

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**

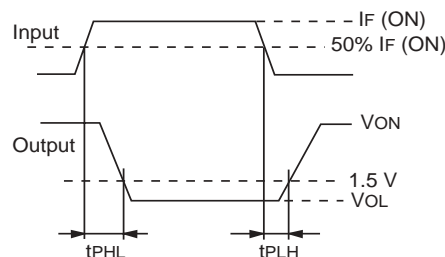
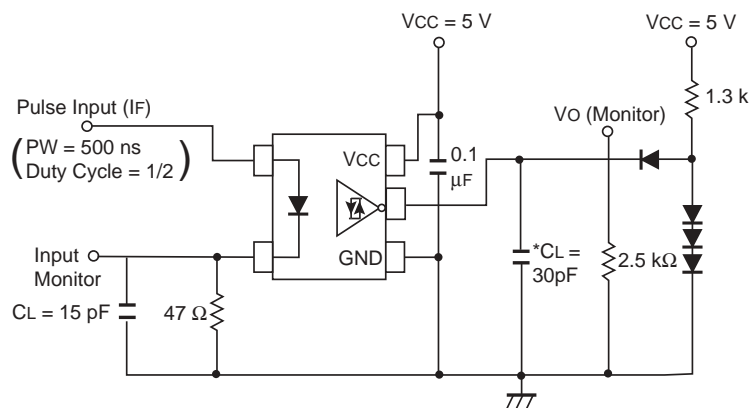
ELECTRICAL CHARACTERISTICS ($T_A = -40$ to $+85$ °C, unless otherwise specified)

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 <small>$T_A = 25^\circ\text{C}$</small>	mA		2.0	5 6
	I_{FLH}	Threshold Input Current, Low \rightarrow High, $V_{CC} = 5$ V <small>$T_A = 25^\circ\text{C}$</small>	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 <small>$T_A = 25^\circ\text{C}$</small>	ns	15 10	30	65 85
	t_{PLH}	Propagation Delay Time, Low \rightarrow High ² , $V_{CC} = 5$ V, $I_F = 7.5$ mA <small>$T_A = 25^\circ\text{C}$</small>	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

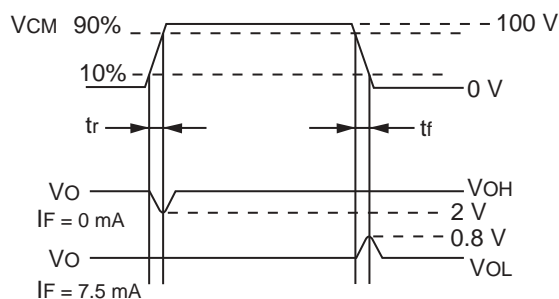
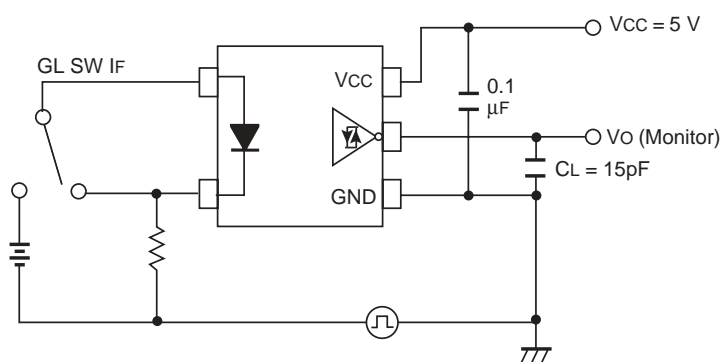
ELECTRICAL CHARACTERISTICS NOTES:

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 Vcc 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			
B_V	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

