



# 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

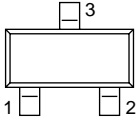
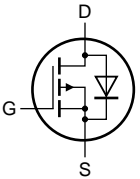
- Line current interrupter in telephone sets
- Relay, high-speed and line transformer drivers

### 1.4 Quick reference data

- $V_{DS} \leq -50$  V
- $I_D \leq -130$  mA
- $R_{DSon} \leq 10$   $\Omega$
- $P_{tot} \leq 250$  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

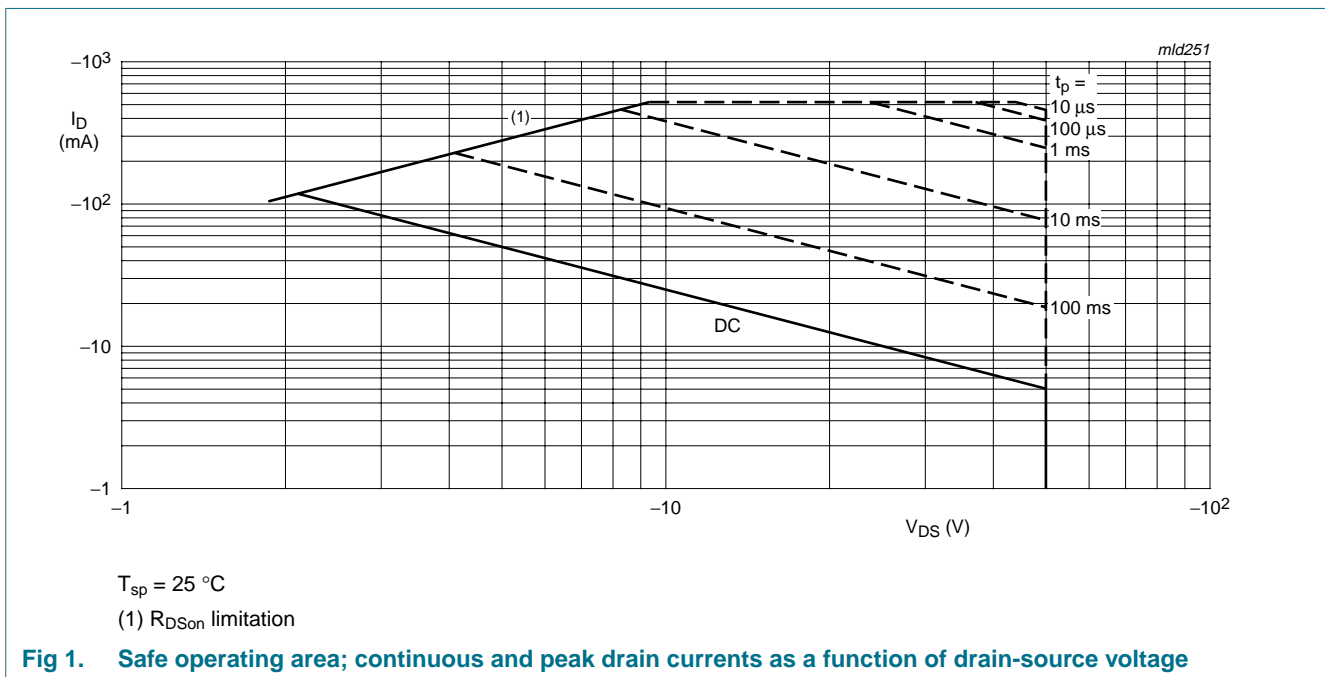
## 5. Limiting values

**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).



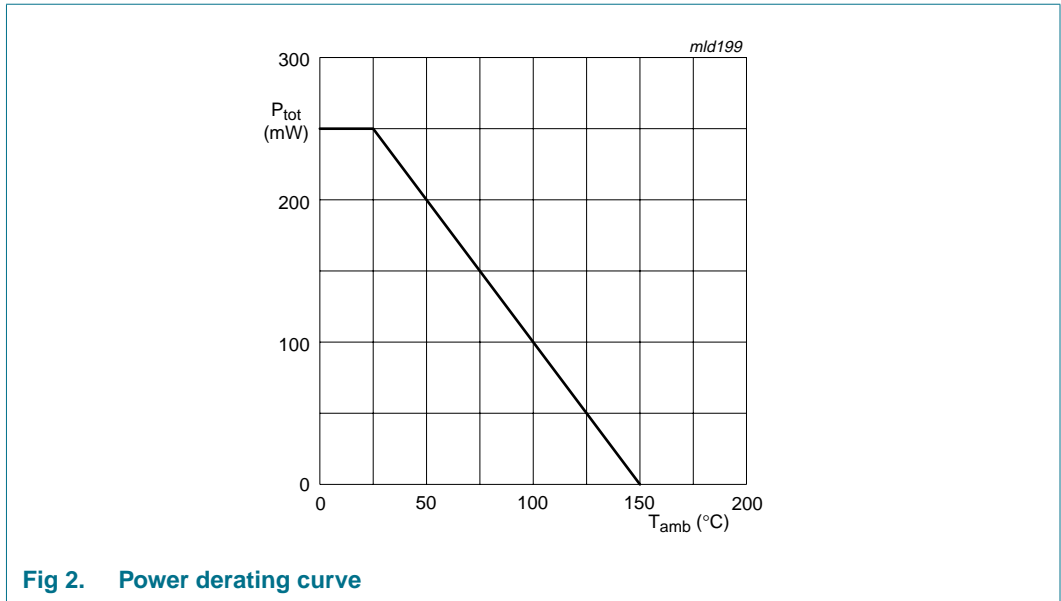


Fig 2. Power derating curve

## 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.

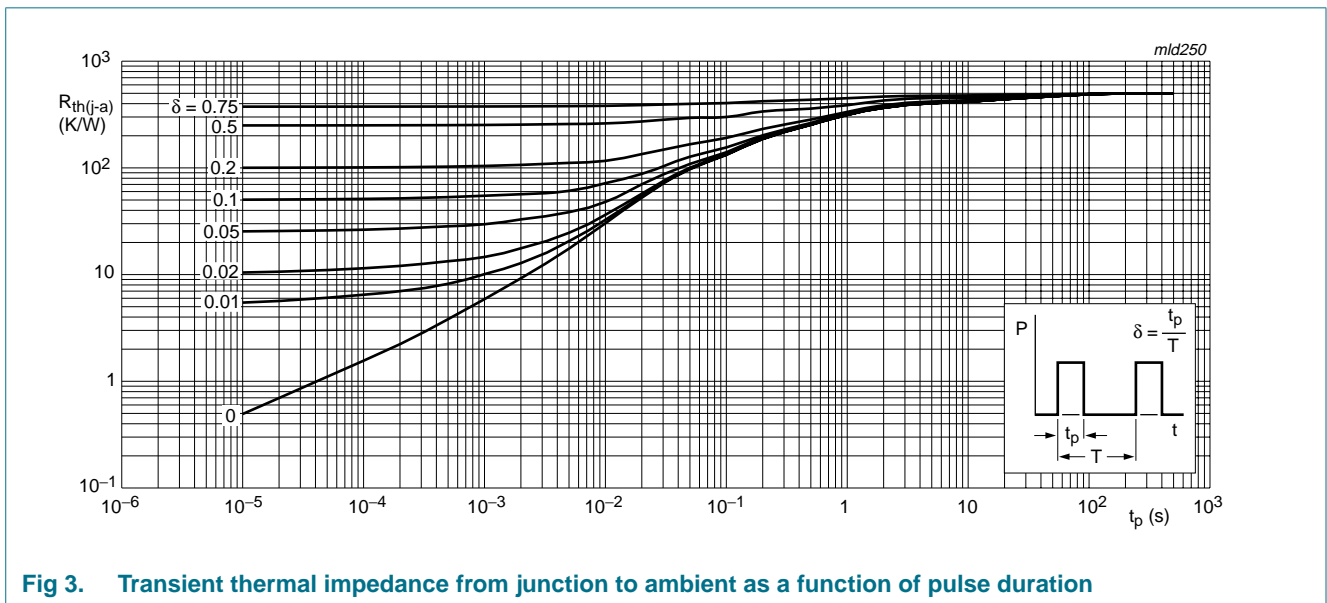


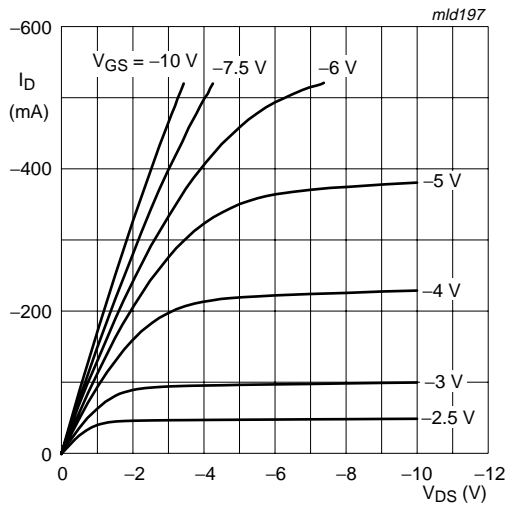
Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration

