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

PS9114

FEATURES

- **HIGH COMMON MODE TRANSIENT IMMUNITY**
  CM_H, CM_L = ±20 kV/μs TYP
- **SMALL PACKAGE**
  5-pin SOP
- **HIGH SPEED**
  10 Mbps
- **PULSE WIDTH DISTORTION**
  $|t_{PHL} - t_{PLH}|$ = 3 ns TYP
- **HIGH ISOLATION VOLTAGE**
  BV = 2500 $V_{r.m.s.}$
- **OPEN COLLECTOR OUTPUT**
- **AVAILABLE IN TAPE AND REEL**
  PS9114-F3, F4: 2500 pcs/reel

DESCRIPTION

NEC's PS9114 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.

APPLICATIONS

- **FACTORY AUTOMATION NETWORK**
- **MEASUREMENT EQUIPMENT**
- **MOTOR DRIVE / INVERTER**

ELECTRICAL CHARACTERISTICS (T_A = 0 to +85°C, Unless otherwise specified)

PART NUMBER				PS9114		
SYMBOL		PARAMETERS	UNITS	MIN	TYP[1]	MAX
Diode	V_F	Forward Voltage, I_F = 10 mA, T_A = 25°C	V	1.4	1.65	1.9
	I_R	Reverse Current, V_R = 3 V, T_A = 25°C	μA			10
	C_t	Capacitance, V = 0, f = 1 MHz, T_A = 25°C	pF		30	
Detector	I_{OH}	High Level Output Current V_{CC} = V_O = 5.5 V, V_F = 0.8 V	μA		0.02	250
	V_{OL}	Low Level Output Voltage[2] V_{CC} = 5.5 V, I_F = 5 mA, I_{OL} = 13 mA	V		0.15	0.6
	I_{CCH}	High Level Supply Current, V_{CC} = 5.5 V, I_F = 0 mA	mA		3	8
	I_{CCL}	Low Level Supply Current, V_{CC} = 5.5 V, I_F = 10 mA	mA		7.0	11
Coupled	I_{FHL}	Threshhold Input Current, High → Low, V_{CC} = 5 V, VO = 0.8V, R_L = 350 Ω	mA		2	5
	R_{I-O}	Isolation Resistance, V_{I-O} = 1 k V_{DC}, RH = 40 to 60%, T_A = 25°C	Ω	10^{11}		
	C_{I-O}	Isolation Capacitance, V = 0, f = 1 MHz, T_A = 25°C	pF		0.6	
	t_{PHL}	Propagation Delay Time[3], High → Low T_A = 25°C V_{CC} = 5 V, R_L = 350 Ω, I_F = 7.5 mA	ns		54	75 100
	t_{PLH}	Propagation Delay Time[3], Low → High T_A = 25°C V_{CC} = 5 V, R_L = 350 Ω, I_F = 7.5 mA	ns		51	75 100
	t_r	Rise Time, V_{CC} = 5 V, R_L = 350 Ω, I_F = 7.5 mA	mA		20	
	t_f	Fall Time, V_{CC} = 5 V, R_L = 350 Ω, I_F = 7.5 mA	mA		10	

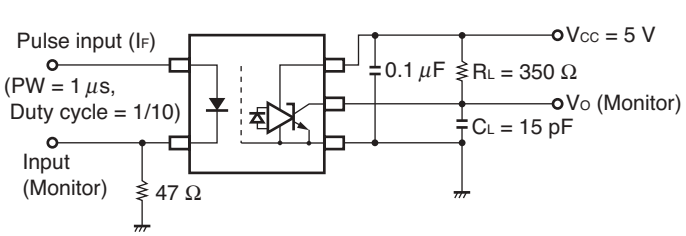
Continued on next page

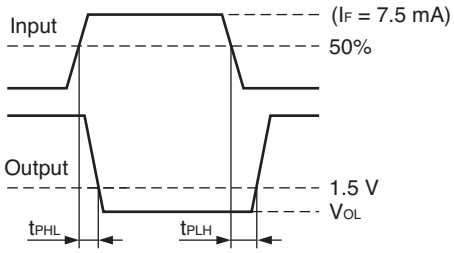
ELECTRICAL CHARACTERISTICS (T_A = 0 to +85°C, Unless otherwise specified), Continued

