



# BF861A; BF861B; BF861C

N-channel junction FETs

Rev. 5 — 15 September 2011

Product data sheet

## 1. Product profile

### 1.1 General description

N-channel symmetrical 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 and benefits

- High transfer admittance
- Low feedback capacitance
- Low input capacitance
- Low noise.

### 1.3 Applications

- Preamplifiers for AM tuners in car radios.

### 1.4 Quick reference data

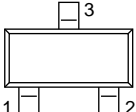

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage (DC)		-	-	25	V
$I_{DSS}$	drain current					
	BF861A	$V_{GS} = 0\text{ V}; V_{DS} = 8\text{ V}$	2	-	6.5	mA
	BF861B	$V_{GS} = 0\text{ V}; V_{DS} = 8\text{ V}$	6	-	15	mA
	BF861C	$V_{GS} = 0\text{ V}; V_{DS} = 8\text{ V}$	12	-	25	mA
$P_{tot}$	total power dissipation	up to $T_{amb} = 25\text{ °C}$	-	-	250	mW
$ y_{fs} $	forward transfer admittance;					
	BF861A	$V_{GS} = 0\text{ V}; V_{DS} = 8\text{ V}$	12	-	20	mS
	BF861B	$V_{GS} = 0\text{ V}; V_{DS} = 8\text{ V}$	16	-	25	mS
	BF861C	$V_{GS} = 0\text{ V}; V_{DS} = 8\text{ V}$	20	-	30	mS
$C_{iss}$	input capacitance	$f = 1\text{ MHz}$	-	-	10	pF
$C_{rss}$	reverse transfer capacitance	$f = 1\text{ MHz}$	-	-	2.7	pF



## 2. Pinning information

Table 2. Discrete pinning

Pin	Description	Simplified outline	Symbol
1	source		 sym053
2	drain		
3	gate		

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BF861A	-	plastic surface mounted package; 3 leads	SOT23
BF861B	-	plastic surface mounted package; 3 leads	SOT23
BF861C	-	plastic surface mounted package; 3 leads	SOT23

## 4. Marking

Table 4. Marking codes

Type number	Marking code <sup>[1]</sup>
BF861A	28*
BF861B	29*
BF861C	30*

- [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)		-	25	V
$V_{GSO}$	gate-source voltage	open drain	-	25	V
$V_{DGO}$	drain-gate voltage (DC)	open source	-	25	V
$I_G$	forward gate current (DC)		-	10	mA
$P_{tot}$	total power dissipation	up to $T_{amb} = 25\text{ °C}$ <sup>[1]</sup>	-	250	mW
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	operating junction temperature		-	150	°C

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

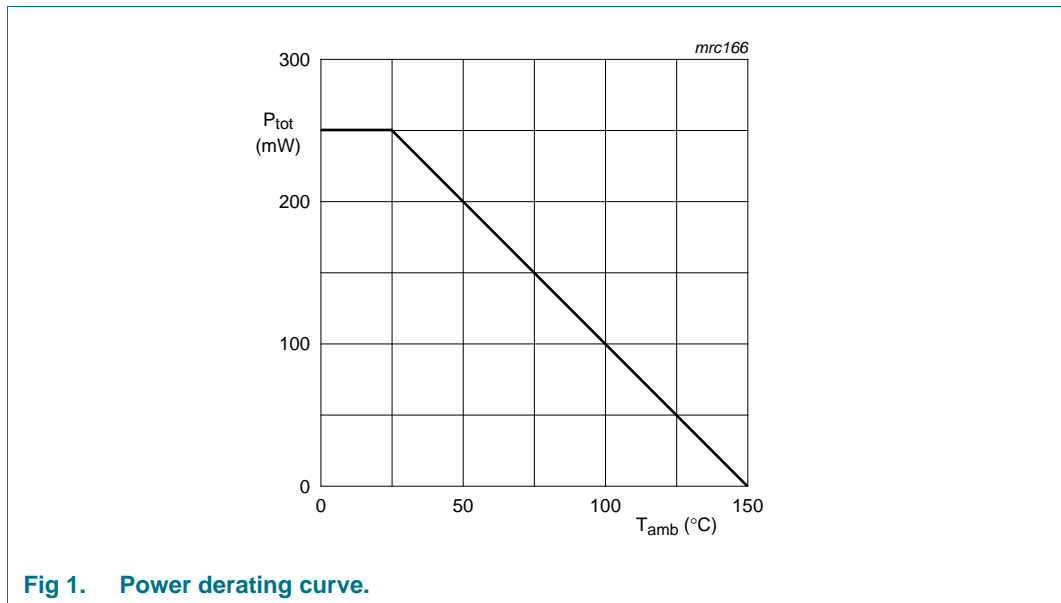


Fig 1. Power derating curve.

