



# BTA225-600B

3Q Hi-Com Triac

6 August 2014

Product data sheet

## 1. General description

Planar passivated high commutation three quadrant triac in a SOT78 (TO-220AB) plastic package intended for use in circuits where high static and dynamic  $dV/dt$  and high  $dI/dt$  can occur. This "series B" triac will commute the full rated RMS current at the maximum rated junction temperature without the aid of a snubber.

## 2. Features and benefits

- 3Q technology for improved noise immunity
- High blocking voltage capability
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by  $dV/dt$
- Less sensitive gate for very high noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only

## 3. Applications

- Heating controls
- High power motor control
- High power switching

## 4. Quick reference data

Table 1. Quick reference data

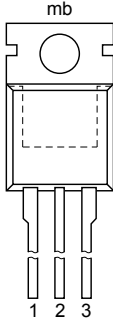

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	-	600	V
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 20\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	-	190	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 91\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	25	A
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G+; $T_j = 25\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 7</a>	2	18	50	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G-; $T_j = 25\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 7</a>	2	21	50	mA



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2- G-; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 7</a>	2	34	50	mA

## 5. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 <p><b>TO-220AB (SOT78)</b></p>	
2	T2	main terminal 2		
3	G	gate		
mb	T2	mounting base; main terminal 2		

## 6. Ordering information

**Table 3. Ordering information**

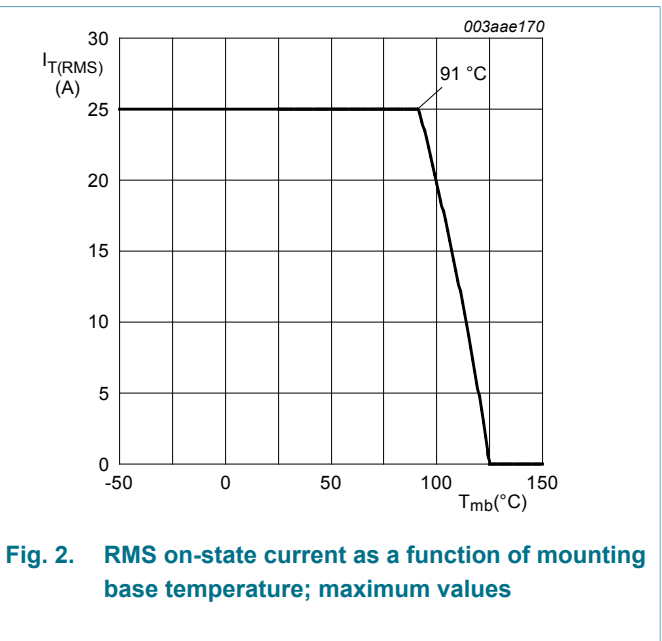
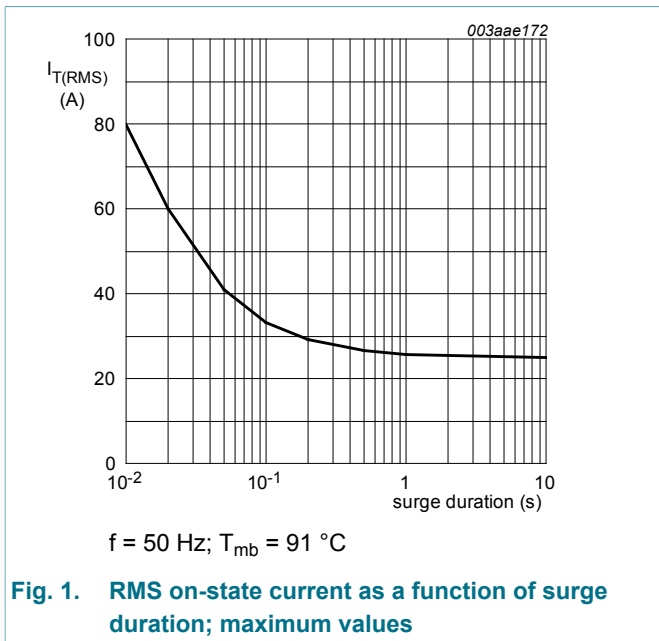
Type number	Package		
	Name	Description	Version
BTA225-600B	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

