DATA SHEET

NEC

PHOTOCOUPLER

PS9611,PS9611L

HIGH NOISE REDUCTION, HIGH-SPEED 10 Mbps TOTEM POLE OUTPUT TYPE 8-PIN DIP PHOTOCOUPLER

–NEPOC Series–

DESCRIPTION

The PS9611 and PS9611L are optically coupled high-speed, totem pole output isolators containing a GaAlAs LED on the input side and a photodiode and a signal processing circuit on the output side on one chip.

The PS9611 is in a plastic DIP (Dual In-line Package) and the PS9611L is lead bending type (Gull-wing) for surface mounting.

FEATURES

- High common mode transient immunity (CM_H, CM_L = ±10 kV/μs TYP.)
- High-speed response (t_{PHL} = 30 ns TYP., t_{PLH} = 35 ns TYP.)
- Pulse width distortion ($|t_{PHL} - t_{PLH}|$ = 5 ns TYP.)
- Totem pole output (No pull-up resistor required)
- Ordering number of tape product: PS9611L-E3, E4: 1 000 pcs/reel
- Safety standards
  - UL approved: File No. E72422 (S)
  - VDE0884 approved (Option) : No.91877

APPLICATIONS

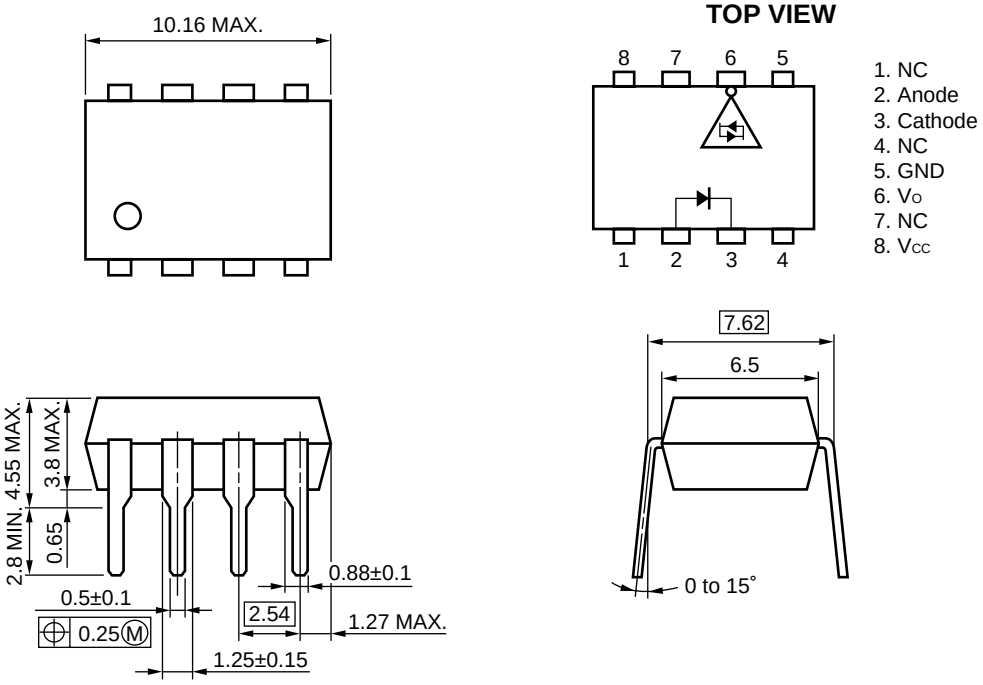
- Computer and peripheral manufactures
- Measurement equipment
- PDP

Document No. PN10072EJ01V0DS (1st edition)
(Previous No. P13102EJ4V0DS00)
Date Published February 2002 CP(K)
Printed in Japan

