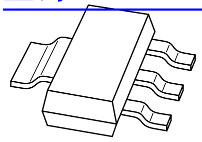


BTA201W series E

1 A Three-quadrant triacs high commutation

Rev. 02 — 17 September 2007 Product data sheet

1. Product profile

1.1 General description

Passivated guaranteed commutation triacs in a surface-mounted plastic package, intended for interfacing with low-power drivers, including microcontrollers.

1.2 Features

- Suitable for interfacing with low-power drivers, including microcontrollers
- SOT223 surface mounted

1.3 Applications

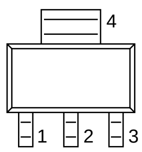
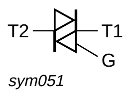
- Motor control
- Solenoid drivers

1.4 Quick reference data

- $I_{TSM} \leq 12.5$ A
- $V_{DRM} \leq 600$ V (BTA201W-600E)
- $V_{DRM} \leq 800$ V (BTA201W-800E)
- $I_{T(RMS)} \leq 1$ A
- $I_{GT} \leq 10$ mA

2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Symbol
1	main terminal 1 (T1)	 SOT223	
2	main terminal 2 (T2)		
3	gate (G)		
4	main terminal 2 (T2)		

founded by Philips

3. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
BTA201W-600E	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223
BTA201W-800E			

