

1. General description

Planar passivated Silicon Controlled Rectifier in a TO247 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

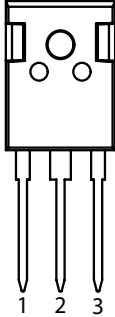
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Absolute maximum rating							
V_{DRM}	repetitive peak off-state voltage			-	-	1400	V
V_{RRM}	repetitive peak reverse voltage			-	-	1400	V
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 130\text{ °C}$; 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	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 7 ; Fig. 8		-	-	50	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 938\text{ V}$; $T_j = 125\text{ °C}$; Gate open circuit; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform		1500	-	-	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
BT155W-1400T	TO247	BT155W-1400TQ	Tube	30	TO247N	20-July-2016

7. Marking

Table 4. Marking codes

Type number	Marking codes
BT155W-1400T	BT155W 1400T

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			-	1400	V
V_{RRM}	repetitive peak reverse voltage			-	1400	V
$I_{\text{T(AV)}}$	average on-state current	half sine wave; $T_{\text{mb}} \leq 130\text{ }^{\circ}\text{C}$		-	50	A
$I_{\text{T(RMS)}}$	RMS on-state current	half sine wave; $T_{\text{mb}} \leq 130\text{ }^{\circ}\text{C}$; Fig 1 ; Fig 2 ; Fig 3		-	79	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{\text{J(init)}} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 10\text{ ms}$; Fig 4 ; Fig 5		-	650	A
		half sine wave; $T_{\text{J(init)}} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 8.3\text{ ms}$		-	715	A
I^2t	I^2t for fusing	$t_{\text{p}} = 10\text{ ms}$; sine-wave pulse		-	2113	A^2s
di_{T}/dt	rate of rise of on-state current	$I_{\text{G}} = 200\text{ mA}$		-	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
$P_{\text{G(AV)}}$	average gate power	over any 20 ms period		-	1	W
T_{stg}	storage temperature			-40	150	$^{\circ}\text{C}$
T_{J}	junction temperature			-	150	$^{\circ}\text{C}$

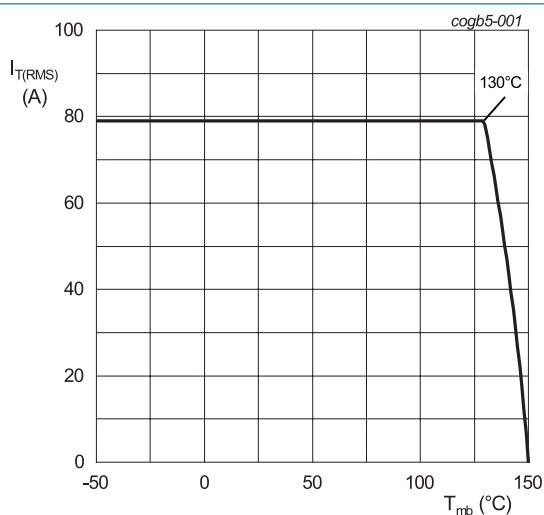


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values

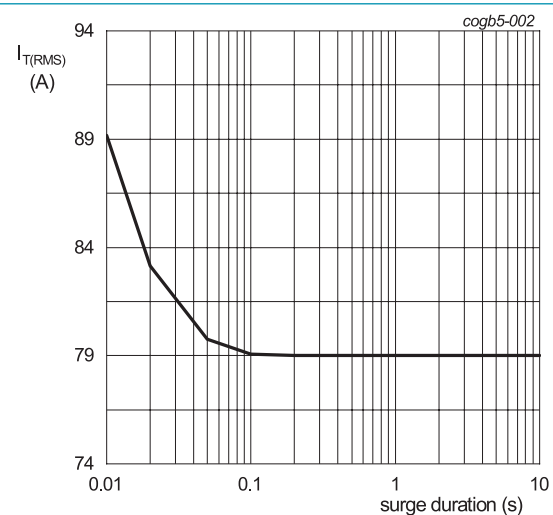


Fig. 2. RMS on-state current as a function of surge duration; maximum values
 $f = 50\text{ Hz}$; $T_{\text{mb}} = 130\text{ }^{\circ}\text{C}$

