NEC

PHOTOCOUPLER

PS9614,PS9614L

HIGH NOISE REDUCTION, HIGH SPEED DIGITAL OUTPUT TYPE 8-PIN DIP PHOTOCOUPLER

–NEPOC Series–

DESCRIPTION

The PS9614 and PS9614L are optically coupled isolators containing a GaAlAs LED on the input side and a photo diode and a signal processing circuit on the output side on one chip.

The PS9614 is in a plastic DIP (Dual In-line Package) and the PS9614L is lead bending type (Gull-wing) for surface mounting.

FEATURES

- High common mode transient immunity (CM_H, CM_L = ±20 kV/μs TYP.)
- High isolation voltage (BV = 3 750 Vr.m.s.)
- High-speed response (10 Mbps)
- Pulse width distortion ($|t_{PHL} - t_{PLH}|$ = 10 ns TYP.)
- Open collector output
- Ordering number of tape product: PS9614L-E3, E4: 1 000 pcs/reel
- Safety standards
  - UL approved: File No. E72422 (S)
  - VDE0884 approved (Option) : No.91877

APPLICATIONS

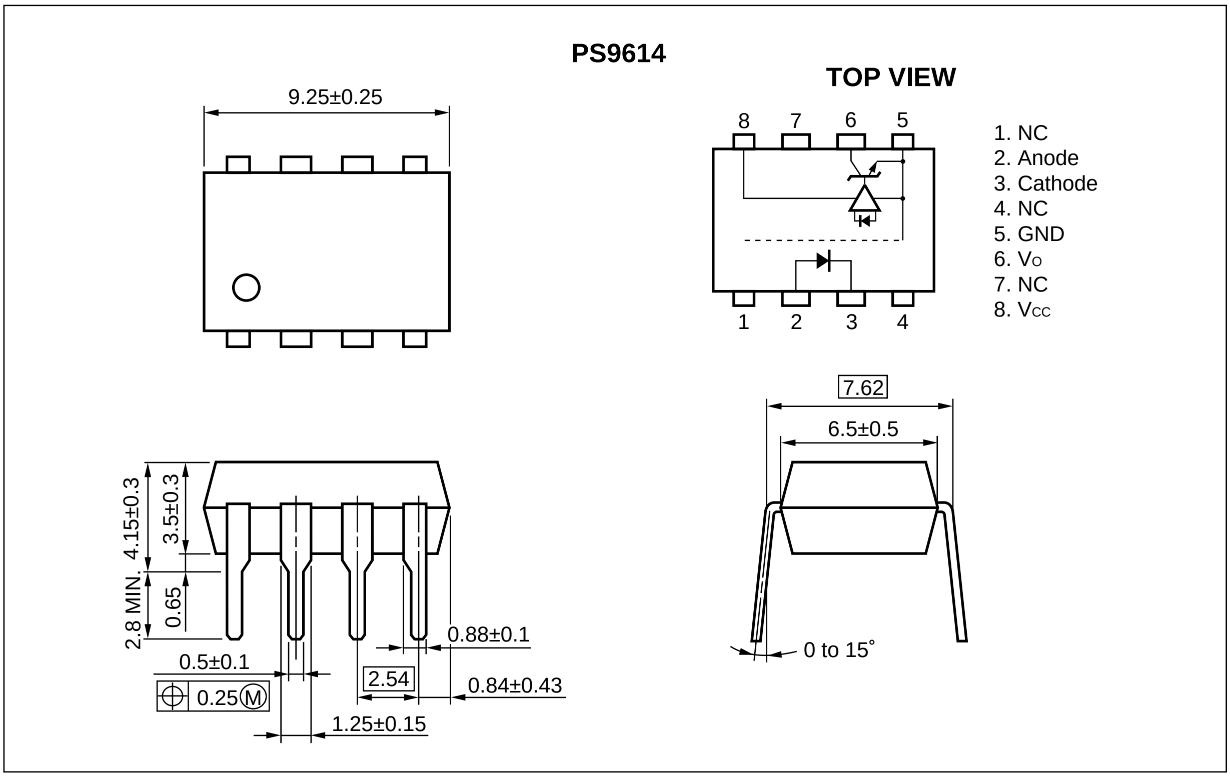
- FA Network
- Measurement equipment
- PDP

Document No. PN10094EJ02V0DS (2nd edition)
Date Published February 2003 CP(K)
Printed in Japan

