

## 1. General description

Planar passivated high commutation three quadrant triac in a TO263 (D2PAK) surface mountable plastic package. This triac is intended for use in motor control circuits where high blocking voltage, high static and dynamic  $dV/dt$  as well as high  $dI/dt$  can occur. This "series C0T" triac will commute the full rated RMS current at the maximum rated junction temperature without the aid of a snubber. This device has high operating capability ( $T_{j(max)} = 150\text{ °C}$ )

## 2. Features and benefits

- 3Q technology for improved noise immunity
- High commutation capability with maximum false trigger immunity
- High junction operating temperature capability ( $T_{j(max)} = 150\text{ °C}$ )
- High immunity to false turn-on by  $dV/dt$
- High voltage capability
- Less sensitive gate for very high noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only

## 3. Applications

- Applications subject to high temperature ( $T_{j(max)} = 150\text{ °C}$ )
- Compressor starting control circuits
- General purpose motor controls
- Reversing induction motor controls e.g. vertical axis washing machines

## 4. Quick reference data

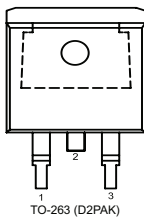
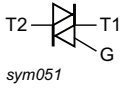
Table 1. Quick reference data

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; $T_{mb} \leq 134\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		8			A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 20\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>		60			A
		full sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 16.7\text{ ms}$		65			A
$T_j$	junction temperature			150			°C
Symbol	Parameter	Conditions	Notes	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+; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>		-	-	10	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G-; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>		-	-	10	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2- G-; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>		-	-	10	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>		-	-	30	mA
$V_T$	on-state voltage	$I_T = 10\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>		-	1.30	1.65	V

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Dynamic characteristics</b>							
$dV_D/dt$	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		400	-	-	V/ $\mu\text{s}$
		$V_{DM} = 536 \text{ V}$ ; $T_j = 150 \text{ }^\circ\text{C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit		200	-	-	V/ $\mu\text{s}$
$dI_{com}/dt$	rate of change of commutating current	$V_D = 400 \text{ V}$ ; $T_j = 150 \text{ }^\circ\text{C}$ ; $I_{T(RMS)} = 8 \text{ A}$ ; $dV_{com}/dt = 20 \text{ V}/\mu\text{s}$ ; gate open circuit		3	-	-	A/ms
		$V_D = 400 \text{ V}$ ; $T_j = 150 \text{ }^\circ\text{C}$ ; $I_{T(RMS)} = 8 \text{ A}$ ; $dV_{com}/dt = 10 \text{ V}/\mu\text{s}$ ; gate open circuit		4	-	-	A/ms
		$V_D = 400 \text{ V}$ ; $T_j = 150 \text{ }^\circ\text{C}$ ; $I_{T(RMS)} = 8 \text{ A}$ ; $dV_{com}/dt = 1 \text{ V}/\mu\text{s}$ ; 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		 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	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BTA308B-800ET	TO263	BTA308B-800ETJ	Reel	800	TO263N	28-Sep-2016

## 7. Marking

Table 4. Marking codes

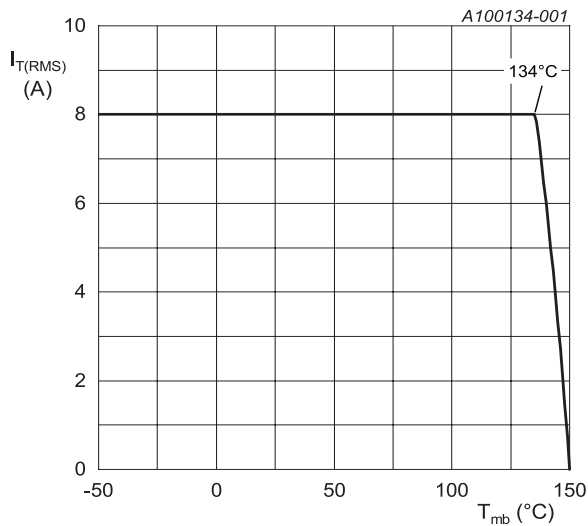
Type number	Marking codes
BTA308B-800ET	BTA308B 800ET

