

1. Product profile

1.1 General description

Passivated, new generation, high commutation triacs, in a TO220 plastic package.

1.2 Features

- Very high commutation performance maximized at each gate sensitivity
- High immunity to dV/dt

1.3 Applications

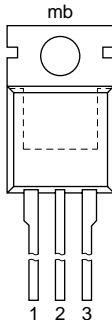

- High power motor control e.g. washing machines, vacuum cleaners
- Non-linear rectifier-fed motor loads
- Refrigeration and air conditioning compressors
- Electronic thermostats

1.4 Quick reference data

- $V_{DRM} \leq 600$ V (BTA312-600B/C)
- $V_{DRM} \leq 800$ V (BTA312-800B/C/ET)
- $I_{TSM} \leq 95$ A ($t = 20$ ms)
- $I_{GT} \leq 50$ mA (BTA312 series B)
- $I_{GT} \leq 35$ mA (BTA312 series C)
- $I_{T(RMS)} \leq 12$ A

2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Symbol
1	main terminal 1 (T1)		
2	main terminal 2 (T2)		
3	gate (G)		
mb	mounting base; main terminal 2 (T2)		

SOT78 (TO-220AB)

3. Ordering information

Table 2. Ordering information

Type number	Package		Version
	Name	Description	
BTA312-600B	SC-46	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78
BTA312-600CT			
BTA312-800B			
BTA312-800ET			