## 7. Characteristics

**Table 7. Characteristics**

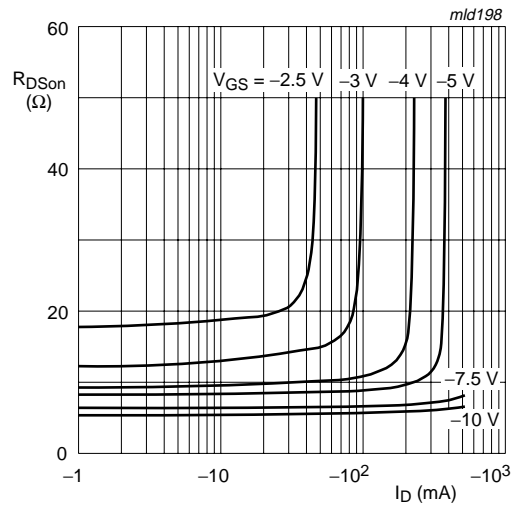
$T_j = 25\text{ °C}$  unless otherwise specified.

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
$R_{DS(on)}$	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



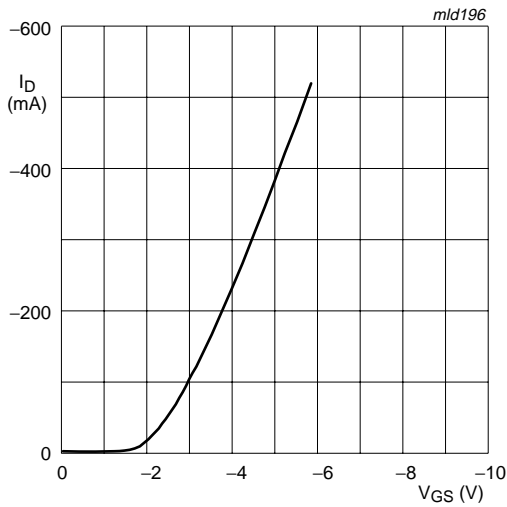
$T_j = 25\text{ }^\circ\text{C}$

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



