

## DATA SHEET

**NEC****PHOTOCOUPLER  
PS2501-1,-2,-4, PS2501L-1,-2,-4****HIGH ISOLATION VOLTAGE  
SINGLE TRANSISTOR TYPE  
MULTI PHOTOCOUPLER SERIES**

-NEPOC™ Series-

**DESCRIPTION**

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

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

**FEATURES**

- High isolation voltage ( $BV = 5\,000\text{ Vr.m.s.}$ )
- High collector to emitter voltage ( $V_{CE0} = 80\text{ V}$ )
- High-speed switching ( $t_r = 3\ \mu\text{s TYP.}$ ,  $t_f = 5\ \mu\text{s TYP.}$ )
- Ordering number of taping product: PS2501L-1-E3, E4, F3, F4, PS2501L-2-E3, E4
- UL approved: File No. E72422 (S)

**APPLICATIONS**

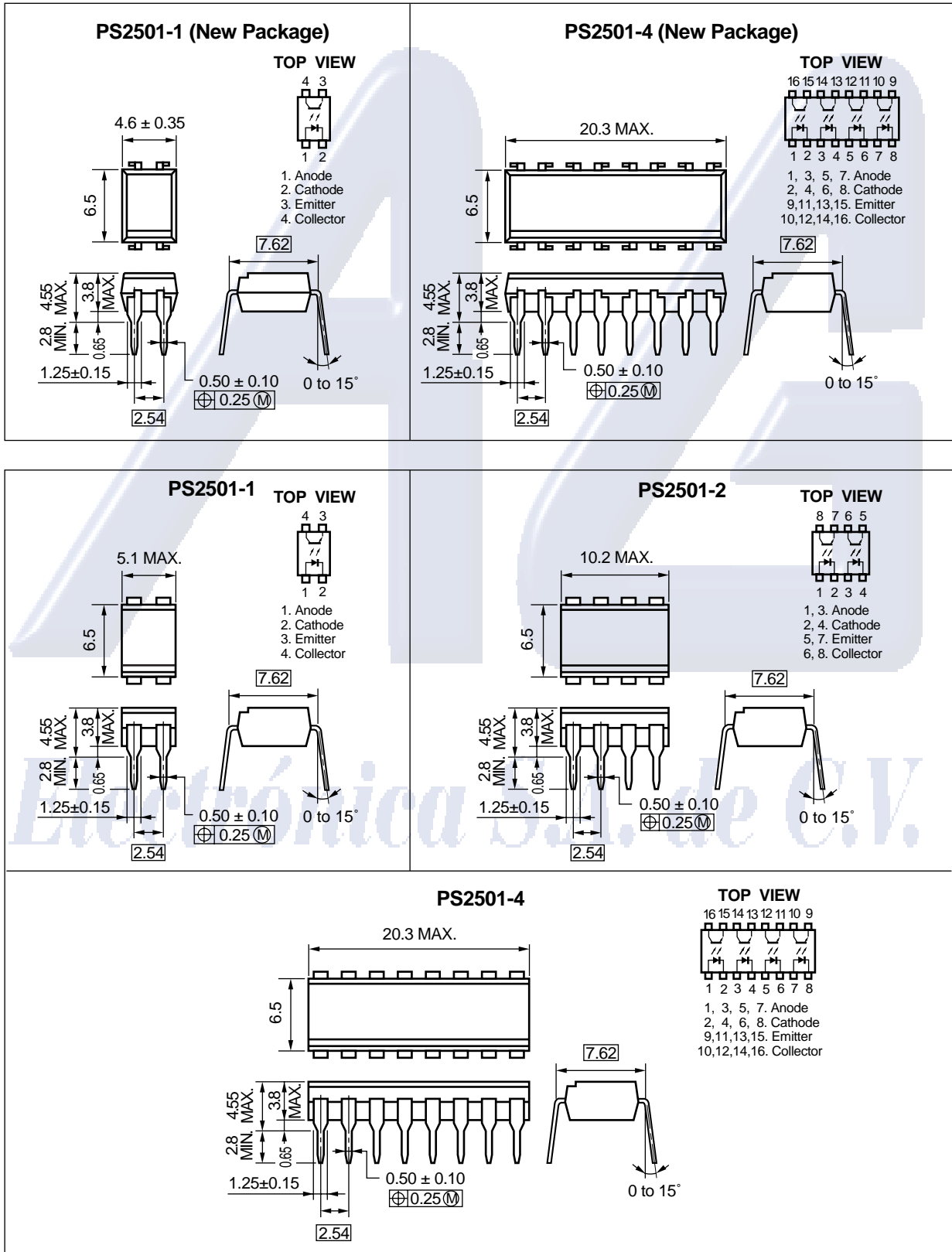
- Power supply
- Telephone/FAX.
- FA/OA equipment
- Programmable logic controller

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The information in this document is subject to change without notice.

