

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

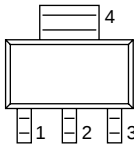
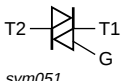
- Motor control
- Solenoid drivers

1.4 Quick reference data

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

2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Symbol
1	main terminal 1 (T1)	 SOT223	 sym051
2	main terminal 2 (T2)		
3	gate (G)		
4	main terminal 2 (T2)		

3. Ordering information

Table 2. Ordering information

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

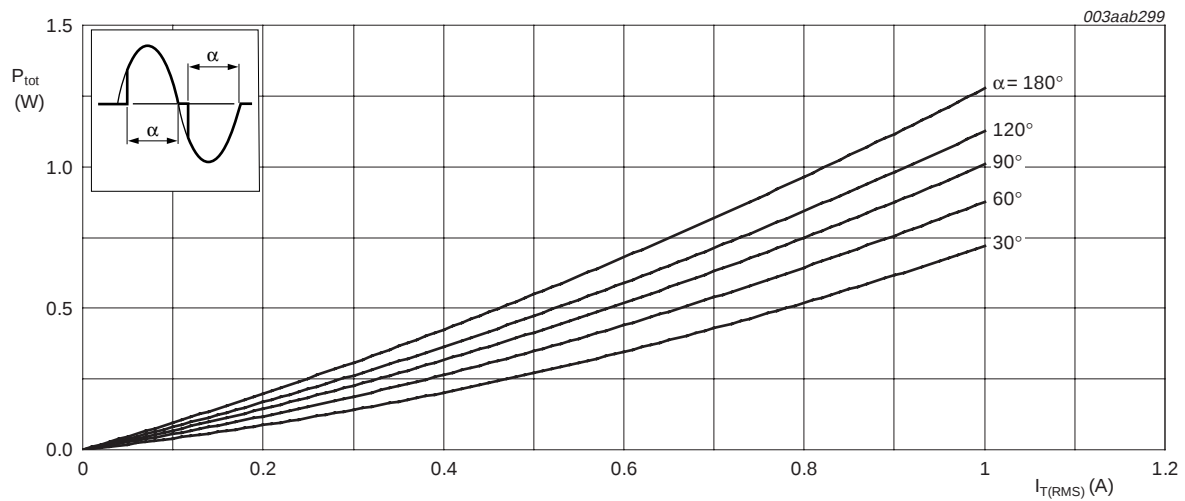
4. Limiting values

Table 3. Limiting values

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

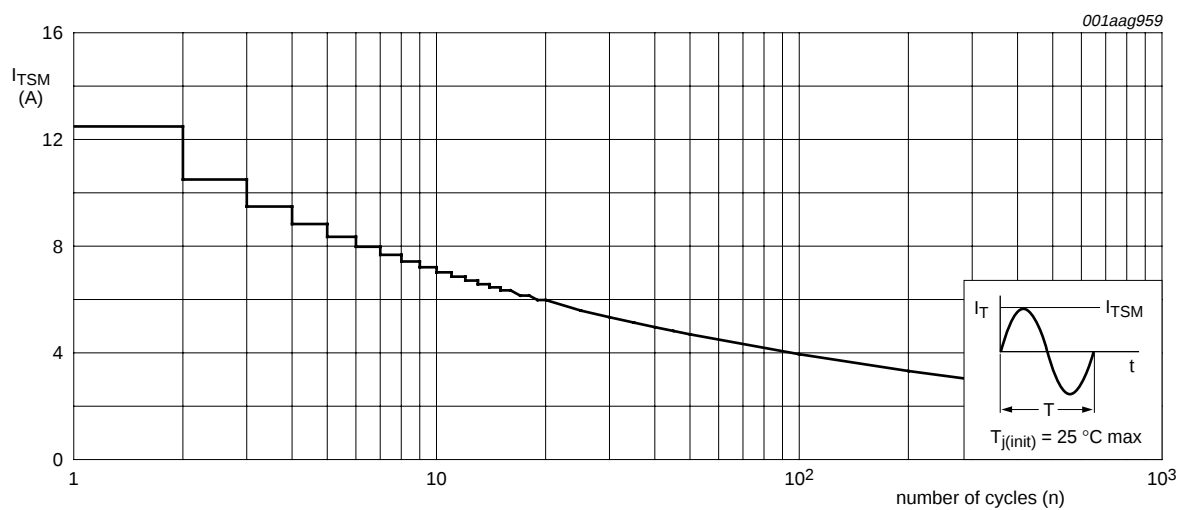
Symbol	Parameter	Conditions	Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage	BTA201W-600E	[1] -	600	V
		BTA201W-800E	-	800	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{sp}} \leq 106\text{ °C}$; see Figure 4 and 5	-	1	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{\text{j}} = 25\text{ °C}$ prior to surge; see Figure 2 and 3			
		$t = 20\text{ ms}$	-	12.5	A
		$t = 16.7\text{ ms}$	-	13.7	A
I^2t	I^2t for fusing	$t_{\text{p}} = 10\text{ ms}$	-	0.78	A ² s
di_{T}/dt	rate of rise of on-state current	$I_{\text{TM}} = 1.5\text{ A}$; $I_{\text{G}} = 0.2\text{ A}$; $di_{\text{G}}/dt = 0.2\text{ A}/\mu\text{s}$	-	100	A/ μs
I_{GM}	peak gate current		-	2	A
P_{GM}	peak gate power		-	5	W
$P_{\text{G(AV)}}$	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 .



