

DATA SHEET

BF994S

N-channel dual-gate MOS-FET

Product specification

July 1993



N-channel dual-gate MOS-FET

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FEATURES

- Protected against excessive input voltage surges by integrated back-to-back diodes between gates and source.

APPLICATIONS

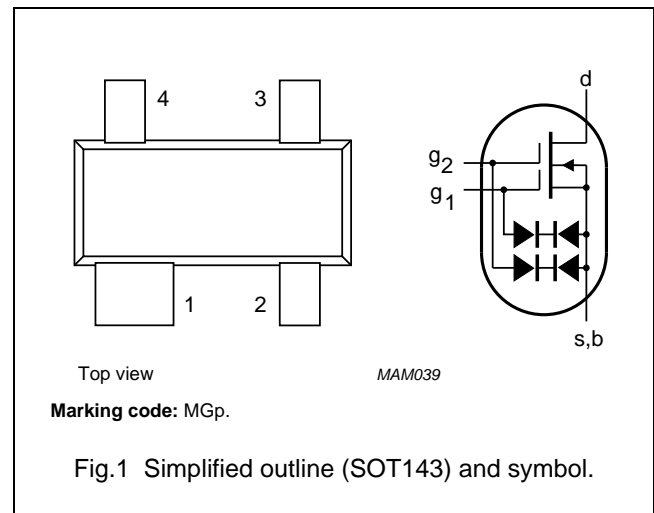
- VHF applications such as:
 - VHF television tuners
 - Professional communication equipment.

PINNING

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

DESCRIPTION

Depletion type field-effect transistor in a plastic SOT143 microminiature package with interconnected source and substrate.



QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | TYP. | MAX. | UNIT |
|--------------------|-----------------------------|--|------|------|------|
| V _{DS} | drain-source voltage | | – | 20 | V |
| I _D | drain current | | – | 30 | mA |
| P _{tot} | total power dissipation | up to T _{amb} = 60 °C | – | 200 | mW |
| T _j | junction temperature | | – | 150 | °C |
| Y _{fs} | transfer admittance | f = 1 kHz; I _D = 10 mA; V _{DS} = 15 V; V _{G2-S} = 4 V | 18 | – | mS |
| C _{ig1-s} | input capacitance at gate 1 | f = 1 MHz; I _D = 10 mA; V _{DS} = 15 V; V _{G2-S} = 4 V | 2.5 | 3 | pF |
| C _{rs} | feedback capacitance | f = 1 MHz; I _D = 10 mA; V _{DS} = 15 V; V _{G2-S} = 4 V | 25 | – | fF |
| F | noise figure | f = 200 MHz; G _S = 2 mS; B _S = B _{Sopt} ; I _D = 10 mA; V _{DS} = 15 V; V _{G2-S} = 4 V | 1 | – | dB |

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LIMITING VALUES

In according 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 (DC) | | – | 30 | mA |
| $I_{D(AV)}$ | average drain current | | – | 30 | mA |
| I_{G1-S} | gate 1-source current | | – | ± 10 | mA |
| I_{G2-S} | gate 2-source current | | – | ± 10 | mA |
| P_{tot} | total power dissipation | up to $T_{amb} = 60\text{ }^\circ\text{C}$; note 1 | – | 200 | mW |
| T_{stg} | storage temperature range | | –65 | +150 | $^\circ\text{C}$ |
| T_j | junction temperature | | – | 150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

