



# BRIGHTTEK

BRIGHTTEK (EUROPE) LIMITED

*Brighten up The World With LED!*



ISO/TS 16949:2009

BS EN ISO 14001:2004

QC 90000 IECQ 11519

## PRODUCT DATASHEET

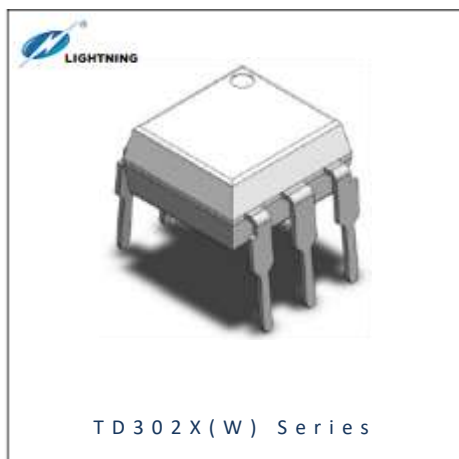


- ▶ DC Input Photo Coupler
- ▶ Standard DIP6
- ▶ Random-Phase TRIAC

### TD302X-GV(W)



Release Date: 26 June 2025 Version: A01



TD302X(W) Series

## TD302X(W) Series

### DESCRIPTION:



The TD302X(W) series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a monolithic silicon random-phase photo TRIAC in a plastic DIP6 package with different lead forming options.

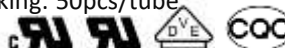
With the robust coplanar double mold structure, TD302X(W) series provide the most stable isolation feature.

### FEATURES:

#### APPLICATIONS:

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

- High isolation 5000Vrms
- DC input with random-phase photo TRIAC output
- Operating temperature range -40°C to +100°C
- REACH & RoHS compliance
- 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: 50pcs/tube



Partner with: LIGHTNING

## NAMING & ORDERING INFORMATION:

Naming Information:

|                          |                                        |
|--------------------------|----------------------------------------|
| <b>TD302 X - G V (W)</b> |                                        |
| <b>TD302X</b>            | Part Number                            |
| <b>X</b>                 | Selection: LED Trigger Current (X=1~3) |
| <b>G</b>                 | Green Option                           |
| <b>V</b>                 | VDE Option                             |
| <b>W</b>                 | White Package                          |

Ordering Information:

| <b>TD302X-GV(W)</b>                               |                 |        |      |      |      |                                                  |
|---------------------------------------------------|-----------------|--------|------|------|------|--------------------------------------------------|
| <u>X</u> = Selection: LED Trigger Current (X=1~3) |                 |        |      |      |      |                                                  |
| Part Number                                       | Symbol          | Values |      |      | Unit | Test Condition                                   |
|                                                   |                 | Min.   | Typ. | Max. |      |                                                  |
| TD3021-GV(W)                                      | I <sub>FT</sub> | ---    | ---  | 15   | mA   | I <sub>TM</sub> =100mA<br>Terminal<br>Voltage=3V |
| TD3022-GV(W)                                      |                 | ---    | ---  | 10   |      |                                                  |
| TD3023-GV(W)                                      |                 | ---    | ---  | 5    |      |                                                  |

| Version No. | Original Release Date |
|-------------|-----------------------|
| Rev: A01    | 21/06/2021            |

## SCHEMATIC DIAGRAM & MARKING:

Schematic Diagram:

| PIN Definition |           |
|----------------|-----------|
| 1              | Anode     |
| 2              | Cathode   |
| 3              | NC        |
| 4              | Terminal  |
| 5              | Substrate |
| 6              | Terminal  |

Marking Information:

| Marking Definition |                    |
|--------------------|--------------------|
| TD                 | Manufacturer Code  |
| 302X               | Part Number & Rank |
| V                  | VDE Applicable     |
| Y                  | Fiscal Year        |
| A                  | Manufacturing Code |
| WW                 | Work Week          |

Labelling Information:

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
|  <b>BRIGHTTEK</b><br>BRIGHTTEK (EUROPE) LIMITED  LIGHTNING<br>Part No.: XXXXXXXXXXXX      Bin Code: X<br><br>Lot No.: XXXXXXXX<br>Date Code: XXXX<br>QTY: XXX PCS<br><br>MSL: 1<br>Made in Quanzhou Fujian<br>     | <p>This product is manufactured, tested, and packed by</p>                             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <p>for more details, please visit <a href="http://www.tdled.com">www.tdled.com</a></p> |

## 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<br>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 * <sup>1</sup> | Vrms |
| Operating Temperature                             | $T_{opr}$    | -40~+100            | °C   |
| Storage Temperature                               | $T_{stg}$    | -55~+125            | °C   |
| Soldering Temperature                             | $T_{sol}$    | 260 * <sup>2</sup>  | °C   |

\*1. AC for 1 minute, R.H.=40~60%.

\*2. For 10 seconds max.

## ELECTRICAL CHARACTERISTICS:

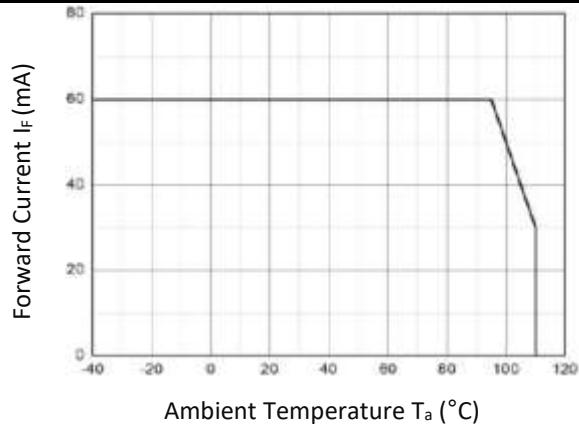
Electrical Optical Characteristics at  $T_a=25^{\circ}\text{C}$ :

| Parameter                                     |        | Symbol           | Values |       |                    | Unit | Test Condition                                                |
|-----------------------------------------------|--------|------------------|--------|-------|--------------------|------|---------------------------------------------------------------|
|                                               |        |                  | Min.   | Typ.  | Max.               |      |                                                               |
| INPUT                                         |        |                  |        |       |                    |      |                                                               |
| Forward Voltage                               |        | V <sub>F</sub>   | ---    | 1.24  | 1.4                | V    | I <sub>F</sub> =10mA                                          |
| Reverse Current                               |        | I <sub>R</sub>   | ---    | ---   | 10                 | μA   | V <sub>R</sub> =6V                                            |
| Input Capacitance                             |        | C <sub>IN</sub>  | ---    | 8.5   | 250                | pF   | V=0, f=1kHz                                                   |
| OUTPUT                                        |        |                  |        |       |                    |      |                                                               |
| Peak Off-State Current<br>Either Direction    |        | I <sub>DRM</sub> | ---    | ---   | 100 * <sup>1</sup> | nA   | V <sub>DRM</sub> =Rated V <sub>DRM</sub><br>I <sub>F</sub> =0 |
| Peak On-State Voltage<br>Either Direction     |        | V <sub>TM</sub>  | ---    | 1.58  | 2.5                | V    | I <sub>TM</sub> =100mA                                        |
| Critical Rate of Rise of Off-State<br>Voltage |        | dV/dt            | 1000   | ---   | ---                | V/μs | V <sub>PEAK</sub> =400V<br>I <sub>F</sub> =0                  |
| TRANSFER CHARACTERISTICS                      |        |                  |        |       |                    |      |                                                               |
| LED Trigger Current                           | TD3021 | I <sub>FT</sub>  | ---    | ---   | 15                 | mA   | I <sub>TM</sub> =100mA<br>Terminal<br>Voltage=3V              |
|                                               | TD3022 |                  | ---    | ---   | 10                 |      |                                                               |
|                                               | TD3023 |                  | ---    | ---   | 5                  |      |                                                               |
| Holding Current                               |        | I <sub>H</sub>   | ---    | 257   | ---                | μA   | ---                                                           |
| Isolation Resistance                          |        | R <sub>ISO</sub> | 10^12  | 10^14 | ---                | Ω    | DC=500V,<br>40~60% R.H.                                       |
| Floating Capacitance                          |        | C <sub>IO</sub>  | ---    | 0.8   | ---                | pF   | V=0, f=1MHz                                                   |

