## MAC15, MAC15A Series

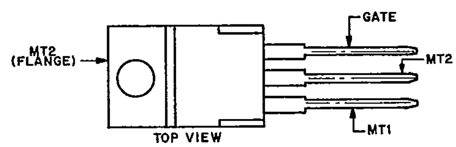
File Number **1086**

# 15-A Silicon Triacs

### Three-Lead Plastic Types for Power-Control and Power-Switching Applications

**Features:**
- *800V, 125 Deg. C $T_J$* 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*

**TERMINAL DESIGNATIONS**




92CS-39970

**JEDEC TO-220AB**

The RCA-MAC15 and MAC15A series triacs are gate-controlled full-wave silicon switches utilizing a plastic case with three leads to facilitate mounting on printed-circuit boards. They are intended for the control of ac loads in such applications as motor controls, light dimmers, heating controls, and power-switching systems.

These devices are designed to switch from an off-state to an on-state for either polarity of applied voltage with positive or negative gate triggering voltages. They have an on-state current rating of 12-A at $T_C$ = 95°C and 15-A at $T_C$ = 80°C and repetitive off-state voltage ratings, of 200, 400, 600, and 800 volts.

The plastic package design provides not only ease of mounting but also low thermal impedance, which allows operation at high case temperatures and permits reduced heat-sink size.

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

| | MAC15-4 MAC15A-4 | MAC15-6 MAC15A-6 | MAC15-8 MAC15A-8 | MAC15-10 MAC15A-10 | |
|---|---|---|---|---|---|
| $V_{DROM}$• $T_J$ = -40 to 125°C | 200 | 400 | 600 | 800 | V |
| $I_{T(RMS)}$ $\theta$ = 360°: | | | | | |
| $T_C$ = 95°C | 12 | | | | A |
| = 80°C | 15 | | | | A |
| For other conditions | See Fig. 3 | | | | |
| $I_{TSM}$: | | | | | |
| For more than one full cycle of applied principal voltage, at current and temperature shown above for $I_{T(RMS)}$: | | | | | |
| 60 Hz (sinusoidal) | 150 | | | | A |
| 50 Hz (sinusoidal) | 140 | | | | A |
| For more than one cycle of applied principal voltage | See Fig. 4 | | | | |
| di/dt: | | | | | |
| $V_D = V_{DROM}$, $I_{GT}$ = 200 mA, $t_r$ = 0.1 μs | 100 | | | | A/μs |
| $I_{GTM}$■ | | | | | |
| For 1 μs max. | 2 | | | | A |
| $P_{GM}$ (For 1 μs max., $I_{GTM} \leq 4$ A) | 20 | | | | W |
| $P_{G(AV)}$ | 0.5 | | | | W |
| $T_{stg}$ | -40 to 150 | | | | °C |
| $T_C$ | -40 to 125 | | | | °C |
| $T_T$ (During soldering for 10 s max.) | 230 | | | | °C |

•For either polarity of main terminal 2 voltage ($V_{MT2}$) with reference to main terminal 1.
■For either polarity of gate voltage ($V_G$) with reference to main terminal 1.

