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## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



### FEATURES

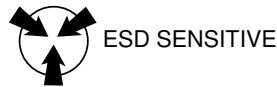
- **SOP (SMALL OUTLINE PACKAGE)**  
4.5 x 7.3 x 2.3 mm MAX
- **HIGH SPEED RESPONSE**  
 $t_{PHL}, t_{PLH} = 50 \text{ ns TYP}$
- **HIGH ISOLATION VOLTAGE**  
 $BV = 2500 \text{ Vr.m.s. MIN}$
- **LOW INPUT CURRENT**  
 $I_{FHL} = 2.5 \text{ mA TYP}$
- **TAPING PRODUCT NUMBER**  
PS9701-F3

### 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

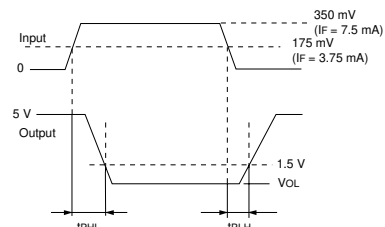
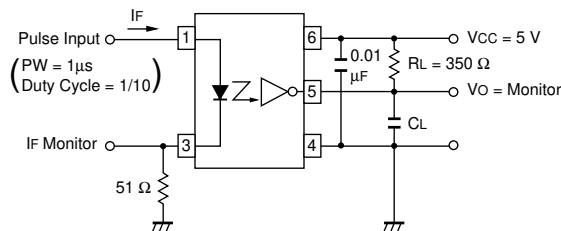
- **COMPUTER AND PERIPHERAL MEMORY**
- **ELECTRONIC INSTRUMENT**
- **AUDIO-VISUAL INTERFACE**



### 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<br>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<br>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<br>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<br>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<br>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<br>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<br>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:

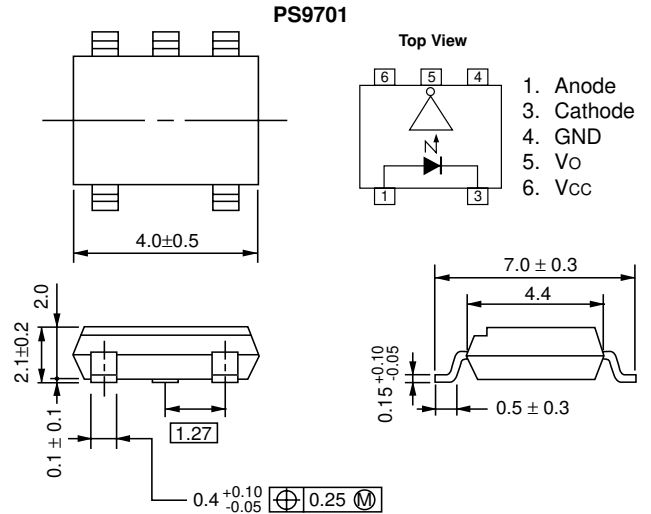
1. Operation in excess of any one of these parameters may result in permanent damage.
2. AC voltage for 1 minute at T<sub>A</sub> = 25 °C, RH = 60% between input and output.

**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.

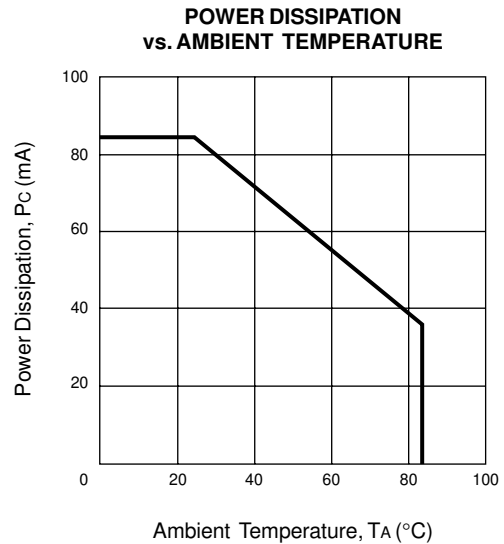
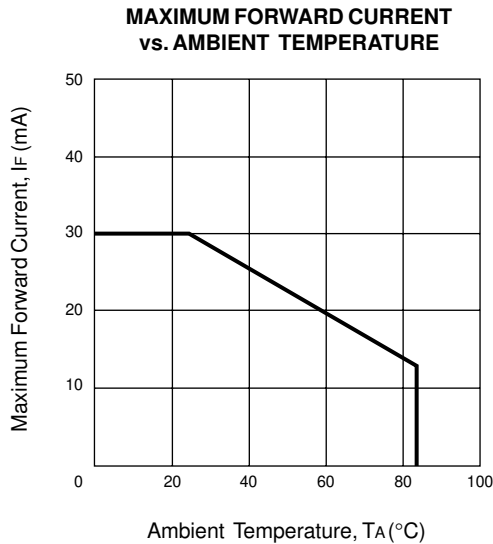
**OUTLINE DIMENSIONS** (Units in mm)



