

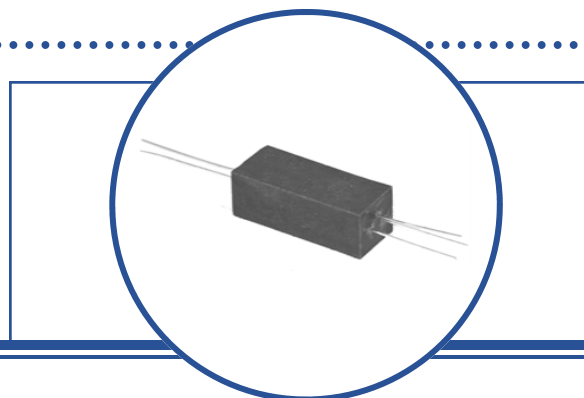
# Optically Coupled Isolator

## OPI120, OPI123



### Features:

- 15 kV electrical isolation
- Choice of phototransistor or photodarlington output
- Hermetically sealed LED and photosensor
- Base contact for conventional transistor biasing (OP120 only)
- UL recognized File No. E58730\*
- Wide operating temperature range



### Description:

Each Optoisolator in this data sheet contains an infrared Light Emitting Diode (LED) and a NPN silicon Photosensor. The **OPI120** has an 890 nm Light Emitting Diode (LED) and NPN phototransistor sensor, whereas the **OP123** has a 890 nm LED and a photodarlington sensor. The devices are sealed in a precast opaque housing with a optically transmissive path between the LED and the photosensor.

The Optoisolators in this data sheet are UL approved under E 58730.

This series is designed for transmission of information between one power supply voltage to another where the potentials during surge conditions are not greater than the guaranteed isolation voltage.

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

TX and TXV processing is available. For more information, contact your local representative or OPTEK.

### Applications:

- High voltage isolation between input and output
- Electrical isolation in dirty environments
- Industrial equipment
- Medical equipment
- Office equipment

| Ordering Information |                     |            |                          |         |                               |                             |                       |
|----------------------|---------------------|------------|--------------------------|---------|-------------------------------|-----------------------------|-----------------------|
| Part Number          | LED Peak Wavelength | Sensor     | Isolation Voltage (,000) | CTR Min | I <sub>F</sub> (mA) Typ / Max | V <sub>CE</sub> (Volts) Max | Lead Length / Spacing |
| OPI120               | 890 nm              | Transistor | 15                       | 20      | 10 / 50                       | 25                          | 0.40" / 0.75"         |
| OPI123               | 935 nm              | Darlington |                          | 50      |                               | 20                          |                       |



RoHS

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

### Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

|  |                   |
|--|-------------------|
| Storage Temperature  | -55° C to +125° C |
| Operating Temperature  | -55° C to +100° C |
| Input-to-Output Isolation Voltage <sup>(1)(2)</sup>  | ± 15 kVDC         |
| Lead Soldering Temperature (1/16" (1.6 mm) from case for 5 seconds with soldering iron) <sup>(3)</sup> | 260° C            |

