



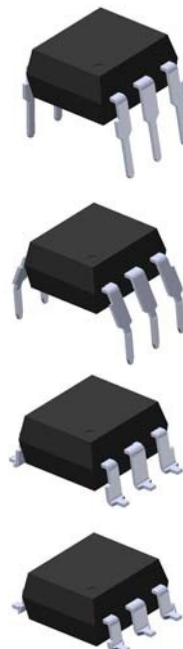
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# 6 PIN DIP RANDOM-PHASE TRIAC DRIVER PHOTOCOUPLER

**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

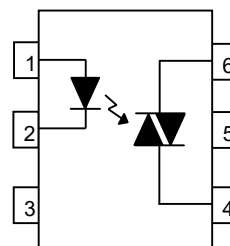
The EL301X, EL302X and EL305X series of devices each consist of a GaAs infrared emitting diode optically coupled to a monolithic silicon random phase Triac.

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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## 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>	EL301X 250	V
			EL302X 400	
			EL305X 600	
	Peak Repetitive Surge Current	I <sub>TSM</sub>	1	A
	Power dissipation	P <sub>D</sub>	300	mW
Derating factor (above 85°C)	7.4		mW / °C	
Isolation voltage *1		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 *2		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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## EL301X Series EL302X Series EL305X Series

### Electrical Characteristics ( $T_a=25^\circ\text{C}$ unless specified otherwise)

#### Input

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Forward voltage	$V_F$	-	1.18	1.5	V	$I_F = 10\text{mA}$
Reverse Leakage current	$I_R$	-	-	10	$\mu\text{A}$	$V_R = 6\text{V}$

#### Output

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Peak Blocking Current	$I_{\text{DRM}}$	-	-	100	nA	$V_{\text{DRM}} = \text{Rated } V_{\text{DRM}}$ $I_F = 0\text{mA}$
Peak On-state Voltage	$V_{\text{TM}}$	-	-	2.5	V	$I_{\text{TM}}=100\text{mA peak}$ , $I_F=\text{Rated } I_{\text{FT}}$
Critical Rate of Rise off-state Voltage	EL301X EL302X	-	100	-	$\text{V}/\mu\text{s}$	$V_{\text{PEAK}} = \text{Rated } V_{\text{DRM}}$ , $I_F=0$ (Fig. 8)
	EL305X	1000	-	-		$V_{\text{PEAK}} = 400\text{V}$ , $I_F=0$ (Fig. 8)

#### Transfer Characteristics

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
LED Trigger Current	EL3010 EL3021 EL3051	-	-	15	mA	Main terminal Voltage=3V
	EL3011 EL3022 EL3052	-	-	10		
	EL3012 EL3023 EL3053	-	-	5		
Holding Current	$I_H$	-	250	-	$\mu\text{A}$	

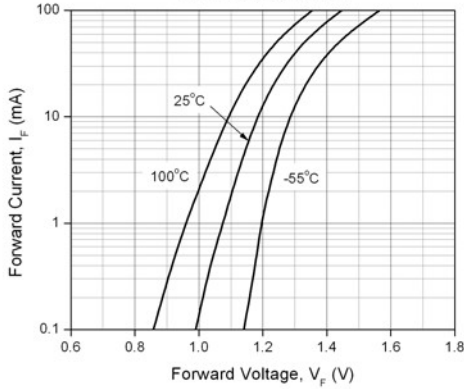
\* Typical values at  $T_a = 25^\circ\text{C}$

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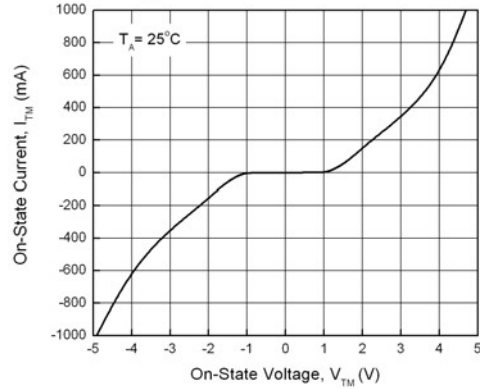
**EL301X Series  
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## Typical Performance Curves