## 6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient		[1] 500	K/W

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

## 7. Characteristics

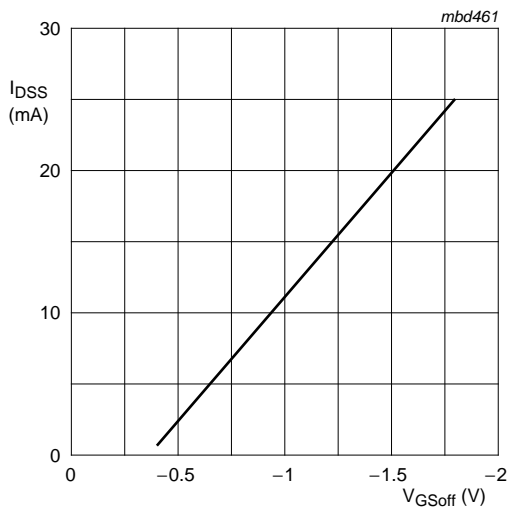
Table 7. Characteristics

T<sub>j</sub> = 25 °C; V<sub>DS</sub> = 8 V; V<sub>GS</sub> = 0 V 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	-25	-	-	V	
V <sub>GSoff</sub>	gate-source cut-off voltage	BF861A	I <sub>D</sub> = 1 μA	-0.2	-	-1	V
		BF861B	I <sub>D</sub> = 1 μA	-0.5	-	-1.5	V
		BF861C	I <sub>D</sub> = 1 μA	-0.8	-	-2	V
V <sub>GSS</sub>	gate-source forward voltage	V <sub>DS</sub> = 0 V; I <sub>G</sub> = 1 mA	-	-	1	V	
I <sub>DSS</sub>	drain current	BF861A		2	-	6.5	mA
		BF861B		6	-	15	mA
		BF861C		12	-	25	mA
I <sub>GSS</sub>	gate cut-off current	V <sub>GS</sub> = -20 V; V <sub>DS</sub> = 0 V	-	-	-1	nA	

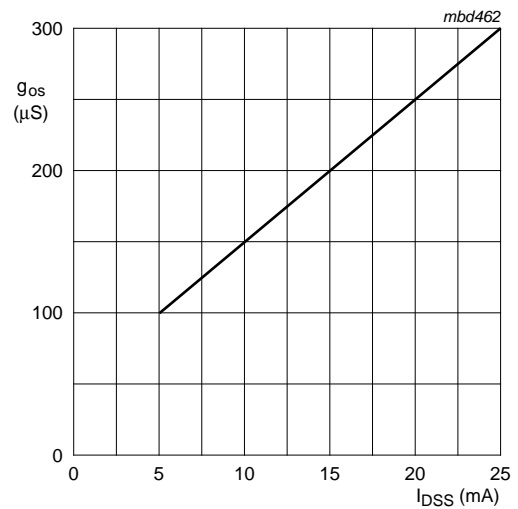
**Table 7. Characteristics ...continued**  
 $T_j = 25\text{ }^\circ\text{C}$ ;  $V_{DS} = 8\text{ V}$ ;  $V_{GS} = 0\text{ V}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$ y_{fs} $	forward transfer admittance					
	BF861A		12	-	20	mS
	BF861B		16	-	25	mS
	BF861C		20	-	30	mS
$g_{os}$	common source output conductance					
	BF861A		-	-	200	$\mu\text{S}$
	BF861B		-	-	250	$\mu\text{S}$
	BF861C		-	-	300	$\mu\text{S}$
$C_{iss}$	input capacitance	$f = 1\text{ MHz}$	-	-	10	pF
$C_{rss}$	reverse transfer capacitance	$f = 1\text{ MHz}$	-	2.1	2.7	pF
$V_n/\sqrt{B}$	equivalent input noise voltage	$V_{GS} = 0\text{ V}$ ; $f = 1\text{ MHz}$	-	1.5	-	nV/ $\sqrt{\text{Hz}}$



