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# 4 PIN SOP ZERO CROSS TRIAC PHOTOCOUPLER

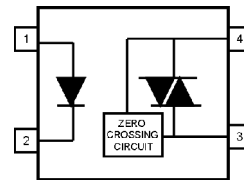
ELM304X Series  
ELM306X Series  
ELM308X Series

## Features:

- ELM304X  $V_{DRM}$  of 400V, ELM306X  $V_{DRM}$  of 600V and ELM308X  $V_{DRM}$  of 800V
- High isolation voltage between input and output ( $V_{iso}=3750$  V rms )
- Zero voltage crossing
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approved (No.40028116)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved



## Schematic



## Description

The ELM304X, ELM306X and ELM308X devices consist of a GaAs infrared emitting diode optically coupled to a monolithic silicon detector performing the function of a zero voltage crossing bilateral triac driver.

They are designed for use with a discrete power triac in the interface of logic systems to equipment powered from 110 to 240 VAC lines, such as solid-state relays, industrial controls, motors, solenoids and consumer appliances, etc.

## Applications

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

## Pin Configuration

1. Anode
2. Cathode
3. Terminal
4. 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
	Peak forward current (1us pulse, 300pps)	I <sub>F(PK)</sub>	1	A
	Reverse voltage	V <sub>R</sub>	6	V
	Power dissipation	P <sub>D</sub>	100	mW
Output	Off-state Output Terminal Voltage	M304X	400	V
		M306X	600	
		M308X	800	
	On state RMS Current	I <sub>T(RMS)</sub>	70	mA(RMS)
Power dissipation		P <sub>D</sub>	300	mW
Isolation voltage *1		V <sub>iso</sub>	3750	V rms
Operating temperature		T <sub>opr</sub>	-40~+110	°C
Storage temperature		T <sub>stg</sub>	-55~+150	°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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## 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	I <sub>DRM1</sub>	-	-	100	nA	V <sub>DRM</sub> = Rated V <sub>DRM</sub> I <sub>F</sub> = 0mA
Peak On-state Voltage	V <sub>TM</sub>	-	-	3	V	I <sub>TM</sub> =100mA peak
Critical Rate of Rise off-state Voltage	dv/dt	1000	-	-	V/μs	
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>	-	-	1000	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	3042 3062 3082	-	-	10	mA	Main terminal Voltage=3V
	3043 3063 3083	-	-	5		
	3044 3064 3084	-	-	3		
Holding Current	I <sub>H</sub>	-	280	-	μA	

