CEL

Solid State Relay
OCMOS FET

# PS710E-1A,PS710EL-1A

## 6-PIN DIP, 0.08 Ω LOW ON-STATE RESISTANCE 2.0 A CONTINUOUS LOAD CURRENT 1-ch Optical Coupled MOS FET

–NEPOC Series–

### DESCRIPTION

The PS710E-1A and PS710EL-1A are solid state relays containing a GaAs LED on the input side and MOS FETs on the output side.

It is suitable for PLC, etc. because of its large continuous load current and low on-state resistance.

The PS710EL-1A has a surface mount type lead.

### FEATURES

- Low on-state resistance ($R_{on}$ = 0.08 Ω TYP.)
- Large continuous load current ($I_L$ = 2.0 A)
- 1 channel type (1 a output)
- Low LED operating current ($I_F$ = 2 mA)
- Designed for AC/DC switching line changer
- Small package (6-pin DIP)
- Low offset voltage
- PS710EL-1A: Surface mount type

### APPLICATIONS

- Measurement equipment
- FA equipment



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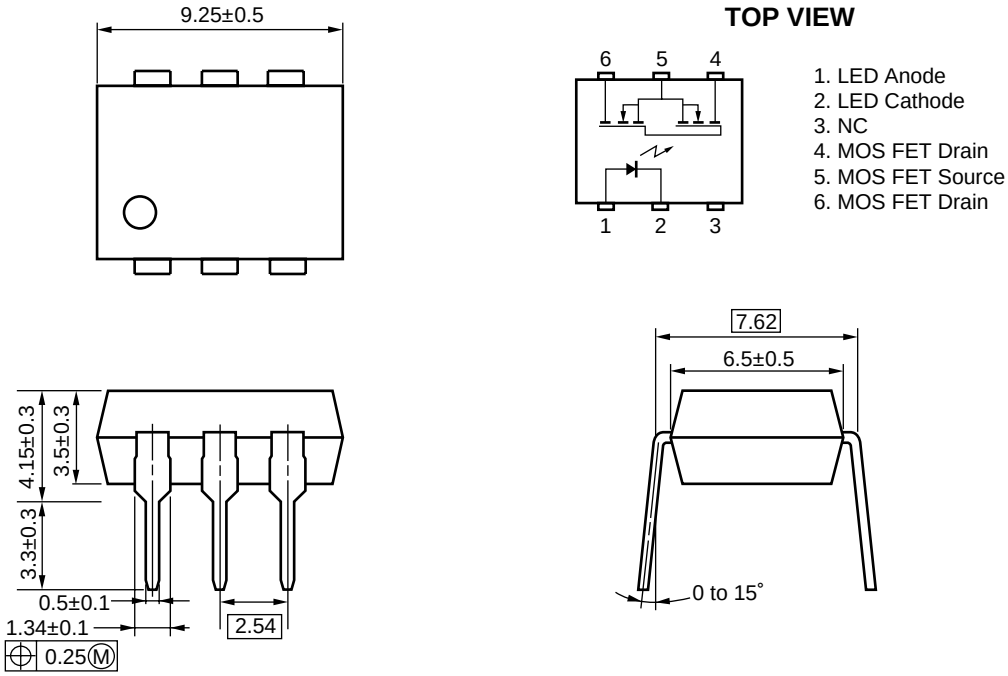
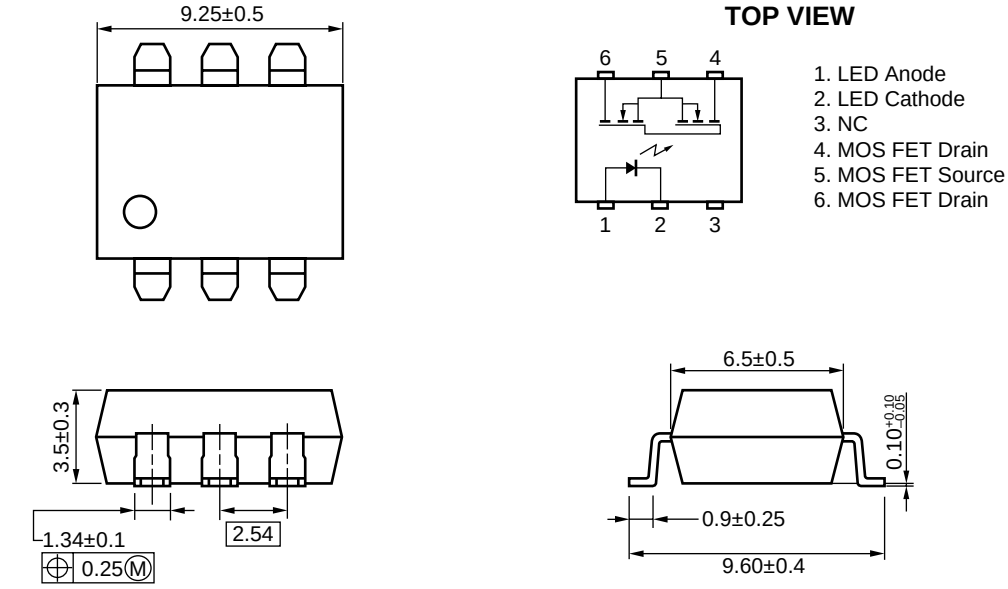
**PACKAGE DIMENSIONS (UNIT: mm)**

