

## 1、Description

Designed primarily for industrial and consumer applications for full wave control of ac loads such as appliance controls, heater controls, motor controls, and other power switching applications.


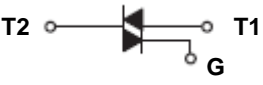
## 2、Applications

- Power gate Switching
- appliance control
- heater control
- motor control

## 3、Features

- Blocking voltage to 800V
- On-state RMS current to 6A
- Ultra low gate trigger current
- Low cost package.

## 4、Pinning information

PIN	Description	Simplified outline	Symbol
1	main terminal 1 ( T1 )	 TO-220	
2	main terminal 2 ( T2 )		
3	gate ( G )		
tab	main terminal		

## 5、Quick reference data

SYMBOL	PARAMETER	MAX	UNIT
$V_{DRM}$ $V_{RRM}$	Repetitive peak off-state voltages	800	V
$I_{T(RMS)}$	RMS on-state current	6	A
$I_{TSM}$	Non-repetitive peak on-state current	60	A

## 6、Thermal characteristics

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Thermal resistance junction to case		-	-	2.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient		-	-	62.5	°C/W
$T_L$	Maximum Lead Temperature for Soldering Purposes 1/8" from case for 10 Seconds	in free air		-	260-	°C

## 7、Limiting value

Limiting values in accordance with the Maximum System(IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
$V_{DRM}$ $V_{RRM}$	Repetitive peak off-state voltages		-		800	V
$I_{T(RMS)}$	RMS on-state current	Full Cycle Sine Wave 50 to 60 Hz ( $T_C = 80\text{ }^{\circ}\text{C}$ )	-		6	A
$I_{Tsm}$	Non-repetitive peak Surge Current	One Full Cycle Sine Wave, 60 Hz, $T_J = 110\text{ }^{\circ}\text{C}$	-	-	60	A
$I^2t$	$I^2t$ for fusing	$t = 8.3\text{ ms}$	-	-	26	$\text{A}^2\text{s}$
$di_T/dt$	Repetitive rate of rise of on-state current after triggering	$I_{TM} = 12\text{ A}$ ; $I_G = 0.2\text{ A}$ ; $di_G/dt = 0.2\text{ A/s}$  T2+ G+ T2+ G- T2- G- T2- G+				
			-	-	50	$\text{A}/\mu\text{s}$
			-	-	50	$\text{A}/\mu\text{s}$
			-	-	50	$\text{A}/\mu\text{s}$
			-	-	10	$\text{A}/\mu\text{s}$
$I_{GM}$	Peak gate current	$t \leq 2\text{ s}$ , $T_C = 80\text{ }^{\circ}\text{C}$	-	-	$\pm 2.0$	A
$V_{GM}$	Peak gate voltage	$t \leq 2\text{ s}$ , $T_C = 80\text{ }^{\circ}\text{C}$	-	-	$\pm 10$	V
$P_{GM}$	Peak gate power	$t \leq 2\text{ s}$ , $T_C = 80\text{ }^{\circ}\text{C}$	-	-	20	W
$P_{G(AV)}$	Average gate power	$t \leq 8.3\text{ ms}$ , $T_C = 80\text{ }^{\circ}\text{C}$	-	-	0.5	W
$T_{stg}$	Storage temperature		-40	-	150	$^{\circ}\text{C}$
$T_J$	Operating junction temperature		-40	-	110	$^{\circ}\text{C}$

## 8、Characteristics

$T_J = 25\text{ }^{\circ}\text{C}$  unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
<b>Static characteristics</b>						
$I_{GT}$	Gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$  T2+ G+ T2+ G- T2- G- T2- G+	-	15	50	mA
			-	15	50	mA
			-	15	50	mA
			-	30	75	mA
			-	30		mA
$I_H$	Holding current	$V_D = 12\text{ Vdc}$ , Initiating Current = $\pm 200\text{ mA}$ , Gate Open	-	30		mA
$V_{TM}$	On-state voltage	$I_{TM} = \pm 8\text{ A Peak}$ , Pulse Width $\leq 2\text{ ms}$ , Duty Cycle $\leq 2\%$	-	1.3	1.8	V
$V_{GT}$	Gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ MT2(+), G(+); MT2(+), G(-); MT2(-), G(-) MT2(-), G(+)	-	-	2.0	V
			-	-	2.5	V
$V_{GD}$	Gate Non-Trigger Voltage (Continuous dc)	$V_D = 12\text{ V}$ , $T_C = 110\text{ }^{\circ}\text{C}$ , $R_L = 100\text{ }\Omega$ ) All Four Quadrants	0.2	-	-	V
<b>Dynamic Characteristics</b>						
$dv_D/dt$	Critical rate of rise of off-state voltage	$V_D = \text{Rated } V_{DRM}$ , Exponential Waveform, $T_C = 110\text{ }^{\circ}\text{C}$	-	25	-	$\text{V}/\mu\text{s}$
$dv_D/dt(c)$	Critical Rate of Rise of Commutation Voltage	$V_D = \text{Rated } V_{DRM}$ , $I_{TM} = 11.3\text{ A}$ , Commutating $di/dt = 4.1\text{ A/ms}$ , Gate Unenergized, $T_C = 80\text{ }^{\circ}\text{C}$	10		-	$\text{V}/\mu\text{s}$
$t_{gt}$	Gate controlled turn-on time	$V_D = \text{Rated } V_{DRM}$ , $I_{TM} = 16\text{ A Peak}$ , $I_G = 30\text{ mA}$	-	1.5	-	$\mu\text{s}$

