

# BTA316B-800C

## 3Q Hi-Com Triac

Rev. 02 — 29 November 2010

Product data sheet

## 1. Product profile

### 1.1 General description

Planar passivated high commutation three quadrant triac in a SOT404 plastic package intended for use in circuits where high static and dynamic dV/dt and high di/dt can occur. This "series C" triac will commutate the full RMS current at the maximum rated junction temperature without the aid of a snubber.

### 1.2 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 voltage capability
- Planar passivated for voltage ruggedness and reliability
- Surface mountable package
- Triggering in three quadrants only

### 1.3 Applications

- Electronic thermostats (heating and cooling)
- High power motor controls e.g. washing machines and vacuum cleaners
- Rectifier-fed DC inductive loads e.g. DC motors and solenoids

### 1.4 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; $T_{j(init)} = 25^\circ\text{C}$ ; $t_p = 20\text{ ms}$ ; see <a href="#">Figure 4</a> ; see <a href="#">Figure 5</a>	-	-	140	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 101^\circ\text{C}$ ; see <a href="#">Figure 3</a> ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	-	16	A

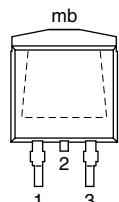
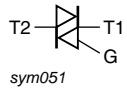


**Table 1.** Quick reference data ...*continued*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12 \text{ V}$ ; $I_T = 0.1 \text{ A}$ ; $T2+ G+$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 7</a>	2	-	35	mA
		$V_D = 12 \text{ V}$ ; $I_T = 0.1 \text{ A}$ ; $T2+ G-$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 7</a>	2	-	35	mA
		$V_D = 12 \text{ V}$ ; $I_T = 0.1 \text{ A}$ ; $T2- G-$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 7</a>	2	-	35	mA

## 2. 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		 sym051

**SOT404 (D2PAK)**

## 3. Ordering information

**Table 3.** Ordering information

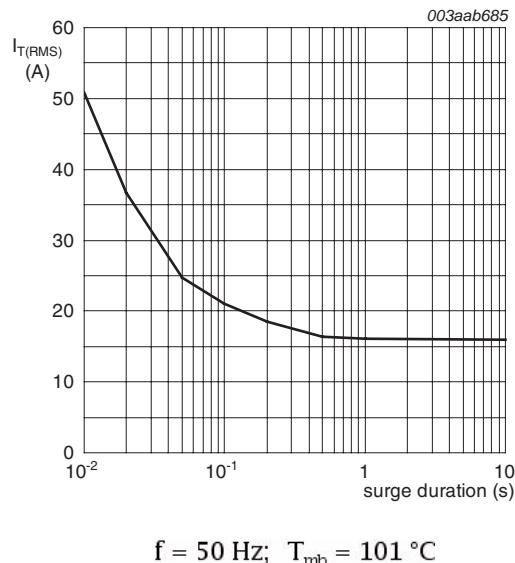
Type number	Package		
	Name	Description	Version
BTA316B-800C	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

## 4. Limiting values

**Table 4. Limiting values**

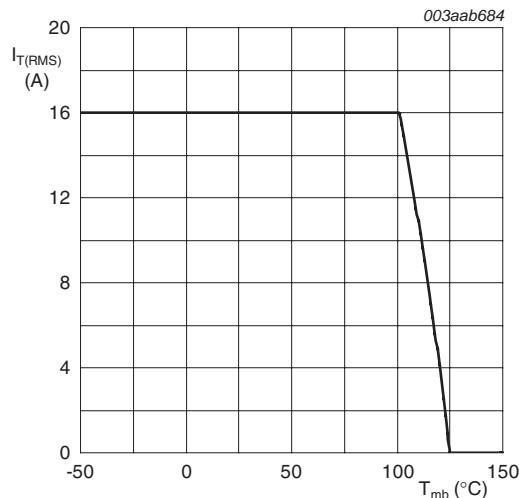
In accordance with the Absolute Maximum Rating System (IEC 60134).

