

To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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**HIGH COLLECTOR TO EMITTER VOLTAGE
 HIGH ISOLATION VOLTAGE
 MULTI PHOTOCOUPLER SERIES**

–NEPOC Series–

★ DESCRIPTION

The PS2532-1 and PS2532L-1 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon darlington connected phototransistor.

The PS2532-1 is in a plastic DIP (Dual In-line Package) and the PS2532L-1 is lead bending type (Gull-wing) for surface mount.

FEATURES

- High collector to emitter voltage ($V_{CEO} = 300\text{ V}$)
- High Isolation voltage ($BV = 5\,000\text{ Vr.m.s.}$)
- High current transfer ratio ($CTR = 4\,000\%$ TYP.)
- High-speed switching ($t_r, t_f = 100\ \mu\text{s}$ TYP.)
- ★ • Ordering number of tape product: PS2532L-1-E3, E4, F3, F4
- ★ • Safety standards
 - UL approved: File No. E72422
 - BSI approved: No. 8221/8222
 - CSA approved: No. CA 101391
 - NEMKO approved: No. P98101708
 - SEMKO approved: No. 0143092/01-02
 - DEMKO approved: No. 307863
 - FIMKO approved: No. FI 17640
 - DIN EN60747-5-2 (VDE0884 Part2) approved (Option)

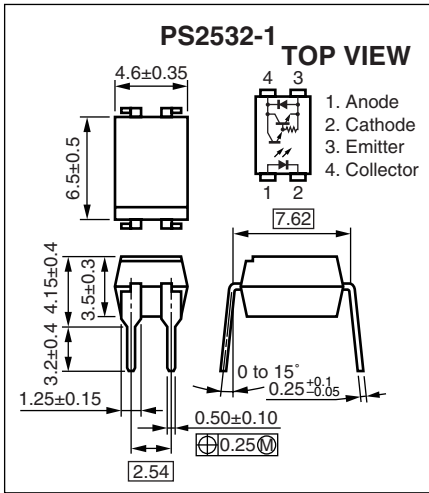
APPLICATIONS

- Telephone, Exchange equipment
- FAX/MODEM

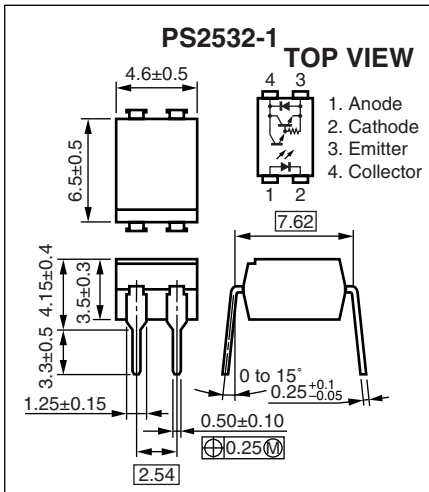
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 Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

★ PACKAGE DIMENSIONS (Unit : mm)

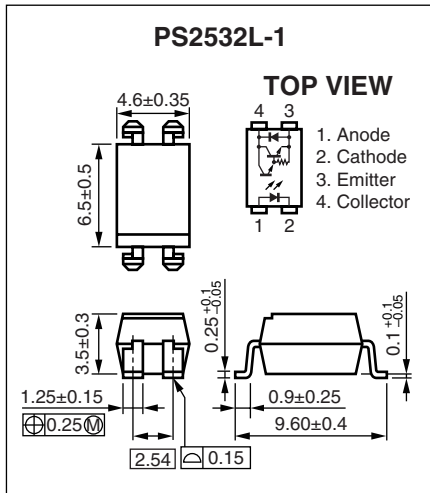
DIP Type (New package)