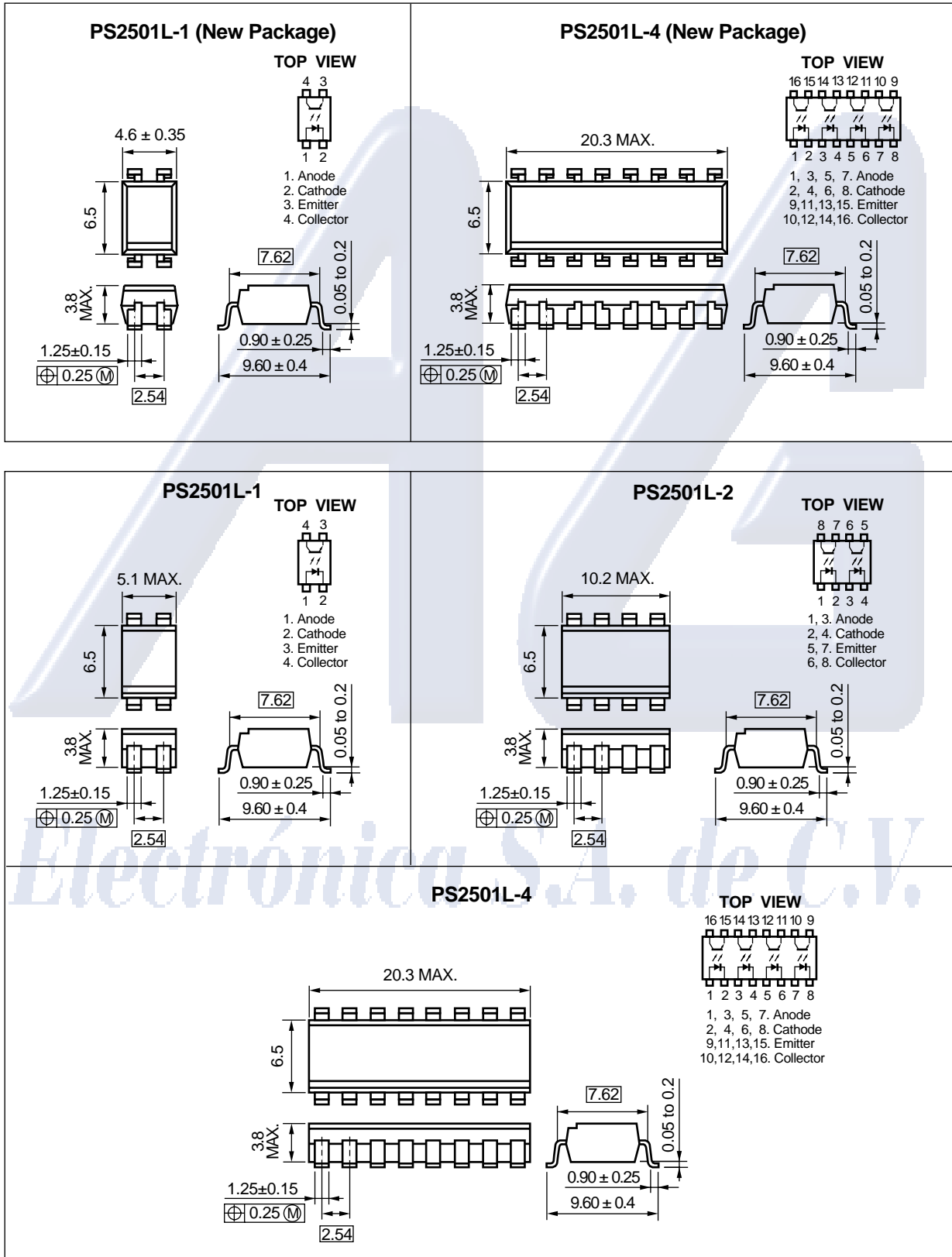
★ **PACKAGE DIMENSIONS (in millimeters)**