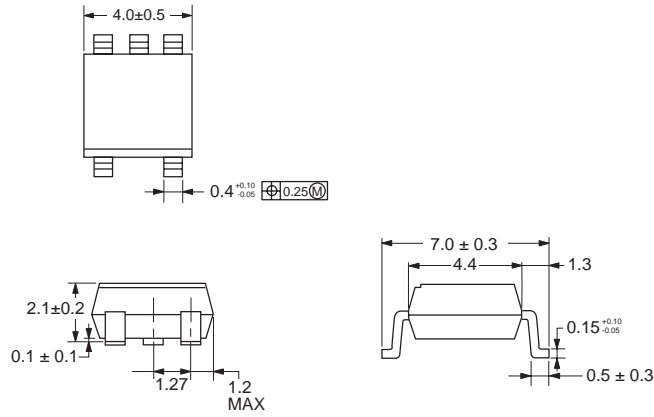
PART NUMBER			PS9711		
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
I_{FH}	High Level Input Current	mA	7.5		12.5
I_{FL}	Low Level Input Current	μA	0		250
V_{CC}	Supply Voltage	V	4.5	5.0	5.5
N	TTL \rightarrow $R_L = 1\text{ k}\Omega$	TTL			3

ORDERING INFORMATION

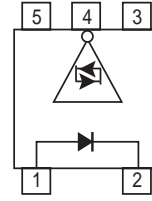
PART NUMBER	PACKAGE	PACKING STYLE
PS9711	5 Pin SOP	Magazine case 100 pcs
PS9711-E3		Embossed Tape 900 pcs/reel
PS9711-E4		
PS9711-F3		Embossed Tape 3500 pcs/reel
PS9711-F4		

OUTLINE DIMENSIONS (Units in mm)

PS9711

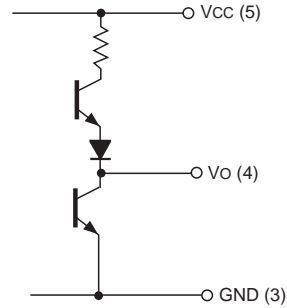


PIN CONNECTION (Top View)



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

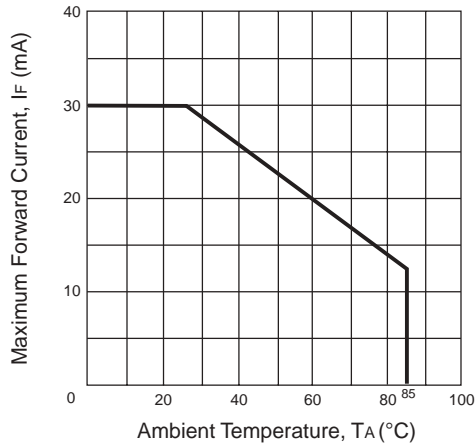
INTERNAL OUTPUT CIRCUIT



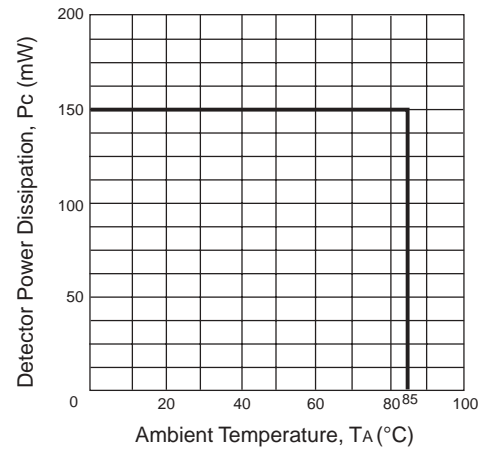
LED	OUTPUT
ON	L
OFF	H

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

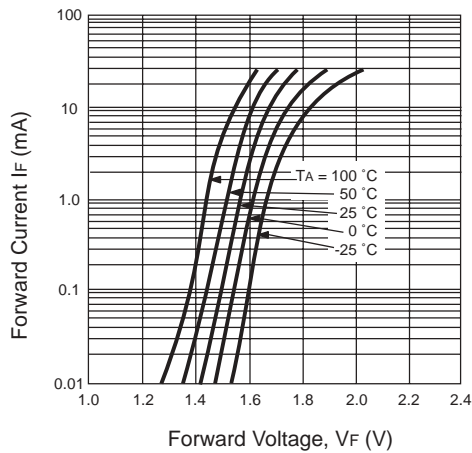
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



