



BTA420-800CT

3Q Hi-Com Triac

4 February 2013

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 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
- Less sensitive gate for high 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

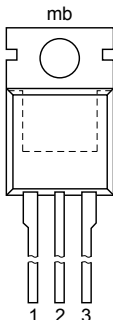
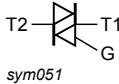
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	800	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	-	200	A
T_j	junction temperature		-	-	150	°C
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 122\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	20	A



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	-	-	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
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	1250	-	-	V/μs
dI _{com} /dt	rate of change of commutating current	V _D = 400 V; T _j = 150 °C; I _{T(RMS)} = 20 A; dV _{com} /dt = 10 V/μs; gate open circuit	16	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 <p style="text-align: center;">TO-220AB (SOT78)</p>	 <p style="text-align: center;"><i>sym051</i></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
BTA420-800CT	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

7. Marking

Table 4. Marking codes

Type number	Marking code
BTA420-800CT	BTA420-800CT

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
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 122\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	20	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	-	200	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$	-	220	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; sine-wave pulse	-	200	A^2s
di_T/dt	rate of rise of on-state current	$I_T = 24\text{ A}$; $I_G = 0.2\text{ A}$; $di_G/dt = 0.2\text{ A}/\mu s$	-	100	$A/\mu s$
I_{GM}	peak gate current		-	2	A
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	$^{\circ}C$
T_j	junction temperature		-	150	$^{\circ}C$

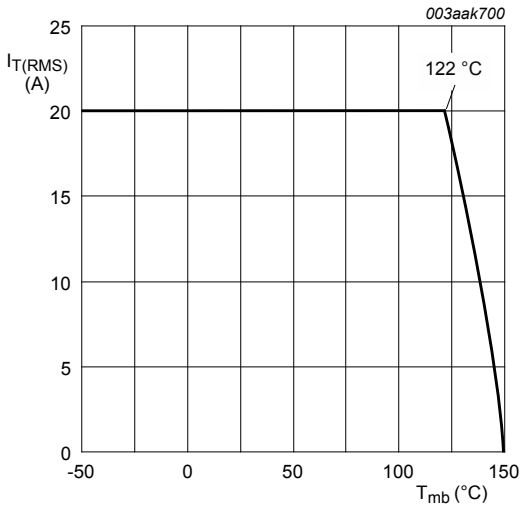
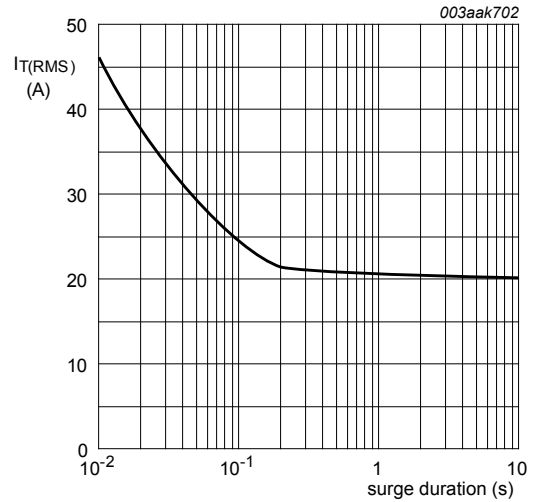
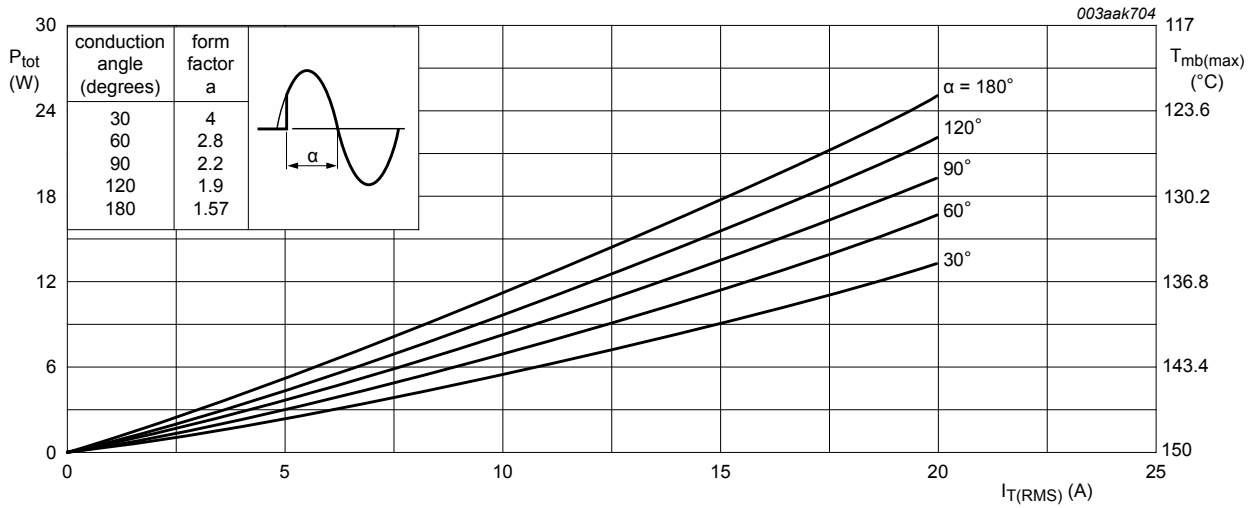


