

# DATA SHEET

**BFR30; BFR31**

N-channel field-effect transistors

Product specification  
Supersedes data of April 1991

1997 Dec 05



N-channel field-effect transistors

BFR30; BFR31

DESCRIPTION

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

APPLICATIONS

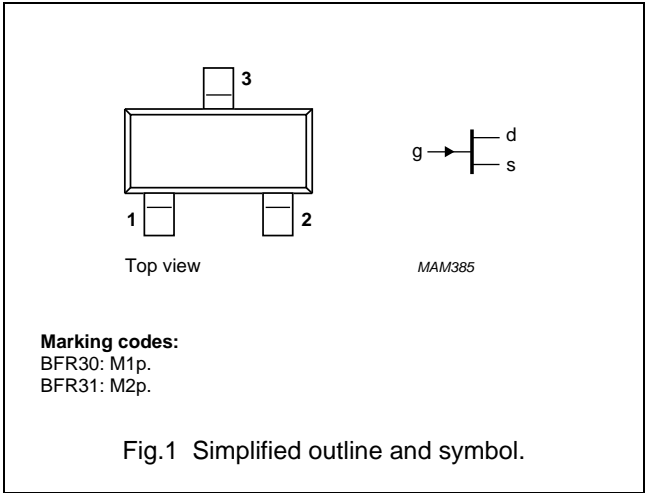
- Low level general purpose amplifiers in thick and thin-film circuits.

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		–	$\pm 25$	V
$V_{GSO}$	gate-source voltage	open drain	–	–25	V
$P_{tot}$	total power dissipation	$T_{amb} \leq 40\text{ }^{\circ}\text{C}$	–	250	mW
$I_{DSS}$	drain current BFR30 BFR31	$V_{GS} = 0$ ; $V_{DS} = 10\text{ V}$	4 1	10 5	mA mA
$ y_{fs} $	common-source transfer admittance BFR30 BFR31	$I_D = 1\text{ mA}$ ; $V_{DS} = 10\text{ V}$ ; $f = 1\text{ kHz}$	1 1.5	4 4.5	mS mS

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## LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{DS}$	drain-source voltage		–	$\pm 25$	V
$V_{DGO}$	drain-gate voltage	open source	–	–25	V
$V_{GSO}$	gate-source voltage	open drain	–	–25	V
$I_D$	drain current		–	10	mA
$I_G$	forward gate current (DC)		–	5	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 40\text{ °C}$ ; note 1; see Fig.2	–	250	mW
$T_{stg}$	storage temperature		–65	+150	°C
$T_j$	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
$R_{th\ j-a}$	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.

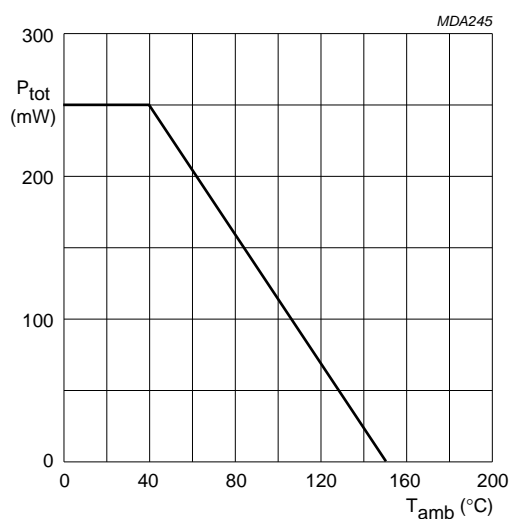


Fig.2 Power derating curve.

