DATA SHEET

NEC

PHOTOCOUPLER

PS2832-1,-4,PS2833-1,-4

HIGH COLLECTOR TO EMITTER VOLTAGE 4, 16-PIN SSOP PHOTOCOUPLER

–NEPOC Series–

DESCRIPTION

The PS2832-1, -4 and PS2833-1, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon darlington-connected phototransistor.

The package is a Shrink SOP (Small Outline Package) type for high density mounting applications.

FEATURES

- High collector to emitter voltage (V_{CEO} = 300 V: PS2832-1, -4)
  (V_{CEO} = 350 V: PS2833-1, -4)
- Small and thin package (4, 16-pin SSOP, Pin pitch 1.27 mm)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- High current transfer ratio (CTR = 2 000% TYP.)
- Ordering number of tape product: PS2832-1-F3, F4, PS2832-4-F3, F4
  PS2833-1-F3, F4, PS2833-4-F3, F4

<R> • Safety standards: PS2832-1, -4

- UL approved: File No. E72422
- BSI approved: No. 8315, 8316
- CSA approved: No. CA 101391
- DIN EN60747-5-2 (VDE0884 Part2) approved (Option)

PS2833-1, -4

- UL approved: File No. E72422

APPLICATIONS

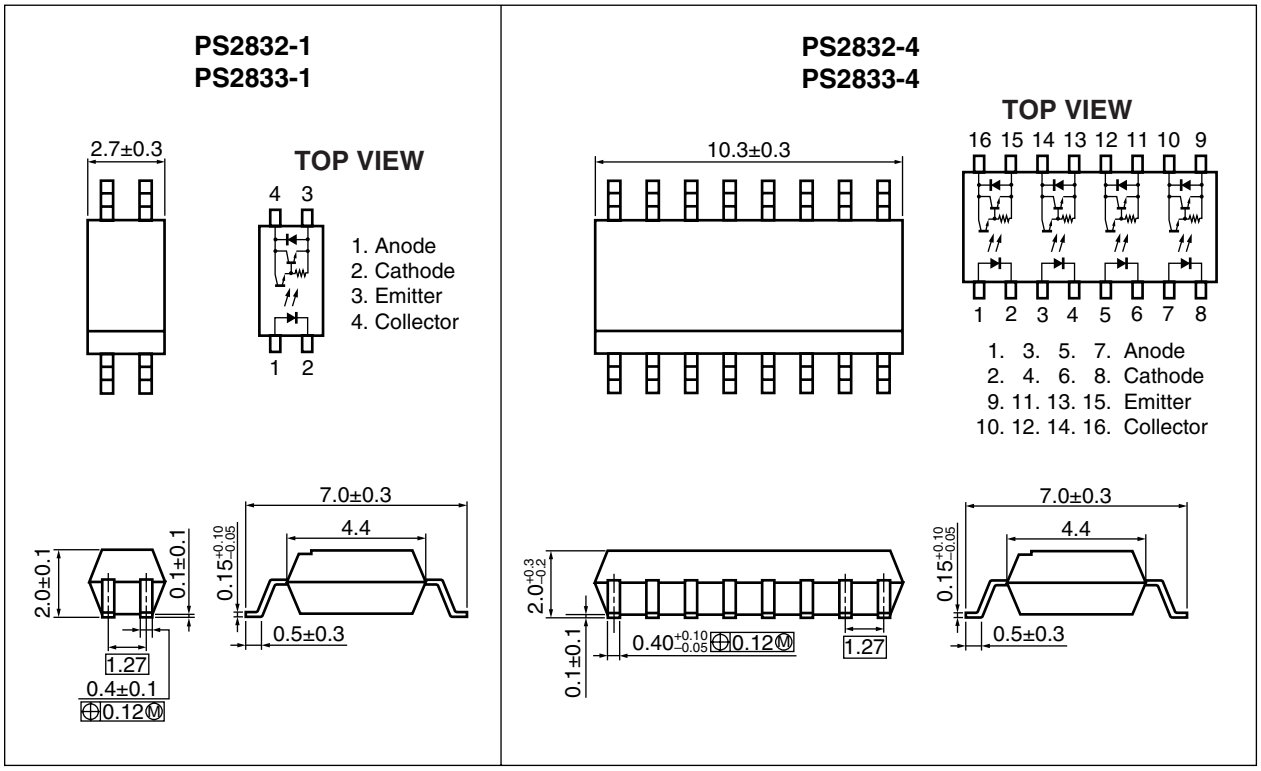
- Hybrid IC
- Telephone/Telegraph Receiver
- FAX