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50$ Hz; $T_{mb} = 122$ °C

Fig. 2. RMS on-state current as a function of surge duration; maximum values



$\alpha =$ conduction angle

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

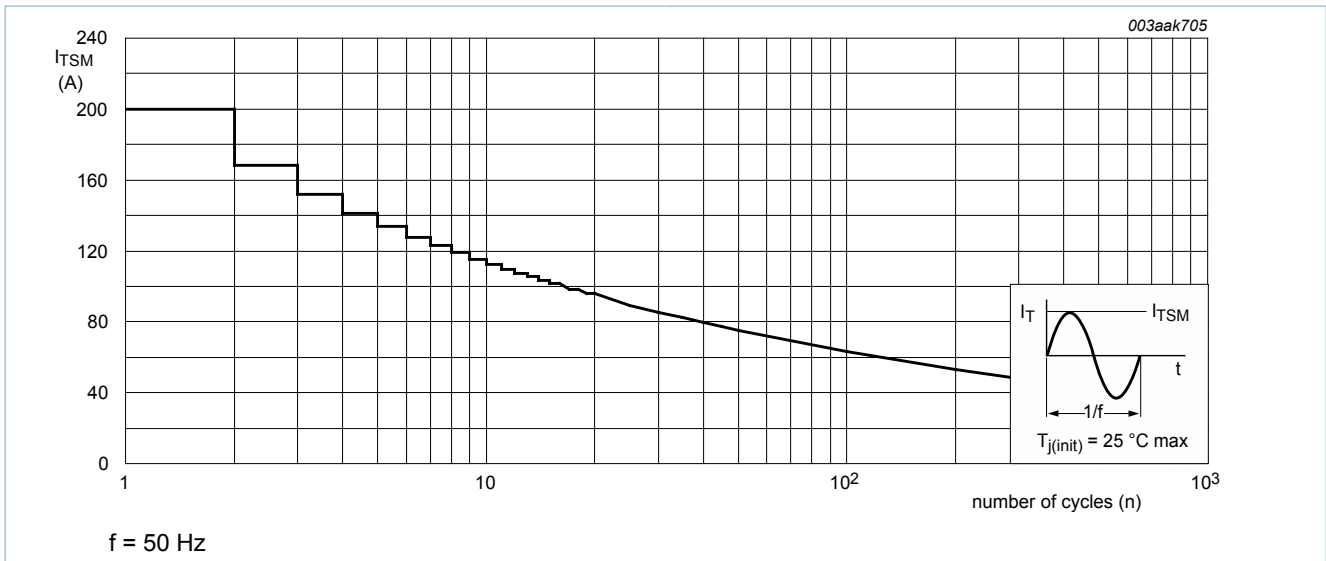


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

