

PS9924

Data Sheet

R08DS0059EJ0100

Rev.1.00

Jun 28, 2013

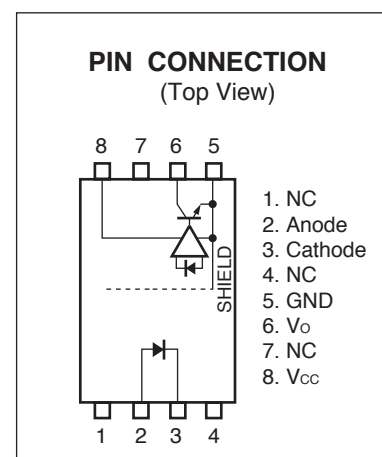
HIGH CMR, 10 Mbps OPEN COLLECTOR OUTPUT TYPE, 8-PIN LSDIP PHOTOCOUPLER
 FOR CREEPAGE DISTANCE OF 14.5 mm

DESCRIPTION

The PS9924 is an optical coupled high-speed, active low type 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

- Long creepage distance (14.5 mm MIN.)
- High common mode transient immunity (CM_H , $CM_L = \pm 15 \text{ kV}/\mu\text{s}$ MIN.)
- High-speed response ($t_{PHL} = 100 \text{ ns}$ MAX., $t_{PLH} = 100 \text{ ns}$ MAX.)
- Low power consumption ($V_{CC} = 3.3/5\text{V}$)
- 8-pin LSDIP (Long Creepage SDIP) type
- Embossed tape product: PS9924-F3: 1 000 pcs/reel
- Pb-Free and Halogen Free product
- Safety standards
 - UL approved: No. E72422
 - CSA approved: No. CA 101391 (CA5A, CAN/CSA-C22.2 60065, 60950)
 - SEMKO approved (EN 60065, EN 60950)
 - DIN EN 60747-5-5 (VDE 0884-5) approved (Option)

