

BTA316B-800E

3Q Hi-Com Triac

Rev. 02 — 25 November 2010

Product data sheet

1. Product profile

1.1 General description

Planar passivated high commutation three quadrant triac in a SOT404 plastic package. This "series E" triac balances the requirements of commutation performance and gate sensitivity. The "sensitive gate" "series E" is intended for interfacing with low power drivers including microcontrollers.

1.2 Features and benefits

- 3Q technology for improved noise immunity
- Direct interfacing with low power drivers and microcontrollers
- Good immunity to false turn-on by dV/dt
- High commutation capability with sensitive gate
- 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

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; $T_{\text{j}(\text{init})} = 25\text{ °C}$; $t_{\text{p}} = 20\text{ ms}$; see Figure 4 ; see Figure 5	-	-	140	A
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 101\text{ °C}$; see Figure 3 ; see Figure 1 ; see Figure 2	-	-	16	A

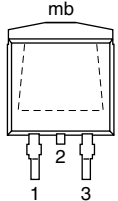
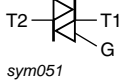


Table 1. Quick reference data ...continued

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+; $T_j = 25\text{ }^\circ\text{C}$; see Figure 7	-	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ }^\circ\text{C}$; see Figure 7	-	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; see Figure 7	-	-	10	mA

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1		 sym051
2	T2	main terminal 2		
3	G	gate		
mb	T2	mounting base; main terminal 2		

SOT404 (D2PAK)

3. Ordering information

Table 3. Ordering information

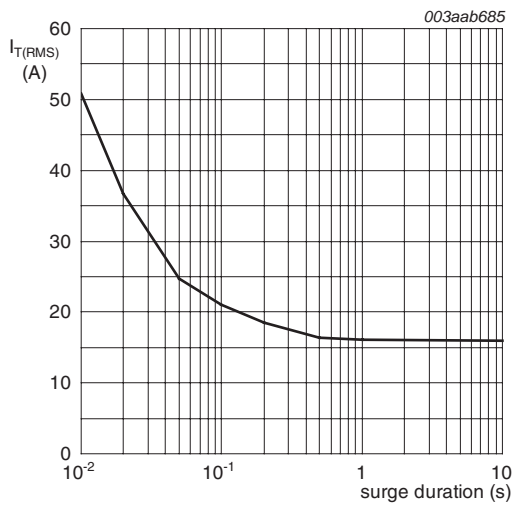
Type number	Package		Version
	Name	Description	
BTA316B-800E	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

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



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

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

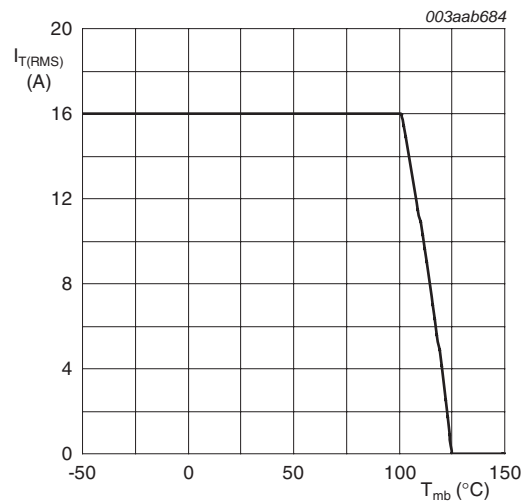


Fig 2. RMS on-state current as a function of mounting base temperature; maximum values

