



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 ^[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 $T_{amb} = 25\text{ °C}$ [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.

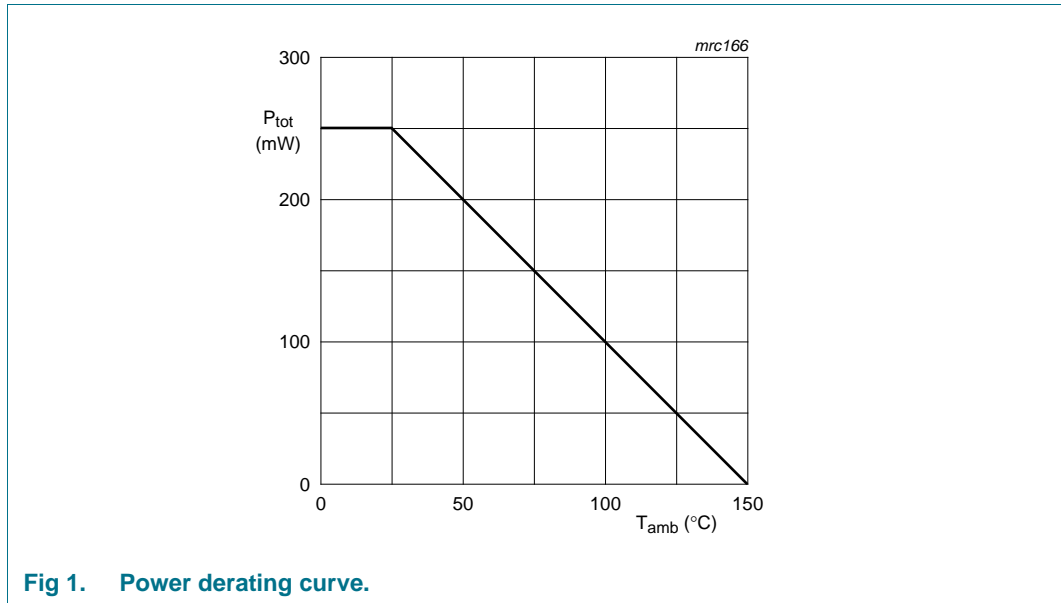


Fig 1. Power derating curve.

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 °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
 $T_j = 25\text{ }^\circ\text{C}$; $V_{DS} = 8\text{ V}$; $V_{GS} = 0\text{ V}$ 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 | μS |
| | BF861B | | - | - | 250 | μS |
| | BF861C | | - | - | 300 | μS |
| 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/ $\sqrt{\text{Hz}}$ |



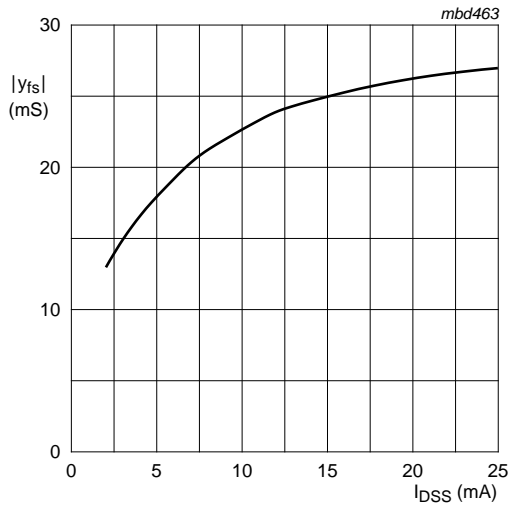
$V_{DS} = 8\text{ V}$.

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.



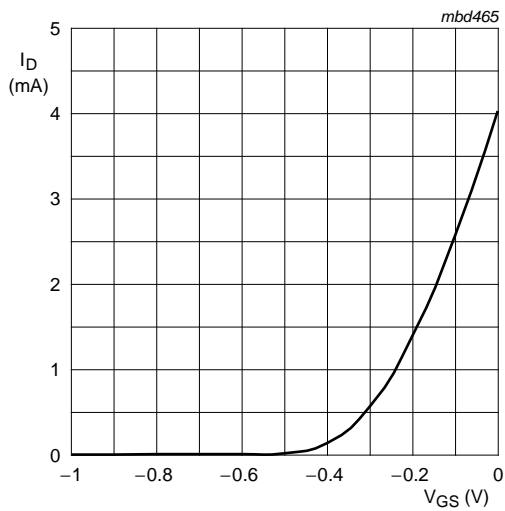
$V_{DS} = 8 \text{ V.}$
 $V_{GS} = 0 \text{ V.}$

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.



