

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

HIGH ISOLATION VOLTAGE  
SINGLE TRANSISTOR TYPE  
MULTI PHOTO COUPLER SERIES

– NEPOC SERIES –

**DESCRIPTION**

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

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.

**FEATURES**

- High isolation voltage (BV: 5 kV<sub>r.m.s.</sub> MIN.)
- High collector to emitter voltage (V<sub>CEO</sub>: 80 V MIN.)
- High current transfer ratio (CTR: 300 % TYP.)
- High speed switching (t<sub>r</sub> = 3 μs, t<sub>f</sub> = 5 μs TYP.)
- Each isolated channels per package
- Taping product number (PS2501L-1-E3, E4, F3, F4)  
(PS2501L-2-E3, E4)
- UL recognized [File No. E72422(s)]

**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

**ABSOLUTE MAXIMUM RATINGS (TA = 25 °C)**

		(PS2501-1)	(PS2501-2, 4)	
		(PS2501L-1)	(PS2501L-2, 4)	
<b>Diode</b>				
Reverse Voltage	$V_R$	6	6	V
Forward Current (DC)	$I_F$	80	80	mA
Power Dissipation Derating	$\Delta P_D/^\circ C$	1.5	1.2	mW/°C
Power Dissipation	$P_D$	150	120	mW/Channel
Peak Forward Current (PW = 100 $\mu$ s, Duty cycle 1 %)	$I_F$ (Peak)	1	1	A
<b>Transistor</b>				
Collector to Emitter Voltage	$V_{CEO}$	80	80	V
Emitter to Collector Voltage	$V_{ECO}$	7	7	V
Collector Current	$I_C$	50	50	mA
Power Dissipation Derating	$\Delta P_C/^\circ C$	1.5	1.2	mW/°C
Power Dissipation	$P_C$	150	120	mW/Channel
<b>Coupled</b>				
Isolation Voltage <sup>Note 1</sup>	BV	5 000	5 000	$V_{r.m.s.}$
Storage Temperature	$T_{stg}$	-55 to +150	-55 to +150	°C
Operating Temperature	$T_{opt}$	-55 to +100	-55 to +100	°C
Lead Temperature (Soldering 10 s)	$T_{sol}$	260	260	°C
Total Power Dissipation	$P_T$	250	200	mW/Channel

**Note 1** AC voltage for 1 minute at  $T_A = 25\text{ }^\circ\text{C}$ , RH = 60 % between input and output.

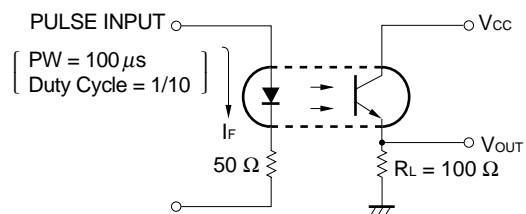
**ELECTRICAL CHARACTERISTICS (TA = 25 °C)**

CHARACTERISTIC		SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Diode	Forward Voltage	$V_F$		1.17	1.4	V	$I_F = 10\text{ mA}$
	Reverse Current	$I_R$			5	$\mu\text{A}$	$V_R = 5\text{ V}$
	Junction Capacitance	$C_t$		50		pF	$V = 0, f = 1.0\text{ MHz}$
Transistor	Collector to Emitter Dark Current	$I_{CEO}$			100	nA	$V_{CE} = 80\text{ V}, I_F = 0$
	Coupled	Current Transfer Ratio <sup>Note 2</sup>	CTR	80	300	600	%
Collector Saturation Voltage		$V_{CE(sat)}$			0.3	V	$I_F = 10\text{ mA}, I_C = 2\text{ mA}$
Isolation Resistance		$R_{1-2}$	$10^{11}$			$\Omega$	$V_{in-out} = 1.0\text{ kV}$
Isolation Capacitance		$C_{1-2}$		0.5		pF	$V = 0, f = 1.0\text{ MHz}$
Rise Time <sup>Note 3</sup>		$t_r$		3		$\mu\text{s}$	$V_{CC} = 10\text{ V}, I_C = 2\text{ mA}, R_L = 100\text{ }\Omega$
Fall Time <sup>Note 3</sup>	$t_f$		5		$\mu\text{s}$	$V_{CC} = 10\text{ V}, I_C = 2\text{ mA}, R_L = 100\text{ }\Omega$	

