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April 1st, 2010
Renesas Electronics Corporation

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2 A HIGH-SPEED SWITCHING SCR

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.

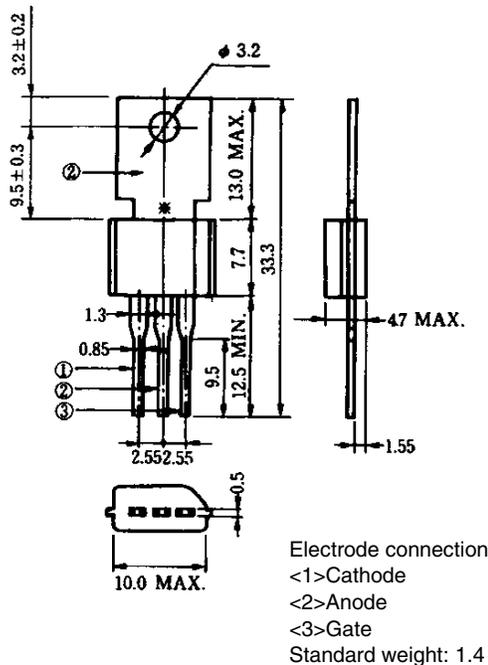
FEATURES

- This transistor is designed for high-speed switching and is ideal 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 equipments, ignitors of devices for light industry, inverter, and solenoid valve drives

PACKAGE DRAWING (UNIT: mm)



*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 | $R_{GK} = 1 \text{ k}\Omega$ |
| Non-repetitive peak off-state voltage | V_{DSM} | 300 | 500 | V | $R_{GK} = 1 \text{ k}\Omega$ |
| Repetitive peak reverse voltage | V_{RRM} | 200 | 400 | V | $R_{GK} = 1 \text{ k}\Omega$ |
| Repetitive peak off-voltage | V_{DRM} | 200 | 400 | V | $R_{GK} = 1 \text{ k}\Omega$ |
| Average on-state current | $I_{T(AV)}$ | 2 (Tc = 77°C, Single half-wave, $\theta = 180^\circ$) | | A | Refer to Figure 6 and 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, $t_p = 10 \mu\text{s}$) | | A | — |
| Fusing current | $\int i^2 dt$ | 1.6 (1 ms ≤ t ≤ 10 ms) | | A ² s | — |
| Critical rate of rise of on-state current | di_T/dt | 50 | | A/ μs | — |
| 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 to +150 | | °C | — |

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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 | | |
| 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} = 1/2 V _{DRM} | 0.2 | - | - | V | - |
| Critical rate of-rise of off-state voltage | dv/dt | T _j = 125°C, V _{DM} = 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 V _{DM} = 2/3 V _{DRM} , V _R = 50 V dv/dt = 10 V/μs | - | - | 15 | μs | - |
| Turn-on time | T _{gt} | T _j = 125°C, V _{DM} = 2/3 V _{DRM} I _{TM} = 30 A I _G = 5 mA, t _{IG} = 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 (T_a = 25°C)

