



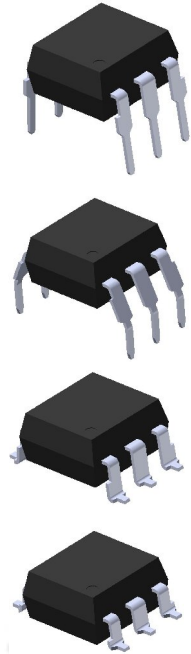
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# 6 PIN DIP RANDOM-PHASE TRIAC DRIVER PHOTOCOUPLER

EL301X Series  
EL302X Series  
EL305X Series

## Features:

- Peak breakdown voltage
  - 250V: EL301X
  - 400V: EL302X
  - 600V: EL305X
- High isolation voltage between input and output (Viso=5000 V rms )
- Compact dual-in-line package
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approved (No.132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CSA approved



## Description

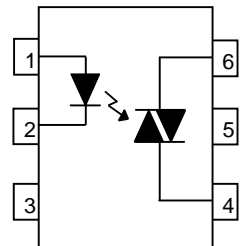
The EL301X, EL302X and EL305X series of devices each consist of a GaAs infrared emitting diode optically coupled to a monolithic silicon random phase photo Triac.

They are designed for interfacing between electronic controls and power triacs to control resistive and inductive loads for 115 to 240 VAC operations.

## Applications

- Solenoid/valve controls
- Lamp ballasts
- Static AC power switch
- Interfacing microprocessors to 115 to 240Vac peripherals
- Incandescent lamp dimmers
- Temperature controls
- Motor controls

## Schematic



## Pin Configuration

1. Anode
2. Cathode
3. No Connection
4. Terminal
5. Substrate (do not connect)
6. Terminal



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**EL301X Series**  
**EL302X Series**  
**EL305X Series**

## Absolute Maximum Ratings (T<sub>a</sub>=25°C)

| Parameter                           |                                                   | Symbol           | Rating   | Unit  |     |
|-------------------------------------|---------------------------------------------------|------------------|----------|-------|-----|
| Input                               | Forward current                                   | I <sub>F</sub>   | 60       | mA    |     |
|                                     | Reverse voltage                                   | V <sub>R</sub>   | 6        | V     |     |
|                                     | Power dissipation<br>Derating factor (above 85°C) | P <sub>D</sub>   | 100      | mW    |     |
|                                     | 3.8                                               |                  | mW /°C   |       |     |
| Output                              | Off-state Output Terminal<br>Voltage              | V <sub>DRM</sub> | 250      | V     |     |
|                                     |                                                   |                  | EL301X   |       | 400 |
|                                     |                                                   |                  | EL302X   |       | 600 |
|                                     | Peak Repetitive Surge Current                     | I <sub>TSM</sub> | 1        | A     |     |
|                                     | Power dissipation<br>Derating factor (above 85°C) | P <sub>D</sub>   | 300      | mW    |     |
|                                     | 7.4                                               |                  | mW /°C   |       |     |
| Isolation voltage <sup>*1</sup>     |                                                   | V <sub>iso</sub> | 5000     | V rms |     |
| Total power dissipation             |                                                   | P <sub>D</sub>   | 330      | mW    |     |
| Operating temperature               |                                                   | T <sub>opr</sub> | -55~+100 | °C    |     |
| Storage temperature                 |                                                   | T <sub>stg</sub> | -55~+125 | °C    |     |
| Soldering temperature <sup>*2</sup> |                                                   | T <sub>sol</sub> | 260      | °C    |     |

### Notes

\*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 & 3 are shorted together, and pins 4, 5 & 6 are shorted together.

\*2 For 10 seconds.



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## Electrical Characteristics (T<sub>a</sub>=25°C unless specified otherwise)

### Input

| Parameter               | Symbol         | Min. | Typ.* | Max. | Unit | Condition             |
|-------------------------|----------------|------|-------|------|------|-----------------------|
| Forward voltage         | V <sub>F</sub> | -    | 1.18  | 1.5  | V    | I <sub>F</sub> = 10mA |
| Reverse Leakage current | I <sub>R</sub> | -    | -     | 10   | μA   | V <sub>R</sub> = 6V   |

