

# DATA SHEET

**BF994S**

N-channel dual-gate MOS-FET

Product specification

July 1993



# N-channel dual-gate MOS-FET

# BF994S

### FEATURES

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

### APPLICATIONS

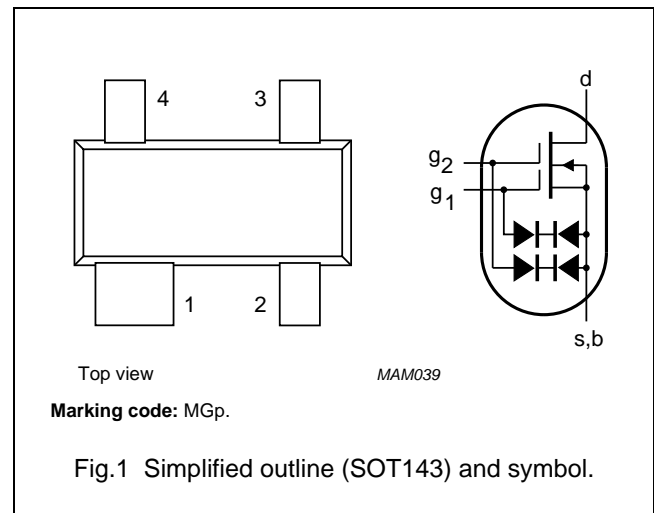
- VHF applications such as:
  - VHF television tuners
  - Professional communication equipment.

### PINNING

PIN	SYMBOL	DESCRIPTION
1	s, b	source
2	d	drain
3	g <sub>2</sub>	gate 2
4	g <sub>1</sub>	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 <sub>DS</sub>	drain-source voltage		–	20	V
I <sub>D</sub>	drain current		–	30	mA
P <sub>tot</sub>	total power dissipation	up to T <sub>amb</sub> = 60 °C	–	200	mW
T <sub>j</sub>	junction temperature		–	150	°C
Y <sub>fs</sub>	transfer admittance	f = 1 kHz; I <sub>D</sub> = 10 mA; V <sub>DS</sub> = 15 V; V <sub>G2-S</sub> = 4 V	18	–	mS
C <sub>ig1-s</sub>	input capacitance at gate 1	f = 1 MHz; I <sub>D</sub> = 10 mA; V <sub>DS</sub> = 15 V; V <sub>G2-S</sub> = 4 V	2.5	3	pF
C <sub>rs</sub>	feedback capacitance	f = 1 MHz; I <sub>D</sub> = 10 mA; V <sub>DS</sub> = 15 V; V <sub>G2-S</sub> = 4 V	25	–	fF
F	noise figure	f = 200 MHz; G <sub>S</sub> = 2 mS; B <sub>S</sub> = B <sub>Sopt</sub> ; I <sub>D</sub> = 10 mA; V <sub>DS</sub> = 15 V; V <sub>G2-S</sub> = 4 V	1	–	dB

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## LIMITING VALUES

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

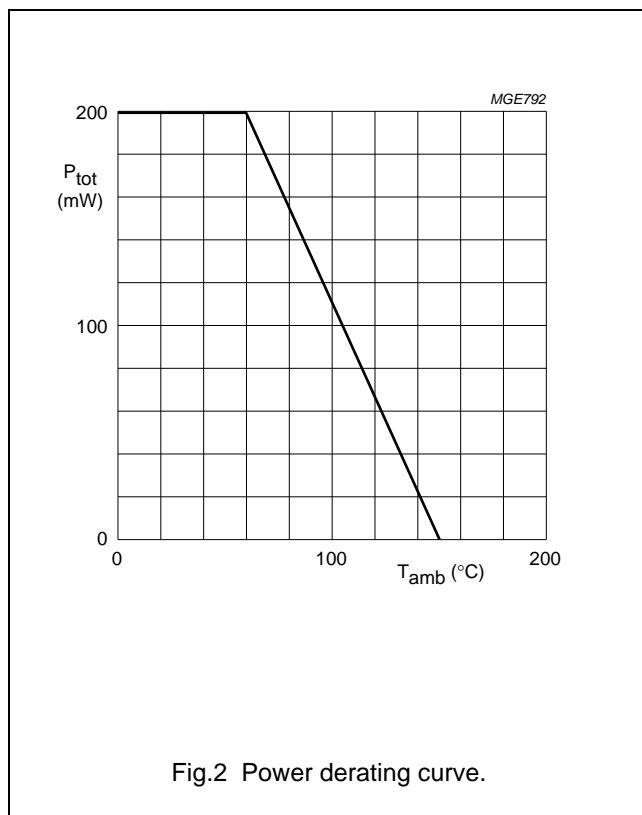
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{DS}$	drain-source voltage		–	20	V
$I_D$	drain current (DC)		–	30	mA
$I_{D(AV)}$	average drain current		–	30	mA
$I_{G1-S}$	gate 1-source current		–	$\pm 10$	mA
$I_{G2-S}$	gate 2-source current		–	$\pm 10$	mA
$P_{tot}$	total power dissipation	up to $T_{amb} = 60\text{ }^\circ\text{C}$ ; 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  $8 \times 10 \times 0.7\text{ mm}$ .



