

DATA SHEET

NEC
ELECTRONICS**PHOTO COUPLERS**
PS2501 -1,-2,-3,-4
PS2501L-1,-2,-3,-4**HIGH ISOLATION VOLTAGE**
SINGLE TRANSISTOR TYPE
MULTI PHOTO COUPLER SERIES

NEPOC SERIES

DESCRIPTION

PS2501-1, -2, -3, -4 and PS2501L-1, -2, -3, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon photo transistor.

PS2501-1, -2, -3, -4 are in a plastic DIP (Dual In-line Package) and PS2501L-1, -2, -3, -4 are lead bending type (Gull-wing) for surface mount.

FEATURES

- High isolation voltage (BV: 5 kV_{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 = 10 μs TYP.)
- Low cost
- Each isolated channels per package

APPLICATIONS

Interface circuit for various instrumentations, control equipments.

- AC Line/Digital Logic Isolate high voltage transients
- Digital Logic/Digital Logic Eliminate spurious ground loops
- Twisted pair line receiver Eliminate ground loop pick-up
- Telephone/Telegraph line receiver Isolate high voltage transients
- High Frequency Power Supply Feedback Control Maintain floating ground
- Relay Contact Monitor Isolate floating grounds and transients
- Power Supply Monitor Isolate transients and ground systems

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PS2501-1,-2,-3,-4, PS2501L-1,-2,-3,-4**NEC** ELECTRON DEVICE

T-41-83

ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

		(PS2501-1) (PS2501L-1)	(PS2501-2, 3, 4) (PS2501L-2, 3, 4)	
Diode				
Reverse Voltage	V_R	6	6	V
Forward Current (DC)	I_F	80	80	mA
Power Dissipation	P_D	150	120	mW/Channel
Peak Forward Current (PW = 100 μs , Duty Cycle 1 %)	$I_{F(\text{Peak})}$	1	1	A
Transistor				
Collector to Emitter Voltage	V_{CEO}	80	80	V
Emitter to Collector Voltage	V_{ECO}	7	7	V
Collector Current	I_C	80	80	mA
Power Dissipation	P_C	150	120	mW/Channel
Coupled				
Isolation Voltage *1)	BV	5000	5000	$V_{r.m.s.}$
Storage Temperature	T_{stg}	-55 to +150	-55 to +150	$^\circ\text{C}$
Operating Temperature	T_{opt}	-55 to +100	-55 to +100	$^\circ\text{C}$
Lead Temperature (Soldering 10 s)	T_{sol}	260	260	$^\circ\text{C}$
Total Power Dissipation	P_T	250	200	mW/Channel

*1) AC voltage for 1 minute at $T_a = 25^\circ\text{C}$, RH = 60 % between input and output.**ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)**

	CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Diode	Forward Voltage	V_F		1.1	1.4	V	$I_F = 10\text{ mA}$
	Reverse Current	I_R			5	μA	$V_R = 5\text{ V}$
	Junction Capacitance	C		50		pF	$V = 0$, $f = 1.0\text{ MHz}$
Transistor	Collector to Emitter Dark Current	I_{CEO}			100	nA	$V_{CE} = 40\text{ V}$, $I_F = 0$
	Collector to Emitter Breakdown Voltage	BV_{CEO}	40	60		V	$I_C = 1\text{ mA}$, $I_B = 0$
	Emitter to Collector Breakdown Voltage	BV_{ECO}	7	9		V	$I_E = 100\text{ }\mu\text{A}$, $I_B = 0$
Coupled	Current Transfer Ratio *2)	CTR	80	300	600	%	$I_F = 5\text{ mA}$, $V_{CE} = 5\text{ V}$
	Collector Saturation Voltage	$V_{CE(\text{sat})}$			0.3	V	$I_F = 10\text{ mA}$, $I_C = 2\text{ mA}$
	Isolation Resistance	R_{1-2}	10^{11}			Ω	$V_{in-out} = 1.0\text{ kV}$
	Isolation Capacitance	C_{1-2}		0.5		pF	$V = 0$, $f = 1.0\text{ MHz}$
	Rise Time	*3) t_r		3		μs	$V_{CC} = 10\text{ V}$, $I_C = 2\text{ mA}$, $R_L = 100\text{ }\Omega$
	Fall Time	*3) t_f		5		μs	$V_{CC} = 10\text{ V}$, $I_C = 2\text{ mA}$, $R_L = 100\text{ }\Omega$

