DATA SHEET

NEC

PHOTOCOUPLER

PS2561-1,-2, PS2561L-1,-2

HIGH ISOLATION VOLTAGE SINGLE TRANSISTOR TYPE MULTI PHOTOCOUPLER SERIES

DESCRIPTION

The PS2561-1, -2 and PS2561L-1, -2 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor.

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

FEATURES

- High isolation voltage BV = 5 000 Vr.m.s.: standard products
  BV = 3 750 Vr.m.s.: VDE0884 approved products (Option)
- High collector to emitter voltage (V_{CEO} = 80 V)
- High current transfer ratio (CTR = 200 % TYP.)
- High-speed switching (t_r = 3 μs TYP., t_f = 5 μs TYP.)
- UL approved (File No. E72422 (S))
- ★ CSA approved (No. CA 101391)
- BSI approved (BS415, BS7002) No. 7112
- SEMKO approved (SS4410165) No. 9317144
- NEMKO approved (NEK-HD 195S6) No. A21409
- DEMKO approved (Section 101, 137) No. 300535
- ★ FIMKO approved (E69-89) No. 167265-08
- VDE0884 approved (Option)

APPLICATIONS

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

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

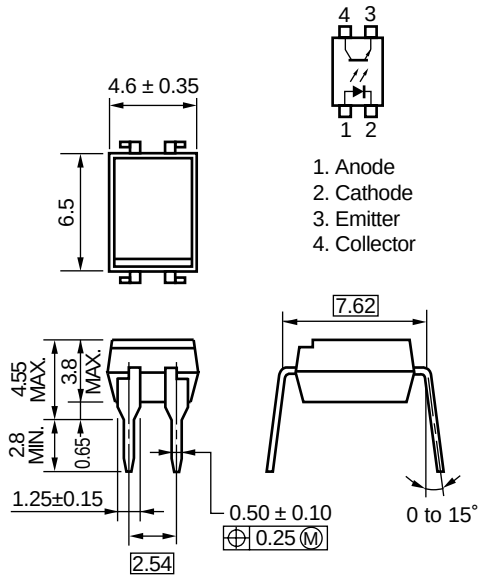
Document No. P12989EJ4V0DS00 (4th edition)
(Previous No. LC-2225)
Date Published August 1997 NS
Printed in Japan

The mark ★ shows major revised points.

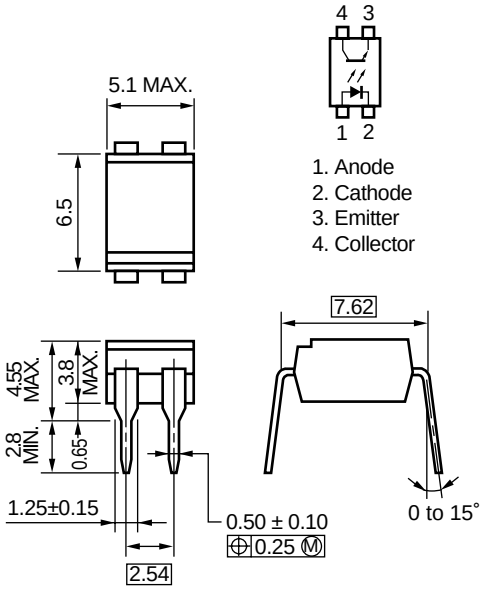
★ **PACKAGE DIMENSIONS (in millimeters)**

DIP Type

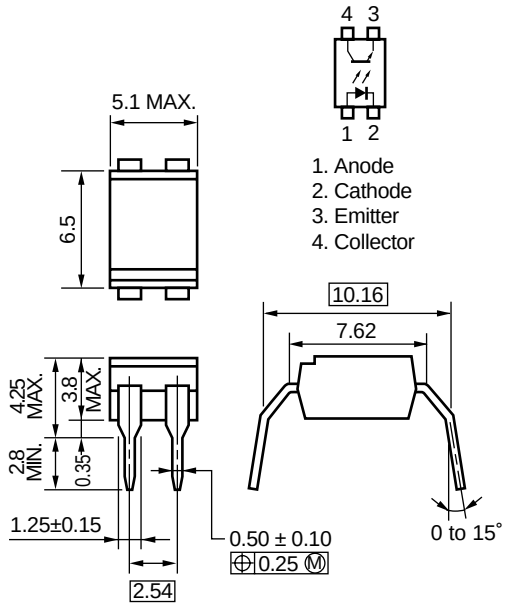
PS2561-1 (New Package)



