

**HIGH ISOLATION VOLTAGE
SINGLE TRANSISTOR TYPE
MULTI PHOTOCOUPLER SERIES**

–NEPOC Series–

★ DESCRIPTION

The PS2561-1, -2, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor.

The PS2561-1, -2, -4 are in a plastic DIP (Dual In-line Package) and the PS2561L-1, -2, -4 are lead bending type (Gull-wing) for surface mount.

The PS2561L1-1, -2, -4 are lead bending type for long creepage distance.

The PS2561L2-1, -2, -4 are lead bending type for long creepage distance (Gull-wing) for surface mount.

FEATURES

- High Isolation voltage ($BV = 5\,000\text{ Vr.m.s.}$)
- High collector to emitter voltage ($V_{CEO} = 80\text{ V}$)
- High current transfer ratio ($CTR = 200\% \text{ TYP.}$)
- High-speed switching ($t_r = 3\ \mu\text{s TYP.}$, $t_f = 5\ \mu\text{s TYP.}$)
- ★ • Ordering number of taping product: PS2561L-1-E3, E4, F3, F4, PS2561L-2-E3, E4, PS2561L2-1-E3, E4
- UL approved: File No. E72422
- CSA approved: No. CA 101391
- ★ • BSI approved: No. 7112/7420
- ★ • SEMKO approved: No. 0144211
- NEMKO approved: No. A21409
- DEMKO approved: No. 300535
- ★ • FIMKO approved: No. FI10620A1
- VDE approved (Option)

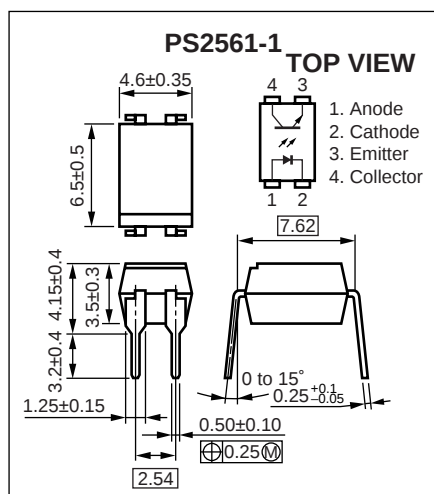
APPLICATIONS

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

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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

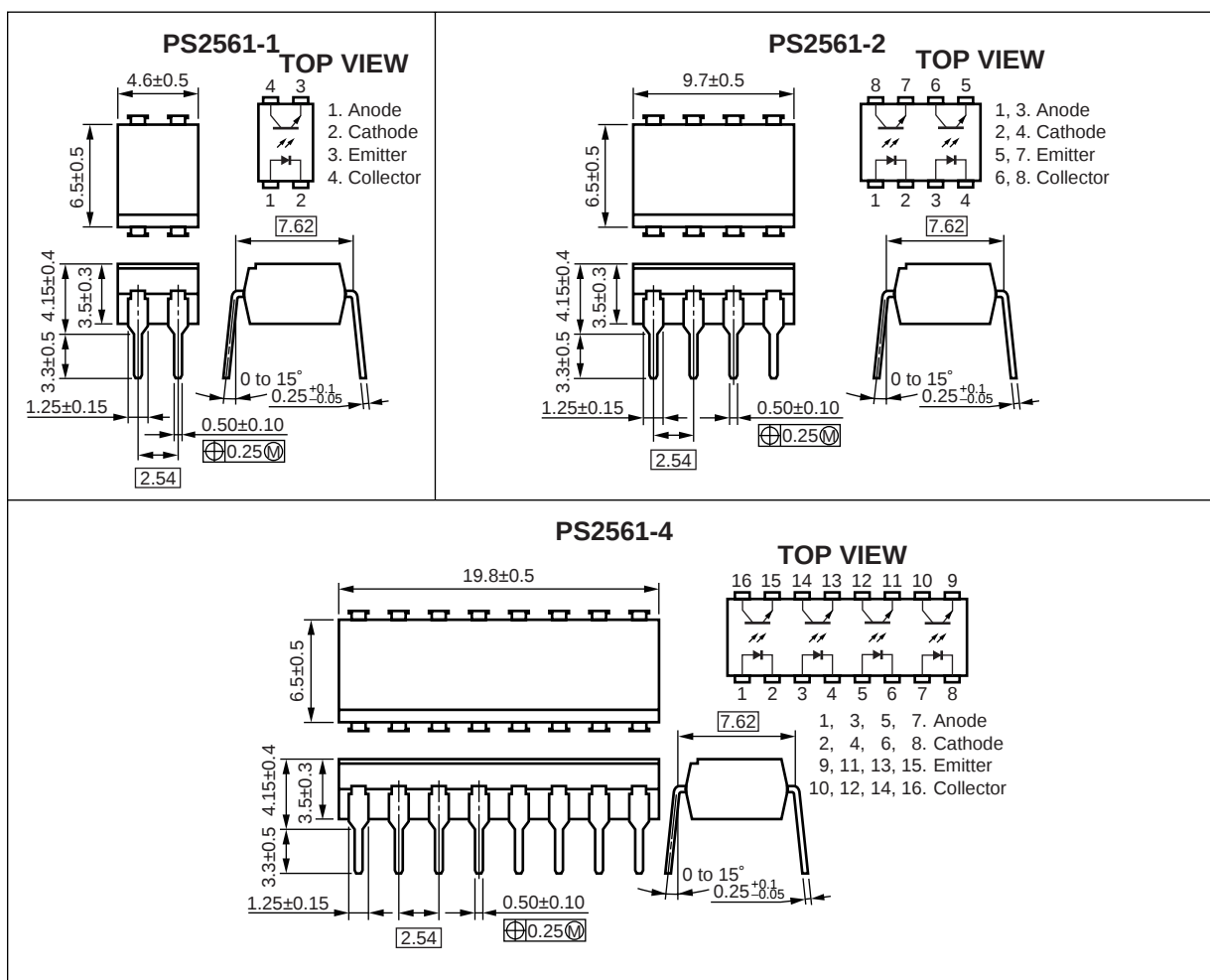
★ PACKAGE DIMENSIONS (UNIT : mm)

DIP Type (New package)

