

# BTA225-600BT

Three quadrant triacs high commutation

Rev. 01 — 3 March 2005

Product data sheet

## 1. Product profile

### 1.1 General description

Passivated high commutation 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. These devices will commute the full rated RMS current at the maximum rated junction temperature, without the aid of a snubber.

### 1.2 Features

- High maximum junction temperature
- High commutation capability

### 1.3 Applications

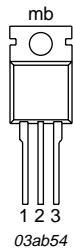
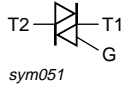
- Motor control
- Industrial and domestic heating

### 1.4 Quick reference data

- $V_{DRM} \leq 600$  V
- $I_{T(RMS)} \leq 25$  A
- $I_{TSM} \leq 200$  A
- $I_{GT} \leq 50$  mA (T2+ G+; T2+ G-; T2- G-)

## 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, connected to main terminal 2 (T2)		

SOT78 (TO-220AB)

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### 3. Ordering information

**Table 2: Ordering information**

Type number	Package		Version
	Name	Description	
BTA225-600BT	SC-46	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

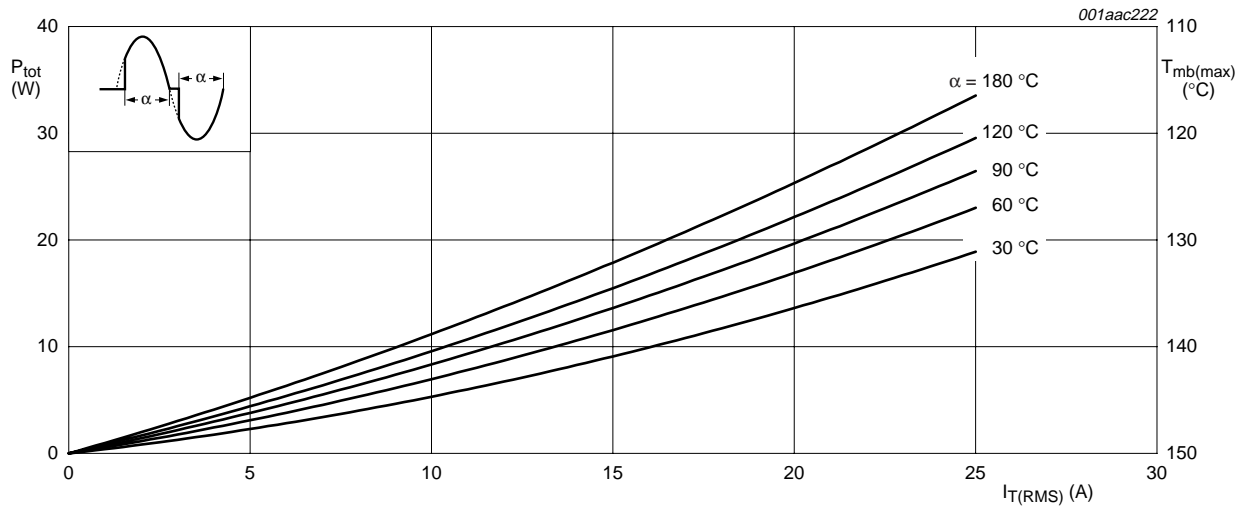
### 4. Limiting values

**Table 3: Limiting values**

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

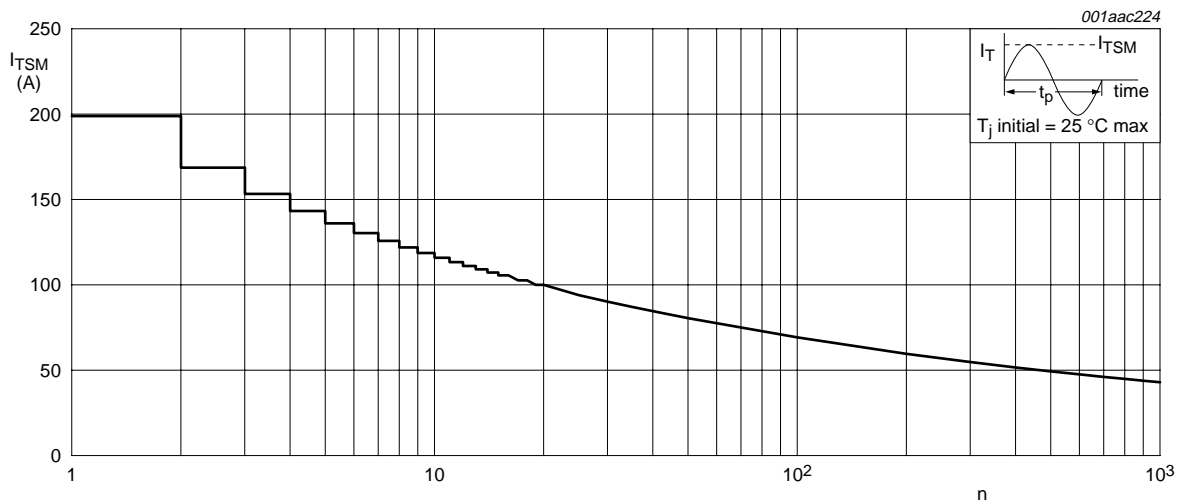
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		[1] -	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 116\text{ °C}$ ; see <a href="#">Figure 4</a> and <a href="#">5</a>	-	25	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_j = 25\text{ °C}$ prior to surge; see <a href="#">Figure 2</a> and <a href="#">3</a>			
		$t_p = 20\text{ ms}$	-	200	A
		$t_p = 16.7\text{ ms}$	-	220	A
$I^2t$	$I^2t$ for fusing	$t = 10\text{ ms}$	-	200	$A^2s$
$di_T/dt$	repetitive rate of rise of on-state current after triggering	$I_{TM} = 30\text{ A}$ ; $I_G = 0.2\text{ A}$ ; $di_G/dt = 0.2\text{ A}/\mu s$	-	100	$A/\mu s$
$I_{GM}$	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
$T_j$	junction temperature		-	150	°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 15 A/ $\mu s$ .



