

HIGH NOISE REDUCTION/ HIGH SPEED 10 Mbps, TOTEM-POLE OUTPUT TYPE 5 PIN SOP TOM OPTOCOUPLER

PS9711

FEATURES

- **HIGH COMMON MODE TRANSIENT IMMUNITY**
CMH, CML: ± 10 kV/ μ s TYP
- **SMALL PACKAGE**
5 pin SOP
- **HIGH SPEED RESPONSE**
 $t_{PHL} = 30$ ns, $t_{PLH} = 35$ ns TYP
- **PULSE WIDTH DISTORTION**
 $|t_{PHL}-t_{PLH}| = 7$ ns TYP
- **TOTEM-POLE OUTPUT**
No Pull-up resistor required
- **TAPE AND REEL AVAILABLE**

DESCRIPTION

The PS9711 is an optically coupled high speed totem pole isolator containing a GaAlAs LED on the light emitting diode side (input side) and a photodiode and a signal processing circuit on the light receiving side (output side) on one chip. It is housed in a plastic SOP (Small Out-Line Package) for high density applications.

APPLICATIONS

- **COMPUTER AND PERIPHERAL DEVICES**
- **MEASUREMENT EQUIPMENT**
- **POWER SUPPLY**

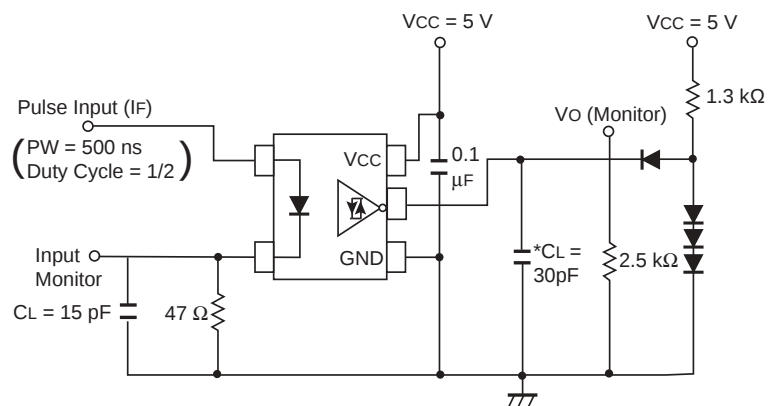
ELECTRICAL CHARACTERISTICS ($T_A = -40$ to $+85$ °C, unless otherwise specified)

