

## 8 PIN DIP 400 V BREAKDOWN VOLTAGE TRANSFER TYPE 2-CH OPTICAL COUPLED MOSFET

**PS7141-1C**  
**PS7141L-1C**

### FEATURES

- **2 CHANNEL TYPE:**  
(1a + 1b output)
- **LOW LED OPERATING CURRENT:**  
 $I_F = 2 \text{ mA}$
- **DESIGNED FOR AC/DC SWITCHING LINE CHANGER**
- **SMALL PACKAGE:**  
8 pin DIP
- **LOW OFFSET VOLTAGE**
- **SURFACE MOUNT AVAILABLE:**  
PS7141L-1C

### DESCRIPTION

The PS7141-1C and PS7141L-1C are transfer type solid state relays containing normally open (N.O.) contacts and normally closed (N.C.) contacts on the output side. They are suitable for analog signal control because of their low offset and high linearity.

### APPLICATIONS

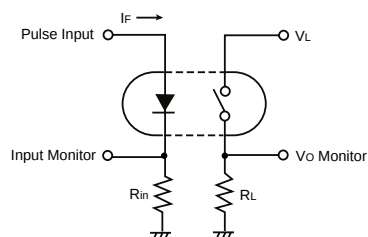
- EXCHANGE EQUIPMENT
- MEASUREMENT EQUIPMENT
- FA/OA EQUIPMENT

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

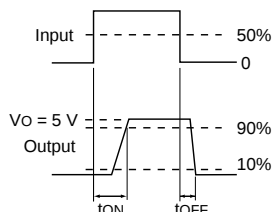
| PART NUMBER |                         |                                                               |                                                                                                             |       | PS7141-1C, PS7141L-1C |           |     |
|-------------|-------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------|-----------------------|-----------|-----|
| SYMBOLS     |                         | PARAMETERS                                                    |                                                                                                             | UNITS | MIN                   | TYP       | MAX |
| Diode       | V <sub>F</sub>          | Forward Voltage, I <sub>F</sub> = 10 mA                       |                                                                                                             | V     |                       | 1.2       | 1.4 |
|             | I <sub>R</sub>          | Reverse Current, V <sub>R</sub> = 5 V                         |                                                                                                             | μA    |                       |           | 5.0 |
| MOSFET      | I <sub>OFF</sub>        | Off-State Leakage Current,                                    | N.O.: I <sub>F</sub> = 0 mA, V <sub>D</sub> = 400 V<br>N.C.: I <sub>F</sub> = 10 mA, V <sub>D</sub> = 400 V | μA    |                       | 0.03      | 1.0 |
|             | C <sub>out</sub>        | Output Capacitance,                                           | N.O.: V <sub>D</sub> = 0 V, f = 1 MHz<br>N.C.: V <sub>D</sub> = 0 V, f = 1 MHz, I <sub>F</sub> = 10 mA      | pF/ch |                       | 65<br>185 |     |
|             |                         |                                                               |                                                                                                             |       |                       |           |     |
|             |                         |                                                               |                                                                                                             |       |                       |           |     |
| Coupled     | I <sub>Fon</sub>        | LED On-state Current,                                         | N.O.: I <sub>L</sub> = 150 mA                                                                               | mA    |                       |           | 2.0 |
|             | I <sub>Foff</sub>       | LED Off-state Current,                                        | N.C.: I <sub>L</sub> = 150 mA                                                                               |       |                       |           | 2.0 |
|             | R <sub>ON1</sub>        | On-State Resistance,                                          | N.O.: I <sub>F</sub> = 10 mA, I <sub>L</sub> = 10 mA                                                        | Ω     |                       | 20        | 30  |
|             |                         |                                                               | N.C.: I <sub>F</sub> = 0 mA, I <sub>L</sub> = 10 mA                                                         |       |                       | 24        | 30  |
|             | R <sub>ON2</sub>        |                                                               | N.O.: I <sub>F</sub> = 10 mA, I <sub>L</sub> = 150 mA, t≤10 ms                                              |       |                       | 16        | 25  |
|             |                         |                                                               | N.C.: I <sub>F</sub> = 0 mA, I <sub>L</sub> = 150 mA, t≤10 ms                                               |       |                       | 16        | 25  |
|             | t <sub>ON</sub> (N.O.)  | Turn-on Time <sup>1</sup>                                     | I <sub>F</sub> = 10 mA, V <sub>O</sub> = 5 V, P <sub>W</sub> ≥ 10 ms                                        | ms    |                       | 0.33      | 1.0 |
|             | t <sub>ON</sub> (N.C.)  |                                                               |                                                                                                             |       |                       | 0.02      | 0.2 |
|             | t <sub>OFF</sub> (N.O.) | Turn-off Time <sup>1</sup>                                    |                                                                                                             |       |                       | 0.03      | 0.2 |
|             | t <sub>OFF</sub> (N.C.) |                                                               |                                                                                                             |       |                       | 0.20      | 1.0 |
|             | R <sub>I-O</sub>        | Isolation Resistance, V <sub>I-O</sub> = 1.0 kV <sub>DC</sub> |                                                                                                             | Ω     | 10 <sup>9</sup>       |           |     |
|             | C <sub>I-O</sub>        | Isolation Capacitance, V = 0 V, f = 1 MHz                     |                                                                                                             | pF/ch |                       | 1.1       |     |

