NEC

PHOTOCOUPLER

PS9711

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

–NEPOC™ Series–

DESCRIPTION

The PS9711 is an optically coupled high-speed, totem-pole output isolator containing a GaAlAs LED on light emitting diode (input) and a photodiode and a signal processing circuit on light receiving side (output side) on one chip.

FEATURES

- High common mode transient immunity (CM_H, CM_L = ±10 kV/μs 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)
- Ordering number of taping product: PS9711-E3, E4: 900 pcs/reel,
  PS9711-F3, F4 (Recommended): 3 500 pcs/reel

APPLICATIONS

- Computer and peripheral manufactures
- Measurement equipment
- PDP

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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

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The mark ★ shows major revised points.

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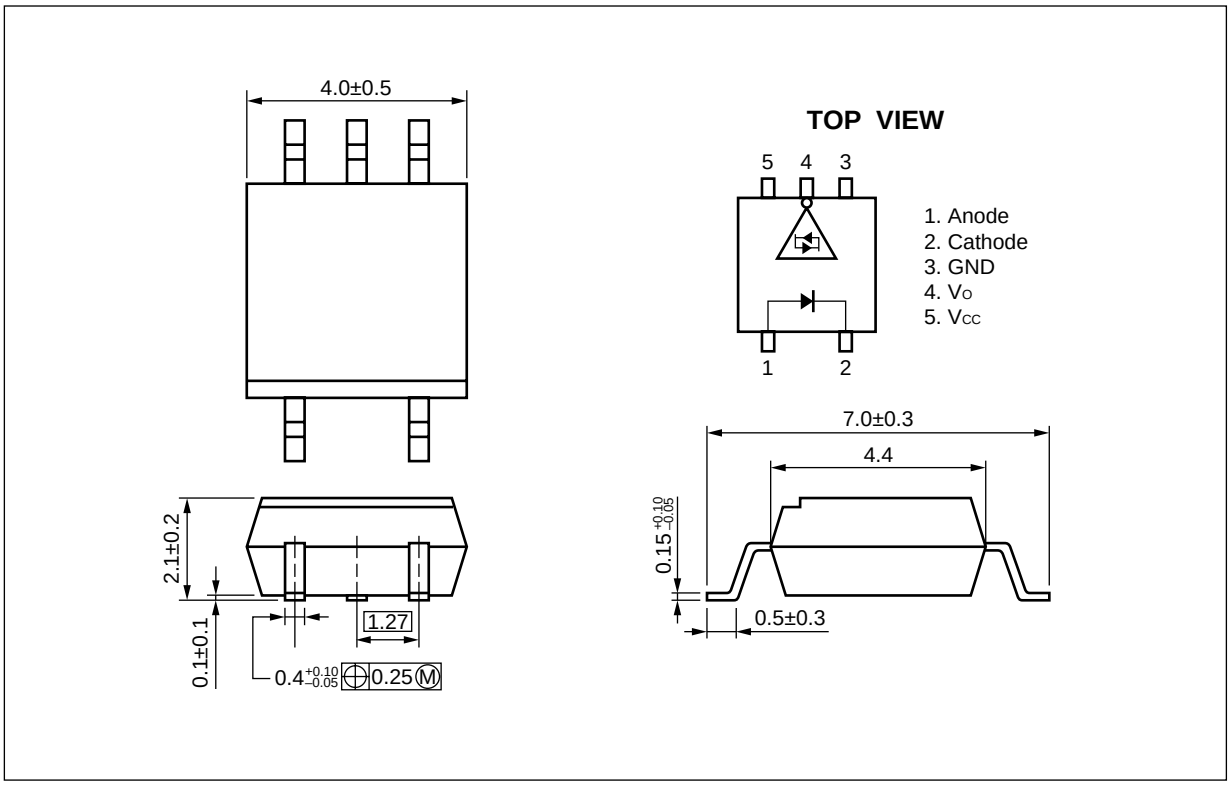
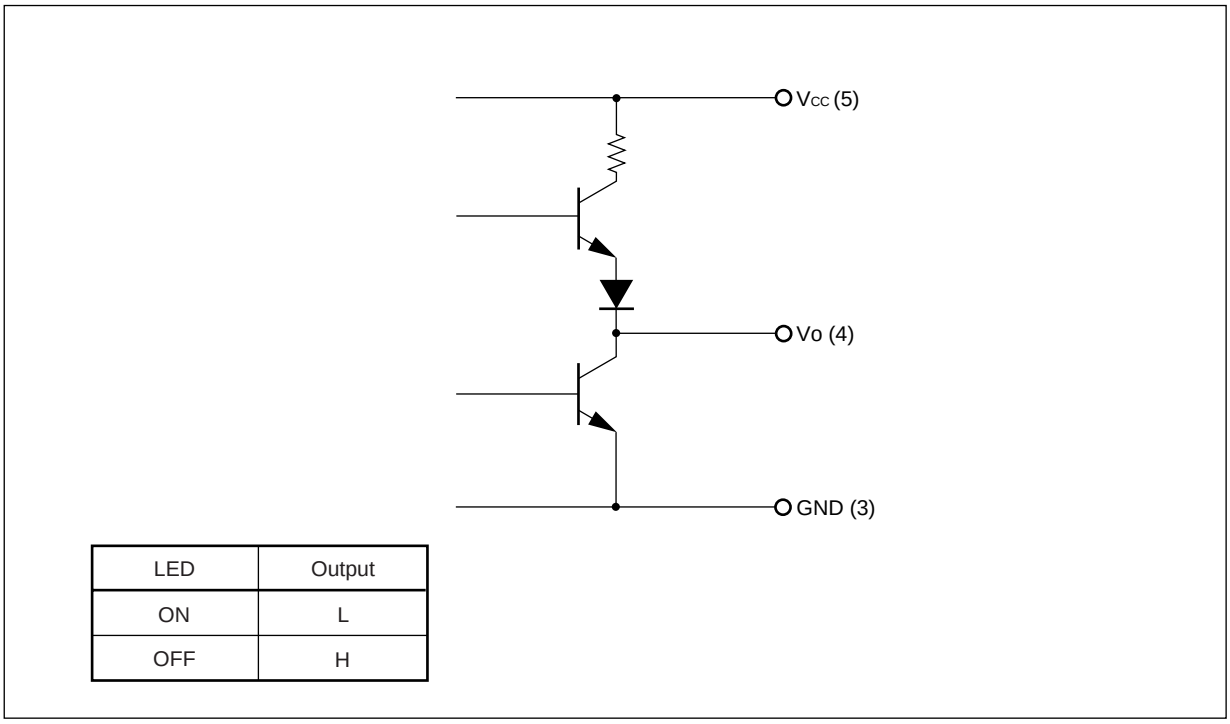
PACKAGE DIMENSIONS (in millimeters)