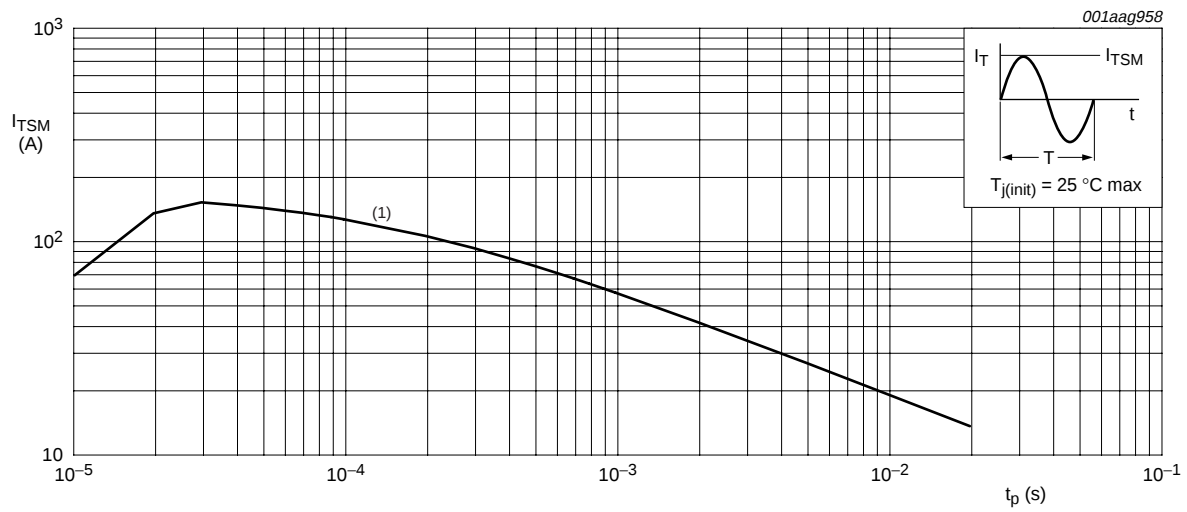
α = conduction angle

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



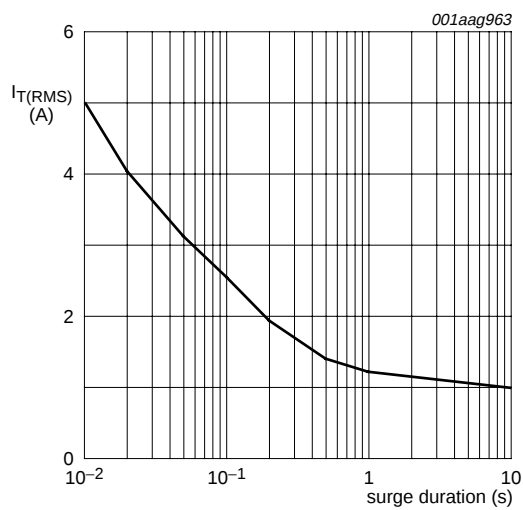
$f = 50\text{ Hz}$

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



$t_p \leq 20\text{ ms}$
 (1) dI_T/dt limit

