DATA SHEET

NEC

PHOTOCOUPLER

PS2566-1,-2, PS2566L-1,-2

HIGH ISOLATION VOLTAGE AC INPUT, DARLINGTON TRANSISTOR TYPE MULTI PHOTOCOUPLER SERIES

–NEPOC™ Series–

DESCRIPTION

The PS2566-1, -2 and PS2566L-1, -2 are optically coupled isolators containing GaAs light emitting diodes and an NPN silicon darlington connected phototransistor.

PS2566-1, -2 are in a plastic DIP (Dual In-line Package) and PS2566L-1, -2 are lead bending type (Gull-wing) for surface mount.

FEATURES

- AC input response
- ★ High Isolation voltage (BV = 5 000 Vr.m.s.)
- High current transfer ratio (CTR = 2 000 % TYP.)
- High-speed switching (t_r, t_f = 100 μs TYP.)
- Ordering number of taping product: PS2566L-1-E3, E4, F3, F4, PS2566L-2-E3, E4
- UL approved: File No. E72422 (S)
- CSA approved: No. CA 101391
- BSI approved: No. 7112
- SEMKO approved: No. 9317144
- NEMKO approved: No. A21409
- DEMKO approved: No. 300535
- FIMKO approved: No. 167265-08
- VDE0884 approved (Option)

APPLICATIONS

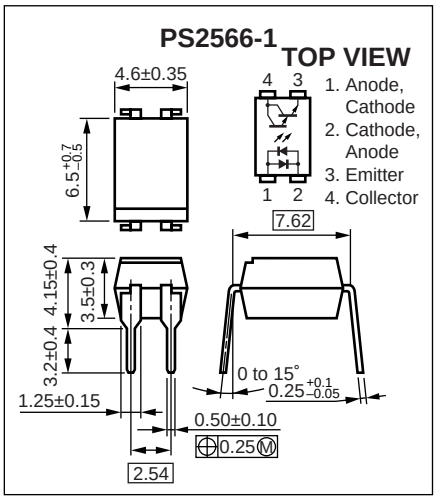
- Telephone/FAX.
- FA/OA equipment
- Programmable logic controller

Document No. P12992EJ5V0DS00 (5th edition)
Date Published February 2001 NS CP(K)
Printed in Japan

The mark ★ shows major revised points.

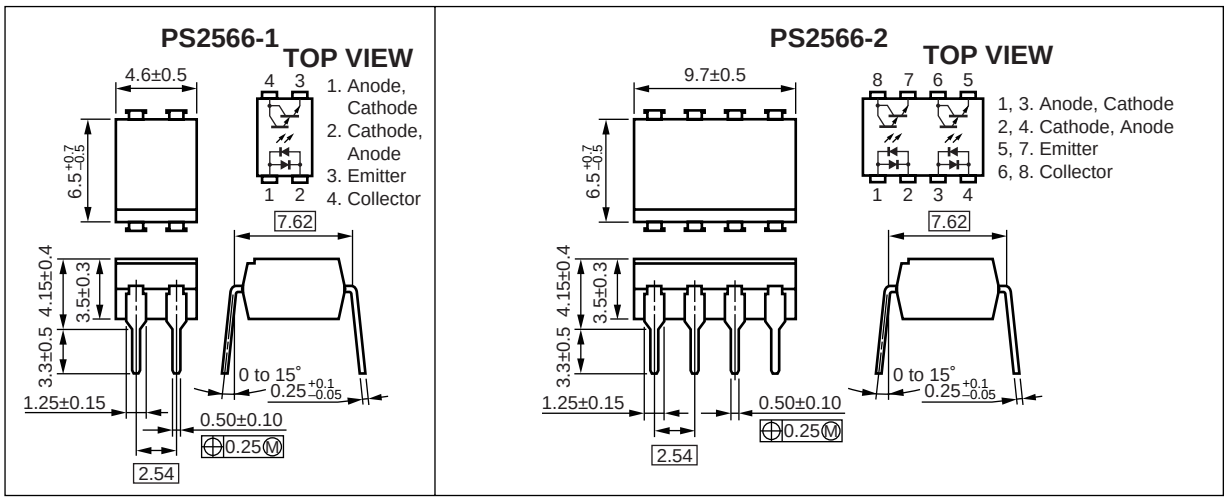
★ **PACKAGE DIMENSIONS (UNIT : mm)**

DIP Type (New package)

