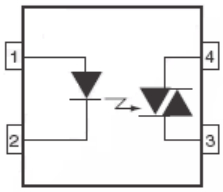
DATASHEET

4 PIN SOP RANDOM-PHASE TRIAC PHOTOCOUPLER
ELM302X, ELM305X Series



Schematic



Pin Configuration
1. Anode
2. Cathode
3. Terminal
4. Terminal

Features:

- Halogens free.
  (Br <900 ppm ,Cl <900 ppm , Br+Cl < 1500 ppm)
- Peak breakdown voltage
  - 400V: ELM302X
  - 600V: ELM305X
- High isolation voltage between input and output (Viso=3750 V rms)
- Compact dual-in-line package
- Compliance with EU REACH.
- Pb free and RoHS compliant.
- UL and cUL approved
- VDE approved
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

Description

The ELM302X series and ELM305X series are optically isolated triac driver devices. These devices contain a GaAs infrared emitting diode and a light activated silicon bilateral switch, which functions like a 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

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Absolute Maximum Ratings (Ta=25℃)

Parameter			Symbol	Rating	Unit
Input	Forward current		I_F	30	mA
	Reverse voltage		V_R	6	V
	Power Dissipation		P_D	50	mW
Output	Off-state Output Terminal Voltage	ELM302X	V_{DRM}	400	V
		ELM305X		600	
	R.M.S. On-state current		$I_{T(RMS)}$	70	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}	250	mW
Isolation voltage *1			V_{ISO}	3750	Vrms
Operating temperature			T_{OPR}	-40~+100	°C
Storage temperature			T_{STG}	-55~+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 are shorted together, and pins 3, 4 are shorted together.

*2 For 10 seconds

Recommended Operating Conditions (Note)

Please use under recommended operating conditions to obtain expected characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit
Forward current	ELM30X2	I_F	15	20	25	mA
	ELM30X3		7	10	20	mA
	ELM30X4		5	7	15	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.

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

Input

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Forward Voltage	V_F	-	1.2	1.5	V	I_F = 10mA
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_{DRM}	-	-	500	nA	V_{DRM} = Rated V_{DRM} I_F = 0mA
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	ELM302X	dv/dt	600	-	-	V/μs	V_{PEAK} = 0.636×Rated V_{DRM}, I_F = 0mA (Fig.10)
	ELM305X						

Transfer Characteristics

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
LED Trigger Current	3022 3052	I_{FT}	-	-	10	mA	Main terminal Voltage=3V*2
	3023 3053		-	-	5		
	3024 3054		-	-	3		
Holding Current		I_H	-	250		μA	

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

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Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs. Forward Voltage

