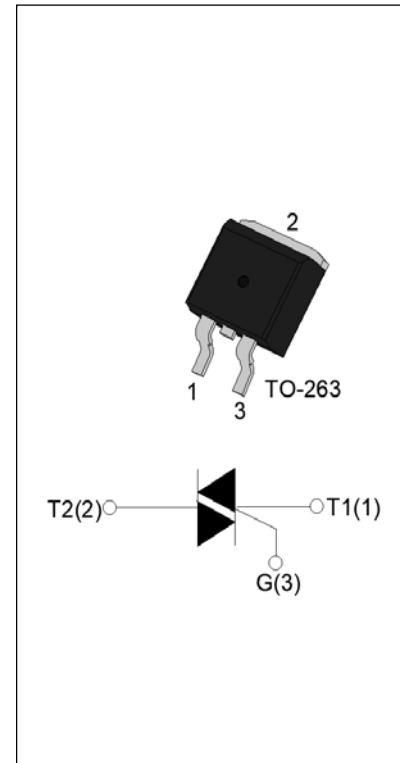


**JST12E-1000SW 12A TRIAC**

Rev.A.1.1

**DESCRIPTION:**

The JST12E-1000SW 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-1000SW 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    |
| $I_{GT\ I/II/III}$ | 10/10/10 | mA   |

**ABSOLUTE MAXIMUM RATINGS**

| Parameter                                                                                                        | Symbol       | Value   | Unit                   |
|------------------------------------------------------------------------------------------------------------------|--------------|---------|------------------------|
| Storage junction temperature range                                                                               | $T_{stg}$    | -40-150 | °C                     |
| Operating junction temperature range                                                                             | $T_j$        | -40-125 | °C                     |
| Repetitive peak off-state voltage ( $T_j=25^\circ\text{C}$ )                                                     | $V_{DRM}$    | 1000    | V                      |
| Repetitive peak reverse voltage ( $T_j=25^\circ\text{C}$ )                                                       | $V_{RRM}$    | 1000    | V                      |
| RMS on-state current ( $T_c \leq 103^\circ\text{C}$ )                                                            | $I_{T(RMS)}$ | 12      | A                      |
| Non repetitive surge peak on-state current (full cycle , $t_p=20\text{ms}$ , $T_j=25^\circ\text{C}$ )            | $I_{TSM}$    | 120     | A                      |
| Non repetitive surge peak on-state current (full cycle , $t_p=16.6\text{ms}$ , $T_j=25^\circ\text{C}$ )          |              | 132     |                        |
| $I^2t$ value for fusing ( $t_p=10\text{ms}$ , $T_j=25^\circ\text{C}$ )                                           | $I^2t$       | 72      | $\text{A}^2\text{s}$   |
| Critical rate of rise of on-state current ( $I_G=2 \times I_{GT}$ , $f=100\text{Hz}$ , $T_j=125^\circ\text{C}$ ) | $di/dt$      | 50      | $\text{A}/\mu\text{s}$ |
| Peak gate current ( $t_p=20\mu\text{s}$ , $T_j=125^\circ\text{C}$ )                                              | $I_{GM}$     | 4       | A                      |
| Average gate power dissipation ( $T_j=125^\circ\text{C}$ )                                                       | $P_{G(AV)}$  | 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) | $V_{pp}$ | 4 | 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.  | 10  | 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.  | 25  | mA               |
|             |                                                                                    | II          |       | 30  |                  |
| $I_H$       | $I_T=500\text{mA}$                                                                 |             | MAX.  | 15  | mA               |
| $dV/dt$     | $V_D=670\text{V}$ Gate Open $T_j=125^{\circ}\text{C}$                              |             | MIN.  | 200 | V/ $\mu\text{s}$ |
| $(dI/dt)_c$ | $(dV/dt)_c=10\text{V}/\mu\text{s}$ $T_j=125^{\circ}\text{C}$                       |             | MIN.  | 3   | A/ms             |
| $t_{on}$    | $I_G=20\text{mA}$ $I_A=200\text{mA}$ $I_R=20\text{mA}$<br>$T_j=25^{\circ}\text{C}$ |             | TYP.  | 2.5 | $\mu\text{s}$    |
| $t_{off}$   |                                                                                    |             |       | 25  |                  |

