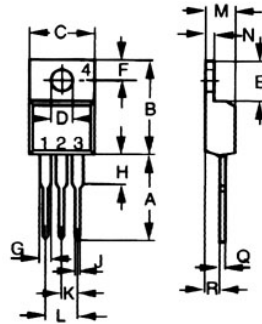


Dimensions TO-220



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	$T_c = 110^\circ\text{C}$	8	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	84	A
		F = 50 Hz	t = 20 ms	80	
$I^2t$	$I^2t$ Value for fusing	tp = 10 ms		36	$\text{A}^2\text{s}$
dI/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
$I_{GM}$	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		BTA/BTB		Unit
				CW	BW	
$I_{GT}$ (1)	$V_D = 12\text{ V}$ $R_L = 30\ \Omega$	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)	$I_T = 100\ \text{mA}$		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.	400	1000	V/μs
(dI/dt)c (2)	Without snubber $T_j = 125^\circ\text{C}$		MIN.	4.5	7	A/ms

Symbol	Test Conditions	Quadrant		Value	Unit
$I_{GT}$ (1)	$V_D = 12\text{ V}$ $R_L = 30\ \Omega$	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)	$(dI/dt)_c = 3.5\text{ A/ms}$ $T_j = 125^\circ\text{C}$		MIN.	10	V/ $\mu\text{s}$

## STATIC CHARACTERISTICS

Symbol	Test Conditions		Value	Unit	
$V_{TM}$ (2)	$I_{TM} = 11\text{ A}$ $t_p = 380\ \mu\text{s}$	$T_j = 25^\circ\text{C}$	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.	50	$\text{m}\Omega$
$I_{DRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25^\circ\text{C}$	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)	1.6	$^\circ\text{C/W}$
$R_{th(j-a)}$	Junction to ambient	60	$^\circ\text{C/W}$

## PRODUCT SELECTOR

Part Number	Voltage (xxx)		Sensitivity	Type	Package
	200 V	~ 1000 V			
BTB/BTA08	X	X	50 mA	Standard	TO-220AB

## OTHER INFORMATION

Part Number	Marking	Weight	Base quantity	Packing mode
BTB/BTA08	BTB/BTA08	2.3 g	250	Bulk

Fig. 1: Maximum power dissipation versus RMS on-state current (full cycle).

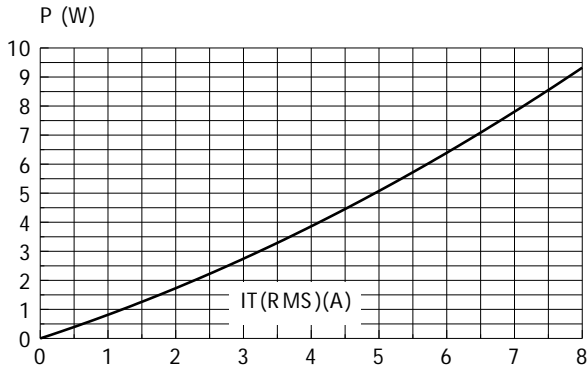


Fig. 2-1: RMS on-state current versus case temperature (full cycle).

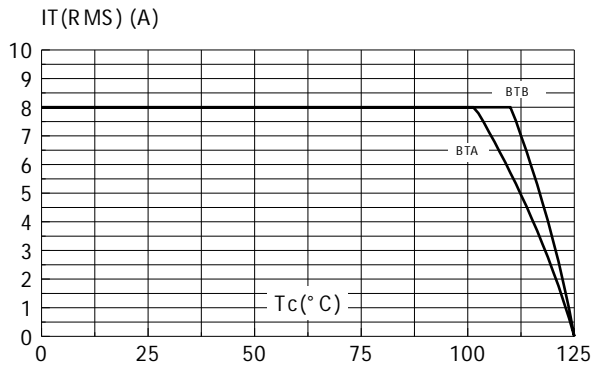


Fig. 2-2: RMS on-state current versus ambient temperature (printed circuit board FR4, copper thickness: 35µm), full cycle.