★ **INTERNAL OUT PUT CIRCUIT**



LED	Output
ON	L
OFF	H

ORDERING INFORMATION

Part Number	Package	Packing Style	Application Part Number*1
PS9711	5-pin SOP	Magazine case 100 pcs	PS9711
PS9711-E3		Embossed Tape 900 pcs/reel	
PS9711-E4			
PS9711-F3		Embossed Tape 3 500 pcs/reel	
PS9711-F4			

***1** For the application of the Safety Standard, following part number should be used.

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise specified)

Parameter		Symbol	Ratings	Unit
Diode	Forward Current	I_F	30	mA
	Reverse Voltage	V_R	3.0	V
Detector	Supply Voltage	V_{CC}	7	V
	Output Voltage	V_O	7	V
	High Level Output Current*1	I_{OH}	–5	mA
	Low Level Output Current*1	I_{OL}	13	mA
	Power Dissipation*1	P_C	130	mW
Isolation Voltage*2		BV	2 500	Vr.m.s.
Operating Ambient Temperature		T_A	–40 to +85	°C
Storage Temperature		T_{stg}	–55 to +125	°C

***1** T_A = –40 to +85 °C

***2** AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output.

RECOMMENDED OPERATING CONDITIONS

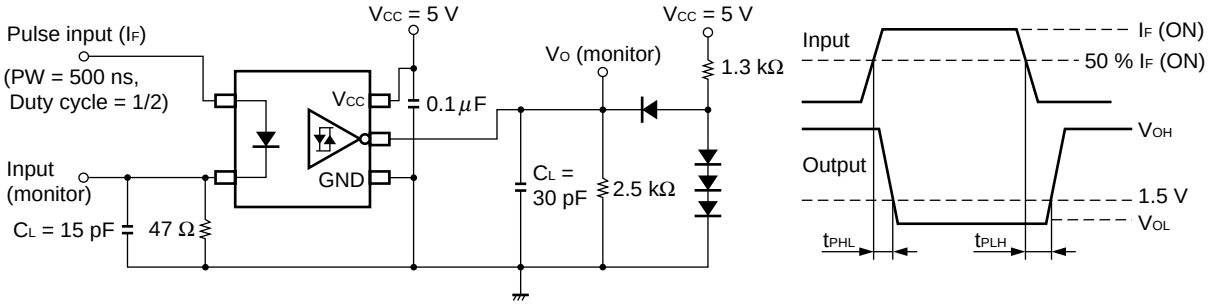
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
★ High Level Input Current	I_{FH}	7.5		12.5	mA
Low Level Input Current	I_{FL}	0		250	μA
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
TTL (loads)	N			3	

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

	Parameter	Symbol	Conditions		MIN.	TYP. [*1]	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 10 mA, T_A = 25 °C		1.4	1.65	1.9	V
	Reverse Current	I_R	V_R = 3 V, T_A = 25 °C				10	μA
	Terminal Capacitance	C_t	V = 0 V, f = 1 MHz, T_A = 25 °C			30		pF
Detector	High Level Output Current	I_{OH}	V_{CC} = V_O = 5.5 V, I_F = 250 μA			1	200	μA
	High Level Output Voltage	V_{OH}	V_{CC} = 4.5 V, I_F = 250 μA, I_{OH} = –2 mA		2.4	3.0		V
	Low Level Output Voltage	V_{OL}	V_{CC} = 4.5 V, I_F = 7 mA, I_O = 8 mA			0.38	0.6	V
	High Level Supply Current	I_{CCH}	V_{CC} = 5.5 V, I_F = 0 mA			11	17	mA
	Low Level Supply Current	I_{CCL}	V_{CC} = 5.5 V, I_F = 10 mA			12	18	mA
	High Level Output Short Circuit Current	I_{OSH}	V_{CC} = 5.5 V, V_O = GND, I_F = 0 mA, 10 ms or less			–26		mA
	Low Level Output Short Circuit Current	I_{OSL}	V_{CC} = V_O = 5.5 V, I_F = 8 mA, 10 ms or less			34		mA
Coupled	Threshold Input Current (H → L)	I_{FHL}	V_{CC} = 5 V	T_A = 25 °C		2.0	5	mA
							6	
	Threshold Input Current (L → H)	I_{FLH}	V_{CC} = 5 V	T_A = 25 °C	0.5			mA
					0.35			
	Isolation Resistance	R_{I-O}	V_{I-O} = 1 kV_{DC}, RH = 40 to 60 %, T_A = 25 °C		10^{11}			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1 MHz, T_A = 25 °C			0.4		pF
★	Propagation Delay Time (H → L)[*2]	t_{PHL}		T_A = 25 °C	15	30	65	ns
			V_{CC} = 5 V, I_F = 7.5 mA		10		85	
★	Propagation Delay Time (L → H)[*2]	t_{PLH}		T_A = 25 °C	15	35	65	ns
			V_{CC} = 5 V, I_F = 7.5 mA		10		85	
	Pulse Width Distortion (PWD)[*2]	$\lvert t_{PHL}-t_{PLH} \rvert$	V_{CC} = 5 V, I_F = 7.5 mA			7	35	ns
	Common Mode Transient Immunity at High Level Output[*3]	CM_H	V_{CC} = 5 V, T_A = 25 °C, I_F = 0 mA, $V_{O\ (MIN.)}$ = 2 V, V_{CM} = 100 V		1	10		kV/μs
	Common Mode Transient Immunity at Low Level Output[*3]	CM_L	V_{CC} = 5 V, T_A = 25 °C, I_F = 7.5 mA, $V_{O\ (MAX.)}$ = 0.8 V, V_{CM} = 100 V		1	10		kV/μs

