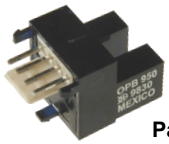
# Photologic® Dual Channel Encoder

## OPB950Z, OPB951




Package 1


Package 2

RoHS

**Features:**

- Dual channel outputs for Quadrature Output
- Open collector inverter outputs
- 0.010” (0.254 mm) sensor apertures for high resolution
- Snap mount
- OPB950 5±.0.5 Volt Vcc, OPB951 4.75 to 16 Volt Vcc

**Description:**

Each OPB950, series devices consists of an infrared Light Emitting Diode (LED) and a monolithic integrated circuit which incorporates two independent photodiodes, linear amplifiers, Schmitt trigger circuits and output transistors. The device is offered in two versions (see page 2 for package drawings). The OPB950 features a dual open-collector output that is compatible with TTL/LSTTL and can drive up to 8 TTL loads. The OPB951 brings out the anode of the LED for custom power applications.

Applications include linear and rotary encoders with high resolution provided by internal 0.010” (0.254 mm) apertures located in front of each Photologic® sensor on 0.040” (1.02 mm) center line spacing.

Custom electrical, wire, cabling and connectors are available. Contact your local representative or OPTEK for more information.

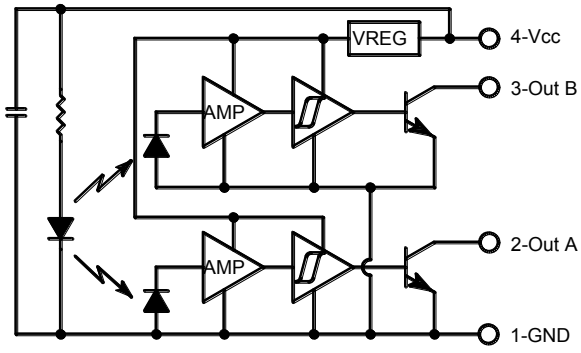
**Applications:**

- Mechanical switch replacement
- Speed and direction indication
- Mechanical limit indication
- Rotary encoders
- Edge sensing
- Sliding Door Automotive and Liftgate applications

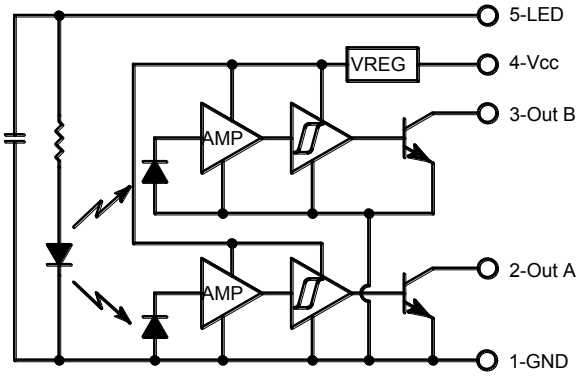
**Ordering Information**

| Part Number | Package | LED Peak Wavelength | Sensor | Slot Width / Depth | Aperture Emitter/ Sensor | Lead Length/ Connector |
|---|---|---|---|---|---|---|
| **OPB950Z** | 1 | 890 nm | Dual TTL | 0.200" / 0.350” | 0.05” / 0.01" | Molex 5102 |
| **OPB951** | 2 | | Dual TTL | | | |

**OPB950Z**




**OPB951**



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## Electrical Specifications

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

| | |
|---|---|
| Storage & Operating Temperature Range | -40°C to +85° C |

**Input Diode**

| | |
|---|---|
| Forward DC Current | 50 mA |
| Reverse DC Voltage | 2.0 V |
| Power Dissipation[1] | 100 mW |

**Output Photologic®**

| | | |
|---|---|---|
| Supply Voltage, $V_{CC}$ | OPB950Z / OPB951 | 5.5 V / 16 V |
| Voltage at Output | | 16 V |
| Power Dissipation[2] | | 200 mW |
| Sinking Output Current | | 40 mA |

