1. General description

Planar passivated high commutation three quadrant triac in a TO220 plastic package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series B" triac will commutate the full rated RMS current at the maximum rated junction temperature without the aid of a snubber.

2. Features and benefits

- 3Q technology for improved noise immunity
- High blocking voltage capability
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- Less sensitive gate for very high noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only

3. Applications

- Heating controls
- High power motor control
- High power switching
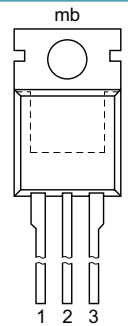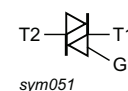
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage			-	-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 91$ °C; Fig. 1; Fig. 2; Fig. 3		-	-	25	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25$ °C; $t_p = 20$ ms; Fig. 4; Fig. 5		-	-	190	A
		full sine wave; $T_{j(init)} = 25$ °C; $t_p = 16.7$ ms		-		209	A
T_j	junction temperature			-	-	125	°C
Symbol	**Parameter**	**Conditions**		**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12$ V; $I_T = 0.1$ A; T2+ G+; $T_j = 25$ °C; Fig. 7		2	18	50	mA
		$V_D = 12$ V; $I_T = 0.1$ A; T2+ G-; $T_j = 25$ °C; Fig. 7		2	21	50	mA
		$V_D = 12$ V; $I_T = 0.1$ A; T2- G-; $T_j = 25$ °C; Fig. 7		2	34	50	mA

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 9		-	31	60	mA
V_T	on-state voltage	I_T = 30 A; T_j = 25 °C; Fig. 10		-	1.3	1.55	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 536 V; T_j = 125 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		1000	4000	-	V/µs
dI_{com}/dt	rate of change of commutating current	V_D = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 25 A; dV_{com}/dt = 20 V/µs; (without snubber condition); gate open circuit; Fig. 12		-	44	-	A/ms

5. Pinning information

Table 2. Pinning information

| Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	mb	T2 —▷◁— T1 / G
2	T2	main terminal 2		sym051
3	G	gate	1 2 3	
mb	T2	mounting base; main terminal 2		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
T225-800B	TO220	BTA225-800B, 127	Tube	50	SOT78	13-Jun-2020

7. Limiting values

Table 4. Limiting values

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage			-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 91$ °C; Fig. 1; Fig. 2; Fig. 3		-	25	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25$ °C; $t_p = 20$ ms; Fig 4; Fig 5		-	190	A
		full sine wave; $T_{j(init)} = 25$ °C; $t_p = 16.7$ ms		-	209	A
I^2t	I^2t for fusing	$t_P = 10$ ms; SIN		-	180	A^2s
dI_T/dt	rate of rise of on-state current	$I_G = 0.2$ A		-	100	A/µs
I_{GM}	peak gate current			-	2	A
P_{GM}	peak gate power			-	5	W
$P_{G(AV)}$	average gate power	over any 20 ms period		-	0.5	W
T_{stg}	storage temperature			-40	150	°C
T_j	junction temperature			-	125	°C
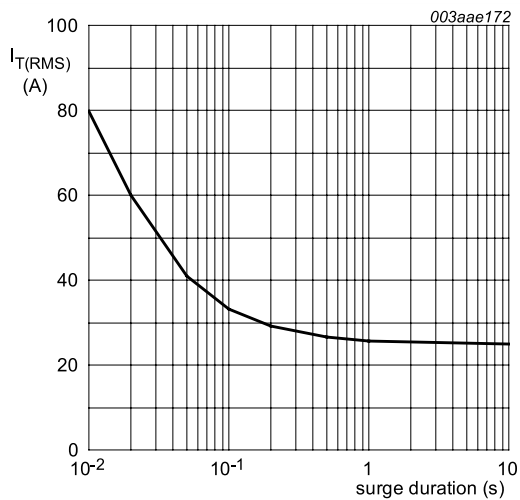
f = 50 Hz; $T_{mb} = 91$ °C
Fig. 1.   RMS on-state current as a function of surge duration; maximum values