Document No. PN10257EJ02V0DS (2nd edition)
Date Published May 2006 NS CP(K)
Printed in Japan

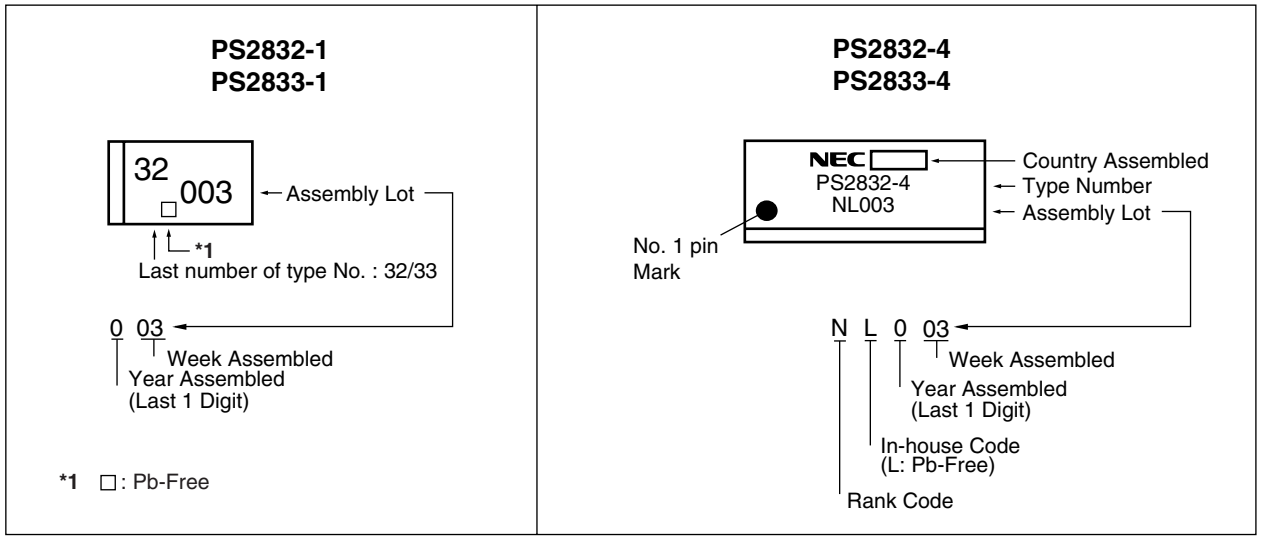
The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

PACKAGE DIMENSIONS (UNIT: mm)



