PS9124

R08DS0049EJ0001
Rev.0.01
Jul 03, 2012

HIGH CMR, 10 Mbps OPEN COLLECTOR OUTPUT TYPE, 5-PIN SOP (SO-5) PHOTOCOUPLER

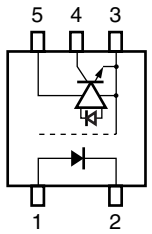
DESCRIPTION

The PS9124 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.

FEATURES

- Low power consumption (V_{CC} = 3.3/5 V)
- Small package (SO-5)
- High-speed response (t_{PHL} = 75 ns MAX., t_{PLH} = 75 ns MAX.)
- High-speed (10 Mbps)
- High isolation voltage (BV = 3 750 Vr.m.s.)
- Open collector output
- Embossed tape product : PS9124-F3 : 2 500 pcs/reel
- Pb-Free product
- Safety standards
  - UL approved: No. E72422
  - CSA approved: No. CA 101391 (CA5A, CAN/CSA-C22.2 60065, 60950)
  - DIN EN60747-5-5 (VDE0884-5) :2011-11 approved: No. 40008902 (Option)

PIN CONNECTION
(Top View)

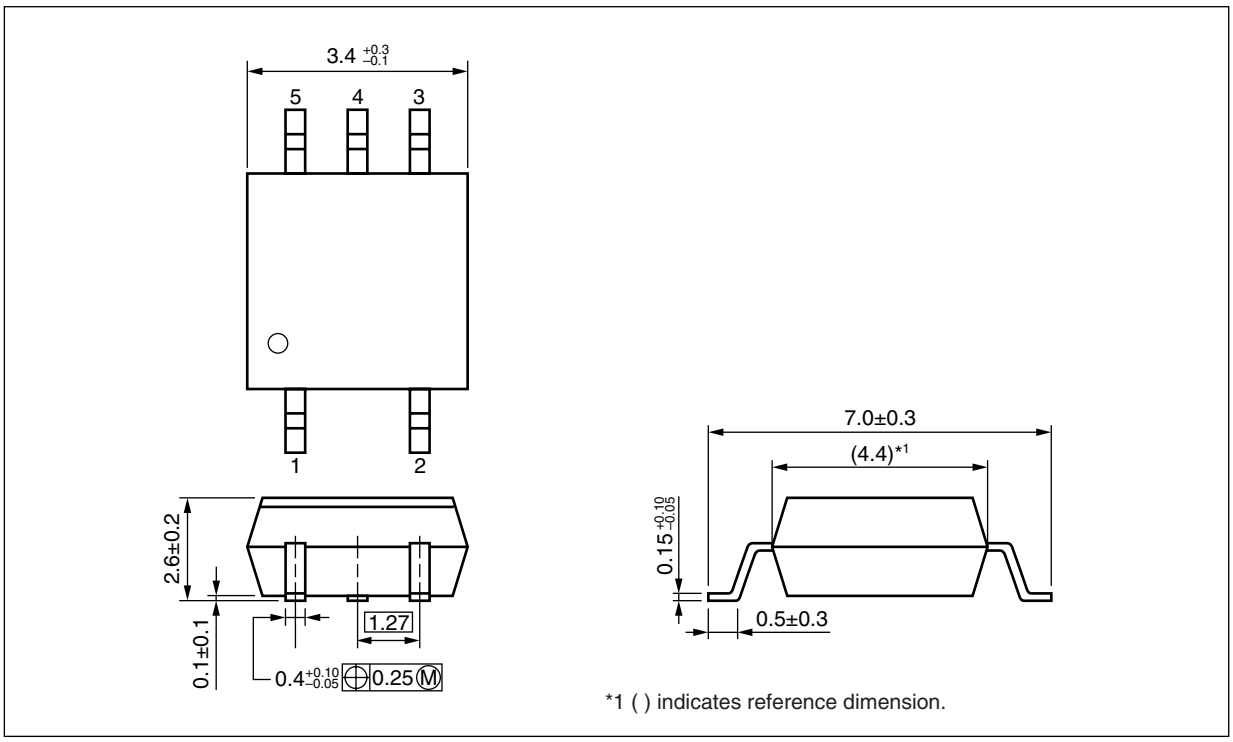


1. Anode
2. Cathode
3. GND
4. V_O
5. V_{CC}

APPLICATIONS

- PDP
- FA Network

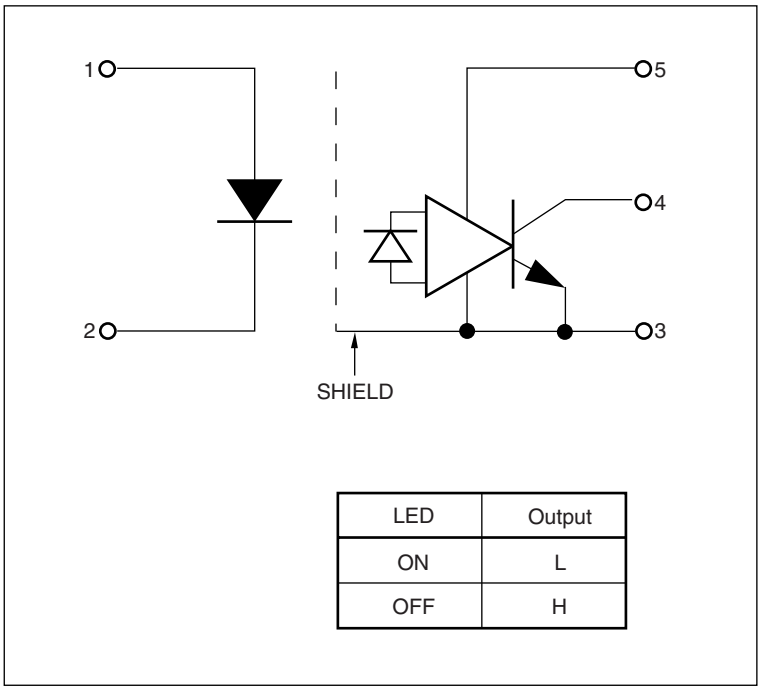
PACKAGE DIMENSIONS (UNIT: mm)



PHOTOCOUPLER CONSTRUCTION

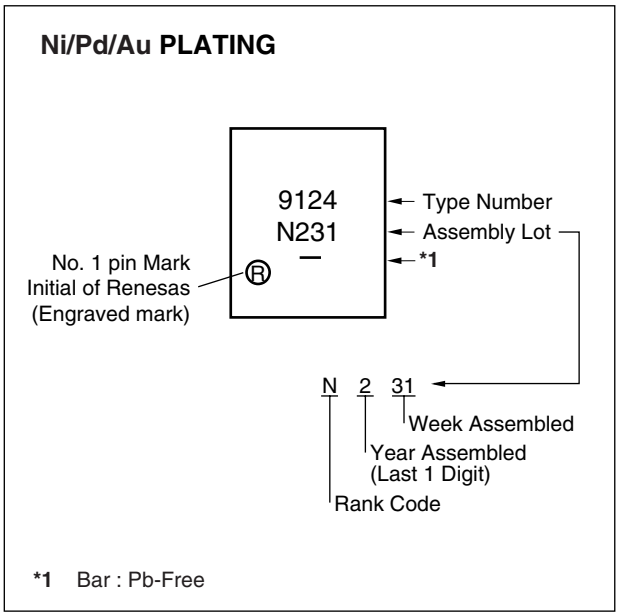
Parameter	Unit (MIN.)
Air Distance	4.2 mm
Outer Creepage Distance	4.2 mm
Isolation Distance	0.2 mm

BLOCK DIAGRAM (Unit: mm)