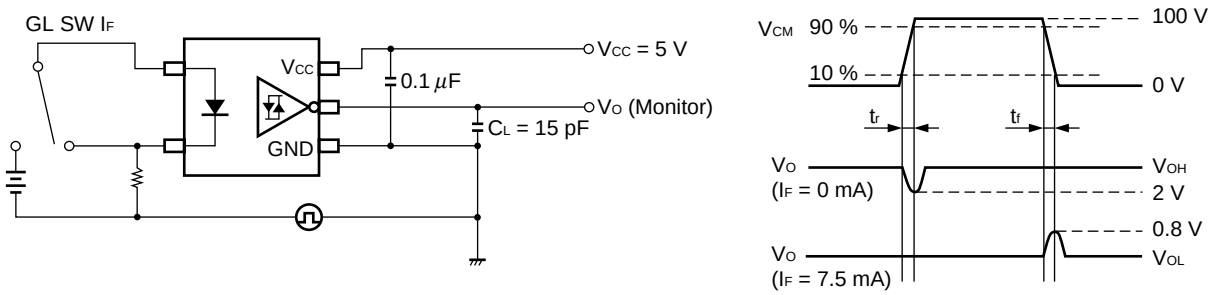
***1** Typical values at T_A = 25 °C

***2** Test circuit for propagation delay time



C_L is approximately which includes probe and stray wiring capacitance.

***3** Test circuit for common mode transient immunity



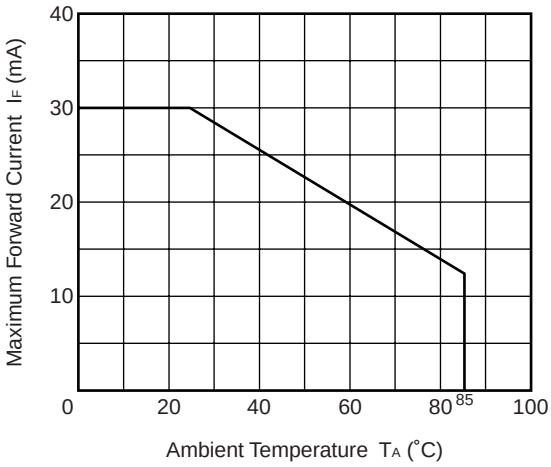
C_L is approximately which includes probe and stray wiring capacitance.

USAGE CAUTIONS

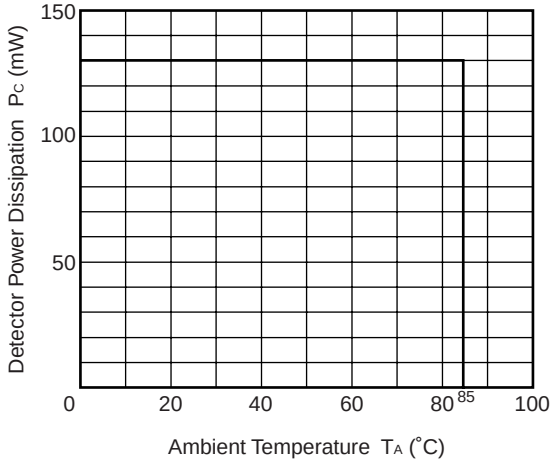
1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of more than 0.1 μF is used between V_{CC} and GND near device.

TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

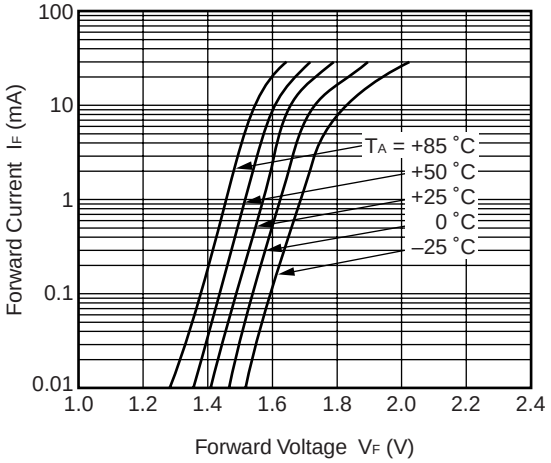
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



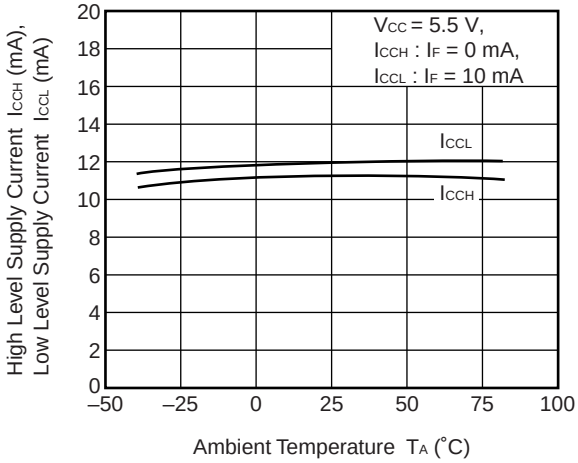
DETECTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



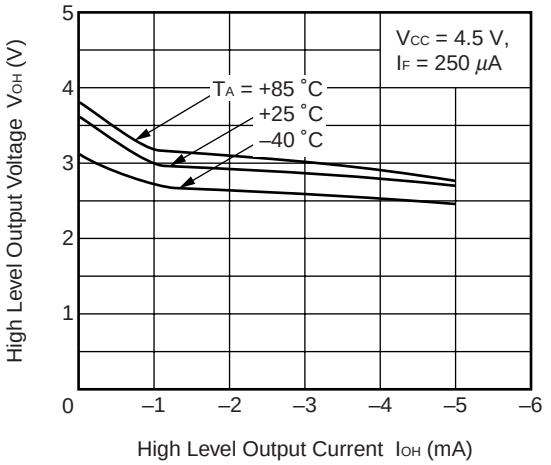
FORWARD CURRENT vs. FORWARD VOLTAGE



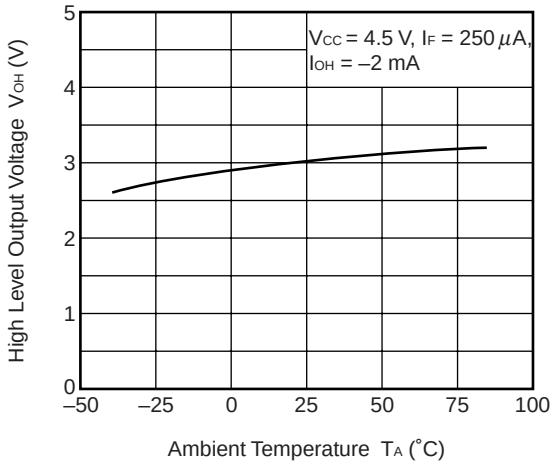
SUPPLY CURRENT vs. AMBIENT TEMPERATURE



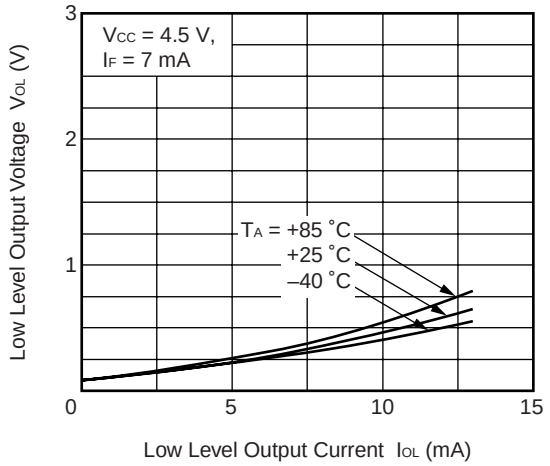
HIGH LEVEL OUTPUT VOLTAGE vs. HIGH LEVEL OUTPUT CURRENT



