



# PMBFJ308; PMBFJ309; PMBFJ310

N-channel silicon field-effect transistors

Rev. 03 — 23 July 2004

Product data sheet

## 1. Product profile

### 1.1 General description

Symmetrical N-channel silicon junction field-effect transistors in a SOT23 package.

#### CAUTION



The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling.

### 1.2 Features

- Low noise
- Interchangeability of drain and source connections
- High gain.

### 1.3 Applications

- AM input stage in car radios
- VHF amplifiers
- Oscillators and mixers.

### 1.4 Quick reference data

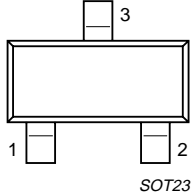

Table 1: Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage		-	-	±25	V
$V_{GSoff}$	gate-source cut-off voltage					
	PMBFJ308	$V_{DS} = 10\text{ V}; I_D = 1\ \mu\text{A}$	-1	-	-6.5	V
	PMBFJ309	$V_{DS} = 10\text{ V}; I_D = 1\ \mu\text{A}$	-1	-	-4	V
	PMBFJ310	$V_{DS} = 10\text{ V}; I_D = 1\ \mu\text{A}$	-2	-	-6.5	V
$I_{DSS}$	drain current					
	PMBFJ308	$V_{GS} = 0\text{ V}; V_{DS} = 10\text{ V}$	12	-	60	mA
	PMBFJ309	$V_{GS} = 0\text{ V}; V_{DS} = 10\text{ V}$	12	-	30	mA
	PMBFJ310	$V_{GS} = 0\text{ V}; V_{DS} = 10\text{ V}$	24	-	60	mA
$P_{tot}$	total power dissipation	up to $T_{amb} = 25\text{ °C}$	-	-	250	mW
$ y_{fs} $	forward transfer admittance	$V_{DS} = 10\text{ V}; I_D = 10\text{ mA}$	10	-	-	mS

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## 2. Pinning information

Table 2: Discrete pinning <sup>[1]</sup>

Pin	Description	Simplified outline	Symbol
1	source		 sym060
2	drain		
3	gate		

[1] Drain and source are interchangeable.

## 3. Ordering information

Table 3: Ordering information

Type number	Package		
	Name	Description	Version
PMBFJ308	-	plastic surface mounted package; 3 leads	SOT23
PMBFJ309			
PMBFJ310			

## 4. Marking

Table 4: Marking

Type number	Marking code <sup>[1]</sup>
PMBFJ308	48*
PMBFJ309	49*
PMBFJ310	50*

[1] \* = 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 (DC)		-	$\pm 25$	V
$V_{GSO}$	gate-source voltage	open drain	-	-25	V
$V_{GDO}$	gate-drain voltage	open source	-	-25	V
$I_G$	forward gate current (DC)		-	50	mA

**Table 5: Limiting values ...continued**

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

Symbol	Parameter	Conditions	Min	Max	Unit
$P_{tot}$	total power dissipation	up to $T_{amb} = 25\text{ °C}$	-	250	mW
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	150	°C

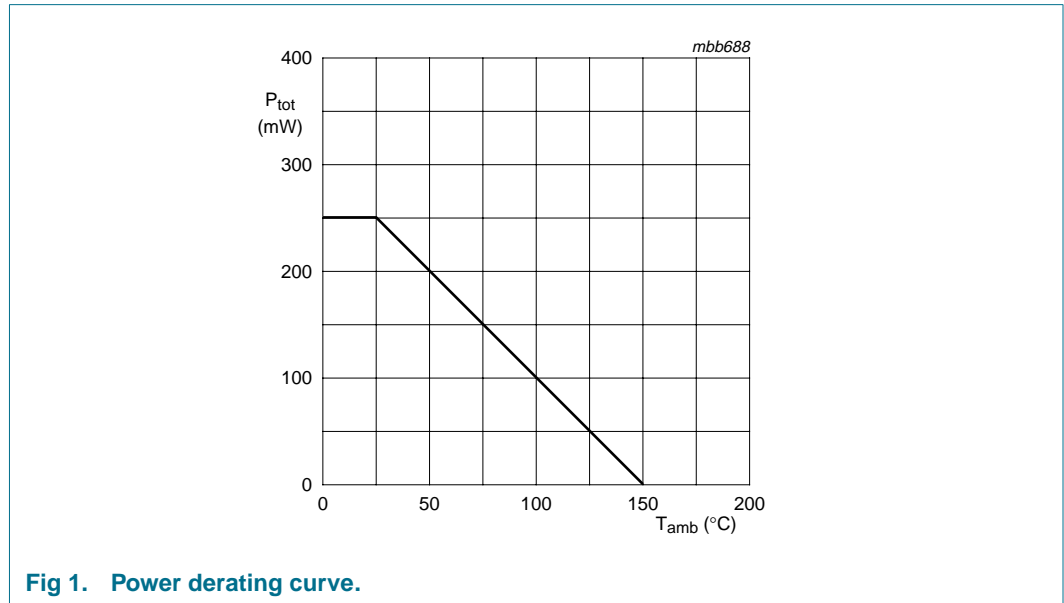


Fig 1. Power derating curve.