## 7. Limiting values

**Table 4. 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		-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 91\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	25	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 20\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	190	A
		full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 16.7\text{ ms}$	-	209	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; SIN	-	180	$\text{A}^2\text{s}$
$di_T/dt$	rate of rise of on-state current	$I_T = 30\text{ A}$ ; $I_G = 0.2\text{ A}$ ; $di_G/dt = 0.2\text{ A}/\mu\text{s}$	-	100	$\text{A}/\mu\text{s}$
$I_{GM}$	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	$^{\circ}\text{C}$
$T_j$	junction temperature		-	125	$^{\circ}\text{C}$



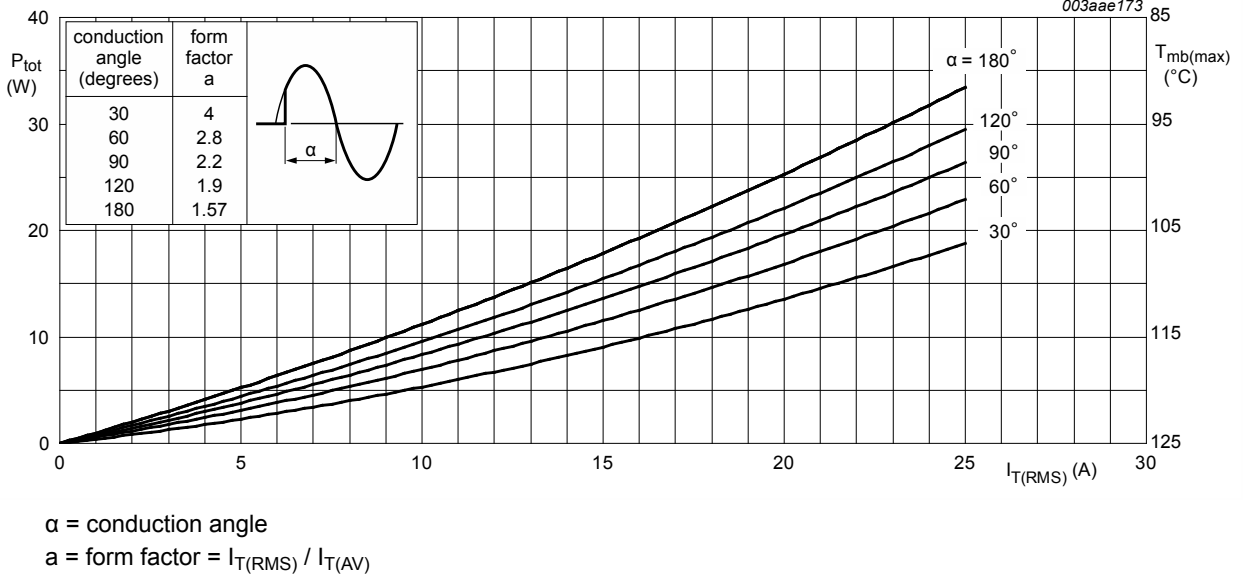


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

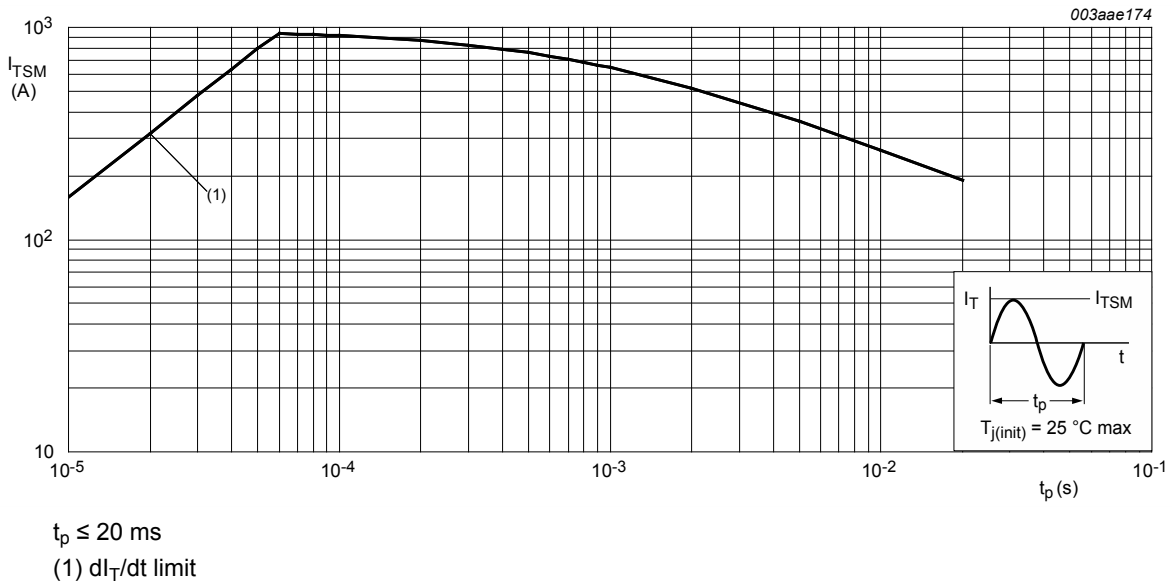
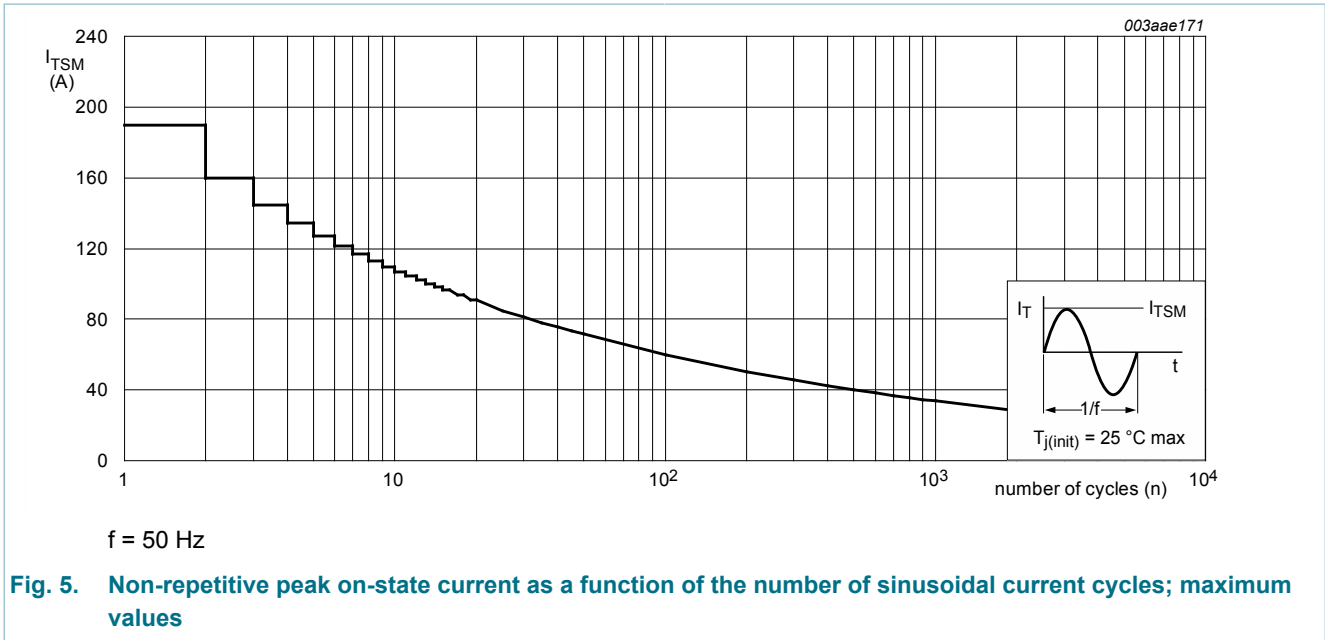


