

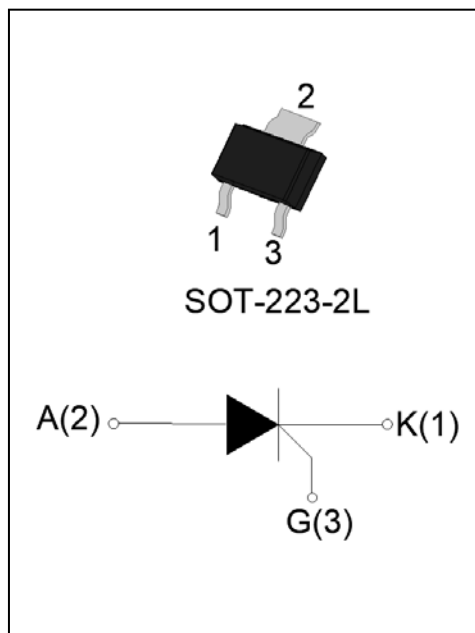


### DESCRIPTION:

The JX040W 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 SOT-223-2L is RoHS compliant.

### MAIN FEATURES

| Symbol              | Value      | Unit    |
|---------------------|------------|---------|
| $I_{T(RMS)}$        | 2          | 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 ( $T_c \leq 77^{\circ}C$ )  | $I_{T(AV)}$  | 1.3                  | A           |
| RMS on-state current ( $T_c \leq 77^{\circ}C$ )  | $I_{T(RMS)}$ | 2                    | A           |
| Non repetitive surge peak on-state current ( $t_p=10ms, T_j=25^{\circ}C$ )                     | $I_{TSM}$    | 25                   | A           |
| Non repetitive surge peak on-state current ( $t_p=8.3ms, T_j=25^{\circ}C$ )                    |              | 28                   |             |
| $I^2t$ value for fusing ( $t_p=10ms, T_j=25^{\circ}C$ )  | $I^2t$       | 3.1                  | $A^2s$      |
| 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>( $T_j=25^{\circ}C$ ; non-repetitive, off-state; FIG.8) | $V_{pp}$ | 0.5 | kV |

**NOTE 1:** When we parallel connect a  $\leq 1K\Omega$  resistor between Gate and Cathode, the  $T_j$  can reach  $125^{\circ}C$ ; if without this resistor, the  $T_j$  only can reach  $110^{\circ}C$ .

