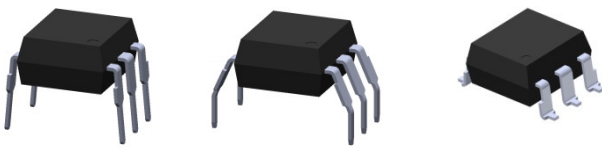
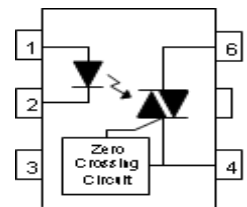


### 5 PIN DIP ZERO-CROSS TRIAC DRIVER PHOTOCOUPLER EL303X(P5), EL304X(P5), EL306X(P5), EL308X(P5) Series



Schematic



#### Features:

- Peak breakdown voltage
  - 250V: EL303X(P5)
  - 400V: EL304X(P5)
  - 600V: EL306X(P5)
  - 800V: EL308X(P5)
- High isolation voltage between input and output (Viso=5000 V rms )
- Zero voltage crossing
- Pb free and RoHS compliant.
- UL and cUL approved(No. E214129)
- VDE approved (No.132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved
- Compliance with EU REACH

#### Pin Configuration

1. Anode
2. Cathode
3. No Connection
4. Terminal
5. Pin Cut
6. Terminal

#### Description

The EL303X(P5), EL304X(P5), EL306X(P5) and EL308X(P5) 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

**Absolute Maximum Ratings (Ta=25°C)**

Parameter		Symbol	Rating	Unit	
Input	Forward current	$I_F$	60	mA	
	Reverse voltage	$V_R$	6	V	
	Power dissipation	$P_D$	100	mW	
	Derating factor (above $T_a = 85^\circ\text{C}$ )		3.8	mW / °C	
Output			250		
	Off-state Output Terminal Voltage	$V_{DRM}$	EL303X	400	V
			EL304X	600	
			EL306X	800	
			EL308X		
	Peak Repetitive Surge Current	$I_{TSM}$	1	A	
	Power dissipation	$P_C$	300	mW	
Derating factor (above $T_a = 85^\circ\text{C}$ )	7.6		mW/°C		
Total power dissipation	$P_{TOT}$	330	mW		
Isolation voltage <sup>*1</sup>	$V_{ISO}$	5000	Vrms		
Operating temperature	$T_{OPR}$	-55 to 100	°C		
Storage temperature	$T_{STG}$	-55 to 125	°C		
Soldering Temperature <sup>*2</sup>	$T_{SOL}$	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, 6 are shorted together.

\*2 For 10 seconds

**Electro-Optical Characteristics (Ta=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>	-	-	100 500	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, I <sub>F</sub> =Rated I <sub>FT</sub>
Critical Rate of Rise off-state Voltage	dv/dt	1000 600	-	-	V/μs	V <sub>PEAK</sub> =Rated V <sub>DRM</sub> , I <sub>F</sub> =0 (Fig. 10)
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

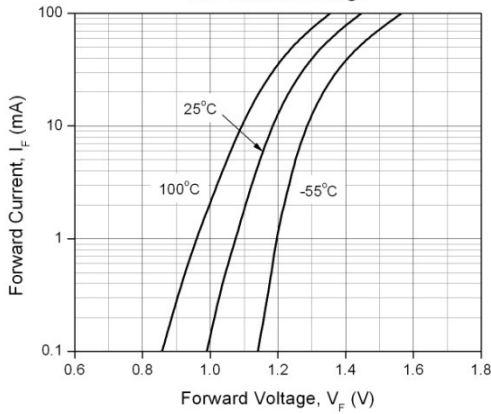
**Transfer Characteristics**

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

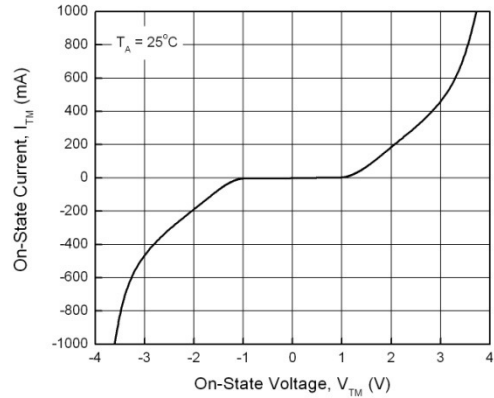
\* Typical values at T<sub>a</sub> = 25°C