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

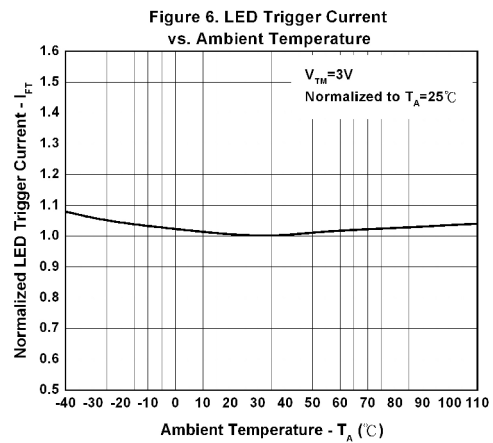
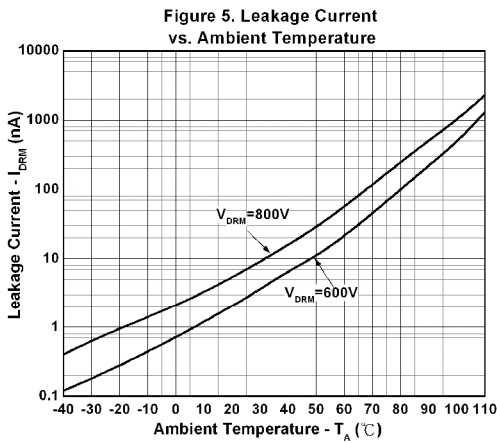
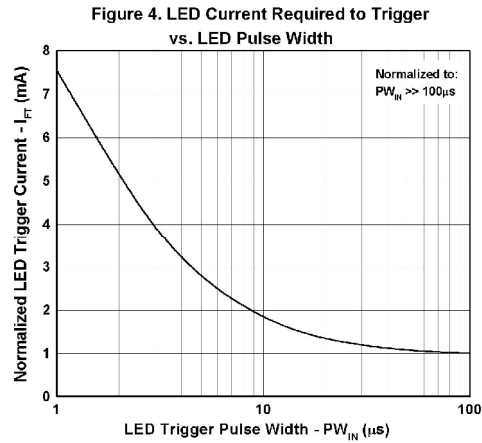
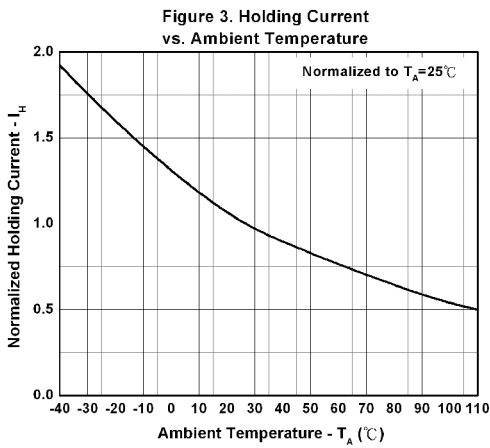
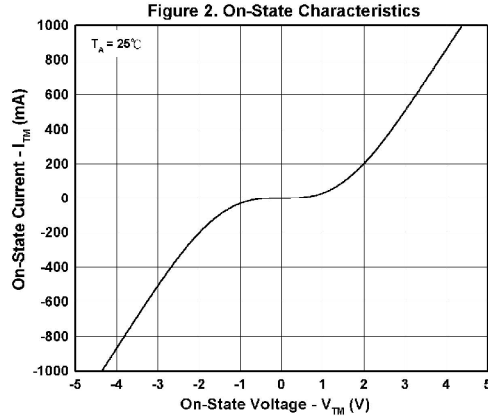
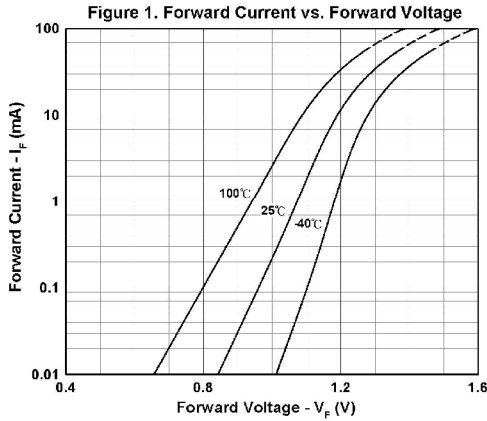


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## ELM304X Series ELM306X Series ELM308X Series