#### Input Diode

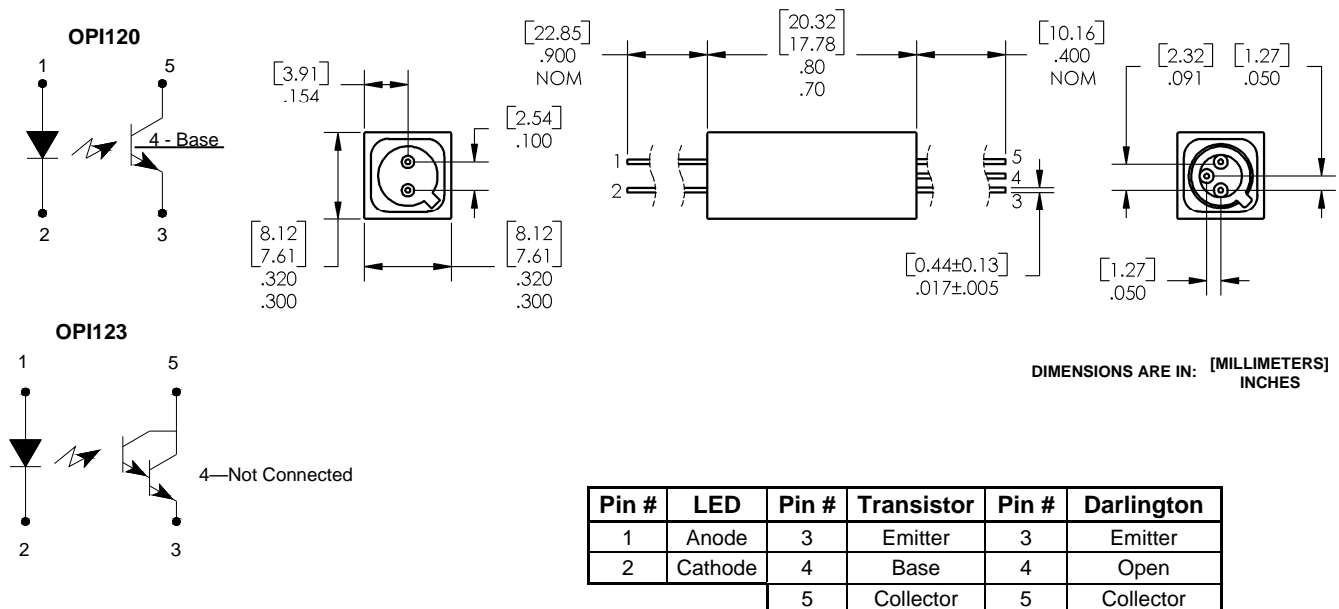
|                                   |        |
|-----------------------------------|--------|
| Forward DC Current <sup>(4)</sup> | 150 mA |
| Reverse DC Voltage                | 3 V    |
| Power Dissipation <sup>(5)</sup>  | 200 mW |

#### Output Photosensor

|                                  |        |
|----------------------------------|--------|
| Collector-Emitter Voltage        |        |
| OPI120                           | 25 V   |
| OPI123                           | 20 V   |
| Emitter-Collector Voltage        | 5 V    |
| Collector-Base Voltage           |        |
| OPI120                           | 25 V   |
| Power Dissipation <sup>(6)</sup> | 250 mW |

#### Notes:

- (1) Measured with input and output leads shorted in air with a maximum relative humidity of 50%. If suitably encapsulated or oil-immersed, the isolation voltage is increased to 25 kV minimum.
- (2) UL recognition is for 3750 VAC to 100° C.
- (3) RMA flux is recommended. The duration can be extended to 10 seconds maximum when flow soldering.
- (4) Derate linearly 2.0 mA/°C above 25°C.
- (5) Derate linearly 2.67 mW/°C above 25°C.
- (6) Derate linearly 3.33 mW/°C above 25°C.



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

| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|--------|-----------|-----|-----|-----|-------|-----------------|
|--------|-----------|-----|-----|-----|-------|-----------------|

#### Input Diode

|       |                                     |        |        |            |               |  |
|-------|-------------------------------------|--------|--------|------------|---------------|--|
| $V_F$ | Forward Voltage<br>OPI120<br>OPI123 | -<br>- | -<br>- | 1.5<br>1.5 | V             | $I_F = 30 \text{ mA}$<br>$I_F = 10 \text{ mA}$ |
| $I_R$ | Reverse Current                     | -      | -      | 100        | $\mu\text{A}$ | $V_R = 3 \text{ V}$                            |

