



BT137-600

4Q Triac

Rev. 5 — 25 March 2011

Product data sheet

1. Product profile

1.1 General description

Planar passivated four quadrant triac in a SOT78 plastic package intended for use in general purpose bidirectional switching and phase control applications.

1.2 Features and benefits

- High blocking voltage capability
- Less sensitive gate for improved noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in all four quadrants

1.3 Applications

- General purpose motor control
- General purpose switching

1.4 Quick reference data

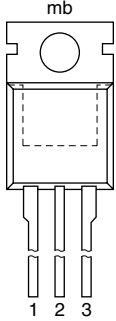
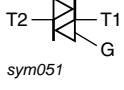
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	600	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; see Figure 4 ; see Figure 5	-	-	65	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 102\text{ °C}$; see Figure 1 ; see Figure 2 ; see Figure 3	-	-	8	A
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ °C}$; see Figure 7	-	5	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; see Figure 7	-	8	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; see Figure 7	-	11	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G+; $T_j = 25\text{ °C}$; see Figure 7	-	30	70	mA



2. Pinning information

Table 2. Pinning information

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

SOT78 (TO-220AB)

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BT137-600	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		-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 102\text{ °C}$; see Figure 1 ; see Figure 2 ; see Figure 3	-	8	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; see Figure 4 ; see Figure 5	-	65	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$; see Figure 4 ; see Figure 5	-	71	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; sine-wave pulse	-	21	A ² s
di_T/dt	rate of rise of on-state current	$I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $di_G/dt = 0.2\text{ A}/\mu\text{s}$; T2+ G+	-	50	A/ μs
		$I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $di_G/dt = 0.2\text{ A}/\mu\text{s}$; T2+ G-	-	50	A/ μs
		$I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $di_G/dt = 0.2\text{ A}/\mu\text{s}$; T2- G-	-	50	A/ μs
		$I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $di_G/dt = 0.2\text{ A}/\mu\text{s}$; T2- G+	-	10	A/ μs
I_{GM}	peak gate current		-	2	A
V_{GM}	peak gate voltage		-	5	V
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

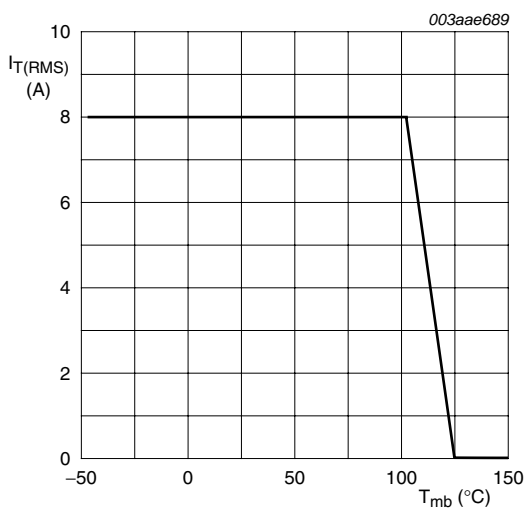
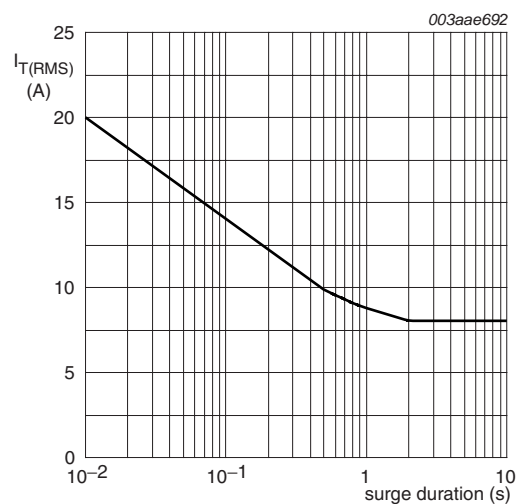


Fig 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50\text{ Hz}$
 $T_{mb} \leq 102\text{ °C}$

