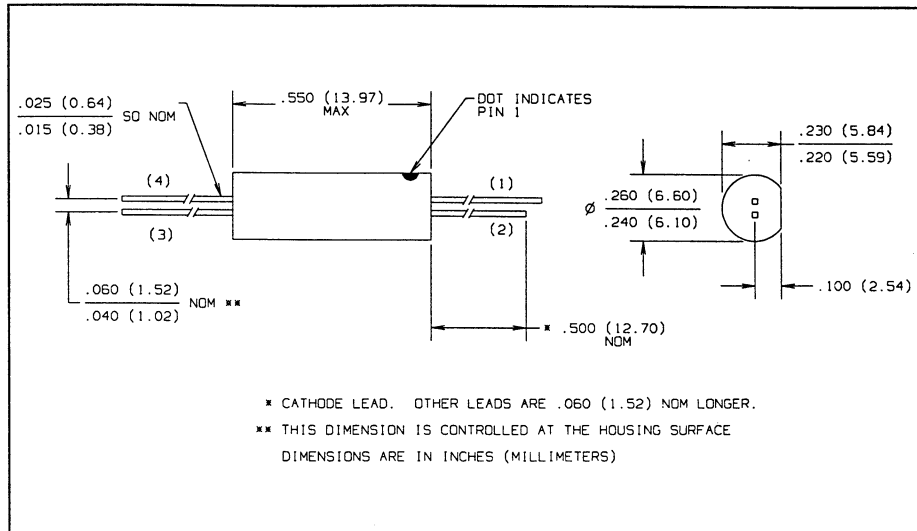
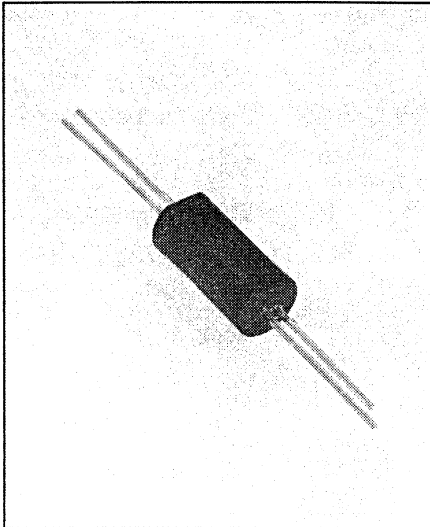


# Optically Coupled Isolators

## Types OPI110, OPI110A, OPI110B, OPI110C, OPI113



### Features

- 10kV electrical isolation
- Phototransistor output
- Low cost plastic housing
- UL Recognized File Number E58730<sup>(6)</sup>

### Description

The OPI110 and OPI113 series devices are optically coupled isolators, each containing an infrared emitting diode and an NPN silicon photosensor. The OPI110 uses a phototransistor and the OPI113 uses either a photodarlington or phototransistor sensor. The devices are sealed in a precast opaque housing. This series is designed for applications requiring high voltage isolation between input and output.

### Replaces

K8900 series

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

|  |                             |
|--|-----------------------------|
| Input-to-Output Isolation Voltage .....  | ± 10 kVDC <sup>(1)(6)</sup> |
| 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 <sup>(2)</sup>       |

### Input Diode

|                          |                      |
|--------------------------|----------------------|
| Forward DC Current ..... | 40 mA <sup>(3)</sup> |
| Reverse DC Voltage ..... | 2.0 V                |
| Power Dissipation .....  | 50 mW <sup>(4)</sup> |

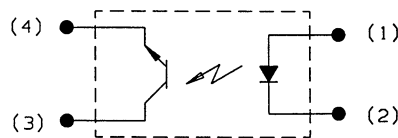
### Output Photosensor

|  |                       |
|--|-----------------------|
| Collector-Emitter Voltage OPI110 ..... | 30 V                  |
| OPI113 .....                           | 15 V                  |
| Emitter-Collector Voltage .....        | 5.0 V                 |
| Power Dissipation .....                | 100 mW <sup>(5)</sup> |

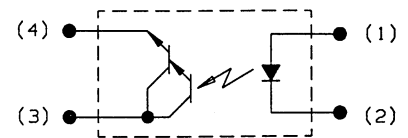
### Notes:

- (1) Measured with input and output leads shorted. Typical input/output capacitance is 0.06 pF.
- (2) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering.
- (3) Derate linearly 0.67 mA/° C above 25° C.
- (4) Derate linearly 0.83 mW/° C above 25° C.
- (5) Derate linearly 1.67 mW/° C above 25° C.
- (6) UL recognition is for 3500 VAC, 1 minute only.

