BTA201 series B, E and ER

Triacs logic level

Rev. 01 — 25 August 2005 Product data sheet

1. Product profile

1.1 General description

Passivated guaranteed commutation triacs in a plastic package. The 'sensitive gate' E and ER series are intended for interfacing with low power drivers, including microcontrollers. The high commutation B series are designed to commutate the full RMS current at the maximum junction temperature without the aid of a snubber.

1.2 Features

- Suitable for interfacing with low power drivers, including microcontrollers
- Reverse pinning option (ER type)

1.3 Applications

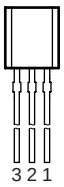
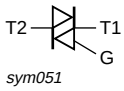
- Motor control
- Solenoid drivers

1.4 Quick reference data

- $I_{TSM} \leq 12.5$ A
- $V_{DRM} \leq 600$ V (BTA201-600B)
- $V_{DRM} \leq 600$ V (BTA201-600E)
- $V_{DRM} \leq 800$ V (BTA201-800B)
- $V_{DRM} \leq 800$ V (BTA201-800E)
- $V_{DRM} \leq 800$ V (BTA201-800ER)
- $I_{T(RMS)} \leq 1$ A
- $I_{GT} \leq 50$ mA (BTA201-600B)
- $I_{GT} \leq 10$ mA (BTA201-600E)
- $I_{GT} \leq 50$ mA (BTA201-800B)
- $I_{GT} \leq 10$ mA (BTA201-800E)
- $I_{GT} \leq 10$ mA (BTA201-800ER)

2. Pinning information

Table 1: Pinning

Pin	Description		Simplified outline	Symbol
1	main terminal 2 (T2)	B and E series	 SOT54 (TO92)	 sym051
2	gate (G)			
3	main terminal 1 (T1)			
1	main terminal 1 (T1)	ER series		
2	gate (G)			
3	main terminal 2 (T2)			

PHILIPS

3. Ordering information

Table 2: Ordering information

Type number	Package		
	Name	Description	Version
BTA201-600B	TO-92	plastic single-ended leaded (through hole) package; 3-leads	SOT54
BTA201-600E			
BTA201-800B			
BTA201-800E			
BTA201-800ER			

