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 Vr.m.s. MIN
- **HIGH CURRENT TRANSFER RATIO**
  CTR: 2000% TYP
- **HIGH SPEED SWITCHING**
  tr, tf = 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**

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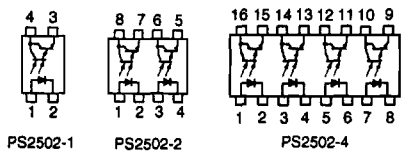
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

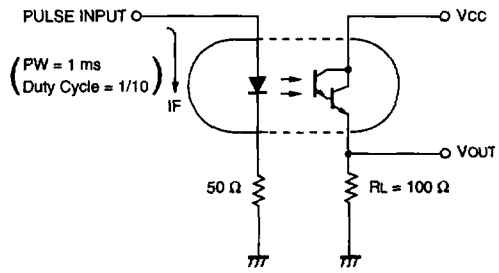
PART NUMBER				PS2502-1, -2, -4, PS2502L-1, -2, -4		
SYMBOLS		PARAMETERS	UNITS	MIN	TYP	MAX
Diode	V_F	Forward Voltage, I_F = 10 mA	V		1.17	1.4
	I_R	Reverse Current, V_R = 5 V	µA			5
	C	Junction Capacitance, V= 0, f = 1.0 MHz	pF		50	
Transistor	I_{CEO}	Collector to Emitter Dark Current, V_{CE} = 40 V, I_F = 0	nA			400
	BV_{CEO}	Collector to Emitter Breakdown Voltage, I_C = 1mA, I_B = 0	V	40	60	
	BV_{ECO}	Emitter to Collector Breakdown Voltage, I_E = 100 µA, I_B = 0	V	6	8	
Coupled	CTR	Current Transfer Ratio[1], I_F = 1mA, V_{CE} = 2 V	%	200	2000	
	$V_{CE\ (sat)}$	Collector Saturation Voltage, I_F = 1 mA, I_C = 2 mA	V			1.0
	R_{1-2}	Isolation Resistance, V_{in-out} = 1.0 kV	Ω	10^{11}		
	C_{1-2}	Isolation Capacitance, V = 0, f = 1.0 MHz	pF		0.5	
	t_r	Rise Time[2], V_{CC} = 10 V, I_C = 10mA, R_L = 100 Ω	µs		100	
	t_f	Fall Time[2], V_{CC} = 10 V, I_C =10mA, R_L = 100 Ω	µs		100	

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



PS2502-1 PS2502-2 PS2502-4

2.Test Circuit for Switching Time



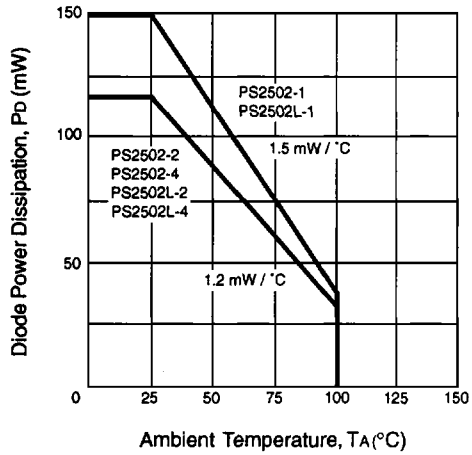
ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS	
			PS2502 -1 PS2502L-1	PS2502 -2, 4 PS2502L-2,4
Diode				
I_F	Forward Current	mA	80	80
V_R	Reverse Voltage	V	6	6
P_D	Power Dissipation	mW/ch	150	120
$I_{F(PEAK)}$	Peak Forward Current (PW = 100 µs, Duty Cycle 1%)	A	1	1
Transistor				
V_{CEO}	Collector to Emitter Voltage	V	40	40
V_{ECO}	Emitter to Collector Voltage	V	6	6
I_C	Collector Current	mA	200	160
P_C	Power Dissipation	mW/ch	200	160
Coupled				
BV	Isolation Voltage[2]	$V_{r.m.s.}$	5000	5000
T_{stg}	Storage Temperature	°C	-55 to +150	-55 to +150
T_{opt}	Operating Temperature	°C	-55 to +100	-55 to +100
T_{sol}	Lead Temperature (Soldering 10 s)	°C	260	260
P_T	Total Power Dissipation	mW/ch	250	200

