

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**
 $t_r, t_f = 100 \mu\text{s}$ 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**

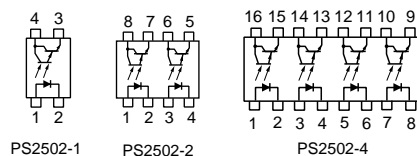
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

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		1.17	1.4
	I _R	Reverse Current, V _R = 5 V			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 = 1 mA, 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 = 1 mA, 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 = 10 mA, R _L = 100 Ω	μs		100
t _f	Fall Time ² , V _{CC} = 10 V, I _c = 10 mA, R _L = 100 Ω	μs		100	

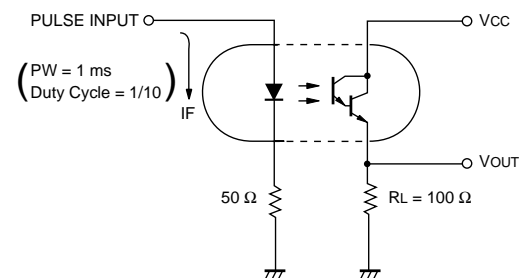
Notes:

1. CTR rank (PS2502-1, PS2502L-1 only)

- K: 2000 %
- L: 700 to 3400 %
- M: 200 to 1000 %



2. Test Circuit for Switching Time



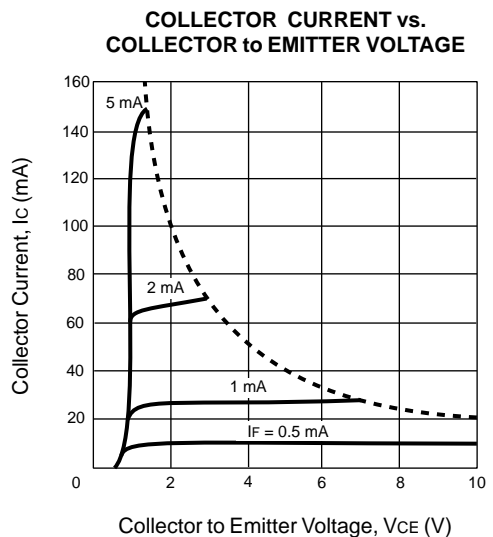
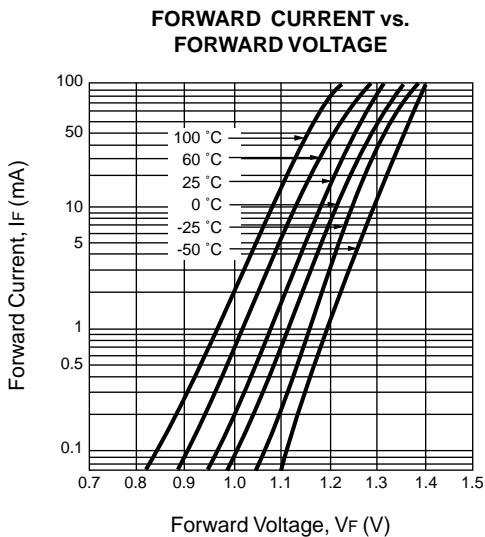
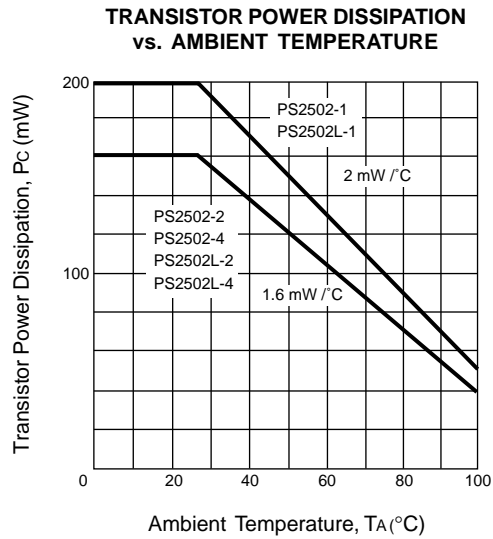
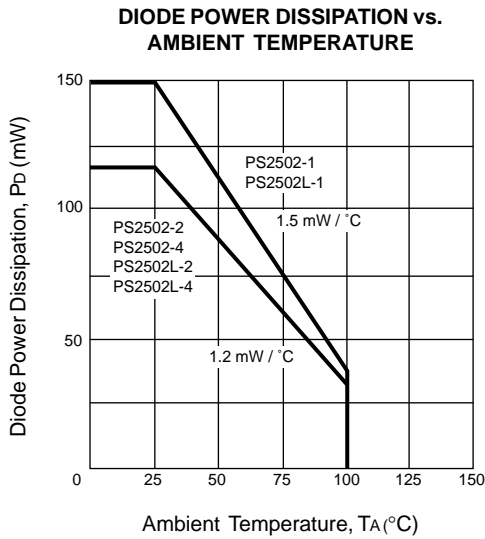
ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