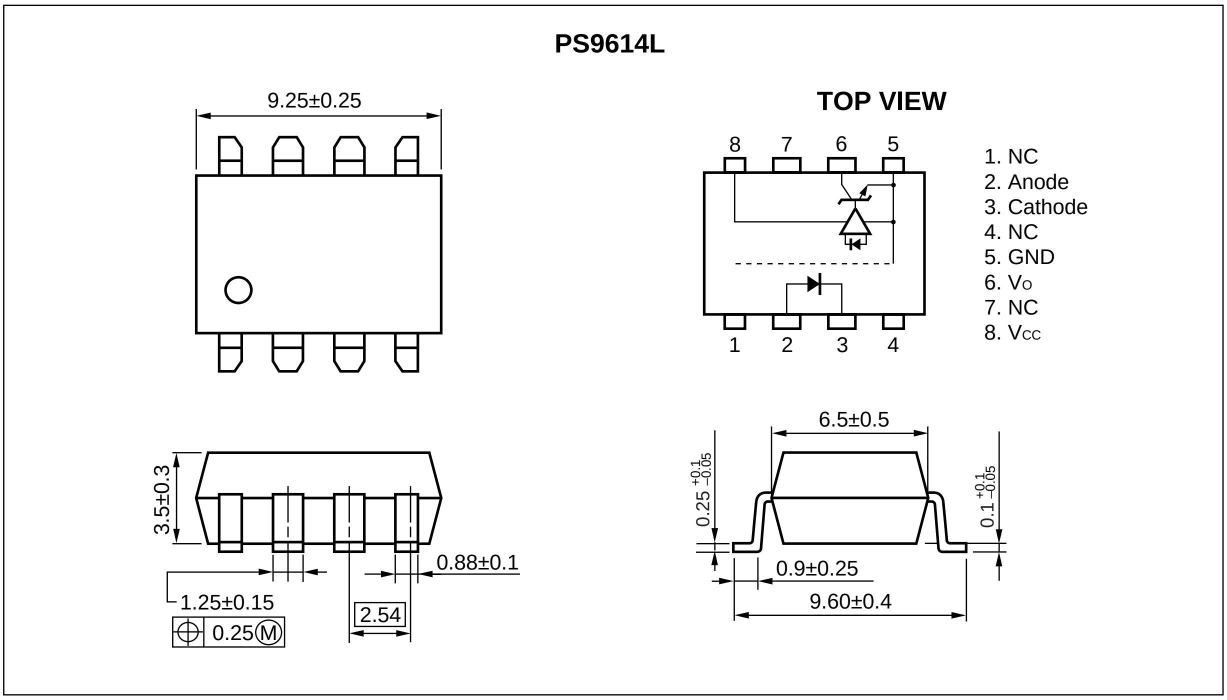
The mark ★ shows major revised points.

★ PACKAGE DIMENSIONS (UNIT: mm)

