

## 1. General description

Planar passivated Silicon Controlled Rectifier in a TO-247 plastic package intended for use in applications requiring very high inrush current capability and high thermal cycling performance. This product is qualified to AEC-Q101 standard for use in automotive applications.



AEC - Q101 Qualified



**Lead-Free**

## 2. Features and benefits

- High thermal cycling performance
- Planar passivated for voltage ruggedness and reliability
- High voltage capacity
- Very high current surge capability
- AEC-Q101 compliant

## 3. Applications

- Automotive battery charging (on-board and off-board)
- Solid State Relay (SSR)
- Uninterruptible Power Supply (UPS)
- Inrush protection and soft-start
- AC and DC motor controls
- Heating controls
- AC Power rectification
- Renewable energy inverters
- Industrial welding systems

## 4. Quick reference data

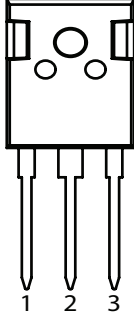

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Absolute maximum rating</b>						
$V_{DRM}$	repetitive peak off-state voltage		-	-	1200	V
$V_{RRM}$	repetitive peak reverse voltage		-	-	1200	V
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ °C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	-	650	A
		half sine wave; $T_{j(\text{init})} = 25\text{ °C}$ ; $t_p = 8.3\text{ ms}$	-	-	715	A
$T_j$	junction temperature		-	-	150	°C
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 131\text{ °C}$	-	-	50	A

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 131\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	79	A
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 7</a> ; <a href="#">Fig. 8</a>	-	-	50	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 804\text{ V}$ ; $T_j = 125\text{ }^{\circ}\text{C}$ ; $R_{GK} = 100\text{ }\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform	1500	-	-	V/ $\mu\text{s}$

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		 sym037
2	A	anode		
3	G	gate		
mb	A	mounting base; connected to anode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BT155W-1200T-A	TO-247	BT155W-1200T-AQ	Tube	30	TO-247N	20-Jul-2016

## 7. Marking

Table 4. Marking codes

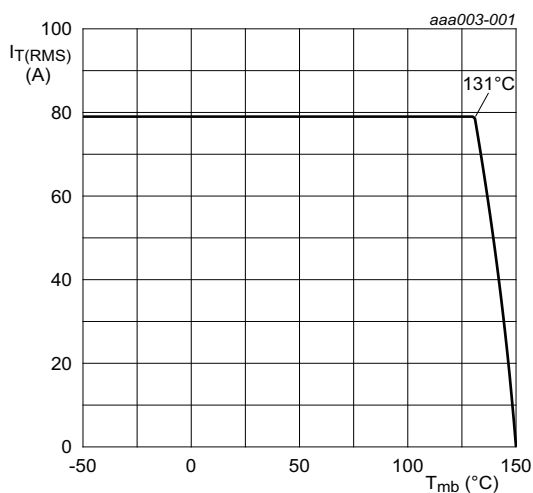
Type number	Marking codes
BT155W-1200T-A	BT155W-1200T-A

