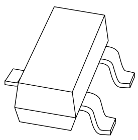


BF861A; BF861B; BF861C

N-channel junction FETs

Rev. 04 — 24 September 2004 **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

- 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

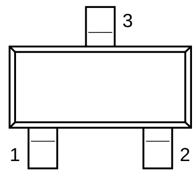
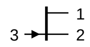
Table 1: Quick reference data

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

PHILIPS

2. Pinning information

Table 2: Discrete pinning

Pin	Description	Simplified outline	Symbol
1	source	 SOT23	 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 [1]
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

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 °C [1]	-	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.

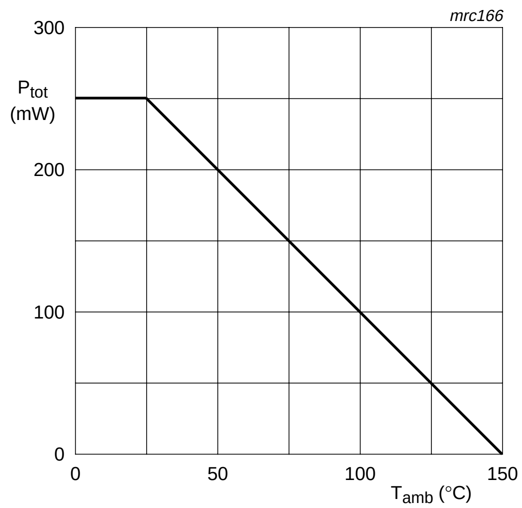


Fig 1. Power derating curve.

6. Thermal characteristics

Table 6: Thermal characteristics

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

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

7. Characteristics

Table 7: Characteristics

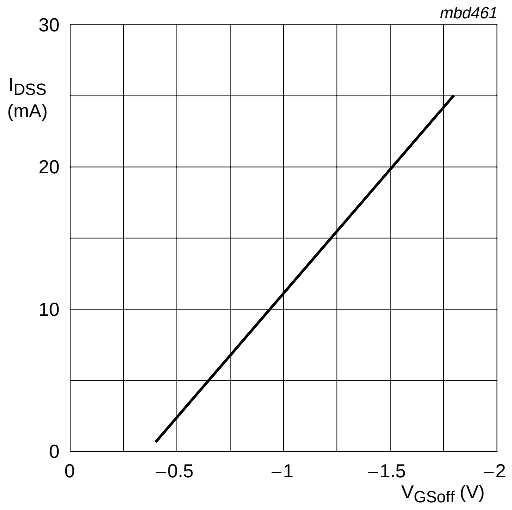
T_j = 25 °C; V_{DS} = 8 V; V_{GS} = 0 V unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)GSS}$	gate-source breakdown voltage	I_G = –1 µA	–25	-	-	V

Table 7: Characteristics *...continued*

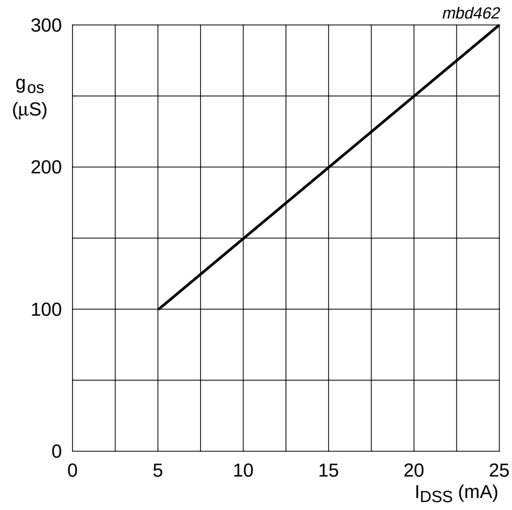
$T_j = 25\,°C$; $V_{DS} = 8$ V; $V_{GS} = 0$ V unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{GSoff}	gate-source cut-off voltage					
	BF861A	$I_D = 1\ \mu A$	–0.2	-	–1	V
	BF861B	$I_D = 1\ \mu A$	–0.5	-	–1.5	V
	BF861C	$I_D = 1\ \mu A$	–0.8	-	–2	V
V_{GSS}	gate-source forward voltage	$V_{DS} = 0$ V; $I_G = 1$ mA	-	-	1	V
I_{DSS}	drain current					
	BF861A		2	-	6.5	mA
	BF861B		6	-	15	mA
	BF861C		12	-	25	mA
I_{GSS}	gate cut-off current	$V_{GS} = –20$ V; $V_{DS} = 0$ V	-	-	–1	nA
$\lvert y_{fs} \rvert$	forward transfer admittance					
	BF861A		12	-	20	mS
	BF861B		16	-	25	mS
	BF861C		20	-	30	mS
g_{os}	common source output conductance					
	BF861A		-	-	200	µS
	BF861B		-	-	250	µS
	BF861C		-	-	300	µS
C_{iss}	input capacitance	f = 1 MHz	-	-	10	pF
C_{rss}	reverse transfer capacitance	f = 1 MHz	-	2.1	2.7	pF
$V_n/\sqrt{B}$	equivalent input noise voltage	$V_{GS} = 0$ V; f = 1 MHz	-	1.5	-	$nV/\sqrt{Hz}$



