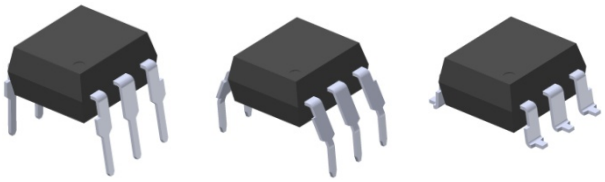
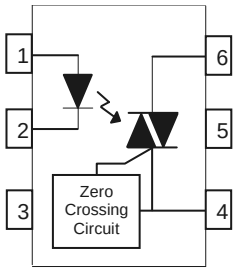
DATASHEET

6 PIN DIP ZERO-CROSS TRIAC DRIVER PHOTOCOUPLER
EL303X, EL304X, EL306X, EL308X Series



Schematic



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

Features:

- Compliance Halogens Free
(Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- Peak breakdown voltage
  - 250V: EL303X - 400V: EL304X
  - 600V: EL306X - 800V: EL308X
- High isolation voltage between input and output (Viso=5000 V rms)
- Zero voltage crossing
- Compliance with EU REACH
- Pb free
- The product itself will remain within RoHS compliant version
- UL and cUL approved
- VDE approved
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

Description

The EL303X, EL304X, EL306X and EL308X series of devices each consist of a 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℃) *3

Parameter			Symbol	Rating	Unit
Input	Forward current		I_F	50	mA
	Reverse voltage		V_R	6	V
	Power dissipation		P_D	100	mW
Output	Off-state Output Terminal Voltage	EL303X	V_{DRM}	250	V
		EL304X		400	
		EL306X		600	
		EL308X		800	
	R.M.S. On-state current		$I_{T(RMS)}$	100	mA
	Peak Repetitive Surge Current (pw≤100μs,120pps)		I_{TP}	2	A
	Peak Non-repetitive Surge Current (f=60Hz, one cycle)		I_{TSM}	1	A
	Power dissipation		P_C	300	mW
Total power dissipation			P_{TOT}	400	mW
Isolation voltage *1			V_{ISO}	5000	Vrms
Operating temperature			T_{OPR}	-40 to 100	℃
Storage temperature			T_{STG}	-55 to 125	℃
Soldering Temperature*2			T_{SOL}	260	℃

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
*3 Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions are within the absolute maximum ratings.

Recommended Operating Conditions (Note)

Please use under recommended operating conditions to obtain expected characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit
Input forward current	EL30X1	I_F	20	25	30	mA
	EL30X2		15	20	25	mA
	EL30X3		7	10	20	mA
AC mains voltage		V_{AC}	-	-	240	V
Operating temperature		T_{OPR}	-25	-	85	°C

Notes:
The recommended operating conditions are given as a design guide necessary to obtain the intended performance of the device. Each parameter is an independent value. When creating a system design using this device, the electrical characteristics specified in this data sheet should also be considered.

Electro-Optical Characteristics (Ta=25ºC unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.*1	Max.	Unit	Condition
Forward Voltage	V_F	-	-	1.5	V	I_F = 30mA
Reverse Leakage current	I_R	-	-	10	μA	V_R = 6V

Note: Reverse Voltage (VR) Condition is applied to IR test only. The device is not designed for reverse operation

Output

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Peak Blocking Current	I_{DRM1}	-	-	500	nA	V_{DRM} = Rated V_{DRM} I_F = 0 mA*2
Peak On-state Voltage	V_{TM}	-	-	3	V	I_{TM}=100 mA peak, I_F=Rated I_{FT}
Critical Rate of Rise off-state Voltage	dv/dt	600	-	-	V/μs	V_{PEAK} = 0.636×Rated V_{DRM}, I_F = 0mA (Fig. 12)
Inhibit Voltage (MT1-MT2 voltage above which device will not trigger)	V_{INH}	-	-	20	V	I_F= Rated I_{FT}
Leakage in Inhibited State	I_{DRM2}	-	-	500	μA	I_F= Rated I_{FT}, V_{DRM}=Rated V_{DRM}, off state

Notes:
*1.Typical values at T_a = 25°C.
*2.Test voltage must be applied within dv/dt rating.

Transfer Characteristics (Ta=25ºC unless specified otherwise)

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
LED Trigger Current	EL3031 EL3041 EL3061 EL3081	I_{FT}	-	-	15	mA	Main terminal Voltage=3V*3
	EL3032 EL3042 EL3062 EL3082		-	-	10		
	EL3033 EL3043 EL3063 EL3083		-	-	5		
Holding Current		I_H	-	250	-	μA	

Notes:
*3. All devices are guaranteed to trigger at an I_F value over than max I_{FT}.