## 8. Limiting values

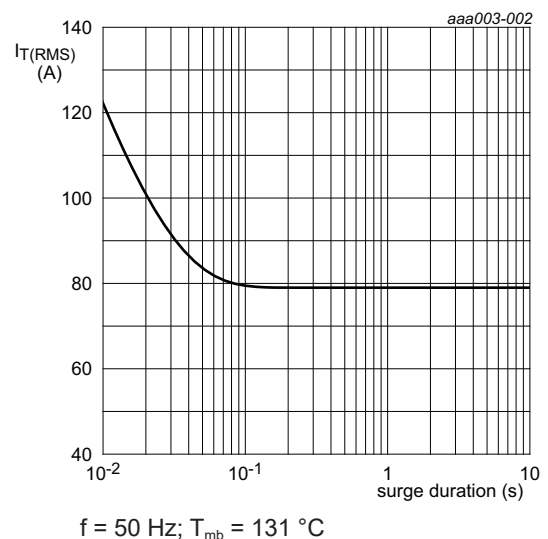
**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	1200	V
$V_{RRM}$	repetitive peak reverse voltage		-	1200	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 131\text{ °C}$	-	50	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 131\text{ °C}$ ; <a href="#">Fig 1</a> ; <a href="#">Fig 2</a> ; <a href="#">Fig 3</a>	-	79	A
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{J(init)} = 25\text{ °C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig 4</a> ; <a href="#">Fig 5</a>	-	650	A
		half sine wave; $T_{J(init)} = 25\text{ °C}$ ; $t_p = 8.3\text{ ms}$	-	715	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; sine-wave pulse	-	2113	A <sup>2</sup> s
$di_T/dt$	rate of rise of on-state current	$I_G = 100\text{mA}$	-	150	A/ $\mu\text{s}$
$I_{GM}$	peak gate current		-	8	A
$V_{RGM}$	peak reverse gate voltage		-	5	V
$P_{GM}$	peak gate power		-	20	W
$P_{G(AV)}$	average gate power	over any 20 ms period	-	1	W
$T_{stg}$	storage temperature		-40	150	°C
$T_j$	junction temperature		-	150	°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**  
 $f = 50\text{ Hz}$ ;  $T_{mb} = 131\text{ °C}$

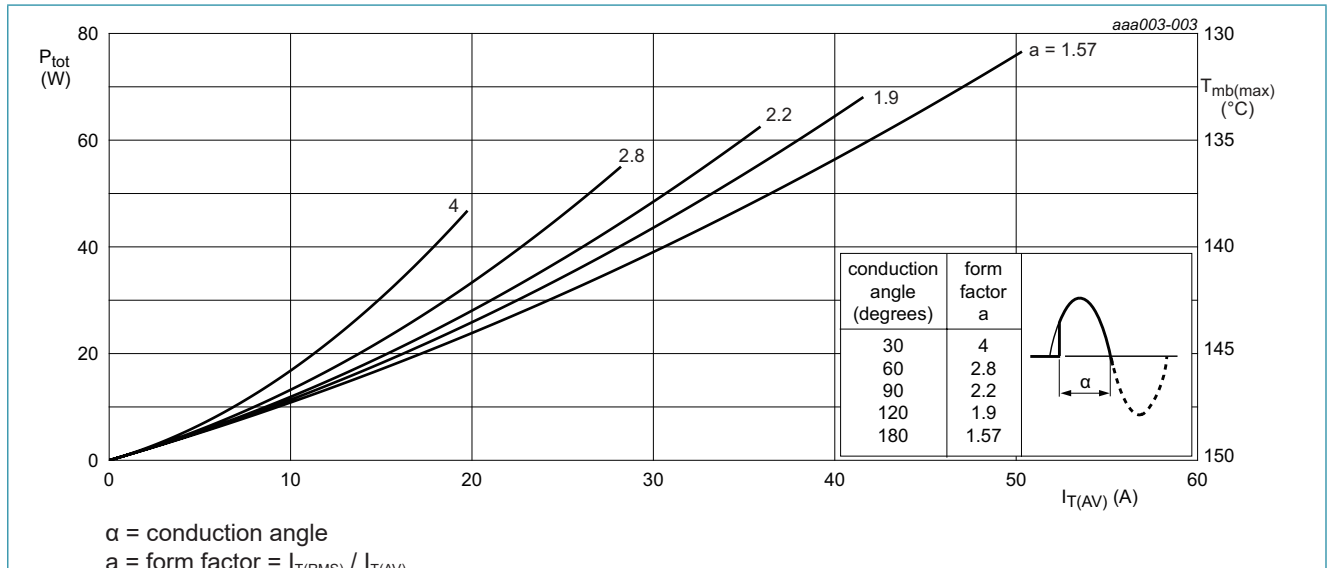


Fig. 3. Total power dissipation as a function of average on-state current; maximum values

