

BF1208D

Dual N-channel dual gate MOSFET

Rev. 01 — 16 May 2007 Product data sheet

1. Product profile

1.1 General description

The BF1208D is a combination of two dual gate MOSFET amplifiers with shared source and gate2 leads and an integrated switch. The integrated switch is operated by the gate1 bias of amplifier B.

The source and substrate are interconnected. Internal bias circuits enable DC stabilization and a very good cross modulation performance during Automatic Gain Control (AGC). Integrated diodes between the gates and source protect against excessive input voltage surges. The transistor has a SOT666 micro-miniature plastic package.

CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

1.2 Features

- Two low noise gain controlled amplifiers in a single package. One with a fully integrated bias and one with a partly integrated bias
- Internal switch to save external components
- Superior cross modulation performance during AGC
- High forward transfer admittance
- High forward transfer admittance to input capacitance ratio

1.3 Applications

- Gain controlled low noise amplifiers for VHF and UHF applications with 5 V supply voltage
  - digital and analog television tuners
  - professional communication equipment

NXP founded by Philips

1.4 Quick reference data

Table 1. Quick reference data

Per MOSFET unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DS}	drain-source voltage	DC		-	-	6	V
I_D	drain current	DC		-	-	30	mA
P_{tot}	total power dissipation	$T_{sp} \leq 109$ °C	[1]	-	-	180	mW
$\|y_{fs}\|$	forward transfer admittance	f = 100 MHz; T_j = 25 °C					
		amplifier A; I_D = 19 mA		26	31	41	mS
		amplifier B; I_D = 15 mA		25	30	40	mS
$C_{iss(G1)}$	input capacitance at gate1	f = 100 MHz					
		amplifier A	[2]	-	2.1	2.6	pF
		amplifier B	[2]	-	2.1	2.6	pF
C_{rss}	reverse transfer capacitance	f = 100 MHz	[2]	-	30	-	fF
NF	noise figure	$Y_S = Y_{S(opt)}$					
		amplifier A; f = 400 MHz		-	0.9	1.5	dB
		amplifier B; f = 800 MHz		-	1.4	2.0	dB
Xmod	cross modulation	input level for k = 1 %; f_w = 50 MHz; f_{unw} = 60 MHz at 40 dB AGC					
		amplifier A	[3]	102	105	-	dBµV
		amplifier B	[4]	102	105	-	dBµV
T_j	junction temperature			-	-	150	°C

[1] T_{sp} is the temperature at the soldering point of the source lead.

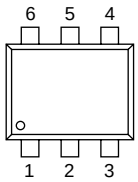
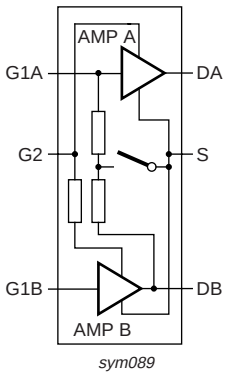
[2] Calculated from S-parameters.

[3] Measured in Figure 33 test circuit.

[4] Measured in Figure 34 test circuit.

2. Pinning information

Table 2. Discrete pinning

Pin	Description	Simplified outline	Symbol
1	gate1 (AMP A)		
2	gate2		
3	gate1 (AMP B)		
4	drain (AMP B)		
5	source		
6	drain (AMP A)		

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3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BF1208D	-	plastic surface-mounted package; 6 leads	SOT666

4. Marking

Table 4. Marking codes

Type number	Marking code
BF1208D	4A

5. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
Per MOSFET						
V_{DS}	drain-source voltage	DC		-	6	V
I_D	drain current	DC		-	30	mA
I_{G1}	gate1 current			-	±10	mA
I_{G2}	gate2 current			-	±10	mA
P_{tot}	total power dissipation	$T_{sp} \leq 109$ °C	[1]	-	180	mW
T_{stg}	storage temperature			–65	+150	°C
T_j	junction temperature			-	150	°C

[1] T_{sp} is the temperature at the soldering point of the source lead.

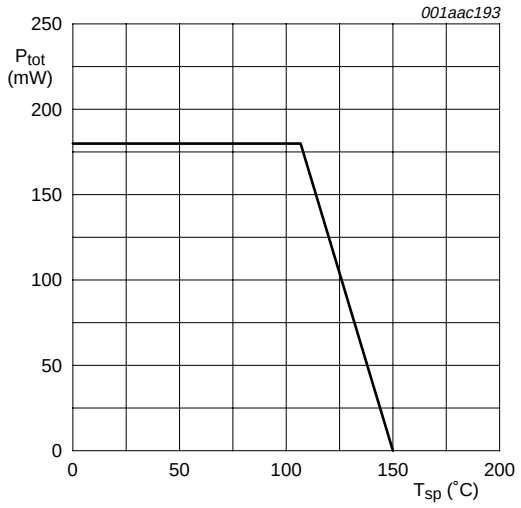


Fig 1. Power derating curve

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6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point		225	K/W

7. Static characteristics

Table 7. Static characteristics

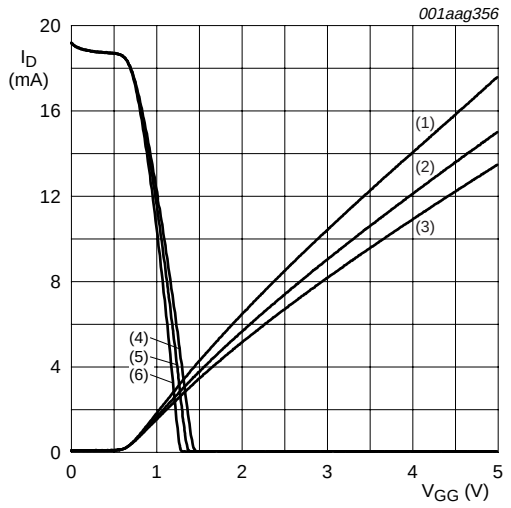
T_j = 25 °C; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per MOSFET; unless otherwise specified							
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{G1-S} = V_{G2-S} = 0 V; I_D = 10 µA					
		amplifier A		6	-	-	V
		amplifier B		6	-	-	V
$V_{(BR)G1-SS}$	gate1-source breakdown voltage	V_{G2-S} = V_{DS} = 0 V; I_{G1-S} = 10 mA		6	-	10	V
$V_{(BR)G2-SS}$	gate2-source breakdown voltage	V_{G1-S} = V_{DS} = 0 V; I_{G2-S} = 10 mA		6	-	10	V
$V_{F(S-G1)}$	forward source-gate1 voltage	V_{G2-S} = V_{DS} = 0 V; I_{S-G1} = 10 mA		0.5	-	1.5	V
$V_{F(S-G2)}$	forward source-gate2 voltage	V_{G1-S} = V_{DS} = 0 V; I_{S-G2} = 10 mA		0.5	-	1.5	V
$V_{G1-S(th)}$	gate1-source threshold voltage	V_{DS} = 5 V; V_{G2-S} = 4 V; I_D = 100 µA		0.3	-	1.0	V
$V_{G2-S(th)}$	gate2-source threshold voltage	V_{DS} = 5 V; V_{G1-S} = 5 V; I_D = 100 µA		0.4	-	1.0	V
I_{DS}	drain-source current	V_{G2-S} = 4 V; $V_{DS(B)}$ = 5 V; R_{G1} = 86 kΩ					
		amplifier A; $V_{DS(A)}$ = 5 V	[1]	14	-	24	mA
		amplifier B	[2]	10	-	20	mA
I_{G1-S}	gate1 cut-off current	V_{G2-S} = $V_{DS(A)}$ = 0 V					
		amplifier A; $V_{G1-S(A)}$ = 5 V; $I_{D(B)}$ = 0 A		-	-	50	nA
		amplifier B; $V_{G1-S(B)}$ = 5 V; $V_{DS(B)}$ = 0 V		-	-	50	nA
I_{G2-S}	gate2 cut-off current	V_{G2-S} = 4 V; $V_{G1-S(B)}$ = 0 V; $V_{G1-S(A)}$ = $V_{DS(A)}$ = $V_{DS(B)}$ = 0 V		-	-	20	nA

[1] R_{G1} connects gate1 (B) to V_{GG} = 0 V (see Figure 3).