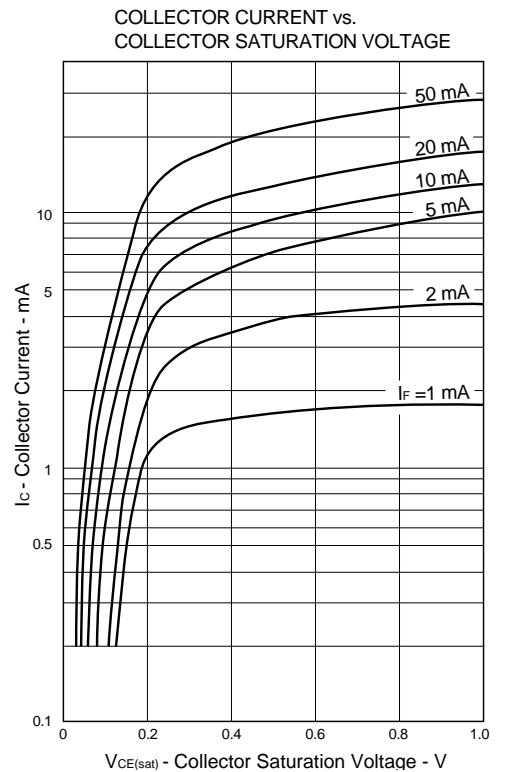
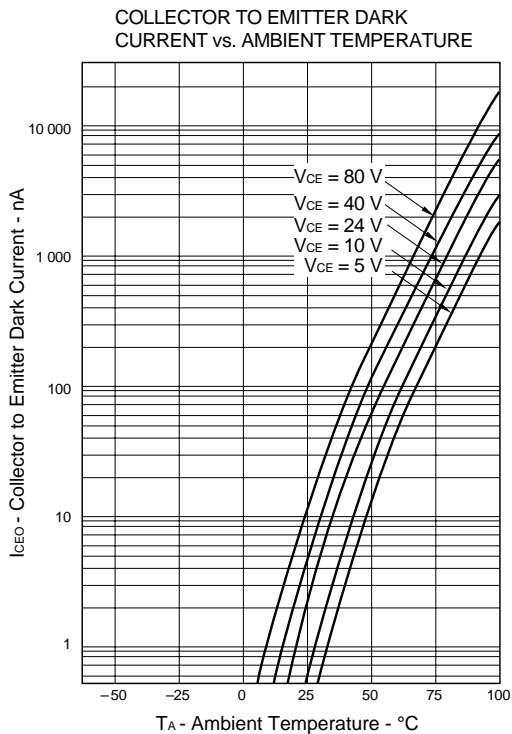
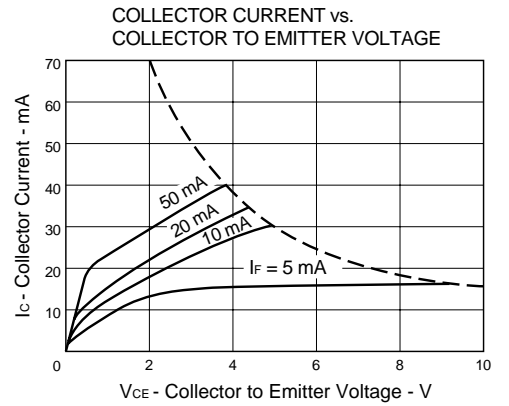
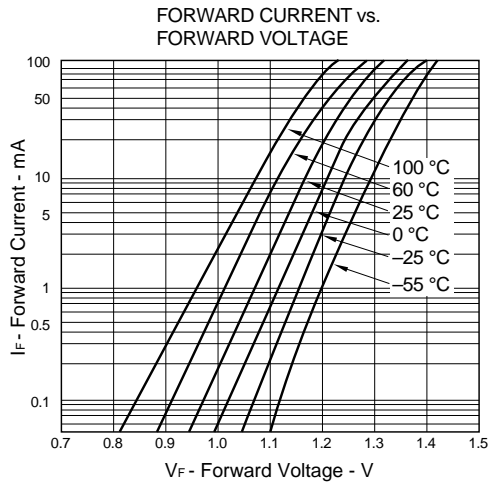
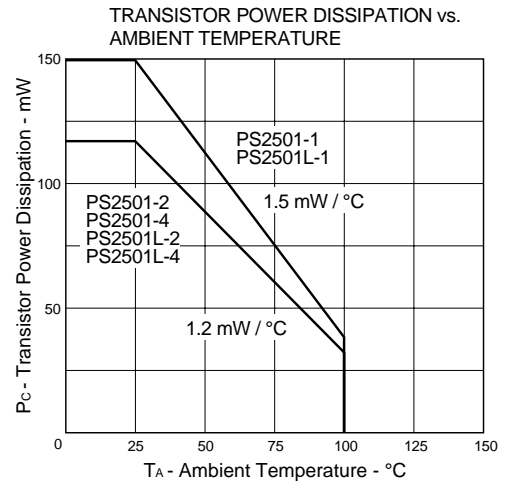
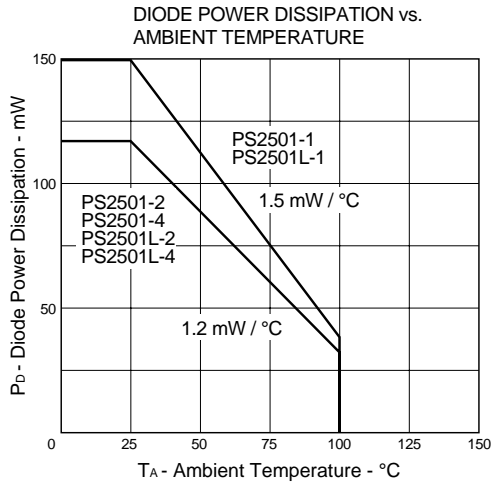
**Note 2** CTR rank (only PS2501-1, PS2501L-1)

