N-CHANNEL SILICON FIELD EFFECT TRANSISTORS

BFW10 BFW11

N-Channel depletion mode silicon epitaxial planar junction field effect transistors designed for use in wide-band amplifiers (0 to 300MHz). Their very low noise figure at low frequencies makes them suitable for differential amplifiers, electromedical and nuclear detector pre-amplifiers. They are in TO-72 encapsulation with a shield lead connected to case.

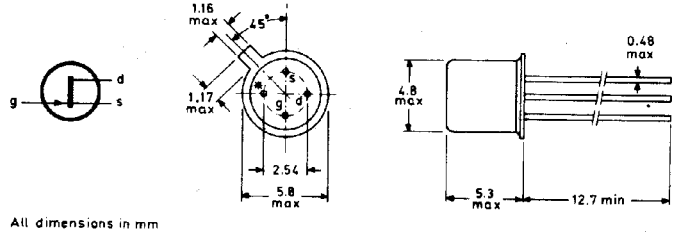
QUICK REFERENCE DATA

$\pm V_{DS}$ max.	30		V
$-V_{GSO}$ max. (open drain)	30		V
P_{tot} max. ($T_{amb} \leq 25^{\circ}C$)	300		mW
	BFW10	BFW11	
I_{DSS} ($V_{DS} = 15V$, $V_{GS} = 0$) min.	8.0	4.0	mA
max.	20	10	mA
$-V_{(P)GS}$ max. ($I_D = 0.5nA$, $V_{DS} = 15V$)	8.0	6.0	V
$-C_{rs}$ max. ($f = 1.0MHz$, $V_{DS} = 15V$, $V_{GS} = 0$)	0.80	0.80	pF
$\lvert y_{fs} \rvert$ min. ($f = 200MHz$, $V_{DS} = 15V$, $V_{GS} = 0$)	3.2	3.2	mA/V
N max. ($f = 100MHz$, $V_{DS} = 15V$, $V_{GS} = 0$, $R_G = 1k\Omega$)	2.5	2.5	dB
$V_n/\sqrt{B}$ max. ($f = 10Hz$, $B = 5.0Hz$)	75	75	$nV/\sqrt{Hz}$

Unless otherwise stated, data are applicable to both types

OUTLINE AND DIMENSIONS

Conforms to J.E.D.E.C. TO-72
B.S. 3934 SO-12A/SB4-3



All dimensions in mm

D2967

Insulated electrodes \ *Shield lead (connected to case)

Accessories available: 56246, 56263

RATINGS

Limiting values of operation according to the absolute maximum system.

Electrical

$\pm V_{DS}$ max.	Drain-source voltage ($V_{GS} = 0$)	30	V
V_{DGO} max.	Drain-gate voltage (open source)	30	V
$-V_{GSO}$ max.	Gate-source voltage (open drain)	30	V
I_D max.	Drain current	20	mA
I_G max.	Gate current	10	mA
P_{tot} max.	Power dissipation ($T_{amb} \leq 25^oC$)	300	mW

Temperature

T_{stg} min.	-65	^oC
T_{stg} max.	200	^oC
T_j max.	200	^oC

THERMAL CHARACTERISTIC

$R_{th(j-amb)}$	0.59	$^oC/mW$

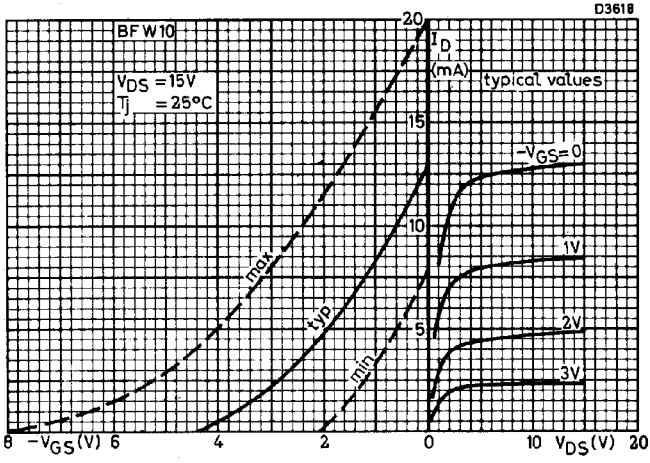
ELECTRICAL CHARACTERISTICS ($T_j = 25^oC$ unless otherwise stated)