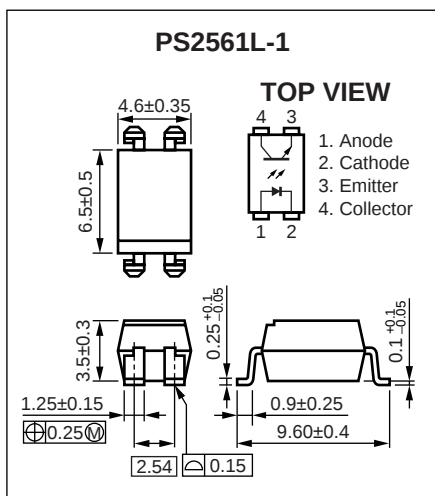


Caution New package 1-ch only

DIP Type

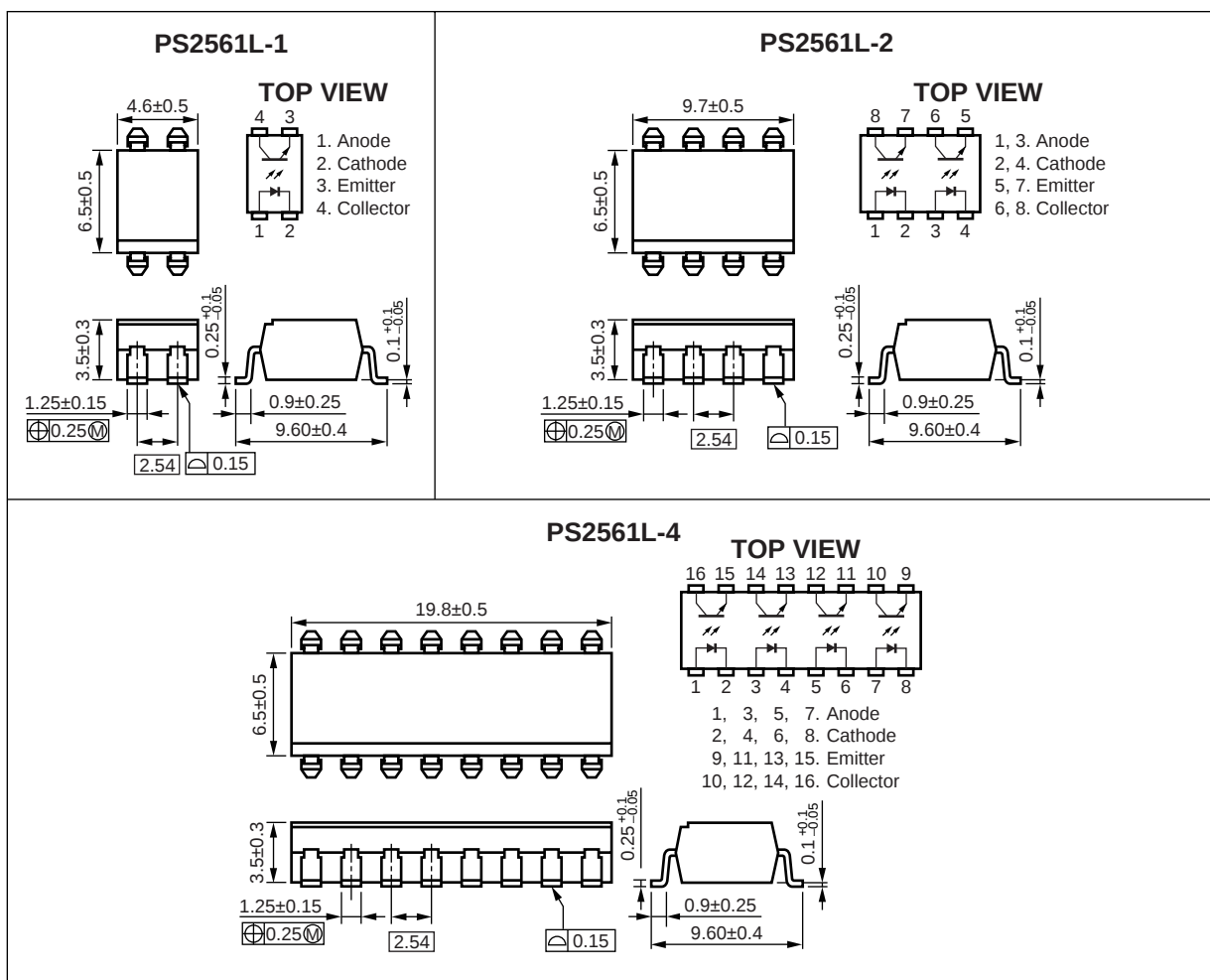


Lead Bending Type (New package)

