NEC

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

PS7142-1C
PS7142L-1C

FEATURES

- **2 CHANNEL TYPE:**
  1a + 1b output
- **LOW LED OPERATING CURRENT:**
  I_F = 2 mA
- **DESIGNED FOR AC/DC SWITCHING LINE CHANGER**
- **SMALL PACKAGE:**
  8 Pin DIP
- **LOW OFFSET VOLTAGE**
- **SURFACE MOUNT TYPE LEAD AVAILABLE:**
  PS7142L-1C

DESCRIPTION

PS7142-1C and PS7142L-1C are transfer type solid state relays containing normally open (N.O.) contacts and normally closed contacts on the output side.

They are suitable for analog signal control because of their low offset and high linearity.

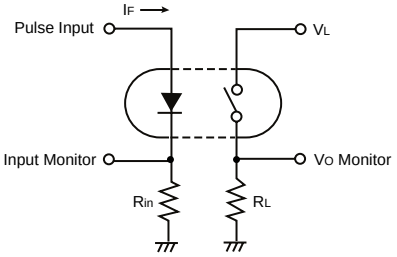
APPLICATIONS

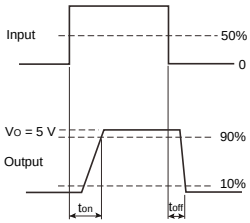
- **EXCHANGE EQUIPMENT**
- **MEASUREMENT EQUIPMENT**
- **FA/OA EQUIPMENT**

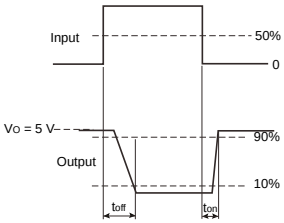
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER					PS7142-1C, PS7142L-1C		
	SYMBOLS	PARAMETERS		UNITS	MIN	TYP	MAX
Diode	V_F	Forward Voltage, I_F = 10 mA		V		1.2	1.4
Diode	I_R	Reverse Current, V_R = 5 V		µA			5.0
MOSFET	I_{Loff}	Off-State Leakage Current,	N.O.: I_F = 0 mA, V_D = 400 V	µA		0.03	1.0
			N.C.: I_F = 10 mA, V_D = 400 V				
	C_{OUT}	Output Capacitance,	N.O.: V_D = 0 V, f = 1 MHz	pF/ch		140	
			N.C.: I_F = 10 mA, V_D = 0 V, f = 1 MHz	pF/ch		430	
Coupled	I_{Fon}	LED On-state Current, N.O.: I_L = 200 mA		mA			2.0
Coupled	I_{Foff}	LED Off-state Current, N.C.: I_L = 200 mA		mA			2.0
Coupled	R_{on1}	On-State Resistance,	N.O.: I_F = 10 mA, I_L = 10 mA	Ω		8	12
			N.C.: I_F = 0 mA, I_L = 10 mA			7	12
	R_{on2}		N.O.: I_F = 10 mA, I_L = 200 mA, t ≤10 ms			7	10
			N.C.: I_F = 0 mA, I_L = 200 mA, t ≤10 ms			7	10
Coupled	t_{on} (N.O.)	Turn-On Time[1], I_F = 10 mA, V_O = 5 V, PW ≥ 10 ms		ms		0.3	2.0
Coupled	t_{on} (N.C.)					0.03	0.2
Coupled	t_{off} (N.O.)	Turn-Off Time[1], I_F = 10 mA, V_O = 5 V, PW ≥ 10 ms		ms		0.03	0.2
Coupled	t_{off} (N.C.)					0.6	2.0
Coupled	R_{I-O}	Isolation Resistance, V_{in-out} = 1.0 kV_{DC}		Ω	10^9		
Coupled	C_{I-O}	Isolation Capacitance, V = 0 V, f = 1 MHz		pF/ch		1.1	

