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.

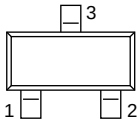
1.4 Quick reference data

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 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

2. Pinning information

Table 2. Discrete pinning

Pin	Description	Simplified outline	Symbol
1	source		
2	drain		
3	gate		

sym053

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
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.

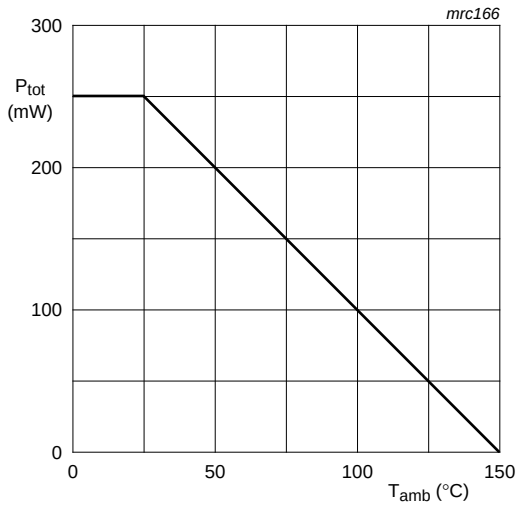


Fig 1. Power derating curve.

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

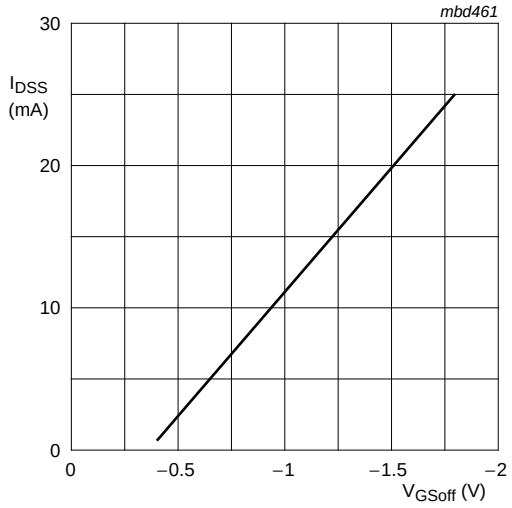
T_j = 25 °C; V_{DS} = 8 V; V_{GS} = 0 V unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)GSS}$	gate-source breakdown voltage	I_G = −1 μA	−25	-	-	V
V_{GSoff}	gate-source cut-off voltage					
	BF861A	I_D = 1 μA	−0.2	-	−1	V
	BF861B	I_D = 1 μA	−0.5	-	−1.5	V
	BF861C	I_D = 1 μA	−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

Table 7. Characteristics *...continued*

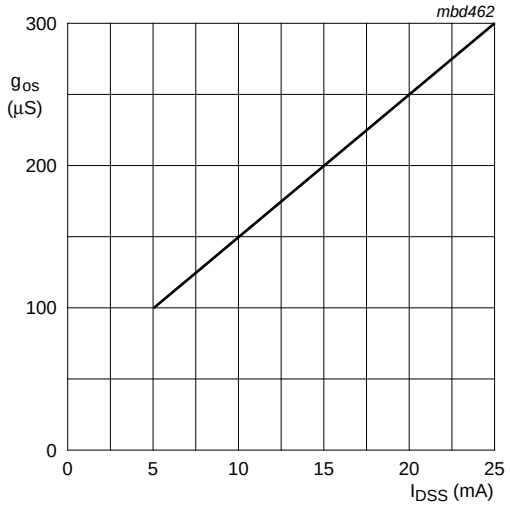
T_j = 25 °C; V_{DS} = 8 V; V_{GS} = 0 V unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$\lvert y_{fs} \rvert$	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/√Hz



V_{DS} = 8 V.

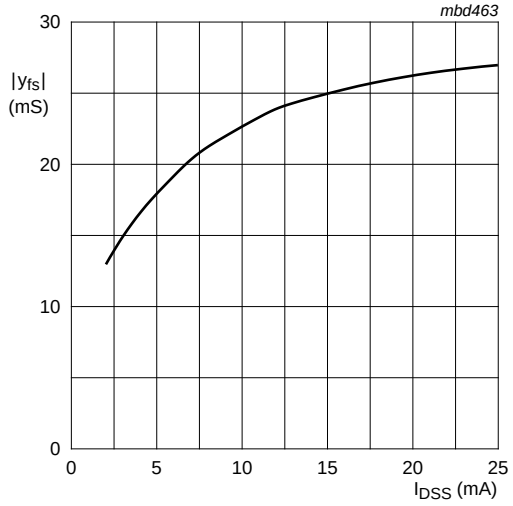
Fig 2. Drain current as a function of gate-source cut-off voltage; typical values.



