

1. General description

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

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
- 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

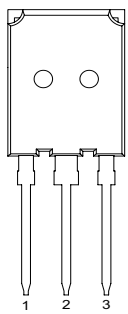

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
V_{DRM}	repetitive peak off-state voltage			1600			V
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 97\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3		250			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		1600			A
		half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$		1760			A
T_j	operating junction temperature			-40 to 150			°C
Symbol	Parameter	Conditions	Notes	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		15	-	100	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 9		-	-	200	mA
V_T	on-state voltage	$I_T = 160\text{ A}$; $T_j = 25\text{ °C}$; Fig. 11		-	-	1.50	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 1072\text{ V}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit; $T_j = 150\text{ °C}$		1500	-	-	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
TYN160WP-1600T	TO247P	TYN160WP-1600TQ	Tube	30	TO247PN	25-Jun-2024

7. Marking

Table 4. Marking codes

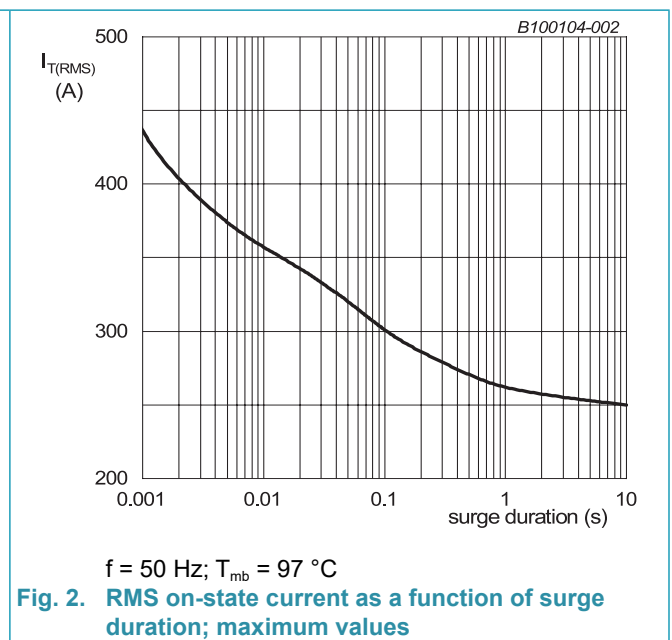
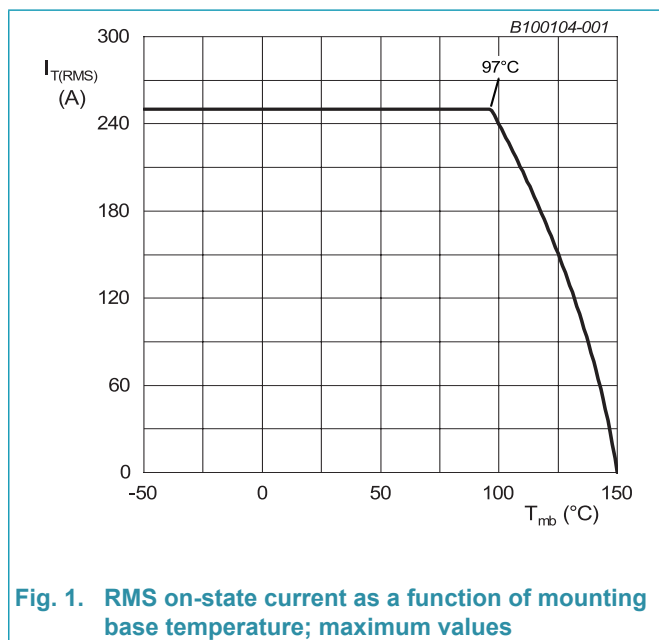
Type number	Marking codes
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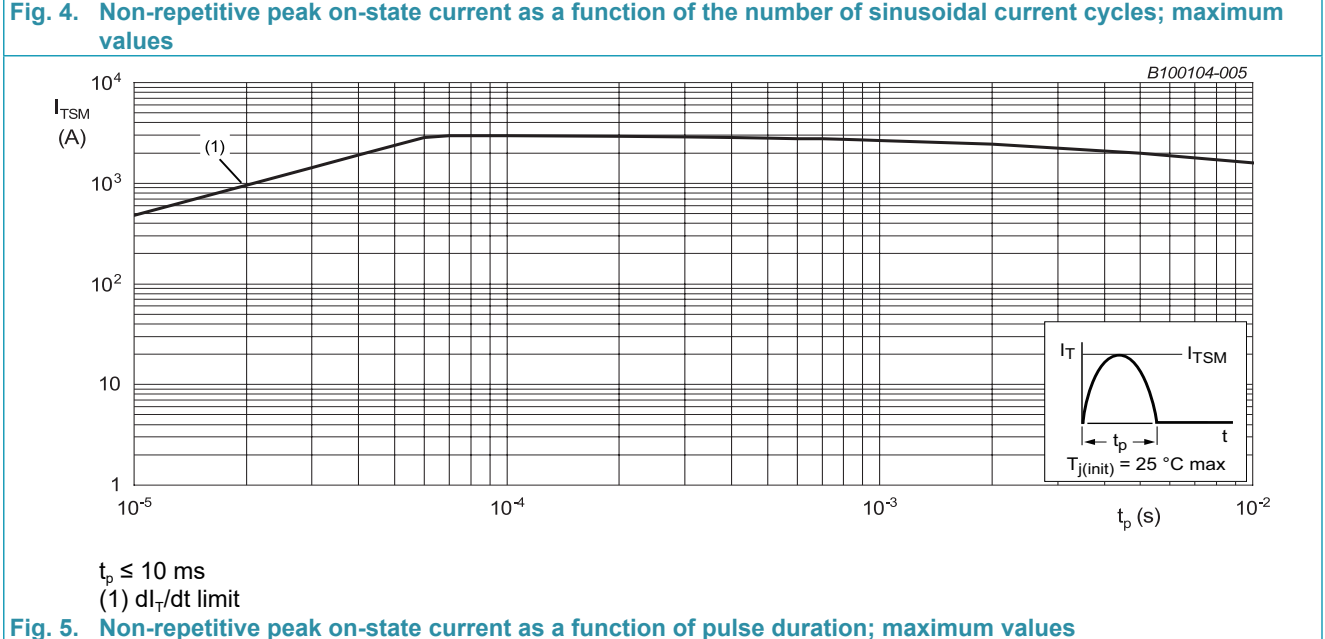
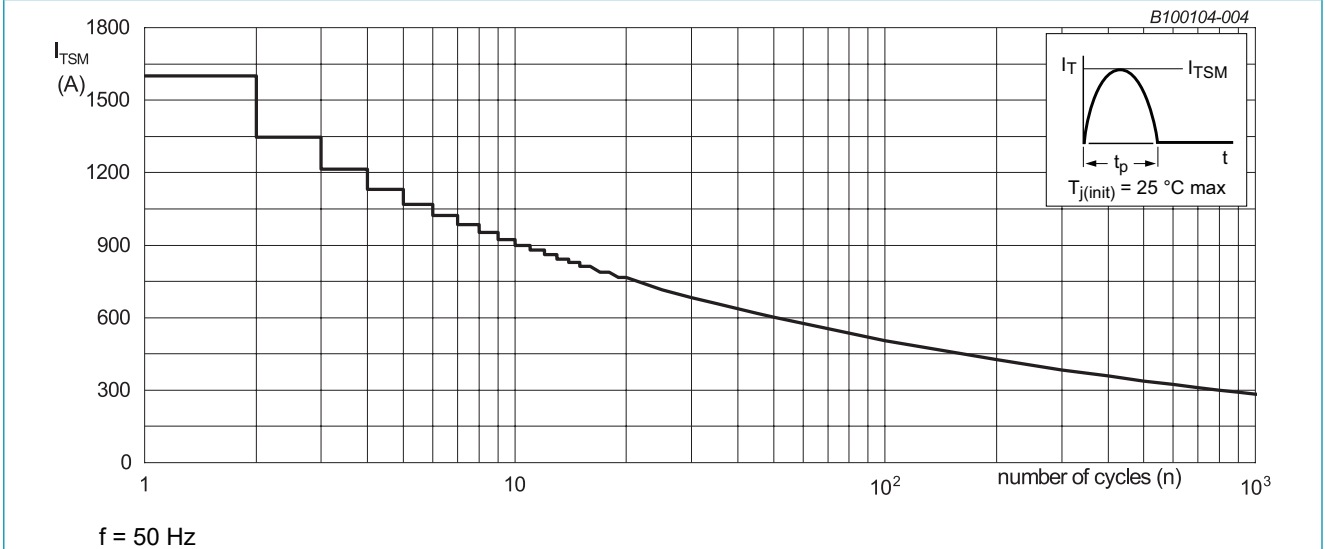
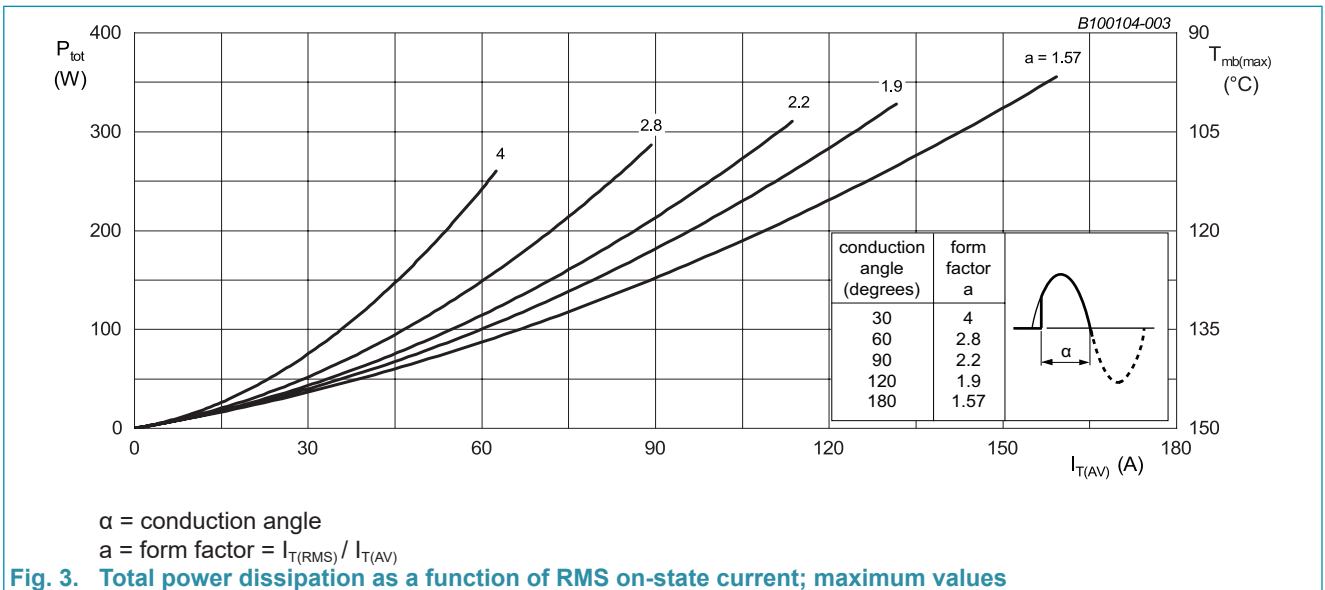
8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Notes	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; $T_{mb} \leq 97\text{ °C}$;		160	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 97\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3		250	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		1600	A
		half sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$		1760	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; sine-wave pulse		12800	A^2s
di_T/dt	rate of rise of on-state current	$I_G = 100\text{ mA}$		200	$A/\mu s$
I_{GM}	peak gate current			10	A
V_{GRM}	peak reverse gate voltage			5	V
P_{GM}	peak gate power			20	W
$P_{G(AV)}$	average gate power	over any 20 ms period		0.5	W
T_{stg}	storage temperature			-40 to 150	$^{\circ}C$
T_j	operating junction temperature			-40 to 150	$^{\circ}C$