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:

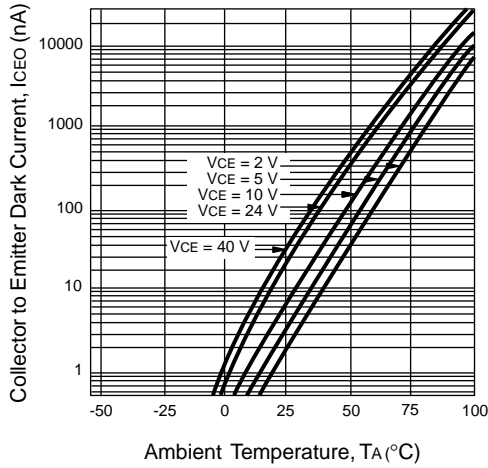
1. Operation in excess of any one of these parameters may result in permanent damage.
2. AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output.

TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

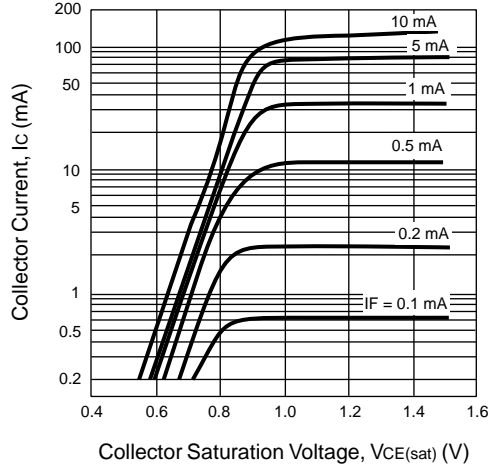


TYPICAL PERFORMANCE CURVES ($T_A = 25^\circ\text{C}$)

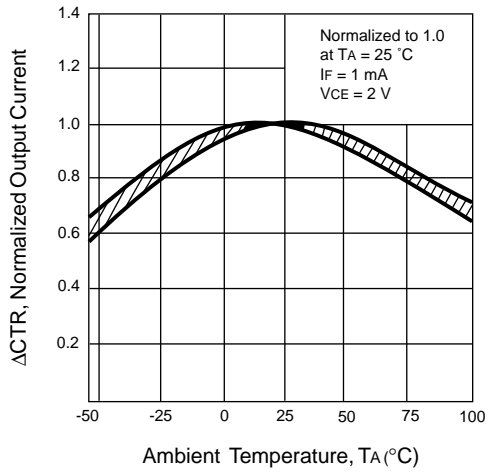
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



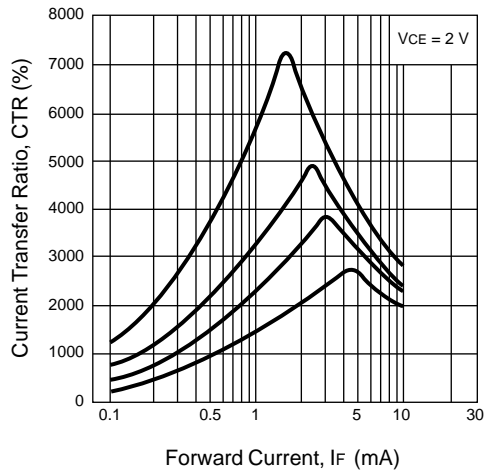
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



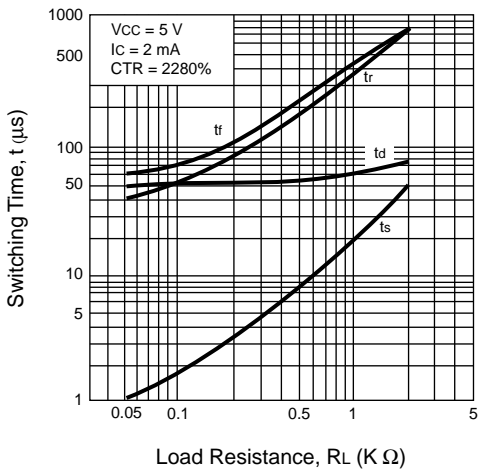
NORMALIZED OUTPUT CURRENT vs. AMBIENT TEMPERATURE