V_{DS} = 8 V.

V_{GS} = 0 V.

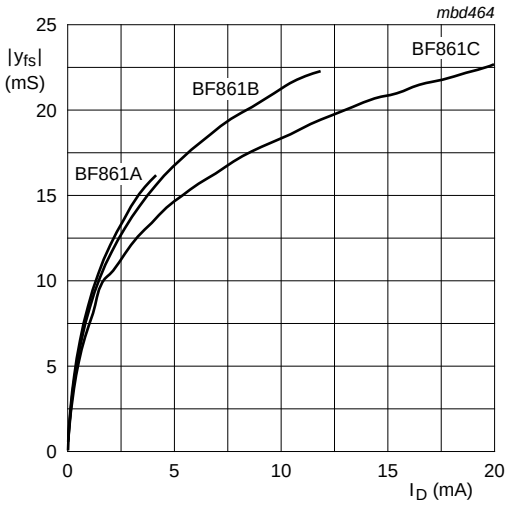
Fig 3. Common-source output conductance as a function of drain current; typical values.



V_{DS} = 8 V.

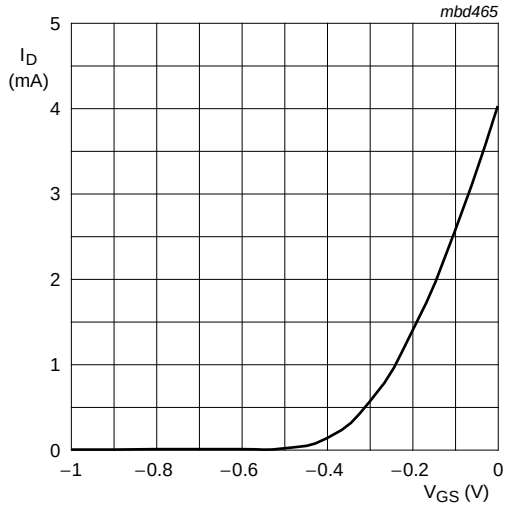
V_{GS} = 0 V.

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



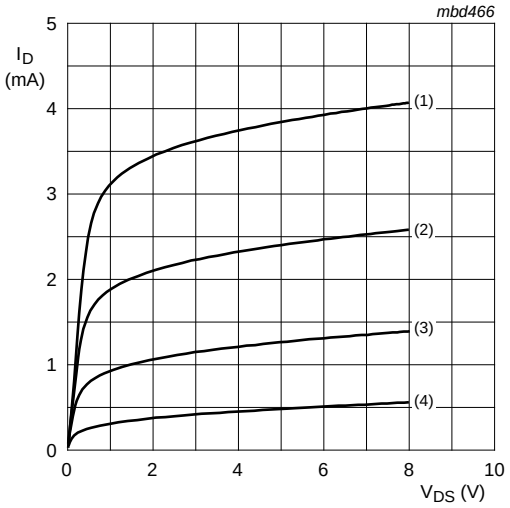
V_{DS} = 8 V.

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.

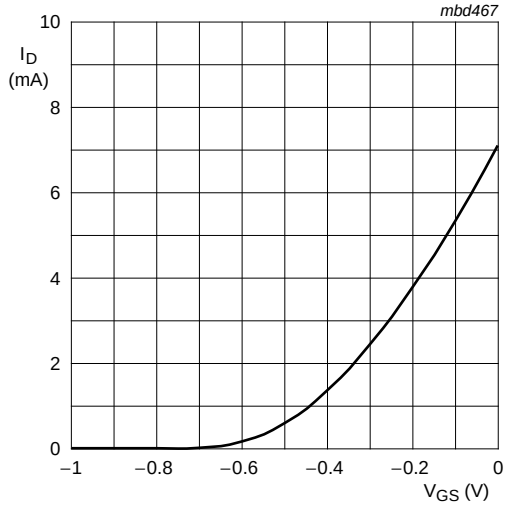
(1) V_{GS} = 0 V.

(2) V_{GS} = −100 mV.

(3) V_{GS} = −200 mV.

