



Solid State Relay
OCMOS FET

PS7160-1A, PS7160L-1A

6-PIN DIP, 600 V BREAK DOWN VOLTAGE
1-ch Optical Coupled MOS FET

DESCRIPTION

The PS7160-1A and PS7160L-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 PS7160L-1A has a surface mount type lead.

FEATURES

- 1 channel type (1 a output)
- Low LED operating current ($I_F = 2 \text{ mA}$)
- Designed for AC/DC switching line changer
- Small package (6-pin DIP)
- Low offset voltage
- PS7160L-1A: Surface mount type
- UL approved: File No. E72422 (S)
- BSI approved: No. 8245/8246
- CSA approved: No. CA 101391

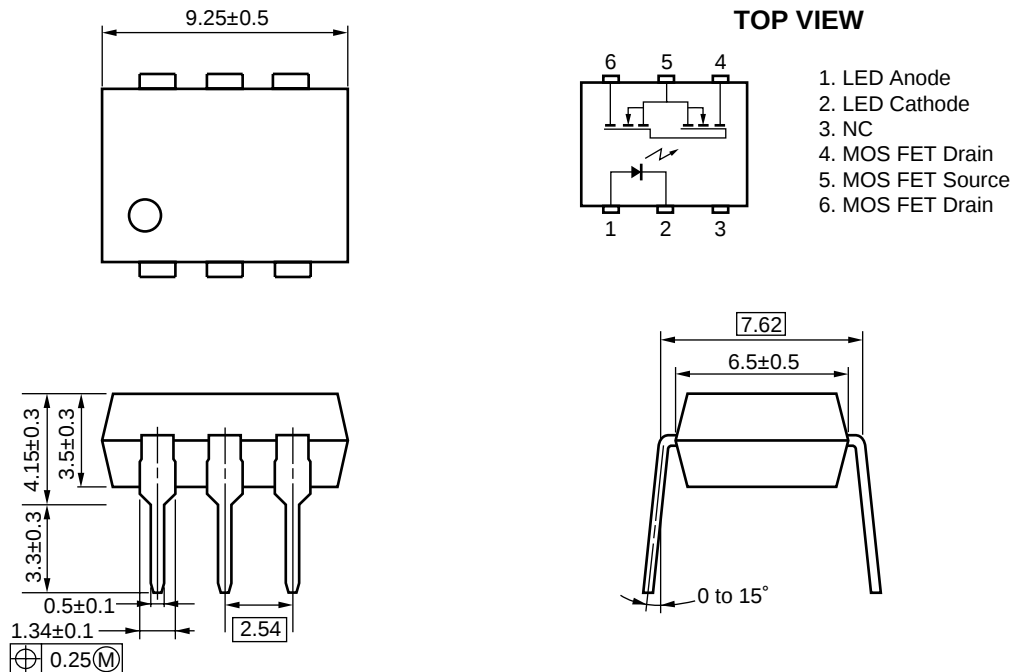
APPLICATIONS

- Exchange equipment
- Measurement equipment
- FA/OA equipment

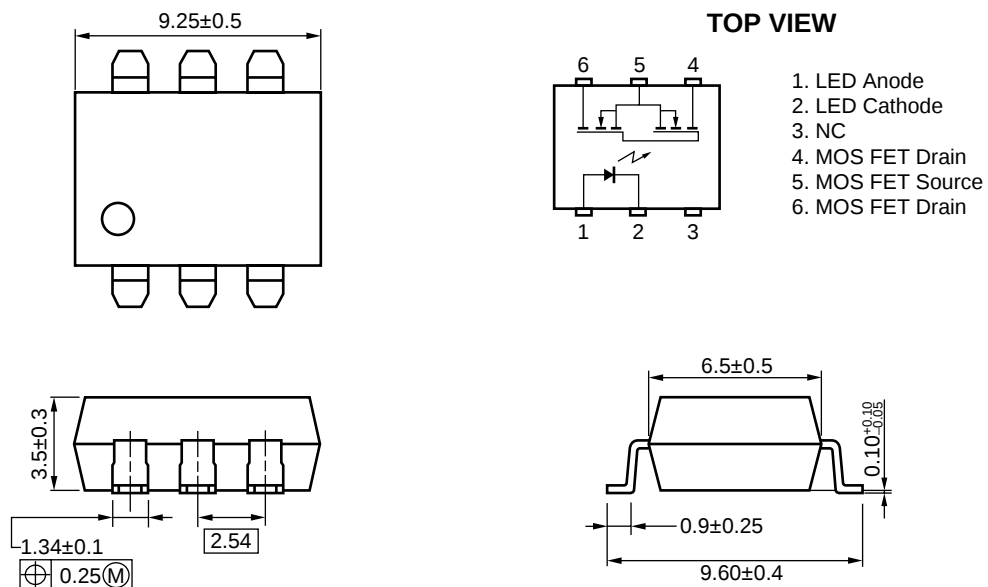
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PACKAGE DIMENSIONS (in millimeters)