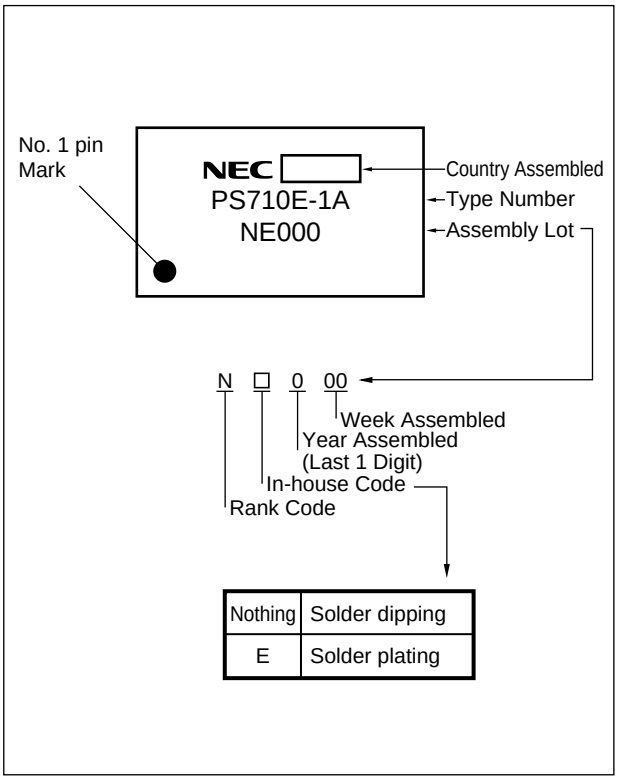
**PS710E-1A**




**PS710EL-1A**



**MARKING EXAMPLE**



## ORDERING INFORMATION (Solder Contains Lead)

| Part Number | Package | Packing Style | Application Part Number*1 |
|---|---|---|---|
| PS710E-1A | 6-pin DIP | Magazine case 50 pcs | PS710E-1A |
| PS710EL-1A | | | PS710EL-1A |
| PS710EL-1A-E3 | | Embossed tape 1 000 pcs/reel | |
| PS710EL-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 |
|---|---|---|---|
| PS710E-1A-A | 6-pin DIP | Magazine case 50 pcs | PS710E-1A |
| PS710EL-1A-A | | | PS710EL-1A |
| PS710EL-1A-E3-A | | Embossed tape 1 000 pcs/reel | |
| PS710EL-1A-E4-A | | | |

