



**THE DATASHEET OF**  
**BT136-600,127**

## 1. General description

Planar passivated four quadrant triac in a SOT78 (TO-220AB) plastic package intended for use in general purpose bidirectional switching and phase control applications.

## 2. Features and benefits

- High blocking voltage capability
- Less sensitive gate for improved noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in all four quadrants

## 3. Applications

- General purpose motor controls
- General purpose switching

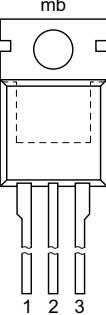
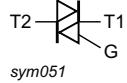
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{DRM}$	repetitive peak off-state voltage				600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 107^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	4			A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25^\circ\text{C}$ ; $t_p = 20\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	25			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G+; $T_j = 25^\circ\text{C}$ ; <a href="#">Fig. 7</a>	-	5	35	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G-; $T_j = 25^\circ\text{C}$ ; <a href="#">Fig. 7</a>				
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2- G-; $T_j = 25^\circ\text{C}$ ; <a href="#">Fig. 7</a>				
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2- G+; $T_j = 25^\circ\text{C}$ ; <a href="#">Fig. 7</a>				

## 5. 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		

## 6. Ordering information

Table 3. Ordering information

Type number	Package			Version
	Name	Description		
BT136-600	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB		SOT78

## 7. Marking

Table 4. Marking codes

Type number	Marking codes
BT136-600	BT136-600

## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Values	Unit
$V_{DRM}$	repetitive peak off-state voltage		600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 107$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	4	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25$ °C; $t_p = 20$ ms; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	25	A
		full sine wave; $T_{j(init)} = 25$ °C; $t_p = 16.7$ ms	27	A
$I^2t$	$I^2t$ for fusing	$t_p = 10$ ms; SIN	3.1	$A^2s$
$dI_T/dt$	rate of rise of on-state current	$I_G = 70$ mA; T2+ G+	50	$A/\mu s$
		$I_G = 70$ mA; T2+ G-	50	$A/\mu s$
		$I_G = 70$ mA; T2- G-	50	$A/\mu s$
		$I_G = 140$ mA; T2- G+	10	$A/\mu s$
$I_{GM}$	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 to 150	°C
$T_j$	junction temperature		125	°C