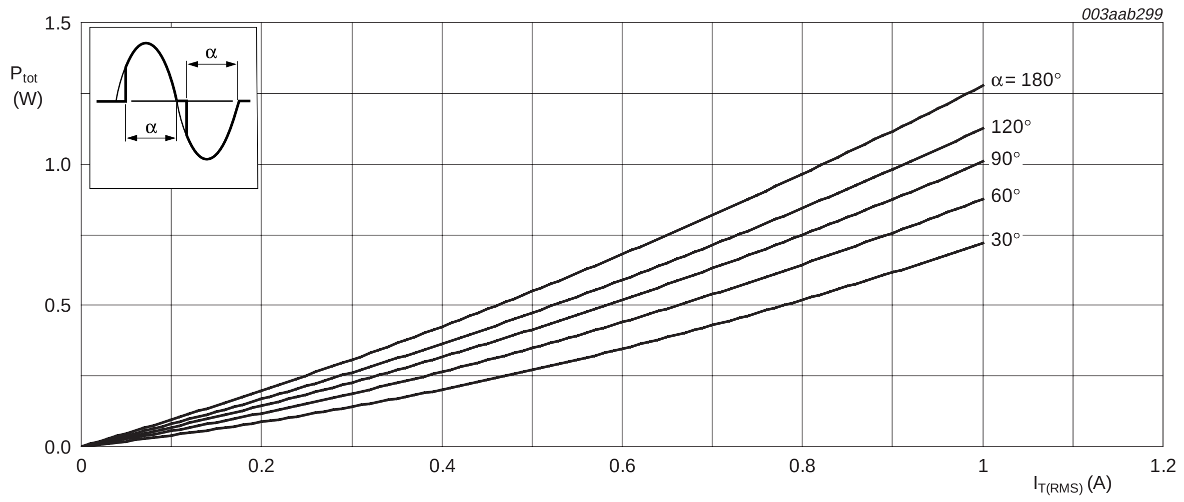
4. Limiting values

Table 3. Limiting values

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

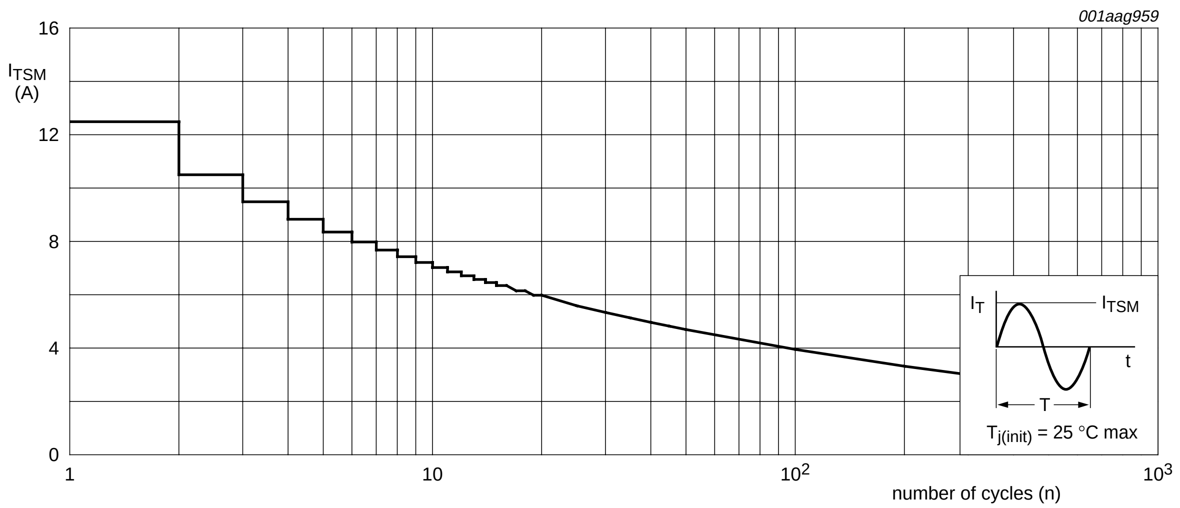
Symbol	Parameter	Conditions		Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage	BTA201W-600E	[1]	-	600	V
		BTA201W-800E		-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{sp} \leq 106$ °C; see Figure 4 and 5		-	1	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_j = 25$ °C prior to surge; see Figure 2 and 3				
		t = 20 ms		-	12.5	A
		t = 16.7 ms		-	13.7	A
I^2t	I^2t for fusing	t = 10 ms		-	0.78	A^2s
dI_T/dt	rate of rise of on-state current	$I_{TM} = 1.5$ A; $I_G = 0.2$ A; $dI_G/dt = 0.2$ A/µs		-	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		-	0.1	W
T_{stg}	storage temperature			–40	+150	°C
T_j	junction temperature			-	125	°C

[1] Although not recommended, off-state voltages up to 800 V may be applied without damage, but the triac may switch to the on-state. The rate of rise of current should not exceed 6 A/µs.



