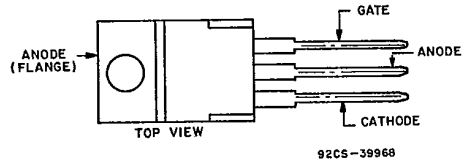
# 8-A Silicon Controlled Rectifiers

For Power Switching, Power Control

**Features:**

- *High dv/dt capability*
- *Glass-passivated chip*
- *Shorted-emitter gate-cathode construction*
- *Low thermal resistance*

**TERMINAL DESIGNATIONS**




**JEDEC TO-220AB**

The RCA-C122 series types are medium-power silicon controlled rectifiers designed for switching ac and dc currents. These devices can switch from the off-state to the on-state when both the anode and gate voltages are positive. Negative anode voltages make these devices revert to the blocking state regardless of gate-voltage polarity.

The TO-220AB package provides easy package mounting and low thermal resistance, allowing operation at high case temperatures and permitting reduced heat-sink size. These SCR's can be used in lighting and motorspeed controls and power-switching systems.

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

| | C122F | C122A | C122B | C122C | C122D | C122E | C122M | |
|---|---|---|---|---|---|---|---|---|
| $V_{RROM}^{\Delta}$, $V_{DROM}^{\Delta}$ | 50 | 100 | 200 | 300 | 400 | 500 | 600 | V |
| $I_{T(RMS)}$ ($T_C$ = 75°C, $\theta$ = 180°) | 8 | | | | | | | A |
| $I_{TSM}$ | | | | | | | | |
| For one full cycle of applied principal voltage 400-Hz | 200 | | | | | | | A |
| 60-Hz | 100 | | | | | | | A |
| 50-Hz | 85 | | | | | | | A |
| For more than one full cycle of applied principal voltage | See Fig. 3 | | | | | | | |
| di/dt | | | | | | | | |
| $V_D = V_{DROM}$ $I_{GT}$ = 80 mA, $t_r$ = 0.5 $\mu$s | 100 | | | | | | | A/$\mu$s |
| $I^2t$ | | | | | | | | |
| $T_J$ = -65 to 100°C, t = 1 to 8.3 ms | 40 | | | | | | | $A^2s$ |
| $P_{GM}$• (for 10 $\mu$s max.) | 16 | | | | | | | W |
| $P_{G(AV)}$• (averaging time = 10 ms max.) | 0.5 | | | | | | | W |
| $T_{stg}$ | -65 to +150 | | | | | | | °C |
| $T_C$ | -65 to +100 | | | | | | | °C |
| $T_T$ | | | | | | | | |
| During soldering for 10 s maximum (terminal and case) | 250 | | | | | | | °C |

ΔThese values do not apply if there is a positive gate signal. Gate must be open or negatively biased.
•Any values of peak gate current or peak gate voltage which result in equal or lower power are permissible.

## ELECTRICAL CHARACTERISTICS

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

| CHARACTERISTIC | LIMITS FOR ALL TYPES Except as Specified | | | UNITS |
|---|---|---|---|---|
| | Min. | Typ. | Max. | |
| $I_{DOM}$ or $I_{ROM}$<br>$V_D = V_{DROM}$ or $V_R = V_{RROM}$, $T_C$ = +100°C | – | 0.1 | 0.5 | mA |
| $v_T$<br>$i_T$ = 16 A, $T_C$ = +25°C | – | 1.45 | 1.83 | V |
| For other values of $i_T$ ..... | ← See Fig. 5 → | | | |
| $I_{GT}$<br>$V_D$ = 12 V (DC), $R_L$ = 30 Ω<br>$T_C$ = +25°C ..... | – | 10 | 15 | mA |
| For other case temperatures ..... | ← See Fig. 6 → | | | |
| $V_{GT}$<br>$V_D$ = 12 V (DC), $R_L$ = 30 Ω<br>$T_C$ = +25°C ..... | – | 1.0 | 1.5 | V |
| For other case temperatures | ← See Fig. 7 → | | | |
| $i_{HO}$<br>$T_C$ = +25°C ..... | – | 20 | 30 | mA |
| For other case temperatures ..... | ← See Fig. 8 → | | | |
| dv/dt<br>$V_D = V_{DROM}$ Exponential voltage rise<br>$T_C$ = +100°C (See Fig. 12) | 10 | 100 | – | V/μs |
| $t_{gt}$<br>$V_D = V_{DROM}$, $i_T$ = 4.5 A, $i_T$ = 2 A<br>$I_{GT}$ = 80 mA, 0.1 μs rise time<br>$T_C$ = +25°C (See Fig. 10) | – | 1.6 | 2.5 | μs |
| $t_q$<br>$V_D = V_{DROM}$, $i_T$ = 2 A, $t_p$ = 50 μs<br>dv/dt = 200 V/μs, di/dt = −10 A/μs<br>$I_{GT}$ = 200 mA at $t_{ON}$, $T_C$ = +75°C (See Fig. 13) | – | 10 | 35 | μs |
| $R_{\theta JC}$ | – | – | 1.8 | °C/W |
| $R_{\theta JA}$ | – | – | 75 | |

