TYN20B-600T

SCR

Rev.02 - 10 May 2019 Product data sheet

1. General description

Planar passivated Silicon Controlled Rectifier (SCR) in a TO263 (D2PAK) surface mountable plastic package intended for use in applications requiring very high inrush current capability, high thermal cycling performance and high junction temperature capability ($T_{j(max)}$ = 150 °C).

2. Features and benefits

- High bidirectional blocking voltage capability
- High junction operating temperature capability
- High thermal cycling performance
- Planar passivated for voltage ruggedness and reliability
- Surface mountable package
- Very high current surge capability

3. Applications

- Capacitive Discharge Ignition (CDI)
- Crowbar protection
- Inrush protection
- Motor control
- Voltage regulation

4. Quick reference data

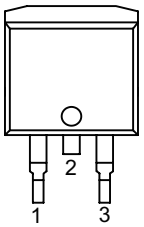
Table 1. Quick reference data

Symbol	Parameter	Conditions	Values				Unit
V_{RRM}	repetitive peak reverse voltage		600				V
$I_{T(AV)}$	average on-state current	half sine wave;T_{mb} ≤ 129 °C; Fig 1	12.7				A
$I_{T(RMS)}$	RMS on-state current	half sine wave;T_{mb} ≤ 129 °C; Fig 2; Fig 3	20				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	210				A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 ms	231				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 = 0.1A; T_j = 25 °C; Fig 7		-	4.5	32	mA
Dynamic characteristics							

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 402 V; T_j = 150 °C; exponential waveform; gate open circuit		1000	-	-	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

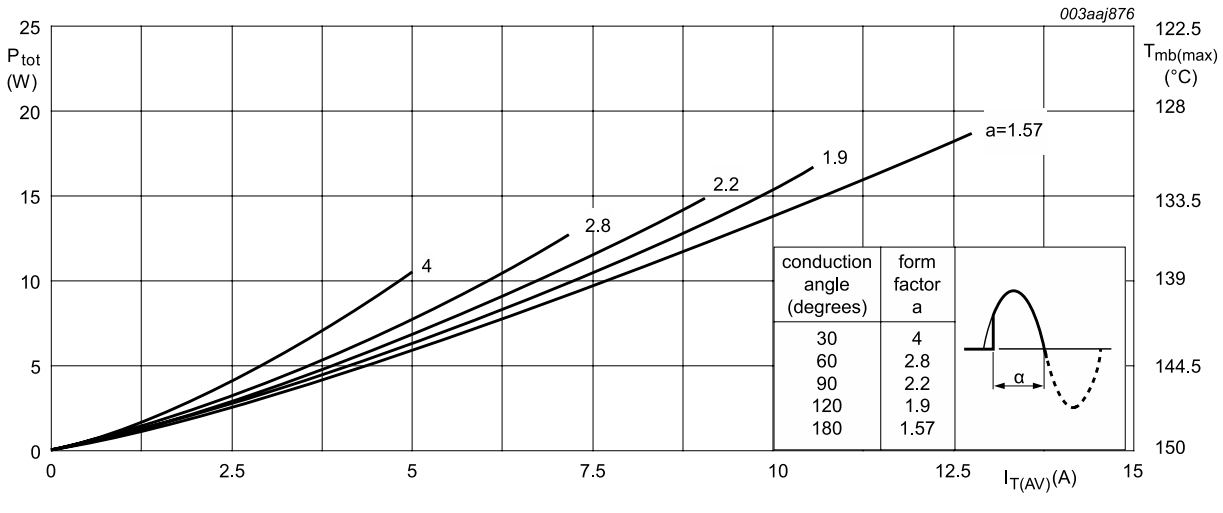
Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
TYN20B-600T	TO263	TYN20B-600TJ	Reel	800	TO263E	26-May-2017

7. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions	Values	Unit
V_{DRM}	repetitive peak off-state voltage		600	V
V_{RRM}	repetitive peak reverse voltage		600	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 129$ °C; Fig 1	12.7	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 129$ °C; Fig 2; Fig 3	20	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	210	A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 ms	231	A
I^2t	I^2t for fusing	t_p = 10 ms; sine-wave pulse	220.5	A^2s
dI_T/dt	rate of rise of on-state current	I_G = 70 mA	100	A/µs
I_{GM}	peak gate current		5	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 to 150	°C
T_j	junction temperature		150	°C



