

4 PIN SOP ZERO-CROSS TRIAC PHOTOCOUPLER ELM304X, ELM306X, ELM308X Series



Features:

- Halogens free.
(Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- Peak breakdown voltage
 - 400V: ELM304X
 - 600V: ELM306X
 - 800V: ELM308X
- High isolation voltage between input and output (Viso=3750 V rms)
- Zero voltage crossing
- 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

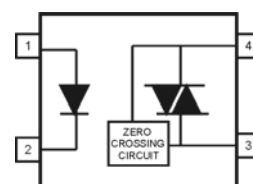
The ELM304X, ELM306X and ELM308X devices consist of a GaAs infrared emitting diode optically coupled to a monolithic silicon detector performing the function of a zero voltage crossing bilateral triac driver.

They are designed for use with a discrete power triac in the interface of logic systems to equipment powered from 110 to 240 VAC lines, such as solid-state relays, industrial controls, motors, solenoids and consumer appliances, etc.

Applications

- Solenoid/valve controls
- Light controls
- Static power switch
- AC motor drivers
- E.M. contactors
- Temperature controls
- AC Motor starters
- Solid state relays

Schematic



Pin Configuration

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

Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	50	mA
	Peak forward current (1us pulse, 300pps)	$I_{F(PK)}$	1	A
	Reverse voltage	V_R	6	V
	Power Dissipation	P_D	100	mW
Output	ELM304X		400	
	Off-state Output Terminal Voltage	V_{DRM}	600	V
	ELM306X		800	
	ELM308X			
	On state RMS current	$I_{T(RMS)}$	70	mA(RMS)
	Power dissipation	P_C	300	mW
Isolation voltage ^{*1}		V_{ISO}	3750	Vrms
Operating temperature		T_{OPR}	-40~+100	°C
Storage temperature		T_{STG}	-55~+150	°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
Input forward current	EL30X2	15	20	25	mA
	EL30X3	7	10	20	mA
	EL30X4	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.

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

Input

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Forward Voltage	V_F	-	-	1.5	V	$I_F = 10\text{mA}$
Reverse Leakage current	I_R	-	-	10	μA	$V_R = 6\text{V}$

Note: Reverse Voltage(V_R) Condition is applied to I_R 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	$V_{DRM} = \text{Rated } V_{DRM}$ $I_F = 0\text{mA}$
Peak On-state Voltage	V_{TM}	-	-	2.5	V	$I_{TM} = 100\text{mA peak}$
Critical Rate of Rise off-state Voltage	dv/dt	1000	-	-	V/ μs	$V_{PEAK} = 0.636 \times \text{Rated } V_{DRM}$, $I_F = 0\text{mA}$ (Fig.12)
Inhibit Voltage (MT1-MT2 voltage above which device will not trigger)	V_{INH}	-	-	20	V	
Leakage in Inhibited State	I_{DRM2}	-	-	1000	μA	$I_F = \text{Rated } I_{FT}$, $V_{DRM} = \text{Rated } V_{DRM}$, off state

Transfer Characteristics

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
LED Trigger Current	3042	-	-	10	mA	Main terminal Voltage=3V ^{*1}
	3062					
	3082					
	3043	-	-	5		
	3063					
	3083					
	3044	-	-	3		
	3064					
	3084					
Holding Current	I _H	-	280	-	μA	

