



# 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

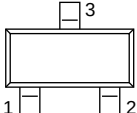
Table 1. Quick reference data

| 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      |  | <br>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 $T_{amb} = 25\text{ °C}$ [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.

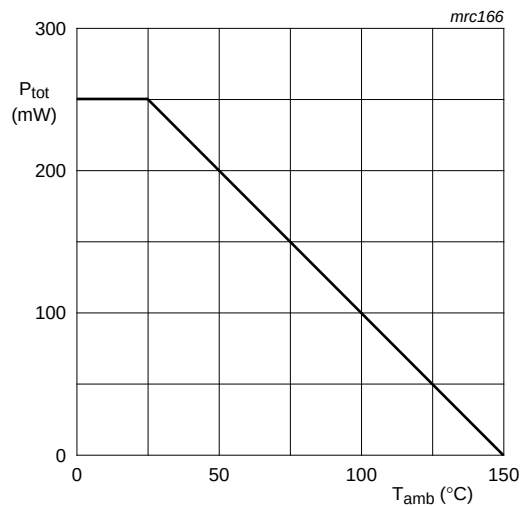


Fig 1. Power derating curve.

## 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

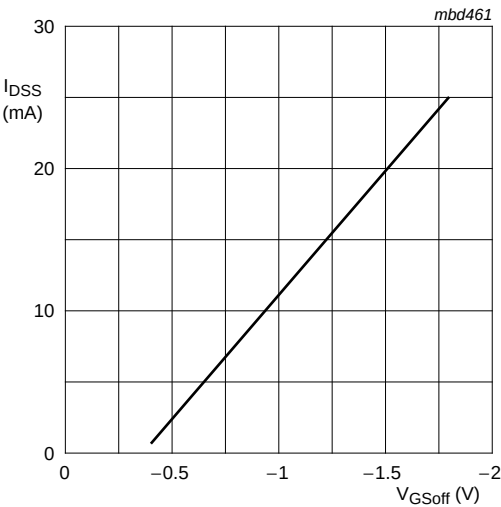
Table 7. Characteristics

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

| Symbol        | Parameter                     | Conditions                                         | Min  | Typ | Max  | Unit |
|---------------|-------------------------------|----------------------------------------------------|------|-----|------|------|
| $V_{(BR)GSS}$ | gate-source breakdown voltage | $I_G = -1\text{ }\mu\text{A}$                      | -25  | -   | -    | V    |
| $V_{GSoff}$   | gate-source cut-off voltage   |                                                    |      |     |      |      |
|               | BF861A                        | $I_D = 1\text{ }\mu\text{A}$                       | -0.2 | -   | -1   | V    |
|               | BF861B                        | $I_D = 1\text{ }\mu\text{A}$                       | -0.5 | -   | -1.5 | V    |
|               | BF861C                        | $I_D = 1\text{ }\mu\text{A}$                       | -0.8 | -   | -2   | V    |
| $V_{GSS}$     | gate-source forward voltage   | $V_{DS} = 0\text{ V}$ ; $I_G = 1\text{ mA}$        | -    | -   | 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          | $V_{GS} = -20\text{ V}$ ;<br>$V_{DS} = 0\text{ V}$ | -    | -   | -1   | nA   |

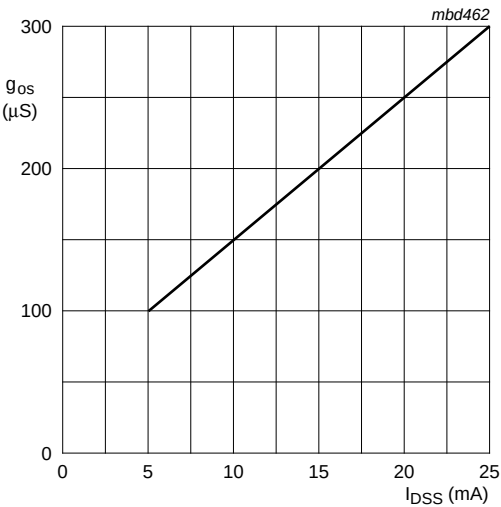
Table 7. Characteristics ...continued  
 $T_j = 25\text{ }^{\circ}\text{C}$ ;  $V_{DS} = 8\text{ V}$ ;  $V_{GS} = 0\text{ V}$  unless otherwise specified.

