CEL

Solid State Relay
OCMOS FET

PS7141-1B,-2B,PS7141L-1B,-2B

6, 8-PIN DIP, 400 V BREAK DOWN VOLTAGE NORMALLY CLOSE TYPE 1-ch, 2-ch Optical Coupled MOS FET

–NEPOC Series–

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DESCRIPTION

The PS7141-1B, -2B and PS7141L-1B, -2B are solid state relays containing GaAs LEDs on the light emitting side (input side) and normally close (N.C.) contact MOS FETs on the output side.

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

The PS7141L-1B, -2B have a surface mount type lead.

FEATURES

- 1 channel type (1 b output) or 2 channel type (1 b + 1 b output)
- Low LED operating current (I_F = 2 mA)
- Designed for AC/DC switching line changer
- Small package (6, 8-pin DIP)
- Low offset voltage
- Ordering number of taping product : PS7141L-1B-E3, E4: 1 000 pcs/reel
  : PS7141L-2B-E3, E4: 1 000 pcs/reel

<R>
- Pb-Free product
- Safety standards

<R>
  - 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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The mark <R> shows major revised points.

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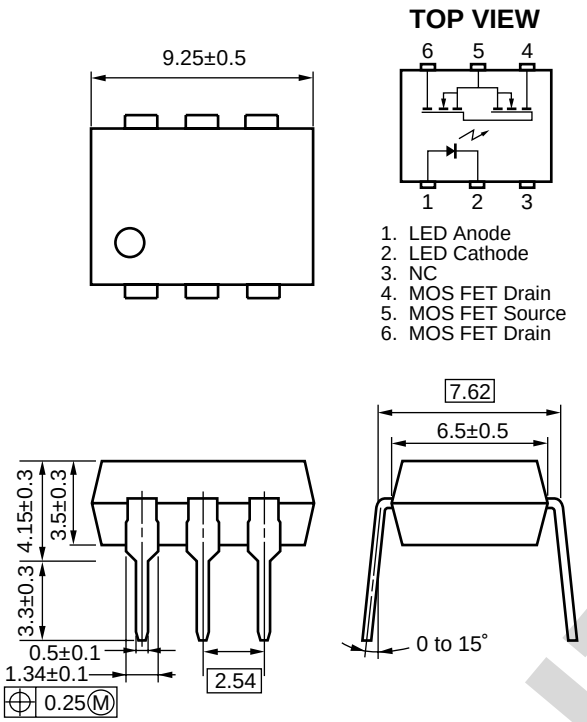
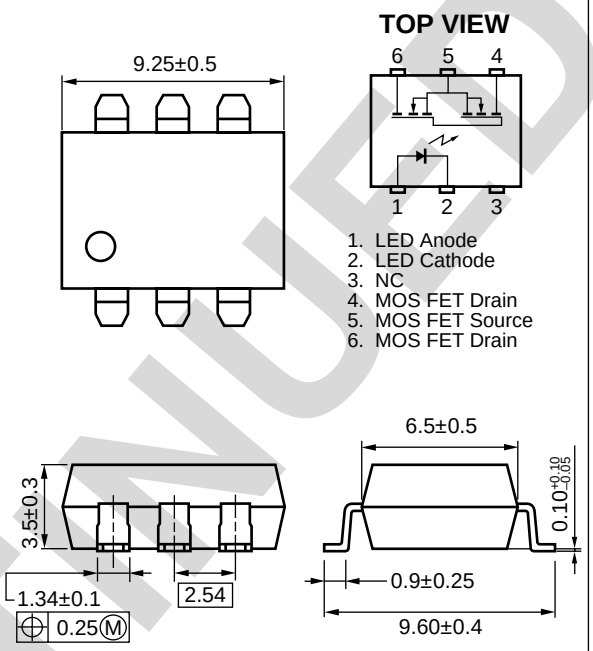
The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

PACKAGE DIMENSIONS (in millimeters)