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



$f = 50\text{ Hz}$; $T_{sp} = 106\text{ °C}$

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

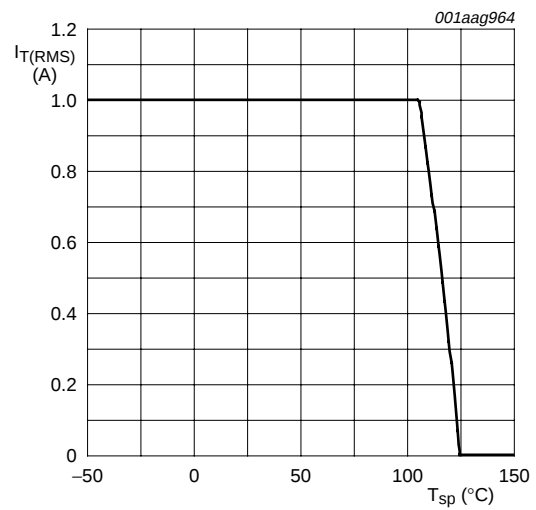


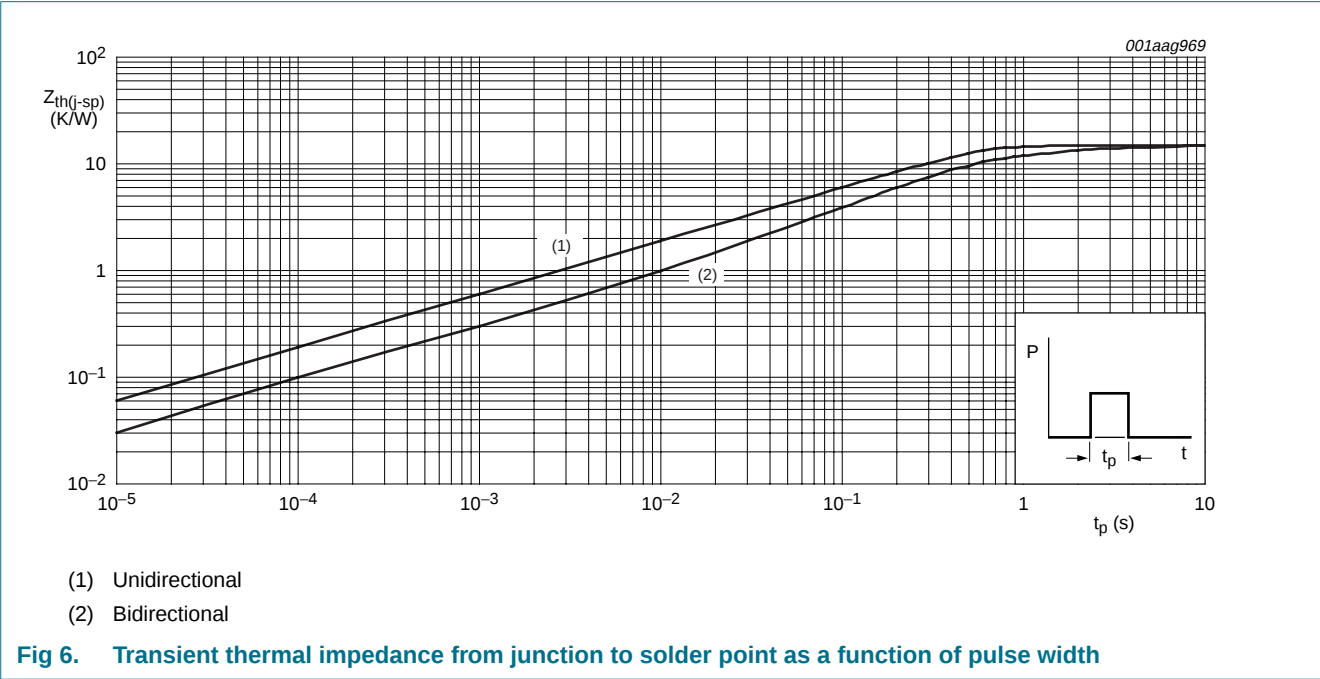
Fig 5. RMS on-state current as a function of solder point temperature; maximum values

