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# IMPORTANT NOTICE

10 December 2015

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## 1. Global joint venture starts operations as WeEn Semiconductors

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Dear customer,

As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

In this document where the previous NXP references remain, please use the new links as shown below.

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WeEn Semiconductors



# BT151-800R

SCR, 12 A, 15mA, 800 V, SOT78

Rev. 05 — 2 March 2009

Product data sheet

## 1. Product profile

### 1.1 General description

Planar passivated SCR (Silicon Controlled Rectifier) in a SOT78 plastic package.

### 1.2 Features and benefits

- High reliability
- High surge current capability
- High thermal cycling performance

### 1.3 Applications

- Ignition circuits
- Motor control
- Protection Circuits
- Static switching

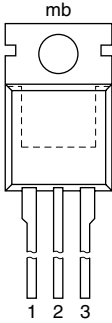

### 1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{\text{DRM}}$	repetitive peak off-state voltage		-	-	800	V
$I_{\text{T(AV)}}$	average on-state current	half sine wave; $T_{\text{mb}} \leq 109\text{ °C}$ ; see <a href="#">Figure 3</a>	-	-	7.5	A
$I_{\text{T(RMS)}}$	RMS on-state current	half sine wave; $T_{\text{mb}} \leq 109\text{ °C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	-	12	A
<b>Static characteristics</b>						
$I_{\text{GT}}$	gate trigger current	$V_{\text{D}} = 12\text{ V}$ ; $T_{\text{j}} = 25\text{ °C}$ ; $I_{\text{T}} = 100\text{ mA}$ ; see <a href="#">Figure 8</a>	-	2	15	mA

## 2. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		
3	G	gate		
mb	mb	anode		

**SOT78**  
(TO-220AB;SC-46)

## 3. Ordering information

**Table 3. Ordering information**

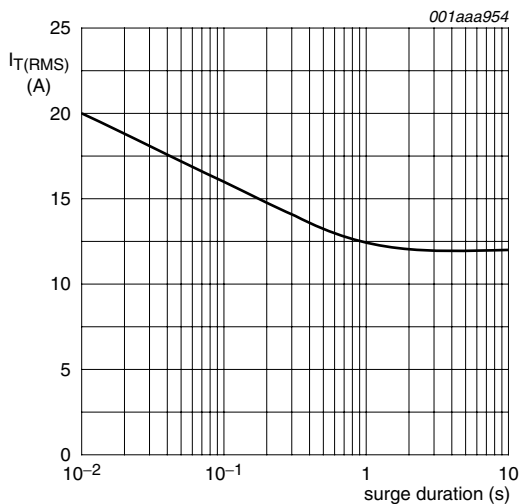
Type number	Package		Version
	Name	Description	
BT151-800R	TO-220AB;	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78
	SC-46		

## 4. Limiting values

**Table 4. Limiting values**

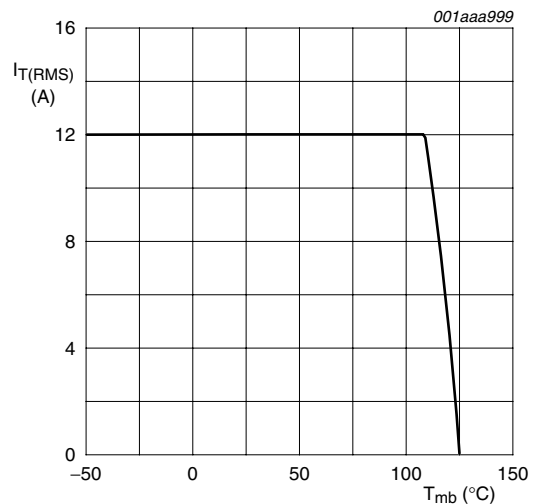
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	800	V
$V_{RRM}$	repetitive peak reverse voltage		-	800	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 109\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 3</a>	-	7.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 109\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	12	A
$di_T/dt$	rate of rise of on-state current	$I_T = 20\text{ A}$ ; $I_G = 50\text{ mA}$ ; $di_G/dt = 50\text{ mA}/\mu\text{s}$	-	50	A/ $\mu\text{s}$
$I_{GM}$	peak gate current		-	2	A
$P_{GM}$	peak gate power		-	5	W
$T_{stg}$	storage temperature		-40	150	$^{\circ}\text{C}$
$T_j$	junction temperature		-	125	$^{\circ}\text{C}$
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$	-	132	A
		half sine wave; $t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 4</a> ; see <a href="#">Figure 5</a>	-	120	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; sine-wave pulse	-	72	A <sup>2</sup> s
$P_{G(AV)}$	average gate power	over any 20 ms period	-	0.5	W
$V_{RGM}$	peak reverse gate voltage		-	5	V