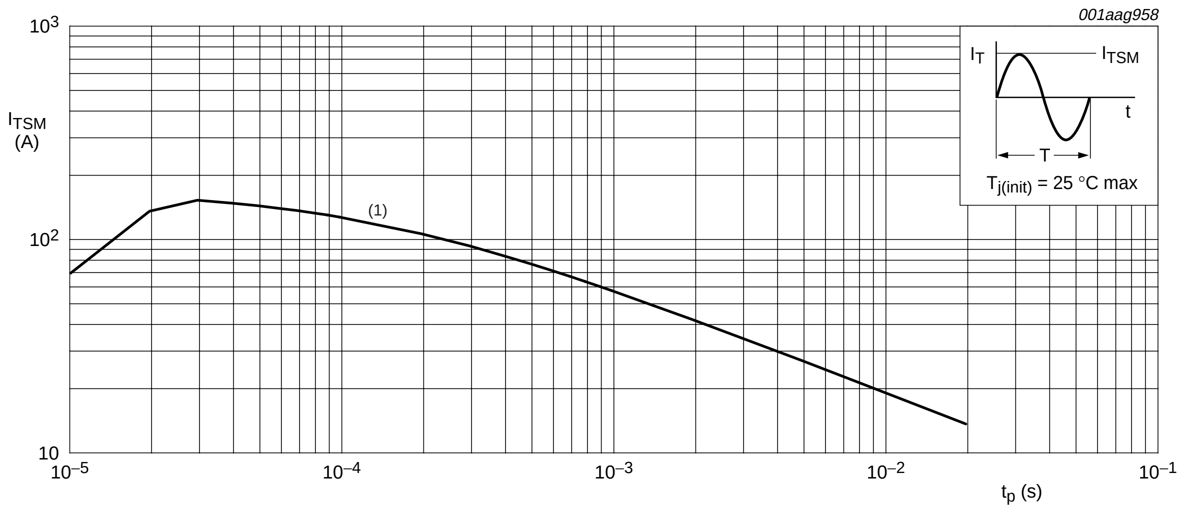
α = conduction angle

Fig 1. Total power dissipation as a function of RMS on-state current; maximum values



f = 50 Hz

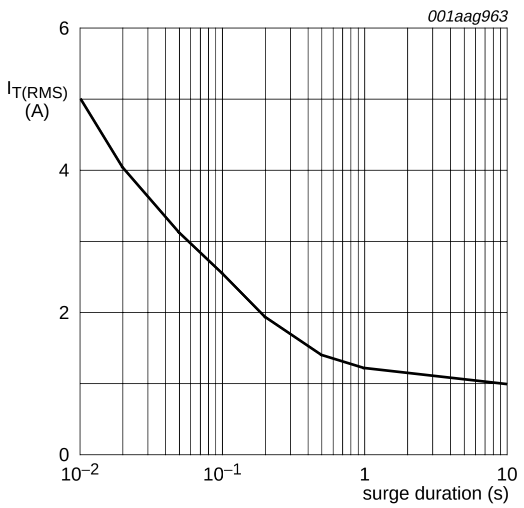
Fig 2. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



$t_p \leq 20$ ms

(1) dI_T/dt limit

Fig 3. Non-repetitive peak on-state current as a function of pulse width; maximum values