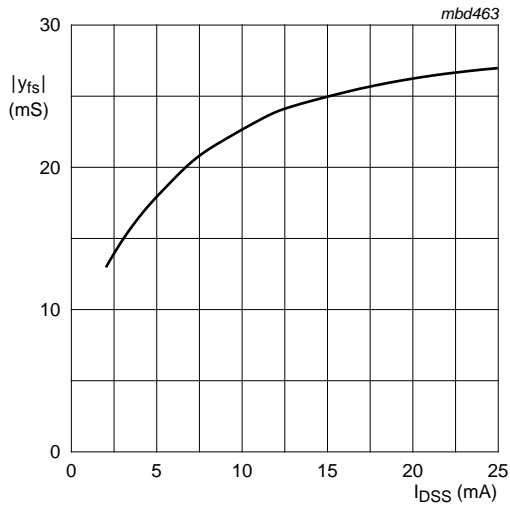
$V_{DS} = 8\text{ V}$ .

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



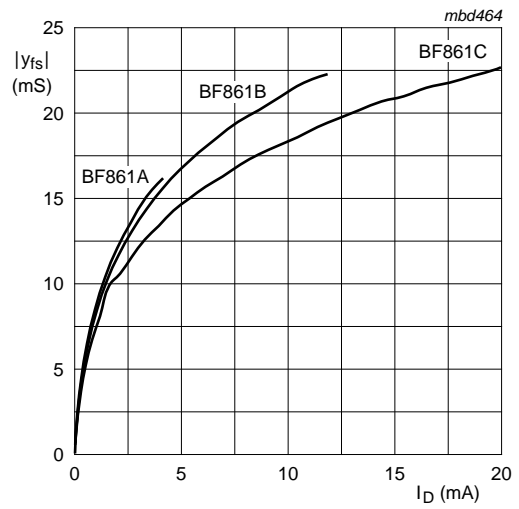
$V_{DS} = 8\text{ V}$ .  
 $V_{GS} = 0\text{ V}$ .

**Fig 3. Common-source output conductance as a function of drain current; typical values.**



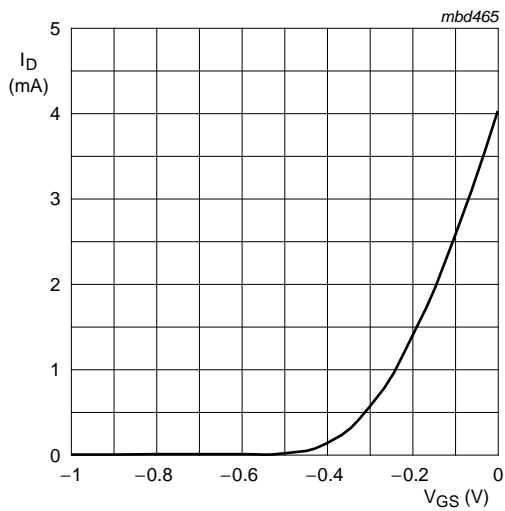
$V_{DS} = 8 \text{ V.}$   
 $V_{GS} = 0 \text{ V.}$