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; $T_{mb} \leq 101^{\circ}\text{C}$ ; see <a href="#">Figure 3</a> ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	16	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25^{\circ}\text{C}$ ; $t_p = 20\text{ ms}$ ; see <a href="#">Figure 4</a> ; see <a href="#">Figure 5</a>	-	140	A
		full sine wave; $T_{j(\text{init})} = 25^{\circ}\text{C}$ ; $t_p = 16.7\text{ ms}$	-	150	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; sine-wave pulse	-	98	$\text{A}^2\text{s}$
$dI_T/dt$	rate of rise of on-state current	$I_T = 20\text{ A}$ ; $I_G = 0.2\text{ A}$ ; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$	-	100	$\text{A}/\mu\text{s}$
$I_{GM}$	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	$^{\circ}\text{C}$
$T_j$	junction temperature		-	125	$^{\circ}\text{C}$



$f = 50\text{ Hz}$ ;  $T_{mb} = 101^{\circ}\text{C}$

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



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

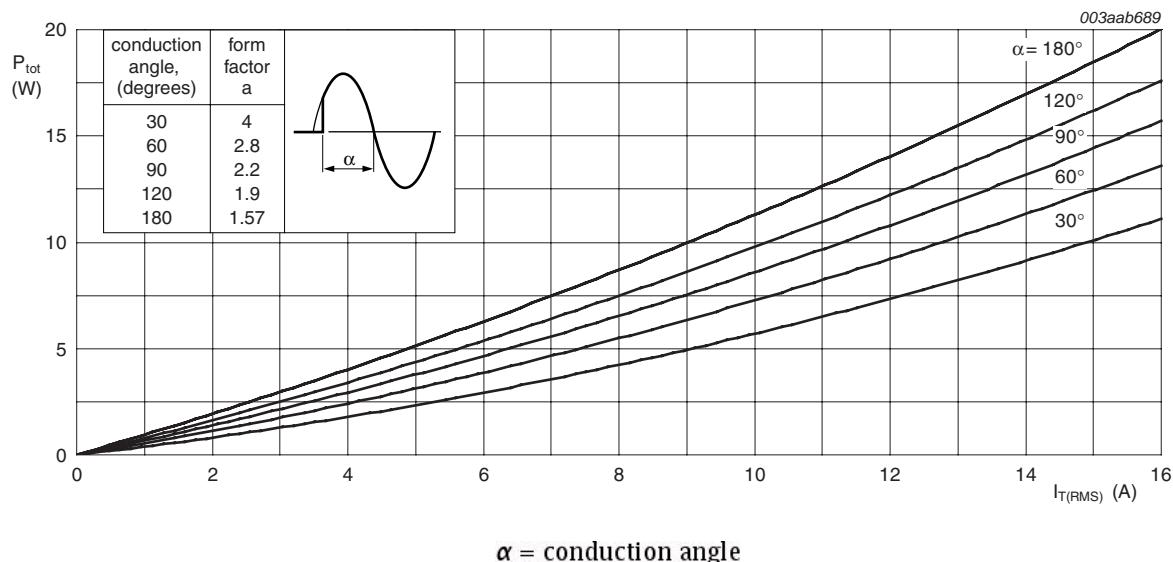


Fig 3. Total power dissipation as a function of RMS on-state current; maximum values

