NEC

Solid State Relay
OCMOS FET

PS7241-1C

8-PIN SOP 400 V BREAK DOWN VOLTAGE TRANSFER TYPE 2-ch Optical Coupled MOS FET

DESCRIPTION

The PS7241-1C is a transfer type solid state relay containing normally open (N.O.) contact and normally close (N.C.) contact on output side.

It is suitable for analog signal control because of their low offset and high linearity.

FEATURES

- 2 channel type (1 a + 1 b output)
- Low LED operating current (I_F = 2 mA)
- Designed for AC/DC switching line changer
- Small and thin package (8-pin SOP, Height = 2.1 mm)
- Low offset voltage
- Ordering number of taping product: PS7241-1C-F3, F4
- UL approved: File No. E72422 (S)
- BSI approved: No. 8241/8242
- CSA approved: No. CA 101391
- VDE approved: No. 121302 ÜG

APPLICATIONS

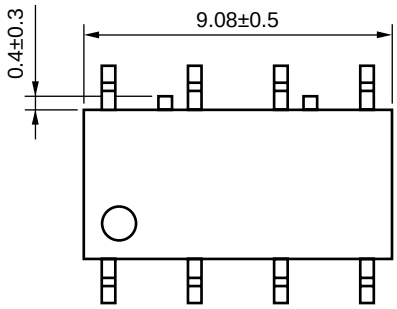
- Exchange equipment
- Measurement equipment
- FA/OA equipment

Document No. PN10303EJ01V1DS (1st edition)
(Previous No. P13266EJ4V0DS00)
Date Published February 2003 CP(K)
Printed in Japan

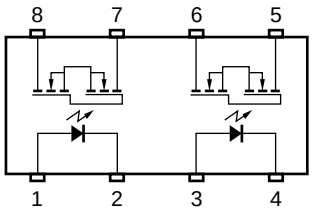
The mark ★ shows major revised points.

PACKAGE DIMENSIONS

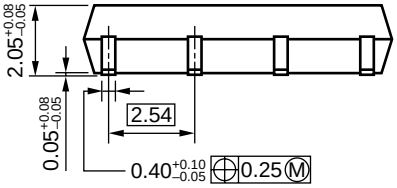
(in millimeters)

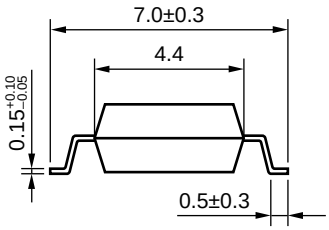


TOP VIEW



1. LED Anode
2. LED Cathode
3. LED Anode
4. LED Cathode
5. MOS FET (N.O.)
6. MOS FET (N.O.)
7. MOS FET (N.C.)
8. MOS FET (N.C.)





ORDERING INFORMATION

Part Number	Package	Packing Style	Application Part Number*1
PS7241-1C	8-pin SOP	Magazine case 45 pcs	PS7241-1C
PS7241-1C-F3		Embossed Tape 1 500 pcs/reel	
PS7241-1C-F4			

***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
Diode	Forward Current (DC)	I_F	50	mA
	Reverse Voltage	V_R	5	V
	Power Dissipation	P_D	50	mW/ch
	Peak Forward Current*1	I_{FP}	1	A
MOS FET	Break Down Voltage	V_L	400	V
	Continuous Load Current	I_L	120	mA
	Pulse Load Current*2 (AC/DC Connection)	I_{LP}	200	mA
	Power Dissipation	P_D	180	mW/ch
Isolation Voltage*3		BV	1 500	Vr.m.s.
Total Power Dissipation		P_T	460	mW
★ Operating Ambient Temperature		T_A	–40 to +85	°C
Storage Temperature		T_{stg}	–40 to +100	°C

