

**JX040K 4A Sensitive SCR**

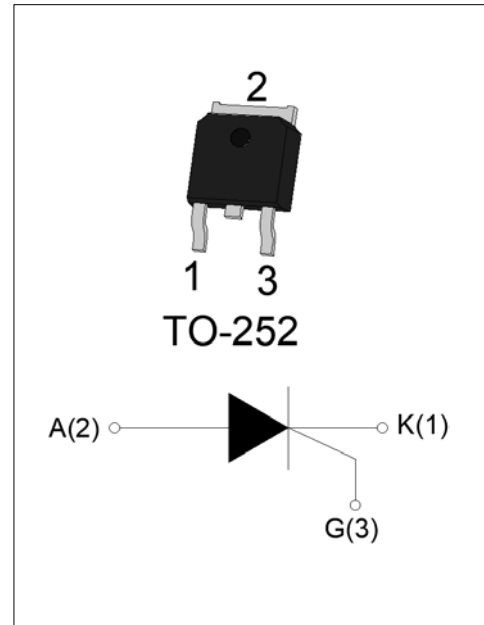
Rev.A.1.1

**DESCRIPTION:**

The JX040K SCR provides high  $dV/dt$  rate with strong resistance to electromagnetic interface. It is especially recommended for use on residual current circuit breaker, straight hair, igniter etc. Package TO-252 is RoHS compliant.

**MAIN FEATURES**

| Symbol            | Value      | Unit    |
|-------------------|------------|---------|
| $I_{T(RMS)}$      | 4          | A       |
| $V_{DRM}/V_{RRM}$ | 600        | V       |
| $I_{GT}$          | $\leq 200$ | $\mu A$ |

**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 <sup>①</sup> | $^{\circ}C$ |
| Repetitive peak off-state voltage ( $T_j=25^{\circ}C$ )                                              | $V_{DRM}$    | 600                  | V           |
| Repetitive peak reverse voltage ( $T_j=25^{\circ}C$ )                                                | $V_{RRM}$    | 600                  | V           |
| Average on-state current ( $T_c \leq 93^{\circ}C$ )                                                  | $I_{T(AV)}$  | 2.5                  | A           |
| RMS on-state current ( $T_c \leq 93^{\circ}C$ )                                                      | $I_{T(RMS)}$ | 4                    | A           |
| Non repetitive surge peak on-state current ( $t_p=10ms$ , $T_j=25^{\circ}C$ )                        | $I_{TSM}$    | 40                   | A           |
| Non repetitive surge peak on-state current ( $t_p=8.3ms$ , $T_j=25^{\circ}C$ )                       |              | 44                   |             |
| $I^2t$ value for fusing ( $t_p=10ms$ , $T_j=25^{\circ}C$ )                                           | $I^2t$       | 8                    | $A^2s$      |
| 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 ( $t_p=20\mu s$ , $T_j=125^{\circ}C$ )                                             | $I_{GM}$     | 2                    | A           |
| Average gate power dissipation ( $T_j=125^{\circ}C$ )                                                | $P_{G(AV)}$  | 0.5                  | W           |

|                                                                                      |          |     |    |
|--------------------------------------------------------------------------------------|----------|-----|----|
| Peak gate power                                                                      | $P_{GM}$ | 5   | W  |
| Peak pulse voltage<br>( $T_j=25^{\circ}\text{C}$ ; non-repetitive, off-state; FIG.8) | $V_{pp}$ | 0.5 | kV |

**NOTE 1:** Operating junction temperature  $T_j$  is up to  $125^{\circ}\text{C}$  when a resistor  $\leq 1\text{k}\Omega$  is connected between Gate and Cathode. Without this resistor, the  $T_j$  is up to  $110^{\circ}\text{C}$  only.