**Typical Electro-Optical Characteristics Curves**

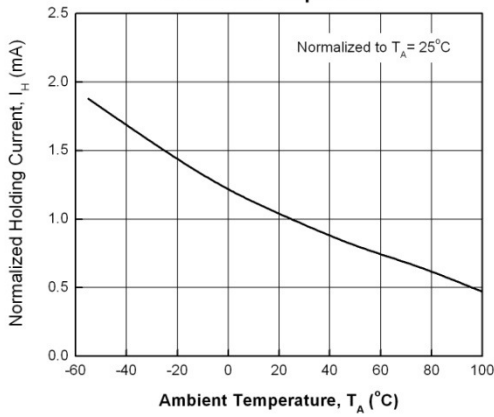
**Figure 1. Forward Current vs Forward Voltage**



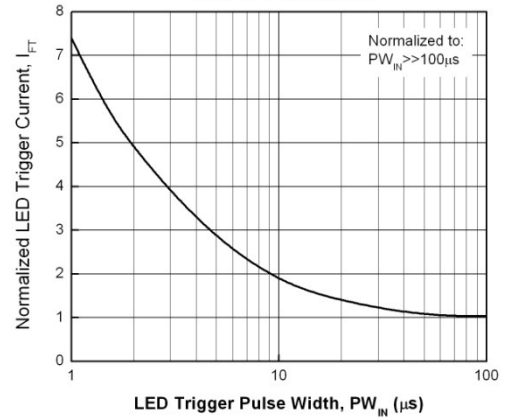
**Figure 2. On-State Characteristics**



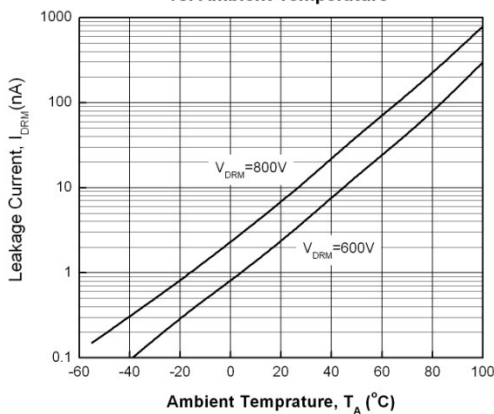
**Figure 3. Holding Current vs. Ambient Temperature**



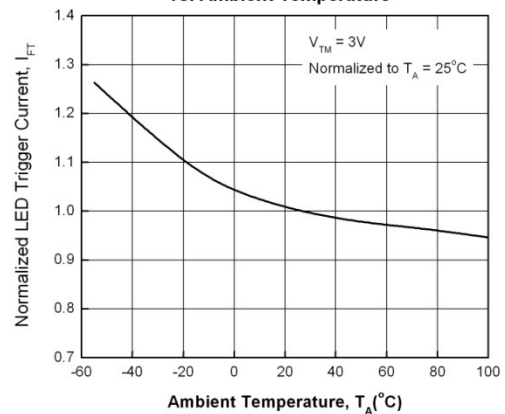
**Figure 4. LED Current Required to Trigger vs. LED Pulse Width**



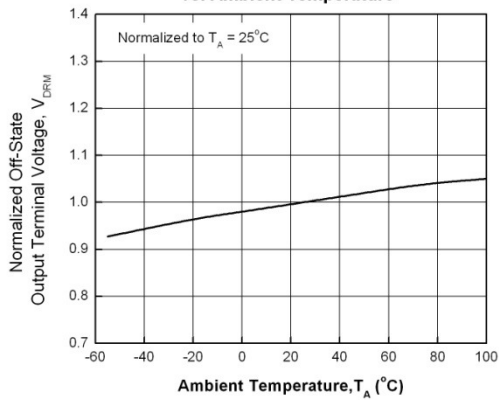
**Figure 5. Leakage Current vs. Ambient Temperature**



