

## 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:  $\pm 10$  kV/ $\mu$ s TYP
- **SMALL PACKAGE**  
5 pin SOP
- **HIGH SPEED RESPONSE**  
tPHL = 30 ns, tPLH = 35 ns TYP
- **PULSE WIDTH DISTORTION**  
|tPHL-tPLH| = 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**

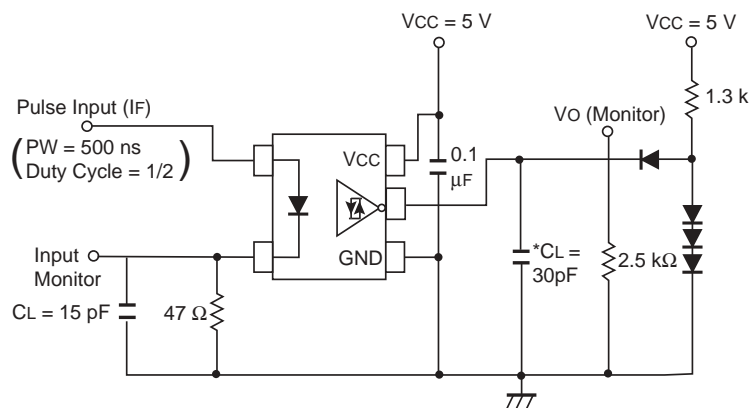
### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = -40 to +85 °C, unless otherwise specified)

PART NUMBER				PS9711		
SYMBOLS		PARAMETERS	UNITS	MIN	TYP	MAX
Diode	V <sub>F</sub>	Forward Voltage, I <sub>F</sub> = 10 mA, T <sub>A</sub> = 25°C	V	1.4	1.65	1.9
	I <sub>R</sub>	Reverse Current, V <sub>R</sub> = 3 V, T <sub>A</sub> = 25°C	$\mu$ A			10
	C <sub>t</sub>	Capacitance, V = 0, f = 1.0 MHz, T <sub>A</sub> = 25°C	pF		30	
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 $\mu$ A	$\mu$ A		1	200
	V <sub>OH</sub>	High Level Output Voltage, V <sub>CC</sub> = 4.5 V, I <sub>F</sub> = 250 $\mu$ A, I <sub>OH</sub> = -2 mA	V	2.4	3.0	
	V <sub>OL</sub>	Low Level Output Voltage, V <sub>CC</sub> = 4.5 V, I <sub>F</sub> = 7 mA, I <sub>O</sub> = 8 mA	V		0.38	0.6
	I <sub>CCH</sub>	High Level Supply Current, V <sub>CC</sub> = 5.5 V, I <sub>F</sub> = 0 mA	mA		11	17
	I <sub>CCL</sub>	Low Level Supply Current, V <sub>CC</sub> = 5.5 V, I <sub>F</sub> = 10 mA	mA		12	18
	I <sub>OSH</sub>	High Level Output Short Circuit Current, V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = GND, I <sub>F</sub> = 0 mA, 10 ms or less	mA		-26	
	I <sub>OSL</sub>	Low Level Output Short Circuit Current, V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = GND, I <sub>F</sub> = 8 mA, 10 ms or less	mA		34	
Coupled	I <sub>FHL</sub>	Threshold Input Current, High $\rightarrow$ Low, V <sub>CC</sub> = 5 V <span style="border: 1px solid black; padding: 2px;">T<sub>A</sub> = 25°C</span>	mA		2.0	5 6
	I <sub>FLH</sub>	Threshold Input Current, Low $\rightarrow$ High, V <sub>CC</sub> = 5 V <span style="border: 1px solid black; padding: 2px;">T<sub>A</sub> = 25°C</span>	mA	0.5 0.35		
	R <sub>I-O</sub>	Isolation Resistance, V <sub>in-out</sub> = 1 kV <sub>DC</sub> , R <sub>H</sub> = 40 to 60%, T <sub>A</sub> = 25°C	$\Omega$		10 <sup>11</sup>	
	C <sub>I-O</sub>	Isolation Capacitance, V = 0, f = 1.0 MHz, T <sub>A</sub> = 25°C	pF		0.6	
	t <sub>PHL</sub>	Propagation Delay Time, High $\rightarrow$ Low <sup>2</sup> , V <sub>CC</sub> = 5 V, I <sub>F</sub> = 7.5 mA <span style="border: 1px solid black; padding: 2px;">T<sub>A</sub> = 25°C</span>	ns	15 10	30	65 85
	t <sub>PLH</sub>	Propagation Delay Time, Low $\rightarrow$ High <sup>2</sup> , V <sub>CC</sub> = 5 V, I <sub>F</sub> = 7.5 mA <span style="border: 1px solid black; padding: 2px;">T<sub>A</sub> = 25°C</span>	ns	15 10	35	65 85
	t <sub>PHL</sub> -t <sub>PLH</sub>	Pulse Width Distortion, (PWD) <sup>2</sup> , V <sub>CC</sub> = 5 V, I <sub>F</sub> = 7.5 mA	ns		7	35
	CMH	Common Mode Transient Immunity at High Level Output <sup>3</sup> V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25°C, I <sub>F</sub> = 0 mA, V <sub>O(min)</sub> = 2 V, V <sub>CM</sub> = 100 V	kV/ $\mu$ s		1	10
	CML	Common Mode Transient Immunity at Low Level Output <sup>3</sup> V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25°C, I <sub>F</sub> = 7.5 mA, V <sub>O</sub> = 0.8 V (max) R <sub>L</sub> = 350 $\Omega$ V <sub>CM</sub> = 1 kV	kV/ $\mu$ s		1	10

