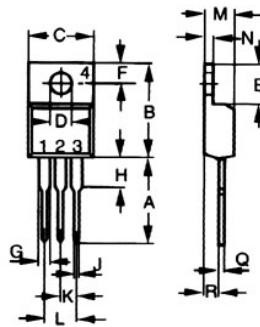
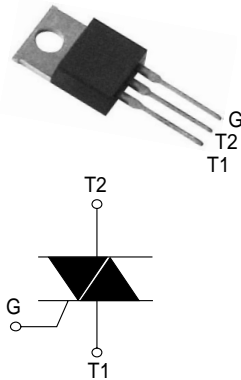


Dimensions TO-220AB



Dim.	Inches		Millimeter	
	Min.	Max.	Min.	Max.
A	0.500	0.550	12.70	13.97
B	0.580	0.630	14.73	16.00
C	0.390	0.420	9.91	10.66
D	0.139	0.161	3.54	4.08
E	0.230	0.270	5.85	6.85
F	0.100	0.125	2.54	3.18
G	0.045	0.065	1.15	1.65
H	0.110	0.230	2.79	5.84
J	0.025	0.040	0.64	1.01
K	0.100	BSC	2.54	BSC
M	0.170	0.190	4.32	4.82
N	0.045	0.055	1.14	1.39
Q	0.014	0.022	0.35	0.56
R	0.090	0.110	2.29	2.79

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	TO-220AB $T_c = 105^\circ\text{C}$	10 A
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25^\circ\text{C}$ )	F = 60 Hz t = 16.7 ms	105 A
		F = 50 Hz t = 20 ms	100 A
$I^2t$	$I^2t$ Value for fusing	tp = 10 ms	55 $\text{A}^2\text{s}$
dl/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , tr ≤ 100 ns	F = 120 Hz $T_j = 125^\circ\text{C}$	50 A/μs
$V_{DSM}/V_{RSM}$	Non repetitive surge peak off-state voltage	tp = 10 ms $T_j = 25^\circ\text{C}$	$V_{DRM}/V_{RRM} + 100$ V
$I_{GM}$	Peak gate current	tp = 20 μs $T_j = 125^\circ\text{C}$	4 A
$P_{G(AV)}$	Average gate power dissipation	$T_j = 125^\circ\text{C}$	1 W
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range		- 40 to + 150 - 40 to + 125 $^\circ\text{C}$

**ELECTRICAL CHARACTERISTICS ( $T_j = 25^\circ\text{C}$ , unless otherwise specified)**
**■ SNUBBERLESS™ and LOGIC LEVEL(3 Quadrants)**

Symbol	Test Conditions	Quadrant	BTB/BTB		Unit	
			CW	BW		
$I_{GT}$ (1)	$V_D = 12\text{ V}$ $R_L = 33\ \Omega$	I - II - III	MAX.	35	50	mA
$V_{GT}$		I - II - III	MAX.	1.3		
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3\ \text{k}\Omega$ $T_j = 125^\circ\text{C}$	I - II - III	MIN.	0.2		V
$I_H$ (2)	$I_T = 500\ \text{mA}$		MAX.	35	50	mA
$I_L$	$I_G = 1.2 I_{GT}$	I - III	MAX.	50	70	
		II		60	80	
dV/dt (2)	$V_D = 67\% V_{DRM}$ gate open $T_j = 125^\circ\text{C}$		MIN.	500	1000	V/μs
(dl/dt)c (2)	Without snubber $T_j = 125^\circ\text{C}$		MIN.	5.5	9.0	A/ms



Symbol	Test Conditions	Quadrant		Value	Unit
$I_{GT}$ (1)	$V_D = 12\text{ V}$ $R_L = 33\ \Omega$	I - II - III IV	MAX.	50 100	mA
$V_{GT}$		ALL	MAX.	1.3	V
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3\ \Omega$ $T_j = 125^\circ\text{C}$	ALL	MIN.	0.2	V
$I_H$ (2)	$I_T = 500\text{ mA}$		MAX.	50	mA
$I_L$	$I_G = 1.2 I_{GT}$	I - III - IV	MAX.	50	mA
		II		100	
$dV/dt$ (2)	$V_D = 67\% V_{DRM}$ gate open $T_j = 125^\circ\text{C}$		MIN.	400	V/ $\mu\text{s}$
$(dV/dt)_c$ (2)	$(dI/dt)_c = 4.4\text{ A/ms}$ $T_j = 125^\circ\text{C}$		MIN.	10	V/ $\mu\text{s}$

