



# X04xxxE/F

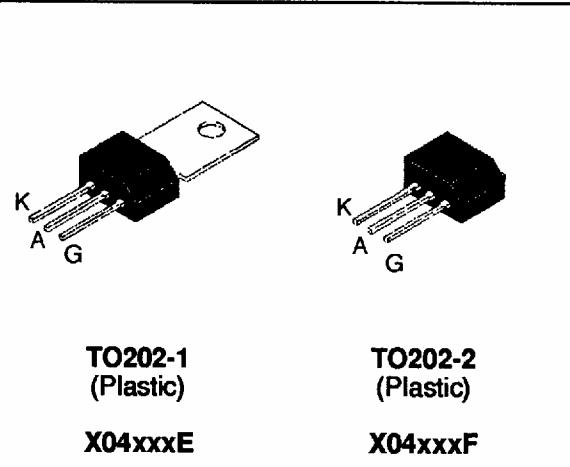
## SENSITIVE GATE SCR

### FEATURES

- $I_{T(RMS)} = 4A$
- $V_{DRM} = 200V$  to  $800V$
- Low  $I_{GT} < 200\mu A$

### DESCRIPTION

The X04xxxE/F series of SCRs uses a high performance TOP GLASS PNPN technology. These parts are intended for general purpose applications where low gate sensitivity is required.



### ABSOLUTE RATINGS (limiting values)

| Symbol             | Parameter  |                            | Value              |            | Unit   |
|--------------------|--|----------------------------|--------------------|------------|--------|
| $I_{T(RMS)}$       | RMS on-state current<br>(180° conduction angle)  | X04xxxE/F                  | $T_c = 90^\circ C$ | 4          | A      |
|                    |  | X04xxxF                    | $T_a = 25^\circ C$ | 1.35       |        |
| $I_{T(AV)}$        | Mean on-state current<br>(180° conduction angle)   | X04xxxE/F                  | $T_c = 90^\circ C$ | 2.5        | A      |
|                    |  | X04xxxF                    | $T_a = 25^\circ C$ | 0.9        |        |
| $I_{TSM}$          | Non repetitive surge peak on-state current<br>( $T_j$ initial = $25^\circ C$ )                     | $t_p = 8.3 \text{ ms}$     | 33                 |            | A      |
|                    |  | $t_p = 10 \text{ ms}$      | 30                 |            |        |
| $I^2t$             | $I^2t$ Value for fusing  | $t_p = 10 \text{ ms}$      | 4.5                |            | $A^2s$ |
| $dI/dt$            | Critical rate of rise of on-state current<br>$I_G = 10 \text{ mA}$ $dI/dt = 0.1 \text{ A}/\mu s$ . | 50                         |                    | $A/\mu s$  |        |
| $T_{stg}$<br>$T_j$ | Storage and operating junction temperature range   | $-40, +150$<br>$-40, +125$ |                    | $^\circ C$ |        |
| $T_I$              | Maximum lead temperature for soldering during 10s at<br>4.5mm from case                            | 260                        |                    | $^\circ C$ |        |

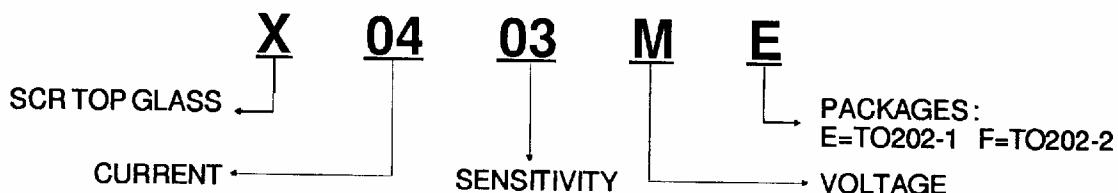
| Symbol                 | Parameter  | Voltage |     |     |     | Unit |
|------------------------|--|---------|-----|-----|-----|------|
|                        |  | B       | D   | M   | N   |      |
| $V_{DRM}$<br>$V_{RRM}$ | Repetitive peak off-state voltage<br>$T_j = 125^\circ C$ $R_{GK} = 1K\Omega$ | 200     | 400 | 600 | 800 | V    |