**Electrical Characteristics** ($T_A$ = 25°C and Vcc = +5 Volts unless otherwise noted )

| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| **Input LED OPB951** (see op240 for additional information) | | | | | | |
| $V_F$ | Forward Voltage | - | - | 1.80 | V | $I_F$ = 20 mA |
| $I_R$ | Reverse Current | - | - | 100 | µA | $V_R$= 2.0 V |
| $\lambda_P$ | Wavelength at Peak Emission | - | 890 | - | nm | $I_F$ = 10 mA |
| **Output Photologic® Sensor** (see OPL583 for additional information) | | | | | | |
| **SYMBOL** | **PARAMETER** | **MIN** | **TYP** | **MAX** | **UNITS** | **TEST CONDITIONS** |
| $V_{CC}$ | Operating Supply Voltage[4] | 4.5 | - | 16 | V | - |
| $E_{ET}^{(+)}/E_{ET}^{(-)}$ | Hysteresis Ratio | 1.1 | 1.5 | 2 | - | - |
| MATCH | Channel Match $E_{ET}^{(+A)} / E_{ET}^{(+B)}$ | 0.67 | 1 | 1.5 | - | - |
| $I_{CCL}$ | Supply Current, Both Outputs Low (LED On, No Target) | - | 8.5 | 12 | mA | $E_E$ = 0.5 mW/cm$^2$ (no load on output) |
| $I_{CCH}$ | Supply Current, Both Outputs High (LED Off) | - | 3.5 | 6 | mA | $E_E$ = 0 mW/cm$^2$ (no load on output) |
| $I_{CCM}$ | Supply Current, Mixed Output States (one high, one low) | - | 6 | - | mA | $E_E$ = 0 mW/cm$^2$ and 0.5 mW/cm$^2$ |
| $I_{oh}$ | High Level Output Current | - | 1 | 30 | µA | $E_E$ = 0 mW/cm$^2$ , $V_{OH}$ = 16 V |
| $V_{OL}$ | Low Level Output Voltage | - | 0.21 | 0.4 | V | $E_E$ = 0 mW/cm$^2$ , $I_{OL}$ = 12.8 mA |
| $T_{PHL}$<br>$T_{PLH}$ | Propagation Delay<br>Output High to Low<br>Output Low to HIgh | - | 2<br>10 | - | µs<br>µs | $V_{CC}$ = 5 V, $R_L$ = 360 Ω<br>$E_E$ = 0 or 0.5 mW/cm$^2$ , f = 10 kHz, D.C. = 50% |
| $t_r$<br>$t_f$ | Output Rise Time<br>Output Fall Time | - | 20<br>15 | - | ns<br>ns | - |



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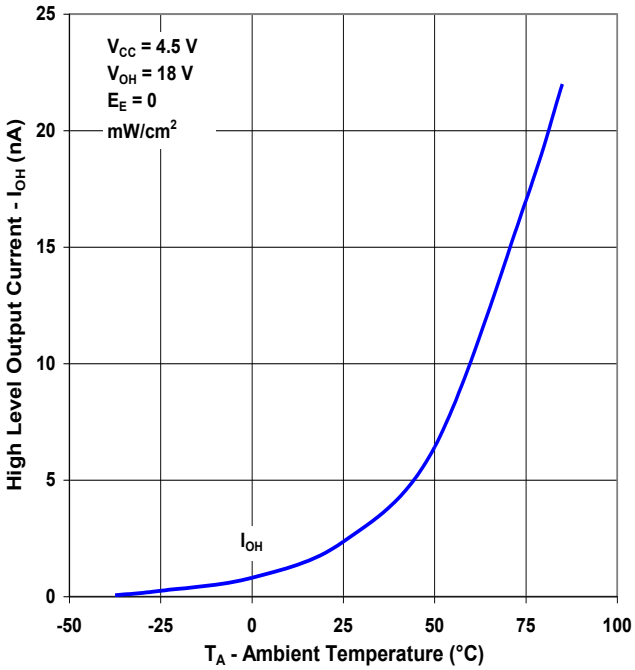
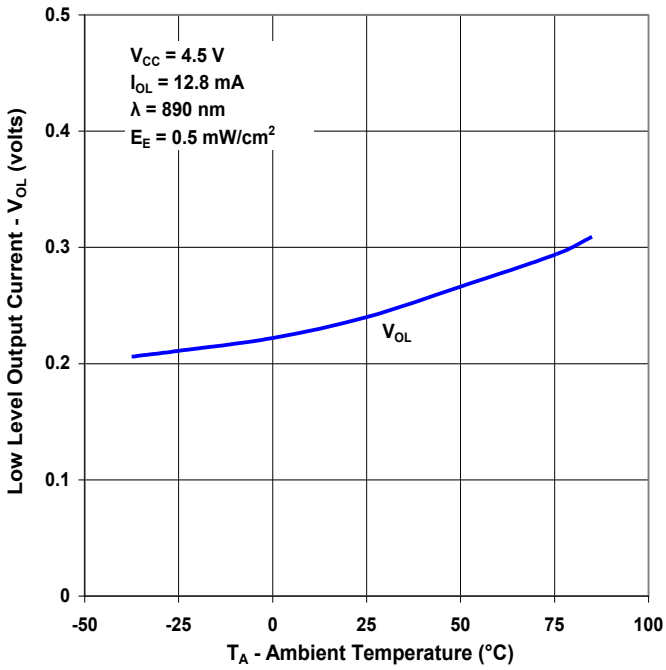
## Performance