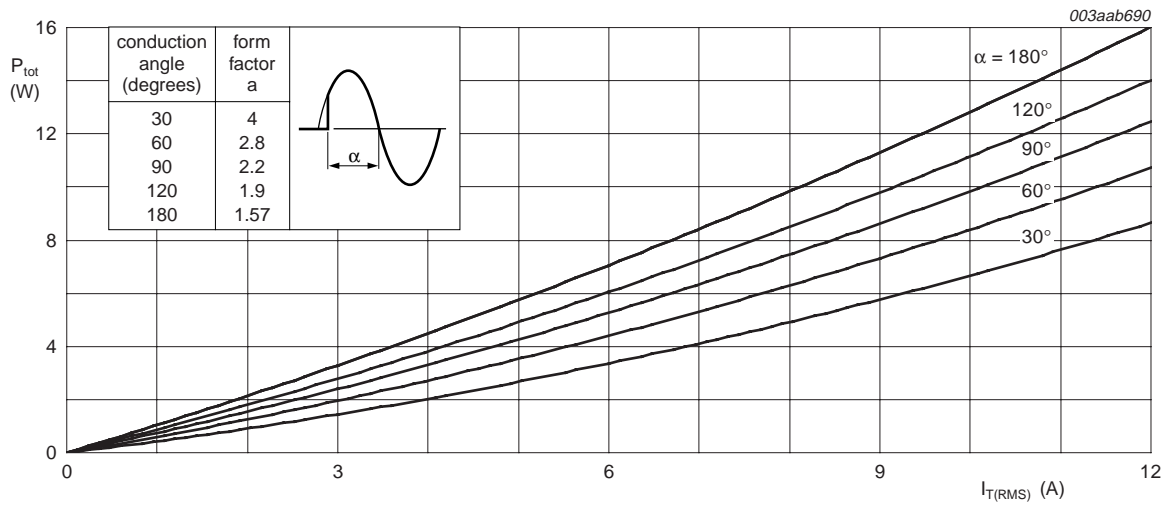
4. Limiting values

Table 3. Limiting values

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

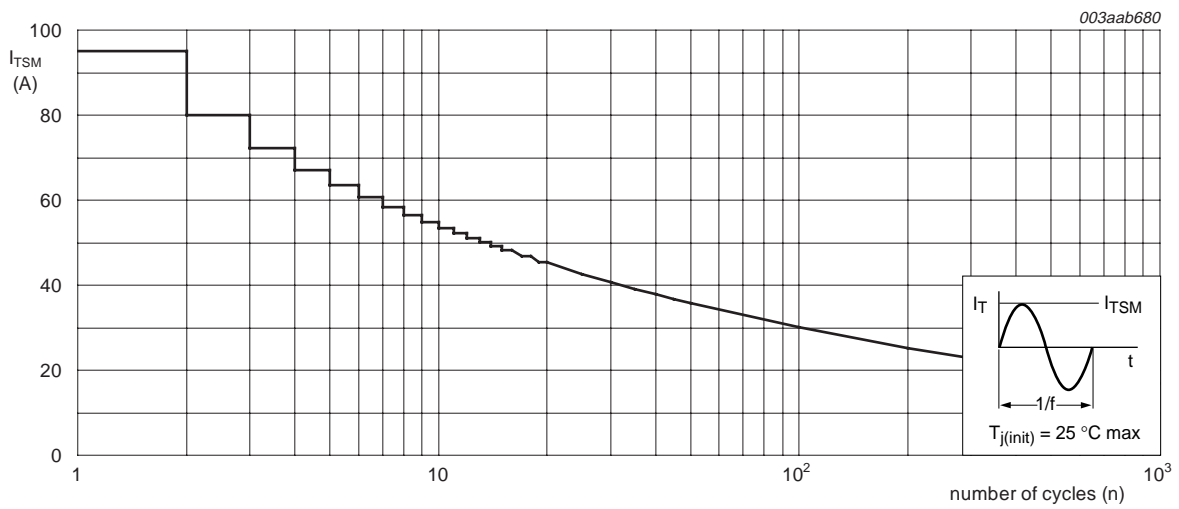
Symbol	Parameter	Conditions	Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage	BTA312-600B; BTA312-600CT	[1] -	600	V
		BTA312-800B; BTA312-800ET	-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 101\text{ °C}$; see Figure 4 and 5	-	12	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_j = 25\text{ °C}$ prior to surge; see Figure 2 and 3			
		$t = 20\text{ ms}$	-	95	A
		$t = 16.7\text{ ms}$	-	105	A
I^2t	I^2t for fusing	$t = 10\text{ ms}$	-	45	A^2s
di_T/dt	rate of rise of on-state current	$I_{TM} = 20\text{ A}$; $I_G = 0.2\text{ A}$; $di_G/dt = 0.2\text{ A}/\mu s$	-	100	$A/\mu s$
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	°C
T_j	junction temperature		-	125	°C

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



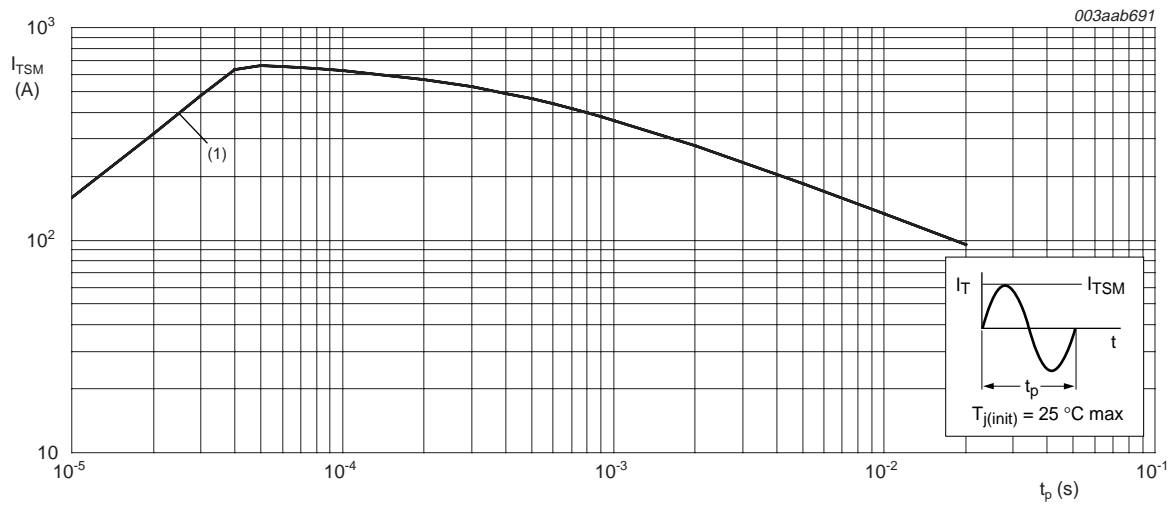
α = conduction angle

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



f = 50 Hz

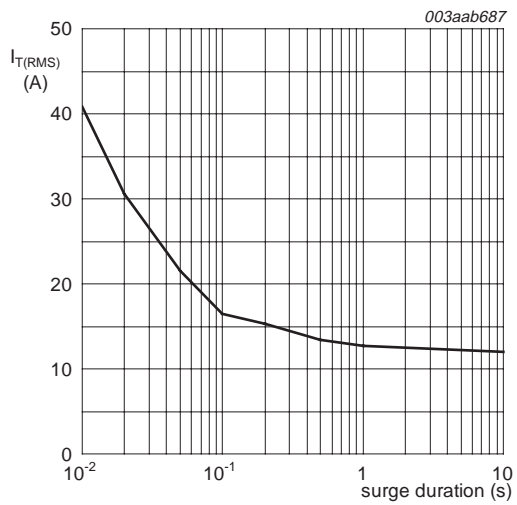
Fig 2. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