V_{DS} = 8 V.

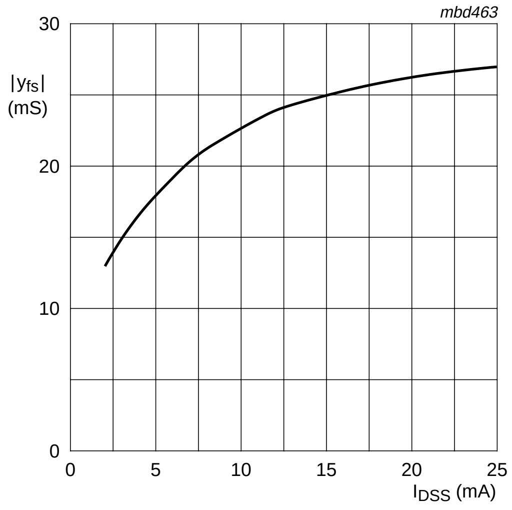
Fig 2. Drain current as a function of gate-source cut-off voltage; typical values.



V_{DS} = 8 V.

V_{GS} = 0 V.

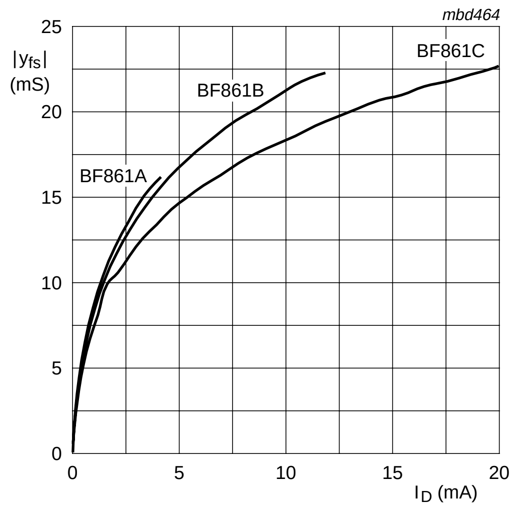
Fig 3. Common-source output conductance as a function of drain current; typical values.



V_{DS} = 8 V.

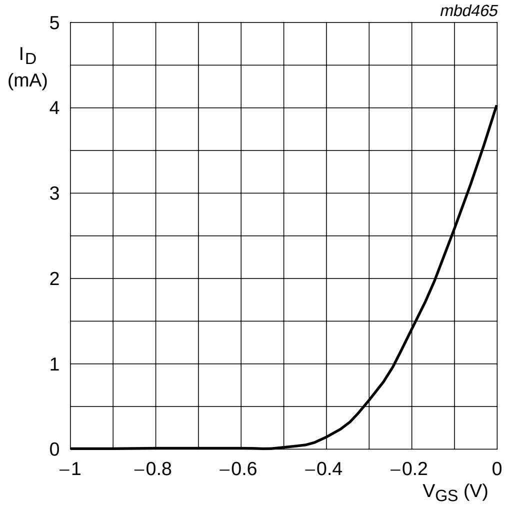
V_{GS} = 0 V.