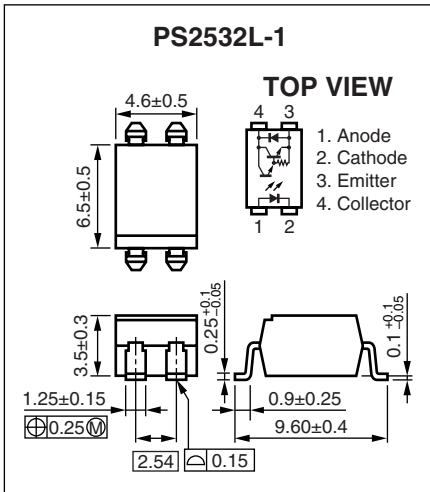
DIP Type



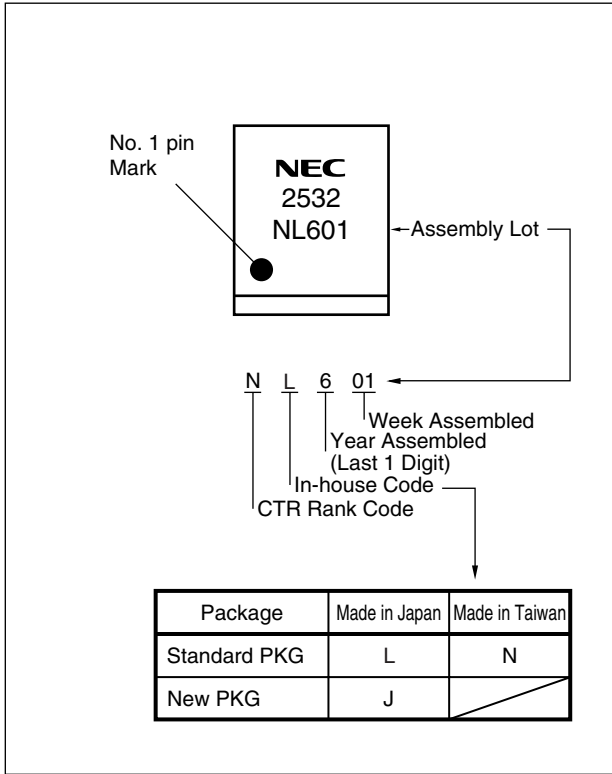
Lead Bending Type (New package)



Lead Bending Type



★ MARKING EXAMPLE



★ **ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number ^{*1}
PS2532-1	PS2532-1-A	Pb-Free	Magazine case 100 pcs	Standard products (UL, CSA, BSI, NEMKO, SEMKO, DEMKO, FIMKO approved)	PS2532-1
PS2532L-1	PS2532L-1-A		Embossed Tape 1 000 pcs/reel		
PS2532L-1-E3	PS2532L-1-E3-A				
PS2532L-1-E4	PS2532L-1-E4-A		Embossed Tape 2 000 pcs/reel		
PS2532L-1-F3	PS2532L-1-F3-A				
PS2532L-1-F4	PS2532L-1-F4-A		Magazine case 100 pcs	DIN EN60747-5-2 (VDE0884 Part2)	
PS2532-1-V	PS2532-1-V-A				
PS2532L-1-V	PS2532L-1-V-A		Embossed Tape 1 000 pcs/reel	Approved (Option)	
PS2532L-1-V-E3	PS2532L-1-V-E3-A				
PS2532L-1-V-E4	PS2532L-1-V-E4-A		Embossed Tape 2 000 pcs/reel		
PS2532L-1-V-F3	PS2532L-1-V-F3-A				
PS2532L-1-V-F4	PS2532L-1-V-F4-A				

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

★ **ABSOLUTE MAXIMUM RATINGS** ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified)

Parameter		Symbol	Ratings	Unit
Diode	Forward Current (DC)	I_F	80	mA
	Reverse Voltage	V_R	6	V
	Power Dissipation Derating	$\Delta P_D/^\circ\text{C}$	1.5	mW/°C
	Power Dissipation	P_D	150	mW
	Peak Forward Current ^{*1}	I_{FP}	1	A
Transistor	Collector to Emitter Voltage	V_{CEO}	300	V
	Emitter to Collector Voltage	V_{ECO}	0.6	V
	Collector Current	I_C	150	mA
	Power Dissipation Derating	$\Delta P_C/^\circ\text{C}$	3.0	mW/°C
	Power Dissipation	P_C	300	mW
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