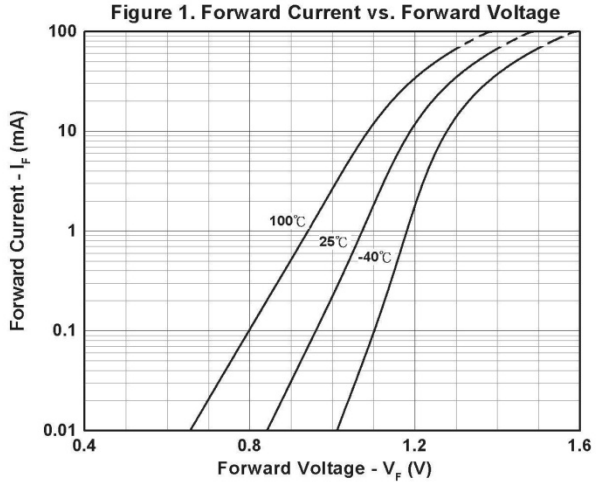


Figure 2. On-State Characteristics

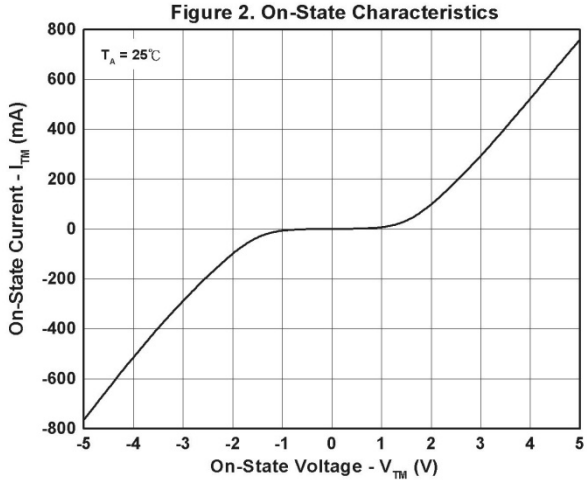


Figure 3. Holding Current vs. Ambient Temperature

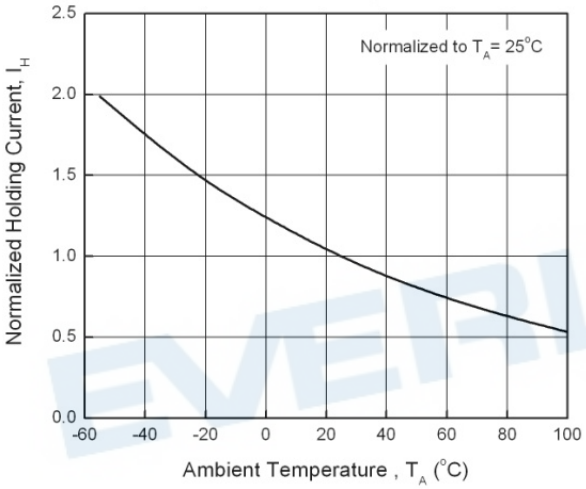


Figure 4. LED Current Required to Trigger vs. LED Pulse Width

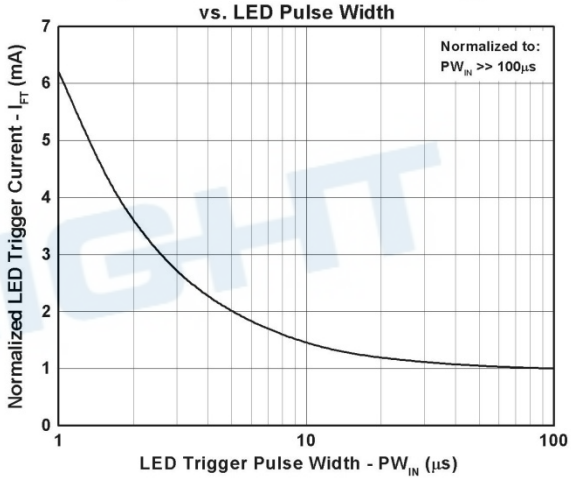


Figure 5. Leakage Current vs. Ambient Temperature

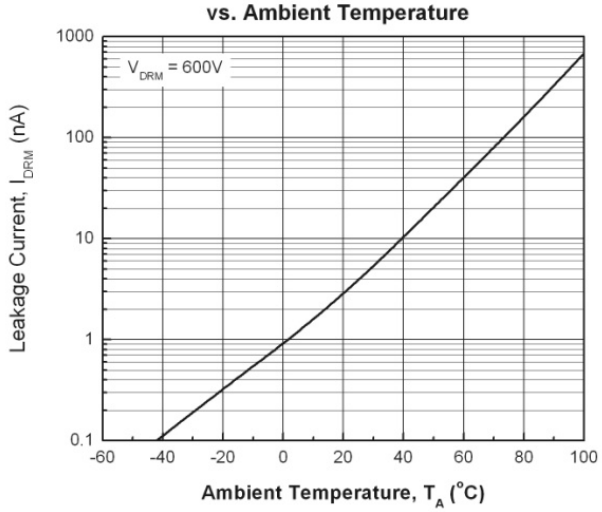
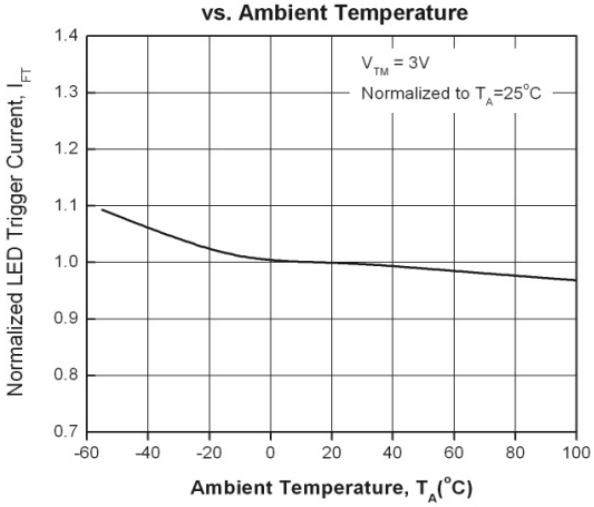


