

BTA216-600BT

Triacs high commutation

Rev. 01 — 25 August 2005

Product data sheet

1. Product profile

1.1 General description

Passivated high commutation triac in a plastic envelope. Featuring high maximum junction temperature and high commutation capability. Intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This device will commute the full rated RMS current at the maximum rated junction temperature, without the aid of a snubber.

1.2 Features

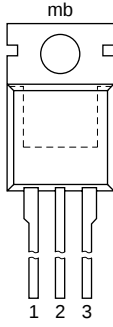
- High maximum junction temperature
- High commutation capability

1.3 Quick reference data

- $V_{DRM} \leq 600 \text{ V}$
- $I_{GT} \leq 50 \text{ mA}$
- $T_j \leq 150 \text{ }^{\circ}\text{C}$
- $I_{T(RMS)} \leq 16 \text{ A}$
- $I_{TSM} \leq 140 \text{ A}$
- $dI_{com}/dt = 18 \text{ A/ms}$

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		

[1] Connected to main terminal 2 (T2)

SOT78 (TO-220AB)

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3. Ordering information

Table 2: Ordering information

Type number	Package		
	Name	Description	Version
BTA216-600BT	TO-220AB	plastic single-ended package; heatsink mounted; 3 leads; 1 mounting hole	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
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 124\text{ }^{\circ}\text{C}$; see Figure 4 and 5	-	16	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{\text{J}} = 25\text{ }^{\circ}\text{C}$ prior to surge; see Figure 2 and 3			
		$t = 20\text{ ms}$	-	140	A
		$t = 16.7\text{ ms}$	-	150	A
I^2t	I^2t for fusing	$t = 10\text{ ms}$	-	98	A^2s
di_{T}/dt	rate of rise of on-state current	$I_{\text{TM}} = 20\text{ A}$; $I_{\text{G}} = 0.2\text{ A}$; $dI_{\text{G}}/dt = 0.2\text{ A}/\mu\text{s}$	-	100	$\text{A}/\mu\text{s}$
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	$^{\circ}\text{C}$
T_{J}	junction temperature		-	150	$^{\circ}\text{C}$

[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/ μs .

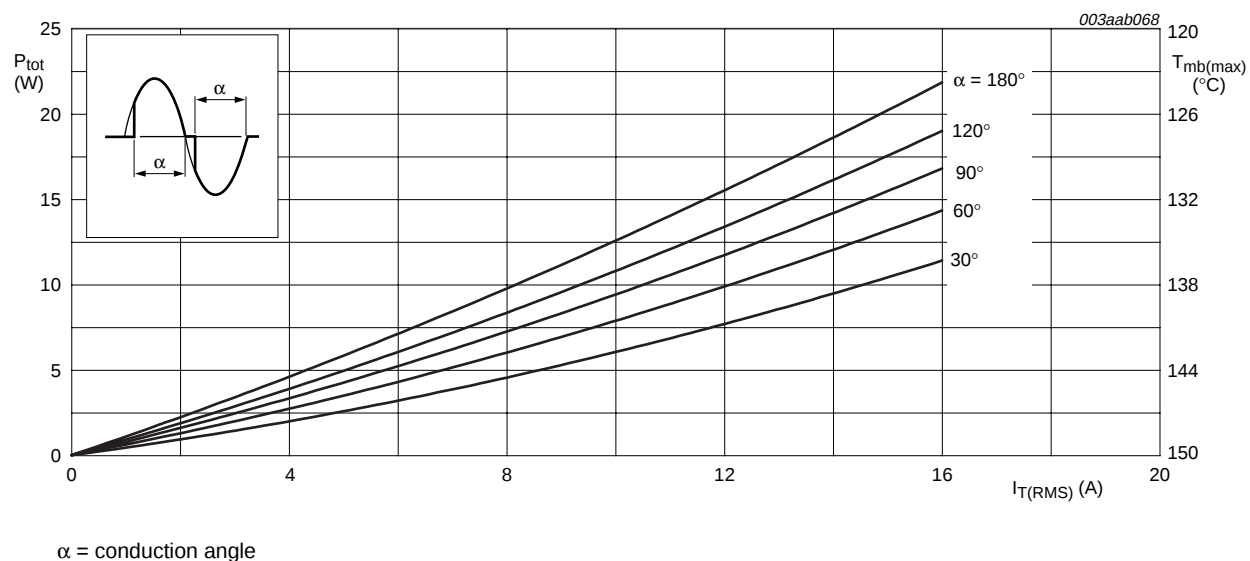


Fig 1. On-state power dissipation as a function of RMS on-state current; maximum values

