

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 BT" triac will commute the full RMS current at the maximum rated junction temperature without the aid of a snubber where higher junction operating temperature capability is required.

2. Features and benefits

- 3Q technology for improved noise immunity
- High blocking voltage capability
- High commutation capability with maximum false trigger immunity
- Higher operating temperature capability
- 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

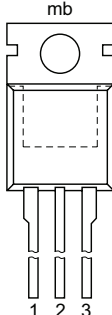
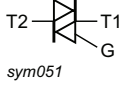
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage			-	-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 116\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3		-	-	25	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5		-	-	230	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$		-	-	253	A
T_j	junction temperature			-	-	150	°C
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ °C}$; Fig. 7		2	-	50	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; Fig. 7		2	-	50	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; Fig. 7		2	-	50	mA

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_H	holding current	$V_D = 12\text{ V}$; $T_J = 25\text{ °C}$; Fig. 9		-	-	60	mA
V_T	on-state voltage	$I_T = 30\text{ A}$; $T_J = 25\text{ °C}$; Fig. 10		-	1.3	1.55	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_J = 150\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		-	2300	-	V/ μ s
		$V_{DM} = 536\text{ V}$; $T_J = 125\text{ °C}$; exponential waveform; gate open circuit		1000	4000	-	V/ μ s
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_J = 150\text{ °C}$; $I_{T(RMS)} = 25\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; gate open circuit		-	19	-	A/ms
		$V_D = 400\text{ V}$; $T_J = 125\text{ °C}$; $I_{T(RMS)} = 25\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; gate open circuit		-	44	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1		
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	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BTA325-800BT	TO220	BTA325-800BTQ	Tube	50	SOT78	13-Jun-2008

7. Marking

Table 4. Marking codes

Type number	Marking codes	
	Assembly factory: d	Assembly factory: A
BTA325-800BT	BTA325 800BT PJdxxxx xx	BTA325 800BT PJAxxxx xx

8. Limiting values

Table 5. 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			-	800	V
V_{RRM}	repetitive peak reverse voltage			-	800	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 116^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3		-	25	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{\text{j(init)}} = 25^\circ\text{C}$; $t_{\text{p}} = 20\text{ ms}$; Fig 4 ; Fig 5		-	230	A
		full sine wave; $T_{\text{j(init)}} = 25^\circ\text{C}$; $t_{\text{p}} = 16.7\text{ ms}$		-	253	A
I^2t	I^2t for fusing	$t_{\text{p}} = 10\text{ ms}$; SIN		-	264.5	A^2s
di_{T}/dt	rate of rise of on-state current	$I_{\text{G}} = 100\text{ mA}$		-	100	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current			-	2	A
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	$^\circ\text{C}$

