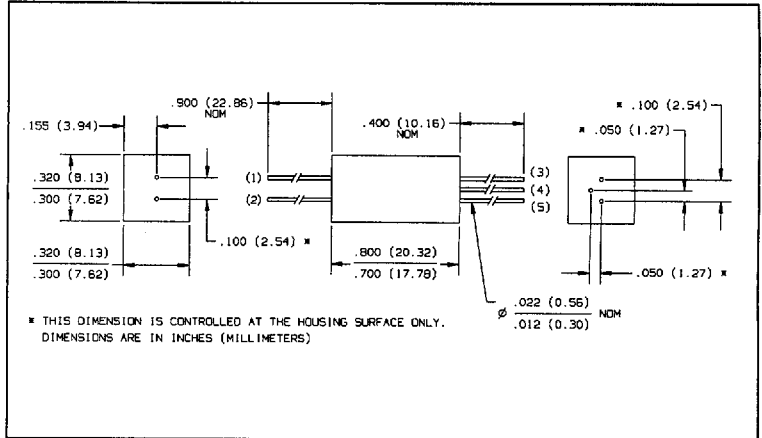
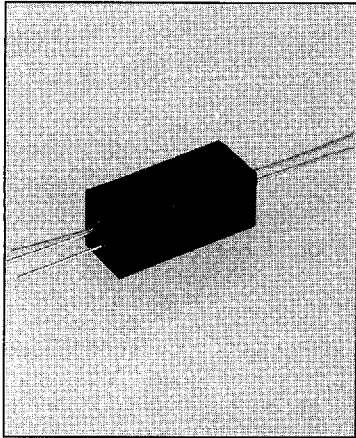


# Optically Coupled Isolators

## Types OPI120, OPI123



### Features

- 15kV electrical isolation
- Phototransistor output (OPI120) or photodarlington output (OPI123)
- Hermetically sealed LED and photosensor
- Base contact lead for conventional transistor biasing (OPI120 only)
- TX-TXV process available (see Hi-Rel section)
- UL recognized File No. E58730<sup>(6)</sup>

### Description

The OPI120 and OPI123 are optically coupled isolators, each containing an infrared emitting diode and an NPN silicon phototransistor (OPI120) or photodarlington (OPI123) sealed in a high dielectric plastic housing. The LED and sensor are in hermetically sealed packages. These series are designed for applications requiring high voltage isolation between input and output over a wide range of temperatures.

### Replaces

K8920 series

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

Input-to-Output Isolation Voltage	± 15 kVDC <sup>(1)(6)</sup>
Storage Temperature Range	-55° C to +125° C
Operating Temperature Range	-55° C to +100° 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	150 mA <sup>(3)</sup>
Reverse DC Current	3.0 V
Power Dissipation	200 mW <sup>(4)</sup>

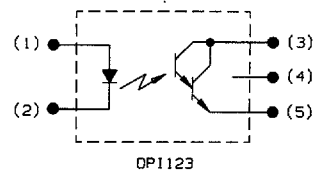
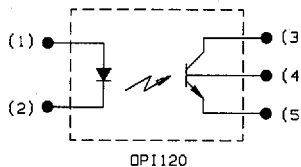
### Output Photosensor

Collector-Emitter Voltage (OPI120)	25 V
(OPI123)	20 V
Emitter-Collector Voltage	5.0 V
Collector-Base Voltage (OPI120)	25 V
Power Dissipation	250 mW <sup>(5)</sup>

### Notes:

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

### Schematics



6798580 0002711 174

# Types OPI120, OPI123

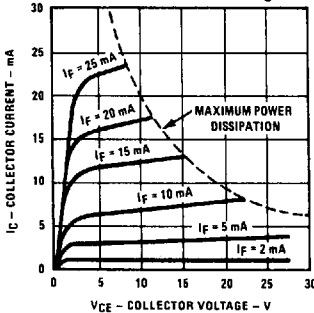
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Electrical Characteristics ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