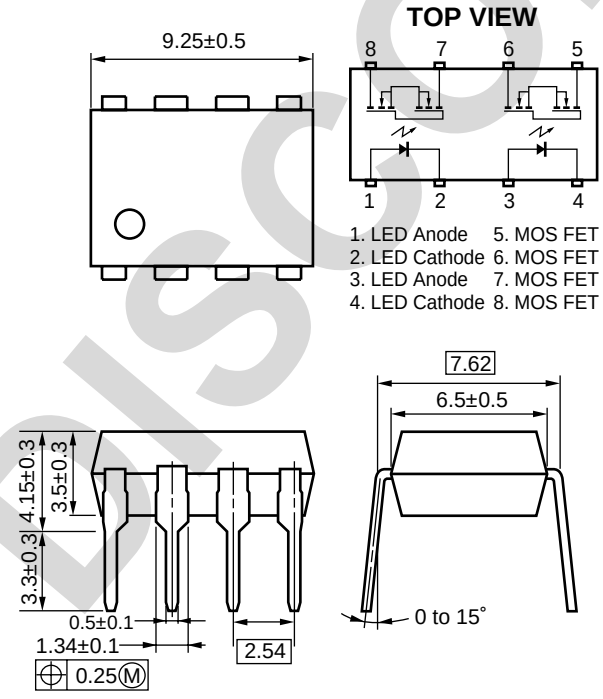
PS7141-1B



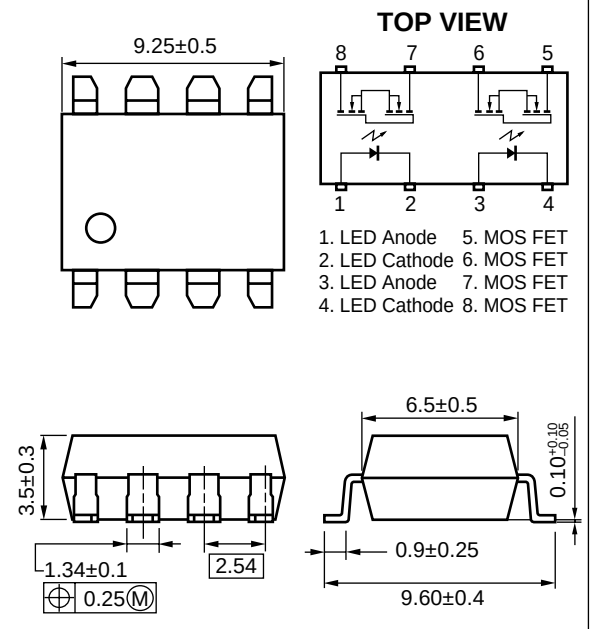
PS7141L-1B



PS7141-2B



PS7141L-2B



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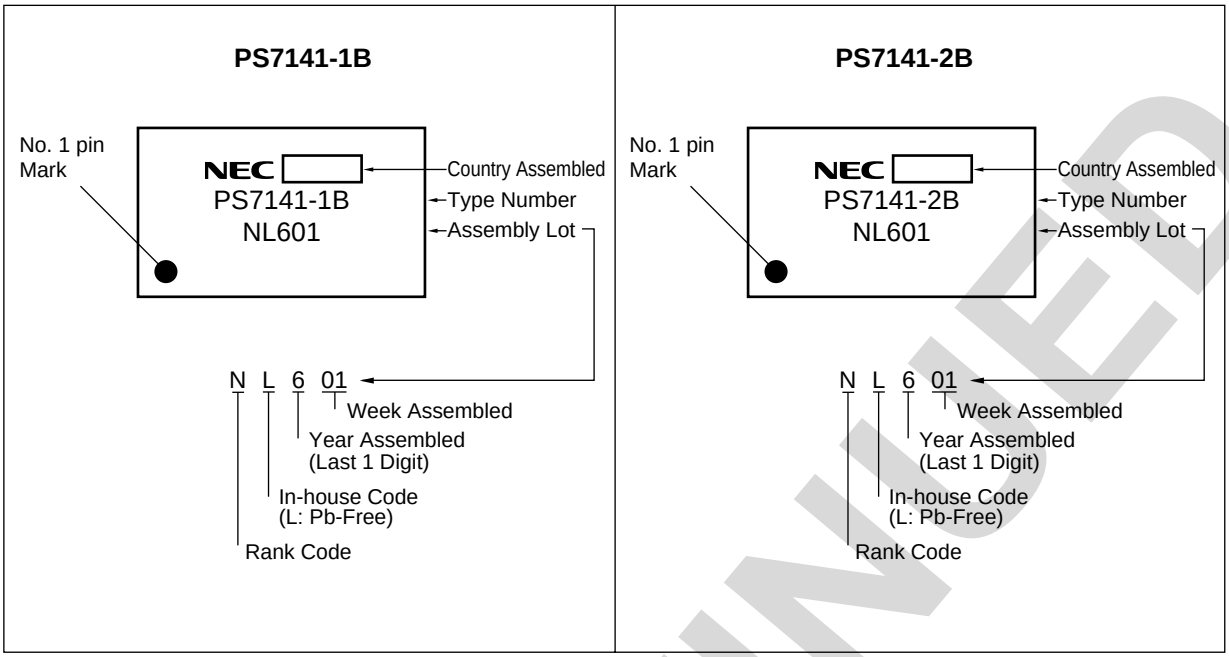
<R> **MARKING EXAMPLE**



