

## 1. General description

Planar passivated four quadrant triac in a SOT1292 (IITO3P) package intended for use in circuits where high static and dynamic  $dV/dt$  and high  $dI/dt$  can occur. This triac will commute the full RMS current at the maximum rated junction temperature ( $T_{j(max)} = 150\text{ °C}$ ). It is used in applications where "high junction operating temperature capability" is required.

## 2. Features and benefits

- High current TRIAC
- Low thermal resistance
- High junction operating temperature capability ( $T_{j(max)} = 150\text{ °C}$ )
- High voltage capability
- Planar passivated for voltage ruggedness and reliability
- Insulated tab rated at 2500 V rms

## 3. Applications

- High current / high surge applications
- High power / industrial controls -- e.g. heating, motors, lighting

## 4. Quick reference data

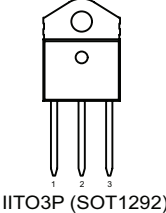

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values	Unit
<b>Absolute maximum rating</b>				
$V_{DRM}$	repetitive peak off-state voltage		800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 105\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	40	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $t_p = 20\text{ ms}$ ; $T_{j(init)} = 25\text{ °C}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	400	A
		full sine wave; $t_p = 16.7\text{ ms}$ ; $T_{j(init)} = 25\text{ °C}$ ;	440	A
$T_j$	junction temperature		150	°C

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Static characteristics</b>							
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G+; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	-	50	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G-; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	-	50	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G-; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	-	50	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G+; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	-	70	mA
$I_H$	holding current	$V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 9}$		-	-	80	mA
$V_T$	on-state voltage	$I_T = 56.6\text{ A}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 10}$		-	1.2	1.5	V
<b>Dynamic characteristics</b>							
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}; T_j = 125\text{ }^\circ\text{C}; (V_{DM} = 67\% \text{ of } V_{DRM}); \text{exponential waveform; gate open circuit}$		750	-	-	V/ $\mu\text{s}$
		$V_{DM} = 536\text{ V}; T_j = 150\text{ }^\circ\text{C}; (V_{DM} = 67\% \text{ of } V_{DRM}); \text{exponential waveform; gate open circuit}$		500	-	-	V/ $\mu\text{s}$
$dI_{com}/dt$	rate of change of commutating current	$V_D = 400\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{T(RMS)} = 20\text{ A}; dV_{com}/dt = 20\text{ V}/\mu\text{s}; \text{gate open circuit}$		20	-	-	A/ms
		$V_D = 400\text{ V}; T_j = 150\text{ }^\circ\text{C}; I_{T(RMS)} = 20\text{ A}; dV_{com}/dt = 20\text{ V}/\mu\text{s}; \text{gate open circuit}$		10	-	-	A/ms

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 ITO3P (SOT1292)	 sym051
2	T2	main terminal 2		
3	G	gate		
mb	n.c.	mounting base; isolated		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BTA41-800B	IITO3P	plastic single-ended through-hole package; isolated heatsink mounted; 1 mounting hole; 3-lead TO3P	SOT1292

## 7. Marking

Table 4. Marking codes

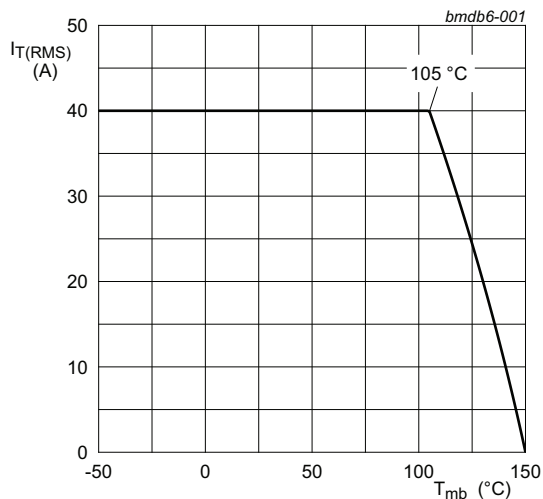
Type number	Marking codes
BTA41-800B	BTA41-800B