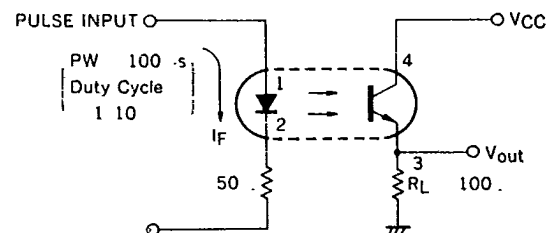
*2) CTR rank (only PS2501-1, PS2501L-1)

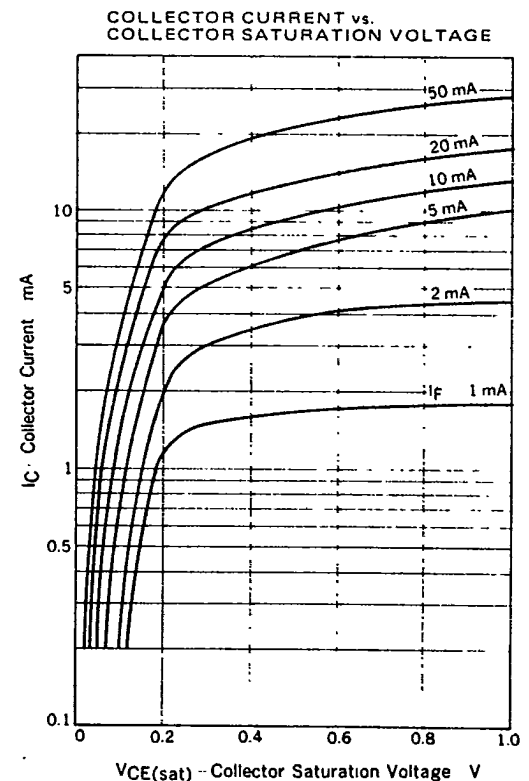
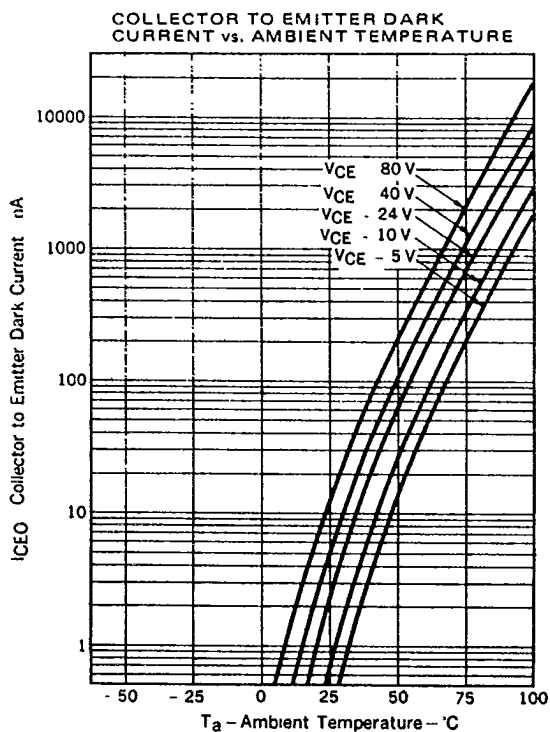
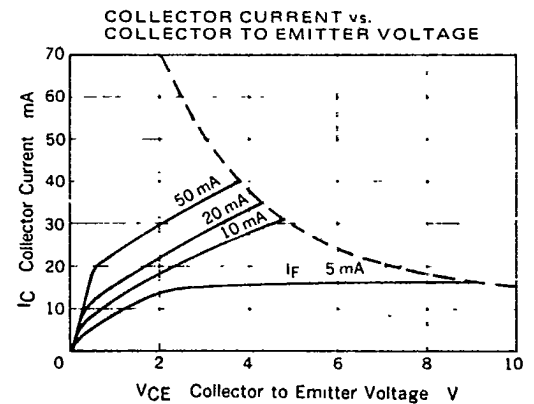
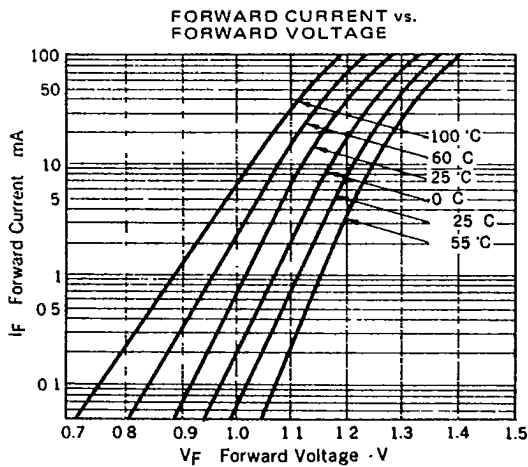
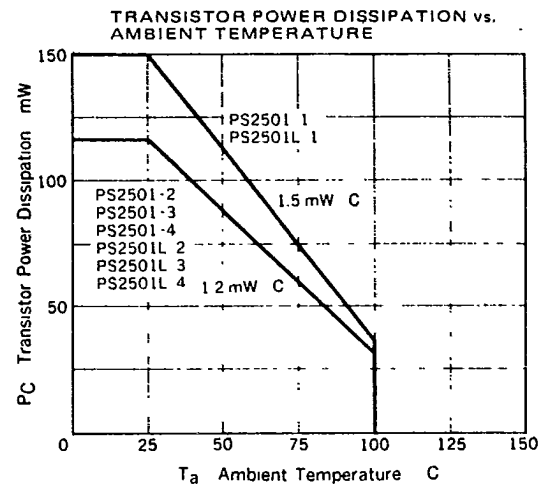
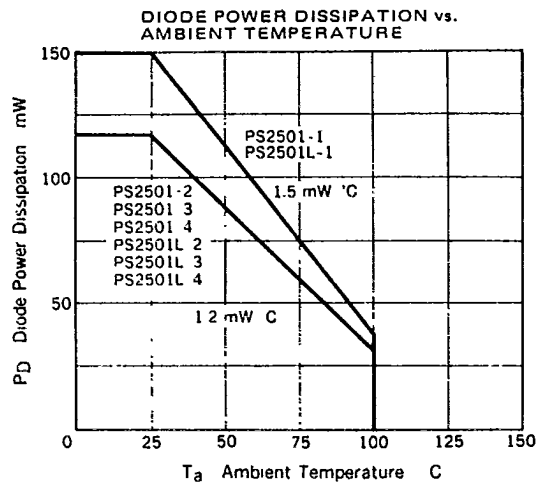
KA: 300 to 600 (%)

