

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 ($T_{j(max)} = 150\text{ }^{\circ}\text{C}$)
- 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

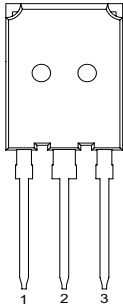
4. Quick reference data

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; $T_{mb} \leq 97\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3		250			A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5		1600			A
		half sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$; $t_p = 8.3\text{ ms}$		1760			A
T_j	operating junction temperature			-40 to 150			$^{\circ}\text{C}$
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.2\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 7		15	-	100	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 9		-	-	200	mA
V_T	on-state voltage	$I_T = 160\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$; 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; $T_j = 150\text{ }^{\circ}\text{C}$		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
TYN160WP-1600T	TO247P	TYN160WP-1600TQ	Tube	30	TO247PN	25-Jun-2024
TYN160WP-1600T	TO247P	TYN160WP-1600T,127	Tube	30	TO247PN	25-Jun-2024

7. Marking

Table 4. Marking codes

Type number	Marking codes
TYN160WP-1600T	TYN160WP 1600T

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; $T_{mb} \leq 97\text{ }^{\circ}\text{C}$;		160	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 97\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3		250	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5		1600	A
		half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 8.3\text{ ms}$		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	$I_G = 200\text{ mA}$		200	$\text{A}/\mu\text{s}$
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	$^{\circ}\text{C}$
T_j	operating junction temperature			-40 to 150	$^{\circ}\text{C}$

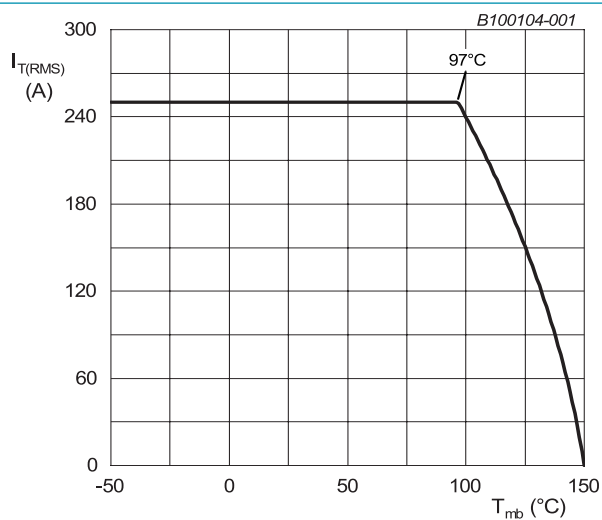
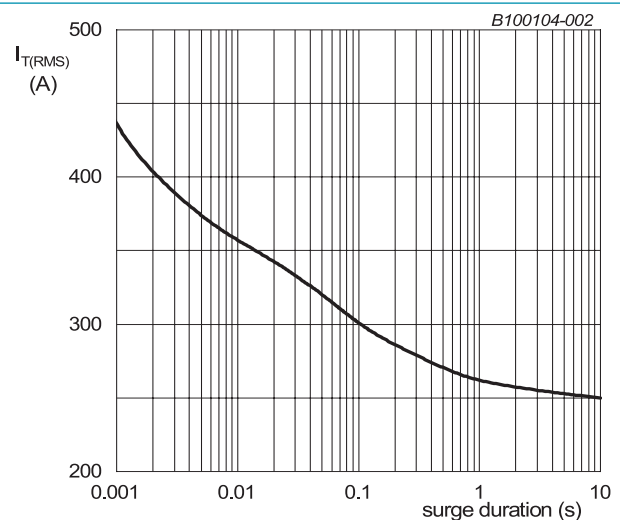


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50\text{ Hz}$; $T_{mb} = 97\text{ }^{\circ}\text{C}$