## 8. Limiting values

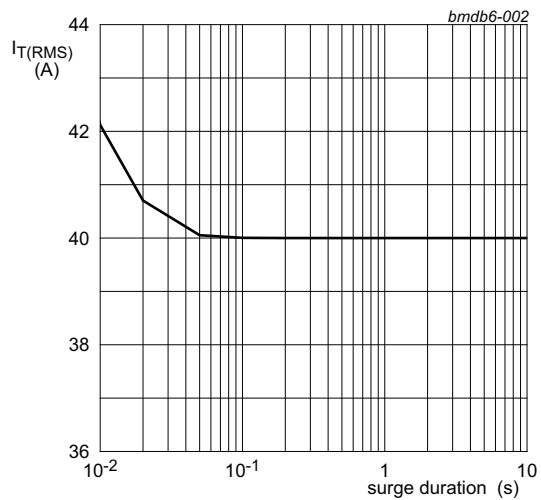
**Table 4. Limiting values**

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

Symbol	Parameter	Conditions	Values	Unit
$V_{\text{DRM}}$	repetitive peak off-state voltage		800	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 105^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	40	A
$I_{\text{TSM}}$	non-repetitive peak on-state current	full sine wave; $t_p = 20 \text{ ms}$ ; $T_{\text{j(init)}} = 25^\circ\text{C}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	400	A
		full sine wave; $t_p = 16.7 \text{ ms}$ ; $T_{\text{j(init)}} = 25^\circ\text{C}$ ;	440	A
$I^2t$	$I^2t$ for fusing	$t_p = 10 \text{ ms}$ ; sine wave	800	$\text{A}^2\text{s}$
$dI_{\text{T}}/dt$	rate of rise of on-state current	$I_{\text{G}} = 150 \text{ mA}$	150	$\text{A}/\mu\text{s}$
$I_{\text{GM}}$	peak gate current	$t_p = 20 \mu\text{s}$	8	A
$P_{\text{GM}}$	peak gate power	$t_p = 20 \mu\text{s}$	40	W
$P_{\text{G(AV)}}$	average gate power	over any 20 ms period	1	W
$T_{\text{stg}}$	storage temperature		-40 to 150	$^\circ\text{C}$
$T_{\text{j}}$	junction temperature		150	$^\circ\text{C}$