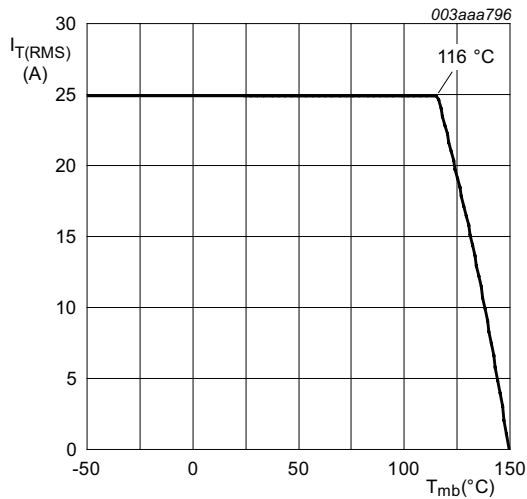
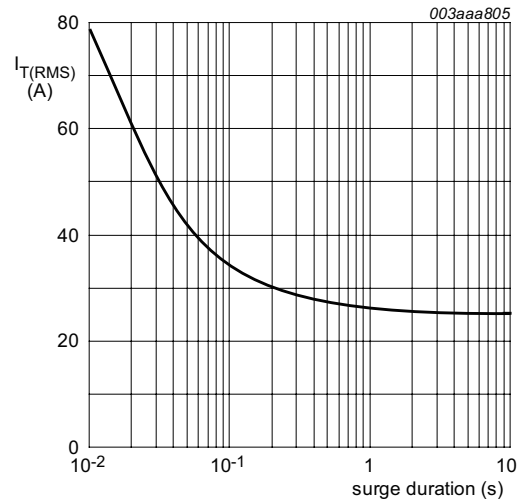
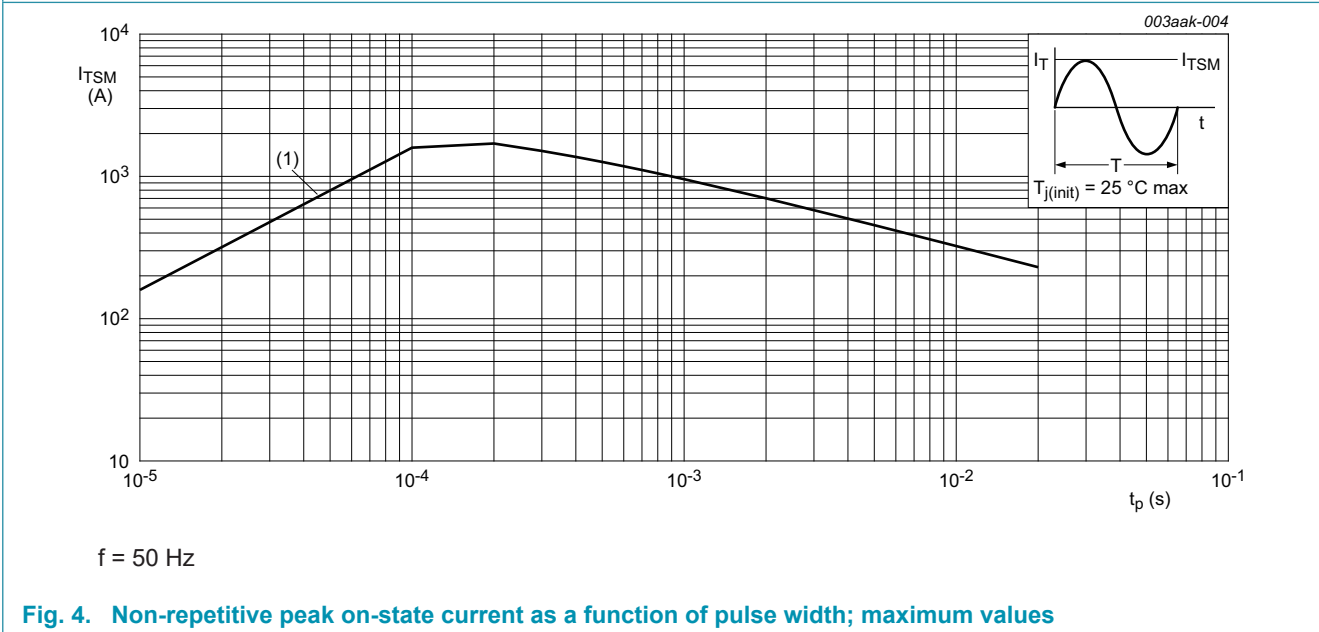
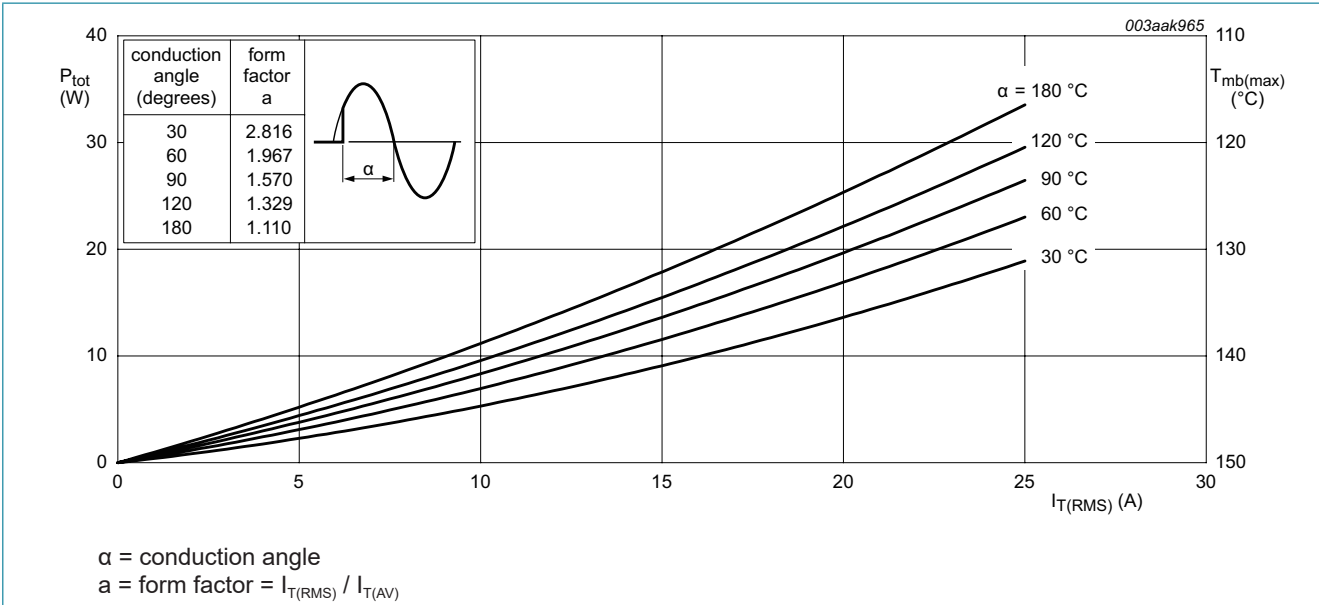