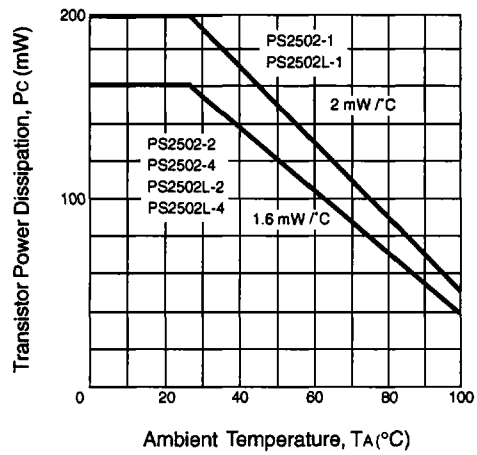
Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and ouput.

TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

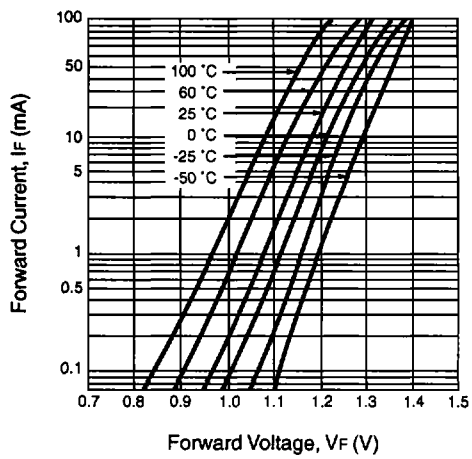
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



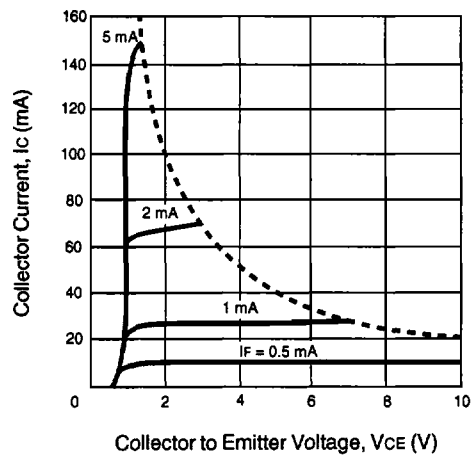
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



FORWARD CURRENT vs. FORWARD VOLTAGE

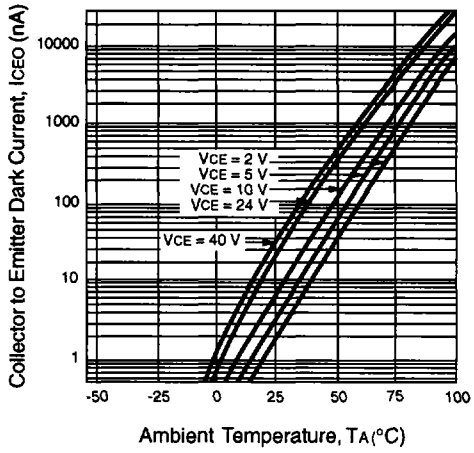


COLLECTOR CURRENT vs. COLLECTOR to EMITTER VOLTAGE

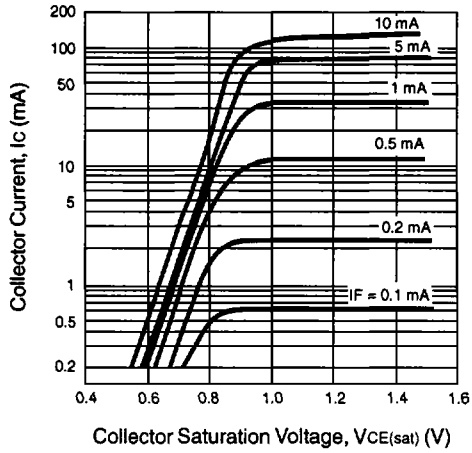


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

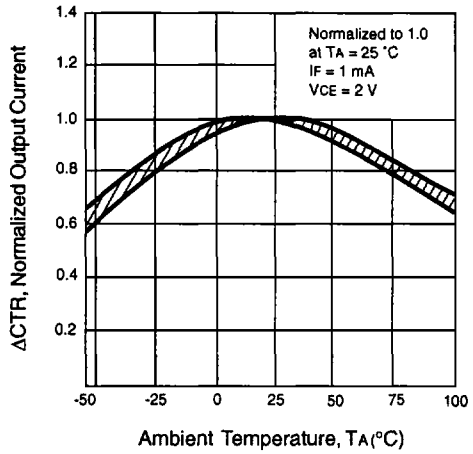
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



