

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[1]	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

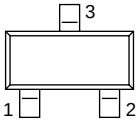
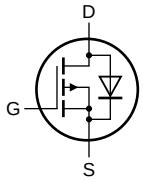
1.4 Quick reference data

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

NXP founded by Philips

2. Pinning information

Table 2. Pinning

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

3. Ordering information

Table 3. Ordering information

Type number[1]	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[1]	Marking code[2]
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

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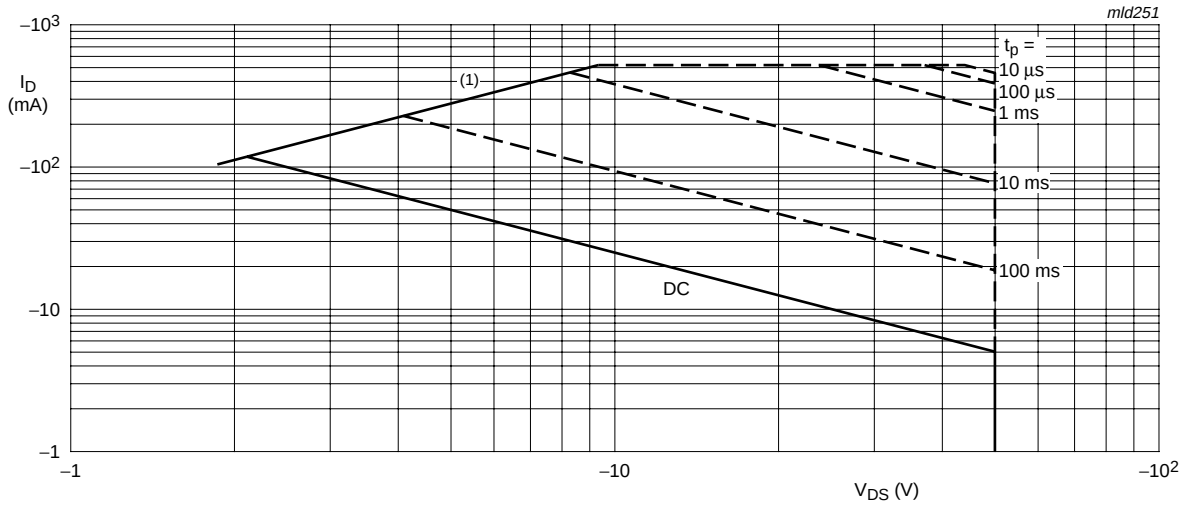
5. Limiting values

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 °C ≤ T_j ≤ 150 °C		-	−50	V
V_{GS}	gate-source voltage			-	±20	V
I_D	drain current	T_{sp} = 25 °C; V_{GS} = −10 V; see Figure 1		-	−130	mA
		T_{sp} = 100 °C; V_{GS} = −10 V		-	−75	mA
I_{DM}	peak drain current	T_{sp} = 25 °C; t_p ≤ 10 µs; see Figure 1		-	−520	mA
P_{tot}	total power dissipation	T_{sp} = 25 °C; see Figure 2	[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).



T_{sp} = 25 °C

(1) R_{DSon} limitation

Fig 1. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

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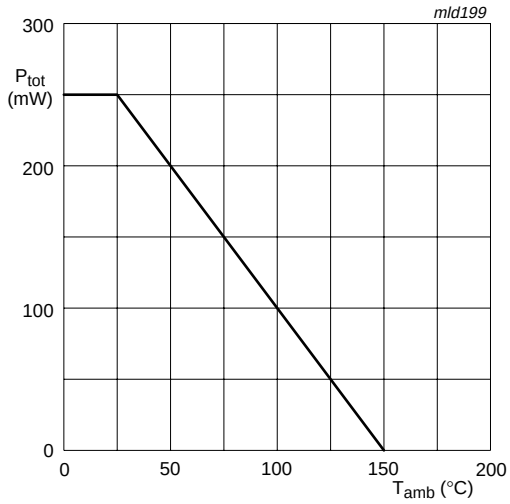


Fig 2. Power derating curve

6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	see Figure 3	[1]	-	-	500	K/W

