PS8902

1 Mbps HIGH CMR ANALOG OUTPUT TYPE, 8-PIN LSDIP PHOTOCOUPLER
FOR CREEPAGE DISTANCE OF 15 mm

R08DS0128EJ0200
Rev. 2.00
Jun. 30, 2021

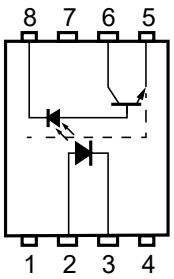
DESCRIPTION

The PS8902 is an optically coupled isolator containing an AlGaAs 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 (15 mm MIN.)
- 8-pin LSDIP (Long Creepage SDIP) type
- High-speed response (tPHL = 0.8 μs MAX., tPLH = 1.2 μs MAX.)
- High common mode transient immunity (CM_H, CM_L = ±15 kV/μs MIN.)
- Embossed tape product: PS8902-Y-F3: 1 000 pcs/reel
- Pb-Free Product
- Safety standards
  - UL approved: UL1577, Double protection
  - CSA approved: CAN/CSA-C22.2 No.62368-1, Reinforced insulation
  - VDE approved: DIN EN 60747-5-5 (Option)

PIN CONNECTION
(Top View)



1. NC
2. Anode
3. Kathode
4. NC
5. GND
6. Vo
7. NC
8. Vcc

APPLICATIONS

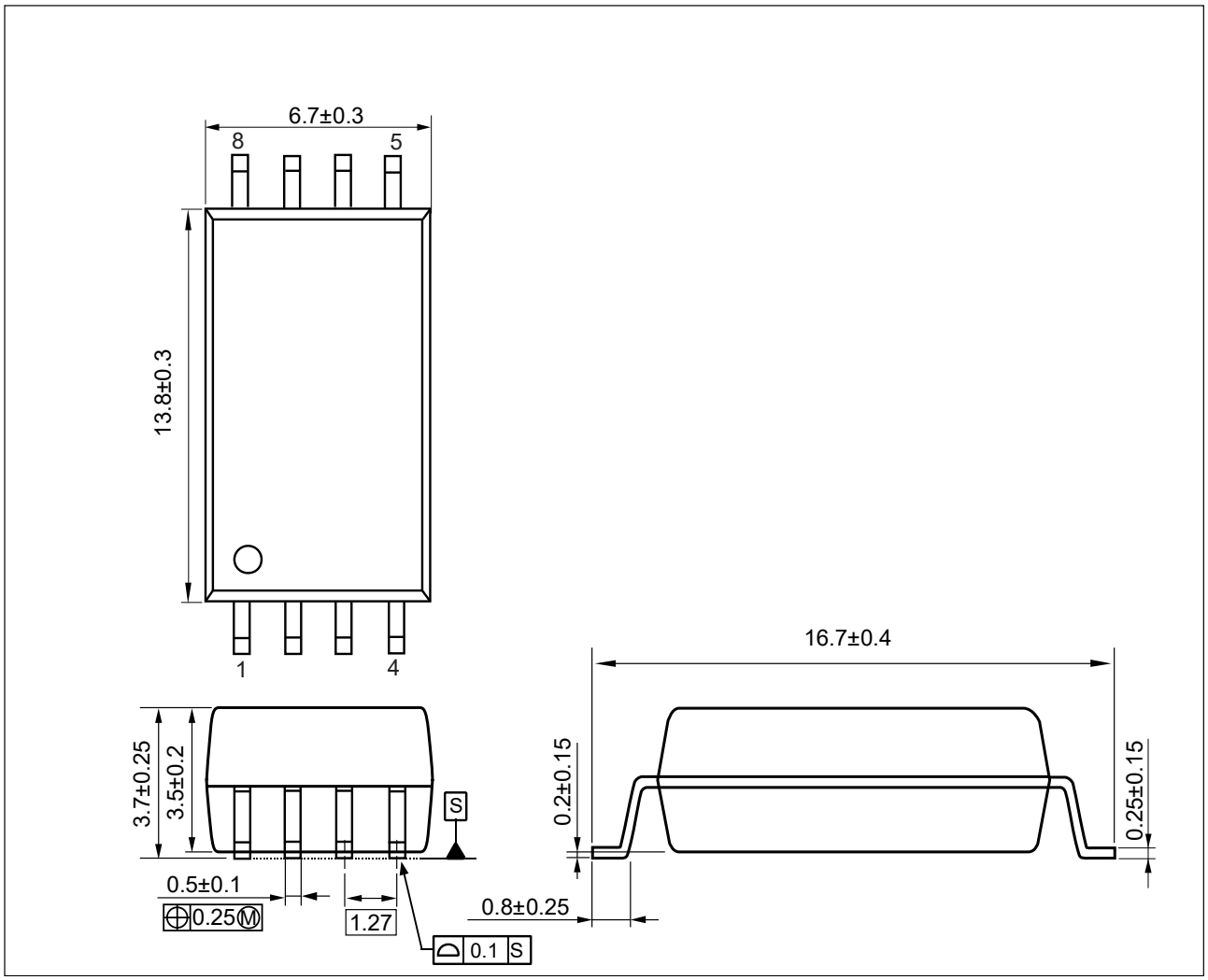
Power supply

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

Start of mass production
Sep.2015

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PACKAGE DIMENSIONS (UNIT: mm)



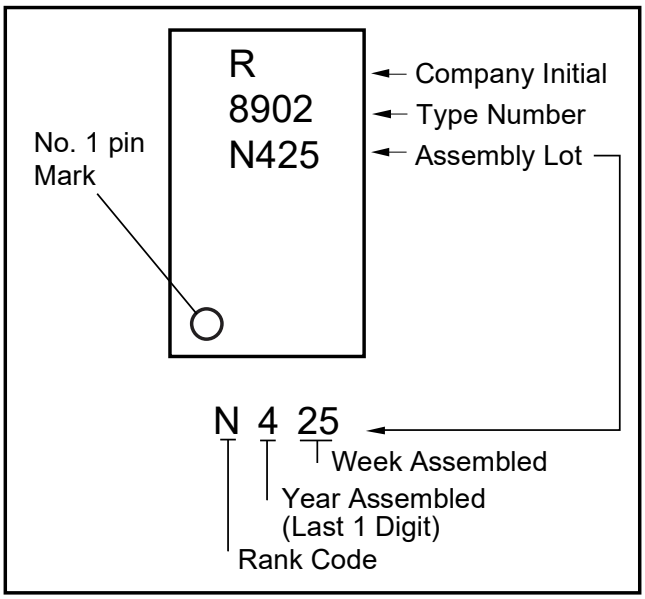