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

| Symbol    | Test Condition                                                       | Value |      |      | Unit             |
|-----------|----------------------------------------------------------------------|-------|------|------|------------------|
|           |                                                                      | MIN.  | TYP. | MAX. |                  |
| $I_{GT}$  | $V_D=12\text{V}$ $R_L=33\Omega$                                      | -     | 50   | 200  | $\mu\text{A}$    |
| $V_{GT}$  |                                                                      | -     | 0.6  | 0.8  | V                |
| $V_{GD}$  | $V_D=V_{DRM}$ $T_j=125^{\circ}\text{C}$                              | 0.2   | -    | -    | V                |
| $I_L$     | $I_G=1.2 I_{GT}$                                                     | -     | -    | 6    | mA               |
| $I_H$     | $I_T=0.05\text{A}$                                                   | -     | -    | 5    | mA               |
| dV/dt     | $V_D=400\text{V}$ $T_j=125^{\circ}\text{C}$ $R_{GK}=1\text{k}\Omega$ | 50    | -    | -    | V/ $\mu\text{s}$ |
|           | $V_D=400\text{V}$ $T_j=125^{\circ}\text{C}$ $R_{GK}=220\Omega$       | 200   | -    | -    |                  |
| $t_{on}$  | $I_G=10\text{mA}$ $I_A=20\text{mA}$ $I_R=2\text{mA}$                 | -     | 2    | -    | $\mu\text{s}$    |
| $t_{off}$ | $T_j=25^{\circ}\text{C}$                                             | -     | 50   | -    | $\mu\text{s}$    |

### STATIC CHARACTERISTICS

| Symbol    | Parameter                            |                           | Value(MAX.) | Unit          |
|-----------|--------------------------------------|---------------------------|-------------|---------------|
| $V_{TM}$  | $I_T=8\text{A}$ $t_p=380\mu\text{s}$ | $T_j=25^{\circ}\text{C}$  | 1.6         | V             |
| $V_{TO}$  | Threshold voltage                    | $T_j=125^{\circ}\text{C}$ | 0.8         | V             |
| $R_D$     | Dynamic Resistance                   | $T_j=125^{\circ}\text{C}$ | 0.1         | $\Omega$      |
| $I_{DRM}$ | $V_D=V_{DRM}$ $V_R=V_{RRM}$          | $T_j=25^{\circ}\text{C}$  | 5           | $\mu\text{A}$ |
| $I_{RRM}$ |                                      | $T_j=125^{\circ}\text{C}$ | 0.5         | mA            |