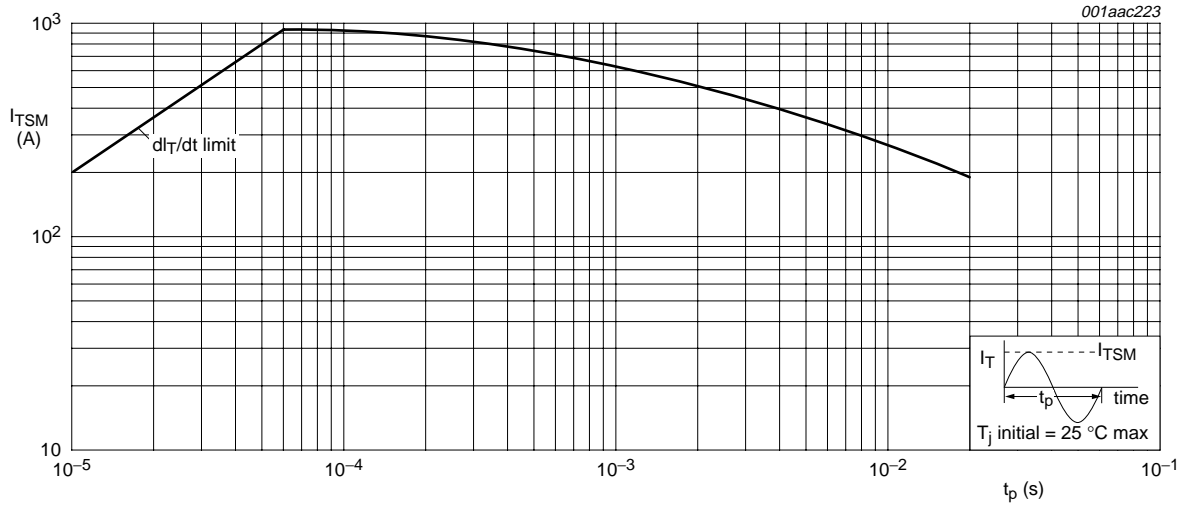
$\alpha$  = conduction angle

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



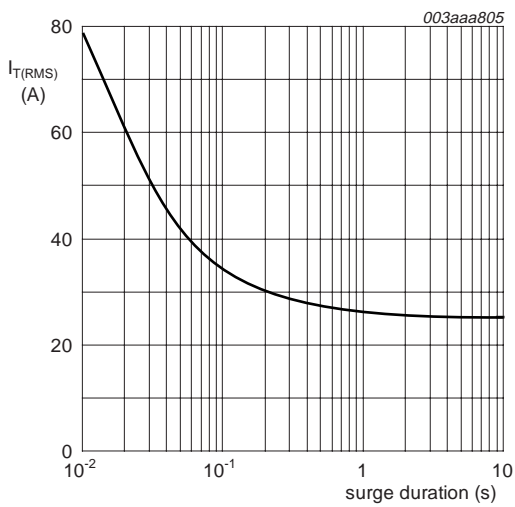
$f = 50$  Hz

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



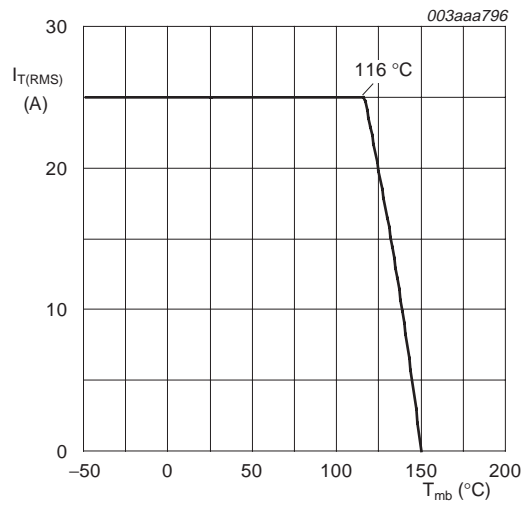
$t_p \leq 20 \text{ ms}$

**Fig 3. Non-repetitive peak on-state current as a function of pulse width ( $t_p$ ) for sinusoidal currents; maximum values**