PS7160-1A



PS7160L-1A



ORDERING INFORMATION (Solder Contains Lead)

Part Number	Package	Packing Style	Application Part Number *1
PS7160-1A	6-pin DIP	Magazine case 50 pcs	PS7160-1A
PS7160L-1A			PS7160L-1A
PS7160L-1A-E3		Embossed Tape 1 000 pcs/reel	
PS7160L-1A-E4			

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

ORDERING INFORMATION (Pb-Free)

Part Number	Package	Packing Style	Application Part Number ^{*1}
PS7160-1A-A	6-pin DIP	Magazine case 50 pcs	PS7160-1A
PS7160L-1A-A			PS7160L-1A
PS7160L-1A-E3-A		Embossed Tape 1 000 pcs/reel	
PS7160L-1A-E4-A			

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

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

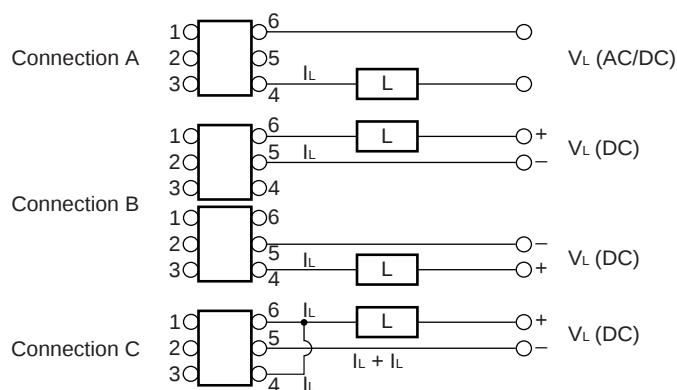
Parameter		Symbol	Ratings	Unit
Diode	Forward Current (DC)	I_F	50	mA
	Reverse Voltage	V_R	5.0	V
	Power Dissipation	P_D	50	mW
	Peak Forward Current ^{*1}	I_{FP}	1	A
★ MOS FET	Break Down Voltage	V_L	600	V
	Continuous Load Current ^{*2}	Connection A	I_L	90 (120) 130 (160) 200 (210) mA
		Connection B		
		Connection C		
	Pulse Load Current ^{*3} (AC/DC Connection)	I_{LP}	250	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	$^\circ\text{C}$
	Storage Temperature	T_{stg}	-40 to +100	$^\circ\text{C}$

*1 $PW = 100 \mu\text{s}$, Duty Cycle = 1 %

*2 Conditions: $I_F \geq 2 \text{ mA}$.

Conditions: $I_F \geq 5 \text{ mA}$. Load current () value is.

The following types of load connections are available.



*3 $PW = 100 \text{ ms}$, 1 shot

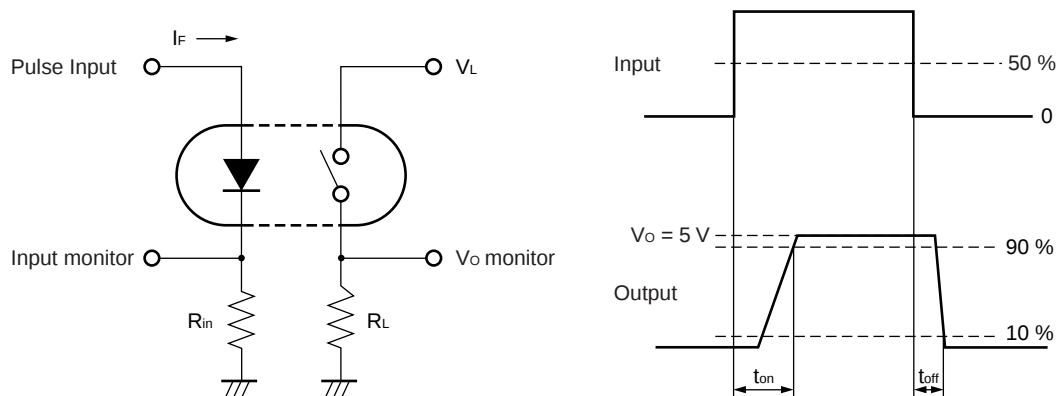
*4 AC voltage for 1 minute at $T_A = 25^\circ\text{C}$, $RH = 60\%$ between input and output

