This version: Jul. 1998
Previous version: Jan. 1998

OKI electronic components

KGF1254B/1254

Medium-Power Amplifier

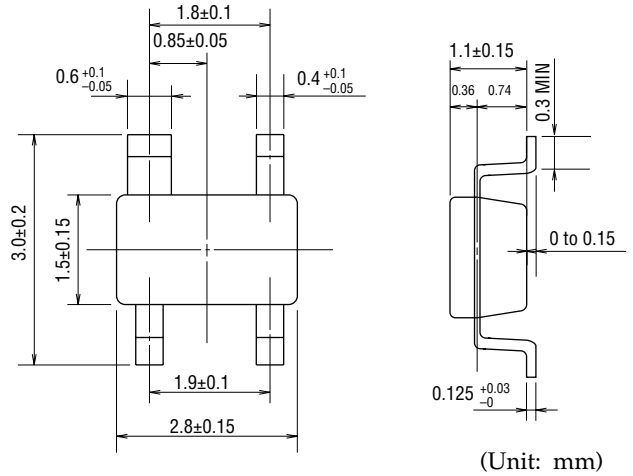
GENERAL DESCRIPTION

The KGF1254B is a medium-power amplifier, with frequencies ranging from the UHF-band to the L-band, that features high output power, low noise, and low current operation. The KGF1254B specifications are guaranteed to a fixed matching circuit for 5.2 V and 850 MHz; external impedance-matching circuits are also required. Because of the low noise and high output power at the low operating current, the KGF1254B is ideal as a transmitter-driver amplifier for personal handy phones.
The KGF1254 is an amplifier similar to the KGF1254B in specifications and typical properties. Although having S Parameters that are slightly different from those of the KGF1254B, the KGF1254 meets the specifications for the KGF1254B, even with the same matching circuits as those of the KGF1254B.

FEATURES

- High output power: 20 dBm (min.)
- Low noise: 2.5 dB (max.)
- Low current operation: 80 mA (max.)
- Self-bias circuit configuration with built-in source capacitor
- Package: 4PSOP

PACKAGE DIMENSIONS

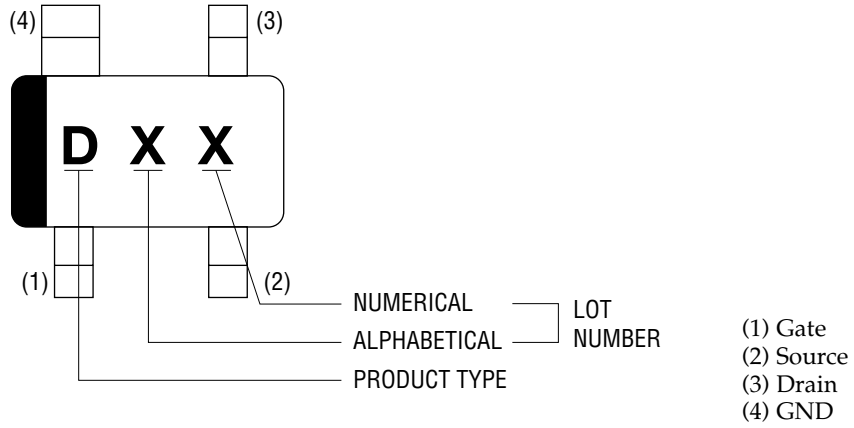


(Unit: mm)

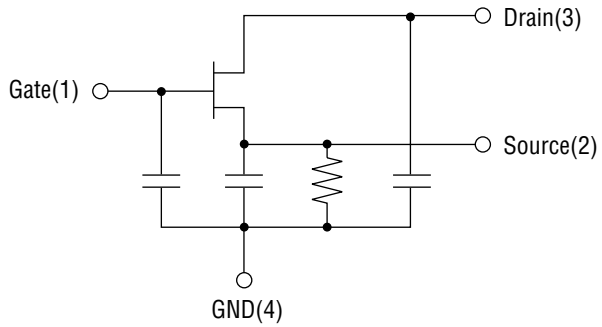
Package material	Epoxy resin
Lead frame material	42 alloy
Pin treatment	Solder plating
Solder plate thickness	5 µm or more

Note: Ask our sales department for detailed requirements of the KGF1254.

MARKING



CIRCUIT



ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Unit	Min.	Max.
Drain-Source voltage	V_{DS}	Ta = 25°C	V	—	10
Gate-Source voltage	V_{GS}	Ta = 25°C	V	–5.0	0.4
Drain current	I_{DS}	Ta = 25°C	mA	—	360
Total power dissipation	P_{tot}	Ta = 25°C	mW	—	300
Channel temperature	T_{ch}	—	°C	—	150
Storage temperature	T_{stg}	—	°C	–45	125