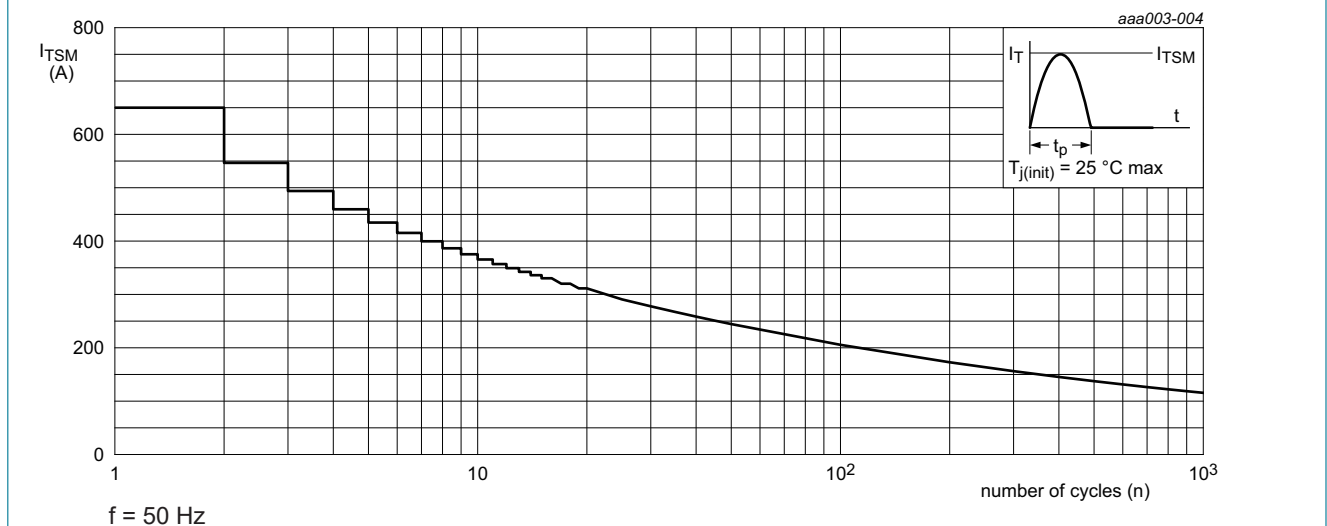


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

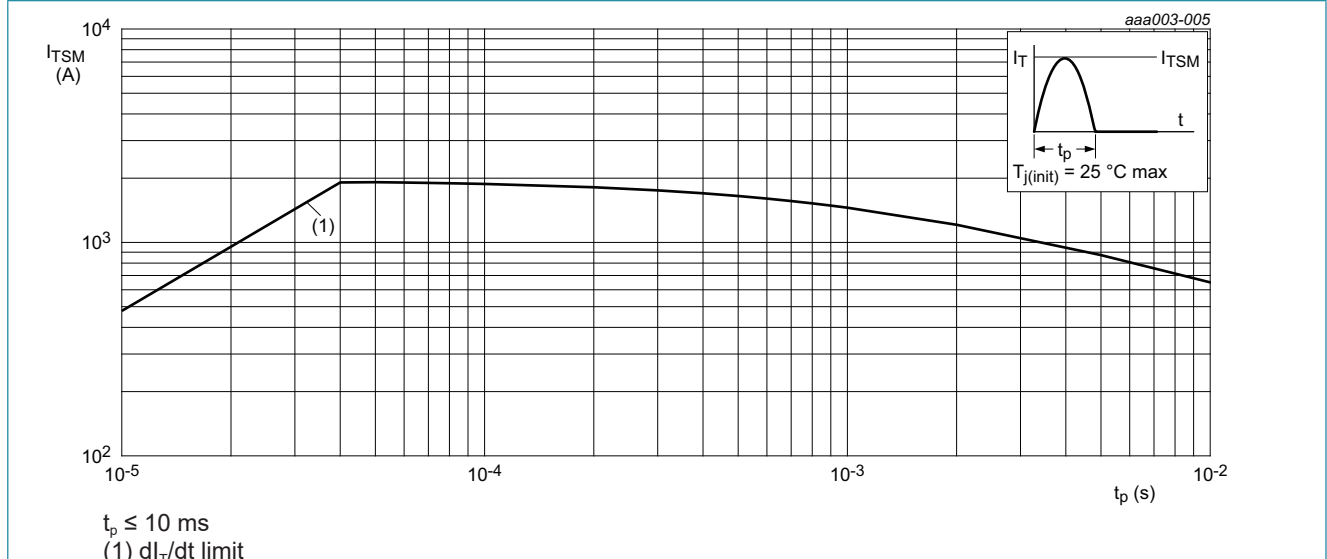


Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