### Output

| Parameter                               | Symbol           | Min.  | Typ.* | Max. | Unit | Condition                                                             |                                                                           |
|-----------------------------------------|------------------|-------|-------|------|------|-----------------------------------------------------------------------|---------------------------------------------------------------------------|
| Peak Blocking Current                   | I <sub>DRM</sub> | -     | -     | 100  | nA   | V <sub>DRM</sub> = Rated V <sub>DRM</sub><br>I <sub>F</sub> = 0mA     |                                                                           |
| Peak On-state Voltage                   | V <sub>TM</sub>  | -     | -     | 2.5  | V    | I <sub>TM</sub> =100mA peak,<br>I <sub>F</sub> =Rated I <sub>FT</sub> |                                                                           |
| Critical Rate of Rise off-state Voltage | EL301X<br>EL302X | dv/dt | -     | 100  | -    | V/μs                                                                  | V <sub>PEAK</sub> =Rated V <sub>DRM</sub> , I <sub>F</sub> =0<br>(Fig. 8) |
|                                         | EL305X           |       | 1000  | -    | -    |                                                                       |                                                                           |

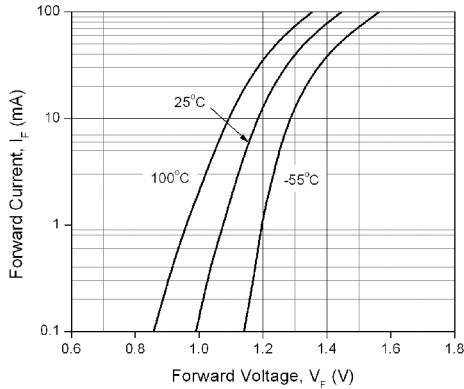
### Transfer Characteristics

| Parameter           | Symbol                     | Min. | Typ.* | Max. | Unit | Condition                |
|---------------------|----------------------------|------|-------|------|------|--------------------------|
| LED Trigger Current | EL3020                     | -    | -     | 30   | mA   | Main terminal Voltage=3V |
|                     | EL3010<br>EL3021<br>EL3051 | -    | -     | 15   |      |                          |
|                     | EL3011<br>EL3022<br>EL3052 | -    | -     | 10   |      |                          |
|                     | EL3012<br>EL3023<br>EL3053 | -    | -     | 5    |      |                          |
| Holding Current     | I <sub>H</sub>             | -    | 250   | -    | μA   |                          |

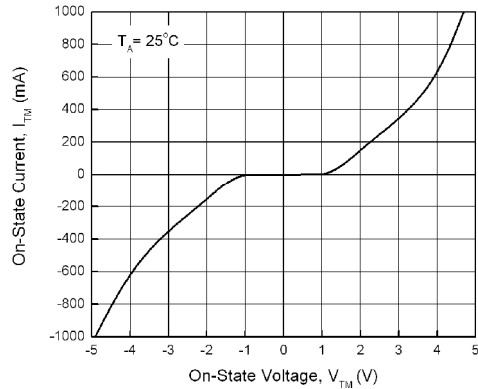
\* Typical values at T<sub>a</sub> = 25°C

**Typical Performance Curves**

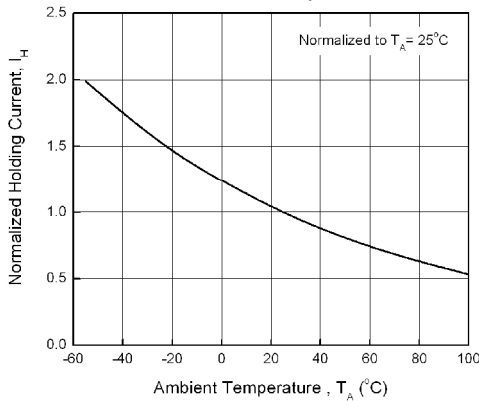
**Figure 1. Forward Current vs Forward Voltage**



