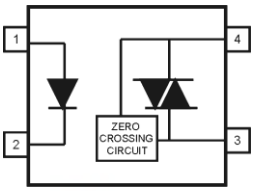
DATASHEET

# 4 PIN DIP ZERO-CROSS TRIAC DRIVER PHOTOCOUPLER
# ELT304X, ELT306X, ELT308X Series

Schematic




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

**Features:**

- Compliance Halogens Free
  (Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- Peak breakdown voltage
  - 400V: ELT304X
  - 600V: ELT306X
  - 800V: ELT308X
- High isolation voltage between input and output (Viso=5000 V rms )
- Zero voltage crossing
- The product itself will remain within RoHS compliant version
- Compliance with EU REACH
- UL and cUL approved(No. E214129)
- VDE approved
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

## Description

The ELT304X, ELT306X and ELT308X series of devices each consist of a GaAs 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℃)

| Parameter | | | Symbol | Rating | Unit |
|---|---|---|---|---|---|
| Input | Forward current | | $I_F$ | 60 | mA |
| | Reverse voltage | | $V_R$ | 6 | V |
| | Power dissipation | | $P_D$ | 100 | mW |
| Output | Off-state Output Terminal Voltage | ELT304X | $V_{DRM}$ | 400 | V |
| | | ELT306X | | 600 | |
| | | ELT308X | | 800 | |
| | Peak Repetitive Surge Current | | $I_{TSM}$ | 1 | A |
| | Power dissipation | | $P_C$ | 300 | mW |
| Total power dissipation | | | $P_{TOT}$ | 330 | mW |
| Isolation voltage *1 | | | $V_{ISO}$ | 5000 | Vrms |
| Operating temperature | | | $T_{OPR}$ | -55 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 are shorted together, and pins 3 & 4 are shorted together.
*2 For 10 seconds

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

### Input

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

### Output

| Parameter | | Symbol | Min. | Typ.* | Max. | Unit | Condition |
|---|---|---|---|---|---|---|---|
| Peak Blocking Current | ELT304X | $I_{DRM}$ | - | - | 100 | nA | $V_{DRM}$ = Rated $V_{DRM}$<br>$I_F$ = 0mA |
| | ELT306X<br>ELT308X | | | | 500 | | |
| Peak On-state Voltage | | $V_{TM}$ | - | - | 3 | V | $I_{TM}$=100mA peak,<br>$I_F$=Rated $I_{FT}$ |
| Critical Rate of Rise off-state Voltage | ELT304X<br>ELT306X | dv/dt | 1000 | - | - | V/μs | $V_{PEAK}$ =Rated $V_{DRM}$,<br>$I_F$=0 (Fig. 10) |
| | ELT308X | | 600 | - | - | | |
| 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 $I_{FT}$,<br>$V_{DRM}$=Rated $V_{DRM}$,<br>off state |

### Transfer Characteristics

| Parameter | | Symbol | Min. | Typ.* | Max. | Unit | Condition |
|---|---|---|---|---|---|---|---|
| LED Trigger Current | ELT3041<br>ELT3061<br>ELT3081 | $I_{FT}$ | - | - | 15 | mA | Main terminal Voltage=3V |
| | ELT3042<br>ELT3062<br>ELT3082 | | - | - | 10 | | |
| | ELT3043<br>ELT3063<br>ELT3083 | | - | - | 5 | | |
| Holding Current | | $I_H$ | - | 280 | - | μA | |