Figure 6. LED Trigger Current vs. Ambient Temperature



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

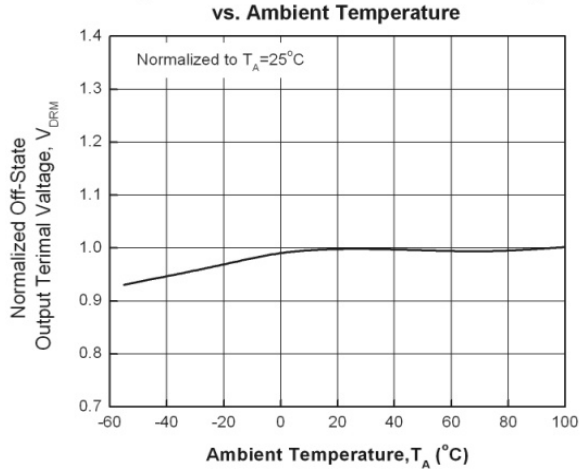


Fig 8. I_F Maximum rating vs Temperature

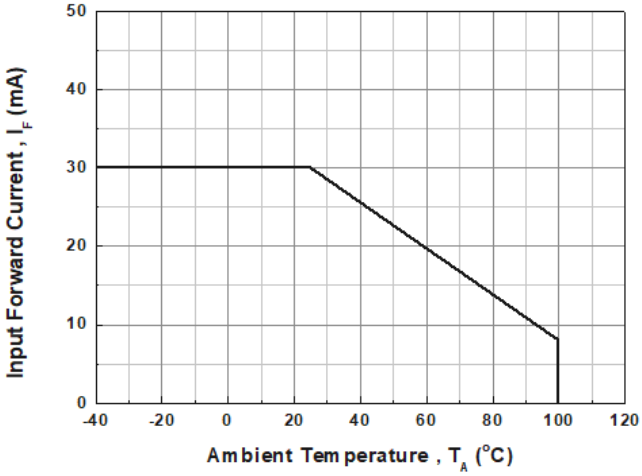
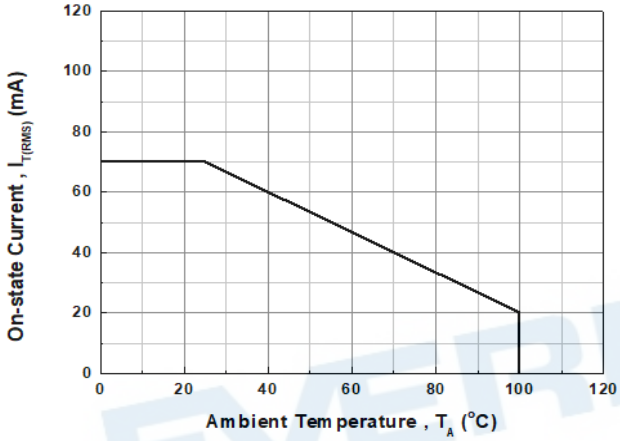


