BRIGHTEK

BRIGHTEK (EUROPE) LIMITED

Brighten Up The World With LED!

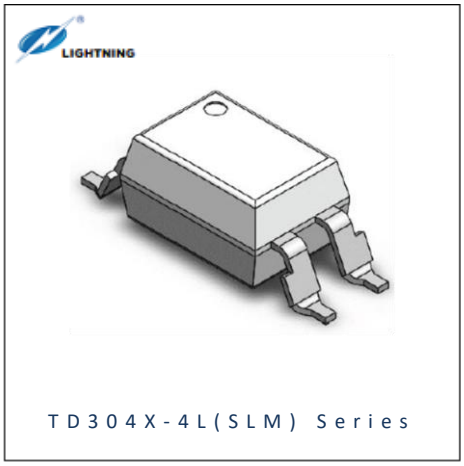
ISO/TS 16949:2009 BS EN ISO 14001:2004 QC 080000 IECQ HSPM

# PRODUCT DATASHEET


- ▶ DC Input Photo Coupler
- ▶ SMD4 Gullwing
- ▶ Zero-Cross TRIAC

Release Date: 10 June 2025 Version: A00

# TD304X-4L(SLM)(T1)-GV




TD304X-4L(SLM) Series

## TD304X-4L(SLM) Series

Pb RoHS Compliant

### DESCRIPTION:

The TDTD304X-4L(SLM) series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a monolithic silicon zero-cross photo TRIAC in a plastic DIP4 package with SMD4 Gullwing lead forming option.

With the robust coplanar double mold structure, TD304X-4L(SLM) series provide the most stable isolation feature.

### FEATURES:

- High isolation 5000Vrms
- DC input with zero-cross photo TRIAC output
- Operating temperature range -40°C to +100°C
- REACH & RoHS compliance; Halogen free
- MSL class 1
- Regulatory Approvals:
  - UL - UL1577
  - VDE - EN60747-5-5 (VDE0884-5)
  - CQC - GB4943.1, GB8898
  - cUL - CSA Component Acceptance Service Notice 5A
- Packing: T1/T2: 1500pcs/reel

### APPLICATIONS:

- Solenoid/valve controls
- Lighting controls
- Motor controls
- Temperature controls
- Static AC power switches
- Solid state relays
- Interfacing microprocessors to 115 to 240VAC peripherals

Partner with: LIGHTNING

## NAMING & ORDERING INFORMATION:

Naming Information:

| TD304 X - 4L (SLM) (T1) - G V | |
|---|---|
| TD304 | Part Number |
| X | Selection: LED Trigger Current (X=1~3) |
| 4L | DIP4 Based Package |
| SLM | Lead Form Option: SMD4 Gullwing |
| T1 | Selection: Tape and Reel Option (T1(default)/T2) |
| G | Green Option |
| V | VDE Option |

Ordering Information:

**TD304X-4L(SLM)(T1)-GV**

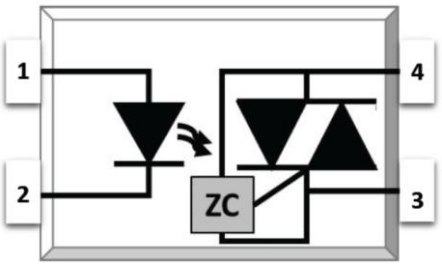
X = Selection: LED Trigger Current (X=1~3)

| Part Number | Symbol | Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| TD3041-4L(SLM)(T1)-GV | $I_{FT}$ | --- | --- | 15 | mA | $I_{TM}$=100mA Terminal Voltage=3V |
| TD3042-4L(SLM)(T1)-GV | | --- | --- | 10 | | |
| TD3043-4L(SLM)(T1)-GV | | --- | --- | 5 | | |

| Version No. | Original Release Date |
|---|---|
| Rev: A00 | 05/09/2024 |

## SCHEMATIC DIAGRAM & MARKING:

Schematic Diagram:




| PIN Definition | |
|---|---|
| 1 | Anode |
| 2 | Cathode |
| 3 | Terminal |
| 4 | Terminal |

Marking Information:


| Marking Definition | |
|---|---|
| TD | Manufacturer Code |
| 304X | Part Number & Rank |
| V | VDE Applicable |
| Y | Fiscal Year |
| A | Manufacturing Code |
| WW | Work Week |

Labelling Information:


This product is manufactured, tested, and packed by

LIGHTNING

for more details, please visit www.tdled.com

## ABSOLUTE CHARACTERISTICS:

Absolute Maximum Ratings:

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| INPUT | | | |
| Forward Current | $I_F$ | 60 | mA |
| Reverse Voltage | $V_R$ | 6 | V |
| Junction Temperature | $T_j$ | 125 | °C |
| Input Power Dissipation | $P_I$ | 100 | mW |
| OUTPUT | | | |
| Off-State Output Terminal Voltage | $V_{DRM}$ | 400 | V |
| Peak Repetitive Surge Current PW=100μs, 120pps | $I_{TSM}$ | 1 | A |
| On-State RMS Current | $I_{T(RMS)}$ | 100 | mA |
| Junction Temperature | $T_j$ | 125 | °C |
| Output Power Dissipation | $P_O$ | 300 | mW |
| COMMON | | | |
| Total Power Dissipation | $P_{tot}$ | 400 | mW |
| Isolation Voltage | $V_{iso}$ | 5000 *1 | Vrms |
| Operating Temperature | $T_{opr}$ | -40~+100 | °C |
| Storage Temperature | $T_{stg}$ | -55~+125 | °C |
| Soldering Temperature | $T_{sol}$ | 260 *2 | °C |

*1. AC for 1 minute, R.H.=40~60%.
*2. For 10 seconds max.

