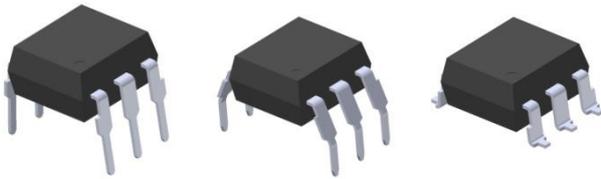
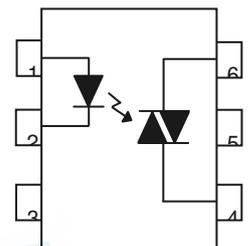


### 6 PIN DIP RANDOM-PHASE TRIAC DRIVER PHOTOCOUPLER EL301X, EL302X, EL305X Series



Schematic



#### 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
- Compliance with EU REACH
- The product itself will remain within RoHS compliant version
- UL and cUL approved (No. E214129)
- VDE approved (No.132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

#### Pin Configuration

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

#### 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

**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 Derating factor (above $T_a = 85^\circ\text{C}$ )	$P_D$	100 3.8	mW mW / °C
Output	EL301X		250	
	Off-state Output Terminal Voltage	$V_{DRM}$	400	V
	EL302X		600	
	EL305X		600	
	Peak Repetitive Surge Current ( $p_w=100\mu\text{s}, 120\text{pps}$ )	$I_{TSM}$	1	A
	On-State RMS Current	$I_{T(RMS)}$	100	mA
	Power dissipation Derating factor (above $T_a = 85^\circ\text{C}$ )	$P_C$	300 7.4	mW 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, 5 & 6 are shorted together.

\*2 For 10 seconds

## Electro-Optical Characteristics (Ta=25°C unless specified otherwise)

### Input

Parameter	Symbol	Min.	Typ.*1	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.*1	Max.	Unit	Condition
Peak Blocking Current	$I_{DRM}$	-	-	100	nA	$V_{DRM} = \text{Rated } V_{DRM}$ $I_F = 0\text{mA}$ *2
Peak On-state Voltage	$V_{TM}$	-	-	2.5	V	$I_{TM} = 100\text{mA peak}$ , $I_F = \text{Rated } I_{FT}$
Critical Rate of Rise off-state Voltage	EL301X EL302X EL305X	-	100	-	$\text{V}/\mu\text{s}$	$V_{PEAK} = \text{Rated } V_{DRM}$ , $I_F = 0$ (Fig. 8)*3
		1000	-	-		$V_{PEAK} = 400\text{V}$ , $I_F = 0$ (Fig. 8)

#### Notes:

\*1. Typical values at  $T_a = 25^\circ\text{C}$

\*2. Test voltage must be applied within dv/dt rating.

\*3. This is static dv/dt. See Figure 8 for test circuit. Commutating dv/dt is a function of the load-driving thyristor(s) only.

**Transfer Characteristics**

Parameter	Symbol	Min.	Typ.*1	Max.	Unit	Condition	
LED Trigger Current	EL3020			30	mA	Main terminal Voltage=3V*4	
	EL3010 EL3021 EL3051	-	-	15			
	EL3011 EL3022 EL3052	-	-	10			
	EL3012 EL3023 EL3053	-	-	5			
		$I_{FT}$					
Holding Current	$I_H$	-	250	-	$\mu A$		

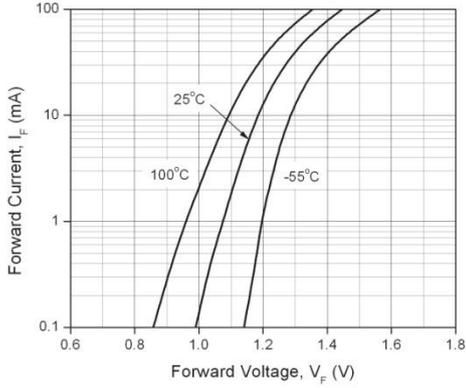
## Notes:

- \*4. All devices are guaranteed to trigger at an  $I_F$  value less than or equal to max  $I_{FT}$ . Therefore, recommended operating  $I_F$  lies between max  $I_{FT}$  (30 mA for EL3020, 15 mA for EL3010/EL3021/EL3051, 10 mA for EL3011/EL3022/EL3052, 5 mA for EL3012/EL3023/EL3053) and absolute maximum  $I_F$  (60 mA).