LED	Output
ON	L
OFF	H

MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standards Approval	Application Part Number *1
PS9124	PS9124-AX	Pb-Free (Ni/Pd/Au)	20 pcs (Tape 20 pcs cut)	Standard products (UL, CSA approved)	PS9124
PS9124-F3	PS9124-F3-AX		Embossed Tape 2 500 pcs/reel		
PS9124-V	PS9124-V-AX		20 pcs (Tape 20 pcs cut)	DIN EN60747-5-5 (VDE0884-5) : 2011-11 approved (Option)	
PS9124-V-F3	PS9124-V-F3-AX		Embossed Tape 2 500 pcs/reel		

Note: *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	25	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	200	mW
Isolation Voltage *3		BV	3 750	Vr.m.s.
Operating Ambient Temperature		T_A	–40 to +110	°C
Storage Temperature		T_{stg}	–55 to +125	°C

Notes: *1. Reduced to 0.2 mA/°C at T_A = 25°C or more.
*2. Reduced to 4.0 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

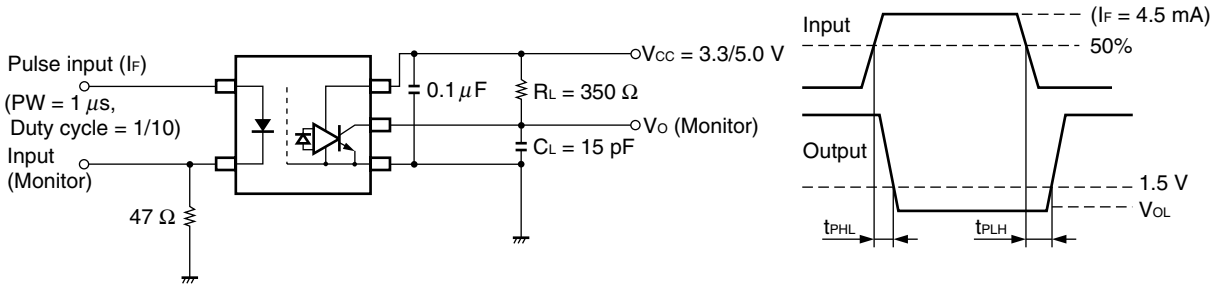
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Low Level Input Voltage	V_{FL}	–2		0.8	V
High Level Input Current	I_{FH}	3.8	6.0	7.5	mA
Supply Voltage	V_{CC}	2.7	3.3	3.6	V
		4.5	5.0	5.5	
TTL (R_L = 1 kΩ, loads)	N			5	
Pull-up Resistor	R_L	330		4 k	Ω

ELECTRICAL CHARACTERISTICS (T_A = –40 to +110°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 = 3.3 V, V_F = 0.8 V		1	80	μA
			V_{CC} = V_O = 5.5 V, V_F = 0.8 V		1	100	
	Low Level Output Voltage	V_{OL}	V_{CC} = 3.3 V, I_F = 4.5 mA, I_{OL} = 13 mA		0.2	0.6	V
			V_{CC} = 5.5 V, I_F = 4.5 mA, I_{OL} = 13 mA				
	High Level Supply Current	I_{CCH}	V_{CC} = 3.3 V, I_F = 0 mA, V_O = open		4	7	mA
			V_{CC} = 5.5 V, I_F = 0 mA, V_O = open				
	Low Level Supply Current	I_{CCL}	V_{CC} = 3.3 V, I_F = 4.5 mA, V_O = open		6	10	mA
			V_{CC} = 5.5 V, I_F = 4.5 mA, V_O = open		7	10	
Coupled	Threshold Input Voltage (H → L)	I_{FHL}	V_{CC} = 3.3 V, R_L = 350 Ω, V_O = 0.8 V		1.0	3.0	mA
			V_{CC} = 5 V, R_L = 350 Ω, V_O = 0.8 V				
	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		40	75	ns
			V_{CC} = 3.3 V, I_F = 4.5 mA, R_L = 350 Ω, C_L = 15 pF			100	
			T_A = 25°C		40	75	
			V_{CC} = 5 V, I_F = 4.5 mA, R_L = 350 Ω, C_L = 15 pF			100	
	Propagation Delay Time (L → H) [*2]	t_{PLH}	T_A = 25°C		50	75	ns
			V_{CC} = 3.3 V, I_F = 4.5 mA, R_L = 350 Ω, C_L = 15 pF			100	
			T_A = 25°C		45	75	
			V_{CC} = 5 V, I_F = 4.5 mA, R_L = 350 Ω, C_L = 15 pF			100	
	Pulse Width Distortion (PWD)	$\lvert t_{PHL}-t_{PLH} \rvert$	V_{CC} = 3.3/5 V, I_F = 4.5 mA, R_L = 350 Ω, C_L = 15 pF		5	35	ns
	Propagation Delay Skew	t_{psk}	V_{CC} = 3.3/5 V, I_F = 4.5 mA, R_L = 350 Ω, C_L = 15 pF			40	ns
	Rise Time	t_r	V_{CC} = 3.3/5 V, I_F = 4.5 mA, R_L = 350 Ω, C_L = 15 pF		20		ns
	Fall Time	t_f	V_{CC} = 3.3/5 V, I_F = 4.5 mA, R_L = 350 Ω, C_L = 15 pF		5		ns
	Common Mode Transient Immunity at High Level Output [*3]	CM_H	V_{CC} = 3.3/5 V, T_A = 25°C, I_F = 0 mA, V_O > 2 V, R_L = 350 Ω, V_{CM} = 1 kV	10	15		kV/μs
	Common Mode Transient Immunity at Low Level Output [*3]	CM_L	V_{CC} = 3.3/5 V, T_A = 25°C, I_F = 4.5 mA, V_O < 0.8 V, R_L = 350 Ω, V_{CM} = 1 kV	10	15		kV/μs

