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Solid State Relay  
OCMOS FET

# PS7113-1A,-2A,PS7113L-1A,-2A

6, 8-PIN DIP, 100 V BREAK DOWN VOLTAGE  
350 mA CONTINUOUS LOAD CURRENT  
1-ch, 2-ch Optical Coupled MOS FET

–NEPOC Series–

## DESCRIPTION

The PS7113-1A, -2A and PS7113L-1A, -2A are solid state relays containing GaAs LEDs on the light emitting side (input side) and MOS FETs on the output side.

They are suitable for analog signal control because of their low offset and high linearity.

The PS7113L-1A, -2A have a surface mount type lead.

## FEATURES

- 1 channel type (1 a output) or 2 channel type (1 a + 1 a output)
- Low LED operating current ( $I_f = 2 \text{ mA}$ )
- Designed for AC/DC switching line changer
- Small package (6, 8-pin DIP)
- Low offset voltage
- Ordering number of taping product : PS7113L-1A-E3, E4: 1 000 pcs/reel  
: PS7113L-2A-E3, E4: 1 000 pcs/reel

<R>

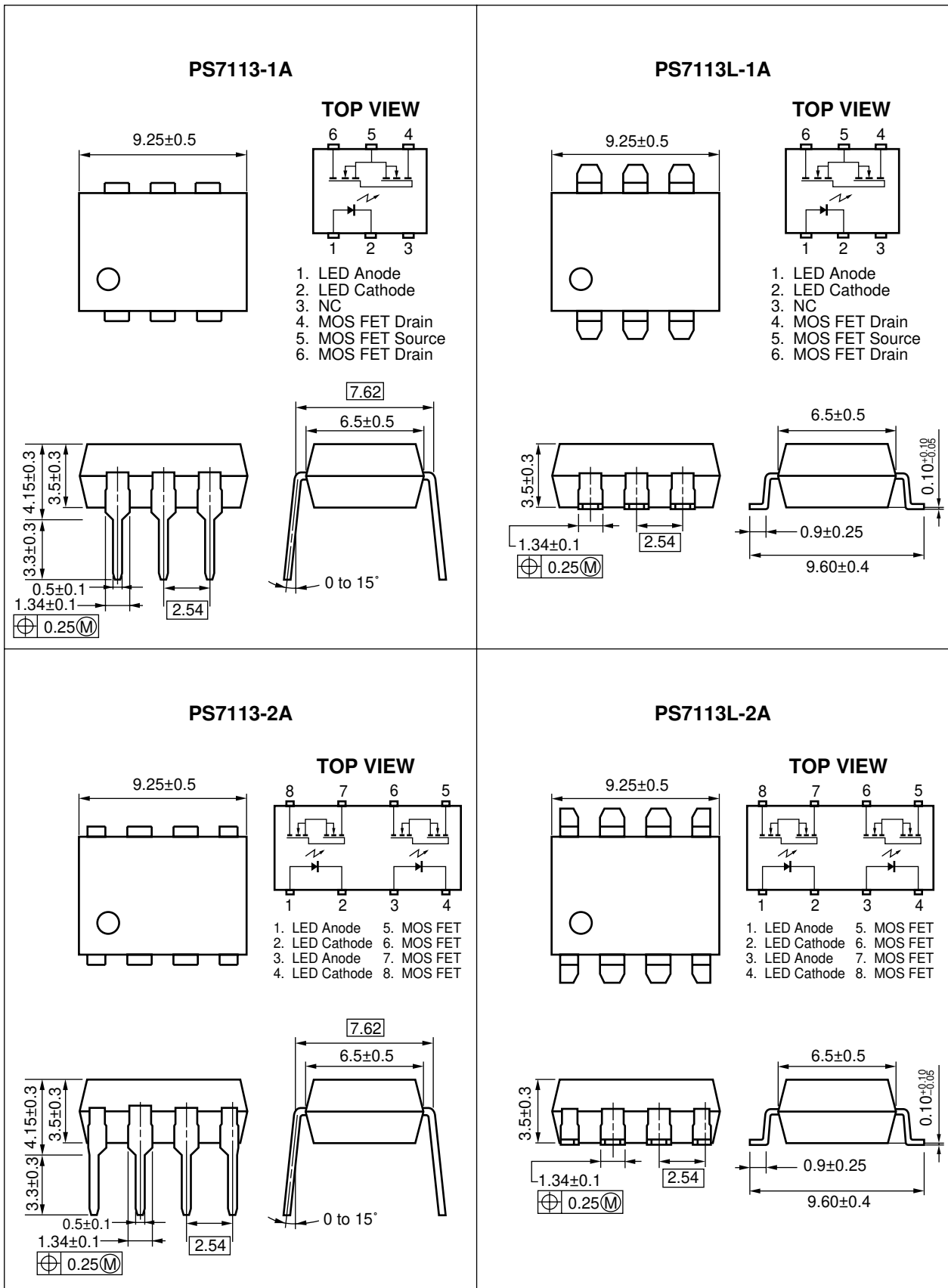
- Pb-Free product
- Safety standards
  - UL approved: File No. E72422
  - BSI approved: No. 8245/8246
  - CSA approved: No. CA 101391