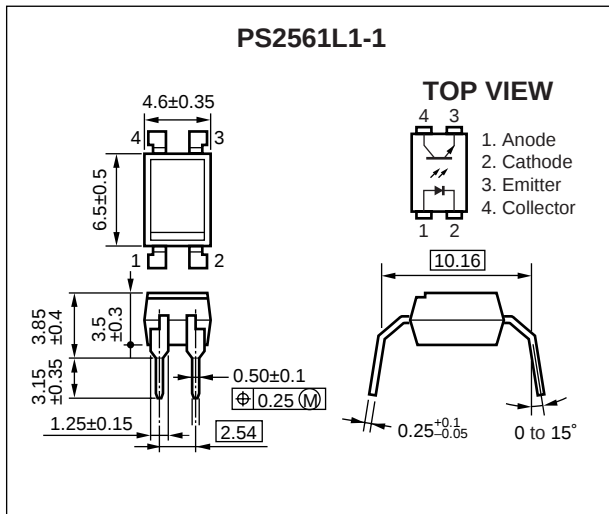


Caution New package 1-ch only

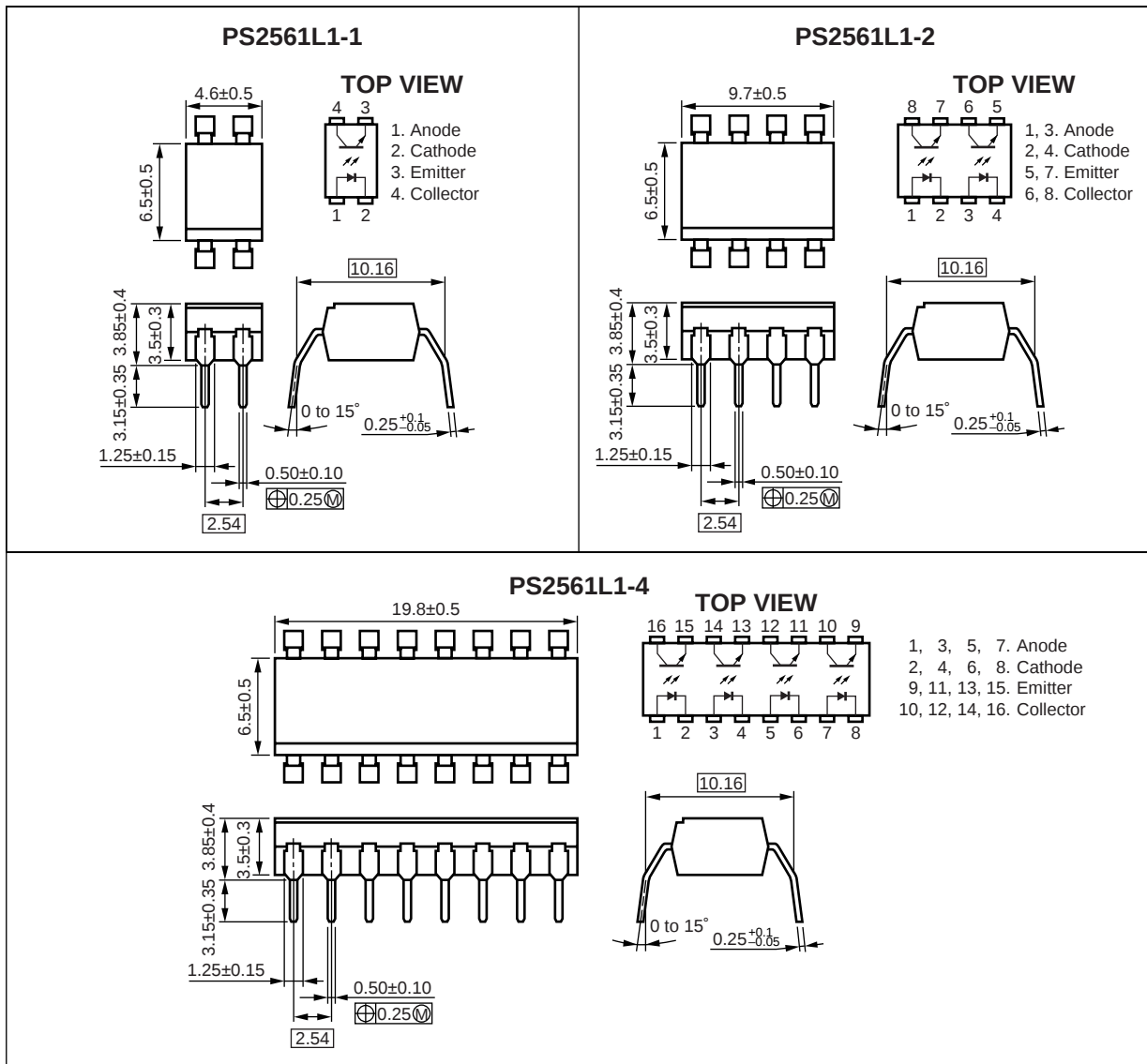
Lead Bending Type



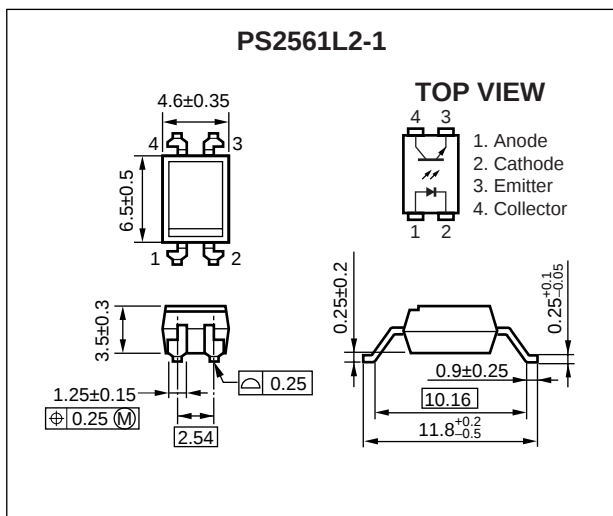
Lead Bending Type For Long Creepage Distance (New Package)



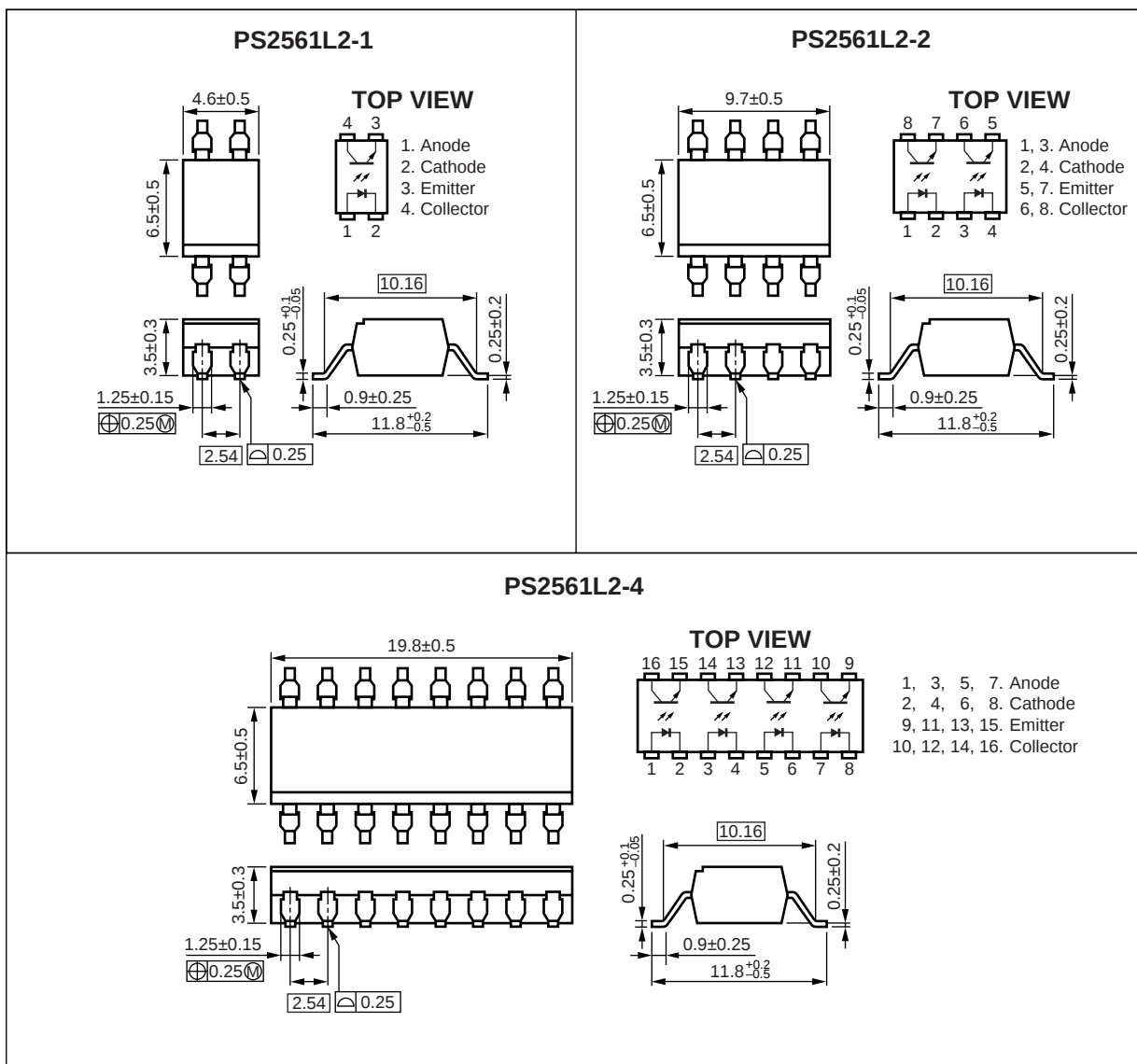
Lead Bending Type For Long Creepage Distance