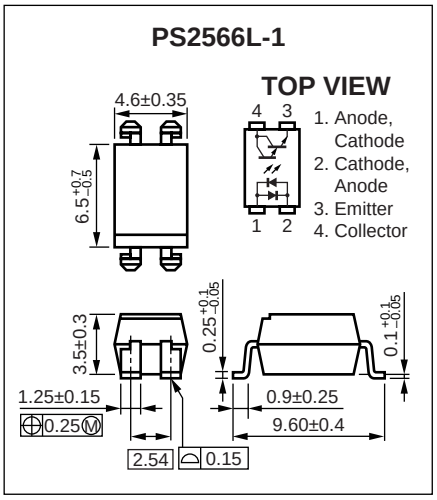


Caution New package 1-ch only

DIP Type

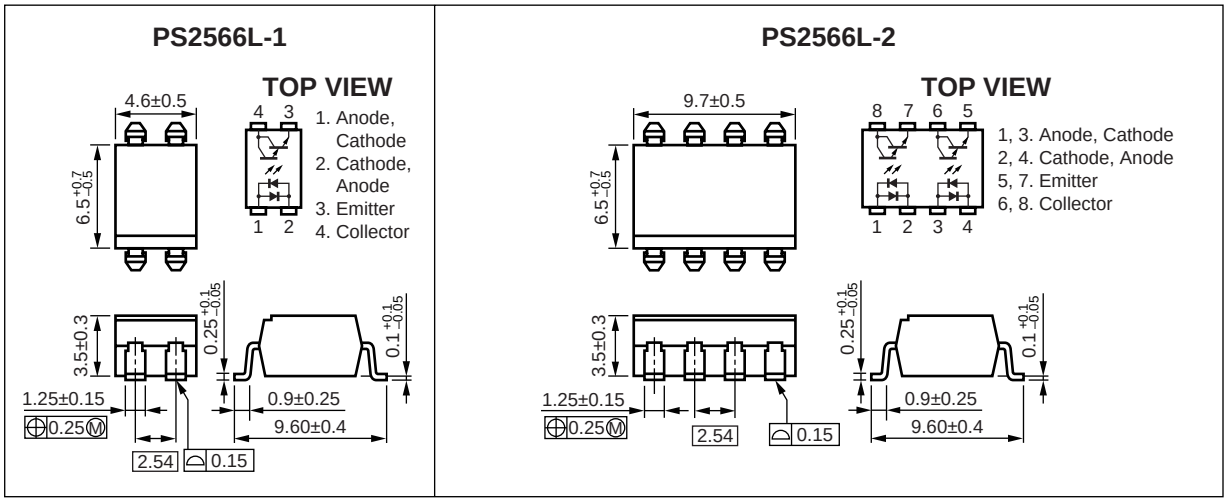


Lead Bending Type (New package)