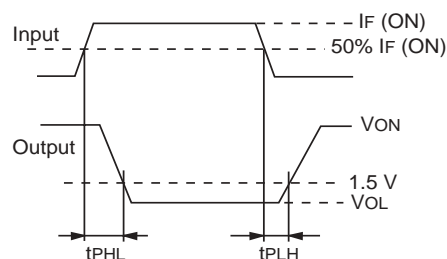
SEE NOTES ON NEXT PAGE

## ELECTRICAL CHARACTERISTICS NOTES:

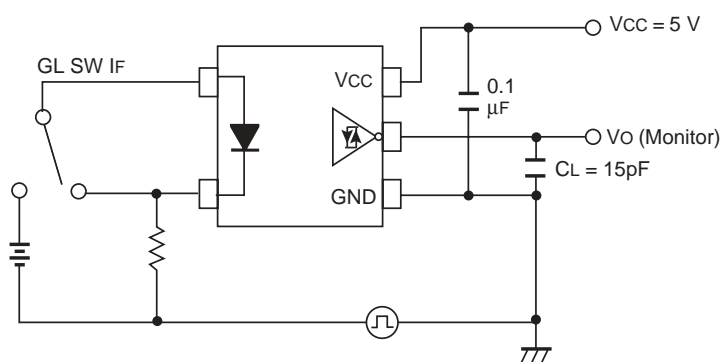
1. Typical Values at  $T_A = 25^\circ\text{C}$ .
2. Test Circuit for Propagation Delay Time:



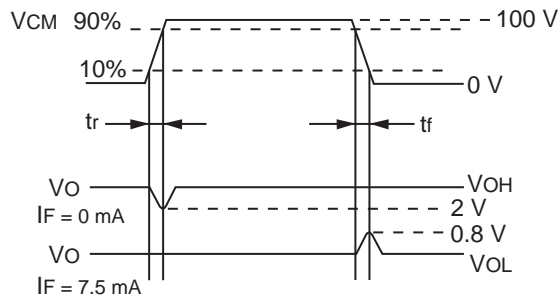
$C_L$  is approximately 15 pF, which includes probe and stray wiring capacitance.



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  $\mu\text{F}$  is used between Vcc and GND near device.