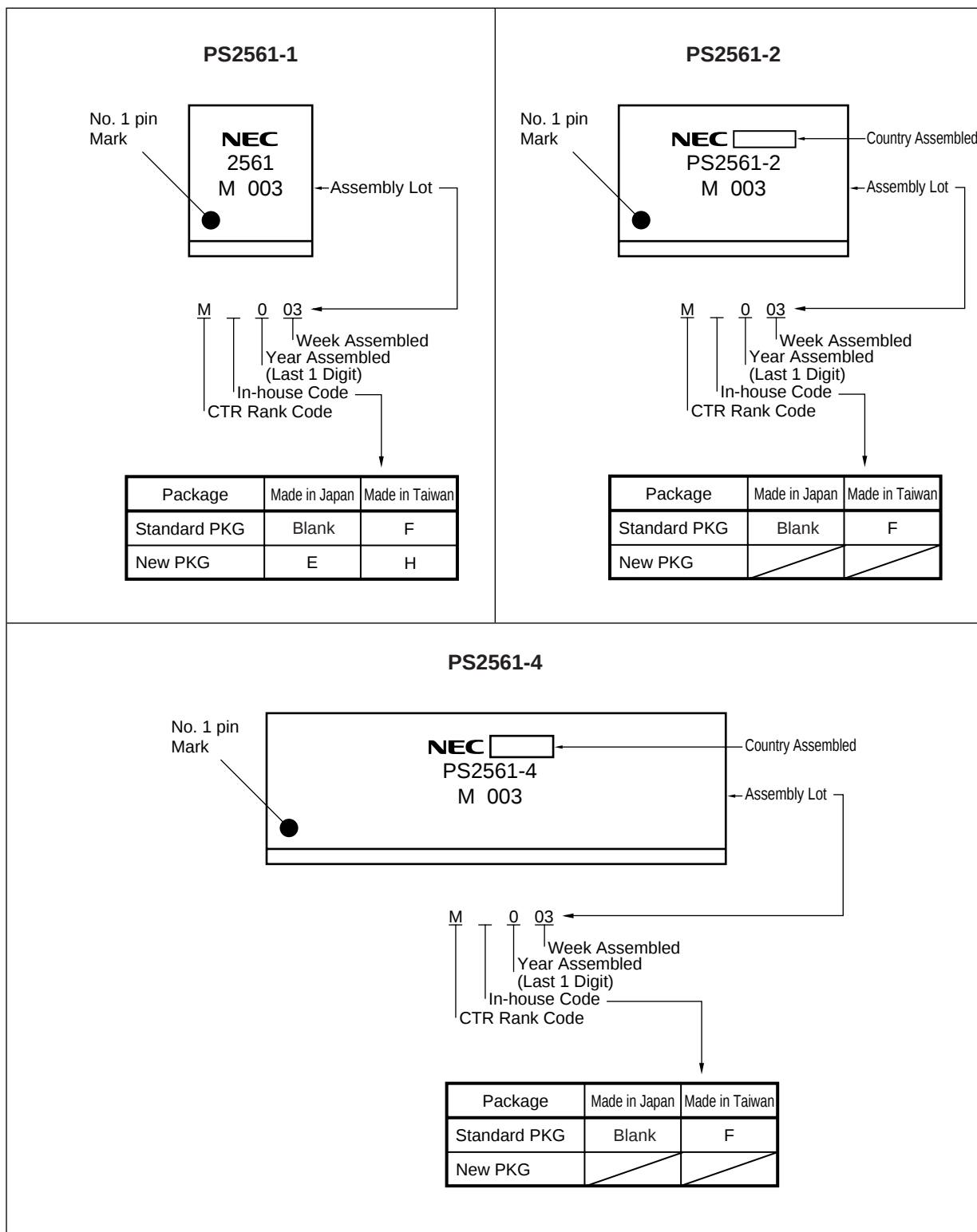
Lead Bending Type For Long Creepage Distance (Gull-Wing) (New Package)



Lead Bending Type For Long Creepage Distance (Gull-Wing)



★ MARKING EXAMPLE



★ ORDERING INFORMATION (1/2)

Part Number	Package	Packing Style	Safety Standard Approval	Application Part Number ^{*1}
PS2561-1	4-pin DIP	Magazine case 100 pcs	Standard products (UL, CSA, BSI, NEMKO, SEMKO, DEMKO, FIMKO approved)	PS2561-1
PS2561L-1				
PS2561L1-1				
PS2561L2-1				
PS2561L-1-E3		Embossed Tape 1 000 pcs/reel		
PS2561L-1-E4				
PS2561L-1-F3		Embossed Tape 2 000 pcs/reel		
PS2561L-1-F4				
PS2561L2-1-E3		Embossed Tape 1 000 pcs/reel		
PS2561L2-1-E4				
PS2561-2	8-pin DIP	Magazine case 45 pcs		PS2561-2
PS2561L-2				
PS2561L1-2				
PS2561L2-2				
PS2561L-2-E3		Embossed Tape 1 000 pcs/reel		
PS2561L-2-E4				
PS2561-4	16-pin DIP	Magazine case 20 pcs		PS2561-4
PS2561L-4				
PS2561L1-4				
PS2561L2-4				
PS2561-1-V	4-pin DIP	Magazine case 100 pcs	VDE approved products (Option)	PS2561-1
PS2561L-1-V				
PS2561L1-1-V				
PS2561L2-1-V				
PS2561L-1-V-E3		Embossed Tape 1 000 pcs/reel		
PS2561L-1-V-E4				
PS2561L-1-V-F3		Embossed Tape 2 000 pcs/reel		
PS2561L-1-V-F4				
PS2561L2-1-V-E3		Embossed Tape 1 000 pcs/reel		
PS2561L2-1-V-E4				

*1 For the application of the Safety Standard, following part number should be used.

★ ORDERING INFORMATION (2/2)

Part Number	Package	Packing Style	Safety Standard Approval	Application Part Number ^{*1}
PS2561-2-V	8-pin DIP	Magazine case 45 pcs	VDE approved products (Option)	PS2561-2
PS2561L-2-V				
PS2561L1-2-V				
PS2561L2-2-V				
PS2561L-2-V-E3		Embossed Tape 1 000 pcs/reel		
PS2561L-2-V-E4				
PS2561-4-V	16-pin DIP	Magazine case 20 pcs		PS2561-4
PS2561L-4-V				
PS2561L1-4-V				
PS2561L2-4-V				

*1 For the application of the Safety Standard, following part number should be used.

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise specified)

★	Parameter		Symbol	Ratings		Unit
				PS2561-1	PS2561-2,-4	
Diode	Reverse Voltage		V _R	6		V
	Forward Current (DC)		I _F	80		mA
	Power Dissipation Derating		ΔP _D /°C	1.5	1.2	mW/°C
	Power Dissipation		P _D	150	120	mW/ch
	Peak Forward Current ^{*1}		I _{FP}	1		A
Transistor	Collector to Emitter Voltage		V _{CEO}	80		V
	Emitter to Collector Voltage		V _{ECO}	7		V
	Collector Current		I _C	50		mA/ch
	Power Dissipation Derating		ΔP _C /°C	1.5	1.2	mW/°C
	Power Dissipation		P _C	150	120	mW/ch
Isolation Voltage ^{*2}			BV	5 000		Vr.m.s.
Operating Ambient Temperature			T _A	-55 to +100		°C
Storage Temperature			T _{stg}	-55 to +150		°C