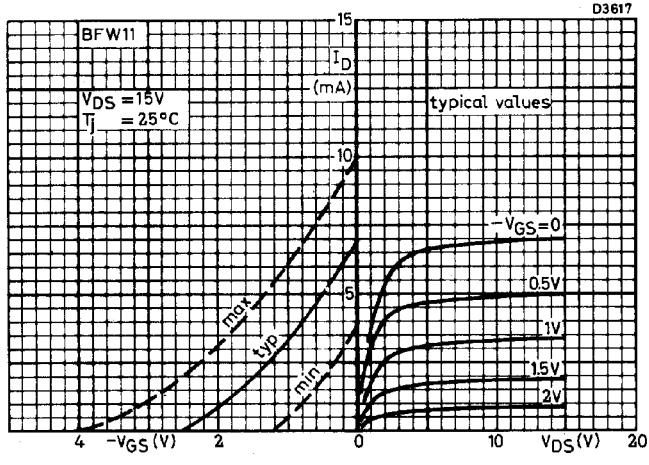
			BFW10	BFW11	
$-I_{GSS}$	Gate cut-off current $-V_{GS} = 20V$, $V_{DS} = 0$	max.	0.1	0.1	nA
	$-V_{GS} = 20V$, $V_{DS} = 0$, $T_j = 150^oC$	max.	0.5	0.5	μA
I_{DSS}	*Drain current $V_{DS} = 15V$, $V_{GS} = 0$	min. max.	8.0 20	4.0 10	mA mA
$-V_{GS}$	Gate-source voltage $I_D = 400\mu A$, $V_{DS} = 15V$	min max.	2.0 7.5	- -	V V
	$I_D = 50\mu A$, $V_{DS} = 15V$	min. max.	- -	1.25 4.0	V V

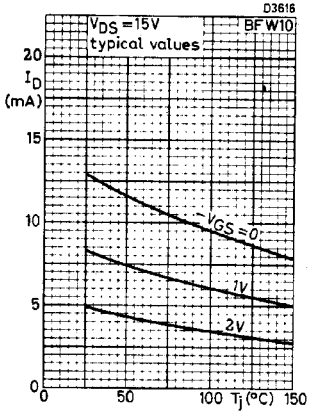
*Measured under pulsed conditions.

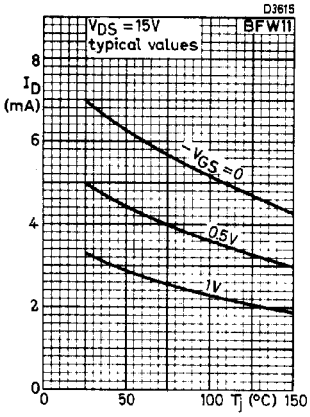
ELECTRICAL CHARACTERISTICS (contd.)

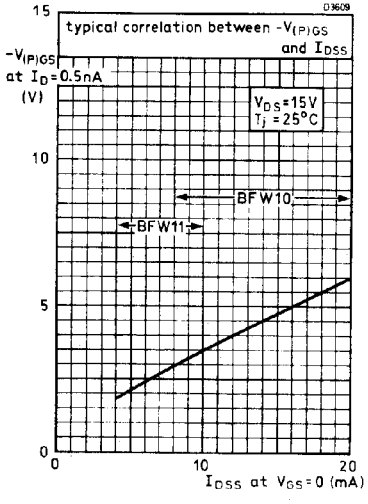
			BFW10	BFW11	
$-V_{(P)GS}$	Gate-source cut-off voltage $I_D = 0.5nA$, $V_{DS} = 15V$	max.	8.0	6.0	V
	y-parameters $V_{DS} = 15V$, $V_{GS} = 0$, $T_{amb} = 25^oC$				
	f = 1.0kHz				
$\lvert y_{fs} \rvert$	Transfer admittance	min.	3.5	3.0	mA/V
		max.	6.5	6.5	mA/V
$\lvert y_{os} \rvert$	Output admittance	max.	85	50	μA/V
	f = 1.0MHz				
C_{is}	Input capacitance	typ.	4.0	4.0	pF
		max.	5.0	5.0	pF
$-C_{rs}$	Feedback capacitance	typ.	0.6	0.6	pF
		max.	0.80	0.80	pF
	f = 200MHz				
$\lvert y_{fs} \rvert$	Transfer admittance	min.	3.2	3.2	mA/V
g_{is}	Input conductance	max.	800	800	μA/V
g_{os}	Output conductance	max.	200	100	μA/V
N	Noise figure, $T_{amb} = 25^oC$ f = 100MHz, $R_G = 1k\Omega$ $V_{DS} = 15V$, $V_{GS} = 0$, (input tuned to minimum noise)	max.	2.5	2.5	dB
$V_n/\sqrt{B}$	Equivalent noise voltage $V_{DS} = 15V$, $V_{GS} = 0$, f = 10Hz, $T_{amb} = 25^oC$	max.	75	75	$nV/\sqrt{Hz}$

