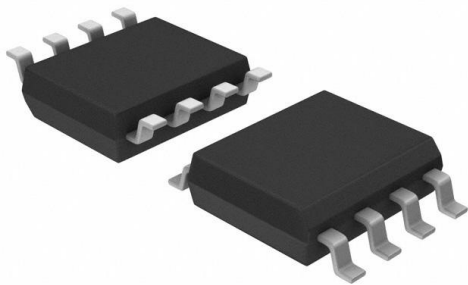


PS9851-1-AX Datasheet

www.digi-electronics.com



<https://www.DiGi-Electronics.com>

DiGi Electronics Part Number	PS9851-1-AX-DG
Manufacturer	CEL
Manufacturer Product Number	PS9851-1-AX
Description	OPTOISO 2.5KV PUSH PULL 8SSOP
Detailed Description	Logic Output Optoisolator 15Mbps Push-Pull, Totem Pole 2500Vrms 1 Channel 10kV/ μ s CMTI 8-SSOP

This model PS9851-1-AX is available at DiGi Electronics.

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Purchase and inquiry

Manufacturer Product Number:

PS9851-1-AX

Series:

NEPOC

Number of Channels:

1

Voltage - Isolation:

2500Vrms

Input Type:

DC

Current - Output / Channel:

2 mA

Propagation Delay tpLH / tpHL (Max):

60ns, 60ns

Voltage - Forward (Vf) (Typ):

1.6V

Voltage - Supply:

4.5V ~ 5.5V

Mounting Type:

Surface Mount

Supplier Device Package:

8-SSOP

Manufacturer:

CEL

Product Status:

Discontinued at Digi-Key

Inputs - Side 1/Side 2:

1/0

Common Mode Transient Immunity (Min):

10kV/ μ s

Output Type:

Push-Pull, Totem Pole

Data Rate:

15Mbps

Rise / Fall Time (Typ):

4ns, 4ns

Current - DC Forward (If) (Max):

20mA

Operating Temperature:

-40°C ~ 100°C

Package / Case:

8-SOIC (0.154", 3.90mm Width)

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.49.8000

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

PS9851-1, PS9851-2

R08DS0107EJ0400

Rev4.00

Apr 09, 2013

HIGH NOISE REDUCTION, 15 Mbps CMOS OUTPUT TYPE
8-PIN SSOP (SO-8) HIGH-SPEED PHOTOCOUPLER

DESCRIPTION

The PS9851-1, PS9851-2 are optically coupled isolators containing GaAlAs LED on the input side and a CMOS output IC on the output side.

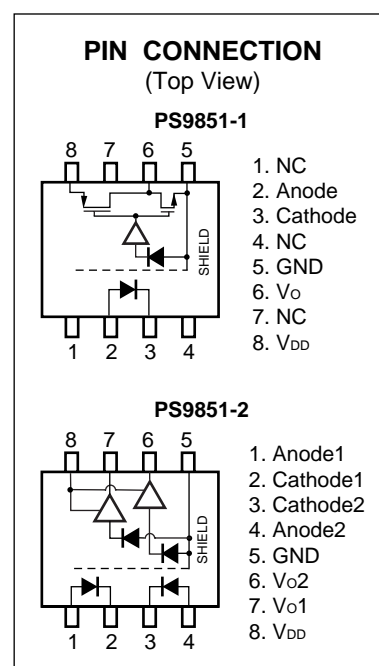
They are high common mode transient immunity (CMR), high-speed CMOS output type photocouplers designed for high-speed logic interface circuits.

FEATURES

- High-speed response (15 Mbps)
- Operable at high temperature (-40 to $+100^{\circ}\text{C}$)
- High common mode transient immunity ($\text{CM}_{\text{H}}, \text{CM}_{\text{L}} = \pm 20 \text{ kV}/\mu\text{s}$ TYP.)
- High isolation voltage ($\text{BV} = 2\,500 \text{ V}_{\text{r.m.s.}}$)
- Pulse width distortion ($|\text{t}_{\text{PHL}} - \text{t}_{\text{PLH}}| = 3 \text{ ns}$ TYP.)
- Ordering number of tape product : PS9851-1-F3: 1 500 pcs/reel
- : PS9851-2-F3: 1 500 pcs/reel
- Pb-Free product
- <R> • Safety standards
 - UL approved: No. E72422
 - DIN EN 60747-5-5 (VDE 0884-5) approved (Option)

