Three quadrant triacs guaranteed commutation

BTA208X series D, E and F

GENERAL DESCRIPTION

Passivated guaranteed commutation triacs in a full pack, plastic envelope intended for use in motor control circuits or with other highly inductive loads. These devices balance the requirements of commutation performance and gate sensitivity. The "sensitive gate" E series and "logic level" D series are intended for interfacing with low power drivers, including micro controllers.

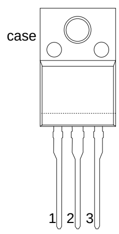
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BTA208X-	**600D**	**-**	
	BTA208X-	**600E**	**800E**	
	BTA208X-	**600F**	**800F**	
V_{DRM}	Repetitive peak off-state voltages	600	800	V
$I_{T(RMS)}$	RMS on-state current	8	8	A
I_{TSM}	Non-repetitive peak on-state current	65	65	A

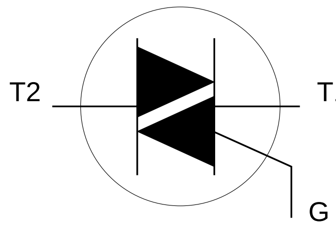
PINNING - SOT186A

PIN	DESCRIPTION
1	main terminal 1
2	main terminal 2
3	gate
case	isolated

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
				-600	**-800**	
V_{DRM}	Repetitive peak off-state voltages		-	600[1]	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{hs} \leq 73$ ˚C	-	8		A
I_{TSM}	Non-repetitive peak on-state current	full sine wave; $T_j = 25$ ˚C prior to surge				
		t = 20 ms	-	65		A
		t = 16.7 ms	-	72		A
I^2t	I^2t for fusing	t = 10 ms	-	21		A^2s
dI_T/dt	Repetitive rate of rise of on-state current after triggering	$I_{TM} = 12$ A; $I_G = 0.2$ A; $dI_G/dt = 0.2$ A/µs		100		A/µs
I_{GM}	Peak gate current		-	2		A
P_{GM}	Peak gate power		-	5		W
$P_{G(AV)}$	Average gate power	over any 20 ms period	-	0.5		W
T_{stg}	Storage temperature		-40	150		˚C
T_j	Operating junction temperature		-	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 6 A/µs.

ISOLATION LIMITING VALUE & CHARACTERISTIC

T_{hs} = 25 ˚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 Hz; sinusoidal waveform; R.H. ≤ 65% ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 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	-	-	4.5	K/W
		without heatsink compound	-	-	6.5	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	in free air	-	55	-	K/W

STATIC CHARACTERISTICS

T_j = 25 ˚C unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
		BTA208X-		**...D**	**...E**	**...F**	
I_{GT}	Gate trigger current[2]	V_D = 12 V; I_T = 0.1 A					
		T2+ G+	-	5	10	25	mA
		T2+ G-	-	5	10	25	mA
		T2- G-	-	5	10	25	mA
I_L	Latching current	V_D = 12 V; I_{GT} = 0.1 A					
		T2+ G+	-	15	25	30	mA
		T2+ G-	-	25	30	40	mA
		T2- G-	-	25	30	40	mA
I_H	Holding current	V_D = 12 V; I_{GT} = 0.1 A	-	15	25	30	mA
V_T	On-state voltage	I_T = 10 A	-	1.65			V
V_{GT}	Gate trigger voltage	V_D = 12 V; I_T = 0.1 A	-	1.5			V
		V_D = 400 V; I_T = 0.1 A; T_j = 125 ˚C	0.25	-			V
I_D	Off-state leakage current	$V_D = V_{DRM(max)}$; T_j = 125 ˚C	-	0.5			mA

2 Device does not trigger in the T2-, G+ quadrant.

DYNAMIC CHARACTERISTICS

T_j = 25 ˚C unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.			MAX.	UNIT
		BTA208X-	**...D**	**...E**	**...F**		
dV_D/dt	Critical rate of rise of off-state voltage	V_{DM} = 67% $V_{DRM(max)}$; T_j = 110 ˚C; exponential waveform; gate open circuit	20	60	70	-	V/µs
dI_{com}/dt	Critical rate of change of commutating current	V_{DM} = 400 V; T_j = 125 ˚C; $I_{T(RMS)}$ = 8 A; dV_{com}/dt = 10V/µs; gate open circuit	2	5	14	-	A/ms
dI_{com}/dt	Critical rate of change of commutating current	V_{DM} = 400 V; T_j = 125 ˚C; $I_{T(RMS)}$ = 8 A; dV_{com}/dt = 0.1V/µs; gate open circuit	6	10	20	-	A/ms