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

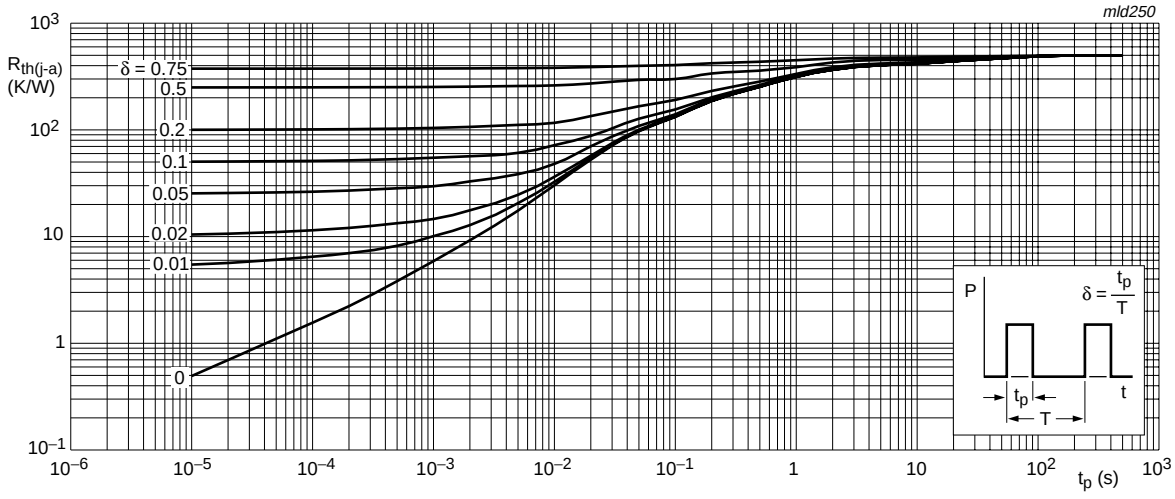


Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration

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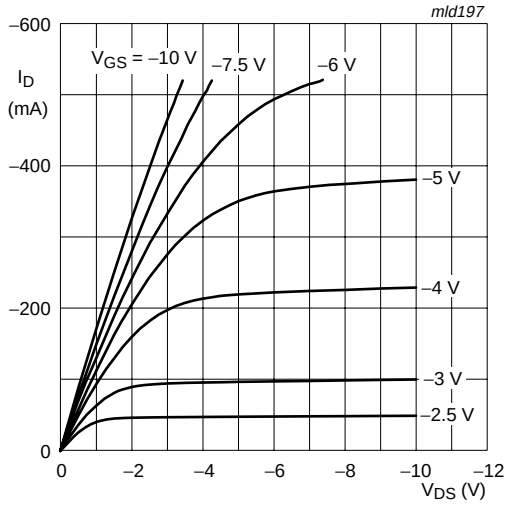
7. Characteristics

Table 7. Characteristics

T_j = 25 °C unless otherwise specified.

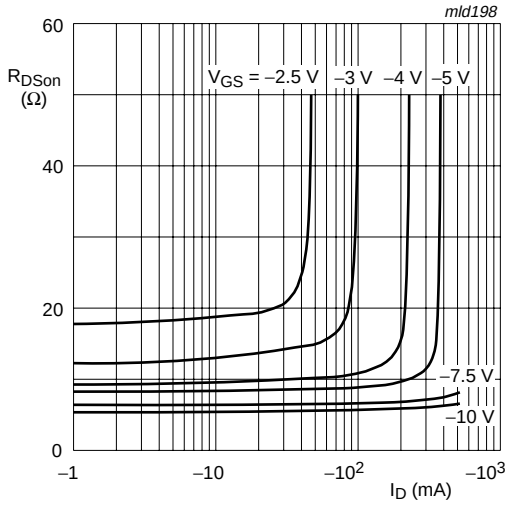
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = –10 µA; V_{GS} = 0 V	–50	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = –1 mA; V_{DS} = V_{GS}; see Figure 8				
		T_j = 25 °C	–0.8	-	–2	V
		T_j = –55 °C	-	-	–1.8	V
I_{DSS}	drain leakage current	V_{DS} = –40 V; V_{GS} = 0 V				
		T_j = 25 °C	-	-	–100	nA
		V_{DS} = –50 V; V_{GS} = 0 V				
		T_j = 25 °C	-	-	–10	µA
		T_j = 125 °C	-	-	–60	µA
I_{GSS}	gate leakage current	V_{GS} = +20 V; V_{DS} = 0 V	-	-	100	nA
		V_{GS} = –20 V; V_{DS} = 0 V	-	-	100	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = –10 V; I_D = –130 mA; see Figure 5 and 7	-	6	10	Ω
Dynamic characteristics						
$\|Y_{fs}\|$	transfer admittance	V_{DS} = –25 V; I_D = –130 mA	50	-	-	mS
C_{iss}	input capacitance	V_{GS} = 0 V; V_{DS} = –25 V; f = 1 MHz; see Figure 9	-	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 V; V_{GS} = 0 V to –10 V; I_D = –200 mA; see Figure 10 and 11	-	3	-	ns
t_{off}	turn-off time	V_{DS} = –40 V; V_{GS} = –10 V to 0 V; I_D = –200 mA; see Figure 10 and 11	-	7	-	ns

