TYN100WP-1600T

SCR

Rev.01 - 06 February 2024 Preliminary data sheet

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 (Tj(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
- 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

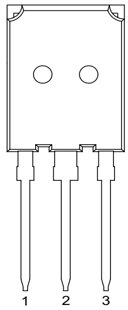
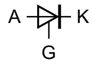
4. Quick reference data

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} ≤ 102 °C; Fig. 1; Fig. 2; Fig. 3		160			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		1100			A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 ms		1210			A
T_j	junction temperature			150			°C
Symbol	**Parameter**	**Conditions**	**Notes**	**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		15	-	100	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 9		-	-	200	mA
V_T	on-state voltage	I_T = 100 A; T_j = 25 °C; Fig. 11		-	-	1.50	V
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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		 sym037
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
TYN100WP-1600T	TO247P	TYN100WP-1600TQ	Tube	30	TO247PN	tbd

7. Marking

Table 4. Marking codes

Type number	Marking codes
TYN100WP-1600T	TYN100WP 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; $T_{mb} \leq 102$ °C;		100	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 102$ °C; Fig. 1; Fig. 2; Fig. 3		160	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		1100	A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms		1210	A
I^2t	I^2t for fusing	$t_p = 10$ ms; sine-wave pulse		6050	A^2s
dI_T/dt	rate of rise of on-state current	$I_G = 100$ mA		200	A/µs
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	°C
T_j	junction temperature			150	°C

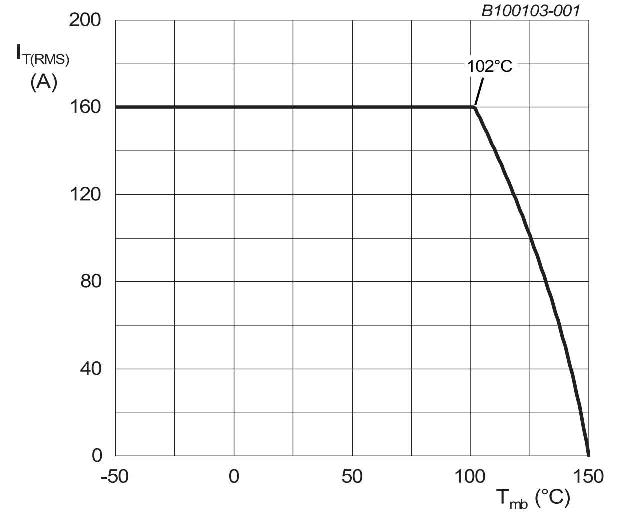
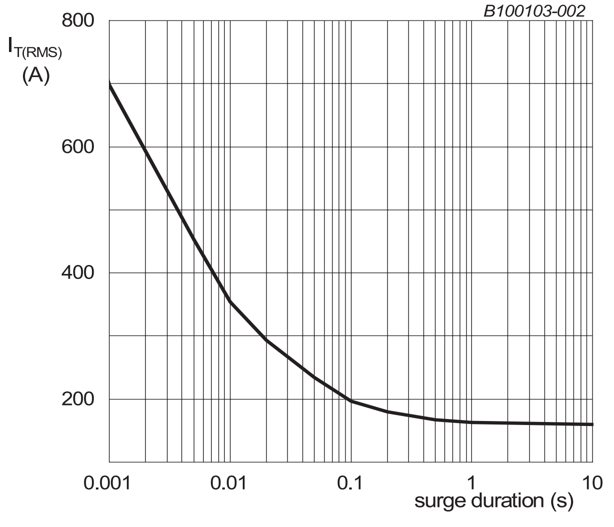
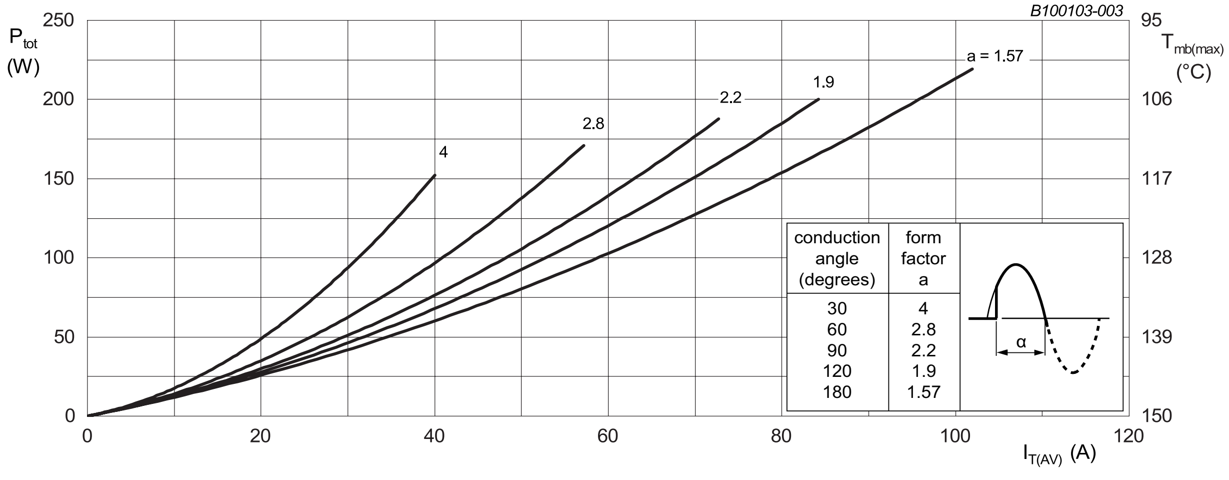