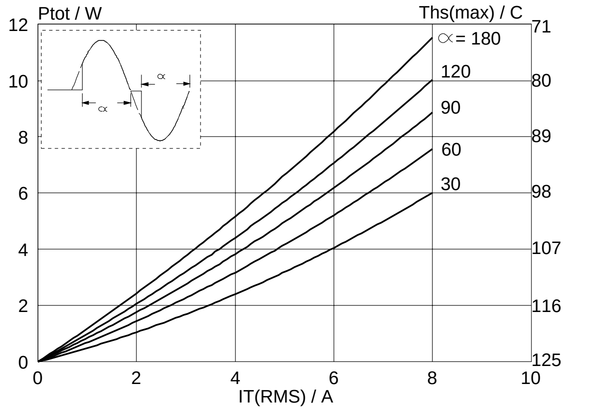


Fig.1. Maximum on-state dissipation, P_{tot}, versus rms on-state current, $I_{T(RMS)}$, where α = conduction angle.

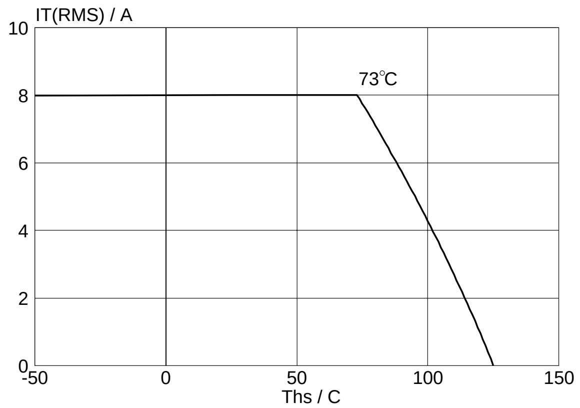


Fig.4. Maximum permissible rms current $I_{T(RMS)}$, versus heatsink temperature T_{hs}.

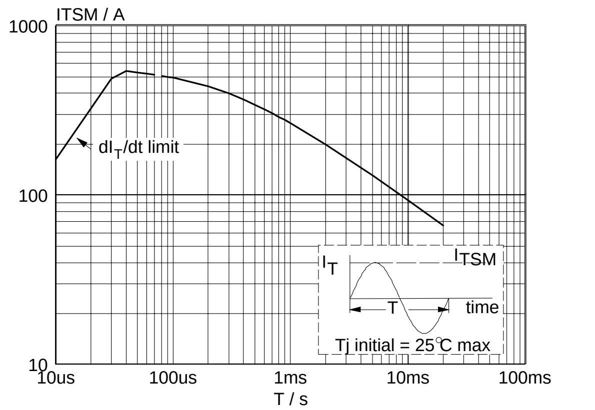


Fig.2. Maximum permissible non-repetitive peak on-state current I_{TSM}, versus pulse width t_p, for sinusoidal currents, $t_p \leq 20ms$.

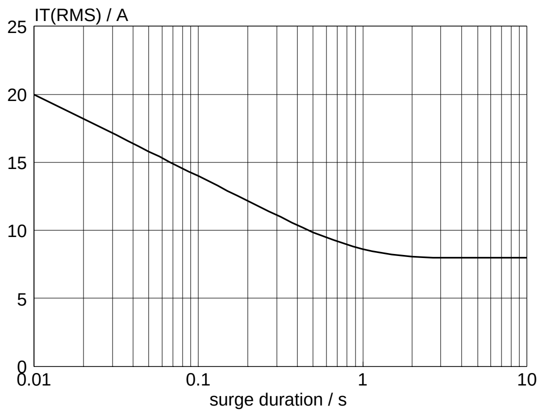


Fig.5. Maximum permissible repetitive rms on-state current $I_{T(RMS)}$, versus surge duration, for sinusoidal currents, f = 50 Hz; $T_{hs} \leq 73^{\circ}C$.

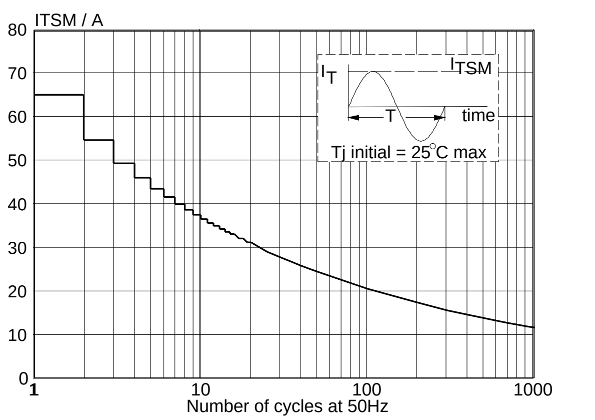


Fig.3. Maximum permissible non-repetitive peak on-state current I_{TSM}, versus number of cycles, for sinusoidal currents, f = 50 Hz.