## 9. Electrical Characteristics Curve

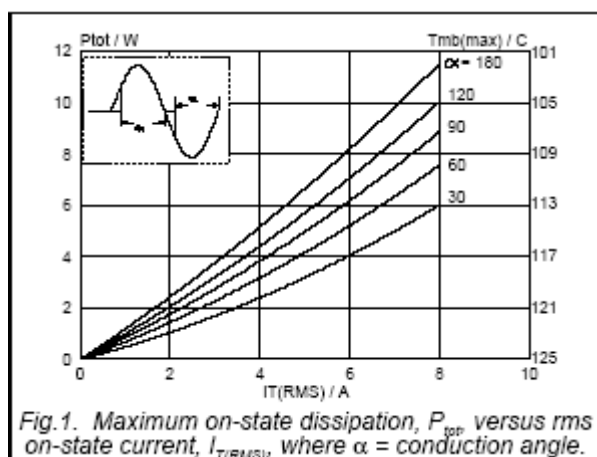


Fig.1. Maximum on-state dissipation,  $P_{top}$ , versus rms on-state current,  $I_{T(RMS)}$ , where  $\alpha$  = conduction angle.

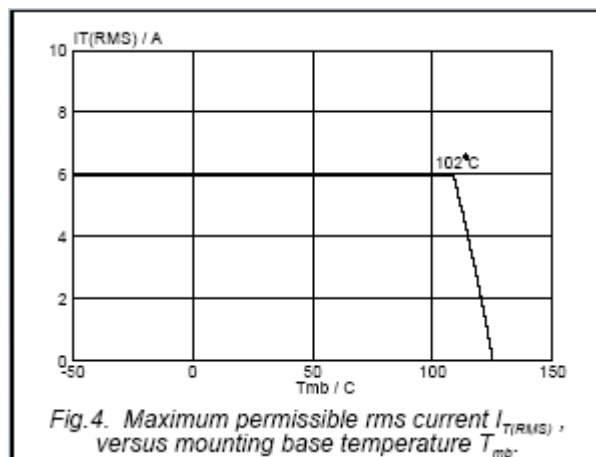


Fig.4. Maximum permissible rms current  $I_{T(RMS)}$ , versus mounting base temperature  $T_{mb}$ .

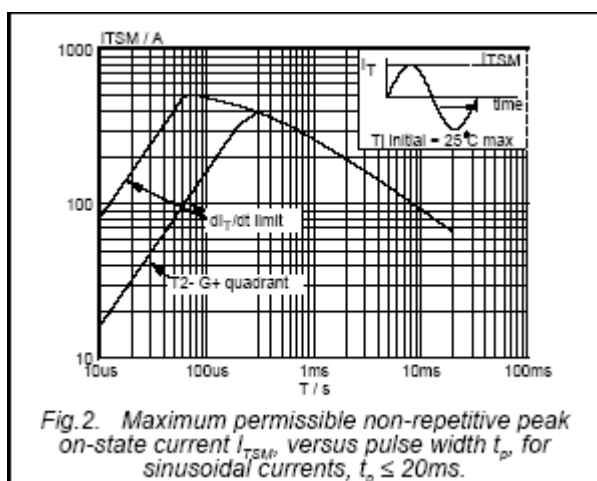


Fig.2. Maximum permissible non-repetitive peak on-state current  $I_{TSM}$ , versus pulse width  $t_p$ , for sinusoidal currents,  $t_p \leq 20\text{ms}$ .