RECOMMENDED OPERATING CONDITIONS ($T_A = 25\text{ }^{\circ}\text{C}$)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
LED Operating Current	I_F	2	10	20	mA
LED Off Voltage	V_F	0		0.5	V

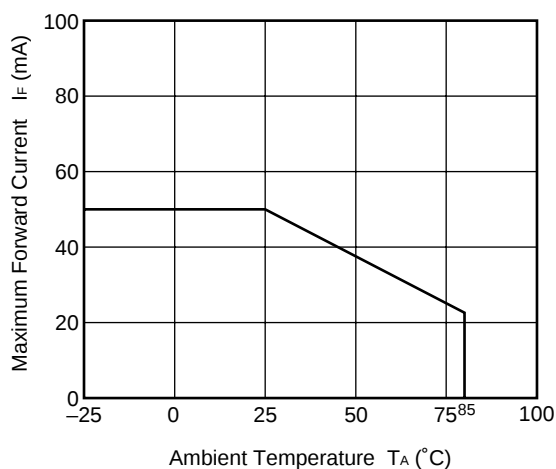
ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	$I_F = 10\text{ mA}$		1.2	1.4	V
	Reverse Current	I_R	$V_R = 5\text{ V}$			5.0	μA
MOS FET	Off-state Leakage Current	I_{Leak}	$V_D = 600\text{ V}$		0.03	1.0	μA
	Output Capacitance	C_{out}	$V_D = 0\text{ V}, f = 1\text{ MHz}$		110		pF
Coupled	LED On-state Current	I_{Fon}	$I_L = 90\text{ mA}$			2.0	mA
	On-state Resistance	R_{on1}	$I_F = 10\text{ mA}, I_L = 10\text{ mA}$		42	50	Ω
		R_{on2}	$I_F = 10\text{ mA}, I_L = 90\text{ mA}, t \leq 10\text{ ms}$		33	50	
	Turn-on Time ^{*1}	t_{on}	$I_F = 10\text{ mA}, V_O = 5\text{ V}, R_L = 1.5\text{ k}\Omega,$ $PW \geq 10\text{ ms}$		0.8	1.5	ms
	Turn-off Time ^{*1}	t_{off}			0.06	0.2	
	Isolation Resistance	$R_{\text{I-O}}$	$V_{\text{I-O}} = 1.0\text{ kVDC}$	10^9			Ω
	Isolation Capacitance	$C_{\text{I-O}}$	$V = 0\text{ V}, f = 1\text{ MHz}$		1.1		pF