LA: 200 to 400 (%)

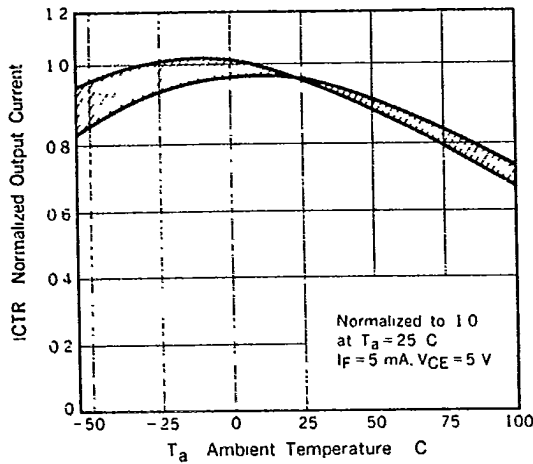
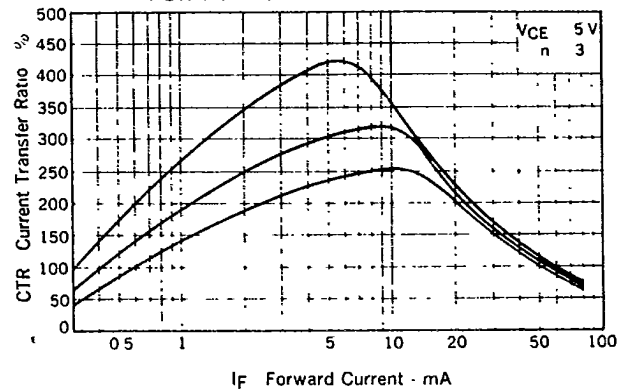
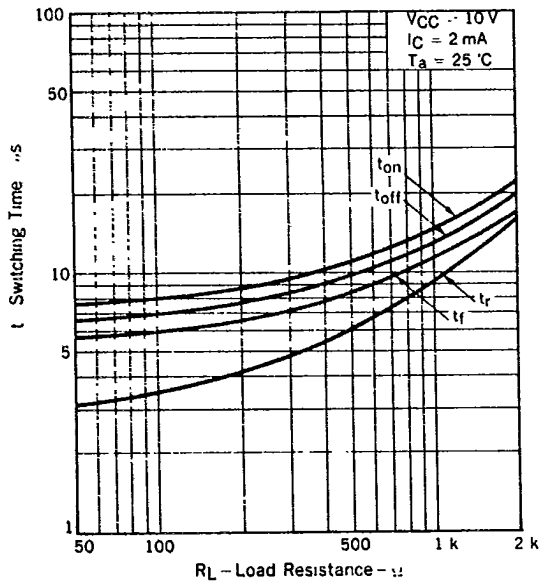
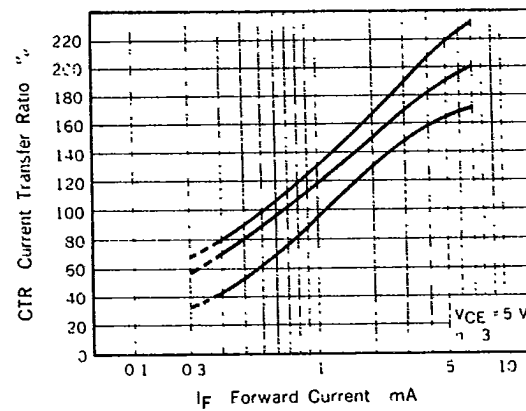
MA: 80 to 240 (%)