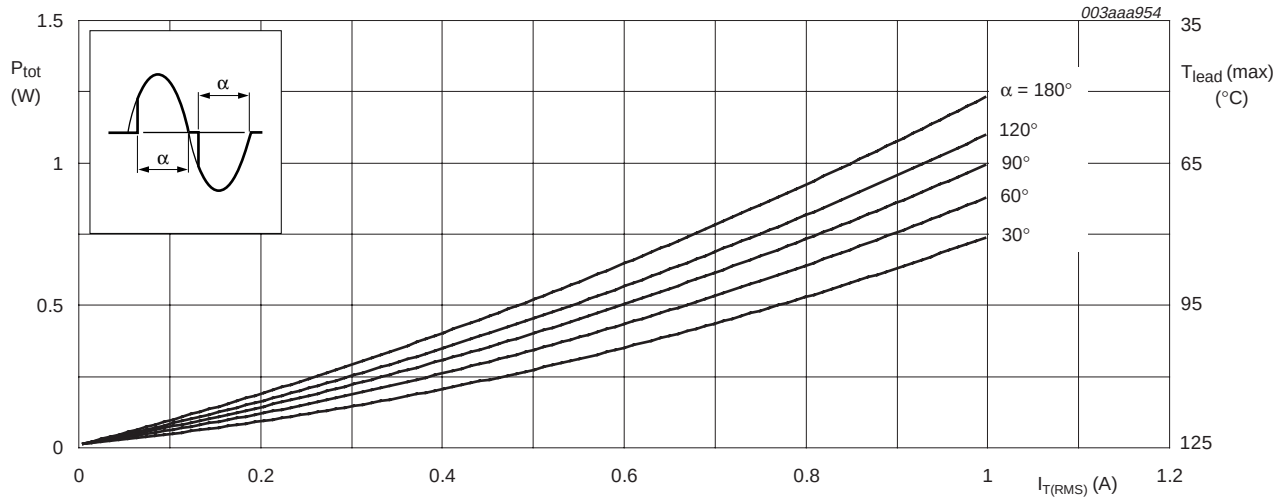
4. Limiting values

Table 3: Limiting values

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

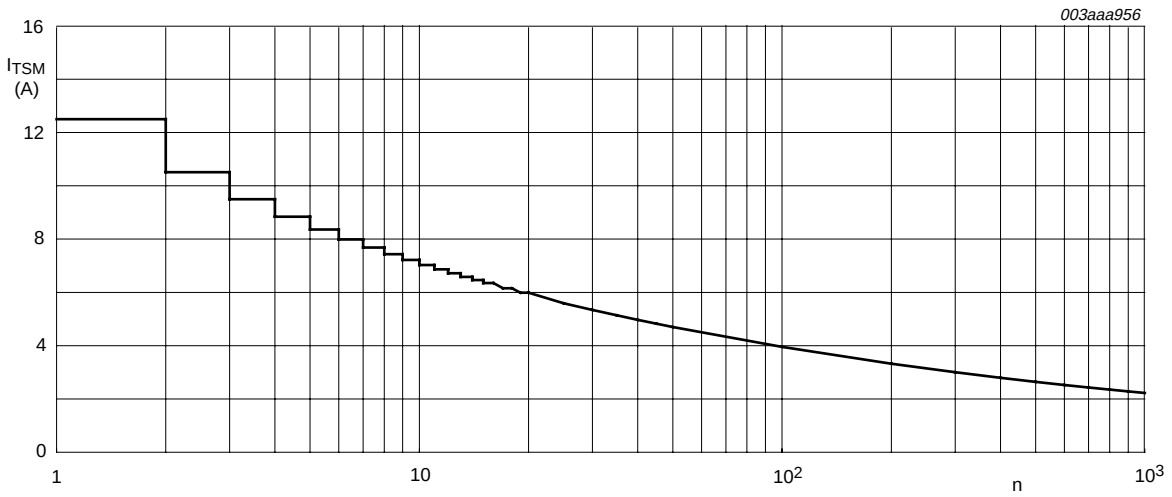
Symbol	Parameter	Conditions		Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage					
	BTA201-600B		[1]	-	600	V
	BTA201-600E		[1]	-	600	V
	BTA201-800B			-	800	V
	BTA201-800E			-	800	V
	BTA201-800ER			-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{lead} \leq 54.3$ °C; Figure 4 and Figure 5		-	1	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; T_j = 25 °C prior to surge; Figure 2 and Figure 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	repetitive rate of rise of on-state current after triggering	I_{TM} = 1.5 A; I_G = 0.2 A; dI_G/dt = 0.2 A/µs		-	50	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.



