

1. Product profile

1.1 General description

Passivated triacs in a full pack, plastic package intended for use in applications requiring high bidirectional transient and blocking voltage capability and thermal cycling performance.

1.2 Features

- Isolated package
- High I_{TSM}

1.3 Applications

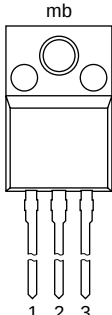
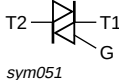
- Lamp dimmers
- High inrush resistive loads
- Motor speed controllers
- Heating and static switching

1.4 Quick reference data

- $V_{DRM} \leq 600 \text{ V}$
(BT236X-600_600F_600G)
- $V_{DRM} \leq 800 \text{ V}$ (BT236X-800_800G)
- $I_{TSM} \leq 65 \text{ A}$ ($t = 20 \text{ ms}$)
- $I_{T(RMS)} \leq 6 \text{ A}$
- $I_{GT} \leq 35 \text{ mA}$ (BT236X-600_800)
- $I_{GT} \leq 25 \text{ mA}$ (BT236X-600F)
- $I_{GT} \leq 50 \text{ mA}$ (BT236X-600G_800G)

2. Pinning information

Table 1: Pinning

Pin	Description	Simplified outline	Symbol
1	main terminal 1 (T1)		
2	main terminal 2 (T2)		
3	gate (G)		
mb	mounting base; isolated		
SOT186A (3-lead TO-220F)			

3. Ordering information

Table 2: Ordering information

Type number	Package		Version
	Name	Description	
BT236X-600	3-lead	plastic single-ended package; isolated heatsink mounted; 1 mounting hole;	SOT186A
BT236X-600F	TO-220F	3 lead TO-220 'full pack'	
BT236X-600G			
BT236X-800			
BT236X-800G			