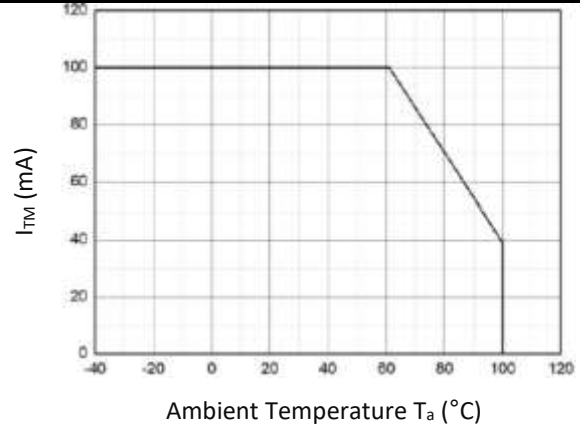
\*1. Test voltage must be applied within  $dV/dt$  rating.

## CHARACTERISTIC CURVES:

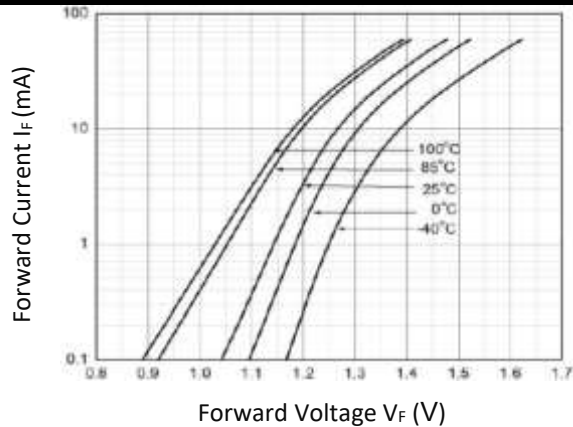
Forward Current v.s. Ambient Temperature



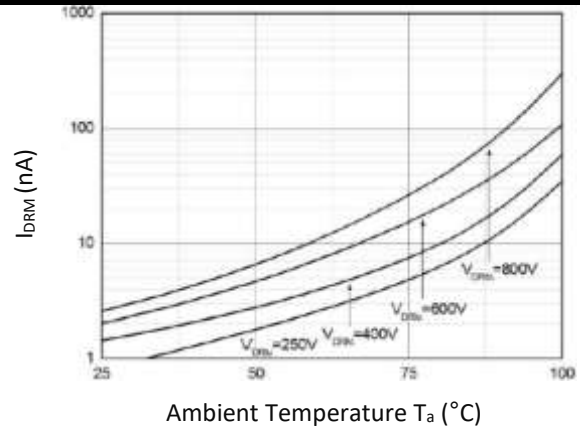
On-State Terminal Current v.s. Ambient Temperature



