

Features

- $I_{T(RMS)} = 0.8\text{ A}$
- $V_{DRM}, V_{RRM} = 600\text{ V}$
- $I_{GT} = 30\text{ to }200\ \mu\text{A}$

Applications

- Limited gate current topologies
- Ground fault circuit interrupters
- Overvoltage crowbar protection in power supplies
- Protection in electronic ballasts
- Capacitive discharge ignitions
- Igniters (lighting, oven...)

Description

The X006 SCR can be used as on/off function in applications where topology does not offer high current for gate triggering.

This device is optimized in forward voltage drop and inrush current capabilities for reduced power losses and high reliability in harsh environments.

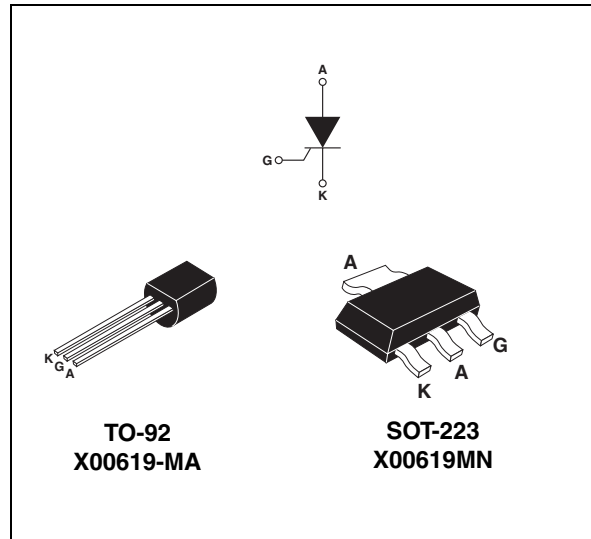


Table 1. Device summary

| | |
|---------------------|-------------------------|
| $I_{T(RMS)}$ | 0.8 A |
| V_{DRM} / V_{RRM} | 600 V |
| I_{GT} | 30 to 200 μA |

1 Characteristics

Table 2. Absolute ratings (limiting values, $T_j = 25\text{ °C}$ unless otherwise specified)

| Symbol | Parameter | | Value | Unit | |
|--------------------|--|-------------------------|-----------------------|--------------------------------|-------------|
| $I_{T(RMS)}$ | On-state rms current (180 °Conduction angle) | TO-92 | $T_L = 83\text{ °C}$ | 0.8 | A |
| | | SOT-223 | $T_c = 107\text{ °C}$ | | |
| $I_{T(AV)}$ | Average on-state current (180 °Conduction angle) | TO-92 | $T_L = 83\text{ °C}$ | 0.5 | A |
| | | SOT-223 | $T_c = 107\text{ °C}$ | | |
| 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 $I_G = 2 \times I_{GT}, t_r \leq 100\text{ ns}$ | F = 60 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} T_j | Storage junction temperature range Operating junction temperature range | | | - 40 to + 150 - 40 to + 125 | $^{\circ}C$ |

Table 3. Electrical characteristics ($T_j = 25\text{ °C}$ unless otherwise specified)

| Symbol | Test conditions | | Value | Unit | |
|----------|--|-----------------------|-------|---------|-----------|
| I_{GT} | $V_D = 12\text{ V}, R_L = 140\text{ }\Omega$ | MIN. | 30 | μA | |
| | | MAX. | 200 | | |
| V_{GT} | | | 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. | 40 | $V/\mu s$ |

Table 4. Static electrical characteristics

| Symbol | Test conditions | | Value | Unit | |
|-------------------|--|-----------------------|-------|---------|-----------|
| V_{TM} | $I_{TM} = 1\text{ A}, t_p = 380\text{ }\mu s$ | $T_j = 25\text{ °C}$ | MAX | 1.35 | V |
| V_{TO} | Threshold voltage | $T_j = 125\text{ °C}$ | | 0.85 | V |
| R_d | Dynamic resistance | | | 245 | $m\Omega$ |
| $I_{DRM} I_{RRM}$ | $V_{DRM} = V_{RRM}, R_{GK} = 1\text{ k}\Omega$ | $T_j = 25\text{ °C}$ | | 1 | μA |
| | | $T_j = 125\text{ °C}$ | 100 | μA | |

