

PS8902

R08DS0128EJ0100

Rev. 1.00

Aug 24, 2015

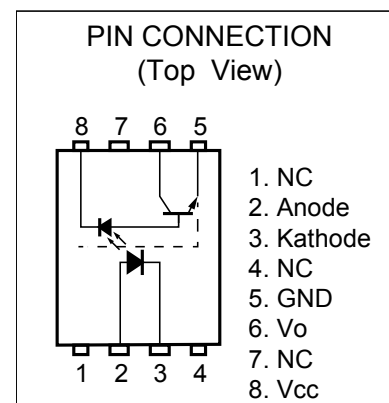
 1 Mbps HIGH CMR ANALOG OUTPUT TYPE, 8-PIN LSDIP PHOTOCOUPLER
 FOR CREEPAGE DISTANCE OF 14.5 mm

DESCRIPTION

The PS8902 is an optically coupled isolator containing a GaAlAs LED on the light emitting diode (input side) and a PIN photodiode and a high-speed amplifier transistor on the output side on one chip.

FEATURES

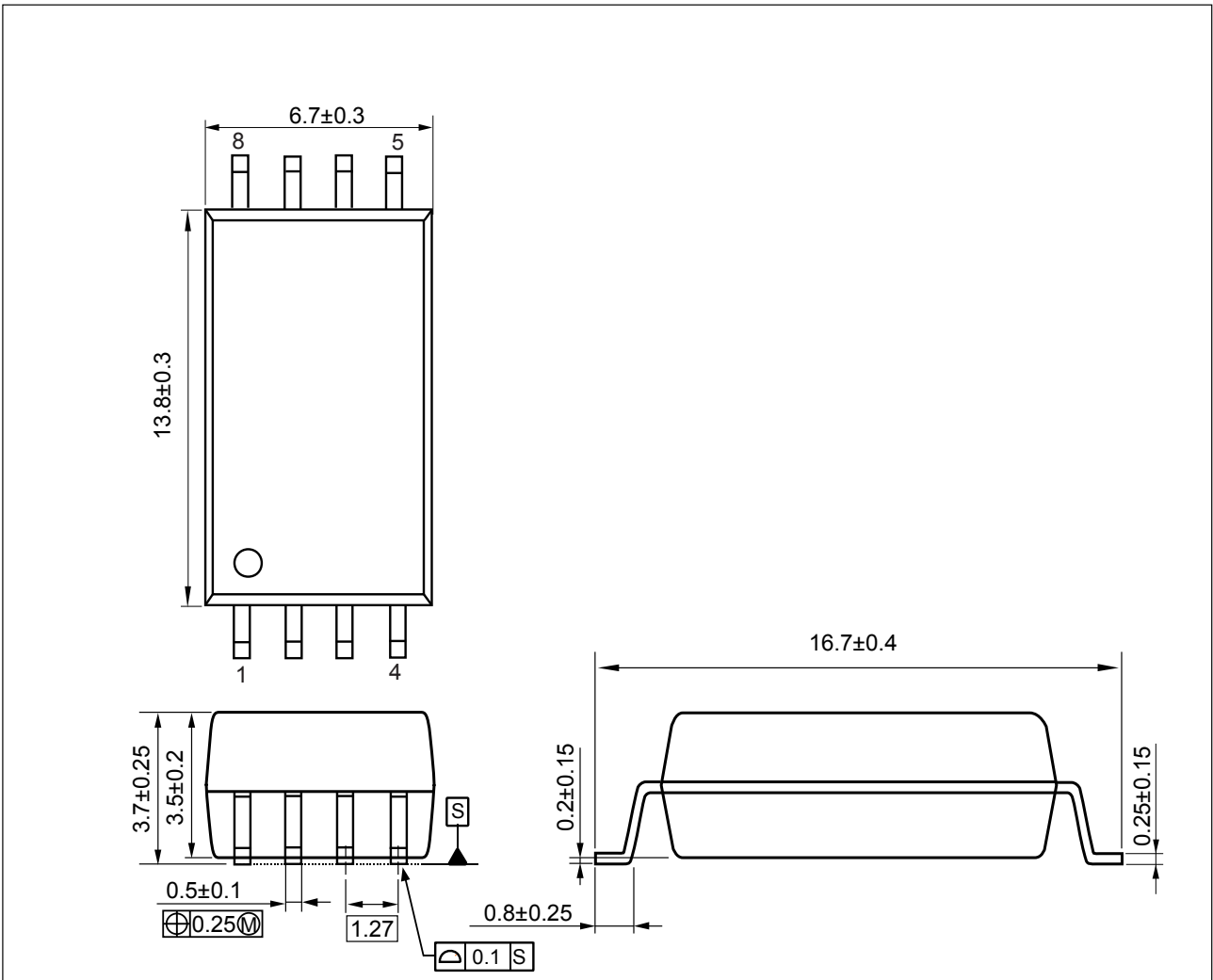
- Long creepage distance (14.5 mm MIN.)
- 8-pin LSDIP (Long Creepage SDIP) type
- High-speed response ($t_{PHL} = 0.8 \mu s$ MAX., $t_{PLH} = 1.2 \mu s$ MAX.)
- High common mode transient immunity ($CM_H, CM_L = \pm 15 kV/\mu s$ MIN.)
- Embossed tape product: PS8902-Y-F3: 1 000 pcs/reel
- Pb-Free Product
- Safety standards
 - UL approved: No. E72422
 - CSA approved: No. CA 101391 (CA5A, CAN/CSA-C22.2 60065, 60950)
 - DIN EN 60747-5-5 (VDE 0884-5) approved (Option)



