

# 6 PIN DIP ZERO CROSS TRIAC DRIVER PHOTOCOUPLER

**EL303X Series**  
**EL304X Series**  
**EL306X Series**  
**EL308X Series**

## Features:

- Peak breakdown voltage
  - 250V: EL303X
  - 400V: EL304X
  - 600V: EL306X
  - 800V: EL308X
- High isolation voltage between input and output (Viso=5000 V rms )
- Zero voltage crossing
- Pb free and RoHS compliant.
- UL approved (No.E214129)
- VDE approved (No.132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CSA approved



## Description

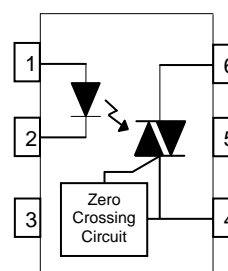
The EL303X, EL304X, EL306X and EL308X series of devices each consist of a GaAs infrared emitting diode optically coupled to a monolithic silicon zero voltage crossing photo triac.

They are designed for use with a discrete power triac in the interface of logic systems to equipment powered from 110 to 380 VAC lines, such as solid-state relays, industrial controls, motors, solenoids and consumer appliances.

## Applications

- Solenoid/valve controls
- Light controls
- Static power switch
- AC motor drivers
- E.M. contactors
- Temperature controls
- AC Motor starters

## Schematic



## Pin Configuration

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



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## 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	P <sub>D</sub>	100	mW	
	Derating factor (above 85°C)		3.8	mW /°C	
Output	Off-state Output Terminal Voltage	V <sub>DRM</sub>	EL303X	250	V
			EL304X	400	
			EL306X	600	
			EL308X	800	
	Peak Repetitive Surge Current	I <sub>TSM</sub>	1	A	
	Power dissipation	P <sub>D</sub>	300	mW	
Derating factor (above 85°C)	7.6		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>	-	-	1.5	V	I <sub>F</sub> = 30mA
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	EL303X/304X	-	-	100	nA	V <sub>DRM</sub> = Rated V <sub>DRM</sub> I <sub>F</sub> = 0mA
	EL306X/308X			500		
Peak On-state Voltage	V <sub>TM</sub>	-	-	3	V	I <sub>TM</sub> =100mA peak, I <sub>F</sub> =Rated I <sub>FT</sub>
Critical Rate of Rise of off-state Voltage	EL303X /304X /306X	1000	-	-	V/μs	V <sub>PEAK</sub> =Rated V <sub>DRM</sub> , I <sub>F</sub> =0 (Fig. 10)
	EL308X	600	-	-		
Inhibit Voltage (MT1-MT2 voltage above which device will not trigger)	V <sub>INH</sub>	-	-	20	V	I <sub>F</sub> = Rated I <sub>FT</sub>
Leakage in Inhibited State	I <sub>DRM2</sub>	-	-	500	μA	I <sub>F</sub> = Rated I <sub>FT</sub> , V <sub>DRM</sub> =Rated V <sub>DRM</sub> , off state

### Transfer Characteristics

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
LED Trigger Current	I <sub>FT</sub>	-	-	15	mA	Main terminal Voltage=3V
				10		
				5		
Holding Current	I <sub>H</sub>	-	280	-	μA	

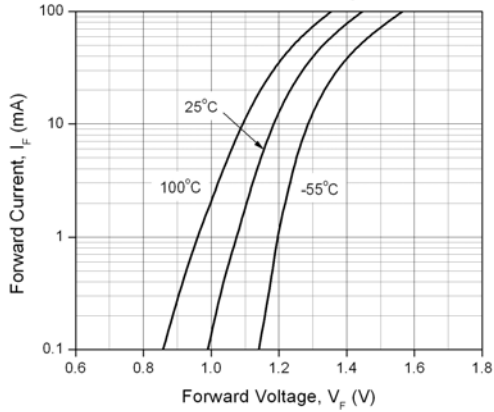
\* Typical values at T<sub>a</sub> = 25°C

**6 PIN DIP ZERO CROSS TRIAC DRIVER  
PHOTOCOUPLER**

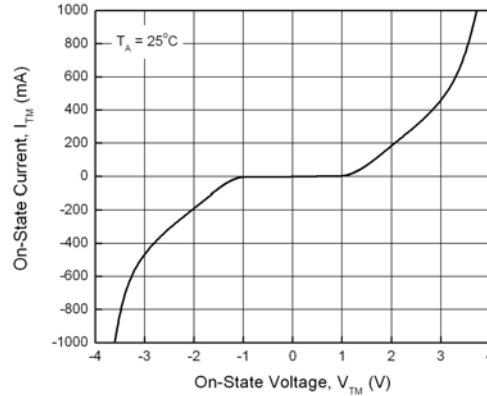
**EL303X Series  
EL304X Series  
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**Typical Performance Curves**

