

### 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.

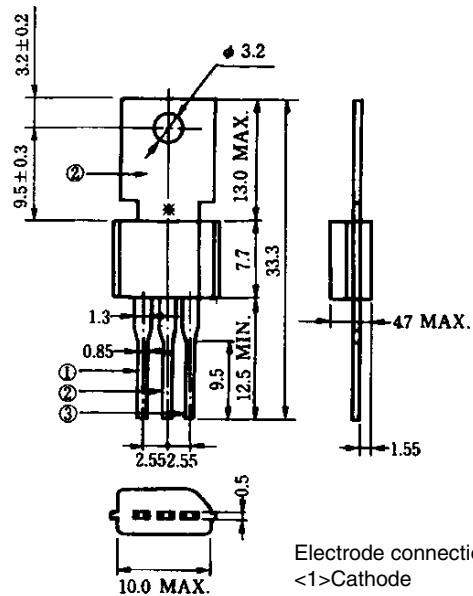
#### FEATURES

- 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)



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	$R_{GK} = 1 \text{ k}\Omega$
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 <sup>2</sup> s	—
Critical rate of rise of on-state current	$di_T/dt$	50		A/ $\mu\text{s}$	—
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 to +150		°C	—

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ELECTRICAL CHARACTERISTICS ( $T_j = 25^\circ\text{C}$ ,  $R_{GK} = 1\text{ k}\Omega$ )

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

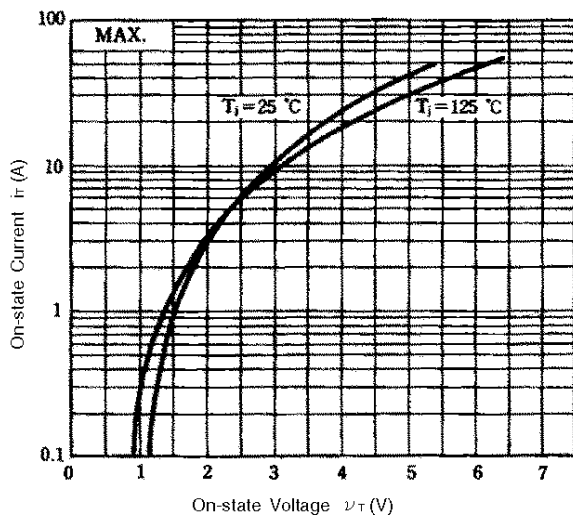
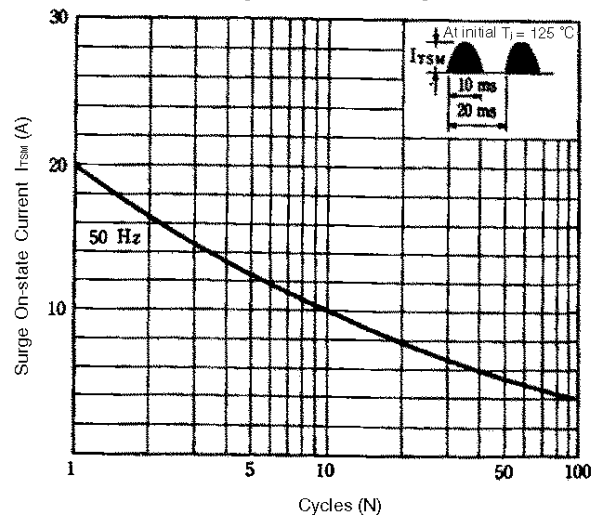
TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )Figure 1.  $i_T$  vs.  $v_T$  CharacteristicsFigure 2.  $I_{TSM}$  Rating

