

1. General description

Planar passivated high commutation three quadrant triac in a SOT223-2L surface mountable plastic package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series ET" triac will commute the full RMS current at the maximum rated junction temperature ($T_{j(max)} = 150\text{ °C}$) without the aid of a snubber. It is used in applications where "high junction operating temperature capability" is required.

2. Features and benefits

- 3Q technology for improved noise immunity
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- High junction operating temperature capability
- High voltage capability
- 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

- Applications subject to high temperature
- Electronic thermostats (heating and cooling)
- High power motor controls e.g. washing machines and vacuum cleaners
- Rectifier-fed DC inductive loads e.g. DC motors and solenoids

4. Quick reference data

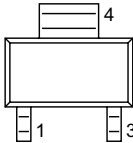
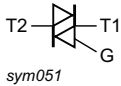
Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values	Unit
V_{DRM}	repetitive peak off-state voltage			800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{sp} \leq 85\text{ °C}$; 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		40	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$		44	A
T_j	operating junction temperature			-40 to 150	°C

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G+;$ $T_j = 25\text{ °C};$ Fig. 7		-	-	10	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G-;$ $T_j = 25\text{ °C};$ Fig. 7		-	-	10	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G-;$ $T_j = 25\text{ °C};$ Fig. 7		-	-	10	mA
I_H	holding current	$V_D = 12\text{ V}; T_j = 25\text{ °C};$ Fig. 9		-	-	30	mA
V_T	on-state voltage	$I_T = 5\text{ A}; T_j = 25\text{ °C};$ Fig. 10		-	-	1.6	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}; T_j = 150\text{ °C}; (V_{DM} = 67\%$ of V_{DRM}); exponential waveform; $R_{G(T1)} = 220\text{ }\Omega$		2000	-	-	V/ μ s
dV_{com}/dt	rate of change of commutating voltage	$V_D = 400\text{ V}; T_j = 125\text{ °C}; dI_{com}/dt = 2\text{ A/ms}$		3	-	-	V/ μ s

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1		 sym051
3	G	gate		
4	T2	main terminal 2		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BTA404V-800ET	SOT223-2L	BTA404V-800ETF	Reel	4000	SOT223d-2L	02-Apr-2025

7. Marking

Table 4. Marking codes

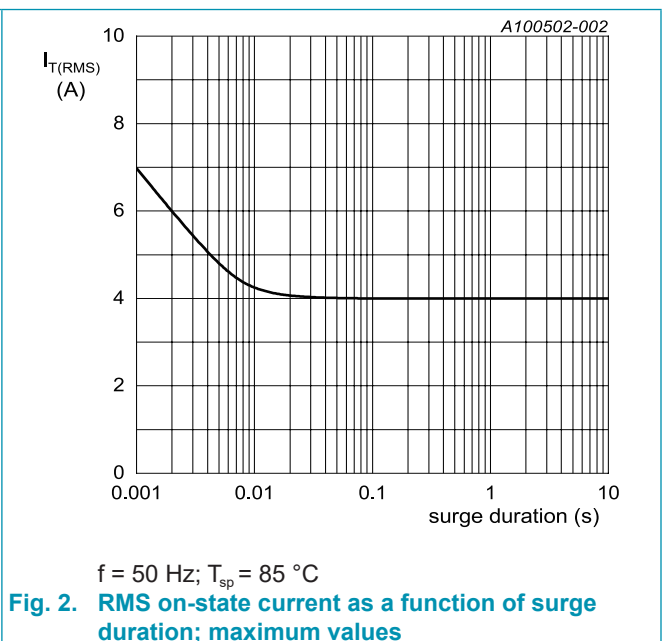
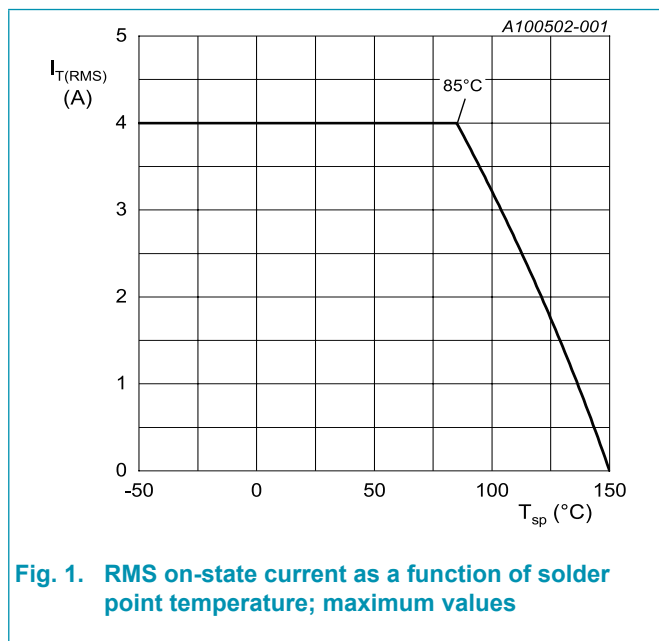
Type number	Marking codes
BTA404V-800ET	404V8E