ABSOLUTE MAXIMUM RATINGS<sup>1</sup> ( $T_A = 25^\circ\text{C}$ )

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 <sup>2</sup>	mA	-5
$I_{OL}$	Low Level Output Current <sup>2</sup>	mA	13
$P_D$	Power Dissipation	mW	130
Coupled			
$B_V$	Isolation Voltage <sup>3</sup>	$V_{r.m.s.}$	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

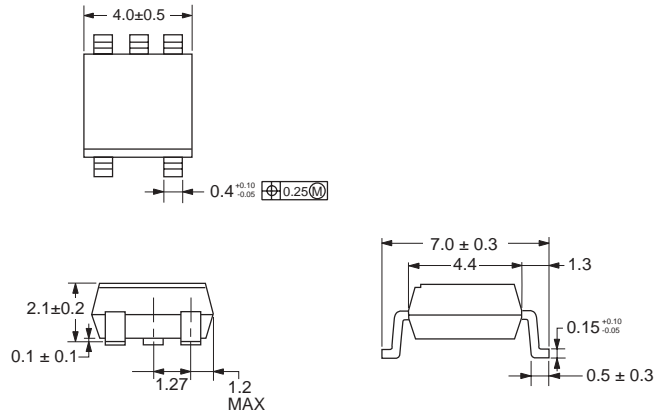
PART NUMBER			PS9711		
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
$I_{FH}$	High Level Input Current	mA	7.5		12.5
$I_{FL}$	Low Level Input Current	$\mu\text{A}$	0		250
$V_{CC}$	Supply Voltage	V	4.5	5.0	5.5
N	TTL $\rightarrow$ $R_L = 1\text{ k}\Omega$	TTL			3

## ORDERING INFORMATION

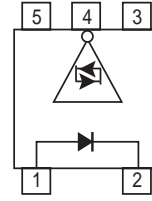
PART NUMBER	PACKAGE	PACKING STYLE
PS9711	5 Pin SOP	Magazine case 100 pcs
PS9711-E3		Embossed Tape 900 pcs/reel
PS9711-E4		
PS9711-F3	Embossed Tape 3500 pcs/reel	
PS9711-F4		