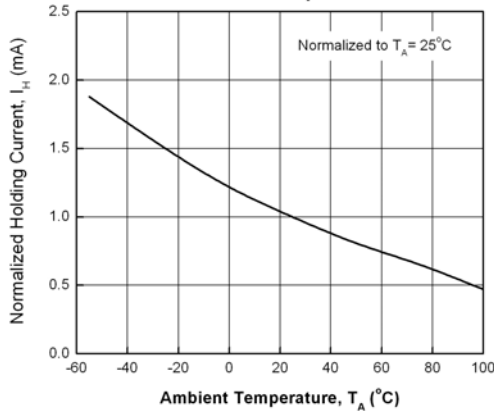
**Figure 1. Forward Current vs Forward Voltage**



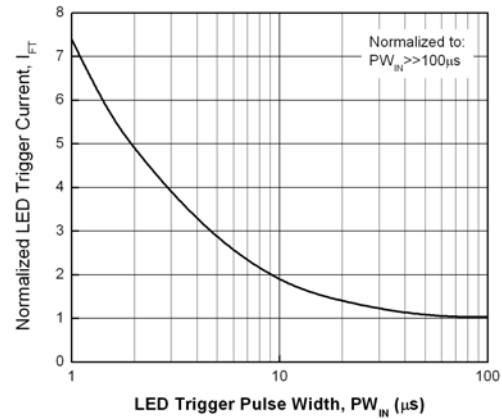
**Figure 2. On-State Characteristics**



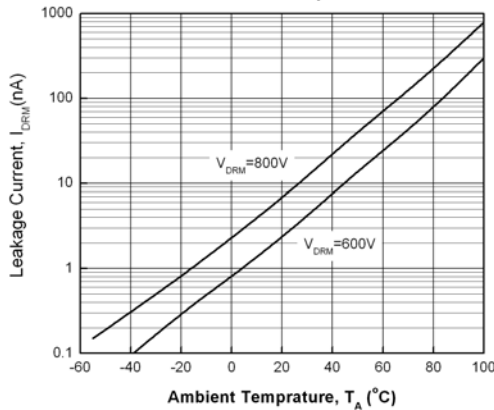
**Figure 3. Holding Current vs. Ambient Temperature**



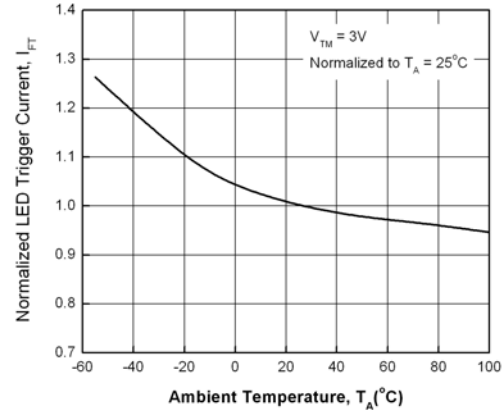
**Figure 4. LED Current Required to Trigger vs. LED Pulse Width**



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



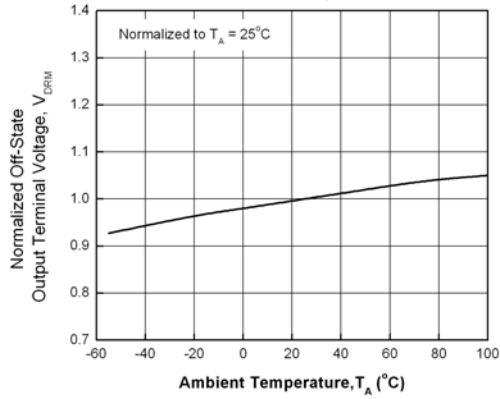
**Figure 6. LED Trigger Current vs. Ambient Temperature**



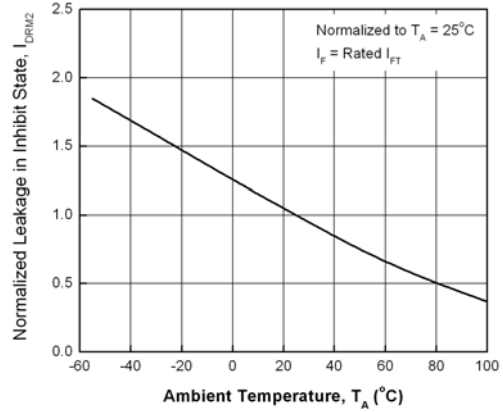
**6 PIN DIP ZERO CROSS TRIAC DRIVER  
PHOTOCOUPLER**