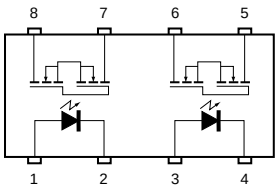
Note:
1. Test circuit for Switching Time







PS7142-1C, PS7142L-1C



ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS		PARAMETERS	UNITS	RATINGS
Diode				
	V_R	Reverse Voltage	V	5
	I_F	Forward Current (DC)	mA	50
	P_D	Power Dissipation	mW/ch	50
	I_{FP}	Peak Forward Current[2]	A	1
MOSFET	V_L	Break Down Voltage	V	400
	I_L	Continuous Load Current	mA	200
	I_{LP}	Pulse Load Current[3] (AC/DC Connection)	mA	400
	P_D	Power Dissipation	mW/ch	375
BV		Isolation Voltage[4]	Vr.m.s.	1500
P_T		Total Power Dissipation	mW	850
T_A		Operating Ambient Temp.	°C	-40 to +80
T_{STG}		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_A = 25 °C, RH = 60% between input and output.

RECOMMENDED OPERATING CONDITIONS (T_A = 25 °C)

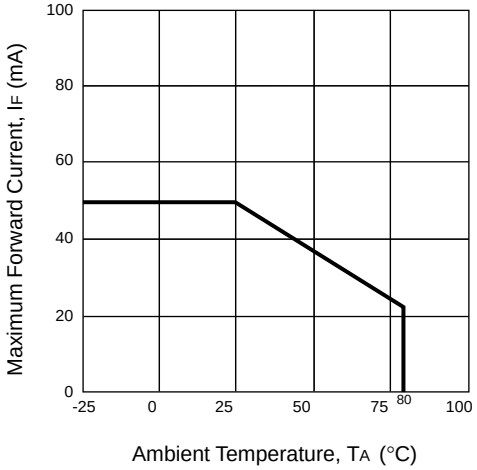
SYMBOL	PARAMETER	UNITS	MIN	TYP	MAX
I_F	LED Operating Current	mA	2	10	20
V_F	LED Off Voltage	V	0		0.5

ORDERING INFORMATION

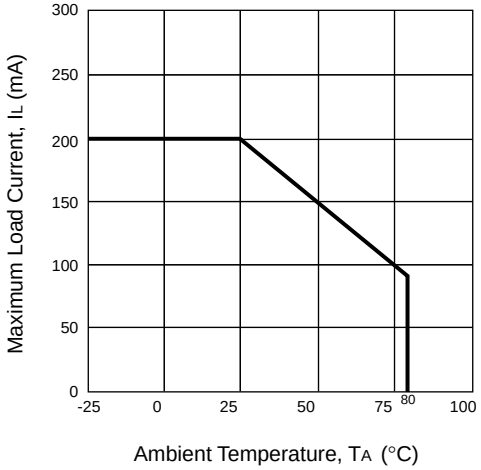
PART NUMBER	PACKAGE	PACKING STYLE
PS7142-1C	8 Pin DIP	Magazine case, 50 pcs
PS7142L-1C		
PS714L2-1C-E3		Embossed Tape, 1000 pcs/reel
PS7142L-1C-E4		

TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

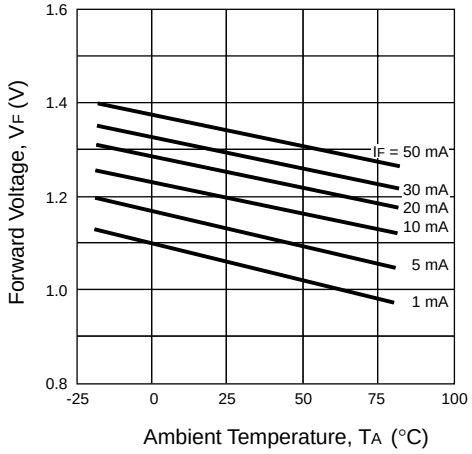
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