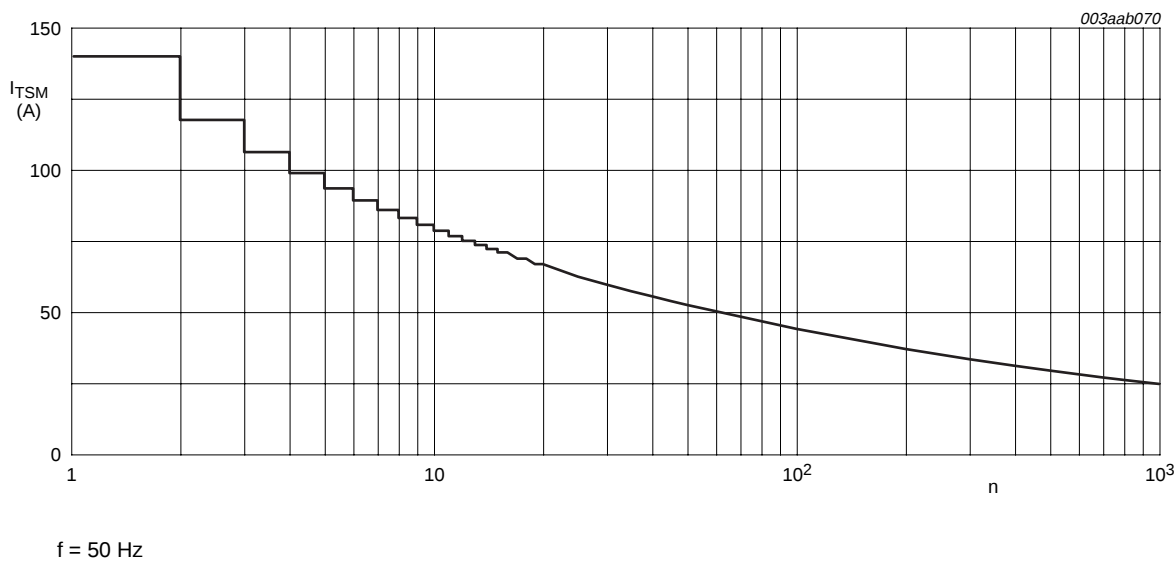


Fig 2. Non-repetitive peak on-state current as a function of number of half cycles; sinusoidal currents; maximum values

