DATA SHEET

BFR30; BFR31
N-channel field-effect transistors

Product specification
Supersedes data of April 1991
File under Discrete Semiconductors, SC07

1997 Dec 05

Philips
Semiconductors

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N-channel field-effect transistors BFR30; BFR31

DESCRIPTION

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

APPLICATIONS

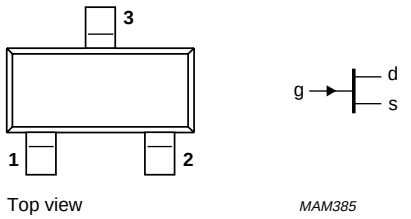
- Low level general purpose amplifiers in thick and thin-film circuits.

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.

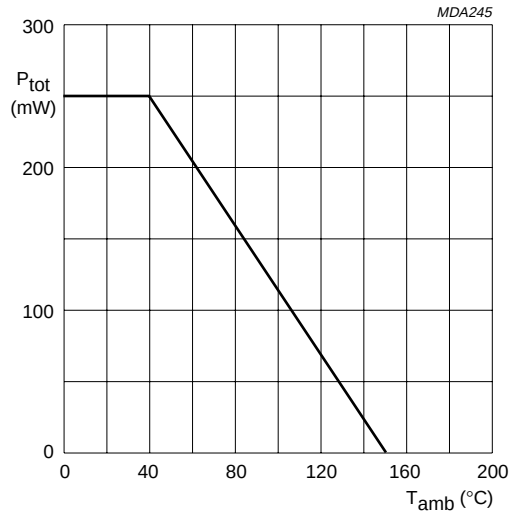
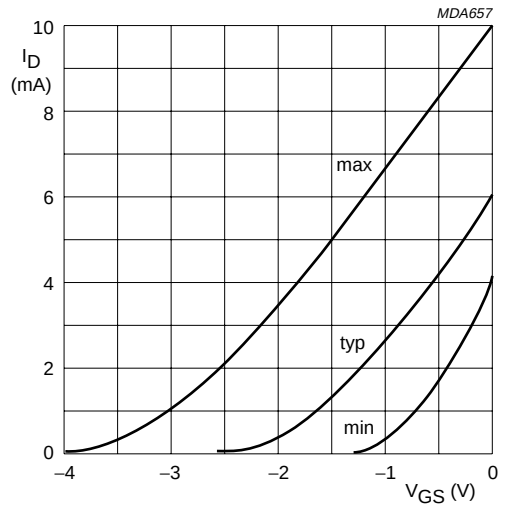


Fig.2 Power derating curve.

CHARACTERISTICS

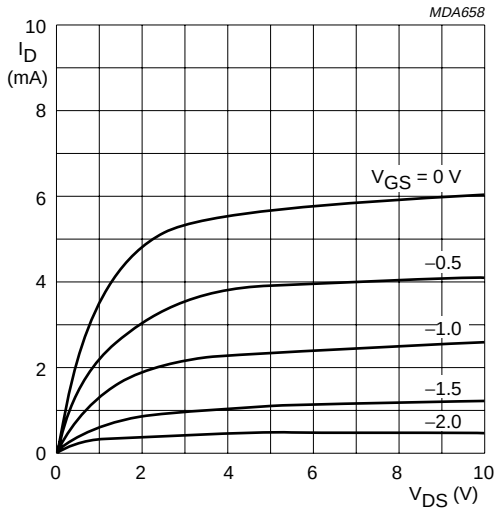
T_j = 25 °C unless otherwise specified.

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



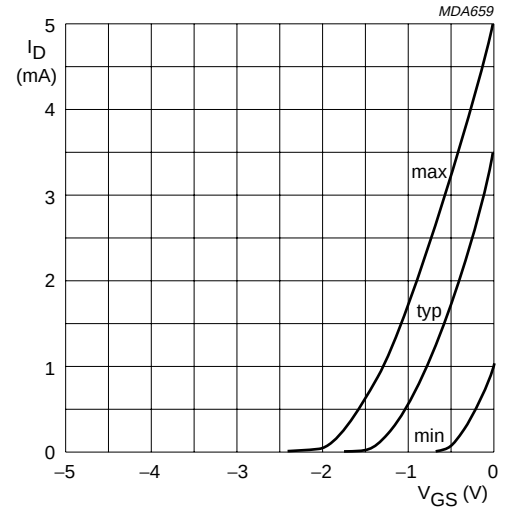
BFR30.
V_{DS} = 10 V; T_j = 25 °C.

Fig.3 Input characteristics.



