

### FEATURES

- **LOW C x R :**  
C x R = 12.6 pF · Ω
- **1 CHANNEL TYPE:**  
1a output
- **LOW ON-STATE RESISTANCE:**  
R<sub>on</sub> = 1.1 Ω TYP
- **HIGH PASS CHARACTERISTICS:**  
ERT = 45 ps TYP
- **DESIGNED FOR AC/DC SWITCHING LINE CHANGER**
- **ULTRA SMALL FLAT-LEAD PACKAGE:**  
4.2 (L) X 2.5 (W) X 1.85 (H) mm
- **LOW OFFSET VOLTAGE**
- **ORDERING NUMBER OF TAPING PRODUCT:**  
PS7801-1A-F3, F4 (3 500 pcs/reel)

### DESCRIPTION

NEC's PS7802-1A is a low output capacitance solid state relay containing GaAs LEDs on the light emitting side (input side) and MOSFETs on the output side.

An ultra small flat-lead package has been provided which realizes a reduction in mounting area about 50% compared with the PS72xx series.

It is suitable for high frequency signal control, due to its low C x R, low on-state resistance, and low off-state leakage current.

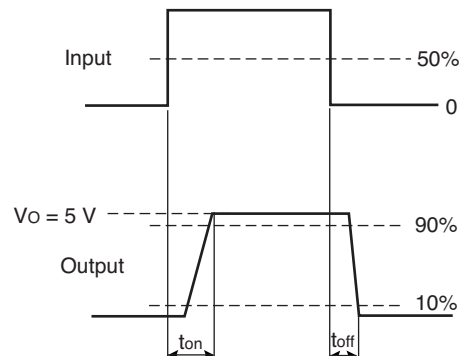
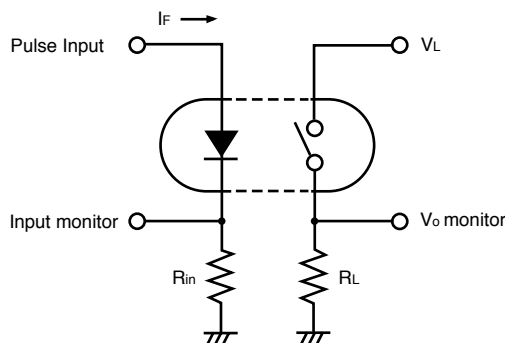
### APPLICATIONS

- **MEASUREMENT EQUIPMENT**

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

| PART NUMBER |                   |  | PS7802-1A       |      |      |       |
|-------------|-------------------|--|-----------------|------|------|-------|
|             | SYMBOLS           | PARAMETERS   | MIN             | TYP  | MAX  | UNITS |
| Diode       | V <sub>F</sub>    | Forward Voltage, I <sub>F</sub> = 5 mA   |                 | 1.1  | 1.4  | V     |
|             | I <sub>R</sub>    | Reverse Current, V <sub>R</sub> = 5 V  |                 |      | 5.0  | μA    |
| MOS FET     | I <sub>LOFF</sub> | Off-State Leakage Current, V <sub>D</sub> = 40 V   |                 | 0.1  | 1    | nA    |
|             | C <sub>out</sub>  | Output Capacitance, V <sub>D</sub> = 0 V, f = 1 MHz  |                 | 11.5 |      | pF    |
|             | R <sub>ON</sub>   | On-State Resistance, I <sub>F</sub> = 5 mA, I <sub>L</sub> = 250 mA  |                 | 1.1  | 1.6  | Ω     |
|             | t <sub>ON</sub>   | Turn-on Time, I <sub>F</sub> = 5 mA, V <sub>O</sub> = 5 V, R <sub>L</sub> = 500 Ω, P <sub>W</sub> ≥ 10 ms  |                 | 0.1  | 0.5  | ms    |
|             | t <sub>OFF</sub>  | Turn-off Time, I <sub>F</sub> = 5 mA, V <sub>O</sub> = 5 V, R <sub>L</sub> = 500 Ω, P <sub>W</sub> ≥ 10 ms |                 | 0.08 | 0.50 | ms    |
|             | R <sub>I-O</sub>  | Isolation Resistance, V <sub>I-O</sub> = 0.5 k VDC   | 10 <sup>9</sup> |      |      | Ω     |
|             | C <sub>I-O</sub>  | Isolation Capacitance, V = 0 V, f = 1 MHz  |                 | 0.3  |      | pF    |
|             | ERT               | Equivalent Rise Time, I <sub>F</sub> = 10 mA, t <sub>r</sub> (in) = 25.0 ps, V = 250 mV, 50 Ω termination  |                 | 45   |      | ps    |