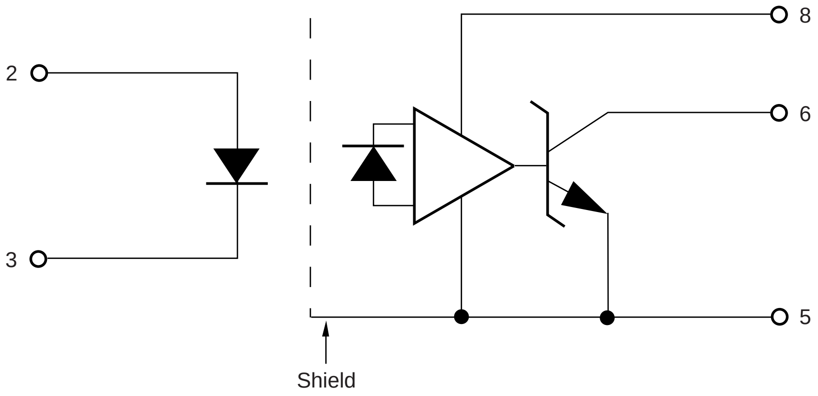
DIP Type



Lead Bending Type

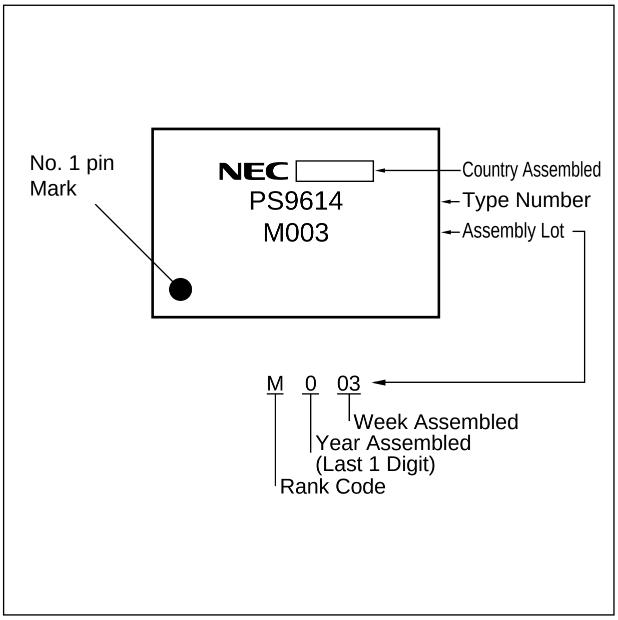


FUNCTIONAL DIAGRAM



LED	Output
ON	L
OFF	H

MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Package	Packing Style	Safety Standards Approval	Application Part Number[*1]
PS9614	8-pin DIP	Magazine case 50 pcs	Approved products other than VDE	PS9614
PS9614L				PS9614L
PS9614L-E3		Embossed Tape 1 000 pcs/reel		
PS9614L-E4				
PS9614-V		Magazine case 50 pcs	VDE0884 approved (Option)	PS9614
PS9614L-V				PS9614L
PS9614L-V-E3		Embossed Tape 1 000 pcs/reel		
PS9614L-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	V
Detector	Supply Voltage	V_{CC}	7	V
	Output Voltage	V_O	7	V
	Output Current	I_O	25	mA
	Power Dissipation[*1]	P_C	40	mW
Isolation Voltage[*2]		BV	3 750	Vr.m.s.
Operating Ambient Temperature		T_A	–40 to +85	°C
Storage Temperature		T_{stg}	–55 to +125	°C

***1** Applies to output pin V_O.

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

RECOMMENDED OPERATING CONDITIONS (T_A = 25°C)

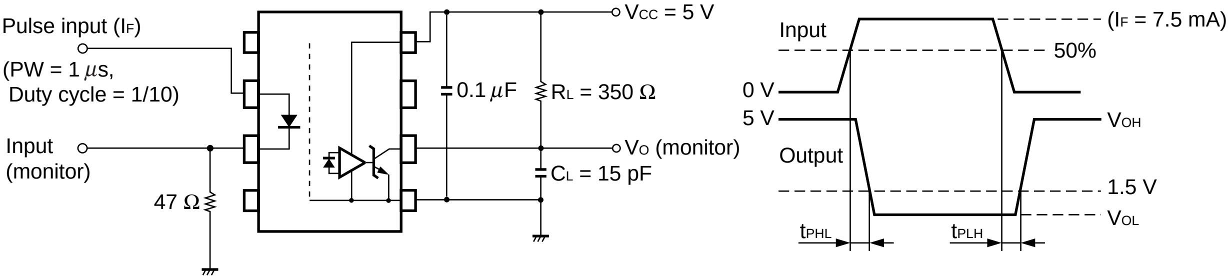
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
High Level Input Current	I_{FH}	6.3	10	12.5	mA
Low Level Input Voltage	V_{FL}	0		0.8	V
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
TTL (R_L = 1 kΩ, loads)	N			5	
Pull-up Resistance	R_L	330		4 k	Ω
Operating Ambient Temperature	T_A	–40		+85	°C