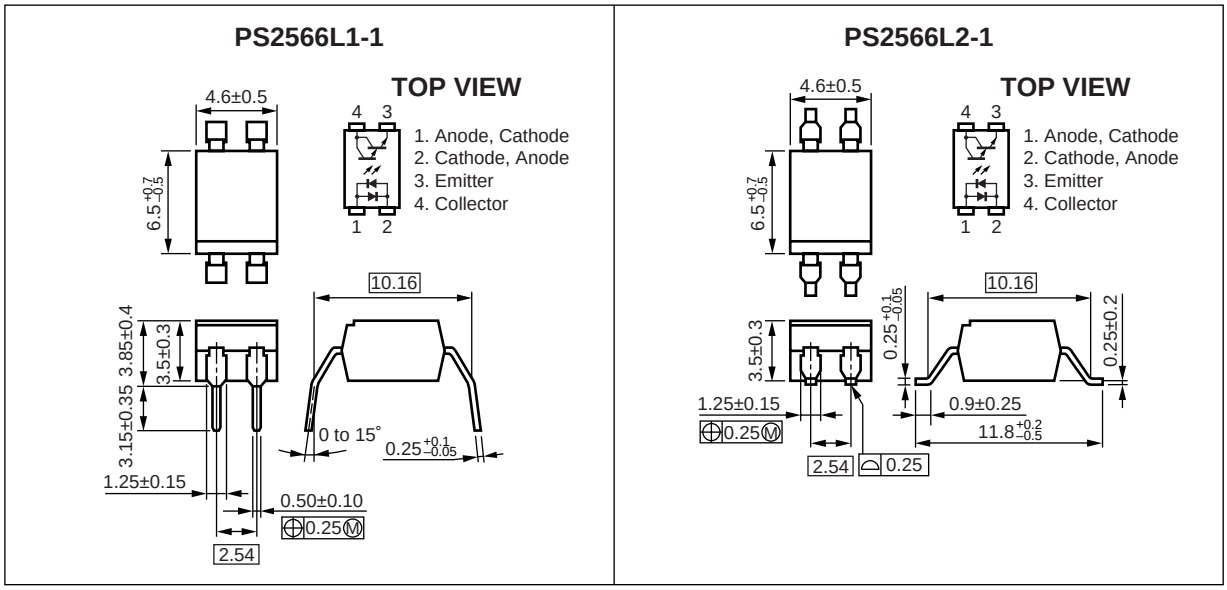


Caution New package 1-ch only

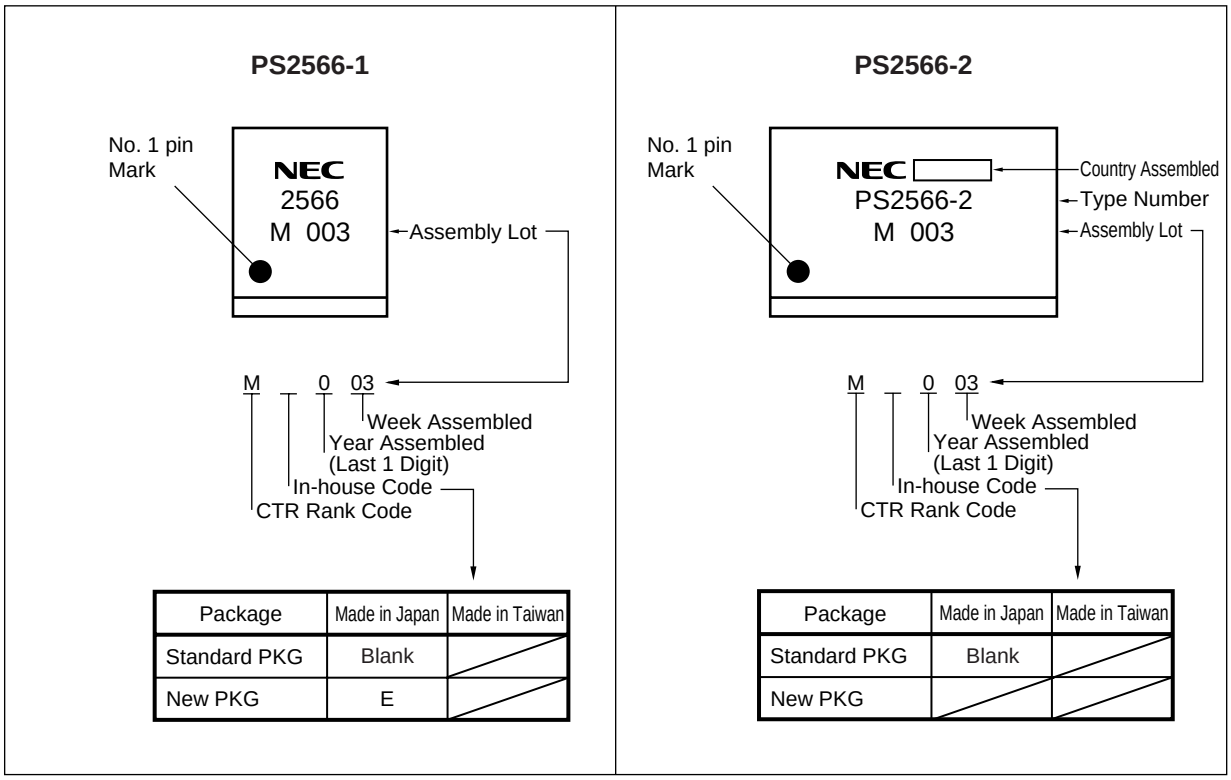
Lead Bending Type



Lead Bending Type For Long Creepage Distance (New package)



★ **MARKING EXAMPLE**



Package	Made in Japan	Made in Taiwan
Standard PKG	Blank	
New PKG	E	

Package	Made in Japan	Made in Taiwan
Standard PKG	Blank	
New PKG		

★ ORDERING INFORMATION

Part Number	Package	Packing Style	Safety Standard Approval	Application Part Number*1
PS2566-1	4-pin DIP	Magazine case 100 pcs	Standard products (UL, CSA, BSI, NEMKO, SEMKO, DEMKO, FIMKO approved)	PS2566-1
PS2566L-1				
PS2566L1-1				
PS2566L2-1				
PS2566L-1-E3		Embossed Tape 1 000 pcs/reel		
PS2566L-1-E4				
PS2566L-1-F3		Embossed Tape 2 000 pcs/reel		
PS2566L-1-F4				
PS2566-2	8-pin DIP	Magazine case 45 pcs		PS2566-2
PS2566L-2				
PS2566L-2-E3		Embossed Tape 1 000 pcs/reel		
PS2566L-2-E4				
PS2566-1-V	4-pin DIP	Magazine case 100 pcs	VDE0884 approved products (Option)	PS2566-1
PS2566L-1-V				
PS2566L1-1-V				
PS2566L2-1-V				
PS2566L-1-V-E3		Embossed Tape 1 000 pcs/reel		
PS2566L-1-V-E4				
PS2566L-1-V-F3		Embossed Tape 2 000 pcs/reel		
PS2566L-1-V-F4				
PS2566L-2-V	8-pin DIP	Magazine case 45 pcs		PS2566-2
PS2566L-2-V				
PS2566-2-V-E3		Embossed Tape 1 000 pcs/reel		
PS2566L-2-V-E4				

***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
			PS2566-1, PS2566L-1	PS2566-2, PS2566L-2	
Diode	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}	40		V
	Emitter to Collector Voltage	V_{ECO}	6		V
	Collector Current	I_C	200	160	mA/ch
	Power Dissipation Derating	ΔP_C/°C	2.0	1.6	mW/°C
	Power Dissipation	P_C	200	160	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

