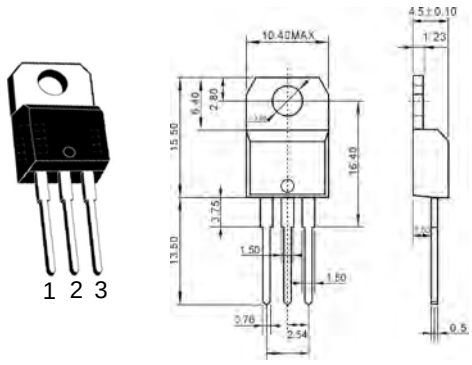
Bi-Directional Triode Thyristor

Designed for high performance full-wave ac control applications where high noise immunity and high commutating di/dt are required.

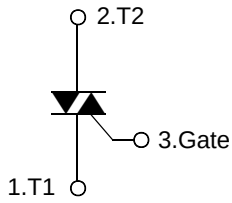
TO-220AB



Features

- Blocking Voltage to 800 V
- On-State Current Rating of 16A RMS at 80℃
- Uniform Gate Trigger Currents in Three Quadrants
- High Immunity to dV/dt-1500V/us minimum at 125℃
- Minimizes Snubber Networks for Protection
- Industry Standard TO-220AB Package
- High Commutating dI/dt- 4.0A/ms minimum at 125℃
- Internally Isolated (2500VRMS)
- These are Pb-Free Devices

Symbol



Absolute Maximum Ratings

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current(full since wave)	TO-220AB	TC=100℃	16	A
		TO-220AB Ins.	TC=85℃		
I_{TSM}	Non repetitive surge peak on-state current(full cycle, Tj initial=25℃)	F=50Hz	t=20ms	160	A
		F=60Hz	t=16.7ms	168	
I^2t	I^2t Value for fusing	tp=10ms		144	A^2s
DI/DT	Critical rate of rise of on-state current IG=2X$I_{GT,tr\leq100ns}$	F=120Hz	Tj=125℃	50	A/us
VDSM/VRSM	Non repetitive surge peak off-state voltage	tp=10ms	Tj=25℃	Vdrm / vrrm + 100V	V
IGM	Peak gate current	tp=20us	Tj=125℃	4	A
$P_{G(AV)}$	Average gate power dissipation		Tj=125℃	1	W
T_{stg}	Storage junction temperature range			-40 to +150	℃
T_j	Operating junction temperature range			-40 to +125	

Electrical Characteristics(Tj=25℃,unlessotherwisespecified)

Snubberless™ and Logic Level (3 quadrants)

Symbol	Test conditions	Quadrant	BTA16-800C		Unit
I_{GT}(1)	V_D=12V R_L=33Ω	Ⅰ-Ⅱ-Ⅲ	MAX	35	mA
V_{GT}		Ⅰ-Ⅱ-Ⅲ	MAX	1.3	V
V_{GD}	V_D=V_{DRM} R_L=3.3KΩTj=125℃	Ⅰ-Ⅱ-Ⅲ	MIN	0.2	V
IH(2)	IT=500mA		MAX	50	mA
IL	I_G=1.2I_{GT}	Ⅰ-Ⅲ	MAX	70	mA
		Ⅱ		80	
Dv / Dt(2)	V_D=67%V_{DRM} Gate open Tj=125℃		MIN	1000	V/us
(Dl/dt)c(2)	(Dv/dt)c=0.1V/us Tj=125℃		MIN	-	A/ms
	(Dv/dt)c=10V/us Tj=125℃			-	
	Without snubber Tj=125℃			14	

Standard (4 Quadrants)

Symbol	Test conditions	Quadrant	BTA16-800C		Unit
IGT(1)	V_D=12V R_L=33Ω	Ⅰ-Ⅱ-Ⅲ	MAX	35	mA
		Ⅳ		50	
VGT		ALL	MAX	1.3	V
VGD	V_D=V_{DRM} R_L=3.3KΩTj=125℃	ALL	MIN	0.2	V
IH(2)	IT=500mA		MAX	50	mA
IL	I_G=1.2I_{GT}	Ⅰ-Ⅲ-Ⅳ	MAX	60	mA
		Ⅱ		120	
(Dl/dt)(2)	V_D=67%V_{DRM} Gate open Tj=125℃		MIN	400	V/us
(Dl/dt)c(2)	(Dv/dt)c=7A/ms Tj=125℃		MIN	10	V/us

