CEL

NEC's HIGH CMR, 10 Mbps OPEN COLLECTOR OUTPUT TYPE 5-PIN SOP 3.3V HIGH-SPEED PHOTOCOUPLER

PS9121

DESCRIPTION

The PS9121 is an optically coupled high-speed, isolator containing a GaAlAs LED on the input side and a photodiode and a signal processing circuit on the output side on one chip.

PS9121 is specified high CMR, high CTR and pulse width distortion with operating temperature.

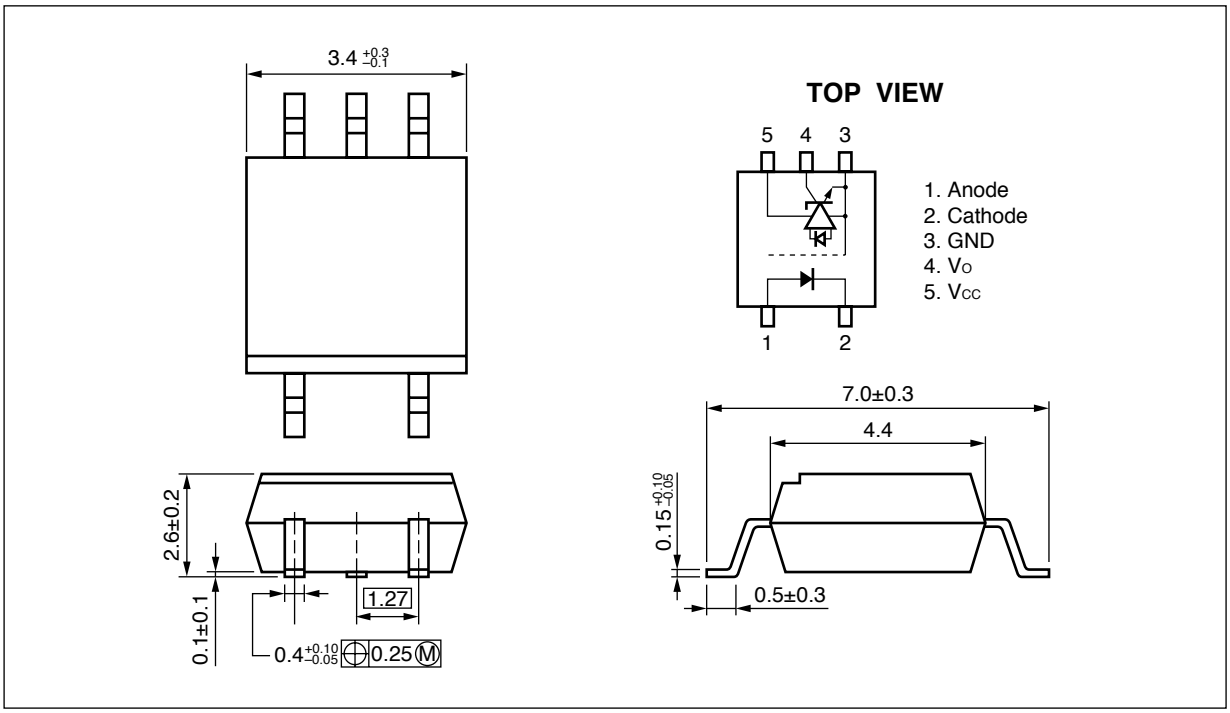
FEATURES

- Low Power Consumption (V_{CC} :3.3V)
- Extended Vcc Operating Range to 5.5 V, Typical Performance Data included for reference
- High common mode transient immunity (CM_H, CM_L = ±20 kV/μs TYP.)
- Pulse width distortion ($|t_{PHL} - t_{PLH}|$ = 35 ns MIN.)
- High-speed (10 Mbps)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Open collector output
- Ordering number of taping product: PS9121-F3, F4: 2 500 pcs/reel