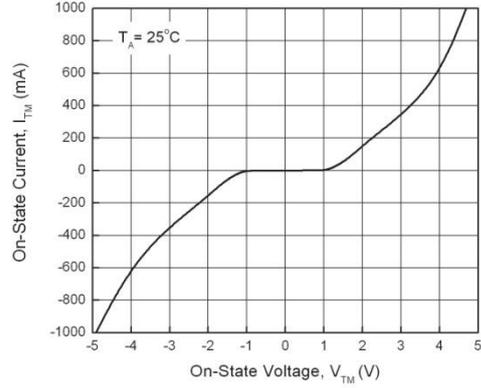
EVERLIGHT

# Typical Electro-Optical Characteristics Curves

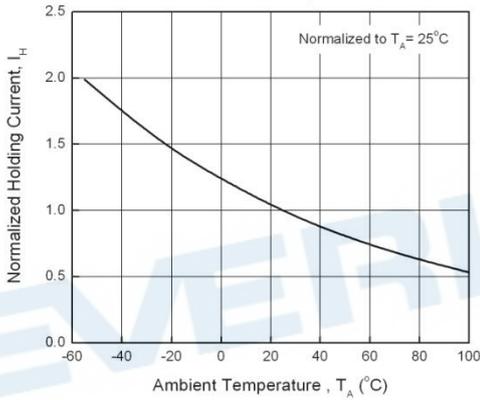
**Figure 1. Forward Current vs Forward Voltage**



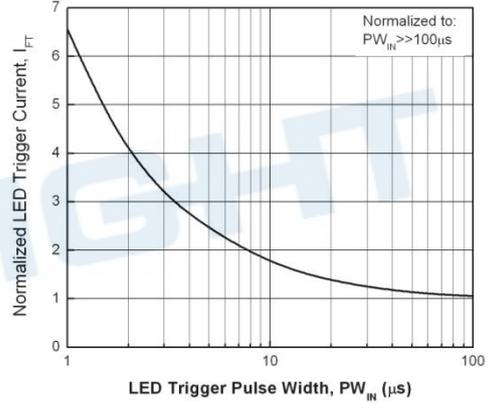
**Figure 2. On-State Characteristics**



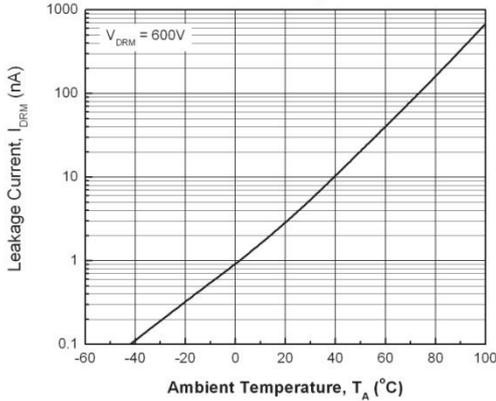
**Figure 3. Holding Current vs. Ambient Temperature**



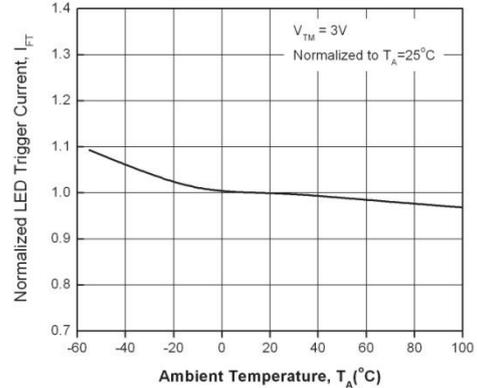
**Figure 4. LED Current Required to Trigger vs. LED Pulse Width**