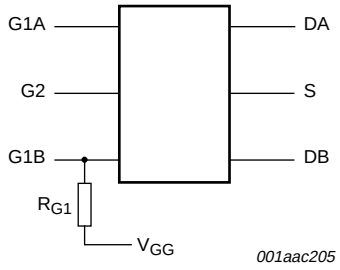
[2] R_{G1} connects gate1 (B) to V_{GG} = 5 V (see Figure 3).

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(1) $I_{D(B)}$; R_{G1} = 68 kΩ.
(2) $I_{D(B)}$; R_{G1} = 86 kΩ.
(3) $I_{D(B)}$; R_{G1} = 100 kΩ.
(4) $I_{D(A)}$; R_{G1} = 100 kΩ.
(5) $I_{D(A)}$; R_{G1} = 86 kΩ.
(6) $I_{D(A)}$; R_{G1} = 68 kΩ.

Fig 2. Drain currents of MOSFET A and B as a function of V_{GG}



V_{GG} = 5 V: amplifier A is off; amplifier B is on.
V_{GG} = 0 V: amplifier A is on; amplifier B is off.

Fig 3. Functional diagram

8. Dynamic characteristics

8.1 Dynamic characteristics for amplifier A

Table 8. Dynamic characteristics for amplifier A[1]

Common source; T_{amb} = 25 °C; V_{G2-S} = 4 V; V_{DS} = 5 V; I_D = 19 mA; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$\|y_{fs}\|$	forward transfer admittance	f = 100 MHz; T_j = 25 °C		26	31	41	mS
$C_{iss(G1)}$	input capacitance at gate1	f = 100 MHz	[2]	-	2.1	2.6	pF
$C_{iss(G2)}$	input capacitance at gate2	f = 100 MHz	[2]	-	3.4	-	pF
C_{oss}	output capacitance	f = 100 MHz	[2]	-	0.8	-	pF
C_{rss}	reverse transfer capacitance	f = 100 MHz	[2]	-	30	-	fF
G_{tr}	transducer power gain	$B_S = B_{S(opt)}$; $B_L = B_{L(opt)}$					
		f = 200 MHz; G_S = 2 mS; G_L = 0.5 mS		32	36	40	dB
		f = 400 MHz; G_S = 2 mS; G_L = 1 mS		28	32	36	dB
		f = 800 MHz; G_S = 3.3 mS; G_L = 1 mS		24	28	33	dB
NF	noise figure	f = 11 MHz; G_S = 20 mS; B_S = 0 S		-	3.0	-	dB
		f = 400 MHz; $Y_S = Y_{S(opt)}$		-	0.9	1.5	dB
		f = 800 MHz; $Y_S = Y_{S(opt)}$		-	1.1	1.7	dB

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Table 8. Dynamic characteristics for amplifier A[1] *...continued*

Common source; T_{amb} = 25 °C; V_{G2-S} = 4 V; V_{DS} = 5 V; I_D = 19 mA; unless otherwise specified.

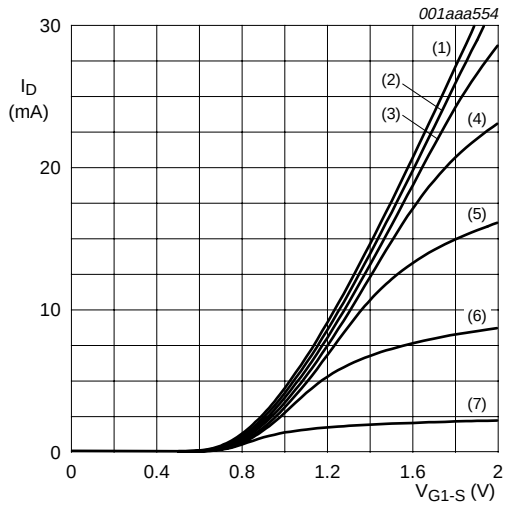
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Xmod	cross modulation	input level for k = 1 %; f_w = 50 MHz; f_{unw} = 60 MHz	[3]				
		at 0 dB AGC		90	-	-	dBµV
		at 10 dB AGC		-	90	-	dBµV
		at 20 dB AGC		-	99	-	dBµV
		at 40 dB AGC		102	105	-	dBµV

[1] For the MOSFET not in use: $V_{G1-S(B)}$ = 0 V; $V_{DS(B)}$ = 0 V.

[2] Calculated from S-parameters.

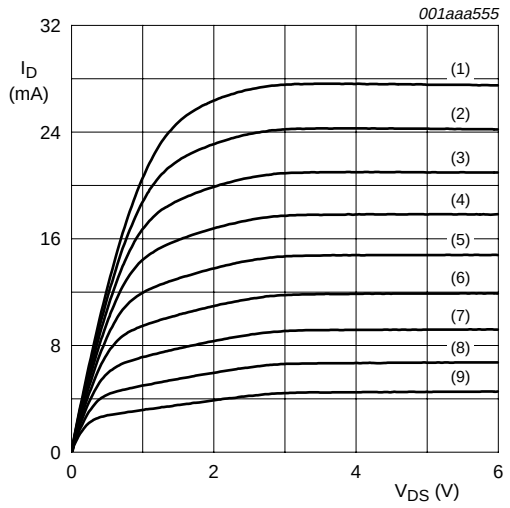
[3] Measured in Figure 33 test circuit.

8.1.1 Graphics for amplifier A



(1) V_{G2-S} = 4 V.
(2) V_{G2-S} = 3.5 V.
(3) V_{G2-S} = 3 V.
(4) V_{G2-S} = 2.5 V.
(5) V_{G2-S} = 2 V.
(6) V_{G2-S} = 1.5 V.
(7) V_{G2-S} = 1 V.
$V_{DS(A)}$ = 5 V; $V_{G1-S(B)}$ = $V_{DS(B)}$ = 0 V; T_j = 25 °C.

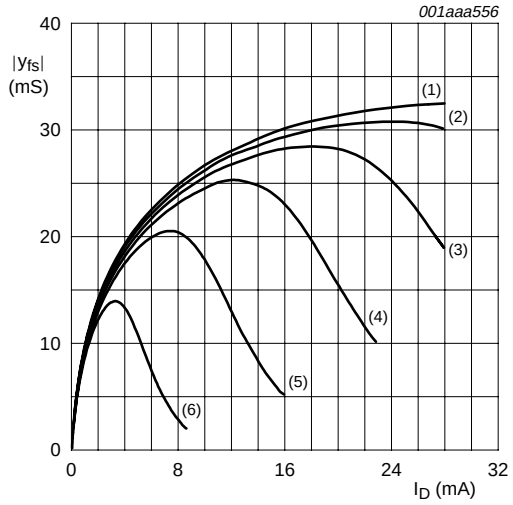
Fig 4. Amplifier A: transfer characteristics; typical values



(1) $V_{G1-S(A)}$ = 1.8 V.
(2) $V_{G1-S(A)}$ = 1.7 V.
(3) $V_{G1-S(A)}$ = 1.6 V.
(4) $V_{G1-S(A)}$ = 1.5 V.
(5) $V_{G1-S(A)}$ = 1.4 V.
(6) $V_{G1-S(A)}$ = 1.3 V.
(7) $V_{G1-S(A)}$ = 1.2 V.
(8) $V_{G1-S(A)}$ = 1.1 V.
(9) $V_{G1-S(A)}$ = 1 V.
V_{G2-S} = 4 V; $V_{G1-S(B)}$ = $V_{DS(B)}$ = 0 V; T_j = 25 °C.

