

**T0450H-6K 4A TRIAC**

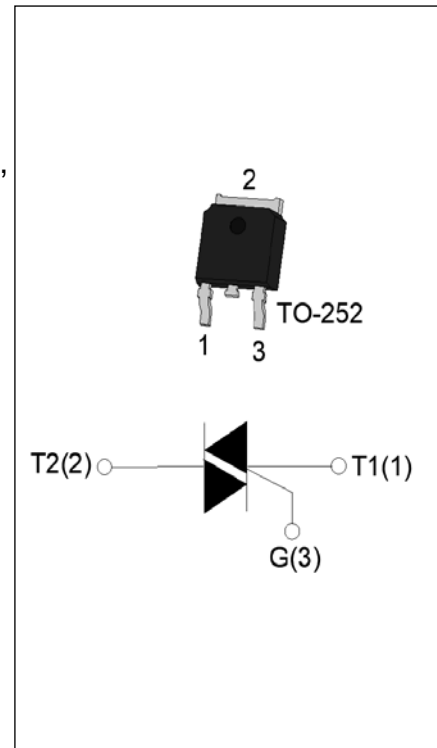
Rev.A.1.0

**DESCRIPTION:**

The T0450H-6K 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. Compared to traditional triacs, T0450H-6K provides a very high switching capability up to junction temperatures of 150°C. Package TO-252 is RoHS compliant.

**MAIN FEATURES**

| Symbol             | Value    | Unit |
|--------------------|----------|------|
| $I_{T(RMS)}$       | 4        | A    |
| $V_{DRM}/V_{RRM}$  | 600      | V    |
| $I_{GT\ I/II/III}$ | 50/50/50 | mA   |


**ABSOLUTE MAXIMUM RATINGS**

| Parameter  | Symbol       | Value   | Unit                   |
|--|--------------|---------|------------------------|
| Storage junction temperature range   | $T_{stg}$    | -40-150 | °C                     |
| Operating junction temperature range   | $T_j$        | -40-150 | °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 ( $T_c \leq 128^\circ\text{C}$ )  | $I_{T(RMS)}$ | 4       | A                      |
| Non repetitive surge peak on-state current (full cycle , $t_p=20\text{ms}$ , $T_j=25^\circ\text{C}$ )            | $I_{TSM}$    | 40      | A                      |
| Non repetitive surge peak on-state current (full cycle , $t_p=16.6\text{ms}$ , $T_j=25^\circ\text{C}$ )          |              | 44      |                        |
| $I^2t$ value for fusing ( $t_p=10\text{ms}$ , $T_j=25^\circ\text{C}$ )   | $I^2t$       | 8       | $\text{A}^2\text{s}$   |
| Critical rate of rise of on-state current ( $I_G=2 \times I_{GT}$ , $f=100\text{Hz}$ , $T_j=150^\circ\text{C}$ ) | $di/dt$      | 100     | $\text{A}/\mu\text{s}$ |
| Peak gate current ( $t_p=20\mu\text{s}$ , $T_j=150^\circ\text{C}$ )  | $I_{GM}$     | 4       | A                      |
| Average gate power dissipation ( $T_j=150^\circ\text{C}$ )   | $P_{G(AV)}$  | 1       | 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.  | 50   | mA               |
| $V_{GT}$    |  | I - II - III | MAX.  | 1    | V                |
| $V_{GD}$    | $V_D=V_{DRM}$ $T_j=150^\circ\text{C}$<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.  | 50   | mA               |
|             |  | II           |       | 60   |                  |
| $I_H$       | $I_T=100\text{mA}$   |              | MAX.  | 40   | mA               |
| $dV/dt$     | $V_D=400\text{V}$ Gate Open $T_j=150^\circ\text{C}$                              |              | MIN.  | 1500 | V/ $\mu\text{s}$ |
| $(dI/dt)_c$ | $(dV/dt)_c=20\text{V}/\mu\text{s}$ , $T_j=150^\circ\text{C}$                     |              | MIN.  | 10   | A/ms             |
| $t_{on}$    | $I_G=80\text{mA}$ $I_A=400\text{mA}$ $I_R=40\text{mA}$<br>$T_j=25^\circ\text{C}$ |              | TYP.  | 5    | $\mu\text{s}$    |
| $t_{off}$   |  |              |       | 50   |                  |