**EL303X Series  
EL304X Series  
EL306X Series  
EL308X Series**

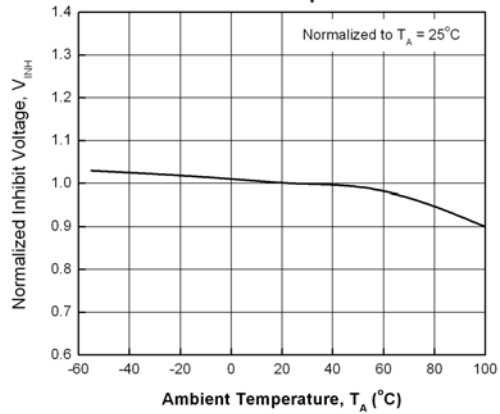
**Figure 7. Off-State Output Terminal Voltage vs. Ambient Temperature**



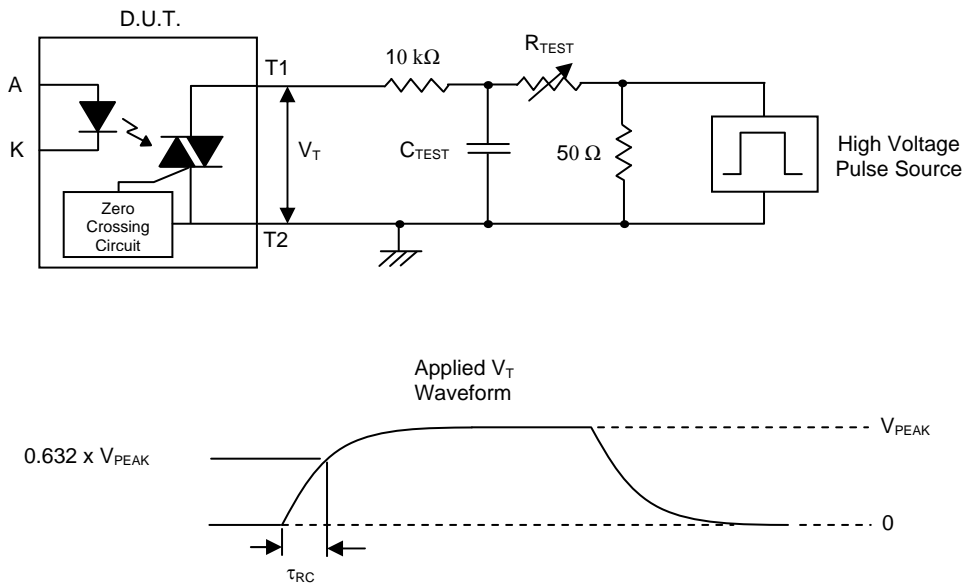
**Figure 8. Leakage in Inhibit State vs. Ambient Temperature**



**Figure 9. Inhibit Voltage vs. Ambient Temperature**



**Figure 10. 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,  $V_{PEAK} = 600V$  for EL306X series. The  $dv/dt$  value is calculated as follows:

$$dv/dt = \frac{0.63 \times 600}{\tau_{RC}} = \frac{378}{\tau_{RC}}$$



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## Order Information

### Part Number

**EL303XY(Z)-V**  
or **EL304XY(Z)-V**  
or **EL306XY(Z)-V**  
or **EL308XY(Z)-V**

#### Note

X = Part No. (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 option

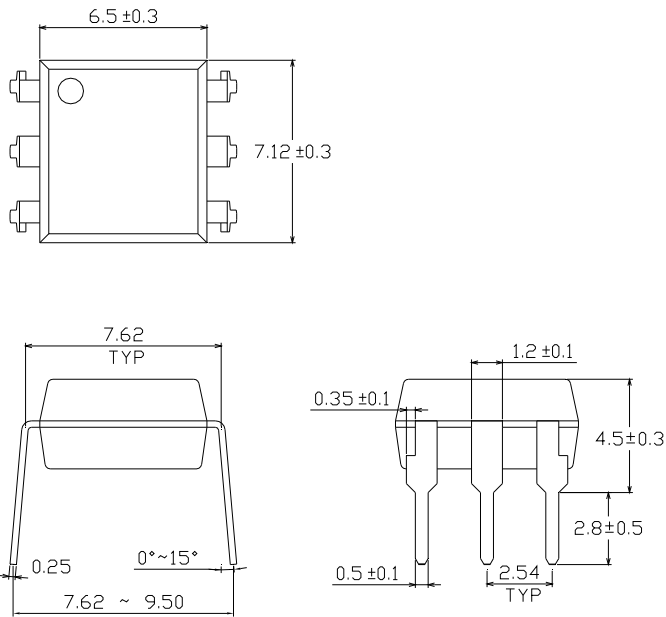
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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