Notes:

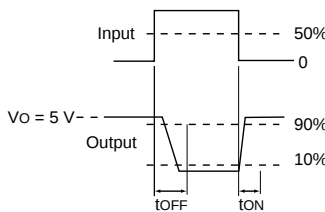
1. Test Circuit Switching Time:



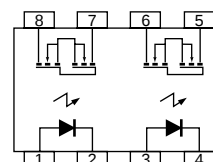
**N.O. (between pin 5 and 6)**



**N.C. (between pin 7 and 8)**



**PS7141-1C, PS7141L-1C**



PS7141-1C, PS7141L-1C

ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (T<sub>A</sub> = 25°C)

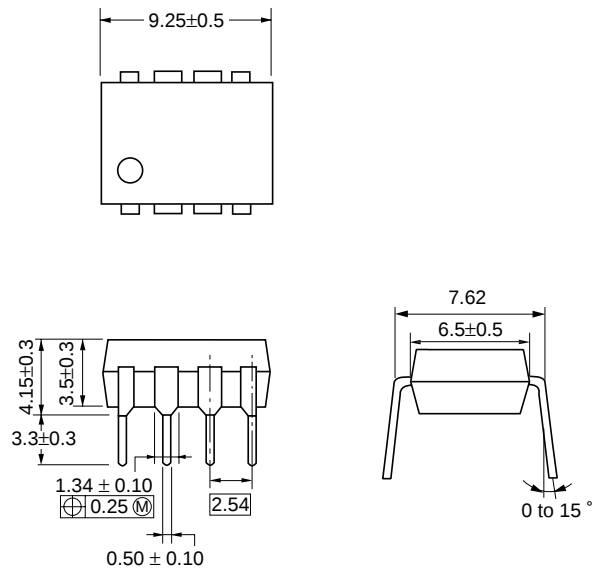
| SYMBOLS          | PARAMETERS                                          | UNITS   | RATINGS     |
|------------------|-----------------------------------------------------|---------|-------------|
| Diode            |                                                     |         |             |
| I <sub>F</sub>   | Forward Current (DC)                                | mA      | 50          |
| V <sub>R</sub>   | Reverse Voltage                                     | V       | 5.0         |
| P <sub>D</sub>   | Power Dissipation                                   | mW/ch   | 50          |
| I <sub>FP</sub>  | Peak Foward Current <sup>2</sup>                    | A       | 1           |
| MOSFET           |                                                     |         |             |
| V <sub>L</sub>   | Break Down Voltage                                  | V       | 400         |
| I <sub>L</sub>   | Continuous Load Current                             | mA      | 150         |
| I <sub>LP</sub>  | Pulse Load Current <sup>3</sup><br>AC/DC Connection | mA      | 300         |
| P <sub>D</sub>   | Power Dissipation                                   | mW/ch   | 375         |
| BV               | Isolation Voltage <sup>4</sup>                      | Vr.m.s. | 1500        |
| P <sub>T</sub>   | Total Power Dissipation                             | mW      | 850         |
| T <sub>A</sub>   | Operating Ambient Temp.                             | °C      | -40 to +80  |
| T <sub>STG</sub> | Storage Temperature                                 | °C      | -40 to +100 |

Notes:

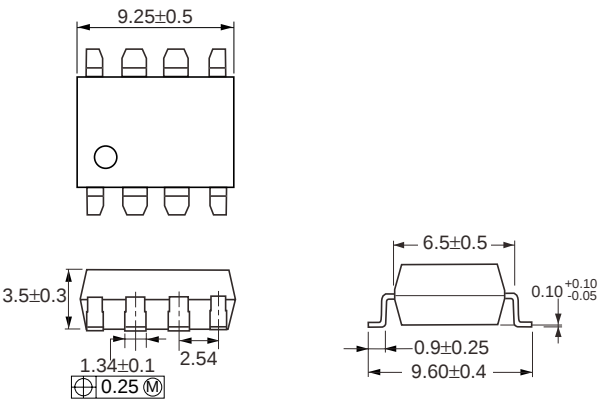
1. Operation in excess of any one of these parameters may result in permanent damage.
2. PW = 100 μs, Duty Cycle = 1 %.
3. PW = 100 ms, 1 shot.
4. AC voltage for 1 minute at T<sub>A</sub> = 25 °C, RH = 60 % between input and output.

OUTLINE DIMENSIONS (Units in mm)

PS7141-1C

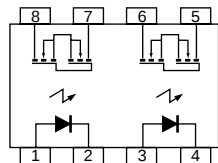


PS7141L-1C



PIN CONNECTION (Top View)

PS7141-1C, PS7141L-1C



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

RECOMMENDED  
OPERATING CONDITIONS (T<sub>A</sub> = 25°C)

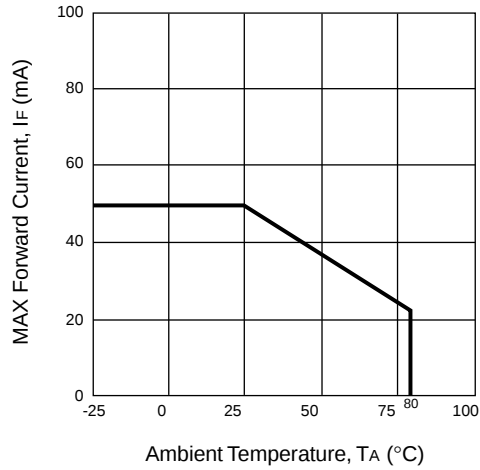
| PART NUMBER    |                       | PS7141-1C,PS7141L-1C |     |     |     |
|----------------|-----------------------|----------------------|-----|-----|-----|
| SYMBOLS        | PARAMETERS            | UNITS                | MIN | TYP | MAX |
| I <sub>F</sub> | LED Operating Current | mA                   | 2   | 10  | 20  |
| V <sub>F</sub> | LED Off Voltage       | V                    | 0   |     | 0.5 |

ORDERING INFORMATION

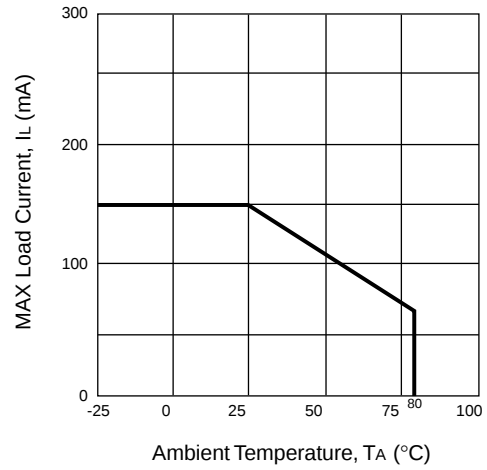
| PART NUMBER   | PACKAGE   | PACKING STYLE               |
|---------------|-----------|-----------------------------|
| PS7141-1C     | 8-PIN DIP | Magazine case 50 pcs        |
| PS7141L-1C    |           |                             |
| PS7141L-1C-E3 |           | Embossed Tape 1000 pcs/reel |
| PS7141L-1C-E4 |           |                             |

# TYPICAL PERFORMANCE CURVES ( $T_A = 25\text{ }^{\circ}\text{C}$ )

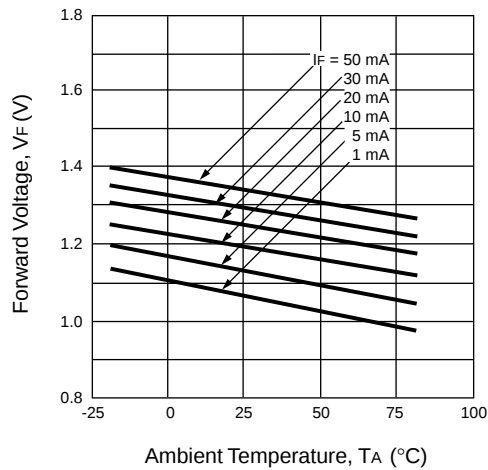
**MAX FORWARD CURRENT  
vs. AMBIENT TEMPERATURE**