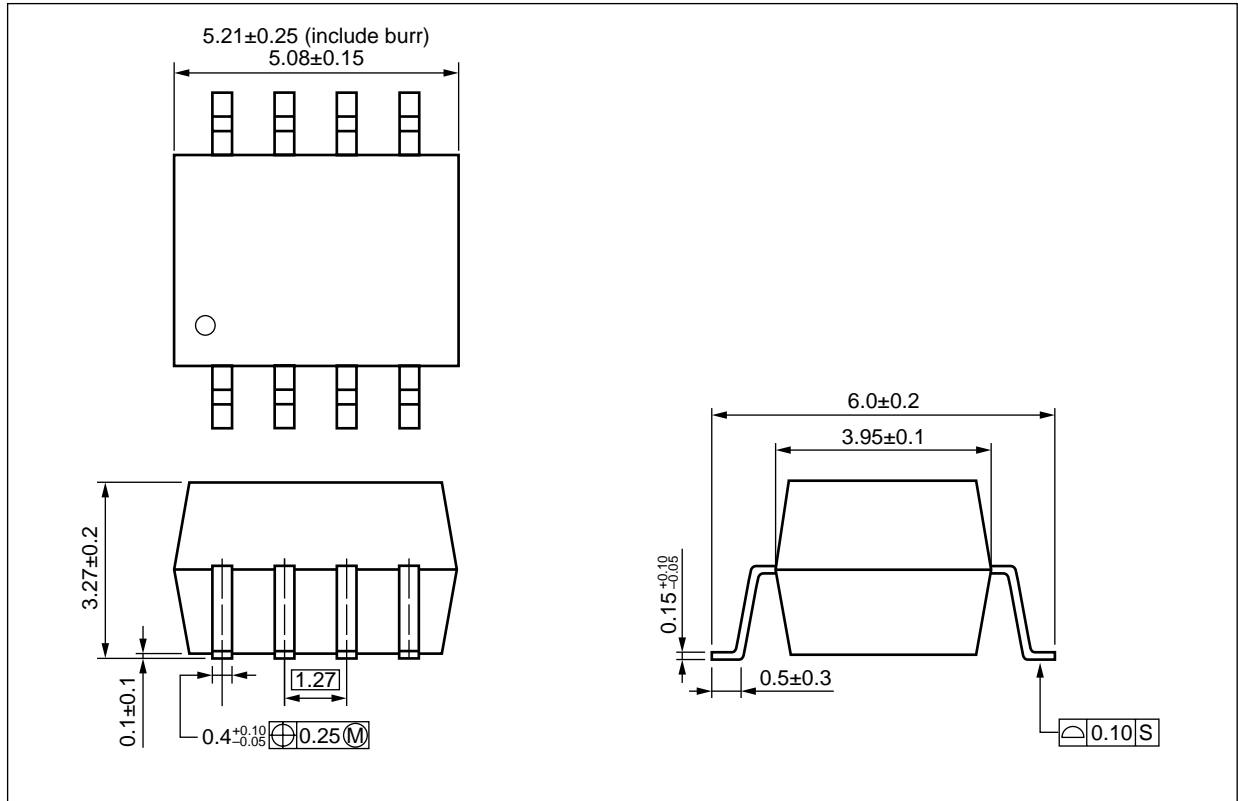
APPLICATIONS

- FA Network
- Measurement equipment
- PDP



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.

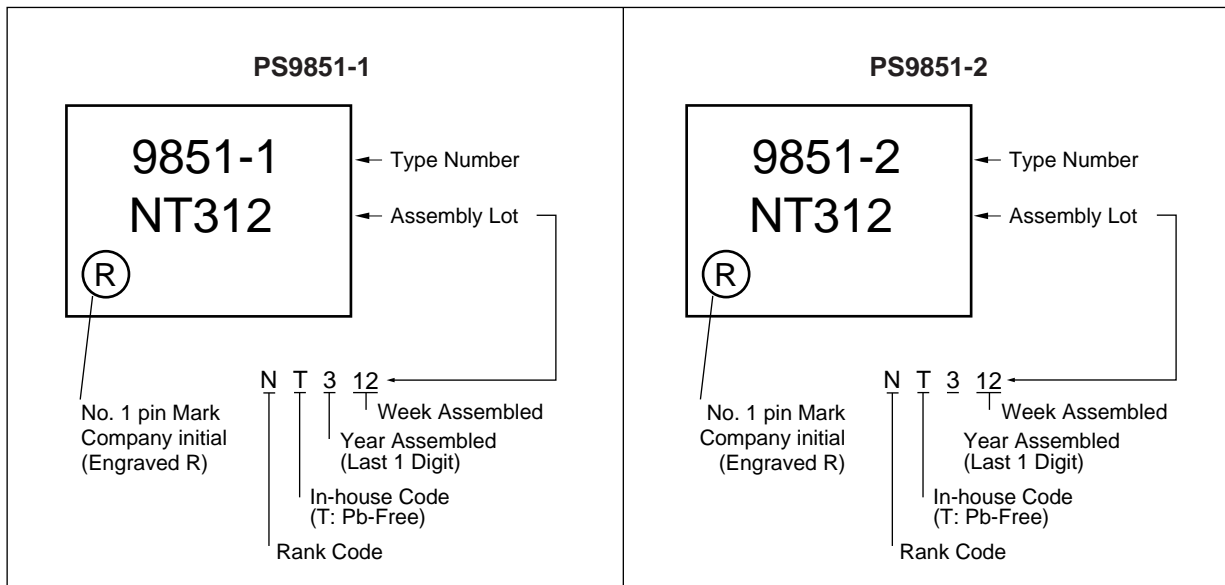
PS9851-1, PS9851-2**PACKAGE DIMENSIONS (UNIT: mm)****<R> PHOTOCOUPLER CONSTRUCTION**