APPLICATIONS

- Power supply
- Computer and peripheral manufactures
- General purpose inverter
- Substitutions for relays and pulse transformers

PACKAGE DIMENSIONS (UNIT: mm)

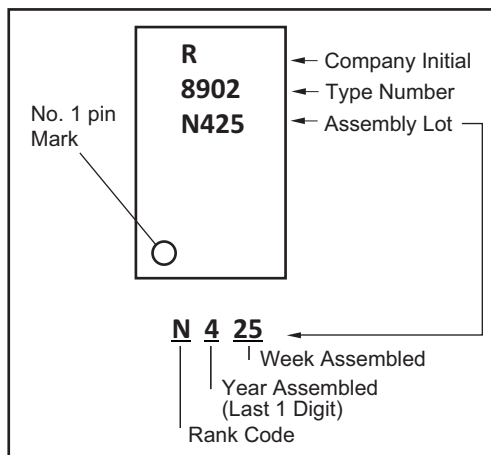


Weight: 0.642g (typ.)

PHOTOCOUPLER CONSTRUCTION

Parameter	Unit (MIN.)
Air Distance	14.5 mm
Outer Creepage Distance	14.5 mm
Isolation Distance	0.4 mm

MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number ^{*1}
PS8902	PS8902-Y-AX	Pb-Free (Ni/Pd/Au)	10 pcs (Tape 10 pcs cut)	Standard products (UL,CSA approved)	PS8902
PS8902-F3	PS8902-Y-F3-AX		Embossed Tape 1 000 pcs/reel		
PS8902-V	PS8902-Y-V-AX		10 pcs (Tape 10 pcs cut)	UL,CSA approved DIN EN60747-5-5 (VDE0884-5): 2011-11 approved (Option)	
PS8902-V-F3	PS8902-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	5.0	V
	Power Dissipation ^{*1}	P _D	45	mW
Detector	Supply Voltage	V _{CC}	35	V
	Output Voltage	V _O	35	V
	Output Current	I _O	8.0	mA
	Power Dissipation ^{*2}	P _C	250	mW
Isolation Voltage ^{*3}		BV	7500	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.

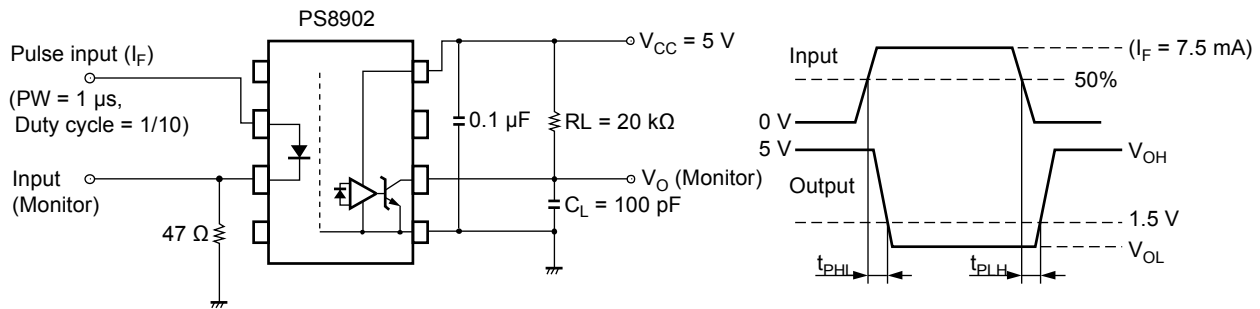
*2 Reduced to 5.2 mW/°C at T_A = 85°C or more.

*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.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