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

Fig. 1. Total power dissipation as a function of average on-state current; maximum values

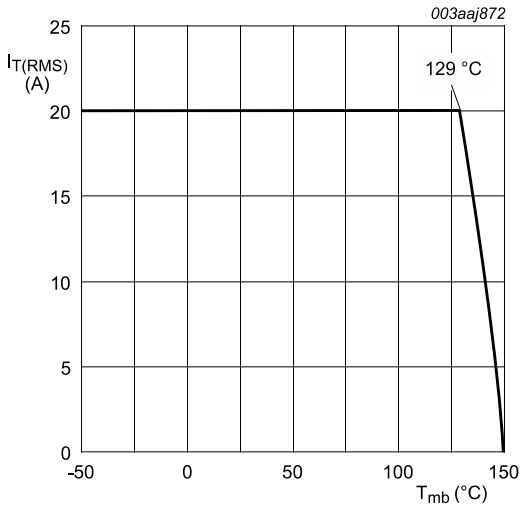
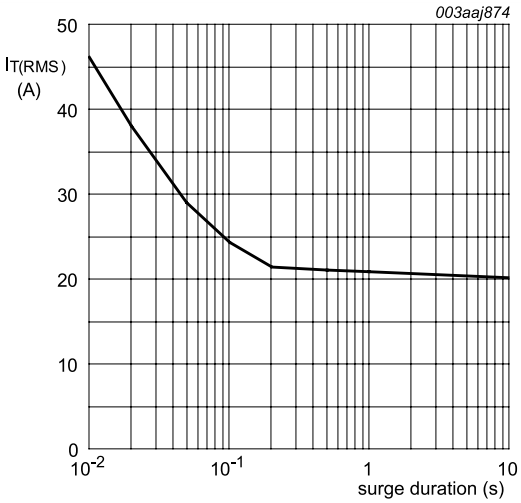
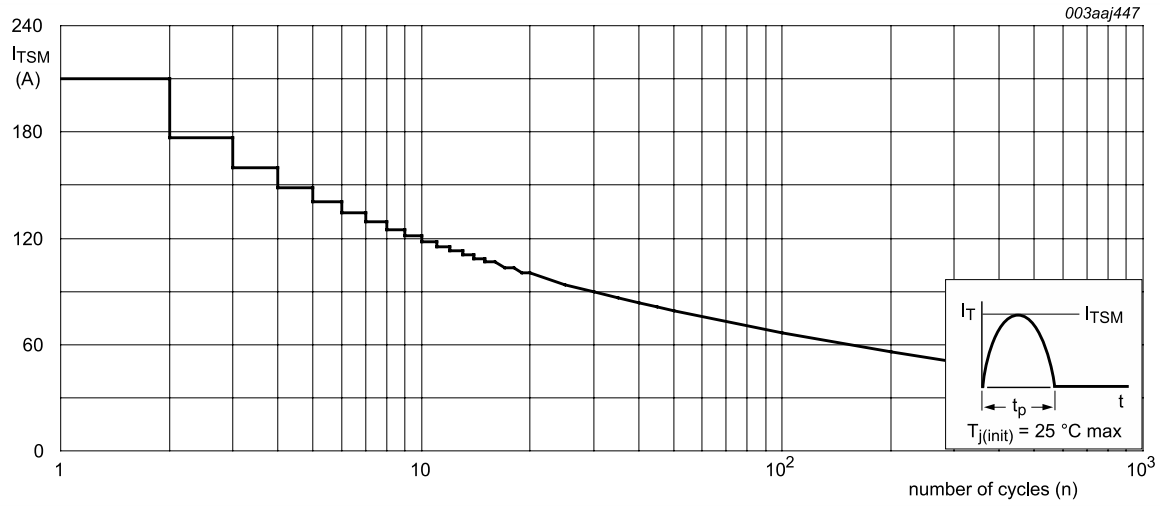


Fig. 2. RMS on-state current as a function of mounting base temperature; maximum values