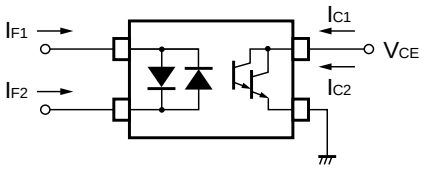
***1** PW = 100 μs, Duty Cycle = 1 %

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

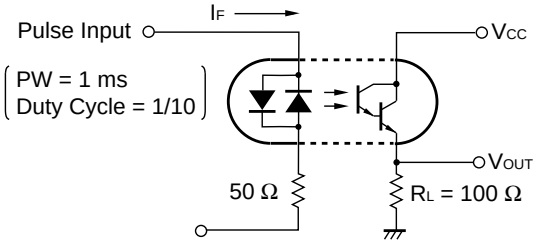
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = ±10 mA		1.17	1.4	V
	Terminal Capacitance	C_t	V = 0 V, f = 1.0 MHz		100		pF
Transistor	Collector to Emitter Dark Current	I_{CEO}	V_{CE} = 40 V, I_F = 0 mA			400	nA
Coupled	Current Transfer Ratio (I_C/I_F)	CTR	I_F = ±1 mA, V_{CE} = 2 V	200	2 000		%
	CTR Ratio*1	CTR1/ CTR2	I_F = 1 mA, V_{CE} = 2 V	0.3	1.0	3.0	
	Collector Saturation Voltage	$V_{CE (sat)}$	I_F = ±1 mA, I_C = 2 mA			1.0	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 = 10 mA, R_L = 100 Ω		100		μs
	Fall Time*2	t_f			100		

***1** CTR1 = I_{C1}/I_{F1}, CTR2 = I_{C2}/I_{F2}

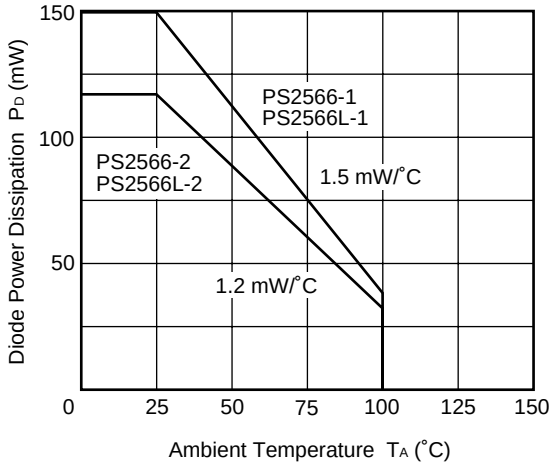


***2** Test circuit for switching time

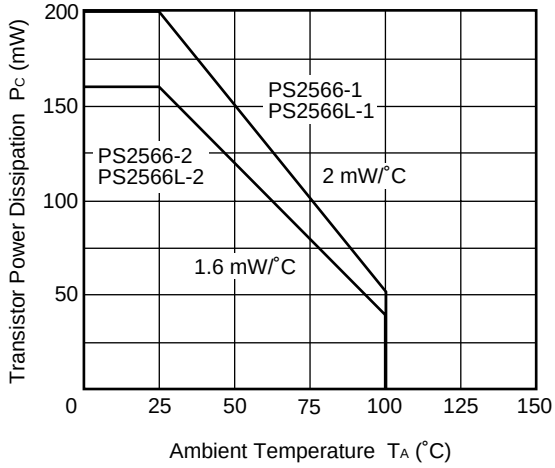


TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

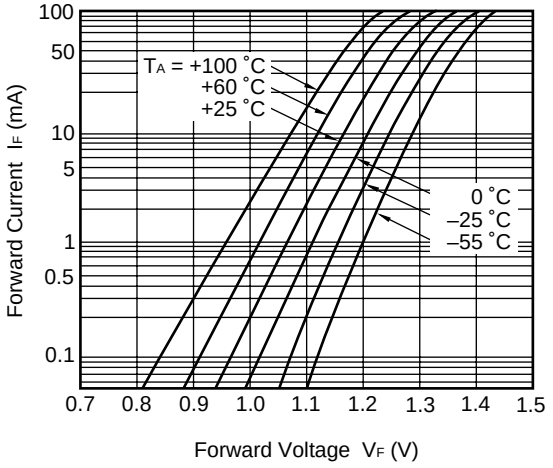
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



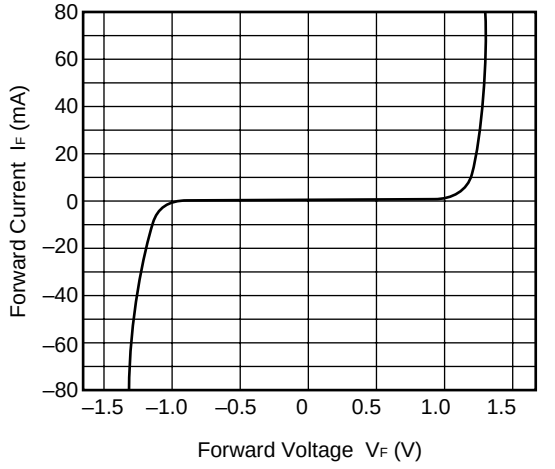
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



