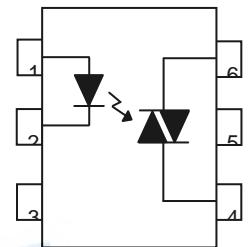


6 PIN DIP RANDOM-PHASE TRIAC DRIVER PHOTOCOUPLER EL301X, EL302X, EL305X Series



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	P_D	100	mW
	Derating factor (above $T_a = 85^\circ\text{C}$)		3.8	mW / °C
Output	Off-state Output Terminal Voltage	V_{DRM}	EL301X 250	V
			EL302X 400	
			EL305X 600	
	Peak Repetitive Surge Current (pw=100µs,120pps)	I_{TSM}	1	A
	On-State RMS Current	$I_{T(RMS)}$	100	mA
	Power dissipation	P_C	300	mW
	Derating factor (above $T_a = 85^\circ\text{C}$)		7.4	mW/°C
	Total power dissipation	P_{TOT}	330	mW
Isolation voltage ^{*1}	V_{ISO}	5000	Vrms	
Operating temperature	T_{OPR}	-55 to 100	°C	
Storage temperature	T_{STG}	-55 to 125	°C	
Soldering Temperature ^{*2}	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 = 10mA
Reverse Leakage current	I _R	-	-	10	μA	V _R = 6V

Output

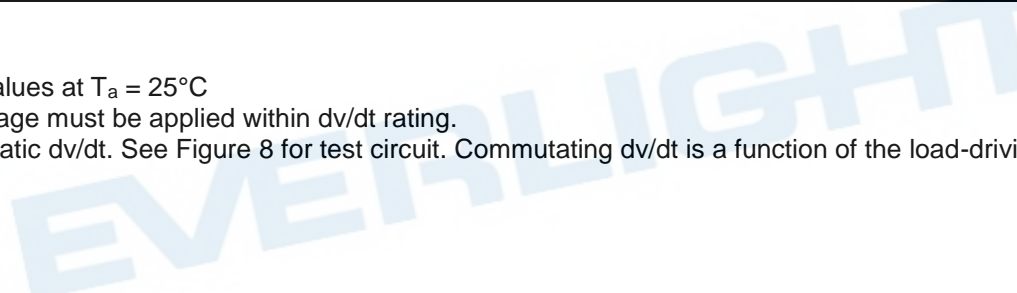
Parameter	Symbol	Min.	Typ.*1	Max.	Unit	Condition
Peak Blocking Current	I _{DRM}	-	-	100	nA	V _{DRM} = Rated V _{DRM} I _F = 0mA*2
Peak On-state Voltage	V _{TM}	-	-	2.5	V	I _{TM} =100mA peak, I _F =Rated I _{FT}
Critical Rate of Rise off-state Voltage	EL301X EL302X EL305X dv/dt	- 1000	100 -	- -	V/μs	V _{PEAK} =Rated V _{DRM} , I _F =0 (Fig. 8)*3 V _{PEAK} =400V, I _F =0 (Fig. 8)

Notes:

*1. Typical values at T_a = 25°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		
Holding Current	I_H	-	250	-	μA	