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

Typical Electro-Optical Characteristics Curves

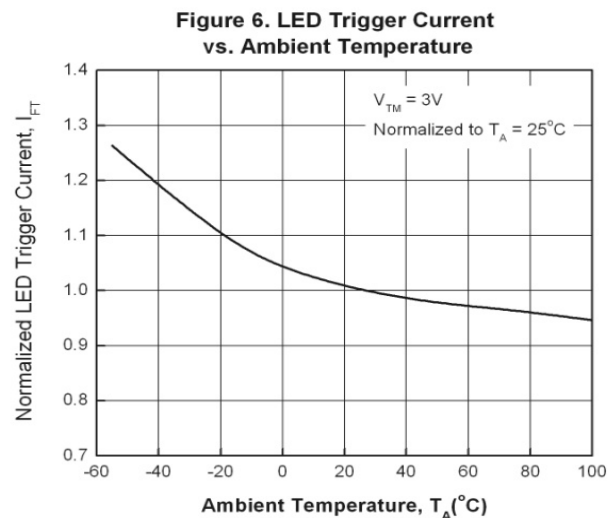
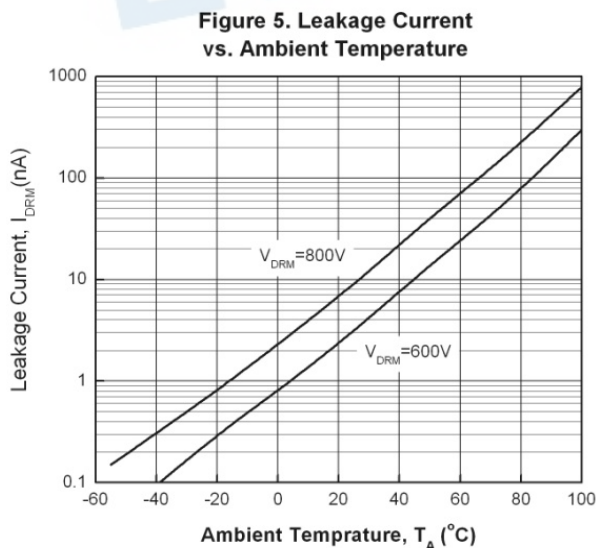
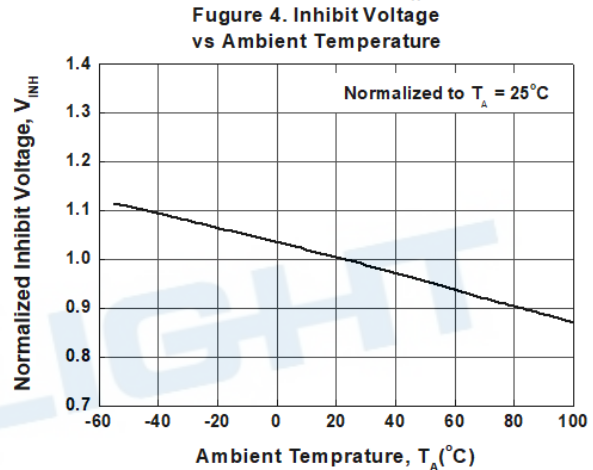
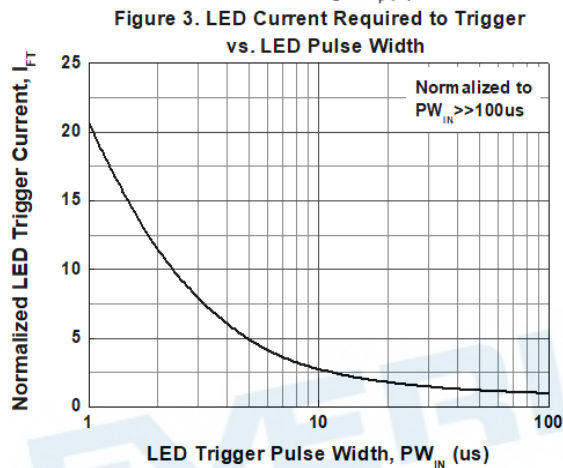
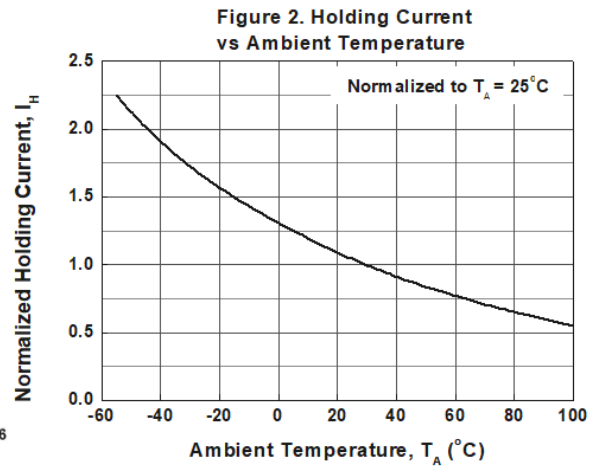
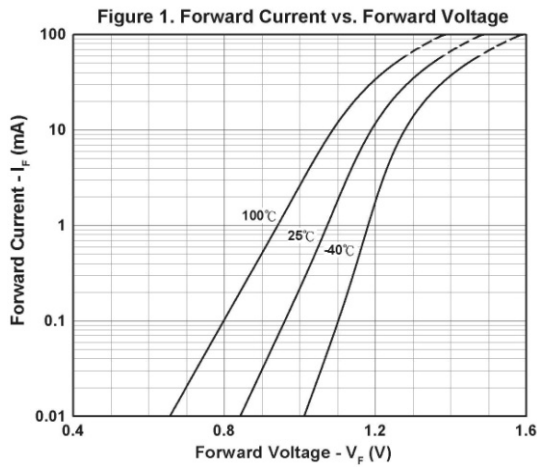