* Typical values at $T_a$ = 25°C

## Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

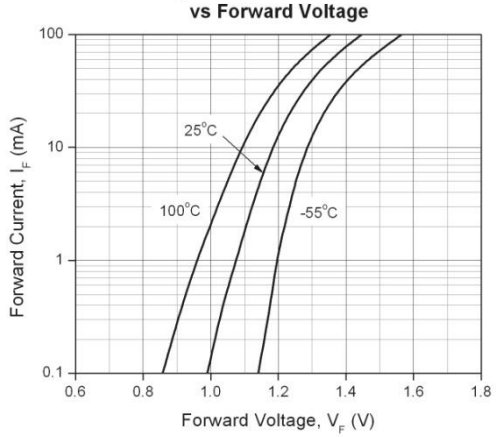



Figure 2. On-State Characteristics

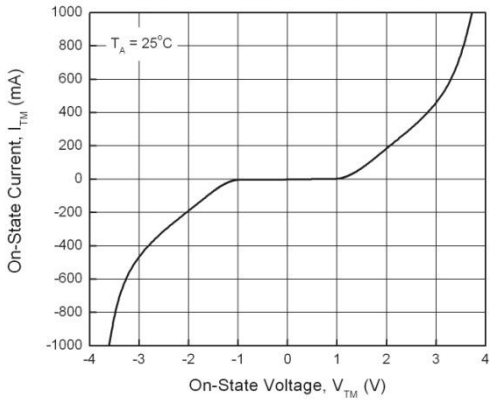



Figure 3. Holding Current vs. Ambient Temperature

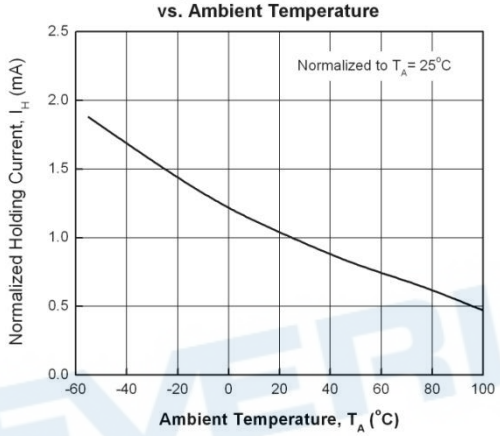



Figure 4. LED Current Required to Trigger vs. LED Pulse Width

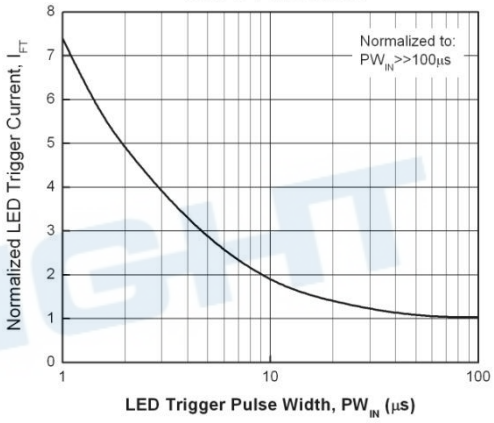



Figure 5. Leakage Current vs. Ambient Temperature

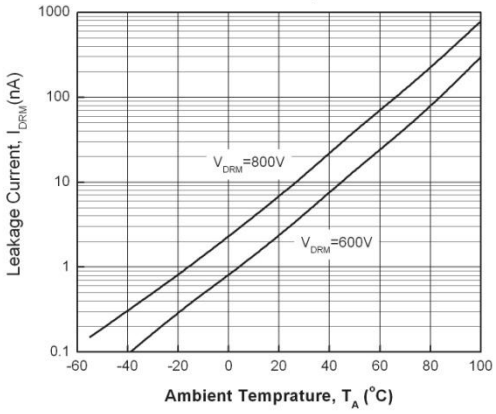



Figure 6. LED Trigger Current vs. Ambient Temperature

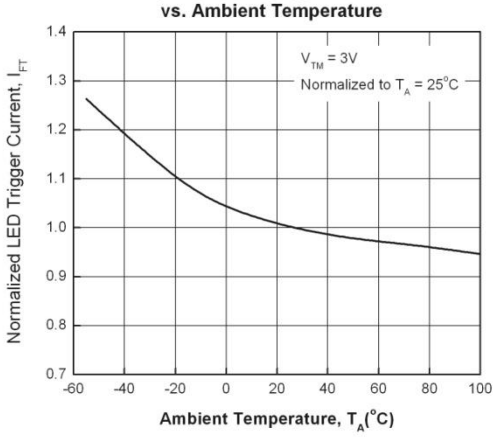


