N-CHANNEL SILICON FIELD-EFFECT TRANSISTORS

Planar epitaxial symmetrical junction field effect transistor in a microminiature plastic envelope. It is intended for low level general purpose amplifiers in thick and thin-film circuits.

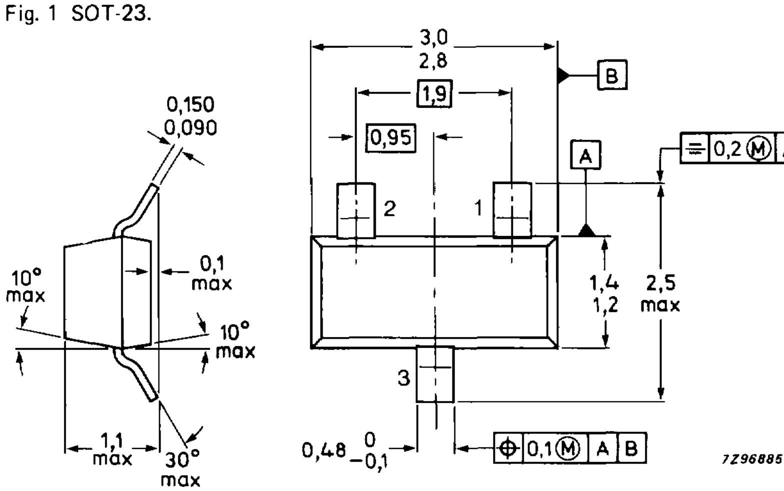
QUICK REFERENCE DATA

Drain-source voltage	$\pm V_{DS}$	max.	25		V
Gate-source voltage (open drain)	$-V_{GSO}$	max.	25		V
Total power dissipation up to T_{amb} = 40 °C	P_{tot}	max.	250		mW
			BFR30	BFR31	
Drain current		min.	4	1	mA
V_{DS} = 10 V; V_{GS} = 0	I_{DSS}	max.	10	5	mA
Transfer admittance (common source)		min.	1.0	1.5	mS
I_D = 1 mA; V_{DS} = 10 V; f = 1 kHz	$\lvert y_{fs} \rvert$	max.	4.0	4.5	mS

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-23.



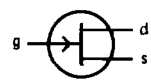
TOP VIEW

Marking code

BFR30 = M1p
BFR31 = M2p

Pinning

1 = drain
2 = source
3 = gate



Note: Drain and source are interchangeable.

See also *Soldering recommendations.*

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Drain-source voltage	$\pm V_{DS}$	max.	25	V
Drain-gate voltage (open source)	V_{DGO}	max.	25	V
Gate-source voltage (open drain)	$-V_{GSO}$	max.	25	V
Drain current	I_D	max.	10	mA
Gate current	I_G	max.	5	mA
Total power dissipation up to T_{amb} = 40 °C*	P_{tot}	max.	250	mW
Storage temperature range	T_{stg}		−65 to + 150	°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

From junction to ambient*	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BFR30	BFR31	
Gate cut-off current $-V_{GS}$ = 10 V; V_{DS} = 0	$-I_{GSS}$	max.	0.2	0.2	nA
Drain current V_{DS} = 10 V; V_{GS} = 0	I_{DSS}	min. max.	4 10	1 5	mA mA
Gate-source voltage I_D = 1 mA; V_{DS} = 10 V	$-V_{GS}$	min. max.	0.7 3.0	0 1.3	V V
I_D = 50 μA; V_{DS} = 10 V	$-V_{GS}$	max.	4.0	2.0	V
Gate-source cut-off voltage I_D = 0,5 nA; V_{DS} = 10 V	$-V_{(P)GS}$	max.	5	2.5	V
y parameters					
Transfer admittance at f = 1 kHz; T_{amb} = 25 °C I_D = 1 mA; V_{DS} = 10 V	$\|y_{fs}\|$	min. max.	1.0 4.0	1.5 4.5	mS mS
I_D = 200 μA; V_{DS} = 10 V	$\|y_{fs}\|$	min.	0.5	0.75	mS
Output admittance at f = 1 kHz I_D = 1 mA; V_{DS} = 10 V	$\|y_{os}\|$	max.	40	25	μS
I_D = 200 μA; V_{DS} = 10 V	$\|y_{os}\|$	max.	20	15	μS

