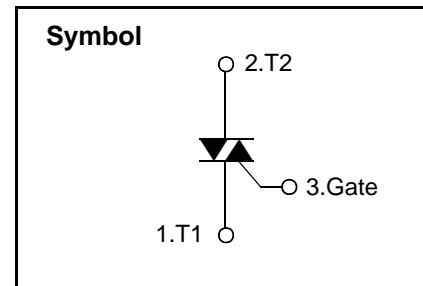
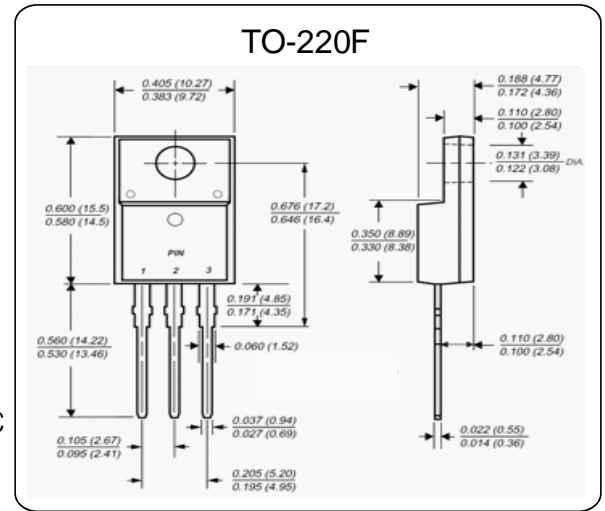


## Bi-Directional Triode Thyristor

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

### Features

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



### Absolute Maximum Ratings

Symbol	Parameter			Value	Unit	
$I_{T(RMS)}$	RMS on-state current(full sine wave)	TO-220F	$T_C=85^\circ C$	16	A	
$I_{TSM}$	Non repetitive surge peak on-state current(full cycle, $T_j$ initial= $25^\circ C$ )	F=50Hz	t=20ms	160	A	
		F=60Hz	t=16.7ms	168		
$I^2t$	$I^2t$ Value for fusing	tp=10ms		144	A <sup>2</sup> s	
DI/DT	Critical rate of rise of on-state current $I_G=2X_{IGT, tr \le 100ns}$	F=120Hz	$T_j=125^\circ C$	50	A/us	
VDSM/V RSM	Non repetitive surge peak off-state voltage	tp=10ms	$T_j=25^\circ C$	Vdrm / vrrm + 100V	V	
IGM	Peak gate current	tp=20us	$T_j=125^\circ C$	4	A	
$P_{G(AV)}$	Average gate power dissipation	$T_j=125^\circ C$		1	W	
$T_{stg}$	Storage junction temperature range				-40 to +150	°C
$T_j$	Operating junction temperature range				-40 to +125	



# BT16F-800C

## Electrical Characteristics(T<sub>j</sub>=25°C, unless otherwise specified)

### Snubberless™ and Logic Level(3 quadrants)

Symbol	Test conditions	Quadrant	BT16F-600C		Unit
I <sub>GT</sub> (1)	V <sub>D</sub> =12V R <sub>L</sub> =33Ω	I - II - III	MAX	35	mA
V <sub>GT</sub>		I - II - III	MAX	1.3	V
V <sub>GD</sub>	V <sub>D</sub> =V <sub>DRM</sub> R <sub>L</sub> =3.3KΩT <sub>j</sub> =125°C	I - II - III	MIN	0.2	V
I <sub>H</sub> (2)	I <sub>T</sub> =500mA		MAX	50	mA
I <sub>L</sub>	I <sub>G</sub> =1.2I <sub>GT</sub>	I - III	MAX	70	mA
		II		80	
Dv / Dt(2)	V <sub>D</sub> =67%V <sub>DRM</sub> Gate open T <sub>j</sub> =125°C		MIN	1000	V/us
(DI/dt)c(2)	(Dv/dt)c=0.1 V/us T <sub>j</sub> =125°C		MIN	-	A/ms
	(Dv/dt)c=10V/us T <sub>j</sub> =125°C			-	
	Without snubber T <sub>j</sub> =125°C			14	