**DIP Type**



**Caution New package 1-ch, 4-ch only**

**Lead Bending Type**



**Caution New package 1-ch, 4-ch only**

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C, unless otherwise specified)**

Parameter		Symbol	Ratings		Unit
			PS2501-1, PS2501L-1	PS2501-2,-4 PS2501L-2,-4	
Diode	Reverse Voltage	V <sub>R</sub>	6		V
	Forward Current (DC)	I <sub>F</sub>	80		mA
	Power Dissipation Derating	ΔP <sub>D</sub> /°C	1.5	1.2	mW/°C
	Power Dissipation	P <sub>D</sub>	150	120	mW/ch
	Peak Forward Current <sup>*1</sup>	I <sub>FP</sub>	1		A
Transistor	Collector to Emitter Voltage	V <sub>CEO</sub>	80		V
	Emitter to Collector Voltage	V <sub>ECO</sub>	7		V
	Collector Current	I <sub>C</sub>	50		mA/ch
	Power Dissipation Derating	ΔP <sub>C</sub> /°C	1.5	1.2	mW/°C
	Power Dissipation	P <sub>C</sub>	150	120	mW/ch
Isolation Voltage <sup>*2</sup>		BV	5 000		Vr.m.s.
Operating Ambient Temperature		T <sub>A</sub>	-55 to +100		°C
Storage Temperature		T <sub>stg</sub>	-55 to +150		°C

\*1 PW = 100 μs, Duty Cycle = 1 %

\*2 AC voltage for 1 minute at T<sub>A</sub> = 25 °C, RH = 60 % between input and output

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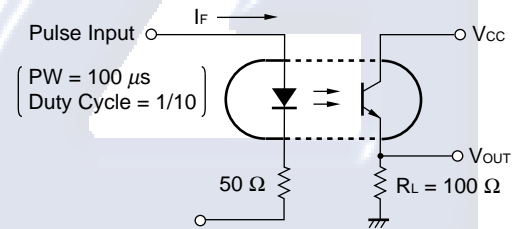
**NEC****PS2501-1,-2,-4,PS2501L-1,-2,-4****ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 10 mA		1.17	1.4	V
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 5 V			5	μA
	Terminal Capacitance	C <sub>t</sub>	V = 0 V, f = 1.0 MHz		50		pF
Transistor	Collector to Emitter Dark Current	I <sub>CEO</sub>	V <sub>CE</sub> = 80 V, I <sub>F</sub> = 0 mA			100	nA
Coupled	Current Transfer Ratio (I <sub>c</sub> /I <sub>F</sub> ) <sup>*1</sup>	CTR	I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V	80	300	600	%
	Collector Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>F</sub> = 10 mA, I <sub>c</sub> = 2 mA			0.3	V
	Isolation Resistance	R <sub>I-O</sub>	V <sub>I-O</sub> = 1.0 kV <sub>DC</sub>	10 <sup>11</sup>			Ω
	Isolation Capacitance	C <sub>I-O</sub>	V = 0 V, f = 1.0 MHz		0.5		pF
	Rise Time <sup>*2</sup>	t <sub>r</sub>	V <sub>CC</sub> = 10 V, I <sub>c</sub> = 2 mA, R <sub>L</sub> = 100 Ω		3		μs
	Fall Time <sup>*2</sup>	t <sub>f</sub>			5		

\*1 CTR rank ( \* : only PS2501-1, PS2501L-1)