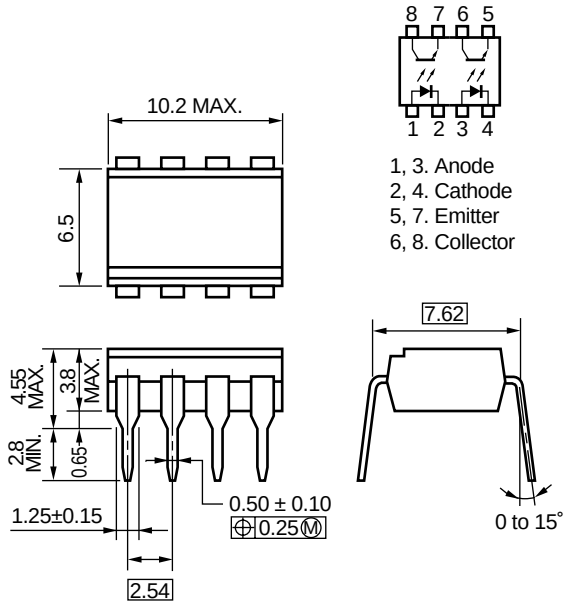
PS2561-1



PS2561L1-1



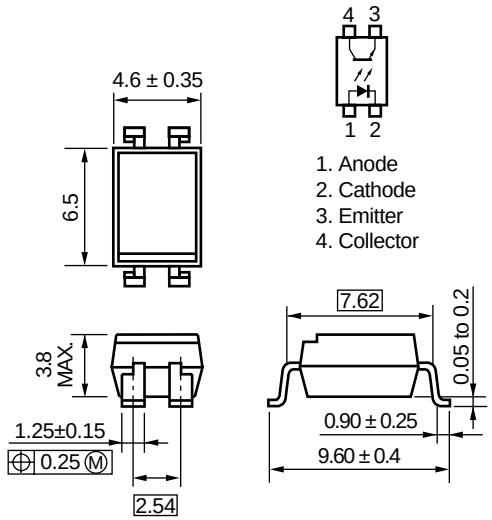
PS2561-2



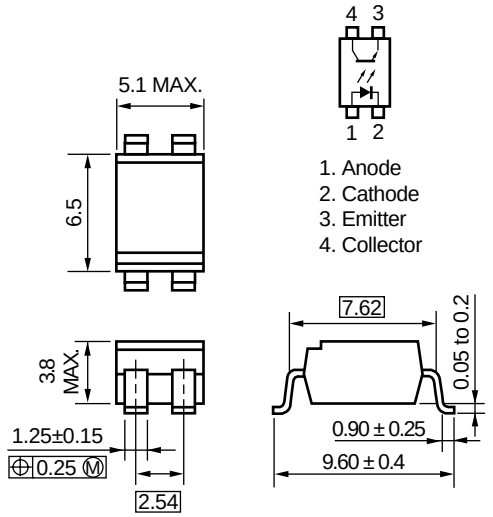
Caution New package 1ch only

Lead Bending Type

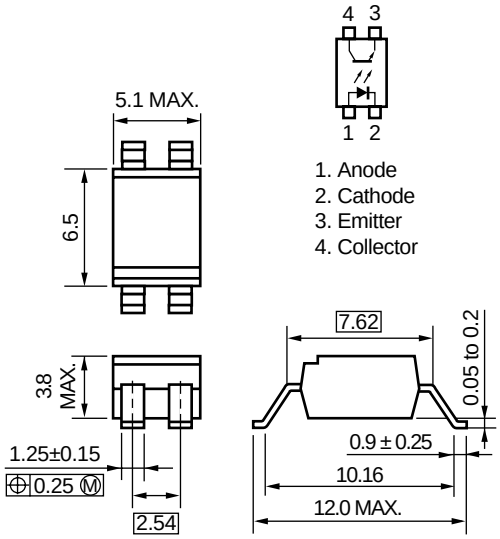
PS2561L-1 (New Package)