### Standard (4Quadrants)

Symbol	Test conditions	Quadrant	BT16F-600C		Unit
IGT(1)	V <sub>D</sub> =12V R <sub>L</sub> =33Ω	I - II - III	MAX	35	mA
		IV		50	
VGT		ALL	MAX	1.3	V
VGD	V <sub>D</sub> =V <sub>DRM</sub> R <sub>L</sub> =3.3KΩT <sub>j</sub> =125°C	ALL	MIN	0.2	V
I <sub>H</sub> (2)	I <sub>T</sub> =500mA		MAX	50	mA
I <sub>L</sub>	I <sub>G</sub> =1.2IGT	I - III - IV	MAX	60	mA
		II		120	
(DI/dt)(2)	V <sub>D</sub> =67%V <sub>DRM</sub> Gate open T <sub>j</sub> =125°C		MIN	400	V/us
(DI/dt)c(2)	(Dv/dt)c=7 A/ms T <sub>j</sub> =125°C		MIN	10	V/us

### Static Characteristics

Symbol	Test conditions		Value	Unit	
V <sub>TM</sub> (2)	I <sub>TM</sub> =22A t <sub>p</sub> =380us	T <sub>J</sub> =25°C	MAX	1.55	V
V <sub>to</sub> (2)	Threshold voltage	T <sub>J</sub> =125°C	MAX	0.85	V
R <sub>d</sub> (2)	Dynamic resistance	T <sub>J</sub> =125°C	MAX	25	mΩ
I <sub>DRM</sub>	V <sub>DRM</sub> =V <sub>R<sub>RM</sub></sub>	T <sub>J</sub> =25°C		5	uA
I <sub>R<sub>RM</sub></sub>		T <sub>J</sub> =125°C	MAX	2	mA
V <sub>DRM</sub> /V <sub>R<sub>RM</sub></sub>	Voltage	T <sub>J</sub> =25°C	MIN	800	V

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

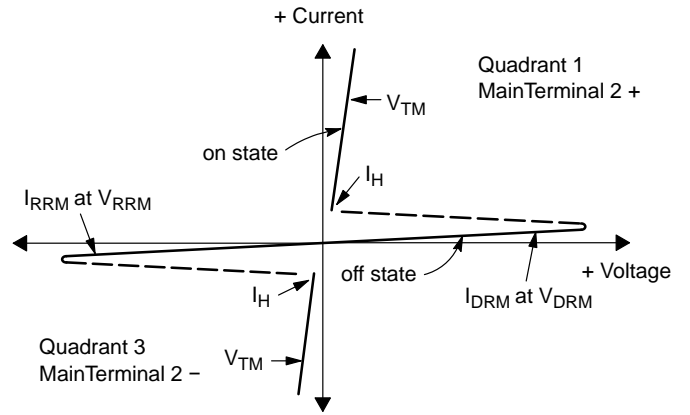
Note 2: for both polarities of A2 referenced to A1

### Thermal Resistances

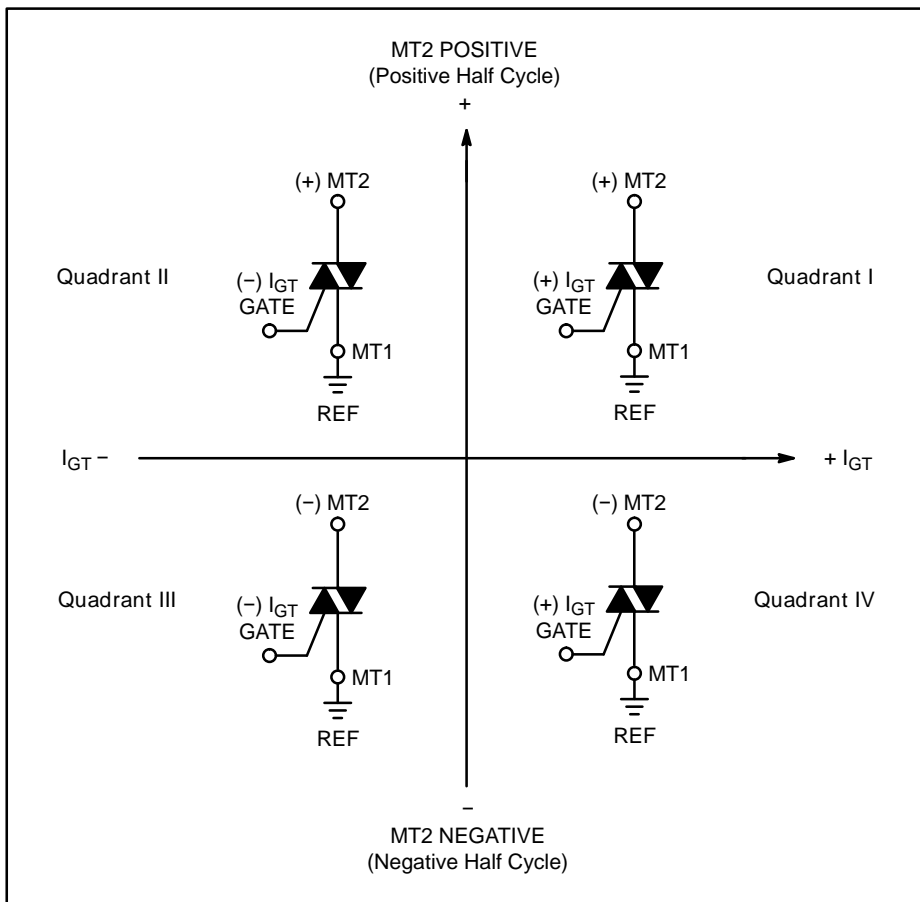
Symbol	Parameter		Value	Unit
R <sub>th(j-c)</sub>	Junction to case(AC)	TO-220F	2.1	°C/W
R <sub>th(j-a)</sub>	Junction to ambient	TO-220F	60	°C/W