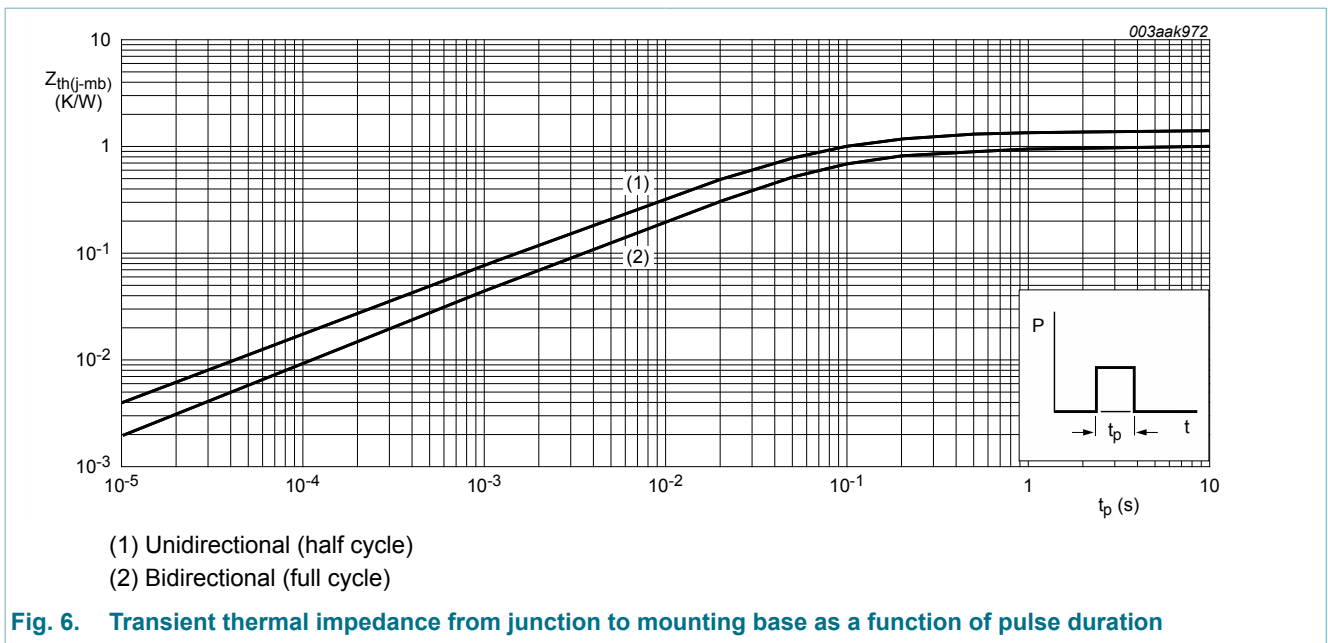
Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values



## 8. Thermal characteristics

Table 5. Thermal characteristics

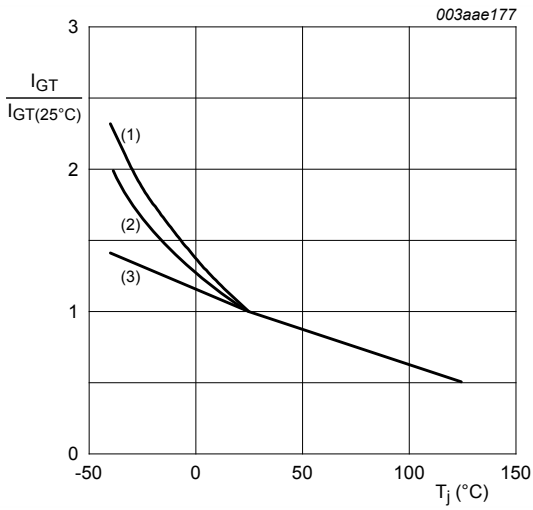
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; <a href="#">Fig. 6</a>	-	-	1	K/W
		half cycle; <a href="#">Fig. 6</a>	-	-	1.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



