CEL

NEC's HIGH ISOLATION VOLTAGE SOP OPTOCOUPLER

PS2801-1 PS2801-4

FEATURES

- **HIGH ISOLATION VOLTAGE**
  BV: 2.5 k $V_{r.m.s.}$ MIN
- **HIGH COLLECTOR TO EMITTER VOLTAGE**
  V_{CEO} = 80 V
- **SMALL THIN PACKAGE**
  4, 16 Pin SOP, Lead pin pitch: 1.27 mm
- **HIGH SPEED SWITCHING**
  t_r = 3 μs, t_f = 5 μs TYP
- **TAPING PRODUCT NUMBER**
  PS2801-1-F3, PS2801-4-F3

DESCRIPTION

NEC's PS2801-1 and PS2801-4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor in a plastic SOP (Small Out-Line Package) for high density applications. Lead pin pitch is 1.27 mm. This package has a shield effect to cut off ambient light.

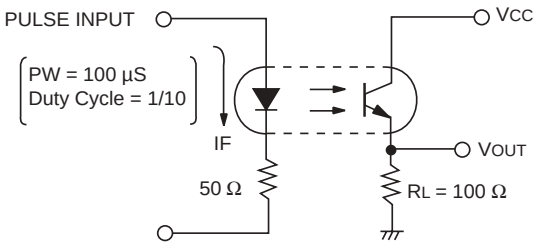
APPLICATIONS

- **PROGRAMMABLE LOGIC CONTROLLERS**
- **MEASURING INSTRUMENTS**
- **POWER SUPPLY**
- **HYBRID IC**

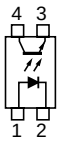
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER				PS2801-1, PS2801-4		
SYMBOLS		PARAMETERS	UNITS	MIN	TYP	MAX
Diode	V_F	Forward Voltage, I_F = 5 mA	V		1.1	1.4
	I_R	Reverse Current, V_R = 5 V	μA			5
	Ct	Terminal Capacitance, V = 0, f = 1.0 MHz	pF		30	
Transistor	I_{CEO}	Collector to Emitter Dark Current, V_{CE} = 80 V, I_F = 0 mA	nA			100
Coupled	CTR	Current Transfer Ratio, I_F = 5 mA, V_{CE} = 5 V	%	80		600
	$V_{CE(sat)}$	Collector Saturation Voltage, I_F = 10 mA, I_C = 2 mA	V			0.3
	R_{I-O}	Isolation Resistance, V_{in-out} = 1.0 kV_{DC}	Ω	10^{11}		
	C_{I-O}	Isolation Capacitance, V = 0, f = 1.0 MHz	pF		0.4	
	t_r	Rise Time[1], V_{CC} = 5 V, I_C = 2 mA, R_L = 100 Ω	μs		3	
	t_f	Fall Time[1], V_{CC} = 5 V, I_C = 2 mA, R_L = 100 Ω	μs		5	

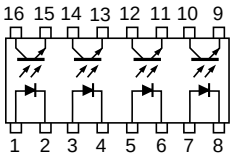
1. Test Circuit for Switching Time



PS2801-1



PS2801-4



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

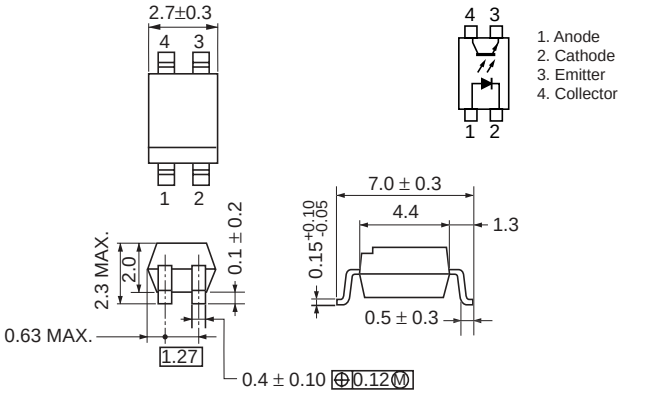
SYMBOLS	PARAMETERS	UNITS	RATINGS	
			PS2801-1	PS2801-4
Diode				
V_R	Reverse Voltage	V	6	6
I_F	Forward Current (DC)	mA	50	50
ΔP_D/°C	Power Dissipation Derating	mW/°C	0.6	0.8
P_D	Power Dissipation	mW/Ch	60	80
$I_{F(Peak)}$	Peak Forward Current PW = 100 μs, Duty Cycle 1%	A	1	1
Transistor				
V_{CEO}	Collector to Emitter Voltage	V	80	80
V_{ECO}	Emitter to Collector Voltage	V	6	6
I_C	Collector Current	mA/Ch	50	50
ΔP_C/°C	Power Dissipation Derating	mW/°C	1.2	1.2
P_C	Power Dissipation	mW/Ch	120	120
Coupled				
BV	Isolation Voltage[2]	$V_{r.m.s.}$	2500	
T_{STG}	Storage Temperature	°C	-55 to +150	
T_{OP}	Operating Temperature	°C	-55 to +100	

Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output.

OUTLINE DIMENSIONS (Units in mm)

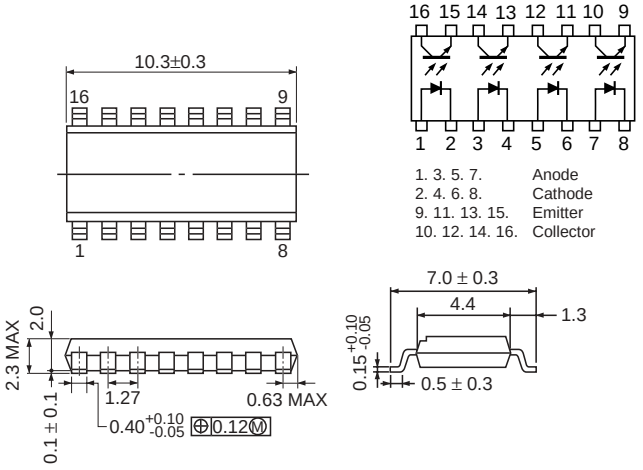
PS2801-1

PIN CONNECTION (Top View)



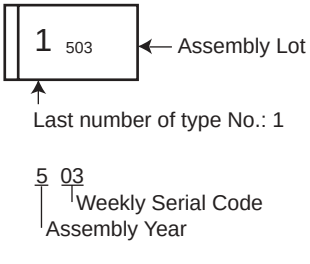
PS2801-4

PIN CONNECTION (Top View)

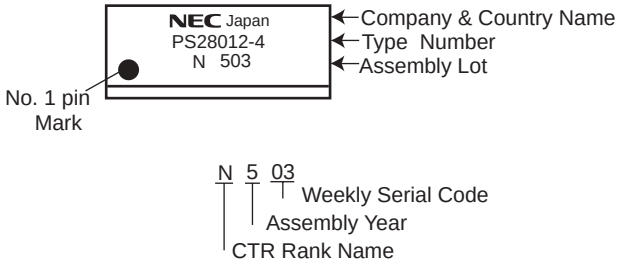


PACKAGE MARKING

PS2801-1



PS2801-4



CHANGE TO CARRIER TAPE DIMENSIONS

NEC plans to change the carrier tape material used for the taping of NEC's photocoupler PS28XX Series and PS874X due to environmental considerations. The change of the material of NEC's other photocouplers from vinyl chloride to polystyrene (Non-PVC) has been completed.

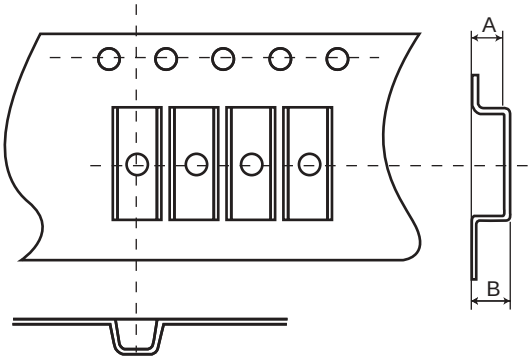
1. Affected products:
   PS28XX-1, PS28XX-4, PS874X

2. Description of change:
   Change of dimensions in correspondence with change of carrier tape material from vinyl chloride to polystyrene (non-PVC).
   For dimensions, see below.