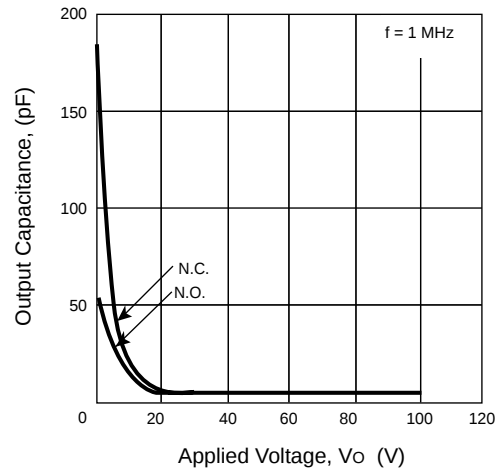
**MAX LOAD CURRENT  
vs. AMBIENT TEMPERATURE**



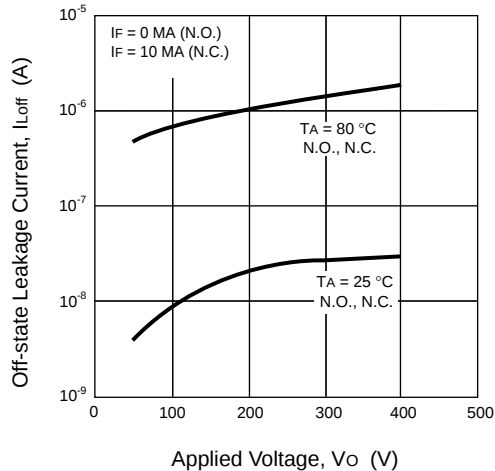
**FORWARD VOLTAGE vs.  
AMBIENT TEMPERATURE**



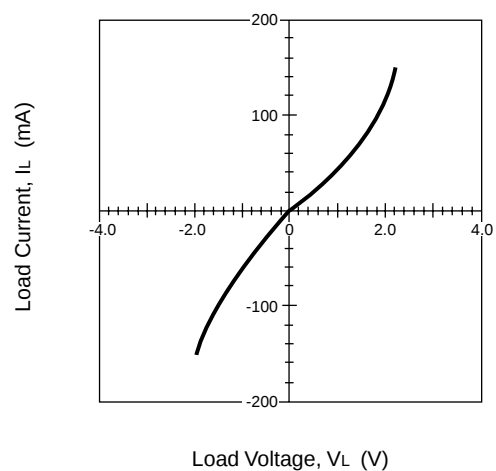
**OUTPUT CAPACITANCE  
vs. APPLIED VOLTAGE**