## MAC15, MAC15A Series

**ELECTRICAL CHARACTERISTICS**
*At Maximum Ratings Unless Otherwise Specified, and at Indicated Temperatures*

| CHARACTERISTIC | LIMITS For All Types Except as Specified | | | UNITS |
|---|---|---|---|---|
| | Min. | Typ. | Max. | |
| $I_{DROM}$● $V_{DROM}$ = Max. rated value, $T_C$ = 125°C | – | – | 2 | mA |
| $v_{TM}$● $T_C$ = 25°C, $i_T$ = 21A (peak) | – | 1.3 | 1.6 | V |
| $I_{HO}$● Gate open, Initial principal current = 200 mA (dc) $v_D$ = 12 V, $T_C$ = 25°C | – | 6 | 40 | mA |
| dv/dt● (Commutating) $v_D$ = $V_{DROM}$, $i_T$ = 21A (peak) di/dt = 8 A/ms, $T_C$ = 80°C | – | 5 | – | V/μs |
| $I_{GT}$●■ $v_D$ = 12 V (dc), $R_L$ = 100 Ω; $T_C$ = 25°C; Mode / $V_{MT2}$ / $V_G$ | | | | mA |
| 1+ + + | – | – | 50 | |
| 111– – – | – | – | 50 | |
| 1– + – MAC15A series only | – | – | 75 | |
| 111+ – + MAC15A series only | – | – | 75 | |
| $V_{GT}$●■ $v_D$ = 12 V (dc), $R_L$ = 100 Ω; $T_C$ = 25°C; Mode / $V_{MT2}$ / VG | | | | V |
| 1+ + + | – | 0.9 | 2 | |
| 111– – – | – | 1.1 | 2 | |
| 1– + – MAC15A series only | – | 0.9 | 2.5 | |
| 111+ – + MAC15A series only | – | 1.4 | 2.5 | |
| $T_C$ = 110°C $v_D$ = $V_{DROM}$, $R_L$ = 10 kΩ | | | | |
| 1+ + + | 0.2 | – | – | |
| 111– – – | 0.2 | – | – | |
| 1– + – MAC15A series only | 0.2 | – | – | |
| 111+ – + MAC15A series only | 0.2 | – | – | |
| $t_{gt}$ $v_D$ = $V_{DROM}$, $I_{GT}$ = 120 mA, $t_r$ = 0.1 μs, $i_T$ = 17A (peak), $T_C$ = 25°C | – | 1.5 | 2 | μs |
| $R_{\theta JC}$ | – | – | 2 | °C/W |

● For either polarity of main terminal 2 voltage ($V_{MT2}$) with reference to main terminal 1.
■ For either polarity of gate voltage ($V_G$) with reference to main terminal 1.

