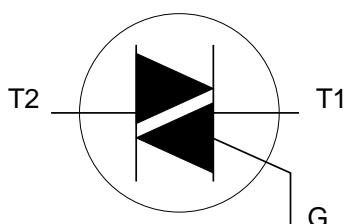


KERSEMI ELECTRONIC CO.,LTD.

GENERAL DESCRIPTION

Glass passivated triacs in a full pack, plastic envelope, intended for use in applications requiring high bidirectional transient and blocking voltage capability and high thermal cycling performance. Typical applications include motor control, industrial and domestic lighting, heating and static switching.

SYMBOL


**SOT186A
TO-220F**


QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
	BT139-X	500	600	800	
	BT139-X	500F	600F	800F	
	BT139-X	500G	600G	800G	
V_{DRM}	Repetitive peak off-state voltages	500	600	800	V
$I_{T(RMS)}$	RMS on-state current	16	16	16	A
I_{TSM}	Non-repetitive peak on-state current	140	140	140	A

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
				-500 500 ¹	-600 600 ¹	-800 800	
V_{DRM}	Repetitive peak off-state voltages		-				V
$I_{T(RMS)}$ I_{TSM}	RMS on-state current Non-repetitive peak on-state current	full sine wave; $T_{hs} \leq 38^\circ C$ full sine wave; $T_j = 25^\circ C$ prior to surge $t = 20$ ms $t = 16.7$ ms $t = 10$ ms $I_{TM} = 20$ A; $I_G = 0.2$ A; $dI_G/dt = 0.2$ A/ μ s	-		16		A
I^2t dl_T/dt	I^2t for fusing Repetitive rate of rise of on-state current after triggering		-	140	150	98	A ² s
I_{GM} V_{GM} P_{GM} $P_{G(AV)}$ T_{stg} T_j	Peak gate current Peak gate voltage Peak gate power Average gate power Storage temperature Operating junction temperature	over any 20 ms period	T2+ G+ T2+ G- T2- G- T2- G+	-	50	50	A/ μ s
				-	50	50	A/ μ s
				-	10	10	A/ μ s
				-	2	2	A
				-	5	5	V
				-	5	5	W
			-40		0.5	0.5	W
				-	150	150	°C
				-	125	125	°C

¹ Although not recommended, off-state voltages up to 800V may be applied without damage, but the triac may switch to the on-state. The rate of rise of current should not exceed 15 A/ μ s.

ISOLATION LIMITING VALUE & CHARACTERISTIC
 $T_{hs} = 25^\circ C$ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	R.M.S. isolation voltage from all three terminals to external heatsink	$f = 50-60 \text{ Hz}$; sinusoidal waveform; R.H. $\leq 65\%$; clean and dustfree	-		2500	V
C_{isol}	Capacitance from T2 to external heatsink	$f = 1 \text{ MHz}$	-	10	-	pF

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th j-hs}$	Thermal resistance junction to heatsink	full or half cycle with heatsink compound	-	-	4.0	K/W
$R_{th j-a}$	Thermal resistance junction to ambient	without heatsink compound in free air	-	55	5.5	K/W

STATIC CHARACTERISTICS
 $T_j = 25^\circ C$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.		UNIT	
					...F	...G		
I_{GT}	Gate trigger current	$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}$	$T2+ G+$ $T2+ G-$ $T2- G-$ $T2- G+$	-	5	35	50	mA
				-	8	35	50	mA
				-	10	35	50	mA
				-	22	70	100	mA
I_L	Latching current	$V_D = 12 \text{ V}; I_{GT} = 0.1 \text{ A}$	$T2+ G+$ $T2+ G-$ $T2- G-$ $T2- G+$	-	7	40	60	mA
				-	20	60	90	mA
				-	8	40	60	mA
				-	10	60	90	mA
I_H	Holding current	$V_D = 12 \text{ V}; I_{GT} = 0.1 \text{ A}$	$T2+ G+$ $T2+ G-$ $T2- G-$ $T2- G+$	-	6	30	30	mA
				-	30	30	60	mA
				-	1.2		1.6	V
				-	0.7		1.5	V
V_T V_{GT}	On-state voltage Gate trigger voltage	$V_D = 400 \text{ V}; I_T = 0.1 \text{ A}; T_j = 125^\circ C$	$I_T = 20 \text{ A}$ $V_D = 12 \text{ V}; I_T = 0.1 \text{ A}$	0.25	0.4		-	V
				-				V
I_D	Off-state leakage current	$V_D = V_{DRM(max)}; T_j = 125^\circ C$	-	0.1		0.5		mA