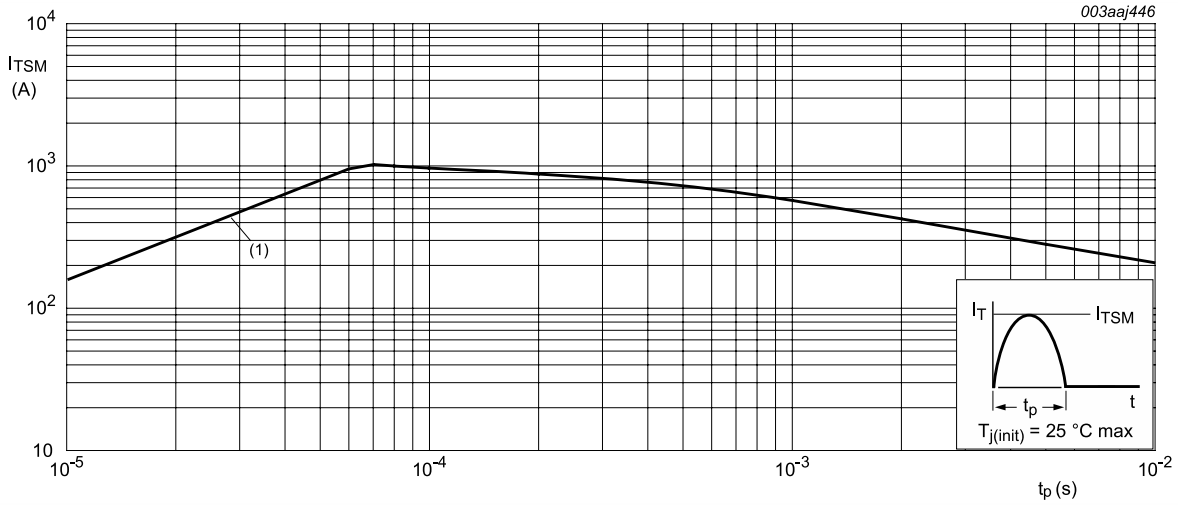
f = 50 Hz; T_{mb} =129 °C

Fig. 3. RMS on-state current as a function of surge duration; 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 for sinusoidal currents; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 6		-	-	1.1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	minimum footprint, FR4 board		-	55	-	K/W

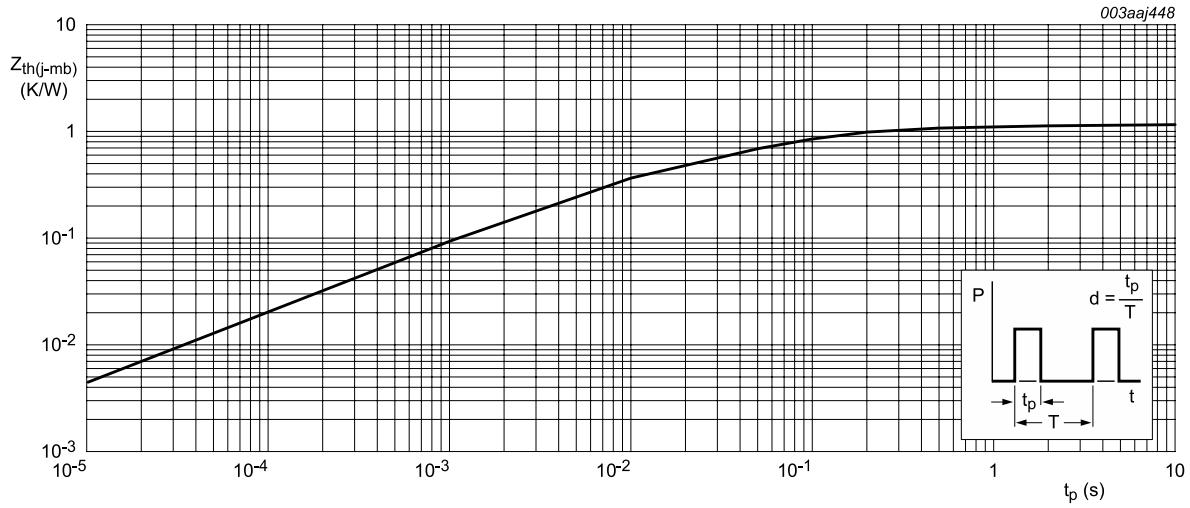


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. 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		-	4.5	32	mA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T_j = 25 °C; Fig. 8		-	21	60	mA
I_H	holding current	V_D = 12 V;T_j = 25 °C; Fig. 9		-	16	40	mA
V_T	on-state voltage	I_T = 32 A; T_j = 25 °C; Fig. 10		-	1.2	1.5	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A;T_j = 25 °C; Fig. 11		-	0.7	1.3	V
		V_D = 400V; I_T = 0.1 A;T_j =150 °C		0.2	0.4	-	V
I_D	off-state current	V_D = 600 V; T_j = 150 °C		-	0.2	1	mA
I_R	reverse current	V_R = 600 V; T_j = 150 °C		-	0.2	1	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 402 V; T_j = 150 °C; exponential waveform; gate open circuit		1000	-	-	V/µs

