

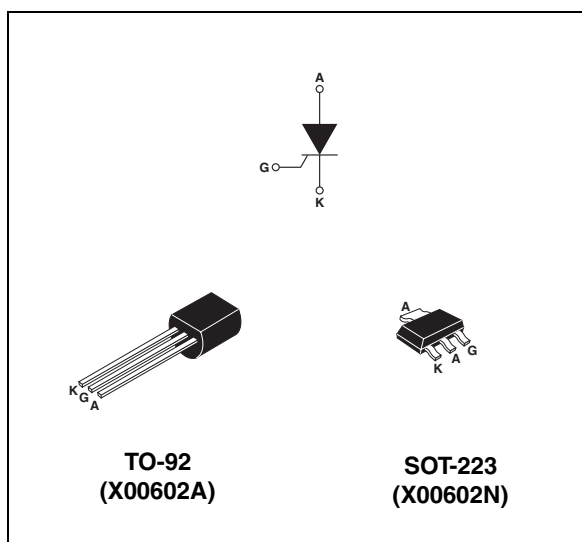
**0.8 A sensitive gate SCRs****Features**

- $I_{T(RMS)} = 0.8\text{ A}$
- $V_{DRM}/V_{RRM} = 600\text{ V}$
- $I_{GT} = 200\ \mu\text{A}$

**Description**

Thanks to highly sensitive triggering levels, the X006 SCR series is suitable for all applications where the available gate current is limited, such as ground fault circuit interrupters, overvoltage crowbar protection in low power supplies, capacitive ignition circuits, etc.

Available in through-hole or surface-mount packages, these devices are optimized in forward voltage drop and inrush current capabilities, for reduced power losses and high reliability in harsh environments.



# 1 Characteristics

**Table 1. Absolute ratings (limiting values)**

| Symbol             | Parameter  |                         |                           | Value                          | Unit      |
|--------------------|--|-------------------------|---------------------------|--------------------------------|-----------|
| $I_{T(RMS)}$       | RMS on-state current (180 °Conduction angle)   | TO-92                   | $T_j = 85\text{ °C}$      | 0.8                            | A         |
|                    |  | SOT-223                 | $T_{tab} = 100\text{ °C}$ |                                |           |
| $I_{T(AV)}$        | Average on-state current (180 °Conduction angle)   | TO-92                   | $T_j = 85\text{ °C}$      | 0.5                            | A         |
|                    |  | SOT-223                 | $T_{tab} = 100\text{ °C}$ |                                |           |
| $I_{TSM}$          | Non repetitive surge peak on-state current   | $t_p = 8.3\text{ ms}$   | $T_j = 25\text{ °C}$      | 10                             | A         |
|                    |  | $t_p = 10\text{ ms}$    |                           | 9                              |           |
| $I^2t$             | $I^2t$ Value for fusing  | $t_p = 10\text{ ms}$    | $T_j = 25\text{ °C}$      | 0.4                            | $A^2s$    |
| $di/dt$            | Critical rate of rise of on-state current<br>$I_G = 2 \times I_{GT}, t_r \leq 100\text{ ns}$ | $F = 60\text{ Hz}$      | $T_j = 125\text{ °C}$     | 50                             | $A/\mu s$ |
| $I_{GM}$           | Peak gate current  | $t_p = 20\text{ }\mu s$ | $T_j = 125\text{ °C}$     | 1                              | A         |
| $P_{G(AV)}$        | Average gate power dissipation   | $T_j = 125\text{ °C}$   |                           | 0.1                            | W         |
| $T_{stg}$<br>$T_j$ | Storage junction temperature range<br>Operating junction temperature range                   |                         |                           | - 40 to + 150<br>- 40 to + 125 | °C        |

