DATA SHEET

NEC

Solid State Relay
OCMOS FET

PS7141E-1A,PS7141EL-1A

6-PIN DIP, 400V BREAK DOWN VOLTAGE NORMALLY OPEN TYPE 1-ch Optical Coupled MOS FET

–NEPOC Series–

DESCRIPTION

The PS7141E-1A and PS7141EL-1A 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 PS7141EL-1A has a surface mount type lead.

FEATURES

- 1 channel type (1 a output)
- Designed for AC/DC switching line changer
- Small package (6-pin DIP)
- Low offset voltage
- Ordering number of taping product: PS7141EL-1A-E3, E4: 1 000 pcs/reel
- <R> Pb-Free product
- <R> Safety standards
  - UL approved: File No. E72422
  - BSI approved: No. 8806/8807
  - SEMKO approved: No. 313447
  - DEMKO approved: No. 312887
  - NEMKO approved: No. P4202453
  - FIMKO approved: No. FI 20732

APPLICATIONS

- Exchange equipment
- Measurement equipment
- FA/OA equipment

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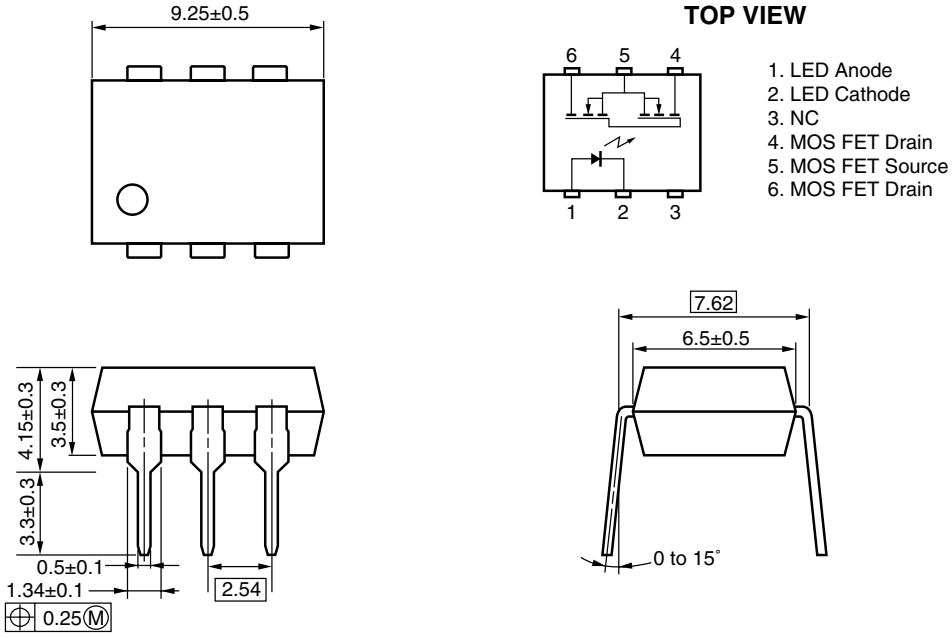
The mark <R> shows major revised points.

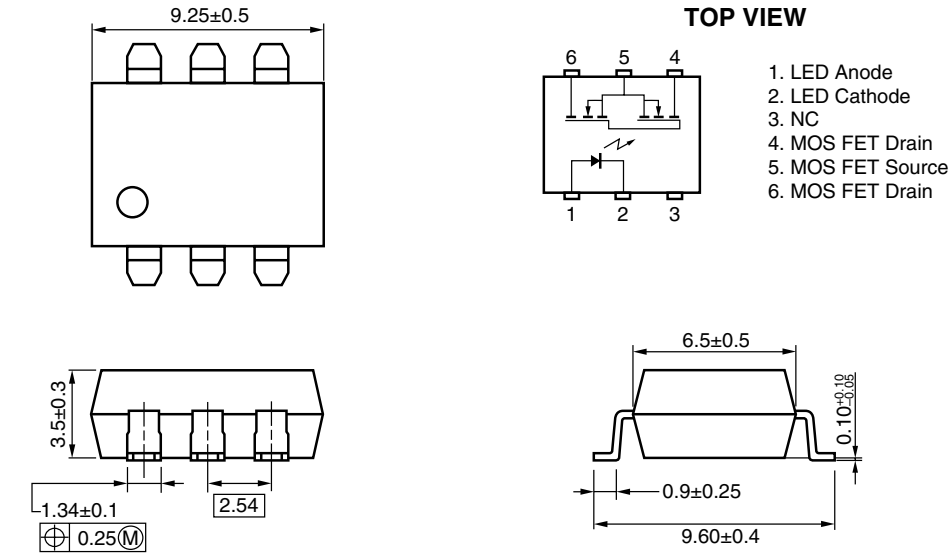
The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