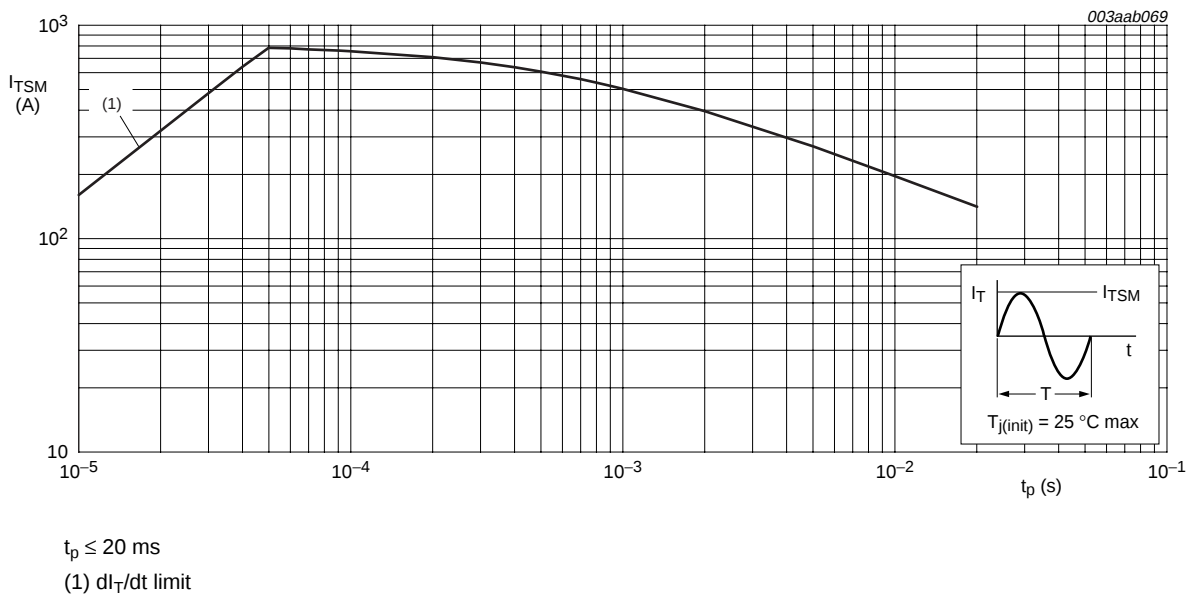


Fig 3. Non-repetitive peak on-state current as a function of pulse width; sinusoidal currents; maximum values

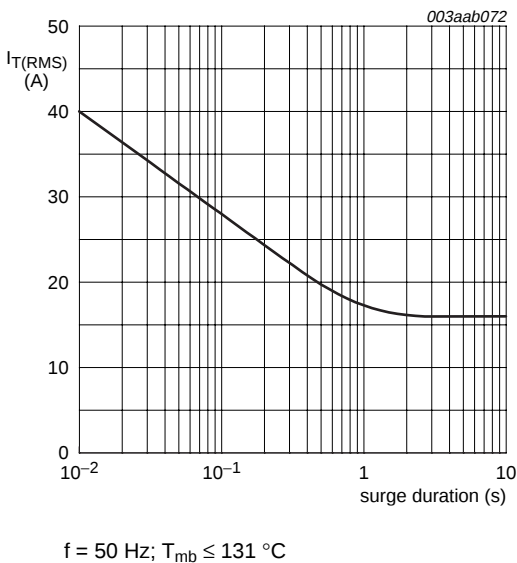


Fig 4. RMS on-state current as a function of surge duration; sinusoidal currents; maximum values

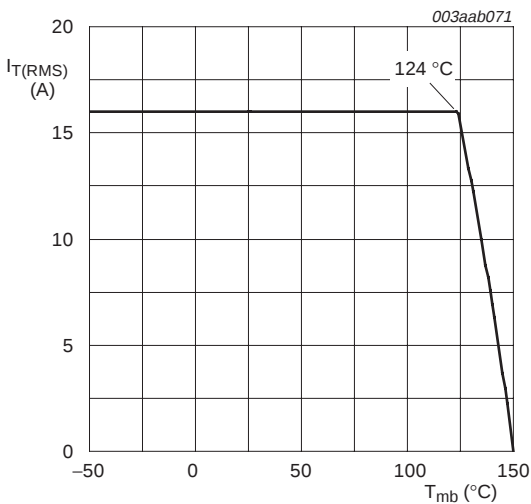
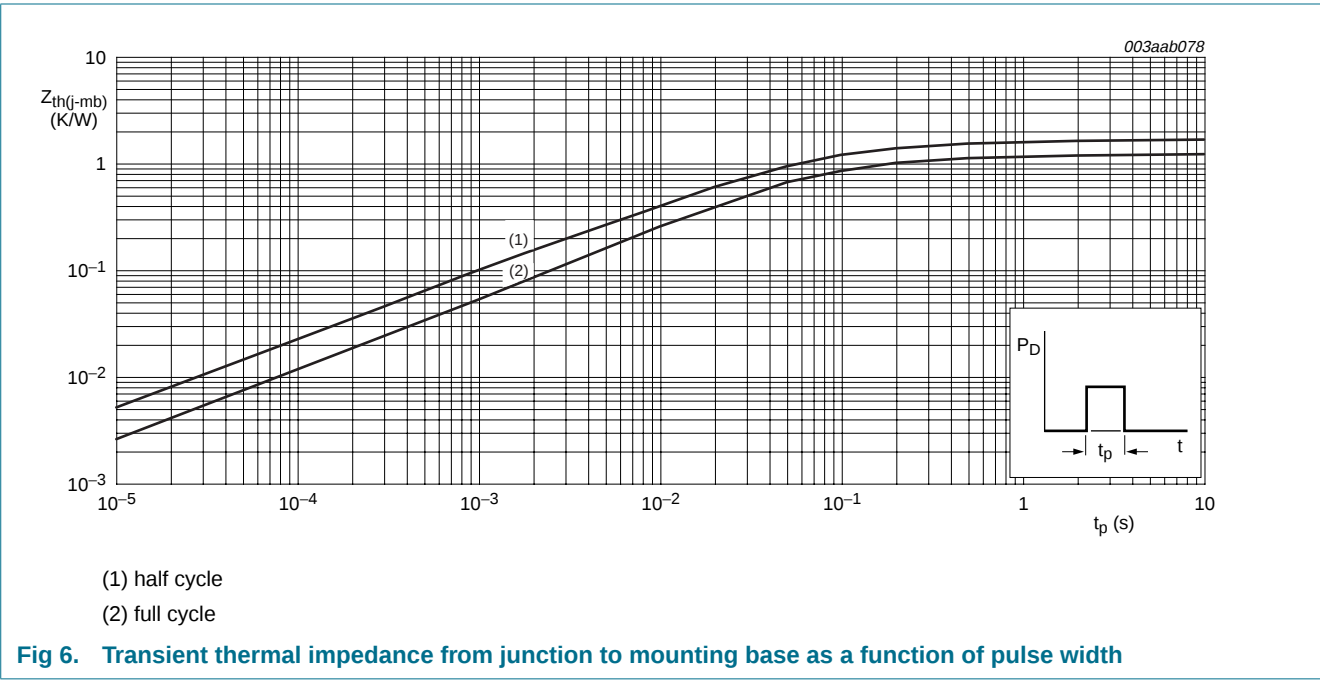