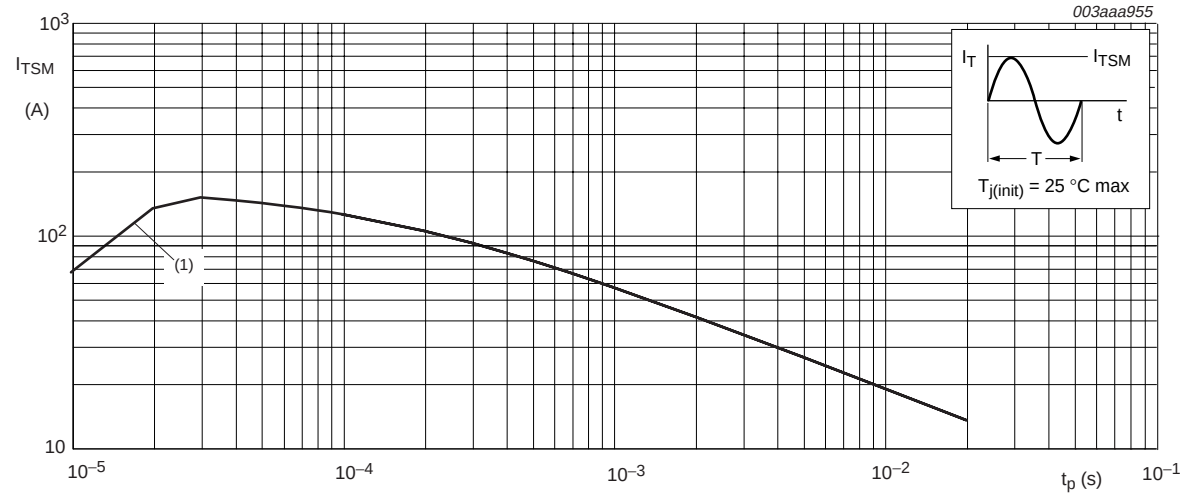
α = conduction angle

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



f = 50 Hz

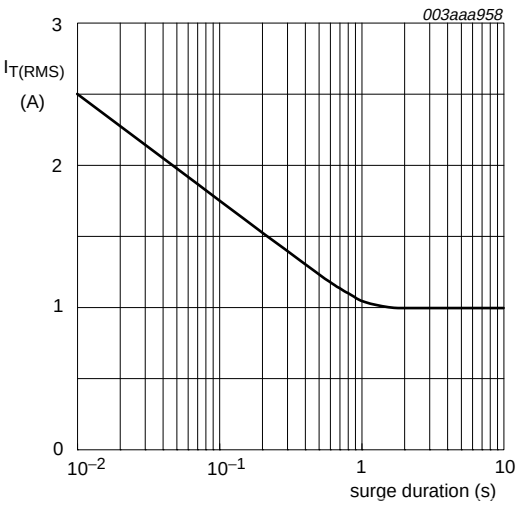
Fig 2. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



$t_p \leq 20$ 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; $T_{lead} \leq 66$ °C

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

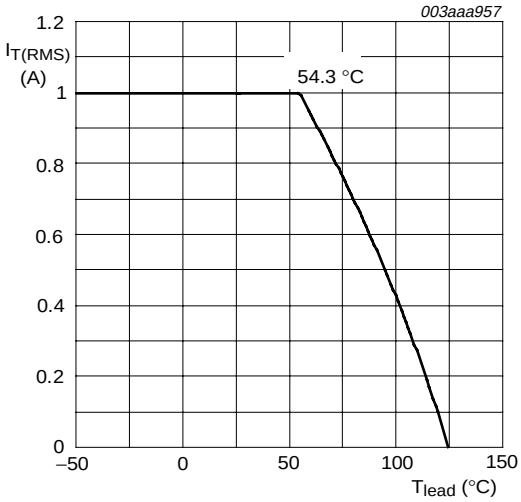
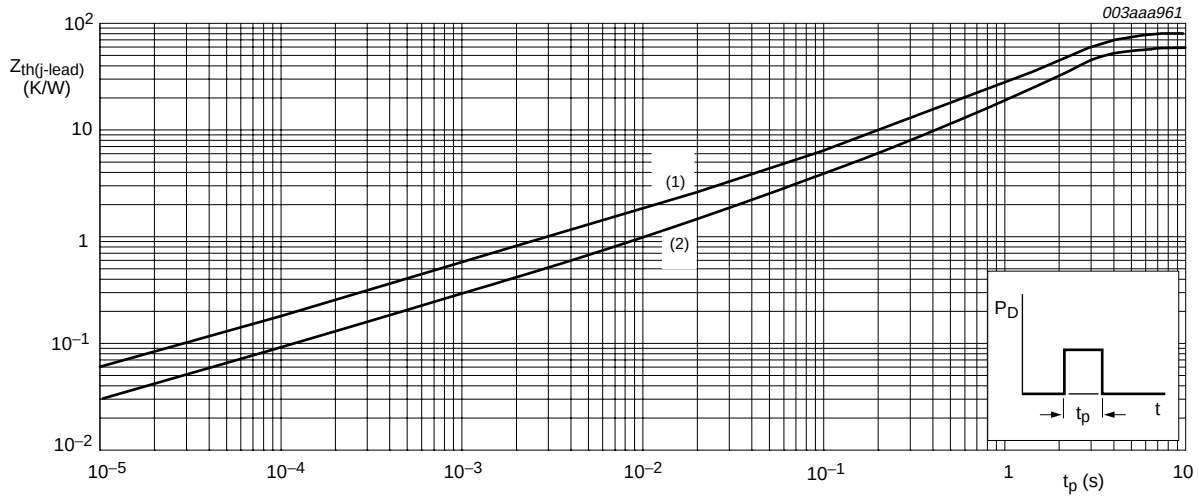