### Schematics



OPI110



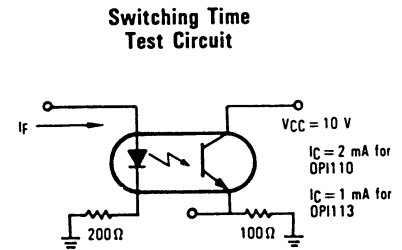
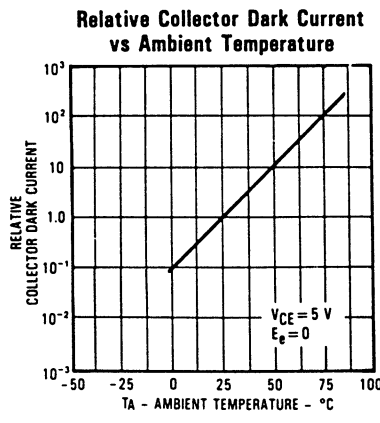
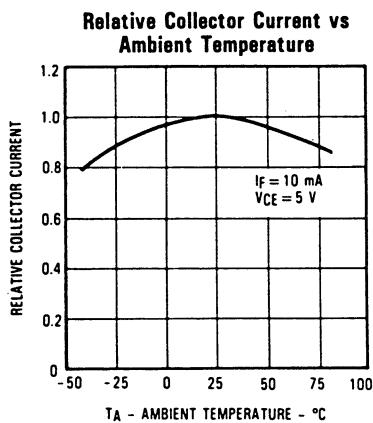
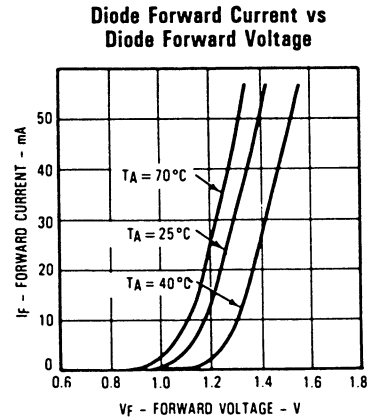
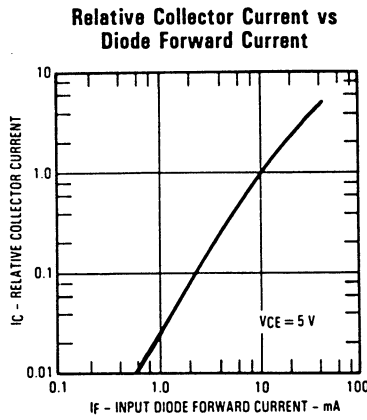
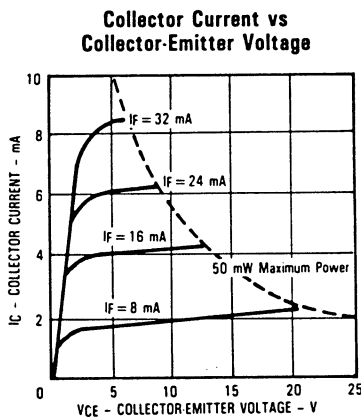
OPI113

# Types OPI110, OPI110A, OPI110B, OPI110C, OPI113

Electrical Characteristics ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| SYMBOL                    | PARAMETER                           | MIN   | TYP                           | MAX          | UNITS                 | TEST CONDITIONS  |
|---------------------------|-------------------------------------|---|-------------------------------|--------------|-----------------------|--|
| <b>Input Diode</b>        |                                     |   |                               |              |                       |  |
| $V_F$                     | Forward Voltage                     |   |                               | 1.60         | V                     | $I_F = 20\text{ mA}$   |
| $I_R$                     | Reverse Current                     |   |                               | 100          | $\mu\text{A}$         | $V_R = 2.0\text{ V}$   |
| <b>Output Photosensor</b> |                                     |   |                               |              |                       |  |
| $V_{(BR)CEO}$             | Collector-Emitter Breakdown Voltage | OPI110<br>OPI113                                  | 30<br>15                      |              | V<br>V                | $I_C = 100\ \mu\text{A}$<br>$I_C = 100\ \mu\text{A}, I_F = 0$  |
| $V_{(BR)ECO}$             | Emitter-Collector Breakdown Voltage |   | 5.0                           |              | V                     | $I_E = 100\ \mu\text{A}, I_F = 0$  |
| $I_{CEO}$                 | Collector-Emitter Dark Current      | OPI110<br>OPI113                                  |                               | 100<br>100   | nA<br>nA              | $V_{CE} = 15\text{ V}, E_e = 0$<br>$V_{CE} = 10\text{ V}, E_e = 0$   |
| <b>Coupled</b>            |                                     |   |                               |              |                       |  |
| $I_C/I_F$                 | DC Current Transfer Ratio           | OPI110<br>OPI110A<br>OPI110B<br>OPI110C<br>OPI113 | 12.5<br>25<br>50<br>100<br>50 | 400          | %<br>%<br>%<br>%<br>% | $I_F = 10.0\text{ mA}, V_{CE} = 5.0\text{ V}$<br>$I_F = 10.0\text{ mA}, V_{CE} = 5.0\text{ V}$<br>$I_F = 10.0\text{ mA}, V_{CE} = 5.0\text{ V}$<br>$I_F = 10.0\text{ mA}, V_{CE} = 5.0\text{ V}$<br>$I_F = 5.0\text{ mA}, V_{CE} = 2.0\text{ V}$ |
| $V_{CE(SAT)}$             | Collector Saturation Voltage        | OPI110<br>OPI113                                  |                               | 0.40<br>1.20 | V<br>V                | $I_F = 10.0\text{ mA}, I_C = 1.6\text{ mA}$<br>$I_F = 10.0\text{ mA}, I_C = 5.0\text{ mA}$   |
| $I_{CEO}$                 | Collector-Emitter Dark Current      | OPI110<br>OPI113                                  |                               | 200<br>100   | nA<br>nA              | $V_{CE} = 20.0\text{ V}, I_F = 0$<br>$V_{CE} = 10.0\text{ V}, I_F = 0$   |
| $V_{ISO}$                 | Isolation Voltage                   |   | 10.0                          |              | kVDC                  | (See Note 1)   |

## Typical Performance Curves (OPI110 Only)



$t_r$  and  $t_f$  for OPI110 are typically 4  $\mu\text{s}$ .  
 $t_r$  and  $t_f$  for OPI113 are typically 40  $\mu\text{s}$ .  
 The input waveform is supplied by a generator with the following characteristics:  $Z_{OUT} = 50\ \Omega$ ,  $t_r \leq 15\text{ ns}$ , duty cycle  $\cong 1\%$ , pulse width = 100  $\mu\text{s}$ .

OPTICALLY COUPLED ISOLATORS

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

Optek Technology, Inc. 1215 W. Crosby Road Carrollton, Texas 75006 (972)323-2200 Fax (972)323-2396