## 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>	-	-	0.25	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	50	-	K/W

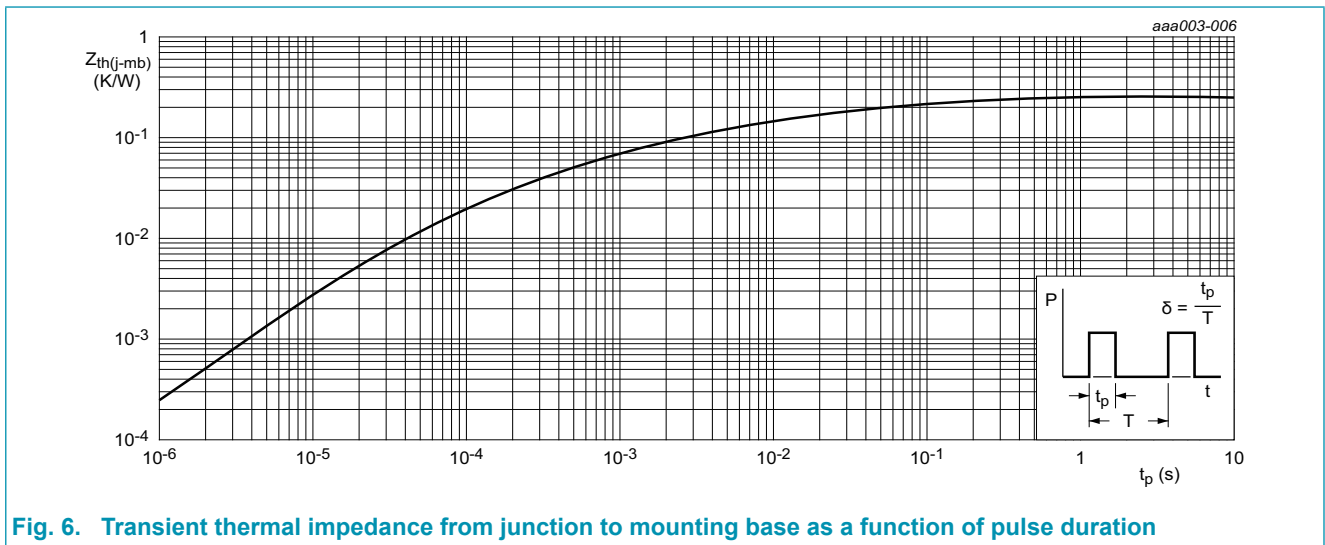
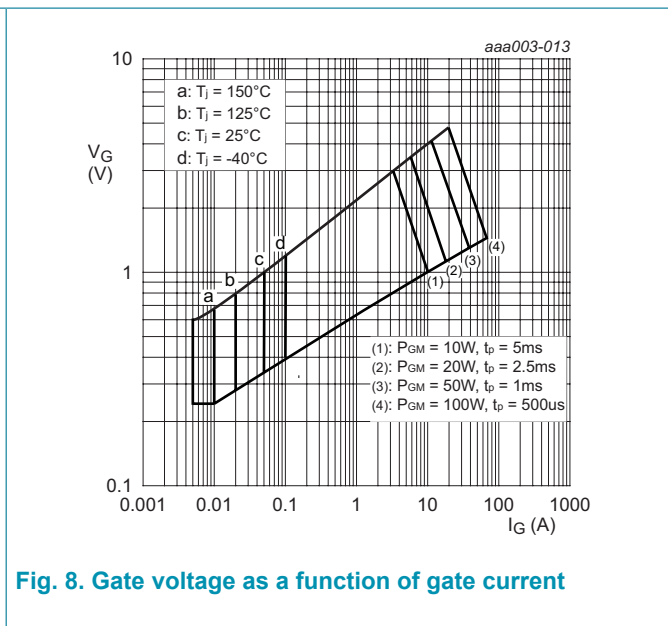
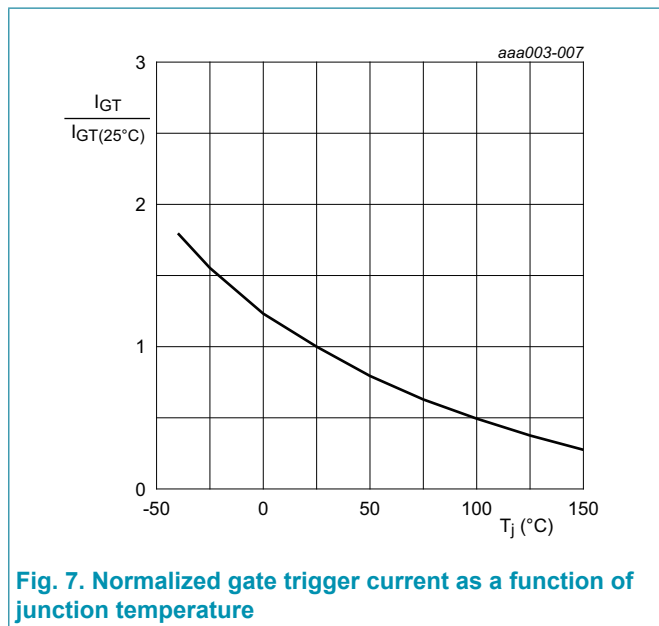