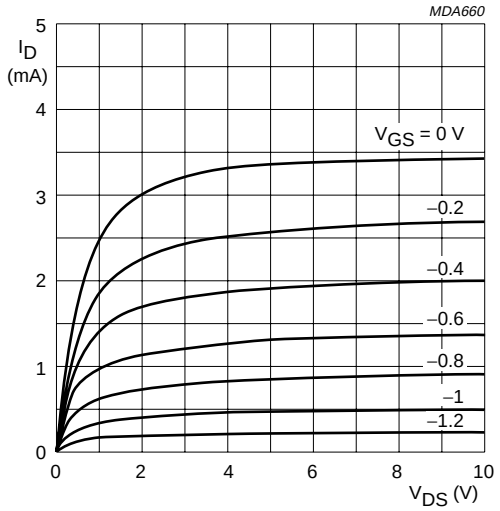
BFR30.
T_j = 25 °C.

Fig.4 Output characteristics; typical values.



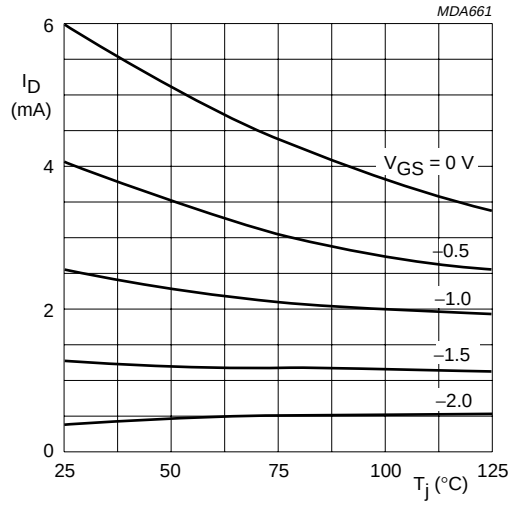
BFR31.
V_{DS} = 10 V; T_j = 25 °C.

Fig.5 Input characteristics.



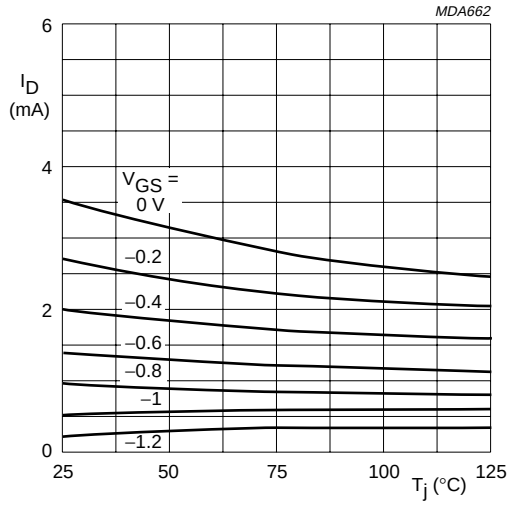
BFR31.
T_j = 25 °C.

Fig.6 Output characteristics; typical values.



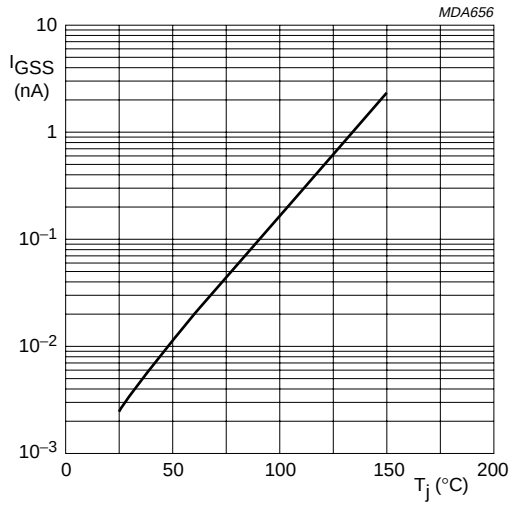
BFR30.
V_{DS} = 10 V.

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



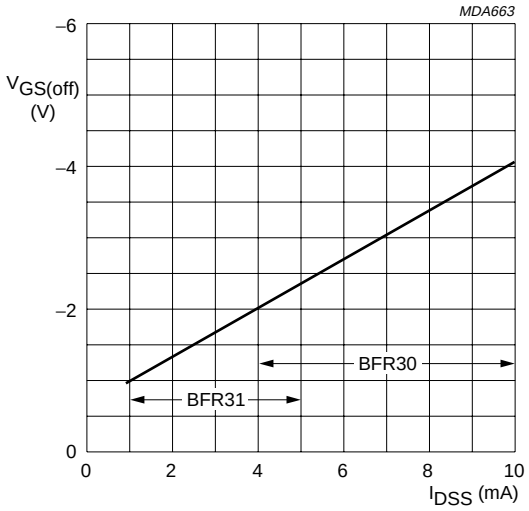
BFR31.
V_{DS} = 10 V.

