

1. General description

Planar passivated high commutation three quadrant triac in a TO220 plastic package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series CT" triac will commute the full RMS current at the maximum rated junction temperature ($T_{j(max)} = 150\text{ °C}$) without the aid of a snubber. It is used in applications where "high junction operating temperature capability" is required.

2. Features and benefits

- 3Q technology for improved noise immunity
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- High junction operating temperature capability
- High voltage capability
- High current capability
- Least sensitive gate for highest noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only

3. Applications

- Applications subject to high temperature
- Heating controls
- High power motor control
- High power switching

4. Quick reference data

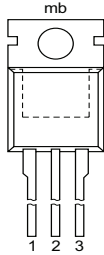
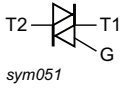
Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
V_{DRM}	repetitive peak off-state voltage			800			V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 131\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3		30			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		270			A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$		297			A
T_j	junction temperature			150			°C
Symbol	Parameter	Conditions	Notes	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		-	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; Fig. 7		-	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; Fig. 7		-	-	35	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 9		-	-	50	mA
V_T	on-state voltage	$I_T = 42\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10		-	1.20	1.50	V

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536 \text{ V}$; $T_j = 125 \text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		2000	-	-	V/ μs
		$V_{DM} = 536 \text{ V}$; $T_j = 150 \text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		1000	-	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400 \text{ V}$; $T_j = 125 \text{ }^\circ\text{C}$; $I_{T(RMS)} = 30 \text{ A}$; $dV_{com}/dt = 20 \text{ V}/\mu\text{s}$; gate open circuit		16	-	-	A/ms
		$V_D = 400 \text{ V}$; $T_j = 150 \text{ }^\circ\text{C}$; $I_{T(RMS)} = 30 \text{ A}$; $dV_{com}/dt = 20 \text{ V}/\mu\text{s}$; gate open circuit		13	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1		 sym051
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
BTA330-800CT	TO220	BTA330-800CTQ	Tube	50	SOT78	13-Jun-2008

7. Marking

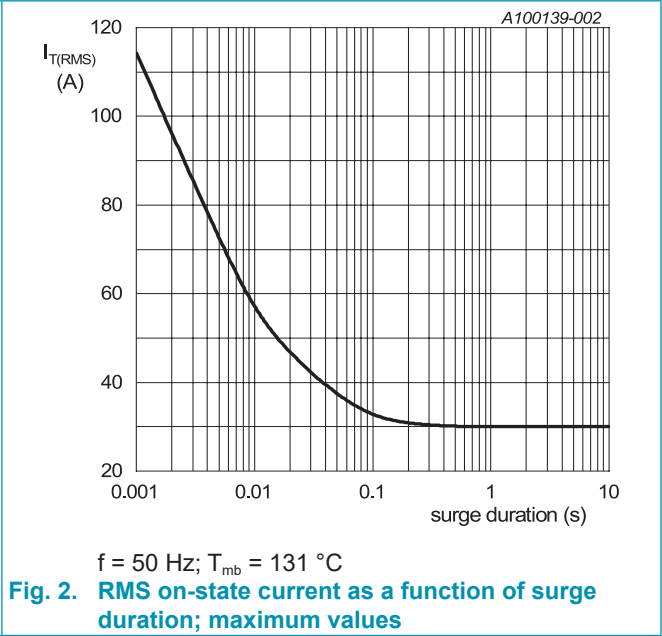
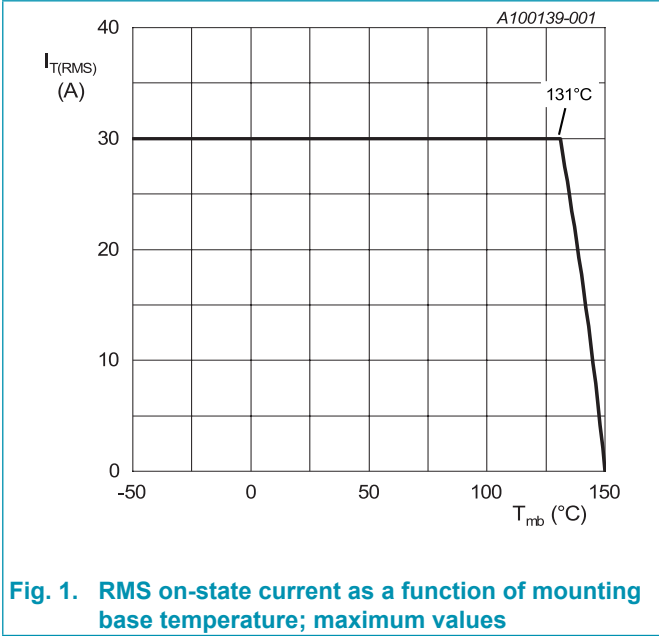
Table 4. Marking codes