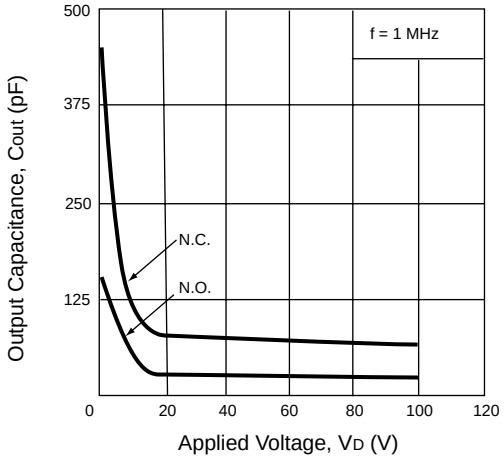
MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



FORWARD VOLTAGE vs. AMBIENT TEMPERATURE

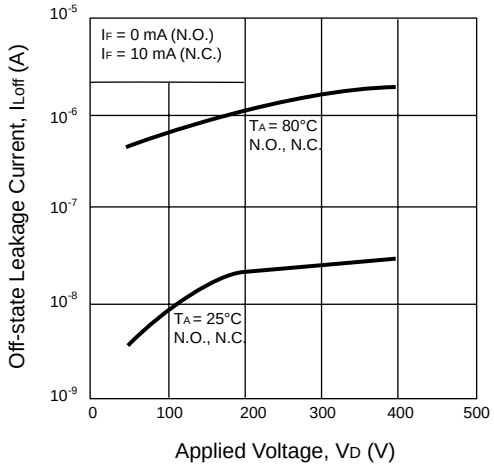


OUTPUT CAPACITANCE vs. APPLIED VOLTAGE

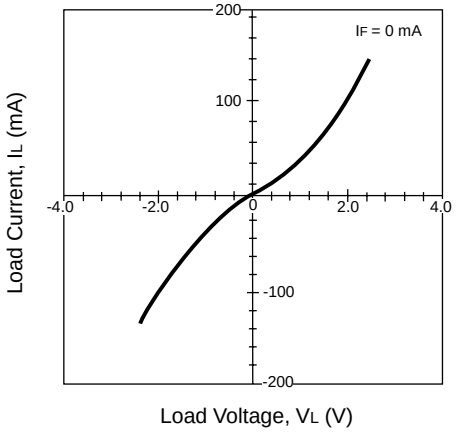


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

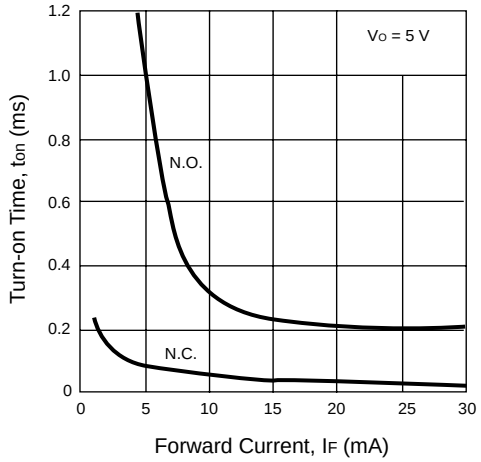
OFF-STATE LEAKAGE CURRENT vs. APPLIED VOLTAGE