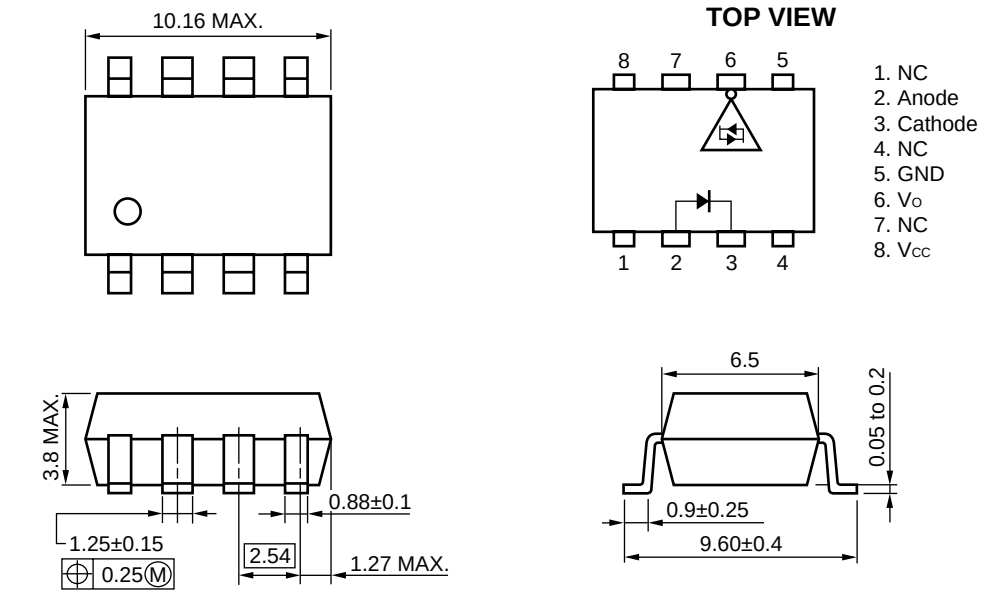
The mark ★ shows major revised points.

PACKAGE DIMENSIONS (UNIT: mm)

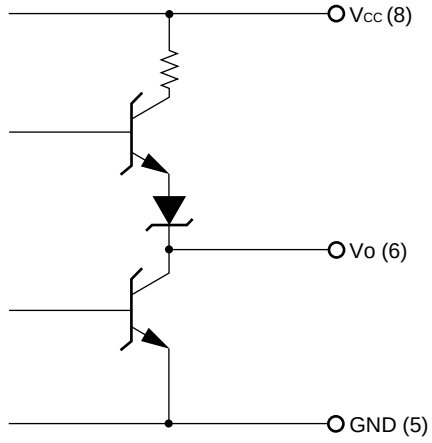
PS9611



PS9611L

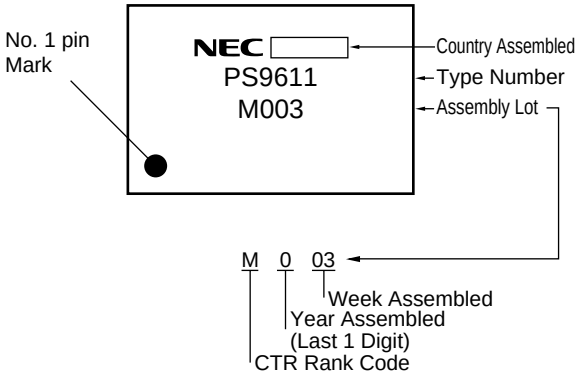


INTERNAL OUTPUT CIRCUIT



LED	Output
ON	L
OFF	H

MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Package	Packing Style	Safety Standards Approval	Application Part Number*1
PS9611	8-pin DIP	Magazine case 50 pcs	Approved products other than VDE	PS9611
PS9611L				PS9611L
PS9611L-E3		Embossed Tape 1 000 pcs/reel		
PS9611L-E4				
PS9611-V		Magazine case 50 pcs	VDE0884 approved (Option)	PS9611
PS9611L-V				PS9611L
PS9611L-V-E3		Embossed Tape 1 000 pcs/reel		
PS9611L-V-E4				

***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}	25	mA
	Power Dissipation*1, 2	P_C	150	mW
Isolation Voltage*3		BV	3 750	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** Applies to output pin V_O and power supply pin V_{CC}.

