

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

–NEPOC™ Series–

#### DESCRIPTION

The PS2534-1, -2, -4, PS2534L-1, -2, -4, PS2535-1, -2, -4 and PS2535L-1, -2, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon darlington connected phototransistor.

The PS2534-1, -2, -4 and PS2535-1, -2, -4 are in a plastic DIP (Dual In-line Package) and the PS2534L-1, -2, -4 and PS2535L-1, -2, -4 are lead bending type (Gull-wing) for surface mount.

#### FEATURES

- High collector to emitter voltage ( $V_{CEO} = 300\text{ V}$ : PS2534-1, -2, -4, PS2534L-1, -2, -4)  
( $V_{CEO} = 350\text{ V}$ : PS2535-1, -2, -4, PS2535L-1, -2, -4)
- High isolation voltage ( $BV = 5\ 000\text{ Vr.m.s.}$ )
- High current transfer ratio ( $CTR = 1\ 500\ \%$  TYP.)
- Ordering number of taping product: PS2534L-1-E3, E4, F3, F4, PS2534L-2-E3, E4  
PS2535L-1-E3, E4, F3, F4, PS2535L-2-E3, E4

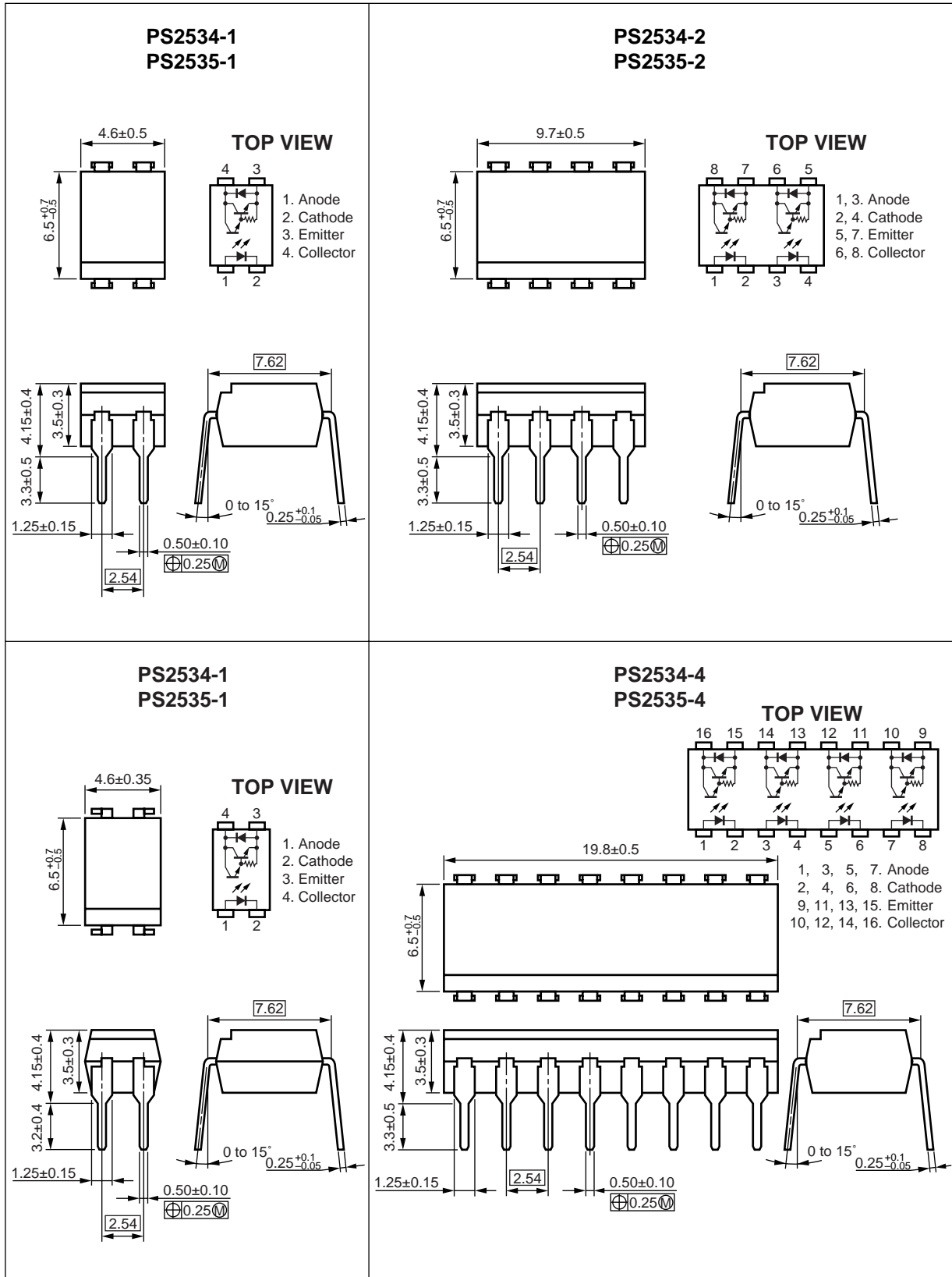
#### APPLICATIONS

- Telephone, Exchange equipment
- FAX/MODEM

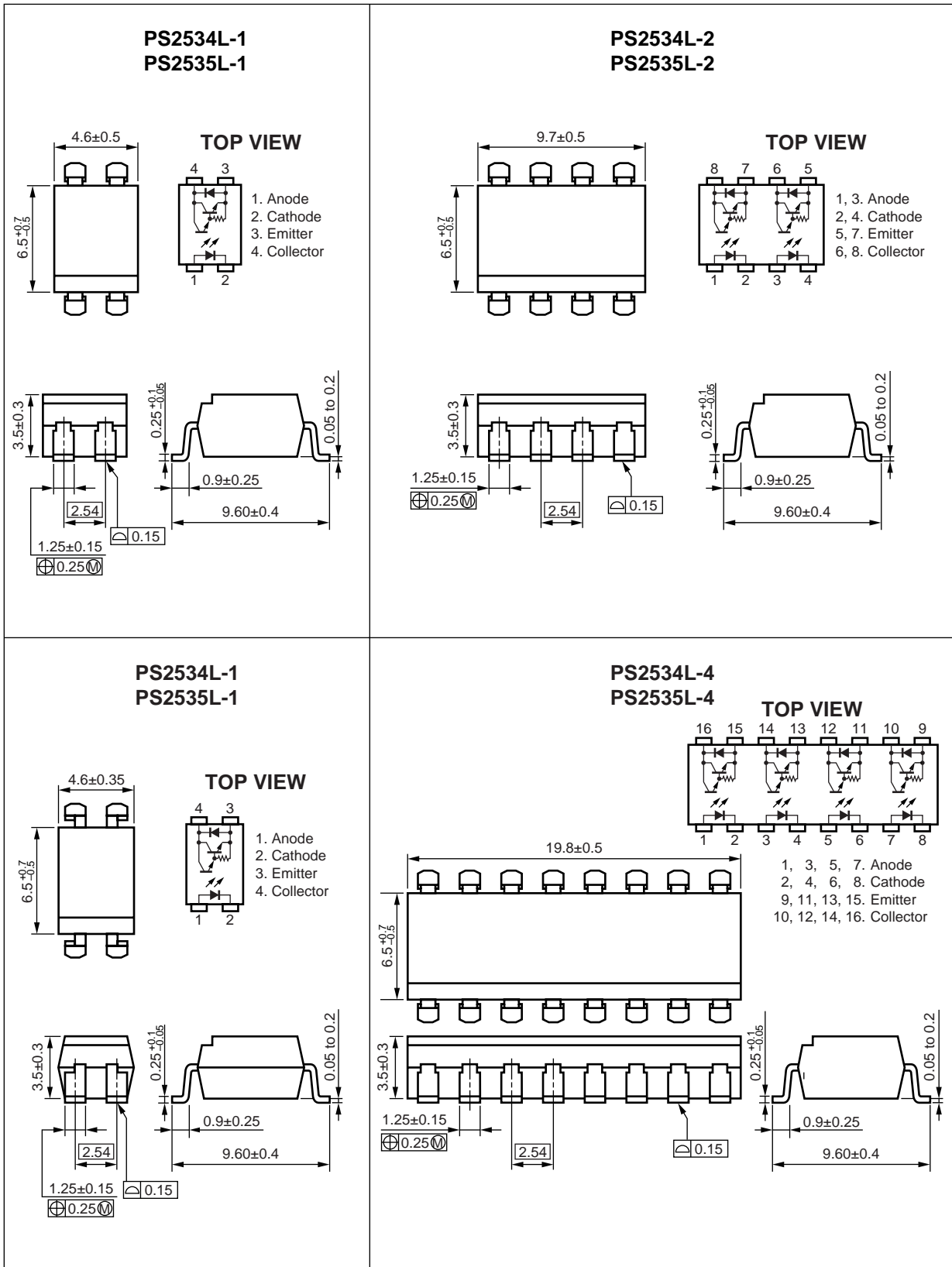
The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.  
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

PACKAGE DIMENSIONS (in millimeters)