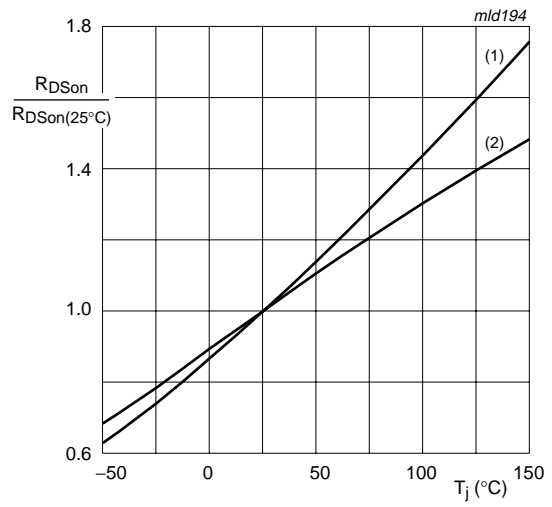
$T_j = 25\text{ }^\circ\text{C}$

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



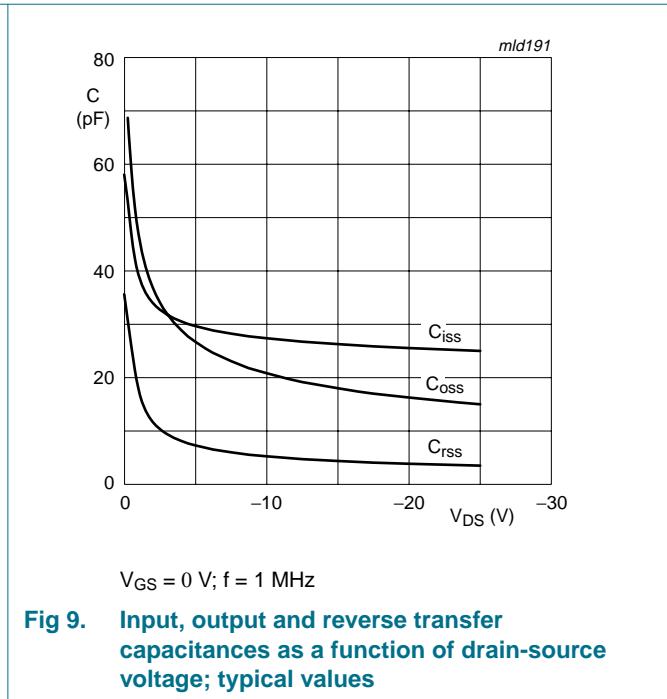
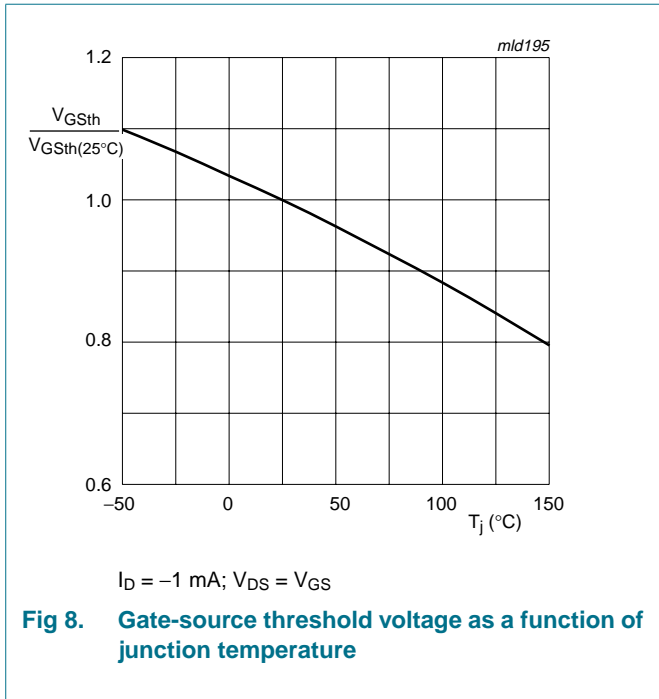
$T_j = 25\text{ }^\circ\text{C}; V_{DS} = -10\text{ V}$

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

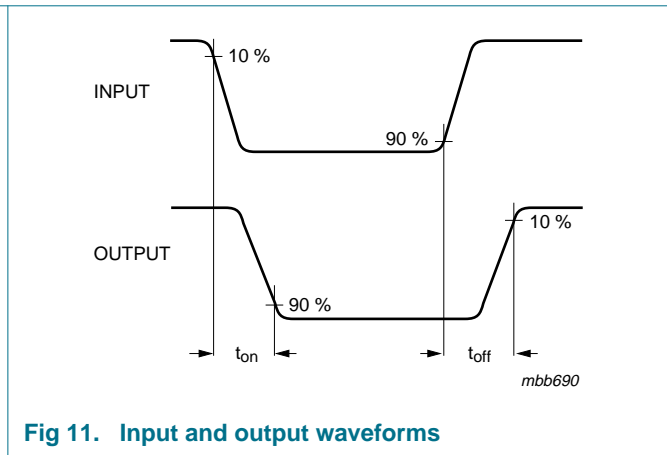
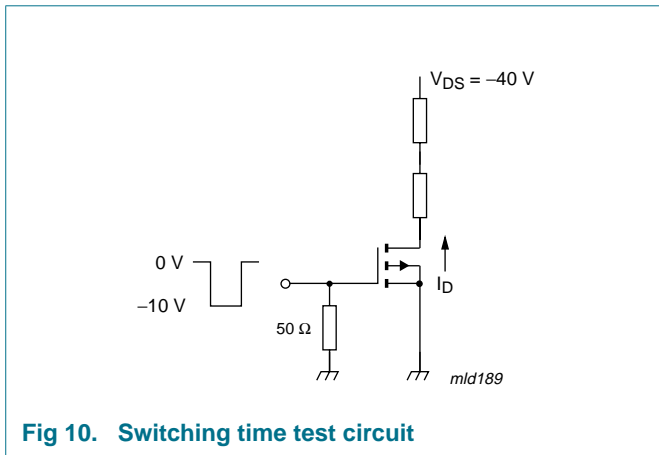