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Notes	Values	Unit
V_{DRM}	repetitive peak off-state voltage			800	V
V_{RRM}	repetitive peak reverse voltage			800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{sp} \leq 85\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3		4	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(initial)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig 4 ; Fig 5		40	A
		full sine wave; $T_{j(initial)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$		44	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; sine-wave pulse		8	A ² s
di_T/dt	rate of rise of on-state current	$I_G = 70\text{ mA}$		100	A/ μ s
I_{GM}	peak gate current	$t_p = 20\text{ }\mu$ s		4	A
P_{GM}	peak gate power			10	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	operating junction temperature			-40 to 150	°C



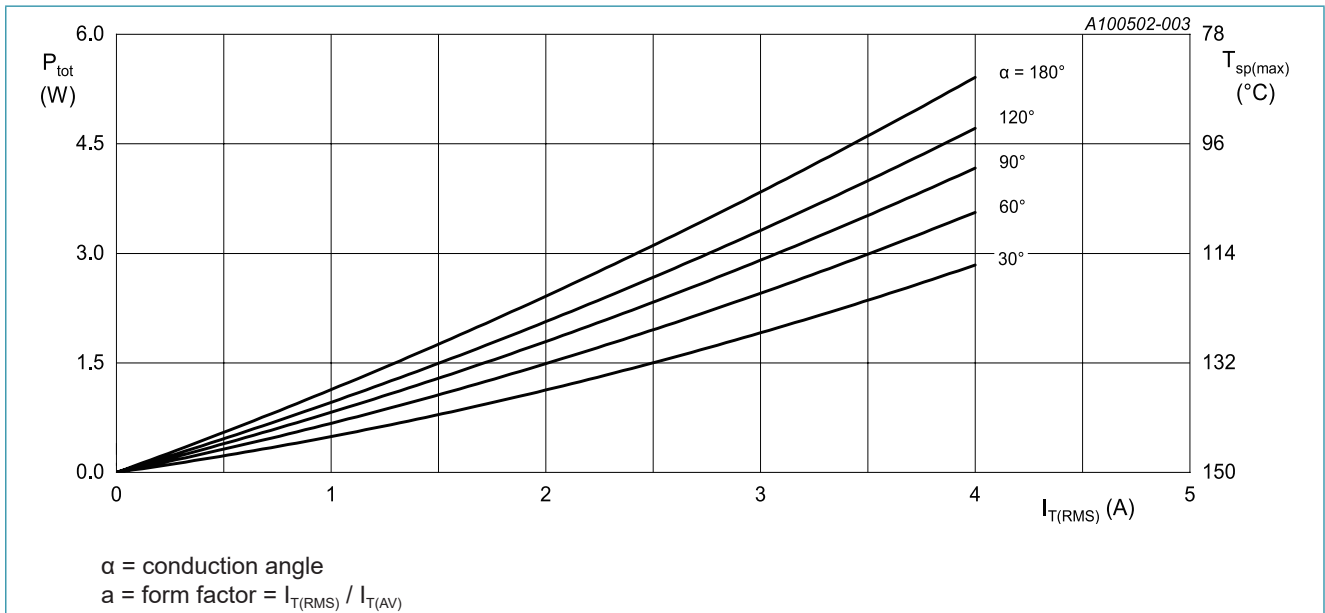


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

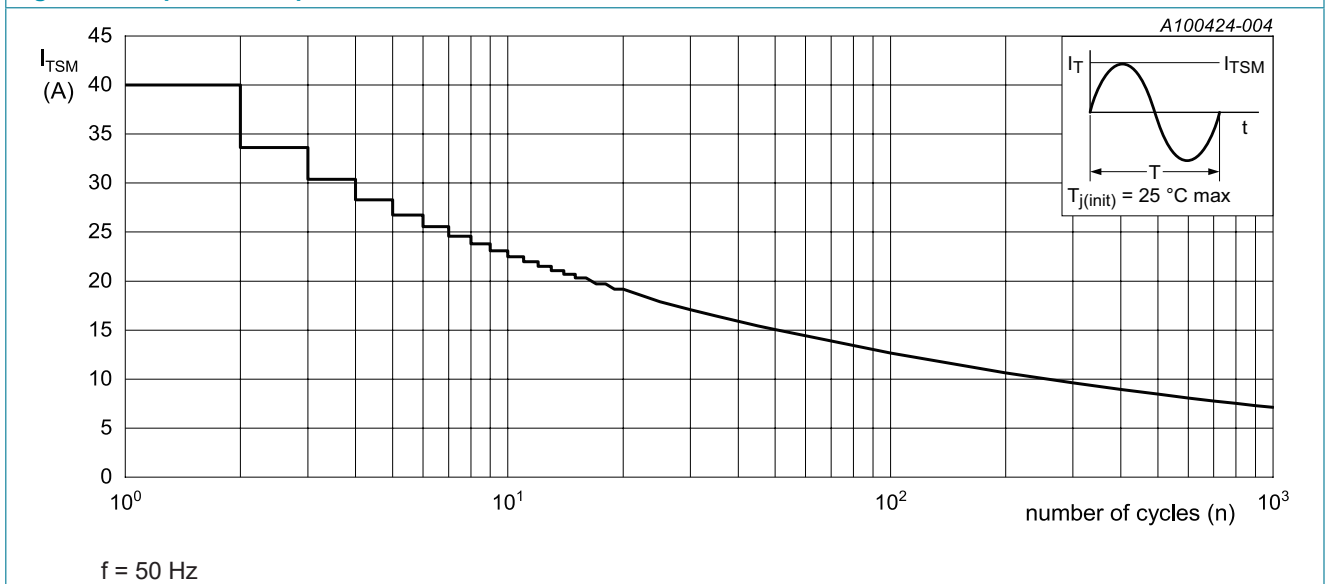


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

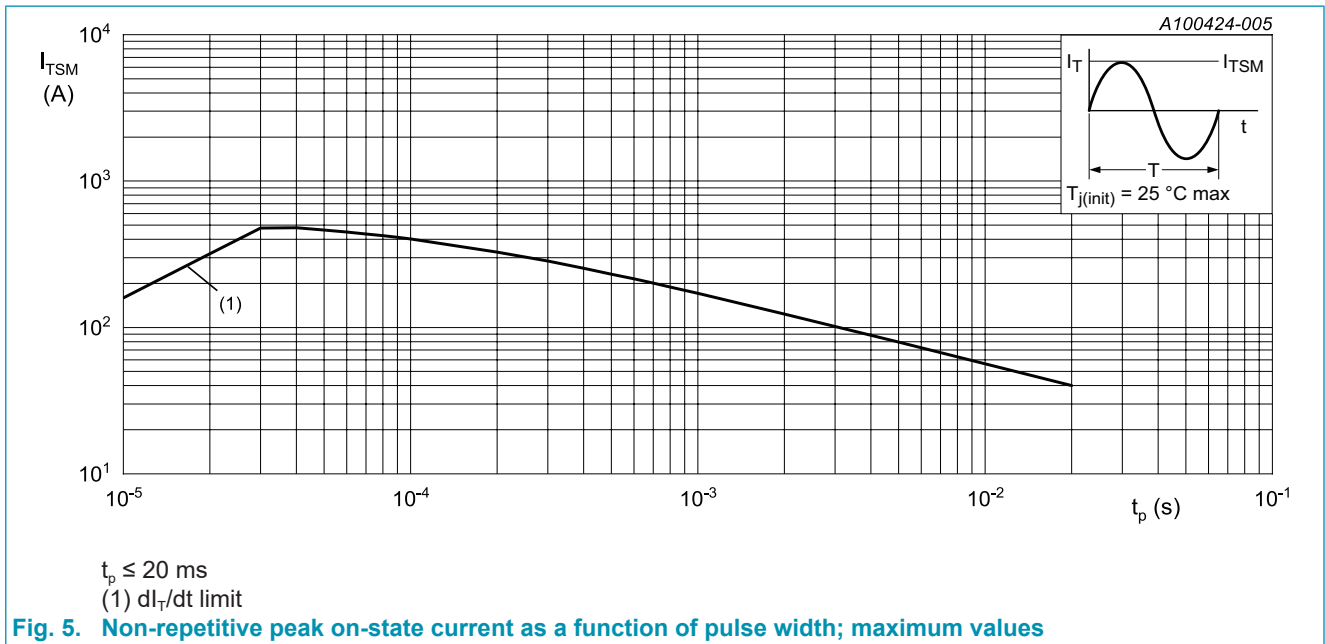
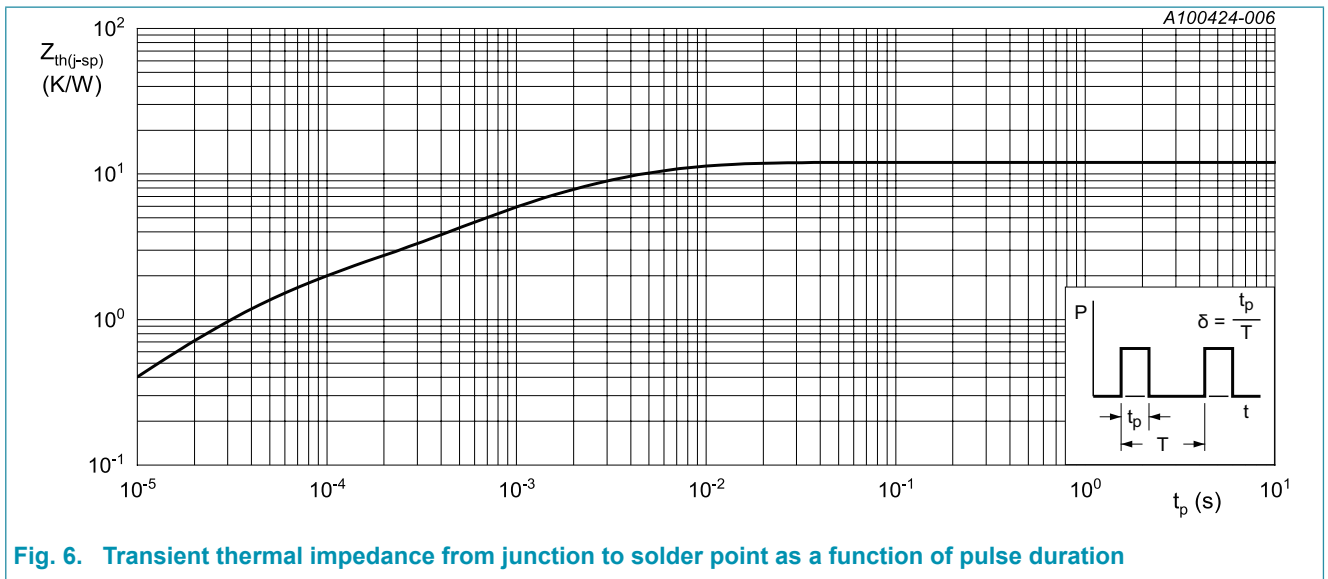


Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

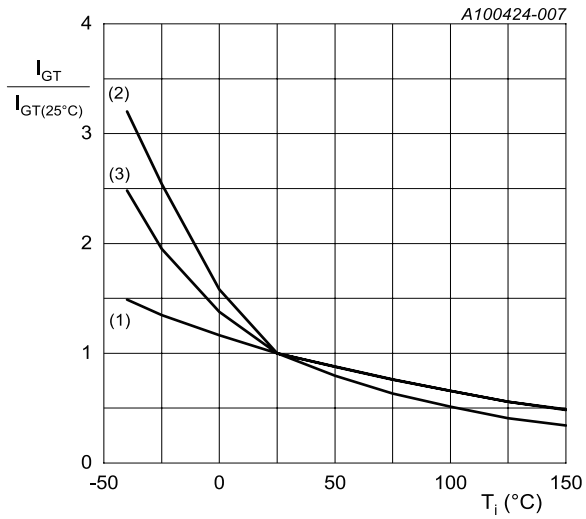
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	full cycle; Fig 6		-	-	12	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air; printed-circuit board mounted; pad area		-	65	-	K/W



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_J = 25\text{ °C}$; Fig. 7		-	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_J = 25\text{ °C}$; Fig. 7		-	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_J = 25\text{ °C}$; Fig. 7		-	-	10	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G+; $T_J = 25\text{ °C}$; Fig. 8		-	-	40	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G-; $T_J = 25\text{ °C}$; Fig. 8		-	-	50	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G-; $T_J = 25\text{ °C}$; Fig. 8		-	-	40	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_J = 25\text{ °C}$; Fig. 9		-	-	30	mA
V_T	on-state voltage	$I_T = 5\text{ A}$; $T_J = 25\text{ °C}$; Fig. 10		-	-	1.6	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_J = 25\text{ °C}$; Fig. 11		-	-	1	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_J = 150\text{ °C}$; Fig. 11		0.3	-	-	V
I_D	off-state current	$V_D = 800\text{ V}$; $T_J = 25\text{ °C}$		-	-	10	μA
		$V_D = 800\text{ V}$; $T_J = 150\text{ °C}$		-	-	2	mA
I_R	reverse current	$V_R = 800\text{ V}$; $T_J = 25\text{ °C}$		-	-	10	μA
		$V_R = 800\text{ V}$; $T_J = 150\text{ °C}$		-	-	2	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_J = 150\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; $R_{G(T1)} = 220\ \Omega$		2000	-	-	V/ μs
dV_{com}/dt	rate of change of commutating voltage	$V_D = 400\text{ V}$; $T_J = 125\text{ °C}$; $dI_{com}/dt = 2\text{ A/ms}$		3	-	-	V/ μs