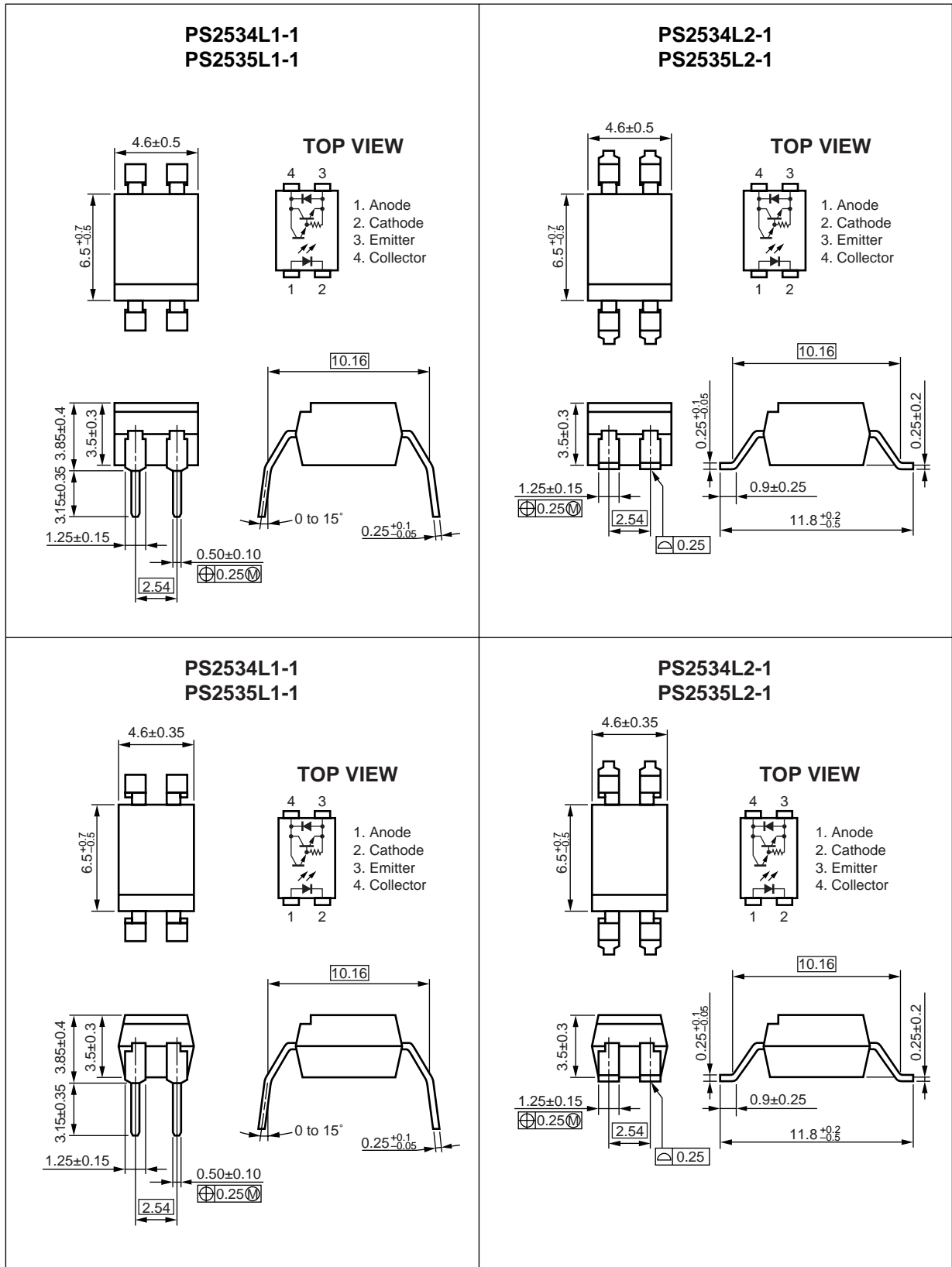
DIP type



Lead bending type



★ Lead bending type for long distance



★ **ORDERING INFORMATION**

Part Number	Package	Packing Style	Application Part Number <sup>*1</sup>
PS2534-1	4-pin DIP	Magazine case 100 pcs	PS2534-1
PS2534L-1			
PS2534L-1-E3		Embossed Tape 1 000 pcs/reel	
PS2534L-1-E4			
PS2534L-1-F3		Embossed Tape 2 000 pcs/reel	
PS2534L-1-F4			
PS2534-2	8-pin DIP	Magazine case 45 pcs	PS2534-2
PS2534L-2			
PS2534L-2-E3		Embossed Tape 1 000 pcs/reel	
PS2534L-2-E4			
PS2534-4	16-pin DIP	Magazine case 20 pcs	PS2534-4
PS2534L-4			
PS2535-1	4-pin DIP	Magazine case 100 pcs	PS2535-1
PS2535L-1			
PS2535L-1-E3		Embossed Tape 1 000 pcs/reel	
PS2535L-1-E4			
PS2535L-1-F3		Embossed Tape 2 000 pcs/reel	
PS2535L-1-F4			
PS2535-2	8-pin DIP	Magazine case 45 pcs	PS2535-2
PS2535L-2			
PS2535L-2-E3		Embossed Tape 1 000 pcs/reel	
PS2535L-2-E4			
PS2535-4	16-pin DIP	Magazine case 20 pcs	PS2535-4
PS2535L-4			

