

**4-PIN SOP 400 V BREAK DOWN VOLTAGE
NORMALLY CLOSE TYPE
1-ch Optical Coupled MOS FET**

-NEPOC Series-

DESCRIPTION

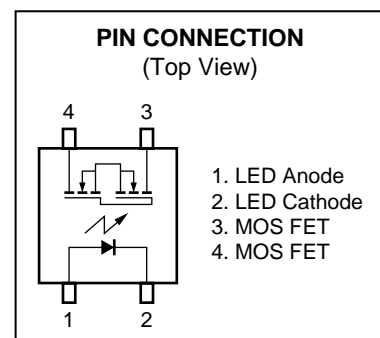
The PS7241E-1B is an optically coupled element that combines a GaAs infrared LED on the input side with a normally close MOS FET on the output side to realize an excellent cost performance.

The small, thin package and high sensitivity of this element makes it ideal for battery-driven mobile devices, and its small offset voltage at power-on and good linearity also make it suitable for controlling micro analog signals.

FEATURES

- Small and thin package (4-pin SOP, Height = 2.1 mm)
- 1 channel type (1 b output)
- Low LED operating current ($I_f = 3 \text{ mA}$)
- Designed for AC/DC switching line changer
- Low offset voltage
- Ordering number of taping product: PS7241E-1B-E3, E4, F3, F4
- Pb-Free product
- Safety standards
 - UL approved: File No. E72422
 - BSI approved: File No. 8241/8242

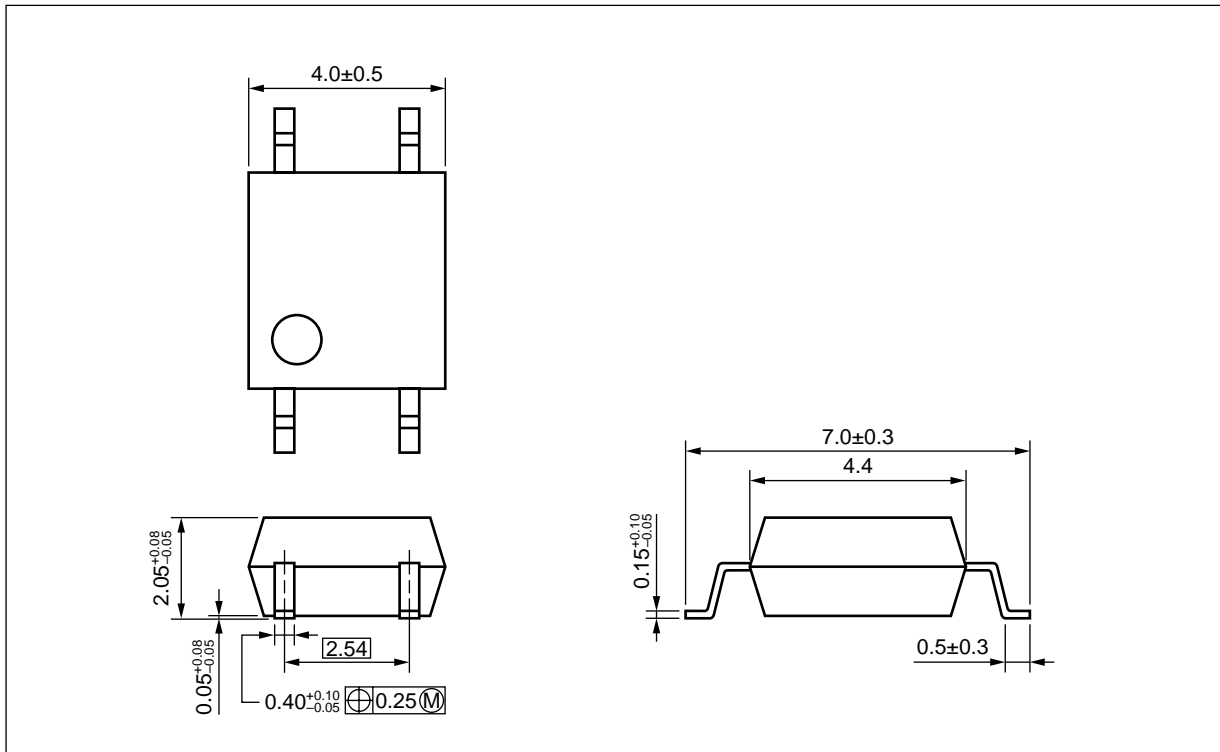
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**APPLICATIONS**

