TYN50W-1400T

SCR

Rev.01 - 05 August 2021 — 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 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

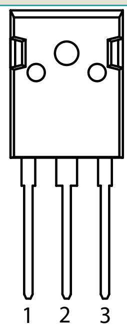
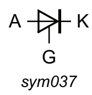
Table 1. Quick reference data

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; $T_{mb} \leq 129$ °C; Fig. 1; Fig. 2; Fig. 3		-	-	79	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		-	-	650	A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ 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 V; I_T = 0.1 A; T_j = 25 °C; Fig. 7; Fig. 8		-	-	50	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

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
TYN50W-1400T	TO247	TYN50W-1400TQ	Tube	30	TO247E	18-Jun-2021

7. Marking

Table 4. Marking codes

Type number	Marking codes
TYN50W-1400T	TYN50W 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
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 129$ °C		-	50	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 129$ °C; Fig 1; Fig 2; Fig 3		-	79	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		-	650	A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms		-	715	A
I^2t	I^2t for fusing	$t_p = 10$ ms; sine-wave pulse		-	2113	A^2s
dI_T/dt	rate of rise of on-state current	$I_G = 200mA$		-	200	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	150	°C
T_j	junction temperature			-	150	°C

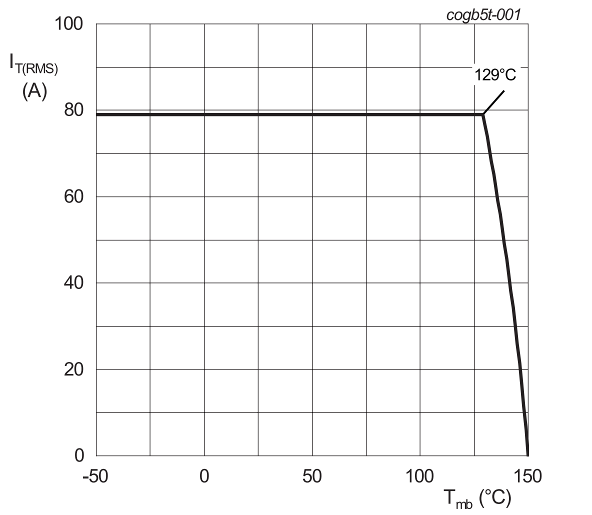
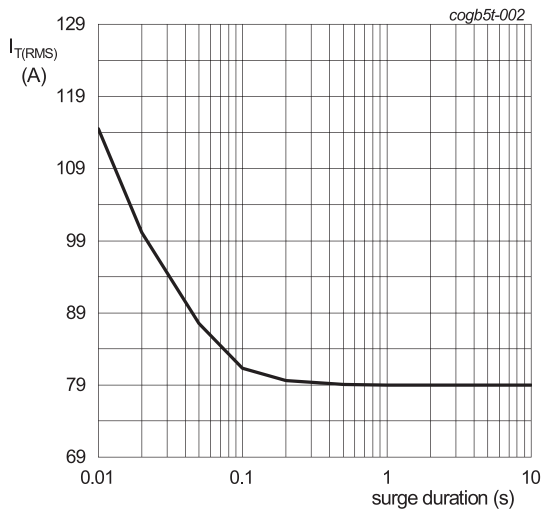
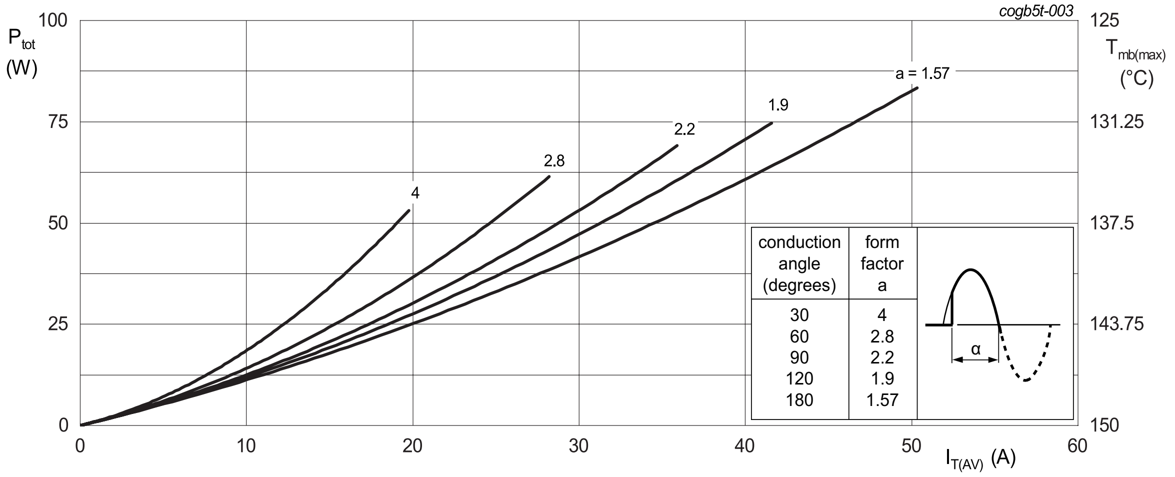


