



BT150-500R

SCR

13 March 2014

Product data sheet

1. General description

Planar passivated SCR with sensitive gate in a SOT78 (TO-220AB) plastic package. This device is intended to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

2. Features and benefits

- Sensitive gate
- Planar passivated for voltage ruggedness and reliability
- Direct triggering from low power drivers and logic ICs

3. Applications

- General purpose switching
- Protection Circuits

4. Quick reference data

Table 1. Quick reference data

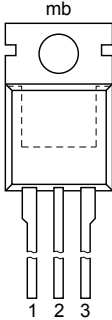
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		[1]	-	-	500	V
V_{RRM}	repetitive peak reverse voltage			-	-	500	V
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{\text{j(init)}} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 10\text{ ms}$; Fig. 4; Fig. 5		-	-	35	A
$I_{\text{T(RMS)}}$	RMS on-state current	half sine wave; $T_{\text{mb}} \leq 113\text{ }^{\circ}\text{C}$; Fig. 2; Fig. 3		-	-	4	A
Static characteristics							
I_{GT}	gate trigger current	$V_{\text{D}} = 12\text{ V}$; $I_{\text{T}} = 0.1\text{ A}$; $T_{\text{j}} = 25\text{ }^{\circ}\text{C}$; Fig. 7		-	15	200	μA

[1] Although not recommended, off-state voltages up to 800V may be applied without damage, but the thyristor may switch to the on-state. The rate of rise of current should not exceed 15 A/ μs .



5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 TO-220AB (SOT78)	
2	A	anode		
3	G	gate		
mb	A	mounting base; connected to anode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BT150-500R	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

7. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage		[1]	-	500	V
V_{RRM}	repetitive peak reverse voltage			-	500	V
$I_{\text{T(AV)}}$	average on-state current	half sine wave; $T_{\text{mb}} \leq 113\text{ }^{\circ}\text{C}$; Fig. 1		-	2.5	A
$I_{\text{T(RMS)}}$	RMS on-state current	half sine wave; $T_{\text{mb}} \leq 113\text{ }^{\circ}\text{C}$; Fig. 2 ; Fig. 3		-	4	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{\text{j(init)}} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 10\text{ ms}$; Fig. 4 ; Fig. 5		-	35	A
		half sine wave; $T_{\text{j(init)}} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 8.3\text{ ms}$		-	38	A
I^2t	I^2t for fusing	$t_{\text{p}} = 10\text{ ms}$; SIN		-	6.1	A^2s
dl_{T}/dt	rate of rise of on-state current	$I_{\text{T}} = 10\text{ A}$; $I_{\text{G}} = 50\text{ mA}$; $dl_{\text{G}}/dt = 50\text{ mA}/\mu\text{s}$		-	50	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current			-	2	A
V_{RGM}	peak reverse gate voltage			-	5	V
P_{GM}	peak gate power			-	5	W
$P_{\text{G(AV)}}$	average gate power	over any 20 ms period		-	0.5	W
T_{stg}	storage temperature			-40	150	$^{\circ}\text{C}$
T_{j}	junction temperature		[2]	-	125	$^{\circ}\text{C}$

[1] Although not recommended, off-state voltages up to 800V may be applied without damage, but the thyristor may switch to the on-state. The rate of rise of current should not exceed 15 A/ μs .

[2] Operation above 110 $^{\circ}\text{C}$ may require the use of a gate to cathode resistor of 1k Ω or less.