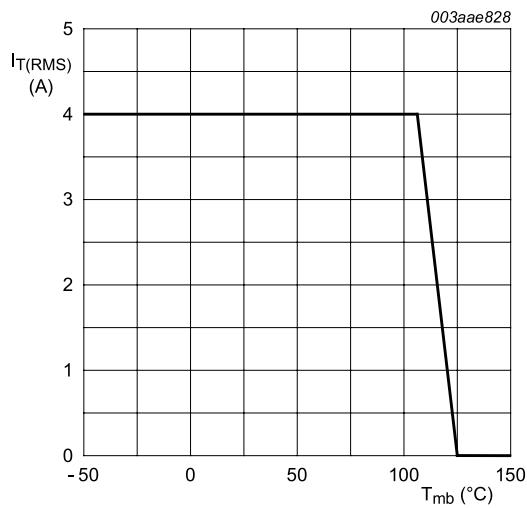
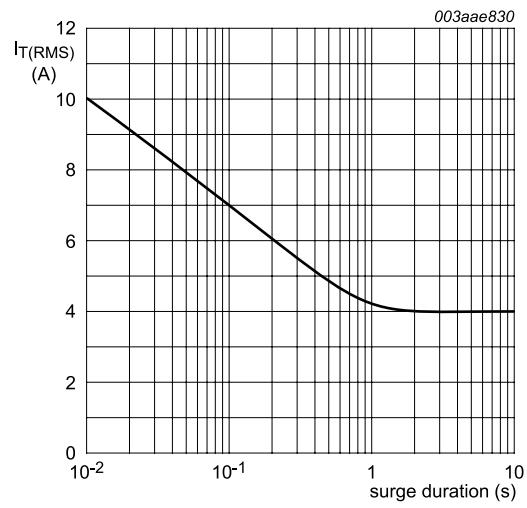
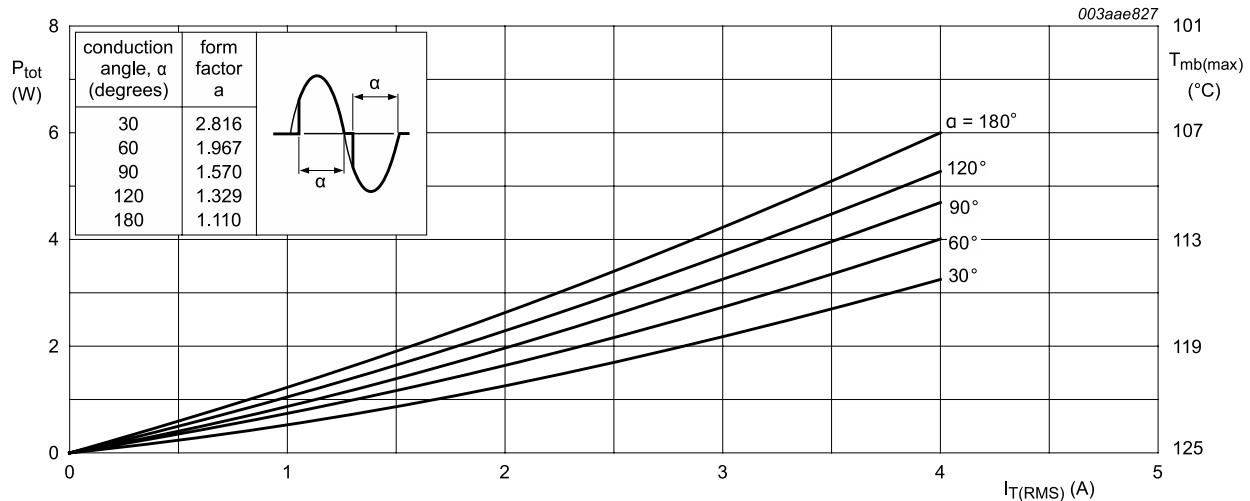


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50$  Hz;  $T_{mb} \leq 107$  °C