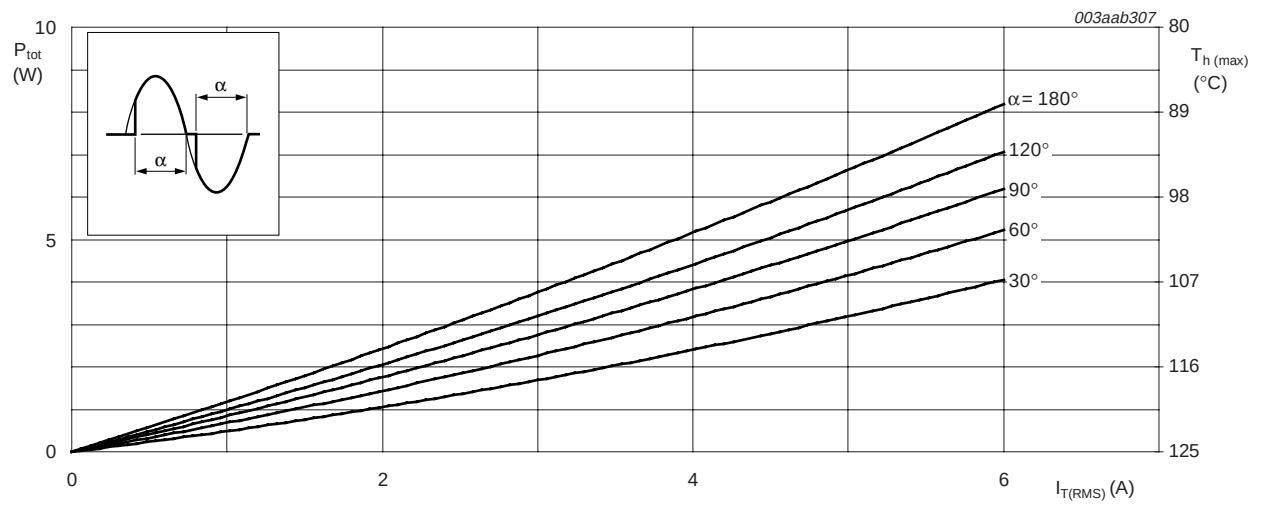
4. Limiting values

Table 3: Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

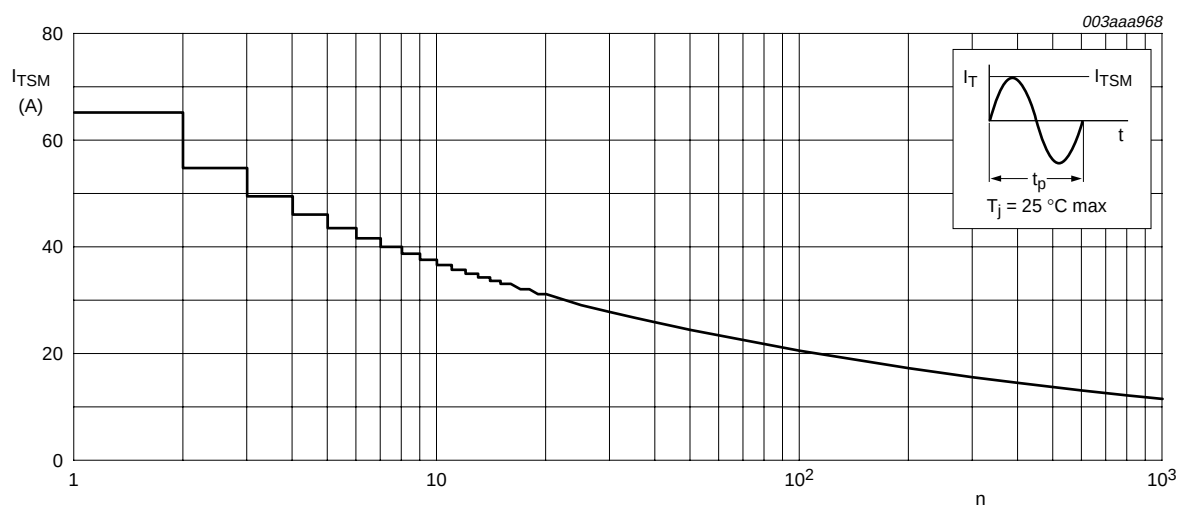
Symbol	Parameter	Conditions	Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage				
	BT236X-600		[1] -	600	V
	BT236X-600F		[1] -	600	V
	BT236X-600G		[1] -	600	V
	BT236X-800		-	800	V
	BT236X-800G		-	800	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{h}} \leq 88\text{ °C}$; see Figure 4 and 5	-	6	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{\text{j}} = 25\text{ °C}$ prior to surge; see Figure 2 and 3			
		$t = 20\text{ ms}$	-	65	A
		$t = 16.7\text{ ms}$	-	71	A
I^2t	I^2t for fusing	$t = 10\text{ ms}$	-	21	A ² s
di_{T}/dt	rate of rise of on-state current	$I_{\text{TM}} = 12\text{ A}$; $I_{\text{G}} = 0.2\text{ A}$; $di_{\text{G}}/dt = 0.2\text{ A}/\mu\text{s}$			
		T2+ G+	-	50	A/ μs
		T2+ G-	-	50	A/ μs
		T2- G-	-	50	A/ μs
		T2- G+	-	10	A/ μs
I_{GM}	peak gate current		-	2	A
V_{GM}	peak gate voltage		-	5	V
P_{GM}	peak gate power		-	5	W
$P_{\text{G(AV)}}$	average gate power	over any 20 ms period	-	0.5	W
T_{stg}	storage temperature		-40	+150	°C
T_{j}	junction temperature		-	125	°C

[1] Although not recommended, off-state voltages up to 800 V 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 .