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



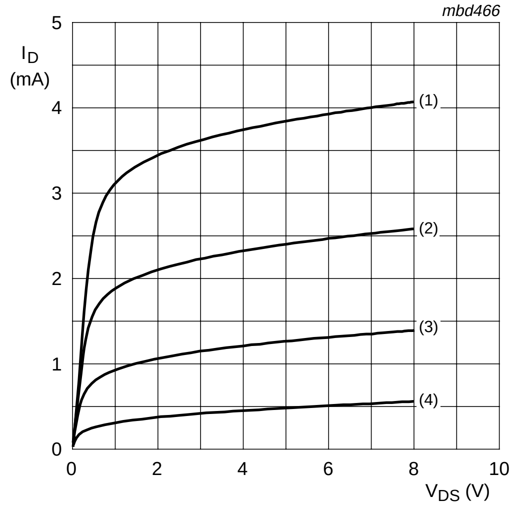
V_{DS} = 8 V.

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



V_{DS} = 8 V.

Fig 6. Typical input characteristics; BF861A.



V_{DS} = 8 V.

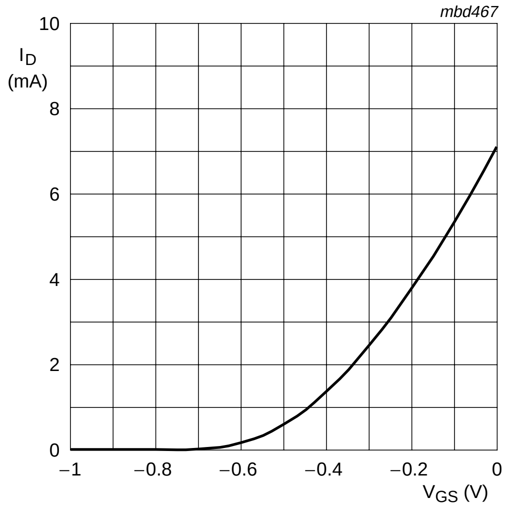
(1) V_{GS} = 0 V.

(2) V_{GS} = −100 mV.

(3) V_{GS} = −200 mV.

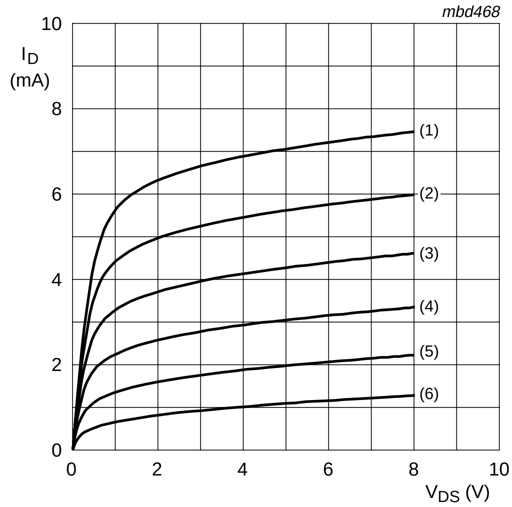
(4) V_{GS} = −300 mV.

Fig 7. Typical output characteristics: BF861A.



V_{DS} = 8 V.

Fig 8. Typical input characteristics; BF861B.



V_{DS} = 8 V.

(1) V_{GS} = 0 V.

(2) V_{GS} = −100 mV.

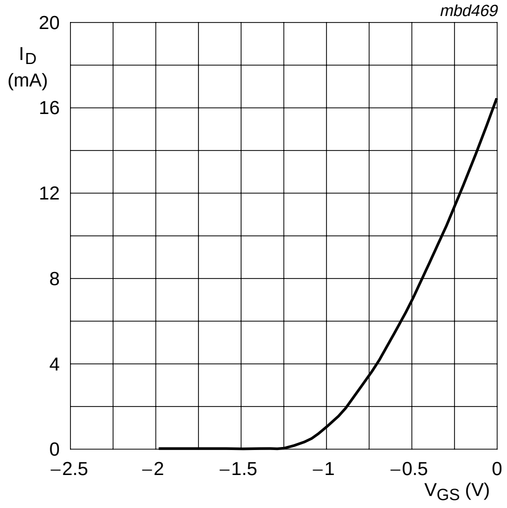
(3) V_{GS} = −200 mV.

