TYN40-800T

SCR

Rev.02 - 08 May 2019 Product data sheet

1. General description

Planar passivated Silicon Controlled Rectifier (SCR) in a TO220 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 junction operating temperature capability ($T_{j(max)}$ = 150 °C)
- Very high current surge capability
- Planar passivated for voltage ruggedness and reliability
- High turn-on current rise dI_T/dt = 100 A/µs
- High noise immunity dV_D/dt = 500 V/µs up to 150 °C
- High thermal cycling performance
- High voltage capability

3. Applications

- Ignition circuits
- Protection circuits e.g. SMPS inrush current
- Motor control circuits and starters
- Voltage regulation
- Solid state relays
- High junction operating temperature capability ($T_{j(max)}$ = 150 °C)

4. Quick reference data

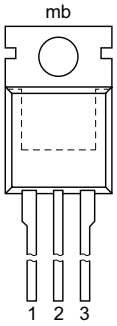
Table 1. Quick reference data

Symbol	Parameter	Conditions	Values	Unit
Absolute maximum rating				
V_{DRM}	repetitive peak off-state voltage		800	V
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 128°C$; Fig. 1; Fig. 2; Fig. 3	40	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	450	A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 ms	495	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		-	-	15	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 9		-	-	60	mA
V_T	on-state voltage	I_T = 80 A; T_j = 25 °C; Fig. 10		-	-	1.6	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 536 V; T_j = 150 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		500	-	-	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
TYN40-800T	TO220	TYN40-800TQ	Tube	50	SOT78	26-April-2019

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		800	V
V_{RRM}	repetitive peak reverse voltage		800	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 128°C$;	25	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 128°C$; Fig. 1; Fig. 2; Fig. 3	40	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	450	A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 ms	495	A
I^2t	I^2t for fusing	t_p = 10ms; sine wave	1012.5	A^2s
dI_T/dt	rate of rise of on-state current	I_G = 30mA	100	A/µs
I_{GM}	peak gate current		5	A
V_{GM}	peak 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

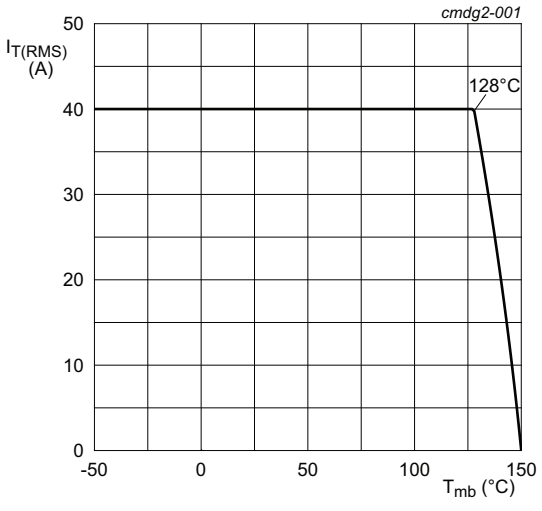
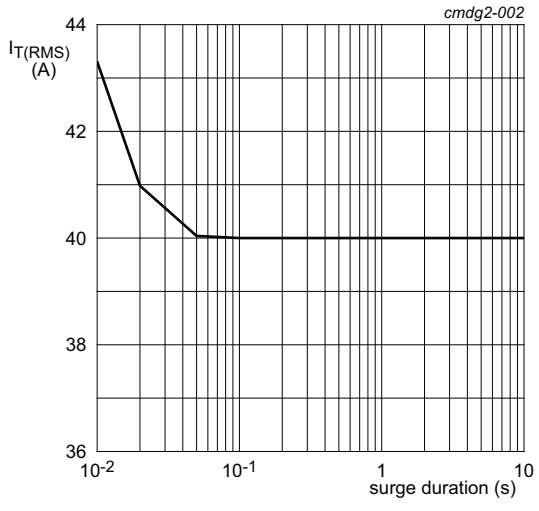
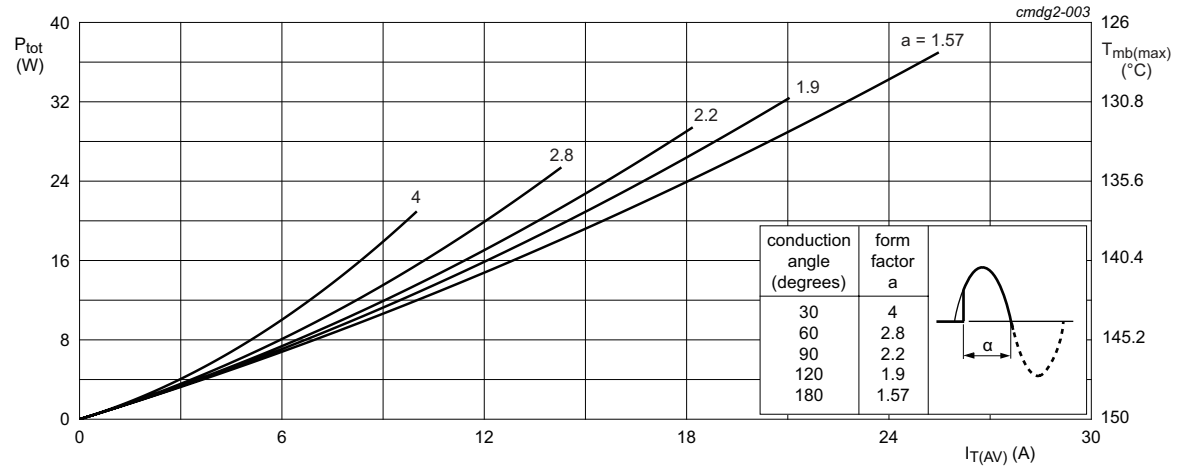