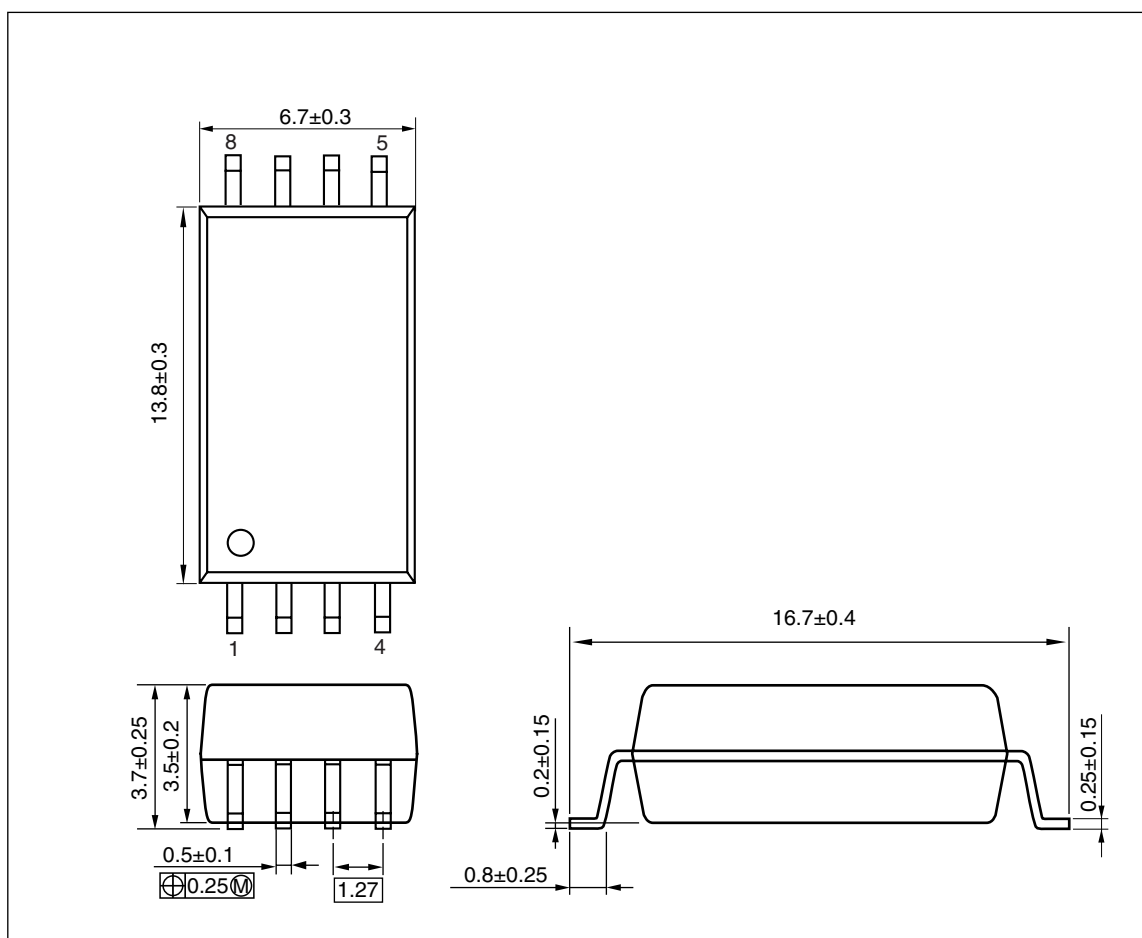


APPLICATIONS

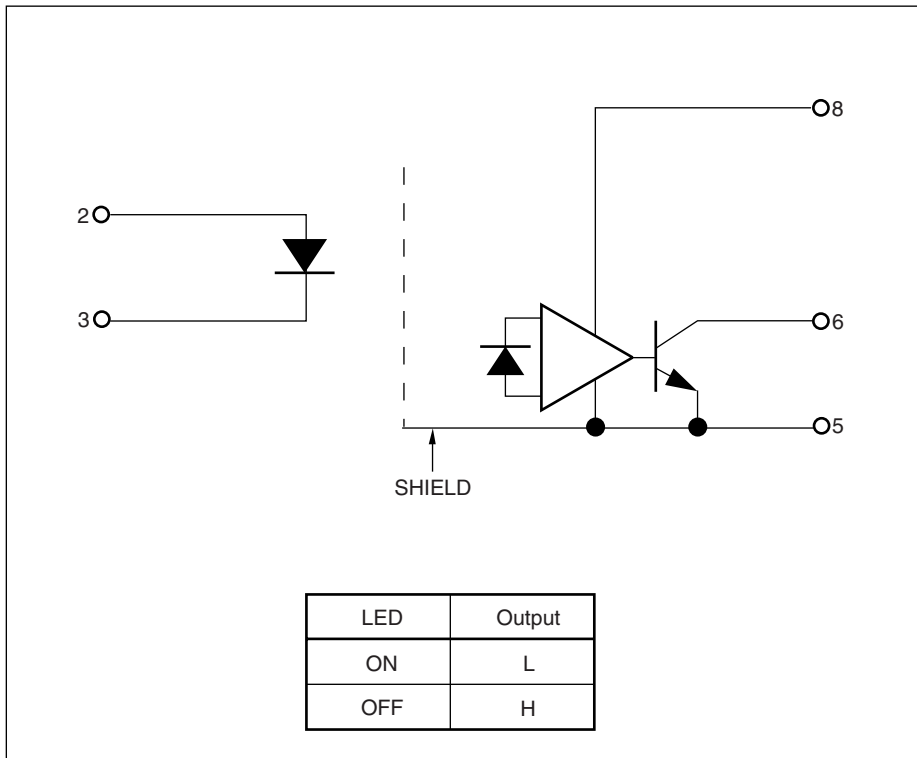
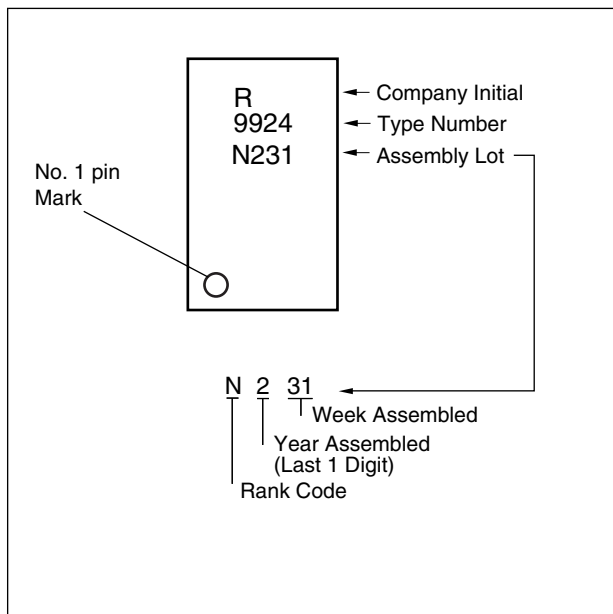
- Industrial inverter
- Solar inverter