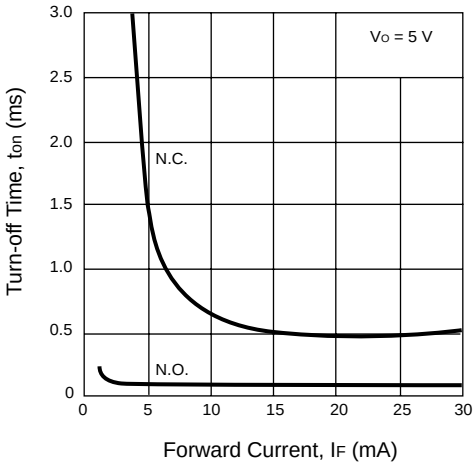
LOAD CURRENT vs. LOAD VOLTAGE



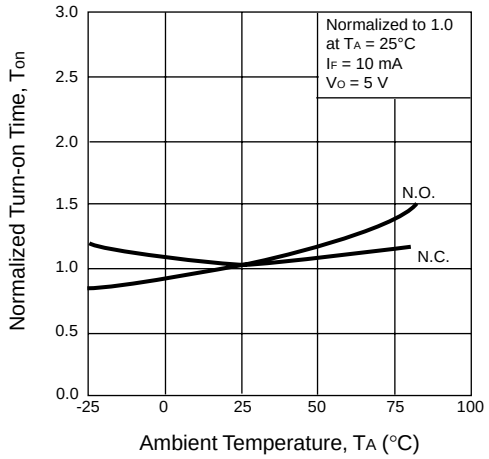
TURN-ON TIME vs. FORWARD CURRENT



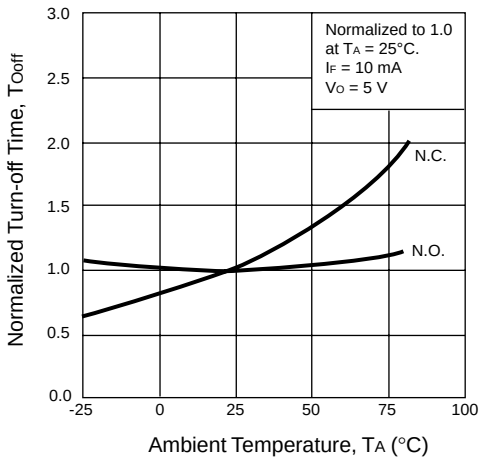
TURN-OFF TIME vs. FORWARD CURRENT



NORMALIZED TURN-ON TIME vs. AMBIENT TEMPERATURE

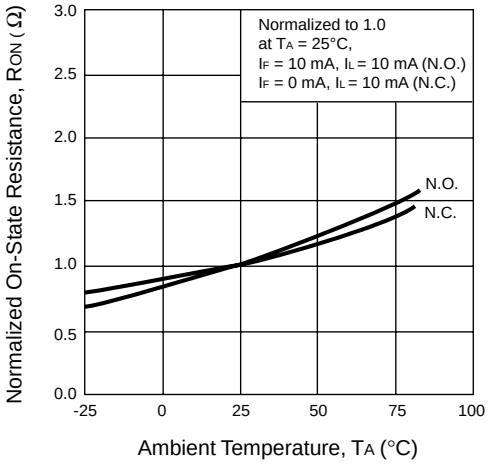


NORMALIZED TURN-OFF TIME vs. AMBIENT TEMPERATURE

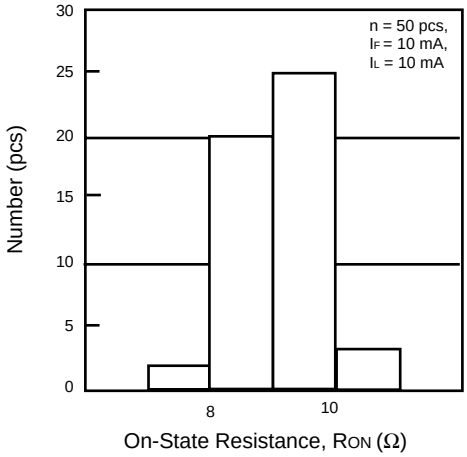


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

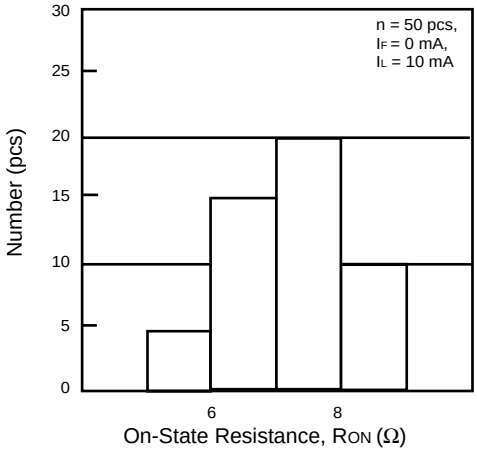
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



