

TOPT12-800C0

TOPTriac

8 October 2012

Preliminary data sheet

1. Product profile

1.1 General description

Planar passivated Temperature and Overload Protected Triac with high commutation performance in a SOT78 (TO-220AB) plastic package. This TOPTriac™ conveniently self protects by turning off in the event of excessive temperature. It is triggered negatively, which can be continuous DC or pulsed.

1.2 Features and benefits

- Exclusive negative gate triggering
- Full cycle AC conduction
- Hi-Com technology for enhanced immunity to false triggering
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- High minimum I_{GT} for guaranteed immunity to gate noise
- Over-temperature self protection function
- Pin compatible with standard triacs
- Planar passivated for voltage ruggedness and reliability

1.3 Applications

- Any suitable circuit for protection against overload and/or over temperature
- Electronic motor starters e.g. refrigeration compressors
- Heating and cooking appliances
- High power motors e.g. vacuum cleaners, window blinds, well pumps

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; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	-	100	A
T_j	junction temperature	normal operation	-	-	125	°C
		self-protection	-	-	150	°C
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 100\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	12	A



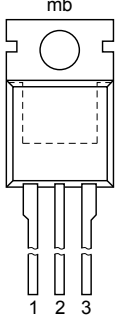
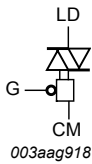
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Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; LD+ G-; $T_J = 25\text{ }^\circ\text{C}$	5	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; LD- G-; $T_J = 25\text{ }^\circ\text{C}$	5	-	35	mA

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	CM	common; mounting base	 <p>TO-220AB (SOT78)</p>	 <p>003aag918</p>
2	LD	load		
3	G	gate		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
TOPT12-800C0	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78
TOPT12-800C0/DG	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; $T_{mb} \leq 100\text{ }^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	12	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ }^\circ\text{C}$; $t_p = 16.7\text{ ms}$	-	110	A

Symbol	Parameter	Conditions		Min	Max	Unit
		full sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5		-	100	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN		-	50	A^2s
dl_T/dt	rate of rise of on-state current	$I_T = 20\text{ A}$; $I_G = 0.2\text{ A}$; $dl_G/dt = 0.2\text{ A}/\mu\text{s}$		-	100	$\text{A}/\mu\text{s}$
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	$^{\circ}\text{C}$
T_j	junction temperature	normal operation		-	125	$^{\circ}\text{C}$
		self-protection		-	150	$^{\circ}\text{C}$

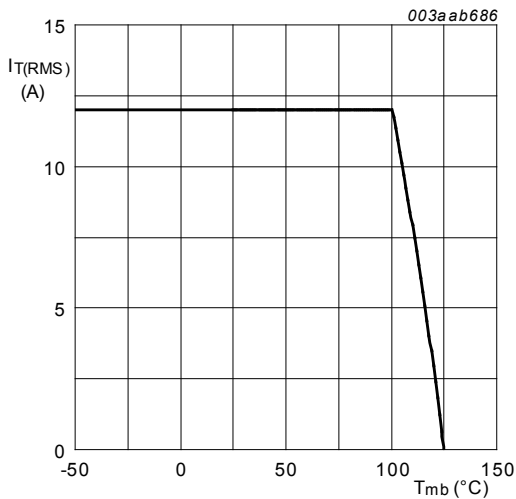
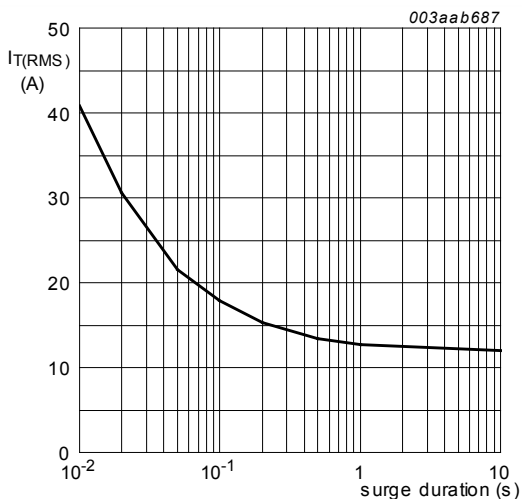