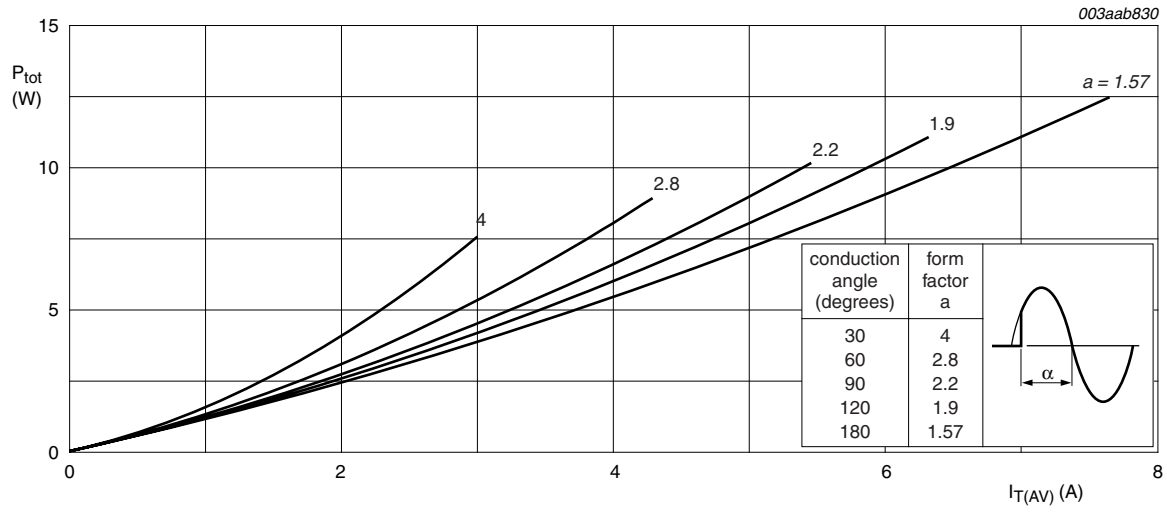


$f = 50\text{ Hz}; T_{mb} = 109\text{ }^{\circ}\text{C}$

**Fig 1. RMS on-state current as a function of surge duration; maximum values**

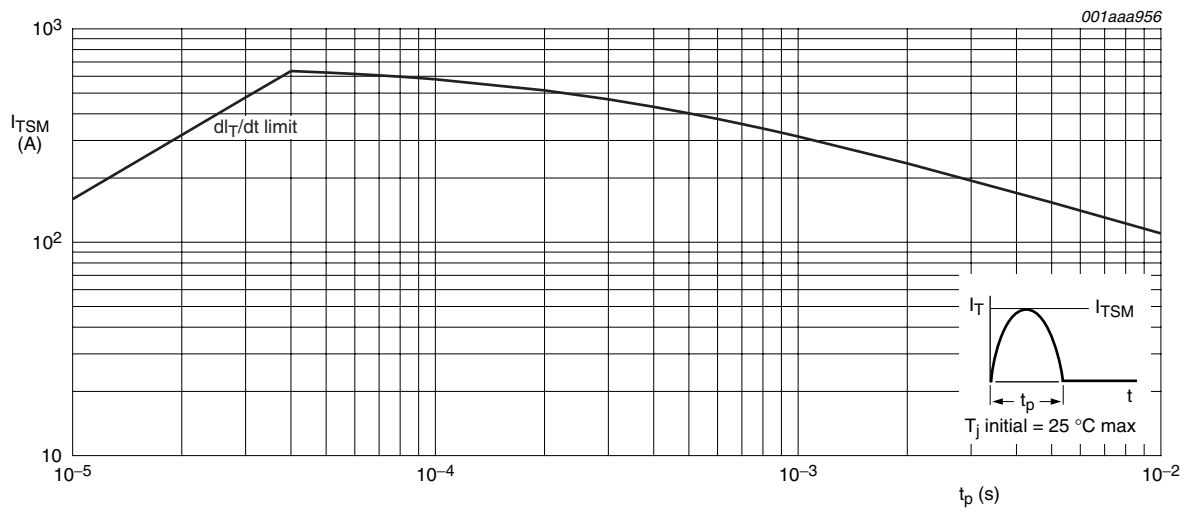


