

BTA316B-600C

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 rated 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		-	-	600	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25 \text{ }^{\circ}\text{C}$; $t_p = 20 \text{ ms}$; see Figure 4 ; see Figure 5	-	-	140	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 101 \text{ }^{\circ}\text{C}$; see Figure 3 ; see Figure 1 ; see Figure 2	-	-	16	A

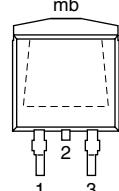
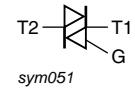


Table 1. Quick reference data ...*continued*

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+; $T_j = 25^\circ\text{C}$; see Figure 7	2	-	35	mA
		$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; T2+ G-; $T_j = 25^\circ\text{C}$; see Figure 7	2	-	35	mA
		$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; T2- G-; $T_j = 25^\circ\text{C}$; see Figure 7	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		

SOT404 (D2PAK)

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BTA316B-600C	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		-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 101^\circ\text{C}$; see Figure 3 ; see Figure 1 ; see Figure 2	-	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 Figure 4 ; see Figure 5	-	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	A^2s
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	$^\circ\text{C}$

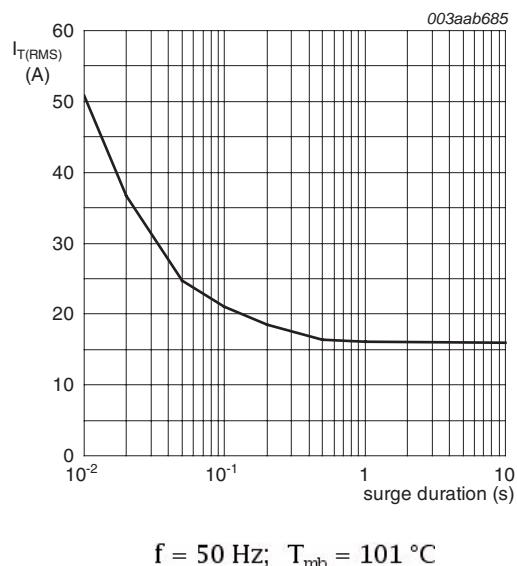


Fig 1. RMS on-state current as a function of surge duration; maximum values

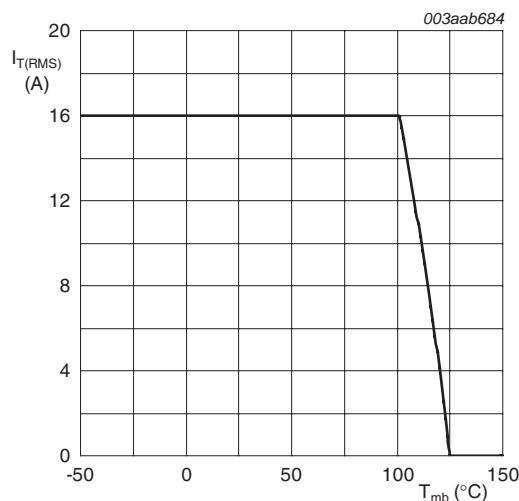


Fig 2. RMS on-state current as a function of mounting base temperature; maximum values