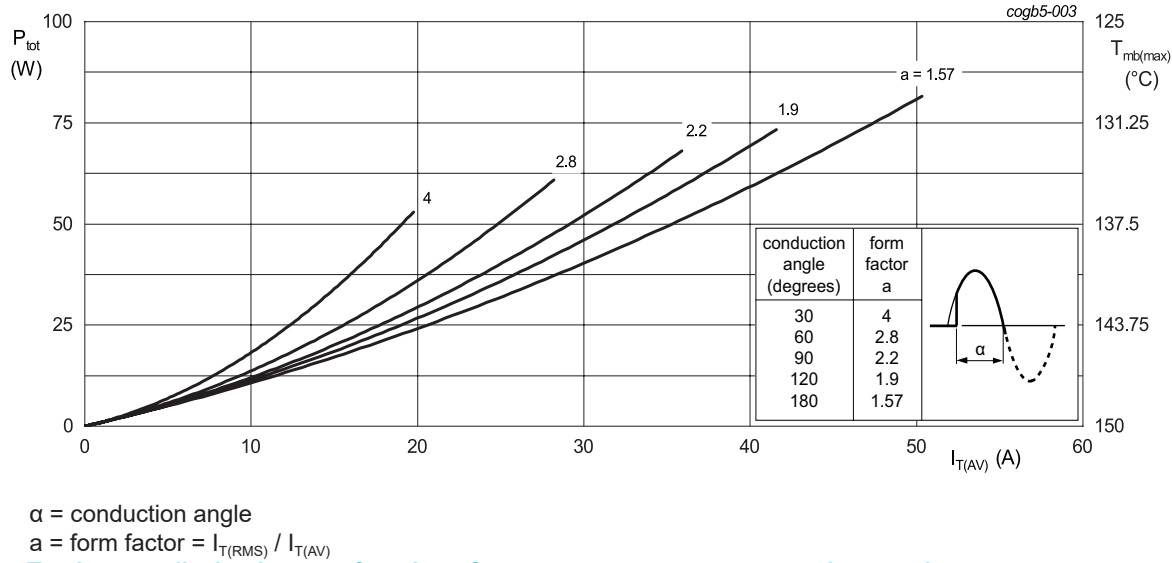
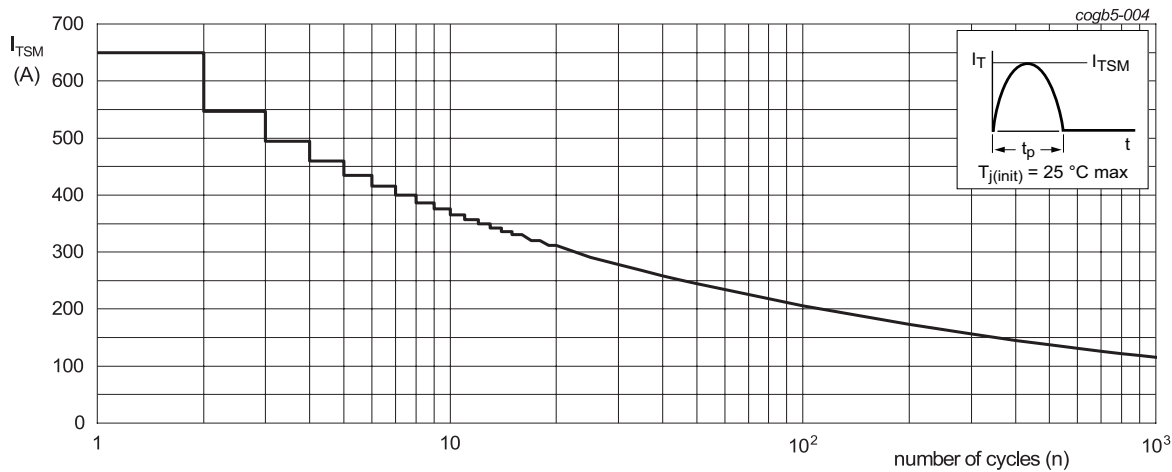
