

1. General description

Planar passivated four quadrant triac in a SOT428 (DPAK) surface-mountable 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
- Surface mountable package
- Triggering in all four quadrants

3. Applications

- General purpose motor control
- General purpose switching

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
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 107^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	4	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25^\circ\text{C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	-	25	A
		full sine wave; $T_{j(\text{init})} = 25^\circ\text{C}$; $t_p = 16.7\text{ ms}$	-	-	27	A
T_j	junction temperature		-	-	125	$^\circ\text{C}$

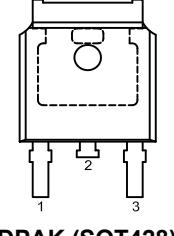
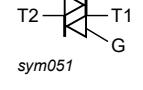
Static characteristics

I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_j = 25^\circ\text{C}$; Fig. 7	-	5	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25^\circ\text{C}$; Fig. 7	-	8	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25^\circ\text{C}$; Fig. 7	-	11	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G+; $T_j = 25^\circ\text{C}$; Fig. 7	-	30	70	mA

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_H	holding current	$V_D = 12 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 9		-	5	15	mA
V_T	on-state voltage	$I_T = 5 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 10		-	1.4	1.7	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536 \text{ V}$; $T_j = 125 \text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		100	250	-	V/ μ s
dV_{com}/dt	rate of change of commutating voltage	$V_D = 400 \text{ V}$; $T_j = 95 \text{ }^\circ\text{C}$; $dI_{com}/dt = 1.8 \text{ A}/\text{ms}$; $I_T = 4 \text{ A}$; gate open circuit		-	50	-	V/ μ s

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	 DPAK (SOT428)	

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BT136S-800	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428

7. 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; $T_{mb} \leq 107^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	4	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25^\circ\text{C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	25	A
		full sine wave; $T_{j(\text{init})} = 25^\circ\text{C}$; $t_p = 16.7\text{ ms}$	-	27	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN	-	3.1	A^2s
dI_T/dt	rate of rise of on-state current	$I_G = 150\text{ mA}$	-	50	$\text{A}/\mu\text{s}$
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	150	$^\circ\text{C}$
T_j	junction temperature		-	125	$^\circ\text{C}$

