

### FEATURES

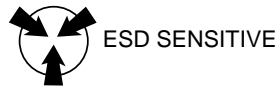
- **SOP (SMALL OUTLINE PACKAGE)**  
4.5 x 7.3 x 2.3 mm MAX
- **HIGH SPEED RESPONSE**  
 $t_{PHL}, t_{PLH} = 50 \text{ ns TYP}$
- **HIGH ISOLATION VOLTAGE**  
 $BV = 2500 \text{ Vr.m.s. MIN}$
- **LOW INPUT CURRENT**  
 $I_{FHL} = 2.5 \text{ mA TYP}$
- **TAPING PRODUCT NUMBER**  
PS9701-F3

### DESCRIPTION

PS9701 is an optically coupled isolator containing a GaAlAs LED on the light emitting side (input side) and a photodiode and a signal processing circuit on the light receiving side (output side) on one chip. This is an SOP (Small Out-line Package) type for high density applications.

### APPLICATIONS

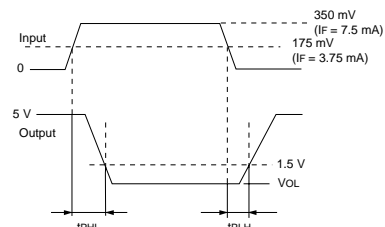
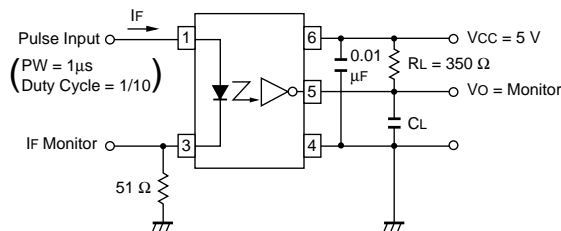
- **COMPUTER AND PERIPHERAL MEMORY**
- **ELECTRONIC INSTRUMENT**
- **AUDIO-VISUAL INTERFACE**



### ELECTRICAL CHARACTERISTICS (TA = 25 °C)

PART NUMBER			PS9701			
SYMBOL	PARAMETERS	UNITS	MIN	TYP	MAX	
Diode	V <sub>F</sub>	Forward Voltage, I <sub>F</sub> = 10 mA	V	1.4	1.9	
	I <sub>R</sub>	Reverse Current, V <sub>R</sub> = 5 V	μA		10	
	C <sub>t</sub>	Capacitance, V = 0, f = 1 MHz	pF	60		
Detector	I <sub>OH</sub>	High Level Output Current V <sub>CC</sub> = V <sub>O</sub> = 5.5 V, I <sub>F</sub> = 250 μA, T <sub>A</sub> = 0 to 70°C	μA	2	250	
	V <sub>OL</sub>	Low Level Output Voltage V <sub>CC</sub> = 5.5 V, I <sub>F</sub> = 7.5 mA, I <sub>O</sub> = 13 mA, T <sub>A</sub> = 0 to 70°C	V	0.3	0.6	
	I <sub>CCH</sub>	High Level Supply Current, V <sub>CC</sub> = 5.5 V, I <sub>F</sub> = 0, T <sub>A</sub> = 0 to 70°C	mA	4	6	8
	I <sub>CCL</sub>	Low Level Supply Current, V <sub>CC</sub> = 5.5 V, I <sub>F</sub> = 10 mA, T <sub>A</sub> = 0 to 70°C	mA	9	12	15
Coupled	I <sub>FHL</sub>	Threshold Input Current, High → Low V <sub>CC</sub> = 5 V, V <sub>O</sub> = 0.8 V, R <sub>L</sub> = 350 Ω, T <sub>A</sub> = 25°C V <sub>CC</sub> = 5 V, T <sub>A</sub> = -40 to +85 °C, V <sub>O</sub> = 0.8 V, R <sub>L</sub> = 350 Ω	mA	0.5	2.5	5 7
	R <sub>1-2</sub>	Isolation Resistance, V <sub>in-out</sub> = 1 k V <sub>DC</sub> , R <sub>H</sub> = 40 to 60%	Ω	10 <sup>11</sup>		
	C <sub>1-2</sub>	Isolation Capacitance, V = 0, f = 1 MHz	pF		0.4	
	t <sub>PHL</sub>	Propagation Delay Time <sup>1</sup> , High → Low V <sub>CC</sub> = 5 V, I <sub>F</sub> = 7.5 mA, R <sub>L</sub> = 350 Ω, C <sub>L</sub> = 15 pF	ns		50	75
	t <sub>PLH</sub>	Propagation Delay Time <sup>1</sup> , Low → High V <sub>CC</sub> = 5 V, I <sub>F</sub> = 7.5 mA, R <sub>L</sub> = 350 Ω, C <sub>L</sub> = 15 pF	ns		50	75
	t <sub>r</sub>	Rise Time, V <sub>CC</sub> = 5 V, I <sub>F</sub> = 7.5 mA, R <sub>L</sub> = 350 Ω, C <sub>L</sub> = 15 pF	ns		20	
	t <sub>f</sub>	Fall Time, V <sub>CC</sub> = 5 V, I <sub>F</sub> = 7.5 mA, R <sub>L</sub> = 350 Ω, C <sub>L</sub> = 15 pF	ns		10	