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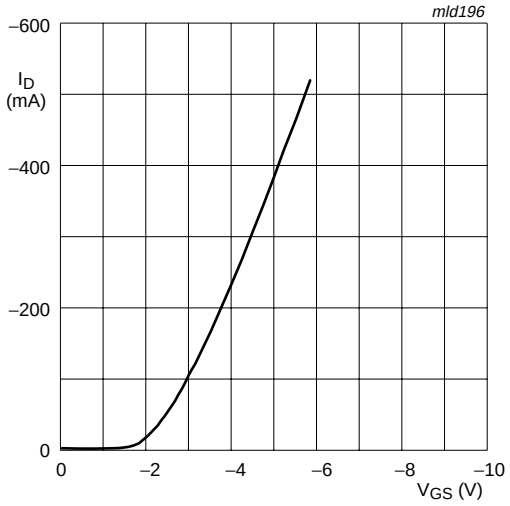
T_j = 25 °C

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



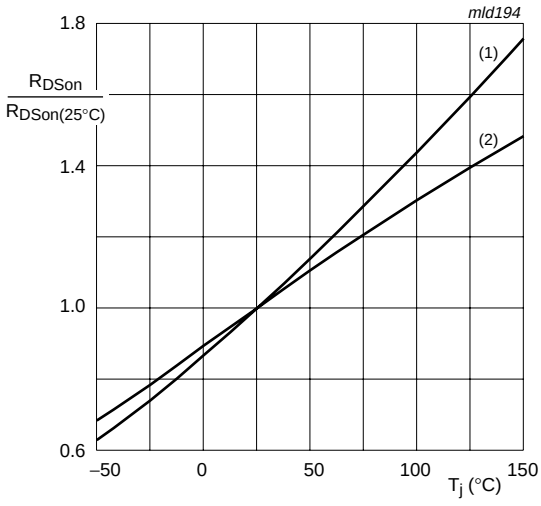
T_j = 25 °C

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



T_j = 25 °C; V_{DS} = −10 V

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

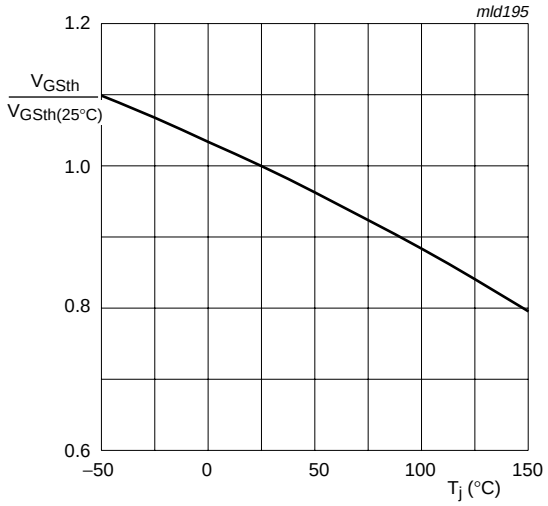


(1) I_D = −130 mA; V_{GS} = −10 V

(2) I_D = −20 mA; V_{GS} = −2.4 V

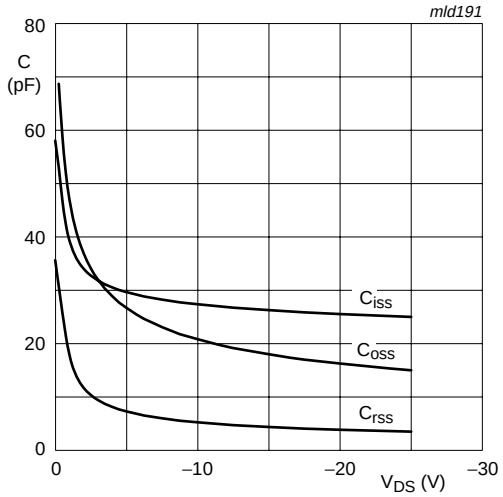
Fig 7. Normalized drain-source on-state resistance factor as a function of junction temperature

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I_D = −1 mA; V_{DS} = V_{GS}