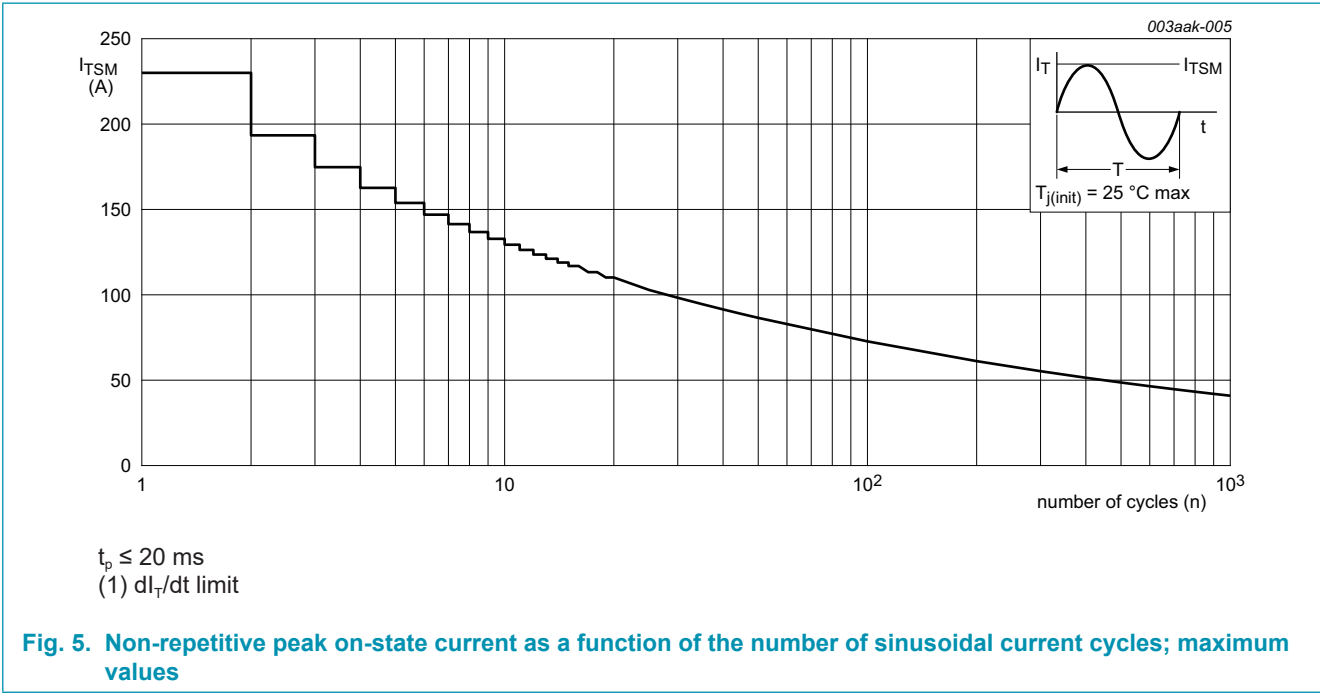
Fig. 2. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50\text{ Hz}$; $T_{\text{mb}} = 116^\circ\text{C}$