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0.7 mm.

y parameters (continued)

			BFR30	BFR31	
Input capacitance at f = 1 MHz					
I_D = 1 mA; V_{DS} = 10 V	C_{is}	max.	4	4	pF
I_D = 200 μA; V_{DS} = 10 V	C_{is}	max.	4	4	pF
Feedback capacitance at f = 1 MHz; T_{amb} = 25 ^oC					
I_D = 1 mA; V_{DS} = 10 V	C_{rs}	max.	1.5	1.5	pF
I_D = 200 μA; V_{DS} = 10 V	C_{rs}	max.	1.5	1.5	pF
Equivalent noise voltage					
I_D = 200 μA; V_{DS} = 10 V B = 0.6 to 100 Hz	V_n	max.	0.5	0.5	μV

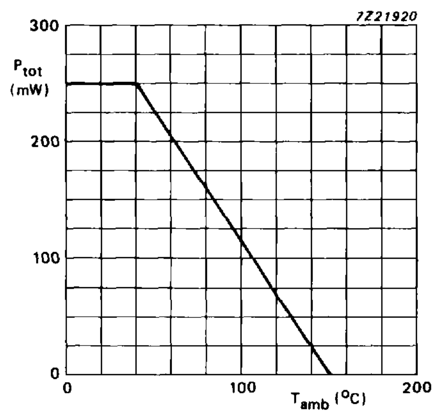


Fig.2 Power derating curve.

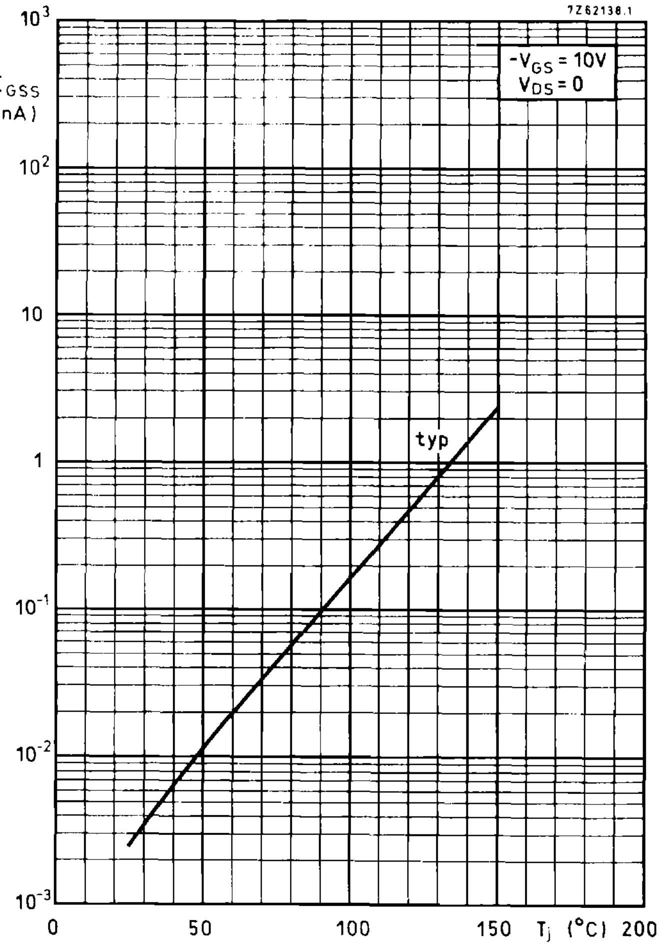

7Z62138.1
-V_{GS} = 10V
V_{DS} = 0
I_{GSS} (nA)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
typ
0
50
100
150
T_j (°C)
200

Fig.3.