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

### 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 7</a> ; <a href="#">Fig. 8</a>	-	-	50	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 9</a>	-	-	300	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 10</a>	-	-	200	mA
$V_T$	on-state voltage	$I_T = 50\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 11</a>	-	-	1.3	V
		$I_T = 90\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 11</a>	-	-	1.5	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. 12</a>	-	0.7	1	V
		$V_D = 800\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 125\text{ }^\circ\text{C}$ ; <a href="#">Fig. 12</a>	0.25	0.4	-	V
$I_D$	off-state current	$V_D = 1200\text{ V}$ ; $T_j = 125\text{ }^\circ\text{C}$	-	-	3	mA
$I_R$	reverse current	$V_D = 1200\text{ V}$ ; $T_j = 125\text{ }^\circ\text{C}$	-	-	3	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 804\text{ V}$ ; $T_j = 125\text{ }^\circ\text{C}$ ; $R_{GK} = 100\text{ }\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform	1500	-	-	V/ $\mu\text{s}$
		$V_{DM} = 804\text{ V}$ ; $T_j = 150\text{ }^\circ\text{C}$ ; $R_{GK} = 100\text{ }\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform	1000	-	-	V/ $\mu\text{s}$
$t_{gt}$	gate-controlled turn-on time	$I_{TM} = 40\text{ A}$ ; $V_D = 800\text{ V}$ ; $I_G = 0.1\text{ A}$ ; $dI_G/dt = 5\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ }^\circ\text{C}$	-	2	-	$\mu\text{s}$
$t_q$	commutated turn-off time	$V_{DM} = 804\text{ V}$ ; $T_j = 125\text{ }^\circ\text{C}$ ; $I_{TM} = 20\text{ A}$ ; $V_R = 25\text{ V}$ ; $(dI_T/dt)_M = 30\text{ A}/\mu\text{s}$ ; $dV_D/dt = 50\text{ V}/\mu\text{s}$ ; $R_{GK(ext)} = 100\text{ k}\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ )	-	150	-	$\mu\text{s}$