- 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 (%)

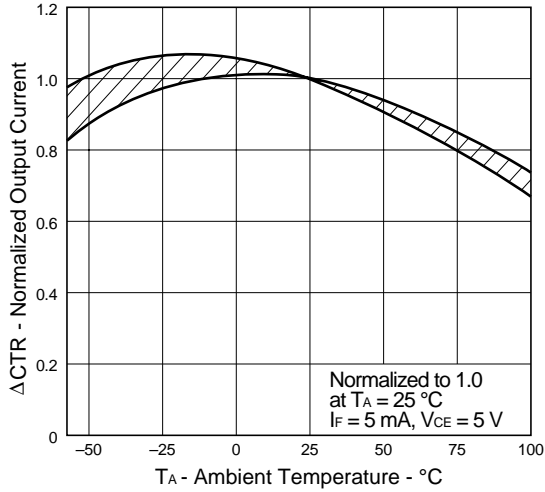
**Note 3** Test Circuit for Switching Time



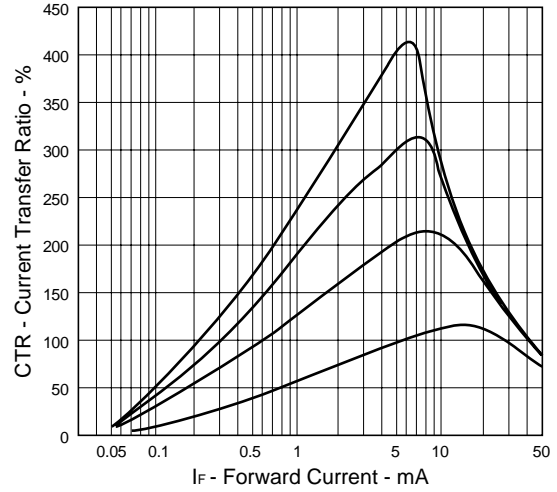
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)