## 6. Thermal characteristics

**Table 6: Thermal characteristics**

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

[1] Device mounted on an FR4 printed-circuit board.

## 7. Static characteristics

**Table 7: Static characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)GSS}$	gate-source breakdown voltage	$I_G = -1\text{ }\mu\text{A}$ ; $V_{DS} = 0\text{ V}$	-25	-	-	V
$V_{GSoff}$	gate-source cut-off voltage					V
	PMBFJ308	$I_D = 1\text{ }\mu\text{A}$ ; $V_{DS} = 10\text{ V}$	-1	-	-6.5	V
	PMBFJ309	$I_D = 1\text{ }\mu\text{A}$ ; $V_{DS} = 10\text{ V}$	-1	-	-4	V
	PMBFJ310	$I_D = 1\text{ }\mu\text{A}$ ; $V_{DS} = 10\text{ V}$	-2	-	-6.5	V
$V_{GSS}$	gate-source forward voltage	$I_G = 1\text{ mA}$ ; $V_{DS} = 0\text{ V}$	-	-	1	V

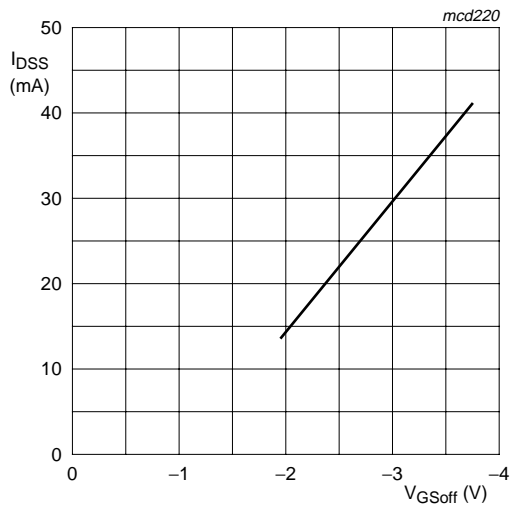
**Table 7: Static characteristics ...continued** $T_j = 25\text{ }^\circ\text{C}$ ; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{DSS}$	drain-source leakage current					
	PMBFJ308	$V_{GS} = 0\text{ V}; V_{DS} = 10\text{ V}$	12	-	60	mA
	PMBFJ309	$V_{GS} = 0\text{ V}; V_{DS} = 10\text{ V}$	12	-	30	mA
	PMBFJ310	$V_{GS} = 0\text{ V}; V_{DS} = 10\text{ V}$	24	-	60	mA
$I_{GSS}$	gate-source leakage current	$V_{GS} = -15\text{ V}; V_{DS} = 0\text{ V}$	-	-	-1	nA
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 0\text{ V}; V_{DS} = 100\text{ mV}$	-	50	-	$\Omega$
$ y_{fs} $	forward transfer admittance	$I_D = 10\text{ mA}; V_{DS} = 10\text{ V}$	10	-	-	mS
$ y_{os} $	common source output admittance	$I_D = 10\text{ mA}; V_{DS} = 10\text{ V}$	-	-	250	$\mu\text{S}$