(1)  $I_D = -130\text{ mA}; V_{GS} = -10\text{ V}$   
 (2)  $I_D = -20\text{ mA}; V_{GS} = -2.4\text{ V}$

**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

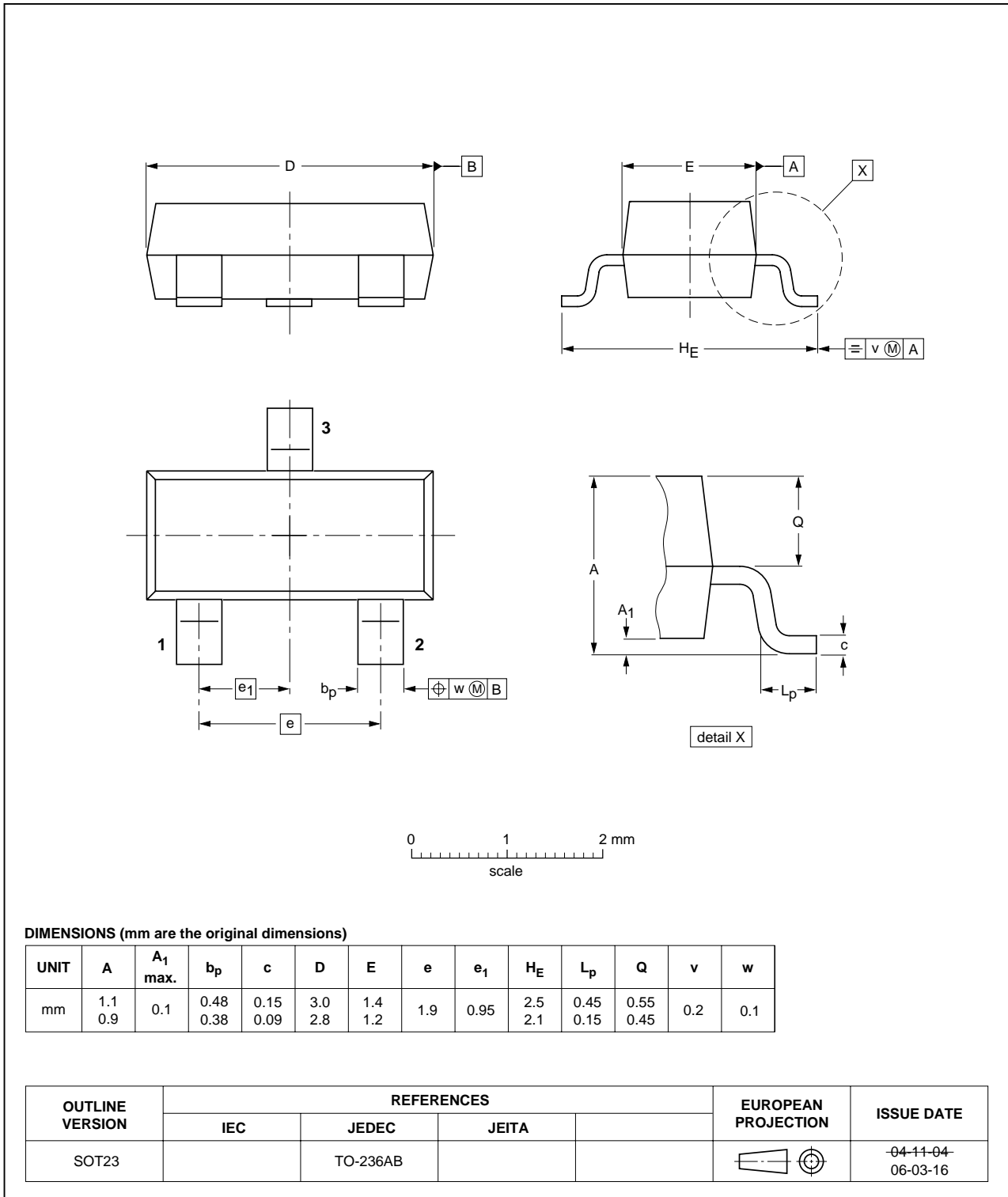


Fig 12. Package outline SOT23 (TO-236AB)



## 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".

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