
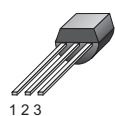


### HAOPIN MICROELECTRONICS CO.,LTD.

#### Description

Glass passivated, sensitive gate thyristors in a plastic envelope, intended for use in general purpose switching and phase control applications. These devices are intended to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

| Symbol  |             | Simplified outline   |  |
|---|-------------|--|--|
|  |             | <br>TO-92 |  |
| Pin   | Description |  |  |
| 1   | Cathode     |  |  |
| 2   | anode       |  |  |
| 3   | gate        |  |  |
| TAB   | anode       |  |  |

#### Applications:

- ◆ Motor control
- ◆ Industrial and domestic lighting
- ◆ Heating
- ◆ Static switching

#### Features

- ◆ Blocking voltage to 400 V
- ◆ On-state RMS current to 0.8 A
- ◆ Ultra low gate trigger current

| SYMBOL      | PARAMETER   | Value | Unit |
|-------------|---|-------|------|
| $V_{DRM}$   | Repetitive peak off-state voltages                                    | 400   | V    |
| $I_T (RMS)$ | RMS on-state current (full sine wave)                                 | 0.8   | A    |
| $I_{TSM}$   | Non-repetitive peak on-state current (full cycle, $T_j$ initial=25°C) | 8     | A    |

| SYMBOL        | PARAMETER                | Value | UNIT |
|---------------|--------------------------|-------|------|
| $R_{th(j-a)}$ | Junction to ambient (DC) | 150   | °C/W |
| $R_{th(j-l)}$ | Junction to lead (DC)    | 80    | °C/W |

### HAOPIN MICROELECTRONICS CO.,LTD.

Limiting values in accordance with the Maximum system(IEC 134)

| SYMBOL             | PARAMETER  | CONDITIONS                                 |          | Value | UNIT                     |                  |
|--------------------|--|--|----------|-------|--------------------------|------------------|
| $V_{DRM}$          | Repetitive peak off-state Voltages                                     |  | -        | 400   | V                        |                  |
| $I_{TSM}$          | Non repetitive surge peak on-state current                             | Tl=25°C                                    | Tp=8.3ms | -     | 8                        | A                |
|                    |  |  | Tp=10ms  | -     | 7                        |                  |
| $I_{T(AV)}$        | Average On-state Current   | Haif Cycle=180° Tl=55°C                    | -        | 0.5   | A                        |                  |
| $I_{T(RMS)}$       | RMS on-state current   | Tl=55°C                                    | -        | 0.8   | A                        |                  |
| $I_{GM}$           | Peak gate current  | Tp=20 μs Tj=125°C                          | -        | 1     | A                        |                  |
| dI/dt              | Critical rate of rise of on-state current                              | $I_G=2 \cdot I_{GT}$ , tr<=100ns<br>F=60Hz | Tj=125°C | -     | 30                       | A/μs             |
| $P_{G(AV)}$        | Average gate power   |  | Tj=125°C | -     | 0.1                      | W                |
| $I^2t$             | I <sup>2</sup> t Value for fusing                                      | Tp=10ms                                    | Tj=25°C  | -     | 0.24                     | A <sup>2</sup> s |
| $T_{stg}$<br>$T_j$ | Average gate power dissipation<br>Operating junction temperature range |  |          | -     | -40 to+150<br>-40 to+125 | °C               |

T<sub>j</sub>=25°C unless otherwise stated

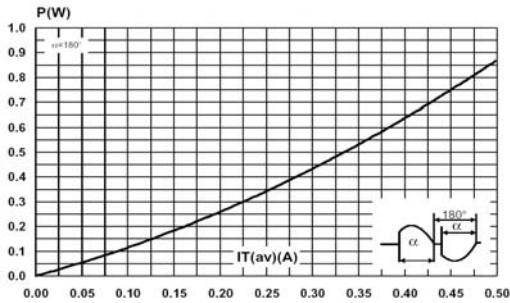
| SYMBOL                 | PARAMETER            | CONDITIONS  | MIN                 | TYP    | MAX        | UNIT     |    |
|------------------------|----------------------|---|---------------------|--------|------------|----------|----|
| Static characteristics |                      |   |                     |        |            |          |    |
| $I_{GT}$<br>$V_{GT}$   | Gate trigger current | $V_D=12V$ $R_L=140\Omega$                           | -                   | -      | 200<br>0.8 | μA<br>V  |    |
| $V_{TM}$<br>$V_{GD}$   | Forward On- voltage  | $I_{TM}=1.6A$ tp=380 μs                             | Tj=25°C             | -      | -          | 1.95     | V  |
|                        |                      | $V_D=V_{DRM}$ $R_L=3.3k\Omega$<br>$R_{GK}=1K\Omega$ | Tj=125°C            | 0.1    | -          | -        | V  |
| $I_H$<br>$I_L$         | Holding Current      | $I_T=50mA$ $R_{GK}=1K\Omega$                        |                     | -      | -          | 5        | mA |
|                        |                      | $I_G=1mA$ $R_{GK}=1K\Omega$                         |                     | -      | -          | 6        | mA |
| $I_{DRM}$              |                      | $V_{DRM}$ $R_{GK}=1k\Omega$                         | Tj=125°C<br>Tj=25°C | -<br>- | -<br>-     | 100<br>1 | μA |
| $V_{TO}$               | Threshold voltage    |   |                     |        |            | 1.0      | V  |