### Typical Performance Curves





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

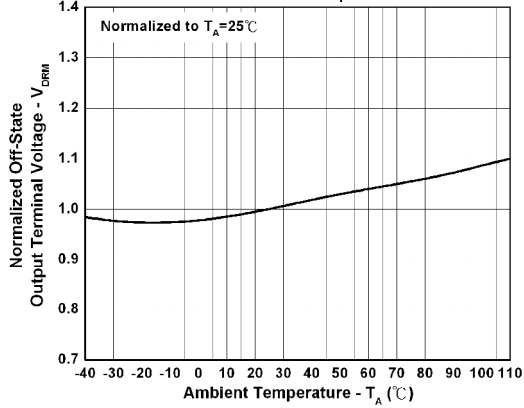


Figure 8. Leakage in Inhibit State vs. Ambient Temperature

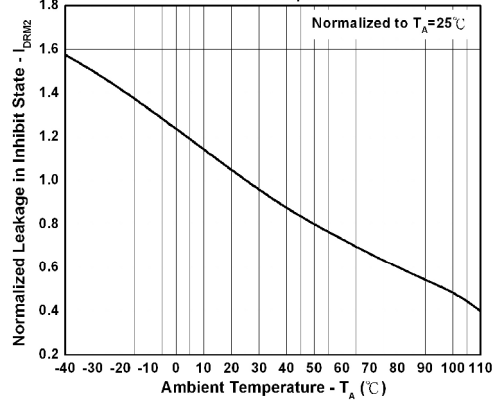
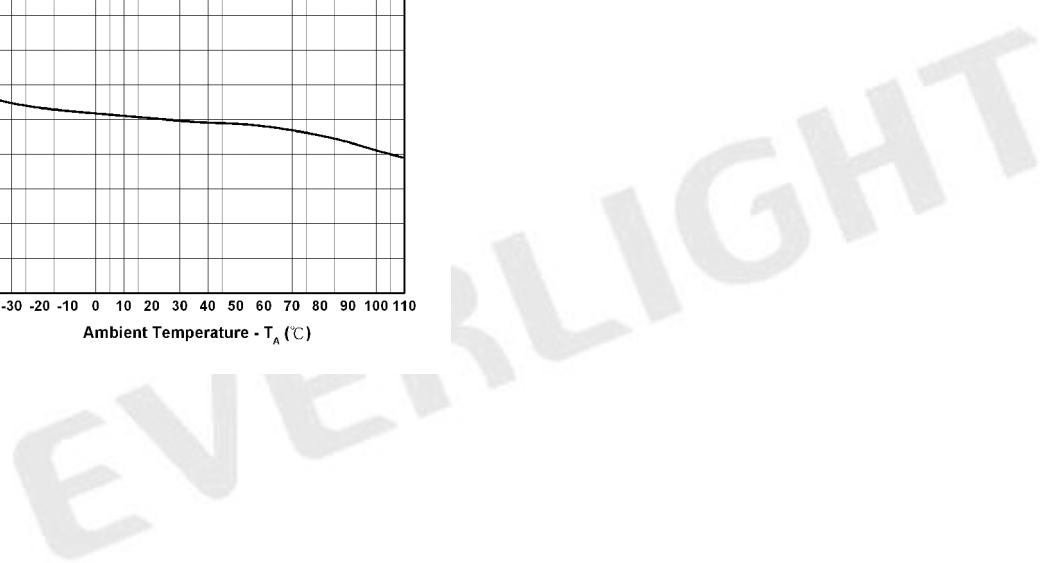
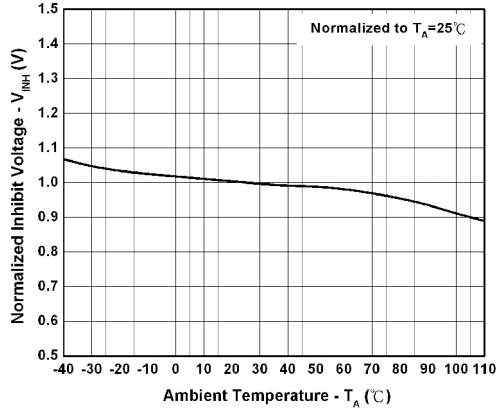
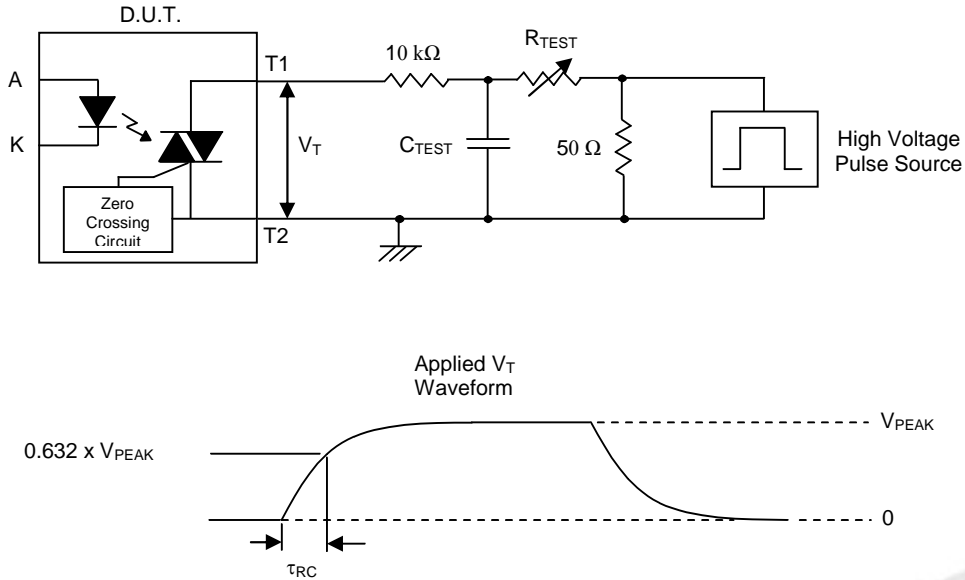