		PART NUMBER		PS9114		
	SYMBOL	PARAMETERS	UNITS	MIN	TYP	MAX
Coupled	$\lvert t_{PHL} - t_{PLH} \rvert$	Pulse Width Distortion, (PWD)[3], V_{CC} = 5 V, R_L = 350 Ω, I_F = 7.5 mA	ns		3	50
	t_{PSK}	Propagation Delay Skew, V_{CC} = 5 V, R_L = 350 Ω, I_F = 7.5 mA	ns			60
	CM_H	Common Mode Transient Immunity at High Level Output[4], V_{CC} = 5 V, T_A = 25°C, I_F = 0 mA, $V_{O\ (MIN)}$ = 2 V, V_{CM} = 1 kV	kV/μs	10	20	
	CM_L	Common Mode Transient Immunity at Low Level Output[4], V_{CC} = 5 V, T_A = 25°C, I_F = 7.5 mA, $V_{O\ (MAX)}$ = 0.8 V, V_{CM} = 1 kV	kV/μs	10	20	

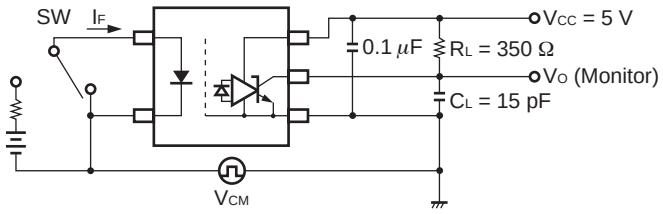
Notes:

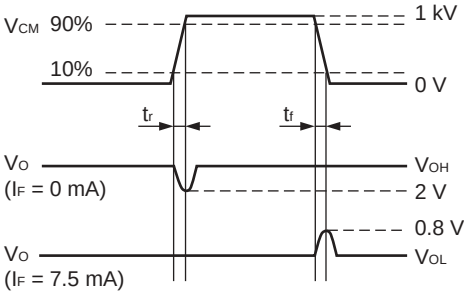
1. Typical values at T_A = 25°C.
2. Because V_{OL} of 2 V or more may be output when LED current input and when output supply of V_{CC} = 2.6 V or less, it is important to confirm the characteristics (operation with the power supply on and off) during design, before using this device..
3. Test Circuit for Propagation delay time





4.Test Circuit for common mode transient immunity





Remark C_L includes probe and stray wiring capacitance.

USAGE CAUTIONS

1. This device is ESD sensitive.
2. Bypass capacitor of more than 0.1 μF must be used between V_{CC} and GND within 10 mm of the device.

ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
Diode			
I_F	Forward Current	mA	30
V_R	Reverse Voltage	V	5
Detector			
V_{CC}	Supply Voltage	V	7
V_O	Output Voltage	V	7
I_O	Output Current	mA	25
P_C	Power Dissipation[2]	mW	40
Coupled			
BV	Isolation Voltage[3]	$V_{r.m.s.}$	2500
T_A	Operating Temperature	°C	-40 to +85
T_{STG}	Storage Temperature	°C	-55 to +125

Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.
2. Applies to output pin Vo. 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

	PART NUMBER		PS9114		
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
V_{FL}	Low Level Input Voltage	mA	0		0.8
I_{FH}	High Level Input Current	mA	6.3	10	12.5
V_{CC}	Supply Voltage	V	4.5	5.0	5.5
N	TTL(R_L = 1kΩ loads)				5
R_L	Operating Temperature	Ω	300		4 k