#### 1. Test Circuit for Switching Time



2. The turn-on time and turn-off time are specified as input-pulse width ≥ 10 ms. Please note that when the device operates with an input-pulse of under 10 ms, the turn-on time and turn-off time will increase

**ABSOLUTE MAXIMUM RATINGS<sup>1</sup>** (TA = 25°C)

| SYMBOLS | PARAMETERS                     | RATINGS                           | UNITS  |
|---------|--------------------------------|-----------------------------------|--------|
| Diode   | IF                             | Forward Current (DC)              | 50 mA  |
|         | VR                             | Reverse Voltage                   | 5.0 V  |
|         | PD                             | Power Dissipation                 | 50 mW  |
|         | IFP                            | Peak Forward Current <sup>2</sup> | 1 A    |
| MOS FET | VL                             | Break Down Voltage                | 40 V   |
|         | IL                             | Continuous Load Current           | 250 mA |
|         | ILP                            | Pulse Load Current <sup>3</sup>   | 500 mA |
|         | PD                             | Power Dissipation                 | 100 mW |
| Viso    | Isolation Voltage <sup>4</sup> | 500 V <sub>rms</sub>              |        |
| PT      | Total Power Dissipation        | 150 mW                            |        |
| TA      | Operating Ambient Temp.        | -40 to +85                        | °C     |
| TSTG    | Storage Temperature            | -40 to +100                       | °C     |

Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.
2. PW = 100 μs, Duty Cycle = 1 %
3. PW = 100 ms, 1 shot
4. AC voltage for 1 minute at TA = 25°C, RH = 60% between input and output

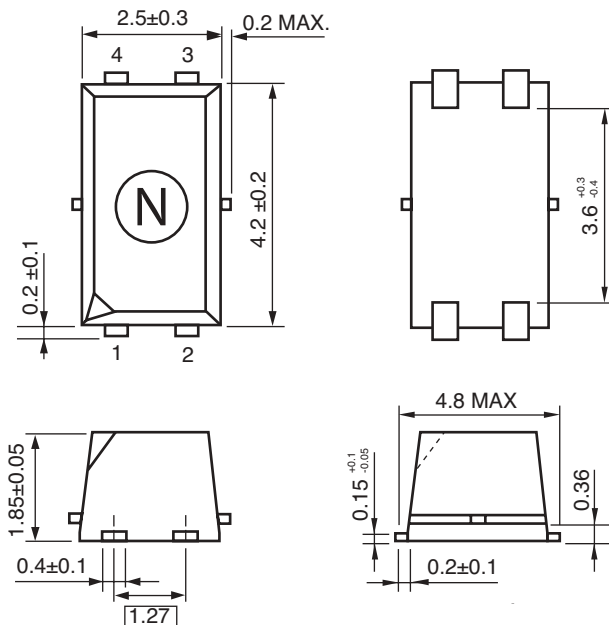
**ORDERING INFORMATION**

| PART NUMBER  | PACKAGE    | PACKING STYLE           |
|--------------|------------|-------------------------|
| PS7802-1A-F3 | 4-PIN SSOP | Embossed Tape 3 500 pcs |
| PS7802-1A-F4 |            |                         |