Figure 7. Off-State Output Terminal Voltage vs. Ambient Temperature

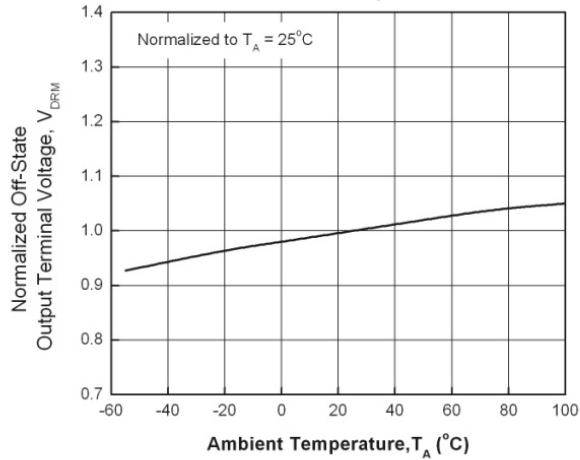


Figure 8. Leakage in Inhibit State vs. Ambient Temperature

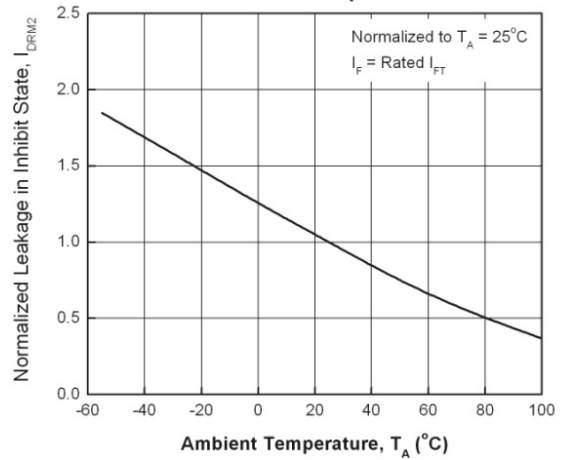


Figure 9. On-State Characteristics

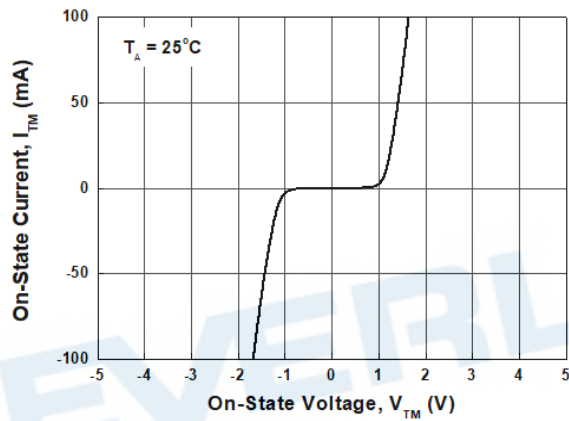


Fig 10. I_F Maximum rating vs Temperature

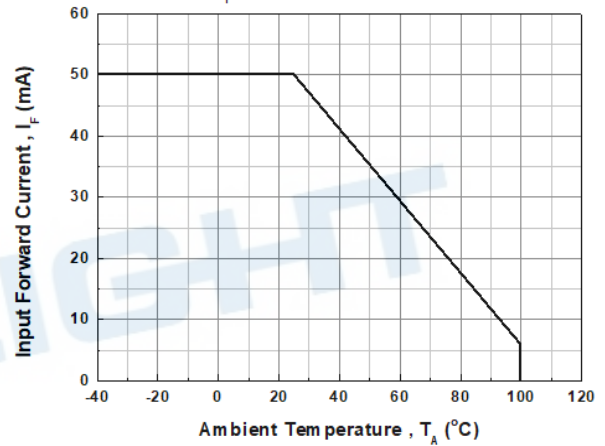
