PS9123

–NEPOC Series–

HIGH CMR, 10 Mbps TOTEM POLE OUTPUT TYPE, 5-PIN SOP (SO-5) PHOTOCOUPLER

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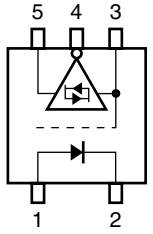
DESCRIPTION

The PS9123 is an optically coupled high-speed, totem pole output isolator containing a GaAlAs LED on the input side and a photodiode and a signal processing circuit on the output side on one chip.
The PS9123 is specified high CMR, high CTR and pulse width distortion with operating temperature.

FEATURES

- High common mode transient immunity (CM_H, CM_L = ±20 kV/μs TYP.)
- Small package (SO-5)
- Pulse width distortion ($|t_{PHL} - t_{PLH}|$ = 7 ns TYP.)
- High-speed (10 Mbps)
- High isolation voltage (BV = 3 750 Vr.m.s.)
- Totem pole output
- Embossed tape product : PS9123-F3 : 2 500 pcs/reel
- Pb-Free product

PIN CONNECTION
(Top View)



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

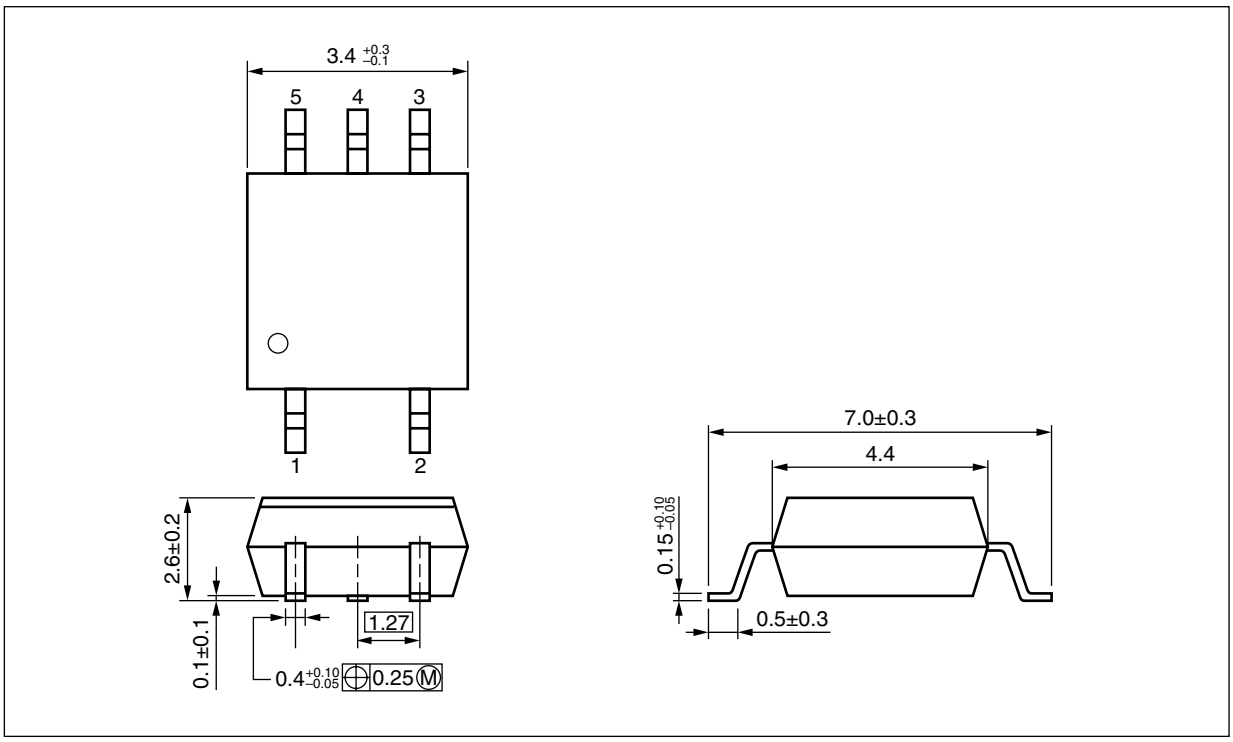
APPLICATIONS

- PLC
- Inverter
- AC servo

TRUTH TABLE

LED	Output
ON	L
OFF	H

PACKAGE DIMENSIONS (UNIT: mm)

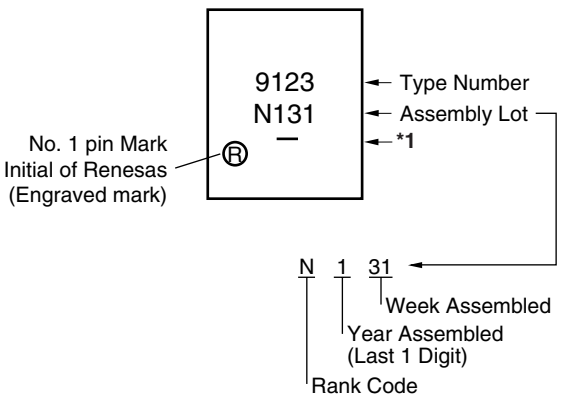


PHOTOCOUPLER CONSTRUCTION

Parameter	Unit (MIN.)
Air Distance	4.2 mm
Outer Creepage Distance	4.2 mm
Isolation Distance	0.2 mm

MARKING EXAMPLE

Ni/Pd/Au PLATING



*1 Bar : Pb-Free

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}	7	V
	Output Voltage	V_O	7	V
	High Level Output Current	I_{OH}	–5	mA
	Low Level Output Current	I_{OL}	13	mA
	Power Dissipation *2	P_C	130	mW
Isolation Voltage *3		BV	3 750	Vr.m.s.
Operating Ambient Temperature		T_A	–40 to +100	°C
Storage Temperature		T_{stg}	–55 to +125	°C

Notes: *1. Reduced to 0.5 mW/°C at T_A = 85°C or more.

