

**Three quadrant triacs  
guaranteed commutation**

**BTA212X 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.

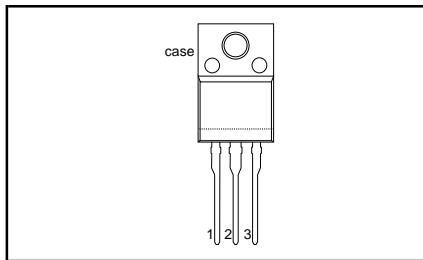
**QUICK REFERENCE DATA**

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
$V_{DRM}$	Repetitive peak off-state voltages	600D 600E 600F 600	- 800E 800F 800	V
$I_{T(RMS)}$	RMS on-state current	12	12	A
$I_{TSM}$	Non-repetitive peak on-state current	95	95	A

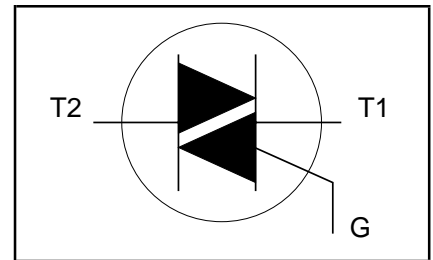
**PINNING - SOT186A**

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
$V_{DRM}$	Repetitive peak off-state voltages		-	-600 600 <sup>1</sup>	-800 800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{hs} \leq 56^\circ C$	-	12		A
$I_{TSM}$	Non-repetitive peak on-state current	full sine wave; $T_j = 25^\circ C$ prior to surge $t = 20\text{ ms}$	-	95		A
$I^2t$	$I^2t$ for fusing	$t = 16.7\text{ ms}$	-	105		A
$dl_T/dt$	Repetitive rate of rise of on-state current after triggering	$t = 10\text{ ms}$ $I_{TM} = 20\text{ A}; I_G = 0.2\text{ A}; dl_G/dt = 0.2\text{ A}/\mu s$	-	45		A <sup>2</sup> s
$I_{GM}$	Peak gate current		-	2		A
$V_{GM}$	Peak gate voltage		-	5		V
$P_{GM}$	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

<sup>1</sup> 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 3 A/μs.

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### ISOLATION LIMITING VALUE & CHARACTERISTIC

$T_{hs} = 25\text{ °C}$  unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{isol}$	R.M.S. isolation voltage from all three terminals to external heatsink	$f = 50\text{-}60\text{ Hz}$ ; 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
$R_{th\ j\text{-}hs}$	Thermal resistance junction to heatsink	full or half cycle with heatsink compound	-	-	4.0	K/W
$R_{th\ j\text{-}a}$	Thermal resistance junction to ambient	without heatsink compound in free air	-	55	5.5	K/W

### STATIC CHARACTERISTICS

$T_j = 25\text{ °C}$  unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.			UNIT
					...D	...E	...F	
		<b>BTA212X-</b>						
$I_{GT}$	Gate trigger current <sup>2</sup>	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ T2+ G+ T2+ G- T2- G-	-	-	5	10	25	mA
$I_L$	Latching current	$V_D = 12\text{ V}$ ; $I_{GT} = 0.1\text{ A}$ T2+ G+ T2+ G- T2- G-	-	-	15	20	25	mA
$I_H$	Holding current	$V_D = 12\text{ V}$ ; $I_{GT} = 0.1\text{ A}$	-	-	15	25	30	mA
$V_T$	On-state voltage	$I_T = 17\text{ A}$	-	1.3	1.6			V
$V_{GT}$	Gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ $V_D = 400\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 125\text{ °C}$	0.25	0.4	1.5			V
$I_D$	Off-state leakage current	$V_D = V_{DRM(max)}$ ; $T_j = 125\text{ °C}$	-	0.1	0.5			mA

<sup>2</sup> Device does not trigger in the T2-, G+ quadrant.