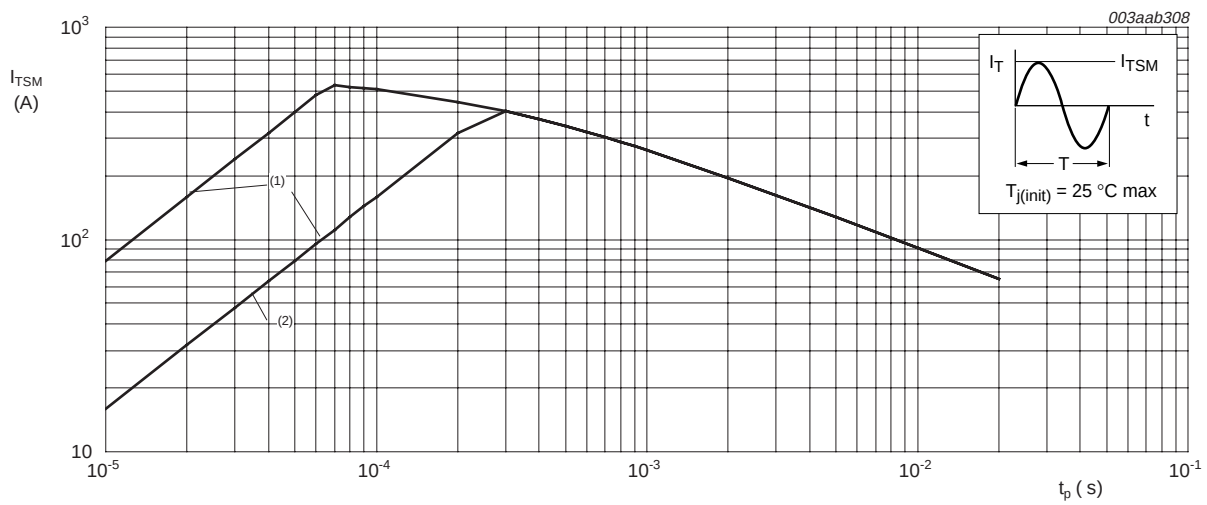
α = conduction angle

Fig 1. Total power dissipation as a function of RMS on-state current; maximum values



$f = 50$ Hz

Fig 2. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

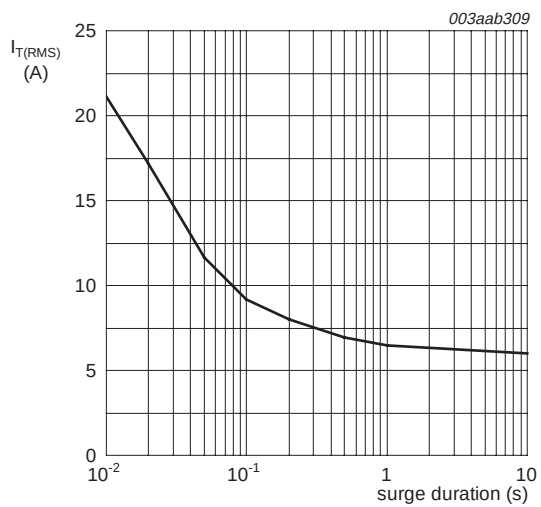


$t_p \leq 20\text{ ms}$

(1) dI_T/dt limit

(2) T2- G+ quadrant

Fig 3. Non-repetitive peak on-state current as a function of pulse duration; maximum values



