## **DISCRETE SEMICONDUCTORS**

## DATA SHEET

# **BFR30**; **BFR31**N-channel field-effect transistors

Product specification Supersedes data of April 1991



## N-channel field-effect transistors

## **BFR30; BFR31**

## **DESCRIPTION**

Planar epitaxial symmetrical junction N-channel field-effect transistor in a plastic SOT23 package.

## **APPLICATIONS**

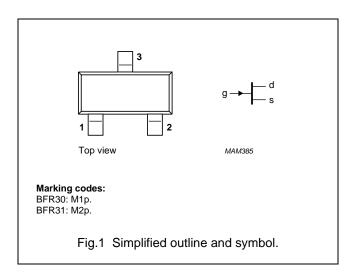
• Low level general purpose amplifiers in thick and thin-film circuits.

#### **PINNING - SOT23**

PIN	SYMBOL	DESCRIPTION
1	d	drain <sup>(1)</sup>
2	s	source <sup>(1)</sup>
3	g	gate

## Note

1. Drain and source are interchangeable.



## **CAUTION**

This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling.

## **QUICK REFERENCE DATA**

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{DS}$	drain-source voltage		_	±25	V
$V_{GSO}$	gate-source voltage	open drain	_	-25	V
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 40 °C	_	250	mW
I <sub>DSS</sub>	drain current	V <sub>GS</sub> = 0; V <sub>DS</sub> = 10 V			
	BFR30		4	10	mA
	BFR31		1	5	mA
y <sub>fs</sub>	common-source transfer admittance	I <sub>D</sub> = 1 mA; V <sub>DS</sub> = 10 V; f = 1 kHz			
	BFR30		1	4	mS
	BFR31		1.5	4.5	mS

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## **LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>DS</sub>	drain-source voltage		_	±25	V
$V_{DGO}$	drain-gate voltage	open source	_	-25	V
V <sub>GSO</sub>	gate-source voltage	open drain	_	-25	V
I <sub>D</sub>	drain current		-	10	mA
I <sub>G</sub>	forward gate current (DC)		-	5	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 40 °C; note 1; see Fig.2	_	250	mW
T <sub>stg</sub>	storage temperature		-65	+150	°C
Tj	operating junction temperature		_	150	°C

#### Note

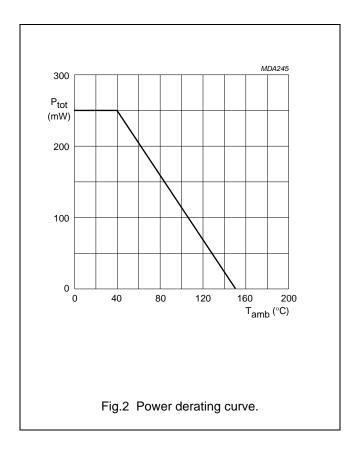
1. Mounted on a ceramic substrate of  $8 \times 10 \times 0.7$  mm.

## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th j-a</sub>	thermal resistance from junction to ambient	note 1	430	K/W

## Note

1. Mounted on a ceramic substrate of  $8 \times 10 \times 0.7$  mm.



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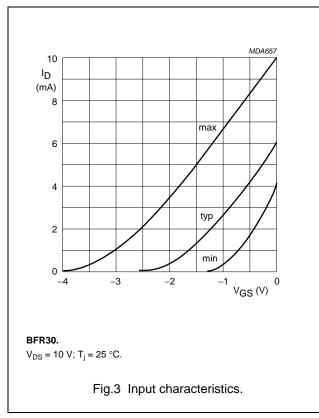
## **CHARACTERISTICS**

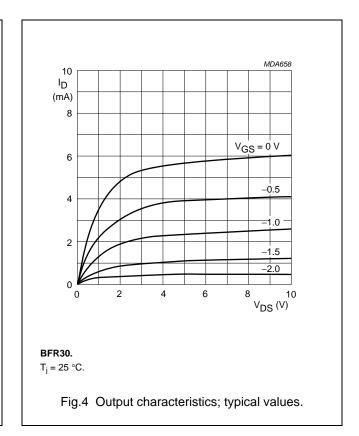
 $T_j = 25$  °C unless otherwise specified.