Figure 1. i_T vs. v_T Characteristics

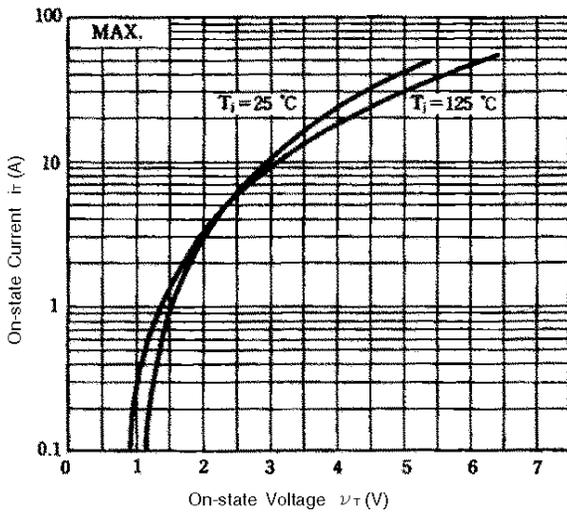


Figure 2. I_{TSM} Rating

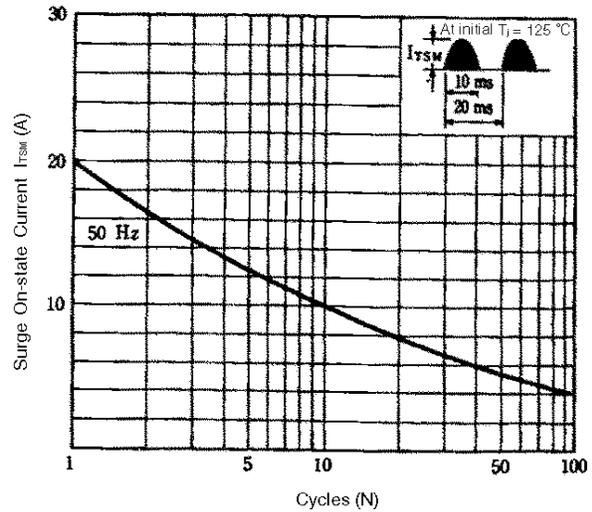


Figure 3. I_{TRM} vs. t_P Rating

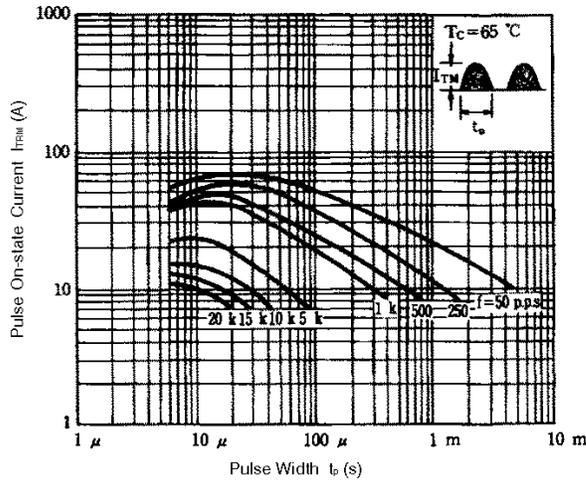


Figure 4. I_{TRM} vs. t_P Rating

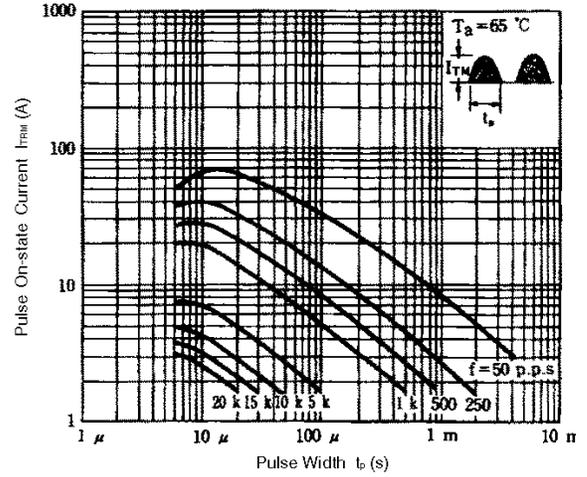


Figure 5. $P_{T(AV)}$ vs. $I_{T(AV)}$ Characteristics

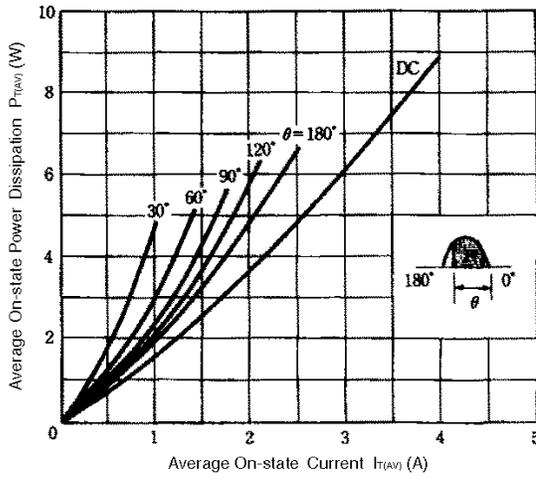