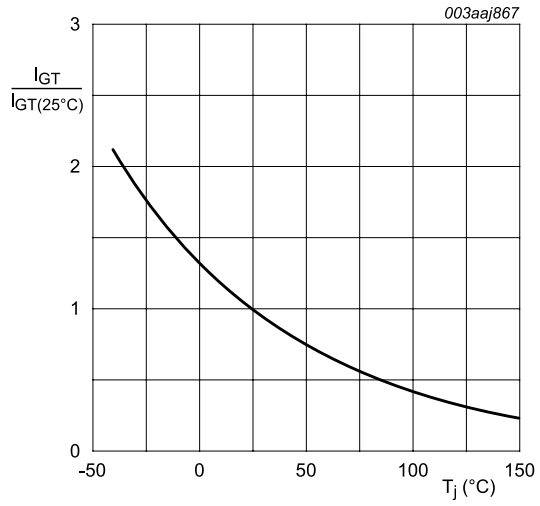


Fig. 7. Normalized gate trigger current as a function of junction temperature

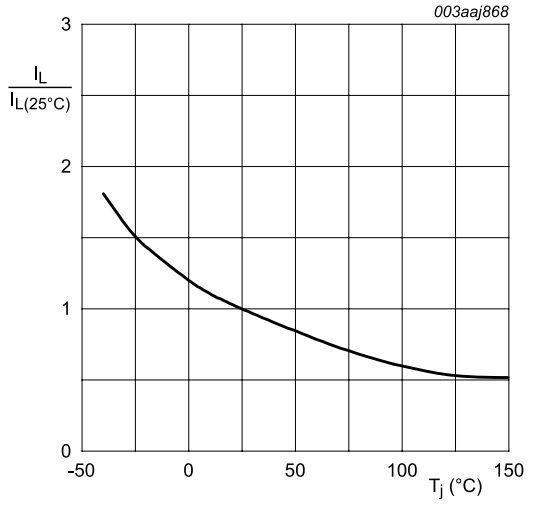


Fig. 8. Normalized latching current as a function of junction temperature

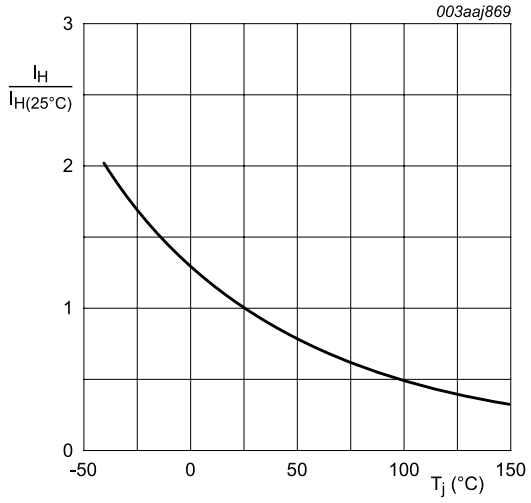
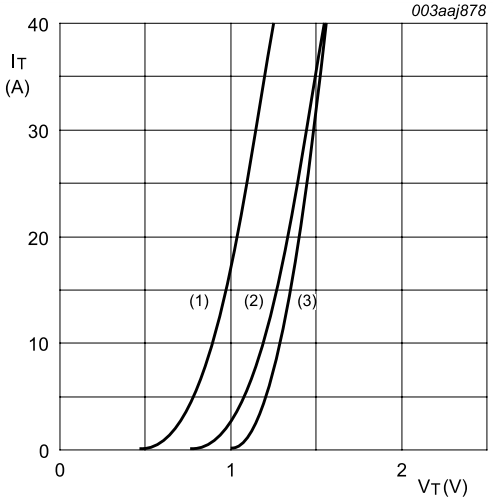


Fig. 9. Normalized holding current as a function of junction temperature



V_o = 1.0485 V; R_s = 0.0133 Ω
(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig. 10. On-state current as a function of on-state voltage