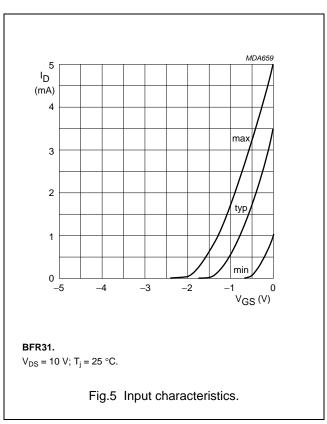
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I <sub>GSS</sub>	gate cut-off current	V <sub>DS</sub> = 0; V <sub>GS</sub> = -10 V	_	-0.2	nA
I <sub>DSS</sub>	drain current	V <sub>GS</sub> = 0; V <sub>DS</sub> = 10 V			
	BFR30		4	10	mA
	BFR31		1	5	mA
$V_{GS}$	gate-source voltage	I <sub>D</sub> = 1 mA; V <sub>DS</sub> = 10 V			
	BFR30		-0.7	-3	V
	BFR31		0	-1.3	V
$V_{GS}$	gate-source voltage	$I_D = 50 \mu A; V_{DS} = 10 V$			
	BFR30		_	-4	V
	BFR31		_	-2	V
$V_{GSoff}$	gate-source cut-off voltage	I <sub>D</sub> = 0.5 nA; V <sub>DS</sub> = 10 V			
	BFR30		_	<b>-5</b>	V
	BFR31		_	-2.5	V
y <sub>fs</sub>	common-source transfer admittance	$I_D = 1 \text{ mA}; V_{DS} = 10 \text{ V}; f = 1 \text{ kHz};$			
	BFR30	T <sub>amb</sub> = 25 °C	1	4	mS
	BFR31		1.5	4.5	mS
y <sub>fs</sub>	common-source transfer admittance	$I_D = 200 \mu A; V_{DS} = 10 V; f = 1 kHz;$			
	BFR30	T <sub>amb</sub> = 25 °C	0.5	_	mS
	BFR31		0.75	_	mS
y <sub>os</sub>	common source output admittance	I <sub>D</sub> = 1 mA; V <sub>DS</sub> = 10 V; f = 1 kHz			
	BFR30		_	40	μS
	BFR31		_	25	μS
y <sub>os</sub>	common source output admittance	$I_D = 200 \mu A; V_{DS} = 10 V; f = 1 kHz$			
	BFR30		_	20	μS
	BFR31		_	15	μS
C <sub>is</sub>	input capacitance	V <sub>DS</sub> = 10 V; f = 1 MHz			
		I <sub>D</sub> = 1 mA	_	4	pF
		$I_{D} = 0.2 \text{ nA}$	_	4	pF
C <sub>rs</sub>	feedback capacitance	V <sub>DS</sub> = 10 V; f = 1 MHz; T <sub>amb</sub> = 25 °C			
-		I <sub>D</sub> = 1 mA	_	1.5	pF
		I <sub>D</sub> = 200 μA	_	1.5	pF
V <sub>n</sub>	equivalent input noise voltage	$I_D = 200 \mu A; V_{DS} = 10 V;$	_	0.5	μV
•		B = 0.6 to 100 Hz			

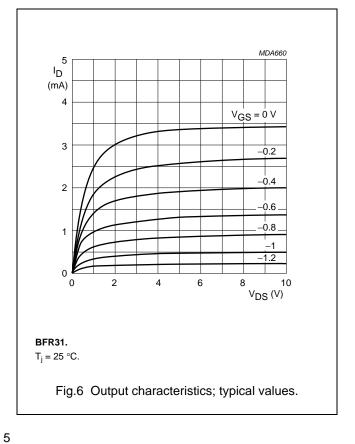
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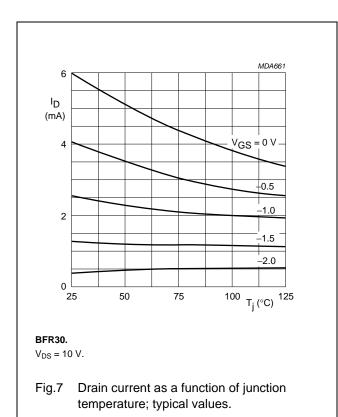