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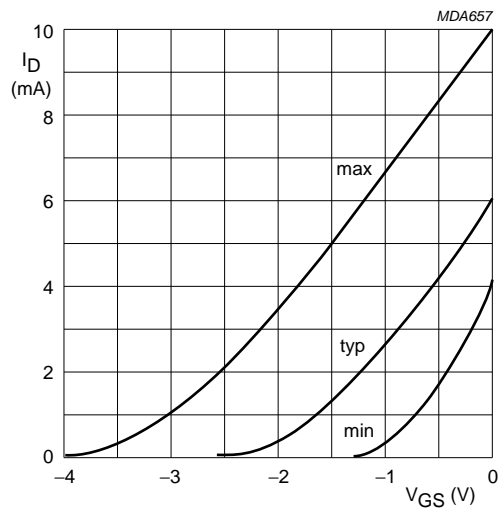
## CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$I_{GSS}$	gate cut-off current	$V_{DS} = 0$ ; $V_{GS} = -10\text{ V}$	—	−0.2	nA
$I_{DSS}$	drain current BFR30 BFR31	$V_{GS} = 0$ ; $V_{DS} = 10\text{ V}$	4 1	10 5	mA mA
$V_{GS}$	gate-source voltage BFR30 BFR31	$I_D = 1\text{ mA}$ ; $V_{DS} = 10\text{ V}$	−0.7 0	−3 −1.3	V V
$V_{GS}$	gate-source voltage BFR30 BFR31	$I_D = 50\text{ }\mu\text{A}$ ; $V_{DS} = 10\text{ V}$	— —	−4 −2	V V
$V_{GSoff}$	gate-source cut-off voltage BFR30 BFR31	$I_D = 0.5\text{ nA}$ ; $V_{DS} = 10\text{ V}$	— —	−5 −2.5	V V
$ y_{fs} $	common-source transfer admittance BFR30 BFR31	$I_D = 1\text{ mA}$ ; $V_{DS} = 10\text{ V}$ ; $f = 1\text{ kHz}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$	1 1.5	4 4.5	mS mS
$ y_{fs} $	common-source transfer admittance BFR30 BFR31	$I_D = 200\text{ }\mu\text{A}$ ; $V_{DS} = 10\text{ V}$ ; $f = 1\text{ kHz}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$	0.5 0.75	— —	mS mS
$ y_{os} $	common source output admittance BFR30 BFR31	$I_D = 1\text{ mA}$ ; $V_{DS} = 10\text{ V}$ ; $f = 1\text{ kHz}$	— —	40 25	$\mu\text{S}$ $\mu\text{S}$
$ y_{os} $	common source output admittance BFR30 BFR31	$I_D = 200\text{ }\mu\text{A}$ ; $V_{DS} = 10\text{ V}$ ; $f = 1\text{ kHz}$	— —	20 15	$\mu\text{S}$ $\mu\text{S}$
$C_{is}$	input capacitance	$V_{DS} = 10\text{ V}$ ; $f = 1\text{ MHz}$ $I_D = 1\text{ mA}$ $I_D = 0.2\text{ nA}$	— —	4 4	pF pF
$C_{rs}$	feedback capacitance	$V_{DS} = 10\text{ V}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$ $I_D = 1\text{ mA}$ $I_D = 200\text{ }\mu\text{A}$	— —	1.5 1.5	pF pF
$V_n$	equivalent input noise voltage	$I_D = 200\text{ }\mu\text{A}$ ; $V_{DS} = 10\text{ V}$ ; $B = 0.6\text{ to }100\text{ Hz}$	—	0.5	$\mu\text{V}$

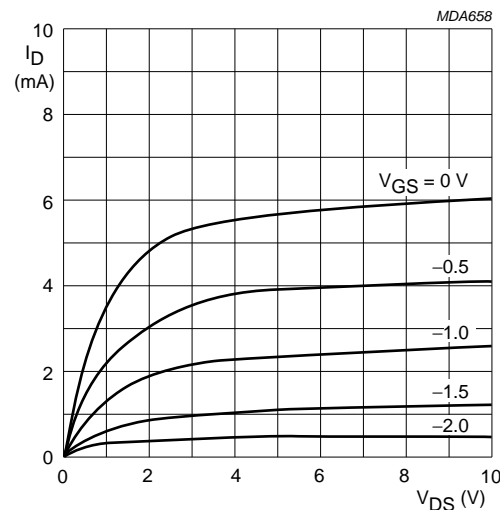
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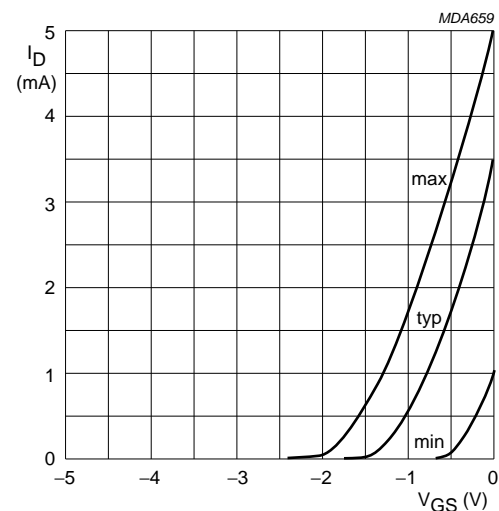
**BFR30.**  
 $V_{DS} = 10\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

Fig.3 Input characteristics.