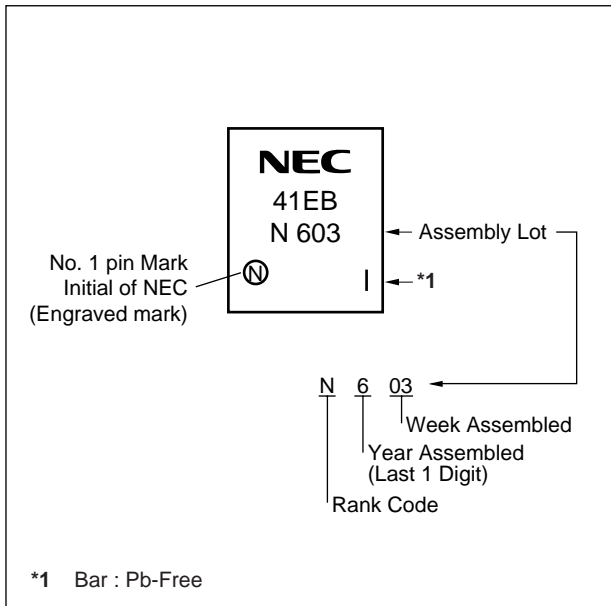
- Laptop PC, PDA
- Modem card
- Telephone, FAX
- Measurement equipment

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

PACKAGE DIMENSIONS (UNIT: mm)



MARKING EXAMPLE



<R> **ORDERING INFORMATION**

| Part Number | Order Number | Solder Plating Specification | Packing Style | Safety Standard Approval | Application Part Number ^{*1} |
|---------------|-----------------|------------------------------|------------------------------|---|---------------------------------------|
| PS7241E-1B | PS7241E-1B-A | Pb-Free | Magazine case 100 pcs | Standard products (UL, BSI approved) | PS7241E-1B |
| PS7241E-1B-E3 | PS7241E-1B-E3-A | | Embossed Tape 900 pcs/reel | | |
| PS7241E-1B-E4 | PS7241E-1B-E4-A | | | | |
| PS7241E-1B-F3 | PS7241E-1B-F3-A | | Embossed Tape 3 500 pcs/reel | | |
| PS7241E-1B-F4 | PS7241E-1B-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 |
|---------------------------------|--|------------------|-------------|---------|
| Diode | Forward Current (DC) | I _F | 50 | mA |
| | Reverse Voltage | V _R | 5.0 | V |
| | Power Dissipation | P _D | 50 | mW |
| | 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} | 240 | mA |
| | Power Dissipation | P _D | 300 | mW |
| Isolation Voltage ^{*3} | | BV | 1 500 | Vr.m.s. |
| Total Power Dissipation | | P _T | 350 | 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
Pins 1-2 shorted together, 3-4 shorted together.

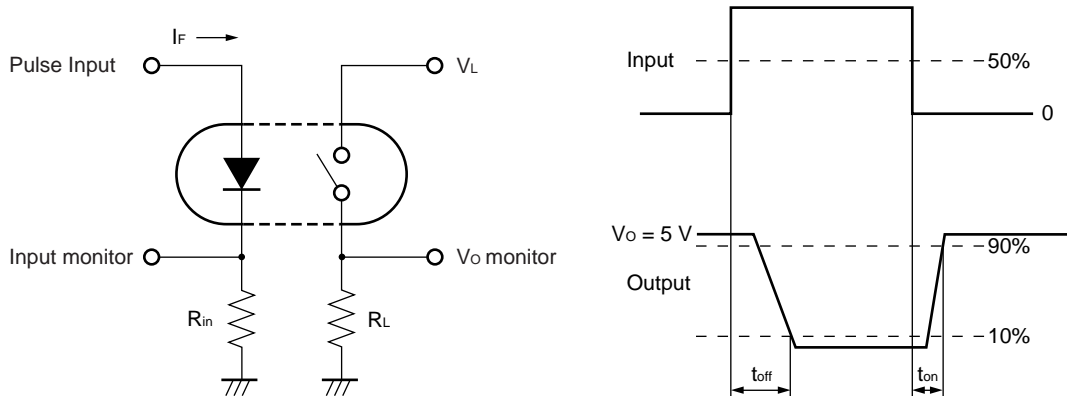
RECOMMENDED OPERATING CONDITIONS (T_A = 25°C)

