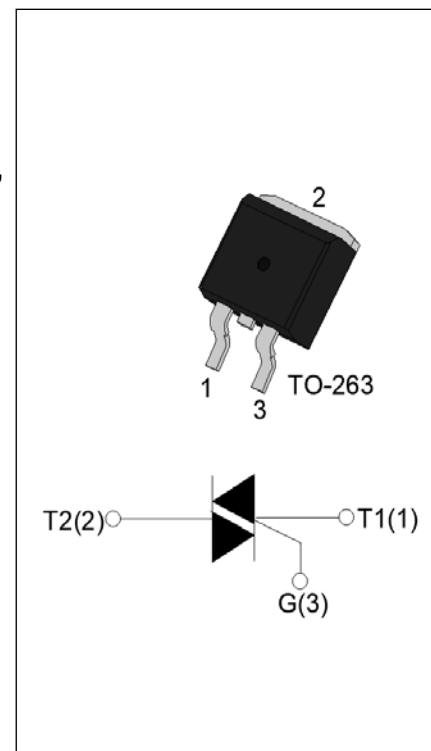


## DESCRIPTION:

The T2050H-6G 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, T2050H-6G provides a very high switching capability up to junction temperatures of 150 °C. Package TO-263 is RoHS compliant.

## MAIN FEATURES

| Symbol             | Value    | Unit |
|--------------------|----------|------|
| $I_{T(RMS)}$       | 20       | 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 ( $T_j=25^{\circ}C$ )                                              | $V_{DRM}$    | 600     | V         |
| Repetitive peak reverse voltage ( $T_j=25^{\circ}C$ )                                                | $V_{RRM}$    | 600     | V         |
| RMS on-state current ( $T_c \leq 121^{\circ}C$ )                                                     | $I_{T(RMS)}$ | 20      | A         |
| Non repetitive surge peak on-state current (full cycle , $t_p=20ms$ , $T_j=25^{\circ}C$ )            | $I_{TSM}$    | 200     | A         |
| Non repetitive surge peak on-state current (full cycle , $t_p=16.6ms$ , $T_j=25^{\circ}C$ )          |              | 220     |           |
| $I^2t$ value for fusing ( $t_p=10ms$ , $T_j=25^{\circ}C$ )                                           | $I^2t$       | 200     | $A^2s$    |
| Critical rate of rise of on-state current ( $I_G=2 \times I_{GT}$ , $f=100Hz$ , $T_j=150^{\circ}C$ ) | $di/dt$      | 100     | $A/\mu s$ |
| Peak gate current ( $t_p=20\mu s$ , $T_j=150^{\circ}C$ )                                             | $I_{GM}$     | 4       | A         |
| Average gate power dissipation ( $T_j=150^{\circ}C$ )                                                | $P_{G(AV)}$  | 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.  | 70   | mA               |
|             |                                                                                    | II          |       | 100  |                  |
| $I_H$       | $I_T=500\text{mA}$                                                                 |             | MAX.  | 60   | mA               |
| $dV/dt$     | $V_D=400\text{V}$ Gate Open $T_j=150^{\circ}\text{C}$                              |             | MIN.  | 2200 | V/ $\mu\text{s}$ |
| $(dI/dt)_c$ | $(dV/dt)_c=20\text{V}/\mu\text{s}$ , $T_j=150^{\circ}\text{C}$                     |             | MIN.  | 30   | 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.  | 12   | $\mu\text{s}$    |
| $t_{off}$   |                                                                                    |             |       | 90   |                  |

