

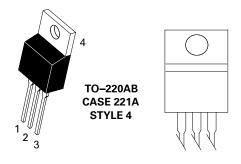
# BTA16-600BW3G, BTA16-800BW3G,

**Thyristors** 





#### **Pin Out**



#### **Description**

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 16 A RMS at 80°C
   Uniform Gate Trigger Currents in Three Quadrants
- High Immunity to dV/dt 1500 V/µs minimum at 125°C
- Minimizes Snubber Networks for Protection
- Industry Standard TO-220AB Package
- High Commutating dl/dt 4.0 A/ms minimum at 125°C
- Internally Isolated (2500 V<sub>BMS</sub>)
- These Devices are Pb-Free

#### **Functional Diagram**



### **Additional Information**







Samples



Maximum Ratings (T <sub>J</sub> = 25°C unless otherwise noted)					
Rating		Symbol	Value	Unit	
Peak Repetitive Off-State Voltage (Note 1) (Gate Open, Sine Wave 50 to 60 Hz, T <sub>J</sub> = -40° to 125°C)  BTA16–600BW3G BTA16–800BW3G		V <sub>drm</sub> , V <sub>rrm</sub>	600 800	V	
On-State RMS Current (Full Cycle Sine Wave, 60 Hz, T <sub>C</sub> = 80°C)		I <sub>T (RMS)</sub>	16	А	
Peak Non-Repetitive Surge Current (One Full Cycle Sine Wave, 60 Hz, T <sub>C</sub> = 25°C)		I <sub>TSM</sub>	170	А	
Circuit Fusing Consideration (t = 8.3 ms)		l²t	120	A <sup>2</sup> sec	
Non-Repetitive Surge Peak Off-State Voltage (T <sub>J</sub> = 25°C, t = 10ms)		$V_{DSM}/V_{RSM}$	V <sub>DSM</sub> /V <sub>RSM</sub> +100	V	
Peak Gate Current ( $T_J = 125$ °C, t = 20ms)		I <sub>GM</sub>	4.0	А	
Peak Gate Power (Pulse Width $\leq$ 1.0 $\mu$ s, T <sub>C</sub> = 80°C)		P <sub>G(AV)</sub>	20	W	
Average Gate Power (T <sub>J</sub> = 125°C)		$P_{G(AV)}$	1.0	W	
Operating Junction Temperature Range		T <sub>J</sub>	-40 to +125	°C	
Storage Temperature Range		T <sub>stg</sub>	-40 to +125	°C	
RMS Isolation Voltage (t = 300 ms, R.H. ≤ 30%, T <sub>s</sub> = 25°C)		Vina	2500	V	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied.

# **Thermal Characteristics**

	Symbol	Value	Unit	
Thermal Resistance,	Junction-to-Case (AC) Junction-to-Ambient	R <sub>ejc</sub> R <sub>eja</sub>	2.5 60	°C/W
Maximum Lead Temperature for Solder 10 seconds	T <sub>L</sub>	260	°C	

Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

V<sub>DRM</sub> and V<sub>RRM</sub> for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.



# Electrical Characteristics - OFF (T<sub>1</sub> = 25°C unless otherwise noted; Electricals apply in both directions)

Characteristic		Symbol	Min	Тур	Max	Unit
Peak Repetitive Blocking Current	T, = 25°C	I <sub>DRM</sub> ,	-	-	0.005	m ^
$(V_D = V_{DRM} = V_{RRM}; Gate Open)$	T <sub>J</sub> = 125°C	IRRM	-	-	2.0	mA

# **Electrical Characteristics** - **ON** $(T_j = 25^{\circ}\text{C unless otherwise noted; Electricals apply in both directions)$