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.



6. Static characteristics

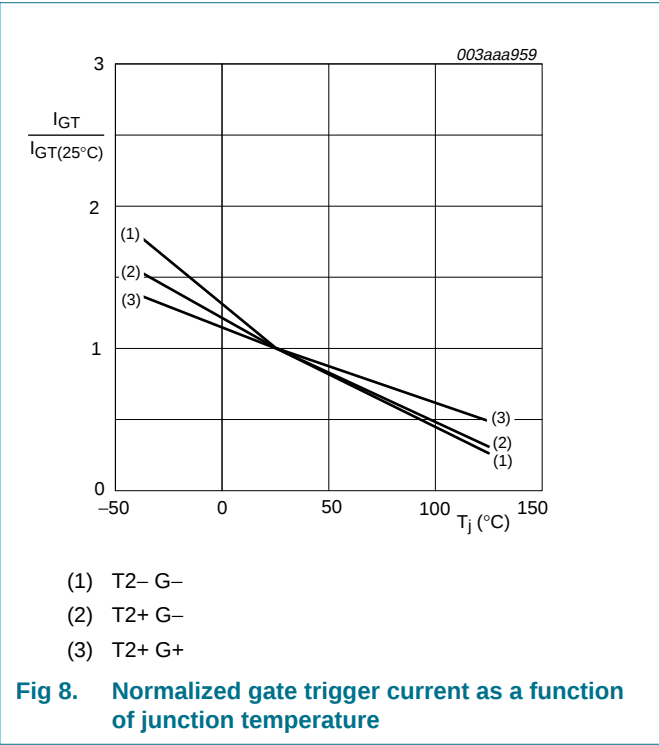
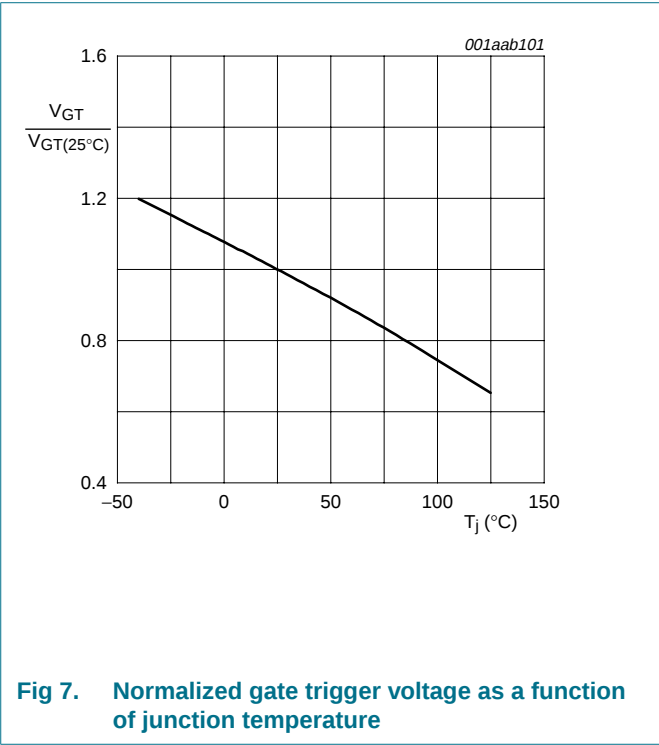
Table 5. Static characteristics
 $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