## ELECTRICAL CHARACTERISTICS:

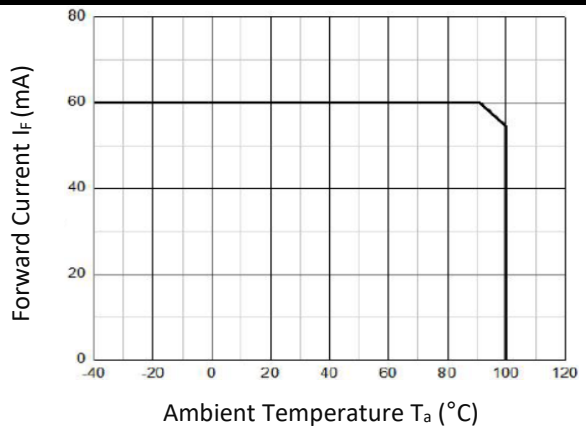
Electrical Optical Characteristics at $T_a$=25°C:

| Parameter | | Symbol | Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | | |
| INPUT | | | | | | | |
| Forward Voltage | | $V_F$ | --- | 1.24 | 1.4 | V | $I_F$=10mA |
| Reverse Current | | $I_R$ | --- | --- | 10 | μA | $V_R$=6V |
| Input Capacitance | | $C_{IN}$ | --- | 8.5 | 250 | pF | V=0, f=1kHz |
| OUTPUT | | | | | | | |
| Peak Off-State Current Either Direction | | $I_{DRM}$ | --- | --- | 500 *1 | nA | $V_{DRM}$=Rated $V_{DRM}$ $I_F$=0 |
| Peak Off-State Voltage Either Direction | | $V_{TM}$ | --- | 1.59 | 2.5 | V | $I_{TM}$=100mA |
| Critical Rate of Rise of Off-State Voltage | | dV/dt | 1000 | --- | --- | V/μs | $V_{PEAK}$=400V $I_F$ =0 |
| TRANSFER CHARACTERISTICS | | | | | | | |
| LED Trigger Current | TD3041-4L | $I_{FT}$ | --- | --- | 15 | mA | $I_{TM}$=100mA Terminal Voltage=3V |
| | TD3042-4L | | --- | --- | 10 | | |
| | TD3043-4L | | --- | --- | 5 | | |
| Holding Current | | $I_H$ | --- | 237 | --- | μA | --- |
| Isolation Resistance | | $R_{ISO}$ | 10^12 | 10^14 | --- | Ω | DC=500V, 40~60% R.H. |
| Floating Capacitance | | $C_{IO}$ | --- | 0.4 | 1 | pF | V=0, f=1MHz |
| ZERO-CROSSING CHARACTERISTICS | | | | | | | |
| Inhibit Voltage | | $V_{INH}$ | --- | --- | 20 | V | $I_F$=Rated $I_{FT}$ |
| Leakage in Inhibited State | | $I_{DRM2}$ | --- | --- | 500 | μA | $I_F$=Rated $I_{FT}$ $V_{DRM}$=Rated $V_{DRM}$ |

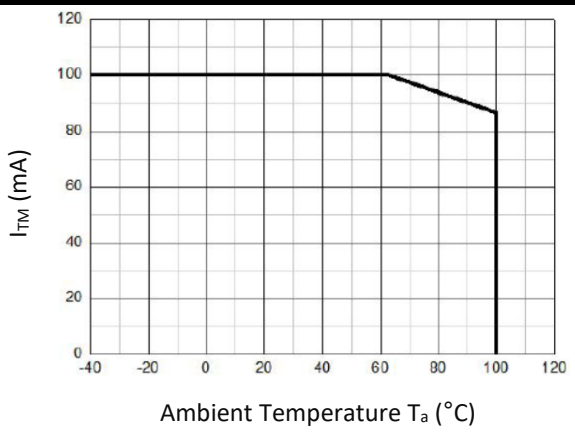
*1. Test voltage must be applied within dV/dt rating.

## CHARACTERISTIC CURVES:

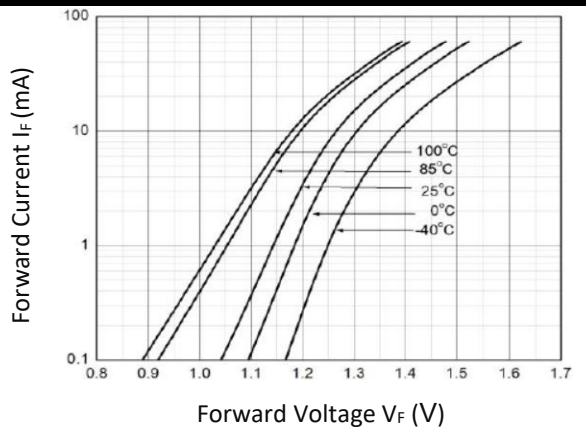
### Forward Current v.s. Ambient Temperature



