

1. General description

Planar passivated Silicon Controlled Rectifier in a TO247 (SOT429) plastic package intended for use in applications requiring very high inrush current capability and high thermal cycling performance.

2. Features and benefits

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

3. Applications

- Line rectifying 50/60 Hz
- Softstart AC motor control
- DC Motor control
- Power converter
- AC power control
- Lighting and temperature control
- Uninterruptible Power Supply (UPS)
- Solid State Relay (SSR)
- Traction battery charging

4. Quick reference data

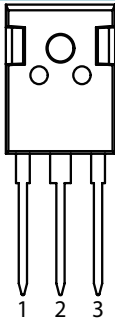

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Absolute maximum rating						
V_{RRM}	repetitive peak reverse voltage		-	-	1200	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 117\text{ °C}$	-	-	80	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 117\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	126	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5	-	-	1100	A
		half sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$	-	-	1210	A
T_j	junction temperature		-	-	150	°C

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 7 ; Fig. 8	-	-	70	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 804\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 100\text{ }\Omega$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform	1500	-	-	V/ μ s
		$V_{DM} = 804\text{ V}$; $T_j = 150\text{ °C}$; $R_{GK} = 100\text{ }\Omega$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform	1000	-	-	V/ μ s

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
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
BT158W-1200T	TO247	BT158W-1200TQ	Tube	30	TO247N	20-July-2016

7. Marking

Table 4. Marking codes

Type number	Marking codes	
	Assembly factory: N	Assembly factory: A
BT158W-1200T	BT158W 1200T PJNxxxx xx	BT158W 1200T PJAxxxx xx

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; $T_{mb} \leq 117\text{ }^{\circ}\text{C}$	-	80	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 117\text{ }^{\circ}\text{C}$; Fig 1 ; Fig 2 ; Fig 3	-	126	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 10\text{ ms}$; Fig 4 ; Fig 5	-	1100	A
		half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 8.3\text{ ms}$	-	1210	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; no voltage reapplied	-	6115	A^2s
di_T/dt	rate of rise of on-state current	$I_G = 200\text{mA}$	-	150	$\text{A}/\mu\text{s}$
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	$^{\circ}\text{C}$
T_j	junction temperature		-	150	$^{\circ}\text{C}$

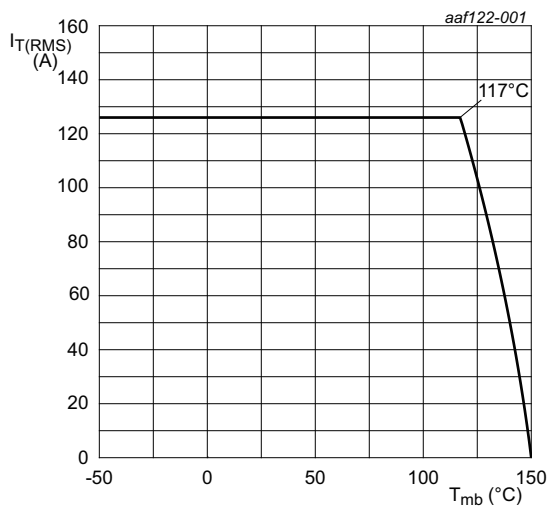
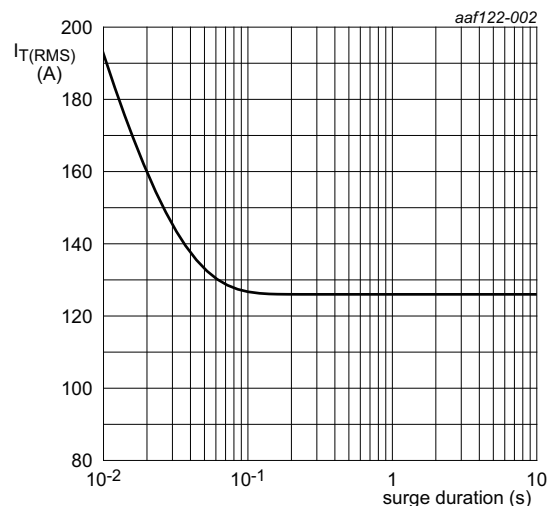


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50\text{ Hz}$; $T_{mb} = 117\text{ }^{\circ}\text{C}$
Fig. 2. RMS on-state current as a function of surge duration; maximum values