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

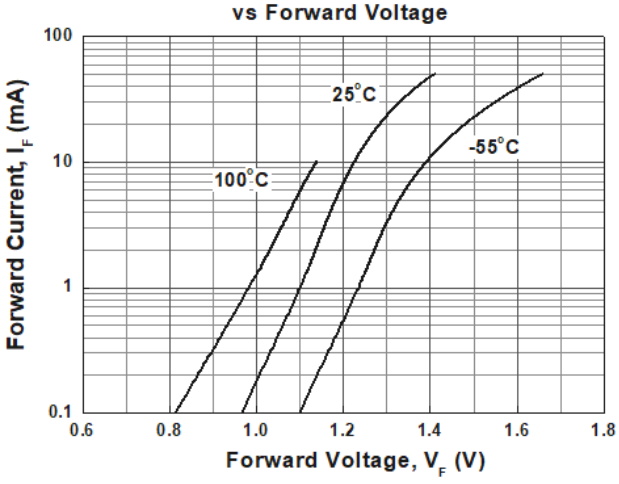


Figure 2. Holding Current vs Ambient Temperature

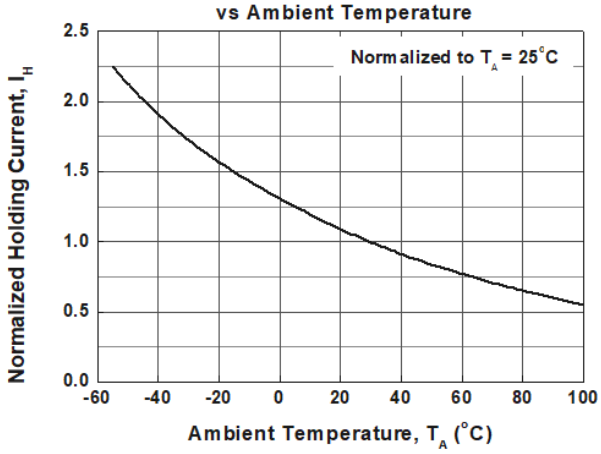
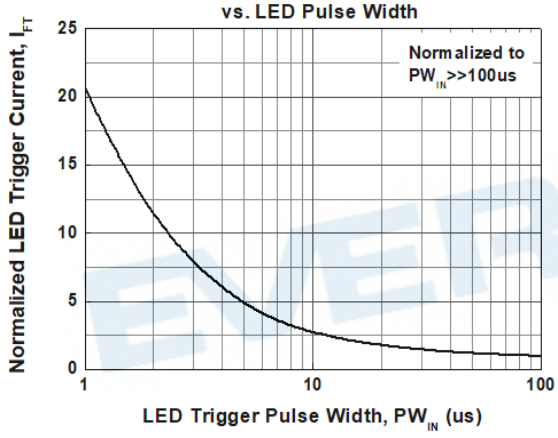