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

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

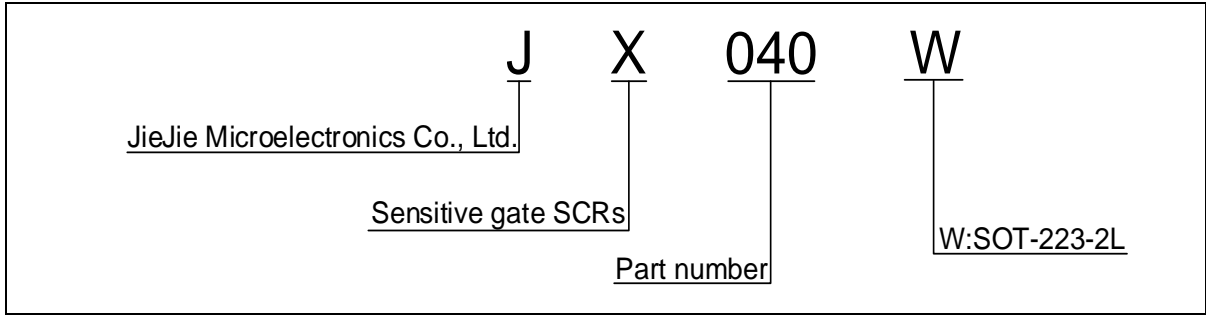
**STATIC CHARACTERISTICS**

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

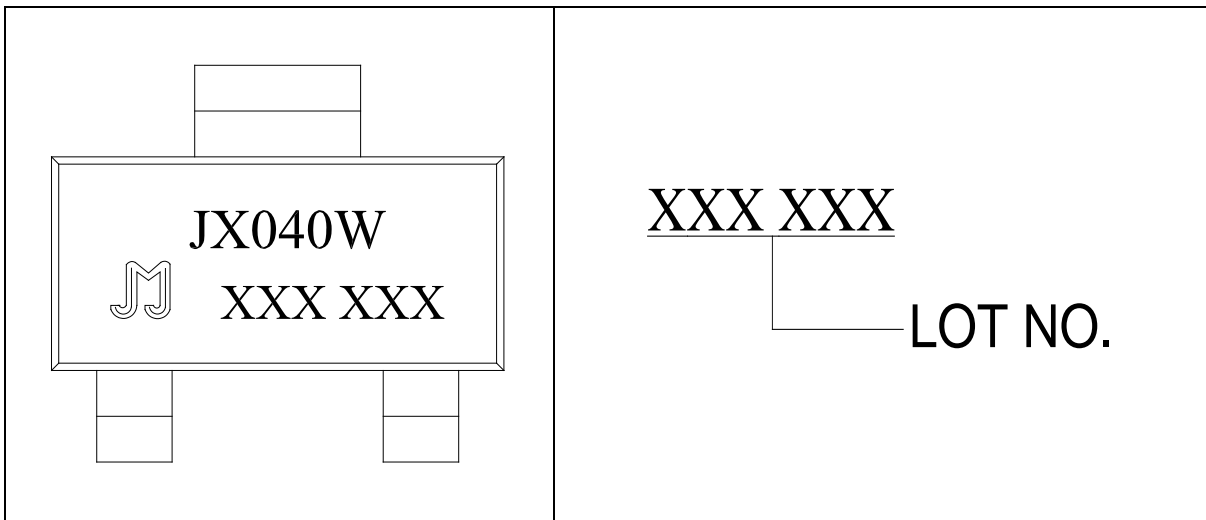
**THERMAL RESISTANCES**

| Symbol        | Parameter                | Value | Unit          |
|---------------|--------------------------|-------|---------------|
| $R_{th(j-c)}$ | junction to case (DC)    | 20    | $^{\circ}C/W$ |
| $R_{th(j-a)}$ | junction to ambient (DC) | 150   | $^{\circ}C/W$ |

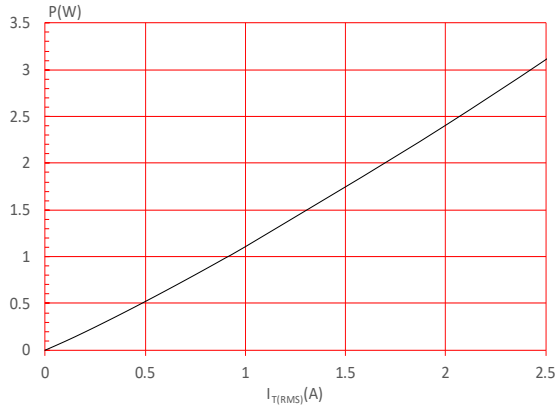
**ORDERING INFORMATION**



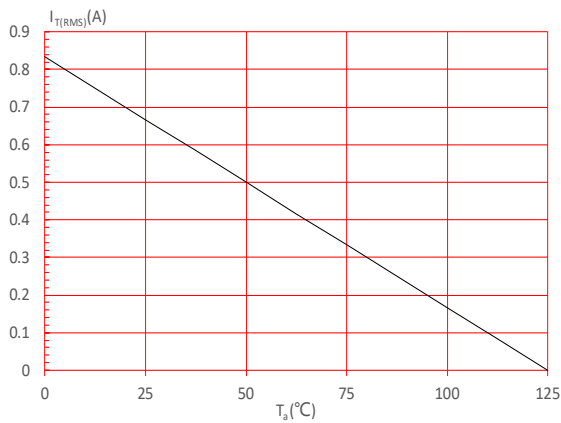
**MARKING**



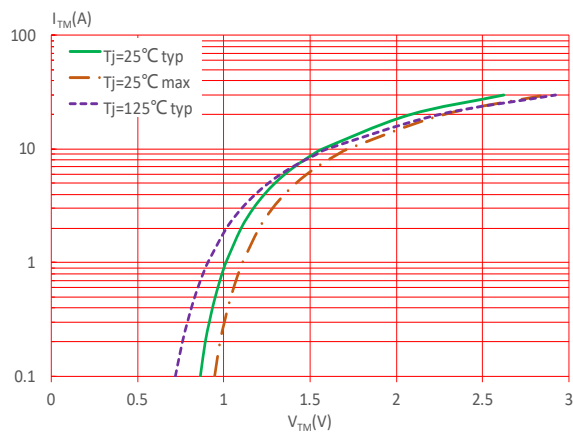
**FIG.1** Maximum power dissipation versus RMS on-state current