Table 5. Thermal resistances

| Symbol | Parameter | | Value | Unit |
|---------------|--------------------------|---------------------------------|-------|-----------------------------|
| $R_{th(j-l)}$ | Junction to leads (DC) | TO-92 | Max. | $^{\circ}\text{C}/\text{W}$ |
| $R_{th(j-c)}$ | Junction to case (DC) | SOT-223 | | |
| $R_{th(j-a)}$ | Junction to ambient (DC) | TO-92 | | |
| | | $S = 5 \text{ cm}^2$ SOT-223 | | |
| | | | 70 | |
| | | | 30 | |
| | | | 150 | |
| | | | 60 | |

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



Figure 2. Average and DC on-state current versus case temperature (SOT-223)



Figure 3. Average and DC on-state current versus lead temperature (TO-92)



Figure 4. Average and DC on-state current versus ambient temperature (free air convection)



Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration

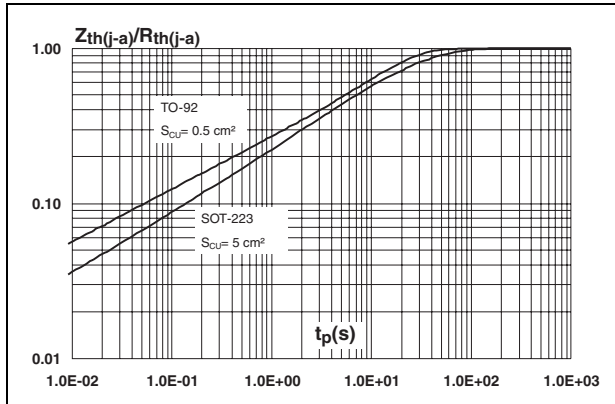


Figure 6. Relative variation of gate trigger, holding and latching current versus junction temperature



Figure 7. Relative variation of holding current versus gate-cathode resistance (typical values)

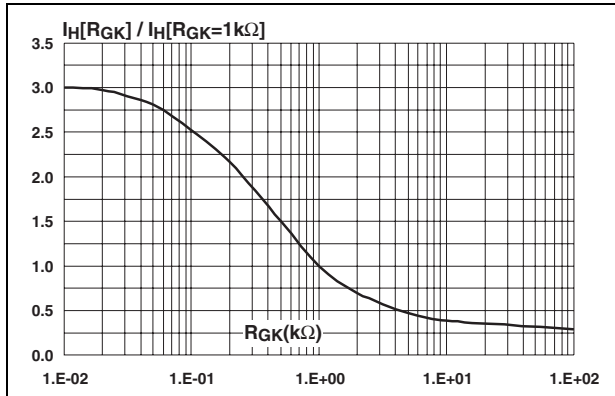


Figure 8. Relative variation of dV/dt immunity versus gate-cathode resistance (typical values)



Figure 9. Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values)

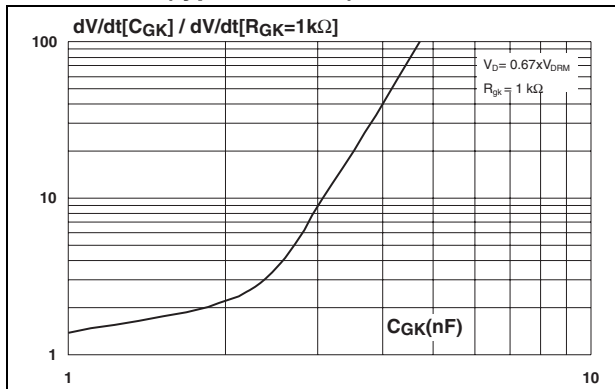


Figure 10. Surge peak on-state current versus number of cycles



Figure 11. Non repetitive surge peak on state current for a sinusoidal pulse and corresponding value of I^2t