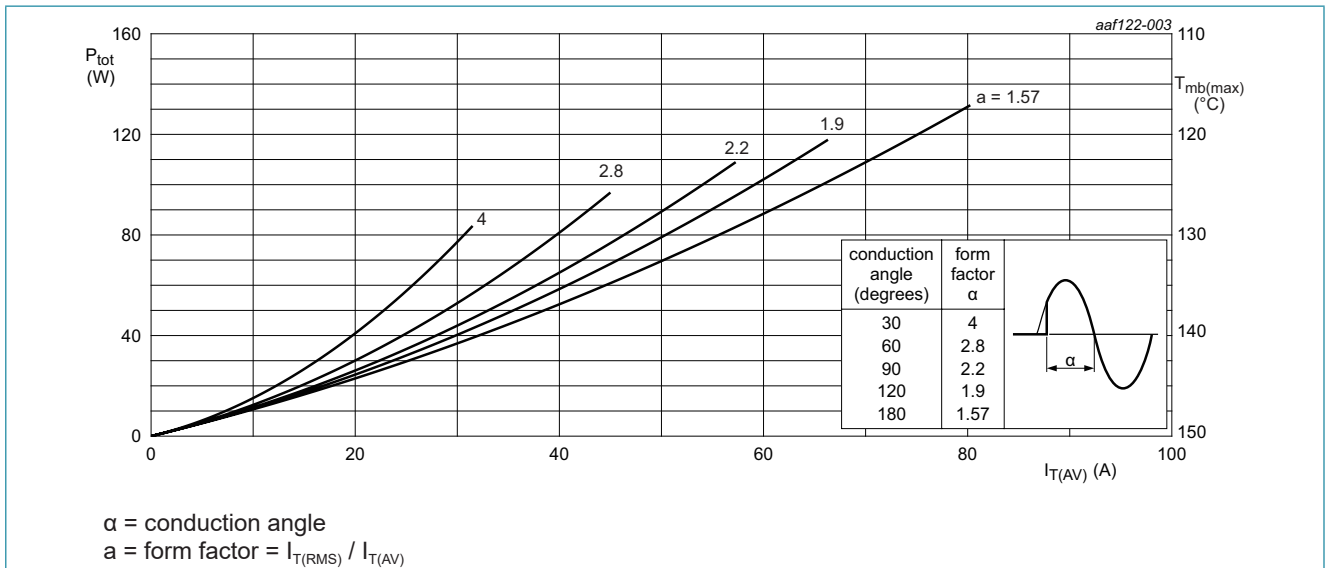


Fig. 3. Total power dissipation as a function of average on-state current; maximum values