(4) V_{GS} = −300 mV.

(5) V_{GS} = −400 mV.

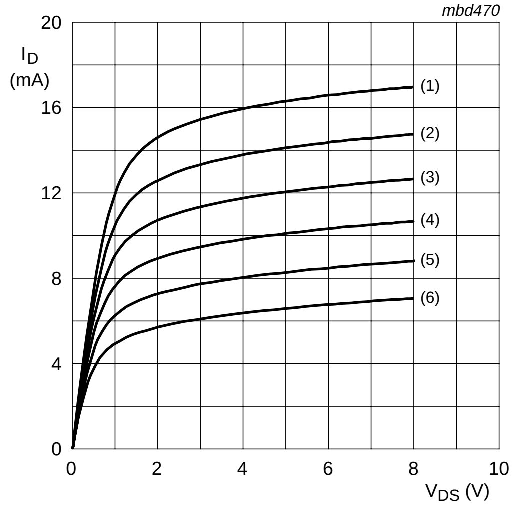
(6) V_{GS} = −500 mV.

Fig 9. Typical output characteristics; BF861B.



V_{DS} = 8 V.

Fig 10. Typical input characteristics; BF861C.



V_{DS} = 8 V.

(1) V_{GS} = 0 V.

(2) V_{GS} = −200 mV.

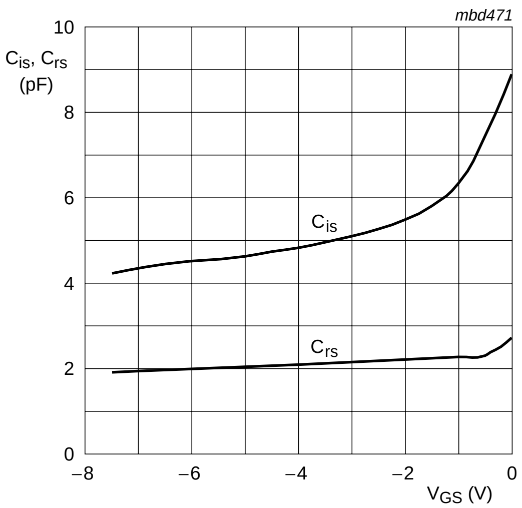
(3) V_{GS} = −400 mV.

(4) V_{GS} = −600 mV.

(5) V_{GS} = −800 mV.

(6) V_{GS} = −1 V.

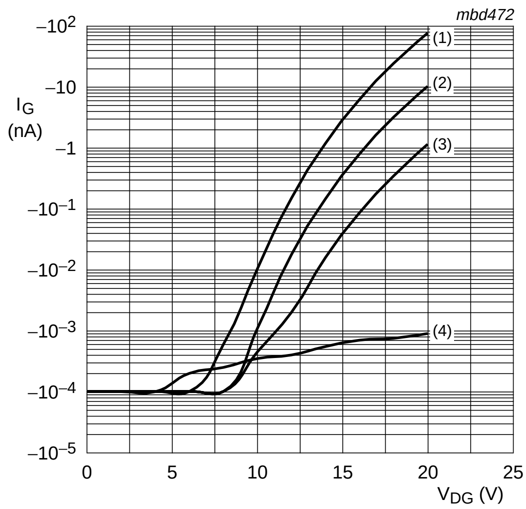
Fig 11. Typical output characteristics; BF861C.



V_{DS} = 8 V.

f = 1 MHz.

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



V_{DS} = 8 V.

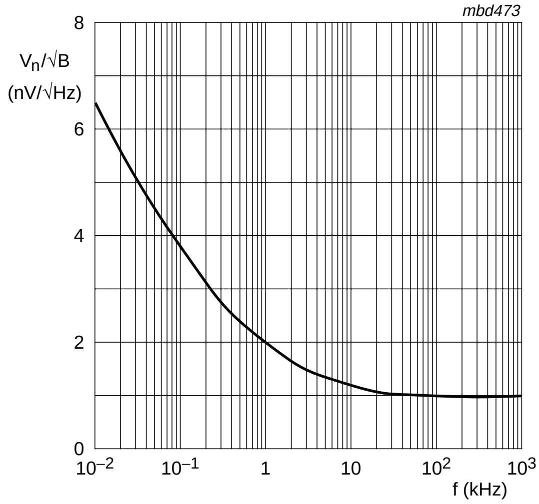
(1) I_D = 10 mA.