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



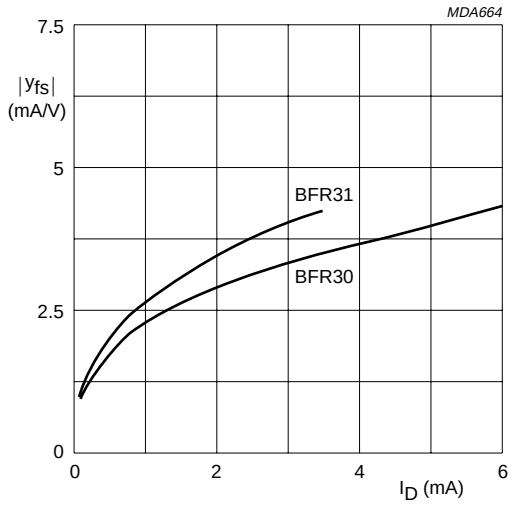
V_{GS} = −10 V; V_{DS} = 0.

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



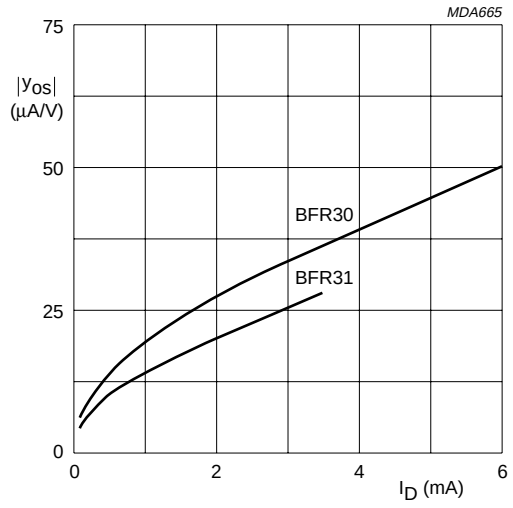
I_D = 0.5 nA; V_{DS} = 10 V; V_{GS} = 0; T_j = 25 °C.

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



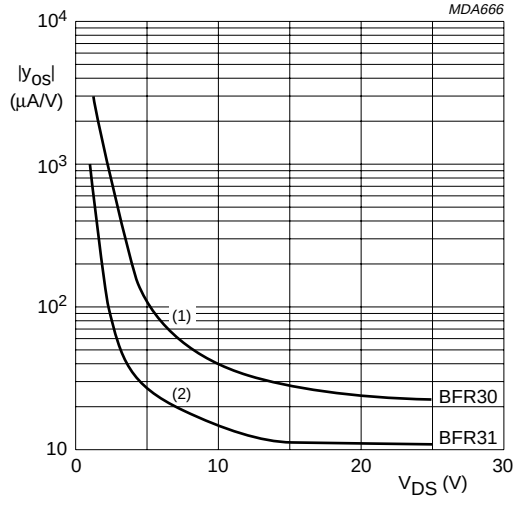
V_{DS} = 10 V; f = 1 kHz; T_{amb} = 25 °C.

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



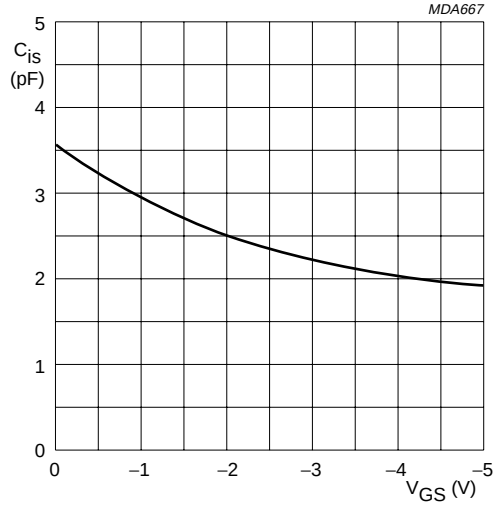
V_{DS} = 10 V; f = 1 kHz; T_{amb} = 25 °C.