**Fig 4. Forward transfer admittance as a function of drain current; typical values.**



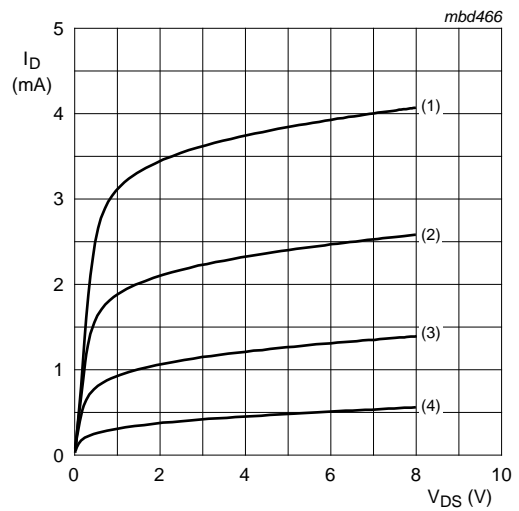
$V_{DS} = 8 \text{ V.}$

**Fig 5. Forward transfer admittance as a function of drain current; typical values.**



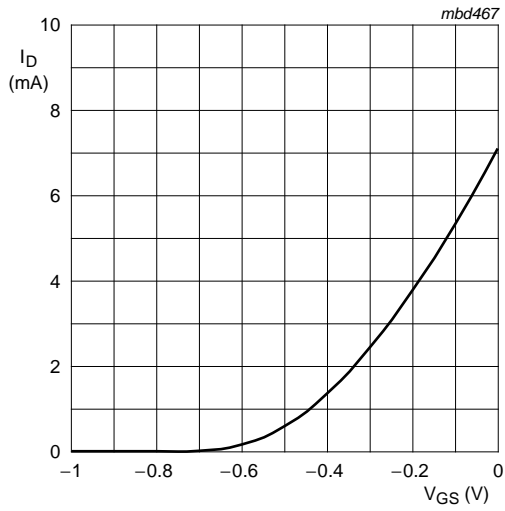
$V_{DS} = 8 \text{ V.}$

**Fig 6. Typical input characteristics; BF861A.**



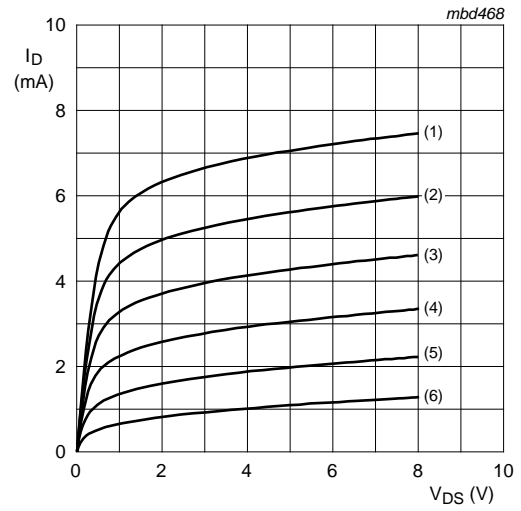
$V_{DS} = 8 \text{ V.}$   
 (1)  $V_{GS} = 0 \text{ V.}$   
 (2)  $V_{GS} = -100 \text{ mV.}$   
 (3)  $V_{GS} = -200 \text{ mV.}$   
 (4)  $V_{GS} = -300 \text{ mV.}$

**Fig 7. Typical output characteristics: BF861A.**



$V_{DS} = 8\text{ V.}$

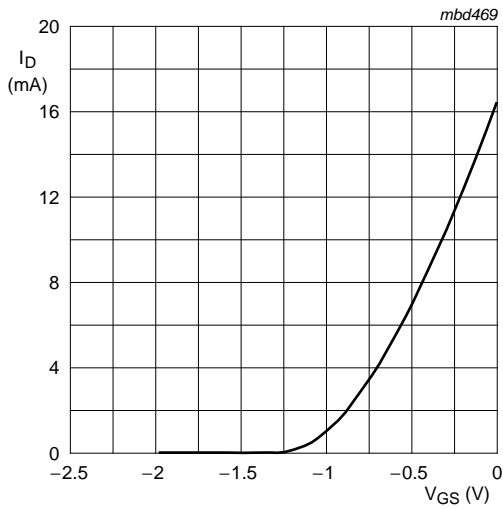
**Fig 8. Typical input characteristics; BF861B.**



$V_{DS} = 8\text{ V.}$

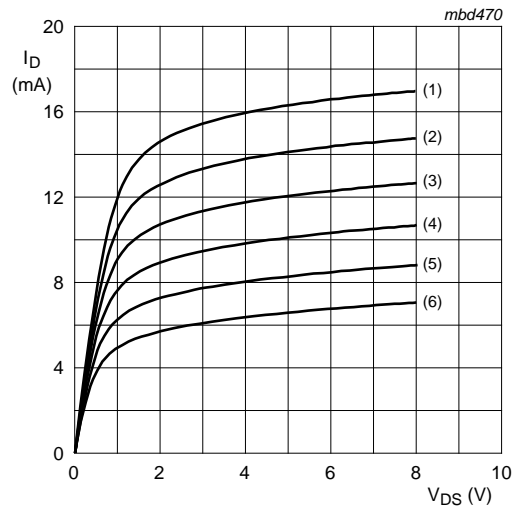
- (1)  $V_{GS} = 0\text{ V.}$
- (2)  $V_{GS} = -100\text{ mV.}$
- (3)  $V_{GS} = -200\text{ mV.}$
- (4)  $V_{GS} = -300\text{ mV.}$
- (5)  $V_{GS} = -400\text{ mV.}$
- (6)  $V_{GS} = -500\text{ mV.}$