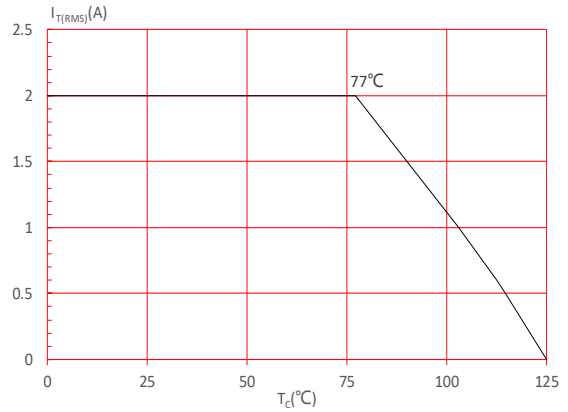
**FIG.3:** RMS on-state current versus ambient temperature (printed circuit board FR4,copper thickness:35μm)(full cycle)



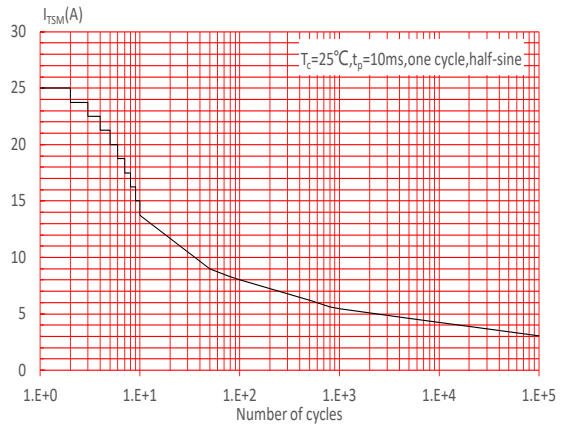
**FIG.5:** On-state characteristics



**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  $t_p < 10\text{ms}$ , and corresponding value of  $I^2t$  ( $dI/dt < 50\text{A}/\mu\text{s}$ )

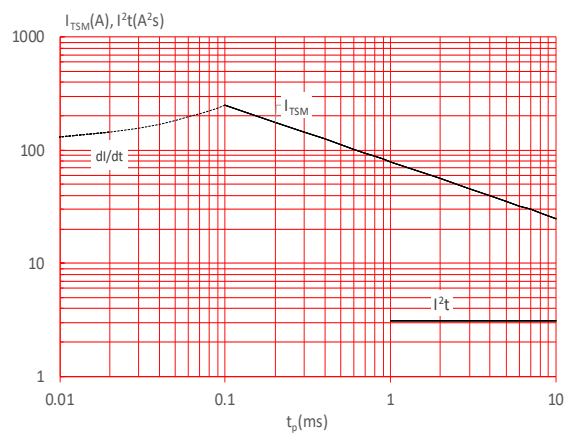


FIG.7: Relative variations of gate trigger current, holding current and latching current versus junction temperature