Fig. 1. RMS on-state current as a function of surge duration; maximum values





9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; Fig. 6	-	-	1	K/W
		half cycle; Fig. 6	-	-	1.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	printed circuit board (FR4) mounted	-	55	-	K/W

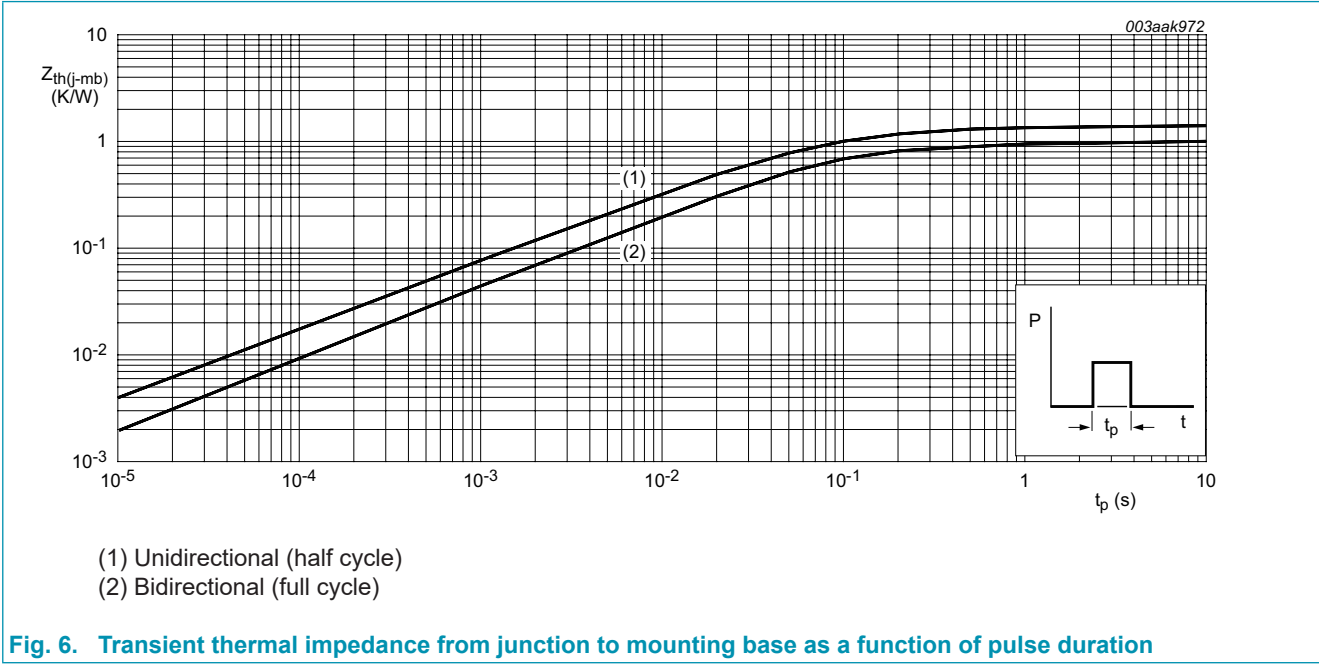
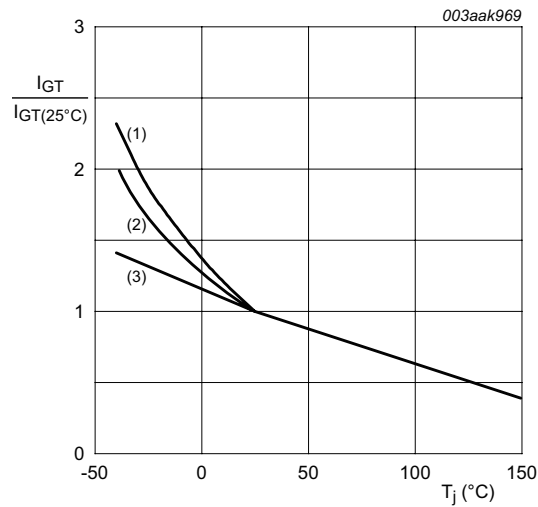