#### 1. Test Circuit for Propagation delay time



\*C<sub>L</sub> is approximately 15 pF, which includes probe and stray wiring capacitance.

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

SYMBOLS	PARAMETERS	UNITS	RATINGS
<b>Diode</b>			
I <sub>F</sub>	Forward Current	mA	30
V <sub>R</sub>	Reverse Voltage	V	5
<b>Detector</b>			
V <sub>CC</sub>	Supply Voltage	V	7
V <sub>O</sub>	Output Voltage	V	7
I <sub>O</sub>	Output Current	mA	50
P <sub>C</sub>	Power Dissipation	mW	85
<b>Coupled</b>			
BV	Isolation Voltage <sup>2</sup>	V <sub>r.m.s.</sub>	2500
T <sub>OP</sub>	Operating Temperature	°C	-40 to +85
T <sub>STG</sub>	Storage Temperature	°C	-55 to +125

Notes:

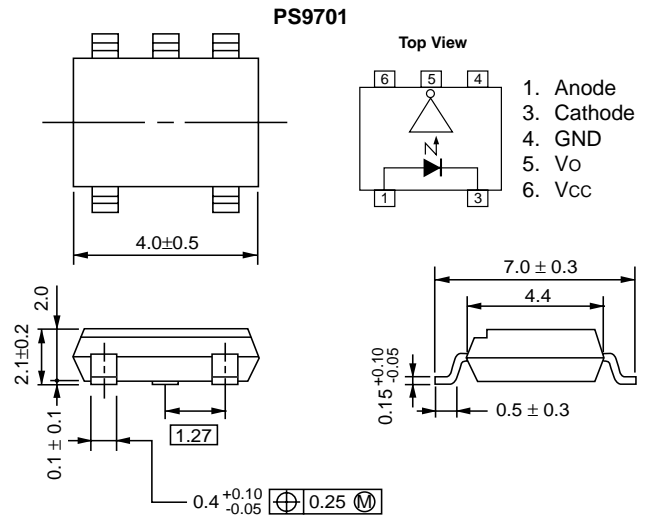
- Operation in excess of any one of these parameters may result in permanent damage.
- AC voltage for 1 minute at T<sub>A</sub> = 25 °C, RH = 60% between input and output.

**RECOMMENDED OPERATING CONDITIONS**

PART NUMBER			PS9701		
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
I <sub>FL</sub>	Low Level Input Current	μA	0		250
I <sub>FH</sub>	High Level Input Current	mA	5	7.5	15
V <sub>CC</sub>	Supply Voltage	V	4.5	5	5.5
T <sub>OP</sub>	Operating Temperature	°C	0	25	70

\* By-pass capacitor of more than 0.1 μF is used between V<sub>CC</sub> and GND near the device.

