



# BSS84

## P-channel enhancement mode vertical DMOS transistor

Rev. 06 — 16 December 2008

Product data sheet

## 1. Product profile

### 1.1 General description

P-channel enhancement mode vertical Diffusion Metal-Oxide Semiconductor (DMOS) transistor in a small Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number <sup>[1]</sup>	Package	
	NXP	JEDEC
BSS84	SOT23	TO-236AB
BSS84/DG		

[1] /DG: halogen-free

### 1.2 Features

- Low threshold voltage
- High-speed switching
- Direct interface to CMOS and Transistor-Transistor Logic (TTL)
- No secondary breakdown

### 1.3 Applications

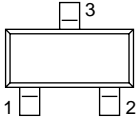
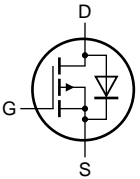
- Line current interrupter in telephone sets
- Relay, high-speed and line transformer drivers

### 1.4 Quick reference data

- $V_{DS} \leq -50$  V
- $I_D \leq -130$  mA
- $R_{DS(on)} \leq 10$   $\Omega$
- $P_{tot} \leq 250$  mW

## 2. Pinning information

**Table 2. Pinning**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 <p>SOT23 (TO-236AB)</p>	 <p>001aaa025</p>
2	S	source		
3	D	drain		

## 3. Ordering information

**Table 3. Ordering information**

Type number <sup>[1]</sup>	Package		
	Name	Description	Version
BSS84	TO-236AB	plastic surface-mounted package; 3 leads	SOT23
BSS84/DG			

[1] /DG: halogen-free

## 4. Marking

**Table 4. Marking codes**

Type number <sup>[1]</sup>	Marking code <sup>[2]</sup>
BSS84	13*
BSS84/DG	ZV*

[1] /DG: halogen-free

[2] \* = -: made in Hong Kong  
 \* = p: made in Hong Kong  
 \* = t: made in Malaysia  
 \* = W: made in China

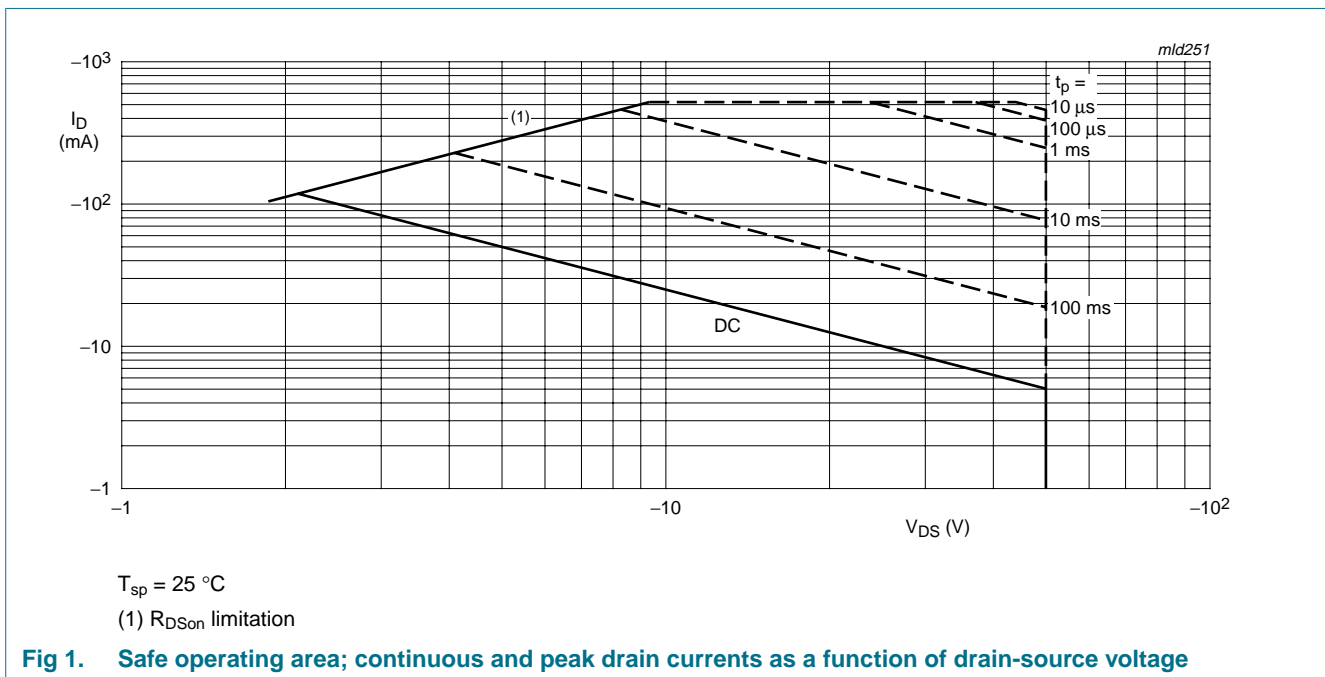
## 5. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	drain-source voltage	$25\text{ °C} \leq T_j \leq 150\text{ °C}$	-	-50	V
$V_{GS}$	gate-source voltage		-	$\pm 20$	V
$I_D$	drain current	$T_{sp} = 25\text{ °C}; V_{GS} = -10\text{ V};$ see <a href="#">Figure 1</a>	-	-130	mA
		$T_{sp} = 100\text{ °C};$ $V_{GS} = -10\text{ V}$	-	-75	mA
$I_{DM}$	peak drain current	$T_{sp} = 25\text{ °C}; t_p \leq 10\text{ }\mu\text{s};$ see <a href="#">Figure 1</a>	-	-520	mA
$P_{tot}$	total power dissipation	$T_{sp} = 25\text{ °C};$ see <a href="#">Figure 2</a> [1]	-	250	mW
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-65	+150	°C