| 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/ $\sqrt{\text{Hz}}$ |



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

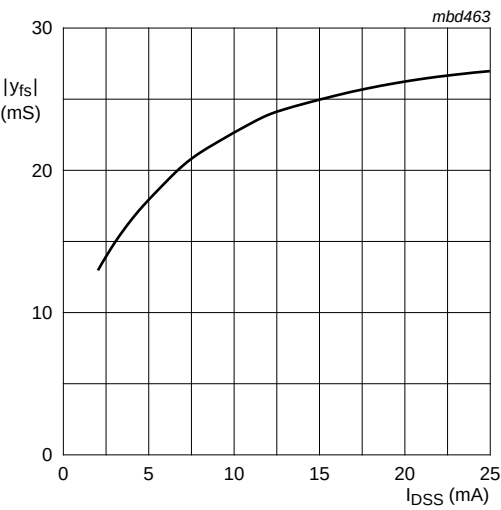
Fig 2. Drain current as a function of gate-source cut-off voltage; typical values.



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

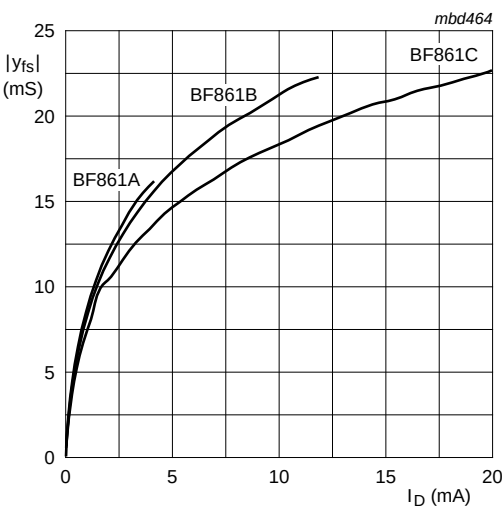
$V_{GS} = 0\text{ V}$ .

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



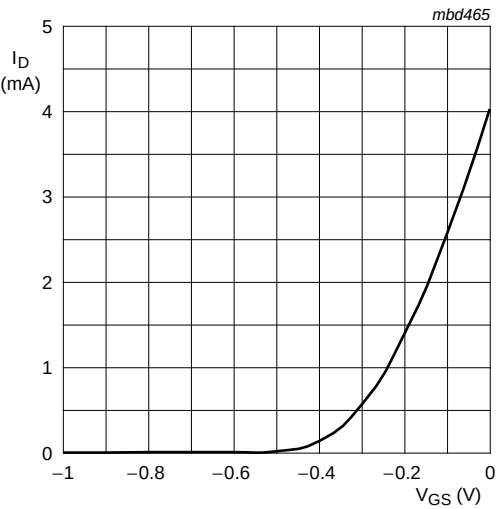
$V_{DS} = 8\text{ V.}$   
 $V_{GS} = 0\text{ V.}$