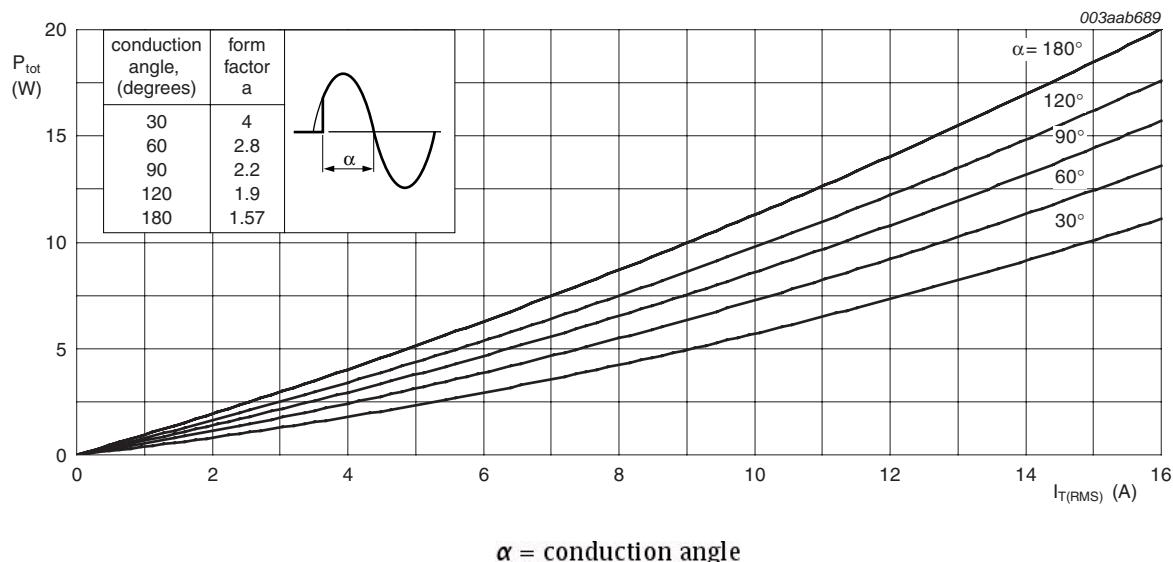


Fig 3. Total power dissipation as a function of RMS on-state current; maximum values