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<R> **ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number*1
PS7141-1B	PS7141-1B-A	Pb-Free	Magazine case 50 pcs	Standard products (UL, BSI, CSA approved)	PS7141-1B
PS7141L-1B	PS7141L-1B-A				
PS7141L-1B-E3	PS7141L-1B-E3-A		Embossed Tape 1 000 pcs/reel		
PS7141L-1B-E4	PS7141L-1B-E4-A				
PS7141-2B	PS7141-2B-A		Magazine case 50 pcs		PS7141-2B
PS7141L-2B	PS7141L-2B-A				
PS7141L-2B-E3	PS7141L-2B-E3-A		Embossed Tape 1 000 pcs/reel		
PS7141L-2B-E4	PS7141L-2B-E4-A				

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

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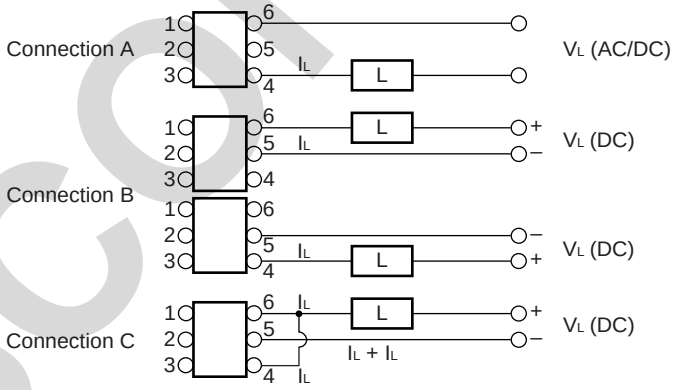
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

Parameter			Symbol	Ratings		Unit
				PS7141-1B, PS7141L-1B	PS7141-2B, PS7141L-2B	
Diode	Forward Current (DC)		I_F	50		mA/ch
	Reverse Voltage		V_R	5.0		V
	Power Dissipation		P_D	50		mW/ch
	Peak Forward Current *1		I_{FP}	1		A/ch
MOS FET	Break Down Voltage		V_L	400		V
	Continuous Load Current *2	Connection A	I_L	150		mA/ch
		Connection B		200	–	
		Connection C		300	–	
	Pulse Load Current *3 (AC/DC Connection)		I_{LP}	300		mA/ch
	Power Dissipation		P_D	560	375	mW/ch
Isolation Voltage *4			BV	1 500		Vr.m.s.
Total Power Dissipation			P_T	610	850	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: $I_F \geq 2$ 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. (PS7141-1B)
Pins 1-4 shorted together, 5-8 shorted together. (PS7141-2B)