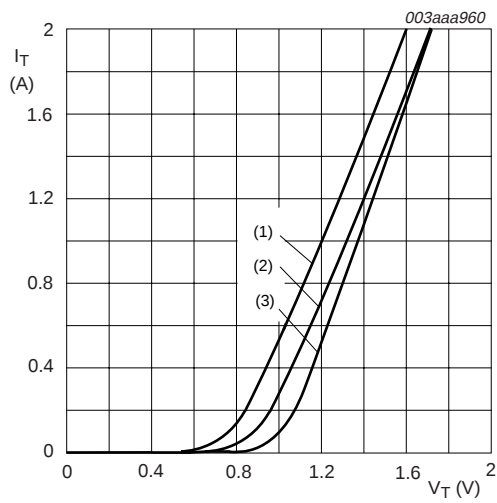
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
BTA201W-600E and BTA201W-800E						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; see Figure 8				
		T2+ G+	1	-	10	mA
		T2+ G-	1	-	10	mA
		T2- G-	1	-	10	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; see Figure 10				
		T2+ G+	-	-	12	mA
		T2+ G-	-	-	20	mA
		T2- G-	-	-	12	mA
I_H	holding current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; see Figure 11	-	-	12	mA
V_T	on-state voltage	$I_T = 1.4\text{ A}$; see Figure 9	-	1.2	1.5	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; see Figure 7	-	0.7	1.5	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ }^{\circ}\text{C}$	0.2	0.3	-	V
I_D	off-state current	$V_D = V_{DRM(max)}$; $T_j = 125\text{ }^{\circ}\text{C}$	-	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	$V_{DM} = 0.67V_{DRM(max)}$; $T_j = 125\text{ }^{\circ}\text{C}$; exponential waveform; gate open circuit	600	-	-	$\text{V}/\mu\text{s}$
di_{com}/dt	rate of change of commutating current	$V_{DM} = 400\text{ V}$; $T_j = 125\text{ }^{\circ}\text{C}$; $I_{T(RMS)} = 4\text{ A}$; gate open circuit				
		$dV_{com}/dt = 20\text{ V}/\mu\text{s}$	2.5	-	-	A/ms
		$dV_{com}/dt = 10\text{ V}/\mu\text{s}$	3.5	-	-	A/ms
t_{gt}	gate-controlled turn-on time	$I_{TM} = 20\text{ A}$; $V_D = V_{DRM(max)}$; $I_G = 0.1\text{ A}$; $di_G/dt = 5\text{ A}/\mu\text{s}$	-	2	-	μs





$V_0 = 1.02 \text{ V}$; $R_s = 358 \text{ m}\Omega$

- (1) $T_j = 125 \text{ }^\circ\text{C}$; typical values
- (2) $T_j = 125 \text{ }^\circ\text{C}$; maximum values
- (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