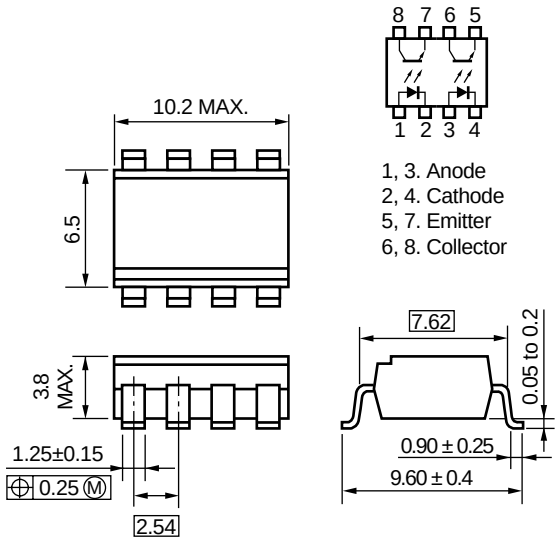
PS2561L-1



PS2561L2-1



PS2561L-2



Caution New package 1ch only

★ ORDERING INFORMATION

Part Number	Package	Safety Standard Approval	Application part number[*1]
PS2561-1 PS2561L-1 PS2561L1-1 PS2561L2-1	4-pin DIP 4-pin DIP (lead bending surface mount) 4-pin DIP (for long distance) 4-pin DIP (for long distance surface mount)	Standard products • UL approved • CSA approved • BSI approved • NEMKO approved • DEMKO approved • SEMKO approved • FIMKO approved	PS2561-1
PS2561-2 PS2561L-2	8-pin DIP 8-pin DIP (lead bending surface mount)		PS2561-2
PS2561-1-V PS2561L-1-V PS2561L1-1-V PS2561L2-1-V	4-pin DIP 4-pin DIP (lead bending surface mount) 4-pin DIP (for long distance) 4-pin DIP (for long distance surface mount)	VDE0884 approved products (Option)	PS2561-1
PS2561-2-V PS2561L-2-V	8-pin DIP 8-pin DIP (lead bending surface mount)		PS2561-2

***1** As applying to Safety Standard, following part number should be used.

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

Parameter		Symbol	Ratings		Unit
			PS2561-1, PS2561L-1	PS2561-2, PS2561L-2	
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 3 750[*3]		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

***3** VDE0884 approved products (Option)

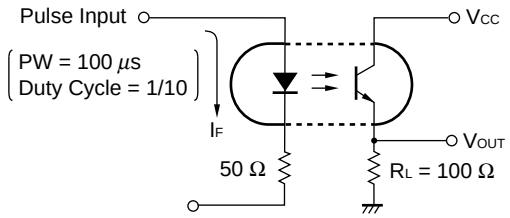
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

	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[*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	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)

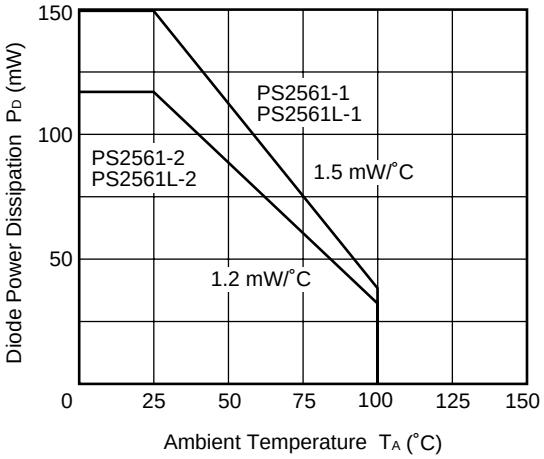
L : 200 to 400 (%)
M : 80 to 240 (%)
D : 100 to 300 (%)
H : 80 to 160 (%)
W : 130 to 260 (%)