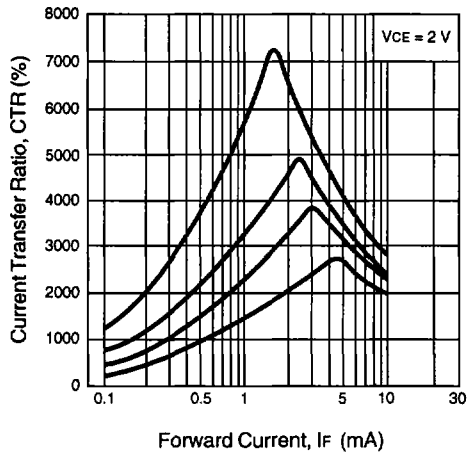
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



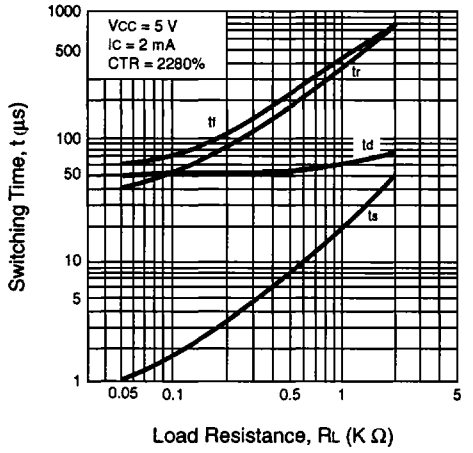
NORMALIZED OUTPUT CURRENT vs. AMBIENT TEMPERATURE



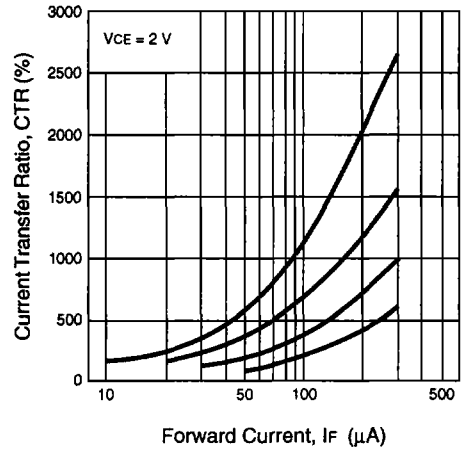
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



