# 2S2M, 2S4M

The 2S2M and 2S4M are P-gate fully diffused mold SCRs with an average on-current of 2 A. The repeat peak off-voltages (and reverse voltages) are 200 V and 400 V.

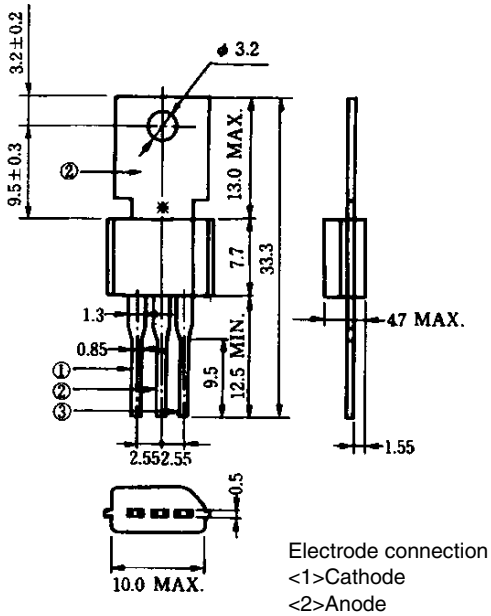
## FEATURES

- This transistor is designed for high-speed switching and is deal for use in commercial frequencies, high-frequency pulse applications, and inverter applications.
- This transistor features a small and lightweight package and is easy to handle even on the mounting surface due to its TO-202AA dimensions. Processing of lead wires and heatsink (tablet) using jigs is also possible.
- Employs flame-retardant epoxy resin (UL94V-0).

## APPLICATIONS

Consumer electronic euipments, ignitors of devices for light indutry, inverter, and solenoid valve drives

## PACKAGE DRAWING (UNIT: mm)




Electrode connection
<1>Cathode
<2>Anode
<3>Gate
Standard weight: 1.4

*TC test bench-mark

## ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

| Parameter | Symbol | 2S2M | 2S4M | Ratings | Unit |
|---|---|---|---|---|---|
| Non-repetitive peak reverse voltage | $V_{RSM}$ | 300 | 500 | V | $R_{GK}$ = 1 kΩ |
| Non-repetitive peak off-state voltage | $V_{DSM}$ | 300 | 500 | V | $R_{GK}$ = 1 kΩ |
| Repetitive peak reverse voltage | $V_{RRM}$ | 200 | 400 | V | $R_{GK}$ = 1 kΩ |
| Repetitive peak off-voltage | $V_{DRM}$ | 200 | 400 | V | $R_{GK}$ = 1 kΩ |
| Average on-state current | $I_{T(AV)}$ | 2 (Tc = 77°C, Single half-wave, $\theta$ = 180°) | | A | Refer to Figure 6 snd 7. |
| Surge on-state current | $I_{TSM}$ | 20 (f = 50 Hz, Sine half-wave, 1 cycle) | | A | Refer to Figure 2. |
| High-frequency peak on-state current | $I_{TRM}$ | 15 (Tc = 65°C, f = 10 kp.p.s, $t_p$ = 10 $\mu$s) | | A | – |
| Fusing current | $\int i_t^2 dt$ | 1.6 (1 ms≤t≤10 ms) | | $A^2s$ | – |
| Critical rate of rise of on-state current | $dI_T/dt$ | 50 | | A/$\mu$s | – |
| Peak gate power dissipation | $P_{GM}$ | 0.5 (f≥50 Hz, Duty≤10%) | | W | – |
| Average gate power dissipation | $P_{G(AV)}$ | 0.1 | | W | |
| Peak gate forward current | $I_{FGM}$ | 0.2 (f≥50 Hz, Duty≤10%) | | A | – |
| Peak gate reverse voltage | $V_{RGM}$ | 6 | | V | – |
| Junction temperature | $T_j$ | −40 to +125 | | °C | – |
| Storage temperature | $T_{stg}$ | −55 tp +150 | | °C | – |