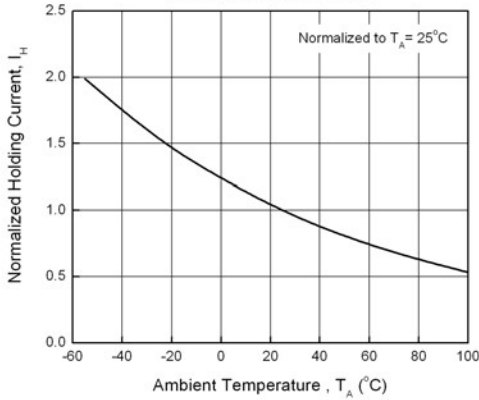
**Figure 1. Forward Current vs Forward Voltage**



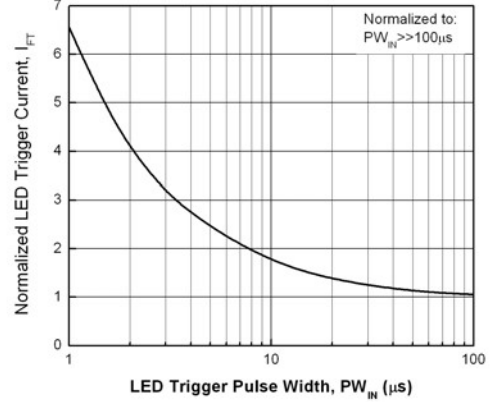
**Figure 2. On-State Characteristics**



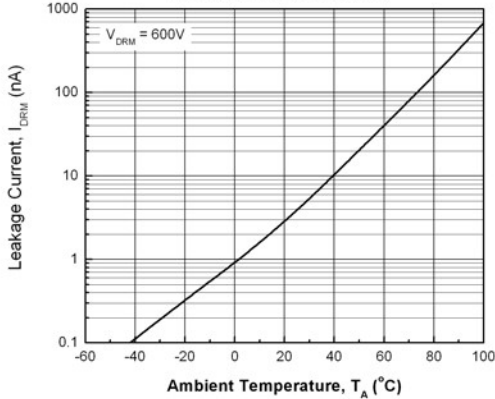
**Figure 3. Holding Current vs. Ambient Temperature**



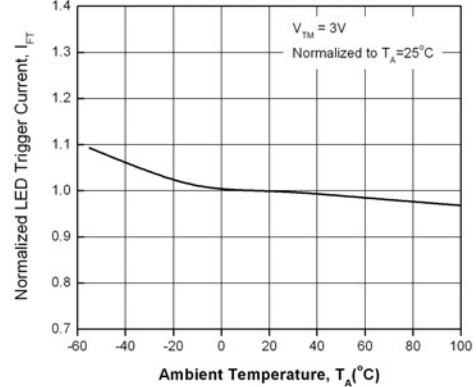
**Figure 4. LED Current Required to Trigger vs. LED Pulse Width**