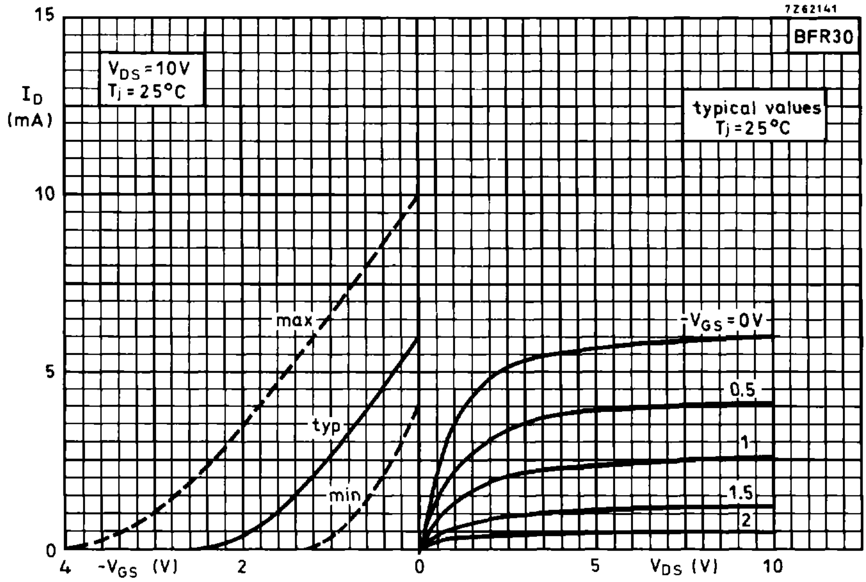

7Z62141
BFR30
V_{DS} = 10 V
T_j = 25 °C
I_D (mA)
typical values
T_j = 25 °C
max
typ
min
$-V_{GS}$ = 0 V
0.5
1
1.5
2
15
10
5
0
4
$-V_{GS}$ (V)
2
0
5
V_{DS} (V)
10

Fig.4.

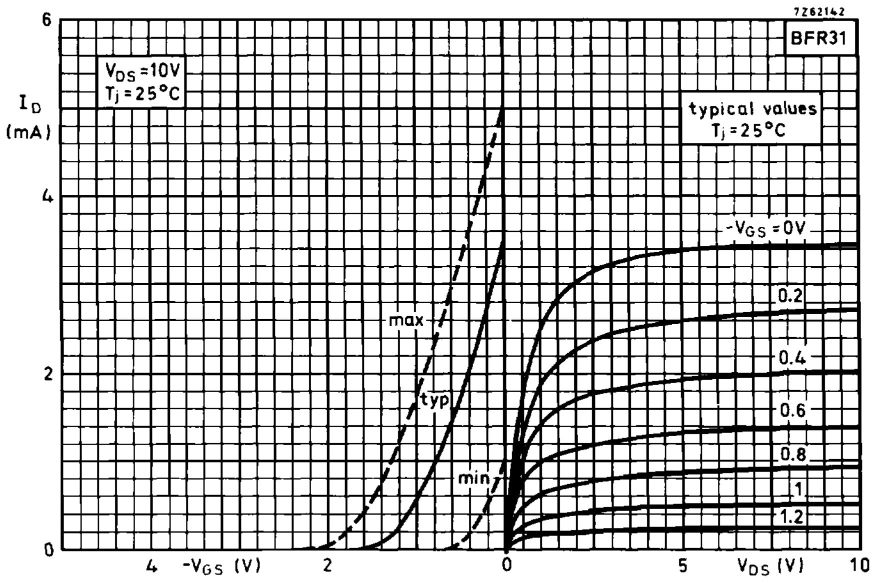

7Z62142
BFR31
V_{DS} = 10 V
T_j = 25 °C
I_D (mA)
typical values
T_j = 25 °C
max
typ
min
$-V_{GS}$ = 0 V
0.2
0.4
0.6
0.8
1
1.2
6
4
2
0
4
$-V_{GS}$ (V)
2
0
5
V_{DS} (V)
10

Fig.5.

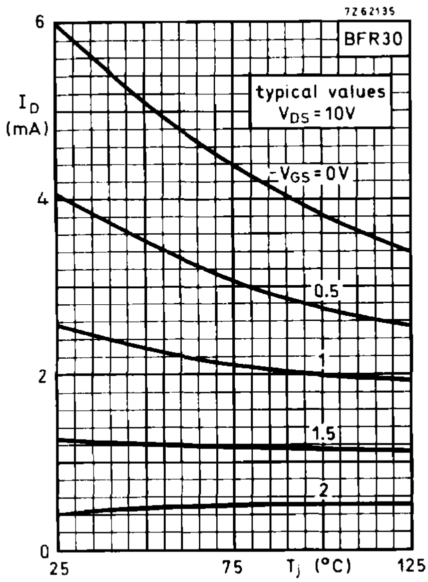


Fig.6.

