File Number **1301**

BTA23 Series

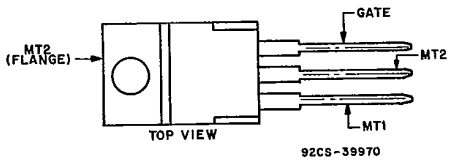
12-A Silicon Triacs

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-2203AB

The RCA BTA23-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:*

	BTA23B	BTA23C	BTA23D	BTA23E	BTA23M	BTA23N	
V_{DROM}•, Gate open, T_J = -65 to 125°C	200	300	400	500	600	800	V
$I_{T(RMS)}$, T_C = 70°C, θ = 360°				12			A
I_{TSM} (for 1 full cycle) 60 Hz (sinusoidal)				115			A
50 Hz (sinusoidal)				108			A
di/dt							
$V_D = V_{DROM}$, I_G = 200 mA, t_r = 0.1 μs				70			A/μs
I^2t (See Fig. 14)							
t = 20 ms				73			A^2s
t = 2.5 ms				36			A^2s
t = 0.5 ms				20			A^2s
I_{GTM}■							
For 1 μs max.				4			A
P_{GM} (For 1 μs max., $I_{GTM} \leq 4$ A				16			W
$P_{G(AV)}$				0.2			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.

BTA23 Series

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

CHARACTERISTIC				LIMITS For All Types Unless Otherwise Specified Min.	Typ.	Max.	UNITS
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)				—	—	1.6	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. 15)				4	10	—	V/μs
dv/dt• $v_D = V_{DROM}$, exponential voltage rise, gate open, T_C = 100°C:							
BTA23B				100	300	—	
BTA23C				85	275	—	
BTA23D				75	250	—	V/μs
BTA23E				65	225	—	
BTA23M				60	200	—	
BTA23N				30	70	—	
I_{GT}•■ v_D = 12 V (dc) R_L = 30 Ω	Mode	V_{MT2}	V_G				
T_C = 25°C	I^+	positive	positive	—	10	25	mA
	III^-	negative	negative	—	20	30	
For other case temperatures							
	I^-	positive	negative	—	20	60	
	III^+	negative	positive	—	30	60	
For other case temperatures					See Figs. 10 & 11		
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	—	—	
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	—	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.

BTA23 Series

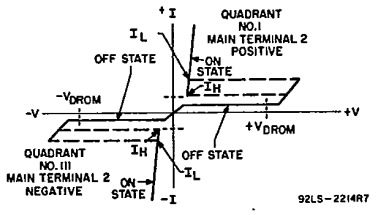


Fig. 1 — Principal voltage-current characteristic.

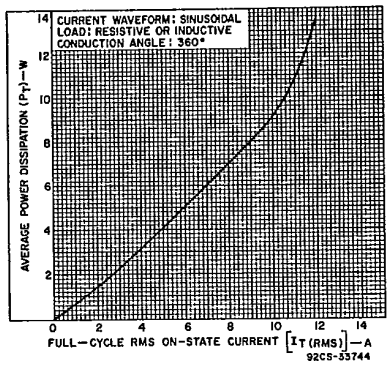


Fig. 2 — Power dissipation as a function of on-state current.

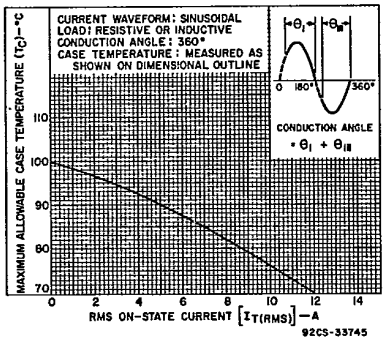


Fig. 3 - Allowable case temperature as a function of on-state current.