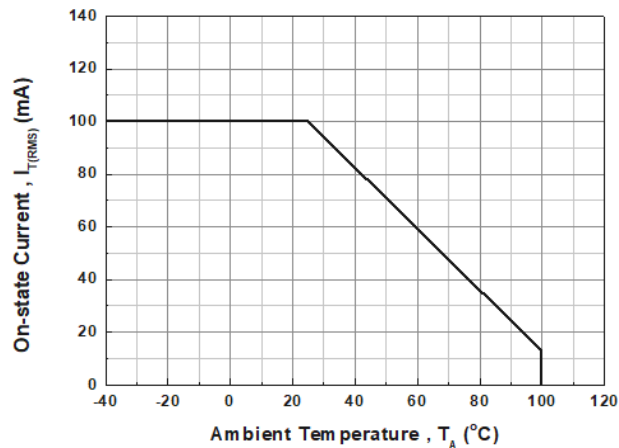
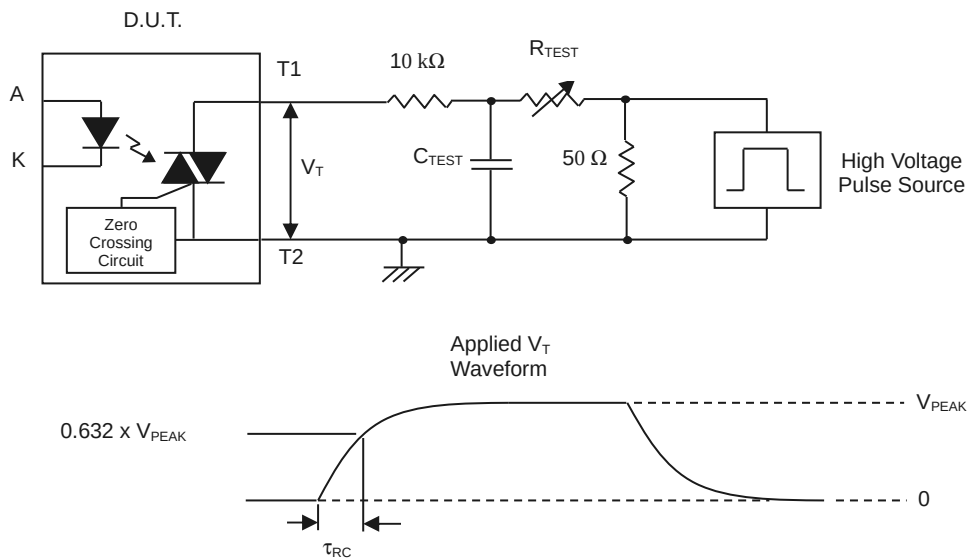


Fig 11. On-state Current vs Temperature



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

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

ELM304X(Z)-V
or **ELM306X(Z)-V**
or **ELM308X(Z)-V**

Note

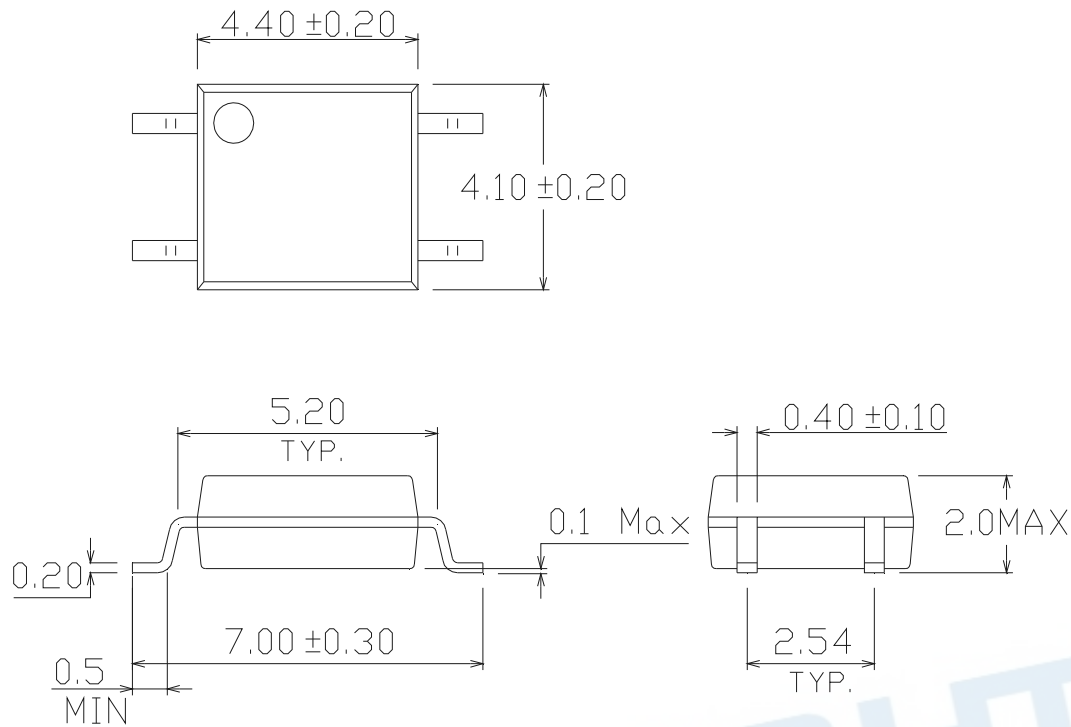
X = Part No. (2 for $I_{FT}=10mA$, 3 for $I_{FT}=5mA$, 4 for $I_{FT}=3mA$)