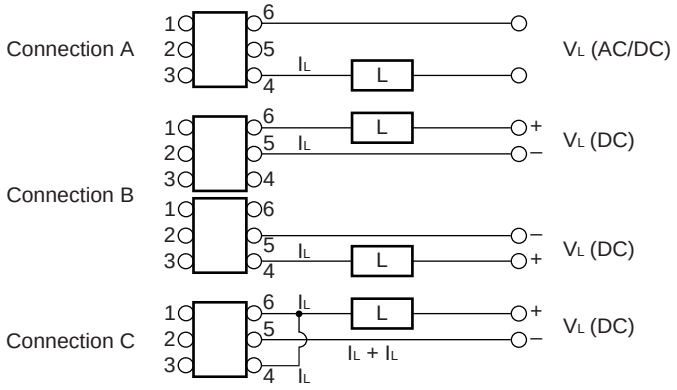
***1** For the application of the Safety Standard, following part number should be used.

## 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 | Load Voltage | | $V_L$ | 80 | V |
| | Continuous Load Current*2 | Connection A | $I_L$ | 2.0 | A |
| | | Connection B | | 3.0 | |
| | | Connection C | | 4.0 | |
| | Pulse Load Current*3 (AC/DC Connection) | | $I_{LP}$ | 4.0 | A |
| | Power Dissipation | | $P_D$ | 600 | mW |
| Isolation Voltage*4 | | | BV | 1 500 | Vr.m.s. |
| Total Power Dissipation | | | $P_T$ | 650 | 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

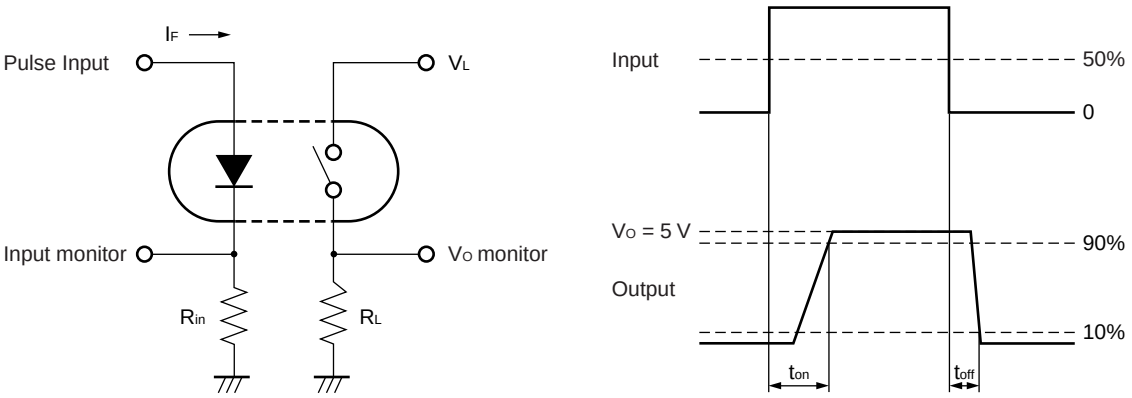
## RECOMMENDED OPERATING CONDITIONS ($T_A$ = 25°C)

| 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 |
|---|---|---|---|---|---|---|---|
| Diode | Forward Voltage | $V_F$ | $I_F$ = 10 mA | | 1.2 | 1.4 | V |
| | Reverse Current | $I_R$ | $V_R$ = 5 V | | | 5.0 | $\mu$A |
| MOS FET | Off-state Leakage Current | $I_{Loff}$ | $V_D$ = 80 V | | | 50 | nA |
| | Output Capacitance | $C_{out}$ | $V_D$ = 0 V, f = 1 MHz | | 480 | | pF |
| Coupled | LED On-state Current | $I_{Fon}$ | $I_L$ = 2.0 A | | | 2.0 | mA |
| | On-state Resistance | $R_{on}$ | $I_F$ = 10 mA, $I_L$ = 2.0 A, t ≤ 10 ms | | 0.083 | 0.15 | Ω |
| | Turn-on Time[*1, 2] | $t_{on}$ | $I_F$ = 10 mA, $V_O$ = 5 V, $R_L$ = 500 Ω, PW ≥ 10 ms | | 1.0 | 2.0 | ms |
| | Turn-off Time[*1, 2] | $t_{off}$ | | | 0.02 | 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 | | 0.5 | | pF |

