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# 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; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 20\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	-	200	A
$T_j$	junction temperature		-	-	150	°C
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 122\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	20	A



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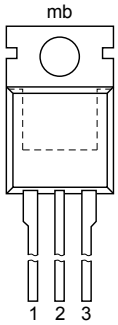
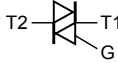
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Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
I <sub>GT</sub>	gate trigger current	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2+ G+; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>	-	-	35	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2+ G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>	-	-	35	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2- G-; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>	-	-	35	mA
<b>Dynamic Characteristics</b>						
dV <sub>D</sub> /dt	rate of rise of off-state voltage	V <sub>DM</sub> = 536 V; T <sub>j</sub> = 150 °C; (V <sub>DM</sub> = 67% of V <sub>DRM</sub> ); exponential waveform; gate open circuit	1250	-	-	V/μs
dI <sub>com</sub> /dt	rate of change of commutating current	V <sub>D</sub> = 400 V; T <sub>j</sub> = 150 °C; I <sub>T(RMS)</sub> = 20 A; dV <sub>com</sub> /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;"><b>TO-220AB (SOT78)</b></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		Version
	Name	Description	
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**

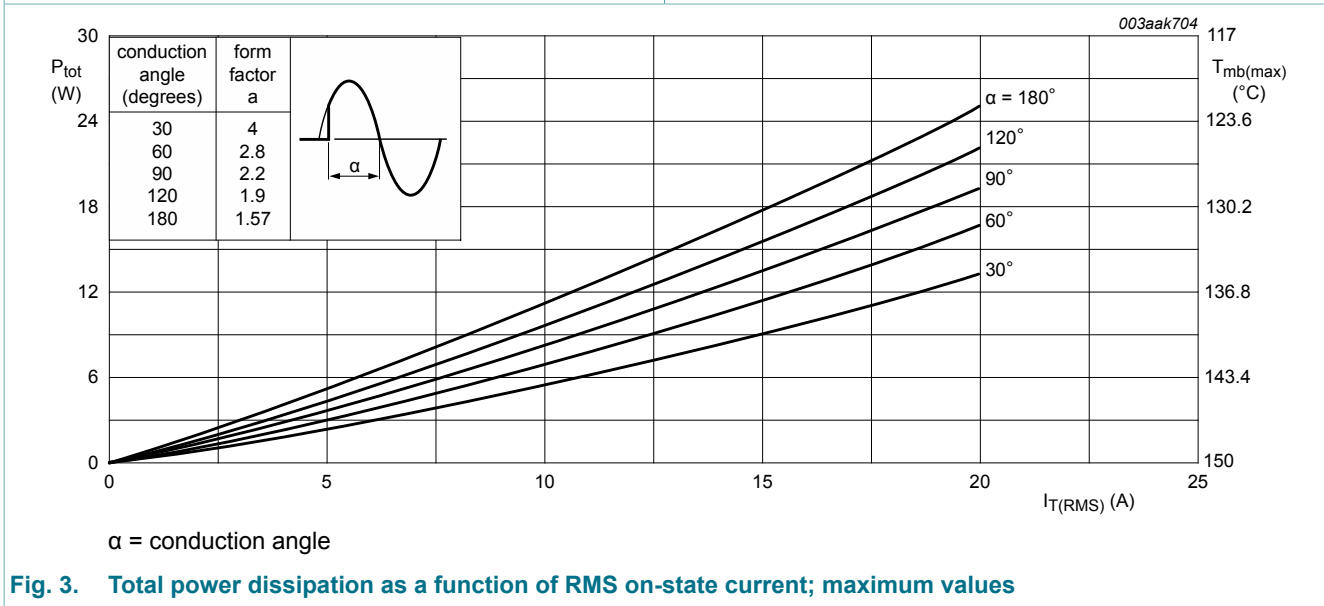
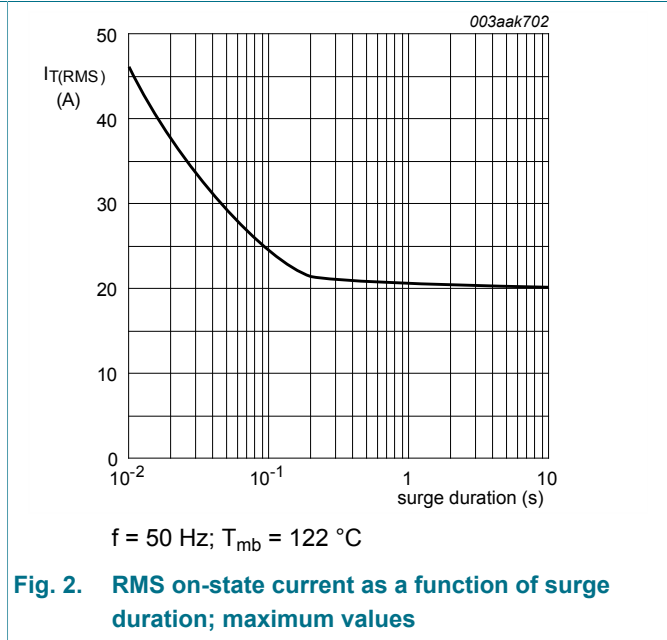
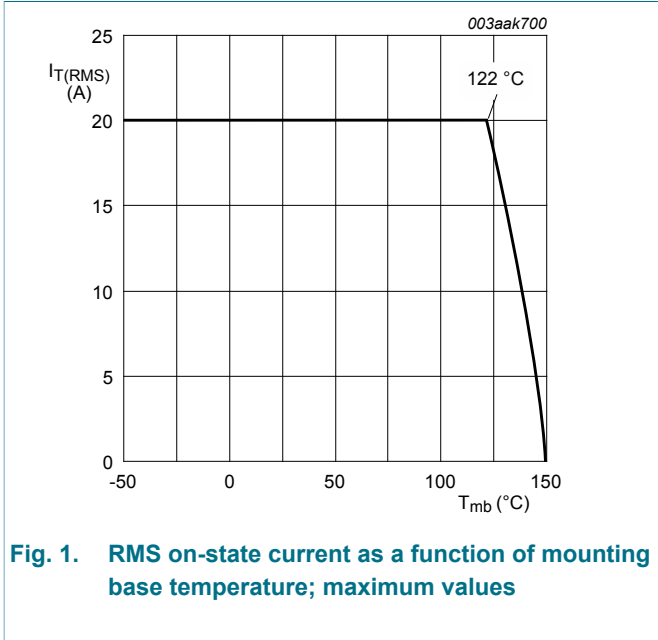
In accordance with the Absolute Maximum Rating System (IEC 60134).

