N-channel field-effect transistors BFR30; BFR31

DESCRIPTION

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

APPLICATIONS

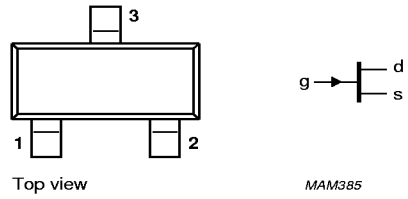
- Low level general purpose amplifiers in thick and thin-film circuits.

PINNING - SOT23

PIN	SYMBOL	DESCRIPTION
1	d	drain(1)
2	s	source(1)
3	g	gate

Note

1. Drain and source are interchangeable.



Marking codes:
BFR30: M1p.
BFR31: M2p.

Fig.1 Simplified outline and symbol.

CAUTION

This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

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_{tot}	total power dissipation	$T_{amb} \leq 40$ °C	–	250	mW
I_{DSS}	drain current	$V_{GS} = 0$; $V_{DS} = 10$ V			
	BFR30		4	10	mA
	BFR31		1	5	mA
$\lvert y_{fs} \rvert$	common-source transfer admittance	$I_D = 1$ mA; $V_{DS} = 10$ V; f = 1 kHz			
	BFR30		1	4	mS
	BFR31		1.5	4.5	mS

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	±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	$T_{amb} \leq 40$ °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
$R_{th\ j\text{-}a}$	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.

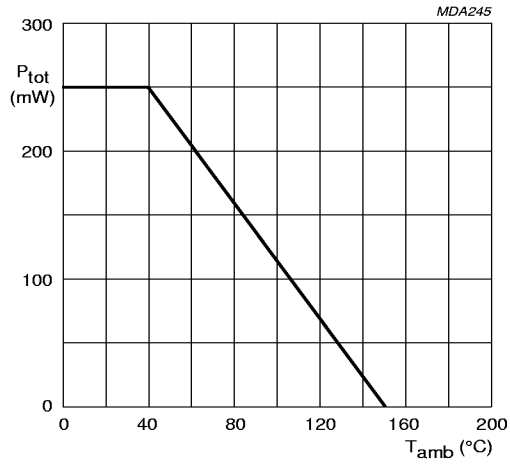
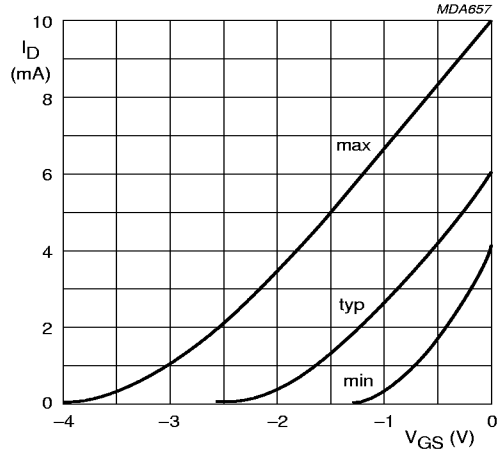


Fig.2 Power derating curve.

CHARACTERISTICS

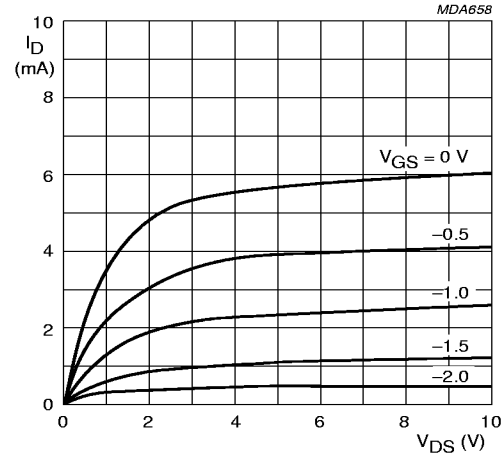
T_j = 25 °C unless otherwise specified.

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



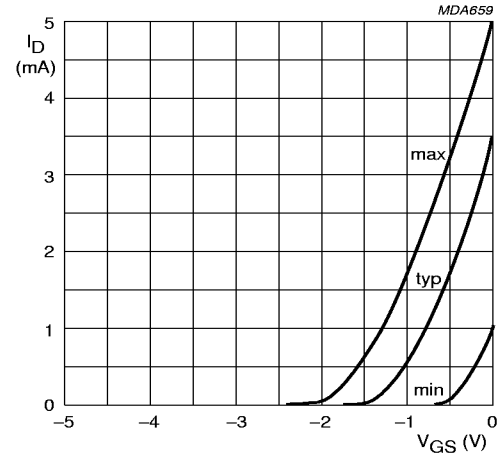
BFR30.
V_{DS} = 10 V; T_j = 25 °C.