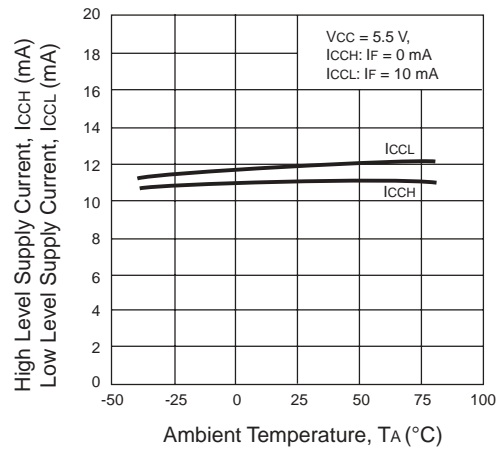
DETECTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



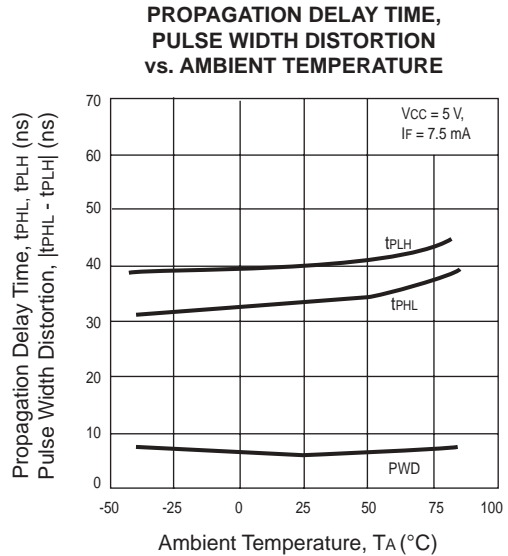
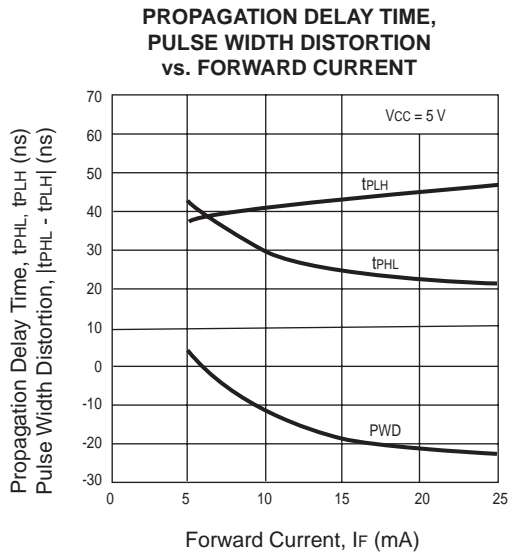