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

RECOMMENDED OPERATING CONDITIONS

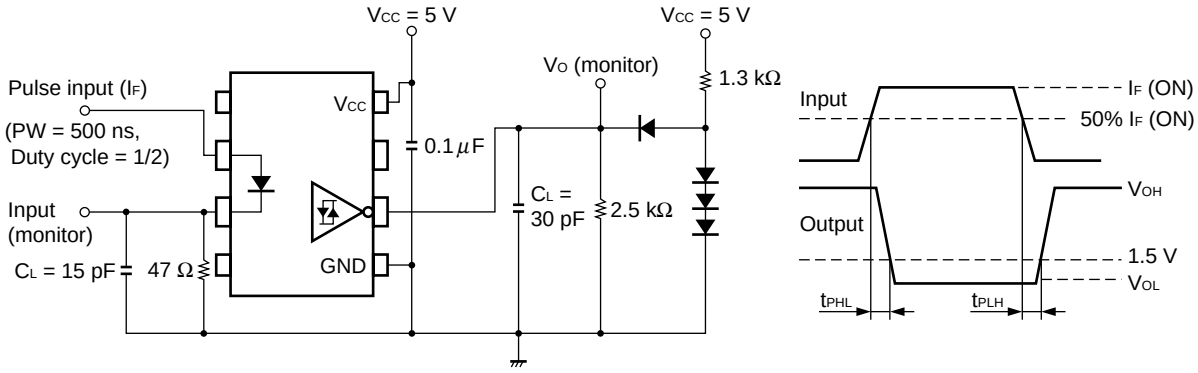
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
High Level Input Current	I_{FH}	7.5		12.5	mA
Low Level Input Current	I_{FL}	0		250	μA
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
TTL (loads)	N			5	

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_{OL} = 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		2.7	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			0.9		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			5	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

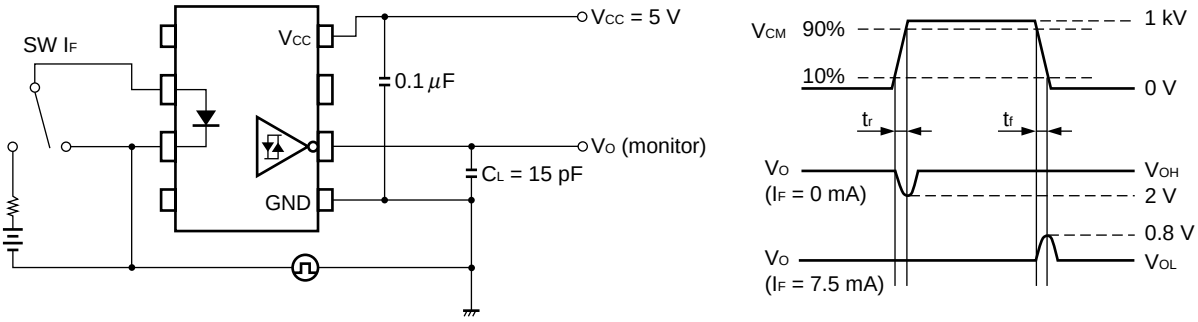
***1** Typical values at T_A = 25°C

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



C_L includes probe and stray wiring capacitance.

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



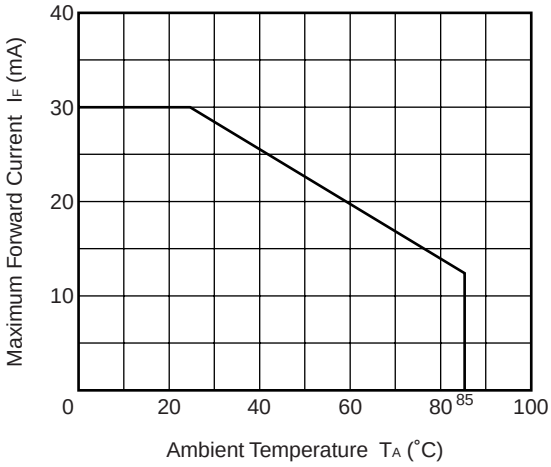
C_L includes probe and stray wiring capacitance.