Fig.3 Input characteristics.



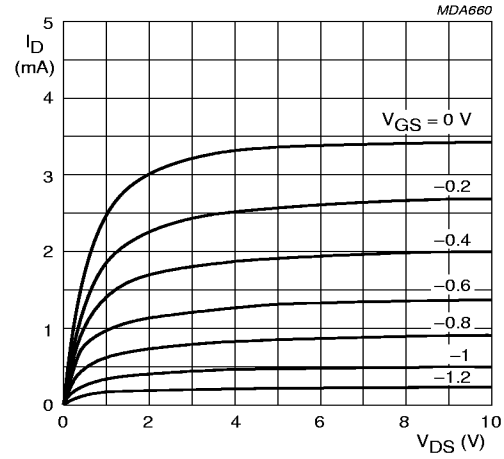
BFR30.
T_j = 25 °C.

Fig.4 Output characteristics; typical values.



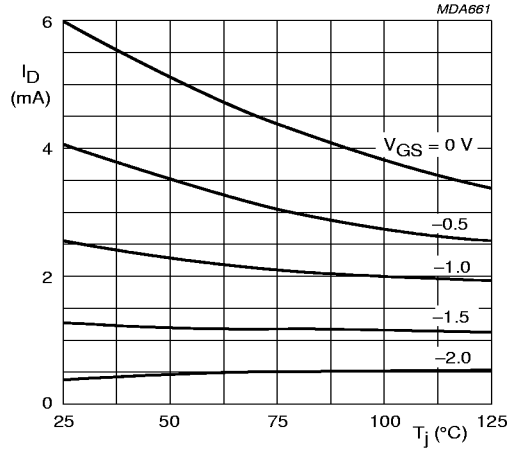
BFR31.
V_{DS} = 10 V; T_j = 25 °C.

Fig.5 Input characteristics.



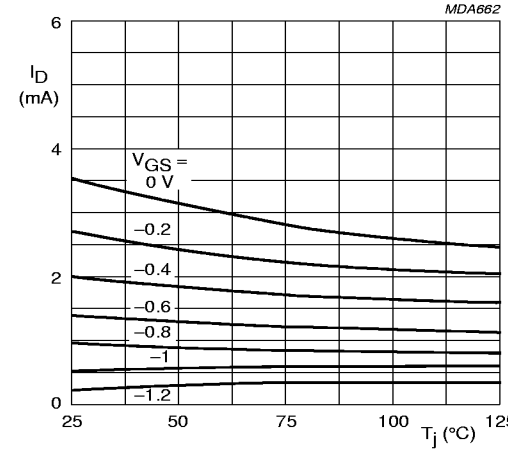
BFR31.
T_j = 25 °C.

Fig.6 Output characteristics; typical values.



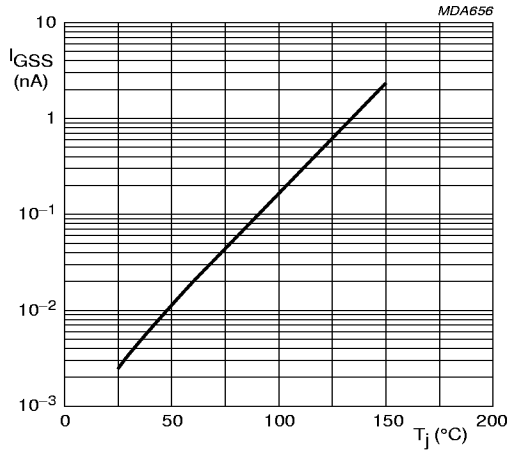
BFR30.
V_{DS} = 10 V.

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



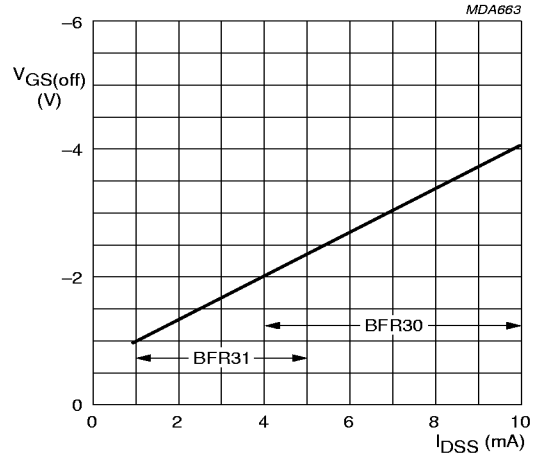
BFR31.
V_{DS} = 10 V.