3. Reason for change:
   Environmental considerations (non-PVC).

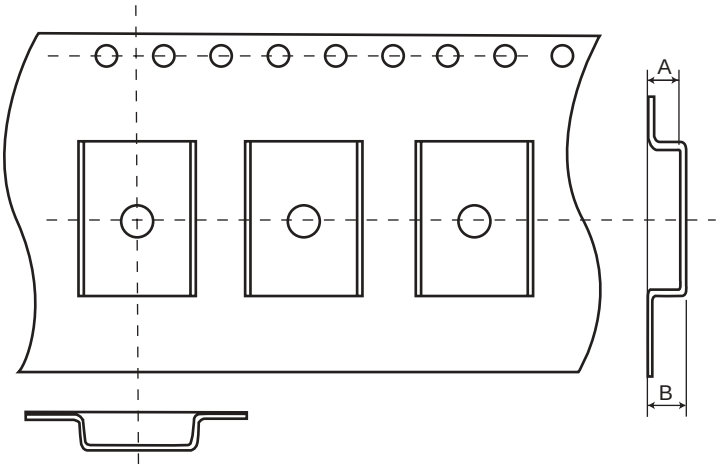
4. Implementation period:
   This change will be implemented in products shipped from January 2001.

DIMENSIONS OF PS28XX-1 CARRIER TAPE



Portions A and B in the figure above will be changed as follows in correspondence with the change in material (non-PVC):
A: 2.5±0.1→ 2.3±0.1
B: 2.9 MAX → 2.8 MAX

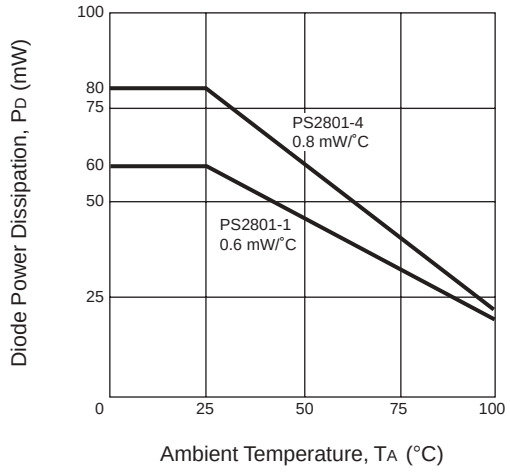
CARRIER TAPE DIMENSIONS OF PS28XX-1, PS874X



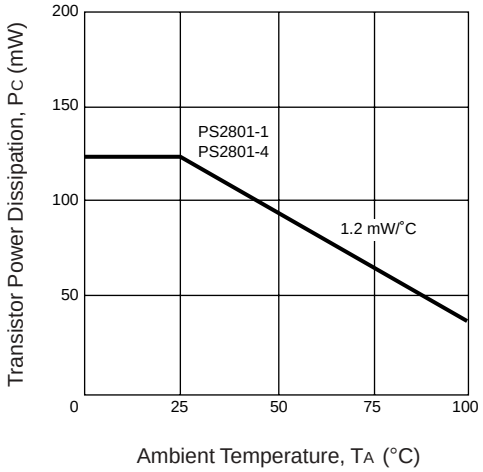
Portions A and B in the figure above will be changed as follows in correspondence with the change in material (non-PVC):
A: 2.0±0.1→ 2.3±0.1
B: 2.5 MAX → 2.8 MAX

TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

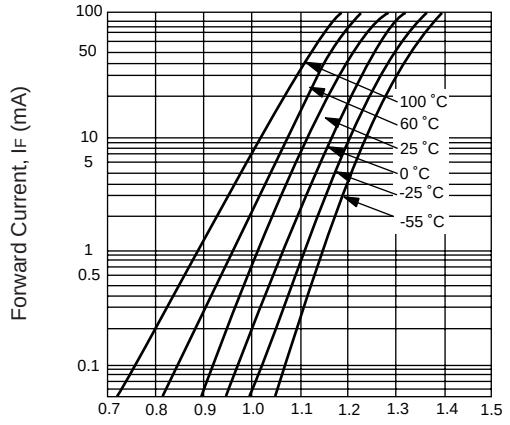
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