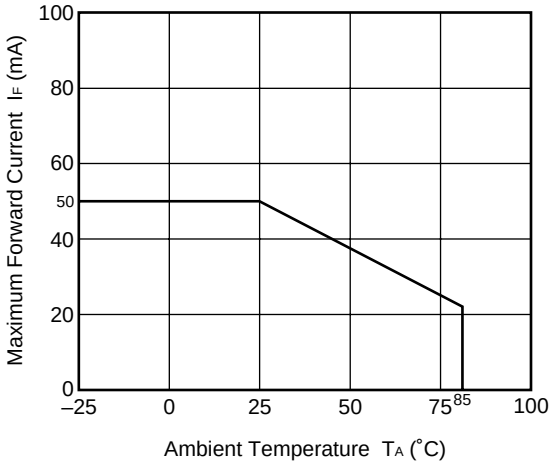
***1** Test Circuit for Switching Time



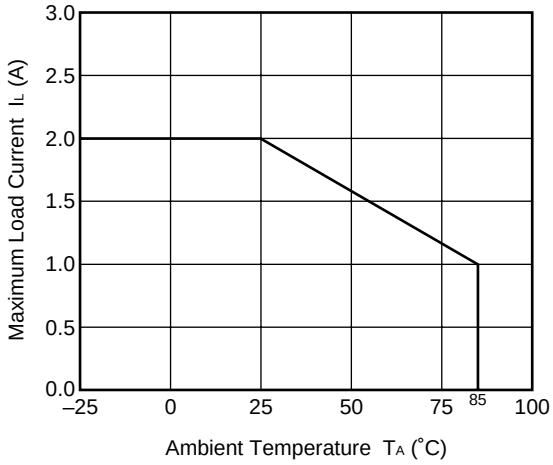

***2** The turn-on time and turn-off time are specified as input-pulse width ≥ 10 ms.
Be aware that when the device operates with an input-pulse width of under 10 ms, the turn-on time and turn-off time will increase.

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

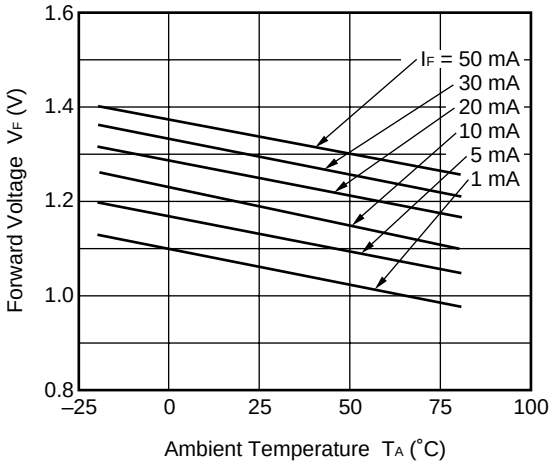
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