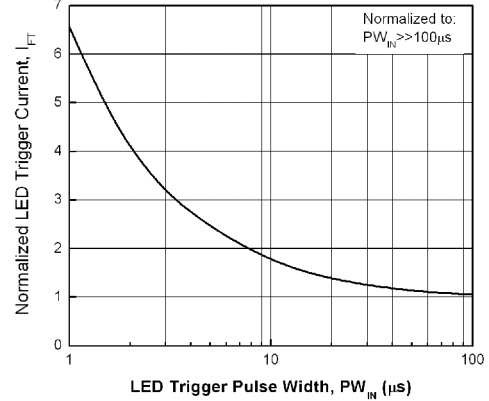
**Figure 2. On-State Characteristics**



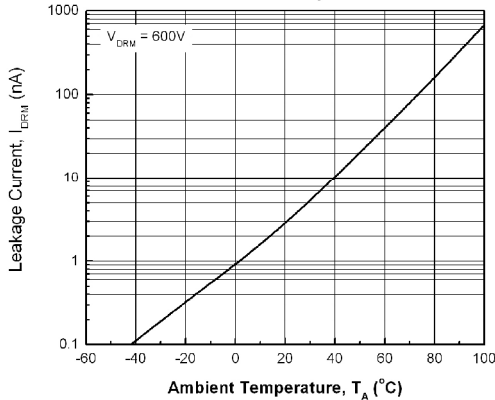
**Figure 3. Holding Current vs. Ambient Temperature**



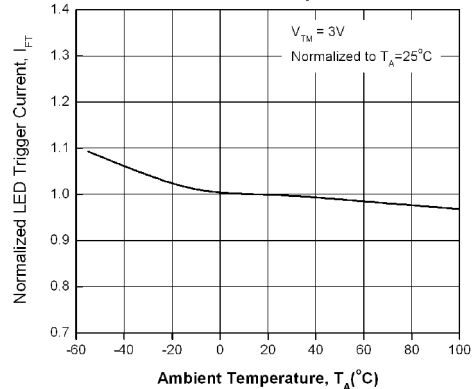
**Figure 4. LED Current Required to Trigger vs. LED Pulse Width**



**Figure 5. Leakage Current vs. Ambient Temperature**



**Figure 6. LED Trigger Current vs. Ambient Temperature**



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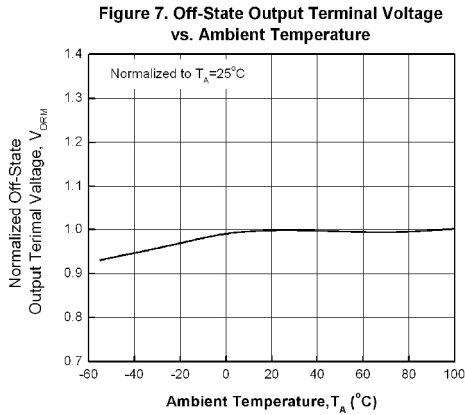
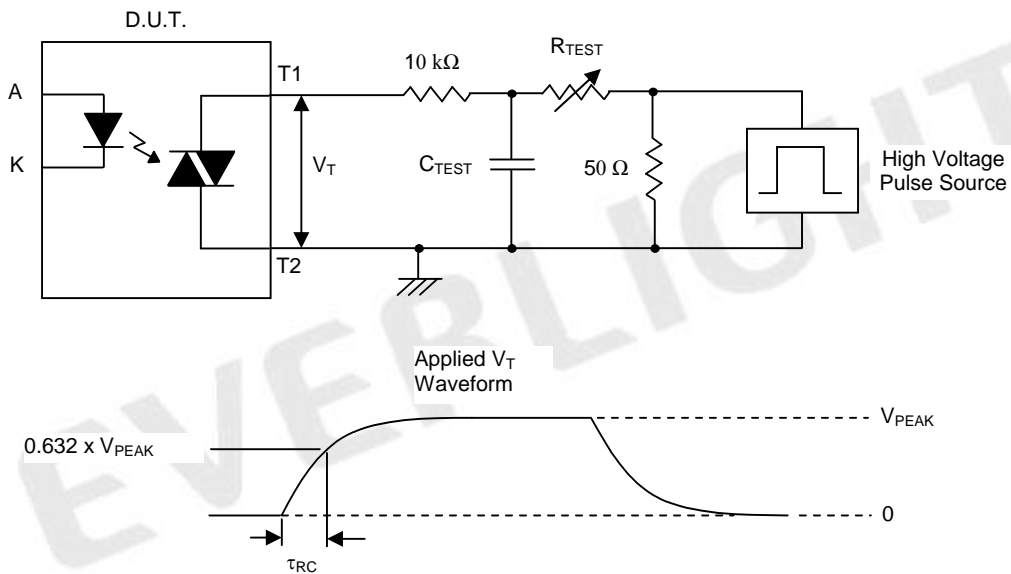