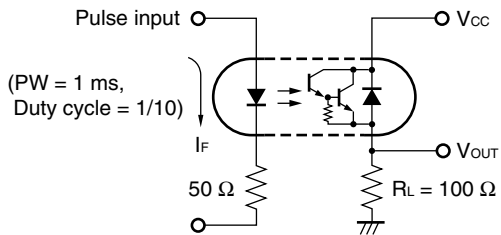
*1 PW = 100 μs , Duty Cycle = 1%

*2 AC voltage for 1 minute at $T_A = 25\text{ }^\circ\text{C}$, RH = 60% between input and output
Pins 1-2 shorted together, 3-4 shorted together.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

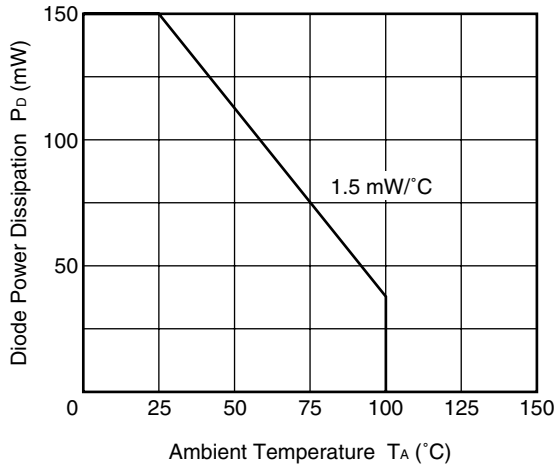
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V _F	I _F = 10 mA		1.15	1.40	V
	Reverse Current	I _R	V _R = 5 V			5	μA
	Terminal Capacitance	C _t	V = 0 V, f = 1.0 MHz		30		pF
Transistor	Collector to Emitter Dark Current	I _{CEO}	V _{CE} = 300 V, I _F = 0 mA			400	nA
Coupled	Current Transfer Ratio (I _c /I _F)	CTR	I _F = 1 mA, V _{CE} = 2 V	1 500	4 000	6 500	%
	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		0.6		pF
	Rise Time ^{*1}	t _r	V _{CC} = 5 V, I _c = 10 mA, R _L = 100 Ω		100		μs
	Fall Time ^{*1}	t _f			100		

***1 Test circuit for switching time**

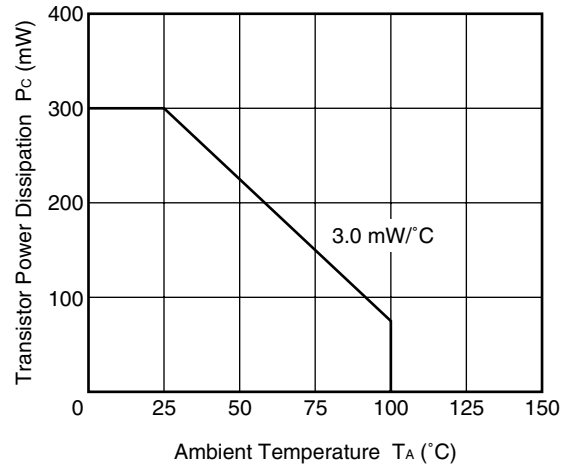


★ TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified)

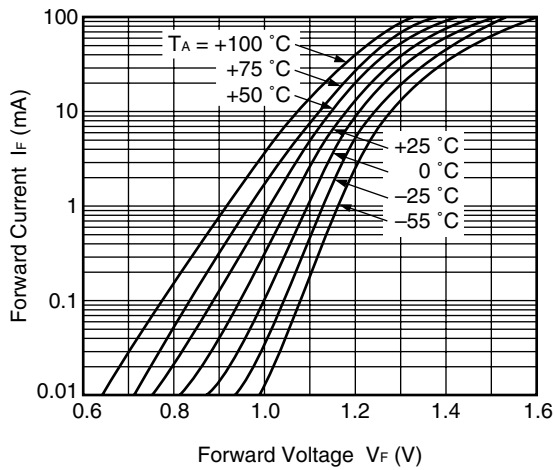
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