Figure 3. LED Current Required to Trigger vs. LED Pulse Width



Fugure 4. Inhibit Voltage vs Ambient Temperature

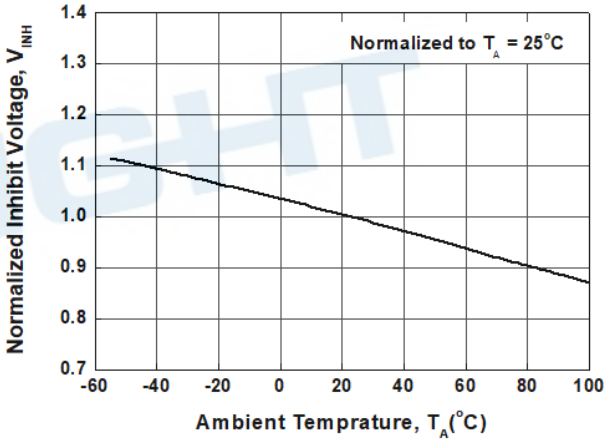


Figure 5. Leakage Current vs. Ambient Temperature

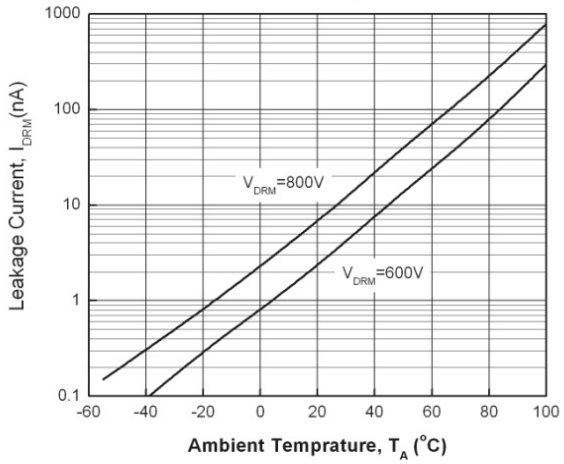


Figure 6. LED Trigger Current vs. Ambient Temperature

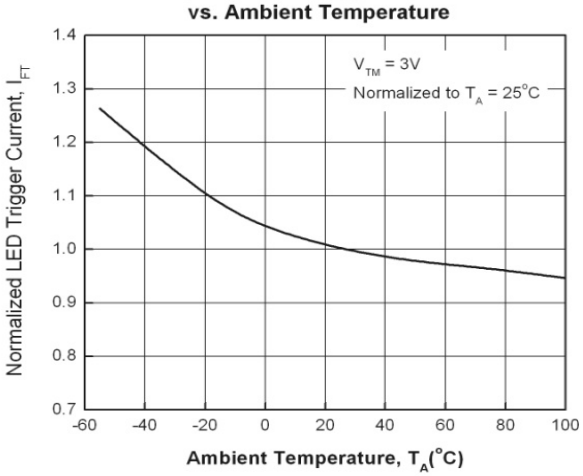


Figure 7. Off-State Output Terminal Voltage vs. Ambient Temperature

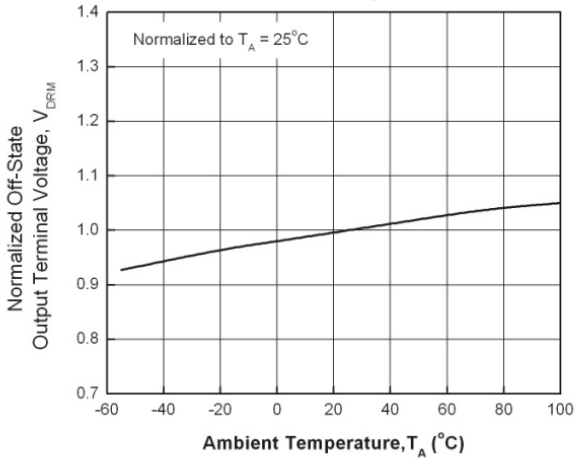


Figure 8. Leakage in Inhibit State vs. Ambient Temperature