Figure 8. Static dv/dt Test Circuit & Waveform



## Measurement Method

The high voltage pulse is set to the required  $V_{PEAK}$  value and applied to the D.U.T. output side through the RC circuit above. LED current is not applied. The waveform  $V_T$  is monitored using a x100 scope probe. By varying  $R_{TEST}$ , the  $dv/dt$  (slope) is increased, until the D.U.T. is observed to trigger (waveform collapses). The  $dv/dt$  is then decreased until the D.U.T. stops triggering. At this point,  $\tau_{RC}$  is recorded and the  $dv/dt$  calculated.

$$dv/dt = \frac{0.632 \times V_{PEAK}}{\tau_{RC}}$$

~~For example,  $V_{PEAK} = 400V$  for EL302X series. The  $dv/dt$  value is calculated as follows:~~



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**EL305X Series**

$$dv/dt = \frac{0.63 \times 400}{\tau_{RC}} = \frac{252}{\tau_{RC}}$$

## Order Information

### Part Number

**EL301XY(Z)-V**  
or **EL302XY(Z)-V**  
or **EL305XY(Z)-V**

#### Note

X = Part No. for EL301x (0, 1 or 2)

X = Part No. for EL302x (0, 1, 2 or 3)

X = Part No. for EL305x (1, 2 or 3)

Y = Lead form option (S, S1, M or none)

Z = Tape and reel option (TA, TB or none).

V = VDE safety approved (optional)

| Option  | Description                                                   | Packing quantity    |
|---------|---------------------------------------------------------------|---------------------|
| None    | Standard DIP-6                                                | 65 units per tube   |
| M       | Wide lead bend (0.4 inch spacing)                             | 65 units per tube   |
| S (TA)  | Surface mount lead form + TA tape & reel option               | 1000 units per reel |
| S (TB)  | Surface mount lead form + TB tape & reel option               | 1000 units per reel |
| S1 (TA) | Surface mount lead form (low profile) + TA tape & reel option | 1000 units per reel |
| S1 (TB) | Surface mount lead form (low profile) + TB tape & reel option | 1000 units per reel |

## Package Drawings



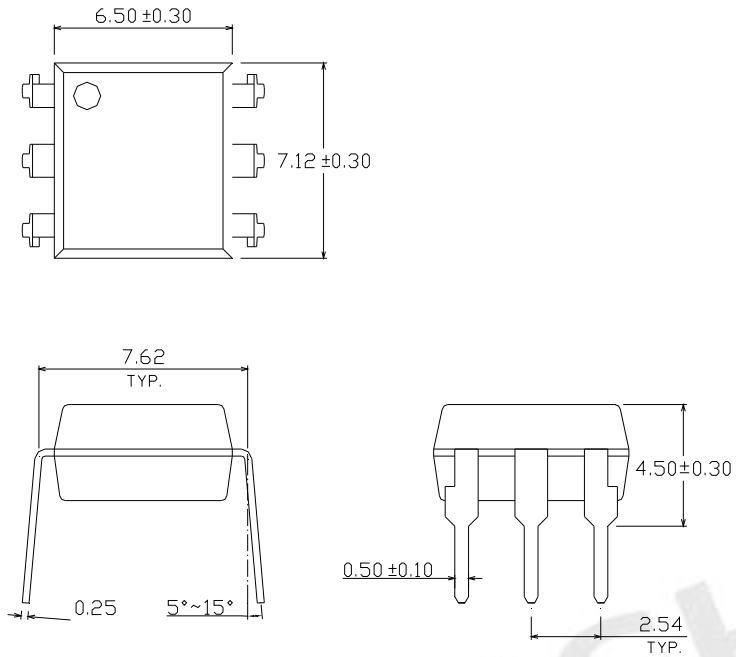
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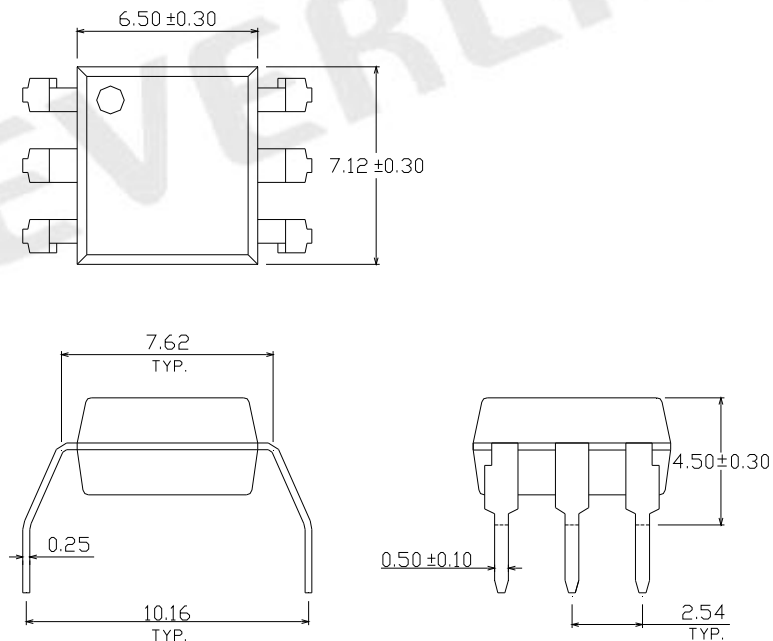
EL301X Series  
EL302X Series  
EL305X Series