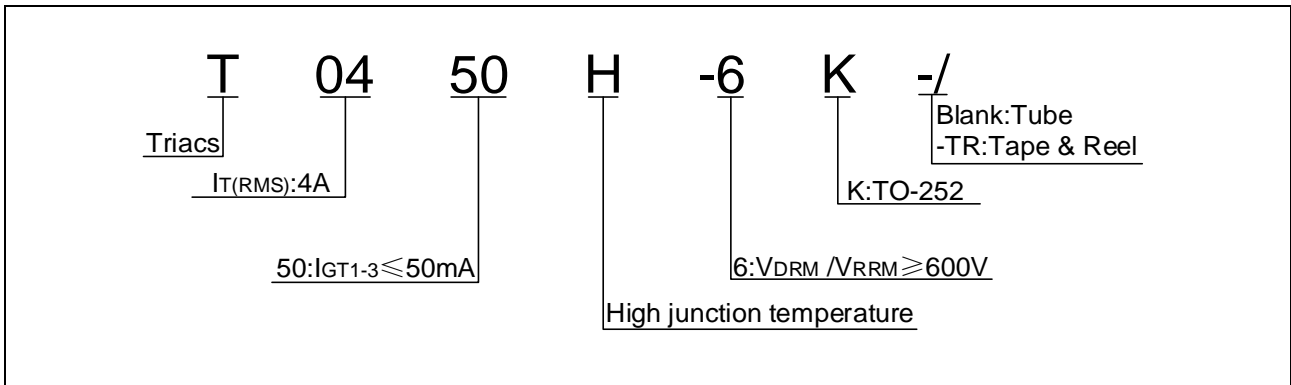
**STATIC CHARACTERISTICS**

| Symbol    | Parameter                                 |                         | Value(MAX.) | Unit             |
|-----------|---|-------------------------|-------------|------------------|
| $V_{TM}$  | $I_{TM}=5.5\text{A}$ $t_p=380\mu\text{s}$ | $T_j=25^\circ\text{C}$  | 1.4         | V                |
| $V_{TO}$  | Threshold voltage                         | $T_j=150^\circ\text{C}$ | 0.6         | V                |
| $R_D$     | Dynamic resistance                        | $T_j=150^\circ\text{C}$ | 129         | $\text{m}\Omega$ |
| $I_{DRM}$ | $V_D=V_{DRM}$ $V_R=V_{RRM}$               | $T_j=25^\circ\text{C}$  | 5           | $\mu\text{A}$    |
| $I_{RRM}$ |   | $T_j=150^\circ\text{C}$ | 0.8         | mA               |