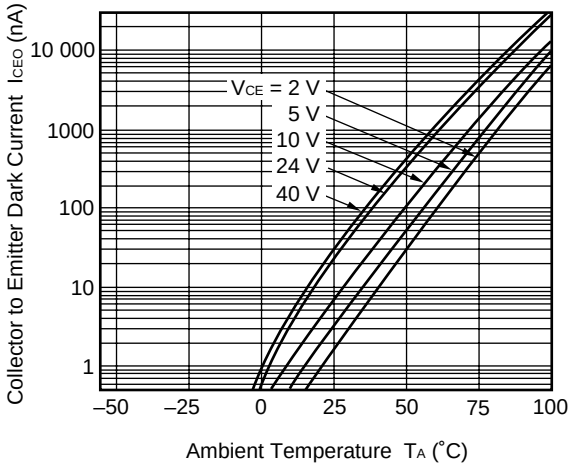
FORWARD CURRENT vs. FORWARD VOLTAGE



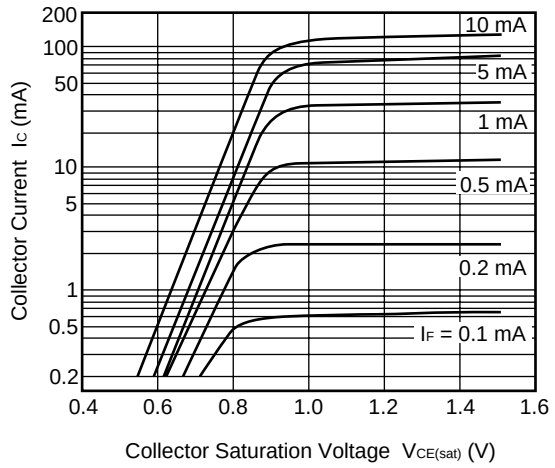
FORWARD CURRENT vs. FORWARD VOLTAGE



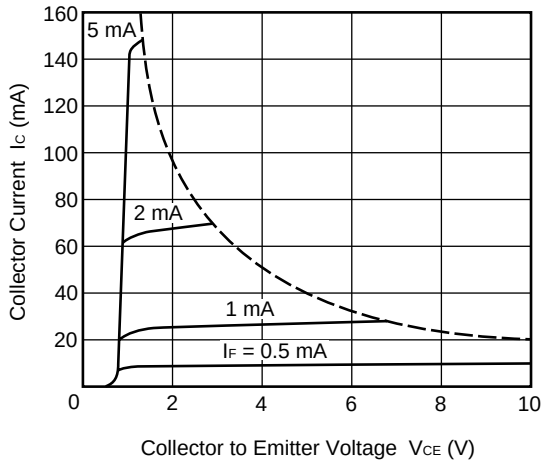
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



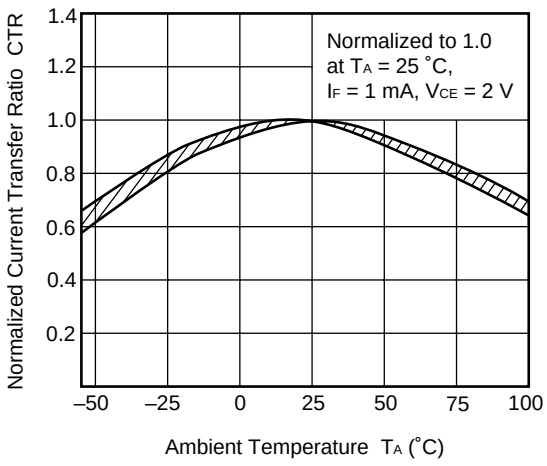
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



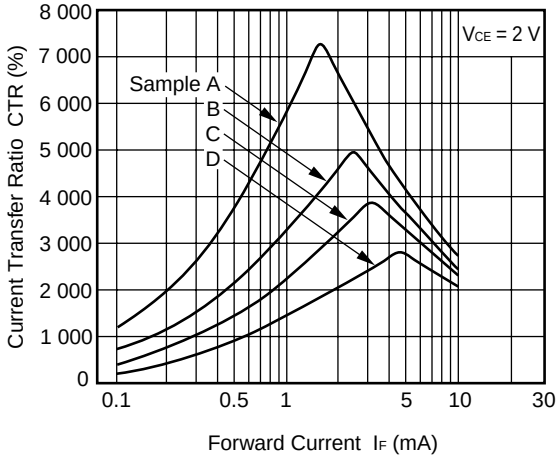
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



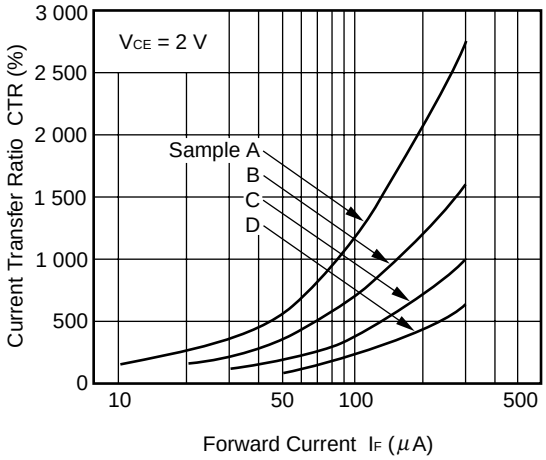
NORMALIZED CURRENT TRANSFER
RATIO vs. AMBIENT TEMPERATURE