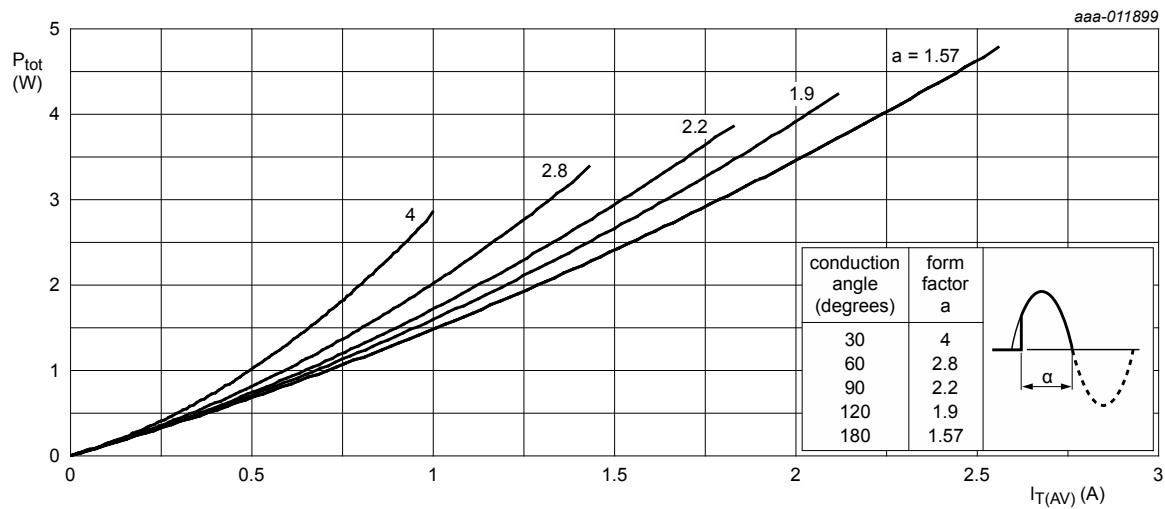


Fig. 1. Total power dissipation as a function of average on-state current; maximum values

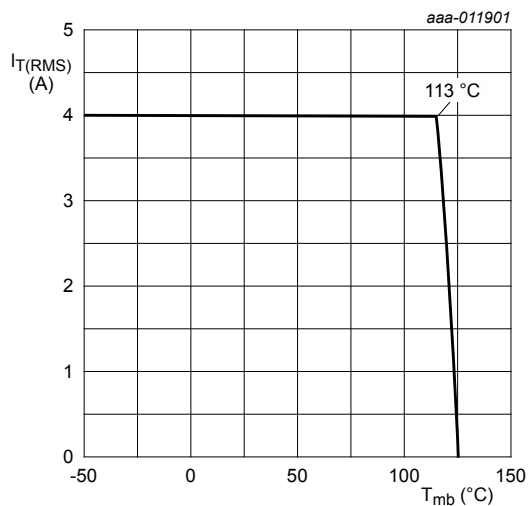


Fig. 2. RMS on-state current as a function of mounting base temperature; maximum values

