

JST138K-600E 12A TRIAC

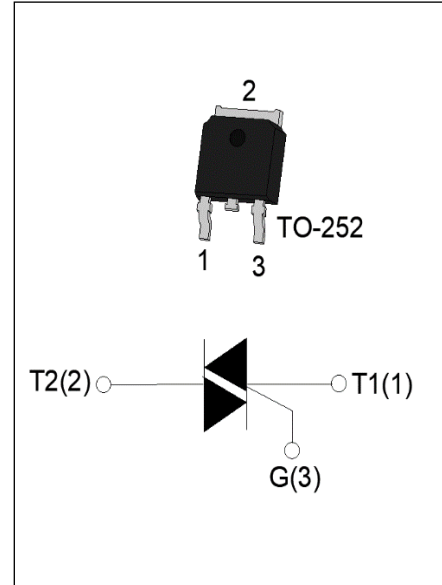
Rev.A.1.0

DESCRIPTION:

The JST138K-600E 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. Package TO-252 is RoHS compliant.

MAIN FEATURES

| Symbol | Value | Unit |
|-----------------------|-------------|------|
| $I_{T(RMS)}$ | 12 | A |
| V_{DRM}/V_{RRM} | 600 | V |
| $I_{GT\ I/II/III/IV}$ | 10/10/10/25 | 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} | 600 | V |
| Repetitive peak reverse voltage ($T_j=25^\circ\text{C}$) | | V_{RRM} | 600 | V |
| RMS on-state current ($T_c \leq 70^\circ\text{C}$) | | $I_{T(RMS)}$ | 12 | A |
| Non repetitive surge peak on-state current (full cycle , $t_p=20\text{ms}$, $T_j=25^\circ\text{C}$) | | I_{TSM} | 95 | A |
| Non repetitive surge peak on-state current (full cycle , $t_p=16.6\text{ms}$, $T_j=25^\circ\text{C}$) | | | 105 | |
| I^2t value for fusing ($t_p=10\text{ms}$, $T_j=25^\circ\text{C}$) | | I^2t | 45 | A^2s |
| Critical rate of rise of on-state current ($I_G=2 \times I_{GT}$, $f=100\text{Hz}$, $T_j=125^\circ\text{C}$) | I - II | di/dt | 80 | $\text{A}/\mu\text{s}$ |
| | III-IV | | 50 | |
| 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 ($T_j=25^\circ\text{C}$; non-repetitive,off-state;FIG.8) | | V_{pp} | 0.5 | 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. | 10 | mA |
| | | IV | | 25 | |
| V_{GT} | | ALL | MAX. | 1 | V |
| V_{GD} | $V_D=V_{DRM}$ $T_j=125^{\circ}\text{C}$ $R_L=3.3\text{K}\Omega$ | ALL | MIN. | 0.2 | V |
| I_L | $I_G=1.2I_{GT}$ | I - III - IV | MAX. | 25 | mA |
| | | II | | 35 | |
| I_H | $I_T=500\text{mA}$ | | MAX. | 25 | mA |
| dV/dt | $V_D=400\text{V}$ Gate Open $T_j=125^{\circ}\text{C}$ | | MIN. | 150 | $\text{V}/\mu\text{s}$ |
| $(dV/dt)_c$ | $(dI/dt)_c=5\text{A/ms}$, $T_j=110^{\circ}\text{C}$ | | MIN. | 5 | $\text{V}/\mu\text{s}$ |
| t_{on} | $I_G=40\text{mA}$ $I_A=200\text{mA}$ $I_R=20\text{mA}$ $T_j=25^{\circ}\text{C}$ | | TYP. | 3 | μs |
| t_{off} | | | | 30 | |

