NEC

HIGH ISOLATION VOLTAGE SINGLE TRANSISTOR TYPE MULTI OPTOCOUPLER SERIES

PS2501-1,-2,-4
PS2501L-1,-2,-4

FEATURES

- **HIGH ISOLATION VOLTAGE**
  BV: 5kV$_{r.m.s.}$ MIN
- **HIGH COLLECTOR TO EMITTER VOLTAGE**
  V_{CEO}: 80 V MIN
- **HIGH CURRENT TRANSFER RATIO**
  CTR: 300% TYP
- **HIGH SPEED SWITCHING**
  t_r = 3 µs, t_f = 5 µs TYP
- **LOW COST**
- **ISOLATED CHANNELS PER EACH PACKAGE**

DESCRIPTION

PS2501-1, -2, -4 and PS2501L-1, -2, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor. PS2501-1, -2, -4 are in a plastic DIP (Dual In-line Package) and PS2501L-1, -2, -4 are lead bending type (Gull-wing) for surface mount.

APPLICATIONS

Interface circuit for various instrumentations and control equipments

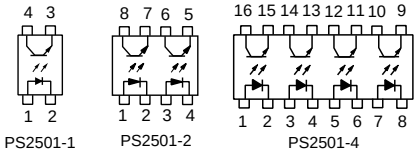
- **AC LINE / DIGITAL LOGIC**
- **DIGITAL LOGIC / DIGITAL LOGIC**
- **TWISTED PAIR LINE RECEIVER**
- **TELEPHONE / TELEGRAPH LINE RECEIVER**
- **HIGH FREQUENCY POWER SUPPLY FEEDBACK CONROL**
- **RELAY CONTACT MONITOR**
- **POWER SUPPLY MONITOR**

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

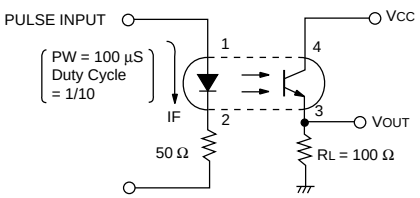
PART NUMBER				PS2501-1, -2, -4 PS2501L-1, -2, -4		
	SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
Diode	V_F	Forward Voltage, I_F = 10 mA	V		1.17	1.4
	I_R	Reverse Current, V_R = 5 V	µA			5
	C	Junction Capacitance, V= 0, f = 1.0 MHz	pF		50	
Transistor	I_{CEO}	Collector to Emitter Dark Current, Vce = 80 V, I_F = 0	nA			100
	BV_{CEO}	Collector to Emitter Breakdown Voltage, I_C = 1 mA, IB = 0	V	40	60	
	BV_{ECO}	Emitter to Collector Breakdown Voltage, I_E = 100 µA, I_B = 0	V	7	9	
Coupled	CTR	Current Transfer Ratio [1], I_F= 5 mA, V_{CE} = 5 V	%	80	300	600
	$V_{CE\ (sat)}$	Collector Saturation Voltage, I_F = 10 mA, I_C = 2 mA	V			0.3
	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 = 2 mA, R_L = 100 Ω	µs		3	
	t_f	Fall Time [2], V_{CC} = 10 V, I_C = 2 mA, R_L = 100 Ω	µs		5	

Notes:

1. CTR rank (PS2501-1, PS2501L-1 only)
   K: 300 to 600 %
   L: 200 to 400 %
   M: 80 to 240 %
   D: 100 to 300 %
   H: 80 to 160 %
   W: 130 to 260 %
   Q: 100 to 200%
   N: 80 to 600 %