**STATIC CHARACTERISTICS**

Symbol	Test Conditions		Value	Unit
$V_{TM}$ (2)	$I_{TM} = 14\text{ A}$ $t_p = 380\ \mu\text{s}$	$T_j = 25^\circ\text{C}$	MAX.	1.55    V
$V_{to}$ (2)	Threshold voltage	$T_j = 125^\circ\text{C}$	MAX.	0.85    V
$R_d$ (2)	Dynamic resistance	$T_j = 125^\circ\text{C}$	MAX.	40 $\text{m}\Omega$
$I_{DRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25^\circ\text{C}$	MAX.	5 $\mu\text{A}$
$I_{RRM}$		$T_j = 125^\circ\text{C}$		1    mA

**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
$R_{th(j-c)}$	Junction to case (AC)	1.5	$^\circ\text{C/W}$
$R_{th(j-a)}$	Junction to ambient	60	$^\circ\text{C/W}$

**PRODUCT SELECTOR**

Part Number	Voltage (xxx)		Sensitivity	Type	Package
	200 V	~ ~ 1000 V			
BTBV/BTA10	X	X	50 mA	Standard	TO-220AB

**OTHER INFORMATION**

Part Number	Marking	Weight	Base quantity	Packing mode
BTB/BTA10	BTB/BTA10	2.3 g	250	Bulk



Fig. 2 RMS on-state current versus case temperature (full cycle).

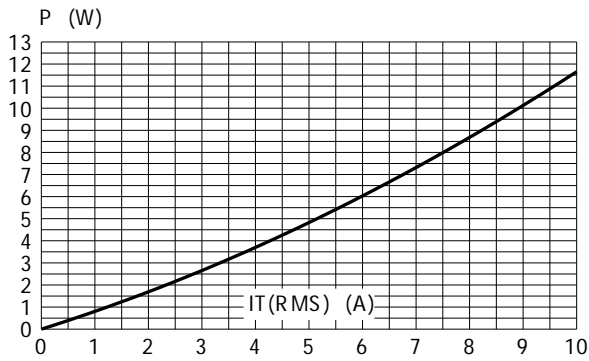


Fig. 3 Relative variation of thermal impedance versus pulse duration.

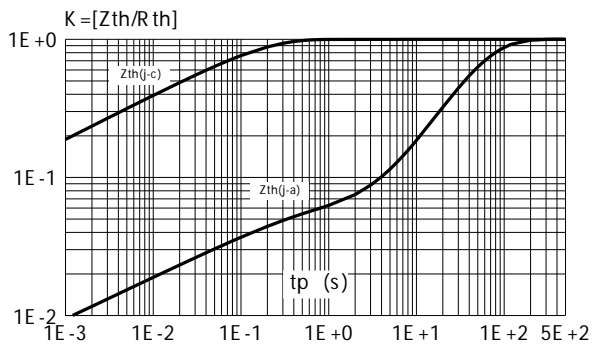


Fig. 5 Surge peak on-state current versus number of cycles.