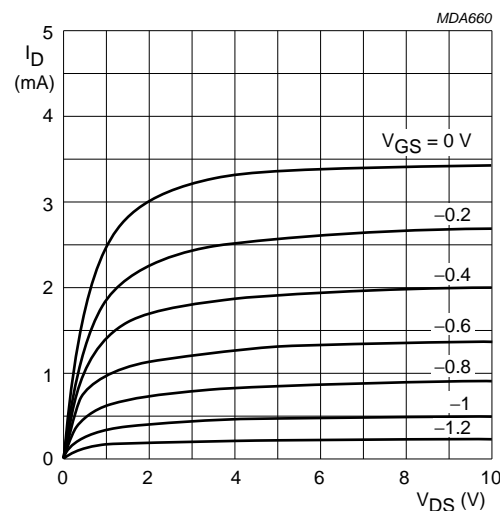
**BFR30.**  
 $T_j = 25\text{ }^\circ\text{C}$ .

Fig.4 Output characteristics; typical values.



**BFR31.**  
 $V_{DS} = 10\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

Fig.5 Input characteristics.

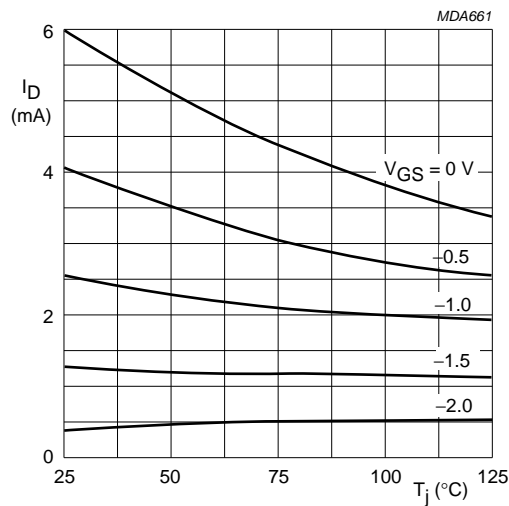


**BFR31.**  
 $T_j = 25\text{ }^\circ\text{C}$ .

Fig.6 Output characteristics; typical values.

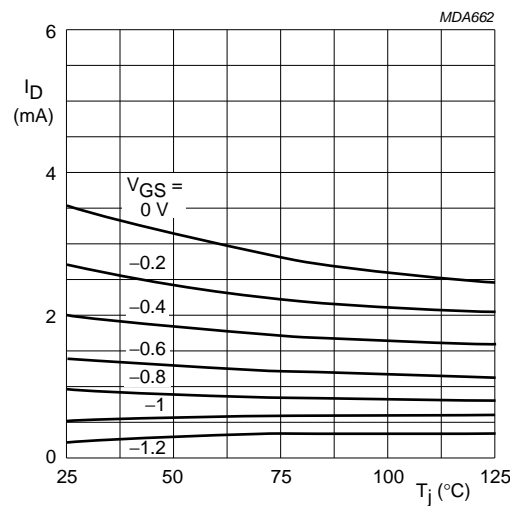
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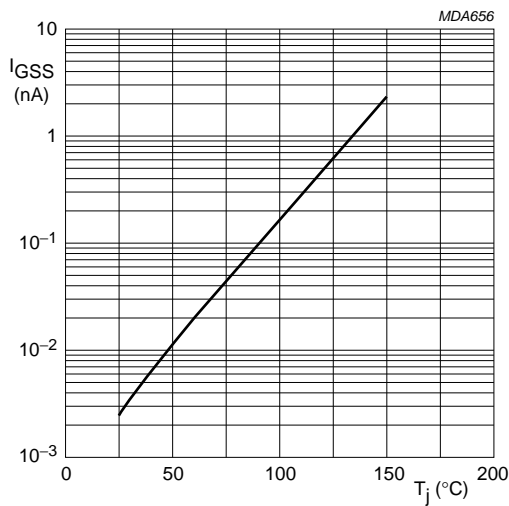
**BFR30.**  
 $V_{DS} = 10\text{ V}.$

Fig.7 Drain current as a function of junction temperature; typical values.



