TYN80W-1600T

SCR

Rev.03 - 14 November 2019 — Product data sheet

1. General description

Planar passivated Silicon Controlled Rectifier in a TO247 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 °C).

2. Features and benefits

- High junction operating temperature capability ($T_{j(max)}$ = 150 °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

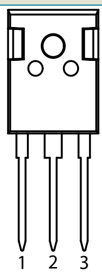
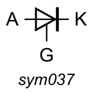
Table 1. Quick reference data

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} ≤ 117°C; Fig. 1; Fig. 2; Fig. 3	126	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)}$ = 25 °C; t_p = 10 ms; Fig. 4; Fig. 5	850	A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 ms	930	A
T_j	junction temperature		150	°C

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 7; Fig. 8		-	-	80	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 10		-	-	200	mA
V_T	on-state voltage	I_T = 80 A; T_j = 25 °C; Fig. 11		-	-	1.47	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 1070 V; T_j = 150 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		1000	-	-	V/μs

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
TYN80W-1600T	TO247	TYN80W-1600TQ	Tube	30	TO247N	20-July-2016

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; $T_{mb} \leq 117°C$;	80	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 117°C$; Fig. 1; Fig. 2; Fig. 3	126	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)}$ = 25 °C; t_p = 10 ms; Fig. 4; Fig. 5	850	A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 ms	930	A
I^2t	I^2t for fusing	t_p = 10 ms; sine wave	3610	A^2s
dI_T/dt	rate of rise of on-state current	I_G = 200 mA	150	A/µs
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	°C
T_j	junction temperature		150	°C

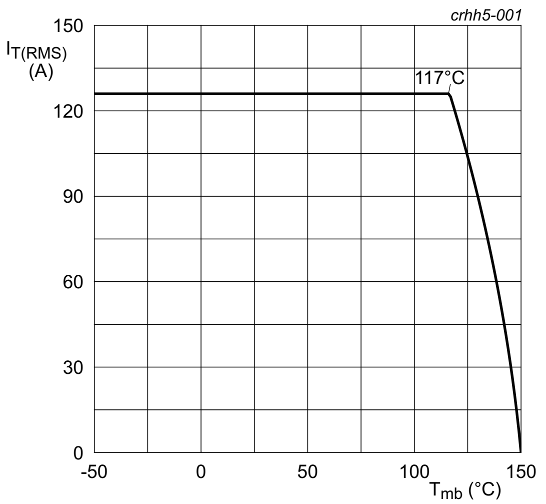
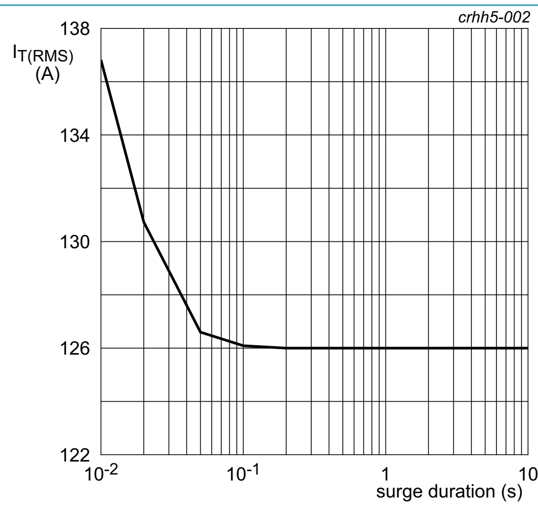
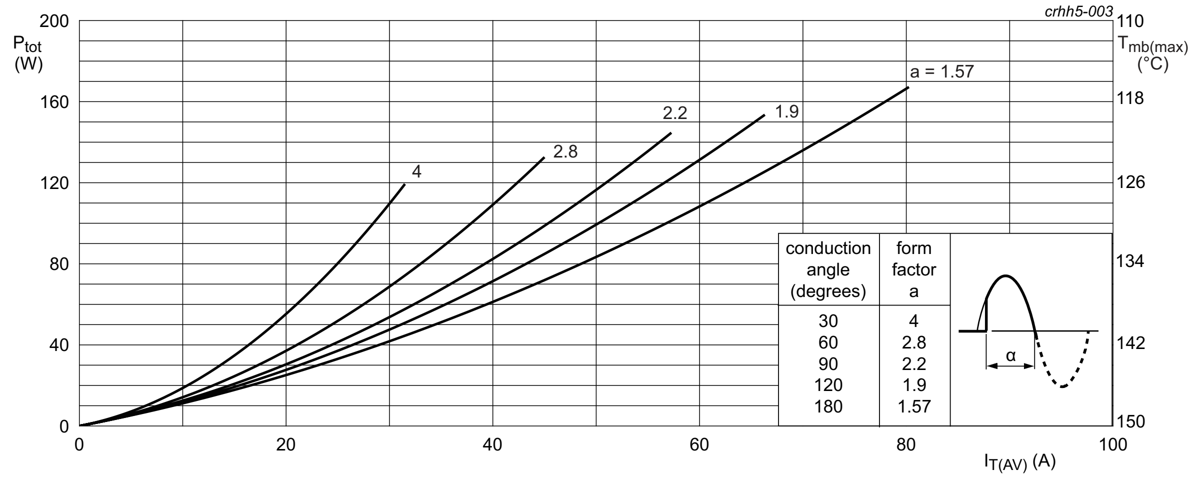