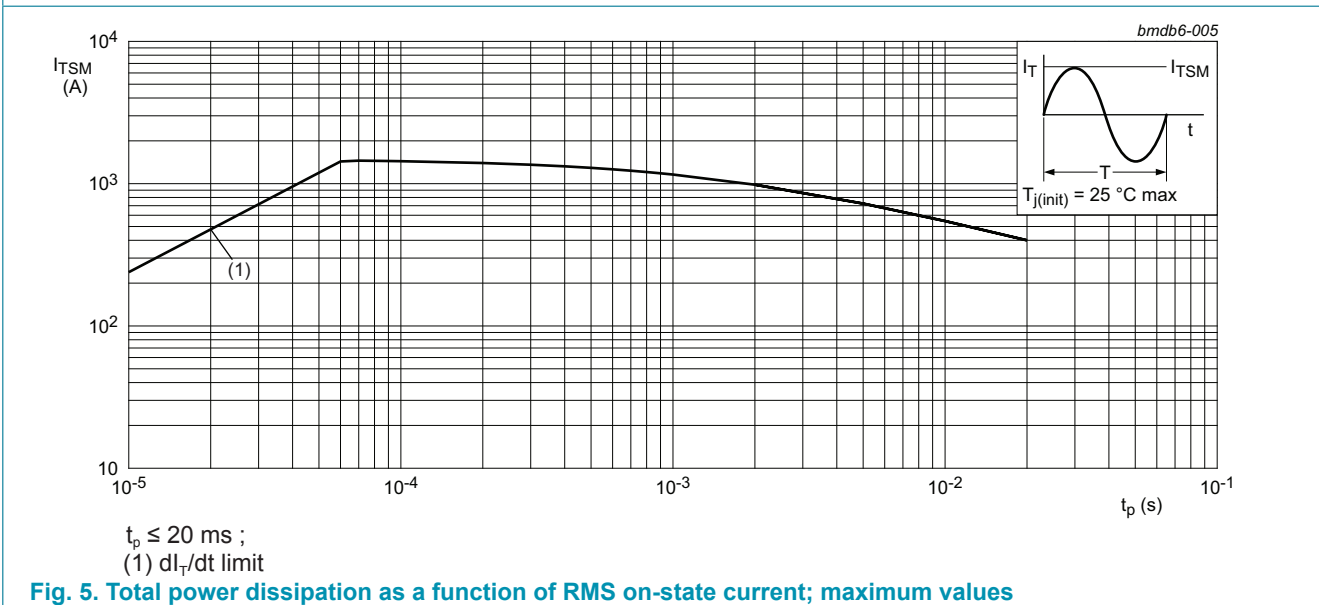
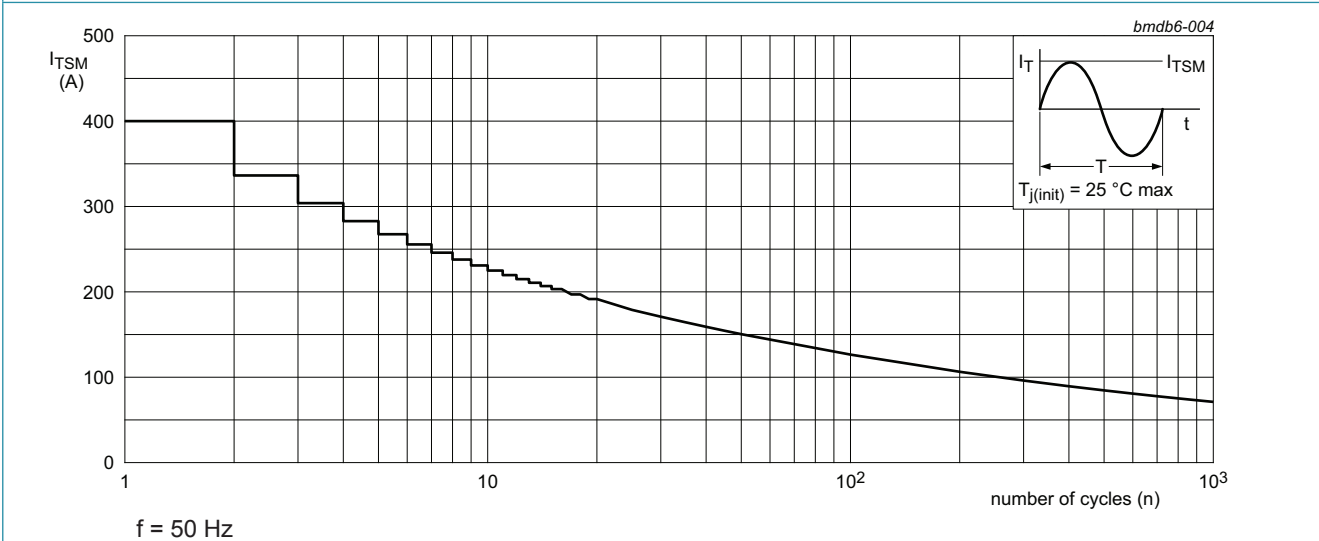