PACKAGE DIMENSIONS (in millimeters)

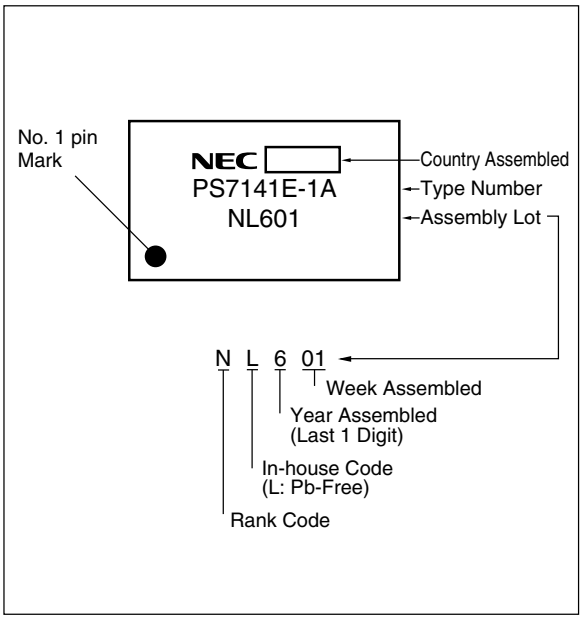
PS7141E-1A



PS7141EL-1A



<R> **MARKING EXAMPLE**



<R> **ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number*1
PS7141E-1A	PS7141E-1A-A	Pb-Free	Magazine case 50 pcs	Standard products (UL, BSI, SEMKO, DEMKO, NEMKO, FIMKO approved)	PS7141E-1A
PS7141EL-1A	PS7141EL-1A-A				
PS7141EL-1A-E3	PS7141EL-1A-E3-A		Embossed Tape 1 000 pcs/reel		
PS7141EL-1A-E4	PS7141EL-1A-E4-A				

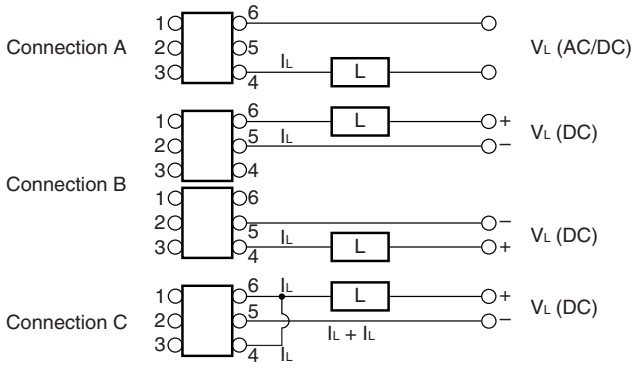
***1** For the application of the Safety Standard, following part number should be used.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

Parameter			Symbol	Ratings	Unit
Diode	Forward Current (DC)		I_F	50	mA
	Reverse Voltage		V_R	5.0	V
	Power Dissipation		P_D	50	mW
	Peak Forward Current *1		I_{FP}	1	A
MOS FET	Break Down Voltage		V_L	400	V
	Continuous Load Current *2	Connection A	I_L	120	mA
		Connection B		150	
		Connection C		250	
	Pulse Load Current *3 (AC/DC Connection)		I_{LP}	240	mA
	Power Dissipation		P_D	560	mW
Isolation Voltage *4			BV	1 500	Vr.m.s.
Total Power Dissipation			P_T	610	mW
Operating Ambient Temperature			T_A	−40 to +85	°C
Storage Temperature			T_{stg}	−40 to +100	°C

***1** PW = 100 μs, Duty Cycle = 1%

***2** Conditions: $I_F \geq 5$ mA. The following types of load connections are available.



***3** PW = 100 ms, 1 shot

***4** AC voltage for 1 minute at T_A = 25°C, RH = 60% between input and output
Pins 1-3 shorted together, 4-6 shorted together.