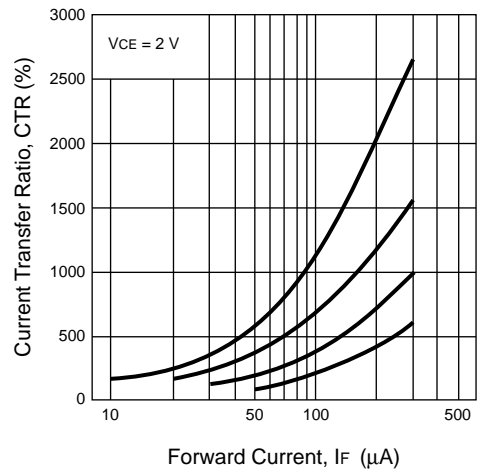
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



SWITCHING TIME vs. LOAD RESISTANCE

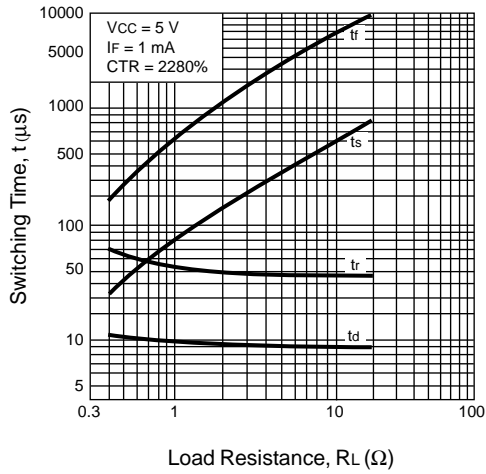


CURRENT TRANSFER RATIO vs. FORWARD CURRENT

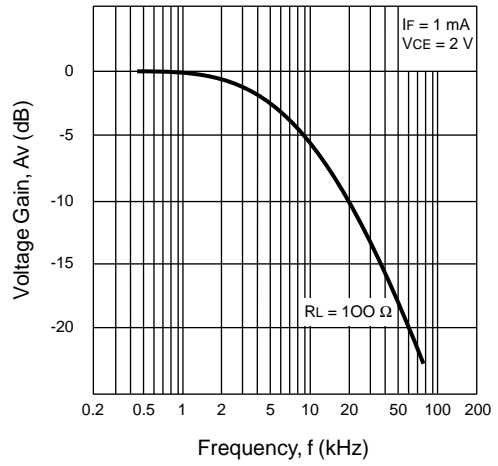


TYPICAL PERFORMANCE CURVES ($T_A = 25\text{ }^\circ\text{C}$)