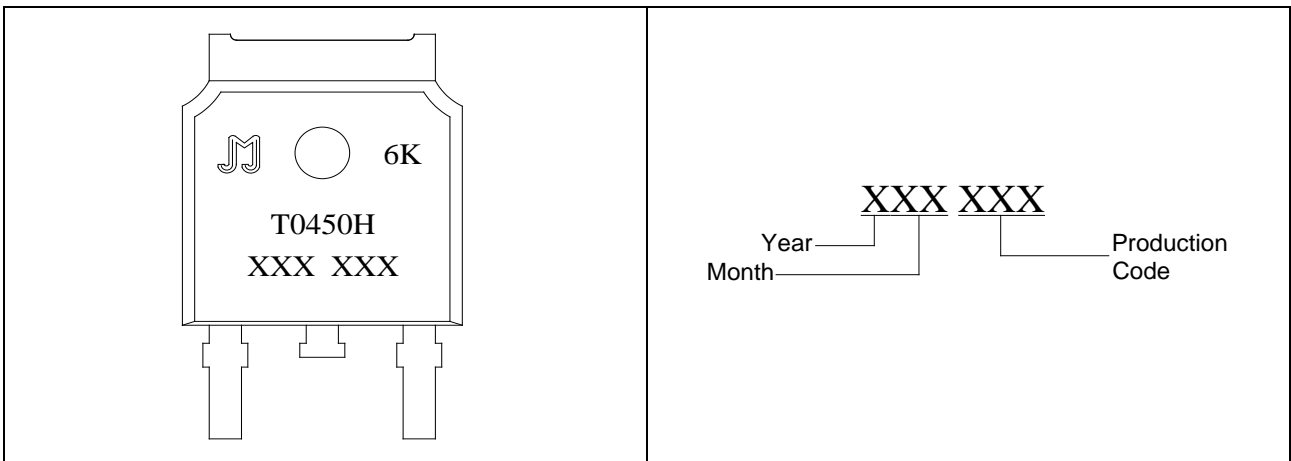
**THERMAL RESISTANCES**

| Symbol        | Parameter                | Value | Unit                      |
|---------------|--------------------------|-------|---------------------------|
| $R_{th(j-c)}$ | junction to case (AC)    | 4.3   | $^\circ\text{C}/\text{W}$ |
| $R_{th(j-a)}$ | junction to ambient (AC) | 120   | $^\circ\text{C}/\text{W}$ |

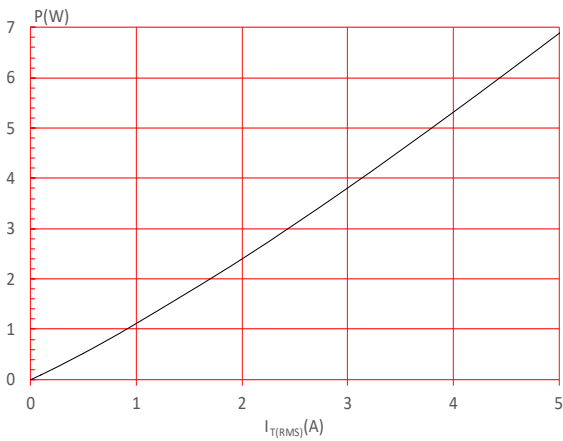
**ORDERING INFORMATION**



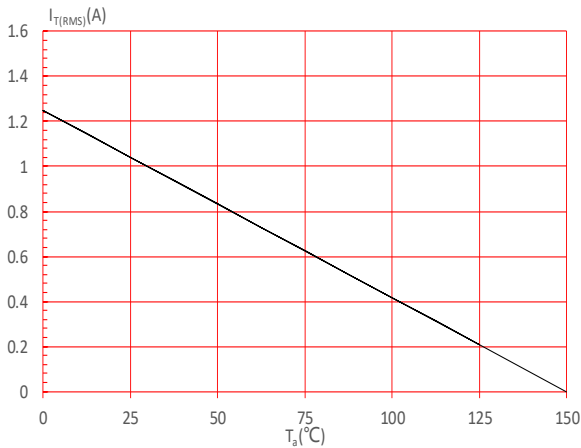
**MARKING**



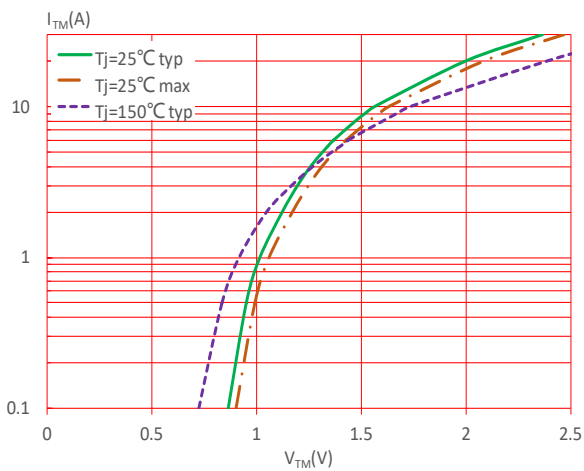
**FIG.1:** Maximum power dissipation versus RMS on-state current