Fig 5. RMS on-state current as a function of lead temperature; maximum values

5. Thermal characteristics

Table 4: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j\text{-}lead)}$	thermal resistance from junction to lead	full cycle; Figure 6	-	-	60	K/W
		half cycle Figure 6	-	-	80	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient	printed-circuit board mounted; lead length = 4 mm	-	150	-	K/W



(1) Unidirectional

(2) Bidirectional

Fig 6. Transient thermal impedance as a function of pulse width

6. Static characteristics

Table 5: Static characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	BTA201-600B BTA201-800B			BTA201-600E BTA201-800E BTA201-800ER			Unit
			Min	Typ	Max	Min	Typ	Max	
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; Figure 8							
		T2+ G+	-	-	50	-	-	10	mA
		T2+ G–	-	-	50	-	-	10	mA
		T2– G–	-	-	50	-	-	10	mA
I_L	latching current	V_D = 12 V; I_{GT} = 0.1 A; Figure 10							
		T2+ G+	-	-	30	-	-	12	mA
		T2+ G–	-	-	50	-	-	20	mA
		T2– G–	-	-	30	-	-	12	mA
I_H	holding current	V_D = 12 V; I_{GT} = 0.1 A; Figure 11	-	-	30	-	-	12	mA
V_T	on-state voltage	I_T = 1.4 A; Figure 9	-	1.2	1.5	-	1.2	1.5	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; Figure 7	-	0.7	1.5	-	0.7	1.5	V
		V_D = 400 V; I_T = 0.1 A; T_j = 125 °C	0.2	0.3	-	0.2	0.3	-	V
I_D	off-state leakage current	$V_D = V_{DRM(max)}$; T_j = 125 °C	-	0.1	0.5	-	0.1	0.5	mA

7. Dynamic characteristics

Table 6: Dynamic characteristics

Symbol	Parameter	Conditions	BTA201-600B BTA201-800B			BTA201-600E BTA21-800E BTA201-800ER			Unit
			Min	Typ	Max	Min	Typ	Max	
dV_D/dt	critical rate of rise of off-state voltage	V_{DM} = 67 % $V_{DRM(max)}$; T_j = 125 °C; exponential waveform; gate open circuit	1000	-	-	200	-	-	V/µs
dI_{com}/dt	rate of change of commutating current	V_{DM} = 400 V; T_j = 125 °C; dV_{com}/dt = 20 V/µs; gate open circuit	12	-	-	2.5	-	-	A/µs
		V_{DM} = 400 V; T_j = 125 °C; dV_{com}/dt = 10 V/µs; gate open circuit	16	-	-	3.5	-	-	A/µs
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	-	-	2	-	µs