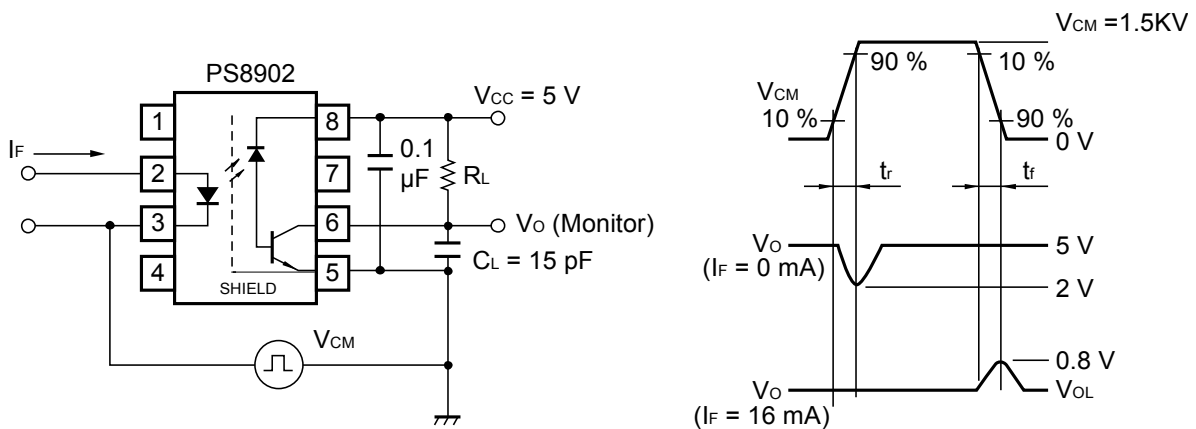
	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V _F	I _F = 16 mA	1.35	1.65	1.85	V
	Reverse Current	I _R	V _R = 3 V	-	-	10	μA
	Forward Voltage Temperature Coefficient	ΔV _F /ΔT _A	I _F = 16 mA	-	-2.2	-	mV/°C
	Terminal Capacitance	C _t	V = 0 V, f = 1 MHz	-	30	-	pF
Detector	High Level Output Current	I _{OH} (1)	I _F = 0 mA, V _{CC} = V _O = 5.5 V	-	0.5	500	nA
	High Level Output Current	I _{OH} (2)	I _F = 0 mA, V _{CC} = V _O = 30 V	-	-	100	μA
	Low Level Output Voltage	V _{OL}	I _F = 16 mA, V _{CC} = 4.5 V, I _{OL} = 1.2 mA	-	0.1	0.4	V
	High Level Supply Current	I _{CCH}	I _F = 0 mA, V _O = open, V _{CC} = 30 V	-	0.01	2	μA
	Low Level Supply Current	I _{CCL}	I _F = 16 mA, V _O = open, V _{CC} = 30 V	-	50	-	μA
Coupled	Current Transfer Ratio	CTR	I _F = 16 mA, V _{CC} = 4.5 V, V _O = 0.4 V	15	-	35	%
	Input-Output Isolation Resistance	R _{I-O}	V _{I-O} = 1 kV _{DC} , R _H = 40 to 60%	10 ¹¹	-	-	Ω
	Input-Output Isolation Capacitance	C _{I-O}	V = 0 V, f = 1 MHz	-	1.0	-	pF
	Propagation Delay Time (H → L) ^{*1}	t _{PHL}	I _F = 16 mA, V _{CC} = 5 V, R _L = 2.2 kΩ, C _L = 15 pF	-	0.3	0.8	μs
	Propagation Delay Time (L → H) ^{*1}	t _{PLH}		-	0.5	1.2	
	Common Mode Transient Immunity at High Level Output ^{*2}	C _{MH}	I _F = 0 mA, V _{CC} = 5 V, R _L = 4.1 kΩ, V _{CM} = 1.5 kV, V _O > 2V	15	-	-	kV/μs
	Common Mode Transient Immunity at Low Level Output ^{*2}	C _{ML}	I _F = 16 mA, V _{CC} = 5 V, R _L = 4.1 kΩ, V _{CM} = 1.5 kV, V _O < 0.8V	15	-	-	

Notes *1 Test circuit for propagation delay time



Remark C_L includes probe and stray wiring capacitance.

*2 Test circuit for common mode transient immunity



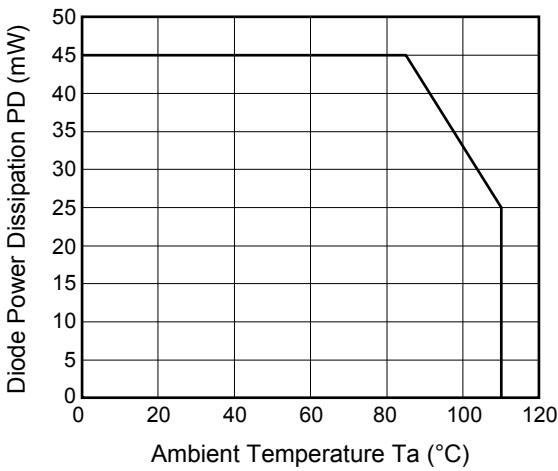
Remark C_L includes probe and stray wiring capacitance.

USAGE CAUTIONS

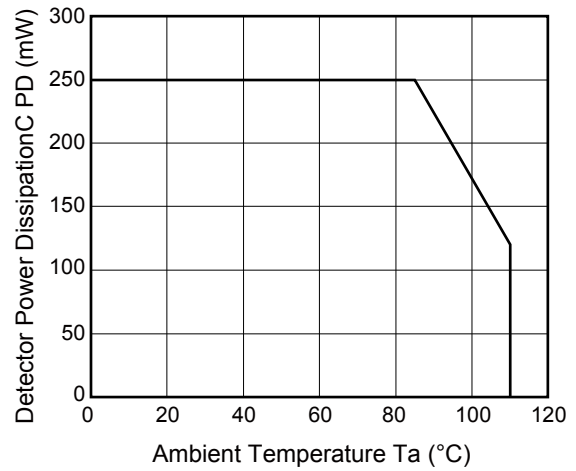
1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of 0.1 μF is used between V_{CC} and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor is no more than 10 mm.
3. Avoid storage at a high temperature and high humidity.

TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

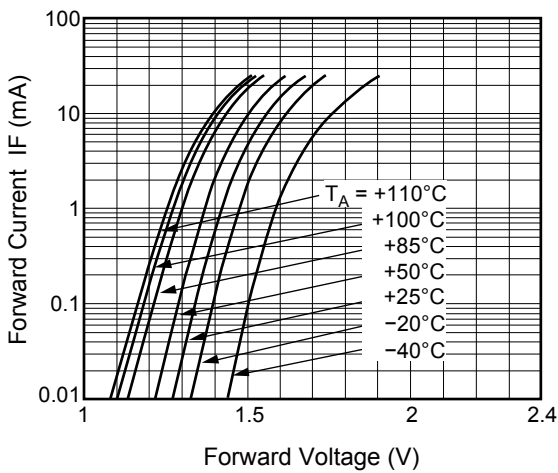
Diode Power Dissipation vs. Ambient Temperature



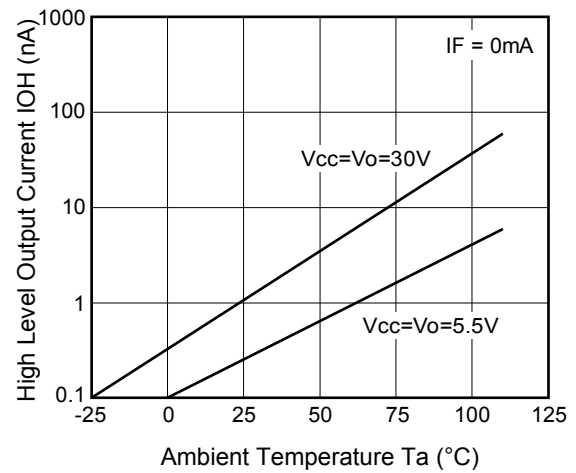
Detector Power Dissipation vs. Ambient Temperature



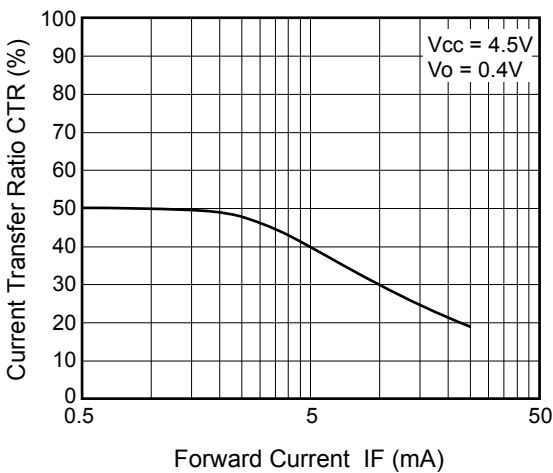
Forward Current vs. Forward Voltage



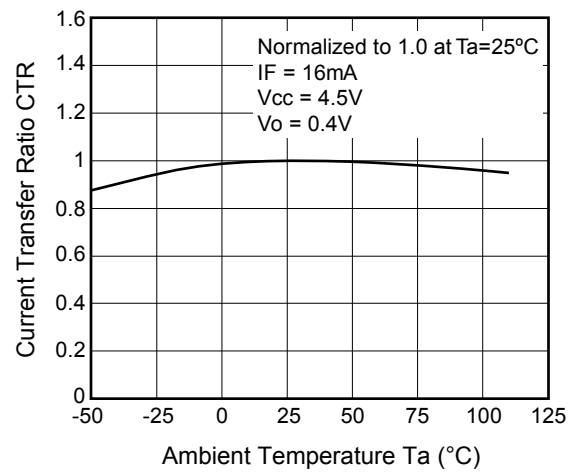
High Level Output Current vs. Ambient Temperature