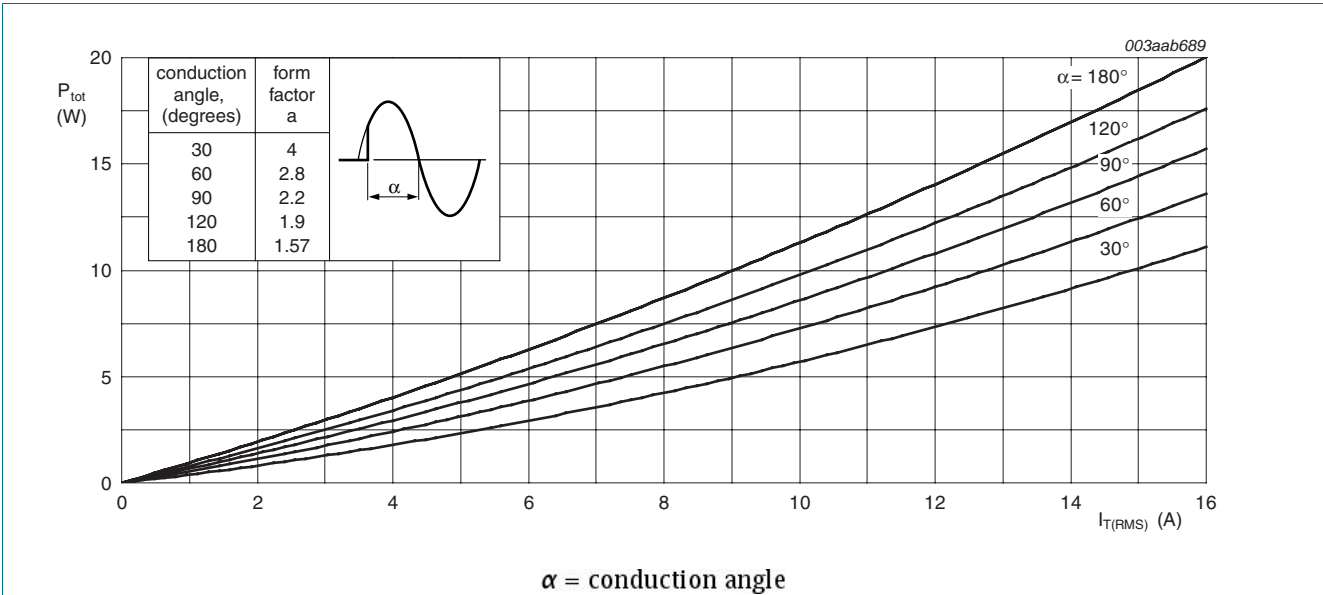


Fig 3. Total power dissipation as a function of RMS on-state current; maximum values