USAGE CAUTIONS

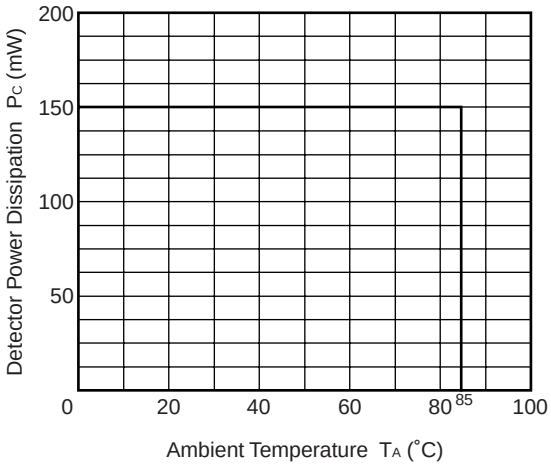
1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of more than 0.1 μF is used between V_{CC} and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor is no more than 10 mm.

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

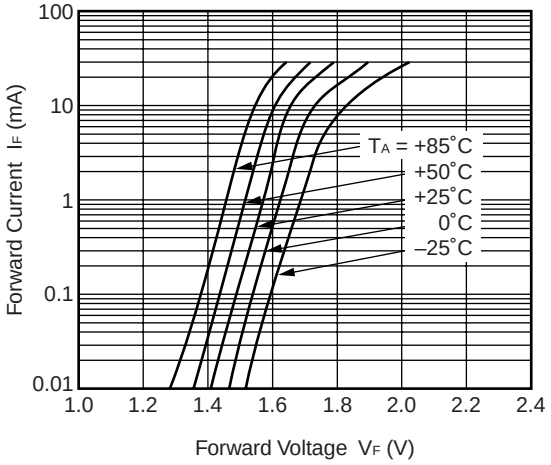
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



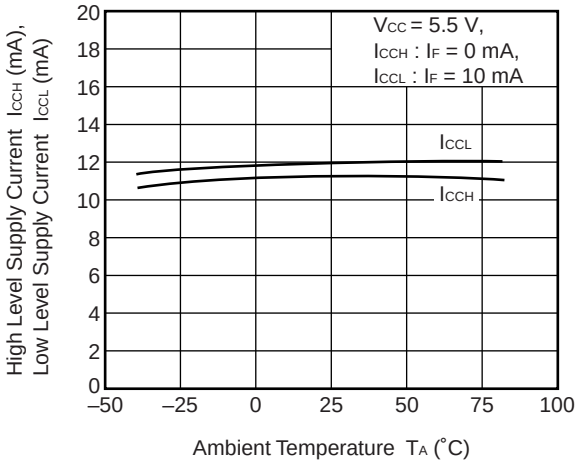
DETECTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