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

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

Parameter		Symbol	Ratings				Unit
			PS2534-1, PS2534L-1	PS2534-2, -4, PS2534L-2, -4	PS2535-1, PS2535L-1	PS2535-2, -4, PS2535L-2, -4	
Diode	Forward Current (DC)	I <sub>F</sub>	50				mA
	Reverse Voltage	V <sub>R</sub>	6				V
	Power Dissipation Derating	ΔP <sub>D</sub> /°C	0.7	0.55	0.7	0.55	mW/°C
	Power Dissipation	P <sub>D</sub>	70	55	70	55	mW/ch
	Peak Forward Current <sup>*1</sup>	I <sub>FP</sub>	0.5				A
Transistor	Collector to Emitter Voltage	V <sub>CEO</sub>	300		350		V
	Emitter to Collector Voltage	V <sub>ECO</sub>	0.3				V
	Collector Current	I <sub>C</sub>	100				mA/ch
	Power Dissipation Derating	ΔP <sub>C</sub> /°C	2.0	1.6	2.0	1.6	mW/°C
	Power Dissipation	P <sub>C</sub>	200	160	200	160	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

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

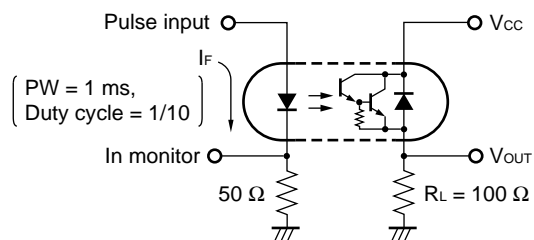
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 10 mA		1.2	1.4	V
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 5 V			5	μA
	Terminal Capacitance	C <sub>t</sub>	V = 0 V, f = 1.0 MHz		30		pF
Transistor	Collector to Emitter Dark Current	I <sub>CEO</sub>	V <sub>CE</sub> = 300 V, I <sub>F</sub> = 0 mA			400	nA
Coupled	Current Transfer Ratio (I <sub>c</sub> /I <sub>F</sub> ) <sup>*1</sup>	CTR	I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 2 V	400	1 500	5 500	%
	Collector Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>F</sub> = 1 mA, I <sub>c</sub> = 2 mA			1.0	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		0.6		pF
	Rise Time <sup>*2</sup>	t <sub>r</sub>	V <sub>CC</sub> = 5 V, I <sub>c</sub> = 10 mA, R <sub>L</sub> = 100 Ω		18		μs
	Fall Time <sup>*2</sup>	t <sub>f</sub>			5		

\*1 CTR rank (only PS2534-1, PS2535-1)

