

### FEATURES

- **HIGH ISOLATION VOLTAGE**  
BV: 5 k Vr.m.s.
- **HIGH COLLECTOR TO EMITTER VOLTAGE**  
V<sub>CEO</sub>: 120 V
- **GUARANTEED MAXIMUM SWITCHING SPEED:**  
t<sub>off</sub> ≤ 60 μs @ I<sub>F</sub> = 5 mA, V<sub>CC</sub> = 5 V, R<sub>L</sub> = 1.9 kΩ
- **HIGH SPEED SWITCHING**  
t<sub>on</sub> = 5 μs TYP @ I<sub>F</sub> = 5mA, V<sub>CC</sub> = 5 V, R<sub>L</sub> = 1.9 kΩ  
t<sub>off</sub> = 25 μs TYP @ I<sub>F</sub> = 5mA, V<sub>CC</sub> = 5 V, R<sub>L</sub> = 1.9 kΩ
- **ORDERING NUMBER OF TAPE PRODUCT:**  
PS2513L-1-E3, E4, F3, F4

### DESCRIPTION

The PS2513-1 and PS2513L-1 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor.

The PS2513-1 is in a plastic DIP (Dual In-line Package) and the PS2513L-1 is lead bending type (Gull-wing) for surface mount.

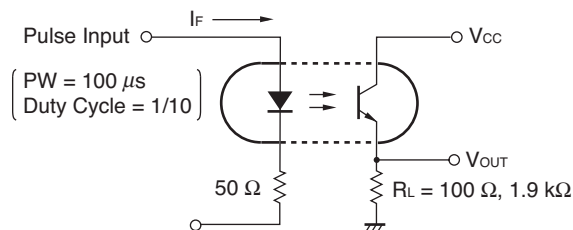
### APPLICATIONS

- Power Supply
- Factory Automation Equipment

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

	SYMBOLS	PART NUMBER	UNITS	MIN	TYP	MAX
Diode	V <sub>F</sub>	Forward Voltage, I <sub>F</sub> = 5 mA	V		1.1	1.3
	I <sub>R</sub>	Reverse Current, V <sub>R</sub> = 5 V	μA			5
	C <sub>t</sub>	Terminal Capacitance, V = 0 V, f = 1.0 MHz	pF		30	
Transistor	I <sub>CEO</sub>	Collector to Emitter Dark Current, V <sub>CE</sub> = 120 V, I <sub>F</sub> = 0 mA	nA			100
Coupled	CTR1	Current Transfer Ratio, I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 5 V	%	25	75	100
	CTR2	(I <sub>c</sub> /I <sub>F</sub> ) I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V	%	50	125	200
	V <sub>CE(sat)</sub>	Collector Saturation Voltage, I <sub>F</sub> = 10 mA, I <sub>c</sub> = 2 mA	V			0.3
	R <sub>I-O</sub>	Isolation Resistance, V <sub>I-O</sub> = 1.0 kV <sub>DC</sub>	Ω	10 <sup>11</sup>		
	C <sub>I-O</sub>	Isolation Capacitance, V = 0 V, f = 1.0 MHz	pF		0.5	
	t <sub>r</sub>	Rise Time*1, V <sub>CC</sub> = 5 V, I <sub>c</sub> = 2 mA, R <sub>L</sub> = 100 Ω	μs		3	
	t <sub>f</sub>	Fall Time*1, V <sub>CC</sub> = 5 V, I <sub>c</sub> = 2 mA, R <sub>L</sub> = 100 Ω			4	
	t <sub>on</sub>	Turn-on Time*1, V <sub>CC</sub> = 5 V, I <sub>F</sub> = 5 mA, R <sub>L</sub> = 1.9	μs		5	60
t <sub>off</sub>	Turn-off Time*1, V <sub>CC</sub> = 5 V, I <sub>F</sub> = 5 mA, R <sub>L</sub> = 1.9			25	60	