Fig 5. Amplifier A: output characteristics; typical values

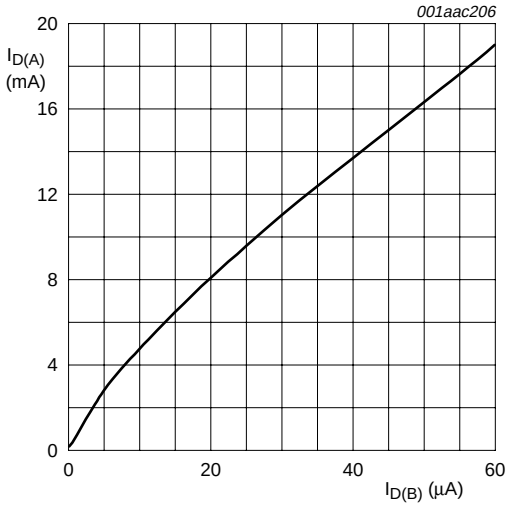
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(1) $V_{G2\text{-}S}$ = 4 V.
(2) $V_{G2\text{-}S}$ = 3.5 V.
(3) $V_{G2\text{-}S}$ = 3 V.
(4) $V_{G2\text{-}S}$ = 2.5 V.
(5) $V_{G2\text{-}S}$ = 2 V.
(6) $V_{G2\text{-}S}$ = 1.5 V.

$V_{DS(A)}$ = 5 V; $V_{G1\text{-}S(B)}$ = $V_{DS(B)}$ = 0 V; T_j = 25 °C.

Fig 6. Amplifier A: forward transfer admittance as a function of drain current; typical values

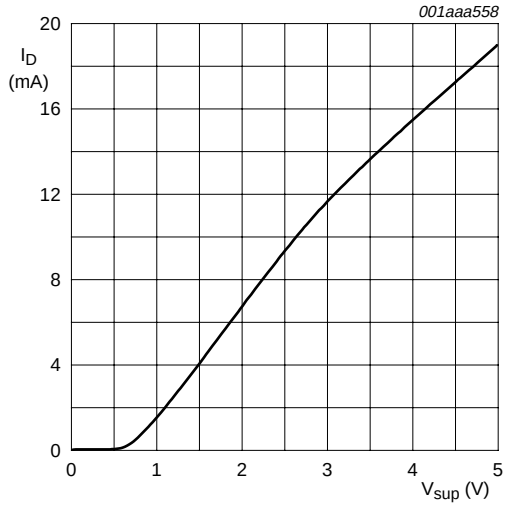


$V_{DS(A)}$ = 5 V; $V_{G2\text{-}S}$ = 4 V; $V_{DS(B)}$ = 5 V; $V_{G1\text{-}S(B)}$ = 0 V; T_j = 25 °C.

$I_{D(B)}$ = internal gate1 current = current in pin drain (AMP B) if MOSFET (B) is switched off.

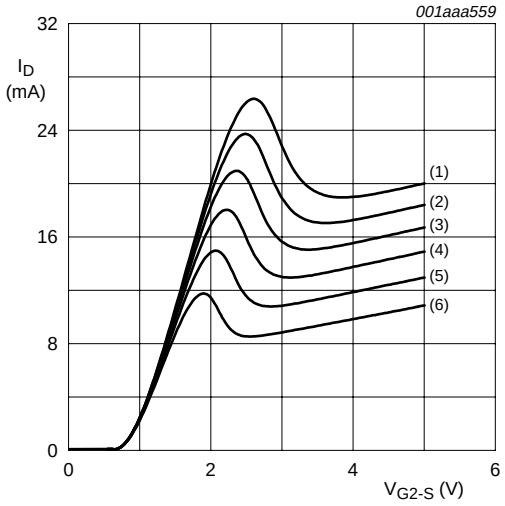
Fig 7. Amplifier A: drain current as a function of internal gate1 current; typical values

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$V_{DS(A)} = V_{DS(B)} = V_{sup}$; $V_{G2-S} = 4$ V; $T_j = 25$ °C; $R_{G1} = 86$ kΩ (connected to ground); see Figure 3.

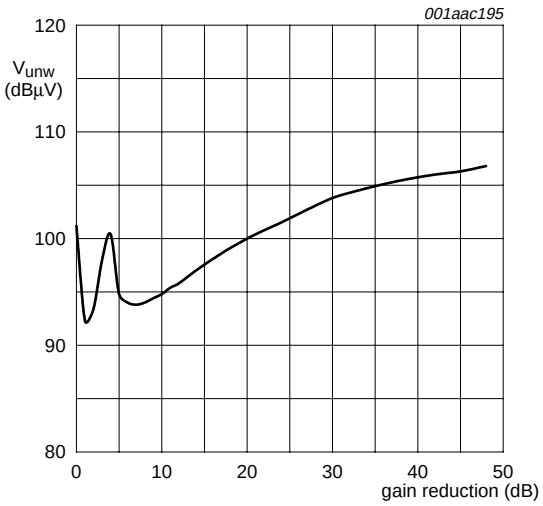
Fig 8. Amplifier A: drain current of amplifier A as a function of supply voltage of A and B amplifier; typical values



(1) $V_{DS(B)} = 5$ V.
(2) $V_{DS(B)} = 4.5$ V.
(3) $V_{DS(B)} = 4$ V.
(4) $V_{DS(B)} = 3.5$ V.
(5) $V_{DS(B)} = 3$ V.
(6) $V_{DS(B)} = 2.5$ V.

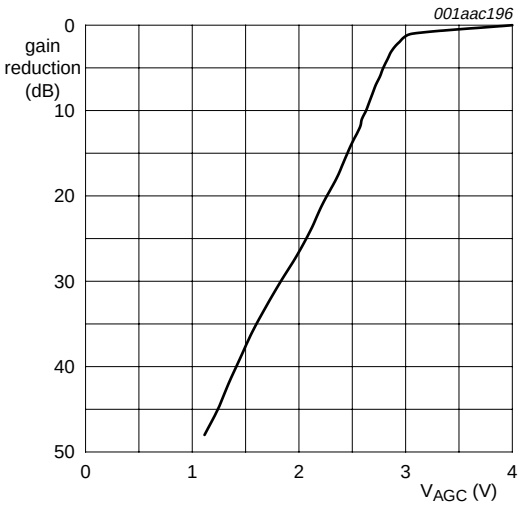
$V_{DS(A)} = 5$ V; $V_{G1-S(B)} = 0$ V; gate1 (AMP A) is open; $T_j = 25$ °C.

Fig 9. Amplifier A: drain current as a function of gate2 voltage; typical values



$V_{DS(A)} = V_{DS(B)} = 5$ V; $V_{G1-S(B)} = 0$ V; $f_w = 50$ MHz; $f_{unw} = 60$ MHz; $T_{amb} = 25$ °C; see Figure 33.

