

# NEC

## HIGH ISOLATION VOLTAGE DARLINGTON TRANSISTOR TYPE MULTI OPTOCOUPLER SERIES

PS2502 -1, -2, -4  
PS2502L -1, -2, -4

### FEATURES

- **HIGH ISOLATION VOLTAGE**  
BV: 5 k V<sub>r.m.s.</sub> MIN
- **HIGH CURRENT TRANSFER RATIO**  
CTR: 2000% TYP
- **HIGH SPEED SWITCHING**  
t<sub>r</sub>, t<sub>f</sub> = 100 μs TYP
- **LOW COST**
- **ISOLATED CHANNELS PER EACH PACKAGE**

### DESCRIPTION

PS2502-1, -2, -4 and PS2502L-1, -2, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon Darlington phototransistor. PS2502-1, -2, and -4 are in a plastic DIP (Dual In-line Package) and PS2502L-1, -2, and -4 are lead bending type (Gull-wing) for surface mount.

### APPLICATIONS

Interface circuit for various instrumentations and control equipment.

- AC LINE / DIGITAL LOGIC
- DIGITAL LOGIC / DIGITAL LOGIC
- TWISTED PAIR LINE RECEIVER
- TELEPHONE / TELEGRAPH LINE RECEIVER
- HIGH FREQUENCY POWER SUPPLY  
FEEDBACK CONTROL
- RELAY CONTACT MONITOR
- POWER SUPPLY MONITOR

1

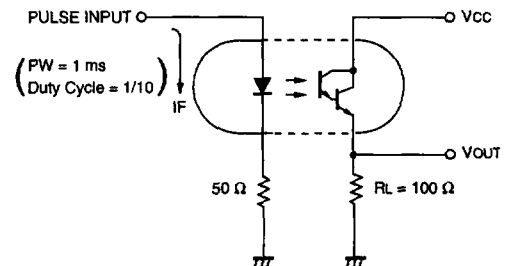
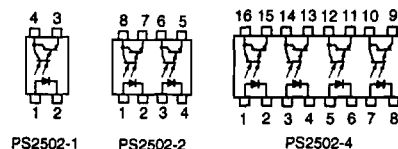
### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)

PART NUMBER			PS2502-1, -2, -4, PS2502L-1, -2, -4		
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
Diode	V <sub>F</sub>	Forward Voltage, I <sub>F</sub> = 10 mA	V	1.17	1.4
	I <sub>R</sub>	Reverse Current, V <sub>R</sub> = 5 V	μA		5
	C	Junction Capacitance, V = 0, f = 1.0 MHz	pF		50
Transistor	I <sub>CEO</sub>	Collector to Emitter Dark Current, V <sub>ce</sub> = 40 V, I <sub>F</sub> = 0	nA		400
	BV <sub>CEO</sub>	Collector to Emitter Breakdown Voltage, I <sub>c</sub> = 1mA, I <sub>b</sub> = 0	V	40	60
	BV <sub>ECO</sub>	Emitter to Collector Breakdown Voltage, I <sub>E</sub> = 100 μA, I <sub>b</sub> = 0	V	6	8
Coupled	CTR	Current Transfer Ratio <sup>1</sup> , I <sub>F</sub> = 1mA, V <sub>CE</sub> = 2 V	%	200	2000
	V <sub>CE(sat)</sub>	Collector Saturation Voltage, I <sub>F</sub> = 1 mA, I <sub>c</sub> = 2 mA	V		1.0
	R <sub>1-2</sub>	Isolation Resistance, V <sub>in-out</sub> = 1.0 kV	Ω	10 <sup>11</sup>	
	C <sub>1-2</sub>	Isolation Capacitance, V = 0, f = 1.0 MHz	pF		0.5
	t <sub>r</sub>	Rise Time <sup>2</sup> , V <sub>CC</sub> = 10 V, I <sub>c</sub> = 10mA, R <sub>L</sub> = 100 Ω	μs		100
t <sub>f</sub>	Fall Time <sup>2</sup> , V <sub>CC</sub> = 10 V, I <sub>c</sub> = 10mA, R <sub>L</sub> = 100 Ω	μs		100	

Notes:

- CTR rank (PS2502-1, PS2502L-1 only)  
K: 2000 %  
L: 700 to 3400 %  
M: 200 to 1000 %