PART NUMBER				PS9711		
SYMBOLS		PARAMETERS	UNITS	MIN	TYP	MAX
Diode	V_F	Forward Voltage, $I_F = 10$ mA, $T_A = 25^\circ\text{C}$	V	1.4	1.65	1.9
	I_R	Reverse Current, $V_R = 3$ V, $T_A = 25^\circ\text{C}$	μ A			10
	C_t	Capacitance, $V = 0$, $f = 1.0$ MHz, $T_A = 25^\circ\text{C}$	pF		30	
Detector	I_{OH}	High Level Output Current, $V_{CC} = V_O = 5.5$ V, $I_F = 250$ μ A	μ A		1	200
	V_{OH}	High Level Output Voltage, $V_{CC} = 4.5$ V, $I_F = 250$ μ A, $I_{OH} = -2$ mA	V	2.4	3.0	
	V_{OL}	Low Level Output Voltage, $V_{CC} = 4.5$ V, $I_F = 7$ mA, $I_O = 8$ mA	V		0.38	0.6
	I_{CCH}	High Level Supply Current, $V_{CC} = 5.5$ V, $I_F = 0$ mA	mA		11	17
	I_{CCL}	Low Level Supply Current, $V_{CC} = 5.5$ V, $I_F = 10$ mA	mA		12	18
	I_{OSH}	High Level Output Short Circuit Current, $V_{CC} = 5.5$ V, $V_O = \text{GND}$, $I_F = 0$ mA, 10 ms or less	mA		-26	
	I_{OSL}	Low Level Output Short Circuit Current, $V_{CC} = 5.5$ V, $V_O = \text{GND}$, $I_F = 8$ mA, 10 ms or less	mA		34	
Coupled	I_{FHL}	Threshold Input Current, High $\rightarrow$ Low, $V_{CC} = 5$ V $T_A = 25^\circ\text{C}$	mA		2.0	5 6
	I_{FLH}	Threshold Input Current, Low $\rightarrow$ High, $V_{CC} = 5$ V $T_A = 25^\circ\text{C}$	mA	0.5 0.35		
	R_{I-O}	Isolation Resistance, $V_{in-out} = 1$ kVDC, $R_H = 40$ to 60%, $T_A = 25^\circ\text{C}$	Ω	10^{11}		
	C_{I-O}	Isolation Capacitance, $V = 0$, $f = 1.0$ MHz, $T_A = 25^\circ\text{C}$	pF		0.6	
	t_{PHL}	Propagation Delay Time, High $\rightarrow$ Low ² , $V_{CC} = 5$ V, $I_F = 7.5$ mA $T_A = 25^\circ\text{C}$	ns	15 10	30	65 85
	t_{PLH}	Propagation Delay Time, Low $\rightarrow$ High ² , $V_{CC} = 5$ V, $I_F = 7.5$ mA $T_A = 25^\circ\text{C}$	ns	15 10	35	65 85
	$ t_{PHL}-t_{PLH} $	Pulse Width Distortion, (PWD) ² , $V_{CC} = 5$ V, $I_F = 7.5$ mA	ns		7	35
	CMH	Common Mode Transient Immunity at High Level Output ³ $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$, $I_F = 0$ mA, $V_{O(min)} = 2$ V, $V_{CM} = 100$ V	kV/ μ s	1	10	
	CML	Common Mode Transient Immunity at Low Level Output ³ $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$, $I_F = 7.5$ mA, $V_O = 0.8$ V (max) $R_L = 350$ Ω $V_{CM} = 1$ kV	kV/ μ s	1	10	

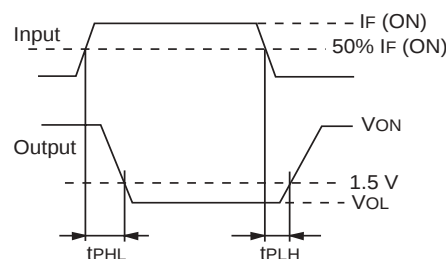
SEE NOTES ON NEXT PAGE

ELECTRICAL CHARACTERISTICS NOTES:

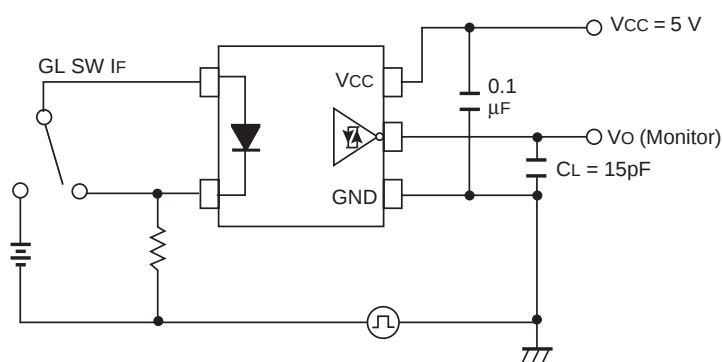
1. Typical Values at $T_A = 25^\circ\text{C}$.
2. Test Circuit for Propagation Delay Time:



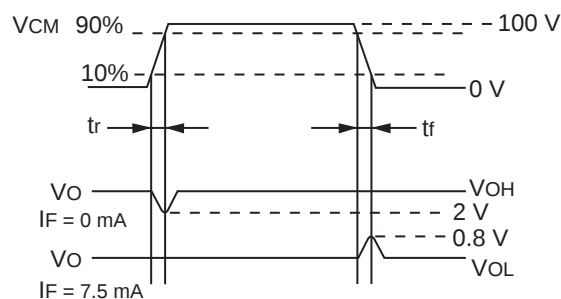
C_L is approximately 15 pF, which includes probe and stray wiring capacitance.