*3) Test Circuit for Switching Time

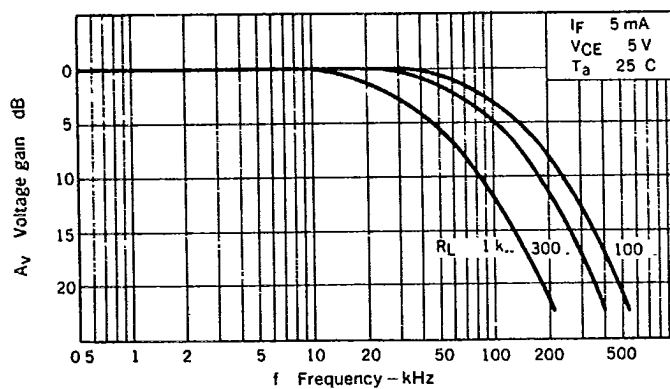


TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

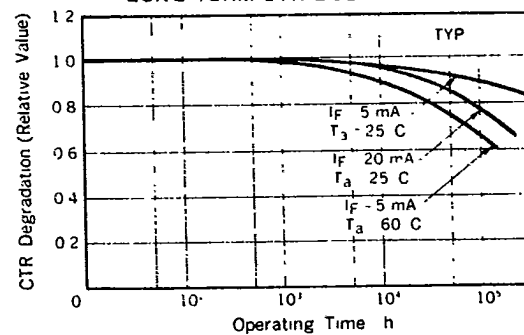
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NORMALIZED OUTPUT CURRENT vs.
AMBIENT TEMPERATURECURRENT TRANSFER RATIO (CTR) vs.
FORWARD CURRENTSWITCHING TIME vs.
LOAD RESISTANCECURRENT TRANSFER RATIO (CTR) vs.
FORWARD CURRENT