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### DYNAMIC CHARACTERISTICS

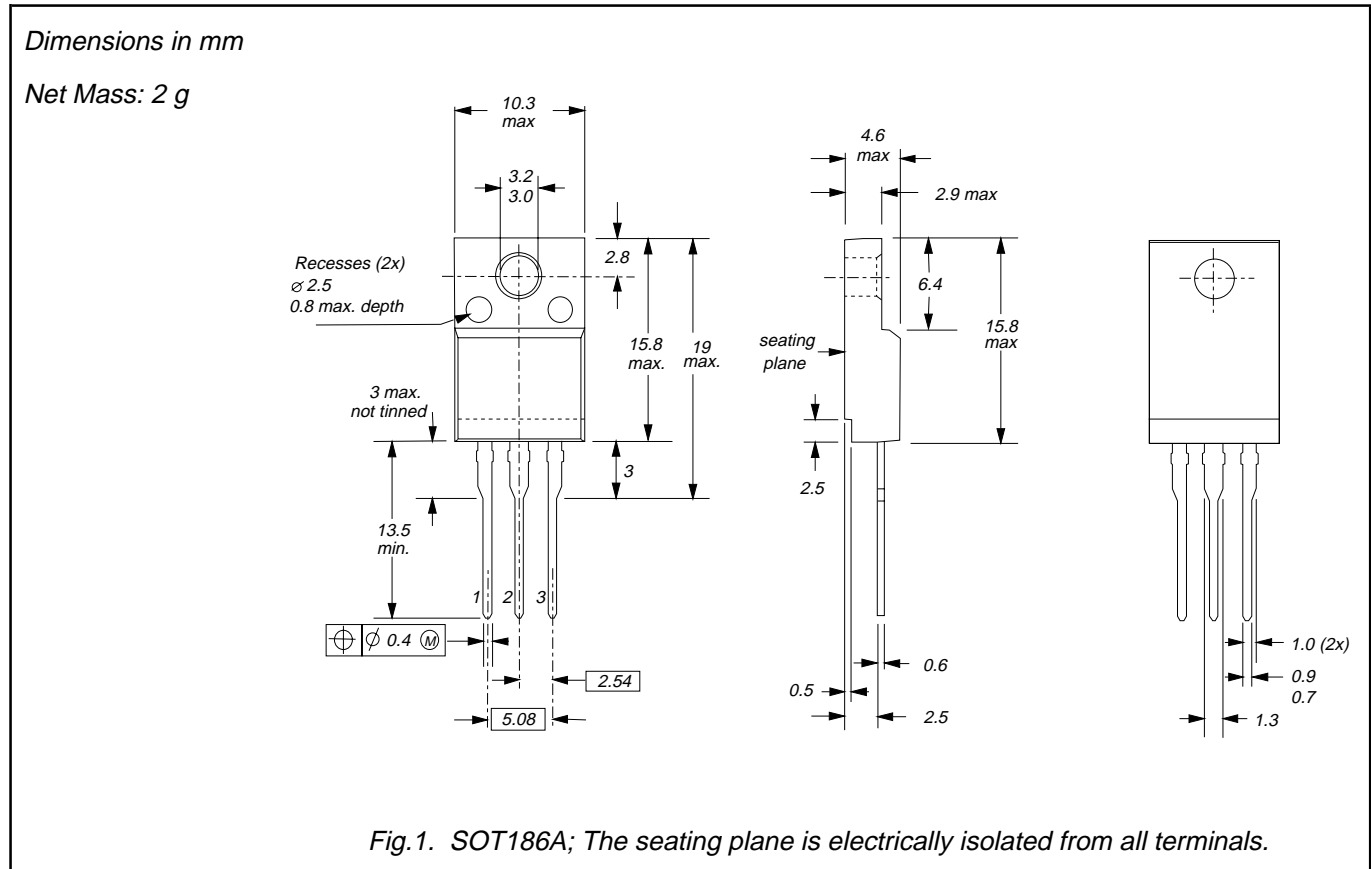
$T_j = 25\text{ °C}$  unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.			TYP.	MAX.	UNIT
			...D	...E	...F			
$dV_D/dt$	Critical rate of rise of off-state voltage	<b>BTA212X-</b> $V_{DM} = 67\% V_{DRM(max)}$ ; $T_j = 110\text{ °C}$ ; exponential waveform; gate open circuit	30	60	70	-	-	V/ $\mu$ s
$dI_{com}/dt$	Critical rate of change of commutating current	$V_{DM} = 400\text{ V}$ ; $T_j = 110\text{ °C}$ ; $I_{T(RMS)} = 12\text{ A}$ ; $dV_{com}/dt = 20\text{ v}/\mu\text{s}$ ; gate open circuit	1.8	3.5	4.5	-	-	A/ms
$dI_{com}/dt$	Critical rate of change of commutating current	$V_{DM} = 400\text{ V}$ ; $T_j = 110\text{ °C}$ ; $I_{T(RMS)} = 12\text{ A}$ ; $dV_{com}/dt = 0.1\text{ v}/\mu\text{s}$ ; gate open circuit	4.3	5.3	6.3	-	-	A/ms
$t_{gt}$	Gate controlled turn-on time	$I_{TM} = 12\text{ A}$ ; $V_D = V_{DRM(max)}$ ; $I_G = 0.1\text{ A}$ ; $dI_G/dt = 5\text{ A}/\mu\text{s}$	-	-	-	2	-	$\mu$ s

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**MECHANICAL DATA**



**Notes**

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

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### DEFINITIONS

<b>Data sheet status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	
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