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I _{GT}	gate trigger current	V _D = 12 V; I _T = 0.1 A; T2+ G+; T _J = 25 °C; Fig. 7		2	-	50	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _J = 25 °C; Fig. 7		2	-	50	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _J = 25 °C; Fig. 7		2	-	50	mA
I _L	latching current	V _D = 12 V; I _G = 0.1 A; T2+ G+; T _J = 25 °C; Fig. 8		-	-	60	mA
		V _D = 12 V; I _G = 0.1 A; T2+ G-; T _J = 25 °C; Fig. 8		-	-	90	mA
		V _D = 12 V; I _G = 0.1 A; T2- G-; T _J = 25 °C; Fig. 8		-	-	60	mA
I _H	holding current	V _D = 12 V; T _J = 25 °C; Fig. 9		-	-	60	mA
V _T	on-state voltage	I _T = 30 A; T _J = 25 °C; Fig. 10		-	1.3	1.55	V
V _{GT}	gate trigger voltage	V _D = 400 V; I _T = 0.1 A; T _J = 150 °C		-	0.6	-	V
		V _D = 12 V; I _T = 0.1 A; T _J = 25 °C; Fig. 11		-	0.7	1	V
		V _D = 400 V; I _T = 0.1 A; T _J = 125 °C; Fig. 11		0.25	0.4	-	V
I _D	off-state current	V _D = 800 V; T _J = 25 °C		-	-	10	μA
		V _D = 800 V; T _J = 125 °C		-	-	0.5	mA
		V _D = 800 V; T _J = 150 °C		-	-	4	mA
I _R	reverse current	V _R = 800 V; T _J = 25 °C		-	-	10	μA
		V _R = 800 V; T _J = 125 °C		-	-	0.5	mA
		V _R = 800 V; T _J = 150 °C		-	-	4	mA
Dynamic characteristics							
dV _D /dt	rate of rise of off-state voltage	V _{DM} = 536 V; T _J = 150 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit		-	2300	-	V/μs
		V _{DM} = 536 V; T _J = 125 °C; exponential waveform; gate open circuit		1000	4000	-	V/μs
dI _{com} /dt	rate of change of commutating current	V _D = 400 V; T _J = 150 °C; I _{T(RMS)} = 25 A; dV _{com} /dt = 20 V/μs; gate open circuit		-	19	-	A/ms
		V _D = 400 V; T _J = 125 °C; I _{T(RMS)} = 25 A; dV _{com} /dt = 20 V/μs; gate open circuit		-	44	-	A/ms



