

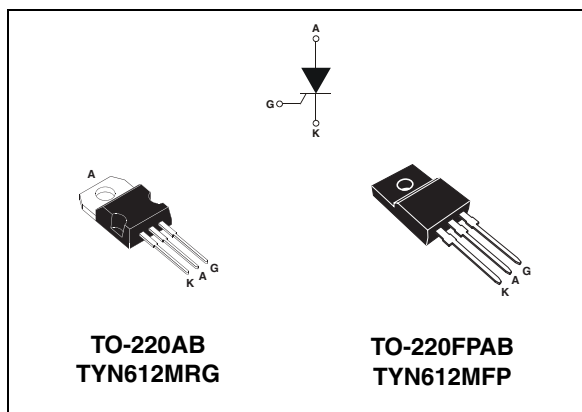
### Main features

| Symbol                       | Value   | Unit |
|------------------------------|---------|------|
| $I_{T(RMS)}$                 | 12      | A    |
| $V_{DRM}/V_{RRM}$            | 600     | V    |
| $I_{GT} \text{ (min / max)}$ | 1.5 / 5 | mA   |

### Description

The TYN612M SCR is suitable to fit modes of control found in applications such as voltage regulation circuits for motorbikes, overvoltage crowbar protection, motor control circuits in power tools and kitchen aids, inrush current limiting circuits, capacitive discharge ignition.

The insulated fullpack package allows a back to back configuration.



### Order codes

| Part Numbers | Marking   |
|--------------|-----------|
| TYN612MRG    | TYN612M   |
| TYN612MFP    | TYN612MFP |

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

| Symbol             | Parameter                                                                                        |                        |                             | Value                          | Unit               |
|--------------------|--------------------------------------------------------------------------------------------------|------------------------|-----------------------------|--------------------------------|--------------------|
| $I_{T(RMS)}$       | RMS on-state current<br>(180° conduction angle)                                                  | TO-220AB               | $T_c = 105^\circ \text{ C}$ | 12                             | A                  |
|                    |                                                                                                  | TO-220FPAB             | $T_c = 70^\circ \text{ C}$  | 12                             |                    |
| $I_{T(AV)}$        | Average on-state current<br>(180° conduction angle)                                              | TO-220AB               | $T_c = 105^\circ \text{ C}$ | 8                              | A                  |
|                    |                                                                                                  | TO-220FPAB             | $T_c = 70^\circ \text{ C}$  | 8                              |                    |
| $I_{TSM}$          | Non repetitive surge peak on-state current                                                       | $t_p = 8.3 \text{ ms}$ | $T_j = 25^\circ \text{ C}$  | 125                            | A                  |
|                    |                                                                                                  | $t_p = 10 \text{ ms}$  |                             | 120                            |                    |
| $I^2t$             | $I^2t$ Value for fusing                                                                          | $t_p = 10 \text{ ms}$  | $T_j = 25^\circ \text{ C}$  | 72                             | $A^2s$             |
| $di/dt$            | Critical rate of rise of on-state current<br>$I_G = 2 \times I_{GT}$ , $t_r \leq 100 \text{ ns}$ | $F = 60 \text{ Hz}$    | $T_j = 125^\circ \text{ C}$ | 50                             | $A/\mu s$          |
| $I_{GM}$           | Peak gate current                                                                                | $t_p = 20 \mu s$       | $T_j = 125^\circ \text{ C}$ | 4                              | A                  |
| $P_{G(AV)}$        | Average gate power dissipation                                                                   |                        | $T_j = 125^\circ \text{ C}$ | 1                              | W                  |
| $T_{stg}$<br>$T_j$ | Storage junction temperature range<br>Operating junction temperature range                       |                        |                             | - 40 to + 150<br>- 40 to + 125 | $^\circ \text{ C}$ |
| $V_{RGM}$          | Maximum peak reverse gate voltage                                                                |                        |                             | 5                              | V                  |