Characteristic		Symbol	Min	Тур	Max	Unit
Forward On-State Voltage (Note 2) ( $I_{TM} = \pm 22.5 \text{ A Peak}$ )	'	$V_{TM}$	-	-	1.55	V
	MT2(+), G(+)		2.5	_	50	mA
Gate Trigger Current (Continuous dc) ( $V_D = 12 \text{ V}, R_L = 30 \Omega$ )	MT2(+), G(-)	I <sub>GT</sub>	2.5	_	50	
	MT2(-), G(-)		2.5	_	50	
Holding Current ( $V_D = 12 \text{ V}$ , Gate Open, Initiating Current = $\pm 150 \text{ mA}$ )		I <sub>H</sub>	-	_	60	mA
	MT2(+), G(+)	IL	-	_	70	mA
Latching Current ( $V_D = 12 \text{ V}, I_G = 50 \text{ mA}$ )	MT2(+), G(-)		-	_	90	
	MT2(-), G(-)		-	-	70	
	MT2(+), G(+)	V <sub>GT</sub>	0.5	_	1.7	V
Gate Trigger Voltage ( $V_D = 12 \text{ V}, R_L = 30 \Omega$ )	MT2(+), G(-)		0.5	-	1.1	
	MT2(-), G(-)		0.5	-	1.1	
	MT2(+), G(+)		0.2	-	-	
Gate Non-Trigger Voltage (T <sub>J</sub> = 125°C)	MT2(+), G(-)	t <sub>gt</sub>	0.2	_	_	V
	MT2(-), G(-)		0.2	_	-	

<sup>2.</sup> Indicates Pulse Test: Pulse Width  $\leq$  2.0 ms, Duty Cycle  $\leq$  2 % .



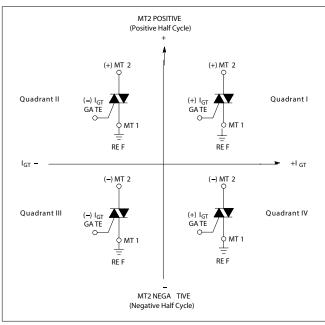
#### **Dynamic Characteristics**

Characteristic	Symbol	Min	Тур	Max	Unit
Rate of Change of Commutating Current, See Figure 10. (Gate Open, $T_J = 125^{\circ}$ C, No Snubber)	(dl/dt)c	4.0	_	_	A/ms
Critical Rate of Rise of On–State Current ( $T_J = 125^{\circ}\text{C}$ , $f = 120$ Hz, $I_G = 2 \times I_{GT'}$ tr $\leq 100$ ns)	dl/dt	_	_	50	A/µs
Critical Rate of Rise of Off-State Voltage ( $V_D = 0.66 \times V_{DRM}$ , Exponential Waveform, Gate Open, $T_J = 125$ °C)	dV/dt	1500	_	_	V/µs

# **Voltage Current Characteristic of SCR**

Symbol	Parameter		
$V_{DRM}$	Peak Repetitive Forward Off State Voltage		
I <sub>DRM</sub>	Peak Forward Blocking Current		
V <sub>RRM</sub>	Peak Repetitive Reverse Off State Voltage		
I <sub>RRM</sub>	Peak Reverse Blocking Current		
V <sub>TM</sub>	Maximum On State Voltage		
I <sub>H</sub>	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

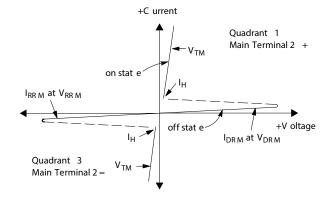
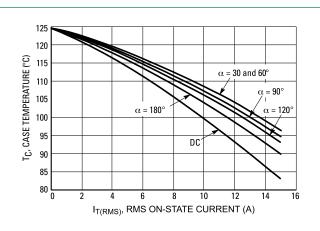
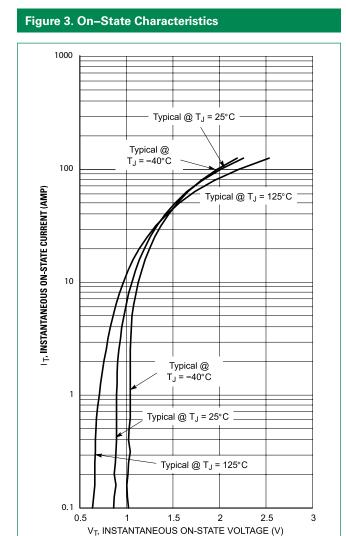