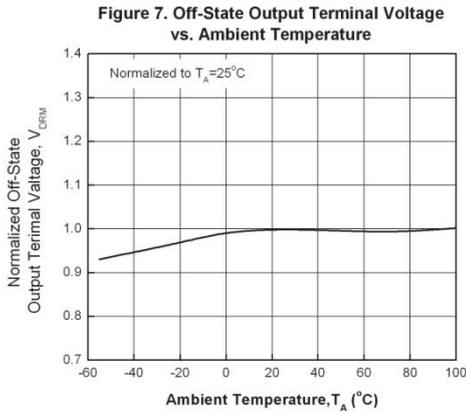


**Figure 5. Leakage Current vs. Ambient Temperature**

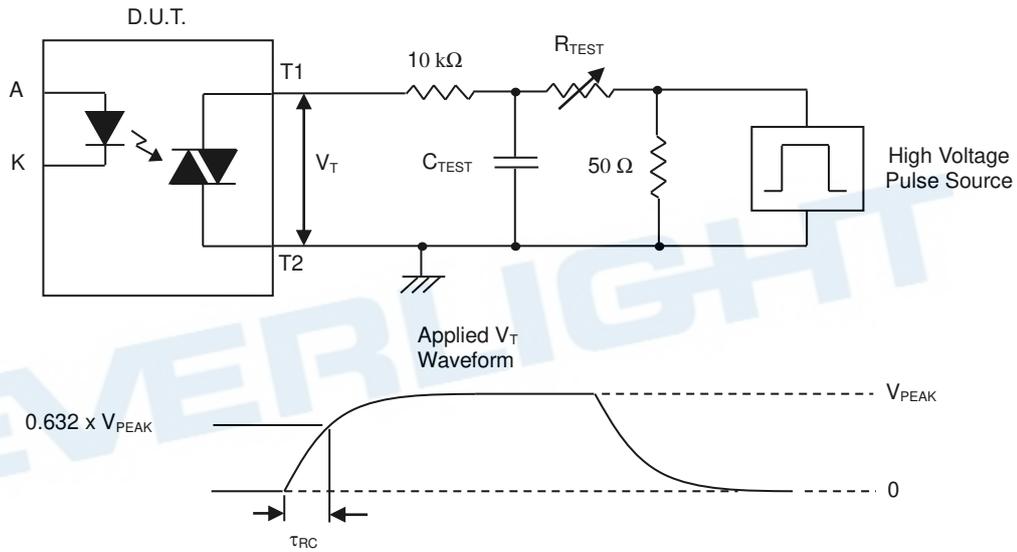


**Figure 6. LED Trigger Current vs. Ambient Temperature**





**Figure 8. Static dv/dt Test Circuit & Waveform**



**Measurement Method**

The high voltage pulse is set to the required V<sub>PEAK</sub> value and applied to the D.U.T. output side through the RC circuit above. LED current is not applied. The waveform V<sub>T</sub> is monitored using a x100 scope probe. By varying R<sub>TEST</sub>, 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, τ<sub>RC</sub> is recorded and the dv/dt calculated.