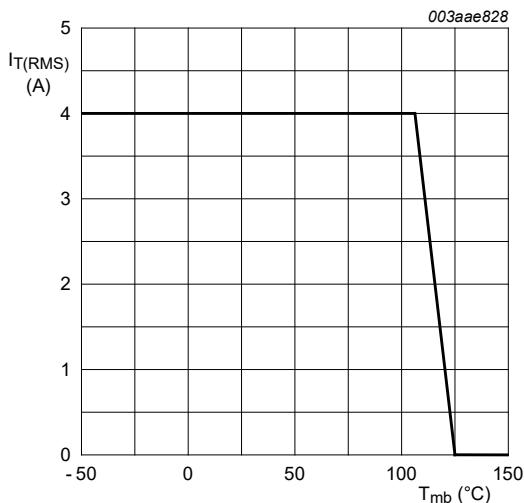


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values

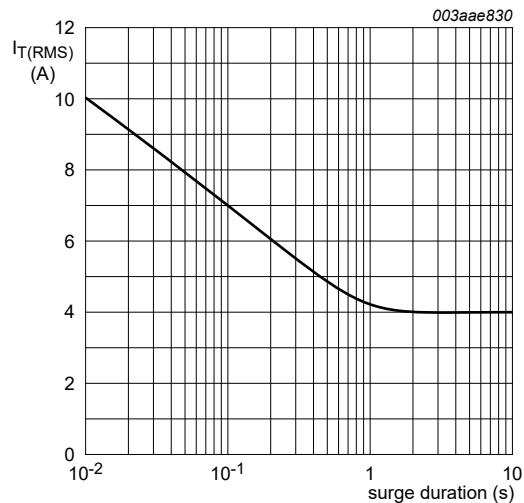


Fig. 2. RMS on-state current as a function of surge duration; maximum values

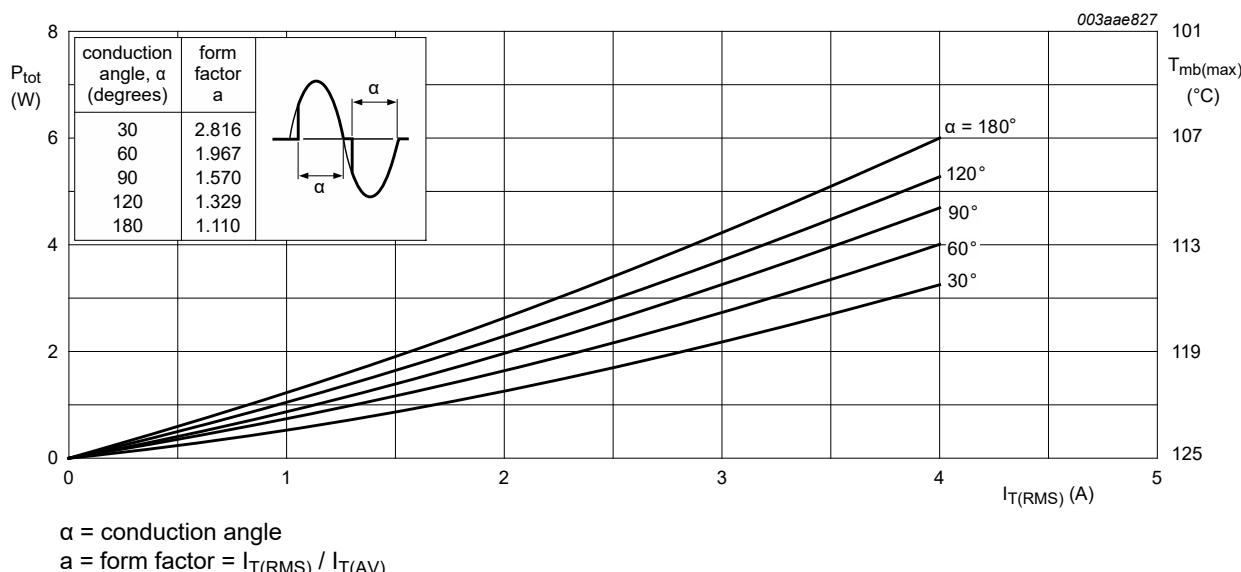


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

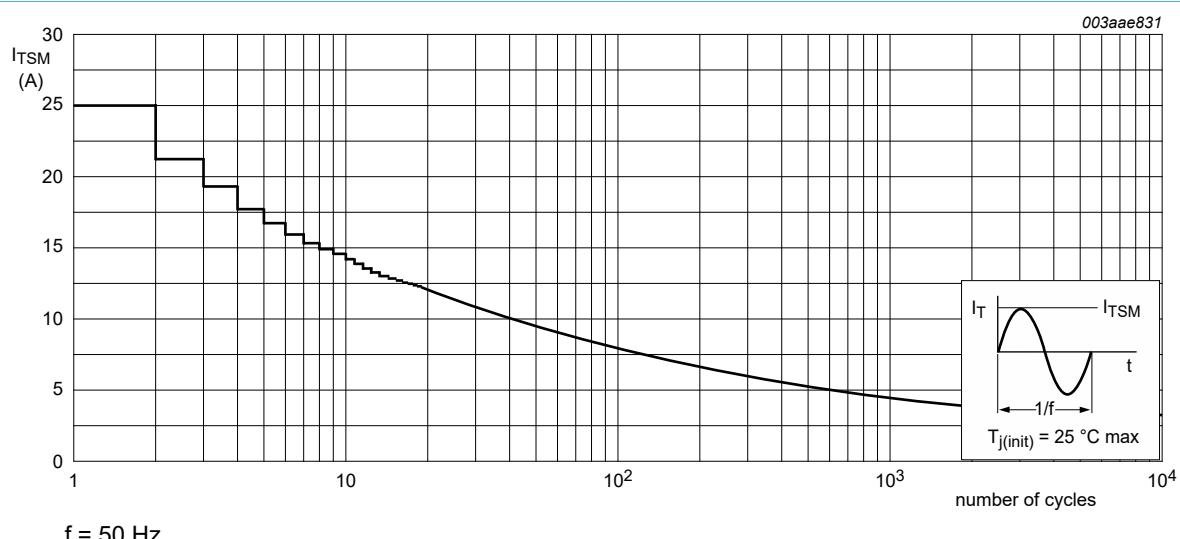