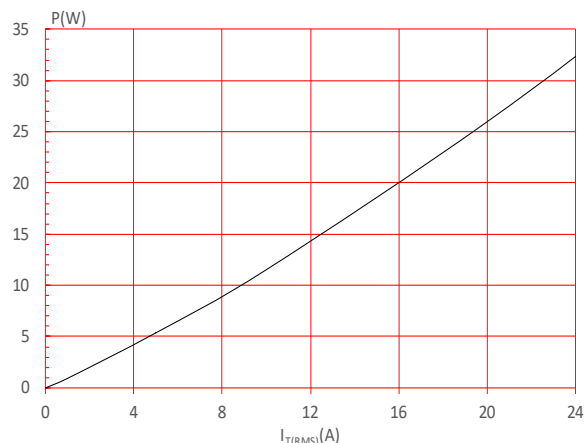
### STATIC CHARACTERISTICS

| Symbol    | Parameter                                |                           | Value(MAX.) | Unit             |
|-----------|------------------------------------------|---------------------------|-------------|------------------|
| $V_{TM}$  | $I_{TM}=28\text{A}$ $t_p=380\mu\text{s}$ | $T_j=25^{\circ}\text{C}$  | 1.4         | V                |
| $V_{TO}$  | Threshold voltage                        | $T_j=150^{\circ}\text{C}$ | 0.71        | V                |
| $R_D$     | Dynamic resistance                       | $T_j=150^{\circ}\text{C}$ | 22          | $\text{m}\Omega$ |
| $I_{DRM}$ | $V_D=V_{DRM}$ $V_R=V_{RRM}$              | $T_j=25^{\circ}\text{C}$  | 5           | $\mu\text{A}$    |
| $I_{RRM}$ |                                          | $T_j=150^{\circ}\text{C}$ | 2.5         | mA               |

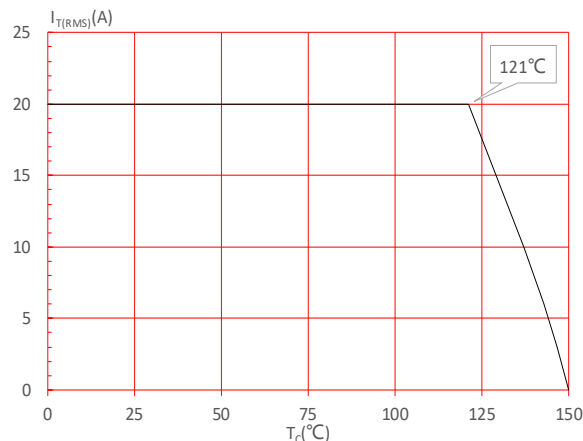
### THERMAL RESISTANCES

| Symbol        | Parameter                                                | Value | Unit                        |
|---------------|----------------------------------------------------------|-------|-----------------------------|
| $R_{th(j-c)}$ | junction to case (AC)                                    | 1.1   | $^{\circ}\text{C}/\text{W}$ |
| $R_{th(j-a)}$ | junction to ambient (AC, in free air, $S=2\text{cm}^2$ ) | 45    | $^{\circ}\text{C}/\text{W}$ |

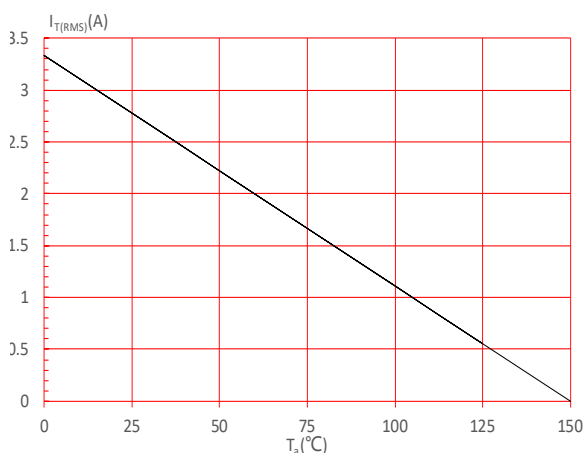
**FIG.1:** Maximum power dissipation versus RMS on-state current



