

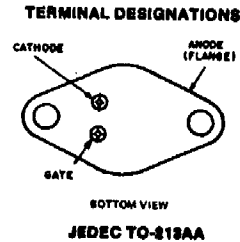
**S3700 Series**

**5-A Silicon Controlled Rectifiers**

For Inverter Applications

**Features:**

- 600V, 125°C T<sub>J</sub> operating
- High dv/dt and di/dt capability
- Low switching losses
- High pulse-current capability
- Low forward and reverse leakage
- SIPOS oxide glass multilayer passivation system
- Advanced unisurface construction
- Precise Ion-implanted diffusion source



**MAXIMUM RATINGS, Absolute-Maximum Values:**

|   | <b>S3700B</b> | <b>S3700D</b>   | <b>S3700M</b> |      |
|---|---------------|-----------------|---------------|------|
| <b>Non-repetitive peak reverse voltage:■</b>  |               |                 |               |      |
| Gate Open ..... V <sub>RR0M</sub>   | 300           | 500             | 700           | V    |
| <b>Non-repetitive peak off-state voltage:■</b>  |               |                 |               |      |
| Gate Open ..... V <sub>RO0M</sub>   | 300           | 500             | 700           | V    |
| <b>Repetitive peak reverse voltage:■</b>  |               |                 |               |      |
| Gate Open ..... V <sub>RR0M</sub>   | 200           | 400             | 600           | V    |
| <b>Repetitive peak off-state voltage:■</b>  |               |                 |               |      |
| Gate Open ..... V <sub>RO0M</sub>   | 200           | 400             | 600           | V    |
| <b>On-state current:</b>  |               |                 |               |      |
| T <sub>c</sub> = 85°C; conduction angle = 180°:   |               |                 |               |      |
| RMS ..... I <sub>TRMS</sub>   |               | 5               |               | A    |
| Average ..... I <sub>TAVM</sub>   |               | 3.2             |               | A    |
| For other conditions  |               | See Figs. 3 & 4 |               |      |
| <b>Peak surge (non-repetitive) on-state current:</b>  |               |                 |               |      |
| For one full cycle of applied principal voltage, T <sub>c</sub> = 85°C                            |               |                 |               |      |
| 60 Hz (sinusoidal) ..... I <sub>TRM</sub>   |               | 80              |               | A    |
| 50 Hz (sinusoidal) ..... I <sub>TRM</sub>   |               | 65              |               | A    |
| For more than one full cycle of applied principal voltage   |               | See Fig. 5      |               |      |
| <b>Rate of change of on-state current</b>   |               |                 |               |      |
| V <sub>0</sub> = V <sub>RR0M</sub> , I <sub>GT</sub> = 50 mA, t <sub>r</sub> = 0.1 μs ..... di/dt |               | 200             |               | A/μs |
| <b>Fusing current (for SCR protection):</b>   |               |                 |               |      |
| T <sub>J</sub> = -40 to 100°C, t = 1 to 8.3 ms ..... I <sub>FT</sub>                              |               | 25              |               | A    |
| <b>Gate power dissipation:†</b>   |               |                 |               |      |
| Peak Forward (for 10 μs max., See Fig. 7) ..... P <sub>GM</sub>                                   |               | 13              |               | W    |
| Peak Reverse (for 10 μs max., See Fig. 8) ..... P <sub>GRM</sub>                                  |               | 13              |               | W    |
| Average (averaging time = 10 ms max.) ..... P <sub>GIAM</sub>                                     |               | 0.5             |               | W    |
| <b>Temperature Range:†</b>  |               |                 |               |      |
| Storage ..... T <sub>stg</sub>  |               | -40 to 150      |               | °C   |
| Operating (Case) ..... T <sub>c</sub>   |               | -40 to 125      |               | °C   |
| <b>Pin Temperature (During soldering):</b>  |               |                 |               |      |
| At distances ≥ 1/32 in. (0.8 mm) from seating plane for 10 s max. .... T <sub>p</sub>             |               | 225             |               | °C   |

■ These values do not apply if there is a positive gate signal. Gate must be open or negatively biased.  
 \* Any product of gate current and gate voltage which results in a gate power less than the maximum is permitted.  
 † For temperature measurement reference point, see *Dimensional Outline*.