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

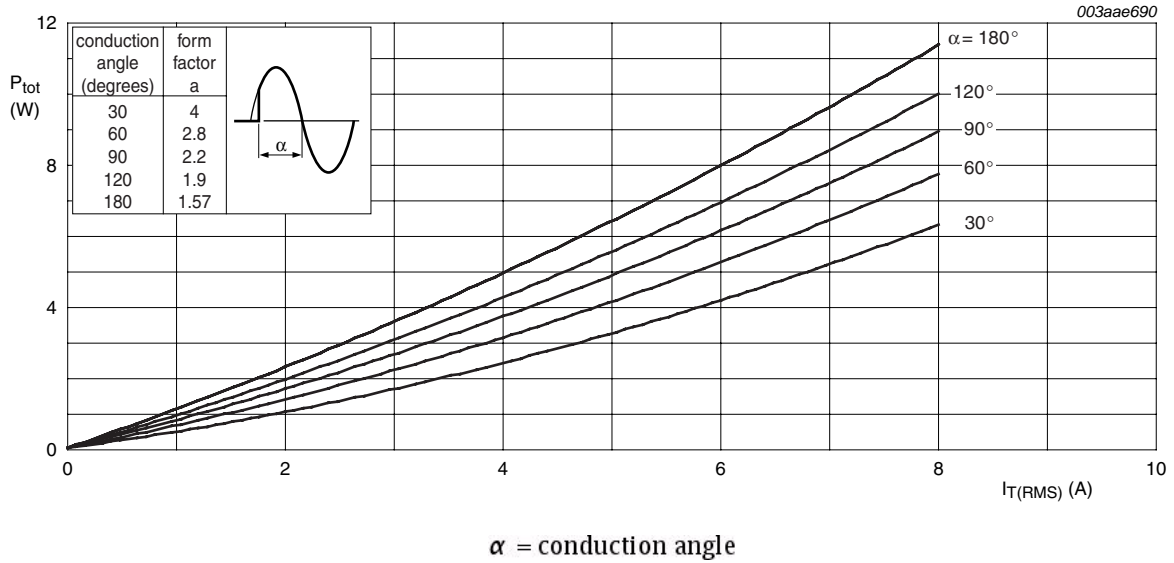


Fig 3. Total power dissipation as a function of RMS on-state current; maximum values