Figure 9. Inhibit Voltage vs. Ambient Temperature



**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

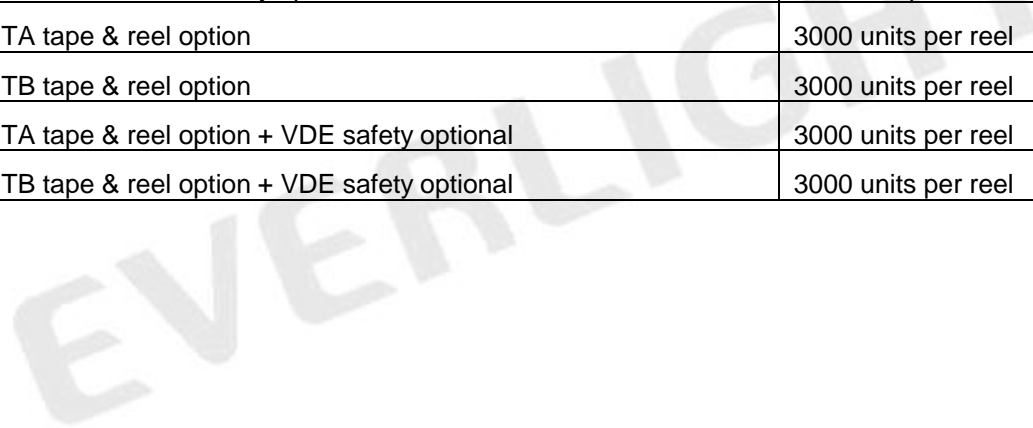
### Part Number

**ELM304X(Z)-V**  
or **ELM306X(Z)-V**  
or **ELM308X(Z)-V**

#### Note

X = Part No. (2 for  $I_{FT}=10mA$ , 3 for  $I_{FT}=5mA$ , 4 for  $I_{FT}=3mA$ )  
Z = Tape and reel option (TA, TB or none).  
V = VDE safety approved optional

Option	Description	Packing quantity
None	Standard	100 units per tube
None	Standard + VDE safety optional	100 units per tube
(TA)	TA tape & reel option	3000 units per reel
(TB)	TB tape & reel option	3000 units per reel
(TA)-V	TA tape & reel option + VDE safety optional	3000 units per reel
(TB)-V	TB tape & reel option + VDE safety optional	3000 units per reel





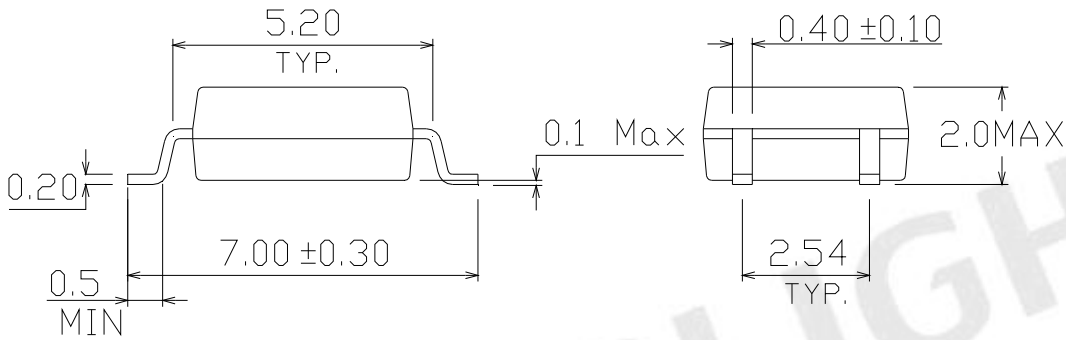
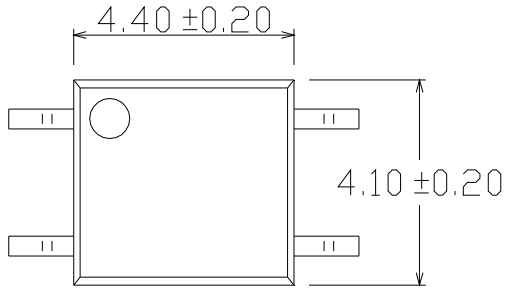
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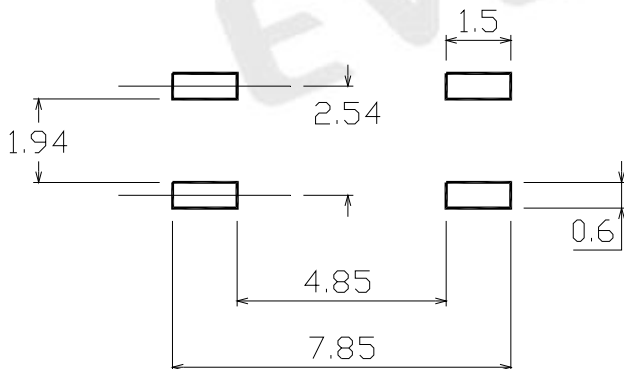
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## Package Drawings