**Fig 2. RMS on-state current as a function of mounting base temperature; maximum values**



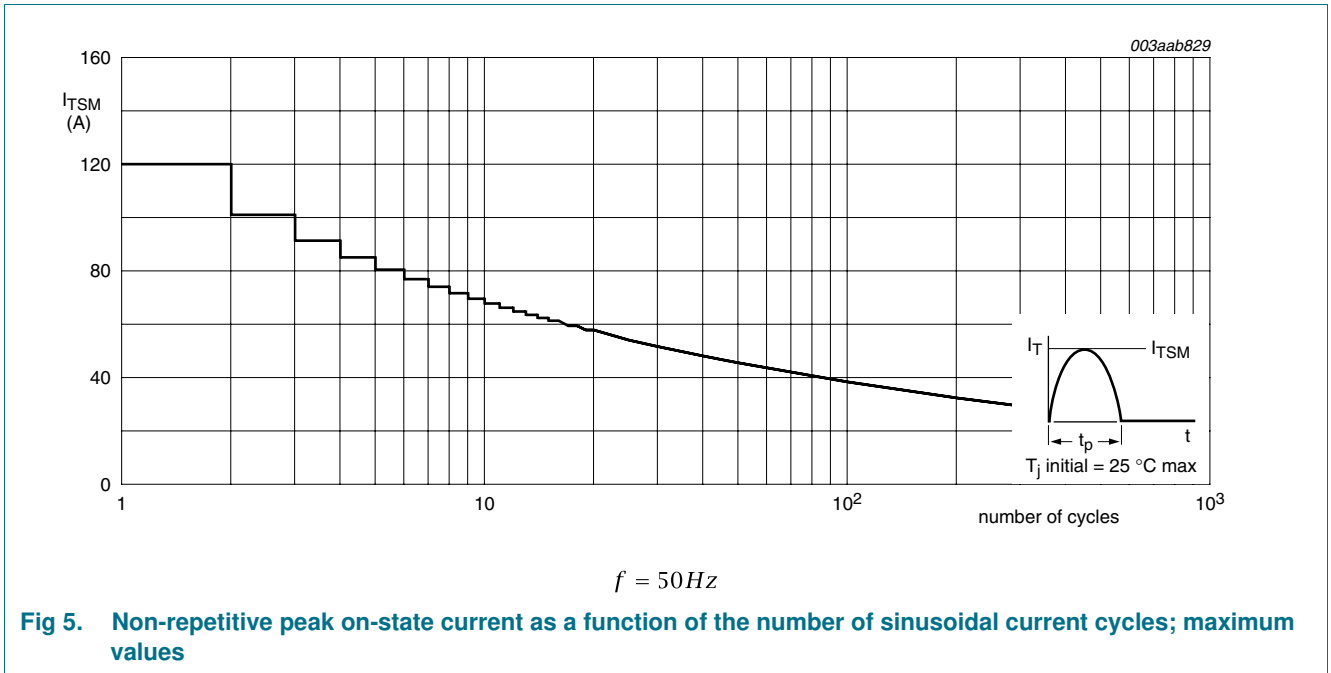
$$a = \text{form factor} = I_{T(RMS)} / I_{T(AV)}$$