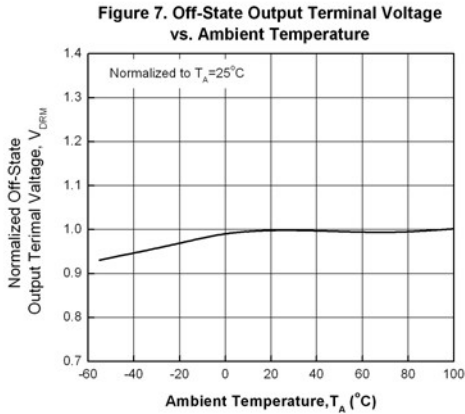


**Figure 5. Leakage Current vs. Ambient Temperature**

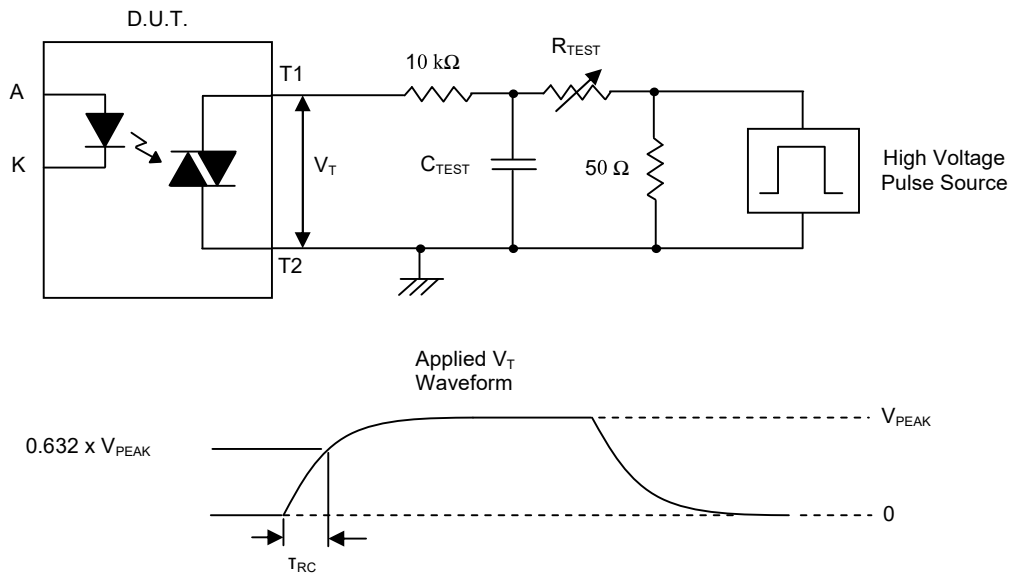


**Figure 6. LED Trigger Current vs. Ambient Temperature**





**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,  $T_{RC}$  is recorded and the dv/dt calculated.

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



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

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

## 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, 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 option

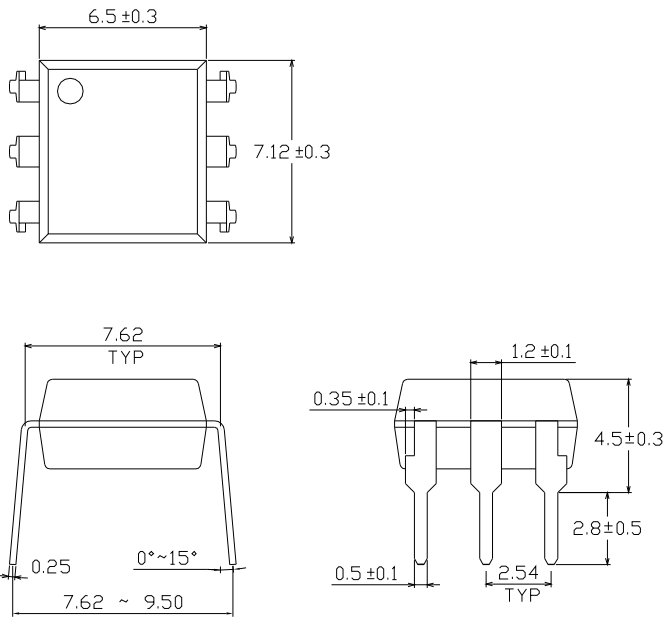
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead 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 RANDOM-PHASE TRIAC DRIVER  
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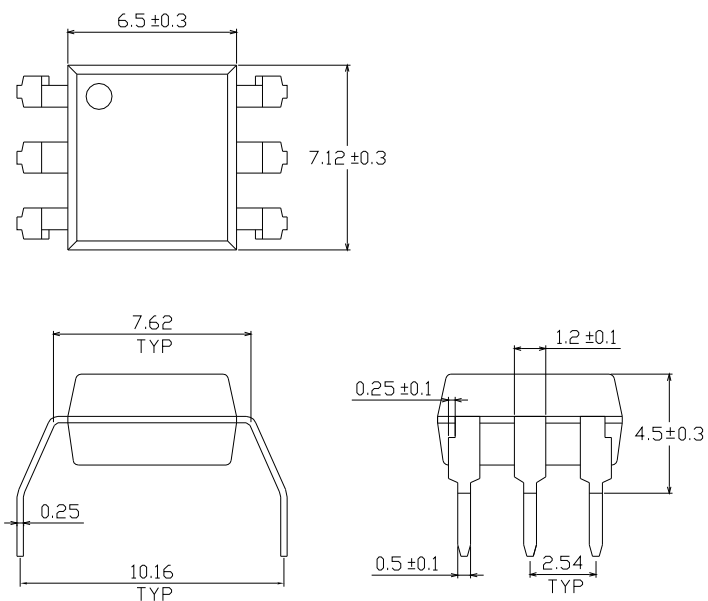
**EL301X Series  
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**Package Drawings  
(Dimensions in mm)**