**OUTLINE DIMENSIONS** (Units in mm)

PS9711

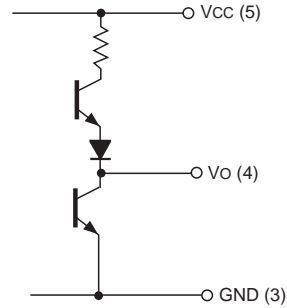


**PIN CONNECTION** (Top View)



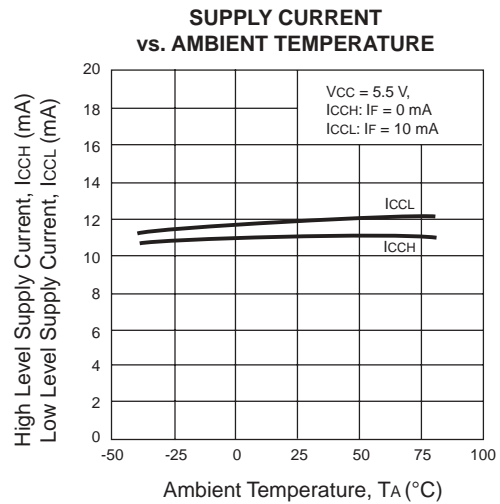
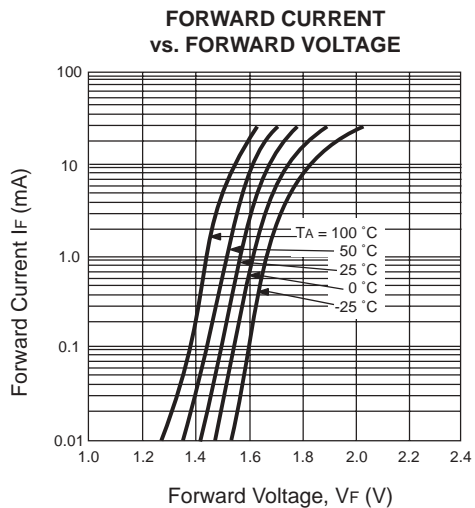
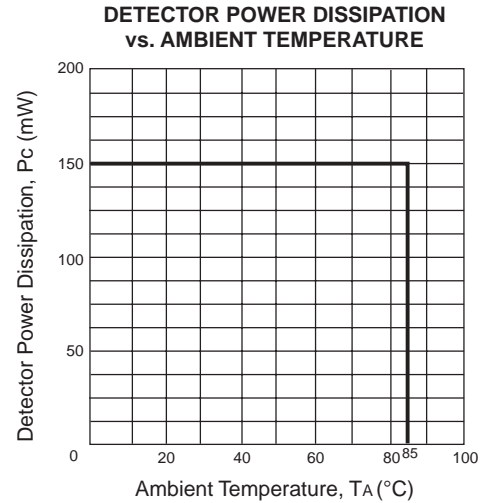
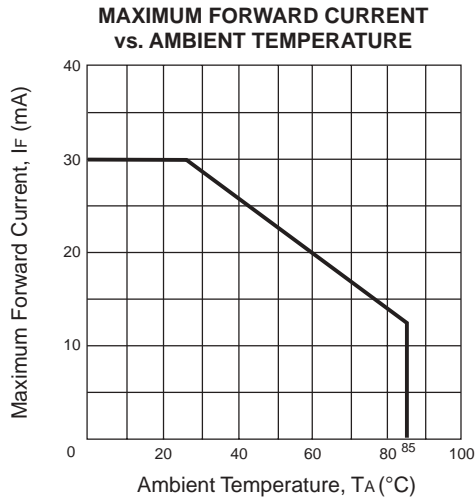
- 1. Anode
- 2. Cathode
- 3. GND
- 4. Vo
- 5. Vcc