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

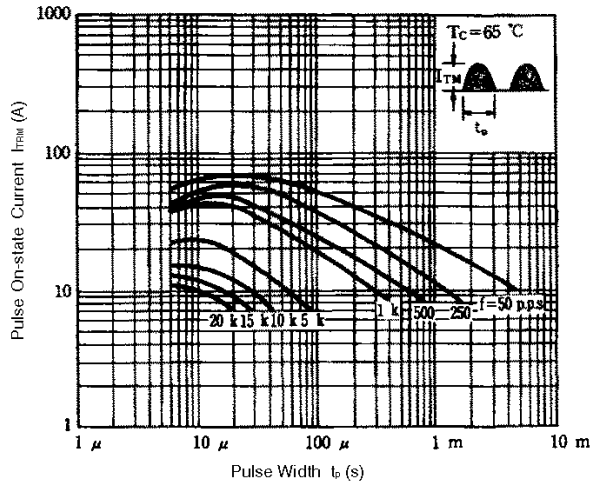


Figure 4.  $I_{TRM}$  vs.  $t_P$  Rating

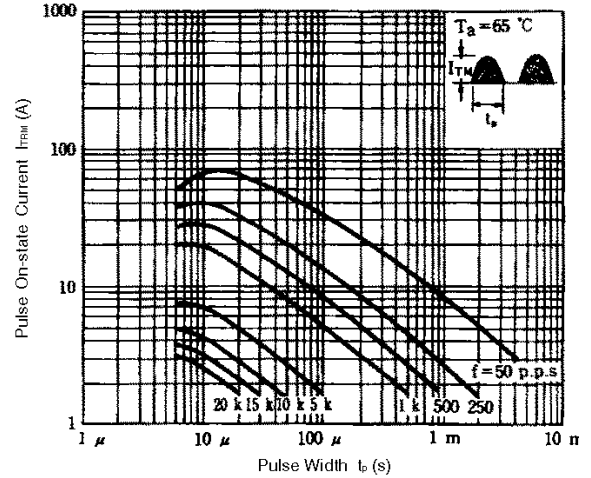


Figure 5.  $P_{T(AV)}$  vs.  $I_{T(AV)}$  Characteristics

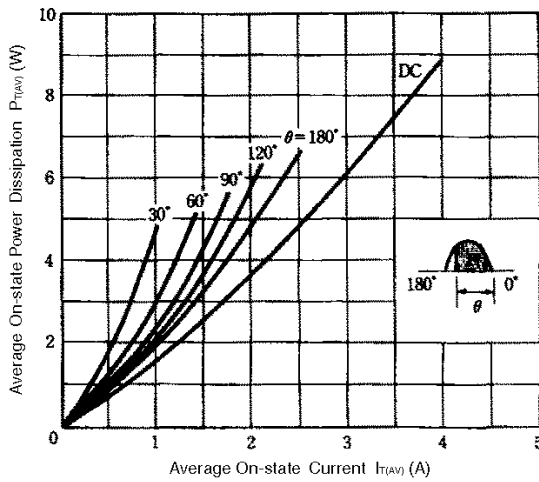


Figure 6.  $T_c$  vs.  $I_{T(AV)}$  Rating

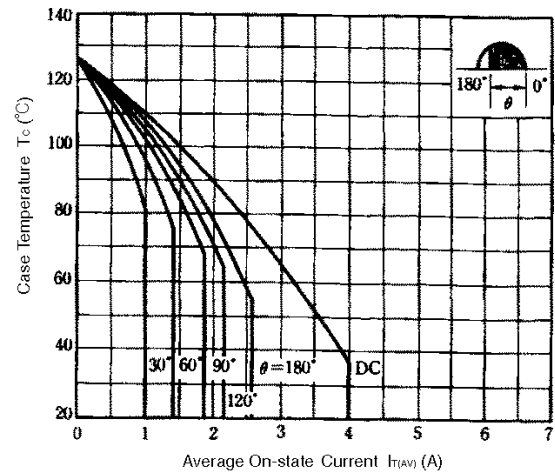