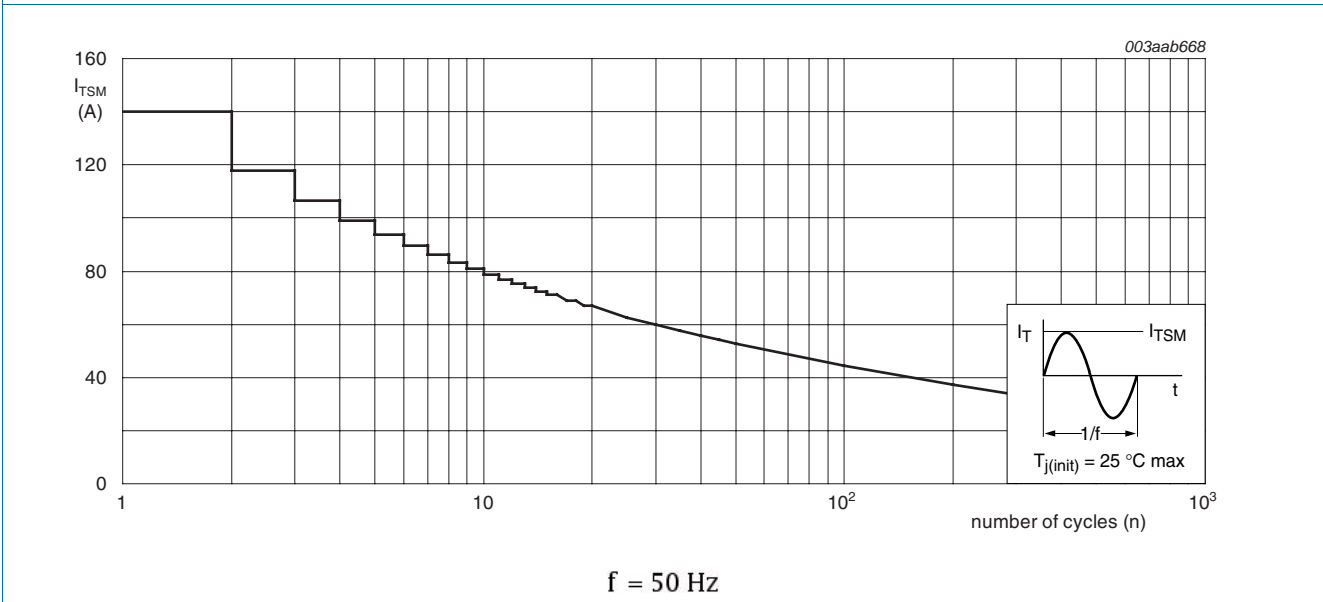
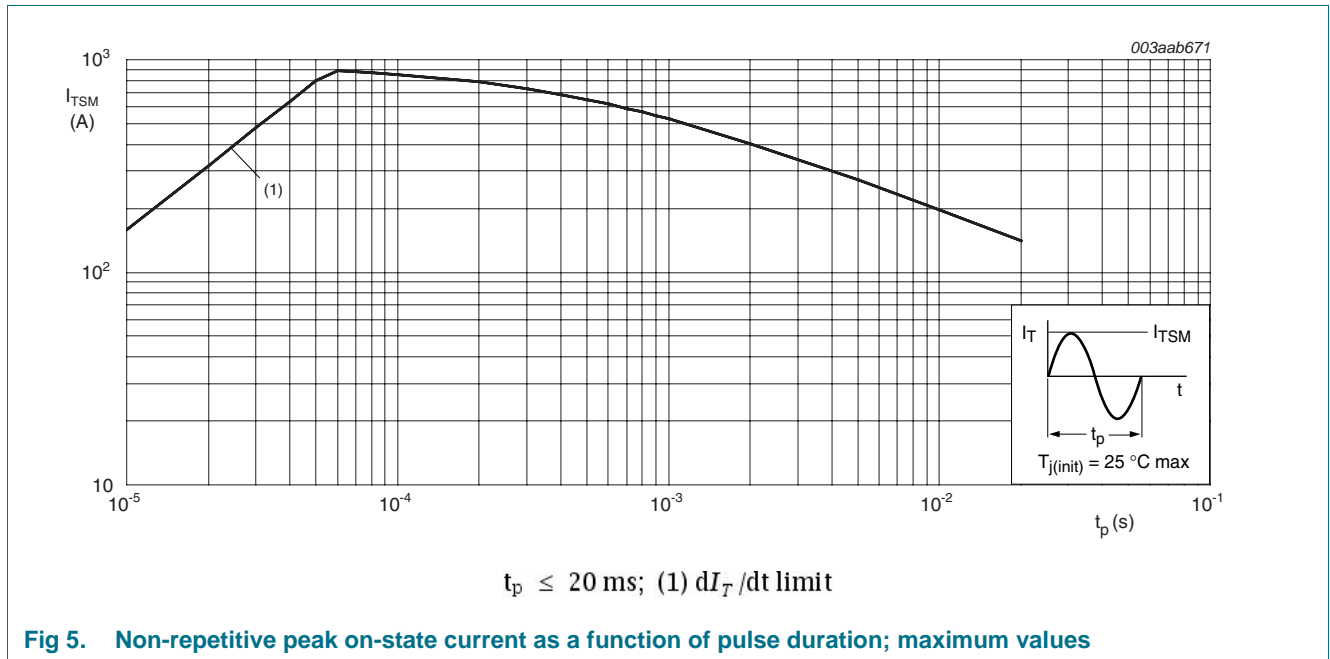


