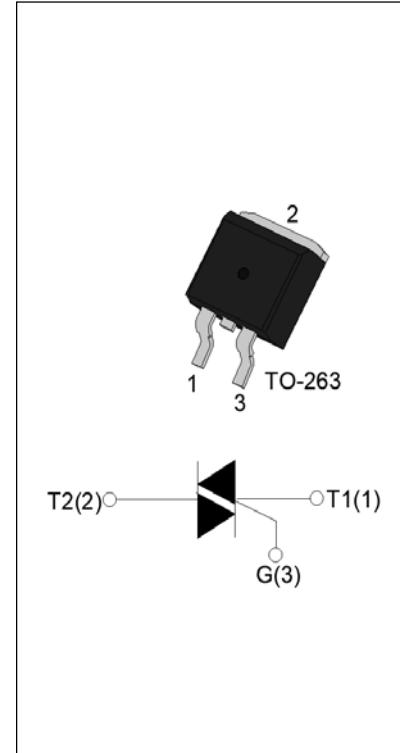


**JST12E-1000TW 12A TRIAC**

Rev.A.1.1

**DESCRIPTION:**

The JST12E-1000TW triac is suitable for general purpose AC switching. It can be used as an ON/OFF function in applications such as heating regulation, induction motor starting circuits, for phase control operation in light dimmers, motor speed controllers. JST12E-1000TW snubberless triac is especially recommended for use on inductive loads. It can be driven directly through the MCU I/O port. Package TO-263 is RoHS compliant.


**MAIN FEATURES**

| Symbol             | Value | Unit |
|--------------------|-------|------|
| $I_{T(RMS)}$       | 12    | A    |
| $V_{DRM}/V_{RRM}$  | 1000  | V    |
| $I_{GT\ I/II/III}$ | 5/5/5 | mA   |

**ABSOLUTE MAXIMUM RATINGS**

| Parameter  | Symbol       | Value   | Unit        |
|--|--------------|---------|-------------|
| Storage junction temperature range   | $T_{stg}$    | -40-150 | $^{\circ}C$ |
| Operating junction temperature range   | $T_j$        | -40-125 | $^{\circ}C$ |
| Repetitive peak off-state voltage ( $T_j=25^{\circ}C$ )  | $V_{DRM}$    | 1000    | V           |
| Repetitive peak reverse voltage ( $T_j=25^{\circ}C$ )  | $V_{RRM}$    | 1000    | V           |
| RMS on-state current ( $T_C \leq 103^{\circ}C$ )   | $I_{T(RMS)}$ | 12      | A           |
| Non repetitive surge peak on-state current (full cycle , $t_p=20ms$ , $T_j=25^{\circ}C$ )            | $I_{TSM}$    | 120     | A           |
| Non repetitive surge peak on-state current (full cycle , $t_p=16.6ms$ , $T_j=25^{\circ}C$ )          |              | 132     |             |
| $I^2t$ value for fusing ( $t_p=10ms$ , $T_j=25^{\circ}C$ )   | $I^2t$       | 72      | $A^2s$      |
| Critical rate of rise of on-state current ( $I_G=2 \times I_{GT}$ , $f=100Hz$ , $T_j=125^{\circ}C$ ) | $di/dt$      | 50      | $A/\mu s$   |
| Peak gate current ( $t_p=20\mu s$ , $T_j=125^{\circ}C$ )   | $I_{GM}$     | 4       | A           |
| Average gate power dissipation ( $T_j=125^{\circ}C$ )  | $P_{G(AV)}$  | 0.5     | W           |
| Peak gate power  | $P_{GM}$     | 10      | W           |

|  |          |     |    |
|--|----------|-----|----|
| Peak pulse voltage<br>( $T_j=25^\circ\text{C}$ ; non-repetitive, off-state; FIG.8) | $V_{pp}$ | 3.5 | kV |
|--|----------|-----|----|