## 9. Characteristics

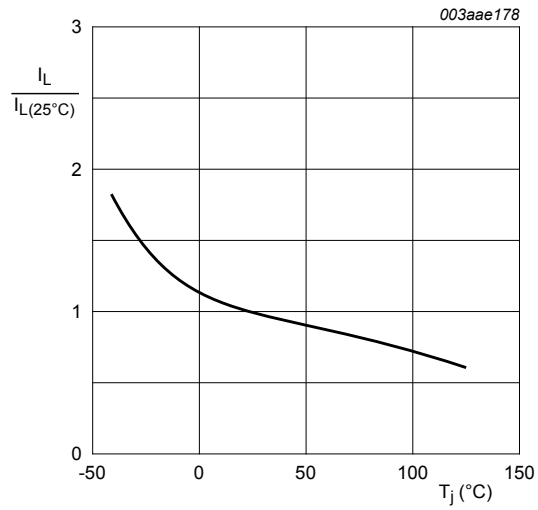
Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
I <sub>GT</sub>	gate trigger current	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2+ G+; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>	2	18	50	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2+ G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>	2	21	50	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2- G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>	2	34	50	mA
I <sub>L</sub>	latching current	V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2+ G+; T <sub>j</sub> = 25 °C; <a href="#">Fig. 8</a>	-	31	60	mA
		V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2+ G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 8</a>	-	34	90	mA
		V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2- G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 8</a>	-	30	60	mA
I <sub>H</sub>	holding current	V <sub>D</sub> = 12 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 9</a>	-	31	60	mA
V <sub>T</sub>	on-state voltage	I <sub>T</sub> = 30 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 10</a>	-	1.3	1.55	V
V <sub>GT</sub>	gate trigger voltage	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 11</a>	-	0.7	1	V
		V <sub>D</sub> = 400 V; I <sub>T</sub> = 0.1 A; T <sub>j</sub> = 125 °C; <a href="#">Fig. 11</a>	0.25	0.4	-	V
I <sub>D</sub>	off-state current	V <sub>D</sub> = 600 V; T <sub>j</sub> = 125 °C	-	0.1	0.5	mA
<b>Dynamic characteristics</b>						
dV <sub>D</sub> /dt	rate of rise of off-state voltage	V <sub>DM</sub> = 402 V; T <sub>j</sub> = 125 °C; (V <sub>DM</sub> = 67% of V <sub>DRM</sub> ); exponential waveform; gate open circuit	1000	4000	-	V/μs
di <sub>com</sub> /dt	rate of change of commutating current	V <sub>D</sub> = 400 V; T <sub>j</sub> = 125 °C; I <sub>T(RMS)</sub> = 25 A; dV <sub>com</sub> /dt = 20 V/μs; (without snubber condition); gate open circuit; <a href="#">Fig. 12</a>	-	44	-	A/ms

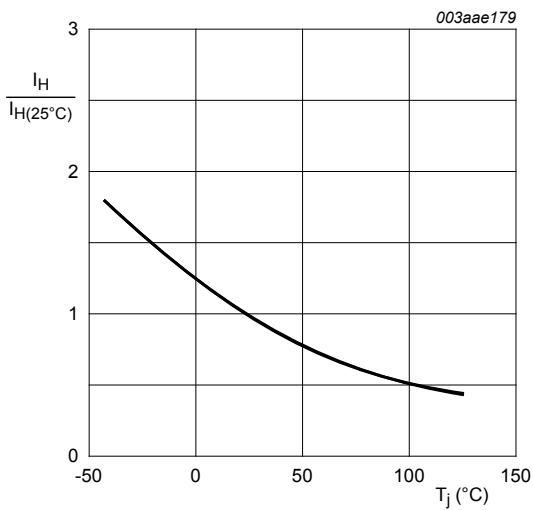


- (1) T2- G-
- (2) T2+ G-
- (3) T2+ G+

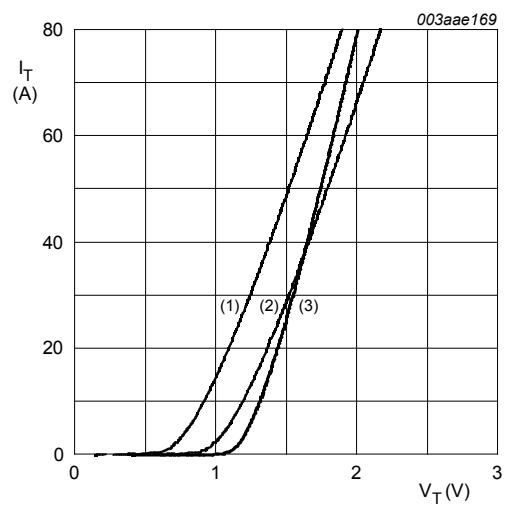
**Fig. 7. Normalized gate trigger current as a function of junction temperature**



