

1. General description

Planar passivated high commutation three quadrant triac in a SOT428 (DPAK) surface-mountable plastic package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series B" triac will commute the full rated RMS current at the maximum rated junction temperature without the aid of a snubber.

2. Features and benefits

- 3Q technology for improved noise immunity
- High blocking voltage capability
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- Less sensitive gate for very high noise immunity
- Planar passivated for voltage ruggedness and reliability
- Surface-mountable package
- Triggering in three quadrants only

3. Applications

- General purpose motor control circuits
- Home appliances
- Rectifier-fed DC inductive loads e.g. DC motors and solenoids

4. Quick reference data

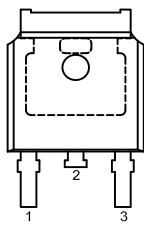
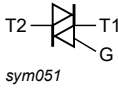
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 107\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	4	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	-	25	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$	-	-	27	A
T_j	junction temperature		-	-	125	°C
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ °C}$; Fig. 7	-	-	50	mA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	-	-	50	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	-	-	50	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9	-	-	30	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	$V_{DM} = 402\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit	1000	-	-	V/ μs
di_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$; $I_{T(RMS)} = 4\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; (snubberless condition); gate open circuit	6	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 DPAK (SOT428)	 sym051
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		
	Name	Description	Version
BTA204S-600B	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		-	600	V
I _{T(RMS)}	RMS on-state current	full sine wave; T _{mb} ≤ 107 °C; Fig. 1; Fig. 2; Fig. 3	-	4	A
I _{TSM}	non-repetitive peak on-state current	full sine wave; T _{j(init)} = 25 °C; t _p = 20 ms; Fig. 4; Fig. 5	-	25	A
		full sine wave; T _{j(init)} = 25 °C; t _p = 16.7 ms	-	27	A
I ² t	I ² t for fusing	t _p = 10 ms; SIN	-	3.1	A ² s
di _T /dt	rate of rise of on-state current	I _G = 100 mA	-	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	-	0.5	W
T _{stg}	storage temperature		-40	150	°C
T _j	junction temperature		-	125	°C

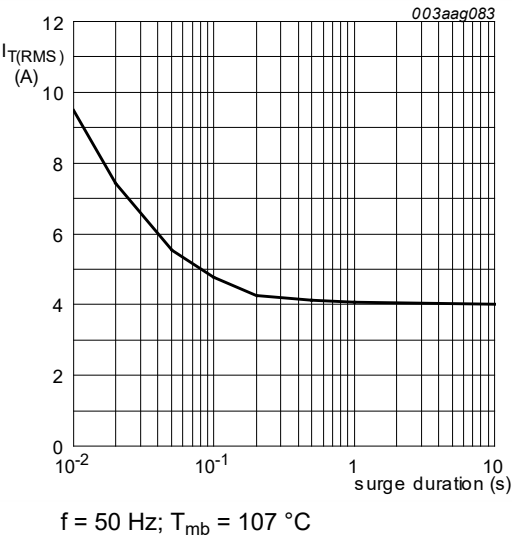


Fig. 1. RMS on-state current as a function of surge duration; maximum values

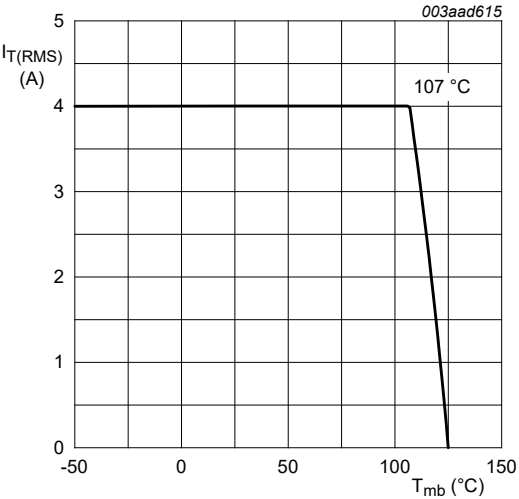


Fig. 2. RMS on-state current as a function of mounting base temperature; maximum values