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



$$t_p = 10 \text{ ms}$$

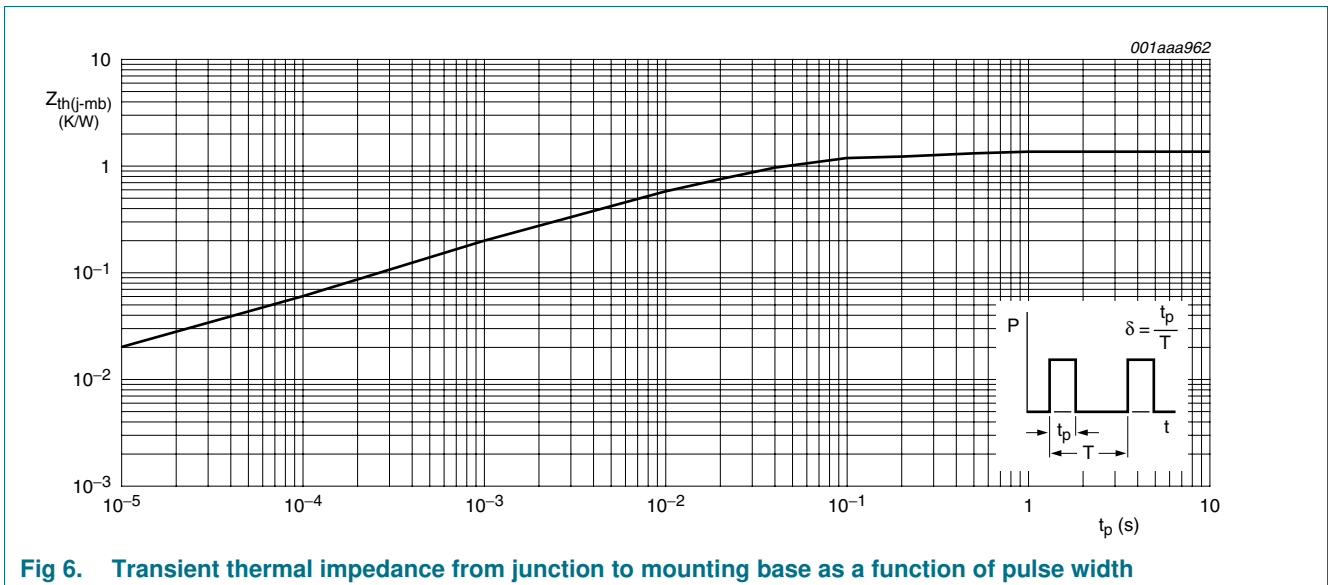
Fig 4. Non-repetitive peak on-state current as a function of pulse width for sinusoidal currents; maximum values



## 5. Thermal characteristics

**Table 5. Thermal characteristics**

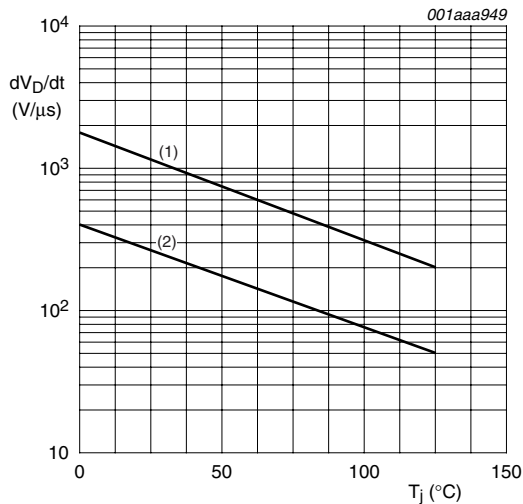
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see <a href="#">Figure 6</a>	-	-	1.3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air		-	60	-	K/W



