

3875081 G E SOLID STATE

01E 17771 D T-25-15

Triacs

BTA22 Series

File Number 1300

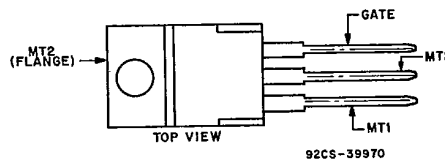
10-A Silicon Triacs

For Power-Control and Power-Switching Applications

Features:

- 800V, 125 Deg. C T_J 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_C of 75°C and repetitive off-state voltage ratings of 200, 300, 400, 500, 600, and 800 volts.

These devices are characterized for I⁺, III⁻ 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_{DROM}^* , Gate open, $T_J = -65$ to 125°C	200	300	400	500	600	800	V
$I_{T(RMS)}$, $T_C = 75^\circ\text{C}$, $\theta = 360^\circ$				10			A
I_{TSM} (for 1 full cycle) 60 Hz (sinusoidal)				110			A
50 Hz (sinusoidal)				103			A
di/dt							
$V_D = V_{DROM}$, $I_G = 200$ mA, $t_r = 0.1$ μs				70			A/ μs
(See Fig. 13)							
i^2t (See Fig. 11)				66			A ² s
$t = 20$ ms				33			A ² s
$t = 2.5$ ms				19			A ² s
$t = 0.5$ ms							
$I_{GTM}^{\dagger}$				4			A
For 1 μs max.				16			W
P_{GM} (For 1 μs max., $I_{GTM} \leq 4$ A)				0.35			W
$P_{G(AV)}$				-65 to 150			°C
$T_{stg}^{\ddagger}$				-65 to 125			°C
$T_C^{\ddagger}$							
T_T (During Soldering):				225			°C
For 10 s max. (terminals and case)							

*For either polarity of main terminal 2 voltage (V_{MT2}) with reference to main terminal 1.

$\dagger$ For either polarity to gate voltage (V_G) with reference to main terminal 1.

$\ddagger$ 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.	
$I_{DROM}^{\bullet}$ Gate open, $T_J = 125^{\circ}\text{C}$, $V_{DROM} = \text{Max. rated value}$	—	0.1	2	mA
$V_{TM}^{\bullet}$ $i_T = 30\text{ A (peak)}$, $T_C = 25^{\circ}\text{C}$ (See Fig. 6)	—	—	1.7	V
$I_{HO}^{\bullet}$ Gate open, Initial principal current = 150 mA (dc) $v_D = 12\text{ V}$, $T_C = 25^{\circ}\text{C}$	—	15	—	mA
For other case temperatures	See Fig. 7			
dv/dt (Commutating) $^{\bullet}$ $v_D = V_{DROM}$, $I_{T(RMS)} = 10\text{ A}$, commutating $di/dt = 4.44\text{ A/ms}$, gate unenergized, $T_C = 75^{\circ}\text{C}$ (See Fig. 14)	4	10	—	V/ μs
$dv/dt^{\bullet}$ $v_D = V_{DROM}$, exponential voltage rise, gate open, $T_C = 100^{\circ}\text{C}$:				V/ μs
BTA22B	100	300	—	
BTA22C	85	275	—	
BTA22D	75	250	—	
BTA22E	65	225	—	
BTA22M	60	200	—	
BTA22N	10	50	—	
$I_{GT}^{\bullet\blacksquare}$ Mode V_{MT2} V_G $v_D = 12\text{ V (dc)}$ I^+ positive positive	—	10	25	mA
$R_L = 30\ \Omega$ III^- negative negative	—	20	30	
$T_C = 25^{\circ}\text{C}$ I^- positive negative	—	20	60	
III^+ negative positive	—	30	60	
For other case temperatures	See Figs. 9 & 10			
$V_{GT}^{\bullet\blacksquare}$ $v_D = 12\text{ V (dc)}$, $R_L = 30\ \Omega$, $T_C = 25^{\circ}\text{C}$	—	1.25	2.5	V
For other case temperatures	See Fig. 12			
$v_D = V_{DROM}$, $R_L = 125\ \Omega$, $T_C = 100^{\circ}\text{C}$	0.2	—	—	
t_{gt} For $v_D = V_{DROM}$, $I_G = 80\text{ mA}$, $t_r = 0.1\ \mu\text{s}$, $i_T = 10\text{ A (peak)}$, $T_C = 25^{\circ}\text{C}$ (See Fig. 5)	—	1.6	—	μs
$R_{\theta JC}$	—	—	2.2	$^{\circ}\text{C/W}$
$R_{\theta JA}$	—	—	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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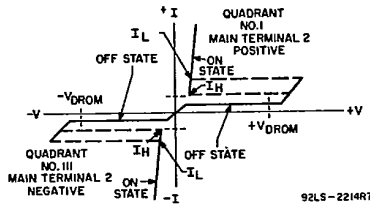


Fig. 1 — Principal voltage-current characteristic.