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

For example, V<sub>PEAK</sub> = 400V for EL302X series. The dv/dt value is calculated as follows:

$$dv/dt = \frac{0.632 \times 400}{\tau_{RC}} = \frac{252.8}{\tau_{RC}}$$

## Order Information

### Part Number

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

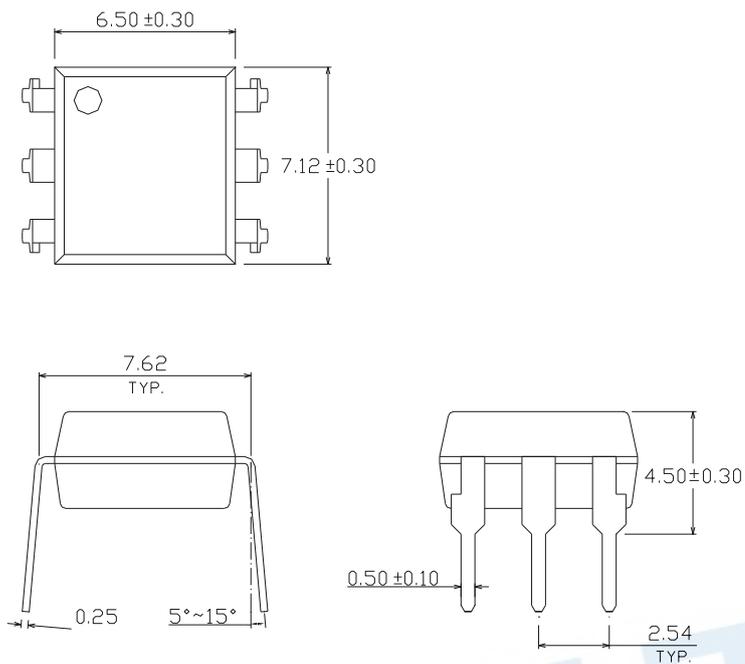
### Notes

- 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)

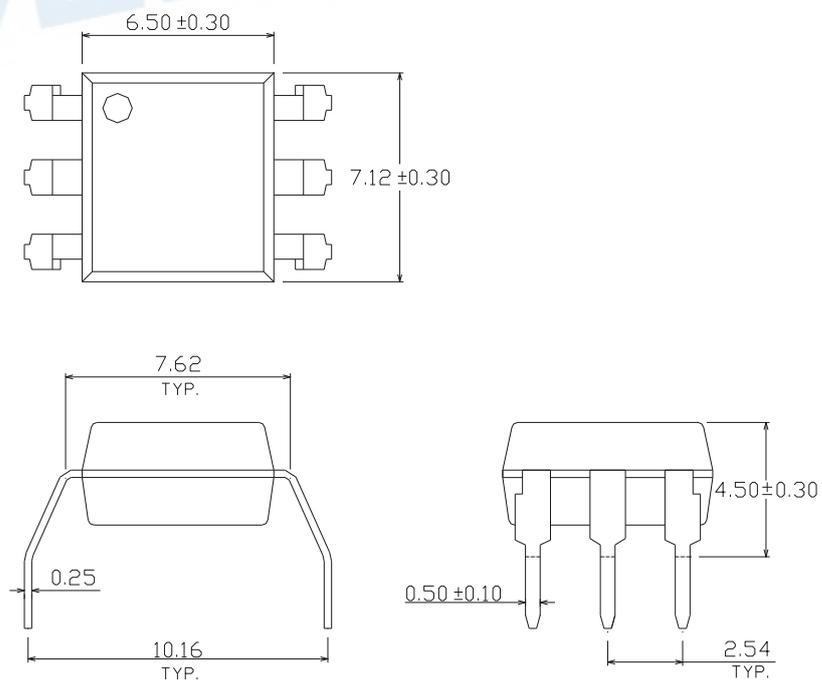
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S	Surface mount lead form	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option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