(Dimensions in mm)

## Standard DIP Type



## Option M Type



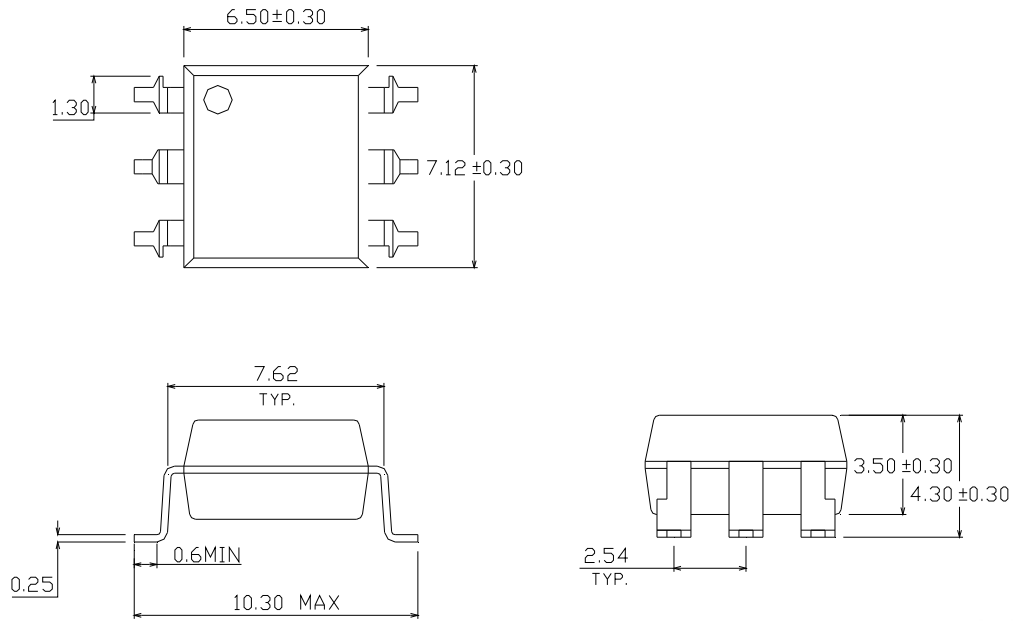
## Option S Type



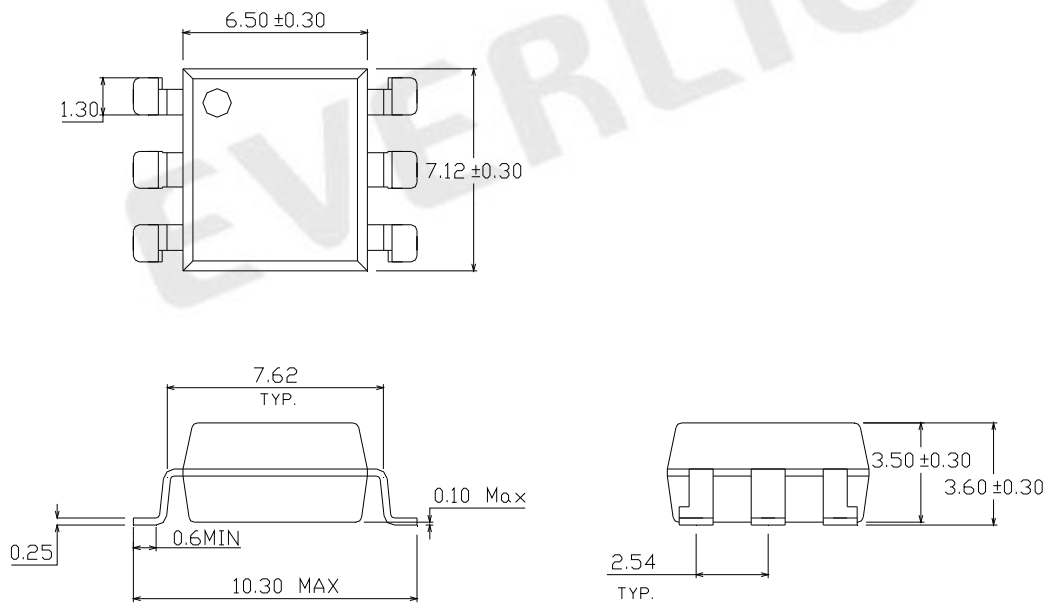
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## Option S1 Type



### Recommended pad layout for surface mount leadform

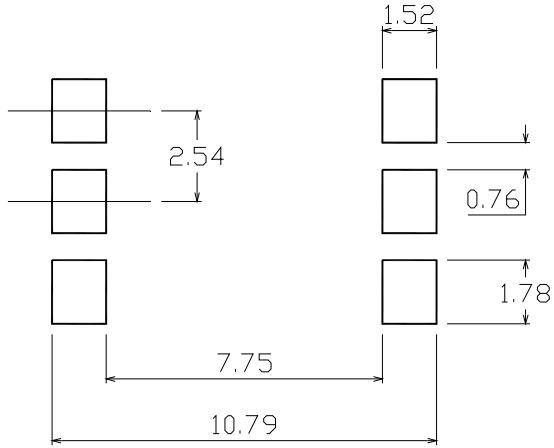




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EL305X Series



## Device Marking

Anode mark



## Notes

- EL denotes Everlight
- 3053 denotes Device Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE option