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

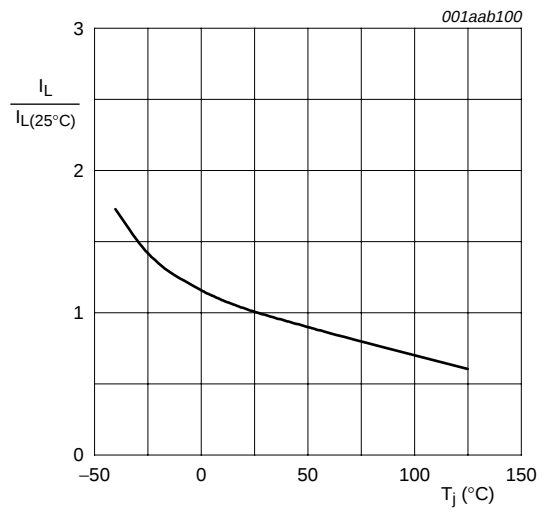


Fig 10. Normalized latching current as a function of junction temperature

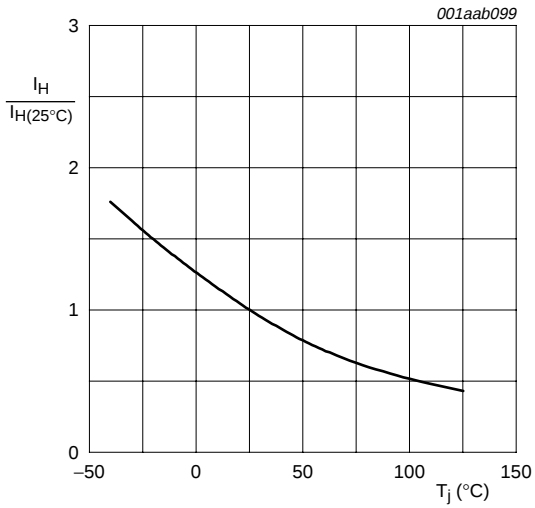
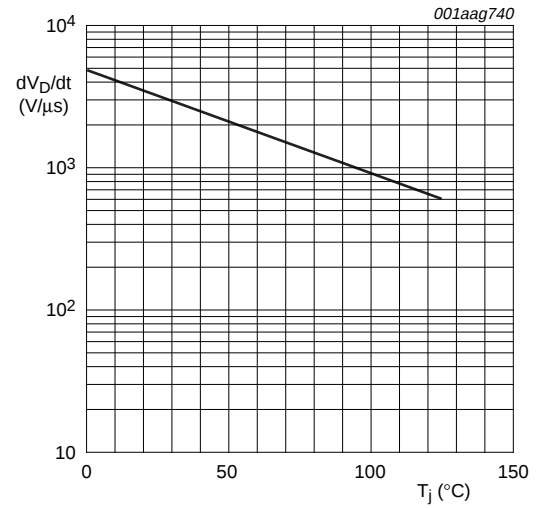