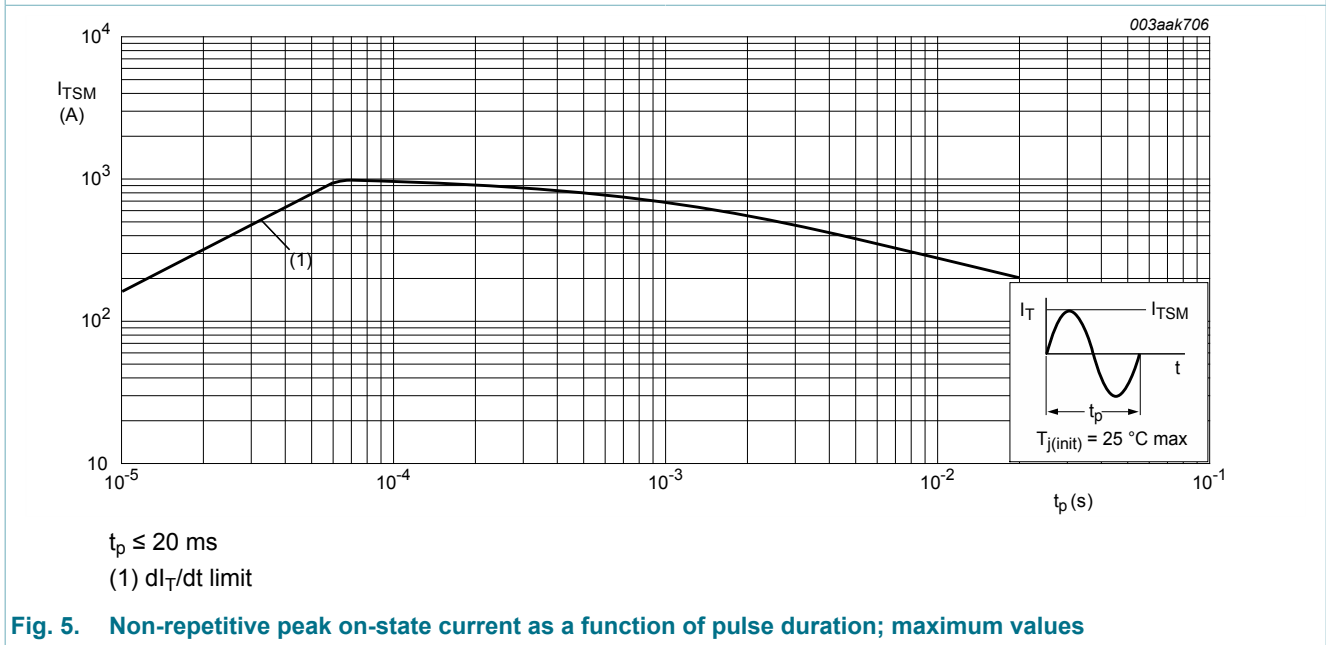
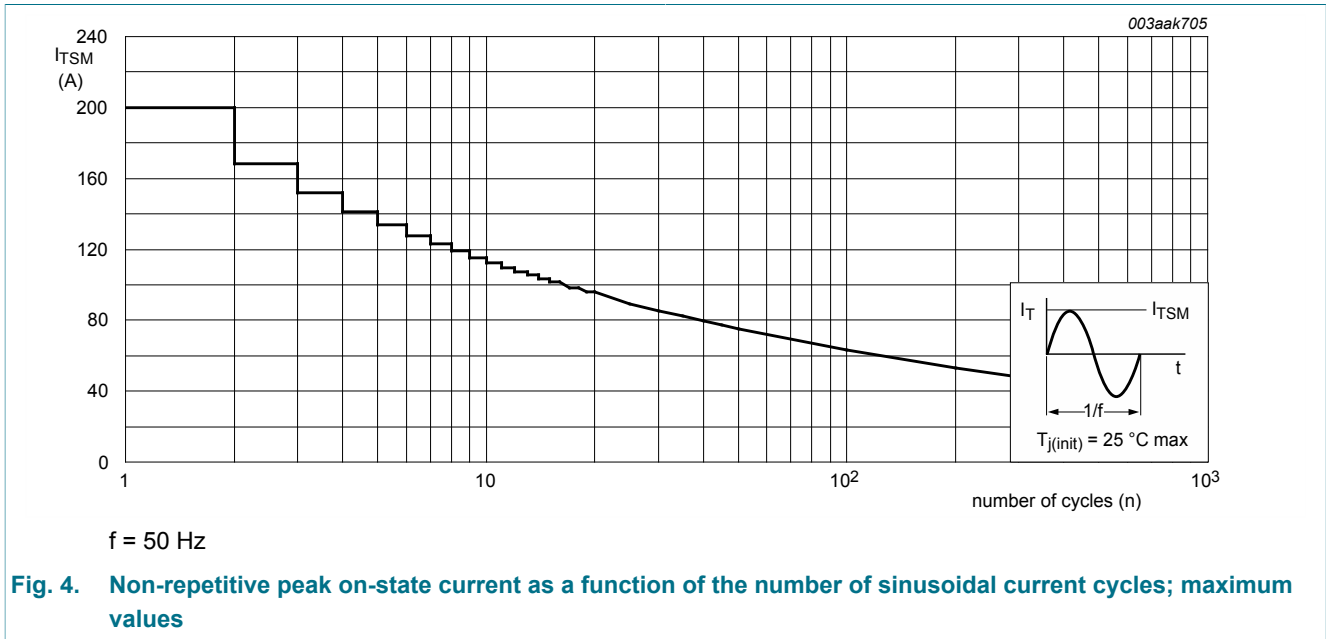
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{\text{DRM}}$	repetitive peak off-state voltage		-	800	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 122\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	20	A
$I_{\text{TSM}}$	non-repetitive peak on-state current	full sine wave; $T_{\text{j(init)}} = 25\text{ }^{\circ}\text{C}$ ; $t_{\text{p}} = 20\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	200	A
		full sine wave; $T_{\text{j(init)}} = 25\text{ }^{\circ}\text{C}$ ; $t_{\text{p}} = 16.7\text{ ms}$	-	220	A
$I^2t$	$I^2t$ for fusing	$t_{\text{p}} = 10\text{ ms}$ ; sine-wave pulse	-	200	$\text{A}^2\text{s}$
$dI_{\text{T}}/dt$	rate of rise of on-state current	$I_{\text{T}} = 24\text{ A}$ ; $I_{\text{G}} = 0.2\text{ A}$ ; $dI_{\text{G}}/dt = 0.2\text{ A}/\mu\text{s}$	-	100	$\text{A}/\mu\text{s}$
$I_{\text{GM}}$	peak gate current		-	2	A
$P_{\text{GM}}$	peak gate power		-	5	W
$P_{\text{G(AV)}}$	average gate power	over any 20 ms period	-	0.5	W
$T_{\text{stg}}$	storage temperature		-40	150	$^{\circ}\text{C}$
$T_{\text{j}}$	junction temperature		-	150	$^{\circ}\text{C}$