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



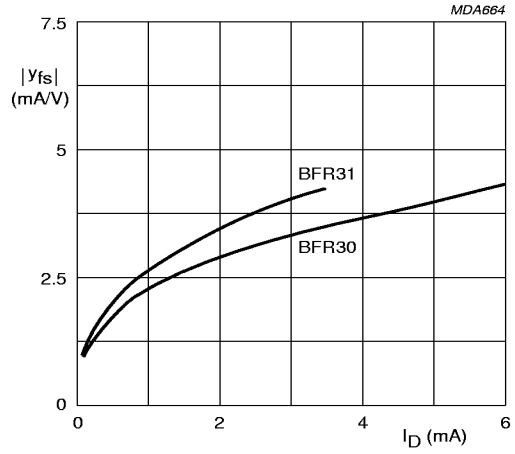
V_{GS} = −10 V; V_{DS} = 0.

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



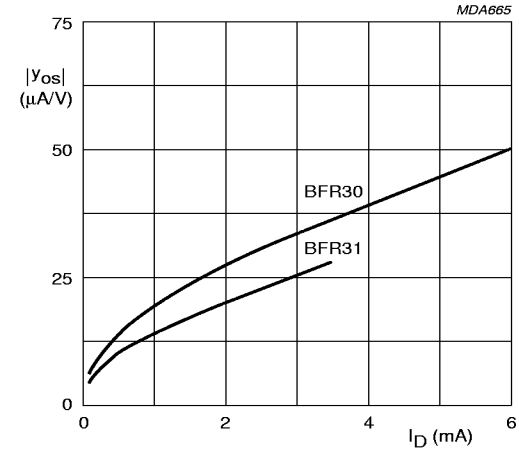
I_D = 0.5 nA; V_{DS} = 10 V; V_{GS} = 0; T_j = 25 °C.

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



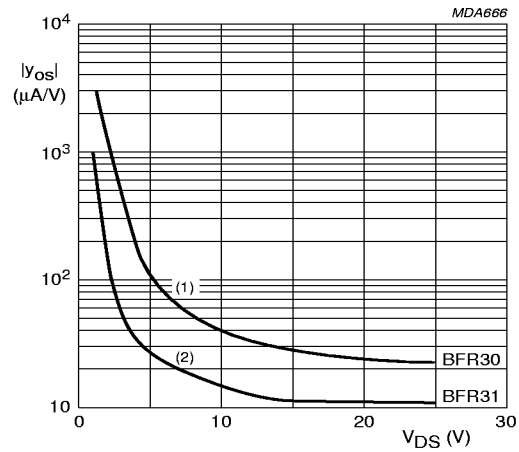
V_{DS} = 10 V; f = 1 kHz; T_{amb} = 25 °C.

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



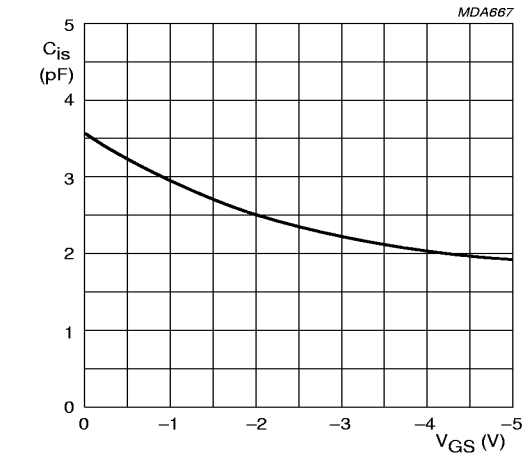
V_{DS} = 10 V; f = 1 kHz; T_{amb} = 25 °C.

Fig.12 Common source output admittance as a function of drain current; typical values.