$t_p \leq 20\text{ ms}$

(1) di_T/dt limit

Fig 3. Non-repetitive peak on-state current as a function of pulse duration; maximum values



$f = 50\text{ Hz}$

$T_{mb} = 101\text{ °C}$

Fig 4. RMS on-state current as a function of surge duration; maximum values

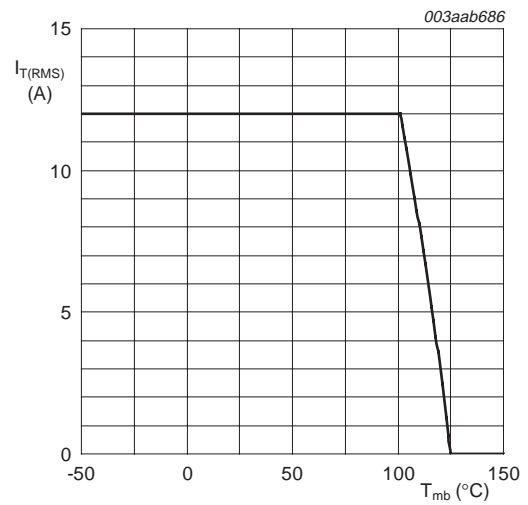
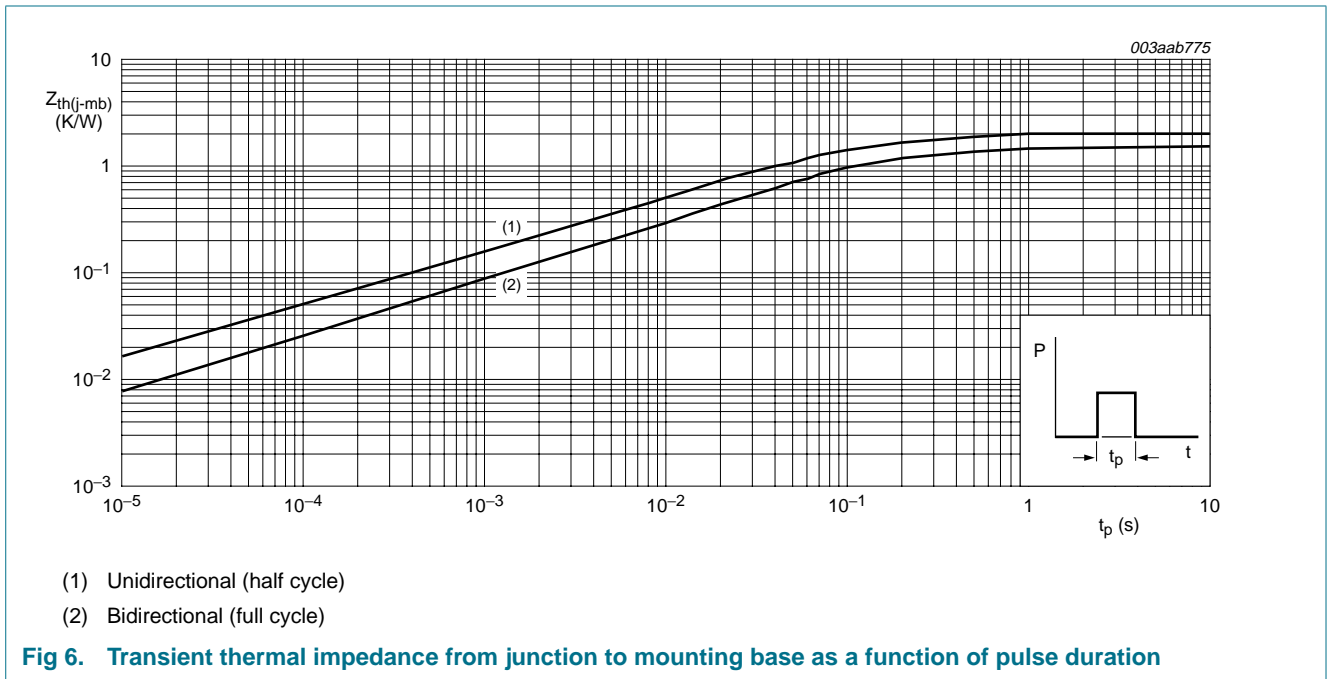


