 250 K-baud

**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 K-baud with typical rise and fall times of 25 nsec. The Schmitt trigger's hysteresis characteristics provide high immunity to noise on input and V<sub>CC</sub>. 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 the OP140SL and OP240SL infrared emitting diodes.

**Absolute Maximum Ratings** (T<sub>A</sub> = 25°C unless otherwise noted)

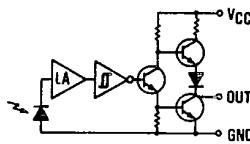
Supply Voltage, V <sub>CC</sub> (not to exceed 3 seconds)	+10.0 V
Storage Temperature Range	-40°C to +100°C
Operating Temperature Range	-40°C to +85°C
Lead Soldering Temperature (1/16 inch [1.6 mm] from case for 5 sec. with soldering iron)	240°C <sup>(1)</sup>
Power Dissipation	85 mW <sup>(2)</sup>
Duration of Output Short to V <sub>CC</sub> or Ground (OPL550, OPL551)	1.00 sec.
Duration of Output Short to V <sub>CC</sub> (OPL550-OC, OPL551-OC)	1.00 sec.
Voltage at Output Lead (OPL550-OC, OPL551-OC)	35 V
Low Level Output Current	16.0 mA
High Level Output Current (OPL550, OPL551)	1.00 mA
Irradiance	25 mW/cm <sup>2</sup>

**Notes:**

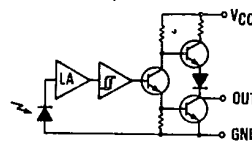
- (1) RMA flux is recommended. Duration can be extended to 10 seconds max. when flow soldering.
- (2) Derate linearly 4.25 mW/°C above 80°C.

**Schematics**

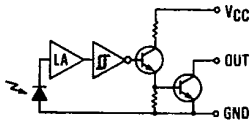
**OPL550 (Totem-Pole Output) Buffer**



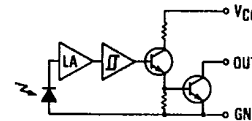
**OPL551 (Totem-Pole Output) Inverter**



**OPL550-OC (Open-Collector Output) Buffer**



**OPL551-OC (Open-Collector Output) Inverter**



Types OPL550, OPL550-OC, OPL551, OPL551-OC, SLB, SLA

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
VCC	Operating Supply Voltage	4.5		5.5	V	
	Peak-to-Peak VCC Ripple Necessary to Cause False Triggering of Output		2.0		V	VCC = 5.0 VDC f = DC to 50 MHz
E <sub>oT(+)</sub>	Positive-Going Threshold Irradiance OPL550, OPL550-OC, OPL551, OPL551-OC OPL550SLA, OPL550-OCSLA, OPL551SLA, OPL551-OCSLA OPL550SLB, OPL550-OCSLB, OPL551SLB, OPL551-OCSLB	.25 .25 .65		2.4 1.40 1.90	mW/cm <sup>2</sup> mW/cm <sup>2</sup> mW/cm <sup>2</sup>	VCC = 5.0 V VCC = 5.0 V VCC = 5.0 V
E <sub>oT(+)</sub> /E <sub>oT(-)</sub>	Hysteresis Ratio	1.50	2.0	3.0		
ICC	Supply Current		8.0	15.0	mA	VCC = 5.5 V, E <sub>o</sub> = 0 or 3.0 mW/cm <sup>2</sup>

OPL550 (Buffer, Totem-Pole)

V <sub>OH</sub>	High Level Output Voltage	2.4	3.3		V	VCC = 4.5 V, I <sub>OH</sub> = -800 μA, E <sub>o</sub> = 3.0 mW/cm <sup>2</sup>
V <sub>OL</sub>	Low Level Output Voltage		.25	0.40	V	VCC = 4.5 V, I <sub>OL</sub> = 12.8 mA, E <sub>o</sub> = 0
I <sub>OS</sub>	Short Circuit Output Current	-20	-55	-100	mA	VCC = 5.5 V, E <sub>o</sub> = 3.0 mW/cm <sup>2</sup> , Output = GND