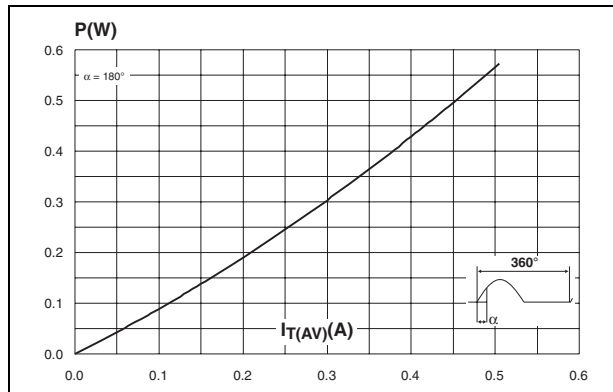
**Table 2. Electrical characteristics**

| Symbol                 | Test Conditions  |                       | Value | Unit    |           |
|------------------------|--|-----------------------|-------|---------|-----------|
| $I_{GT}$               | $V_D = 12\text{ V}, R_L = 140\text{ }\Omega$                         | MIN.                  | 15    | $\mu A$ |           |
|                        |  | MAX.                  | 200   |         |           |
| $V_{GT}$               |  | MAX.                  | 0.8   | V       |           |
| $V_{GD}$               | $V_D = V_{DRM}, R_L = 3.3\text{ k}\Omega, R_{GK} = 1\text{ k}\Omega$ | $T_j = 125\text{ °C}$ | MIN.  | 0.2     | V         |
| $V_{RG}$               | $I_{RG} = 10\text{ }\mu A$   |                       | MIN.  | 5       | V         |
| $I_H$                  | $I_T = 50\text{ mA}, R_{GK} = 1\text{ k}\Omega$                      |                       | MAX.  | 5       | mA        |
| $I_L$                  | $I_G = 1\text{ mA}, R_{GK} = 1\text{ k}\Omega$                       |                       | MAX.  | 6       | mA        |
| $dV/dt$                | $V_D = 67\% V_{DRM}, R_{GK} = 1\text{ k}\Omega$                      | $T_j = 125\text{ °C}$ | MIN.  | 25      | $V/\mu s$ |
| $V_{TM}$               | $I_{TM} = 1\text{ A}, t_p = 380\text{ }\mu s$                        | $T_j = 25\text{ °C}$  | MAX.  | 1.35    | V         |
| $V_{t0}$               | Threshold voltage  | $T_j = 125\text{ °C}$ | MAX.  | 0.85    | V         |
| $R_d$                  | Dynamic resistance   | $T_j = 125\text{ °C}$ | MAX.  | 245     | $m\Omega$ |
| $I_{DRM}$<br>$I_{RRM}$ | $V_{DRM} = V_{RRM}, R_{GK} = 1\text{ k}\Omega$                       | $T_j = 25\text{ °C}$  | MAX.  | 1       | $\mu A$   |
|                        |  | $T_j = 125\text{ °C}$ | MAX.  | 100     |           |

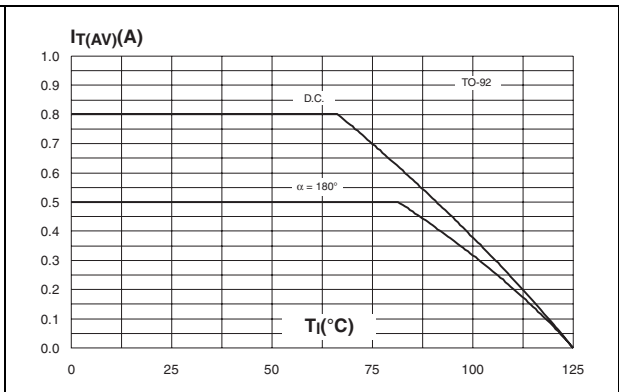
**Table 3. Thermal resistances**

| Symbol        | Parameter                | Value   | Unit |
|---------------|--------------------------|---------|------|
| $R_{th(j-a)}$ | Junction to ambient (DC) | TO-92   | 150  |
|               |                          | SOT-223 | 60   |
| $R_{th(j-l)}$ | Junction to lead (DC)    | TO-92   | 70   |
| $R_{th(j-t)}$ | Junction to tab (DC)     | SOT-223 | 30   |