Fig 9. On-state Current vs Temperature

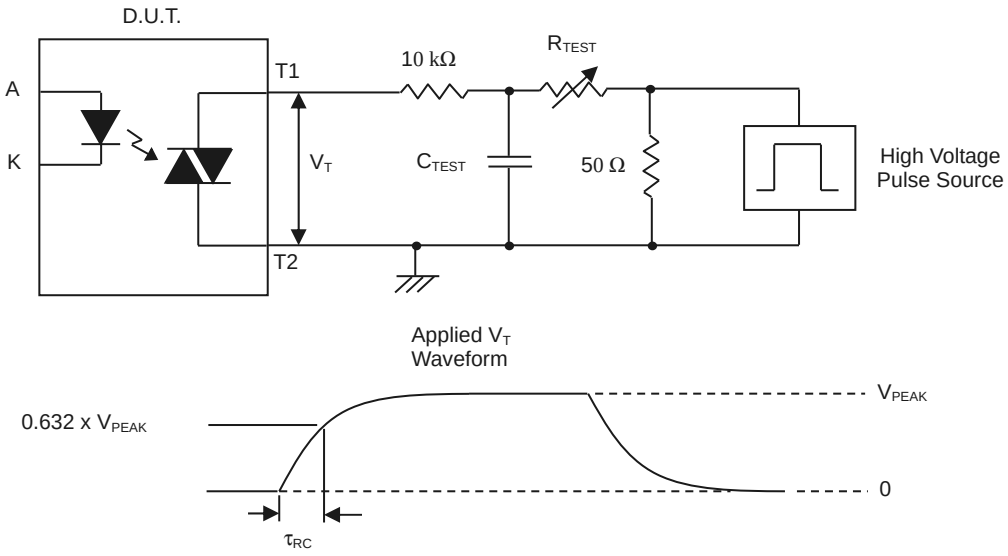


Note：The graphs shown in this datasheet are representing typical data only and do not show guaranteed values

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

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

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Order Information

Part Number

ELM302X(Z)-V
or **ELM305X(Z)-V**

Note

X = Part No. (2 ,3 or 4)
Z = Tape and reel option (TA, TB or none).
V = VDE safety approved (optional)

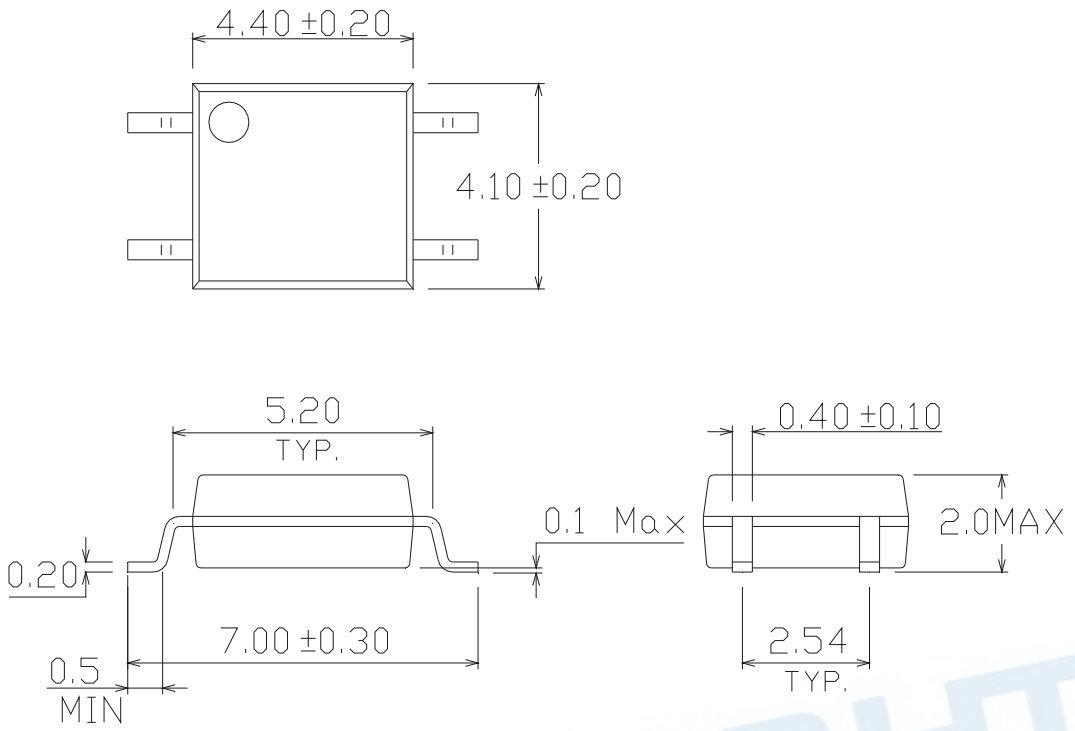
Option	Description	Packing quantity
None	Standard	100 units per tube
None	Standard + VDE safety optional	100 units per tube
(TA)	TA tape & reel option	3500 units per reel
(TB)	TB tape & reel option	3500 units per reel
(TA)-V	TA tape & reel option + VDE safety optional	3500 units per reel
(TB)-V	TB tape & reel option + VDE safety optional	3500 units per reel