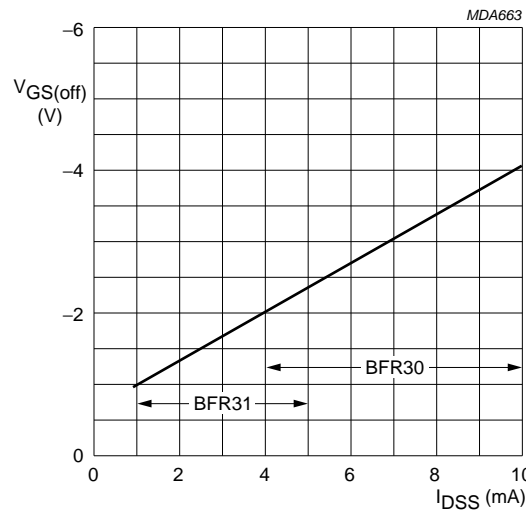
**BFR31.**  
 $V_{DS} = 10\text{ V}.$

Fig.8 Drain current as a function of junction temperature; typical values.



$V_{GS} = -10\text{ V}; V_{DS} = 0.$

Fig.9 Gate cut-off current as a function of junction temperature; typical values.

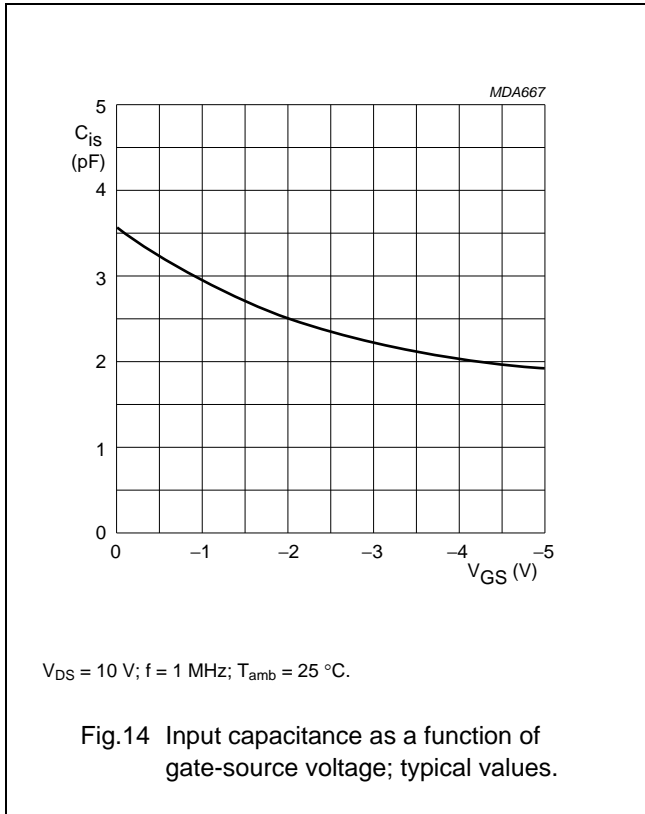