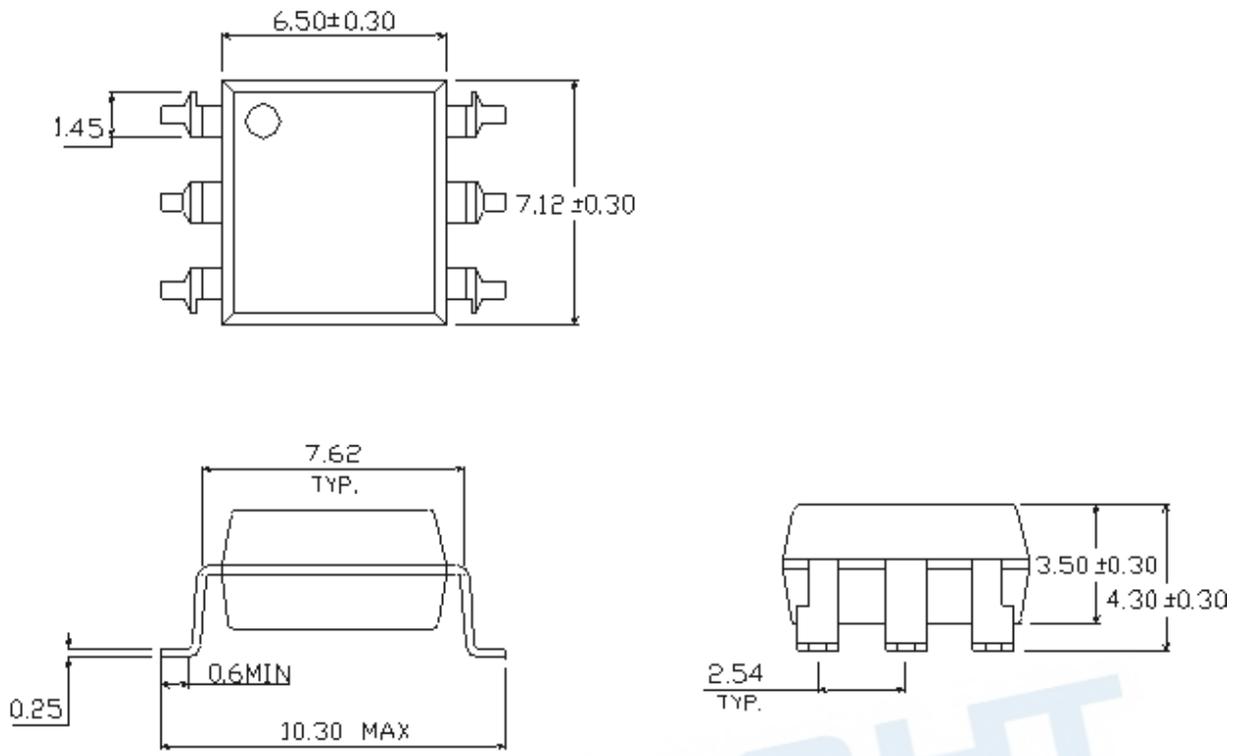
### Standard DIP Type



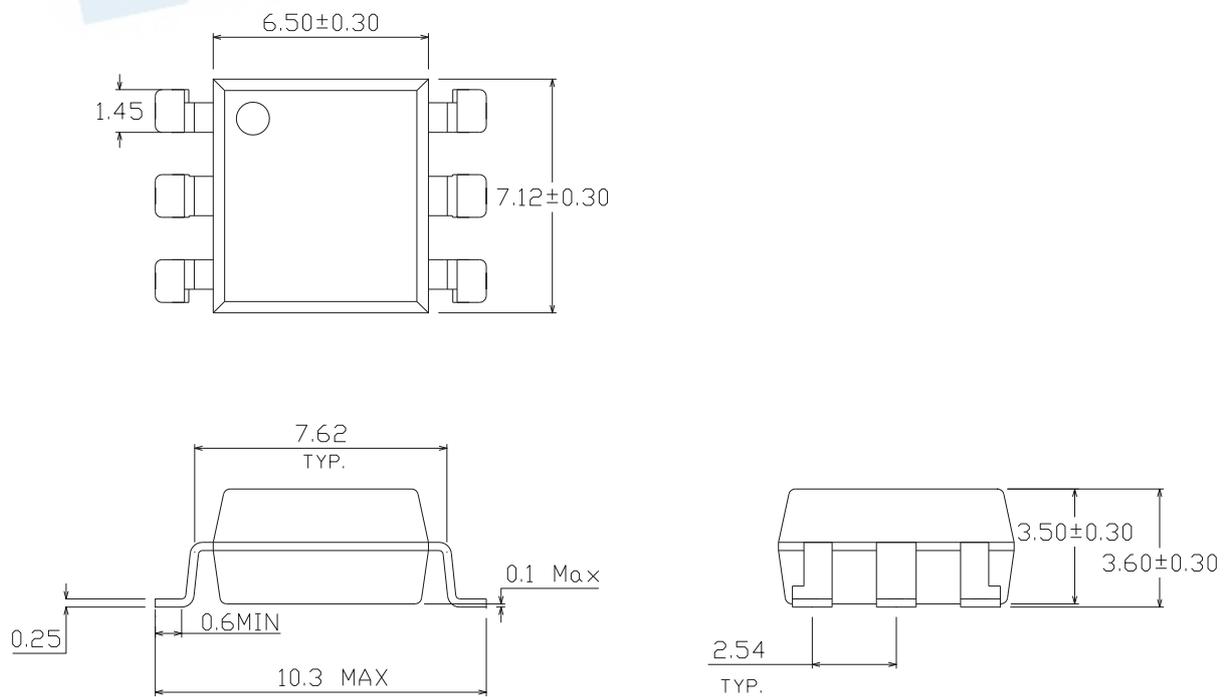
### Option M Type



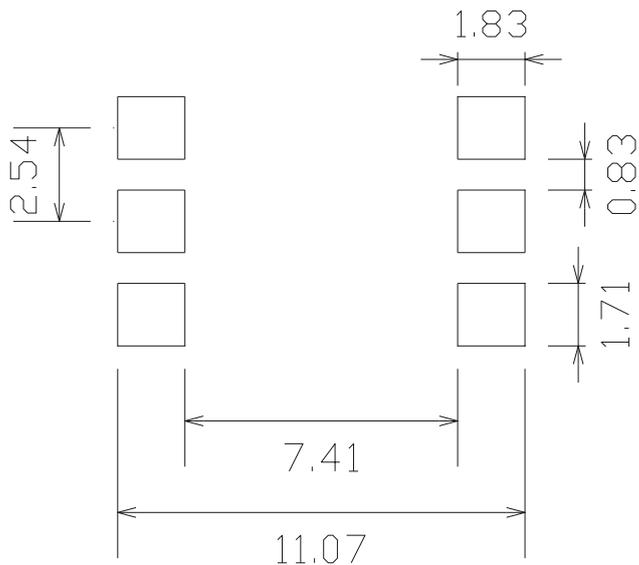
**Option S Type**



**Option S1 Type**



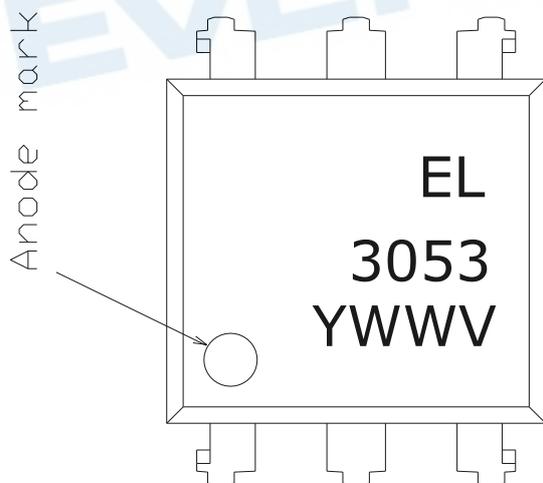
### Recommended pad layout for surface mount leadform



#### Notes

Suggested pad dimension is just for reference only.  
Please modify the pad dimension based on individual need.