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



f = 50 Hz; $T_{mb} = 102$ °C

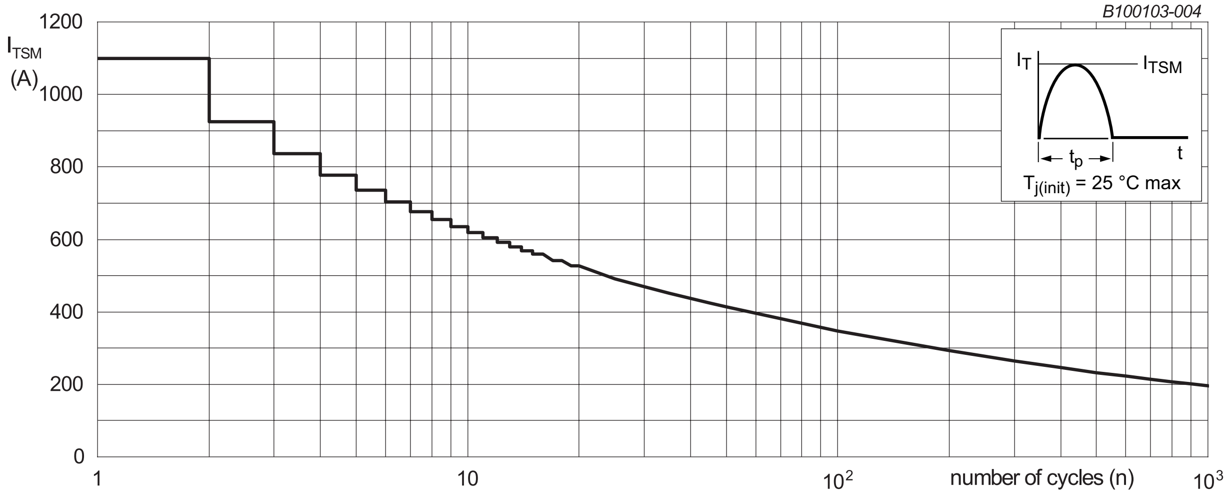
Fig. 2. RMS on-state current as a function of surge duration; maximum values