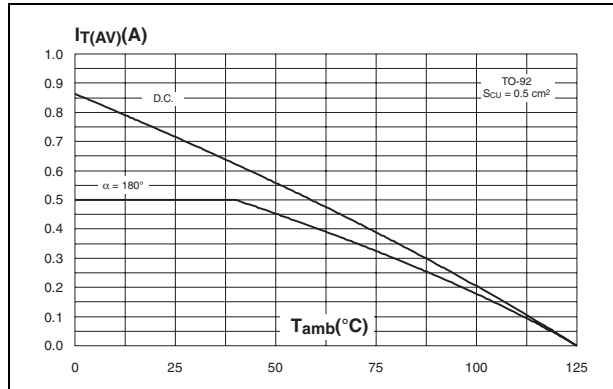
**Figure 1. Maximum average power dissipation versus average on-state current**



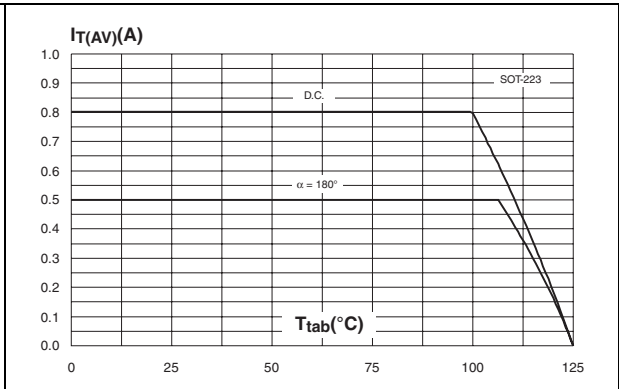
**Figure 2. Average and DC on-state current versus case temperature (TO-92)**



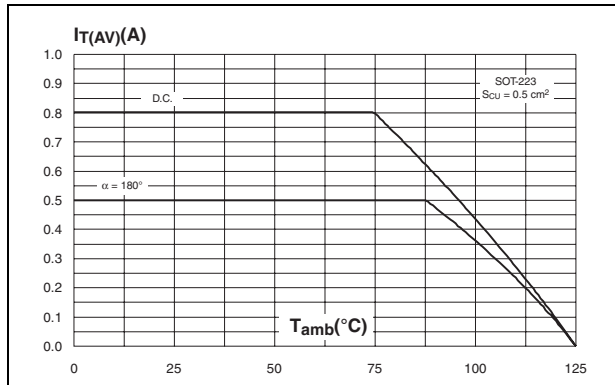
**Figure 3. Average and D.C. on-state current versus ambient temperature (epoxy printed circuit board FR4, copper thickness = 35 μm, S<sub>CU</sub> = 0.5 cm<sup>2</sup>) (TO-92)**



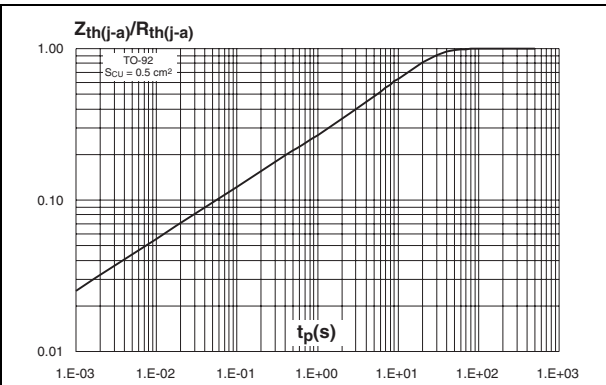
**Figure 4. Average and DC on-state current versus case temperature (SOT-223)**