2. Test Circuit for Switching Time



# PS2502- 1, -2, -4, PS2502L -1, -2, -4

## ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (T<sub>A</sub> = 25°C)

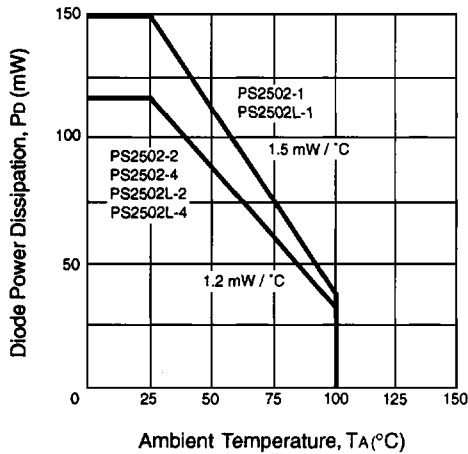
SYMBOLS	PARAMETERS	UNITS	RATINGS	
			PS2502-1 PS2502L-1	PS2502-2, 4 PS2502L-2, 4
<b>Diode</b>				
I <sub>F</sub>	Forward Current	mA	80	80
V <sub>R</sub>	Reverse Voltage	V	6	6
P <sub>D</sub>	Power Dissipation	mW/ch	150	120
I <sub>F</sub> (PEAK)	Peak Forward Current (PW = 100 μs, Duty Cycle 1%)	A	1	1
<b>Transistor</b>				
V <sub>CEO</sub>	Collector to Emitter Voltage	V	40	40
V <sub>ECO</sub>	Emitter to Collector Voltage	V	6	6
I <sub>C</sub>	Collector Current	mA	200	160
P <sub>C</sub>	Power Dissipation	mW/ch	200	160
<b>Coupled</b>				
BV	Isolation Voltage <sup>2</sup>	V <sub>r.m.s.</sub>	5000	5000
T <sub>stg</sub>	Storage Temperature	°C	-55 to +150	-55 to +150
T <sub>opt</sub>	Operating Temperature	°C	-55 to +100	-55 to +100
T <sub>sol</sub>	Lead Temperature (Soldering 10 s)	°C	260	260
P <sub>T</sub>	Total Power Dissipation	mW/ch	250	200

### Notes:

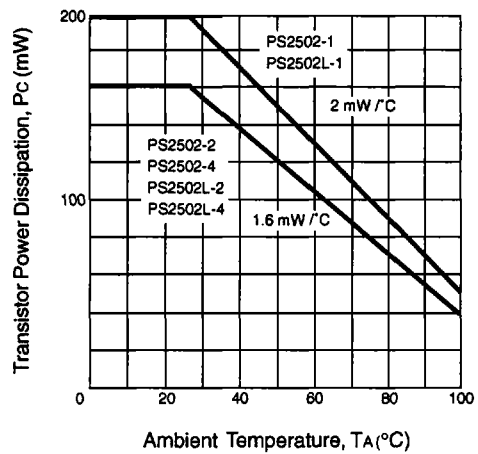
1. Operation in excess of any one of these parameters may result in permanent damage.
2. AC voltage for 1 minute at T<sub>A</sub> = 25 °C, RH = 60 % between input and output.

## TYPICAL PERFORMANCE CURVES (T<sub>A</sub> = 25 °C)

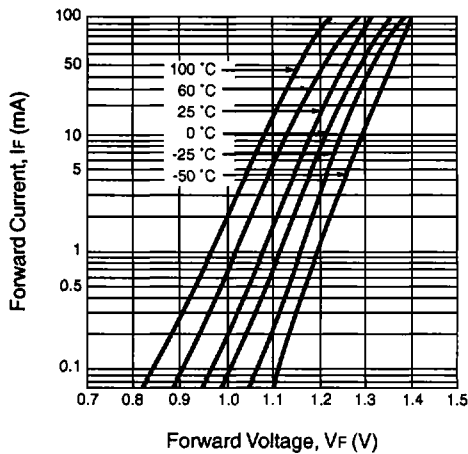
**DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE**



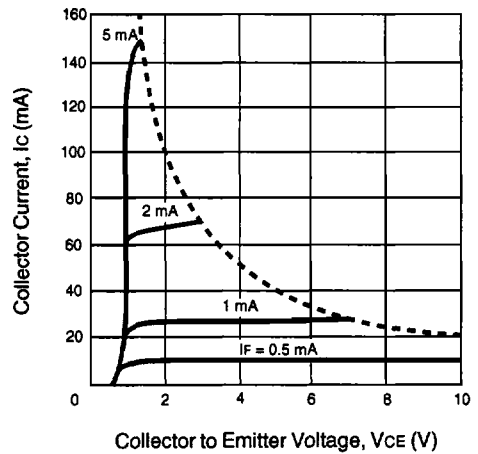
**TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE**