<R> MARKING EXAMPLE



<R> **ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number*1
PS2832-1	PS2832-1-A	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products (UL, BSI, CSA approved)	PS2832-1
PS2832-1-F3	PS2832-1-F3-A		Embossed Tape 3 500 pcs/reel		
PS2832-1-F4	PS2832-1-F4-A				
PS2832-4	PS2832-4-A		Magazine Case 45 pcs		PS2832-4
PS2832-4-F3	PS2832-4-F3-A		Embossed Tape 2 500 pcs/reel		
PS2832-4-F4	PS2832-4-F4-A				
PS2832-1-V	PS2832-1-V-A		50 pcs (Tape 50 pcs cut)	DIN EN60747-5-2 (VDE0884 Part2) Approved (Option)	PS2832-1
PS2832-1-V-F3	PS2832-1-V-F3-A		Embossed Tape 3 500 pcs/reel		
PS2832-1-V-F4	PS2832-1-V-F4-A				
PS2832-4-V	PS2832-4-V-A		Magazine Case 45 pcs		PS2832-4
PS2832-4-V-F3	PS2832-4-V-F3-A		Embossed Tape 2 500 pcs/reel		
PS2832-4-V-F4	PS2832-4-V-F4-A				
PS2833-1	PS2833-1-A		50 pcs (Tape 50 pcs cut)	Standard products (UL approved)	PS2833-1
PS2833-1-F3	PS2833-1-F3-A		Embossed Tape 3 500 pcs/reel		
PS2833-1-F4	PS2833-1-F4-A				
PS2833-4	PS2833-4-A		Magazine Case 45 pcs		PS2833-4
PS2833-4-F3	PS2833-4-F3-A		Embossed Tape 2 500 pcs/reel		
PS2833-4-F4	PS2833-4-F4-A				

***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
			PS2832-1	PS2833-1	PS2832-4	PS2833-4	
Diode	Forward Current (DC)	I_F	50				mA/ch
	Reverse Voltage	V_R	6				V
	Power Dissipation Derating	ΔP_D/°C	0.6		0.8		mW/°C
	Power Dissipation	P_D	60		80		mW/ch
	Peak Forward Current *1	I_{FP}	1				A/ch
Transistor	Collector to Emitter Voltage	V_{CEO}	300	350	300	350	V
	Emitter to Collector Voltage	V_{ECO}	0.3				V
	Collector Current	I_C	60				mA/ch
	Power Dissipation Derating	ΔP_C/°C	1.2				mW/°C
	Power Dissipation	P_C	120				mW/ch
Isolation Voltage *2		BV	2 500				Vr.m.s.
Operating Ambient Temperature		T_A	–55 to +100				°C
Storage Temperature		T_{stg}	–55 to +150				°C

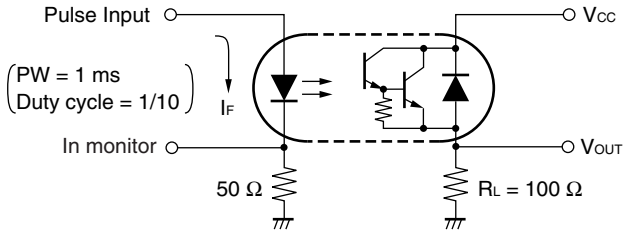
***1** PW = 100 μs, Duty Cycle = 1%

***2** AC voltage for 1 minute at T_A = 25°C, RH = 60% between input and output
Pins 1-2 shorted together, 3-4 shorted together (PS2832-1, PS2833-1).
Pins 1-8 shorted together, 9-16 shorted together (PS2832-4, PS2833-4).

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

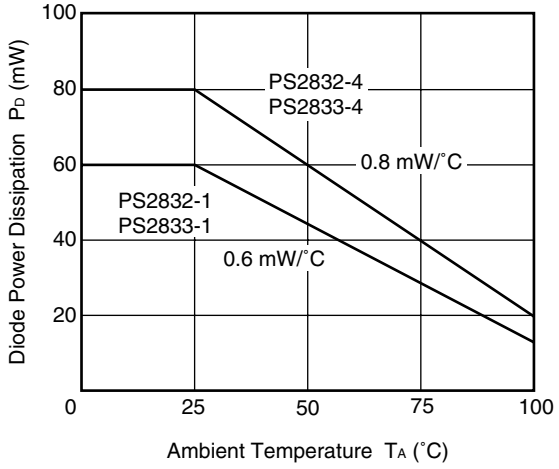
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 10 mA		1.2	1.4	V
	Reverse Current	I_R	V_R = 5 V			5	μA
	Terminal Capacitance	C_t	V = 0 V, f = 1 MHz		15		pF
Transistor	Collector to Emitter Dark Current	I_{CEO}	I_F = 0 mA, V_{CE} = 300 V			400	nA
Coupled	Current Transfer Ratio (I_C/I_F)	CTR	I_F = 1 mA, V_{CE} = 2 V	400	2 000	4 500	%
	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 kV_{DC}	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1 MHz		0.4		pF
	Rise Time*1	t_r	V_{CC} = 5 V, I_C = 10 mA, R_L = 100 Ω		20		μs
	Fall Time*1	t_f			5		