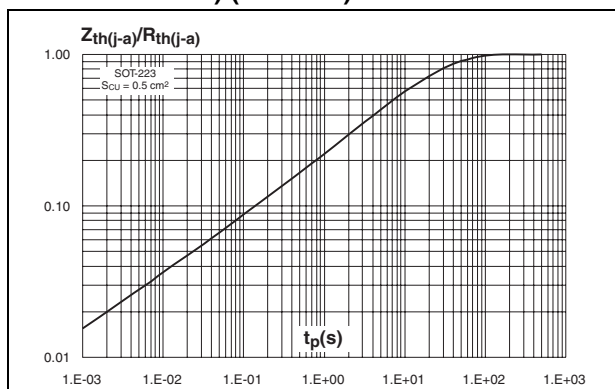
**Figure 5. Average and DC on-state current versus ambient temperature (epoxy PCB FR4, copper thickness = 35 μm, S<sub>CU</sub> = 5 cm<sup>2</sup>) (SOT-223)**



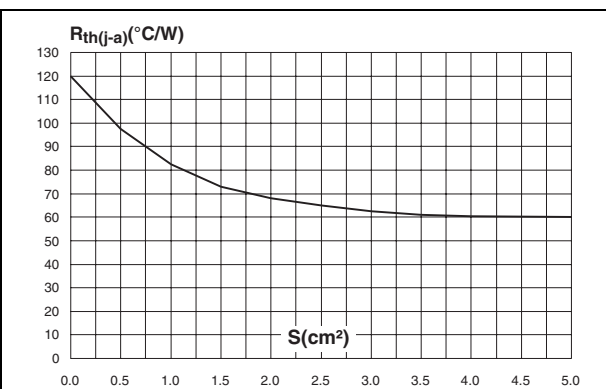
**Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration (PCB FR4, copper thickness = 35 μm, S<sub>CU</sub> = 0.5 cm<sup>2</sup>) (TO-92)**



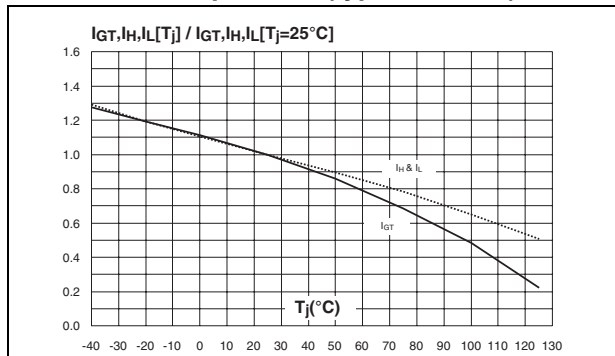
**Figure 7. Relative variation of thermal impedance junction to ambient versus pulse duration (PCB FR4, copper thickness = 35 μm, S<sub>CU</sub> = 0.5 cm<sup>2</sup>) (SOT-223)**



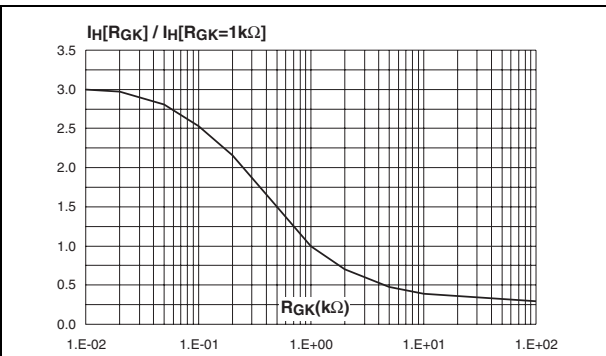
**Figure 8. Thermal resistance junction to ambient versus copper surface under tab (PCB FR4, copper thickness = 35 μm) (SOT-223)**



