

BTA312-800B

3Q Hi-Com Triac

4 October 2012

Product data sheet

1. Product profile

1.1 General description

Planar passivated high commutation three quadrant triac in a SOT78 (TO-220AB) 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 commute the full RMS current at the maximum rated junction temperature without the aid of a snubber.

1.2 Features and benefits

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

1.3 Applications

- Electronic thermostats (heating and cooling)
- High power motor controls e.g. washing machines and vacuum cleaners
- Rectifier-fed DC inductive loads e.g. DC motors and solenoids

1.4 Quick reference data

Table 1. Quick reference data

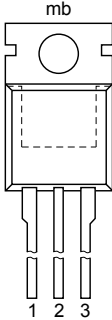
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	800	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	-	100	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 100\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	12	A
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T_2+ G+; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 7	2	-	50	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T_2+ G-; $T_j = 25\text{ }^{\circ}\text{C}$; Fig. 7	2	-	50	mA



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; Fig. 7	2	-	50	mA

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 TO-220AB (SOT78)	
2	T2	main terminal 2		
3	G	gate		
mb	T2	mounting base; main terminal 2		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BTA312-800B	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

4. 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		-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 100\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	12	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	100	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$	-	110	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN	-	50	A ² s
dI_T/dt	rate of rise of on-state current	$I_T = 20\text{ A}$; $I_G = 0.2\text{ A}$; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$	-	100	A/ μs

Symbol	Parameter	Conditions	Min	Max	Unit
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

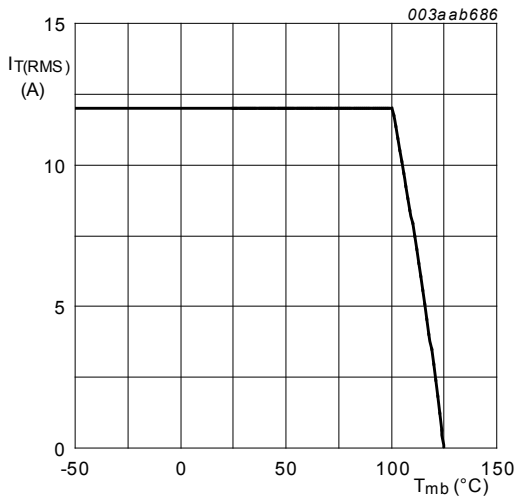
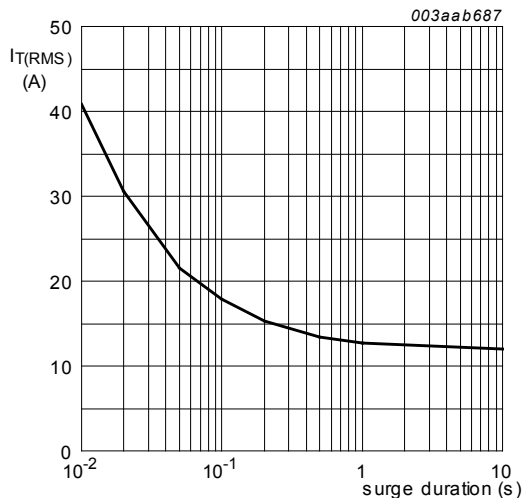
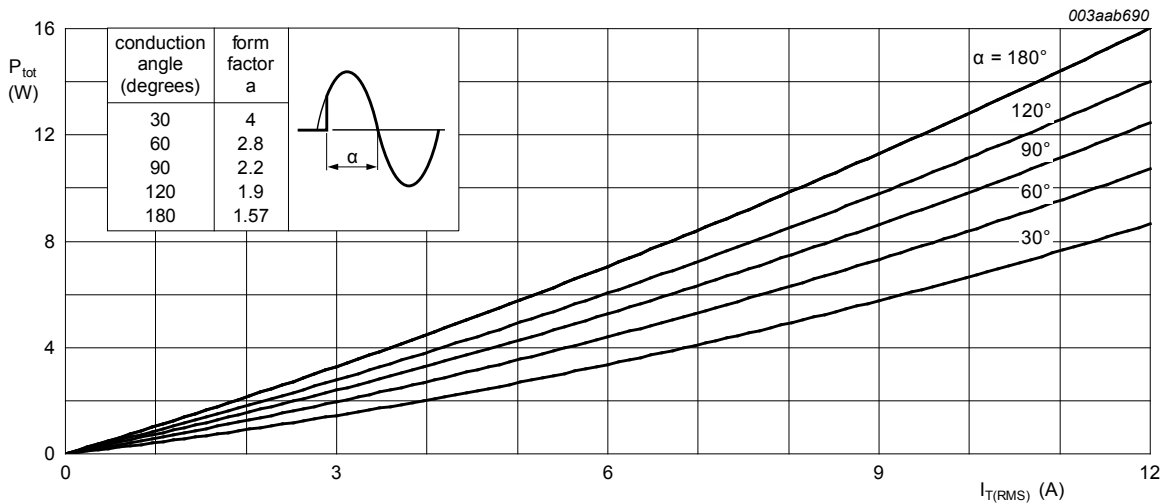