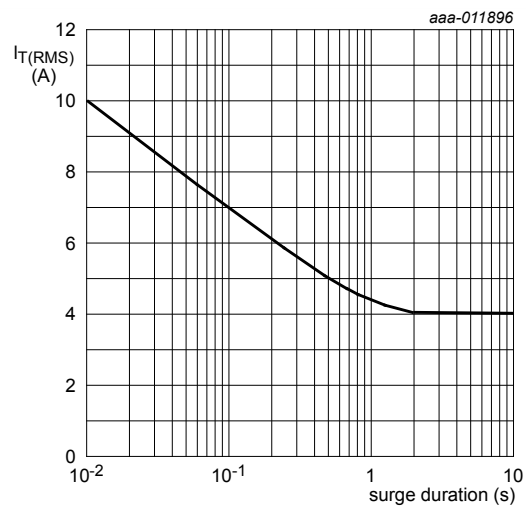


Fig. 3. RMS on-state current as a function of surge duration; maximum values

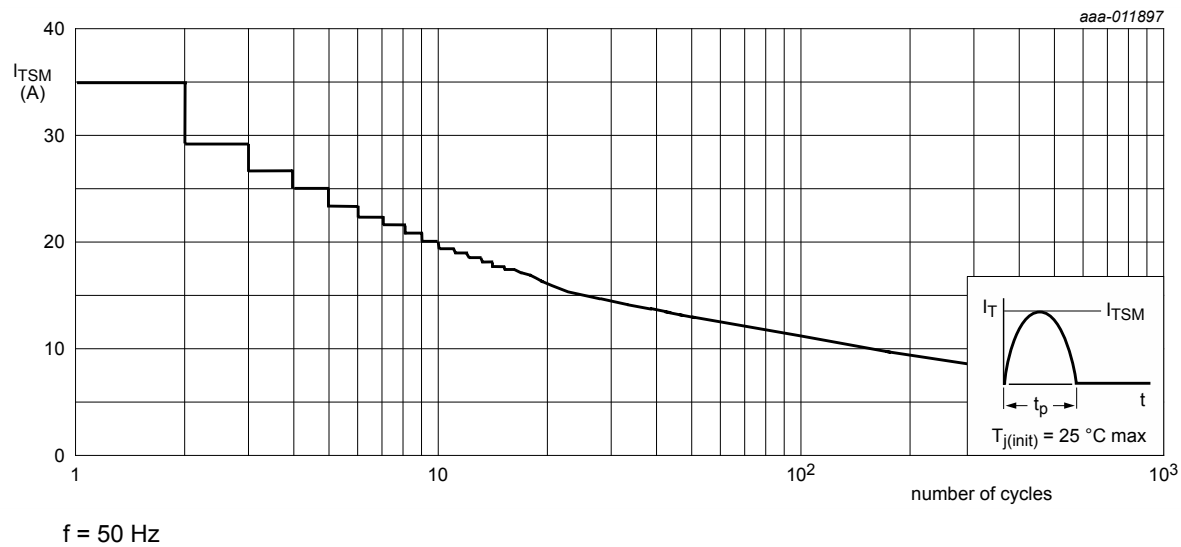


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

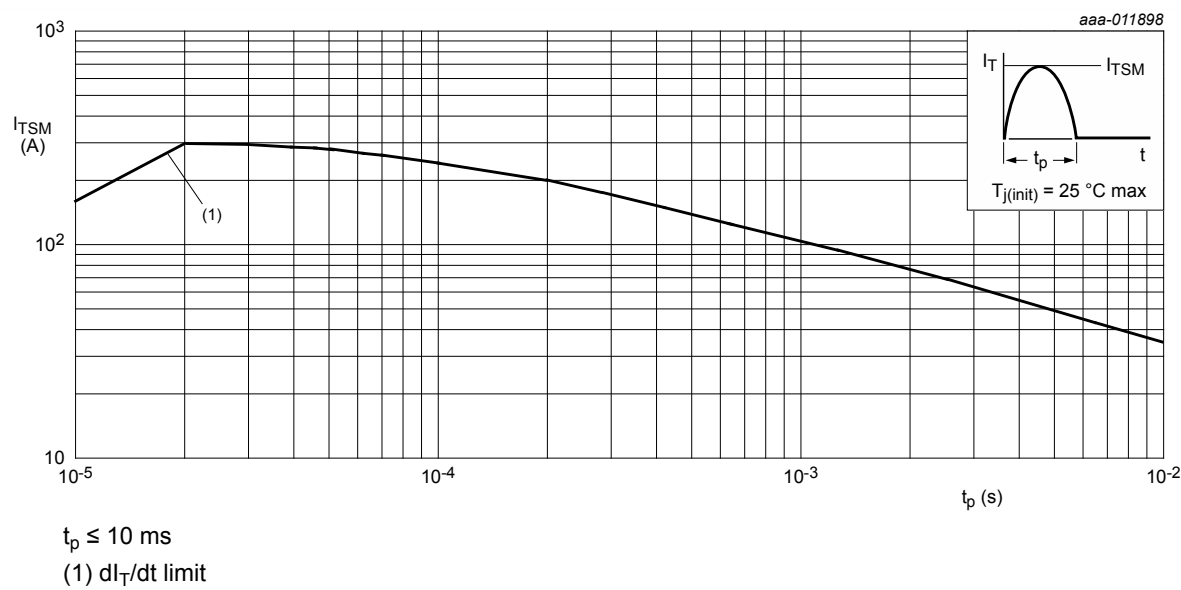
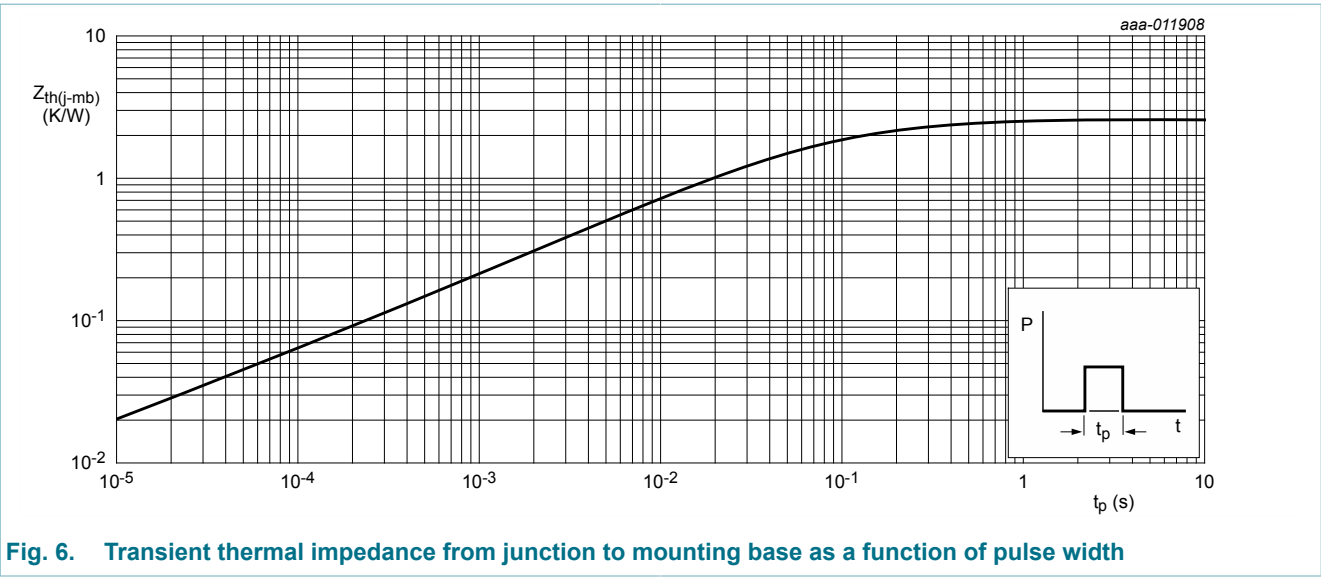