## 6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; $I_T = 100\text{ mA}$ ; see <a href="#">Figure 8</a>	-	2	15	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 9</a>	-	10	40	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 10</a>	-	7	20	mA
$V_T$	on-state voltage	$I_T = 23\text{ A}$ ; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 11</a>	-	1.4	1.75	V
$V_{GT}$	gate trigger voltage	$I_T = 100\text{ mA}$ ; $V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 12</a>	-	0.6	1.5	V
		$I_T = 100\text{ mA}$ ; $V_D = 800\text{ V}$ ; $T_j = 125\text{ °C}$	0.25	0.4	-	V
$I_D$	off-state current	$V_D = 800\text{ V}$ ; $T_j = 125\text{ °C}$	-	0.1	0.5	mA
$I_R$	reverse current	$V_R = 800\text{ V}$ ; $T_j = 125\text{ °C}$	-	0.1	0.5	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$ ; $T_j = 125\text{ °C}$ ; exponential waveform; gate open circuit	50	130	-	V/ $\mu\text{s}$
		$V_{DM} = 536\text{ V}$ ; $T_j = 125\text{ °C}$ ; $R_{GK} = 100\ \Omega$ ; exponential waveform; see <a href="#">Figure 7</a>	200	1000	-	V/ $\mu\text{s}$
$t_{gt}$	gate-controlled turn-on time	$I_{TM} = 40\text{ A}$ ; $V_D = 800\text{ V}$ ; $I_G = 100\text{ mA}$ ; $dI_G/dt = 5\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$	-	2	-	$\mu\text{s}$
$t_q$	commutated turn-off time	$V_{DM} = 536\text{ V}$ ; $T_j = 125\text{ °C}$ ; $I_{TM} = 20\text{ A}$ ; $V_R = 25\text{ V}$ ; $(dI_T/dt)_M = 30\text{ A}/\mu\text{s}$ ; $dV_D/dt = 50\text{ V}/\mu\text{s}$ ; $R_{GK} = 100\ \Omega$	-	70	-	$\mu\text{s}$



(1)  $R_{GK} = 100\ \Omega$   
 (2) Gate open circuit

Fig 7. Critical rate of rise of off-state voltage as a function of junction temperature; minimum values