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



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

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

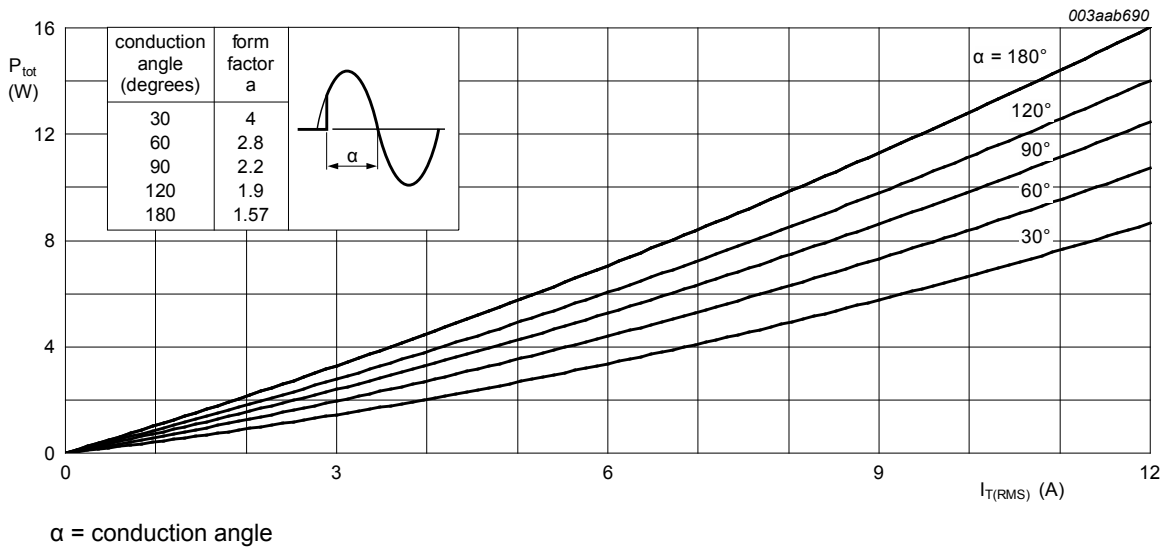


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

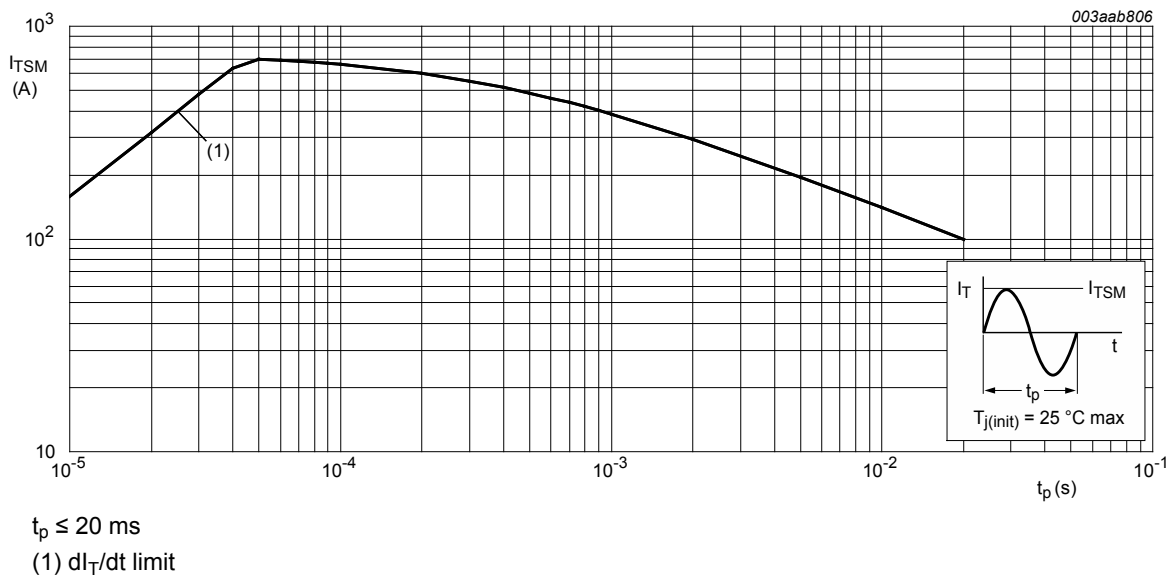