Fig. 5. Non-repetitive peak on-state current as a function of pulse width for sinusoidal currents; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

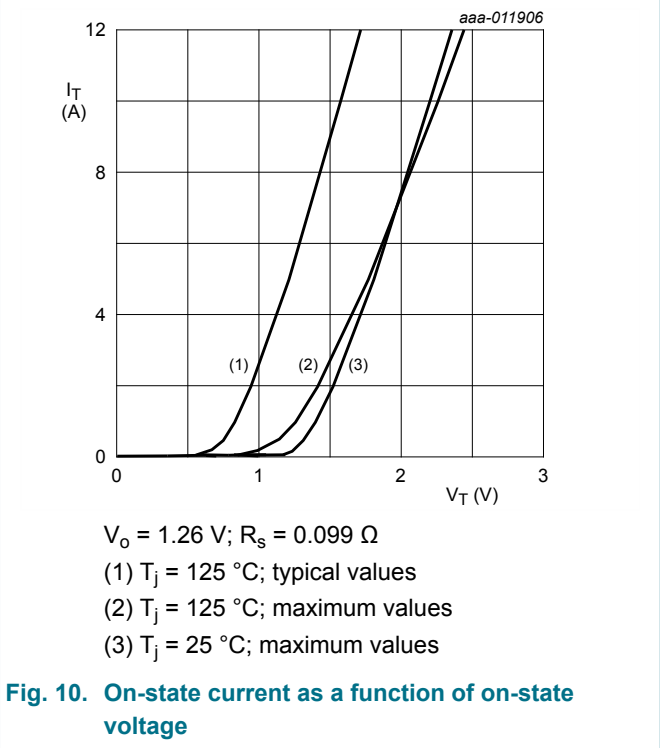
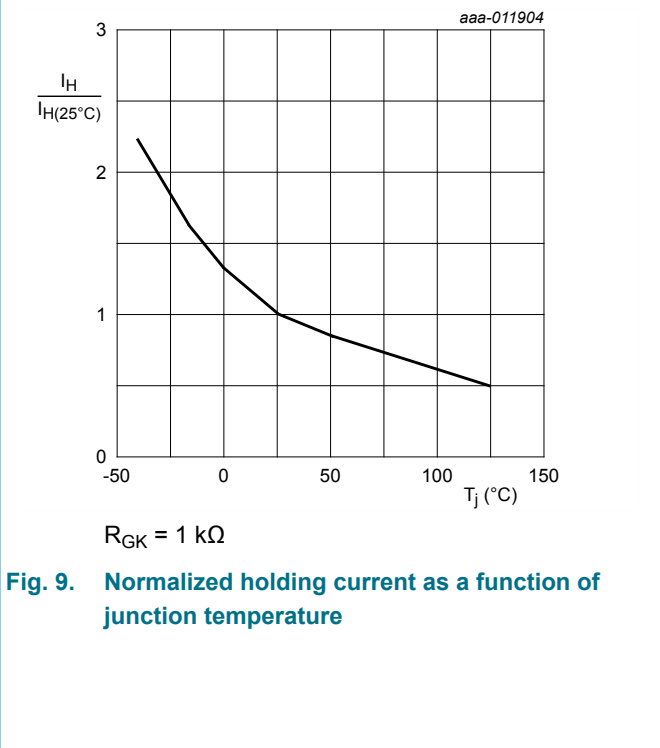
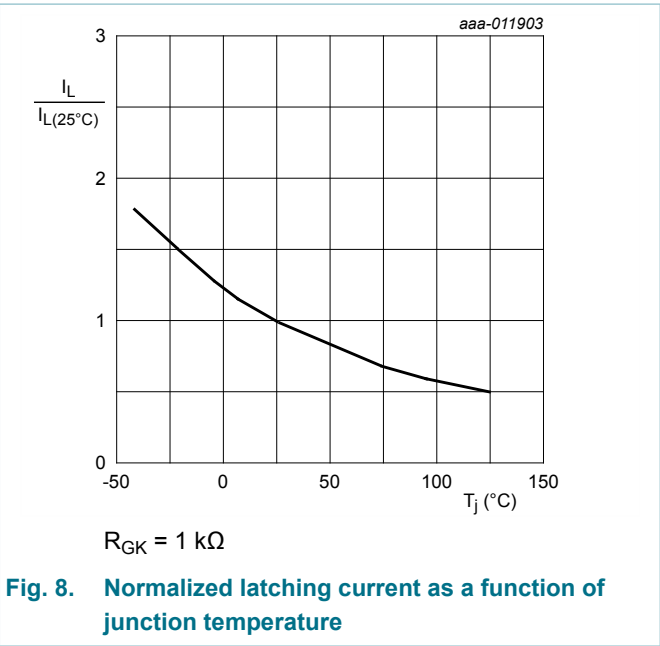
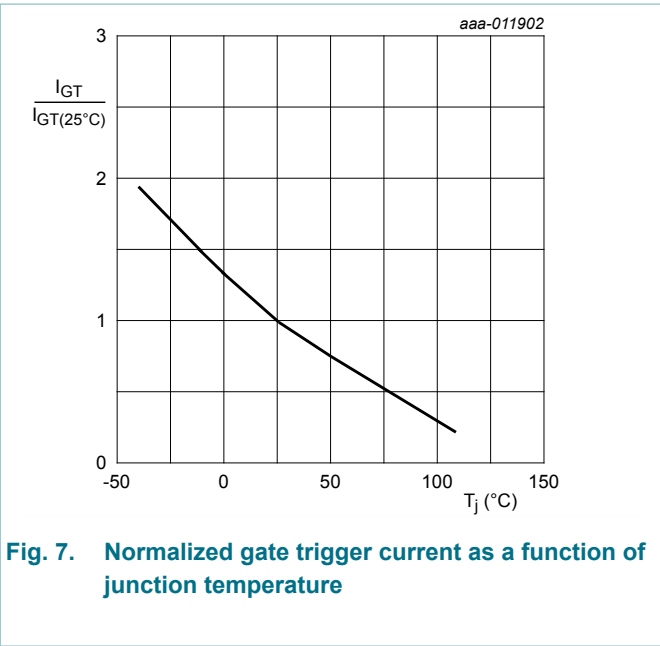
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 6		-	-	2.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	60	-	K/W