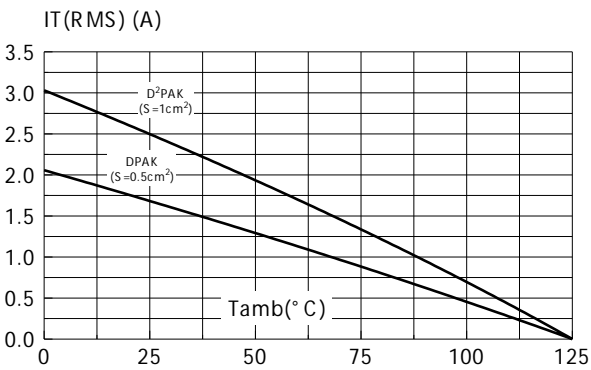


Fig. 3: Relative variation of thermal impedance versus pulse duration.

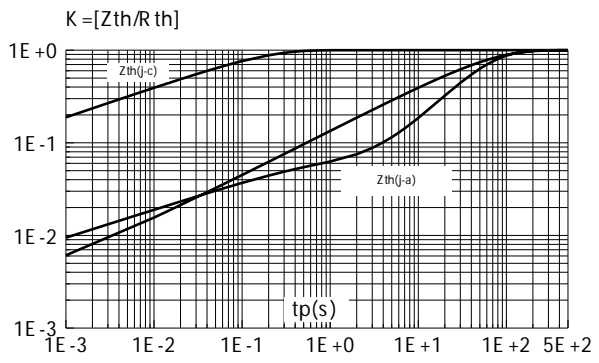


Fig. 4: On-state characteristics (maximum values).

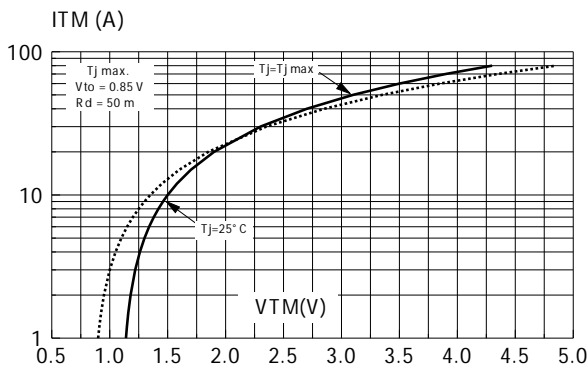


Fig. 5: Surge peak on-state current versus number of cycles.

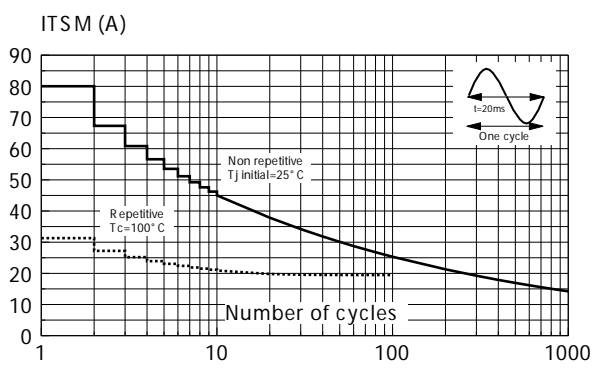


Fig. 6 Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10\text{ms}$ , and corresponding value of  $I^2t$ .