**6 PIN DIP ZERO CROSS TRIAC DRIVER  
PHOTOCOUPLER**

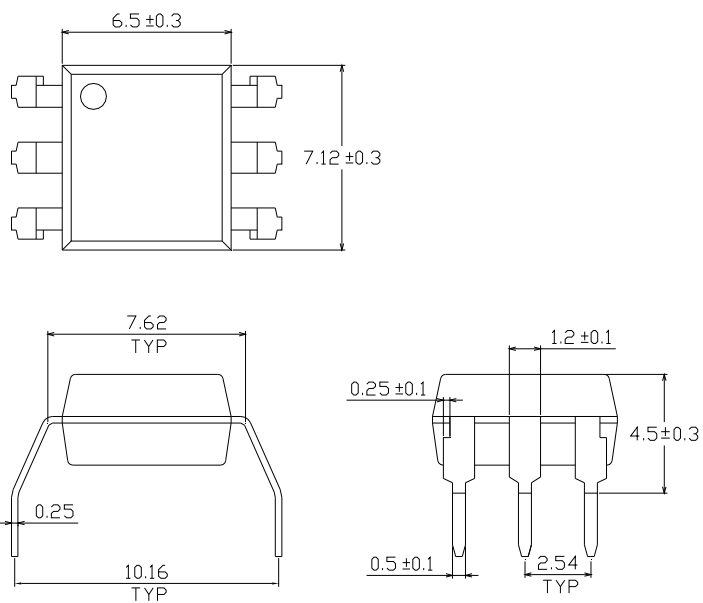
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**Package Drawings  
(Dimensions in mm)**