## APPLICATIONS

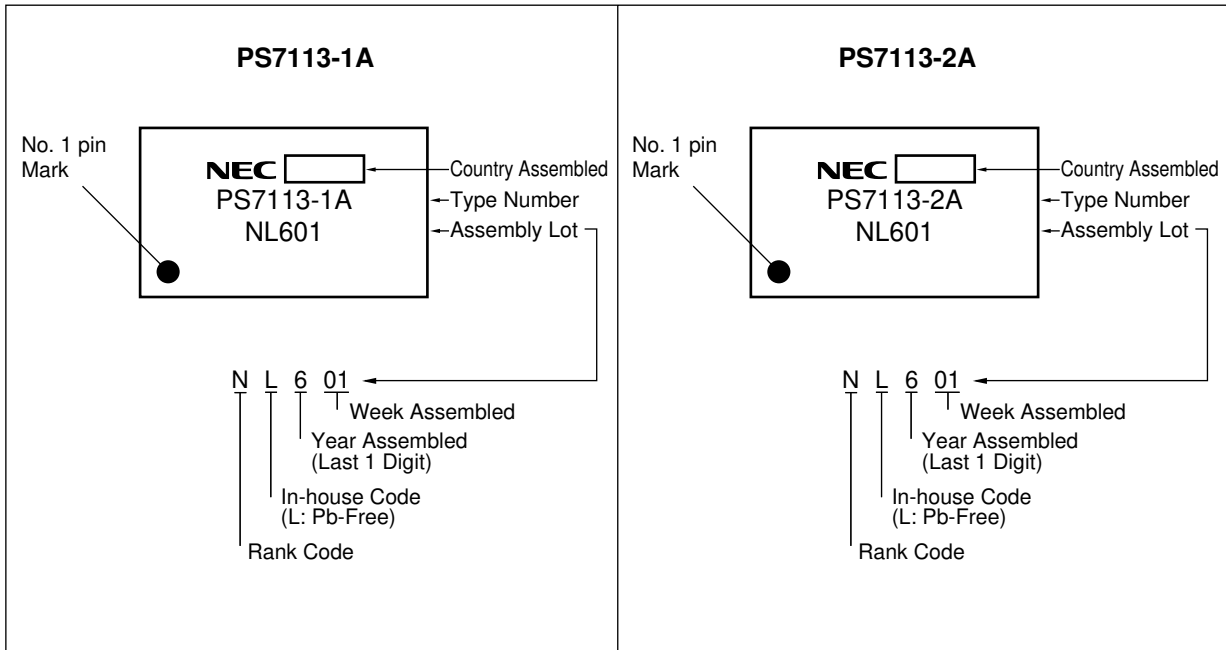
- Exchange equipment
- Measurement equipment
- FA/OA equipment

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**PACKAGE DIMENSIONS (in millimeters)**