## 8. Dynamic characteristics

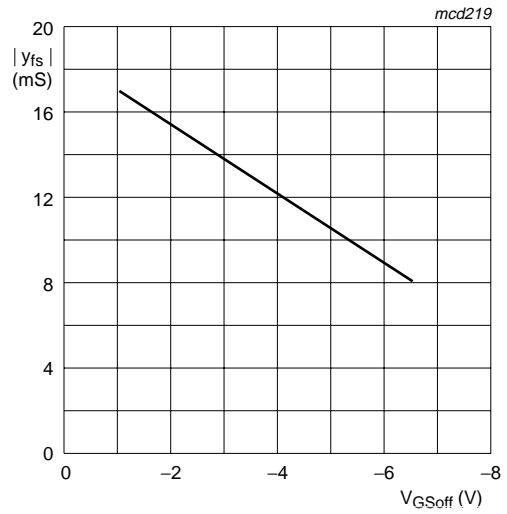
**Table 8: Dynamic characteristics** $T_j = 25\text{ }^\circ\text{C}$ ; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$C_{iss}$	input capacitance	$V_{DS} = 10\text{ V}$				
		$V_{GS} = -10\text{ V}; f = 1\text{ MHz}$	-	3	5	pF
		$V_{GS} = 0\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}$	-	6	-	pF
$C_{rSS}$	reverse transfer capacitance	$V_{DS} = 0\text{ V}; V_{GS} = -10\text{ V}; f = 1\text{ MHz}$	-	1.3	2.5	pF
$g_{is}$	input conductance	$V_{DS} = 10\text{ V}; I_D = 10\text{ mA}$				
		$f = 100\text{ MHz}$	-	200	-	$\mu\text{S}$
		$f = 450\text{ MHz}$	-	3	-	mS
$g_{fs}$	transfer conductance	$V_{DS} = 10\text{ V}; I_D = 10\text{ mA}$				
		$f = 100\text{ MHz}$	-	13	-	mS
		$f = 450\text{ MHz}$	-	12	-	mS
$g_{rs}$	reverse conductance	$V_{DS} = 10\text{ V}; I_D = 10\text{ mA}$				
		$f = 100\text{ MHz}$	-	-30	-	$\mu\text{S}$
		$f = 450\text{ MHz}$	-	-450	-	$\mu\text{S}$
$g_{os}$	output conductance	$V_{DS} = 10\text{ V}; I_D = 10\text{ mA}$				
		$f = 100\text{ MHz}$	-	150	-	$\mu\text{S}$
		$f = 450\text{ MHz}$	-	400	-	$\mu\text{S}$
$V_n$	equivalent input noise voltage	$V_{DS} = 10\text{ V}; I_D = 10\text{ mA}; f = 100\text{ Hz}$	-	6	-	nV/ $\sqrt{\text{Hz}}$



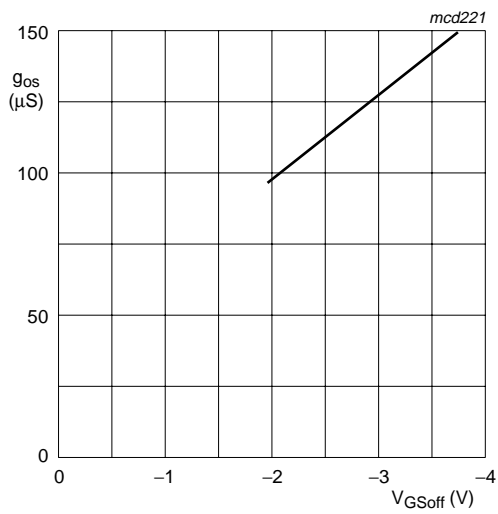
$V_{DS} = 10\text{ V}; T_j = 25\text{ }^\circ\text{C}.$

**Fig. 2. Drain current as a function of gate-source cut-off voltage; typical values.**



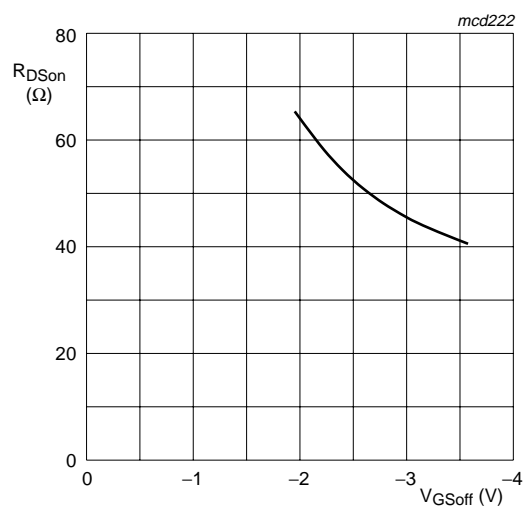
$V_{DS} = 10\text{ V}; I_D = 10\text{ mA}; T_j = 25\text{ }^\circ\text{C}.$

