



# PMBFJ308; PMBFJ309; PMBFJ310

N-channel silicon field-effect transistors

Rev. 4 — 20 September 2011

Product data sheet

## 1. Product profile

### 1.1 General description

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

#### CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

### 1.2 Features and benefits

- 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

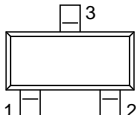



**Table 1. Quick reference data ...continued**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{DSS}$	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

## 2. Pinning information

**Table 2. Discrete pinning<sup>[1]</sup>**

Pin	Description	Simplified outline	Symbol
1	source		 <i>sym060</i>
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*

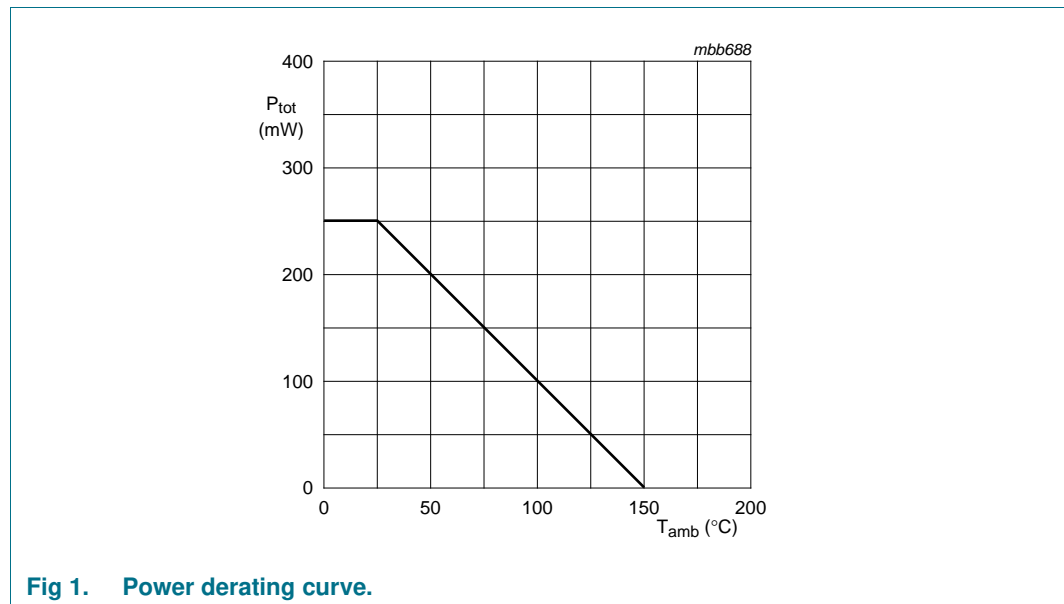
[1] \* = p: Made in Hong Kong.  
 \* = t: Made in Malaysia.  
 \* = W: Made in China.

## 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
$P_{tot}$	total power dissipation	up to $T_{amb} = 25\text{ }^\circ\text{C}$	-	250	mW
$T_{stg}$	storage temperature		-65	+150	$^\circ\text{C}$
$T_j$	junction temperature		-	150	$^\circ\text{C}$