(Dimensions in mm)



## Recommended pad layout for surface mount leadform







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## Device Marking



## Notes

EL denotes Everlight  
M3063 denotes Device Number  
Y denotes 1 digit Year code  
WW denotes 2 digit Week code  
V denotes VDE safety (optional)

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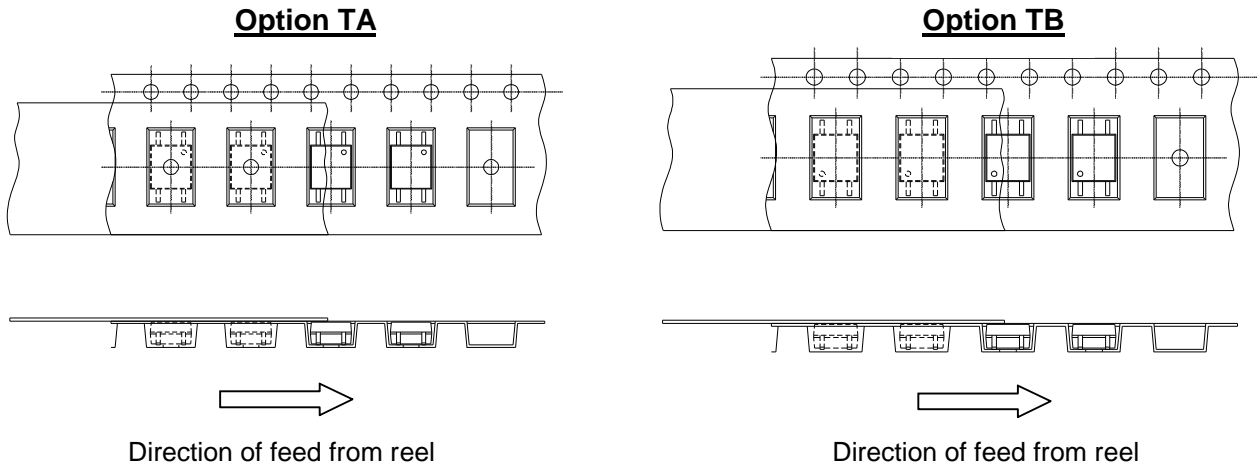


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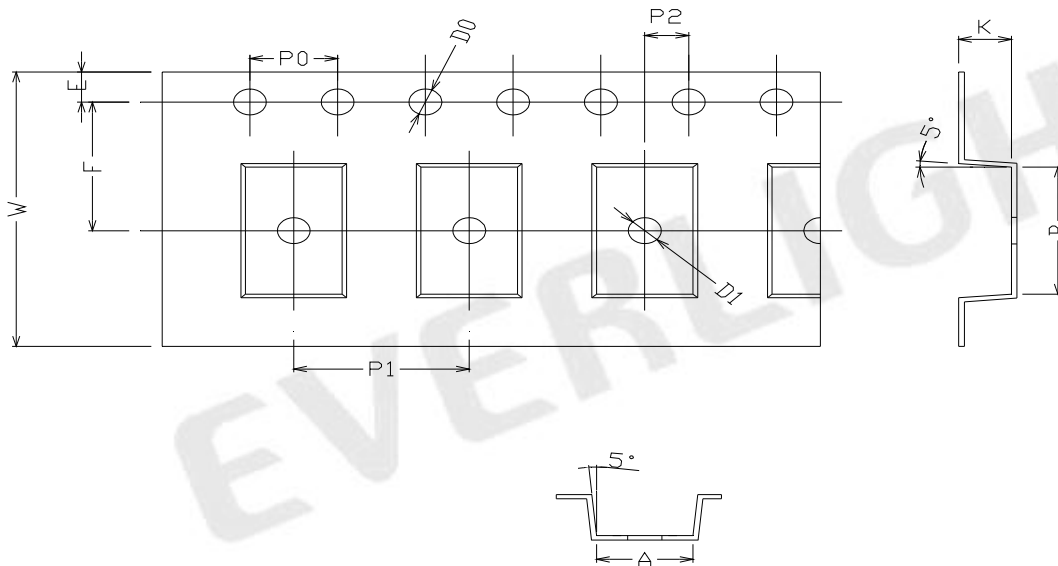
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## Tape & Reel Packing Specifications



