

**CSG10F2500****Gate Turn-off Thyristor**

High-end Power Semiconductor Manufacturer

**FEATURES**

- Free floating silicon technology
- Low on-state and switching loss
- Ring gate electrode
- Industrial standard housing

**KEY PARAMETERS**

|                          |                |
|--------------------------|----------------|
| <b>V<sub>DRM</sub></b>   | <b>2500 V</b>  |
| <b>I<sub>TGQM</sub></b>  | <b>1000 A</b>  |
| <b>I<sub>TSM</sub></b>   | <b>7 kA</b>    |
| <b>V<sub>T0</sub></b>    | <b>1.66 V</b>  |
| <b>r<sub>T</sub></b>     | <b>0.57 mΩ</b> |
| <b>V<sub>DClin</sub></b> | <b>1400 V</b>  |

**VOLTAGE RATINGS**

|                    |                                               |          |                                                                                   |
|--------------------|-----------------------------------------------|----------|-----------------------------------------------------------------------------------|
| V <sub>DRM</sub>   | Repetitive peak off-state voltage             | 2500 V   | V <sub>GR</sub> ≥ 2V                                                              |
| V <sub>RRM</sub>   | Repetitive peak reverse voltage               | 15 V     |                                                                                   |
| I <sub>DRM</sub>   | Repetitive peak off-state current             | ≤ 50 mA  | V <sub>D</sub> = V <sub>DRM</sub> V <sub>GR</sub> ≥ 2V                            |
| I <sub>RRM</sub>   | Repetitive peak reverse current               | ≤ 100 mA | V <sub>R</sub> = V <sub>RRM</sub> R <sub>GK</sub> ≥ ∞                             |
| V <sub>DClin</sub> | Permanent DC voltage for 100 FIT failure rate | 1400 V   | -40 ≤ T <sub>j</sub> ≤ 125 °C. Ambient cosmic radiation at sea level in open air. |

**MECHANICAL RATINGS**

|                |                           |      |      |                  |
|----------------|---------------------------|------|------|------------------|
| F <sub>m</sub> | Mounting force            | min. | 10   | kN               |
|                |                           | max. | 15   | kN               |
| A              | Acceleration:             |      |      |                  |
|                | Device unclamped          |      | 50   | m/s <sup>2</sup> |
|                | Device clamped            |      | 200  | m/s <sup>2</sup> |
| M              | Weight                    |      | 0.8  | kg               |
| D <sub>s</sub> | Surface creepage distance |      | ≥ 22 | mm               |
| D <sub>a</sub> | Air strike distance       |      | ≥ 13 | mm               |



## GTO CHARACTERISTICS

### ON-STATE RATINGS

|                   |                                        |                                      |                                        |                         |
|-------------------|----------------------------------------|--------------------------------------|----------------------------------------|-------------------------|
| I <sub>TAVM</sub> | Max. average on-state current          | 830 A                                | Half sine wave, T <sub>C</sub> = 65 °C |                         |
| I <sub>TRMS</sub> | Max. RMS on-state current              | 1300 A                               |                                        |                         |
| I <sub>TSM</sub>  | Max. peak non-repetitive surge current | 12000 A                              |                                        |                         |
| I <sup>2</sup> t  | Limiting load integral                 | 7.2•10 <sup>5</sup> A <sup>2</sup> s |                                        |                         |
| V <sub>T</sub>    | On-state voltage                       | 2.50 V                               | I <sub>T</sub> = 1000 A                | T <sub>j</sub> = 125 °C |
| V <sub>T0</sub>   | Threshold voltage                      | 1.66 V                               | I <sub>T</sub> = 200 - 2500 A          |                         |
| r <sub>T</sub>    | Slope resistance                       | 0.57 mΩ                              |                                        |                         |
| I <sub>H</sub>    | Holding current                        | 50 A                                 | T <sub>j</sub> = 25 °C                 |                         |