Static Characteristics

Symbol	Test conditions			Value	Unit
VTM(2)	ITM=22A tp=380us	TJ=25℃	MAX	1.55	V
Vto(2)	Threshold voltage	TJ=125℃	MAX	0.85	V
Rd(2)	Dynamic resistance	TJ=125℃	MAX	25	mΩ
I_{DRM}	V_{DRM}=V_{RRM}	TJ=25℃	MAX	5	uA
I_{RRM}		TJ=125℃		2	mA
V_{DRM}/V_{RRM}	Voltage	TJ=25℃	MIN	800	V

Note 1: minimum IGT is guaranted at 5% of IGT max

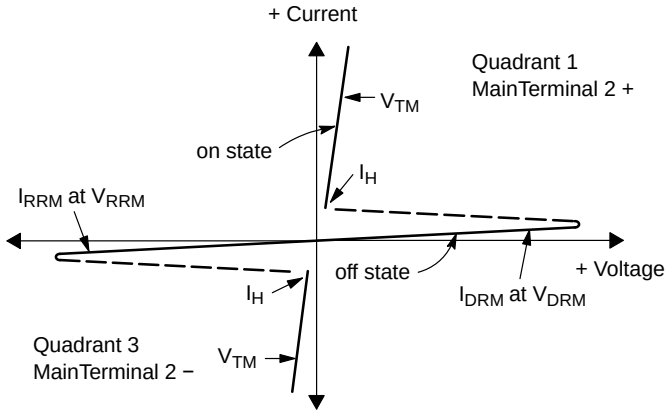
Note 2: for both polarities of A2 referenced to A1

Thermal Resistances

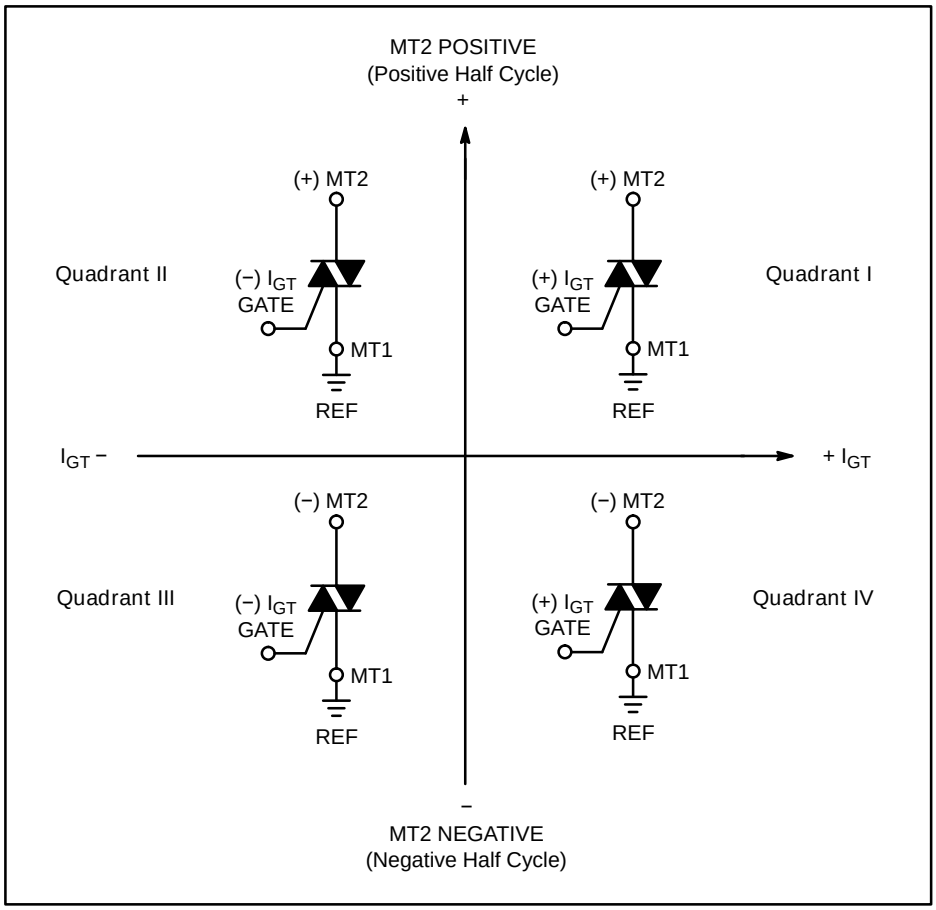
Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case(AC)	TO-220AB	1.2	℃/W
		TO-220AB(Insulated)	2.1	
Rth(j-a)	Junction to ambient	TO-220AB/ TO-220AB(Insulated)	60	℃/W

Voltage Current Characteristic of Triacs (Bidirectional Device)

Symbol	Parameter
V_{DRM}	Peak Repetitive Forward Off State Voltage
I_{DRM}	Peak Forward Blocking Current
V_{RRM}	Peak Repetitive Reverse Off State Voltage
I_{RRM}	Peak Reverse Blocking Current
V_{TM}	Maximum On State Voltage
I_H	Holding Current



Quadrant Definitions for a Triac



All polarities are referenced to MT1.
With in−phase signals (using standard AC lines) quadrants I and III are used.