Figure 7.  $T_A$  vs.  $I_{T(AV)}$  Rating

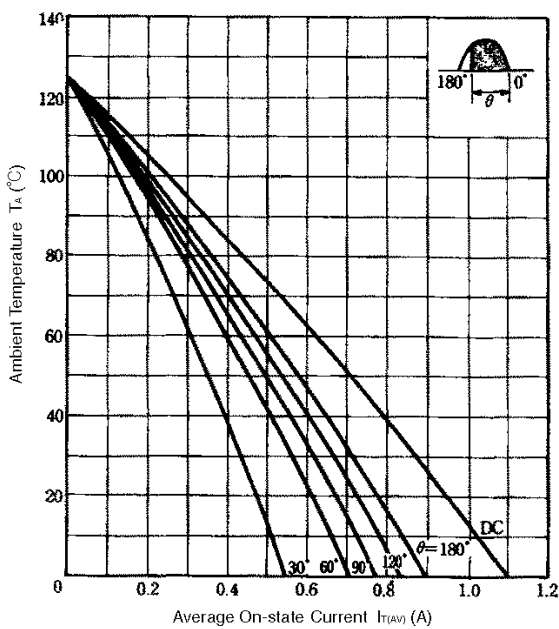


Figure 8.  $I_{GT}$  vs.  $T_A$  Example of Characteristics

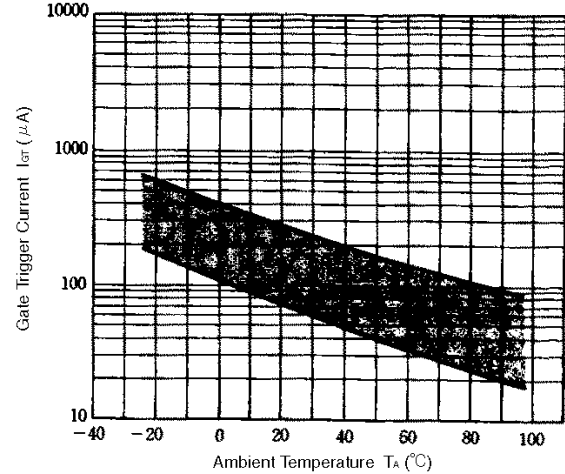


Figure 9.  $V_{GT}$  vs.  $T_A$  Example of Characteristics

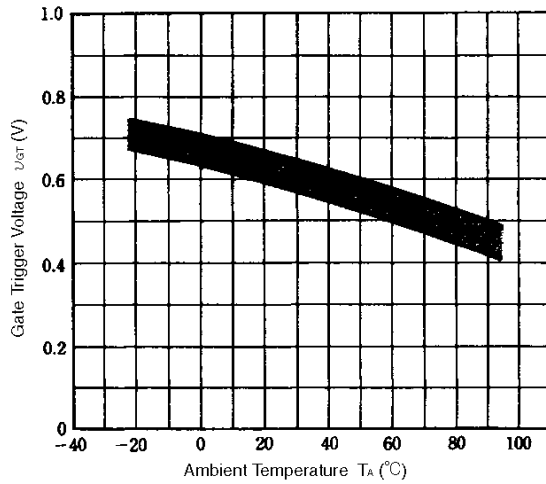


Figure 10.  $i_{GS}$  vs.  $\tau$  Example of Characteristics

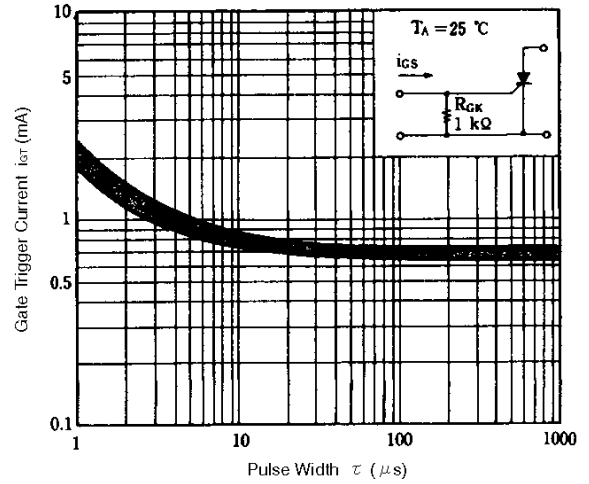