Weight: 0.642g (typ.)

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PHOTOCOUPLER CONSTRUCTION

Parameter	MIN.
Air Distance	14.5 mm
Creepage Distance	15 mm
Isolation Distance	0.4 mm

MARKING EXAMPLE



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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, DIN EN60747-5-5 approved	
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	–55 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.

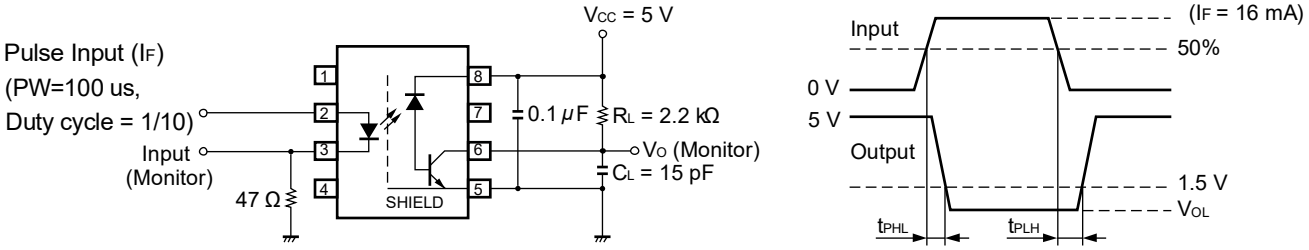
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ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

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	$\Delta V_F/\Delta T_A$	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}, RH = 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,Vo>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, Vo<0.8V	15	-	-	

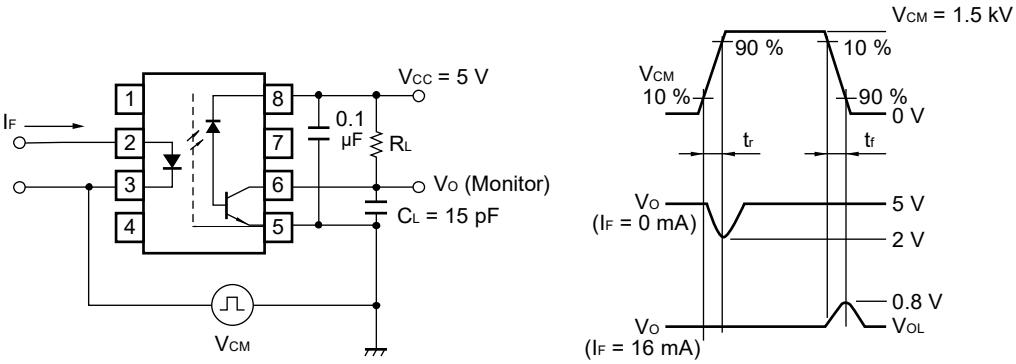
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Notes *1 Test circuit for propagation delay time



Remark C_L is approximately 15 pF which includes probe and stray wiring capacitance.