**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          | $\text{m}\Omega$ |
| $I_{DRM}$ | $V_D=V_{DRM}$ $V_R=V_{RRM}$              | $T_j=25^{\circ}\text{C}$  | 8           | $\mu\text{A}$    |
| $I_{RRM}$ |                                          | $T_j=125^{\circ}\text{C}$ | 1           | mA               |

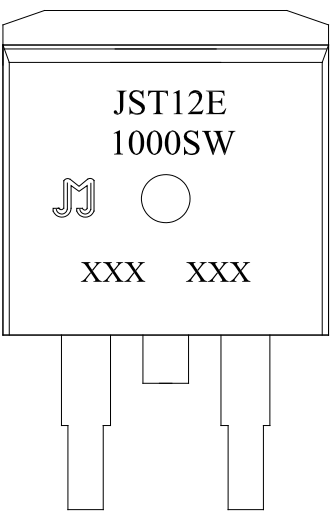
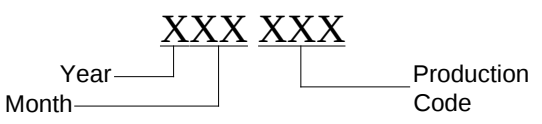
**THERMAL RESISTANCES**

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

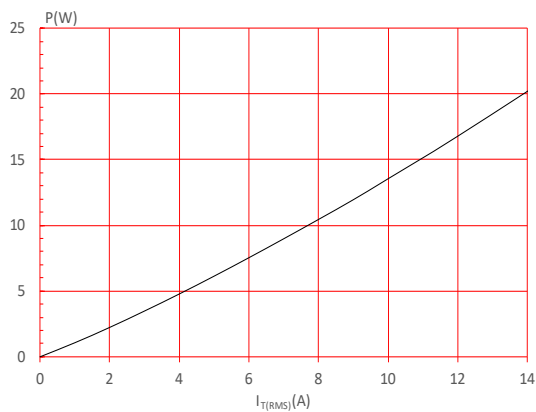
ORDERING INFORMATION

|                                   |             |          |   |                       |                |                              |
|-----------------------------------|-------------|----------|---|-----------------------|----------------|------------------------------|
| J                                 | ST          | 12       | E | -1000                 | SW             | -/                           |
| JieJie Microelectronics Co., Ltd. | Triacs      |          |   |                       |                | Blank:Tube<br>-TR:Tape &Reel |
|                                   | IT(RMS):12A |          |   |                       |                |                              |
|                                   |             | E:TO-263 |   |                       | SW:IGT1-3≤10mA |                              |
|                                   |             |          |   | 1000:VDRM /VRRM≥1000V |                |                              |

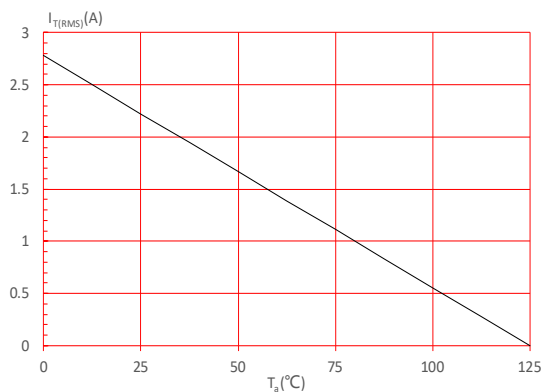
MARKING

|                                                                                     |                                                                                      |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|  |  |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|