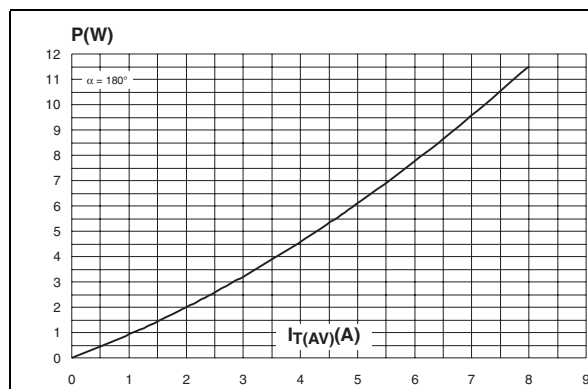
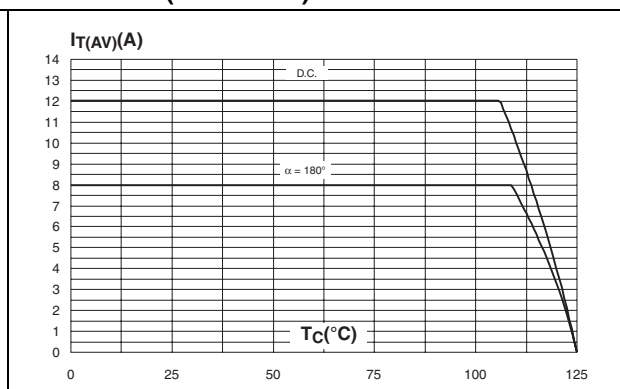
# 1 Characteristics

**Table 2. Electrical characteristics ( $T_j = 25^\circ \text{C}$ , unless otherwise specified)**

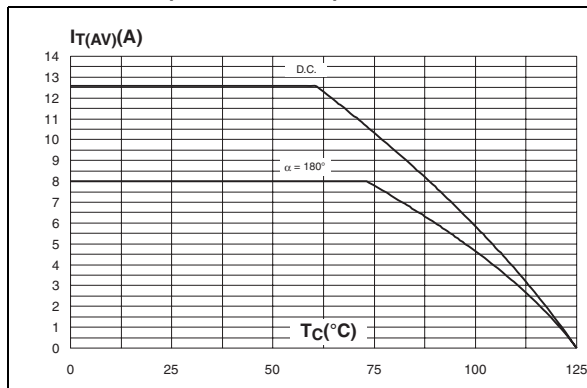
| Symbol                               | Test Conditions                                           |                         |      | Value | Unit |
|--------------------------------------|-----------------------------------------------------------|-------------------------|------|-------|------|
| I <sub>GT</sub>                      | V <sub>D</sub> = 12 V      R <sub>L</sub> = 140 Ω         |                         | MIN. | 1.5   | mA   |
|                                      |                                                           |                         | MAX. | 5     |      |
| V <sub>GT</sub>                      | V <sub>D</sub> = 12 V      R <sub>L</sub> = 140 Ω         |                         | MIN. | 0.5   | V    |
|                                      |                                                           |                         | TYP. | 0.7   |      |
|                                      |                                                           |                         | MAX. | 1.3   |      |
| V <sub>GD</sub>                      | V <sub>D</sub> = V <sub>DRM</sub> R <sub>L</sub> = 3.3 kΩ | T <sub>j</sub> = 125° C | MIN. | 0.2   | V    |
| I <sub>H</sub>                       | I <sub>T</sub> = 500 mA    Gate open                      |                         | MAX. | 20    | mA   |
| I <sub>L</sub>                       | I <sub>G</sub> = 1.2 I <sub>GT</sub>                      |                         | MAX. | 40    | mA   |
| dV/dt                                | V <sub>D</sub> = 67 % V <sub>DRM</sub> Gate open          | T <sub>j</sub> =125° C  | MIN. | 50    | V/μs |
| V <sub>TM</sub>                      | I <sub>TM</sub> = 24 A    t <sub>p</sub> = 380 μs         | T <sub>j</sub> = 25° C  | MAX. | 1.6   | V    |
| V <sub>t0</sub>                      | Threshold voltage                                         | T <sub>j</sub> = 125° C | MAX. | 0.85  | V    |
| R <sub>d</sub>                       | Dynamic resistance                                        | T <sub>j</sub> = 125° C | MAX. | 30    | mΩ   |
| I <sub>DRM</sub><br>I <sub>RRM</sub> | V <sub>DRM</sub> = V <sub>RRM</sub>                       | T <sub>j</sub> = 25° C  | MAX. | 5     | μA   |
|                                      |                                                           | T <sub>j</sub> = 125° C |      | 2     | mA   |