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, $V_F = 0.8$ V			0.03	250	μA
	Low Level Output Voltage	V_{OL}	$V_{CC} = 5.5$ V, $I_F = 5$ mA, $I_{OL} = 13$ mA			0.2	0.6	V
	High Level Supply Current	I_{CCH}	$V_{CC} = 5.5$ V, $I_F = 0$ mA			2.6	8	mA
	Low Level Supply Current	I_{CCL}	$V_{CC} = 5.5$ V, $I_F = 10$ mA			7	11	mA
Coupled	Threshold Input Current	I_{FHL}	$V_{CC} = 5$ V, $V_O = 0.8$ V, $R_L = 350\ \Omega$			2.3	5	mA
	Isolation Resistance	$R_{I\text{-}O}$	$V_{I\text{-}O} = 1$ kV$_{DC}$, RH = 40 to 60%, $T_A = 25$°C		10^{11}			Ω
	Isolation Capacitance	$C_{I\text{-}O}$	V = 0 V, f = 1 MHz, $T_A = 25$°C			0.9		pF
	Propagation Delay Time (H → L)[2]	t_{PHL}	$V_{CC} = 5$ V,	$T_A = 25$°C		61	75	ns
			$R_L = 350\ \Omega$, $I_F = 7.5$ mA, $C_L = 15$ pF				100	
	Propagation Delay Time (L → H)[2]	t_{PLH}	$V_{CC} = 5$ V,	$T_A = 25$ °C		51	75	ns
			$R_L = 350\ \Omega$, $I_F = 7.5$ mA, $C_L = 15$ pF				100	
	Rise Time	t_r	$V_{CC} = 5$ V, $R_L = 350\ \Omega$, $I_F = 7.5$ mA, $C_L = 15$ pF			20		ns
	Fall Time	t_f				8		ns
	Pulse Width Distortion (PWD)[2]	$\lvert t_{PHL}\text{-}t_{PLH} \rvert$				10	50	ns
	Propagation Delay Skew	t_{PSK}					60	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, $V_{CM} = 1$ kV, $R_L = 350\ \Omega$		10	20		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, $V_{CM} = 1$ kV, $R_L = 350\ \Omega$		10	20		kV/μs

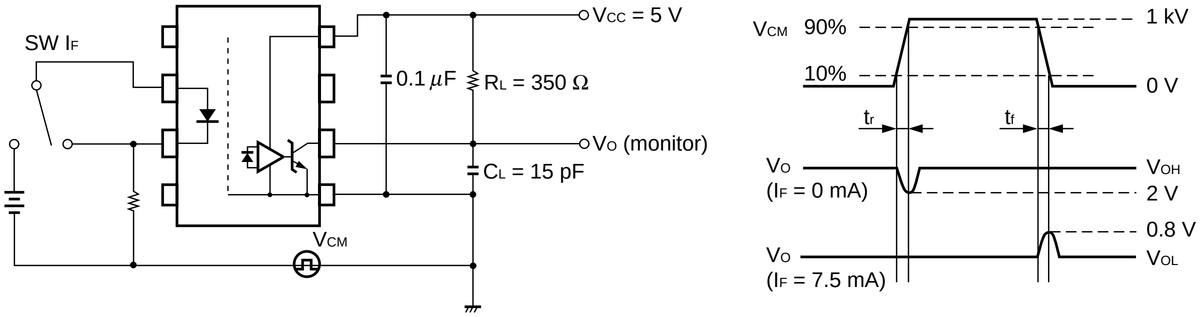
***1** Typical values at T_A = 25°C

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



C_L includes probe and stray wiring capacitance.

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

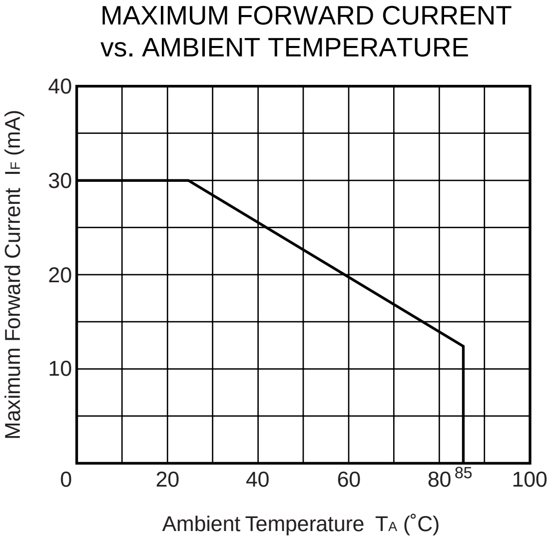


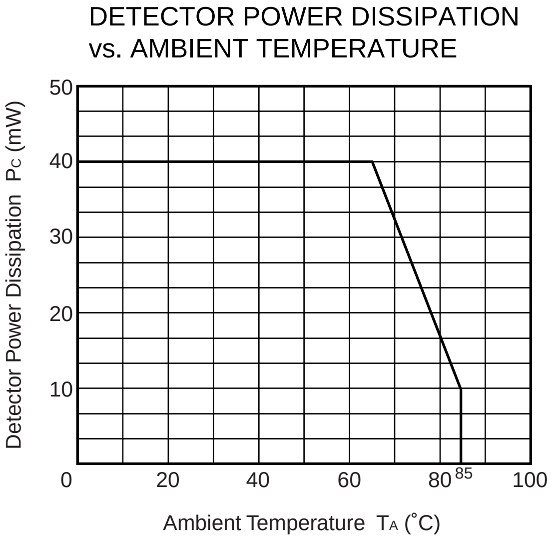
C_L includes probe and stray wiring capacitance.