**RECOMMENDED OPERATING CONDITIONS** (TA = 25°C)

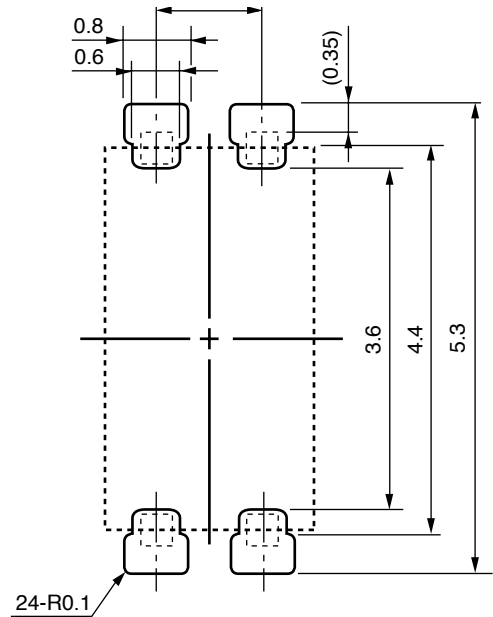
| SYMBOL | PARAMETER             | UNITS | MIN | TYP | MAX |
|--------|-----------------------|-------|-----|-----|-----|
| IF     | LED Operating Current | IF    | 2   | 5   | 20  |
| VF     | LED Off Voltage       | VF    | 0   |     | 0.5 |

**OUTLINE DIMENSIONS** (Units in mm)

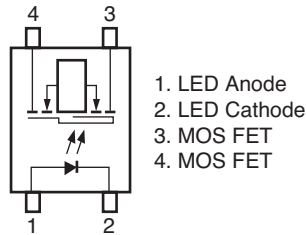


**RECOMMENDED MOUNT PAD DIMENSIONS**

(Units in mm)



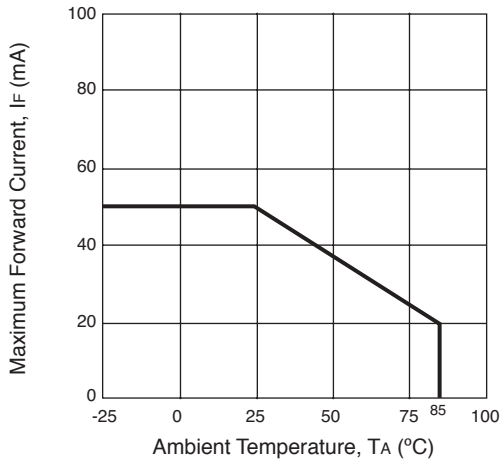
TOP VIEW



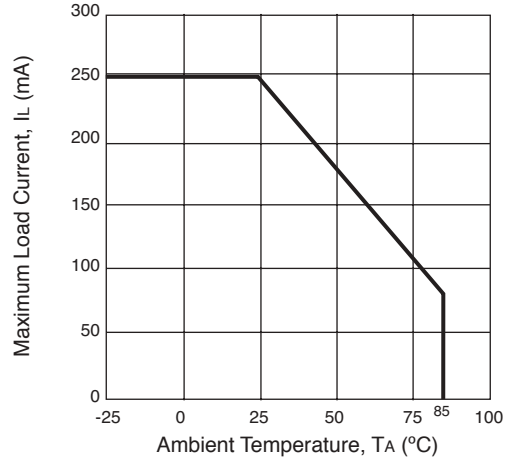
1. LED Anode
2. LED Cathode
3. MOS FET
4. MOS FET

**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ )

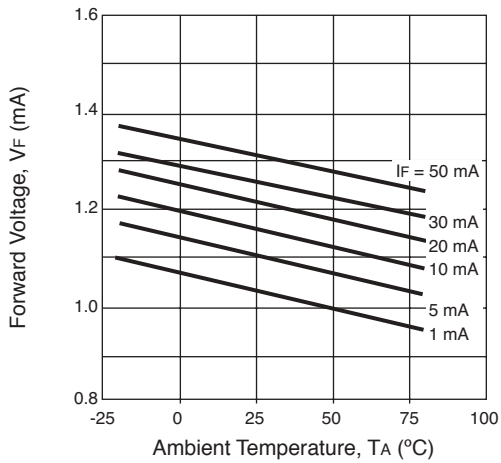
**MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE**