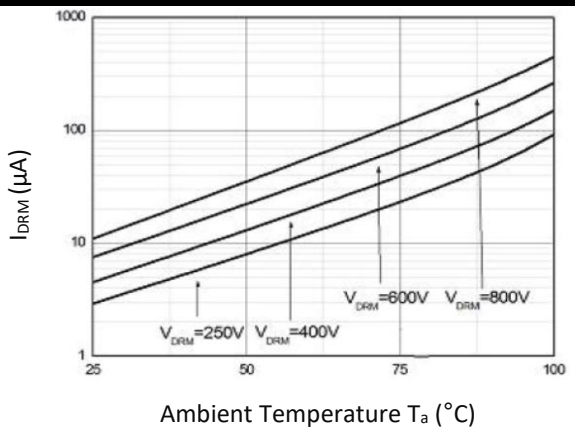

### On-State Terminal Current v.s. Ambient Temperature



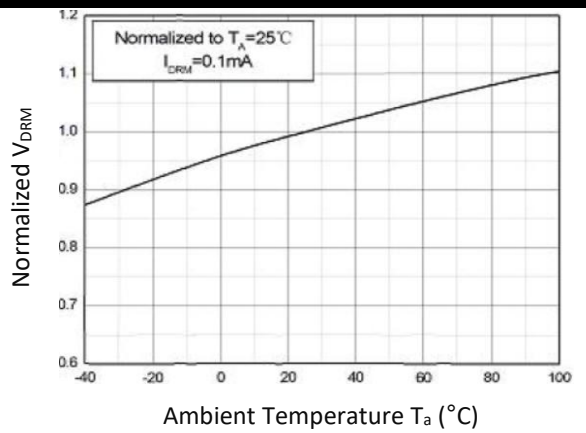

### Forward Current v.s. Forward Voltage



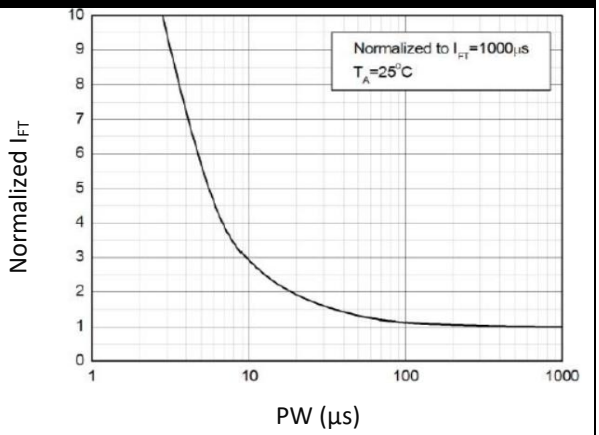

### Off-State Terminal Current v.s. Ambient Temperature




### Normalized Off-State Terminal Voltage v.s. Ambient Temperature

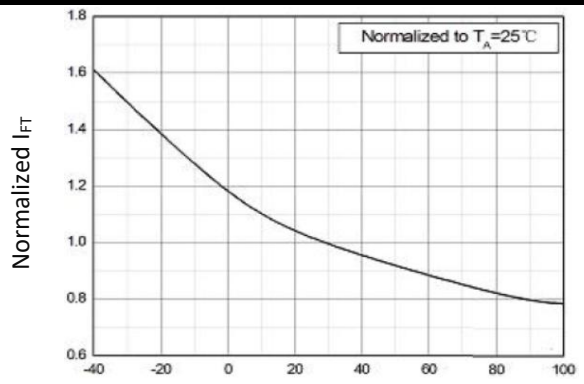



### Normalized Trigger Current v.s. LED Trigger Pulse Width

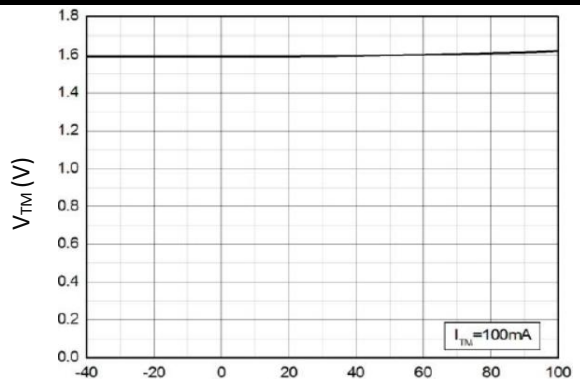


## CHARACTERISTIC CURVES:

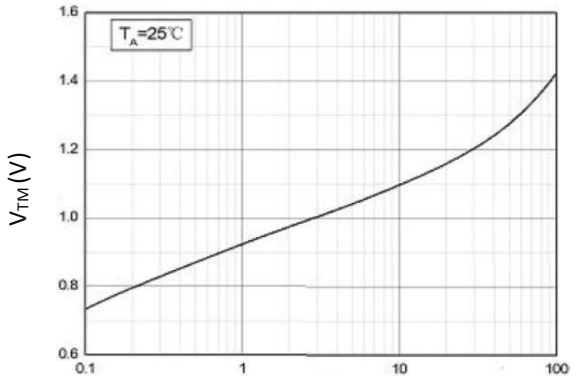
### Normalized Trigger Current v.s. Ambient Temperature