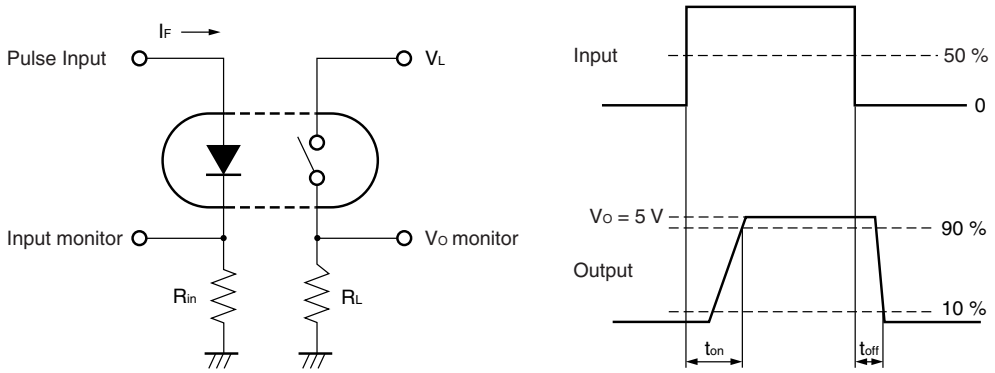
RECOMMENDED OPERATING CONDITIONS (T_A = 25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
LED Operating Current	I_F	5	10	20	mA
LED Off Voltage	V_F	0		0.5	V

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 10 mA		1.2	1.4	V
	Reverse Current	I_R	V_R = 5 V			5.0	μA
MOS FET	Off-state Leakage Current	I_{Loff}	V_D = 400 V		0.01	1.0	μA
	Output Capacitance	C_{out}	V_D = 0 V, f = 1 MHz		36		pF
Coupled	LED On-state Current	I_{Fon}	I_L = 120 mA			5.0	mA
	On-state Resistance	R_{on1}	I_F = 10 mA, I_L = 10 mA		36	50	Ω
		R_{on2}	I_F = 10 mA, I_L = 120 mA, t ≤ 10 ms		25	35	
	Turn-on Time *1, 2	t_{on}	I_F = 10 mA, V_O = 5 V, R_L = 1.5 kΩ, PW ≥ 10 ms		0.5	1.0	ms
	Turn-off Time *1, 2	t_{off}			0.07	0.2	
	Isolation Resistance	R_{I-O}	V_{I-O} = 1.0 kV_{DC}	10^9			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1 MHz		1.1		pF

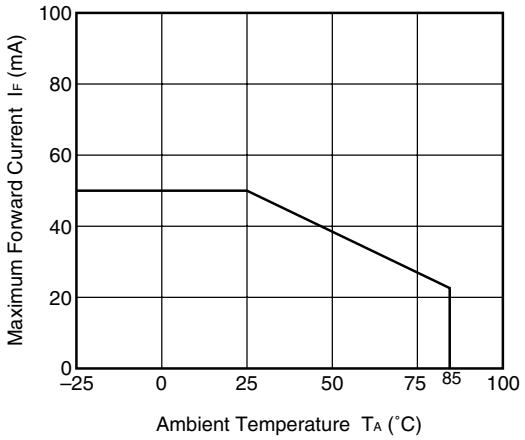
***1** Test Circuit for Switching Time



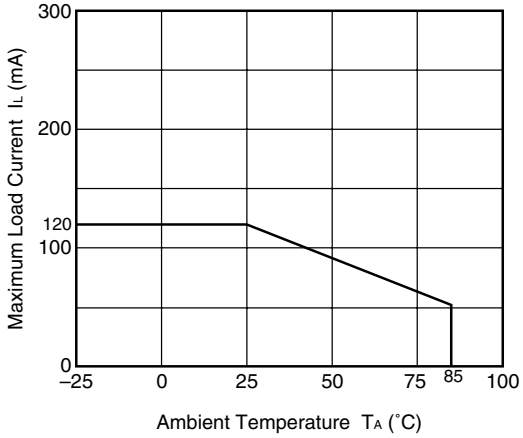
***2** The turn-on time and turn-off time are specified as input-pulse width ≥ 10 ms.
Be aware that when the device operates with an input-pulse width less than 10 ms, the turn-on time and turn-off time will increase.