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

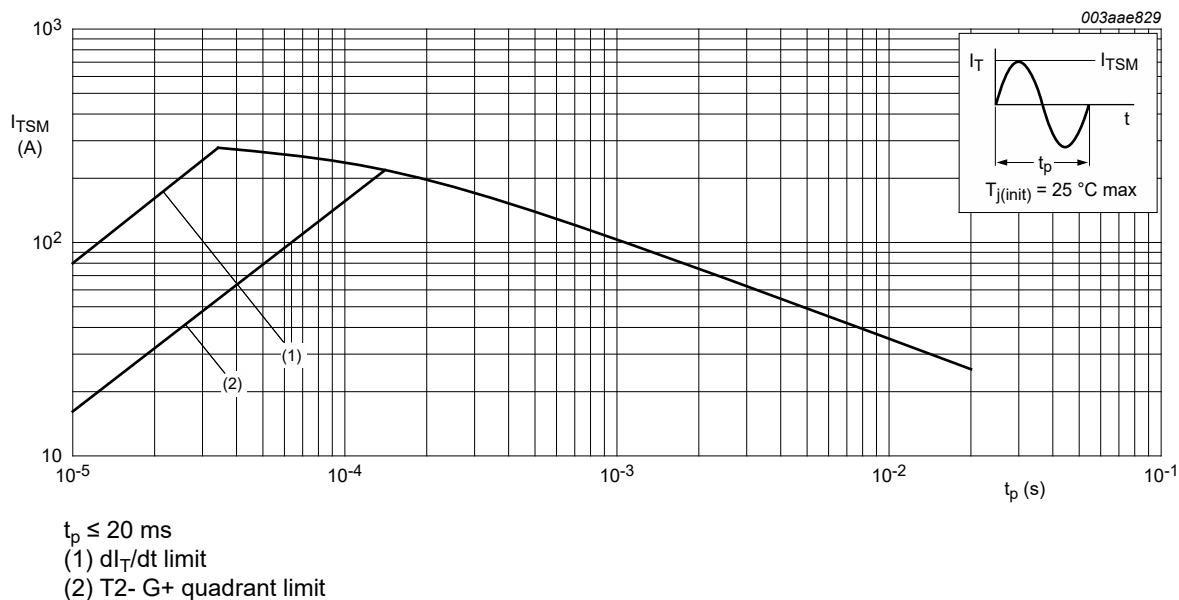


Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	half cycle; Fig. 6	-	-	3.7	K/W
		full cycle; Fig. 6	-	-	3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air; printed circuit board (FR4) mounted; standard footprint, single-sided copper, tin-plated	-	75	-	K/W