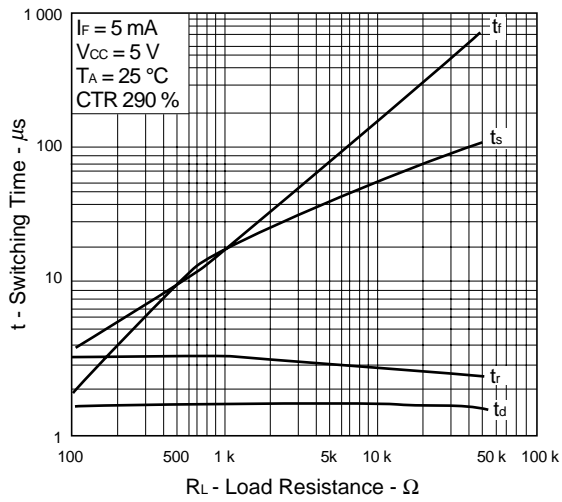
NORMALIZED OUTPUT CURRENT vs. AMBIENT TEMPERATURE



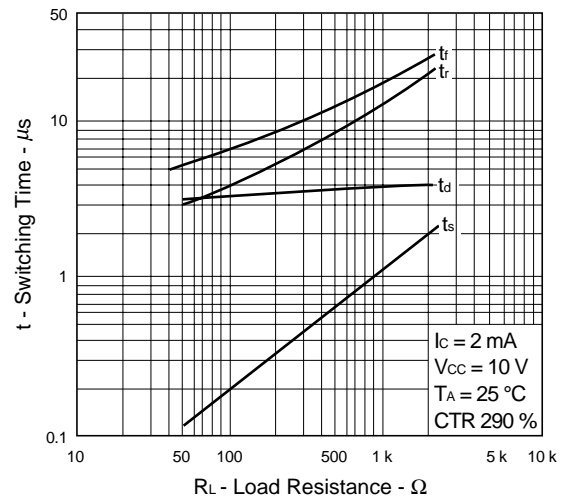
CURRENT TRANSFER RATIO (CTR) vs. FORWARD CURRENT



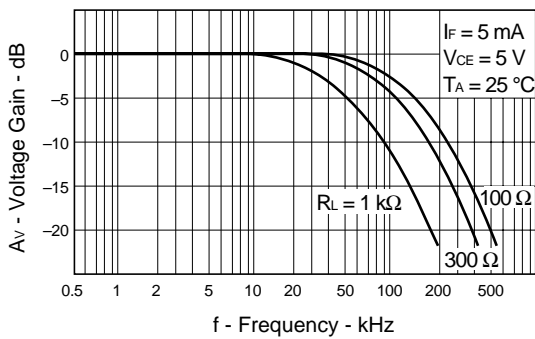
SWITCHING TIME vs. LOAD RESISTANCE



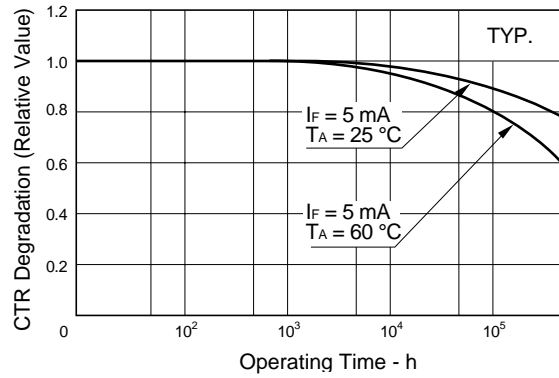
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