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50 \text{ Hz}; T_{mb} = 100 \text{ °C}$

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



α = conduction angle

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

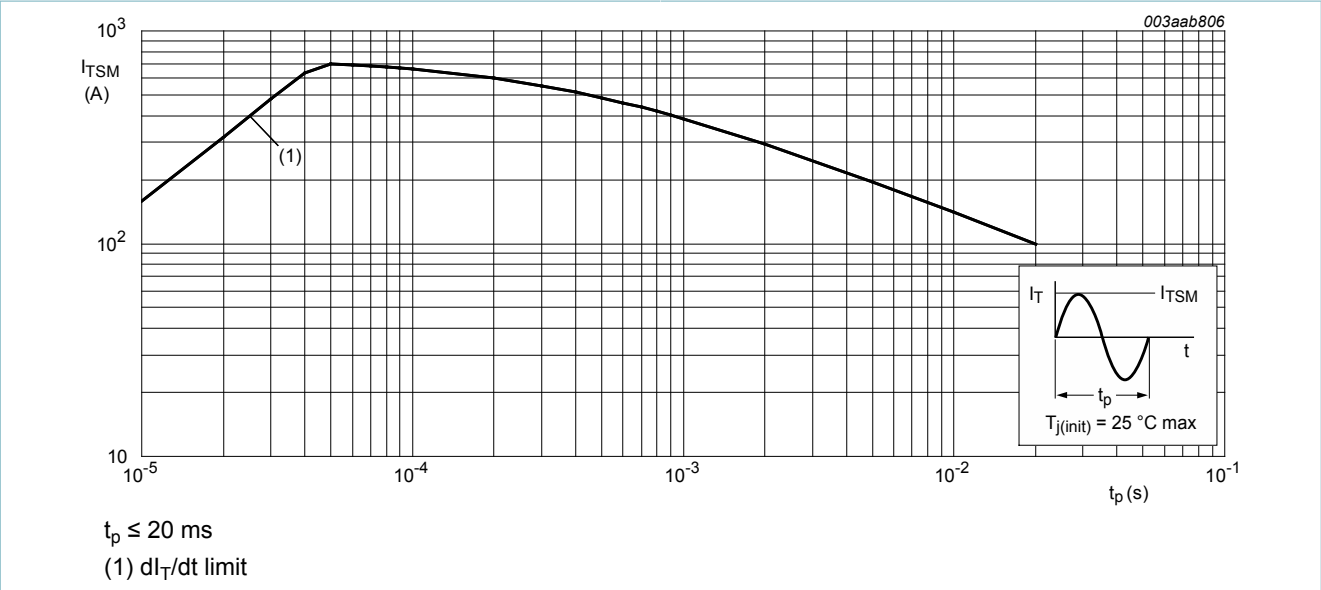


Fig. 4. Non-repetitive peak on-state current as a function of pulse duration; maximum values