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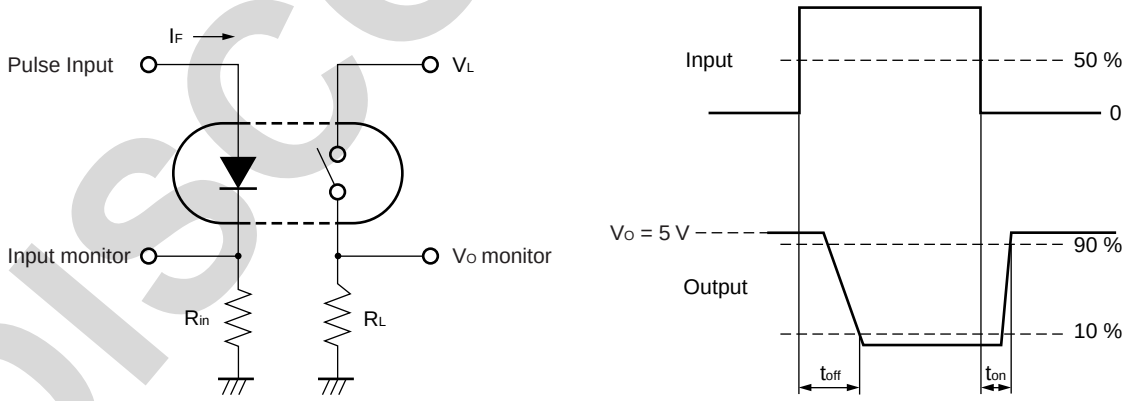
RECOMMENDED OPERATING CONDITIONS (T_A = 25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
LED Operating Current	I_F	2	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
			PS7141-1B, PS7141L-1B	PS7141-2B, PS7141L-2B				
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}	I_F = 10 mA, V_D = 400 V			0.03	1.0	μA
	Output Capacitance	C_{out}	V_D = 0 V, f = 1 MHz, I_F = 10 mA			185		pF/ch
Coupled	LED Off-state Current	I_{Foff}	I_L = 150 mA				2.0	mA
	On-state Resistance	R_{on1}	I_F = 0 mA, I_L = 10 mA			20	30	Ω
		R_{on2}	I_F = 0 mA, I_L = 150 mA, t ≤ 10 ms			16	25	
	Turn-on Time *1, 2	t_{on}	I_F = 10 mA, V_O = 5 V, R_L = 1.5 kΩ, PW ≥ 10 ms	I_F = 10 mA, V_O = 5 V, R_L = 500 Ω, PW ≥ 10 ms		0.02	0.2	ms
	Turn-off Time *1, 2	t_{off}				0.2	1.0	
	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/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.

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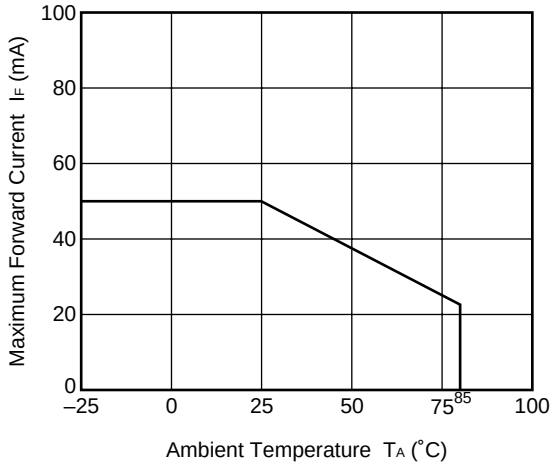
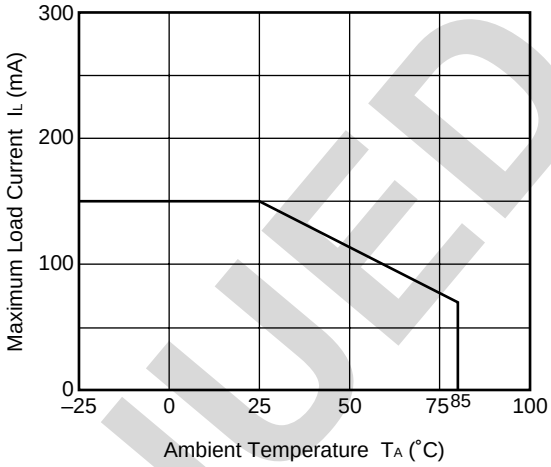
TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