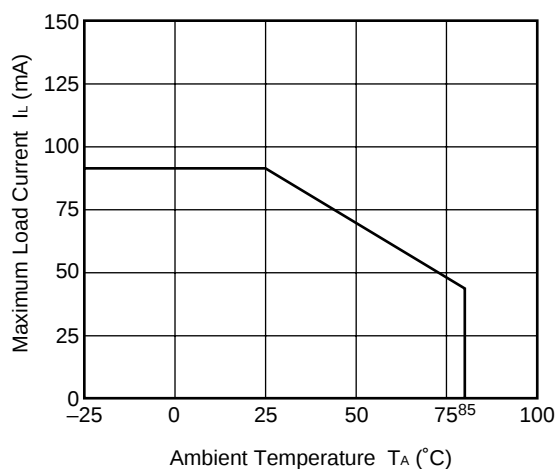
***1 Test Circuit for Switching Time**


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

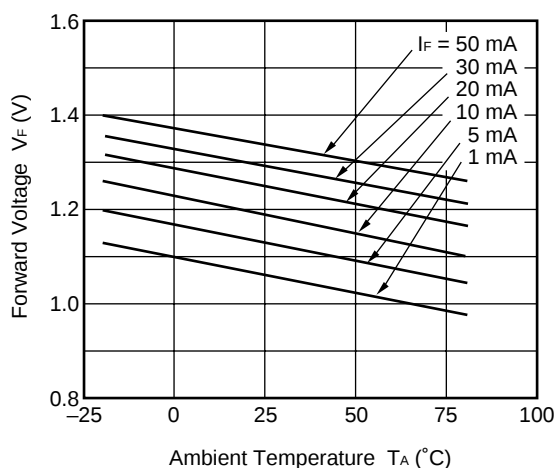
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



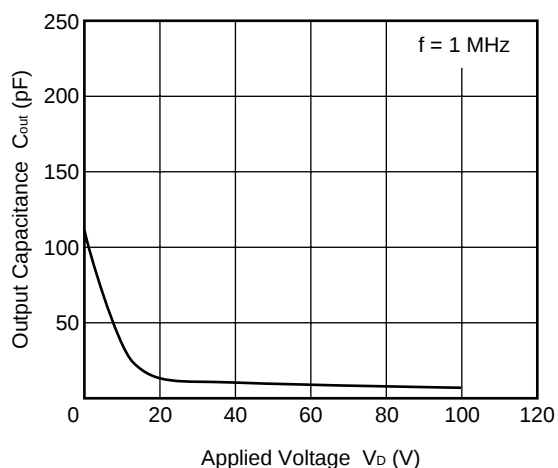
MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



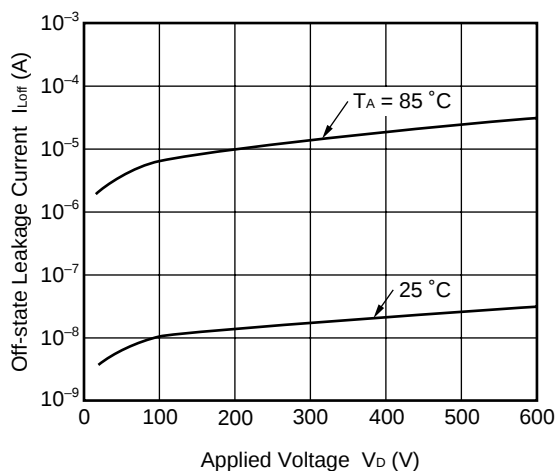
FORWARD VOLTAGE vs. AMBIENT TEMPERATURE



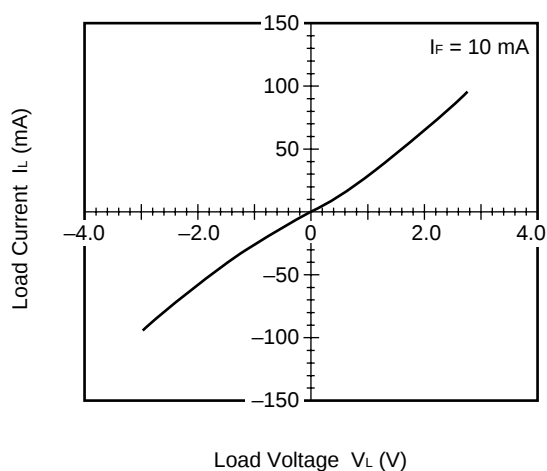
OUTPUT CAPACITANCE vs. APPLIED VOLTAGE



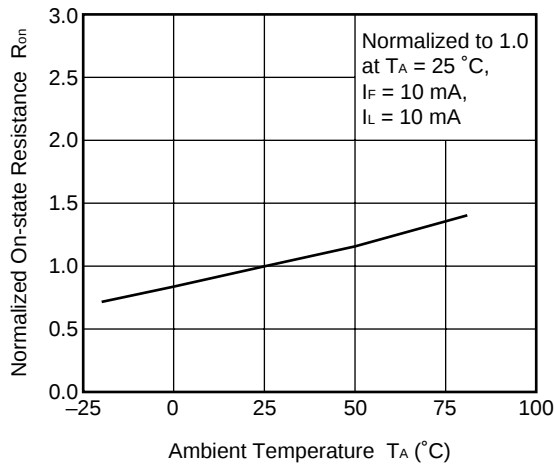
OFF-STATE LEAKAGE CURRENT vs. APPLIED VOLTAGE



