BTA22 Series

File Number **1300**

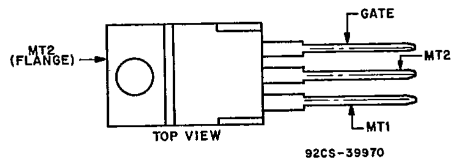
10-A Silicon Triacs

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 VERSAWATT 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

Parameter	All types	Units
$I_{T(RMS)}$, T_C = 75°C, θ = 360°	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 (See Fig. 13)	70	A/µs
I^2t (See Fig. 11) t = 20 ms	66	A^2s
t = 2.5 ms	33	A^2s
t = 0.5 ms	19	A^2s
I_{GTM}■ For 1 µs max.	4	A
P_{GM} (For 1 µs max., $I_{GTM} \leq 4$ A	16	W
$P_{G(AV)}$	0.35	W
T_{stg}†	-65 to 150	°C
T_C†	-65 to 125	°C
T_T (During Soldering): For 10 s max. (terminals and case)	225	°C

•For either polarity of main terminal 2 voltage (V_{MT2}) with reference to main terminal 1.
■For either polarity to gate voltage (V_G) 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 For All Types Unless Otherwise Specified			UNITS
	Min.	Typ.	Max.	
I_{DROM}• Gate open, T_J = 125°C, V_{DROM} = Max. rated value	—	0.1	2	mA
V_{TM}• i_T = 30 A (peak), T_C = 25°C (See Fig. 6)	—	—	1.7	V
I_{HO}• Gate open, Initial principal current = 150 mA (dc) v_D = 12 V, T_C = 25°C	—	15	—	mA
For other case temperatures		See Fig. 7		
dv/dt (Commutating)• v_D = V_{DROM}, $I_{T(RMS)}$ = 10 A, commutating di/dt = 4.44 A/ms, gate unenergized, T_C = 75°C (See Fig. 14)	4	10	—	V/μs
dv/dt• v_D = V_{DROM}, exponential voltage rise, gate open, T_C = 100°C: BTA22B	100	300	—	V/μs
BTA22C	85	275	—	V/μs
BTA22D	75	250	—	V/μs
BTA22E	65	225	—	V/μs
BTA22M	60	200	—	V/μs
BTA22N	10	50	—	V/μs
I_{GT}•■ v_D = 12 V (dc), R_L = 30 Ω, T_C = 25°C — Mode I+, V_{MT2} positive, V_G positive	—	10	25	mA
Mode III−, V_{MT2} negative, V_G negative	—	20	30	mA
Mode I−, V_{MT2} positive, V_G negative	—	20	60	mA
Mode III+, V_{MT2} negative, V_G positive	—	30	60	mA
For other case temperatures		See Figs. 9 & 10		
V_{GT}•■ v_D = 12 V (dc), R_L = 30 Ω, T_C = 25°C	—	1.25	2.5	V
For other case temperatures		See Fig. 12		
v_D = V_{DROM}, R_L = 125 Ω, T_C = 100°C	0.2	—	—	V
t_{gt} For v_D = V_{DROM}, I_G = 80 mA, t_r = 0.1 μs, i_T = 10 A (peak), T_C = 25°C (See Fig. 5)	—	1.6	—	μs
$R_{\theta JC}$	—	—	2.2	°C/W
$R_{\theta JA}$	—	—	60	°C/W

•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.

BTA22 Series

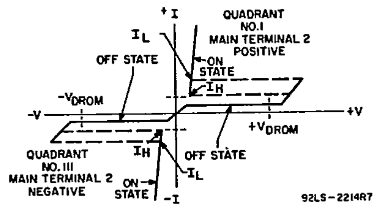


Fig. 1 — Principal voltage-current characteristic.

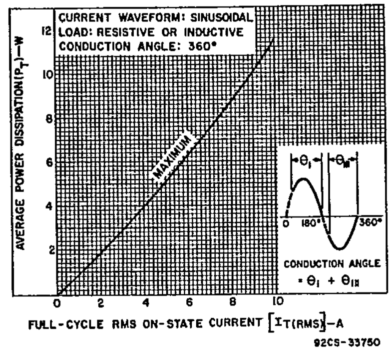


Fig. 2 — Power dissipation vs. on-state current.