SWITCHING TIME vs. LOAD RESISTANCE

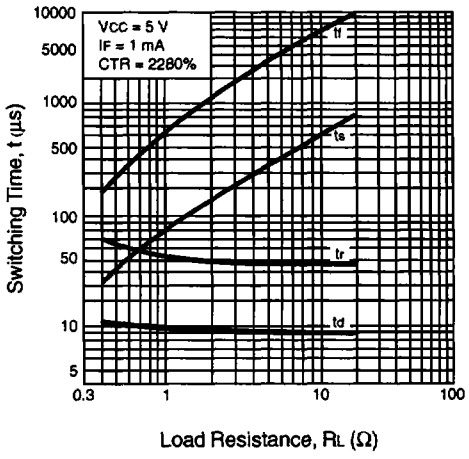


CURRENT TRANSFER RATIO vs. FORWARD CURRENT

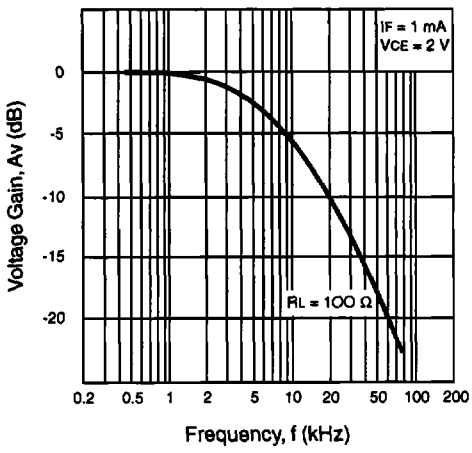


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

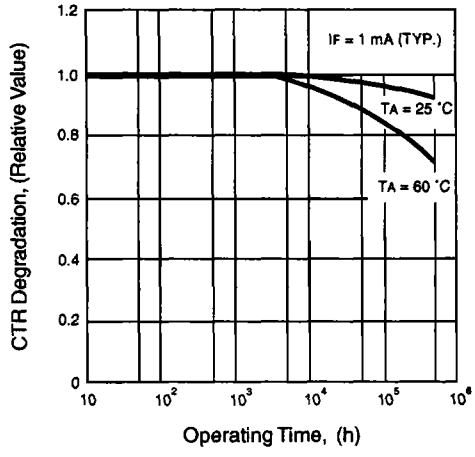
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE

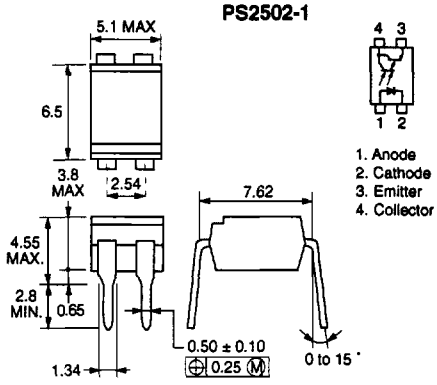


LONG TERM CTR DEGRADATION

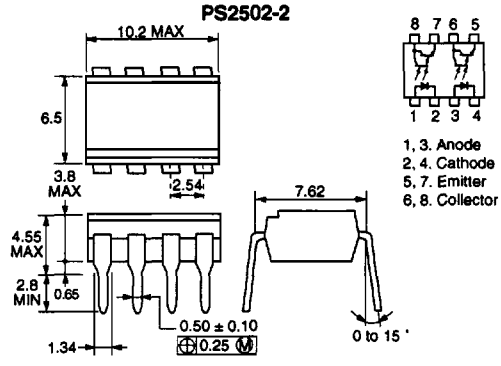


OUTLINE DIMENSIONS (Units in mm) DIP (Dual In-Line Package)

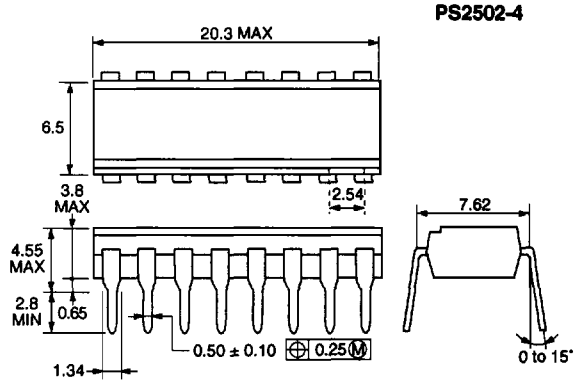
PS2502-1



PS2502-2

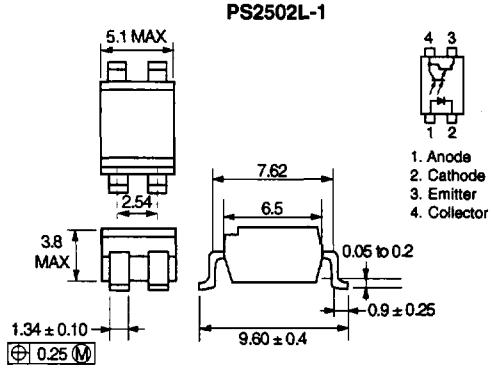


PS2502-4

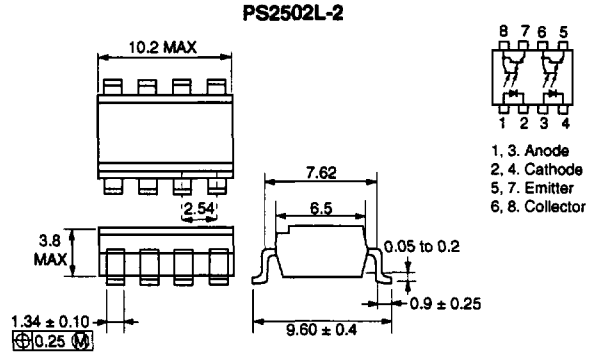


OUTLINE DIMENSIONS (Units in mm) Lead Bending type (Gull-wing)

PS2502L-1



PS2502L-2



PS2502L-4