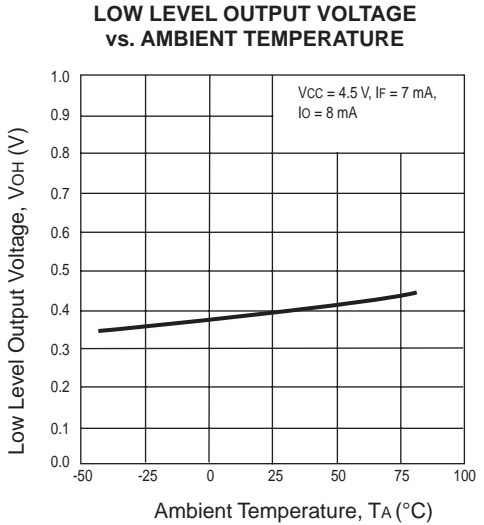
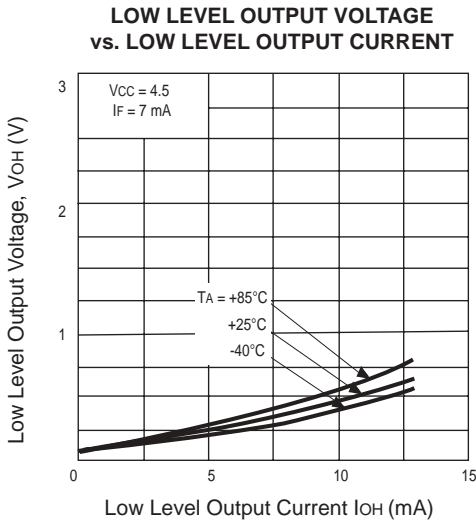
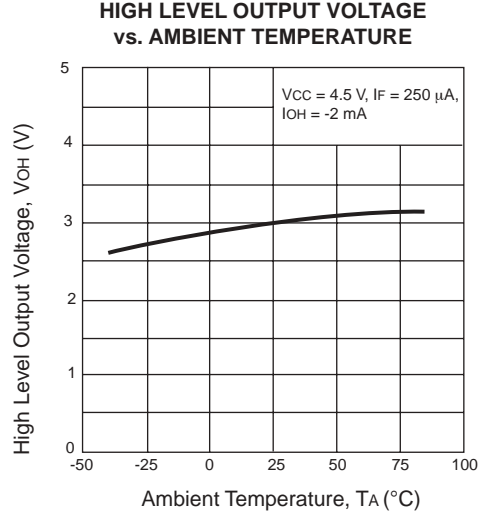
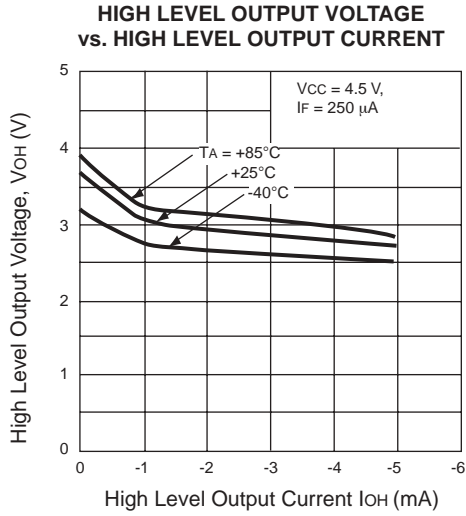
FORWARD CURRENT vs. FORWARD VOLTAGE