## 8. Limiting values

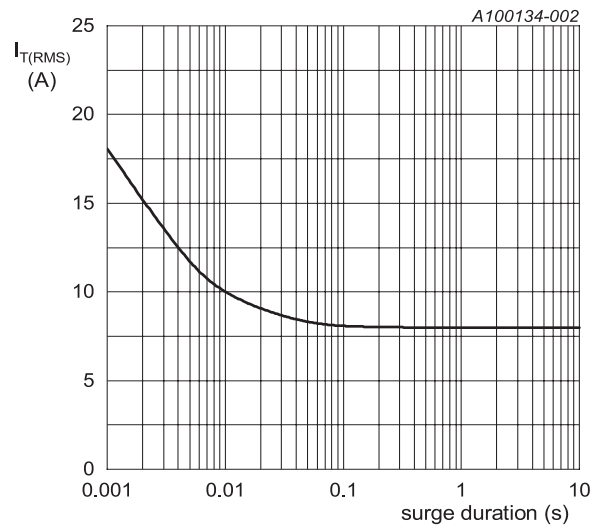
**Table 5. Limiting values**

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
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 134\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		8	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 20\text{ ms}$ ; <a href="#">Fig 4</a> ; <a href="#">Fig 5</a>		60	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 16.7\text{ ms}$		65	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; SIN		18	A <sup>2</sup> s
$di_T/dt$	rate of rise of on-state current	$I_G = 70\text{ mA}$		100	A/ $\mu$ s
$I_{GM}$	peak gate current	$t_p = 20\mu$ s		2	A
$P_{GM}$	peak gate power	$25\text{ °C}$ ; $t_p = 20\mu$ s		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			150	°C