<R> **MARKING EXAMPLE**



<R> **ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number <sup>*1</sup>
PS7113-1A	PS7113-1A-A	Pb-Free	Magazine case 50 pcs	Standard products (UL, BSI, CSA approved)	PS7113-1A
PS7113L-1A	PS7113L-1A-A		Embossed Tape 1 000 pcs/reel		
PS7113L-1A-E3	PS7113L-1A-E3-A				
PS7113L-1A-E4	PS7113L-1A-E4-A				
PS7113-2A	PS7113-2A-A		Magazine case 50 pcs		PS7113-2A
PS7113L-2A	PS7113L-2A-A		Embossed Tape 1 000 pcs/reel		
PS7113L-2A-E3	PS7113L-2A-E3-A				
PS7113L-2A-E4	PS7113L-2A-E4-A				

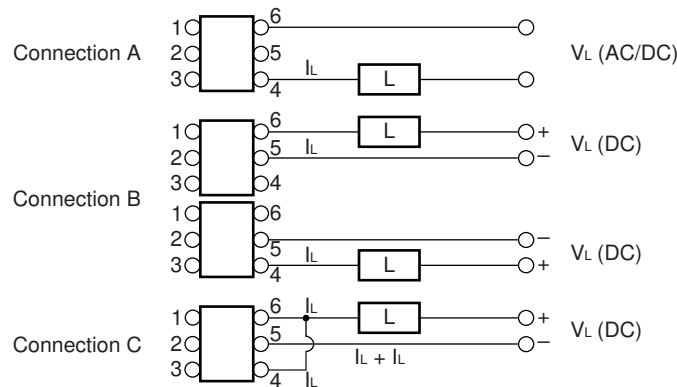
\*1 For the application of the Safety Standard, following part number should be used.

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C, unless otherwise specified)**

Parameter		Symbol	Ratings		Unit	
			PS7113-1A, PS7113L-1A	PS7113-2A, PS7113L-2A		
Diode	Forward Current (DC)	I <sub>F</sub>	50		mA/ch	
	Reverse Voltage	V <sub>R</sub>	5.0		V	
	Power Dissipation	P <sub>D</sub>	50		mW/ch	
	Peak Forward Current <sup>*1</sup>	I <sub>FP</sub>	1		A/ch	
MOS FET	Break Down Voltage	V <sub>L</sub>	100		V	
	Continuous Load Current <sup>*2</sup>	Connection A	I <sub>L</sub>	350		mA/ch
		Connection B		450	–	
		Connection C		700	–	
	Pulse Load Current <sup>*3</sup> (AC/DC Connection)	I <sub>LP</sub>	600		mA/ch	
Power Dissipation	P <sub>D</sub>	560	375	mW/ch		
Isolation Voltage <sup>*4</sup>		BV	1 500		Vr.m.s.	
Total Power Dissipation		P <sub>T</sub>	610	850	mW	
Operating Ambient Temperature		T <sub>A</sub>	–40 to +85		°C	
Storage Temperature		T <sub>stg</sub>	–40 to +100		°C	

\*1 PW = 100 μs, Duty Cycle = 1%

\*2 Conditions: I<sub>F</sub> ≥ 2 mA. The following types of load connections are available.



\*3 PW = 100 ms, 1 shot

\*4 AC voltage for 1 minute at T<sub>A</sub> = 25°C, RH = 60% between input and output

Pins 1-3 shorted together, 4-6 shorted together. (PS7113-1A)

Pins 1-4 shorted together, 5-8 shorted together. (PS7113-2A)

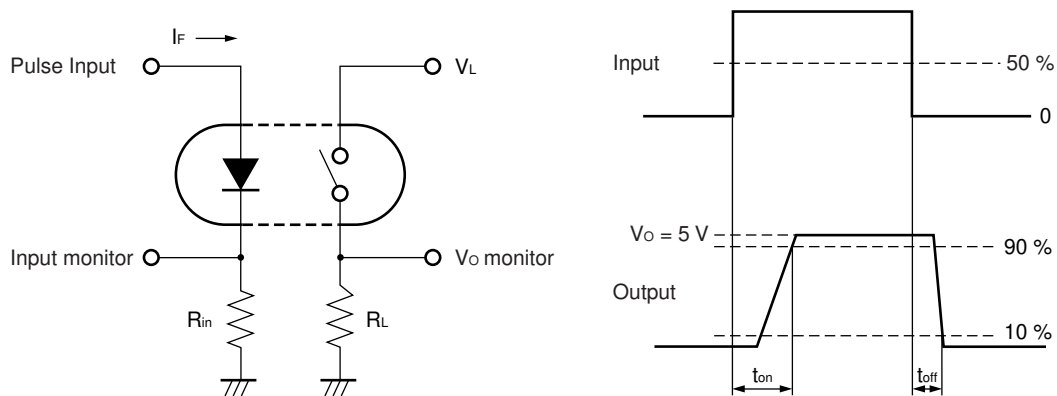
**RECOMMENDED OPERATING CONDITIONS (T<sub>A</sub> = 25°C)**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
LED Operating Current	I <sub>F</sub>	2	10	20	mA
LED Off Voltage	V <sub>F</sub>	0		0.5	V