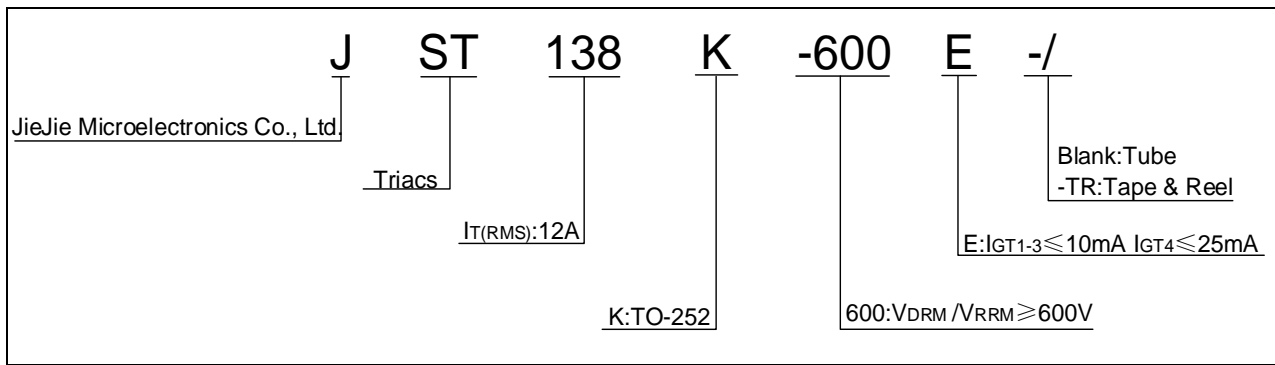
STATIC CHARACTERISTICS

| Symbol | Parameter | | Value(MAX.) | Unit |
|-----------|--|---------------------------|-------------|------------------|
| V_{TM} | $I_{TM}=15\text{A}$ $t_p=380\mu\text{s}$ | $T_j=25^{\circ}\text{C}$ | 1.6 | V |
| V_{TO} | Threshold voltage | $T_j=125^{\circ}\text{C}$ | 0.8 | V |
| R_D | Dynamic resistance | $T_j=125^{\circ}\text{C}$ | 41 | $\text{m}\Omega$ |
| I_{DRM} | $V_D=V_{DRM}$ $V_R=V_{RRM}$ | $T_j=25^{\circ}\text{C}$ | 5 | μA |
| I_{RRM} | | $T_j=125^{\circ}\text{C}$ | 0.5 | mA |

THERMAL RESISTANCES

| Symbol | Parameter | Value | Unit |
|---------------|--------------------------|-------|-----------------------------|
| $R_{th(j-c)}$ | junction to case (AC) | 3 | $^{\circ}\text{C}/\text{W}$ |
| $R_{th(j-a)}$ | junction to ambient (AC) | 100 | $^{\circ}\text{C}/\text{W}$ |