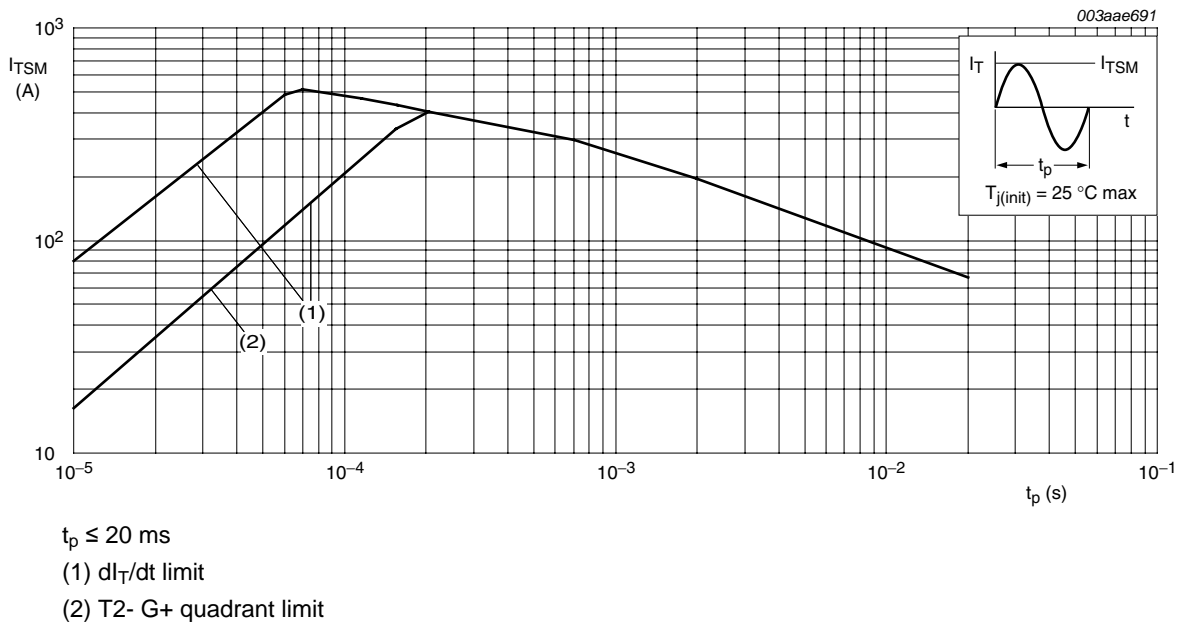
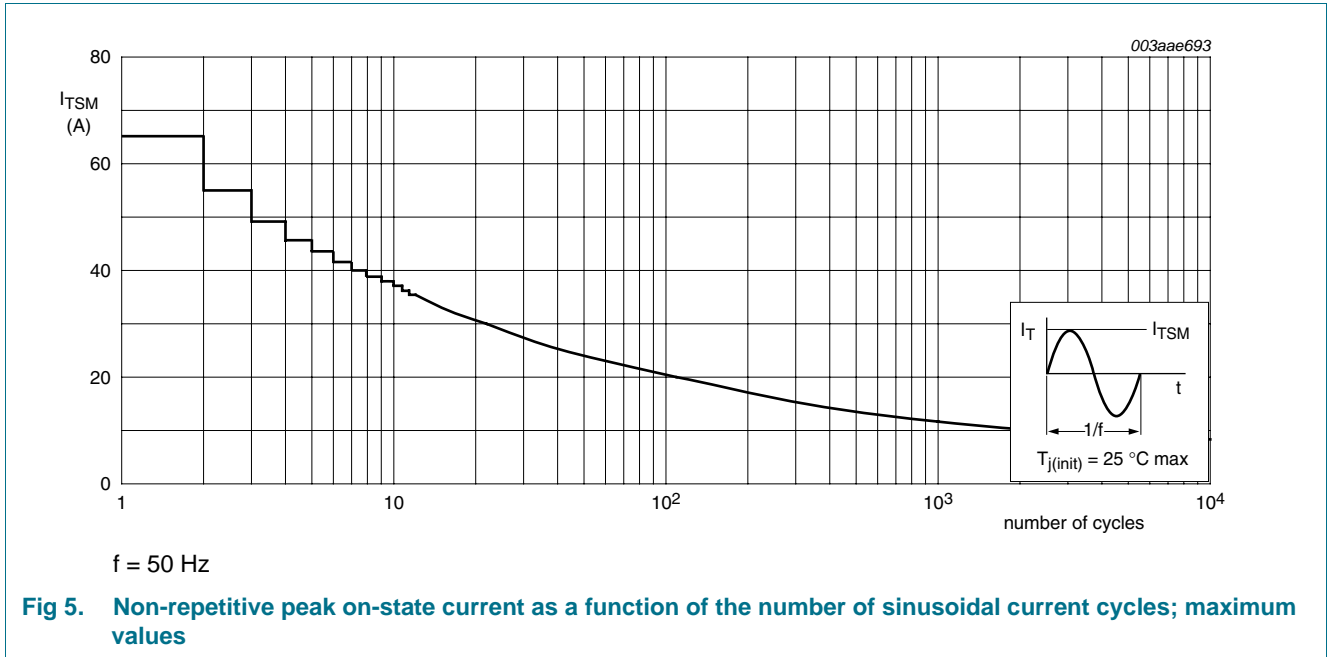