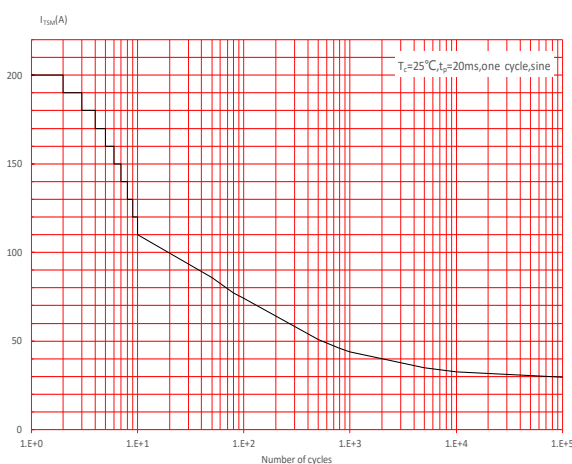
**FIG.2:** RMS on-state current versus case temperature



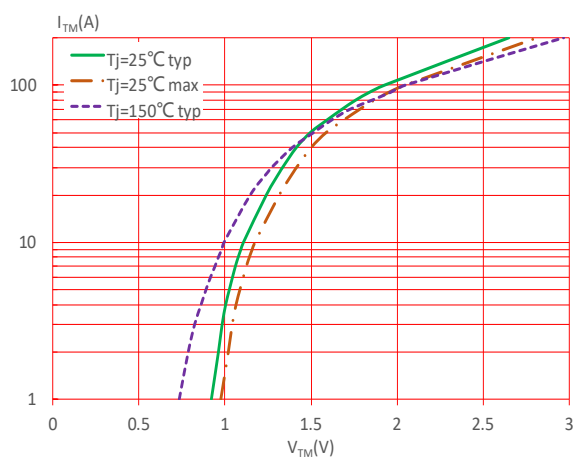
**FIG.3:** RMS on-state current versus ambient temperature (printed circuit board FR4,copper thickness:35μm)(full cycle)



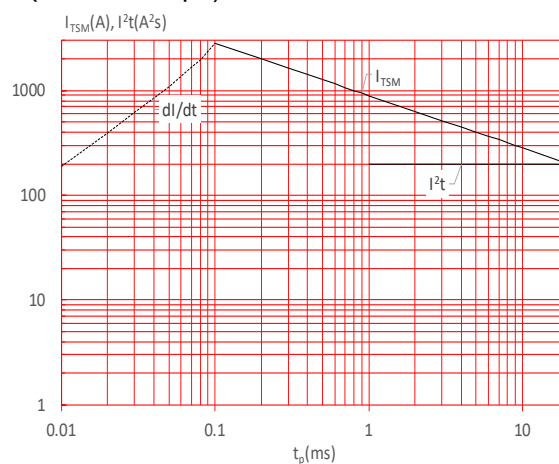
**FIG.4:** Surge peak on-state current versus number of cycles



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



**FIG.6:** Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 20ms$ , 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