9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 6		-	-	0.15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	45	-	K/W

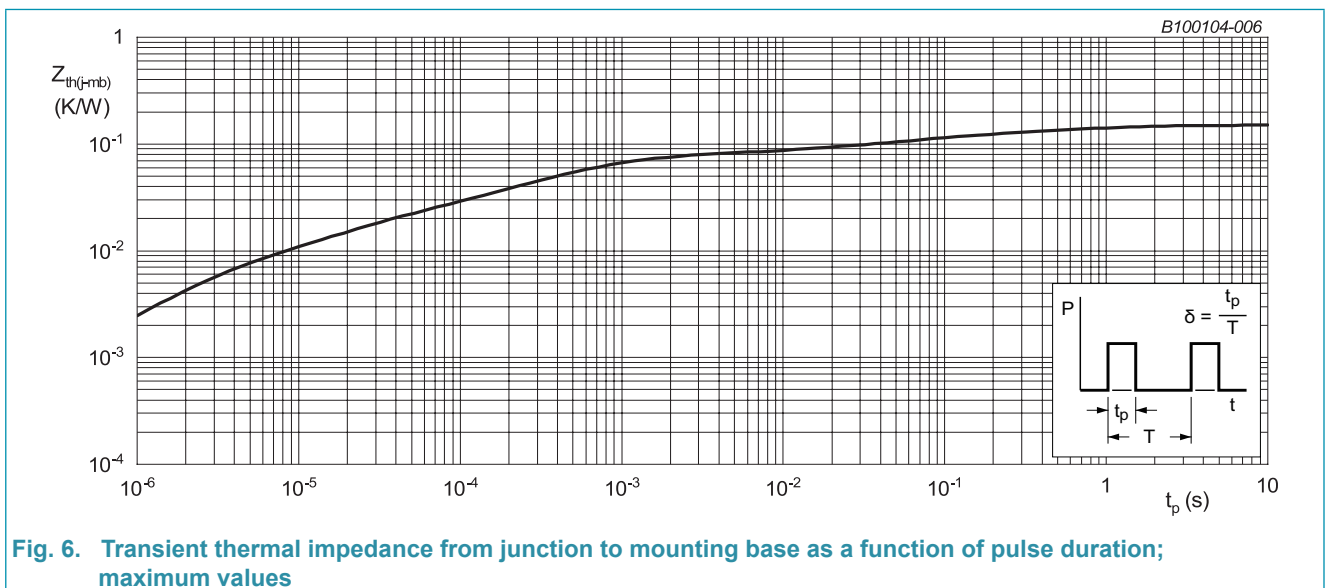


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration; maximum values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	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		15	-	100	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 8		-	-	300	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 9		-	-	200	mA
V_T	on-state voltage	$I_T = 160\text{ A}$; $T_j = 25\text{ °C}$; Fig. 11		-	-	1.50	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10		-	0.7	2.0	V
		$V_D = 1600\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 150\text{ °C}$		0.25	0.45	-	V
I_D	off-state current	$V_D = 1600\text{ V}$; $T_j = 25\text{ °C}$		-	-	100	μA
		$V_D = 1600\text{ V}$; $T_j = 150\text{ °C}$		-	-	15	mA
I_R	reverse current	$V_D = 1600\text{ V}$; $T_j = 25\text{ °C}$		-	-	100	μA
		$V_D = 1600\text{ V}$; $T_j = 150\text{ °C}$		-	-	15	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 1072\text{ V}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit; $T_j = 150\text{ °C}$		1500	-	-	V/ μs
t_{gt}	gate-controlled turn-on time	$I_{TM} = 50\text{ A}$; $V_D = 800\text{ V}$; $I_G = 0.1\text{ A}$; $dI_G/dt = 5\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$		-	2	-	μs
t_q	commutated turn-off time	$V_{DM} = 1072\text{ V}$; ($V_{DM} = 67\%$ of V_{DRM}); $I_{TM} = 160\text{ A}$; $V_R = 25\text{ V}$; $(dI_T/dt)_M = 30\text{ A}/\mu\text{s}$; $dV_D/dt = 50\text{ V}/\mu\text{s}$; $R_{GK(ext)} = 100\text{ k}\Omega$; $T_j = 125\text{ °C}$		-	150	-	μs