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|-----------------------|----------------|------|------|------|------|
| LED Operating Current | I _F | 3 | 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 | | | 5.0 | μA |
| MOS FET | Off-state Leakage Current | I _{Loff} | I _F = 10 mA, V _D = 400 V | | 0.03 | 1.0 | μA |
| | Output Capacitance | C _{out} | I _F = 10 mA, V _D = 0 V, f = 1 MHz | | 206 | | pF |
| Coupled | LED Off-state Current | I _{Foff} | I _L = 120 mA | | | 3.0 | mA |
| | On-state Resistance | R _{on1} | I _F = 0 mA, I _L = 10 mA | | 22 | 35 | Ω |
| | | R _{on2} | I _F = 0 mA, I _L = 120 mA, t ≤ 10 ms | | 17 | 24 | |
| | Turn-on Time ^{*1,2} | t _{on} | I _F = 10 mA, V _O = 5 V, R _L = 500 Ω, PW ≥ 10 ms | | 0.07 | 0.2 | ms |
| | Turn-off Time ^{*1,2} | t _{off} | | | 1.0 | 3.0 | |
| | Isolation Resistance | R _{I-O} | V _{I-O} = 1.0 kVDC | | 10 ⁹ | | Ω |
| | Isolation Capacitance | C _{I-O} | V = 0 V, f = 1 MHz | | | 0.5 | pF |

***1 Test Circuit for Switching Time**



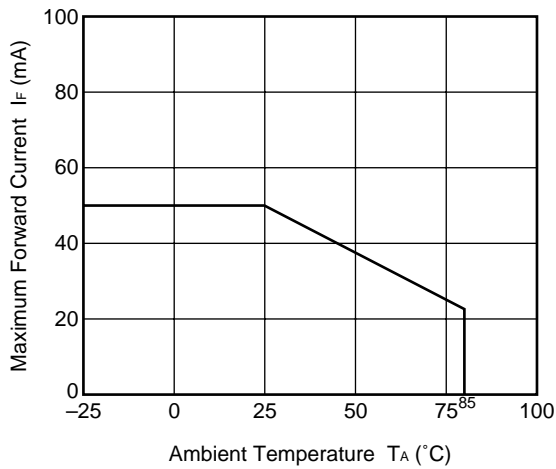
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***2** The turn-on time and turn-off time are specified as input-pulse width ≥ 10 ms.

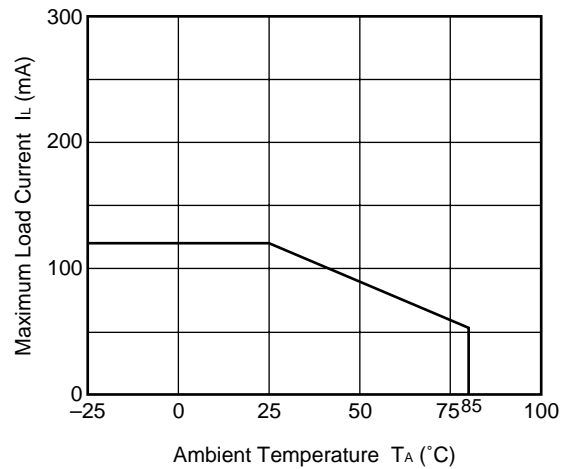
Be aware that when the device operates with an input-pulse width less than 10 ms, the turn-on time and turn-off time will increase.