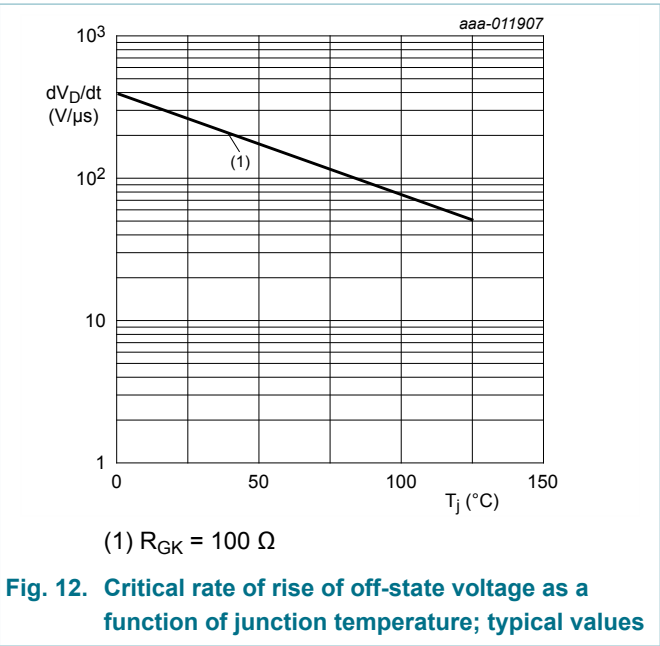
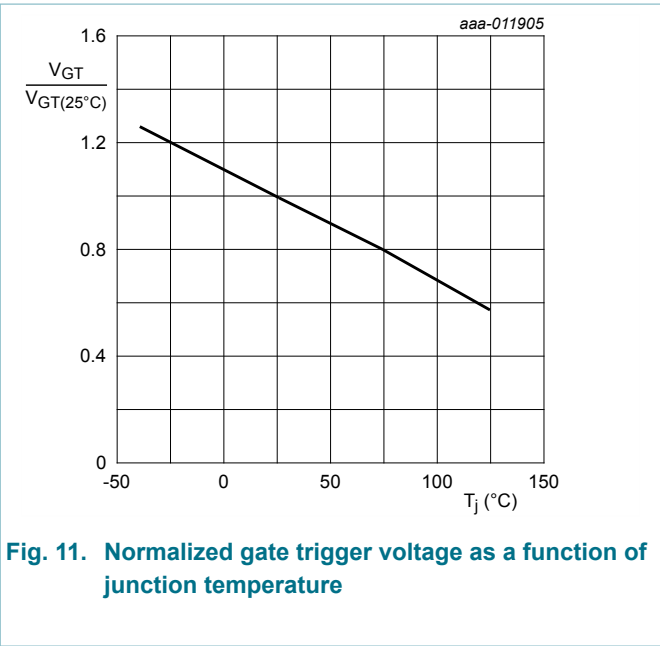