2.Test Circuit for Switching



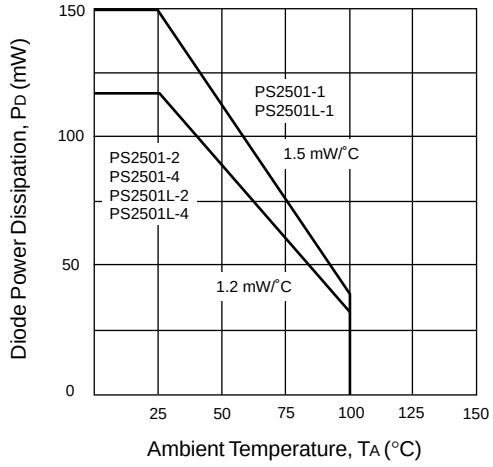
ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS	
			PS2501-1 PS2501L-1	PS2501-2,4 PS2501L-2, 4
Diode				
I_F	Forward Current	mA	80	80
V_R	Reverse Voltage	V	6	6
ΔP_D/°C	Power Dissipation Derating	mW/°C	1.5	1.2
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	80	80
V_{ECO}	Emitter to Collector Voltage	V	7	7
I_C	Collector Current	mA	50	50
ΔP_C/°C	Power Dissipation Derating	mW/°C	1.5	1.2
P_C	Power Dissipation	mW/Ch	150	120
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

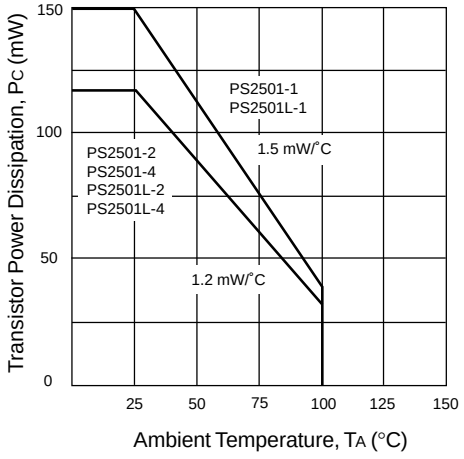
Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and ouput.

TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE

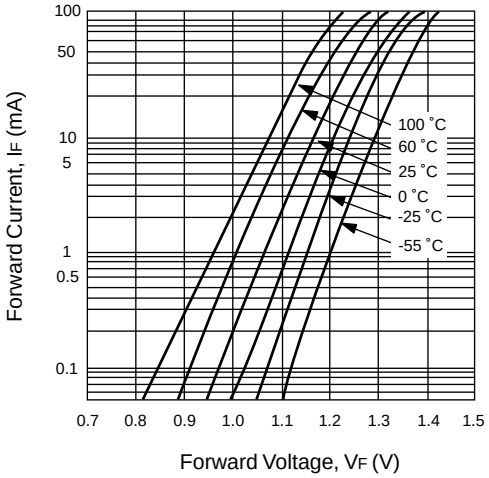


TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE

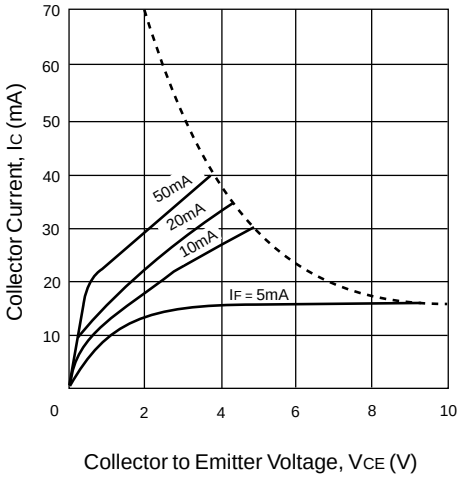


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

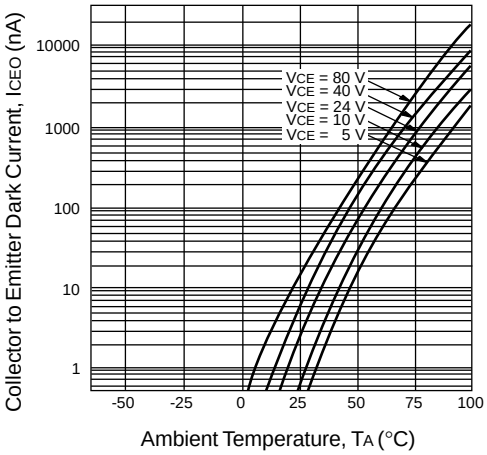
FORWARD CURRENT vs. FORWARD VOLTAGE



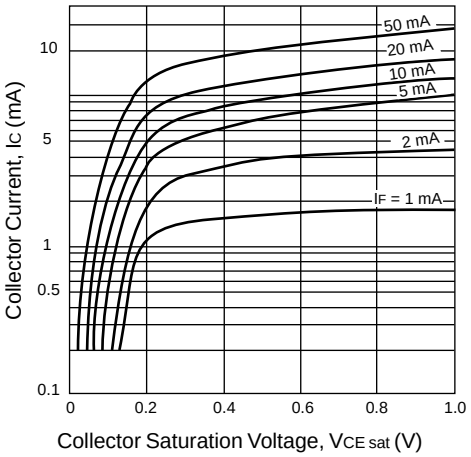
COLLECTOR CURRENT vs. COLLETOR to EMITTER VOLTAGE



