

# 1 Characteristics

**Table 1. Absolute maximum ratings**

Symbol	Parameter			Value	Unit
I <sub>T(RMS)</sub>	On-state rms current (full sine wave)		T <sub>c</sub> = 70 °C	20	A
I <sub>TSM</sub>	Non repetitive surge peak on-state current (full cycle, T <sub>j</sub> initial = 25°C)	F = 50 Hz	t = 10 ms	210	A
		F = 60 Hz	t = 8.3 ms	200	
I <sup>2</sup> t	I <sup>2</sup> t Value for fusing	t <sub>p</sub> = 10 ms		200	A <sup>2</sup> s
dI/dt	Critical rate of rise of on-state current I <sub>G</sub> = 2 x I <sub>GT</sub> , t <sub>r</sub> ≤ 100 ns	Repetitive F = 50 Hz	T <sub>j</sub> = 125 °C	50	A/μs
		Non repetitive		100	
V <sub>DSM</sub> , V <sub>RSM</sub>	Non repetitive peak off-state voltage	t <sub>p</sub> = 10 ms	T <sub>j</sub> = 25 °C	V <sub>DRM</sub> /V <sub>RRM</sub> 100	V
I <sub>GM</sub>	Peak gate current	t <sub>p</sub> = 20 μs	T <sub>j</sub> = 125 °C	4	A
V <sub>GM</sub>	Peak positive gate voltage	t <sub>p</sub> = 20 μs		16	V
P <sub>G(AV)</sub>	Average gate power dissipation		T <sub>j</sub> = 125 °C	1	W
T <sub>stg</sub>	Storage junction temperature range			- 40 to + 150	°C
T <sub>j</sub>	Operating junction temperature range			- 40 to + 125	

**Table 2. Electrical characteristics ( $T_j = 25\text{ °C}$ , unless otherwise specified)**

Symbol	Test conditions	Quadrant		BTA20		Unit
				BW	CW	
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ , $R_L = 33\text{ Ω}$	ALL	Min.	2	1	mA
			Max.	50	35	
$V_{GT}$		ALL	Max.	1.5		V
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ kΩ}$ , $T_j = 125\text{ °C}$	ALL	Min.	0.2		V
$I_H^{(2)}$	$I_T = 500\text{ mA}$ , gate open		Max.	75	50	mA
$I_L$	$I_G = 1.2\text{ } I_{GT}$	I - III	Typ.	50	-	mA
		II		90	-	
		I - II - III	Max.	-	80	
dV/dt <sup>(2)</sup>	$V_D = 67\% V_{DRM}$ , gate open	$T_j = 125\text{ °C}$	Typ.	750	500	V/μs
			Min.	500	250	
(dV/dt) <sub>C</sub> <sup>(2)</sup>	(dI/dt) <sub>C</sub> = 20 A/ms	$T_j = 125\text{ °C}$	Typ.	36	22	V/μs
			Min.	18	11	

1. Minimum  $I_{GT}$  is guaranteed at 5% of  $I_{GT}$  max.

2. For both polarities of A2 referenced to A1.

Table 3. Static characteristics

Symbol	Parameter			Value	Unit
$V_{TM}^{(1)}$	$I_{TM} = 28\text{ A}$ , $t_p = 380\text{ }\mu\text{s}$	$T_j = 125\text{ }^\circ\text{C}$	Max.	1.70	V
$I_{DRM}$	$V_{DRM} = V_{RRM}$	$T_j = 125\text{ }^\circ\text{C}$	Max.	10	$\mu\text{A}$
$I_{RRM}$		$T_j = 125\text{ }^\circ\text{C}$		3	mA

1. For both polarities of A2 referenced to A1.

Table 4. Thermal resistances

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case for AC	2.1	$^\circ\text{C/W}$
$R_{th(j-c)}$	Junction to case for DC	2.8	
$R_{th(j-a)}$	Junction to ambient	60	

Figure 1. Maximum power dissipation versus on-state rms current (full cycle)

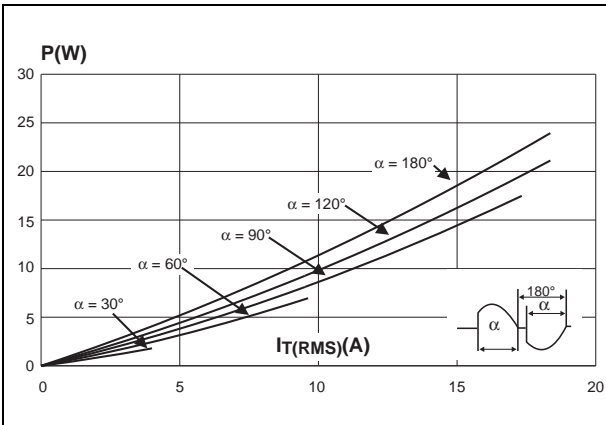


Figure 2. Correlation between maximum rms power dissipation and maximum allowable temperatures