LONG TERM CTR DEGRADATION

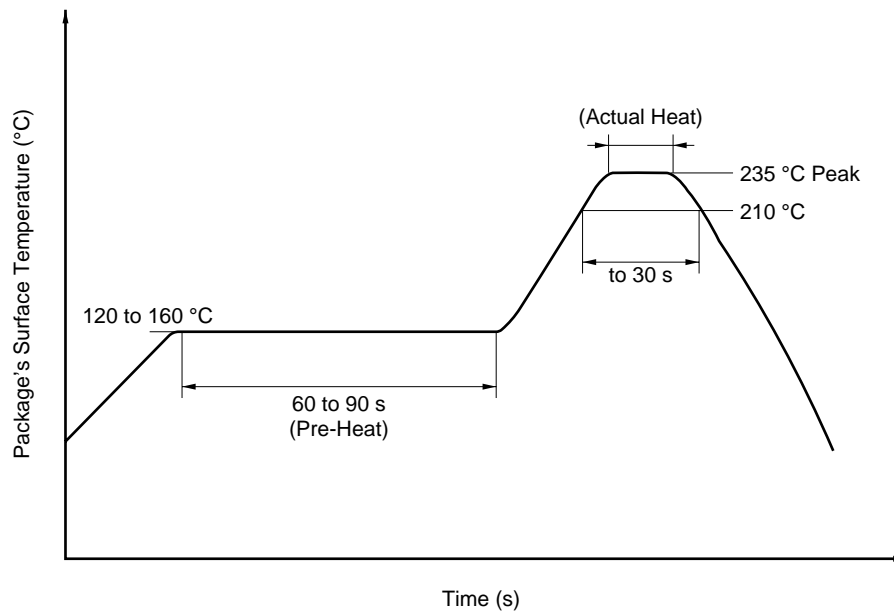


**SOLDERING PRECAUTION**

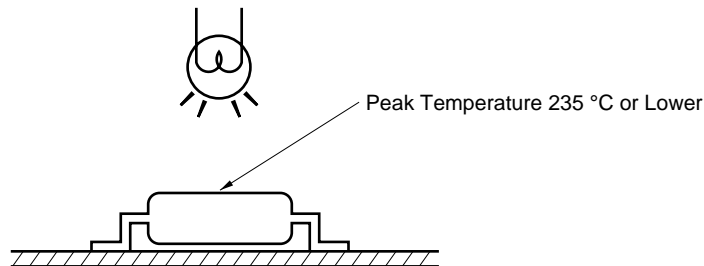
(1) Infrared reflow soldering

- Peak reflow temperature : 235 °C or below (Plastic surface temperature)
- Reflow Time : 30 seconds or less (Time period during which the plastic surface temperature is 210 °C)
- Number of reflow process: Three
- Flux : Rosin flux containing small amount of chloroline (The flux with a maximum chloroline content of 0.2 Wt % is recommended.)

**INFRARED RAY REFLOW TEMPERATURE PROFILE**



**Caution** Please avoid to be removed the residual flux by water after the first reflow processes.

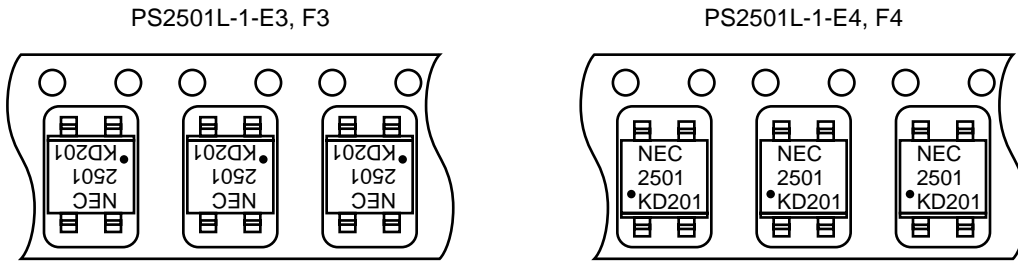


(2) Dip soldering

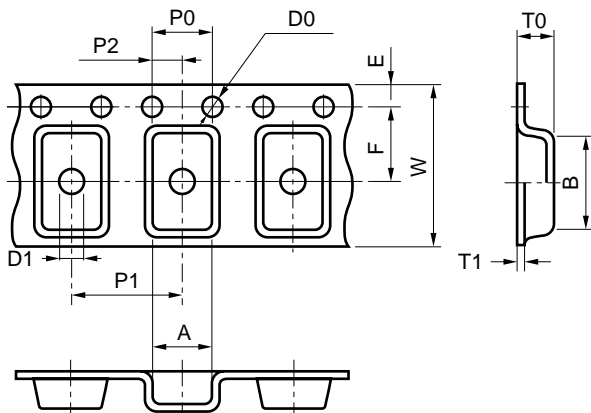
- Peak temperature : 260 °C or lower
- Time : 10 s or less
- Flux : Rosin-base flux