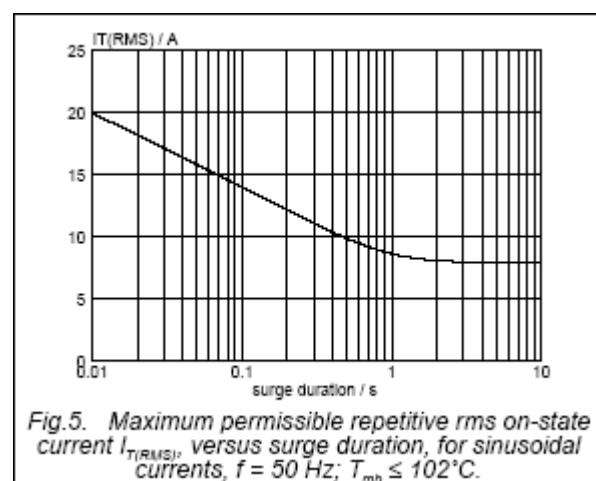


Fig.5. Maximum permissible repetitive rms on-state current  $I_{T(RMS)}$ , versus surge duration, for sinusoidal currents,  $f = 50\text{ Hz}$ ;  $T_{mb} \leq 102^\circ\text{C}$ .

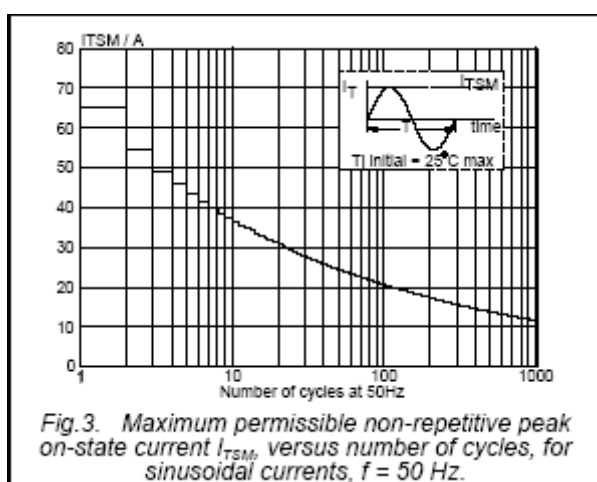


Fig.3. Maximum permissible non-repetitive peak on-state current  $I_{TSM}$ , versus number of cycles, for sinusoidal currents,  $f = 50\text{ Hz}$ .