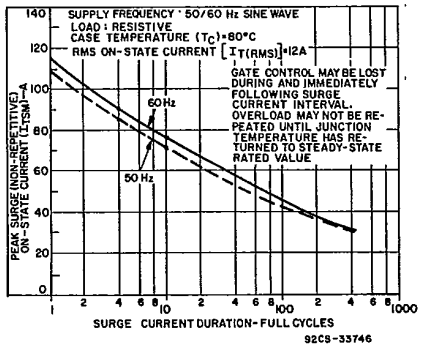


Fig. 4 — Peak surge on-state current as a function of surge current duration.

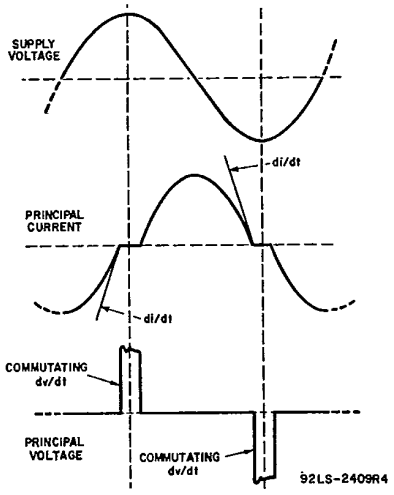


Fig. 5 — Oscilloscope display of commutating dv/dt.

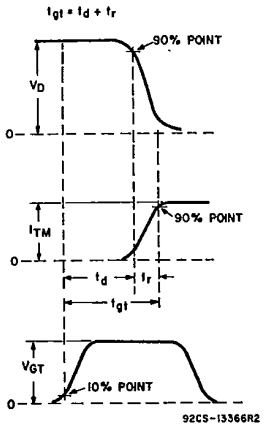


Fig. 6 — Oscilloscope display for measurement of gate-controlled turn-on time (t_{gt}).

BTA23 Series

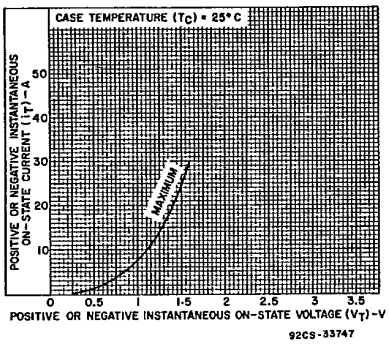


Fig. 7 — On-state current vs. on-state voltage.

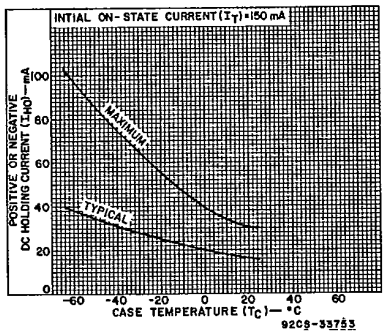


Fig. 8 — DC holding current for either direction of on-state current vs. case temperature.

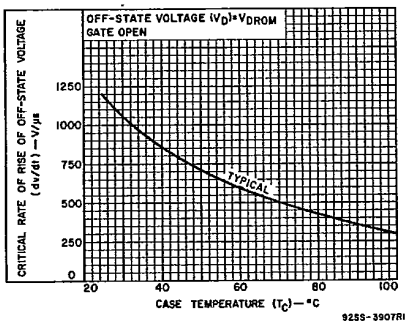


Fig. 9 — Critical rate-of-rise of off-state voltage as a function of case temperature.

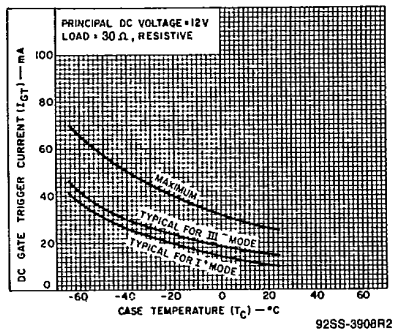


Fig. 10 — DC gate-trigger current (for I^+ and III^- triggering modes) vs. case temperature.