***2** Test circuit for common mode transient immunity

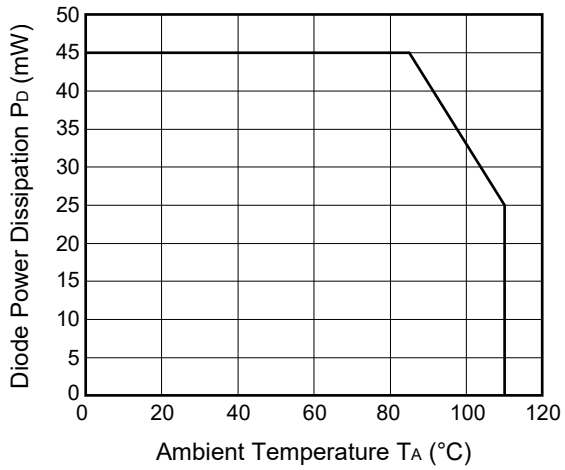


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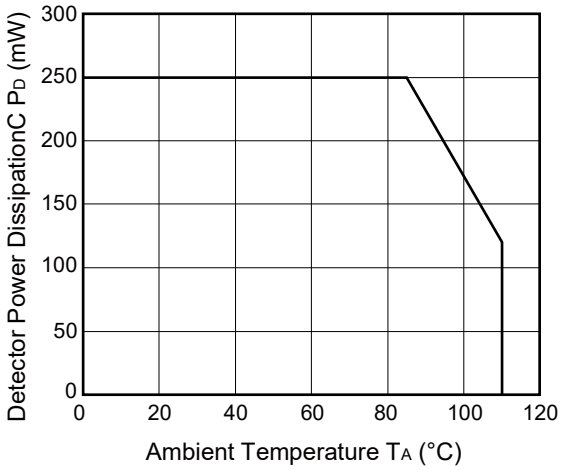
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TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

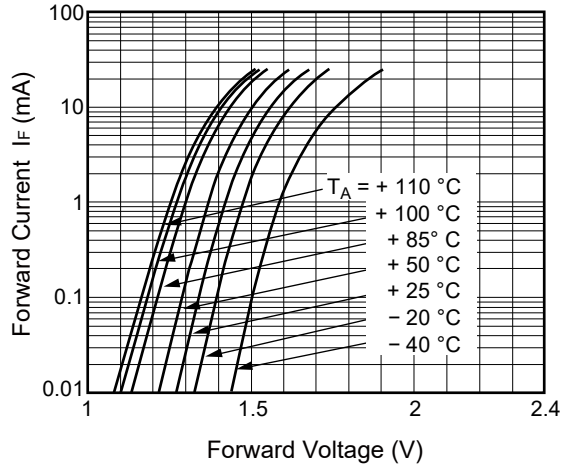
Diode Power Dissipation vs. Ambient Temperature



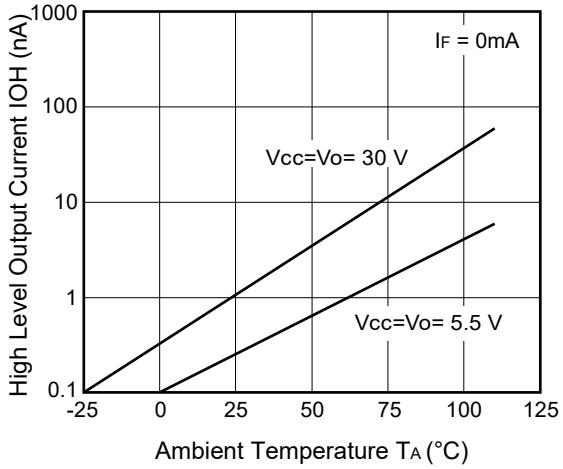
Detector Power Dissipation vs. Ambient Temperature