**ELECTRICAL CHARACTERISTICS** ( $T_j=25^\circ\text{C}$  unless otherwise specified)

| Symbol    | Test Condition   | Quadrant    | Value |     | Unit             |
|-----------|--|-------------|-------|-----|------------------|
| $I_{GT}$  | $V_D=12\text{V}$ $R_L=33\Omega$  | I - II -III | MAX.  | 5   | mA               |
| $V_{GT}$  |  | I - II -III | MAX.  | 1   | V                |
| $V_{GD}$  | $V_D=V_{DRM}$ $T_j=125^\circ\text{C}$<br>$R_L=3.3\text{k}\Omega$                 | I - II -III | MIN.  | 0.2 | V                |
| $I_L$     | $I_G=1.2I_{GT}$  | I -III      | MAX.  | 10  | mA               |
|           |  | II          |       | 15  |                  |
| $I_H$     | $I_T=500\text{mA}$   |             | MAX.  | 10  | mA               |
| dV/dt     | $V_D=670\text{V}$ Gate Open $T_j=125^\circ\text{C}$                              |             | MIN.  | 50  | V/ $\mu\text{s}$ |
| (dI/dt)c  | (dV/dt)c=10V/ $\mu\text{s}$ $T_j=125^\circ\text{C}$                              |             | MIN.  | 1   | A/ms             |
| $t_{on}$  | $I_G=10\text{mA}$ $I_A=200\text{mA}$ $I_R=20\text{mA}$<br>$T_j=25^\circ\text{C}$ |             | TYP.  | 2   | $\mu\text{s}$    |
| $t_{off}$ |  |             |       | 20  |                  |

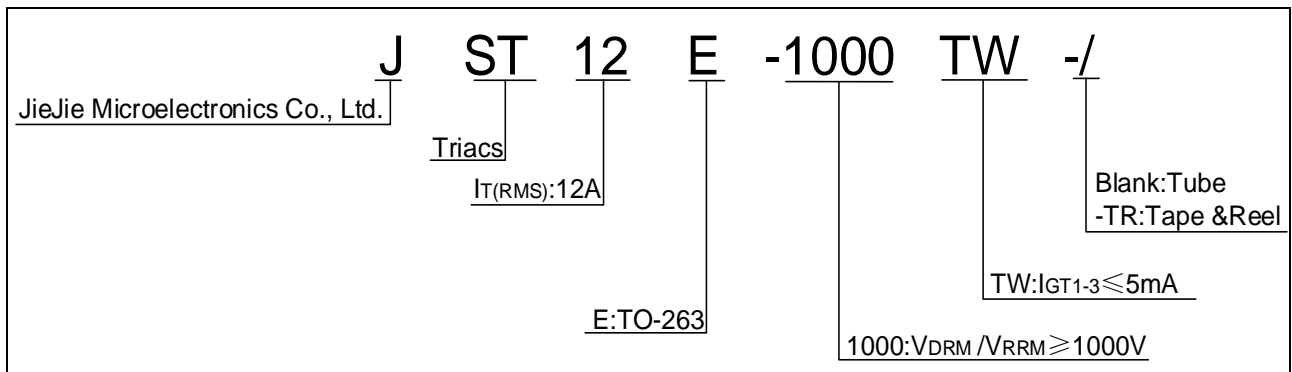
**STATIC CHARACTERISTICS**

| Symbol    | Parameter                                |                         | Value(MAX.) | Unit          |
|-----------|--|-------------------------|-------------|---------------|
| $V_{TM}$  | $I_{TM}=17\text{A}$ $t_p=380\mu\text{s}$ | $T_j=25^\circ\text{C}$  | 1.5         | V             |
| $V_{TO}$  | Threshold voltage                        | $T_j=125^\circ\text{C}$ | 0.77        | V             |
| $R_D$     | Dynamic resistance                       | $T_j=125^\circ\text{C}$ | 35          | m $\Omega$    |
| $I_{DRM}$ | $V_D=V_{DRM}$ $V_R=V_{RRM}$              | $T_j=25^\circ\text{C}$  | 8           | $\mu\text{A}$ |
| $I_{RRM}$ |  | $T_j=125^\circ\text{C}$ | 1           | mA            |