$f = 50 \text{ Hz}; T_{mb} \leq 116 \text{ °C}$

**Fig 4. RMS on-state current as a function of surge duration for sinusoidal currents**

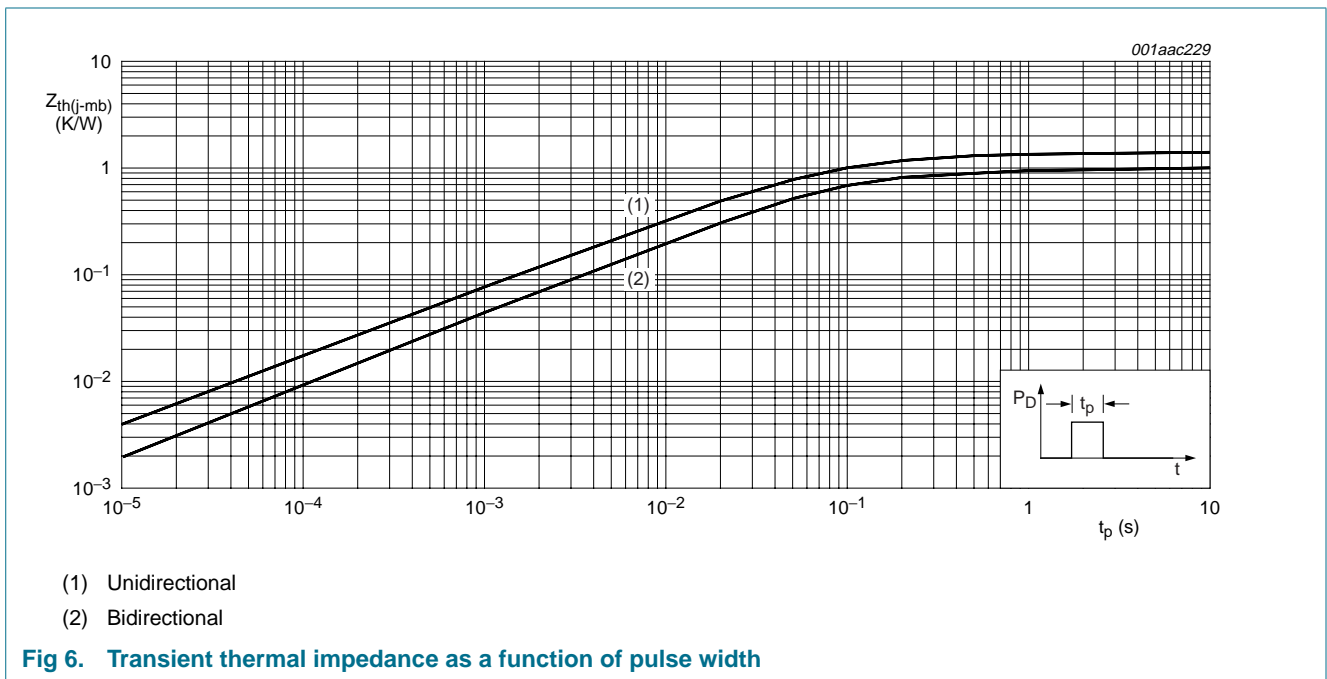


**Fig 5. RMS on-state current as a function of mounting base temperature; maximum values**

**5. Thermal characteristics**

**Table 4: Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle	-	-	1.0	K/W
		half cycle	-	-	1.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