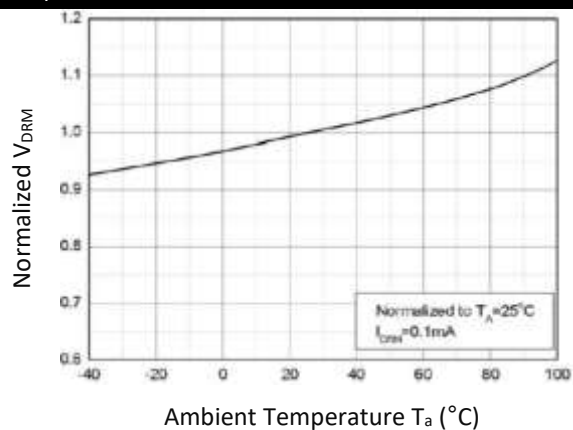
Forward Current v.s. Forward Voltage



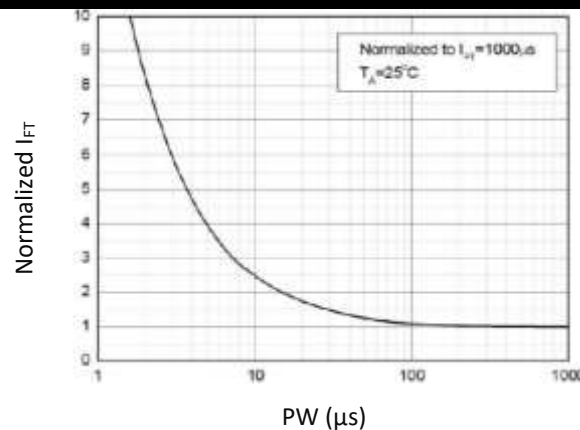
Off-State Terminal Current v.s. Ambient Temperature



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

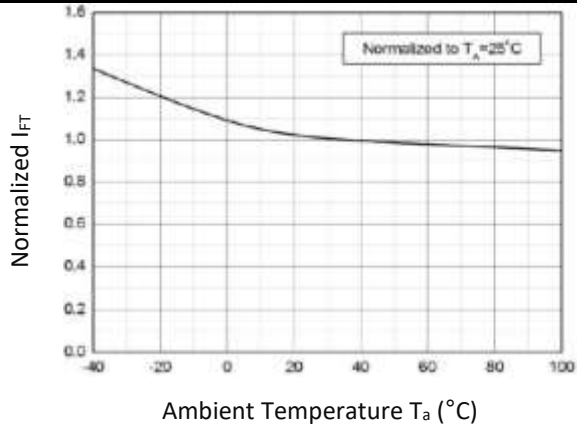


Normalized Trigger Current v.s. LED Trigger Pulse Width

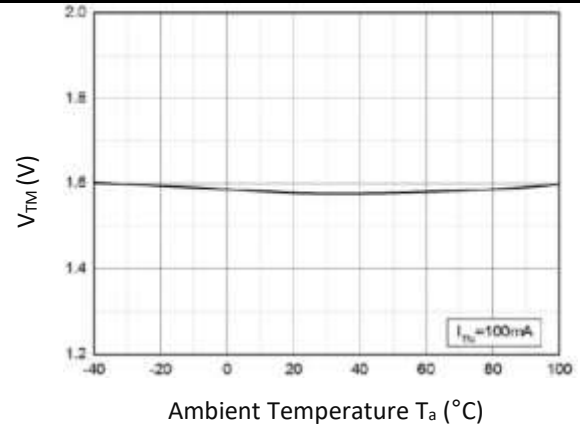


## CHARACTERISTIC CURVES:

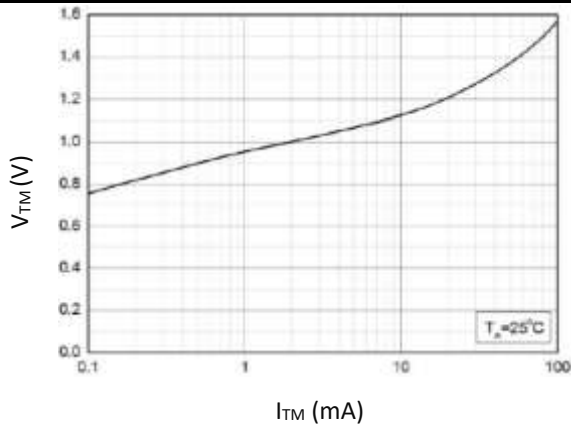
Normalized Trigger Current v.s. Ambient Temperature