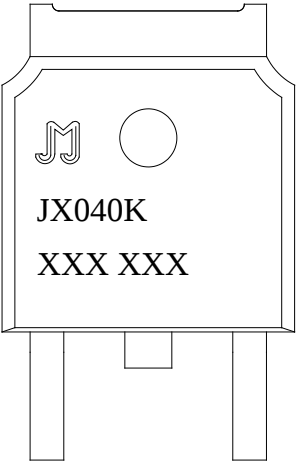
### THERMAL RESISTANCES

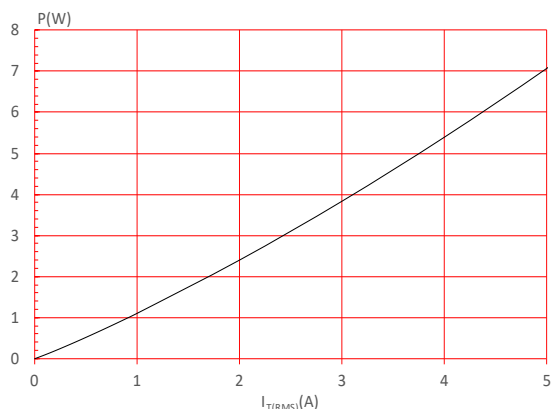
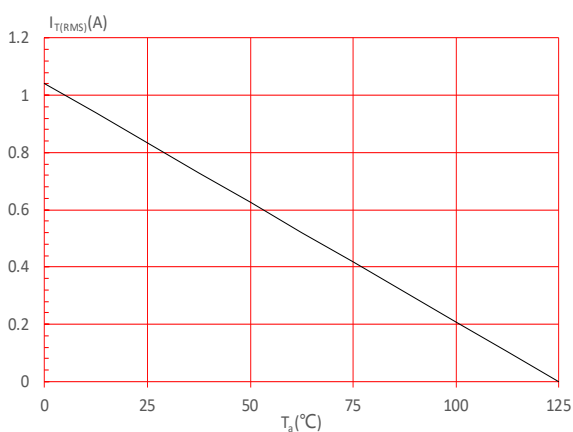
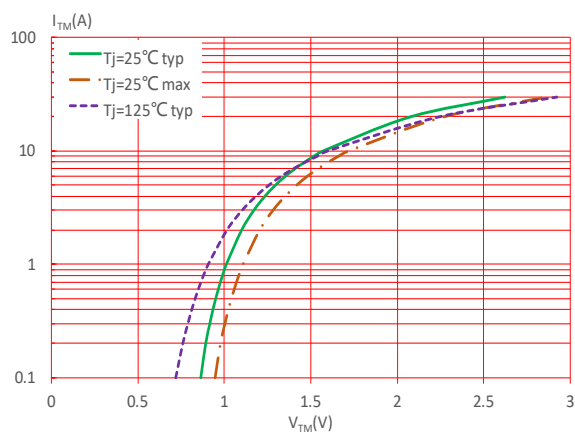
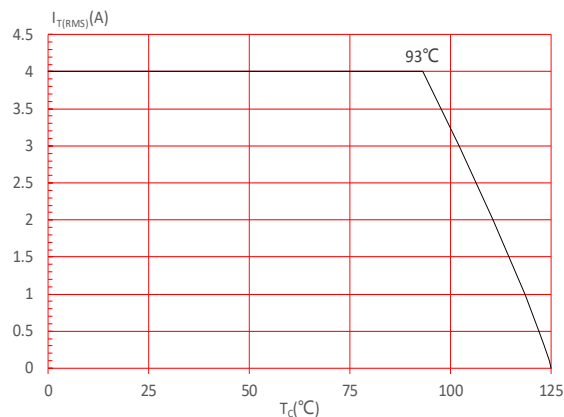
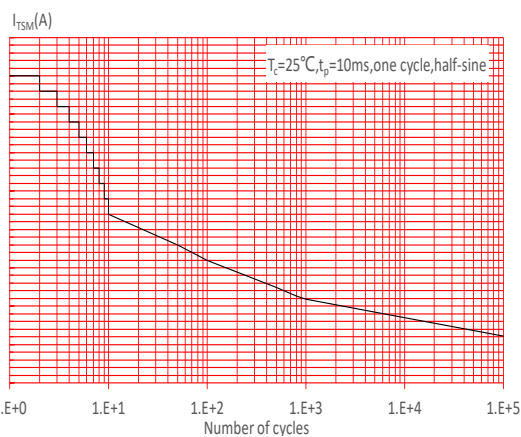
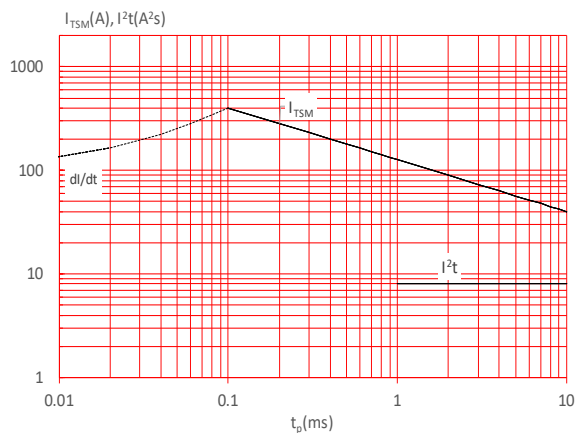
| Symbol        | Parameter                | Value | Unit                 |
|---------------|--------------------------|-------|----------------------|
| $R_{th(j-c)}$ | junction to case (DC)    | 6     | $^{\circ}\text{C/W}$ |
| $R_{th(j-a)}$ | junction to ambient (DC) | 120   | $^{\circ}\text{C/W}$ |