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

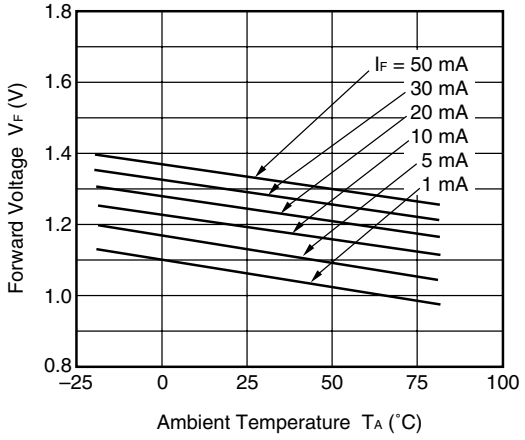
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



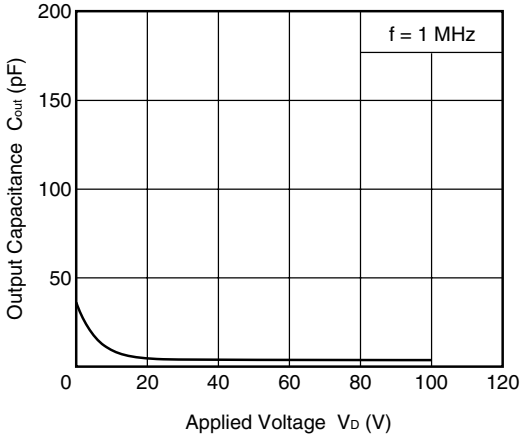
MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



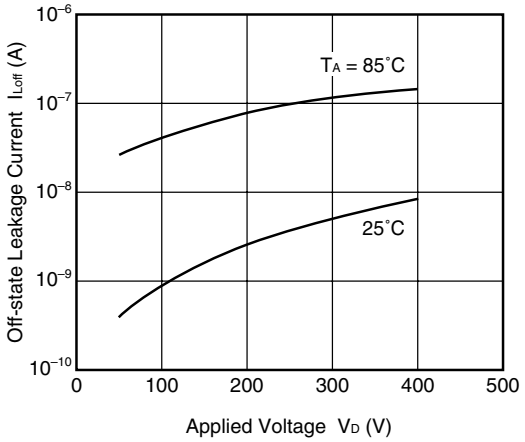
FORWARD VOLTAGE vs. AMBIENT TEMPERATURE



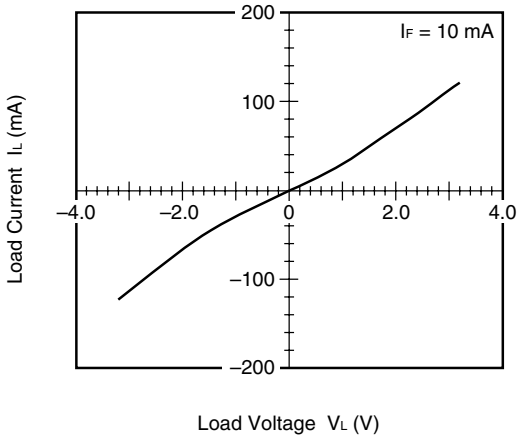
OUTPUT CAPACITANCE vs. APPLIED VOLTAGE



OFF-STATE LEAKAGE CURRENT vs. APPLIED VOLTAGE

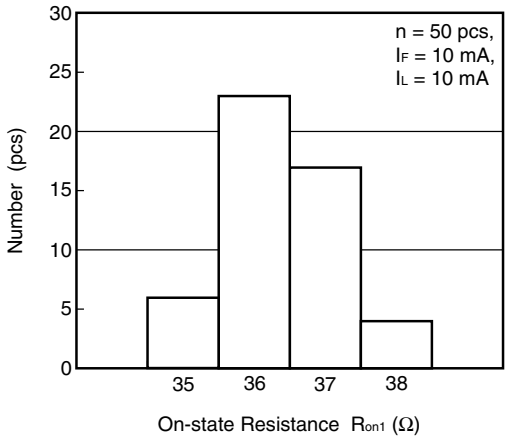


LOAD CURRENT vs. LOAD VOLTAGE

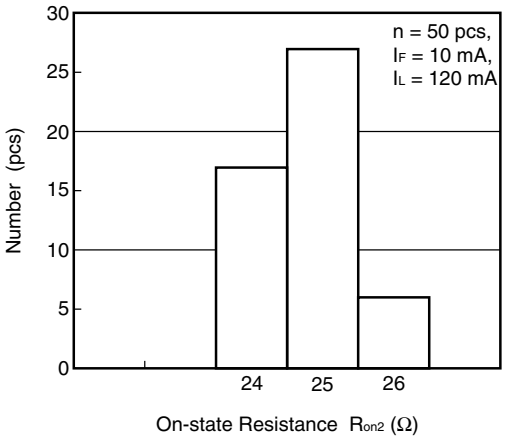


Remark The graphs indicate nominal characteristics.