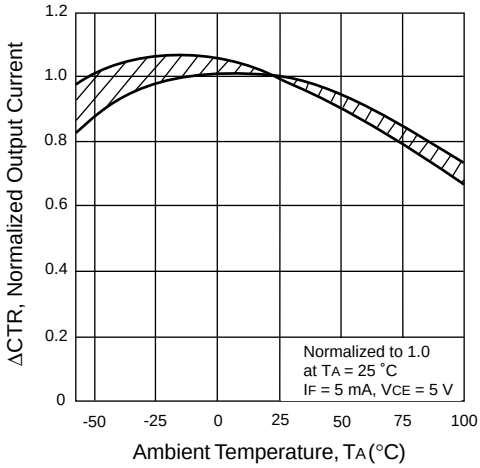
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



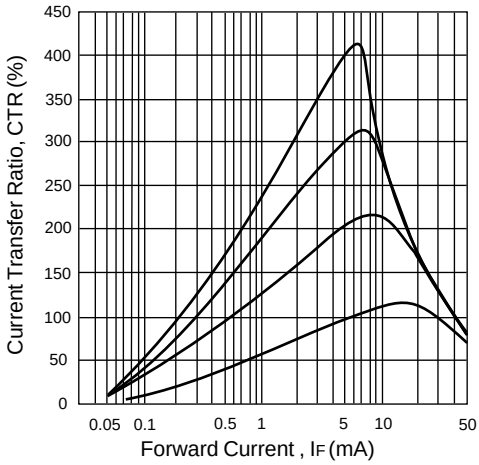
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



