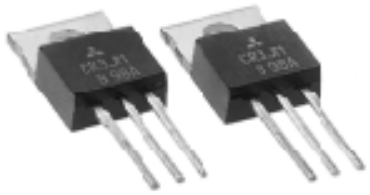
CR3JM

LOW POWER, STROBE USE
NON-INSULATED TYPE, GLASS PASSIVATION TYPE

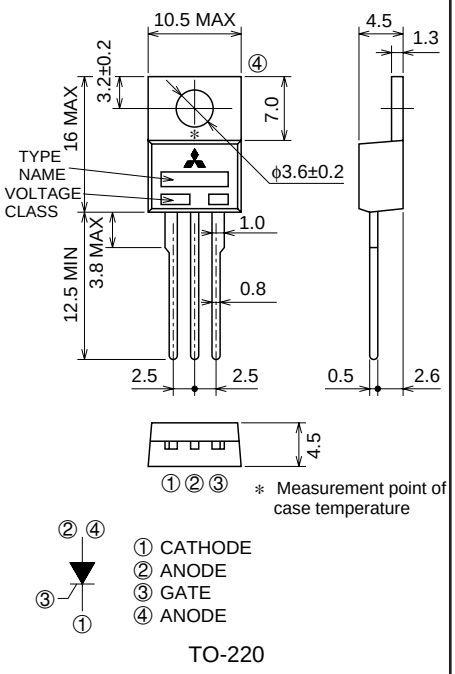
CR3JM



- $I_{T\ (AV)}$ 0.8A
- V_{DRM} 400V
- I_{GT} 50mA

OUTLINE DRAWING

Dimensions in mm



TO-220

APPLICATION

Automatic strobe flasher

MAXIMUM RATINGS

Symbol	Parameter	Voltage class	Unit
		8	
V_{RRM}	Repetitive peak reverse voltage	400	V
V_{RSM}	Non-repetitive peak reverse voltage	480	V
V_{DRM}	Repetitive peak off-state voltage	400	V
V_{DSM}	Non-repetitive peak off-state voltage	480	V

Symbol	Parameter	Conditions	Ratings	Unit
$I_{T\ (AV)}$	Average on-state current	Commercial frequency, sine half wave, 180° conduction, T_a=37°C	0.8	A
I_{TRM}	Repetitive peak on-state current *1	C_M=1800μF with discharge current	240	A
P_{GM}	Peak gate power dissipation		3.0	W
$P_{G\ (AV)}$	Average gate power dissipation		0.3	W
V_{FGM}	Peak gate forward voltage		6	V
V_{RGM}	Peak gate reverse voltage		6	V
I_{FGM}	Peak gate forward current		1	A
T_j	Junction temperature		–40 ~ +125	°C
T_{stg}	Storage temperature		–40 ~ +125	°C
—	Weight	Typical value	2.0	g

*1. Refer to sections 1, 2 on STROBE FLASHER APPLICATION.

MITSUBISHI ELECTRIC

CR3JM

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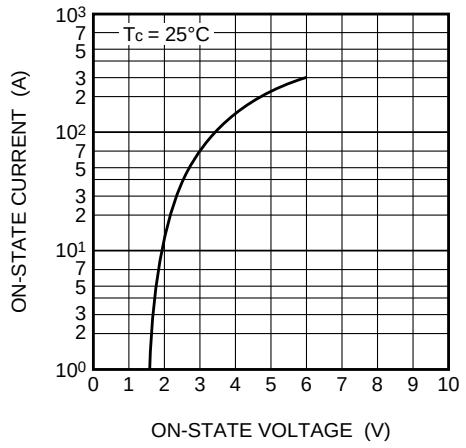
ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I_{RRM}	Repetitive peak reverse current	T_j=25°C, V_{RRM} applied	—	—	0.1	mA
I_{DRM}	Repetitive peak off-state current	T_j=25°C, V_{DRM} applied	—	—	0.1	mA
V_{TM}	On-state voltage	T_c=25°C, I_{TM}=3A, Instantaneous value	—	—	1.8	V
V_{GT}	Gate trigger voltage	T_j=25°C, V_D=6V, R_L=6Ω	—	—	2.0	V
V_{GD}	Gate non-trigger voltage	T_j=125°C, V_D=1/2V_{DRM}	0.1	—	—	V
I_{GT}	Gate trigger current	T_j=25°C, V_D=6V, R_L=6Ω	—	—	50	mA
C_c	Commutating capacitor *2	C_M=1800μF, V_{CM}=350V, I_{TM}=240A, L=50μH, V_{GK}=–6V, T_a=25°C	—	—	2.8	μF