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 10 mA		1.2	1.4	V
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 5 V			5.0	μA
MOS FET	Off-state Leakage Current	I <sub>Loff</sub>	V <sub>D</sub> = 100 V		0.03	1.0	μA
	Output Capacitance	C <sub>out</sub>	V <sub>D</sub> = 0 V, f = 1 MHz		250		pF/ch
Coupled	LED On-state Current	I <sub>Fon</sub>	I <sub>L</sub> = 350 mA			2.0	mA
	On-state Resistance	R <sub>on1</sub>	I <sub>F</sub> = 10 mA, I <sub>L</sub> = 10 mA		0.9	2.5	Ω
		R <sub>on2</sub>	I <sub>F</sub> = 10 mA, I <sub>L</sub> = 350 mA, t ≤ 10 ms				
	Turn-on Time *1,2	t <sub>on</sub>	I <sub>F</sub> = 10 mA, V <sub>O</sub> = 5 V, R <sub>L</sub> = 500 Ω, PW ≥ 10 ms		1.3	3.0	ms
	Turn-off Time *1,2	t <sub>off</sub>			0.06	0.2	
	Isolation Resistance	R <sub>I-O</sub>	V <sub>I-O</sub> = 1.0 kV <sub>DC</sub>	10 <sup>9</sup>			Ω
	Isolation Capacitance	C <sub>I-O</sub>	V = 0 V, f = 1 MHz		1.1		pF/ch

**\*1 Test Circuit for Switching Time**



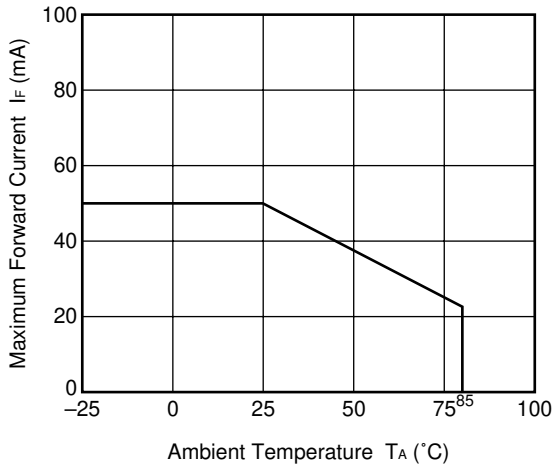
<R>

**\*2** The turn-on time and turn-off time are specified as input-pulse width ≥ 10 ms.

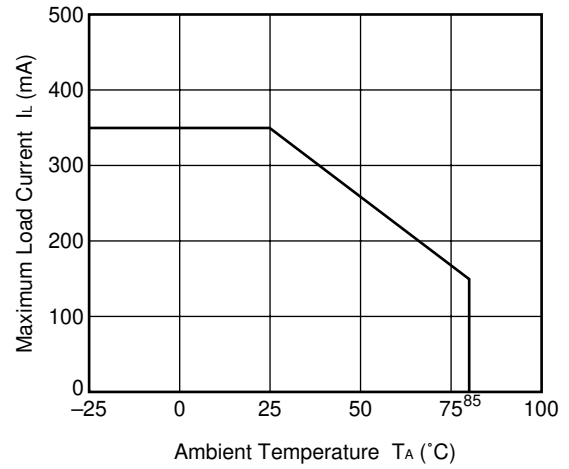
Be aware that when the device operates with an input-pulse width less than 10 ms, the turn-on time and turn-off time will increase.