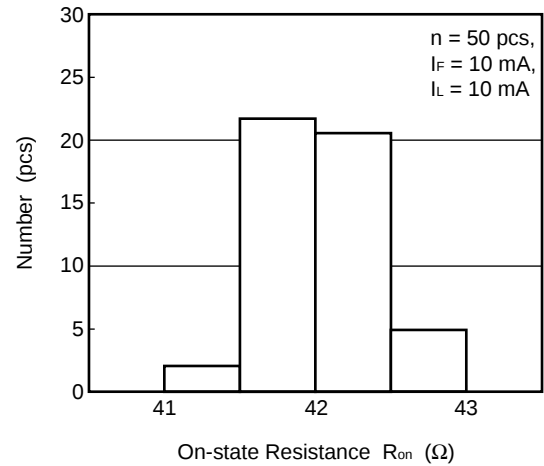
LORD CURRENT vs. LORD VOLTAGE



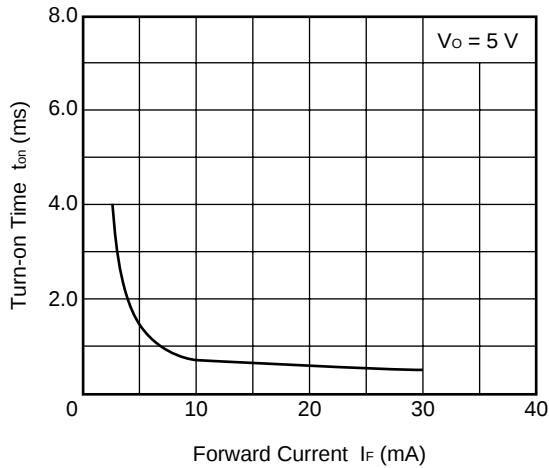
NORMALIZED ON-STATE RESISTANCE
vs. AMBIENT TEMPERATURE