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



$f = 50\text{ Hz}$ ;  $T_{mb} = 134\text{ °C}$

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

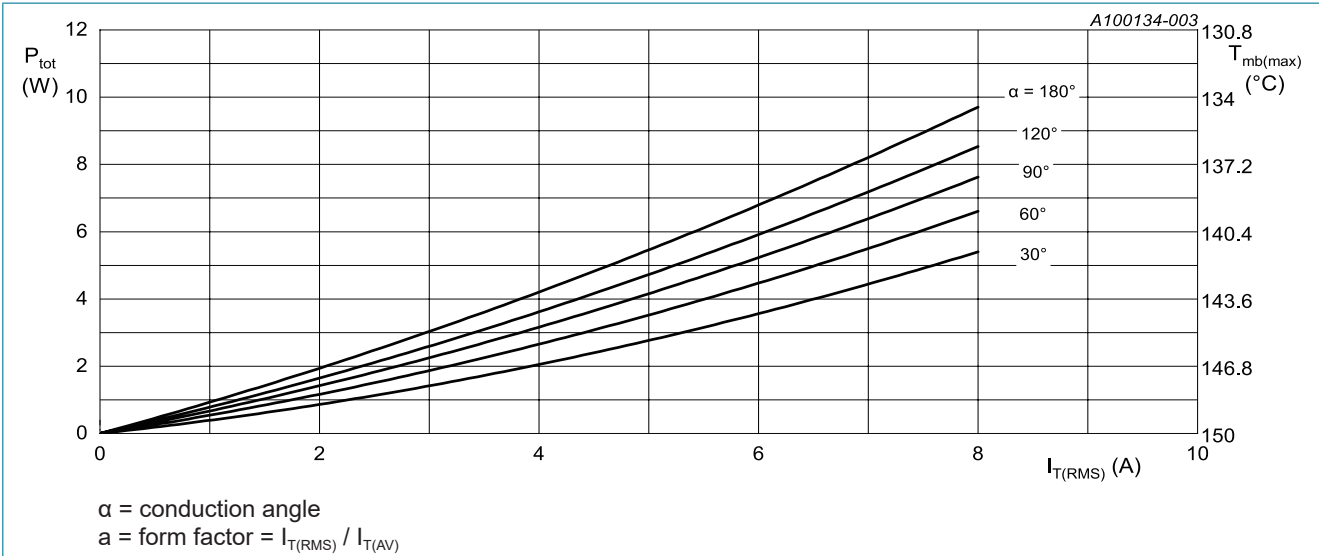