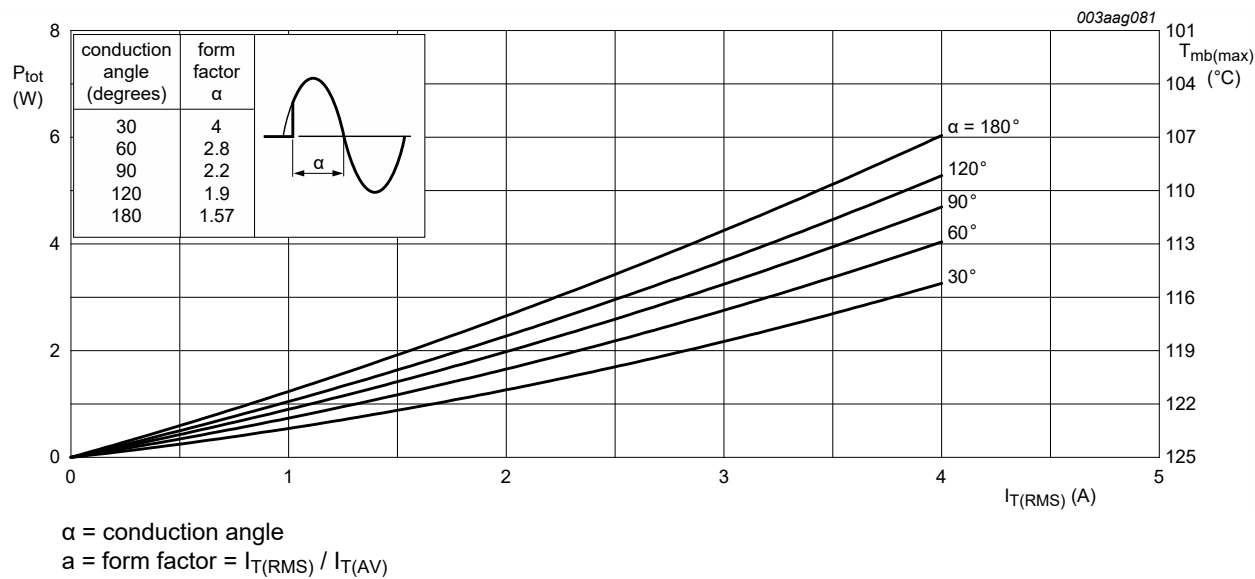


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

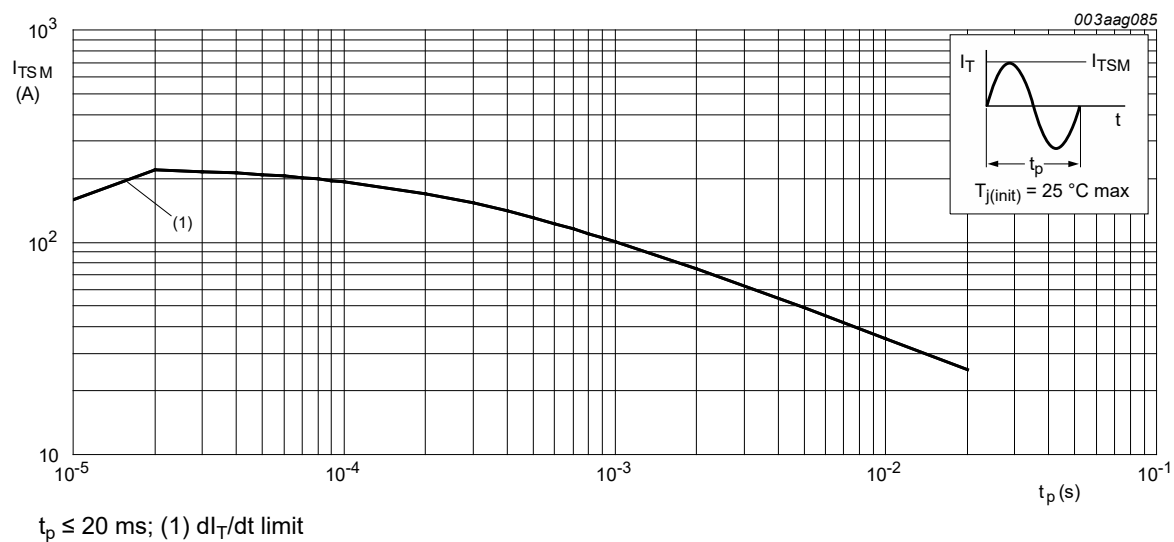
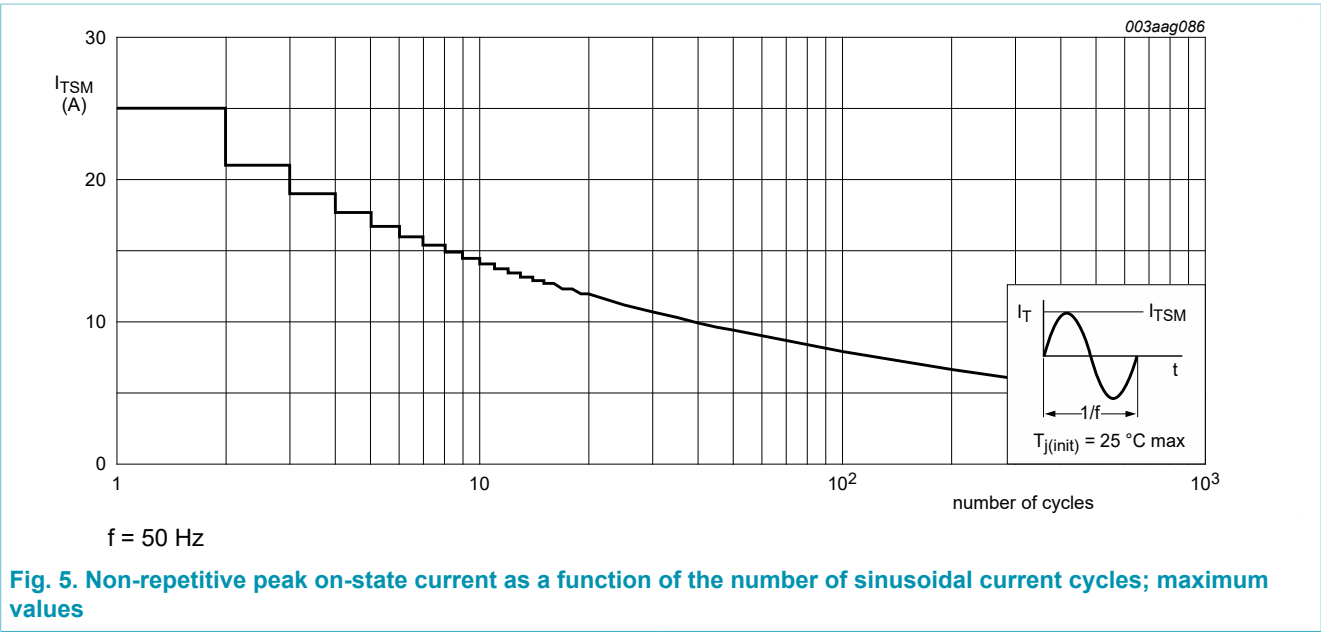


Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values



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	full cycle; Fig. 6	-	-	3	K/W
		half cycle; Fig. 6	-	-	3.7	K/W
R _{th(j-a)}	thermal resistance from junction to ambient free air	printed circuit board (FR4) mounted	-	75	-	K/W