#### 1. Test circuit for switching time



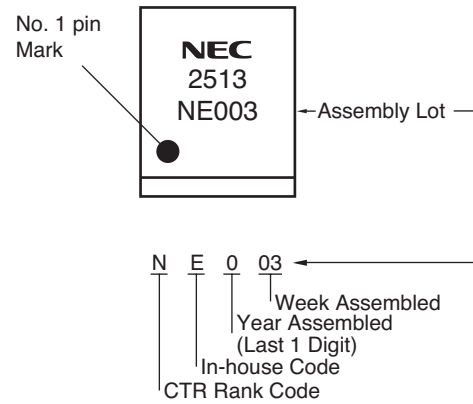
**ABSOLUTE MAXIMUM RATINGS<sup>1</sup>** (T<sub>A</sub> = 25°C)

SYMBOLS	PARAMETERS	RATINGS PS2513-1, PS2513L-1	UNITS
<b>Diode</b>			
V <sub>R</sub>	Reverse Voltage	6	V
I <sub>F</sub>	Forward Current (DC)	60	mA
ΔP <sub>D</sub> /°C	Power Dissipation Derating	1.5	mW/°C
P <sub>D</sub>	Power Dissipation	150	mW
I <sub>FP</sub>	Peak Forward Current*1	1	A
<b>Transistor</b>			
V <sub>CEO</sub>	Collector to Emitter Voltage	120	V
V <sub>ECC</sub>	Emitter to Collector Voltage	6	V
I <sub>C</sub>	Collector Current	30	mA
ΔP <sub>C</sub> /°C	Power Dissipation Derating	1.5	mW/°C
P <sub>C</sub>	Power Dissipation	150	mW
BV	Isolation Voltage*2	5 000	Vr.m.s.
T <sub>A</sub>	Operating Ambient Temperature	-55 to +100	°C
T <sub>stg</sub>	Storage Temperature	-55 to +150	°C

**NOTE:**

1. PW = 100 μs, Duty Cycle = 1%
2. AC voltage for 1 minute at T<sub>A</sub> = 25°C, RH = 60% between input and output

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

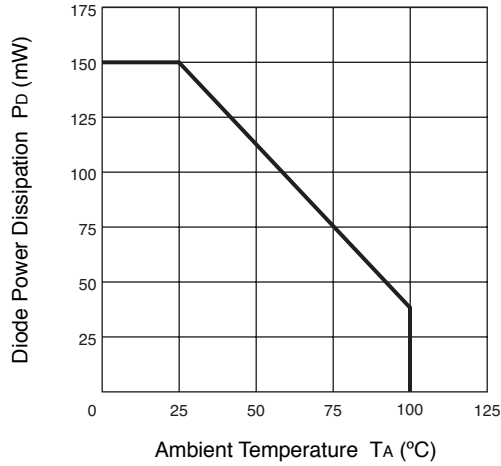


**ORDERING INFORMATION**

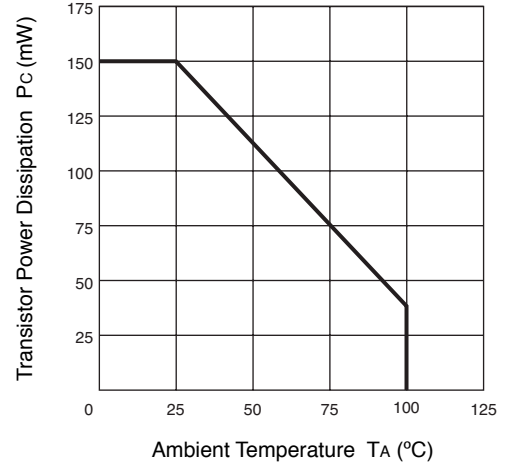
PART NUMBER	PACKAGE	PACKING STYLE
PS2513-1	4-pin DIP	Magazine case 100 pcs
PS2513L-1		
PS2513L-1-E3		Embossed Tape 1 000 pcs/reel
PS2513L-1-E4		
PS2513L-1-F3		Embossed Tape 2 000 pcs/reel
PS2513L-1-F4		

TYPICAL PERFORMANCE CURVES (TA = 25°C)

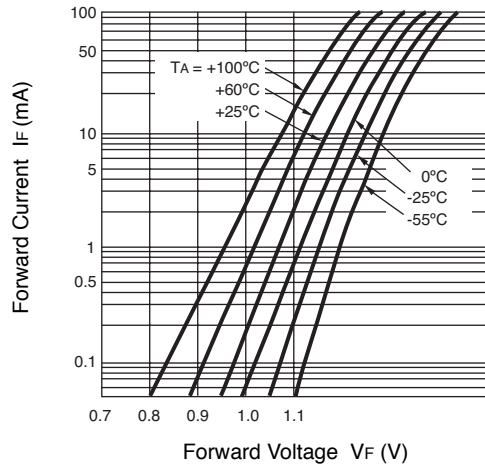
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