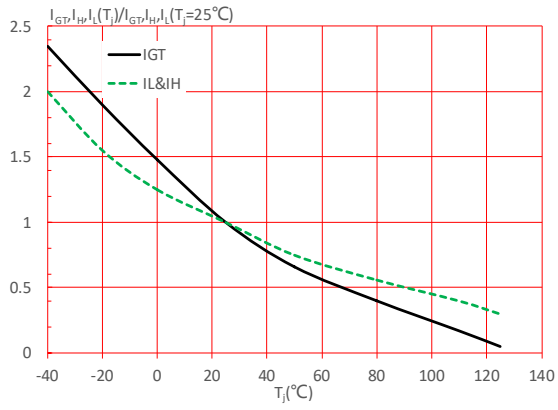
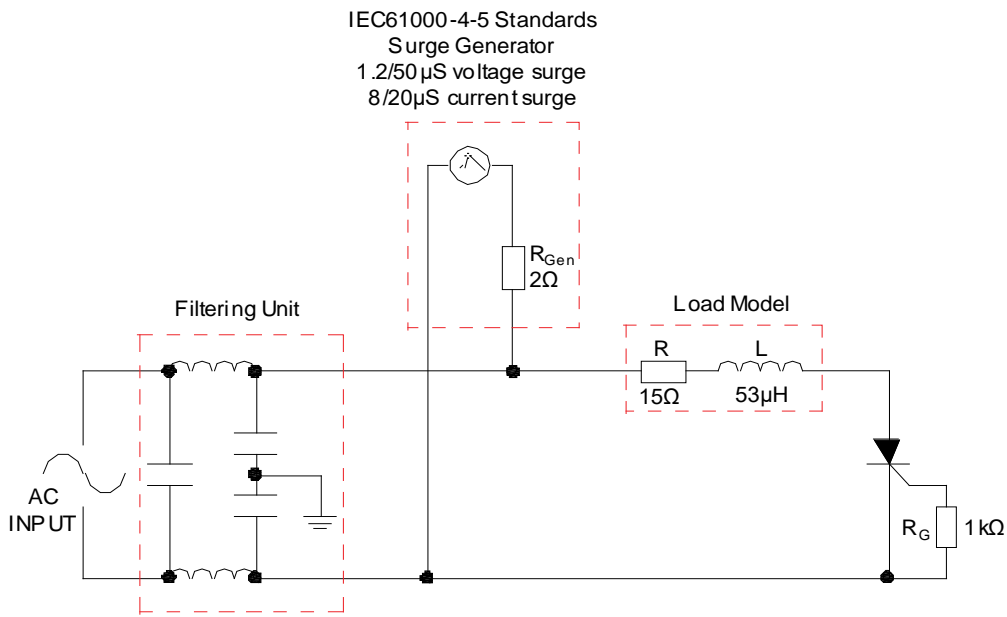
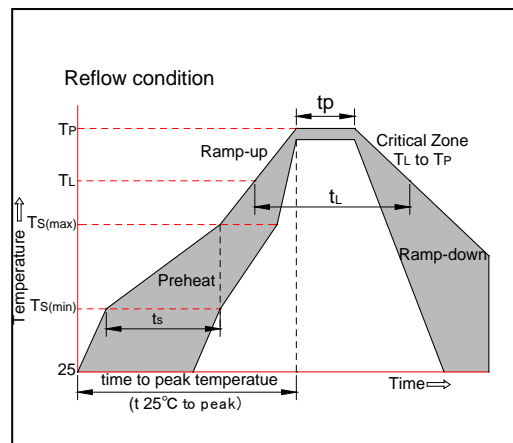


FIG.8: Test circuit for inductive and resistive loads to IEC-61000-4-5 standards.



**SOLDERING PARAMETERS**

|   |                                      |   |
|---|--------------------------------------|---|
| Reflow Condition  |                                      | Pb-Free assembly<br>(see figure at right) |
| Pre Heat  | -Temperature Min<br>( $T_{s(min)}$ ) | +150°C                                    |
|   | -Temperature Max<br>( $T_{s(max)}$ ) | +200°C                                    |
|   | -Time (Min to Max)<br>(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( $T_L$ )<br>(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                                    |



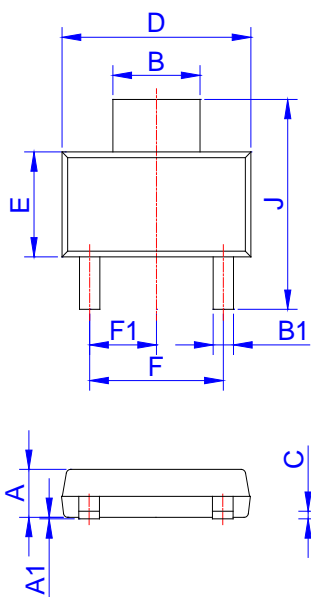
**ORDERING INFORMATION**

| Order code | Voltage<br>$V_{DRM}/V_{RRM}$ (V) | IGT( $\mu$ A) | Package    | Base qty.<br>(pcs) | Delivery<br>mode |
|------------|----------------------------------|---------------|------------|--------------------|------------------|
| JX040W     | 600                              | $\leq 200$    | SOT-223-2L | 4,000              | Tape & Reel      |

**Document Revision History**

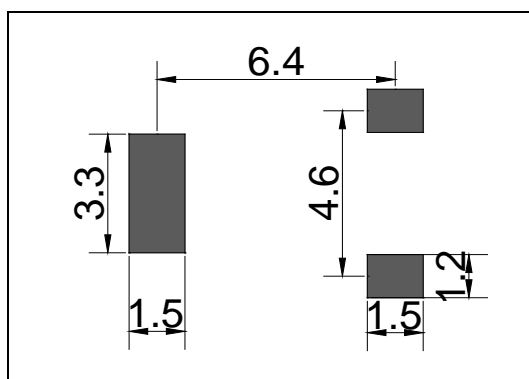
| Date         | Revision | Changes     |
|--------------|----------|-------------|
| May.18, 2023 | A.1.0    | Last update |