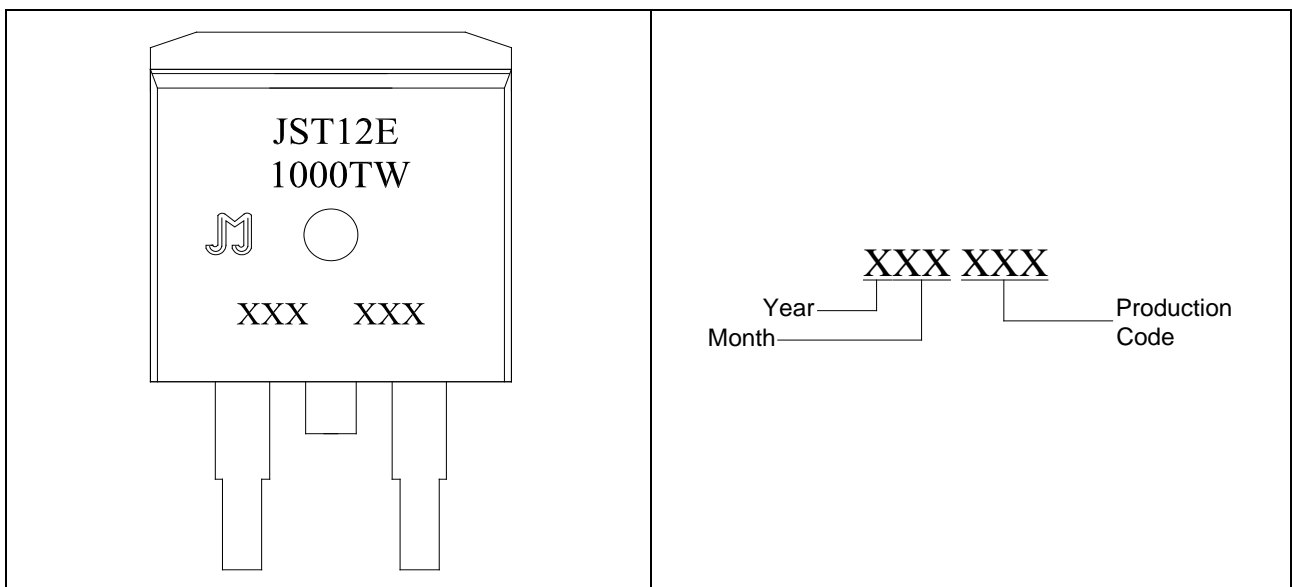
**THERMAL RESISTANCES**

| Symbol        | Parameter  | Value | Unit               |
|---------------|--|-------|--------------------|
| $R_{th(j-c)}$ | junction to case (AC)                                    | 1.3   | $^\circ\text{C/W}$ |
| $R_{th(j-a)}$ | junction to ambient (AC, in free air, $S=2\text{cm}^2$ ) | 45    | $^\circ\text{C/W}$ |

