

## 1. General description

Planar passivated Silicon Controlled Rectifier (SCR) in a SOT78 (TO-220AB) plastic package intended for use in applications requiring high bidirectional blocking voltage capability, high current inrush capability and high thermal cycling performance.

## 2. Features and benefits

- AC power control
- High bidirectional blocking voltage capability
- High thermal cycling performance
- Planar passivated for voltage ruggedness and reliability
- High junction operating temperature capability ( $T_{j(max)} = 150\text{ °C}$ )
- Package meets UL94V0 flammability requirement
- Package is RoHS compliant
- IEC 61000-4-4 fast transient

## 3. Applications

- Capacitive Discharge Ignition (CDI)
- Crowbar protection
- Inrush protection
- Motor control
- Voltage regulation
- High junction operating temperature capability ( $T_{j(max)} = 150\text{ °C}$ )

## 4. Quick reference data

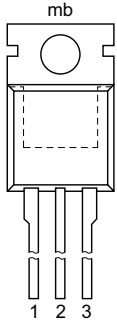

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values	Unit
<b>Absolute maximum rating</b>				
$V_{DRM}$	repetitive peak off-state voltage		800	V
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 128\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	25	A
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	300	A
		half sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 8.3\text{ ms}$	330	A
$T_j$	junction temperature		150	°C

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 7</a>	1.5	-	10	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 9</a>	-	-	60	mA
$V_T$	on-state voltage	$I_T = 30\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 10</a>	-	1.10	1.50	V
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$ ; $T_j = 150\text{ }^\circ\text{C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit	80	-	-	V/ $\mu\text{s}$

## 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; connect to anode		

## 6. Ordering information

Table 3. Ordering information

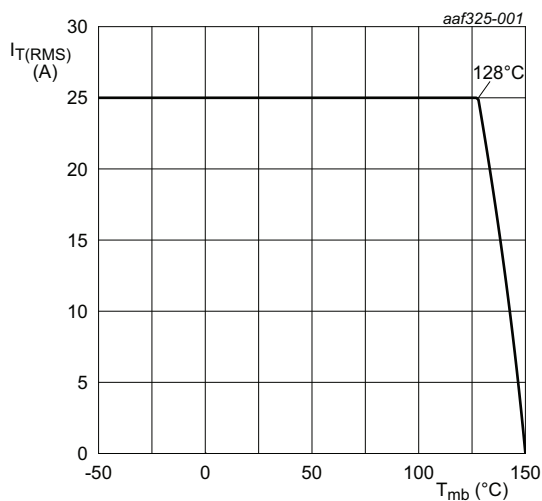
Type number	Package		
	Name	Description	Version
BT145-800RT	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

## 7. Limiting values

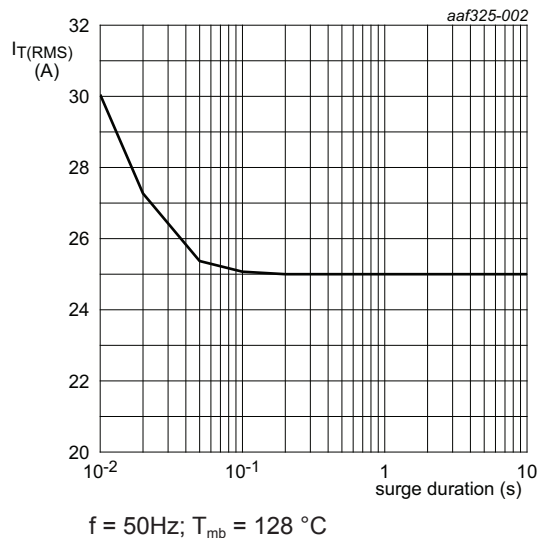
**Table 4. Limiting values**

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

Symbol	Parameter	Conditions	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; $T_{mb} \leq 128^{\circ}\text{C}$ ;	16	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 128^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	25	A
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25^{\circ}\text{C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	300	A
		half sine wave; $T_{j(\text{init})} = 25^{\circ}\text{C}$ ; $t_p = 8.3\text{ ms}$	330	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ms}$ ; sine wave	450	$\text{A}^2\text{s}$
$dI_T/dt$	rate of rise of on-state current	$I_G = 20\text{mA}$	200	$\text{A}/\mu\text{s}$
$I_{GM}$	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	$^{\circ}\text{C}$
$T_j$	junction temperature		150	$^{\circ}\text{C}$