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



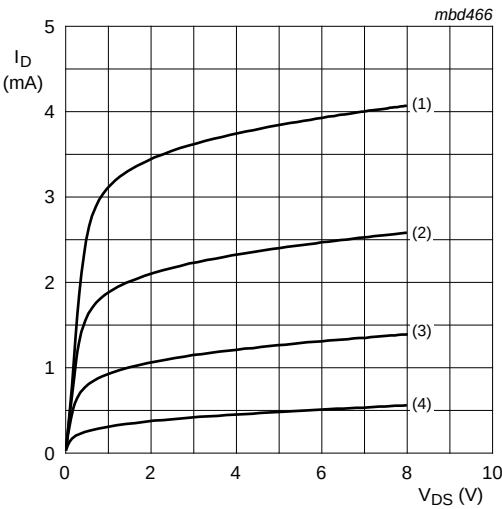
$V_{DS} = 8\text{ V.}$

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



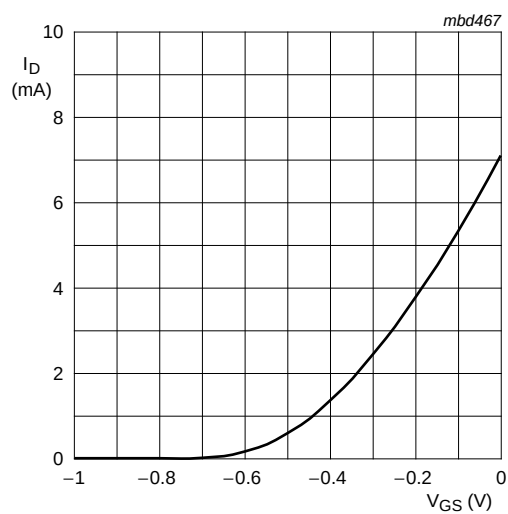
$V_{DS} = 8\text{ V.}$

Fig 6. Typical input characteristics; BF861A.



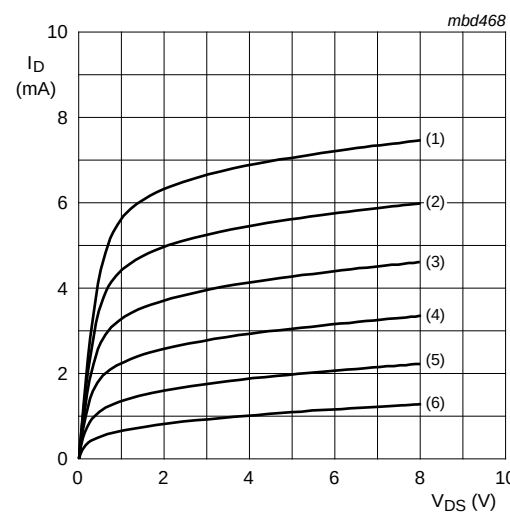
$V_{DS} = 8\text{ V.}$   
(1)  $V_{GS} = 0\text{ V.}$   
(2)  $V_{GS} = -100\text{ mV.}$   
(3)  $V_{GS} = -200\text{ mV.}$   
(4)  $V_{GS} = -300\text{ mV.}$

Fig 7. Typical output characteristics: BF861A.



V<sub>DS</sub> = 8 V.

Fig 8. Typical input characteristics; BF861B.



V<sub>DS</sub> = 8 V.

- (1) V<sub>GS</sub> = 0 V.
- (2) V<sub>GS</sub> = -100 mV.
- (3) V<sub>GS</sub> = -200 mV.
- (4) V<sub>GS</sub> = -300 mV.
- (5) V<sub>GS</sub> = -400 mV.
- (6) V<sub>GS</sub> = -500 mV.

Fig 9. Typical output characteristics; BF861B.

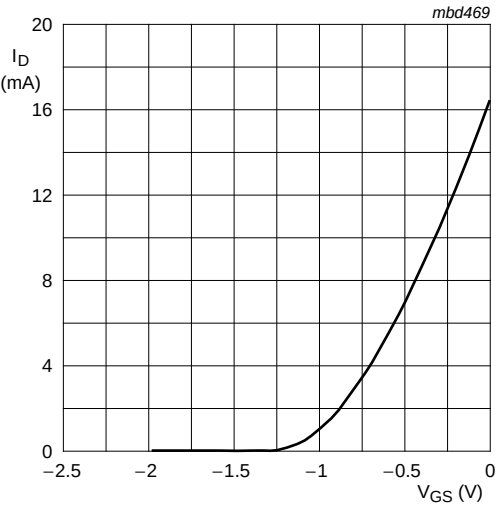


Fig 10. Typical input characteristics; BF861C.