## ORDERING INFORMATION

|                                   |                     |                 |            |          |                                 |
|-----------------------------------|---------------------|-----------------|------------|----------|---------------------------------|
|                                   | <u>J</u>            | <u>X</u>        | <u>040</u> | <u>K</u> | <u>-/</u>                       |
| JieJie Microelectronics Co., Ltd. |                     |                 |            |          | Blank: Tube<br>-TR: Tape & Reel |
|                                   | Sensitive gate SCRs |                 |            |          |                                 |
|                                   |                     | $I_{T(RMS)}:4A$ |            |          |                                 |
|                                   |                     |                 |            | K:TO-252 |                                 |

## MARKING

|                                                                                                                                                                                                                                                                                               |                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
|  <p>  <br/> JX040K<br/> XXX XXX </p> | <p> <u>XXX</u> <u>XXX</u><br/> Year      Production<br/> Month      Code </p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|

**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  $t_p < 10ms$ , 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

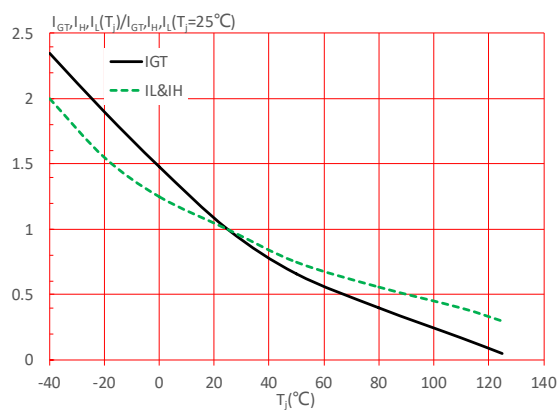
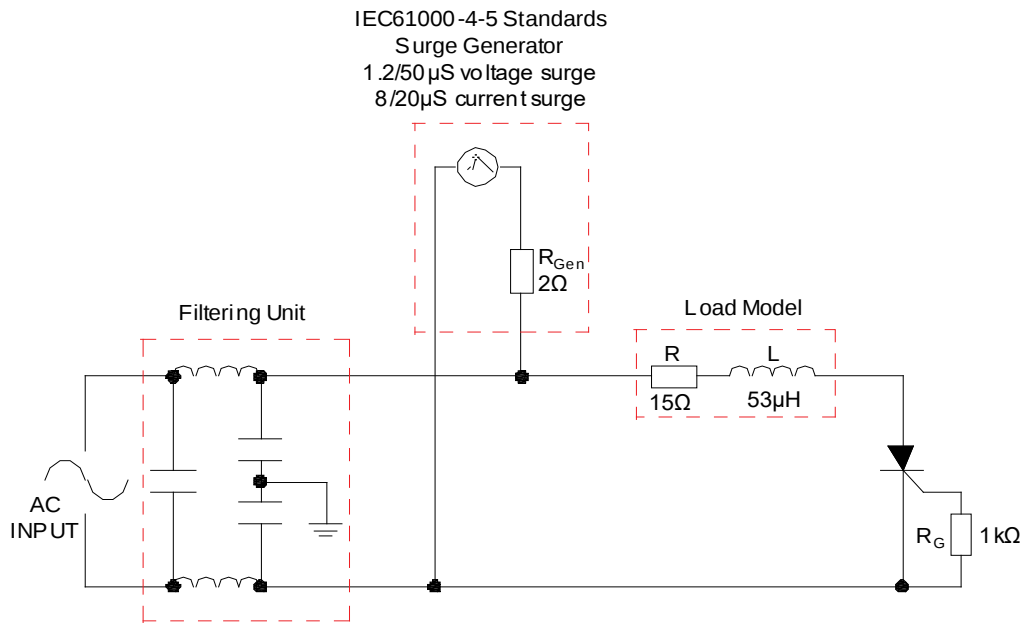
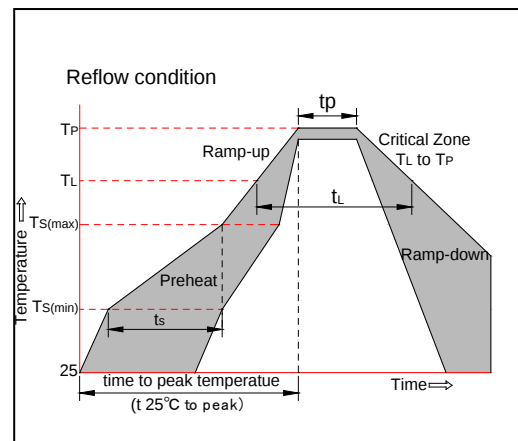


FIG.8: Test circuit for inductive and resistive loads to IEC-61000-4-5 standards.