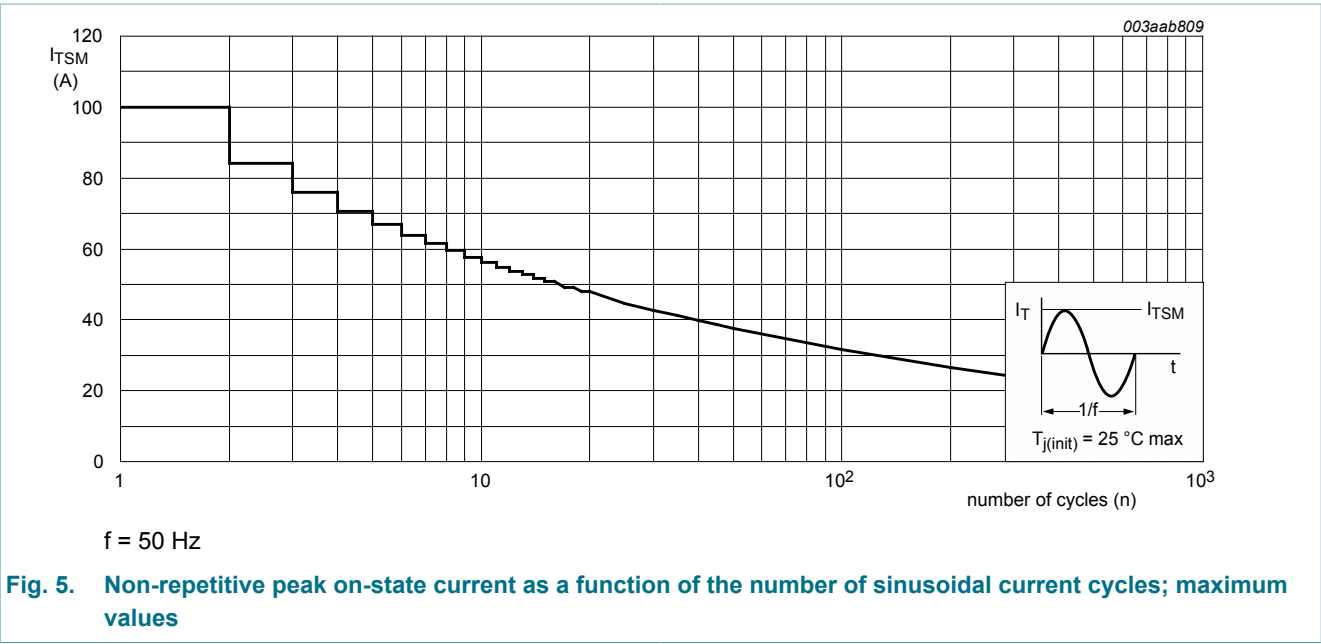


Fig. 4. Non-repetitive peak on-state current as a function of pulse duration; maximum values



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	half cycle; Fig. 6	-	-	2	K/W
		full cycle; Fig. 6	-	-	1.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