**Figure 7. Off-State Output Terminal Voltage vs. Ambient Temperature**

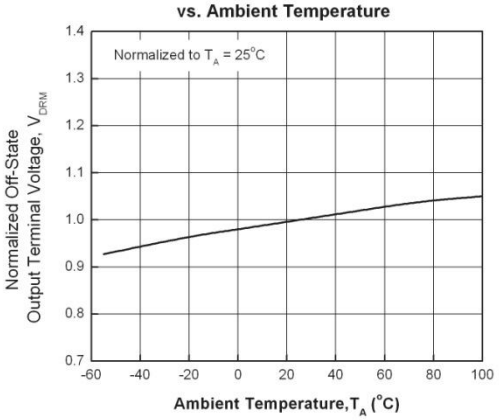



**Figure 8. Leakage in Inhibit State vs. Ambient Temperature**

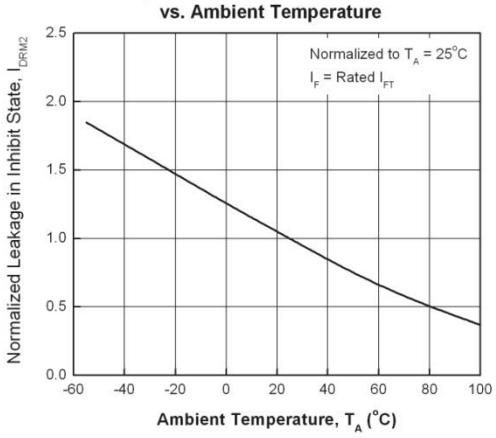
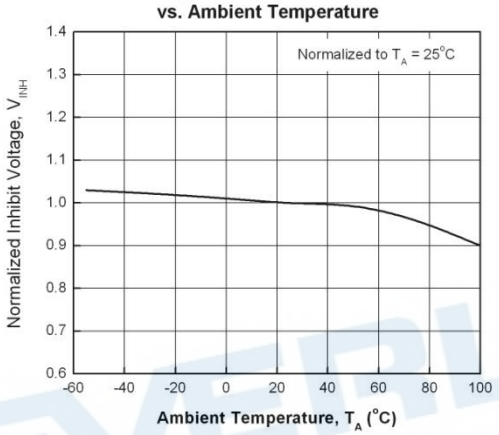
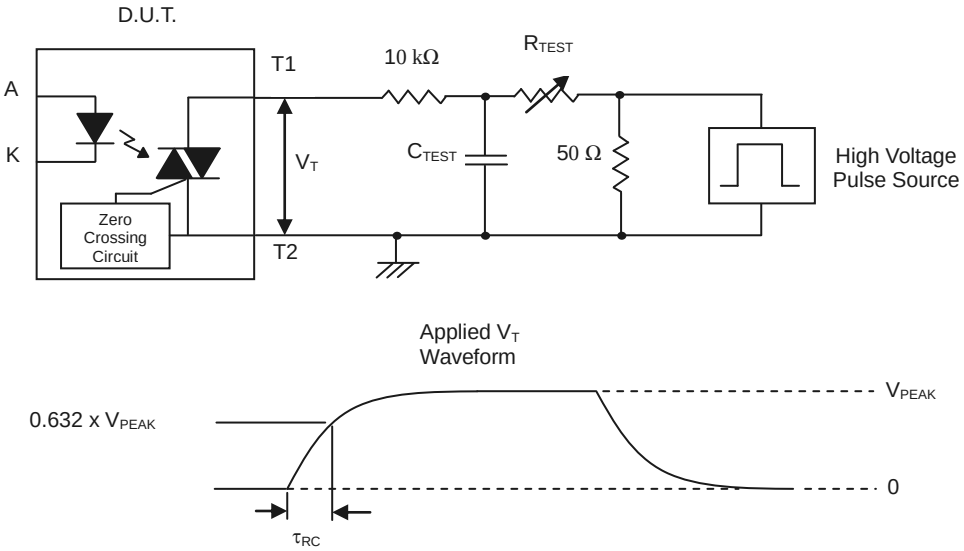



**Figure 9. Inhibit Voltage vs. Ambient Temperature**



## 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, $\tau_{RC}$ is recorded and the dv/dt calculated.

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

For example, $V_{PEAK}$ = 600V for ELT306X series. The dv/dt value is calculated as follows:

$$dv/dt = \frac{0.63 \times 600}{\tau_{RC}} = \frac{378}{\tau_{RC}}$$

## Order Information

### Part Number

**ELT304X(Y)(Z)-V**
**or ELT306X(Y)(Z)-V**
**or ELT308X(Y)(Z)-V**

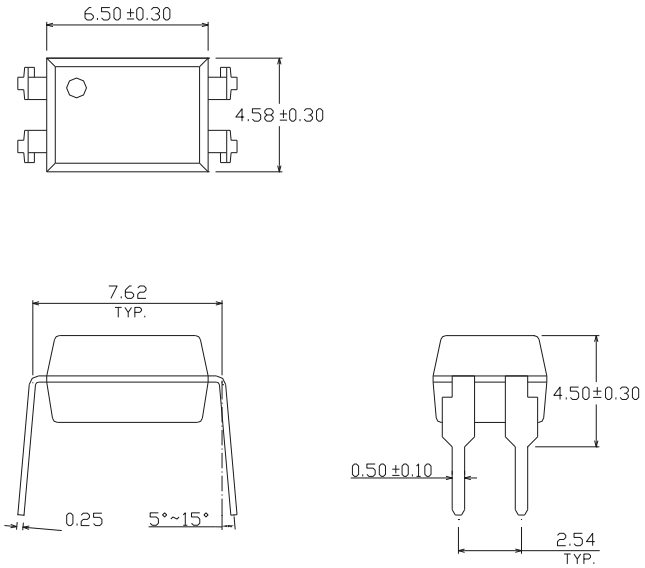
**Note**

Note
X = Part No. (1, 2, or 3)
Y = Lead form option (S, S1, M or none)
Z = Tape and reel option (TA, TB, TU, TD or none).
V = VDE safety approved option

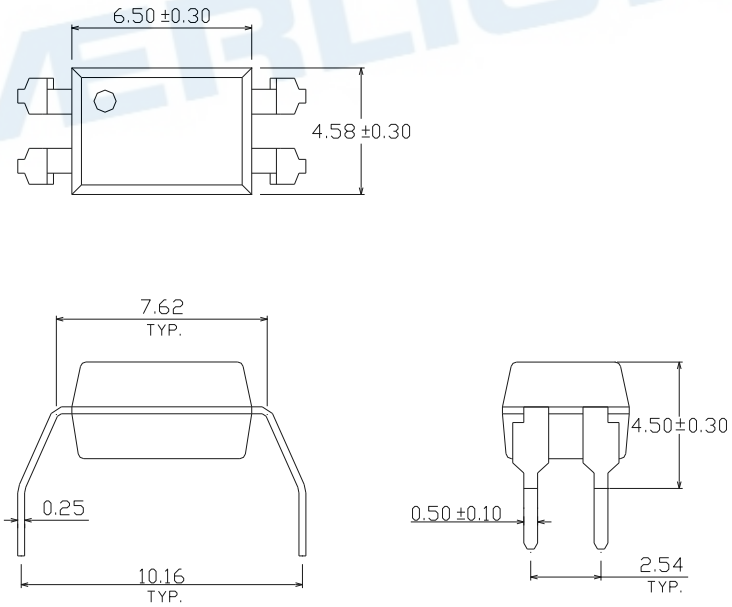
| Option | Description | Packing quantity |
|---|---|---|
| None | Standard DIP-4 | 100 units per tube |
| M | Wide lead bend (0.4 inch spacing) | 100 units per tube |
| S (TA) | Surface mount lead form + TA tape & reel option | 1000 units per reel |
| S (TB) | Surface mount lead form + TB tape & reel 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 |
| S (TU) | Surface mount lead form + TU tape & reel option | 1500 units per reel |
| S (TD) | Surface mount lead form + TD tape & reel option | 1500 units per reel |
| S1 (TU) | Surface mount lead form (low profile) + TU tape & reel option | 1500 units per reel |
| S1 (TD) | Surface mount lead form (low profile) + TD tape & reel option | 1500 units per reel |

