BTA20 Series

File Number **1298**

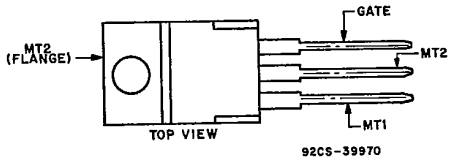
6-A Silicon Triacs

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 BTA20-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 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:*

	BTA20C	BTA20D	BTA20E	BTA20M	BTA20N	
V_{DROM}*, Gate open, T_J = -65 to 125°C	300	400	500	600	800	V
$I_{T(RMS)}$, T_C = 75°C, θ = 360°			6			A
I_{TSM} (for 1 full cycle) 60 Hz (sinusoidal)			80			A
50 Hz (sinusoidal)			75			A
di/dt						
$V_D = V_{DROM}$, I_G = 200 mA, t_r = 0.1 μs (See Fig. 11)			70			A/μs
I^2t (See Fig. 10)						
t = 20 ms			40			A^2s
t = 2.5 ms			20			A^2s
t = 0.5 ms			11			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.

BTA20 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)	—	2	3	V
I_{HO}● Gate open, Initial principal current = 150 mA (dc)				
v_D = 12 V, T_C = 25°C	—	100	—	mA
For other case temperatures		See Fig. 7		
dv/dt (Commutating)● $v_D = V_{DROM}$, $I_{T(RMS)}$ = 6 A, commutating di/dt = 3.2 A/ms, gate unenergized, T_C = 80°C (See Fig. 11)	2	10	—	V/μs
dv/dt● $v_D = V_{DROM}$, exponential voltage rise, gate open, T_C = 100°C:				
BTA20C	40	275	—	V/μs
BTA20D	30	250	—	
BTA20E	20	225	—	
BTA20M	15	150	—	
BTA20N	10	50	—	
I_{GT}●■ Mode / V_{MT2} / V_G				
v_D = 12 V (dc) I^+ positive positive	—	25	80	mA
R_L = 30 Ω				
T_C = 25°C III^- negative negative	—	25	80	
For other case temperatures		See Fig. 9		
V_{GT}●■ v_D = 12 V (dc), R_L = 30 Ω,				
T_C = 25°C	—	1.5	4	V
For other case temperatures		See Fig. 5		
$v_D = V_{DROM}$, R_L = 125 Ω, T_C = 100°C	0.2	—	—	
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. 13)	—	1.6	2.5	μs
$R_{\theta JC}$	—	—	2.2	°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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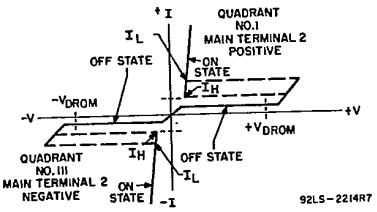

Fig. 1 — Principal voltage-current characteristic.

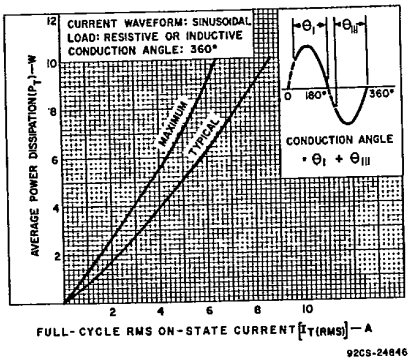

Fig. 2 — Power dissipation vs. on-state current.

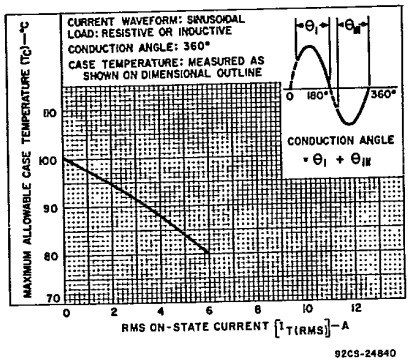

Fig. 3 - Allowable case temperature vs. on-state current.

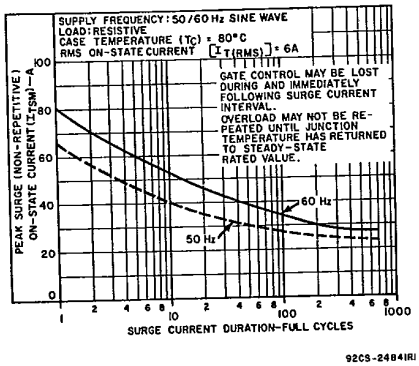

Fig. 4 — Peak surge on-state current vs. surge current duration.

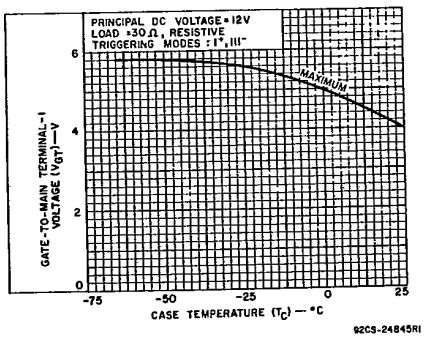

Fig. 5 — DC gate-trigger voltage vs. case temperature.