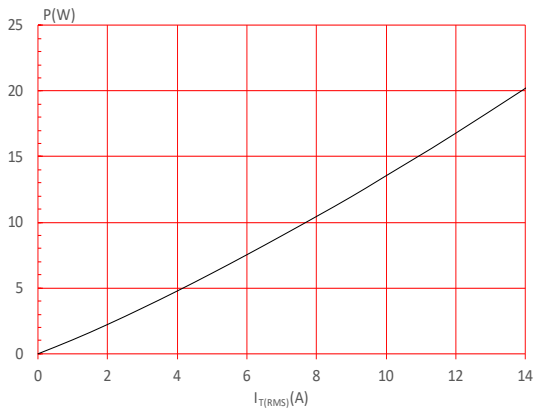
**ORDERING INFORMATION**



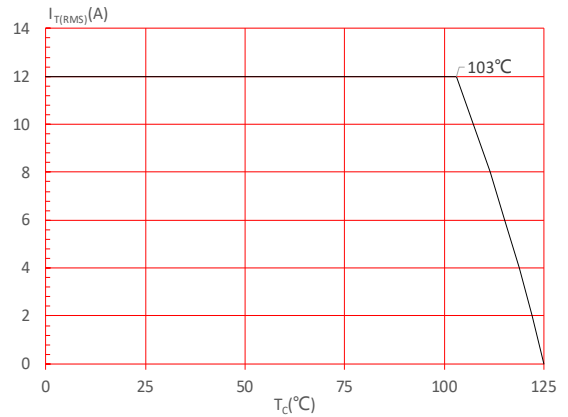
**MARKING**



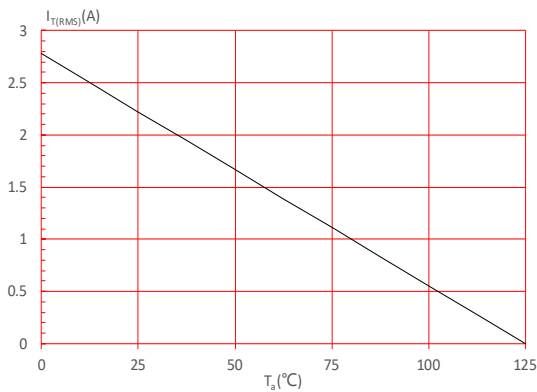
**FIG.1:** Maximum power dissipation versus RMS on-state current



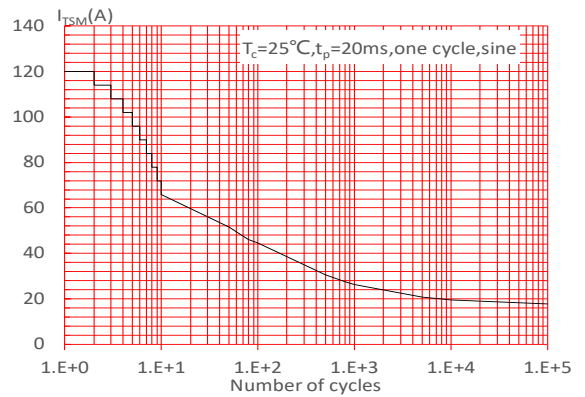
**FIG.2:** RMS on-state current versus case temperature



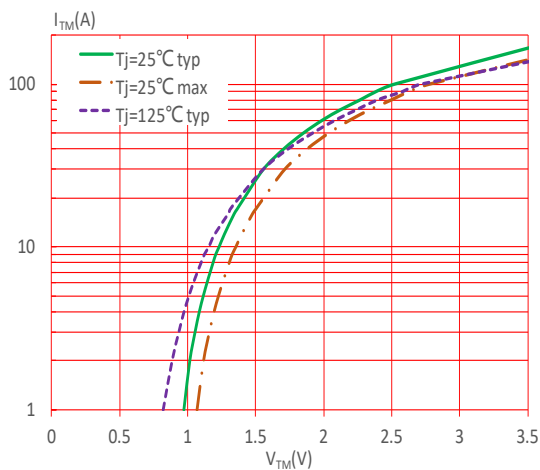
**FIG.3:** RMS on-state current versus ambient temperature (printed circuit board FR4,copper thickness:35μm)(full cycle)