## ELECTRICAL CHARACTERISTICS ($T_j$ = 25°C, $R_{GK}$ = 1 kΩ)

| Parameter | Symbol | Conditions | | Specifications | | | Unit | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | MIN. | TYP. | MAX. | | |
| Repeat peak off-state current | $I_{DRM}$ | $V_{DM} = V_{DRM}$ | $T_j$ = 25°C | | | 10 | μA | – |
| | | | $T_j$ = 125°C | | | 200 | | – |
| Repetitive peak reverse current | $I_{RRM}$ | $V_{RM} = V_{RRM}$ | $T_j$ = 25°C | | | 10 | μA | – |
| | | | $T_j$ = 125°C | | | 200 | V | Refer to Figure 1. |
| On voltage | $V_{TM}$ | $T_j$ = 25°C, $I_{TM}$ = 4 A | | – | – | 2.2 | V | Refer to Figure 9. |
| Gate trigger voltage | $V_{GT}$ | $V_{DM}$ = 6 V, $R_L$ = 100 Ω | | – | – | 0.8 | μA | Refer to Figure 8. |
| Gate trigger current | $I_{GT}$ | $V_{DM}$ = 6 V, $R_L$ = 100 Ω | | – | – | 300 | V | – |
| Gate non-trigger voltage | $V_{GD}$ | $T_j$ = 125°C, $V_{DM} = \frac{1}{2}V_{DRM}$ | | 0.2 | – | – | V | – |
| Critical rate of-rise of off-state voltage | dv/dt | $T_j$ = 125°C, $V_{DM} = \frac{2}{3}V_{DRM}$ | | 10 | – | – | V/μs | – |
| Holding current | $I_H$ | $T_j$ = 25°C, $V_D$ = 24 V | | – | – | 10 | mA | – |
| Commutating turn-off time | $T_q$ | $T_j$ = 125°C, $I_T$ = 2 A<br>$V_{DM} = \frac{2}{3}V_{DRM}$, $V_R$ = 50 V<br>dv/dt = 10 V/μs | | – | | 15 | μs | |
| Turn-on time | $T_{gt}$ | $T_j$ = 125°C, $V_{DM} = \frac{2}{3}V_{DRM}$<br>$I_{TM}$ = 30 A<br>$I_G$ = 5 mA, $t_{1G}$ = 5 μs | | – | – | 2 | μs | – |
| Thermal resistance | $R_{th(j-c)}$ | Junction-to-case DC | | – | – | 10 | °C/W | Refer to Figure 13. |
| | $R_{th(j-a)}$ | Junction-to-ambient DC | | – | – | 75 | | |