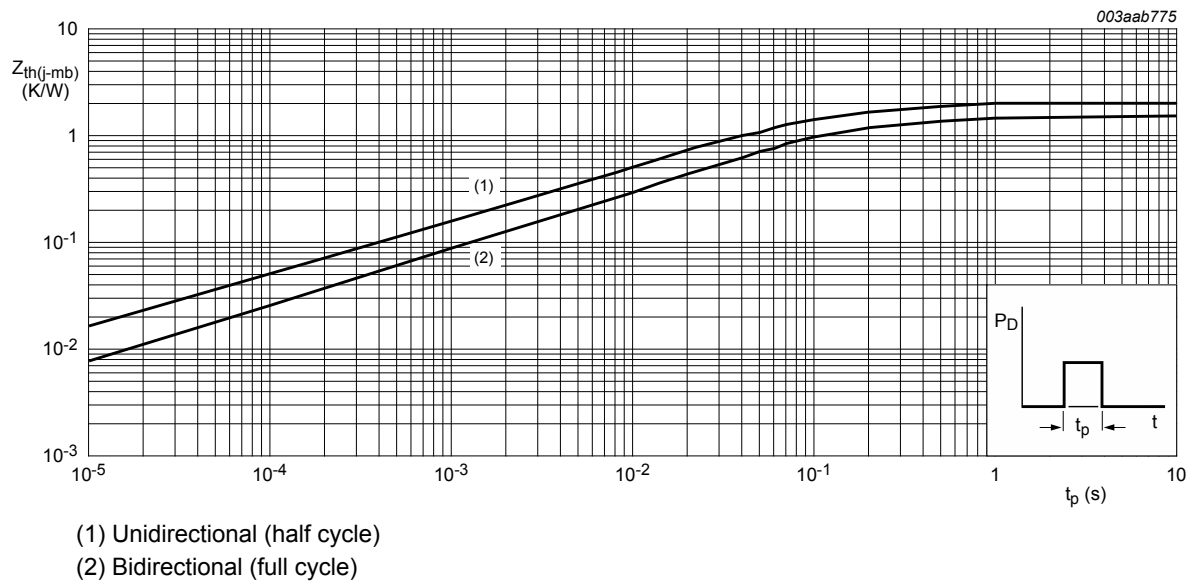


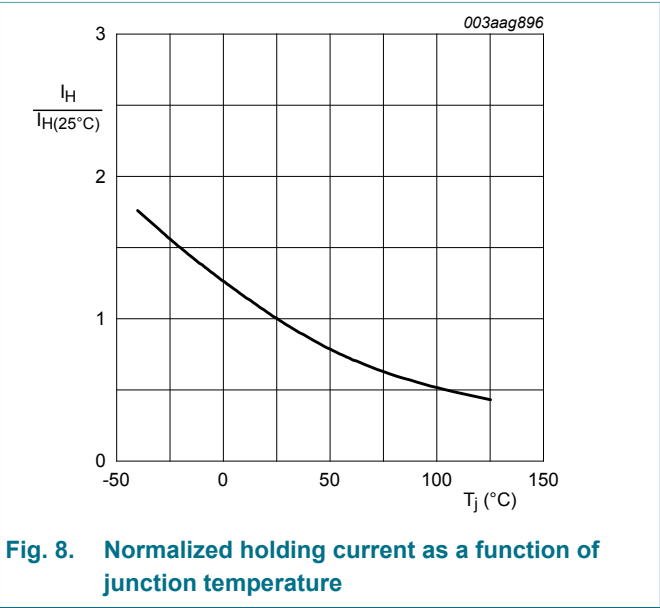
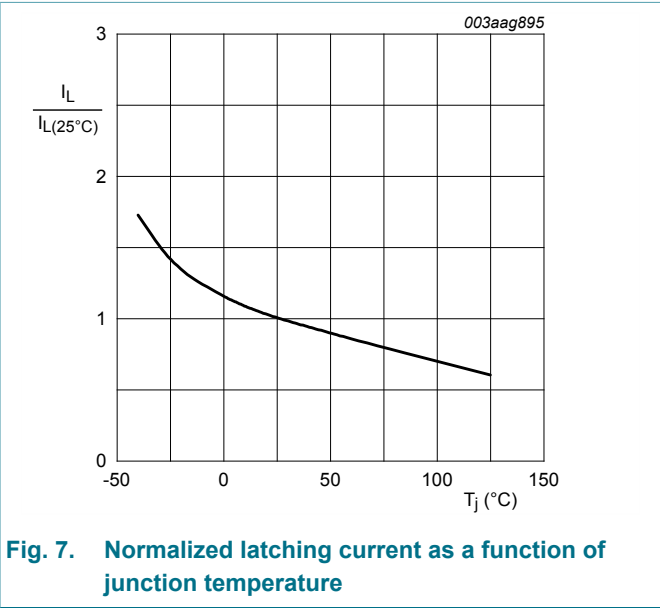
Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