[1] Device mounted on a Printed-Circuit Board (PCB).



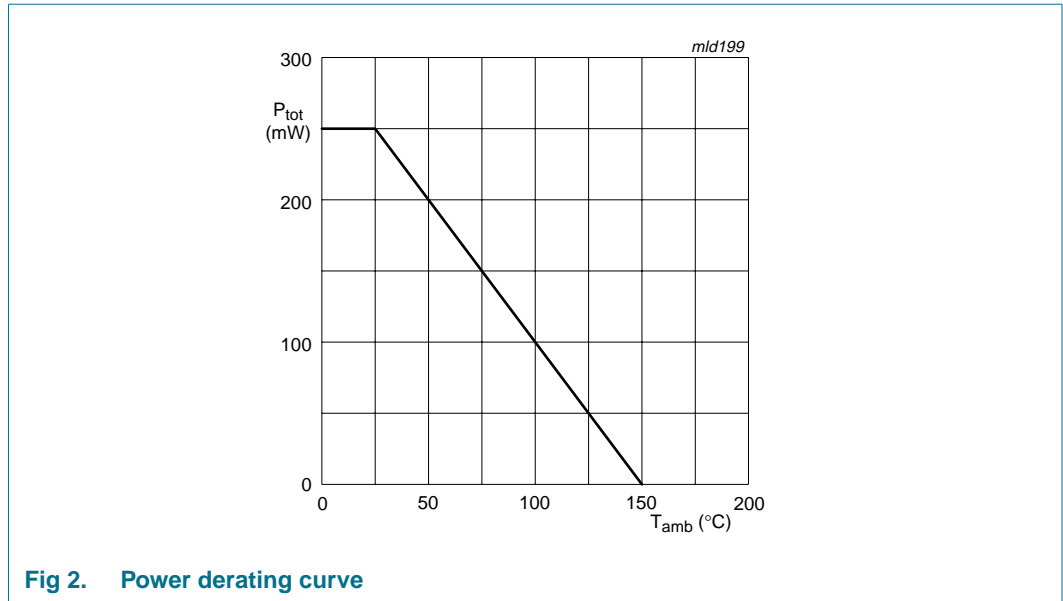


Fig 2. Power derating curve

## 6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	see <a href="#">Figure 3</a>	[1]	-	500	K/W

[1] Mounted on a PCB, vertical in still air.