**Fig. 3. Forward transfer admittance as a function of gate-source cut-off voltage; typical values.**



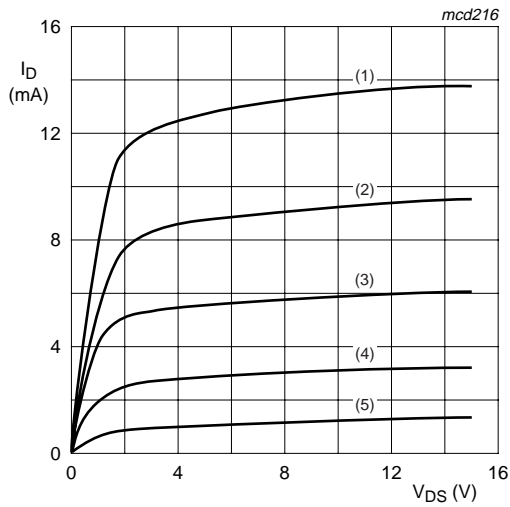
$V_{DS} = 10\text{ V}; I_D = 10\text{ mA}; T_j = 25\text{ }^\circ\text{C}.$

**Fig. 4. Common-source output conductance as a function of gate-source cut-off voltage; typical values.**



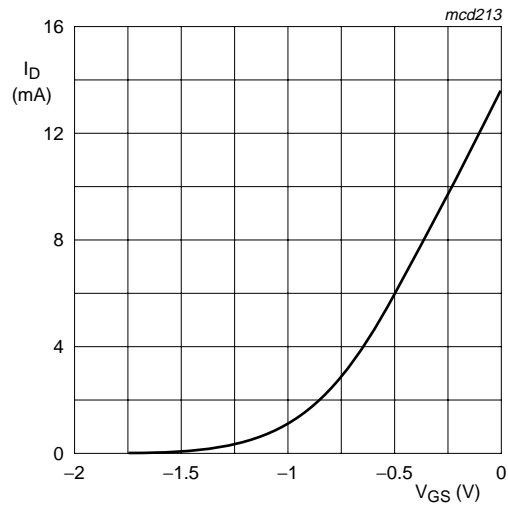
$V_{DS} = 100\text{ mV}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^\circ\text{C}.$

**Fig. 5. Drain-source on-state resistance as a function of gate-source cut-off voltage; typical values.**



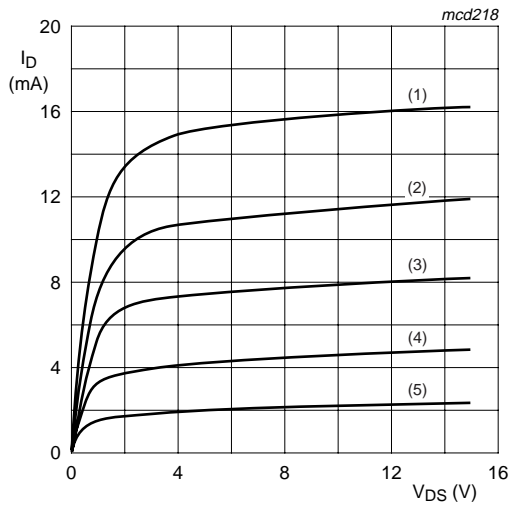
$T_j = 25\text{ }^\circ\text{C}$ .  
 (1)  $V_{GS} = 0\text{ V}$ .  
 (2)  $V_{GS} = -0.25\text{ V}$ .  
 (3)  $V_{GS} = -0.5\text{ V}$ .  
 (4)  $V_{GS} = -0.75\text{ V}$ .  
 (5)  $V_{GS} = -1\text{ V}$ .

**Fig 6. Typical output characteristics; PMBFJ308.**



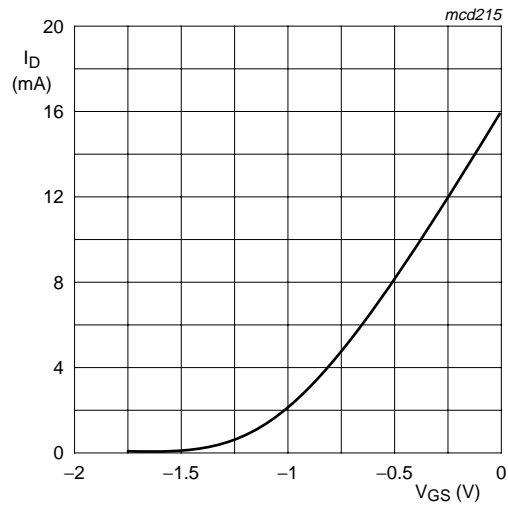
$V_{DS} = 10\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