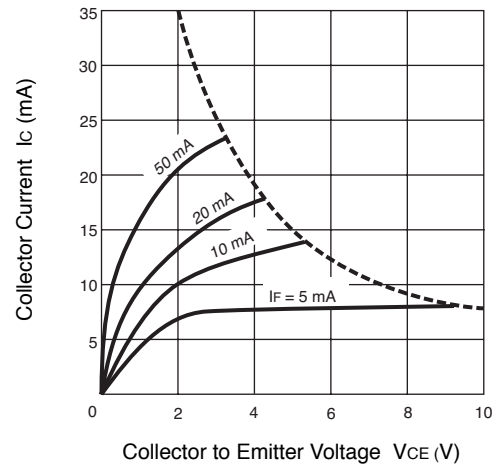
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



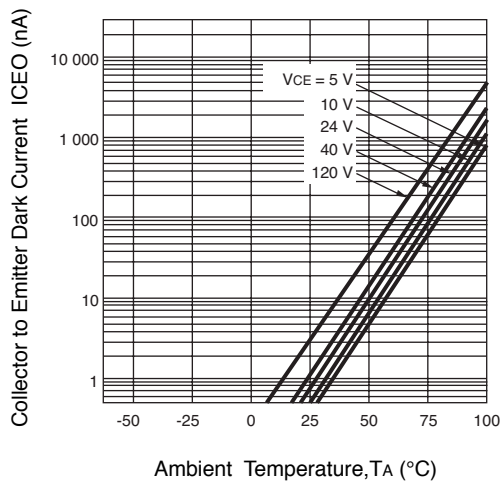
FORWARD CURRENT vs. FORWARD VOLTAGE



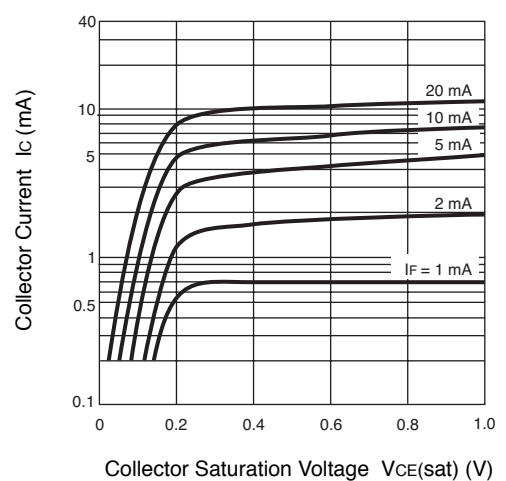
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

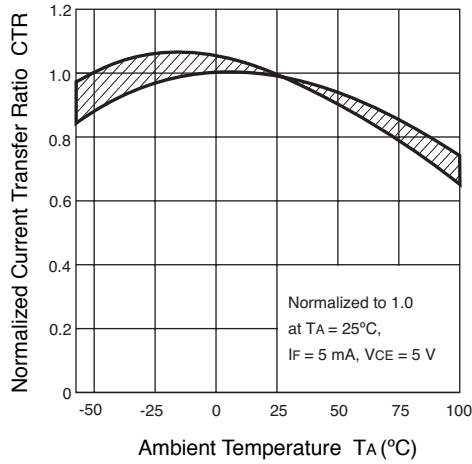


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

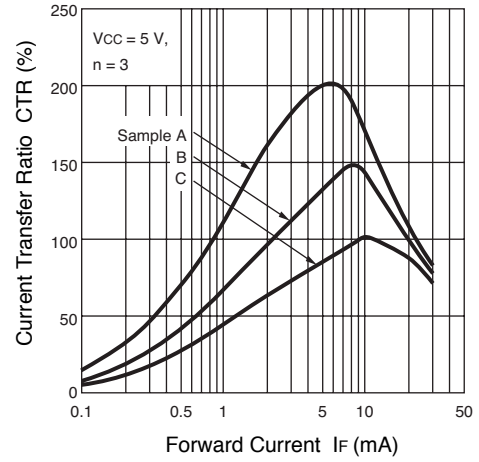


TYPICAL PERFORMANCE CURVES (TA = 25°C)