***2** Test circuit for switching time

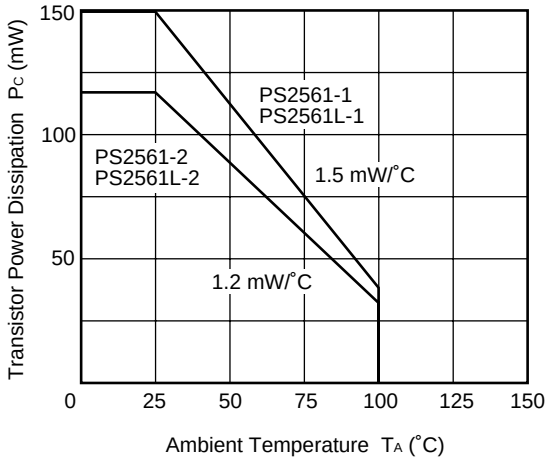


TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

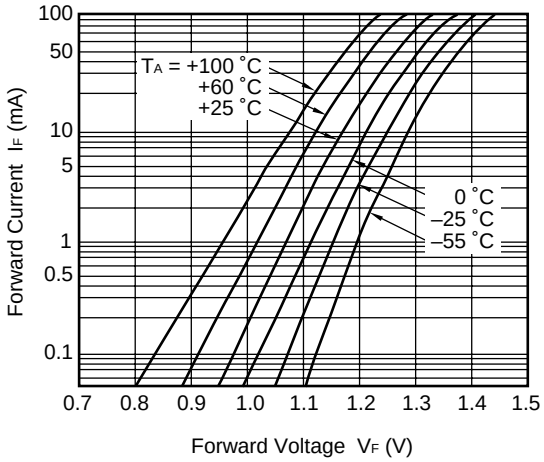
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



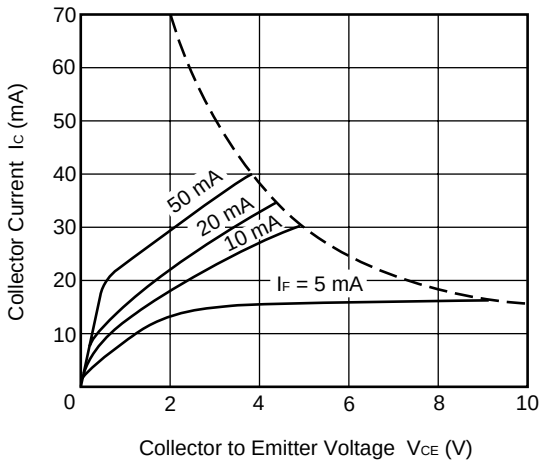
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