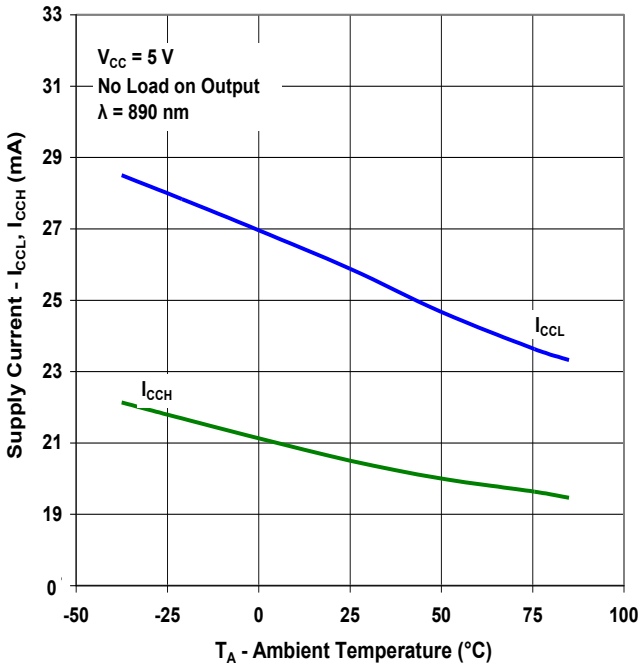
High Level Output vs Ambient Temperature