SUPPLY CURRENT vs. AMBIENT TEMPERATURE

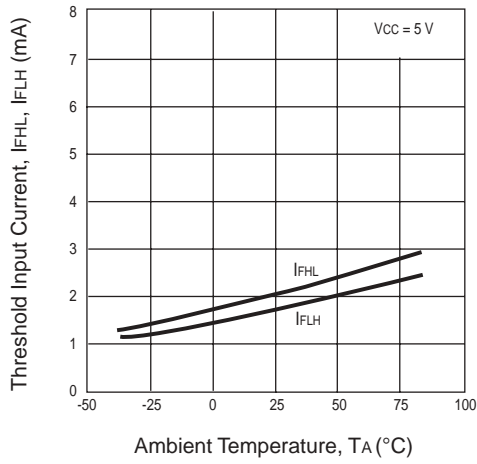


TYPICAL PERFORMANCE CURVES ($T_A = 25^\circ\text{C}$ unless otherwise specified)



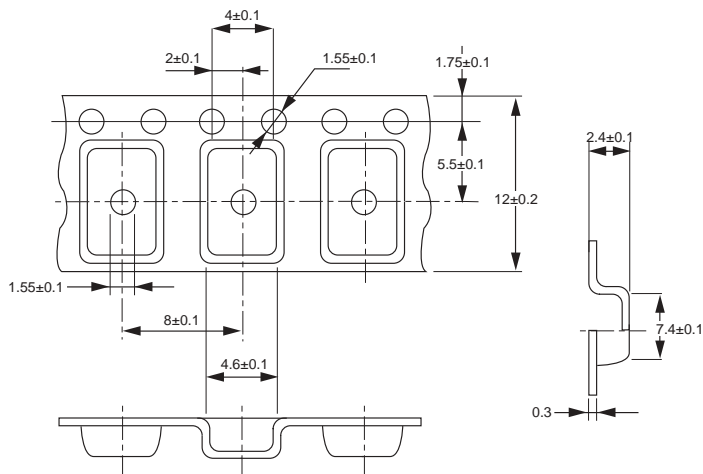
TYPICAL PERFORMANCE CURVES ($T_A = 25^\circ\text{C}$ unless otherwise specified)

THRESHOLD INPUT CURRENT vs. AMBIENT TEMPERATURE

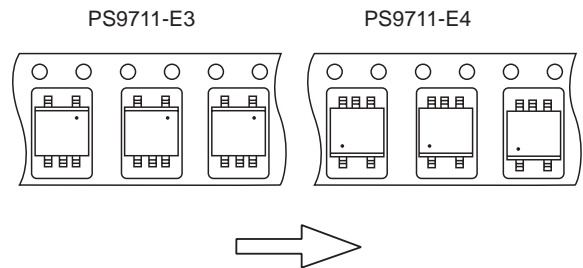


TAPING SPECIFICATIONS (Units in mm)

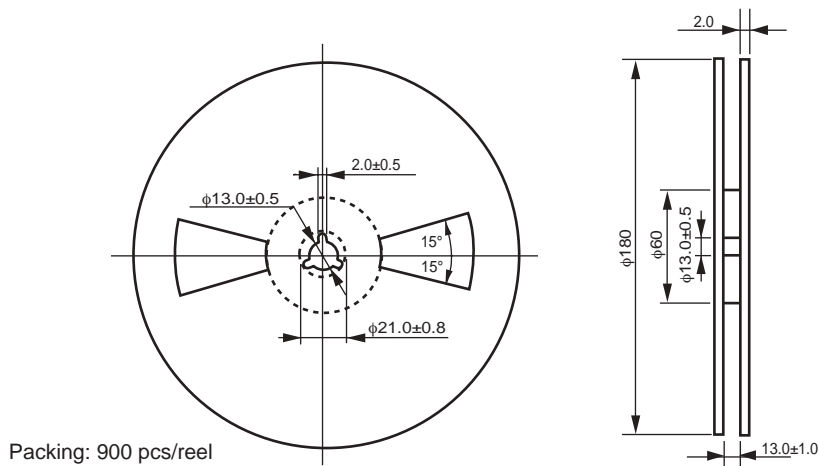
TAPE OUTLINE AND DIMENSIONS



TAPE DIRECTION

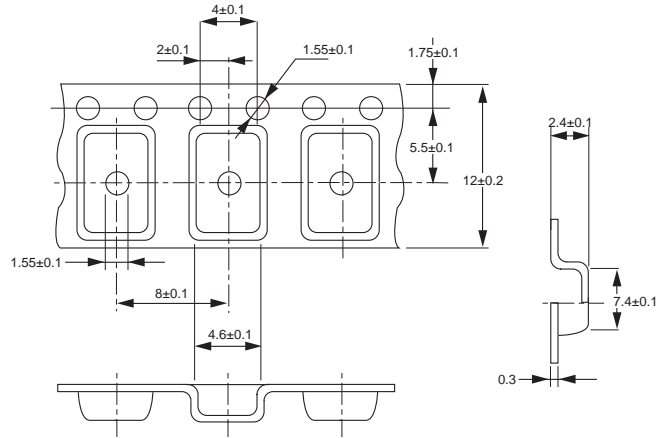


REEL OUTLINE AND DIMENSIONS

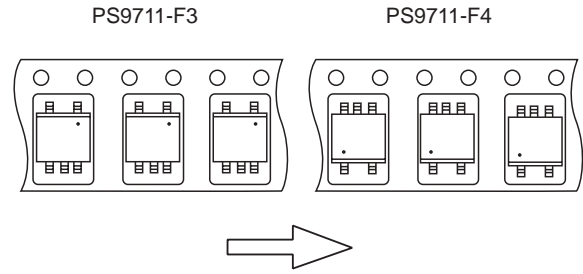


TAPING SPECIFICATIONS (Units in mm)