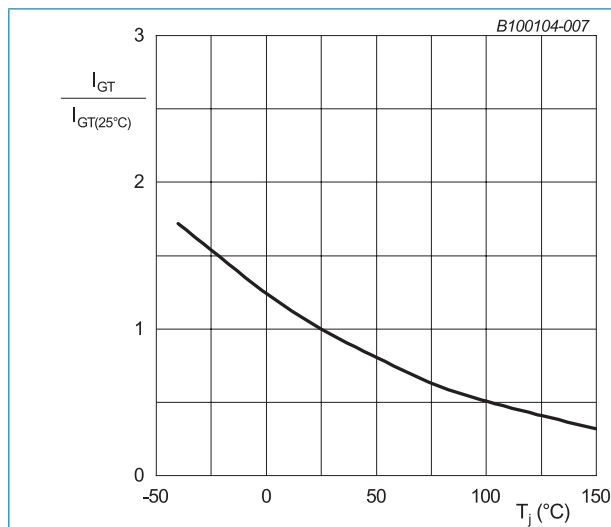


Fig. 7. Normalized gate trigger current as a function of junction temperature

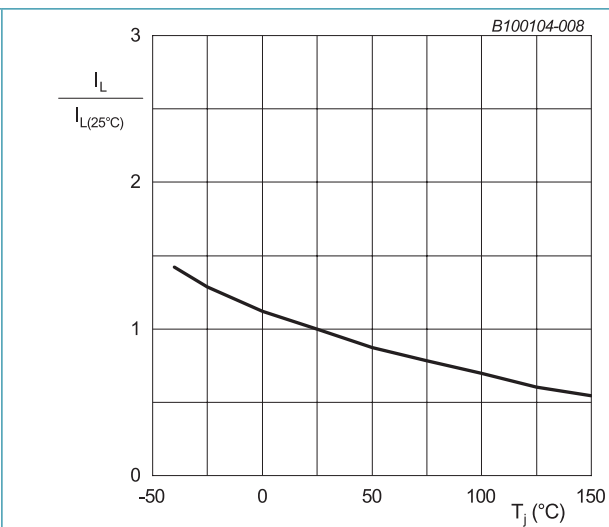


Fig. 8. Normalized latching current as a function of junction temperature

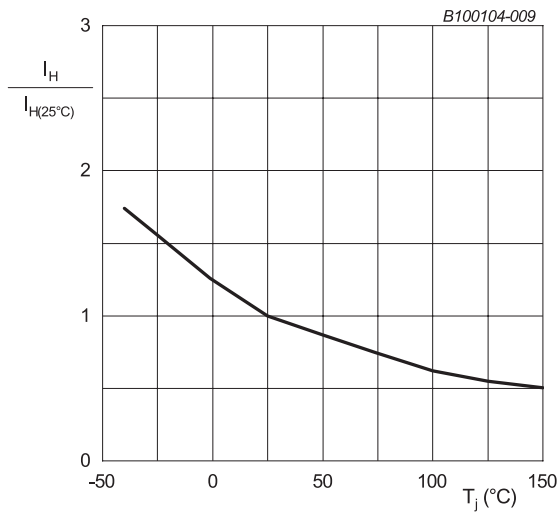


Fig. 9. Normalized holding current as a function of junction temperature

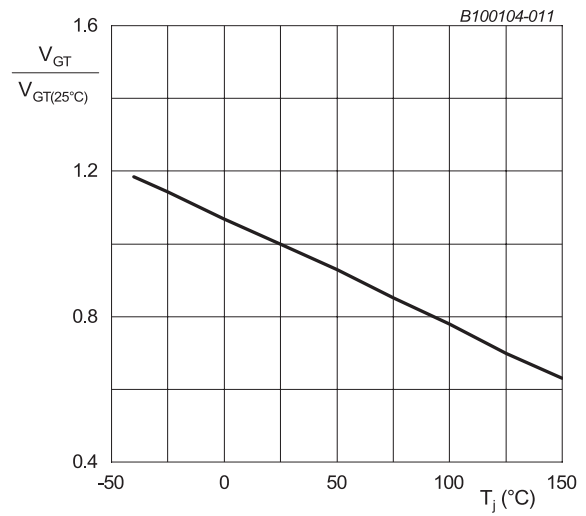
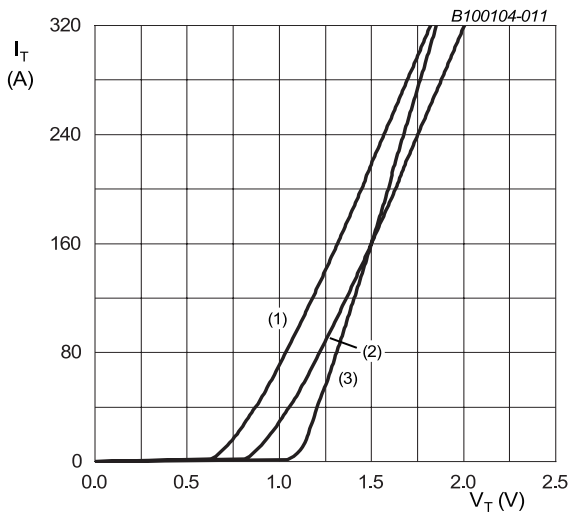


Fig. 10. Normalized gate trigger voltage as a function of junction temperature



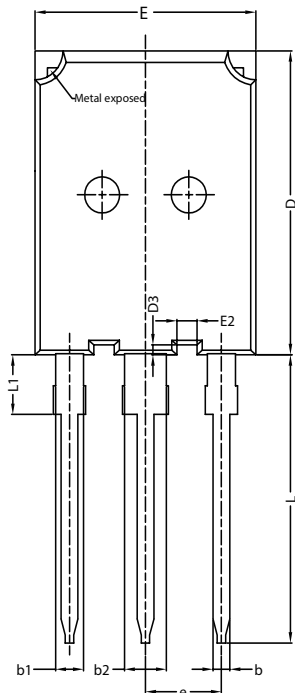
$V_o = 0.986 \text{ V}; R_s = 0.0032 \ \Omega$
 (1) $T_j = 150 \text{ }^\circ\text{C}$; typical values
 (2) $T_j = 150 \text{ }^\circ\text{C}$; maximum values
 (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

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