**Standard DIP Type**



**Option M Type**

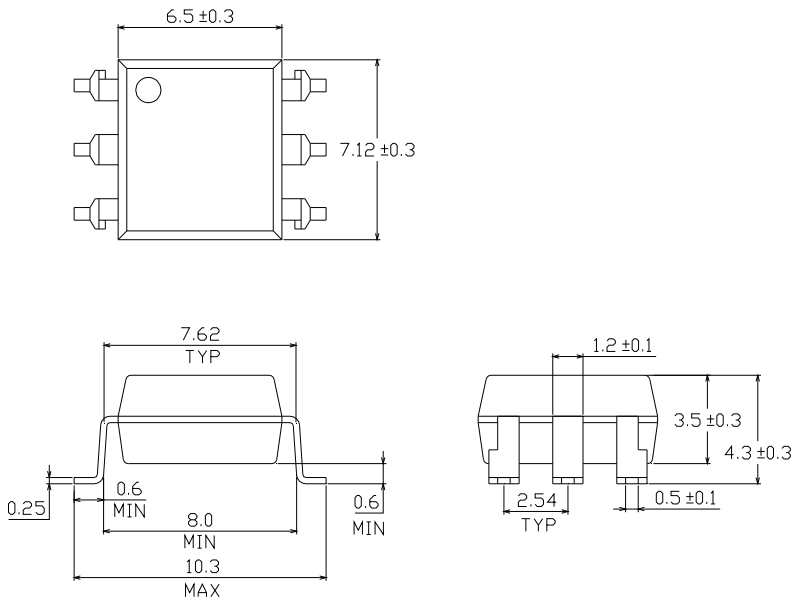




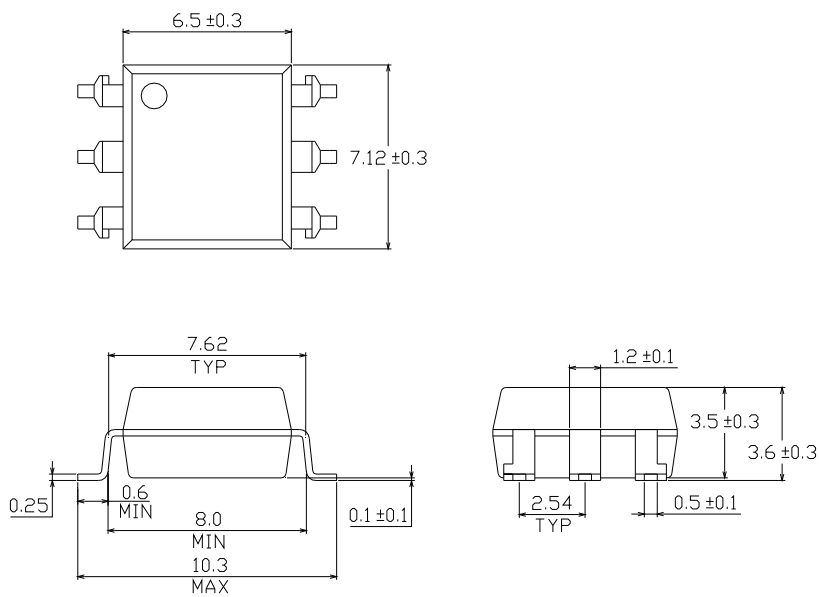
**6 PIN DIP ZERO CROSS TRIAC DRIVER  
PHOTOCOUPLER**

**EL303X Series  
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EL308X Series**

**Option S Type**



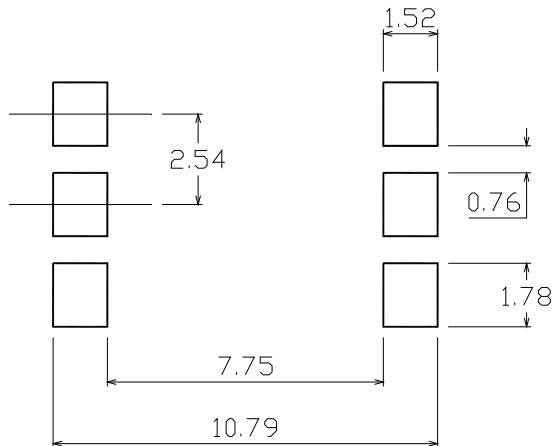
**Option S1 Type**



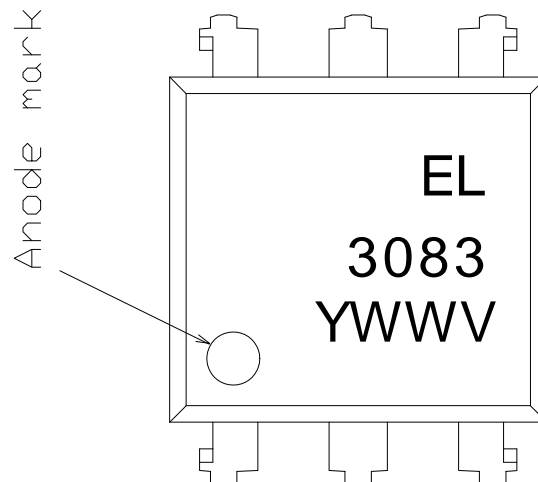
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## Recommended pad layout for surface mount leadform



## Device Marking



## Notes

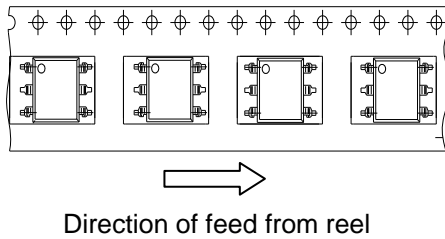
EL denotes Everlight  
3083 denotes Device Number  
Y denotes 1 digit Year code  
WW denotes 2 digit Week code  
V denotes VDE option

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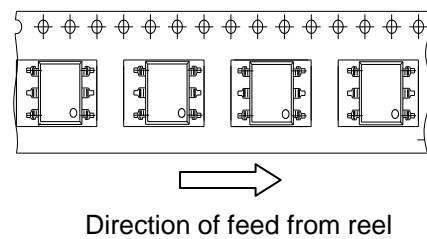
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EL306X Series  
EL308X Series**