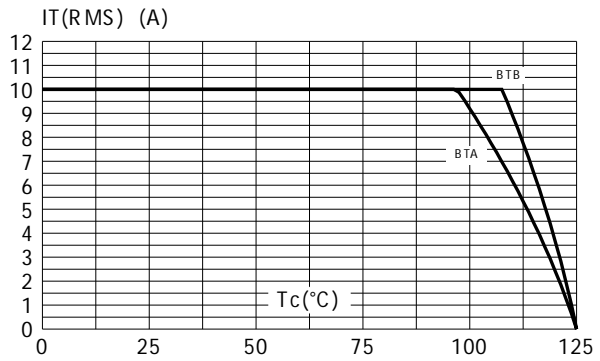
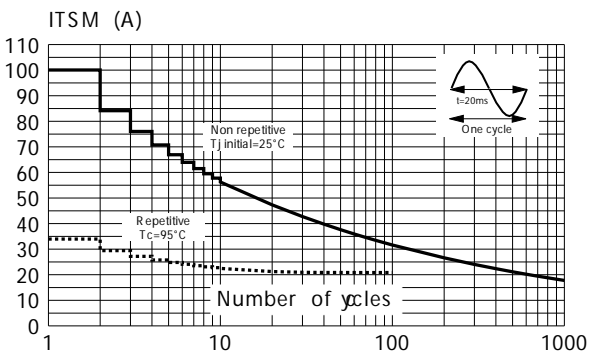


Fig. 4 On-state characteristics (maximum values).

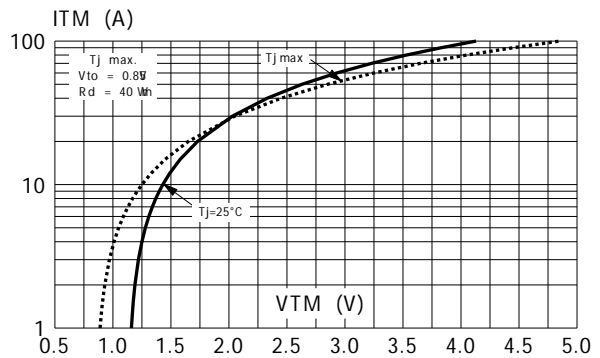


Fig. 6 Non-repetitive surge peak on-state current for a sinusoidal pulse with width tp < 10ms, and corresponding value of I²t.

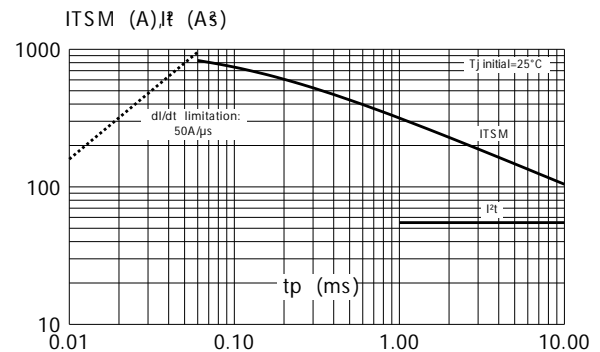


Fig. 7 Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values).

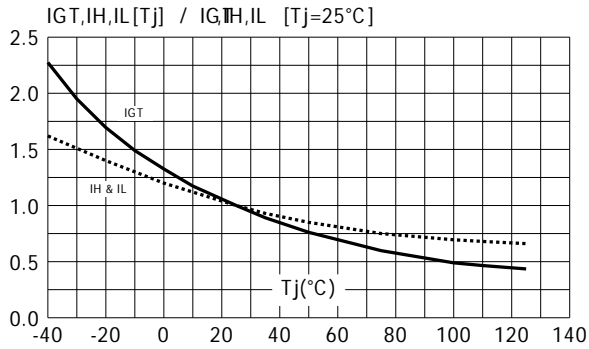


Fig. 8 Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values).

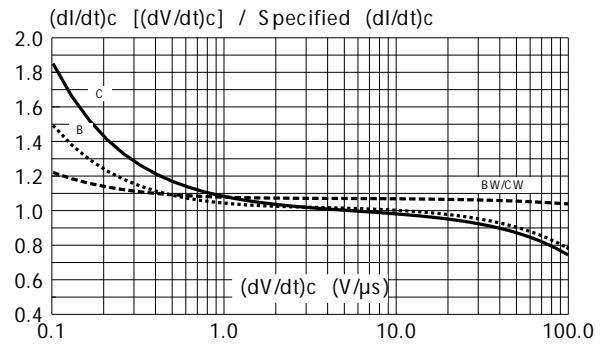


Fig. 9 Relative variation of critical rate of decrease of main current versus junction temperature.