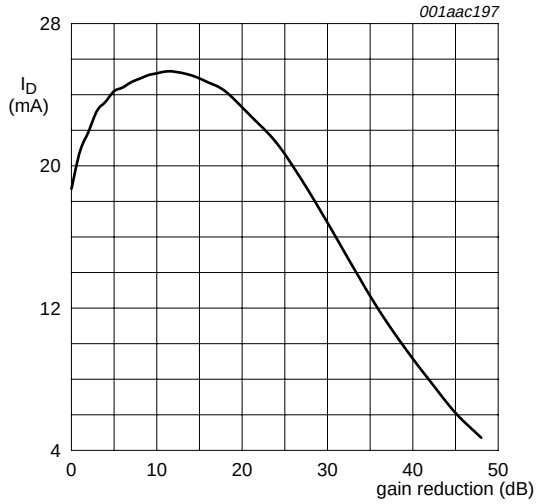
Fig 10. Amplifier A: unwanted voltage for 1 % cross modulation as a function of gain reduction; typical values



$V_{DS(A)} = V_{DS(B)} = 5$ V; $V_{G1-S(B)} = 0$ V; f = 50 MHz; see Figure 33.

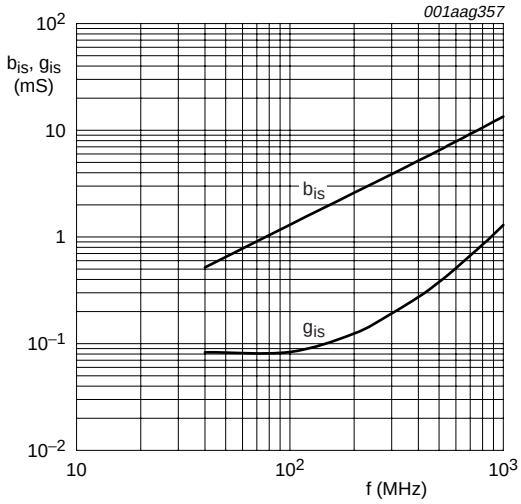
Fig 11. Amplifier A: gain reduction as a function of AGC voltage; typical values

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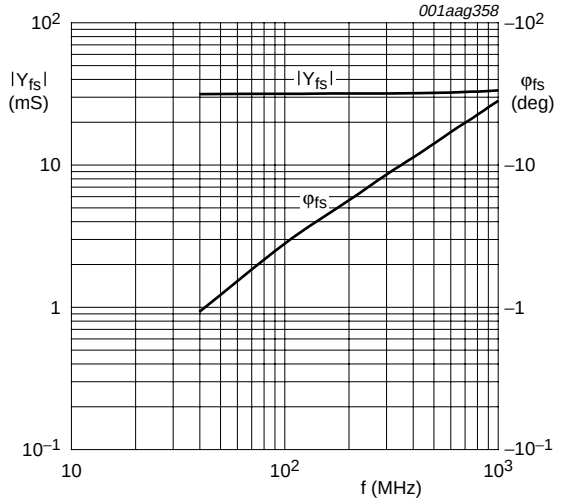
$V_{DS(A)} = V_{DS(B)} = 5$ V; $V_{G1-S(B)} = 0$ V; f = 50 MHz; $T_{amb} = 25$ °C; see Figure 33.

Fig 12. Amplifier A: drain current as a function of gain reduction; typical values



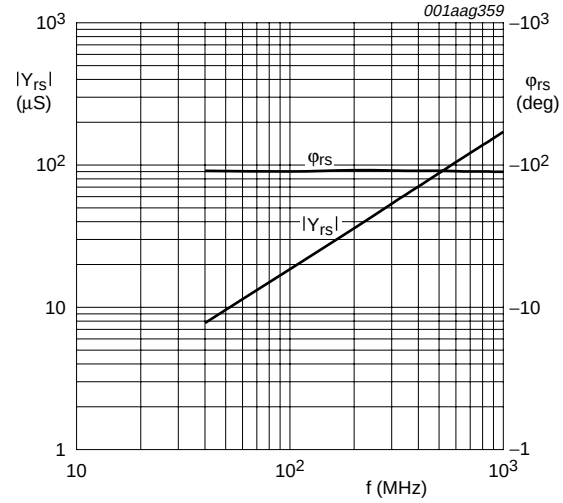
$V_{DS(A)} = 5$ V; $V_{G2-S} = 4$ V; $V_{DS(B)} = V_{G1-S(B)} = 0$ V; $I_{D(A)} = 19$ mA

Fig 13. Amplifier A: input admittance as a function of frequency; typical values



$V_{DS(A)} = 5$ V; $V_{G2-S} = 4$ V; $V_{DS(B)} = V_{G1-S(B)} = 0$ V; $I_{D(A)} = 19$ mA

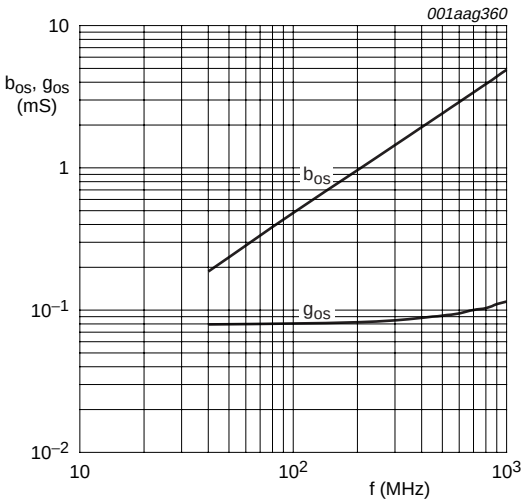
Fig 14. Amplifier A: forward transfer admittance and phase as a function of frequency; typical values



$V_{DS(A)} = 5$ V; $V_{G2-S} = 4$ V; $V_{DS(B)} = V_{G1-S(B)} = 0$ V; $I_{D(A)} = 19$ mA

Fig 15. Amplifier A: reverse transfer admittance and phase as a function of frequency; typical values

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$V_{DS(A)}$ = 5 V; V_{G2-S} = 4 V; $V_{DS(B)}$ = $V_{G1-S(B)}$ = 0 V; $I_{D(A)}$ = 19 mA

Fig 16. Amplifier A: output admittance as a function of frequency; typical values

8.1.2 Scattering parameters for amplifier A

Table 9. Scattering parameters for amplifier A

$V_{DS(A)}$ = 5 V; V_{G2-S} = 4 V; $I_{D(A)}$ = 19 mA; $V_{DS(B)}$ = 0 V; $V_{G1-S(B)}$ = 0 V; T_{amb} = 25 °C; typical values.

f (MHz)	s_{11}		s_{21}		s_{12}		s_{22}	
	Magnitude (ratio)	Angle (deg)	Magnitude (ratio)	Angle (deg)	Magnitude (ratio)	Angle (deg)	Magnitude (ratio)	Angle (deg)
40	0.992	–3.037	3.21	177.04	0.00763	87.34	0.992	–1.139
100	0.99152	–7.62	3.13270	172.06	0.00182	85.21	0.99168	–2.93
200	0.98685	–15.12	3.11006	164.12	0.00350	78.32	0.99047	–5.83
300	0.97979	–22.49	3.06743	156.24	0.00511	73.45	0.98876	–8.72
400	0.97176	–29.74	3.01634	148.56	0.00664	69.12	0.98662	–11.57
500	0.96209	–36.76	2.95125	141.00	0.00805	64.73	0.98424	–14.39
600	0.95108	–43.63	2.87828	133.56	0.00931	60.38	0.98168	–17.21
700	0.93915	–50.35	2.79946	126.28	0.01042	56.16	0.97884	–19.97
800	0.92742	–56.82	2.71508	119.20	0.01141	52.16	0.97630	–22.68
900	0.91573	–62.95	2.62937	112.29	0.01224	48.31	0.97350	–25.42
1000	0.90429	–68.83	2.54239	105.56	0.01297	44.63	0.97115	–28.14

8.1.3 Noise data for amplifier A

Table 10. Noise data for amplifier A

$V_{DS(A)}$ = 5 V; V_{G2-S} = 4 V; $I_{D(A)}$ = 19 mA; $V_{DS(B)}$ = 0 V; $V_{G1-S(B)}$ = 0 V; T_{amb} = 25 °C; typical values; unless otherwise specified.