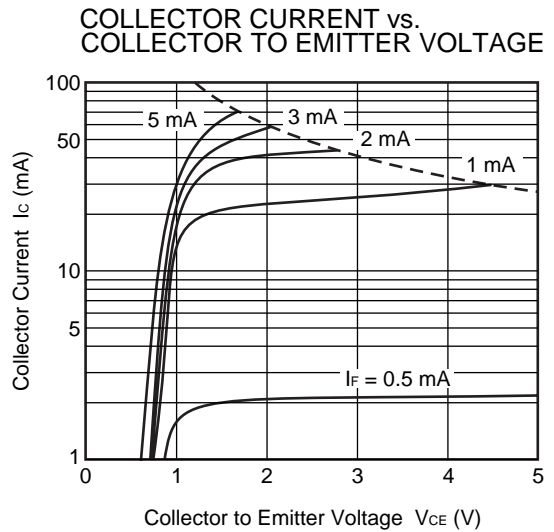
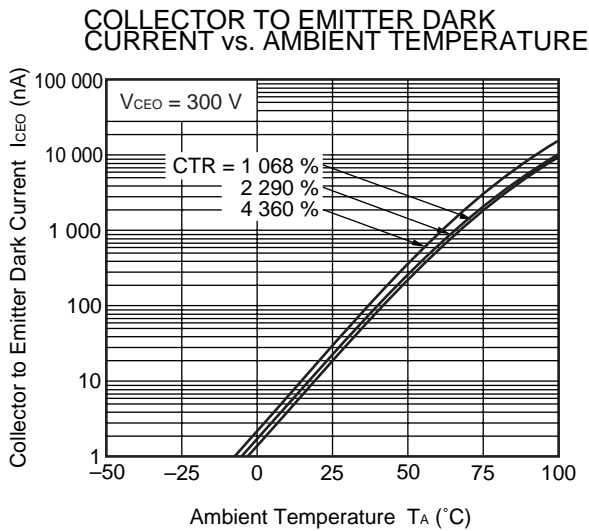
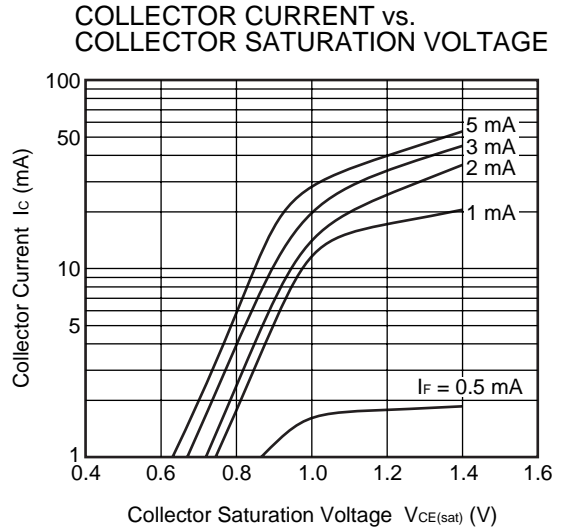
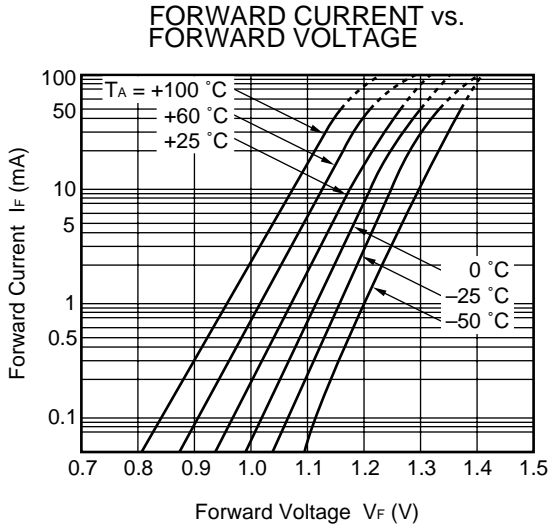
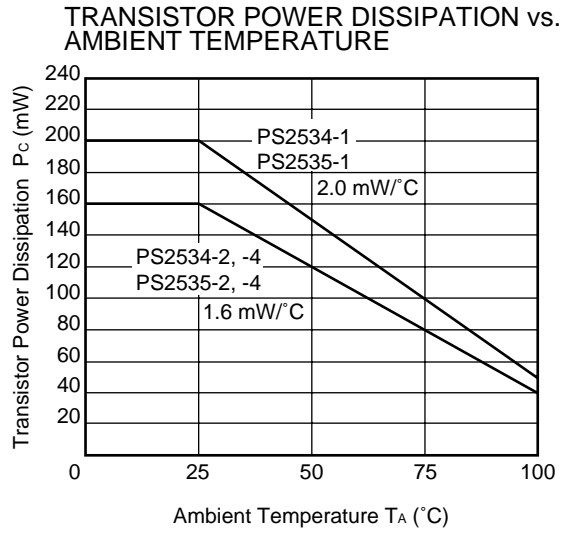
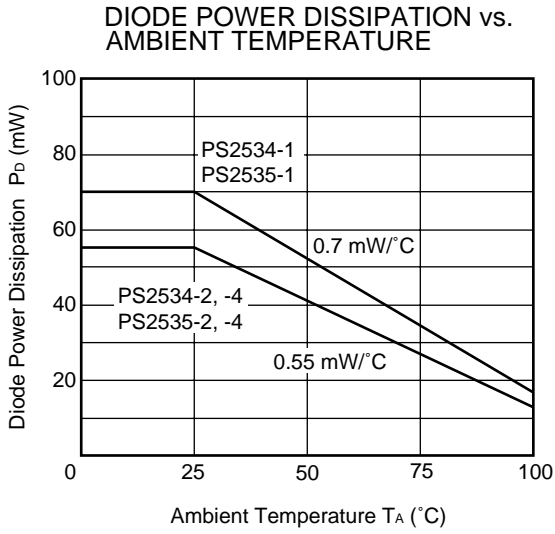
N : 400 to 5 500 (%)

L : 1 500 to 5 500 (%)

\*2 Test circuit for switching time

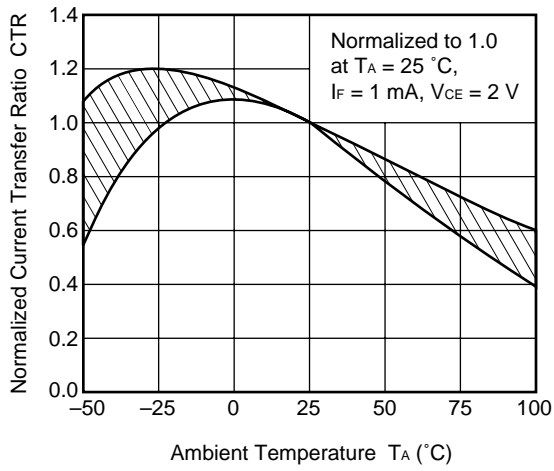


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, unless otherwise specified)