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

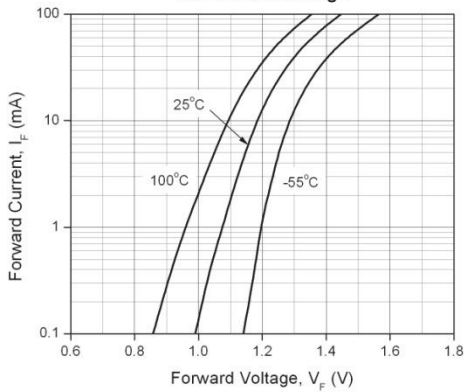


Figure 2. On-State Characteristics

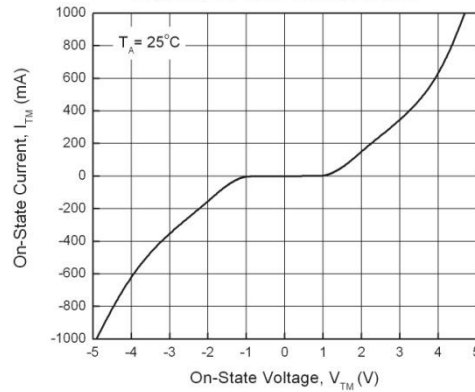


Figure 3. Holding Current vs. Ambient Temperature

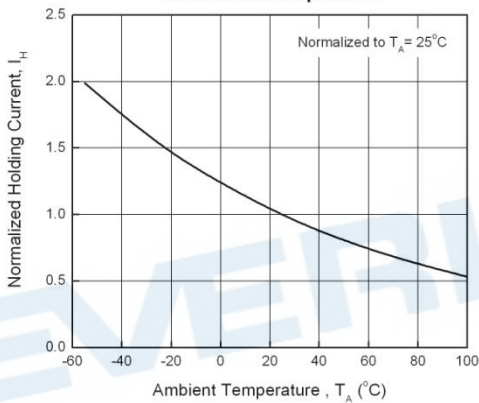


Figure 4. LED Current Required to Trigger vs. LED Pulse Width

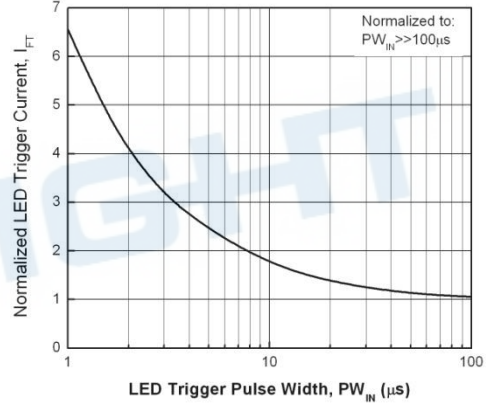


Figure 5. Leakage Current vs. Ambient Temperature

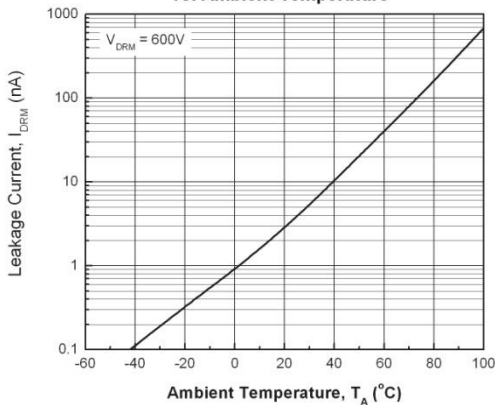


Figure 6. LED Trigger Current vs. Ambient Temperature

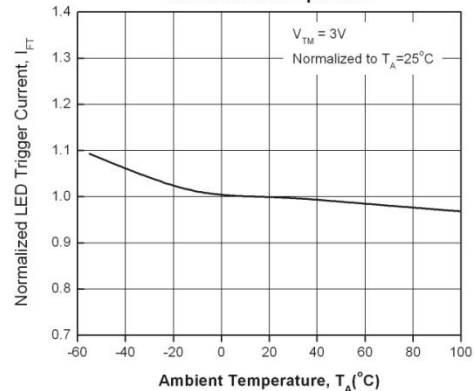


Figure 7. Off-State Output Terminal Voltage vs. Ambient Temperature

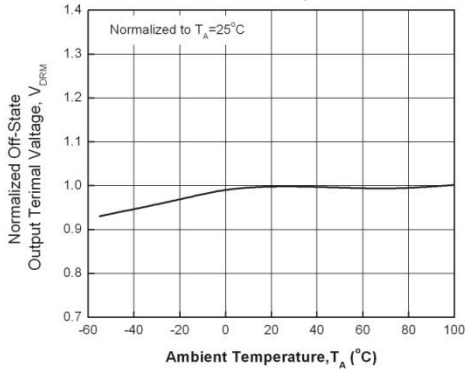
