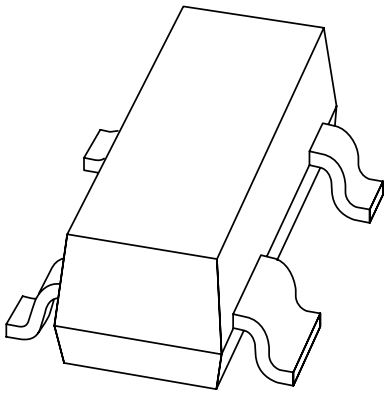
# DATA SHEET



# BF992
## Silicon N-channel dual gate MOS-FET

Product specification
Supersedes data of 1996 Jul 30

1999 Aug 11

Philips
Semiconductors

PHILIPS

# Silicon N-channel dual gate MOS-FET BF992

## APPLICATIONS

- VHF applications such as VHF television tuners and FM tuners with 12 V supply voltage. The device is also suitable for use in professional communications equipment.

## DESCRIPTION

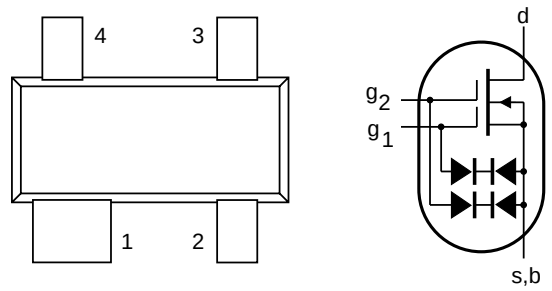
Depletion type field-effect transistor in a plastic micro-miniature SOT143B package with source and substrate interconnected.

The transistor is protected against excessive input voltage surges by integrated back-to-back diodes between gates and source.

| CAUTION |
|---|
| The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling. |

## PINNING

| PIN | SYMBOL | DESCRIPTION |
|---|---|---|
| 1 | s, b | source |
| 2 | d | drain |
| 3 | $g_2$ | gate 2 |
| 4 | $g_1$ | gate 1 |




**Marking code:** M92.

Fig.1 Simplified outline (SOT143B) and symbol.

## QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|
| $V_{DS}$ | drain-source voltage (DC) | | – | 20 | V |
| $I_D$ | drain current (DC) | | – | 40 | mA |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = 60 °C | – | 200 | mW |
| $\lvert Y_{fs} \rvert$ | forward transfer admittance | f = 1 kHz; $I_D$ = 15 mA; $V_{DS}$ = 10 V; $V_{G2\text{-}S}$ = 4 V | 25 | – | mS |
| $C_{ig1\text{-}s}$ | input capacitance at gate 1 | f = 1 MHz; $I_D$ = 15 mA; $V_{DS}$ = 10 V; $V_{G2\text{-}S}$ = 4 V | 4 | – | pF |
| $C_{rs}$ | reverse transfer capacitance | f = 1 MHz; $I_D$ = 15 mA; $V_{DS}$ = 10 V; $V_{G2\text{-}S}$ = 4 V | 30 | – | fF |
| F | noise figure | $G_S$ = 2 mS; $I_D$ = 15 mA; $V_{DS}$ = 10 V; $V_{G2\text{-}S}$ = 4 V; f = 200 MHz | 1.2 | – | dB |
| $T_j$ | operating junction temperature | | – | 150 | °C |

## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $V_{DS}$ | drain-source voltage | | – | 20 | V |
| $I_D$ | drain current | | – | 40 | mA |
| $I_{G1}$ | gate 1 current | | – | ±10 | mA |
| $I_{G2}$ | gate 2 current | | – | ±10 | mA |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 60$ °C; see Fig.2; note 1 | – | 200 | mW |
| $T_{stg}$ | storage temperature | | –65 | +150 | °C |
| $T_j$ | operating junction temperature | | – | 150 | °C |