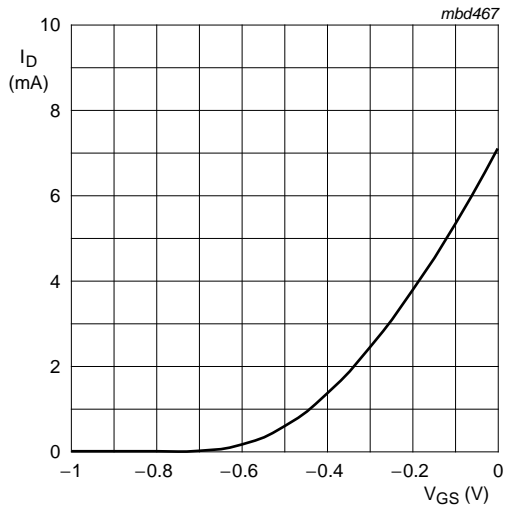
$V_{DS} = 8 \text{ V.}$

Fig 6. Typical input characteristics; BF861A.



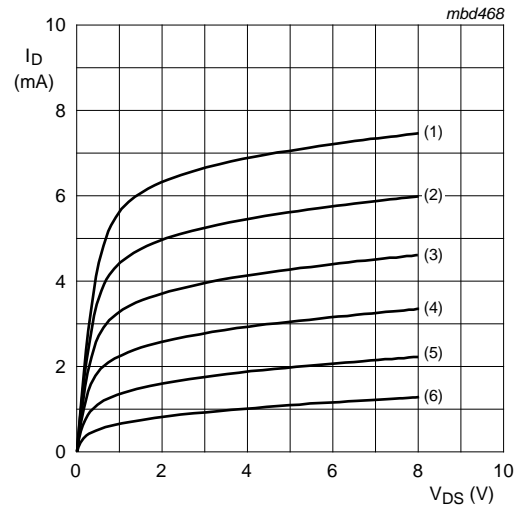
$V_{DS} = 8 \text{ V.}$
 (1) $V_{GS} = 0 \text{ V.}$
 (2) $V_{GS} = -100 \text{ mV.}$
 (3) $V_{GS} = -200 \text{ mV.}$
 (4) $V_{GS} = -300 \text{ mV.}$

Fig 7. Typical output characteristics: BF861A.



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

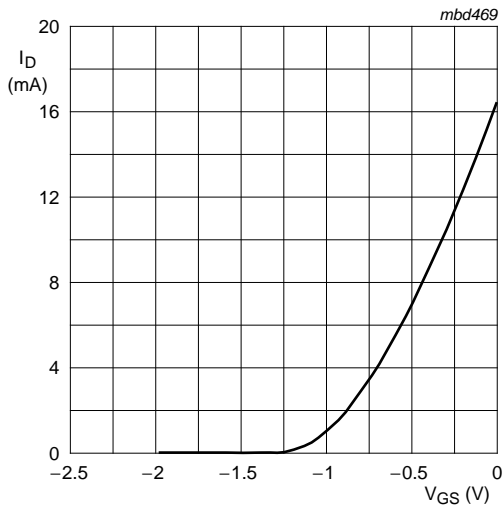
Fig 8. Typical input characteristics; BF861B.