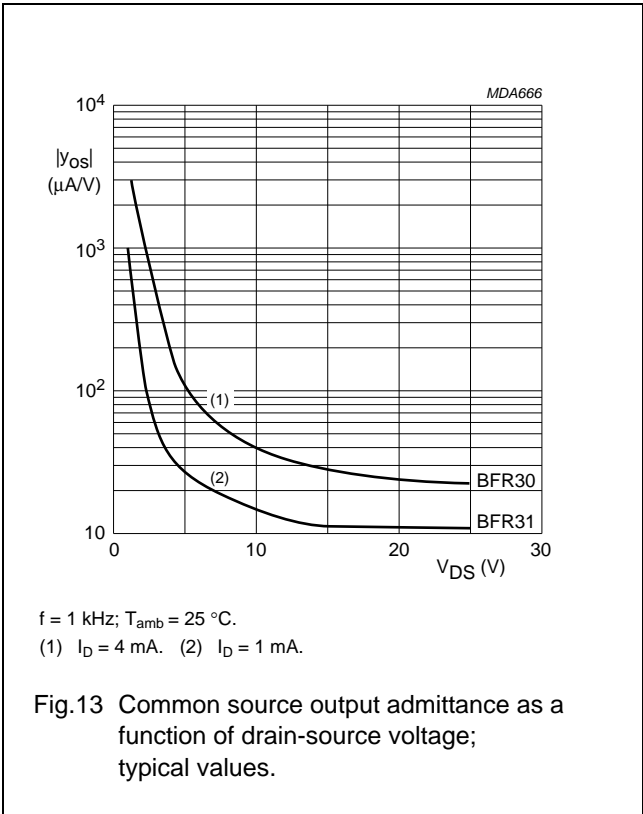
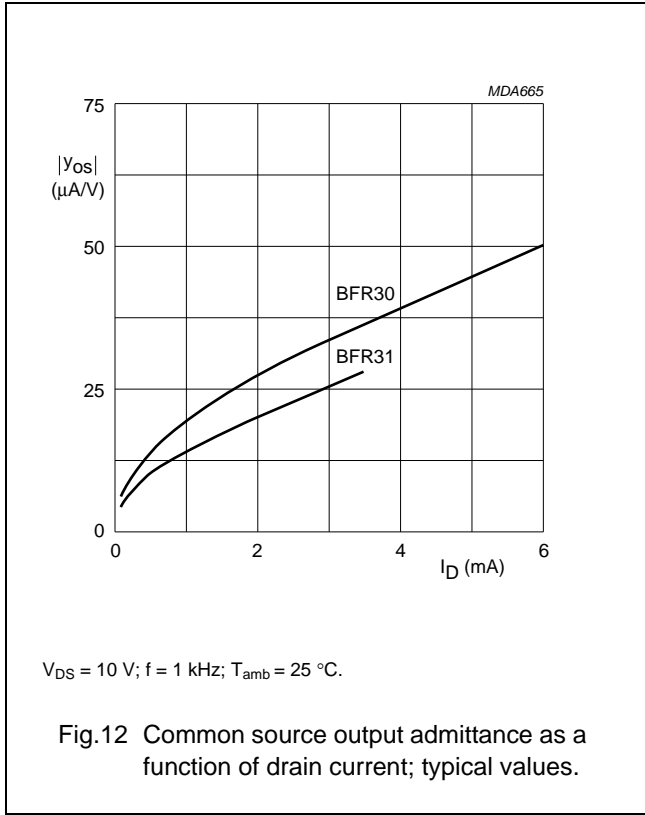
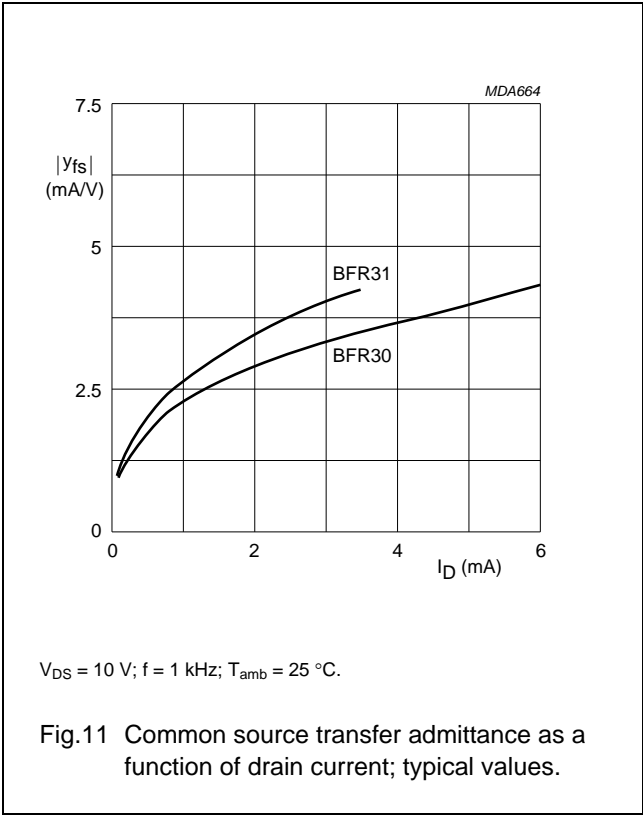


$I_D = 0.5\text{ nA}; V_{DS} = 10\text{ V}; V_{GS} = 0; T_j = 25\text{ °C}.$

Fig.10 Gate-source cut-off voltage as a function of drain current; typical values.