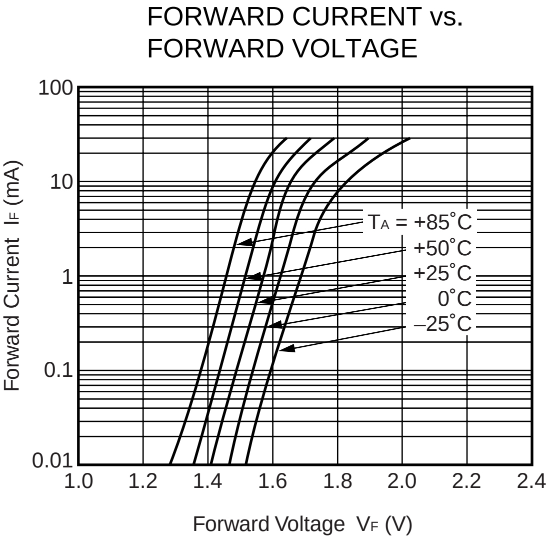
USAGE CAUTIONS

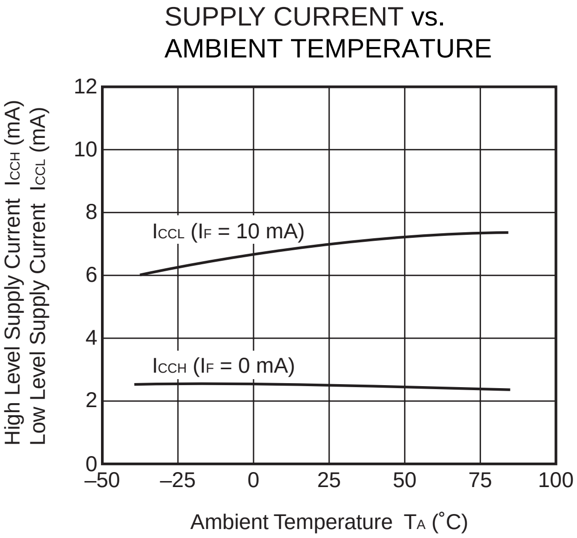
1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of more than 0.1 μF is used between V_{CC} and GND near device. Also, ensure that the distance between the leads of the photocoupler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

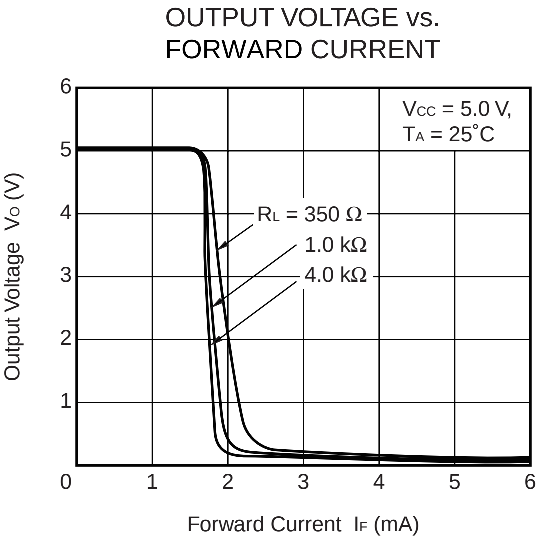
TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