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

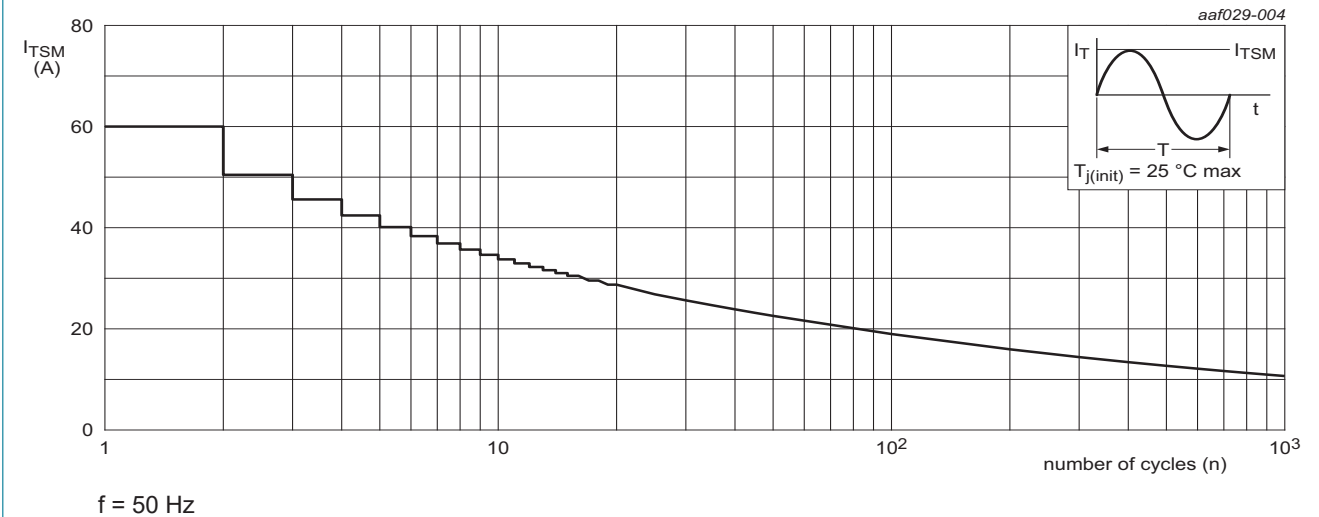


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

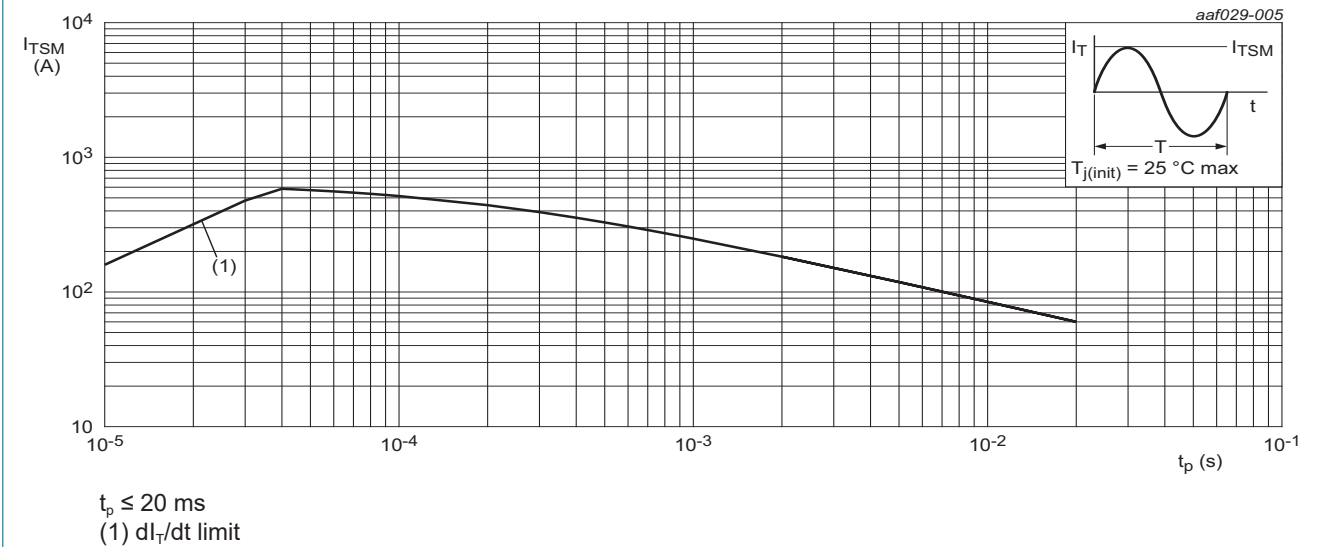
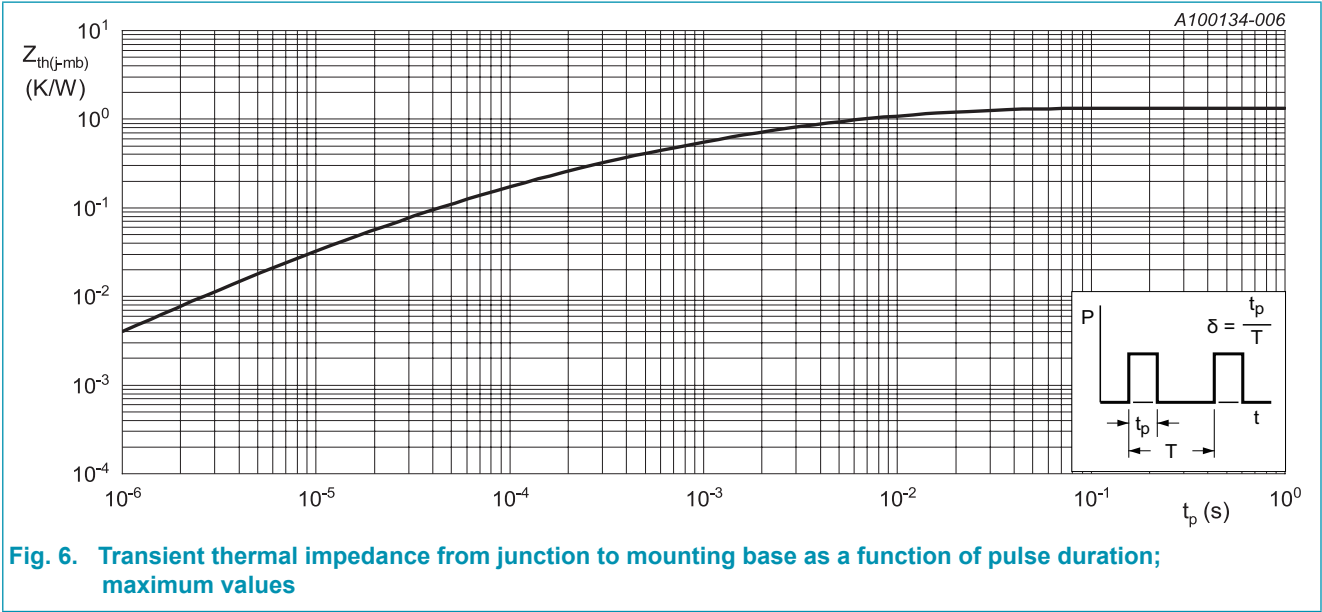


Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

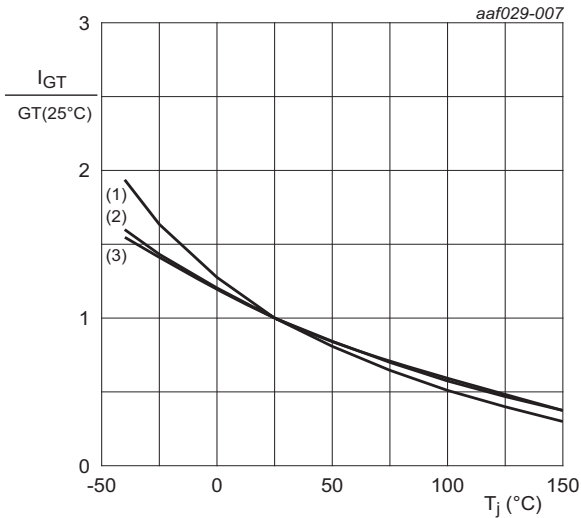
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	<a href="#">Fig. 6</a>		-	-	1.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	60	-	K/W



## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I <sub>GT</sub>	gate trigger current	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2+ G+; T <sub>J</sub> = 25 °C; <a href="#">Fig. 7</a>		-	-	10	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2+ G-; T <sub>J</sub> = 25 °C; <a href="#">Fig. 7</a>		-	-	10	mA
		V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T2- G-; T <sub>J</sub> = 25 °C; <a href="#">Fig. 7</a>		-	-	10	mA
I <sub>L</sub>	latching current	V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2+ G+; T <sub>J</sub> = 25 °C; <a href="#">Fig. 8</a>		-	-	50	mA
		V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2+ G-; T <sub>J</sub> = 25 °C; <a href="#">Fig. 8</a>		-	-	75	mA
		V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T2- G-; T <sub>J</sub> = 25 °C; <a href="#">Fig. 8</a>		-	-	50	mA
I <sub>H</sub>	holding current	V <sub>D</sub> = 12 V; T <sub>J</sub> = 25 °C; <a href="#">Fig. 9</a>		-	-	30	mA
V <sub>T</sub>	on-state voltage	I <sub>T</sub> = 10 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 10</a>		-	1.30	1.65	V
V <sub>GT</sub>	gate trigger voltage	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 11</a>		-	0.7	1	V
		V <sub>D</sub> = 400 V; I <sub>T</sub> = 0.1 A; T <sub>J</sub> = 150 °C		0.2	0.45	-	V
I <sub>D</sub>	off-state current	V <sub>D</sub> = 800 V; T <sub>J</sub> = 25 °C		-	-	10	μA
		V <sub>D</sub> = 800 V; T <sub>J</sub> = 150 °C		-	-	1	mA
I <sub>R</sub>	reverse current	V <sub>D</sub> = 800 V; T <sub>J</sub> = 25 °C		-	-	10	μA
		V <sub>D</sub> = 800 V; T <sub>J</sub> = 150 °C		-	-	1	mA
Dynamic characteristics							
dV <sub>D</sub> /dt	rate of rise of off-state voltage	V <sub>DM</sub> = 536 V; T <sub>J</sub> = 125 °C; (V <sub>DM</sub> = 67% of V <sub>DRM</sub> ); exponential waveform; gate open circuit		400	-	-	V/μs
		V <sub>DM</sub> = 536 V; T <sub>J</sub> = 150 °C; (V <sub>DM</sub> = 67% of V <sub>DRM</sub> ); exponential waveform; gate open circuit		200	-	-	V/μs
dI <sub>com</sub> /dt	rate of change of commutating current	V <sub>D</sub> = 400 V; T <sub>J</sub> = 150 °C; I <sub>T(RMS)</sub> = 8 A; dV <sub>com</sub> /dt = 20 V/μs; gate open circuit		3	-	-	A/ms
		V <sub>D</sub> = 400 V; T <sub>J</sub> = 150 °C; I <sub>T(RMS)</sub> = 8 A; dV <sub>com</sub> /dt = 10 V/μs; gate open circuit		4	-	-	A/ms
		V <sub>D</sub> = 400 V; T <sub>J</sub> = 150 °C; I <sub>T(RMS)</sub> = 8 A; dV <sub>com</sub> /dt = 1 V/μs; gate open circuit		6	-	-	A/ms