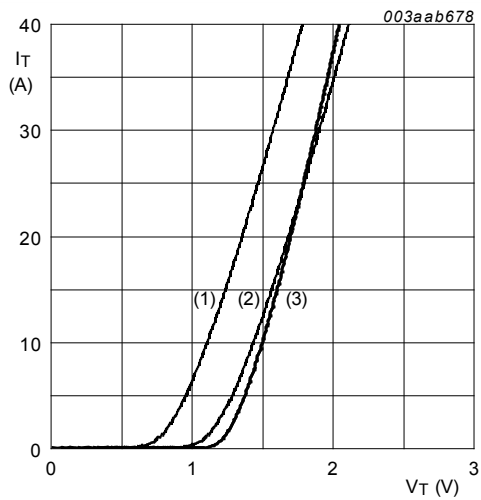
6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; LD+ G-; $T_J = 25\text{ }^\circ\text{C}$	5	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; LD- G-; $T_J = 25\text{ }^\circ\text{C}$	5	-	35	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; LD+ G-; $T_J = 25\text{ }^\circ\text{C}$	-	-	60	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; LD- G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 7	-	-	50	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 8	-	-	35	mA
V_T	on-state voltage	$I_T = 15\text{ A}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 9	-	1.3	1.6	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 10	-	1.4	2.3	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_J = 125\text{ }^\circ\text{C}$; Fig. 10	0.5	-	-	V
I_D	off-state current	$V_D = 800\text{ V}$; $T_J = 125\text{ }^\circ\text{C}$	-	0.1	0.5	mA
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	500	-	-	V/ μs

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
dI _{com} /dt	rate of change of commutating current	V _D = 400 V; I _{T(RMS)} = 12 A; dV _{com} /dt = 20 V/μs; (snubberless condition); gate open circuit		20	-	-	A/ms
Over-temperature protection characteristics							
T _{trip}	trip junction temperature	see application information		125	-	150	°C
V _{G(trip)}	trip gate voltage	I _G = 2 mA; see application information		0.3	-	-	V
		I _G = 50 mA; see application information		-	-	0.9	V
Over-temperature protection limiting values (for pulsed gate triggering)							
I _{G(bl)}	gate bleed current	T _J = 150 °C; V _G = V _{GT} ; see application information		-	-	2	mA
		T _J = 25 °C; V _G = V _{G(trip)} ; see application information		0.5	-	-	mA





$V_o = 1.164\text{ V}$; $R_s = 0.027\text{ }\Omega$

- (1) $T_j = 125\text{ }^\circ\text{C}$; typical values
- (2) $T_j = 125\text{ }^\circ\text{C}$; maximum values
- (3) $T_j = 25\text{ }^\circ\text{C}$; maximum values