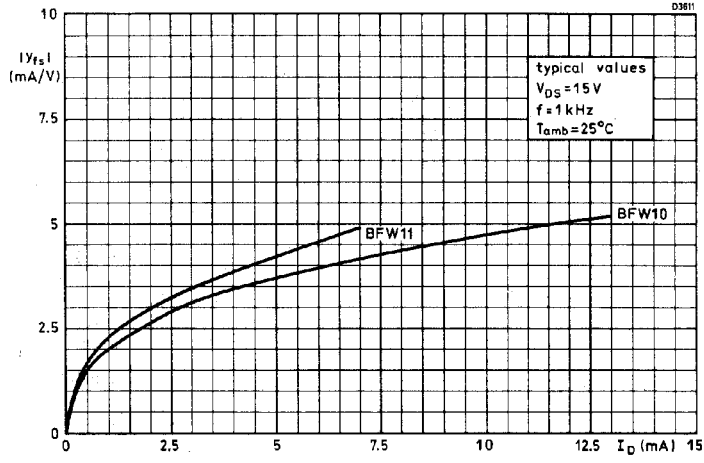

D3618
BFW10
V_{DS} = 15V
T_j = 25°C
I_D (mA)
typical values
20
15
10
5
-V_{GS}=0
1V
2V
3V
max
typ
min
8
-V_{GS}(V)
6
4
2
0
10
V_{DS}(V)
20

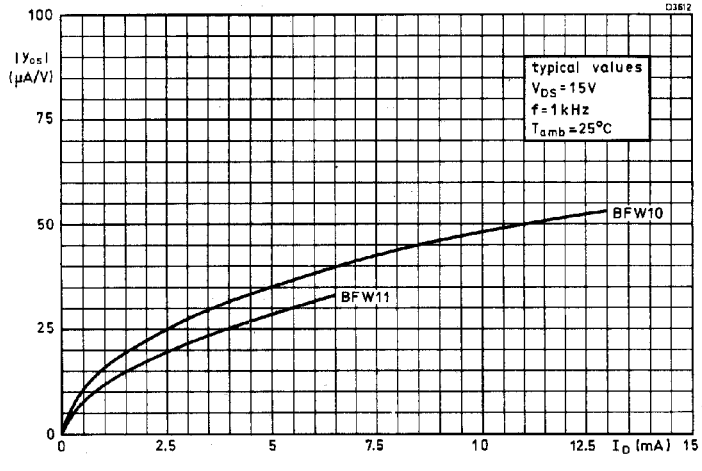

D3617
BFW11
V_{DS} = 15V
T_j = 25°C
I_D (mA)
typical values
15
10
5
-V_{GS}=0
0.5V
1V
1.5V
2V
max
typ
min
4
-V_{GS}(V)
2
0
10
V_{DS}(V)
20

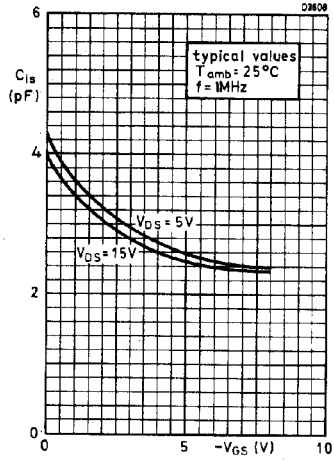

D3616
V_{DS} = 15V
typical values
BFW10
I_D (mA)
20
15
10
5
0
$-V_{GS}$ = 0
1V
2V
0
50
100
T_j (°C)
150