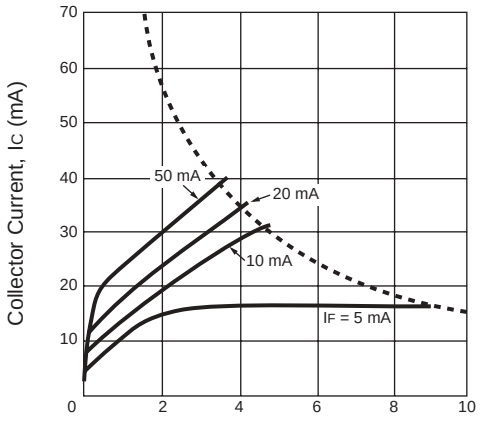
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



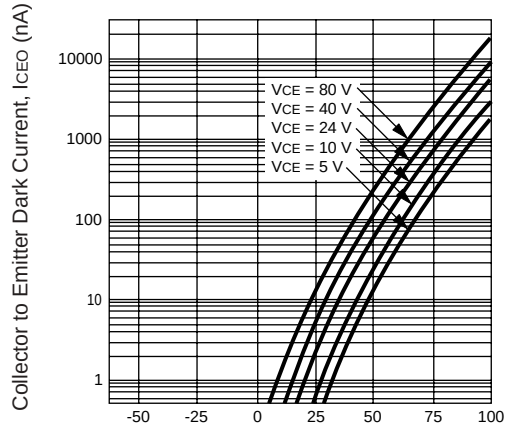
FORWARD CURRENT vs. FORWARD VOLTAGE



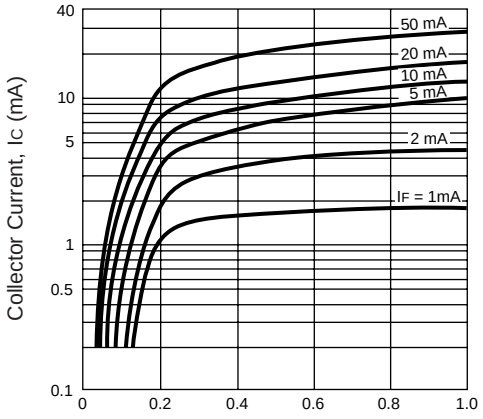
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

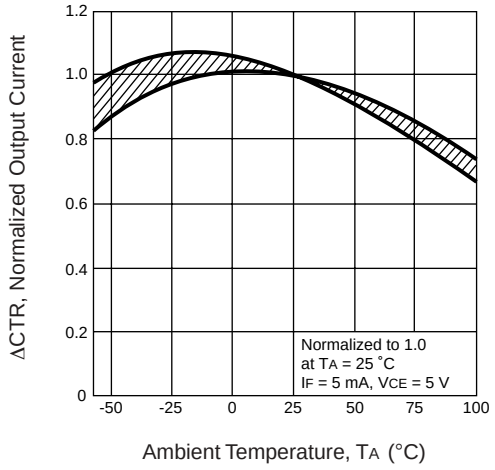


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

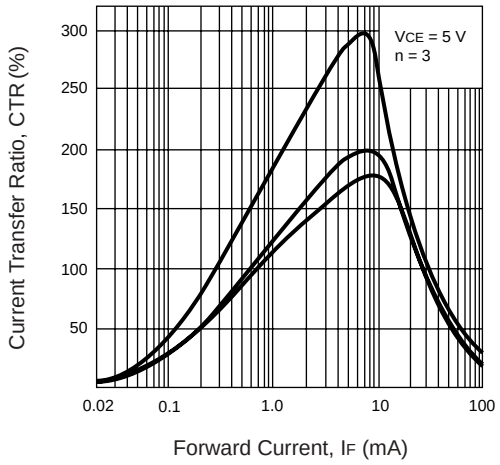


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

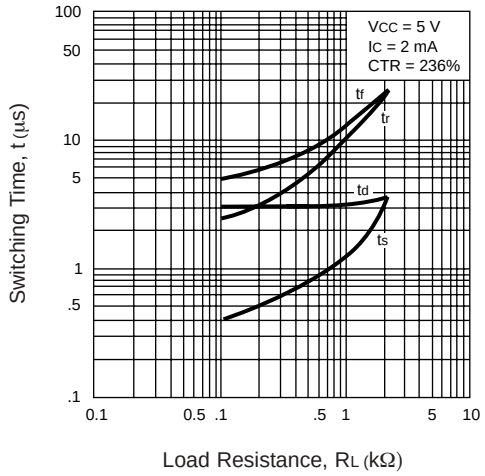
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