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



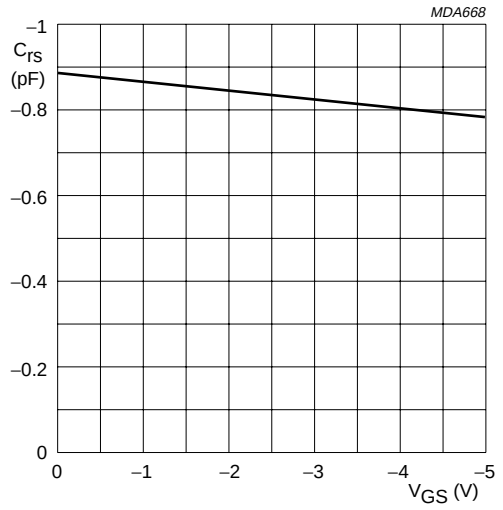
f = 1 kHz; T_{amb} = 25 °C.
(1) I_D = 4 mA. (2) I_D = 1 mA.

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



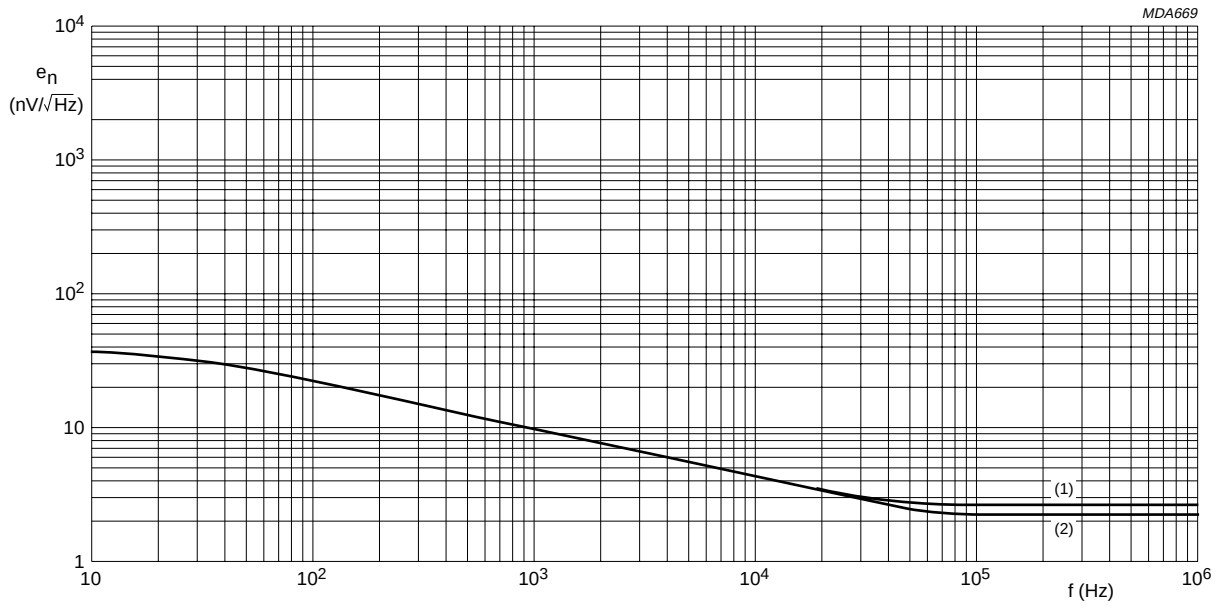
V_{DS} = 10 V; f = 1 MHz; T_{amb} = 25 °C.

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.

