Optoelectronics Division
TRW Electronic Components Group

Product Bulletin 5209
January 1985

1987 Cost Saver Product!
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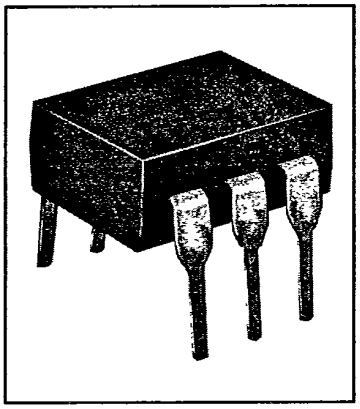
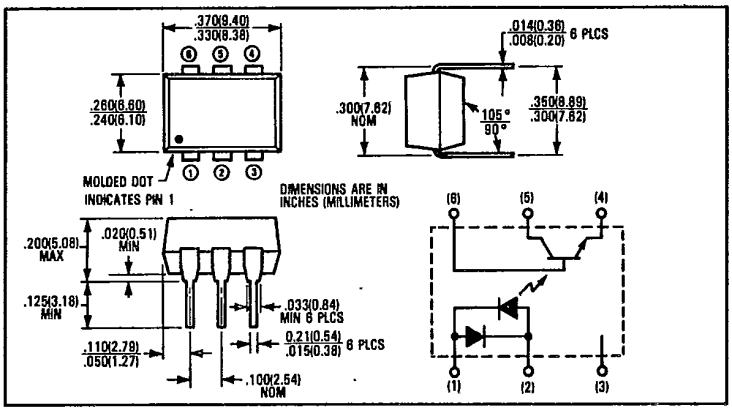
T-41-83

Optically Coupled Isolators
Types OPI2500, OPI2501





Features
- Two inverse parallel LEDs for AC to logic interfacing
- Low cost six pin dual-in-line package

Description
The OPI2500 and OPI2501 are bi-directional optically coupled isolators consisting of two gallium arsenide infrared emitting diodes connected in inverse parallel and an NPN silicon photo-transistor mounted in a standard plastic six pin dual-in-line package. This device is intended for applications where the input to the LEDs is AC.

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

Input-to-Output Isolation Voltage	±1500 VDC[1]
Storage Temperature Range	−55°C to +150°C
Operating Temperature Range	−55°C to +100°C
Lead Soldering Temperature (1/16 inch [1.6 mm] from case for 3 sec. with soldering iron)[2]	260°C
Input Diode	
Forward DC Current	±60 mA
Peak Forward Current (1 μs pulse width, 300 pps)	±3.0 A
Power Dissipation	100 mW[3]
Output Phototransistor	
$V_{(BR)CEO}$	30 V
$V_{(BR)CBO}$	70 V
$V_{(BR)ECO}$	5.0 V
Power Dissipation OPI2500	150 mW[4]
OPI2501	300 mW[5]

Notes:
(1) Measured with input leads shorted together and phototransistor leads shorted together.
(2) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering or using a solder pot.
(3) Derate linearly 1.33 mW/°C above 25°C.
(4) Derate linearly 2.0 mW/°C above 25°C.

Types OPI2500, OPI2501

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Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter		Min.	Typ.	Max.	Units	Test Conditions
Input Diode							
V_F	Forward Voltage				1.50	V	I_F = 10.0 mA
Output Phototransistor							
$V_{(BR)CEO}$	Collector-to-Emitter Breakdown Voltage		30			V	I_C = 1.00 mA
$V_{(BR)ECO}$	Emitter-to-Collector Breakdown Voltage		5.0			V	I_E = 10.0 μA
$V_{(BR)CBO}$	Collector-to-Base Breakdown Voltage		70			V	I_C = 10.0 μA
I_{CEO}	Collector-Emitter Dark Current			5.0	50	nA	V_{CE} = 10.0 V
C_{CE}	Capacitance Collector-to-Emitter			8.0		pF	V_{CE} = 0
h_{FE}	DC Current Gain			250			V_{CE} = 5.0 V, I_C = 100 μA
Coupled							
I_C/I_F	DC Current Transfer Ratio	OPI2500	12.5	20		%	I_F = ±10.0 mA, V_{CE} = 5.0 V
		OPI2501	20.0			%	I_F = ±10.0 mA, V_{CE} = 5.0 V
$I_{C(+)}/I_{C(-)}$	CTR Symmetry (OPI2501 only)		0.5		2.0	(ratio)	I_F = ±10.0 mA, V_{CE} = 10.0 V
$V_{CE(SAT)}$	Collector-to-Emitter Saturation Voltage				0.50	V	I_F = ±10.0 mA, I_C = 1.00 mA
V_{ISO}	Isolation Voltage		1500			V	See Note 1
R_{IO}	Input-to-Output Resistance		10^{11}			Ω	V_{IO} = 500 V. See Note 1
C_{IO}	Input-to-Output Capacitance			2.0		pF	f = 1.00 MHz. See Note 1
t_r	Output Rise Time			2.0		μs	V_{CC} = 10.0 V, I_C = 2.0 mA
t_f	Output Fall Time			2.0		μs	R_L = 100Ω. See Test Circuit

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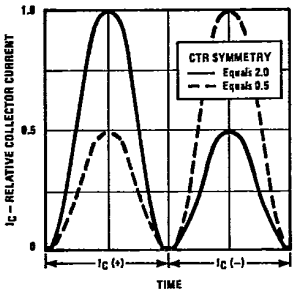
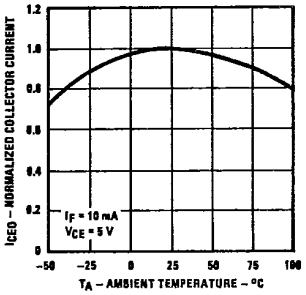
Typical Performance Curves

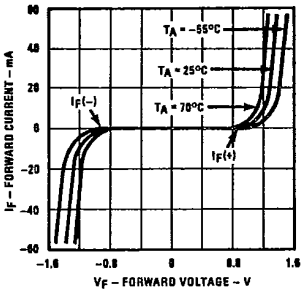
Relative Output Current Wave Form



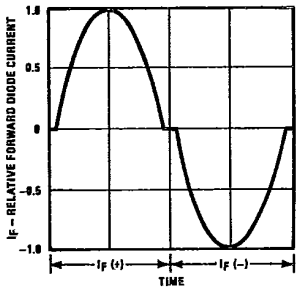
Normalized Collector Current vs Ambient Temperature



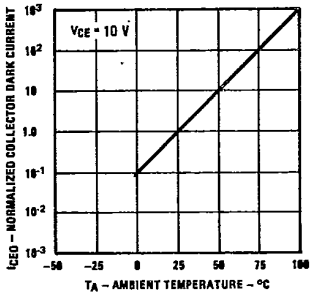
Diode Forward Current vs Diode Forward Voltage



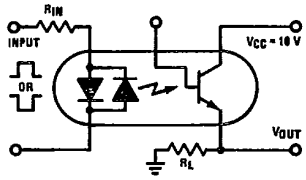
Relative Input Current Wave Form



Normalized Collector Dark Current vs Ambient Temperature



Switching Time Test Circuit



Note: Rise Time (t_r) is time required for collector current to increase from 10% to 90% of its final value. Fall Time (t_f) is time required for the collector current to decrease from 90% to 10% of its initial value.

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