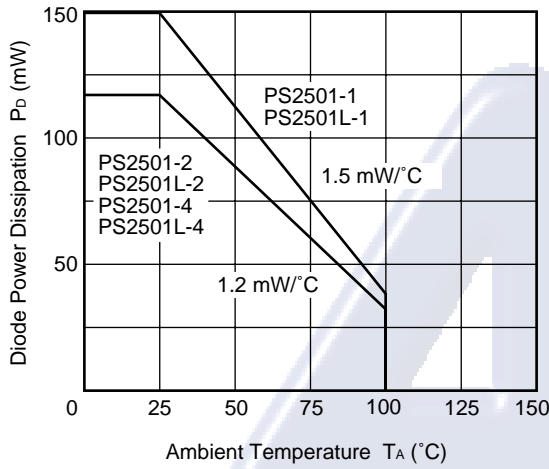
- K\* : 300 to 600 (%)
- L\* : 200 to 400 (%)
- M\* : 80 to 240 (%)
- D\* : 100 to 300 (%)
- H\* : 80 to 160 (%)
- W\* : 130 to 260 (%)
- Q\* : 100 to 200 (%)
- ★ N : 80 to 600 (%)

\*2 Test circuit for switching time

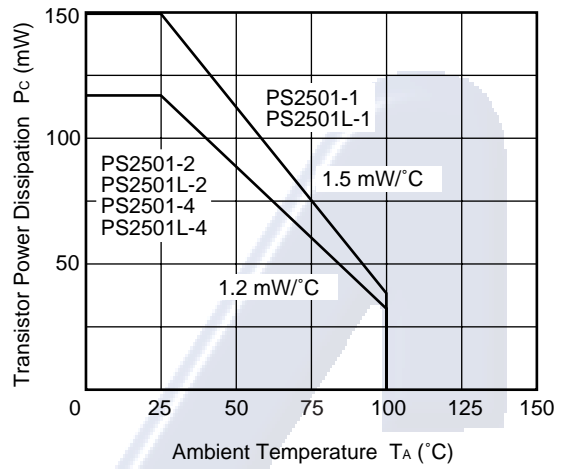
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★ TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, unless otherwise specified)

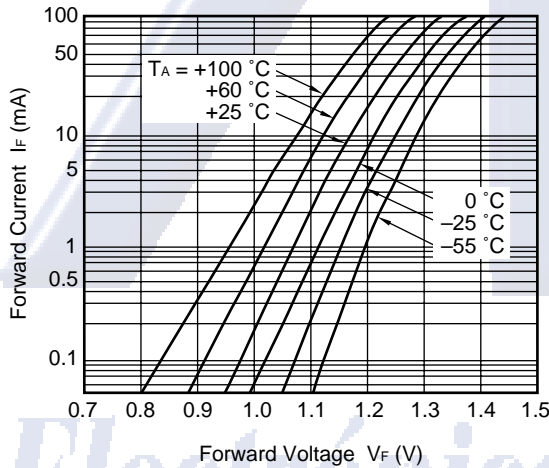
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



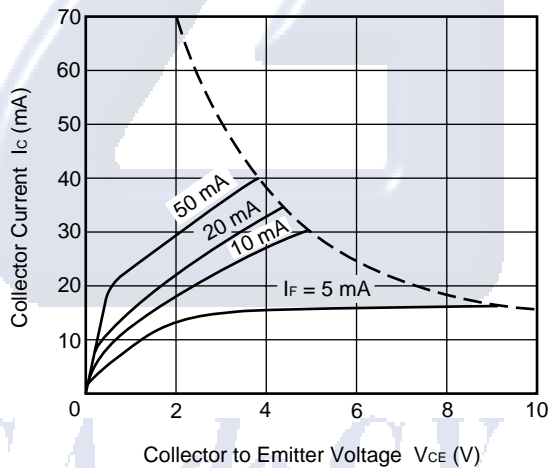
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