ORDERING INFORMATION



MARKING

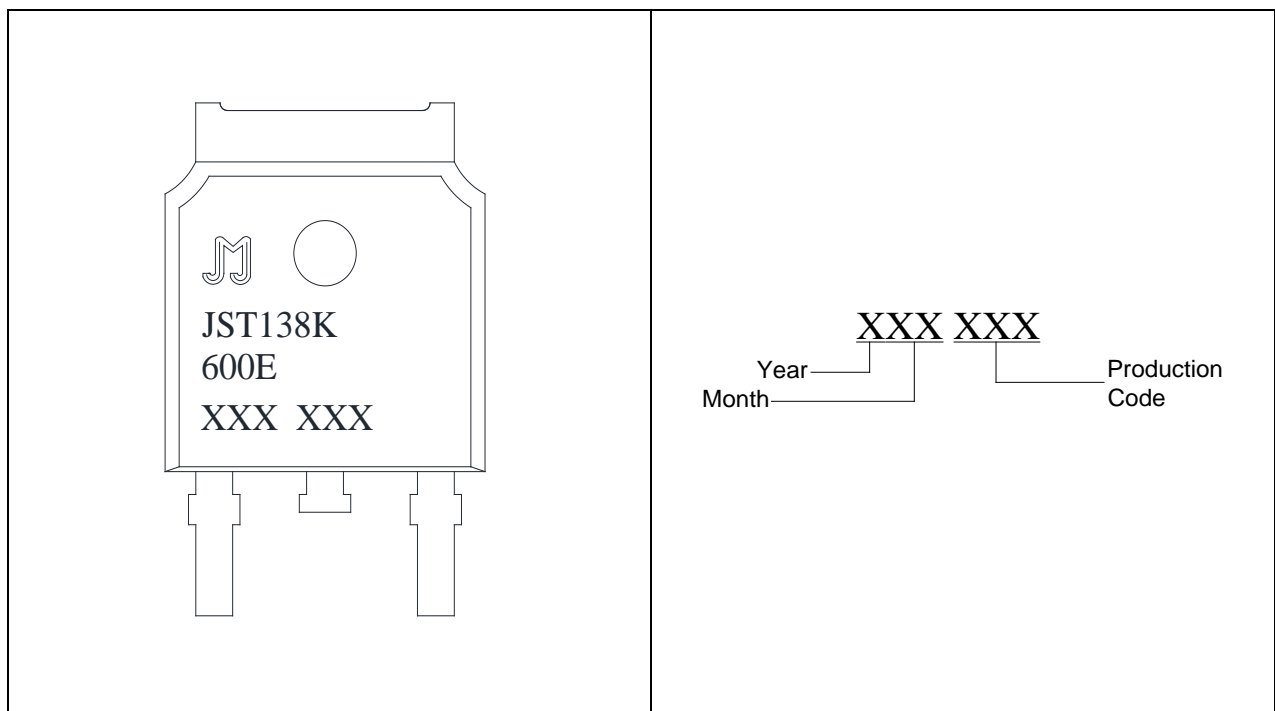


FIG.1 Maximum power dissipation versus RMS on-state current

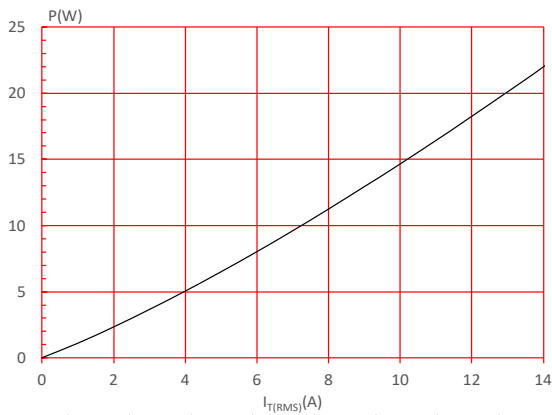


FIG.3: RMS on-state current versus ambient temperature (printed circuit board FR4,copper thickness:35μm)(full cycle)

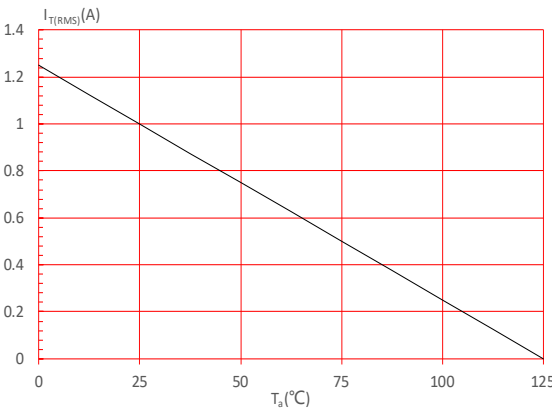


FIG.5: On-state characteristics

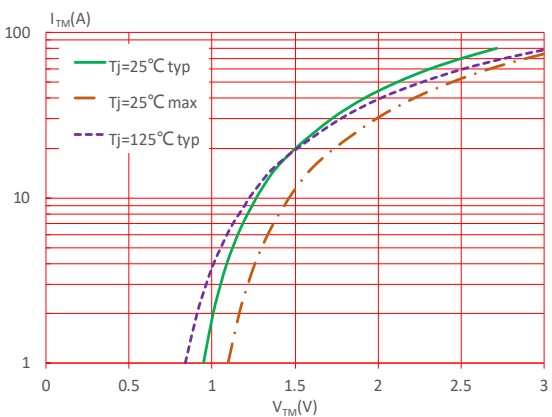


FIG.2: RMS on-state current versus case temperature

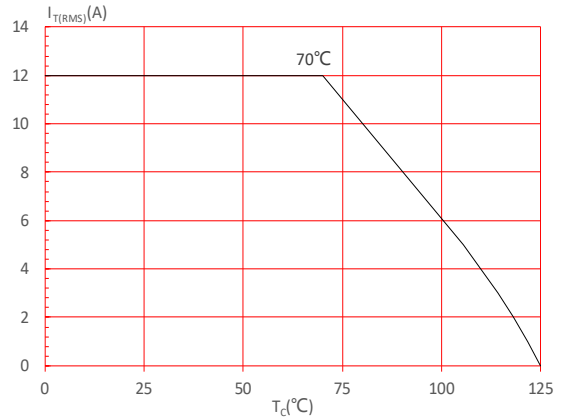


FIG.4: Surge peak on-state current versus number of cycles

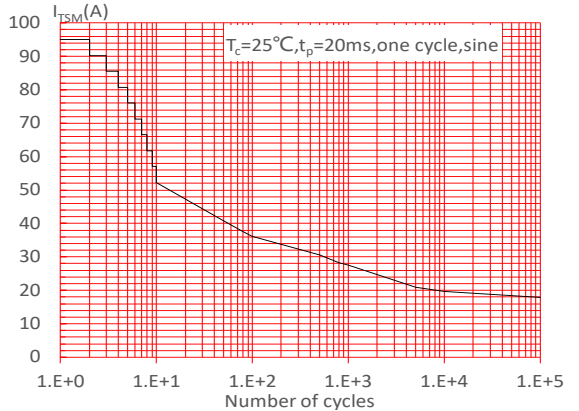


FIG.6: Non-repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 20\text{ms}$, and corresponding value of I^2t (I - II: $di/dt < 80\text{A}/\mu\text{s}$; III-IV: $di/dt < 50\text{A}/\mu\text{s}$)