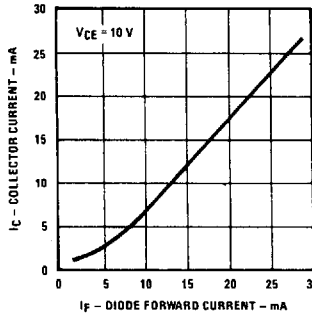
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
<b>Input Diode</b>						
$V_F$	Forward Voltage	OPI120		1.50	V	$I_F = 30\text{ mA}$
		OPI123		1.50	V	$I_F = 10\text{ mA}$
$I_R$	Reverse Current	OPI120		100	$\mu\text{A}$	$V_R = 3\text{ V}$
		OPI123		100	$\mu\text{A}$	$V_R = 3\text{ V}$
<b>Output Photosensor</b>						
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	OPI120	25		V	$I_C = 1\text{ mA}$
		OPI123	20		V	$I_C = 1\text{ mA}$
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage		5.0		V	$I_E = 100\ \mu\text{A}$
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	OPI120	25		V	$I_C = 1\text{ mA}$
$I_{CEO}$	Collector-Emitter Dark Current			100	nA	$V_{CE} = 10\text{ V}$
<b>Coupled</b>						
$I_C/I_F$	DC Current Transfer Ratio	OPI120	20	70	%	$I_F = 10\text{ mA}, V_{CE} = 5\text{ V}$
		OPI123	50		%	$I_F = 10\text{ mA}, V_{CE} = 2\text{ V}$
$V_{CE(SAT)}$	Saturation Voltage	OPI120		0.50	V	$I_F = 30\text{ mA}, I_C = 1\text{ mA}$
		OPI123		1.20	V	$I_F = 5\text{ mA}, I_C = 1\text{ mA}$
$V_{ISO}$	Isolation Voltage		15.0		kV	(See Note 1)
$t_r$	Output Rise Time	OPI120		2.0	$\mu\text{s}$	See Test Circuit
		OPI123		40	$\mu\text{s}$	See Test Circuit
$t_f$	Output Fall Time	OPI120		2.0	$\mu\text{s}$	See Test Circuit
		OPI123		40	$\mu\text{s}$	See Test Circuit

## Typical Performance Curves (OPI120 Only)

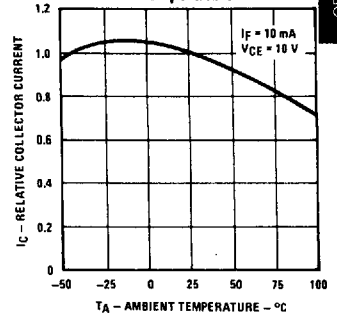
Collector Current vs. Collector-Emitter Voltage



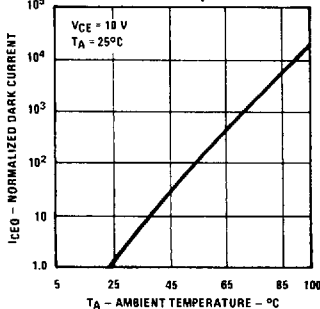
Collector Current vs. Diode Forward Current



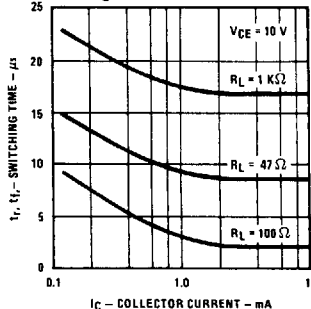
Relative Collector Current vs. Temperature



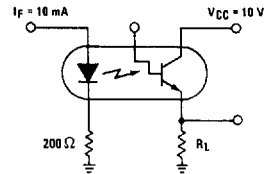
Normalized Dark Current vs. Ambient Temperature



Switching Time vs. Collector Current



Test Circuit



The input waveform is supplied by a generator with the following characteristics:  $Z_{OUT} = 50\ \Omega$ ,  $t_r \leq 15\text{ ns}$ , Duty cycle  $\approx 1\%$ , pulse width  $\approx 100\ \mu\text{s}$ .

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.

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