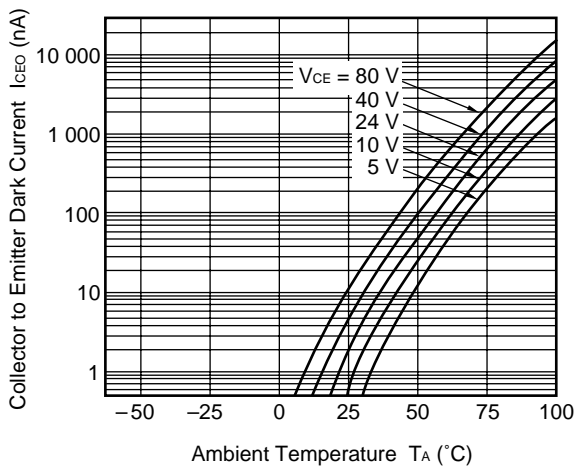
FORWARD CURRENT vs. FORWARD VOLTAGE



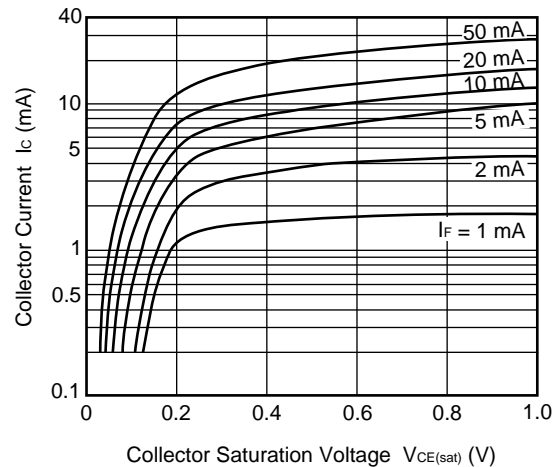
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



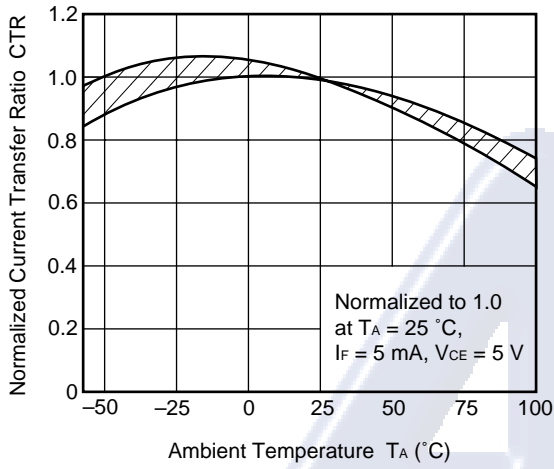
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



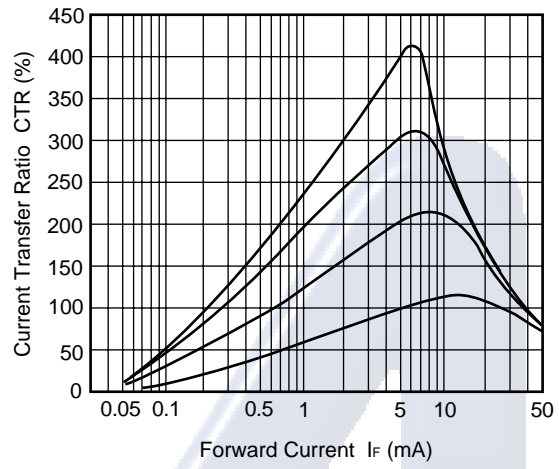
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



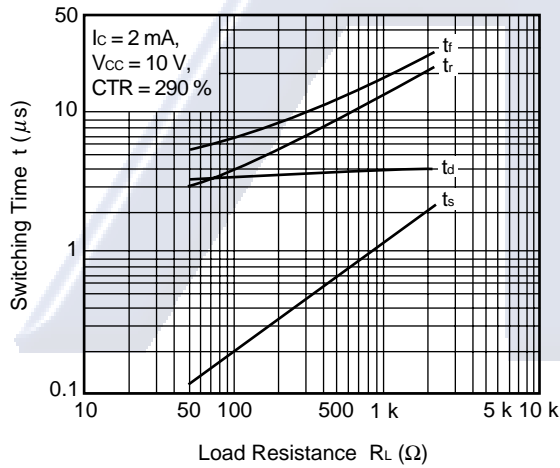
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



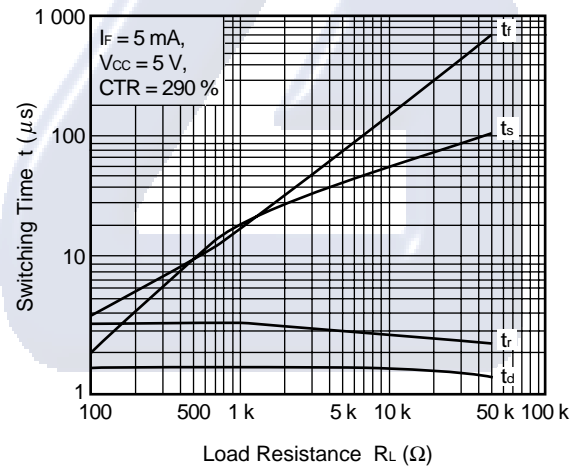
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