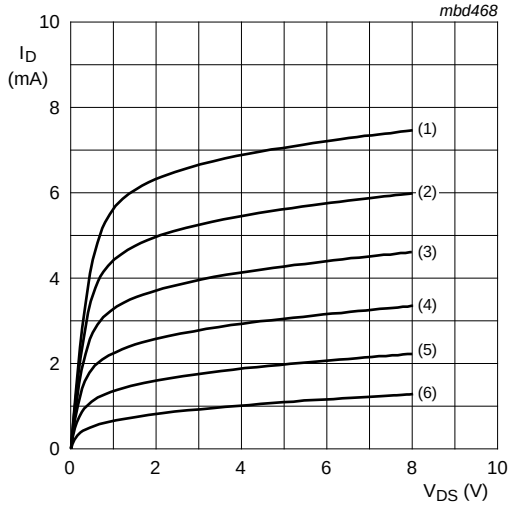
(4) V_{GS} = −300 mV.

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.

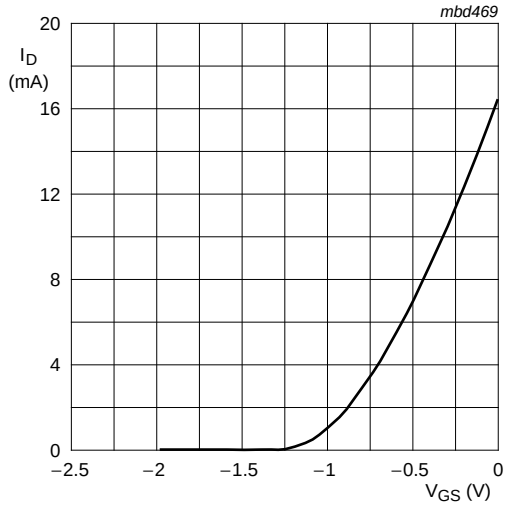
(3) V_{GS} = −200 mV.

(4) V_{GS} = −300 mV.

(5) V_{GS} = −400 mV.

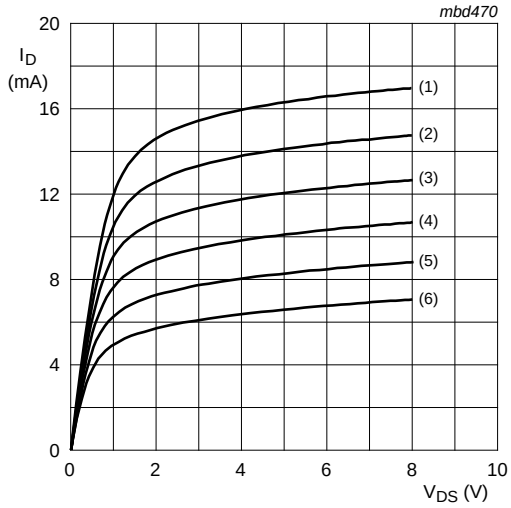
(6) V_{GS} = −500 mV.

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.

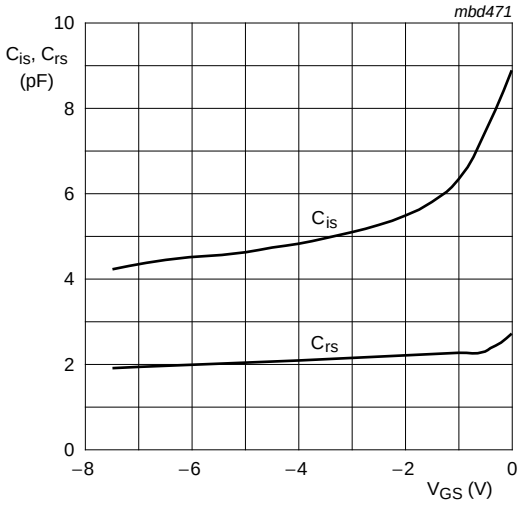
(3) V_{GS} = −400 mV.

(4) V_{GS} = −600 mV.

(5) V_{GS} = −800 mV.

(6) V_{GS} = −1 V.

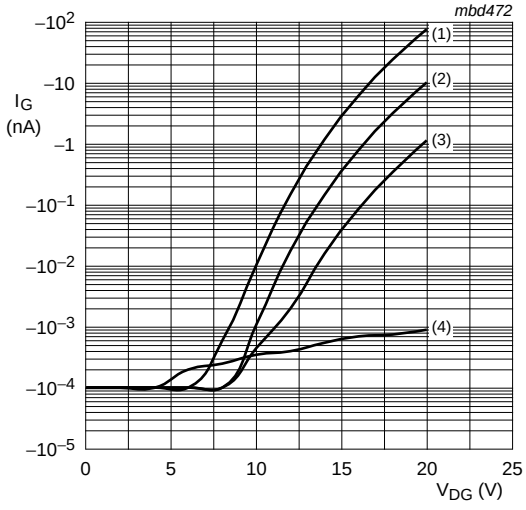
Fig 11. Typical output characteristics; BF861C.