## Tape dimensions



Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	4.4 ± 0.1	7.4 ± 0.1	1.5 + 0.1/-0	1.5 ± 0.1	1.7 5 ± 0.1	7.5 ± 0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0 ± 0.15	8.0 ± 0.1	2.0 ± 0.1	0.25 ± 0.03	16.0 ± 0.2	2.4 ± 0.1

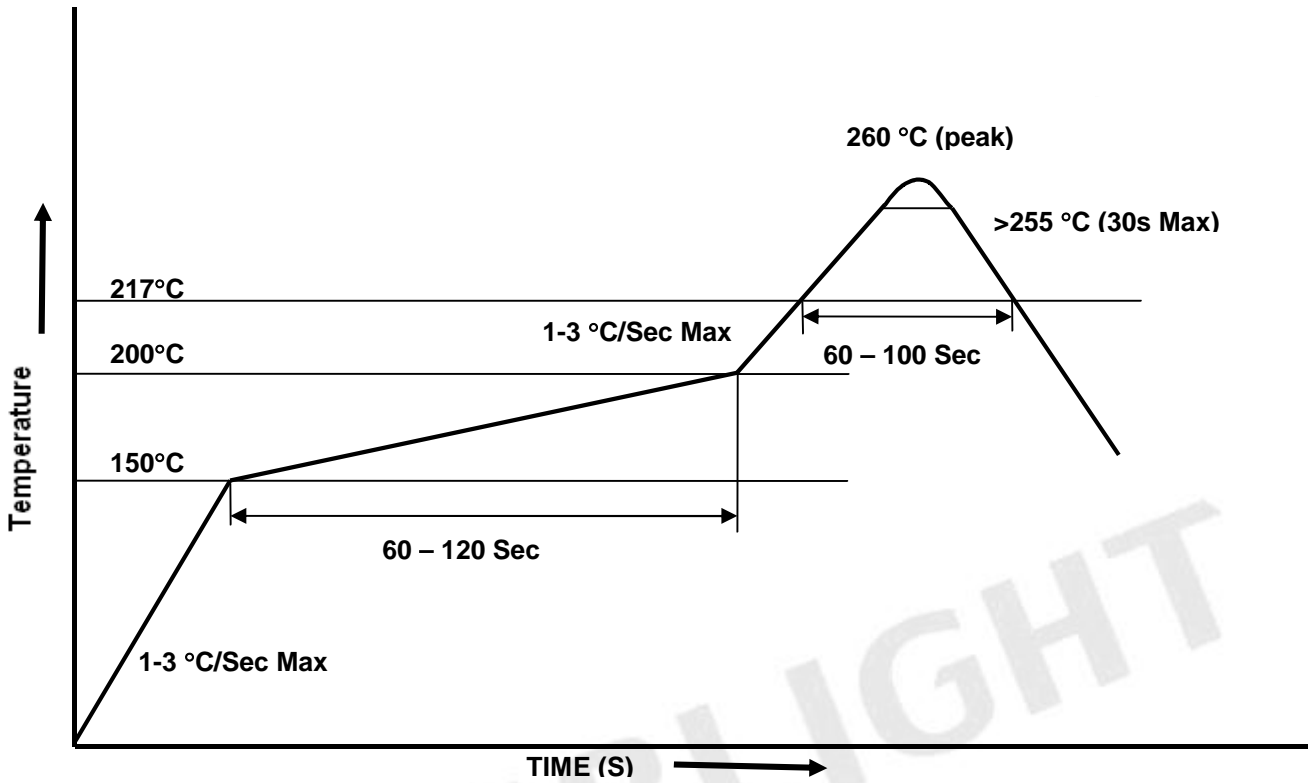


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## Solder Reflow Temperature Profile





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