**Table 3. Thermal resistance**

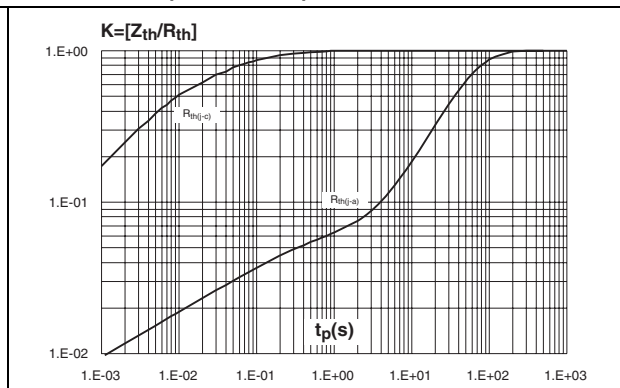
| Symbol        | Parameter                |            | Value | Unit                |
|---------------|--------------------------|------------|-------|---------------------|
| $R_{th(j-c)}$ | Junction to case (DC)    | TO-220AB   | 1.3   | $^\circ \text{C/W}$ |
|               |                          | TO-220FPAB | 4.5   |                     |
| $R_{th(j-a)}$ | Junction to ambient (DC) | TO-220AB   | 55    | $^\circ \text{C/W}$ |
|               |                          | TO-220FPAB | 55    |                     |

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

**Figure 2. Average and D.C. on-state current versus case temperature (TO-220AB)**


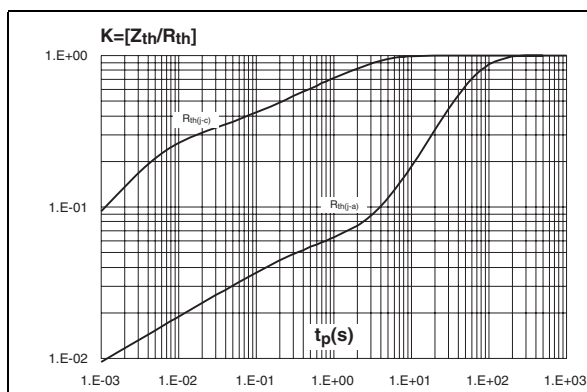
**Figure 3. Average and D.C. on-state current versus case temperature (TO-220FPAB)**



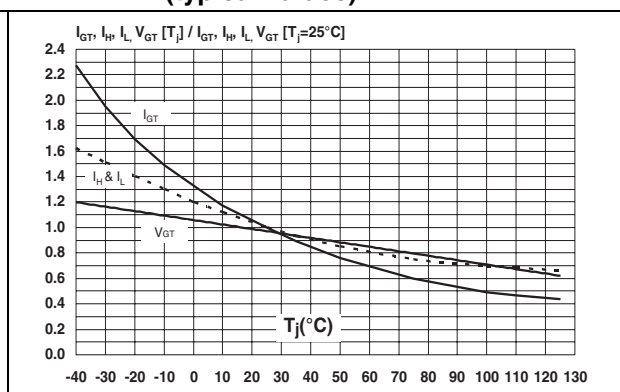
**Figure 4. Relative variation of thermal impedance versus pulse duration (TO-220AB)**



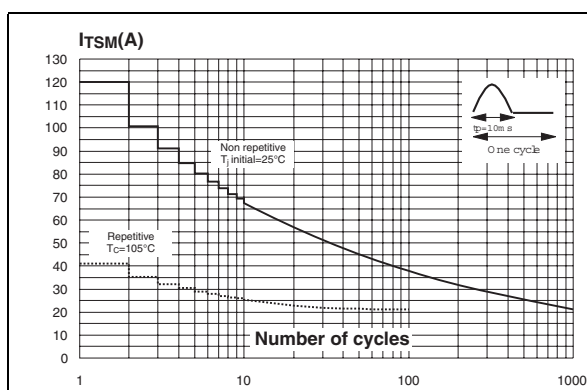
**Figure 5. Relative variation of thermal impedance versus pulse duration (TO-220FPAB)**