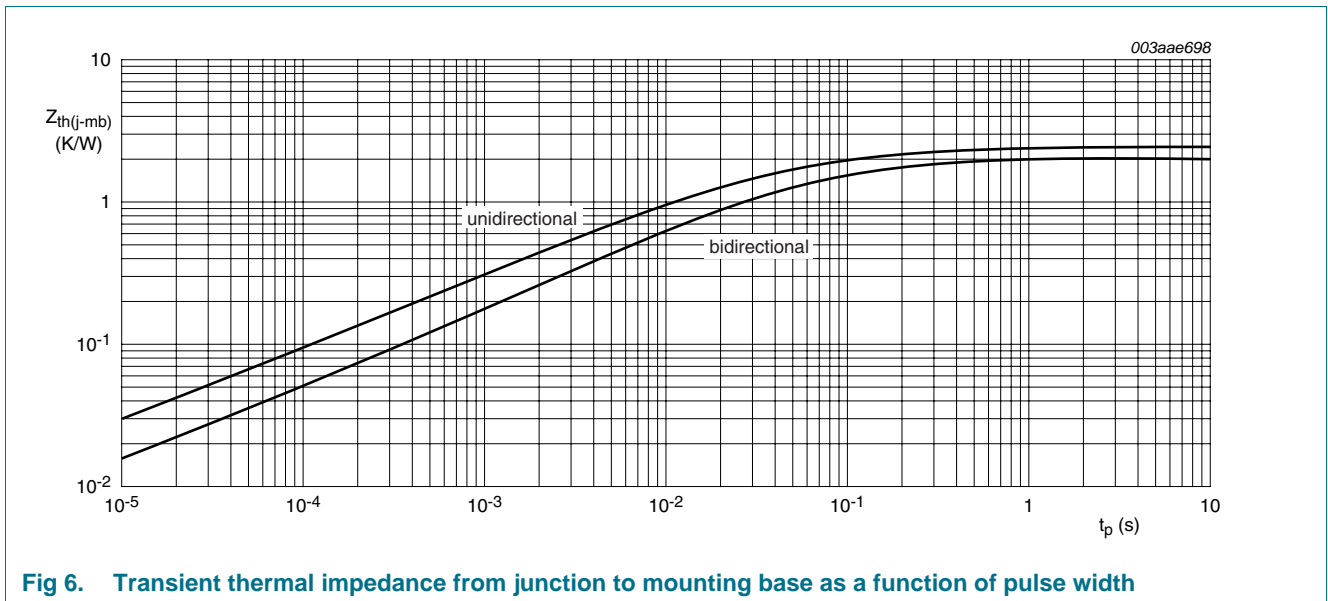
Fig 4. Non-repetitive peak on-state current as a function of pulse width; maximum values



5. Thermal characteristics

Table 5. Thermal characteristics

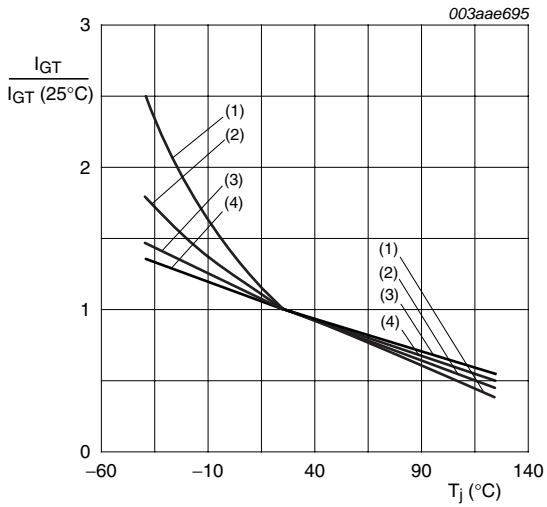
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	half cycle; see Figure 6	-	-	2.4	K/W
		full cycle; see Figure 6	-	-	2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ °C}$; see Figure 7	-	5	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; see Figure 7	-	8	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; see Figure 7	-	11	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G+; $T_j = 25\text{ °C}$; see Figure 7	-	30	70	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ °C}$; see Figure 8	-	7	30	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; see Figure 8	-	16	45	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; see Figure 8	-	5	30	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G+; $T_j = 25\text{ °C}$; see Figure 8	-	7	45	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; see Figure 9	-	5	20	mA
V_T	on-state voltage	$I_T = 10\text{ A}$; $T_j = 25\text{ °C}$; see Figure 10	-	1.3	1.65	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; see Figure 11	-	0.7	1.5	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ °C}$; see Figure 11	0.25	0.4	-	V
I_D	off-state current	$V_D = 600\text{ V}$; $T_j = 125\text{ °C}$	-	0.1	0.5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}$; $T_j = 125\text{ °C}$; exponential waveform; gate open circuit	100	250	-	V/ μ s
dV_{com}/dt	rate of change of commutating voltage	$V_D = 400\text{ V}$; $T_j = 95\text{ °C}$; $dI_{com}/dt = 3.6\text{ A/ms}$; $I_T = 8\text{ A}$; gate open circuit	-	20	-	V/ μ s
t_{gt}	gate-controlled turn-on time	$I_{TM} = 12\text{ A}$; $V_D = 600\text{ V}$; $I_G = 0.1\text{ mA}$; $dI_G/dt = 5\text{ A}/\mu\text{s}$	-	2	-	μ s