**ORDERING INFORMATION**

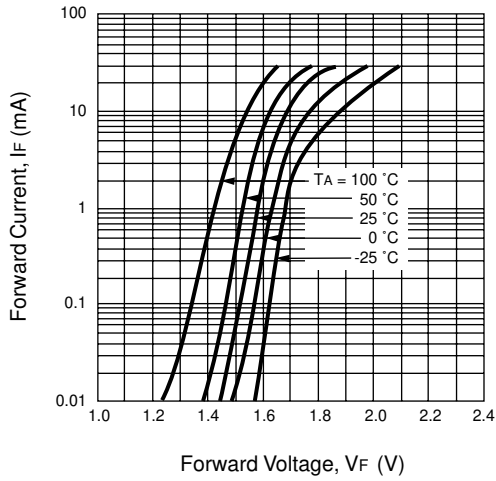
| PART NUMBER | PACKAGE   | PACKING STYLE               | SAFETY STANDARDS APPROVAL |
|-------------|-----------|-----------------------------|---------------------------|
| PS9701      | 5 Pin SOP | Magazine case 100 pcs       | UL approved               |
| PS9701-E3   |           | Embossed Tape 900 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)

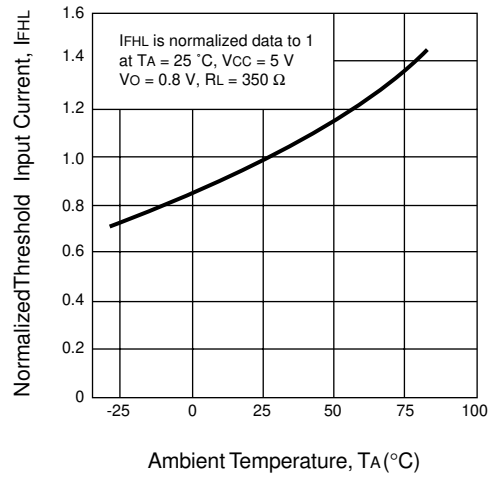


TYPICAL PERFORMANCE CURVES (TA = 25 °C)