<R> **TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)**

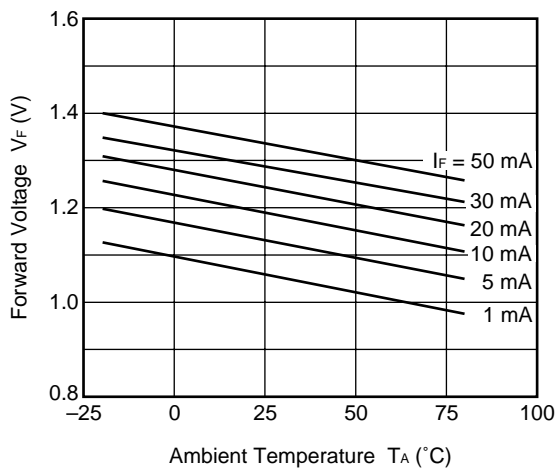
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



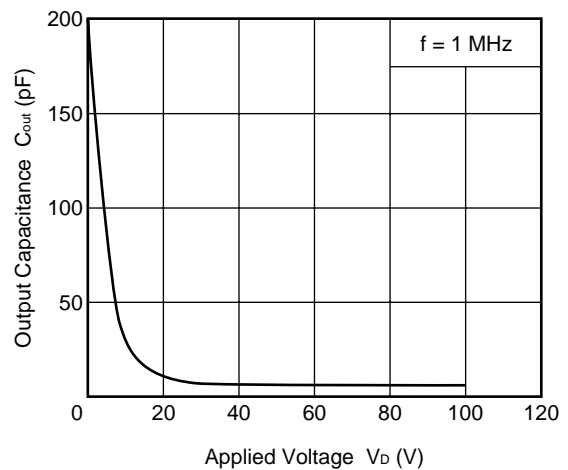
MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