f = 50 Hz; T_{sp} = 106 °C

Fig 4. RMS on-state current as a function of surge duration; maximum values

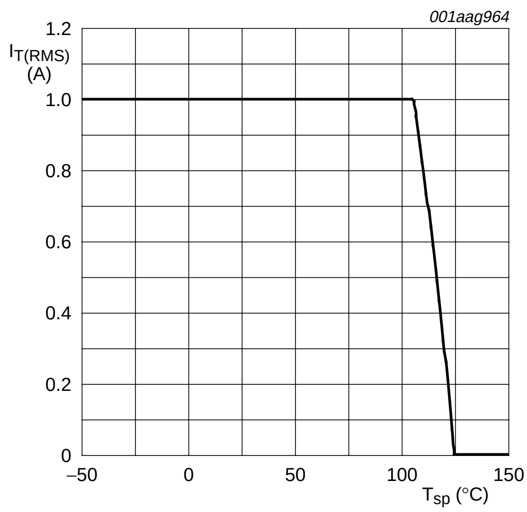


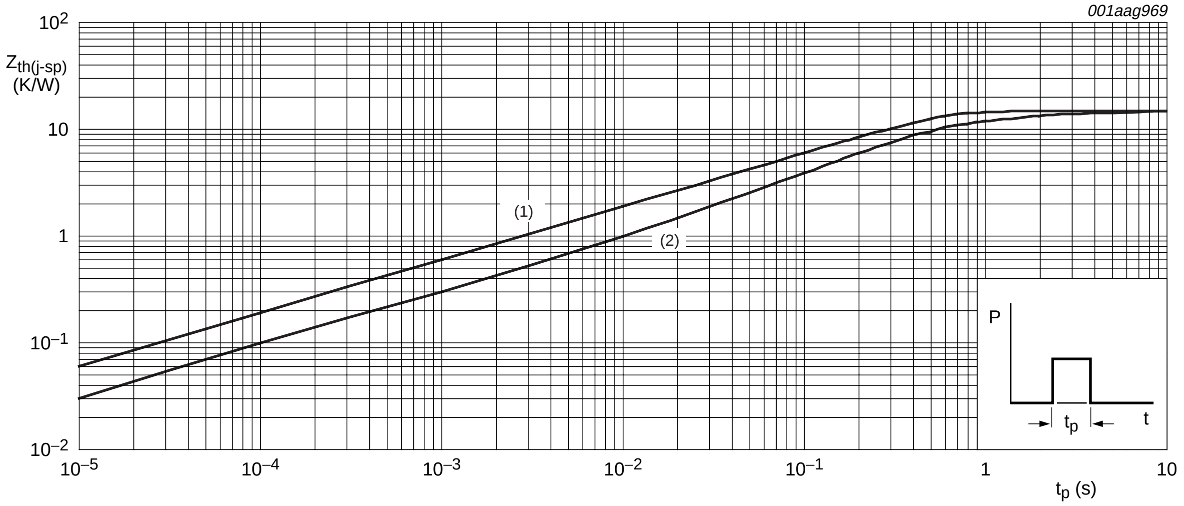
Fig 5. RMS on-state current as a function of solder point temperature; maximum values

5. Thermal characteristics

Table 4. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	see Figure 6		-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	minimum footprint; see Figure 14	[1]	-	156	-	K/W
		for pad area; see Figure 15	[1]	-	70	-	K/W

[1] Mounted on a printed-circuit board.



(1) Unidirectional

(2) Bidirectional

Fig 6. Transient thermal impedance from junction to solder point as a function of pulse width

6. Static characteristics

Table 5. Static characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
BTA201W-600E and BTA201W-800E						
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; see Figure 8				
		T2+ G+	-	-	10	mA
		T2+ G–	-	-	10	mA
		T2– G–	-	-	10	mA
I_L	latching current	V_D = 12 V; I_{GT} = 0.1 A; see Figure 10				
		T2+ G+	-	-	12	mA
		T2+ G–	-	-	20	mA
		T2– G–	-	-	12	mA
I_H	holding current	V_D = 12 V; I_{GT} = 0.1 A; see Figure 11	-	-	12	mA
V_T	on-state voltage	I_T = 1.4 A; see Figure 9	-	1.2	1.5	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; see Figure 7	-	0.7	1.5	V
		V_D = 400 V; I_T = 0.1 A; T_j = 125 °C	0.2	0.3	-	V
I_D	off-state current	V_D = $V_{DRM(max)}$; T_j = 125 °C	-	0.1	0.5	mA

7. Dynamic characteristics

Table 6. Dynamic characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
BTA201W-600E and BTA201W-800E						
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 0.67$V_{DRM(max)}$; T_j = 125 °C; exponential waveform; gate open circuit	600	-	-	V/µs
dI_{com}/dt	rate of change of commutating current	V_{DM} = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 4 A; gate open circuit				
		dV_{com}/dt = 20 V/µs	2.5	-	-	A/ms
		dV_{com}/dt = 10 V/µs	3.5	-	-	A/ms
t_{gt}	gate-controlled turn-on time	I_{TM} = 20 A; V_D = $V_{DRM(max)}$; I_G = 0.1 A; dI_G/dt = 5 A/µs	-	2	-	µs