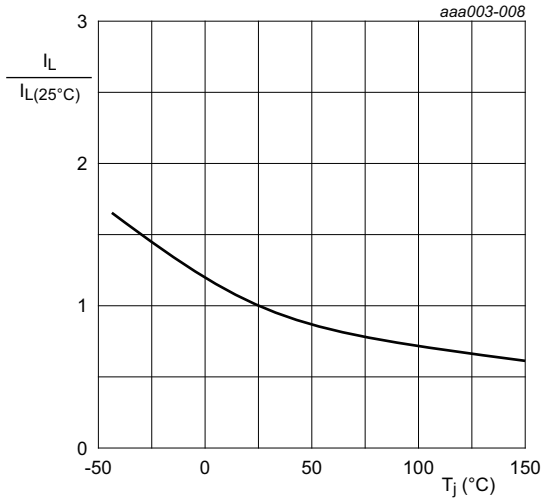


Fig. 9. Normalized latching current as a function of junction temperature

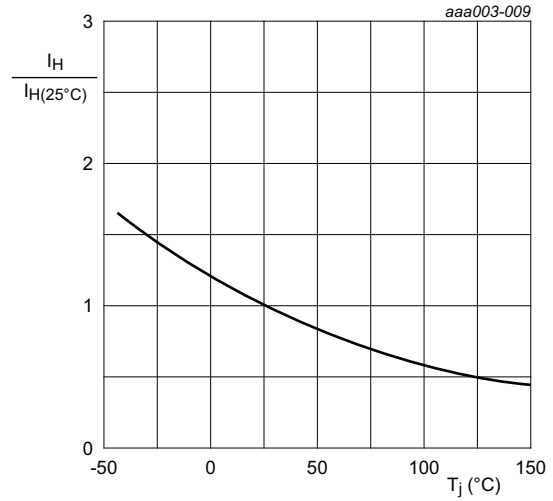
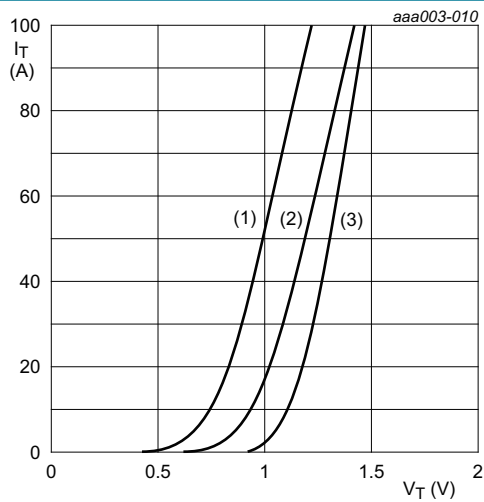


Fig. 10. Normalized holding current as a function of junction temperature



$V_o = 0.975 \text{ V}; R_s = 0.0044 \ \Omega$   
 (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. 11. On-state current as a function of on-state voltage