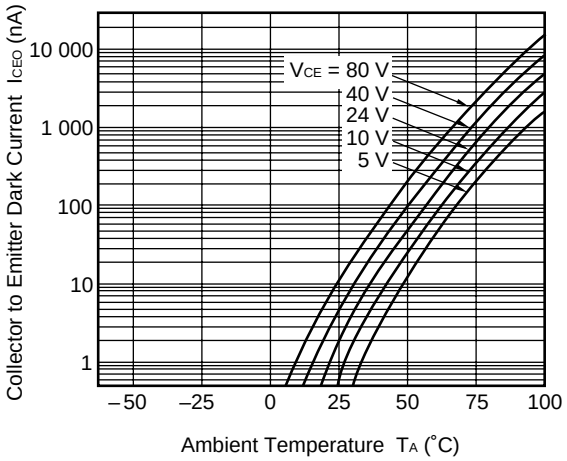
FORWARD CURRENT vs. FORWARD VOLTAGE



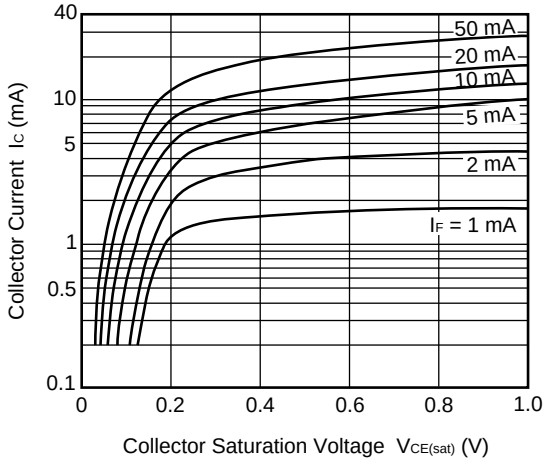
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



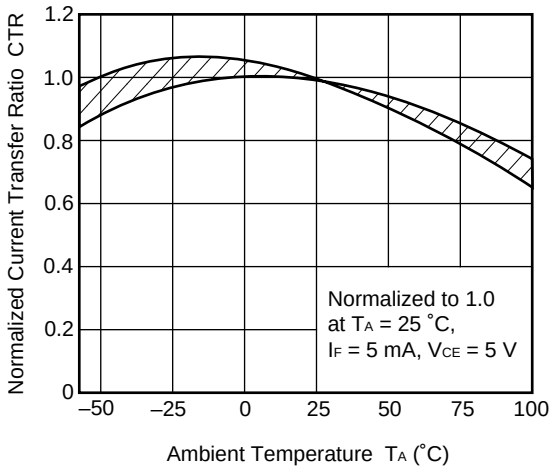
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



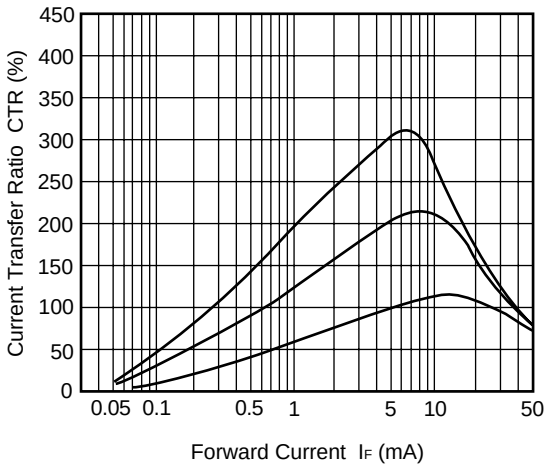
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



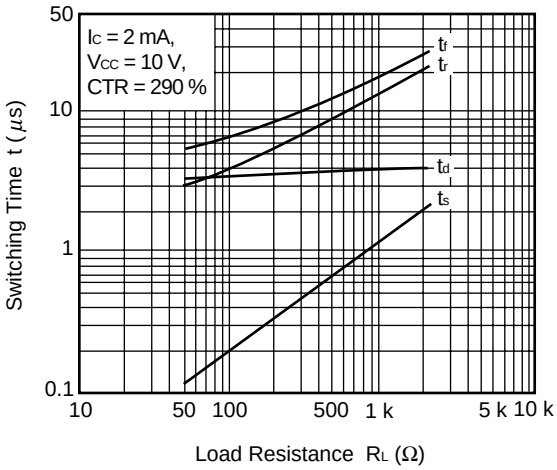
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



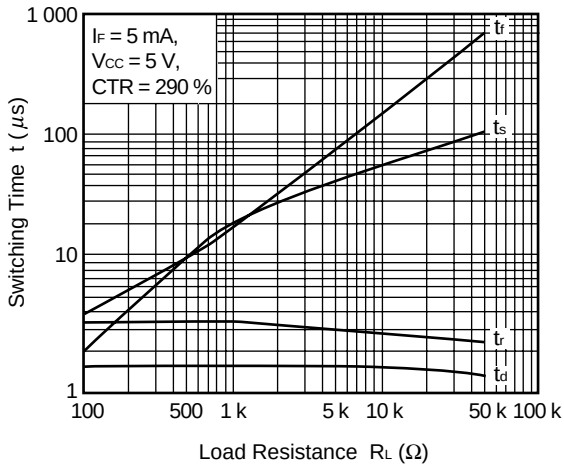
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