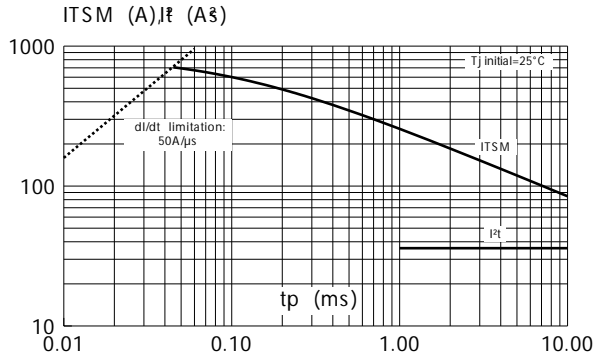


Fig. 8: Relative variation of critical rate of decrease of main current versus  $(dV/dt)_c$  (typical values). Standard Types

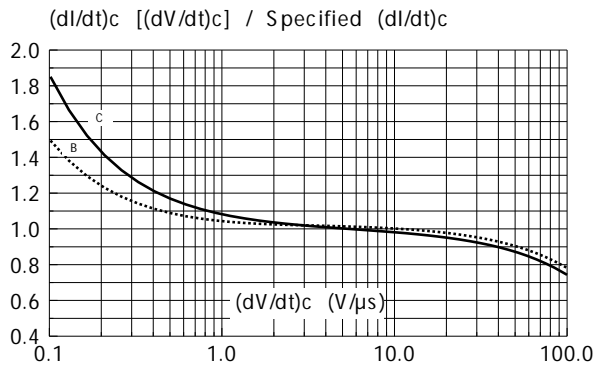


Fig. 9: DPAK and D<sup>2</sup>PAK Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 μm).

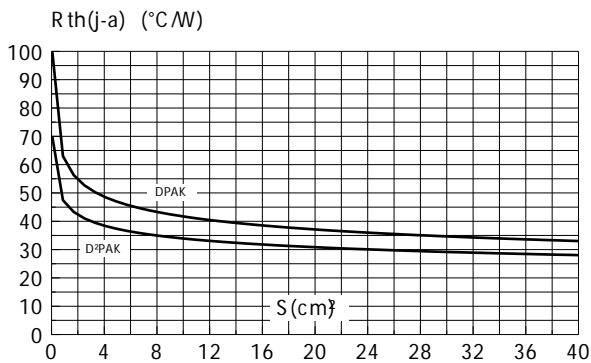


Fig. 7 Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values).

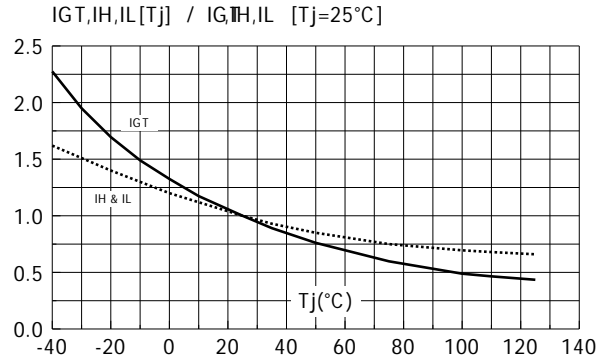


Fig. 9: Relative variation of critical rate of decrease of main current versus junction temperature.

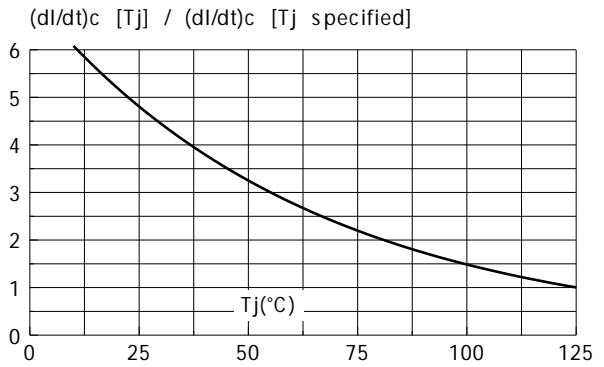


Fig. 6: Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10\text{ms}$ , and corresponding value of  $I^2t$ .