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.

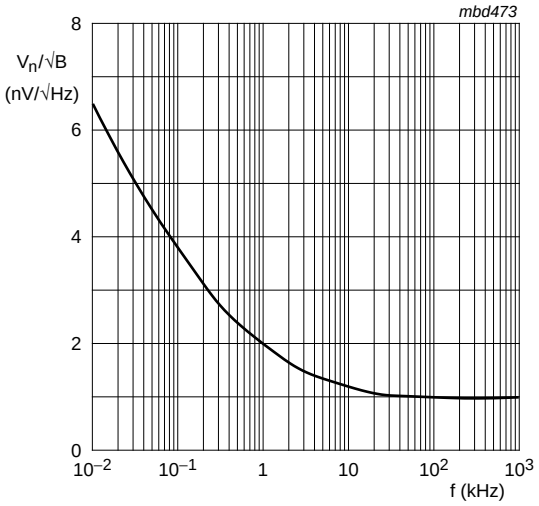
(1) I_D = 10 mA.

(2) I_D = 1 mA.

(3) I_D = 0.1 mA.

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

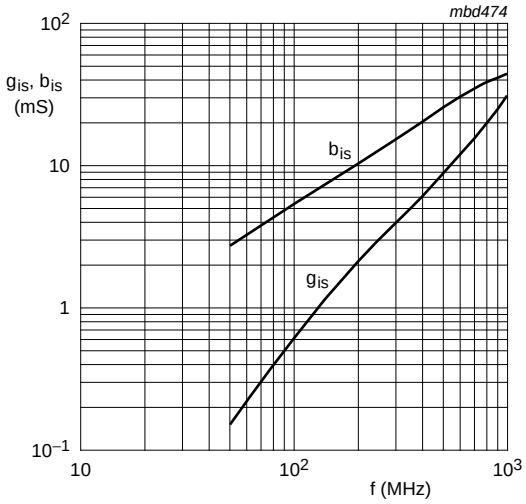
Fig 13. Gate current as a function of drain-gate voltage; typical values.



V_{DS} = 8 V.

V_{GS} = 0 V.

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

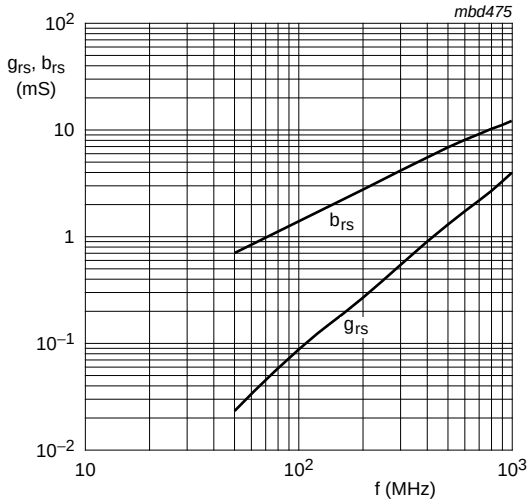


V_{DS} = 8 V.

V_{GS} = 0 V.

T_{amb} = 25 °C.

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

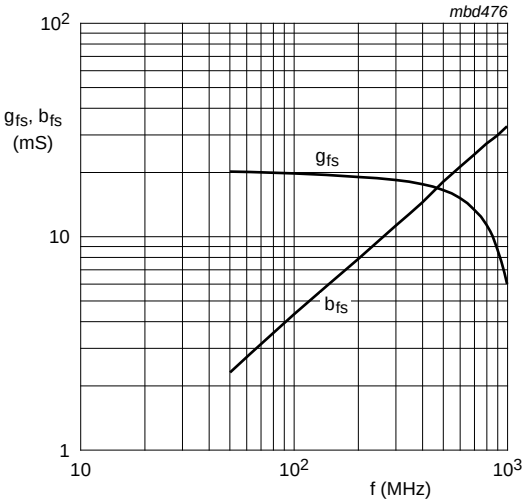


V_{DS} = 8 V.

V_{GS} = 0 V.

T_{amb} = 25 °C.