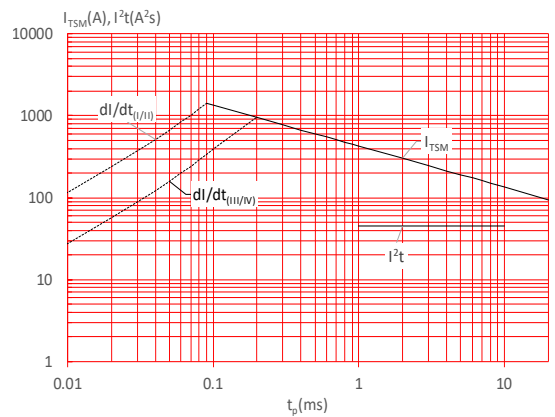


FIG.7: Relative variations of gate trigger current, holding current and latching current versus junction temperature

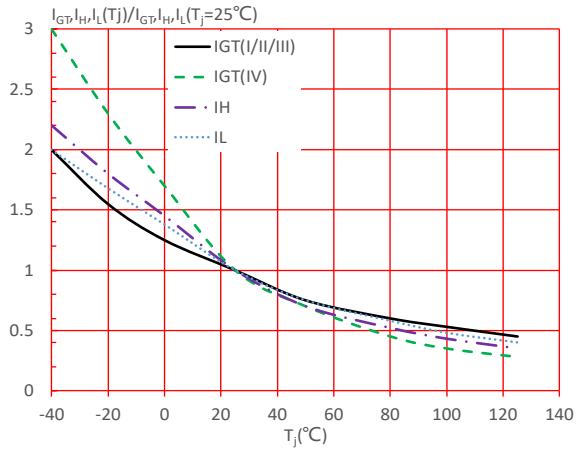
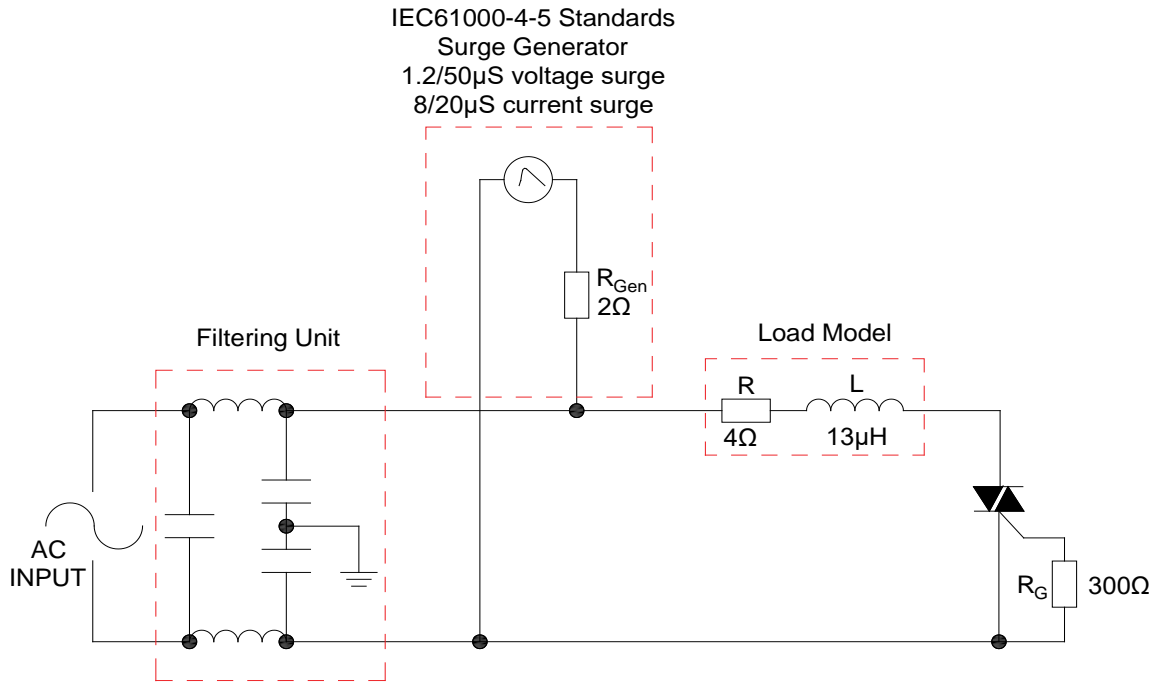
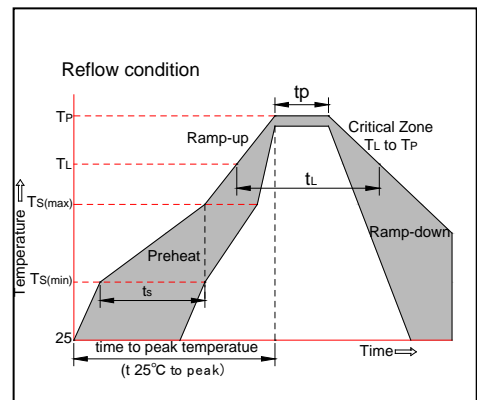