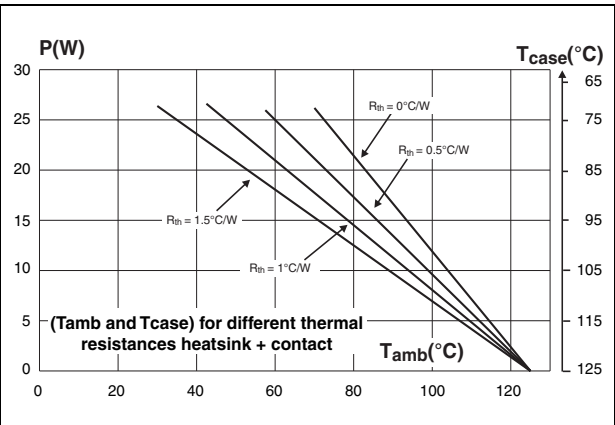


Figure 3. On-state rms current versus case temperature (full cycle)

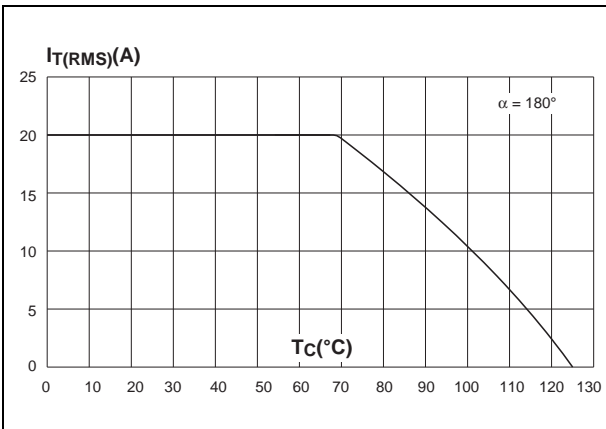


Figure 4. Relative variation of thermal impedance versus pulse duration

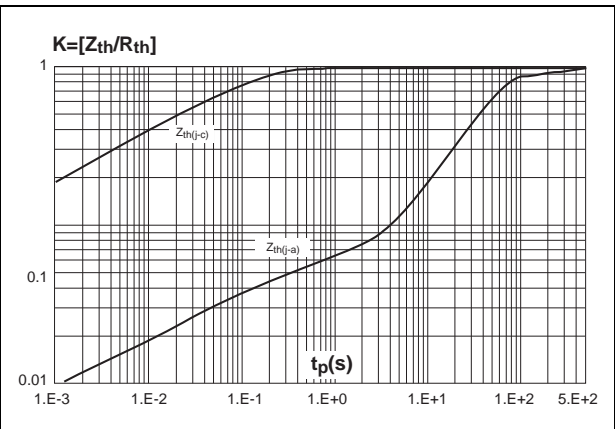


Figure 5. On-state characteristics (maximum values)

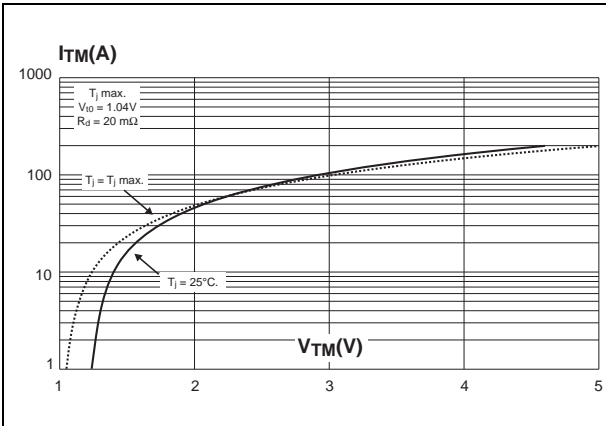


Figure 6. Non repetitive surge peak on-state current versus number of cycles

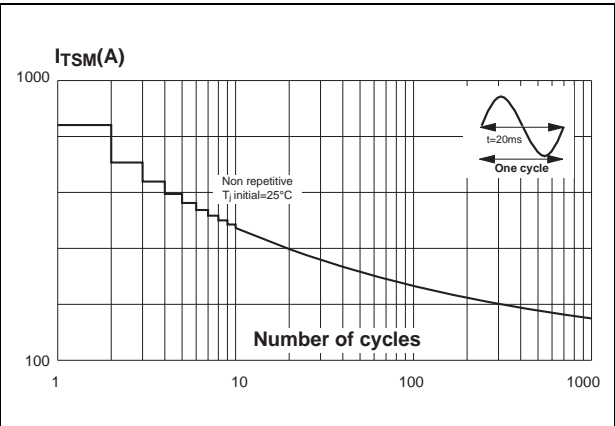


Figure 7. Non repetitive surge peak on-state current for a sinusoidal pulse and corresponding value of  $I^2t$