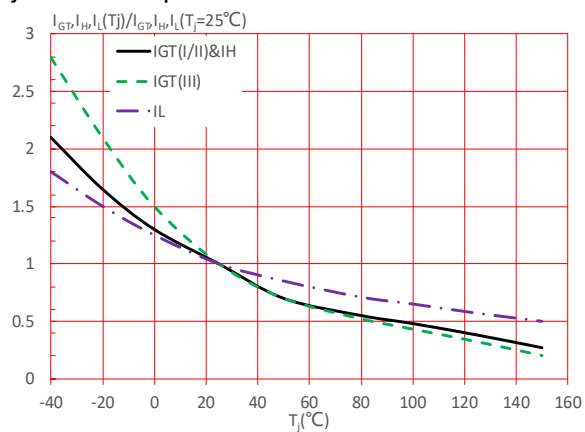
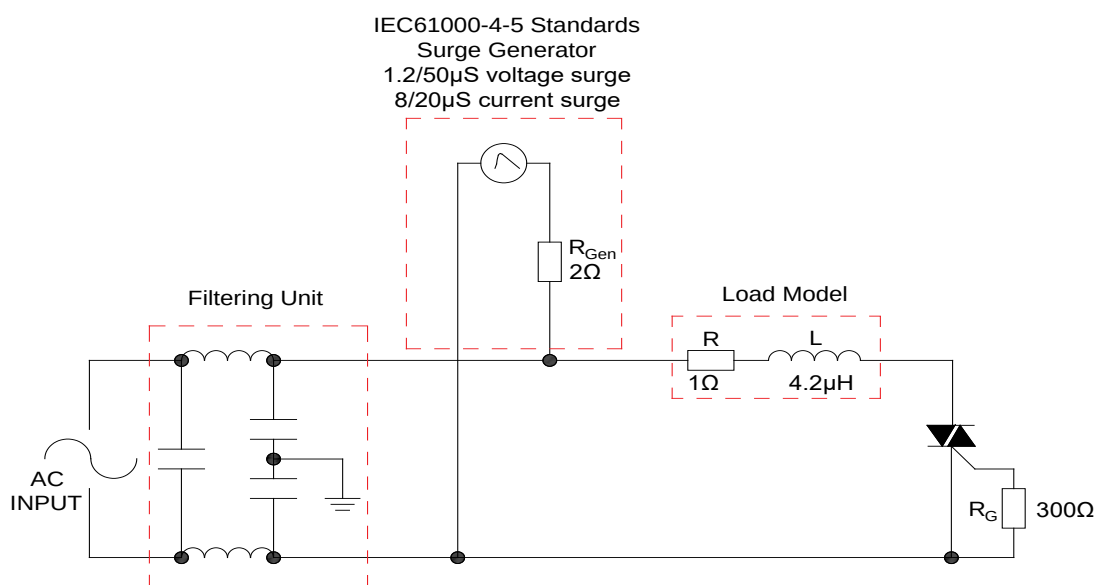
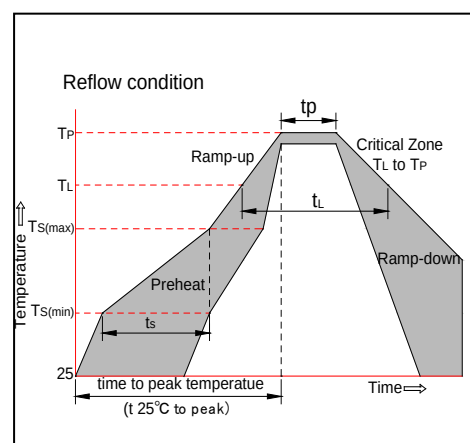


FIG.8: Test circuit for inductive and resistive loads to IEC-61000-4-5 standards

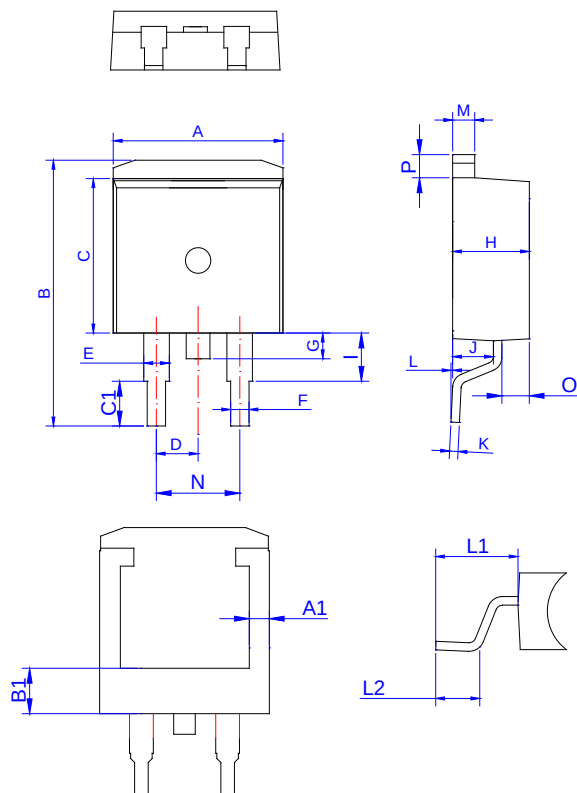


## SOLDERING PARAMETERS

| 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                                    |