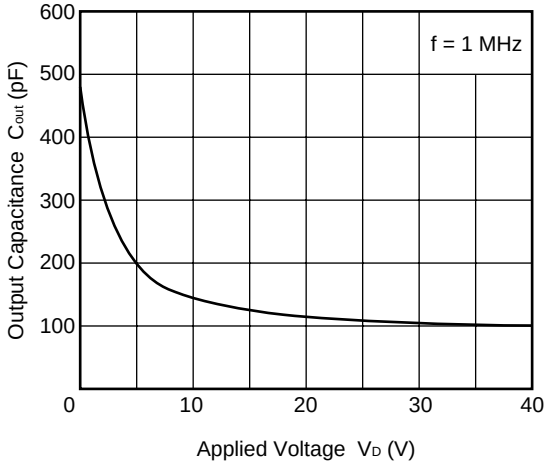

MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



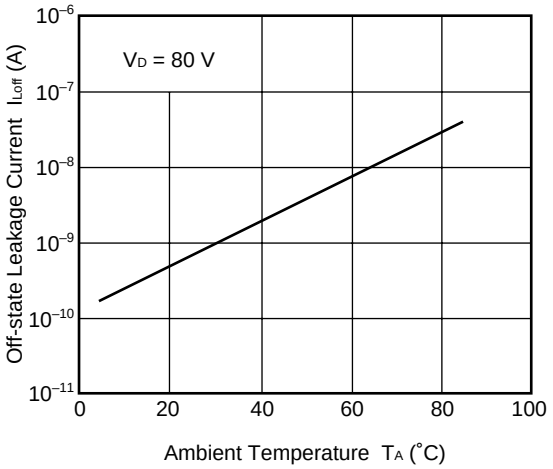

FORWARD VOLTAGE vs. AMBIENT TEMPERATURE



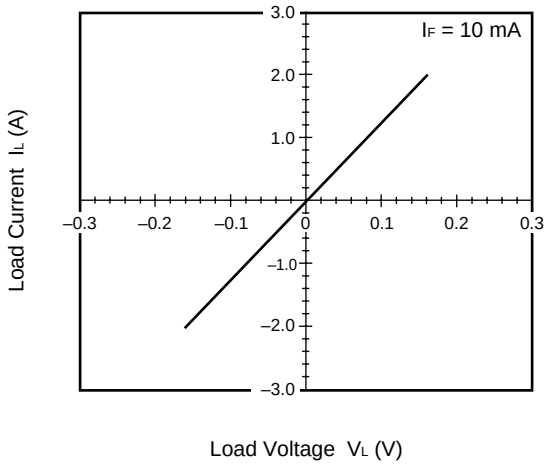

OUTPUT CAPACITANCE vs. APPLIED VOLTAGE



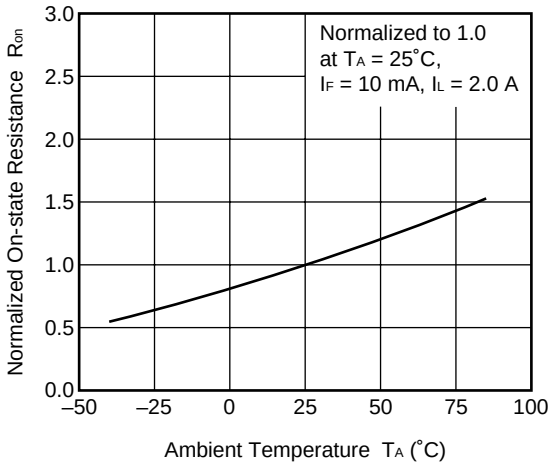

OFF-STATE LEAKAGE CURRENT vs. AMBIENT TEMPERATURE



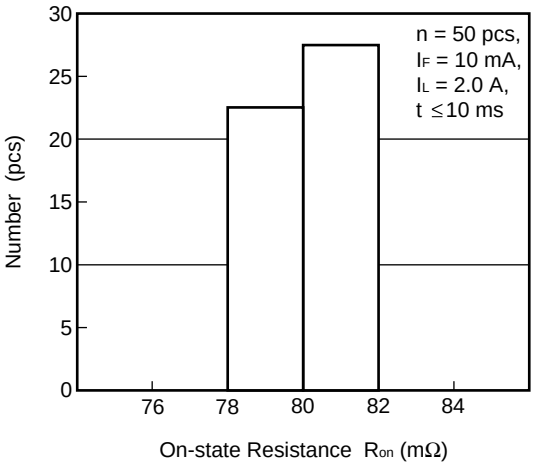

LOAD CURRENT vs. LOAD VOLTAGE



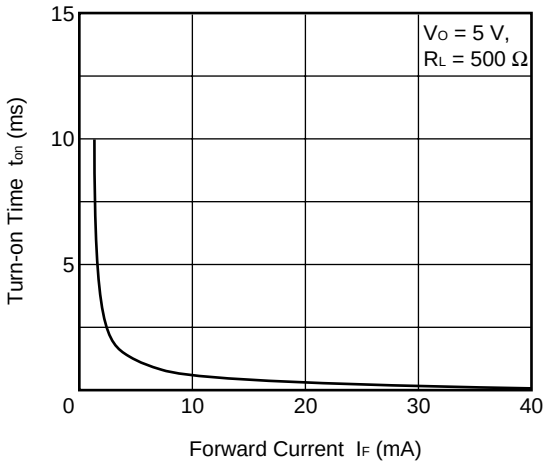
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



