OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Features:

- Four output options available
- High noise immunity
- Direct TTL/LSTTL interface
- TO-18 hermetically sealed package
- Sensors mechanically and spectrally matched to other Optek devices (see device descriptions detailed below)

Description:

All **OPL800**, **OPL801**, **OPL820** and **OPL821** sensors consist of a photodiode, a linear amplifier and a Schmitt trigger on a single silicon chip (monolithic chip for **OPL820** and **OPL821**). **OPL810**, **OPL811**, **OPL812** and **OPL813** sensors also have a voltage regulator added to their photologic chips. Each device's photologic chip is mounted onto a standard TO-18 header and hermetically sealed in a lensed metal can.

All devices in the series feature TTL/LSTTL compatible logic level output, which can drive up to 8 TTL loads (**OPL800**, **OPL801**) or up to 10 TTL loads (**OPL810**, **OPL811**, **OPL812**, **OPL813**, **OPL820** and **OPL821**) without additional circuitry. On all these devices, the Schmitt trigger's hysteresis characteristics provide high immunity to noise on input and V_{cc}.

OPL800 series devices feature medium-speed data rates to 250 kBaud, with typical rise and fall times of 25 nanoseconds.

OPL800 and OPL801 devices are mechanically and spectrally matched to OP130 and OP231 series LEDs. OPL810, OPL811, OPL812 and OPL813 devices are mechanically and spectrally matched to OP130 and OP230 series devices. OPL820 and OPL821 devices are mechanically and spectrally matched to OP130 and OP231 series LEDs.

Applications:

- Non-contact reflective object sensor
- Assembly line automation
- Machine automation
- Machine safety
- End of travel sensor
- Door sensor

Pin #	OPL80_ or OPL81_	OPL82_	Transistor
1	Ground	Ground	Collector
2	V _{cc}	Output	Base
3	Output	V _{cc}	Emitter



General Note

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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Ordering Information							
Part Number	Photologic®	Input Power E _ε (μW/cm ²) Min / Max	V _{cc} (V) Min / Max	I _{OH} / I _{OL}	Lead Length		
OPL800	Totem-Pole						
OPL800-OC	Open-Collector	50 / 600	4.5 / 16.0	0.10 / 12.8	0.50"		
OPL801	Inv-Totem-Pole	50 / 600					
OPL801-OC	Inv-Open-Collector						
OPL810	Totem-Pole			0.10 / 16.0			
OPL810-OC	Open-Collector						
OPL811	Inv-Totem-Pole	5 (100					
OPL811-OC	Inv-Open-Collector	5 / 100					
OPL812-OC	Open-Collector						
OPL813-OC	Inv-Open-Collector						
OPL820	10K Pull-Up		1				
OPL820-OC	Open Collector	2 / 35					
OPL821-OC	Inv. Open Collector						

OPL800, OPL800OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820-OC, OPL821-OC

OPL800/800B/810 Buffered Totem-Pole



OPL801/811 Inverted Totem-Pole







OPL801-OC/811-OC/813-OC/821-OC Inverted Open-Collector



General Note

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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC



OPL820

OPL820 10K Pull-Up



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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC



Electrical Specifications	
bsolute Maximum Ratings (T _A = 25° C unless otherwise noted) PB800/801/810/811 and OPB800-OC Series	
Input Diode	
Operating Temperature Range	
OPL800, OPL801	-55° C to +110° (
OPL810, OPL811	-55° C to +105° (
OPL820	-40° C to +100° (
Storage Temperature Range	
OPL800, OPL801	-65° C to +150°
OPL810, OPL811	-65° C to +125°
OPL820	-55° C to +125°
Lead Soldering Temperature [1/16 inch (1.6mm) from the case for 5 sec. with soldering iron]	260°C ⁽
Input Infrared LED	
Supply Voltage, V _{cc} (not to exceed 3 seconds)	
OPL800, OPL801	10 V
OPL810, OPL811, OPL820	18 V
Sourcing Current	
OPL810, OPL811	10 mA
Output Voltage (high state)	
OPL800, OPL801, OPL810, OPL811	35 V
OPL820	30 V
Output Current Sink (low state)	
OPL810, OPL811	50 mA
OPL820	16 mA
Irradiance	
OPL800, OPL801	3 mW/cm ²
OPL810, OPL810-OC, OPL811, OPL811-OC	2 mW/cm^2
OPL812, OPL812-OC, OPL813, OPL813-OC	1 mW/cm ²

General Note

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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Electrical Specifications

bsolute Maximum Ratings (T _A = 25° C unless otherwise noted) PB800/801/810/811/812/813 and OPB800-OC Series		
Output Photologic®		
Voltage at Output Lead		
OPL800, OPL801, OPL810, OPL811	35 V	
OPL820	30 V	
Duration of Output Short to V _{cc}	1 second	
Power Dissipation		
OPL800, OPL801	120 mW ⁽²⁾	
OPL810, OPL811	250 mW ⁽²⁾	
OPL820	200 mW ⁽²⁾	

Notes:

(1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. For OPB820, a maximum of 20 grams force may be applied to leads while at soldering temperatures.