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

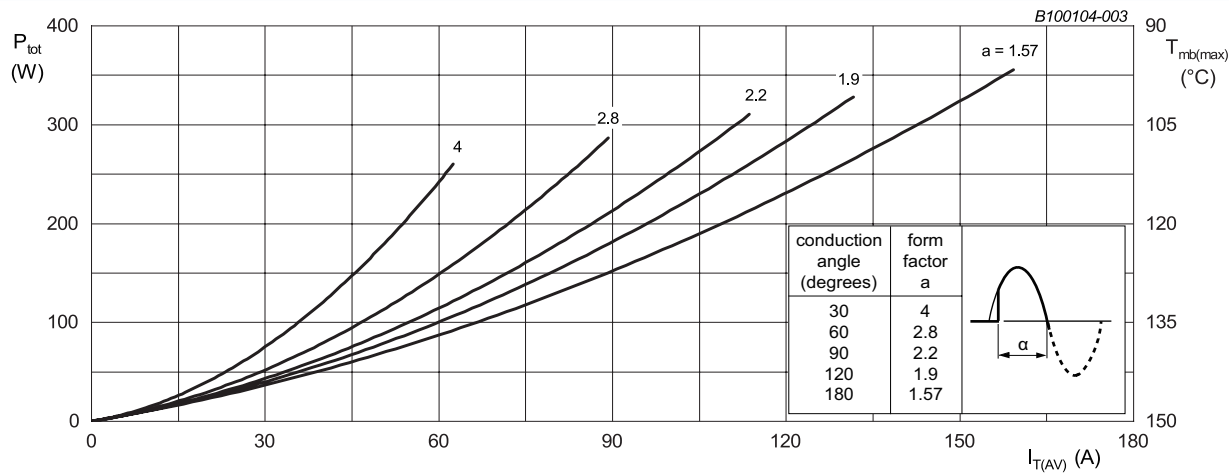
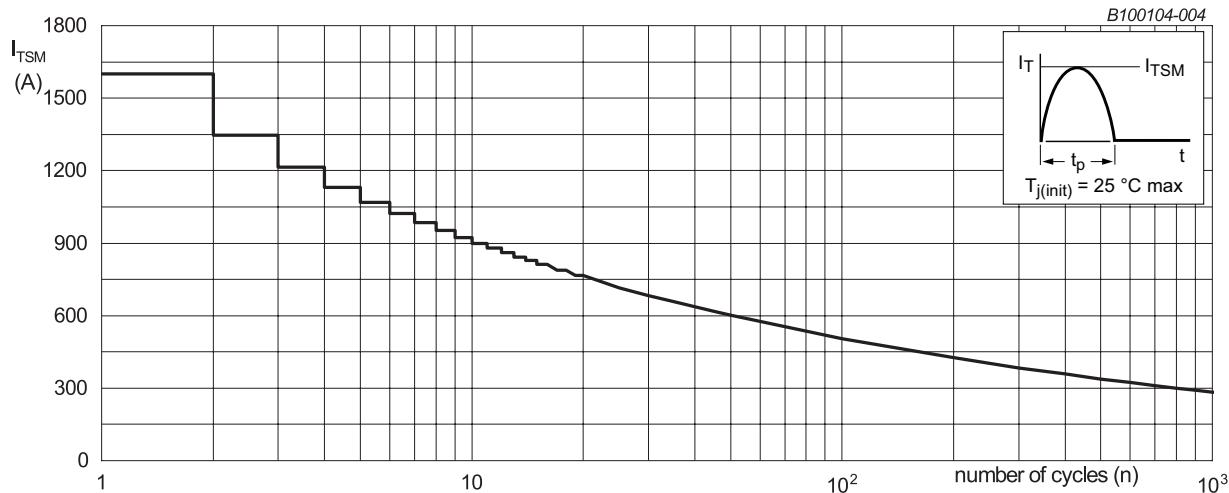
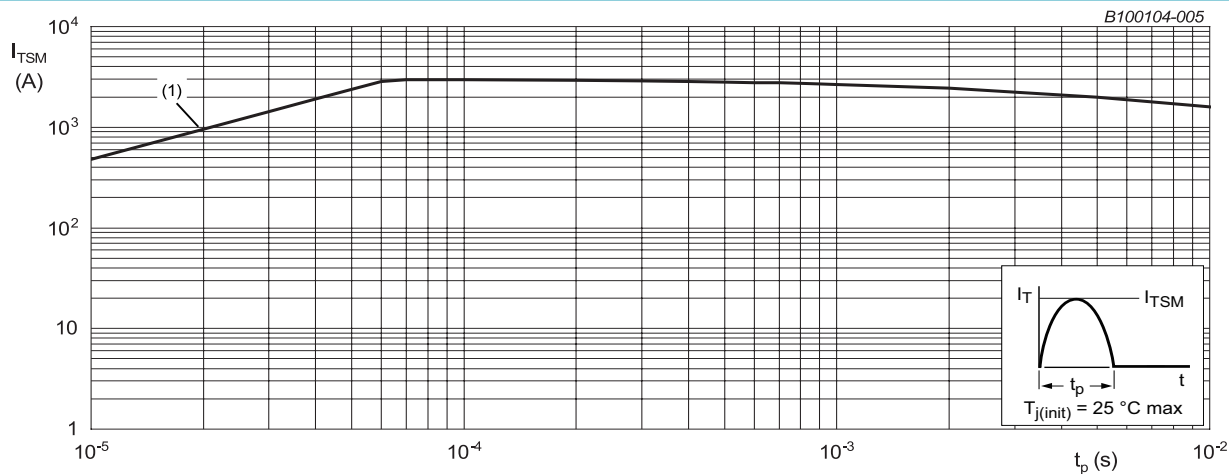