**Fig 9. Typical output characteristics; BF861B.**



$V_{DS} = 8 \text{ V.}$

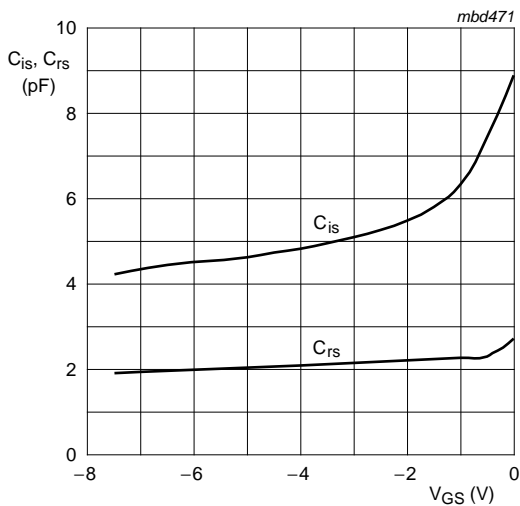
**Fig 10. Typical input characteristics; BF861C.**



$V_{DS} = 8 \text{ V.}$

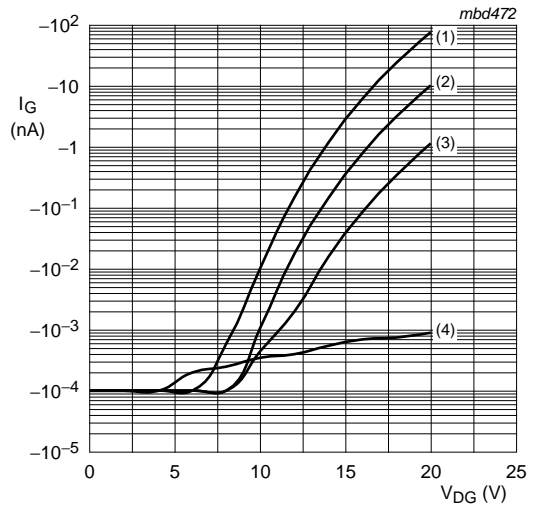
- (1)  $V_{GS} = 0 \text{ V.}$
- (2)  $V_{GS} = -200 \text{ mV.}$
- (3)  $V_{GS} = -400 \text{ mV.}$
- (4)  $V_{GS} = -600 \text{ mV.}$
- (5)  $V_{GS} = -800 \text{ mV.}$
- (6)  $V_{GS} = -1 \text{ V.}$

**Fig 11. Typical output characteristics; BF861C.**



$V_{DS} = 8 \text{ V.}$   
 $f = 1 \text{ MHz.}$

**Fig 12. Input and reverse transfer capacitance as functions of gate-source voltage; typical values.**



$V_{DS} = 8 \text{ V.}$

- (1)  $I_D = 10 \text{ mA.}$
- (2)  $I_D = 1 \text{ mA.}$
- (3)  $I_D = 0.1 \text{ mA.}$
- (4)  $I_D = I_{GSS}.$