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

Note to the Limiting values and the Thermal characteristics

1. Device mounted on a ceramic substrate of $8 \times 10 \times 0.7\text{ mm}$.

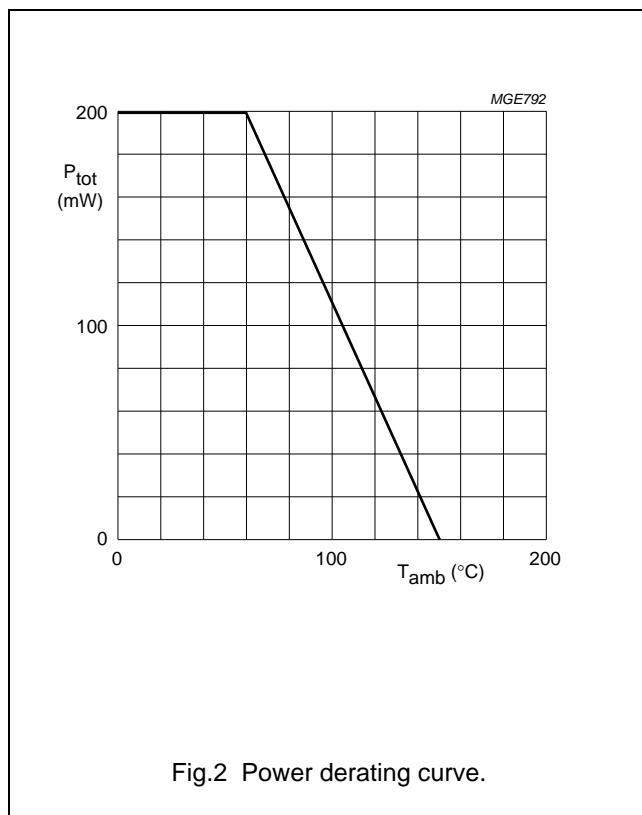


Fig.2 Power derating curve.

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STATIC CHARACTERISTICS $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|-----------------|---------------------------------|--|---------|----------|------|
| I_{G1-SS} | gate 1 cut-off currents | $V_{G1-S} = \pm 5\text{ V}; V_{G2-S} = V_{DS} = 0$ | – | ± 50 | nA |
| I_{G2-SS} | gate 2 cut-off currents | $V_{G2-S} = \pm 5\text{ V}; V_{G1-S} = V_{DS} = 0$ | – | ± 50 | nA |
| $V_{(BR)G1-SS}$ | gate 1-source breakdown voltage | $I_{G1-SS} = \pm 10\text{ mA}; V_{G2-S} = V_{DS} = 0$ | ± 6 | ± 20 | V |
| $V_{(BR)G2-SS}$ | gate 2-source breakdown voltage | $I_{G2-SS} = \pm 10\text{ mA}; V_{G1-S} = V_{DS} = 0$ | ± 6 | ± 20 | V |
| I_{DSS} | drain-source cut-off voltage | $V_{DS} = 15\text{ V}; V_{G1-S} = 0; V_{G2-S} = 4\text{ V}$ | 4 | 20 | mA |
| $V_{(P)G1-S}$ | gate 1-source cut-off voltage | $I_D = 20\text{ }\mu\text{A}; V_{DS} = 15\text{ V}; V_{G2-S} = 4\text{ V}$ | – | –2.5 | V |
| $V_{(P)G2-S}$ | gate 2-source cut-off voltage | $I_D = 20\text{ }\mu\text{A}; V_{DS} = 15\text{ V}; V_{G1-S} = 0$ | – | –2 | V |

DYNAMIC CHARACTERISTICSMeasuring conditions (common source): $I_D = 10\text{ mA}; V_{DS} = 15\text{ V}; V_{G2-S} = 4\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}$.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-------------|-----------------------------|---|------|------|------|------|
| $ Y_{fs} $ | transfer admittance | $f = 1\text{ kHz}$ | 15 | 18 | – | mS |
| C_{ig1-s} | input capacitance at gate 1 | $f = 1\text{ MHz}$ | – | 2.5 | 3 | pF |
| C_{ig2-s} | input capacitance at gate 2 | $f = 1\text{ MHz}$ | – | 1.2 | – | pF |
| C_{rs} | feedback capacitance | $f = 1\text{ MHz}$ | – | 25 | – | fF |
| C_{os} | output capacitance | $f = 1\text{ MHz}$ | – | 1 | – | pF |
| F | noise figure | $f = 200\text{ MHz}; G_S = 2\text{ mS}; B_S = B_{Sopt}$ | – | 1 | – | dB |
| G_p | power gain | $f = 200\text{ MHz}; G_S = 2\text{ mS}; B_S = B_{Sopt};$ $G_L = 0.5\text{ mS}; B_L = B_{Lopt}$ | – | 25 | – | dB |