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



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

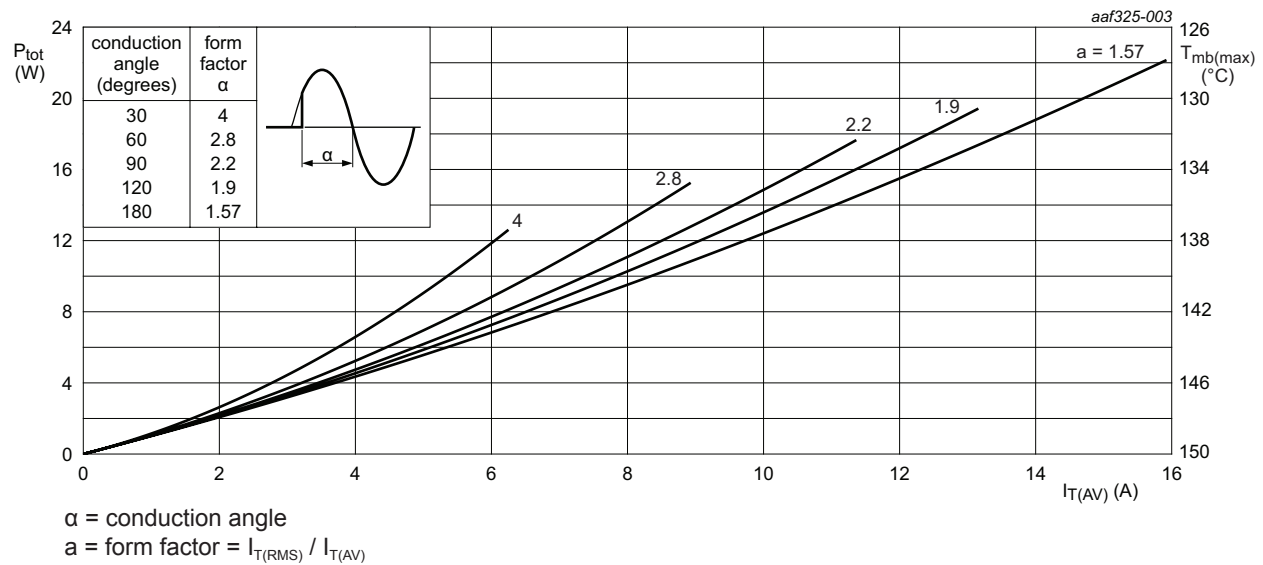


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