NORMALIZED OUTPUT CURRENT vs. AMBIENT TEMPERATURE

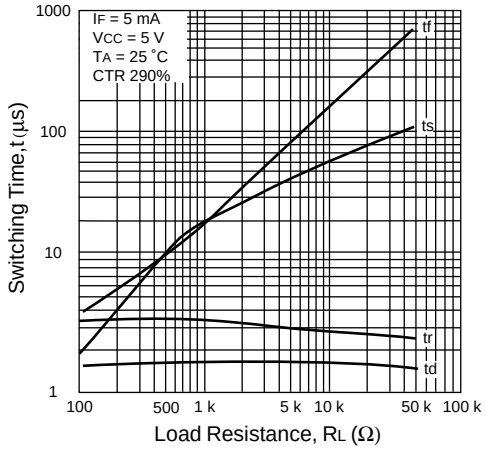


CURRENT TRANSFER RATIO vs. FORWARD CURRENT

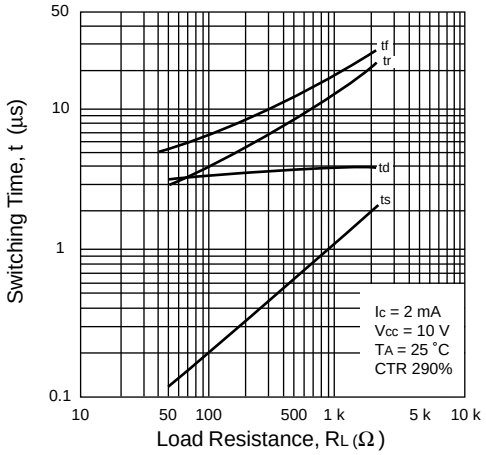


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

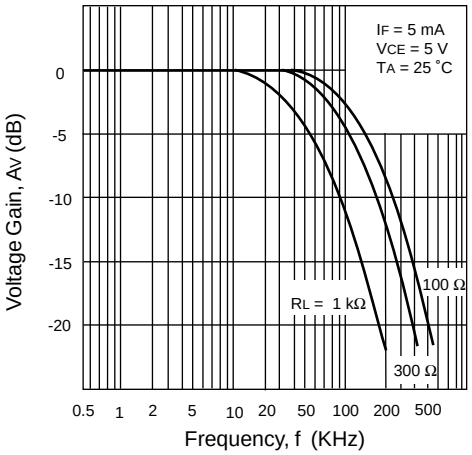
SWITCHING TIME vs. LOAD RESISTANCE



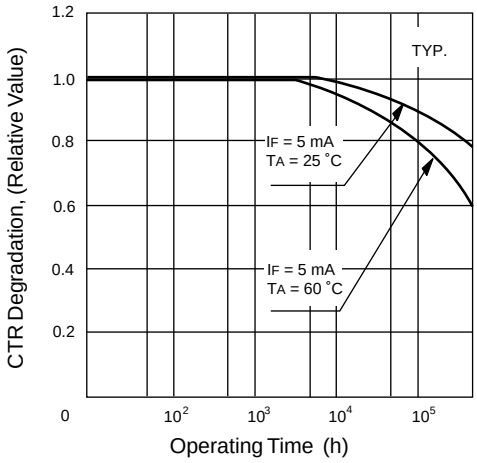
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE