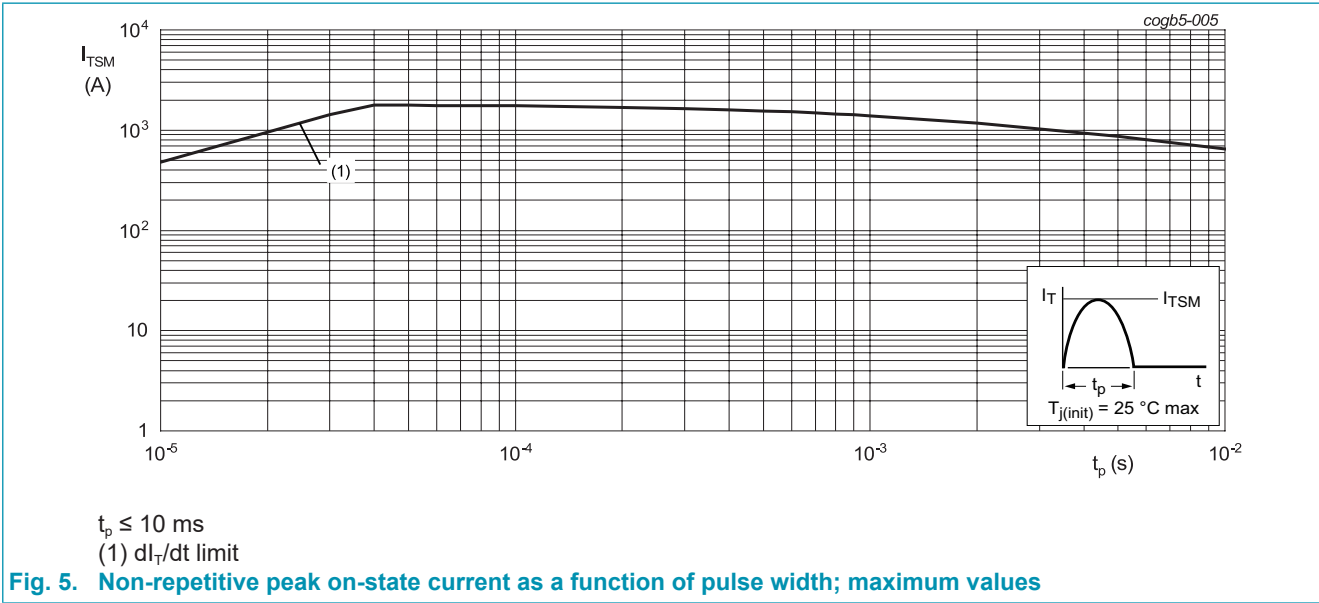