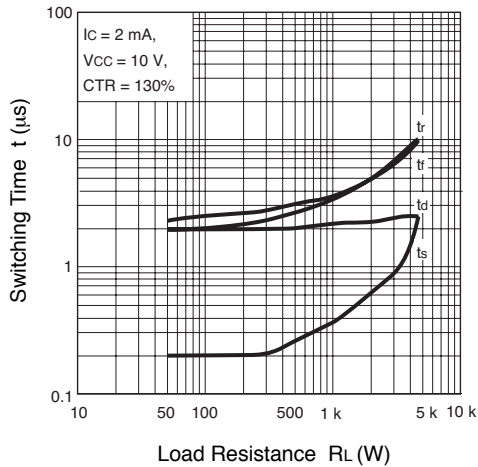
**NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE**



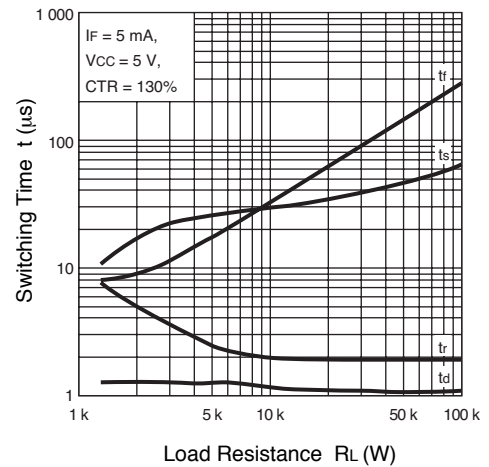
**CURRENT TRANSFER RATIO vs. FORWARD CURRENT**



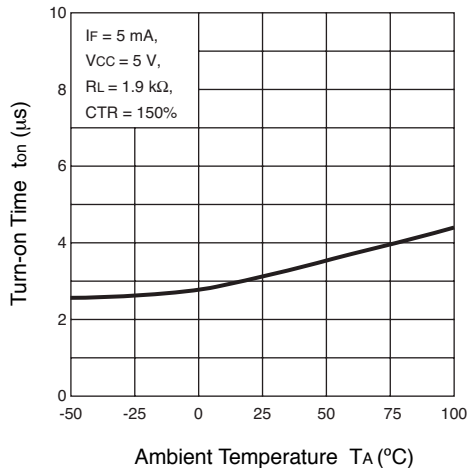
**SWITCHING TIME vs. LOAD RESISTANCE**



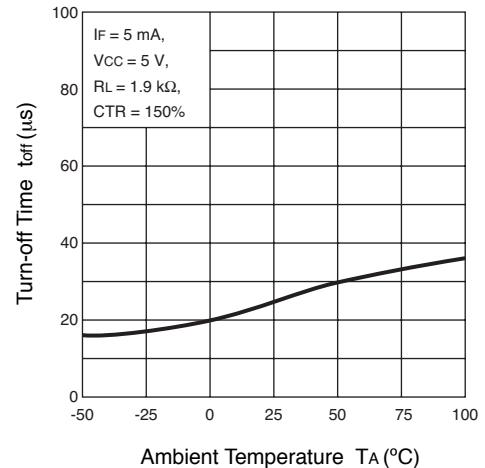
**SWITCHING TIME vs. LOAD RESISTANCE**



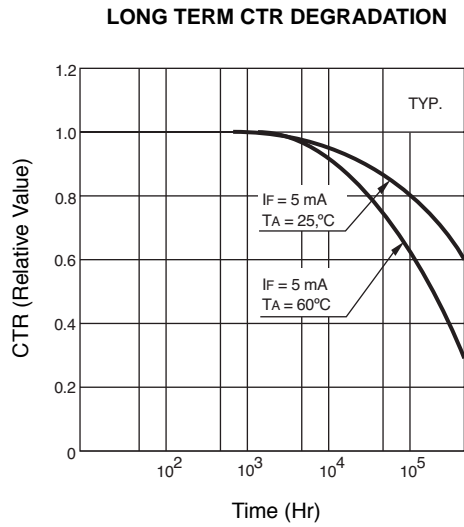
**TURN-ON TIME vs. AMBIENT TEMPERATURE**