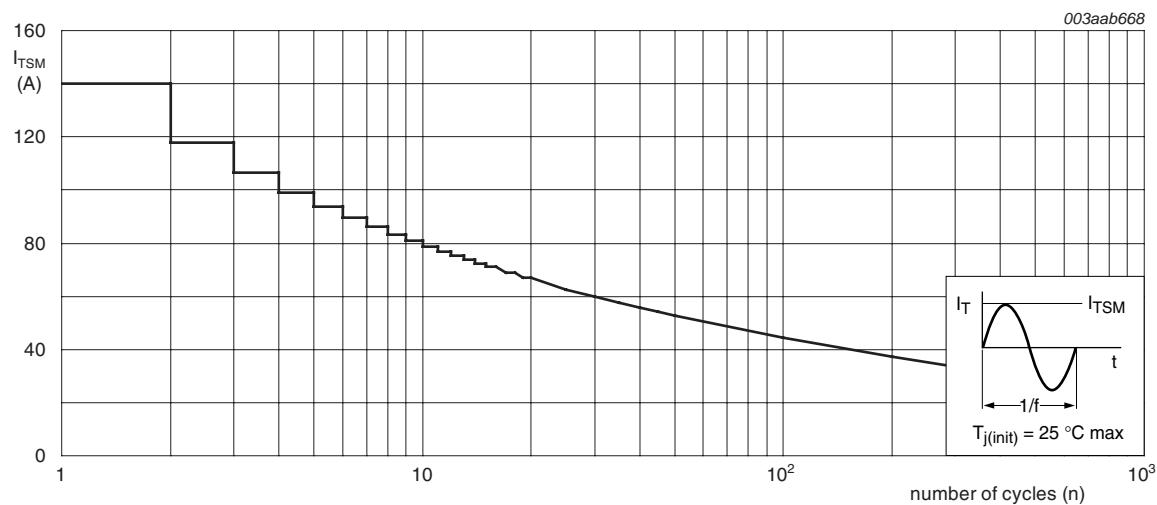


Fig 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

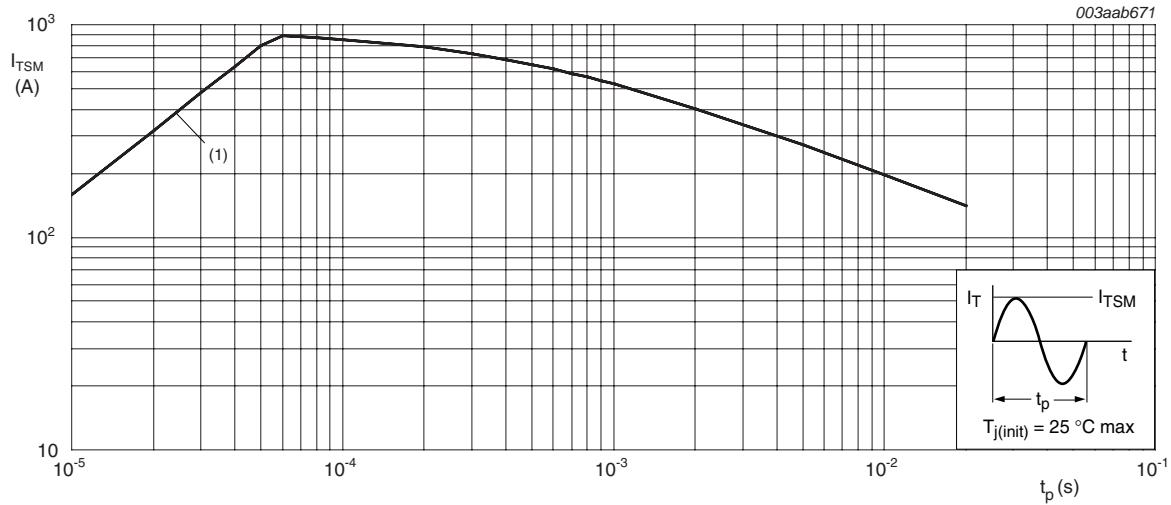
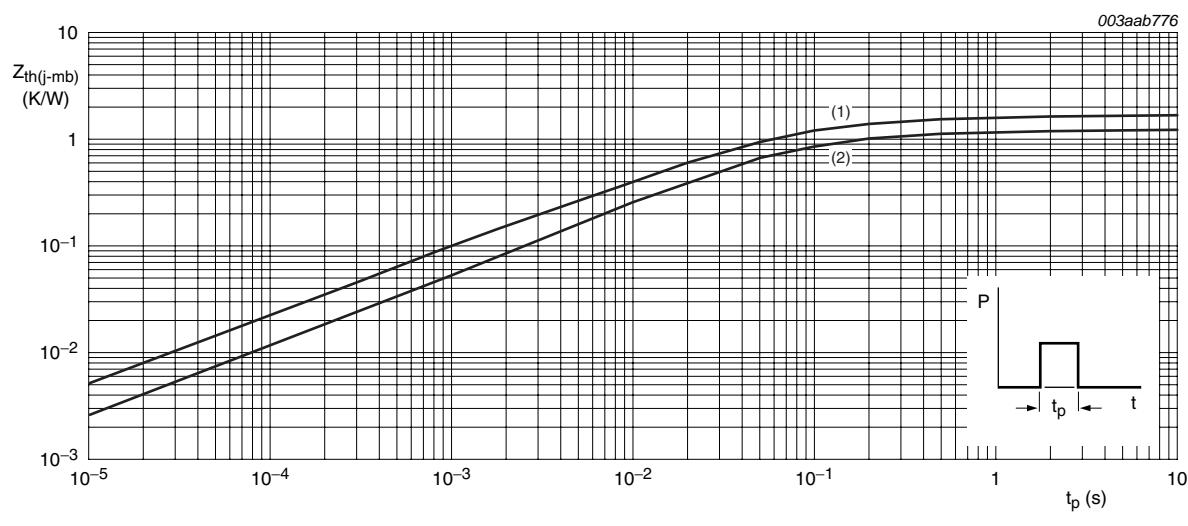