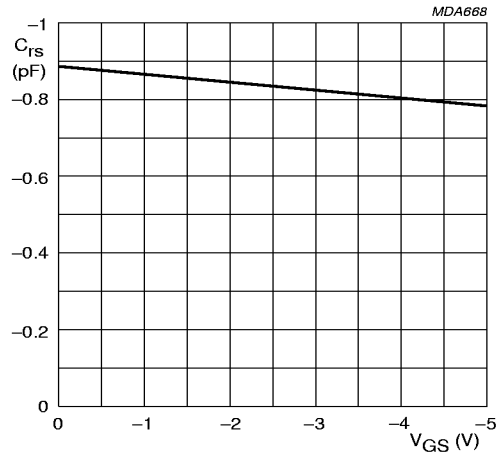
f = 1 kHz; T_{amb} = 25 °C.
(1) I_D = 4 mA. (2) I_D = 1 mA.

Fig.13 Common source output admittance as a function of drain-source voltage; typical values.



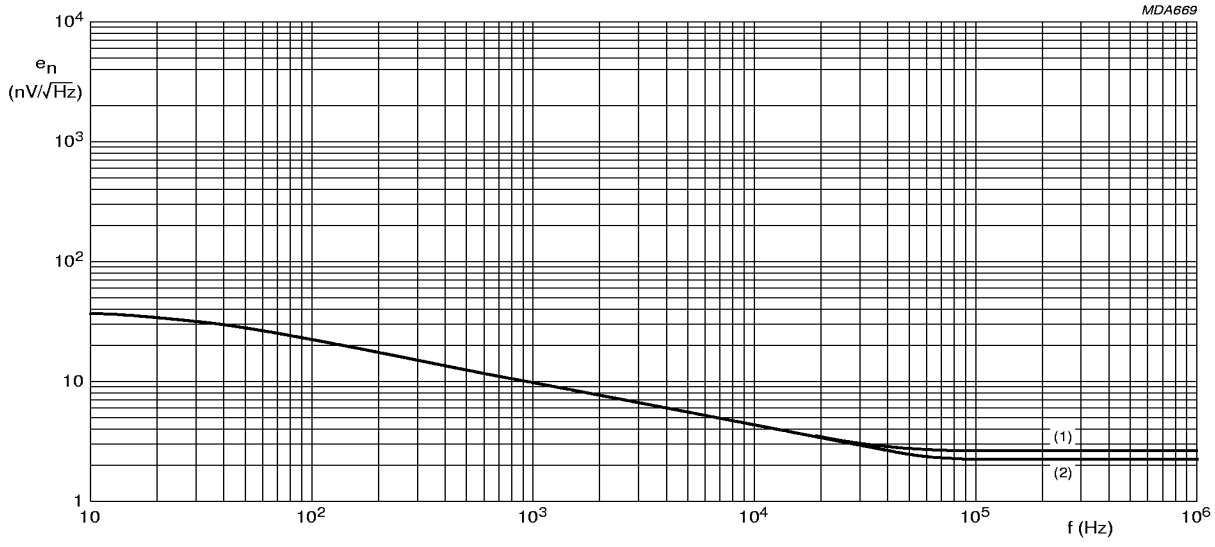
V_{DS} = 10 V; f = 1 MHz; T_{amb} = 25 °C.

Fig.14 Input capacitance as a function of gate-source voltage; typical values.



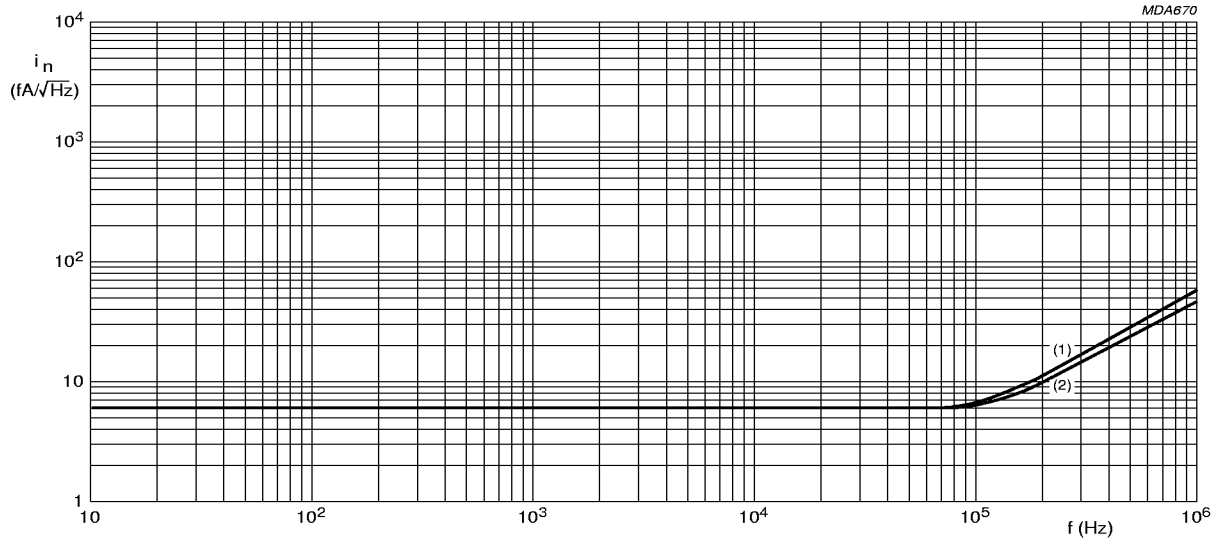
V_{DS} = 10 V; f = 1 MHz; T_{amb} = 25 °C.