***1** PW = 100 μs, Duty Cycle = 1 %

***2** PW = 100 ms, 1 shot

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

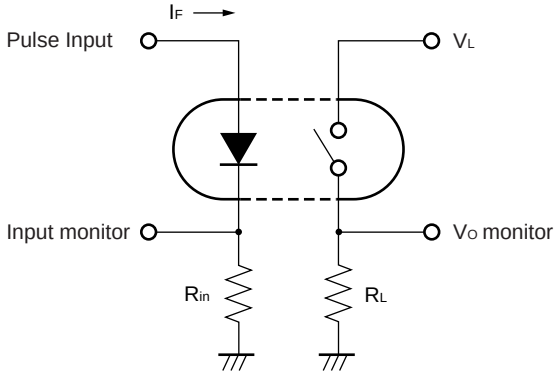
RECOMMENDED OPERATING CONDITIONS (T_A = 25 °C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
LED Operating Current	I_F	2	10	20	mA
LED Off Voltage	V_F	0		0.5	V

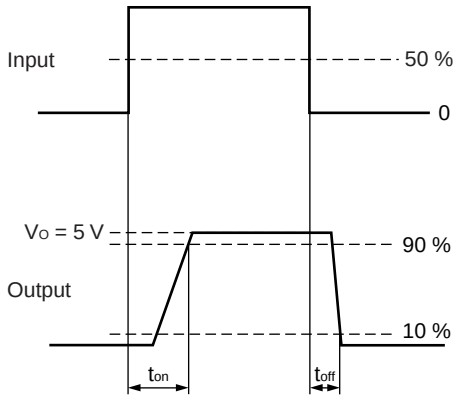
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

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
MOS FET	Off-state Leakage Current	I_{Loff}	N.O.: I_F = 0 mA, V_D = 400 V		0.03	1.0	μA
			N.C.: I_F = 10 mA, V_D = 400 V				
	Output Capacitance	C_{out}	N.O.: V_D = 0 V, f = 1.0 MHz		65		pF/ch
			N.C.: V_D = 0 V, f = 1.0 MHz, I_F = 10 mA		185		
Coupled	LED On-state Current	I_{Fon}	N.O.: I_L = 120 mA			2.0	mA
	LED Off-state Current	I_{Foff}	N.C.: I_L = 120 mA				
	On-state Resistance	R_{on1}	N.O.: I_F = 10 mA, I_L = 10 mA		21	30	Ω
			N.C.: I_F = 0 mA, I_L = 10 mA				
		R_{on2}	N.O.: I_F = 10 mA, I_L = 120 mA, t ≤ 10 ms		16	25	
			N.C.: I_F = 0 mA, I_L = 120 mA, t ≤ 10 ms				
★	Turn-on Time *1	$t_{on\ (N.O.)}$	I_F = 10 mA, V_O = 5 V, R_L = 2 kΩ,		0.2	1.0	ms
		$t_{on\ (N.C.)}$	PW ≥ 10 ms		0.02	0.2	
	Turn-off Time *1	$t_{off\ (N.O.)}$			0.02	0.2	
		$t_{off\ (N.C.)}$			0.1	1.0	
	Isolation Resistance	R_{I-O}	V_{I-O} = 1.0 kV_{DC}	10^9			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1.0 MHz		0.4		pF/ch

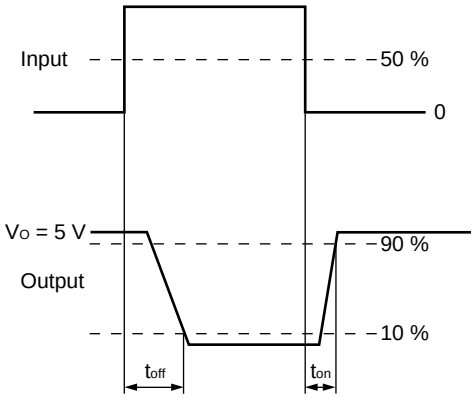
***1** Test Circuit for Switching Time



N.O. (between pin 5 and 6)

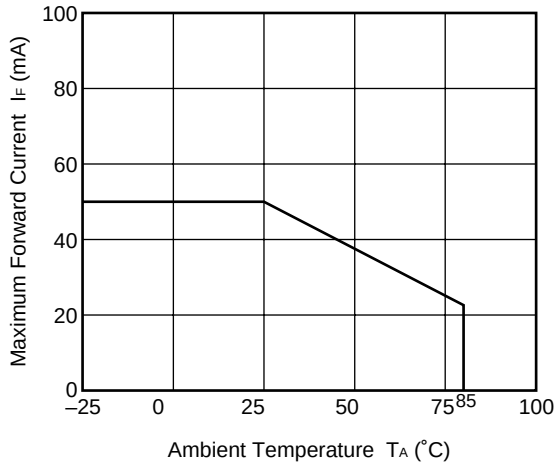


N.C. (between pin 7 and 8)