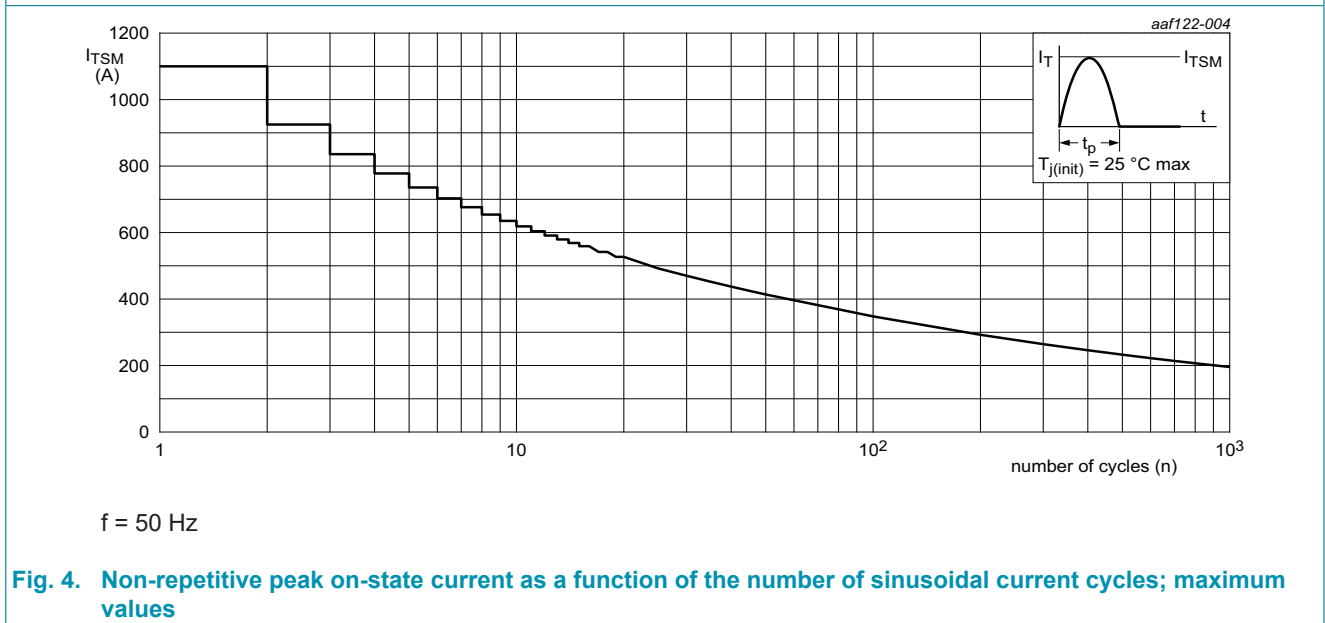


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

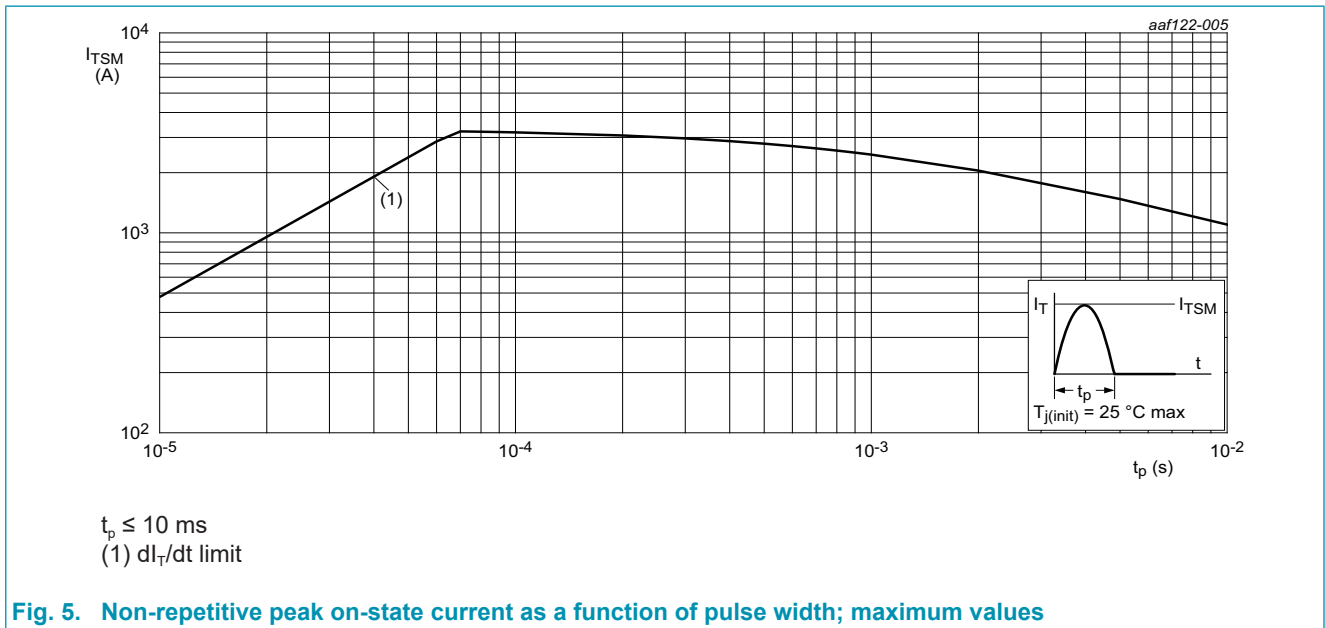


Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

9. Thermal & Mechanical characteristics

Table 6. Thermal & Mechanical characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; Fig 6	-	-	0.25	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	50	-	K/W