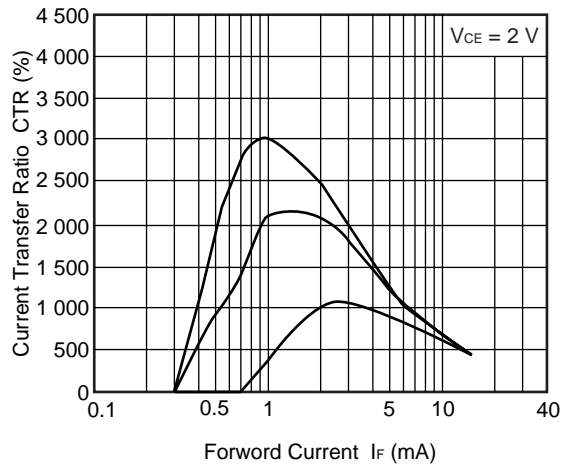




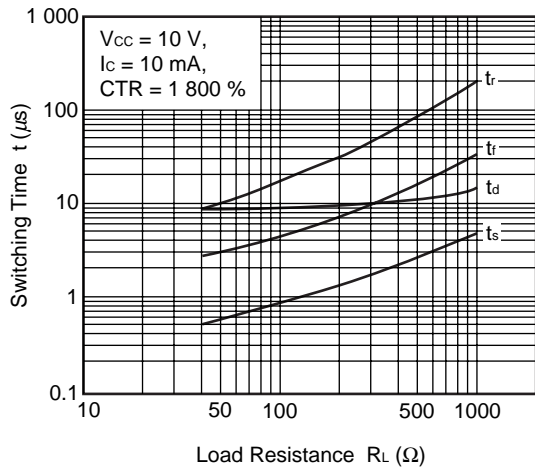
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



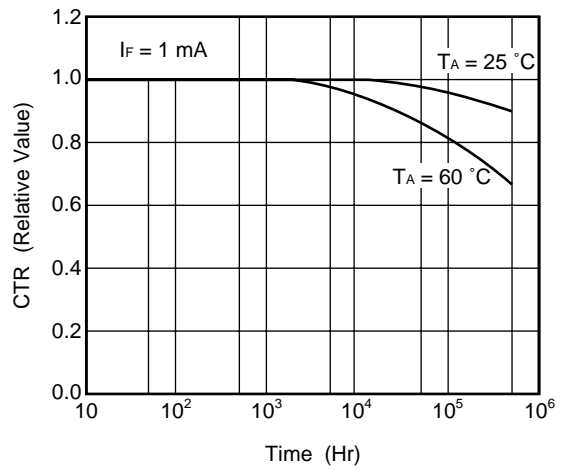
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



SWITCHING TIME vs. LOAD RESISTANCE



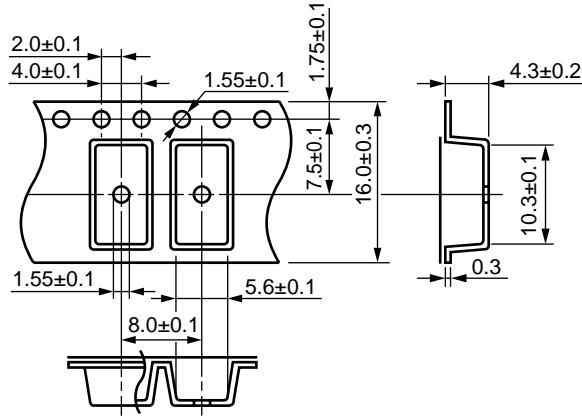
LONG TERM CTR DEGRADATION



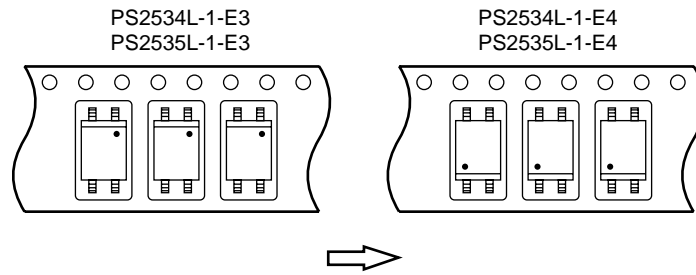
**Remark** The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (in millimeters)