- 4 Pin DIP Type (Lead bending; -1 channel) Taping

1. TAPING DIRECTION



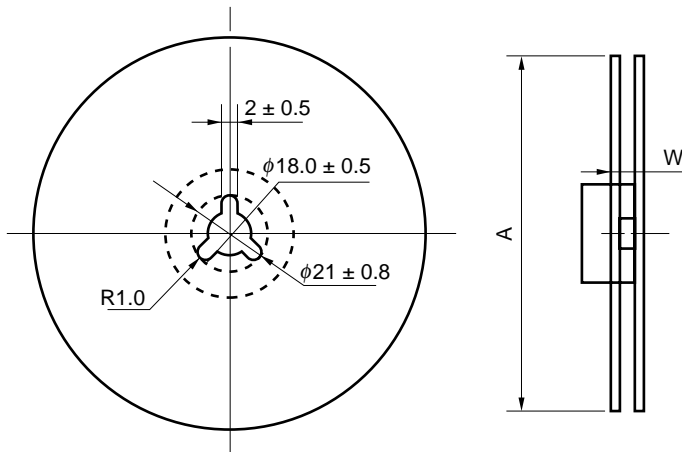
2. OUTLINE AND DIMENSIONS (;TAPE)



Unit: mm

SYMBOL	RATINGS
A	5.6 ± 0.1
B	10.3 ± 0.1
D0	1.55 ± 0.1
D1	1.55 ± 0.1
E	1.75 ± 0.1
F	7.5 ± 0.1
P0	4 ± 0.1
P1	8 ± 0.1
P2	2 ± 0.1
T0	4.3 ± 0.2
T1	0.3
W	16 ± 0.3

3. OUTLINE AND DIMENSIONS (;REEL)



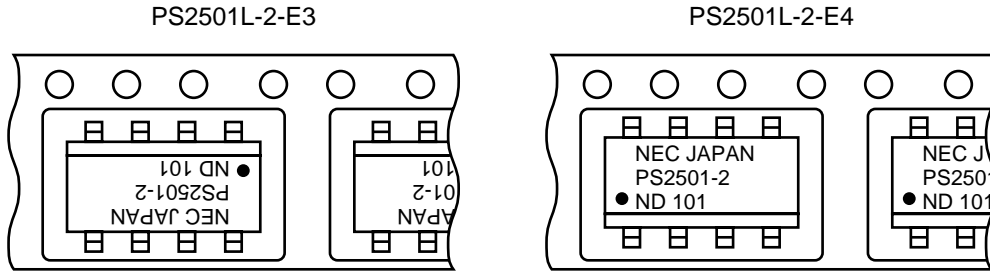
Unit: mm

SYMBOL	RATINGS	
	A	E3, E4
	250	330
N	80 ± 5.0	
W	16.4 <sup>+2.0</sup> <sub>-0</sub>	

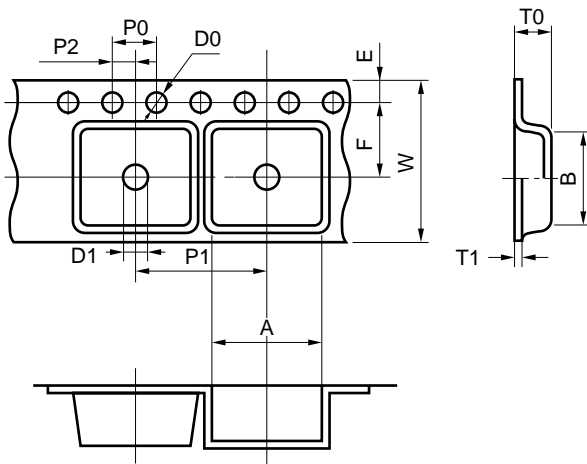
4. PACKING E3, E4; 1000 pieces/reel  
 F3, F4; 2000 pieces/reel