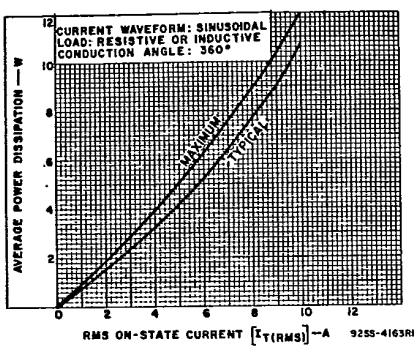



*Fig. 1 — Power dissipation vs. on-state current.*

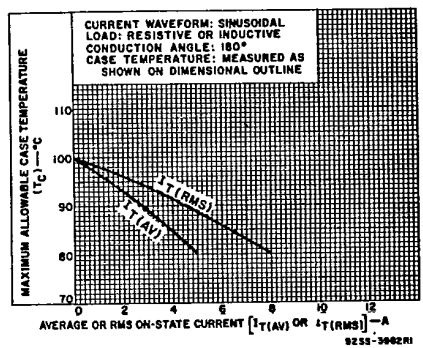



*Fig. 2 — Maximum allowable case temperature vs. on-state current.*

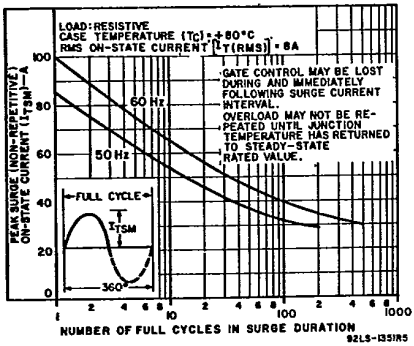



Fig. 3 — Allowable peak surge on-state current vs. surge duration.

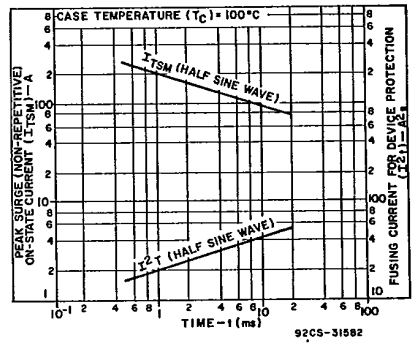



Fig. 4 — Peak surge on-state current and fusing current as a function of time.

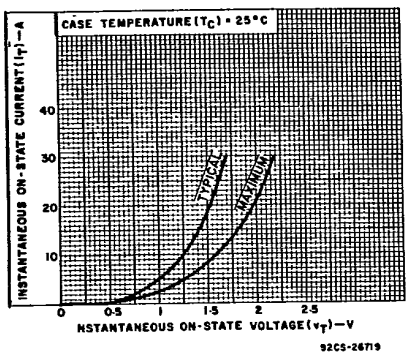



Fig. 5 — Instantaneous on-state current vs. on-state voltage.