*1 PW = 100 μs, Duty Cycle = 1 %

*2 AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V _F	I _F = 10 mA		1.17	1.4	V
	Reverse Current	I _R	V _R = 5 V			5	μA
	Terminal Capacitance	C _t	V = 0 V, f = 1.0 MHz		50		pF
Transistor	Collector to Emitter Dark Current	I _{CEO}	V _{CE} = 80 V, I _F = 0 mA			100	nA
Coupled	Current Transfer Ratio (I _c /I _F) ^{*1}	CTR	I _F = 5 mA, V _{CE} = 5 V	80	200	400	%
	Collector Saturation Voltage	V _{CE(sat)}	I _F = 10 mA, I _c = 2 mA			0.3	V
	Isolation Resistance	R _{I-O}	V _{I-O} = 1.0 kV _{DC}	10 ¹¹			Ω
	Isolation Capacitance	C _{I-O}	V = 0 V, f = 1.0 MHz		0.5		pF
	Rise Time ^{*2}	t _r	V _{CC} = 10 V, I _c = 2 mA, R _L = 100 Ω		3		μs
	Fall Time ^{*2}	t _f			5		

★ *1 CTR rank (only PS2561-1, PS2561L-1, PS2561L1-1, PS2561L2-1)

L : 200 to 400 (%)

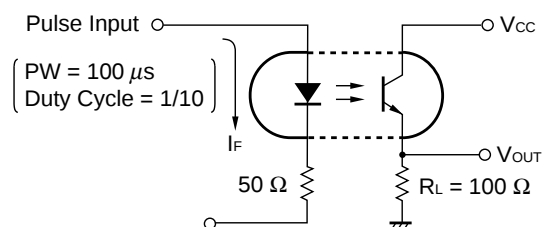
M : 80 to 240 (%)

D : 100 to 300 (%)

H : 80 to 160 (%)

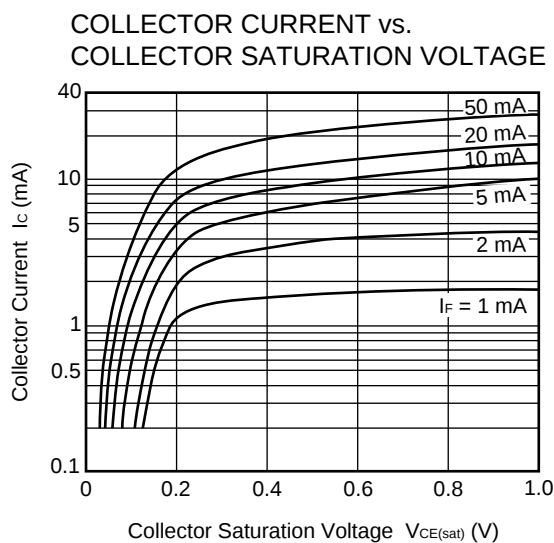
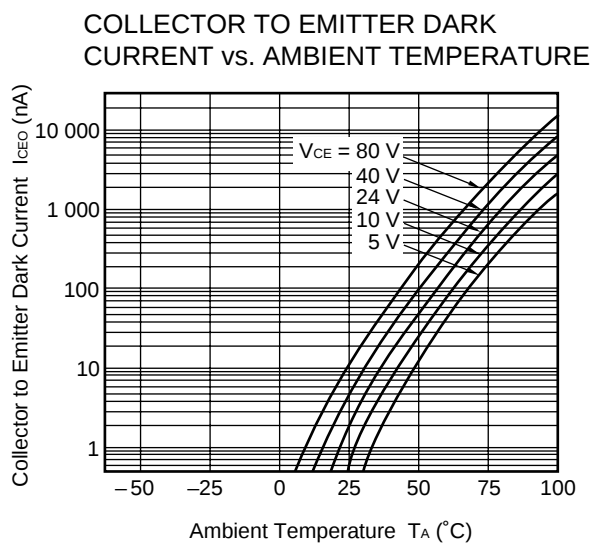
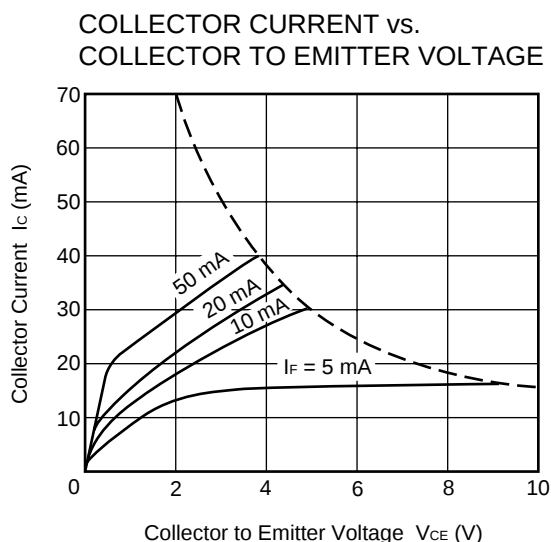
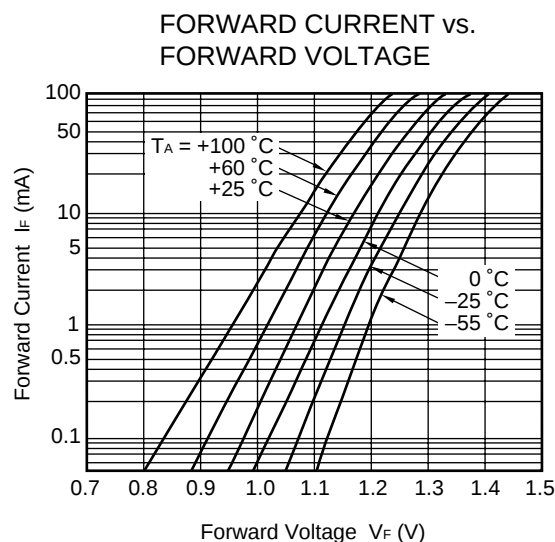
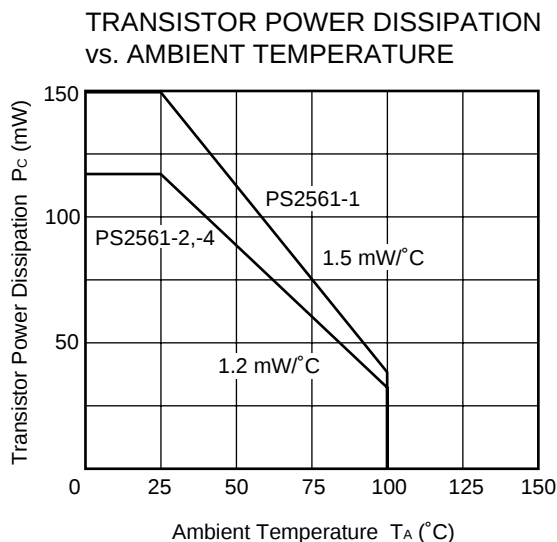
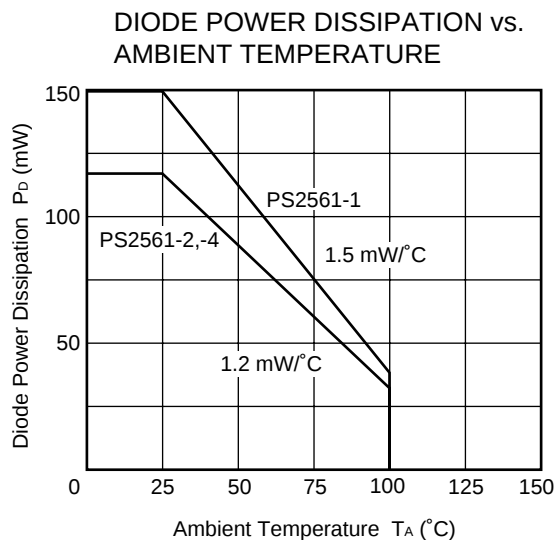
W : 130 to 260 (%)