Type number	Marking codes
BTA330-800CT	BTA330 800CT

8. Limiting values

Table 5. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Notes	Values	Unit
V_{DRM}	repetitive peak off-state voltage			800	V
V_{RRM}	repetitive peak reverse voltage			800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 131\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3		30	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 20\text{ ms}$; Fig 4 ; Fig 5		270	A
		full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 16.7\text{ ms}$		297	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN		364.5	A^2s
dI_T/dt	rate of rise of on-state current	$I_G = 70\text{ mA}$		100	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current			2	A
P_{GM}	peak gate power	$T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 20\text{ }\mu\text{s}$		5	W
$P_{G(AV)}$	average gate power	over any 20 ms period		0.5	W
T_{stg}	storage temperature			-40 to 150	$^{\circ}\text{C}$
T_j	junction temperature			150	$^{\circ}\text{C}$



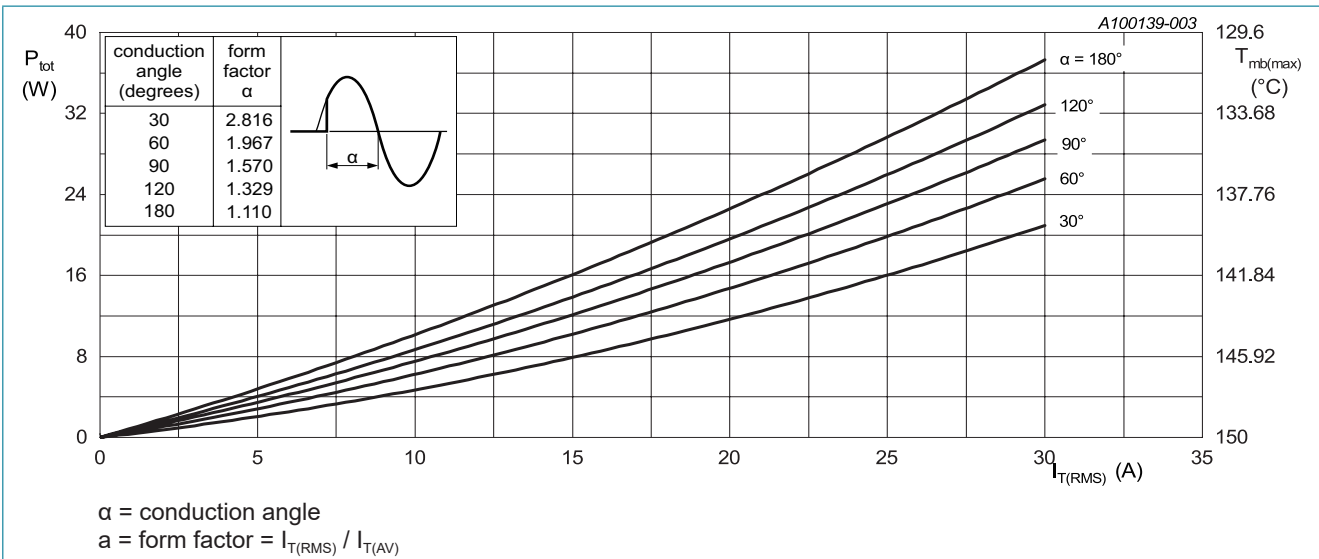


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

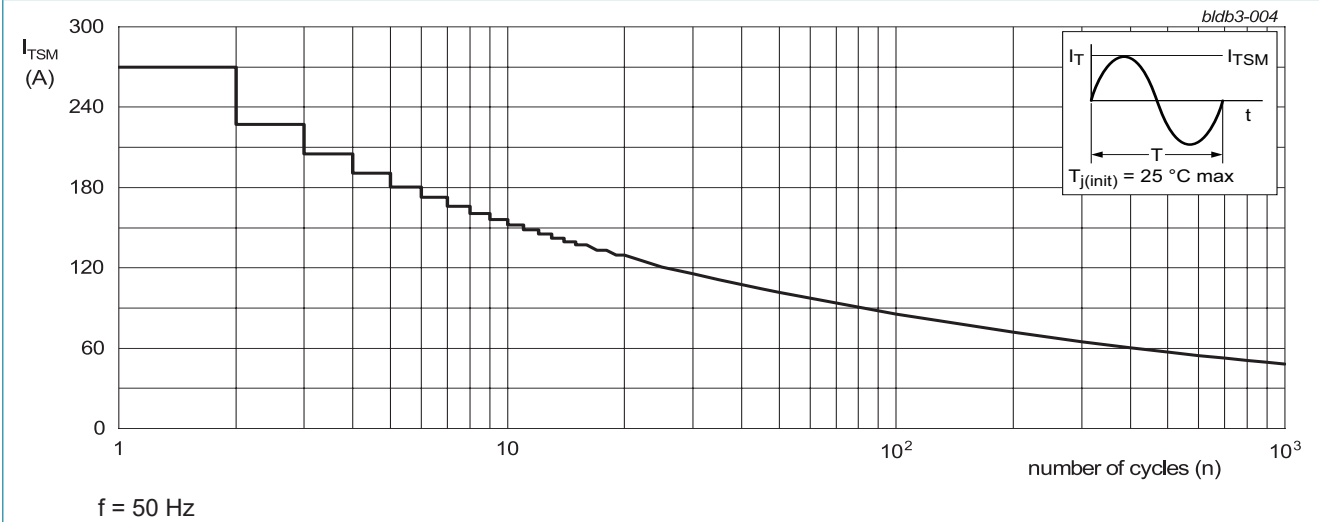


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

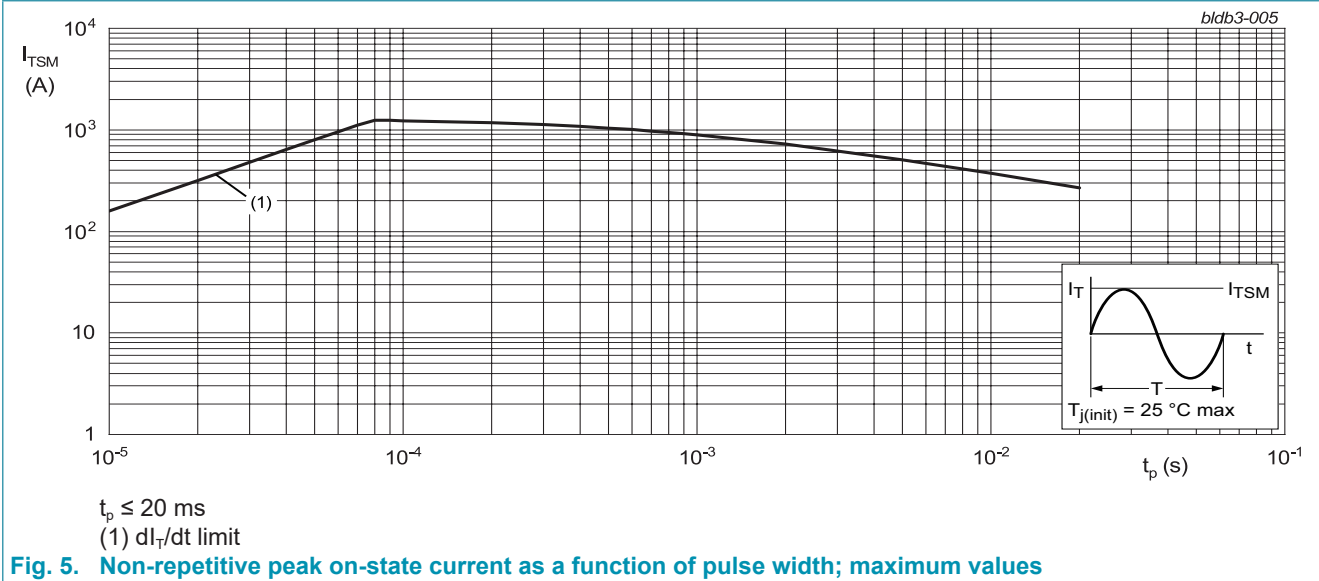
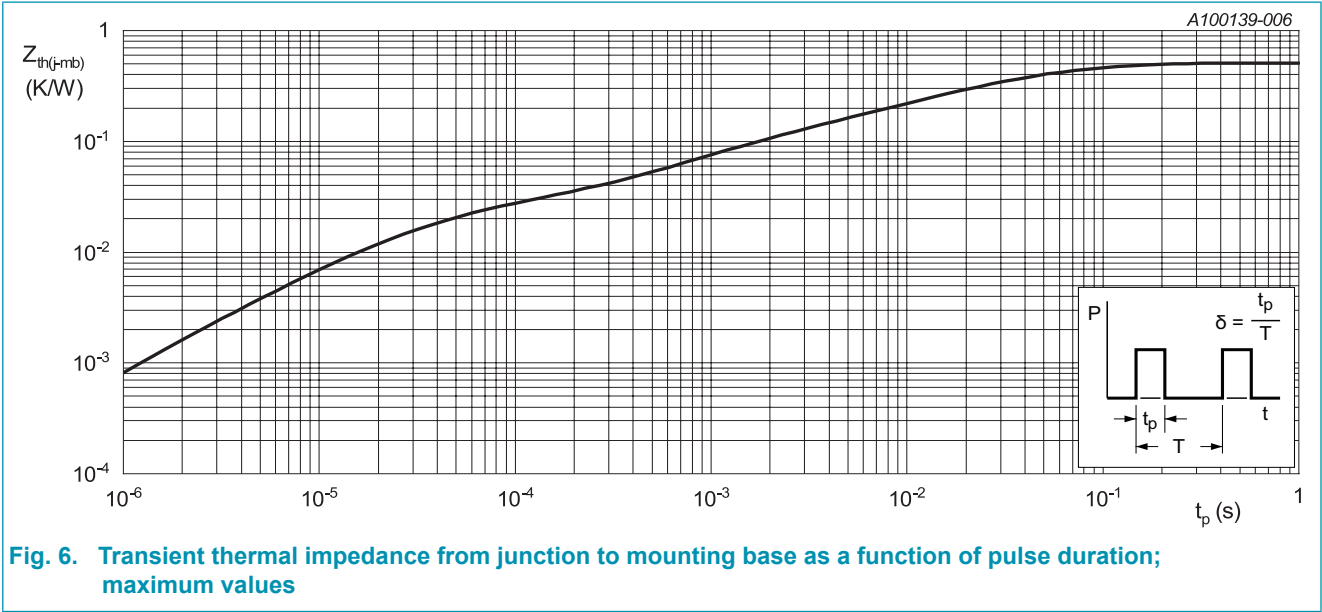


Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

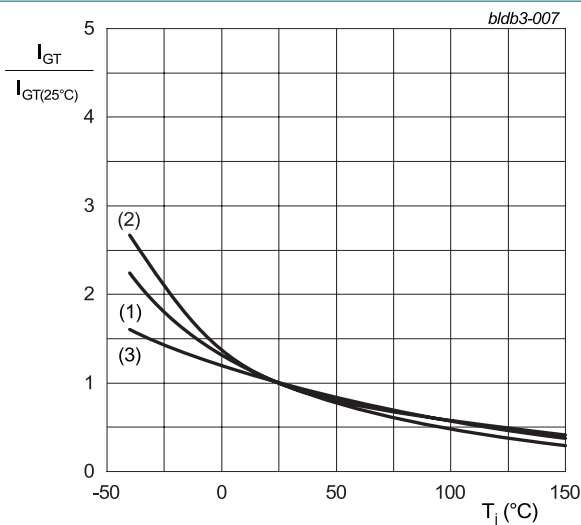
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 6		-	-	0.51	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	60	-	K/W