#### Dynamic Characteristics

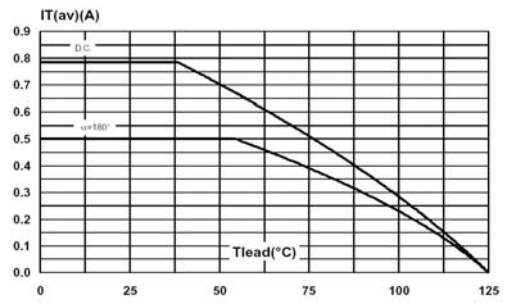
|          |                                       |   |    |   |   |      |
|----------|---------------------------------------|---|----|---|---|------|
| Dv/dt    | Critical rate of rise of voltage rise | $V_D=67\% V_{DRM}$ $R_{GK}=1K\Omega$<br>Tj=125°C              | 75 | - | - | V/μs |
| $t_{gd}$ | Gate controlled delay time            | $I_G=10mA$ , dI <sub>G</sub> /dt=0.1A/us                      | -  | - | - | μs   |
| $t_g$    | commutated turn-off time              | $V_D=0.67V_{DRM}$ , Tj=85°C;<br>$I_T=I_{T(AV)}$ , $V_R=35V$ ; | -  | - | - | μs   |

### Description

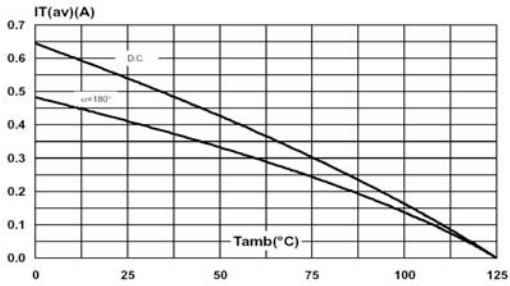
**Fig. 1:** Maximum average power dissipation versus average on-state current.



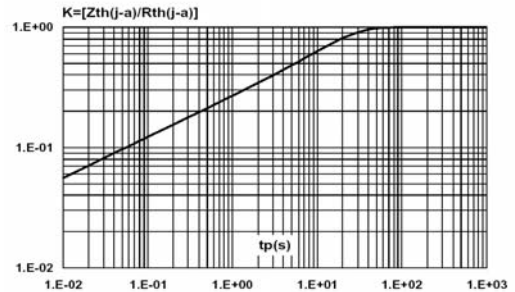
**Fig. 2-1:** Average and D.C. on-state current versus lead temperature.



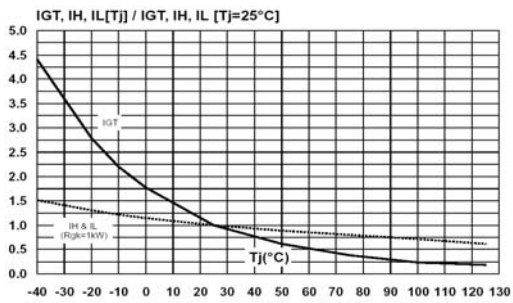
**Fig. 2-2:** Average and D.C. on-state current versus ambient temperature (device mounted on FR4 with recommended pad layout).



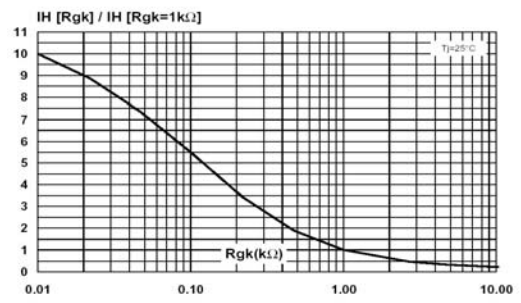
**Fig. 3:** Relative variation of thermal impedance junction to ambient versus pulse duration.