Parameter	Unit (MIN.)
Air Distance	4.0 mm
Outer Creepage Distance	4.0 mm
Isolation Distance	0.2 mm

PS9851-1, PS9851-2

<R> **MARKING EXAMPLE**

Ni/Pd/Au PLATING



PS9851-1, PS9851-2**<R> ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number ^{*1}
PS9851-1	PS9851-1-AX	Pb-Free (Ni/Pd/Au)	20 pcs (Tape 20 pcs cut)	Standard products (UL approved)	PS9851-1
PS9851-1-F3	PS9851-1-F3-AX		Embossed Tape 1 500 pcs/reel		
PS9851-2	PS9851-2-AX		20 pcs (Tape 20 pcs cut)		PS9851-2
PS9851-2-F3	PS9851-2-F3-AX		Embossed Tape 1 500 pcs/reel		
PS9851-1-V	PS9851-1-V-AX		20 pcs (Tape 20 pcs cut)	DIN EN 60747-5-5 (VDE 0884-5)	PS9851-1
PS9851-1-V-F3	PS9851-1-V-F3-AX		Embossed Tape 1 500 pcs/reel		
PS9851-2-V	PS9851-2-V-AX		20 pcs (Tape 20 pcs cut)	approved(Optional)	PS9851-2
PS9851-2-V-F3	PS9851-2-V-F3-AX		Embossed Tape 1 500 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	20	mA
	Reverse Voltage	V _R	5	V
Detector	Supply Voltage	V _{DD}	0 to 5.5	V
	Output Voltage	V _O	-0.5 to V _{DD} +0.5	V
	Output Current	I _O	2	mA
Isolation Voltage ^{*2}		BV	2 500	Vr.m.s.
Operating Ambient Temperature		T _A	-40 to +100	°C
Storage Temperature		T _{stg}	-55 to +125	°C

Notes: *1. Reduced to 0.33 mA/°C at T_A = 85°C or more for PS9851-2.

*2. 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 (T_A = 25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Forward Current	I _F	10		16	mA
Supply Voltage	V _{DD}	4.5	5.0	5.5	V

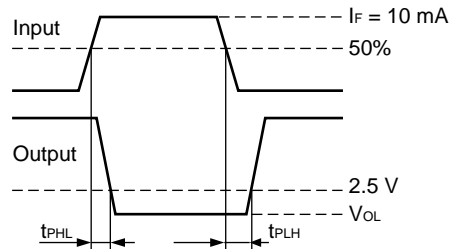
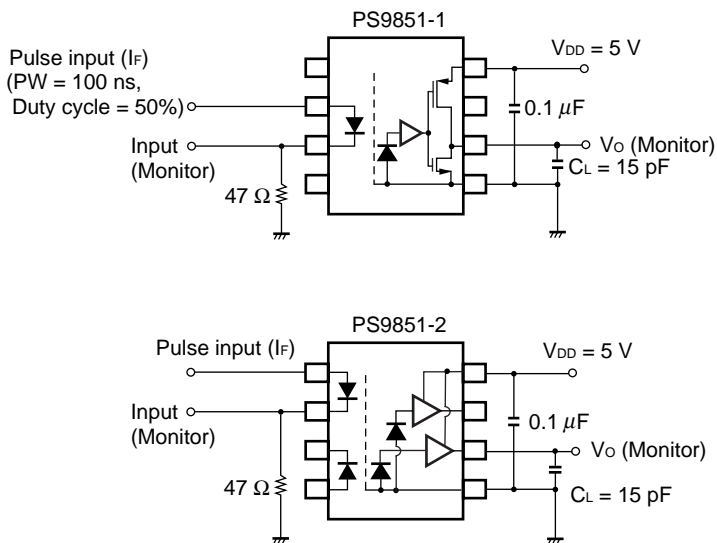
PS9851-1, PS9851-2