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



f = 50 Hz; T_{mb} = 117 °C

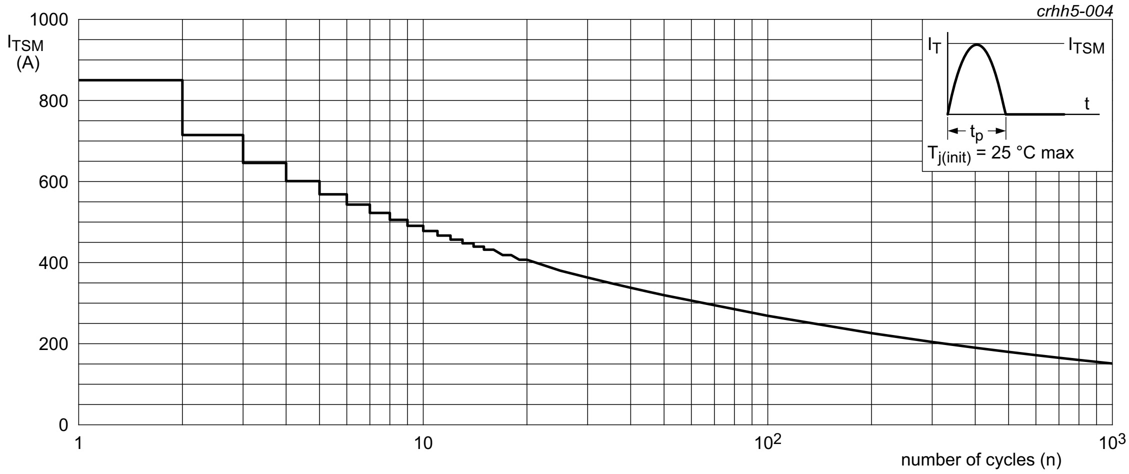
Fig. 2. RMS on-state current as a function of surge duration; maximum values



α = conduction angle

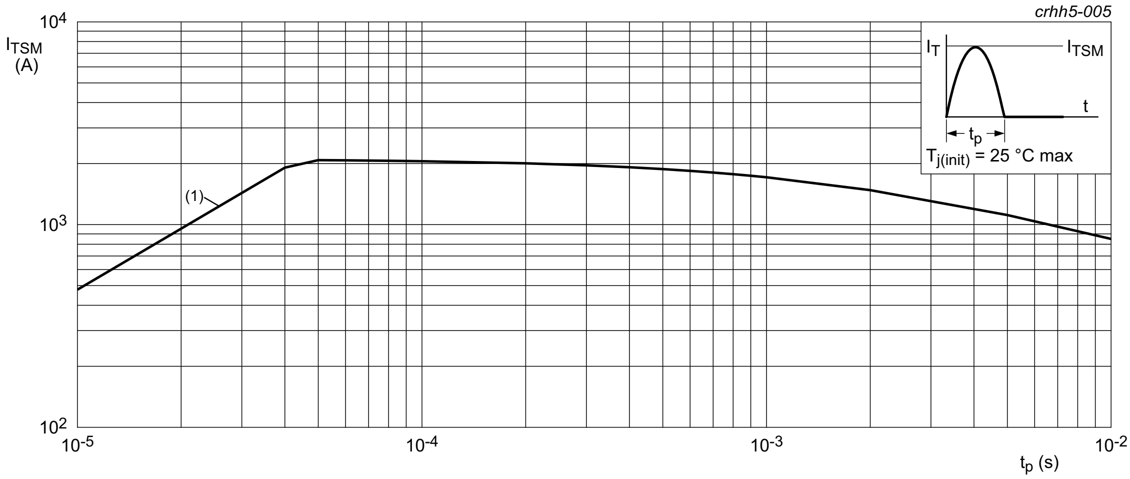
a = form factor = $I_{T(RMS)}$ / $I_{T(AV)}$