**Fig 7. Typical transfer characteristics; PMBFJ308.**



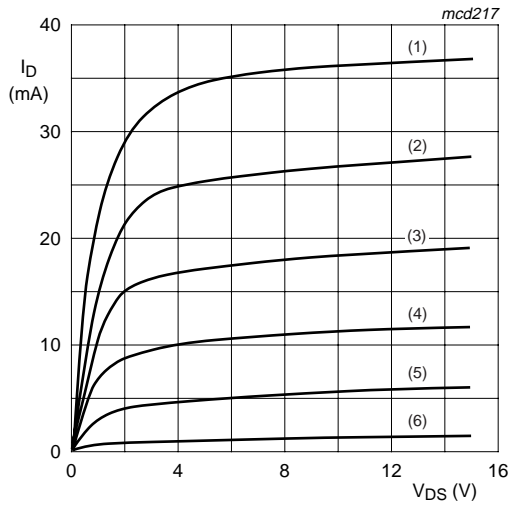
$T_j = 25\text{ }^\circ\text{C}$ .  
 (1)  $V_{GS} = 0\text{ V}$ .  
 (2)  $V_{GS} = -0.25\text{ V}$ .  
 (3)  $V_{GS} = -0.5\text{ V}$ .  
 (4)  $V_{GS} = -0.75\text{ V}$ .  
 (5)  $V_{GS} = -1\text{ V}$ .

**Fig 8. Typical output characteristics; PMBFJ309.**



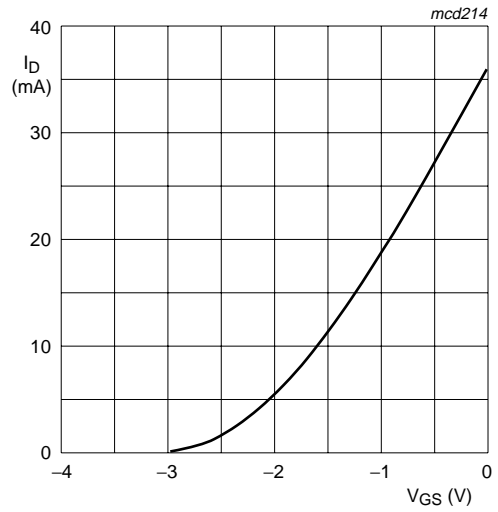
$V_{DS} = 10\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

**Fig 9. Typical transfer characteristics; PMBFJ309.**



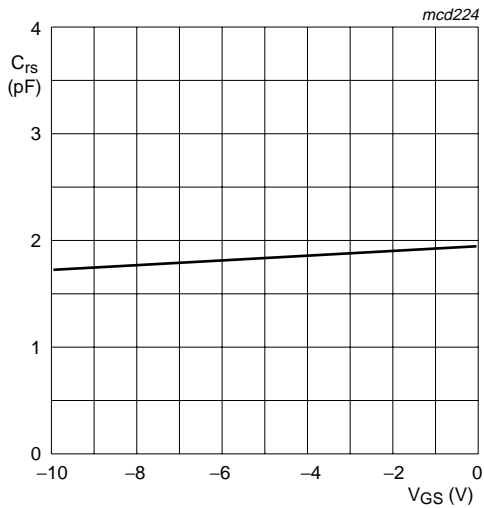
$T_j = 25\text{ }^\circ\text{C}$ .  
 (1)  $V_{GS} = 0\text{ V}$ .  
 (2)  $V_{GS} = -0.5\text{ V}$ .  
 (3)  $V_{GS} = -1\text{ V}$ .  
 (4)  $V_{GS} = -1.5\text{ V}$ .  
 (5)  $V_{GS} = -2\text{ V}$ .  
 (6)  $V_{GS} = -2.5\text{ V}$ .

**Fig 10. Typical output characteristics; PMBFJ310.**



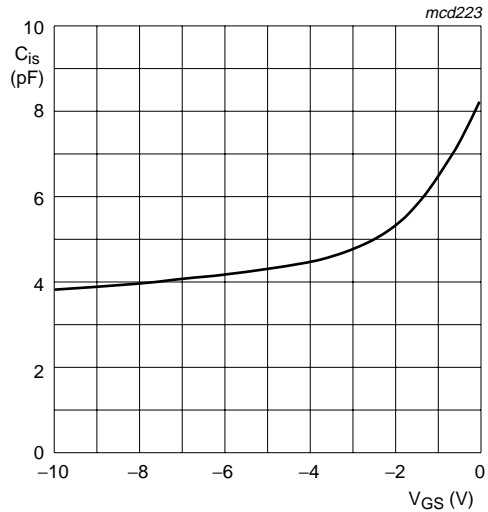
$V_{DS} = 10\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