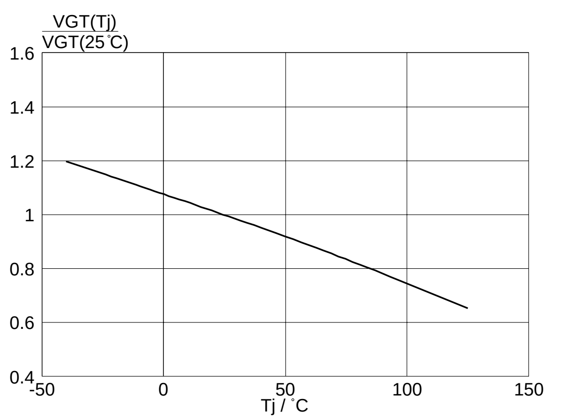


Fig.6. Normalised gate trigger voltage $V_{GT}(T_j)$/ $V_{GT}(25^{\circ}C)$, versus junction temperature T_j.

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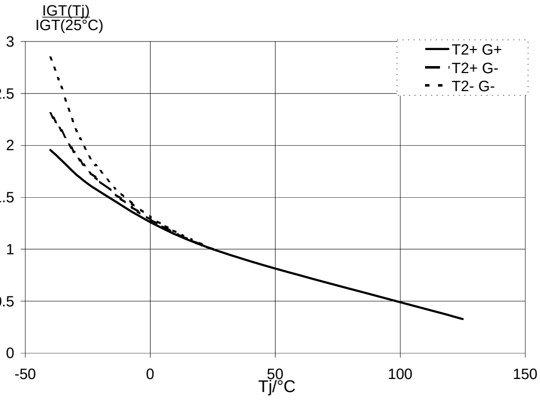

Fig.7. Normalised gate trigger current $I_{GT}(T_j)/ I_{GT}(25˚C)$, versus junction temperature T_j.

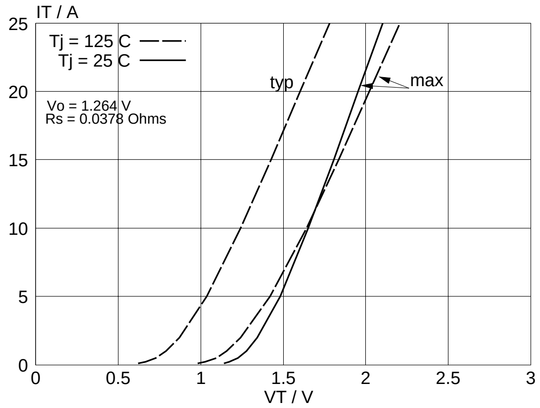

Fig.10. Typical and maximum on-state characteristic.

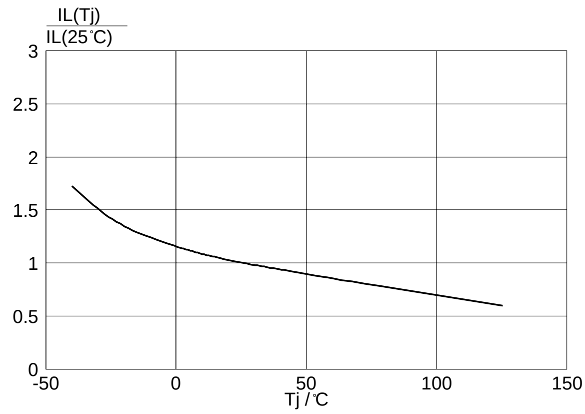

Fig.8. Normalised latching current $I_L(T_j)/ I_L(25˚C)$, versus junction temperature T_j.

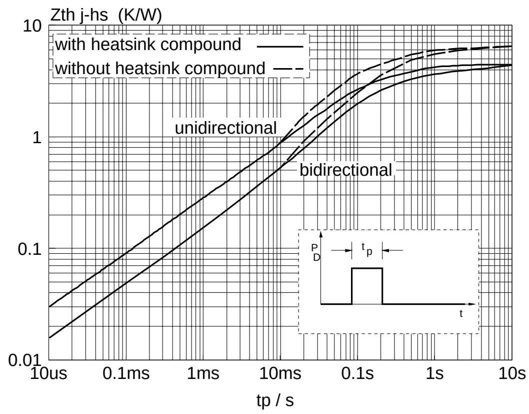

Fig.11. Transient thermal impedance $Z_{th\ j\text{-}hs}$, versus pulse width t_p.