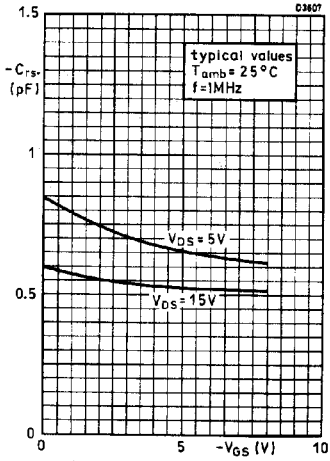

D3615
V_{DS} = 15V
typical values
BFW11
I_D (mA)
8
6
4
2
0
$-V_{GS}$ = 0
0.5V
1V
0
50
100
T_j (°C)
150

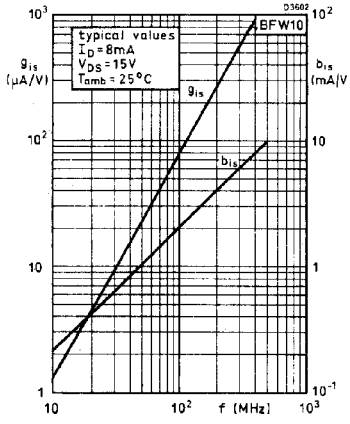

D3609
typical correlation between $-V_{(P)GS}$ and I_{DSS}
$-V_{(P)GS}$ at I_D = 0.5nA (V)
V_{DS} = 15V
T_j = 25°C
BFW10
BFW11
15
10
5
0
0
10
20
I_{DSS} at V_{GS} = 0 (mA)

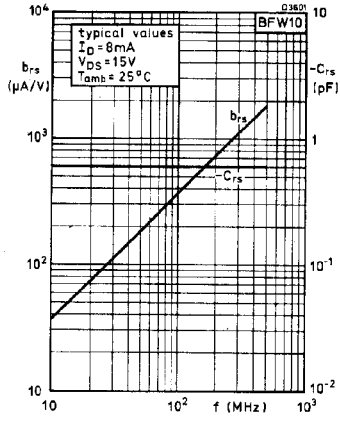

D3611
10
$|Y_{fs}|$ (mA/V)
7.5
5
2.5
0
typical values
V_{DS} = 15 V
f = 1 kHz
T_{amb} = 25°C
BFW11
BFW10
0
2.5
5
7.5
10
12.5
I_D (mA)
15

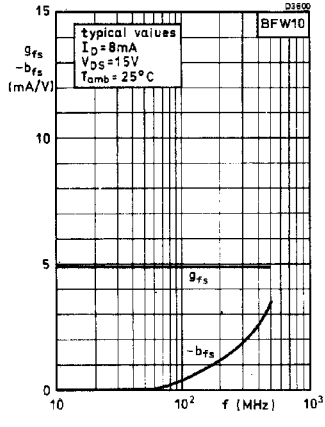

D3612
100
$|Y_{os}|$ (μA/V)
75
50
25
0
typical values
V_{DS} = 15 V
f = 1 kHz
T_{amb} = 25°C
BFW10
BFW11
0
2.5
5
7.5
10
12.5
I_D (mA)
15

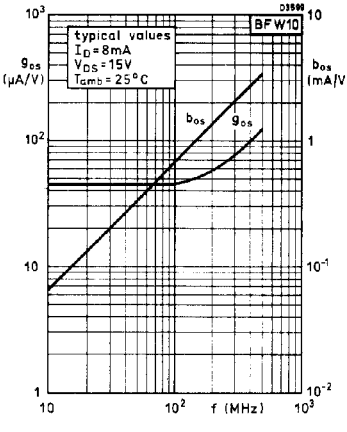

D3606
typical values
T_{amb} = 25 °C
f = 1MHz
C_{is} (pF)
6
4
2
0
V_{DS} = 5V
V_{DS} = 15V
0
5
10
$-V_{GS}$ (V)

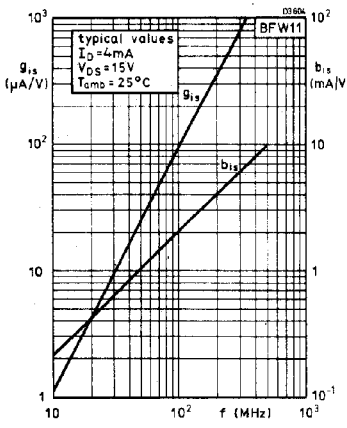

D3607
typical values
T_{amb} = 25 °C
f = 1MHz
$-C_{rs}$ (pF)
1.5
1
0.5
0
V_{DS} = 5V
V_{DS} = 15V
0
5
10
$-V_{GS}$ (V)