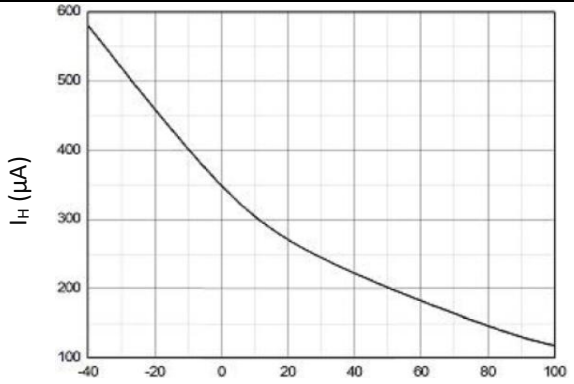

### On-State Terminal Voltage v.s. Ambient Temperature



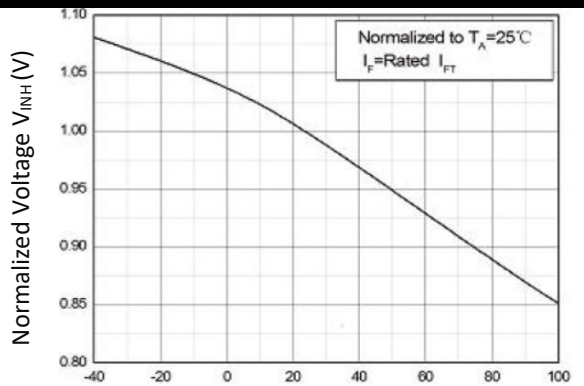

### On-State Terminal Voltage v.s. On-State Terminal Current



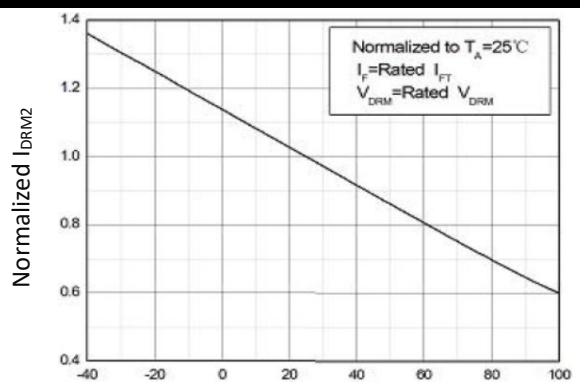

### Holding Current v.s. Ambient Temperature



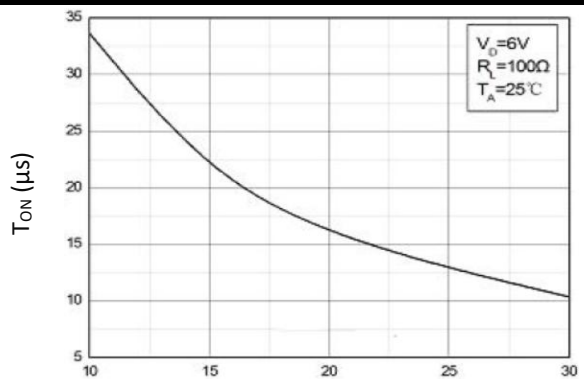
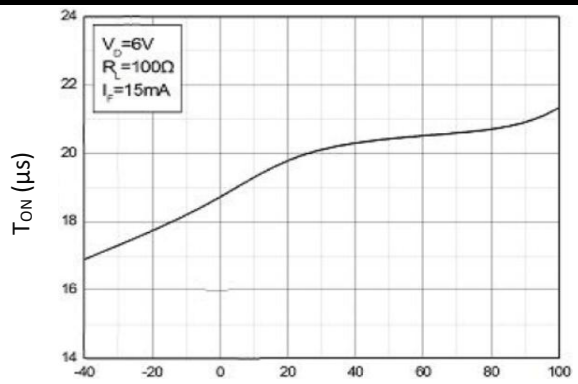

