PRELIMINARY DATA SHEET

NEC

PHOTOCOUPLER

PS9303L,PS9303L2

HIGH CMR, 1 Mbps TOTEM POLE OUTPUT TYPE 6-PIN SDIP PHOTOCOUPLER

–NEPOC Series–

DESCRIPTION

The PS9303L and PS9303L2 are optical 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 PS9303L and PS9303L2 are specified high CMR and pulse width distortion with operating temperature. It is suitable for IPM drive.

The PS9303L is lead bending type (Gull-wing) for surface mounting.

The PS9303L2 is lead bending type for long creepage distance (Gull-wing) for surface mount.

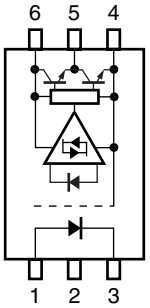
FEATURES

- High common mode transient immunity (CM_H, CM_L = ±15 kV/μs MIN.)
- Half size of 8-pin DIP
- Pulse width distortion ($|t_{PLH} - t_{PHL}|$ = 550 ns MAX.)
- High-speed (1 Mbps)
- High isolation voltage (BV = 5 000 Vr.m.s.)
- Totem pole output (Active High Output Type)
- Pb-Free product

APPLICATIONS

- IPM Driver
- General purpose inverter

PIN CONNECTION
(Top View)



1. Anode
2. NC
3. Cathode
4. GND
5. V_O
6. V_{CC}

TRUTH TABLE

LED	Output
ON	H
OFF	L

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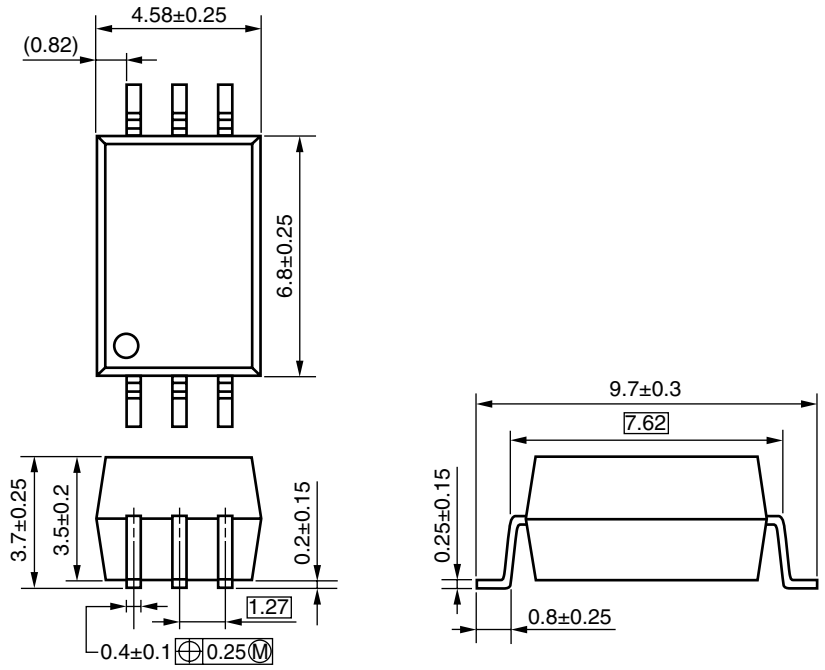
PACKAGE DIMENSIONS (UNIT: mm)

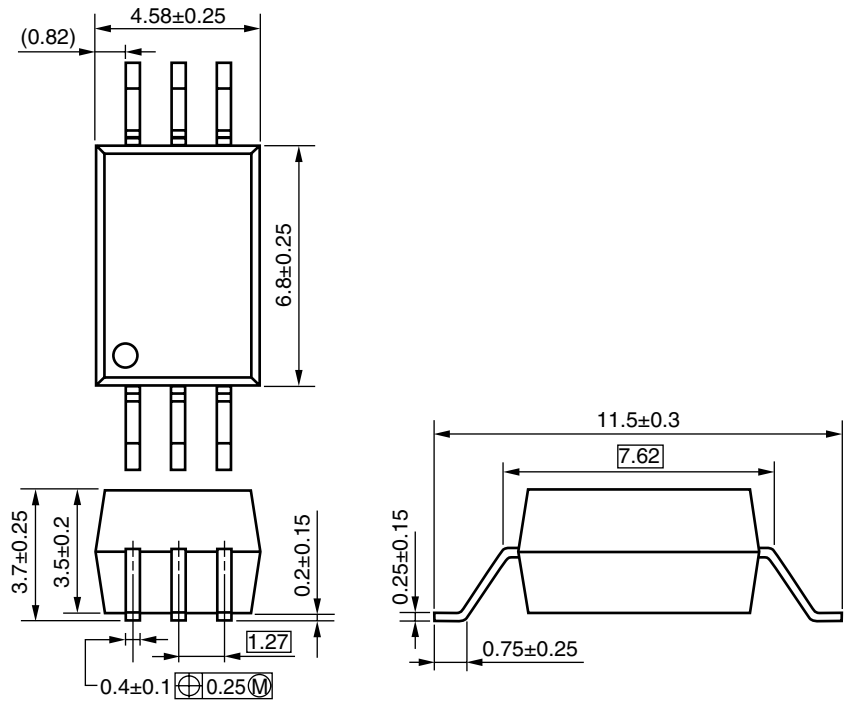
Lead Bending Type (Gull-wing) For Surface Mount

