

1. General description

Planar passivated Silicon Controlled Rectifier in a SOT429N (TO-247) plastic package intended for use in applications requiring very high inrush current capability, high thermal cycling performance and high junction temperature capability ($T_{j(max)} = 150\text{ °C}$).

2. Features and benefits

- High junction operating temperature capability ($T_{j(max)} = 150\text{ °C}$)
- Very high current surge capability
- Planar passivated for voltage ruggedness and reliability
- High thermal cycling performance
- High voltage capability

3. Applications

- Line rectifying 50/60 Hz
- Soft start 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

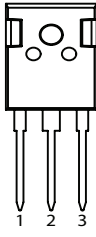

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values	Unit
Absolute maximum rating				
V_{DRM}	repetitive peak off-state voltage		1600	V
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 127\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	79	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5	650	A
		half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$	715	A
T_j	junction temperature		150	°C

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7 ; Fig. 8	-	-	80	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 10	-	-	200	mA
V_T	on-state voltage	$I_T = 50\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 11	-	-	1.3	V
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 1070\text{ V}$; $T_j = 150\text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit	1500	-	-	V/ μs

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>TO-247 (SOT429N)</p>	 <p>sym037</p>
2	A	anode		
3	G	gate		
mb	A	mounting base; connected to anode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
TYN50W-1600T	TO-247	Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3-lead TO-247	SOT429N

7. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions	Values	Unit
V_{DRM}	repetitive peak off-state voltage		1600	V
V_{RRM}	repetitive peak reverse voltage		1600	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 127^{\circ}\text{C}$;	50	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 127^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	79	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25^{\circ}\text{C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5	650	A
		half sine wave; $T_{j(\text{init})} = 25^{\circ}\text{C}$; $t_p = 8.3\text{ ms}$	715	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; sine wave	2112	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 to 150	$^{\circ}\text{C}$
T_j	junction temperature		150	$^{\circ}\text{C}$

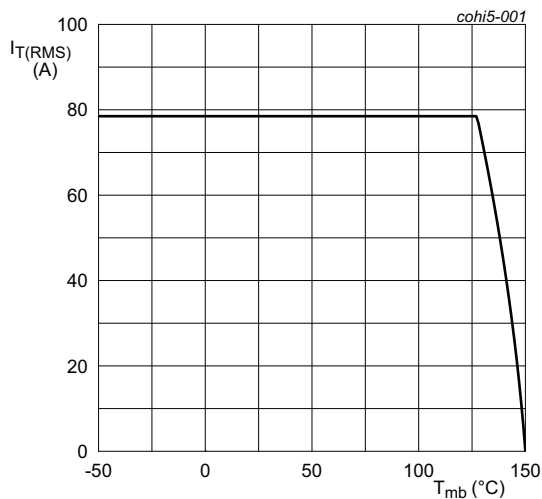
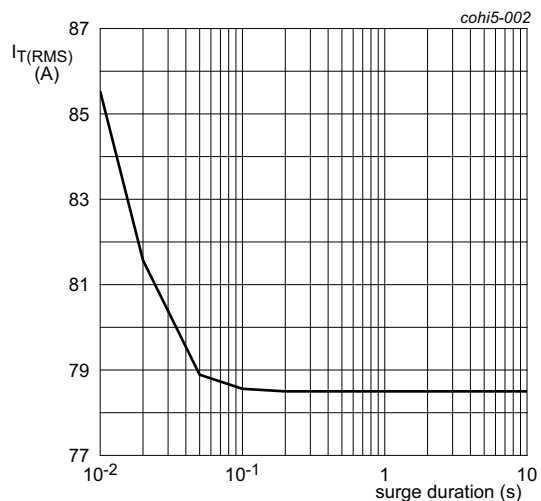


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50\text{ Hz}$; $T_{mb} = 127^{\circ}\text{C}$