**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

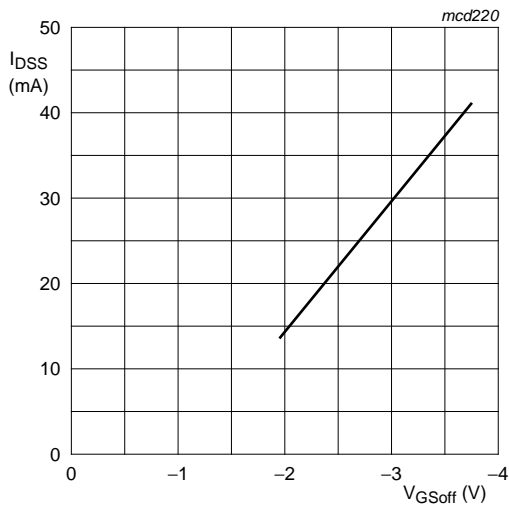
**Table 7. Static characteristics**
*T<sub>j</sub> = 25 °C; unless otherwise specified.*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>(BR)GSS</sub>	gate-source breakdown voltage	I <sub>G</sub> = -1 μA; V <sub>DS</sub> = 0 V	-25	-	-	V
V <sub>GSoff</sub>	gate-source cut-off voltage					V
	PMBFJ308	I <sub>D</sub> = 1 μA; V <sub>DS</sub> = 10 V	-1	-	-6.5	V
	PMBFJ309	I <sub>D</sub> = 1 μA; V <sub>DS</sub> = 10 V	-1	-	-4	V
	PMBFJ310	I <sub>D</sub> = 1 μA; V <sub>DS</sub> = 10 V	-2	-	-6.5	V
V <sub>GSS</sub>	gate-source forward voltage	I <sub>G</sub> = 1 mA; V <sub>DS</sub> = 0 V	-	-	1	V
I <sub>DSS</sub>	drain-source leakage current					
	PMBFJ308	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 10 V	12	-	60	mA
	PMBFJ309	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 10 V	12	-	30	mA
	PMBFJ310	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 10 V	24	-	60	mA
I <sub>GSS</sub>	gate-source leakage current	V <sub>GS</sub> = -15 V; V <sub>DS</sub> = 0 V	-	-	-1	nA
R <sub>DSon</sub>	drain-source on-state resistance	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 100 mV	-	50	-	Ω
y <sub>fs</sub>	forward transfer admittance	I <sub>D</sub> = 10 mA; V <sub>DS</sub> = 10 V	10	-	-	mS
y <sub>os</sub>	common source output admittance	I <sub>D</sub> = 10 mA; V <sub>DS</sub> = 10 V	-	-	250	μS

## 8. Dynamic characteristics

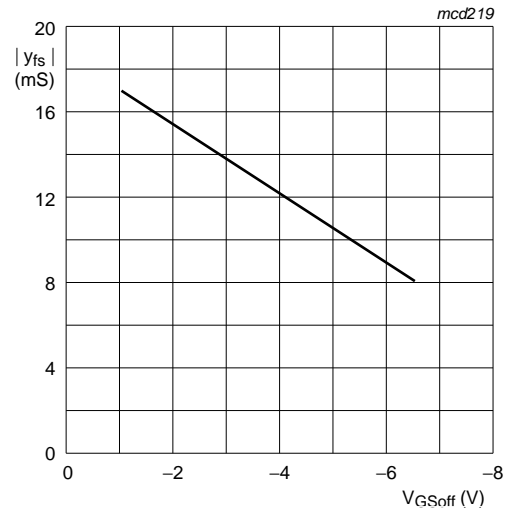
**Table 8. Dynamic characteristics**
*T<sub>j</sub> = 25 °C; unless otherwise specified.*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C <sub>iss</sub>	input capacitance	V <sub>DS</sub> = 10 V				
		V <sub>GS</sub> = -10 V; f = 1 MHz	-	3	5	pF
		V <sub>GS</sub> = 0 V; T <sub>amb</sub> = 25 °C	-	6	-	pF
C <sub>rss</sub>	reverse transfer capacitance	V <sub>DS</sub> = 0 V; V <sub>GS</sub> = -10 V; f = 1 MHz	-	1.3	2.5	pF
g <sub>is</sub>	input conductance	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 10 mA				
		f = 100 MHz	-	200	-	μS
		f = 450 MHz	-	3	-	mS
g <sub>fs</sub>	transfer conductance	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 10 mA				
		f = 100 MHz	-	13	-	mS
		f = 450 MHz	-	12	-	mS
g <sub>rs</sub>	reverse conductance	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 10 mA				
		f = 100 MHz	-	-30	-	μS
		f = 450 MHz	-	-450	-	μS
g <sub>os</sub>	output conductance	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 10 mA				
		f = 100 MHz	-	150	-	μS
		f = 450 MHz	-	400	-	μS
V <sub>n</sub>	equivalent input noise voltage	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 10 mA; f = 100 Hz	-	6	-	nV/√Hz