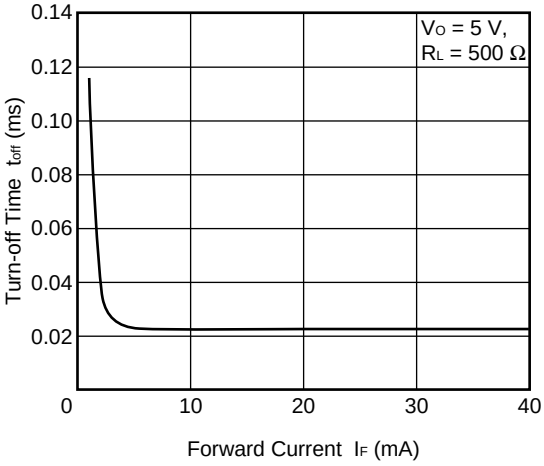

ON-STATE RESISTANCE DISTRIBUTION



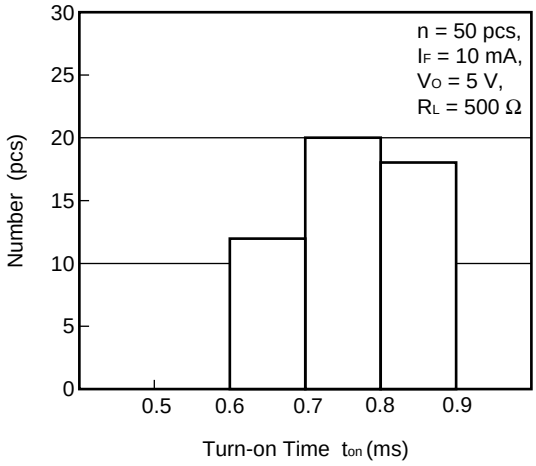

TURN-ON TIME vs. FORWARD CURRENT



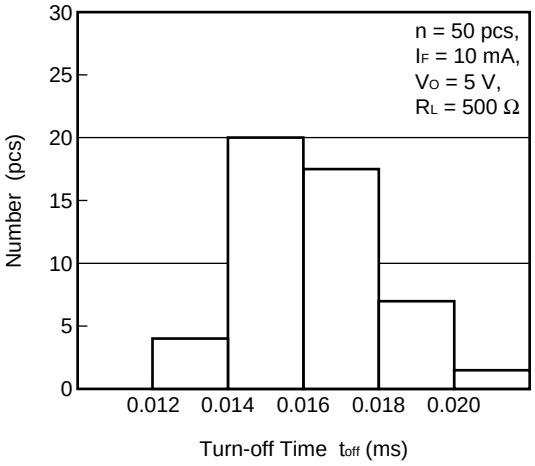

TURN-OFF TIME vs. FORWARD CURRENT



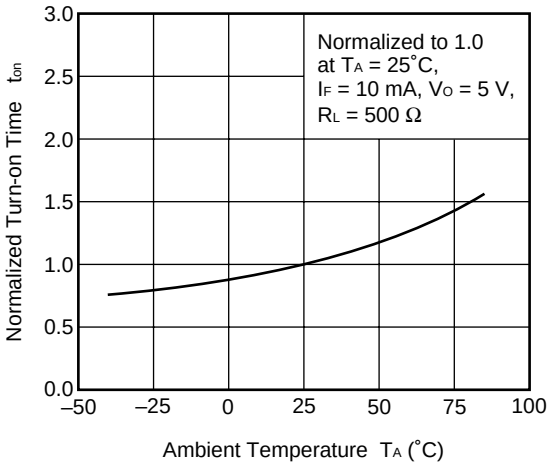

TURN-ON TIME DISTRIBUTION



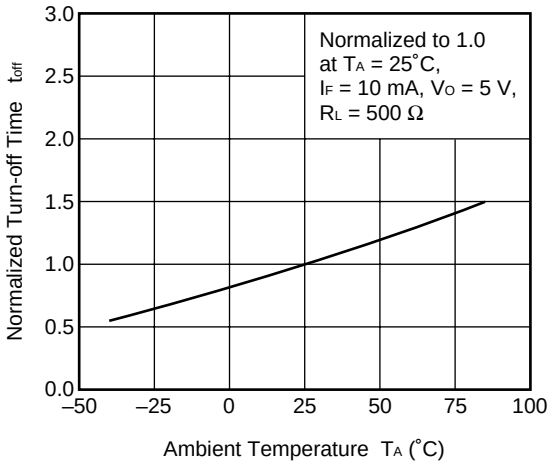

TURN-OFF TIME DISTRIBUTION



NORMALIZED TURN-ON TIME vs.