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



f = 50Hz; T_{mb} = 128 °C

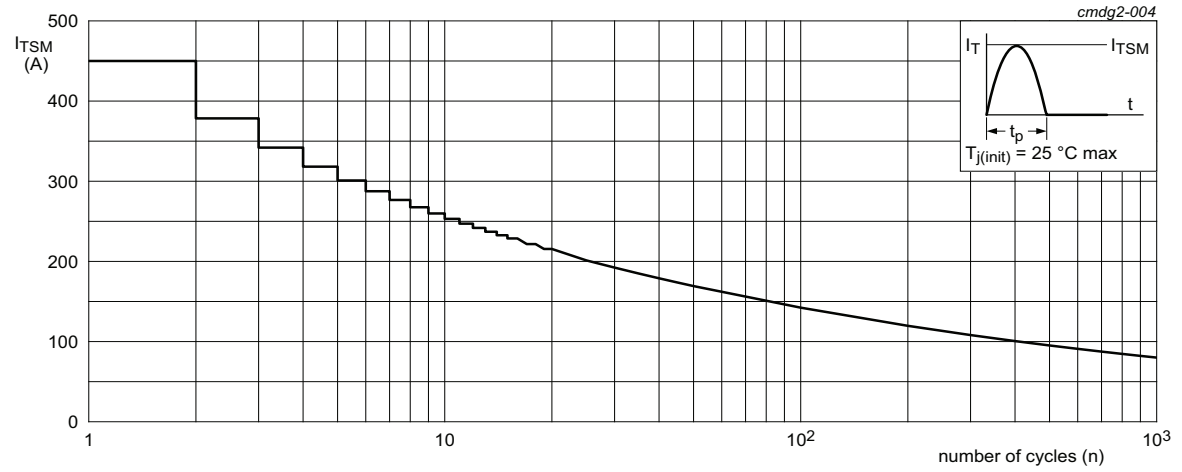
Fig. 2. RMS on-state current as a function of surge duration; maximum values