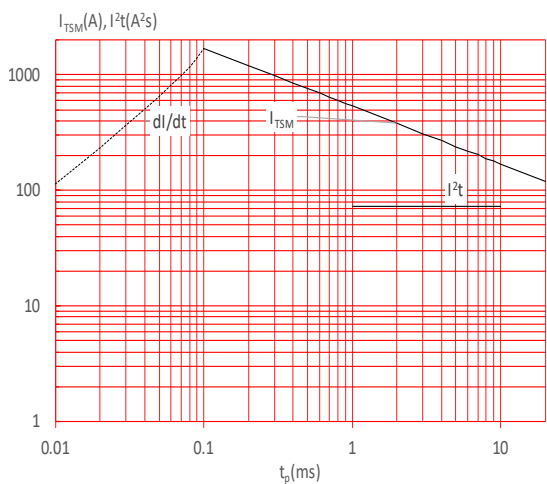
**FIG.4:** Surge peak on-state current versus number of cycles



**FIG.5:** On-state characteristics



**FIG.6:** Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 20\text{ms}$ , and corresponding value of  $I^2t$  ( $di/dt < 50\text{A}/\mu\text{s}$ )



**FIG.7:** Relative variations of gate trigger current, holding current and latching current versus junction temperature

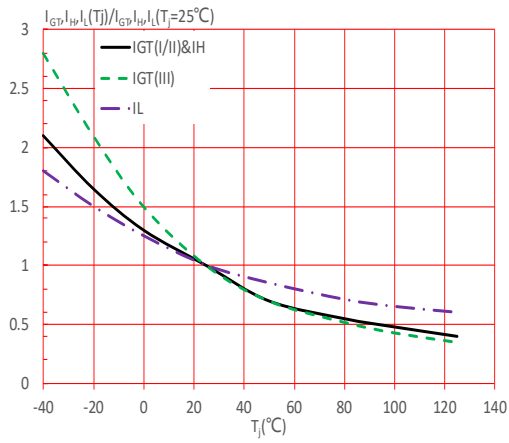
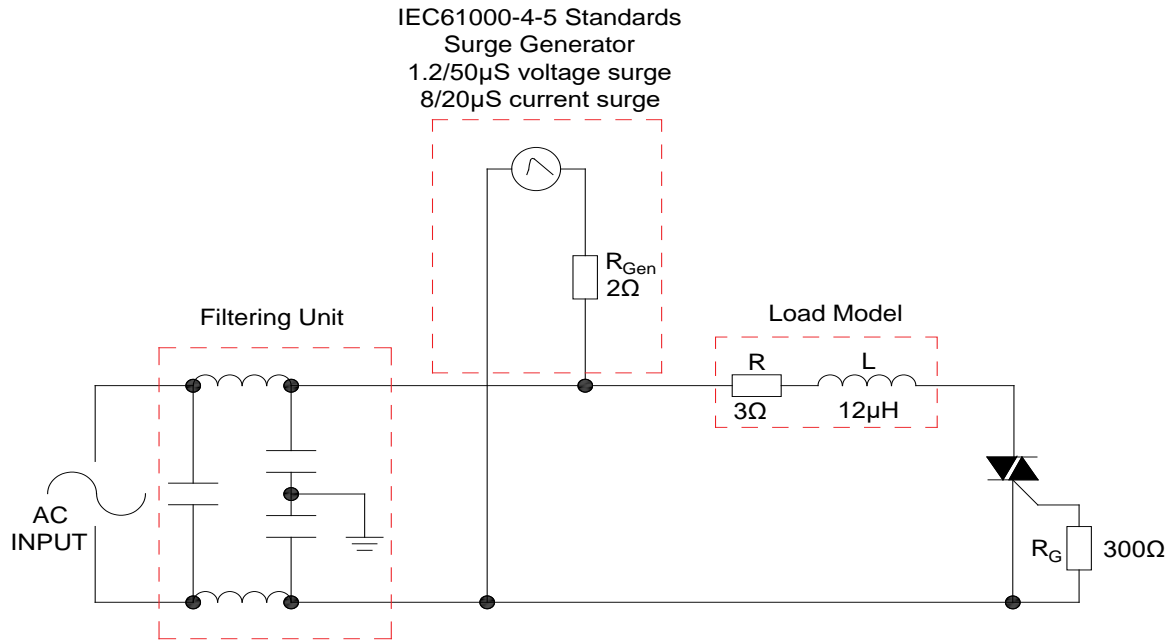
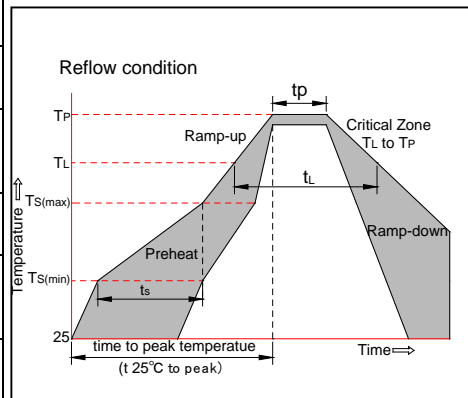