**Note**

1. Device mounted on a ceramic substrate, 8 mm × 10 mm × 0.7 mm.

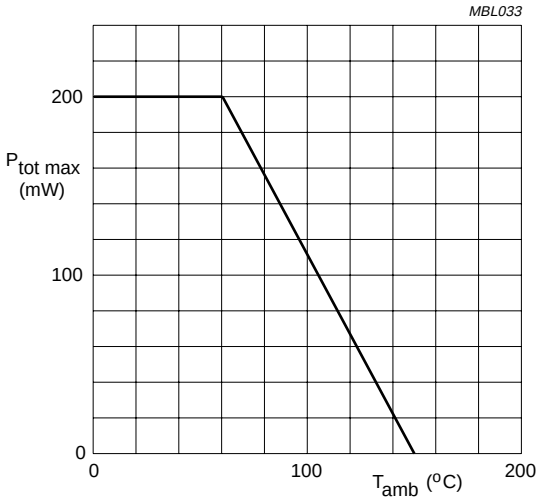



Fig.2 Power derating curves.

## THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---|---|---|---|---|
| $R_{th\ j\text{-}a}$ | thermal resistance from junction to ambient in free air | note 1 | 460 | K/W |

**Note**

1. Device mounted on a ceramic substrate, 8 mm × 10 mm × 0.7 mm.

## STATIC CHARACTERISTICS

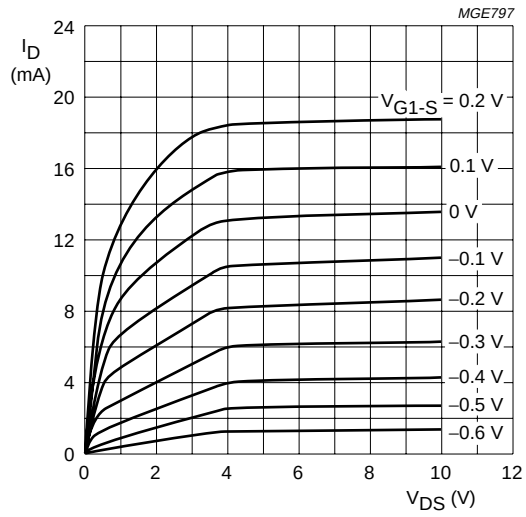
$T_j$ = 25 °C unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $\pm V_{(BR)G1\text{-}SS}$ | gate 1-source breakdown voltage | $V_{G2\text{-}S} = V_{DS} = 0$; $I_{G1\text{-}SS} = \pm 10$ mA | 8 | 20 | V |
| $\pm V_{(BR)G2\text{-}SS}$ | gate 2-source breakdown voltage | $V_{G1\text{-}S} = V_{DS} = 0$; $I_{G2\text{-}SS} = \pm 10$ mA | 8 | 20 | V |
| $-V_{(P)G1\text{-}S}$ | gate 1-source cut-off voltage | $V_{G2\text{-}S}$ = 4 V; $V_{DS}$ = 10 V; $I_D$ = 20 µA | 0.2 | 1.3 | V |
| $-V_{(P)G2\text{-}S}$ | gate 2-source cut-off voltage | $V_{G1\text{-}S}$ = 0; $V_{DS}$ = 10 V; $I_D$ = 20 µA | 0.2 | 1.1 | V |
| $\pm I_{G1\text{-}SS}$ | gate 1 cut-off current | $V_{G2\text{-}S} = V_{DS}$ = 0; $V_{G1\text{-}S} = \pm 7$ V | – | 25 | nA |
| $\pm I_{G2\text{-}SS}$ | gate 2 cut-off current | $V_{G1\text{-}S} = V_{DS}$ = 0; $V_{G2\text{-}S} = \pm 7$ V | – | 25 | nA |