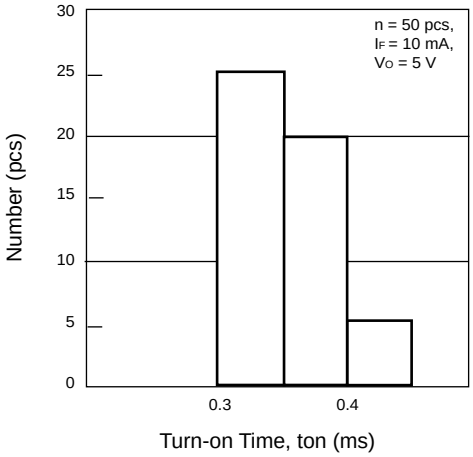
ON-STATE RESISTANCE (N.O.) DISTRIBUTION



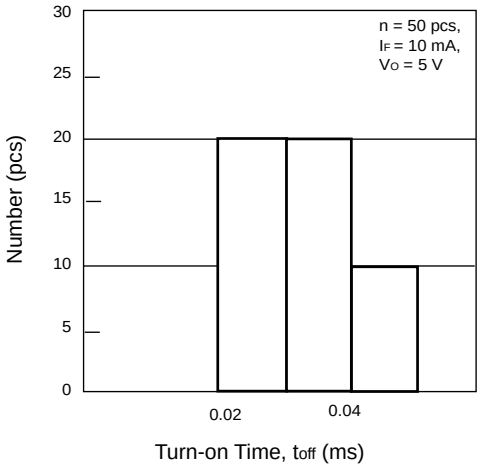
ON-STATE RESISTANCE (N.C.) DISTRIBUTION



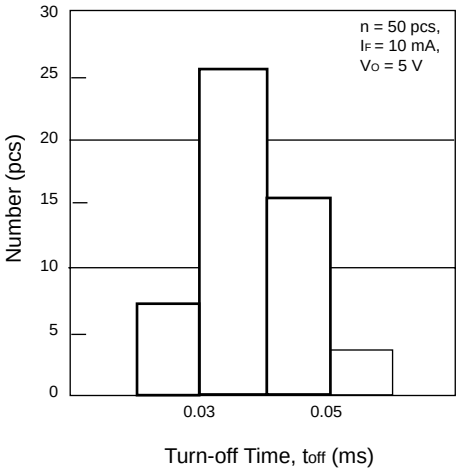
TURN-ON TIME (N.O.) DISTRIBUTION



TURN-ON TIME (N.C.) DISTRIBUTION

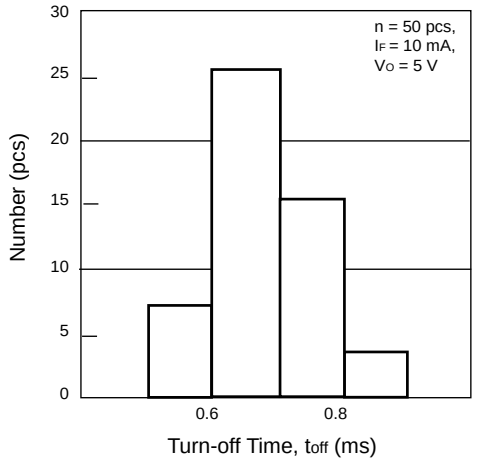


TURN-OFF TIME (N.O.) DISTRIBUTION



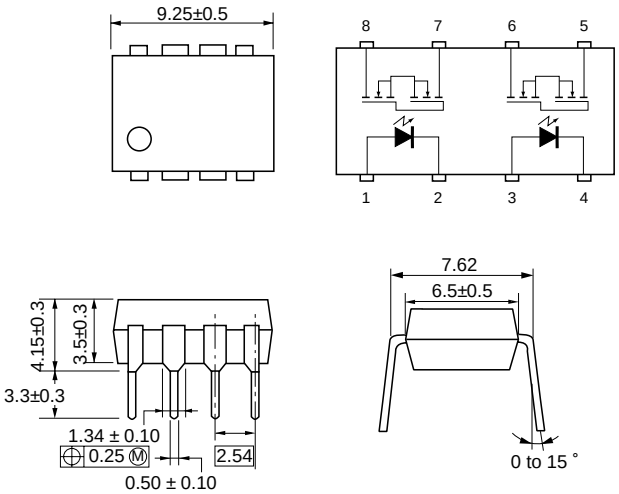
TYPICAL PERFORMANCE CURVES (TA = 25 °C)