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

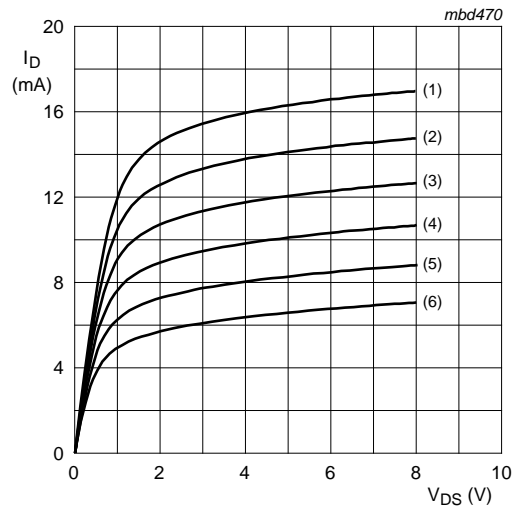
- (1) $V_{GS} = 0 \text{ V.}$
- (2) $V_{GS} = -100 \text{ mV.}$
- (3) $V_{GS} = -200 \text{ mV.}$
- (4) $V_{GS} = -300 \text{ mV.}$
- (5) $V_{GS} = -400 \text{ mV.}$
- (6) $V_{GS} = -500 \text{ mV.}$

Fig 9. Typical output characteristics; BF861B.



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

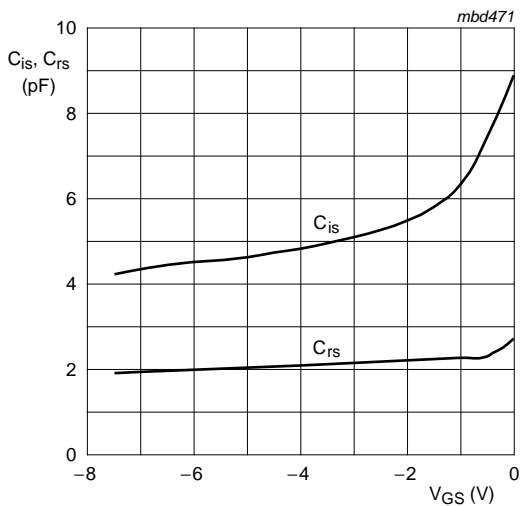
Fig 10. Typical input characteristics; BF861C.



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

- (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) $V_{GS} = -1 \text{ V.}$

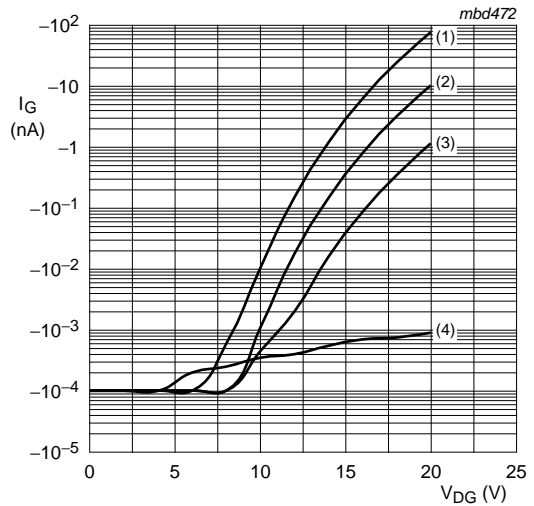
Fig 11. Typical output characteristics; BF861C.