Fig 5. RMS on-state current as a function of mounting base temperature; maximum values

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; see Figure 6	-	-	1.2	K/W
		half cycle; see Figure 6	-	-	1.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



6. Static characteristics

Table 5: Static characteristics

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

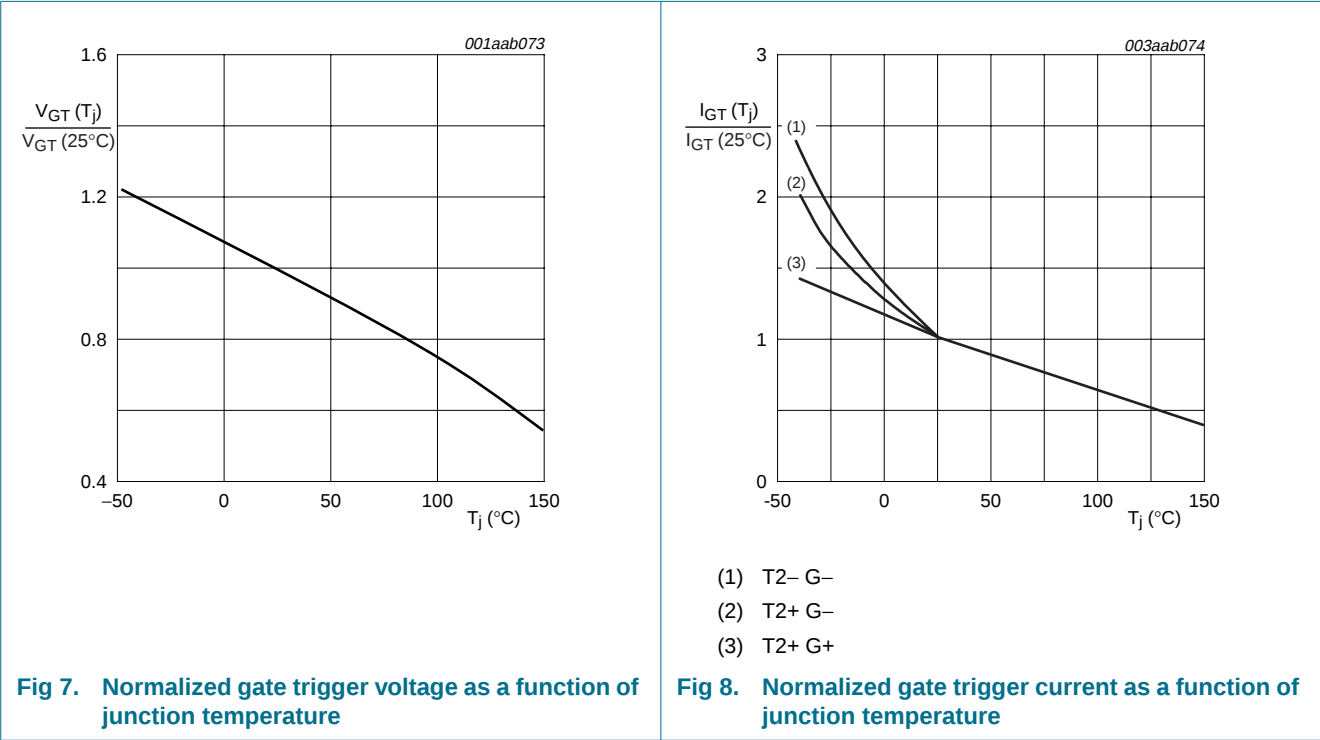
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; see Figure 8	[1]			
		T2+ G+	2	18	50	mA
		T2+ G–	2	21	50	mA
		T2– G–	2	34	50	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_{GT} = 0.1\text{ A}$; see Figure 10				
		T2+ G+	-	31	60	mA
		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 Figure 11	-	31	60	mA
V_T	on-state voltage	$I_T = 20\text{ A}$; see Figure 9	-	1.2	1.5	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; see Figure 7	-	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 current	$V_D = V_{DRM(max)}$; $T_j = 150\text{ °C}$	-	0.5	3	mA