## Package Dimension (Dimensions in mm)

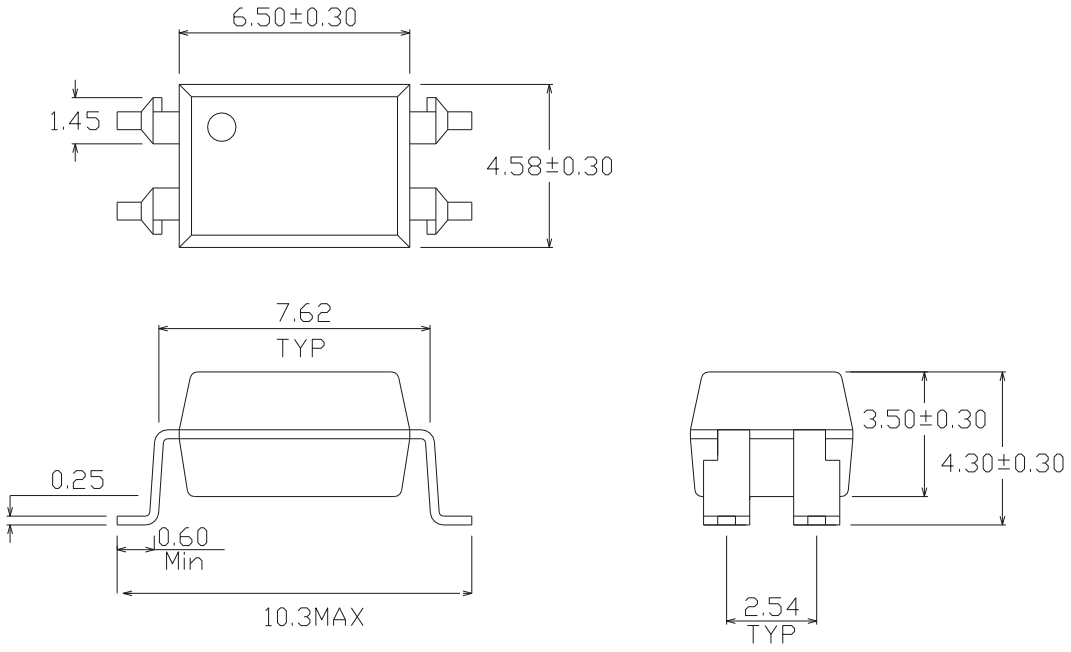
### Standard DIP Type



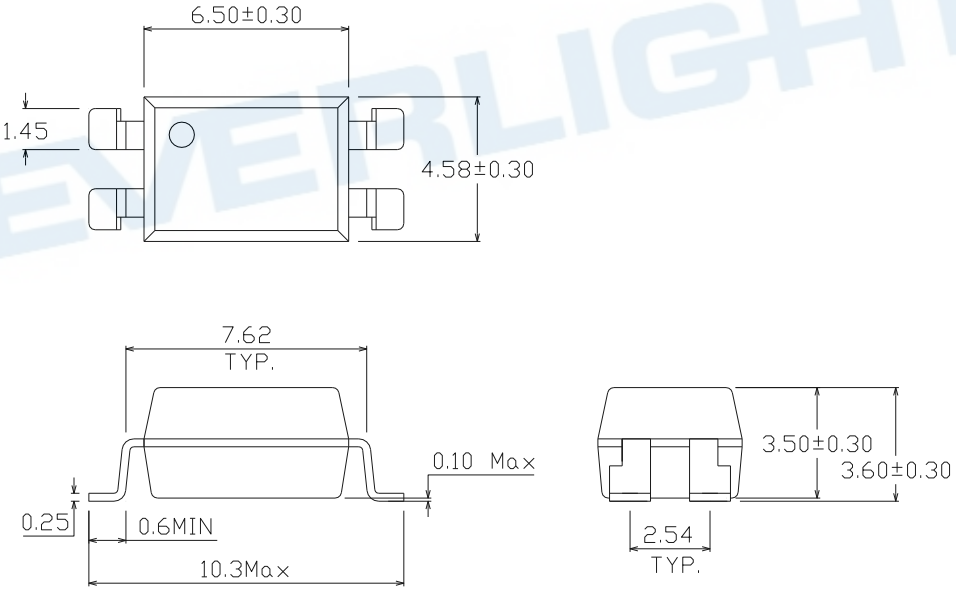

### Option M Type



**Option S Type**

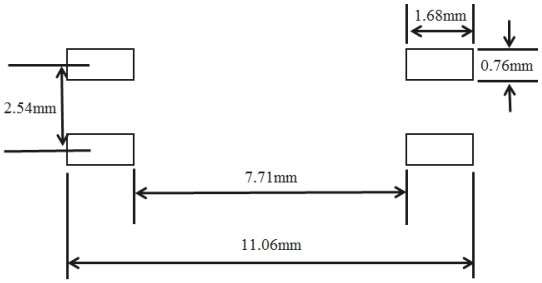



**Option S1 Type**

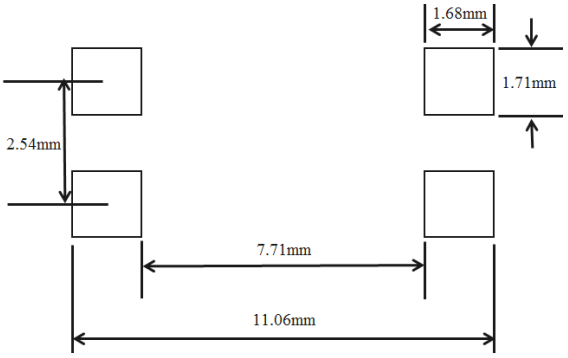


## Recommended pad layout for surface mount leadform

### For S option




### For S1 option



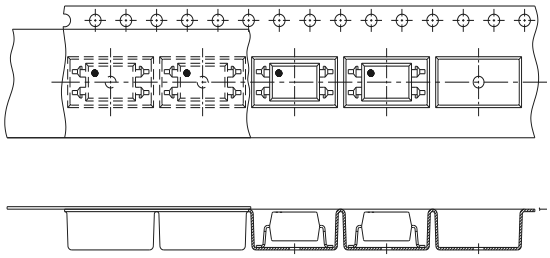

## Device Marking


**Notes**

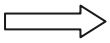
| | |
|---|---|
| EL | denotes Everlight |
| T3083 | denotes Device Number |
| Y | denotes 1 digit Year code |
| WW | denotes 2 digit Week code |
| V | denotes VDE option |

## Tape & Reel Packing Specifications

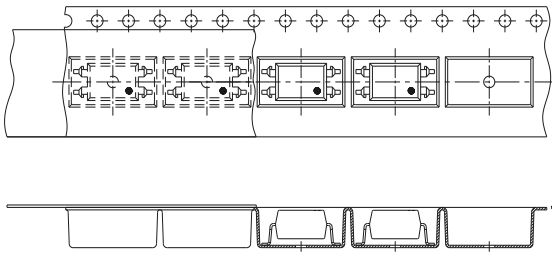