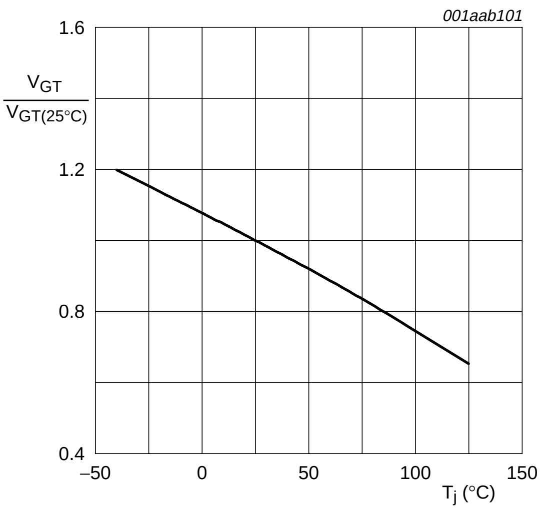
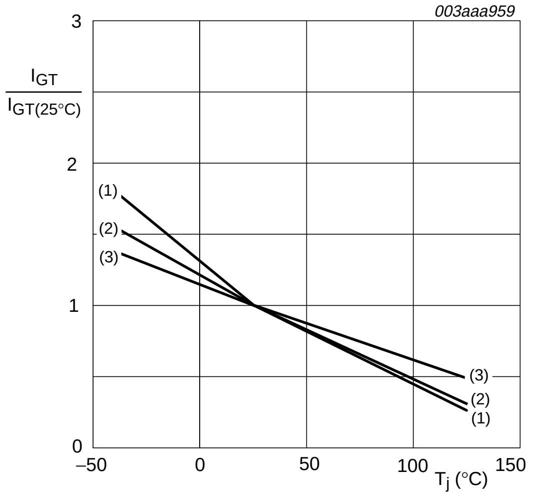