**TURN-OFF TIME vs. AMBIENT TEMPERATURE**

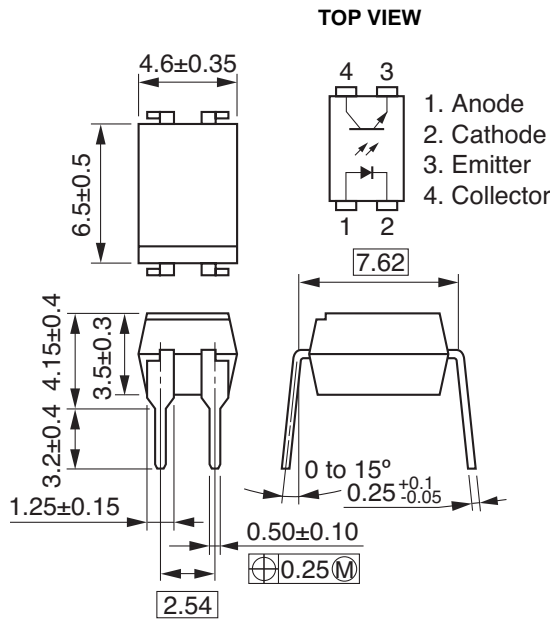


TYPICAL PERFORMANCE CURVES (TA = 25°C)

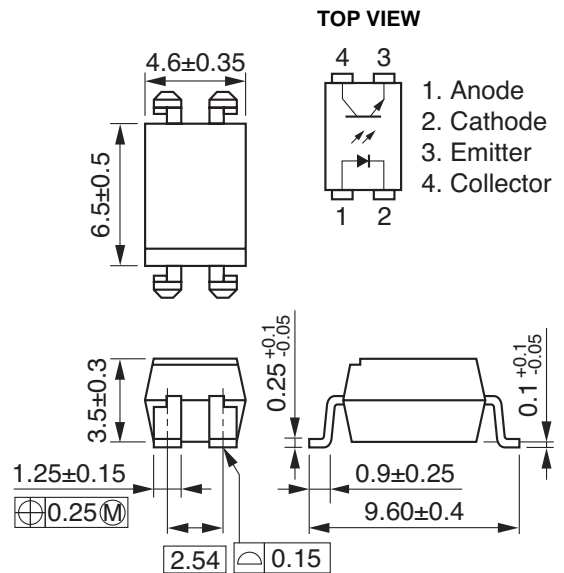


PACKAGE DIMENSIONS (Units in mm)

**PS2513-1**  
DIP Type

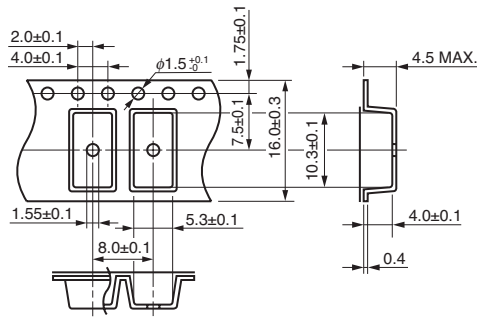


**PS2513L-1**  
Lead Bending

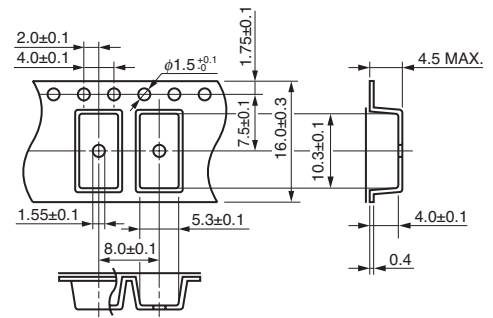


**TAPING SPECIFICATIONS** (Units in mm)

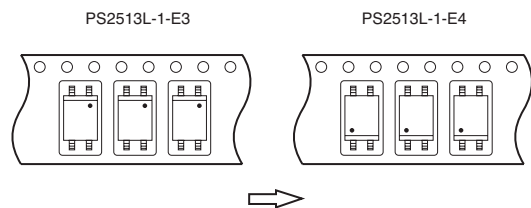
Outline and Dimensions (Tape)