(2) I_D = 1 mA.

(3) I_D = 0.1 mA.

(4) $I_D = I_{GSS}$.

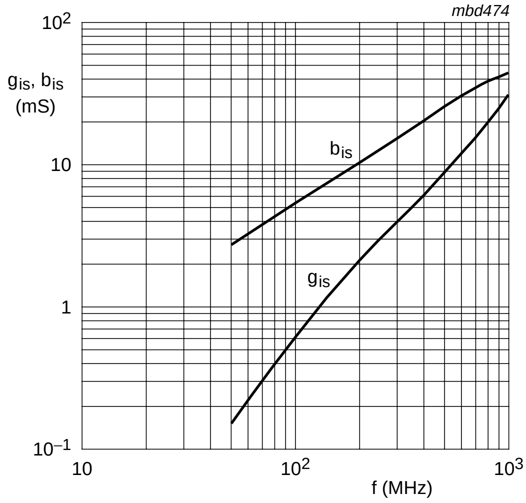
Fig 13. Gate current as a function of drain-gate voltage; typical values.



V_{DS} = 8 V.

V_{GS} = 0 V.

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

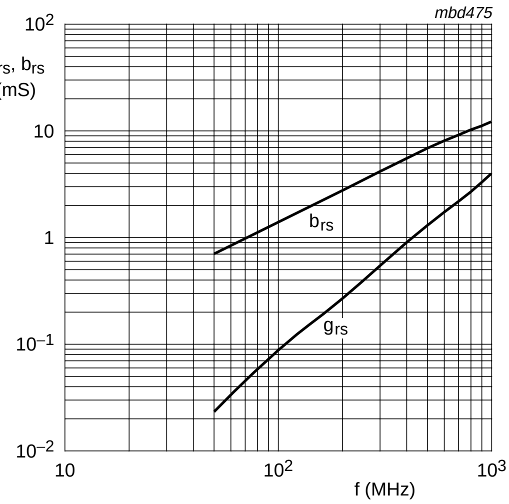


V_{DS} = 8 V.

V_{GS} = 0 V.

T_{amb} = 25 °C.

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

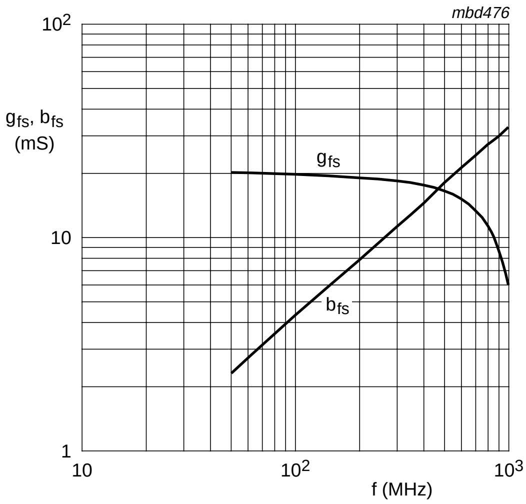


V_{DS} = 8 V.

V_{GS} = 0 V.

T_{amb} = 25 °C.

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

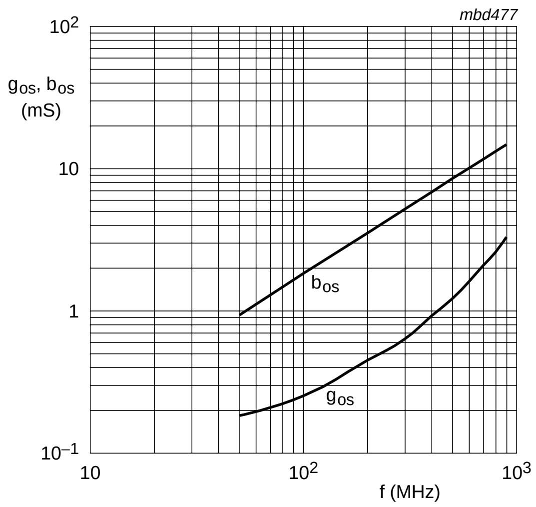


V_{DS} = 8 V.