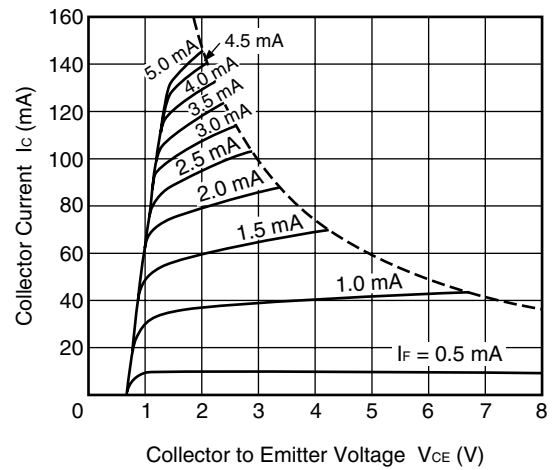
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



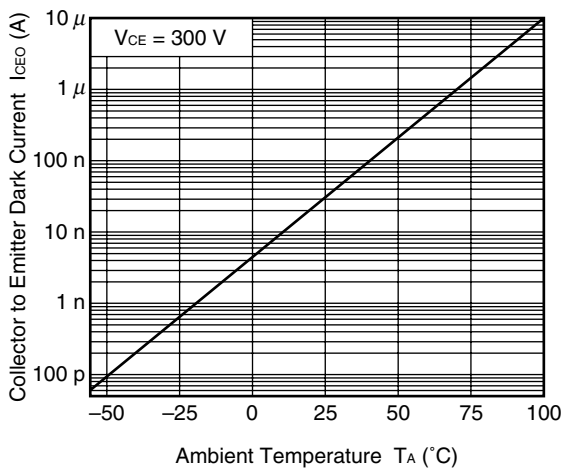
FORWARD CURRENT vs. FORWARD VOLTAGE



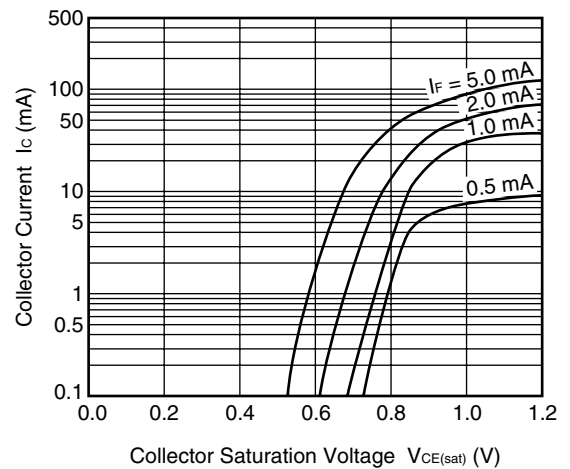
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

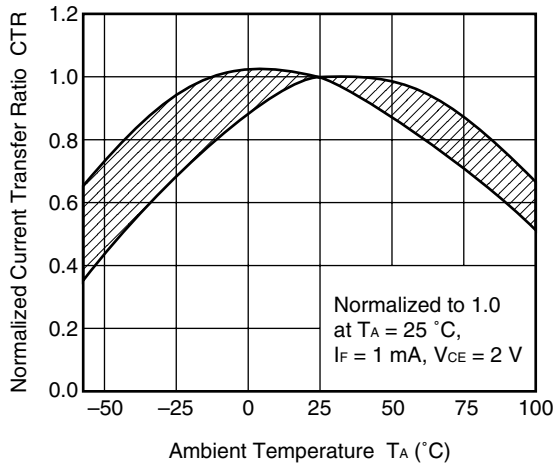


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

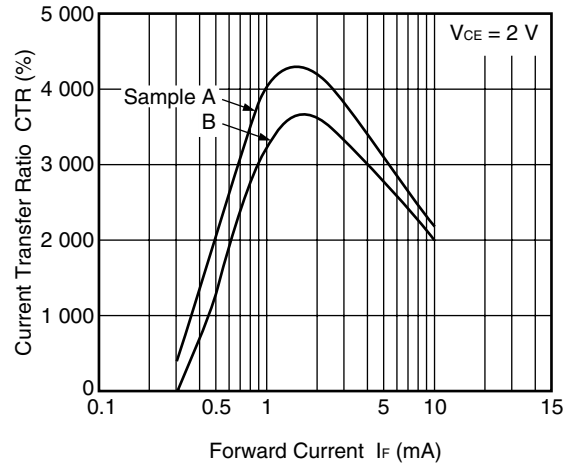


Remark The graphs indicate nominal characteristics.