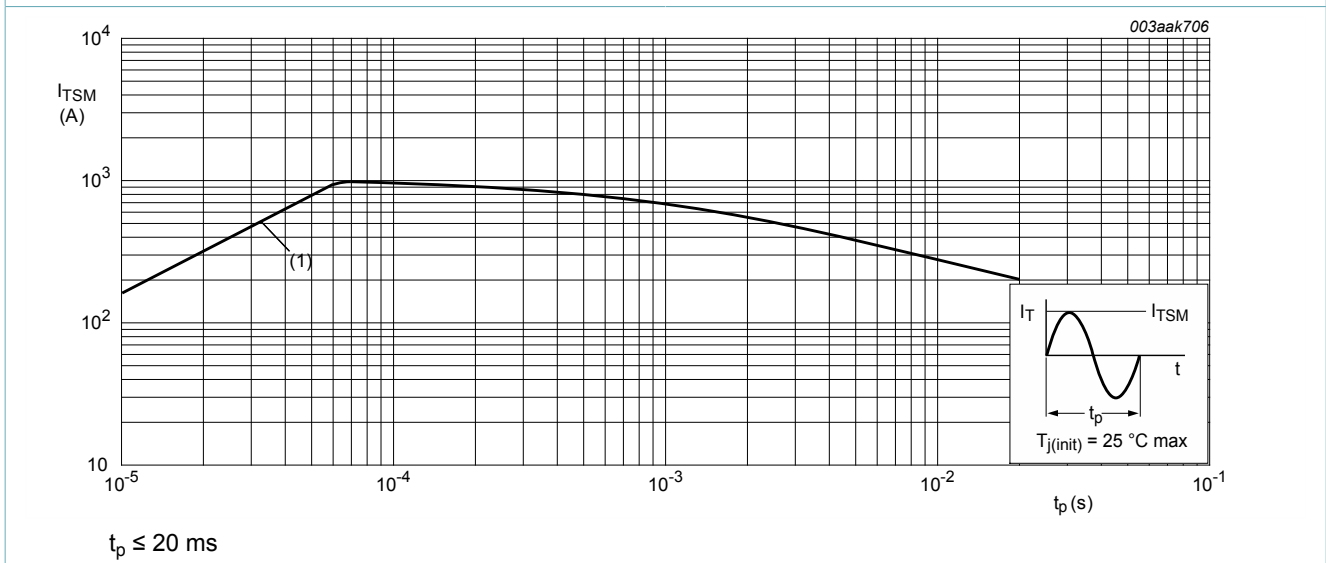
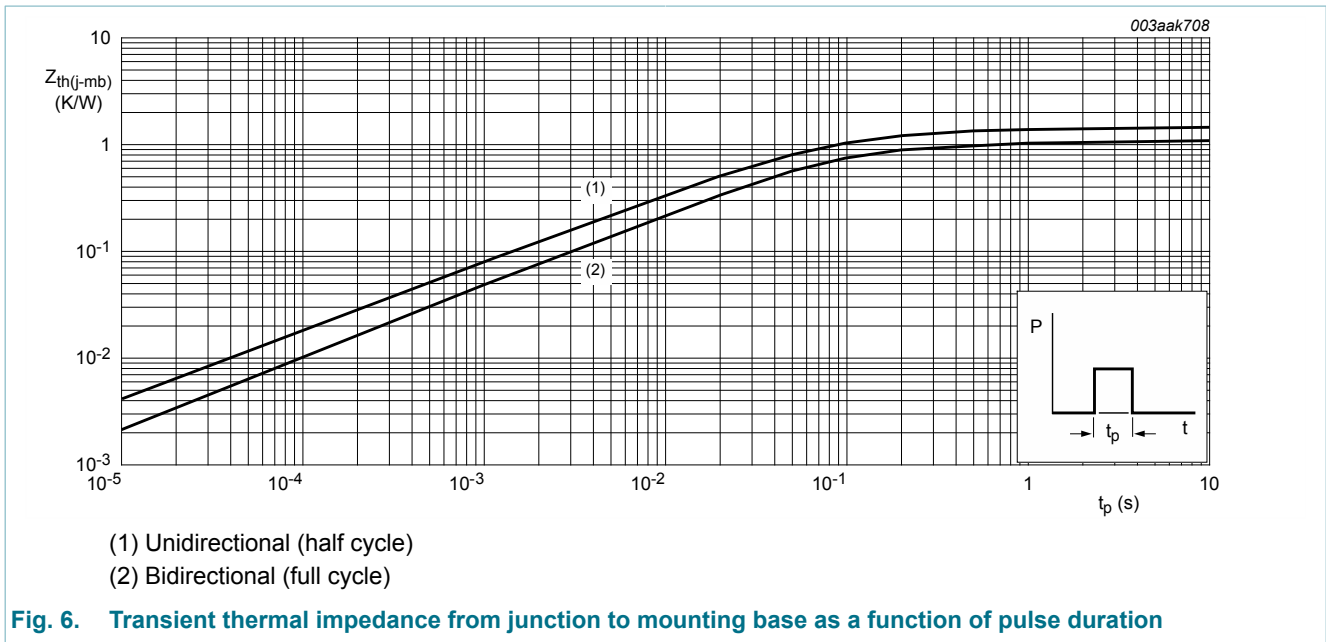


Fig. 5. Non-repetitive peak on-state current as a function of pulse duration; maximum values

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	-	-	1.1	K/W
		half cycle; Fig. 6	-	-	1.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