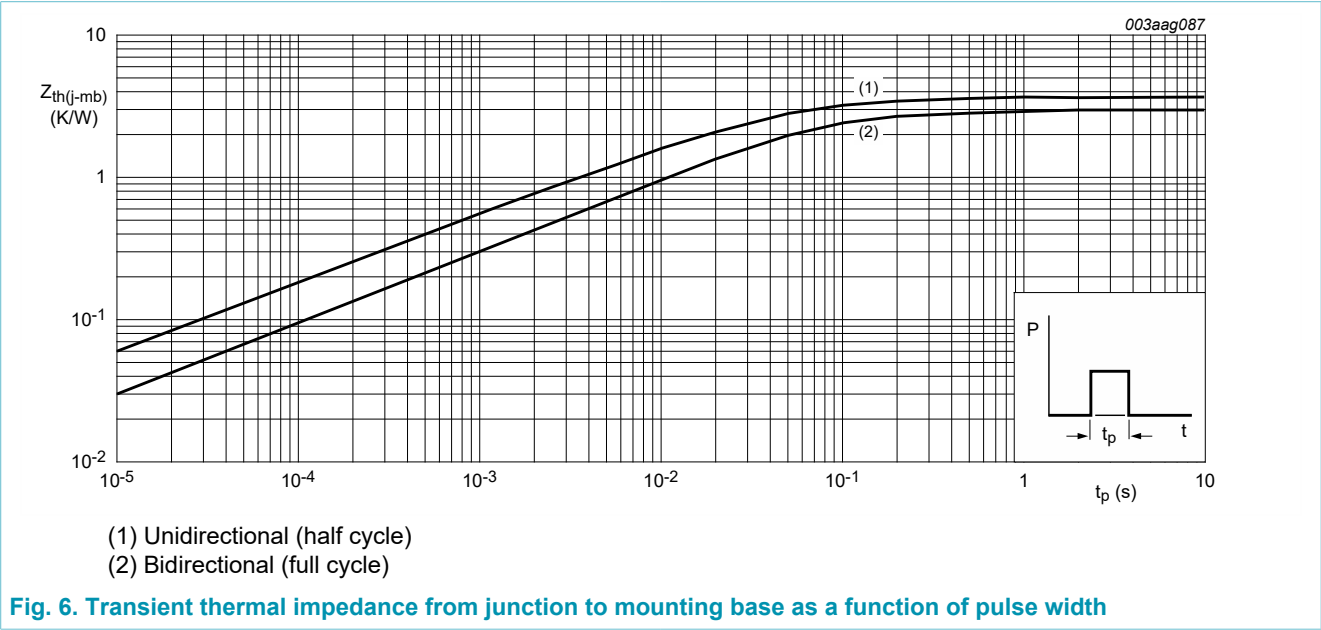
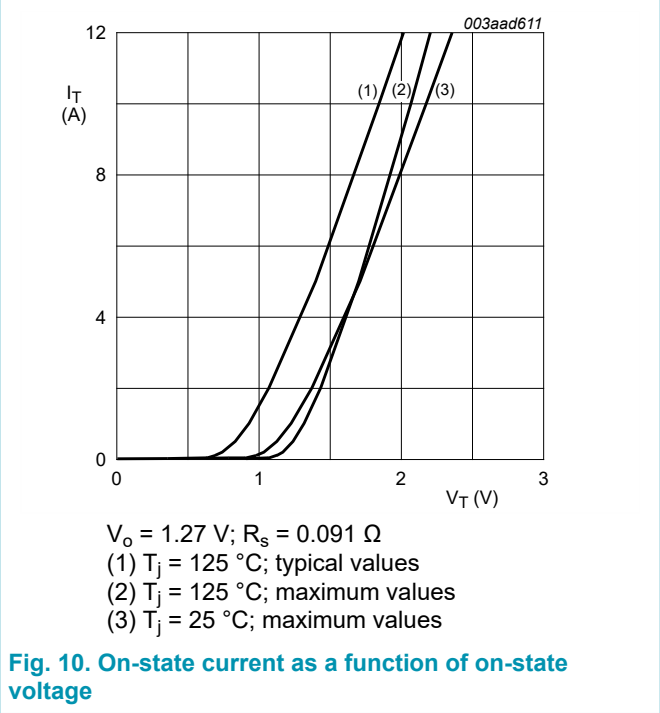
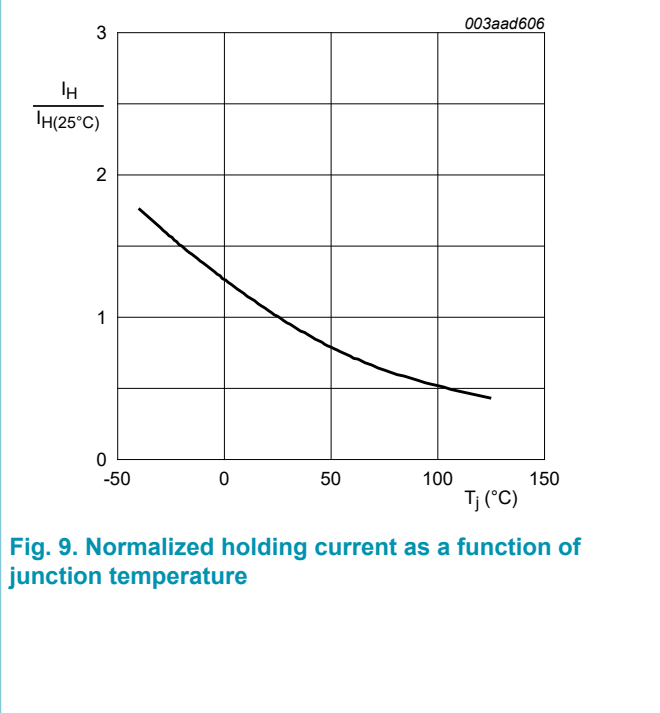