Fig 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



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

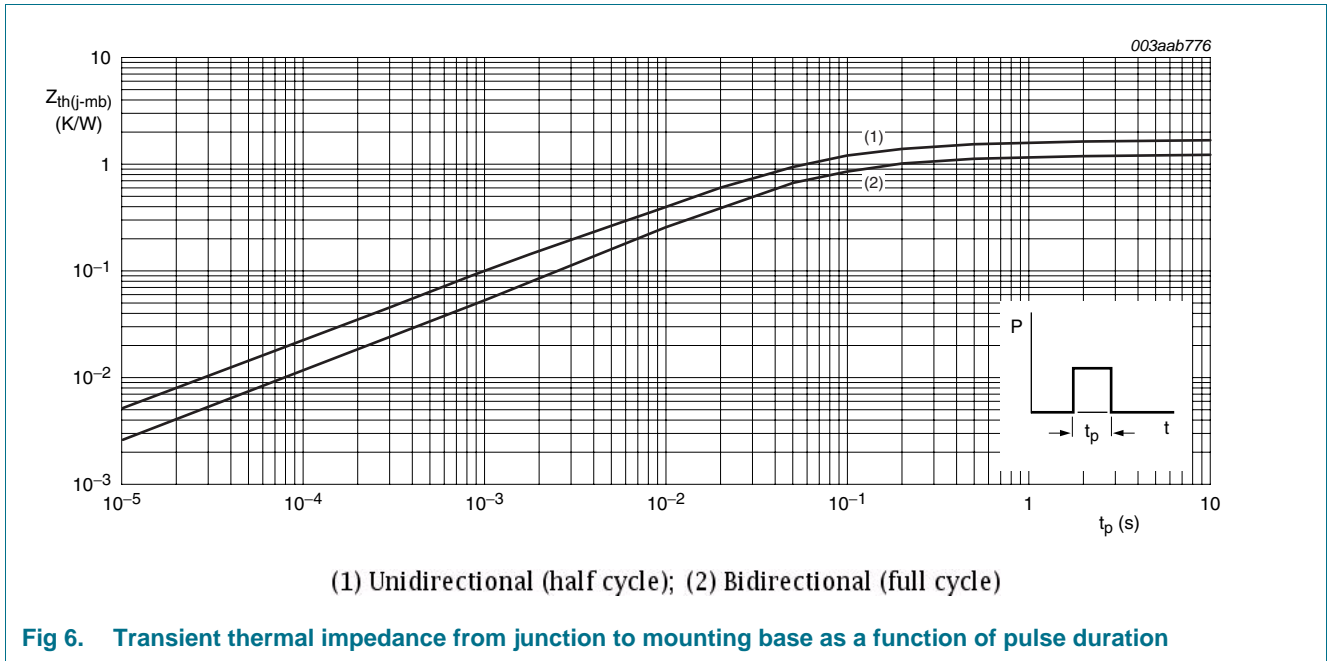