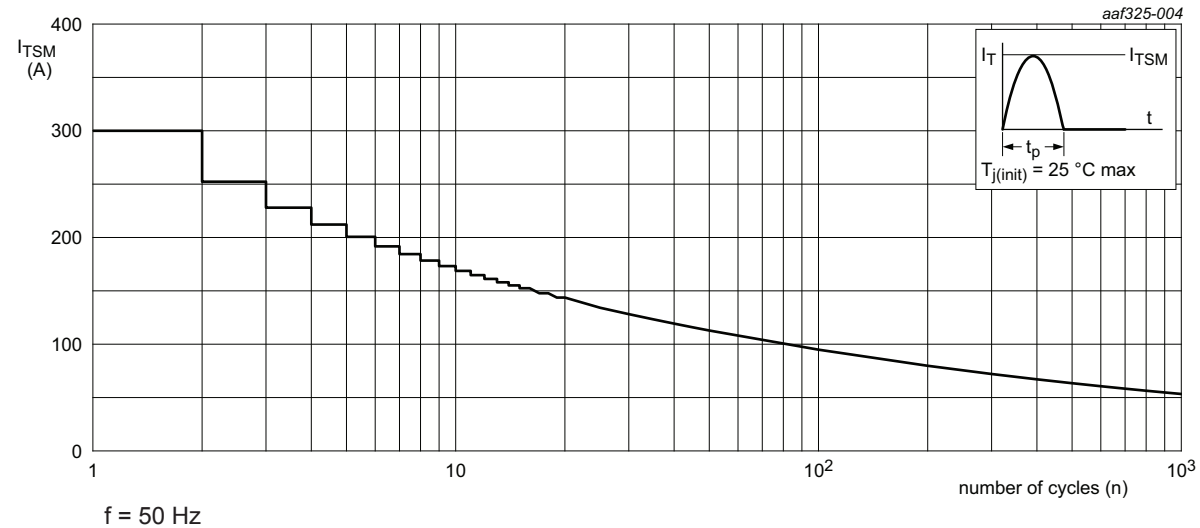


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

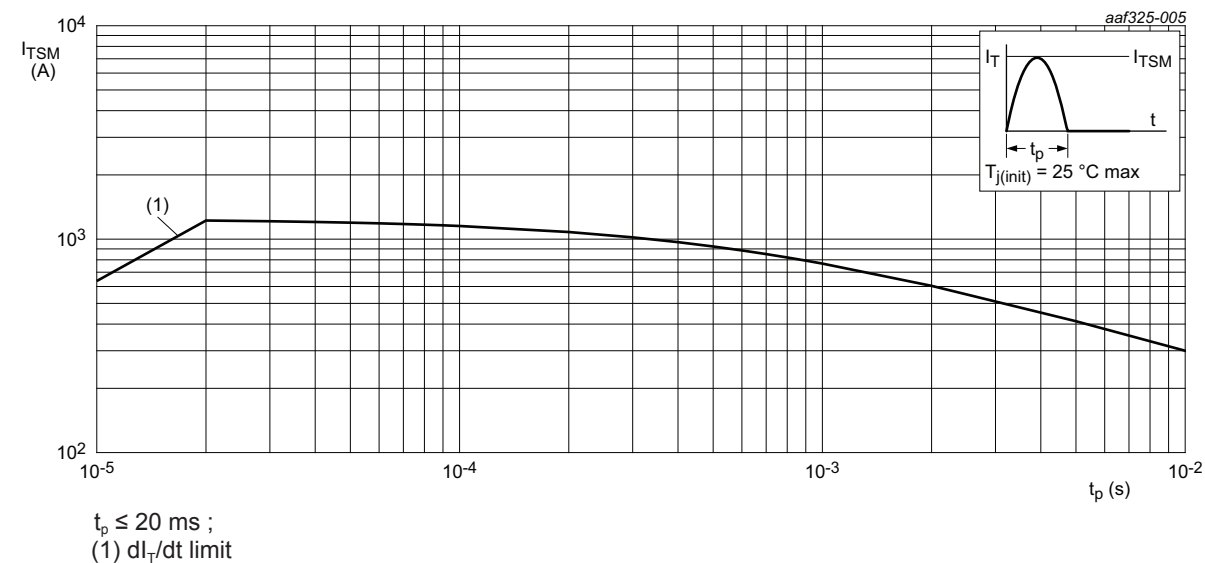
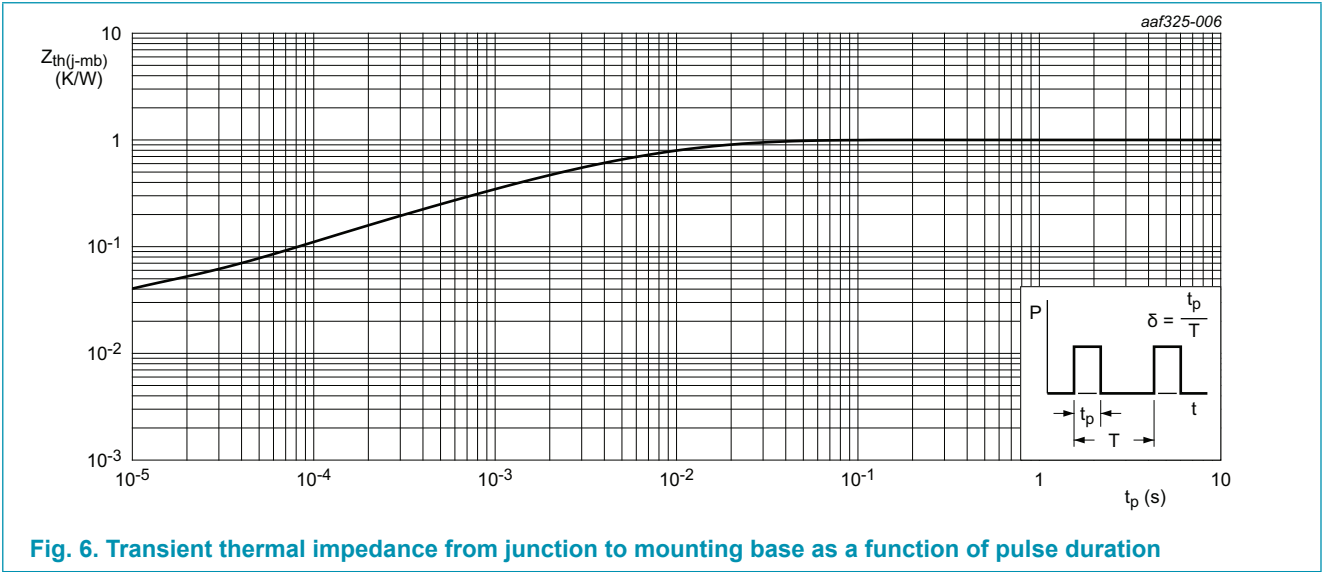