***1** Test circuit for switching time

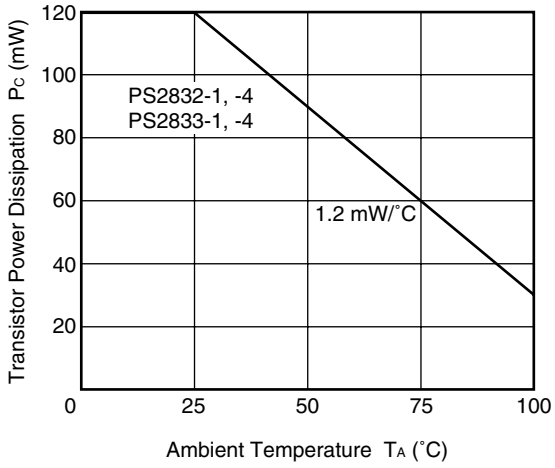


TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

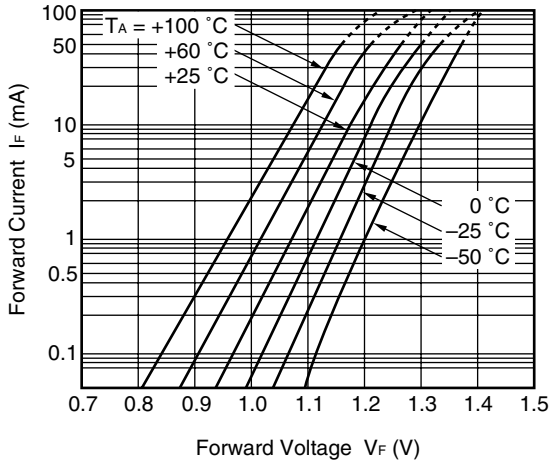
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



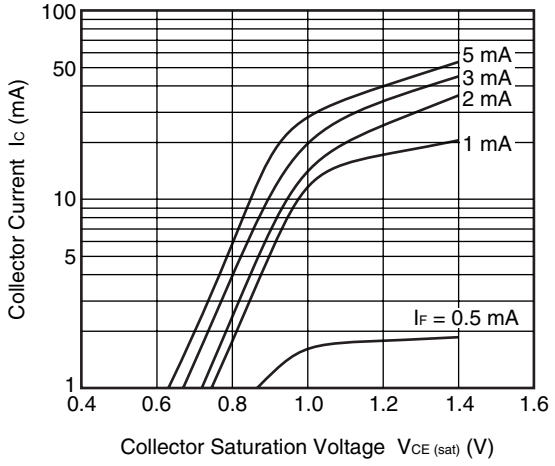
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