α = conduction angle

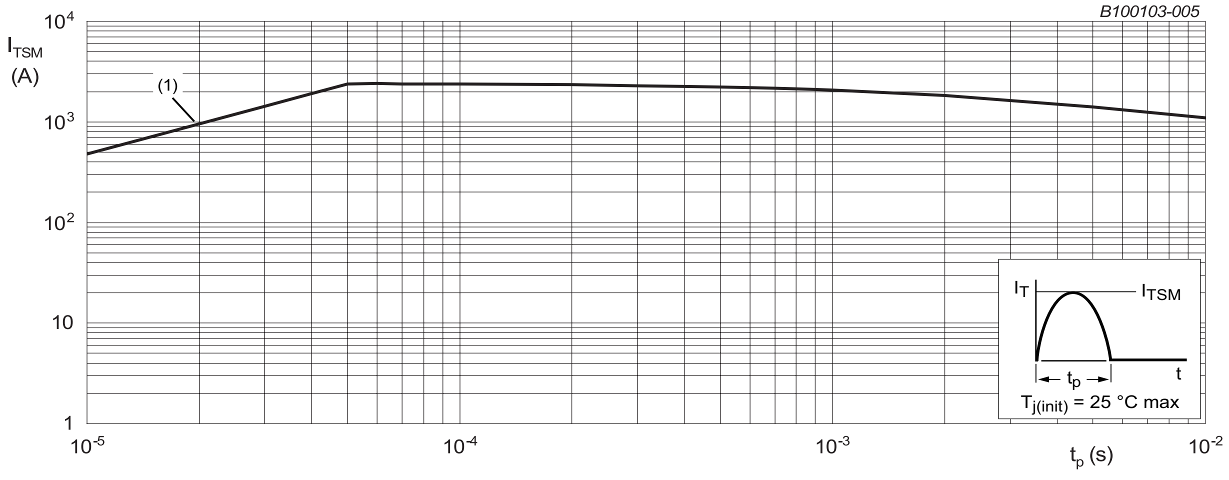
a = form factor = $I_{T(RMS)}$ / $I_{T(AV)}$

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. 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		-	-	0.22	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	45	-	K/W

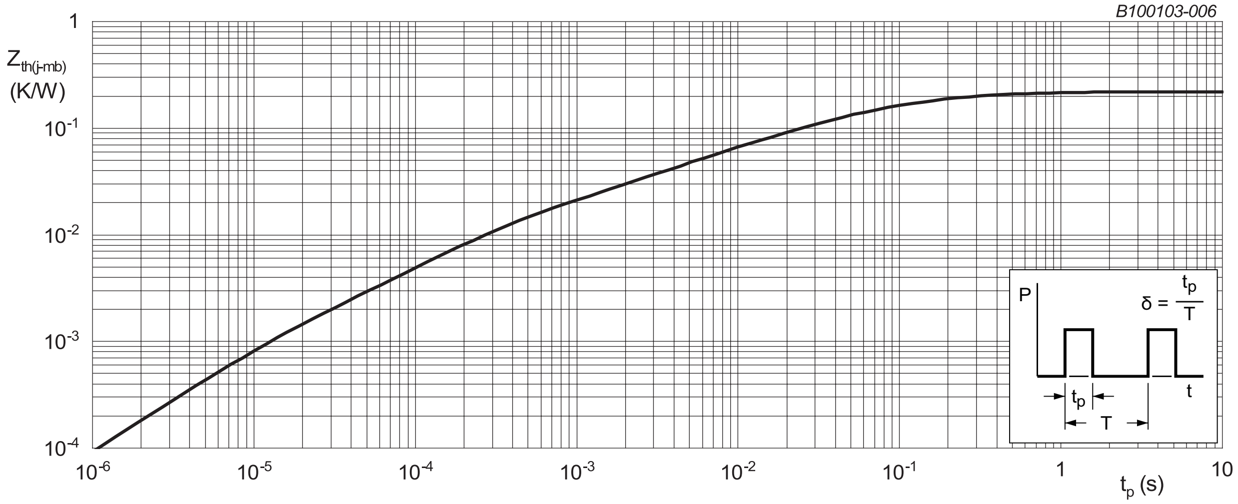


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration; maximum values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 7		15	-	100	mA
I_L	latching current	V_D = 12 V; I_G = 0.1 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 = 100 A; T_j = 25 °C; Fig. 11		-	-	1.50	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 10		-	0.7	2.0	V
		V_D = 1600 V; I_T = 0.1 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 = 0.1 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} = 100 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