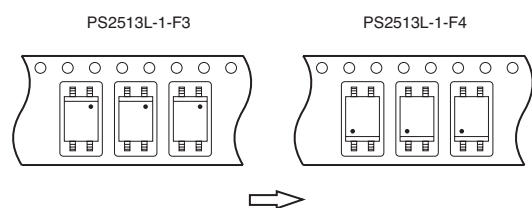
Outline and Dimensions (Tape)



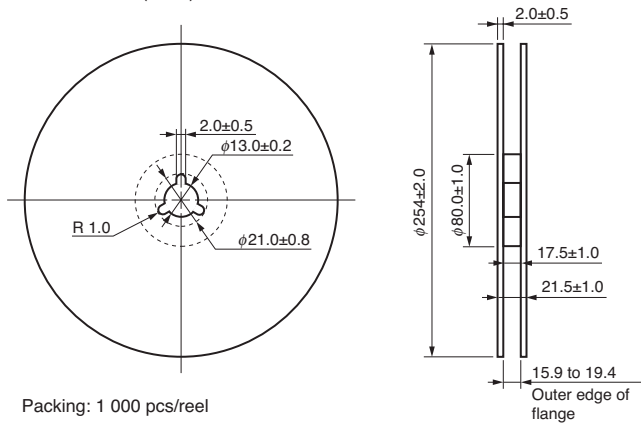
Tape Direction



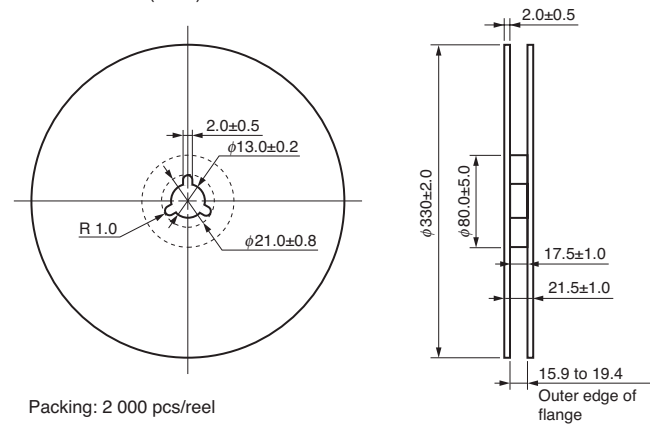
Tape Direction



Outline and Dimensions (Reel)



Outline and Dimensions (Reel)

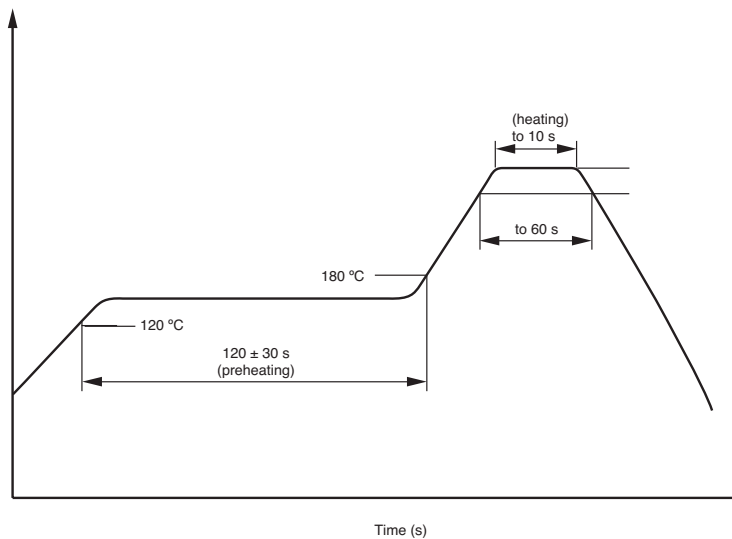


**RECOMMENDED SOLDERING CONDITIONS**

**(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 (Allowed to be dipped in solder including plastic mold portion.)
- 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 and chlorine-based cleaning solvent.

**USAGE CAUTIONS**

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

Life Support Applications

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