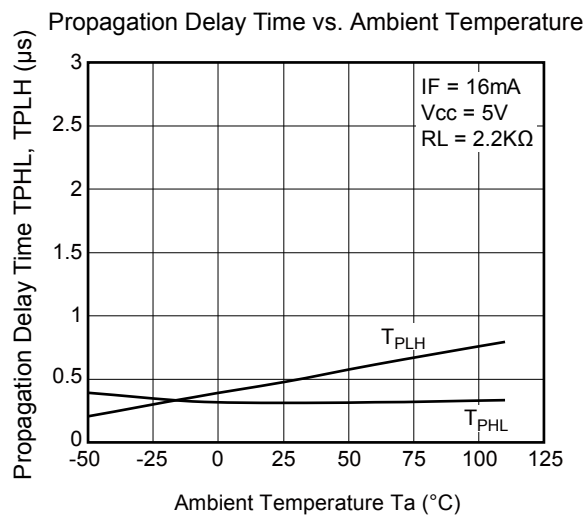
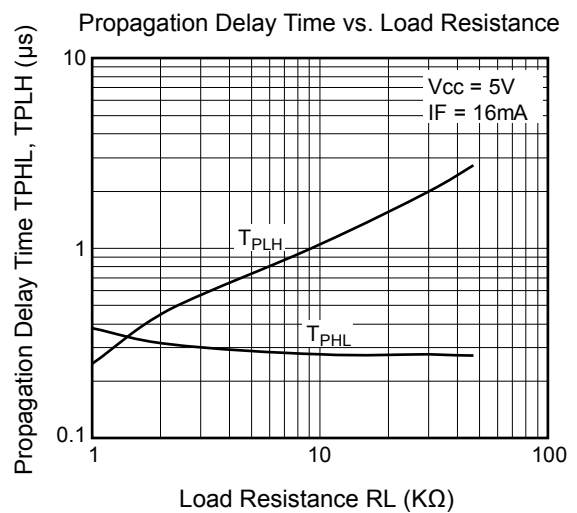
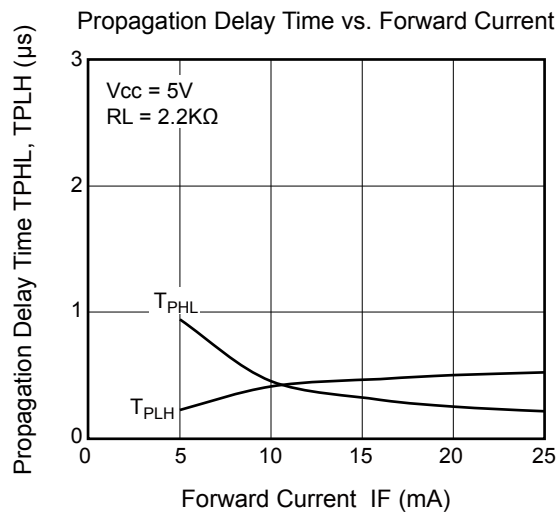
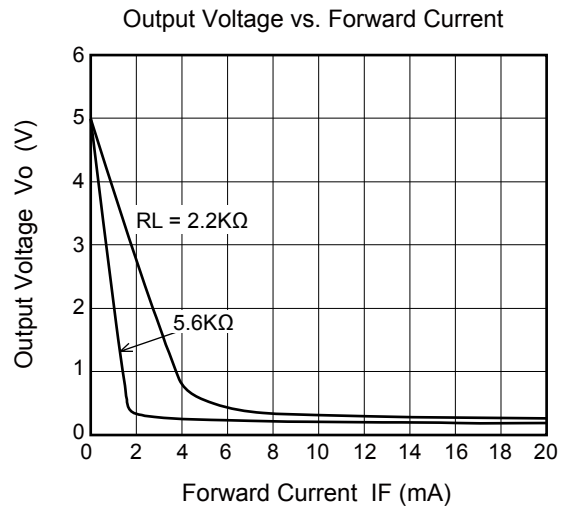
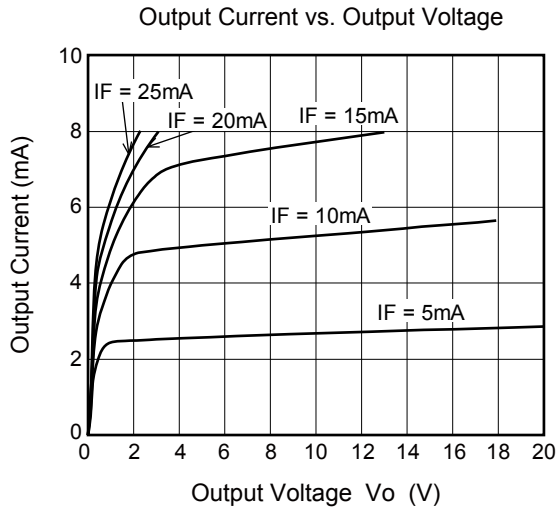
Current Transfer Ratio vs. Forward Current



Current Transfer Ratio

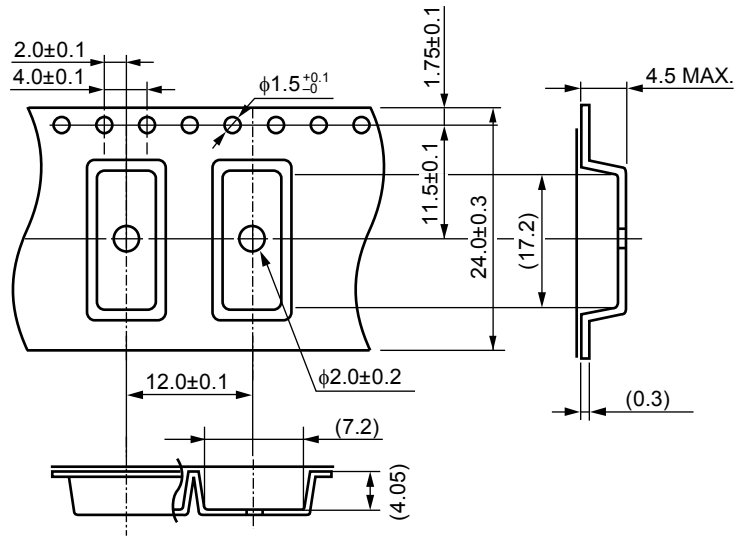


TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

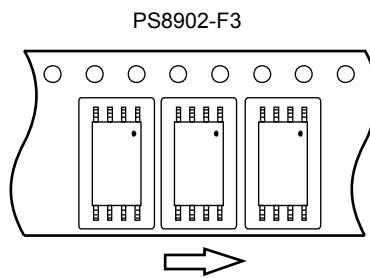


TAPING SPECIFICATIONS (UNIT: mm)