**Figure 6. Relative variation of gate trigger current, holding current, latching current and gate trigger voltage versus junction temperature (typical values)**



**Figure 7. Surge peak on-state current versus number of cycles**



**Figure 8. Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10$  ms, and corresponding values of  $I^2t$**

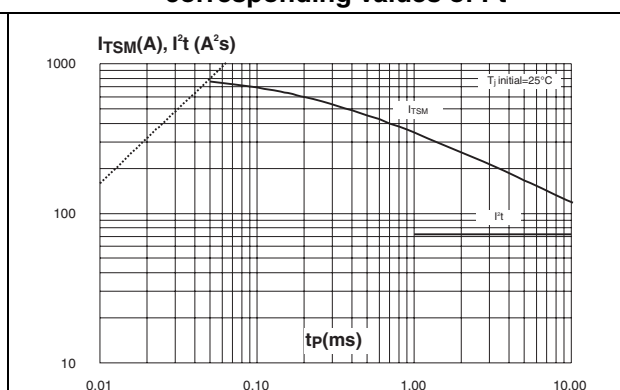
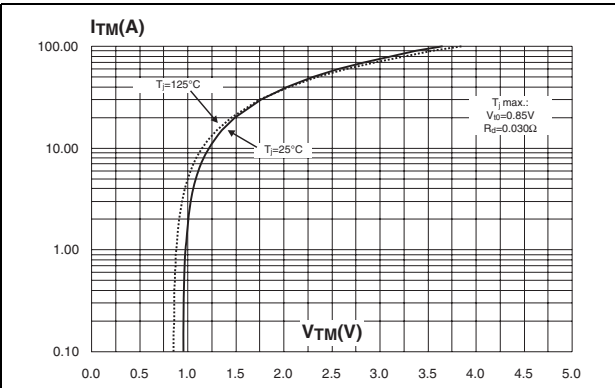
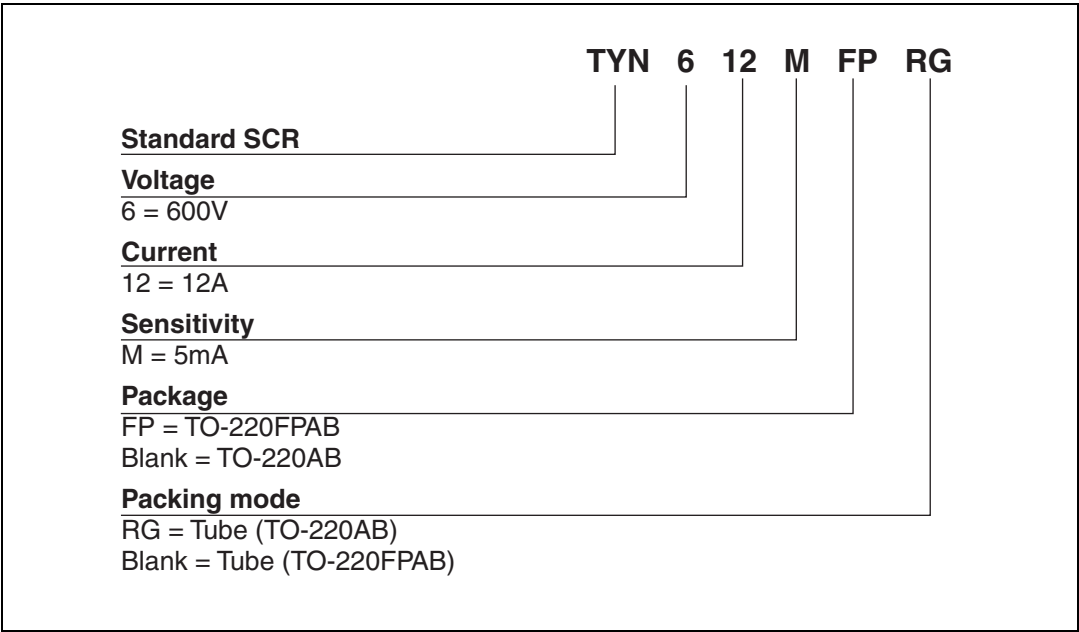


Figure 9. On-state characteristics  
(maximum values)