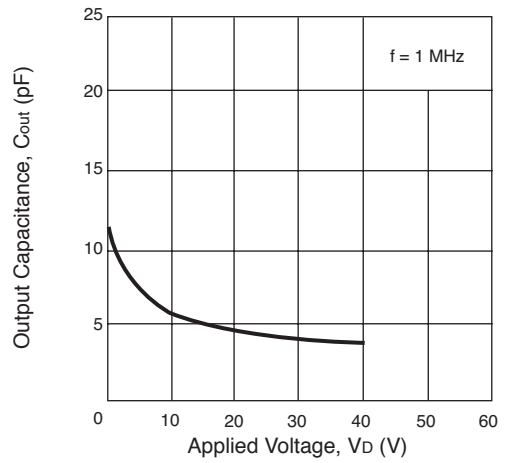
**MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE**



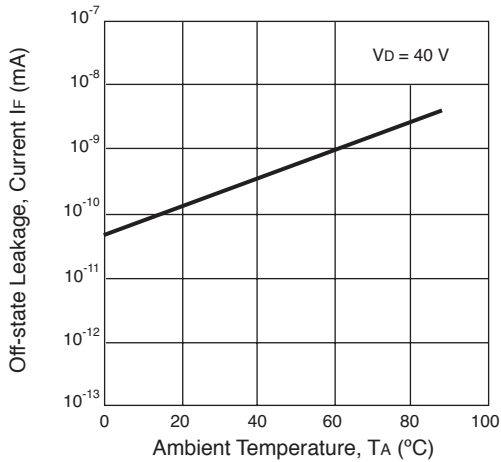
**FORWARD VOLTAGE vs. AMBIENT TEMPERATURE**



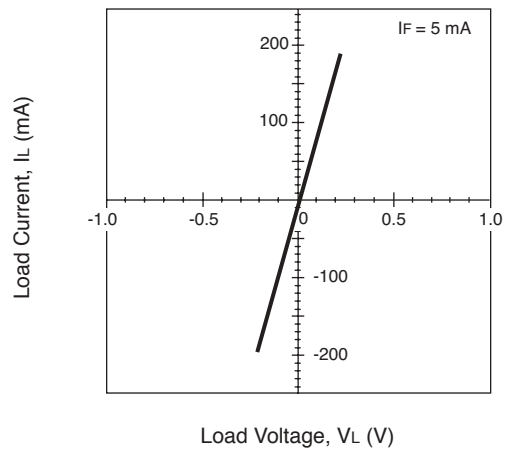
**OUTPUT CAPACITANCE vs. APPLIED VOLTAGE**