$f = 50\text{ Hz}$; $T_h \leq 88\text{ °C}$

Fig 4. RMS on-state current as a function of surge duration; maximum values

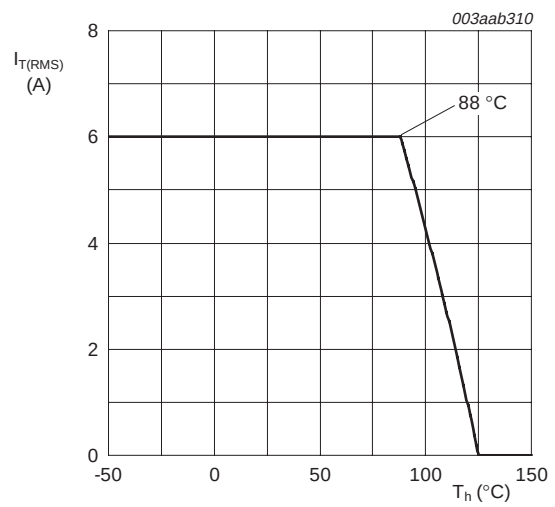


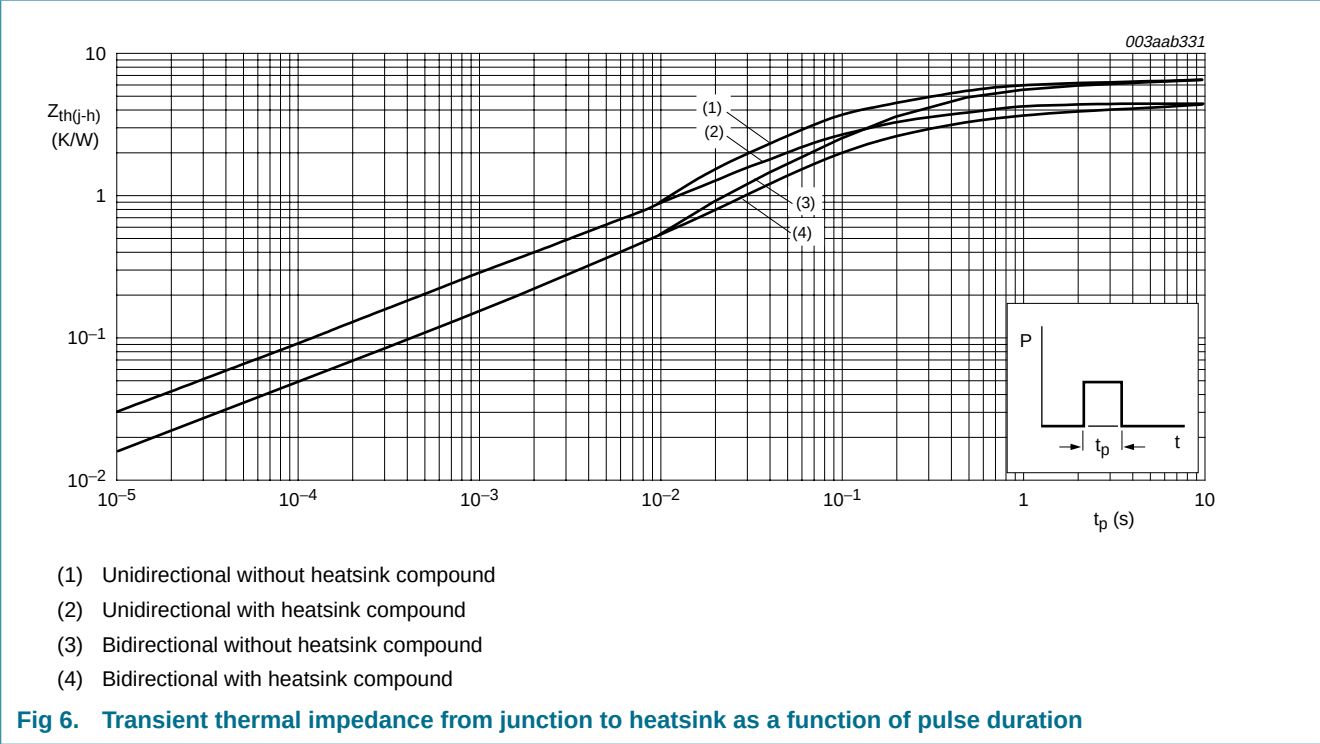
Fig 5. RMS on-state current as a function of heatsink temperature; maximum values

5. Thermal characteristics

Table 4: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	see Figure 6	[1] -	-	4.5	K/W
		see Figure 6	[2] -	-	6.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	55	-	K/W

- [1] Full or half cycle with heatsink compound
[2] Full or half cycle without heatsink compound



6. Isolation characteristics

Table 5: Isolation limiting values and characteristics

$T_h = 25^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(rms)}$	RMS isolation voltage	from all three terminals to external heatsink; $f = 50\text{ Hz}$ to 60 Hz ; sinusoidal waveform; $RH \leq 65\%$; clean and dust free	-	-	2500	V
C_{isol}	isolation capacitance	from pin 2 to external heatsink; $f = 1\text{ MHz}$	-	10	-	pF