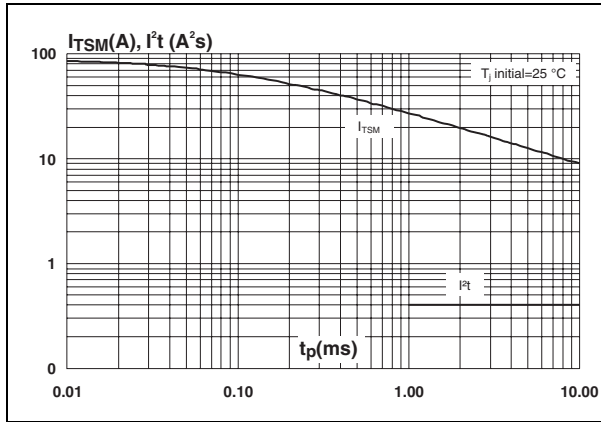


Figure 12. On-state characteristics (maximum values)

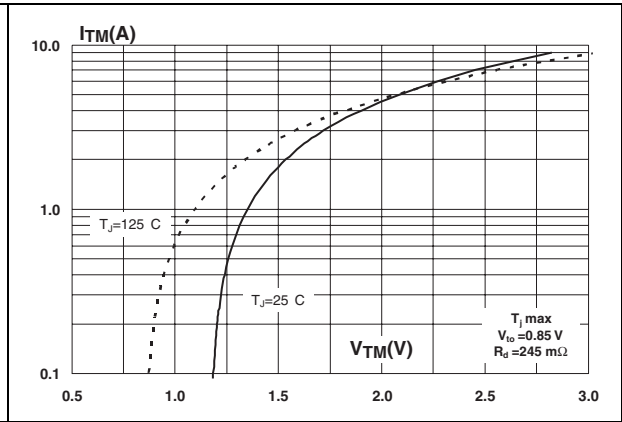
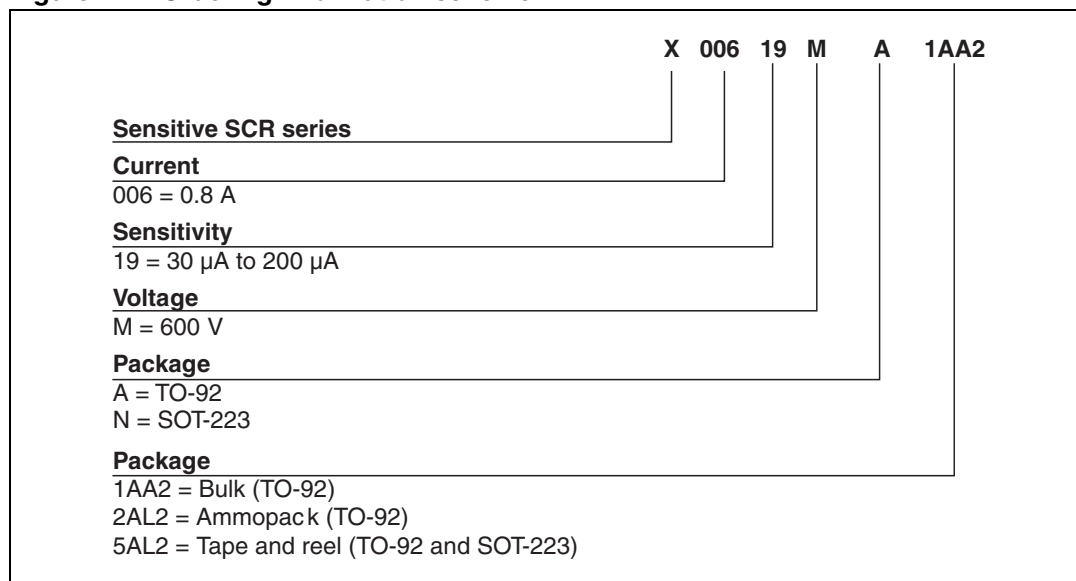


Figure 13. Thermal resistance junction to ambient versus copper surface under tab (SOT-223)



2 Ordering information scheme

Figure 14. Ordering information scheme



3 Package information

- Epoxy meets UL94, V0
- Lead-free packages

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK[®] is an ST trademark.