Fig 5. RMS on-state current as a function of mounting base temperature; maximum values

5. Thermal characteristics

Table 4. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	half cycle; see Figure 6	-	-	2.0	K/W
		full cycle; see Figure 6	-	-	1.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



6. Static characteristics

Table 5. Static characteristics

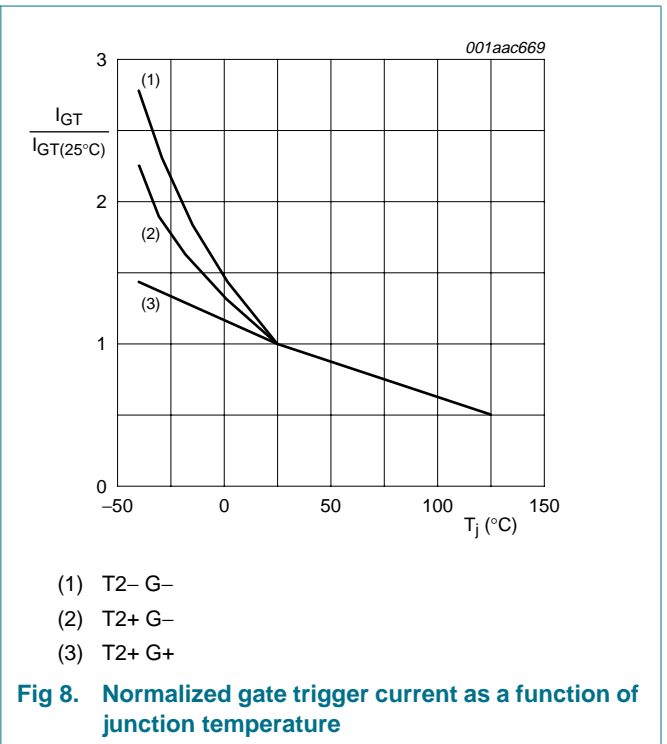
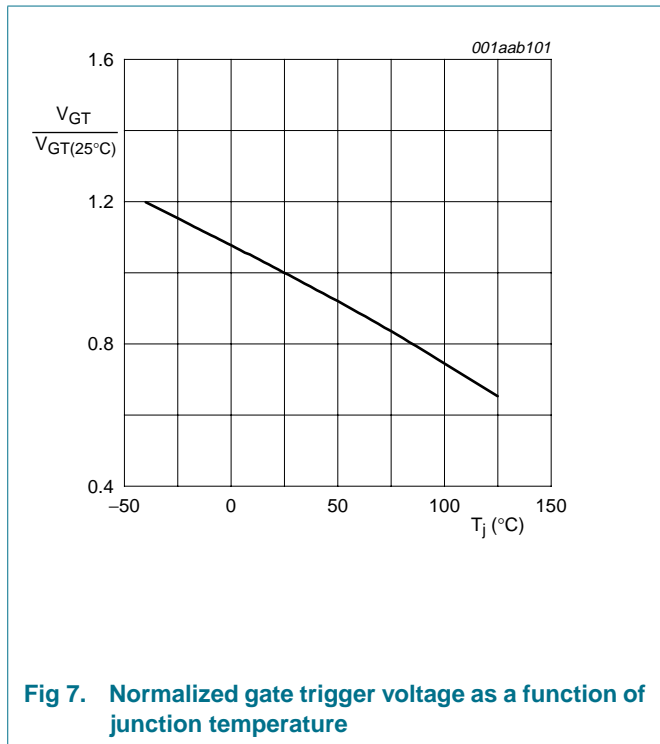
$T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified.