## DYNAMIC CHARACTERISTICS

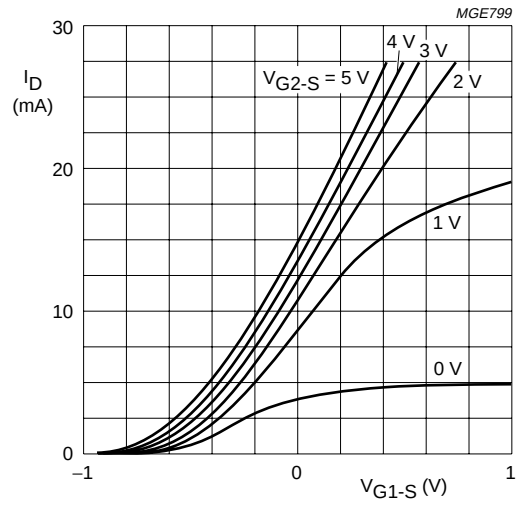
Common source; $T_{amb}$ = 25 °C; $V_{DS}$ = 10 V; $V_{G2\text{-}S}$ = 4 V; $I_D$ = 15 mA; unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $\lvert y_{fs} \rvert$ | forward transfer admittance | | 20 | 25 | – | mS |
| $C_{ig1\text{-}s}$ | input capacitance at gate 1 | f = 1 MHz | – | 4 | – | pF |
| $C_{ig2\text{-}s}$ | input capacitance at gate 2 | f = 1 MHz | – | 1.7 | – | pF |
| $C_{os}$ | output capacitance | f = 1 MHz | – | 2 | – | pF |
| $C_{rs}$ | reverse transfer capacitance | f = 1 MHz | – | 30 | 40 | fF |
| F | noise figure | f = 200 MHz; $G_S$ = 2 mS | – | 1.2 | – | dB |



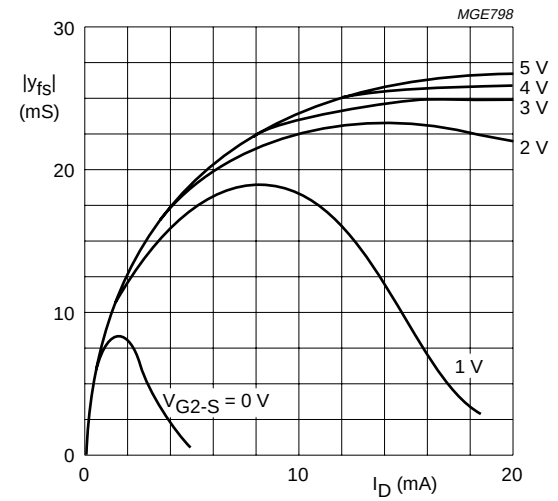

$V_{G2-S}$ = 4 V; $T_j$ = 25 °C.

Fig.3 Output characteristics; typical values.



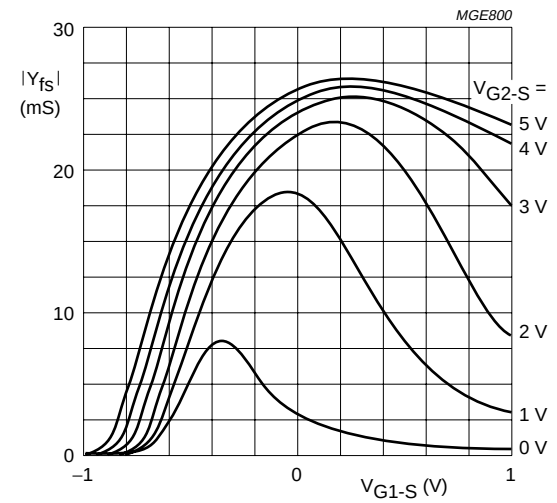

$V_{DS}$ = 10 V; $T_j$ = 25 °C.

Fig.4 Transfer characteristics; typical values.



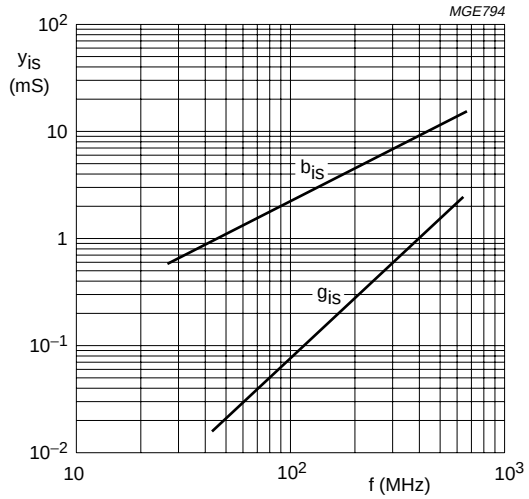

$V_{DS}$ = 10 V; $T_j$ = 25 °C.