(2) Derate linearly 2.5 mW/°C above 25° C for OPL800, OPL801, OPL810, OPL811. Derate linearly 5.7 mW/°C above 90° C for OPL820.

(3) For OPL800, OPL801, OPL810, OPL811, light measurements are made with $\lambda i = 935$ nm. For OPB820, light measurements are made with an LED source having a wavelength of 935 nm.

General Note

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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Electrical Specifications

SYMBOL	PARAMETER	MIN	ТҮР	MAX	UNITS	TEST CONDITIONS
	Operating Supply Voltage					
	OPL800/801	4.5	-	5.5	V	-
	OPL810/811	4.5	-	16	V	-
M	OP820	4.5	-	16	V	-
V _{cc}	Peak-to-Peak V _{cc} Ripple Necessary to					
	Cause False Triggering of Output					
	OPL800/801	-	2	-	V	f = DC to 50 MHz
	OPL810/811	-	-	1	V	f = DC to 50 MHz
I _{CC}	Supply Current	-	-	15	mA	$E_e = 0 \text{ or } 1 \text{ mW/cm}^2$
	Positive-Going Threshold Irradiance ⁽³⁾					
- (+)	OPL800/801	0.050	0.180	0.600	mW/cm ²	T _A = 25°C
Е _{ет} ⁽⁺⁾	OPL810/811	0.015	0.060		mW/cm ²	
	OPL820	0.002	0.015	0.035	mW/cm ²	
	Hysteresis Ratio					
$E_{eT}^{(+)}/E_{eT}^{(-)}$	OPL800/801	1.5	2.0	2.5	-	-
·	OPL810/811	1.2	1.5	2.0	-	-
E _e ⁽⁺⁾ /E _e ⁽⁻⁾	Hysteresis Ratio					
Le /Le	OPL820	1.05	1.20	1.90	-	See below ⁽³⁾
I _{ссн}	High State Supply Current					
ICCH	OPL820	-	5	12	mA	See below ⁽⁴⁾
I _{CCL}	Low State Supply Current					(5)
·CCL	OPL820	-	4	12	mA	See below ⁽⁵⁾

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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Electrical Specifications

Electrical Characteristics (T _A = 25° C unless otherwise noted)						
SYMBOL	PARAMETER	MIN	ТҮР	MAX	UNITS	TEST CONDITIONS
V _{OH}	High Level Output Voltage OPL800 OPL801 OPL810 OPL811 OPL820-OC/821-OC	2.4 2.4 V _{cc} -2.1 V _{cc} -2.1 V _{cc} -1.5	- - - -	- - - V _{CC}	V V V V	$I_{OH} = -800 \ \mu\text{A}, \ E_e = 1 \ m\text{W/cm}^2$ $I_{OH} = -800 \ \mu\text{A}, \ E_e = 0$ $I_{OH} = -1\text{mA}, \ E_e = 0.4 \ m\text{W/cm}^2$ $I_{OH} = -1\text{mA}, \ E_e = 0$ $I_{OH} = -100 \ \mu\text{A}^{(4)}$

Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. For OPB820, a maximum of 20 grams force may be applied to leads while at soldering temperatures.
- (2) Derate linearly 2.5 mW/°C above 25° C for OPL800, OPL801, OPL810, OPL811. Derate linearly 5.7 mW/°C above 90° C for OPL820.
- (3) For OPL800, OPL801, OPL810, OPL811, light measurements are made with λi = 935 nm. For OPB820, light measurements are made with an LED source having a wavelength of 935 nm.
- (4) High output state limits are valid for $4.5 \text{ V} < V_{CC} < 16 \text{ V}$ and $E_e > 0.035 \text{ mW/cm}^2$ (OPL820, OPL820-OC), $E_e < 0.001 \text{ mW/cm}^2$ (OPL821-OC).
- (5) Low output state limits are valid for 4.5 V < V_{CC} < 16 V and E_e > 0.035 mW/cm² (OPL821-OC), E_e < 0.001 mW/cm² (OPL820, OPL820-OC).