**INTERNAL OUTPUT CIRCUIT**

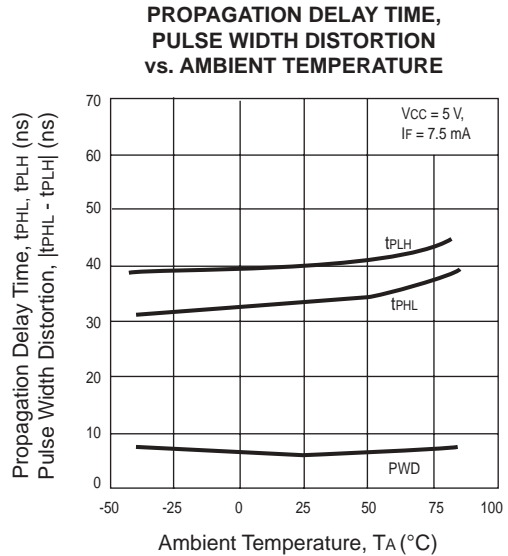
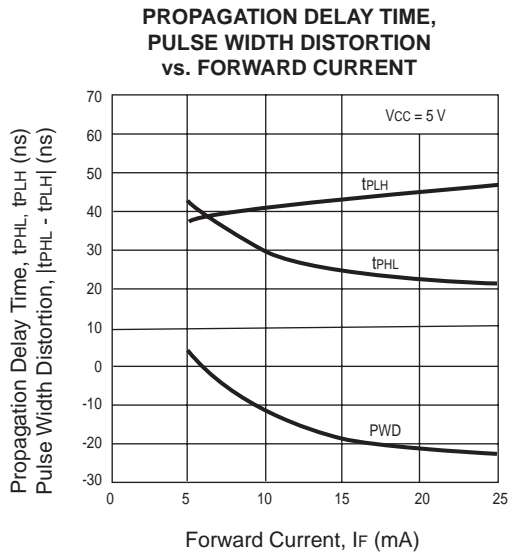
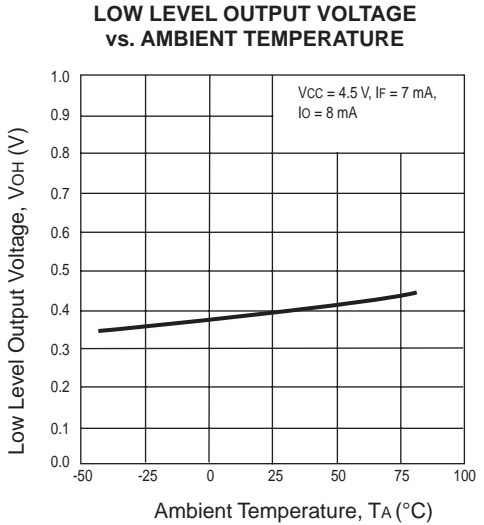
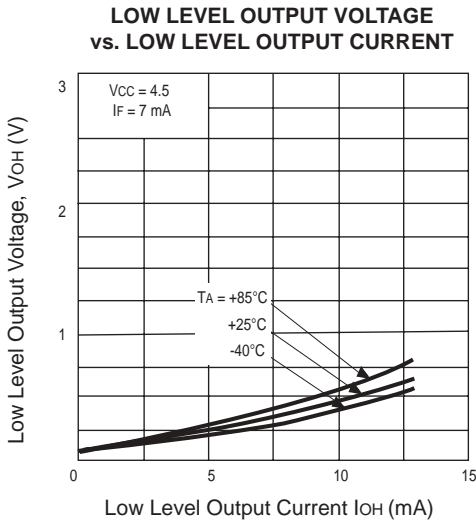
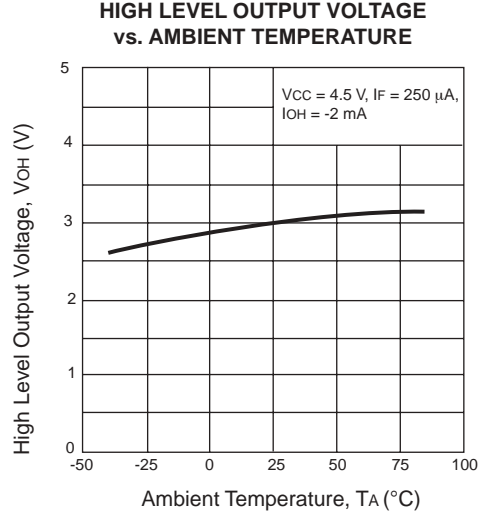
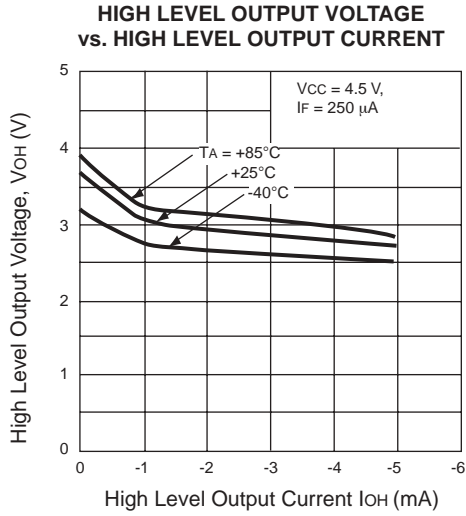


LED	OUTPUT
ON	L
OFF	H

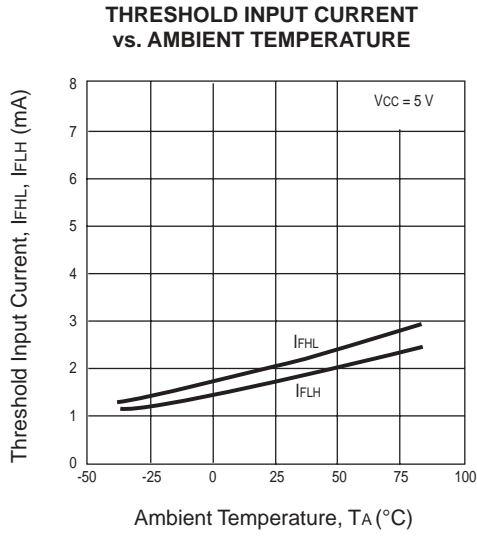
**TYPICAL PERFORMANCE CURVES** ( $T_A = 25^\circ\text{C}$  unless otherwise specified)