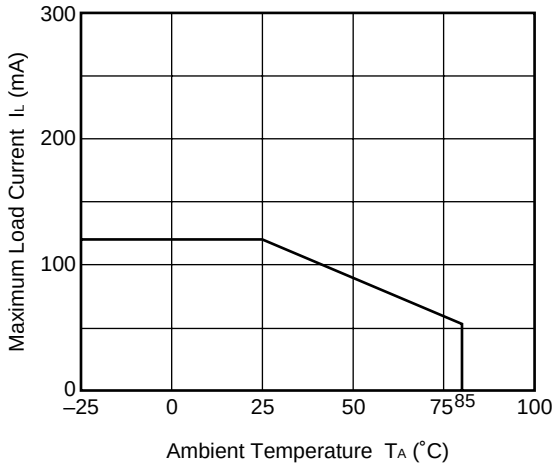


★ TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

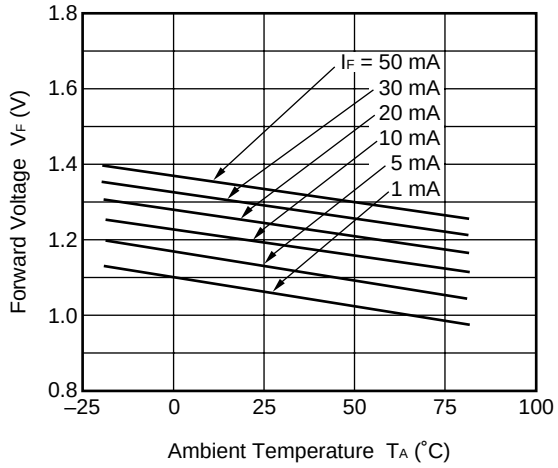
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



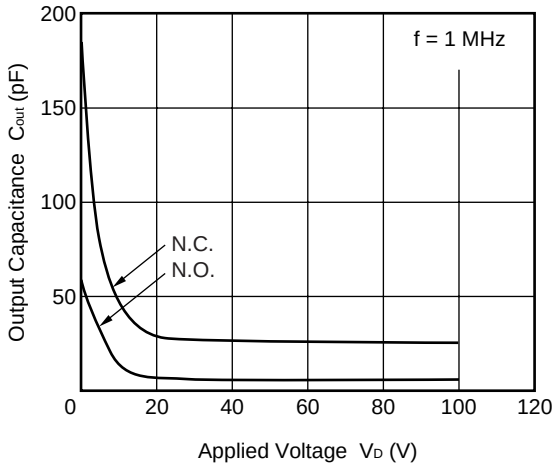
MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