- 8 Pin DIP Type (Lead bending; -2 channel) Taping

1. TAPING DIRECTION



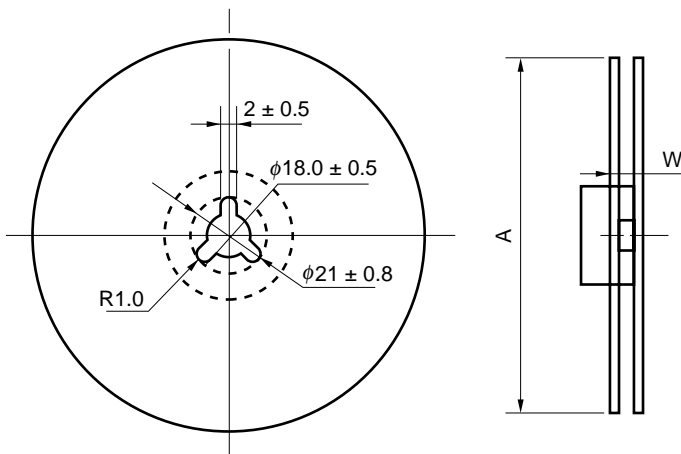
2. OUTLINE AND DIMENSIONS (;TAPE)



Unit: mm

SYMBOL	RATINGS
A	10.7 ± 0.1
B	10.3 ± 0.1
D0	1.55 ± 0.1
D1	1.55 ± 0.1
E	1.75 ± 0.1
F	7.5 ± 0.1
P0	4.0 ± 0.1
P1	12.0 ± 0.1
P2	2.0 ± 0.1
T0	4.3 ± 0.2
T1	0.3
W	16 ± 0.3