<R> **ELECTRICAL CHARACTERISTICS ($T_A = -40$ to $+100^\circ\text{C}$, $V_{DD} = 4.5$ to 5.5 V, unless otherwise specified)**

	Parameter	Symbol	Conditions	MIN.	TYP.*1	MAX.	Unit		
Diode	Forward Voltage	V_F	$I_F = 10 \text{ mA}$, $T_A = 25^\circ\text{C}$		1.6	1.9	V		
	Reverse Current	I_R	$V_R = 3 \text{ V}$, $T_A = 25^\circ\text{C}$			10	μA		
	Terminal Capacitance	C_t	$V = 0 \text{ V}$, $f = 1 \text{ MHz}$, $T_A = 25^\circ\text{C}$		30		pF		
Detector	High Level Supply Current	I_{DDH}	$I_F = 0 \text{ mA}$ (1ch)		2.5	5	mA/ch		
	Low Level Supply Current	I_{DDL}	$I_F = 10 \text{ mA}$ (1ch)		2	5			
	High Level Output Voltage	V_{OH}	$I_O = -20 \mu\text{A}$, $I_F = 0 \text{ mA}$	4.0	5.0		V		
	Low Level Output Voltage	V_{OL}	$I_O = 20 \mu\text{A}$, $I_F = 10 \text{ mA}$		0	0.1			
Coupled	Threshold Input Voltage	I_{FHL}	$V_O < 1 \text{ V}$		2.8	6	mA		
	Isolation Resistance	R_{I-O}	$V_{I-O} = 1 \text{ kV}_{DC}$, $RH = 40$ to 60% , $T_A = 25^\circ\text{C}$	10^{11}			Ω		
	Isolation Capacitance	C_{I-O}	$V = 0 \text{ V}$, $f = 1 \text{ MHz}$, $T_A = 25^\circ\text{C}$		0.6		pF		
	Propagation Delay Time (H \rightarrow L) ^{*2}	t_{PHL}	$I_F = 10 \text{ mA}$, $V_{DD} = 5 \text{ V}$, $C_L = 15 \text{ pF}$, CMOS Levels		34	60	ns		
	Propagation Delay Time (L \rightarrow H) ^{*2}	t_{PLH}			37	60			
	Pulse Width Distortion (PWD) ^{*2}	$ t_{PHL} - t_{PLH} $			3	30			
	Propagation Delay Skew	t_{PSK}				40			
	Rise Time	t_r			4				
	Fall Time	t_f			4				
	Common Mode Transient Immunity at High Level Output ^{*3}	$ CM_H $		$V_{DD} = 5 \text{ V}$, $I_F = 0 \text{ mA}$, $V_{CM} = 1 \text{ kV}$, $V_O > 4 \text{ V}$, $T_A = 25^\circ\text{C}$	10	20			kV/ μs
	Common Mode Transient Immunity at Low Level Output ^{*3}	$ CM_L $		$V_{DD} = 5 \text{ V}$, $I_F = 10 \text{ mA}$, $V_{CM} = 1 \text{ kV}$, $V_O < 1 \text{ V}$, $T_A = 25^\circ\text{C}$	10	20			