## 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.

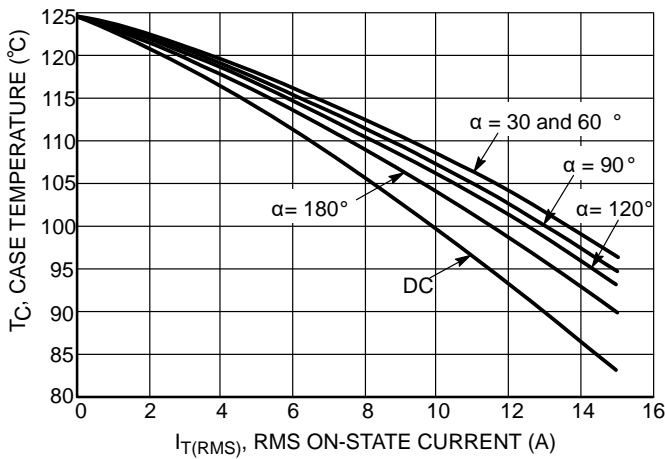


Figure 1. RMS Current Derating

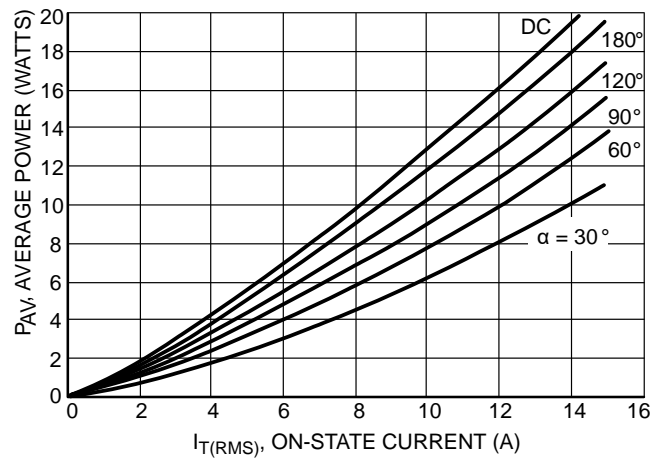


Figure 2. On-State Power Dissipation

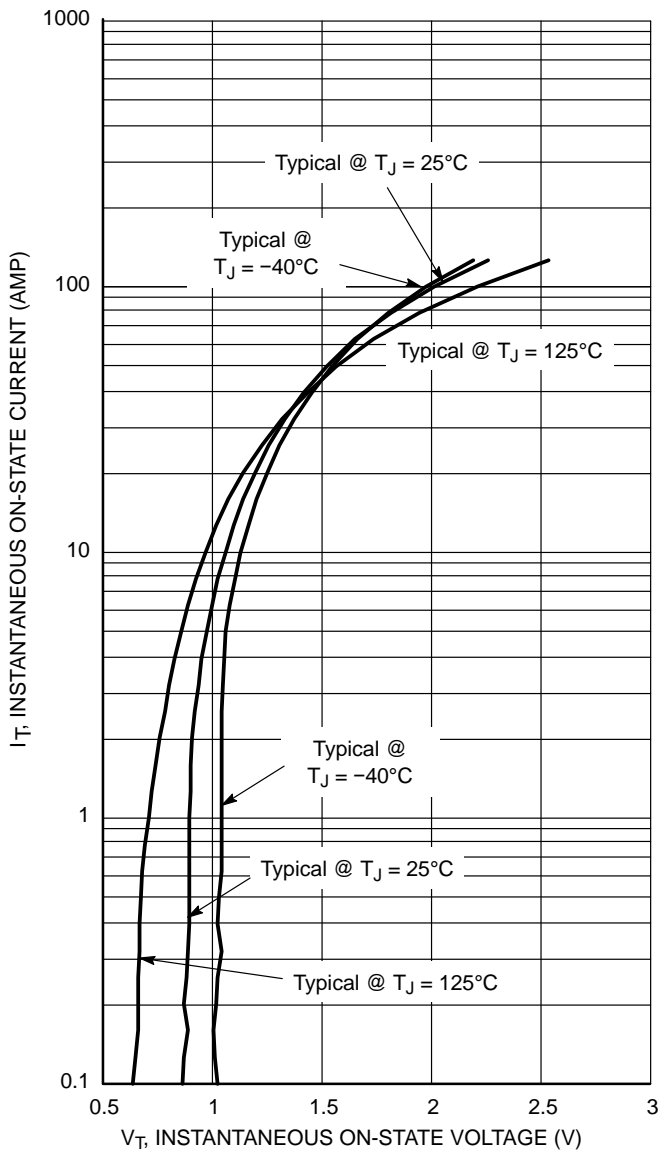


Figure 3. On-State Characteristics