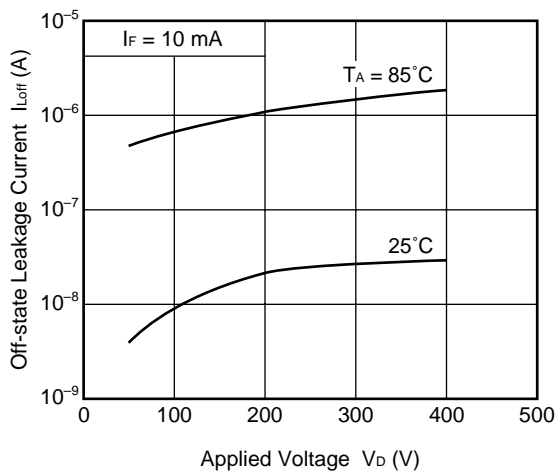
FORWARD VOLTAGE vs. AMBIENT TEMPERATURE



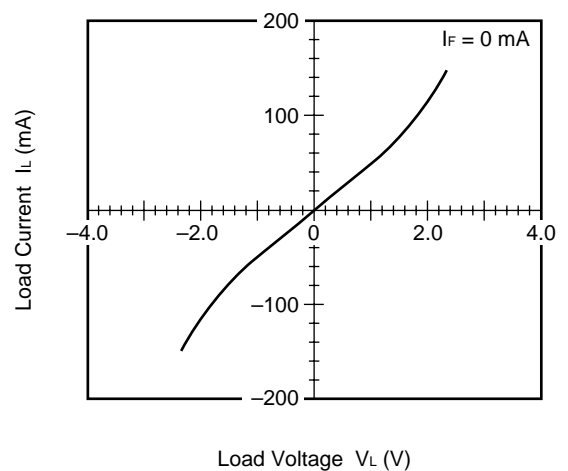
OUTPUT CAPACITANCE vs. APPLIED VOLTAGE



OFF-STATE LEAKAGE CURRENT vs. APPLIED VOLTAGE

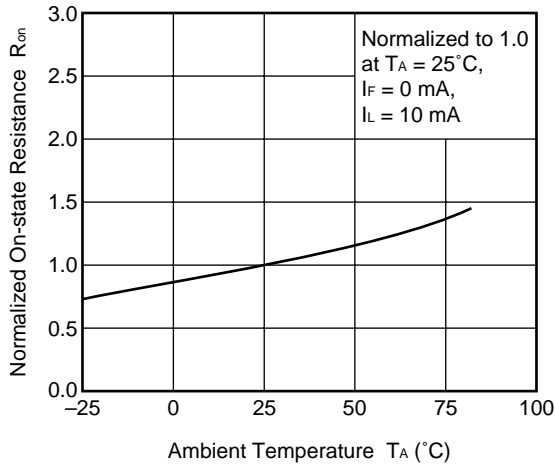


LOAD CURRENT vs. LOAD VOLTAGE

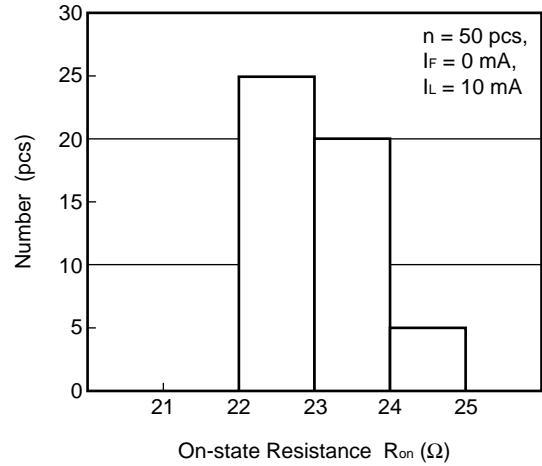


Remark The graphs indicate nominal characteristics.

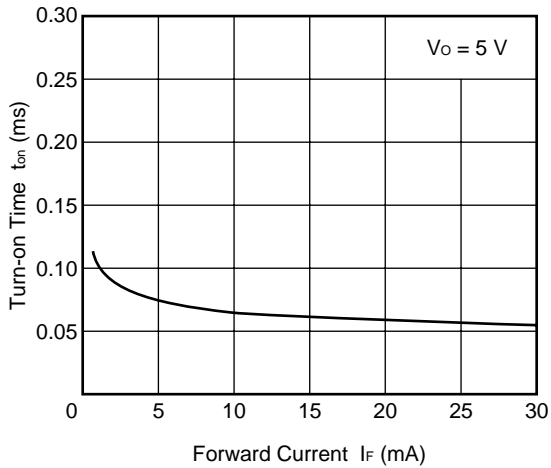
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