## Tape & Reel Packing Specifications

Everlight Electronics Co., Ltd.  
Document No : DPC-0000059

Rev. 2

9

<http://www.everlight.com>  
June 14, 2010

Revision : 2

Release Date:2010-06-23 18:53:44.0

LifecyclePhase:正式發行

Expired Period: Forever

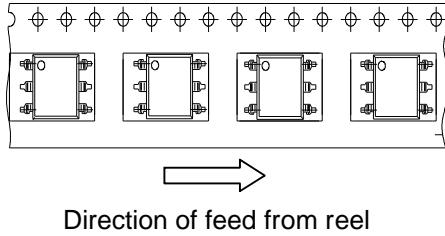


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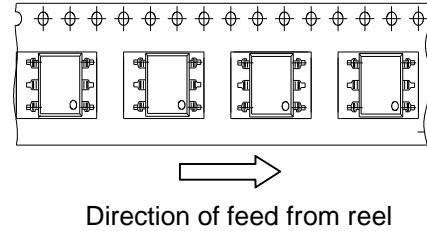
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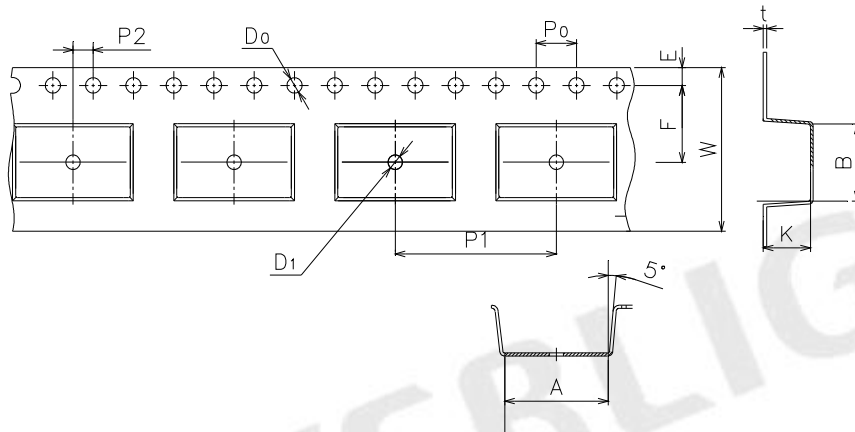
**Option TA**