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

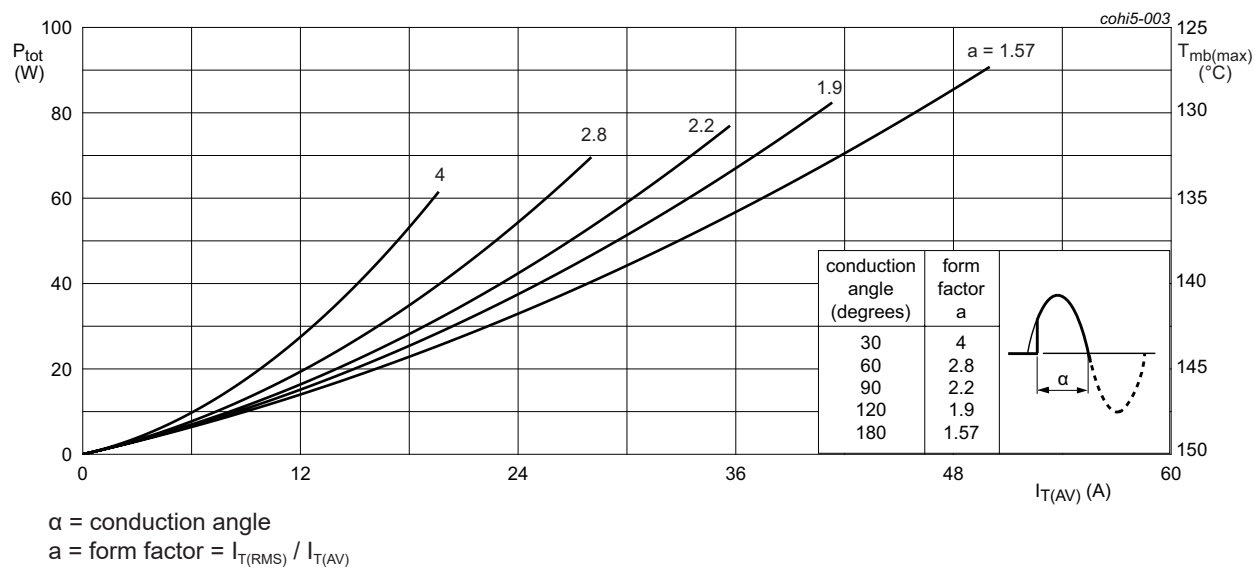


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