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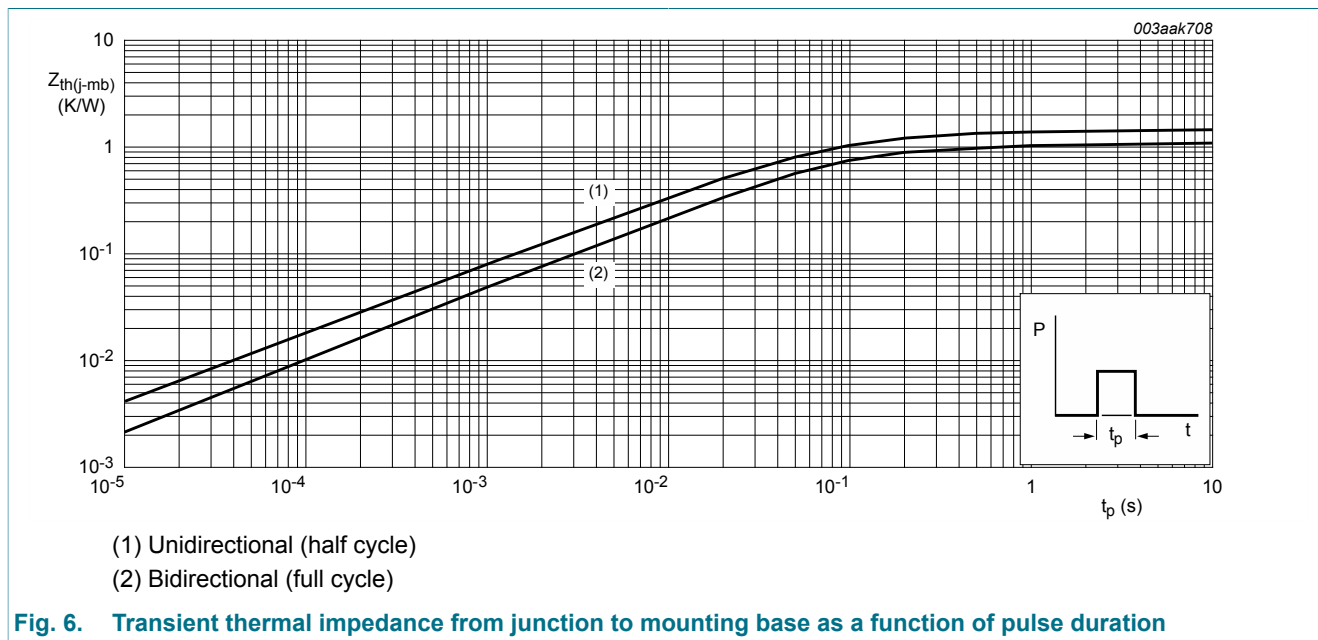