DYNAMIC CHARACTERISTICS
 $T_j = 25^\circ C$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	...F	...G	TYP.	MAX.	UNIT	
dV_D/dt	Critical rate of rise of off-state voltage	$BT139X-$ $V_{DM} = 67\% V_{DRM(max)}; T_j = 125^\circ C$; exponential waveform; gate open circuit	...	100	50	200	250	-	V/ μ s
dV_{com}/dt	Critical rate of change of commutating voltage	$V_{DM} = 400 \text{ V}; T_j = 95^\circ C$; $I_{T(RMS)} = 16 \text{ A}$; $dI_{com}/dt = 7.2 \text{ A/ms}$; gate open circuit	-	-	10	20	-	V/ μ s	
t_{gt}	Gate controlled turn-on time	$I_{TM} = 20 \text{ A}; V_D = V_{DRM(max)}; I_G = 0.1 \text{ A}; dI_G/dt = 5 \text{ A}/\mu\text{s}$	-	-	-	2	-	μ s	

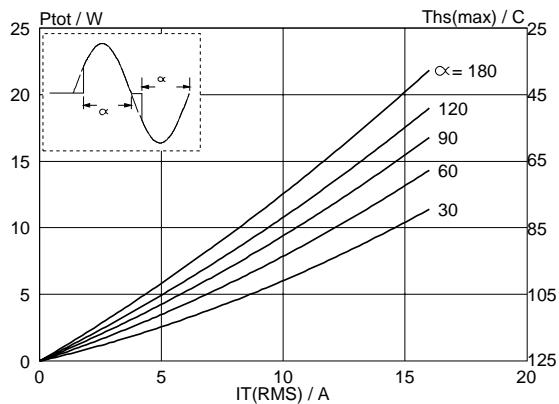


Fig.1. Maximum on-state dissipation, P_{tot} , versus rms on-state current, $IT_{(RMS)}$, where α = conduction angle.

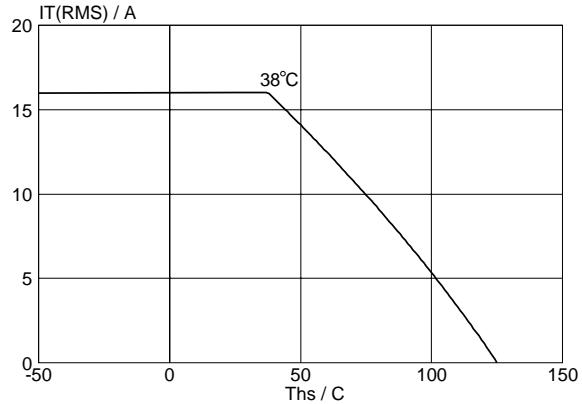


Fig.4. Maximum permissible rms current $IT_{(RMS)}$, versus heatsink temperature Ths .

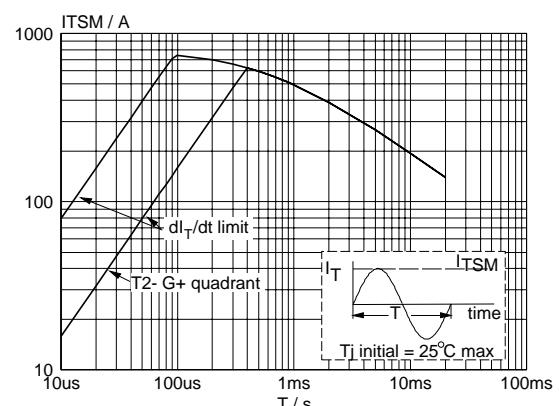


Fig.2. Maximum permissible non-repetitive peak on-state current IT_{TSM} , versus pulse width t_p , for sinusoidal currents, $t_p \leq 20ms$.

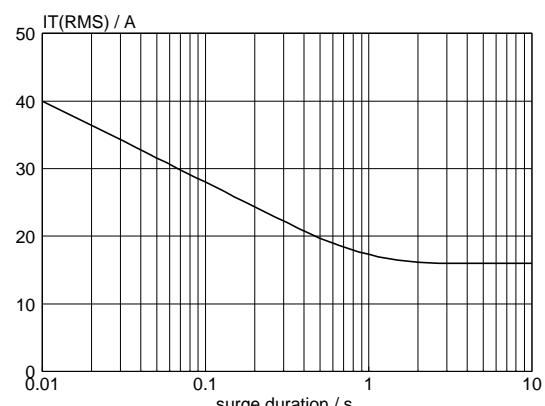


Fig.5. Maximum permissible repetitive rms on-state current $IT_{(RMS)}$, versus surge duration, for sinusoidal currents, $f = 50$ Hz; $Ths \leq 38^\circ C$.