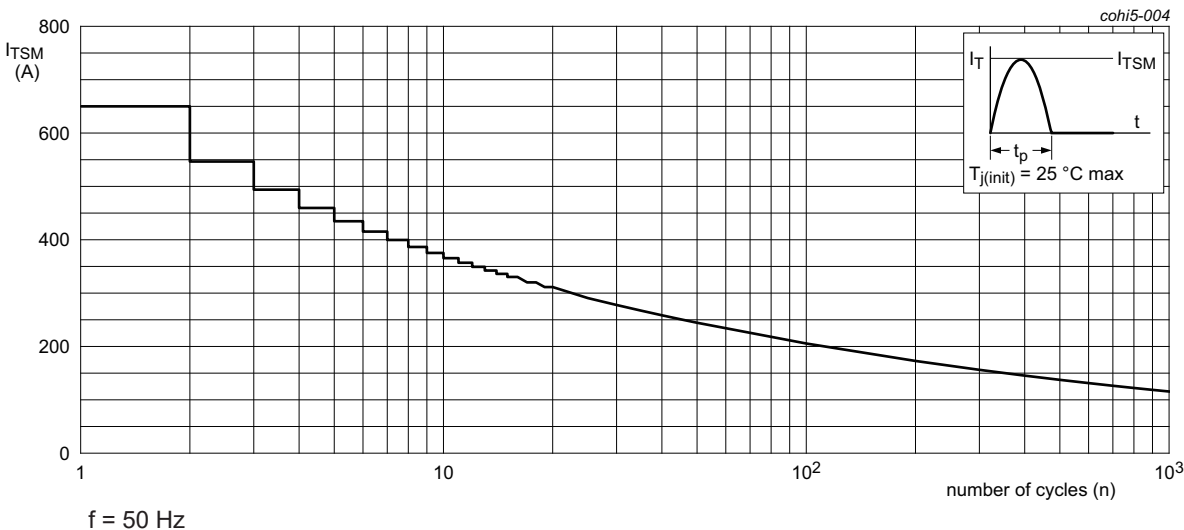


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

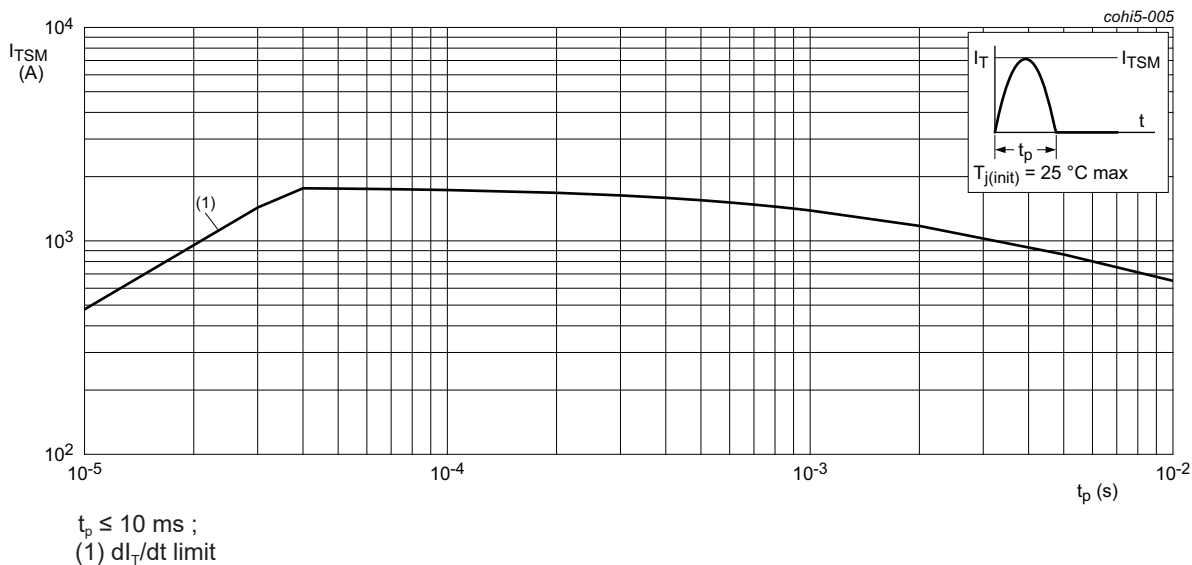
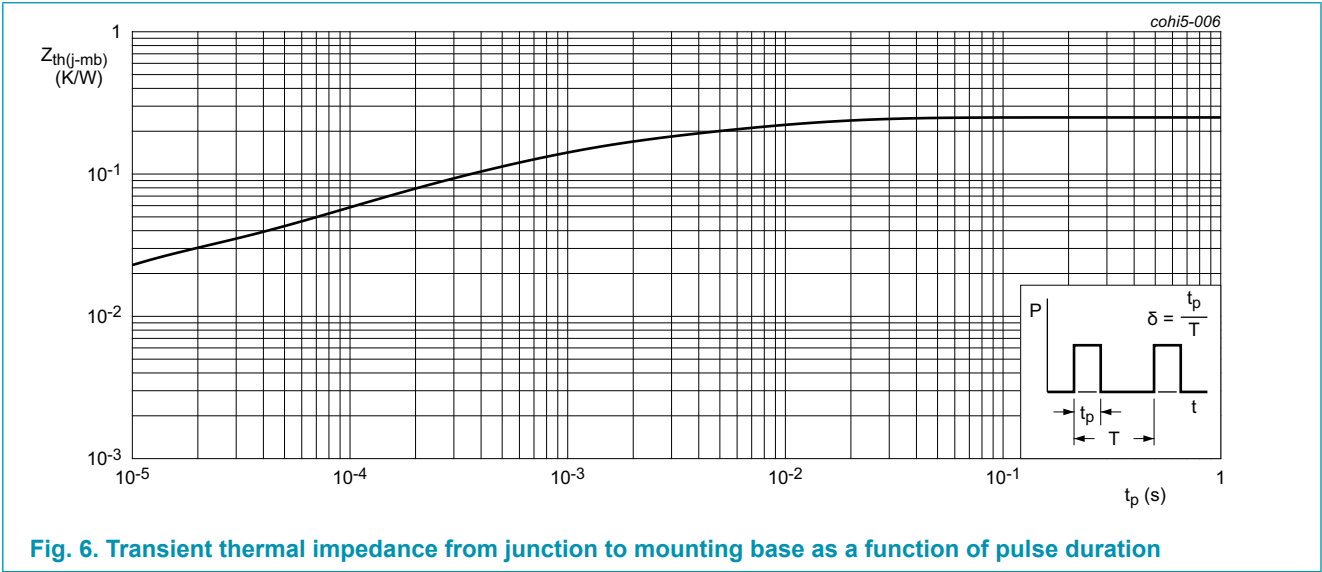