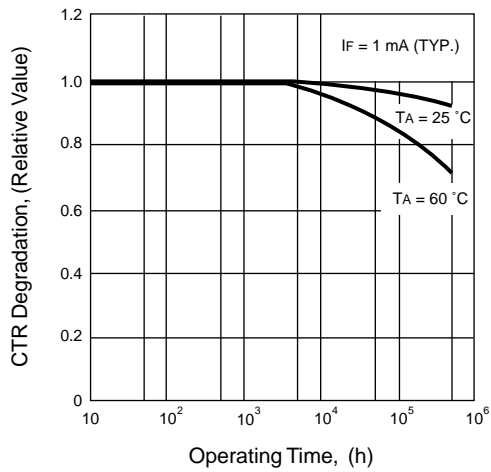
SWITCHING TIME vs. LOAD RESISTANCE



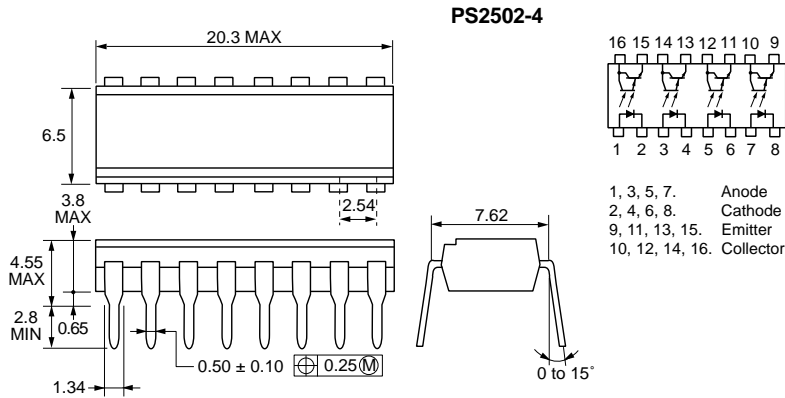
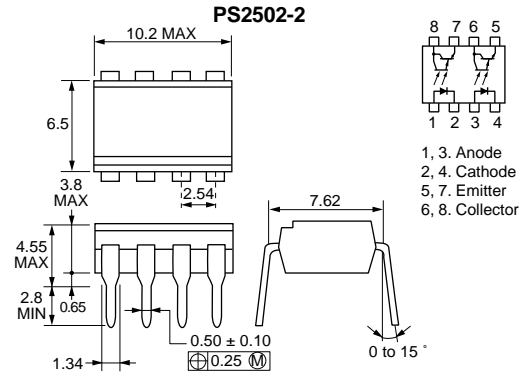
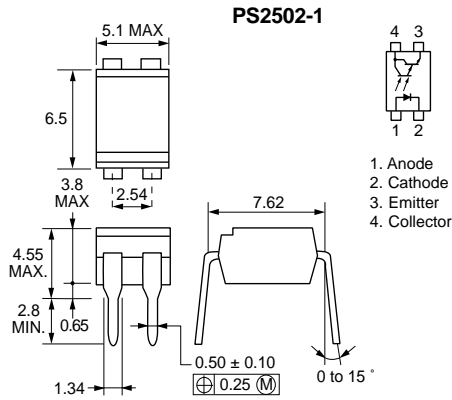
FREQUENCY RESPONSE



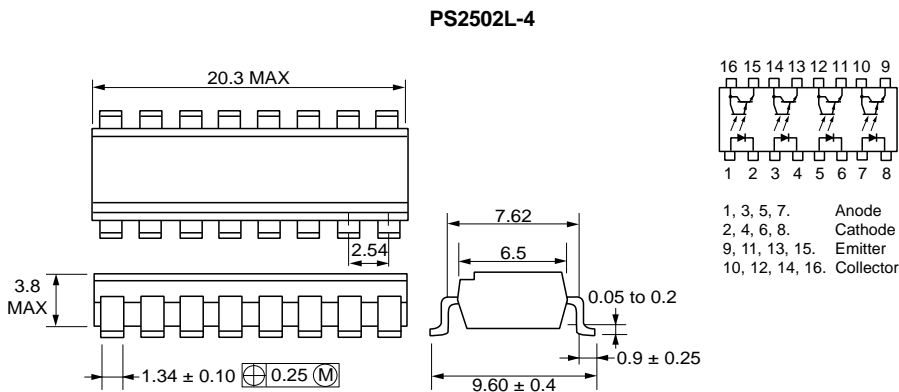
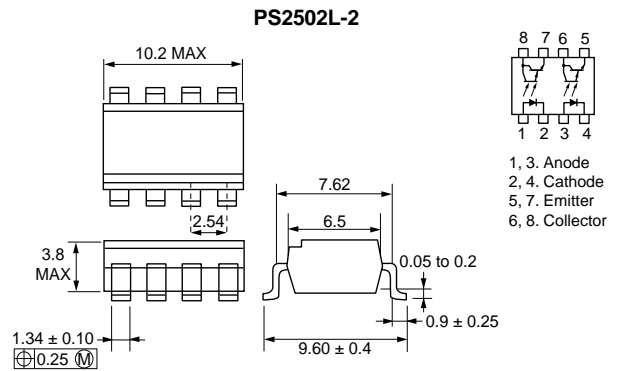
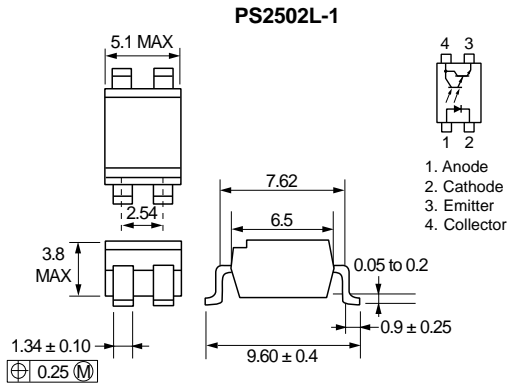
LONG TERM CTR DEGRADATION



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



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



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