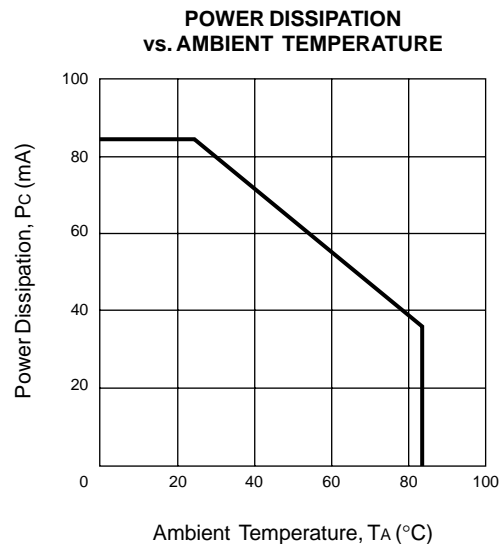
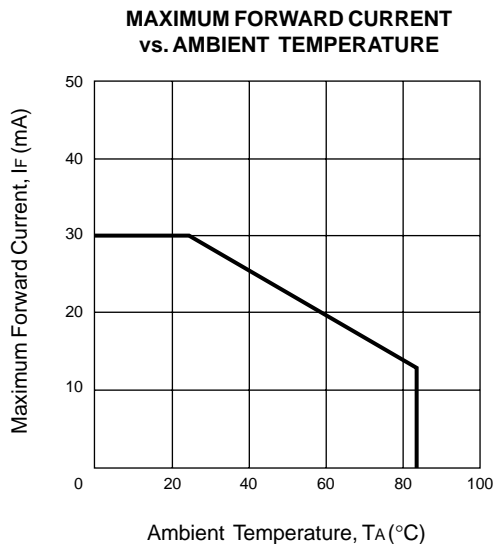
**OUTLINE DIMENSIONS** (Units in mm)



**ORDERING INFORMATION**

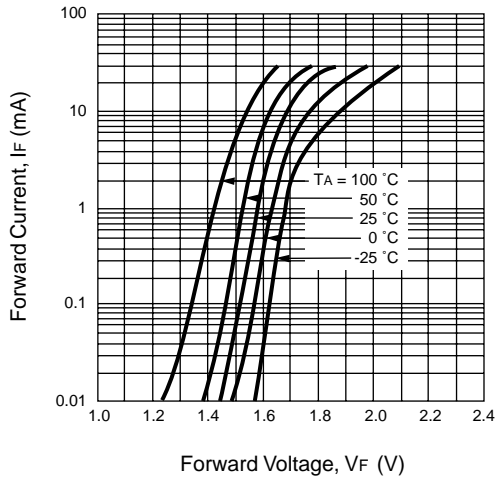
PART NUMBER	PACKAGE	PACKING STYLE	SAFETY STANDARDS APPROVAL
PS9701	5 Pin SOP	Magazine case 100 pcs	UL approved
PS9701-E3		Embossed Tape 900 pcs/reel	
PS9701-E4			
PS9701-F3		Embossed Tape 3500 pcs/reel	
PS9701-F3			
PS9701-V	5 Pin SOP	Magazine case 100 pcs	VDE0884 approved
PS9701-V-E3		Embossed Tape 900 pcs/reel	
PS9701-V-E4			
PS9701-V-F3		Embossed Tape 3500 pcs/reel	
PS9701-V-F4			

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

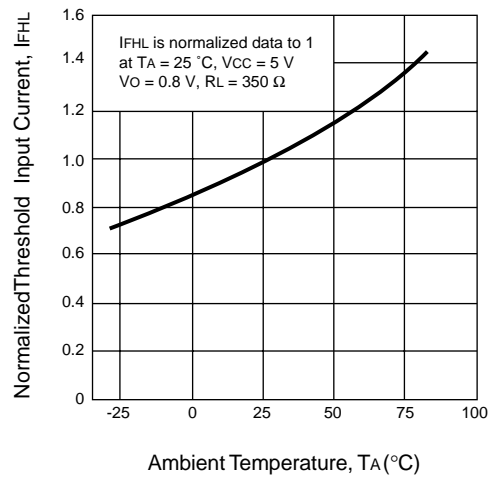


TYPICAL PERFORMANCE CURVES (TA = 25 °C)