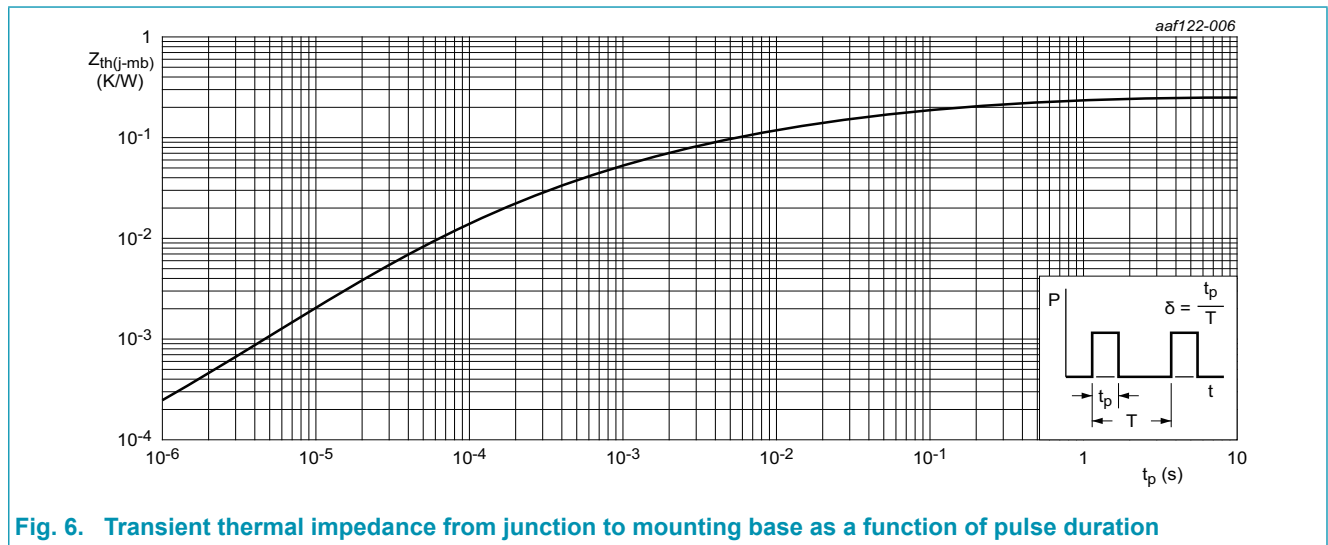


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 7 ; Fig. 8	-	-	70	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 9	-	-	300	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 10	-	-	200	mA
V_T	on-state voltage	$I_T = 80\text{ A}$; $T_j = 25\text{ °C}$; Fig. 11	-	-	1.35	V
		$I_T = 160\text{ A}$; $T_j = 25\text{ °C}$; Fig. 11	-	-	1.65	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 12	-	0.7	1	V
		$V_D = 800\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ °C}$	0.25	0.4	-	V
I_D	off-state current	$V_D = 1200\text{ V}$; $T_j = 25\text{ °C}$	-	-	10	μA
		$V_D = 1200\text{ V}$; $T_j = 125\text{ °C}$	-	-	5	mA
I_R	reverse current	$V_D = 1200\text{ V}$; $T_j = 25\text{ °C}$	-	-	10	μA
		$V_D = 1200\text{ V}$; $T_j = 125\text{ °C}$	-	-	5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 804\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 100\ \Omega$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform	1500	-	-	V/ μs
		$V_{DM} = 804\text{ V}$; $T_j = 150\text{ °C}$; $R_{GK} = 100\ \Omega$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform	1000	-	-	V/ μs
t_{gt}	gate-controlled turn-on time	$I_{TM} = 40\text{ A}$; $V_D = 800\text{ V}$; $I_G = 0.1\text{ A}$; $dI_G/dt = 5\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$	-	2	-	μs
t_q	commutated turn-off time	$V_{DM} = 804\text{ V}$; $T_j = 125\text{ °C}$; $I_{TM} = 20\text{ A}$; $V_R = 25\text{ V}$; $(dI_T/dt)_M = 30\text{ A}/\mu\text{s}$; $dV_D/dt = 50\text{ V}/\mu\text{s}$; $R_{GK(ext)} = 100\text{ k}\Omega$; ($V_{DM} = 67\%$ of V_{DRM})	-	150	-	μs