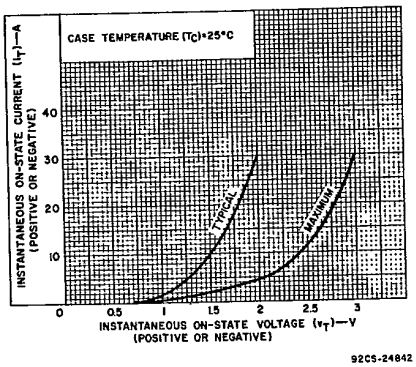

Fig. 6 — On-state current vs. on-state voltage.

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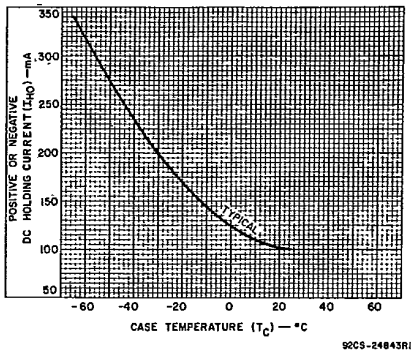

Fig. 7 — DC holding current vs. case temperature.

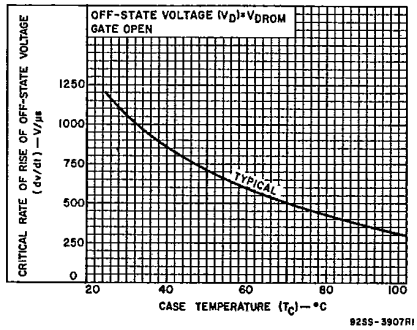

Fig. 8 — Critical rate-of-rise of off-state voltage vs. case temperature.

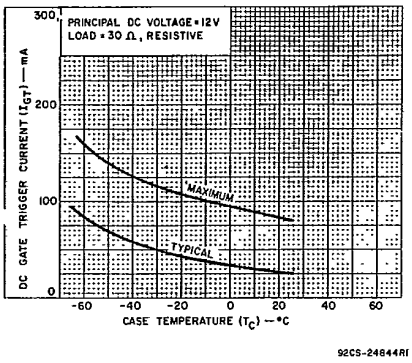

Fig. 9 — DC gate-trigger current (for I^+ and III^- triggering modes) vs. case temperature.

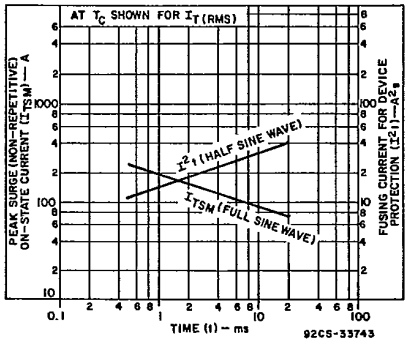

Fig. 10 — Peak surge on-state current and fusing current vs. time.

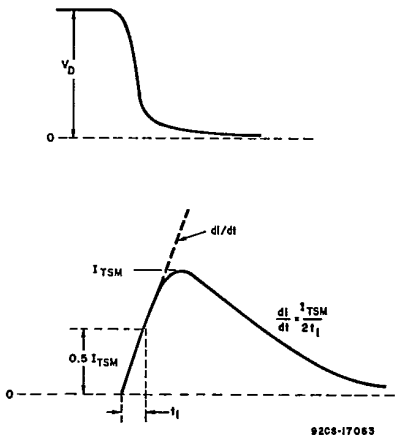

Fig. 11 — Rate of change of on-state current with time (defining di/dt).

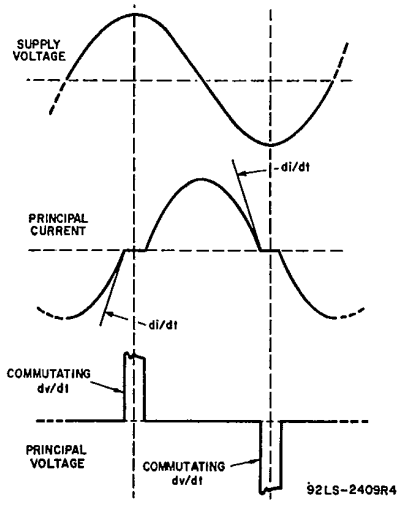

Fig. 12 — Relationship between supply voltage and principal current (inductive load) showing reference points for definition of commutating voltage (dv/dt).

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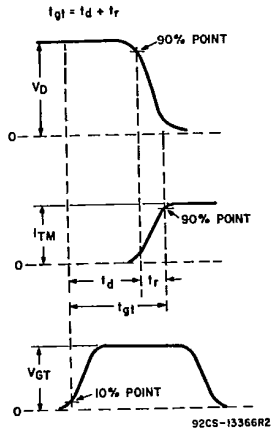
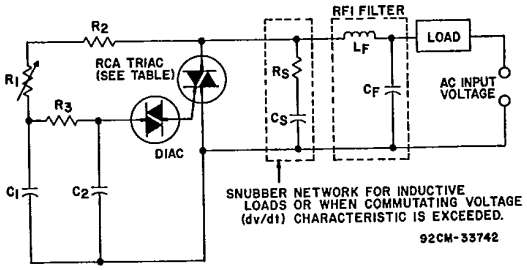


Fig. 13 — Relationship between off-state voltage, on-state current, and gate-trigger voltage showing reference points for definition of turn-on time (t_{gt}).



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 6 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
	LF*	100 μH	200 μH	200 μH
RCA TRIACS		BTA20C	BTA20D BTA20E	BTA20D BTA20E

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

Fig. 14 — Typical phase-control circuit for lamp dimming, heat control, and universal-motor speed control.