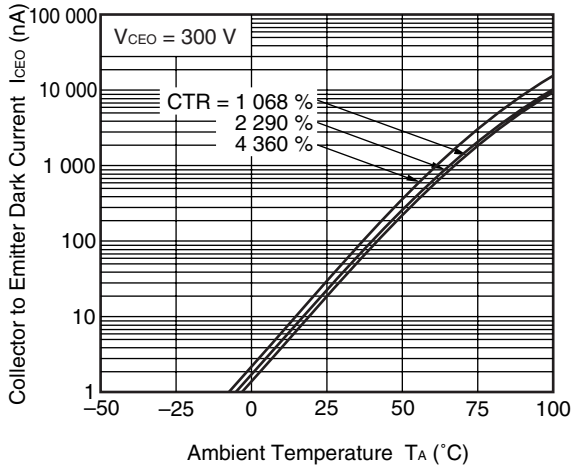
FORWARD CURRENT vs. FORWARD VOLTAGE



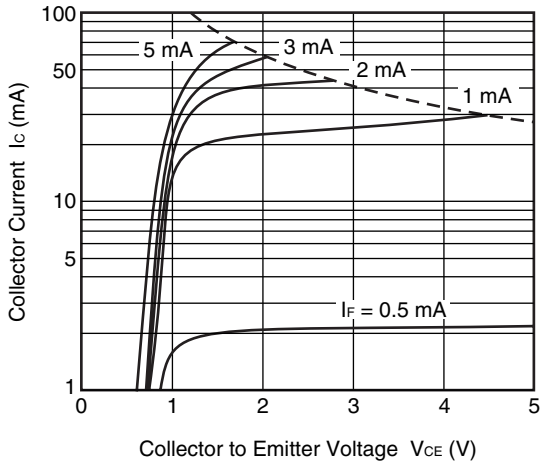
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

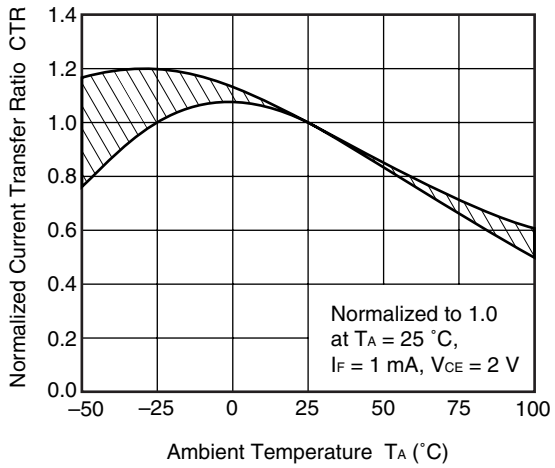


COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

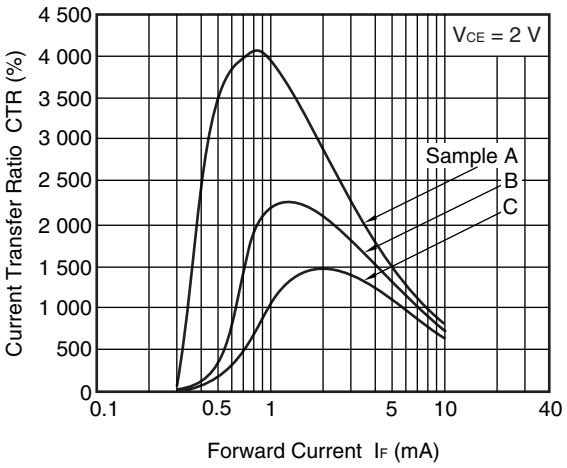


Remark The graphs indicate nominal characteristics.

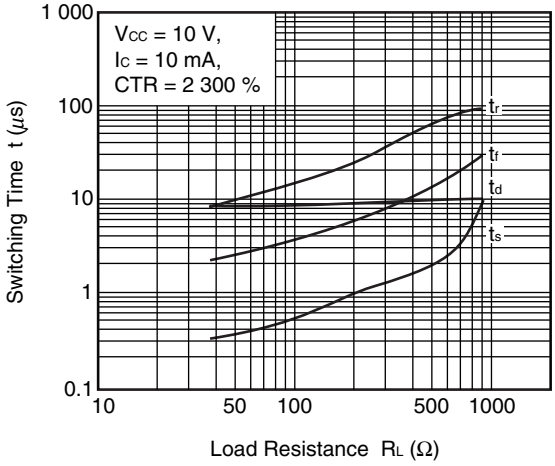
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