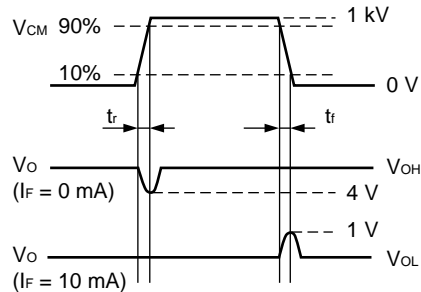
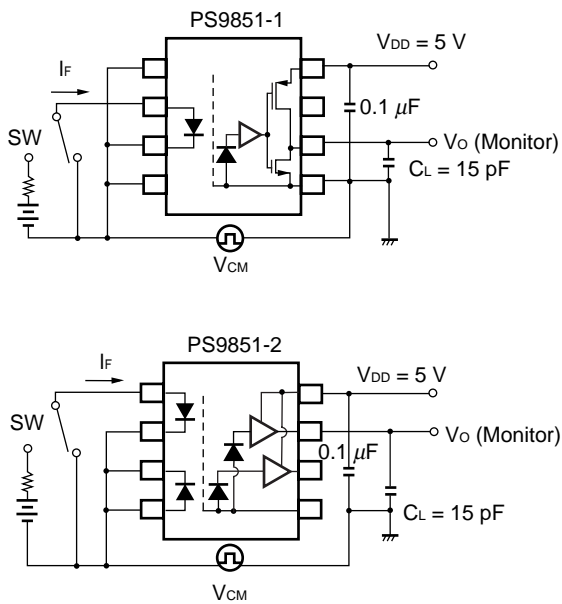
PS9851-1, PS9851-2

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.

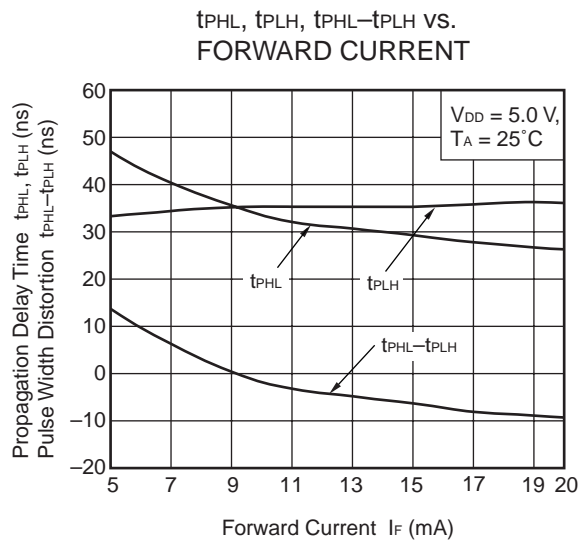
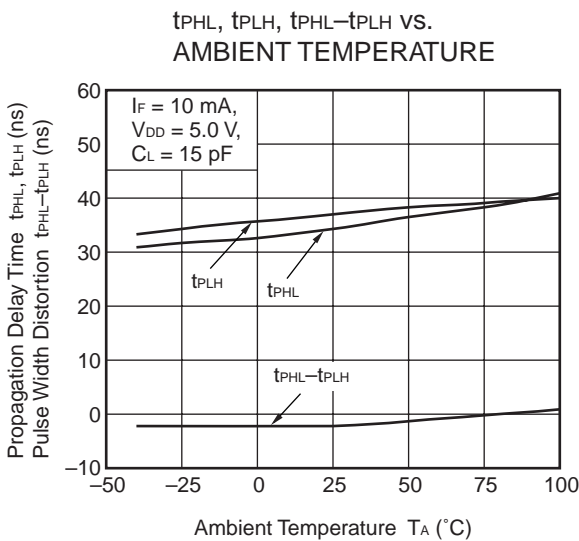