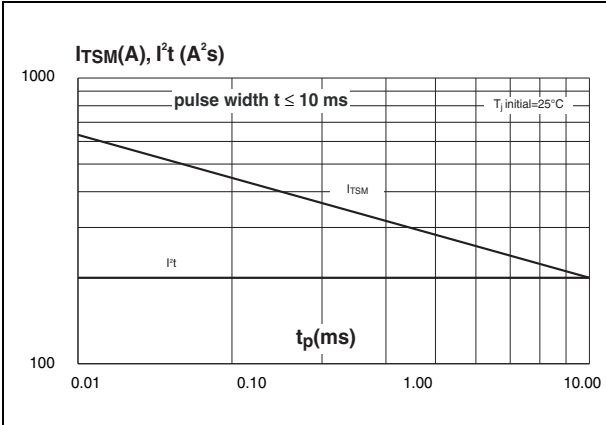
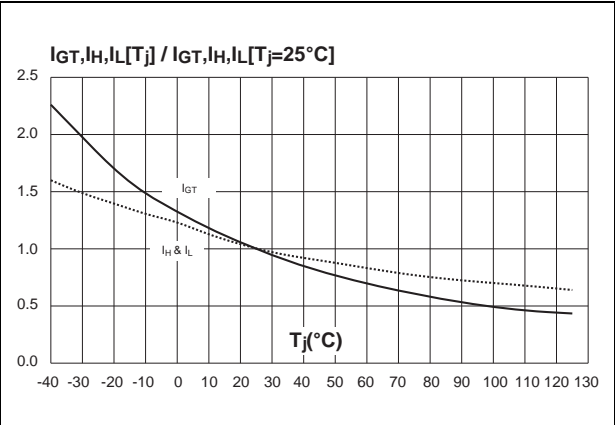


Figure 8. Relative variation of gate trigger current and holding current versus junction temperature