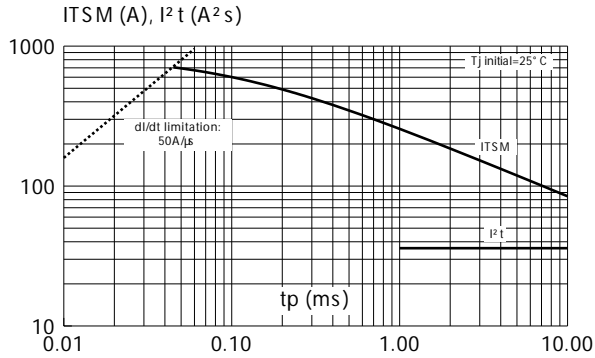


Fig. 8-1: Relative variation of critical rate of decrease of main current versus  $(dV/dt)_c$  (typical values). S nubberless & Logic Level Types

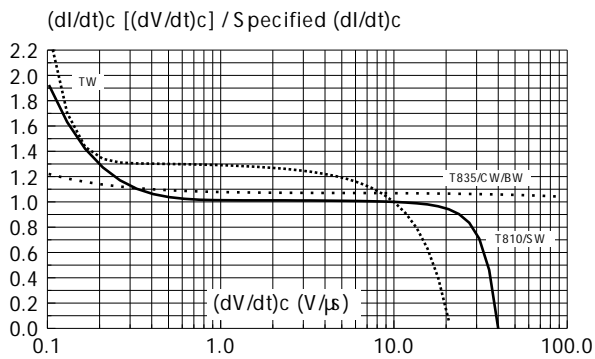


Fig. 9: Relative variation of critical rate of decrease of main current versus junction temperature.

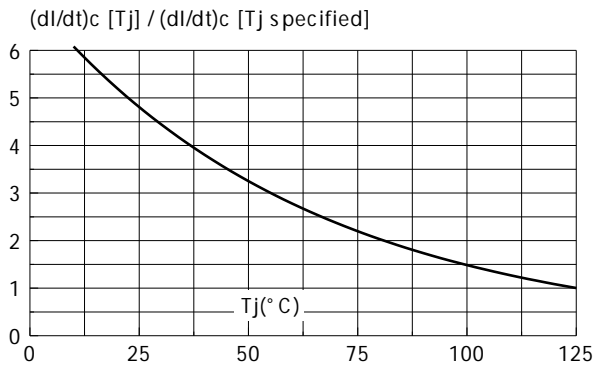


Fig. 7: Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values).

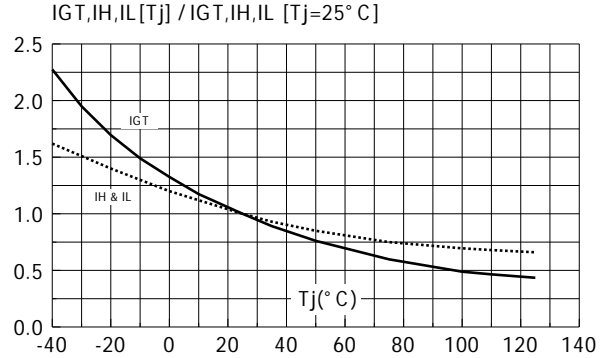


Fig. 8-2: Relative variation of critical rate of decrease of main current versus  $(dV/dt)_c$  (typical values). S standard Types

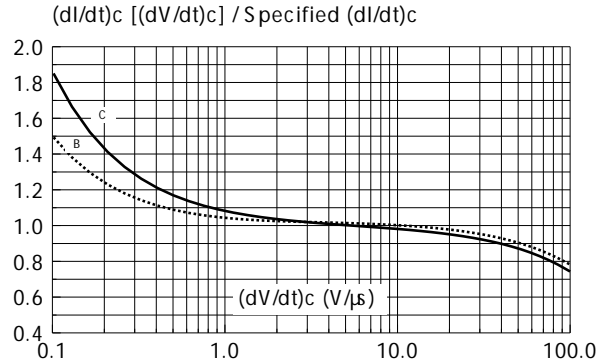


Fig. 10: DPAK and D<sup>2</sup>PAK Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35  $\mu\text{m}$ ).