Fig. 5. Total power dissipation as a function of RMS on-state current; maximum values

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	Fig. 6		-	-	0.25	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	50	-	K/W



9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 7 ; Fig. 8		-	-	80	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; 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	$I_T = 50\text{ A}$; $T_j = 25\text{ °C}$; Fig. 11		-	-	1.3	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
		$V_D = 800\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ °C}$; Fig. 12		0.25	0.4	-	V
I_D	off-state current	$V_D = 1600\text{ V}$; $T_j = 125\text{ °C}$		-	-	3	mA
I_R	reverse current	$V_D = 1600\text{ V}$; $T_j = 125\text{ °C}$		-	-	3	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 1070\text{ V}$; $T_j = 125\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		2000	-	-	V/ μ s
		$V_{DM} = 1070\text{ V}$; $T_j = 150\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		1500	-	-	V/ μ s
t_{gt}	gate-controlled turn-on time	$I_{TM} = 40\text{ A}$; $V_D = 800\text{ V}$; $I_G = 100\text{ mA}$; $(dI_G/dt)_M = 0.5\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$			2	-	μ s
t_q	commutated turn-off time	$V_{DM} = 1070\text{ V}$; $T_j = 125\text{ °C}$; $I_{TM} = 50\text{ A}$; $V_R = 25\text{ V}$; $dV_D/dt = 50\text{ V}/\mu\text{s}$; $(dI_T/dt)_M = 30\text{ A}/\mu\text{s}$; ($V_{DM} = 67\%$ of V_{DRM})			150	-	μ s