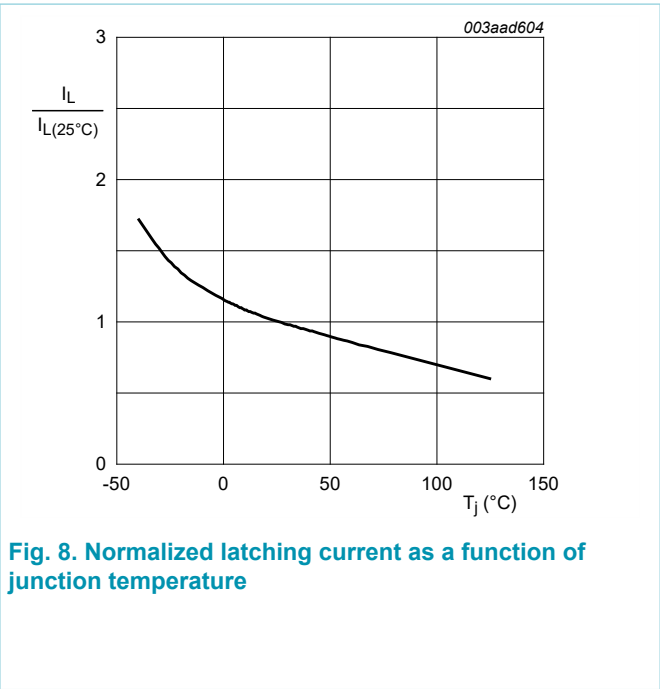
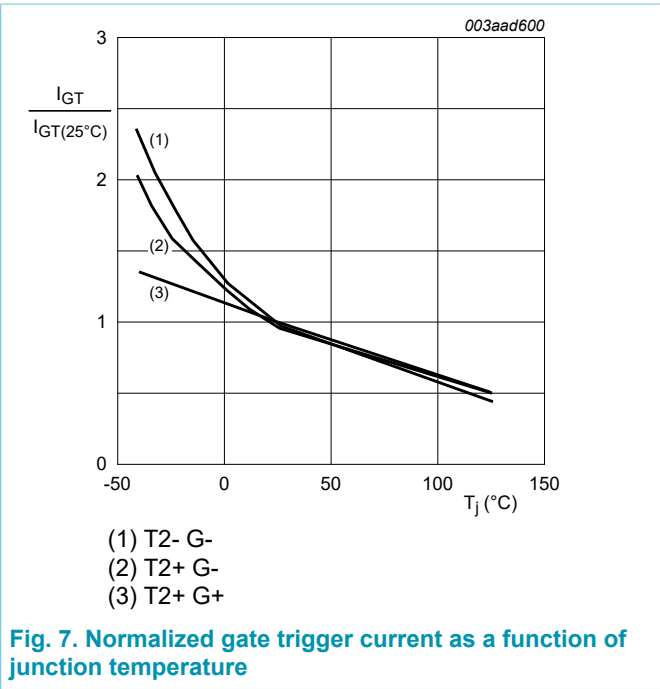