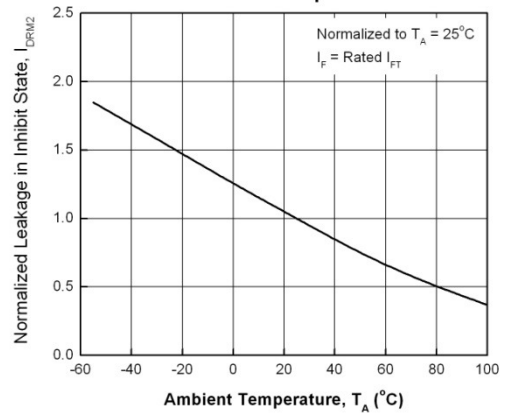
**Figure 6. LED Trigger Current vs. Ambient Temperature**



**Figure 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**

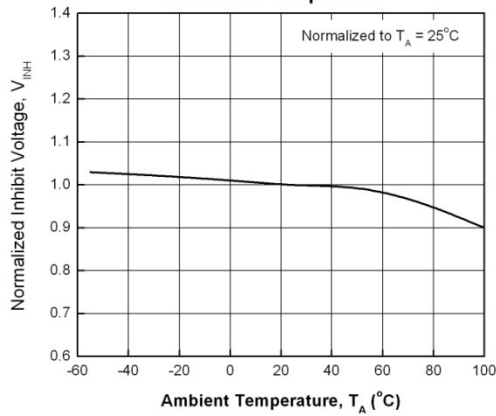
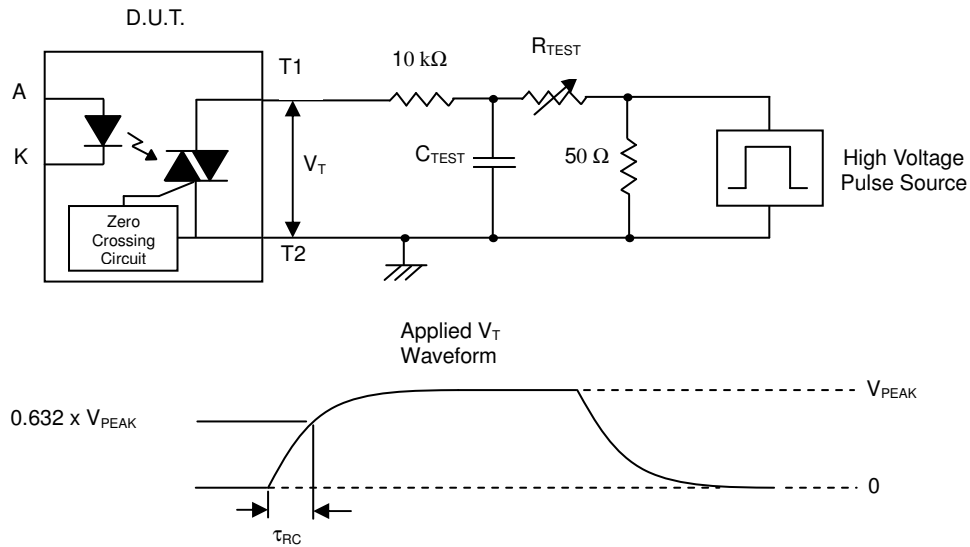


Figure 10. Static dv/dt Test Circuit & Waveform



**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:

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

## Order Information

### Part Number

**EL303XY(Z)(P5)-V**  
or **EL304XY(Z)(P5)-V**  
or **EL306XY(Z)(P5)-V**  
or **EL308XY(Z)(P5)-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).