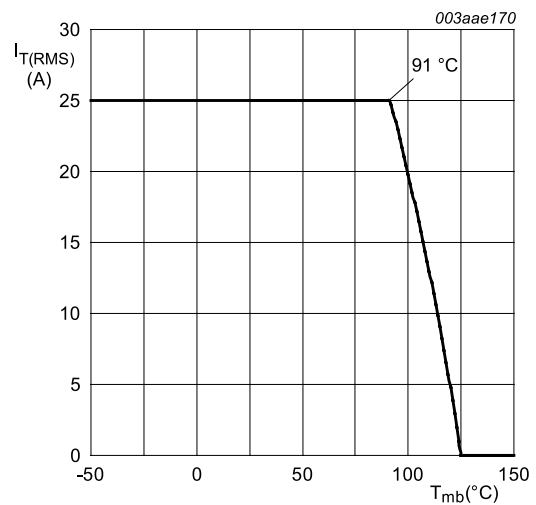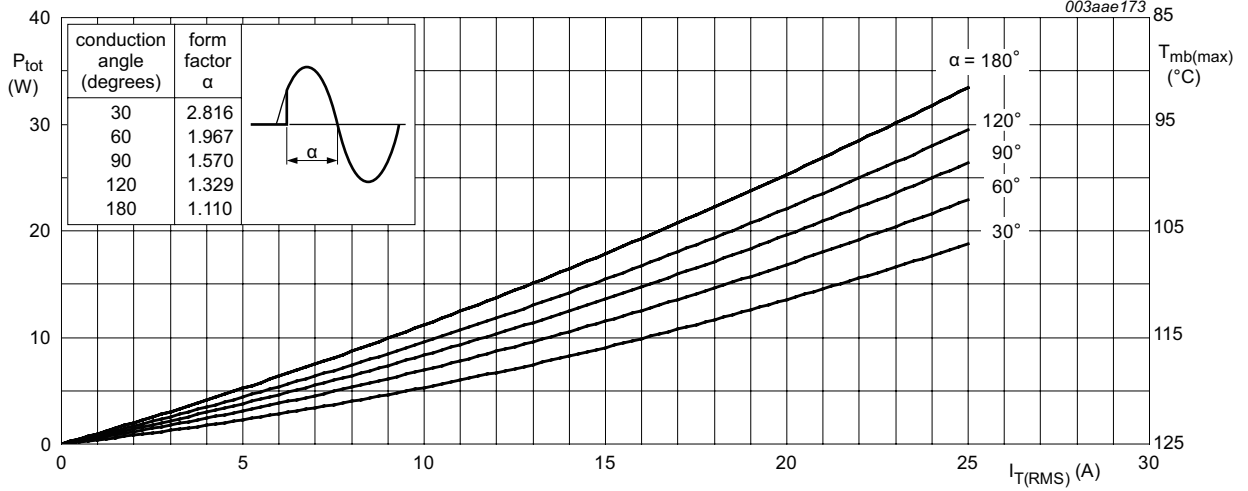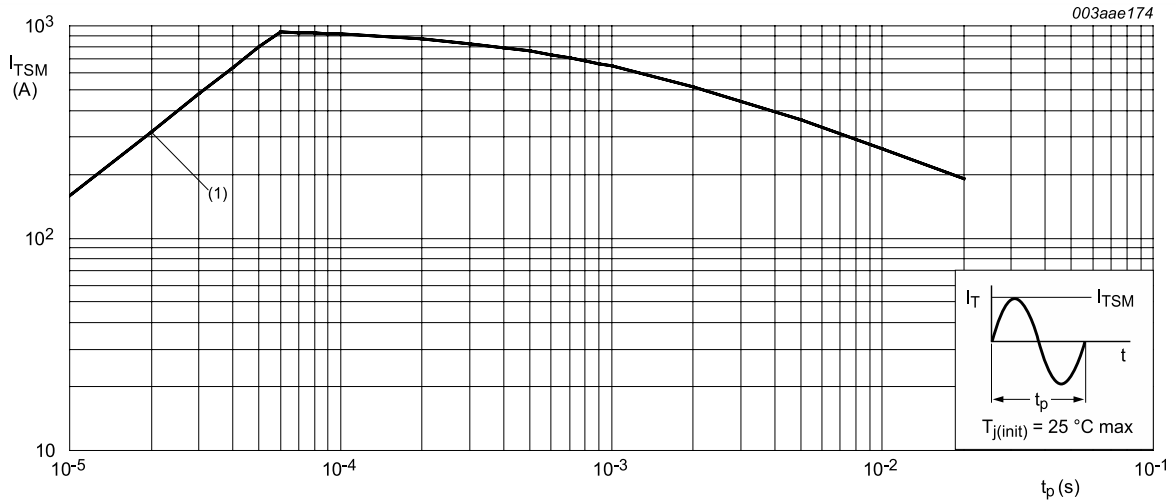
Fig. 2.   RMS on-state current as a function of mounting base temperature; maximum values