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

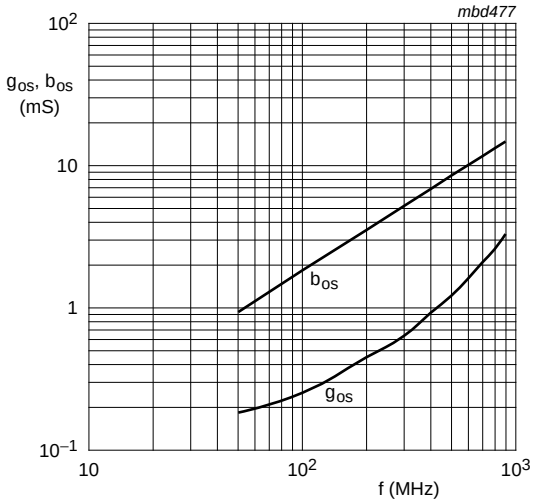


V_{DS} = 8 V.

V_{GS} = 0 V.

T_{amb} = 25 °C.

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



V_{DS} = 8 V.

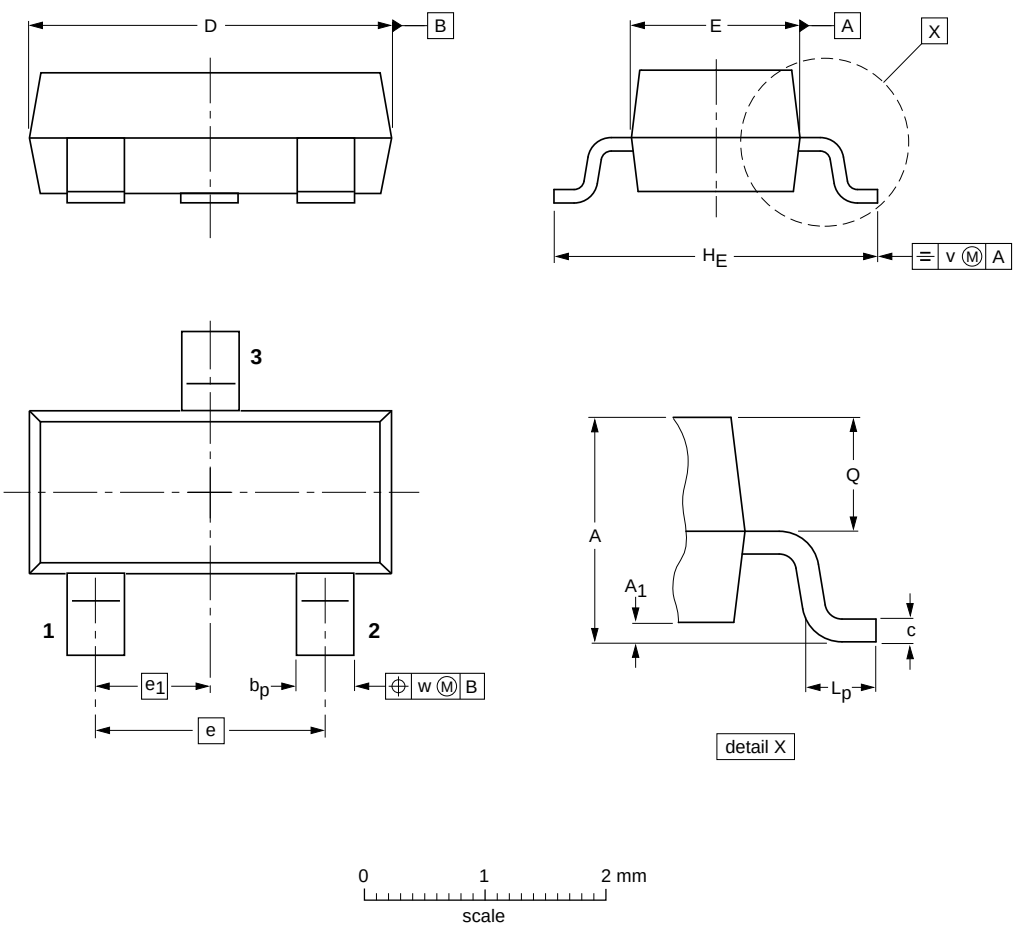
V_{GS} = 0 V.

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	JEITA			
SOT23		TO-236AB				~~04-11-04~~ 06-03-16

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:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Package outline drawings have been updated to the latest version.			
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[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.

[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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11. Contact information

For more information, please visit: **http://www.nxp.com**

For sales office addresses, please send an email to: **salesaddresses@nxp.com**

12. Contents

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Date of release: 15 September 2011

Document identifier: BF861A_BF861B_BF861C

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