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

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

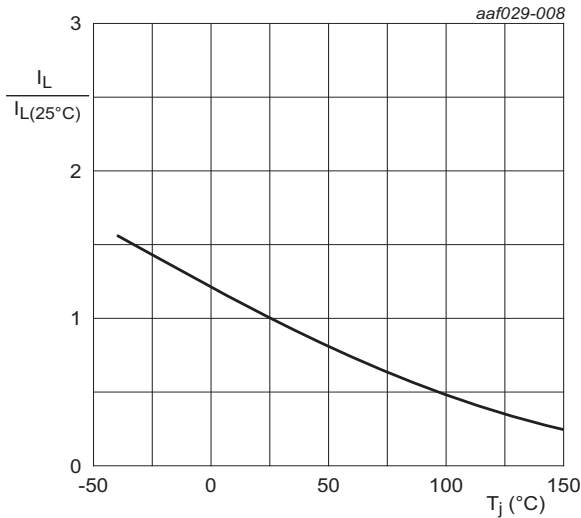


Fig. 8. Normalized latching current as a function of junction temperature

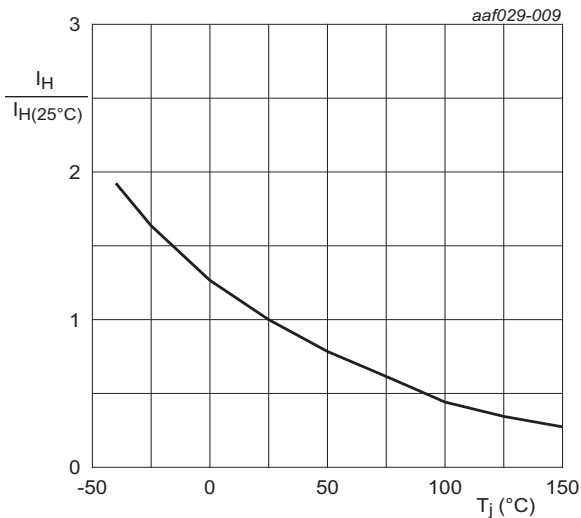
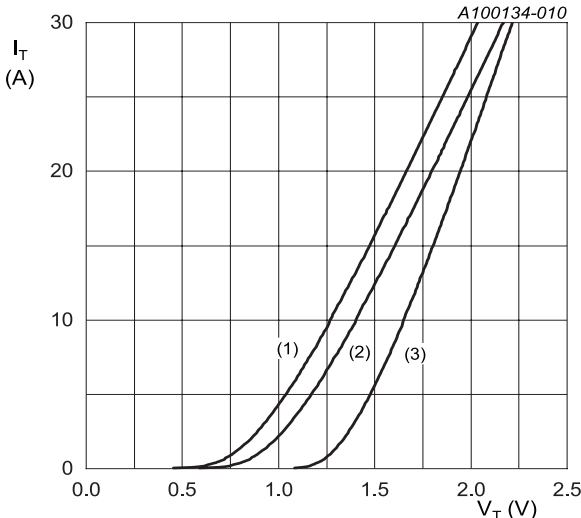


Fig. 9. Normalized holding current as a function of junction temperature



- $V_o = 0.986 \text{ V}$ ;  $R_s = 0.0406 \text{ } \Omega$
- (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