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



f = 50 Hz

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



t_p ≤ 10 ms ;

(1) dI_T/dt limit

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

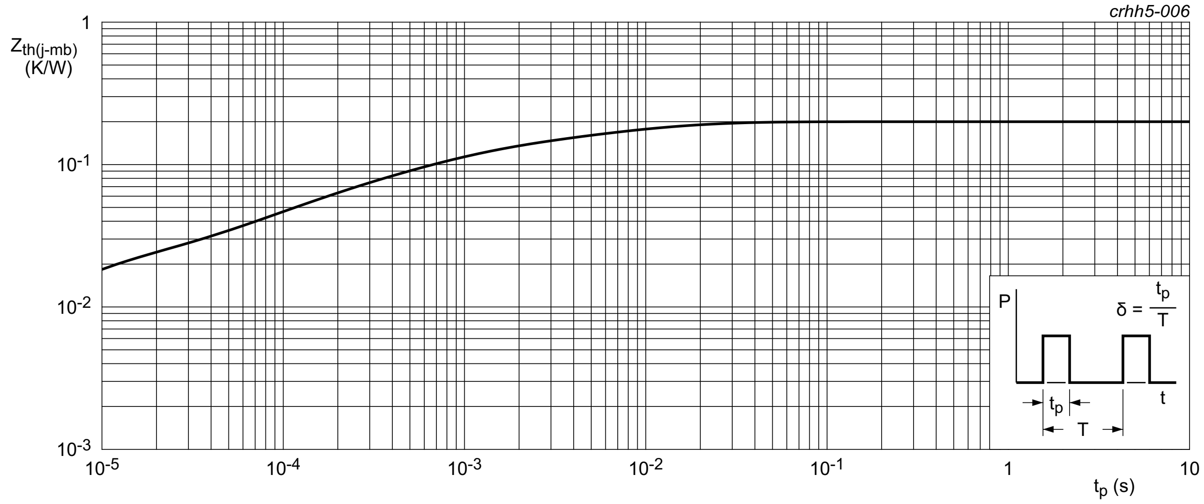


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 7; Fig. 8		-	-	80	mA
I_L	latching current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 9		-	-	300	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 10		-	-	200	mA
V_T	on-state voltage	I_T = 80 A; T_j = 25 °C; Fig. 11		-	-	1.47	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 12		-	0.7	1	V
		V_D = 800 V; I_T = 0.1 A; T_j = 125 °C		0.25	0.4	-	V
I_D	off-state current	V_D = 1600 V; T_j = 25 °C		-	-	10	µA
		V_D = 1600 V; T_j = 125 °C		-	-	3	mA
I_R	reverse current	V_D = 1600 V; T_j = 25 °C		-	-	10	µA
		V_D = 1600 V; T_j = 125 °C		-	-	3	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 1070 V; T_j = 125 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		1500	-	-	V/µs
		V_{DM} = 1070 V; T_j = 150 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		1000	-	-	V/µs
t_{gt}	gate-controlled turn-on time	I_{TM} = 40 A; V_D = 800 V; I_G = 100 mA; $(dI_G/dt)_M$ = 0.5 A/µs; T_j = 25 °C			2	-	µs
t_q	commutated turn-off time	V_{DM} = 1070 V; T_j = 125 °C; I_{TM} = 80 A; V_R = 25 V; dV_D/dt = 50 V/µs; $(dI_T/dt)_M$ = 30 A/µs; (V_{DM} = 67% of V_{DRM})			150	-	µs