**Fig 13. Gate current as a function of drain-gate voltage; typical values.**

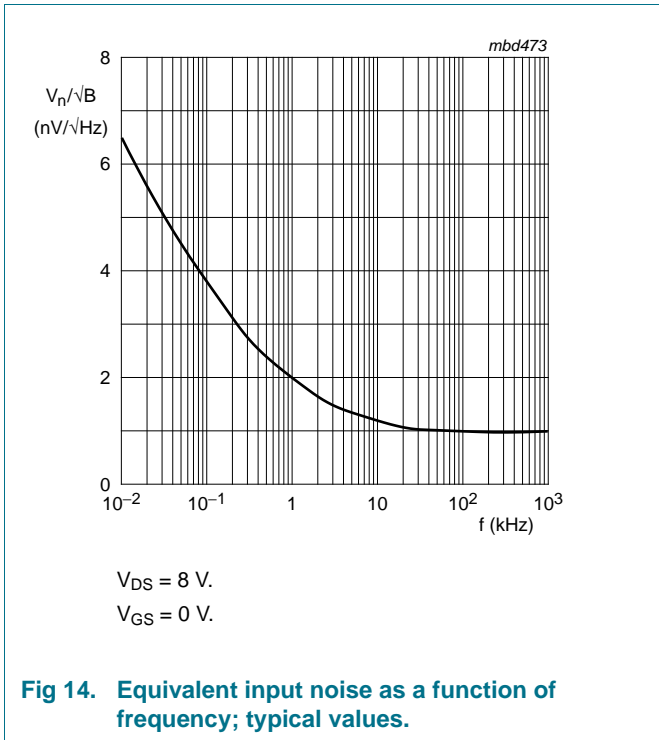


Fig 14. Equivalent input noise as a function of frequency; typical values.

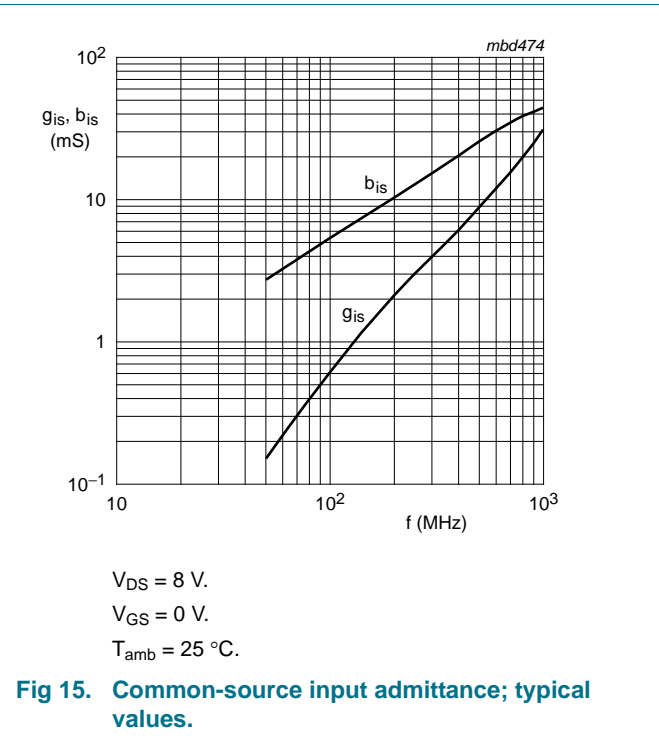


Fig 15. Common-source input admittance; typical values.

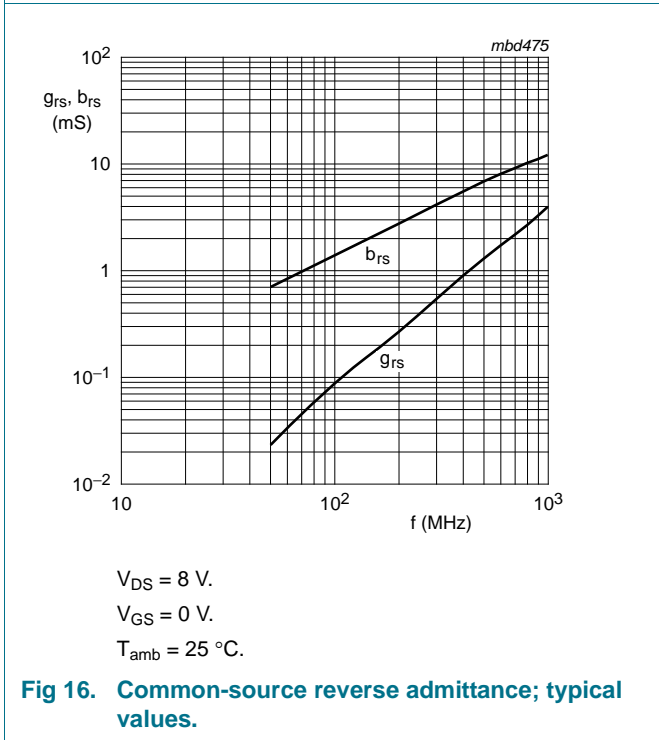


Fig 16. Common-source reverse admittance; typical values.