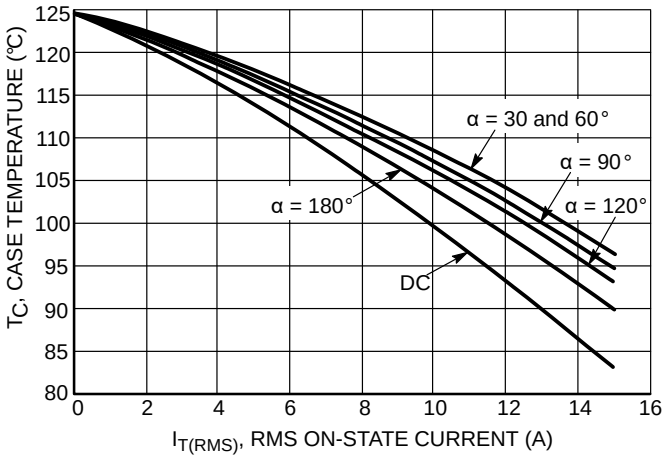


Figure 1. RMS Current Derating

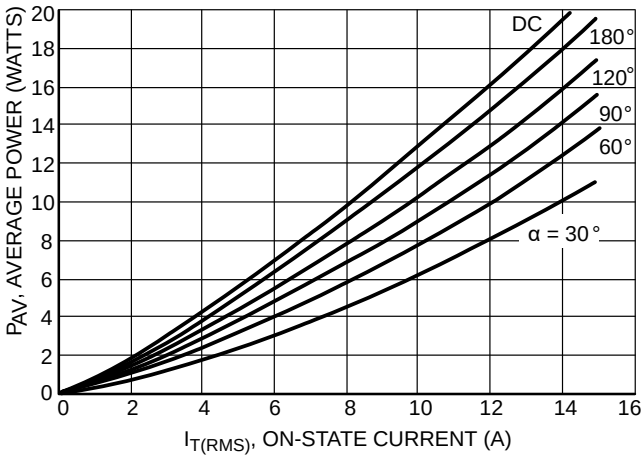


Figure 2. On-State Power Dissipation

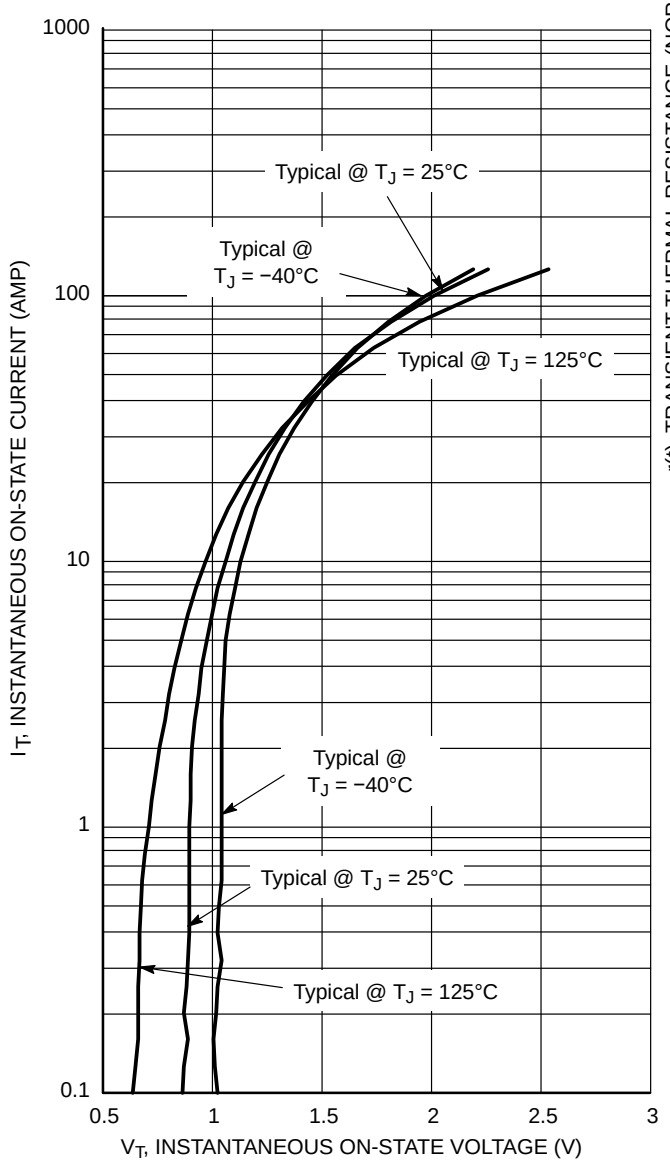


Figure 3. On-State Characteristics

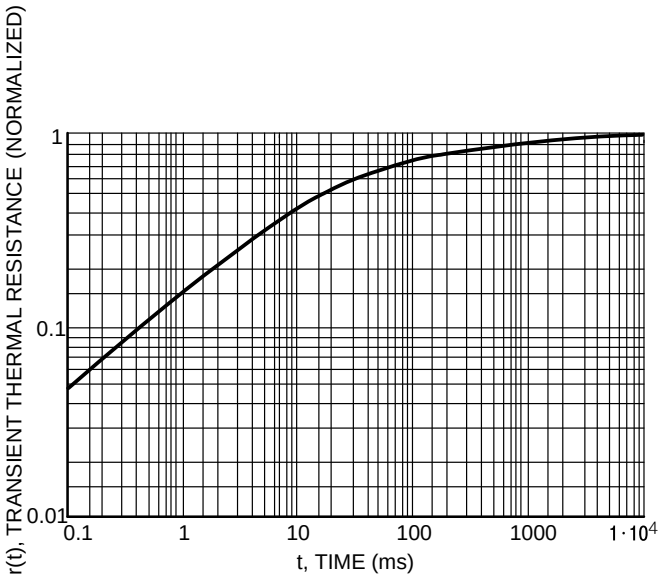


Figure 4. Thermal Response