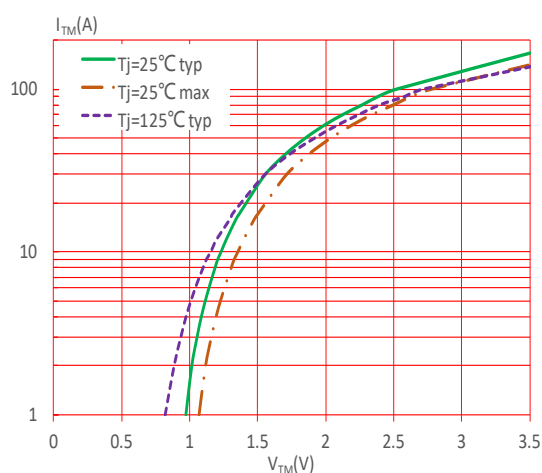
**FIG.1:** Maximum power dissipation versus RMS on-state current



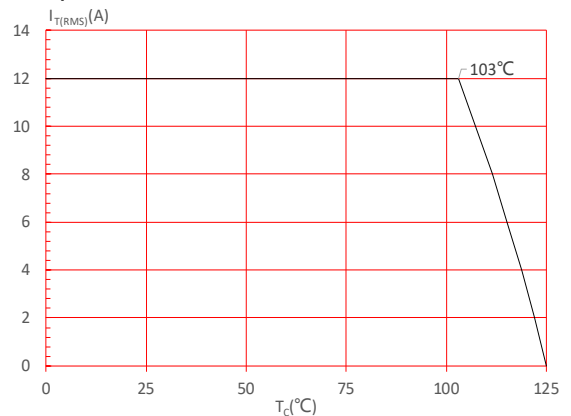
**FIG.3:** RMS on-state current versus ambient temperature (printed circuit board FR4,copper thickness:35 $\mu$ m)(full cycle)



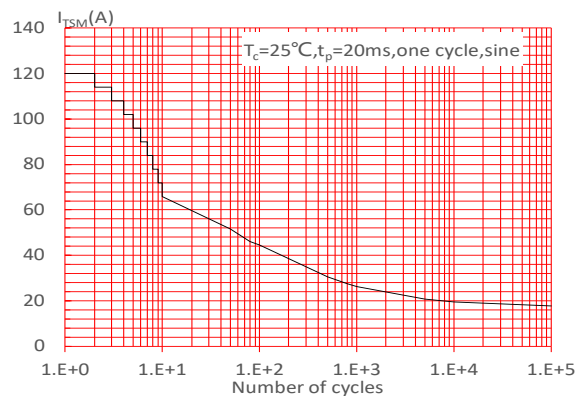
**FIG.5:** On-state characteristics



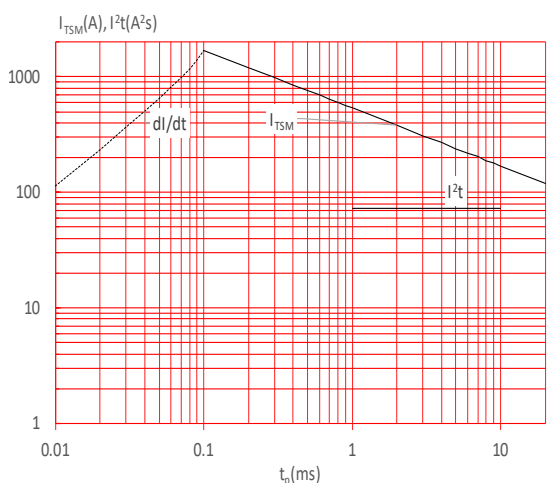
**FIG.2:** RMS on-state current versus case temperature