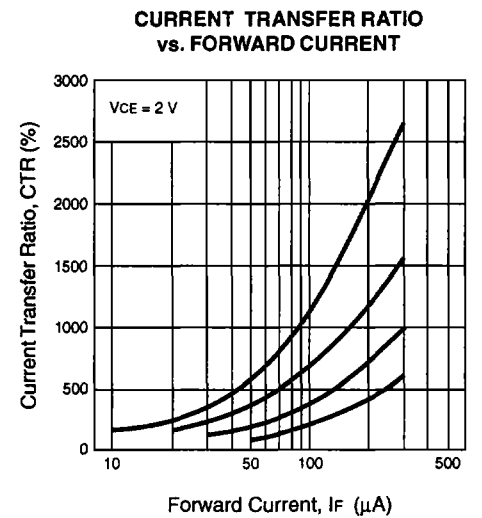
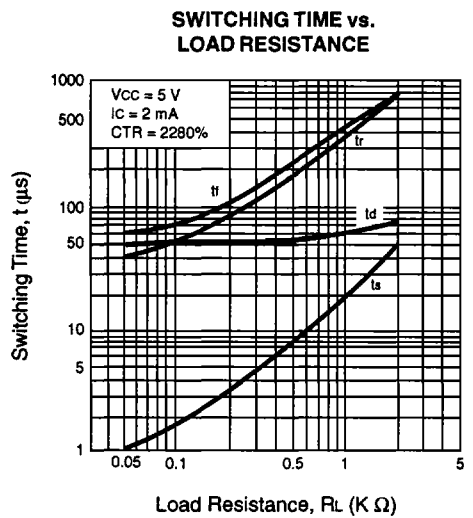
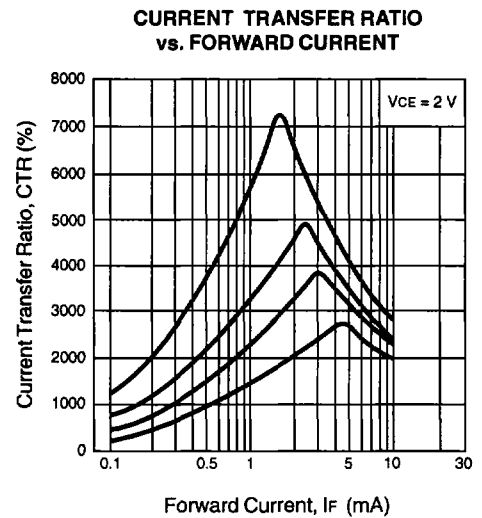
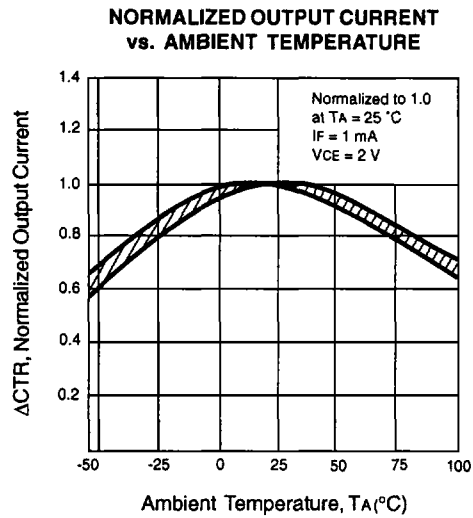
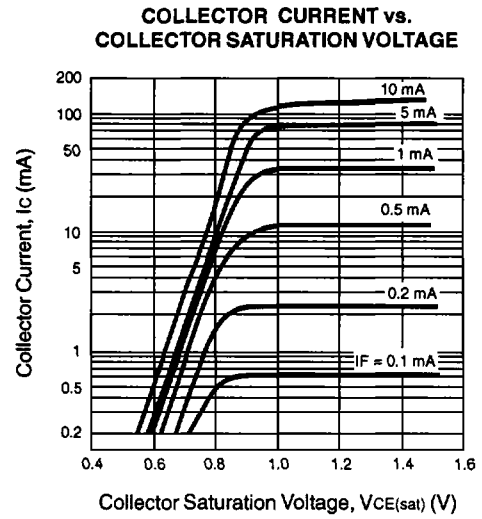
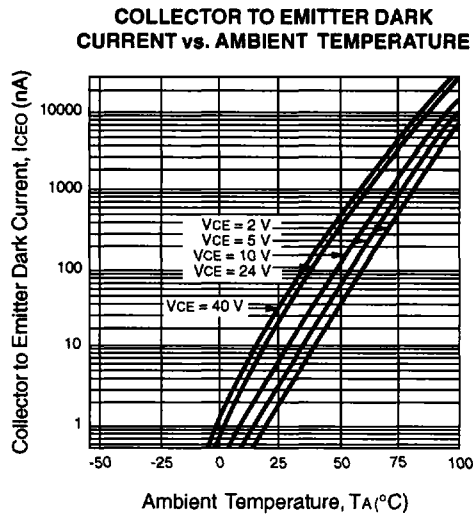
**FORWARD CURRENT vs. FORWARD VOLTAGE**