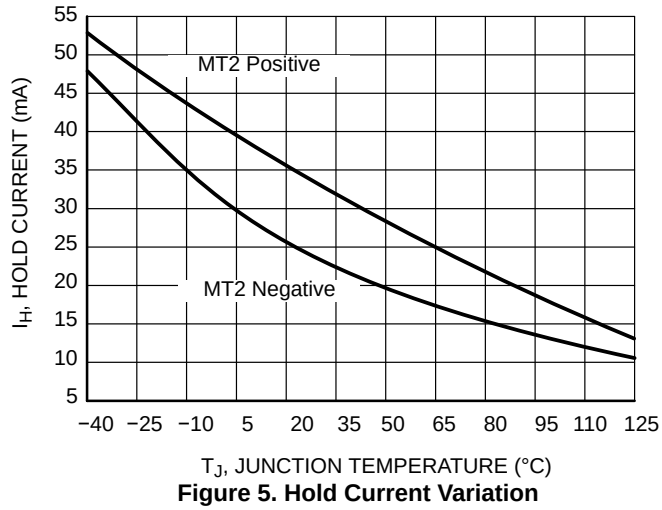


Figure 5. Hold Current Variation

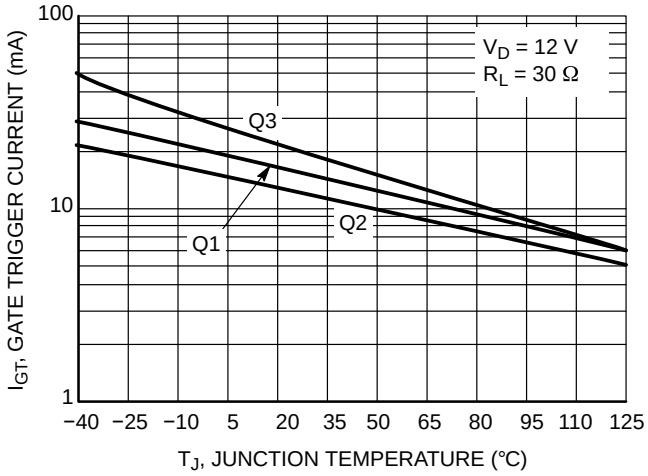


Figure 6. Gate Trigger Current Variation

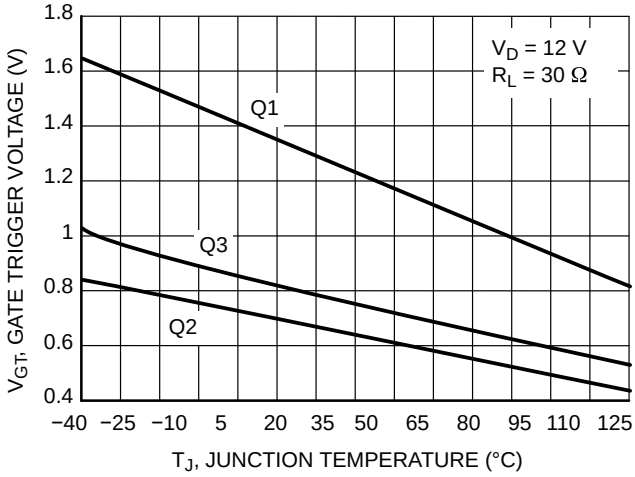


Figure 7. Gate Trigger Voltage Variation

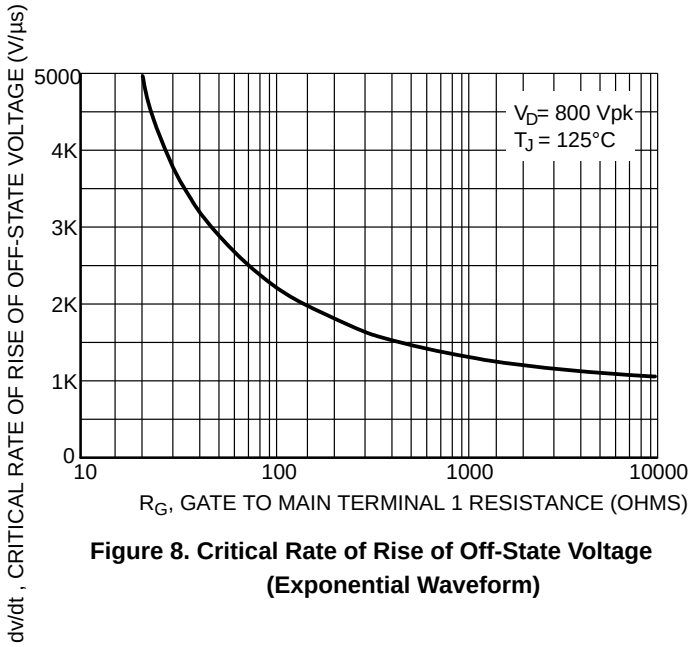
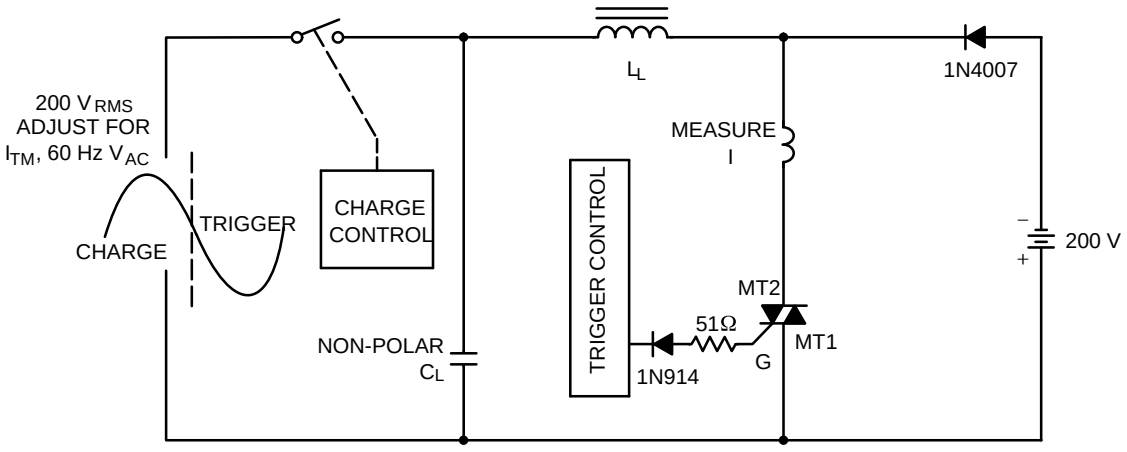


Figure 8. Critical Rate of Rise of Off-State Voltage (Exponential Waveform)



Note: Component values are for verification of rated (di/dt)c. See AN1048 for additional information.

Figure 9. Simplified Test Circuit to Measure the Critical Rate of Rise of Commutating Current $(di/dt)_c$