Fig 5. Non-repetitive peak on-state current as a function of pulse duration; maximum values

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; see <a href="#">Figure 6</a>	-	-	1.2	K/W
		half cycle; see <a href="#">Figure 6</a>	-	-	1.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	printed circuit board mounted; minimum footprint	-	55	-	K/W

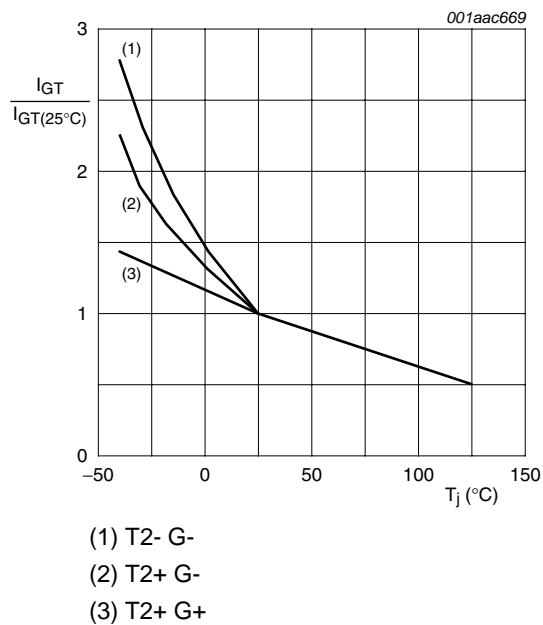


**Fig 6. Transient thermal impedance from junction to mounting base as a function of pulse duration**

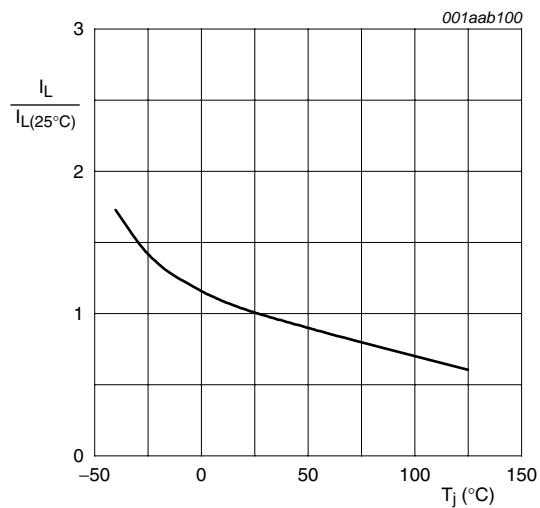
## 6. Characteristics

**Table 6. Characteristics**

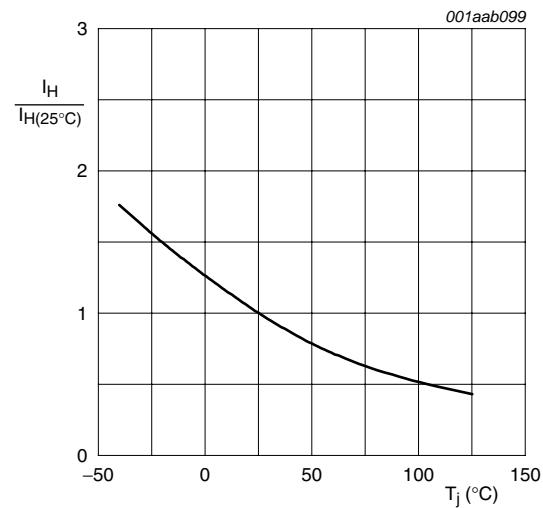
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12 \text{ V}$ ; $I_T = 0.1 \text{ A}$ ; $T2+ G+$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 7</a>	2	-	35	mA
		$V_D = 12 \text{ V}$ ; $I_T = 0.1 \text{ A}$ ; $T2+ G-$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 7</a>	2	-	35	mA
		$V_D = 12 \text{ V}$ ; $I_T = 0.1 \text{ A}$ ; $T2- G-$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 7</a>	2	-	35	mA
$I_L$	latching current	$V_D = 12 \text{ V}$ ; $I_G = 0.1 \text{ A}$ ; $T2+ G+$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 8</a>	-	-	50	mA
		$V_D = 12 \text{ V}$ ; $I_G = 0.1 \text{ A}$ ; $T2+ G-$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 8</a>	-	-	60	mA