FIG.8: Test circuit for inductive and resistive loads to IEC-61000-4-5 standards



SOLDERING PARAMETERS

| Reflow Condition | | Pb-Free assembly (see figure at right) |
|---|--|---|
| Pre Heat | -Temperature Min (T _{s(min)}) | +150°C |
| | -Temperature Max(T _{s(max)}) | +200°C |
| | -Time (Min to Max) (ts) | 60-180 secs. |
| Average ramp up rate (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) (Liquidus) | +217°C |
| | -Temperature(t _L) | 60-150 secs. |
| Peak Temp (T _p) | | +260(+0/-5)°C |
| Time within 5°C of actual 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 |



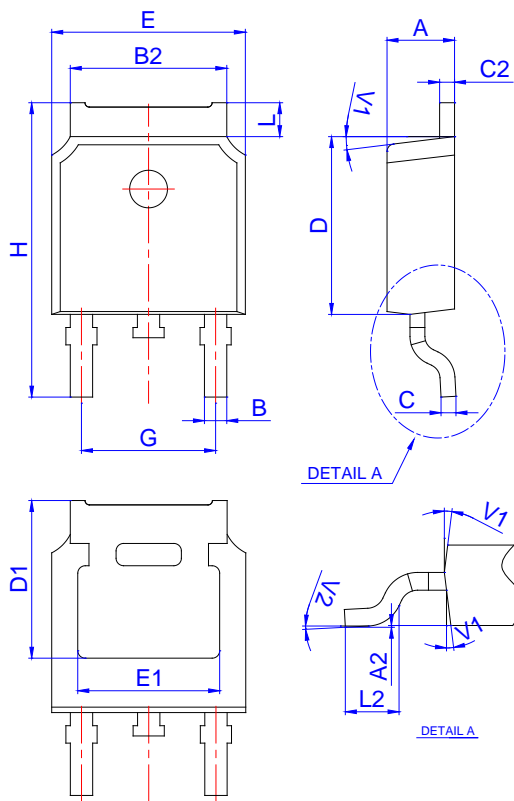
ORDERING INFORMATION

| Order code | Voltage V_{DRM}/V_{RRM} (V) | IGT(mA) | | Package | Base qty. (pcs) | Delivery mode |
|-----------------|----------------------------------|--------------|----|---------|--------------------|---------------|
| | | I - II - III | IV | | | |
| JST138K-600E | 600 | 10 | 25 | TO-252 | 80 | Tube |
| JST138K-600E-TR | | | | | 2,500 | Tape & Reel |

Document Revision History

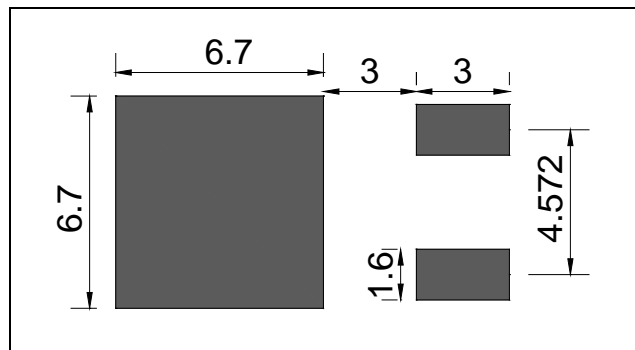
| Date | Revision | Changes |
|--------------|----------|--------------|
| Apr.14, 2023 | A.1.0 | Last updated |