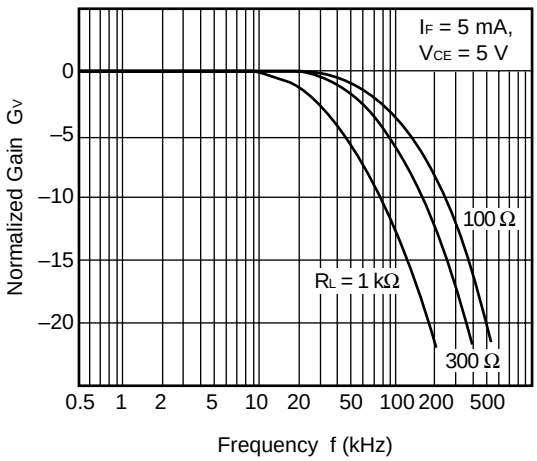
SWITCHING TIME vs. LOAD RESISTANCE



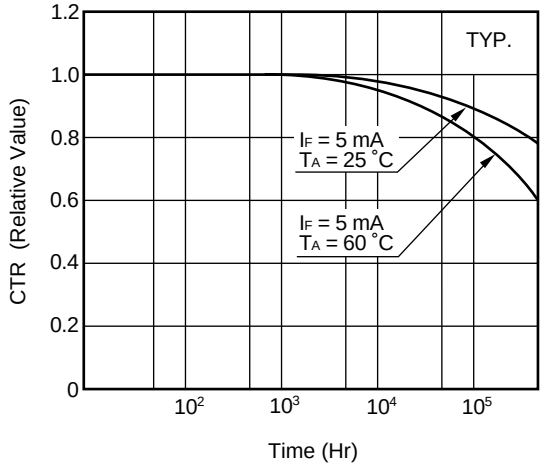
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE

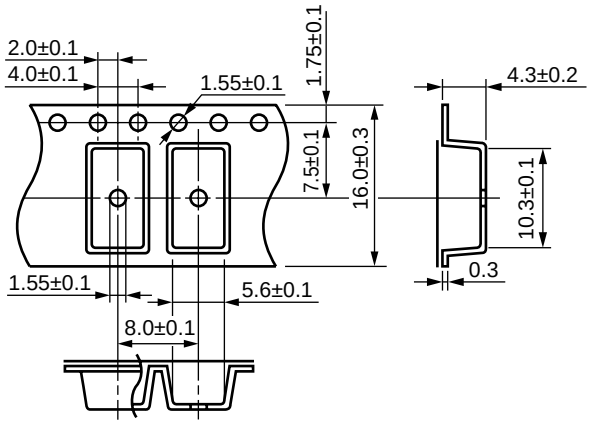


LONG TIME CTR DEGRADATION

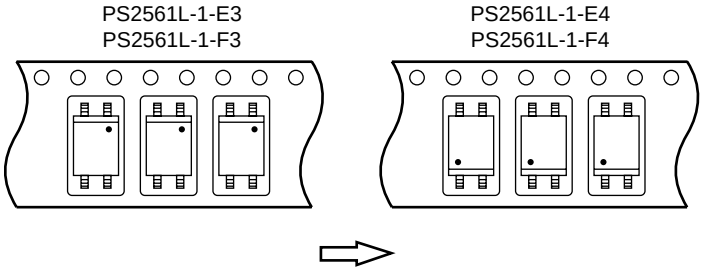


★ **TAPING SPECIFICATIONS (in millimeters)**

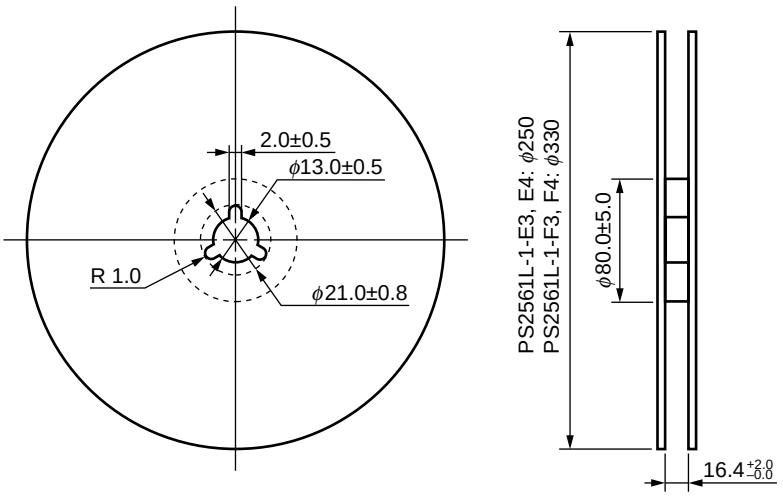
Outline and Dimensions (Tape)



Taping Direction

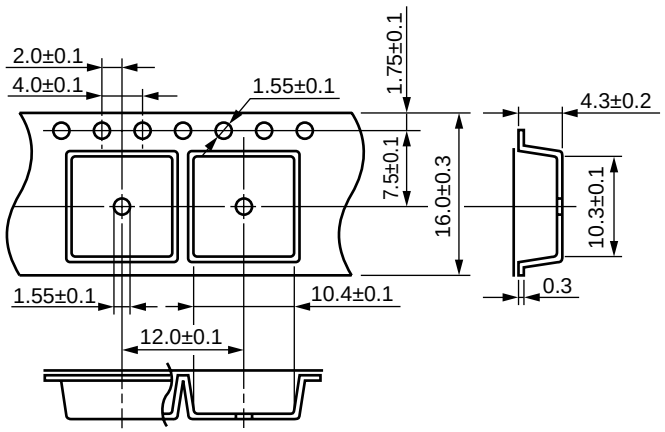


Outline and Dimensions (Reel)

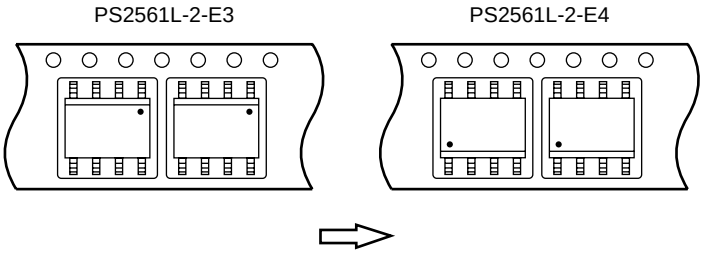


Packing: PS2561L-1-E3, E4 1 000 pcs/reel
PS2561L-1-F3, F4 2 000 pcs/reel

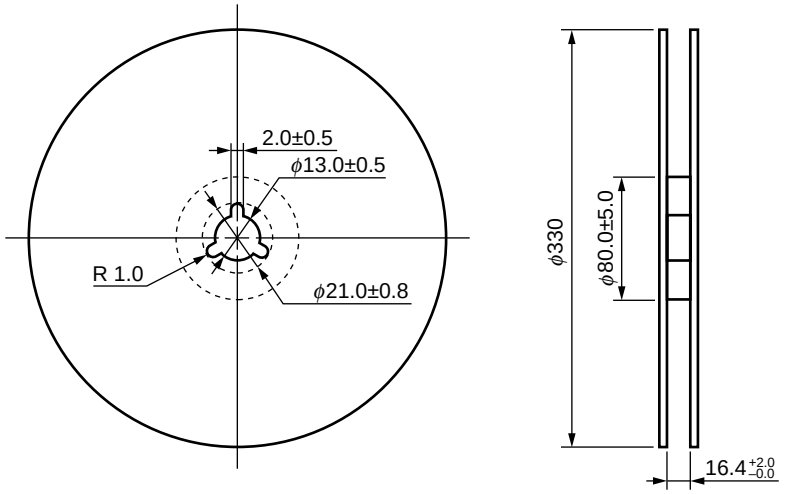
Outline and Dimensions (Tape)