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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	$V_{G1-S} = \pm 5\text{ V}; V_{G2-S} = V_{DS} = 0$	–	$\pm 50$	nA
$I_{G2-SS}$	gate 2 cut-off currents	$V_{G2-S} = \pm 5\text{ V}; V_{G1-S} = V_{DS} = 0$	–	$\pm 50$	nA
$V_{(BR)G1-SS}$	gate 1-source breakdown voltage	$I_{G1-SS} = \pm 10\text{ mA}; V_{G2-S} = V_{DS} = 0$	$\pm 6$	$\pm 20$	V
$V_{(BR)G2-SS}$	gate 2-source breakdown voltage	$I_{G2-SS} = \pm 10\text{ mA}; V_{G1-S} = V_{DS} = 0$	$\pm 6$	$\pm 20$	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 CHARACTERISTICS**Measuring 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

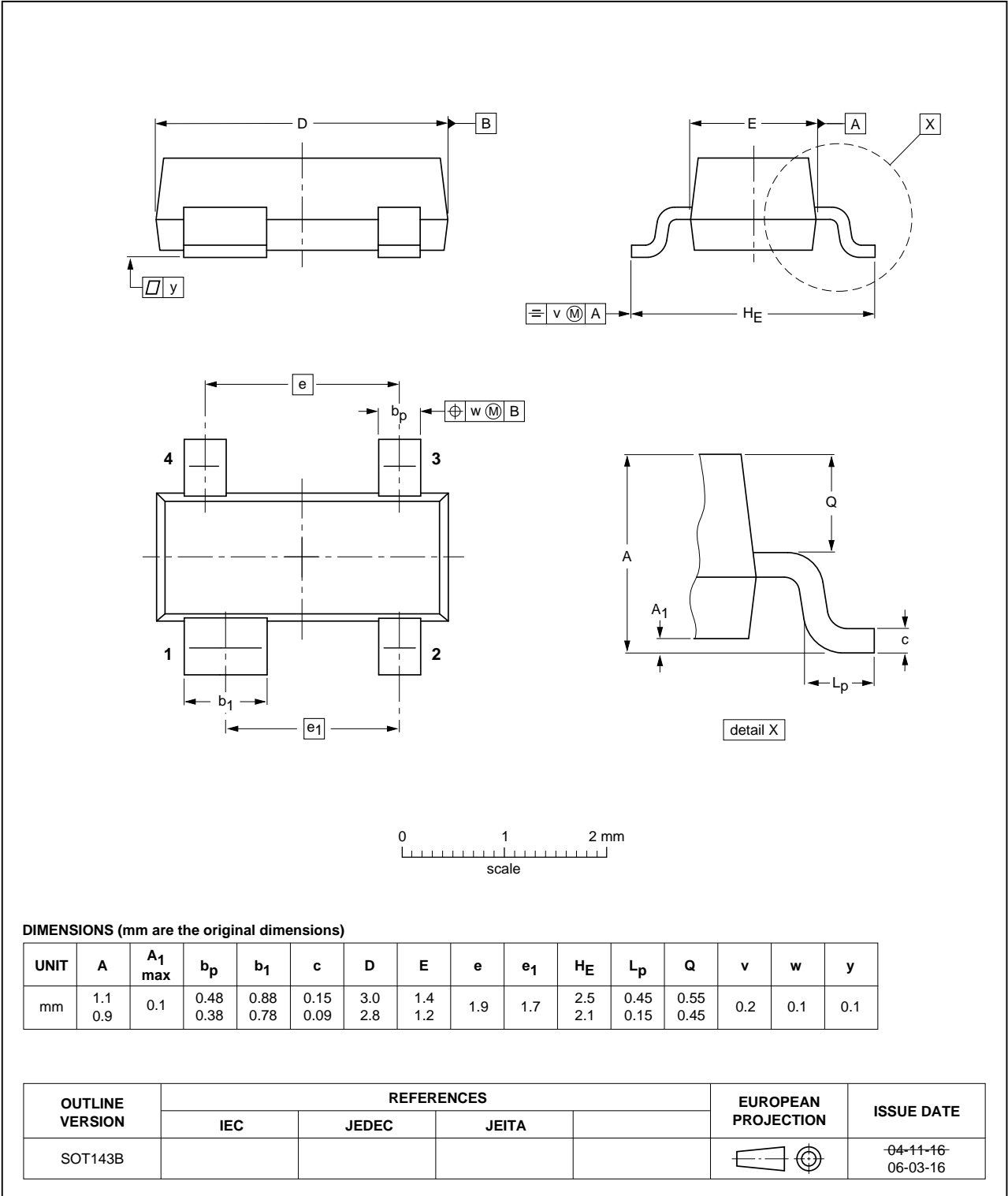
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PACKAGE OUTLINE

Plastic surface-mounted package; 4 leads

SOT143B



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## DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	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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## **Contact information**

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