Figure 6. T_c vs. $I_{T(AV)}$ Rating

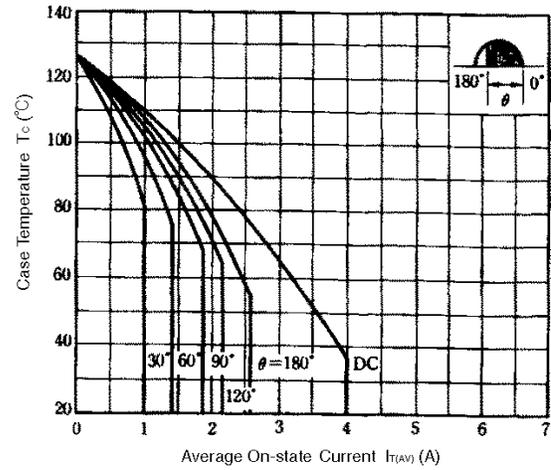


Figure 7. T_A vs. $I_{T(AV)}$ Rating

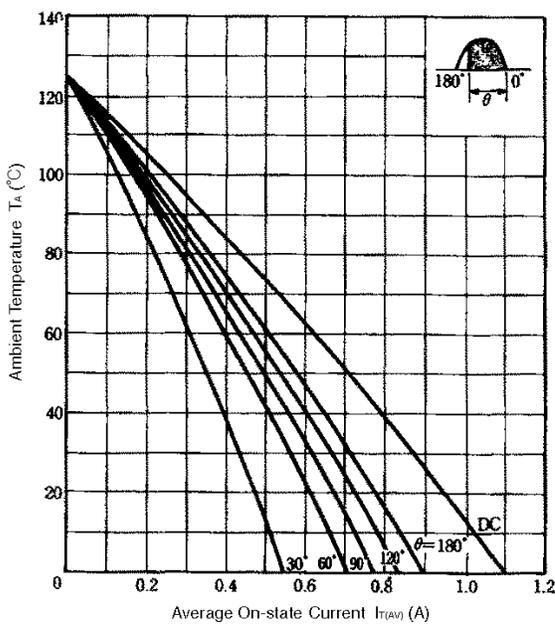


Figure 8. I_{GT} vs. T_A Example of Characteristics

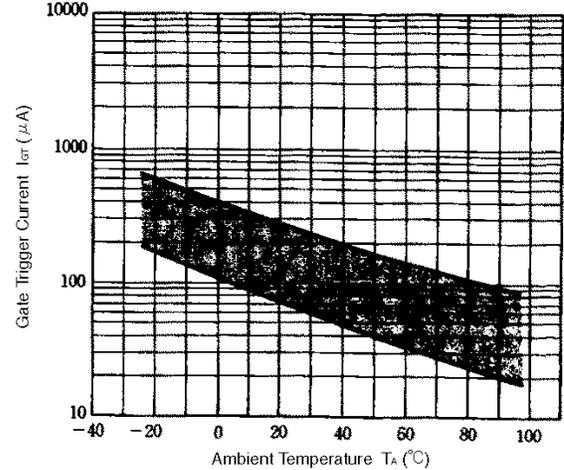


Figure 9. V_{GT} vs. T_A Example of Characteristics

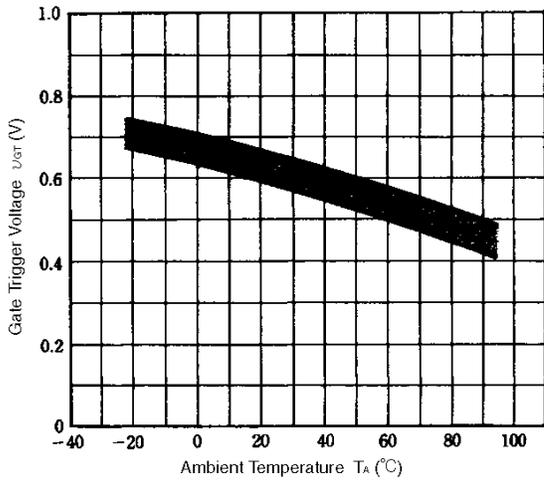


Figure 10. i_{GS} vs. τ Example of Characteristics