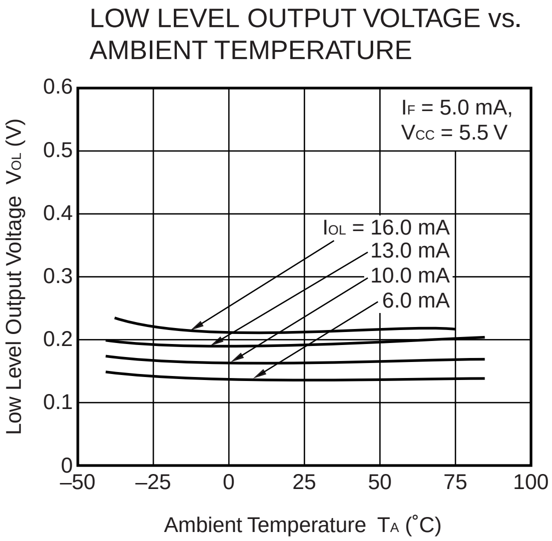




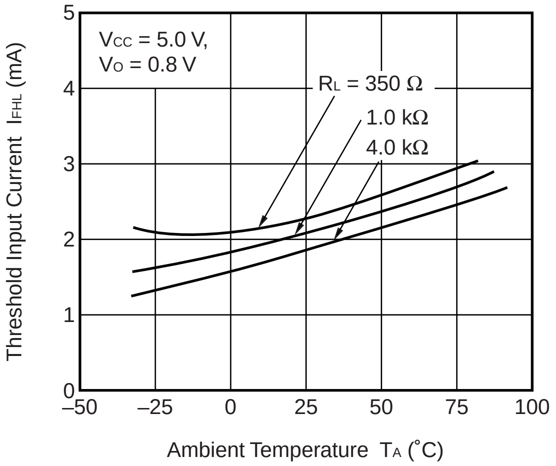




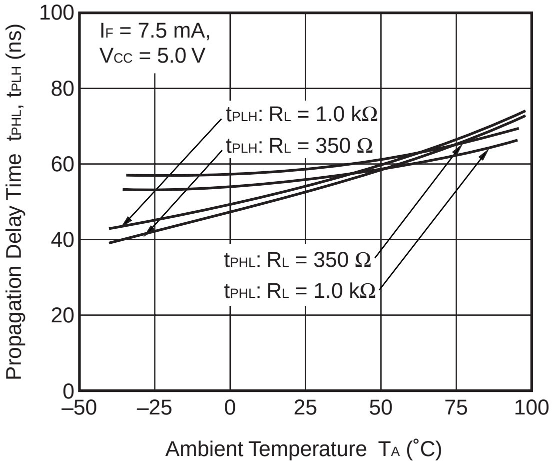




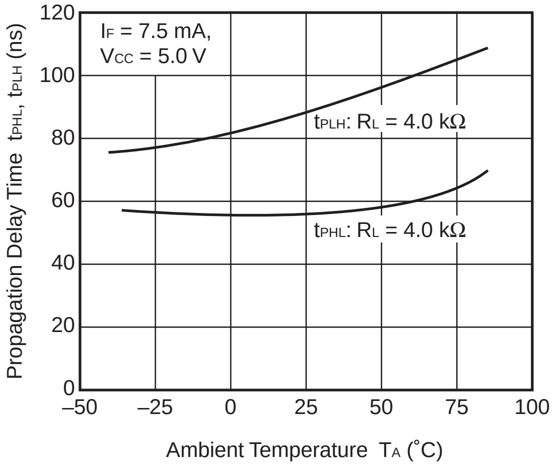
THRESHOLD INPUT CURRENT vs. AMBIENT TEMPERATURE



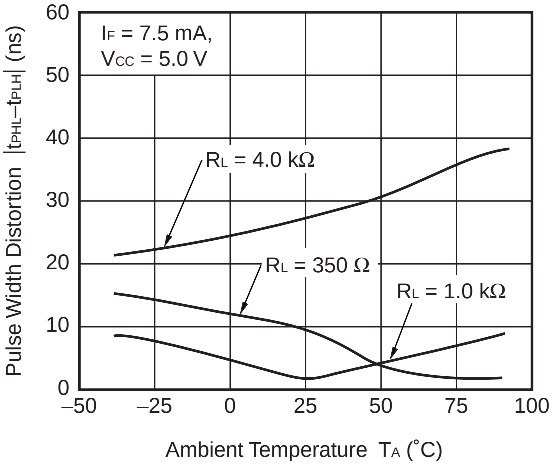
PROPAGATION DELAY TIME vs. AMBIENT TEMPERATURE



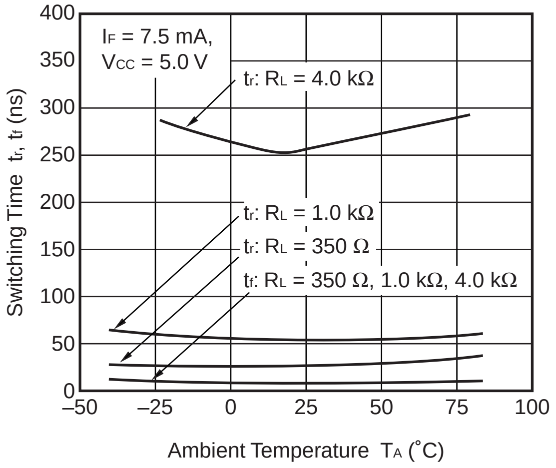
PROPAGATION DELAY TIME vs. AMBIENT TEMPERATURE