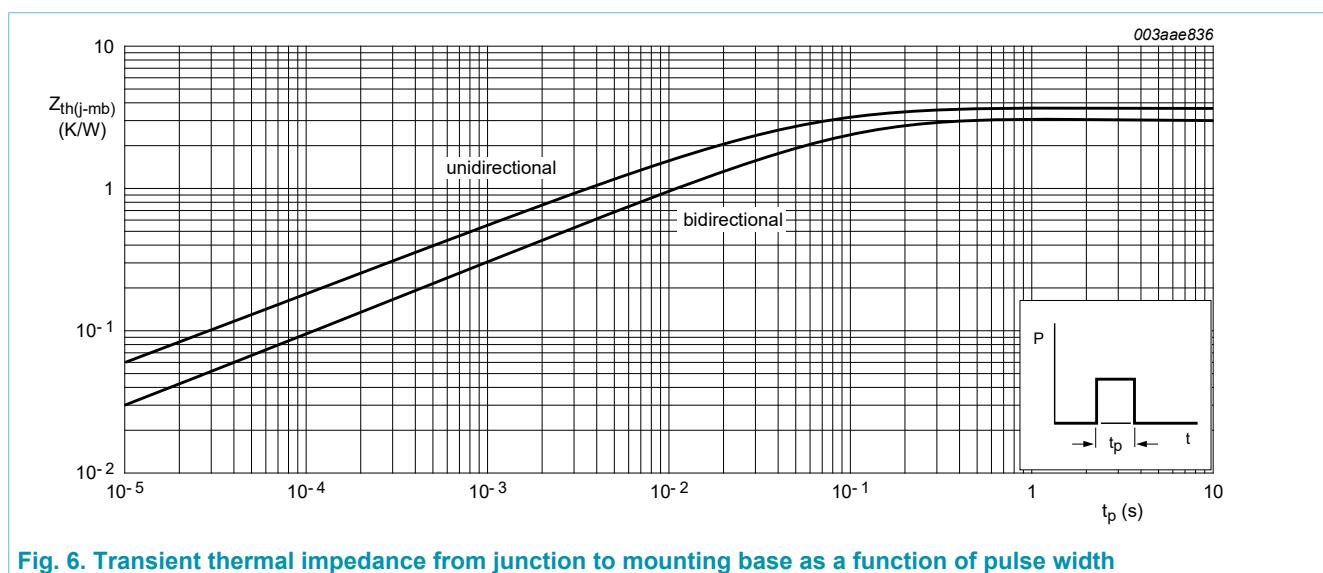


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse width

9. 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+; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 7		-	5	35	mA
		$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; T2+ G-; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 7		-	8	35	mA
		$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; T2- G-; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 7		-	11	35	mA
		$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; T2- G+; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 7		-	30	70	mA
I_L	latching current	$V_D = 12 \text{ V}$; $I_G = 0.1 \text{ A}$; T2+ G+; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 8		-	7	20	mA
		$V_D = 12 \text{ V}$; $I_G = 0.1 \text{ A}$; T2+ G-; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 8		-	16	30	mA
		$V_D = 12 \text{ V}$; $I_G = 0.1 \text{ A}$; T2- G-; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 8		-	5	20	mA
		$V_D = 12 \text{ V}$; $I_G = 0.1 \text{ A}$; T2- G+; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 8		-	7	30	mA
I_H	holding current	$V_D = 12 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 9		-	5	15	mA
V_T	on-state voltage	$I_T = 5 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 10		-	1.4	1.7	V
V_{GT}	gate trigger voltage	$V_D = 12 \text{ V}$; $I_T = 0.1 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 11		-	0.7	1	V
		$V_D = 400 \text{ V}$; $I_T = 0.1 \text{ A}$; $T_j = 125 \text{ }^\circ\text{C}$; Fig. 11		0.25	0.4	-	V
I_D	off-state current	$V_D = 800 \text{ V}$; $T_j = 125 \text{ }^\circ\text{C}$		-	0.1	0.5	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536 \text{ V}$; $T_j = 125 \text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		100	250	-	V/ μ s
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/ μ s