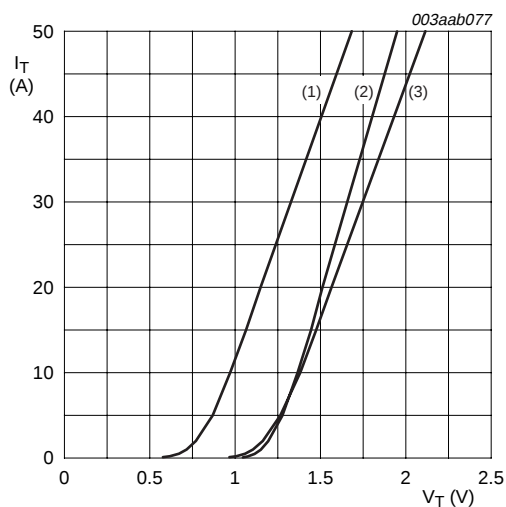
[1] Device does not trigger in the T2– G+ quadrant.

7. Dynamic characteristics

Table 6: Dynamic characteristics
T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
dV _D /dt	rate of rise of off-state voltage	V _{DM} = 0.67V _{DRM(max)} ; T _j = 150 °C; exponential waveform; gate open circuit	500	1500	-	V/μs
di _{com} /dt	rate of change of commutating current	V _{DM} = 400 V; T _j = 150 °C; I _{T(RMS)} = 16 A; without snubber; gate open circuit; see Figure 12	9	18	-	A/ms
t _{gt}	gate-controlled turn-on time	I _{TM} = 20 A; V _D = V _{DRM(max)} ; I _G = 0.1 A; di _G /dt = 5 A/μs	-	2	-	μs