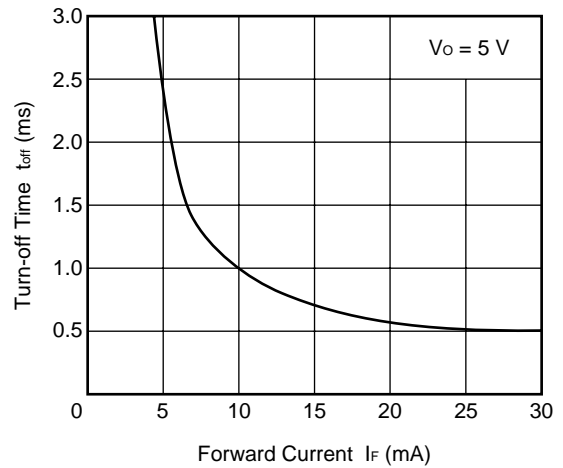
ON-STATE RESISTANCE DISTRIBUTION



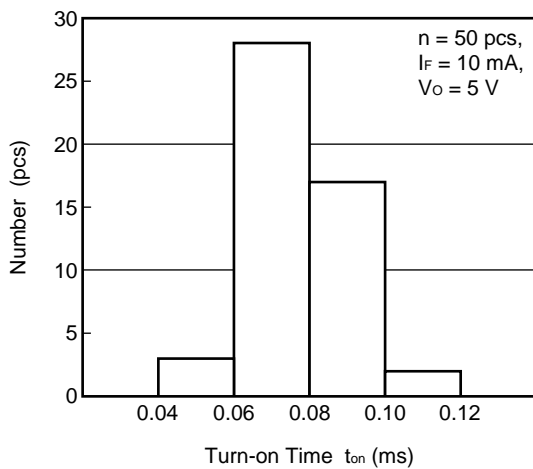
TURN-ON TIME vs. FORWARD CURRENT



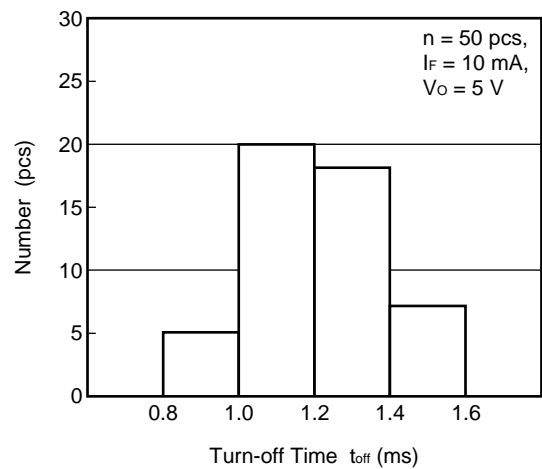
TURN-OFF TIME vs. FORWARD CURRENT



TURN-ON TIME DISTRIBUTION

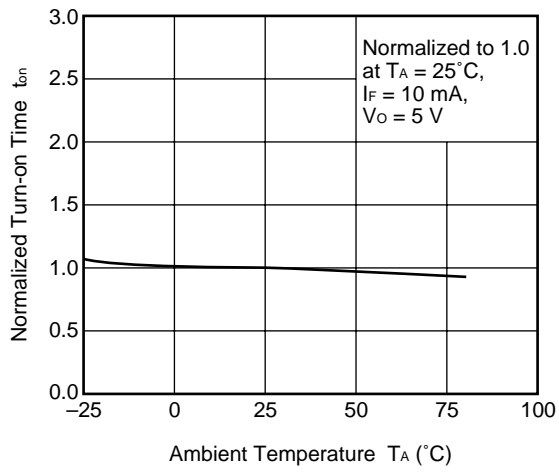


TURN-OFF TIME DISTRIBUTION

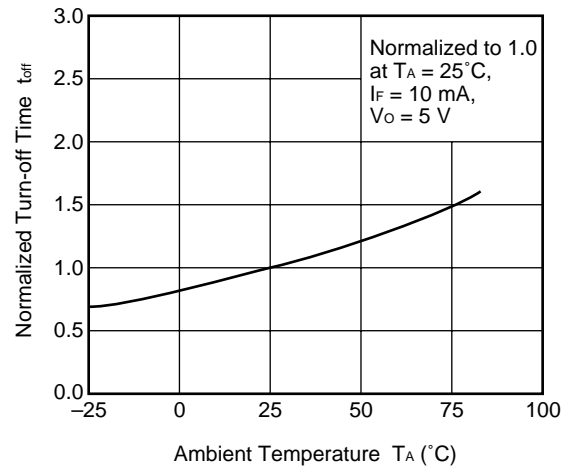


Remark The graphs indicate nominal characteristics.

NORMALIZED TURN-ON TIME vs. AMBIENT TEMPERATURE



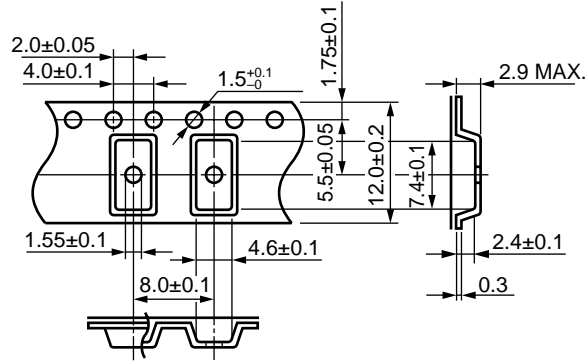
NORMALIZED TURN-OFF TIME vs. AMBIENT TEMPERATURE