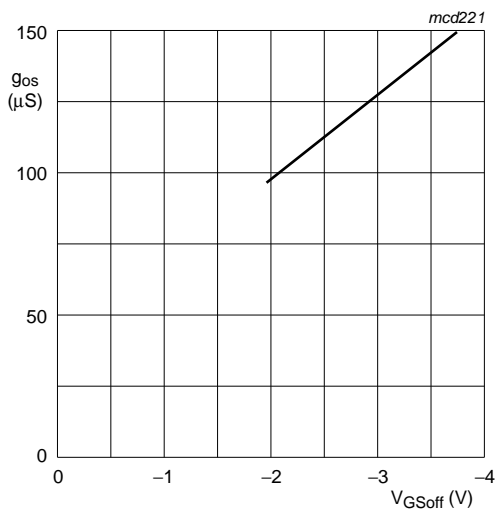
$V_{DS} = 10\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

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



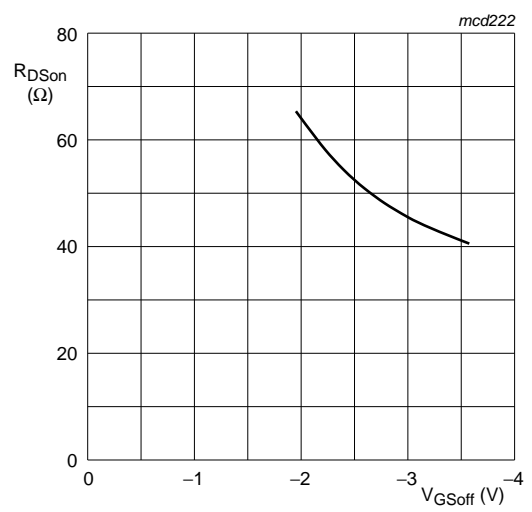
$V_{DS} = 10\text{ V}$ ;  $I_D = 10\text{ mA}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

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



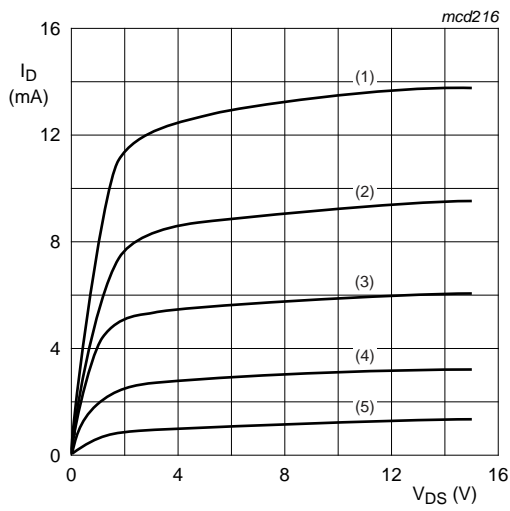
$V_{DS} = 10\text{ V}$ ;  $I_D = 10\text{ mA}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

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



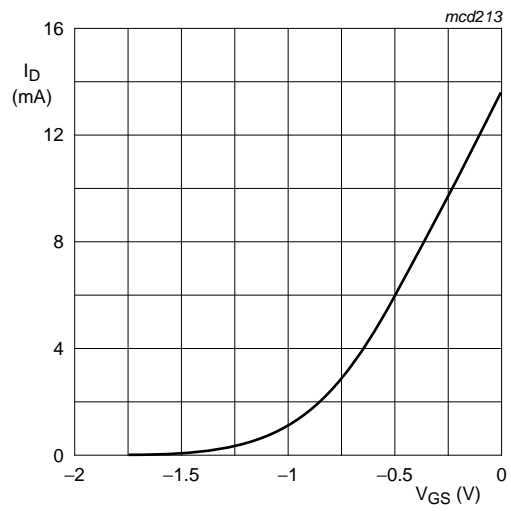
$V_{DS} = 100\text{ mV}$ ;  $V_{GS} = 0\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