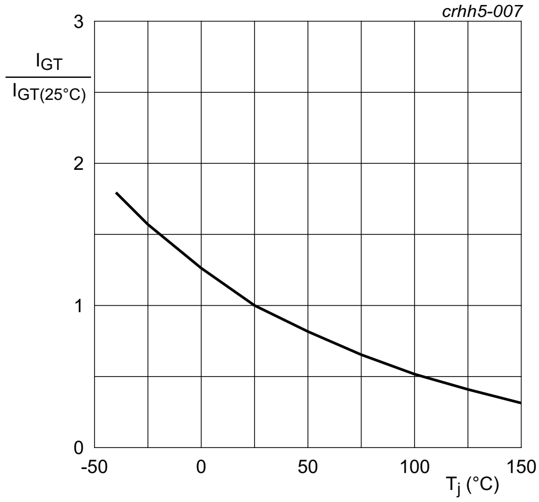


Fig. 7. Normalized gate trigger current as a function of junction temperature

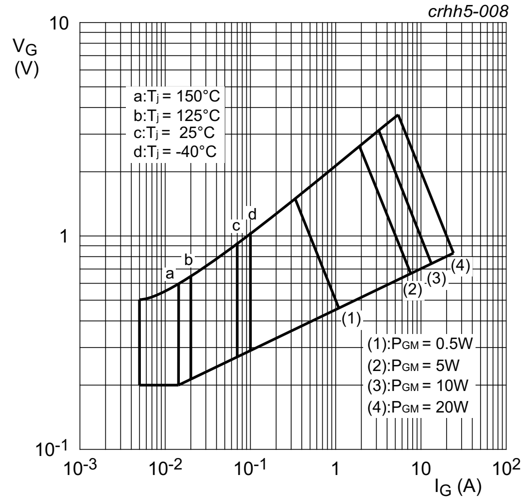


Fig. 8. Gate voltage as a function of gate current

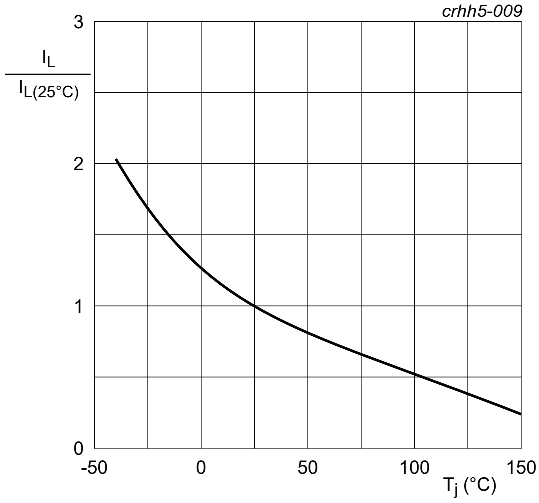


Fig. 9. Normalized latching current as a function of junction temperature

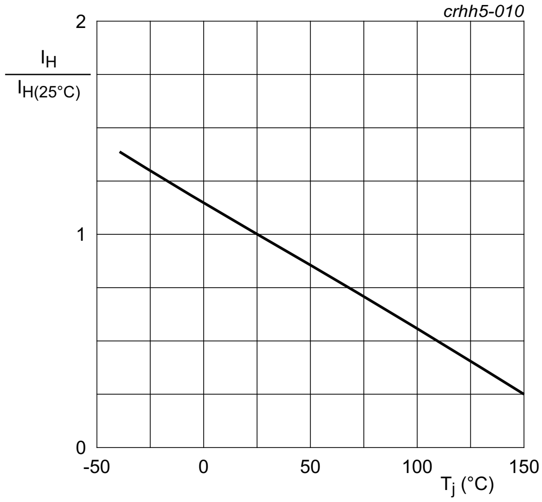
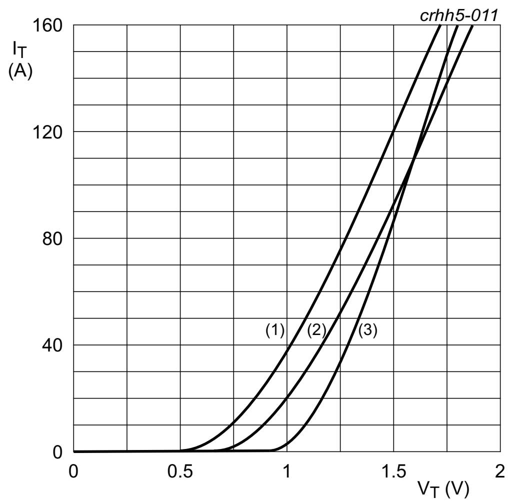


Fig. 10. Normalized holding current as a function of junction temperature



V_o = 0.981 V; R_s = 0.0056 Ω
(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig. 11. On-state current as a function of on-state voltage