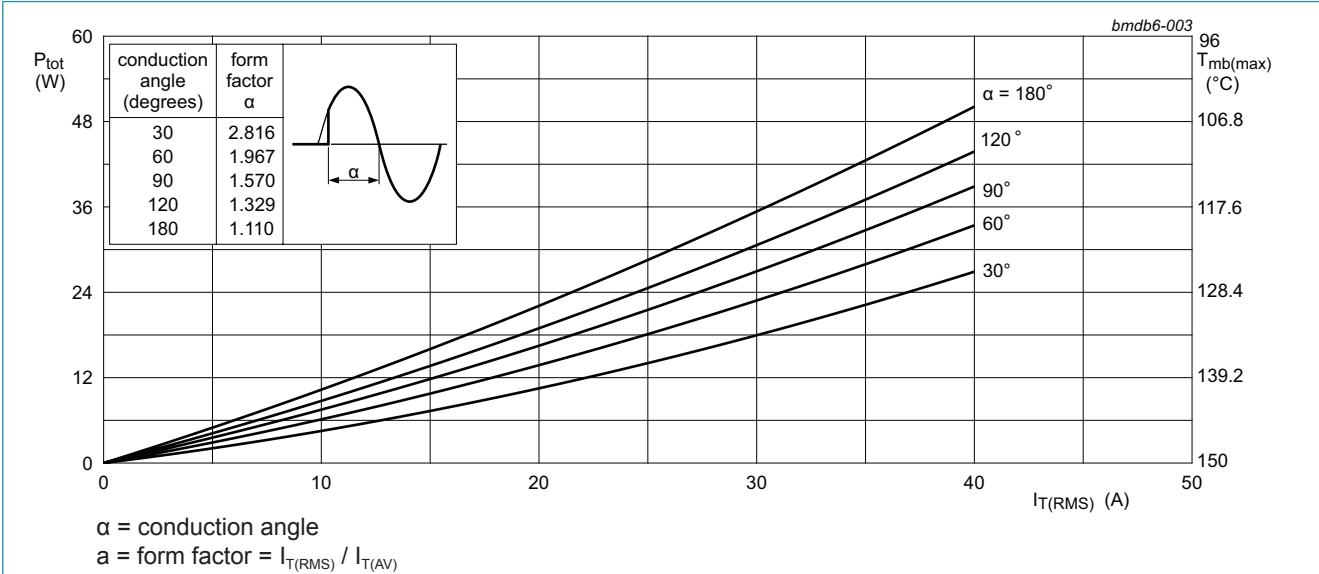


**Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values**



$f = 50 \text{ Hz}$ ;  $T_{\text{mb}} = 105^\circ\text{C}$

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



9. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	<a href="#">Fig. 6</a>		-	-	0.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	55	-	K/W

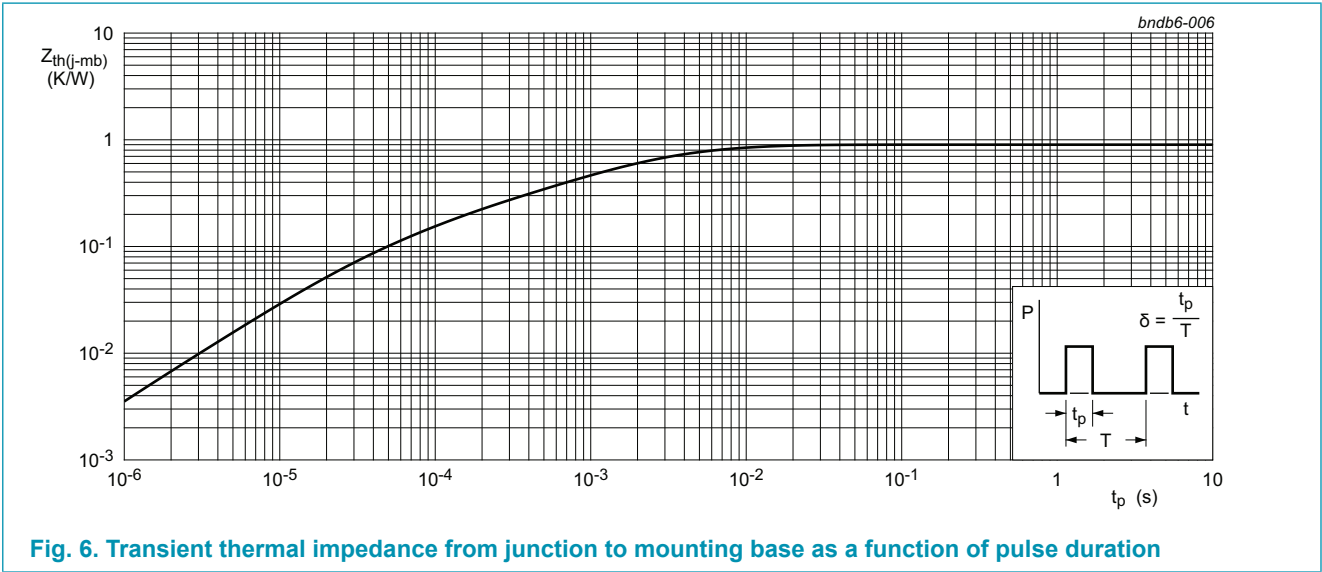


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Isolation characteristics

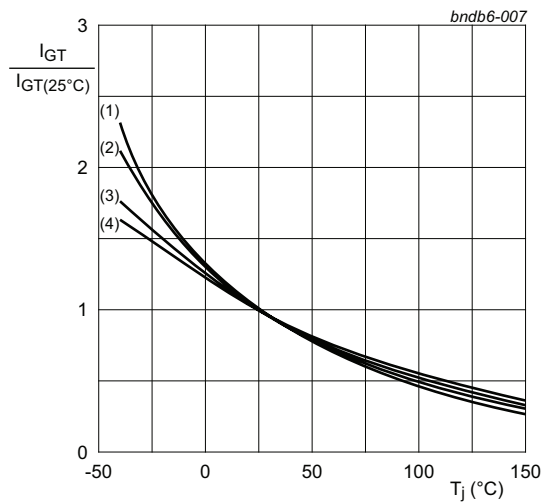
Table 6. Isolation characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminal to external heatsink; sinusoidal waveform; clean and dust free; $50\text{ Hz} \leq f \leq 60\text{ Hz}$ ; $RH \leq 65\%$ ; $T_h = 25\text{ }^\circ\text{C}$		-	-	2500	V

## 11. Characteristics

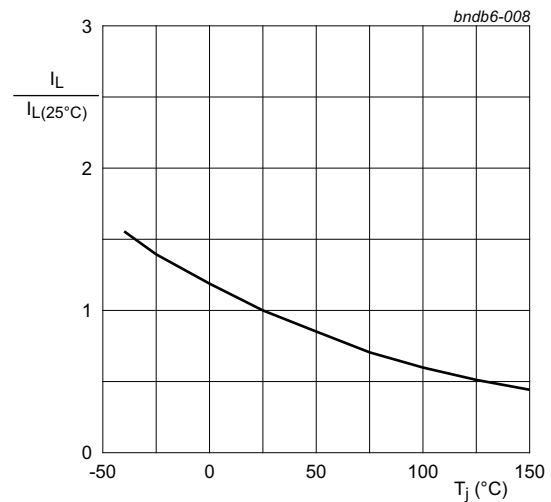
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
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>		-	-	50	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>		-	-	50	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>		-	-	50	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>		-	-	70	mA
I <sub>L</sub>	latching 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. 8</a>		-	-	100	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. 8</a>		-	-	160	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. 8</a>		-	-	100	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. 8</a>		-	-	100	mA
I <sub>H</sub>	holding current	V <sub>D</sub> = 12 V; T <sub>J</sub> = 25 °C; <a href="#">Fig. 9</a>		-	-	80	mA
V <sub>T</sub>	on-state voltage	I <sub>T</sub> = 56.6 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 10</a>		-	1.2	1.5	V
V <sub>GT</sub>	gate trigger voltage	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 11</a>		-	0.8	1.3	V
		V <sub>D</sub> = 400 V; I <sub>T</sub> = 0.1 A; T <sub>J</sub> = 150 °C; <a href="#">Fig. 11</a>		0.2	0.45	-	V
I <sub>D</sub>	off-state current	V <sub>D</sub> = 800 V; T <sub>J</sub> = 25 °C		-	-	10	μA
		V <sub>D</sub> = 800 V; T <sub>J</sub> = 150 °C		-	-	2.5	mA
Dynamic characteristics							
dV <sub>D</sub> /dt	rate of rise of off-state voltage	V <sub>DM</sub> = 536 V; T <sub>J</sub> = 125 °C; (V <sub>DM</sub> = 67% of V <sub>DRM</sub> ); exponential waveform; gate open circuit		750	-	-	V/μs
		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		500	-	-	V/μs
dI <sub>com</sub> /dt	rate of change of commutating current	V <sub>D</sub> = 400 V; T <sub>J</sub> = 125 °C; I <sub>T(RMS)</sub> = 20A; dV <sub>com</sub> /dt = 20 V/μs; gate open circuit		20	-	-	A/ms
		V <sub>D</sub> = 400 V; T <sub>J</sub> = 150 °C; I <sub>T(RMS)</sub> = 20A; dV <sub>com</sub> /dt = 20 V/μs; gate open circuit		10	-	-	A/ms