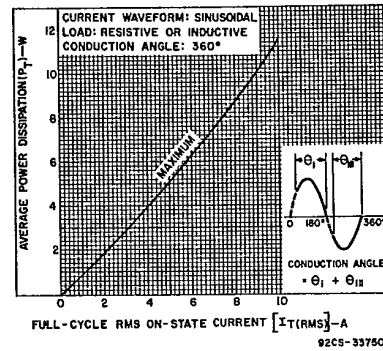


Fig. 2 — Power dissipation vs. on-state current.

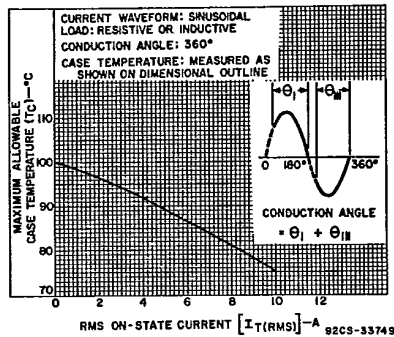


Fig. 3 - Maximum allowable case temperature vs. on-state current.

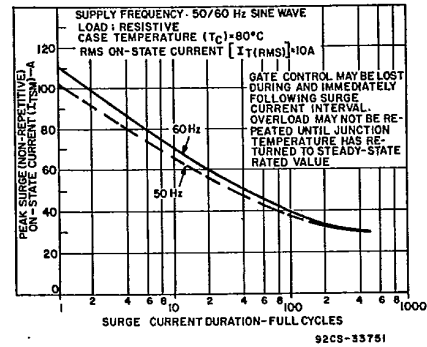


Fig. 4 — Peak surge on-state current vs. surge current duration.

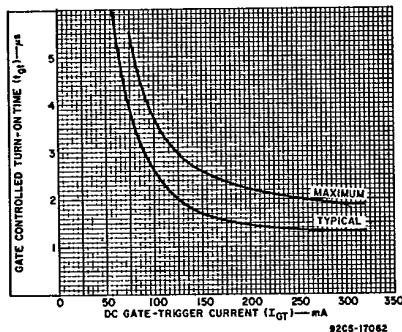


Fig. 5 — Turn-on time vs. gate-trigger current.

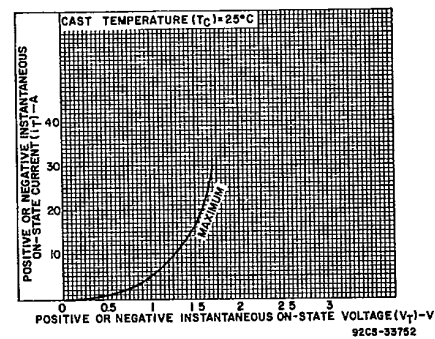


Fig. 6 — On-state current vs. on-state voltage.

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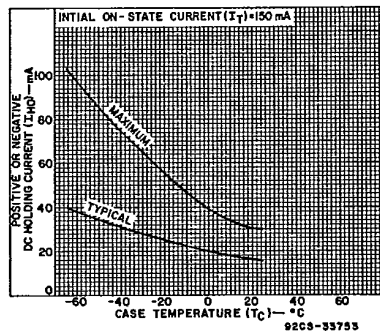


Fig. 7 — DC holding current vs. case temperature.

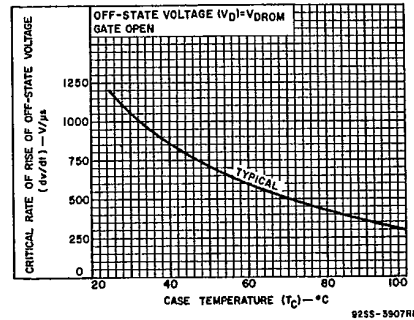


Fig. 8 — Critical rate-of-rise of off-state voltage vs. case temperature.