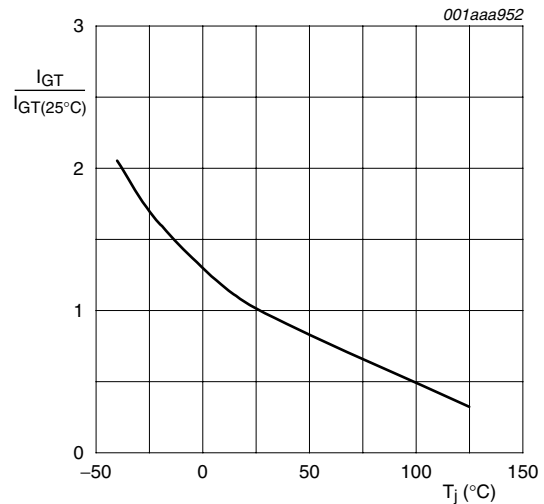


Fig 8. Normalized gate trigger current as a function of junction temperature



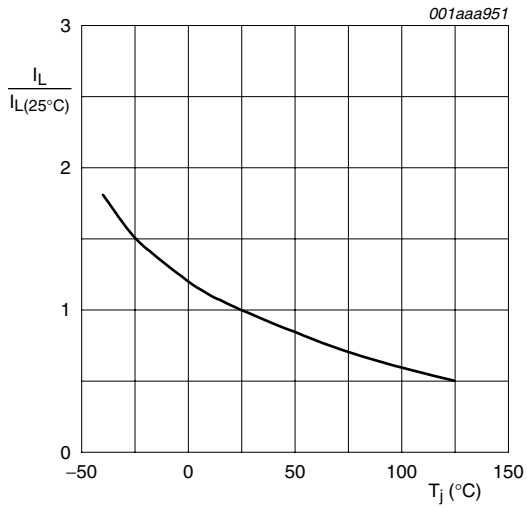


Fig 9. Normalized latching current as a function of junction temperature

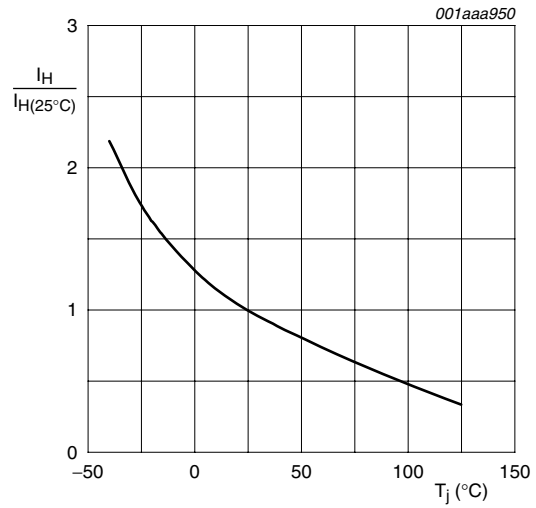
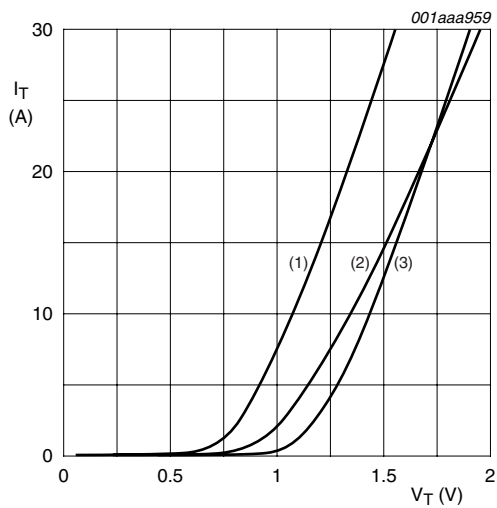


Fig 10. Normalized holding current as a function of junction temperature



- $V_0 = 1.06 \text{ V}; R_s = 0.0304 \Omega$
- (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 11. On-state current as a function of on-state voltage