**Fig 11. Typical transfer characteristics; PMBFJ310.**



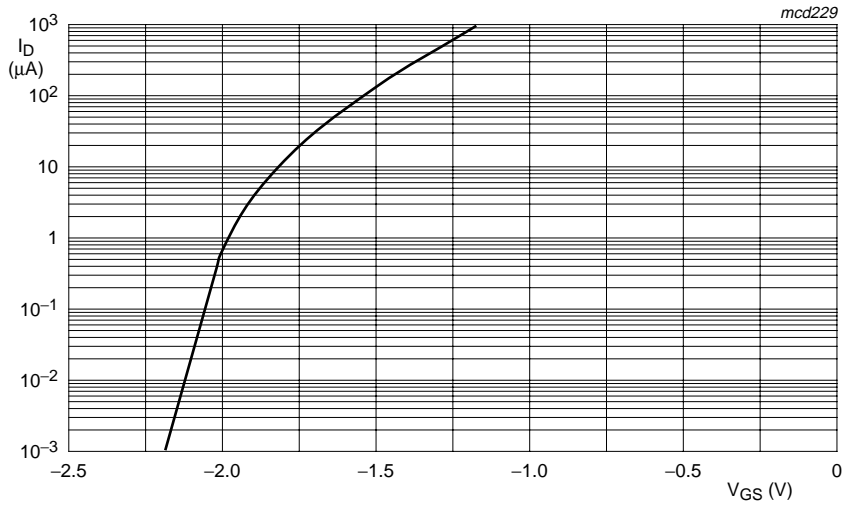
$V_{DS} = 10\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

**Fig 12. Reverse transfer capacitance as a function of gate-source voltage; typical values.**



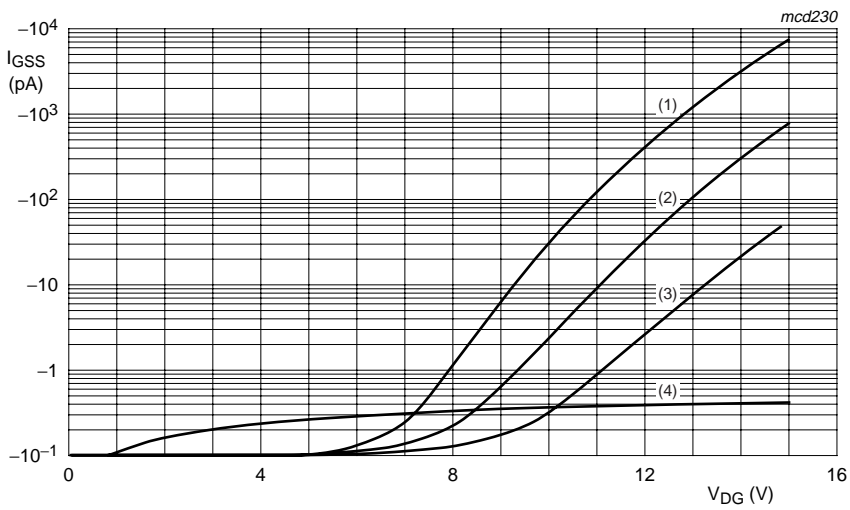
$V_{DS} = 10\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

**Fig 13. Input capacitance as a function of gate-source voltage; typical values.**



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

**Fig 14. Drain current as a function of gate-source voltage; typical values.**



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

- (1)  $I_D = 10 \text{ mA}.$
- (2)  $I_D = 1 \text{ mA}.$
- (3)  $I_D = 100 \text{ } \mu\text{A}.$
- (4)  $I_{GSS}.$