Z = Tape and reel option (TA, TB or none).

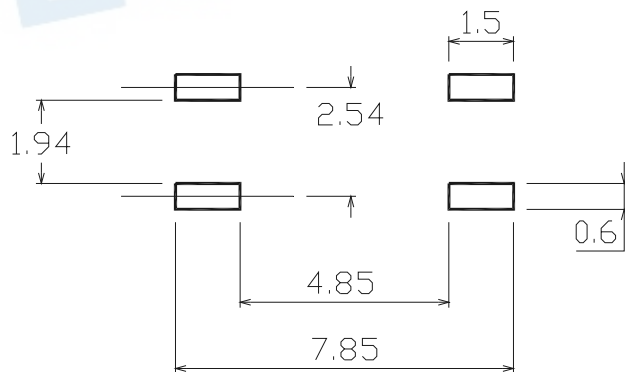
V = VDE safety approved optional

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

Package Dimension (Dimensions in mm)



Recommended pad layout for surface mount leadform



Device Marking



Notes

EL	denotes Everlight
M3063	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE safety option (optional)

EVERLIGHT

Label form

Pb **EVERLIGHT** 11 → 月份

客戶料號 ← CPN: XXXXXXXXXXXX 測試區

億光料號 ← P/N: XXXXXXXXXXXX

億光品名 ← EL817M(C)-VG

生產周別 ← D/C: YWWX CAT: X QTY: 000000 → 包裝數量

生產序號 ← LOT NO: Y151130XXXXXXXXXX

標籤識別碼 ← REFERENCE: BTPyyMMddXXXXX

產地 ← MADE IN XXXXXX

RoHS 標示

CEC e US DVE → 安規標示

QR Code

or

RoHS 標示

RoHS **Pb** **EVERLIGHT** 5 → 月份