Fig. 2. RMS on-state current as a function of surge duration; maximum values



$\alpha$  = conduction angle

$a$  = form factor =  $I_{T(RMS)} / I_{T(AV)}$

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

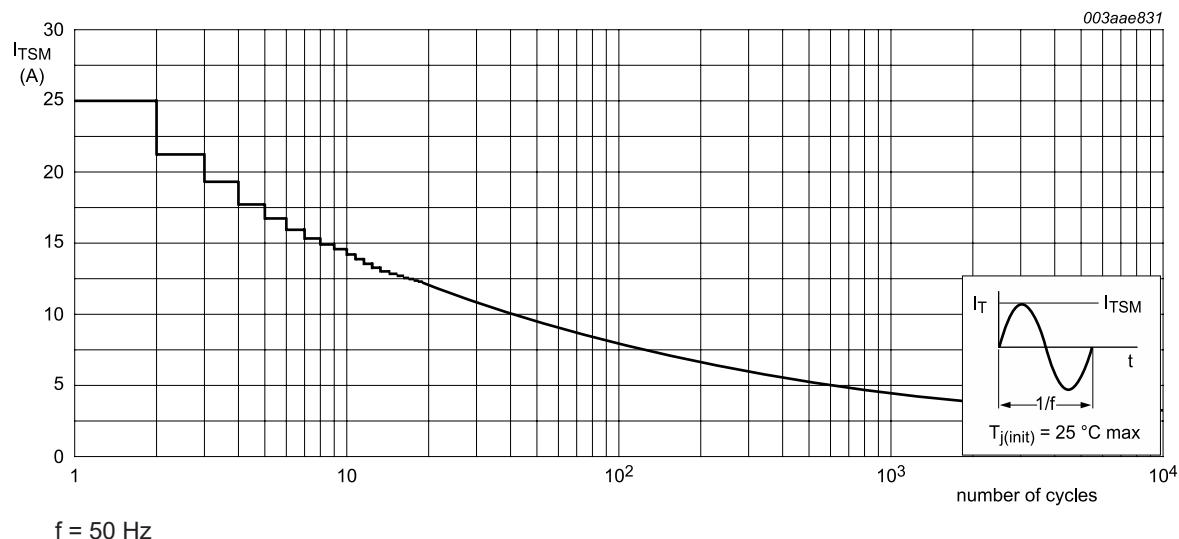


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

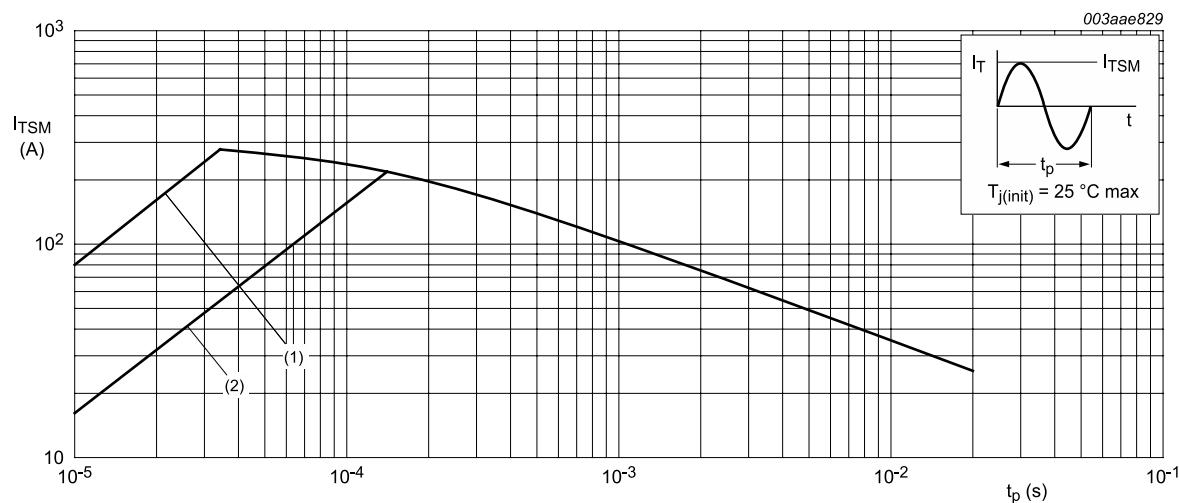


Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; <a href="#">Fig 6</a>		-	-	3	K/W
		half cycle; <a href="#">Fig 6</a>		-	-	3.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	60	-	K/W