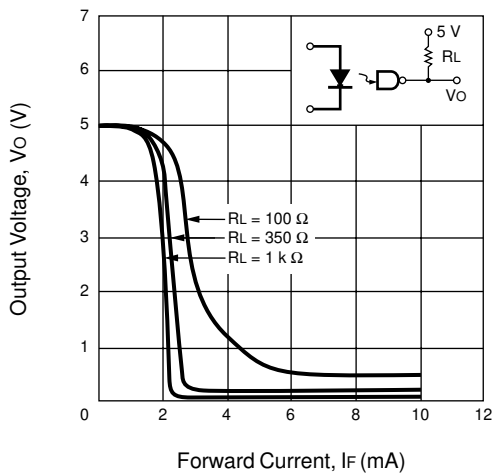
FORWARD CURRENT vs. FORWARD VOLTAGE



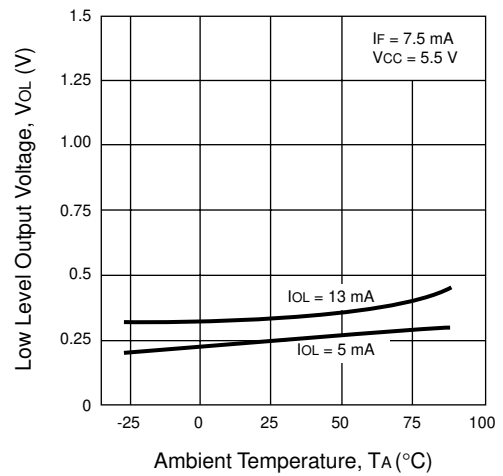
NORMALIZED THRESHOLD INPUT CURRENT vs. AMBIENT TEMPERATURE



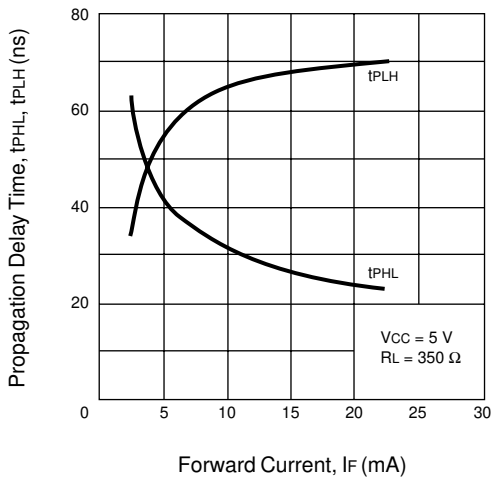
OUTPUT VOLTAGE vs. FORWARD CURRENT



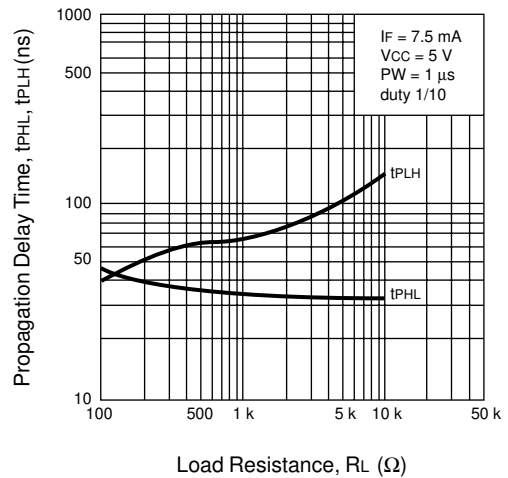
LOW LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

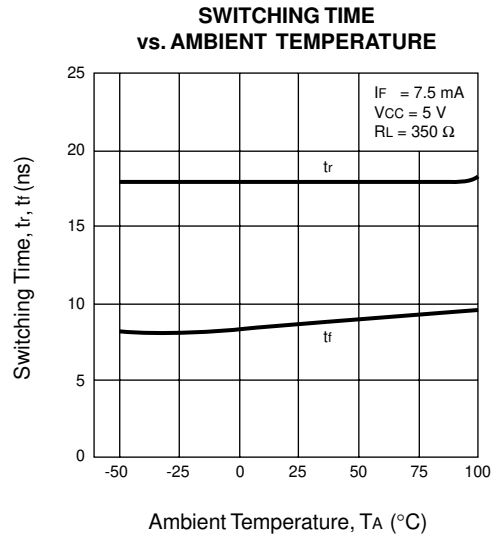
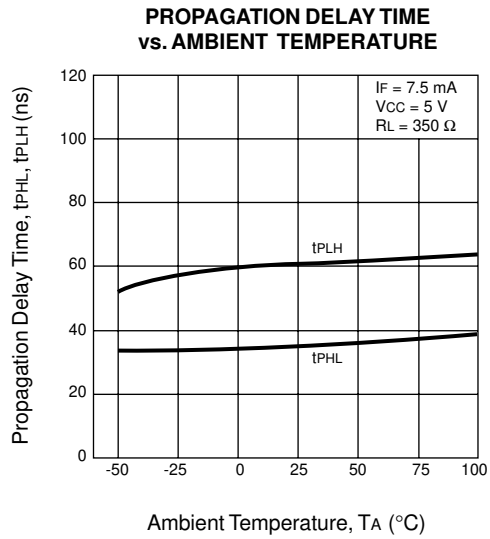