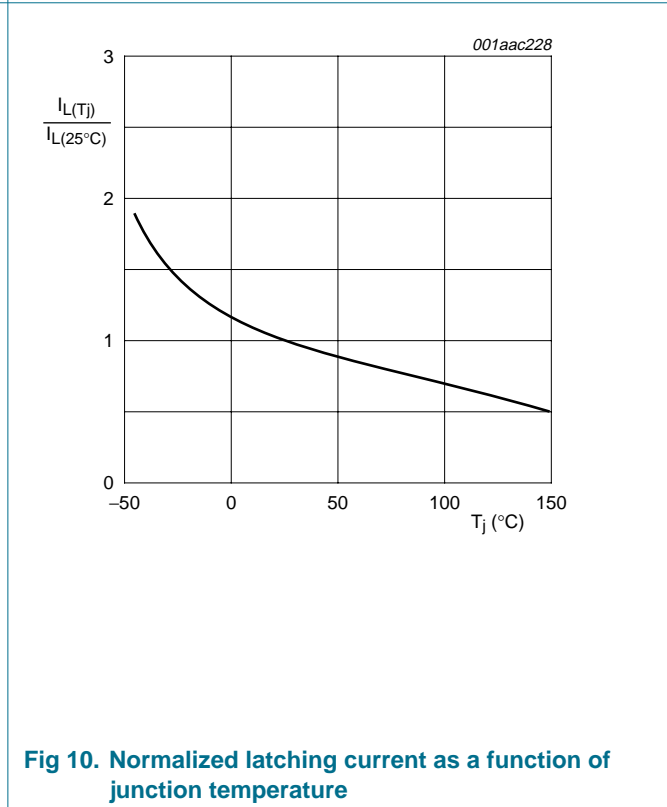
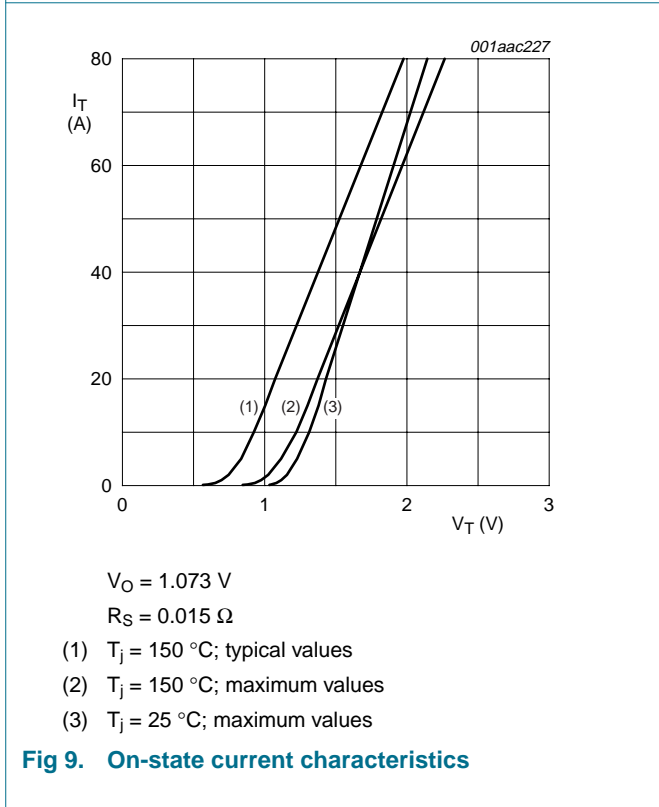