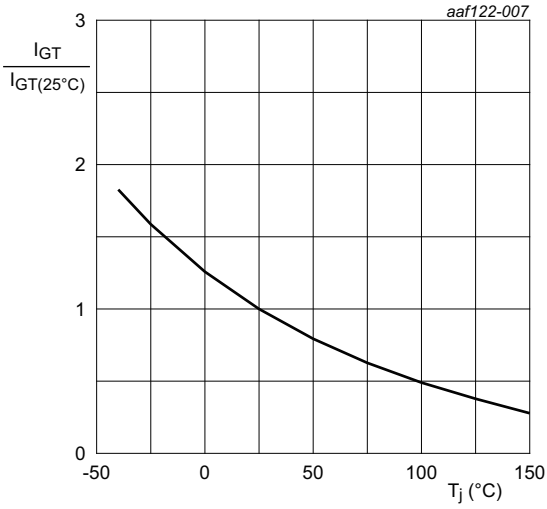


Fig. 7. Normalized gate trigger current as a function of junction temperature

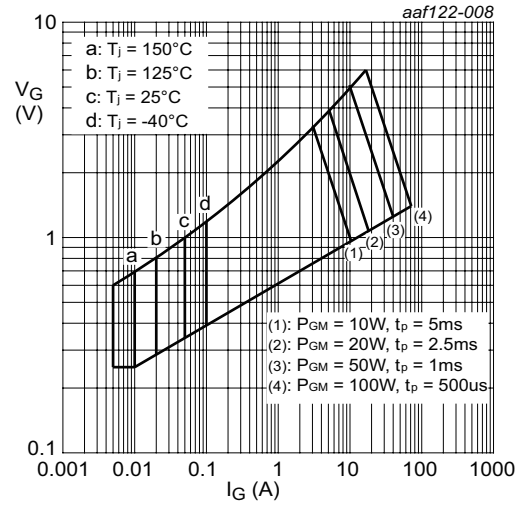


Fig. 8. Gate voltage as a function of gate current

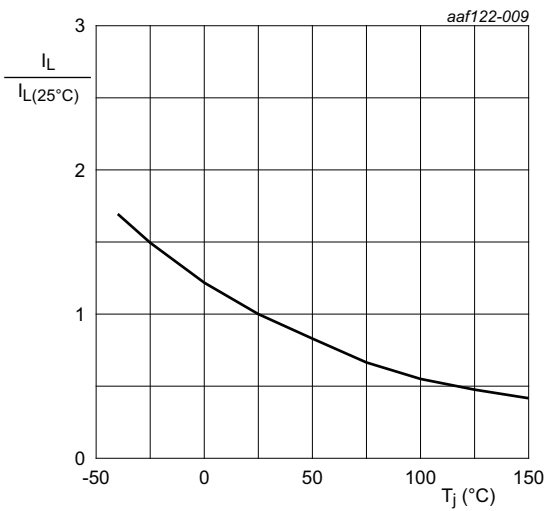


Fig. 9. Normalized latching current as a function of junction temperature

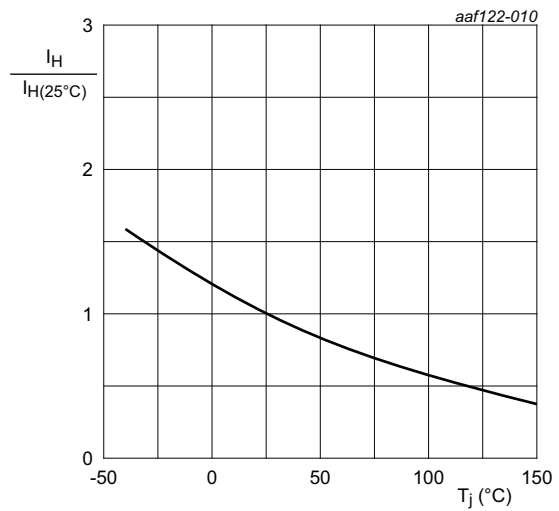
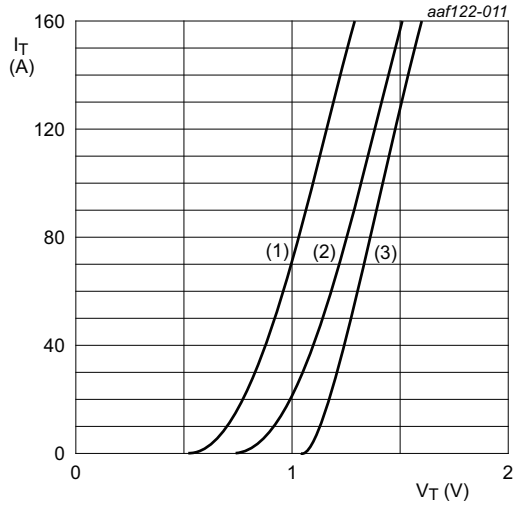


