

# BTA12-600BW3G, BTA12-800BW3G





### **Description**

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

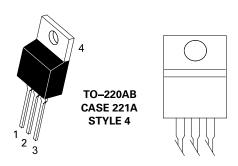
#### **Features**

- Blocking Voltage to 800 V
- On-State Current Rating of 12 A RMS at 25°C
- Uniform Gate Trigger Currents in Three Quadrants
- High Immunity to dV/dt

   2000 V/µs minimum at
   125°C
- Minimizes Snubber
   Networks for Protection

- Industry Standard TO-220AB Package
- High Commutating dl/ dt – 2.5 A/ms minimum at 125°C
- Internally Isolated (2500 VRMS)
- These Devices are Pb-Free and are RoHS Compliant

#### **Pin Out**



### **Functional Diagram**



# **Additional Information**







Samples



### Maximum Ratings (T<sub>1</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, $T_J = -40^{\circ}$ to 125°C)	BTA12-600BW3G BTA12-800BW3G	V <sub>DRM</sub> , V <sub>RRM</sub>	600 800	V
On-State RMS Current (Full Cycle Sine Wave, 60 Hz, $T_{\rm C} = 80^{\circ}{\rm C}$ )		I <sub>T (RMS)</sub>	12	А
Peak Non-Repetitive Surge Current (One Full Cycle Sine Wave, 60 Hz, T <sub>C</sub> = 25°C)		I <sub>TSM</sub>	105	А
Circuit Fusing Consideration (t = 8.3 ms)		l <sup>2</sup> t	46	A²sec
Non-Repetitive Surge Peak Off-State Voltage ( $T_J = 25^{\circ}\text{C}$ , t = 10ms)		V <sub>DSM</sub> /V <sub>RSM</sub>	V <sub>DSM</sub> /V <sub>RSM</sub> +100	V
Peak Gate Current ( $T_J = 125$ °C, $t = 20$ ms)		I <sub>GM</sub>	4.0	А
Peak Gate Power (Pulse Width ≤ 1.0 µs, T <sub>C</sub> = 80°C)		P <sub>G(AV)</sub>	20	W
Average Gate Power ( $T_J = 125^{\circ}\text{C}$ )		P <sub>G(AV)</sub>	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. $\leq$ 30%, $T_A$ = 25°C)		V <sub>iso</sub>	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. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

## **Thermal Characteristics**

	Rating	Symbol	Value	Unit
Thermal Resistance,	Junction—to—Case (AC) Junction—to—Ambient	R <sub>suc</sub> R <sub>sua</sub>	2.5 60	°C/W
Maximum Lead Temperature for Sold 10 seconds	T <sub>L</sub>	260	°C	

## **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	A
$(V_D = V_{DRM} = V_{RRM}; Gate Open)$	T <sub>J</sub> = 125°C	I <sub>RRM</sub>	-	-	2.0	mA mA

# **Electrical Characteristics - ON** $(T_1 = 25^{\circ}\text{C unless otherwise noted}; \text{ Electricals apply in both directions})$

Characteristic		Symbol	Min	Тур	Max	Unit
Forward On-State Voltage (Note 2) ( $I_{TM} = \pm 17 \text{ A Peak}$ )		$V_{TM}$	-	-	1.55	V
	MT2(+), G(+)		2.0	-	50	mA
Gate Trigger Current (Continuous dc) $(V_D = 12 \text{ V, R}_L = 30 \Omega)$	MT2(+), G(-)	I <sub>GT</sub>	2.0	-	50	
	MT2(-), G(-)		2.0	-	50	
Holding Current ( $V_D = 12 \text{ V}$ , Gate Open, Initiating Current = $\pm 100 \text{ mA}$ )		I <sub>H</sub>	-	_	50	mA
	MT2(+), G(+)	I	-	-	70	mA
Latching Current ( $V_D = 24 \text{ V}$ , $I_G = 42 \text{ mA}$ )	MT2(+), G(-)		-	_	80	
	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(+)	V <sub>GD</sub>	0.2	_	-	
Gate Non-Trigger Voltage (T <sub>J</sub> = 125°C)	MT2(+), G(-)		0.2	-	-	V
	MT2(-), G(-)		0.2	-	_	

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

<sup>1.</sup> 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.



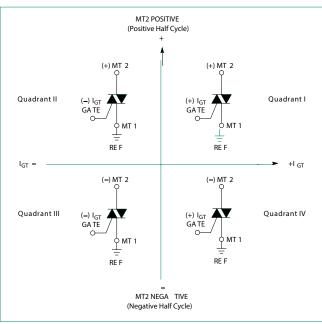
### **Dynamic Characteristics**

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	2.5	_	_	A/ms
Critical Rate of Rise of On–State Current ( $T_J = 125$ °C, $f = 120$ Hz, $I_G = 2 \times I_{GT}$ , $tr \le 100$ 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)		2000	_	_	V/µs

## **Voltage Current Characteristic of SCR**

Symbol	Parameter
V <sub>DRM</sub>	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