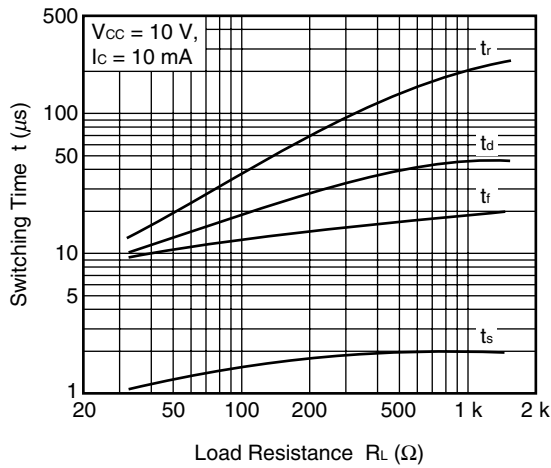
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



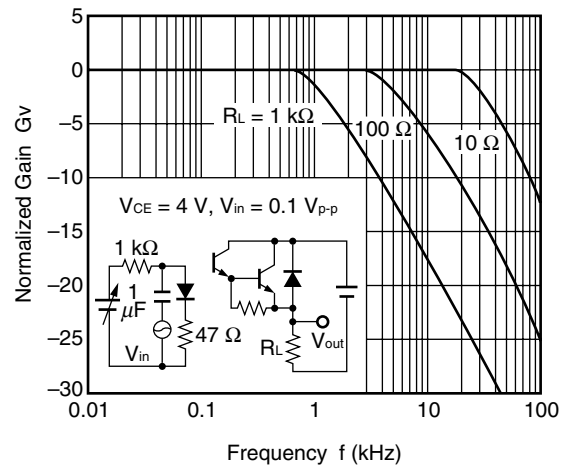
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



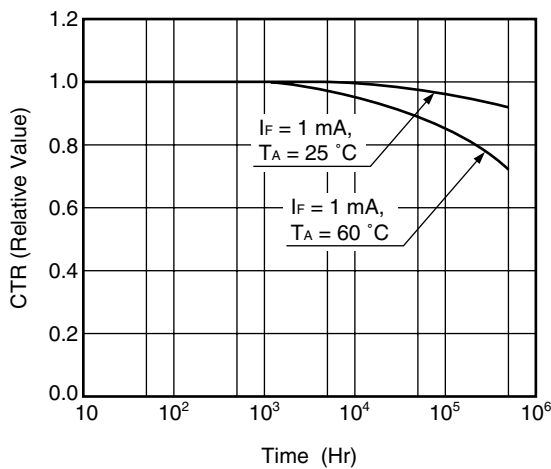
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



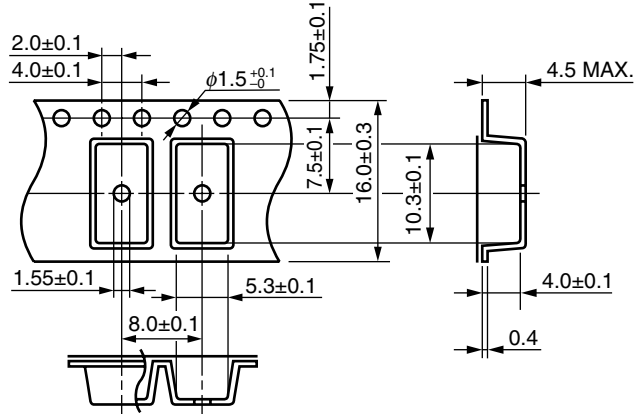
LONG TERM CTR DEGRADATION



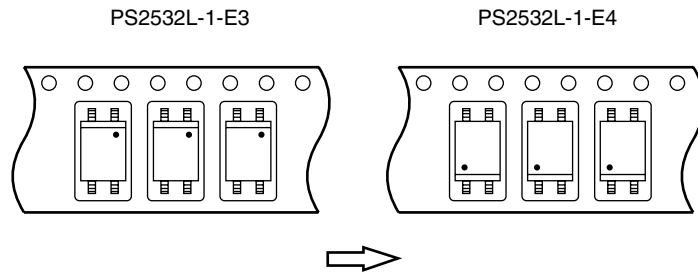
Remark The graphs indicate nominal characteristics.