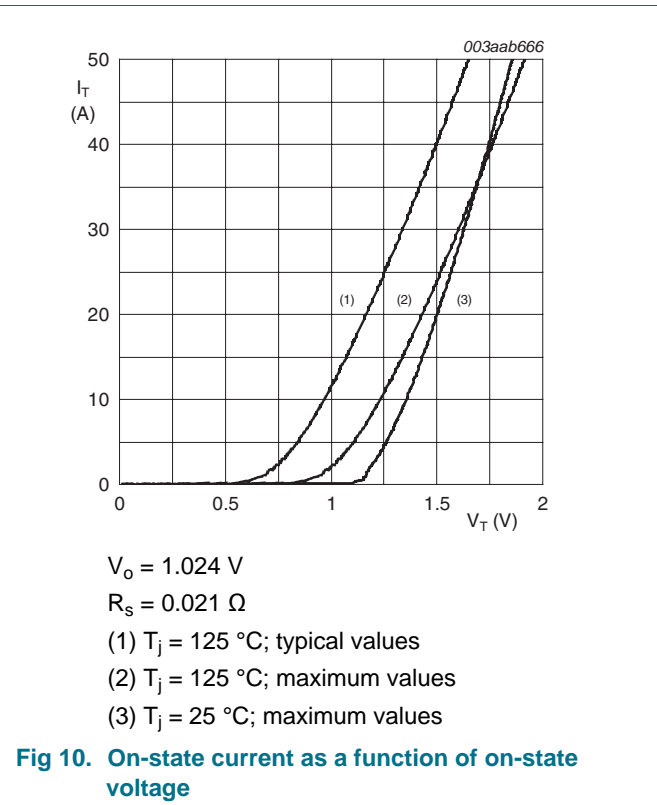
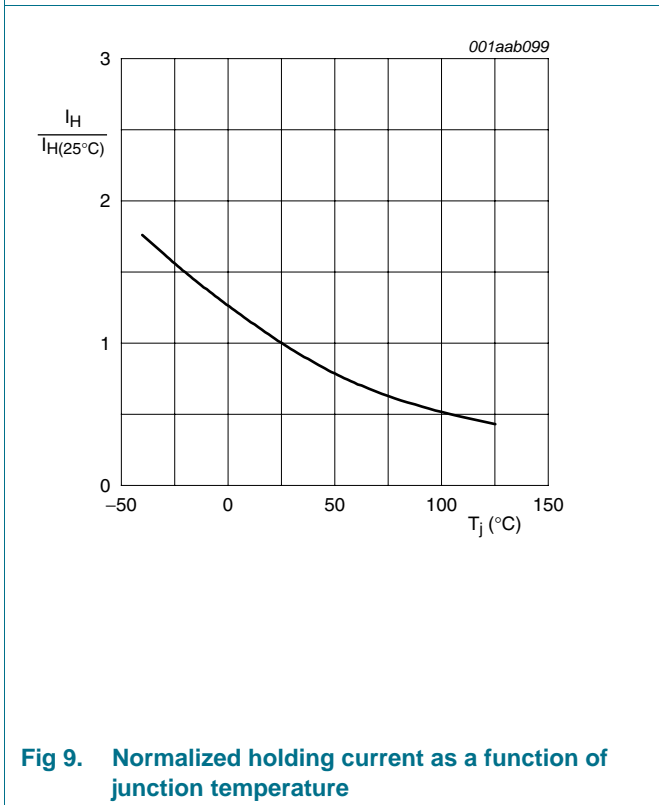
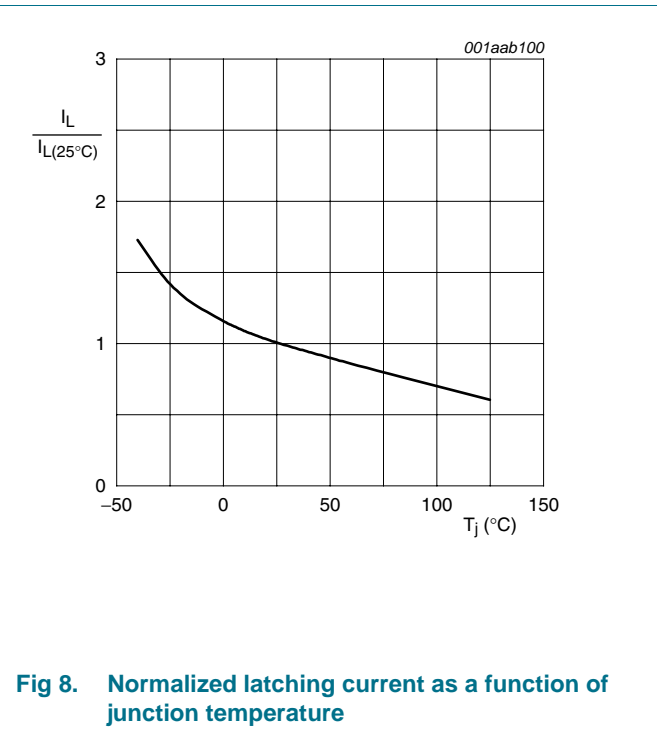
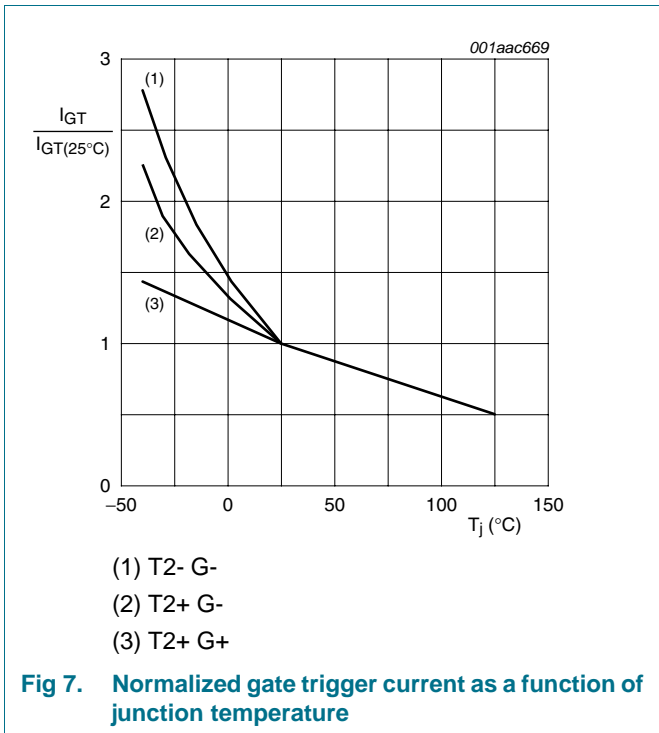