The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

PACKAGE DIMENSIONS (UNIT: mm)**PHOTOCOUPLER CONSTRUCTION**

Parameter	MIN.
Air Distance	14.5 mm
Creepage Distance	14.5 mm
Isolation Distance	0.4 mm

BLOCK DIAGRAM**MARKING EXAMPLE**

ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number ^{*1}
PS9924	PS9924-Y-AX	Pb-Free and Halogen Free (Ni/Pd/Au)	10 pcs (Tape 10 pcs cut)	Standard products (UL, CSA, SEMKO approved)	PS9924
PS9924-F3	PS9924-Y-F3-AX		Embossed Tape 1 000 pcs/reel		
PS9924-V	PS9924-Y-V-AX		10 pcs (Tape 10 pcs cut)	DIN EN 60747-5-5 (VDE 0884-5) approved (Option)	
PS9924-V-F3	PS9924-Y-V-F3-AX		Embossed Tape 1 000 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	I _F	25	mA
	Reverse Voltage	V _R	5	V
	Power Dissipation ^{*1}	P _D	45	mW
Detector	Supply Voltage	V _{CC}	7	V
	Output Voltage	V _O	7	V
	Output Current	I _O	25	mA
	Power Dissipation ^{*2}	P _C	250	mW
Isolation Voltage ^{*3}		BV	7 500	Vr.m.s.
Operating Ambient Temperature		T _A	−40 to +110	°C
Storage Temperature		T _{stg}	−55 to +125	°C

Notes: ^{*1}. Reduced to 0.8 mW/°C at T_A = 85°C or more.

^{*2}. Reduced to 5.2 mW/°C at T_A = 85°C or more.

^{*3} AC voltage for 1 minute at T_A = 25°C, RH = 60% between input and output.

Pins 1-4 shorted together, 5-8 shorted together.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Low Level Forward Voltage	V _{F(OFF)}	−2		0.8	V
High Level Forward Current	I _{F(ON)}	8	10	12	mA
Supply Voltage	V _{CC}	2.7		5.5	V
Pull-up Resistor	R _L	330		4k	Ω

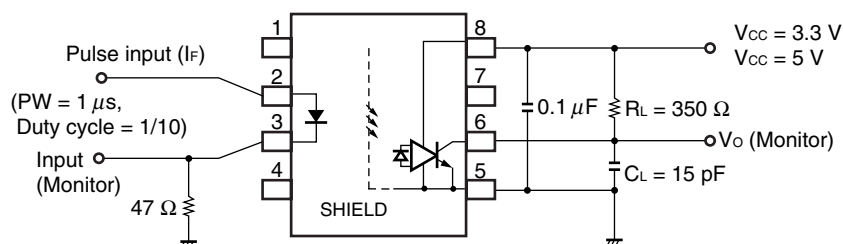
<R> **ELECTRICAL CHARACTERISTICS ($T_A = -40$ to $+110^\circ\text{C}$, unless otherwise specified)**