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

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

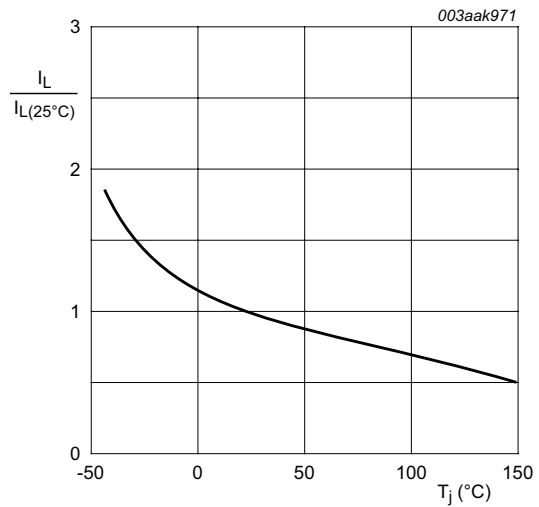


Fig. 8. Normalized holding current as a function of junction temperature

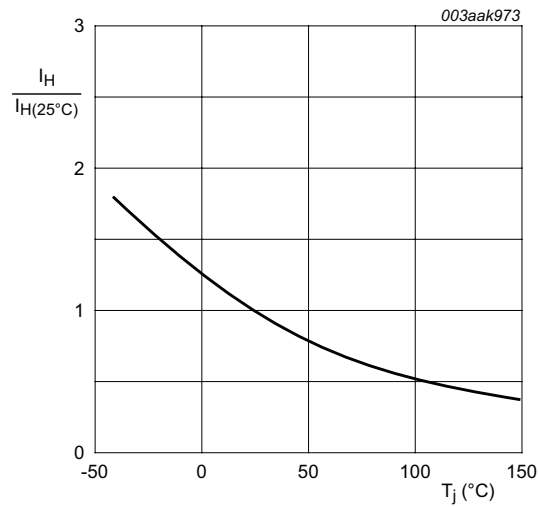
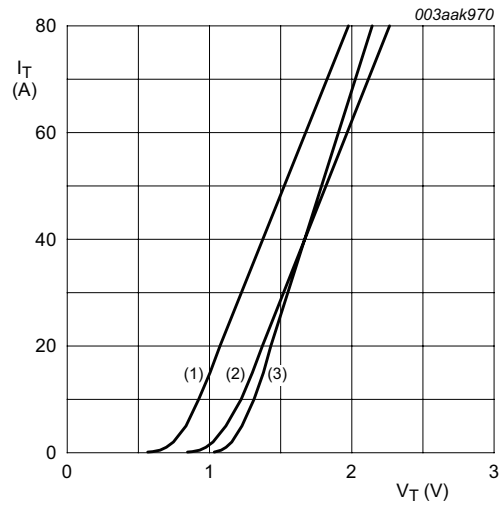


Fig. 9. Normalized holding current as a function of junction temperature



- $V_o = 1.061 \text{ V}$; $R_s = 0.015 \Omega$
- (1) $T_j = 150^{\circ}\text{C}$; typical values
 - (2) $T_j = 150^{\circ}\text{C}$; maximum values
 - (3) $T_j = 25^{\circ}\text{C}$; maximum values