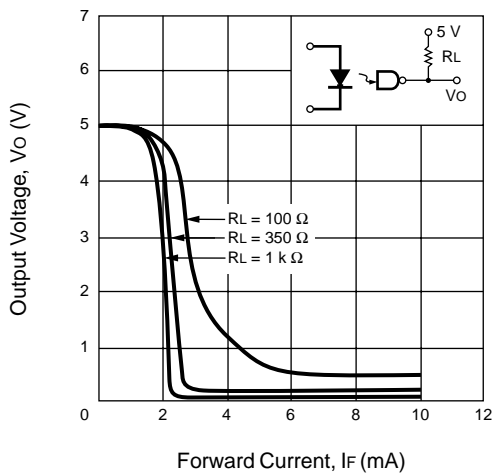
FORWARD CURRENT vs. FORWARD VOLTAGE



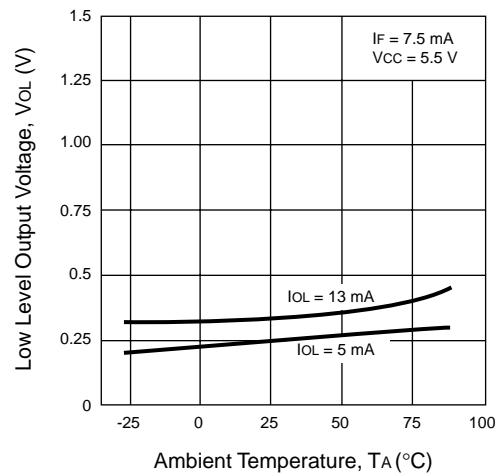
NORMALIZED THRESHOLD INPUT CURRENT vs. AMBIENT TEMPERATURE



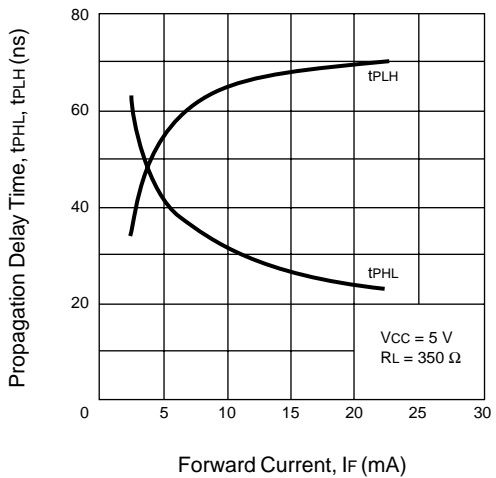
OUTPUT VOLTAGE vs. FORWARD CURRENT



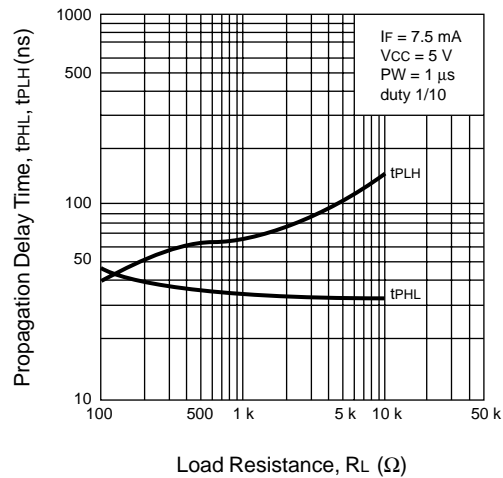
LOW LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

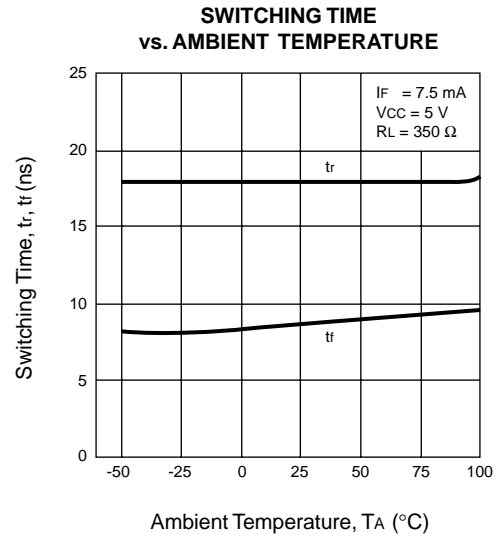
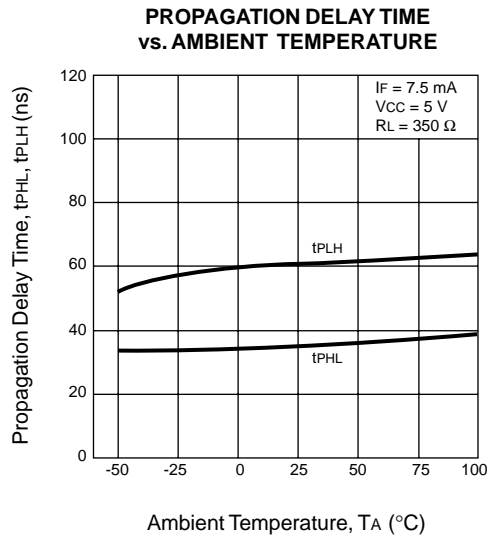