Table 6. TO-92 (plastic) dimensions

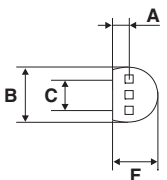
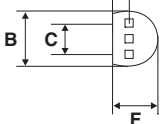
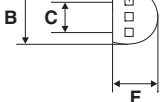




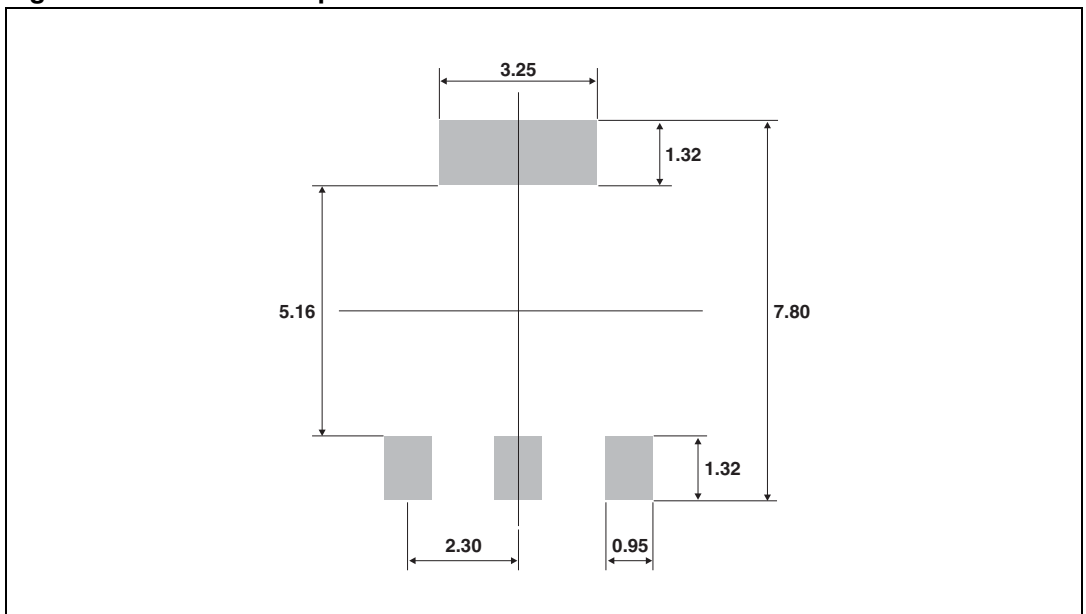
| | Dimensions | | | | | | |
|---|------------|-------------|------|------|--------|-------|-------|
| | Ref. | Millimeters | | | Inches | | |
| | | Min. | Typ. | Max. | Min. | Typ. | Max. |
|  | A | - | 1.35 | - | - | 0.053 | - |
|  | B | - | - | 4.70 | - | - | 0.185 |
|  | C | - | 2.54 | - | - | 0.100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

Table 7. 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 ⁽¹⁾ | 6.30 | 6.50 | 6.70 | 0.248 | 0.256 | 0.264 |
| e | | 2.3 | | | 0.090 | |
| e1 | | 4.6 | | | 0.181 | |
| E ⁽¹⁾ | 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 15. SOT-223 footprint



4 Ordering information

Table 8. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|--------------|-----------|---------|--------|----------|---------------|
| X00619MA1AA2 | X0619 MA | TO-92 | 0.2 g | 2500 | Bulk |
| X00619MA2AL2 | | | | 2000 | Ammopack |
| X00619MA5AL2 | | | | 2000 | Tape and reel |
| X00619MN5AL2 | X0 619 MN | SOT-223 | 0.12 g | 1000 | |

5 Revision history

Table 9. Document revision history

| Date | Revision | Changes |
|-------------|----------|------------------------|
| 26-May-2009 | 1 | First issue |
| 03-May-2012 | 2 | Added SOT-223 package. |

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