FIG.8: Test circuit for inductive and resistive loads to IEC-61000-4-5 standards



**SOLDERING PARAMETERS**

|   |                                      |   |
|---|--------------------------------------|---|
| Reflow Condition  |                                      | Pb-Free assembly<br>(see figure at right) |
| Pre Heat  | -Temperature Min<br>( $T_{s(min)}$ ) | +150°C                                    |
|   | -Temperature<br>Max( $T_{s(max)}$ )  | +200°C                                    |
|   | -Time (Min to Max) (ts)              | 60-180 secs.                              |
| Average ramp up rate<br>(Liquidus Temp ( $T_L$ ) to peak) |                                      | 3°C/sec. Max                              |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                      |                                      | 3°C/sec. Max                              |
| Reflow  | -Temperature( $T_L$ )<br>(Liquidus)  | +217°C                                    |
|   | -Temperature( $t_L$ )                | 60-150 secs.                              |
| Peak Temp ( $T_p$ )                                       |                                      | +260(+0/-5)°C                             |
| Time within 5°C of actual<br>Peak Temp ( $t_p$ )          |                                      | 20-40secs.                                |
| Ramp-down Rate  |                                      | 6°C/sec. Max                              |
| Time 25°C to Peak Temp ( $T_p$ )                          |                                      | 8 min. Max                                |
| Do not exceed   |                                      | +260°C                                    |



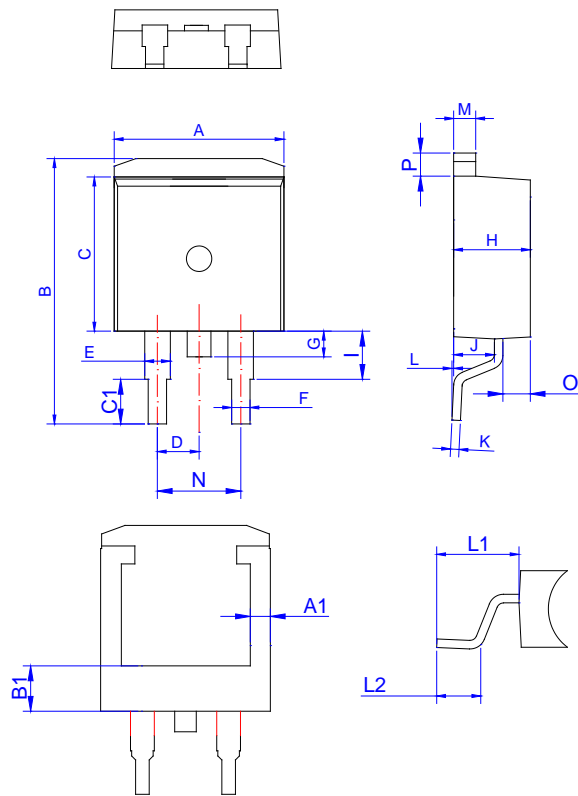
## ORDERING INFORMATION

| Order code       | Voltage<br>$V_{DRM}/V_{RRM}$ (V) | IGT(mA)   | Package | Base qty.<br>(pcs) | Delivery mode |
|------------------|----------------------------------|-----------|---------|--------------------|---------------|
|                  |                                  | I -II-III |         |                    |               |
| JST12E-1000TW    | 1000                             | 5         | TO-263  | 50                 | Tube          |
| JST12E-1000TW-TR |                                  |           |         | 800                | Tape & Reel   |