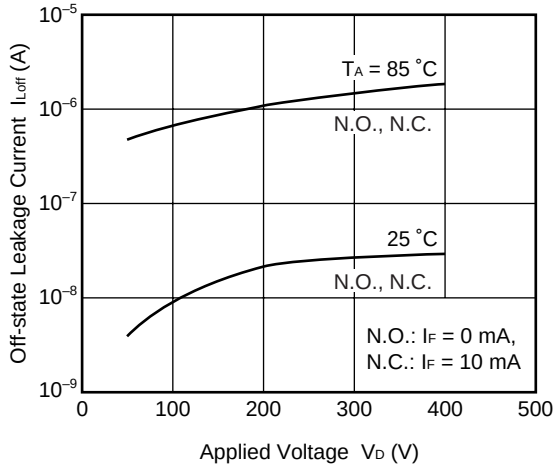
FORWARD VOLTAGE vs. AMBIENT TEMPERATURE



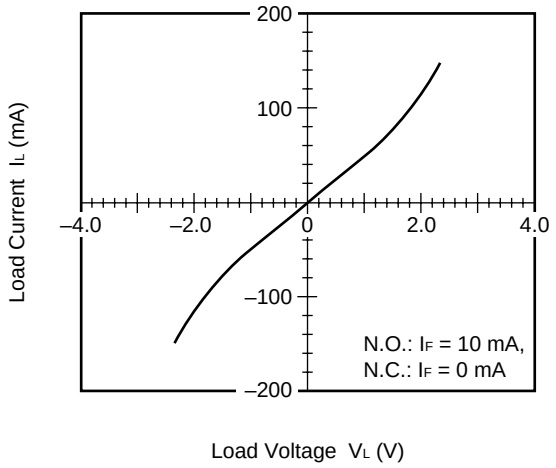
OUTPUT CAPACITANCE vs. APPLIED VOLTAGE



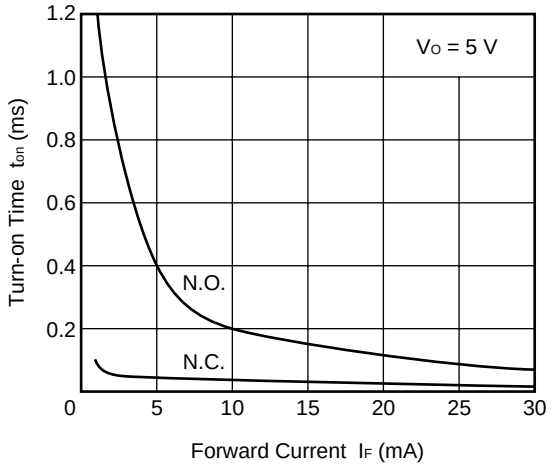
OFF-STATE LEAKAGE CURRENT vs. APPLIED VOLTAGE