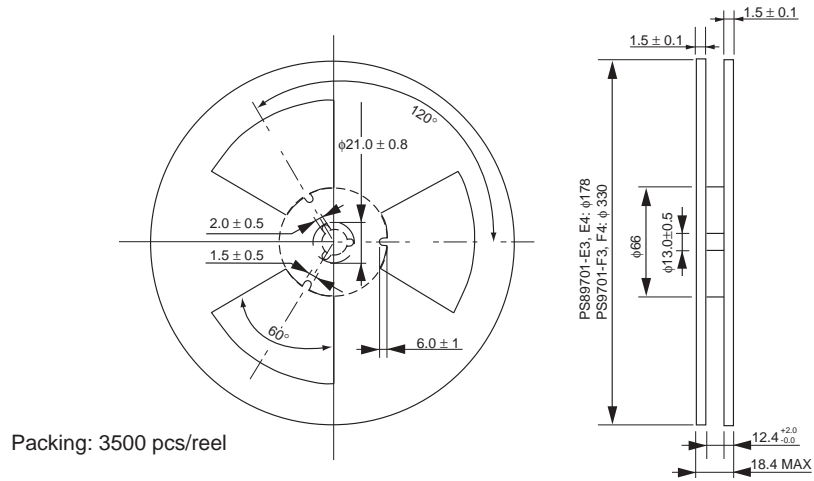
TAPE OUTLINE AND DIMENSIONS



TAPE DIRECTION



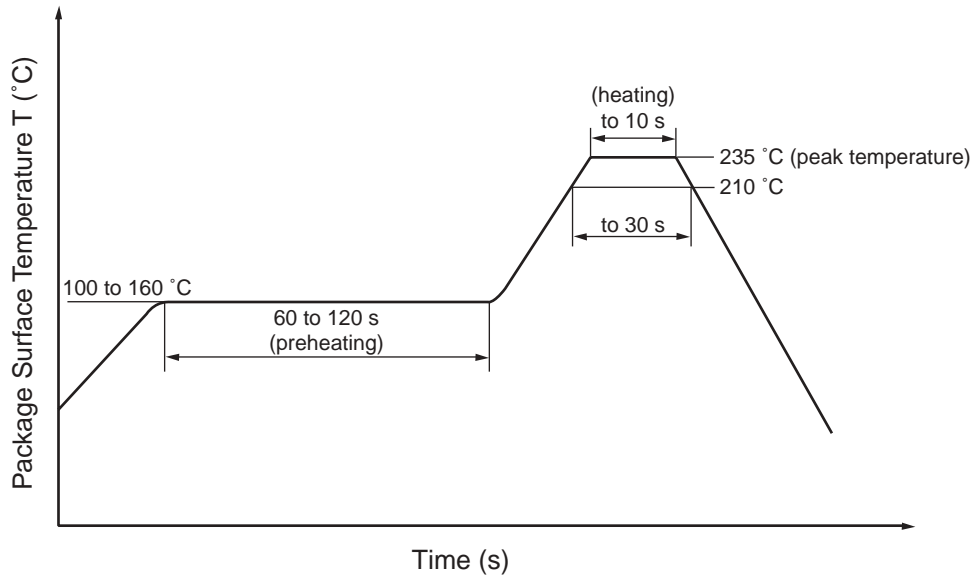
REEL OUTLINE AND DIMENSIONS



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

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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