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

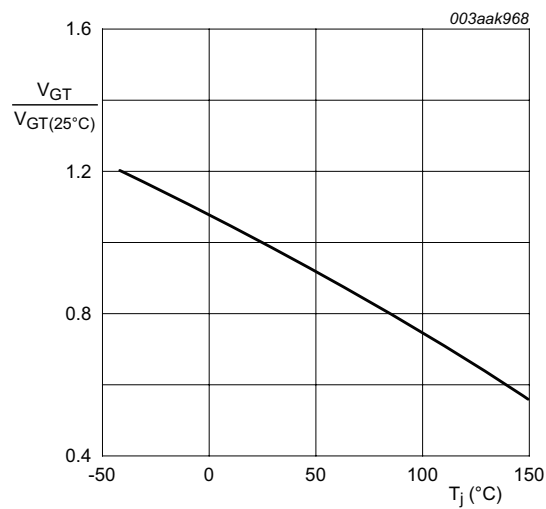


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

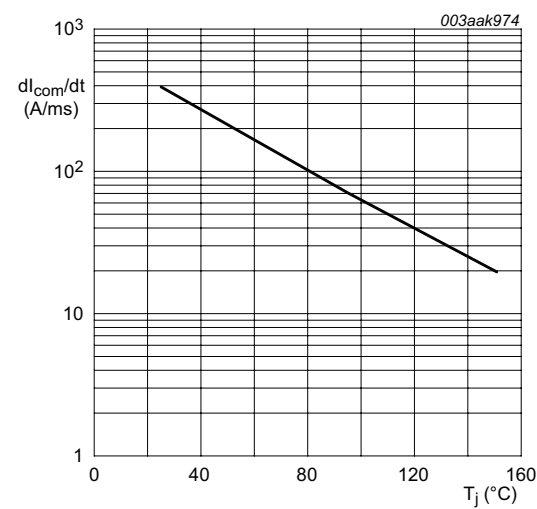


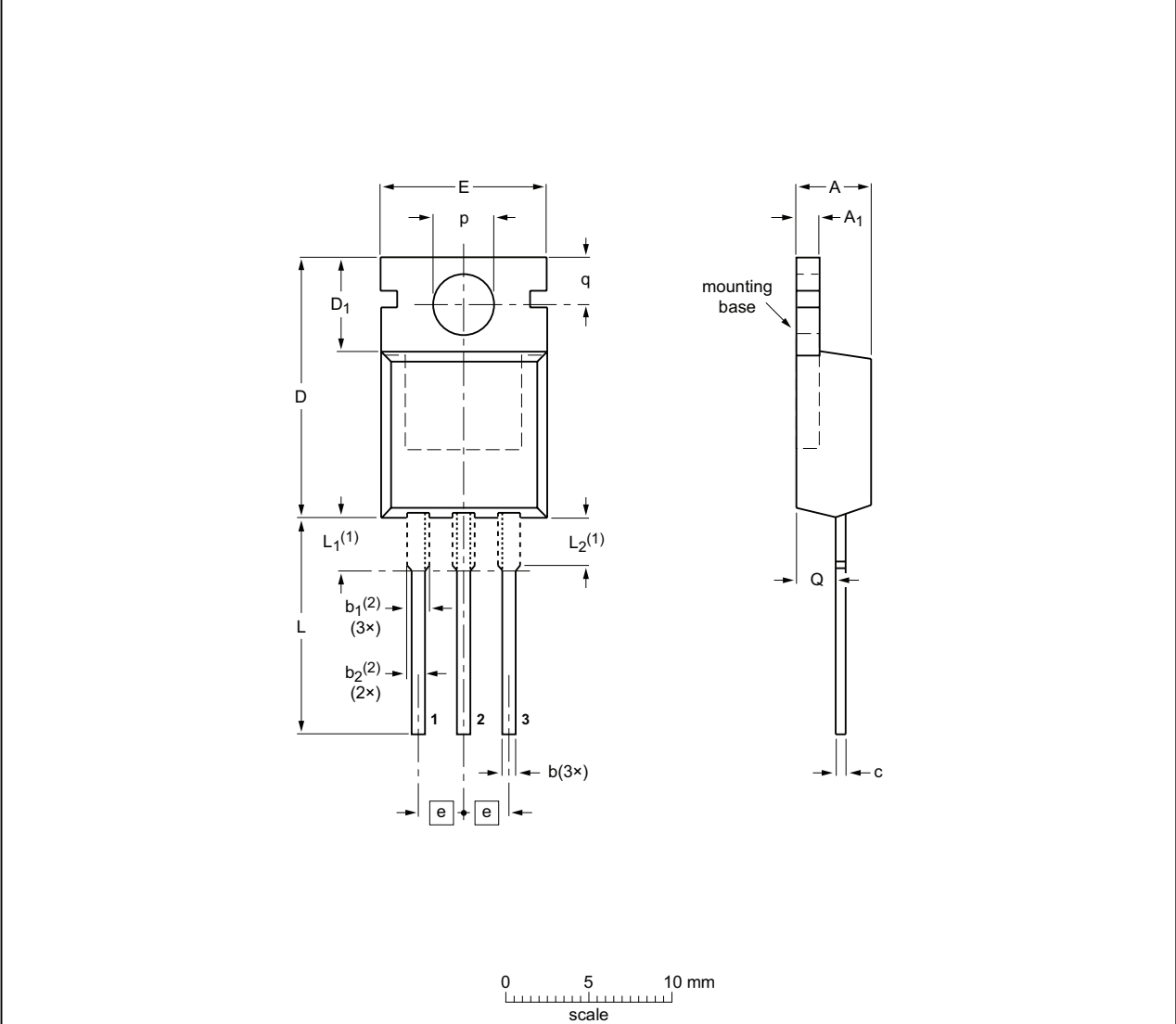
Fig. 12. Critical rate of change of commutating current as a function of junction temperature; typical values

11. Package outline

Assembly factory: d & A

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 (2)	b ₂ (2)	c	D	D ₁	E	e	L	L ₁ (1)	L ₂ (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
- 1. Lead shoulder designs may vary.
 - 2. 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

12. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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