## 9. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; <a href="#">Fig. 6</a>	-	-	1.1	K/W
		half cycle; <a href="#">Fig. 6</a>	-	-	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**

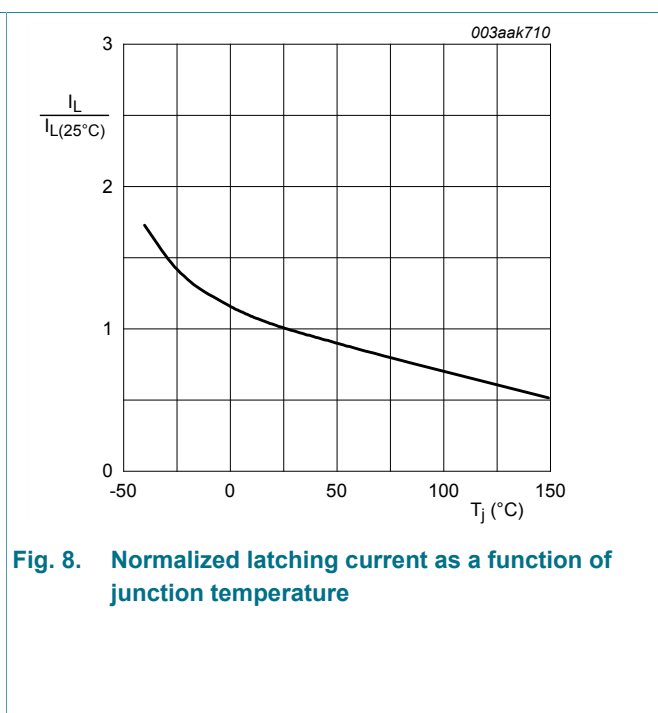
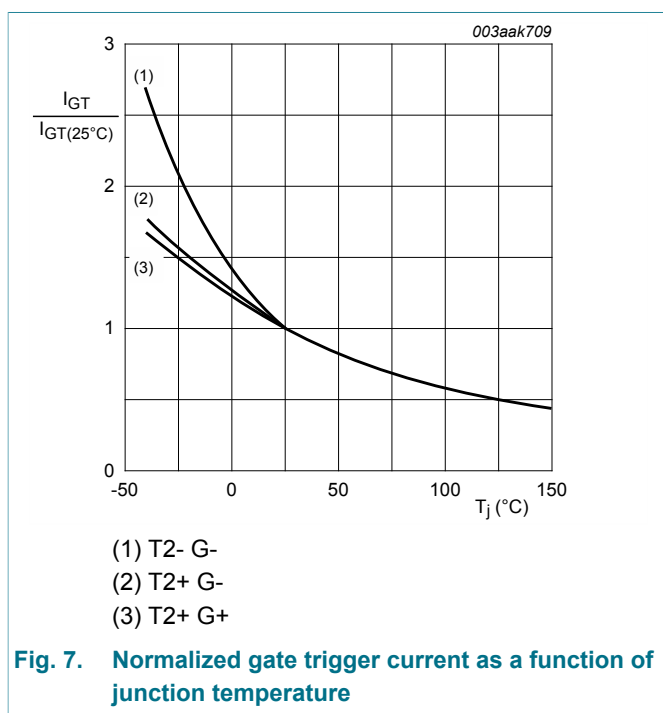
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2+ G+;$ $T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>	-	-	35	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2+ G-;$ $T_j = 25\text{ }^\circ\text{C};$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

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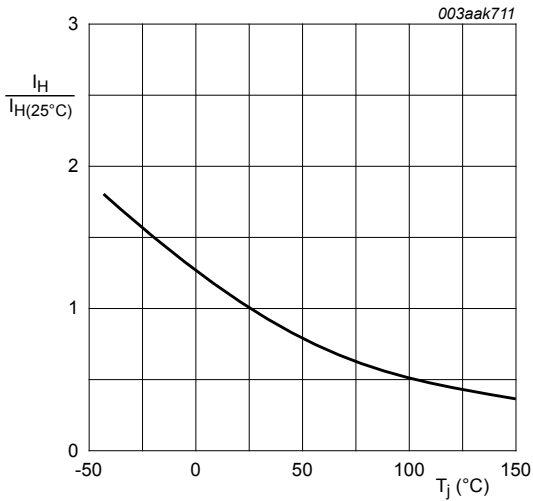
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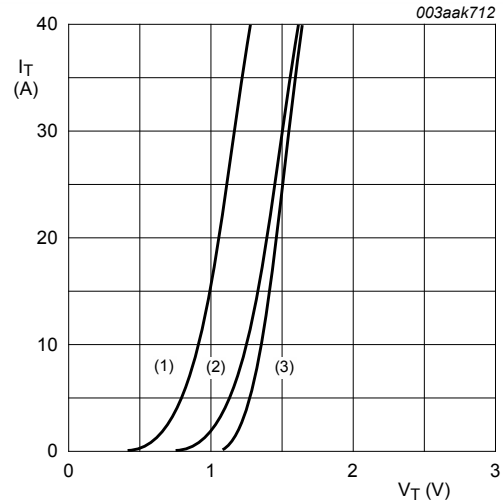
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Dynamic Characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}; T_j = 150\text{ }^\circ\text{C}; (V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit	1250	-	-	V/ $\mu$ s
$dI_{com}/dt$	rate of change 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**



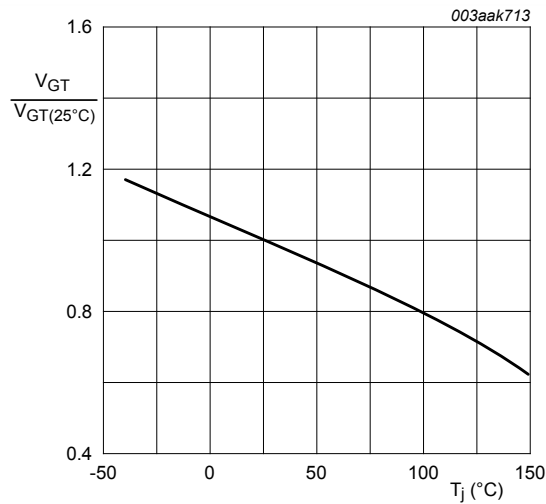
$V_o = 1.087 \text{ V}; R_s = 0.014 \Omega$