Fig. 9. On-state current as a function of on-state voltage

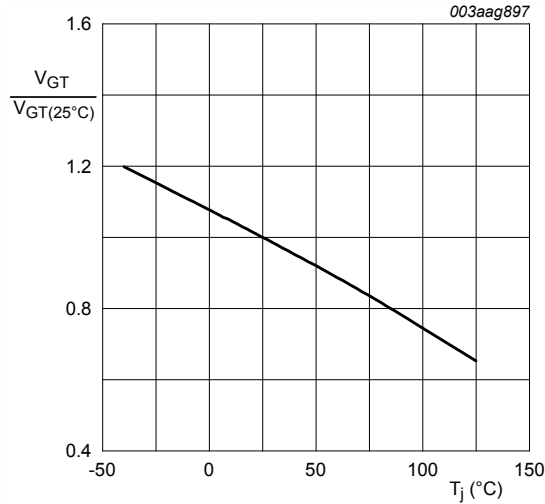


Fig. 10. Normalized gate trigger voltage as a function of junction temperature

7. Package outline

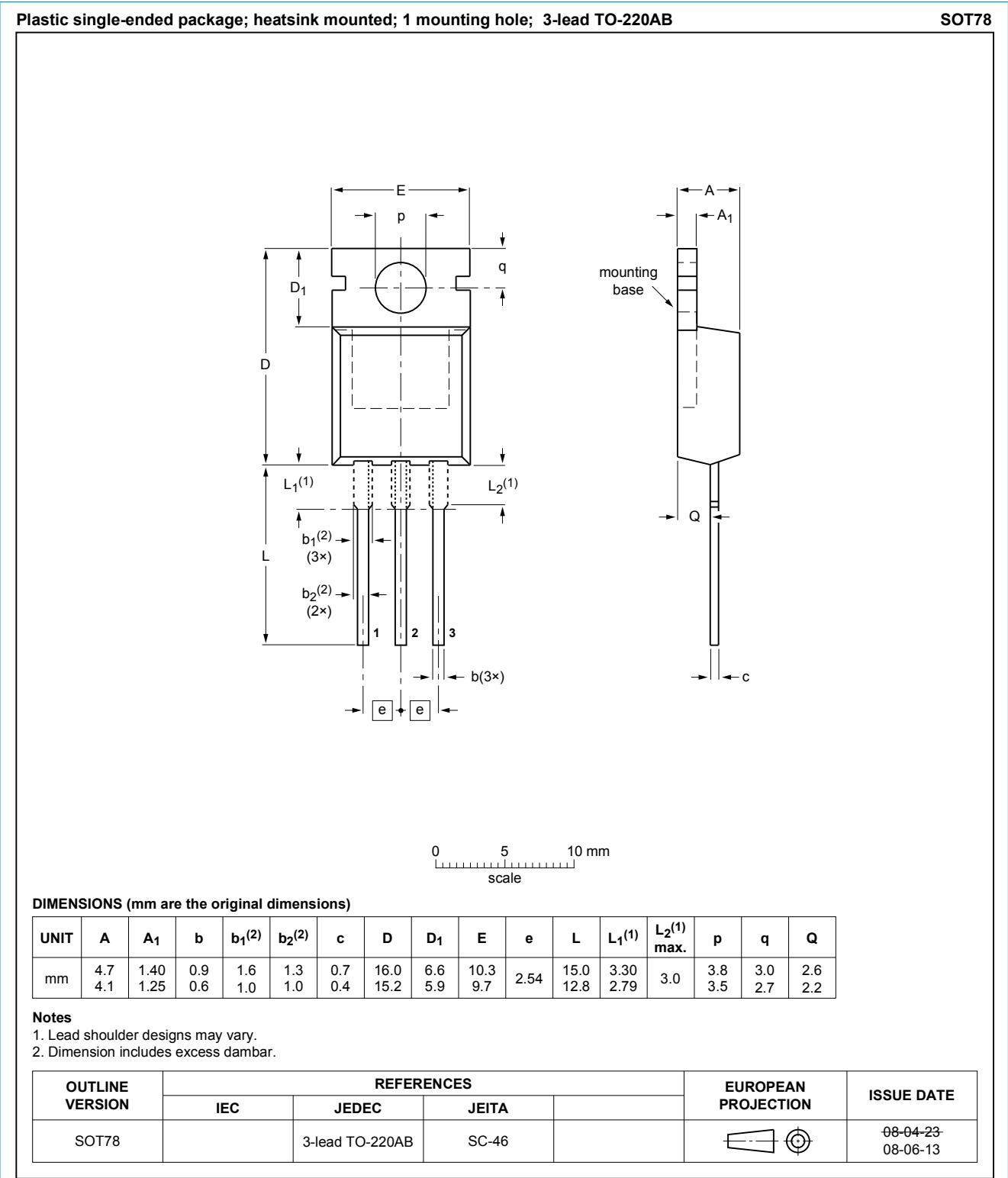


Fig. 11. Package outline TO-220AB (SOT78)

8. 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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