Low Level Output vs Ambient Temperature




Supply Current vs Ambient Temperature







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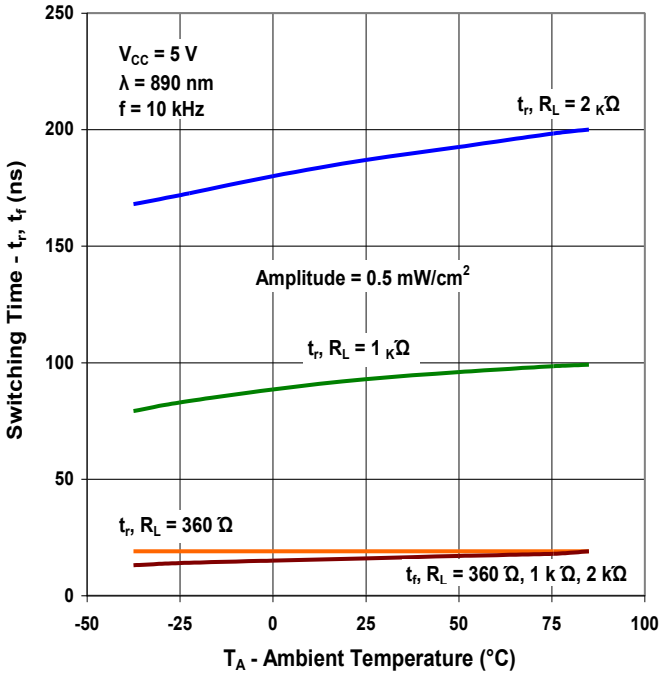
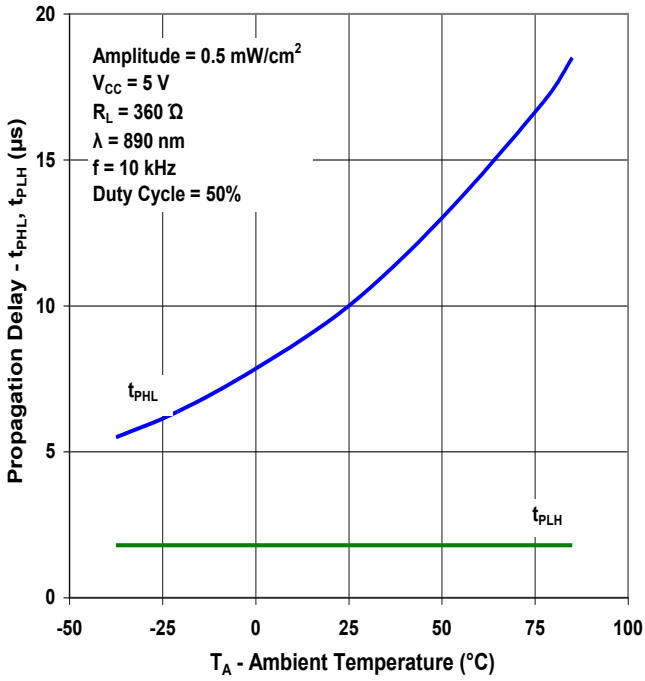
## Performance

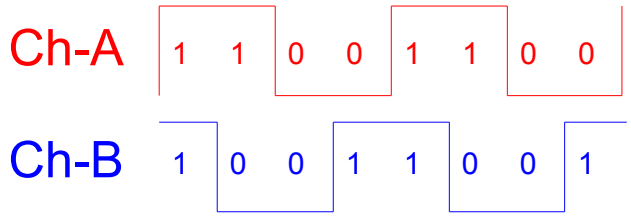
### Rise and Fall Time vs Ambient Temperature vs Output Load



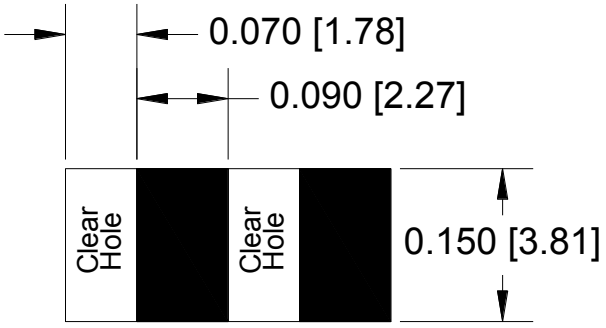

### Propagation Delay vs Ambient Temperature




### Sensor Output(s)




### Ideal Target Size & Spacing For Linear or Circular Targets




Dimensions are in inches [millimeters]