客戶料號 ← CPN: XXXXXXXXXXXX 測試區

客戶品名 ← XXXXXXXXXXXX-XXXXXXXXXX-XXXXXXXXXX-XXXXXXXXXX-XXXXXX

億光料號 ← P/N: XXXXXXXXXXXX

億光品名 ← XXXXXXXXXXXX-XXXXXXXXXX-XXXXXXXXXX-XXXXXX

生產序號 ← LOT NO: Y150516XXX-XXXXXXXXXX-XXXXXXXXXX

包裝數量 ← QTY: 0123456789 HUE: XXXXXXXXXXXX

CTR等級 ← CAT: XXXXXXXXXXXX REF: XXXXXXXXXXXX

標籤識別碼 ← REFERENCE: BTPYYMMDDXXXXX

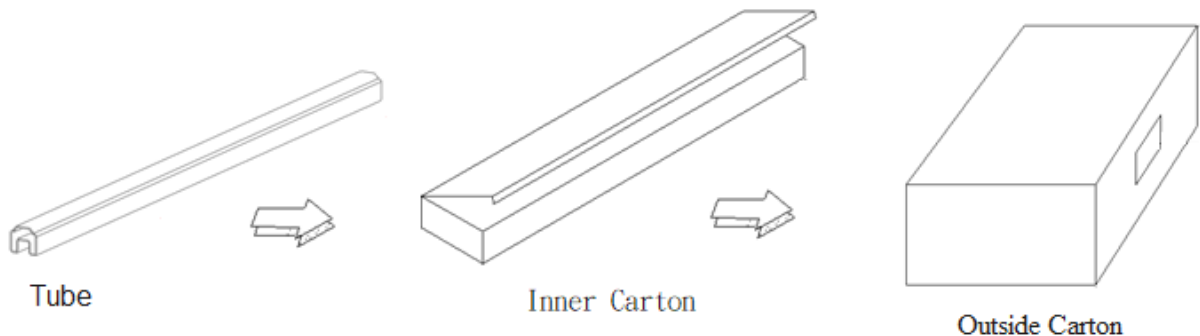
MSL等級 ← MSL-XX MADE IN XXXXXX

產地

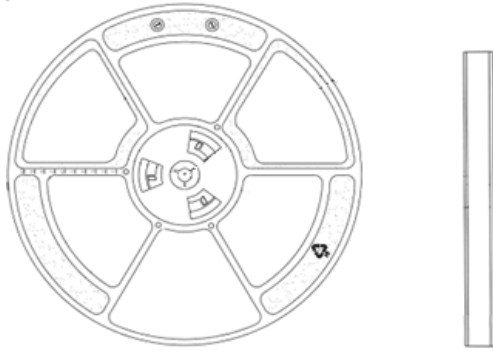
CEC e US DVE → 安規標示

QR Code

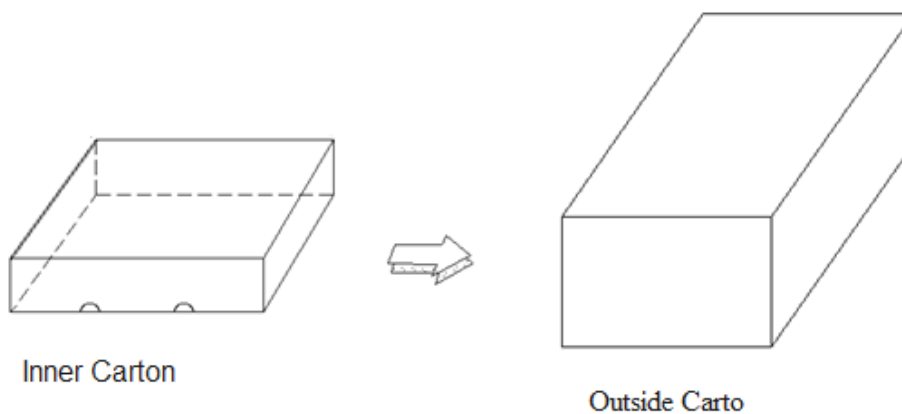
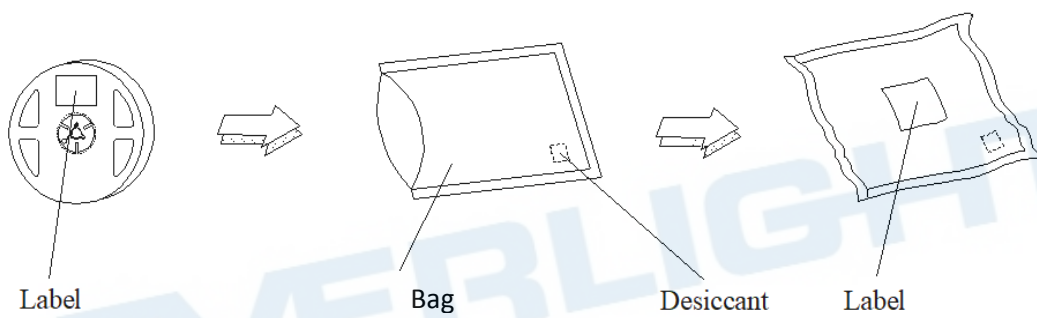
TUBE Dimension



Reel Dimension

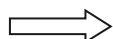
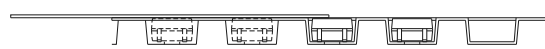
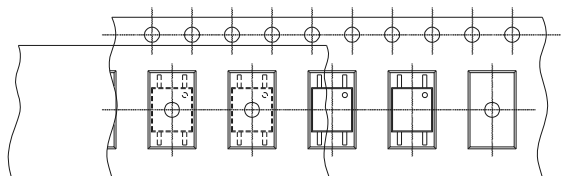