Fig. 10. Normalized holding current as a function of junction temperature



$V_o = 0.984 \text{ V}; R_s = 0.0033 \Omega$
 (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

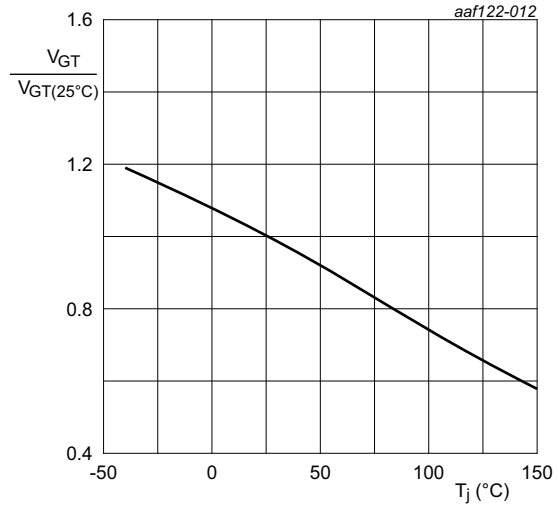
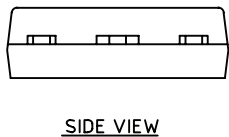
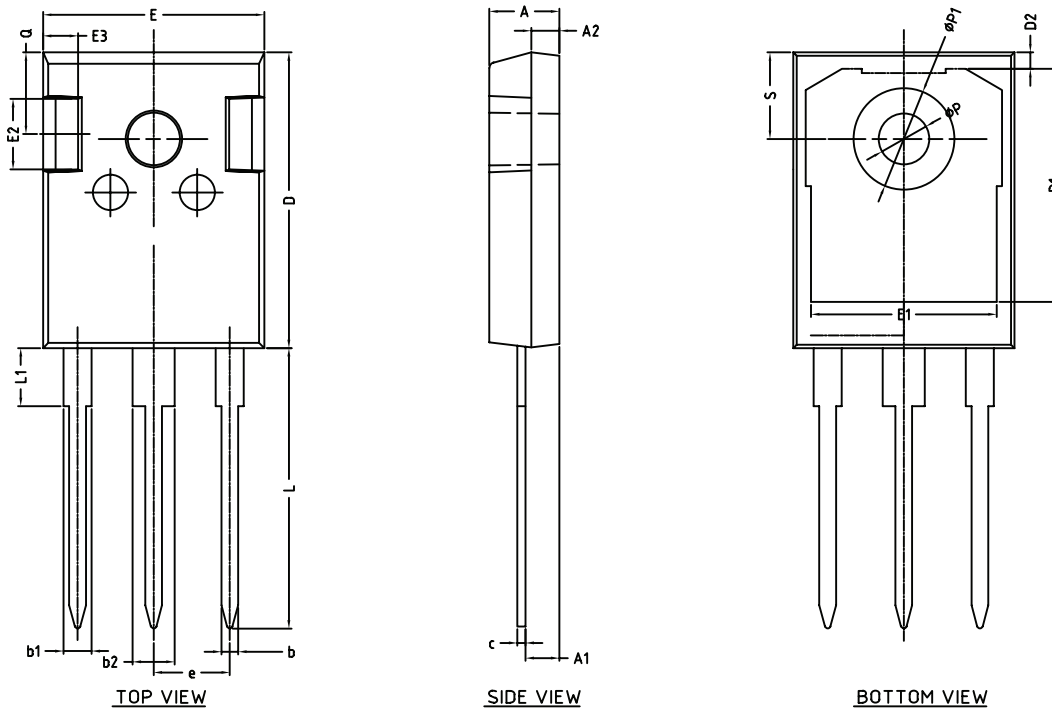


Fig. 12. Normalized gate trigger voltage as a function of junction temperature

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	MAX	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
	MIN	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.

- [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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