α = conduction angle

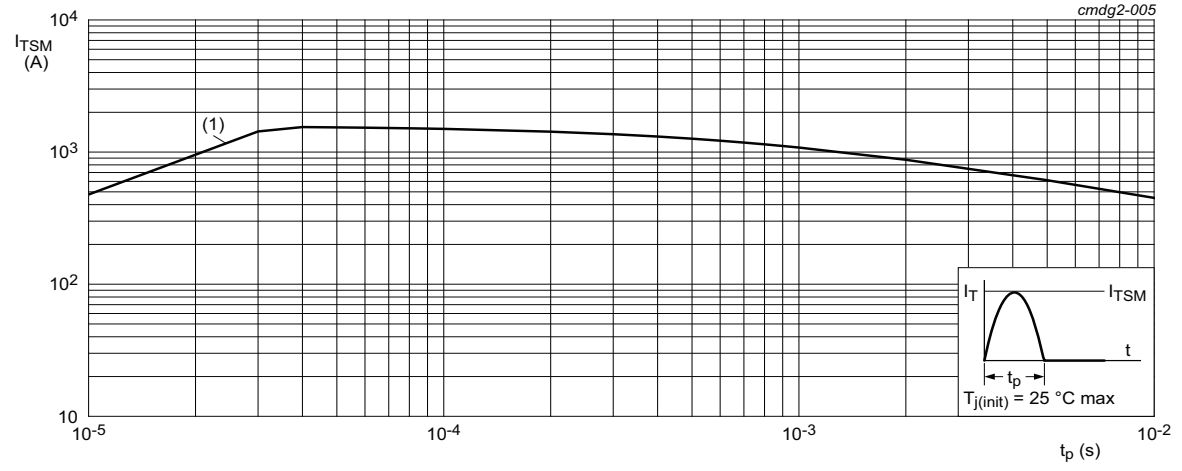
a = form factor = $I_{T(RMS)}$ / $I_{T(AV)}$

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



$t_p \leq 10$ ms ;

(1) dI_T/dt limit

Fig. 5. Non-repetitive peak on-state current as a function of pulse duration; 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		-	-	0.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