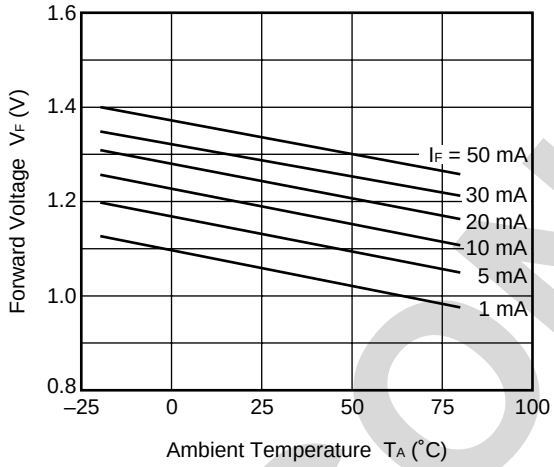
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



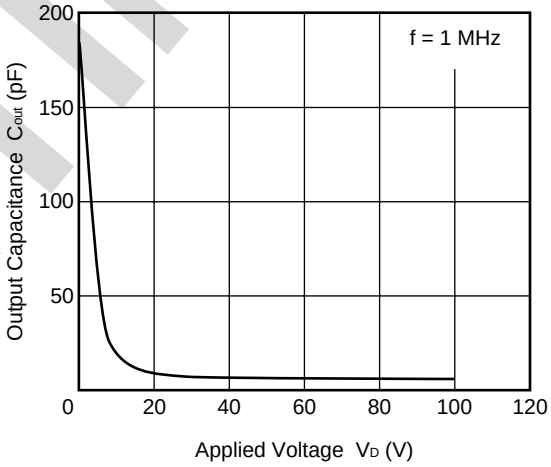
MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



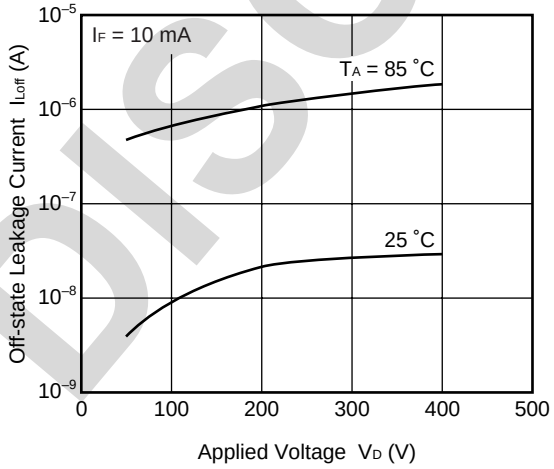
FORWARD VOLTAGE vs. AMBIENT TEMPERATURE



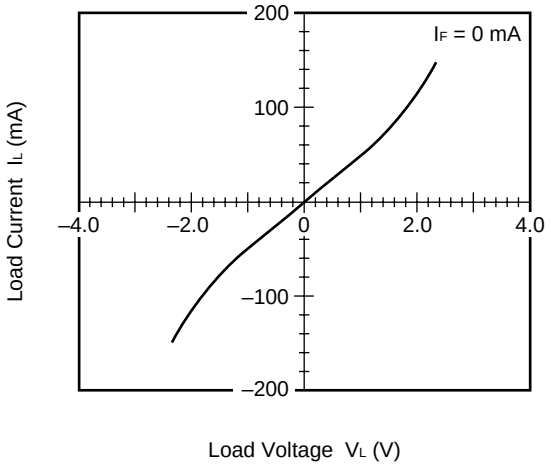
OUTPUT CAPACITANCE vs. APPLIED VOLTAGE



OFF-STATE LEAKAGE CURRENT vs. APPLIED VOLTAGE



LOAD CURRENT vs. LOAD VOLTAGE



Remark The graphs indicate nominal characteristics.