AMBIENT TEMPERATURE



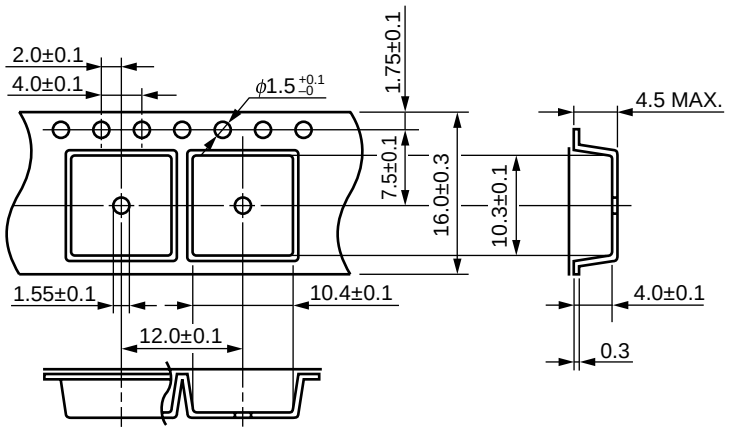

NORMALIZED TURN-OFF TIME vs.
AMBIENT TEMPERATURE



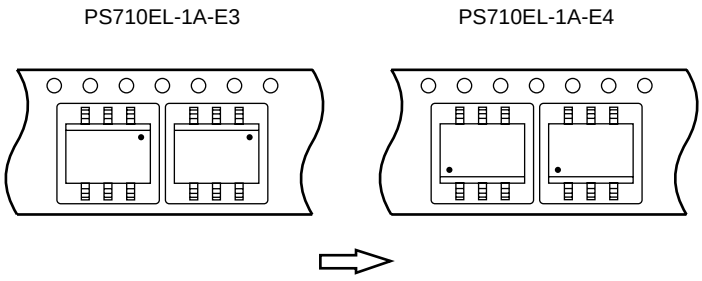

**Remark** The graphs indicate nominal characteristics.

**TAPING SPECIFICATIONS (UNIT: mm)**

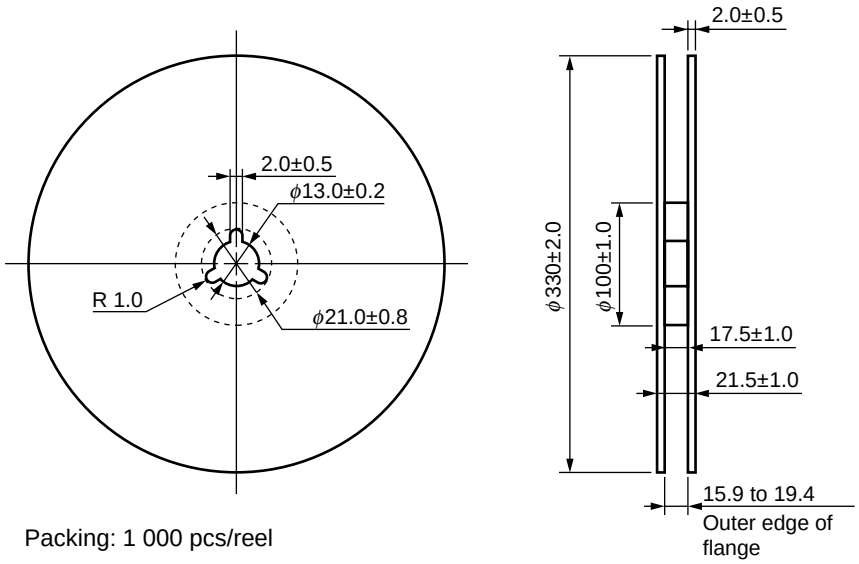
Outline and Dimensions (Tape)




Tape Direction




Outline and Dimensions (Reel)