Fig. 5. Total power dissipation as a function of RMS on-state current; maximum values

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	<a href="#">Fig. 6</a>		-	-	1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W



## 9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Static characteristics</b>							
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_J = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 7</a>		1.5	-	10	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_J = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 8</a>		-	-	80	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_J = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 9</a>		-	-	60	mA
$V_T$	on-state voltage	$I_T = 30\text{ A}$ ; $T_J = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 10</a>		-	1.10	1.50	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_J = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 11</a>		-	0.6	1	V
		$V_D = 400\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_J = 125\text{ }^\circ\text{C}$ ; <a href="#">Fig. 11</a>		0.25	0.4	-	V
$I_D$	off-state current	$V_D = 800\text{ V}$ ; $T_J = 150\text{ }^\circ\text{C}$		-	-	2	mA
$I_R$	reverse current	$V_D = 800\text{ V}$ ; $T_J = 150\text{ }^\circ\text{C}$		-	-	2	mA
<b>Dynamic characteristics</b>							
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$ ; $T_J = 150\text{ }^\circ\text{C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit		80	-	-	V/ $\mu\text{s}$
$t_{gt}$	gate-controlled turn-on time	$I_{TM} = 40\text{ A}$ ; $V_D = 800\text{ V}$ ; $I_G = 0.1\text{ mA}$ ; $dI_G/dt = 5\text{ A}/\mu\text{s}$ ; $T_J = 25\text{ }^\circ\text{C}$			2	-	$\mu\text{s}$
$t_q$	commutated turn-off time	$V_{DM} = 536\text{ V}$ ; $T_J = 125\text{ }^\circ\text{C}$ ; $I_{TM} = 50\text{ A}$ ; $V_R = 25\text{ V}$ ; $dI_T/dt = 30\text{ A}/\mu\text{s}$ ; $dV_D/dt = 50\text{ V}/\mu\text{s}$			70	-	$\mu\text{s}$