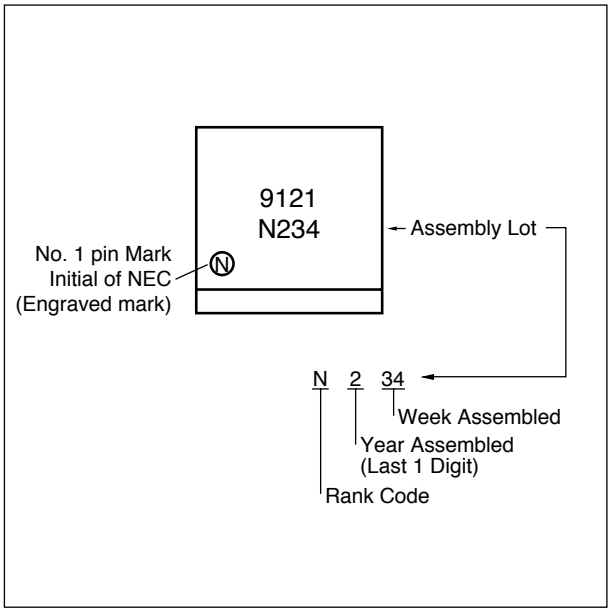
APPLICATIONS

- Measurement equipment
- PDP
- FA Network

PACKAGE DIMENSIONS (UNIT: mm)



MARKING



ORDERING INFORMATION

Part Number	Package	Packing Style	Application Part Number *1
PS9121	5-pin SOP	20 pcs (Tape 20 pcs cut)	PS9121
PS9121-F3		Embossed Tape 2 500 pcs/reel	
PS9121-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 *1	I_F	30	mA
	Reverse Voltage	V_R	5	V
Detector	Supply Voltage	V_{CC}	7	V
	Output Voltage	V_O	7	V
	Output Current	I_O	25	mA
	Power Dissipation *2	P_C	40	mW
Isolation Voltage *3		BV	2 500	Vr.m.s.
Operating Ambient Temperature		T_A	−40 to +85	°C
Storage Temperature		T_{stg}	−55 to +125	°C

***1** Reduced to 0.3 mA/°C at T_A = 25°C or more.

***2** Applies to output pin V_O. Reduced to 1.5 mW/°C at T_A = 65°C or more.

***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
Low Level Input Voltage	V_{FL}	0		0.8	V
High Level Input Current	I_{FH}	6.3	10	12.5	mA
Supply Voltage	V_{CC}	2.7		3.6	V
TTL (R_L = 1 kΩ, loads)	N			5	
Pull-up resistor	R_L	330		4 k	Ω

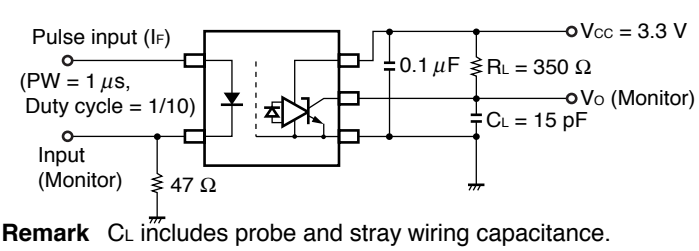
ELECTRICAL CHARACTERISTICS (T_A = –40 to +85°C, unless otherwise specified)