*2. T_A = –40 to +100°C, applies to output pin V_O and power supply pin V_{CC}. Reduced to 2.4 mW/°C at T_A = 75°C or more.

*3 AC voltage for 1 minute at T_A = 25°C, RH = 60% between input and output.
Pins 1-2 shorted together, 3-5 shorted together.

RECOMMENDED OPERATING CONDITIONS

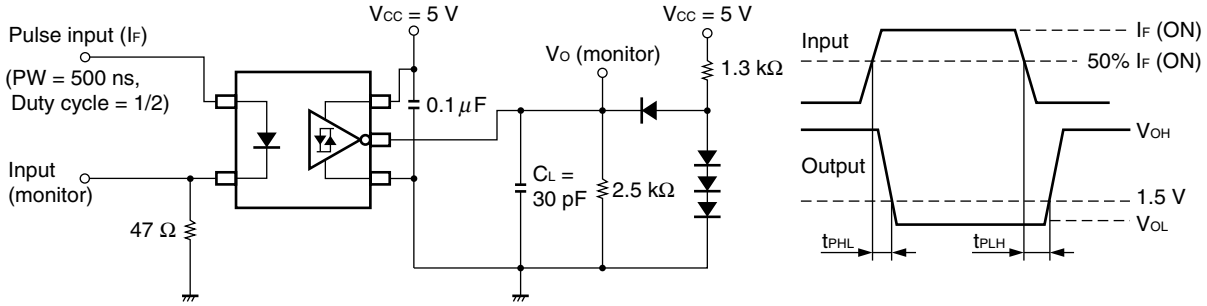
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
High Level Input Current	I_{FH}	7.5		12.5	mA
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
TTL (loads)	N			3	

ELECTRICAL CHARACTERISTICS (T_A = –40 to +100°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	1.3	1.55	1.8	V
	Reverse Current	I_R	V_R = 3 V, T_A = 25°C			10	μA
	Terminal Capacitance	C_t	f = 1 MHz, V_F = 0 V, T_A = 25°C		30		pF
Detector	High Level Output Current	I_{OH}	V_{CC} = V_O = 5.5 V, V_F = 0.8 mA		0.003	100	μA
	High Level Output Voltage	V_{OH}	V_{CC} = 4.5 V, V_F = 0.8 mA, 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		0.25	0.6	V
	High Level Supply Current	I_{CCH}	V_{CC} = 5.5 V, I_F = 0 mA, V_O = open		4	7	mA
	Low Level Supply Current	I_{CCL}	V_{CC} = 5.5 V, I_F = 10 mA, V_O = open		6	10	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 Voltage (H → L)	I_{FHL}	T_A = 25°C		2.3	5	mA
			V_{CC} = 5 V, V_O = 0.6 V			6	
	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)[*2]	t_{PHL}	T_A = 25°C	15	33	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	40	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		7	50	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 > 2 V, V_{CM} = 1 kV	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 < 0.8 V, V_{CM} = 1 kV	10	20		kV/μs

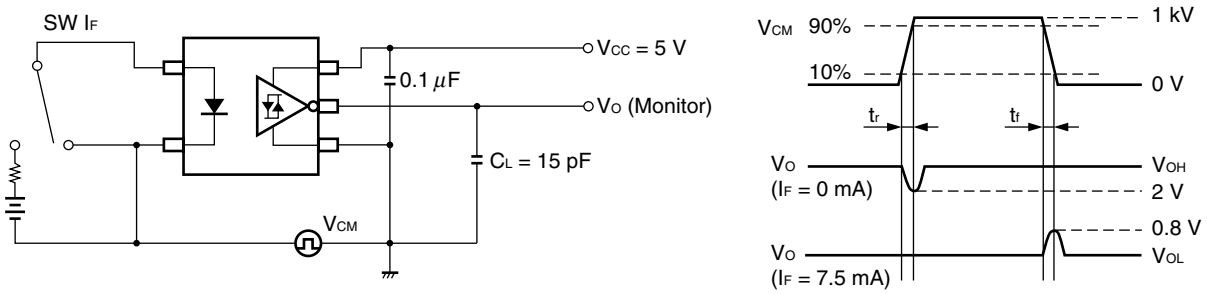
Notes: *1. Typical values at T_A = 25°C

*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.

NOTES ON HANDLING

CAUTIONS REGARDING NOISE

Be aware that when voltage is applied suddenly between the photocoupler's input and output at startup, the output transistor may enter the on state, even if the voltage is within the absolute maximum ratings.

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.

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.

Revision History	PS9123 Preliminary Data Sheet

Rev.	Date	Description	
		Page	Summary
0.01	Jan 29, 2011	–	First edition issued

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