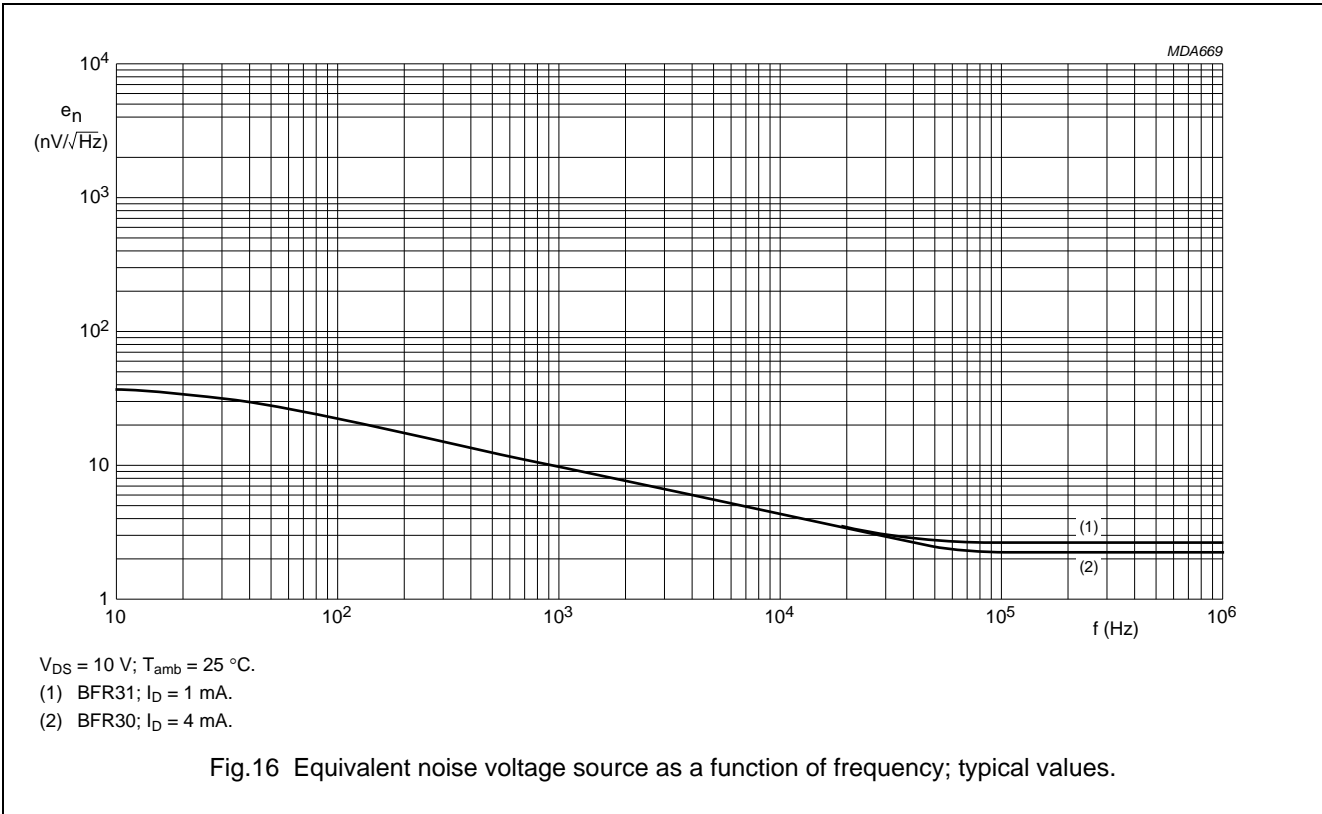
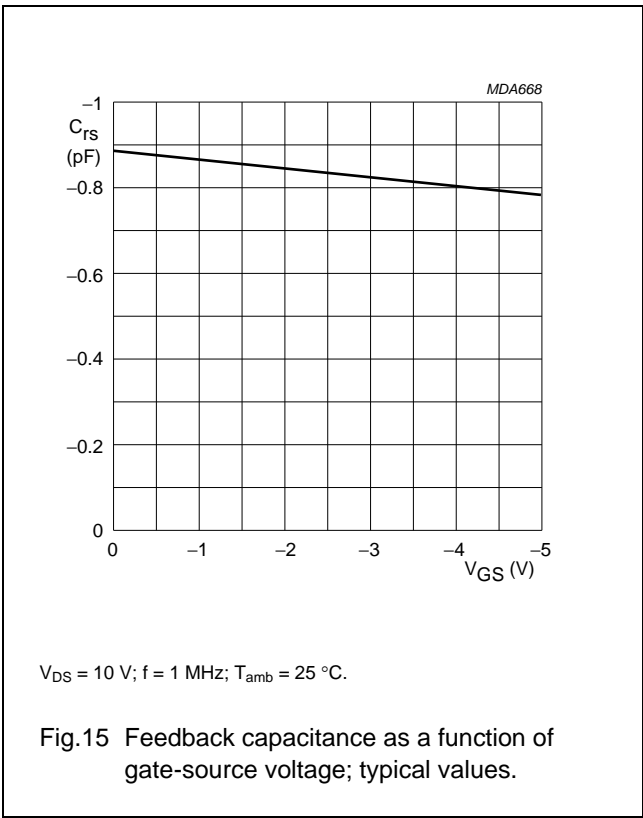
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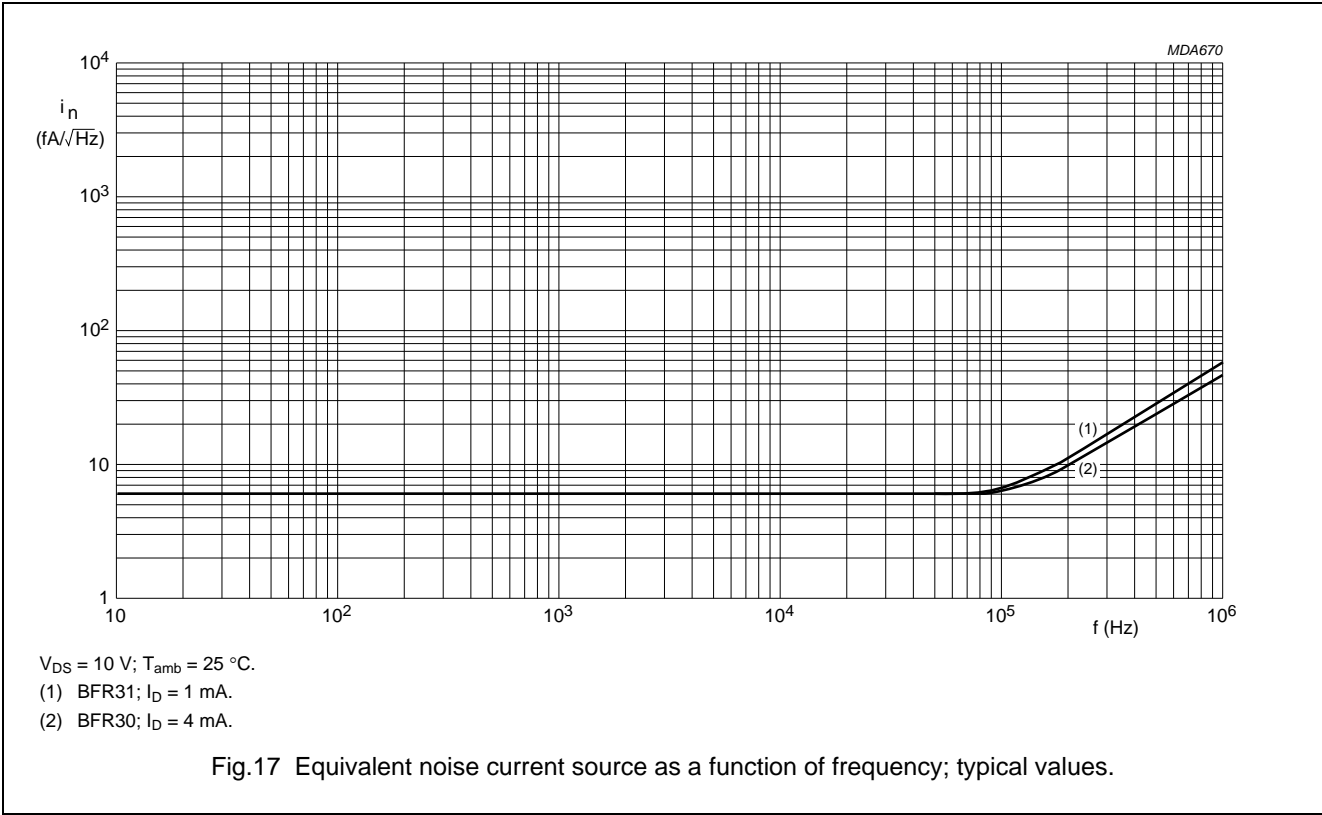
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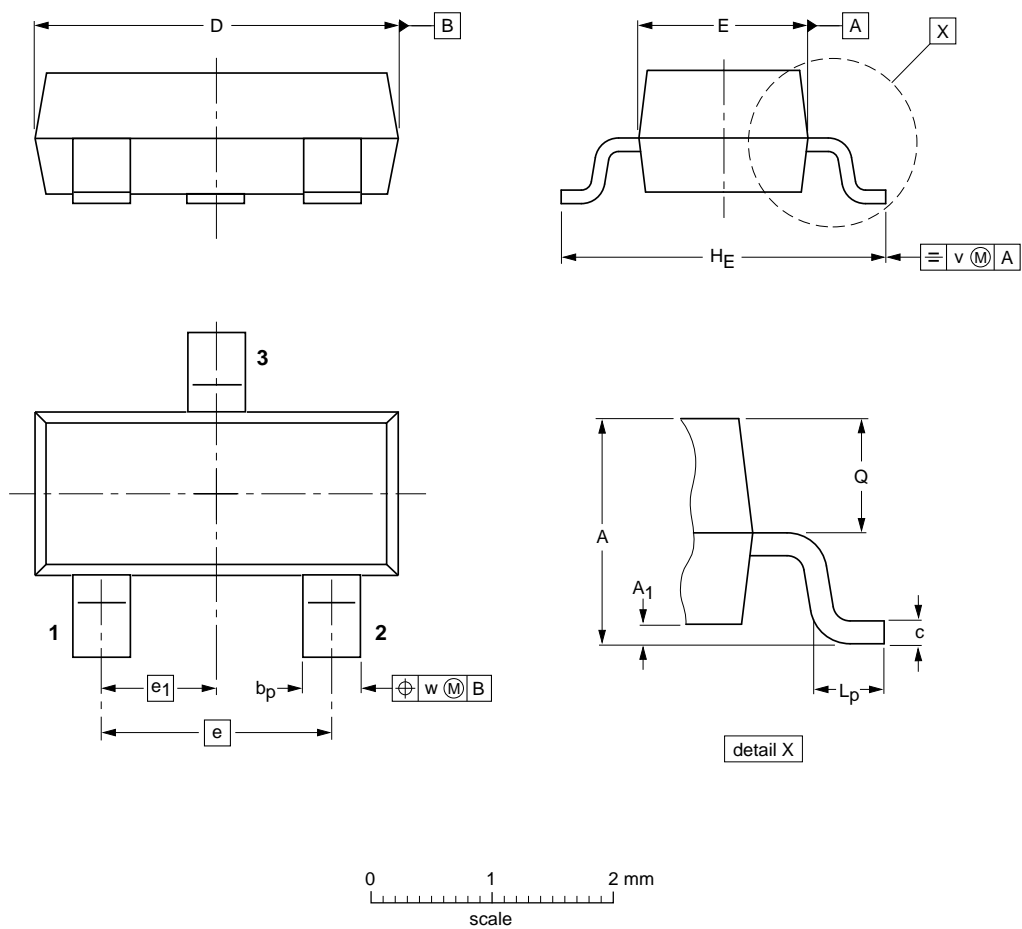
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PACKAGE OUTLINE

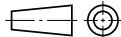
Plastic surface-mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub> max.	b <sub>p</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

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

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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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