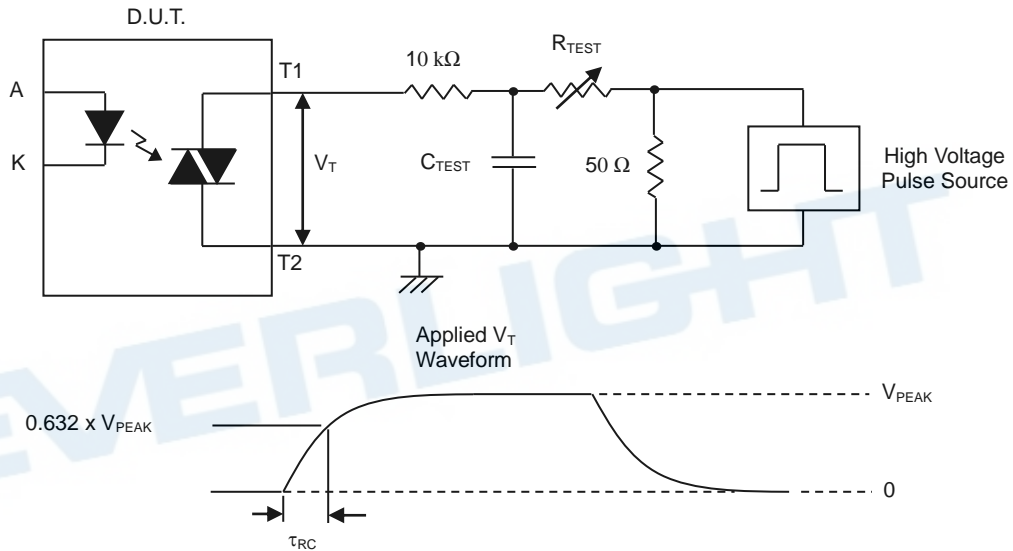


Figure 8. Static dv/dt Test Circuit & Waveform



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, τ_{RC} is recorded and the dv/dt calculated.

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

For example, $V_{PEAK} = 400V$ 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**

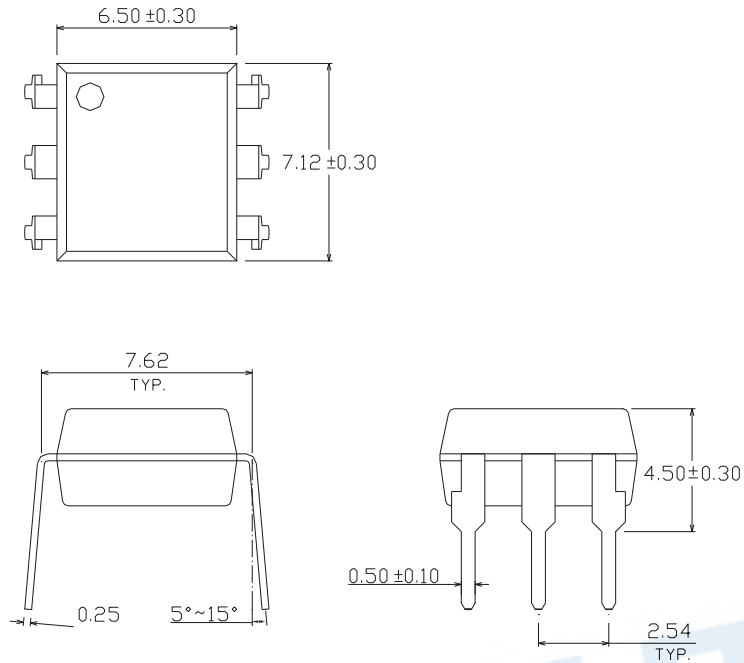
Notes

- 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)

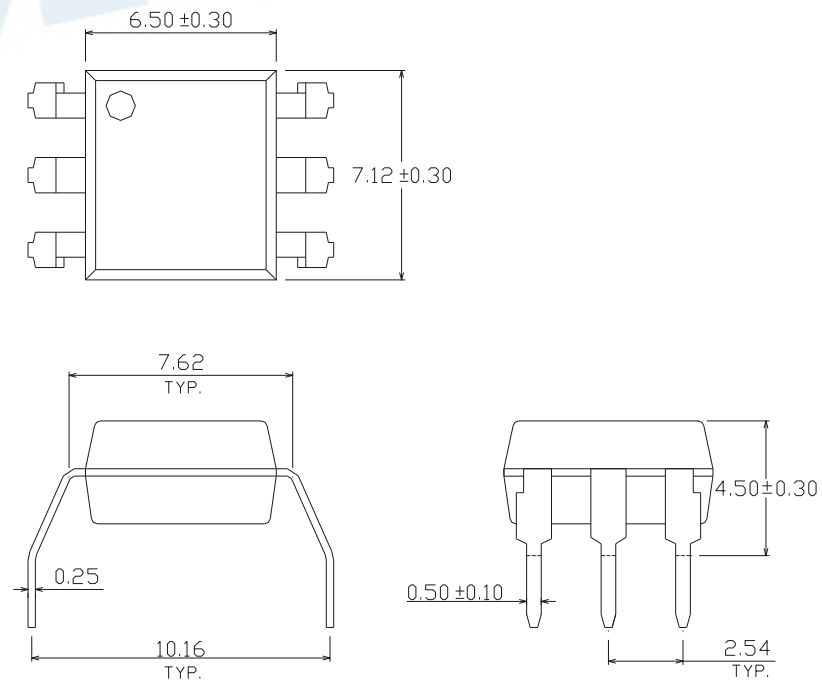
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S	Surface mount lead form	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option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