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



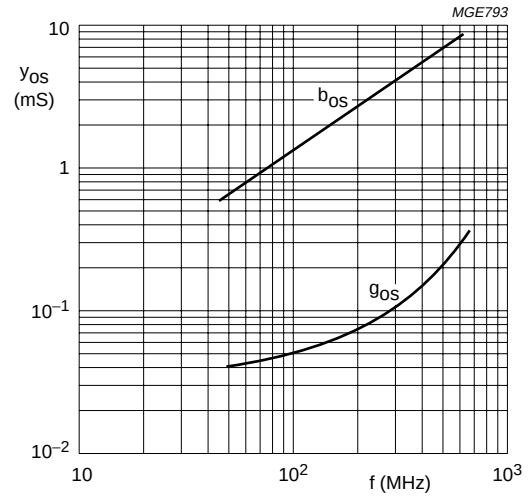

$V_{DS}$ = 10 V; $T_j$ = 25 °C.

Fig.6 Forward transfer admittance as a function of gate 1-source voltage; typical values.



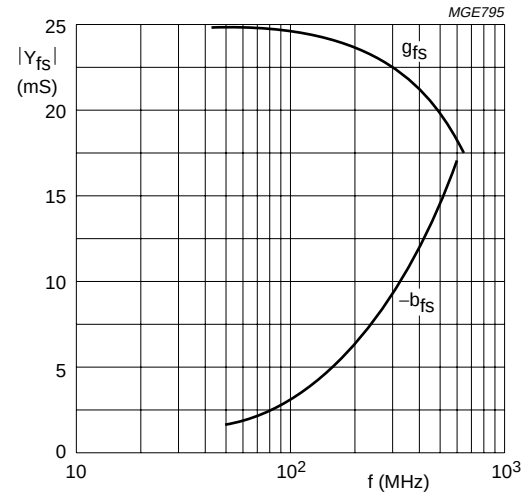

$V_{DS}$ = 10 V; $V_{G2\text{-}S}$ = 4 V; $I_D$ = 15 mA; $T_{amb}$ = 25 °C.

Fig.7 Input admittance as a function of frequency; typical values.



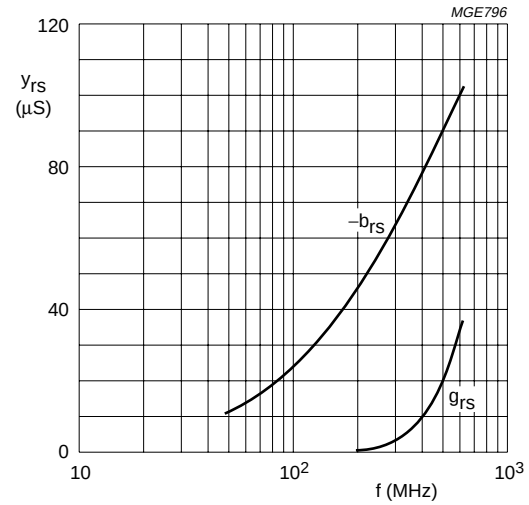

$V_{DS}$ = 10 V; $V_{G2\text{-}S}$ = 4 V; $I_D$ = 15 mA; $T_{amb}$ = 25 °C.

Fig.8 Output admittance as a function of frequency; typical values.




$V_{DS}$ = 10 V; $V_{G2\text{-}S}$ = 4 V; $I_D$ = 15 mA; $T_{amb}$ = 25 °C.

Fig.9 Forward transfer admittance as a function of frequency; typical values.

