

3875081 G E SOLID STATE

01E 17776 D T-25-15

File Number 1301

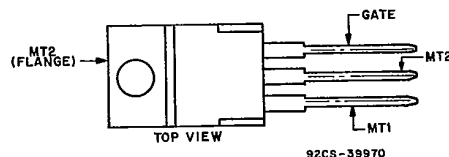
BTA23 Series

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 VER-SAWATT 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
$I_{T(RMS)}$, $T_C = 70^\circ\text{C}$, $\theta = 360^\circ$				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, $t_r = 0.1 \mu\text{s}$				70			A/ μs
I^2t (See Fig. 14)							
$t = 20$ ms				73			A ² s
$t = 2.5$ ms				36			A ² s
$t = 0.5$ ms				20			A ² s
$I_{GTM}^{\dagger}$							
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
$T_{stg}^{\ddagger}$				-65 to 150			°C
$T_C^{\ddagger}$				-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.

3875081 G E SOLID STATE

01E 17777 D T-25-15

Triacs

BTA23 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)	—	—	1.6	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. 15)	4	10	—	V/ μs
$dv/dt^{\bullet}$ $v_D = V_{DROM}$, exponential voltage rise, gate open, $T_C = 100^{\circ}\text{C}$:				
BTA23B	100	300	—	V/ μs
BTA23C	85	275	—	
BTA23D	75	250	—	
BTA23E	65	225	—	
BTA23M	60	200	—	
BTA23N	30	70	—	
$I_{GT}^{\bullet\blacksquare}$ 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	
$T_C = 25^{\circ}\text{C}$ For other case temperatures	See Figs. 10 & 11			
I^- positive negative	—	20	60	
III^+ negative positive	—	30	60	
For other case temperatures	See Figs. 10 & 11			
$V_{GT}^{\bullet\blacksquare}$ $v_D = 12\text{ V (dc)}$, $R_L = 30\ \Omega$, $T_C = 25^{\circ}\text{C}$	—	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. 13)	—	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.

BTA23 Series

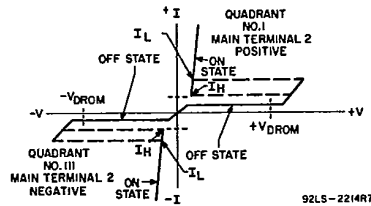


Fig. 1 — Principal voltage-current characteristic.

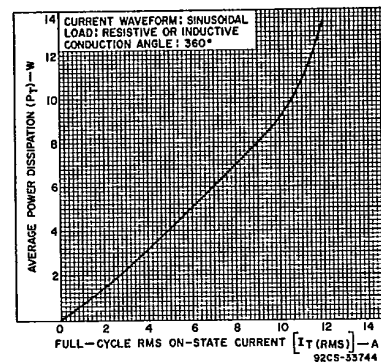


Fig. 2 — Power dissipation as a function of on-state current.

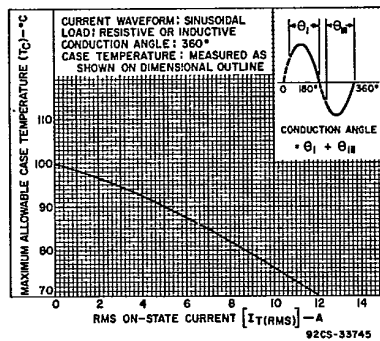


Fig. 3 — Allowable case temperature as a function of on-state current.

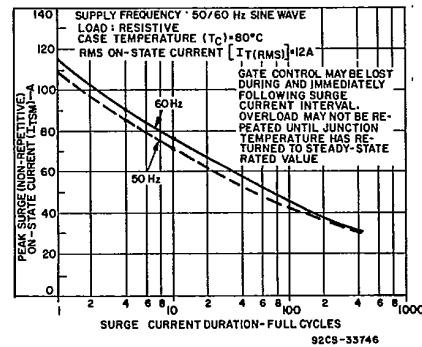


Fig. 4 — Peak surge on-state current as a function of surge current duration.

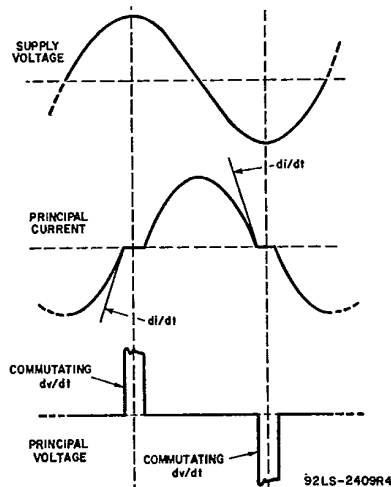
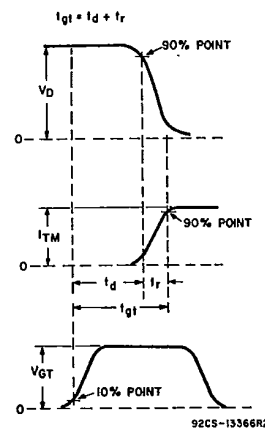


Fig. 5 — Oscilloscope display of commutating dv/dt.

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

3875081 G E SOLID STATE

01E 17779

DT-25-15

Triacs

BTA23 Series

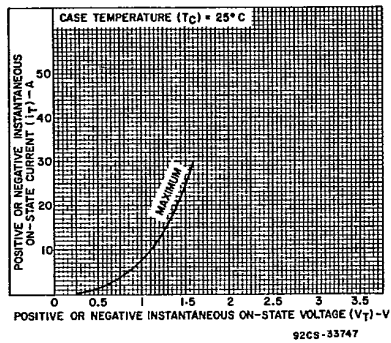


Fig. 7 — On-state current vs. on-state voltage.