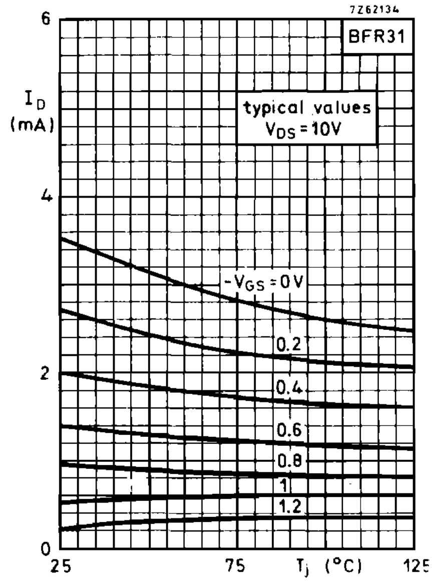


Fig.7.

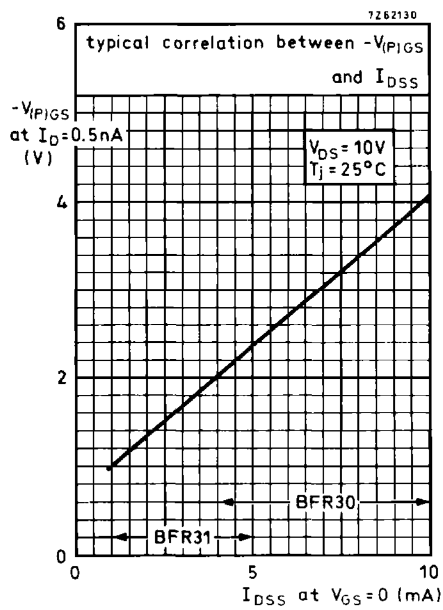


Fig.8.

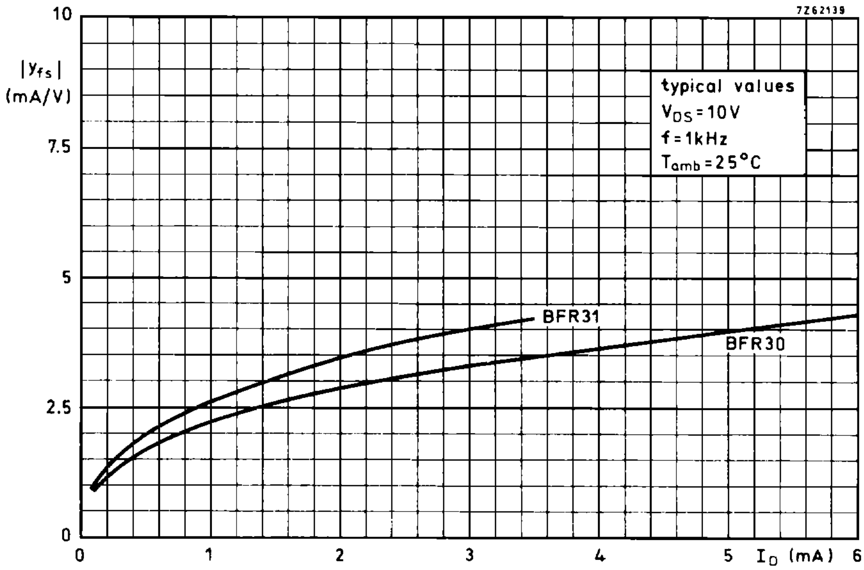

7Z62139
10
|yfs|
(mA/V)
7.5
5
2.5
0
0
1
2
3
4
5
ID (mA)
6
typical values
VDS = 10 V
f = 1 kHz
Tamb = 25 °C
BFR31
BFR30

Fig.9.