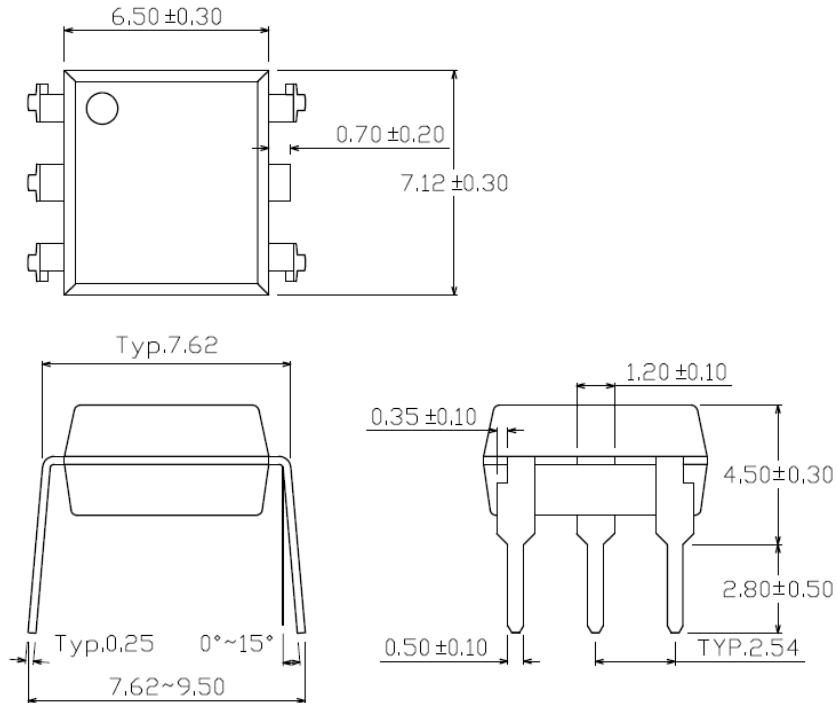
P5 = 5 pins type

V = VDE safety approved option

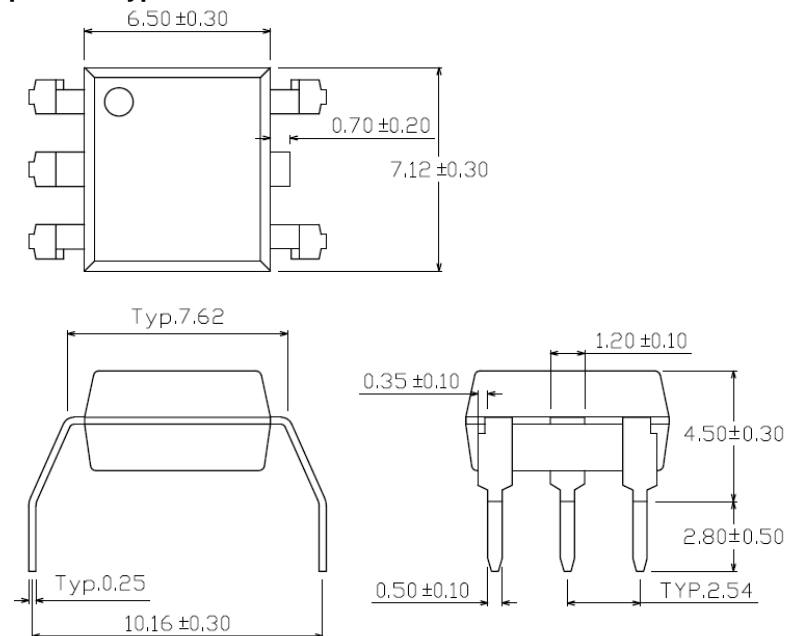
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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