**X04xxxE/F****THERMAL RESISTANCES**

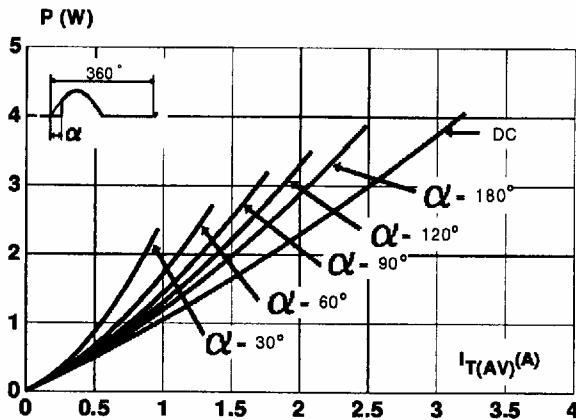
| Symbol               | Parameter               | Value   |     | Unit |
|----------------------|-------------------------|---------|-----|------|
| R <sub>th(j-a)</sub> | Junction to ambient     | X04xxxE | 80  | °C/W |
|                      |                         | X04xxxF | 100 |      |
| R <sub>th(j-c)</sub> | Junction to case for DC | 7.5     |     | °C/W |

**GATE CHARACTERISTICS (maximum values)**P<sub>G (AV)</sub> = 0.2 W P<sub>GM</sub> = 3 W (tp = 20 μs) I<sub>GM</sub> = 1.2 A (tp = 20 μs)**ELECTRICAL CHARACTERISTICS**

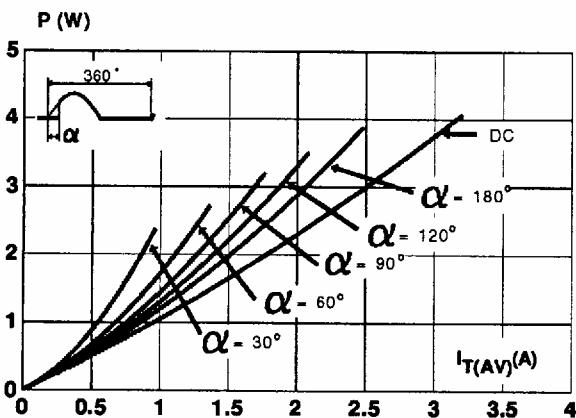
| Symbol                               | Test Conditions   | Sensitivity            |     |     | Unit |      |
|--------------------------------------|---|------------------------|-----|-----|------|------|
|                                      |   | 02                     | 03  | 05  |      |      |
| I <sub>GT</sub>                      | V <sub>D</sub> =12V (DC) R <sub>L</sub> =140Ω   | T <sub>j</sub> = 25°C  | MIN | 20  | 20   | μA   |
|                                      |   |                        | MAX | 200 | 200  |      |
| V <sub>GT</sub>                      | V <sub>D</sub> =12V (DC) R <sub>L</sub> =140Ω   | T <sub>j</sub> = 25°C  | MAX | 0.8 |      | V    |
| V <sub>GD</sub>                      | V <sub>D</sub> =V <sub>DRM</sub> R <sub>L</sub> =3.3kΩ<br>R <sub>GK</sub> = 1 KΩ  | T <sub>j</sub> = 125°C | MIN | 0.1 |      | V    |
| V <sub>RGM</sub>                     | I <sub>RG</sub> =10μA   | T <sub>j</sub> = 25°C  | MIN | 8   |      | V    |
| t <sub>gd</sub>                      | V <sub>D</sub> =V <sub>DRM</sub> I <sub>TM</sub> = 3 x I <sub>T(AV)</sub><br>dI <sub>G</sub> /dt = 0.1A/μs I <sub>G</sub> = 10mA                                    | T <sub>j</sub> = 25°C  | MAX | 2   |      | μs   |
| I <sub>H</sub>                       | I <sub>T</sub> = 50mA R <sub>GK</sub> = 1 KΩ  | T <sub>j</sub> = 25°C  | MAX | 5   |      | mA   |
| I <sub>L</sub>                       | I <sub>G</sub> =1mA R <sub>GK</sub> = 1 KΩ  | T <sub>j</sub> = 25°C  | MAX | 6   |      | mA   |
| V <sub>TM</sub>                      | I <sub>TM</sub> = 8A tp= 380μs  | T <sub>j</sub> = 25°C  | MAX | 1.8 |      | V    |
| I <sub>DRM</sub><br>I <sub>RRM</sub> | V <sub>D</sub> = V <sub>DRM</sub> R <sub>GK</sub> = 1 KΩ<br>V <sub>R</sub> = V <sub>RRM</sub>   | T <sub>j</sub> = 25°C  | MAX | 5   |      | μA   |
|                                      |   | T <sub>j</sub> = 110°C | MAX | 200 |      |      |
| dV/dt                                | V <sub>D</sub> =67%V <sub>DRM</sub> R <sub>GK</sub> = 1 KΩ  | T <sub>j</sub> = 110°C | MIN | 10  |      | V/μs |
|                                      |   |                        | TYP | 15  | 20   |      |
| t <sub>q</sub>                       | I <sub>TM</sub> = 3 x I <sub>T(AV)</sub> V <sub>R</sub> =35V<br>dI/dt=10A/μs tp=100μs<br>dV/dt=2V/μs<br>V <sub>D</sub> = 67%V <sub>DRM</sub> R <sub>GK</sub> = 1 KΩ | T <sub>j</sub> = 110°C | MAX | 50  |      | μs   |