V_{GS} = 0 V.

T_{amb} = 25 °C.

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



V_{DS} = 8 V.

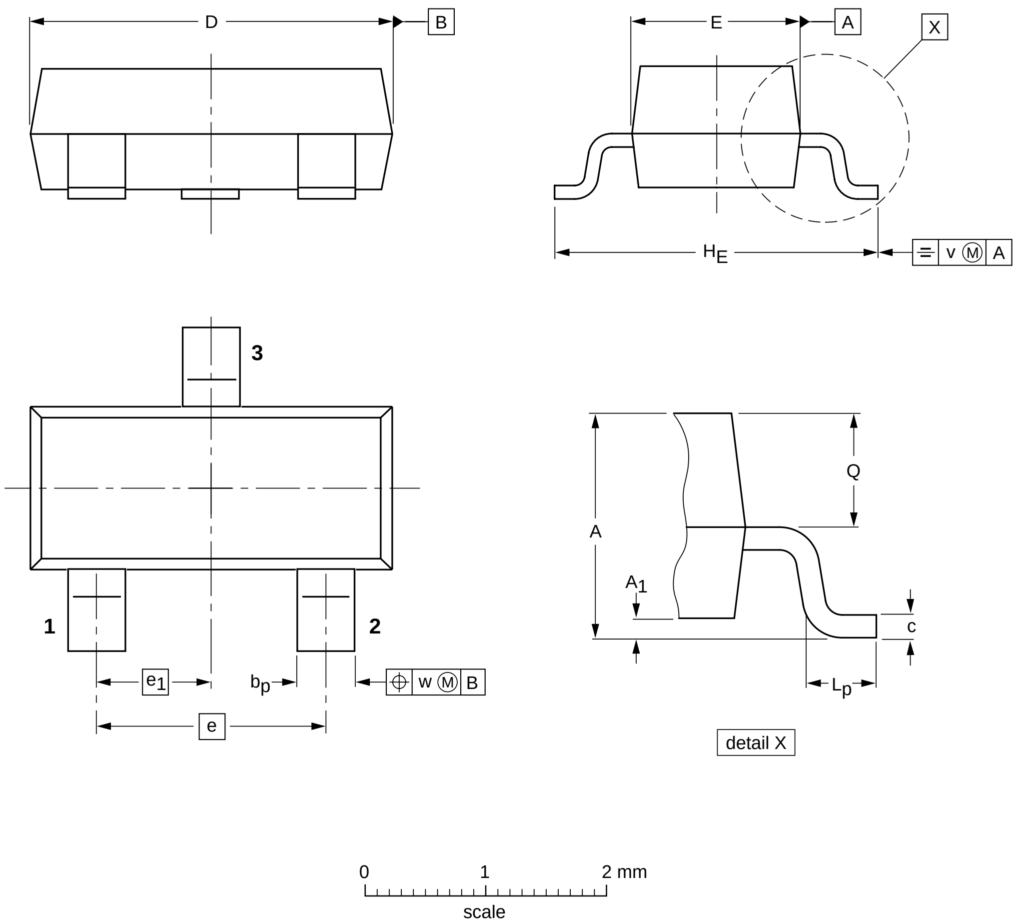
V_{GS} = 0 V.

T_{amb} = 25 °C.

Fig 18. Common-source output admittance; typical values.

8. 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	EIAJ			
SOT23		TO-236AB				~~97-02-28~~ 99-09-13

Fig 19. Package outline

9. Revision history

Table 8: Revision history

Document ID	Release date	Data sheet status	Change notice	Order number	Supersedes
BF861A_BF861B_BF861C_4	20040924	Product data sheet	-	9397 750 13395	BF861_3
Modifications:	• Converted document to TDM format. • Marking code changed and added as Table 4.				
BF861_3	19970904	Product specification	-	9397 750 02667	BF861_2
BF861_2	19950414		-	-	BF861_1
BF861_1	19940829		-	-	-

10. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	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.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

[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.

11. 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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14. Contents

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