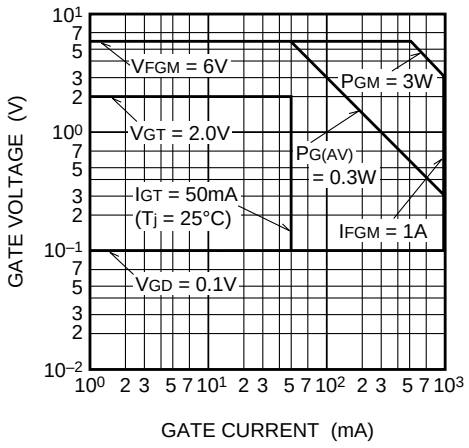
*2. Refer to sections 3 on STROBE FLASHER APPLICATION.

PERFORMANCE CURVES

MAXIMUM ON-STATE CHARACTERISTICS



GATE CHARACTERISTICS



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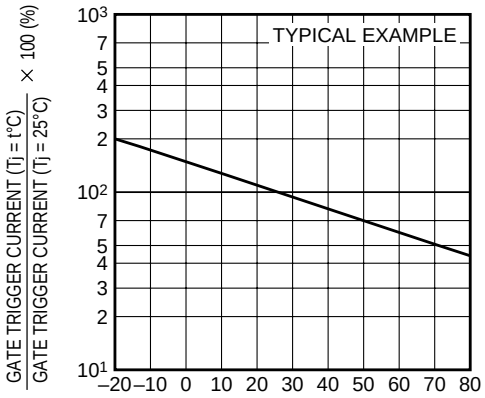
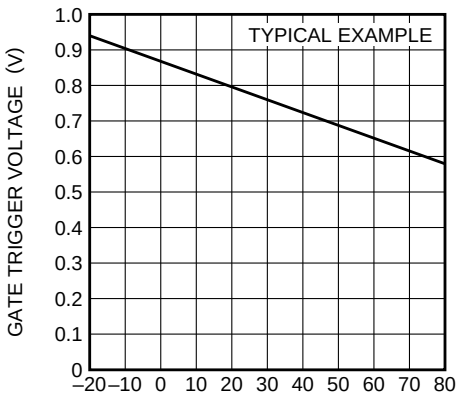
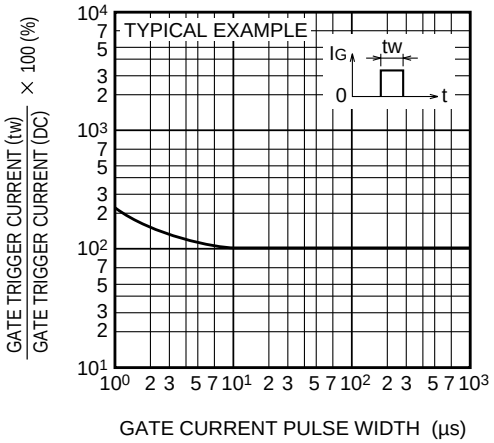
GATE TRIGGER CURRENT VS. JUNCTION TEMPERATURE



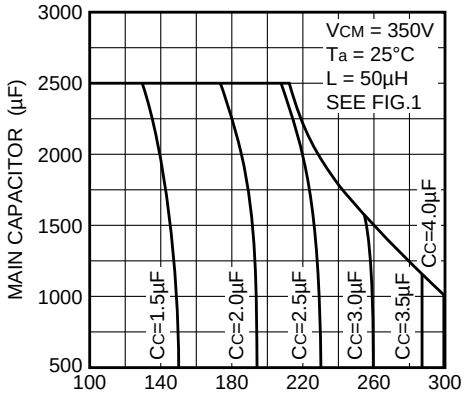
GATE TRIGGER VOLTAGE VS. JUNCTION TEMPERATURE



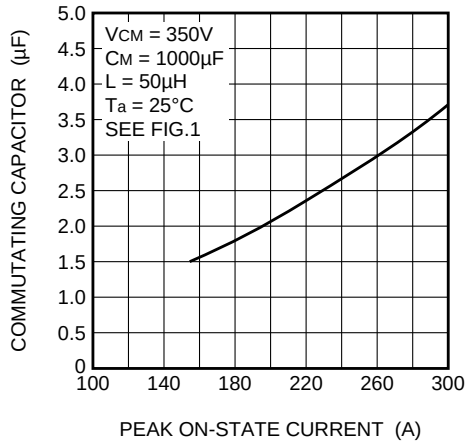
GATE TRIGGER CURRENT VS. GATE CURRENT PULSE WIDTH