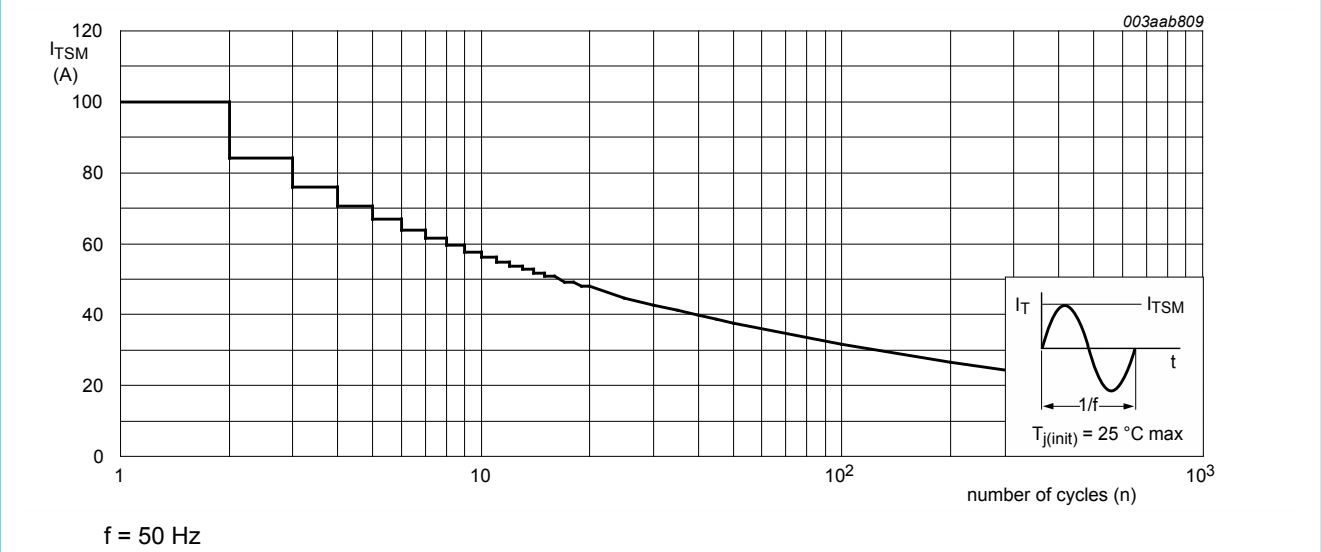
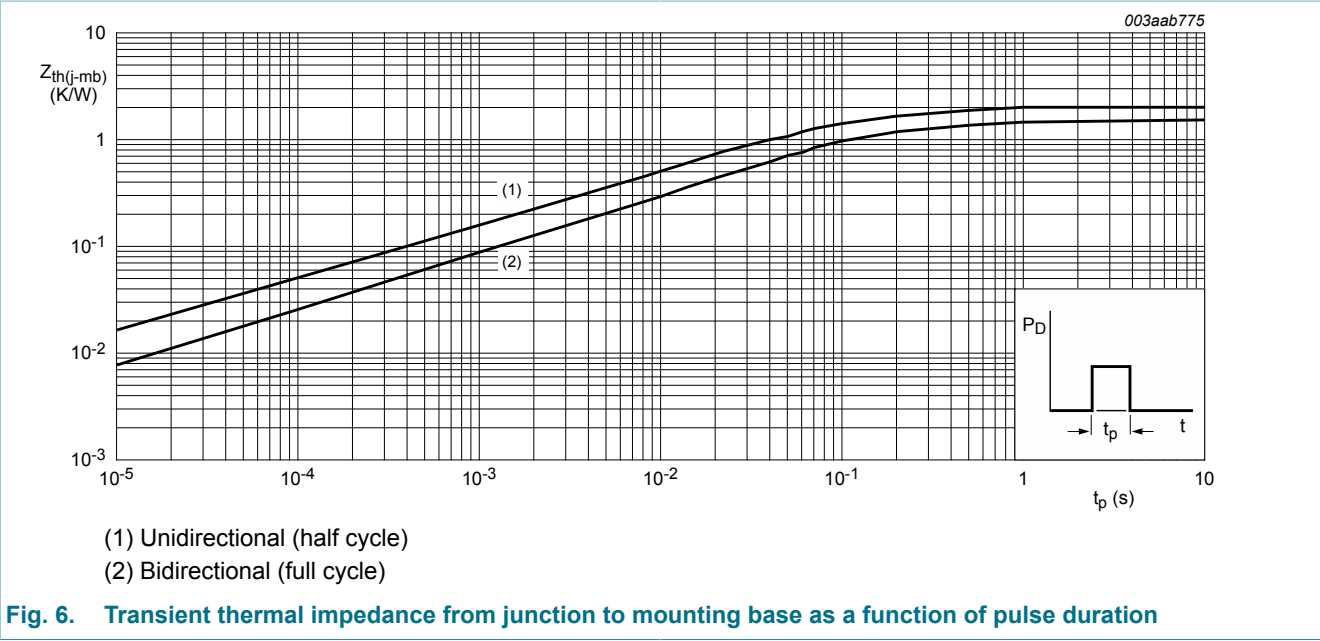