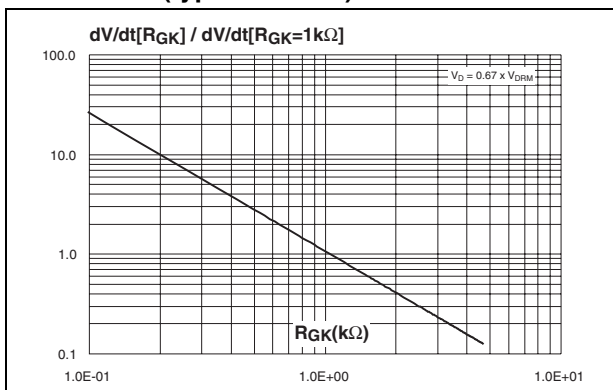
**Figure 9. Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)**



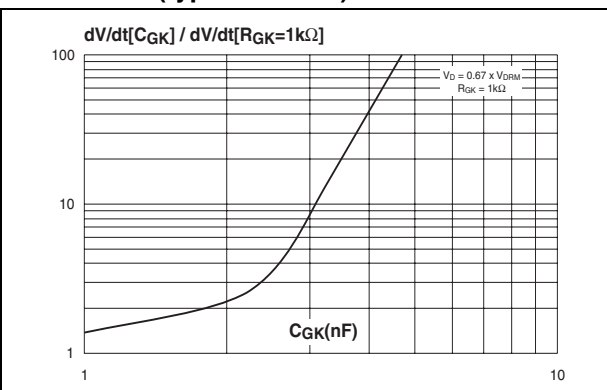
**Figure 10. Relative variation of holding current versus gate-cathode resistance (typical values)**



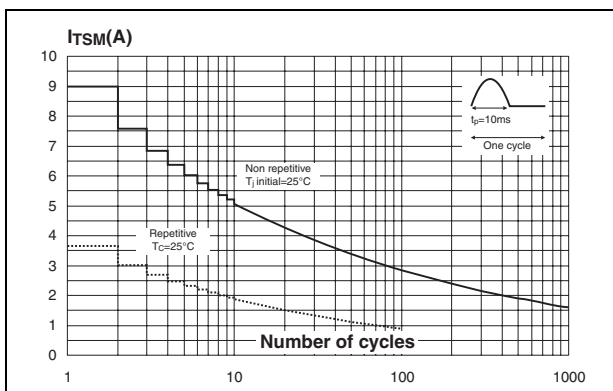
**Figure 11. Relative variation of dV/dt immunity versus gate-cathode resistance (typical values)**



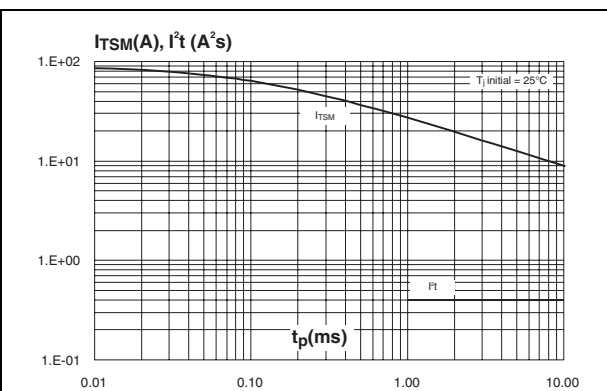
**Figure 12. Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values)**



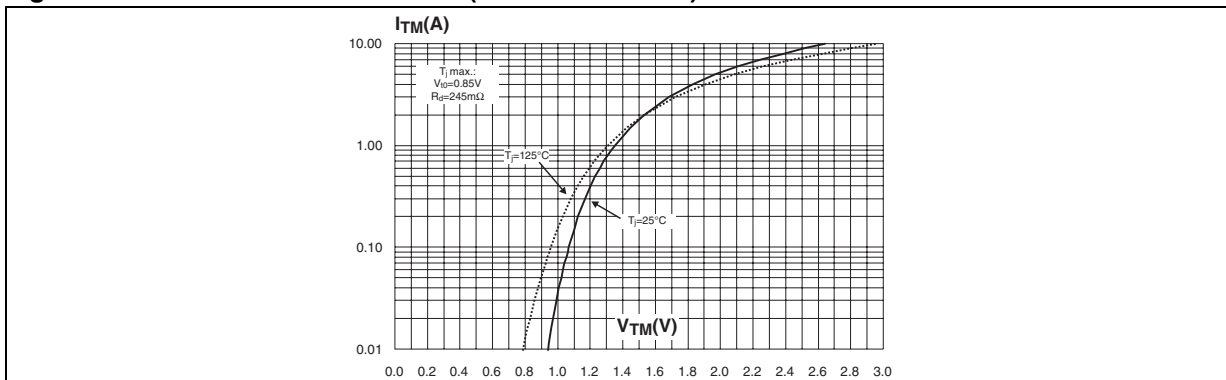
**Figure 13. Surge peak on-state current versus number of cycles**