2 Ordering information scheme



### 3 Package information

- Epoxy meets UL94, V0

**Table 4. TO-220AB dimensions**

| Ref. | Dimensions  |       |       |        |       |       |
|------|-------------|-------|-------|--------|-------|-------|
|      | Millimeters |       |       | Inches |       |       |
|      | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| A    | 15.20       |       | 15.90 | 0.598  |       | 0.625 |
| a1   |             | 3.75  |       |        | 0.147 |       |
| a2   | 13.00       |       | 14.00 | 0.511  |       | 0.551 |
| B    | 10.00       |       | 10.40 | 0.393  |       | 0.409 |
| b1   | 0.61        |       | 0.88  | 0.024  |       | 0.034 |
| b2   | 1.23        |       | 1.32  | 0.048  |       | 0.051 |
| C    | 4.40        |       | 4.60  | 0.173  |       | 0.181 |
| c1   | 0.49        |       | 0.70  | 0.019  |       | 0.027 |
| c2   | 2.40        |       | 2.72  | 0.094  |       | 0.107 |
| e    | 2.40        |       | 2.70  | 0.094  |       | 0.106 |
| F    | 6.20        |       | 6.60  | 0.244  |       | 0.259 |
| ØI   | 3.75        |       | 3.85  | 0.147  |       | 0.151 |
| I4   | 15.80       | 16.40 | 16.80 | 0.622  | 0.646 | 0.661 |
| L    | 2.65        |       | 2.95  | 0.104  |       | 0.116 |
| I2   | 1.14        |       | 1.70  | 0.044  |       | 0.066 |
| I3   | 1.14        |       | 1.70  | 0.044  |       | 0.066 |
| M    |             | 2.60  |       |        | 0.102 |       |

Table 5. TO-220FPAB Dimensions

| Ref. | Dimensions  |      |           |       |
|------|-------------|------|-----------|-------|
|      | Millimeters |      | Inches    |       |
|      | Min.        | Max. | Min.      | Max.  |
| A    | 4.4         | 4.6  | 0.173     | 0.181 |
| B    | 2.5         | 2.7  | 0.098     | 0.106 |
| D    | 2.5         | 2.75 | 0.098     | 0.108 |
| E    | 0.45        | 0.70 | 0.018     | 0.027 |
| F    | 0.75        | 1    | 0.030     | 0.039 |
| F1   | 1.15        | 1.70 | 0.045     | 0.067 |
| F2   | 1.15        | 1.70 | 0.045     | 0.067 |
| G    | 4.95        | 5.20 | 0.195     | 0.205 |
| G1   | 2.4         | 2.7  | 0.094     | 0.106 |
| H    | 10          | 10.4 | 0.393     | 0.409 |
| L2   | 16 Typ.     |      | 0.63 Typ. |       |
| L3   | 28.6        | 30.6 | 1.126     | 1.205 |
| L4   | 9.8         | 10.6 | 0.386     | 0.417 |
| L5   | 2.9         | 3.6  | 0.114     | 0.142 |
| L6   | 15.9        | 16.4 | 0.626     | 0.646 |
| L7   | 9.00        | 9.30 | 0.354     | 0.366 |
| Dia. | 3.00        | 3.20 | 0.118     | 0.126 |

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 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).

## 4 Ordering information

| Ordering type | Marking   | Package  | Weight | Base qty | Delivery mode |
|---------------|-----------|----------|--------|----------|---------------|
| TYN612MRG     | TYN612M   | TO-220AB | 2.3 g  | 50       | Tube          |
| TYN612MFP     | TYN612MFP | TO-220AB | 2.0 g  | 50       | Tube          |

## 5 Revision history

| Date        | Revision | Description of Changes                                                                                       |
|-------------|----------|--------------------------------------------------------------------------------------------------------------|
| Sep-2002    | 1A       | Last update.                                                                                                 |
| 10-Fev-2005 | 2        | TO-220FPAB package added.                                                                                    |
| 11-Apr-2007 | 3        | Reformatted to current standards. Added typical and minimum values for $V_{GT}$ in <a href="#">Table 2</a> . |
| 17-Apr-2007 | 4        | Added $V_{GT}$ curve in <a href="#">Figure 6</a> .                                                           |

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