**Fig 15. Gate current as a function of drain-gate voltage; typical values.**



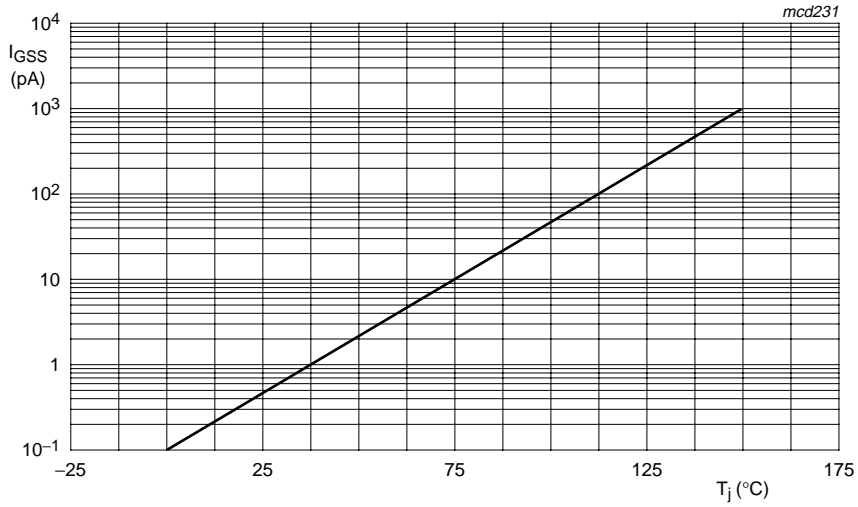
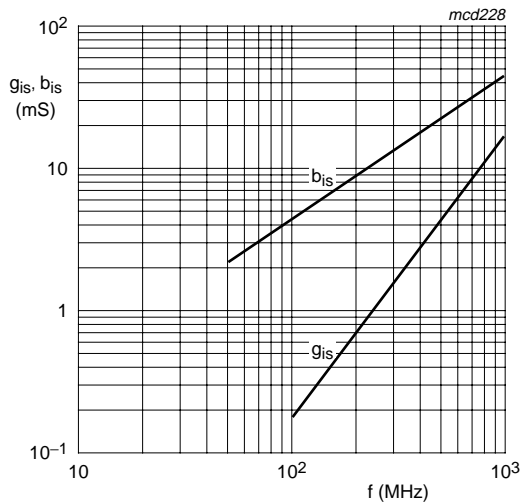
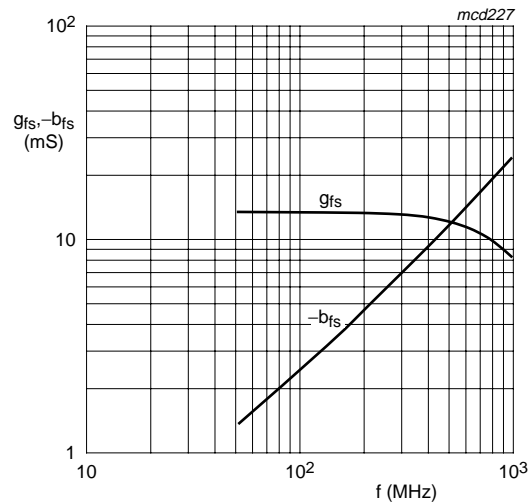


Fig 16. Gate current as a function of junction temperature; typical values.



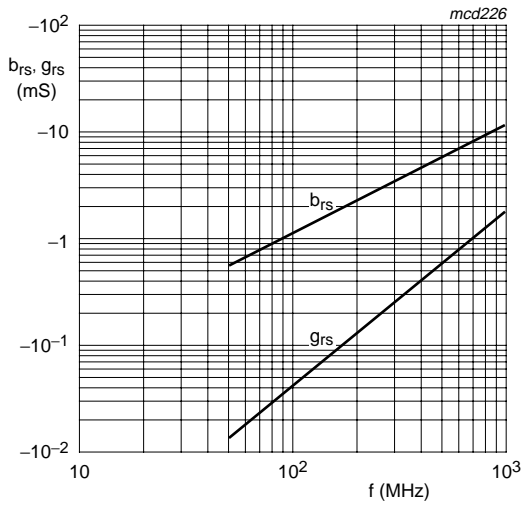
$V_{DS} = 10\text{ V}; I_D = 10\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}.$

Fig 17. Input admittance; typical values.



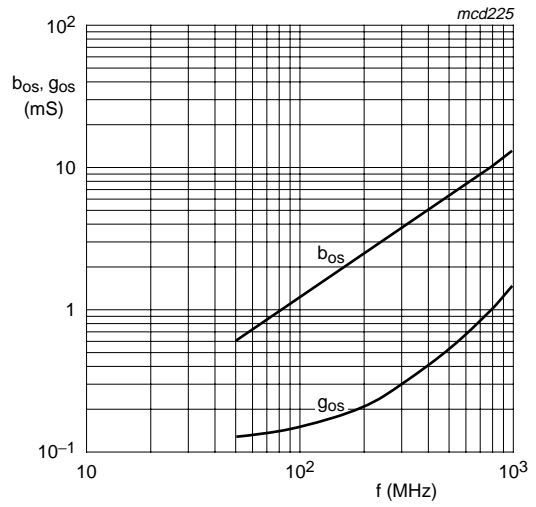
$V_{DS} = 10\text{ V}; I_D = 10\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}.$

Fig 18. Forward transfer admittance; typical values.



$V_{DS} = 10$  V;  $I_D = 10$  mA;  $T_{amb} = 25$  °C.

**Fig 19. Reverse transfer admittance; typical values.**



$V_{DS} = 10$  V;  $I_D = 10$  mA;  $T_{amb} = 25$  °C.