PROPAGATION DELAY TIME vs. FORWARD CURRENT



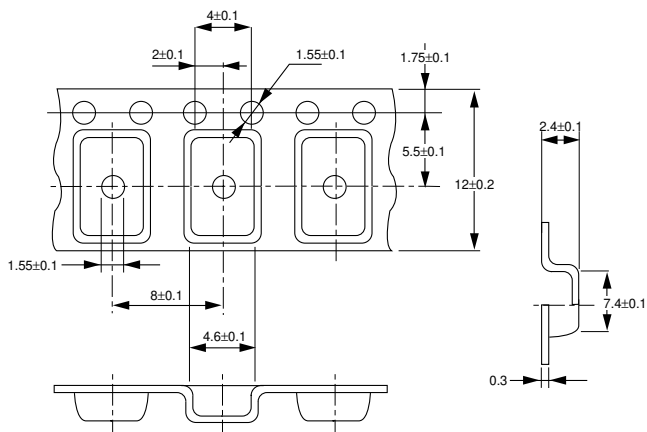
PROPAGATION DELAY TIME vs. LOAD RESISTANCE



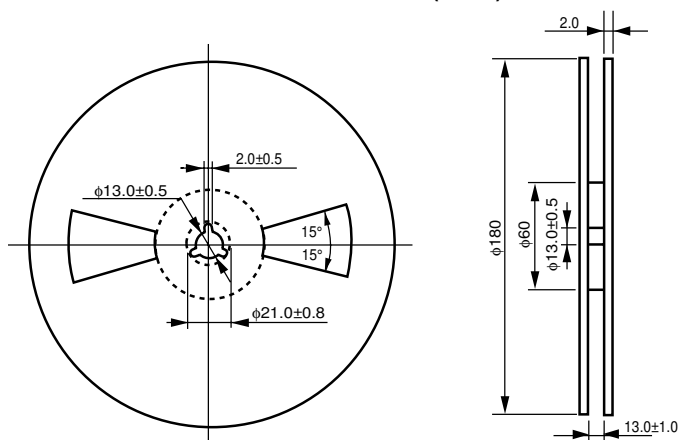
**TYPICAL PERFORMANCE CURVES** ( $T_A = 25\text{ }^\circ\text{C}$ )