PS9303L

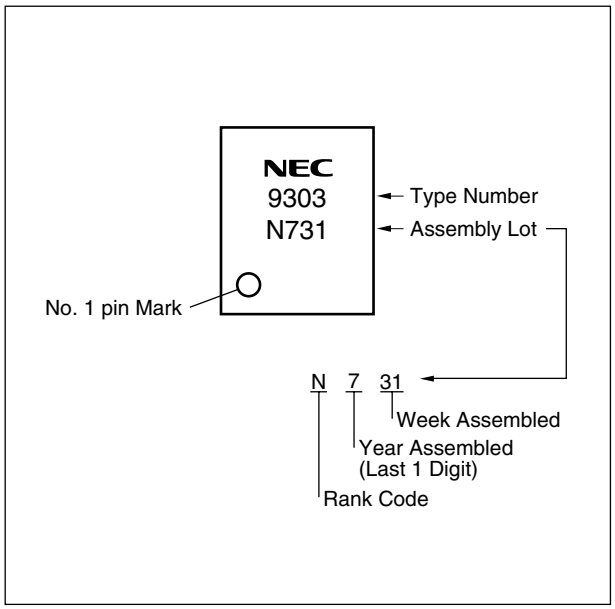


Lead Bending Type (Gull-wing) For Long Creepage Distance (Surface Mount)

PS9303L2



MARKING EXAMPLE



PHOTOCOUPLER CONSTRUCTION

Parameter	PS9303L	PS9303L2
Air Distance (MIN.)	7 mm	8 mm
Outer Creepage Distance (MIN.)	7 mm	8 mm
Isolation Distance (MIN.)	0.4 mm	0.4 mm

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

Parameter		Symbol	Ratings	Unit
Diode	Forward Current*1	I_F	20	mA
	Reverse Voltage	V_R	5	V
Detector	Supply Voltage	V_{CC}	−0.5 to +25	V
	Output Voltage	V_O	−0.5 to +25	V
	Output Current	I_O	25	mA
	Power Dissipation*2	P_C	100	mW
Isolation Voltage*3		BV	5 000	Vr.m.s.
Operating Ambient Temperature		T_A	−40 to +100	°C
Storage Temperature		T_{stg}	−55 to +125	°C

***1** Reduced to 0.33 mA/°C at T_A = 70°C or more.

***2** Reduced to 1.9 mW/°C at T_A = 70°C or more.

***3** AC voltage for 1 minute at T_A = 25°C, RH = 60% between input and output.
Pins 1-3 shorted together, 4-6 shorted together.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Input Current	I_F	6		10	mA
Input Voltage	V_F	0		0.8	V
Supply Voltage	V_{CC}	4.5	15	20	V
Output Voltage	V_O	0		20	V

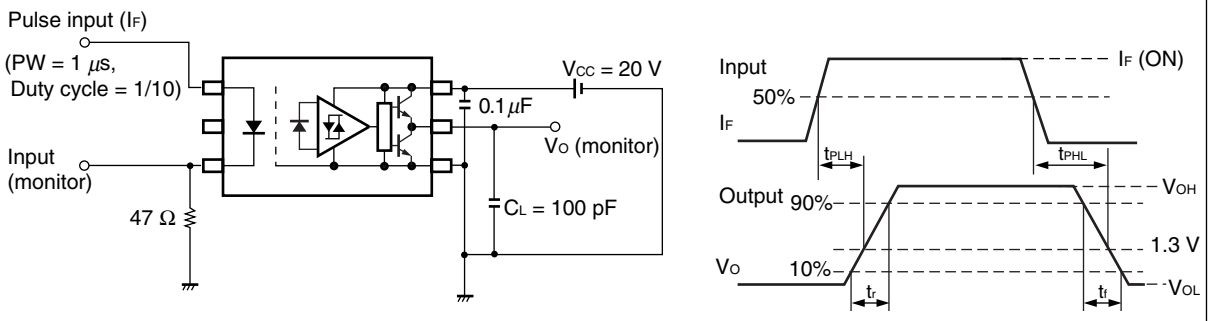
ELECTRICAL CHARACTERISTICS (T_A = –40 to +100°C, V_{CC} = 15 V, unless otherwise specified)