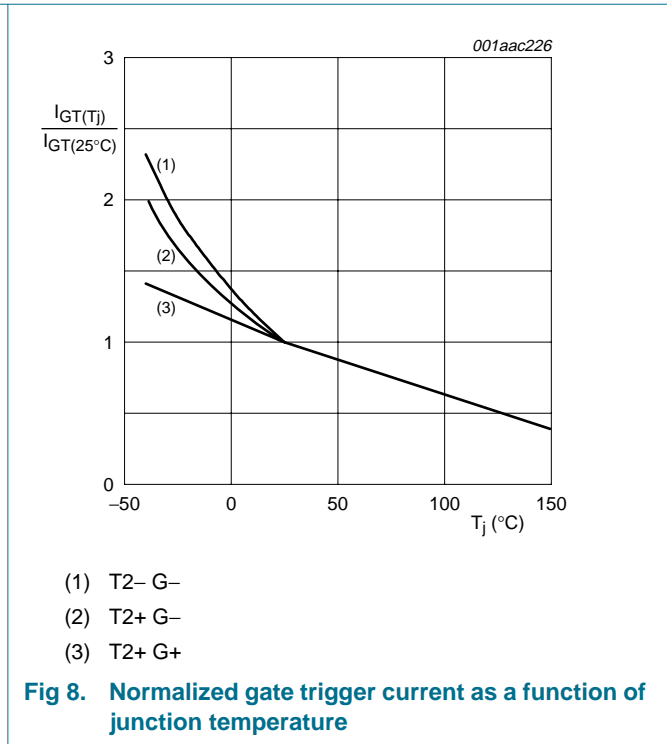
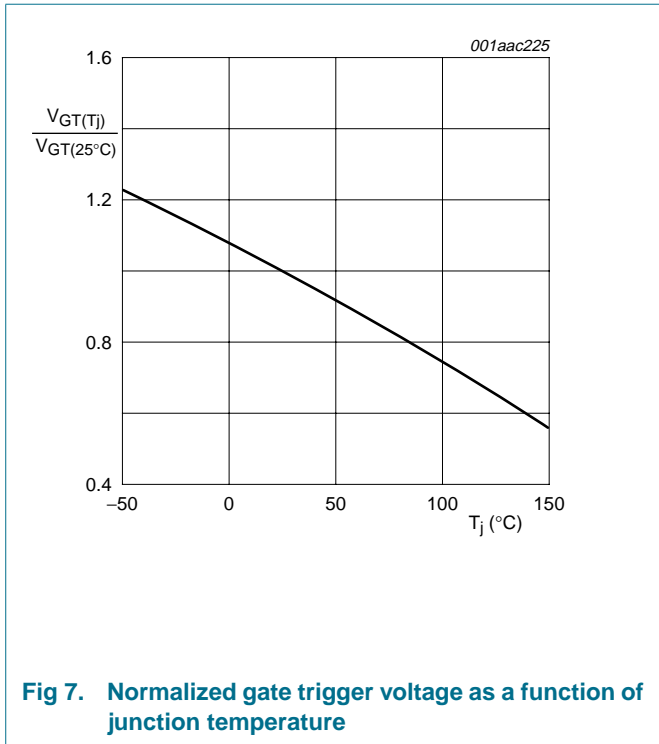
## 6. Characteristics