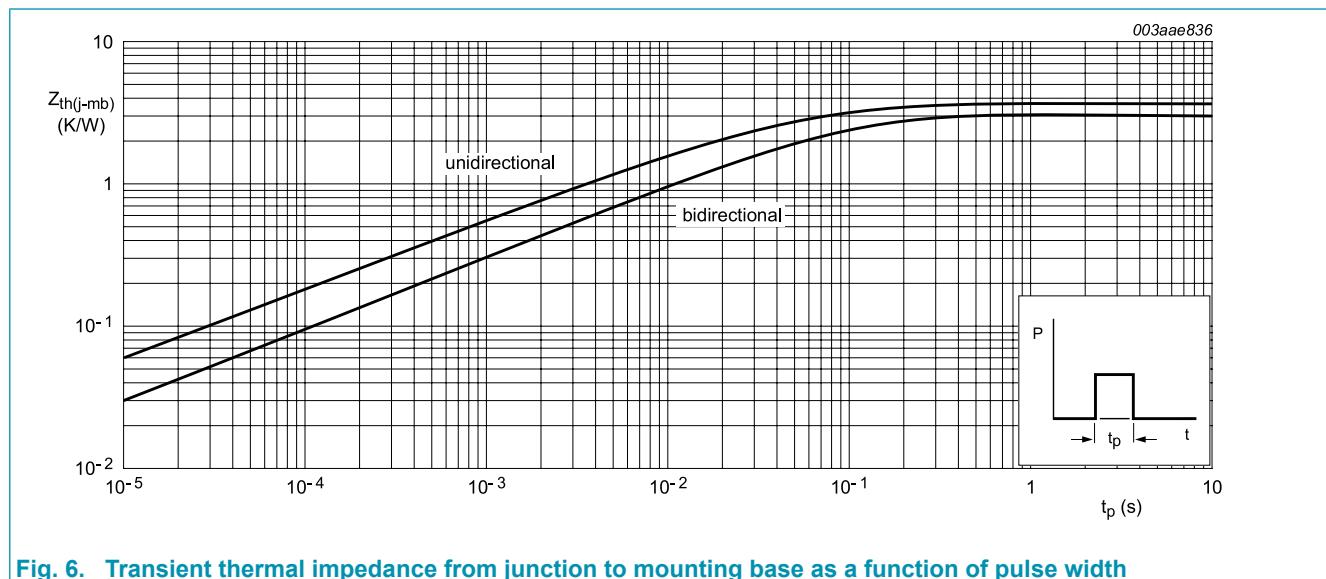


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse width

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Static characteristics</b>							
$I_{GT}$	gate trigger current	$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}; T_2+ \text{ G+}; T_J = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>		-	5	35	mA
		$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}; T_2+ \text{ G-}; T_J = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>		-	8	35	mA
		$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}; T_2- \text{ G-}; T_J = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>		-	11	35	mA
		$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}; T_2- \text{ G+}; T_J = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>		-	30	70	mA
$I_L$	latching current	$V_D = 12 \text{ V}; I_G = 0.1 \text{ A}; T_2+ \text{ G+}; T_J = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 8</a>		-	7	20	mA
		$V_D = 12 \text{ V}; I_G = 0.1 \text{ A}; T_2+ \text{ G-}; T_J = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 8</a>		-	16	30	mA
		$V_D = 12 \text{ V}; I_G = 0.1 \text{ A}; T_2- \text{ G-}; T_J = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 8</a>		-	5	20	mA
		$V_D = 12 \text{ V}; I_G = 0.1 \text{ A}; T_2- \text{ G+}; T_J = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 8</a>		-	7	30	mA
$I_H$	holding current	$V_D = 12 \text{ V}; T_J = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 9</a>		-	5	15	mA
$V_T$	on-state voltage	$I_T = 5 \text{ A}; T_J = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 10</a>		-	1.4	1.7	V
$V_{GT}$	gate trigger voltage	$V_D = 12 \text{ V}; I_T = 0.1 \text{ A}; T_J = 25 \text{ }^\circ\text{C};$ <a href="#">Fig. 11</a>		-	0.7	1	V
		$V_D = 400 \text{ V}; I_T = 0.1 \text{ A}; T_J = 125 \text{ }^\circ\text{C};$ <a href="#">Fig. 11</a>		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
<b>Dynamic characteristics</b>							
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 402 \text{ V}; T_J = 125 \text{ }^\circ\text{C}; (V_{DM} = 67\% \text{ of } V_{DRM})$ ; exponential waveform; gate open circuit		100	250	-	V/μs
$dV_{com}/dt$	rate of change of commutating voltage	$V_D = 400 \text{ V}; T_J = 95 \text{ }^\circ\text{C}; dI_{com}/dt = 1.8 \text{ A/ms}; I_T = 4 \text{ A}$ ; gate open circuit		-	50	-	V/μs
$t_{gt}$	gate-controlled turn-on time	$I_{TM} = 6 \text{ A}; V_D = 600 \text{ V}; I_G = 0.1 \text{ mA}; dI_G/dt = 5 \text{ A/μs}$		-	2	-	μs