**OFF-STATE LEAKAGE CURRENT vs. AMBIENT TEMPERATURE**

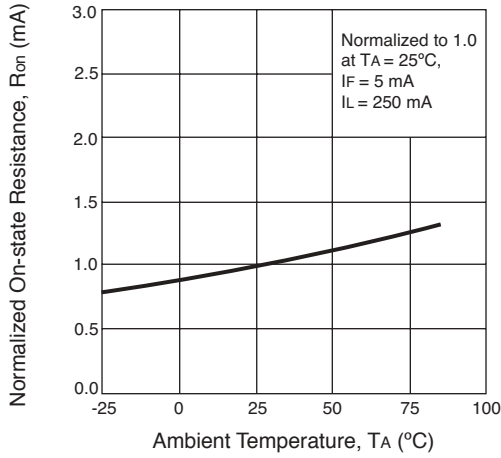


**LOAD CURRENT vs. LOAD VOLTAGE**

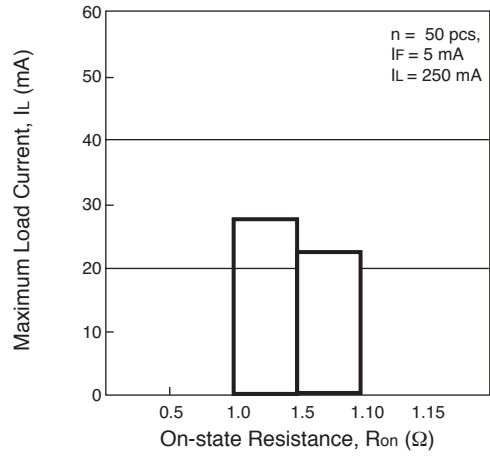


TYPICAL CHARACTERISTICS (TA = 25°C)

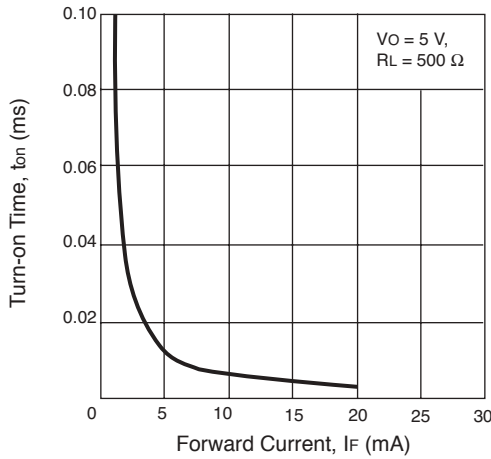
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