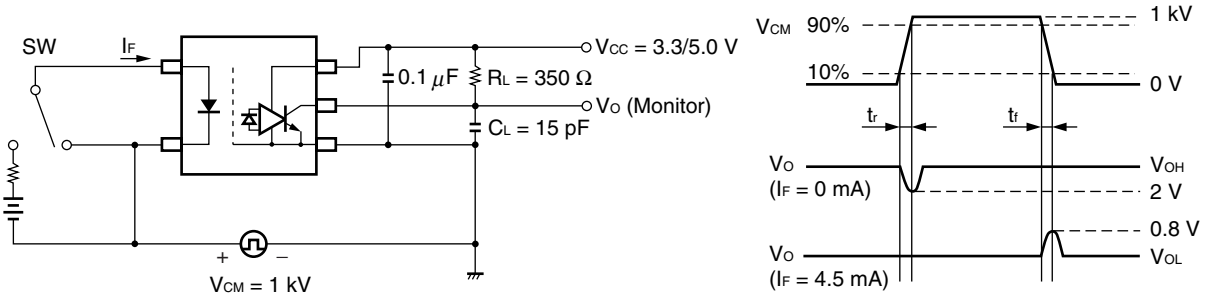
Notes: *1. Typical values at T_A = 25°C

*2. Test circuit for propagation delay time



Remark C_L includes probe and stray wiring capacitance.

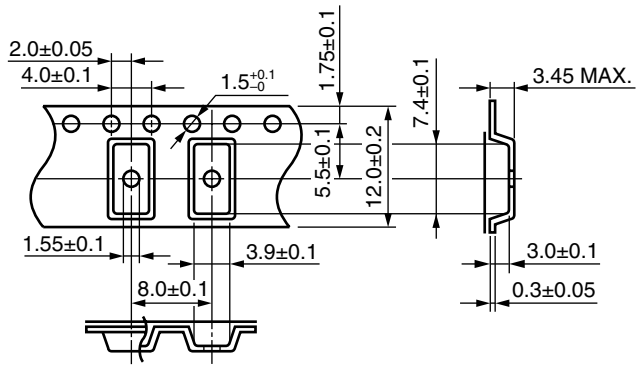
*3. Test circuit for common mode transient immunity



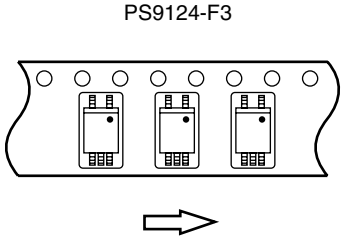
Remark C_L includes probe and stray wiring capacitance.