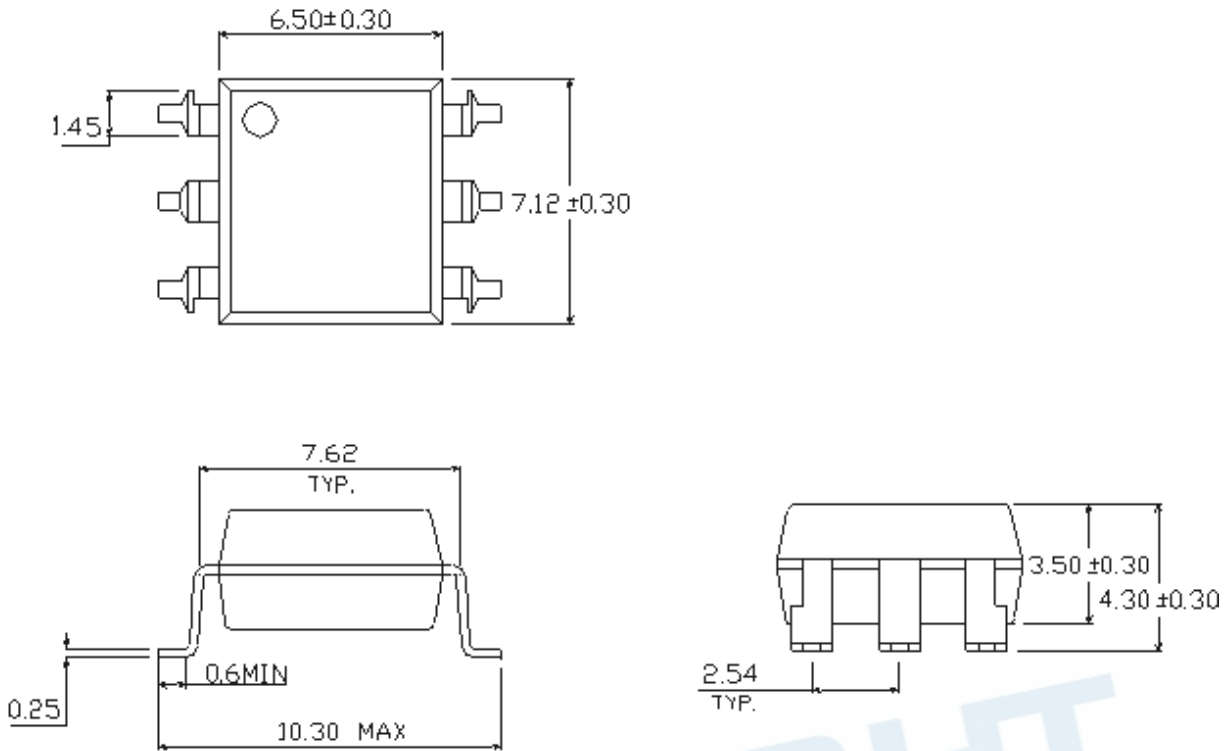
Standard DIP Type



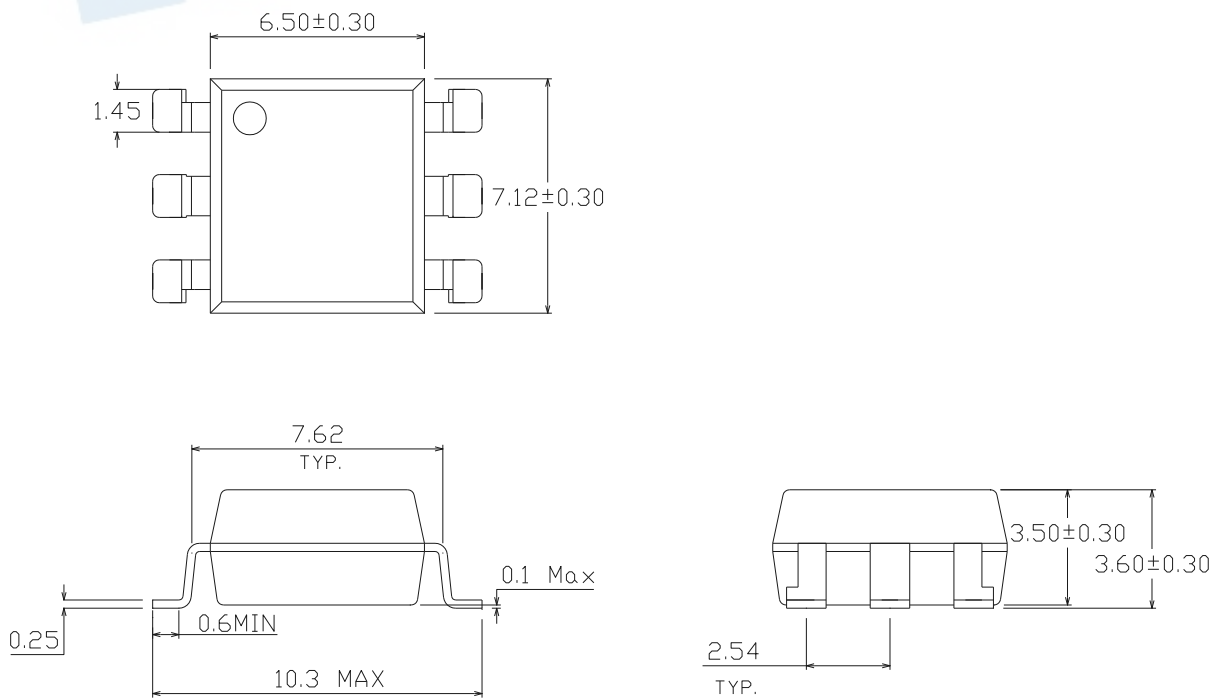
Option M Type



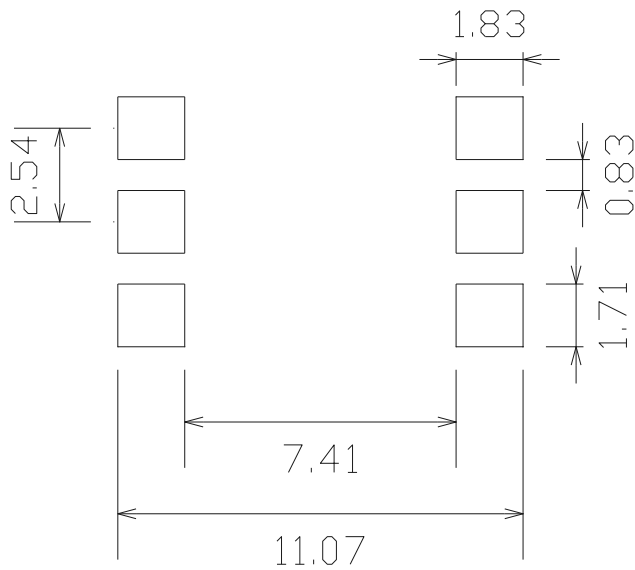
Option S Type



Option S1 Type



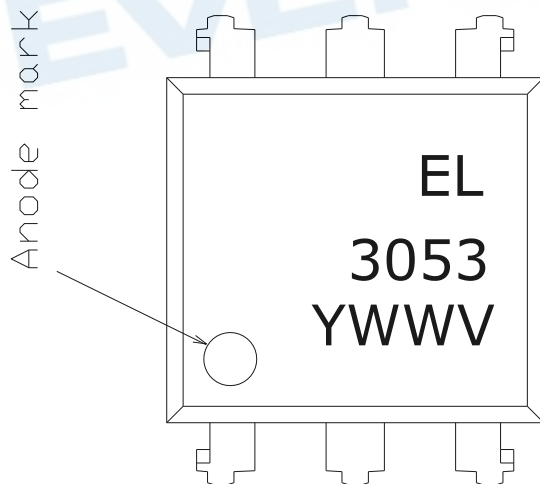
Recommended pad layout for surface mount leadform