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values



$f = 50\text{ Hz}$

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



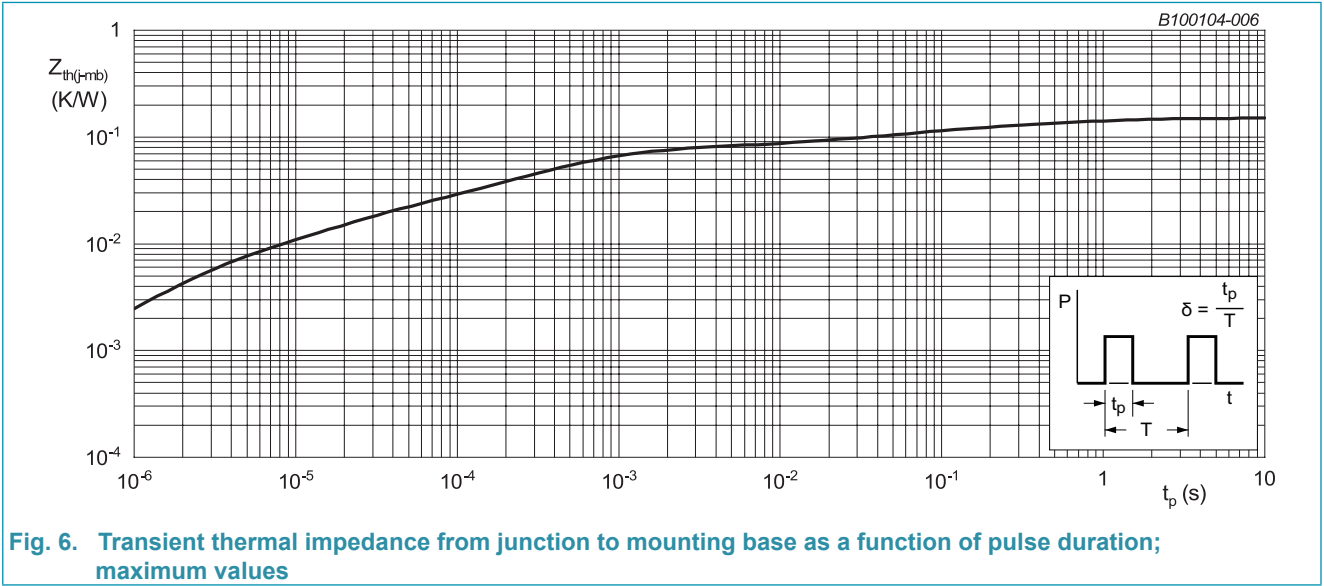
$t_p \leq 10\text{ ms}$
(1) di_T/dt limit