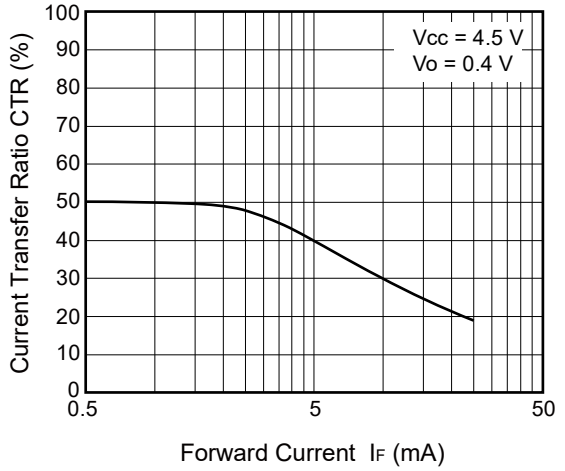
Forward Current vs. Forward Voltage



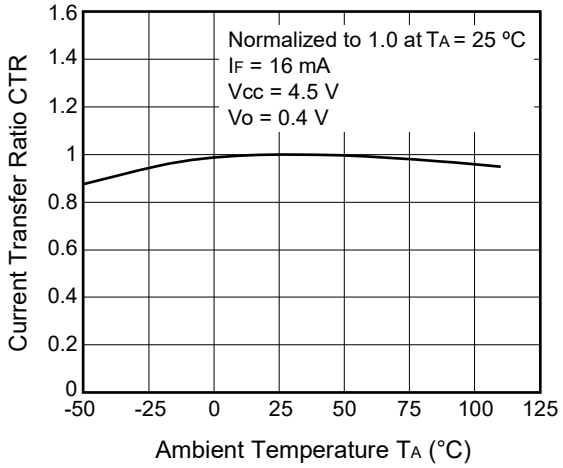
High Level Output Current vs. Ambient Temperature



Current Transfer Ratio vs. Forward Current



Current Transfer Ratio

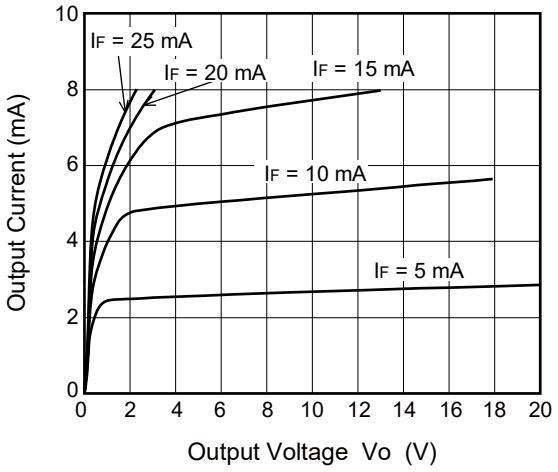


Remark The graphs indicate nominal characteristics.

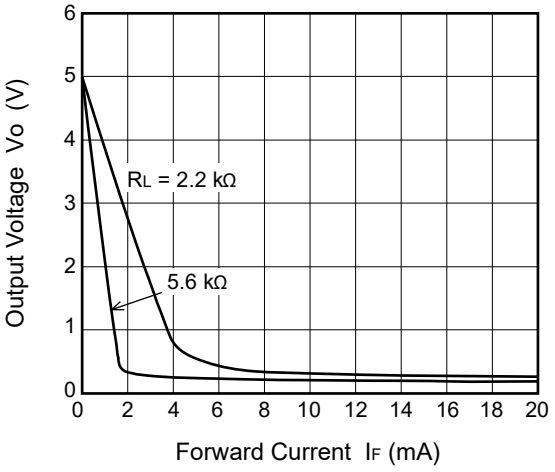
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TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