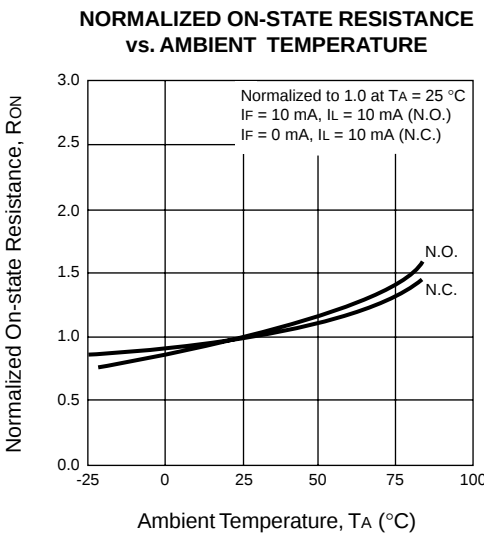
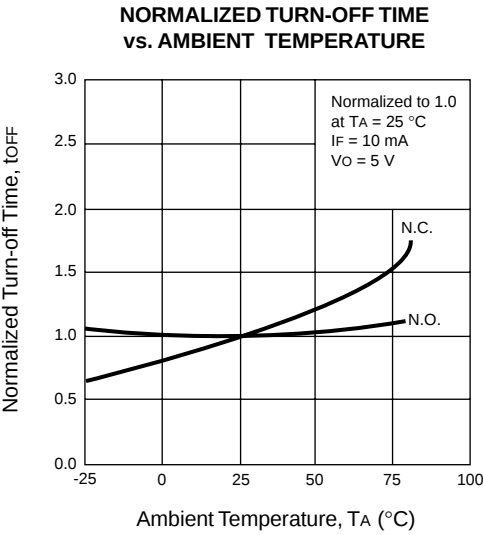
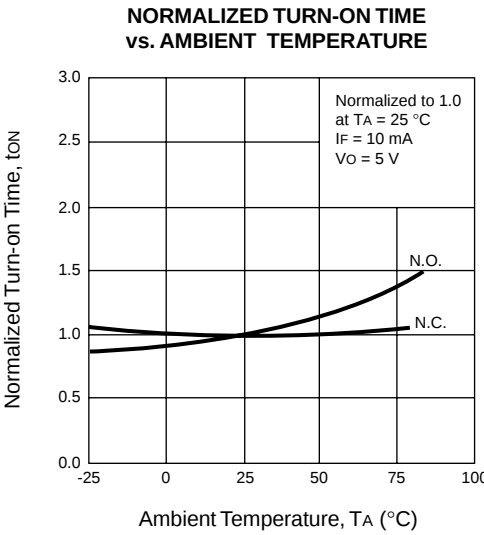
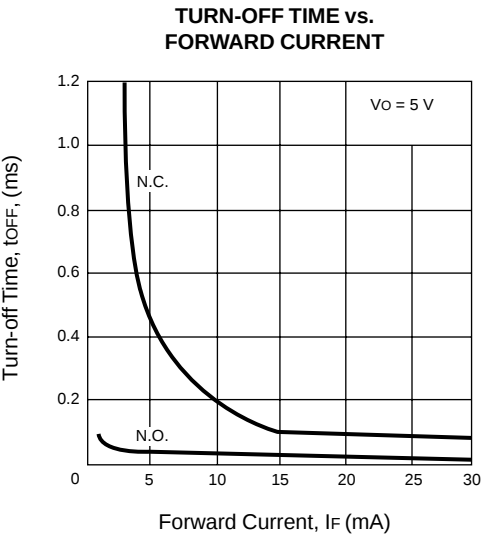
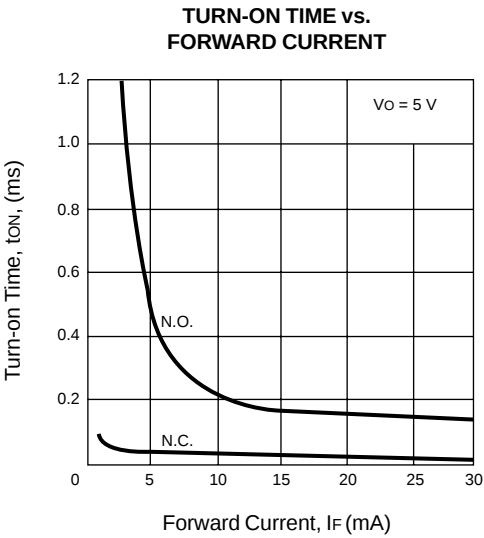
**OFF-STATE LEAKAGE CURRENT  
vs. APPLIED VOLTAGE**