★ TAPING SPECIFICATIONS (Unit : mm)

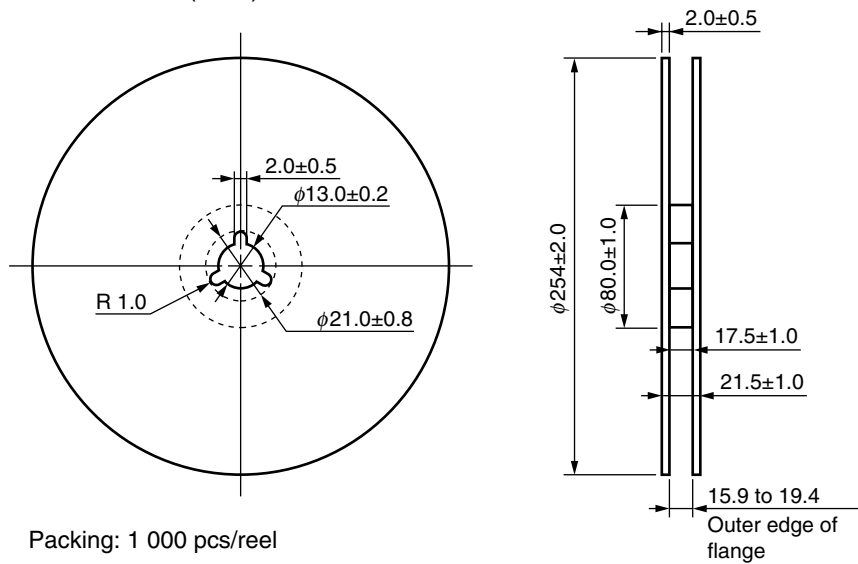
Outline and Dimensions (Tape)



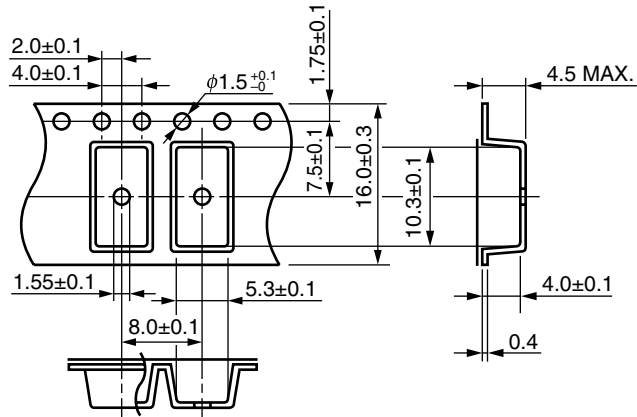
Tape Direction



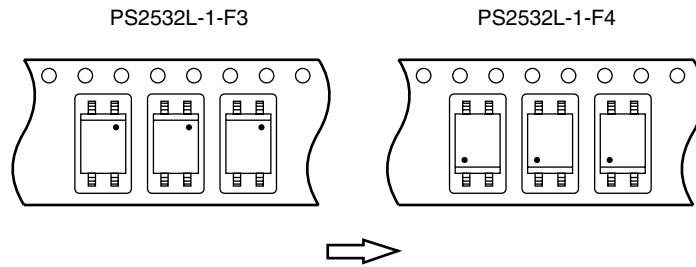
Outline and Dimensions (Reel)