*2 Test circuit for switching time



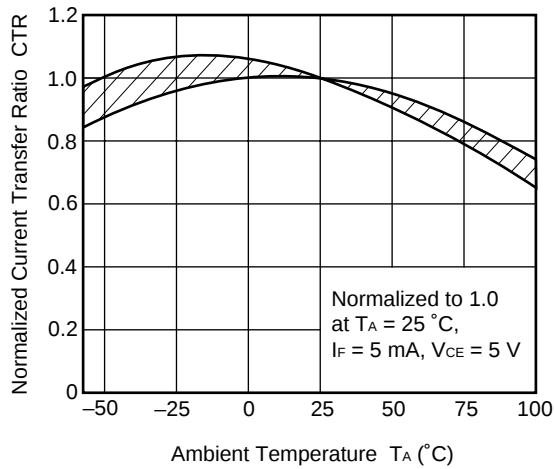
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

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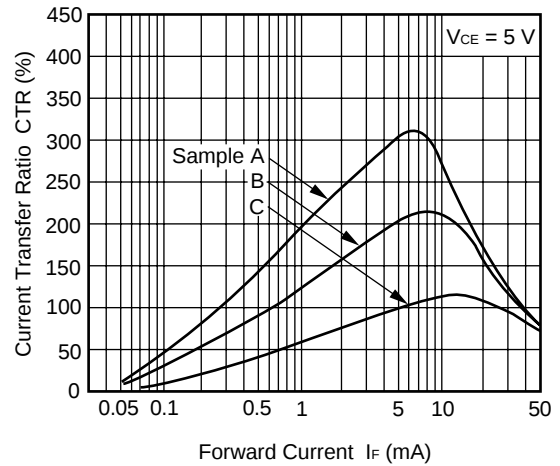


Remark The graphs indicate nominal characteristics.

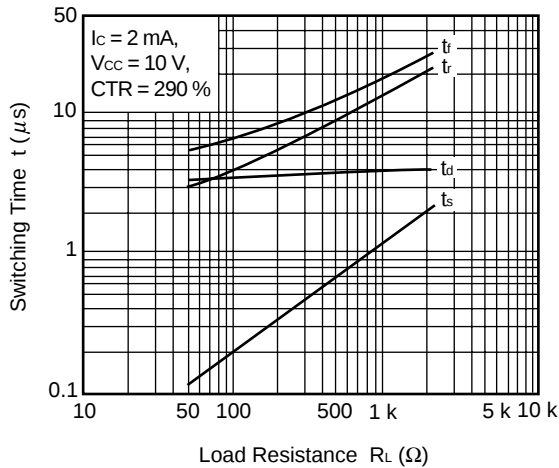
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



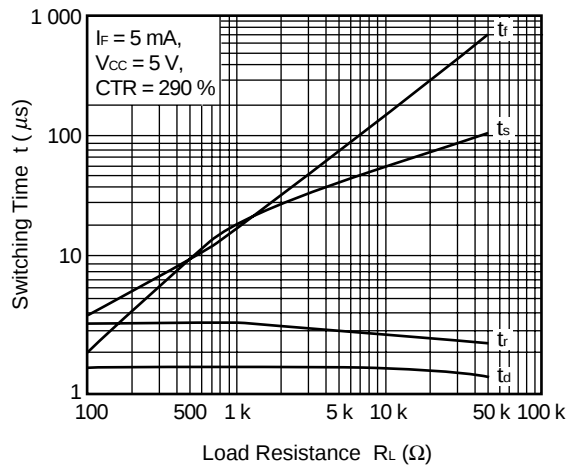
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



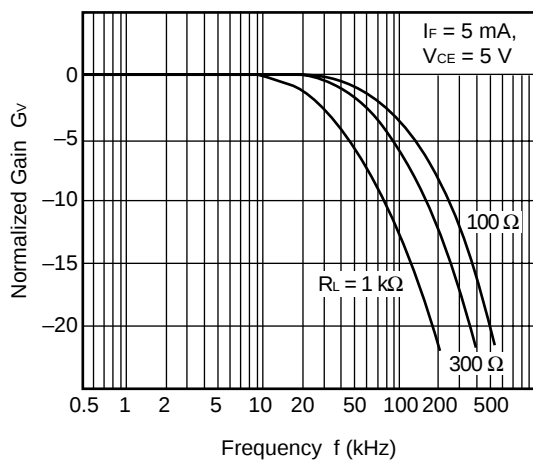
SWITCHING TIME vs. LOAD RESISTANCE



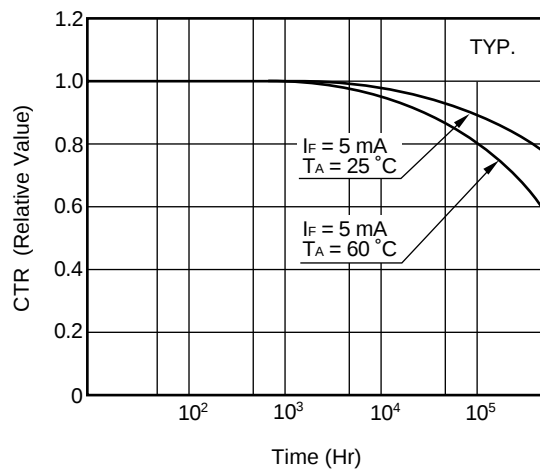
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



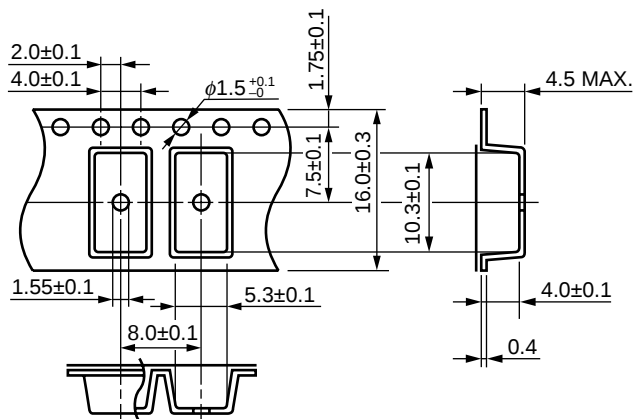
LONG TERM CTR DEGRADATION



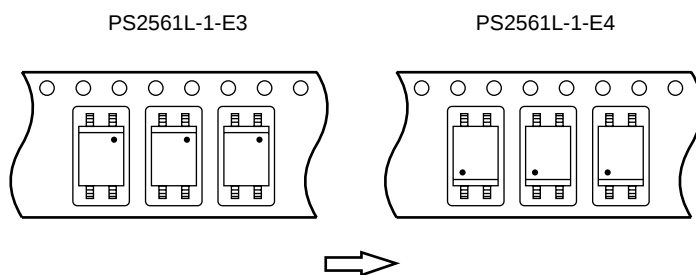
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT : mm)