Fig 7. Normalized gate trigger voltage as a function of junction temperature

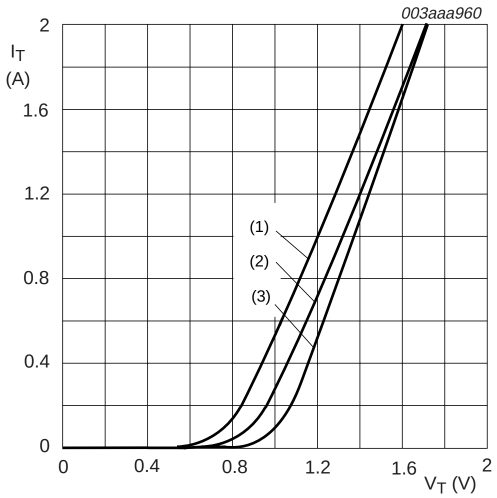


(1) T2− G−

(2) T2+ G−

(3) T2+ G+

Fig 8. Normalized gate trigger current as a function of junction temperature



V_o = 1.02 V; R_s = 358 mΩ

(1) T_j = 125 °C; typical values

(2) T_j = 125 °C; maximum values

(3) T_j = 25 °C; maximum values

Fig 9. On-state current as a function of on-state voltage

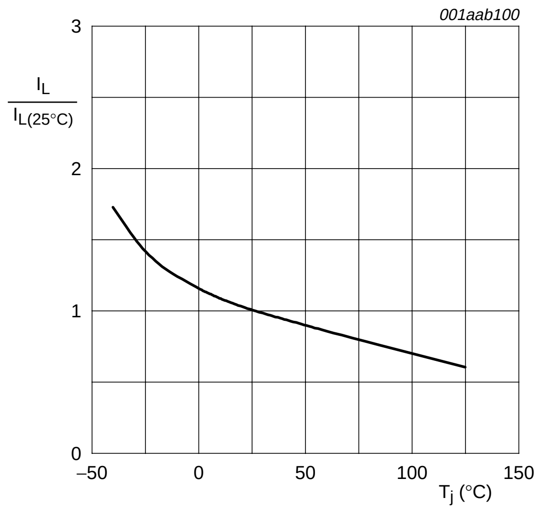


Fig 10. Normalized latching current as a function of junction temperature

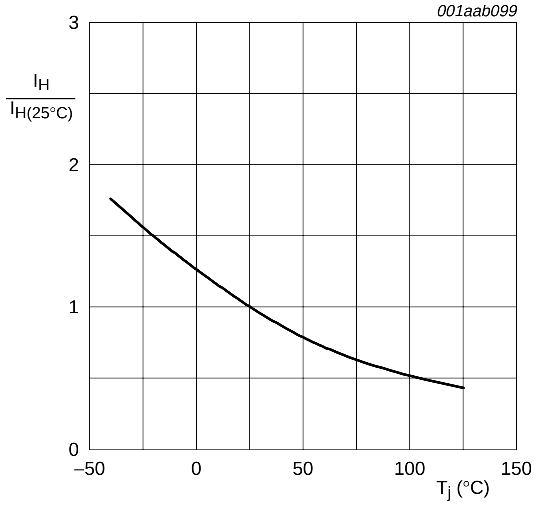
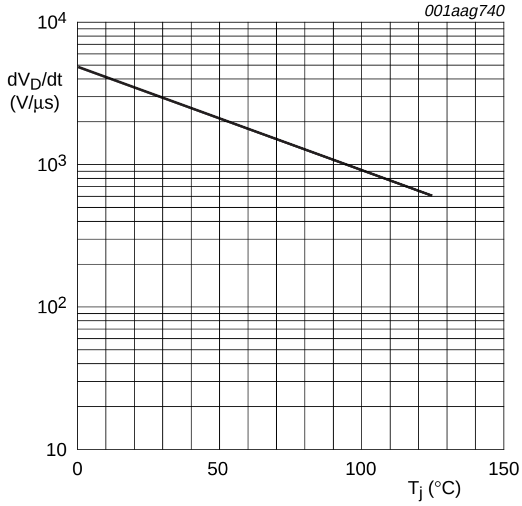