- (1) T2- G+
- (2) T2- G-
- (3) T2+ G-
- (4) T2+ G+

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

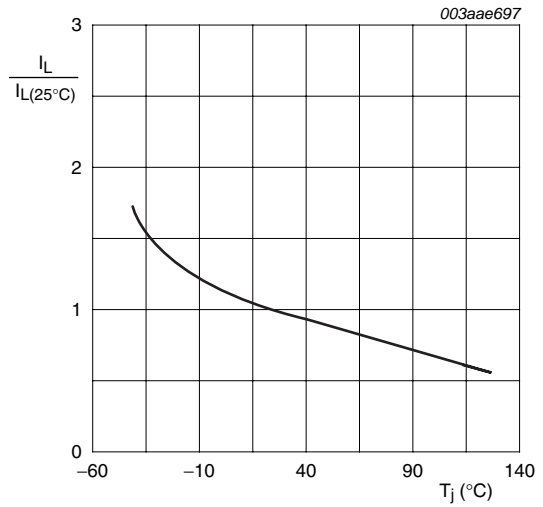


Fig 8. Normalized latching current as a function of junction temperature

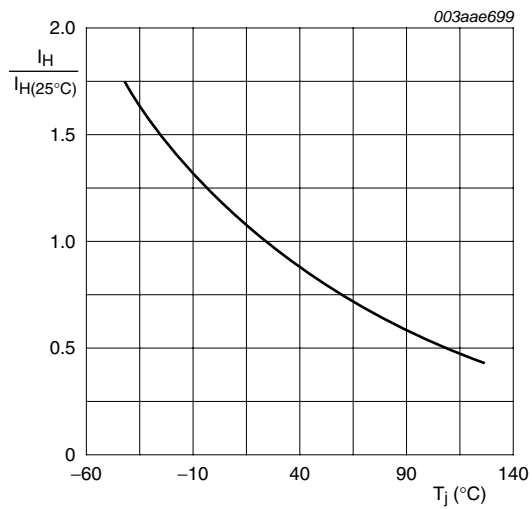
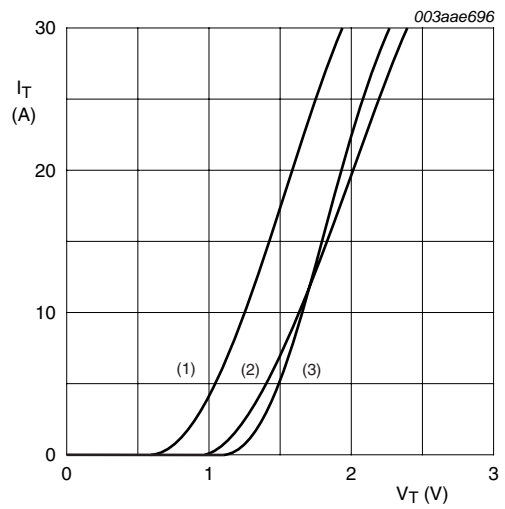