		$V_D = 12 \text{ V}$ ; $I_G = 0.1 \text{ A}$ ; $T2- G-$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 8</a>	-	-	50	mA
$I_H$	holding current	$V_D = 12 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 9</a>	-	-	35	mA
$V_T$	on-state voltage	$I_T = 18 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 10</a>	-	1.3	1.5	V
$V_{GT}$	gate trigger voltage	$V_D = 12 \text{ V}$ ; $I_T = 0.1 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 11</a>	-	0.8	1.5	V
		$V_D = 400 \text{ V}$ ; $I_T = 0.1 \text{ A}$ ; $T_j = 125 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 11</a>	0.25	0.4	-	V
$I_D$	off-state current	$V_D = 800 \text{ V}$ ; $T_j = 125 \text{ }^\circ\text{C}$	-	0.1	0.5	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536 \text{ V}$ ; $T_j = 125 \text{ }^\circ\text{C}$ ; exponential waveform; gate open circuit	500	-	-	V/μs
$dl_{com}/dt$	rate of change of commutating current	$V_D = 400 \text{ V}$ ; $T_j = 125 \text{ }^\circ\text{C}$ ; $I_{T(RMS)} = 16 \text{ A}$ ; $dV_{com}/dt = 20 \text{ V/}\mu\text{s}$ ; "without snubber" condition; gate open circuit	15	-	-	A/ms
$t_{gt}$	gate-controlled turn-on time	$I_{TM} = 20 \text{ A}$ ; $V_D = 800 \text{ V}$ ; $I_G = 0.1 \text{ A}$ ; $dI_G/dt = 5 \text{ A/}\mu\text{s}$	-	2	-	μs



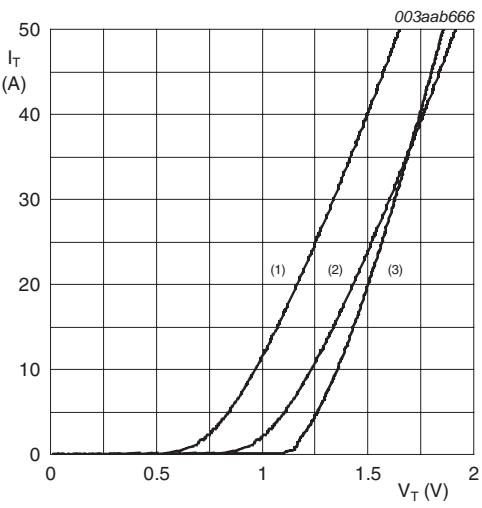
**Fig 7.** Normalized gate trigger current as a function of junction temperature