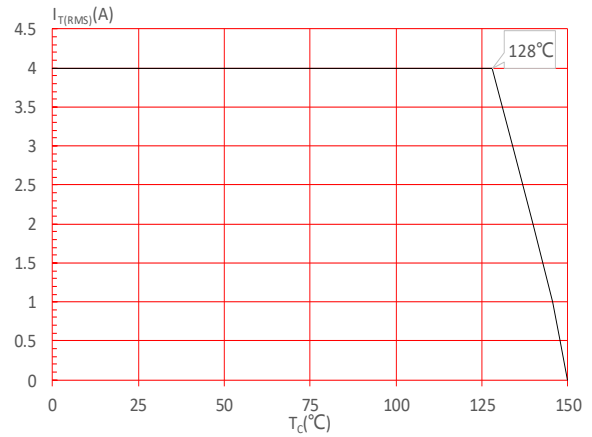
**FIG.3:** RMS on-state current versus ambient temperature (printed circuit board FR4,copper thickness:35 $\mu$ m)(full cycle)



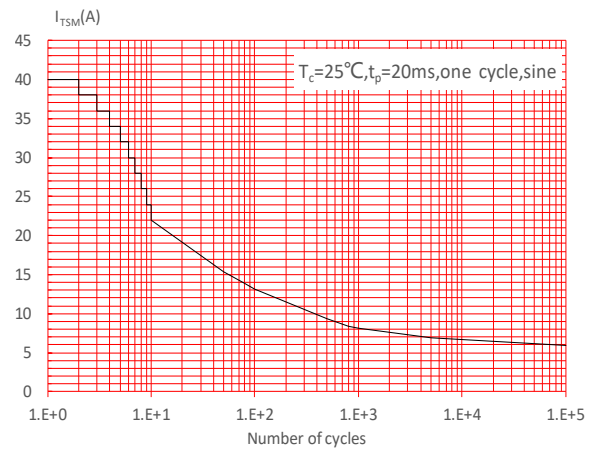
**FIG.5:** On-state characteristics



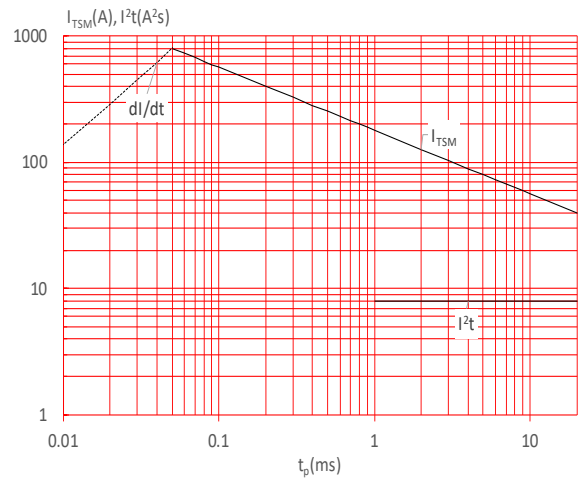
**FIG.2:** RMS on-state current versus case temperature