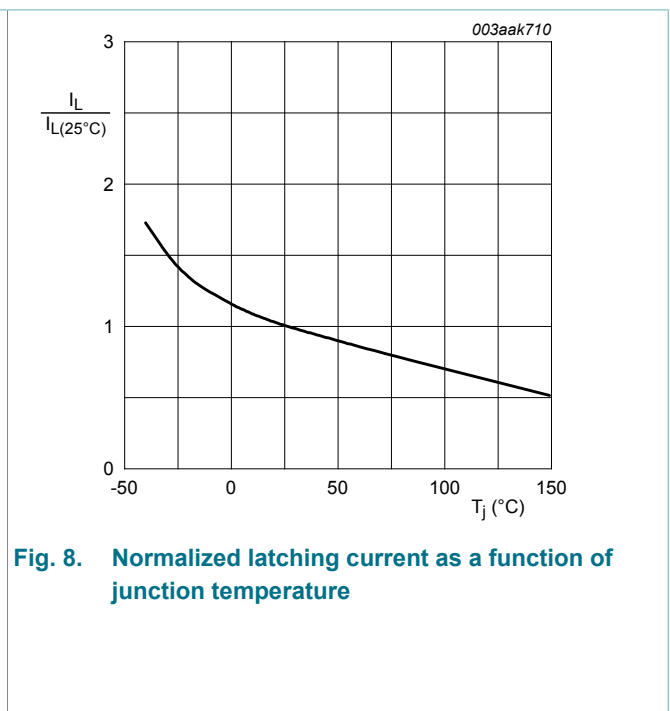
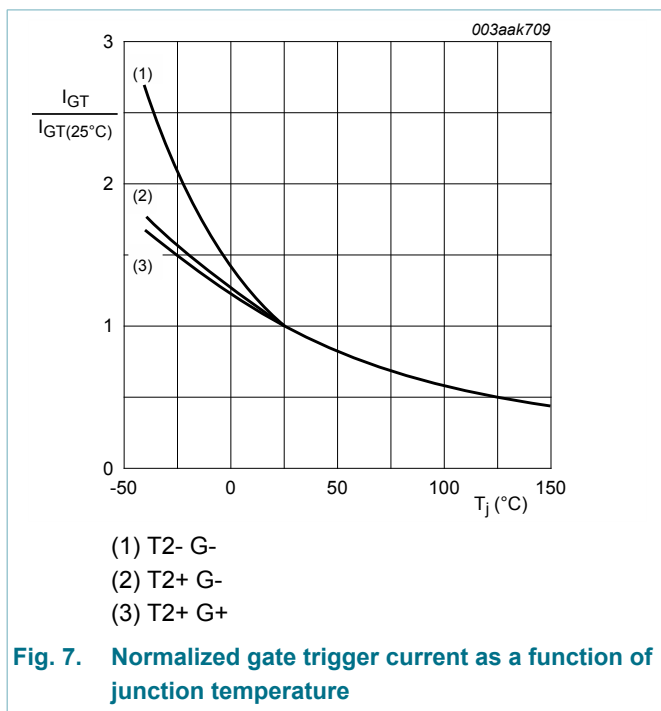


10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2+ G+;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7	-	-	35	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2+ G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7	-	-	35	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2- G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7	-	-	35	mA
I_L	latching current	$V_D = 12\text{ V}; I_G = 0.1\text{ A}; T2+ G+;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 8	-	-	50	mA
		$V_D = 12\text{ V}; I_G = 0.1\text{ A}; T2+ G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 8	-	-	80	mA
		$V_D = 12\text{ V}; I_G = 0.1\text{ A}; T2- G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 8	-	-	50	mA
I_H	holding current	$V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C};$ Fig. 9	-	-	40	mA
V_T	on-state voltage	$I_T = 24\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 10	-	1.2	1.5	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C};$ Fig. 11	-	0.7	1	V
		$V_D = 400\text{ V}; T_j = 150\text{ }^\circ\text{C};$ Fig. 11	0.2	0.4	-	V
I_D	off-state current	$V_D = 800\text{ V}; T_j = 150\text{ }^\circ\text{C}$	-	0.2	1	mA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dynamic Characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536 \text{ V}$; $T_j = 150 \text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit	1250	-	-	V/ μs
di_{com}/dt	rate of change of commutating current	$V_D = 400 \text{ V}$; $T_j = 150 \text{ }^\circ\text{C}$; $I_{T(RMS)} = 20 \text{ A}$; $dV_{com}/dt = 10 \text{ V}/\mu\text{s}$; gate open circuit	16	-	-	A/ms
		$V_D = 400 \text{ V}$; $T_j = 150 \text{ }^\circ\text{C}$; $I_{T(RMS)} = 20 \text{ A}$; $dV_{com}/dt = 1 \text{ V}/\mu\text{s}$; gate open circuit	38	-	-	A/ms