**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)**

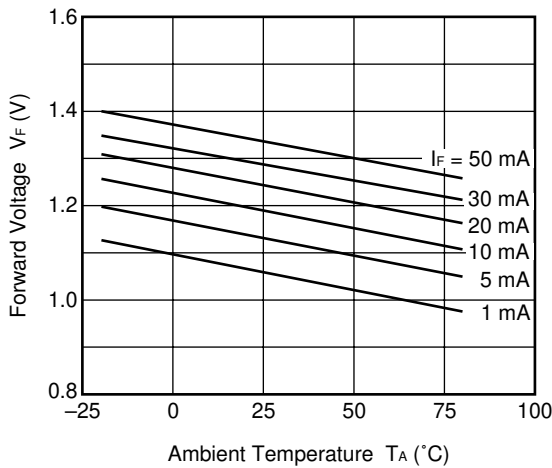
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



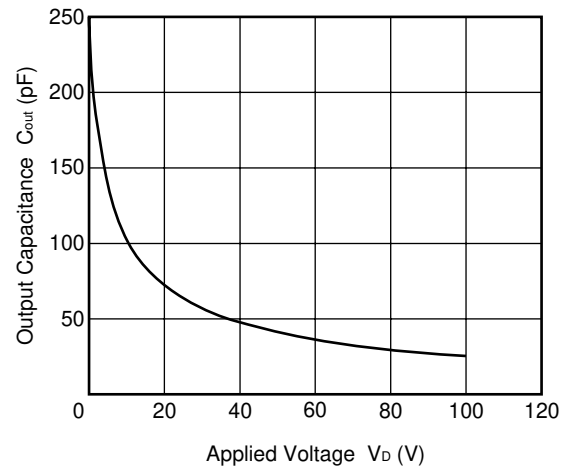
MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