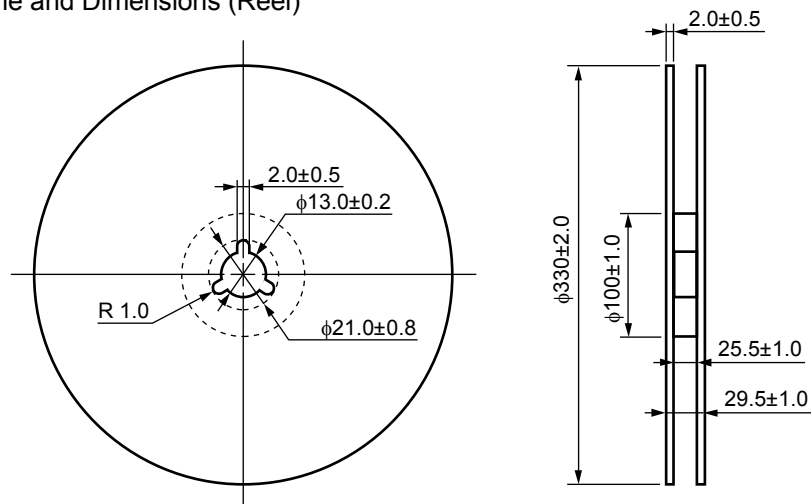
Outline and Dimensions (Tape)



Tape Direction

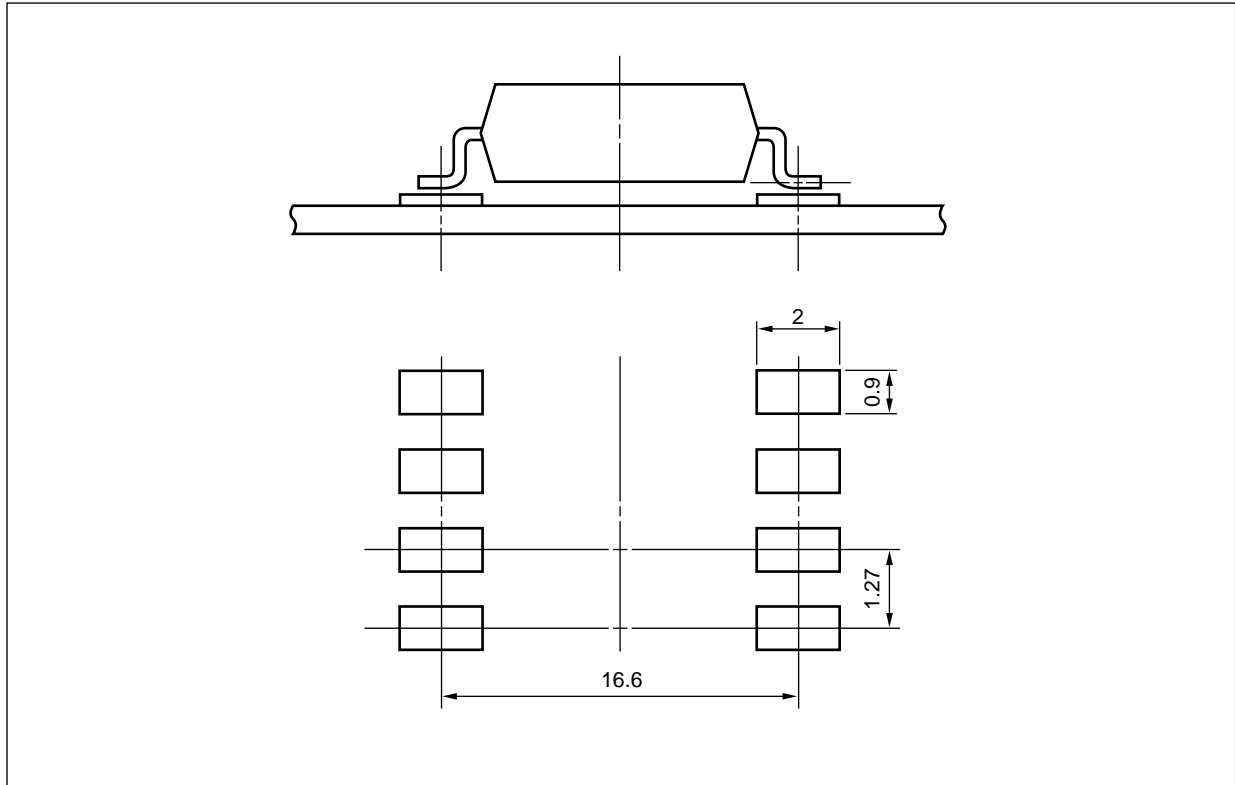


Outline and Dimensions (Reel)