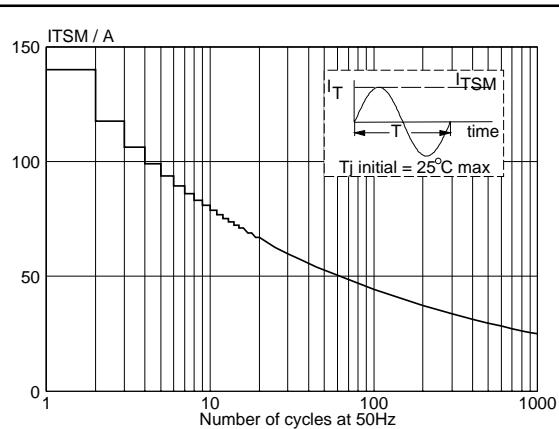


Fig.3. Maximum permissible non-repetitive peak on-state current IT_{TSM} , versus number of cycles, for sinusoidal currents, $f = 50$ Hz.

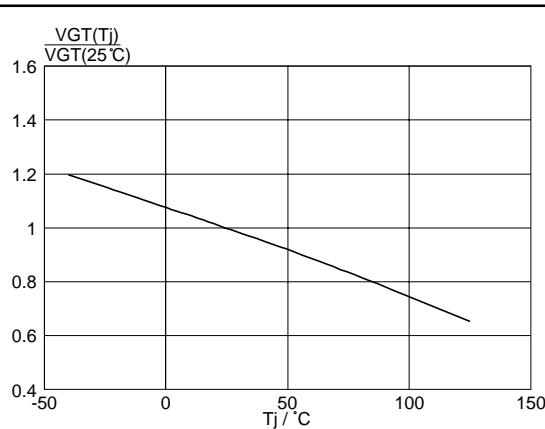


Fig.6. Normalised gate trigger voltage $V_{GT}(T_j)/V_{GT}(25^\circ C)$, versus junction temperature T_j .

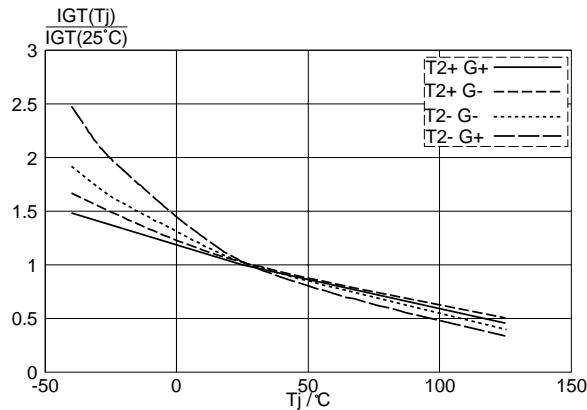


Fig.7. Normalised gate trigger current $I_{GT}(T_j)/I_{GT}(25^\circ\text{C})$, versus junction temperature T_j .

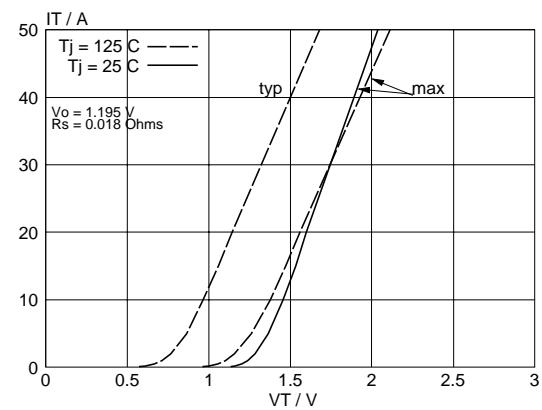


Fig.10. Typical and maximum on-state characteristic.

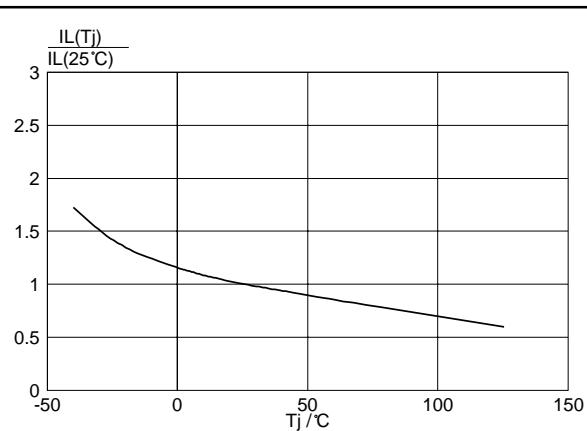


Fig.8. Normalised latching current $I_L(T_j)/I_L(25^\circ\text{C})$, versus junction temperature T_j .

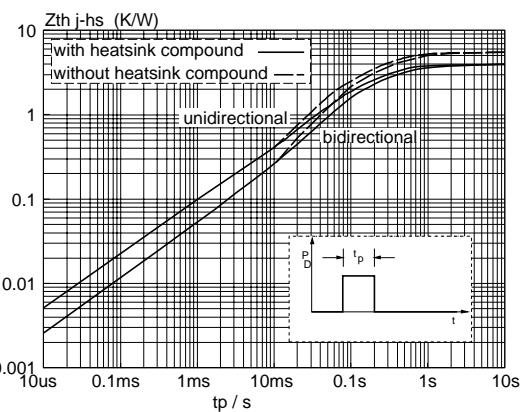


Fig.11. Transient thermal impedance $Z_{th(j-hs)}$, versus pulse width t_p .