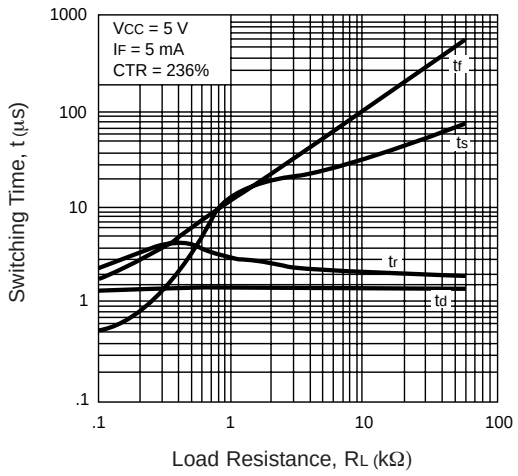
CURRENT TRANSFER RATIO (CTR) vs. FORWARD CURRENT



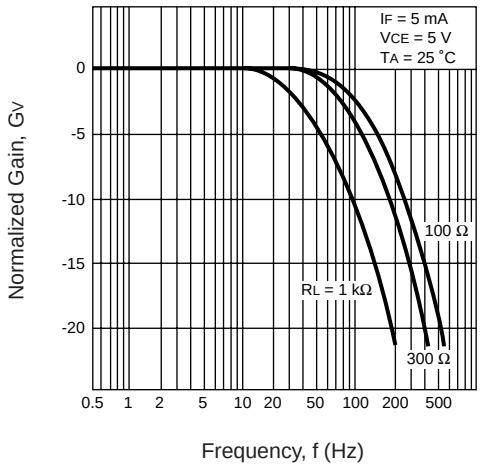
SWITCHING TIME vs. LOAD RESISTANCE



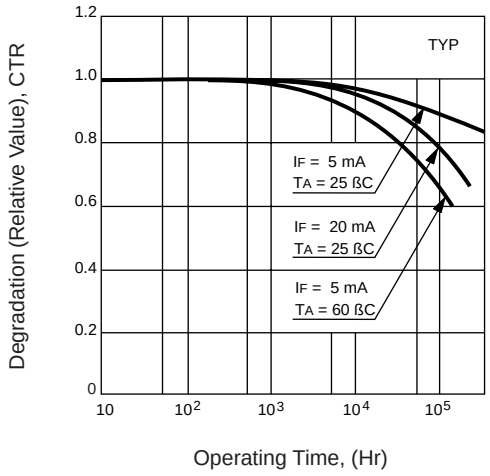
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE

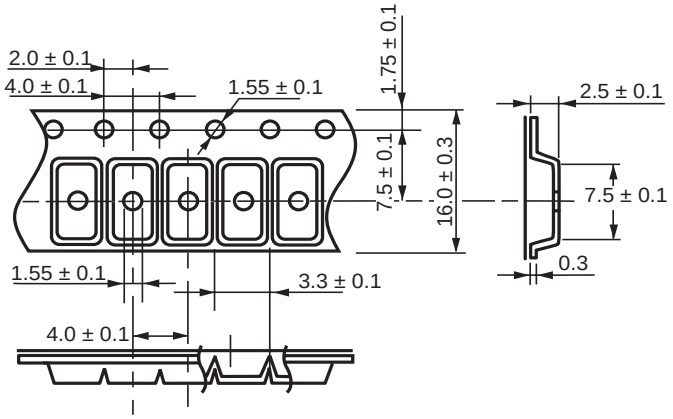


LONG TERM CTR DEGRADATION

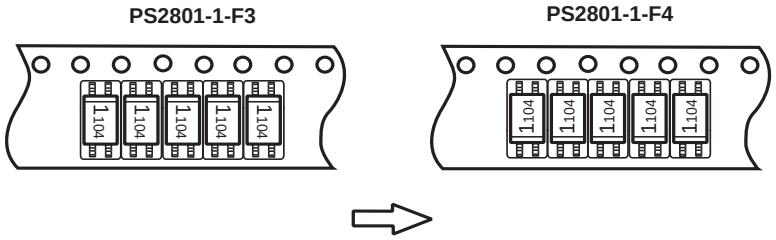


PS2801-1 TAPING SPECIFICATIONS (Units in mm)