FREQUENCY RESPONSE



LONG TERM CTR DEGRADATION



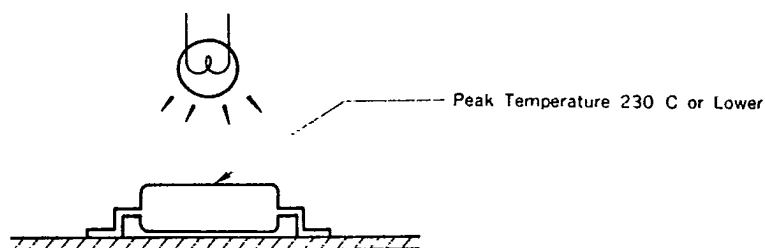
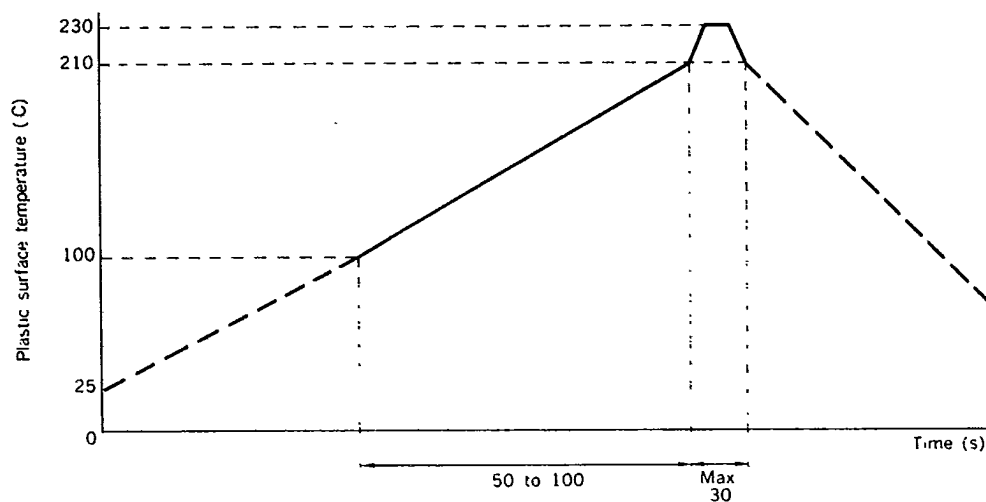
NEC ELECTRON DEVICE**PS2501-1, -2, -3, -4, PS2501L-1, -2, -3, -4**

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SOLDERING PRECAUTION

(1) Infrared reflow soldering

- Peak temperature : 230 °C or lower (plastic surface)
- Time : 30 s or less
(Time during plastic surface temperature overs 210 °C)
- No. of reflow times : 1
- Flux : Rosin-base flux

Reflow Temperature Profile

(2) Dip soldering

- Peak temperature : 260 °C or lower
- Time : 10 s or less
- Flux : Rosin-base flux