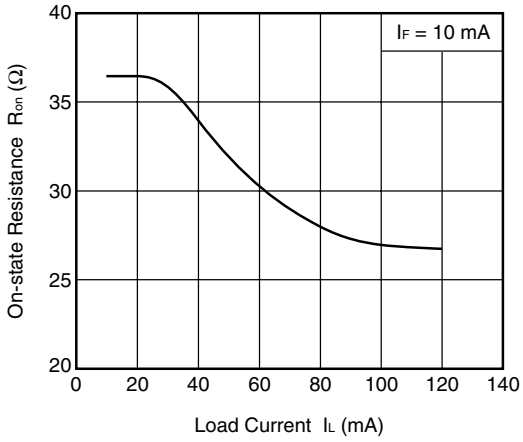
ON-STATE RESISTANCE DISTRIBUTION



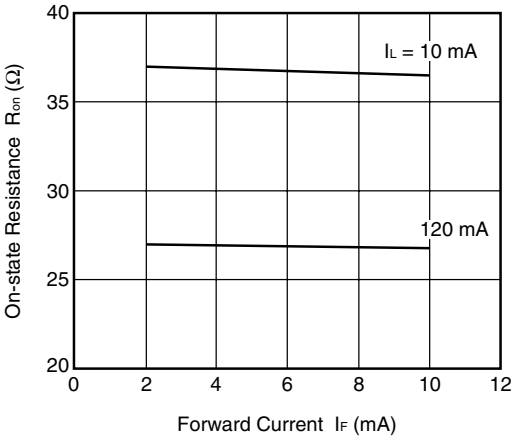
ON-STATE RESISTANCE DISTRIBUTION



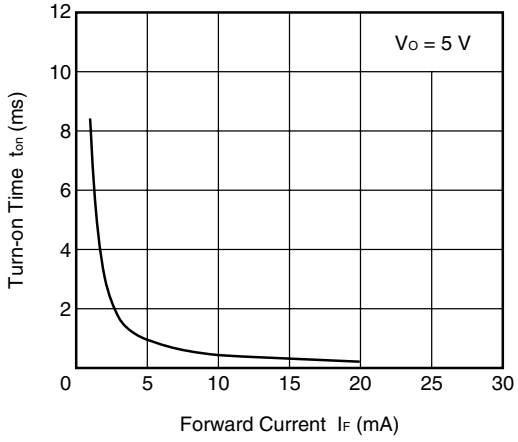
ON-STATE RESISTANCE vs. LOAD CURRENT



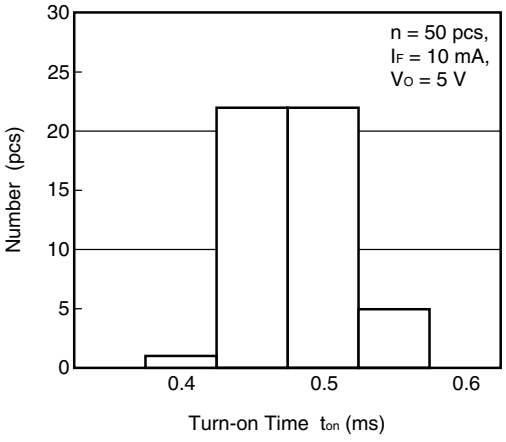
ON-STATE RESISTANCE vs. FORWARD CURRENT



TURN-ON TIME vs. FORWARD CURRENT

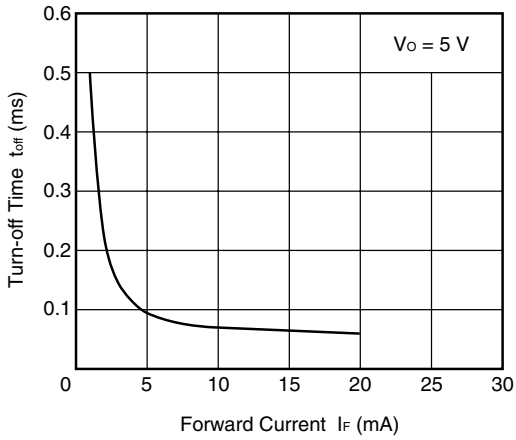