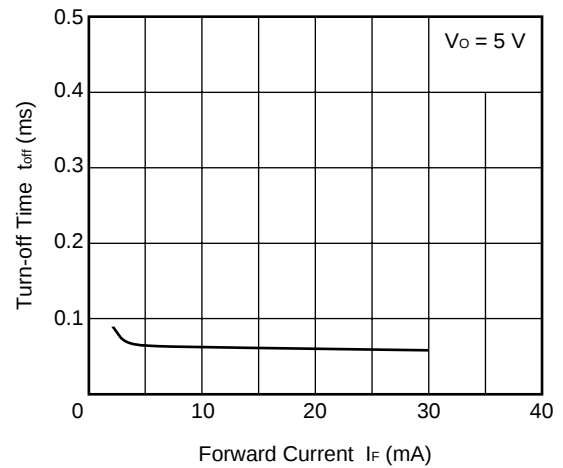
ON-STATE RESISTANCE DISTRIBUTION



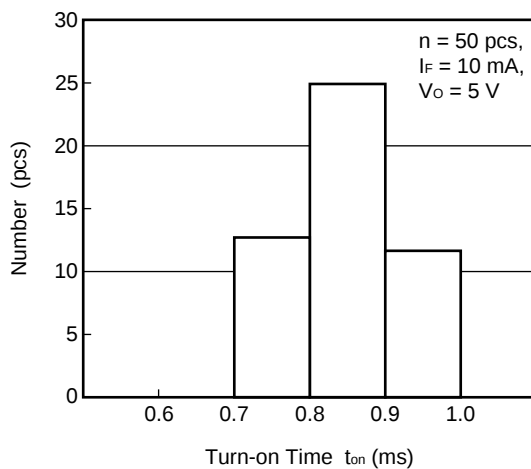
TURN-ON TIME vs. FORWARD CURRENT



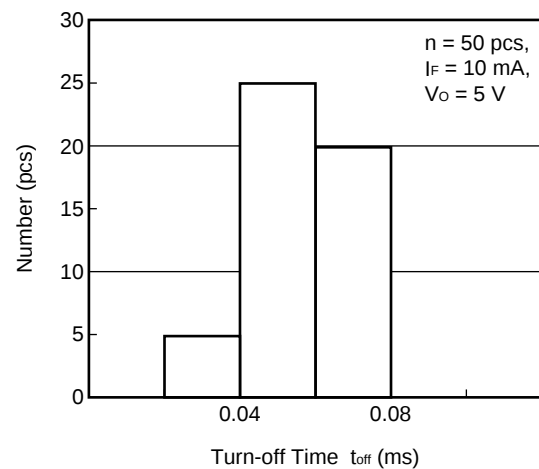
TURN-OFF TIME vs. FORWARD CURRENT



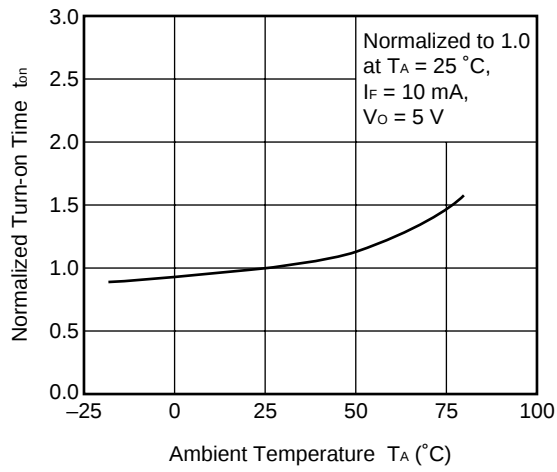
TURN-ON TIME DISTRIBUTION



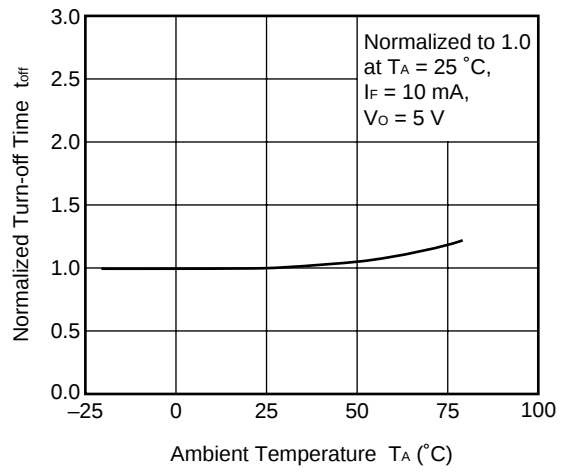
TURN-OFF TIME DISTRIBUTION



**NORMALIZED TURN-ON TIME vs.
AMBIENT TEMPERATURE**



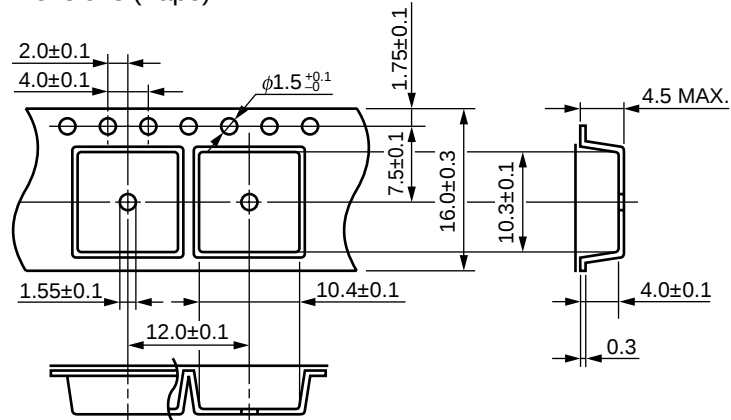
**NORMALIZED TURN-OFF TIME vs.
AMBIENT TEMPERATURE**



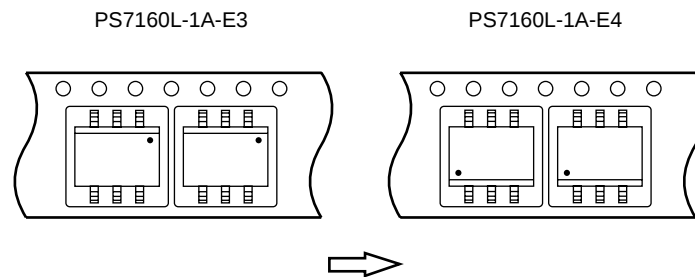
Remark The graphs indicate nominal characteristics.