Notes

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

Device Marking

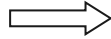
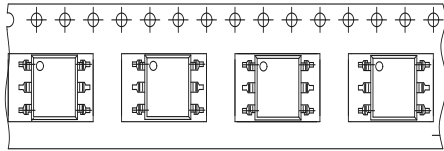


Notes

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

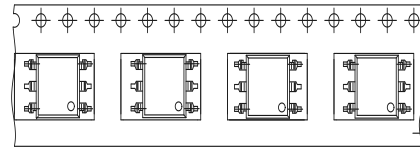
Tape & Reel Packing Specifications

Option TA



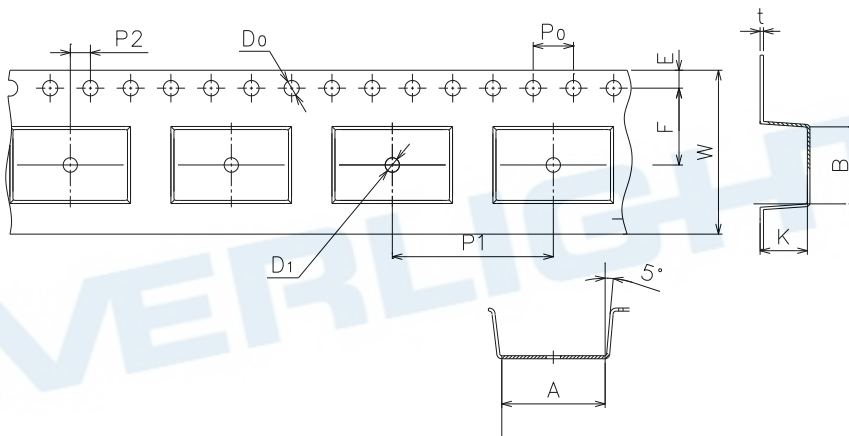
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions

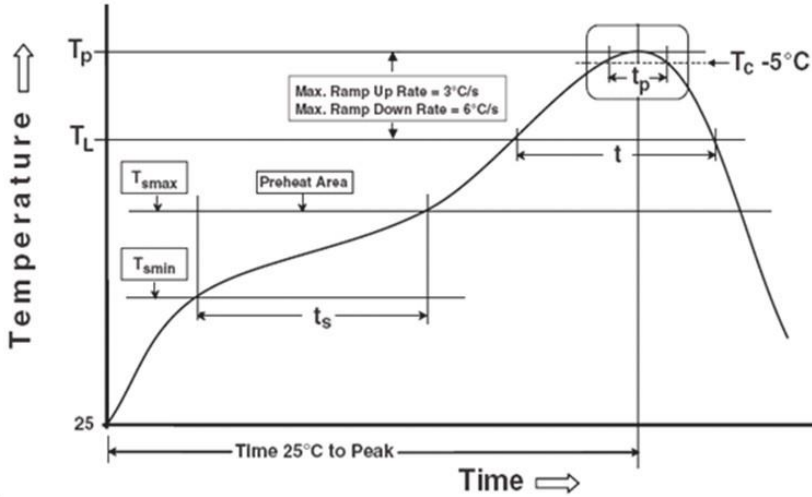


Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.8±0.1	7.5±0.1	1.5±0.1	1.5±0.1	1.75±0.1	7.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

Precautions for Use

1. Soldering Condition

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



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

DISCLAIMER

1. Above specification may be changed without notice. EVERLIGHT will reserve authority on material change for above specification.
2. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
3. When using this product, please observe the absolute maximum ratings and the instructions for use 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.
4. These specification sheets include materials protected under copyright of EVERLIGHT. Reproduction in any form is prohibited without the specific consent of EVERLIGHT.
5. This product is not intended to be used for military, aircraft, automotive, medical, life sustaining or life saving applications or any other application which can result in human injury or death. Please contact authorized Everlight sales agent for special application request.
6. Statements regarding the suitability of products for certain types of applications are based on Everlight's knowledge of typical requirements that are often placed on Everlight products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Everlight's terms and conditions of purchase, including but not limited to the warranty expressed therein.