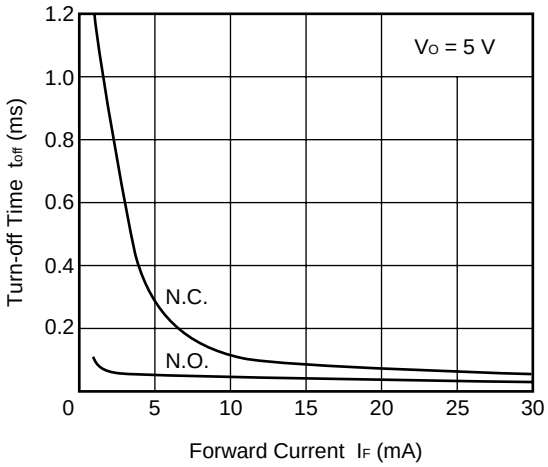
LOAD CURRENT vs. LOAD VOLTAGE



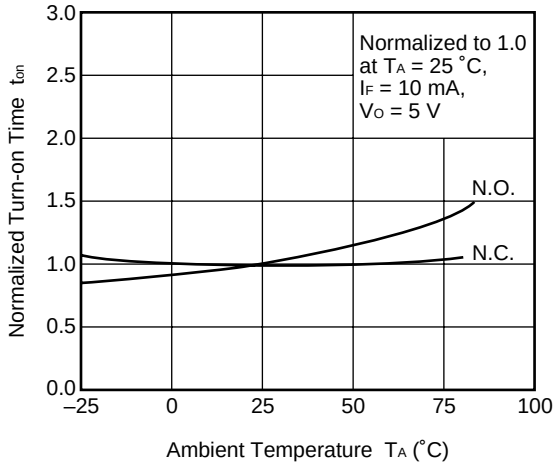
TURN-ON TIME vs. FORWARD CURRENT



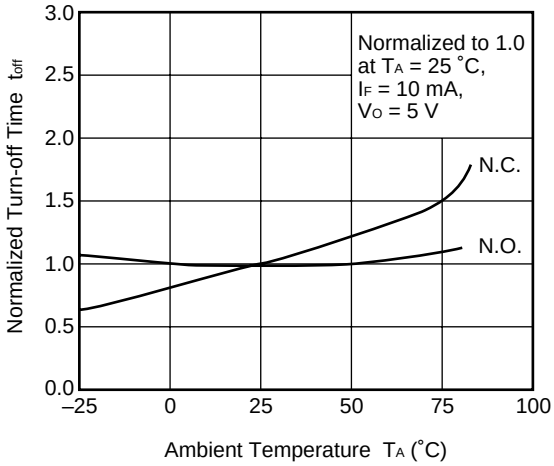
TURN-OFF TIME vs. FORWARD CURRENT



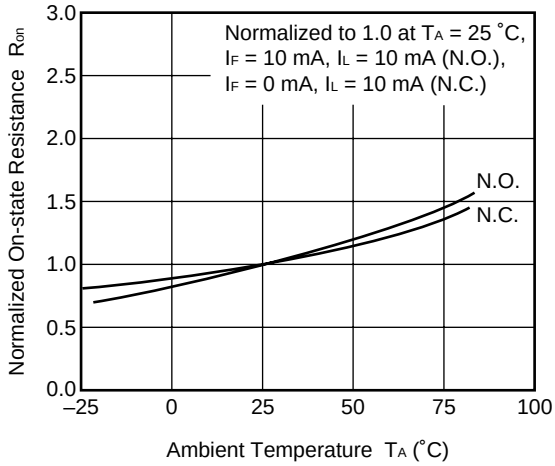
NORMALIZED TURN-ON TIME vs. AMBIENT TEMPERATURE



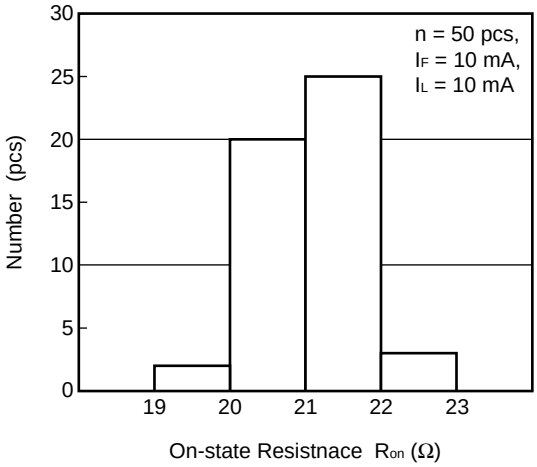
NORMALIZED TURN-OFF TIME vs. AMBIENT TEMPERATURE



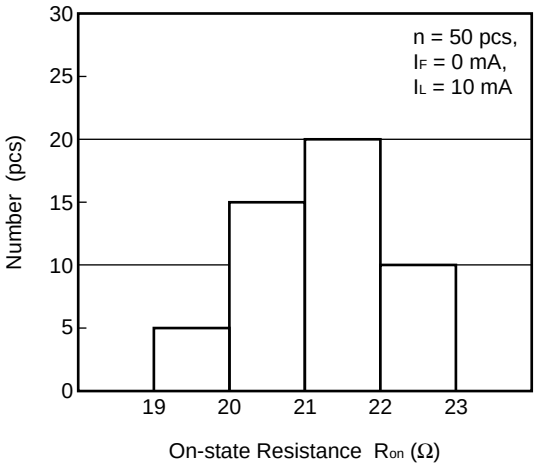
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