Fig.15 Feedback capacitance as a function of gate-source voltage; typical values.



V_{DS} = 10 V; T_{amb} = 25 °C.
(1) BFR31; I_D = 1 mA.
(2) BFR30; I_D = 4 mA.

Fig.16 Equivalent noise voltage source as a function of frequency; typical values.

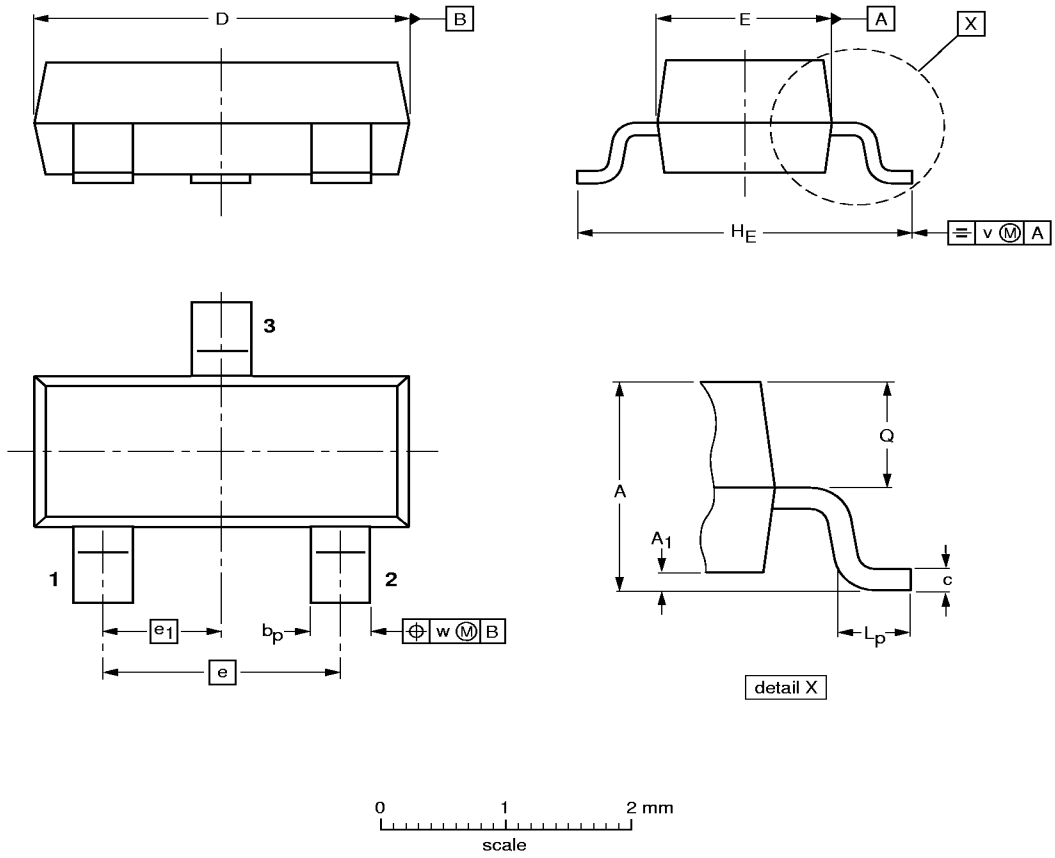


V_{DS} = 10 V; T_{amb} = 25 °C.
(1) BFR31; I_D = 1 mA.
(2) BFR30; I_D = 4 mA.

Fig.17 Equivalent noise current source as a function of frequency; typical values.

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads **SOT23**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max.	b_p	c	D	E	e	e_1	H_E	L_p	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	EIAJ			
SOT23						97-02-28