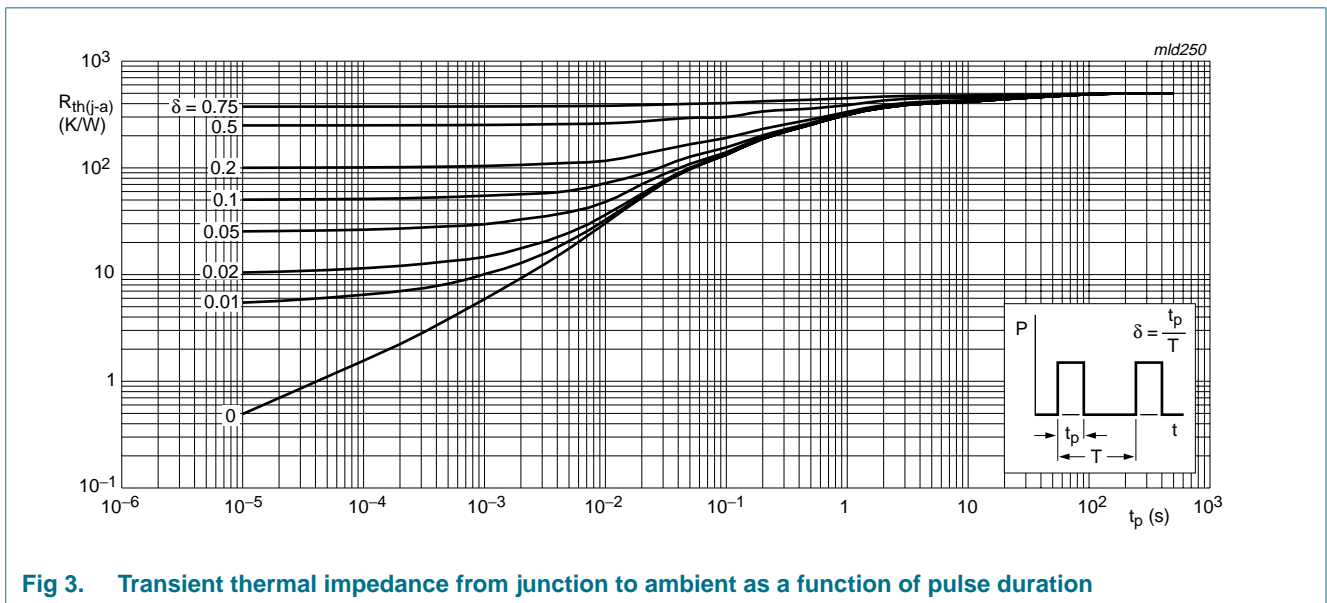


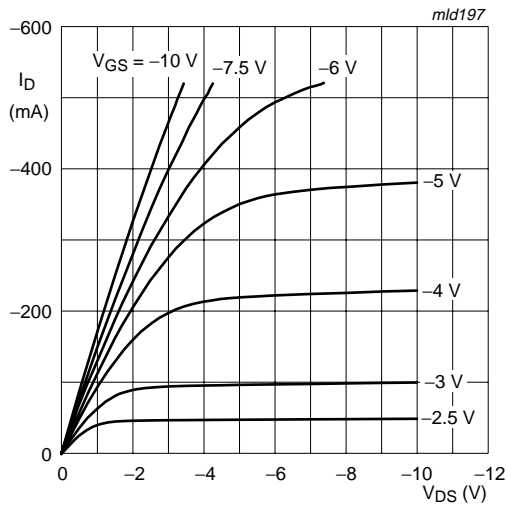
Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration

## 7. Characteristics

**Table 7. Characteristics**

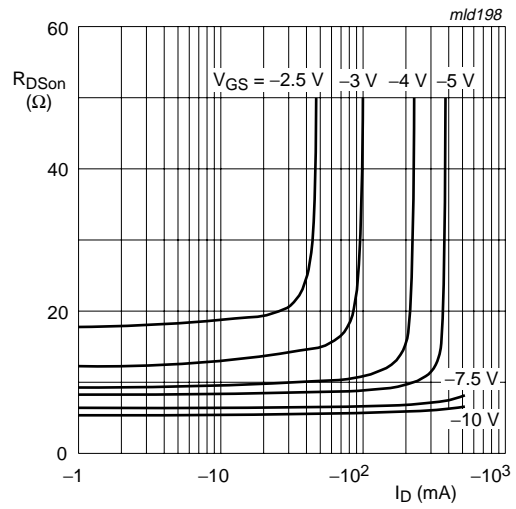
$T_j = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = -10\ \mu\text{A}$ ; $V_{GS} = 0\ \text{V}$	-50	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = -1\ \text{mA}$ ; $V_{DS} = V_{GS}$ ; see <a href="#">Figure 8</a>				
		$T_j = 25\text{ °C}$	-0.8	-	-2	V
		$T_j = -55\text{ °C}$	-	-	-1.8	V
$I_{DSS}$	drain leakage current	$V_{DS} = -40\ \text{V}$ ; $V_{GS} = 0\ \text{V}$				
		$T_j = 25\text{ °C}$	-	-	-100	nA
		$V_{DS} = -50\ \text{V}$ ; $V_{GS} = 0\ \text{V}$				
		$T_j = 25\text{ °C}$	-	-	-10	$\mu\text{A}$
$I_{GSS}$	gate leakage current	$V_{GS} = +20\ \text{V}$ ; $V_{DS} = 0\ \text{V}$	-	-	100	nA
		$V_{GS} = -20\ \text{V}$ ; $V_{DS} = 0\ \text{V}$	-	-	100	nA
		$T_j = 125\text{ °C}$	-	-	-60	$\mu\text{A}$
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = -10\ \text{V}$ ; $I_D = -130\ \text{mA}$ ; see <a href="#">Figure 5</a> and <a href="#">7</a>	-	6	10	$\Omega$
<b>Dynamic characteristics</b>						
$ Y_{fs} $	transfer admittance	$V_{DS} = -25\ \text{V}$ ; $I_D = -130\ \text{mA}$	50	-	-	mS
$C_{iss}$	input capacitance	$V_{GS} = 0\ \text{V}$ ; $V_{DS} = -25\ \text{V}$ ; $f = 1\ \text{MHz}$ ; see <a href="#">Figure 9</a>	-	25	45	pF
$C_{oss}$	output capacitance		-	15	25	pF
$C_{rss}$	reverse transfer capacitance		-	3.5	12	pF
$t_{on}$	turn-on time	$V_{DS} = -40\ \text{V}$ ; $V_{GS} = 0\ \text{V}$ to $-10\ \text{V}$ ; $I_D = -200\ \text{mA}$ ; see <a href="#">Figure 10</a> and <a href="#">11</a>	-	3	-	ns
$t_{off}$	turn-off time	$V_{DS} = -40\ \text{V}$ ; $V_{GS} = -10\ \text{V}$ to $0\ \text{V}$ ; $I_D = -200\ \text{mA}$ ; see <a href="#">Figure 10</a> and <a href="#">11</a>	-	7	-	ns



