

Triacs

BTA22 Series

File Number 1300

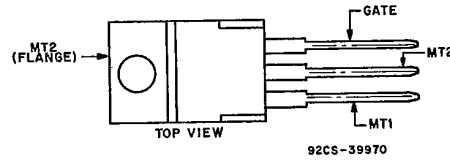
10-A Silicon Triacs

For Power-Control and Power-Switching Applications

Features:

- 800V, 125 Deg. C T<sub>J</sub> 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



JEDEC TO-220AB

The RCA BTA22-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 10 amperes at a T<sub>C</sub> of 75°C and repetitive off-state voltage ratings of 200, 300, 400, 500, 600, and 800 volts.

These devices are characterized for I<sup>+</sup>, III<sup>-</sup> gate-triggering modes only and should suit a wide range of applications that employ diac or anode on/off triggering.

All these types are supplied in the JEDEC TO-220AB VER-SAWATT plastic package.

MAXIMUM RATINGS, Absolute-Maximum Values:

	BTA22B	BTA22C	BTA22D	BTA22E	BTA22M	BTA22N	
V <sub>DROM</sub> *, Gate open, T <sub>J</sub> = -65 to 125°C	200	300	400	500	600	800	V
I <sub>T(RMS)</sub> , T <sub>C</sub> = 75°C, θ = 360°				10			A
I <sub>TSM</sub> (for 1 full cycle) 60 Hz (sinusoidal)				110			A
I <sub>TSM</sub> (for 1 full cycle) 50 Hz (sinusoidal)				103			A
di/dt				70			A/μs
V <sub>D</sub> = V <sub>DROM</sub> , I <sub>G</sub> = 200 mA, t <sub>r</sub> = 0.1 μs (See Fig. 13)				66			A <sup>2</sup> s
i <sup>2</sup> t (See Fig. 11)				33			A <sup>2</sup> s
t = 20 ms				19			A <sup>2</sup> s
t = 2.5 ms							
t = 0.5 ms							
I <sub>GTM</sub> For 1 μs max.				4			A
P <sub>GM</sub> (For 1 μs max., I <sub>GTM</sub> ≤ 4 A)				16			W
P <sub>G(AV)</sub>				0.35			W
T <sub>stg</sub> †				-65 to 150			°C
T <sub>C</sub> †				-65 to 125			°C
T <sub>T</sub> (During Soldering): For 10 s max. (terminals and case)				225			°C

\*For either polarity of main terminal 2 voltage (V<sub>MT2</sub>) with reference to main terminal 1.  
 †For either polarity to gate voltage (V<sub>G</sub>) with reference to main terminal 1.  
 ‡For temperature measurement reference point, see Dimensional Outline.

**BTA22 Series**

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

CHARACTERISTIC	LIMITS			UNITS	
	For All Types Unless Otherwise Specified				
	Min.	Typ.	Max.		
$I_{DROM}^*$ Gate open, $T_J = 125^\circ C$ , $V_{DROM} = \text{Max. rated value}$ .....	—	0.1	2	mA	
$V_{TM}^*$ $i_T = 30 \text{ A (peak)}$ , $T_C = 25^\circ C$ (See Fig. 6) .....	—	—	1.7	V	
$I_{HO}^*$ Gate open, Initial principal current = 150 mA (dc) $V_D = 12 \text{ V}$ , $T_C = 25^\circ C$ .....	—	15	—	mA	
For other case temperatures .....	See Fig. 7				
$dv/dt$ (Commutating)* $V_D = V_{DROM}$ , $I_{T(RMS)} = 10 \text{ A}$ , commutating $di/dt = 4.44 \text{ A/ms}$ , gate unenergized, $T_C = 75^\circ C$ (See Fig. 14) .....	4	10	—	V/ $\mu s$	
$dv/dt^*$ $V_D = V_{DROM}$ , exponential voltage rise, gate open, $T_C = 100^\circ C$ :					
BTA22B .....	100	300	—	V/ $\mu s$	
BTA22C .....	85	275	—		
BTA22D .....	75	250	—		
BTA22E .....	65	225	—		
BTA22M .....	60	200	—		
BTA22N .....	10	50	—		
$I_{GT}^{*■}$ $V_D = 12 \text{ V (dc)}$ $R_L = 30 \Omega$ $T_C = 25^\circ C$	Mode	$V_{MT2}$	$V_G$	mA	
I <sup>+</sup>	positive	positive	.....		—
III <sup>-</sup>	negative	negative	.....		—
I <sup>-</sup>	positive	negative	.....		—
III <sup>+</sup>	negative	positive	.....		—
For other case temperatures .....	See Figs. 9 & 10				
$V_{GT}^{*■}$ $V_D = 12 \text{ V (dc)}$ , $R_L = 30 \Omega$ , $T_C = 25^\circ C$ .....	—	1.25	2.5	V	
For other case temperatures .....	See Fig. 12				
$V_D = V_{DROM}$ , $R_L = 125 \Omega$ , $T_C = 100^\circ C$ .....	0.2	—	—		
$t_{gt}$ For $V_D = V_{DROM}$ , $I_G = 80 \text{ mA}$ , $t_r = 0.1 \mu s$ , $i_T = 10 \text{ A (peak)}$ , $T_C = 25^\circ C$ (See Fig. 5) .....	—	1.6	—	$\mu s$	
$R_{\theta JC}$ .....	—	—	2.2	$^\circ C/W$	
$R_{\theta JA}$ .....	—	—	60		