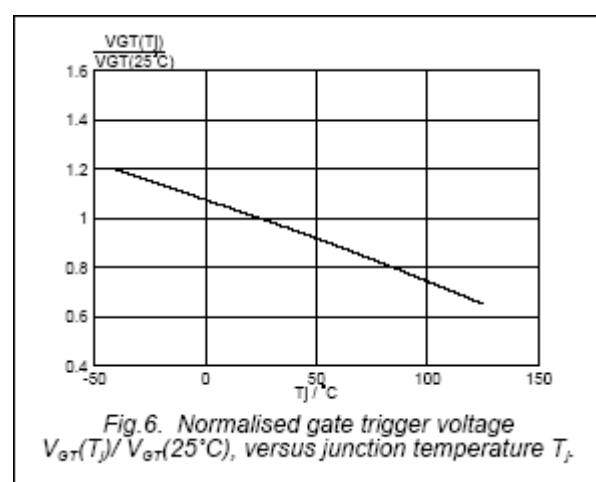
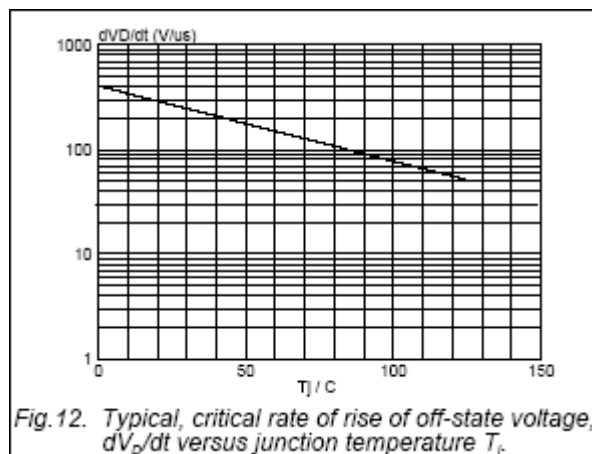
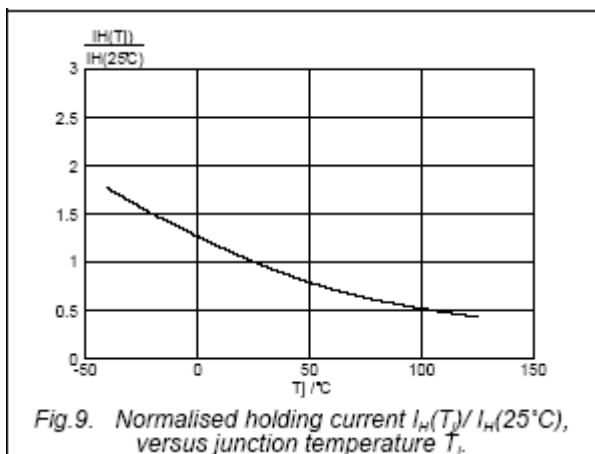
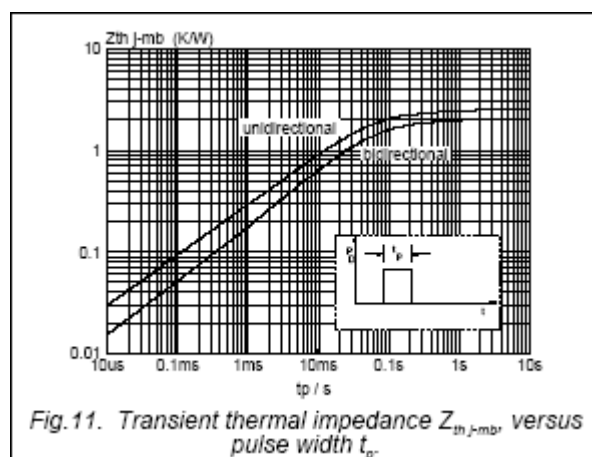
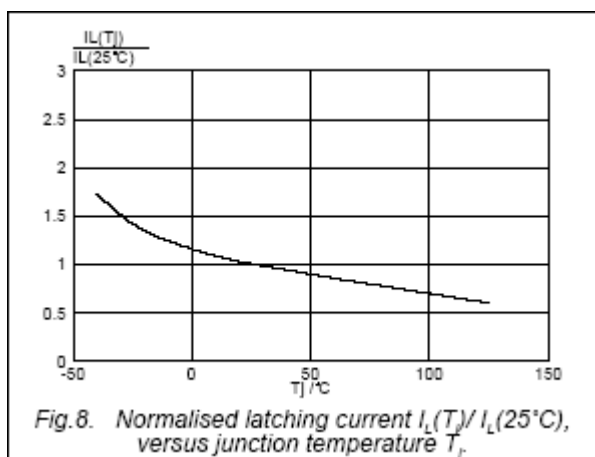
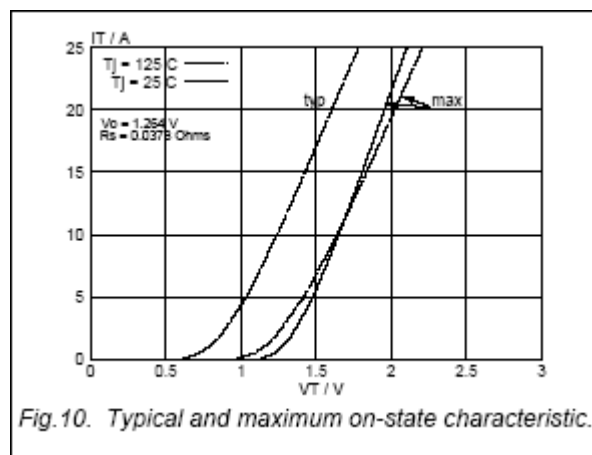
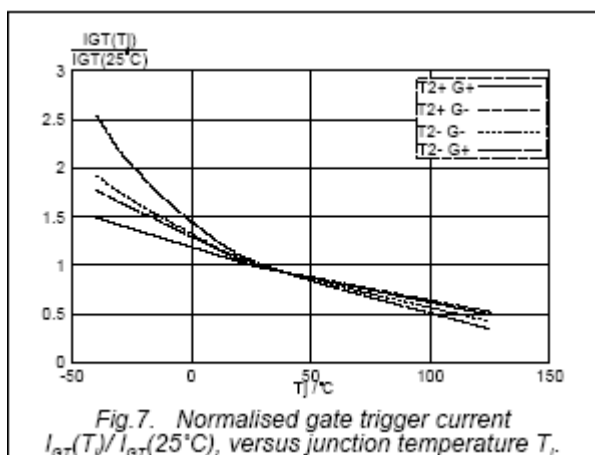
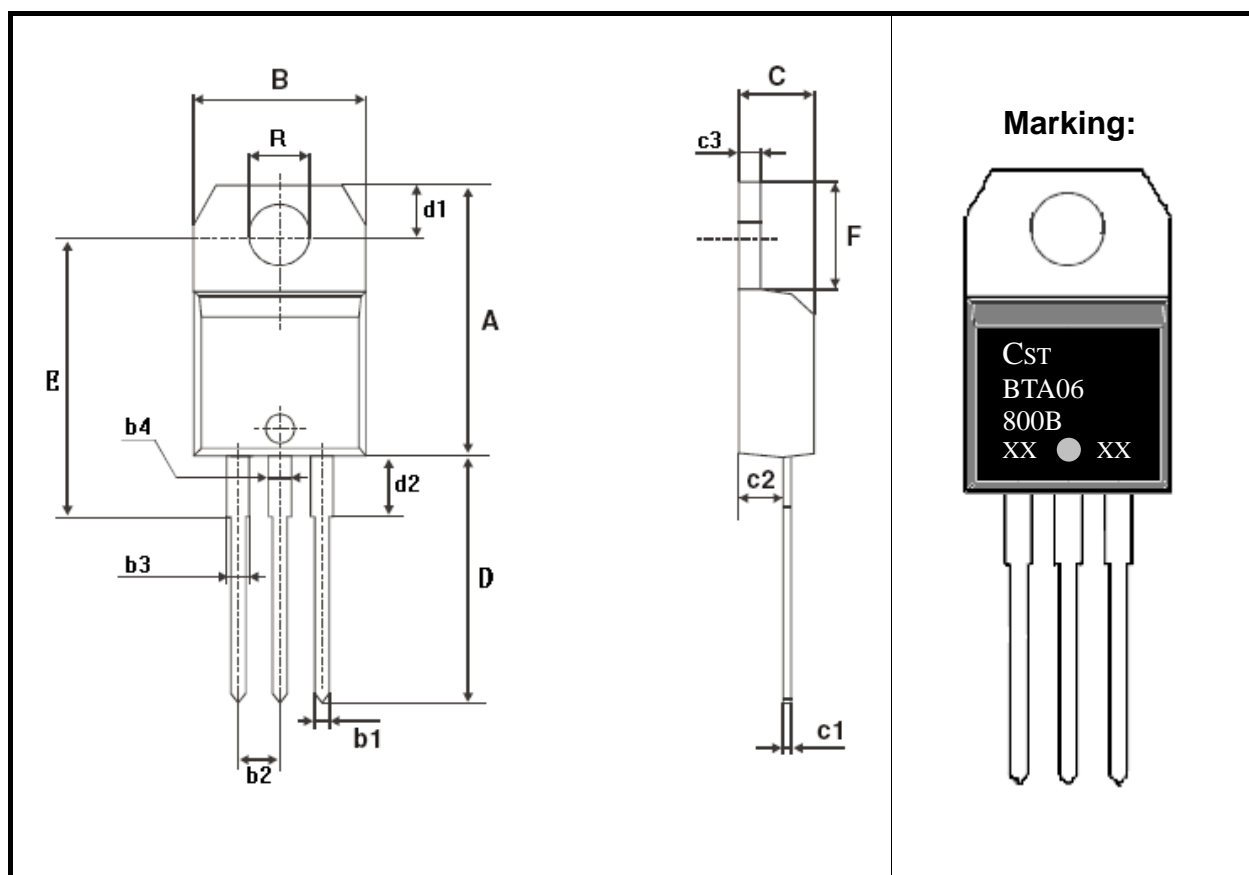


Fig.6. Normalised gate trigger voltage  $V_{GT}(T) / V_{GT}(25^\circ\text{C})$ , versus junction temperature  $T_J$ .



## 10、Package outline (TO-220I)



DIM	Inches			Millimeters		
	Min	Type	Max	Min	Type	Max
A	0.591	-	0.646	15.00	-	16.40
B	0.386	-	0.409	9.80	-	10.40
C	0.160	-	0.190	4.07	-	4.82
D	0.500	-	0.562	12.70	-	14.27
E	-	0.640	-	-	16.25	-
F	0.248	-	0.271	6.29	-	6.89
R	0.140	-	0.156	3.56	-	3.96
b1	0.030	-	0.037	0.75	-	0.95
b2	0.095	-	0.105	2.42	-	2.66
b3	0.046	-	0.054	1.17	-	1.37
b4	0.046	-	0.054	1.17	-	1.37
c1	0.017	-	0.023	0.42	-	0.58
c2	0.091	-	0.115	2.32	-	2.92
c3	0.045	-	0.055	1.15	-	1.39
d1	0.100	-	0.120	2.54	-	3.04
d2	0.125	-	0.155	3.18	-	3.93