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



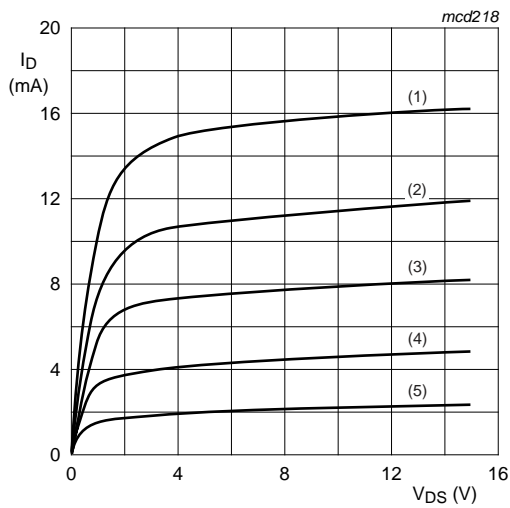
$T_j = 25\text{ }^\circ\text{C}$ .  
 (1)  $V_{GS} = 0\text{ V}$ .  
 (2)  $V_{GS} = -0.25\text{ V}$ .  
 (3)  $V_{GS} = -0.5\text{ V}$ .  
 (4)  $V_{GS} = -0.75\text{ V}$ .  
 (5)  $V_{GS} = -1\text{ V}$ .

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



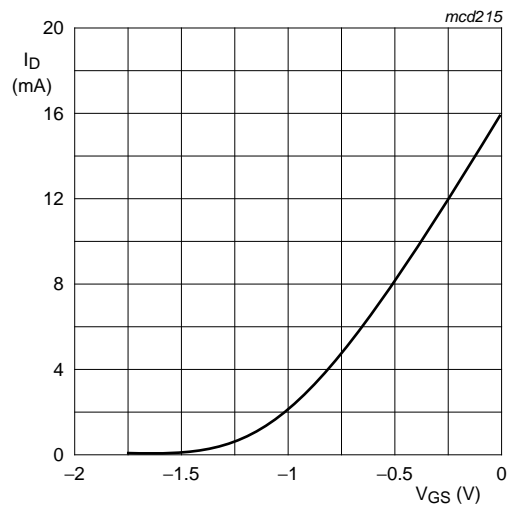
$V_{DS} = 10\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

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



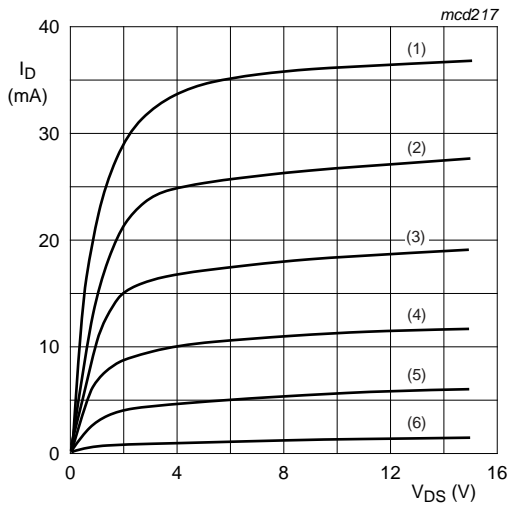
$T_j = 25\text{ }^\circ\text{C}$ .  
 (1)  $V_{GS} = 0\text{ V}$ .  
 (2)  $V_{GS} = -0.25\text{ V}$ .  
 (3)  $V_{GS} = -0.5\text{ V}$ .  
 (4)  $V_{GS} = -0.75\text{ V}$ .  
 (5)  $V_{GS} = -1\text{ V}$ .