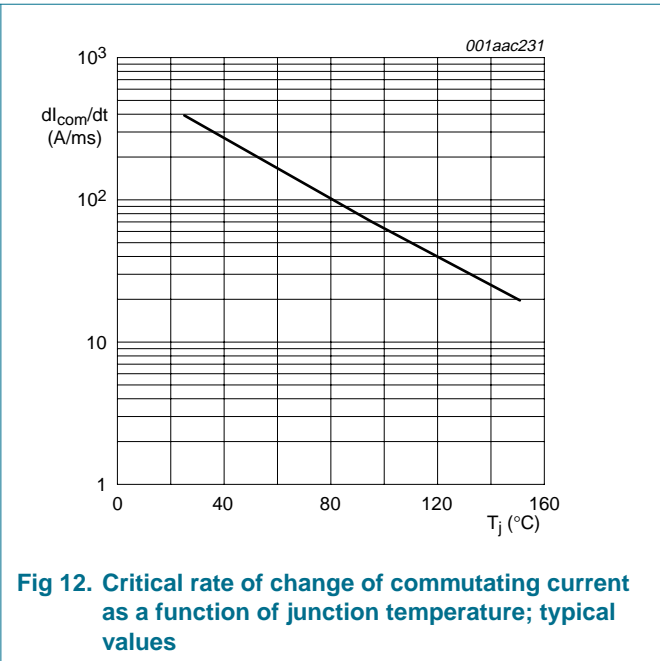
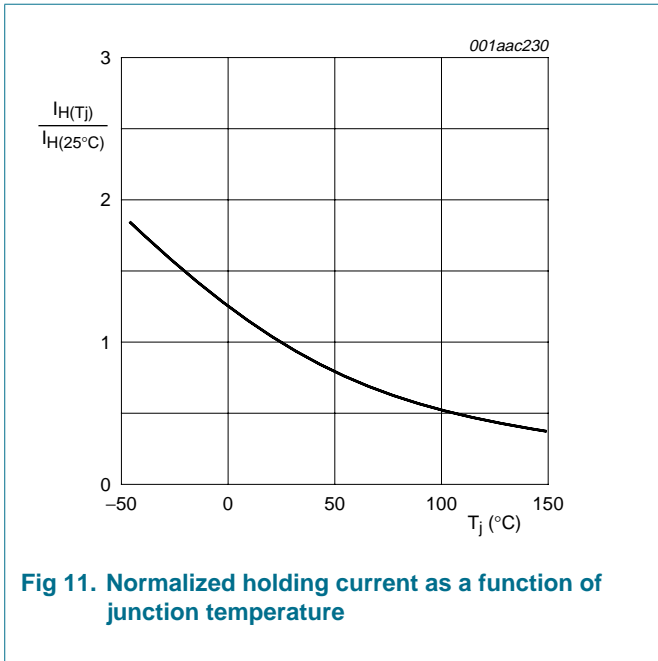
**Table 5: Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A};$ see <a href="#">Figure 8</a>	[1]			
		T2+ G+	2	18	50	mA
		T2+ G-	2	21	50	mA
		T2- G-	2	34	50	mA
$I_L$	latching current	$V_D = 12\text{ V}; I_{GT} = 0.1\text{ A};$ see <a href="#">Figure 10</a>				
		T2+ G+	-	31	60	mA
		T2+ G-	-	34	90	mA
		T2- G-	-	30	60	mA
$I_H$	holding current	$V_D = 12\text{ V}; I_{GT} = 0.1\text{ A};$ see <a href="#">Figure 11</a>	-	31	60	mA
$V_T$	on-state voltage	$I_T = 30\text{ A};$ see <a href="#">Figure 9</a>	-	1.3	1.55	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}; I_T = 0.1\text{ A};$ see <a href="#">Figure 7</a>	-	0.7	1.5	V
		$V_D = 400\text{ V}; I_T = 0.1\text{ A};$ $T_j = 150\text{ °C}$	0.25	0.4	-	V
$I_D$	off-state leakage current	$V_D = V_{DRM(max)}; T_j = 150\text{ °C}$	-	1	5	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	critical rate of rise of off-state voltage	$V_{DM} = 67\% V_{DRM(max)};$ $T_j = 150\text{ °C};$ exponential waveform; gate open circuit	1000	4000	-	V/ $\mu$ s
$dI_{com}/dt$	critical rate of change of commutating current	$V_{DM} = 400\text{ V}; T_j = 150\text{ °C};$ $I_{T(RMS)} = 25\text{ A};$ without snubber; gate open circuit; see <a href="#">Figure 12</a>	9	20	-	A/ms
$t_{gt}$	gate controlled turn-on time	$I_{TM} = 30\text{ A}; V_D = V_{DRM(max)};$ $I_G = 0.1\text{ A}; dI_G/dt = 5\text{ A}/\mu\text{s}$	-	2	-	$\mu$ s

[1] Device does not trigger in the T2-, G+ quadrant.





## 7. Package information

Refer to mounting instructions for SOT78 (TO-220AB) package.