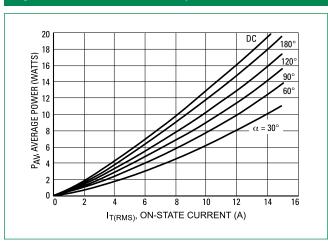
Figure 2. On-State Power Dissipation

# **Figure 1. RMS Current Derating**



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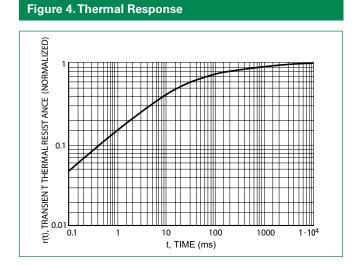
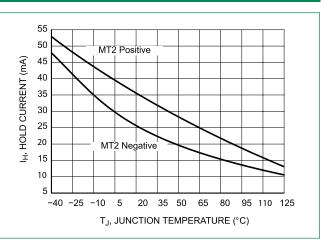
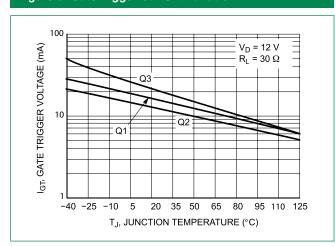


Figure 5. Hold Current Variation



# Figure 6. Gate Trigger Current Variation



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Figure 7. Gate Trigger Voltage Variation

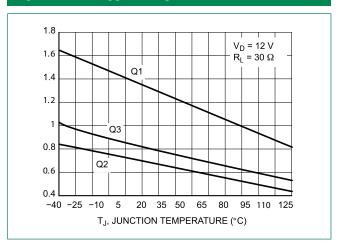


Figure 8. Critical Rate of Rise of Off-State Voltage (Exponential Waveform)

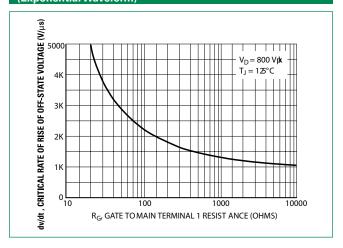
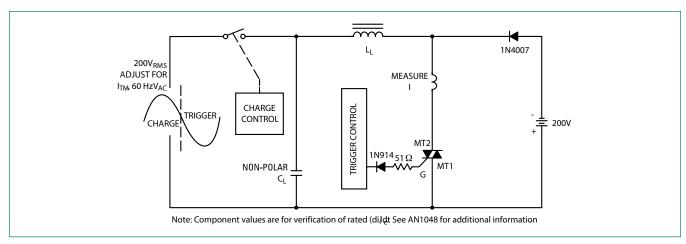


Figure 9. Simplified Test Circuit to Measure the Critical Rate of Rise of Commutating Current (di/dt)

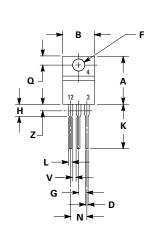


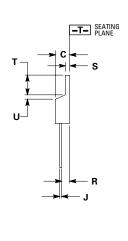
Note: Component values are for verification of rated (di/dt)c. See AN1048 for additional information



# $Surface\ Mount-600V-800V\ >\ BTA16-600BW3G,\ BTA16-800BW3G,$

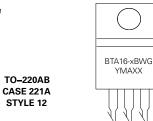
#### **Dimensions**





# **Part Marking System**





x =6 or 8 Y =Year

Y =Year M =Month

A =Assembly Site

XX =Lot Serial Code

G =Pb-Free Package

D:	Inches		Millin	neters
Dim	Min	Max	Min	Max
Α	0.590	0.620	14.99	15.75
В	0.380	0.420	9.65	10.67
С	0.178	0.188	4.52	4.78
D	0.025	0.035	0.64	0.89
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.41	2.67
Н	0.110	0.130	2.79	3.30
J	0.018	0.024	0.46	0.61
K	0.540	0.575	13.72	14.61
L	0.060	0.075	1.52	1.91
N	0.195	0.205	4.95	5.21
Q	0.105	0.115	2.67	2.92
R	0.085	0.095	2.16	2.41
s	0.045	0.060	1.14	1.52
Т	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045		1.15	_
Z	_	0.080	_	2.04

Pin Assignment				
1	Main Terminal 1			
2	Main Terminal 2			
3	Gate			
4	No Connection			

Ordering Information					
Device	Package	Shipping			
BTA16-600BW3G	TO-220AB (Pb-Free)	500 Units / Rail			
BTA16-800BW3G	TO-220AB (Pb-Free)	500 Units / Rail			

<sup>1.</sup> DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

CONTROLLING DIMENSION: INCH.
 DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.