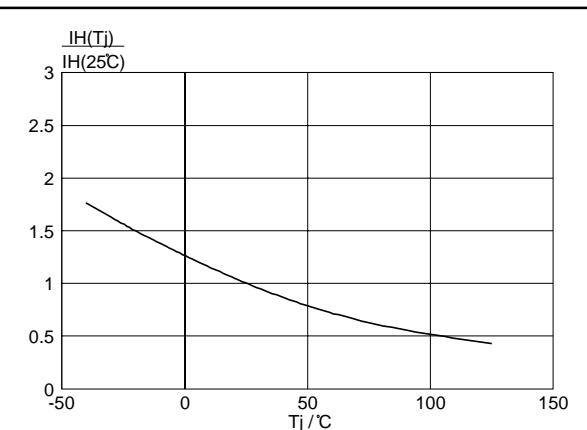


Fig.9. Normalised holding current $I_H(T_j)/I_H(25^\circ\text{C})$, versus junction temperature T_j .

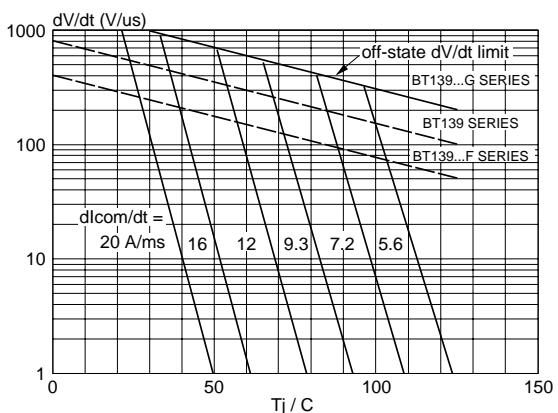


Fig.12. Typical commutation dV/dt versus junction temperature, parameter commutation dl_{γ}/dt . The triac should commutate when the dV/dt is below the value on the appropriate curve for pre-commutation dl_{γ}/dt .

MECHANICAL DATA

Dimensions in mm

Net Mass: 2 g

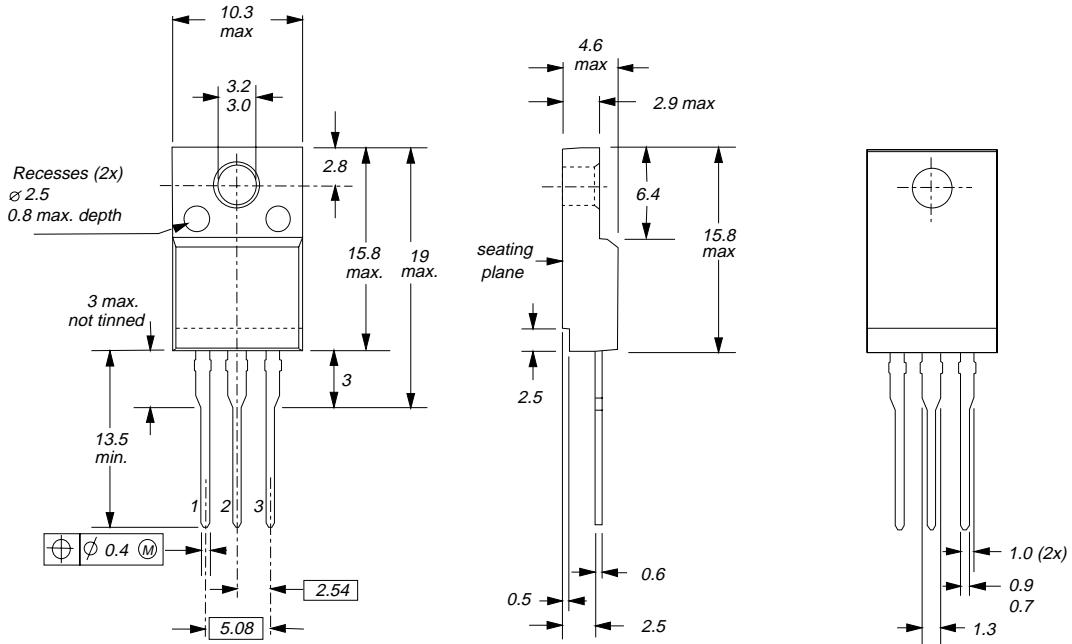


Fig.13. SOT186A; The seating plane is electrically isolated from all terminals.

Notes

1. Refer to mounting instructions for F-pack envelopes.
2. Epoxy meets UL94 V0 at 1/8".