3. Test Circuit for Common Mode Transient Immunity



C_L is approximately 15 pF, which includes probe and stray wiring capacitance.



USAGE CAUTIONS

1. Protect against static electricity when handling.
2. By-pass capacitor of more than 0.1 μF is used between V_{CC} and GND near device.

ABSOLUTE MAXIMUM RATINGS¹ ($T_A = 25^\circ\text{C}$)

SYMBOLS	PARAMETERS	UNITS	RATINGS
Diode			
V_R	Reverse Voltage	V	3.0
I_F	Forward Current (DC)	mA	30
Detector			
V_{CC}	Supply Voltage	V	7
V_O	Output Voltage	V	7
I_{OH}	High Level Output Current ²	mA	-5
I_{OL}	Low Level Output Current ²	mA	13
P_D	Power Dissipation	mW	130
Coupled			
BV	Isolation Voltage ³	V _{r.m.s.}	2500
T_{STG}	Storage Temperature	$^\circ\text{C}$	-55 to +125
T_A	Operating Temperature	$^\circ\text{C}$	-40 to +85

Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.
2. $T_A = -40$ to $+85^\circ\text{C}$.
3. AC voltage for 1 minute at $T_A = 25^\circ\text{C}$, RH = 60 % between input and output.

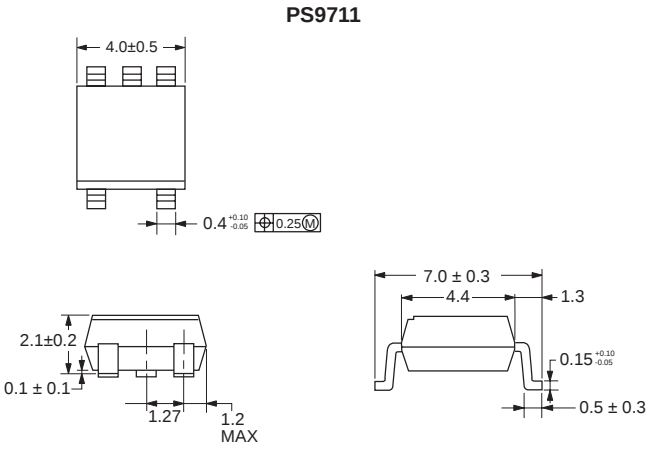
RECOMMENDED
OPERATING CONDITIONS

PART NUMBER			PS9711		
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
I_{FH}	High Level Input Current	mA	7.5		12.5
I_{FL}	Low Level Input Current	μA	0		250
V_{CC}	Supply Voltage	V	4.5	5.0	5.5
N	TTL $\rightarrow$ RL = 1 k Ω	TTL			3

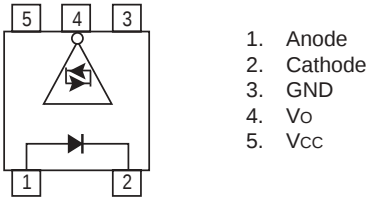
ORDERING INFORMATION

PART NUMBER	PACKAGE	PACKING STYLE
PS9711	5 Pin SOP	Magazine case 100 pcs
PS9711-E3		Embossed Tape 900 pcs/reel
PS9711-E4		
PS9711-F3		Embossed Tape 3500 pcs/reel
PS9711-F4		

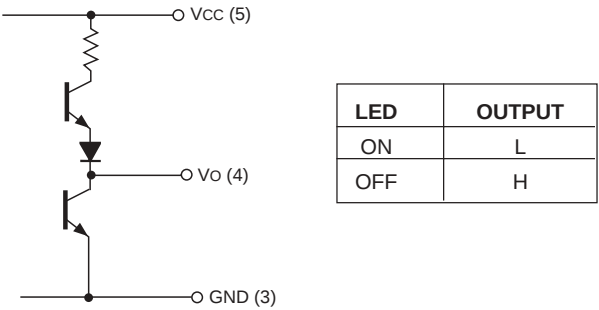
OUTLINE DIMENSIONS (Units in mm)