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

$f = 1 \text{ MHz.}$

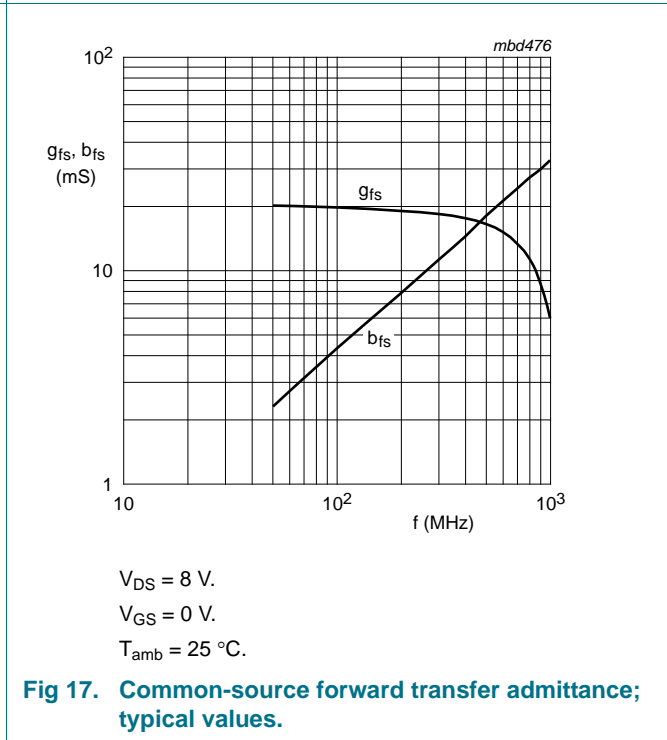
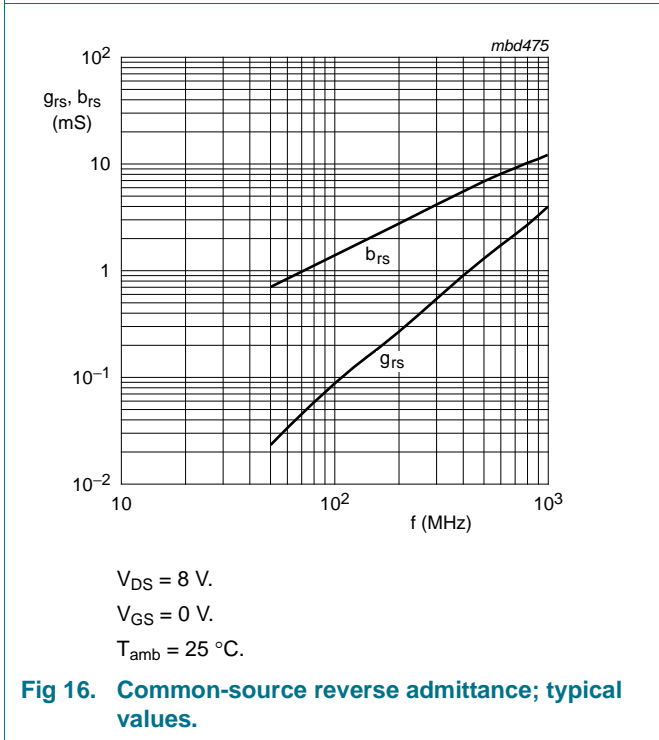
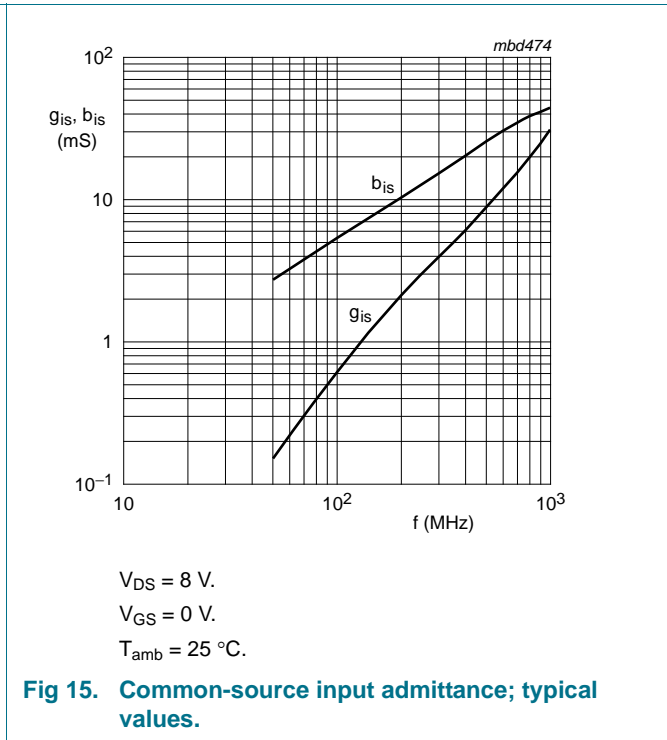
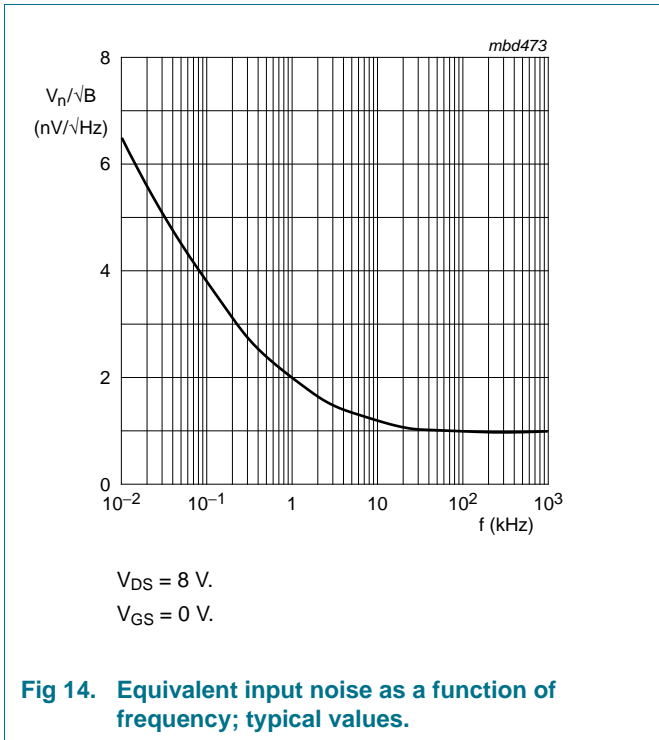
Fig 12. Input and reverse transfer capacitance as functions of gate-source voltage; typical values.