**Fig 20. Output admittance; typical values.**

**9. Package outline**

Plastic surface mounted package; 3 leads

SOT23

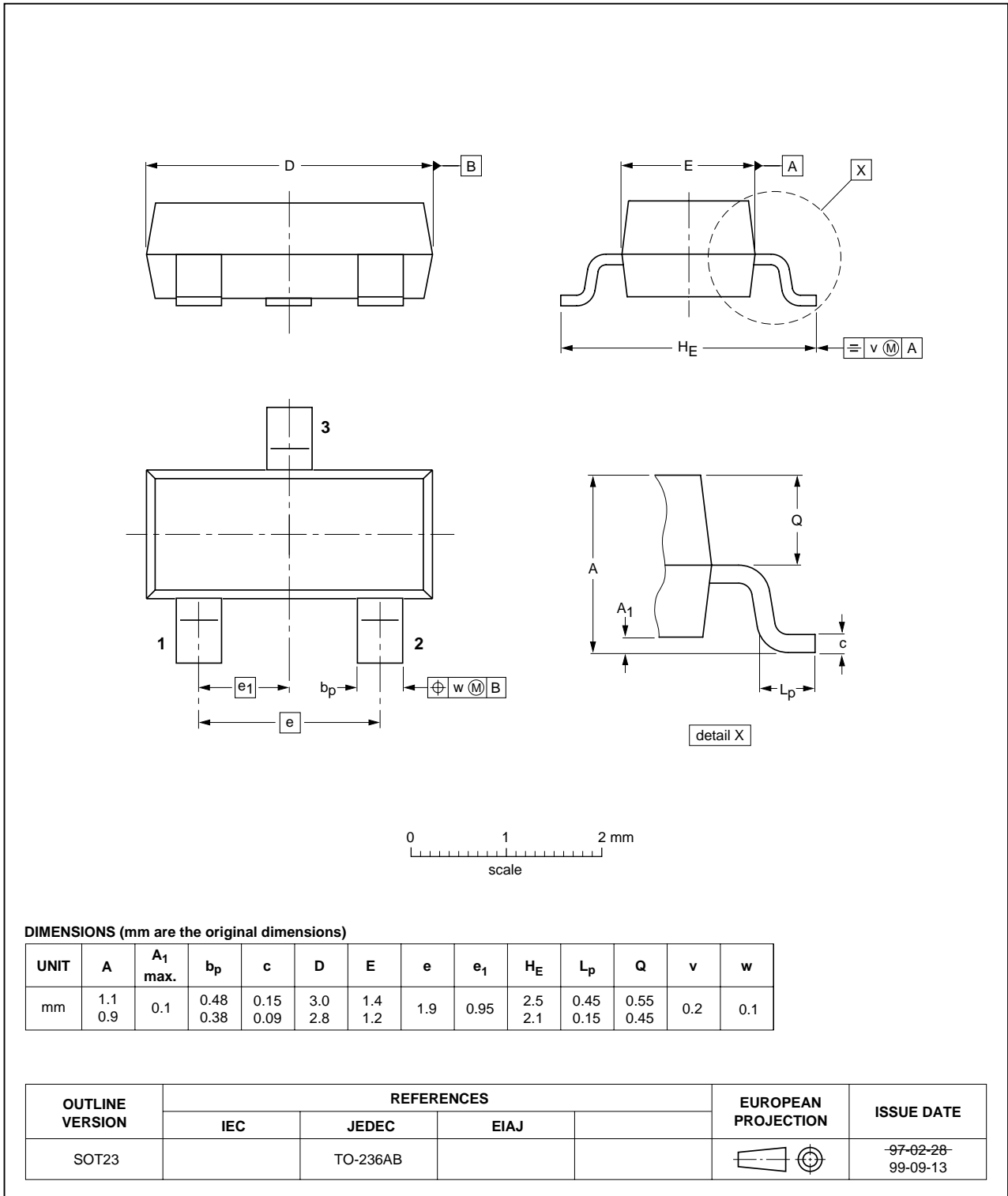


Fig 21. Package outline.

## 10. Revision history

**Table 9: Revision history**

Document ID	Release date	Data sheet status	Change notice	Order number	Supersedes
PMBFJ308_309_310_3	20040723	Product data sheet	-	9397 750 13403	PMBFJ308_309_310_2
Modifications:			<ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors.</li><li><a href="#">Table 4 "Marking"</a>: added new marking codes.</li></ul>		
PMBFJ308_309_310_2	19960911	Product specification	-	9397 750 01141	-

## 11. Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup> <sup>[3]</sup>	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
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[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

## 12. Definitions

**Short-form specification** — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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For sales office addresses, send an email to: [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com)

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