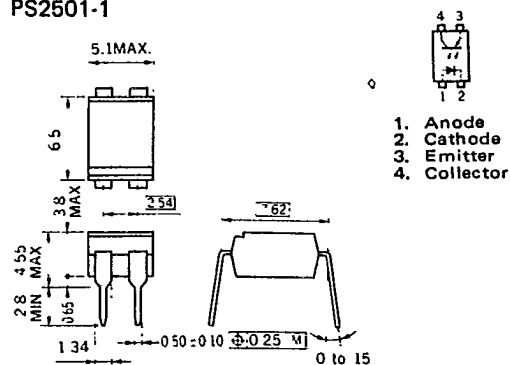
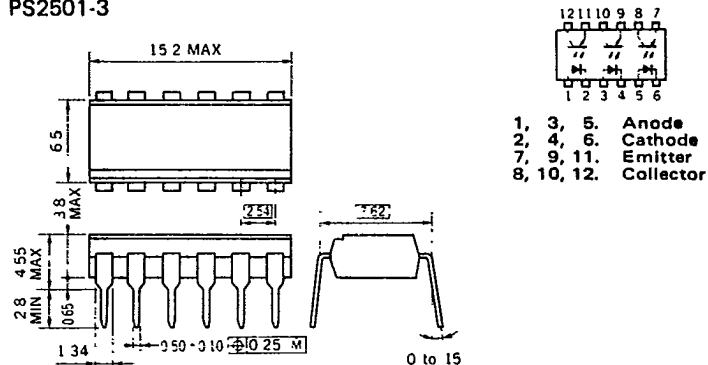
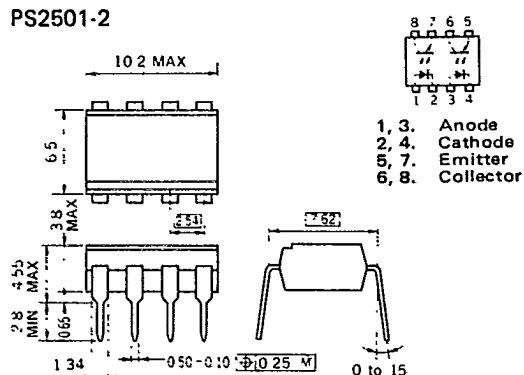
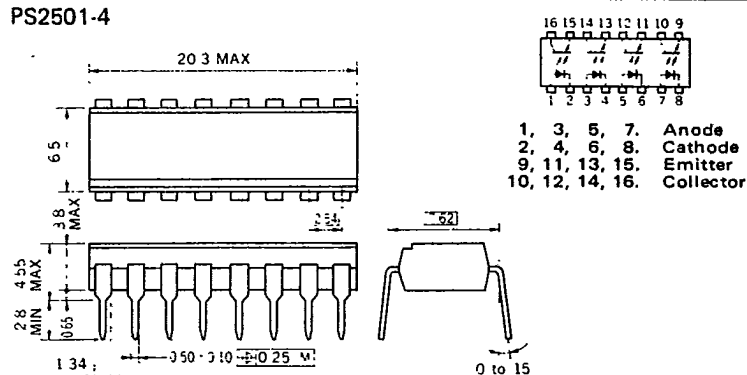
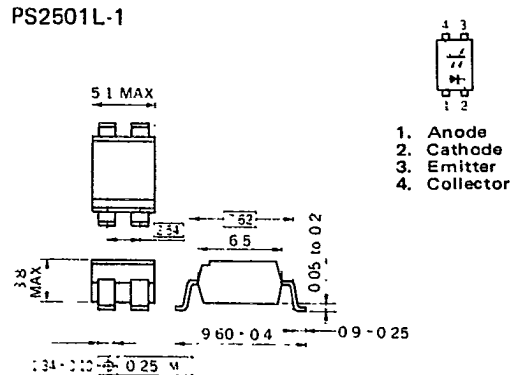
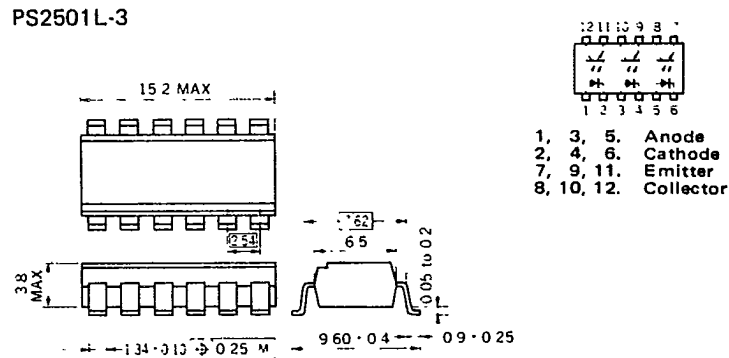
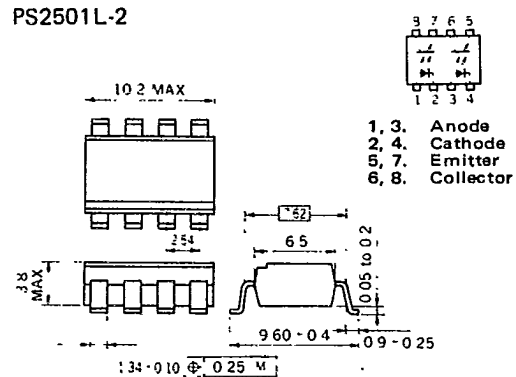
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PS2500 FAMILY

Feature Type Number	High Isolation Voltage	Function	High V _{CEO} (MIN.)	High CTR (TYP.)	High Speed switching (TYP.)
PS2501-1, -2, -3, -4 PS2501L-1, -2, -3, -4	5 000 V _{r.m.s.}	(Unidirectional Input)	80 V	200 %	$t_r = 3 \mu s, t_f = 5 \mu s$
PS2502-1, -2, -3, -4 PS2502L-1, -2, -3, -4			40 V	2 000 %	$t_r, t_f = 100 \mu s$
PS2503-1, -2, -3, -4 PS2503L-1, -2, -3, -4			120 V	200 %	$t_r, t_f = 10 \mu s$
PS2505-1, -2, -3, -4 PS2505L-1, -2, -3, -4		AC Input (Bidirectional Input)	80 V	300 %	$t_r = 3 \mu s, t_f = 5 \mu s$
PS2506-1, -2, -3, -4 PS2506L-1, -2, -3, -4			40 V	2 000 %	$t_r, t_f = 100 \mu s$

NEC ELECTRON DEVICE**PS2501-1,-2,-3,-4,PS2501L-1,-2,-3,-4**

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PACKAGE DIMENSIONS (Unit: mm) DIP (Dual In-line Package)**PS2501-1****PS2501-3****PS2501-2****PS2501-4****PACKAGE DIMENSIONS (Unit: mm) Lead Bending type (Gull-wing)****PS2501L-1****PS2501L-3****PS2501L-2****PS2501L-4**