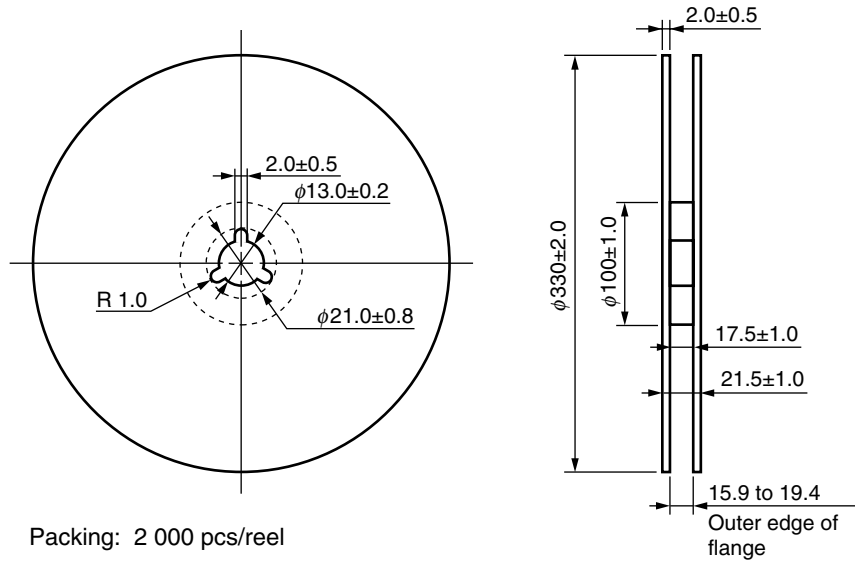
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



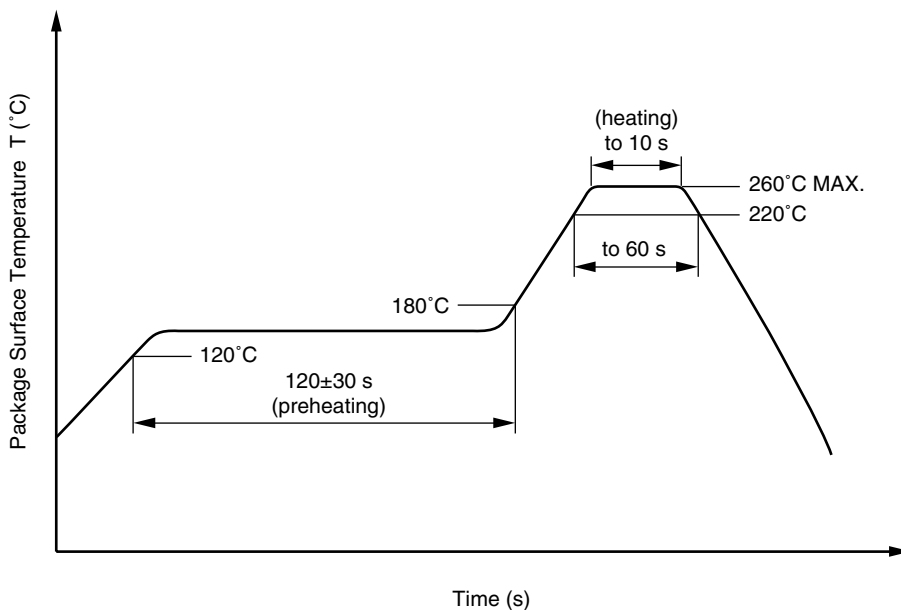
NOTES ON HANDLING

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) Soldering by soldering iron**

- Peak temperature (lead part temperature) 350°C or below
- Time (each pins) 3 seconds or less
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

- (a) Soldering of leads should be made at the point 1.5 to 2.0 mm from the root of the lead.
- (b) Please be sure that the temperature of the package would not be heated over 100°C.

(4) 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 transistor may enter the on state, even if the voltage is within the absolute maximum ratings.

★ 3. Measurement conditions of current transfer ratios (CTR), which differ according to photocoupler

Check the setting values before use, since the forward current conditions at CTR measurement differ according to product.

When using products other than at the specified forward current, the characteristics curves may differ from the standard curves due to CTR value variations or the like. Therefore, check the characteristics under the actual operating conditions and thoroughly take variations or the like into consideration before use.