Taping Direction



Outline and Dimensions (Reel)



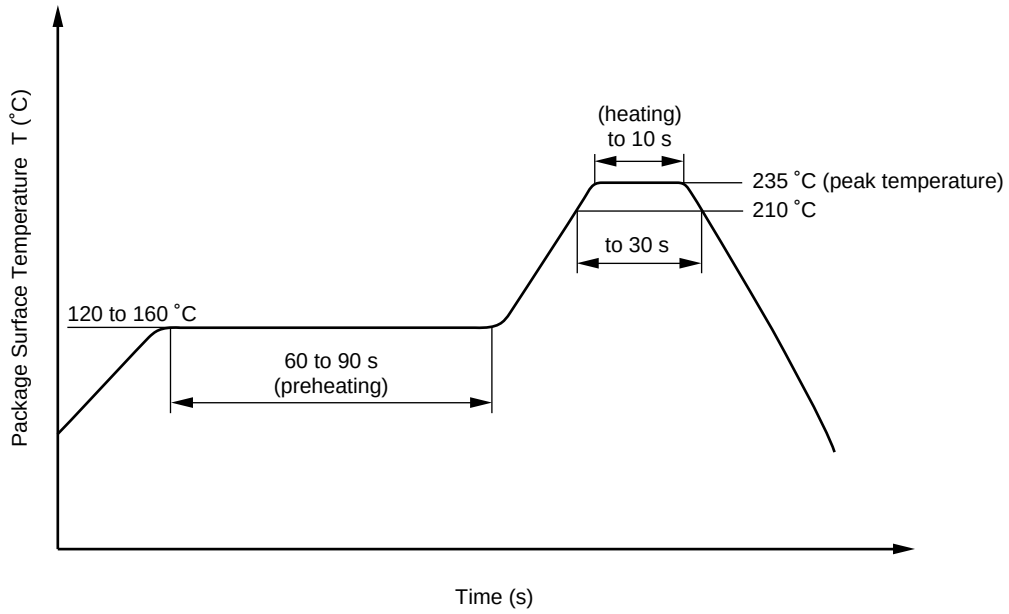
Packing: 1 000 pcs/reel

★ RECOMMENDED SOLDERING CONDITIONS

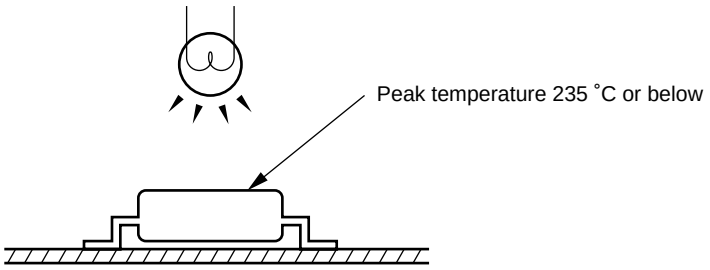
(1) Infrared reflow soldering

- 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 Please avoid to removed the residual flux by water after the first reflow processes.



(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.)

SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)

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 random test) $U_{pr} = 1.6 \times U_{IORM}$, $P_d < 5$ pC	U_{pr}	1 424	V_{peak}
Highest permissible overvoltage	U_{TR}	6 000	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	 Ris MIN. Ris 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, Psi = 0) Power (output or total power dissipation) Isolation resistance V_{IO} = 500 V dc at T_A = 175 °C (Tsi)	 Tsi Isi Psi Ris MIN.	 175 400 700 10^9	 °C mA mW Ω

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.

M4 96.5