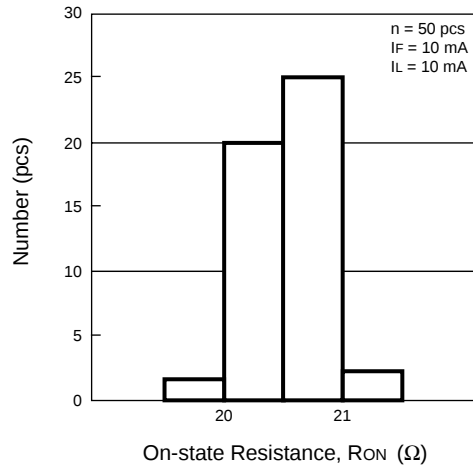
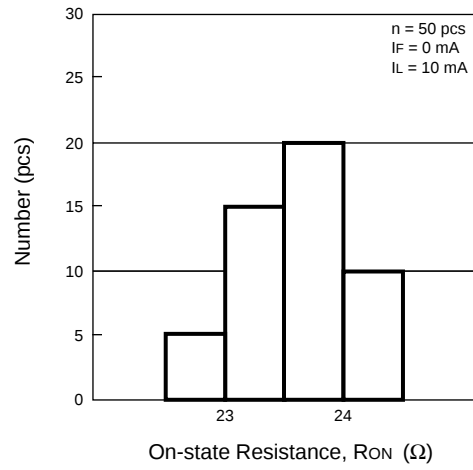
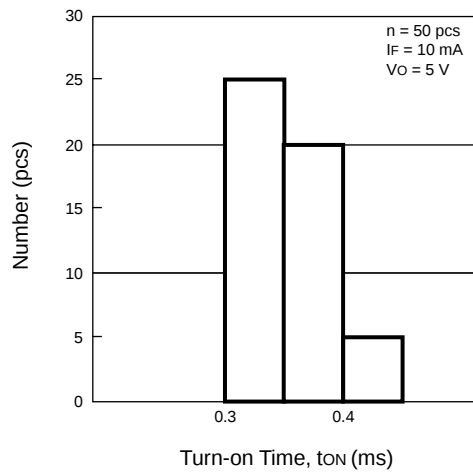
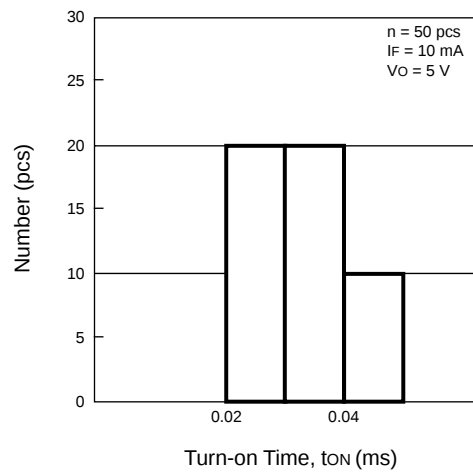
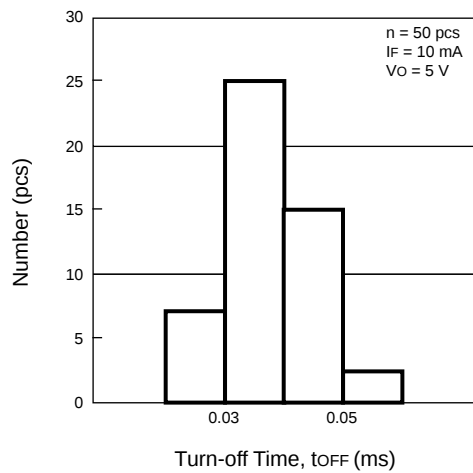
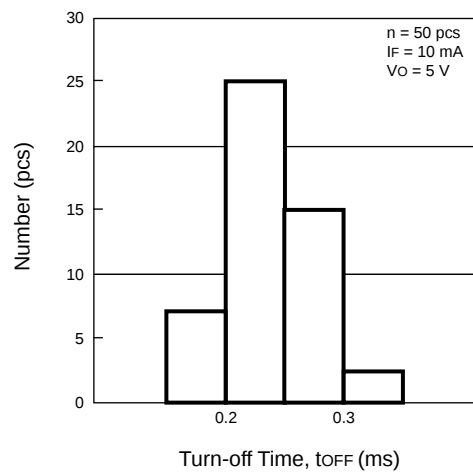


**LOAD CURRENT vs.  
LOAD VOLTAGE**



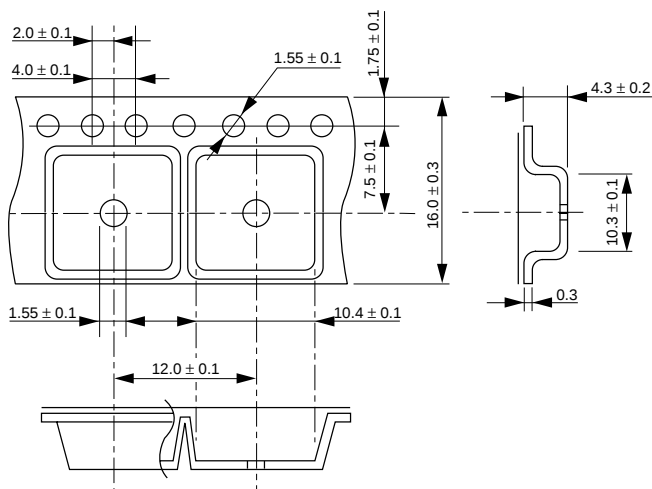
TYPICAL PERFORMANCE CURVES (T<sub>A</sub> = 25 °C)