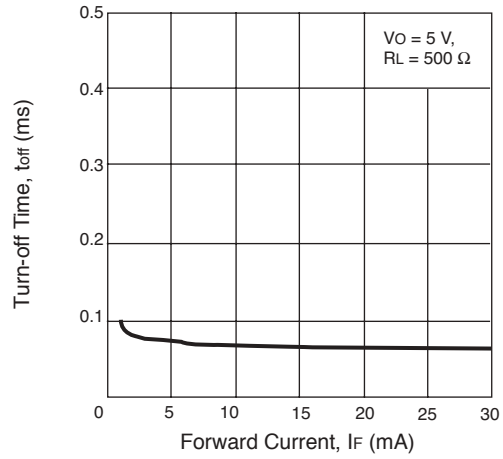
ON-STATE RESISTANCE DISTRIBUTION



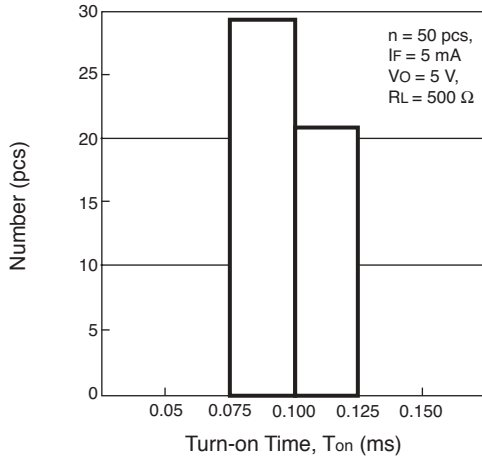
TURN-ON TIME vs. FORWARD CURRENT



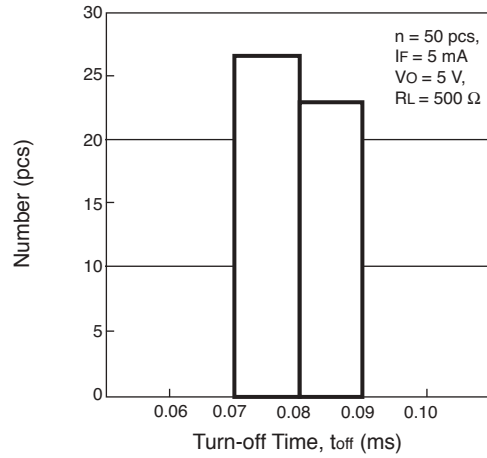
TURN-ON TIME vs. FORWARD CURRENT



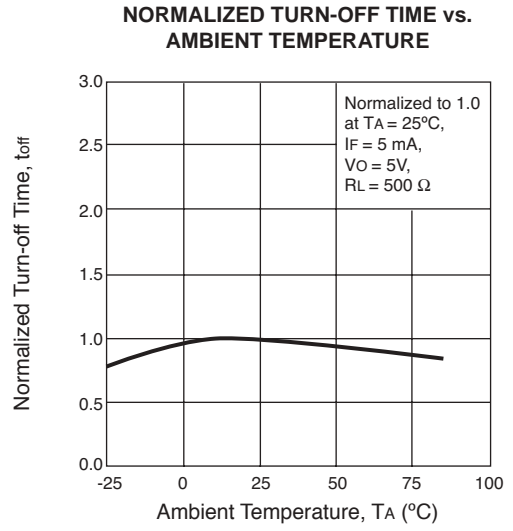
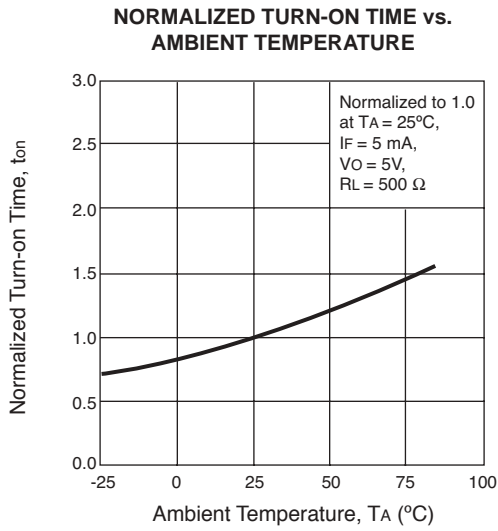
TURN-ON TIME DISTRIBUTION



TURN-OFF TIME DISTRIBUTION

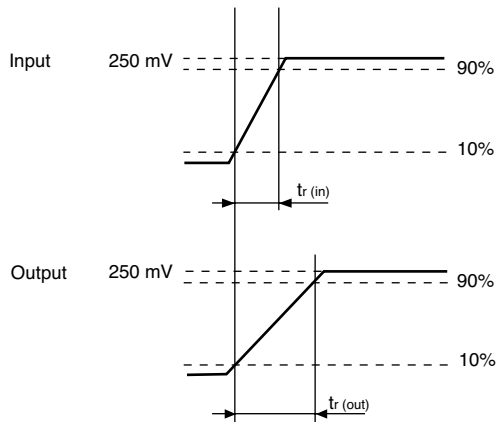


**TYPICAL CHARACTERISTICS** (TA = 25°C)



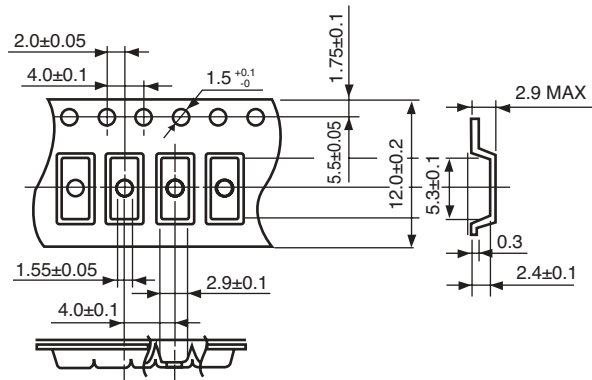
**ERT (Equivalent Rate Time) measurement**