- (1) T2+ G+
- (2) T2+ G-
- (3) T2- G-

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

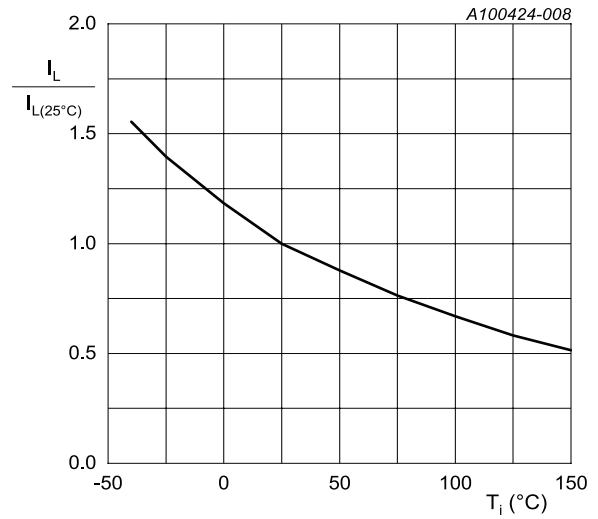


Fig. 8. Normalized latching current as a function of junction temperature

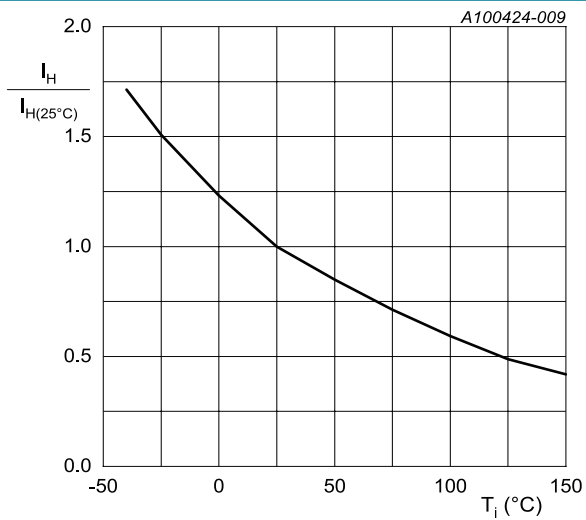
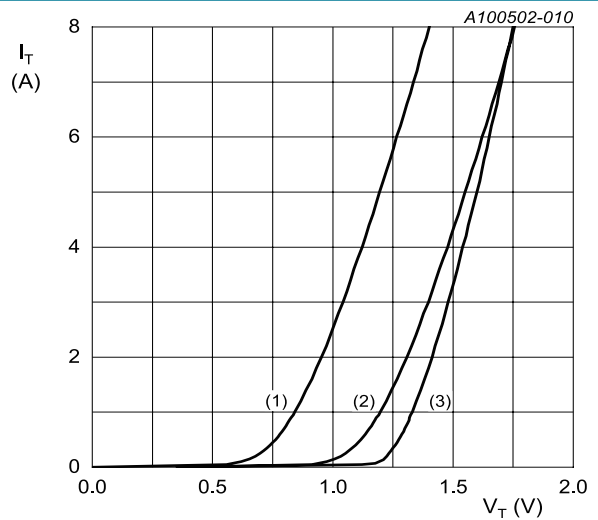
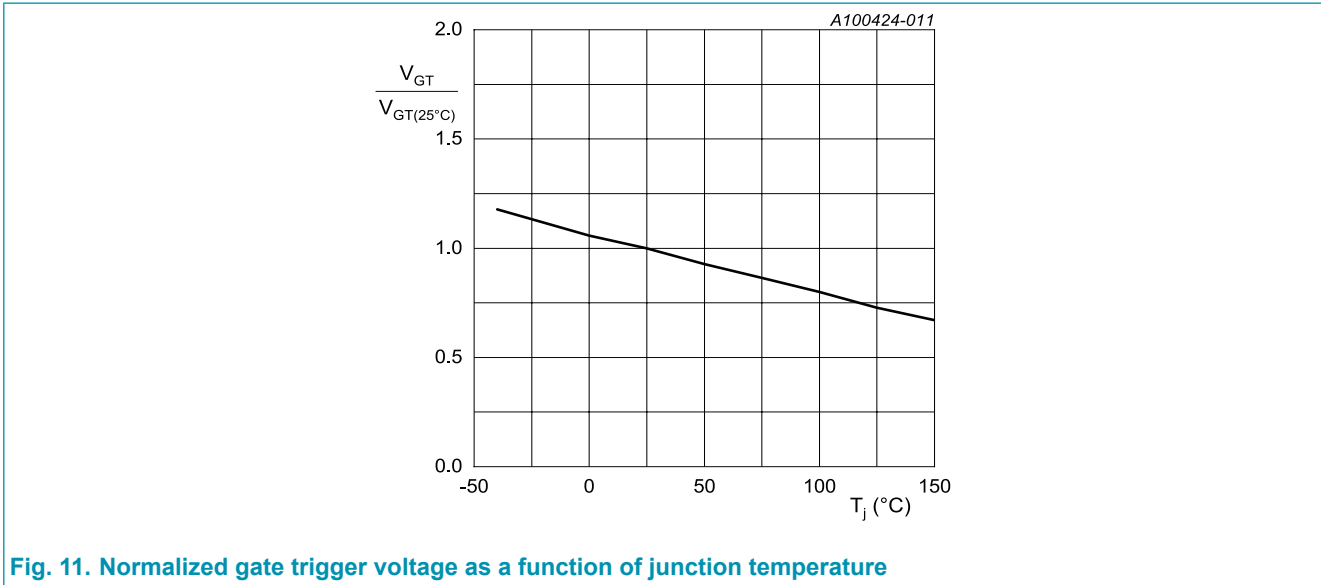