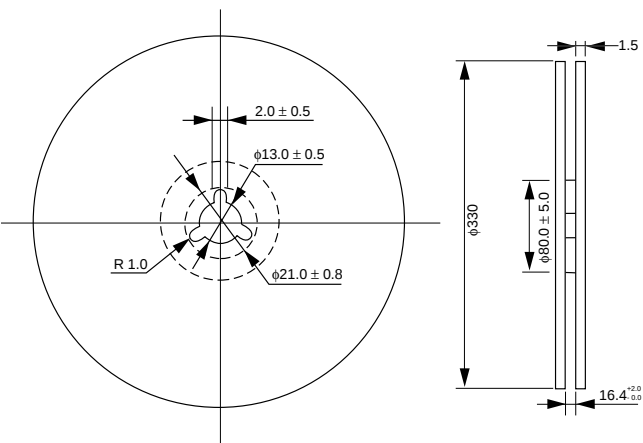
**TYPICAL PERFORMANCE CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$ )**ON-STATE RESISTANCE (N.O.)  
DISTRIBUTION****ON-STATE RESISTANCE (N.C.)  
DISTRIBUTION****TURN-ON TIME (N.O.) DISTRIBUTION****TURN-ON TIME (N.C.) DISTRIBUTION****TURN-OFF TIME (N.O.) DISTRIBUTION****TURN-OFF TIME (N.C.) DISTRIBUTION**

TAPING SPECIFICATIONS (Units in mm)

OUTLINE AND DIMENSIONS (TAPE)



OUTLINE AND DIMENSIONS (REEL)

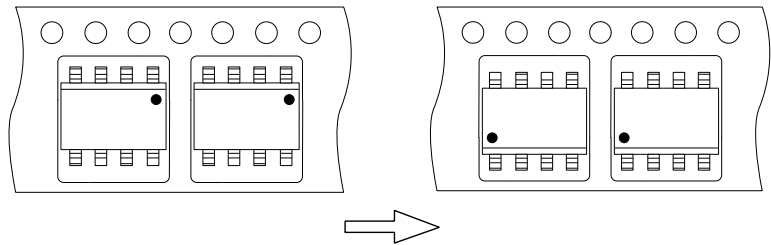


Packaging : 1000 pcs/reel

TAPING DIRECTION

PS7141L-1C-E3

PS7141L-1C-E4

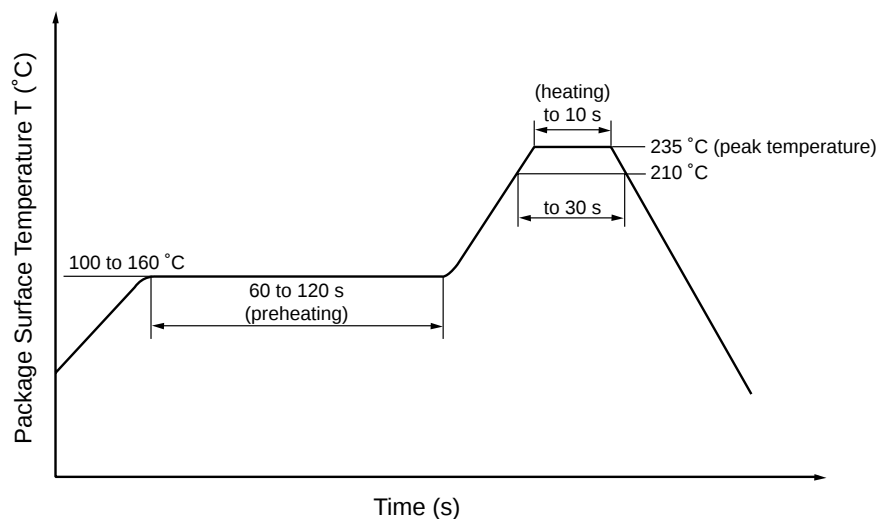


## RECOMMENDED SOLDERING CONDITIONS

### (1) Infrared reflow soldering

- Peak reflow temperature 235 °C or below (package surface temperature)
- Time of temperature higher than 210 °C 30 seconds or less
- Number of reflows Two
- 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 cleaning solvent.

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