**Fig. 4:** Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values).



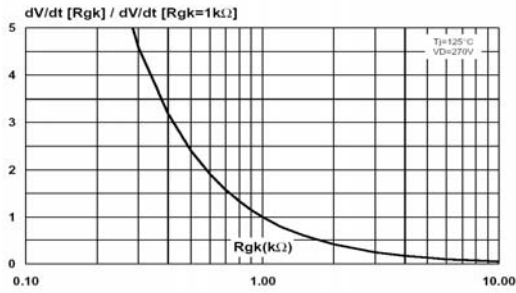
**Fig. 5:** Relative variation of holding current versus gate-cathode resistance (typical values).



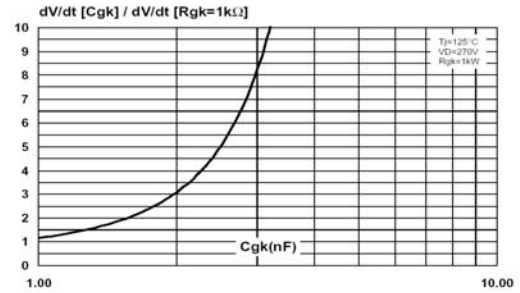
### HAOPIN MICROELECTRONICS CO.,LTD.

#### Description

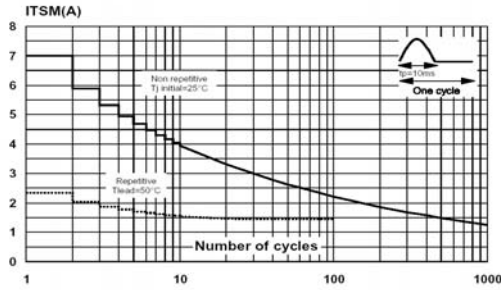
**Fig. 6:** Relative variation of  $dV/dt$  immunity versus gate-cathode resistance (typical values).



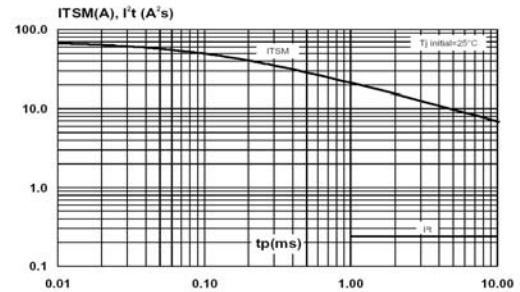
**Fig. 7:** Relative variation of  $dV/dt$  immunity versus gate-cathode capacitance (typical values).



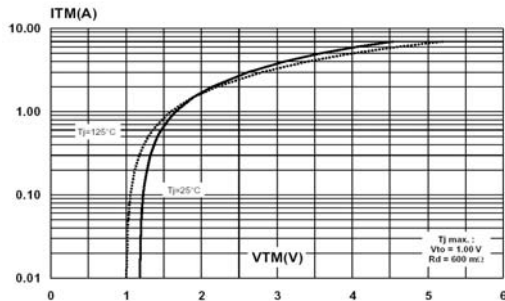
**Fig. 8:** Surge peak on-state current versus number of cycles.



**Fig. 9:** Non repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10ms$ , and corresponding value of  $I^2t$ .



**Fig. 10:** On-state characteristics (maximum values).

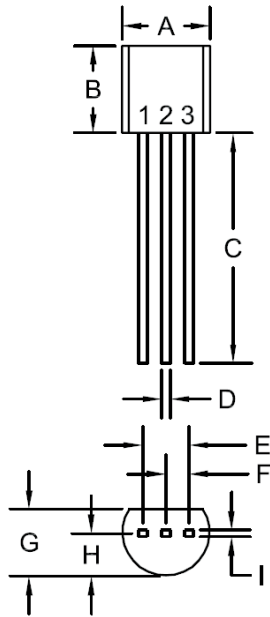


MECHANICAL DATA

Dimensions in mm

Net Mass:0.2 g

TO-92



| SYMBOL  | INCHES |       | MILLIMETERS |      |
|---------|--------|-------|-------------|------|
|         | MIN    | MAX   | MIN         | MAX  |
| A (DIA) | 0.175  | 0.205 | 4.45        | 5.21 |
| B       | 0.170  | 0.210 | 4.32        | 5.33 |
| C       | 0.500  | -     | 12.70       | -    |
| D       | 0.016  | 0.022 | 0.41        | 0.56 |
| E       | 0.100  |       | 2.54        |      |
| F       | 0.050  |       | 1.27        |      |
| G       | 0.125  | 0.165 | 3.18        | 4.19 |
| H       | 0.080  | 0.105 | 2.03        | 2.67 |
| I       | 0.015  |       | 0.38        |      |

TO-92 (REV: R1)

R1