Fig 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

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+; $T_j = 25\text{ °C}$; see Figure 7	-	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; see Figure 7	-	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; see Figure 7	-	-	10	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ °C}$; see Figure 8	-	-	25	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; see Figure 8	-	-	30	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; see Figure 8	-	-	30	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; see Figure 9	-	-	15	mA
V_T	on-state voltage	$I_T = 18\text{ A}$; $T_j = 25\text{ °C}$; see Figure 10	-	1.3	1.5	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; see Figure 11	-	0.8	1.5	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ °C}$; see Figure 11	0.25	0.4	-	V
I_D	off-state current	$V_D = 800\text{ V}$; $T_j = 125\text{ °C}$	-	0.1	0.5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_j = 125\text{ °C}$; exponential waveform; gate open circuit	60	-	-	V/ μ s
di_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 125\text{ °C}$; $I_{T(RMS)} = 16\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; "without snubber" condition; gate open circuit	5	-	-	A/ms
		$V_D = 400\text{ V}$; $T_j = 125\text{ °C}$; $I_{T(RMS)} = 16\text{ A}$; $dV_{com}/dt = 10\text{ V}/\mu\text{s}$; gate open circuit	8	-	-	A/ms
		$V_D = 400\text{ V}$; $T_j = 125\text{ °C}$; $I_{T(RMS)} = 16\text{ A}$; $dV_{com}/dt = 1\text{ V}/\mu\text{s}$; gate open circuit	12	-	-	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	-	μ s



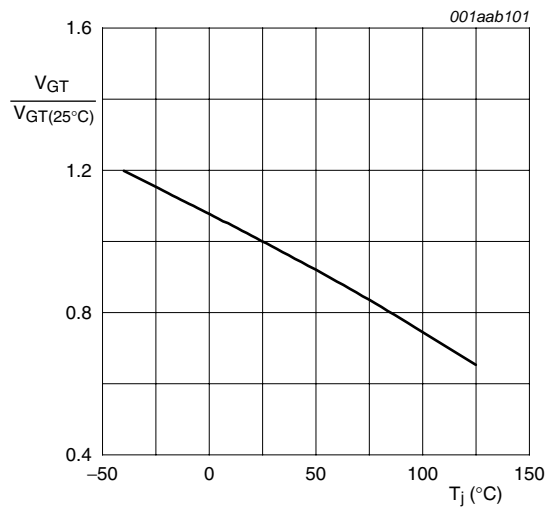


Fig 11. Normalized gate trigger voltage as a function of junction temperature

7. Package outline

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

SOT404



Fig 12. Package outline SOT404 (D2PAK)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BTA316B-800E v.2	20101125	Product data sheet	-	BTA316B_SER_B_C_E v.1
Modifications:				
				<ul style="list-style-type: none">• Type number BTA316B-800E 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	-	-

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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.
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[2] The term 'short data sheet' is explained in section "Definitions".

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Date of release: 25 November 2010

Document identifier: BTA316B-800E