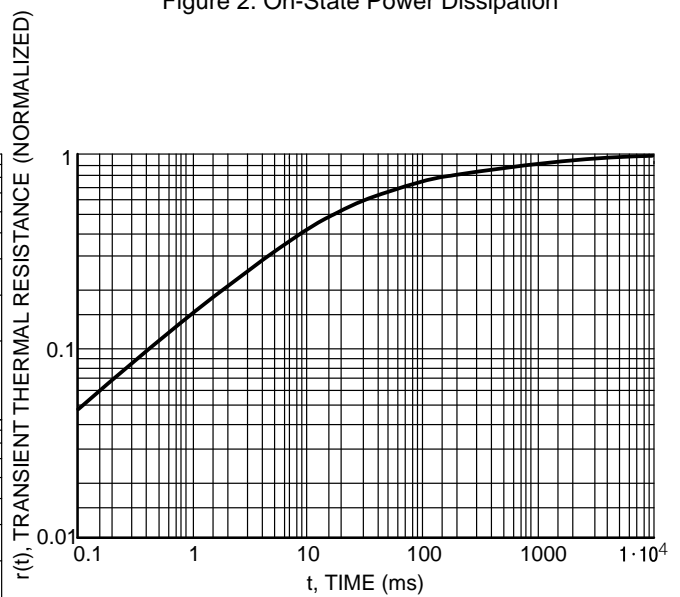


Figure 4. Thermal Response

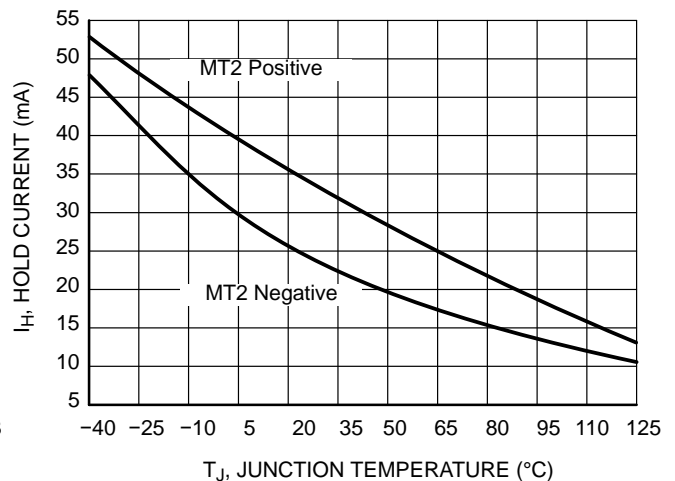


Figure 5. Hold Current Variation

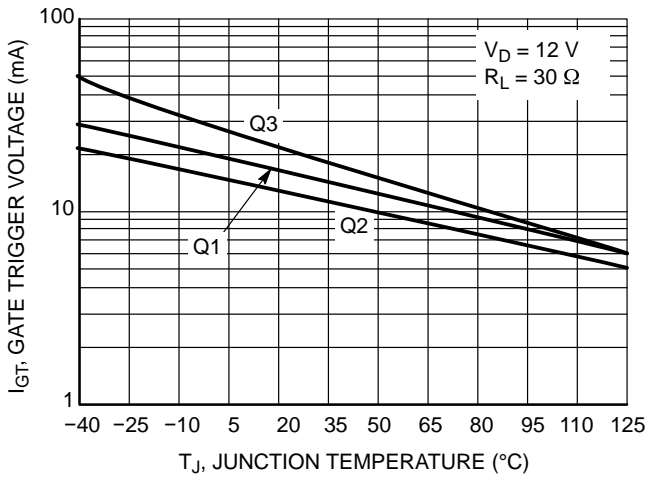


Figure 6. Gate Trigger Current Variation

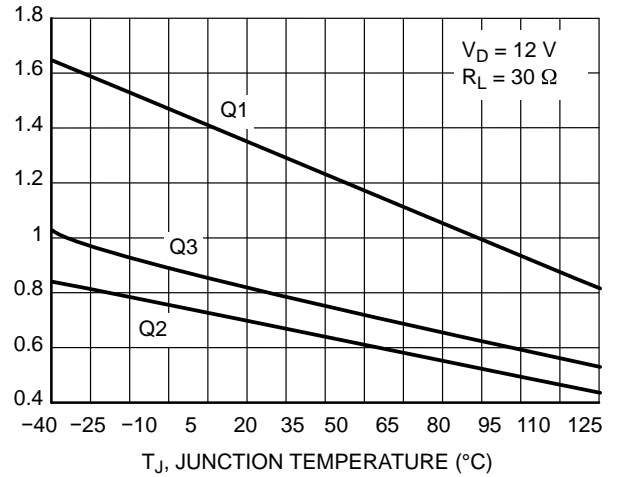