**Fig. 8. Normalized holding current as a function of junction temperature**



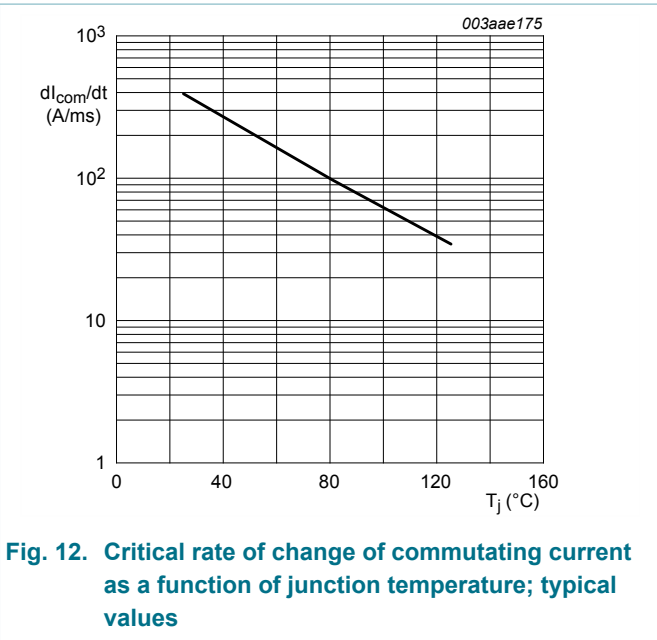
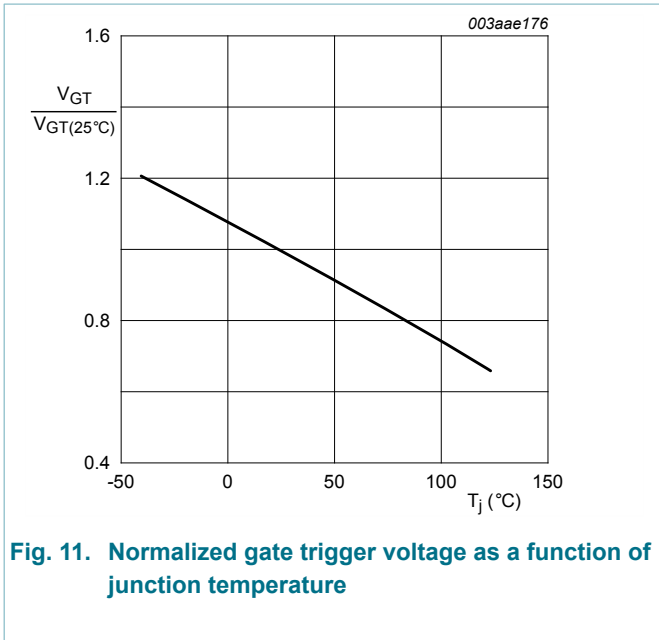
**Fig. 9. Normalized latching current as a function of junction temperature**



- $V_o = 1.073 \text{ V}; R_s = 0.015 \Omega$
- (1)  $T_j = 125^{\circ}\text{C}$ ; typical values
  - (2)  $T_j = 125^{\circ}\text{C}$ ; maximum values
  - (3)  $T_j = 25^{\circ}\text{C}$ ; maximum values

**Fig. 10. On-state current as a function of on-state voltage**

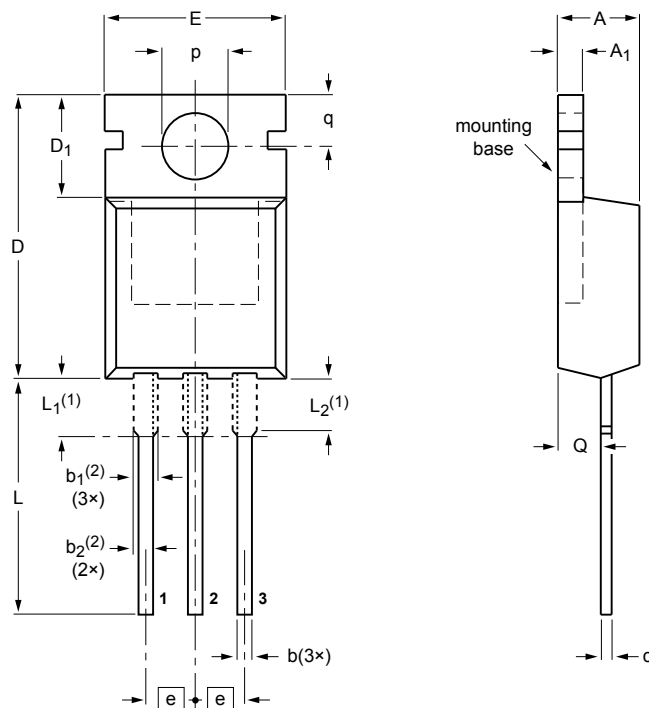




### 10. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78



**DIMENSIONS** (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b	b <sub>1</sub> (2)	b <sub>2</sub> (2)	c	D	D <sub>1</sub>	E	e	L	L <sub>1</sub> (1)	L <sub>2</sub> (1) max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

**Notes**

- Lead shoulder designs may vary.
- Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT78		3-lead TO-220AB	SC-46		08-04-23 08-06-13

Fig. 13. Package outline TO-220AB (SOT78)

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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