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



f = 50 Hz; $T_{mb} = 129$ °C

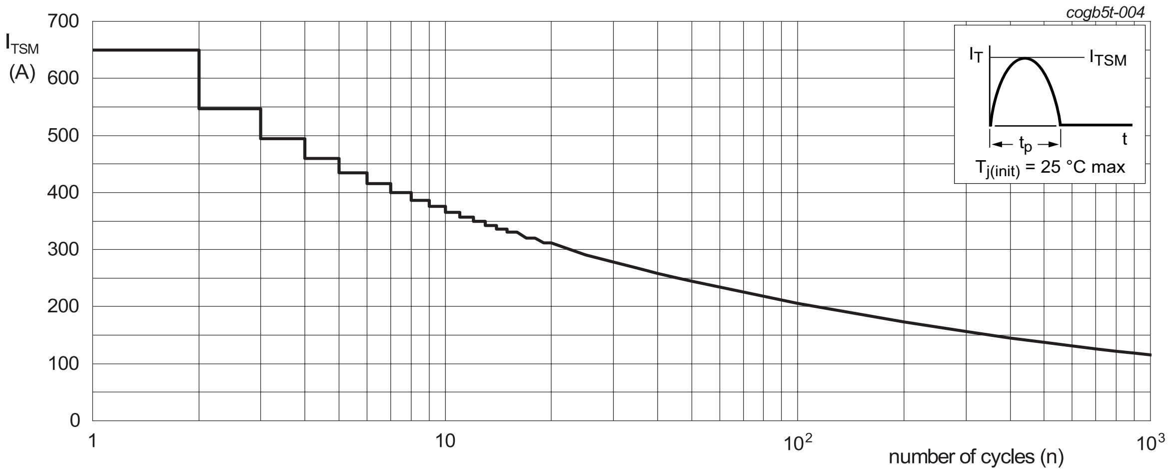
Fig. 2. RMS on-state current as a function of surge duration; maximum values



α = conduction angle

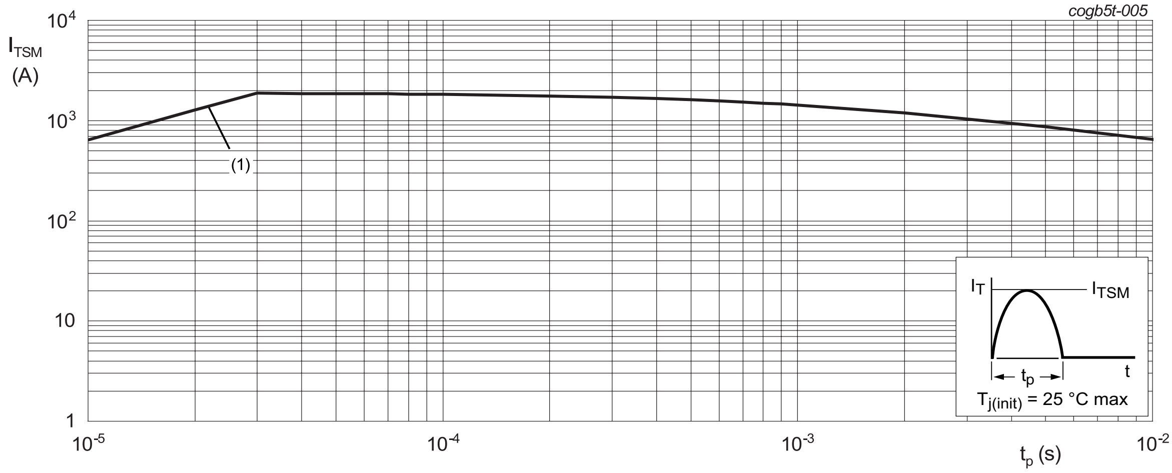
a = form factor = $I_{T(RMS)}$ / $I_{T(AV)}$

Fig. 3. Total power dissipation as a function of 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



$t_p \leq 10$ ms
(1) dI_T/dt limit

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	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.