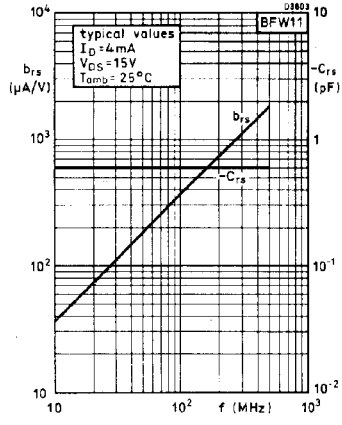

D3602
BFW10
typical values
I_D = 8mA
V_{DS} = 15V
T_{amb} = 25°C
g_{is} (μA/V)
b_{is} (mA/V)
g_{is}
b_{is}
f (MHz)

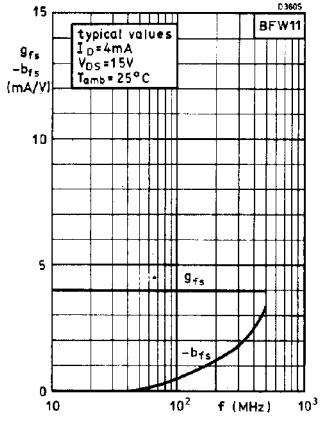

D3601
BFW10
typical values
I_D = 8mA
V_{DS} = 15V
T_{amb} = 25°C
b_{rs} (μA/V)
$-C_{rs}$ (pF)
b_{rs}
$-C_{rs}$
f (MHz)

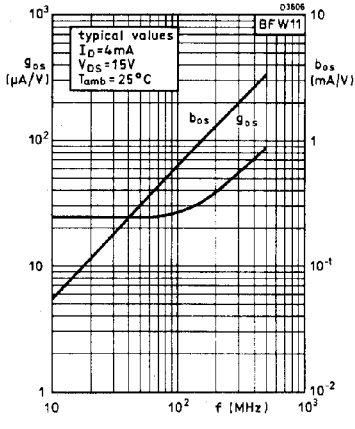

D3600
BFW10
typical values
I_D = 8mA
V_{DS} = 15V
T_{amb} = 25°C
g_{fs} $-b_{fs}$ (mA/V)
g_{fs}
$-b_{fs}$
f (MHz)

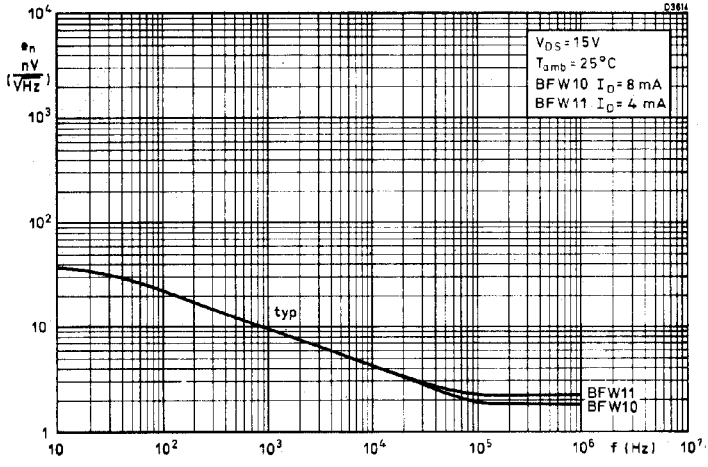

D3599
BFW10
typical values
I_D = 8mA
V_{DS} = 15V
T_{amb} = 25°C
g_{os} (μA/V)
b_{os} (mA/V)
b_{os}
g_{os}
f (MHz)

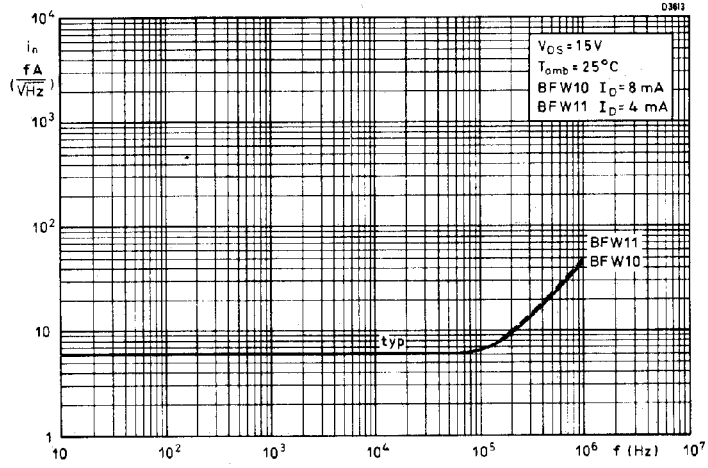

D3604
BFW11
typical values
I_D=4mA
V_{DS}=15V
T_{amb}=25°C
g_{is} (μA/V)
b_{is} (mA/V)
g_{is}
b_{is}
f (MHz)