Fig 8. Gate-source threshold voltage as a function of junction temperature



V_{GS} = 0 V; f = 1 MHz

Fig 9. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

8. Test information

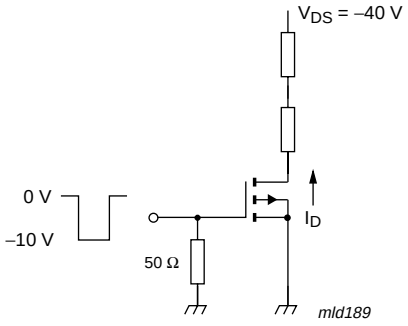


Fig 10. Switching time test circuit

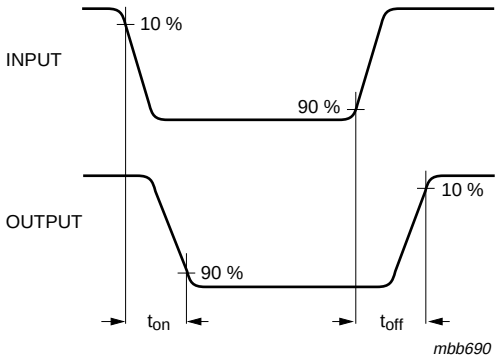
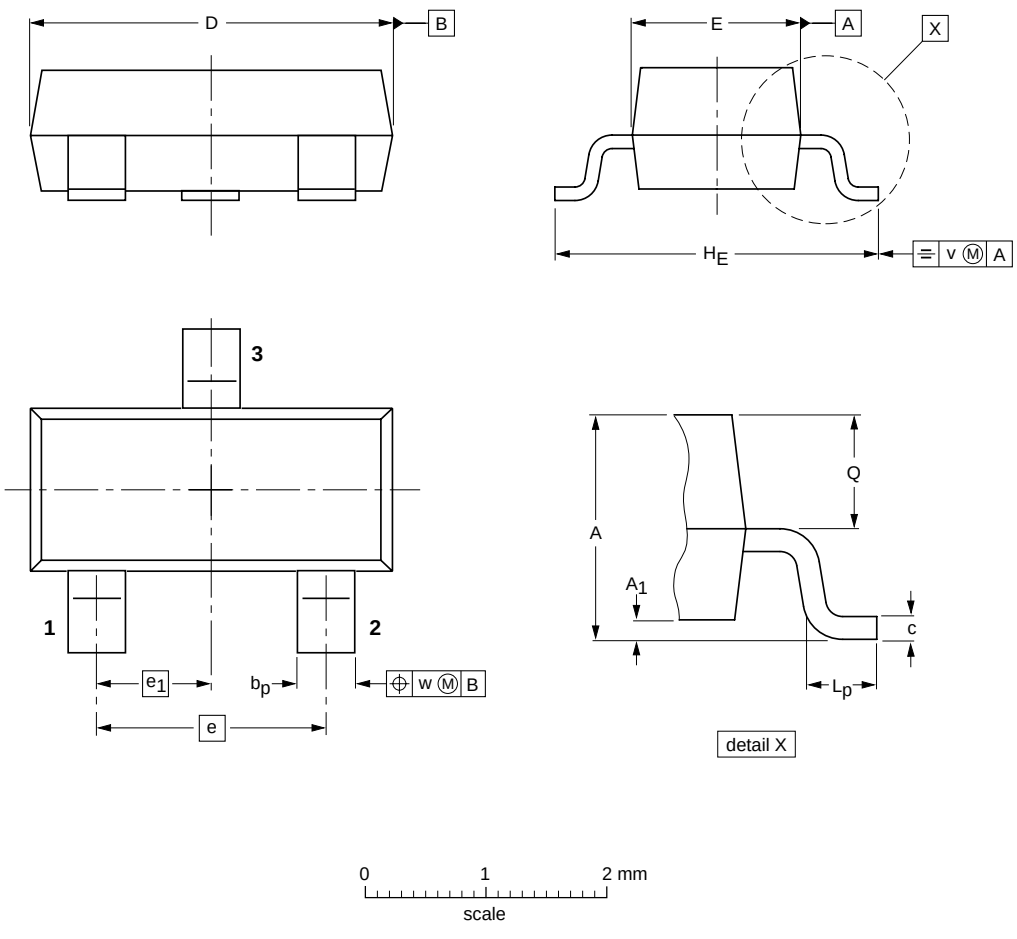


Fig 11. Input and output waveforms

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9. Package outline

Plastic surface-mounted package; 3 leads **SOT23**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max.	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT23		TO-236AB				~~04-11-04~~ 06-03-16

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

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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:	• Table 5 “Limiting values”: P_{tot} 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	-	-

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11.1 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.

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

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