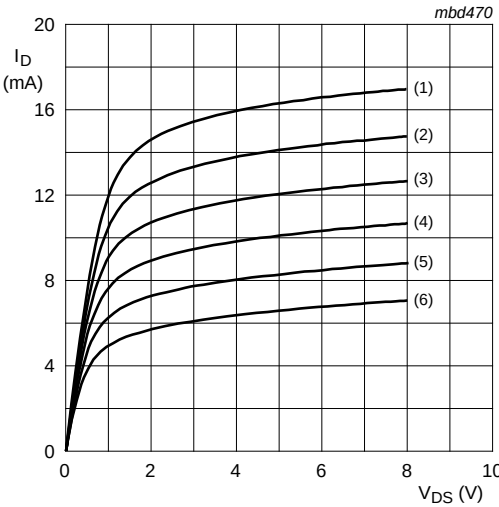


Fig 11. Typical output characteristics; BF861C.

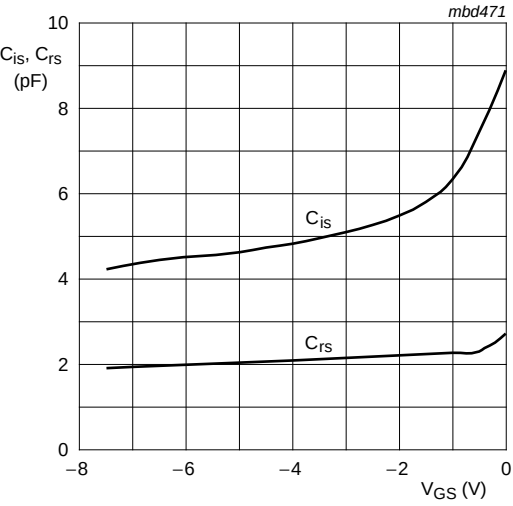


Fig 12. Input and reverse transfer capacitance as functions of gate-source voltage; typical values.

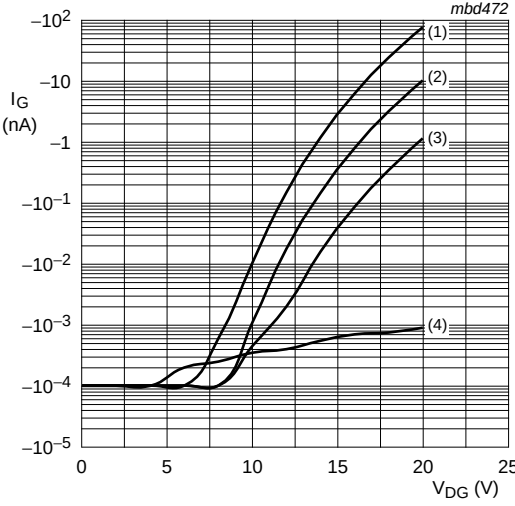
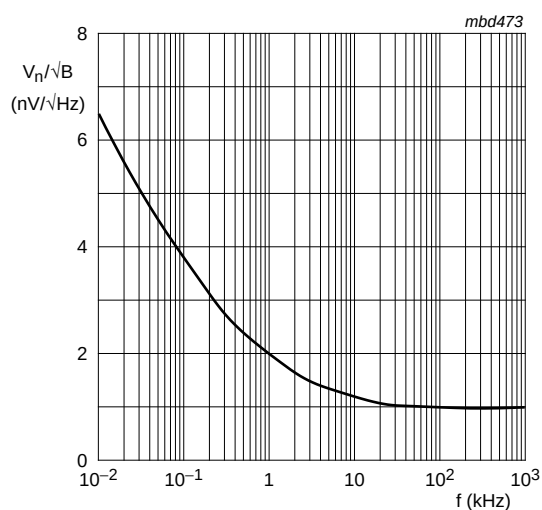
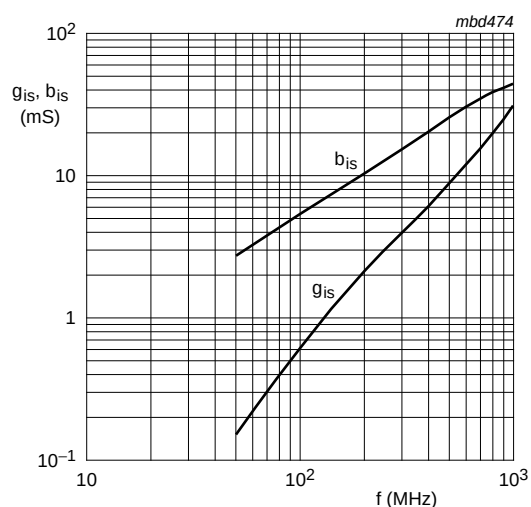