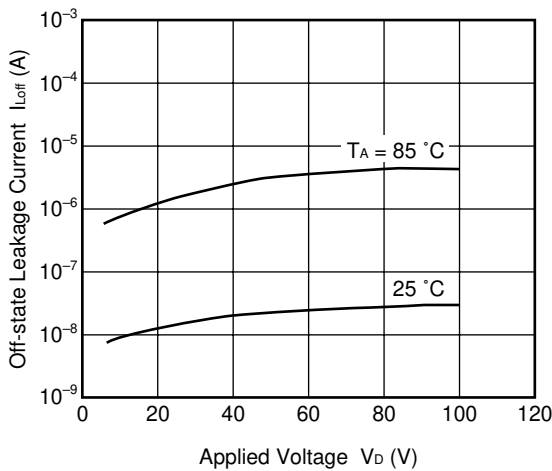
FORWARD VOLTAGE vs. AMBIENT TEMPERATURE



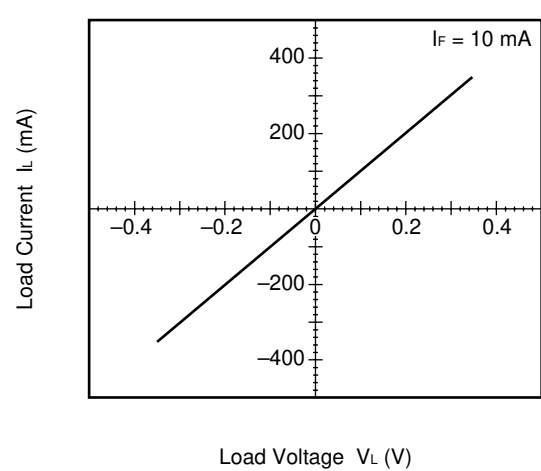
OUTPUT CAPACITANCE vs. APPLIED VOLTAGE



OFF-STATE LEAKAGE CURRENT vs. APPLIED VOLTAGE



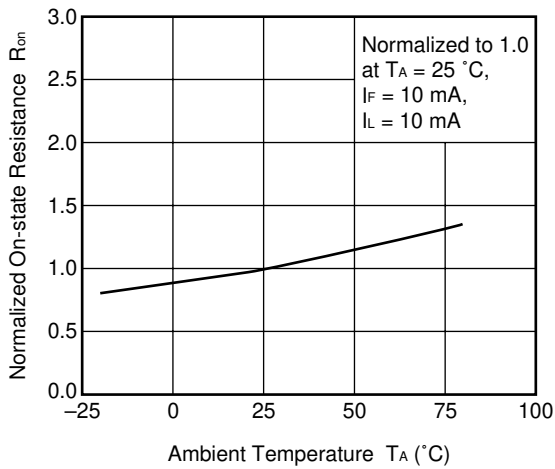
LOAD CURRENT vs. LOAD VOLTAGE



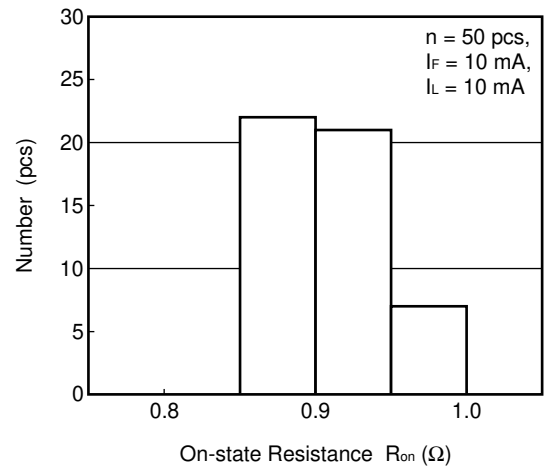
**Remark** The graphs indicate nominal characteristics.



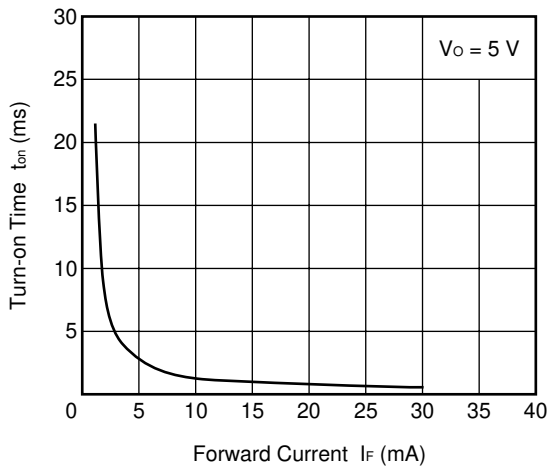
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