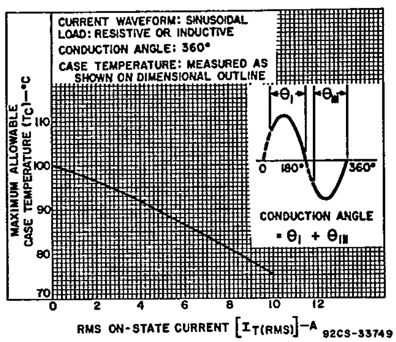


Fig. 3 - Maximum allowable case temperature vs. on-state current.

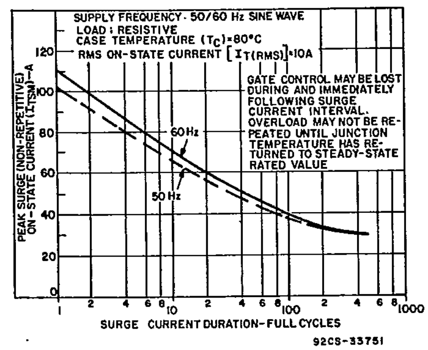


Fig. 4 — Peak surge on-state current vs. surge current duration.

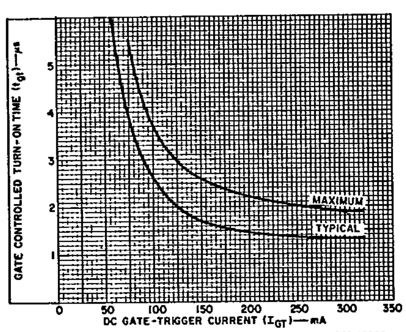


Fig. 5 — Turn-on time vs. gate-trigger current.

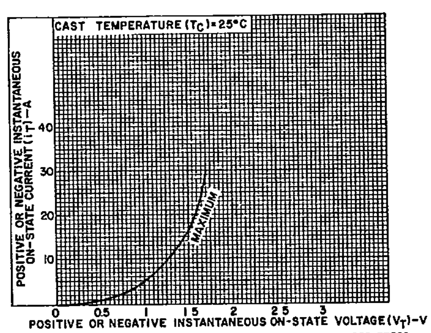


Fig. 6 — On-state current vs. on-state voltage.

BTA22 Series

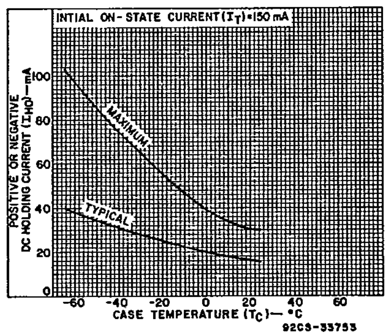


Fig. 7 — DC holding current vs. case temperature.

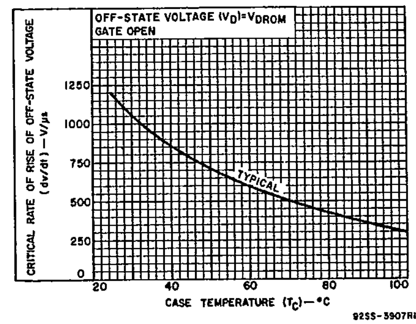


Fig. 8 — Critical rate-of-rise of off-state voltage vs. case temperature.

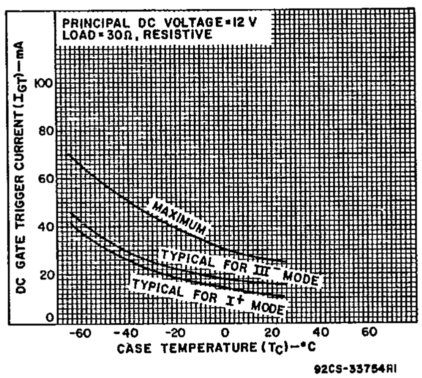


Fig. 9 — DC gate-trigger current (for I^+ and III^- triggering modes) vs. case temperature.

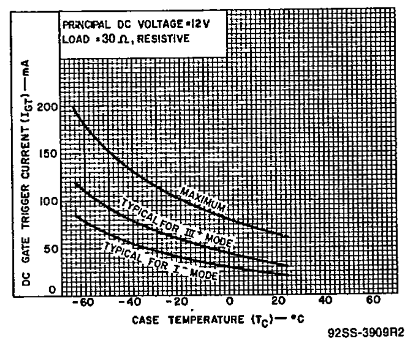


Fig. 10 — DC gate-trigger current (for I^- and III^+ triggering modes) vs. case temperature.