**COLLECTOR CURRENT vs. COLLECTOR to EMITTER VOLTAGE**

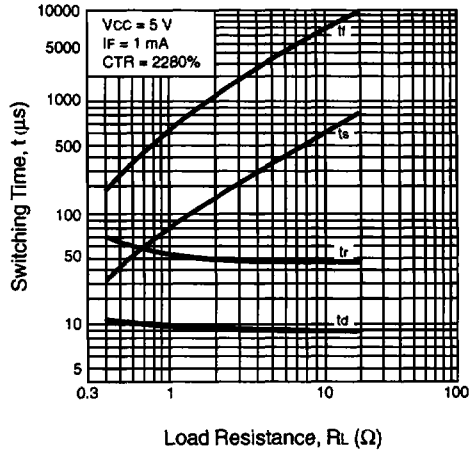


**TYPICAL PERFORMANCE CURVES** ( $T_A = 25^\circ\text{C}$ )

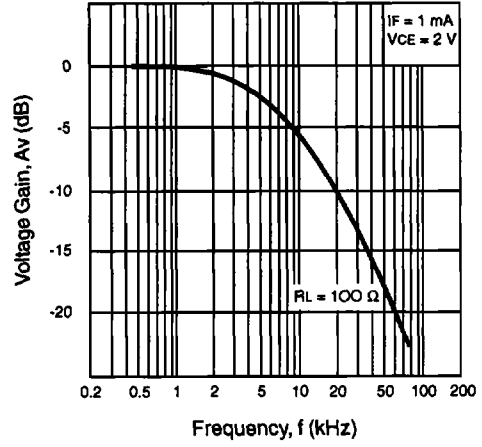


**TYPICAL PERFORMANCE CURVES** ( $T_A = 25^\circ\text{C}$ )

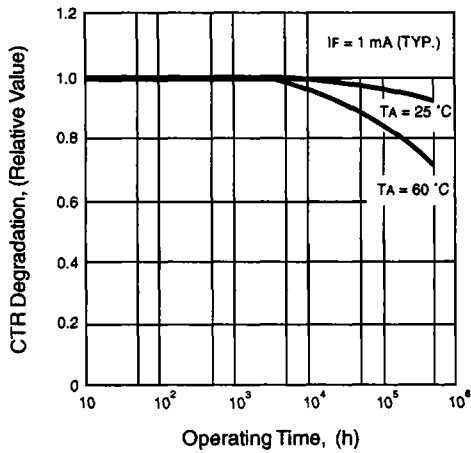
**SWITCHING TIME vs. LOAD RESISTANCE**



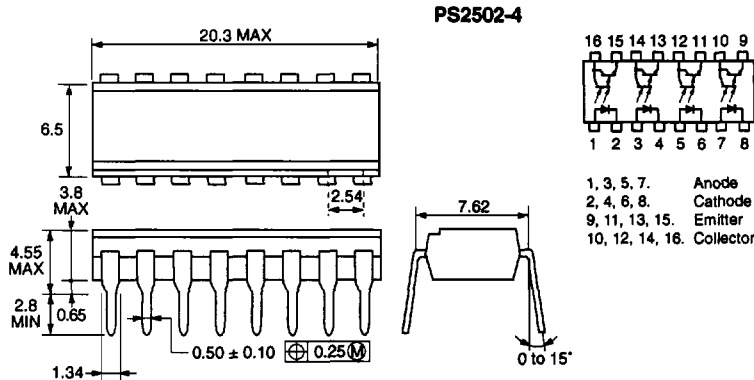
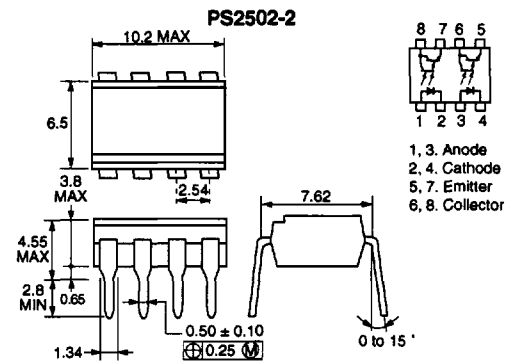
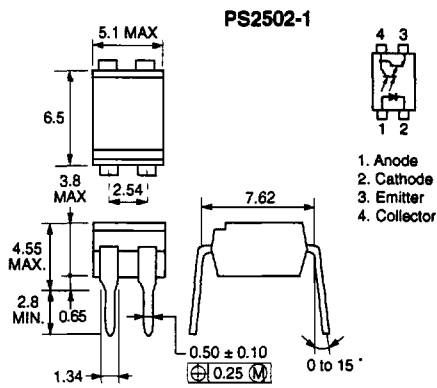
**FREQUENCY RESPONSE**



**LONG TERM CTR DEGRADATION**



**OUTLINE DIMENSIONS** (Units in mm) DIP (Dual In-Line Package)



**OUTLINE DIMENSIONS** (Units in mm) Lead Bending type (Gull-wing)