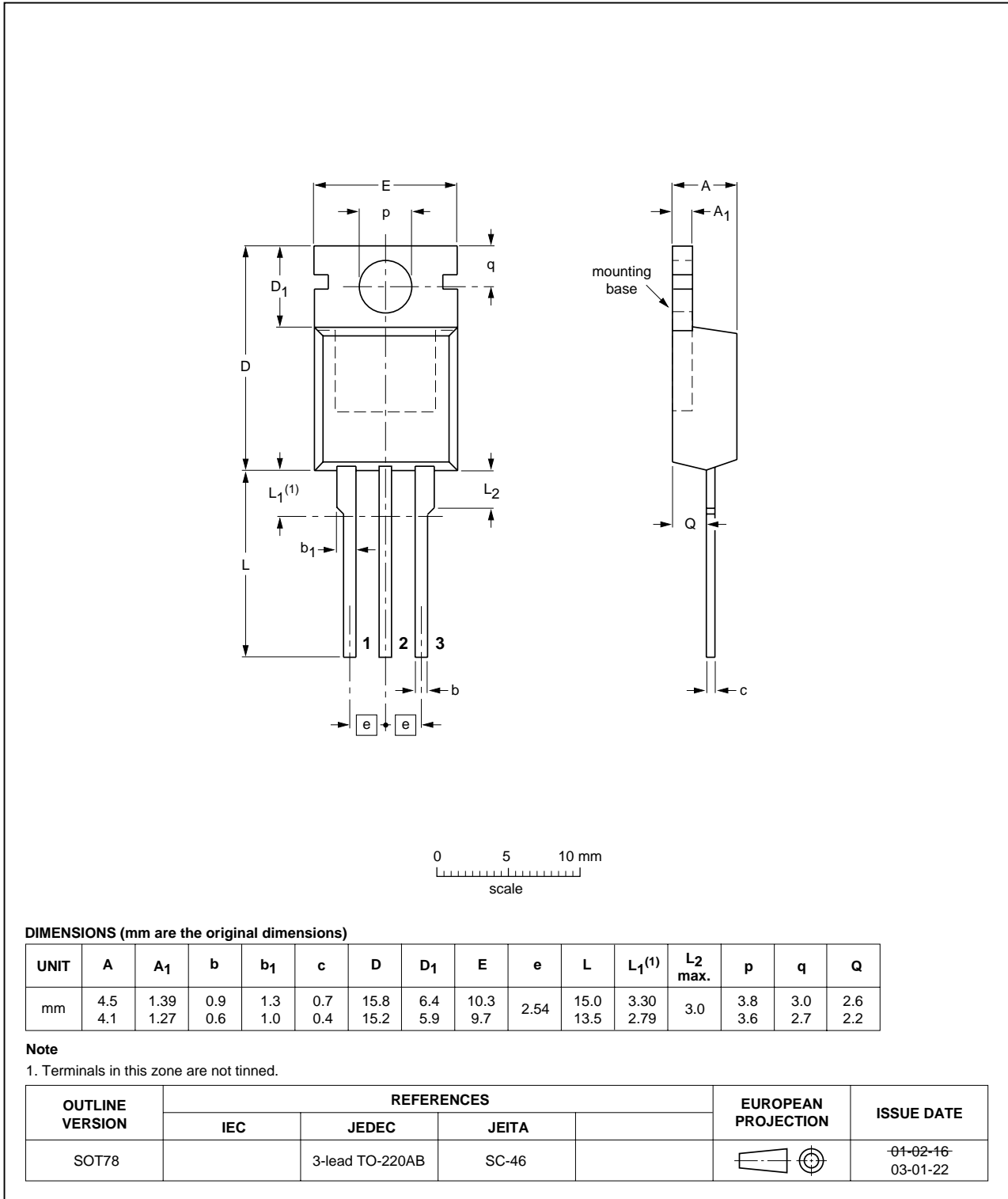
Epoxy meets requirements of UL94 V-0 at  $\frac{1}{8}$  inch.



**8. Package outline**

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

SOT78



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

## 9. Revision history

Table 6: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
BTA225-600BT_1	20050303	Product data sheet	-	9397 750 14379	-

## 10. Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup> <sup>[3]</sup>	Definition
I	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.
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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