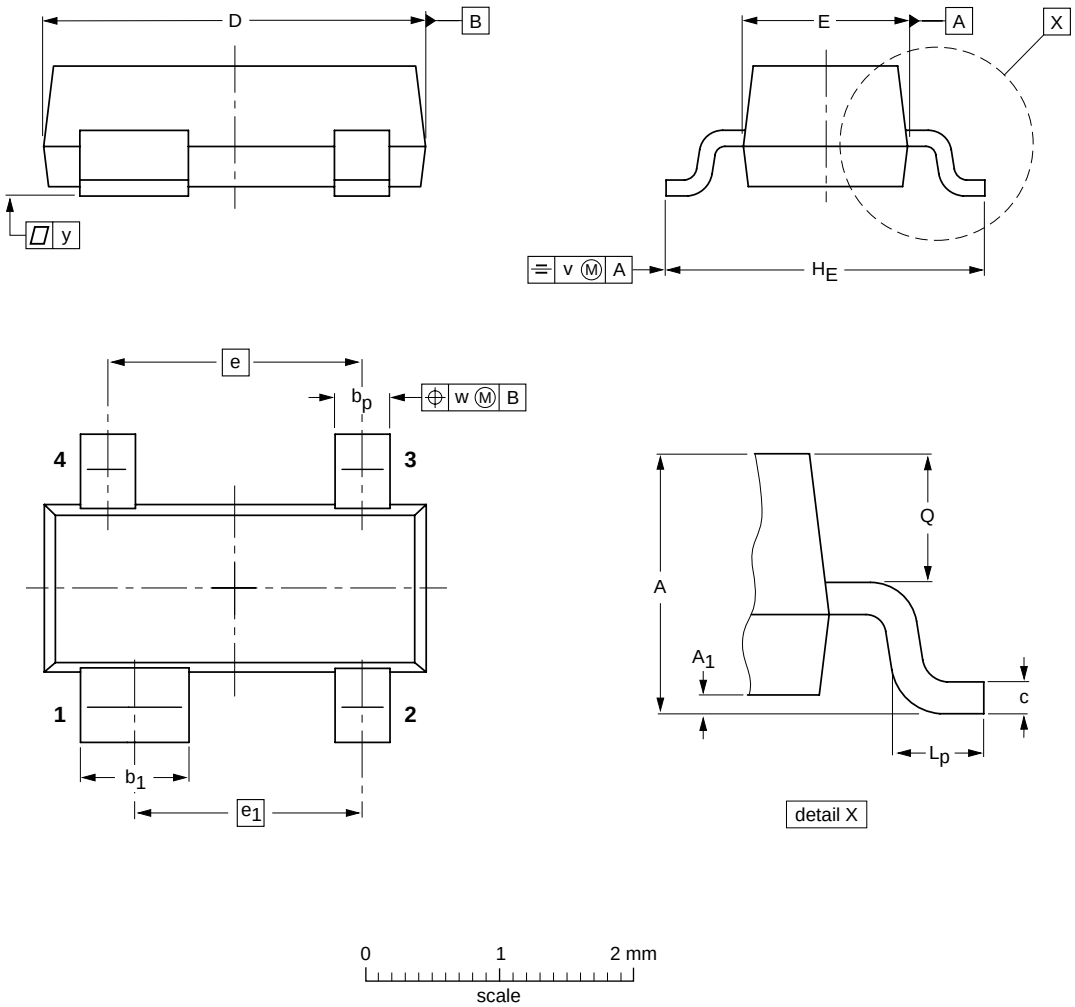



$V_{DS}$ = 10 V; $V_{G2\text{-}S}$ = 4 V; $I_D$ = 15 mA; $T_{amb}$ = 25 °C.

Fig.10 Reverse transfer admittance as a function of frequency; typical values.

## PACKAGE OUTLINE

**Plastic surface mounted package; 4 leads** **SOT143B**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ max | $b_p$ | $b_1$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w | y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1<br>0.9 | 0.1 | 0.48<br>0.38 | 0.88<br>0.78 | 0.15<br>0.09 | 3.0<br>2.8 | 1.4<br>1.2 | 1.9 | 1.7 | 2.5<br>2.1 | 0.45<br>0.15 | 0.55<br>0.45 | 0.2 | 0.1 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | EIAJ | | | |
| SOT143B | | | | | | 97-02-28 |

## DEFINITIONS

| **Data Sheet Status** | |
|---|---|
| Objective specification | This data sheet contains target or goal specifications for product development. |
| Preliminary specification | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification | This data sheet contains final product specifications. |
| **Limiting values** | |
| Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). 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. | |
| **Application information** | |
| Where application information is given, it is advisory and does not form part of the specification. | |

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**NOTES**

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