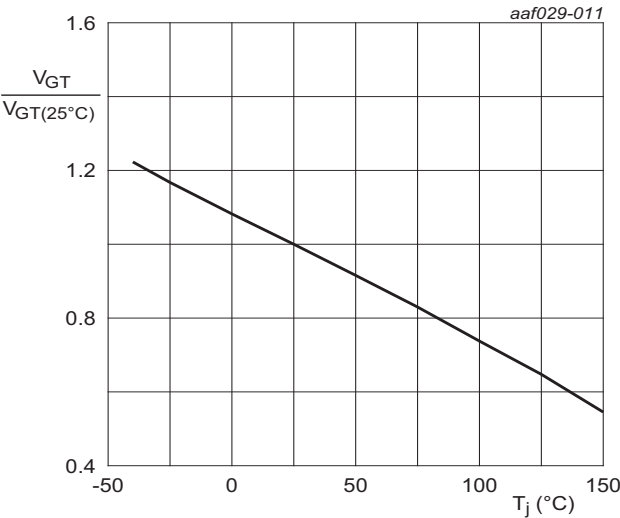
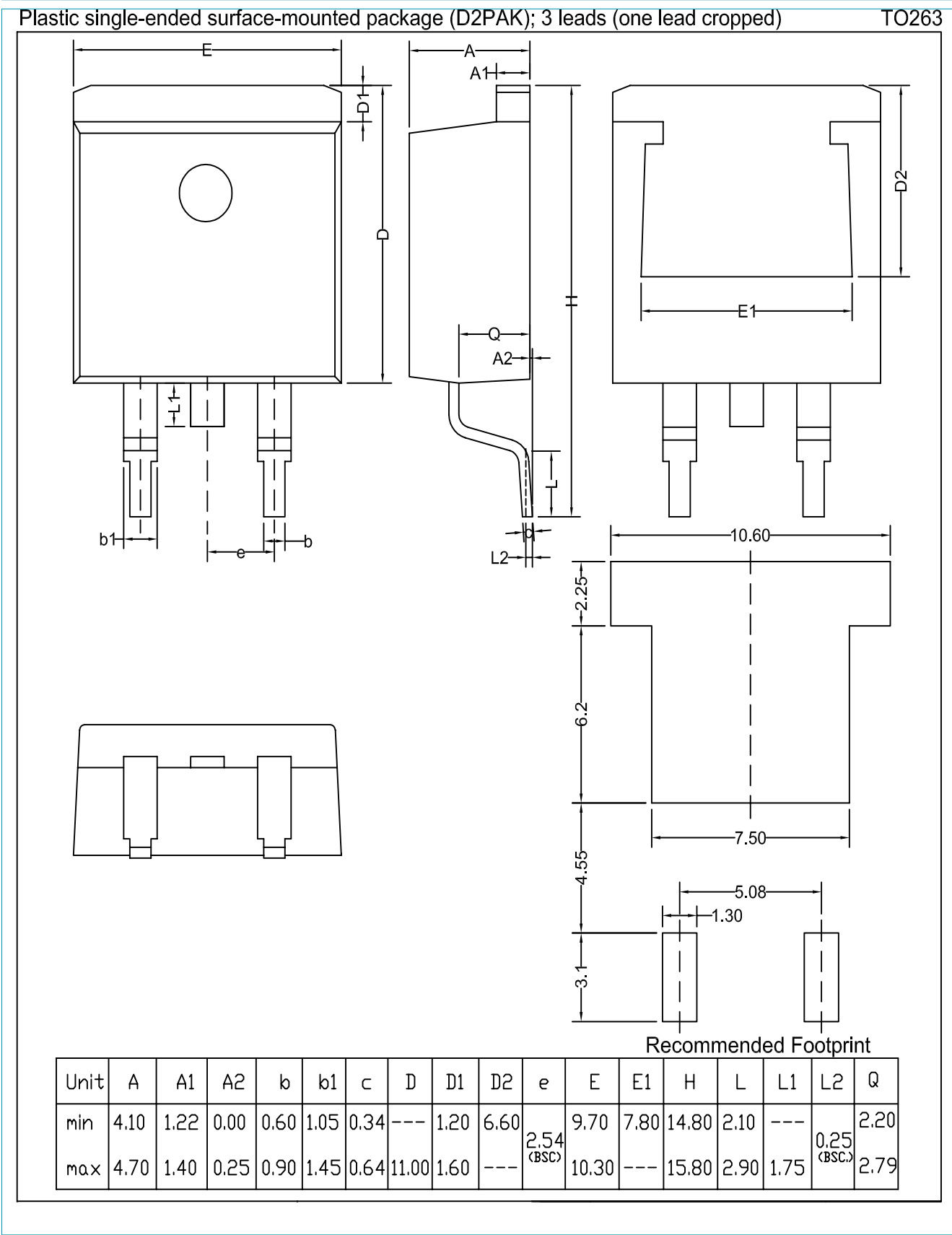


Fig. 11. Normalized gate trigger voltage as a function of junction temperature



11. Package outline



## 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.
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