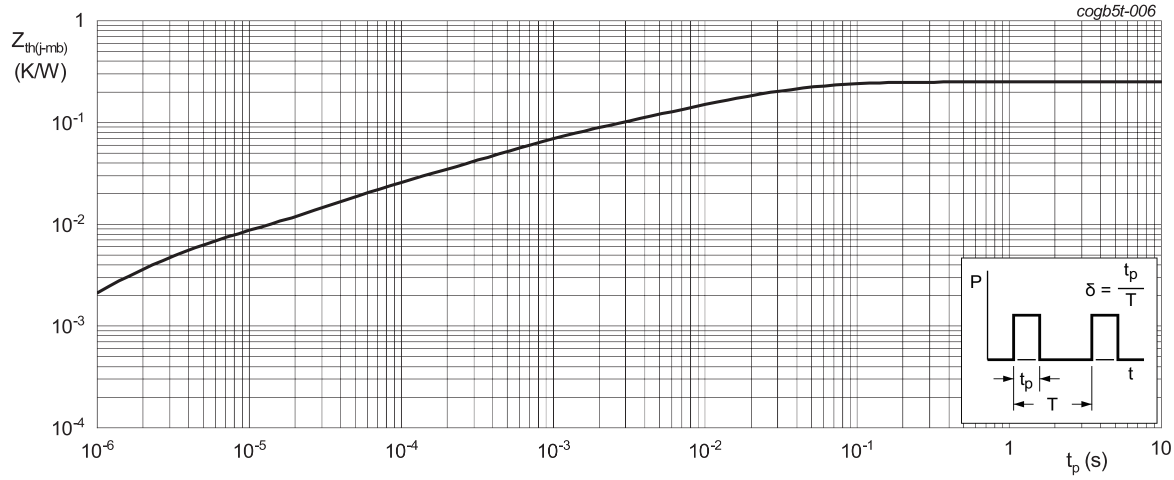


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

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 = 79 A; T_j = 25 °C; Fig. 11		-	-	1.5	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 = 150 °C		-	-	10	mA
I_R	reverse current	V_D = 1400 V; T_j = 25 °C		-	-	10	µA
		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