**Figure 14. Non repetitive surge peak on-state current for a sinusoidal pulse with width t\_p < 10ms, and corresponding value of I^2t**

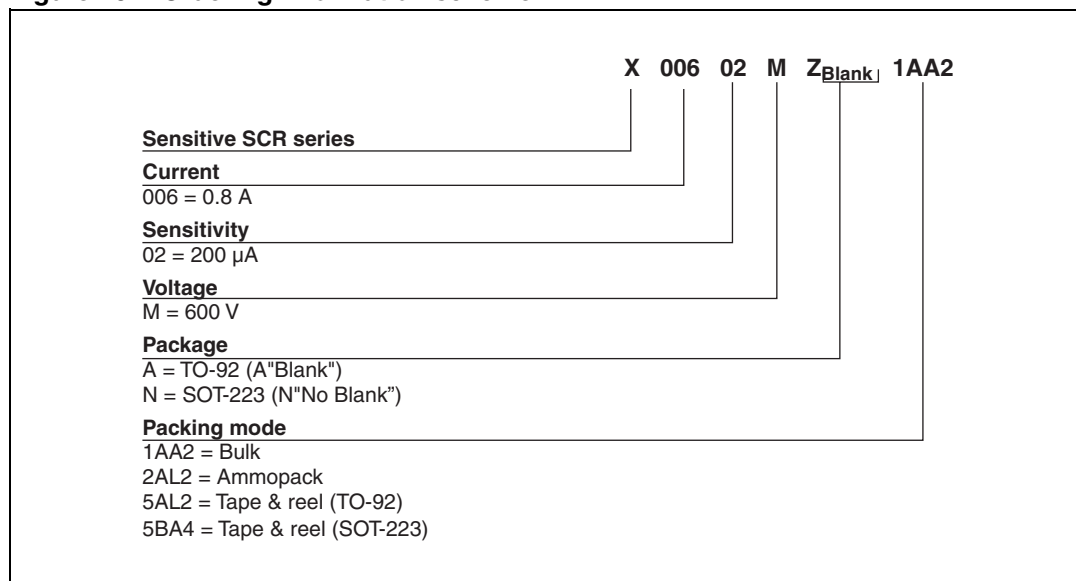


**Figure 15. On-state characteristics (maximum values)**



## 2 Ordering information scheme

Figure 16. Ordering information scheme



### 3 Package information

- Epoxy meets UL94, V0

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at [www.st.com](http://www.st.com).