TURN-ON TIME DISTRIBUTION

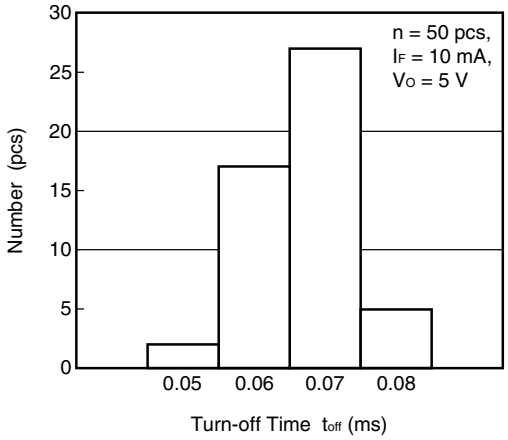


Remark The graphs indicate nominal characteristics.

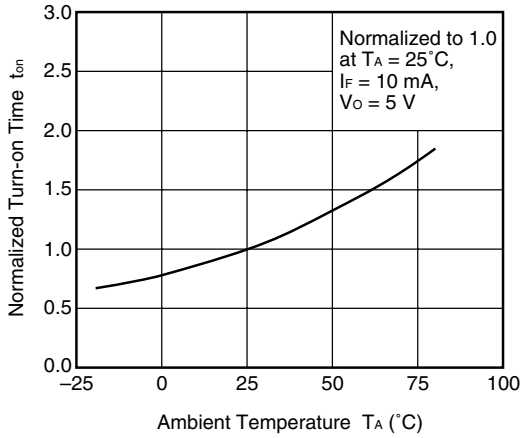
TURN-OFF TIME vs. FORWARD CURRENT



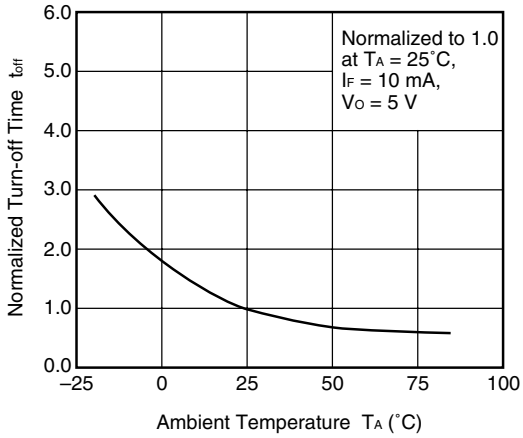
TURN-OFF TIME DISTRIBUTION



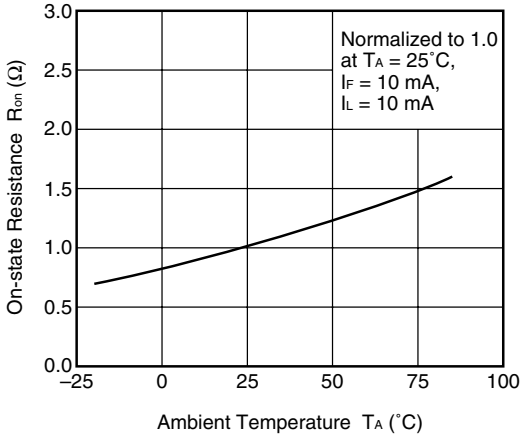
NORMALIZED TURN-ON TIME vs. AMBIENT TEMPERATURE