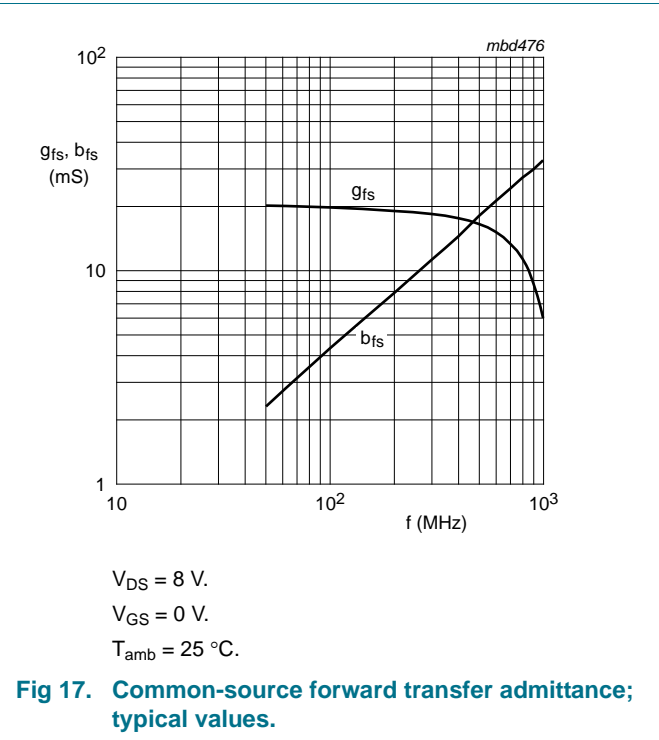
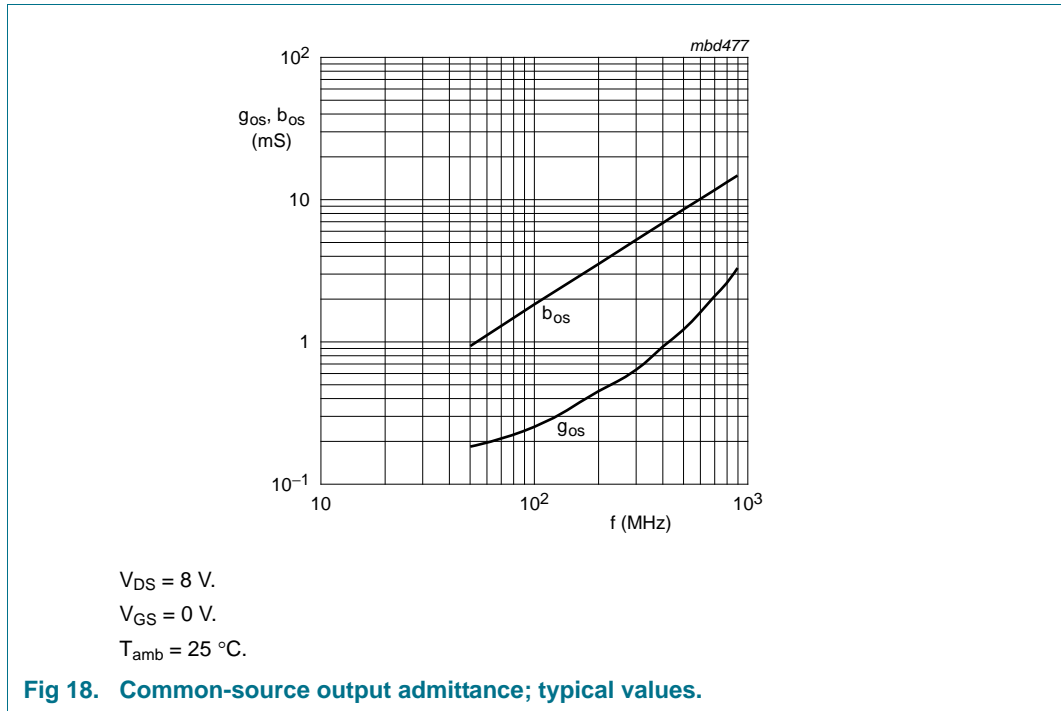


Fig 17. Common-source forward transfer admittance; typical values.