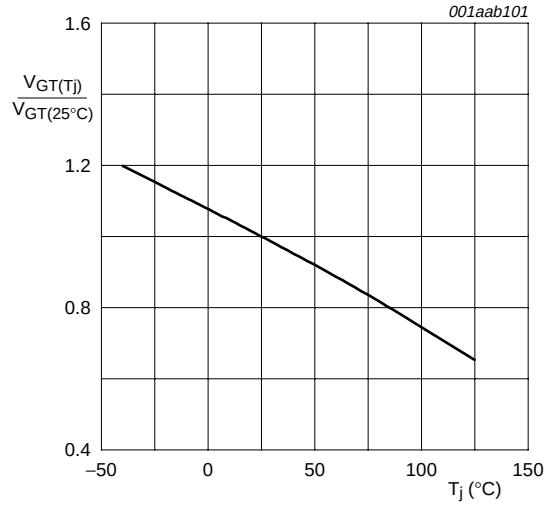
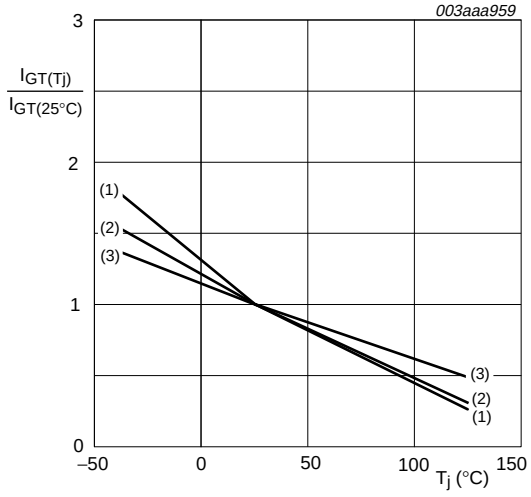
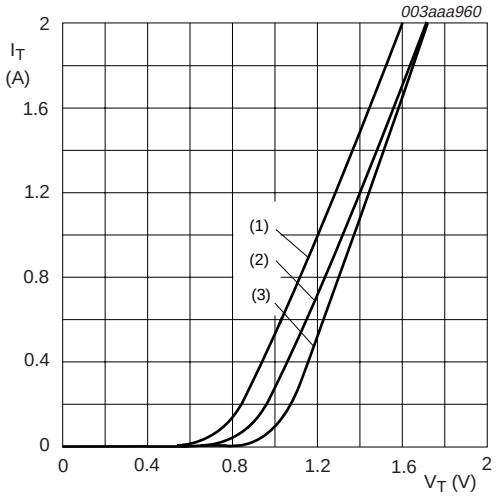


Fig 7. Normalized gate trigger voltage as a function of junction temperature



(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 = 0.358

(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

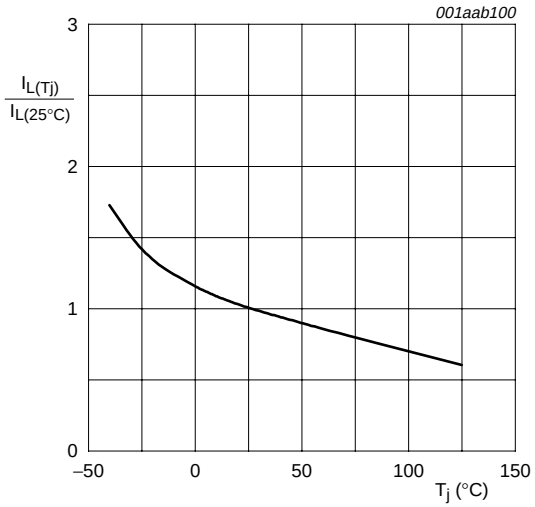


Fig 10. Normalized latching current as a function of junction temperature

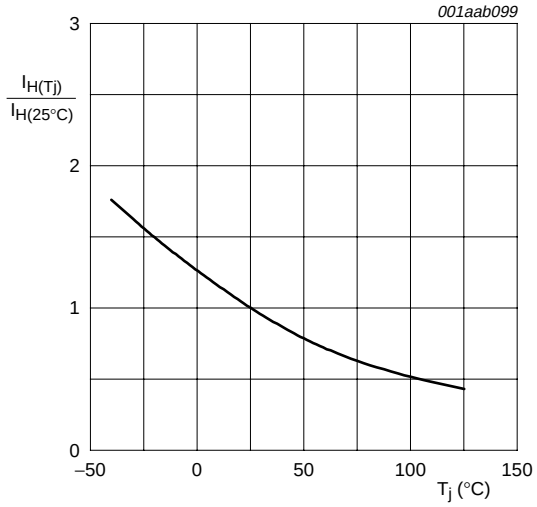
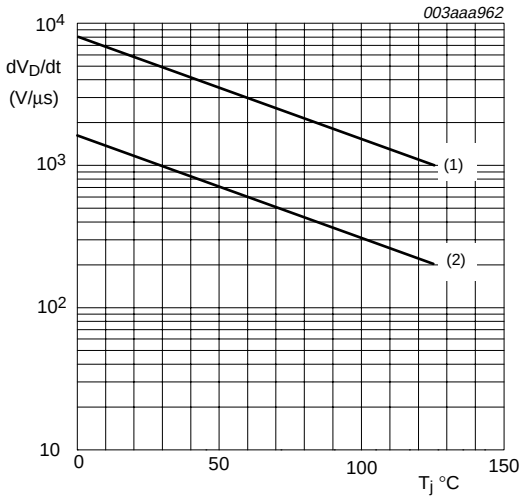