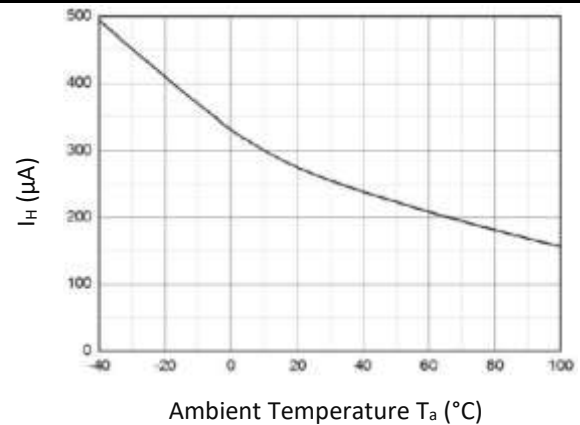
On-State Terminal Voltage v.s. Ambient Temperature



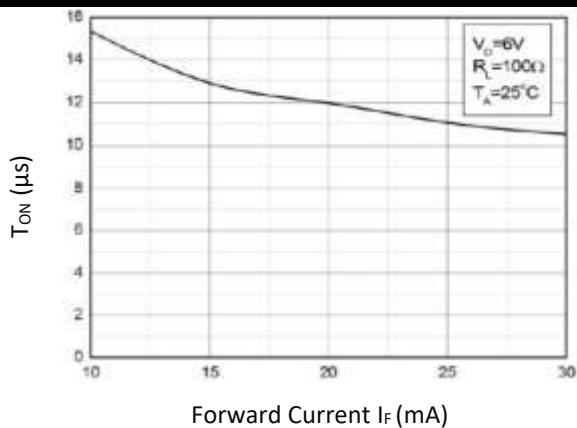
On-State Terminal Voltage v.s. On-State Terminal Current



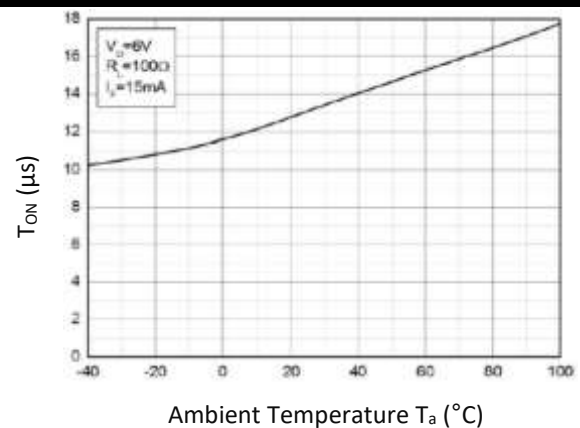
Holding Current v.s. Ambient Temperature