$$ERT = \sqrt{tr(out)^2 - tr(in)^2}$$

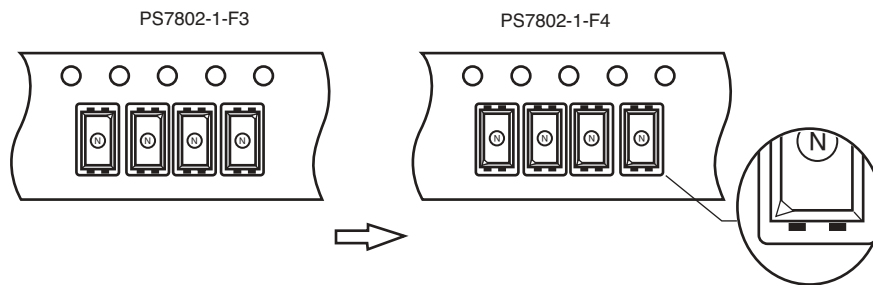


**TAPING SPECIFICATIONS** (Units in mm)

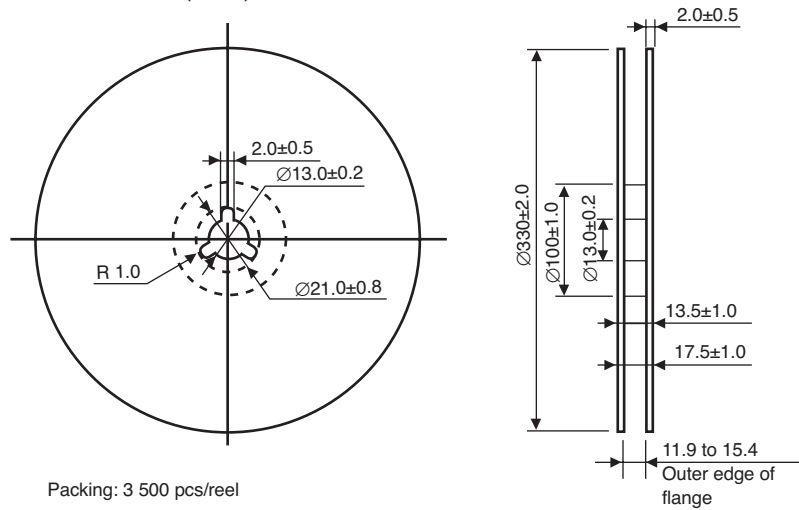
Outline and Dimensions (Tape)



Tape Direction



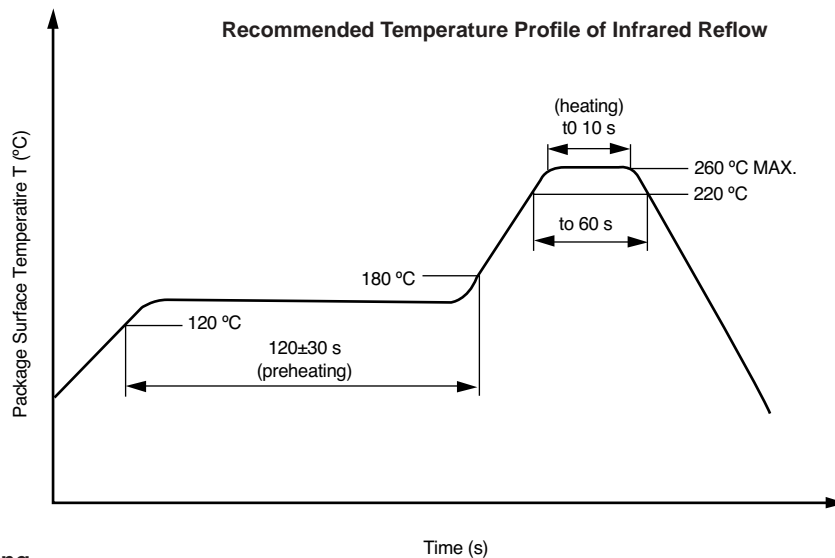
Outline and Dimensions (Reel)



## RECOMMENDED SOLDERING CONDITIONS

### (1) Infrared reflow soldering

- **Peak reflow temperature**  
260 °C (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 max. chlorine content of 0.2 Wt % is recommended)



### (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 max. chlorine content of 0.2 Wt % is recommended.)

### (3) Cautions

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

#### Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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