Figure 11.  $V_{GT}$  vs.  $\tau$  Example of Characteristics

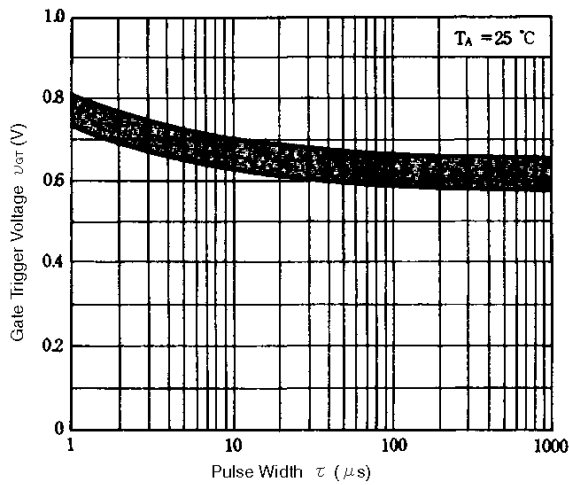


Figure 12.  $I_H$  vs.  $T_A$  Example of Characteristics

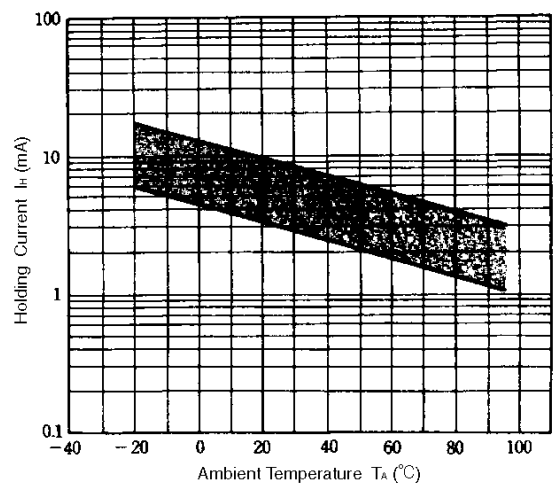
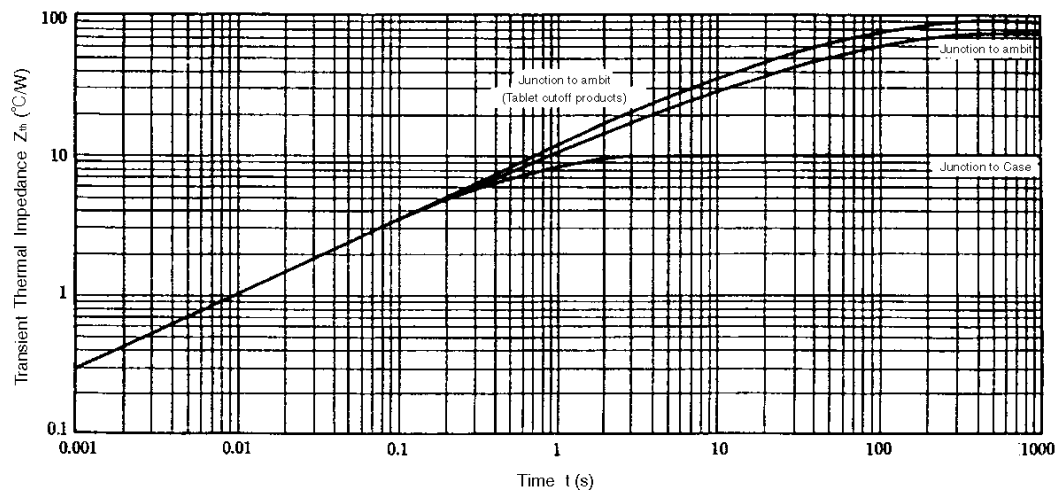


Figure 13.  $Z_{th}$  Characteristics



**[MEMO]**

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