Turn On Time v.s. Forward Current

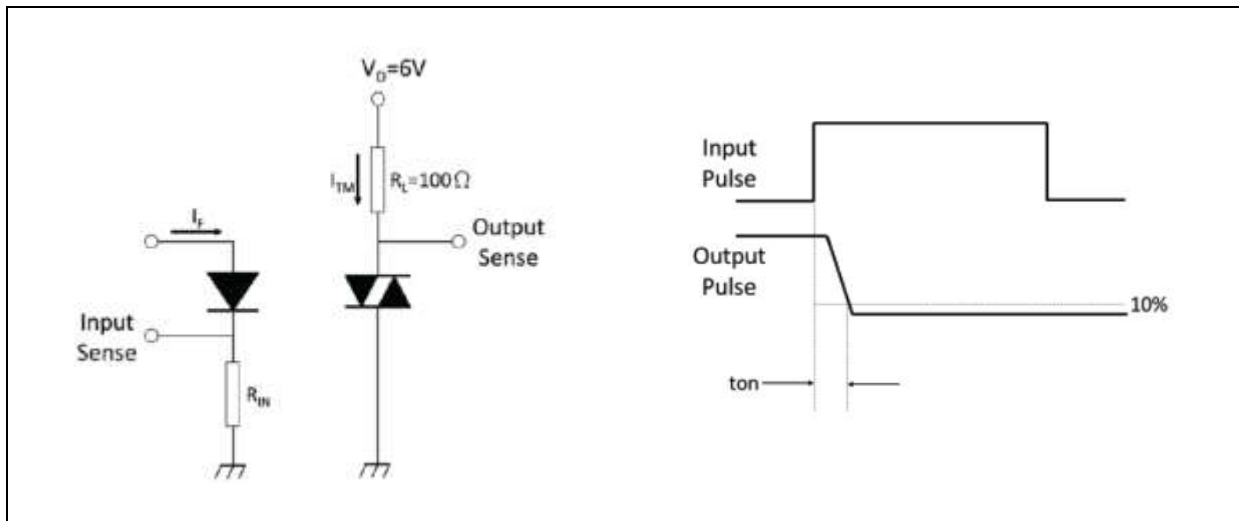


Turn On Time v.s. Ambient Temperature

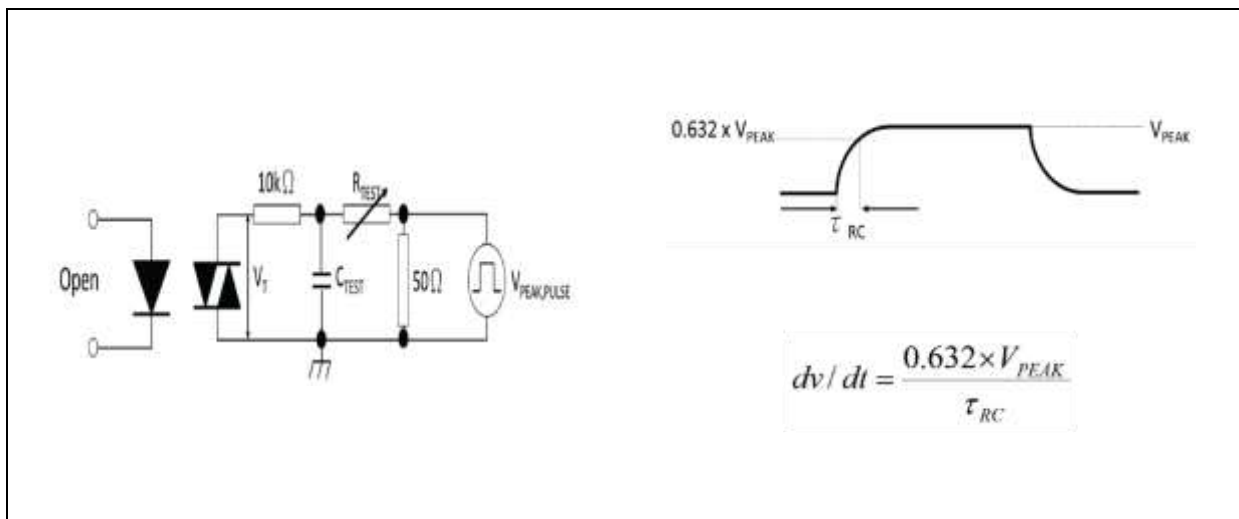


## TEST CIRCUIT:

Test Circuit and Waveforms of Turn On Time:

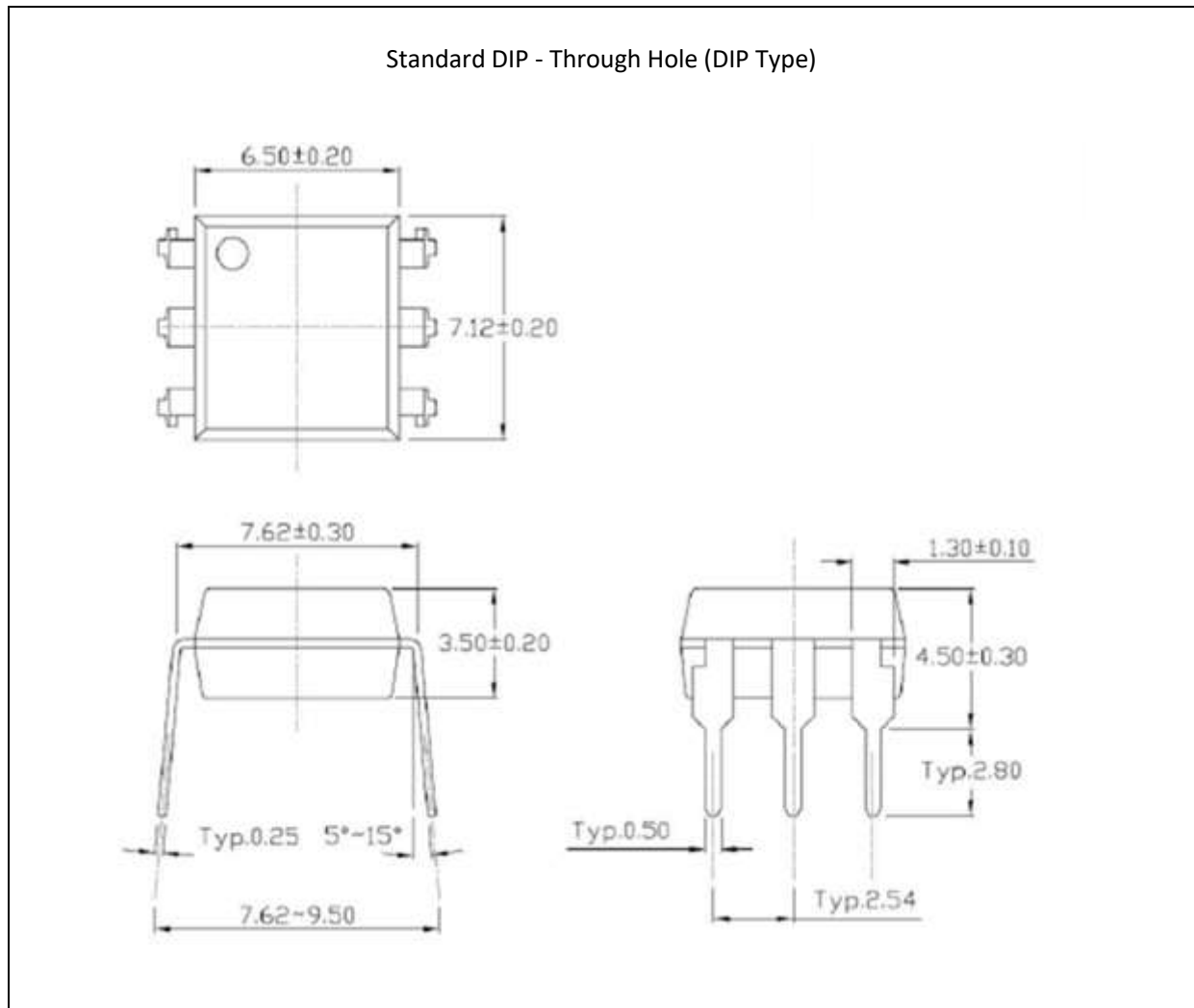


Test Circuit and Waveforms of  $dV/dt$ :



## OUTLINE DIMENSION:

Package Dimension:

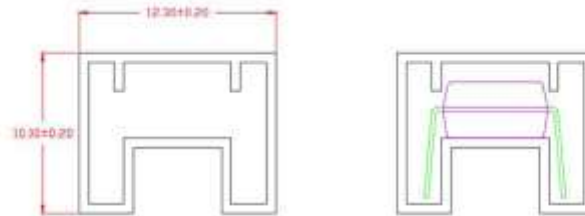


1. All dimensions are in millimetre (mm).

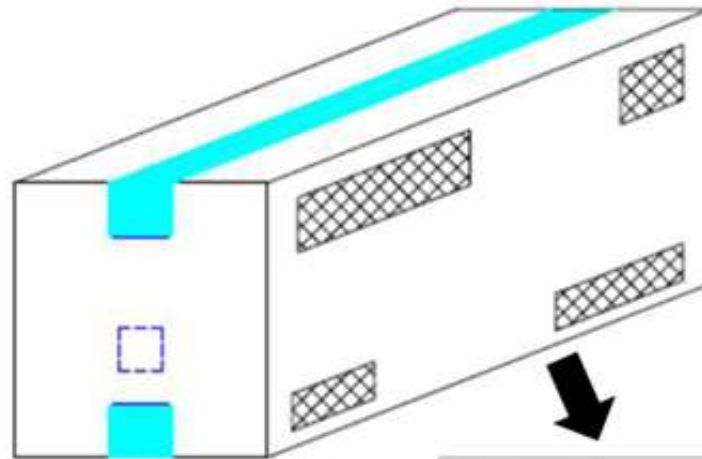
## PACKING SPECIFICATION:

Tube Dimension:

50pcs/tube, 32 tube/inner box, 10 inner box (16Kpcs)/carton



● L x W x H = 52.5cm x 10.7cm x 4.7cm

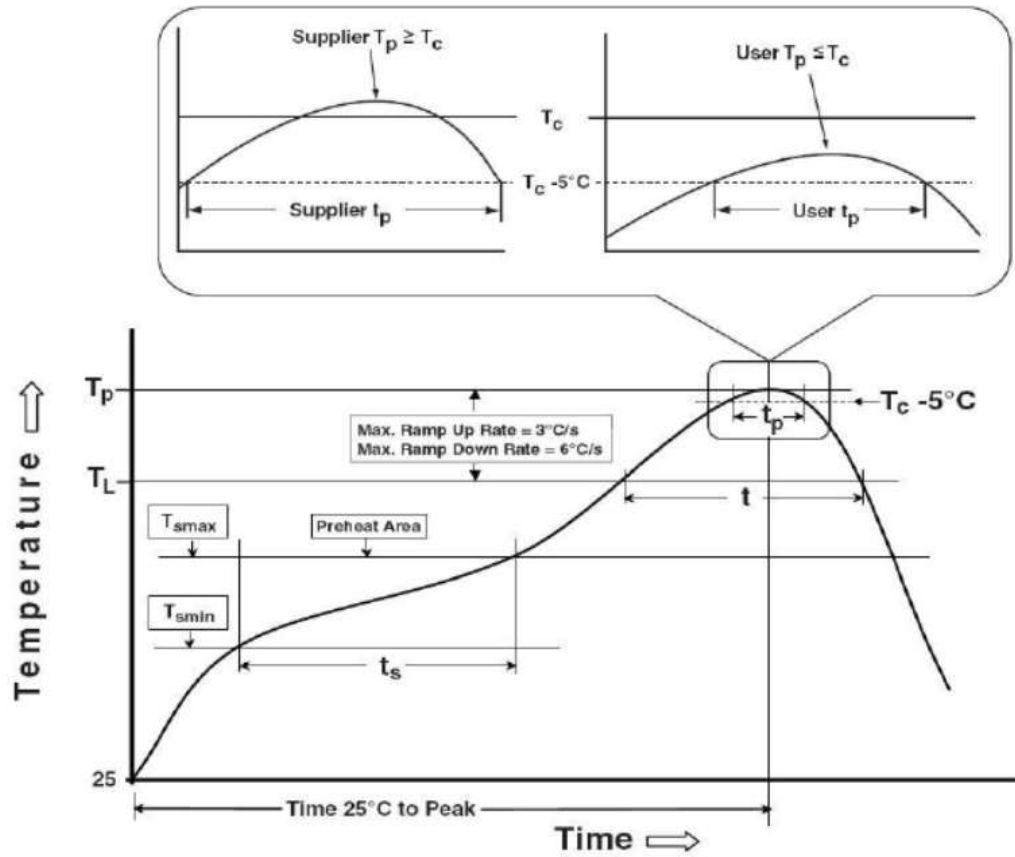


● L x W x H = 53.5cm x 23.5cm x 25.5cm



## RECOMMENDED SOLDERING PROFILE:

Reflow Information:



IPC-620d-5-1

| 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.