OPL550-OC (Buffer, Open-Collector)

I <sub>OH</sub>	High Level Output Current		1.00	100	μA	VCC = 4.5 V, V <sub>OH</sub> = 30 V, E <sub>o</sub> = 3.0 mW/cm <sup>2</sup>
V <sub>OL</sub>	Low Level Output Voltage		.25	0.40	V	VCC = 4.5 V, I <sub>OL</sub> = 12.8 mA, E <sub>o</sub> = 0

OPL551 (Inverter, Totem-Pole)

V <sub>OH</sub>	High Level Output Voltage	2.4	3.3		V	VCC = 4.5 V, I <sub>OH</sub> = -800 μA, E <sub>o</sub> = 0
V <sub>OL</sub>	Low Level Output Voltage		.25	0.40	V	VCC = 4.5 V, I <sub>OL</sub> = 12.8 mA, E <sub>o</sub> = 3.0 mW/cm <sup>2</sup>
I <sub>OS</sub>	Short Circuit Output Current	-20	-55	-100	mA	VCC = 5.5 V, E <sub>o</sub> = 0, Output = GND

OPL551-OC (Inverter, Open-Collector)

I <sub>OH</sub>	High Level Output Current		1.00	100	μA	VCC = 4.5 V, V <sub>OH</sub> = 30 V, E <sub>o</sub> = 0
V <sub>OL</sub>	Low Level Output Voltage		.25	0.40	V	VCC = 4.5 V, I <sub>OL</sub> = 12.8 mA, E <sub>o</sub> = 3.0 mW/cm <sup>2</sup>

OPL550, OPL551

t <sub>r</sub> , t <sub>f</sub>	Output Rise Time, Output Fall Time		25	70	ns	VCC = 5.0 V, T <sub>A</sub> = 25°C, E <sub>o</sub> = 0 or 3.0 mW/cm <sup>2</sup> f = 10.0 kHz, D.C. = 50%, R <sub>L</sub> = 8 TTL Loads
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay, Low-High, High-Low		2.5	5.0	μs	

OPL550-OC, OPL551-OC

t <sub>r</sub> , t <sub>f</sub>	Output Rise Time, Output Fall Time		25	70	ns	VCC = 5.0 V, T <sub>A</sub> = 25°C, E <sub>o</sub> = 0 or 3.0 mW/cm <sup>2</sup> f = 10.0 kHz, D.C. = 50%, R <sub>L</sub> = 360 Ω
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay, Low-High, High-Low		2.5	5.0	μs	

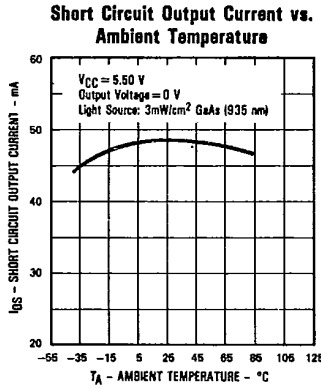
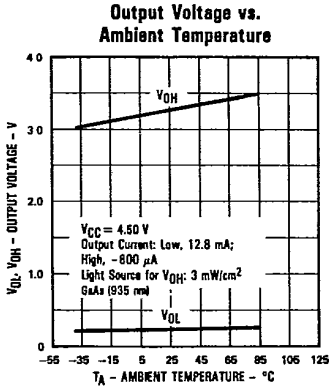
Note: (1) Irradiance measurements are made with λ<sub>i</sub> = 935 nm, through an aperture .020 × .060, centered on the lens, parallel to the leads, and flush +.005 to the lens surface.