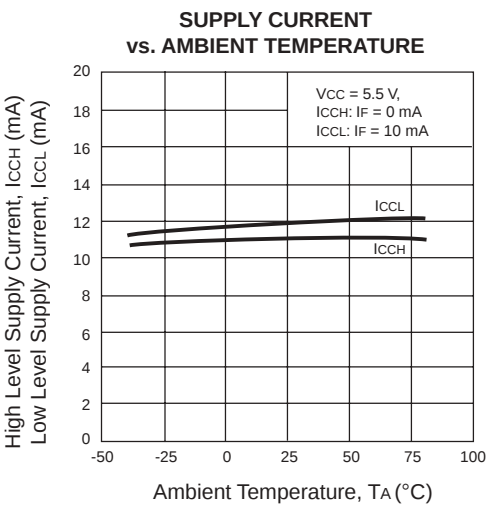
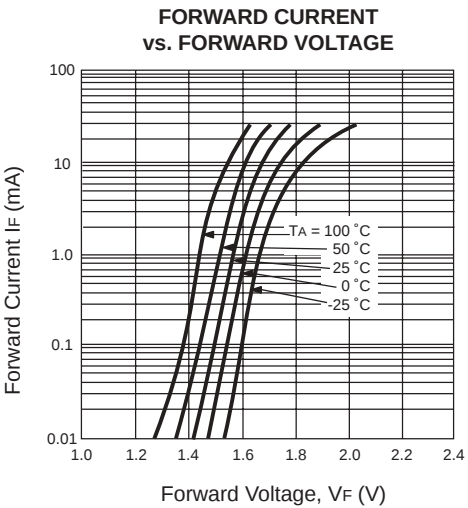
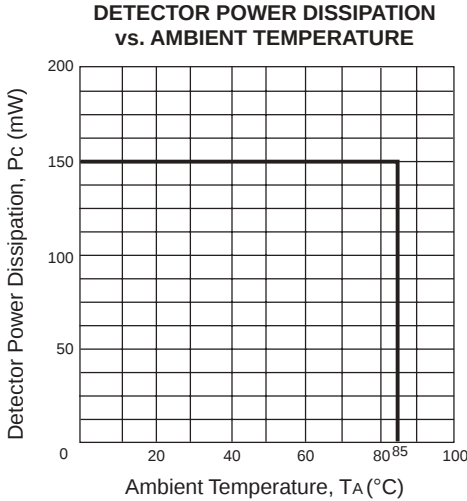
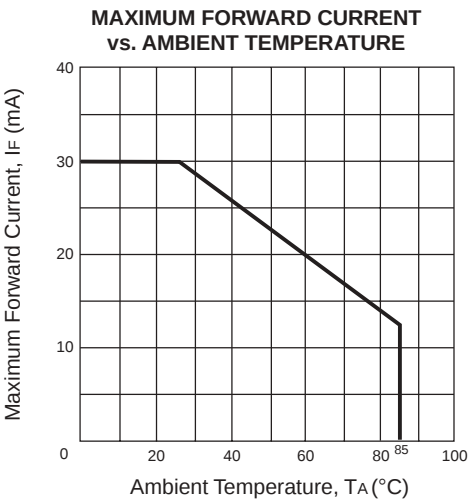
PIN CONNECTION (Top View)