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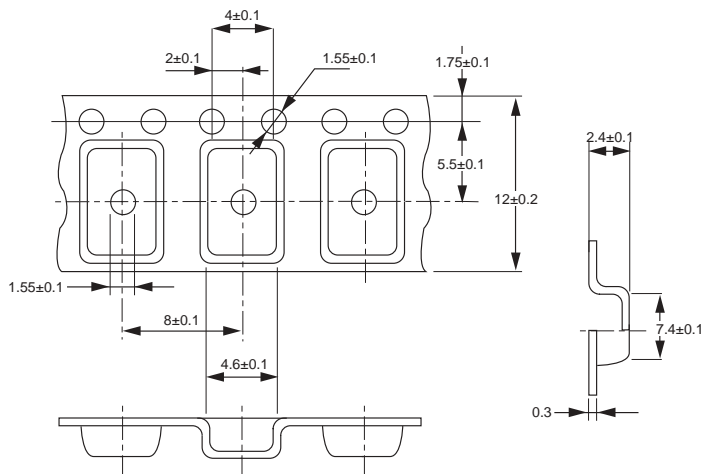


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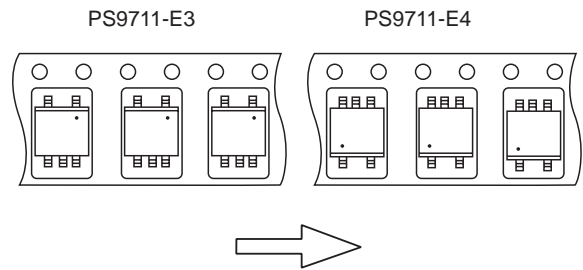