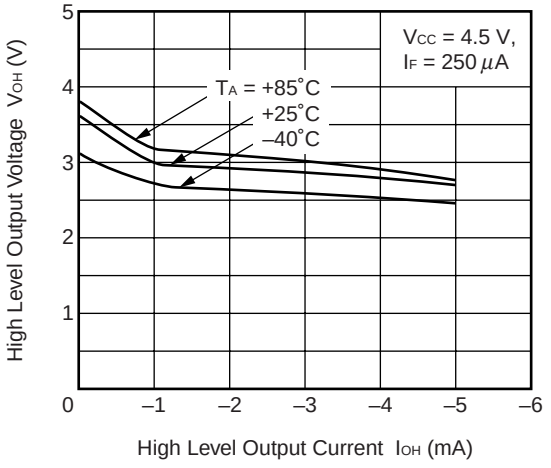
FORWARD CURRENT vs. FORWARD VOLTAGE



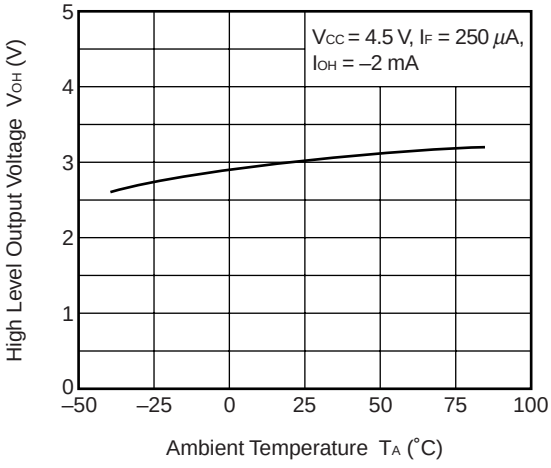
SUPPLY CURRENT vs. AMBIENT TEMPERATURE



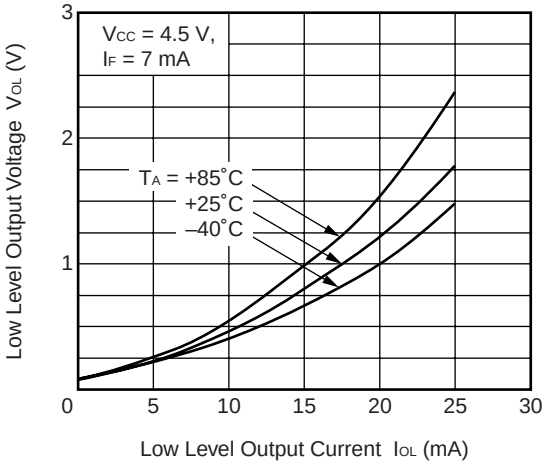
HIGH LEVEL OUTPUT VOLTAGE vs. HIGH LEVEL OUTPUT CURRENT



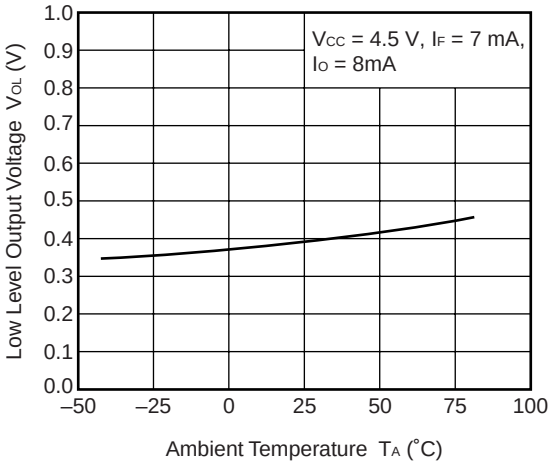
HIGH LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



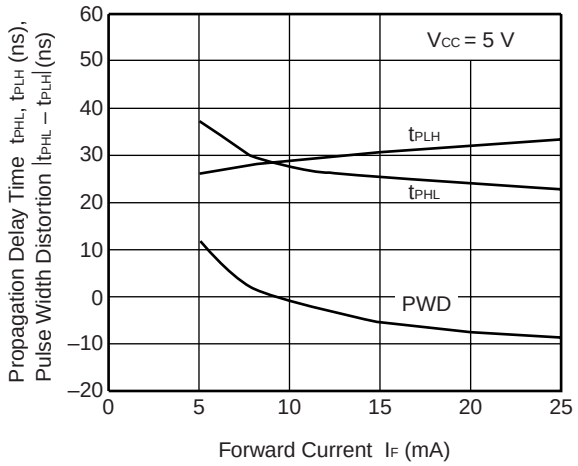
LOW LEVEL OUTPUT VOLTAGE vs.
LOW LEVEL OUTPUT CURRENT