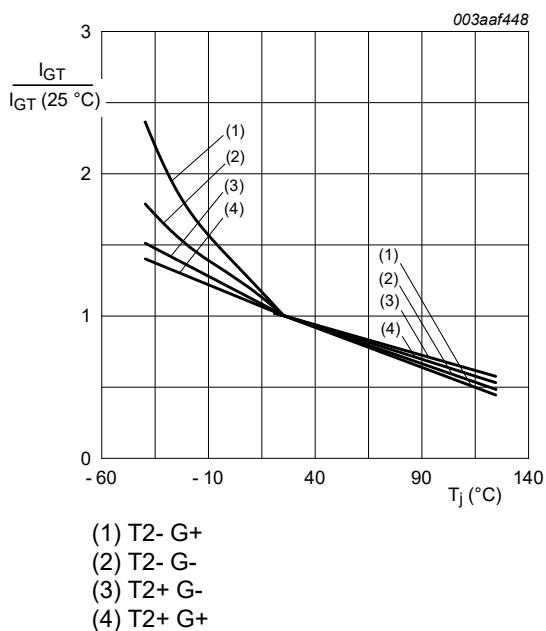


Fig. 7. Normalized gate trigger current as a function of junction temperature

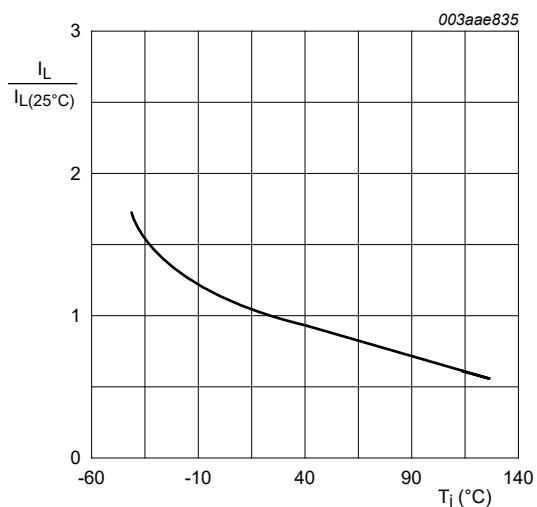


Fig. 8. Normalized latching current as a function of junction temperature

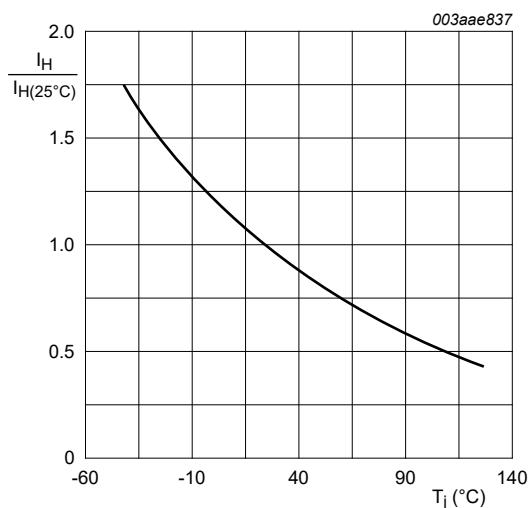


Fig. 9. Normalized holding current as a function of junction temperature

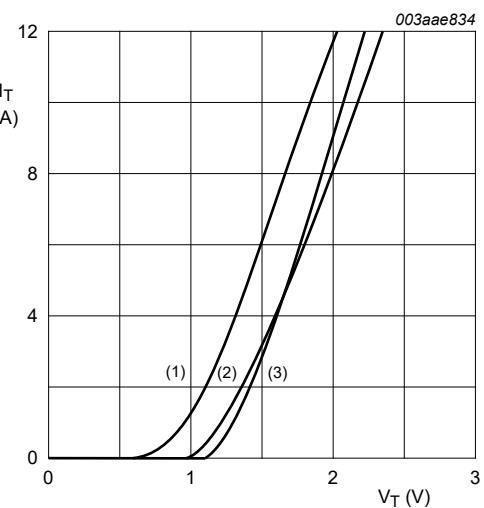


Fig. 10. On-state current as a function of on-state voltage

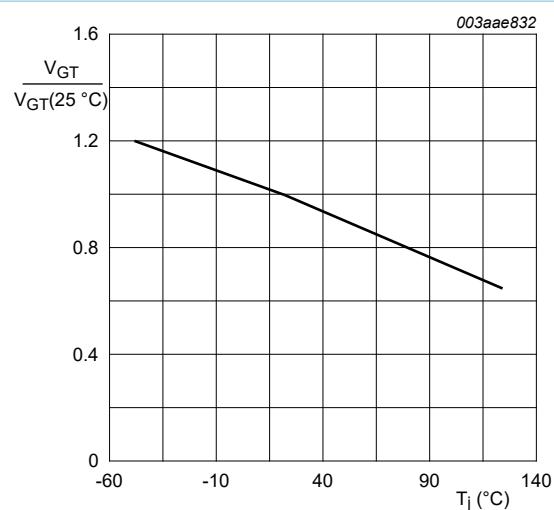
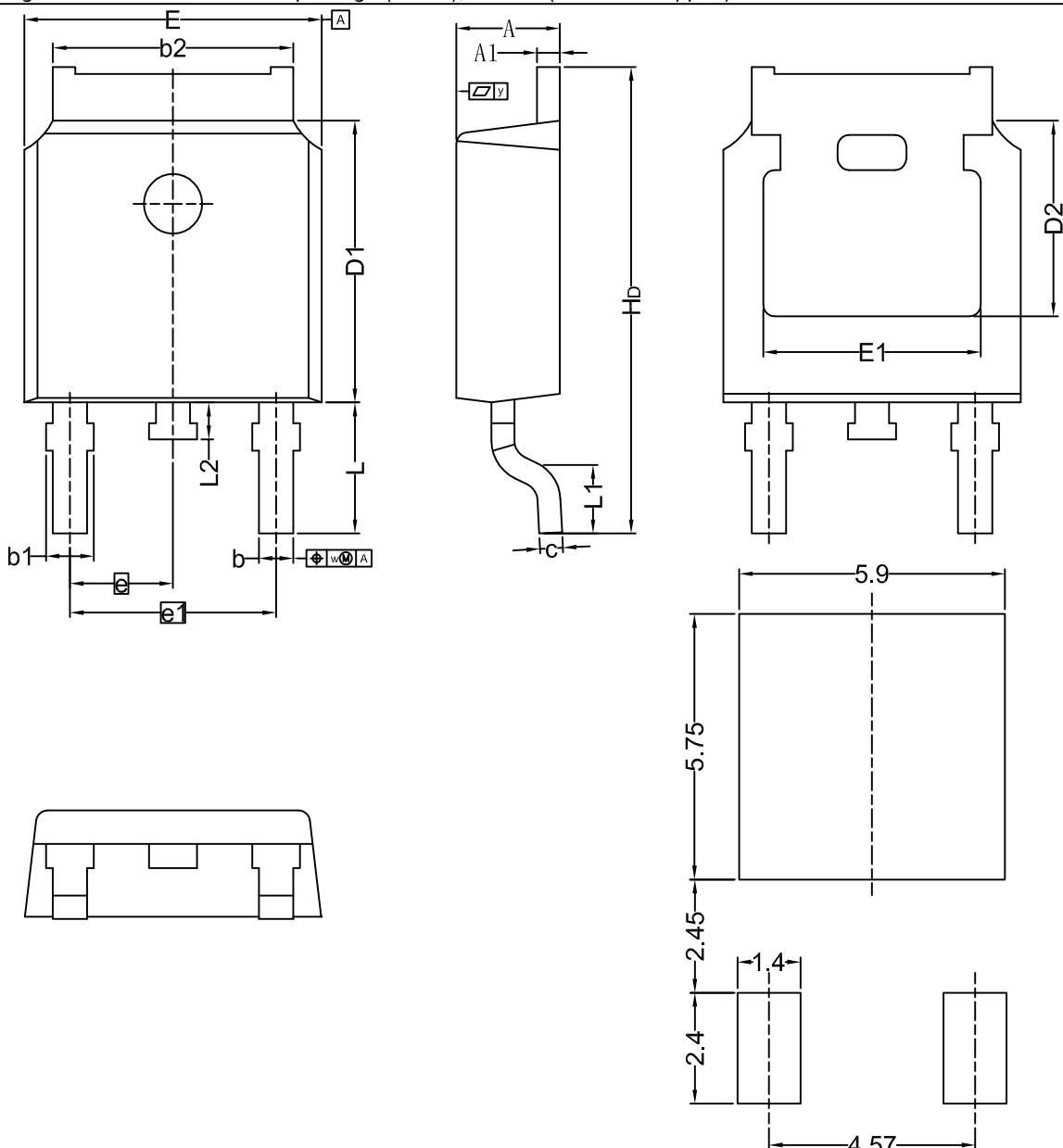


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

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

TO252



Recommended Footprint

Unit	A	A1	b	b1	b2	c	D1	D2	E	E1	e	e1	H _D	L	L1	L2	w	y
min	2.22	0.46	0.71	0.72	5.00	0.20	5.98	4.00	6.47	4.45		2.285	4.57	9.60		0.50	0.50	
nom	2.38	0.93	0.89	1.10	5.46	0.56	6.22	---	6.73	---			10.40	2.90 (Ref.)	---	0.90	0.20	0.20
max																		

Fig. 12. Package outline DPAK (SOT428)

11. Legal information

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