### GATE RATINGS

|           |                                 |       |                           |                                    |
|-----------|---------------------------------|-------|---------------------------|------------------------------------|
| $V_{GT}$  | Gate trigger voltage            | 1.5 V | $V_D = 24\text{ V}$       | $T_j = 25\text{ }^{\circ}\text{C}$ |
| $I_{GT}$  | Gate trigger current            | 2.0 A | $R_A = 0.1\text{ }\Omega$ |                                    |
| $V_{GRM}$ | Repetitive peak reverse voltage | 17 V  |                           |                                    |
| $I_{GRM}$ | Repetitive peak reverse current | 50 mA | $V_G = V_{GRM}$           |                                    |

### TURN ON

|                |                                       |                      |                              |                                                           |
|----------------|---------------------------------------|----------------------|------------------------------|-----------------------------------------------------------|
| $di/dt_{crit}$ | Max. rate of rise of on-state current | 300 A/ $\mu\text{s}$ | $f = 200\text{ Hz}$          | $I_T = 1000\text{ A}, T_j = 125\text{ }^{\circ}\text{C}$  |
|                |                                       | 700 A/ $\mu\text{s}$ | $f = 1\text{ Hz}$            | $I_{GM} = 30\text{ A}, di_G/dt = 20\text{ A}/\mu\text{s}$ |
| $t_d$          | Delay time                            | 1.5 $\mu\text{s}$    | $V_D = 0.5 V_{DRM}$          | $T_j = 125\text{ }^{\circ}\text{C}$                       |
| $t_r$          | Rise time                             | 3.5 $\mu\text{s}$    | $I_T = 1000\text{ A}$        | $di/dt = 300\text{ A}/\mu\text{s}$                        |
| $t_{on(min)}$  | Min. on-time                          | 80 $\mu\text{s}$     | $I_{GM} = 30\text{ A}$       | $di_G/dt = 20\text{ A}/\mu\text{s}$                       |
| $E_{on}$       | Turn-on energy per pulse              | 0.75 Ws              | $C_s = 2\text{ }\mu\text{F}$ | $R_s = 5\text{ }\Omega$                                   |

### TURN OFF

|                |                                   |                    |                                     |                                        |
|----------------|-----------------------------------|--------------------|-------------------------------------|----------------------------------------|
| $I_{TGQM}$     | Max controllable turn-off current | 1000 A             | $V_{DM} = V_{DRM}$                  | $di_{GQ}/dt = 30\text{ A}/\mu\text{s}$ |
|                |                                   |                    | $C_s = 2\text{ }\mu\text{F}$        | $L_s \leq 0.3\text{ }\mu\text{H}$      |
| $t_s$          | Storage time                      | 22.0 $\mu\text{s}$ | $V_D = \frac{1}{2} V_{DRM}$         | $V_{DM} = V_{DRM}$                     |
| $t_f$          | Fall time                         | 2.0 $\mu\text{s}$  | $T_j = 125\text{ }^{\circ}\text{C}$ | $di_{GQ}/dt = 30\text{ A}/\mu\text{s}$ |
| $t_{off(min)}$ | Min. off-time                     | 80 $\mu\text{s}$   | $I_{TGQ} = I_{TGQM}$                |                                        |
| $E_{off}$      | Turn-off energy per pulse         | 3.5 Ws             | $C_s = 2\text{ }\mu\text{F}$        | $R_s = 5\text{ }\Omega$                |
| $I_{GQM}$      | Peak turn-off gate current        | 700 A              | $L_s \leq 0.3\text{ }\mu\text{H}$   |                                        |



**THERMAL RATINGS**

|            |                                                  |             |                     |
|------------|--------------------------------------------------|-------------|---------------------|
| $T_j$      | Storage and operating junction temperature range | -40...125°C |                     |
| $R_{thJC}$ | Thermal resistance junction to case              | 30 K/kW     | Anode side cooled   |
|            |                                                  | 39 K/kW     | Cathode side cooled |
|            |                                                  | 17 K/kW     | Double side cooled  |
| $R_{thCH}$ | Thermal resistance case to heat sink             | 10 K/kW     | Single side cooled  |
|            |                                                  | 5 K/kW      | Double side cooled  |

Analytical function for transient thermal impedance:

$$Z_{thJC}(t) = \sum_{i=1}^4 R_i (1 - e^{-t/\tau_i})$$

| i            | 1    | 2    | 3     | 4      |
|--------------|------|------|-------|--------|
| $R_i$ (K/kW) | 11.7 | 4.7  | 0.64  | 0.0001 |
| $\tau_i$ (s) | 0.9  | 0.26 | 0.002 | 0.001  |



PACKAGE DETAILS

All dimensions in mm, unless stated otherwise. DO NOT SCALE.