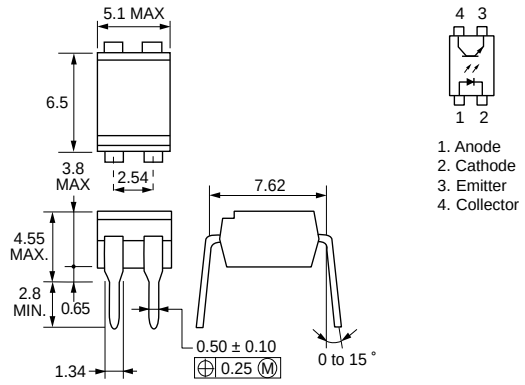


LONG TERM CTR DEGRADATION

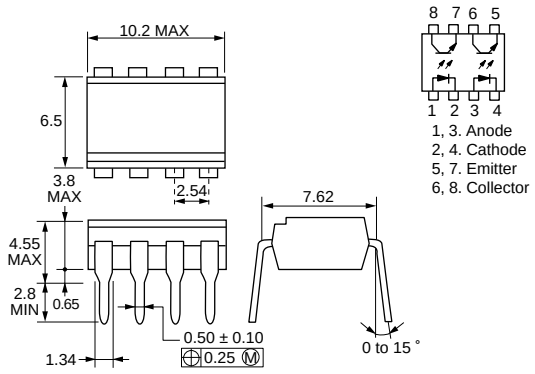


OUTLINE DIMENSIONS (Units in mm) **DIP (Dual In-line Package)**

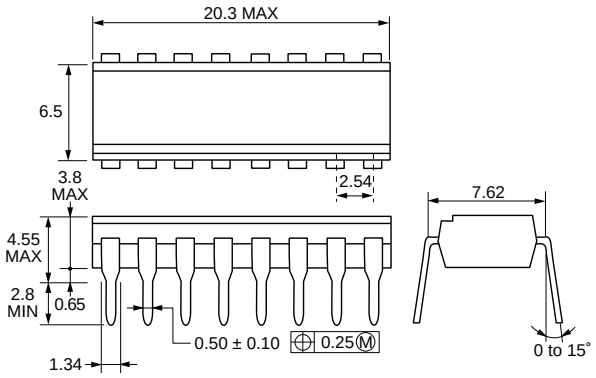
PS2501-1



PS2501-2

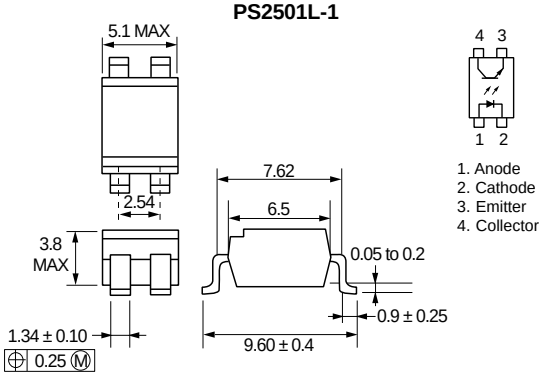


PS2501-4

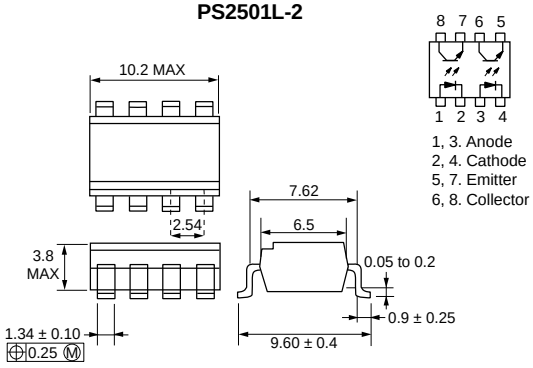


OUTLINE DIMENSIONS (Units in mm) **Lead Bending Type (Gull-wing)**

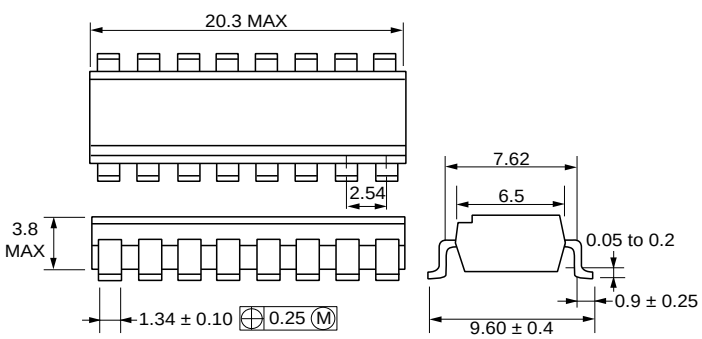
PS2501L-1



PS2501L-2

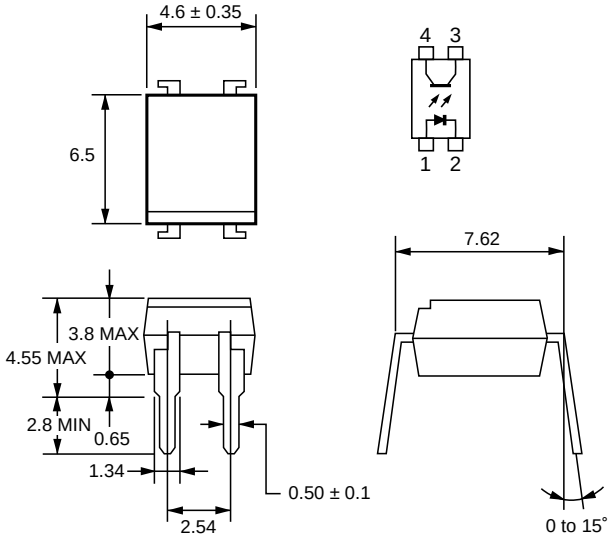


PS2501L-4

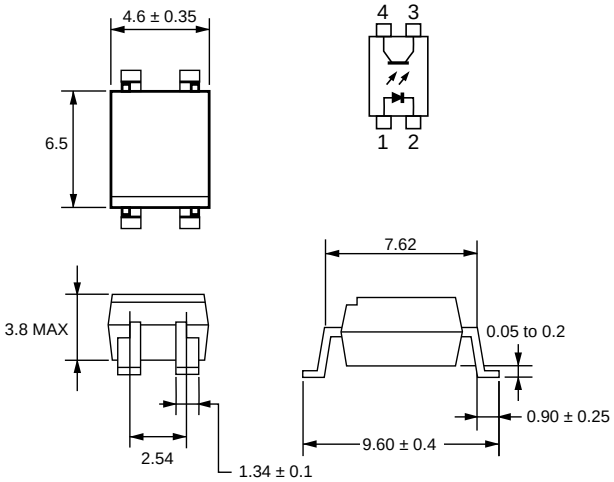


OUTLINE DIMENSIONS (Units in mm)

PS2501-1*



PS2501L-1*



*These packages are manufactured using the new Phoenix manufacturing process, and are interchangeable with the standard PS2501-1 and PS2501L-1.