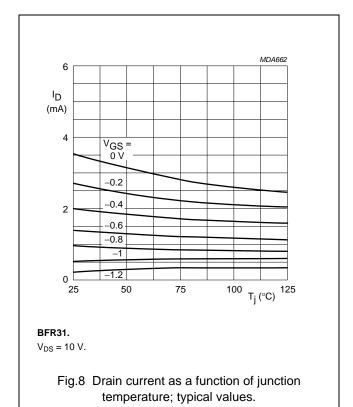


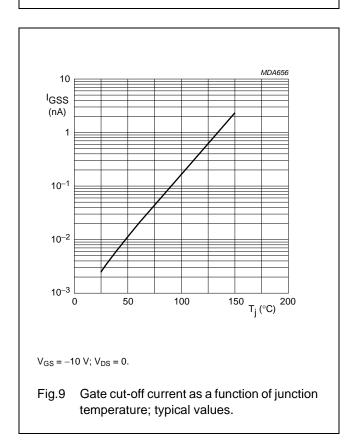


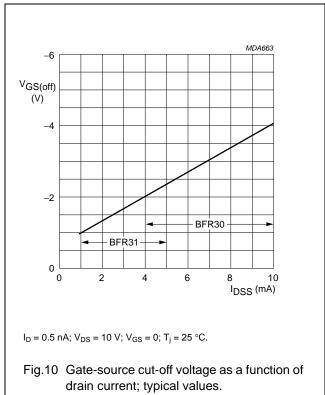
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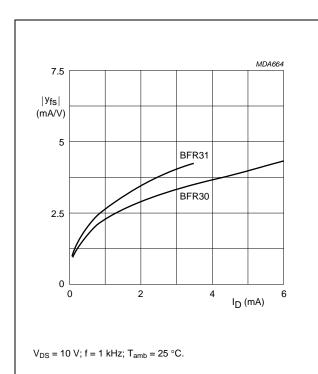
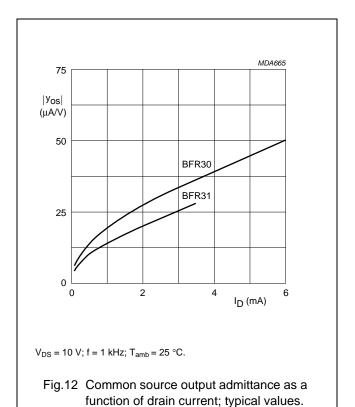
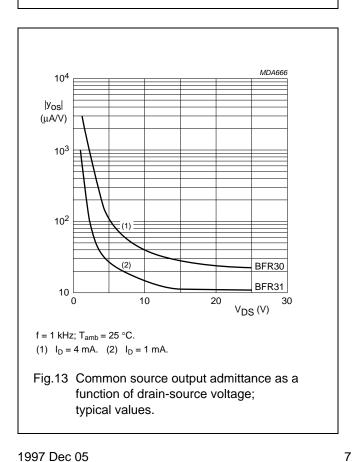
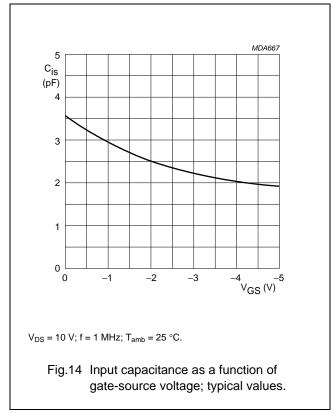


Fig.11 Common source transfer admittance as a function of drain current; typical values.