Fig. 5. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; Fig. 6	-	-	1.5	K/W
		half cycle; Fig. 6	-	-	2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

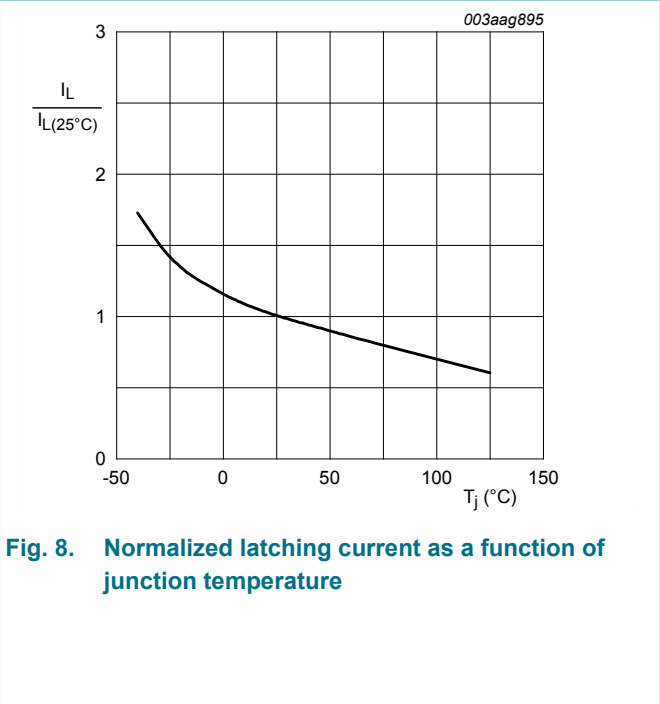
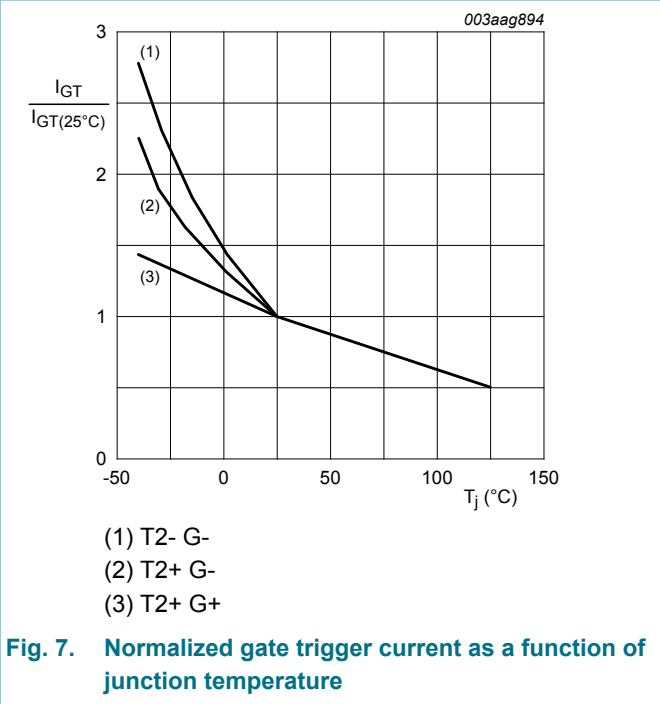