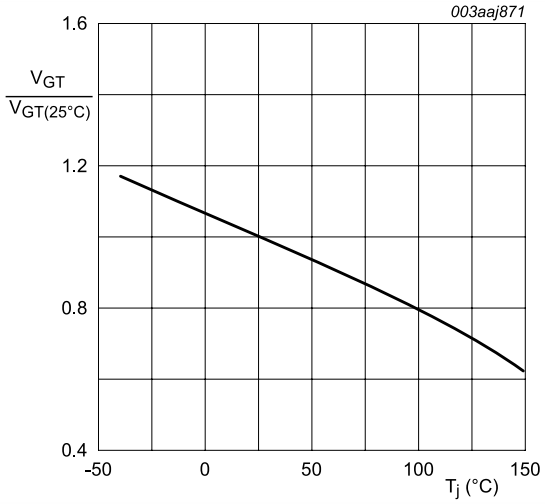
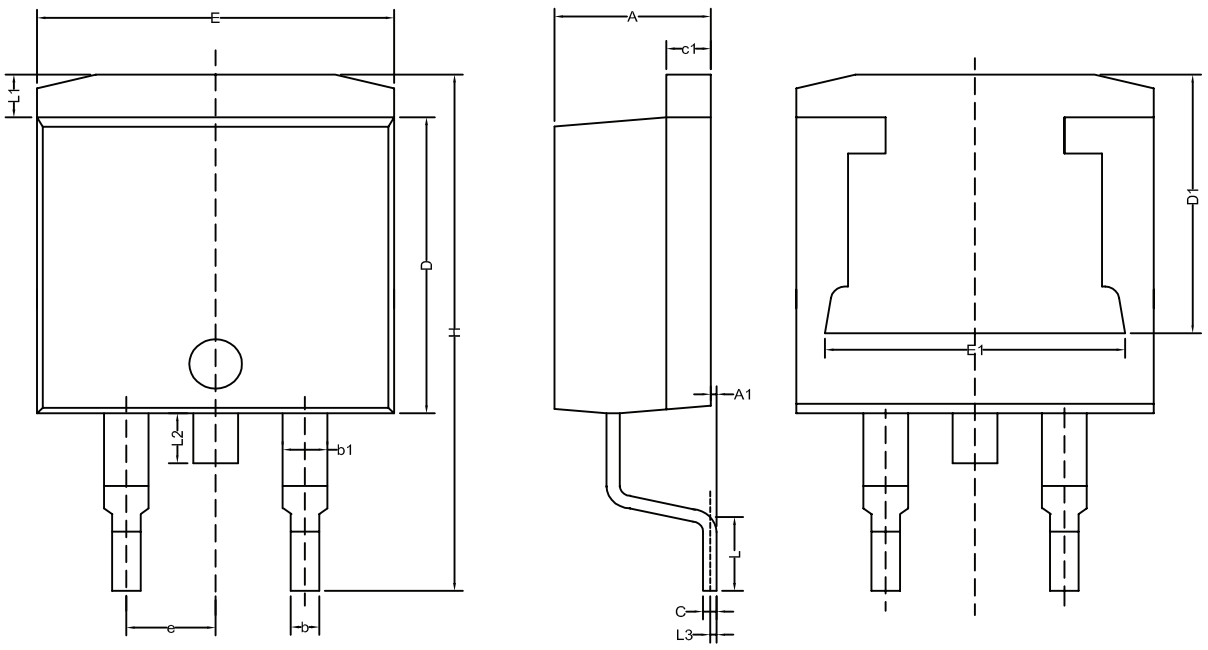
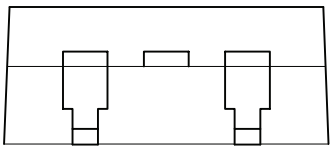


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) TO263





Unit		A	A1	b	b1	c	c1	D	D1	E	E1	e	H	L	L1	L2	L3
MM	min	4.35	0.00	0.69	1.14	0.38	1.14	8.50	7.50	10.00	8.25	2.54 (BSC)	14.60	2.50	1.00	1.27	0.25 (BSC.)
	max	4.75	0.15	0.99	1.73	0.61	1.40	9.02	8.00	10.40	8.80		15.60	2.79	1.65	1.78	

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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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12. Contents

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