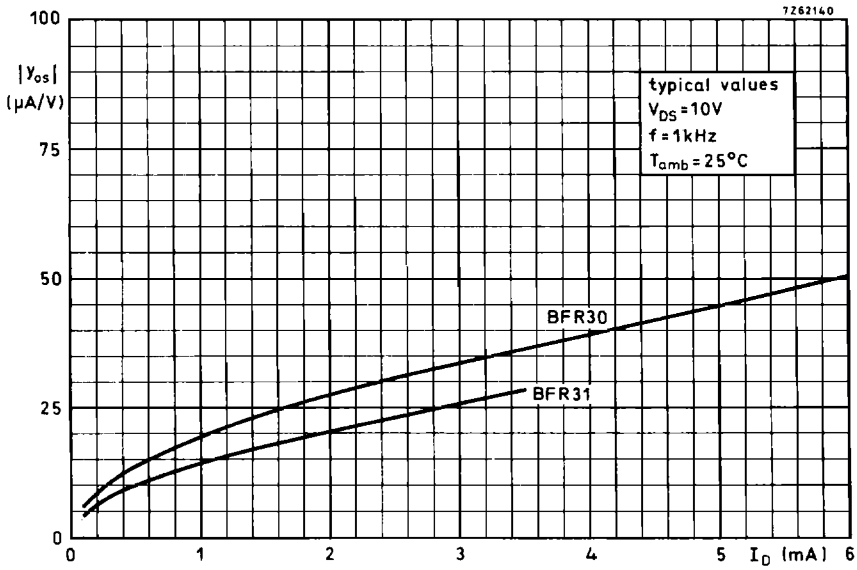

7Z62140
100
|yos|
(μA/V)
75
50
25
0
0
1
2
3
4
5
ID (mA)
6
typical values
VDS = 10 V
f = 1 kHz
Tamb = 25 °C
BFR30
BFR31

Fig.10.

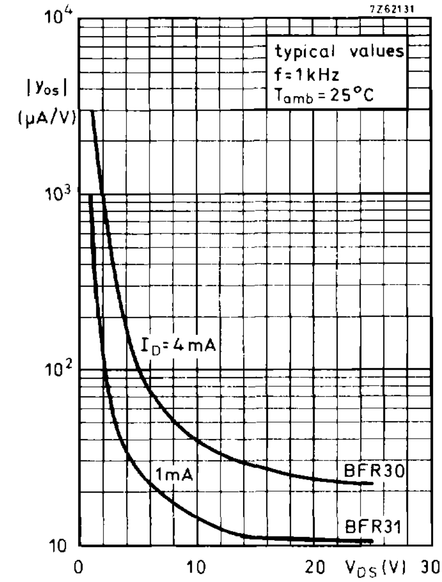


Fig.11.

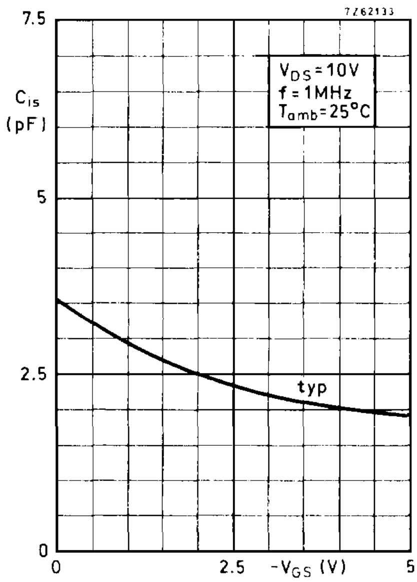


Fig.12.

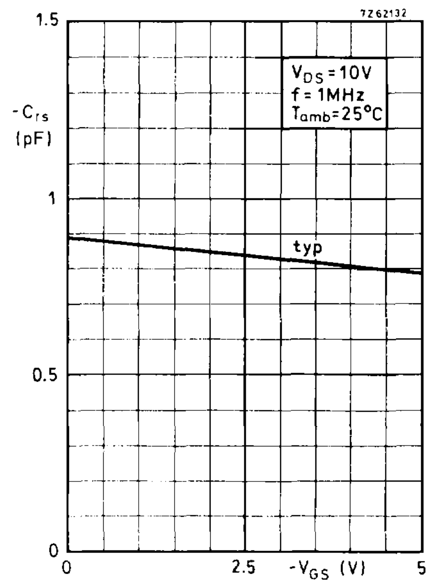


Fig.13.