**Standard DIP Type**



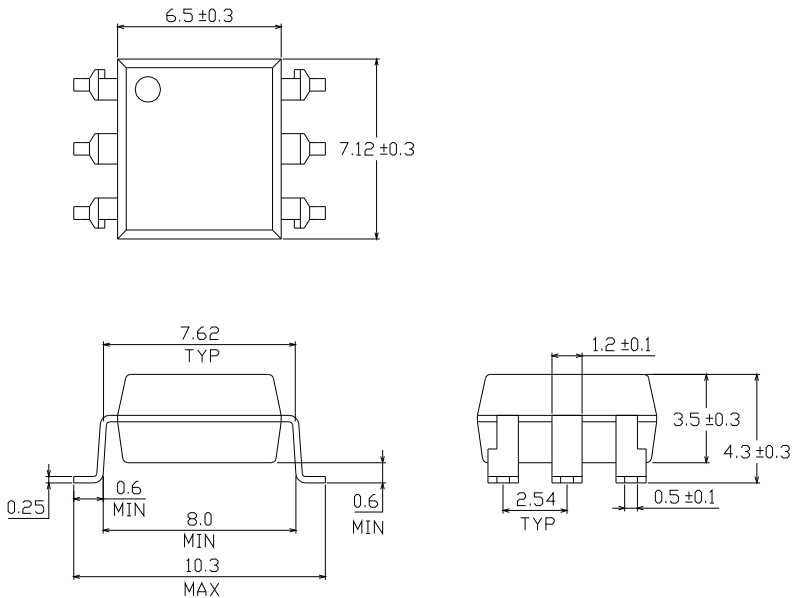
**Option M Type**



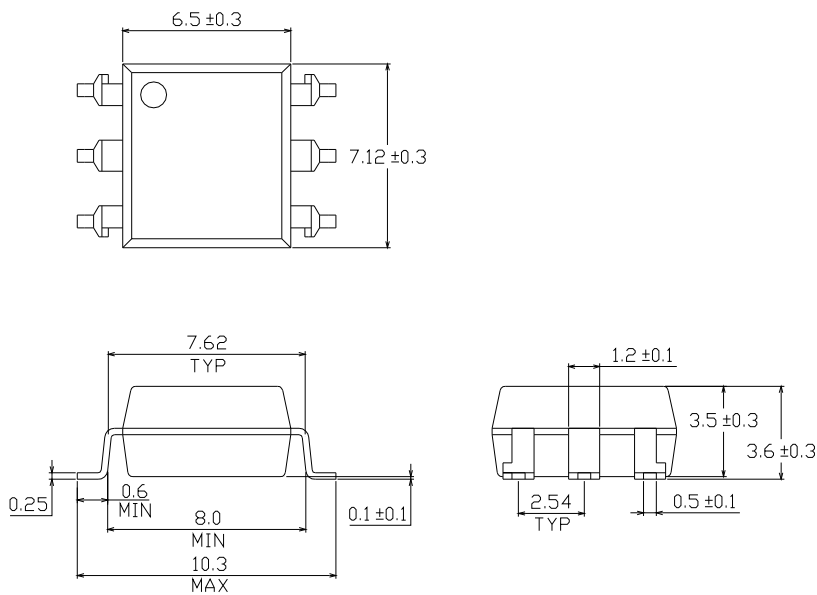
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**EL301X Series  
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EL305X Series**