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



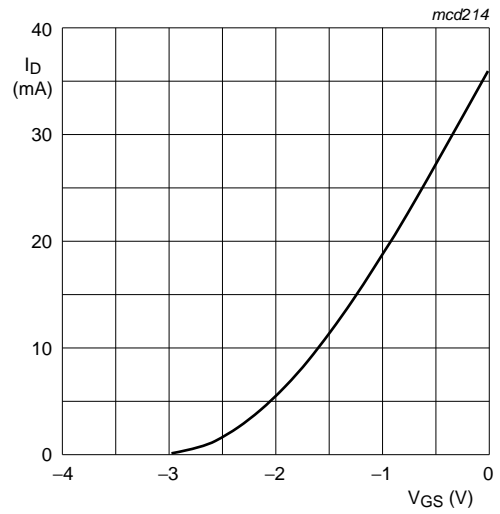
$V_{DS} = 10\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

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



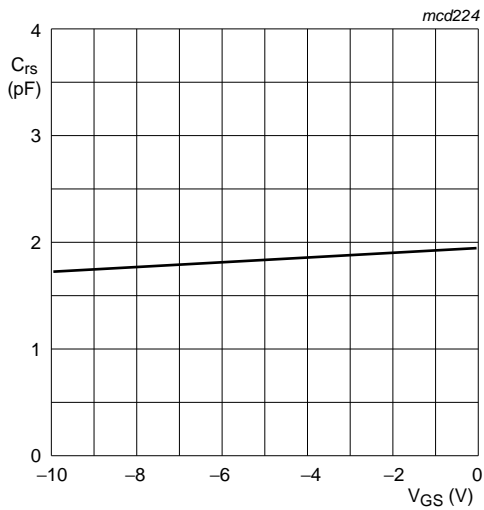
- $T_j = 25\text{ }^\circ\text{C}$ .
- (1)  $V_{GS} = 0\text{ V}$ .
  - (2)  $V_{GS} = -0.5\text{ V}$ .
  - (3)  $V_{GS} = -1\text{ V}$ .
  - (4)  $V_{GS} = -1.5\text{ V}$ .
  - (5)  $V_{GS} = -2\text{ V}$ .
  - (6)  $V_{GS} = -2.5\text{ V}$ .

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



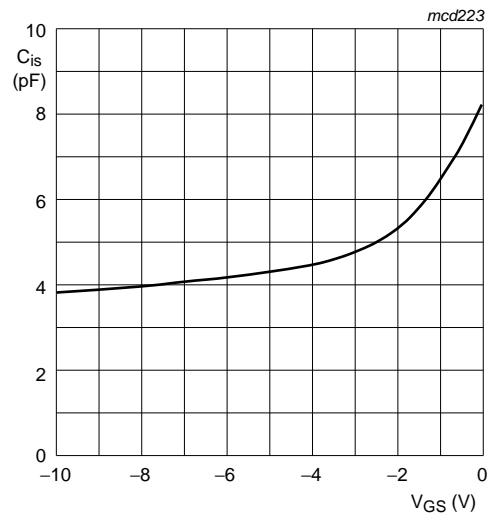
$V_{DS} = 10\text{ V}; T_j = 25\text{ }^\circ\text{C}$ .

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



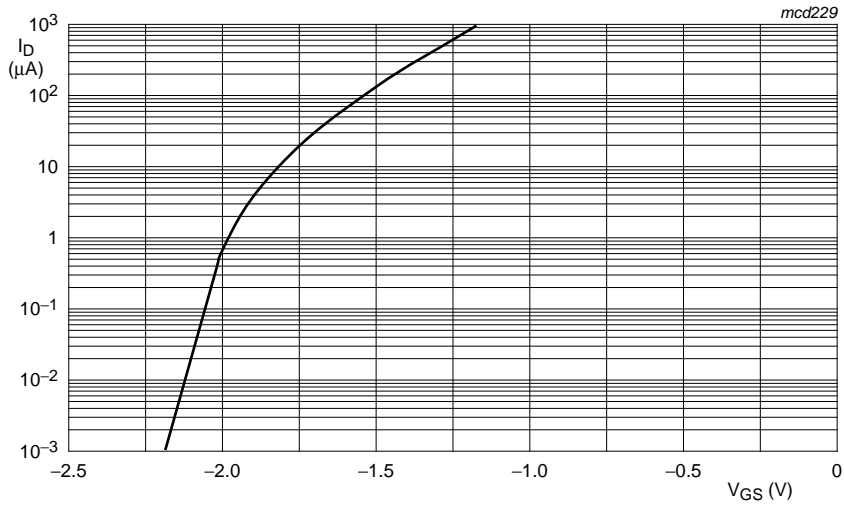
$V_{DS} = 10\text{ V}; T_j = 25\text{ }^\circ\text{C}$ .