Fig. 9. Normalized holding current as a function of junction temperature

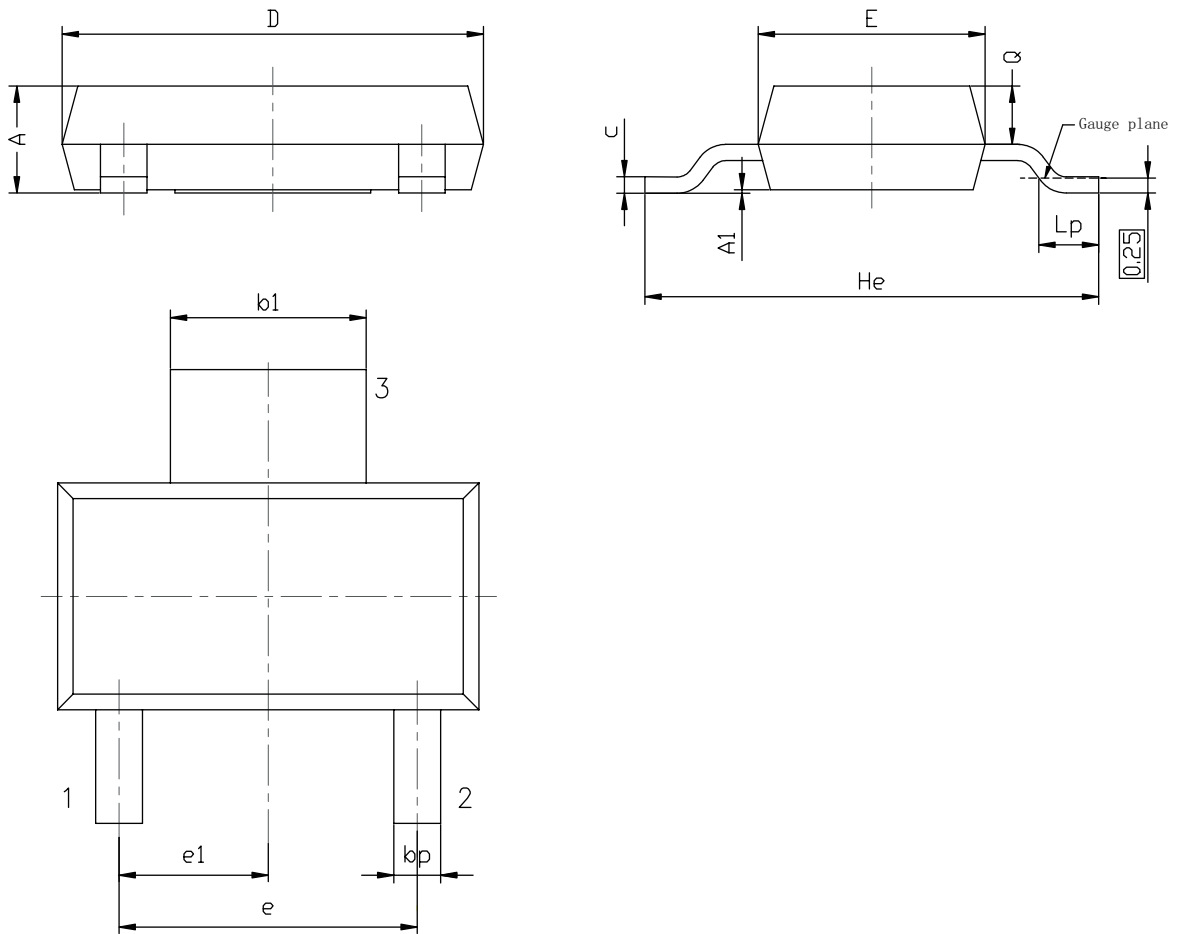


- $V_o = 1.178 \text{ V}; R_s = 0.0730 \Omega$
- (1) $T_j = 150 \text{ }^\circ\text{C}$; typical values
 - (2) $T_j = 150 \text{ }^\circ\text{C}$; maximum values
 - (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

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



11. Package outline



Unit	A	A1	b _p	b ₁	c	D	E	e	e ₁	He	L _p	Q	
mm	Min	1.50	0.01	0.66	2.90	0.23	6.30	3.30	4.50	2.20	6.70	0.75	0.82
	Max	1.81	0.12	0.85	3.13	0.35	6.70	3.70	4.70	2.40	7.30	1.20	0.93

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".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.ween-semi.com>.

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