## TYPICAL CHARACTERISTICS (Ta = 25°C)

Figure 1. $i_T$ vs. $v_T$ Characteristics

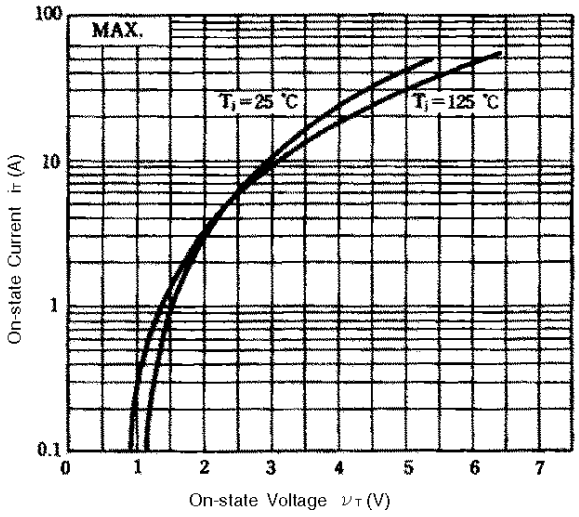



Figure 2. $I_{TSM}$ Rating

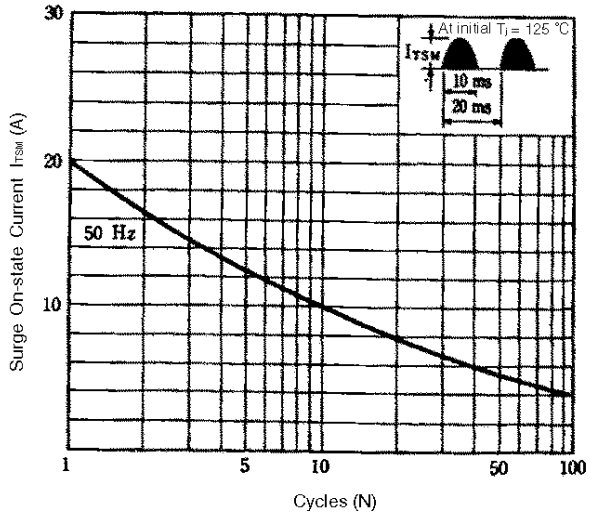


Figure 3. $I_{TRM}$ vs. $t_P$ Rating

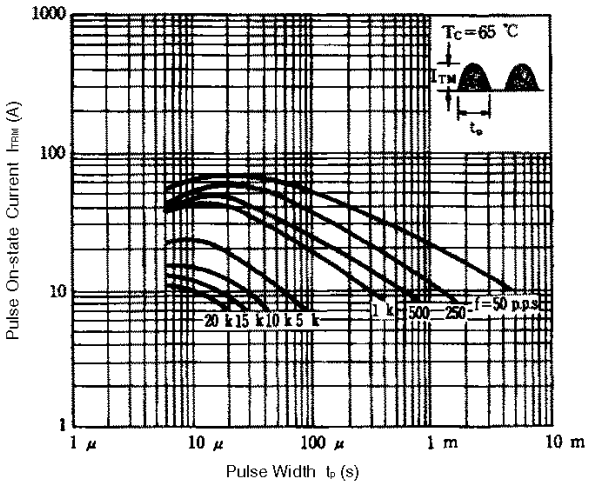



Figure 4. $I_{TRM}$ vs. $t_P$ Rating

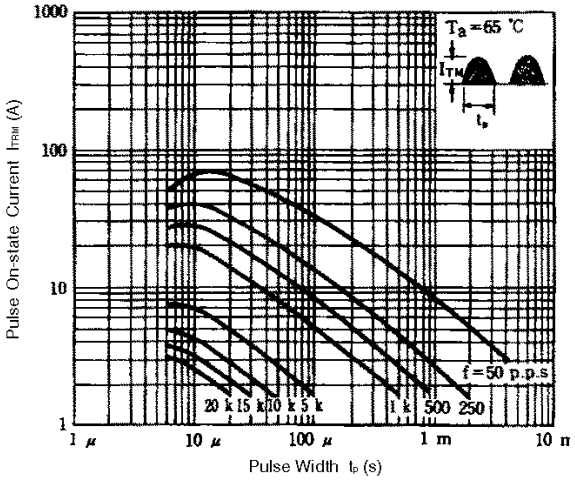



Figure 5. $P_{T(AV)}$ vs. $I_{T(AV)}$ Characteristics

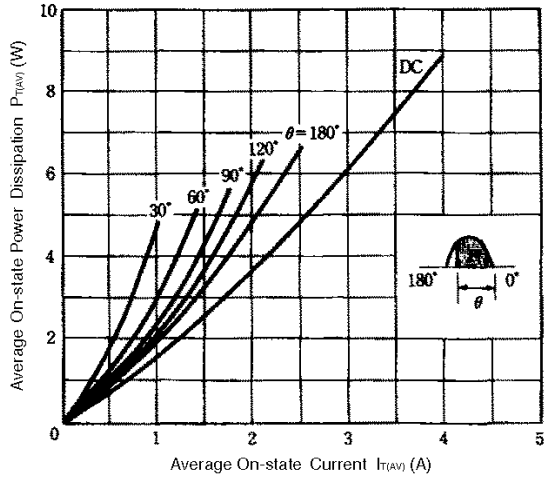



Figure 6. $T_C$ vs. $I_{T(AV)}$ Rating

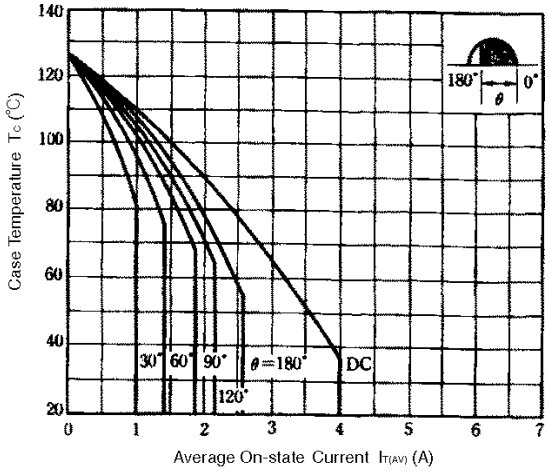



Figure 7. $T_A$ vs. $I_{T(AV)}$ Rating