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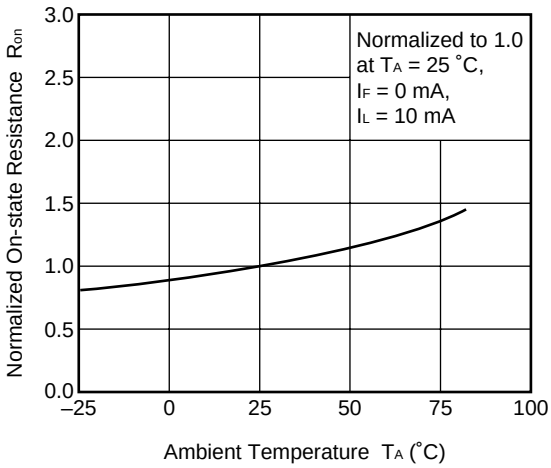
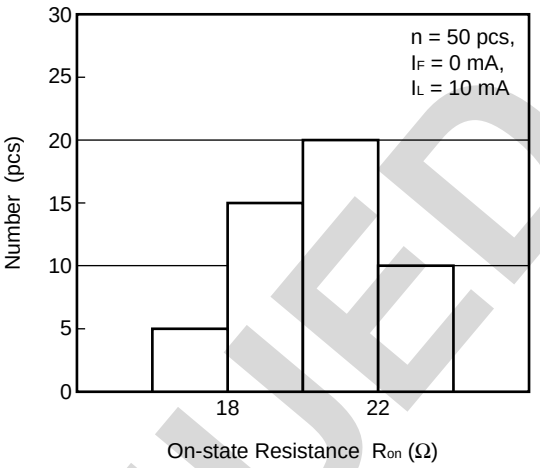
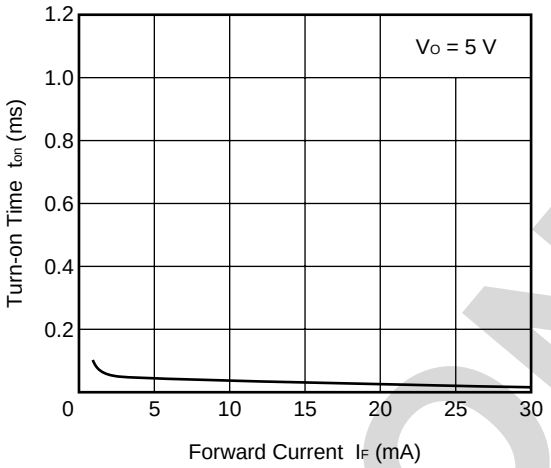
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



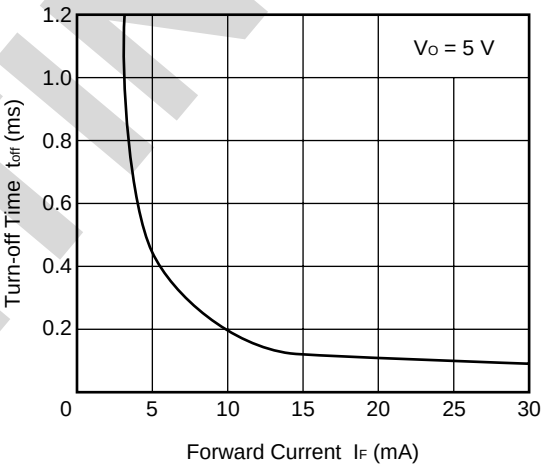
ON-STATE RESISTANCE DISTRIBUTION



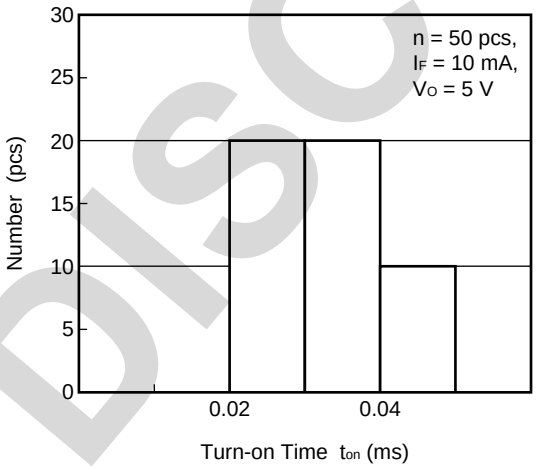
TURN-ON TIME vs. FORWARD CURRENT



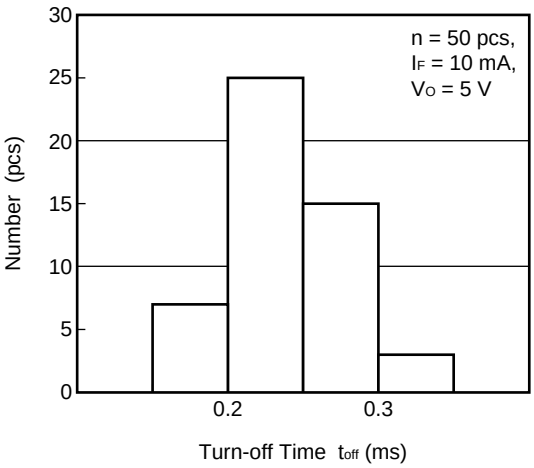
TURN-OFF TIME vs. FORWARD CURRENT



TURN-ON TIME DISTRIBUTION



TURN-OFF TIME DISTRIBUTION



Remark The graphs indicate nominal characteristics.