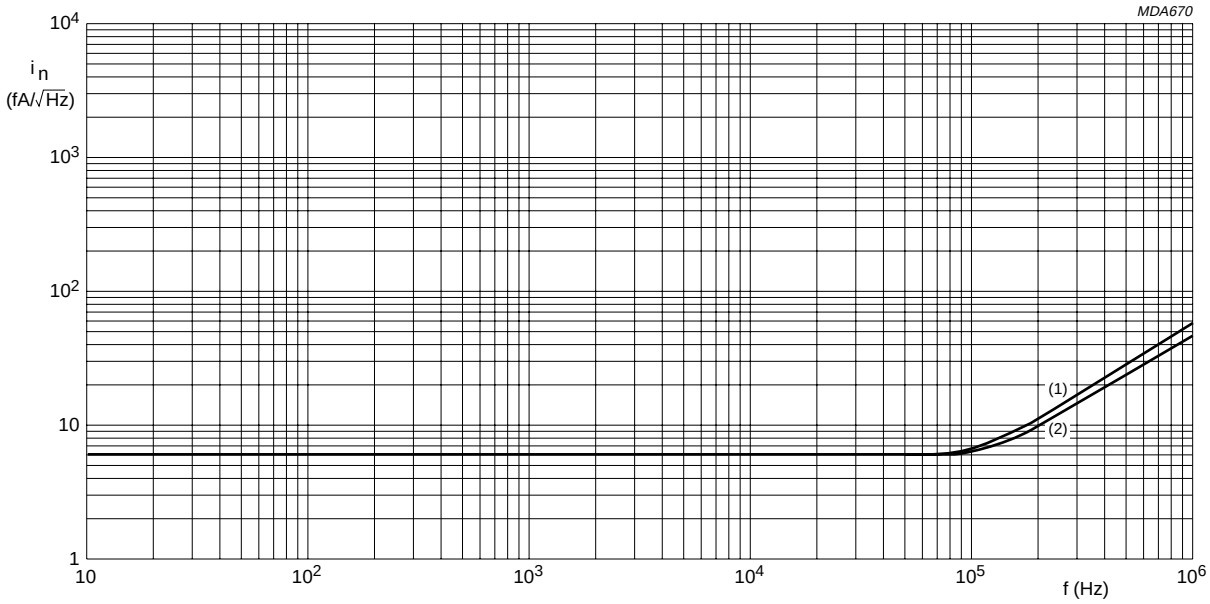


V_{DS} = 10 V; T_{amb} = 25 °C.

(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.

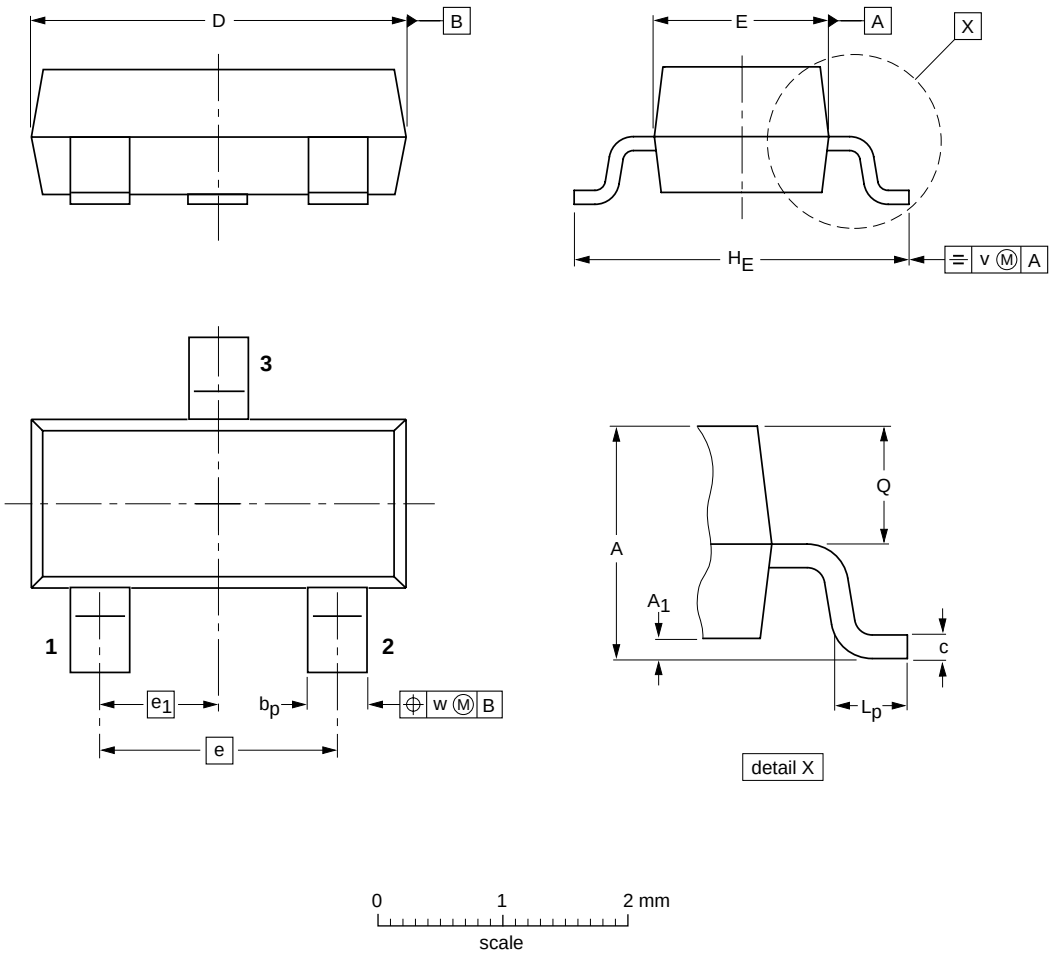
(1) BFR31; I_D = 1 mA.

(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

DEFINITIONS

Data Sheet Status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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