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



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



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

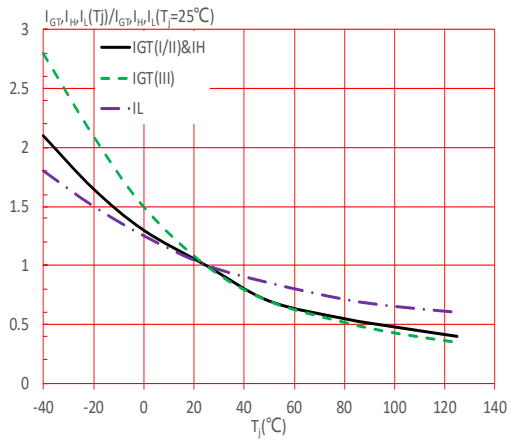
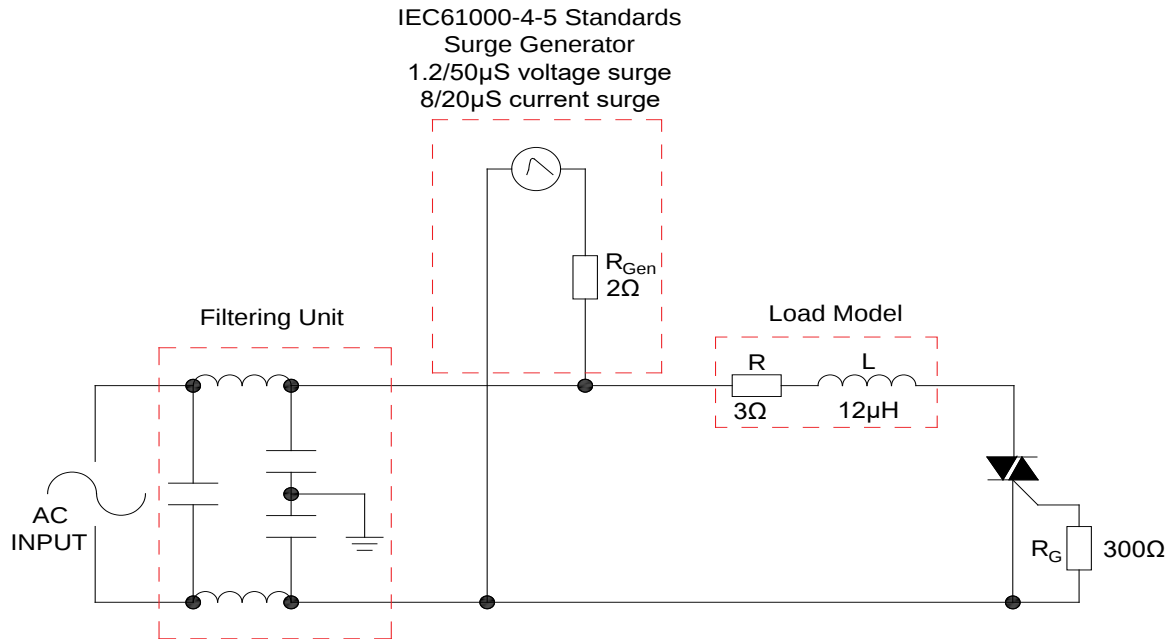
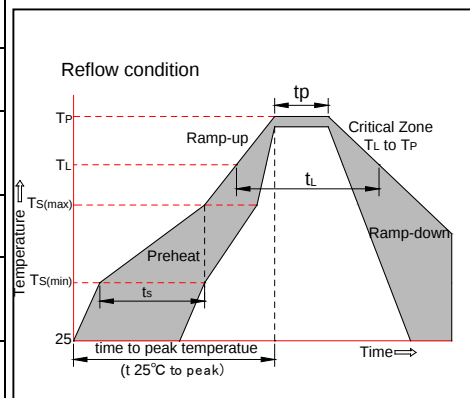


FIG.8: Test circuit for inductive and resistive loads to IEC-61000-4-5 standards



## SOLDERING PARAMETERS

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



**ORDERING INFORMATION**

| Order code       | Voltage<br>$V_{\text{DRM}}/V_{\text{RRM}}$ (V) | IGT(mA)      | Package | Base qty.<br>(pcs) | Delivery mode |
|------------------|------------------------------------------------|--------------|---------|--------------------|---------------|
|                  |                                                | I - II - III |         |                    |               |
| JST12E-1000SW    | 1000                                           | 10           | TO-263  | 50                 | Tube          |
| JST12E-1000SW-TR |                                                |              |         | 800                | Tape & Reel   |