PROPAGATION DELAY TIME vs. FORWARD CURRENT



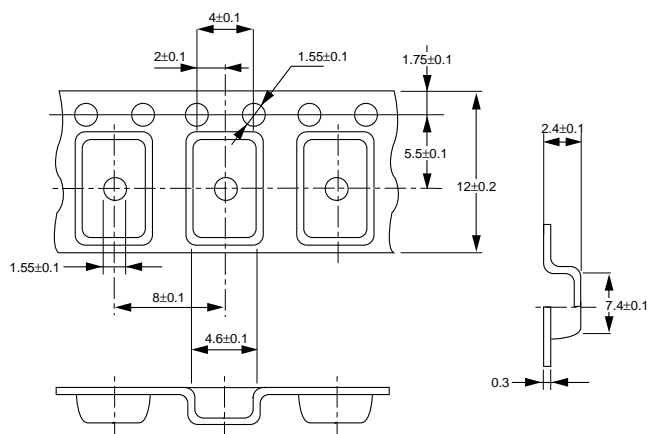
PROPAGATION DELAY TIME vs. LOAD RESISTANCE



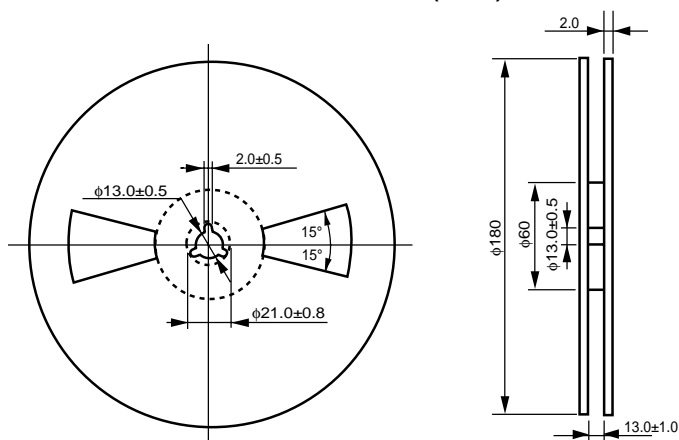
**TYPICAL PERFORMANCE CURVES** ( $T_A = 25^\circ\text{C}$ )