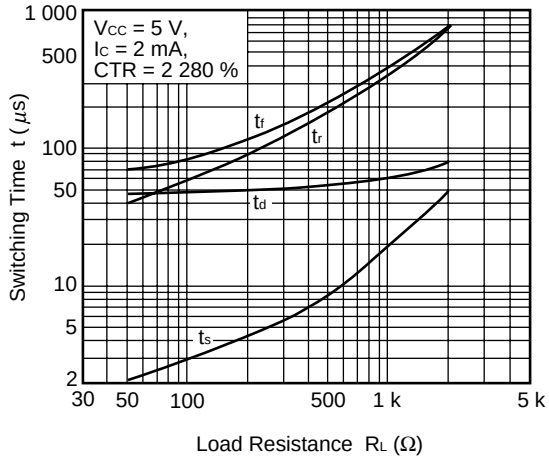
CURRENT TRANSFER RATIO vs.
FORWARD CURRENT



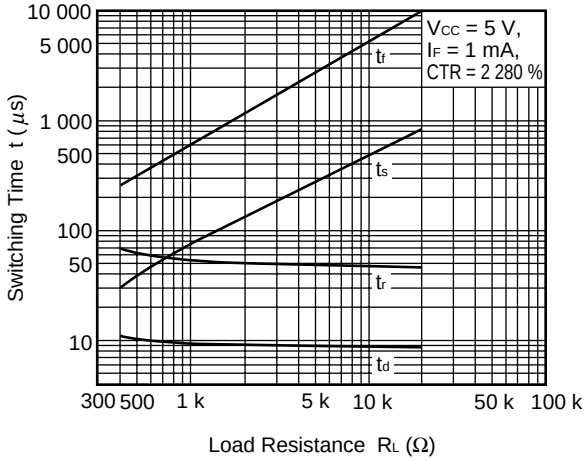
CURRENT TRANSFER RATIO vs.
FORWARD CURRENT



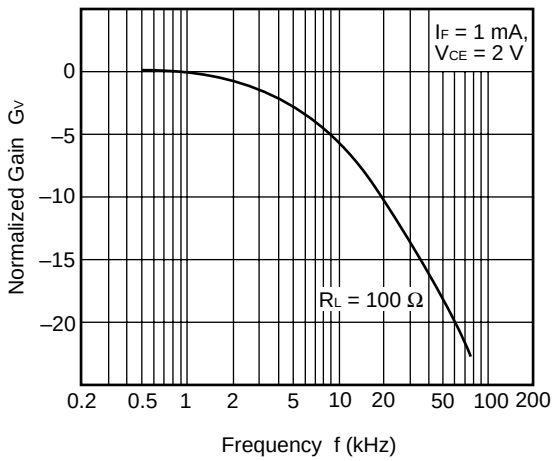
SWITCHING TIME vs.
LOAD RESISTANCE



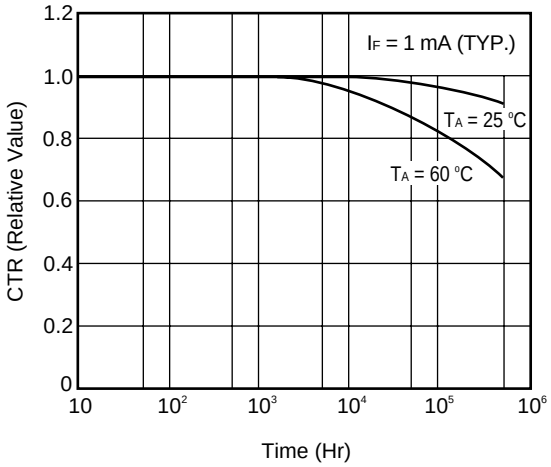
SWITCHING TIME vs.
LOAD RESISTANCE



FREQUENCY RESPONSE



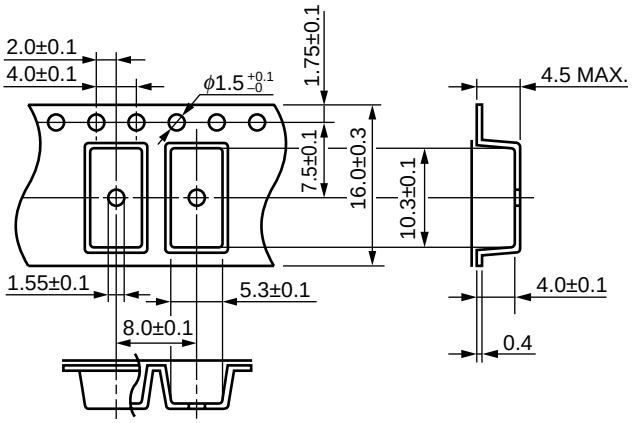
LONG TERM CTR DEGRADATION



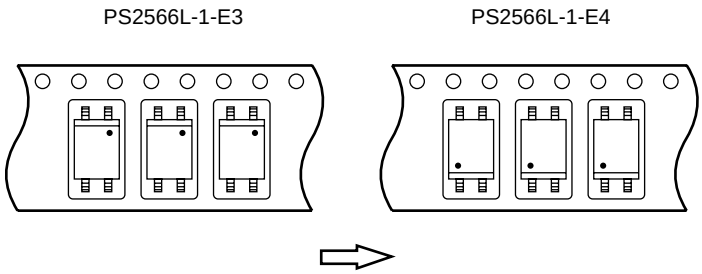
Remark The graphs indicate nominal characteristics.