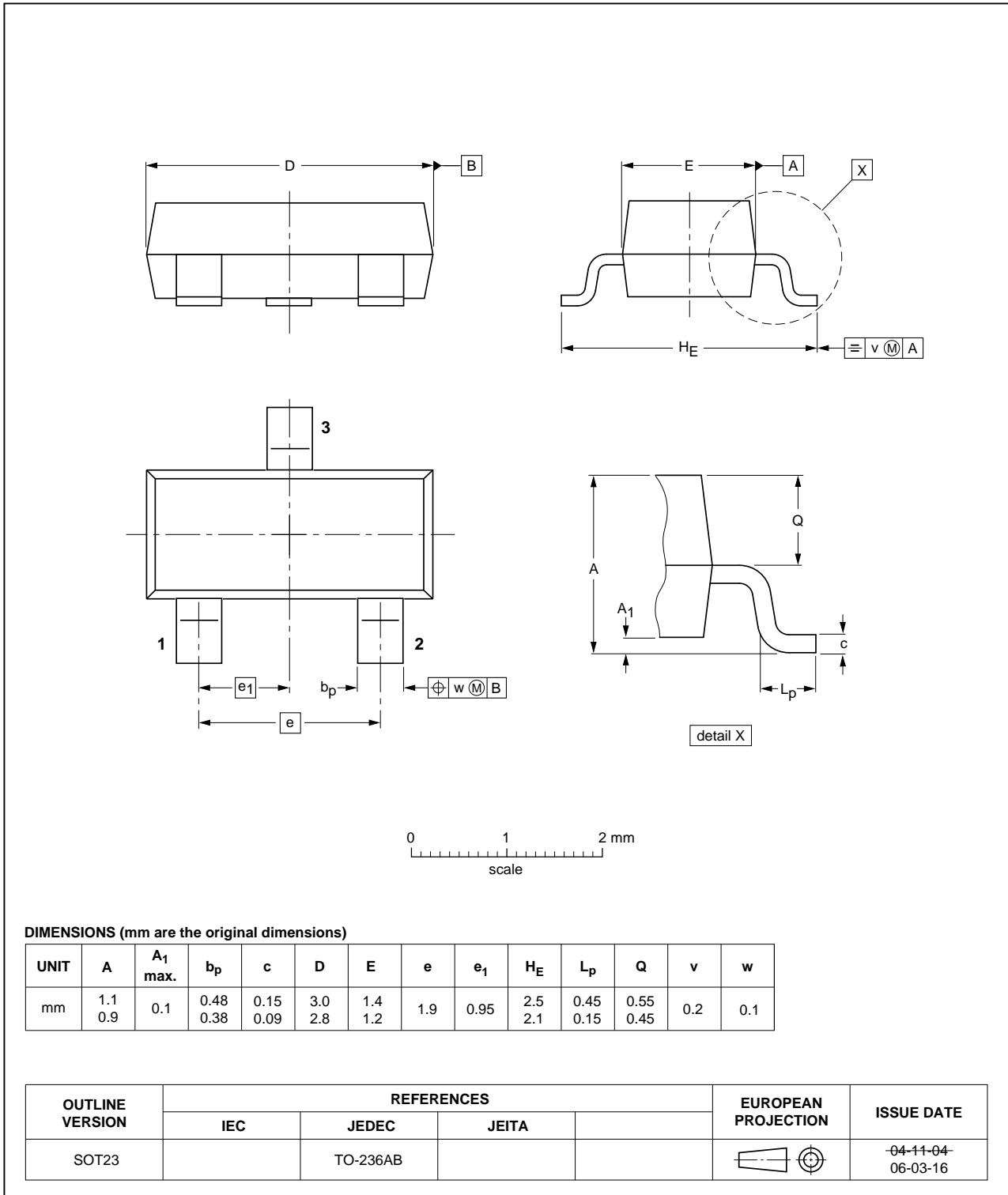




**8. Package outline**

Plastic surface-mounted package; 3 leads

SOT23



**Fig 19. Package outline**

## 9. Revision history

**Table 8. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BF861A_BF861B_BF861C v.5	20110915	Product data sheet	-	BF861A_BF861B_BF861C v.4
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>		
BF861A_BF861B_BF861C v.4 (9397 750 13395)	20040924	Product data sheet	-	BF861 v.3
BF861 v.3 (9397 750 02667)	19970904	Product specification	-	BF861 v.2
BF861 v.2	19950414	-	-	BF861 v.1
BF861 v.1	19940829	-	-	-

## 10. Legal information

### 10.1 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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 Document identifier: BF861A\_BF861B\_BF861C

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