3. OUTLINE AND DIMENSIONS (;REEL)

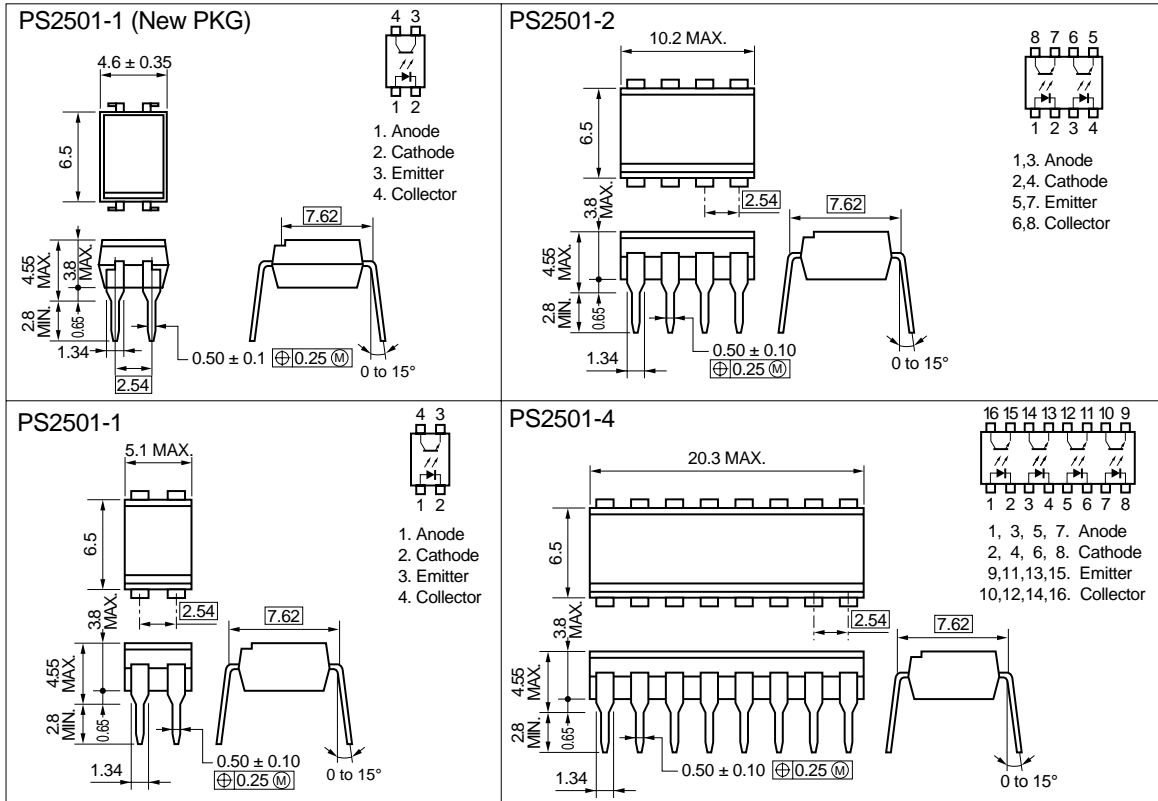


Unit: mm

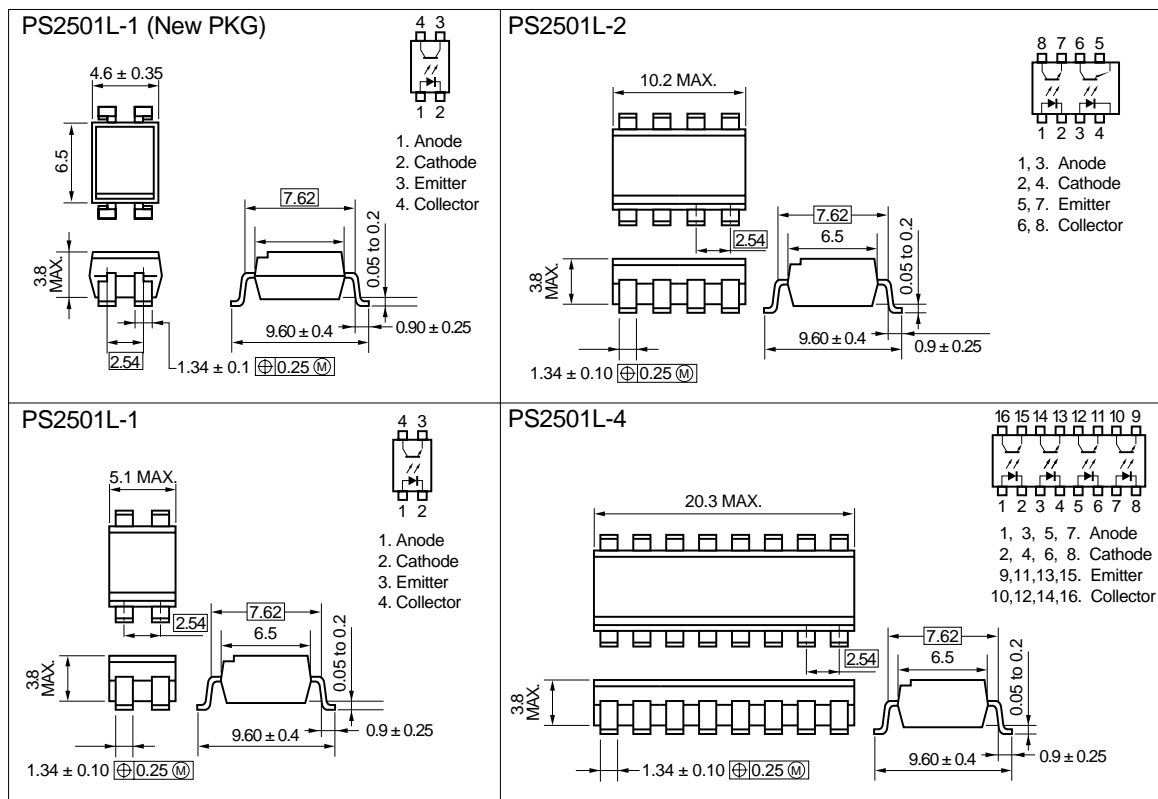
SYMBOL	RATINGS
A	330
N	80 ± 5.0
W	16.4 <sup>+2.0</sup> <sub>-0</sub>

4. PACKING; 1000 pieces/reel

**PACKAGE DIMENSIONS (Unit: mm) DIP (Dual In-line Package)**



**PACKAGE DIMENSIONS (Unit: mm) Lead Bending type (Gull-wing)**



**Note** New package 1ch only



[MEMO]

### Caution

**The Great Care must be taken in dealing with the devices in this guide.**

**The reason is that the material of the devices is GaAs (Gallium Arsenide), which is designated as harmful substance according to the law concerned.**

**Keep the law concerned and so on, especially in case of removal.**

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