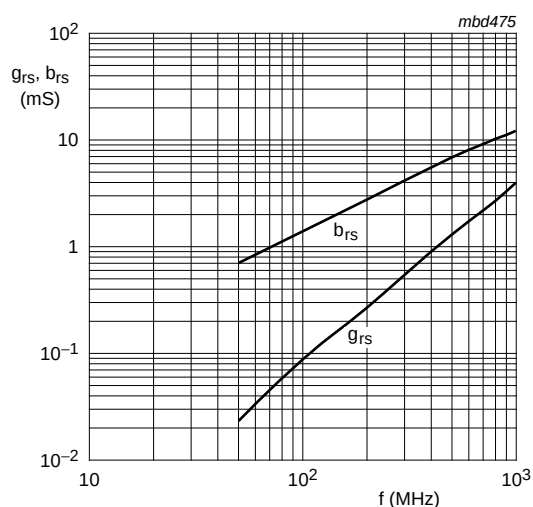
Fig 13. Gate current as a function of drain-gate voltage; typical values.


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

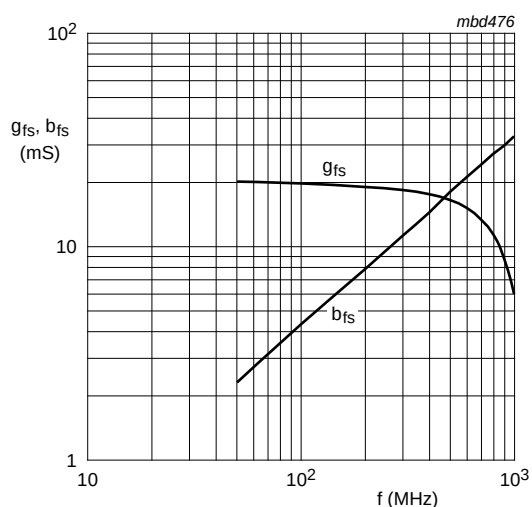
**Fig 14. Equivalent input noise as a function of frequency; typical values.**

 $V_{DS} = 8 \text{ V.}$ 
$$V_{GS} = 0 \text{ V.}$$
$$T_{\text{amb}} = 25\text{ }^{\circ}\text{C}.$$

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

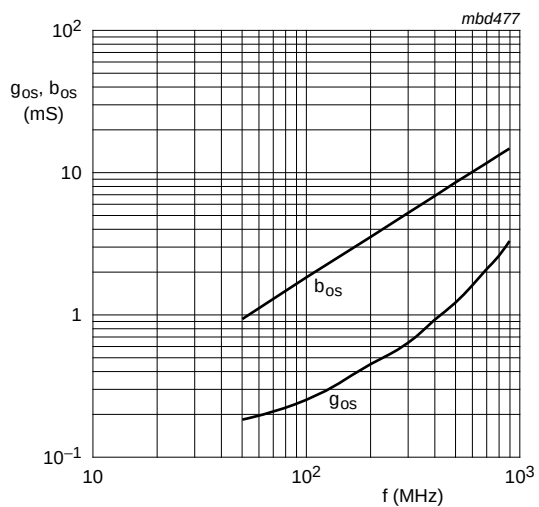

$$V_{DS} = 8 \text{ V.}$$
$$V_{GS} = 0 \text{ V.}$$
$$T_{\text{amb}} = 25\text{ }^{\circ}\text{C}.$$

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

 $V_{DS} = 8 \text{ V.}$ 
$$V_{GS} = 0 \text{ V.}$$
 $T_{\text{amb}} = 25\text{ }^{\circ}\text{C}.$ 