NORMALIZED TURN-OFF TIME vs. AMBIENT TEMPERATURE



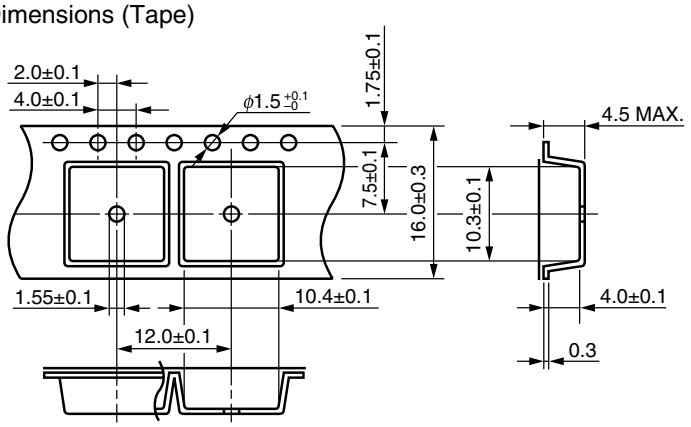
ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



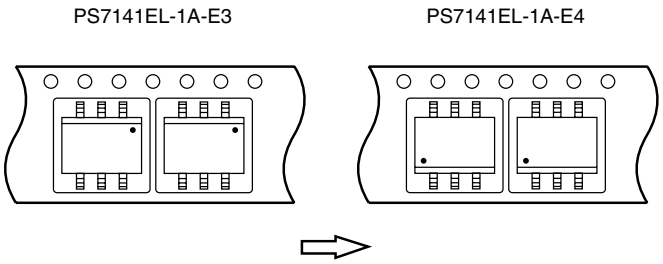
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (in millimeters)

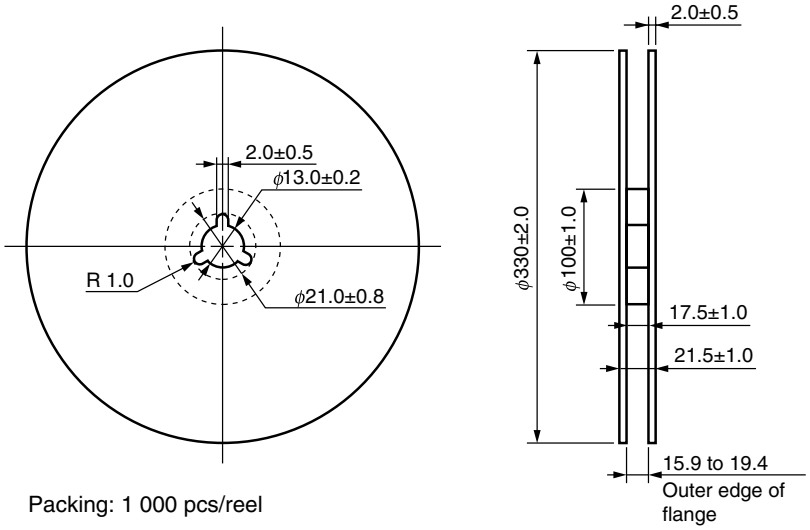
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



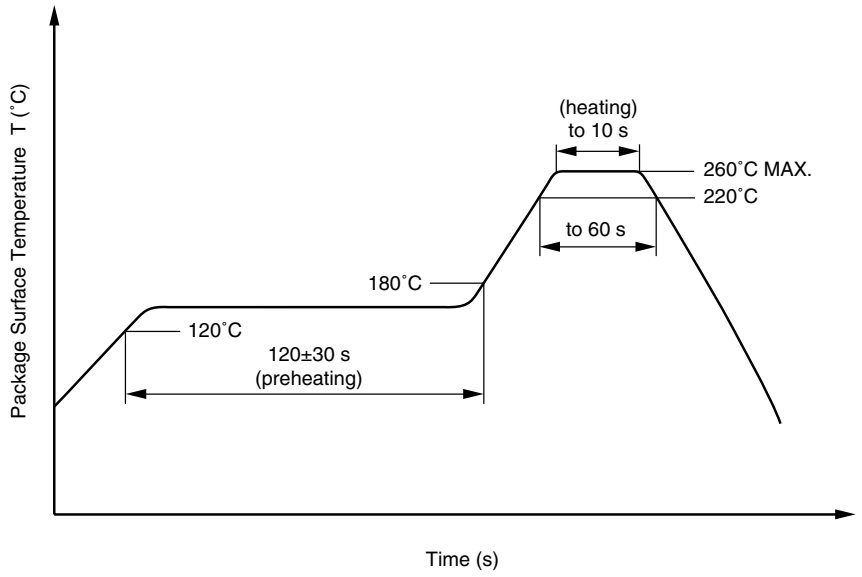
Packing: 1 000 pcs/reel

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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M8E 02. 11-1

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.

▶**For further information, please contact**

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