TURN-OFF TIME (N.C.) DISTRIBUTION



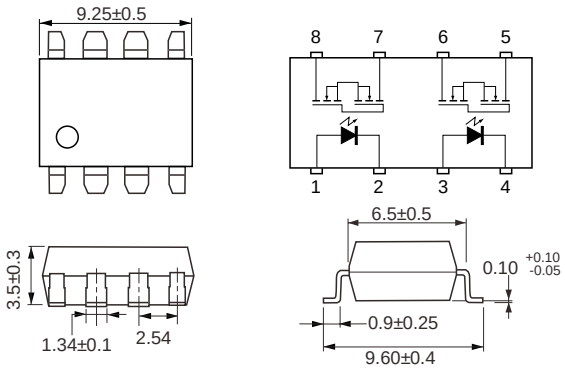
OUTLINE DIMENSIONS (Units in mm)

PS7142-1C



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

PS7142L-1C



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5. MOSFET (N.O.)
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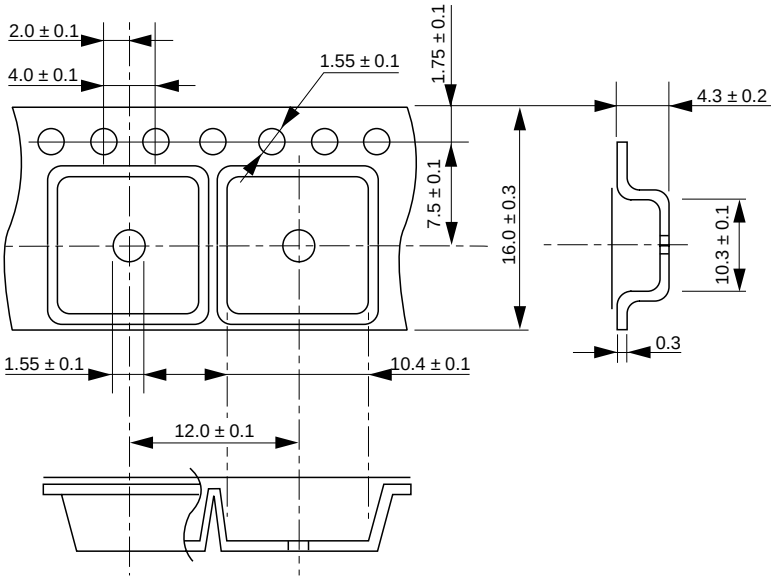
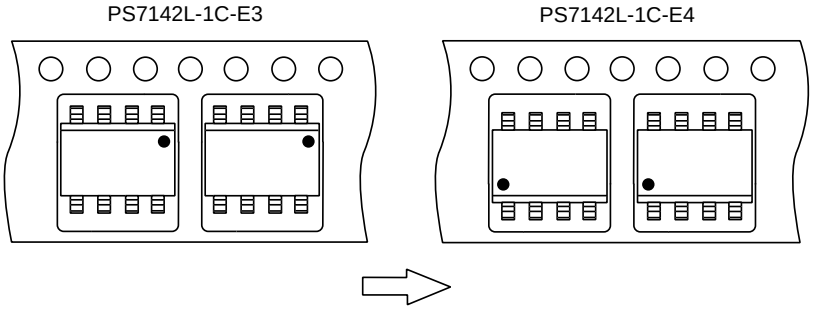
7. MOSFET (N.C.)
8. MOSFET (N.C.)