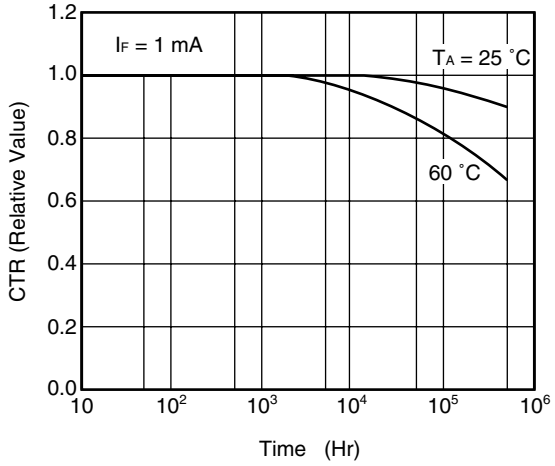
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



SWITCHING TIME vs. LOAD RESISTANCE



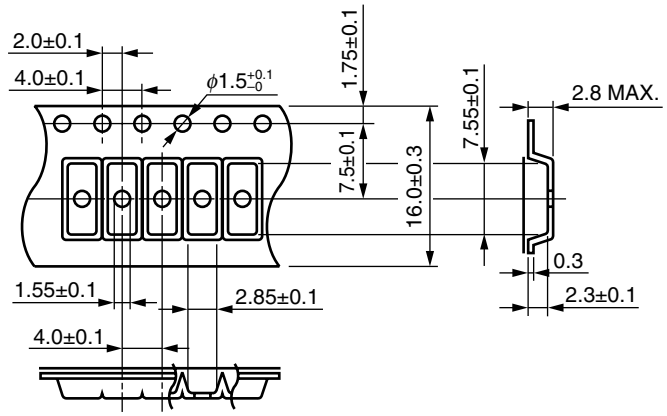
LONG TERM CTR DEGRADATION



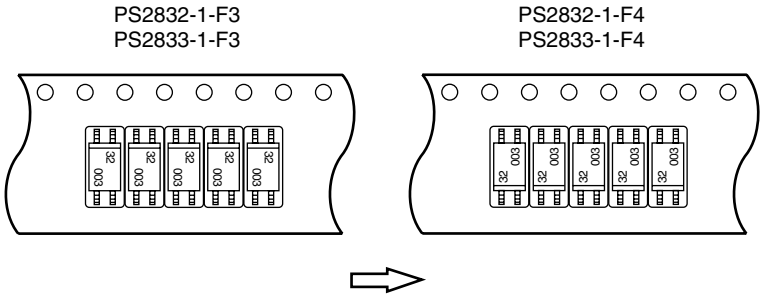
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

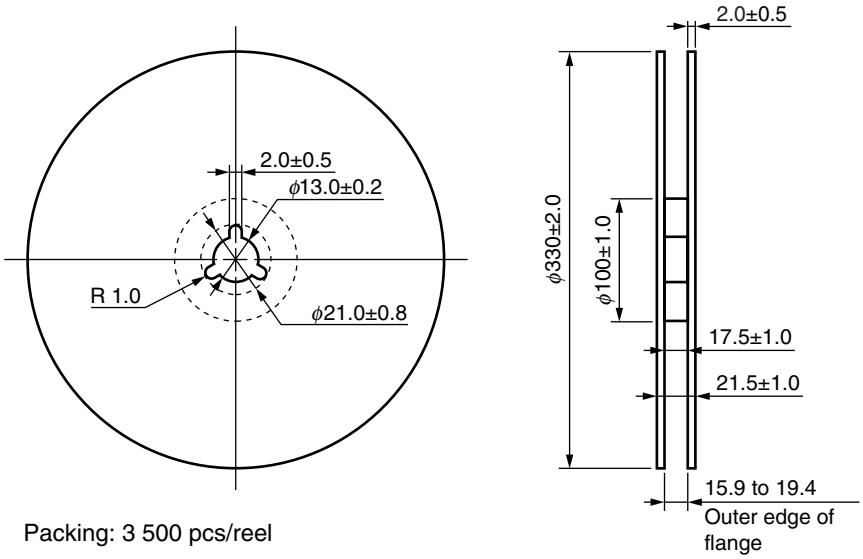
Outline and Dimensions (Tape)