\*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.

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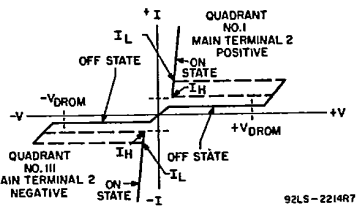


Fig. 1 — Principal voltage-current characteristic.

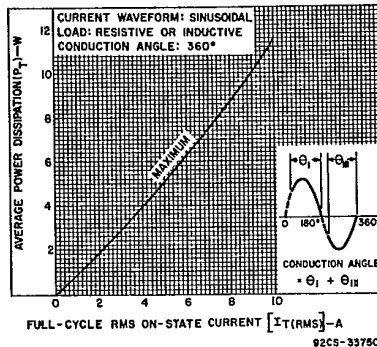


Fig. 2 — Power dissipation vs. on-state current.

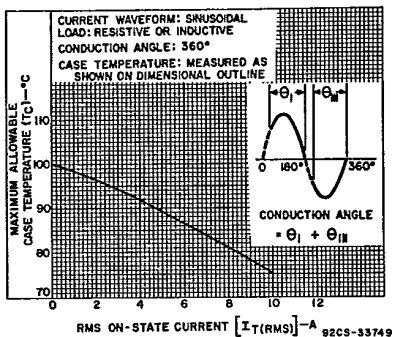


Fig. 3 - Maximum allowable case temperature vs. on-state current.

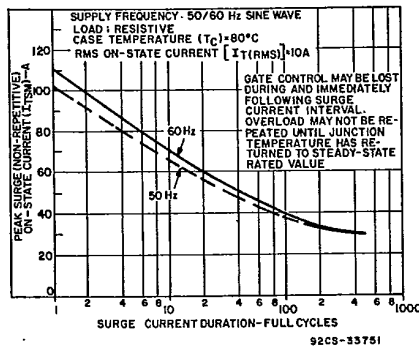


Fig. 4 — Peak surge on-state current vs. surge current duration.

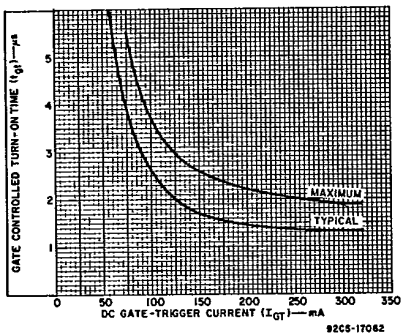


Fig. 5 — Turn-on time vs. gate-trigger current.