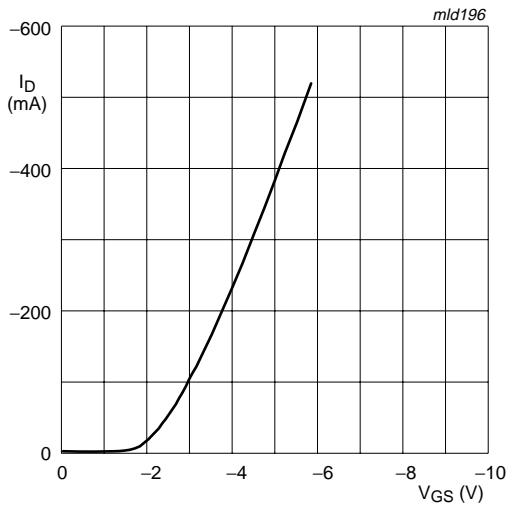
$T_j = 25\text{ }^\circ\text{C}$

**Fig 4. Output characteristics: drain current as a function of drain-source voltage; typical values**



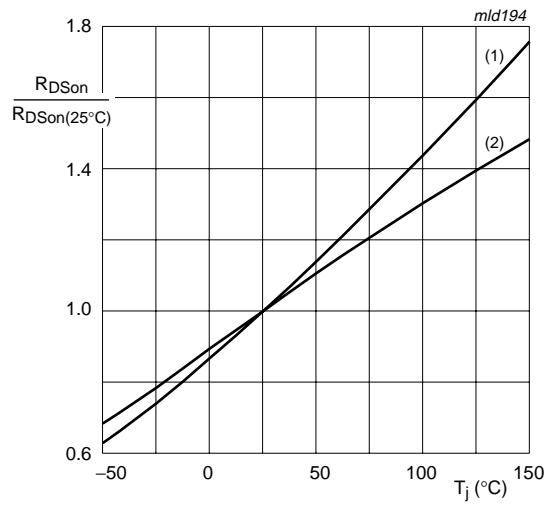
$T_j = 25\text{ }^\circ\text{C}$

**Fig 5. Drain-source on-state resistance as a function of drain current; typical values**



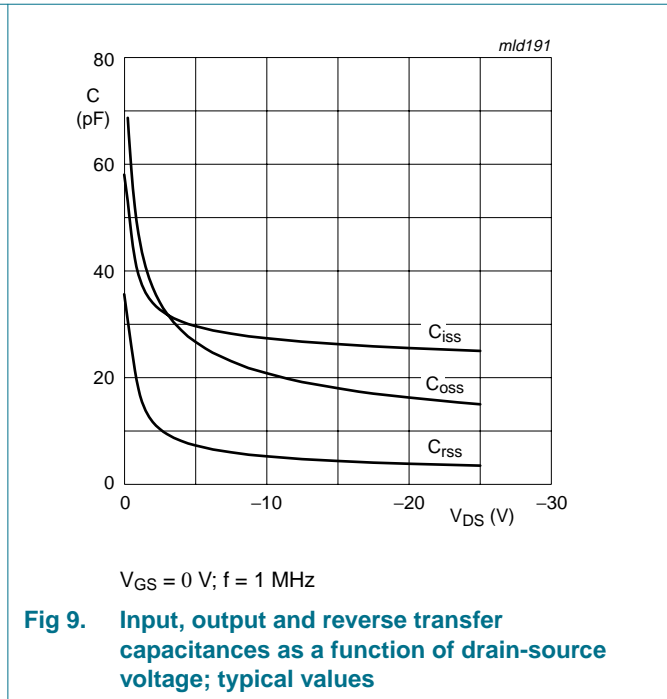
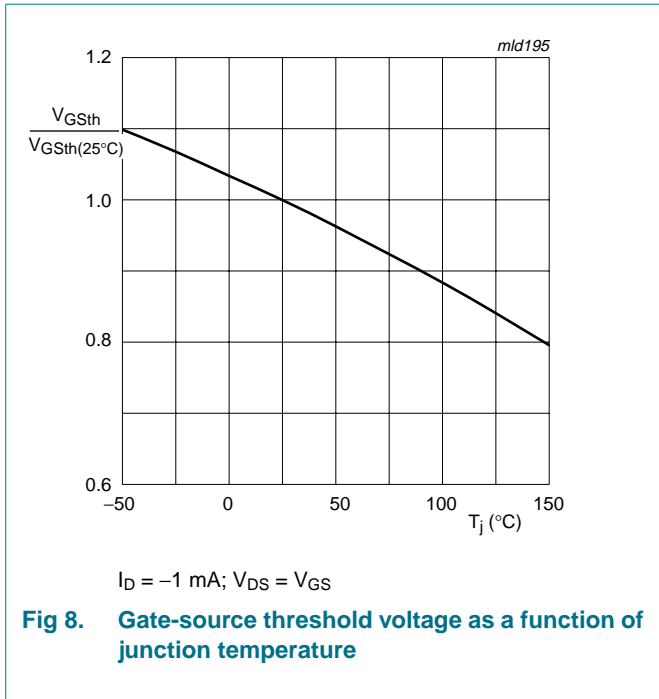
$T_j = 25\text{ }^\circ\text{C}; V_{DS} = -10\text{ V}$