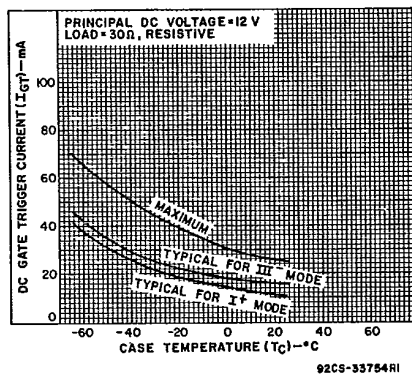
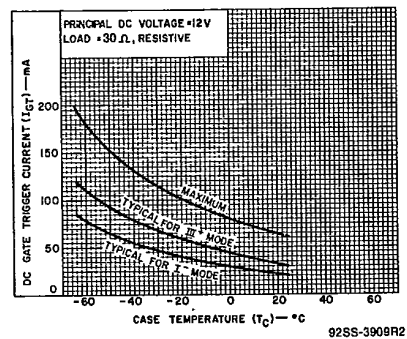
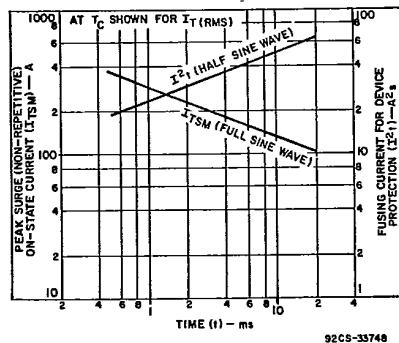
Fig. 9 — DC gate-trigger current (for I^+ and III^- triggering modes) vs. case temperature.Fig. 10 — DC gate-trigger current (for I^- and III^+ triggering modes) vs. case temperature.

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

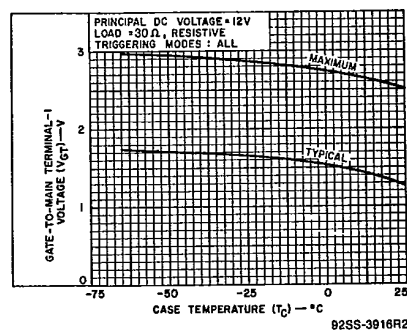


Fig. 12 — DC gate-trigger voltage vs. case temperature.

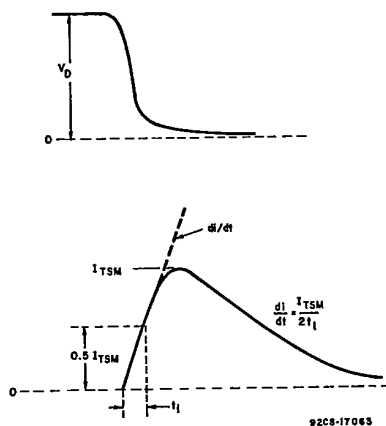
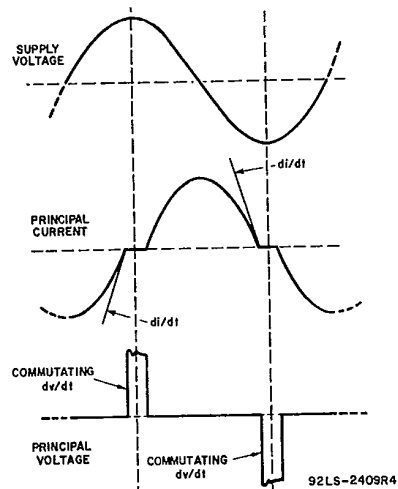
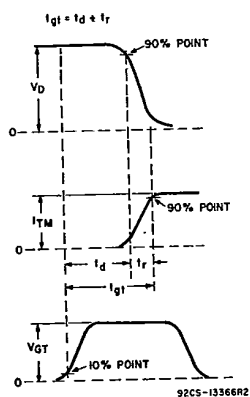
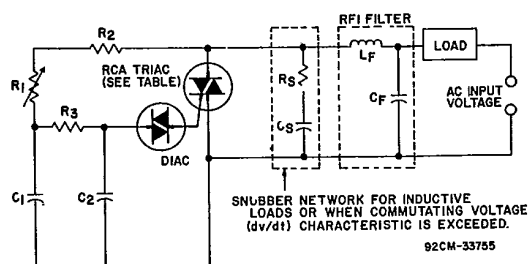
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Fig. 13 — Rate-of-change of on-state current with time (defining di/dt).Fig. 14 — Relationship between supply voltage and principal current (inductive load) showing reference points for definition of commutating voltage (dv/dt).Fig. 15 — Relationship 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 μ F 200 V	0.1 μ F 400 V	0.1 μ F 400 V
C2	0.1 μ F 100 V	0.1 μ F 100 V	0.1 μ F 100 V
R1	100 k Ω 1/2 W	200 k Ω 1/2 W	250 k Ω 1/2 W
R2	2.2 k Ω 1/2 W	3.3 k Ω 1/2 W	3.3 k Ω 1/2 W
R3	15 k Ω 1/2 W	15 k Ω 1/2 W	15 k Ω 1/2 W
SNUBBER NETWORK FOR 10 A (RMS)* INDUCTIVE LOAD	CS	0.068 μ F 200 V	0.1 μ F 400 V
	RS	1.2 k Ω 1/2 W	1 k Ω 1/2 W
	CP*	0.1 μ F 200 V	0.1 μ F 400 V
RFI FILTER	LF*	100 μ H 200 μ H	200 μ H 200 μ H
	RCA TRIACS	BTA22B BTA22C	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.