f (MHz)	NF_{min} (dB)	Γ_{opt}		r_n (ratio)
		(ratio)	(deg)	
400	0.9	0.77	22.7	0.65
800	1.1	0.73	45.75	0.62

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8.2 Dynamic characteristics for amplifier B

Table 11. Dynamic characteristics for amplifier B[1]

Common source; T_{amb} = 25 °C; V_{G2-S} = 4 V; V_{DS} = 5 V; I_D = 15 mA; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$\|y_{fs}\|$	forward transfer admittance	f = 100 MHz; T_j = 25 °C		25	30	40	mS
$C_{iss(G1)}$	input capacitance at gate1	f = 100 MHz	[2]	-	2.1	2.6	pF
$C_{iss(G2)}$	input capacitance at gate2	f = 100 MHz	[2]	-	3.4	-	pF
C_{oss}	output capacitance	f = 100 MHz	[2]	-	0.85	-	pF
C_{rss}	reverse transfer capacitance	f = 100 MHz	[2]	-	30	-	fF
G_{tr}	transducer power gain	$B_S = B_{S(opt)}$; $B_L = B_{L(opt)}$					
		f = 200 MHz; G_S = 2 mS; G_L = 0.5 mS		31	35	39	dB
		f = 400 MHz; G_S = 2 mS; G_L = 1 mS		28	32	36	dB
		f = 800 MHz; G_S = 3.3 mS; G_L = 1 mS		26	30	34	dB
NF	noise figure	f = 11 MHz; G_S = 20 mS; B_S = 0 S		-	3	-	dB
		f = 400 MHz; $Y_S = Y_{S(opt)}$		-	1.1	1.7	dB
		f = 800 MHz; $Y_S = Y_{S(opt)}$		-	1.4	2.0	dB
Xmod	cross modulation	input level for k = 1 %; f_w = 50 MHz; f_{unw} = 60 MHz	[3]				
		at 0 dB AGC		90	-	-	dBμV
		at 10 dB AGC		-	90	-	dBμV
		at 20 dB AGC		-	98	-	dBμV
		at 40 dB AGC		102	105	-	dBμV

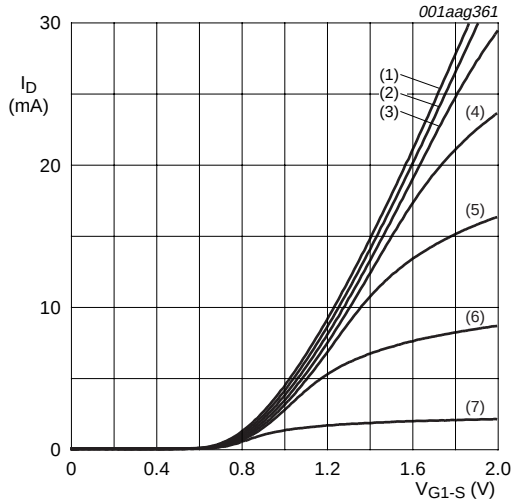
[1] For the MOSFET not in use: $V_{G1-S(A)}$ = 0 V; $V_{DS(A)}$ = 0 V.

[2] Calculated from S-parameters.

[3] Measured in Figure 34 test circuit.

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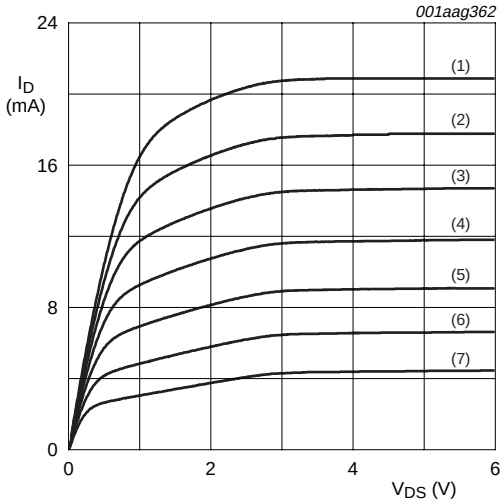
8.2.1 Graphics for amplifier B



(1) V_{G2-S} = 4 V.
(2) V_{G2-S} = 3.5 V.
(3) V_{G2-S} = 3 V.
(4) V_{G2-S} = 2.5 V.
(5) V_{G2-S} = 2 V.
(6) V_{G2-S} = 1.5 V.
(7) V_{G2-S} = 1 V.

$V_{DS(B)}$ = 5 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; T_j = 25 °C.

Fig 17. Amplifier B: transfer characteristics; typical values

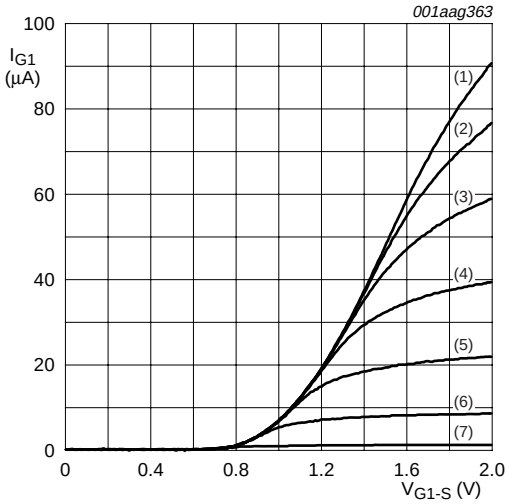


(1) $V_{G1-S(B)}$ = 1.6 V.
(2) $V_{G1-S(B)}$ = 1.5 V.
(3) $V_{G1-S(B)}$ = 1.4 V.
(4) $V_{G1-S(B)}$ = 1.3 V.
(5) $V_{G1-S(B)}$ = 1.2 V.
(6) $V_{G1-S(B)}$ = 1.1 V.
(7) $V_{G1-S(B)}$ = 1 V.

V_{G2-S} = 4 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; T_j = 25 °C.

Fig 18. Amplifier B: output characteristics; typical values

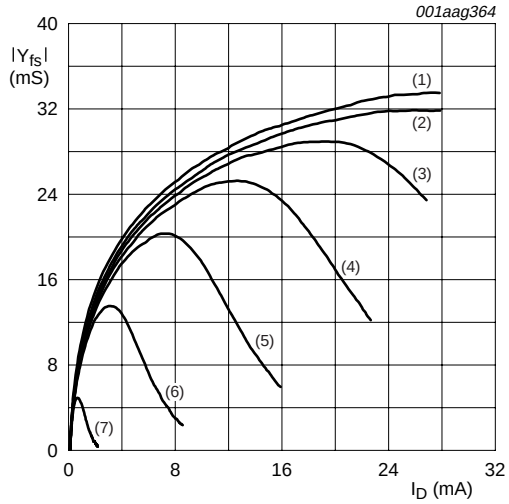
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(1) V_{G2-S} = 4 V.
(2) V_{G2-S} = 3.5 V.
(3) V_{G2-S} = 3 V.
(4) V_{G2-S} = 2.5 V.
(5) V_{G2-S} = 2 V.
(6) V_{G2-S} = 1.5 V.
(7) V_{G2-S} = 1 V.

$V_{DS(B)}$ = 5 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; T_j = 25 °C.