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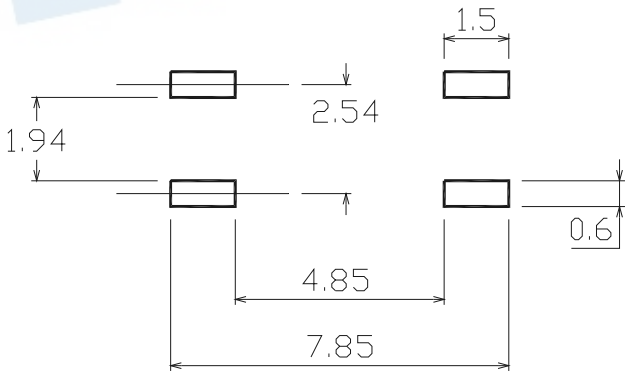
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Package Dimension (Dimensions in mm)



Recommended pad layout for surface mount leadform

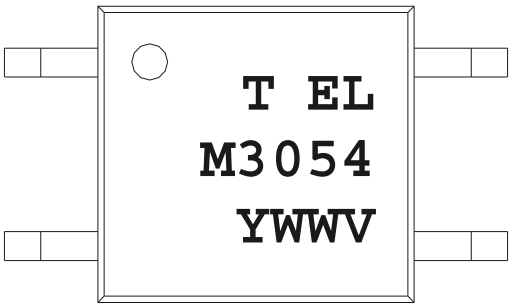


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Device Marking



Notes

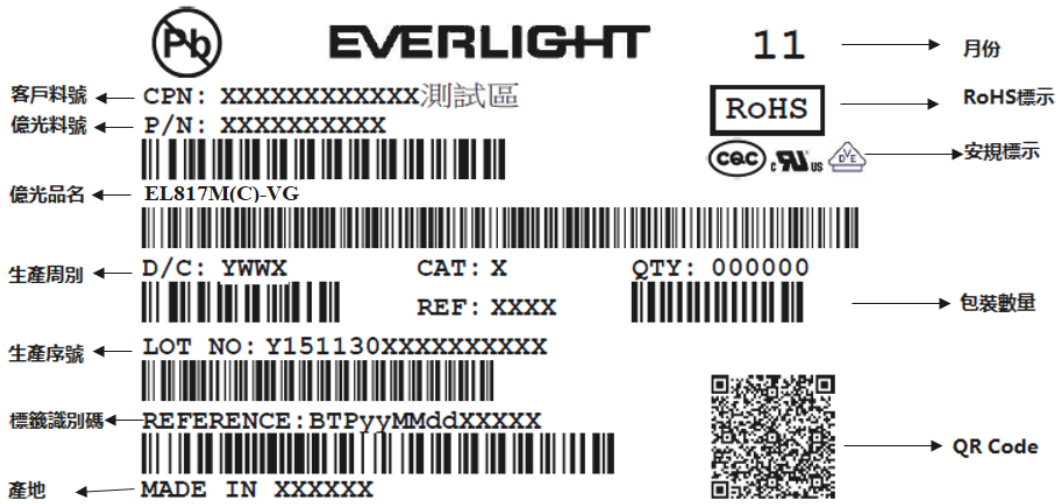
T	denotes Factory No code : made in China T : made in Taiwan
EL	denotes Everlight
M3054	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE safety option (optional)