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



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



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

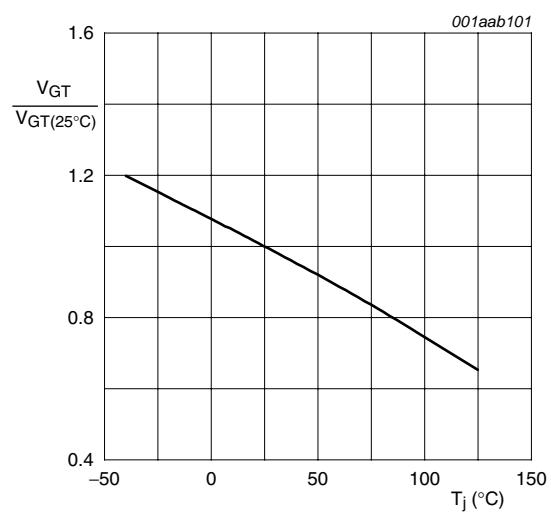
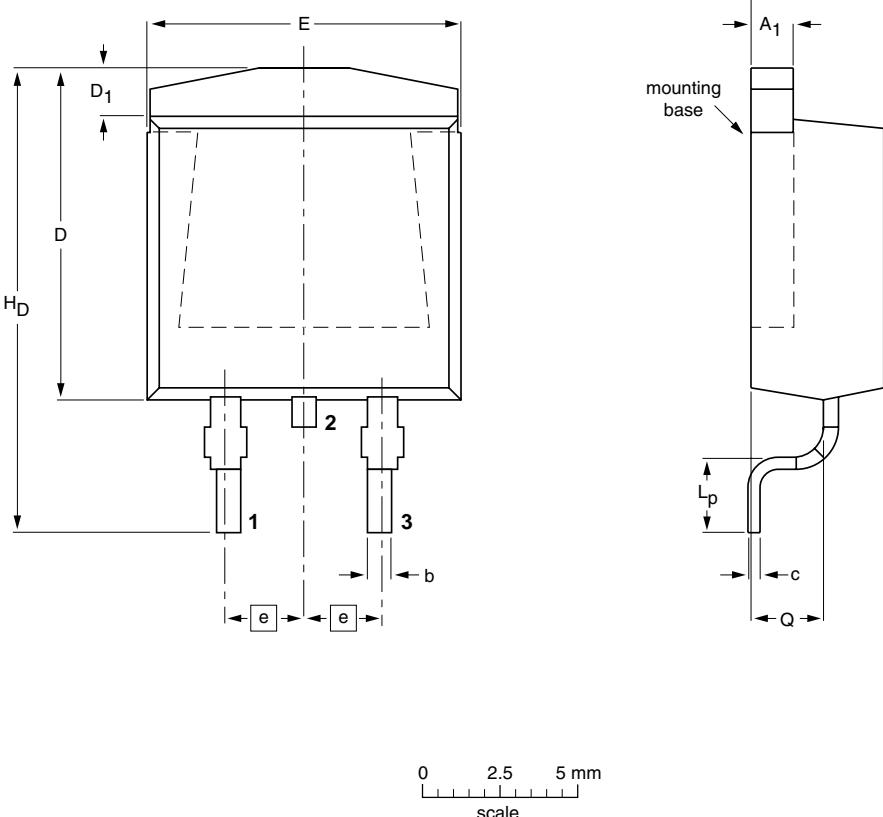


Fig 11. Normalized gate trigger voltage as a function of junction temperature

## 7. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)

SOT404



### DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b	c	D <sub>max.</sub>	D <sub>1</sub>	E	e	L <sub>p</sub>	H <sub>D</sub>	Q
mm	4.50 4.10	1.40 1.27	0.85 0.60	0.64 0.46	11	1.60 1.20	10.30 9.70	2.54	2.90 2.10	15.80 14.80	2.60 2.20

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT404						05-02-11 06-03-16

Fig 12. Package outline SOT404 (D2PAK)

## 8. Revision history

**Table 7. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BTA316B-800C v.2	20101129	Product data sheet	-	BTA316B_SER_B_C_E v.1
Modifications:	<ul style="list-style-type: none"><li>• Type number BTA316B-800C separated from data sheet BTA316B_SER_B_C_E v.1.</li><li>• Various changes to content.</li></ul>			
BTA316B_SER_B_C_E v.1	20070419	Product data sheet	-	-

## 9. Legal information

### 9.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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