conduction angle (degrees)	form factor α
30	2.816
60	1.967
90	1.570
120	1.329
180	1.110

α = conduction angle

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

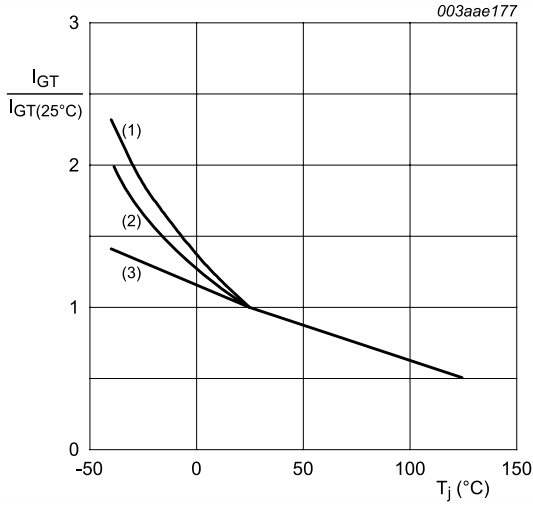**Fig. 3.   Total power dissipation as a function of RMS on-state current; maximum values**

t_p ≤ 20 ms

(1) dIT/dt limit

Fig. 4.   Non-repetitive peak on-state current as a function of pulse duration; maximum values

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; T2+ G+; T_j = 25 °C; Fig. 7		2	18	50	mA
		V_D = 12 V; I_T = 0.1 A; T2+ G-; T_j = 25 °C; Fig. 7		2	21	50	mA
		V_D = 12 V; I_T = 0.1 A; T2- G-; T_j = 25 °C; Fig. 7		2	34	50	mA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T2+ G+; T_j = 25 °C; Fig. 8		-	31	60	mA
		V_D = 12 V; I_G = 0.1 A; T2+ G-; T_j = 25 °C; Fig. 8		-	34	90	mA
		V_D = 12 V; I_G = 0.1 A; T2- G-; T_j = 25 °C; Fig. 8		-	30	60	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 9		-	31	60	mA
V_T	on-state voltage	I_T = 30 A; T_j = 25 °C; Fig. 10		-	1.3	1.55	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 11		-	0.7	1	V
		V_D = 400 V; I_T = 0.1 A; T_j = 150 °C		0.25	0.4	-	V
I_D	off-state current	V_D = 800 V; T_j = 125 °C		-	0.1	0.5	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 536 V; T_j = 125 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		1000	4000	-	V/µs
dI_{com}/dt	rate of change of commutating current	V_D = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 25 A; dV_{com}/dt = 20 V/µs; (without snubber condition); gate open circuit; Fig. 12		-	44	-	A/ms

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(1) T2- G-
(2) T2+ G-
(3) T2+ G+

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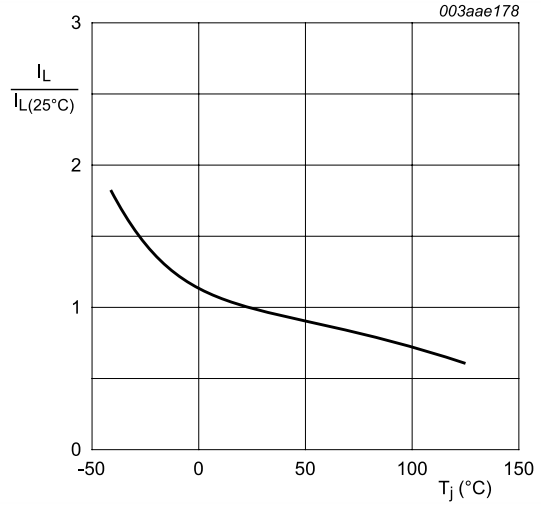