**PACKAGE MECHANICAL DATA**



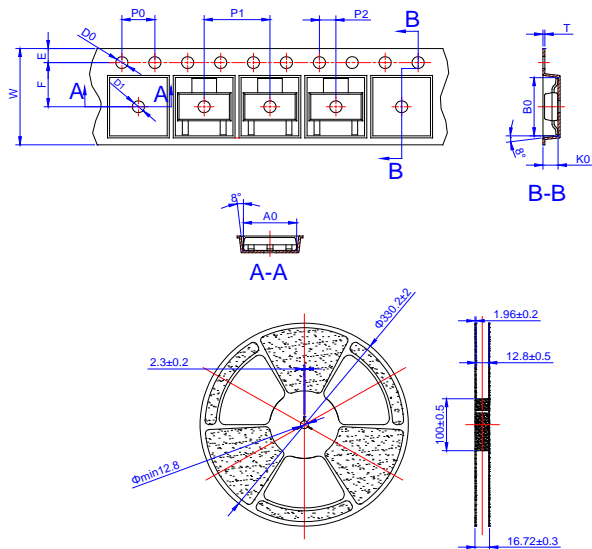
| Ref. | Dimensions  |       |      |        |       |       |
|------|-------------|-------|------|--------|-------|-------|
|      | Millimeters |       |      | Inches |       |       |
|      | Min.        | Typ.  | Max. | Min.   | Typ.  | Max.  |
| A    | 1.50        | 1.60  | 1.80 | 0.059  | 0.063 | 0.071 |
| A1   | 0.01        | 0.06  | 0.10 | 0.001  | 0.002 | 0.004 |
| B    | 2.90        | 3.00  | 3.10 | 0.114  | 0.118 | 0.122 |
| B1   | 0.60        | 0.70  | 0.80 | 0.024  | 0.028 | 0.031 |
| C    | 0.22        | 0.254 | 0.32 | 0.009  | 0.010 | 0.013 |
| D    | 6.30        | 6.50  | 6.70 | 0.248  | 0.256 | 0.264 |
| E    | 3.30        | 3.50  | 3.70 | 0.130  | 0.138 | 0.146 |
| F    | 4.40        |       | 4.80 | 0.173  |       | 0.189 |
| F1   | 2.20        |       | 2.40 | 0.087  |       | 0.094 |
| G    | 0.50        |       | 1.00 | 0.020  |       | 0.039 |
| H    | 1.50        | 1.75  | 2.00 | 0.059  | 0.069 | 0.079 |
| J    | 6.70        | 7.00  | 7.30 | 0.264  | 0.276 | 0.287 |
| K    | 0.80        |       | 1.00 | 0.031  |       | 0.039 |

**FOOTPRINT-SOT-223-2L (dimensions in mm)**






DELIVERY MODE



| Ref. | Dimensions  |       |       |        |       |       |
|------|-------------|-------|-------|--------|-------|-------|
|      | Millimeters |       |       | Inches |       |       |
|      | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| W    | -           | -     | 12.30 | -      | -     | 0.482 |
| E    | 1.65        | 1.75  | 1.85  | 0.065  | 0.069 | 0.073 |
| F    | 5.45        | 5.50  | 5.55  | 0.215  | 0.217 | 0.219 |
| D0   | 1.50        | 1.55  | 1.60  | 0.059  | 0.061 | 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   | 1.95        | 2.00  | 2.05  | 0.077  | 0.079 | 0.081 |
| 10P0 | 39.80       | 40.00 | 40.20 | 1.567  | 1.575 | 1.583 |
| A0   | 6.85        | 6.95  | 7.05  | 0.269  | 0.273 | 0.276 |
| B0   | 7.15        | 7.25  | 7.35  | 0.280  | 0.284 | 0.288 |
| K0   | 1.95        | 2.05  | 2.15  | 0.076  | 0.080 | 0.084 |
| T    | 0.20        | 0.25  | 0.30  | 0.008  | 0.010 | 0.012 |

| PACKAGE    | OUTLINE | REEL (PCS) | PER CARTON (PCS) | TAPE & REEL |
|------------|---------|------------|------------------|-------------|
| SOT-223-2L | TAPING  | 4,000      | 40,000           | 13 inch     |

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