**TAPING SPECIFICATIONS** (Units in mm)

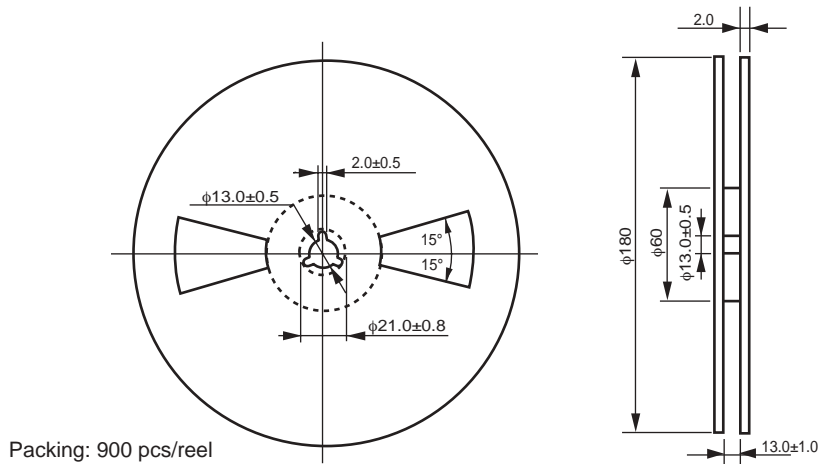
TAPE OUTLINE AND DIMENSIONS



TAPE DIRECTION

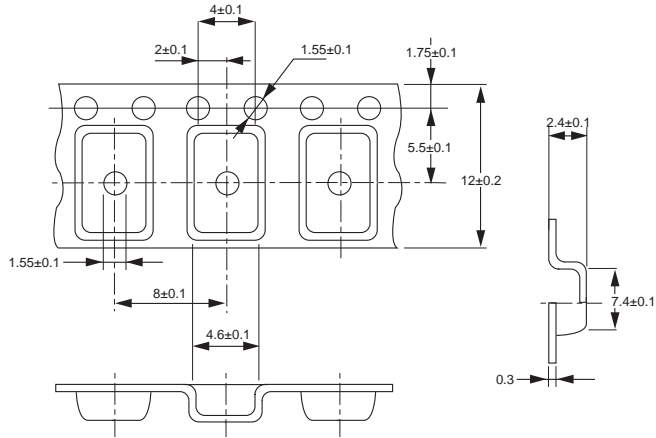


REEL OUTLINE AND DIMENSIONS

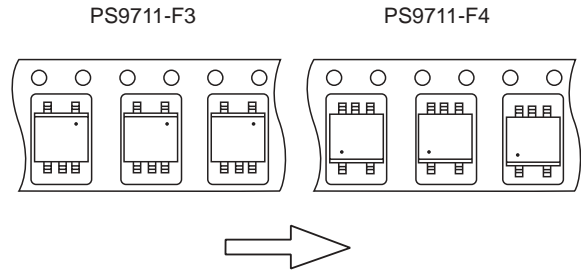


**TAPING SPECIFICATIONS** (Units in mm)

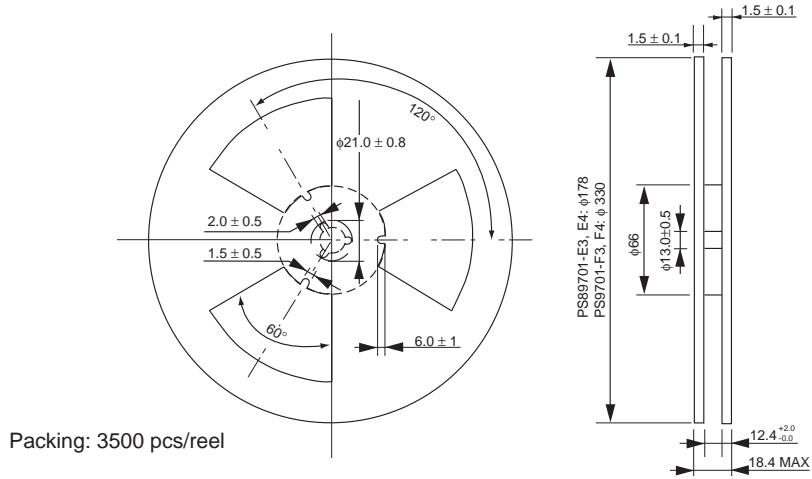
**TAPE OUTLINE AND DIMENSIONS**



**TAPE DIRECTION**



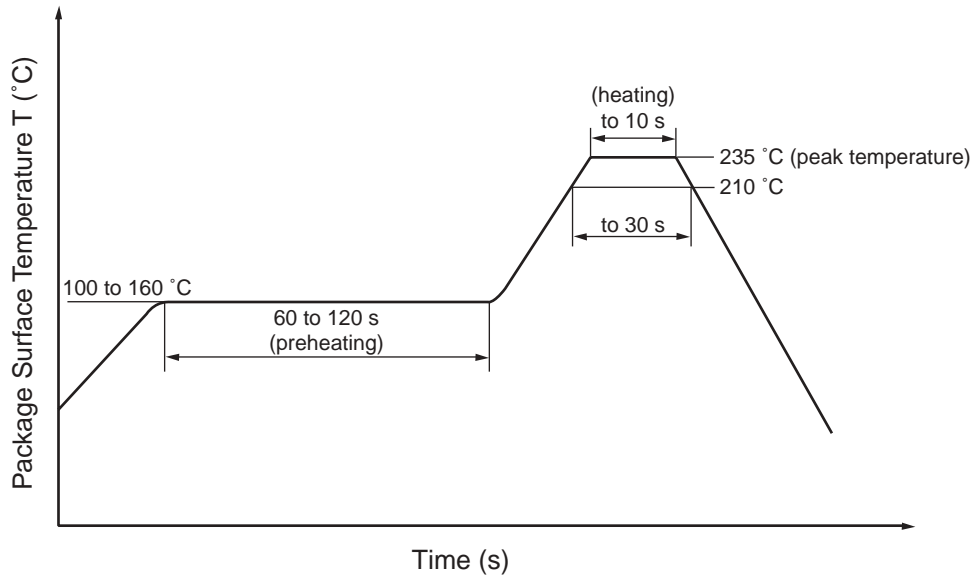
**REEL OUTLINE AND DIMENSIONS**



## 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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