**Package Dimension (Dimensions in mm)**

**Standard DIP Type**

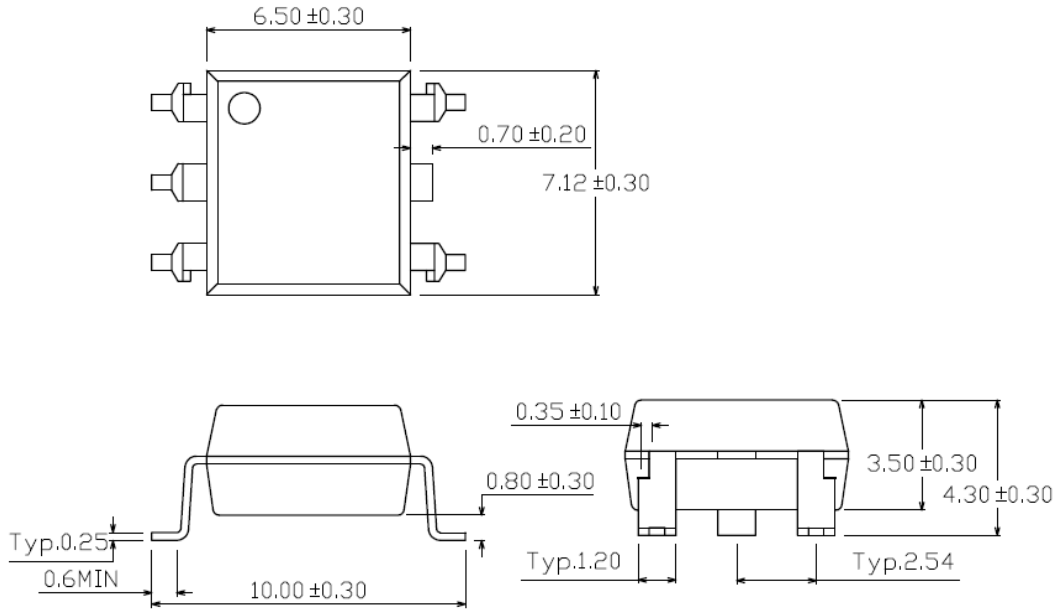


**Option M Type**

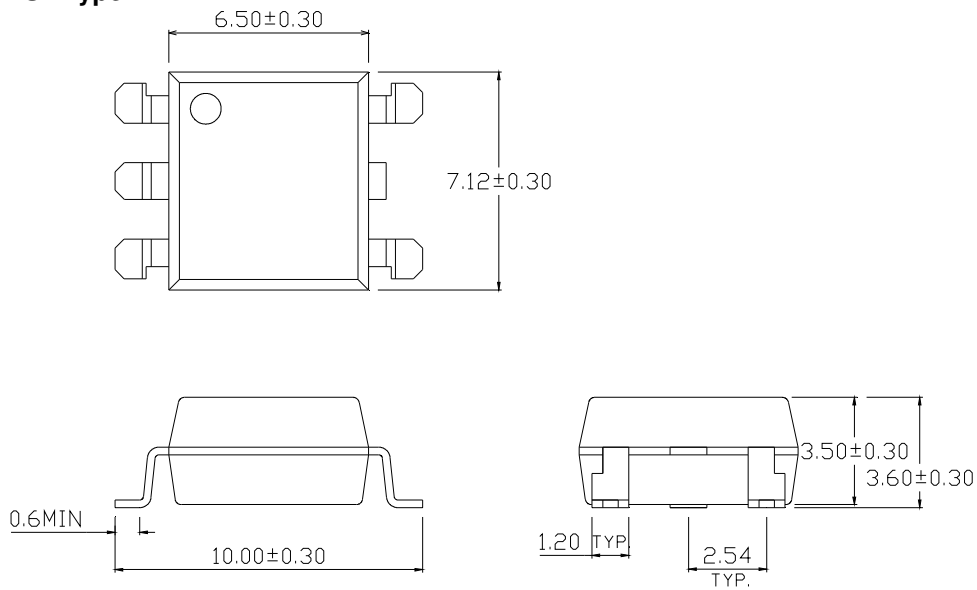




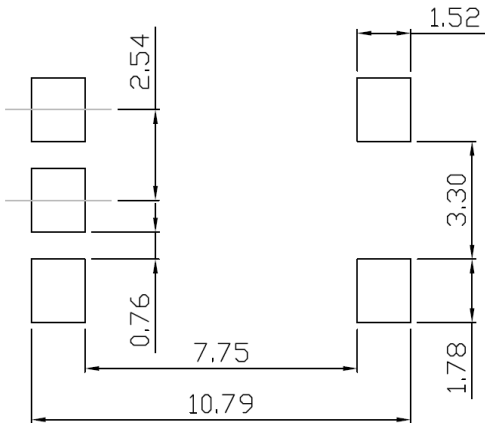
**Option S Type**



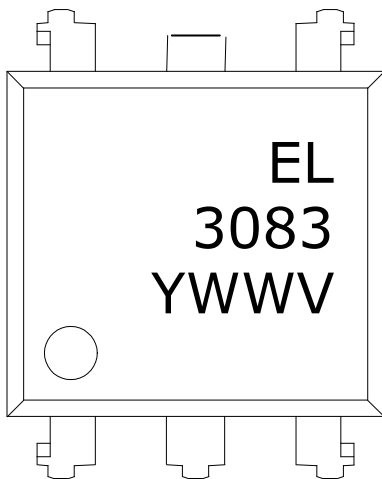
**Option S1 Type**



### Recommended pad layout for surface mount leadform



### Device Marking

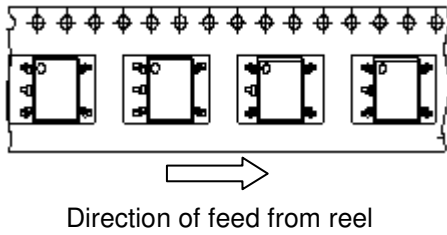


### Notes

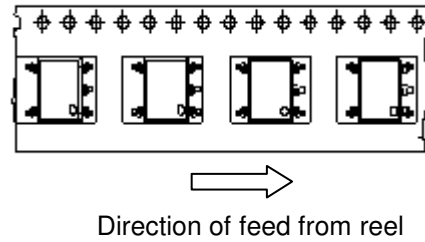
- EL denotes Everlight
- 3083 denotes Device Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE option