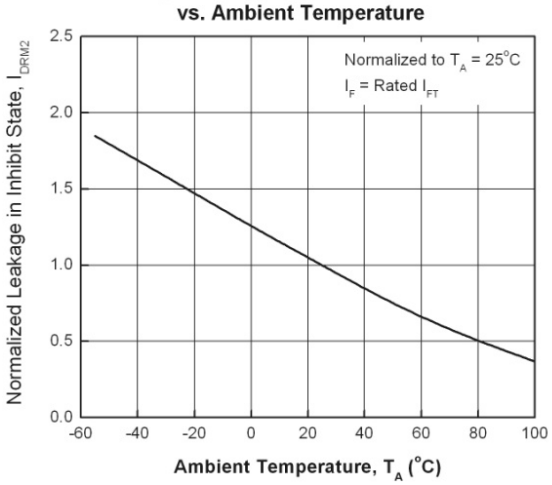


Figure 9. On-State Characteristics

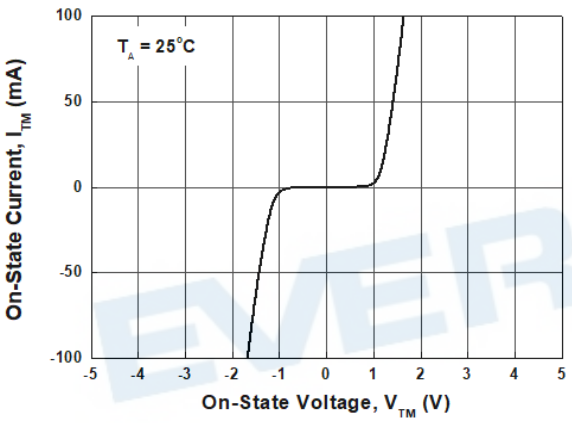


Fig 10. I_F Maximum rating vs Temperature

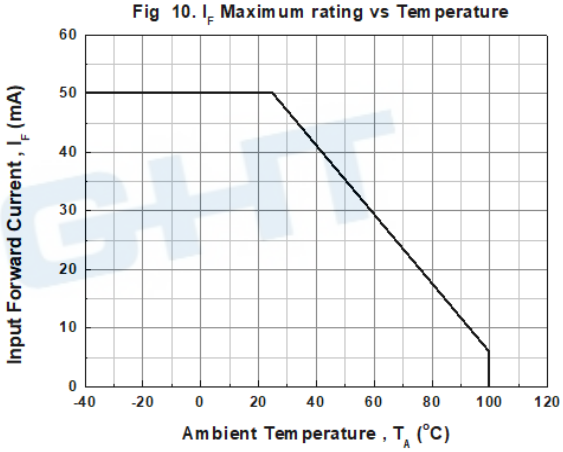


Fig 11. On-state Current vs Temperature

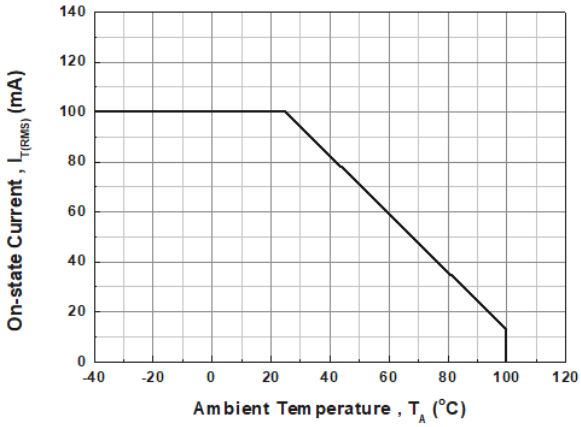
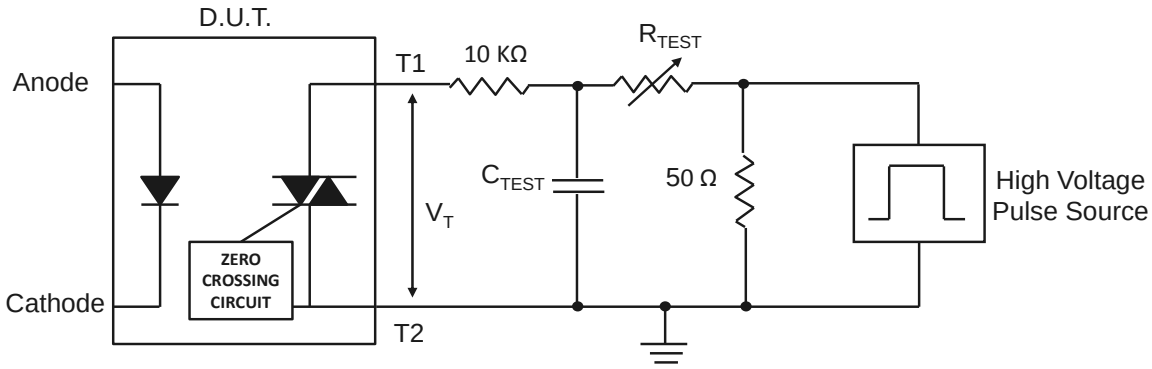
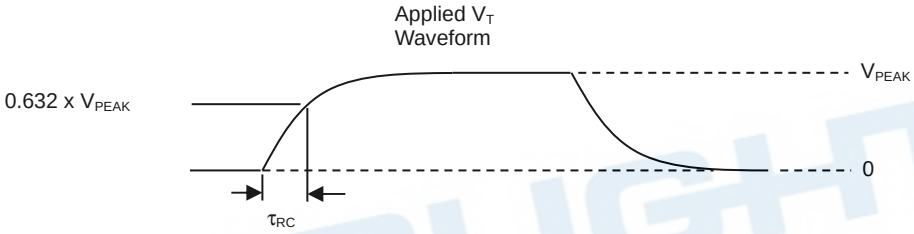


Figure 12. Static dv/dt Test Circuit & Waveform





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.