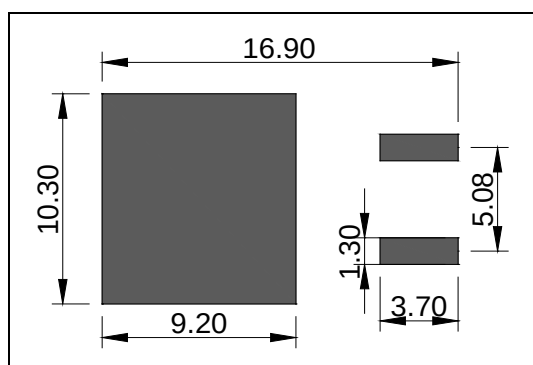


## PACKAGE MECHANICAL DATA

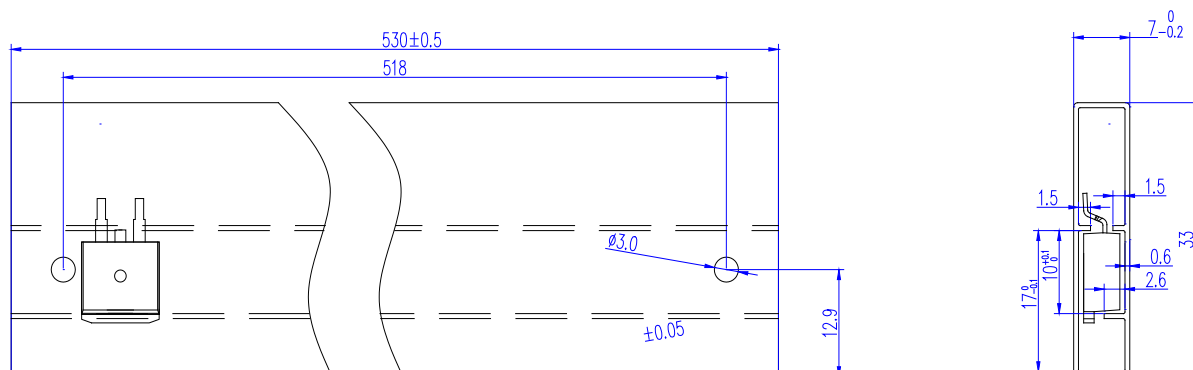


| Ref. | Dimensions  |      |       |        |       |       |
|------|-------------|------|-------|--------|-------|-------|
|      | Millimeters |      |       | Inches |       |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ.  | Max.  |
| A    | 9.90        |      | 10.20 | 0.390  |  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

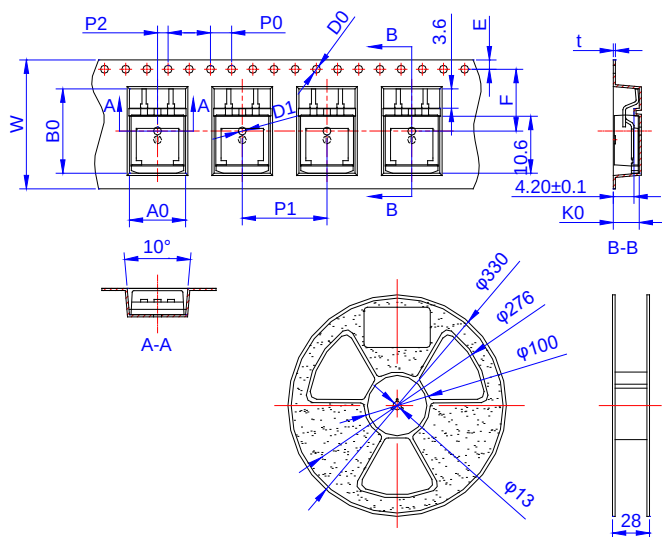
## FOOTPRINT-TO-263 (dimensions in mm)



## 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     |