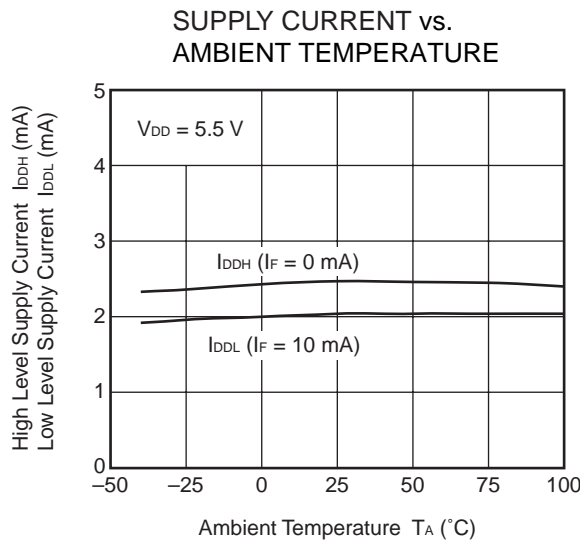
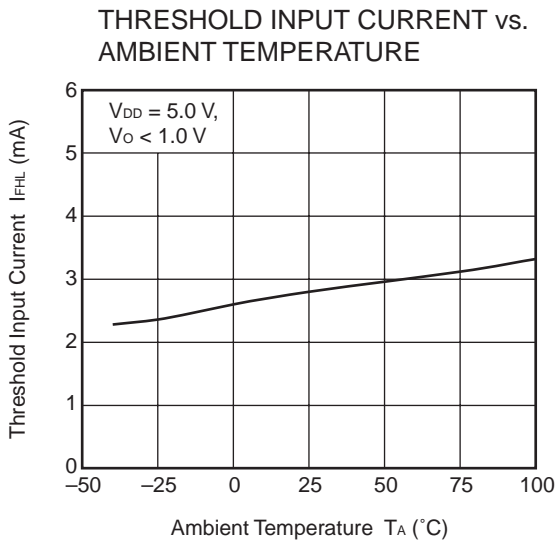
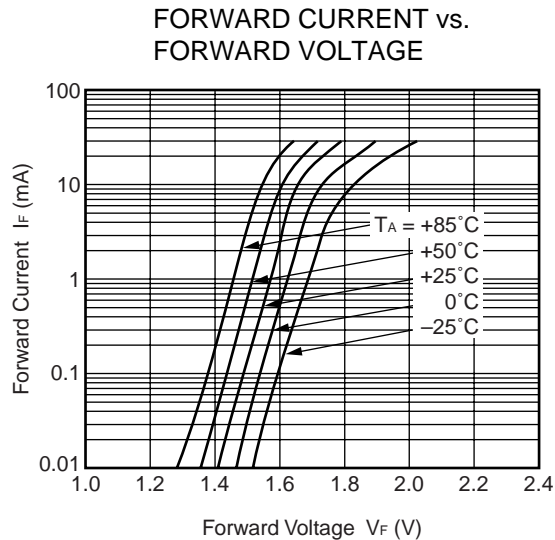
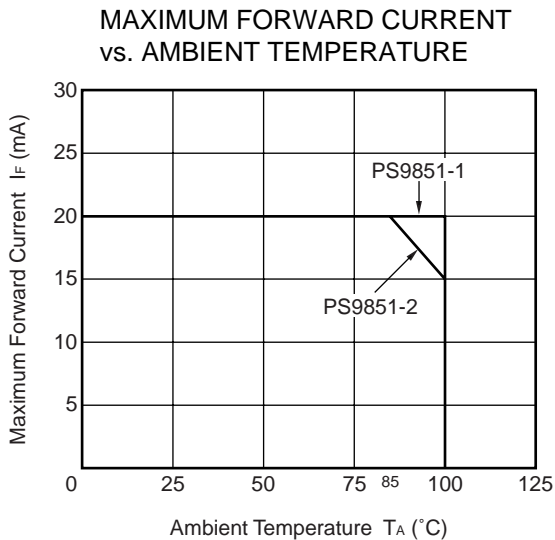
Notes: * 3 Test circuit for common mode transient immunity