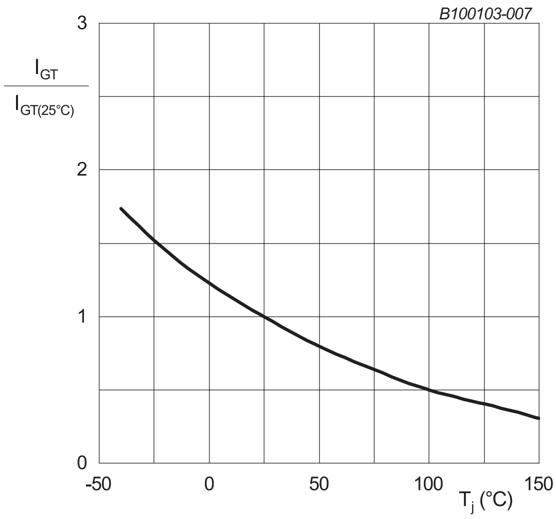


Fig. 7. Normalized gate trigger current as a function of junction temperature

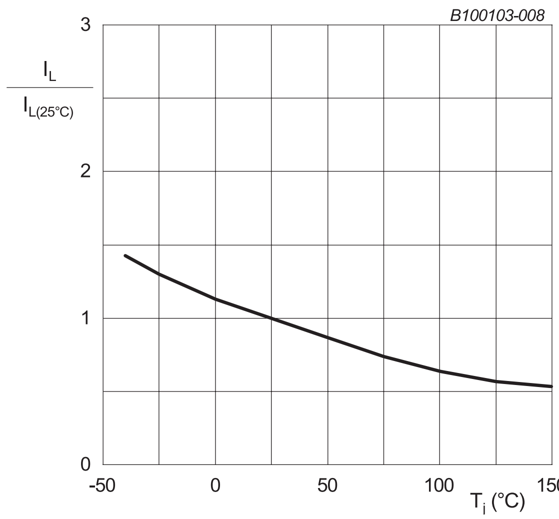


Fig. 8. Normalized latching current as a function of junction temperature

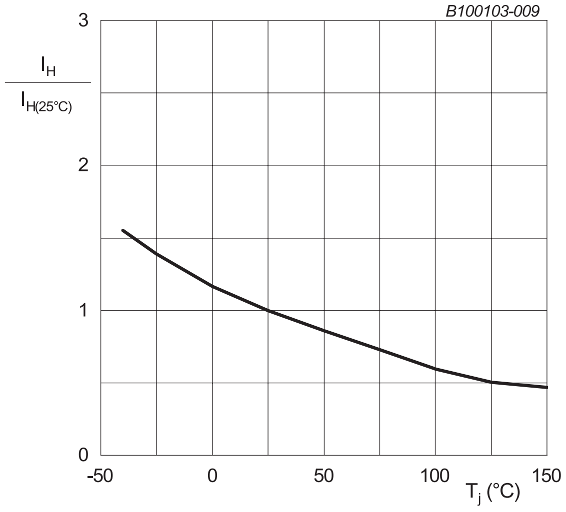


Fig. 9. Normalized holding current as a function of junction temperature

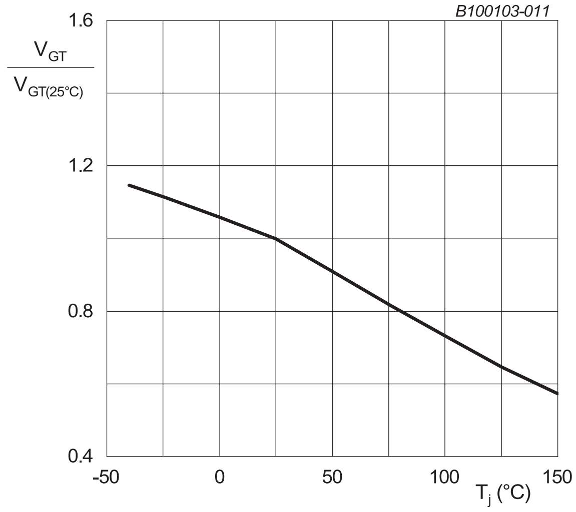
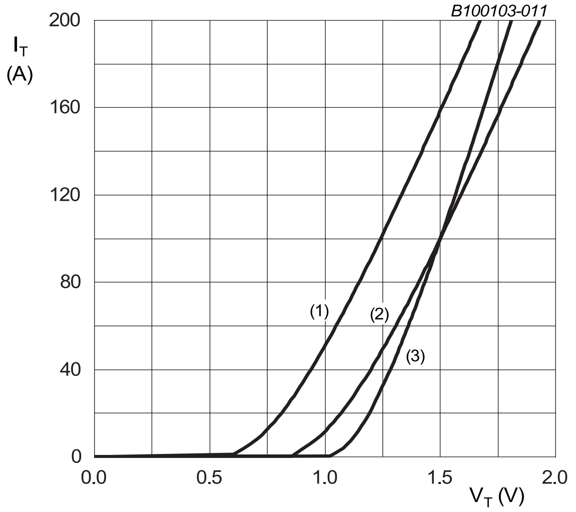