TAPING SPECIFICATIONS (Units in mm)

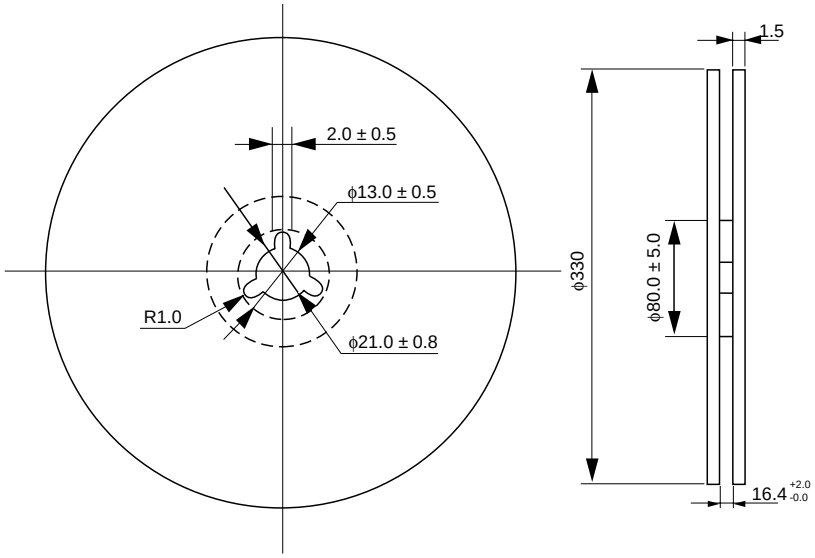
OUTLINE AND DIMENSIONS (TAPE)



TAPING DIRECTION



OUTLINE AND DIMENSIONS (REEL)



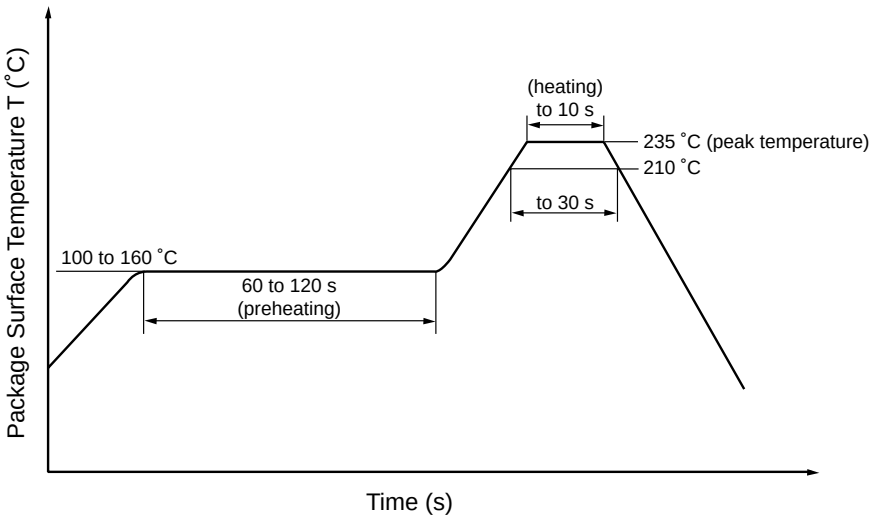
Packing : 1000 pcs/reel

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.