**Table 4. TO-92 (plastic) dimensions**

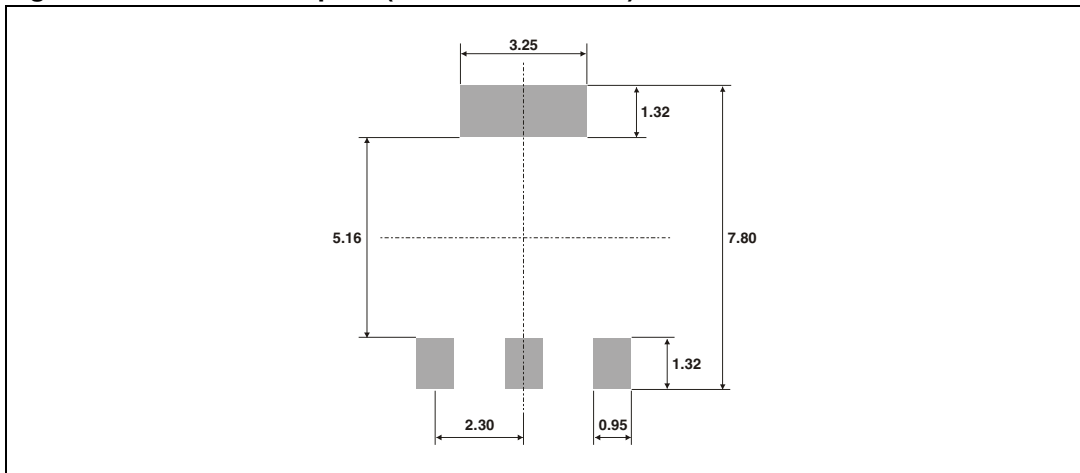
| Ref. | Dimensions  |      |      |        |       |       |
|------|-------------|------|------|--------|-------|-------|
|      | Millimeters |      |      | Inches |       |       |
|      | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A    |             | 1.35 |      |        | 0.053 |       |
| B    |             |      | 4.70 |        |       | 0.185 |
| C    |             | 2.54 |      |        | 0.100 |       |
| D    | 4.40        |      |      | 0.173  |       |       |
| E    | 12.70       |      |      | 0.500  |       |       |
| F    |             |      | 3.70 |        |       | 0.146 |
| a    |             |      | 0.50 |        |       | 0.019 |

**Table 5. SOT-223 dimensions**

| Ref.             | Dimensions  |      |      |        |       |       |
|------------------|-------------|------|------|--------|-------|-------|
|                  | Millimeters |      |      | Inches |       |       |
|                  | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A                |             |      | 1.80 |        |       | 0.071 |
| A1               |             | 0.02 | 0.10 |        | 0.001 | 0.004 |
| B                | 0.60        | 0.70 | 0.85 | 0.024  | 0.027 | 0.033 |
| B1               | 2.90        | 3.00 | 3.15 | 0.114  | 0.118 | 0.124 |
| c                | 0.24        | 0.26 | 0.35 | 0.009  | 0.010 | 0.014 |
| D <sup>(1)</sup> | 6.30        | 6.50 | 6.70 | 0.248  | 0.256 | 0.264 |
| e                |             | 2.3  |      |        | 0.090 |       |
| e1               |             | 4.6  |      |        | 0.181 |       |
| E <sup>(1)</sup> | 3.30        | 3.50 | 3.70 | 0.130  | 0.138 | 0.146 |
| H                | 6.70        | 7.00 | 7.30 | 0.264  | 0.276 | 0.287 |
| V                | 10° max     |      |      |        |       |       |

1. Do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm (0.006inches)

Figure 17. SOT-223 footprint (dimensions in mm)t



## 4 Ordering information

Table 6. Ordering information

| Order code    | Marking  | Package | Weight | Base qty | Delivery mode |
|---------------|----------|---------|--------|----------|---------------|
| X00602MA 1AA2 | X0602 MA | TO-92   | 0.2 g  | 2500     | Bulk          |
| X00602MA 2AL2 |          |         |        | 2000     | Ammopack      |
| X00602MA 5AL2 |          |         |        | 2000     | Tape and reel |
| X00602MN5BA4  | X06 2M   | SOT-223 | 0.12 g | 1000     |               |

## 5 Revision history

Table 7. Document revision history

| Date        | Revision | Changes  |
|-------------|----------|--|
| Jan-2002    | 3        | Last update.   |
| 08-Aug-2006 | 4        | SOT-223 package added.   |
| 1-Apr-2008  | 5        | Reformatted to current standards. Device X00605 removed. Updated dimensions in <a href="#">Table 5</a> . |



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