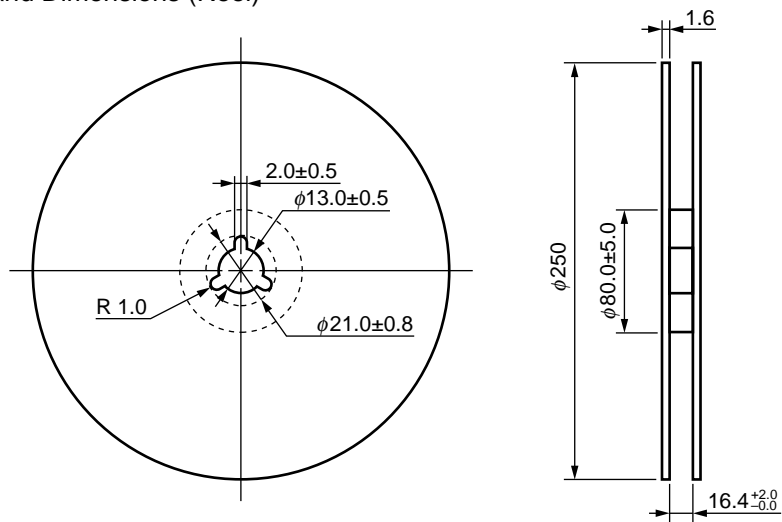
Outline and Dimensions (Tape)



Tape Direction

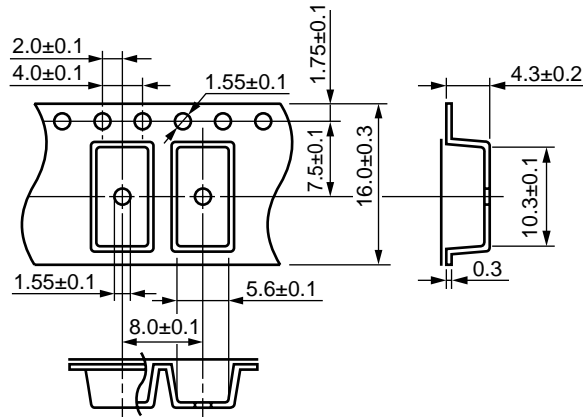


Outline and Dimensions (Reel)

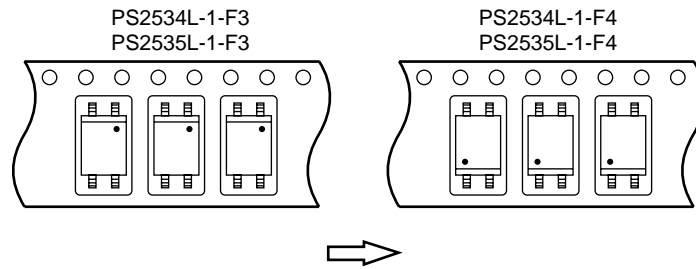


Packing: 1 000 pcs/reel

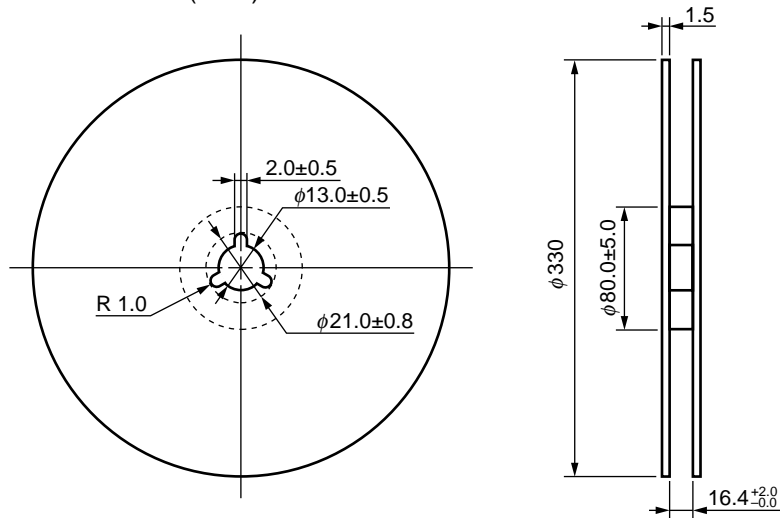
Outline and Dimensions (Tape)



Tape Direction

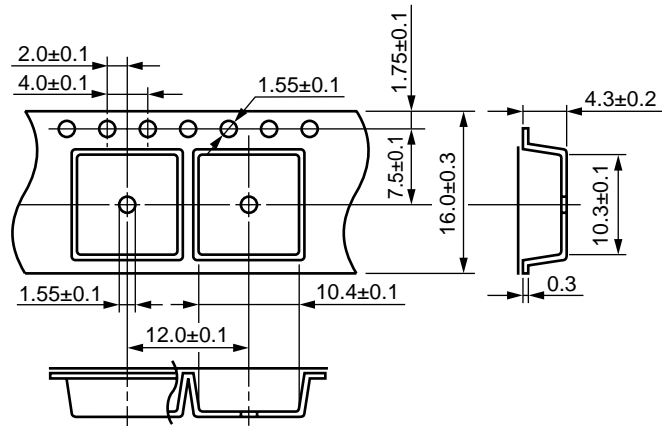


Outline and Dimensions (Reel)