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



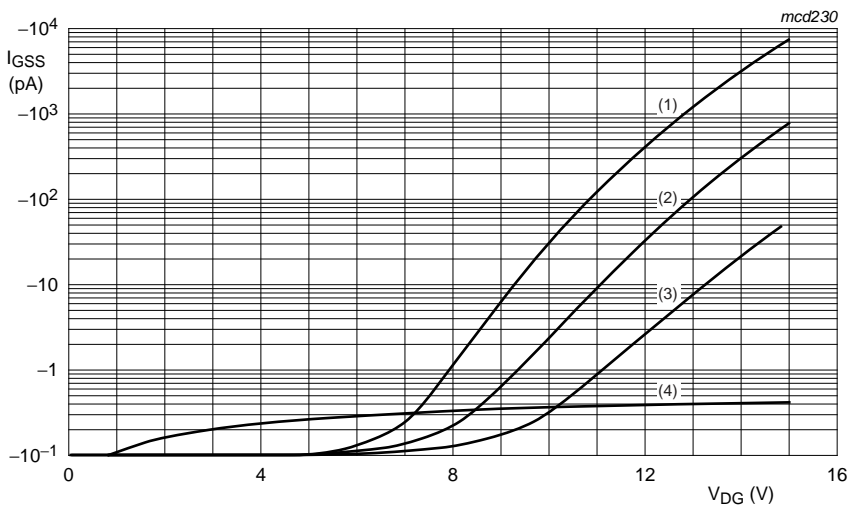
$V_{DS} = 10\text{ V}; T_j = 25\text{ }^\circ\text{C}$ .

**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.**



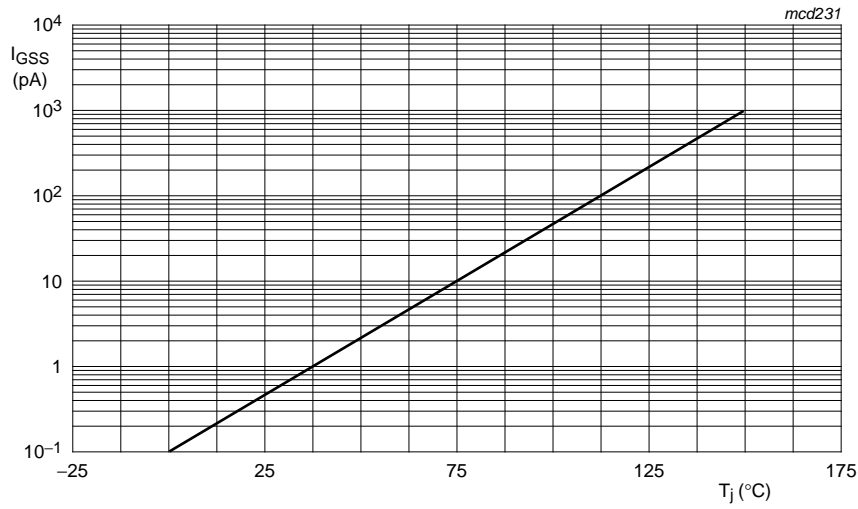
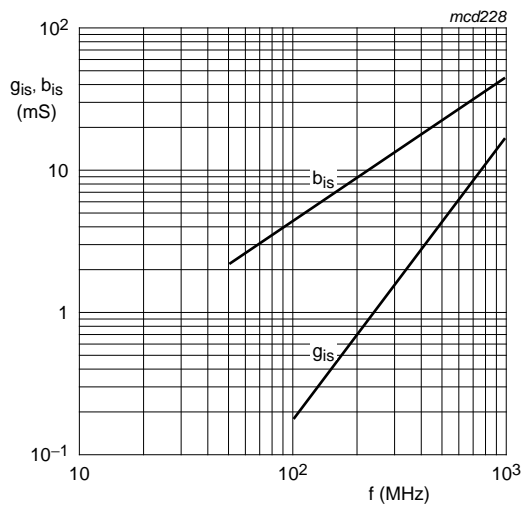
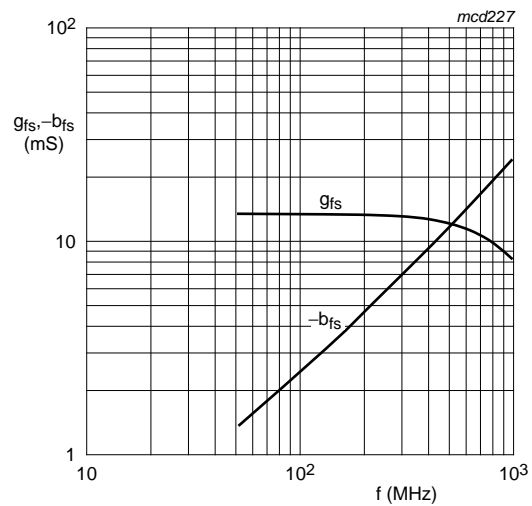