**TAPING SPECIFICATIONS** (Units in mm)

**OUTLINE AND DIMENSIONS (TAPE)**

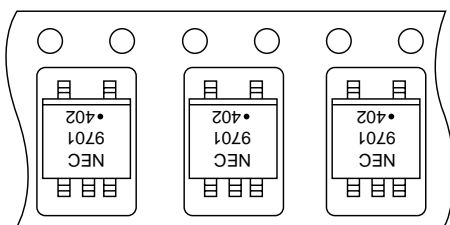


**OUTLINE AND DIMENSIONS (REEL)**

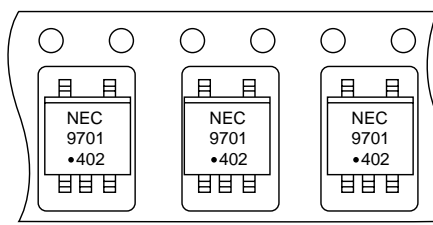


Packing : 900 pcs/reel

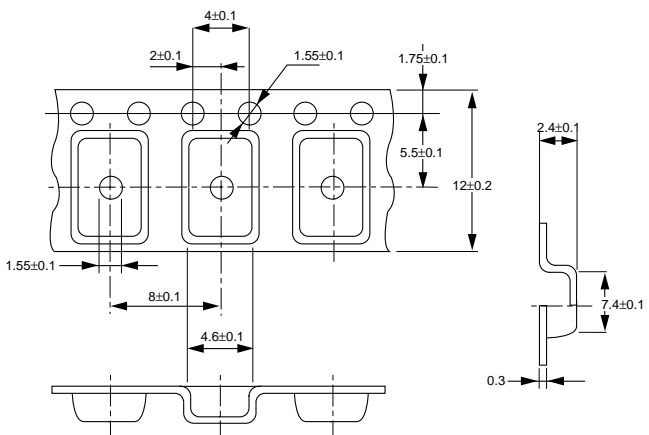
**TAPE DIRECTION**  
**PS9701-E3**



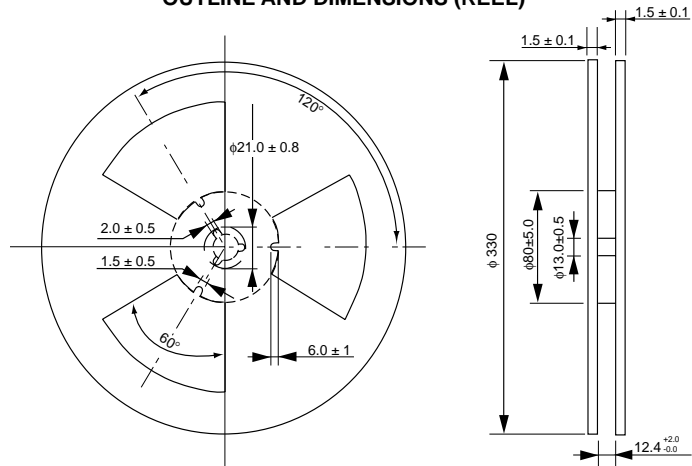
**PS9701-E4**



**OUTLINE AND DIMENSIONS (TAPE)**



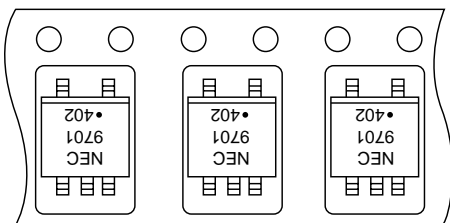
**OUTLINE AND DIMENSIONS (REEL)**



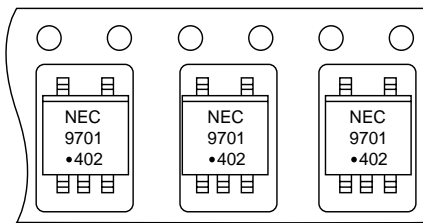
Packing: 3500 pcs/reel

**TAPE DIRECTION**

**PS9701-F3**



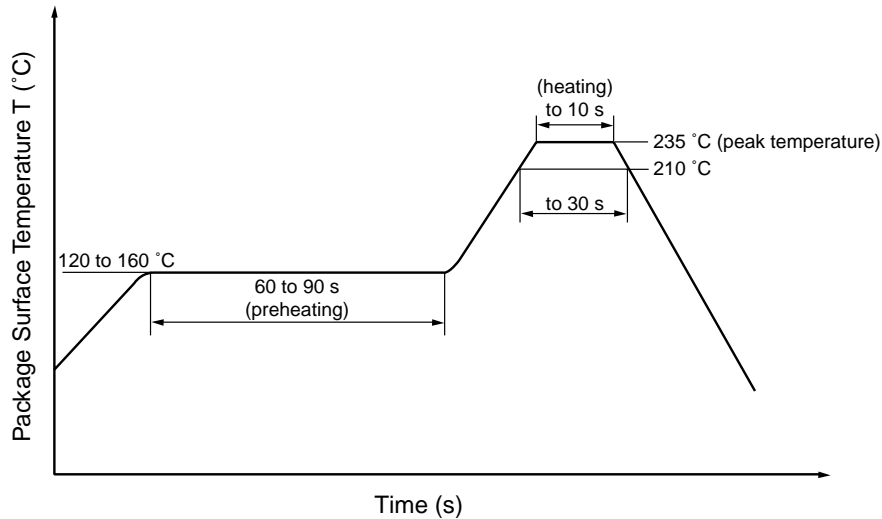
**PS9701-F4**



## 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 Three
- Flux Rosin flux containing a small amount of chlorine  
(The flux with a maximum chlorine content of 0.2 Wt % is recommended)



### (2) Dip soldering

- Temperature 260 °C or below
- Time 10 seconds or less
- Number of times One
- Flux Rosin flux containing a 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.

#### Life Support Applications

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12/04/2001