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	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		-	-	35	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _J = 25 °C; Fig. 7		-	-	35	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _J = 25 °C; Fig. 7		-	-	35	mA
I _L	latching current	V _D = 12 V; I _G = 0.1 A; T2+ G+; T _J = 25 °C; Fig. 8		-	-	70	mA
		V _D = 12 V; I _G = 0.1 A; T2+ G-; T _J = 25 °C; Fig. 8		-	-	100	mA
		V _D = 12 V; I _G = 0.1 A; T2- G-; T _J = 25 °C; Fig. 8		-	-	70	mA
I _H	holding current	V _D = 12 V; T _J = 25 °C; Fig. 9		-	-	50	mA
V _T	on-state voltage	I _T = 42 A; T _J = 25 °C; Fig. 10		-	1.20	1.50	V
V _{GT}	gate trigger voltage	V _D = 12 V; I _T = 0.1 A; T _J = 25 °C; Fig. 11		-	0.9	1.3	V
		V _D = 400 V; I _T = 0.1 A; T _J = 150 °C		0.20	0.45	-	V
I _D	off-state current	V _D = 800 V; T _J = 25 °C		-	-	10	μA
		V _D = 800 V; T _J = 150 °C		-	0.4	2	mA
I _R	reverse current	V _R = 800 V; T _J = 25 °C		-	-	10	μA
		V _R = 800 V; T _J = 150 °C		-	0.4	2	mA
Dynamic characteristics							
dV _D /dt	rate of rise of off-state voltage	V _{DM} = 536 V; T _J = 125 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit		2000	-	-	V/μs
		V _{DM} = 536 V; T _J = 150 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit		1000	-	-	V/μs
dI _{com} /dt	rate of change of commutating current	V _D = 400 V; T _J = 125 °C; I _{T(RMS)} = 30 A; dV _{com} /dt = 20 V/μs; gate open circuit		16	-	-	A/ms
		V _D = 400 V; T _J = 150 °C; I _{T(RMS)} = 30 A; dV _{com} /dt = 20 V/μs; gate open circuit		13	-	-	A/ms