$V_O = 1.195\text{ V}$; $R_S = 18\text{ m}\Omega$

(1) $T_j = 150\text{ }^{\circ}\text{C}$; typical values

(2) $T_j = 25\text{ }^{\circ}\text{C}$; maximum values

(3) $T_j = 150\text{ }^{\circ}\text{C}$; maximum values

Fig 9. On-state characteristic

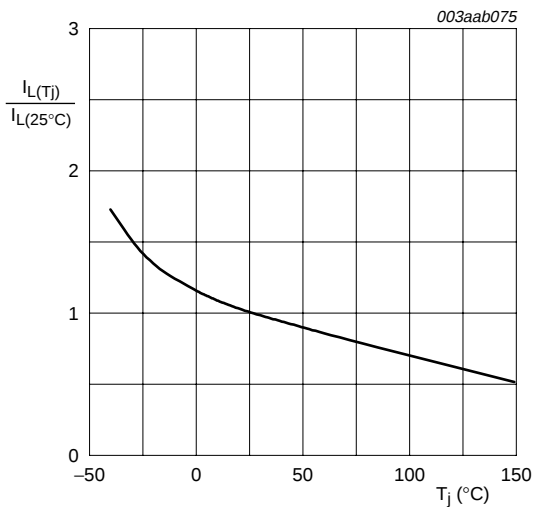


Fig 10. Normalized latching current as a function of junction temperature

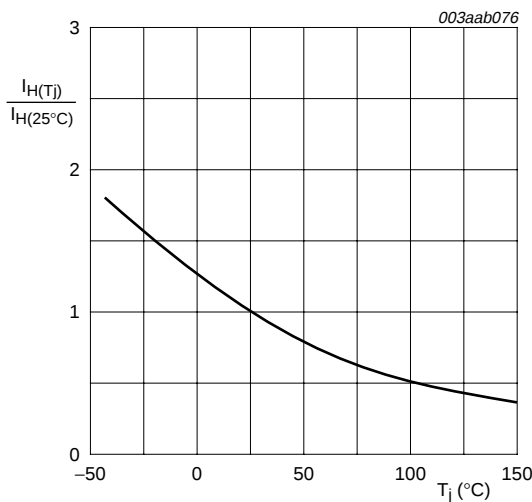


Fig 11. Normalized holding current as a function of junction temperature

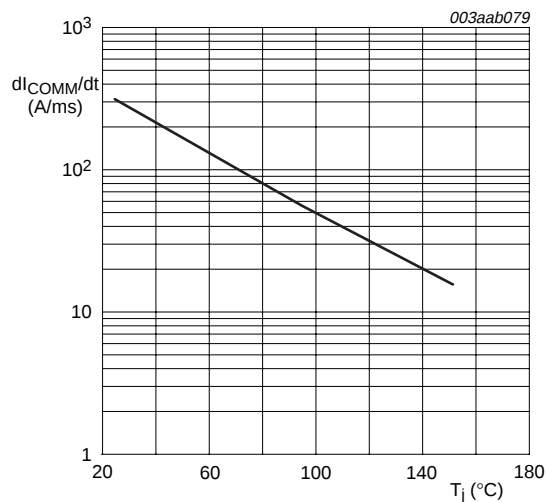


Fig 12. Rate of change of commutating current as a function of junction temperature; typical values

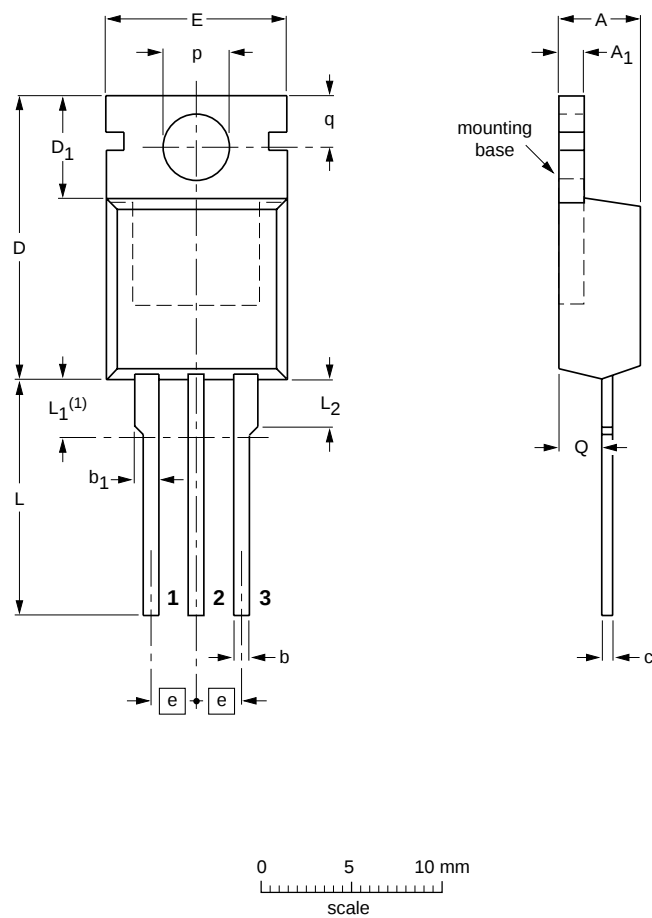
8. Package information

Plastic meets UL94 V-0 at 1/8 inch.

9. 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 ₁	b	b ₁	c	D	D ₁	E	e	L	L ₁	L ₂ max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.45 1.00	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

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT78		3-lead TO-220AB	SC-46			05-01-31 05-03-22

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



10. Revision history

Table 7: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
BTA216-600BT_1	20050825	Product data sheet	-	-	-

11. Data sheet status

Level	Data sheet status ^[1]	Product status ^{[2] [3]}	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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Date of release: 25 August 2005
Document number: BTA216-600BT_1

Published in The Netherlands