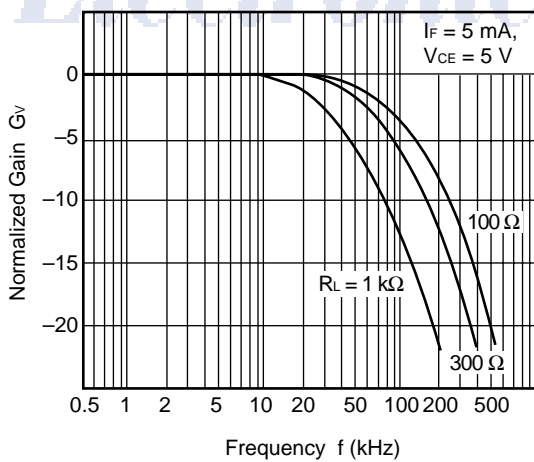
SWITCHING TIME vs. LOAD RESISTANCE



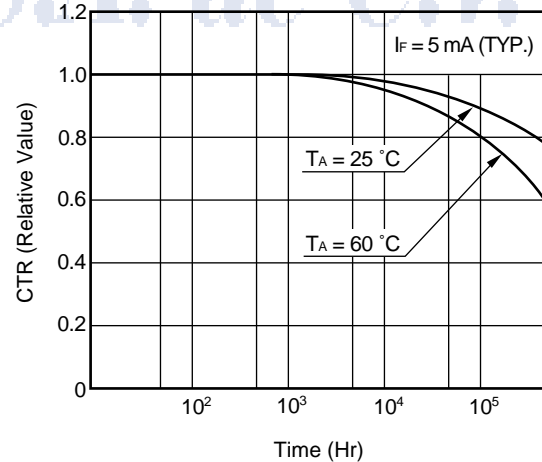
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE