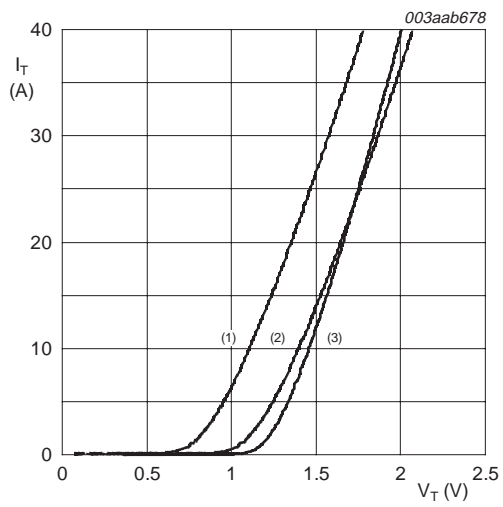
Symbol	Parameter	Conditions	BTA312-600B BTA312-800B			BTA312-600C BTA312-800C			Unit
			Min	Typ	Max	Min	Typ	Max	
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; see Figure 8							
		T2+ G+	2	-	50	2	-	35	mA
		T2+ G-	2	-	50	2	-	35	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_{GT} = 0.1\text{ A}$; see Figure 10							
		T2+ G+	-	-	60	-	-	50	mA
		T2+ G-	-	-	90	-	-	60	mA
I_H	holding current	$V_D = 12\text{ V}$; $I_{GT} = 0.1\text{ A}$; see Figure 11	-	-	60	-	-	35	mA
		T2- G-	-	-	60	-	-	50	mA
			-	-	60	-	-	35	mA
V_T	on-state voltage	$I_T = 15\text{ A}$; see Figure 9	-	1.3	1.6	-	1.3	1.6	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; see Figure 7	-	0.8	1.5	-	0.8	1.5	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ }^\circ\text{C}$	0.25	0.4	-	0.25	0.4	-	V
I_D	off-state current	$V_D = V_{DRM(max)}$; $T_j = 125\text{ }^\circ\text{C}$	-	0.1	0.5	-	0.1	0.5	mA

7. Dynamic characteristics

Table 6. Dynamic characteristics

Symbol	Parameter	Conditions	BTA312-600B BTA312-800B			BTA312-600C BTA312-800C			Unit
			Min	Typ	Max	Min	Typ	Max	
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 0.67 \times V_{DRM(max)}$; $T_j = 125\text{ °C}$; exponential waveform; gate open circuit	1000	2000	-	500	-	-	V/ μ s
dI_{com}/dt	rate of change of commutating current	$V_{DM} = 400\text{ V}$; $T_j = 125\text{ °C}$; $I_{T(RMS)} = 12\text{ A}$; without snubber; gate open circuit	30	-	-	20	-	-	A/ms
t_{gt}	gate-controlled turn-on time	$I_{TM} = 20\text{ A}$; $V_D = V_{DRM(max)}$; $I_G = 0.1\text{ A}$; $dI_G/dt = 5\text{ A}/\mu\text{s}$	-	2	-	-	2	-	μ s