## Document Revision History

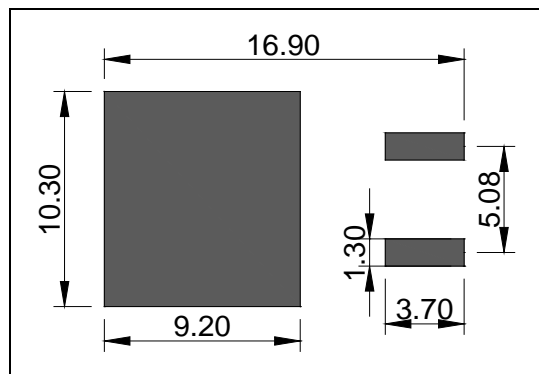
| Date         | Revision | Changes                        |
|--------------|----------|--------------------------------|
| Apr.11, 2023 | A.1.0    | Last updated                   |
| Oct.20, 2025 | A.1.1    | Revise PACKAGE MECHANICAL DATA |

PACKAGE MECHANICAL DATA

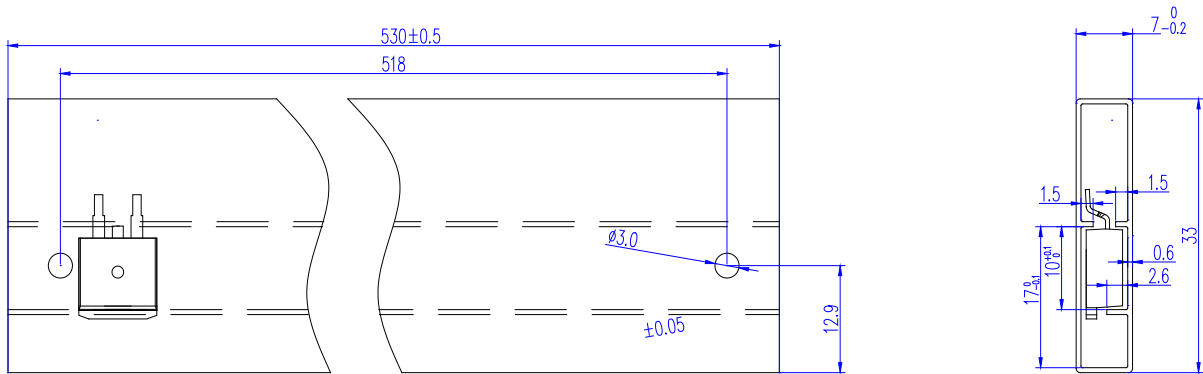


| Ref. | Dimensions  |      |       |        |       |       |
|------|-------------|------|-------|--------|-------|-------|
|      | Millimeters |      |       | Inches |       |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ.  | Max.  |
| A    | 9.90        |      | 10.20 | 0.390  |       | 0.402 |
| A1   | 0.80        |      | 1.20  | 0.031  |       | 0.047 |
| B    | 14.70       |      | 15.80 | 0.579  |       | 0.622 |
| B1   | 2.15        |      | 2.55  | 0.085  |       | 0.100 |
| C    | 9.40        |      | 9.60  | 0.370  |       | 0.378 |
| C1   | 2.40        |      | 2.80  | 0.094  |       | 0.110 |
| D    | 2.40        |      | 2.70  | 0.094  |       | 0.106 |
| E    | 1.20        |      | 1.50  | 0.047  |       | 0.059 |
| F    | 0.75        |      | 0.85  | 0.029  |       | 0.033 |
| G    | 1.00        |      | 1.50  | 0.039  |       | 0.059 |
| H    | 4.40        |      | 4.70  | 0.173  |       | 0.185 |
| I    | 1.80        |      | 2.20  |        |       |       |
| J    | 2.30        |      | 2.70  | 0.091  |       | 0.106 |
| K    | 0.38        |      | 0.55  | 0.015  |       | 0.022 |
| L    | 0           | 0.10 | 0.25  | 0      | 0.004 | 0.010 |
| L1   | 4.65        |      | 5.05  | 0.183  |       | 0.199 |
| L2   | 1.90        |      |       | 0.075  |       |       |
| M    | 1.25        |      | 1.35  | 0.049  |       | 0.053 |
| N    | 4.80        |      | 5.20  |        |       |       |
| O    | 1.30        |      | 1.50  |        |       |       |
| P    | 1.20        |      | 1.50  | 0.047  |       | 0.059 |