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse width

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		-	-	50	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7		-	-	50	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7		-	-	50	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		-	-	30	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 8		-	-	45	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ }^\circ\text{C}$; Fig. 8		-	-	30	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9		-	-	30	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	$V_D = 600\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$		-	0.1	0.5	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		1000	-	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$; $I_{T(RMS)} = 4\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; (snubberless condition); gate open circuit		6	-	-	A/ms



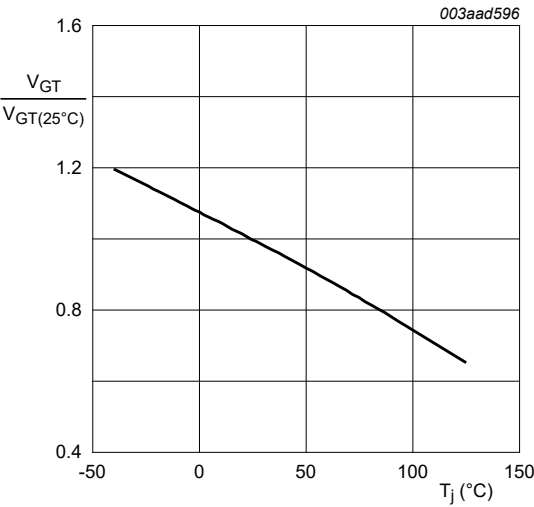


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

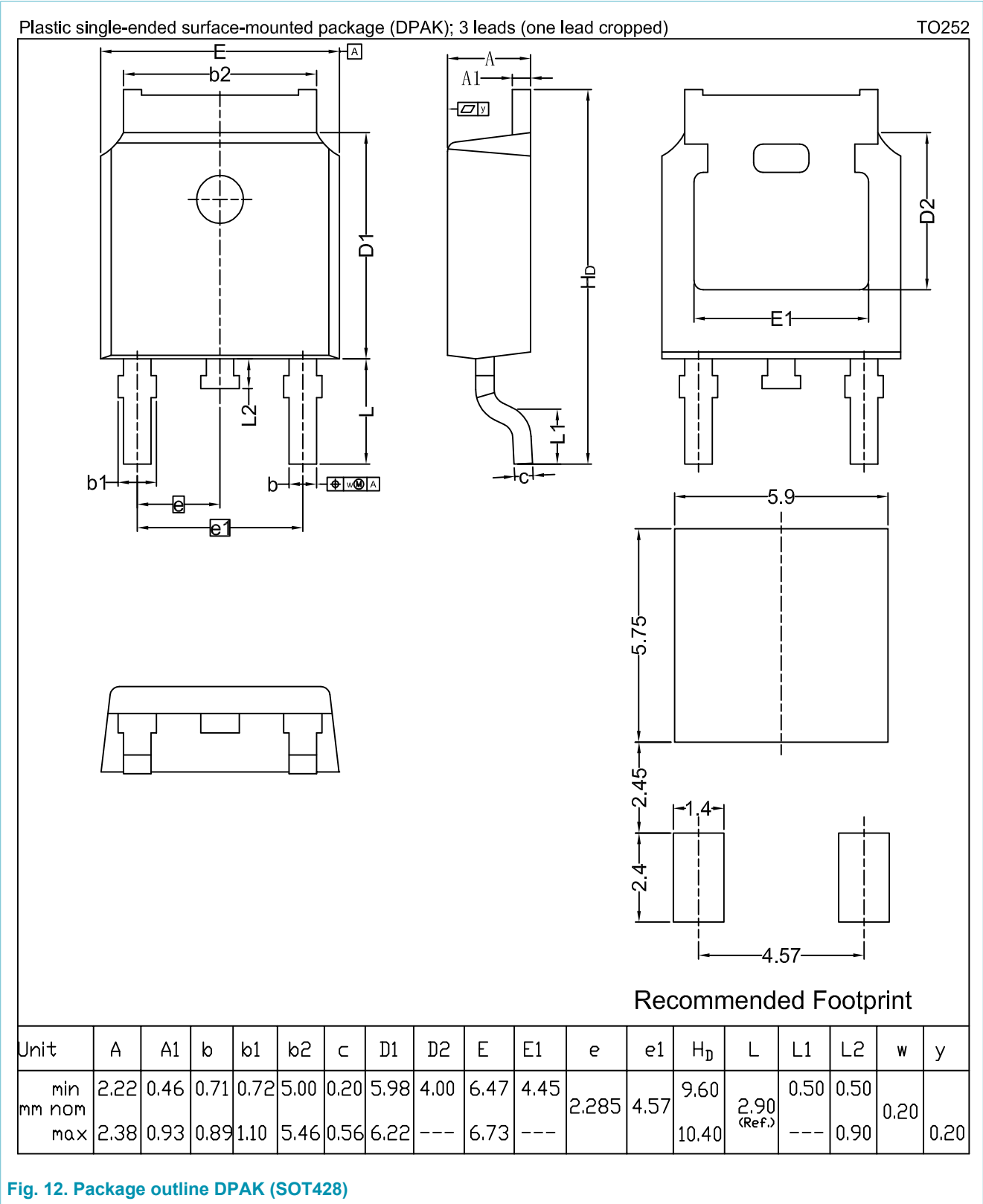


Fig. 12. Package outline DPAK (SOT428)