Parameter		Symbol	Conditions	MIN.	TYP. ^{*1}	MAX.	Unit
Diode	Forward Voltage	V_F	$I_F = 10\text{ mA}$, $T_A = 25^\circ\text{C}$	1.3	1.56	1.8	V
	Reverse Current	I_R	$V_R = 3\text{ V}$, $T_A = 25^\circ\text{C}$			10	μA
	Terminal Capacitance	C_t	$f = 1\text{ MHz}$, $V_F = 0\text{ V}$, $T_A = 25^\circ\text{C}$		30		pF
Detector	High Level Output Current	I_{OH}	$V_{CC} = V_O = 3.3\text{ V}$, $V_F = 0.8\text{ V}$		1	80	μA
			$V_{CC} = V_O = 5.5\text{ V}$, $V_F = 0.8\text{ V}$		1	100	
	Low Level Output Voltage	V_{OL}	$V_{CC} = 3.3\text{ V}$, $I_F = 10\text{ mA}$, $I_{OL} = 13\text{ mA}$		0.2	0.6	V
			$V_{CC} = 5.5\text{ V}$, $I_F = 10\text{ mA}$, $I_{OL} = 13\text{ mA}$				
	High Level Supply Current	I_{CCH}	$V_{CC} = 3.3\text{ V}$, $I_F = 0\text{ mA}$, $V_O = \text{open}$		2	7	mA
			$V_{CC} = 5.5\text{ V}$, $I_F = 0\text{ mA}$, $V_O = \text{open}$		3	7	
	Low Level Supply Current	I_{CCL}	$V_{CC} = 3.3\text{ V}$, $I_F = 10\text{ mA}$, $V_O = \text{open}$		4	10	mA
			$V_{CC} = 5.5\text{ V}$, $I_F = 10\text{ mA}$, $V_O = \text{open}$		5	10	
Coupled	Threshold Input Voltage (H $\rightarrow$ L)	I_{FHL}	$V_{CC} = 3.3\text{ V}$, $R_L = 350\ \Omega$, $V_O = 0.8\text{ V}$		2	5	mA
			$V_{CC} = 5.0\text{ V}$, $R_L = 350\ \Omega$, $V_O = 0.8\text{ V}$				
	Isolation Resistance	R_{I-O}	$V_{I-O} = 1\text{ kV}_{DC}$, $R_H = 40$ to 60%	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	$V_{I-O} = 0\text{ V}$, $f = 1\text{ MHz}$, $T_A = 25^\circ\text{C}$		1.0		pF
	Propagation Delay Time (H $\rightarrow$ L) ^{*2}	t_{PHL}	$V_{CC} = 3.3\text{ V}$, $I_F = 10\text{ mA}$, $R_L = 350\ \Omega$, $C_L = 15\text{ pF}$	$T_A = 25^\circ\text{C}$		45	ns
				$T_A = -40^\circ\text{C}$ to 110°C		100	
			$V_{CC} = 5\text{ V}$, $I_F = 10\text{ mA}$, $R_L = 350\ \Omega$, $C_L = 15\text{ pF}$	$T_A = 25^\circ\text{C}$		45	
				$T_A = -40^\circ\text{C}$ to 110°C		100	
	Propagation Delay Time (L $\rightarrow$ H) ^{*2}	t_{PLH}	$V_{CC} = 3.3\text{ V}$, $I_F = 10\text{ mA}$, $R_L = 350\ \Omega$, $C_L = 15\text{ pF}$	$T_A = 25^\circ\text{C}$		40	ns
				$T_A = -40^\circ\text{C}$ to 110°C		100	
			$V_{CC} = 5\text{ V}$, $I_F = 10\text{ mA}$, $R_L = 350\ \Omega$, $C_L = 15\text{ pF}$	$T_A = 25^\circ\text{C}$		40	
				$T_A = -40^\circ\text{C}$ to 110°C		100	
	Pulse Width Distortion (PWD) ^{*2}	$ t_{PHL} - t_{PLH} $	$V_{CC} = 3.3/5\text{ V}$, $I_F = 10\text{ mA}$, $R_L = 350\ \Omega$, $C_L = 15\text{ pF}$		5	35	ns
	Propagation Delay Skew ^{*2}	t_{psk}				40	
	Rise Time ^{*2}	t_r			20		
	Fall Time ^{*2}	t_f			5		
	Common Mode Transient Immunity at High Level Output ^{*3}	CM_H	$V_{CC} = 3.3/5\text{ V}$, $I_F = 0\text{ mA}$, $V_O > 2\text{ V}$, $R_L = 350\ \Omega$, $V_{CM} = 1\text{ kV}$, $T_A = 25^\circ\text{C}$	15	20		kV/ μs
	Common Mode Transient Immunity at Low Level Output ^{*3}	CM_L	$V_{CC} = 3.3/5\text{ V}$, $I_F = 10\text{ mA}$, $V_O < 0.8\text{ V}$, $R_L = 350\ \Omega$, $V_{CM} = 1\text{ kV}$, $T_A = 25^\circ\text{C}$	15	20		kV/ μs