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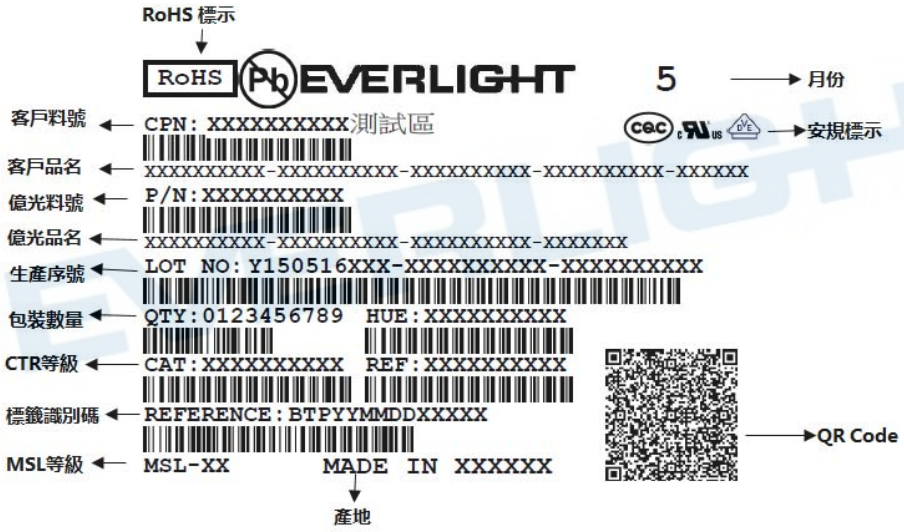
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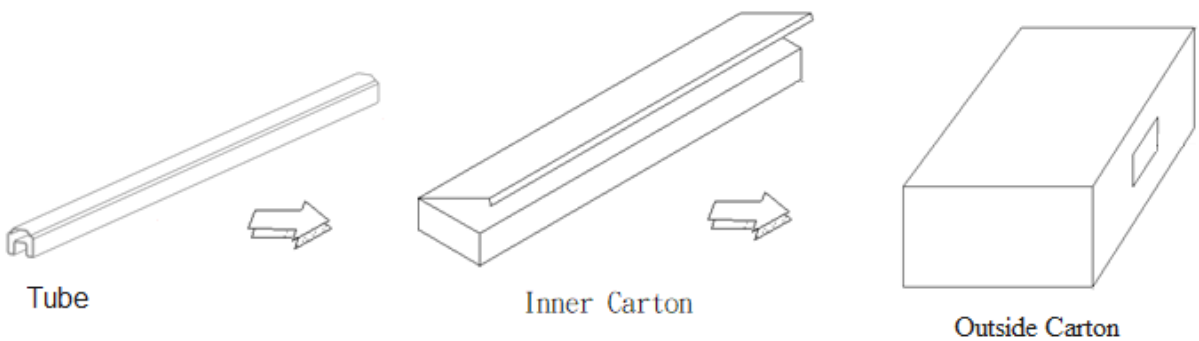
Label form