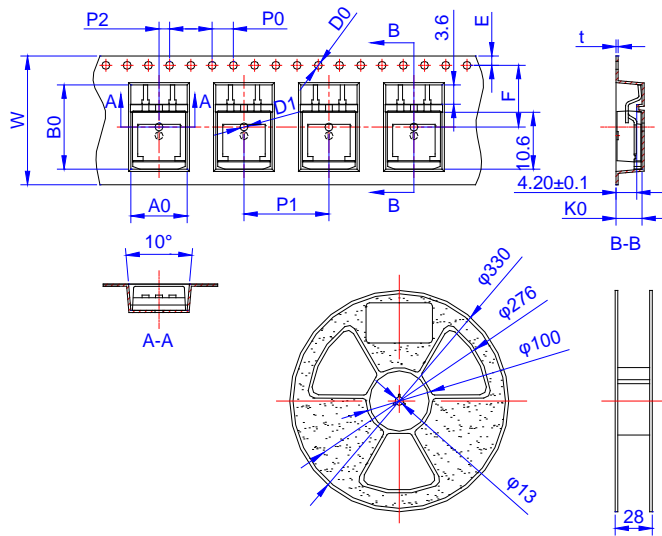
FOOTPRINT-TO-263 (dimensions in mm)



DELIVERY MODE



| PACKAGE | OUTLINE | TUBE (PCS) | INNER BOX (PCS) | PER CARTON |
|---------|---------|------------|-----------------|------------|
| TO-263  | TUBE    | 50         | 1,000           | 5,000      |



| Ref. | Dimensions  |       |       |        |       |       |
|------|-------------|-------|-------|--------|-------|-------|
|      | Millimeters |       |       | Inches |       |       |
|      | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| W    | 23.70       | 24.00 | 24.30 | 0.933  | 0.945 | 0.957 |
| E    | 1.65        | 1.75  | 1.85  | 0.065  | 0.069 | 0.073 |
| F    | 11.40       | 11.50 | 11.60 | 0.449  | 0.453 | 0.457 |
| D0   | -           | 1.50  | 1.60  | -      | 0.059 | 0.063 |
| D1   | -           | 1.50  | 1.60  | -      | 0.059 | 0.063 |
| P0   | 3.90        | 4.00  | 4.10  | 0.154  | 0.157 | 0.161 |
| P1   | 15.90       | 16.00 | 16.10 | 0.626  | 0.630 | 0.634 |
| P2   | 1.90        | 2.00  | 2.10  | 0.075  | 0.079 | 0.083 |
| A0   | 10.80       | 10.90 | 11.00 | 0.425  | 0.429 | 0.433 |
| B0   | 16.20       | 16.30 | 16.40 | 0.638  | 0.642 | 0.646 |
| K0   | 4.80        | 4.90  | 5.00  | 0.189  | 0.193 | 0.197 |
| t    | 0.35        | 0.40  | 0.45  | 0.014  | 0.016 | 0.018 |

| PACKAGE | OUTLINE | REEL (PCS) | PER CARTON (PCS) | TAPE & REEL |
|---------|---------|------------|------------------|-------------|
| TO-263  | TAPING  | 800        | 4,000            | 13 inch     |

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