Parameter		Symbol	Conditions	MIN.	TYP.*1	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 10 mA, T_A = 25°C	1.3	1.55	1.8	V
	Reverse Current	I_R	V_R = 3 V, T_A = 25°C			200	μA
	Terminal Capacitance	C_t	V = 0 V, f = 1 MHz, T_A = 25°C		30		pF
Detector	High Level Output Voltage	V_{OH}	V_{CC} = 5 V, I_O = –3.5 mA, I_F = 10 mA	2.4	3.5		V
			V_{CC} = 20 V, I_O = –3.5 mA, I_F = 10 mA	17.4	18.1		
	Low Level Output Voltage	V_{OL}	I_O = 3.5 mA, V_F = 0.8 V		0.1	0.35	V
	High Level Supply Current	I_{CCH}	V_{CC} = 5 V, I_F = 10 mA		2	4	mA
			V_{CC} = 20 V, I_F = 10 mA		2	4	
	Low Level Supply Current	I_{CCL}	V_{CC} = 5 V, V_F = 0 V		3	5	mA
			V_{CC} = 20 V, V_F = 0 V		3	5	
	High Level Output Short Circuit Current	I_{OSH}	V_{CC} = 20 V, V_O = GND, I_F = 10 mA	–7	–40		mA
	Low Level Output Short Circuit Current	I_{OSL}	V_{CC} = V_O = 20 V, V_F = 0 V	7	40		mA
Coupled	Threshold Input Current	I_{FLH}	V_{CC} = 5 V, V_O > 2.4 V, I_O = –3.5 mA		2	5	mA
	Isolation Resistance	R_{I-O}	V_{I-O} = 500 V_{DC}, RH = 60%, T_A = 25°C	10^{12}			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1 MHz, T_A = 25°C		0.6		pF
	Propagation Delay Time (H → L)	t_{PHL}	V_{CC} = 20 V, C_L = 100 pF, I_F = 10 → 0 mA, V_{THHL} = 1.3 V		250	600	ns
	Propagation Delay Time (L → H)	t_{PLH}	V_{CC} = 20 V, C_L = 100 pF, I_F = 0 → 10 mA, V_{THLH} = 1.3 V		350	600	ns
	Pulse Width Distortion (PWD)	$\lvert t_{PLH}-t_{PHL} \rvert$	V_{CC} = 20 V, C_L = 100 pF, I_F = 10 ↔ 0 mA			550	ns
	Rise Time (10-90%)	t_r	V_{CC} = 20 V, C_L = 100 pF, I_F = 0 → 10 mA		175		ns
	Fall Time (90-10%)	t_f	V_{CC} = 20 V, C_L = 100 pF, I_F = 10 → 0 mA		95		ns
	Common Mode Transient Immunity at High Level Output	CM_H	V_{CC} = 5 V, T_A = 25°C, I_F = 10 mA, $\lvert V_{CM} \rvert$ = 1.0 kV, $V_{O\,(MIN.)}$ = 2.4 V	15			kV/μs
	Common Mode Transient Immunity at Low Level Output	CM_L	V_{CC} = 5 V, T_A = 25°C, I_F = 0 mA, $\lvert V_{CM} \rvert$ = 1.0 kV, $V_{O\,(MAX.)}$ = 0.35 V	15			kV/μs

***1** Typical values at T_A = 25°C

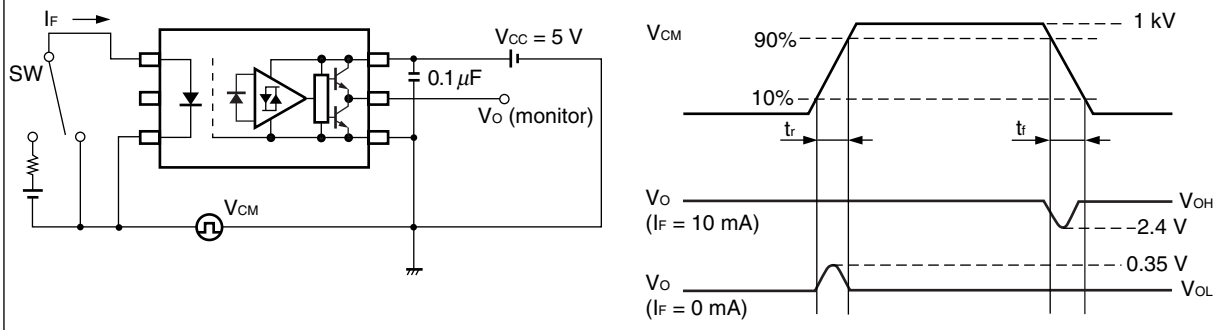
TEST CIRCUIT

Fig. 1 t_{PLH}, t_{PHL}, t_r, t_f Test Circuit and Wave Forms



C_L includes probe and stray wiring capacitance.

Fig. 2 CM_H, CM_L Test Circuit and Wave Forms



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.

NOTES ON HANDLING

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 transistor may enter the on state, even if the voltage is within the absolute maximum ratings.

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M8E 02. 11-1

Caution GaAs Products	This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points. • Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below. 1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials. 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal. • Do not burn, destroy, cut, crush, or chemically dissolve the product. • Do not lick the product or in any way allow it to enter the mouth.