or



TUBE Dimension

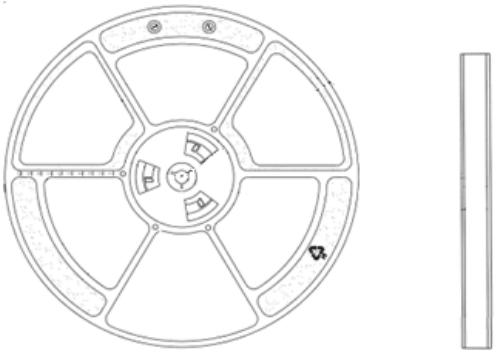


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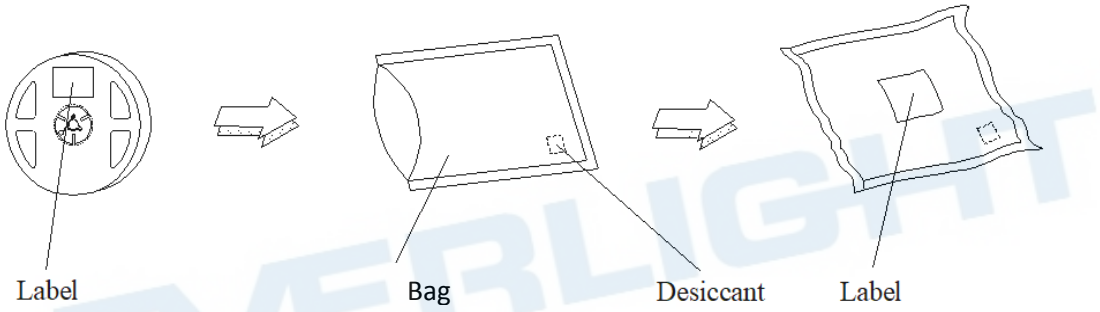
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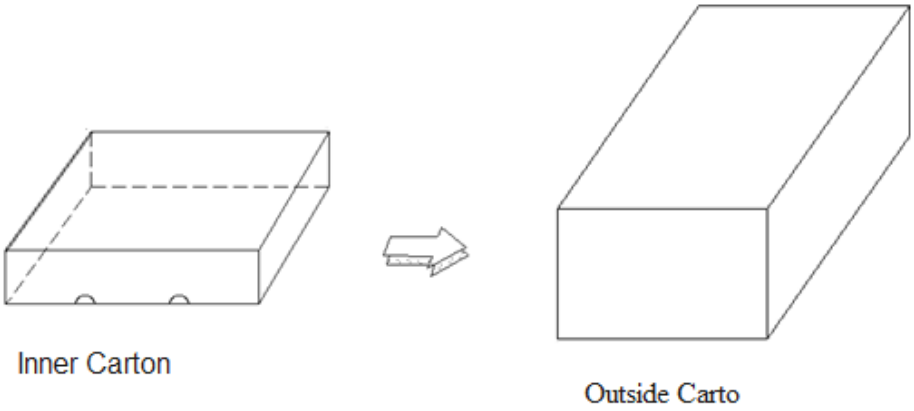
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Reel Dimension



Moisture Resistant Packaging





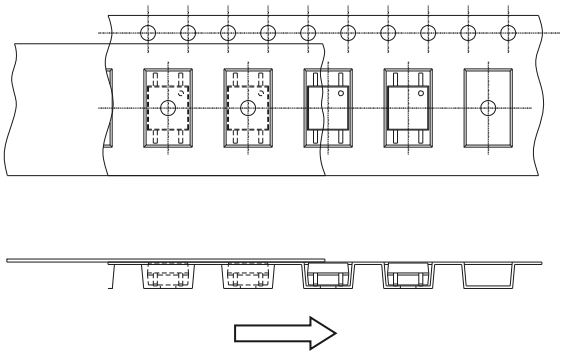
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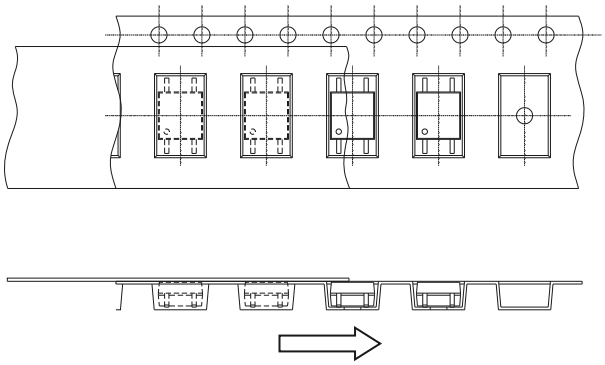
Tape & Reel Packing Specifications