★ **TAPING SPECIFICATIONS (UNIT : mm)**

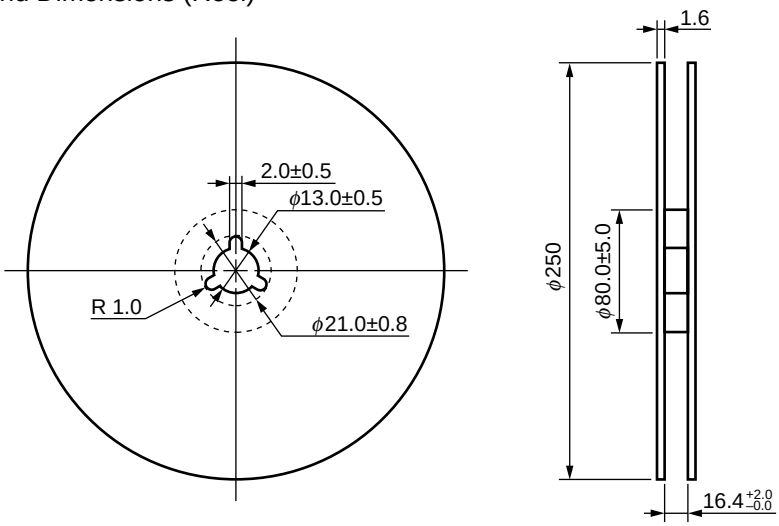
Outline and Dimensions (Tape)



Tape Direction

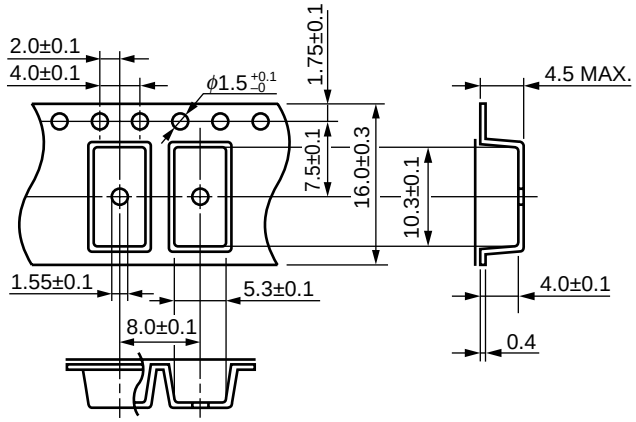


Outline and Dimensions (Reel)

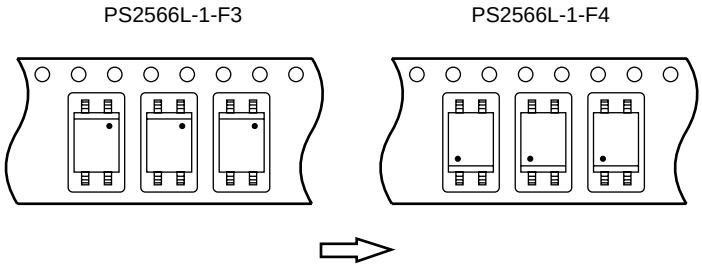


Packing: 1 000 pcs/reel

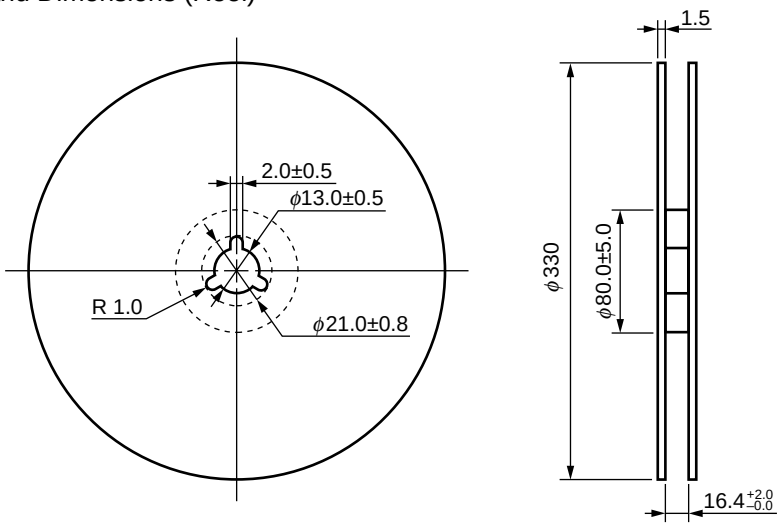
Outline and Dimensions (Tape)



Tape Direction

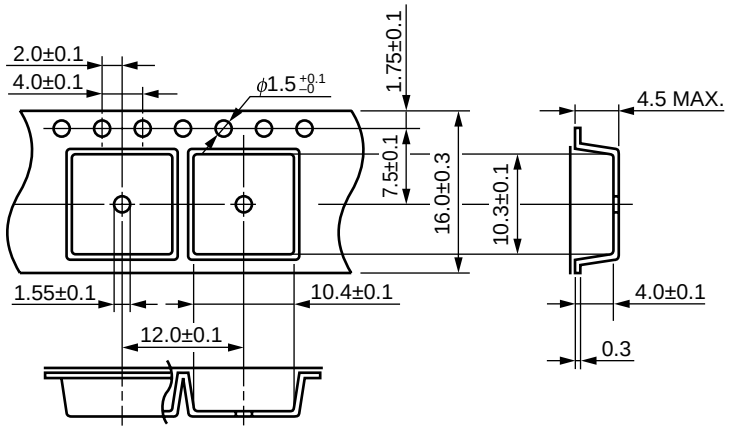


Outline and Dimensions (Reel)