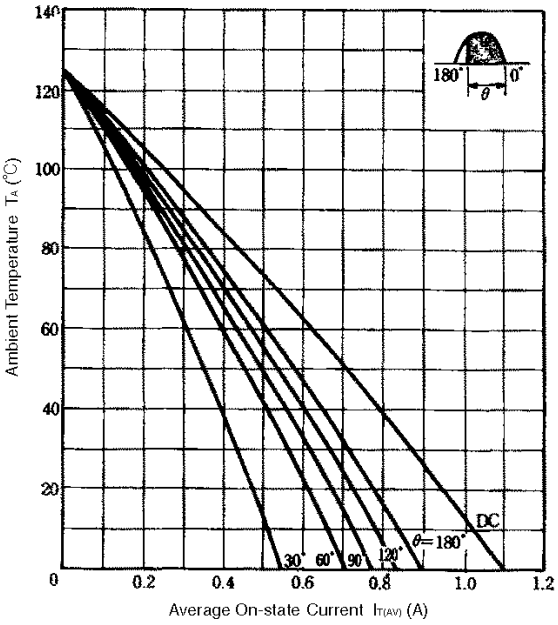



Figure 8. $I_{GT}$ vs. $T_A$ Example of Characteristics

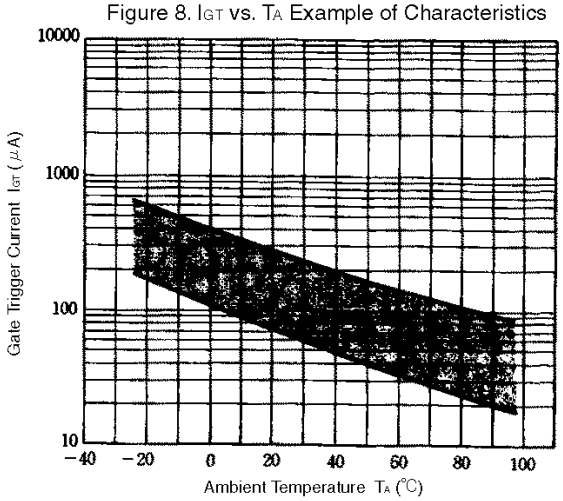


Figure 9. $V_{GT}$ vs. $T_A$ Example of Characteristics

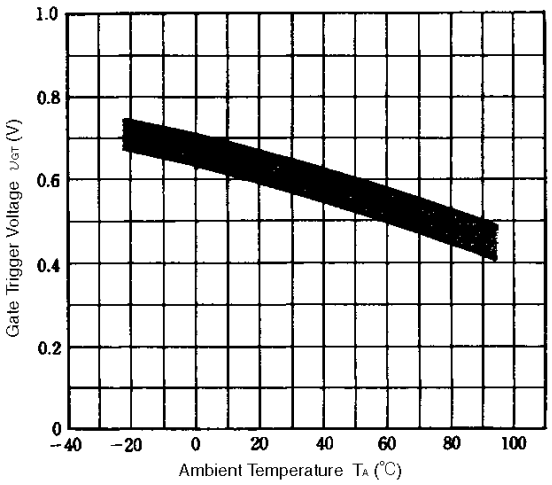



Figure 10. $i_{GS}$ vs. $\tau$ Example of Characteristics

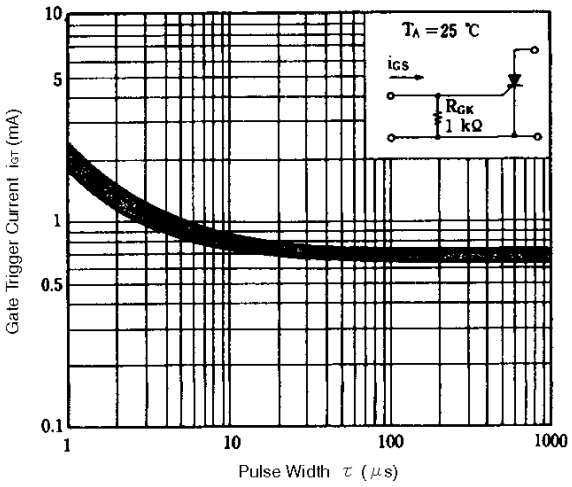



Figure 11. $\upsilon_{GT}$ vs. $\tau$ Example of Characteristics

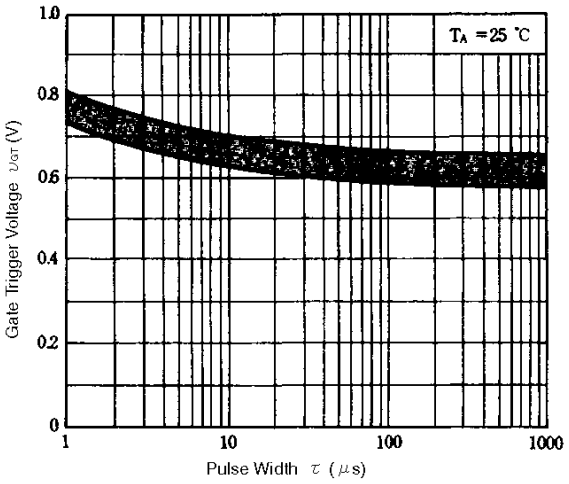



Figure 12. $I_H$ vs. $T_A$ Example of Characteristics

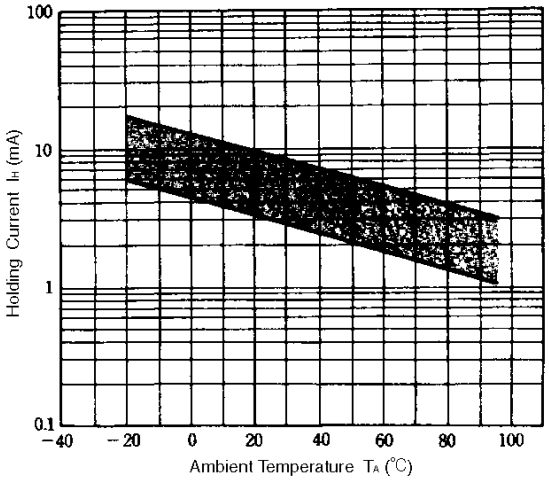



Figure 13. $Z_{th}$ Characteristics