7. Static characteristics

Table 6: Static characteristics

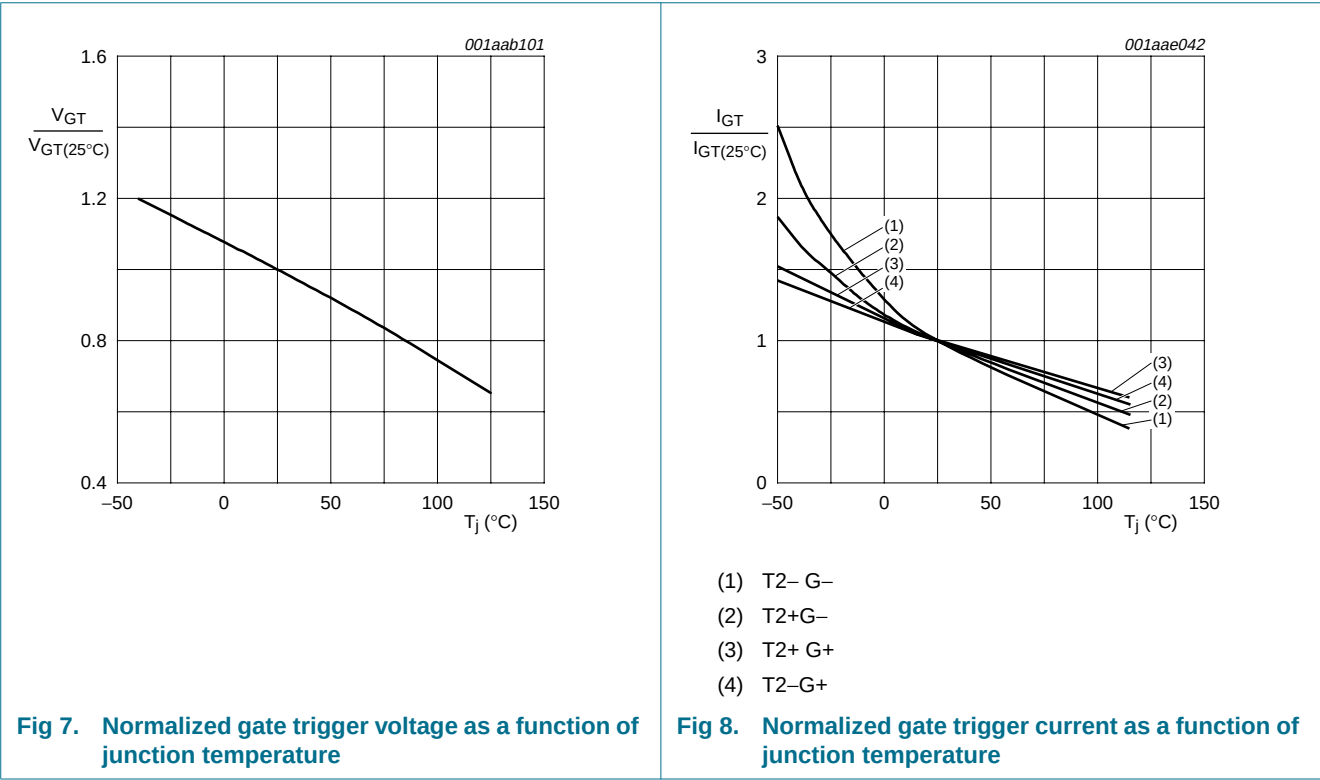
$T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

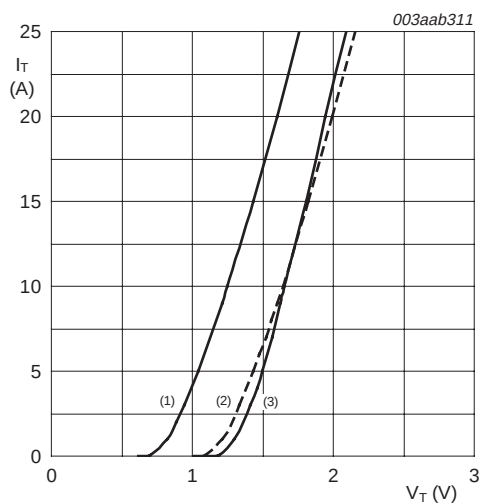
Symbol	Parameter	Conditions	BT236X-600 BT236X-800			BT236X-600F			BT236X-600G BT236X-800G			Unit
			Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{GT}	gate trigger current	$V_D = 12\text{ V};$ $I_T = 0.1\text{ A};$ see Figure 8										
		T2+ G+	-	5	35	-	5	25	-	5	50	mA
		T2+ G-	-	8	35	-	8	25	-	8	50	mA
		T2- G-	-	11	35	-	11	25	-	11	50	mA
		T2- G+	-	30	70	-	30	70	-	30	100	mA
I_L	latching current	$V_D = 12\text{ V};$ $I_{GT} = 0.1\text{ A};$ see Figure 10										
		T2+ G+	-	7	30	-	7	30	-	7	45	mA
		T2+ G-	-	16	45	-	16	45	-	16	60	mA
		T2- G-	-	5	30	-	5	30	-	5	45	mA
		T2- G+	-	7	45		7	45	-	7	60	mA
I_H	holding current	$V_D = 12\text{ V};$ $I_{GT} = 0.1\text{ A};$ see Figure 11	-	5	20	-	5	20	-	5	40	mA
V_T	on-state voltage	$I_T = 10\text{ A};$ see Figure 9	-	1.3	1.65	-	1.3	1.65	-	1.3	1.65	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V};$ $I_T = 0.1\text{ A};$ see Figure 7	-	0.7	1.5	-	0.7	1.5	-	0.7	1.5	V
		$V_D = 400\text{ V};$ $I_T = 0.1\text{ A};$ $T_j = 125\text{ }^{\circ}\text{C}$	0.25	0.4	-	0.25	0.4	-	0.25	0.4	-	V
I_D	off-state current	$V_D = V_{DRM(max)};$ $T_j = 125\text{ }^{\circ}\text{C}$	-	0.1	0.5	-	0.1	0.5	-	0.1	0.5	mA