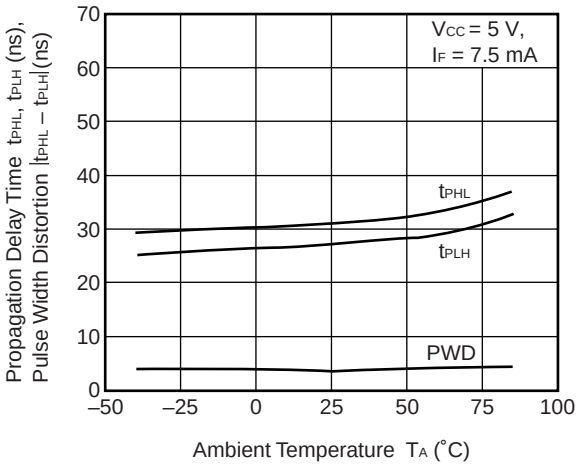
LOW LEVEL OUTPUT VOLTAGE vs.
AMBIENT TEMPERATURE



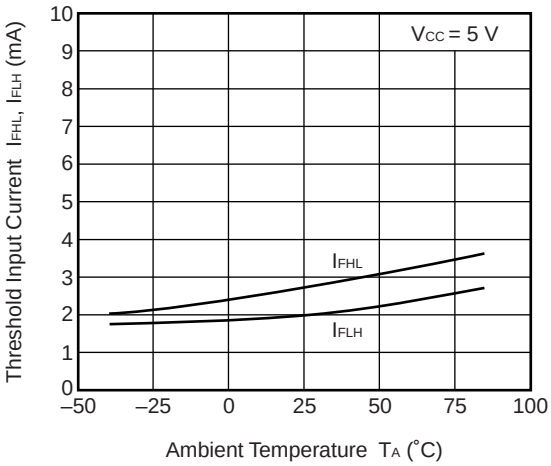
PROPAGATION DELAY TIME,
PULSE WIDTH DISTORTION
vs. FORWARD CURRENT



PROPAGATION DELAY TIME,
PULSE WIDTH DISTORTION
vs. AMBIENT TEMPERATURE



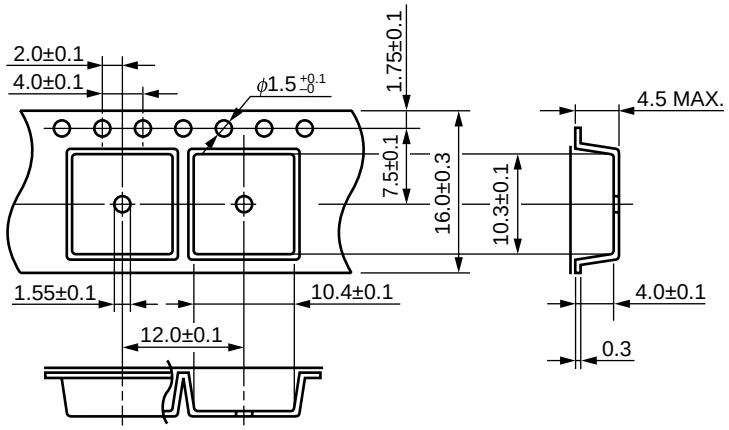
THRESHOLD INPUT CURRENT vs.
AMBIENT TEMPERATURE



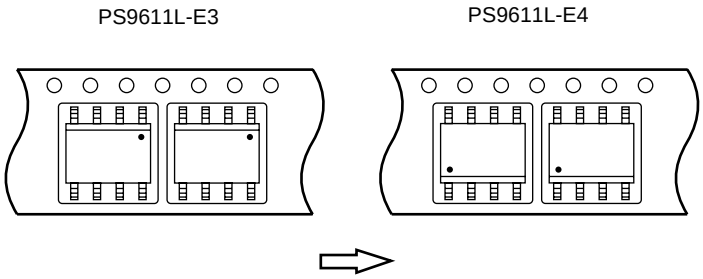
Remark The graphs indicate nominal characteristics.