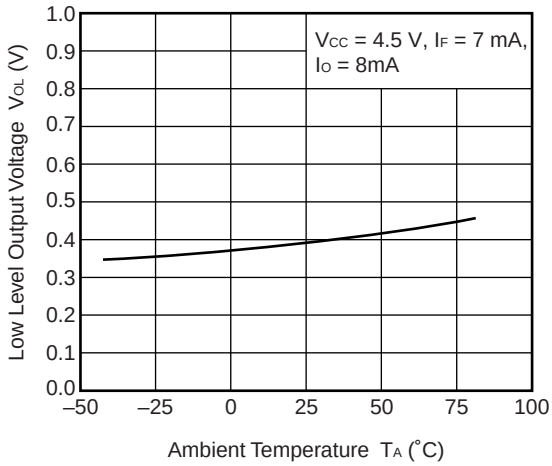
HIGH LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



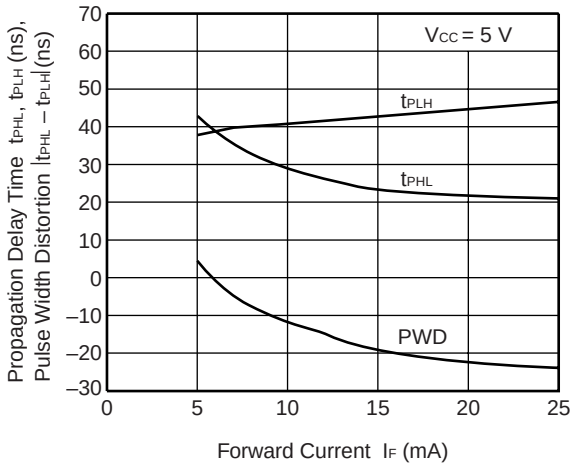
LOW LEVEL OUTPUT VOLTAGE vs.
LOW LEVEL OUTPUT CURRENT



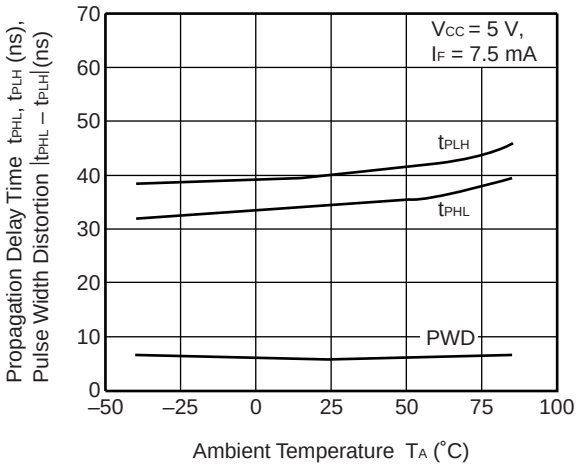
LOW LEVEL OUTPUT VOLTAGE vs.
AMBIENT TEMPERATURE



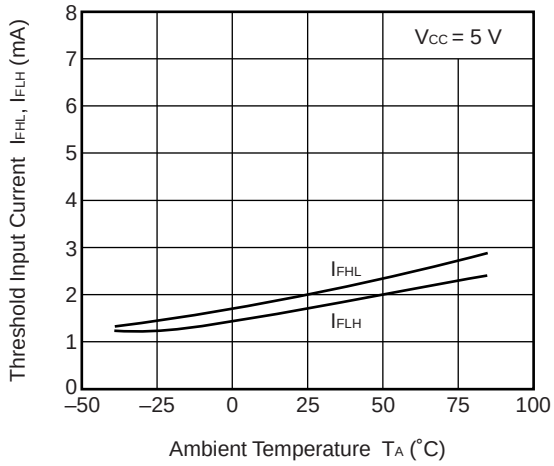
PROPAGATION DELAY TIME,
PULSE WIDTH DISTORTION
vs. FORWARD CURRENT