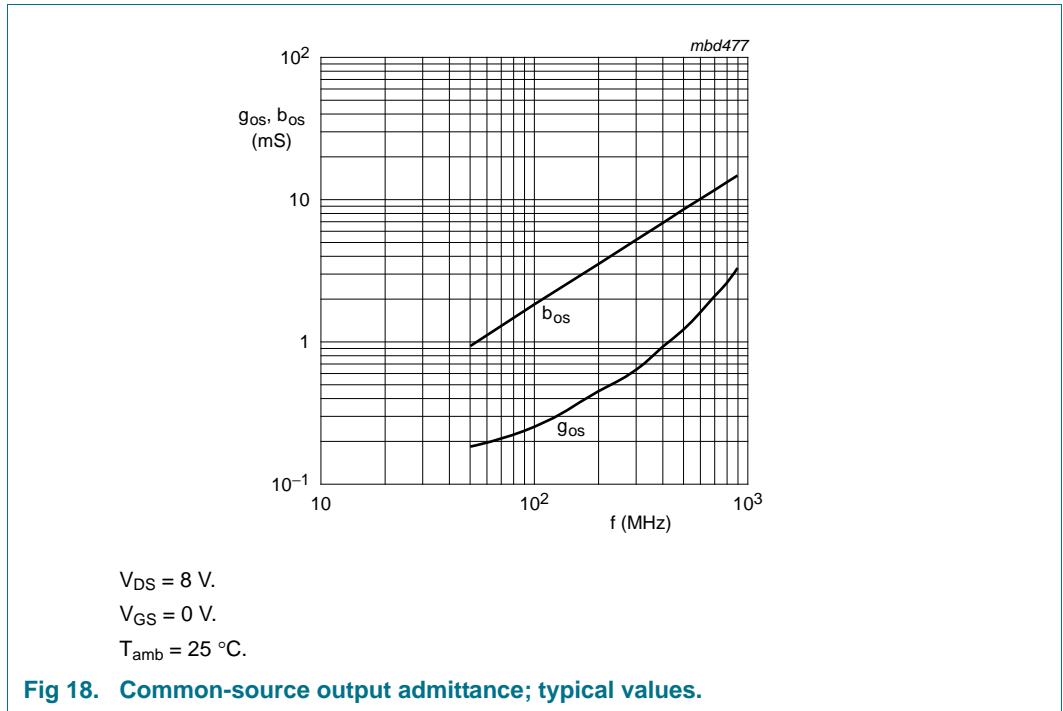


$V_{DS} = 8 \text{ V.}$

- (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.