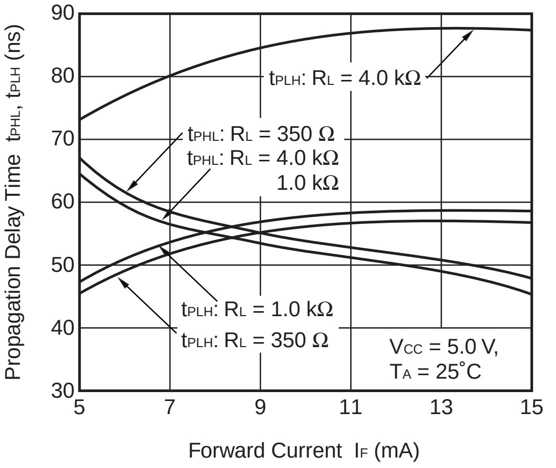
PULSE WIDTH DISTORTION vs. AMBIENT TEMPERATURE



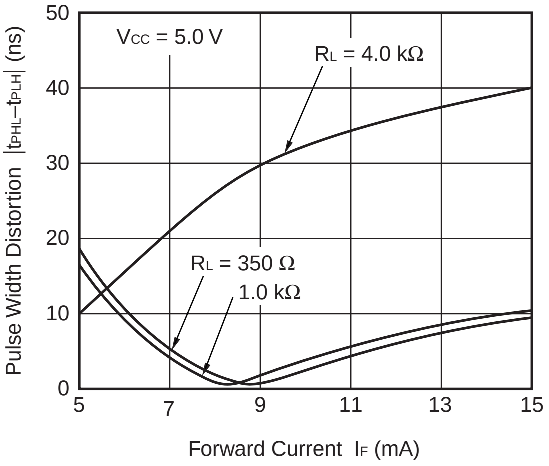
SWITCHING TIME vs. AMBIENT TEMPERATURE



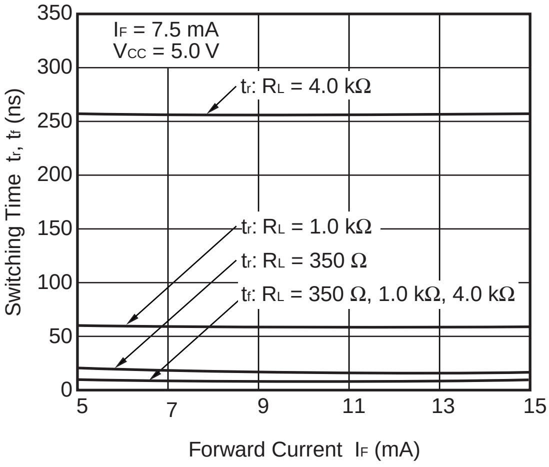
PROPAGATION DELAY TIME vs. FORWARD CURRENT



PULSE WIDTH DISTORTION vs. FORWARD CURRENT



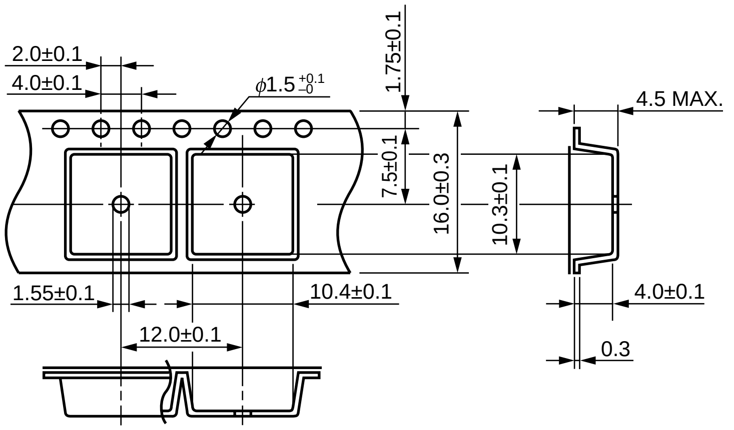
SWITCHING TIME vs. FORWARD CURRENT



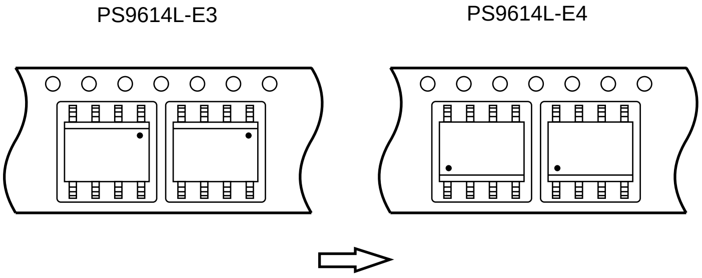
Remark The graphs indicate nominal characteristics.