Fig 9. Normalized holding current as a function of junction temperature



$V_o = 1.264 \text{ V}$

$R_s = 0.038 \ \Omega$

- (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

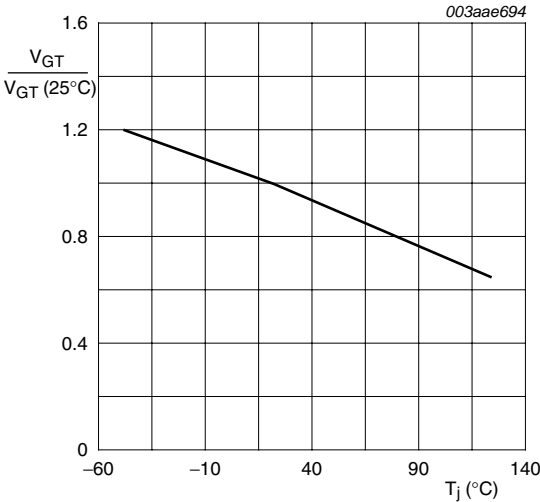


Fig 11. Normalized gate trigger voltage as a function of junction temperature

7. Package outline

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

SOT78

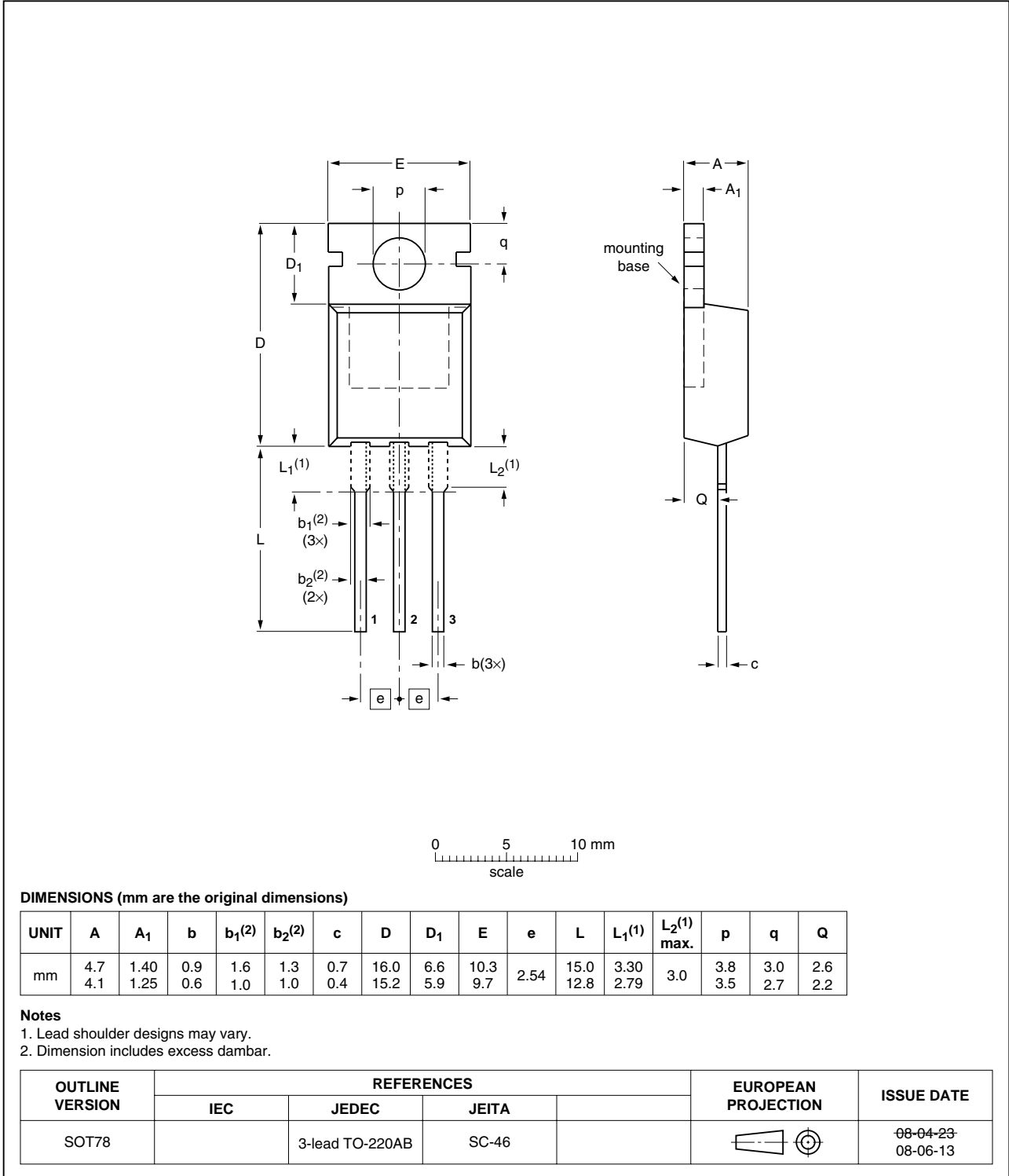


Fig 12. Package outline SOT78 (TO-220AB)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BT137-600 v.5	20110325	Product data sheet	-	BT137-600 v.4
Modifications:	• Various changes to content.			
BT137-600 v.4	20100831	Product data sheet	-	BT137_SERIES v.3

9. Legal information

9.1 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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