#### Device Marking

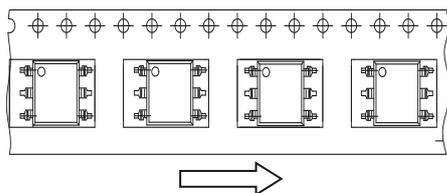


#### Notes

EL denotes EVERLIGHT  
3053 denotes Device Number  
Y denotes 1 digit Year code  
WW denotes 2 digit Week code  
V denotes VDE (optional)

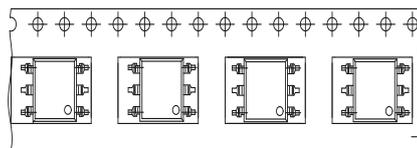
## Tape & Reel Packing Specifications

### Option TA



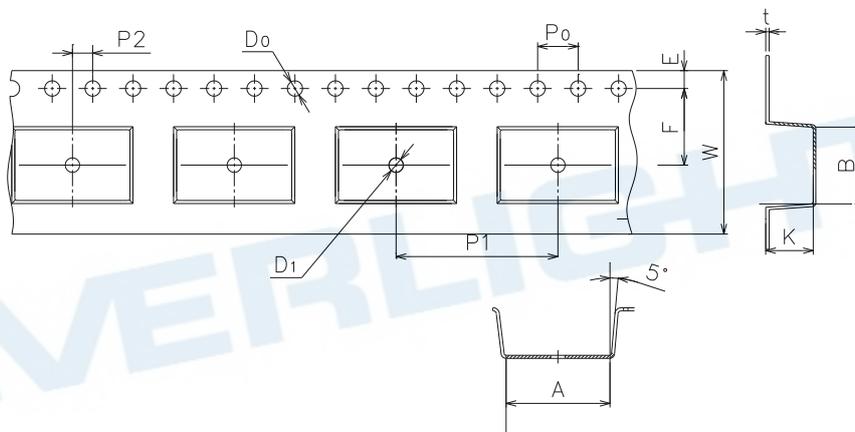
Direction of feed from reel

### Option TB



Direction of feed from reel

## Tape dimensions

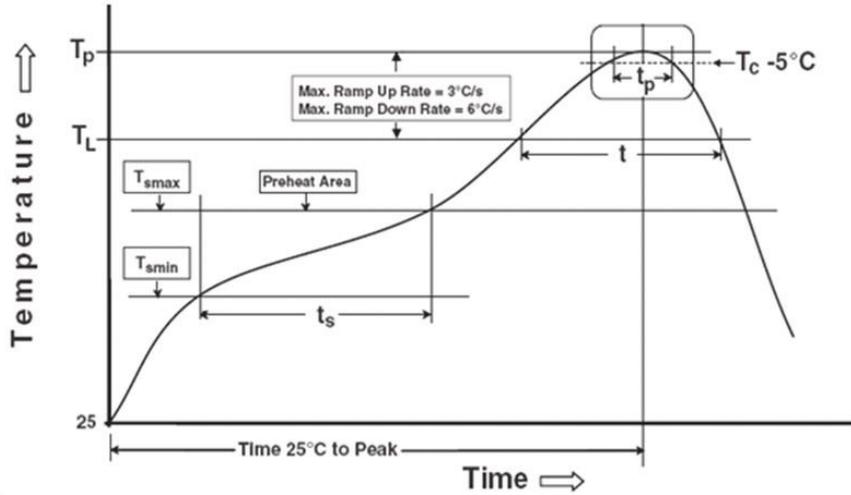


Dimension No.	<b>A</b>	<b>B</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension (mm)	10.8±0.1	7.5±0.1	1.5±0.1	1.5±0.1	1.75±0.1	7.5±0.1
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>K</b>
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

## Precautions for Use

### 1. Soldering Condition

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



Notes

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: $T_p - 5^\circ C$	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

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2. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
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