Tape Direction

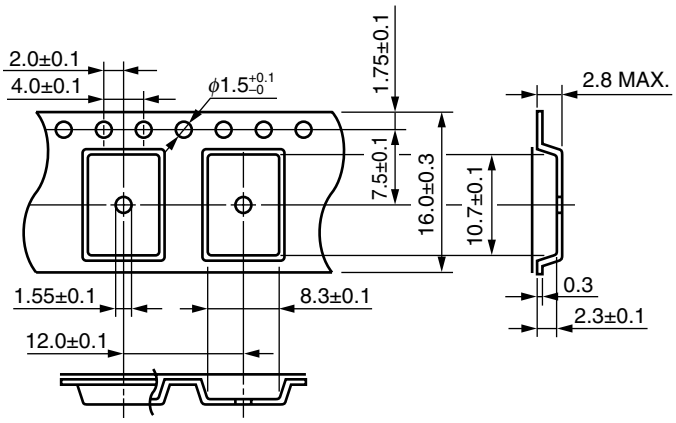


Outline and Dimensions (Reel)

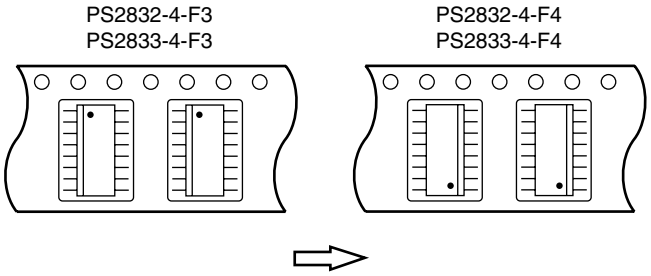


Packing: 3 500 pcs/reel

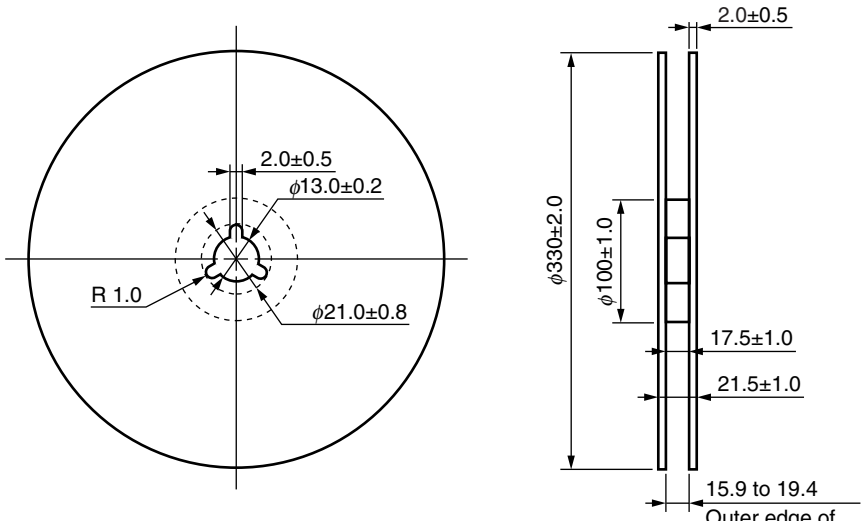
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 2 500 pcs/reel