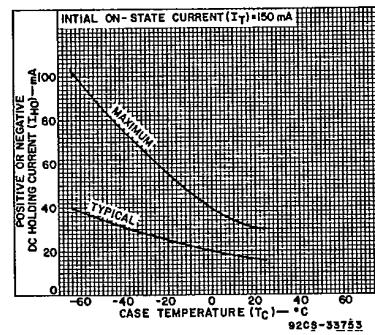


Fig. 8 — DC holding current for either direction of on-state current vs. case temperature.

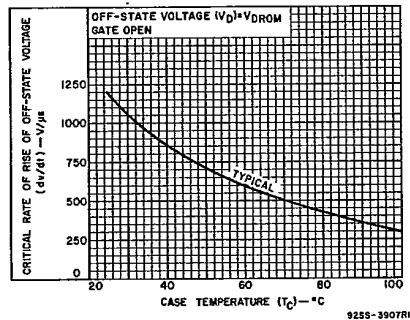


Fig. 9 — Critical rate-of-rise of off-state voltage as a function of case temperature.

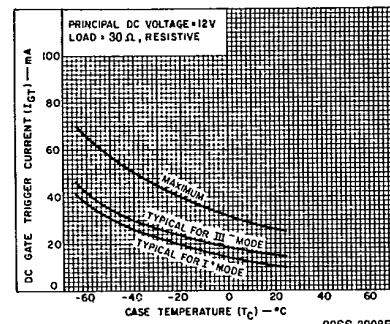
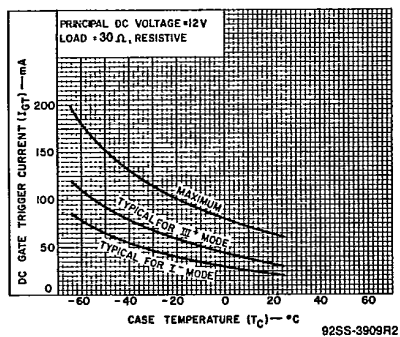
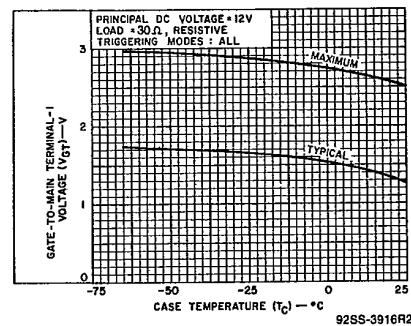
Fig. 10 — DC gate-trigger current (for I^+ and III^+ triggering modes) vs. case temperature.Fig. 11 — DC gate-trigger current (for I^- and III^- triggering modes) vs. case temperature.

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

BTA23 Series

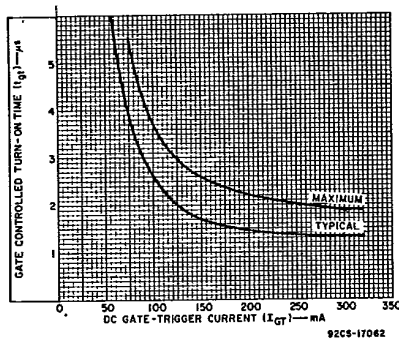


Fig. 13 — Turn-on time vs. gate-trigger current.

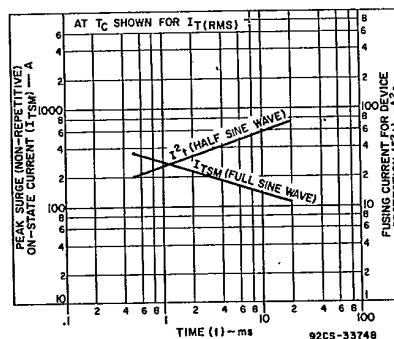


Fig. 14 — Peak surge on-state current and fusing current as a function of time.

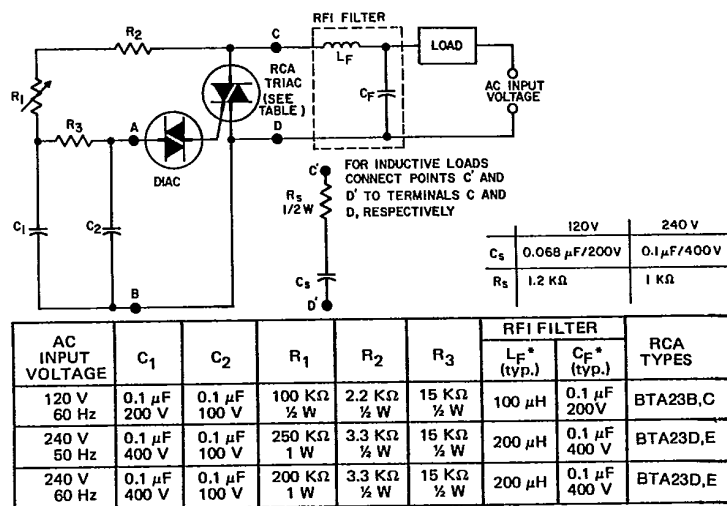


Fig. 15 — Typical phase-control circuit for lamp dimming, heat control, and universal-motor speed control.