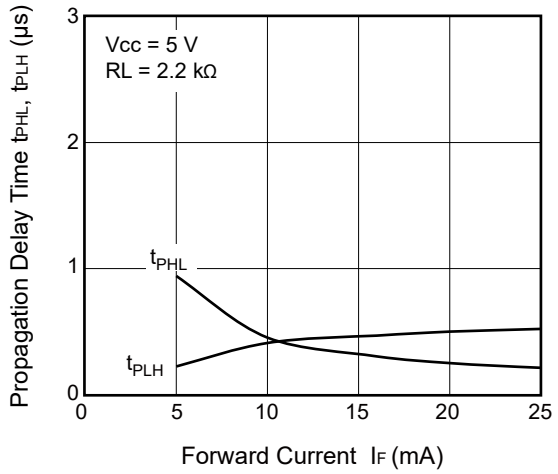
Output Current vs. Output Voltage



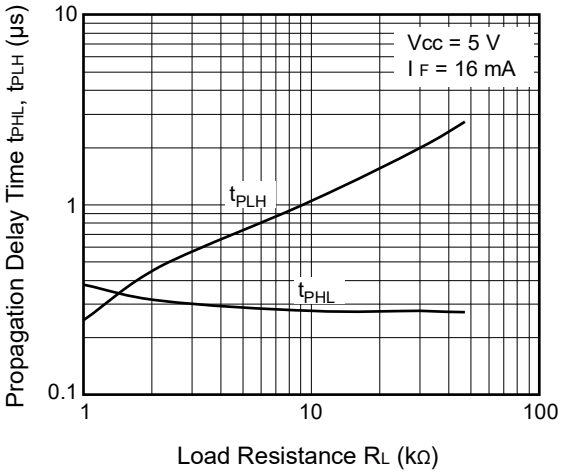
Output Voltage vs. Forward Current



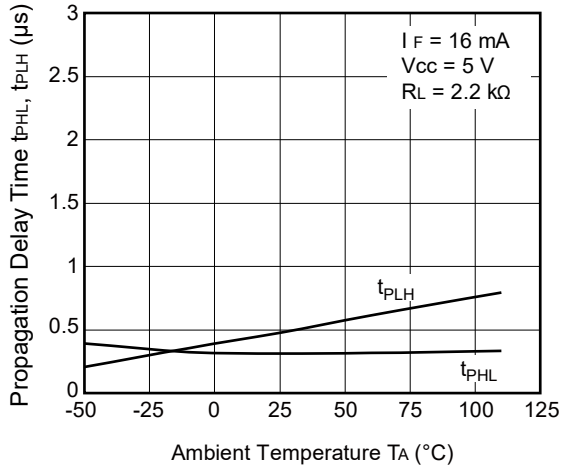
Propagation Delay Time vs. Forward Current



Propagation Delay Time vs. Load Resistance



Propagation Delay Time vs. Ambient Temperature

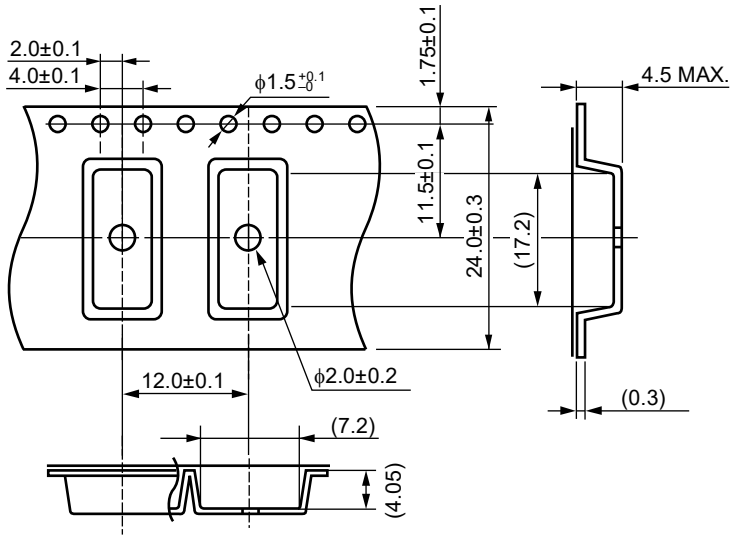


Remark The graphs indicate nominal characteristics.

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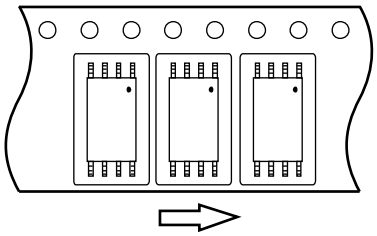
TAPING SPECIFICATIONS (UNIT: mm)

Outline and Dimensions (Tape)