Remark C_L includes probe and stray wiring capacitance.

PS9851-1, PS9851-2

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

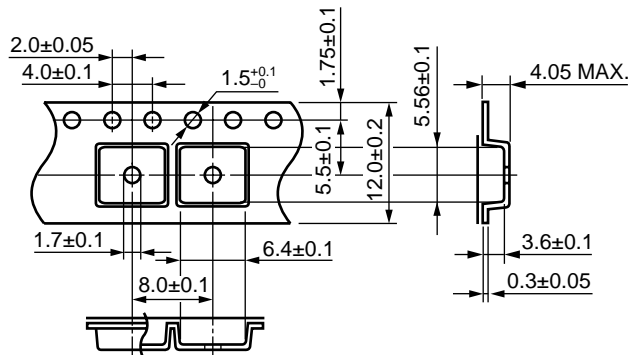


Remark The graphs indicate nominal characteristics.

PS9851-1, PS9851-2

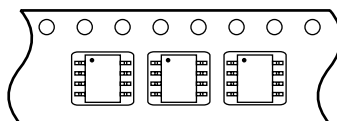
<R> TAPING SPECIFICATIONS (UNIT: mm)

Outline and Dimensions (Tape)

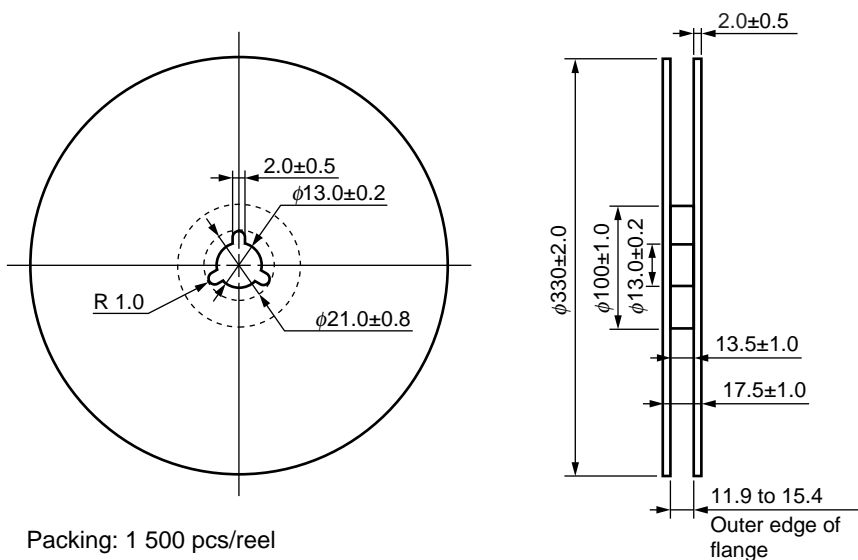


Taping Direction

PS9851-1-F3
PS9851-2-F3

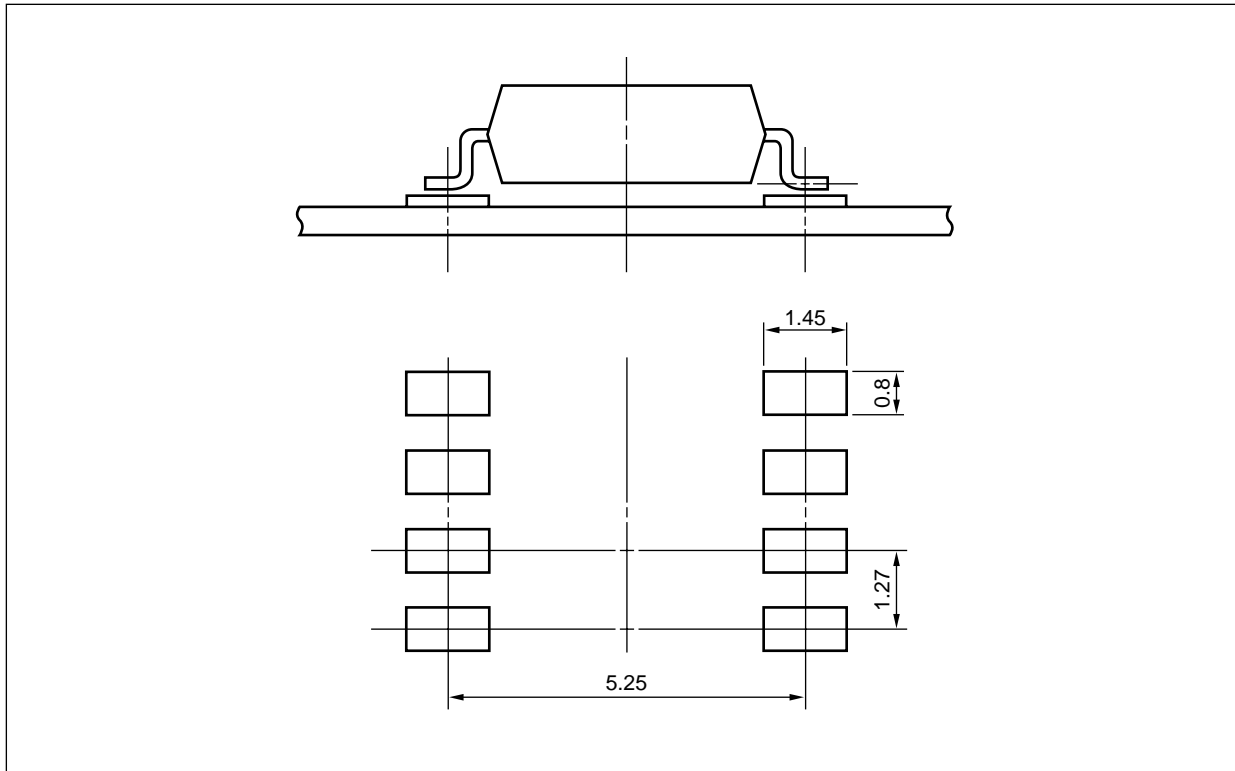


Outline and Dimensions (Reel)