# MAC15, MAC15A Series

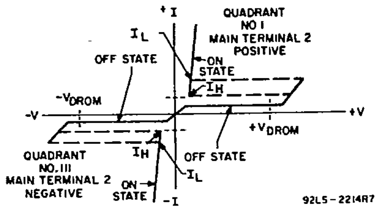



*Fig. 1 — Principal voltage-current characteristic.*

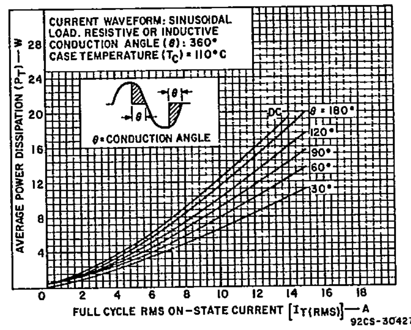



*Fig. 2 — Power dissipation as a function of on-state current.*

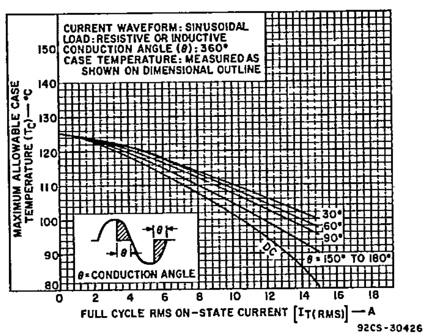



*Fig. 3 — Maximum allowable case-temperature as a function of on-state current.*

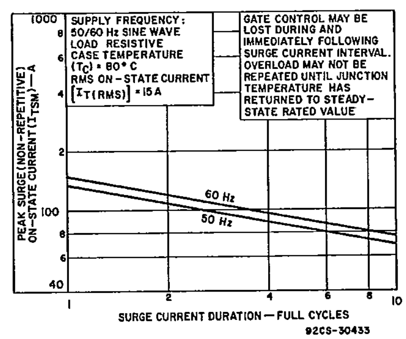



*Fig. 4 — Peak surge on-state current as a function of surge current duration.*

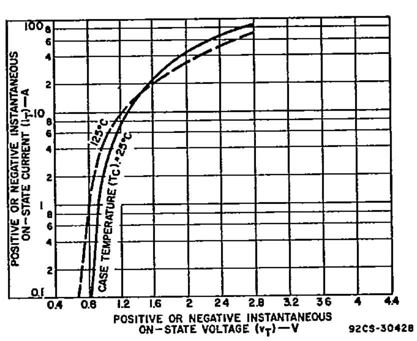



*Fig. 5 — On-state current as a function of on-state voltage.*

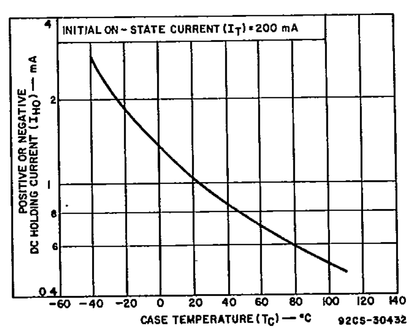



*Fig. 6 — DC holding current as a function of case temperature.*

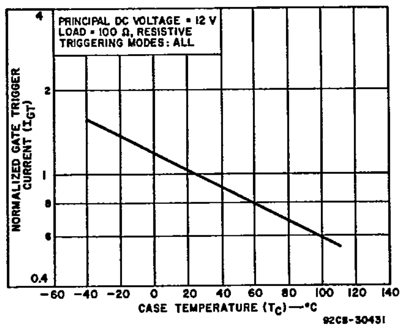



*Fig. 7 – Normalized gate trigger current as a function of case temperature.*

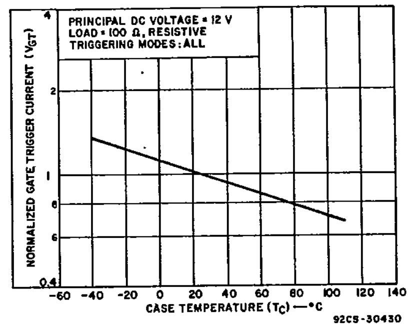



*Fig. 8 – Normalized gate trigger voltage as a function of case temperature.*

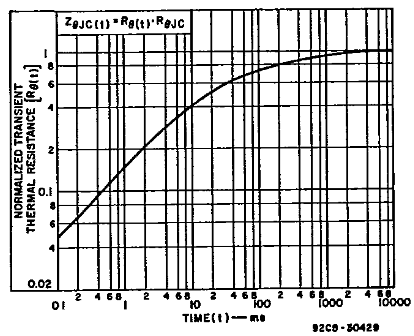



*Fig. 9 – Normalized transient thermal resistance as a function of time.*

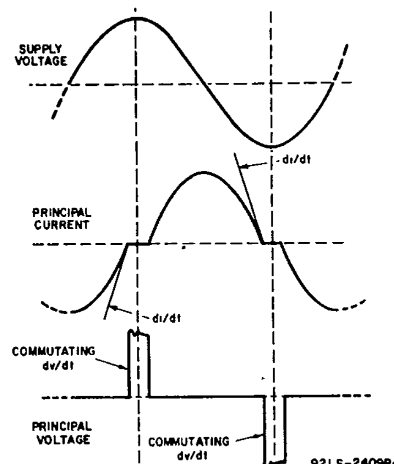
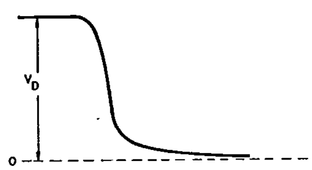



*Fig. 10 – Relationship between supply voltage and principal current (inductive load) showing reference points for definition of commutating voltage (dv/dt).*



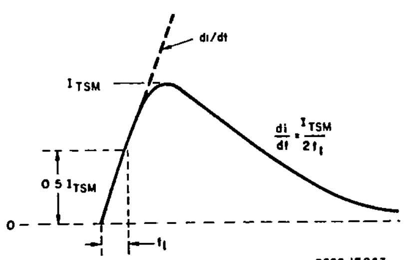




*Fig. 11 – Rate-of-change of on-state current with time (defining di/dt).*

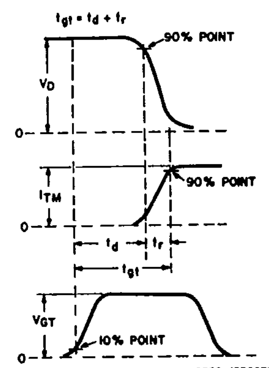



*Fig. 12 – Relationship between off-state voltage, on-state current, and gate-trigger voltage showing reference points for definition of turn-on time ($t_{gt}$).*