PROPAGATION DELAY TIME,
PULSE WIDTH DISTORTION
vs. AMBIENT TEMPERATURE



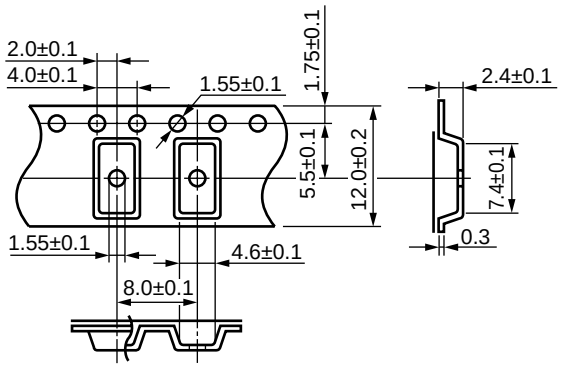
THRESHOLD INPUT CURRENT vs.
AMBIENT TEMPERATURE



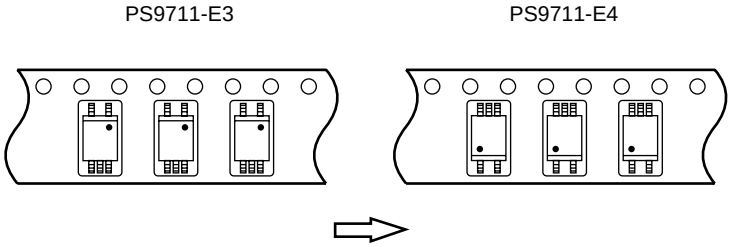
Remark The graphs indicate nominal characteristics.

★ TAPING SPECIFICATIONS (in millimeters)

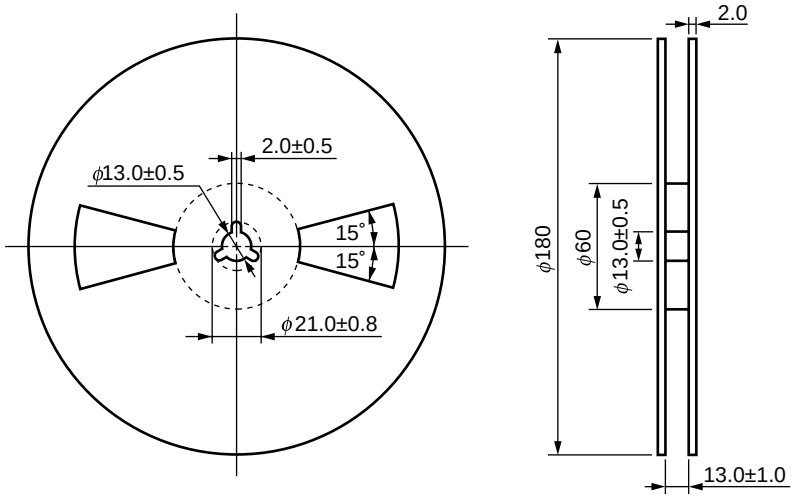
Outline and Dimensions (Tape)



Tape Direction

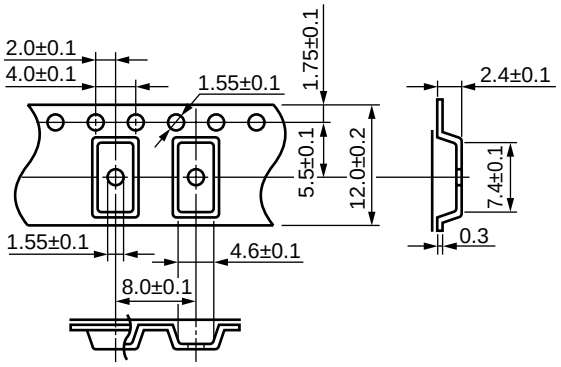


Outline and Dimensions (Tape)