**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  $I^2t$  ( $di/dt < 100A/\mu s$ )



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

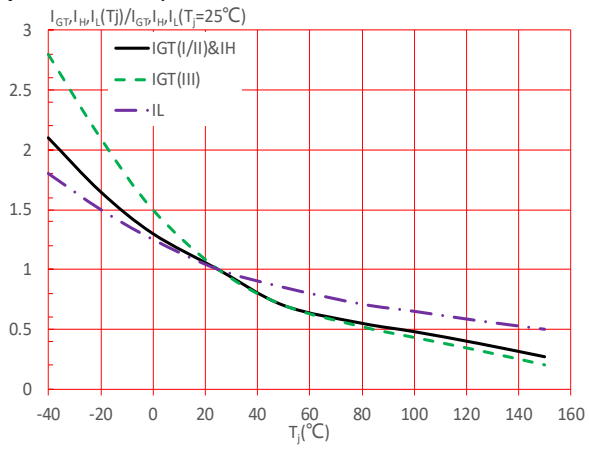
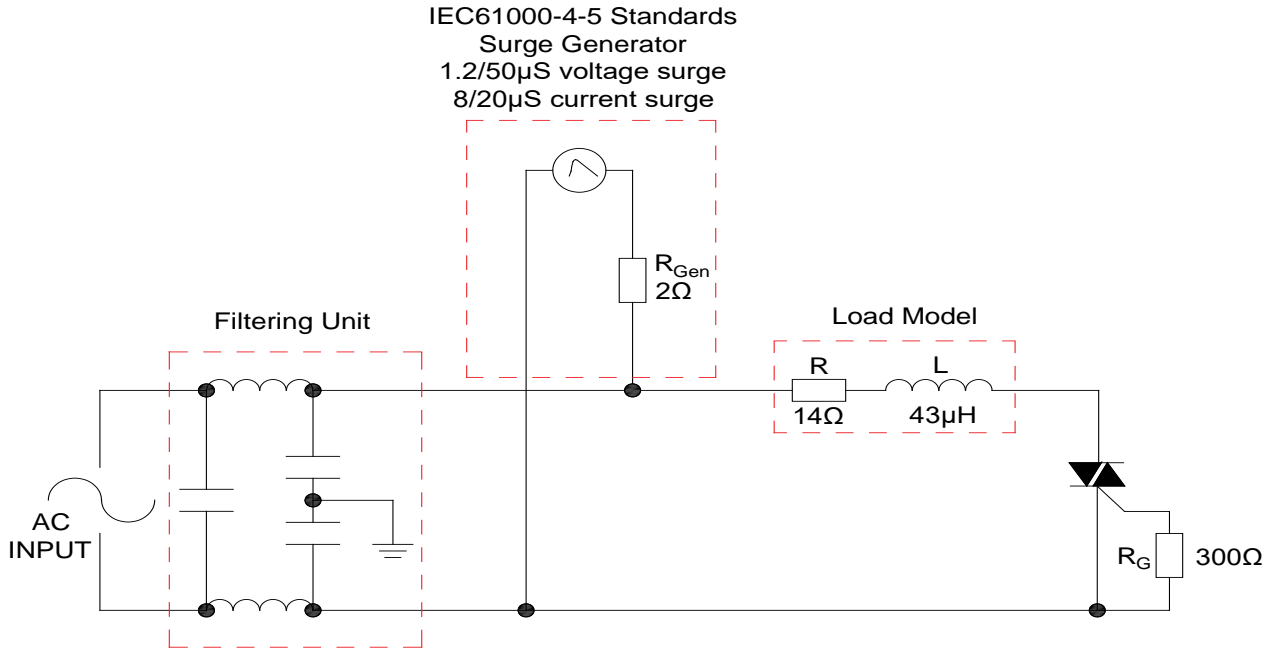
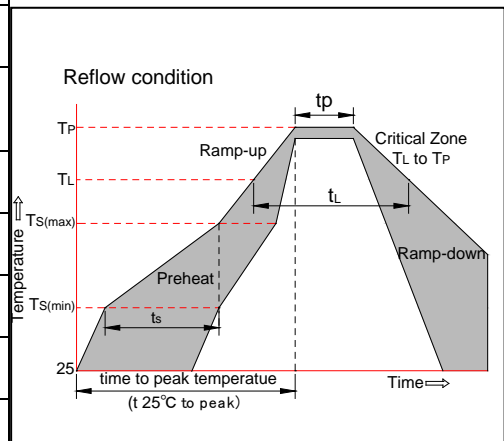