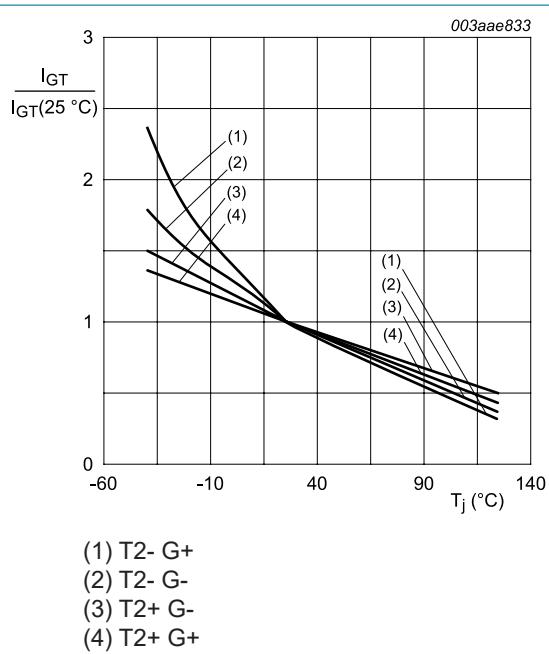


Fig. 7. Normalized gate trigger current as a function of junction temperature

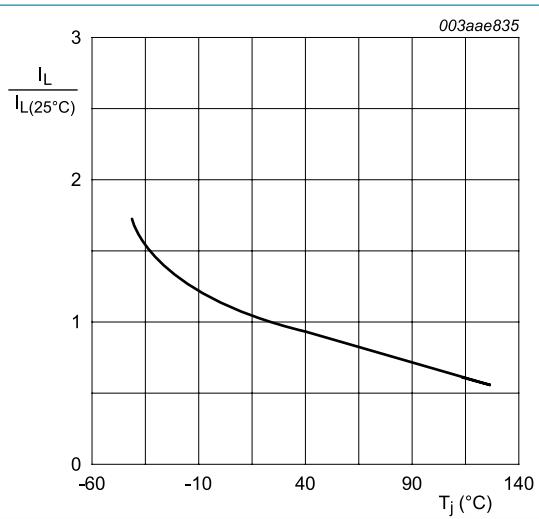


Fig. 8. Normalized latching current as a function of junction temperature

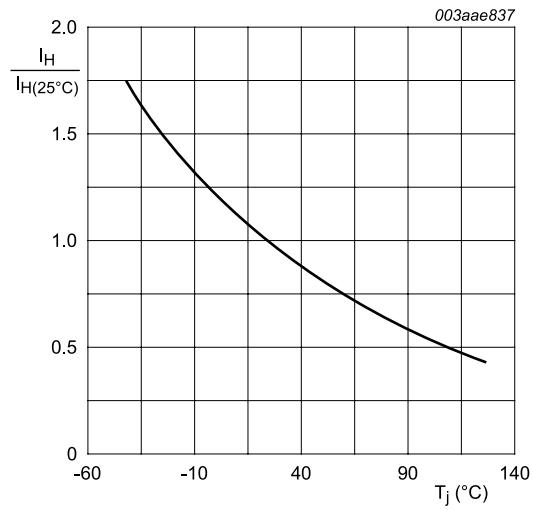
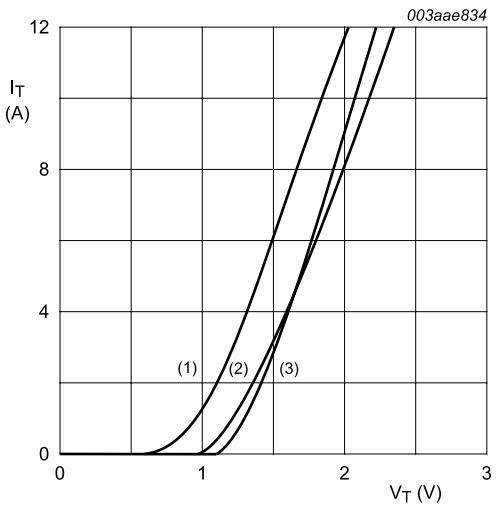