Fig. 10. Normalized gate trigger voltage as a function of junction temperature

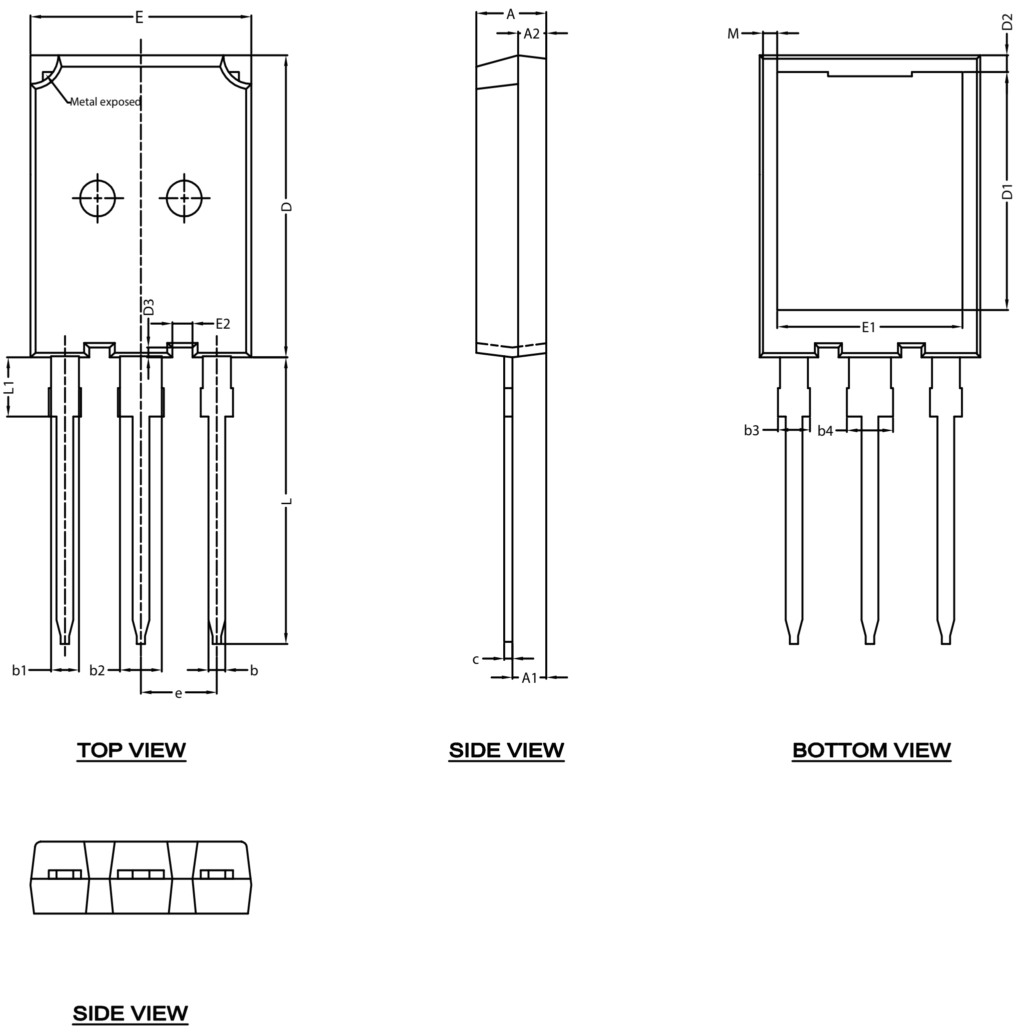


V_o = 1.083 V; R_s = 0.0043 Ω
(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

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

11. Package outline

Plastic single-ended through-hole package; heatsink mounted; 3-lead TO-247 Plus — TO247P



UNIT		A	A1	A2	b	b1	b2	b3	b4	c	D	D1	D2	D3	E	E1	E2	e	L	L1	M
mm	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
	NOM																				
	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.

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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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13. Contents

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