**Fig 6. Transfer characteristics: drain current as a function of gate-source voltage; typical values**

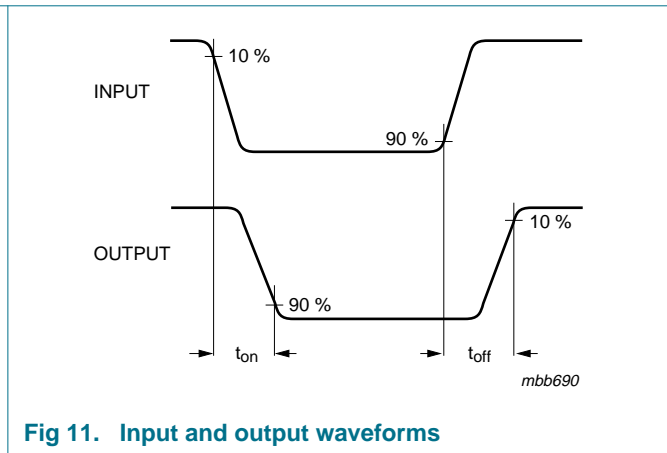
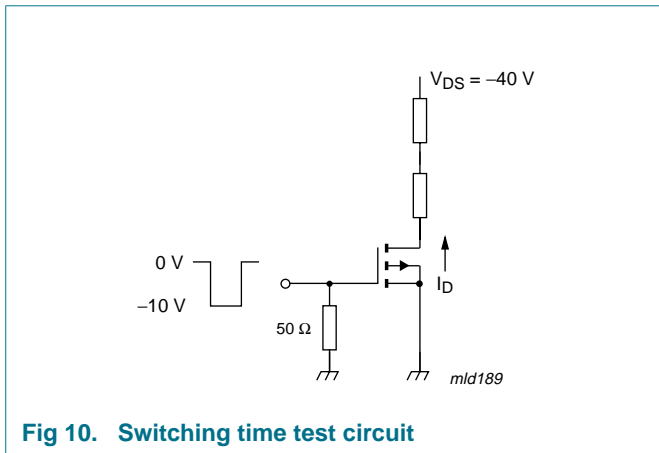


(1)  $I_D = -130\text{ mA}; V_{GS} = -10\text{ V}$   
 (2)  $I_D = -20\text{ mA}; V_{GS} = -2.4\text{ V}$