Fig 16. Gate current as a function of junction temperature; typical values.



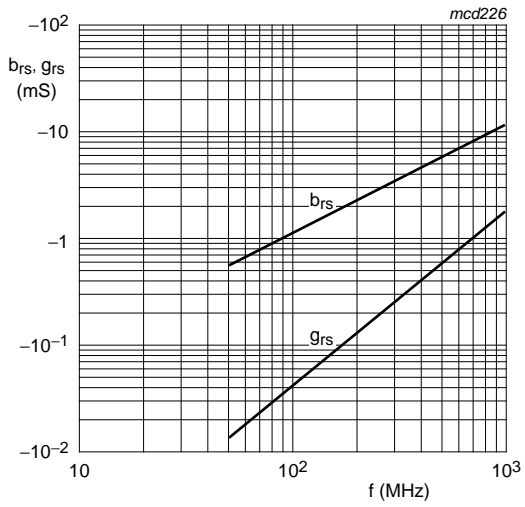
$V_{DS} = 10$  V;  $I_D = 10$  mA;  $T_{amb} = 25$  °C.

Fig 17. Input admittance; typical values.



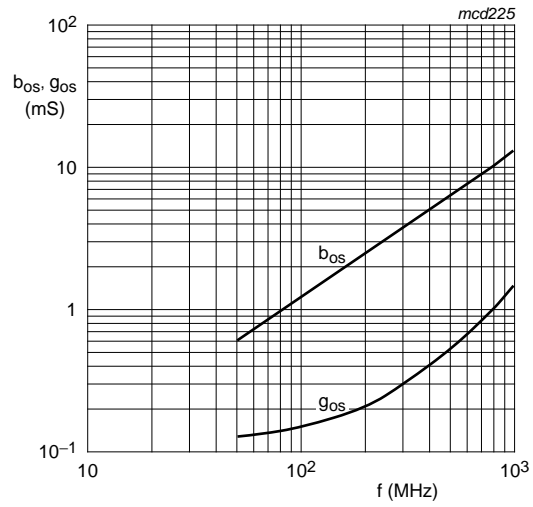
$V_{DS} = 10$  V;  $I_D = 10$  mA;  $T_{amb} = 25$  °C.

Fig 18. Forward transfer admittance; typical values.