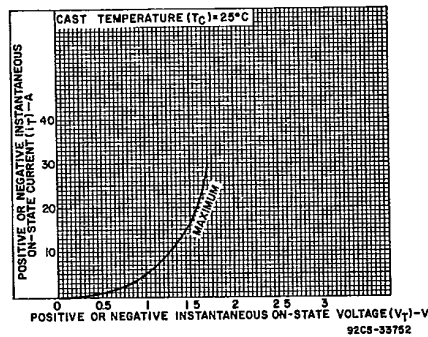


Fig. 6 — On-state current vs. on-state voltage.

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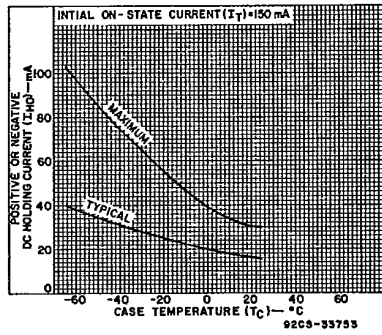


Fig. 7 — DC holding current vs. case temperature.

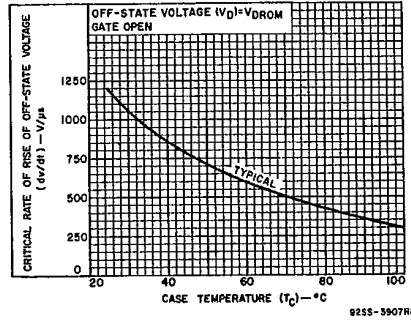


Fig. 8 — Critical rate-of-rise of off-state voltage vs. case temperature.

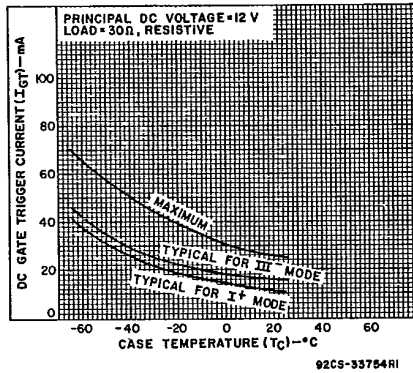


Fig. 9 — DC gate-trigger current (for I<sup>+</sup> and III<sup>-</sup> triggering modes) vs. case temperature.

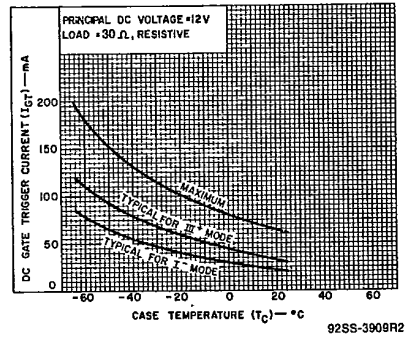


Fig. 10 — DC gate-trigger current (for I<sup>-</sup> and III<sup>+</sup> triggering modes) vs. case temperature.

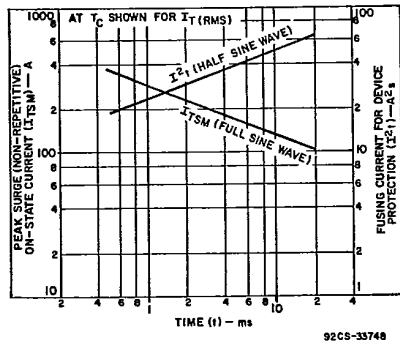


Fig. 11 — Peak surge on-state current and fusing current as a function of time.

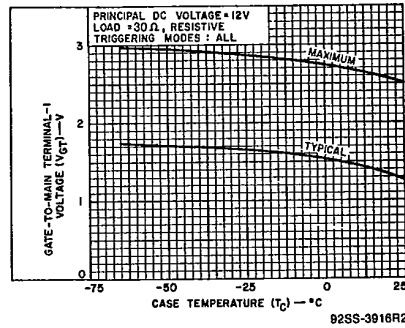


Fig. 12 — DC gate-trigger voltage vs. case temperature.