Types OPL550, OPL550-OC, OPL551, OPL551-OC, SLB, SLA

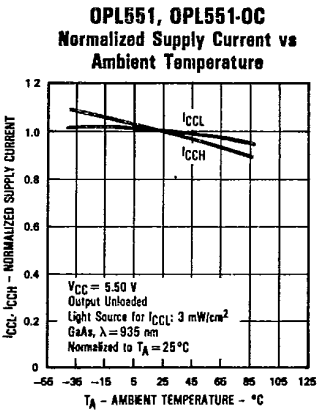
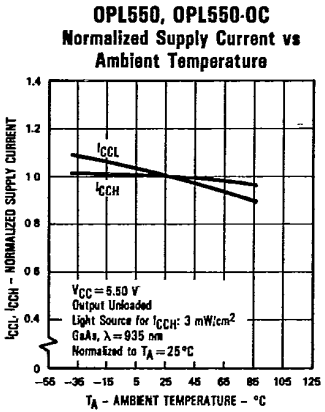
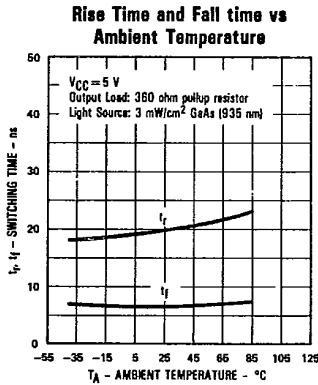
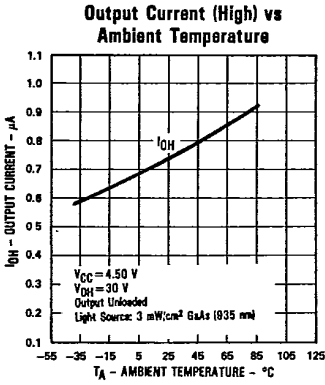
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Typical Performance Curves

OPL550, OPL551



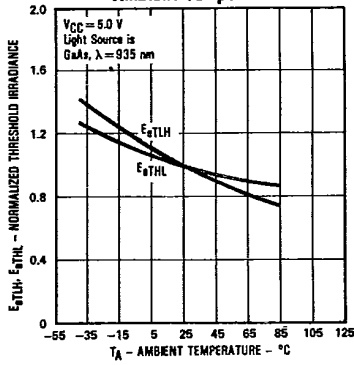
OPL550-OC, OPL551-OC



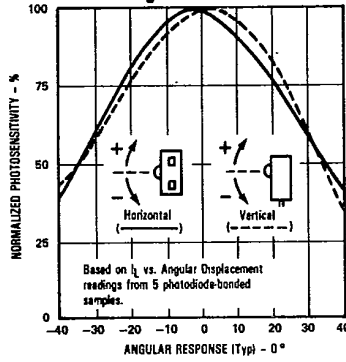
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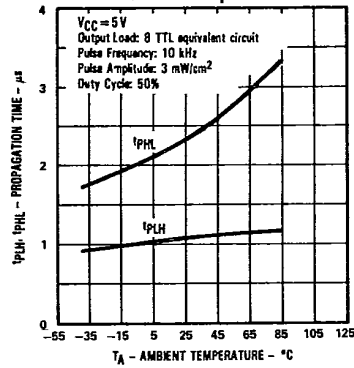
Normalized Threshold Irradiance vs Ambient Temperature



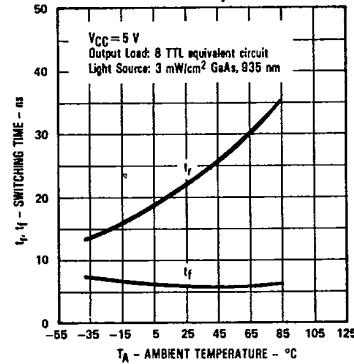
Angular Displacement from Package Mechanical Axis



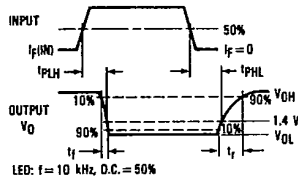
Propagation Time vs Ambient Temperature



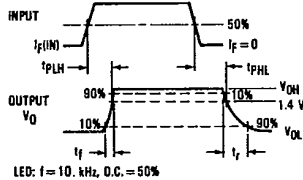
Rise Time and Fall time vs Ambient Temperature



Switching Test Curve for Inverters



Switching Test Curve for Buffers



TRW 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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