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

Order Information

Part Number

EL303XY(Z)-V
or EL304XY(Z)-V
or EL306XY(Z)-V
or EL308XY(Z)-V

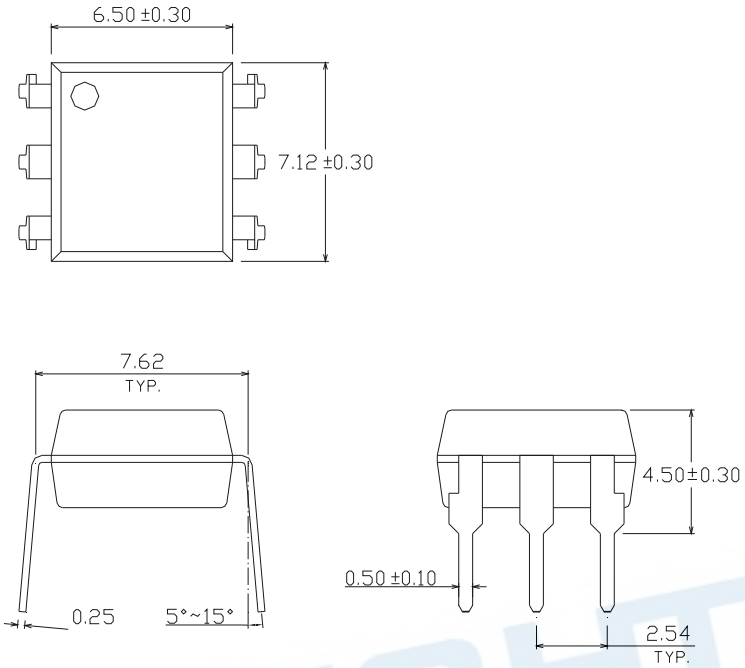
Note

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)
V = VDE safety approved option

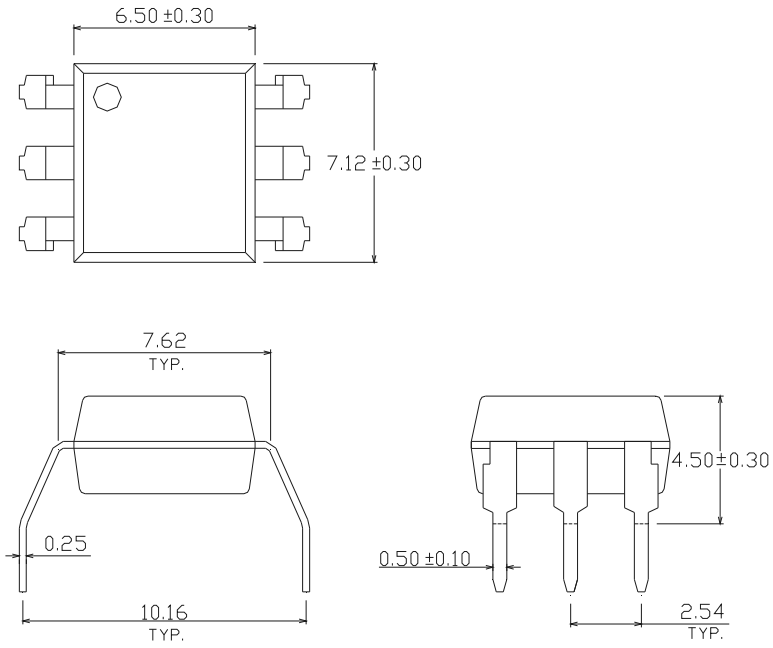
Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount lead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