### Normalized Inhibit Voltage v.s. Ambient Temperature




### Normalized Leakage in Inhibit State v.s. Ambient Temperature

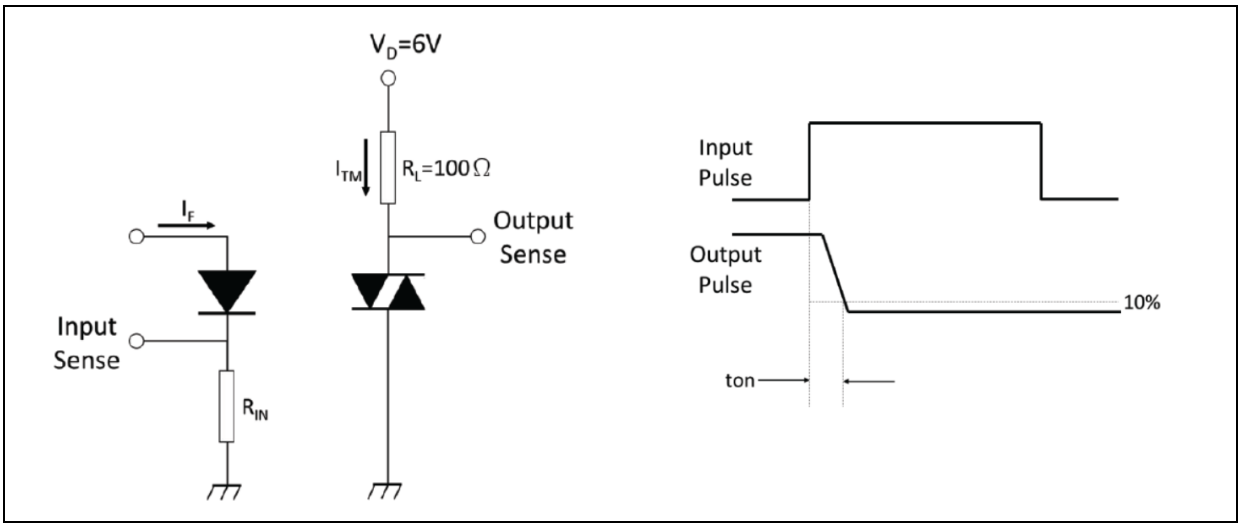


## CHARACTERISTIC CURVES:

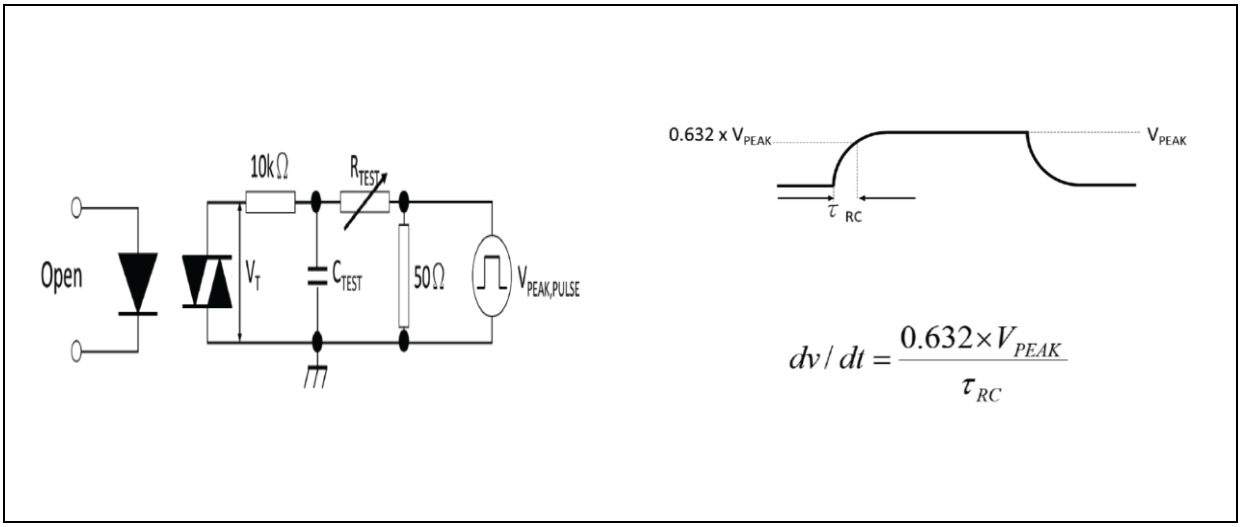
| Turn On Time v.s. Forward Current | Turn On Time v.s. Ambient Temperature |
|---|---|
|  |  |
| Forward Current $I_F$ (mA) | Ambient Temperature $T_a$ (°C) |

## TEST CIRCUIT:

Test Circuit and Waveforms of Turn On Time:




Test Circuit and Waveforms of dV/dt:

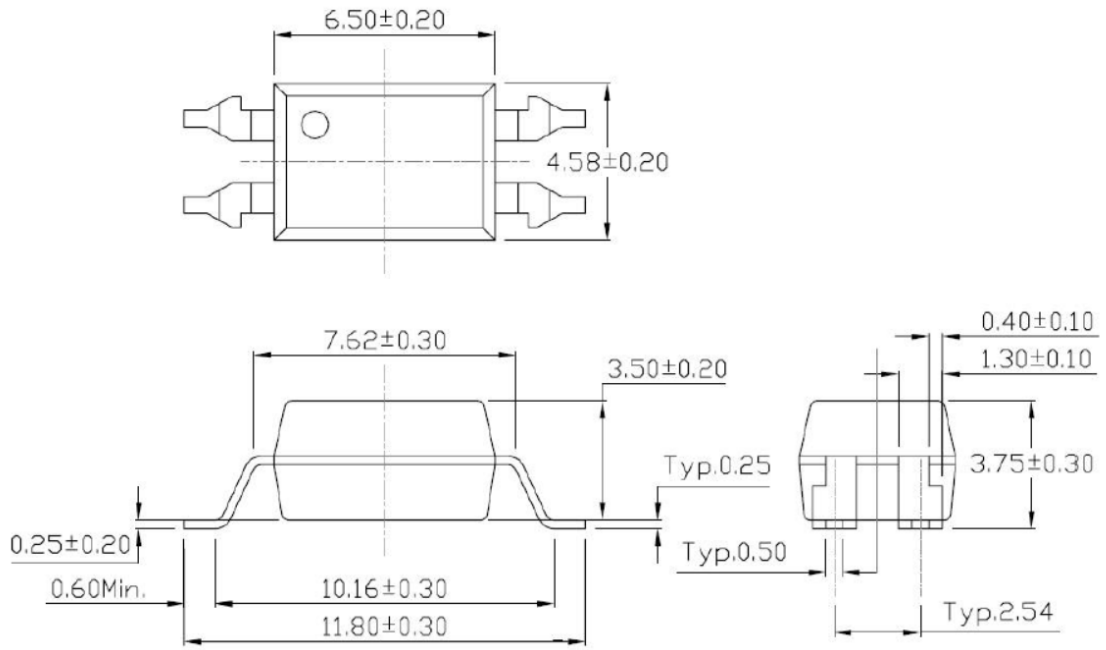



$$dv/dt = \frac{0.632 \times V_{PEAK}}{\tau_{RC}}$$

## OUTLINE DIMENSION:

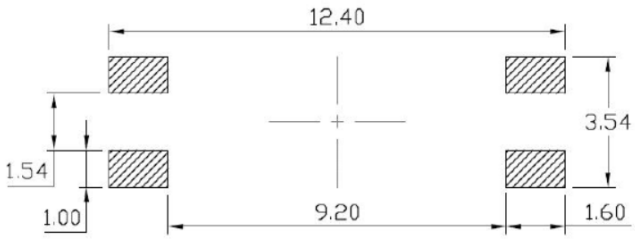
Package Dimension:

Surface Mount Gullwing Lead Forming - SMD (SLM Type)




1. All dimensions are in millimetre (mm).

Recommended Soldering Mask:



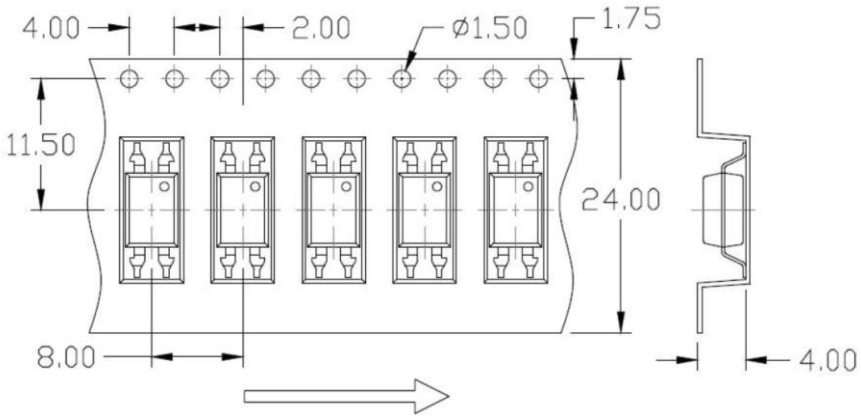

1. Dimensions are in millimetre (mm).

## PACKING SPECIFICATION:

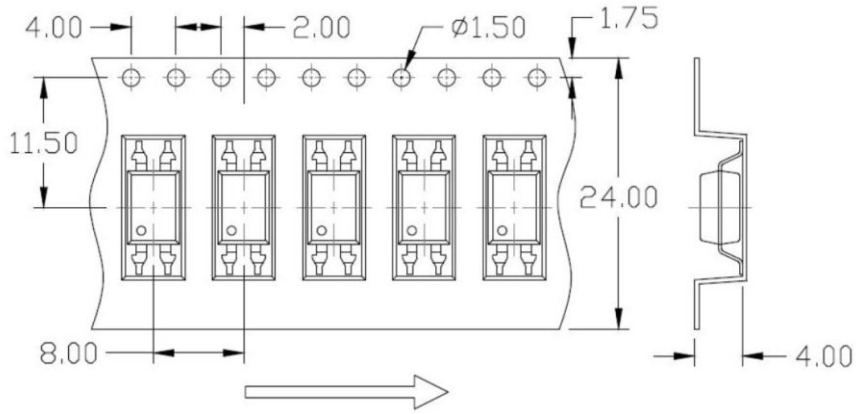
Reel Dimension:

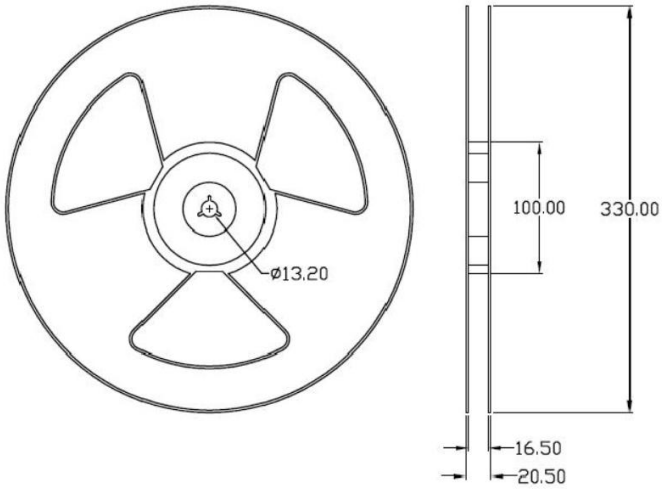
T1(default)/T2: 1500pcs/reel

Reel Option: T1(default)