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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Electrical Specifications

SYMBOL	PARAMETER	MIN	ТҮР	MAX	UNITS	TEST CONDITIONS
	High Level Output Voltage					
	OPL800	2.4	-	-	V	$I_{OH} = -800 \ \mu A$, $E_e = 1 \ mW/cm^2$
	OPL801	2.4	-	-	V	I _{OH} = -800 μA, E _e = 0
V _{он}	OPL810	V _{cc} -2.1	-	-	V	$I_{OH} = -1mA$, $E_e = 0.4 \text{ mW/cm}^2$
	OPL811	V _{cc} -2.1	-	-	V	I _{он} = -1mA, E _e = 0
	OPL820-OC/821-OC	V _{cc} -1.5	-	V _{cc}	V	I _{OH} = -100 μA ⁽⁴⁾
	Low Level Output Voltage					
	OPL800/800-OC	-	-	0.4	V	I _{OL} = 12.8 mA, E _e = 0
	OPL801/801-OC	-	-	0.4	V	$I_{OL} = 12.8 \text{ mA}, E_e = 1 \text{ mW/cm}^2$
V _{OL}	OPL810/810-OC	-	-	0.4	V	I _{OL} = 16 mA, E _e = 0
VOL	OPL811/811-OC	-	-	0.4	V	$I_{OL} = 16 \text{ mA}, E_e = 0.4 \text{ mW/cm}^2$
	OPL812-OC	-	-	0.4	V	I _{OL} = 16 mA, E _e = 0
	OPL813-OC	-	-	0.4	V	$I_{OL} = 16 \text{ mA}, E_e = 0.2 \text{ mW/cm}^2$
	OPL820	-	-	0.4	V	$I_{OL} = 16 \text{ mA}^{(5)}$
	High Level Output Current					
	OPL800-OC	-	-	100	μΑ	$V_{OH} = 30 V, E_e = 2 mW/cm^2$
	OPL801-OC	-	-	100	μΑ	$V_{OH} = 30 V, E_e = 0$
I _{он}	OPL810-OC	-	-	100	μΑ	$V_{OH} = 30 V, E_e = 0.4 mW/cm^2$
	OPL811-OC	-	-	100	μΑ	$V_{OH} = 30 V, E_e = 0$
	OPL812-OC	-	-	100	μA	$V_{OH} = 30 V, E_e = 0.2 mW/cm^2$
	OPL813-OC	-	-	100	μΑ	V _{OH} = 30 V, E _e = 0
	Short Circuit Output Current					
I _{os}	OPL800	-20			mA	$E_e = 1 \text{ mW/cm}^2$, Output = GND
	OPL801	-		-100	mA	$E_e = 0$, Output = GND

General Note

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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Electronics

Electrical Specifications

SYMBOL	PARAMETER	MIN	ТҮР	ΜΑΧ	UNITS	TEST CONDITIONS
	Output Rise Time, Fall Time					
	OPL800/801	-	70	-	ns	$T_A = 25^{\circ}C, E_e = 0 \text{ or } 1 \text{ mW/cm}^2, R_L = 10 \text{ TTL loads, } f = 10 \text{ kHz, D.C.} = 50\%$
	OPL800-OC/801-OC	-	70	-	ns	$T_A = 25$ °C, $E_e = 0$ or 1 mW/cm ² , $R_L = 360 $ Ω, f = 10 kHz, D.C. = 50%
t _r , t _f	OPL810/811	-	70	-	ns	$T_A = 25^{\circ}C, E_e = 0 \text{ or } 0.4 \text{ mW/cm}^2, R_L$ 10 TTL loads, f = 10 kHz, D.C. = 50%
	OPL810-OC/811-OC/812-OC/ 813-OC	-	100	-	ns	$T_A = 25^{\circ}C, E_e = 0 \text{ or } 1 \text{ mW/cm}^2, R_L = 300 \Omega, f = 10 \text{ kHz}, D.C. = 50\%$
	OPL820	-	60	-	ns	RL = 390Ω
	Propagation Delay					
t _{plH} , t _{phl}	Low/High - High/Low OPL800/801	-	5	-	μs	$T_A = 25^{\circ}C$, $E_e = 0$ or 1 mW/cm ² , $R_L = TTL$ loads, f = 10 kHz, D.C. = 50%
	OPL800-OC/801-OC	-	5	-	μs	$T_A = 25^{\circ}C$, $E_e = 0$ or 1 mW/cm ² , $R_L =$ TTL loads, f = 10 kHz, D.C. = 50%
	OPL810/811	-	5	-	μs	$T_A = 25^{\circ}C, E_e = 0 \text{ or } 0.4 \text{ mW/cm}^2, R_L = 10 \text{ TTL loads, } f = 10 \text{ kHz, } D.C. = 50\%$
	OPL810-OC/811-OC/812-OC/	-	5	-	μs	$T_A = 25$ °C, $E_e = 0$ or 1 mW/cm ² , $R_L = 300 $ Ω, f = 10 kHz, D.C. = 50%
	813-OC	-	1	-	μs	$E_{\rm E} = 0.1 {\rm mW/cm^2}$, RL = 390 Ω
	OPL820 (to high state) OPL820 (to low state)	-	2.1	-	μs	$E_{\rm E} = 01 {\rm mW/cm}^2$, RL = 390 Ω
Data Rate	Data Rate Using NRZ Format	-	100	-	kHz	$E_{\rm E}$ = 01 mW/cm ² , RL = 390 Ω

Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. For OPB820, a maximum of 20 grams force may be applied to leads while at soldering temperatures.
- (2) Derate linearly 2.5 mW/°C above 25° C for OPL800, OPL801, OPL810, OPL811. Derate linearly 5.7 mW/°C above 90° C for OPL820.
- (3) For OPL800, OPL801, OPL810, OPL811, light measurements are made with λi = 935 nm. For OPB820, light measurements are made with an LED source having a wavelength of 935 nm.
- (4) High output state limits are valid for $4.5 \text{ V} < V_{CC} < 16 \text{ V}$ and $E_e > 0.035 \text{ mW/cm}^2$ (OPL820, OPL820-OC), $E_e < 0.001 \text{ mW/cm}^2$ (OPL821-OC).
- (5) Low output state limits are valid for 4.5 V < V_{CC} < 16 V and E_e > 0.035 mW/cm² (OPL821-OC), E_e < 0.001 mW/cm² (OPL820, OPL820-OC).

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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC





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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC



Normalized Threshold Irradiance vs. Ambient Temperature V_{CC} = 5 V Light Source is GaAs, λ = 935 TLH E. THL -55 -35 -15 5 25 45 65 85 105 125 TA - AMBIENT TEMPERATURE - °C Propagation Time vs. Ambient Temperature VCC = 5 V Output Load: 8 TTI Pulse Frequency: 10 kHz Pulse Amplitude: 1 mW/cm² Duty Cycle: 50%

IPLH

TA - AMBIENT TEMPERATURE - °C

5 25 45 65 105 125

85

NORMALIZED THRESHOLD IRRADIANCE

EeTHL 0.4

EeTLH.

E -

TPLH- TPHL - PROPAGATION TIME

0

2.5

2.0

1.5

1.0

0.5

-55 -35 -15

2.0

1.6

1.2

0.8



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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC



Performance

OPL810, OPL811 Series





Normalized Threshold Irradiance vs. TA



OPL812, OPL813 Series

Normalized Spectral Response





Angular Displacement from Package Mechanical Axis



General Note

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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC



Performance

OPL812, OPL813 Series







Rise Time & Fall Time vs. TA 100 Test Conditions: VCC = 5 V Frequency = 10 kHz Duty Cycle = 50% ۴ 1 Output Load - 10 TTL equiv valent circuit SWITCHING TIME 60 40 ۲. د tr 20 0 55 - 35 - 15 5 25 45 65 85 105 125 TA - AMBIENT TEMPERATURE - °C





Switching Test Curves

Switching Test Curve for Inverters



Switching Test Curve for Buffers



General Note

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OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC



Performance

Normalized Spectral Response Angular Displacement From Normalized Threshold Irradiance Package Mechanical Axis vs. Ambient Temperature 1.0 100 18 % 0.9 90 Normalized Threshold Irradiance Vcc = 5 V EeT(-) Normalized Photosensitivity -0.8 80 1,5 λ = 940 nm Normalized Response 0.7 70 12 0.6 60 E_eT(+) 0.5 50 0.9 0.4 40 0.3 0.6 30 Based on 0.2 20 IL VS. 0.3 Angular 0.1 10 Displacemen 0.0 0 500 550 600 650 700 750 800 850 900 950 1000 0.0 -5 Ö Š -20 -15 -10 10 15 20 -20 40 80 100 -40 Ó 20 60 Angular Response (Typ) - ^οθ λ - Wavelength - nm TA - Ambient Temperature - °C

OPL820, OPL821 Series

General Note TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC



Performance

OPL820, OPL821 Series



TA - Ambient Temperature - °C

Ee - Irradiance - mW/cm²

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Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

TT Electronics:

<u>OPL800</u> <u>OPL800-OC</u> <u>OPL801</u> <u>OPL801-OC</u> <u>OPL810</u> <u>OPL810-OC</u> <u>OPL811</u> <u>OPL811-OC</u> <u>OPL812</u> <u>OPL812-OC</u> OPL813 OPL813-OC OPL820 OPL820-OC OPL821 OPL821-OC