**Fig 7. Normalized drain-source on-state resistance factor as a function of junction temperature**



**8. Test information**



9. Package outline

Plastic surface-mounted package; 3 leads

SOT23

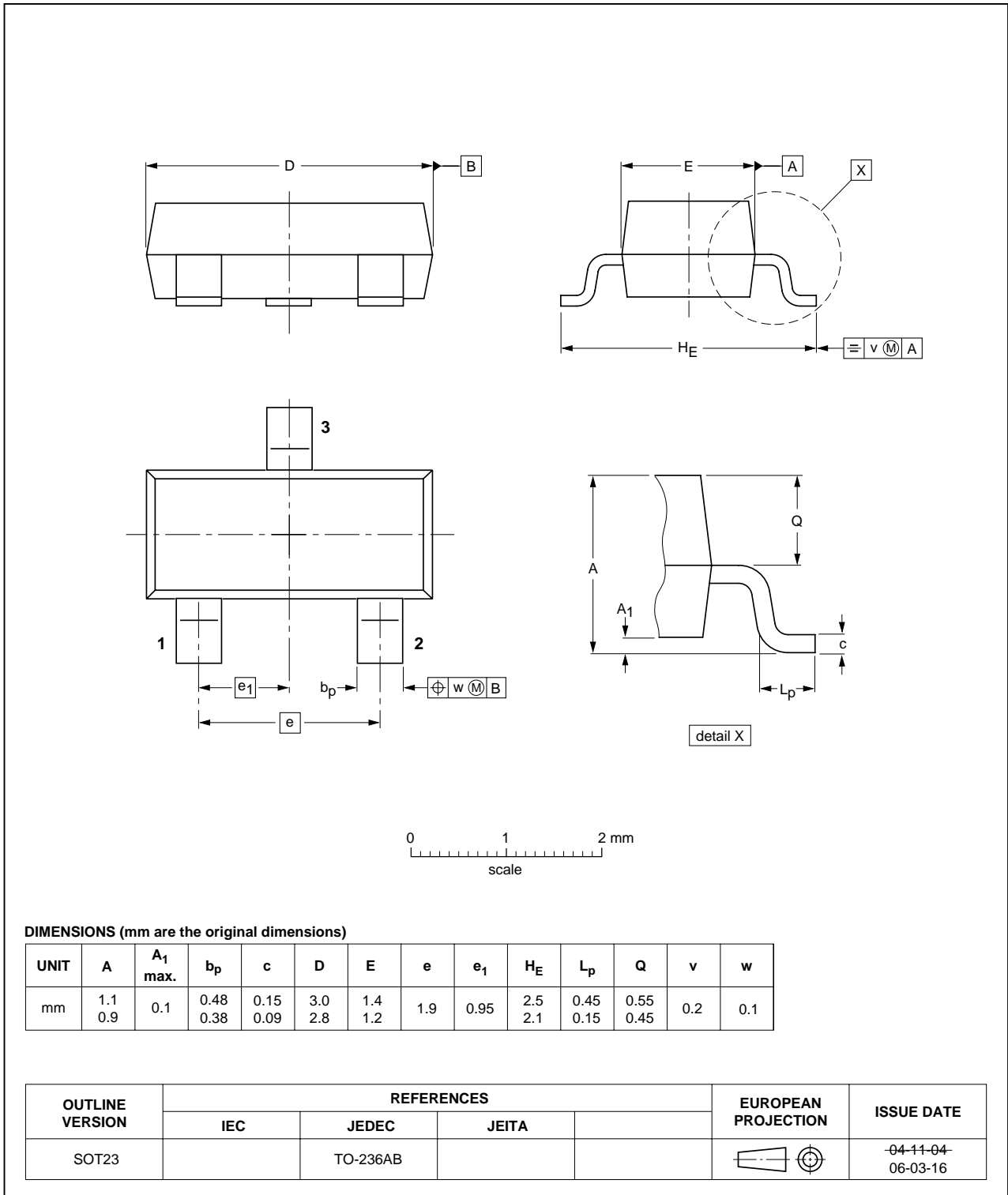


Fig 12. Package outline SOT23 (TO-236AB)



## 10. Revision history

**Table 8. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BSS84_6	20081216	Product data sheet	-	BSS84_5
Modifications:	• <a href="#">Table 5 "Limiting values"</a> : P <sub>tot</sub> figure reference updated			
BSS84_5	20081209	Product data sheet	-	BSS84_4
BSS84_4	20070717	Product data sheet	-	BSS84_3
BSS84_3	20030804	Product specification	-	BSS84_2
BSS84_2	19970618	Product specification	-	BSS84_1
BSS84_1	19950407	Product specification	-	-

## 11. Legal information

### 11.1 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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