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

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

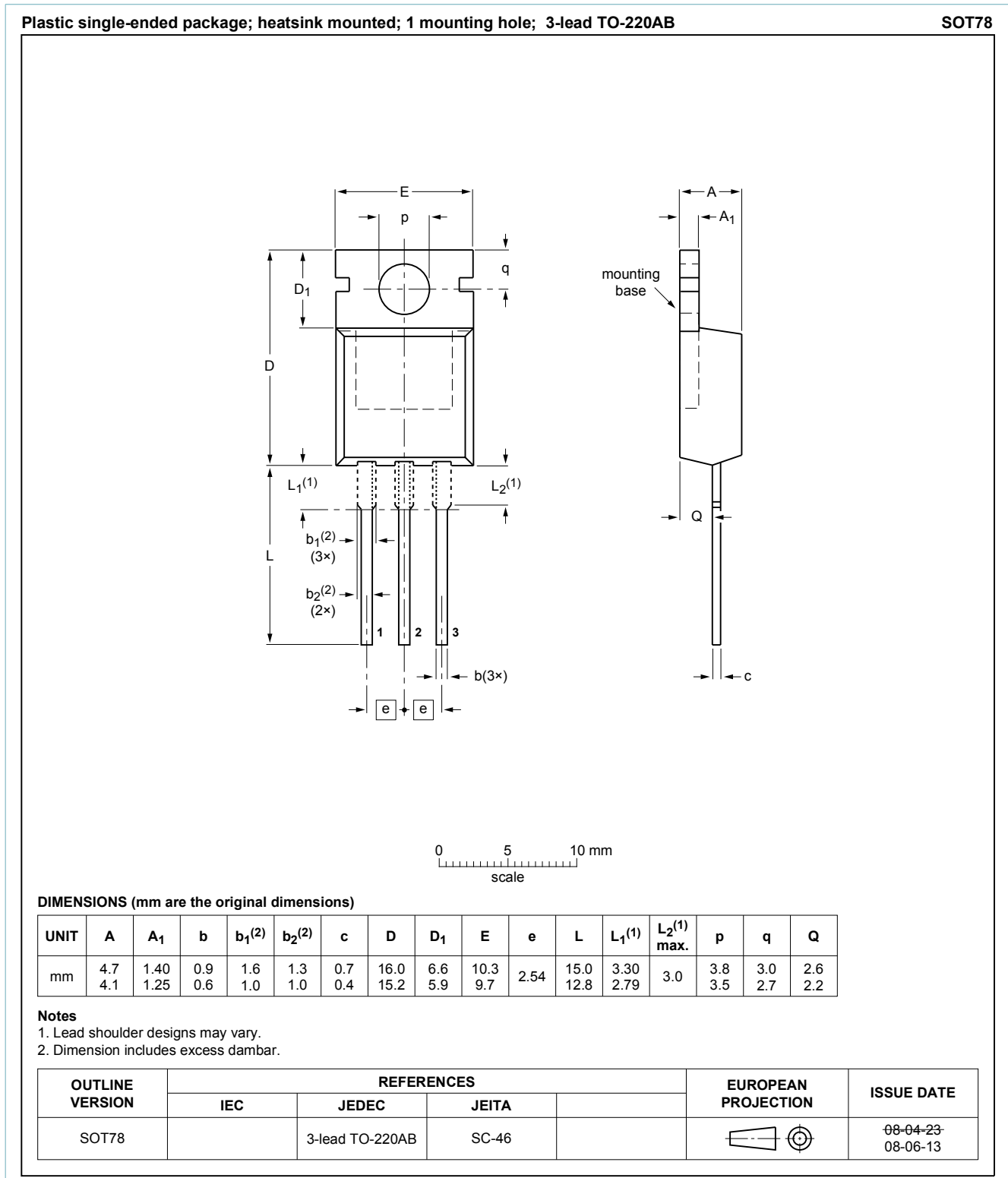
(3)  $T_j = 25 \text{ }^\circ\text{C}$ ; maximum values

**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**



**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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