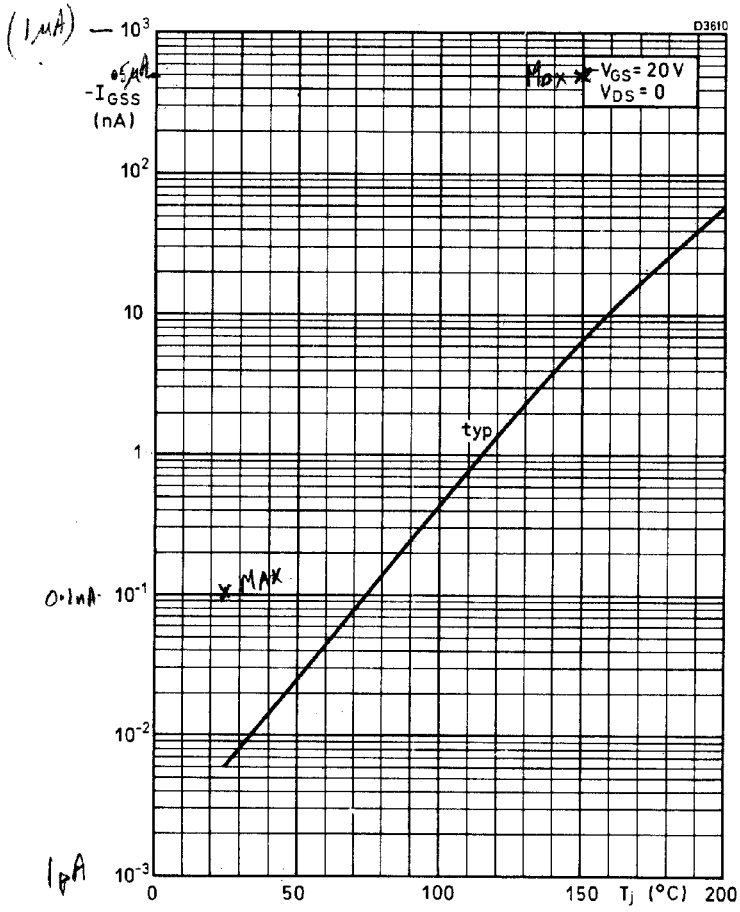

D3603
BFW11
typical values
I_D=4mA
V_{DS}=15V
T_{amb}=25°C
b_{rs} (μA/V)
$-C_{rs}$ (pF)
b_{rs}
$-C_{rs}$
f (MHz)


D3605
BFW11
typical values
I_D=4mA
V_{DS}=15V
T_{amb}=25°C
g_{fs}
$-b_{fs}$ (mA/V)
g_{fs}
$-b_{fs}$
f (MHz)


D3606
BFW11
typical values
I_D=4mA
V_{DS}=15V
T_{amb}=25°C
g_{os} (μA/V)
b_{os} (mA/V)
b_{os}
g_{os}
f (MHz)


D3614
e_n
nV
$(\frac{nV}{\sqrt{Hz}})$
10^4
10^3
10^2
10
1
V_{DS} = 15 V
T_{amb} = 25 °C
BFW10 I_D = 8 mA
BFW11 I_D = 4 mA
typ
BFW11
BFW10
10^2
10^3
10^4
10^5
10^6
f (Hz)
10^7


D3613
i_n
fA
$(\frac{fA}{\sqrt{Hz}})$
10^4
10^3
10^2
10
1
V_{DS} = 15 V
T_{amb} = 25 °C
BFW10 I_D = 8 mA
BFW11 I_D = 4 mA
BFW11
BFW10
typ
10^2
10^3
10^4
10^5
10^6
f (Hz)
10^7


D3610
V_{GS} = 20 V
V_{DS} = 0
$-I_{GSS}$ (nA)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
typ
MAX
0
50
100
150
T_j (°C)
200