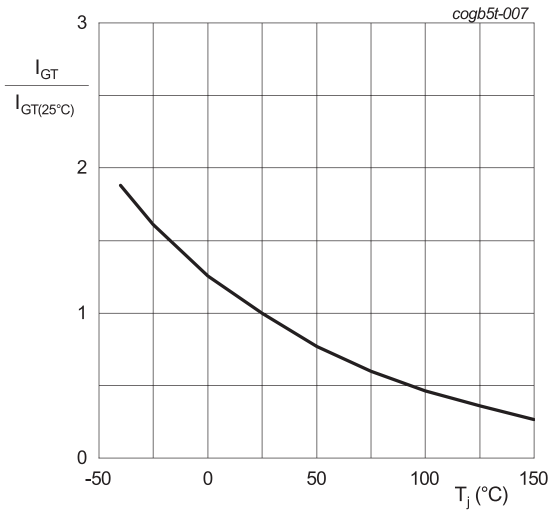


Fig. 7. Normalized gate trigger current as a function of junction temperature

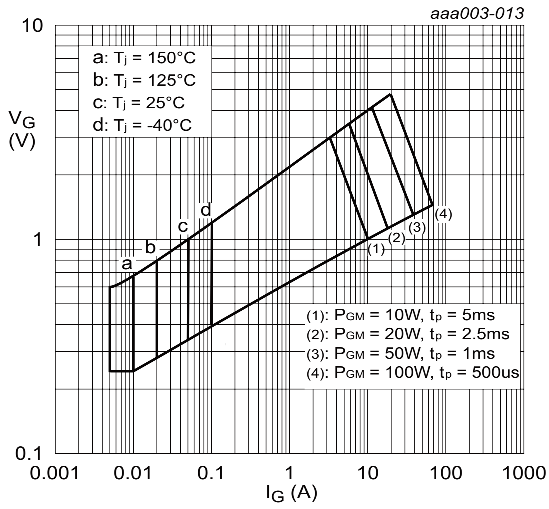


Fig. 8. Gate voltage as a function of gate current

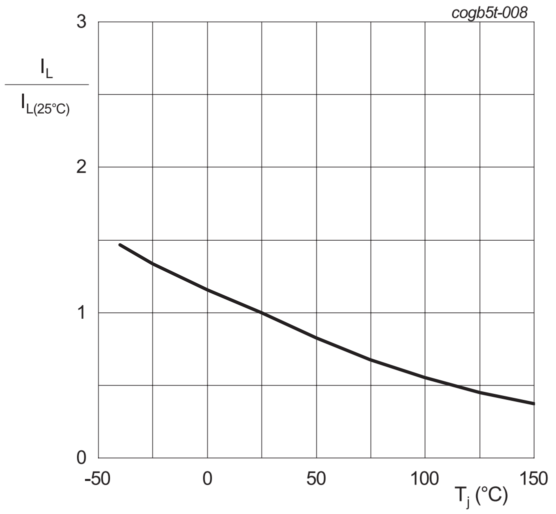


Fig. 9. Normalized latching current as a function of junction temperature

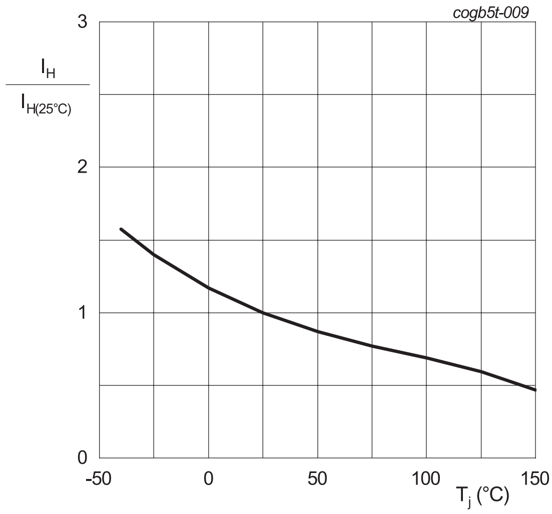
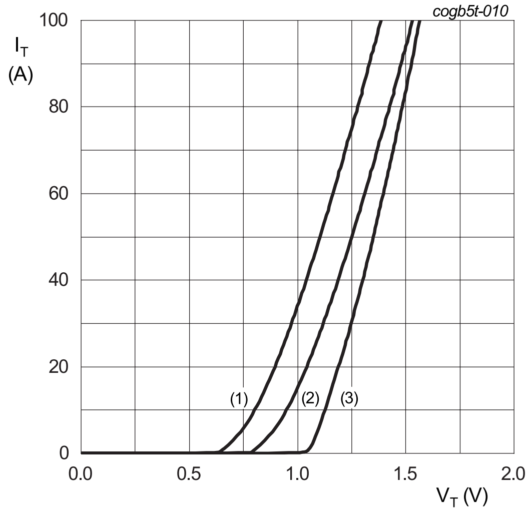


Fig. 10. Normalized holding current as a function of junction temperature



V_o = 0.992 V; R_s = 0.0054 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