Reel Option: T2

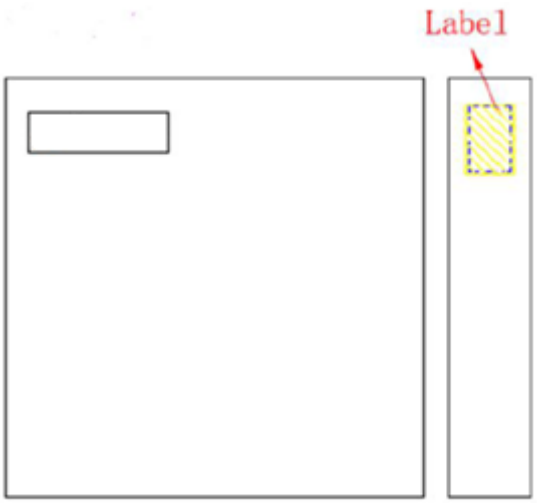


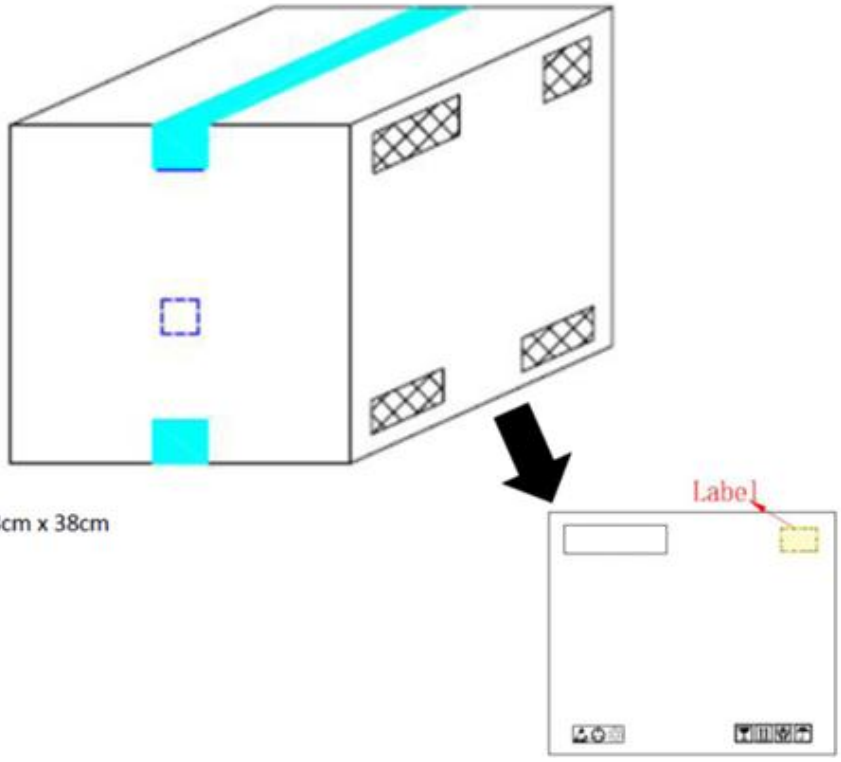
## PACKING SPECIFICATION:

Box Dimension:

T1/T2: 3 reels (4.5Kpcs)/inner box, 5 inner boxes (22.5Kpcs)/carton



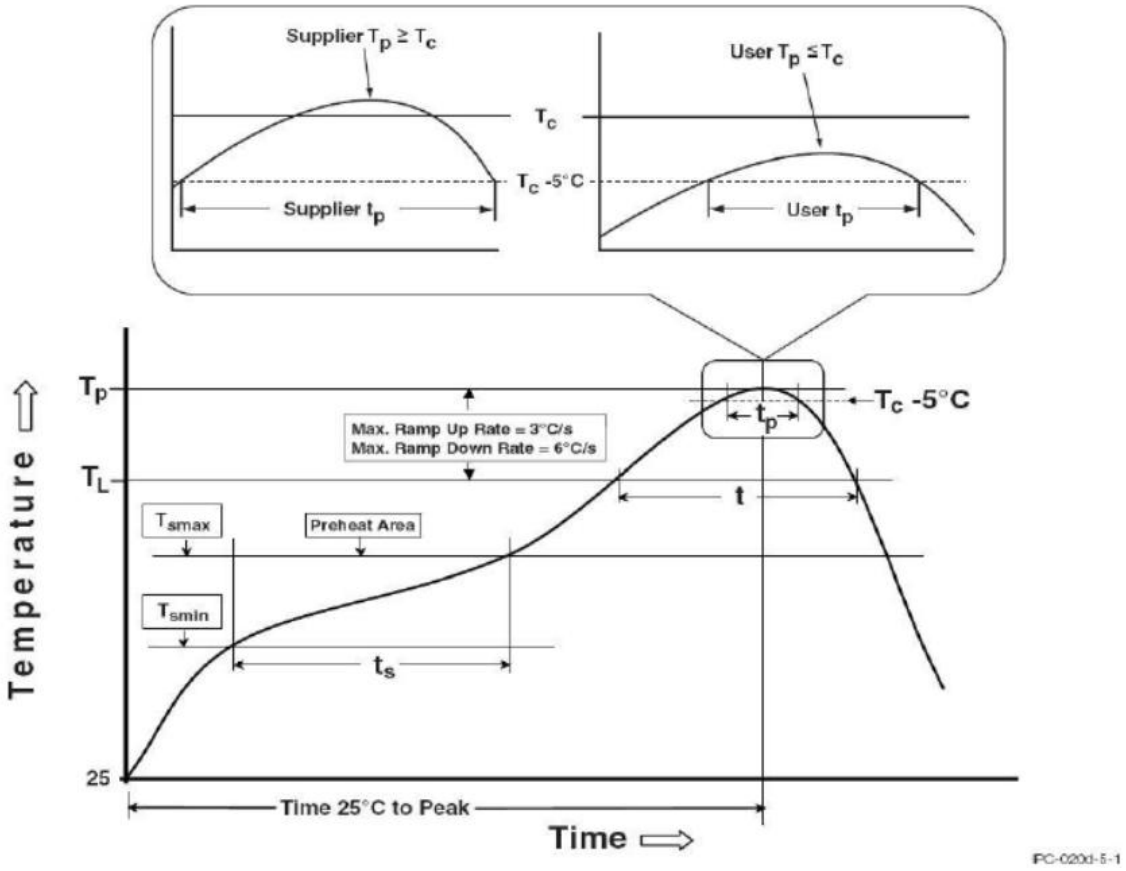

- L x W x H = 36cm x 36cm x 6.9cm




- L x W x H = 45cm x 38cm x 38cm

## RECOMMENDED SOLDERING PROFILE:

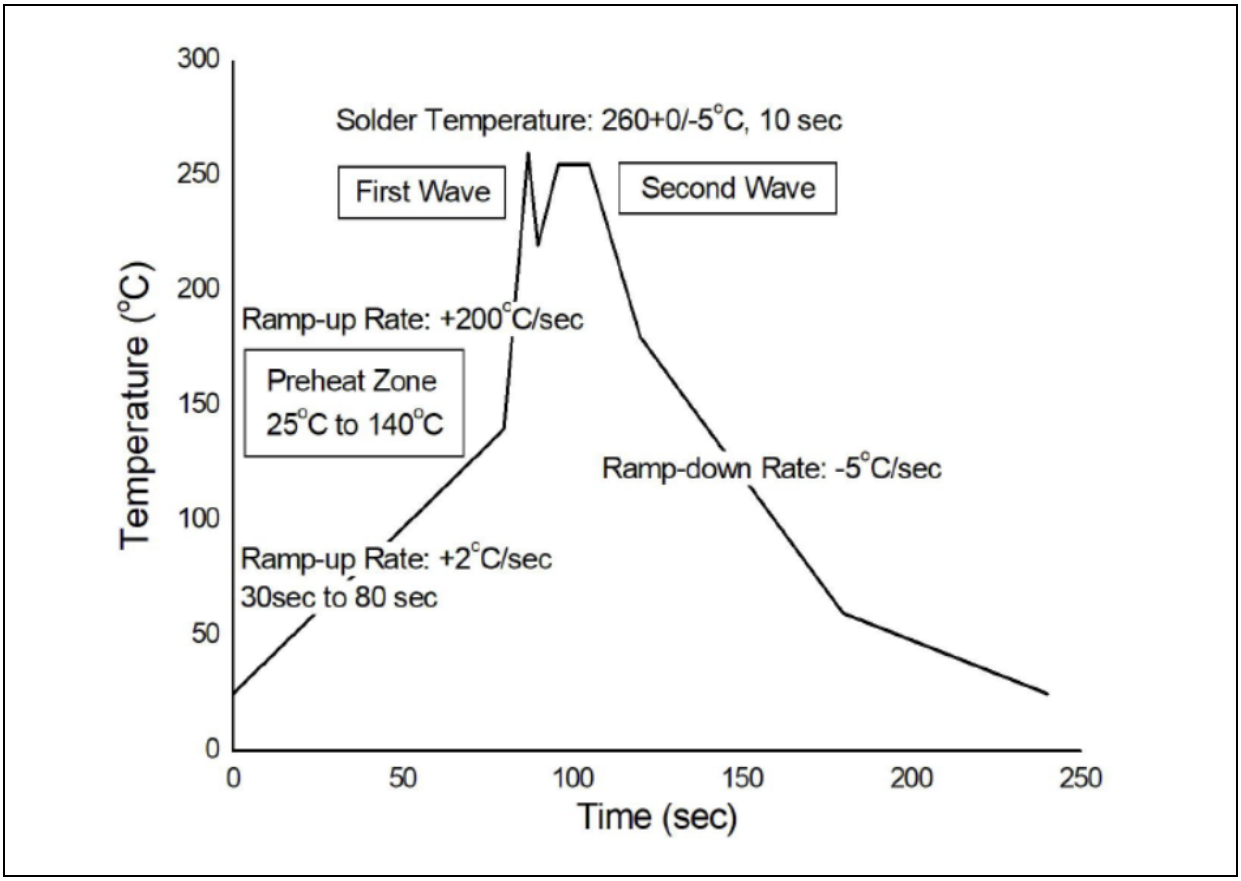
Reflow Information:




| Profile Feature | Sn-Pb Assembly Profile | Pb-Free Assembly Profile |
|---|---|---|
| Temperature Min. ($T_{smin}$) | 100°C | 150°C |
| Temperature Max. ($T_{smax}$) | 150°C | 200°C |
| Time ($t_s$) from ($T_{smin}$ to $T_{smax}$) | 60-120 seconds | 60-120 seconds |
| Ramp-up Rate ($t_L$ to $t_P$) | 3°C/second max. | 3°C/second max. |
| Liquidous Temperature ($T_L$) | 183°C | 217°C |
| Time ($t_L$) Maintained Above ($T_L$) | 60-150 seconds | 60-150 seconds |
| Peak Body Package Temperature | 235°C +0°C / -5°C | 260°C +0°C / -5°C |
| Time ($t_P$) within 5°C of 260°C | 20 seconds | 30 seconds |
| Ramp-down Rate ($T_P$ to $T_L$) | 6°C/second max. | 6°C/second max. |
| Time 25°C to Peak Temperature | 6 minutes max. | 8 minutes max. |

## RECOMMENDED SOLDERING PROFILE:

Wave Soldering (JESD22-A111 Compliant):




Hand Soldering:

| | |
|---|---|
| Soldering Temperature | 380±5°C |
| Soldering Time | 3 sec max. |

Note:

- One time soldering is recommended for all soldering methods.
- Do not solder more than three times for IR reflow soldering.