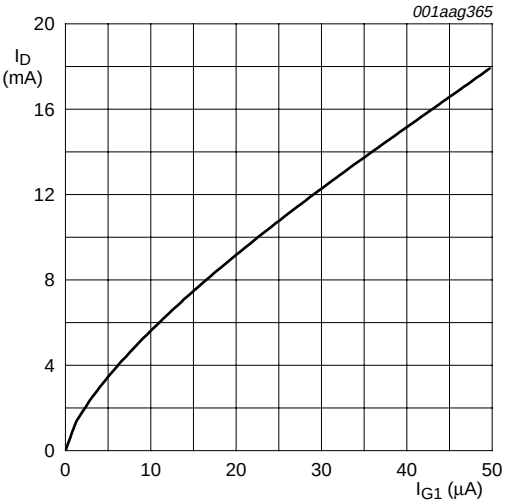
Fig 19. Amplifier B: gate1 current as a function of gate1 voltage; typical values



(1) V_{G2-S} = 4 V.
(2) V_{G2-S} = 3.5 V.
(3) V_{G2-S} = 3 V.
(4) V_{G2-S} = 2.5 V.
(5) V_{G2-S} = 2 V.
(6) V_{G2-S} = 1.5 V.
(7) V_{G2-S} = 1 V.

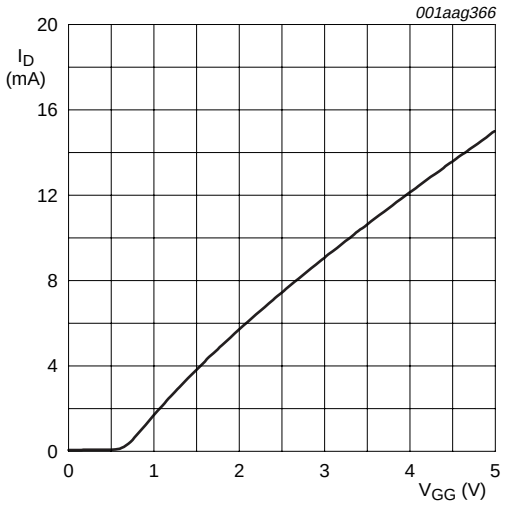
$V_{DS(B)}$ = 5 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; T_j = 25 °C.

Fig 20. Amplifier B: forward transfer admittance as a function of drain current; typical values



$V_{DS(B)}$ = 5 V; V_{G2-S} = 4 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; T_j = 25 °C.

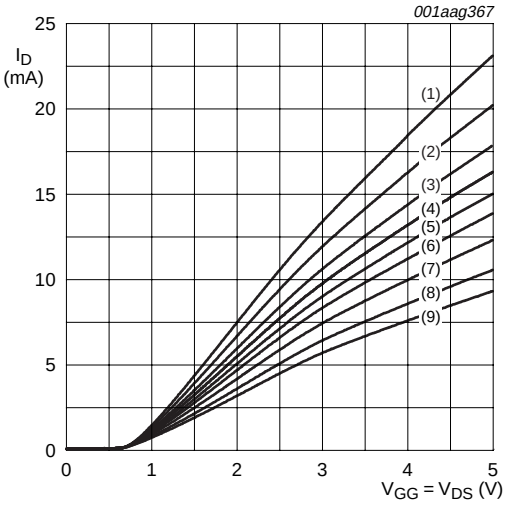
Fig 21. Amplifier B: drain current as a function of gate1 current; typical values



$V_{DS(B)}$ = 5 V; V_{G2-S} = 4 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; T_j = 25 °C; R_{G1} = 86 kΩ (connected to V_{GG}); see Figure 3.

Fig 22. Amplifier B: drain current as a function of gate1 supply voltage; typical values

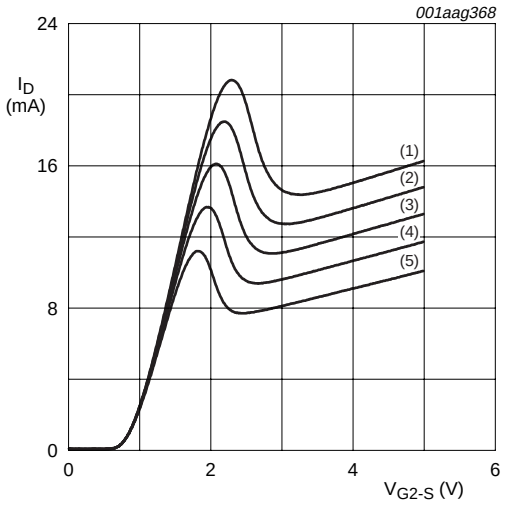
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(1) R_{G1} = 47 kΩ.
(2) R_{G1} = 56 kΩ.
(3) R_{G1} = 68 kΩ.
(4) R_{G1} = 82 kΩ.
(5) R_{G1} = 86 kΩ.
(6) R_{G1} = 100 kΩ.
(7) R_{G1} = 120 kΩ.
(8) R_{G1} = 150 kΩ.
(9) R_{G1} = 180 kΩ.

V_{G2-S} = 4 V; $V_{DS(A)} = V_{G1-S(A)}$ = 0 V; T_j = 25 °C; R_{G1} is connected to V_{GG}; see Figure 3.

Fig 23. Amplifier B: drain current as a function of gate1 supply voltage and drain supply voltage; typical values

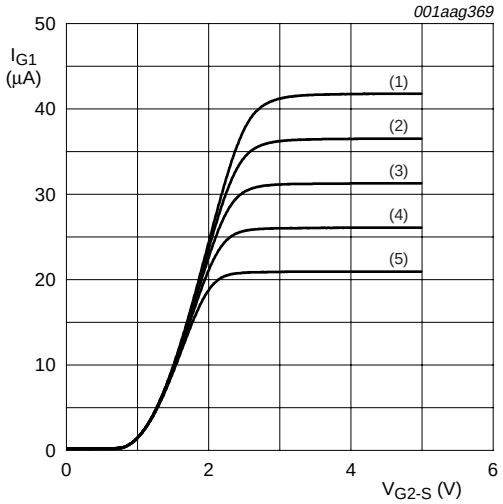


(1) V_{GG} = 5.0 V.
(2) V_{GG} = 4.5 V.
(3) V_{GG} = 4.0 V.
(4) V_{GG} = 3.5 V.
(5) V_{GG} = 3.0 V.

$V_{DS(B)}$ = 5 V; $V_{DS(A)} = V_{G1-S(A)}$ = 0 V; T_j = 25 °C; R_{G1} = 86 kΩ (connected to V_{GG}); see Figure 3.

Fig 24. Amplifier B: drain current as a function of gate2 voltage; typical values

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(1) V_{GG} = 5.0 V.

(2) V_{GG} = 4.5 V.

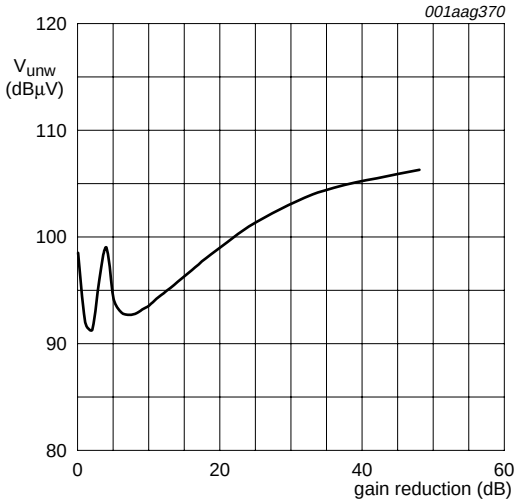
(3) V_{GG} = 4.0 V.

(4) V_{GG} = 3.5 V.

(5) V_{GG} = 3.0 V.