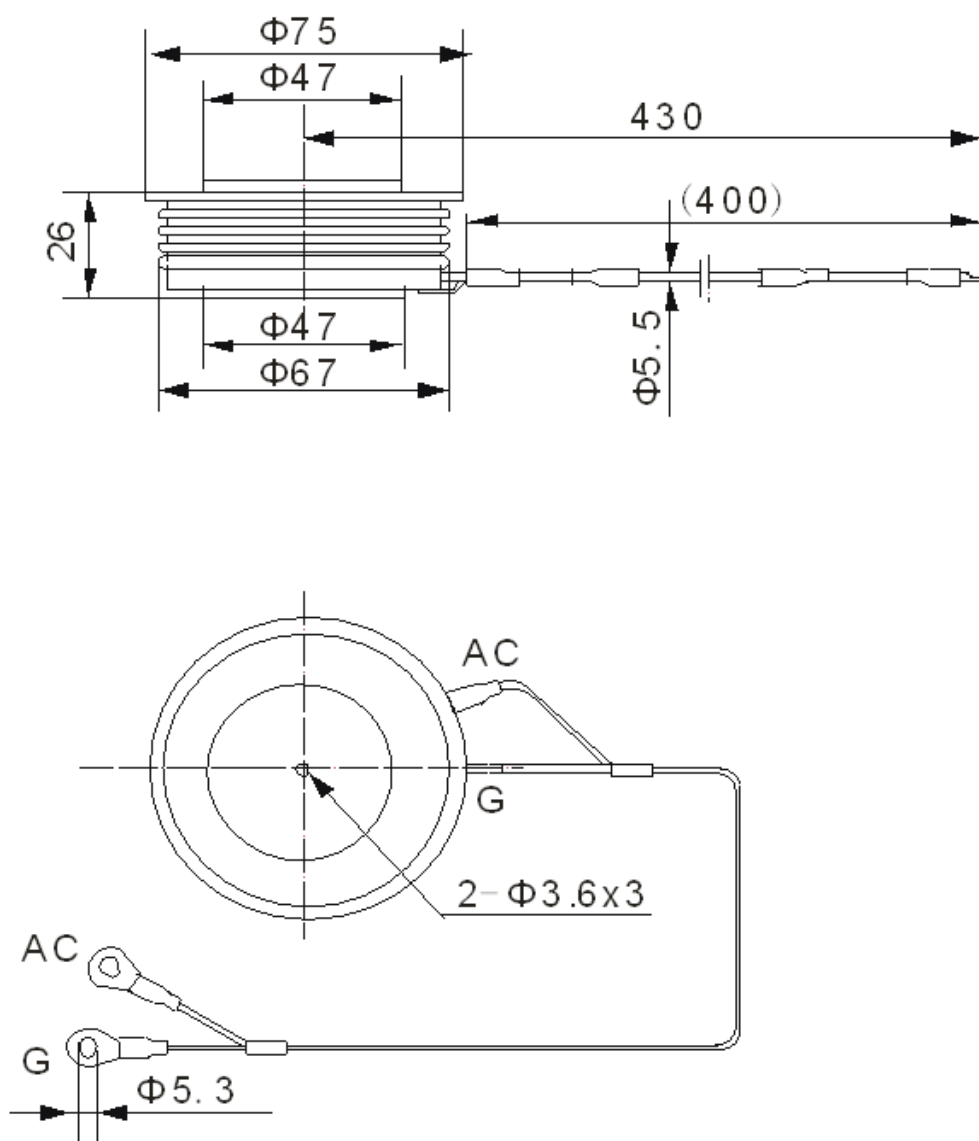


Fig. 1 Outline drawing. All dimensions are in millimeters and represent nominal values unless stated otherwise