## SOLDERING PARAMETERS

| Reflow Condition                                               |                                          | Pb-Free assembly<br>(see figure at right) |
|----------------------------------------------------------------|------------------------------------------|-------------------------------------------|
| Pre Heat                                                       | -Temperature Min (T <sub>S(min)</sub> )  | +150°C                                    |
|                                                                | -Temperature Max (T <sub>S(max)</sub> )  | +200°C                                    |
|                                                                | -Time (Min to Max) (t <sub>s</sub> )     | 60-180 secs.                              |
| Average ramp up rate (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> ) (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 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                                    |



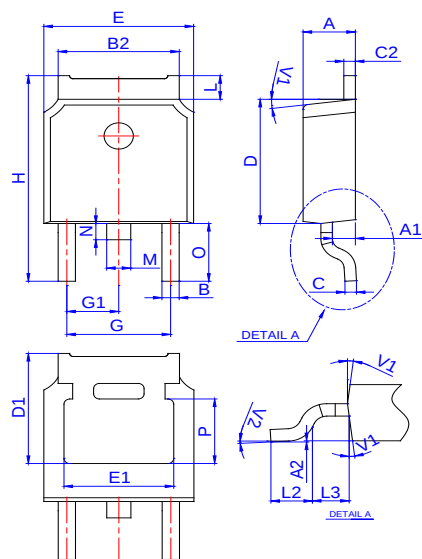
**ORDERING INFORMATION**

| Order code | Voltage<br>V <sub>DRM</sub> /V <sub>RRM</sub> (V) | IGT(μA) | Package | Base qty.<br>(pcs) | Delivery<br>mode |
|------------|---------------------------------------------------|---------|---------|--------------------|------------------|
| JX040K     | 600                                               | ≤200    | TO-252  | 80                 | Tube             |
| JX040K-TR  |                                                   |         |         | 2,500              | Tape & Reel      |

**Document Revision History**

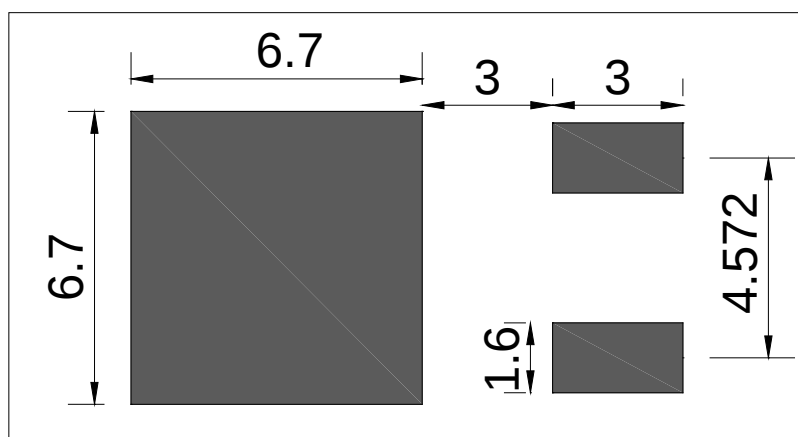
| Date         | Revision | Changes                        |
|--------------|----------|--------------------------------|
| Apr.12, 2023 | A.1.0    | Last update                    |
| Oct.22, 2025 | A.1.1    | Revise PACKAGE MECHANICAL DATA |