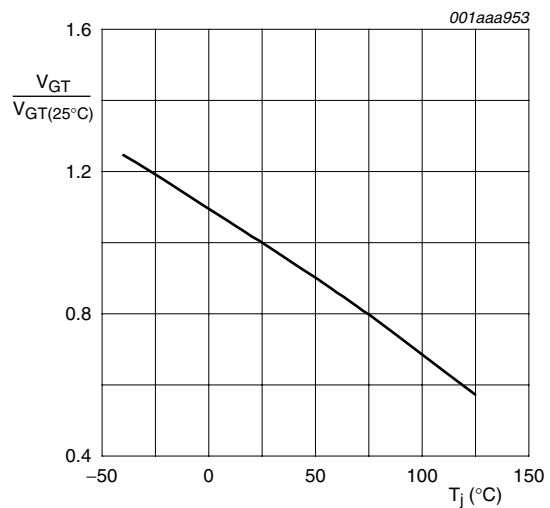


Fig 12. Normalized gate trigger voltage as a function of junction temperature

7. Package outline

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

SOT78

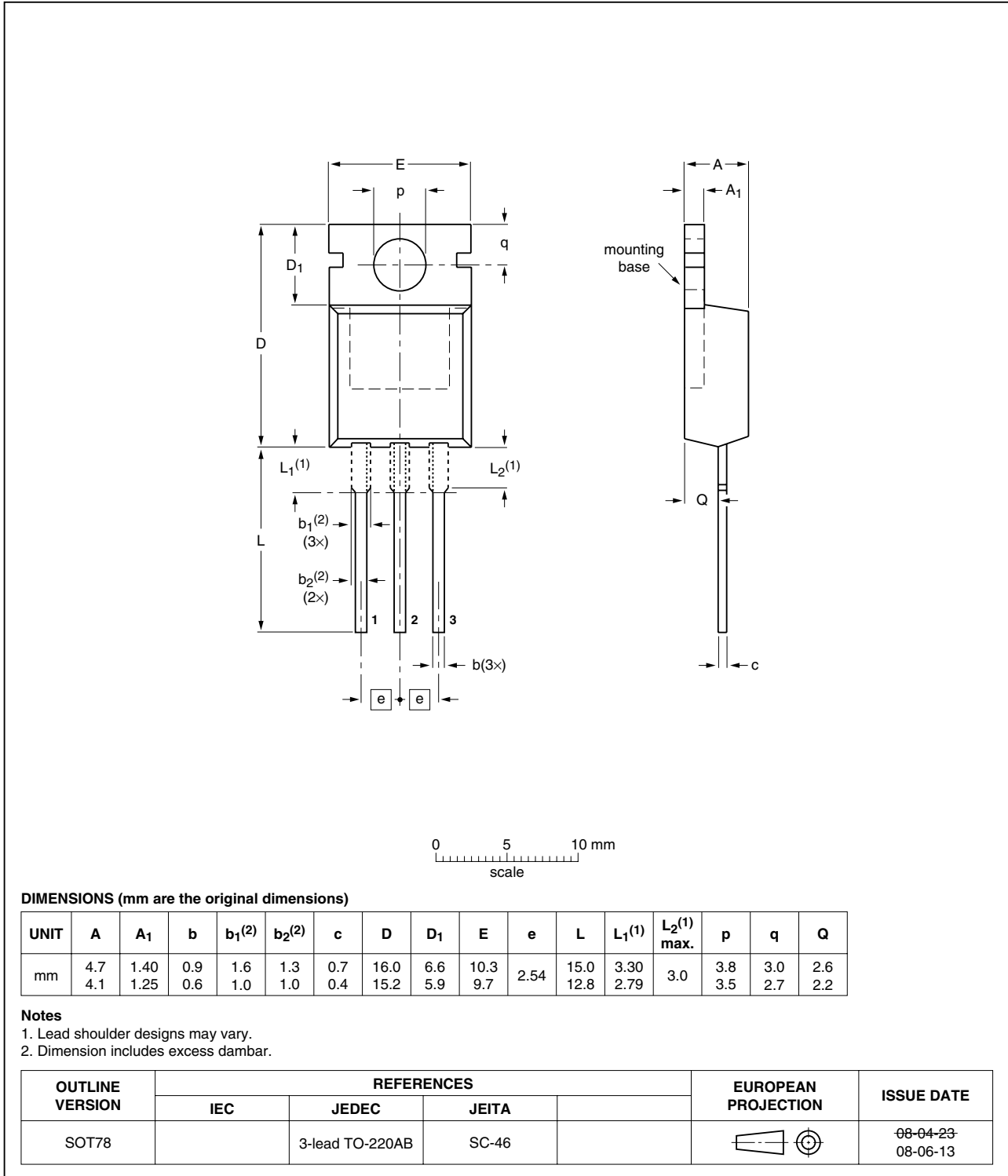


Fig 13. Package outline SOT78 (TO-220AB)

## 8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BT151-800R_5	20090302	Product data sheet	-	BT151_SER_L_R_4
Modifications:		<ul style="list-style-type: none"><li>Package outline updated.</li><li>Type number BT151-800R separated from data sheet BT151_SER_L_R_4.</li></ul>		
BT151_SER_L_R_4	20061023	Product data sheet	-	BT151_SERIES_3
BT151_SERIES_3 (9397 750 13159)	20040607	Product specification	-	BT151_SERIES_2
BT151_SERIES_2	19990601	Product specification	-	BT151_SERIES_1
BT151_SERIES_1	19970901	Product specification	-	-

## 9. Legal information

### 9.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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