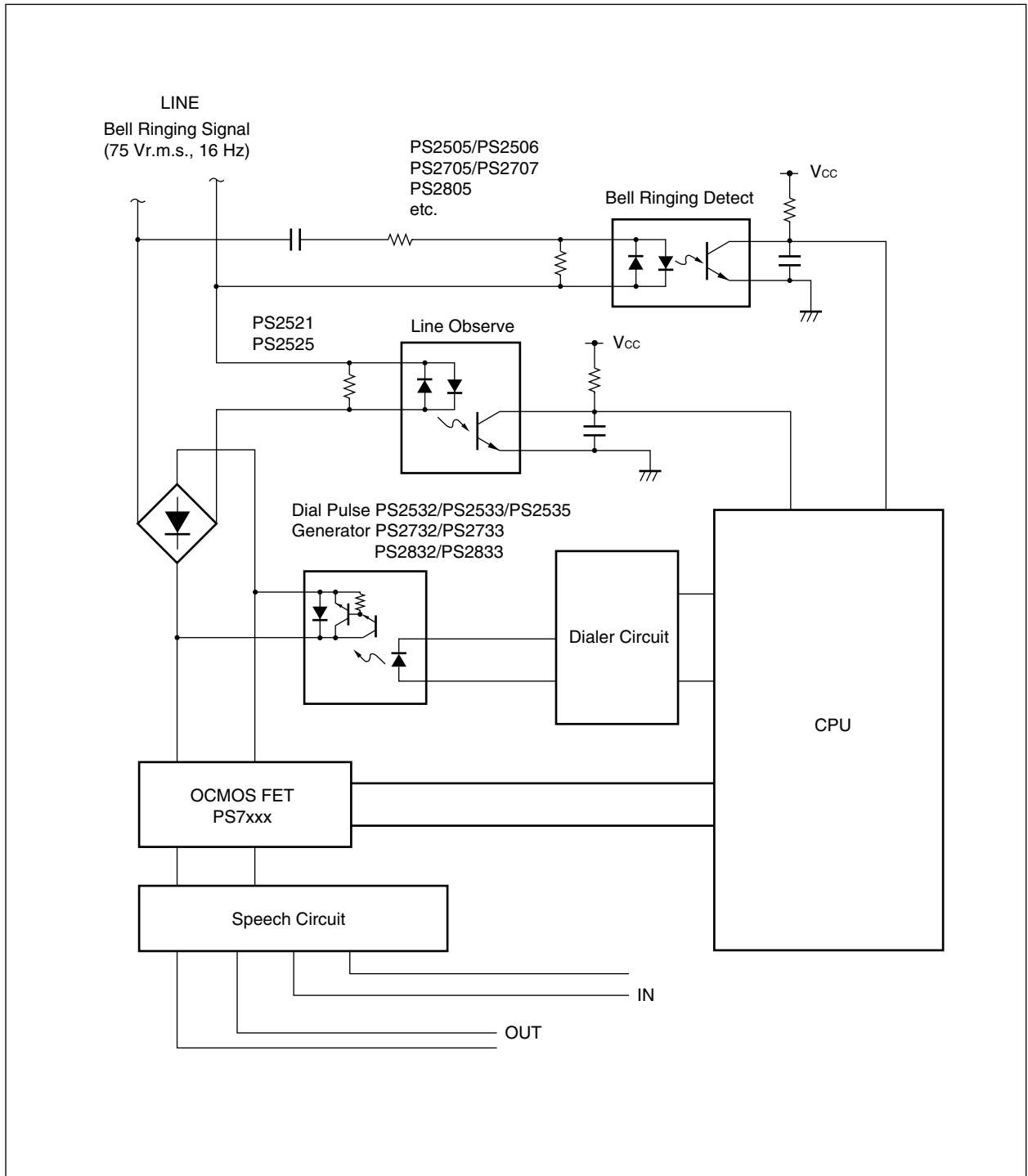
USAGE CAUTIONS

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

SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (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) $U_{pr} = 1.2 \times U_{IORM}, P_d < 5 \text{ pC}$	U_{IORM} U_{pr}	890 1 068	V_{peak} V_{peak}
Test voltage (partial discharge test, procedure b for all devices test) $U_{pr} = 1.6 \times U_{IORM}, P_d < 5 \text{ pC}$	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 $V_{IO} = 500 \text{ V dc at } T_A = 25^\circ\text{C}$ $V_{IO} = 500 \text{ V dc at } T_A \text{ MAX. at least } 100^\circ\text{C}$	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 , $P_{si} = 0$) Power (output or total power dissipation) Isolation resistance $V_{IO} = 500 \text{ V dc at } T_A = 175^\circ\text{C} (T_{si})$	T_{si} I_{si} P_{si} Ris MIN.	175 400 700 10^9	°C mA mW Ω

★ APPLICATION FOR TELEPHONE (EXAMPLE)



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M8E 00.4-0110

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