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

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

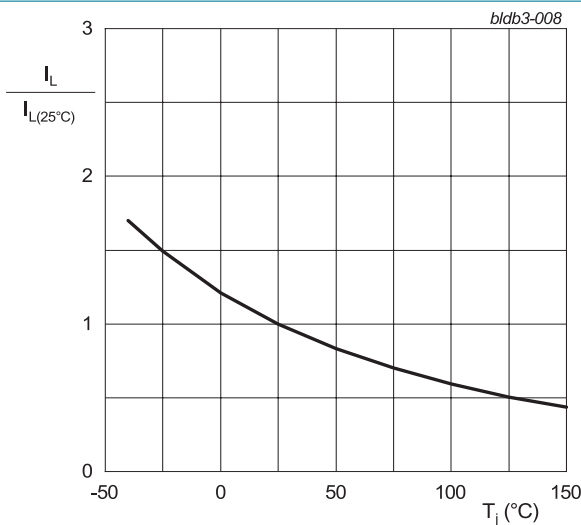


Fig. 8. Normalized latching current as a function of junction temperature

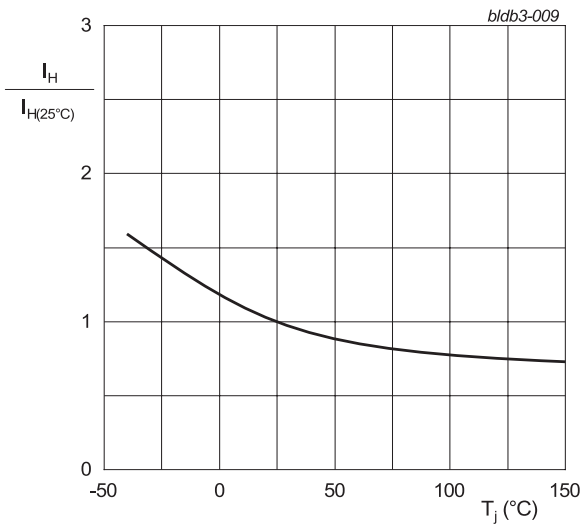
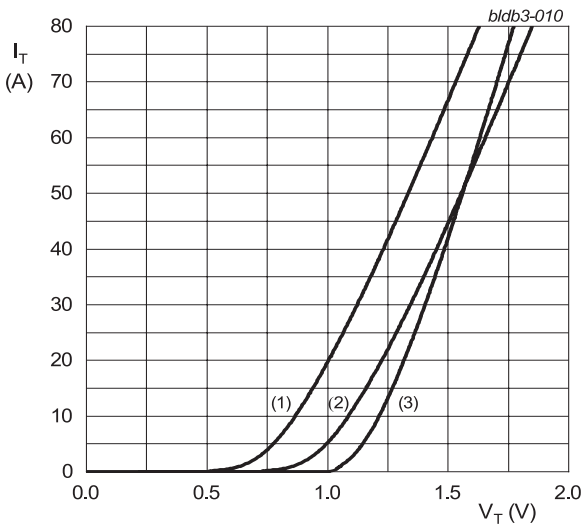


Fig. 9. Normalized holding current as a function of junction temperature



- $V_o = 1.000 V$; $R_s = 0.0114 \Omega$
- (1) $T_j = 150^{\circ}C$; typical values
 - (2) $T_j = 150^{\circ}C$; maximum values
 - (3) $T_j = 25^{\circ}C$; maximum values

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

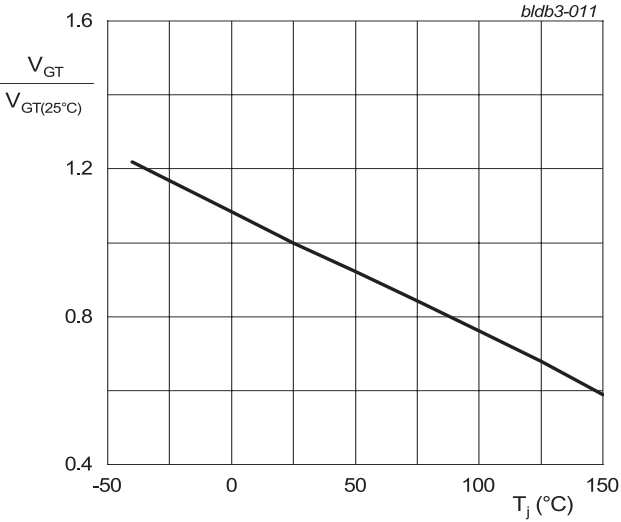
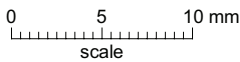
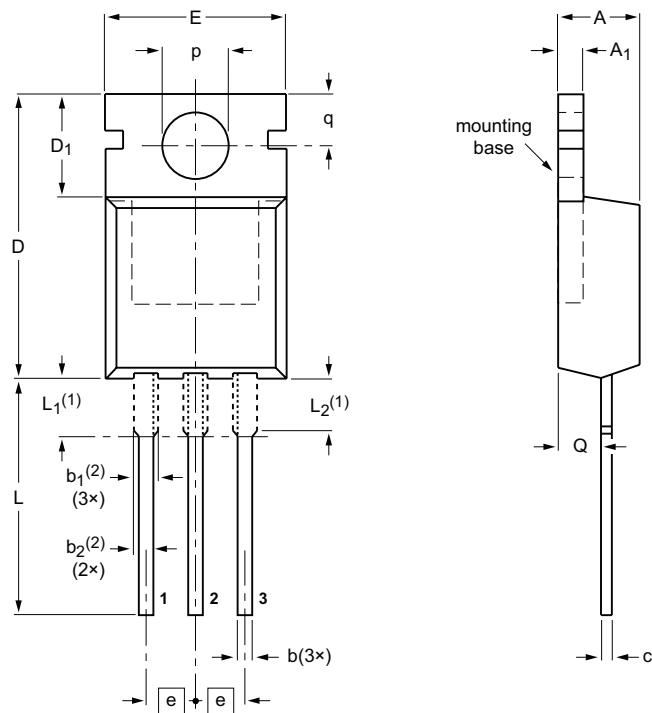


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

11. 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 (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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