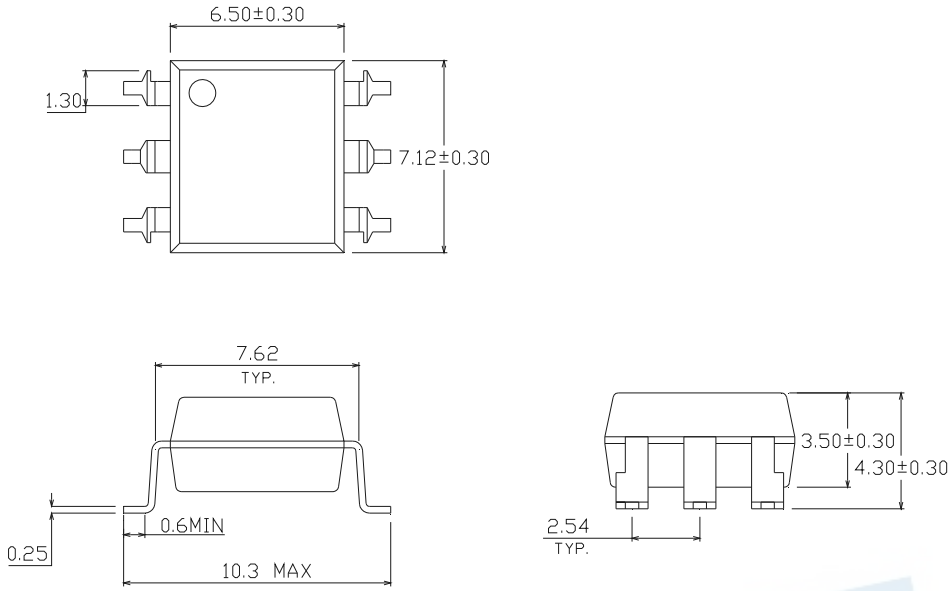
Standard DIP Type



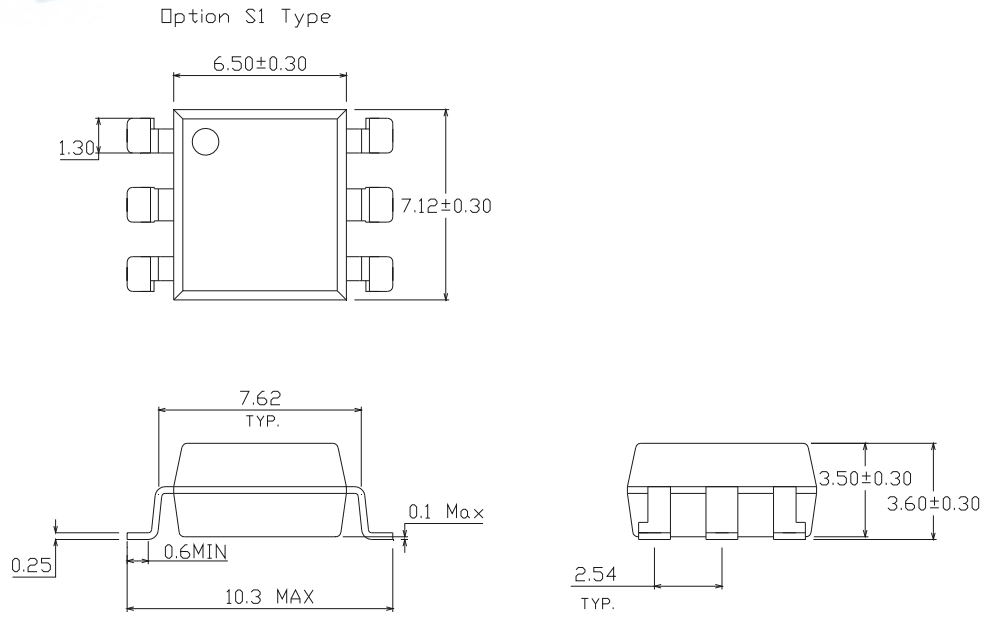
Option M Type



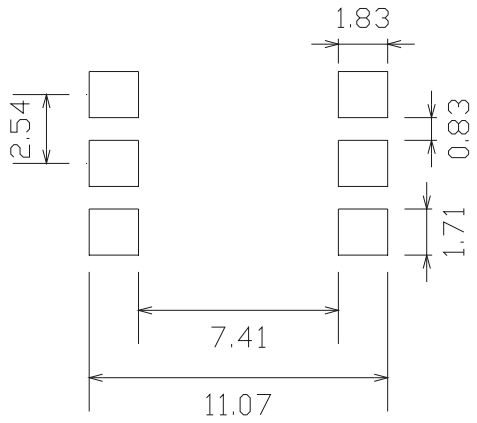
Option S Type



Option S1 Type



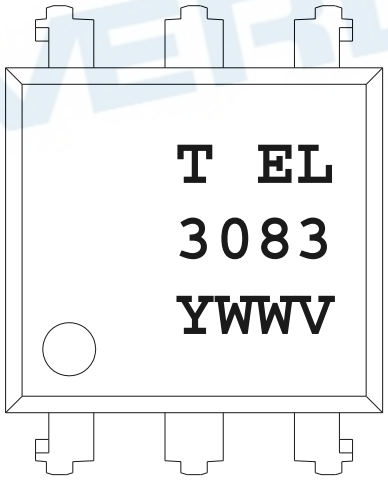
Recommended pad layout for surface mount leadform