Packing: 1 000 pcs/reel

RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



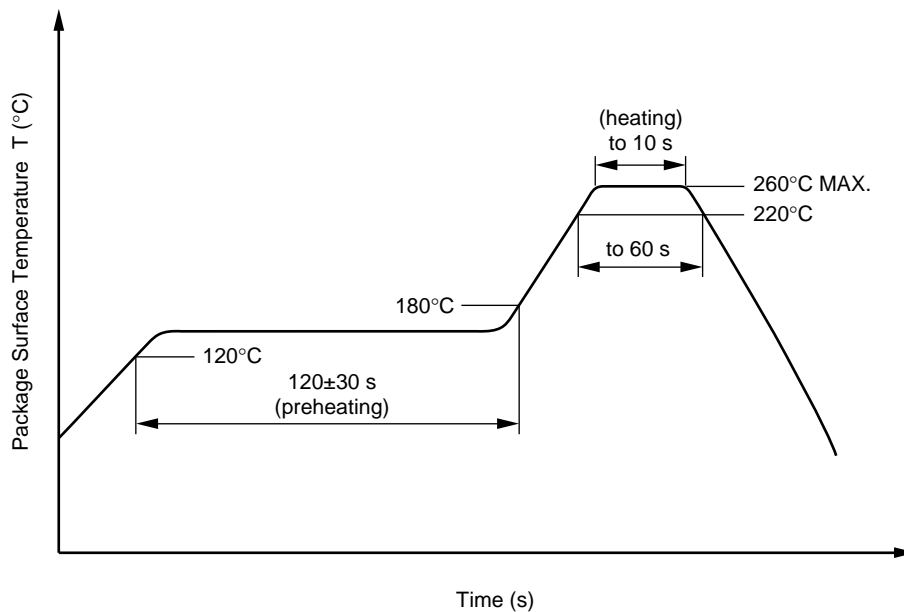
NOTES ON HANDLING

1. Recommended soldering conditions

(1) Infrared reflow soldering

- Peak reflow temperature 260°C or below (package surface temperature)
- Time of peak reflow temperature 10 seconds or less
- Time of temperature higher than 220°C 60 seconds or less
- Time to preheat temperature from 120 to 180°C 120±30 s
- Number of reflows Three
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

Recommended Temperature Profile of Infrared Reflow



(2) Wave soldering

- Temperature 260°C or below (molten solder temperature)
- Time 10 seconds or less
- Preheating conditions 120°C or below (package surface temperature)
- Number of times One (Allowed to be dipped in solder including plastic mold portion.)
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(3) Soldering by Soldering Iron

- Peak Temperature (lead part temperature) 350°C or below
- Time (each pins) 3 seconds or less
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(a) Soldering of leads should be made at the point 1.5 to 2.0 mm from the root of the lead.

(4) Cautions

- Fluxes
 - Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

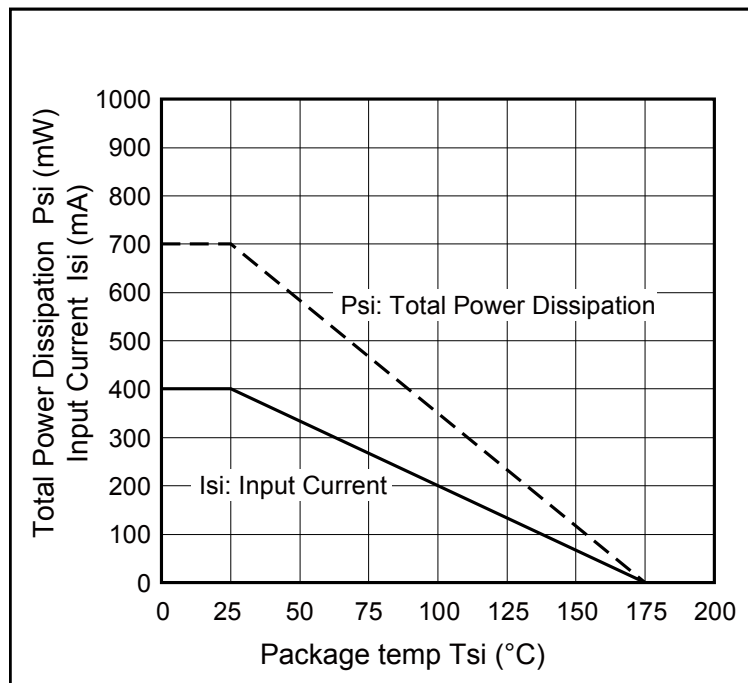
2. Cautions regarding noise

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.