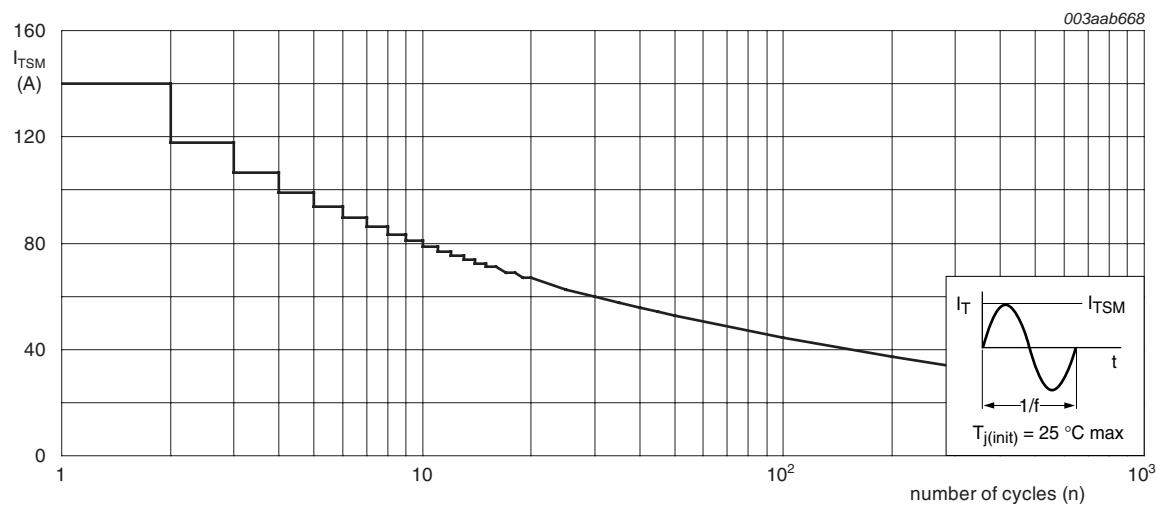


Fig 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

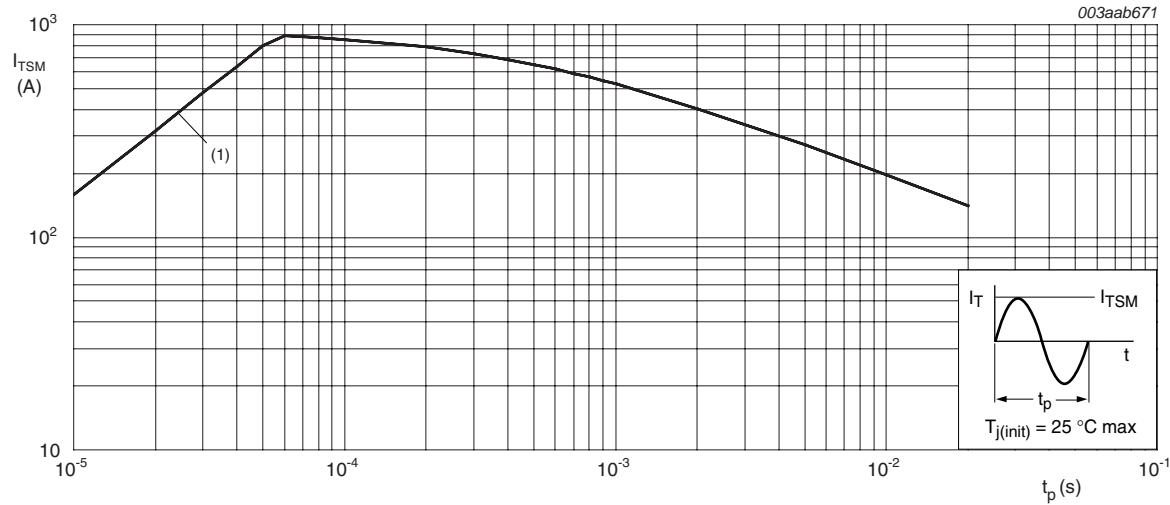


Fig 5. Non-repetitive peak on-state current as a function of pulse duration; maximum values

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 Figure 6	-	-	1.2	K/W
		half cycle; see Figure 6	-	-	1.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	printed circuit board mounted; minimum footprint	-	55	-	K/W

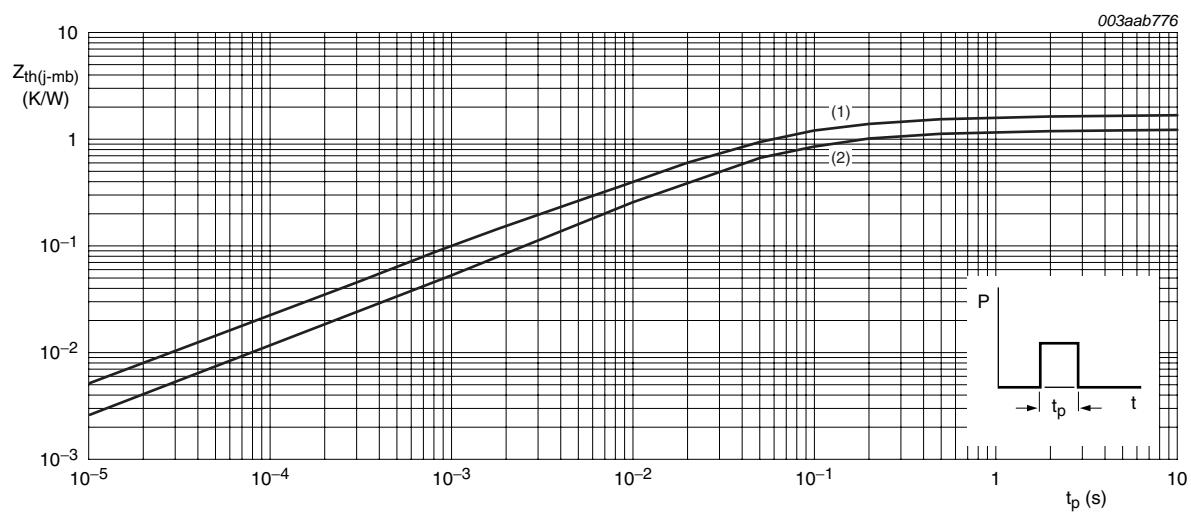


Fig 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; $T2+ G+$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 7	2	-	35	mA
		$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; $T2+ G-$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 7	2	-	35	mA
		$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; $T2- G-$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 7	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 Figure 8	-	-	50	mA
		$V_D = 12 \text{ V}$; $I_G = 0.1 \text{ A}$; $T2+ G-$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 8	-	-	60	mA
		$V_D = 12 \text{ V}$; $I_G = 0.1 \text{ A}$; $T2- G-$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 8	-	-	50	mA
I_H	holding current	$V_D = 12 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 9	-	-	35	mA
V_T	on-state voltage	$I_T = 18 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 10	-	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 Figure 11	-	0.8	1.5	V
		$V_D = 400 \text{ V}$; $I_T = 0.1 \text{ A}$; $T_j = 125 \text{ }^\circ\text{C}$; see Figure 11	0.25	0.4	-	V
I_D	off-state current	$V_D = 600 \text{ V}$; $T_j = 125 \text{ }^\circ\text{C}$	-	0.1	0.5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402 \text{ V}$; $T_j = 125 \text{ }^\circ\text{C}$; 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	$I_{TM} = 20 \text{ A}$; $V_D = 600 \text{ V}$; $I_G = 0.1 \text{ A}$; $dl_G/dt = 5 \text{ A/}\mu\text{s}$	-	2	-	μs