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

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



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

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

**9. Package outline**

Plastic surface-mounted package; 3 leads

SOT23

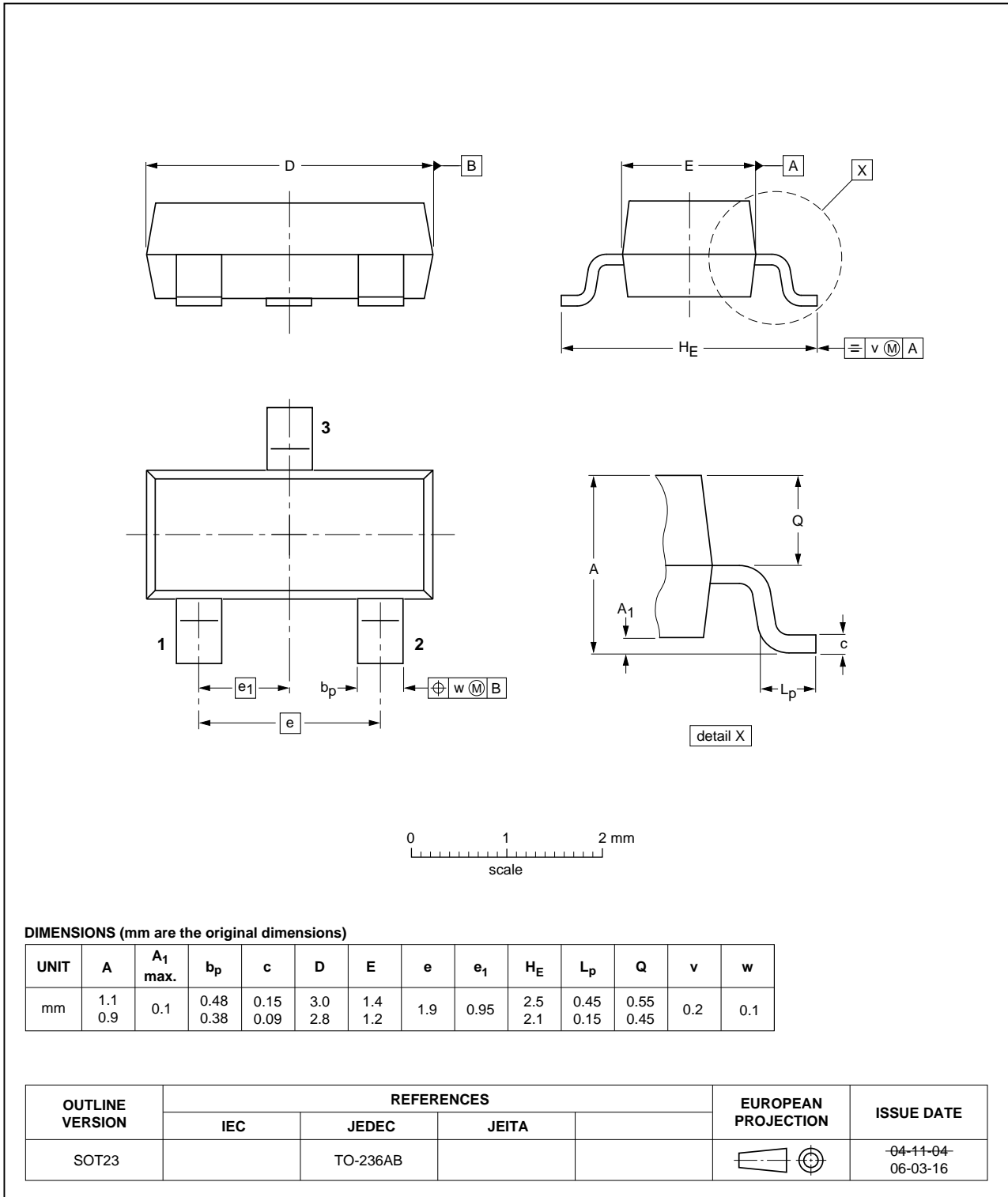


Fig 21. Package outline.

## 10. Revision history

**Table 9. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMBFJ308_309_310 v.4	20110920	Product data sheet	-	PMBFJ308_309_310 v.3
Modifications:		<ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• Package outline drawings have been updated to the latest version.</li></ul>		
PMBFJ308_309_310 v.3 (9397 750 13403)	20040723	Product data sheet	-	PMBFJ308_309_310 v.2
PMBFJ308_309_310 v.2 (9397 750 01141)	19960911	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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For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

## 13. Contents

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