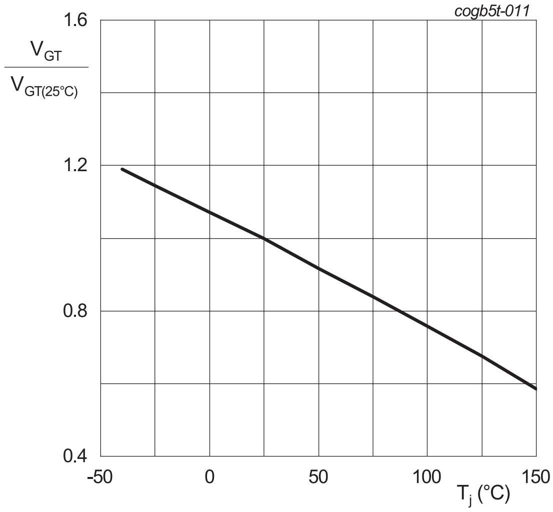
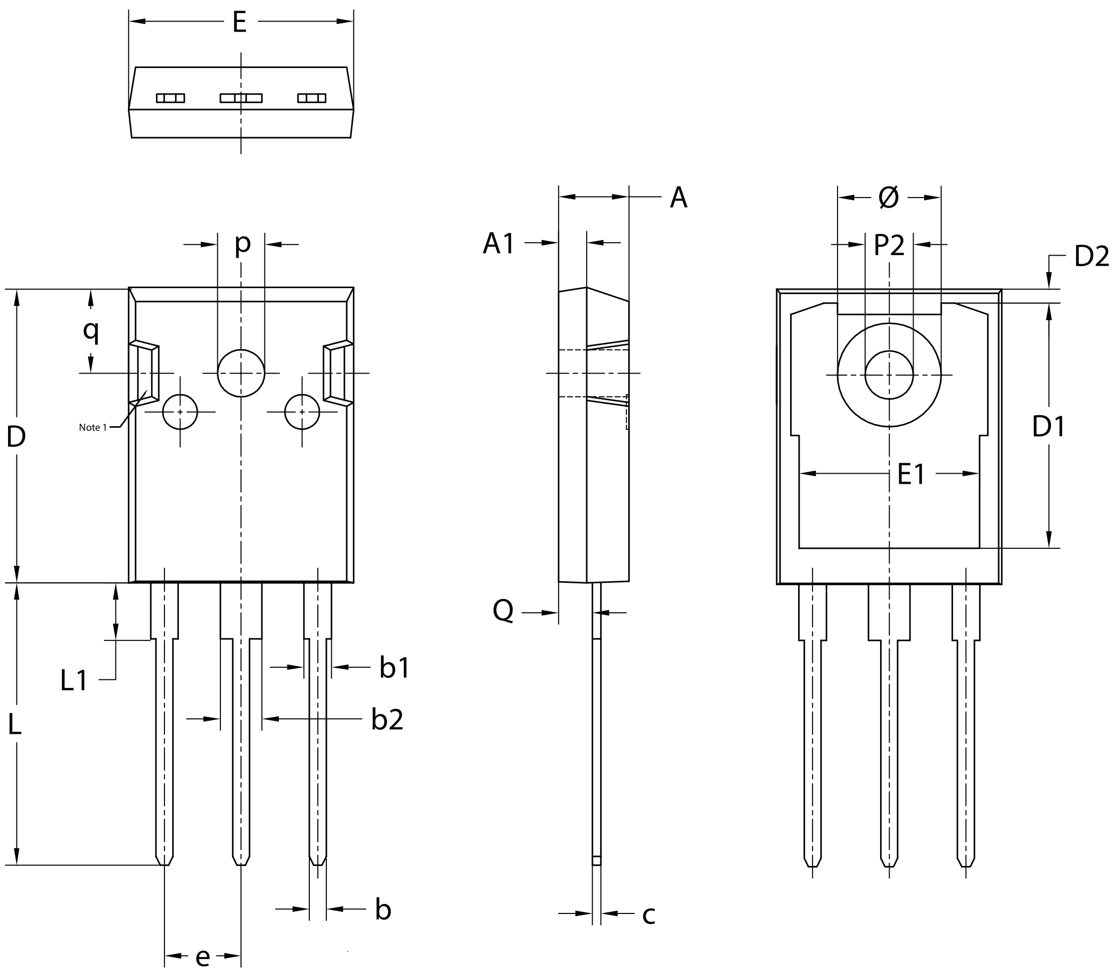


Fig. 12. Normalized gate trigger voltage as a function of junction temperature

11. Package outline

Plastic single-ended through-hole package; heatsink mounted;1 mounting hole; 3 leads TO-247 TO247E



UNIT	A	A1	b	b_1	b_2	c	D	D1	D2	E	E1	e	L	L1	P2	p	Q	q	Ø
mm	5.36 4.68	2.10 1.90	1.40 1.00	2.30 1.90	3.30 2.90	0.72 0.48	21.80 20.80	17.10 16.10	1.36 0.80	16.20 15.38	13.52 13.00	5.44 BSC	20.50 19.50	4.35 3.75	3.64 3.24	3.85 3.45	2.60 2.30	6.58 5.99	7.30 7.10

Note:
1. Metal exposed with Sn plating.
2. Dimension D&E do not include mold flash and gate remain

12. 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.
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13. Contents