Fig. 5. Non-repetitive peak on-state current as a function of pulse duration; maximum values

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



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I _{GT}	gate trigger current	V _D = 12 V; I _T = 0.2 A; T _j = 25 °C; Fig. 7		15	-	100	mA
I _L	latching current	V _D = 12 V; I _G = 0.2 A; T _j = 25 °C; Fig. 8		-	-	300	mA
I _H	holding current	V _D = 12 V; T _j = 25 °C; Fig. 9		-	-	200	mA
V _T	on-state voltage	I _T = 160 A; T _j = 25 °C; Fig. 11		-	-	1.50	V
V _{GT}	gate trigger voltage	V _D = 12 V; I _T = 0.2 A; T _j = 25 °C; Fig. 10		-	0.7	1.0	V
		V _D = 1600 V; I _T = 0.2 A; T _j = 150 °C		0.25	0.45	-	V
I _D	off-state current	V _D = 1600 V; T _j = 25 °C		-	-	100	μA
		V _D = 1600 V; T _j = 150 °C		-	-	15	mA
I _R	reverse current	V _D = 1600 V; T _j = 25 °C		-	-	100	μA
		V _D = 1600 V; T _j = 150 °C		-	-	15	mA
Dynamic characteristics							
dV _D /dt	rate of rise of off-state voltage	V _{DM} = 1072 V; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit; T _j = 150 °C		1500	-	-	V/μs
t _{gt}	gate-controlled turn-on time	I _{TM} = 50 A; V _D = 800 V; I _G = 0.2 A; dI _G /dt = 5 A/μs; T _j = 25 °C		-	2	-	μs
t _q	commutated turn-off time	V _{DM} = 1072 V; (V _{DM} = 67% of V _{DRM}); I _{TM} = 160 A; V _R = 25 V; (d _{IT} /d _t) _M = 30 A/μs; dV _D /dt = 50 V/μs; R _{GK(ext)} = 100 kΩ; T _j = 125 °C		-	150	-	μs