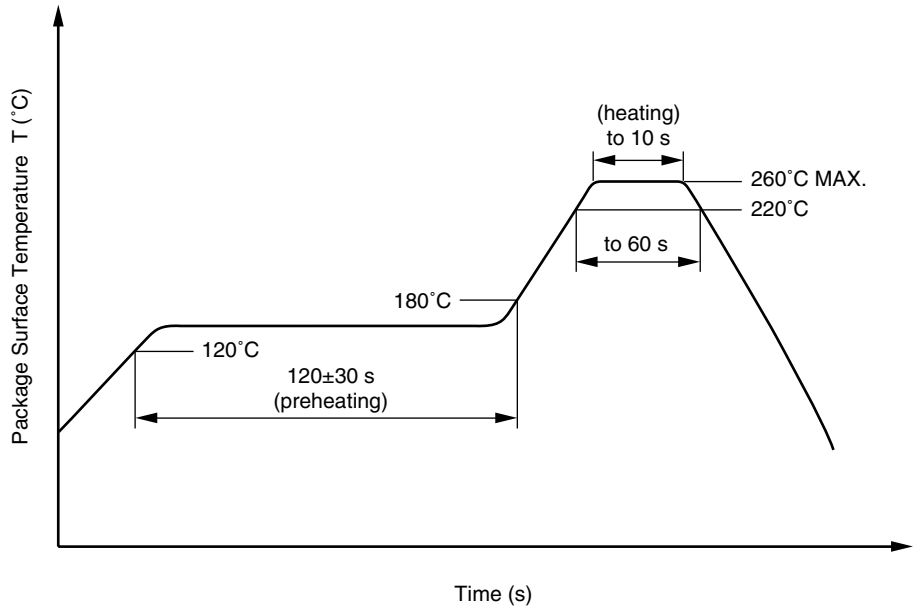
NOTES ON HANDLING

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.)

<R> **(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.

<R> **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.

- **The information in this document is current as of May, 2006. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC Electronics data sheets or data books, etc., for the most up-to-date specifications of NEC Electronics products. Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.**
- No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Electronics. NEC Electronics assumes no responsibility for any errors that may appear in this document.
- NEC Electronics does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC Electronics products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Electronics 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 a customer's equipment shall be done under the full responsibility of the customer. NEC Electronics assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC Electronics endeavors to enhance the quality, reliability and safety of NEC Electronics products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC Electronics products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment and anti-failure features.
- NEC Electronics products are classified into the following three quality grades: "Standard", "Special" and "Specific".
  The "Specific" quality grade applies only to NEC Electronics products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of an NEC Electronics product depend on its quality grade, as indicated below. Customers must check the quality grade of each NEC Electronics product 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 and medical equipment for life support, etc.

The quality grade of NEC Electronics products is "Standard" unless otherwise expressly specified in NEC Electronics data sheets or data books, etc. If customers wish to use NEC Electronics products in applications not intended by NEC Electronics, they must contact an NEC Electronics sales representative in advance to determine NEC Electronics' willingness to support a given application.

(Note)
(1) "NEC Electronics" as used in this statement means NEC Electronics Corporation and also includes its majority-owned subsidiaries.
(2) "NEC Electronics products" means any product developed or manufactured by or for NEC Electronics (as defined above).

M8E 02. 11-1

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.

▶**For further information, please contact**

NEC Compound Semiconductor Devices Hong Kong Limited
E-mail: contact@ncsd-hk.necel.com
Hong Kong Head Office TEL: +852-3107-7303 FAX: +852-3107-7309
Taipei Branch Office TEL: +886-2-8712-0478 FAX: +886-2-2545-3859
Korea Branch Office TEL: +82-2-558-2120 FAX: +82-2-558-5209

NEC Electronics (Europe) GmbH http://www.eu.necel.com/
TEL: +49-211-6503-0 FAX: +49-211-6503-1327

California Eastern Laboratories, Inc. http://www.cel.com/
TEL: +1-408-988-3500 FAX: +1-408-988-0279

Compound Semiconductor Devices Division
NEC Electronics Corporation
URL: http://www.ncsd.necel.com/

0604