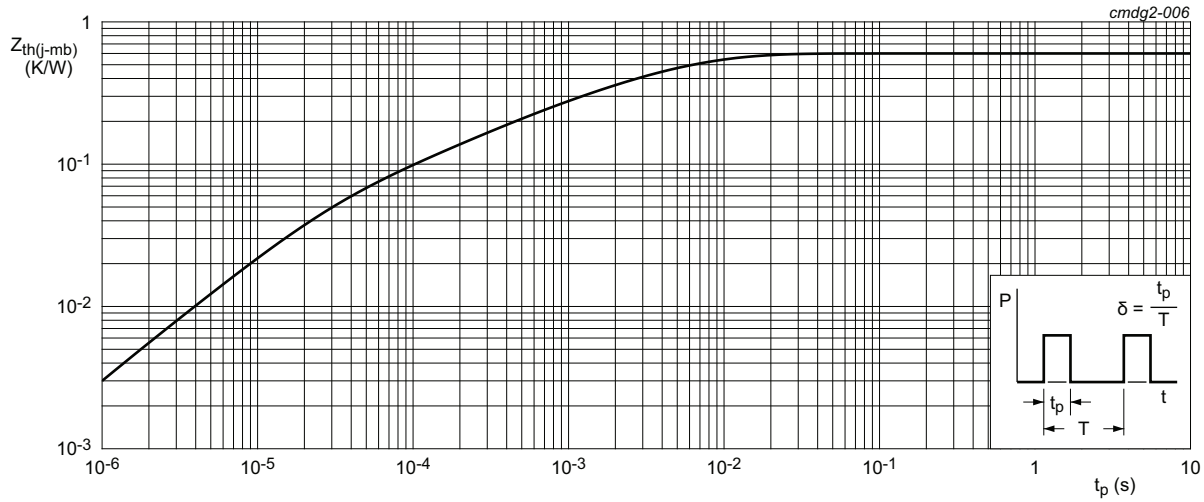


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

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		-	-	15	mA
I_L	latching current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 8		-	-	80	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 9		-	-	60	mA
V_T	on-state voltage	I_T = 80 A; T_j = 25 °C; Fig. 10		-	-	1.6	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 11		-	0.7	1.2	V
		V_D = 400 V; I_T = 0.1 A; T_j = 150 °C		0.25	0.5	-	V
I_D	off-state current	V_D = 800 V; T_j = 150 °C		-	-	2	mA
I_R	reverse current	V_D = 800 V; T_j = 150 °C		-	-	2	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 536 V; T_j = 150 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		500	-	-	V/µs
t_{gt}	gate-controlled turn-on time	I_{TM} = 80 A; V_D = 800 V; I_G = 100 mA; $(dI_G/dt)_M$ = 0.2 A/µs; T_j = 25 °C			2	-	µs
t_q	commutated turn-off time	V_{DM} = 536 V; T_j = 150 °C; I_{TM} = 40 A; V_R = 25 V; dV_D/dt = 50 V/µs; $(dI_T/dt)_M$ = 30 A/µs; (V_{DM} = 67% of V_{DRM})			70	-	µs

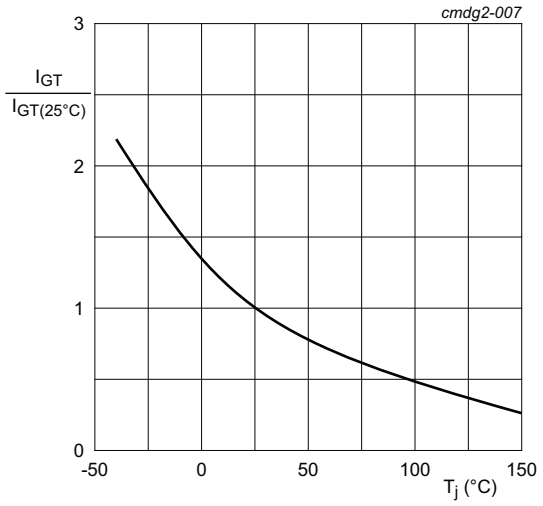


Fig. 7. Normalized gate trigger current as a function of junction temperature

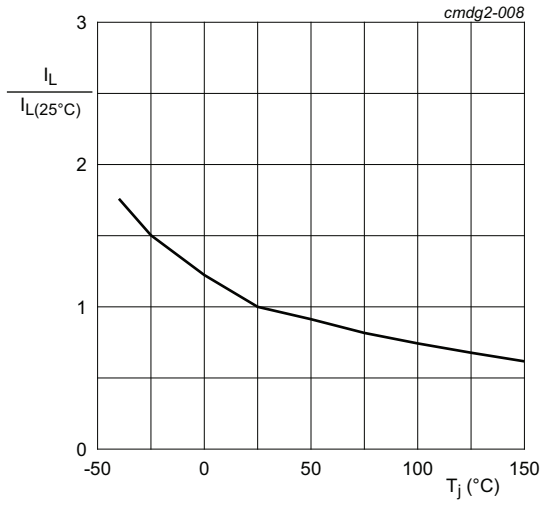


Fig. 8. Normalized latching current as a function of junction temperature

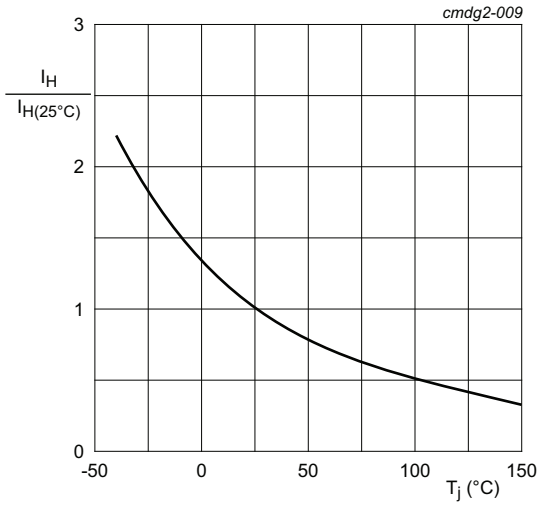
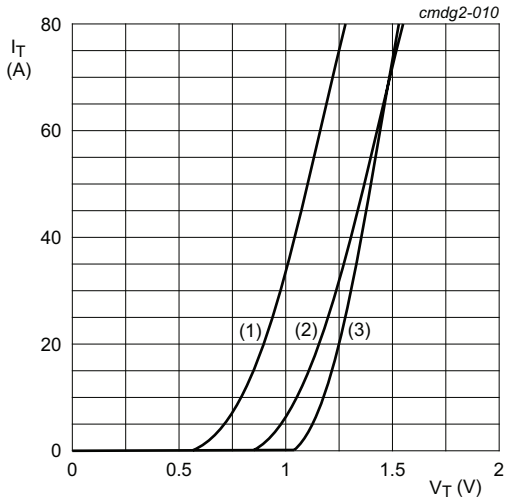