Fig 11. Normalized holding current as a function of junction temperature



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

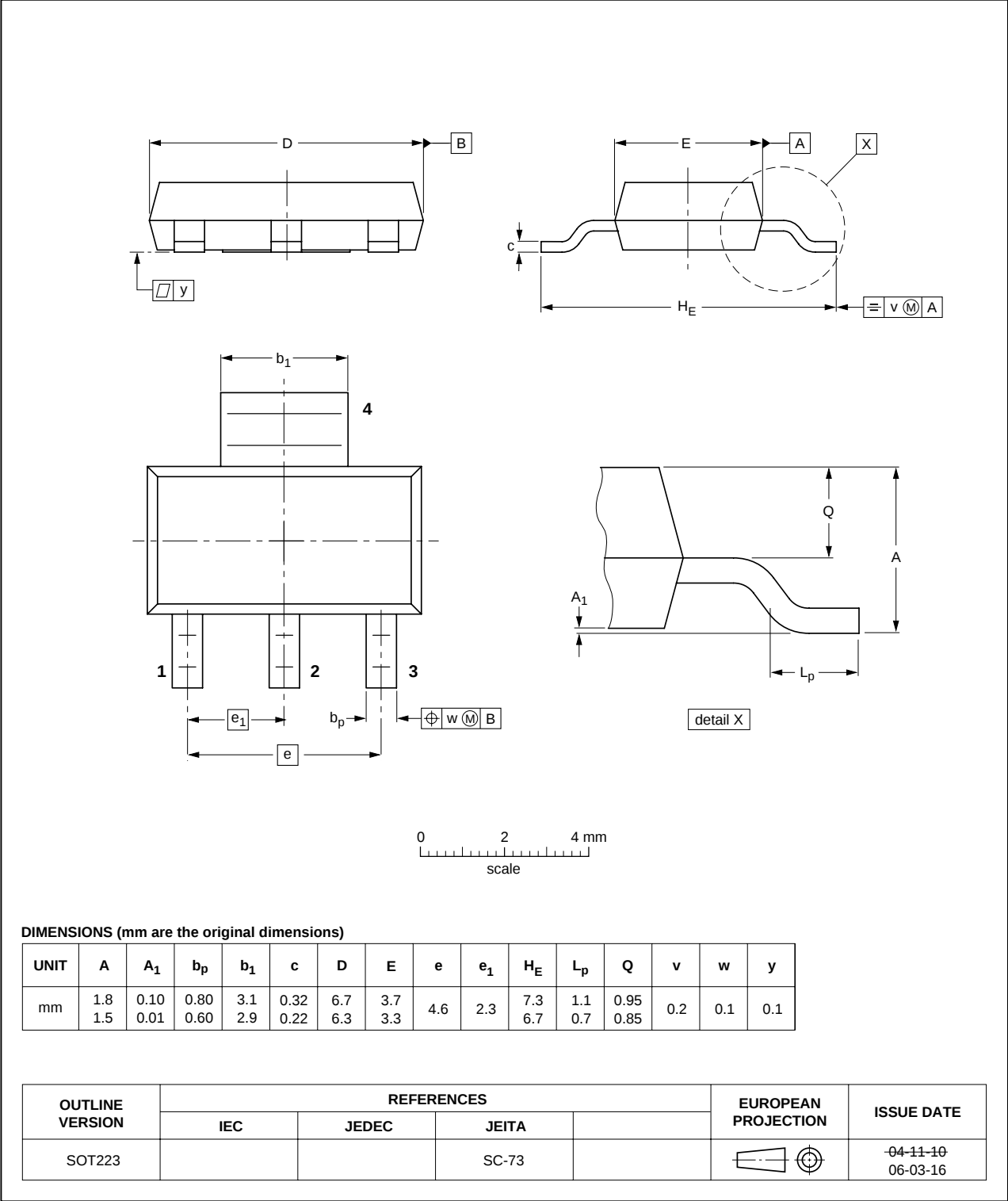
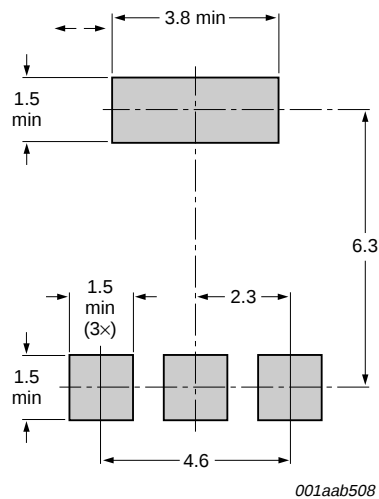


Fig 13. Package outline SOT223

9. Mounting

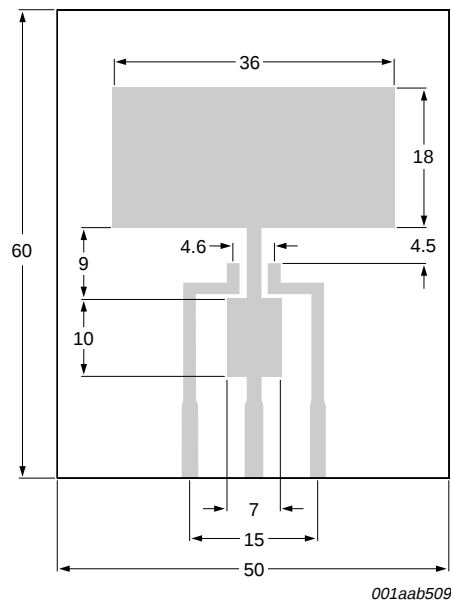
9.1 Mounting instructions



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 μ m thick)

Fig 15. Printed-circuit board pad area SOT223