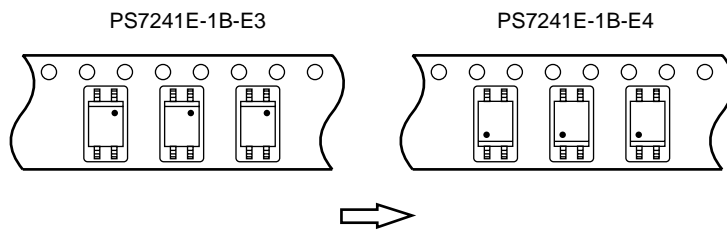
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (in millimeters)

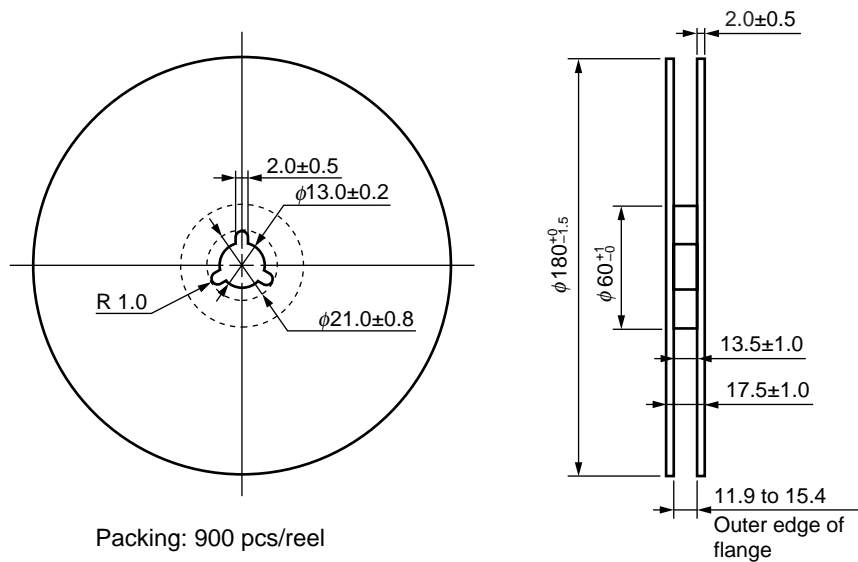
Outline and Dimensions (Tape)



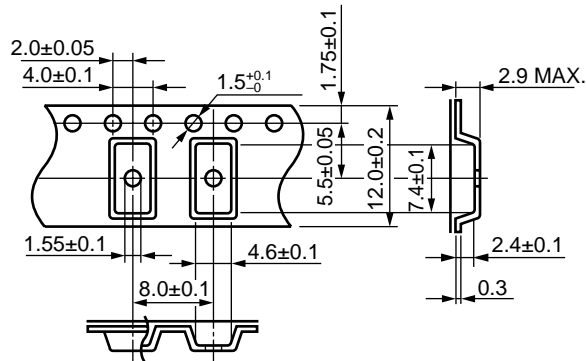
Tape Direction



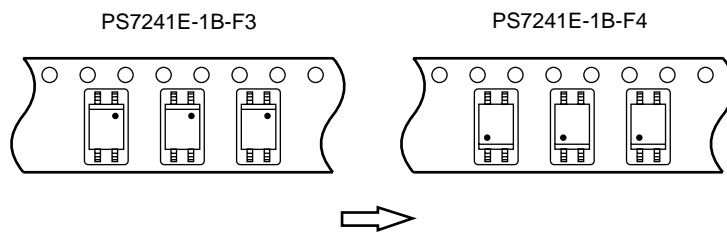
Outline and Dimensions (Reel)