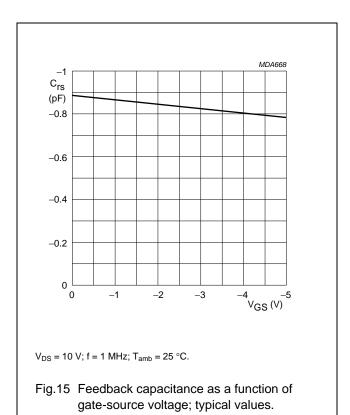






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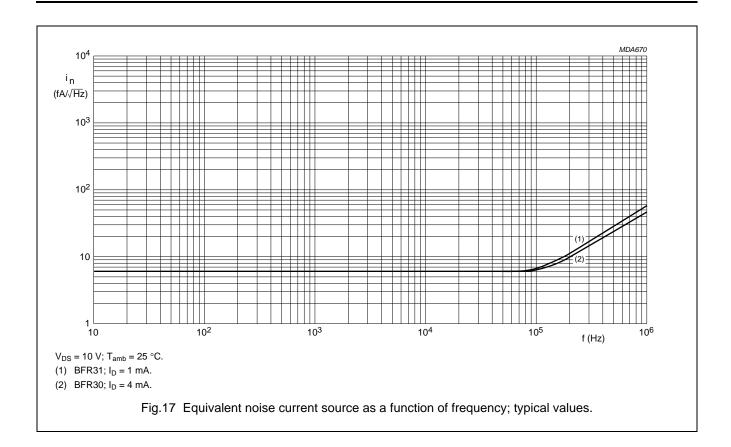
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10<sup>4</sup>  $e_n$  $(nV/\sqrt{Hz})$ 10<sup>3</sup> 10<sup>2</sup> 10 (1) 1 10 10<sup>3</sup> 10<sup>6</sup> 10<sup>2</sup> 10<sup>4</sup> 10<sup>5</sup> f (Hz)  $V_{DS}$  = 10 V;  $T_{amb}$  = 25 °C. (1) BFR31;  $I_D = 1 \text{ mA}$ . (2) BFR30;  $I_D = 4 \text{ mA}$ . Fig.16 Equivalent noise voltage source as a function of frequency; typical values.

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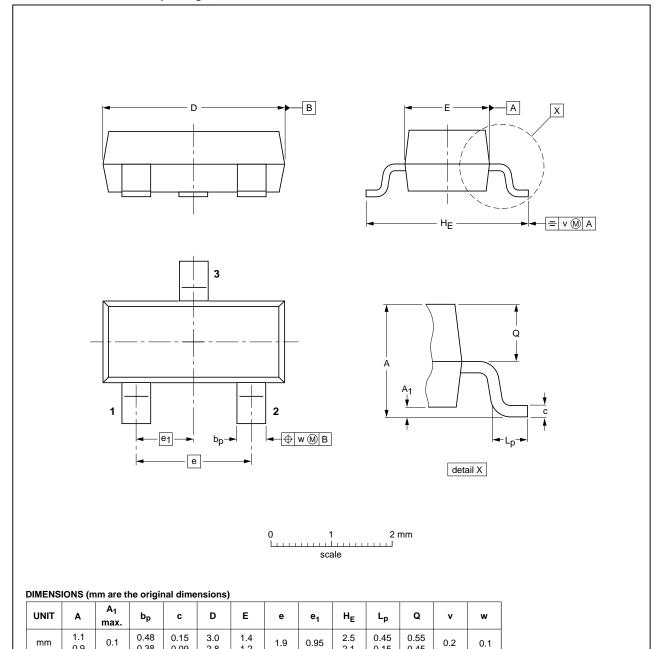
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## **PACKAGE OUTLINE**

Plastic surface-mounted package; 3 leads

SOT23



OUTLINE	REFERENCES			EUROPEAN	ISSUE DATE	
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT23		TO-236AB				<del>-04-11-04-</del> 06-03-16

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0.38

0.9

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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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