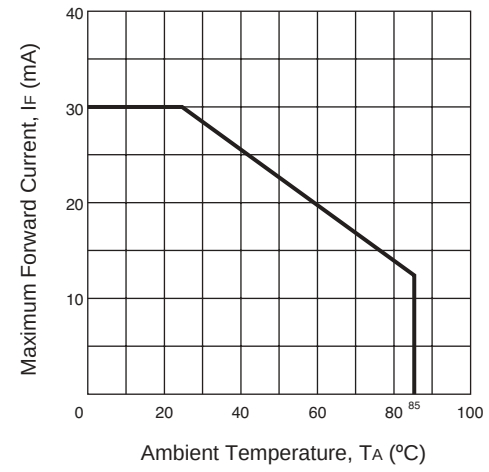
ORDERING INFORMATION

PART NUMBER	PACKAGE	PACKAGE STYLE	APPLIICATION PART NUMBER*
PS9114	5-pin SOP	Magazine case 100 PCS	PS9114
PS9114-F3		Embossed Tape 2500 pcs/reel	
PS9114-F4			

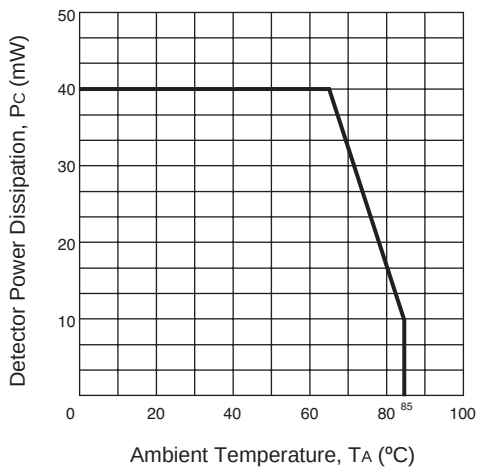
* For the application of the Safety Standard, following part number should be used.

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

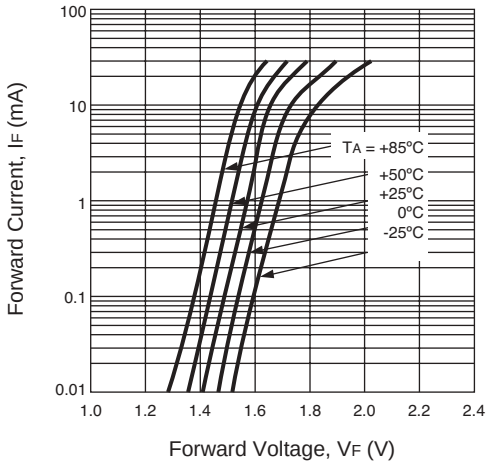
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



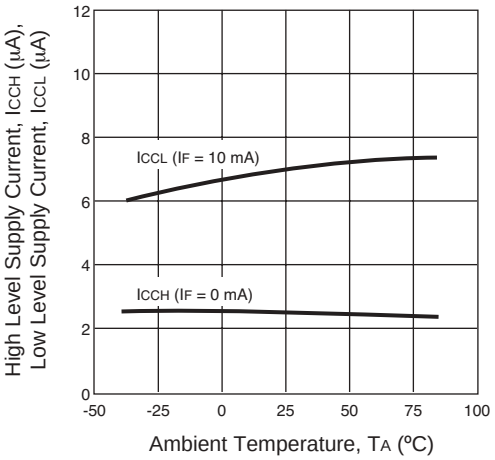
DETECTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