**Option S Type**



**Option S1 Type**

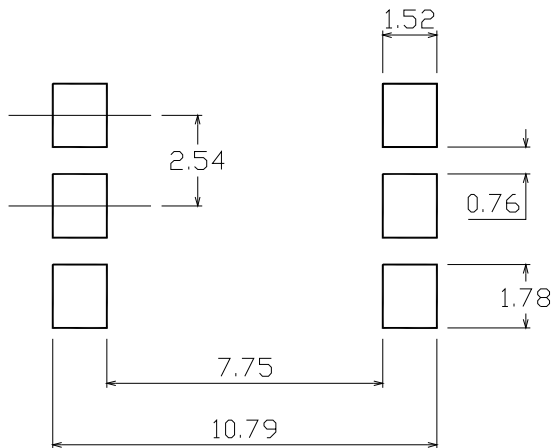




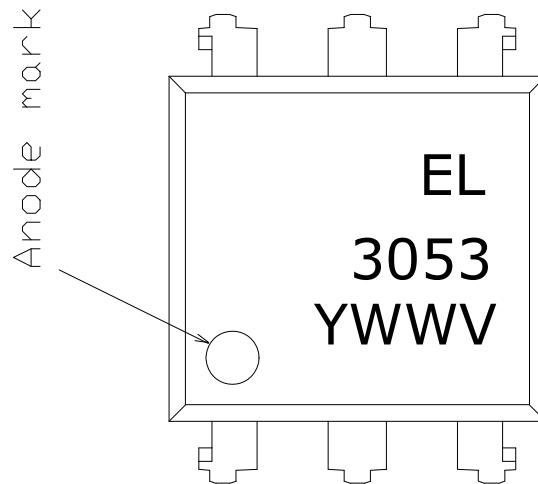
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Recommended pad layout for surface mount leadform



**Device Marking**



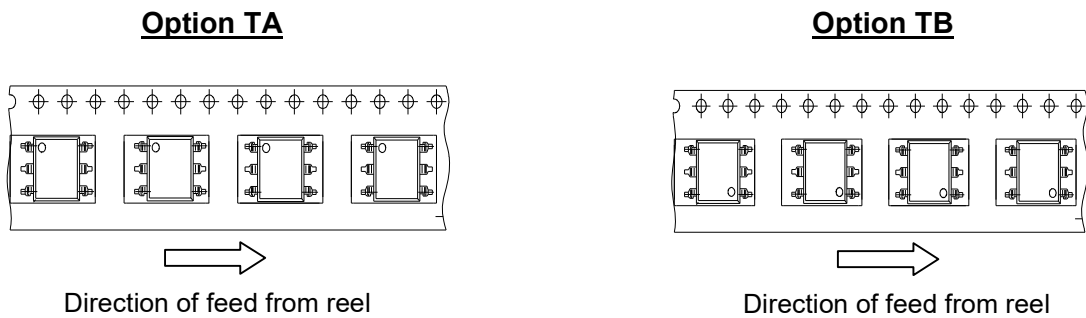
Notes

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

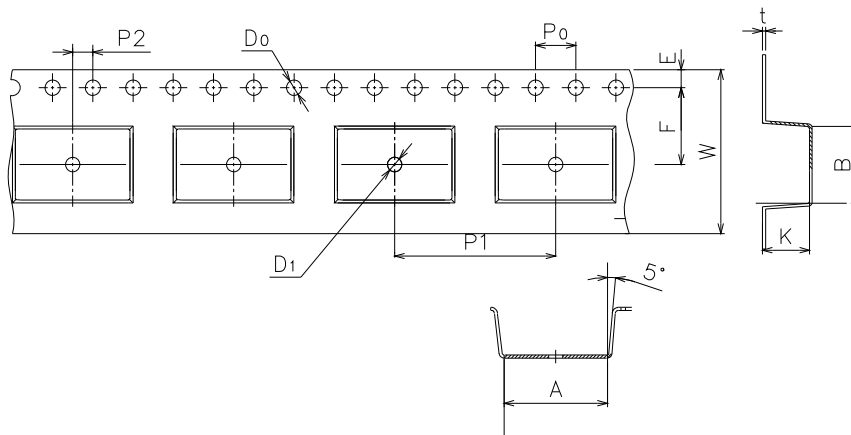
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**Tape & Reel Packing Specifications**