**Option TA**



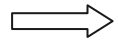
Direction of feed from reel

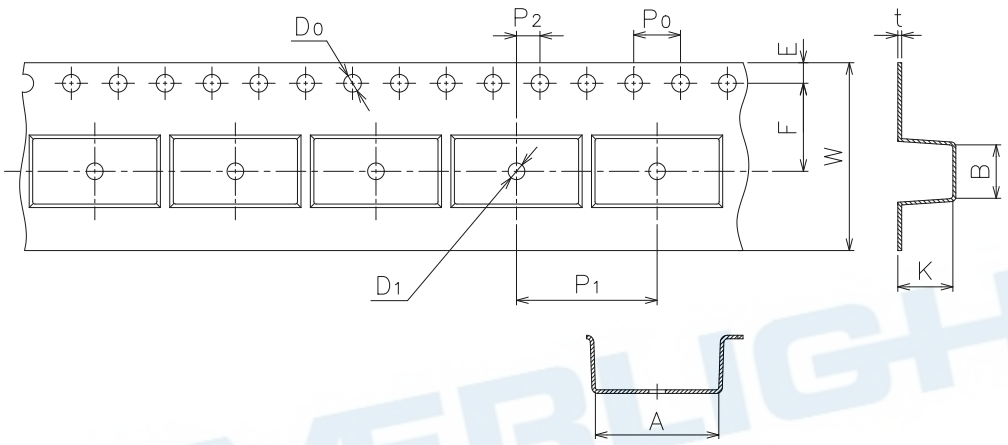


**Option TB**



Direction of feed from reel

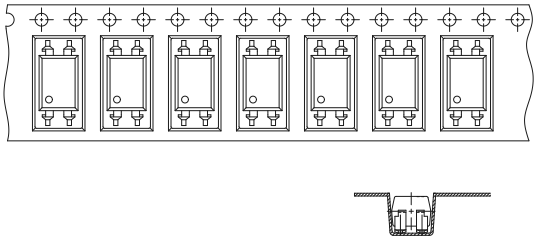





| Dimension No. | A | B | Do | D1 | E | F |
|---|---|---|---|---|---|---|
| Dimension (mm) S | 10.7±0.1 | 4.65±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 7.5±0.1 |
| Dimension (mm) S1 | 10.7±0.1 | 4.65±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 7.5±0.1 |
| Dimension No. | Po | P1 | P2 | t | W | K |
| Dimension (mm) S | 4.0±0.1 | 12.0±0.1 | 2.0±0.1 | 0.4±0.1 | 16.0±0.3 | 4.75±0.1 |
| Dimension (mm) S1 | 4.0±0.1 | 12.0±0.1 | 2.0±0.1 | 0.4±0.1 | 16.0±0.3 | 3.90±0.1 |