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





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

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

$T_{amb} = 25 \text{ }^{\circ}\text{C.}$

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

8. Package outline

Plastic surface-mounted package; 3 leadsSOT23

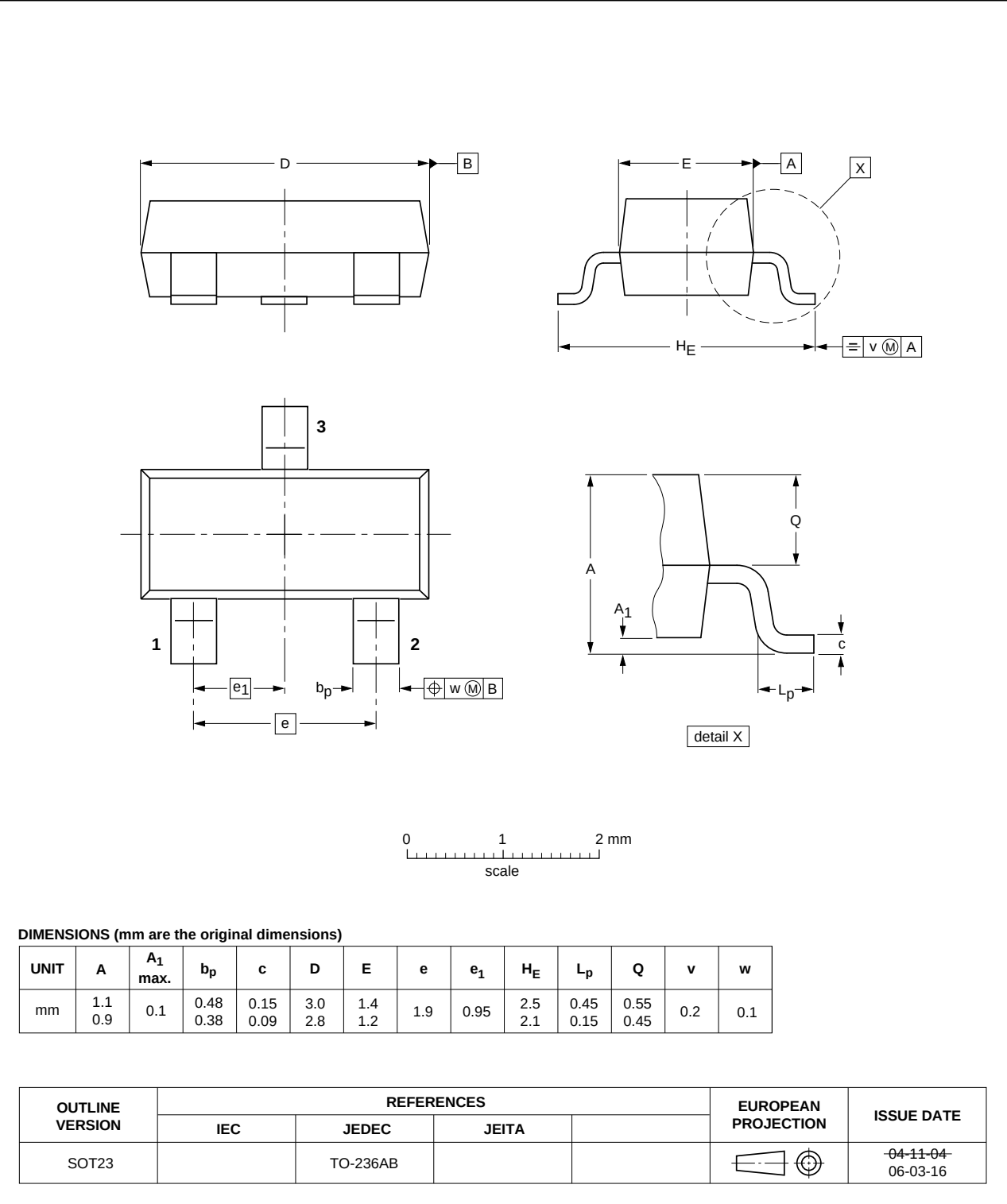


Fig 19. Package outline

## 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<br>(9397 750 13395) | 20040924                                                                                                                                                                                                                                                                                                                             | Product data sheet    | -             | BF861 v.3                |
| BF861 v.3<br>(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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Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

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