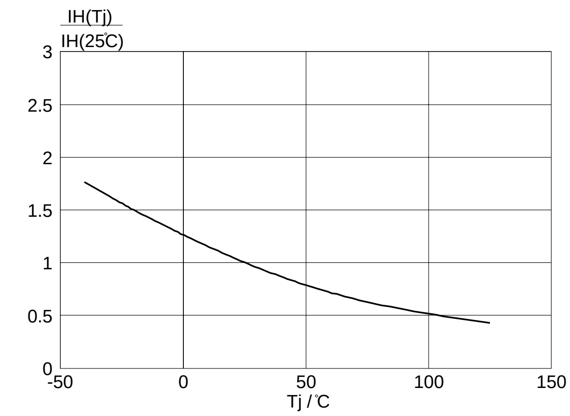

Fig.9. Normalised holding current $I_H(T_j)/ I_H(25˚C)$, versus junction temperature T_j.

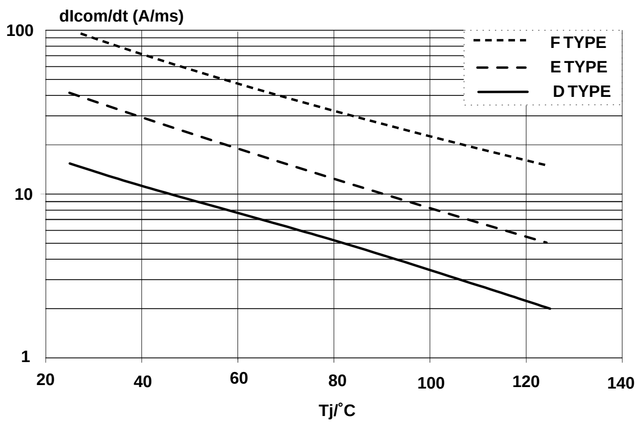

Fig.12. Miniumum, critical rate of change of commutating current dI_{com}/dt versus junction temperature, $dV_{com}/dt = 20V/\mu s$

MECHANICAL DATA

Dimensions in mm

Net Mass: 2 g

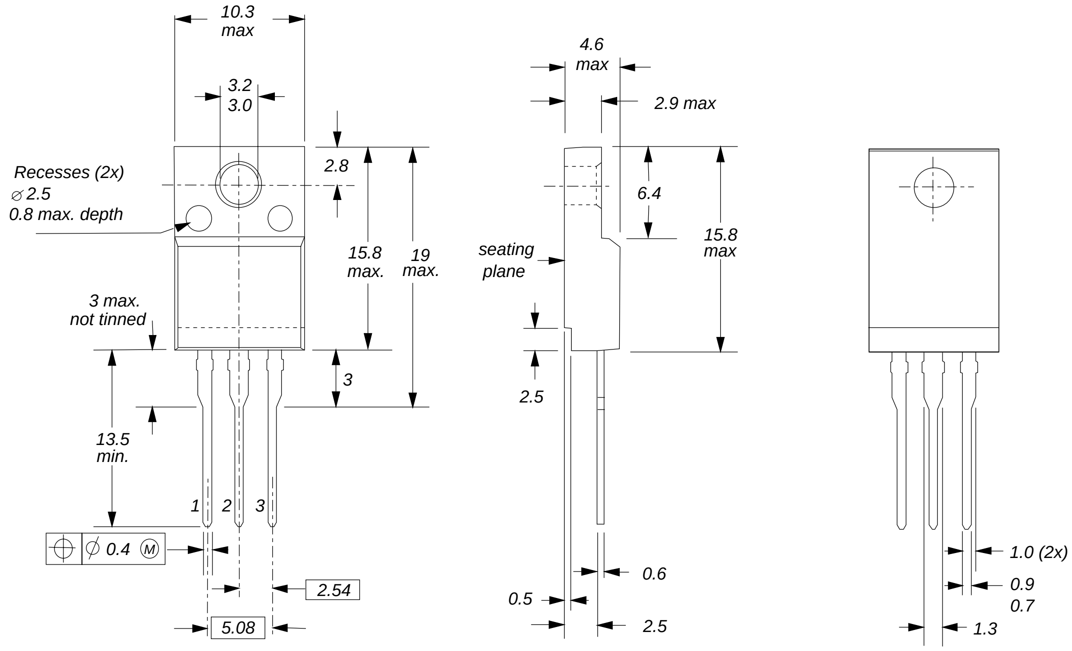

Fig.13. SOT186A; The seating plane is electrically isolated from all terminals.

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

DEFINITIONS

DATA SHEET STATUS		
DATA SHEET STATUS[3]	**PRODUCT STATUS**[4]	**DEFINITIONS**
Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice
Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product
Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Changes will be communicated according to the Customer Product/Process Change Notification (CPCN) procedure SNW-SQ-650A
Limiting values		
Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability.		
Application information		
Where application information is given, it is advisory and does not form part of the specification.		
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3 Please consult the most recently issued datasheet before initiating or completing a design.

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