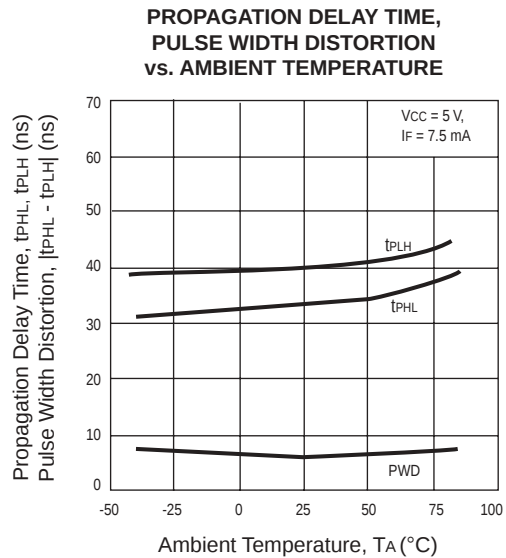
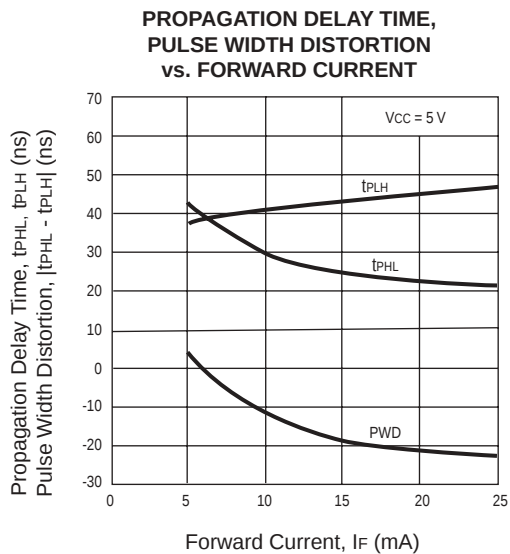
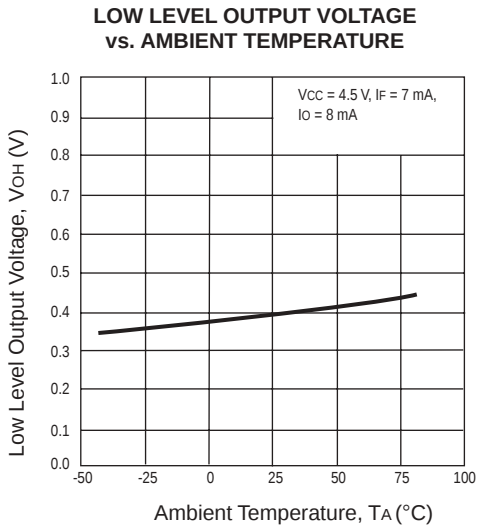
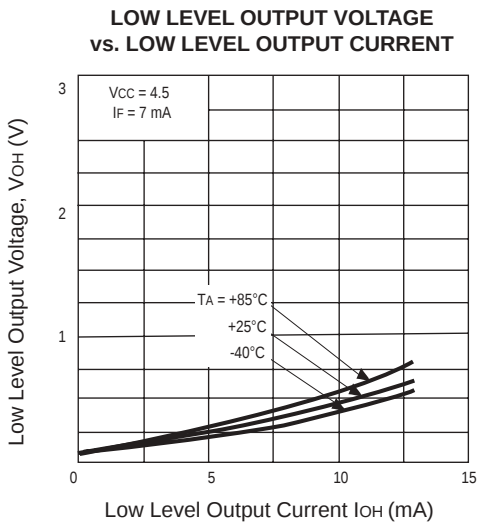
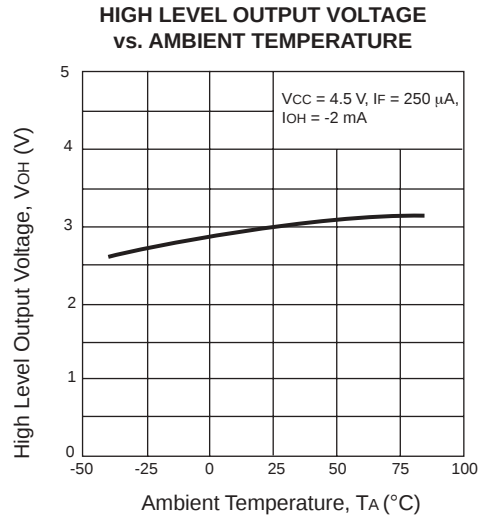
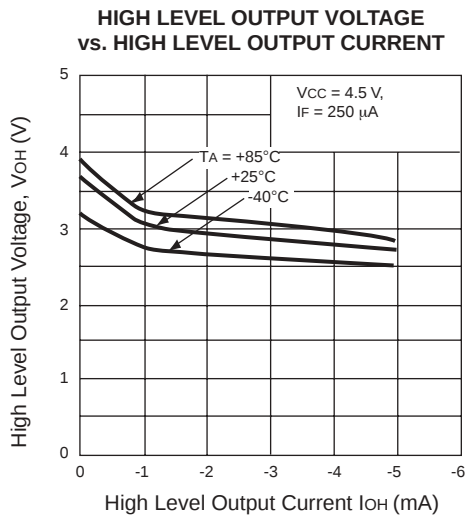
INTERNAL OUTPUT CIRCUIT