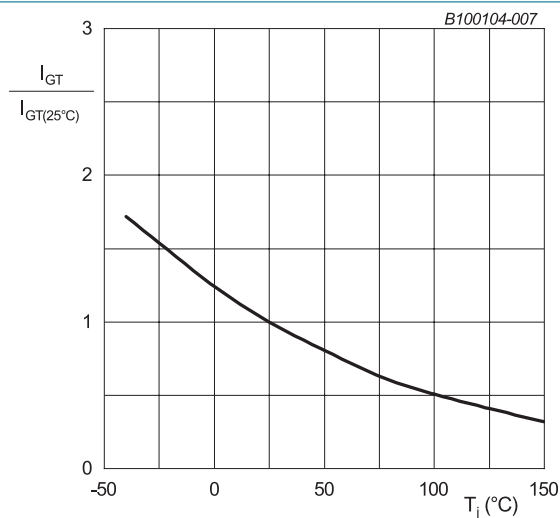


Fig. 7. Normalized gate trigger current as a function of junction temperature

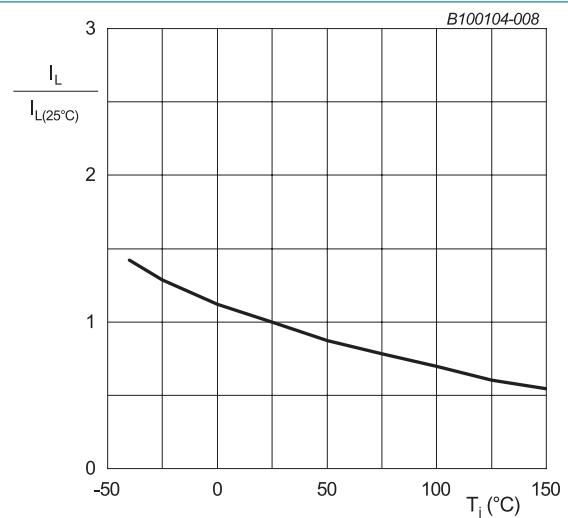


Fig. 8. Normalized latching current as a function of junction temperature

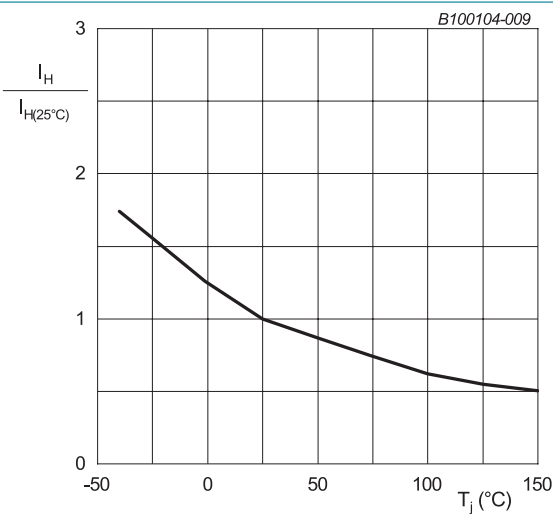


Fig. 9. Normalized holding current as a function of junction temperature

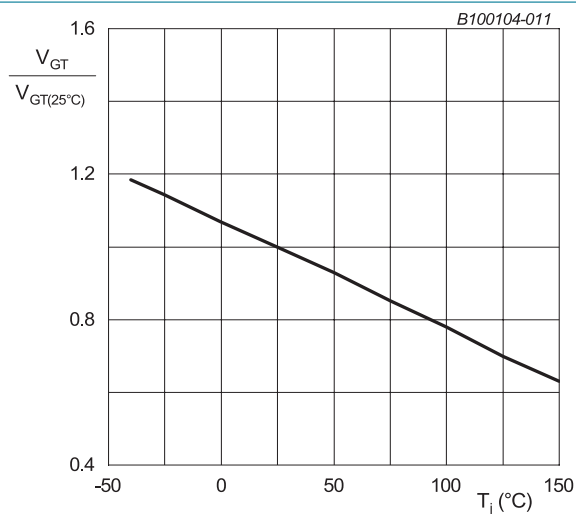
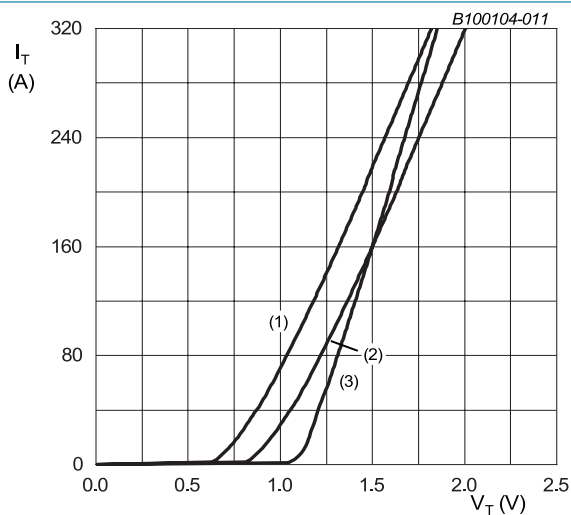