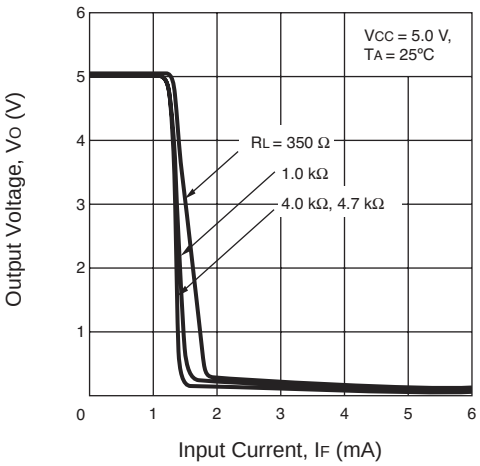
FORWARD CURRENT vs. FORWARD VOLTAGE



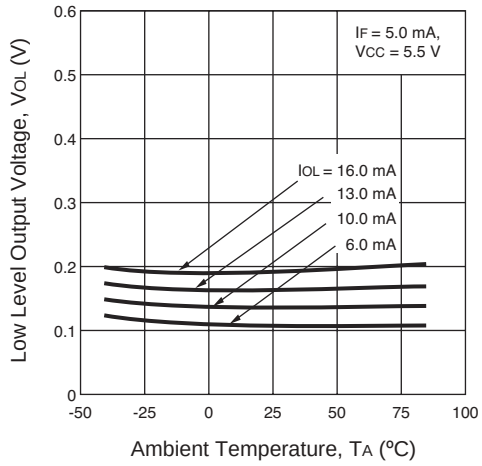
SUPPLY CURRENT vs. AMBIENT TEMPERATURE



OUTPUT VOLTAGE vs. INPUT CURRENT

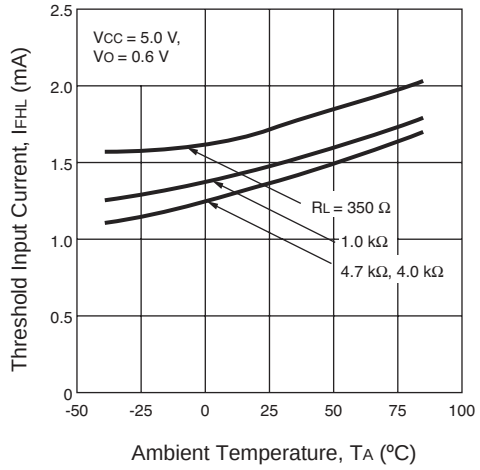


LOW LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

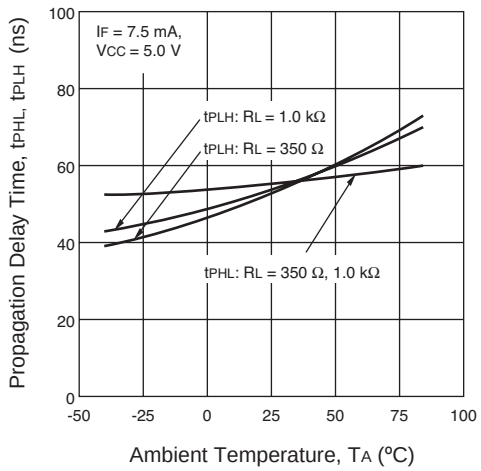


TYPICAL PERFORMANCE CURVES (T_A = 25°C)

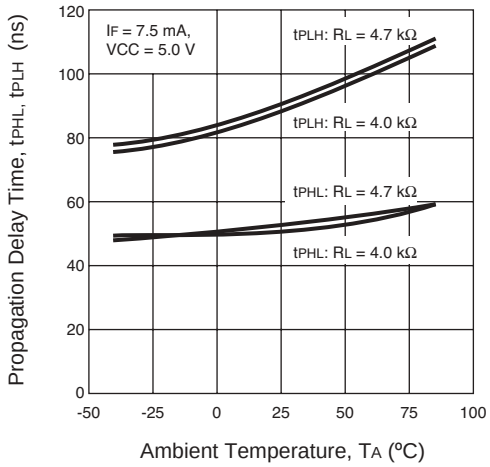
THRESHOLD INPUT CURRENT vs. AMBIENT TEMPERATURE



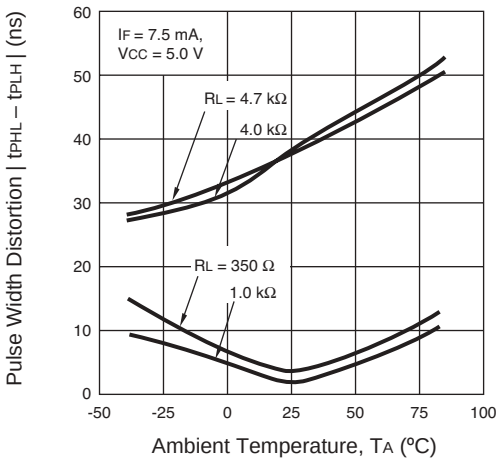
PROPAGATION DELAY TIME vs. AMBIENT TEMPERATURE