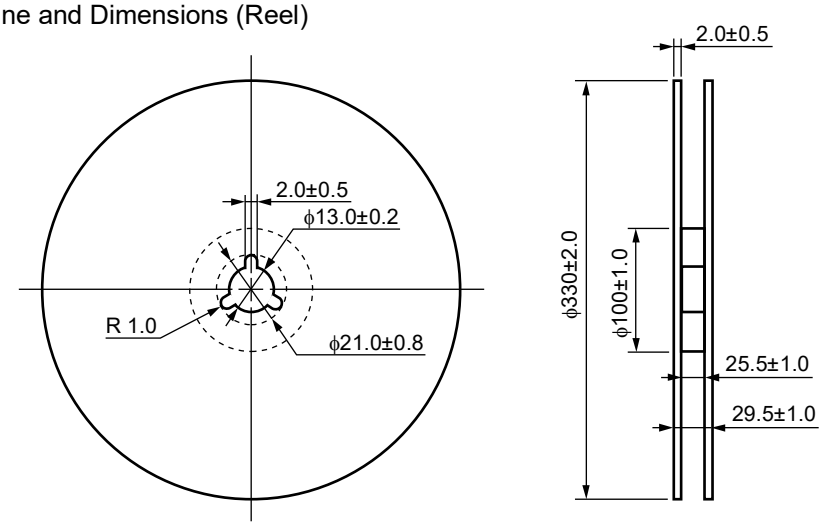


Tape Direction

PS8902-F3



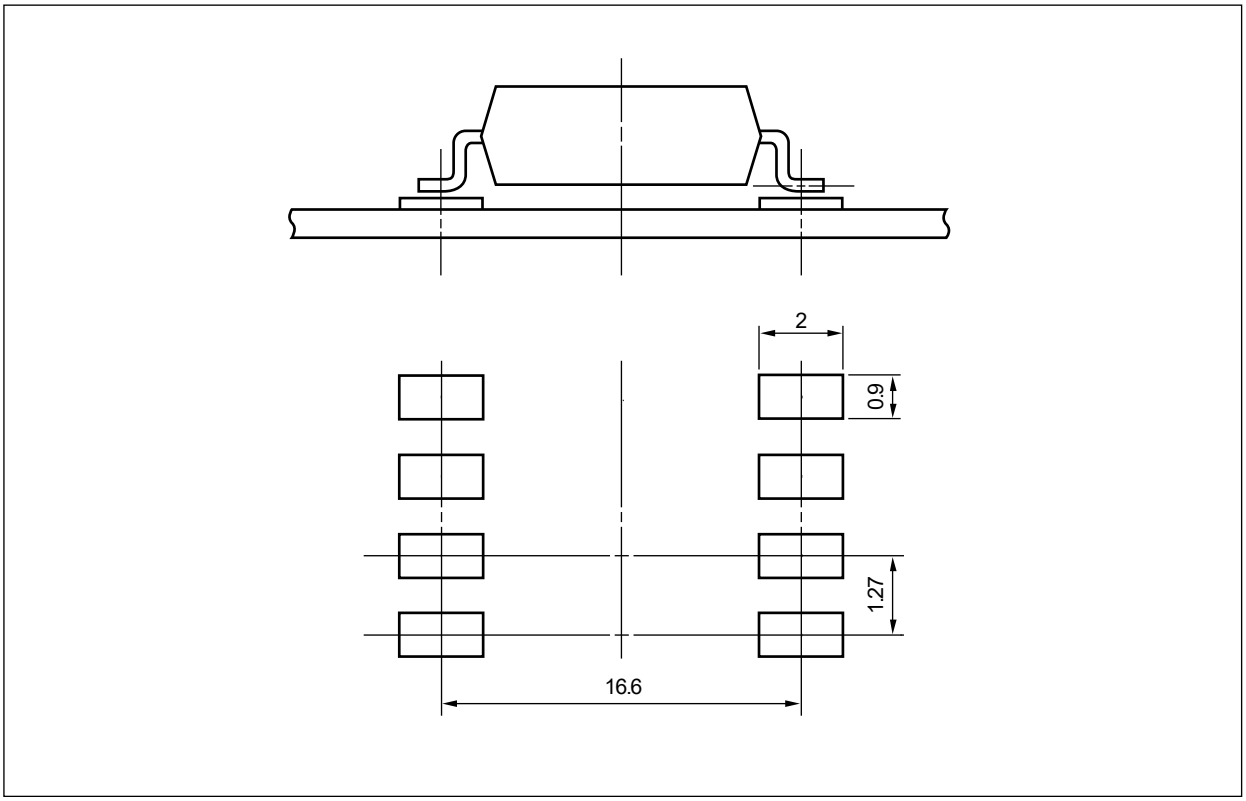
Outline and Dimensions (Reel)



Packing: 1 000 pcs/reel

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RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



【8pin LSDIP】

Remark All dimensions in this figure must be evaluated before use.