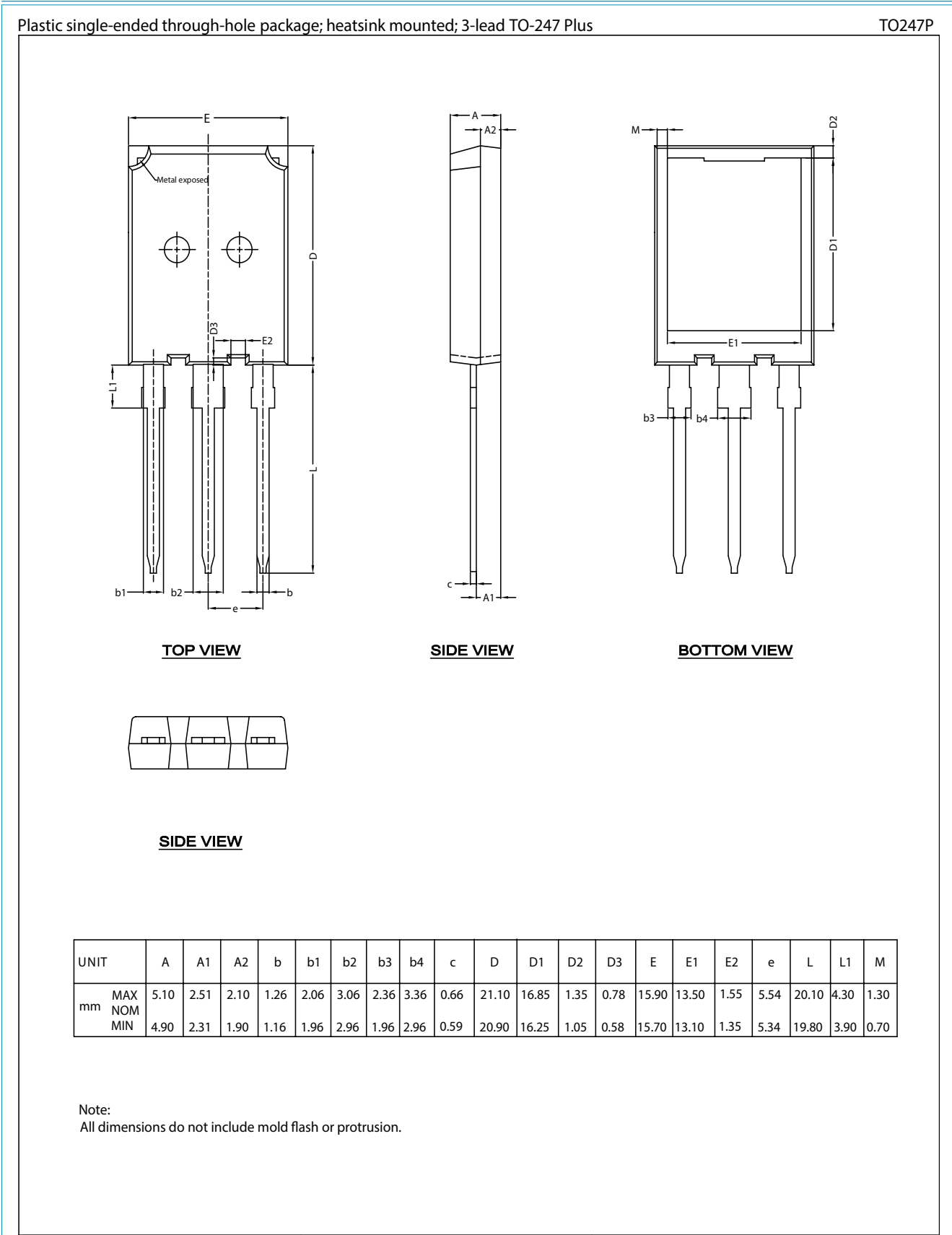
Fig. 10. Normalized gate trigger voltage as a function of junction temperature



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

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

11. Package outline



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.
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