FIG.8: Test circuit for inductive and resistive loads to IEC-61000-4-5 standards



**SOLDERING PARAMETERS**

|   |                                   |   |
|---|-----------------------------------|---|
| Reflow Condition  |                                   | Pb-Free assembly<br>(see figure at right) |
| Pre Heat  | -Temperature Min ( $T_{s(min)}$ ) | +150°C                                    |
|   | -Temperature 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( $T_L$ )(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                                    |



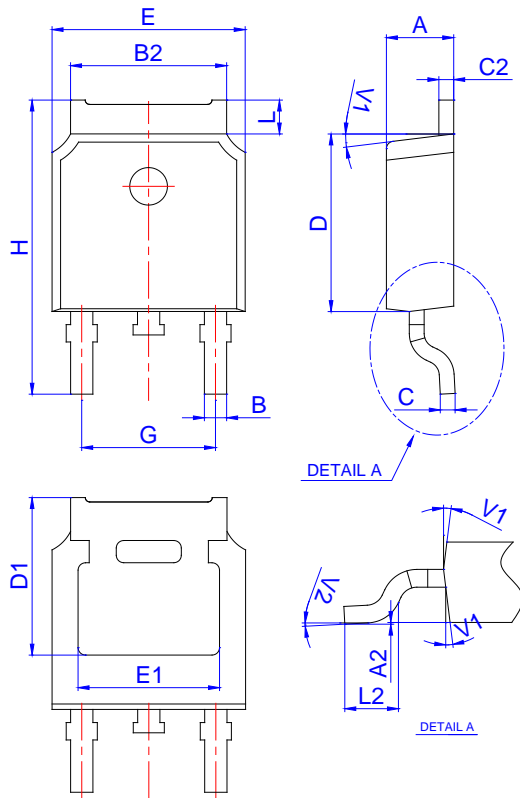
## ORDERING INFORMATION

| Order code   | Voltage<br>$V_{DRM}/V_{RRM}$ (V) | IGT(mA)      | Package | Base qty.<br>(pcs) | Delivery mode |
|--------------|----------------------------------|--------------|---------|--------------------|---------------|
|              |                                  | I - II - III |         |                    |               |
| T0450H-6K    | 600                              | 50           | TO-252  | 80                 | Tube          |
| T0450H-6K-TR |                                  |              |         | 2,500              | Tape & Reel   |

## Document Revision History

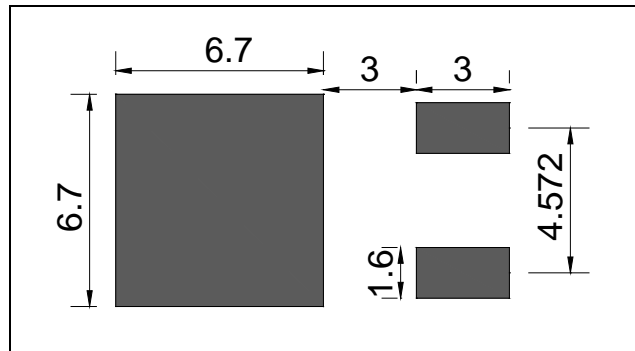
| Date         | Revision | Changes      |
|--------------|----------|--------------|
| Apr.10, 2023 | A.1.0    | Last updated |

**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    | 0.95        |      | 1.30  | 0.037    |      | 0.051 |
| 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   | 1.40        | 1.50  | 1.60  | 0.055  | 0.059 | 0.063 |
| D1   | 1.40        | 1.50  | 1.60  | 0.055  | 0.059 | 0.063 |
| 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   | 6.85        | 6.90  | 7.00  | 0.270  | 0.272 | 0.276 |
| B0   | 10.45       | 10.50 | 10.60 | 0.411  | 0.413 | 0.417 |
| K0   | 2.68        | 2.78  | 2.88  | 0.106  | 0.109 | 0.113 |
| T    | 0.24        | -     | 0.27  | 0.009  | -     | 0.011 |
| 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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