★ TAPING SPECIFICATIONS (in millimeters)

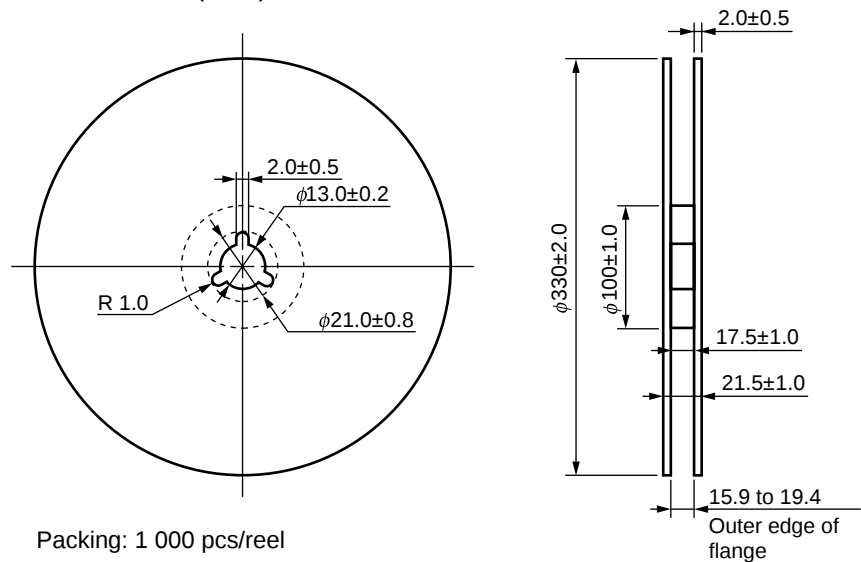
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)

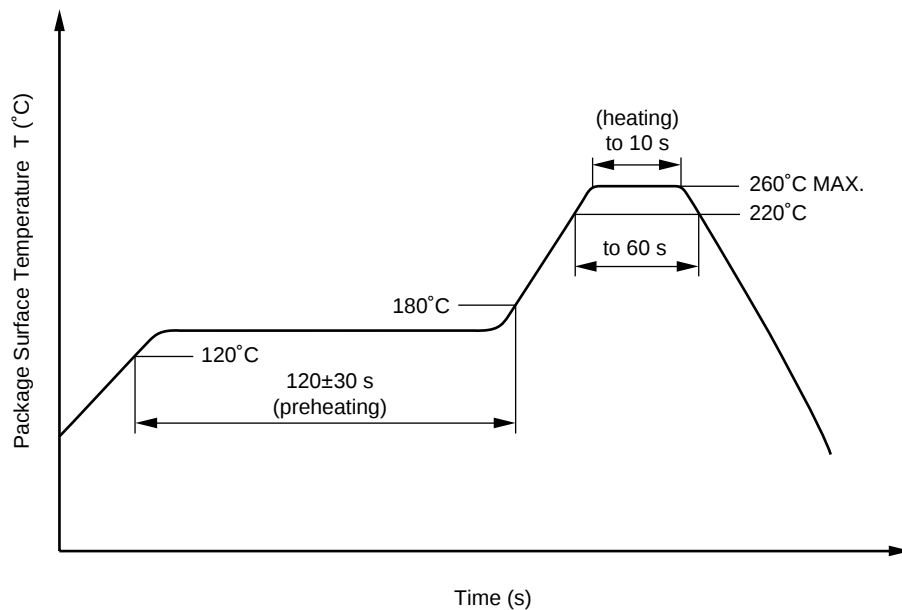


★ **RECOMMENDED SOLDERING CONDITIONS**

(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.) |

(3) Cautions

- Fluxes

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

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	
		-A	-AZ
Lead (Pb)	< 1000 PPM	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.

Important Information and Disclaimer: Information provided by CEL on its website or in other communications concerning the substance content of its products represents knowledge and belief as of the date that it is provided. CEL bases its knowledge and belief on information provided by third parties and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. CEL has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. CEL and CEL suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall CEL's liability arising out of such information exceed the total purchase price of the CEL part(s) at issue sold by CEL to customer on an annual basis.

See CEL Terms and Conditions for additional clarification of warranties and liability.