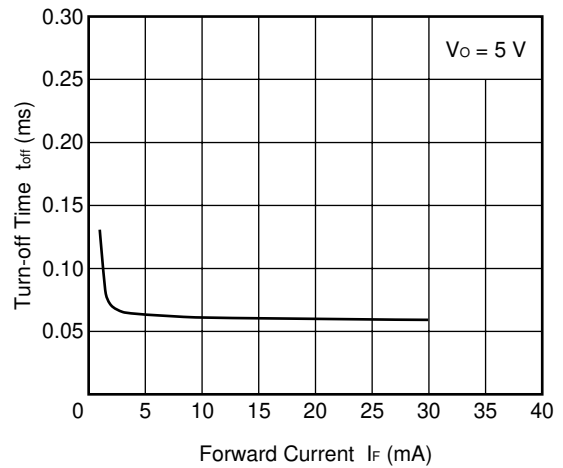
ON-STATE RESISTANCE DISTRIBUTION



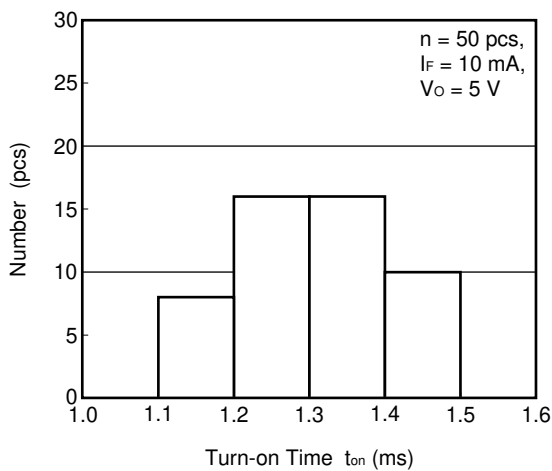
TURN-ON TIME vs. FORWARD CURRENT



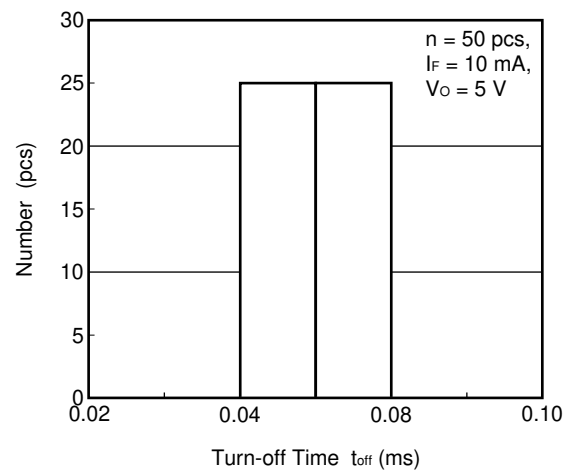
TURN-OFF TIME vs. FORWARD CURRENT



TURN-ON TIME DISTRIBUTION

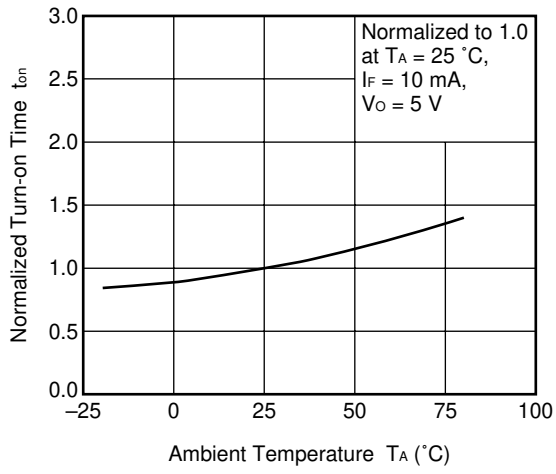


TURN-OFF TIME DISTRIBUTION

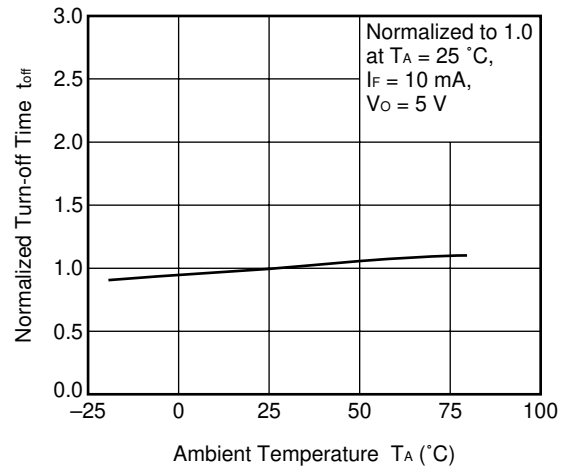


**Remark** The graphs indicate nominal characteristics.

NORMALIZED TURN-ON TIME vs. AMBIENT TEMPERATURE



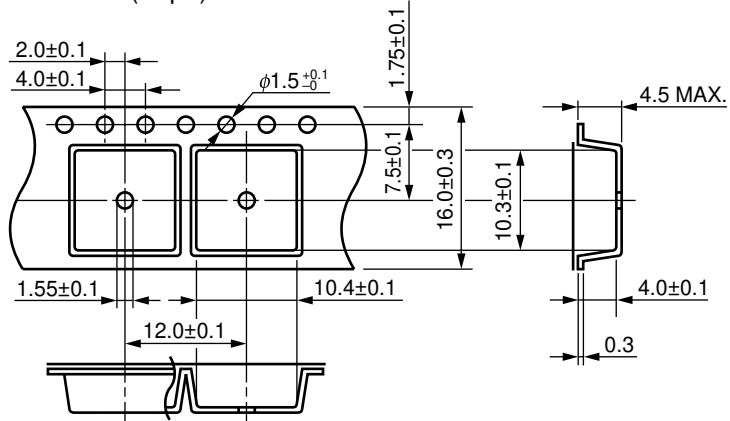
NORMALIZED TURN-OFF TIME vs. AMBIENT TEMPERATURE