**Option TB**



## Tape dimensions



| Dimension No.  | A        | B        | Do         | D1         | E        | F       |
|----------------|----------|----------|------------|------------|----------|---------|
| Dimension (mm) | 10.4±0.1 | 7.52±0.1 | 1.5+0.1/-0 | 1.5+0.1/-0 | 1.75±0.1 | 7.5±0.1 |

| Dimension No.  | Po       | P1      | P2      | t         | W        | K       |
|----------------|----------|---------|---------|-----------|----------|---------|
| Dimension (mm) | 4.0±0.15 | 1.6±0.1 | 2.0±0.1 | 0.35±0.03 | 16.0±0.2 | 4.5±0.1 |

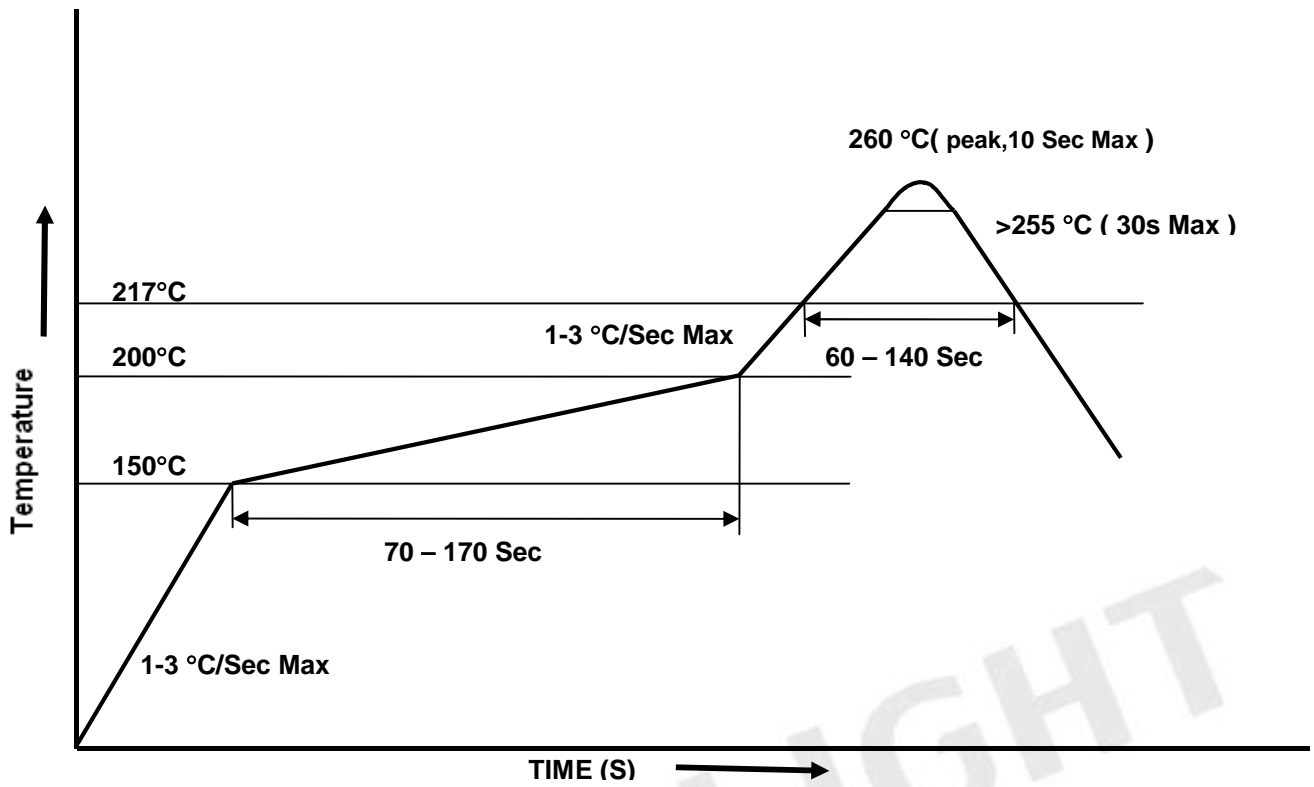
## Solder Reflow Temperature Profile



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## 6 PIN DIP RANDOM-PHASE TRIAC DRIVER PHOTOCOUPLER

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