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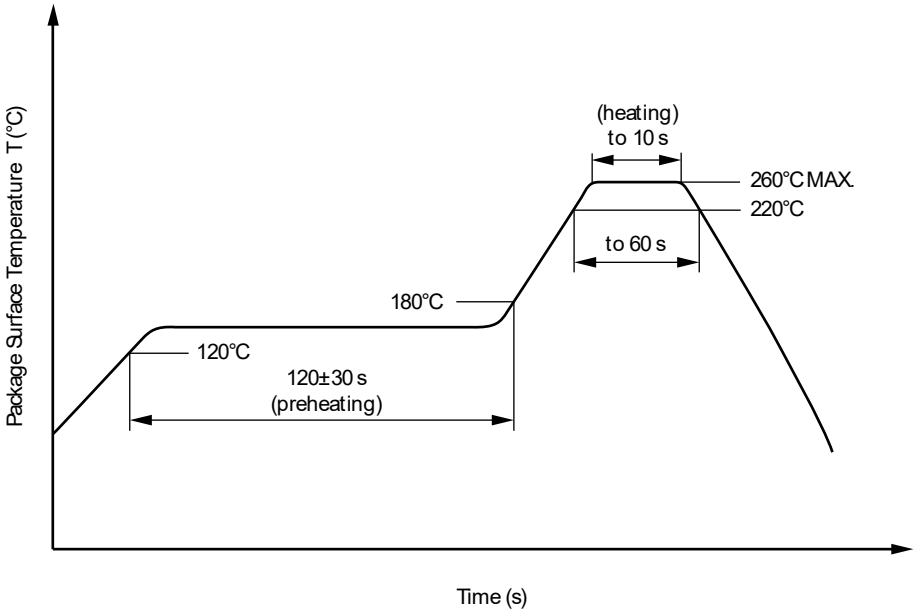
NOTES ON HANDLING

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

(b) Please be sure that the temperature of the package would not be heated over 110 °C

(4) Cautions

- Flux Cleaning
  Avoid cleaning with Freon based or halogen-based (chlorinated etc.) solvents.
- Do not use fixing agents or coatings containing halogen-based substances.

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.

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USAGE CAUTIONS

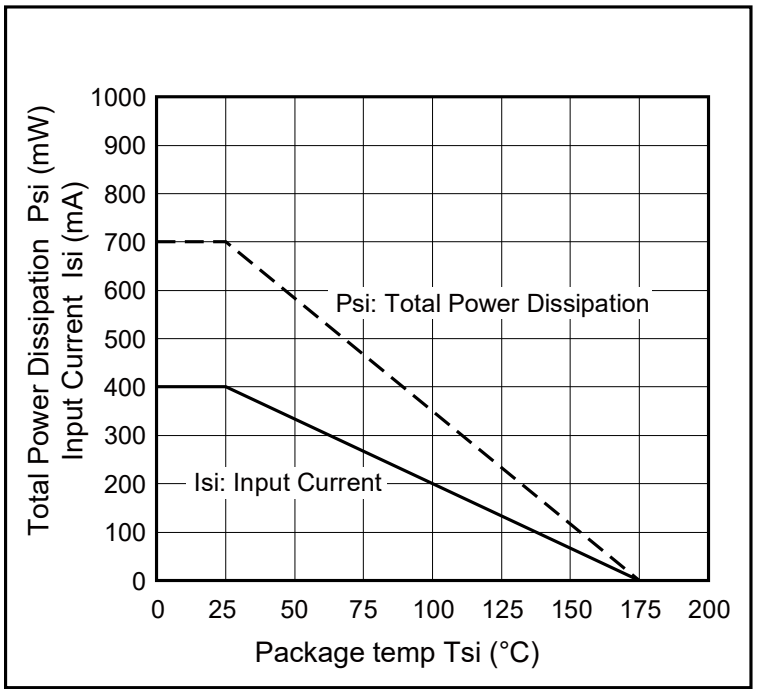
1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of 0.1 μF is used between V_{CC} and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor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

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SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