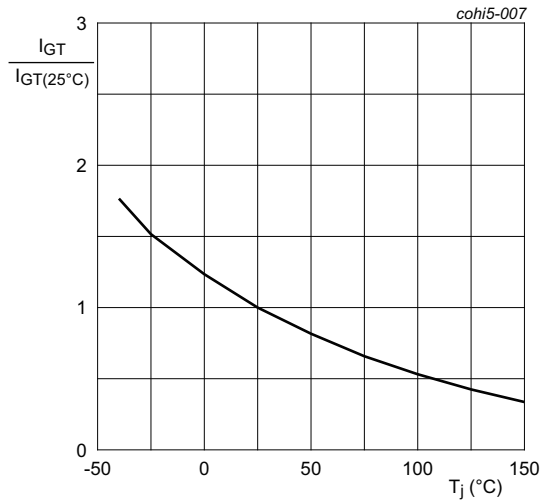


Fig. 7. Normalized gate trigger current as a function of junction temperature

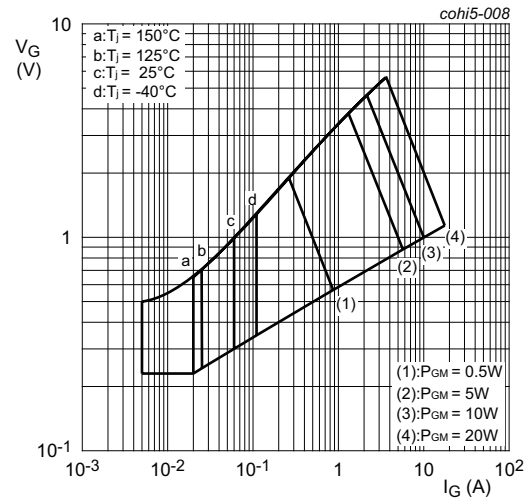


Fig. 8. Gate voltage as a function of gate current

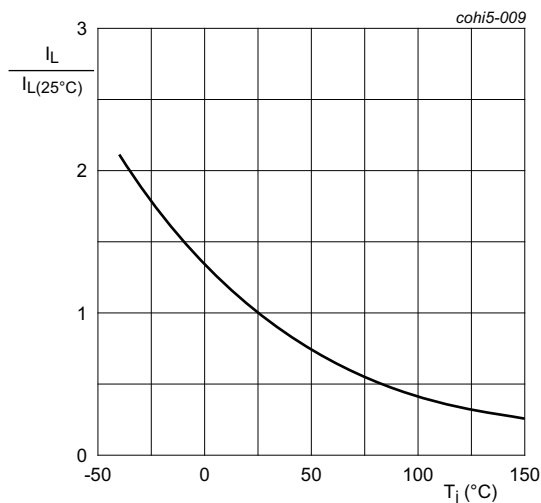


Fig. 9. Normalized latching current as a function of junction temperature

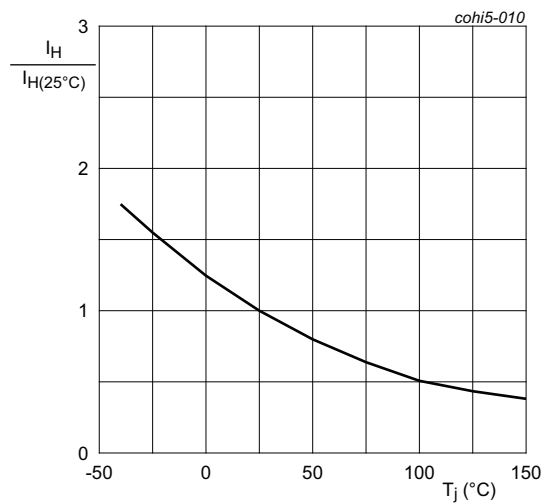
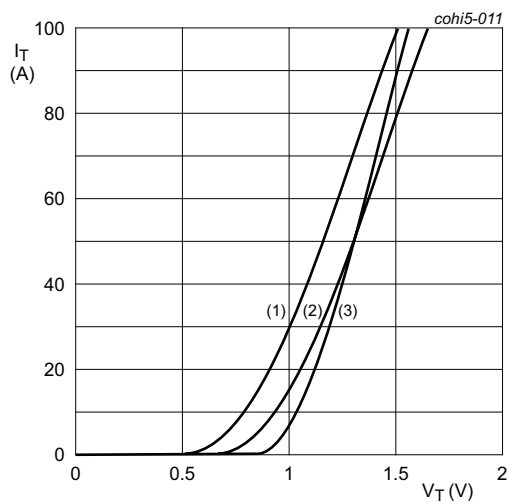


Fig. 10. Normalized holding current as a function of junction temperature



$V_o = 0.963 \text{ V}$; $R_s = 0.0069 \Omega$
 (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