Fig 11. Normalized holding current as a function of junction temperature



Gate open circuit

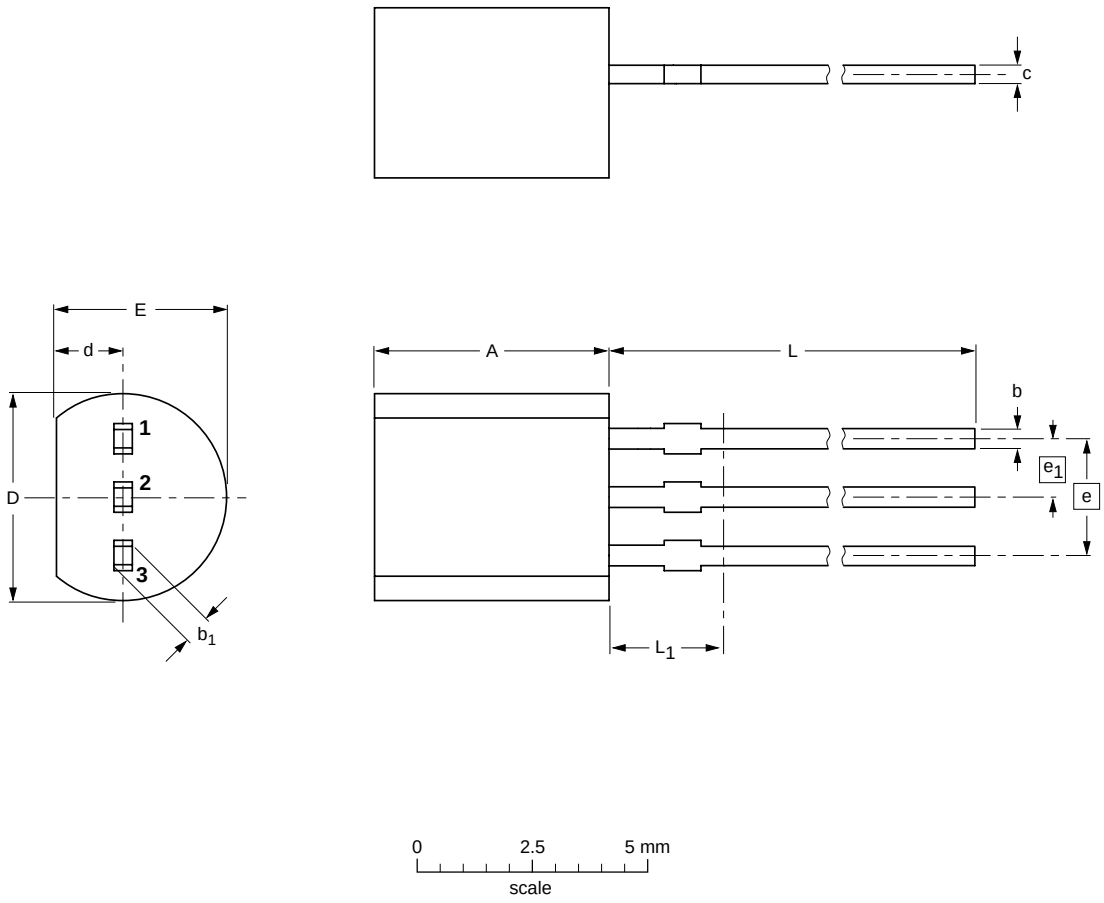
(1) BTA201 series B

(2) BTA201 series E and ER

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

8. Package outline

Plastic single-ended leaded (through hole) package; 3 leads **SOT54**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b_1	c	D	d	E	e	e_1	L	L_1(1) max.
mm	5.2 5.0	0.48 0.40	0.66 0.55	0.45 0.38	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT54		TO-92	SC-43A			~~04-06-28~~ 04-11-16

Fig 13. Package outline SOT54 (TO-92)

9. Revision history

Table 7: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
BTA201_SER_B_E_ER_1	20050825	Product data sheet	-	9397 750 15154	-

10. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

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[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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15. Contents

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