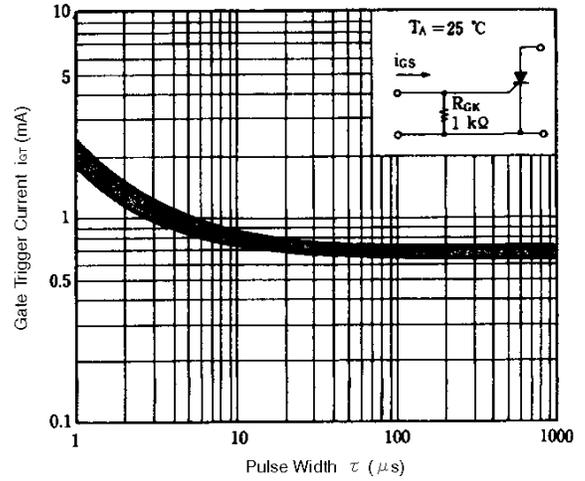


Figure 11. V_{GT} vs. τ Example of Characteristics

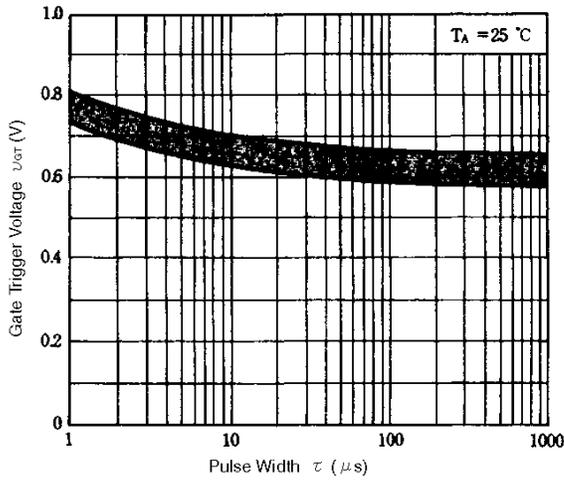


Figure 12. I_H vs. T_A Example of Characteristics

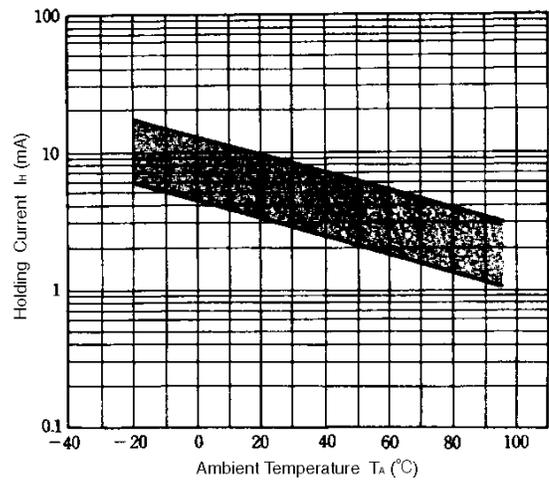
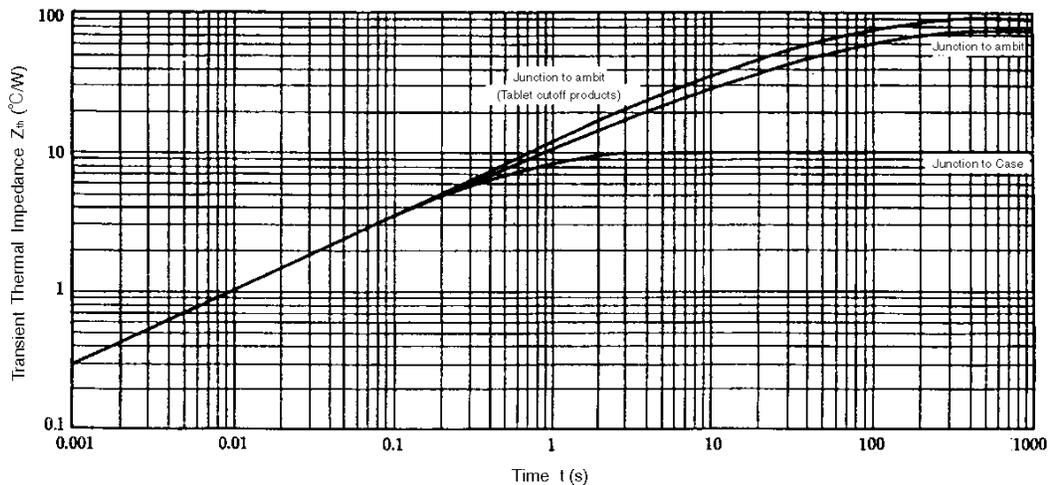


Figure 13. Z_{th} Characteristics



[MEMO]

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