**Please consult OPTEK for target design and sensor location relative to the target.**

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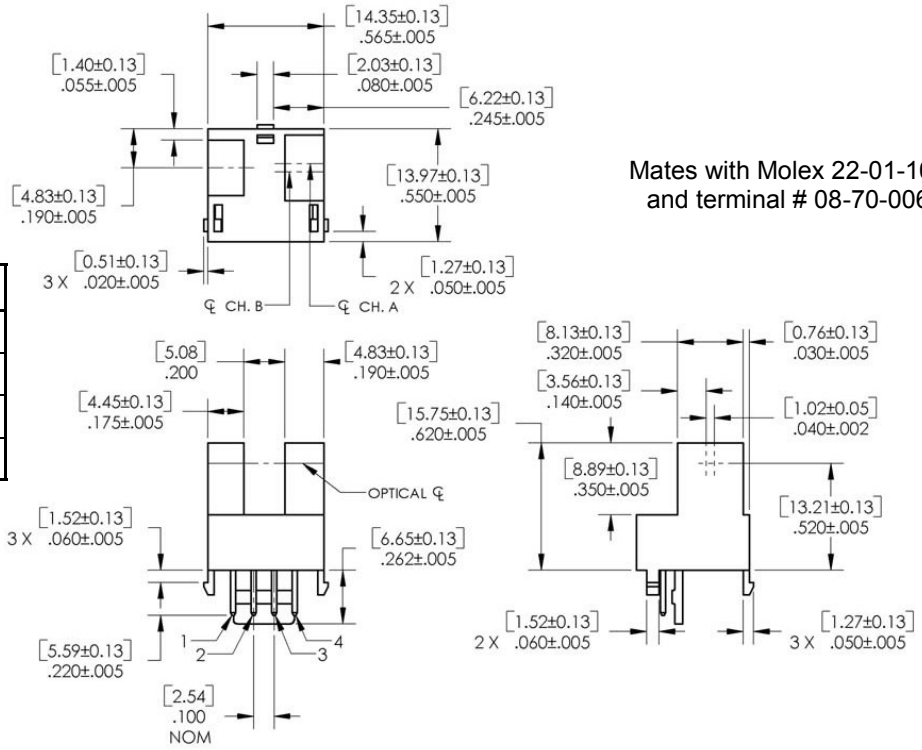
## Packaging

### Package 1 - OPB950Z

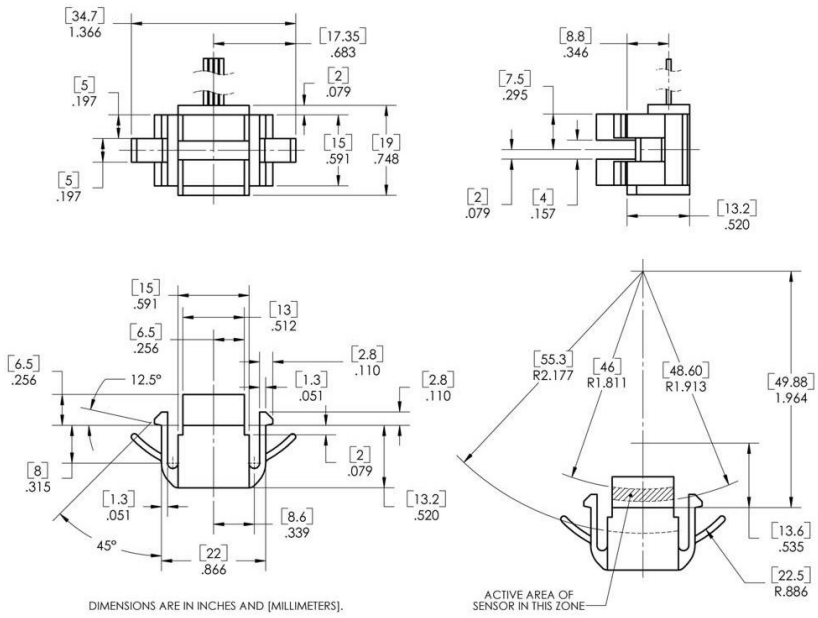
| Pin # | Description |
|---|---|
| 1 | Ground |
| 2 | Output-A |
| 3 | Output-B |
| 4 | $V_{CC}$ |




Mates with Molex 22-01-1042 and terminal # 08-70-0069

### Package 2 - OPB951

| Pin # | Description |
|---|---|
| 1 | Output-A |
| 2 | Output-B |
| 3 | $V_{CC}$ |
| 4 | Ground |







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| Issue | Change Description | Approval | Date |
|---|---|---|---|
| A | Initial Release | Tom Osborne | 2/03/06 |
| A.1 | Minor changes to the first paragraph on page 1 | Tom Osborne | 3/29/06 |
| A.2 | Added OPB951 | | 1/10/07 |
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