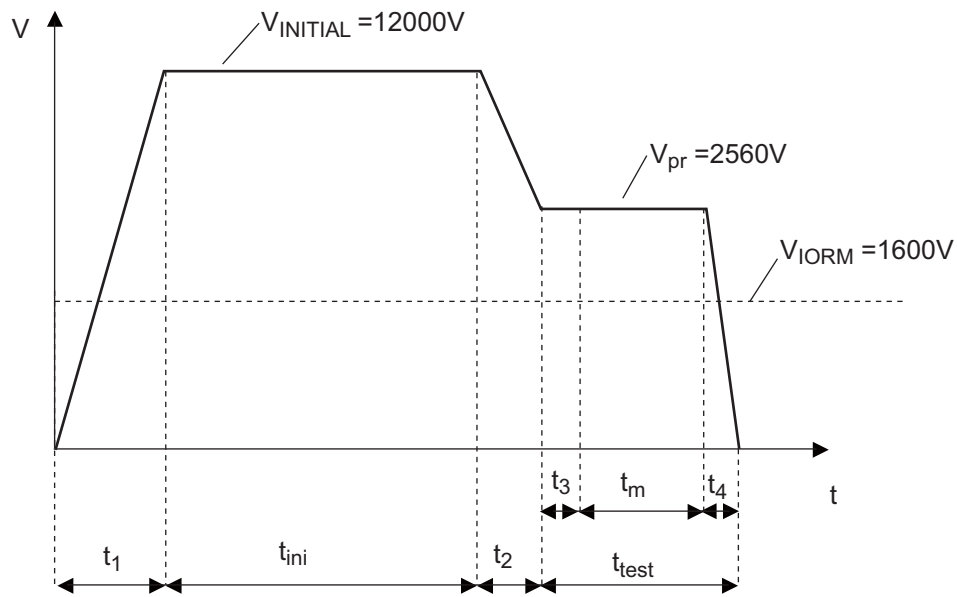
SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Spec.	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		40/110/21	
Dielectric strength maximum operating isolation voltage	U_{IORM}	1 600	V_{peak}
Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.6 \times U_{IORM}, P_d < 5 \text{ pC}$	U_{pr}	2 560	V_{peak}
Test voltage (partial discharge test, procedure b for all devices) $U_{pr} = 1.875 \times U_{IORM}, P_d < 5 \text{ pC}$	U_{pr}	3 000	V_{peak}
Highest permissible overvoltage	U_{TR}	12 000	V_{peak}
Degree of pollution (DIN EN 60664-1 VDE0110 Part 1)		2	
Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303 Part 11))	CTI	175	
Material group (DIN EN 60664-1 VDE0110 Part 1)		III a	
Storage temperature range	T_{stg}	-55 to +125	°C
Operating temperature range	T_A	-40 to +110	°C
Isolation resistance, minimum value $V_{IO} = 500 \text{ V dc at } T_A = 25^\circ\text{C}$	Ris MIN.	10^{12}	Ω
$V_{IO} = 500 \text{ V dc at } T_A \text{ MAX. at least } 100^\circ\text{C}$	Ris MIN.	10^{11}	Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve)			
Package temperature	T_{si}	175	°C
Current (input current I_F , $P_{si} = 0$)	I_{si}	400	mA
Power (output or total power dissipation)	P_{si}	700	mW
Isolation resistance $V_{IO} = 500 \text{ V dc at } T_A = T_{si}$	Ris MIN.	10^9	Ω

Dependence of maximum safety ratings with package temperature

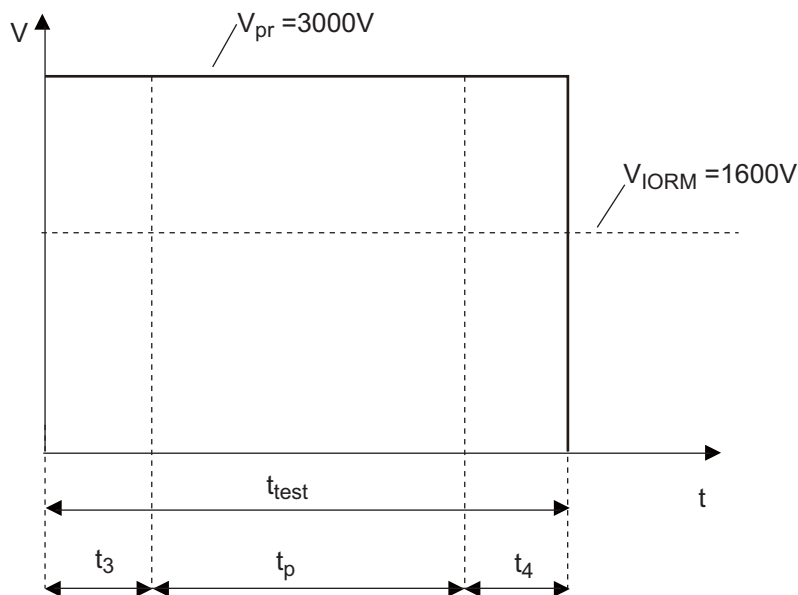


Method a Destructive Test, Type and Sample Test



$t_1, t_2 = 1 \text{ to } 10 \text{ sec}$
 $t_3, t_4 = 1 \text{ sec}$
 $t_m(\text{PARTIAL DISCHARGE}) = 10 \text{ sec}$
 $t_{\text{test}} = 12 \text{ sec}$
 $t_{\text{ini}} = 60 \text{ sec}$

Method b Non-destructive Test, 100% Production Test



$t_3, t_4 = 0.1 \text{ sec}$
 $t_m(\text{PARTIAL DISCHARGE}) = 1.0 \text{ sec}$
 $t_{\text{test}} = 1.2 \text{ sec}$

Caution GaAs Products	<p>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.</p> <ul style="list-style-type: none">• 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. <ol style="list-style-type: none">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. <ul style="list-style-type: none">• 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.
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Revision History	PS8902 Data Sheet
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Rev.	Date	Description	
		Page	Summary
1.00	Aug 24, 2015	-	First edition issued

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