**ORDERING INFORMATION**

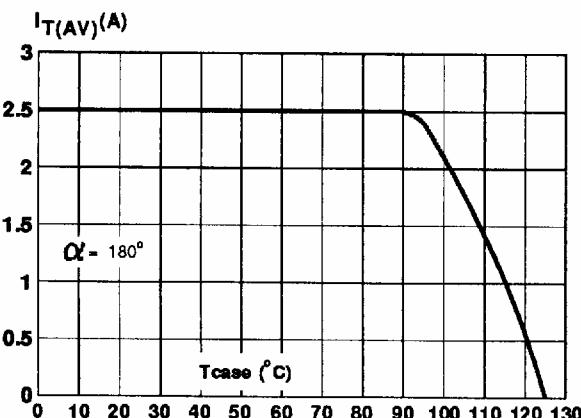
**Fig.1 :** Maximum average power dissipation versus average on-state current (TO202-1).



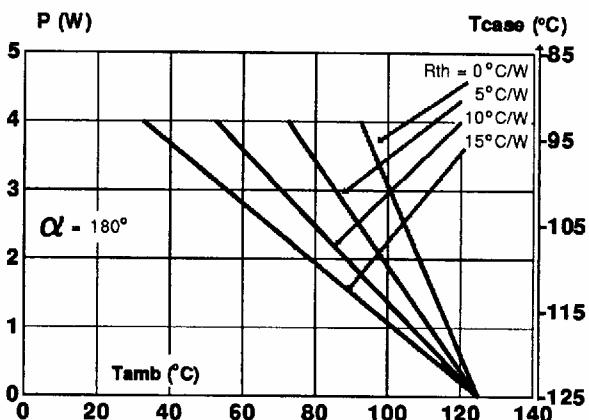
**Fig.3 :** Maximum average power dissipation versus average on-state current (TO202-2).



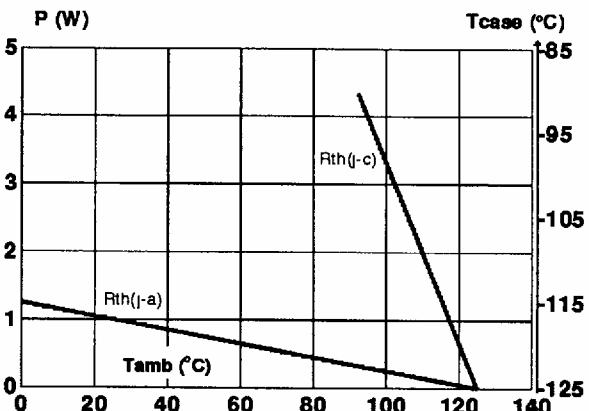
**Fig.5 :** Average on-state current versus case temperature (TO202-1).



**Fig.2 :** Correlation between maximum average power dissipation and maximum allowable temperature (Tamb and Tcase) for different thermal resistances heatsink + contact (TO202-1).



**Fig.4 :** Correlation between maximum average power dissipation and maximum allowable temperature (Tamb and Tcase) (TO202-2).



**Fig.6 :** Average on-state current versus case temperature (TO202-2).