8. Package outline

Plastic surface-mounted package; 3 leads

SOT23

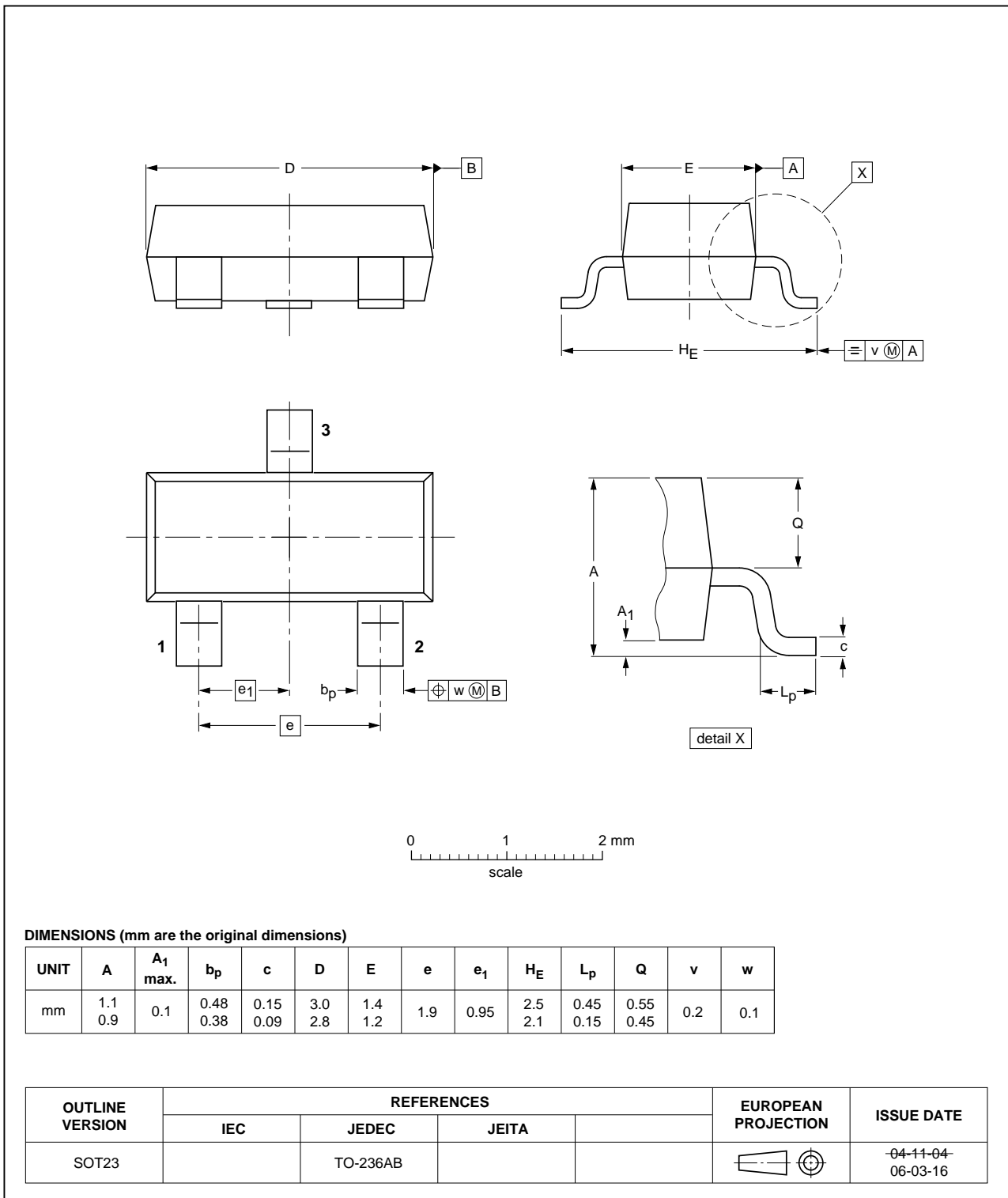


Fig 19. Package outline

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"> • 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 | - | - | - |

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|-----------------------------------|-------------------------------|---|
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