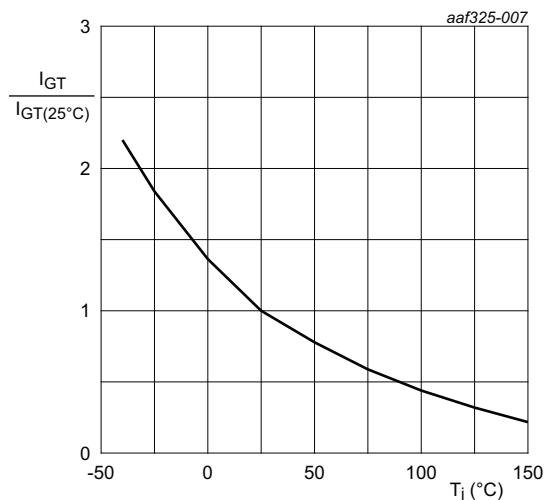


Fig. 7. Normalized gate trigger current as a function of junction temperature

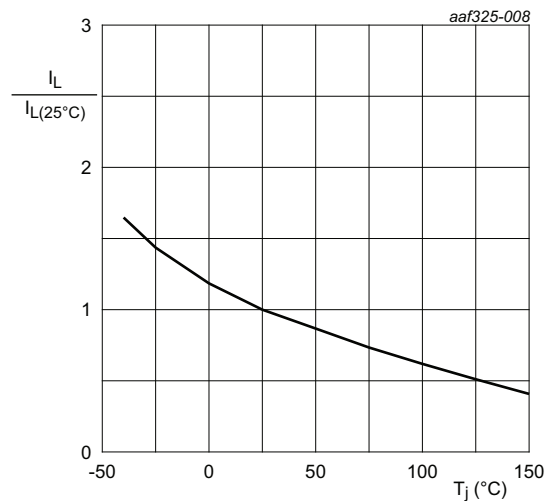


Fig. 8. Normalized latching current as a function of junction temperature

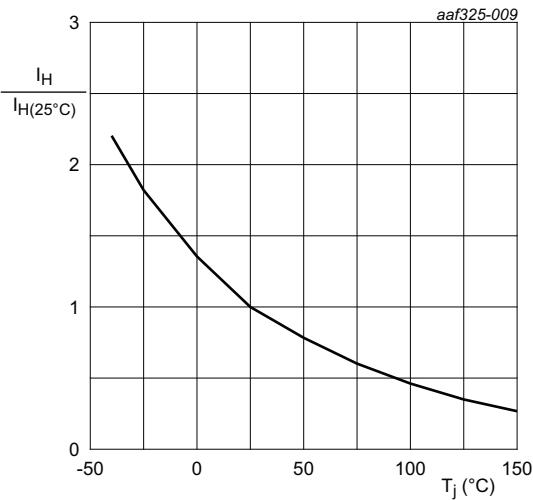
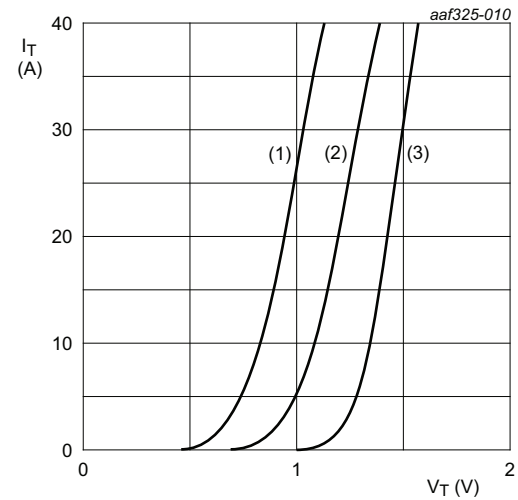


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 0.987 \text{ V}$ ;  $R_s = 0.0103 \Omega$   
(1)  $T_j = 150^\circ\text{C}$ ; typical values  
(2)  $T_j = 150^\circ\text{C}$ ; maximum values  
(3)  $T_j = 25^\circ\text{C}$ ; maximum values