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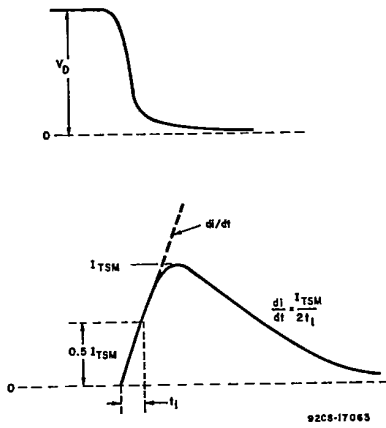


Fig. 13 — Rate-of-change of on-state current with time (defining  $di/dt$ ).

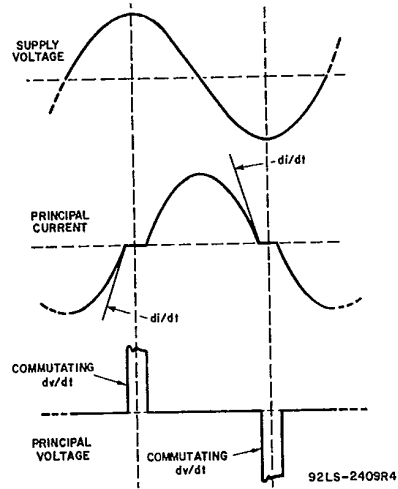


Fig. 14 — Relationship between supply voltage and principal current (inductive load) showing reference points for definition of commutating voltage ( $dv/dt$ ).

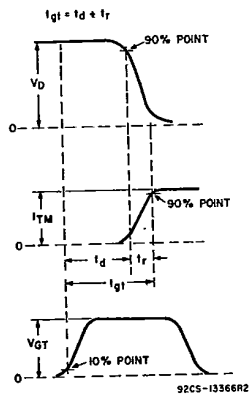
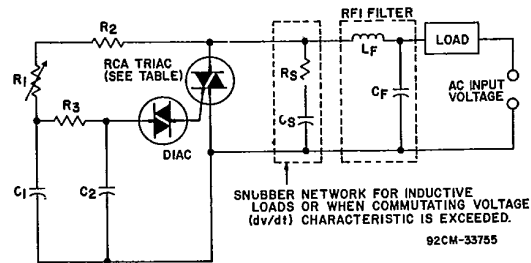


Fig. 15 — Relationship between off-state voltage, on-state current, and gate-trigger voltage showing reference points for definition of turn-on time ( $t_{gt}$ ).



AC INPUT VOLTAGE	120 V 60 Hz	240 V 60 Hz	240 V 50 Hz	
C1	0.1 $\mu$ F 200 V	0.1 $\mu$ F 400 V	0.1 $\mu$ F 400 V	
C2	0.1 $\mu$ F 100 V	0.1 $\mu$ F 100 V	0.1 $\mu$ F 100 V	
R1	100 k $\Omega$ $\frac{1}{2}$ W	200 k $\Omega$ $\frac{1}{2}$ W	250 k $\Omega$ $\frac{1}{2}$ W	
R2	2.2 k $\Omega$ $\frac{1}{2}$ W	3.3 k $\Omega$ $\frac{1}{2}$ W	3.3 k $\Omega$ $\frac{1}{2}$ W	
R3	15 k $\Omega$ $\frac{1}{2}$ W	15 k $\Omega$ $\frac{1}{2}$ W	15 k $\Omega$ $\frac{1}{2}$ W	
SNUBBER NETWORK FOR 10 A (RMS)* INDUCTIVE LOAD	Cs	0.068 $\mu$ F 200 V	0.1 $\mu$ F 400 V	0.1 $\mu$ F 400 V
	Rs	1.2 k $\Omega$ $\frac{1}{2}$ W	1 k $\Omega$ $\frac{1}{2}$ W	1 k $\Omega$ $\frac{1}{2}$ W
RFI FILTER	Cf*	0.1 $\mu$ F 200 V	0.1 $\mu$ F 400 V	0.1 $\mu$ F 400 V
	Lf*	100 $\mu$ H	200 $\mu$ H	200 $\mu$ H
RCA TRIACS	BTA22B BTA22C	BTA22D BTA22E	BTA22D BTA22E	

\*For other RMS current values refer to RCA Application Note AN-4745.  
\*Typical values for lamp dimming circuits.

Fig. 16 — Typical phase-control circuit for lamp dimming, heat control, and universal-motor speed control.