TAPING SPECIFICATIONS (UNIT: mm)

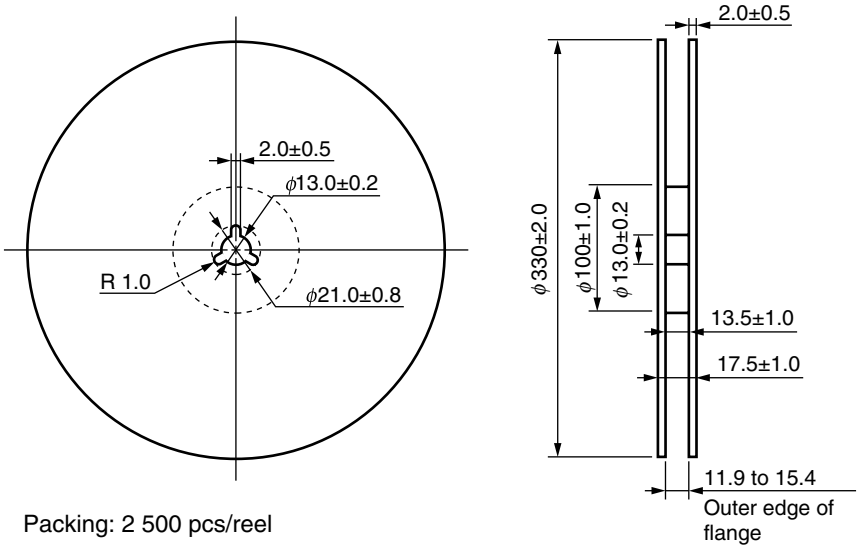
Outline and Dimensions (Tape)



Tape Direction

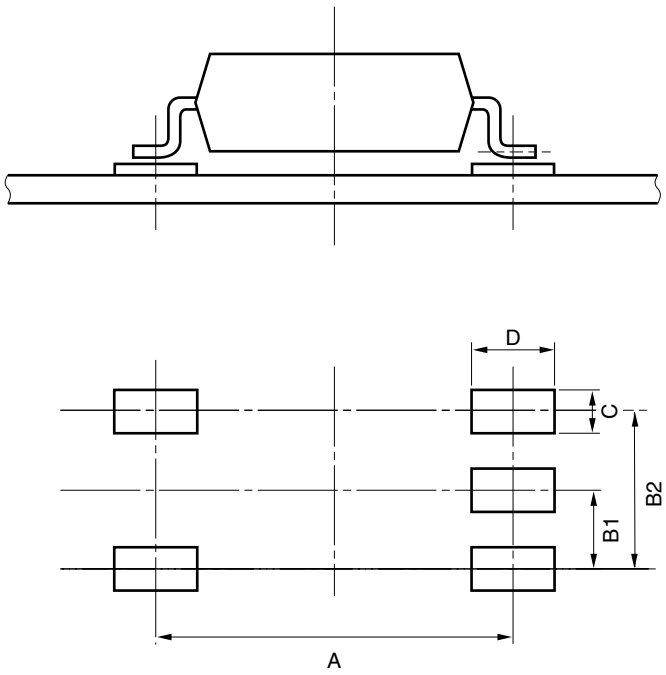


Outline and Dimensions (Reel)



Packing: 2 500 pcs/reel

RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



Part Number	A	B1	B2	C	D
PS9124	6.25	1.27	2.54	0.8	1.45

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	PS9124 Preliminary Data Sheet

Rev.	Date	Description	
		Page	Summary
0.01	Jul 03, 2012	–	First edition issued

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Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
1 harbourFront Avenue, #06-10, keppel Bay Tower, Singapore 098632
Tel: +65-6213-0200, Fax: +65-6278-8001

Renesas Electronics Malaysia Sdn.Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.
11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141

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