Fig. 9. Normalized holding current as a function of junction temperature



V_o = 1.036 V; R_s = 0.0066 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

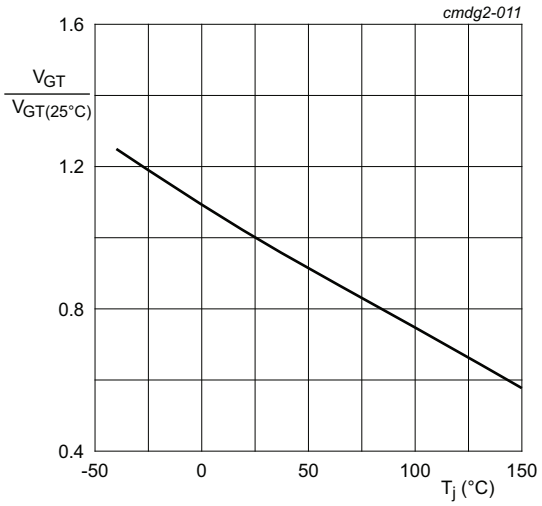
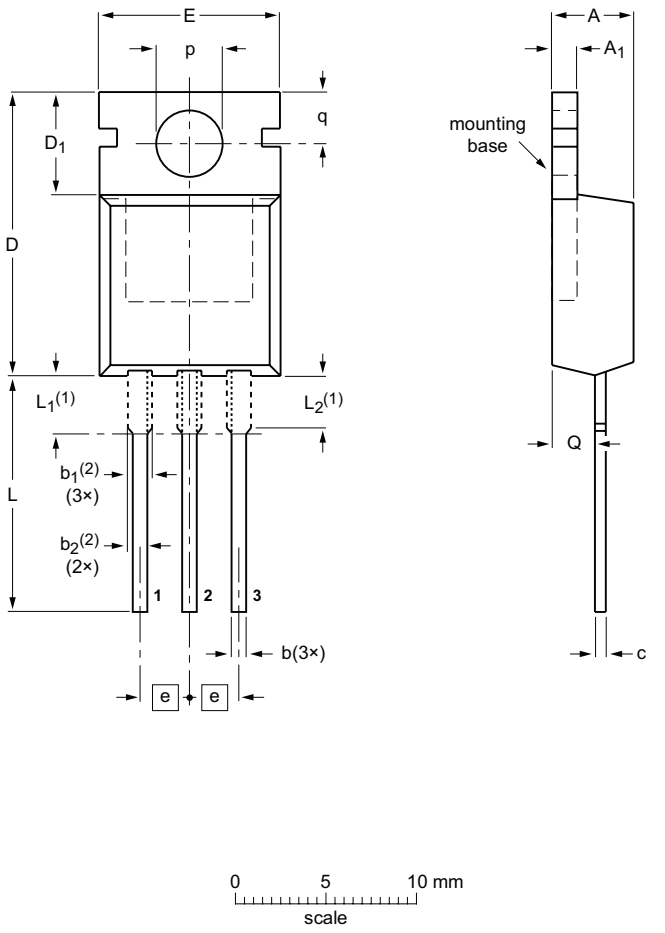


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB **SOT78**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1(2)	b_2(2)	c	D	D_1	E	e	L	L_1(1)	L_2(1) max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

Notes

1. Lead shoulder designs may vary.
2. Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT78		3-lead TO-220AB	SC-46			~~08-04-23~~ 08-06-13

Fig. 12. Package outline TO220

11. 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.
Product [short] data sheet	Production	This document contains the product specification.

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12. Contents

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