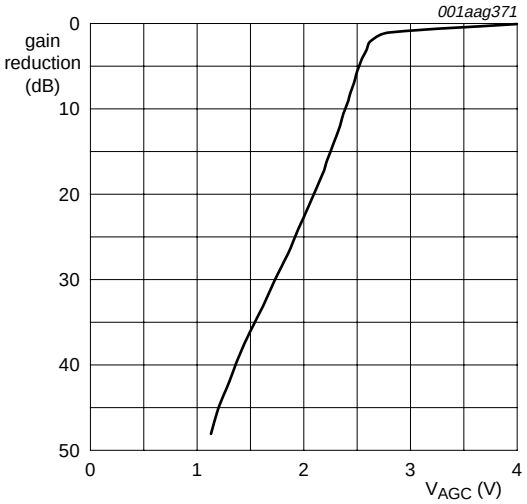
$V_{DS(B)}$ = 5 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; T_j = 25 °C; R_{G1} = 86 kΩ (connected to V_{GG}); see Figure 3.

Fig 25. Amplifier B: gate1 current as a function of gate2 voltage; typical values



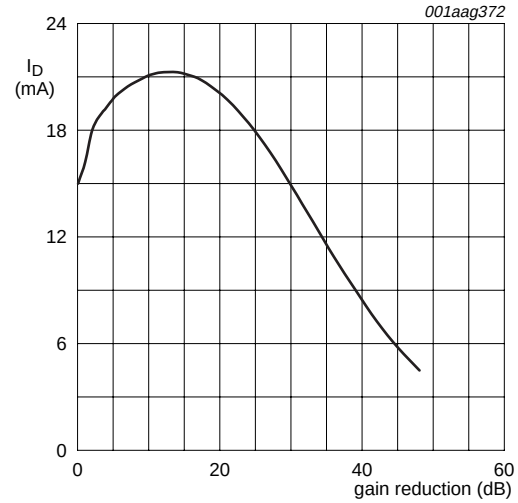
$V_{DS(B)}$ = 5 V; V_{GG} = 5 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; R_{G1} = 86 kΩ (connected to V_{GG}); f_w = 50 MHz; f_{unw} = 60 MHz; T_{amb} = 25 °C; see Figure 34.

Fig 26. Amplifier B: unwanted voltage for 1 % cross modulation as a function of gain reduction; typical values



$V_{DS(B)}$ = 5 V; V_{GG} = 5 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; R_{G1} = 86 kΩ (connected to V_{GG}); f = 50 MHz; T_{amb} = 25 °C; see Figure 34.

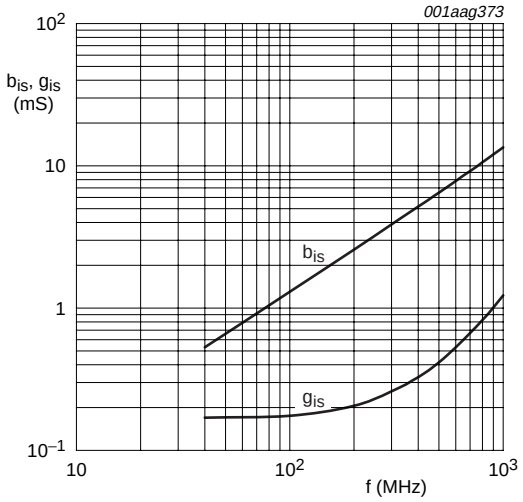
Fig 27. Amplifier B: gain reduction as a function of AGC voltage; typical values



$V_{DS(B)}$ = 5 V; V_{GG} = 5 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; R_{G1} = 86 kΩ (connected to V_{GG}); f = 50 MHz; T_{amb} = 25 °C; see Figure 34.

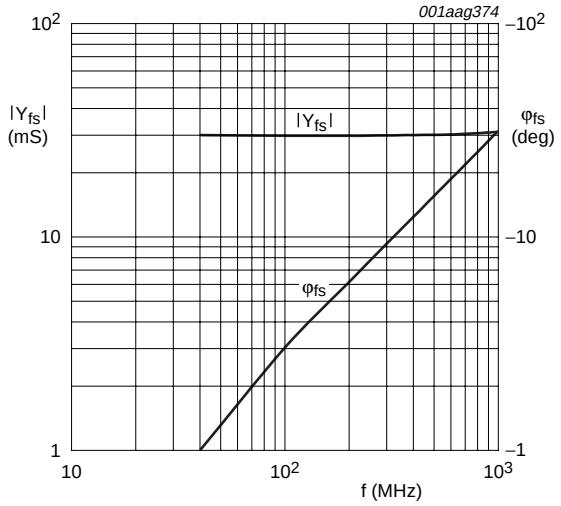
Fig 28. Amplifier B: drain current as a function of gain reduction; typical values

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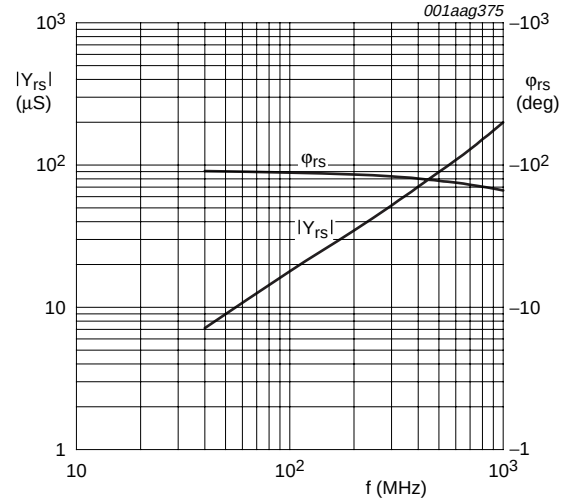
$V_{DS(B)}$ = 5 V; V_{G2-S} = 4 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; $I_{D(B)}$ = 15 mA

Fig 29. Amplifier B: input admittance as a function of frequency; typical values



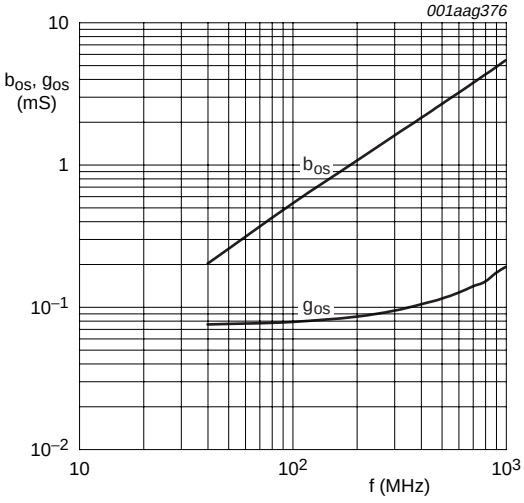
$V_{DS(B)}$ = 5 V; V_{G2-S} = 4 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; $I_{D(B)}$ = 15 mA

Fig 30. Amplifier B: forward transfer admittance and phase as a function of frequency; typical values



$V_{DS(B)}$ = 5 V; V_{G2-S} = 4 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; $I_{D(B)}$ = 15 mA

Fig 31. Amplifier B: reverse transfer admittance and phase as a function of frequency; typical values



$V_{DS(B)}$ = 5 V; V_{G2-S} = 4 V; $V_{DS(A)}$ = $V_{G1-S(A)}$ = 0 V; $I_{D(B)}$ = 15 mA

Fig 32. Amplifier B: output admittance as a function of frequency; typical values

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8.2.2 Scattering parameters for amplifier B

Table 12. Scattering parameters for amplifier B

$V_{DS(B)}$ = 5 V; $V_{G2\text{-}S}$ = 4 V; $I_{D(B)}$ = 15 mA; $V_{DS(A)}$ = 0 V; $V_{G1\text{-}S(A)}$ = 0 V; T_{amb} = 25 °C; typical values.