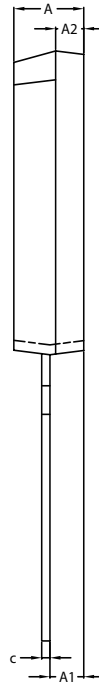
11. Package outline

Plastic single-ended through-hole package; heatsink mounted; 3-lead TO-247 Plus

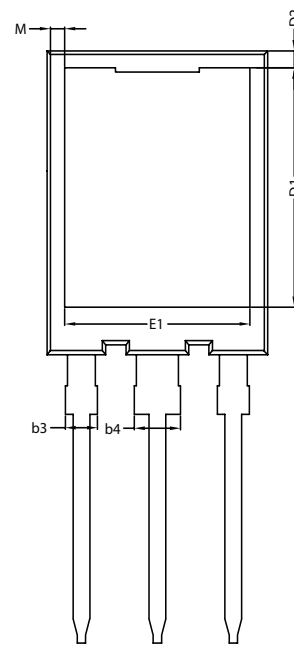
TO247P



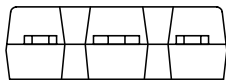
TOP VIEW



SIDE VIEW



BOTTOM VIEW



SIDE VIEW

UNIT	A	A1	A2	b	b1	b2	b3	b4	c	D	D1	D2	D3	E	E1	E2	e	L	L1	M
MAX	5.10	2.51	2.10	1.26	2.06	3.06	2.36	3.36	0.66	21.10	16.85	1.35	0.78	15.90	13.50	1.55	5.54	20.10	4.30	1.30
MIN	4.90	2.31	1.90	1.16	1.96	2.96	1.96	2.96	0.59	20.90	16.25	1.05	0.58	15.70	13.10	1.35	5.34	19.80	3.90	0.70

Note:
All dimensions do not include mold flash or protrusion.

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.
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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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