Packing: 1 500 pcs/reel

RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



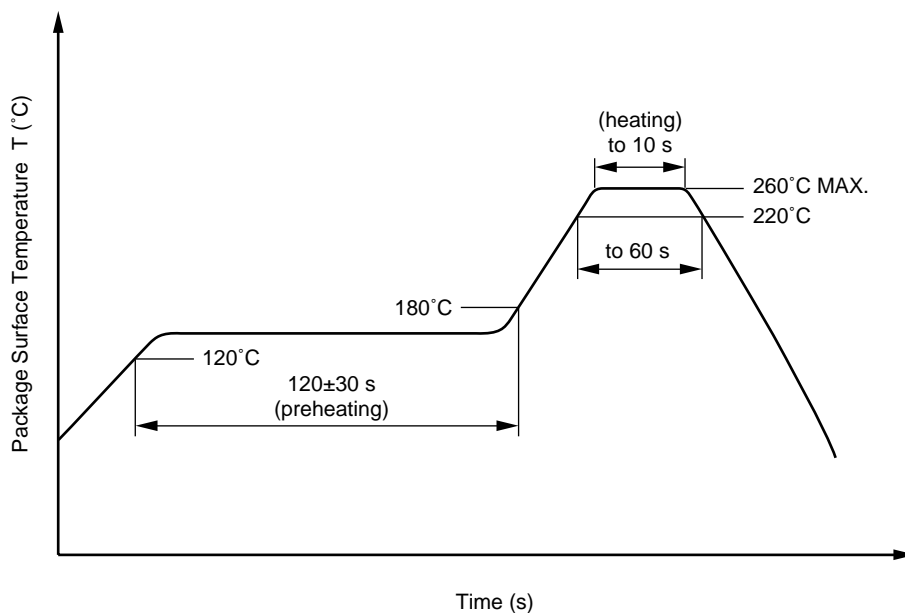
PS9851-1, PS9851-2**<R> NOTES ON HANDLING**

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 pin) 3 seconds or less
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% or less 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 CMOS IC on output side may enter the on state, even if the voltage is within the absolute maximum ratings.

PS9851-1, PS9851-2

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 VDD and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor is no more than 10 mm.
- <R> 3. When V_{DD} is lower than around 2 V, the output(V_{o}) of this product is unstable, and this might produce undesirable operation. Be sure to check the operation of an IC or a discrete component that is connected to this product during Power-up and Power-down process. And we recommend to use a disable function (shutdown function) of the connected IC or a reset IC to avoid this undesirable operation.
4. Avoid storage at a high temperature and high humidity.

PS9851-1, PS9851-2

<R> SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Spec.	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		40/100/21	
Dielectric strength maximum operating isolation voltage 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_{IORM} U_{pr}	566 905	V_{peak} 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}	1 061	V_{peak}
Highest permissible overvoltage	U_{TR}	4 000	V_{peak}
Degree of pollution (DIN EN 60664-1 VDE0110 Part 1)		2	
Comparative tracking index (IEC 60112/DIN EN 60112(VDE 0303 Part11)	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 +100	°C
Isolation resistance, minimum value $V_{IO} = 500 \text{ V dc at } T_A = 25^\circ\text{C}$ $V_{IO} = 500 \text{ V dc at } T_A \text{ MAX. at least } 100^\circ\text{C}$	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 , $P_{si} = 0$) Power (output or total power dissipation) Isolation resistance $V_{IO} = 500 \text{ V dc at } T_A = T_{si}$	T_{si} I_{si} P_{si} Ris MIN.	150 150 600 10^9	°C mA mW Ω

PS9851-1, PS9851-2

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.• 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	PS9851-1, PS9851-2 Data Sheet
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Rev.	Date	Description	
		Page	Summary
1.00	Jun 21, 2004	–	First edition issued
2.00	Aug 22, 2008	–	Second edition issued
3.00	Aug 27, 2008	–	Third edition issued
4.00	Apr 09, 2013	Throughout	Renesas format is applied to this data sheet.
		p.1	Modification of FEATURES
		p.2	Addition of PHOTOCOUPLER CONSTRUCTION
		p.3	Modification of MARKING EXAMPLE
		p.4	Modification of ORDERING INFORMATION
		pp.5, 6	Modification of ELECTRICAL CHARACTERISTICS
		p.8	Modification of TAPING SPECIFICATIONS
		pp.10, 11	Modification of NOTES ON HANDLING
		p.12	Modification of SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

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California Eastern Laboratories, Inc.
 4590 Patrick Henry Drive, Santa Clara, California 95054, U.S.A.
 Tel: +1-408-919-2500, Fax: +1-408-988-0279

Renesas Electronics Europe Limited
 Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
 Tel: +44-1628-651-700, Fax: +44-1628-651-804

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.
 80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre Singapore 339949
 Tel: +65-6213-0200, Fax: +65-6213-0300

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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