#### Output Photosensor (See OP236 for additional information - for reference only)

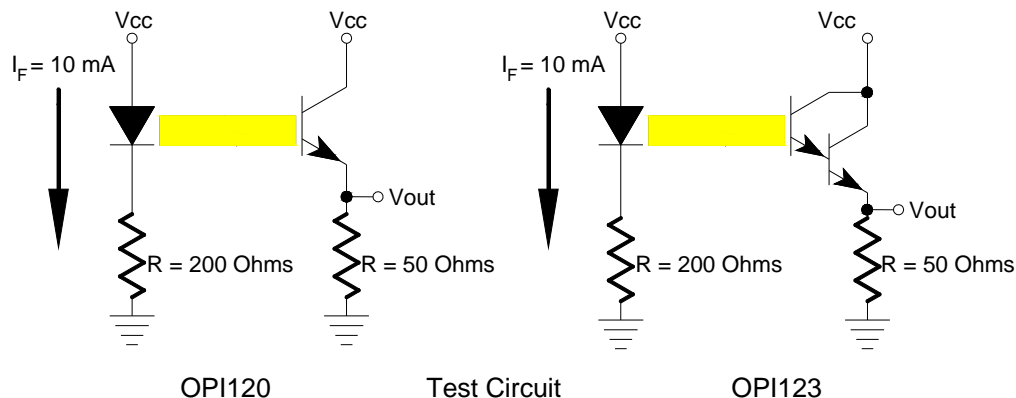
|               |   |          |        |        |    |  |
|---------------|---|----------|--------|--------|----|--|
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage<br>OPI120<br>OPI123 | 25<br>20 | -<br>- | -<br>- | V  | $I_C = 1 \text{ mA}$<br>$I_C = 1 \text{ mA}$ |
| $V_{(BR)ECO}$ | Emitter-Collector Breakdown Voltage                     | 5        | -      | -      | V  | $I_E = 100 \mu\text{A}$                      |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage<br>OPI120              | 25       | -      | -      | V  | $I_C = 1 \text{ mA}$                         |
| $I_{CEO}$     | Collector-Emitter Dark Current                          | -        | -      | 100    | nA | $V_{CE} = 10 \text{ V}$                      |

#### Coupled (See OP804 and OP805 for additional information - for reference only)

|               |  |            |         |            |               |  |
|---------------|--|------------|---------|------------|---------------|--|
| $I_C/I_F$     | DC Current Transfer Ratio<br>OPI120<br>OPI123          | 20<br>50   | 70<br>- | -<br>-     | %             | $I_F = 10 \text{ mA}, V_{CE} = 5 \text{ V}$<br>$I_F = 10 \text{ mA}, V_{CE} = 2 \text{ V}$ |
| $V_{CE(SAT)}$ | Collector Saturation Voltage<br>OPI120<br>OPI123       | -<br>-     | -<br>-  | 0.5<br>1.2 | V             | $I_F = 30 \text{ mA}, I_C = 1 \text{ mA}$<br>$I_F = 5 \text{ mA}, I_C = 1 \text{ mA}$      |
| $I_{C(ON)}$   | On Collector Current<br>OPI120<br>OPI123               | 2.0<br>5.0 | -<br>-  | 50<br>-    | mA            | $I_F = 10 \text{ mA}, V_{CE} = 5 \text{ V}$<br>$I_F = 10 \text{ mA}, V_{CE} = 2 \text{ V}$ |
| $I_{CB(ON)}$  | On Collector Base Current—OPI120                       | 15         | -       | -          | $\mu\text{A}$ | $I_F = 30 \text{ mA}, V_{CB} = 5 \text{ V}$  |
| $V_{ISO}$     | Isolation Voltage <sup>(1)</sup>                       | 15         | -       | -          | kV            | See note 1   |
| $t_r, t_f$    | Output Rise Time, Output Fall Time<br>OPI120<br>OPI123 | -<br>-     | 2<br>40 | -<br>-     | $\mu\text{s}$ | See Test Circuit   |

#### Notes:

- (1) Measured with input and output leads shorted in air with a maximum relative humidity of 50%.  
If suitably encapsulated or oil-immersed, the isolation voltage is increased to 25 kV minimum.



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