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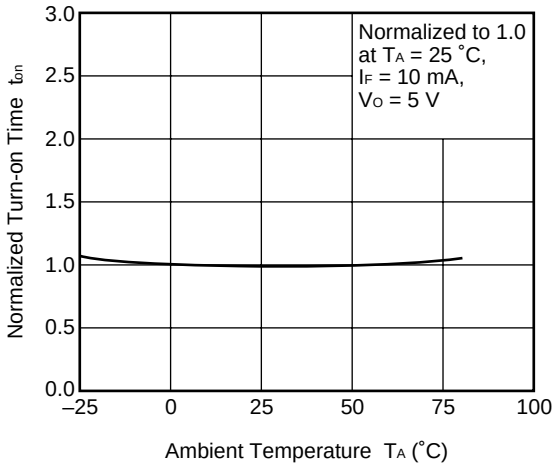
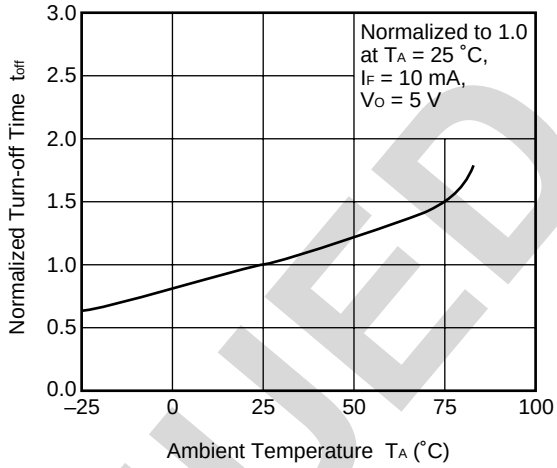
NORMALIZED TURN-ON TIME vs.
AMBIENT TEMPERATURE



NORMALIZED TURN-OFF TIME vs.
AMBIENT TEMPERATURE



Remark The graphs indicate nominal characteristics.

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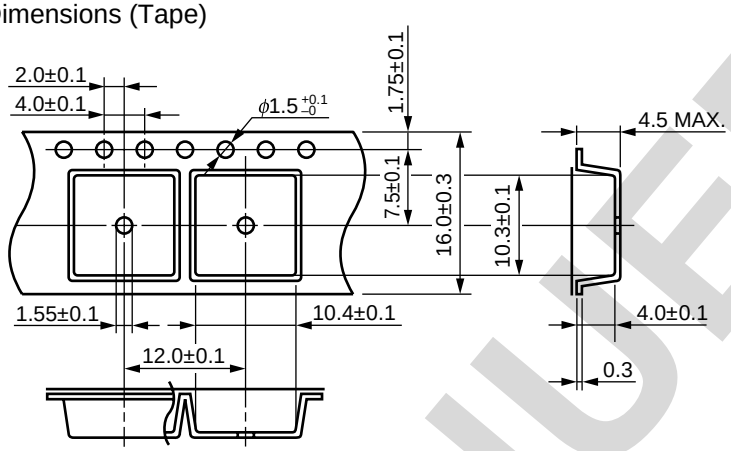
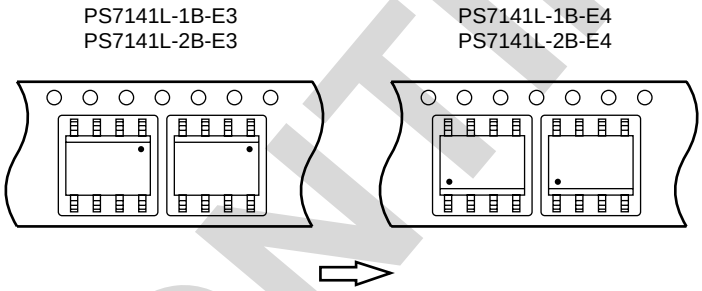
TAPING SPECIFICATIONS (in millimeters)