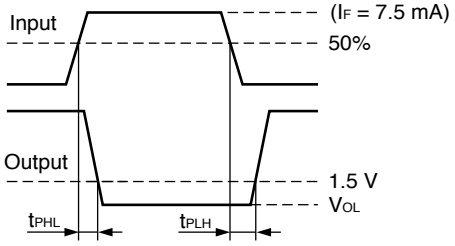
Parameter		Symbol	Conditions	MIN.	TYP. *1	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 10 mA, T_A = 25°C	1.4	1.65	1.8	V
	Reverse Current	I_R	V_R = 3 V, T_A = 25°C			10	μA
	Terminal Capacitance	C_t	V = 0 V, f = 1 MHz, T_A = 25°C		30		pF
Detector	High Level Output Current	I_{OH}	V_{CC} = V_O = 3.3 V, V_F = 0.8 mV		1	80	μA
			V_{CC} = V_O = 5.5 V, V_F = 0.8 mV		1		
	Low Level Output Voltage *2	V_{OL}	V_{CC} = 3.3 V, I_F = 5 mA, I_{OL} = 13 mA		0.2	0.6	V
			V_{CC} = 5.5 V, I_F = 5 mA, I_{OL} = 13 mA		0.2		
	High Level Supply Current	I_{CCH}	V_{CC} = 3.3 V , I_F = 0 mA, V_O = open		4	7	μA
			V_{CC} = 5.5 V , I_F = 0 mA, V_O = open		5		
	Low Level Supply Current	I_{CCL}	V_{CC} = 3.3 V , I_F = 10 mA, V_O = open		7	10	
			V_{CC} = 5.5 V , I_F = 10 mA, V_O = open		9		
Coupled	Threshold Input Current (H → L)	I_{FHL}	V_{CC} = 3.3 V, V_O = 0.8 V, R_L = 350 Ω		2.5	5	mA
			V_{CC} = 5 V, V_O = 0.8 V, R_L = 350 Ω		2.5		
	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		0.6		pF
	Propagation Delay Time (H → L) *3	t_{PHL}	T_A = 25°C		43	75	ns
			V_{CC} = 3.3 V, R_L = 350 Ω, I_F = 7.5 mA			100	
			T_A = 25°C, V_{CC} = 5 V, R_L = 350 Ω, I_F = 7.5 mA		36		
	Propagation Delay Time (L → H) *3	t_{PLH}	T_A = 25°C		46	75	
			V_{CC} = 3.3 V, R_L = 350 Ω, I_F = 7.5 mA			100	
			T_A = 25°C, V_{CC} = 5 V, R_L = 350 Ω, I_F = 7.5 mA		39		
	Rise Time	t_r	V_{CC} = 3.3 V, R_L = 350 Ω, I_F = 7.5 mA		20		
			V_{CC} = 5 V, R_L = 350 Ω, I_F = 7.5 mA				
	Fall Time	t_f	V_{CC} = 3.3 V, R_L = 350 Ω, I_F = 7.5 mA		10		
			V_{CC} = 5 V, R_L = 350 Ω, I_F = 7.5 mA				
	Pulse Width Distortion (PWD) *3	$\lvert t_{PHL}-t_{PLH} \rvert$	V_{CC} = 3.3 V, R_L = 350 Ω, I_F = 7.5 mA		3	35	
			V_{CC} = 5 V, R_L = 350 Ω, I_F = 7.5 mA		3		
	Propagation Delay Skew	t_{PSK}	V_{CC} = 3.3 V, R_L = 350 Ω, I_F = 7.5 mA			40	
	Common Mode Transient Immunity at High Level Output *4	CM_H	R_L = 350 Ω, T_A = 25°C, I_F = 0 mA, $V_{O\,(MIN.)}$ = 2 V, V_{CM} = 1 kV	15	20		kV/μs
	Common Mode Transient Immunity at Low Level Output *4	CM_L	R_L = 350 Ω, T_A = 25°C, I_F = 7.5 mA, $V_{O\,(MAX.)}$ = 0.8 V, V_{CM} = 1 kV	15	20		

***1** Typical values at T_A = 25°C

***2** Because V_{OL} of 2 V or more may be output when LED current input and when output supply of V_{CC} = 2.6 V or less, it is important to confirm the characteristics (operation with the power supply on and off) during design, before using this device.

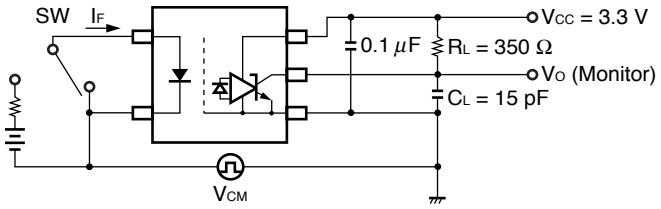
***3** Test circuit for propagation delay time

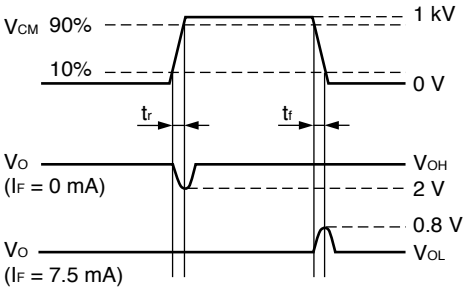




Remark C_L includes probe and stray wiring capacitance.

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





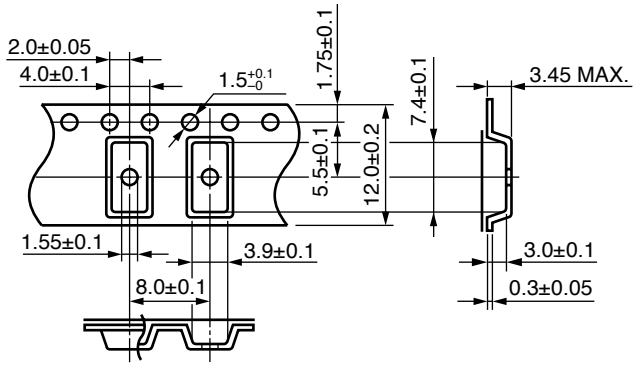
Remark C_L includes probe and stray wiring capacitance.