**Document Revision History**

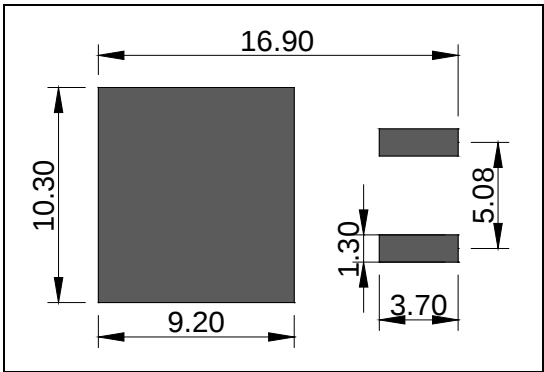
| Date         | Revision | Changes                        |
|--------------|----------|--------------------------------|
| Apr.11, 2023 | A.1.0    | Last updated                   |
| Oct.20, 2025 | A.1.1    | Revise PACKAGE MECHANICAL DATA |

PACKAGE MECHANICAL DATA

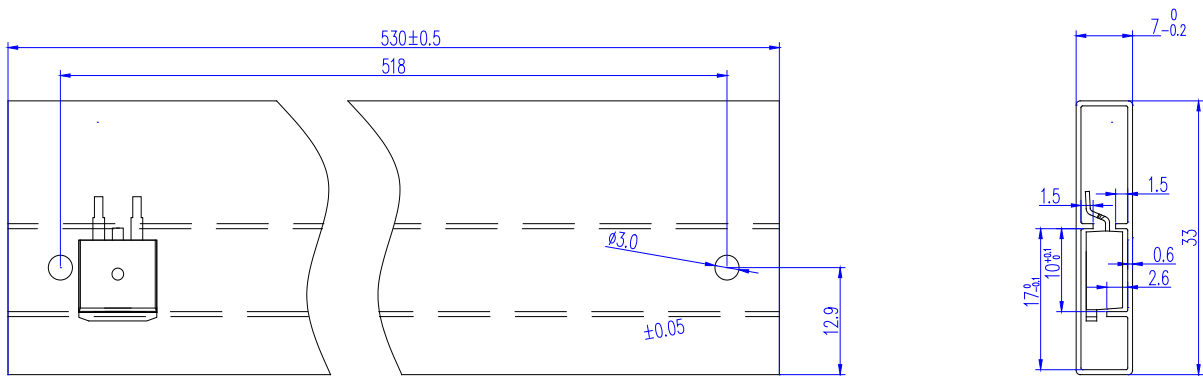


| Ref. | Dimensions  |      |       |        |       |       |
|------|-------------|------|-------|--------|-------|-------|
|      | Millimeters |      |       | Inches |       |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ.  | Max.  |
| A    | 9.90        |      | 10.20 | 0.390  |       | 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 |

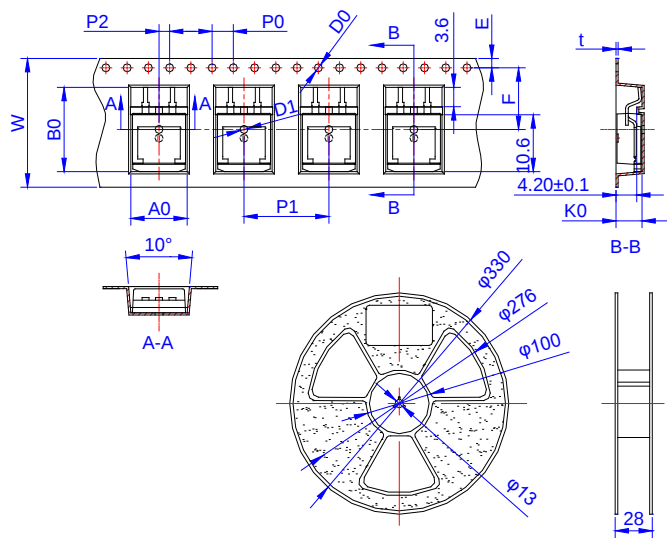
FOOTPRINT-TO-263 (dimensions in mm)



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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