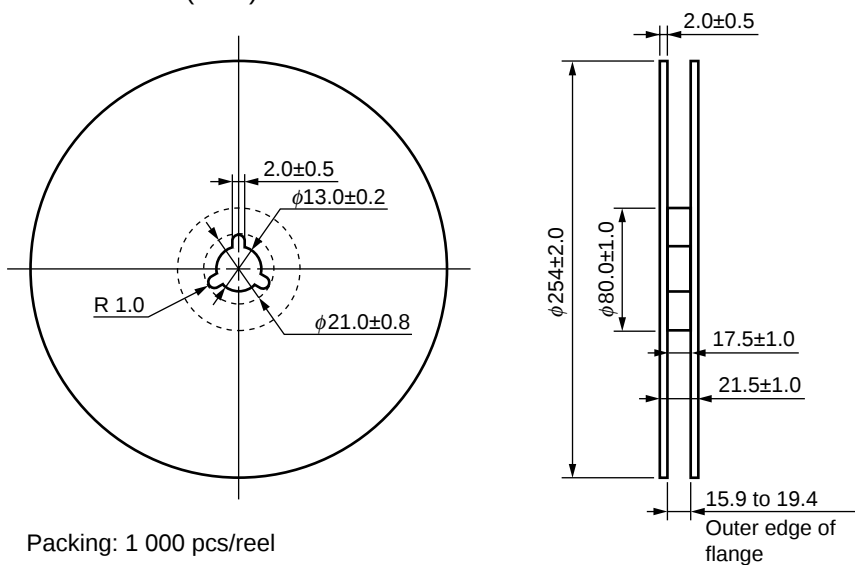
Outline and Dimensions (Tape)



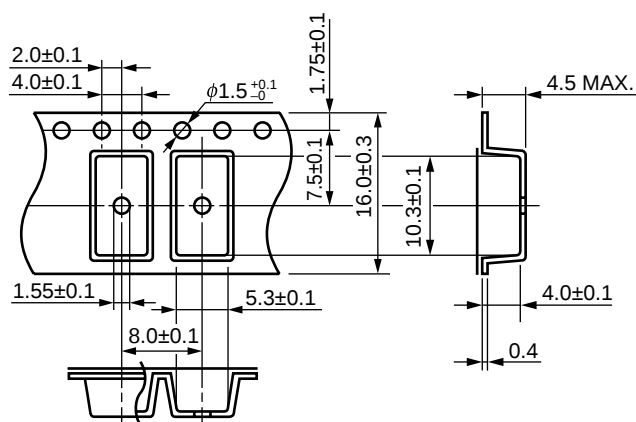
Tape Direction



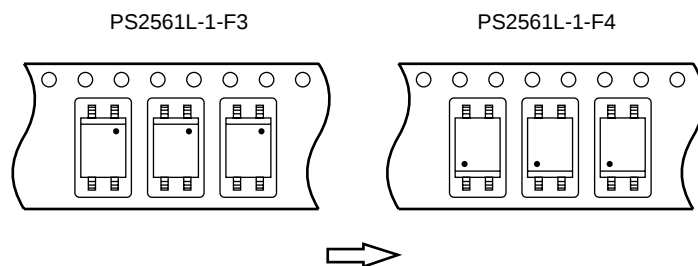
Outline and Dimensions (Reel)



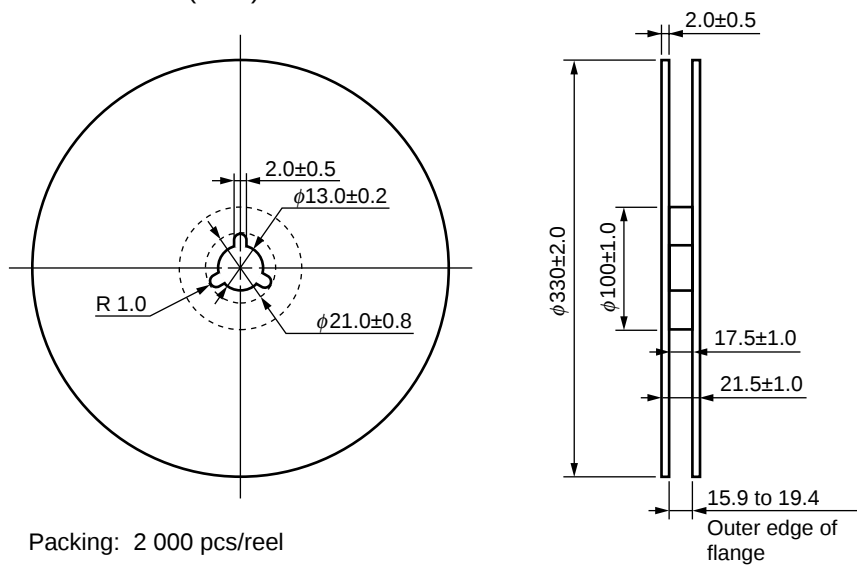
Outline and Dimensions (Tape)



Tape Direction

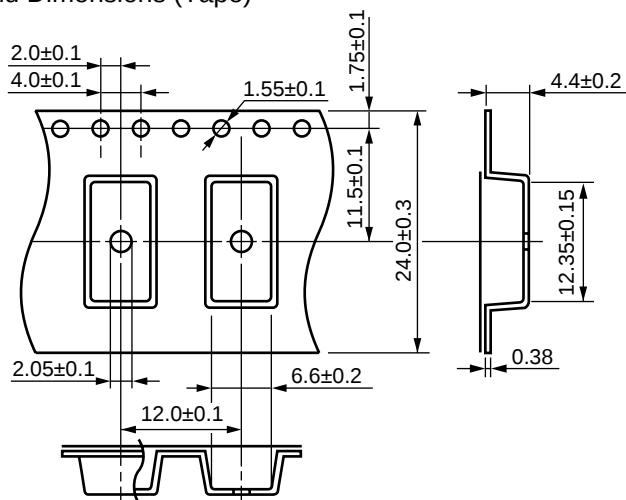


Outline and Dimensions (Reel)

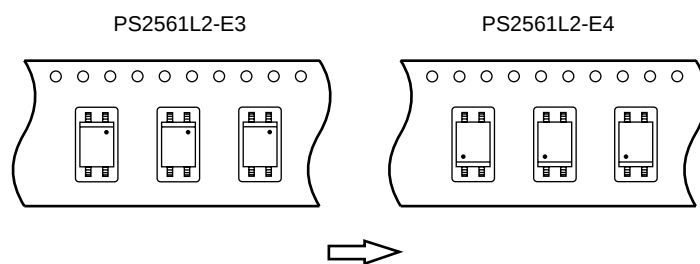


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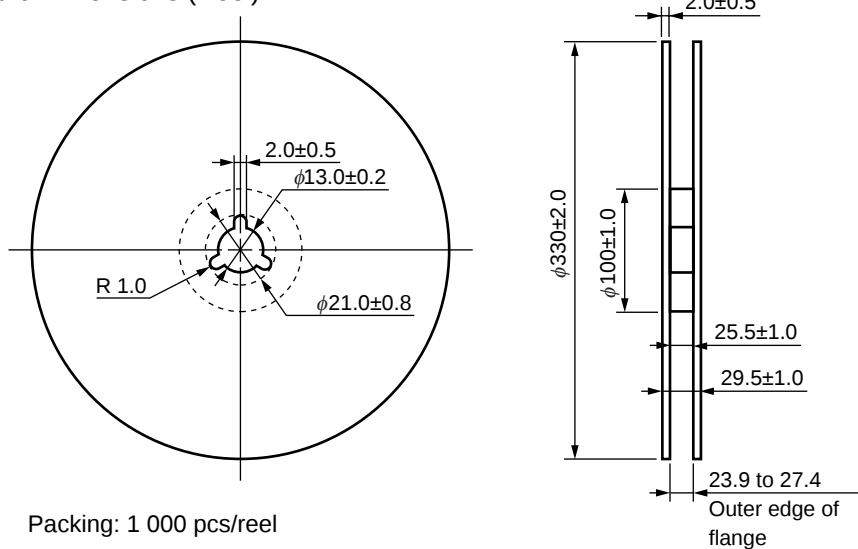
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 1 000 pcs/reel