Figure 7. Gate Trigger Voltage Variation

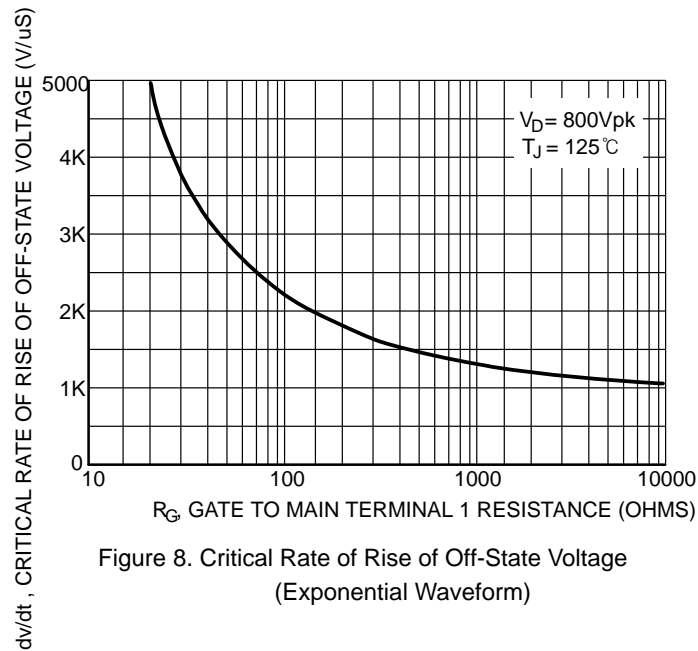
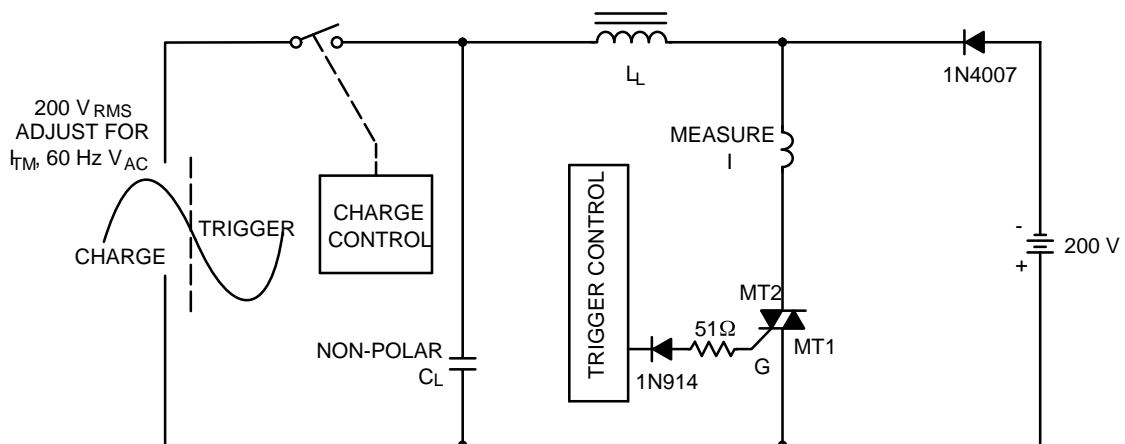


Figure 8. Critical Rate of Rise of Off-State Voltage (Exponential Waveform)



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  $(di/dt)_c$