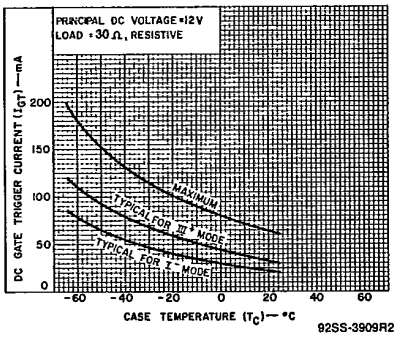


Fig. 11 — DC gate-trigger current (for I^- and III^+ triggering modes) vs. case temperature.

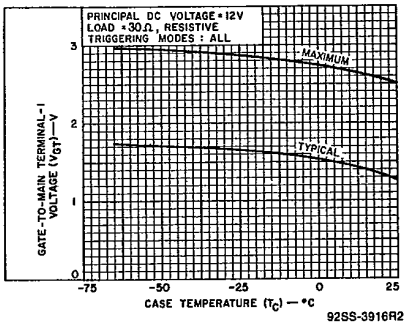


Fig. 12 — DC gate-trigger voltage vs. case temperature.

BTA23 Series

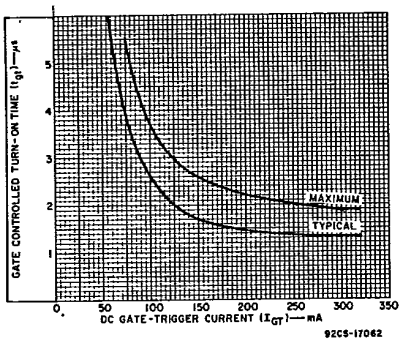


Fig. 13 — Turn-on time vs. gate-trigger current.

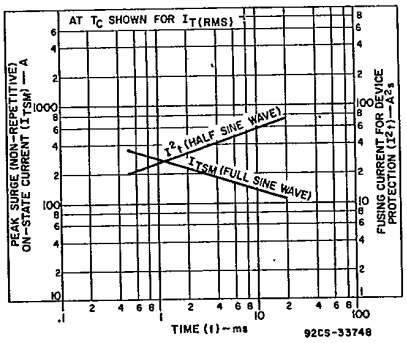
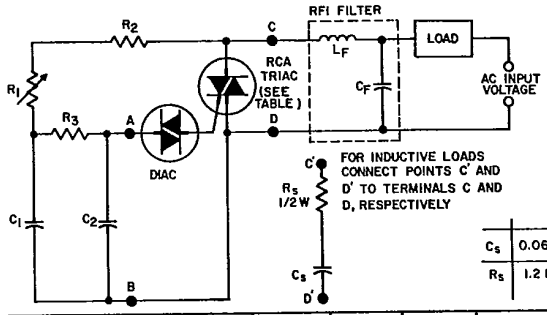


Fig. 14 — Peak surge on-state current and fusing current as a function of time.



	120 V	240 V
C_S	0.068 μF/200V	0.1 μF/400V
R_S	1.2 KΩ	1 KΩ

AC INPUT VOLTAGE	C_1	C_2	R_1	R_2	R_3	RFI FILTER L_F* (typ.)	RFI FILTER C_F* (typ.)	RCA TYPES
120 V 60 Hz	0.1 μF 200 V	0.1 μF 100 V	100 KΩ ½ W	2.2 KΩ ½ W	15 KΩ ½ W	100 μH	0.1 μF 200V	BTA23B,C
240 V 50 Hz	0.1 μF 400 V	0.1 μF 100 V	250 KΩ 1 W	3.3 KΩ ½ W	15 KΩ ½ W	200 μH	0.1 μF 400 V	BTA23D,E
240 V 60 Hz	0.1 μF 400 V	0.1 μF 100 V	200 KΩ 1 W	3.3 KΩ ½ W	15 KΩ ½ W	200 μH	0.1 μF 400 V	BTA23D,E

*Typical values for lamp-dimming circuits.

92CS-33761

Fig. 15 — Typical phase-control circuit for lamp dimming, heat control, and universal-motor speed control.