8. Dynamic characteristics

Table 7: Dynamic characteristics

Symbol	Parameter	Conditions	BT236X-600 BT236X-800			BT236X-600F			BT236X-600G BT236X-800G			Unit
			Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 0.67V_{DRM(max)}$; $T_j = 125\text{ }^{\circ}\text{C}$; exponential waveform; gate open circuit	100	250	-	50	250	-	200	250	-	V/ μs
dV_{com}/dt	rate of change of commutating voltage	$V_{DM} = 400\text{ V}$; $T_j = 95\text{ }^{\circ}\text{C}$; $I_{T(RMS)} = 6\text{ A}$; $dI_{com}/dt = 3.6\text{ A/ms}$; gate open circuit; see Figure 12	-	20	-	-	20	-	10	20	-	V/ μs
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	-	-	2	-	-	2	-	μs





$$V_o = 1.26 \text{ V}$$

$$R_s = 0.0378 \text{ } \Omega$$

- (1) $T_j = 125 \text{ } ^\circ\text{C}$; typical values
- (2) $T_j = 125 \text{ } ^\circ\text{C}$; maximum values
- (3) $T_j = 25 \text{ } ^\circ\text{C}$; maximum values

Fig 9. On-state current as a function of on-state voltage

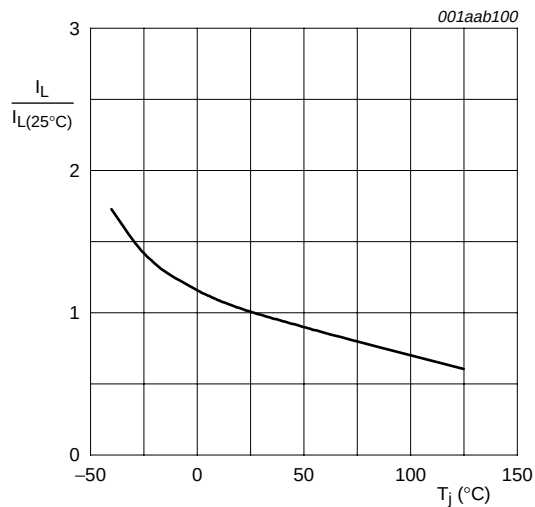


Fig 10. Normalized latching current as a function of junction temperature

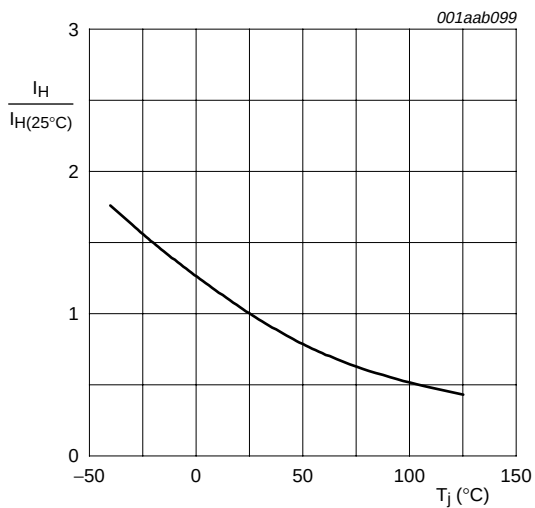
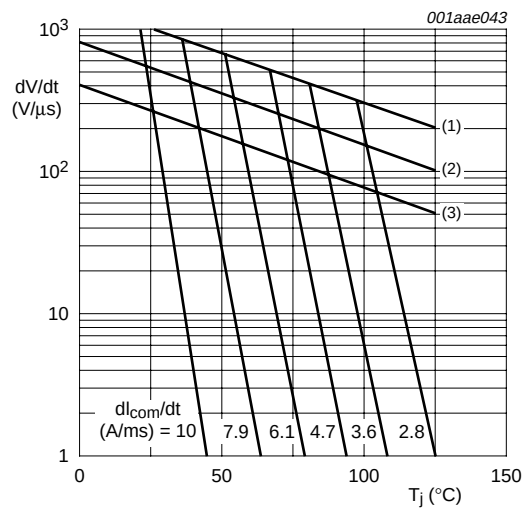