★ TAPING SPECIFICATIONS (UNIT: mm)

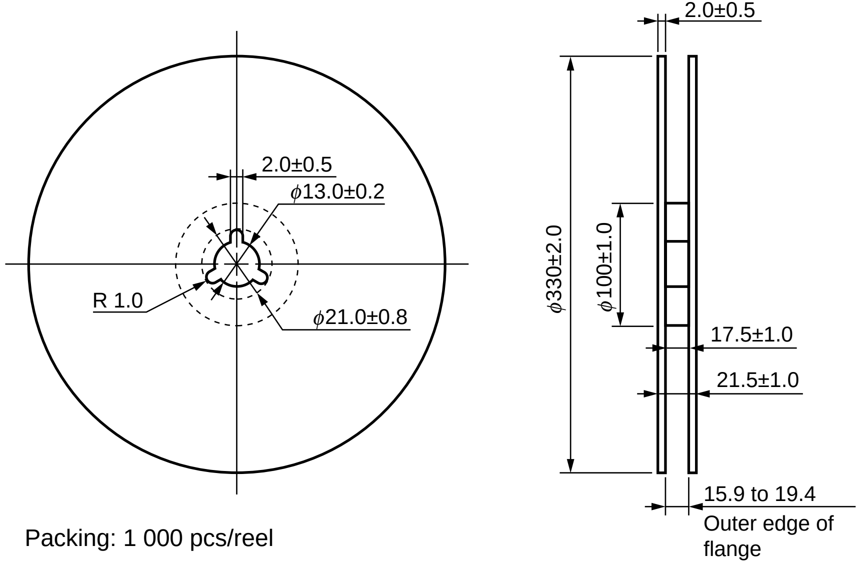
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 1 000 pcs/reel

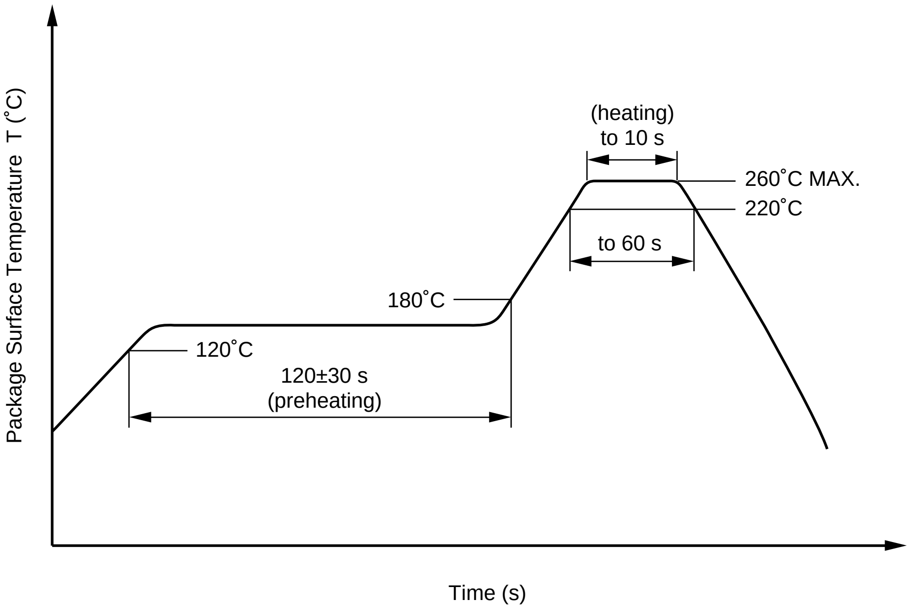
NOTES ON HANDLING

1. 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.

★ 2. Cautions regarding noise

Be aware that when voltage is applied suddenly between the photocoupler’s input and output or between collector-emitters at startup, the output side may enter the on state, even if the voltage is within the absolute maximum ratings.

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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.

▶**For further information, please contact**

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