Fig. 3. Total power dissipation as a function of average on-state current; maximum values



f = 50 Hz

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



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	Fig 6		-	-	0.25	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	50	-	K/W
	Mounting torque	M3 screw mounting		0.55	-	0.8	Nm

Note: It is recommended that a metal washer is inserted between screw head and mounting tab.
Do not use self-tapping screws.

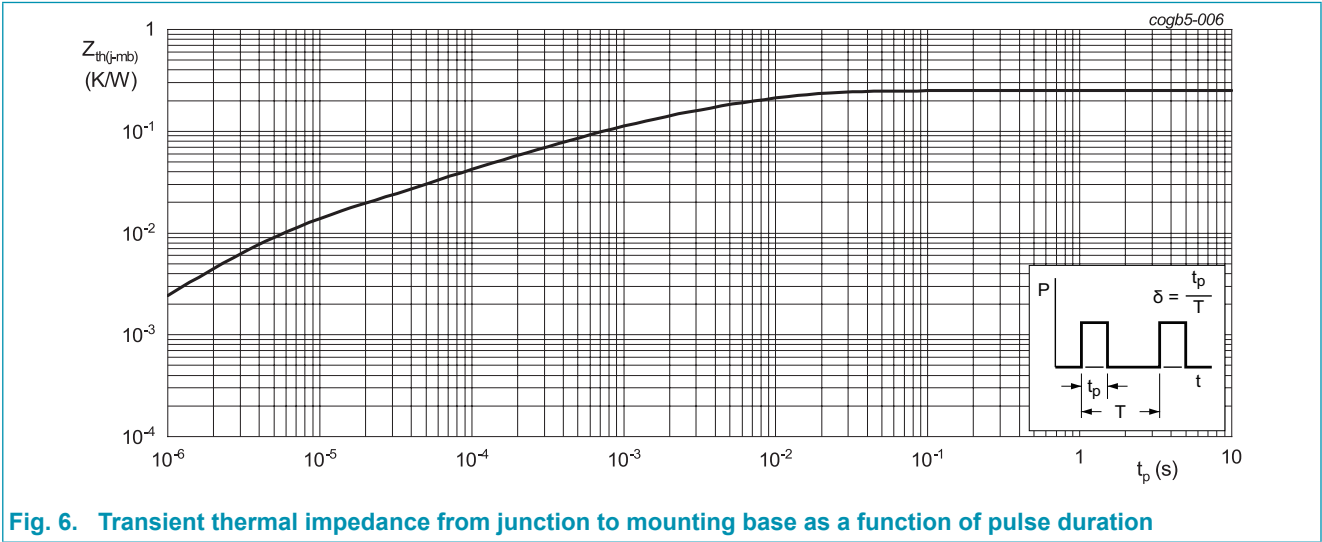


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I _{GT}	gate trigger current	V _D = 12 V; I _T = 0.1 A; T _j = 25 °C; Fig. 7 ; Fig. 8		-	-	50	mA
I _L	latching current	V _D = 12 V; I _G = 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 = 50 A; T _j = 25 °C; Fig. 11		-	-	1.35	V
		I _T = 90 A; T _j = 25 °C; Fig. 11		-	-	1.6	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 = 1400 V; T _j = 25 °C		-	-	10	μA
		V _D = 1400 V; T _j = 125 °C		-	-	4	mA
		V _D = 1400 V; T _j = 150 °C		-	-	10	mA
I _R	reverse current	V _D = 1400 V; T _j = 25 °C		-	-	10	μA
		V _D = 1400 V; T _j = 125 °C		-	-	4	mA
		V _D = 1400 V; T _j = 150 °C		-	-	10	mA
Dynamic characteristics							
dV _D /dt	rate of rise of off-state voltage	V _{DM} = 938 V; T _j = 125 °C; Gate open circuit; (V _{DM} = 67% of V _{DRM}); exponential waveform		1500	-	-	V/μs
		V _{DM} = 938 V; T _j = 150 °C; Gate open circuit; (V _{DM} = 67% of V _{DRM}); exponential waveform		1000	-	-	V/μs
t _{gt}	gate-controlled turn-on time	I _{TM} = 40 A; V _D = 800 V; I _G = 0.1 A; dI _G /dt = 5 A/μs; T _j = 25 °C		-	2	-	μs
t _q	commutated turn-off time	V _{DM} = 938 V; T _j = 125 °C; I _{TM} = 20 A; V _R = 25 V; (dI _T /dt) _M = 30 A/μs; dV _D /dt = 50 V/μs; R _{GK(ext)} = 100 kΩ; (V _{DM} = 67% of V _{DRM})		-	150	-	μs