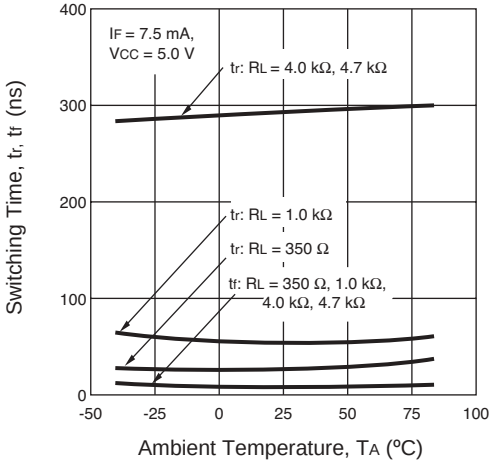
PROPAGATION DELAY TIME, MAXIMUM PROPAGATION DELAYS vs. FORWARD CURRENT



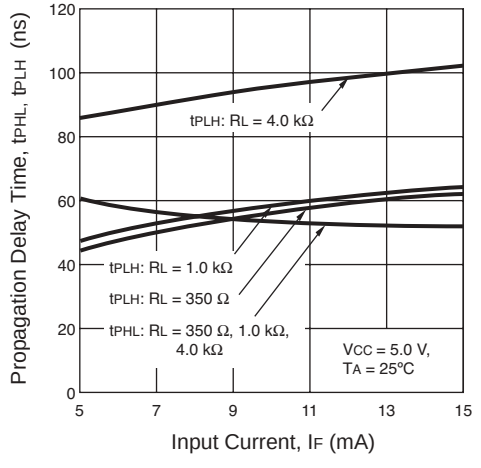
PULSE WIDTH DISTORTION vs. AMBIENT TEMPERATURE



SWITCHING TIME vs. AMBIENT TEMPERATURE

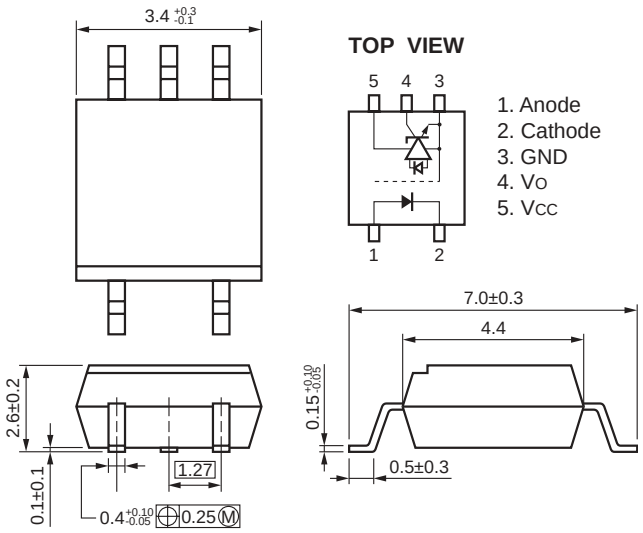


PROPAGATION DELAY TIME vs. INPUT CURRENT

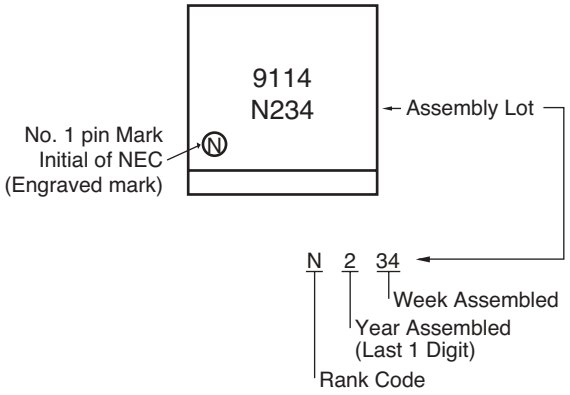


OUTLINE DIMENSIONS (Units in mm)

PS9114



MARKING



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.

California Eastern Laboratories, Your source for NEC RF, Microwave, Optoelectronic, and Fiber Optic Semiconductor Devices.
4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • FAX (408) 988-0279 • **www.cel.com**

DATA SUBJECT TO CHANGE WITHOUT NOTICE