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## S3700 Series

### ELECTRICAL CHARACTERISTICS

At Maximum Ratings Unless Otherwise Specified and at Indicated Case Temperature ( $T_C$ )

| CHARACTERISTIC   | SYMBOL          | LIMITS                               |            |      | UNITS                     |
|--|-----------------|--------------------------------------|------------|------|---------------------------|
|  |                 | FOR ALL TYPES<br>Except as Specified |            |      |                           |
|  |                 | MIN.                                 | TYP.       | MAX. |                           |
| Peak Off-State Current:<br>(Gate open, $T_C = 125^\circ\text{C}$ )<br>Forward Current ( $I_{DOM}$ ) at $V_D = V_{DROM}$ .....  | $I_{DOM}$       | -                                    | 0.5        | 3    | mA                        |
| Reverse Current ( $I_{ROM}$ ) at $V_R = V_{RROM}$ .....  | $I_{ROM}$       | -                                    | 0.3        | 1.5  |                           |
| Instantaneous On-State Voltage:<br>$i_T = 30\text{ A (peak)}$ , $T_C = 25^\circ\text{C}$ .....   | $v_T$           | -                                    | 2.2        | 3    | V                         |
| For other conditions .....   |                 |                                      | See Fig. 6 |      |                           |
| Instantaneous Holding Current:<br>Gate open, $T_C = 25^\circ\text{C}$ .....  | $i_{HO}$        | -                                    | 20         | 50   | mA                        |
| Critical Rate of Rise of Off-State Voltage:<br>$V_D = V_{DROM}$ , exponential voltage rise,<br>Gate open, $T_C = 125^\circ\text{C}$ .....  | $dv/dt$         | 100                                  | 250        | -    | V/ $\mu\text{s}$          |
| DC Gate Trigger Current:<br>$V_D = 12\text{ V (dc)}$ , $R_L = 30\ \Omega$ , $T_C = 25^\circ\text{C}$ .....   | $I_{GT}$        | -                                    | 15         | 40   | mA                        |
| For other conditions .....   |                 |                                      | See Fig. 7 |      |                           |
| DC Gate Trigger Voltage:<br>$V_D = 12\text{ V (dc)}$ , $R_L = 30\ \Omega$ , $T_C = 25^\circ\text{C}$ .....   | $V_{GT}$        | -                                    | 1.8        | 3.5  | V                         |
| For other conditions .....   |                 |                                      | See Fig. 7 |      |                           |
| Gate Controlled Turn-On Time:<br>(Delay Time + Rise Time)<br>For $V_{DX} = V_{DROM}$ , $I_{GT} = 300\text{ mA}$ , $t_r = 0.1\ \mu\text{s}$ ,<br>$i_T = 2\text{ A (peak)}$ , $T_C = 25^\circ\text{C}$ (See Fig. 10) .....   | $t_{gt}$        | -                                    | 0.7        | -    | $\mu\text{s}$             |
| Circuit Commutated Turn-Off Time:<br>$V_{DX} = V_{DROM}$ , $i_T = 2\text{ A}$ , pulse duration = $50\ \mu\text{s}$ ,<br>$dv/dt = 100\text{ V}/\mu\text{s}$ , $-di/dt = -10\text{ A}/\mu\text{s}$ , $I_{GT} = 100\text{ mA}$ ,<br>$V_{GT} = 0\text{ V}$ (at turn-off), $T_C = 80^\circ\text{C}$ (See Fig. 13) ..... | $t_q$           |                                      | 4          | 6    | $\mu\text{s}$             |
| Thermal Resistance:<br>Junction-to-Case .....  | $R_{\theta JC}$ | -                                    | 4          | 8    | $^\circ\text{C}/\text{W}$ |
| Junction-to-Ambient .....  | $R_{\theta JA}$ | -                                    | -          | 40   | $^\circ\text{C}/\text{W}$ |

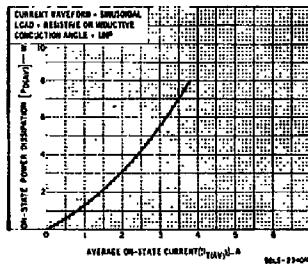


Fig. 1—Power dissipation vs. average on-state current.

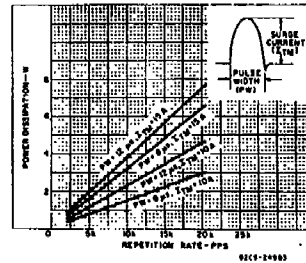


Fig. 2—Dissipation vs. repetition rate.