COMMUTATING CHARACTERISTICS



COMMUTATING CAPACITOR VS. PEAK ON-STATE CURRENT



COMMUTATING CAPACITOR VS. CASE TEMPERATURE

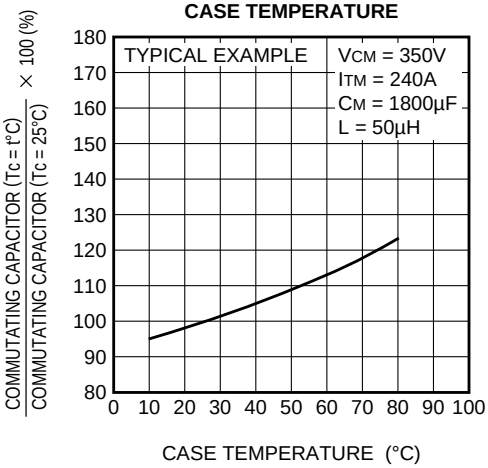


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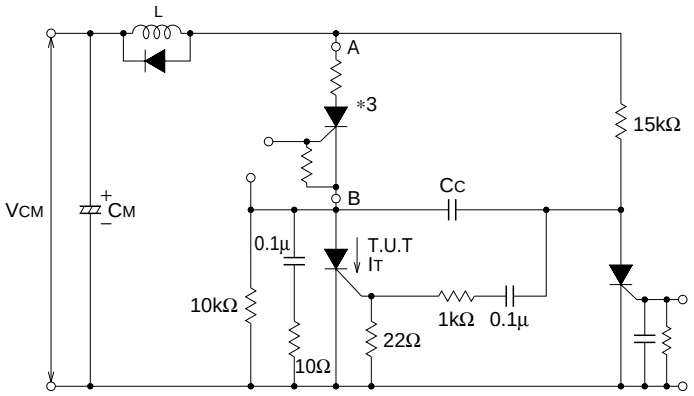
Fig 1. TEST CIRCUIT FOR COMMUTATING CAPACITOR



✻3 The circuit between A-B is a substitute for Xenon flash tube.

STROBE FLASHER APPLICATION

Be sure to remember the following points when designing series type automatic strobe flashers using the CR3JM or CR3AMZ.

1. Rated repetitive peak on-state current ITRM
   The figure shows a turn-off characteristic test circuit.
   When a repetitive discharge current passes to the thyristor (TUT) through the load from the charged main capacitor (CM), the limiting value for the on-state peak current the thyristor can withstand is the rated repetitive peak on-state current.
   To ensure the current fed into the thyristor will not exceed this rated value, it is essential to select the appropriate main capacitor charging voltage VCM, the load (Xenon lamp) resistance and the anode reactor L described below.
2. Main capacitor CM
   In addition to its effect on the peak on-state current value, the capacitance of the main capacitor is an important factor determining the temperature rise of the thyristor junction. When the capacitance of the main capacitor becomes large, the discharge-time constant becomes great also, the temperature rise at the thyristor junction will be very serious and the commutating capability of the thyristor will decrease. When the device is turned off, damage may also be caused by the reverse voltage applied to the thyristor resulting in thermal run away.
3. Commutating Capacitor CC
   The capacitance values of the commutating Capacitor (CC) required for turning the thyristor off can be obtained from the following equation since the electric charge stored in this capacitor and the electric charge released during commutation are the same.

$$CC \geq \frac{iT \cdot tq}{VCC} + \frac{i^2T}{2VCC \cdot (-diT/dt)C} + \Delta CC\ (\mu F)$$

Where

iT : On-state current (A) immediately before turning off
tq : Pulse turn-off time of the thyristor (μs)
VCC : CC charging voltage (V)
(–diT/dt)C : Rate of on-state current drop during commutation (A/μs)
ΔCC : Loss component due to the impedance of the commutating circuit.

In real conditions, however, the turn-off time will vary considerably depending on the temperature of the junction, and the gate reverse bias conditions during turn-off. It is necessary, therefore, to check the actual CC value and to adapt the settings (circuit conditions).
The commutating characteristics graph shown in the figure relates to general circuit conditions.

4. Anode reactor L
   When the thyristor is turned on, the anode reactor L is used to control the rise of the discharge current from the main capacitor and the commutating circuit current in the commutating mode, respectively. The anode reactor L is suitable for use within the range of 20~100μH (air core).
   With this anode reactor inserted, the voltage during commutation may rise and the thyristor may lead to withstand voltage deterioration so that it is necessary to connect the 1~3A class rectifier diode in anti-parallel for protection, i.e., in the opposite direction to the flow of the discharge current.