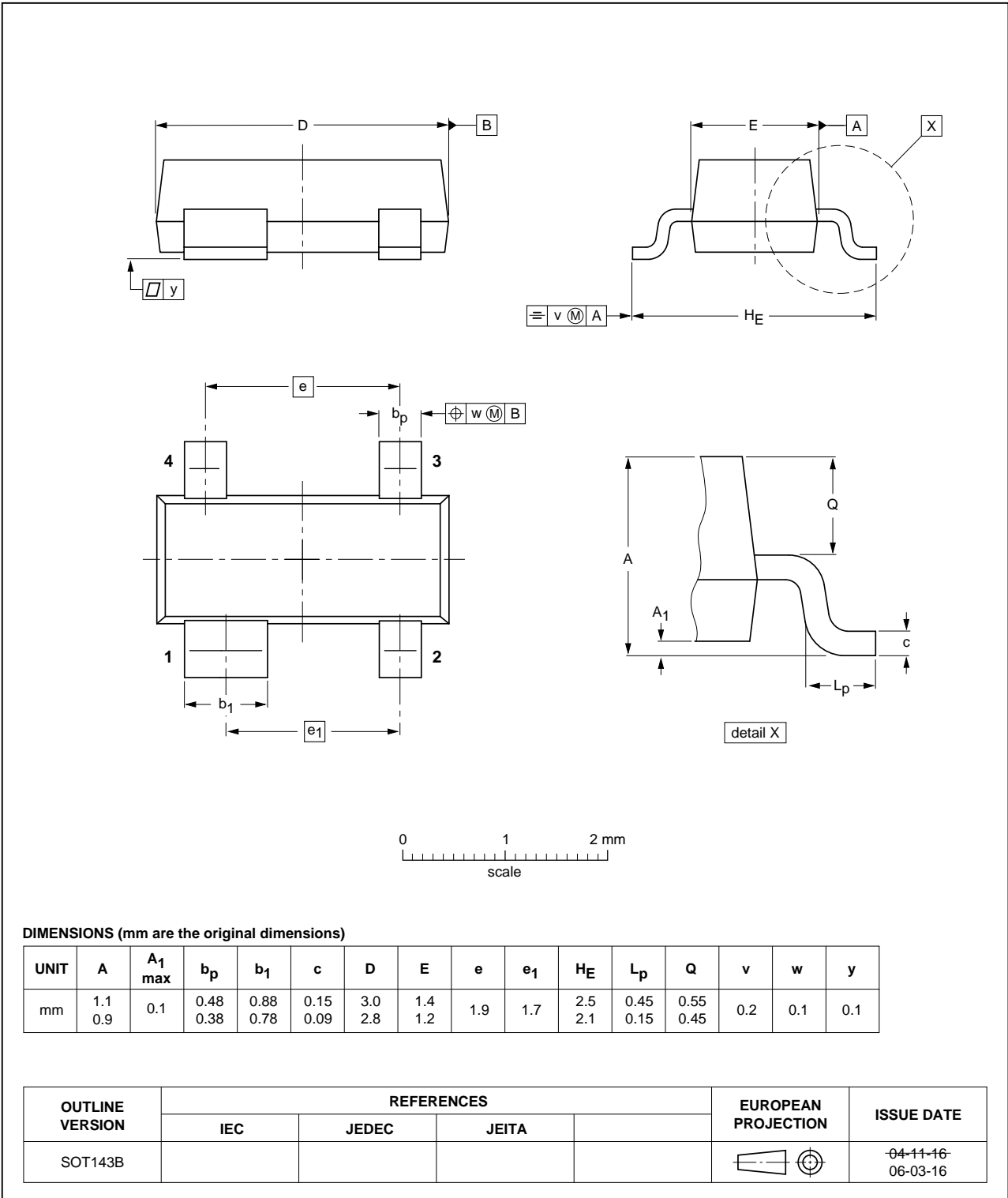
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PACKAGE OUTLINE

Plastic surface-mounted package; 4 leads

SOT143B



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DATA SHEET STATUS

| DOCUMENT STATUS ⁽¹⁾ | PRODUCT STATUS ⁽²⁾ | DEFINITION |
|--------------------------------|-------------------------------|---|
| Objective data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary data sheet | Qualification | This document contains data from the preliminary specification. |
| Product data sheet | Production | This document contains the product specification. |

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This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content, except for package outline drawings which were updated to the latest version.

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