**TAPING SPECIFICATIONS** (Units in mm)

**OUTLINE AND DIMENSIONS (TAPE)**

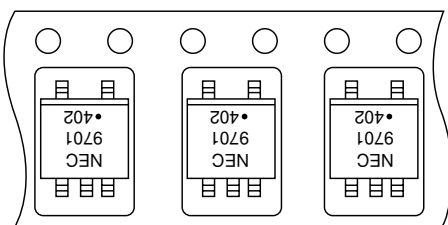


**OUTLINE AND DIMENSIONS (REEL)**

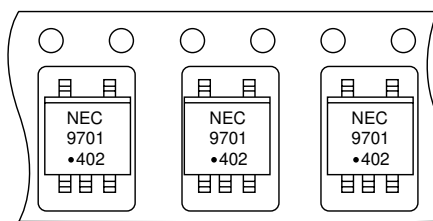


Packing : 900 pcs/reel

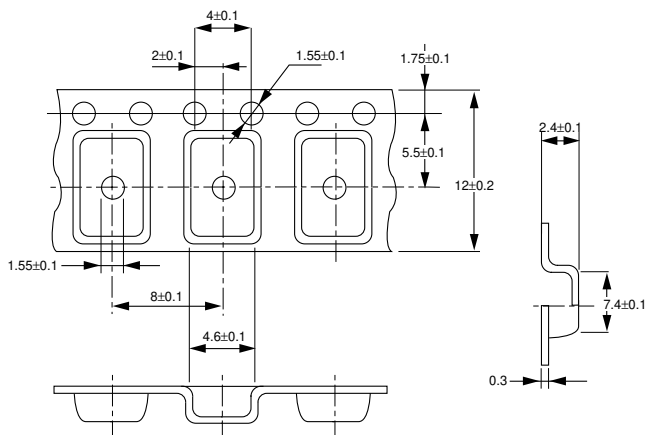
**TAPE DIRECTION**  
**PS9701-E3**



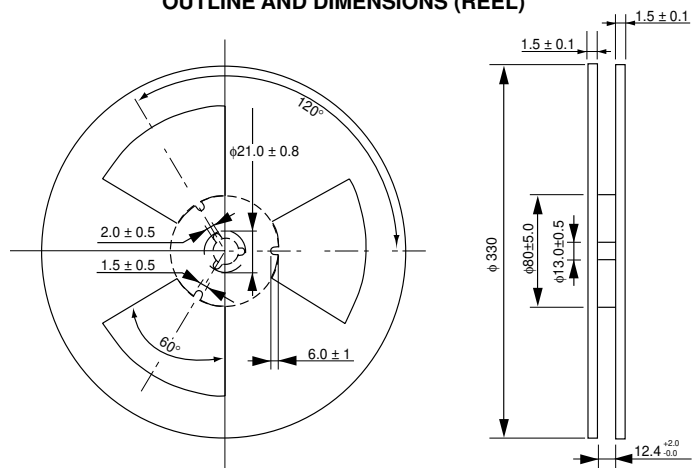
**PS9701-E4**



**OUTLINE AND DIMENSIONS (TAPE)**



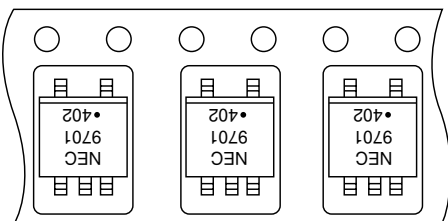
**OUTLINE AND DIMENSIONS (REEL)**



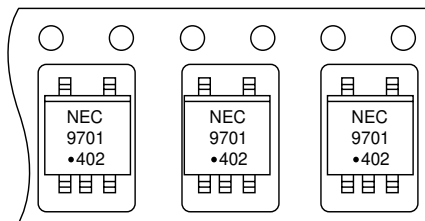
Packing: 3500 pcs/reel

**TAPE DIRECTION**

**PS9701-F3**



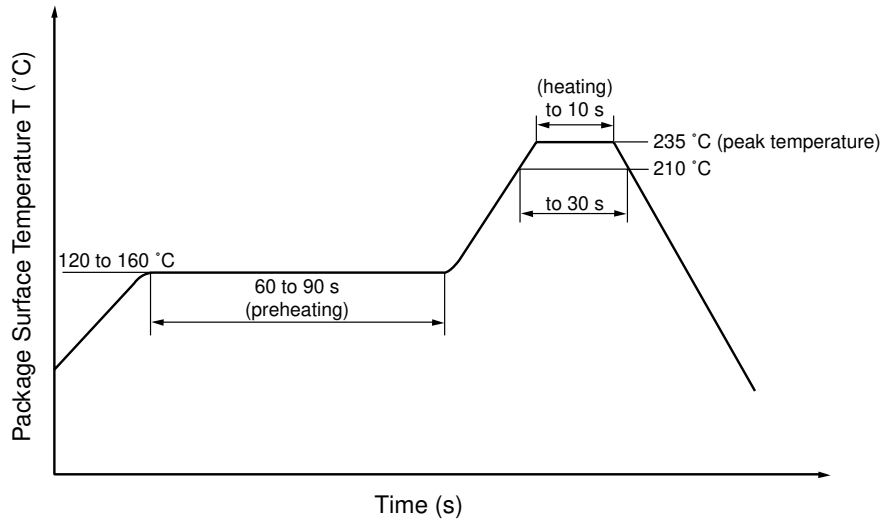
**PS9701-F4**



## 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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**CEL CALIFORNIA EASTERN LABORATORIES** • Headquarters • 4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • Telex 34-6393 • FAX (408) 988-0279  
24-Hour Fax-On-Demand: 800-390-3232 (U.S. and Canada only) • Internet: <http://WWW.CEL.COM>