**Tape & Reel Packing Specifications**

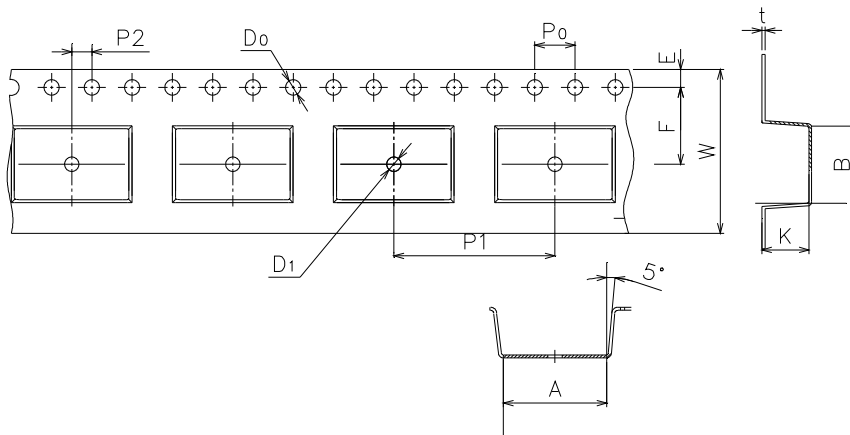
**Option TA**



**Option TB**



**Tape dimensions**



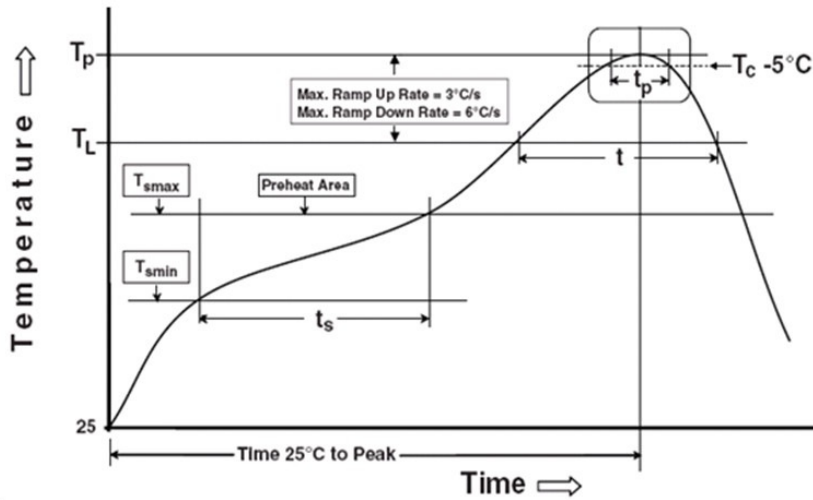
Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.4±0.1	7.5±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1

Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

## Precautions for Use

### 1. Soldering Condition

#### 1.1 (A) Maximum Body Case Temperature Profile for evaluation of Reflow Profile



Note:

Reference: IPC/JEDEC J-STD-020D

#### Preheat

Temperature min ( $T_{smin}$ )	150 °C
Temperature max ( $T_{smax}$ )	200 °C
Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60-120 seconds
Average ramp-up rate ( $T_{smax}$ to $T_p$ )	3 °C/second max

#### Other

Liquidus Temperature ( $T_L$ )	217 °C
Time above Liquidus Temperature ( $t_L$ )	60-100 sec
Peak Temperature ( $T_p$ )	260 °C
Time within 5 °C of Actual Peak Temperature: $T_p - 5^\circ\text{C}$	30 s
Ramp- Down Rate from Peak Temperature	6 °C /second max.
Time 25 °C to peak temperature	8 minutes max.
Reflow times	3 times

## **DISCLAIMER**

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2. When using this product, please observe the absolute maximum ratings and the instructions for using outlined in these specification sheets. EVERLIGHT assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets.
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