$$V_o = 1.127 \text{ V}$$

$$R_s = 0.027 \ \Omega$$

- (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

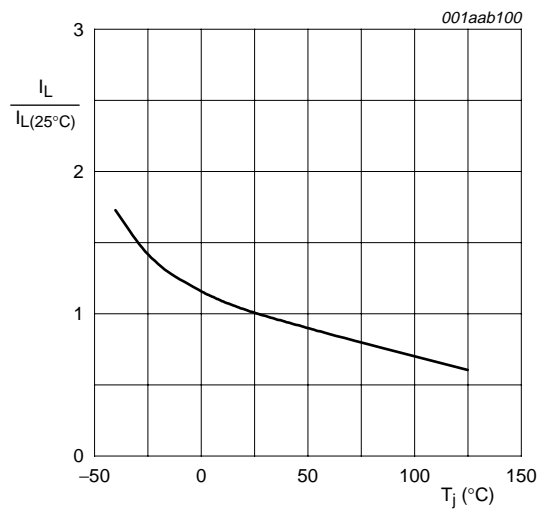


Fig 10. Normalized latching current as a function of junction temperature

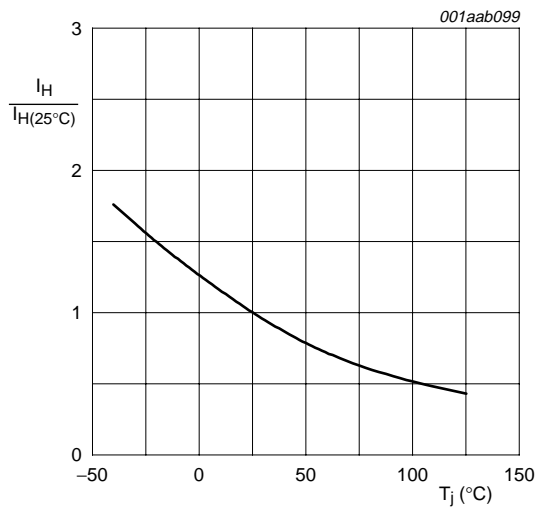


Fig 11. Normalized holding current as a function of junction temperature

8. Package outline

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

TO220

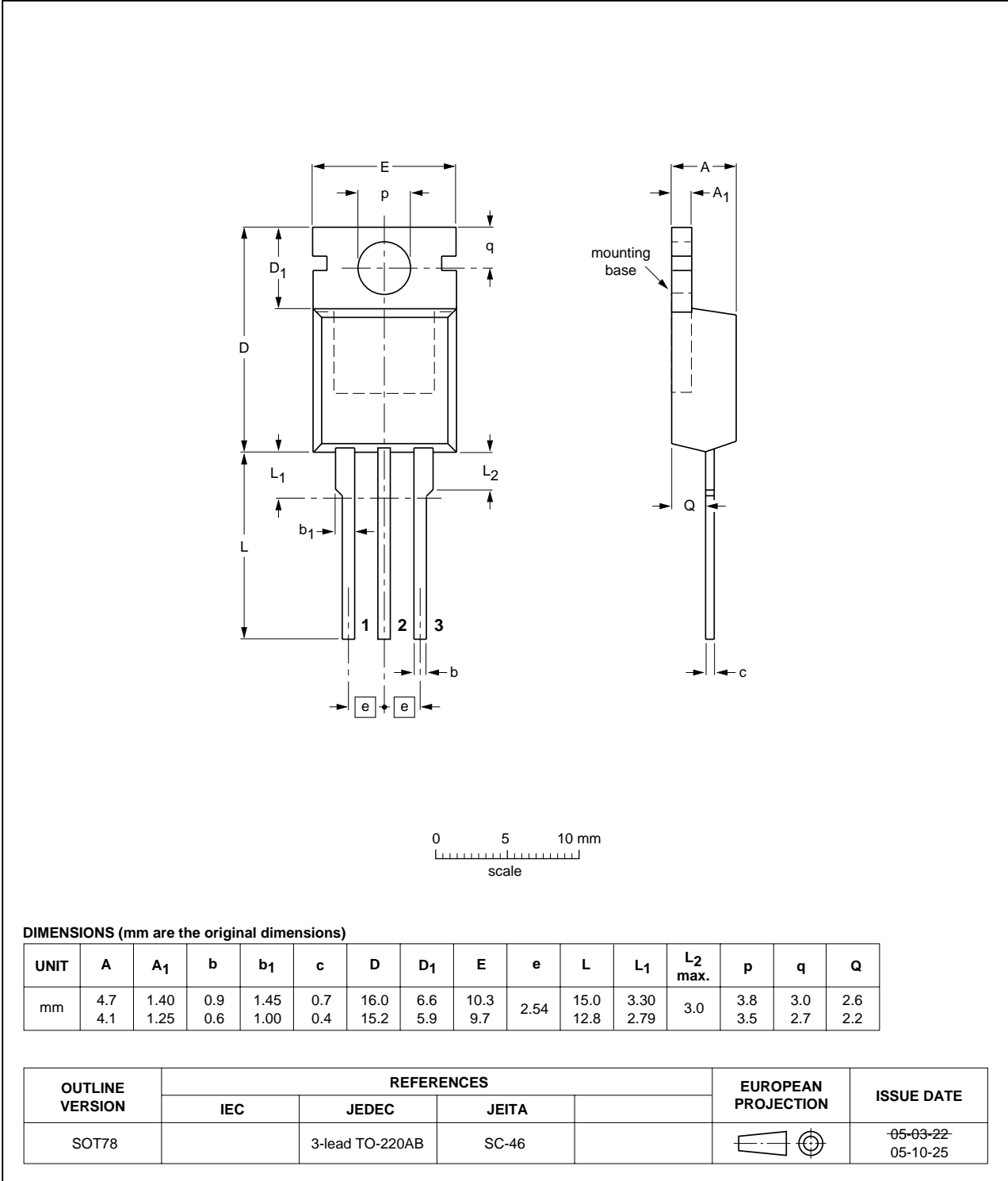


Fig 12. Package outline SOT78 (3-lead TO-220AB)