**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

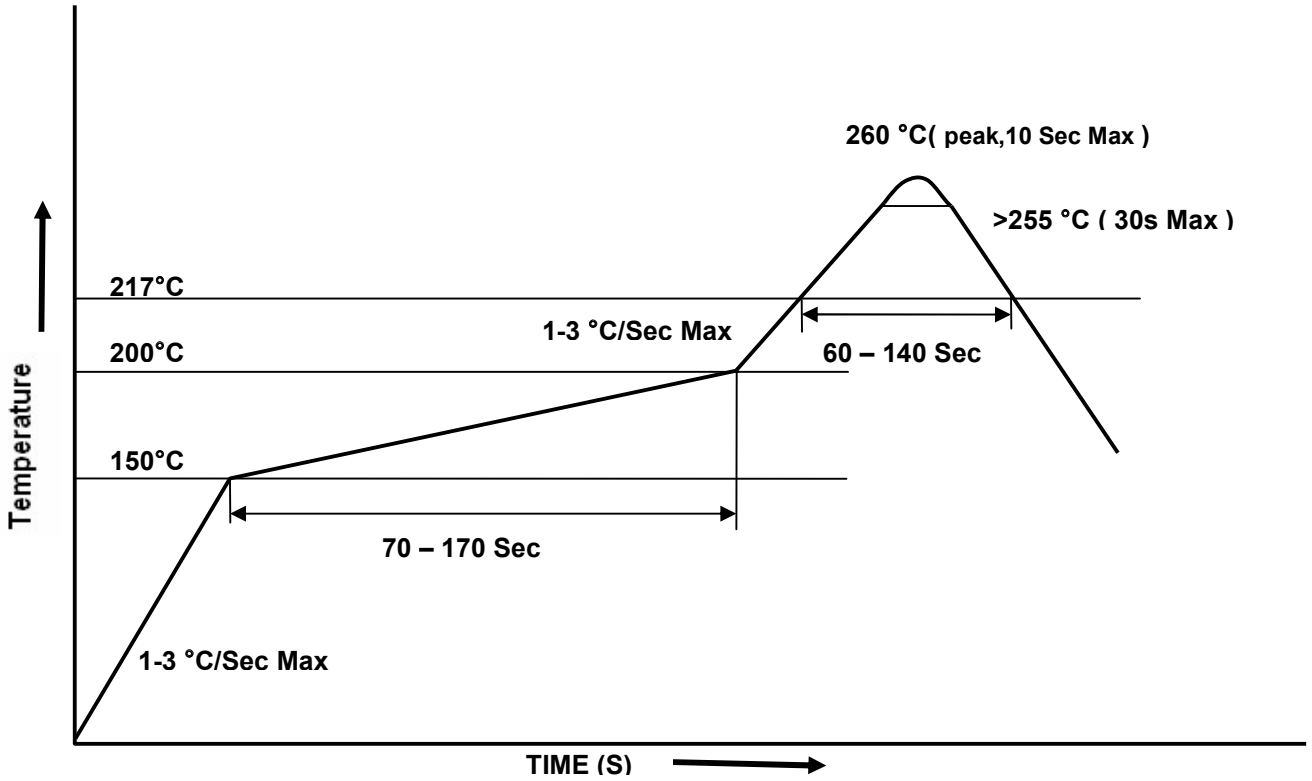


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EL305X Series

## Solder Reflow Temperature Profile





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**EL305X Series**

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