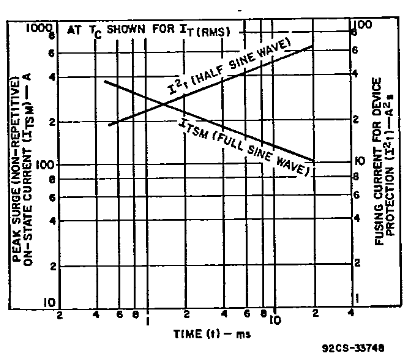


Fig. 11 — Peak surge on-state current and fusing current as a function of time.

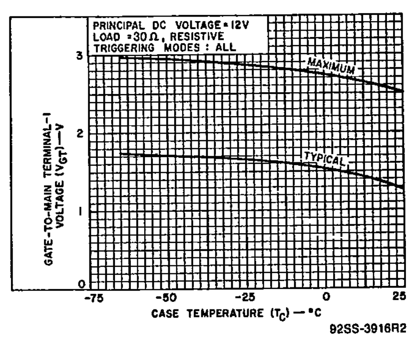


Fig. 12 — DC gate-trigger voltage vs. case temperature.

BTA22 Series

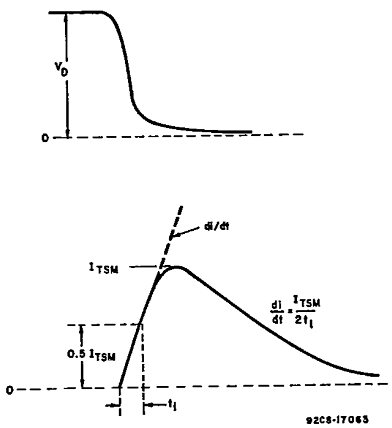


Fig. 13 — Rate-of-change of on-state current with time (defining di/dt).

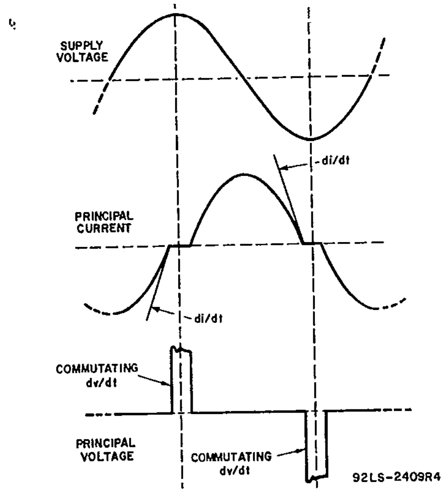


Fig. 14 — Relationship between supply voltage and principal current (inductive load) showing reference points for definition of commutating voltage (dv/dt).

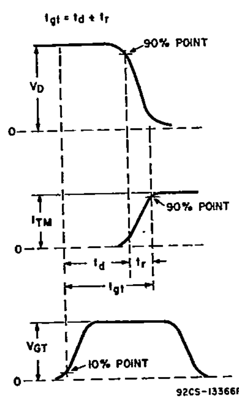
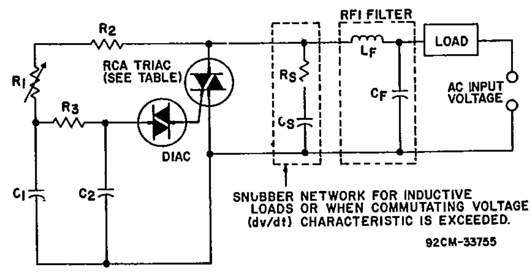


Fig. 15 — Relationship between off-state voltage, on-state current, and gate-trigger voltage showing reference points for definition of turn-on time (t_{gt}).



AC INPUT VOLTAGE		120 V 60 Hz	240 V 60 Hz	240 V 50 Hz
C_1		0.1 µF 200 V	0.1 µF 400 V	0.1 µF 400 V
C_2		0.1 µF 100 V	0.1 µF 100 V	0.1 µF 100 V
R_1		100 kΩ ½ W	200 kΩ ½ W	250 kΩ ½ W
R_2		2.2 kΩ ½ W	3.3 kΩ ½ W	3.3 kΩ ½ W
R_3		15 kΩ ½ W	15 kΩ ½ W	15 kΩ ½ W
SNUBBER NETWORK FOR 10 A (RMS)* INDUCTIVE LOAD	C_S	0.068 µF 200 V	0.1 µF 400 V	0.1 µF 400 V
	R_S	1.2 kΩ ½ W	1 kΩ ½ W	1 kΩ ½ W
RFI FILTER	C_F*	0.1 µF 200 V	0.1 µF 400 V	0.1 µF 400 V
	L_F*	100 µH	200 µH	200 µH
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.