## Tape & Reel Packing Specifications

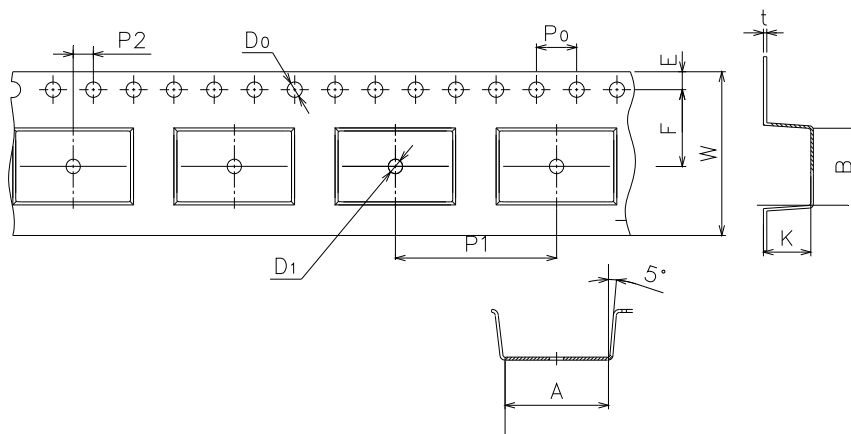
**Option TA**



**Option TB**



## Tape dimensions



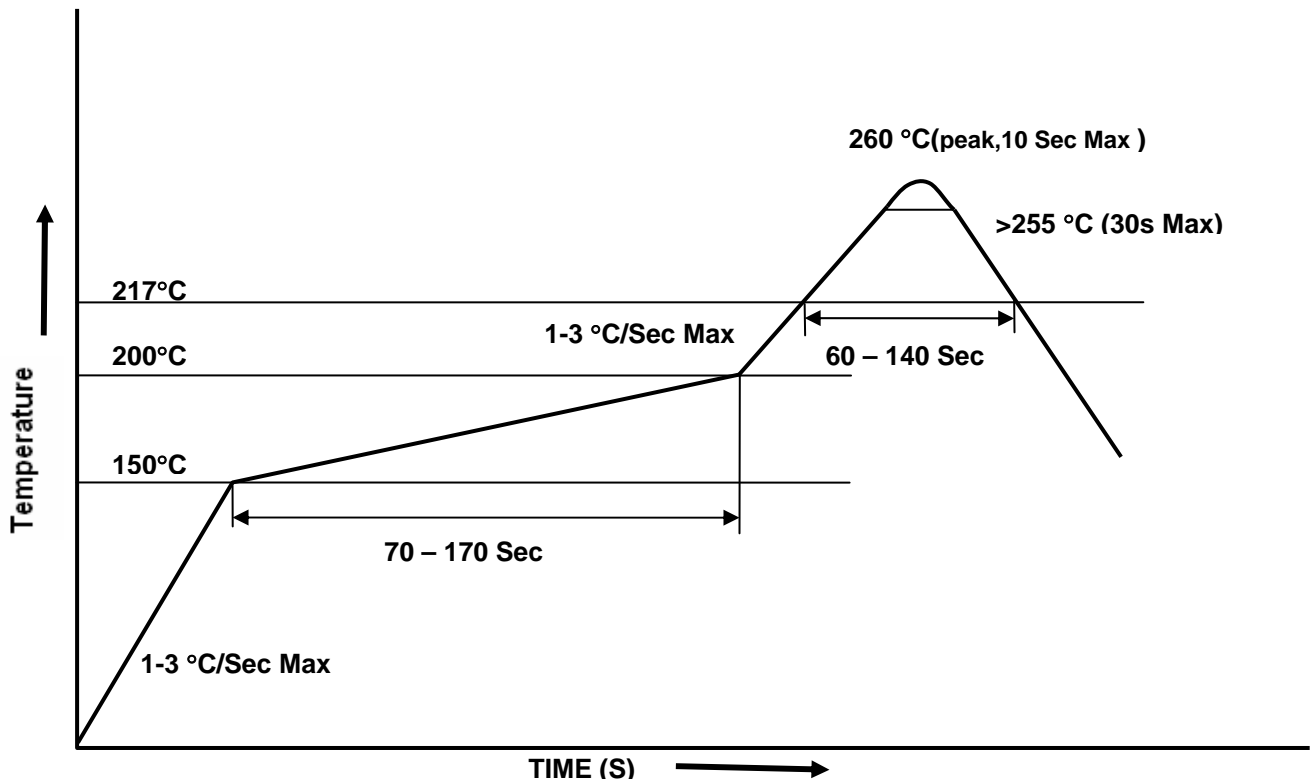
Dimension No.	A	B	D <sub>0</sub>	D <sub>1</sub>	E	F
Dimension (mm)	10.4±0.1	7.52±0.1	1.5+0.1/-0	1.5+0.1/-0	1.75±0.1	7.5±0.1

Dimension No.	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	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

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## Solder Reflow Temperature Profile





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