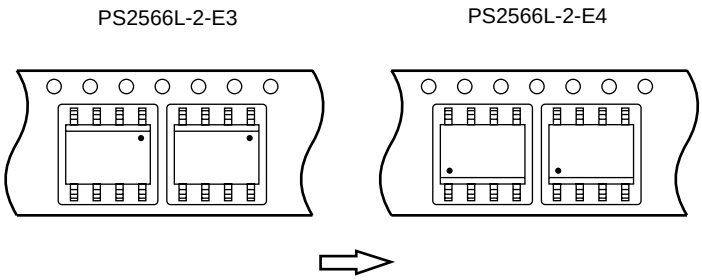


Packing: 2 000 pcs/reel

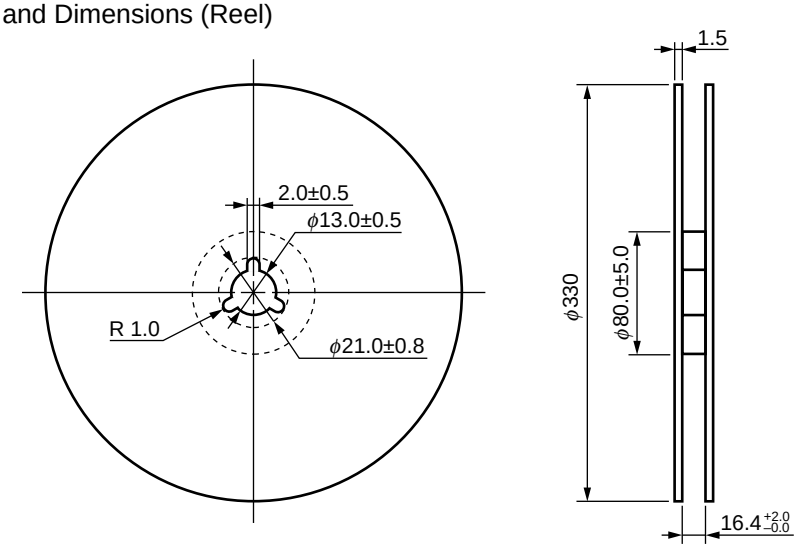
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 1 000 pcs/reel

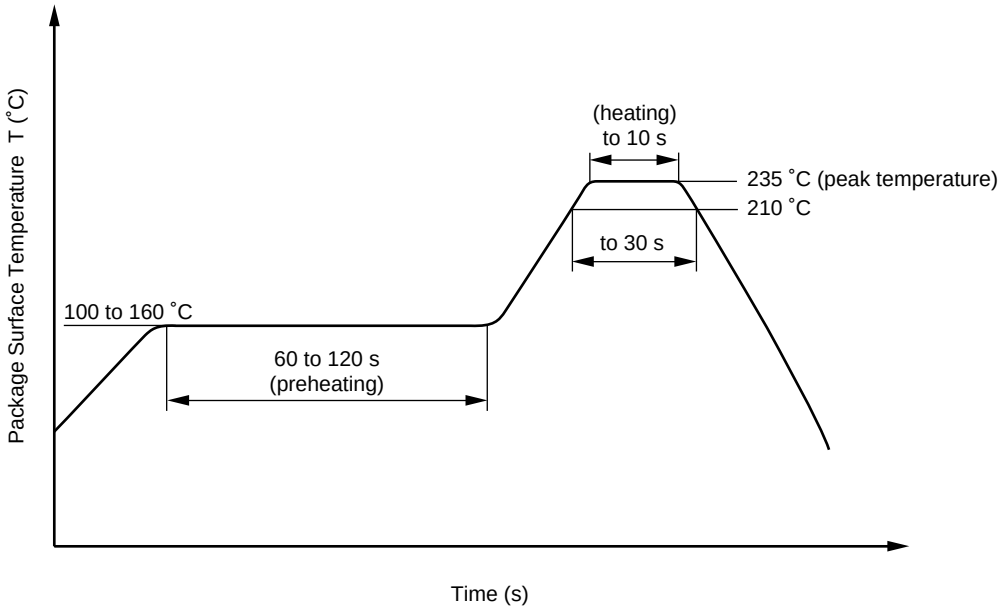
★ NOTES ON HANDLING

1. Recommended soldering conditions

(1) Infrared reflow soldering

- Peak reflow temperature — 235 °C or below (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



(2) Dip soldering

- Temperature — 260 °C or below (molten solder temperature)
- Time — 10 seconds or less
- 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 corrector-emitters at startup, the output side may enter the on state, even if the voltage is within the absolute maximum ratings.

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 × 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 × 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	 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.

NEPOC is a trademark of NEC Corporation.