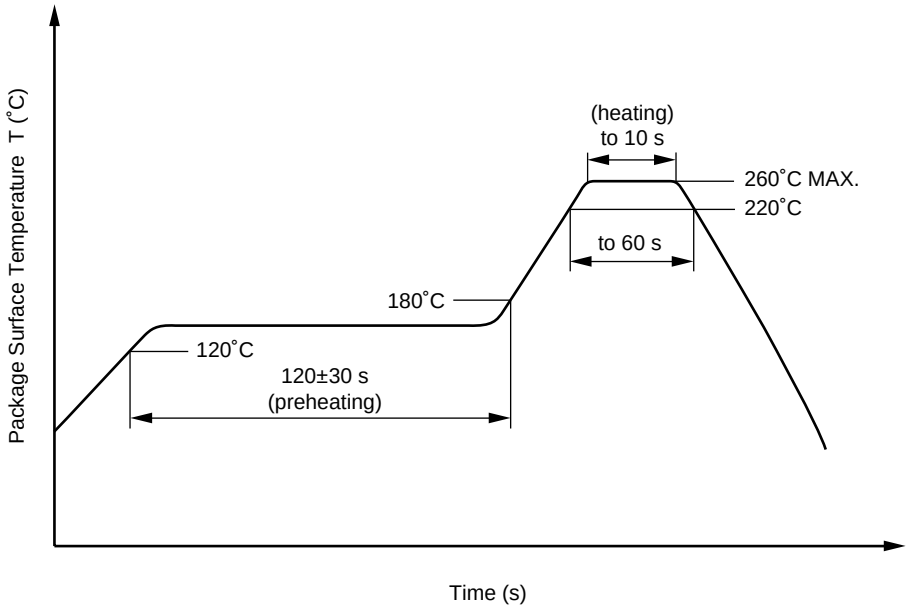

Packing: 1 000 pcs/reel

## 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.) |

**(3) Cautions**

• Fluxes

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

CEL California Eastern Laboratories

4590 Patrick Henry Drive
Santa Clara, CA 95054-1817
Telephone: (408) 919-2500
Facsimile: (408) 988-0279

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.