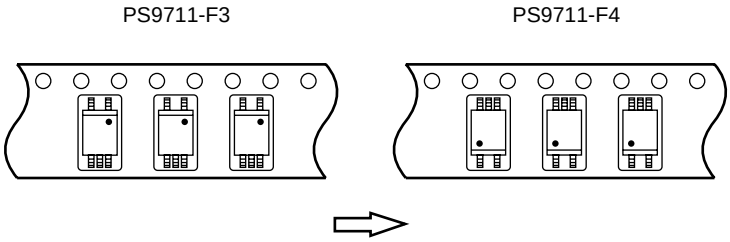


Packing: 900 pcs/reel

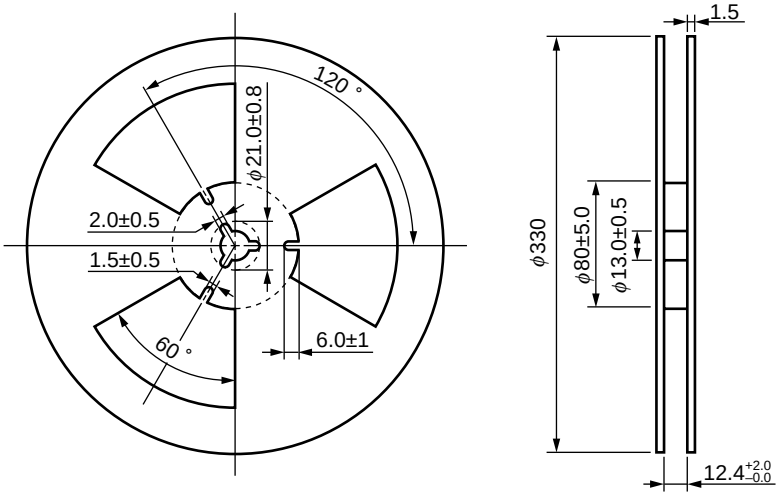
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 3 500 pcs/reel

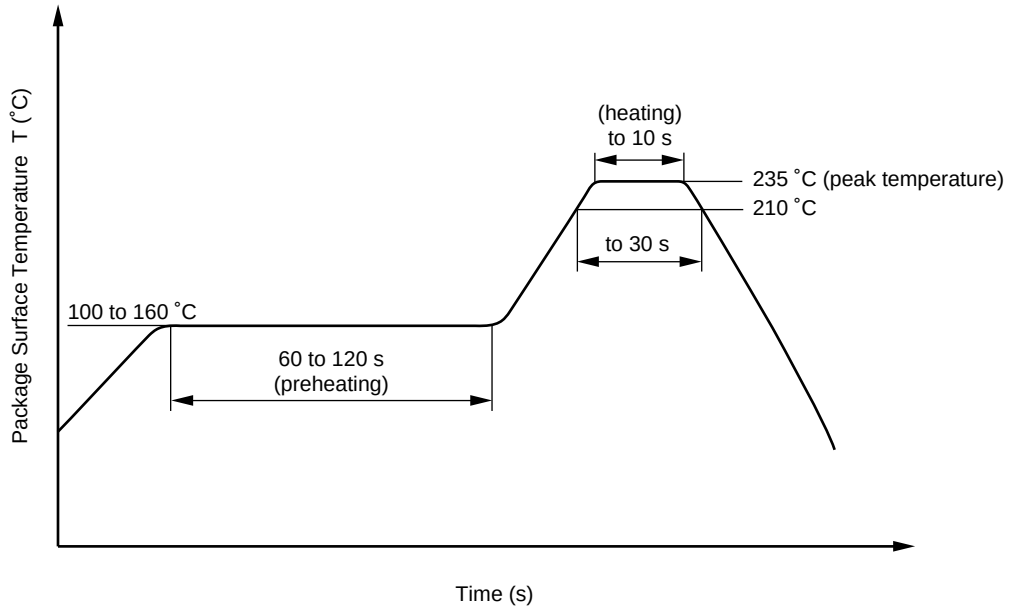
RECOMMENDED SOLDERING CONDITIONS

(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.)

★ Recommended Temperature Profile of Infrared Reflow



(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 freon-based and chlorine-based cleaning solvent.

[MEMO]

CAUTION

Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstances break the hermetic seal.

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