11. Soldering

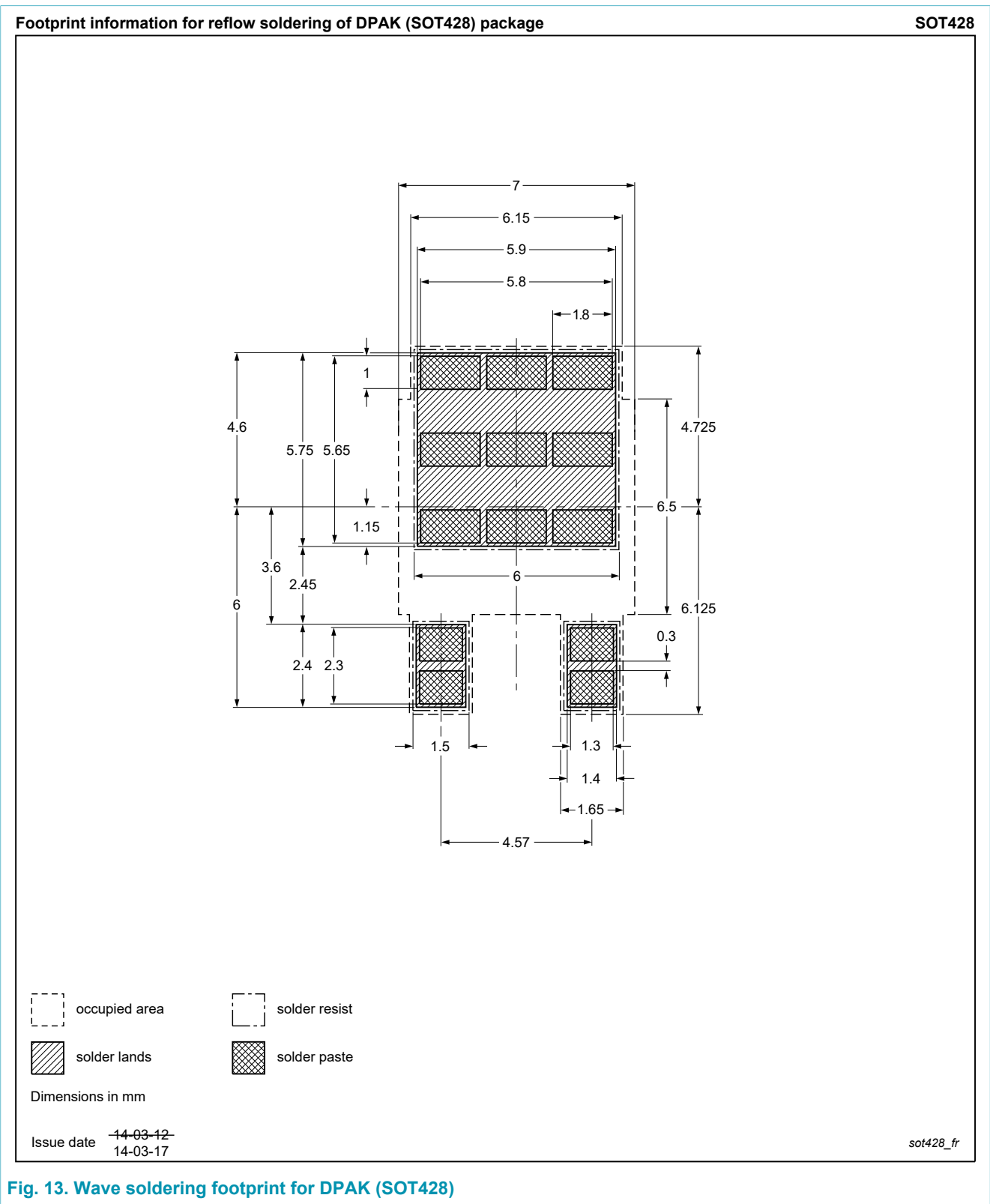


Fig. 13. Wave soldering footprint for DPAK (SOT428)

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.

- [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".
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