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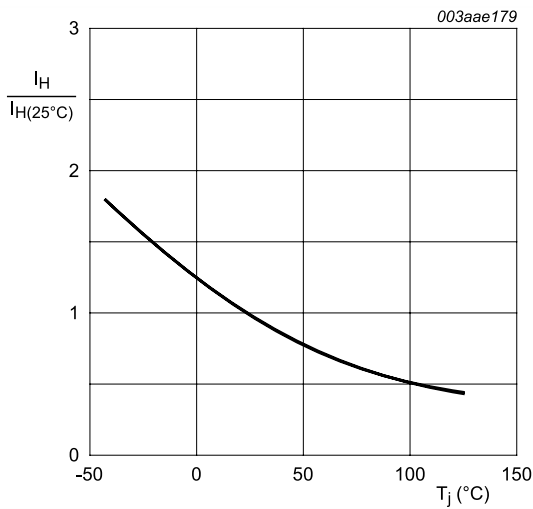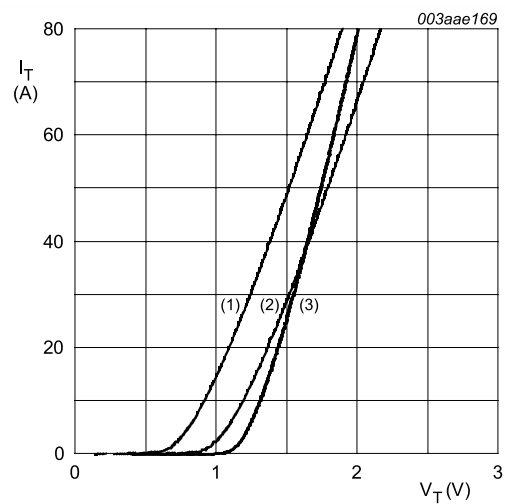**Fig. 8. Normalized holding current as a function of junction temperature**

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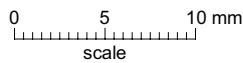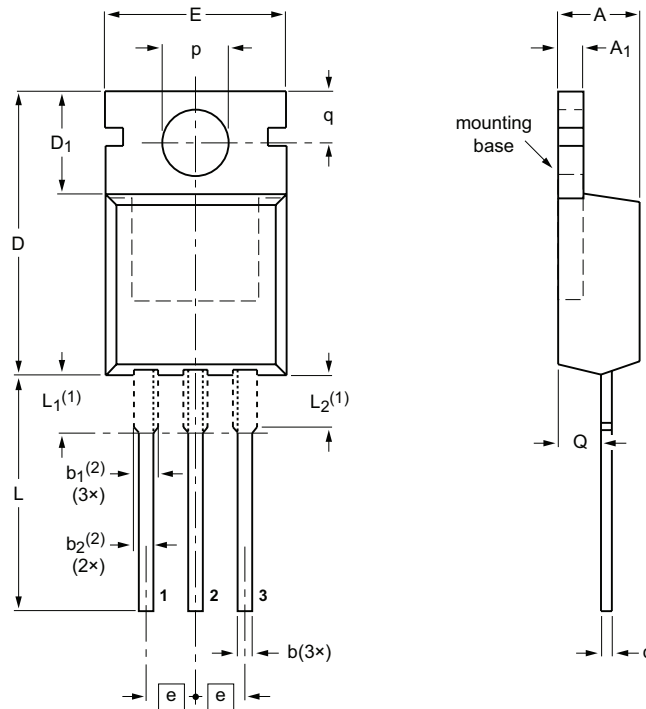**Fig. 9. Normalized holding current as a function of junction temperature**

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V_o = 1.073 V; R_s = 0.015 Ω
(1) T_j = 125 °C; typical values
(2) T_j = 125 °C; maximum values
(3) T_j = 25 °C; maximum values

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

10. Package outline

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

0   5   10 mm

scale

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.

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