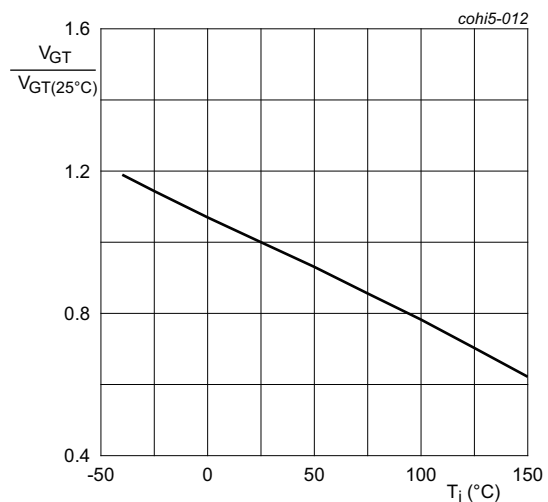
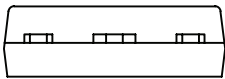
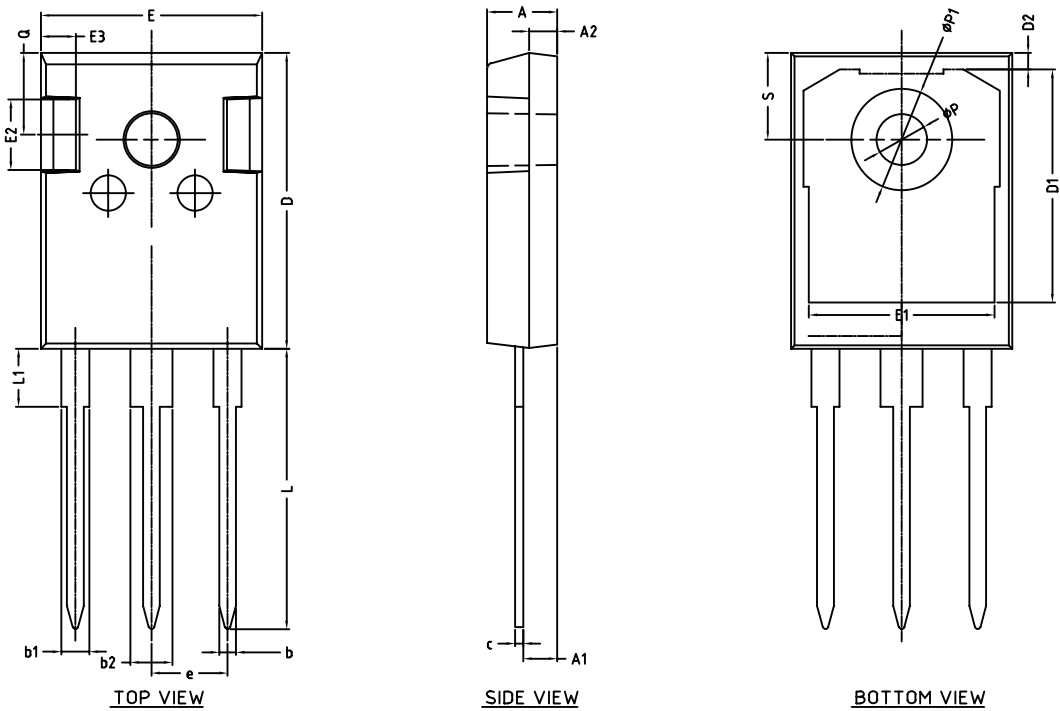


Fig. 12. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3-lead TO-247 SOT429N



SIDE VIEW

UNIT	A	A1	A2	b	b1	b2	c	D	D1	D2	E	E1	E2	E3	e	L	L1	P	P1	Q	S
mm MAX NOM MIN	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				

11. Legal information

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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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- [2] The term 'short data sheet' is explained in section "Definitions".
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12. Contents

1. General description..... 1

2. Features and benefits 1

3. Applications 1

4. Quick reference data 1

5. Pinning information..... 2

6. Ordering information..... 2

7. Limiting values 3

8. Thermal characteristics 5

9. Characteristics..... 6

10. Package outline 8

11. Legal information..... 9

12. Contents 11

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