Option TA



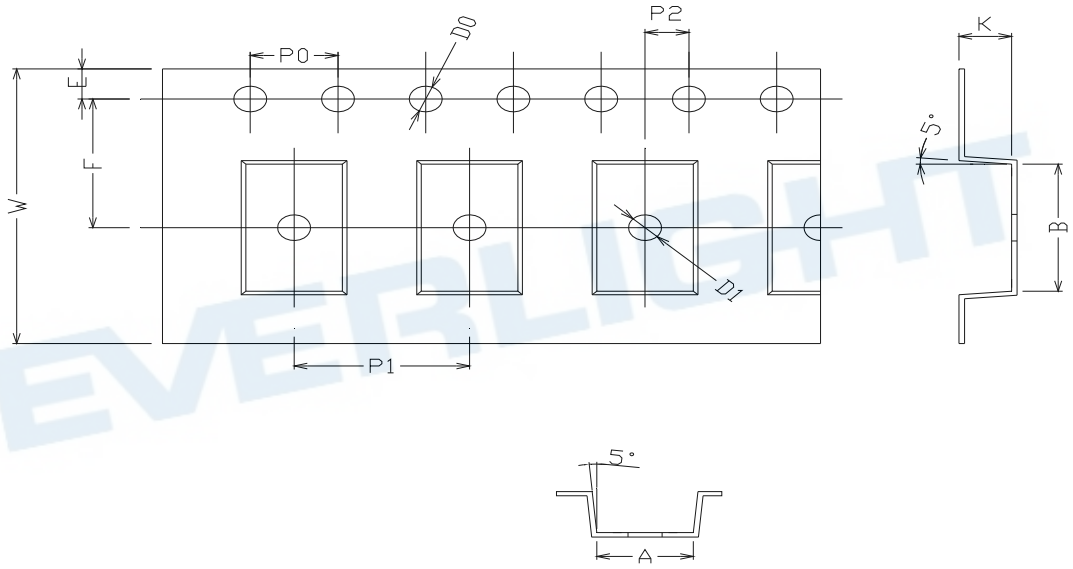
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions



Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	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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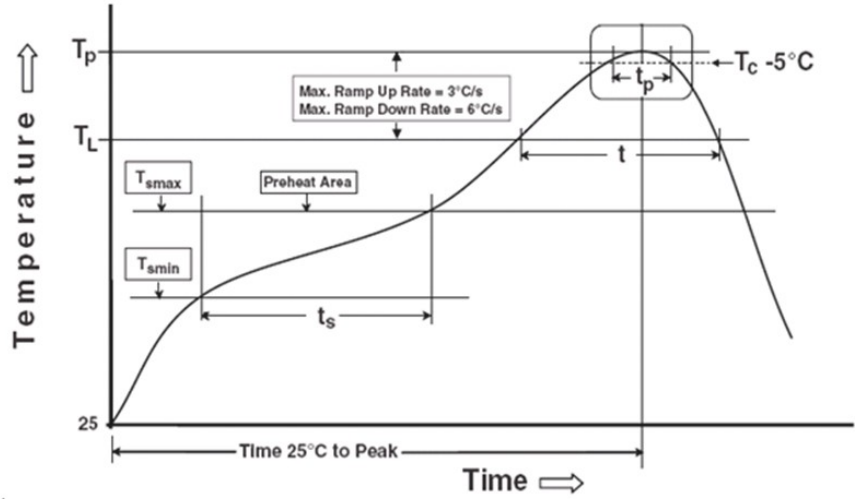
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Precautions for Use

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

.

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EN-60747-5-5 Insulation Related Characteristics

Description	Symbol	Rating	Unit
Climatic Classification	-	55/110/21	-
Pollution Degree	-	2	-
Maximum Working Insulation Voltage	V_{IORM}	707	V_{peak}
Input to Output Test Voltage, Method A $V_{IORM} \times 1.6 = V_{PR}$, Type and Sample Test, t_m = 10s, Partial Discharge < 5 pC	V_{PR}	1131	V_{peak}
Input to Output Test Voltage, Method B $V_{IORM} \times 1.875 = V_{PR}$, 100% Production Test with tm = 1s, Partial Discharge < 5 pC	V_{PR}	1325	V_{peak}
Highest Allowable Overvoltage (Transient Overvoltage, t_{ini} = 60s)	V_{IOTM}	4800	V_{peak}
Safety Limiting Values (max. allowable ratings in case of fault, also refer to thermal derating curve)			
Temperature	T_S	150	°C
Input Current	$I_{S,INPUT}$	200	mA
Output Power	$P_{S,OUTPUT}$	350	mW
Insulation Resistance at T_S, V_{IO} = 500 V	R_S	10^9	Ω

Insulation and Safety Related Specification

Description	Symbol	Rating	Unit
Minimum Creepage Distance	Cr	5	mm
Minimum Clearance	Cl	5	mm
Minimum Insulation Distance	T_I	0.4	mm
Comparative Tracking Index	CTI	175	-

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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.

EVERLIGHT

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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.
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