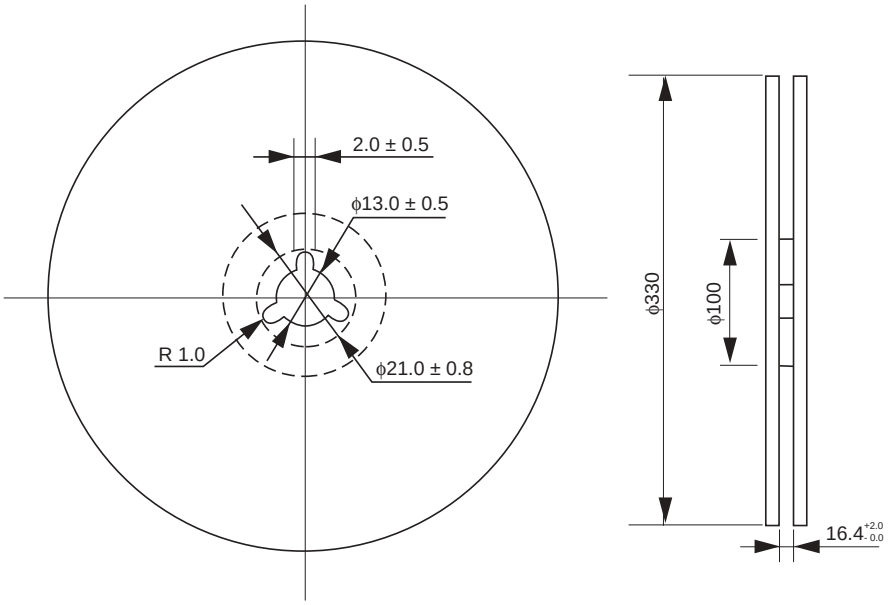
TAPE OUTLINE AND DIMENSIONS



TAPE DIRECTION



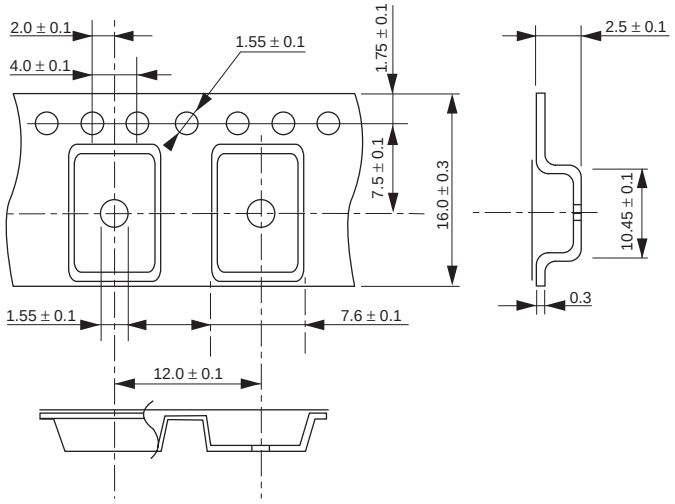
REEL OUTLINE AND DIMENSIONS



Packing: 3500 pcs/reel

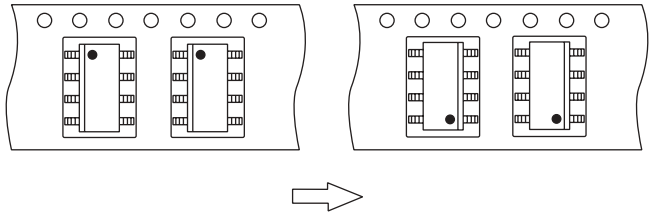
PS2801-4 TAPING SPECIFICATIONS (Units in mm)