## PACKAGE MECHANICAL DATA

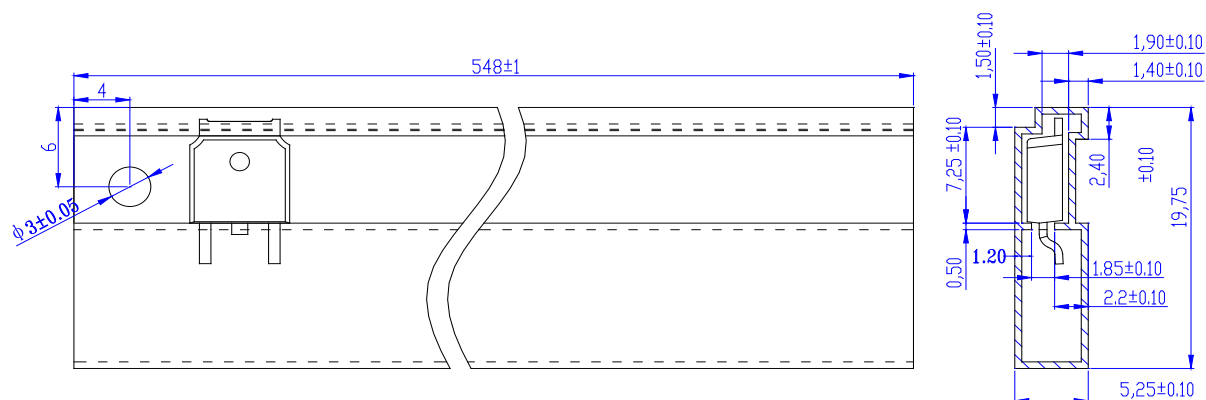


| Ref. | Dimensions  |      |       |          |      |       |
|------|-------------|------|-------|----------|------|-------|
|      | Millimeters |      |       | Inches   |      |       |
|      | Min.        | Typ. | Max.  | Min.     | Typ. | Max.  |
| A    | 2.10        |      | 2.50  | 0.083    |      | 0.098 |
| A1   | 0.80        |      | 1.20  | 0.031    |      | 0.047 |
| 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 |
| G1   | 2.18        |      | 2.38  | 0.086    |      | 0.094 |
| 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 |
| L3   | 1.10        |      | 1.50  | 0.043    |      | 0.059 |
| M    | 0.65        |      | 0.95  | 0.026    |      | 0.037 |
| N    | 0.65        |      | 0.95  | 0.026    |      | 0.037 |
| O    | 2.80        |      | 3.20  | 0.110    |      | 0.126 |
| P    | 3.10        |      | 3.30  | 0.122    |      | 0.130 |
| V1   |             | 7°   |       |          | 7°   |       |
| V2   | 0°          |      | 6°    | 0°       |      | 6°    |

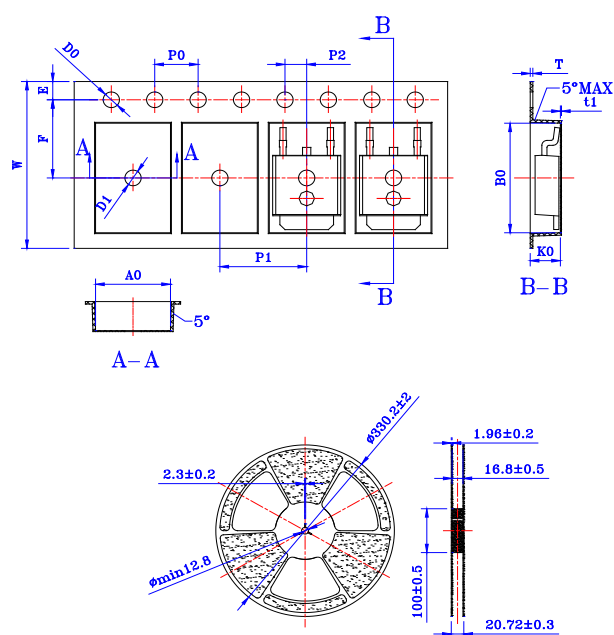
## FOOTPRINT-TO-252 (dimensions in mm)



## 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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