Notes

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

Device Marking

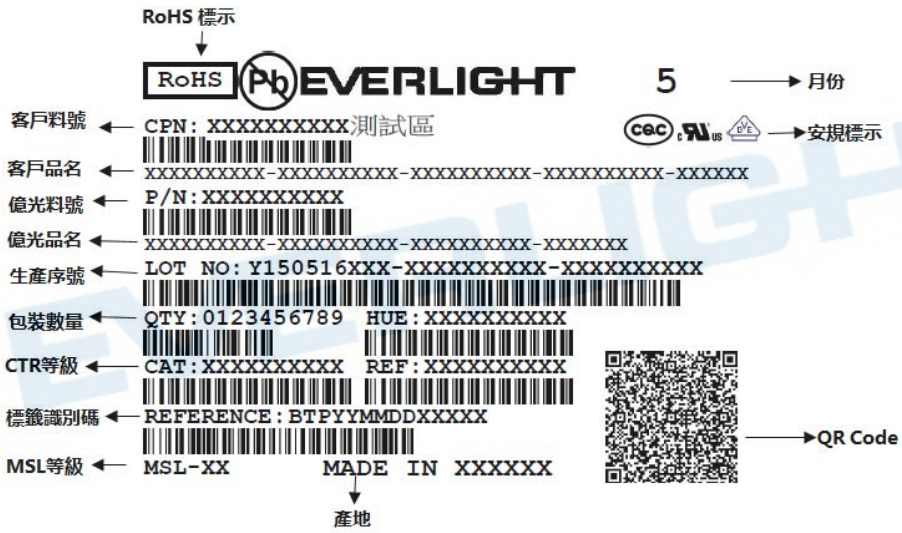


Notes

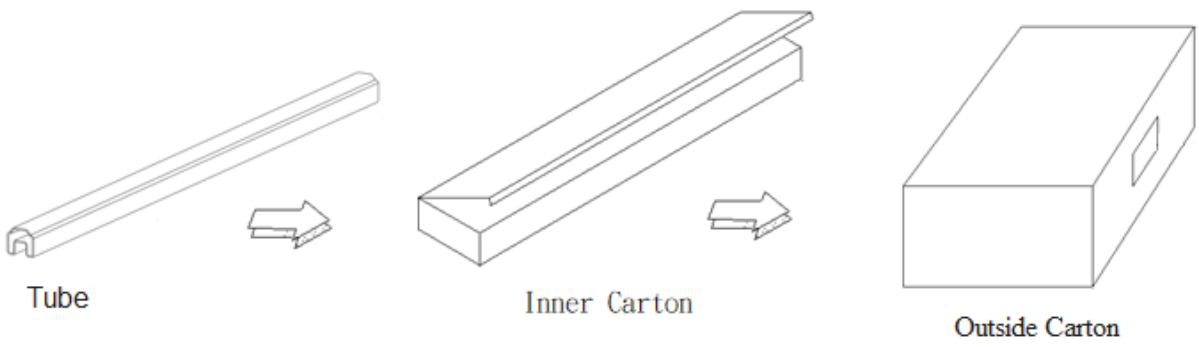
T	denotes Factory No code : made in China T : made in Taiwan
EL	denotes EVERLIGHT
3083	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE option