## 2 Package information

- Epoxy meets UL94, V0
- Lead-free package

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

**Figure 9. TO-220AB package dimensions (definitions)**

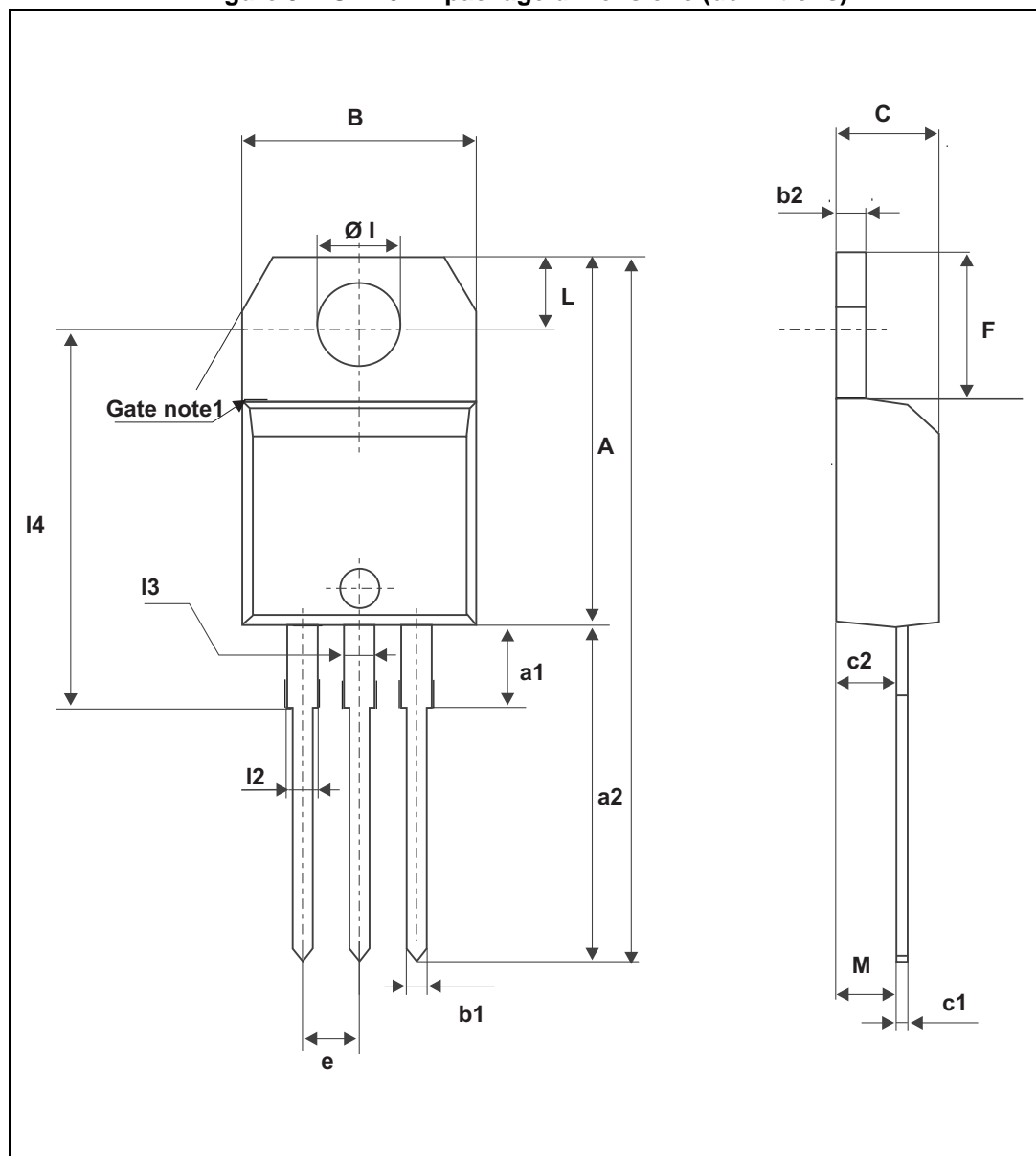


Table 5. TO-220AB package dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	2.40		2.70	0.094		0.106
F	6.20		6.60	0.244		0.259
I	3.75		3.85	0.147		0.151
l4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
l2	1.14		1.70	0.044		0.066
l3	1.14		1.70	0.044		0.066
M		2.60			0.102	

### 3 Ordering information

Figure 10. Ordering information scheme

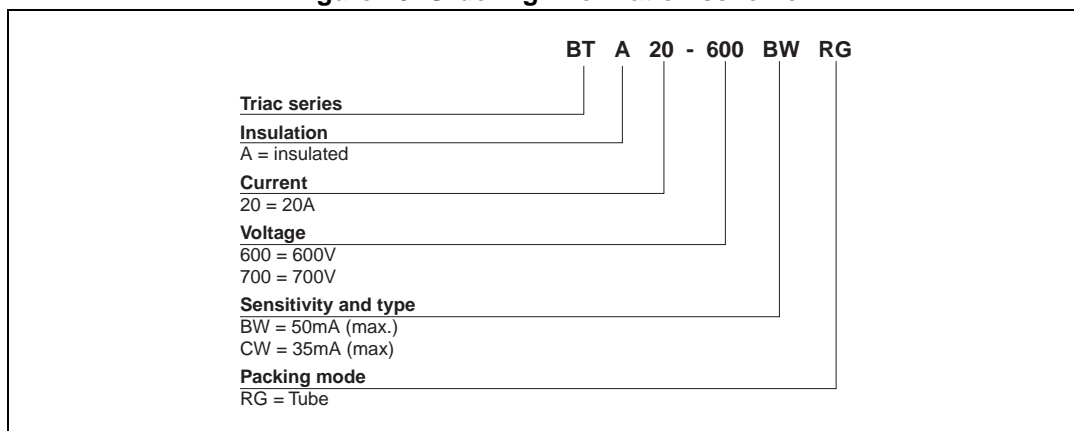


Table 6. Product selector

Order code	Voltage		Sensitivity	Type	Package
	600 V	700 V			
BTA20-600CWRG	X		35 mA	Snubberless	TO-220AB Ins.
BTA20-700BWRG		X	50 mA		
BTA20-700CWRG		X	35 mA		

Table 7. Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
BTA20-600CWRG	BTA20-600CW	TO-220AB Ins.	2.3 g	50	Tube
BTA20-700BWRG	BTA20-700BW				
BTA20-700CWRG	BTA20-700CW				

### 4 Revision history

Table 8. Document revision history

Date	Revision	Changes
Sep-2001	1A	Initial release.
08-Feb-2006	2	TO-220AB Ins. delivery mode changed from bulk to tube.
09-Jul-2012	3	Updated dI/dt repetitive value in <a href="#">Table 1</a> .
01-Sep-2014	4	Updated $V_{DRM}/V_{RRM}$ value in <a href="#">Table 1</a> .

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