f (MHz)	s_{11}		s_{21}		s_{12}		s_{22}	
	Magnitude (ratio)	Angle (deg)	Magnitude (ratio)	Angle (deg)	Magnitude (ratio)	Angle (deg)	Magnitude (ratio)	Angle (deg)
40	0.9830	–3.09	2.96410	176.88	0.00070	87.02	0.9920	–1.22
100	0.98257	–7.62	2.92951	171.69	0.00176	86.41	0.99190	–3.22
200	0.97956	–15.00	2.90869	163.43	0.00339	83.66	0.99064	–6.42
300	0.97446	–22.33	2.86877	155.20	0.00501	81.33	0.98894	–9.59
400	0.96849	–29.56	2.82073	147.13	0.00663	79.12	0.98688	–12.74
500	0.96112	–36.62	2.75891	139.15	0.00820	76.85	0.98454	–15.88
600	0.95238	–43.55	2.68790	131.26	0.00967	74.48	0.98181	–19.02
700	0.94282	–50.37	2.61038	123.50	0.01110	72.29	0.97880	–22.13
800	0.93319	–56.94	2.52719	115.92	0.01250	70.11	0.97585	–25.20
900	0.92326	–63.22	2.44054	108.46	0.01379	67.93	0.97175	–28.30
1000	0.91325	–69.31	2.35036	101.13	0.01506	65.65	0.96801	–31.40

8.2.3 Noise data for amplifier B

Table 13. Noise data for amplifier B

$V_{DS(B)}$ = 5 V; $V_{G2\text{-}S}$ = 4 V; $I_{D(B)}$ = 15 mA; $V_{DS(A)}$ = 0 V; $V_{G1\text{-}S(A)}$ = 0 V; T_{amb} = 25 °C; typical values; unless otherwise specified.

f (MHz)	NF_{min} (dB)	Γ_{opt}		r_n (Ω)
		(ratio)	(deg)	
400	1.1	0.72	22.83	0.66
800	1.4	0.68	46.42	0.64

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9. Test information

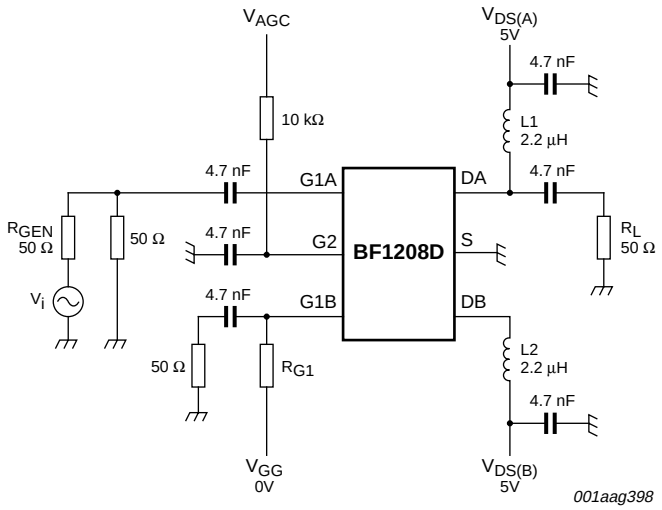


Fig 33. Cross modulation test set-up for amplifier A

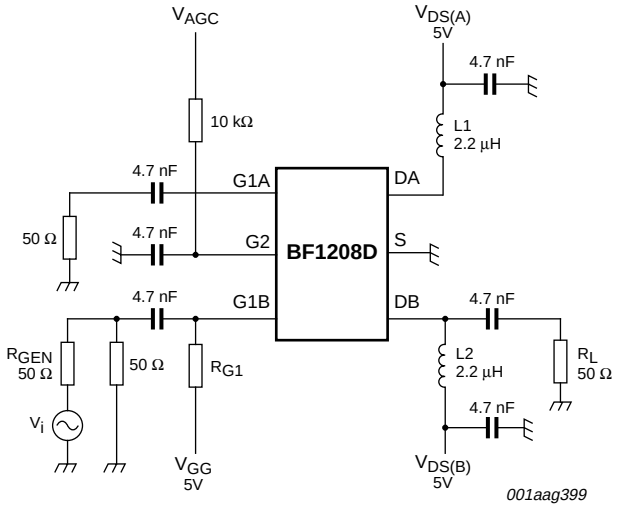
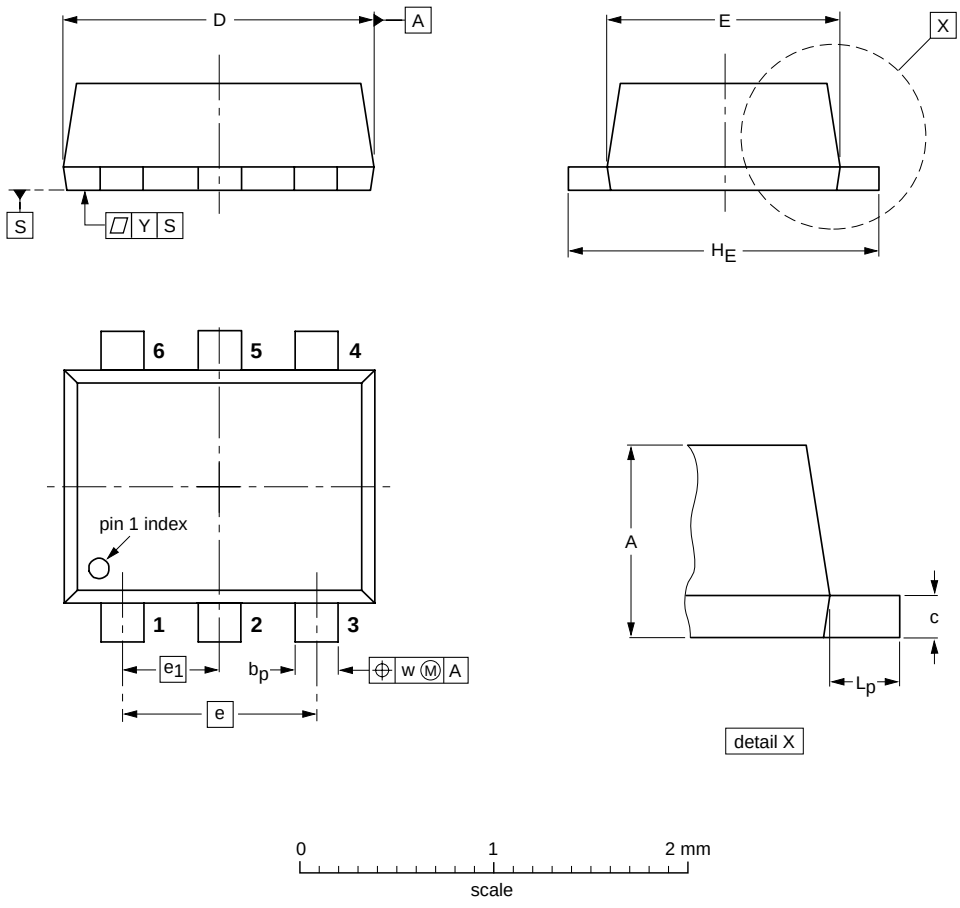


Fig 34. Cross modulation test set-up for amplifier B

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10. Package outline

Plastic surface-mounted package; 6 leads **SOT666**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b_p	c	D	E	e	e_1	H_E	L_p	w	y
mm	0.6 0.5	0.27 0.17	0.18 0.08	1.7 1.5	1.3 1.1	1.0	0.5	1.7 1.5	0.3 0.1	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT666						~~04-11-08~~ 06-03-16

Fig 35. Package outline SOT666

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11. Abbreviations

Table 14. Abbreviations

Acronym	Description
AGC	Automatic Gain Control
DC	Direct Current
MOSFET	Metal-Oxide Semiconductor Field-Effect Transistor
UHF	Ultra High Frequency
VHF	Very High Frequency

12. Revision history

Table 15. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BF1208D_1	20070516	Product data sheet	-	-

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13. Legal information

13.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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