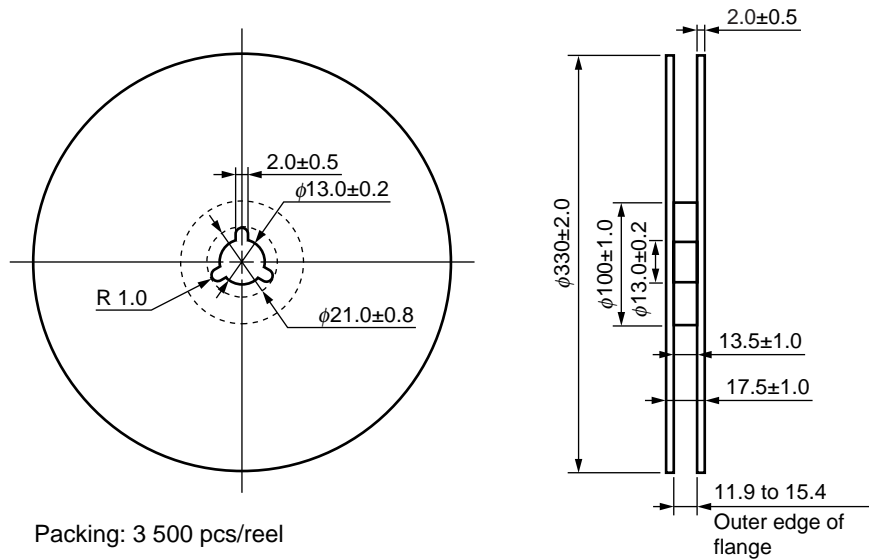
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



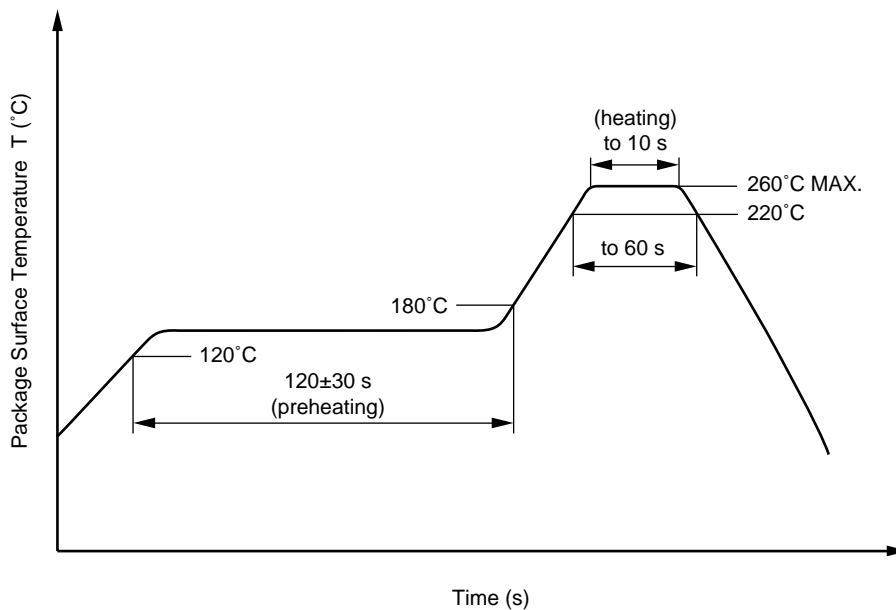
Packing: 3 500 pcs/reel

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.)

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(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.

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USAGE CAUTIONS

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

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| | | |
|-----------------------|----------------------|---|
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|-----------------------|----------------------|---|

► **For further information, please contact**

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NEC Electronics Corporation

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This status is based on CEL’s understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

| Restricted Substance per RoHS | Concentration Limit per RoHS (values are not yet fixed) | Concentration contained in CEL devices | |
|-------------------------------|---|--|-----|
| | | -A | -AZ |
| Lead (Pb) | < 1000 PPM | Not Detected | (*) |
| Mercury | < 1000 PPM | Not Detected | |
| Cadmium | < 100 PPM | Not Detected | |
| Hexavalent Chromium | < 1000 PPM | Not Detected | |
| PBB | < 1000 PPM | Not Detected | |
| PBDE | < 1000 PPM | Not Detected | |

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