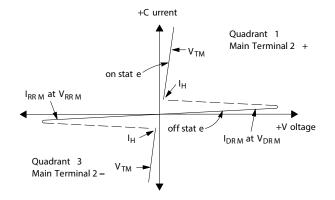
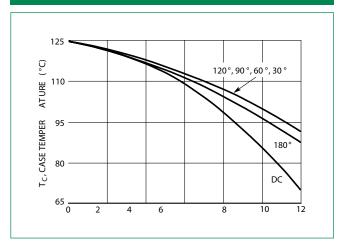




Figure 1. RMS Current Derating



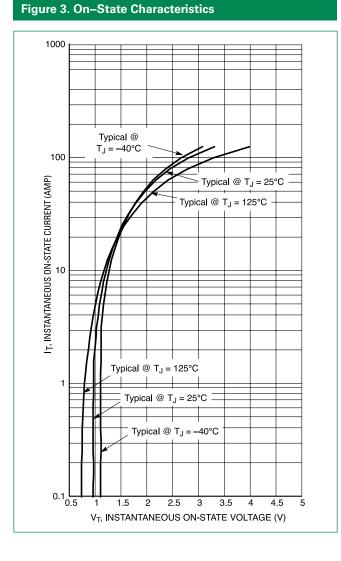


Figure 2. On-State Power Dissipation

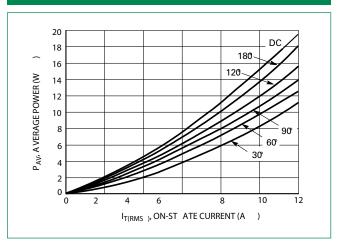


Figure 4. Thermal Response

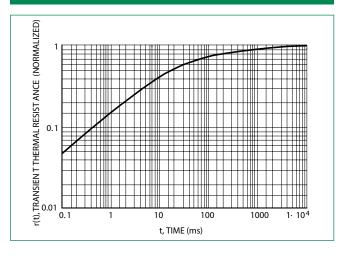
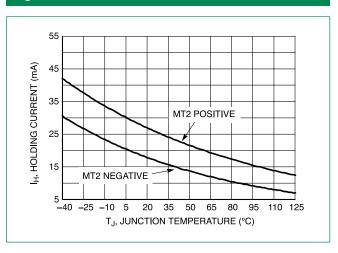


Figure 5. Hold Current Variation





# Figure 6. Gate Trigger Current Variation

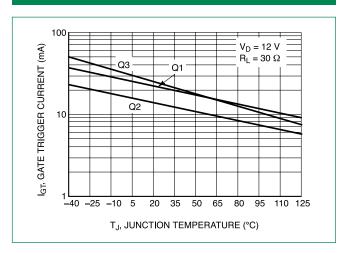


Figure 8. Critical Rate of Rise of Off-State Voltage (Exponential Waveform)

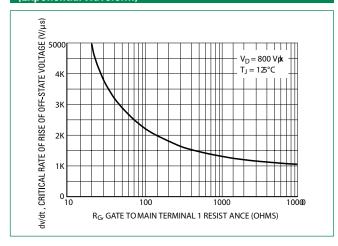


Figure 7. Gate Trigger Voltage Variation

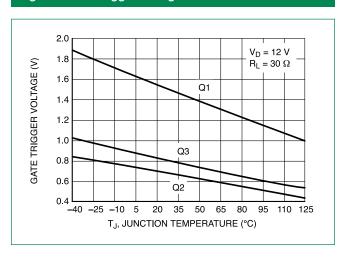


Figure 10. Latching Current Variation

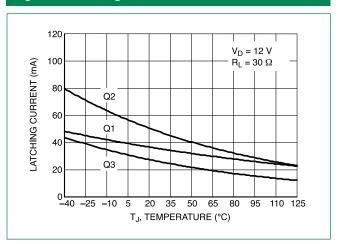
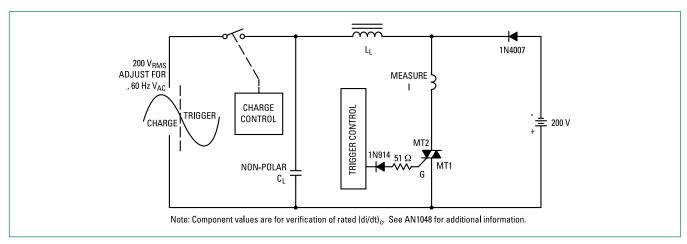


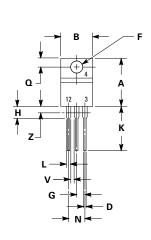
Figure 9. Simplified Test Circuit to Measure the Critical Rate of Rise of Commutating Current (di/dt)

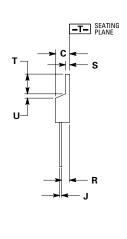


Note: Component values are for verification of rated (di/dt)c. See AN1048 for additional information

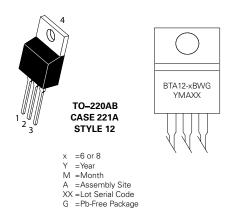


#### **Dimensions**





## **Part Marking System**



5.	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
BTA12-600BW3G	TO-220AB (Pb-Free)	500 Units / Box
BTA12-800BW3G	TO-220AB (Pb-Free)	500 Units / Box

- 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- 2. CONTROLLING DIMENSION: INCH.
- DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

**Disclaimer Notice** - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at: <a href="https://www.littelfuse.com/disclaimer-electronics">www.littelfuse.com/disclaimer-electronics</a>.