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

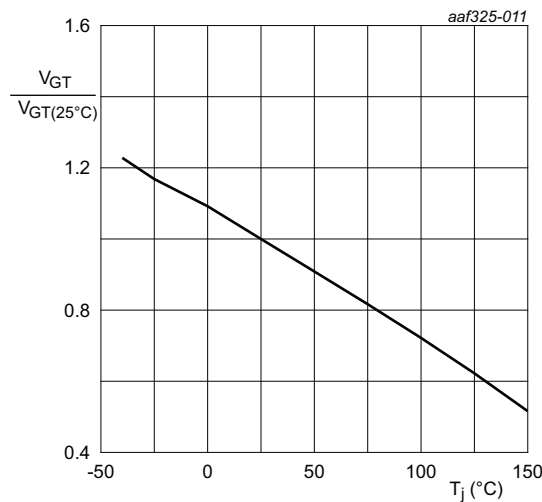


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

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

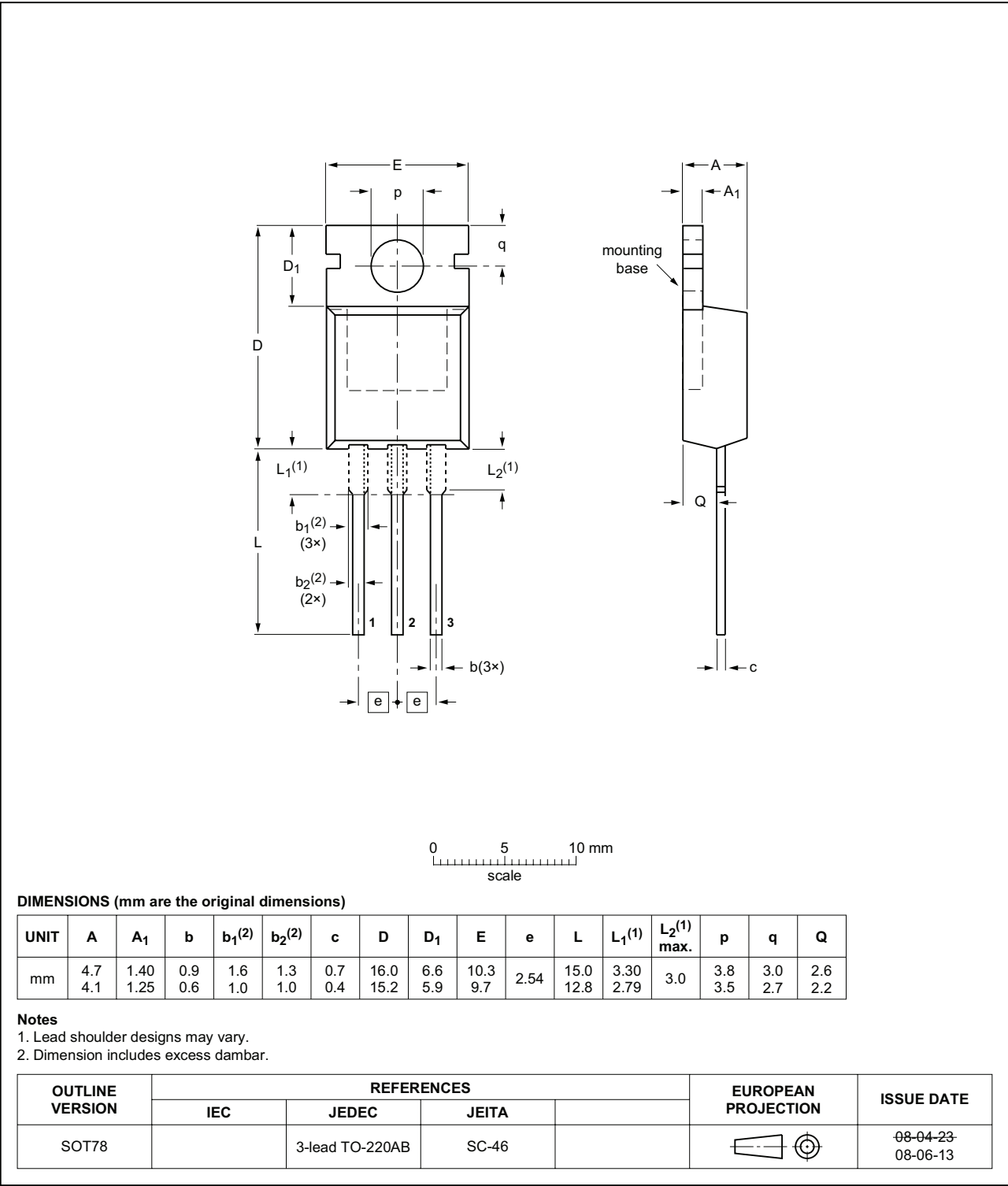


Fig. 12. Package outline TO-220AB (SOT78)



## 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.
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12. Contents

1. General description..... 1

2. Features and benefits ..... 1

3. Applications ..... 1

4. Quick reference data ..... 1

5. Pinning information..... 2

6. Ordering information..... 2

7. Limiting values ..... 3

8. Thermal characteristics ..... 5

9. Characteristics..... 6

10. Package outline ..... 8

11. Legal information..... 9

12. Contents ..... 11

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