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.27 \text{ V}$ ;  $R_s = 0.091 \Omega$   
 (1)  $T_j = 125^{\circ}\text{C}$ ; typical values  
 (2)  $T_j = 125^{\circ}\text{C}$ ; maximum values  
 (3)  $T_j = 25^{\circ}\text{C}$ ; maximum values

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

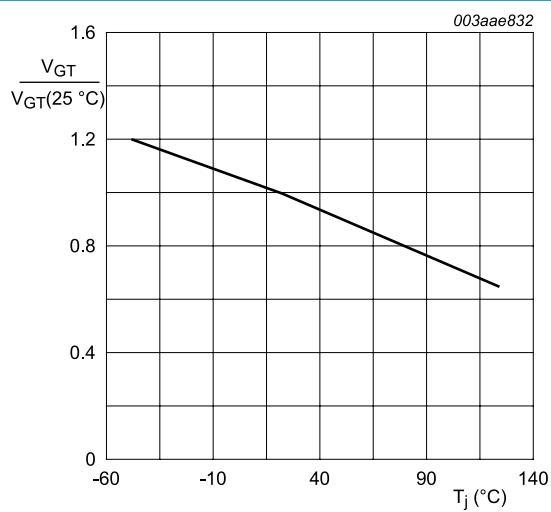
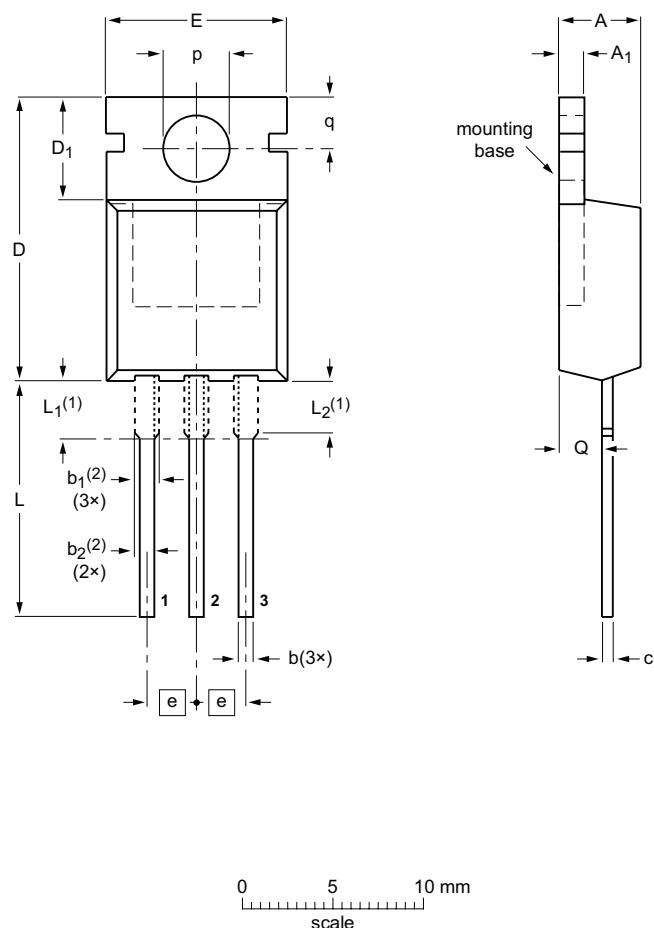


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

## 11. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78



### DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b	b <sub>1</sub> <sup>(2)</sup>	b <sub>2</sub> <sup>(2)</sup>	c	D	D <sub>1</sub>	E	e	L	L <sub>1</sub> <sup>(1)</sup>	L <sub>2</sub> <sup>(1)</sup> max.	p	q	Q
mm	4.7	1.40	0.9	1.6	1.3	0.7	16.0	6.6	10.3	2.54	15.0	3.30	3.0	3.8	3.0	2.6
	4.1	1.25	0.6	1.0	1.0	0.4	15.2	5.9	9.7		12.8	2.79	3.0	3.5	2.7	2.2

### Notes

1. Lead shoulder designs may vary.
2. Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT78		3-lead TO-220AB	SC-46			08-04-23 08-06-13

## 12. Legal information

### 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.

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