TAPE OUTLINE AND DIMENSIONS

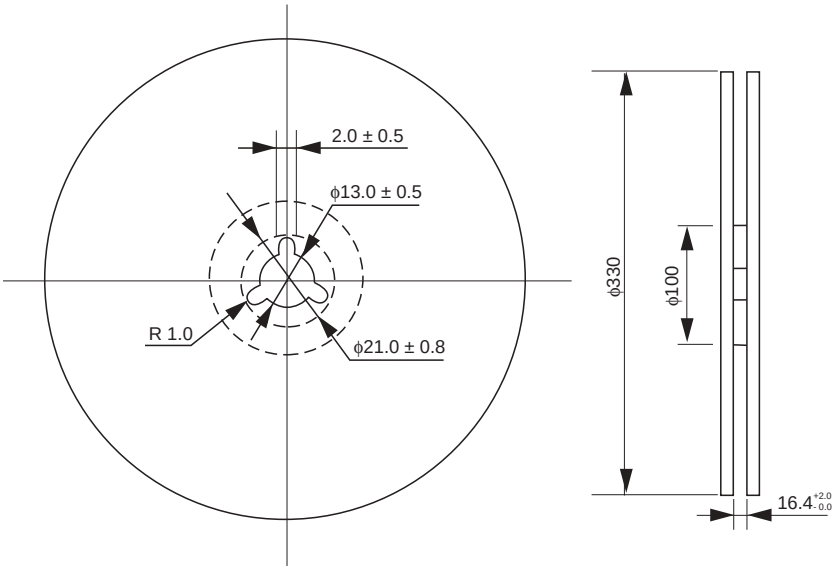


TAPE DIRECTION

PS2801-4-F3 **PS2801-4-F4**



REEL OUTLINE AND DIMENSIONS

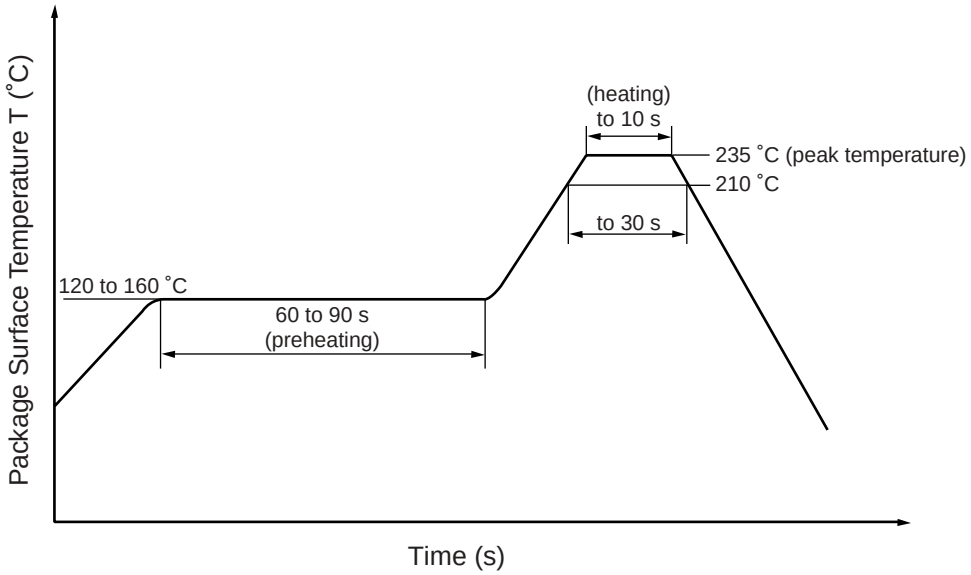


Packing:2500 pcs/reel

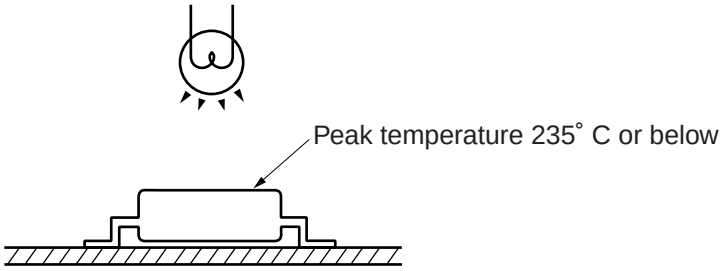
RECOMMENDED SOLDERING CONDITIONS

(1) Infrared reflow soldering

- Peak reflow temperature — 235 ˚C (package surface temperature)
- Time of temperature higher than 210 ˚C — 30 seconds or less
- 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).



CAUTION: Avoid removing the residual flux with chlorine-based cleaning solvent after a reflow process.



(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).