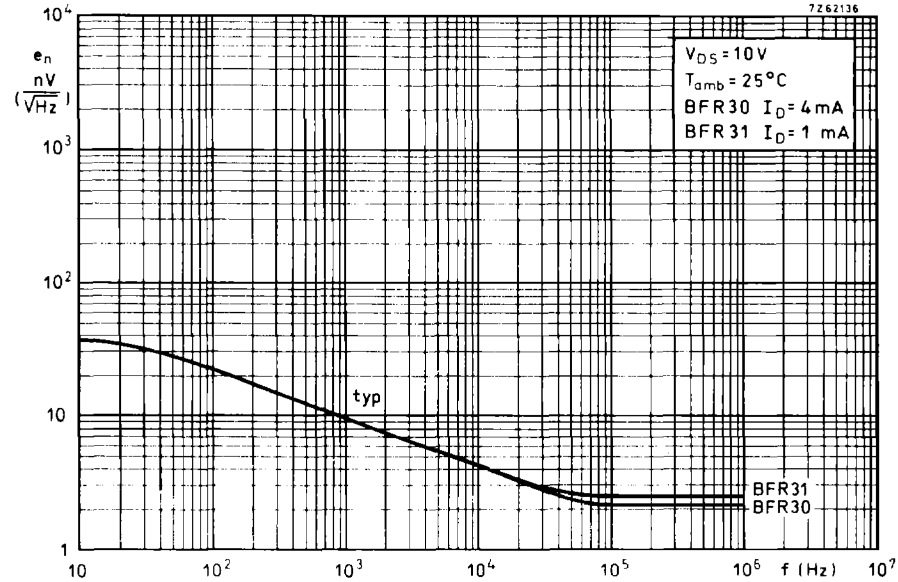

7Z62136
e_n
(nV/√Hz)
V_{DS} = 10 V
T_{amb} = 25 °C
BFR30 I_D = 4 mA
BFR31 I_D = 1 mA
typ
BFR31
BFR30
f (Hz)
1
10
10^2
10^3
10^4
10^5
10^6
10^7

Fig. 14.

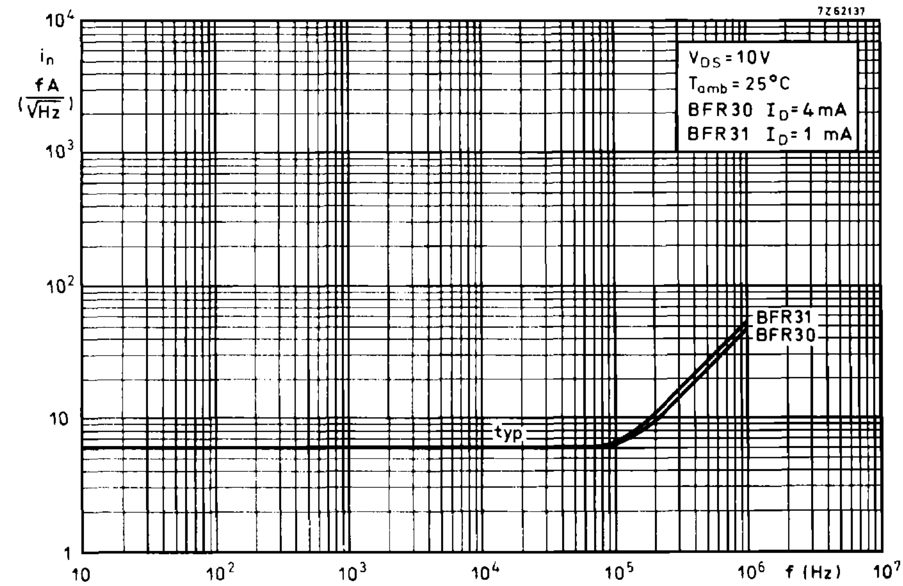

7Z62137
i_n
(fA/√Hz)
V_{DS} = 10 V
T_{amb} = 25 °C
BFR30 I_D = 4 mA
BFR31 I_D = 1 mA
typ
BFR31
BFR30
f (Hz)
1
10
10^2
10^3
10^4
10^5
10^6
10^7

Fig. 15.