**Remark** The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (in millimeters)

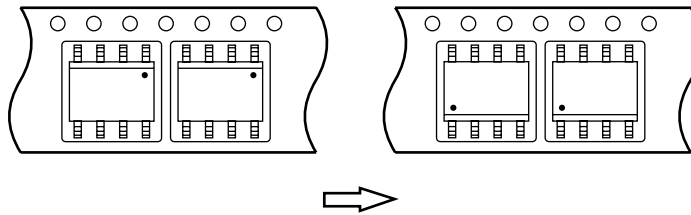
Outline and Dimensions (Tape)



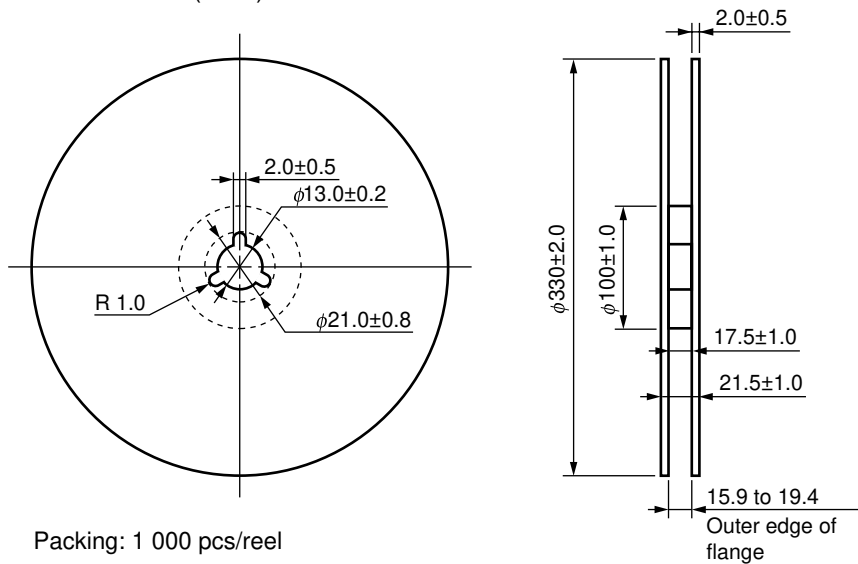
Tape Direction

PS7113L-1A-E3  
PS7113L-2A-E3

PS7113L-1A-E4  
PS7113L-2A-E4



Outline and Dimensions (Reel)

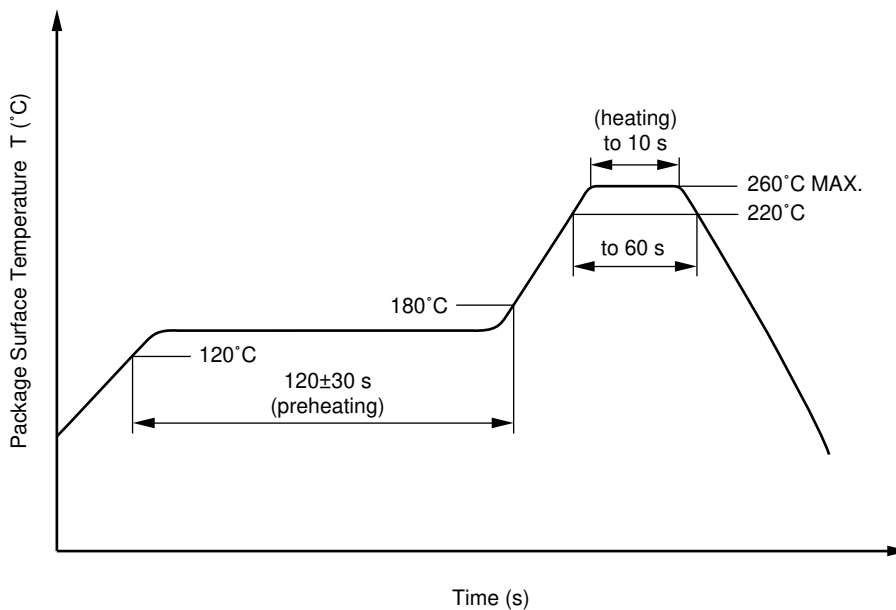


**RECOMMENDED SOLDERING CONDITIONS**

**(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
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

<R>

**(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 100°C.

**(4) Cautions**

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

<R> **USAGE CAUTIONS**

1. Protect against static electricity when handling.
2. Avoid storage at a high temperature and high humidity.

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