Fig 11. Normalized holding current as a function of junction temperature

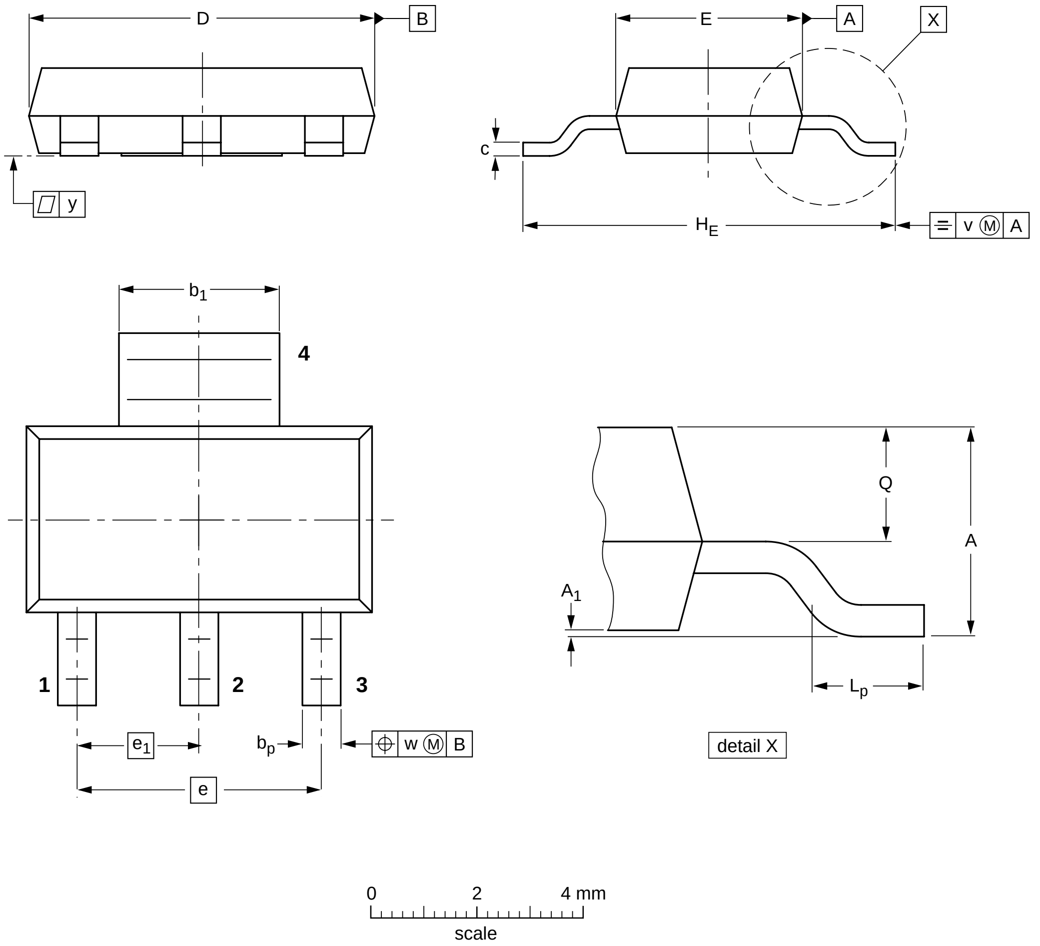


Gate open circuit

Fig 12. Critical rate of rise of off-state voltage as a function of junction temperature; minimum values

8. Package outline

Plastic surface-mounted package with increased heatsink; 4 leads **SOT223**



DIMENSIONS (mm are the original dimensions)

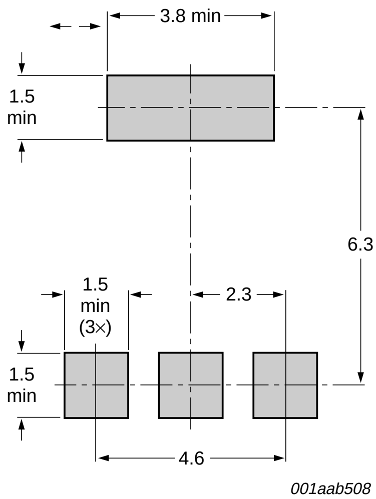
UNIT	A	A_1	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.8 1.5	0.10 0.01	0.80 0.60	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	4.6	2.3	7.3 6.7	1.1 0.7	0.95 0.85	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT223			SC-73			~~04-11-10~~ 06-03-16

Fig 13. Package outline SOT223

9. Mounting

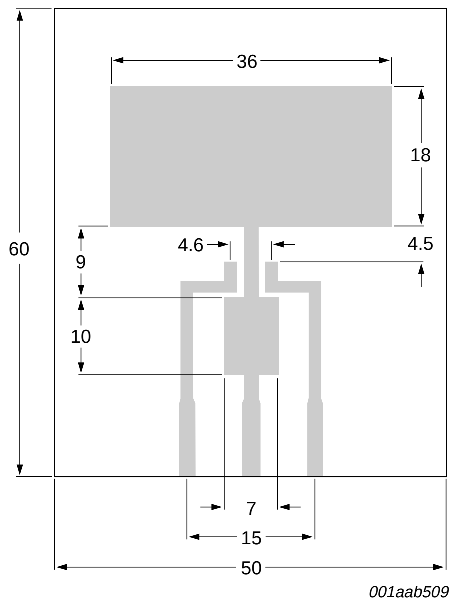
9.1 Mounting instructions



All dimensions are in mm

Fig 14. Minimum footprint SOT223

9.2 Printed-circuit board



All dimensions are in mm

Printed-circuit board: FR4 epoxy glass (1.6 mm thick), copper laminate (35 µm thick)

Fig 15. Printed-circuit board pad area SOT223

10. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BTA201W_SER_E_2	20070917	Product data sheet	-	BTA201W_SER_E_1
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Descriptive titles have been corrected. • Table 3 “Limiting values” on page 2: dI_T/dt uprated • Table 6 “Dynamic characteristics” on page 7: dV_D/dt uprated • Figure 12 “Critical rate of rise of off-state voltage as a function of junction temperature; minimum values” on page 8: graph updated			
BTA201W_SER_E_1	20060207	Product data sheet	-	-

11. Legal information

11.1 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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