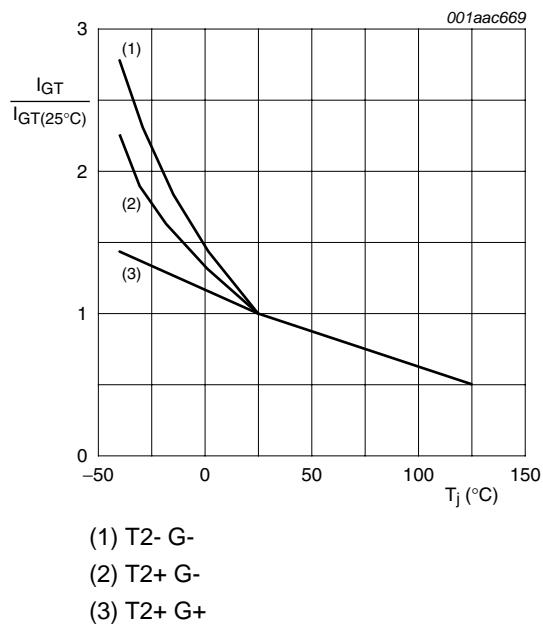


Fig 7. Normalized gate trigger current as a function of junction temperature

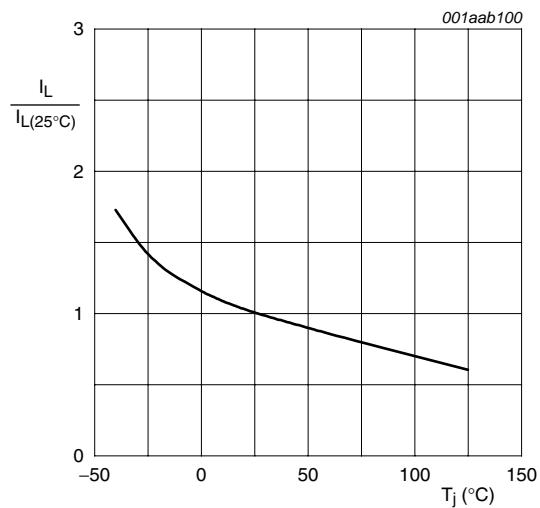


Fig 8. Normalized latching current as a function of junction temperature

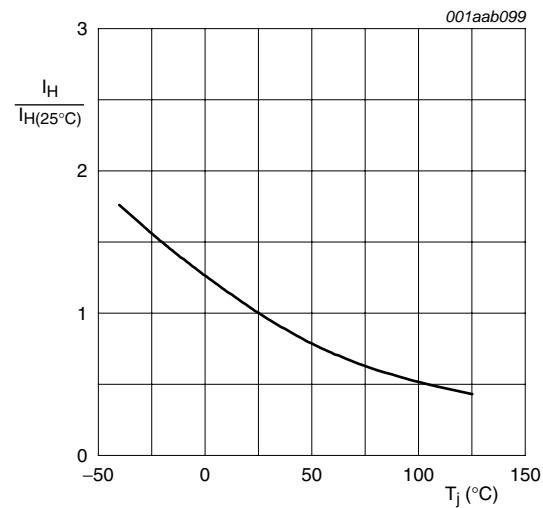


Fig 9. Normalized holding current as a function of junction temperature

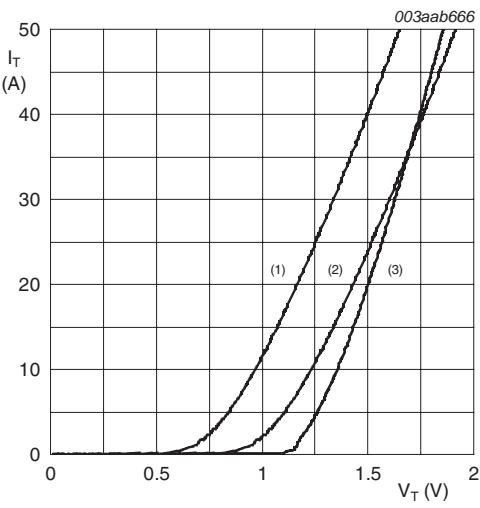


Fig 10. On-state current as a function of on-state voltage

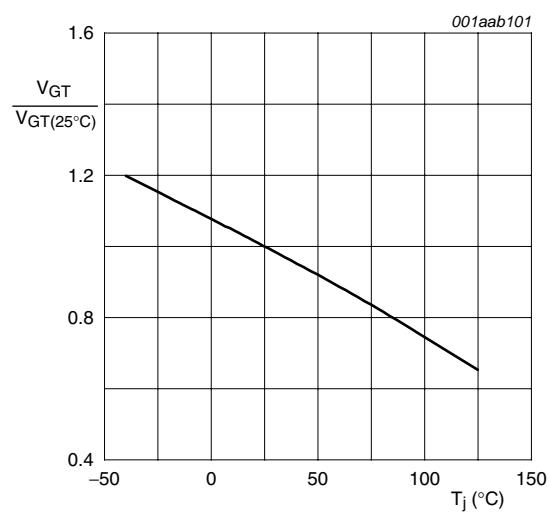
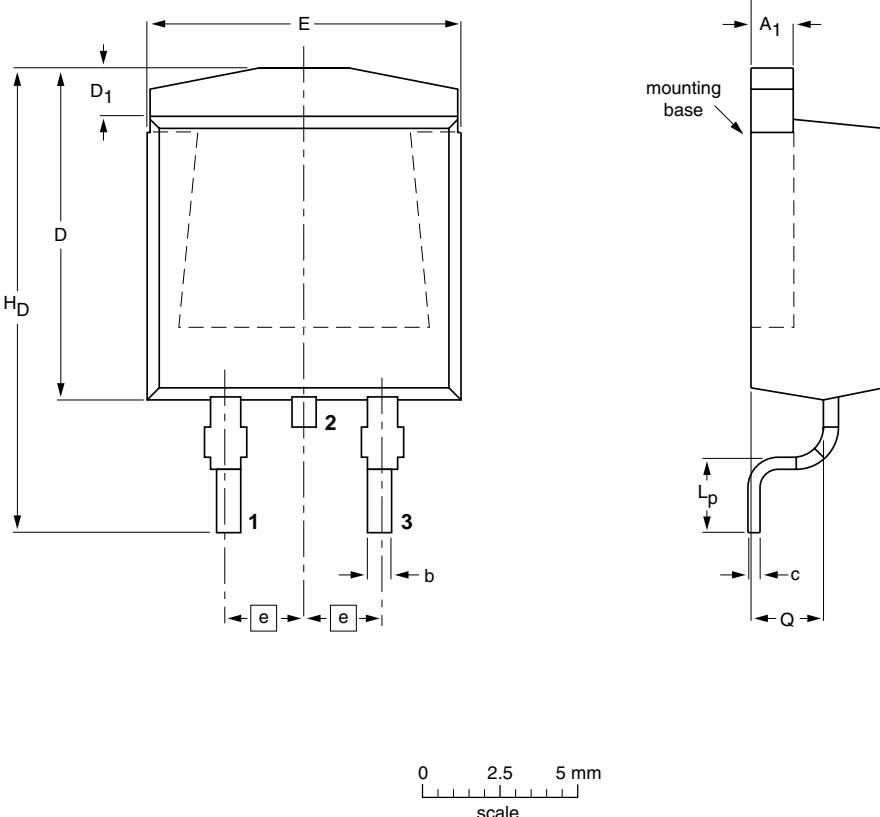


Fig 11. Normalized gate trigger voltage as a function of junction temperature

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 ₁	b	c	D _{max.}	D ₁	E	e	L _p	H _D	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-600C v.2	20101129	Product data sheet	-	BTA316B_SER_B_C_E v.1
Modifications:	<ul style="list-style-type: none">• Type number BTA316B-600C separated from data sheet BTA316B_SER_B_C_E v.1.• Various changes to content.			
BTA316B_SER_B_C_E v.1	20070419	Product data sheet	-	-

9. Legal information

9.1 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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