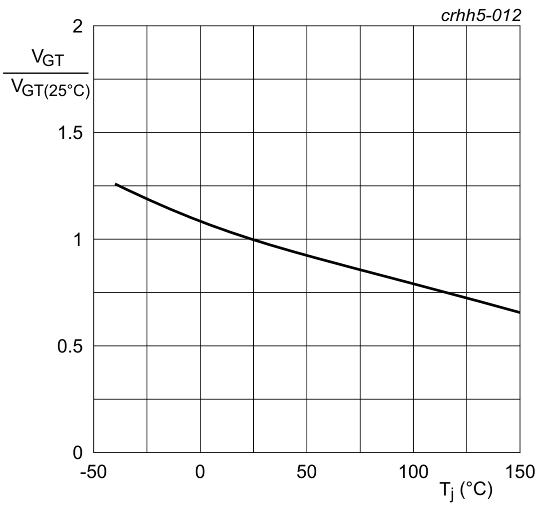
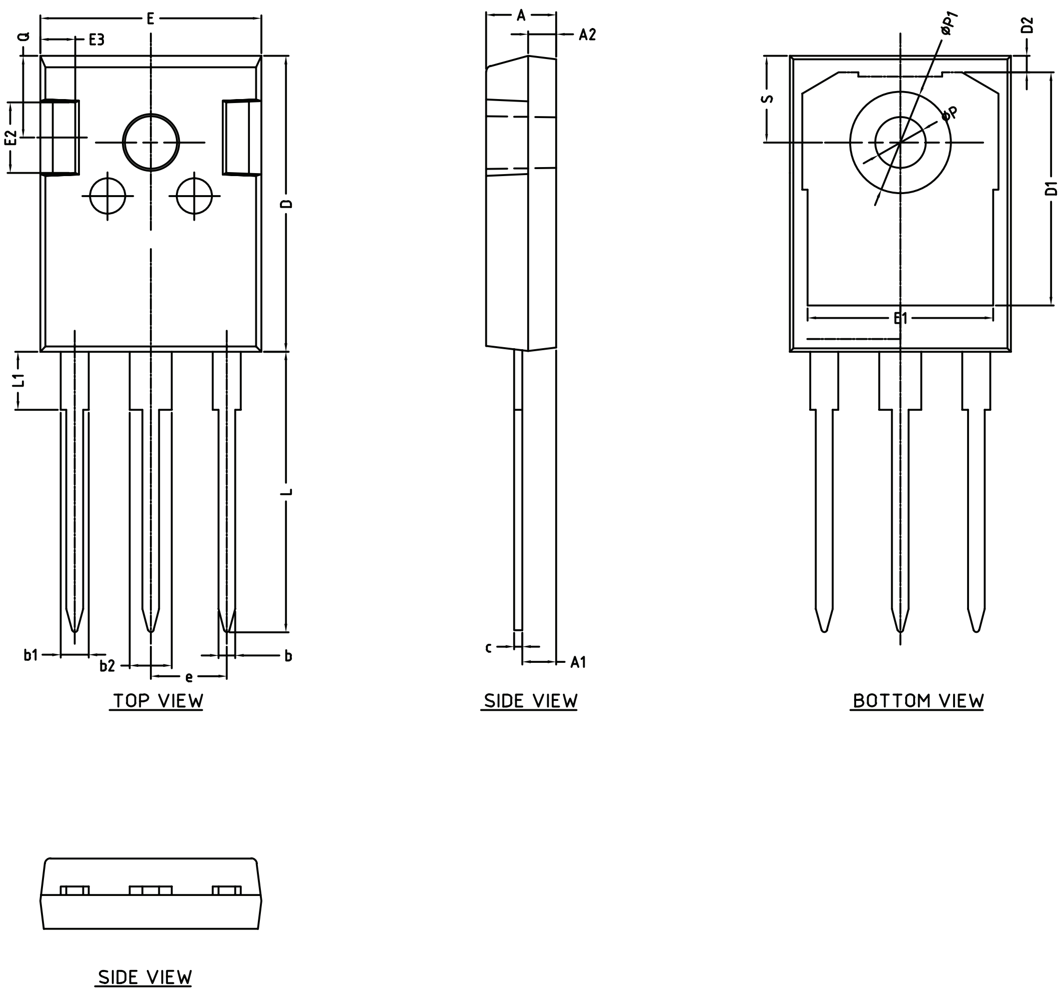


Fig. 12. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

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



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		20.10	4.75	3.70	7.40	6.00	6.25
	NOM															5.45						
	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				

11. 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.
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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

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Date of release: 14 November 2019