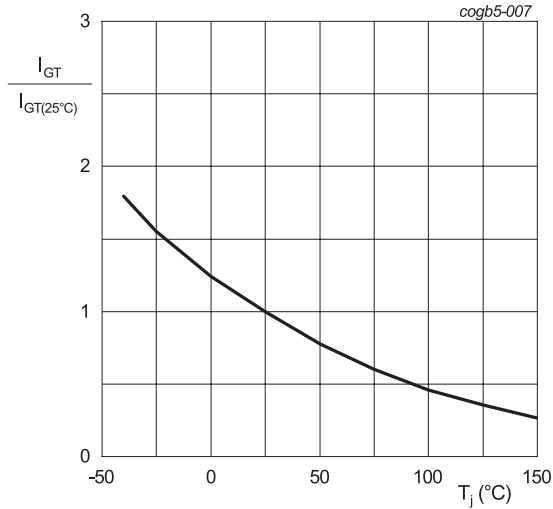


Fig. 7. Normalized gate trigger current as a function of junction temperature

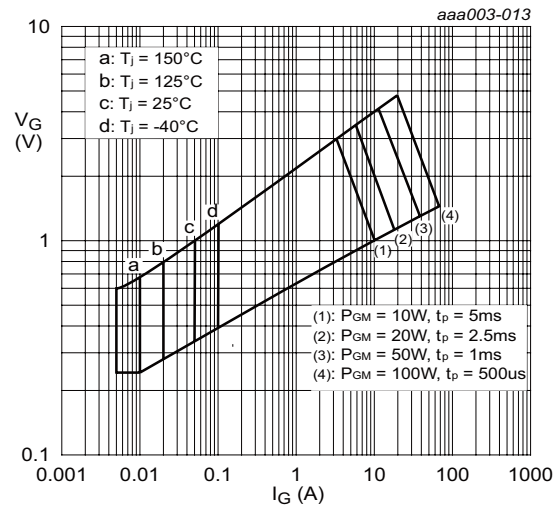


Fig. 8. Gate voltage as a function of gate current

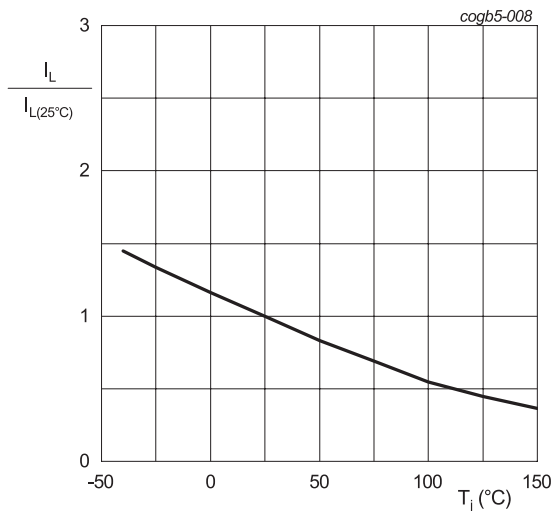


Fig. 9. Normalized latching current as a function of junction temperature

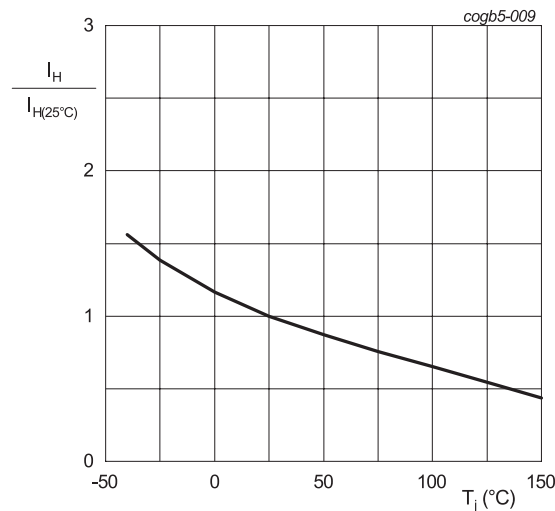
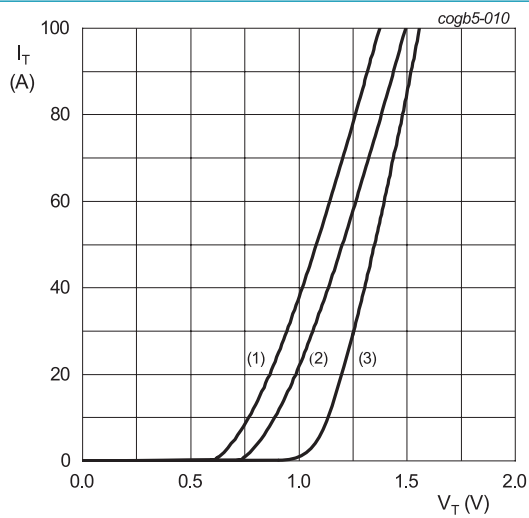


Fig. 10. Normalized holding current as a function of junction temperature



$V_o = 0.935 \text{ V}$; $R_s = 0.0055 \text{ } \Omega$
(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. 11. On-state current as a function of on-state voltage