PACKAGE MECHANICAL DATA



| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|----------|------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.10 | | 2.50 | 0.083 | | 0.098 |
| A2 | 0 | | 0.15 | 0 | | 0.006 |
| B | 0.66 | | 0.86 | 0.026 | | 0.034 |
| B2 | 5.18 | | 5.48 | 0.202 | | 0.216 |
| C | 0.40 | | 0.60 | 0.016 | | 0.024 |
| C2 | 0.44 | | 0.58 | 0.017 | | 0.023 |
| D | 5.90 | | 6.30 | 0.232 | | 0.248 |
| D1 | 5.30REF | | | 0.209REF | | |
| E | 6.40 | | 6.80 | 0.252 | | 0.268 |
| E1 | 4.63 | | | 0.182 | | |
| G | 4.47 | | 4.67 | 0.176 | | 0.184 |
| H | 9.50 | | 10.70 | 0.374 | | 0.421 |
| L | 1.09 | | 1.21 | 0.043 | | 0.048 |
| L2 | 1.35 | | 1.65 | 0.053 | | 0.065 |
| V1 | | 7° | | | 7° | |
| V2 | 0° | | 6° | 0° | | 6° |

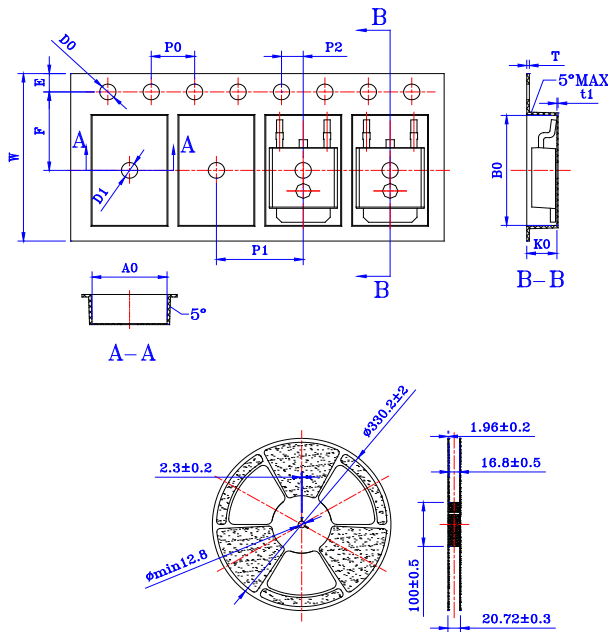
FOOTPRINT-TO-252 (dimensions in mm)



DELIVERY MODE



| PACKAGE | OUTLINE | TUBE (PCS) | INNER BOX (PCS) | PER CARTON |
|---------|---------|------------|-----------------|------------|
| TO-252 | TUBE | 80 | 4,000 | 20,000 |




| Ref. | Dimensions | | | | | |
|------|-------------|-------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| W | 15.90 | 16.00 | 16.10 | 0.626 | 0.630 | 0.634 |
| E | 1.65 | 1.75 | 1.85 | 0.065 | 0.069 | 0.073 |
| F | 7.40 | 7.50 | 7.60 | 0.291 | 0.295 | 0.299 |
| D0 | 1.50 | 1.55 | 1.60 | 0.059 | 0.060 | 0.063 |
| D1 | 1.50 | - | - | 0.059 | - | - |
| P0 | 3.90 | 4.00 | 4.10 | 0.154 | 0.157 | 0.161 |
| P1 | 7.90 | 8.00 | 8.10 | 0.311 | 0.315 | 0.319 |
| P2 | 1.90 | 2.00 | 2.10 | 0.075 | 0.079 | 0.083 |
| 10P0 | 39.80 | 40.00 | 40.20 | 1.567 | 1.575 | 1.583 |
| A0 | 6.80 | 6.90 | 7.00 | 0.267 | 0.272 | 0.276 |
| B0 | 10.40 | 10.50 | 10.60 | 0.408 | 0.413 | 0.417 |
| K0 | 2.60 | 2.70 | 2.80 | 0.102 | 0.106 | 0.110 |
| T | 0.25 | 0.30 | 0.35 | 0.010 | 0.012 | 0.014 |
| t1 | 0.10 | - | - | 0.004 | - | - |

| PACKAGE | OUTLINE | REEL (PCS) | PER CARTON (PCS) | TAPE & REEL |
|---------|---------|------------|------------------|-------------|
| TO-252 | TAPING | 2,500 | 25,000 | 13 inch |

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