6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
IGT	gate trigger current	VD = 12 V; IT = 0.1 A; T2+ G+; Tj = 25 °C; Fig. 7	2	-	50	mA
		VD = 12 V; IT = 0.1 A; T2+ G-; Tj = 25 °C; Fig. 7	2	-	50	mA
		VD = 12 V; IT = 0.1 A; T2- G-; Tj = 25 °C; Fig. 7	2	-	50	mA
IL	latching current	VD = 12 V; IG = 0.1 A; T2+ G+; Tj = 25 °C; Fig. 8	-	-	60	mA
		VD = 12 V; IG = 0.1 A; T2+ G-; Tj = 25 °C; Fig. 8	-	-	90	mA
		VD = 12 V; IG = 0.1 A; T2- G-; Tj = 25 °C; Fig. 8	-	-	60	mA
IH	holding current	VD = 12 V; Tj = 25 °C; Fig. 9	-	-	60	mA
VT	on-state voltage	IT = 15 A; Tj = 25 °C; Fig. 10	-	1.3	1.6	V
VGT	gate trigger voltage	VD = 400 V; IT = 0.1 A; Tj = 125 °C; Fig. 11	0.25	0.4	-	V
		VD = 12 V; IT = 0.1 A; Tj = 25 °C; Fig. 11	-	0.8	1.5	V
ID	off-state current	VD = 800 V; Tj = 125 °C	-	0.1	0.5	mA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_j = 125\text{ }^{\circ}\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit	1000	2000	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 125\text{ }^{\circ}\text{C}$; $I_{T(RMS)} = 12\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; (snubberless condition); gate open circuit	30	-	-	A/ms



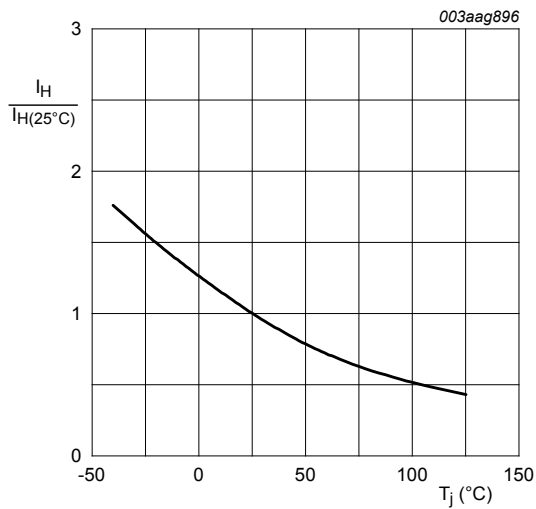
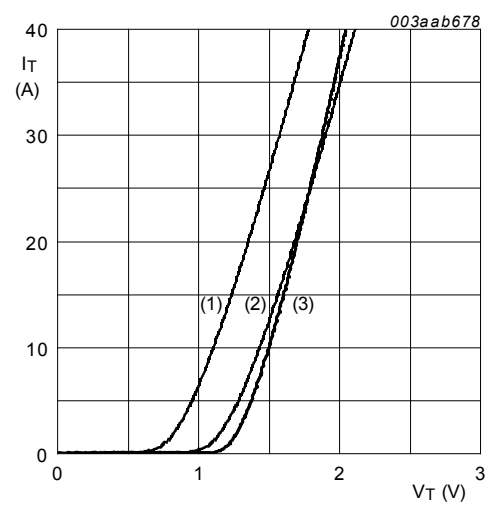


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.164\text{ V}$; $R_s = 0.027\ \Omega$
(1) $T_j = 125^\circ\text{C}$; typical values
(2) $T_j = 125^\circ\text{C}$; maximum values
(3) $T_j = 25^\circ\text{C}$; maximum values