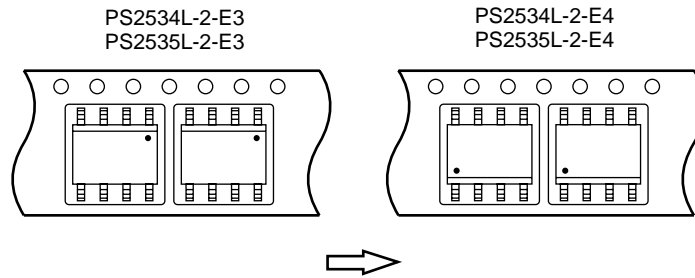


Packing: 2 000 pcs/reel

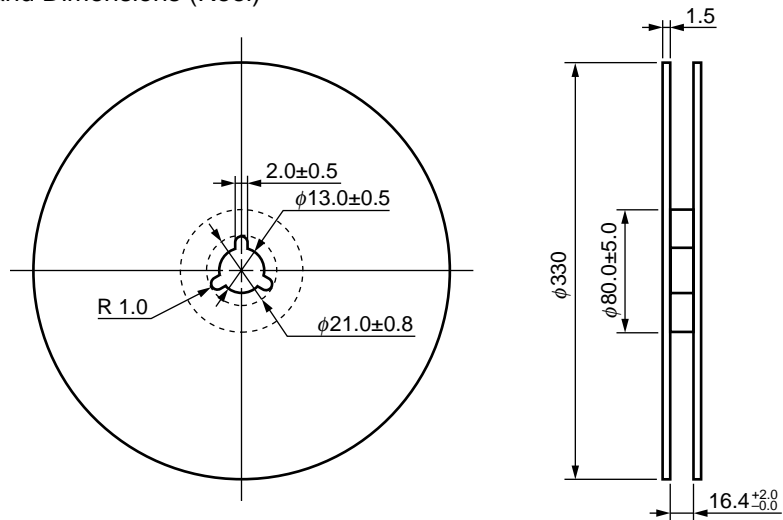
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



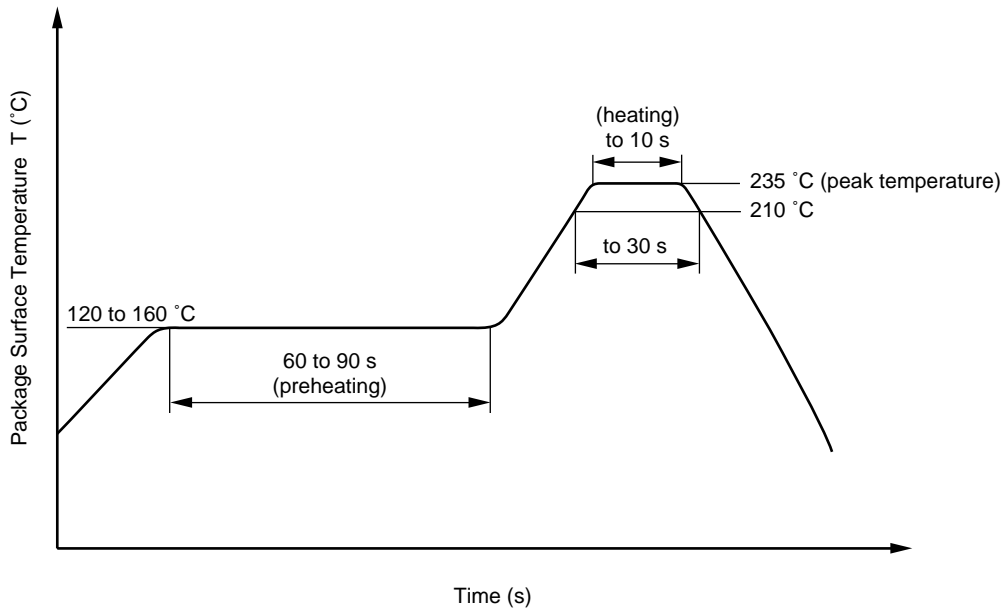
Packing: 1 000 pcs/reel

**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



**(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.)

**(3) Cautions**

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

[MEMO]

[MEMO]

## 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.**

- **The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.**
  - No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.
  - NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.
  - Descriptions of circuits, software, and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software, and information in the design of the customer's equipment shall be done under the full responsibility of the customer. NEC Corporation assumes no responsibility for any losses incurred by the customer or third parties arising from the use of these circuits, software, and information.
  - While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customers must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.
  - NEC devices are classified into the following three quality grades:  
"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.
    - 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)
    - Specific: Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.
- The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.