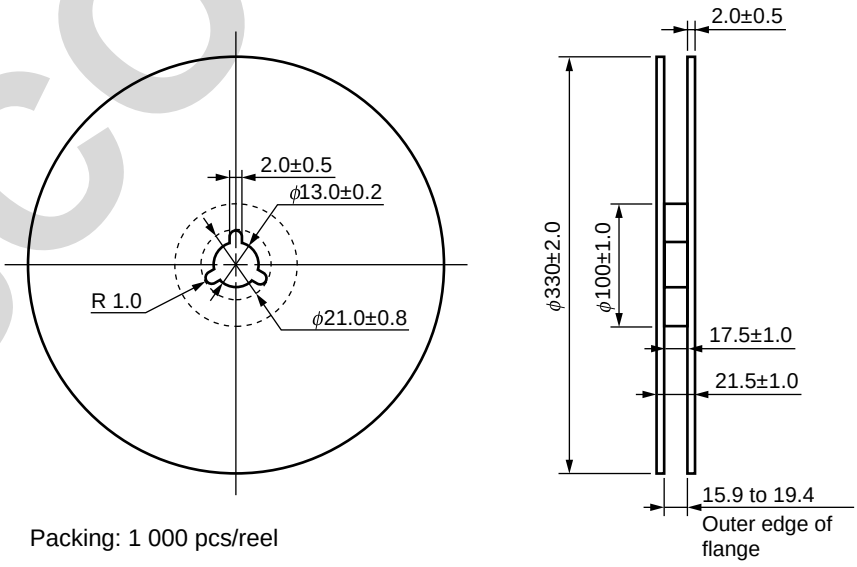
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 1 000 pcs/reel

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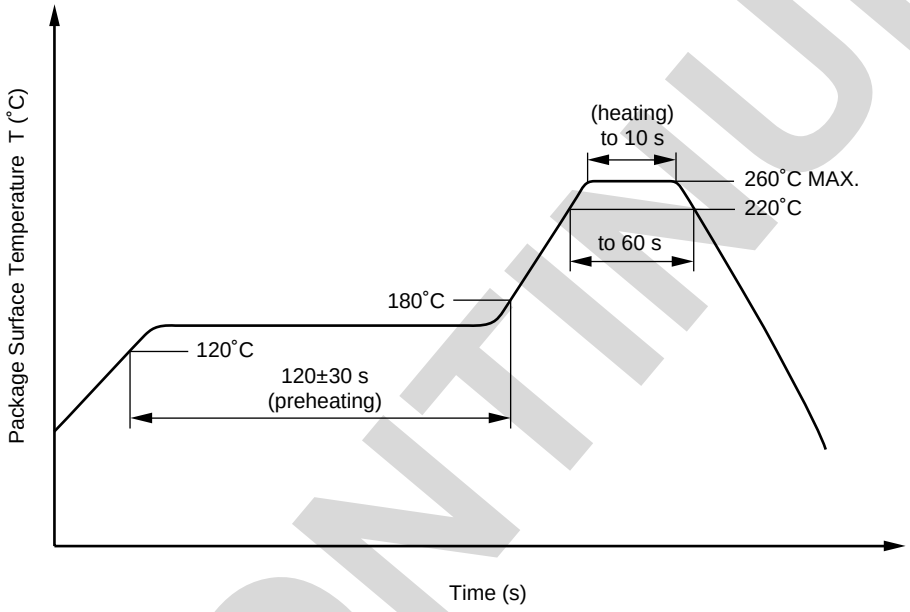
RECOMMENDED SOLDERING CONDITIONS

(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.

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<R> **USAGE CAUTIONS**

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

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- **The information in this document is current as of July, 2006. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC Electronics data sheets or data books, etc., for the most up-to-date specifications of NEC Electronics products. Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.**
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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.

DISCONTINUED

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Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
Lead (Pb)	< 1000 PPM	-A	-AZ
		Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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