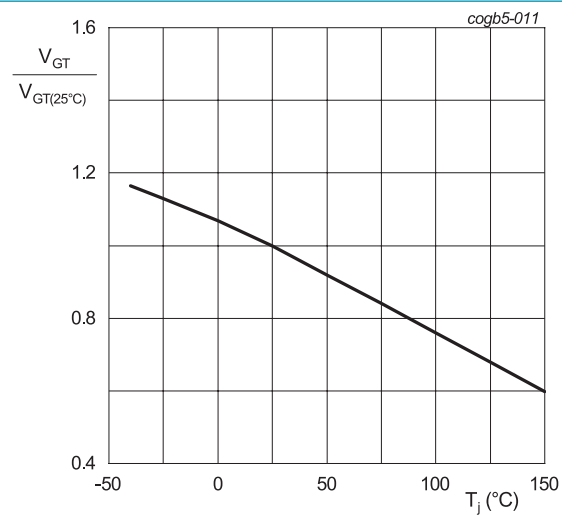
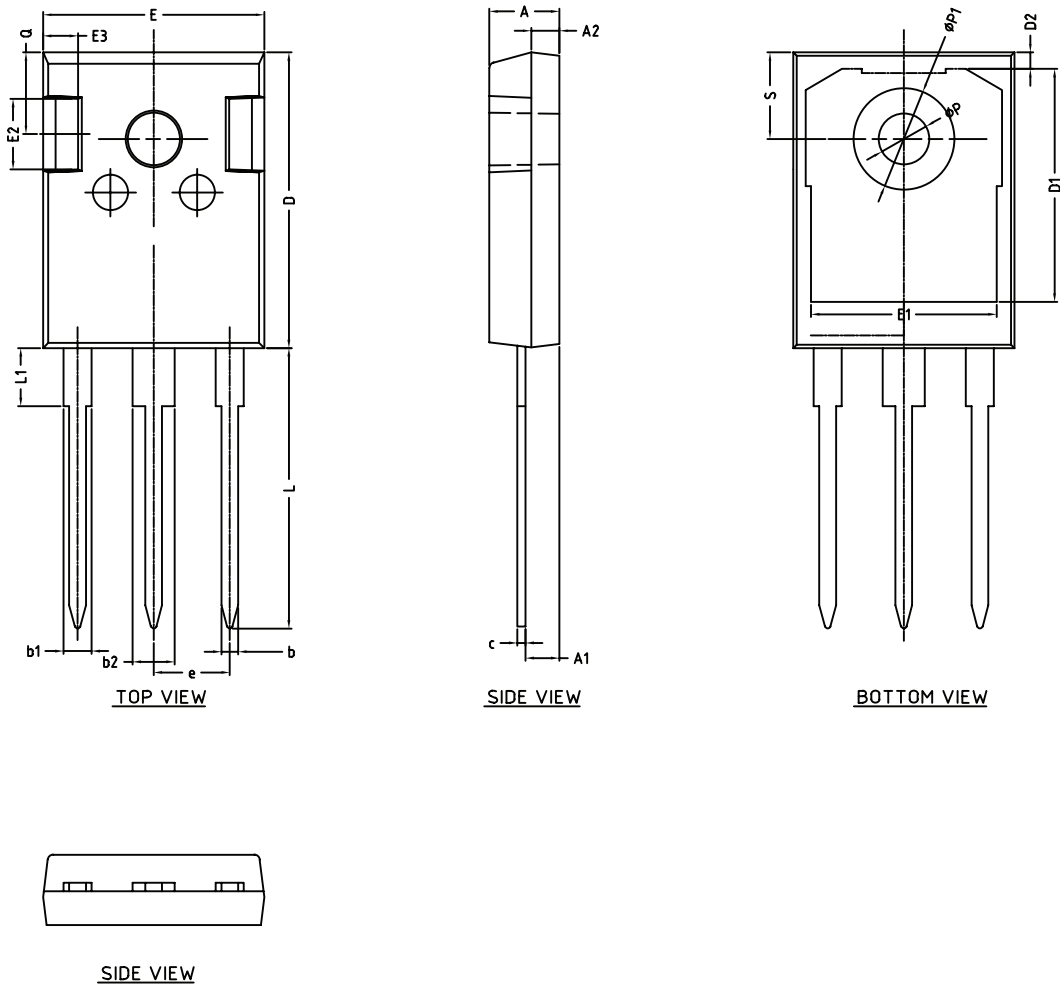


Fig. 12. Normalized gate trigger voltage as a function of junction temperature

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.

- [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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