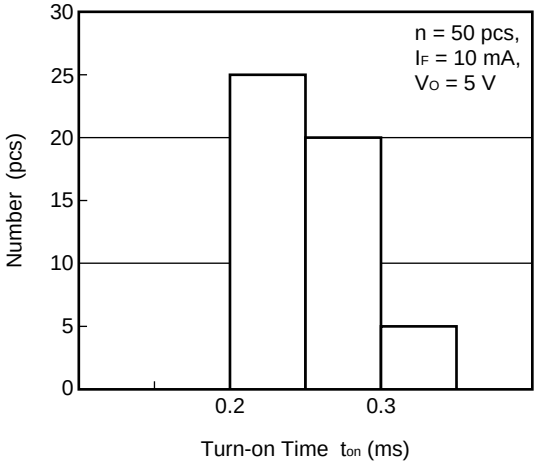
ON-STATE RESISTANCE (N.O.) DISTRIBUTION



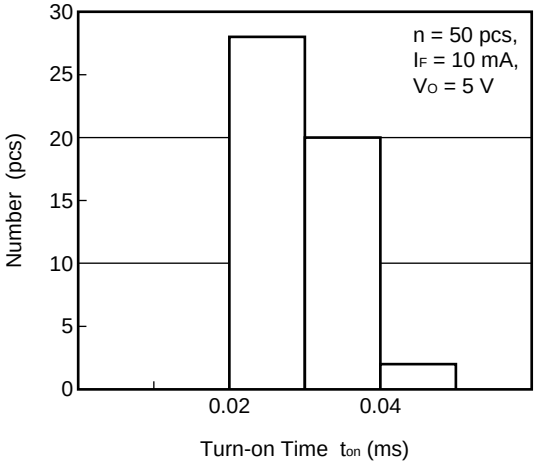
ON-STATE RESISTANCE (N.C.) DISTRIBUTION



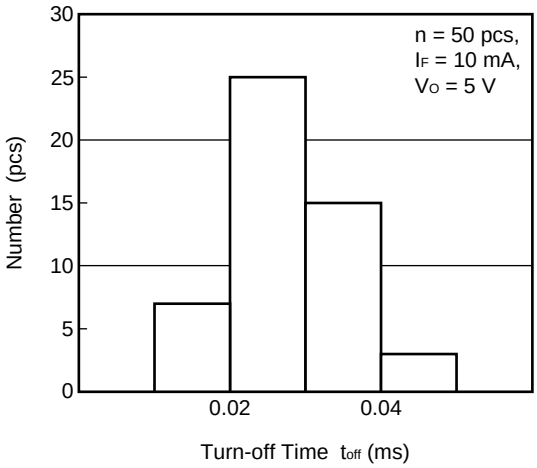
TURN-ON TIME (N.O.) DISTRIBUTION



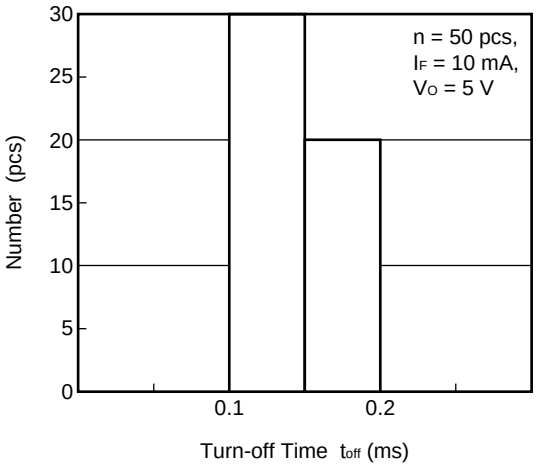
TURN-ON TIME (N.C.) DISTRIBUTION



TURN-OFF TIME (N.O.) DISTRIBUTION



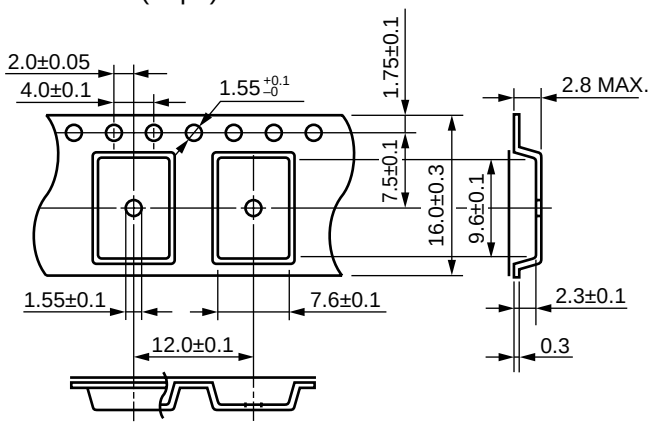
TURN-OFF TIME (N.C.) DISTRIBUTION



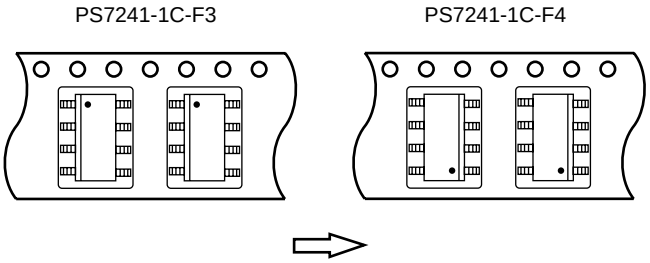
Remark The graphs indicate nominal characteristics.