9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 7		-	15	200	μA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 8		-	0.17	10	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 9		-	0.1	6	mA
V_T	on-state voltage	$I_T = 5\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10		-	1.23	1.8	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 11		-	0.4	1	V
		$V_D = 500\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 110\text{ °C}$; Fig. 11		0.1	0.2	-	V
I_D	off-state current	$V_D = 500\text{ V}$; $T_j = 125\text{ °C}$		-	0.1	0.5	mA
I_R	reverse current	$V_R = 500\text{ V}$; $T_j = 125\text{ °C}$		-	0.1	0.5	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 335\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 100\text{ }\Omega$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; Fig. 12		-	50	-	V/ μs
t_{gt}	gate-controlled turn-on time	$I_{TM} = 10\text{ A}$; $V_D = 500\text{ V}$; $I_G = 5\text{ mA}$; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$		-	2	-	μs
t_q	commutated turn-off time	$V_{DM} = 335\text{ V}$; $T_j = 125\text{ °C}$; $I_{TM} = 8\text{ A}$; $V_R = 10\text{ V}$; $(dI_T/dt)_M = 10\text{ A}/\mu\text{s}$; $dV_D/dt = 2\text{ V}/\mu\text{s}$; $R_{GK} = 1\text{ k}\Omega$; ($V_{DM} = 67\%$ of V_{DRM})		-	100	-	μs

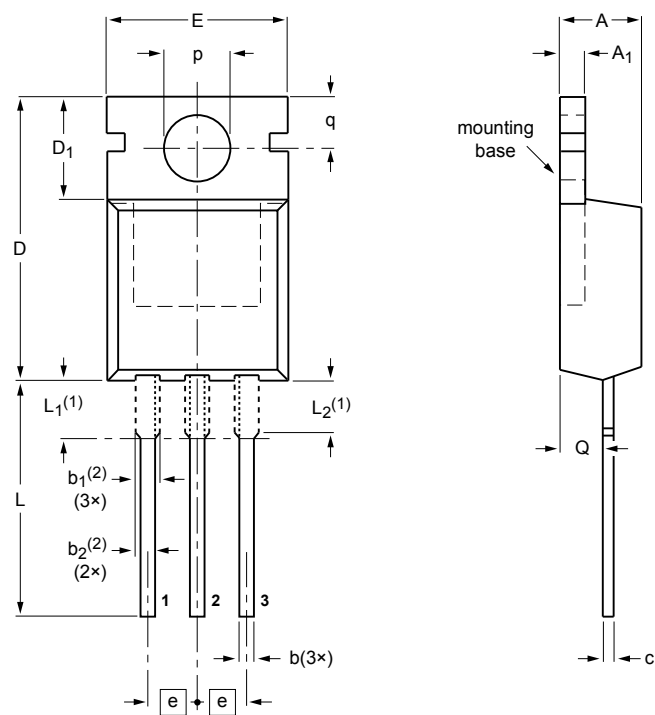




10. Package outline

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. 13. Package outline TO-220AB (SOT78)

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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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