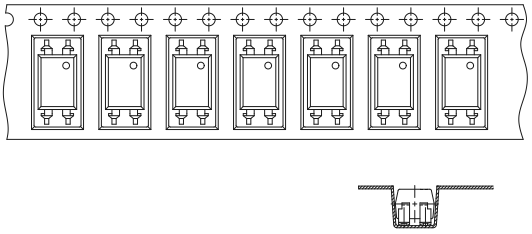
## Tape dimensions

**Option TD**

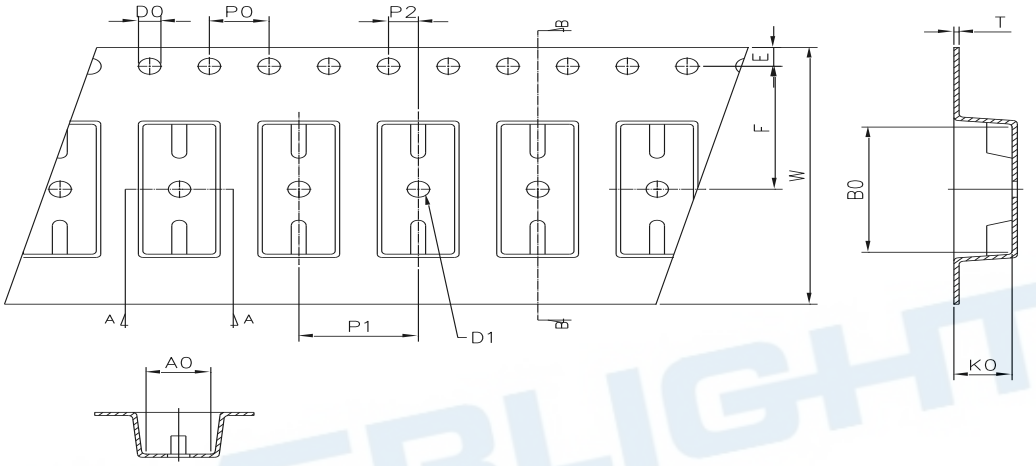


Direction of feed from reel

**Option TU**



Direction of feed from reel

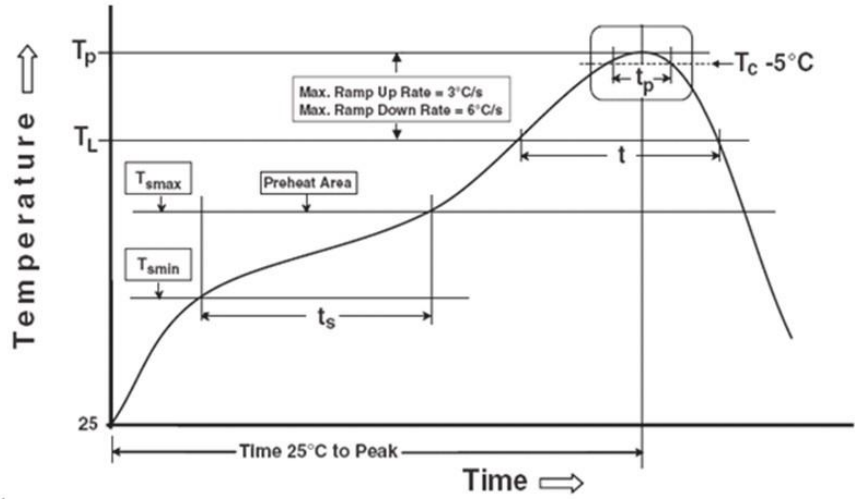



| Dimension No. | Ao | Bo | Do | D1 | E | F |
|---|---|---|---|---|---|---|
| Dimension (mm) S.S1 | 4.90±0.1 | 10.40±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 7.50±0.1 |
| Dimension No. | **Po** | **P1** | **P2** | **t** | **W** | **Ko** |
| Dimension (mm) S.S1 | 4.00±0.1 | 8.00±0. | 2.00±0.1 | 0.40±0.1 | 16.00±0.3 | 4.60±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 |

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