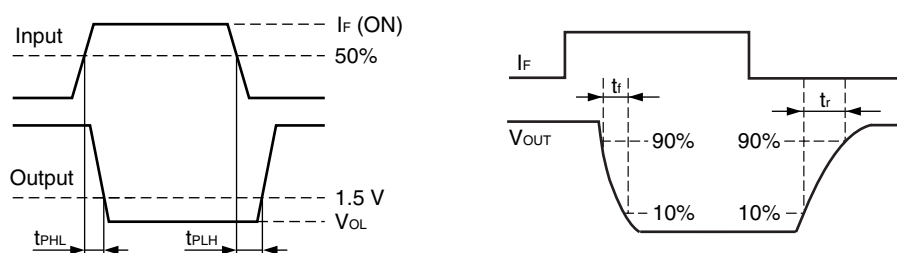
PS9924

Notes: *1. Typical values at $T_A = 25^\circ\text{C}$

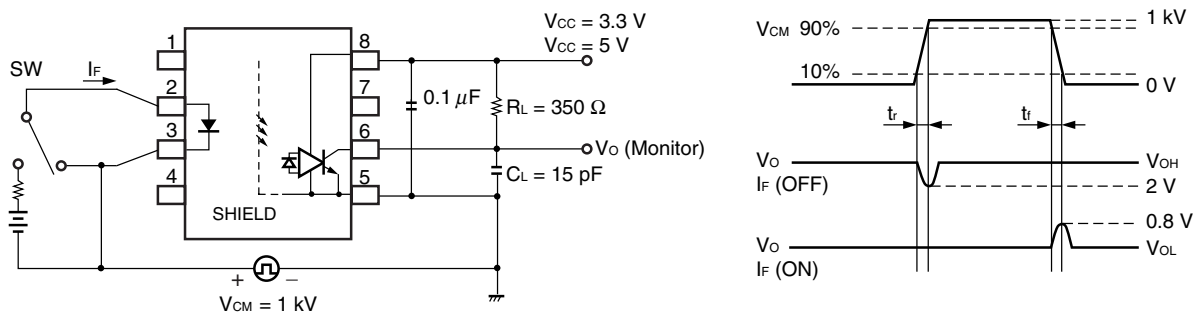
*2. Test circuit for propagation delay time



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.