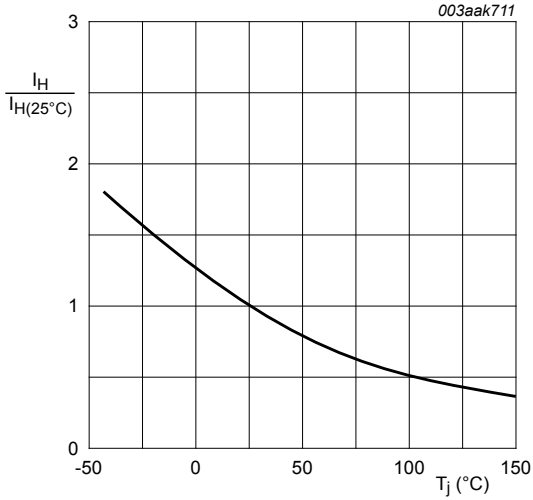
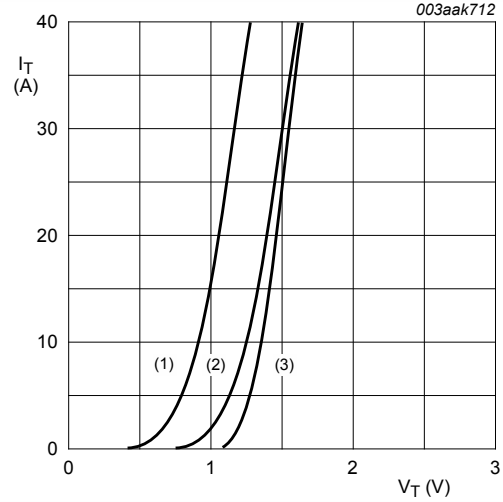


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.087 \text{ V}; R_s = 0.014 \Omega$
 (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

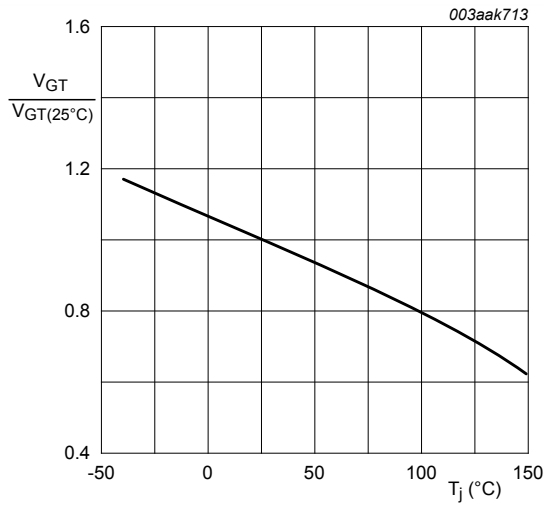
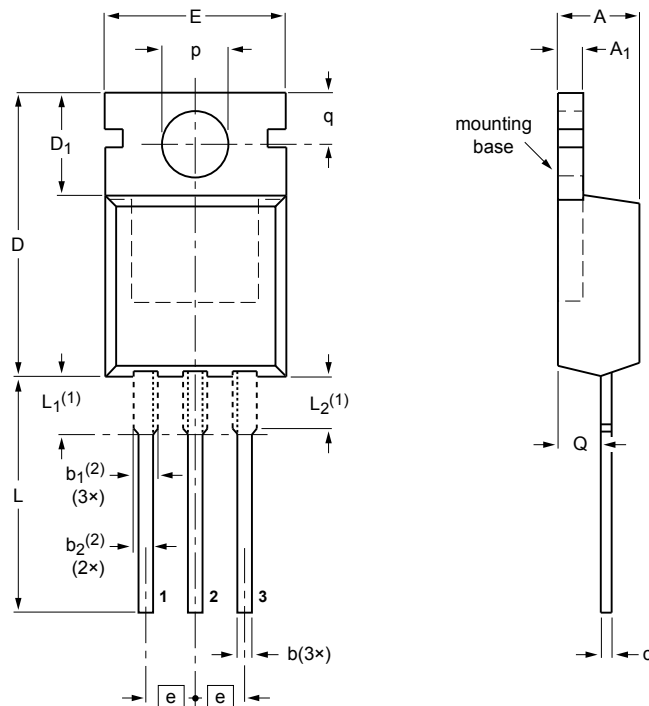


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

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

- 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. 12. Package outline TO-220AB (SOT78)

12. Legal information

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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.

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