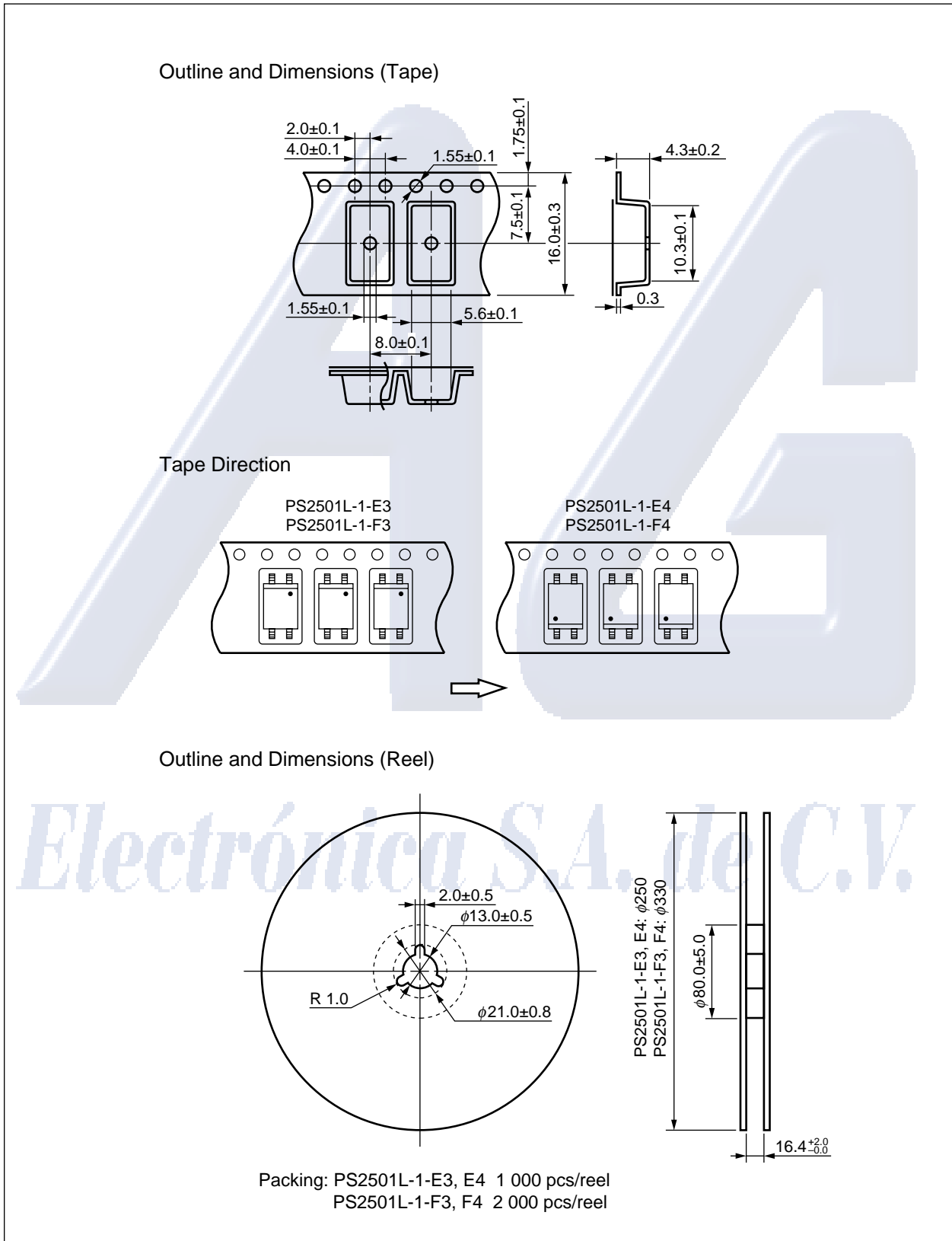


LONG TERM CTR DEGRADATION



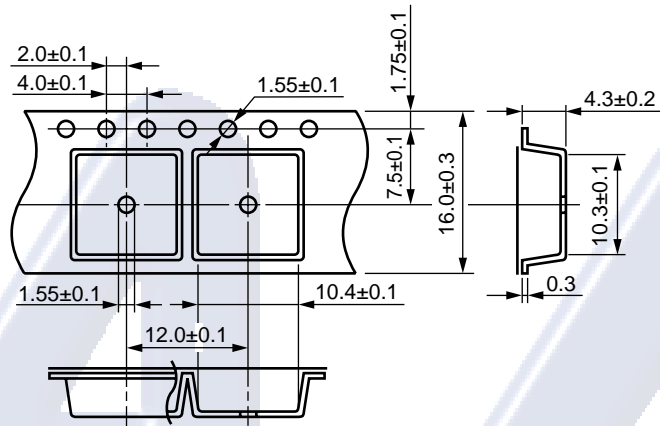
**Remark** The graphs indicate nominal characteristics.

★ **TAPING SPECIFICATIONS (in millimeters)**

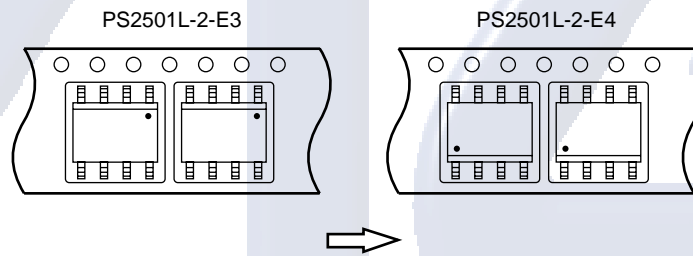




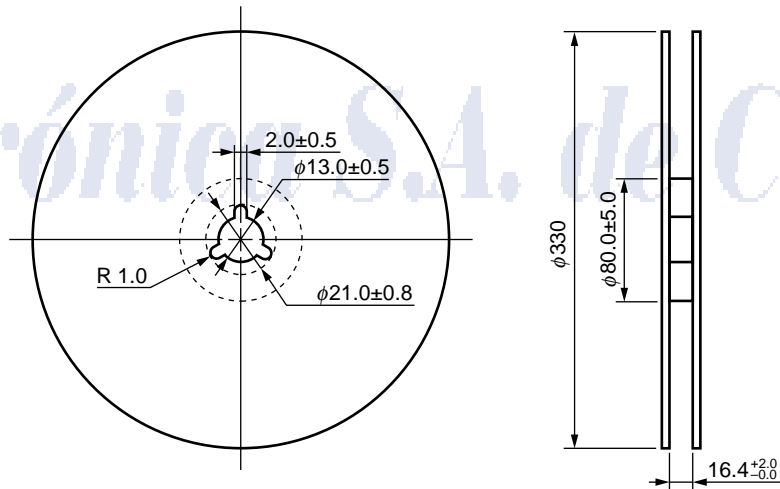
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