Moisture Resistant Packaging



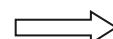
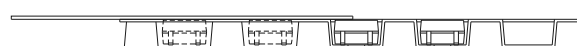
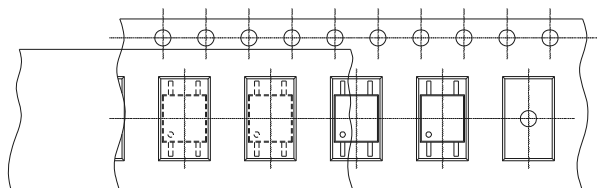
Tape & Reel Packing Specifications

Option TA



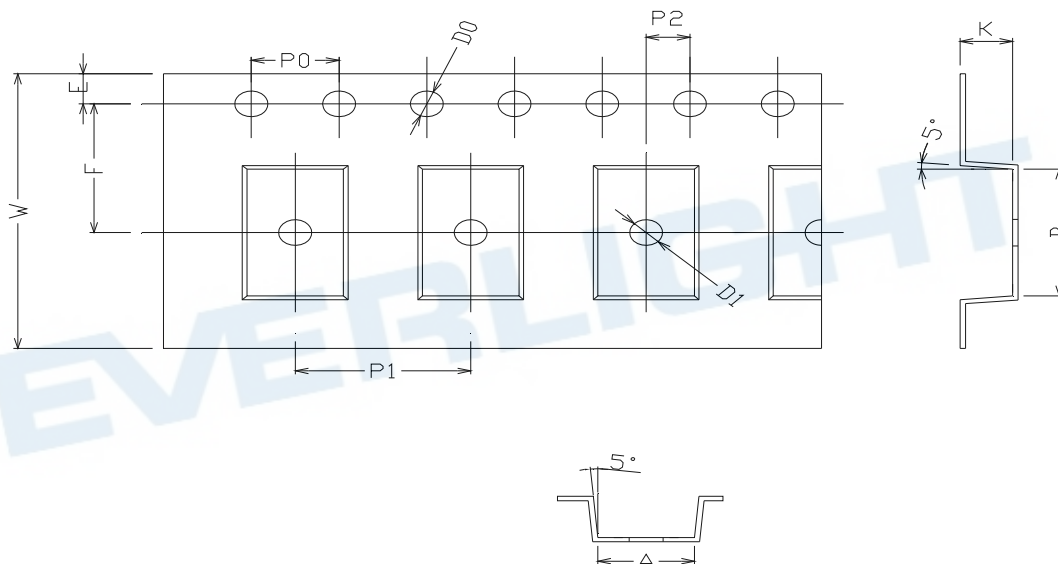
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions



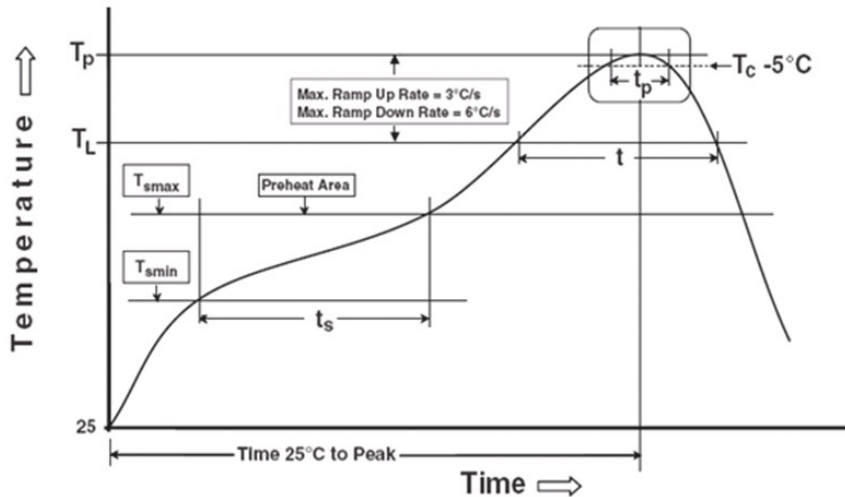
Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	4.4 ± 0.1	7.4 ± 0.1	$1.5 + 0.1/-0$	1.5 ± 0.1	1.75 ± 0.1	7.5 ± 0.1

Dimension No.	P0	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

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

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.

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