USAGE CAUTIONS

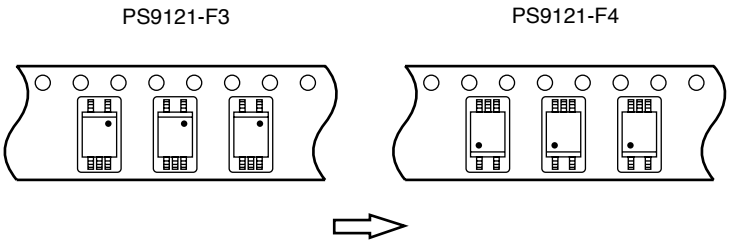
1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of 0.1 μF is used between V_{CC} and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor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

TAPING SPECIFICATIONS (UNIT: mm)

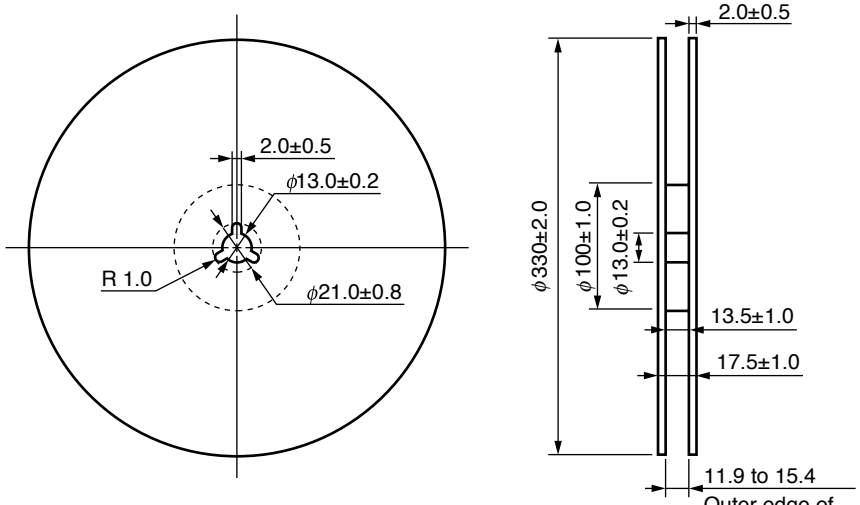
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



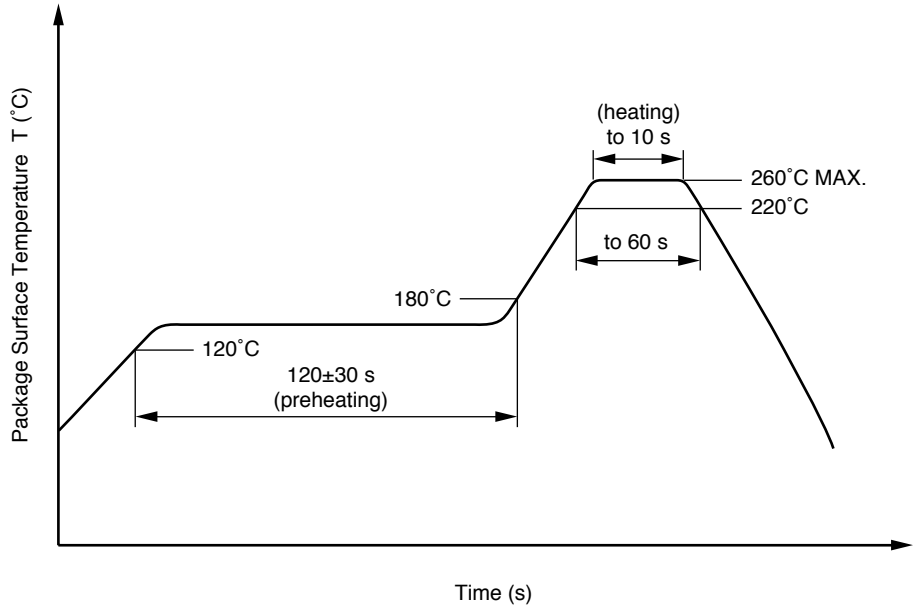
Packing: 2 500 pcs/reel

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.

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.