★ **TAPING SPECIFICATIONS (in millimeters)**

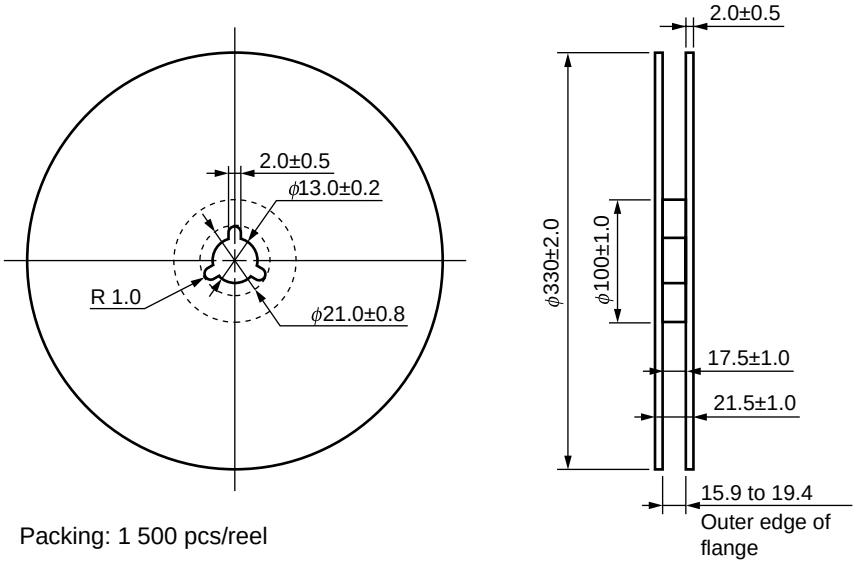
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



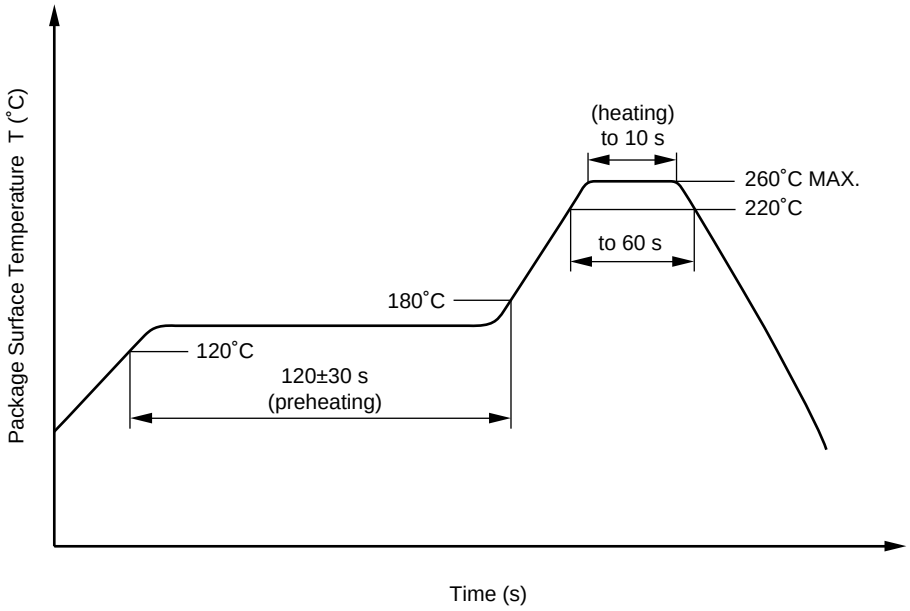
Packing: 1 500 pcs/reel

★ 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
- 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.

- **The information in this document is current as of February, 2003. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC 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 prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.
- NEC 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 semiconductor 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 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 customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor 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 semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment, and anti-failure features.
- NEC semiconductor products are classified into the following three quality grades:
  "Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor 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 semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.

  (Note)

  (1) "NEC" as used in this statement means NEC Corporation, NEC Compound Semiconductor Devices, Ltd. and also includes its majority-owned subsidiaries.

  (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

M8E 00.4-0110

SAFETY INFORMATION ON THIS PRODUCT

Caution GaAs Products	The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested. • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.

►**For further information, please contact**

NEC Compound Semiconductor Devices, Ltd.
5th Sales Group, Sales Division TEL: +81-44-435-1588 FAX: +81-44-435-1579 E-mail: salesinfo@csd-nec.com

NEC Compound Semiconductor Devices Hong Kong Limited
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.ee.nec.de/
TEL: +49-211-6503-01 FAX: +49-211-6503-487

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

0302