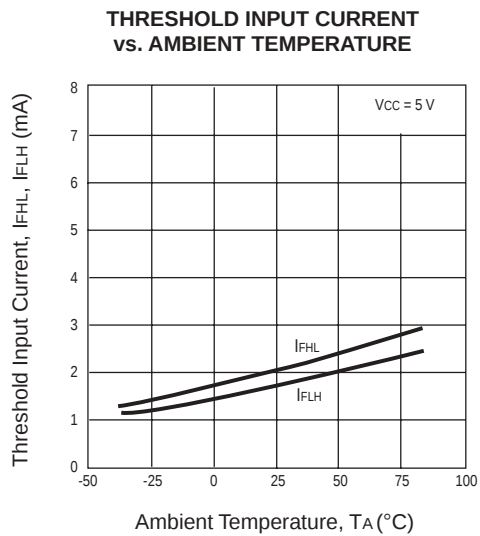
TYPICAL PERFORMANCE CURVES (TA = 25°C unless otherwise specified)



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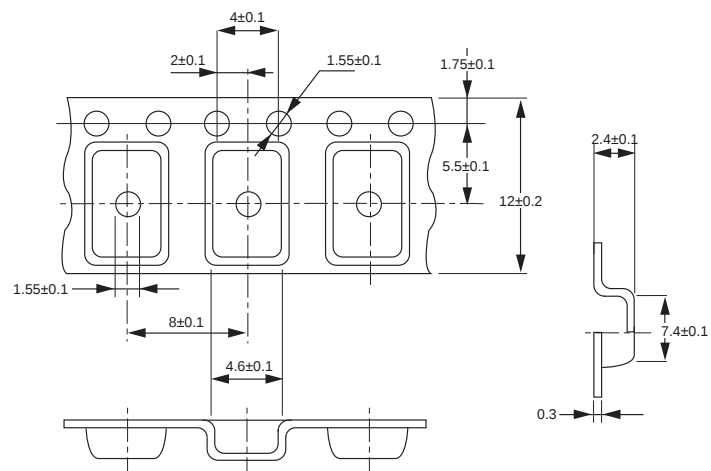


TYPICAL PERFORMANCE CURVES (T_A = 25°C unless otherwise specified)

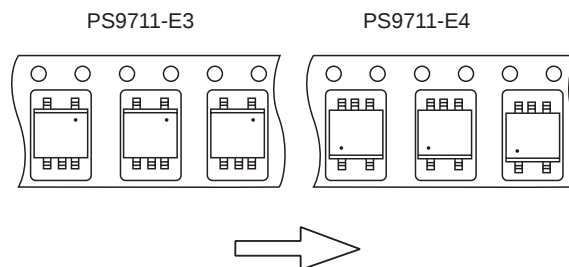


TAPING SPECIFICATIONS (Units in mm)