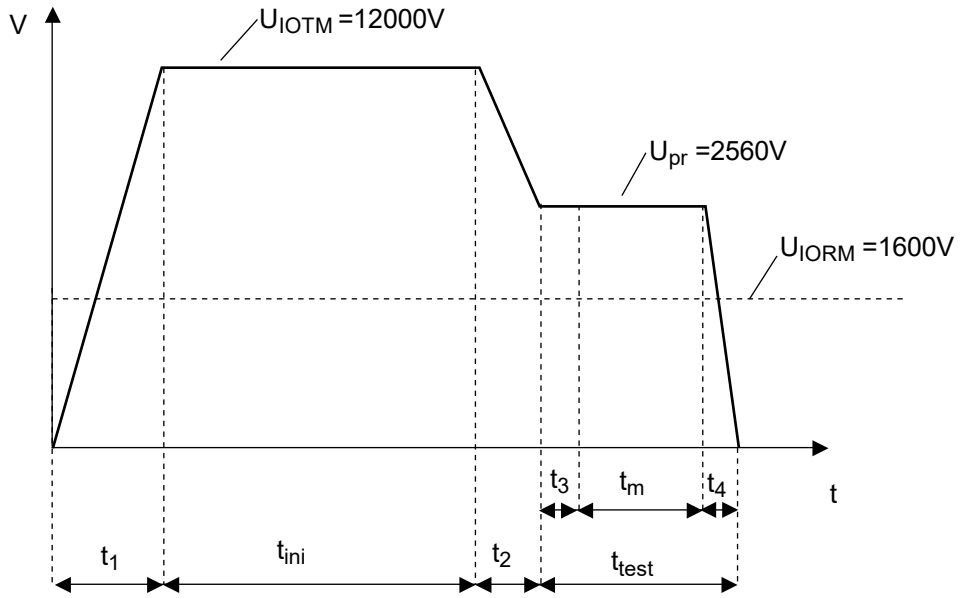
Parameter	Symbol	Rating	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		40/110/21	
Dielectric strength maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) U_{pr} = 1.6 × $U_{IORM.}$, P_d < 5 pC	 U_{IORM} U_{pr}	 1 600 2 560	 V_{peak} V_{peak}
Test voltage (partial discharge test, procedure b for all devices) U_{pr} = 1.875 × $U_{IORM.}$, P_d < 5 pC	U_{pr}	3 000	V_{peak}
Highest permissible overvoltage	U_{IOTM}	12 000	V_{peak}
Degree of pollution (IEC 60664-1/DIN EN 60664-1 (VDE 0110-1))		2	
Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303-11))	CTI	175	
Material group (IEC 60664-1/DIN EN 60664-1 (VDE 0110-1))		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 V dc at T_A = 25 °C V_{IO} = 500 V dc at T_A MAX. at least 100 °C	 Ris MIN. Ris MIN.	 10^{12} 10^{11}	 Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current I_F, Psi = 0) Power (output or total power dissipation) Isolation resistance V_{IO} = 500 V dc at T_A = Tsi	 Tsi Isi Psi Ris MIN.	 175 400 700 10^9	 °C mA mW Ω

Dependence of maximum safety ratings with package temperature



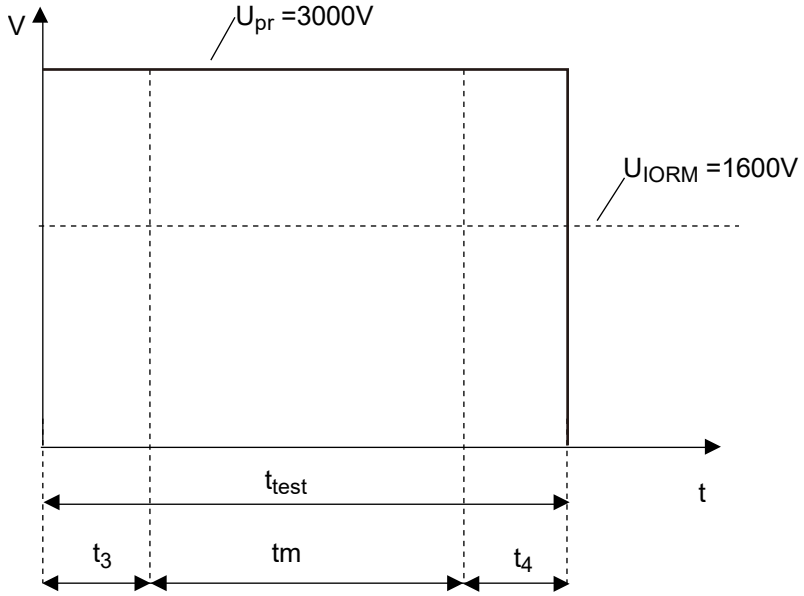
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Method a Destructive Test, Type and Sample Test



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

Method b Non-destructive Test, 100 % Production Test



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

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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.

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