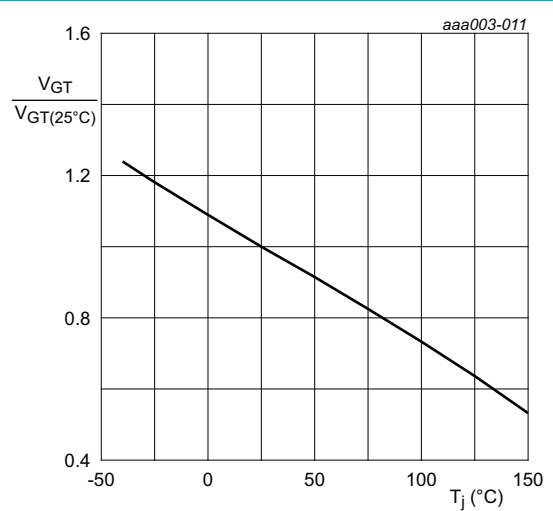
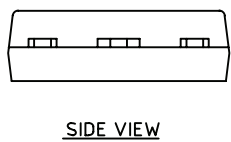
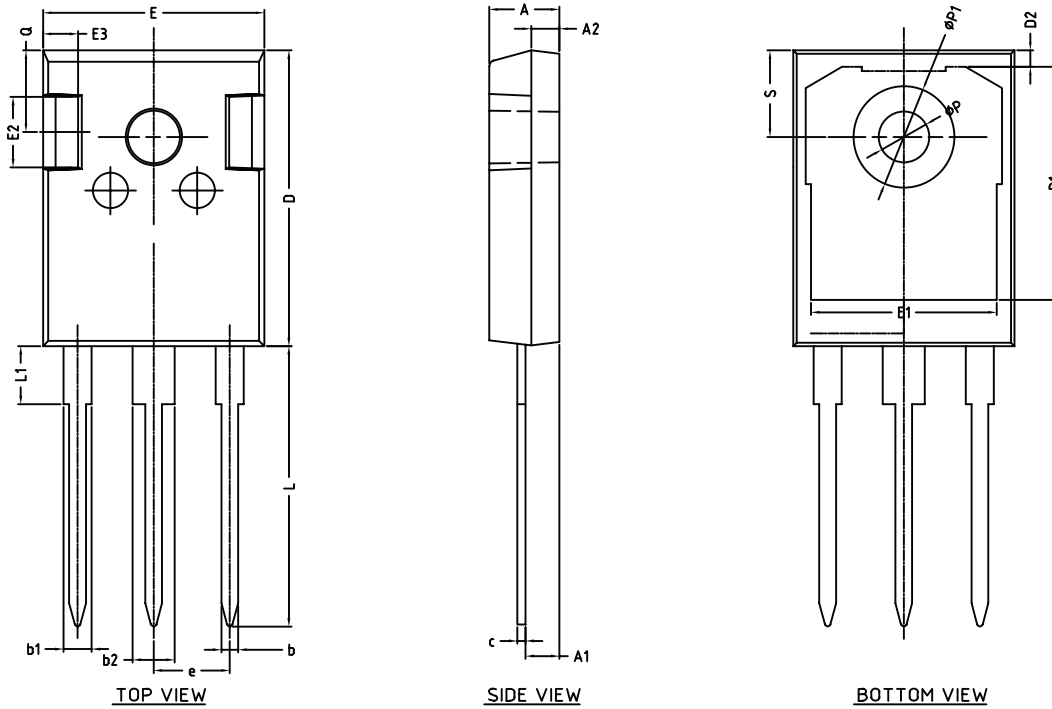


Fig. 12. Normalized gate trigger voltage as a function of junction temperature

### 11. Package outline

Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3-lead TO-247

SOT429N



UNIT	A	A1	A2	b	b1	b2	c	D	D1	D2	E	E1	E2	E3	e	L	L1	P	P1	Q	S
mm	5.20	2.60	2.10	1.40	2.20	3.20	0.70	21.10	16.85	1.35	15.90	13.50	5.20	2.60	5.45	20.10	4.75	3.70	7.40	6.00	6.25
	4.70	2.20	1.90	1.00	1.80	2.80	0.50	20.90	16.25	1.05	15.70	13.10	4.80	2.40		19.80	-	3.50	-	5.60	6.05

OUTLINE VERSION	REFERENCES			PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT429N		TO-247			



## 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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