Fig 11. Normalized holding current as a function of junction temperature



The triac should commutate when the dV/dt is below the value on the appropriate curve for pre-commutation dI_T/dt .

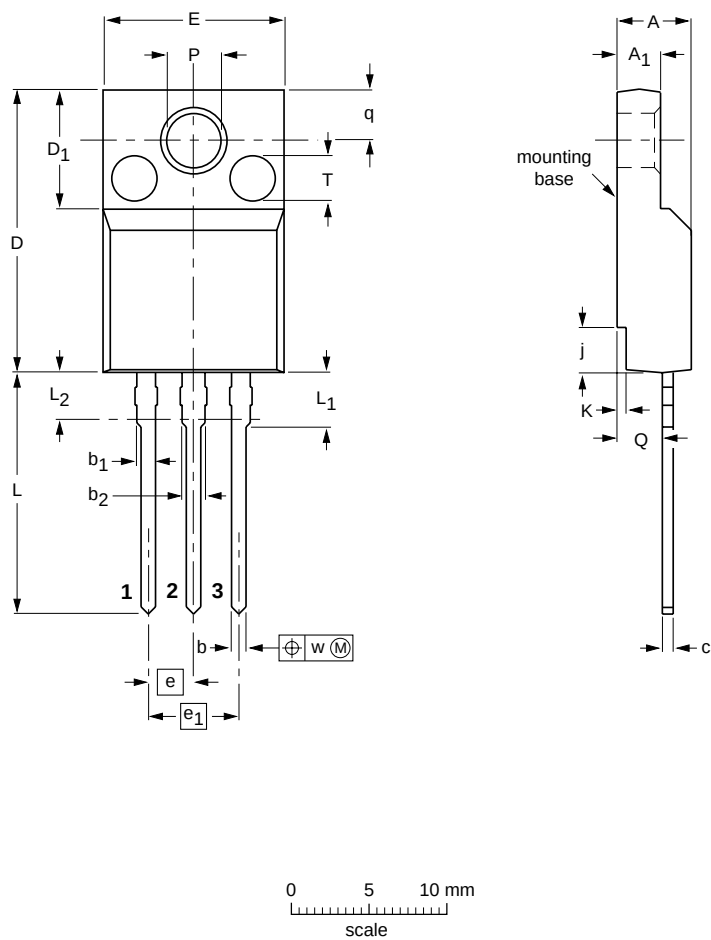
- (1) Off-state dV/dt limit for BT236X-600G_800G
- (2) Off-state dV/dt limit for BT236X-600_800
- (3) Off-state dV/dt limit for BT236X-600F

Fig 12. Typical commutation dV/dt as a function of junction temperature

9. Package outline

Plastic single-ended package; isolated heatsink mounted;
1 mounting hole; 3 lead TO-220 'full pack'

SOT186A



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁	b	b ₁	b ₂	c	D	D ₁	E	e	e ₁	j	K	L	L ₁	L ₂ ⁽¹⁾ max.	P	Q	q	T ⁽²⁾	w
mm	4.6 4.0	2.9 2.5	0.9 0.7	1.1 0.9	1.4 1.0	0.7 0.4	15.8 15.2	6.5 6.3	10.3 9.7	2.54	5.08	2.7 1.7	0.6 0.4	14.4 13.5	3.30 2.79	3	3.2 3.0	2.6 2.3	3.0 2.6	2.5	0.4

Notes

- Terminal dimensions within this zone are uncontrolled.
- Both recesses are $\varnothing 2.5 \times 0.8$ max. depth

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT186A		3-lead TO-220F				02-04-09 06-02-14

Fig 13. Package outline SOT186A (3-lead TO-220F)