★ **TAPING SPECIFICATIONS (UNIT: mm)**

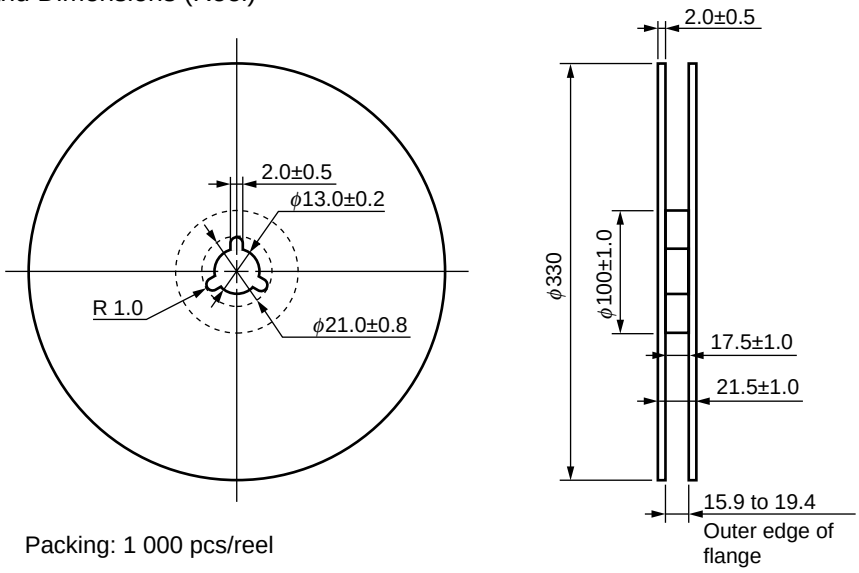
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



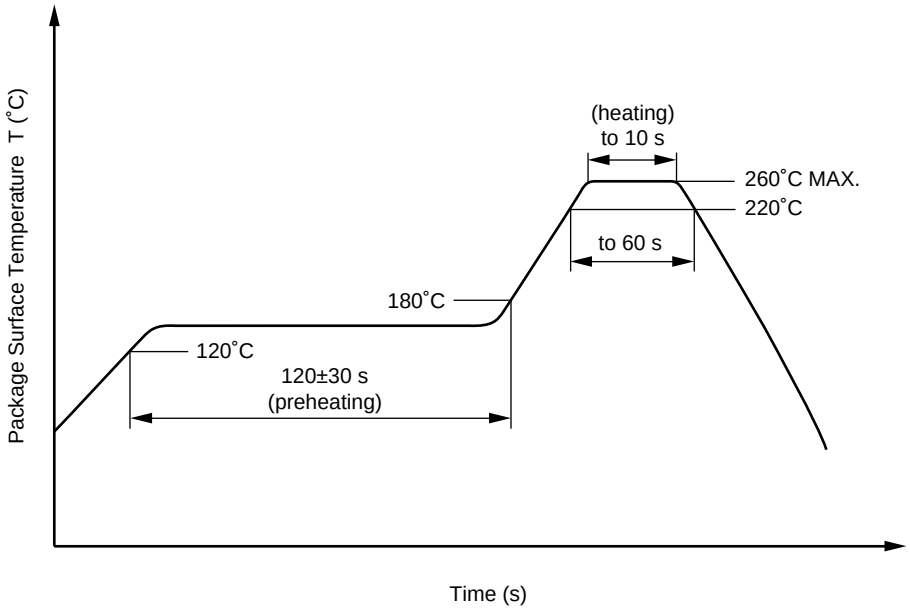
Packing: 1 000 pcs/reel

★ RECOMMENDED SOLDERING CONDITIONS

(1) Infrared reflow soldering

• Peak reflow temperature	260°C or below (package surface temperature)
• Time of peak reflow temperature	10 seconds or less
• Time of temperature higher than 220°C	60 seconds or less
• Time to preheat temperature from 120 to 180°C	120±30 s
• 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) Wave soldering

• Temperature	260°C or below (molten solder temperature)
• Time	10 seconds or less
• Preheating conditions	120°C or below (package surface temperature)
• 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.

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M8E 00.4-0110

SAFETY INFORMATION ON THIS PRODUCT

Caution GaAs Products	The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested. • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.

▶Business issue

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▶Technical issue

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