Label form

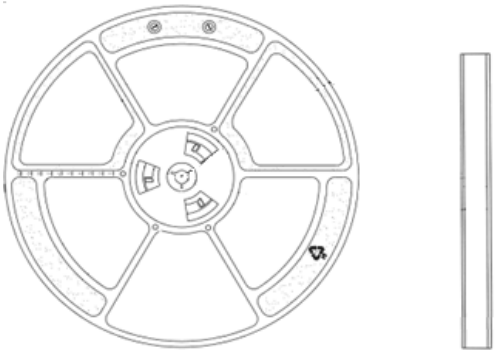
or



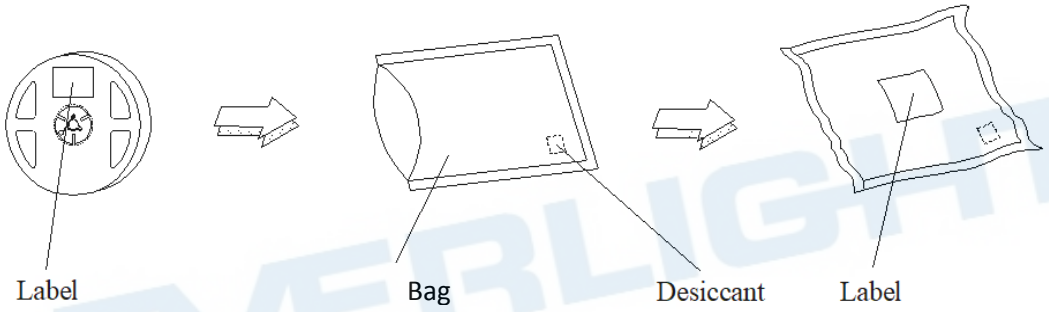
TUBE Dimension

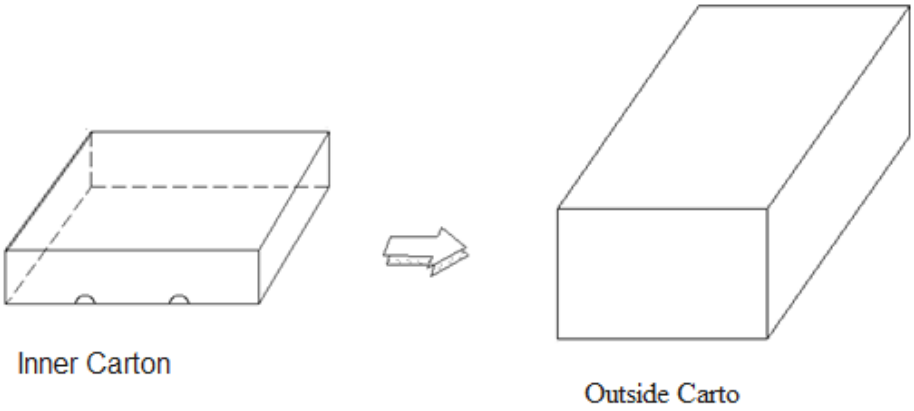


Reel Dimension



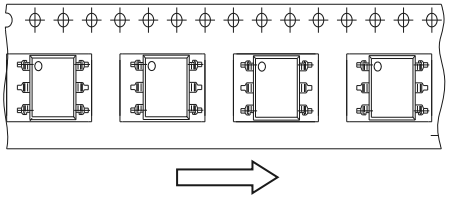
Moisture Resistant Packaging





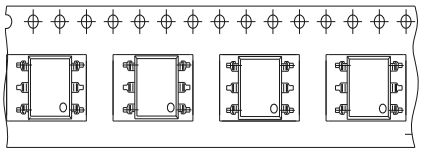
Tape & Reel Packing Specifications

Option TA



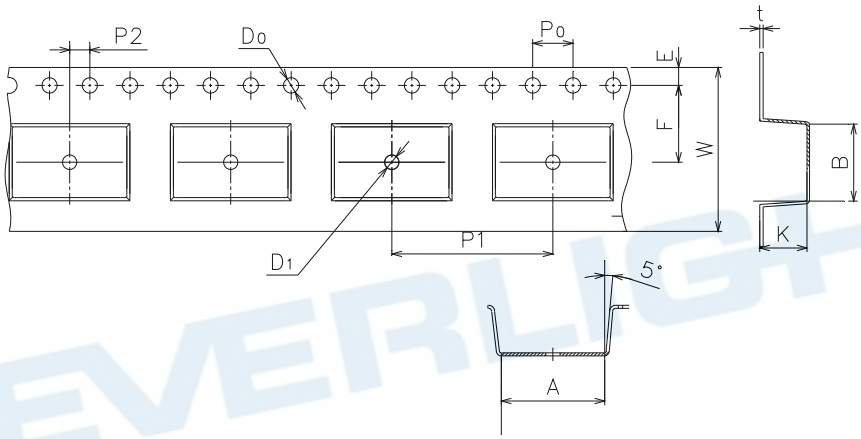
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions



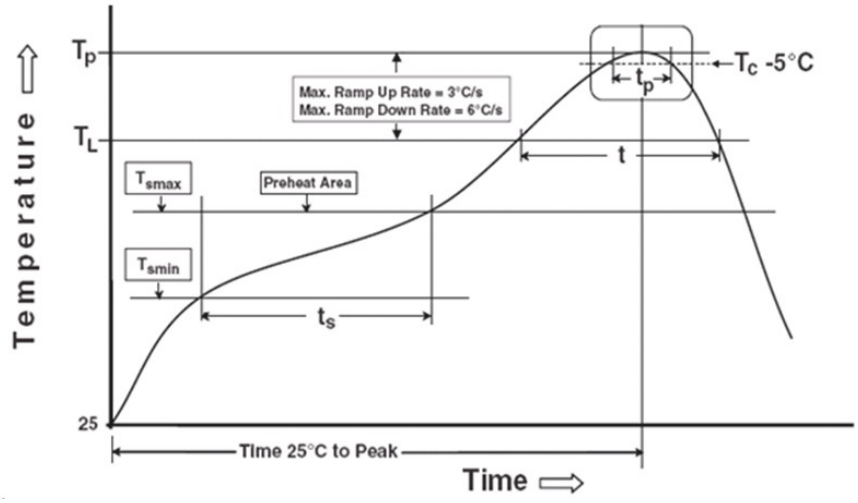
Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.8±0.1	7.55±0.1	1.5±0.1	1.5±0.1	1.75±0.1	7.5±0.1

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



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°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

.

Precautions for General Storage

- Avoid storage locations where devices may be exposed to moisture or direct sunlight.
- Follow the precautions printed on the packing label of the device for transportation and storage.
- Keep the storage location temperature and humidity within a range of 5°C to 35°C and 20 % to 60 %,respectively.
- Do not store the products in locations with poisonous gases (especially corrosive gases) or in dusty conditions.
- Store the products in locations with minimal temperature fluctuations. Rapid temperature changes during storage can cause condensation, resulting in lead oxidation or corrosion, which will deteriorate the solderability of the leads.
- When restoring devices after removal from their packing, use anti-static containers.
- Do not allow loads to be applied directly to devices while they are in storage.
- If devices have been stored for more than two years under normal storage conditions, it is recommended that you check the leads for ease of soldering prior to use.

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.