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

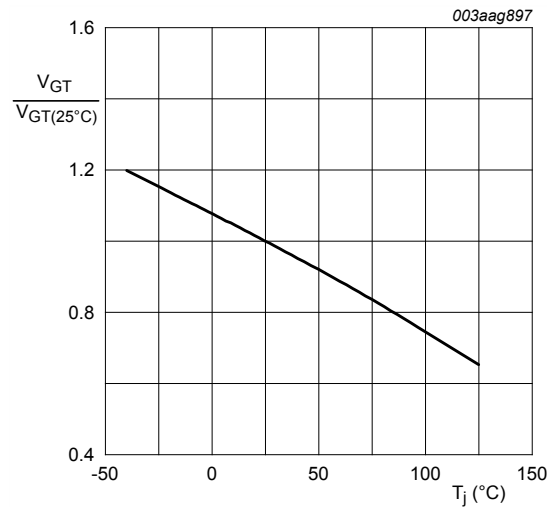


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

7. Package outline

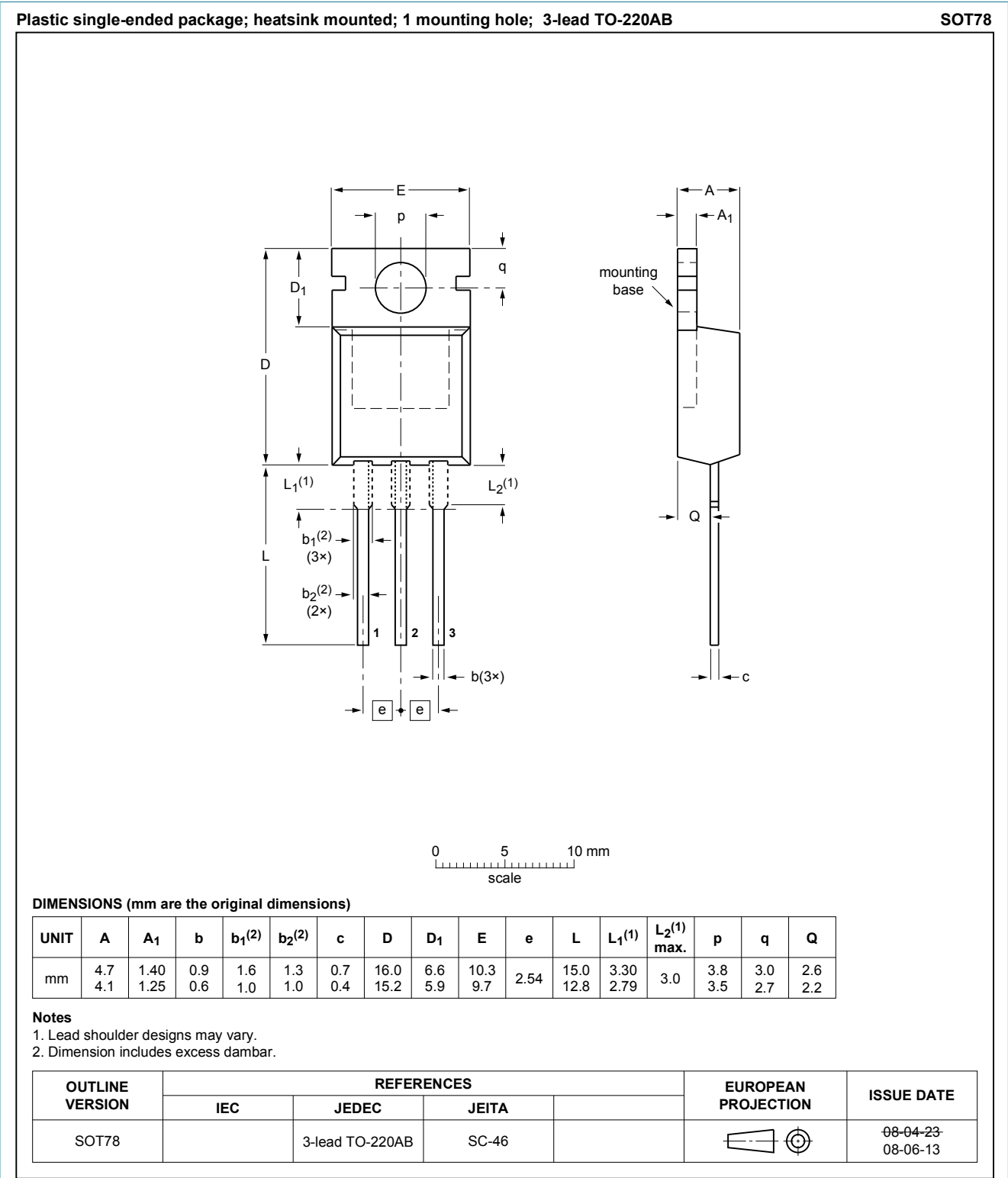


Fig. 12. Package outline TO-220AB (SOT78)

8. Legal information

8.1 Data sheet status

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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