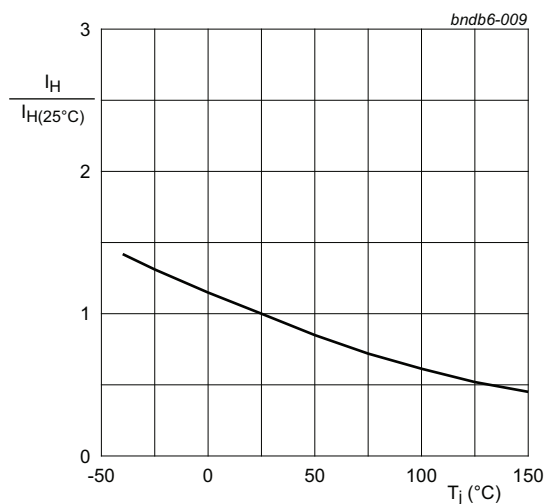


- (1) T2- G+
- (2) T2- G-
- (3) T2+ G-
- (4) T2+ G+

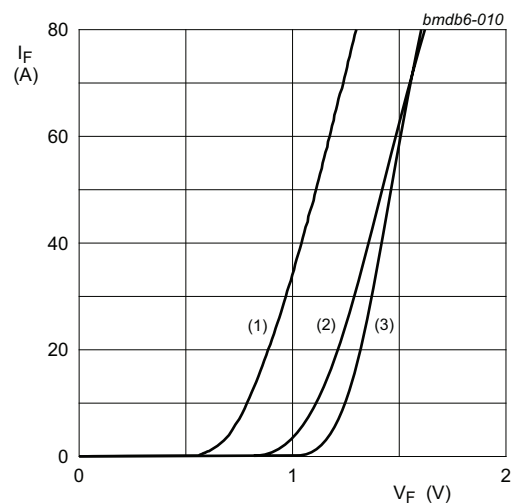
**Fig. 7. Normalized gate trigger current as a function of junction temperature**



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



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



$V_o = 1.063 \text{ V}$ ;  $R_s = 0.0074 \text{ } \Omega$

(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**

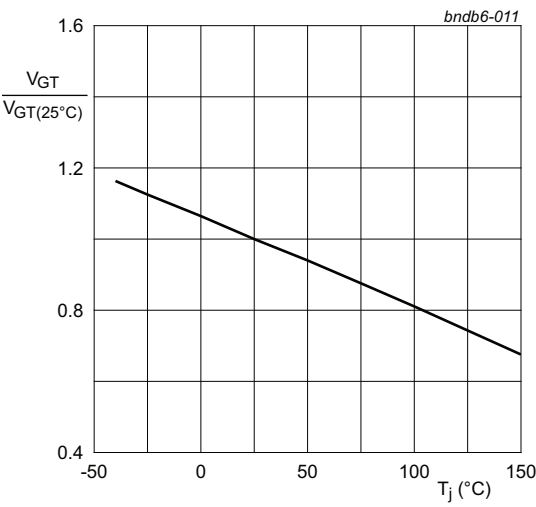


Fig. 11. Normalized gate trigger voltage as a function of junction temperature



12. Package outline

Plastic single-ended through-hole package; isolated heatsink mounted; 1 mounting hole; 3 -lead TO3P

SOT1292

The technical drawing shows the package outline for the BTA41-800B. The top view (left) shows a rectangular body with a circular mounting hole of diameter ØL. Dimensions include H (total width), R (radius of the mounting hole), K (width of the mounting hole area), L (height of the body), and J (pitch of the three leads). The side view (right) shows the profile of the package with dimensions A (total height), B (height of the mounting hole area), E (height of the body), D (height of the leads), and a 0.6mm dimension at the base of the leads.

Unit		A	B	C	D	E	F	G	H	J	K	L	P	R
mm	min	4.75	1.45	14.35	0.50	2.70	15.80	20.40	15.10	5.40	3.40	4.08	1.20	4.6 (typ.)
	max	4.95	1.55	15.60	0.70	2.90	16.50	21.10	15.50	5.65	3.65	4.17	1.40	

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT1292		-				

## 13. 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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