Technical drawing of a mechanical part, showing a top view and a side view. The top view includes dimensions: 2.0 ± 0.1 , 4.0 ± 0.1 , 1.75 ± 0.1 , 7.5 ± 0.1 , 16.0 ± 0.3 , 10.3 ± 0.1 , 1.55 ± 0.1 , 10.4 ± 0.1 , 12.0 ± 0.1 , and a hole diameter of $\phi 1.5^{+0.1}_{-0}$. The side view shows a maximum width of 4.5 MAX. , a width of 4.0 ± 0.1 , and a thickness of 0.3 .

Technical drawing of a circular part with a central feature. The drawing includes the following dimensions:

- Central feature width: 2.0 ± 0.5
- Central feature diameter: $\phi 13.0 \pm 0.2$
- Central feature radius: $R\ 1.0$
- Dashed circle diameter: $\phi 21.0 \pm 0.8$

Technical drawing of a vertical pipe section showing dimensions:

- Overall diameter: $\phi 330 \pm 2.0$
- Length of the section: 100 ± 1.0
- Offset of the outer edge of the flange from the centerline: 2.0 ± 0.5
- Offset of the inner edge of the flange from the centerline: 17.5 ± 1.0
- Offset of the outer edge of the flange from the centerline: 21.5 ± 1.0
- Offset of the outer edge of the flange from the centerline: 15.9 to 19.4
- Label: Outer edge of flange

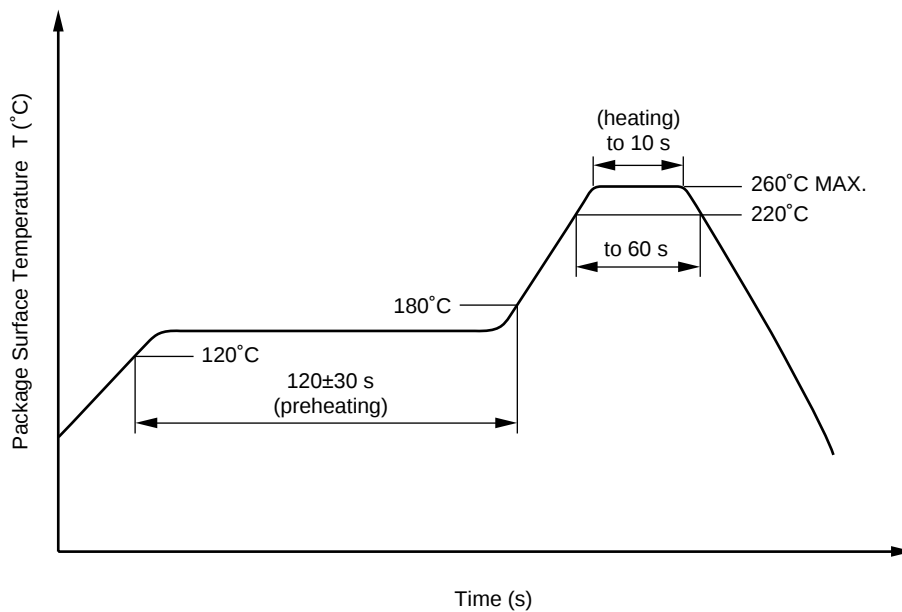
NOTES ON HANDLING

1. Recommended soldering conditions

(1) Infrared reflow soldering

- Peak reflow temperature 260°C or below (package surface temperature)
- Time of peak reflow temperature 10 seconds or less
- Time of temperature higher than 220°C 60 seconds or less
- Time to preheat temperature from 120 to 180°C 120±30 s
- 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



(2) Wave soldering

- Temperature 260°C or below (molten solder temperature)
- Time 10 seconds or less
- Preheating conditions 120°C or below (package surface temperature)
- Number of times One (Allowed to be dipped in solder including plastic mold portion.)
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(3) Cautions

- Fluxes
Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

2. Cautions regarding noise

Be aware that when voltage is applied suddenly between the photocoupler's input and output or between collector-emitters at startup, the output side may enter the on state, even if the voltage is within the absolute maximum ratings.

USAGE CAUTIONS

1. Protect against static electricity when handling.
2. Avoid storage at a high temperature and high humidity.

SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Speck	Unit
Application classification (DIN VDE 0109) for rated line voltages ≤ 300 Vr.m.s. for rated line voltages ≤ 600 Vr.m.s.		IV III	
Climatic test class (DIN IEC 68 Teil 1/09.80)		55/100/21	
Dielectric strength maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.2 \times U_{IORM}$, $P_d < 5$ pC	U_{IORM} U_{pr}	890 1 068	V_{peak} V_{peak}
Test voltage (partial discharge test, procedure b for all devices test) $U_{pr} = 1.6 \times U_{IORM}$, $P_d < 5$ pC	U_{pr}	1 424	V_{peak}
Highest permissible overvoltage	U_{TR}	8 000	V_{peak}
Degree of pollution (DIN VDE 0109)		2	
Clearance distance		> 7.0	mm
Creepage distance		> 7.0	mm
Comparative tracking index (DIN IEC 112/VDE 0303 part 1)	CTI	175	
Material group (DIN VDE 0109)		III a	
Storage temperature range	T_{stg}	-55 to +150	°C
Operating temperature range	T_A	-55 to +100	°C
Isolation resistance, minimum value $V_{IO} = 500$ V dc at $T_A = 25$ °C $V_{IO} = 500$ V dc at T_A MAX. at least 100 °C	R_{is} MIN. R_{is} MIN.	10^{12} 10^{11}	Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current I_F , $P_{si} = 0$) Power (output or total power dissipation) Isolation resistance $V_{IO} = 500$ V dc at $T_A = 175$ °C (T_{si})	T_{si} I_{si} P_{si} R_{is} MIN.	175 400 700 10^9	°C mA mW Ω

- **The information in this document is current as of December, 2003. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
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 "Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots
 "Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
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 (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

M8E 00.4-0110

Caution	GaAs Products	This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points. • Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below. 1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials. 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal. • Do not burn, destroy, cut, crush, or chemically dissolve the product. • Do not lick the product or in any way allow it to enter the mouth.
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► For further information, please contact

NEC Compound Semiconductor Devices, Ltd. <http://www.ncsd.necel.com/>

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