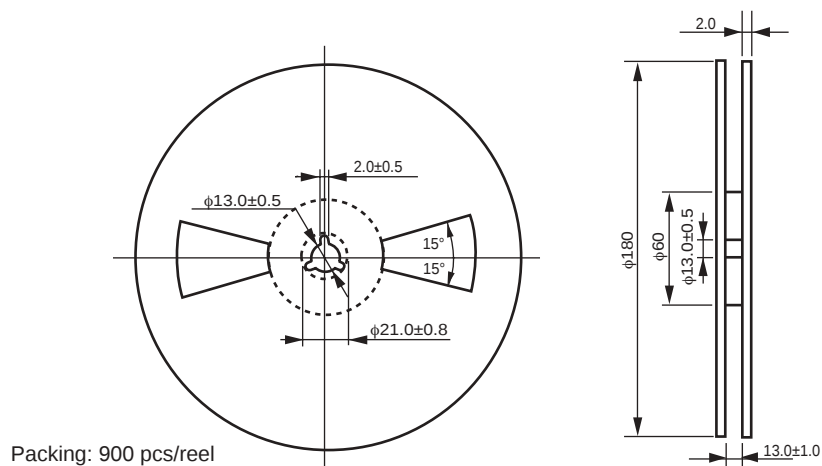
TAPE OUTLINE AND DIMENSIONS



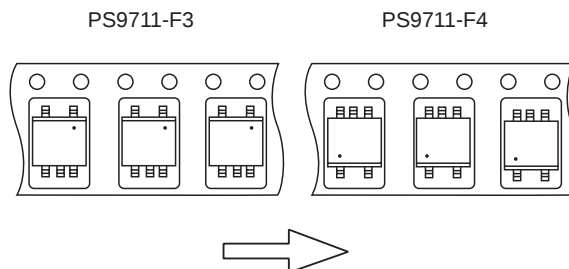
TAPE DIRECTION



REEL OUTLINE AND DIMENSIONS



TAPE DIRECTION



Technical drawing of a circular mechanical part, showing a top view and a side view.

Top View Dimensions:

- Outer Diameter: $\phi 21.0 \pm 0.8$
- Inner Hole Diameter: $\phi 13.0 \pm 0.5$
- Slot Width: 2.0 ± 0.5
- Slot Depth: 1.5 ± 0.5
- Slot Angle: 60°
- Distance from Center to Slot Edge: 6.0 ± 1

Side View Dimensions:

- Part Thickness: 1.5 ± 0.1
- Inner Hole Diameter: $\phi 66$

Part Identification:

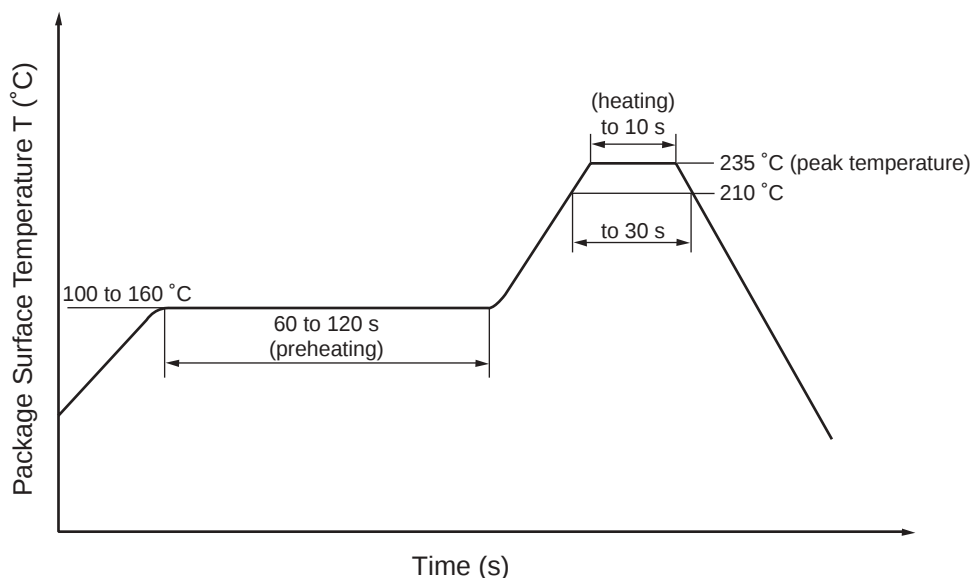
- PS9701-E3, E4; $\phi 1.78$
- PS9701-F3, F4; $\phi 3.30$

Packing: 3500 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 Three
- Flux Rosin flux containing 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 (molten solder temperature)
- Time 10 seconds or less
- 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 chlorine-based cleaning solvent after a reflow process.

Life Support Applications

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