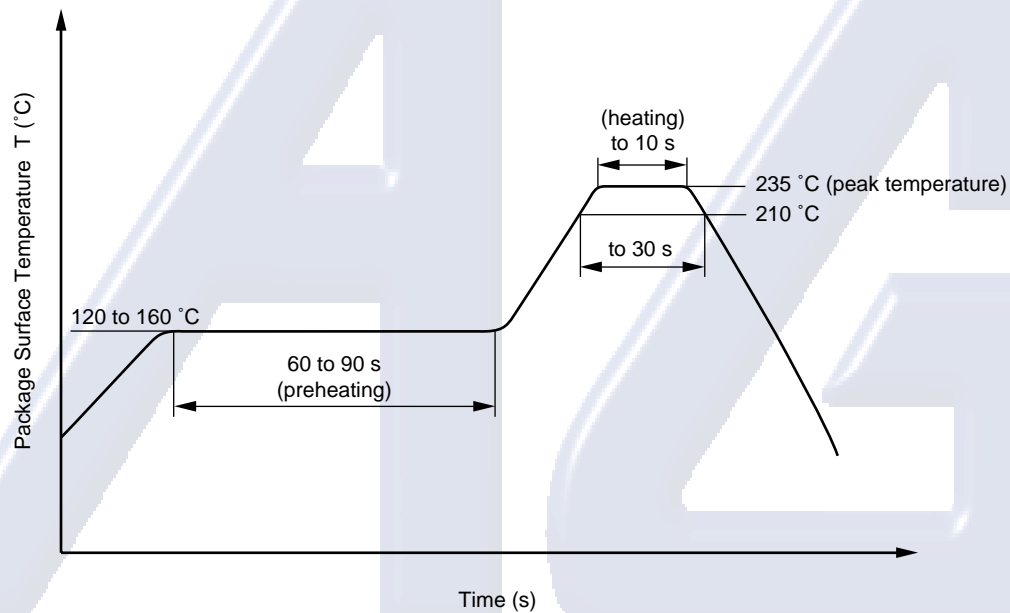
Packing: 1 000 pcs/reel

## ★ RECOMMENDED SOLDERING CONDITIONS

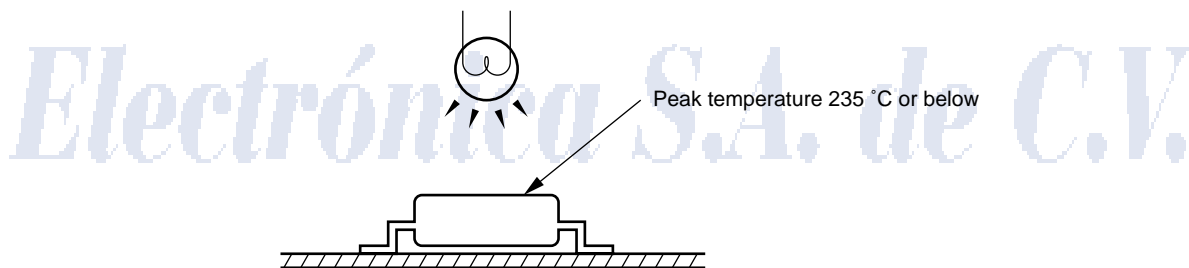
### (1) Infrared reflow soldering

- Peak reflow temperature 235 °C (package surface temperature)
- Time of temperature higher than 210 °C 30 seconds or less
- Number of reflows Three
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

Recommended Temperature Profile of Infrared Reflow



**Caution** Avoid removing the residual flux with chlorine-based cleaning solvent after a reflow process.



### (2) Dip soldering

- Temperature 260 °C or below (molten solder temperature)
- Time 10 seconds or less
- Number of times One
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

**NEC**

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

[MEMO]

**AG**

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**CAUTION**

**Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstances break the hermetic seal.**

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Anti-radioactive design is not implemented in this product.