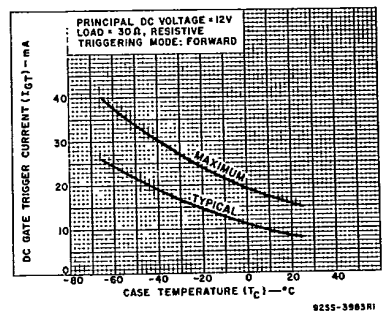



Fig. 6 — DC gate-trigger current vs. case temperature.

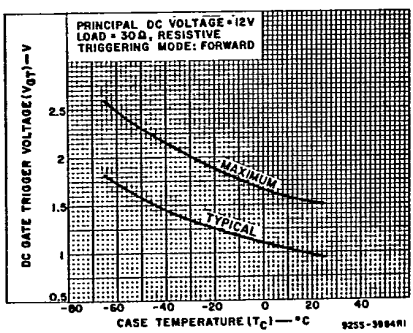



Fig. 7 — DC gate-trigger voltage vs. case temperature.

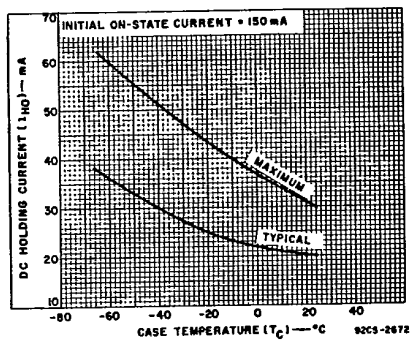



Fig. 8 — Holding current vs. case temperature.

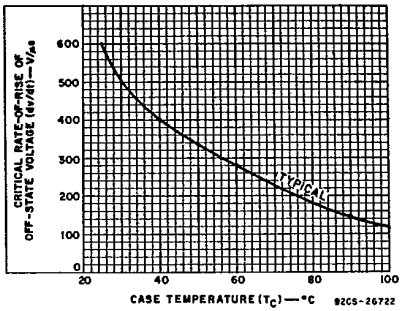



Fig. 9 — Critical rate of rise of off-state voltage vs. case temperature.

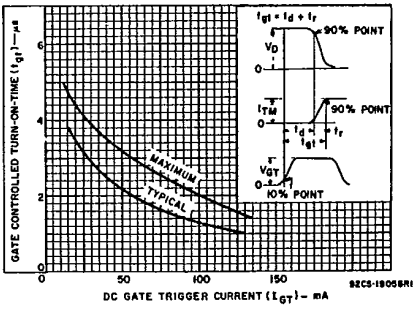



Fig. 10 — Gate-controlled turn-on time vs. gate trigger current.

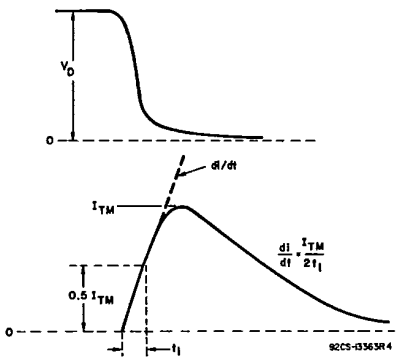



Fig. 11 — Rate of change of on-state current with time (defining di/dt).

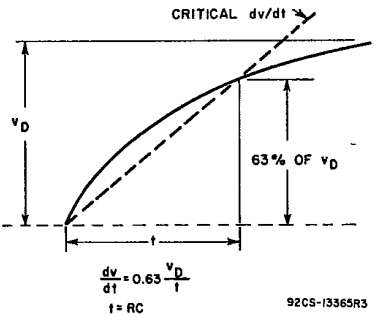



Fig. 12 — Rate of rise of off-state voltage with time (defining critical dv/dt).

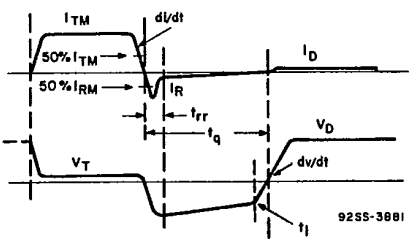



Fig. 13 — Relationship between instantaneous on-state current and voltage, showing reference points for measurement of circuit-commutated turn-off time ($t_q$).