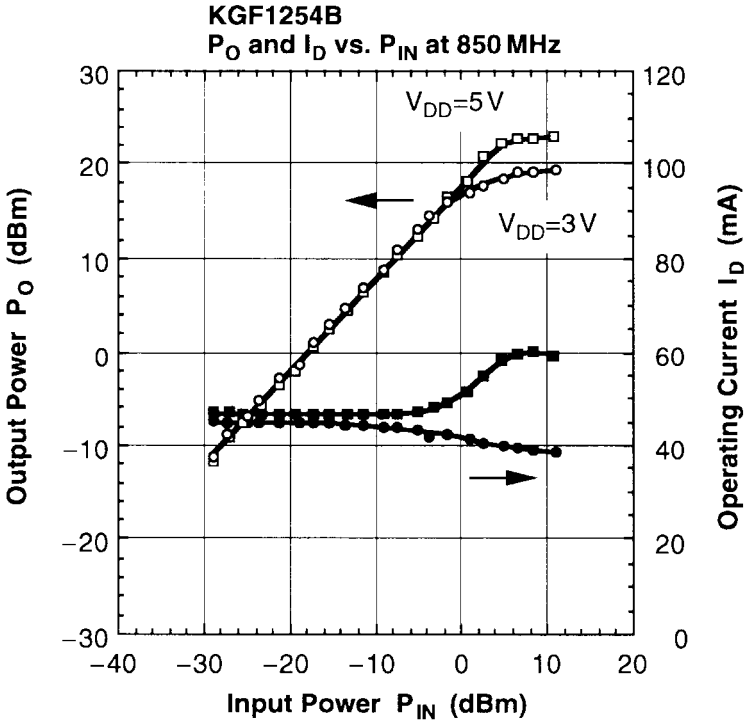
ELECTRICAL CHARACTERISTICS

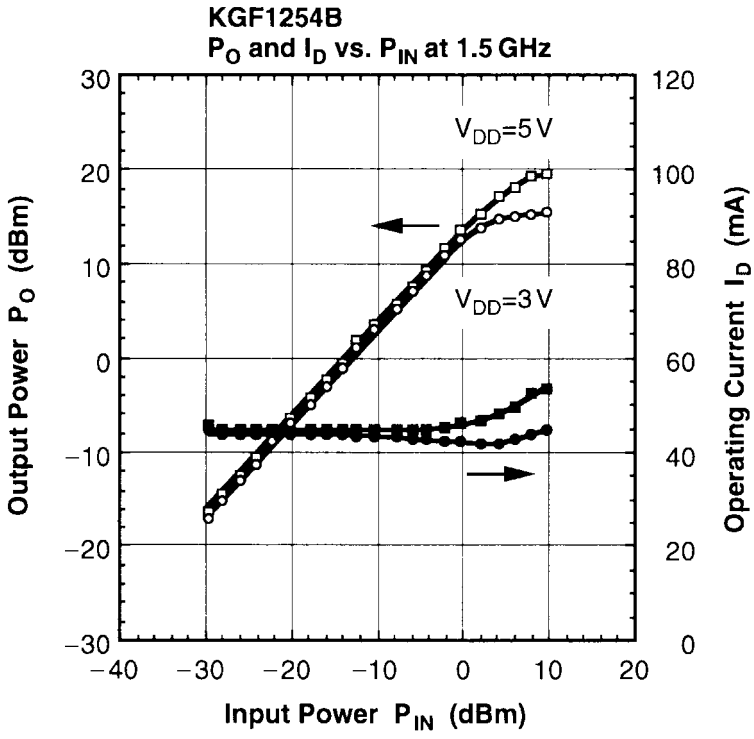
(Ta = 25°C)

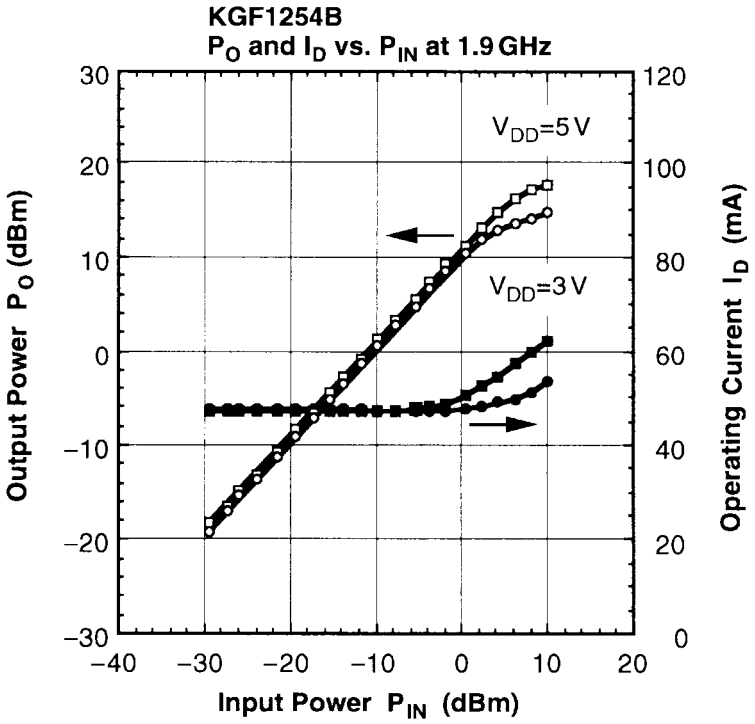
Item	Symbol	Condition		Unit	Min.	Typ.	Max.
Gate-Source leakage current	I_{GSS}	V_{GS} = –3 V		µA	—	—	72
Gate-Drain leakage current	I_{GDO}	V_{GD} = –15 V		µA	—	—	360
Drain-Source leakage current	$I_{DS(off)}$	V_{DS} = 3 V, V_{GS} = –2.5 V		µA	—	—	720
Drain current	I_{DSS}	V_{DS} = 3 V, V_{GS} = 0 V		mA	130	—	—
Operating current	I_D	(*1), P_{IN} = 10 dBm, f = 850 MHz		mA	—	—	80.0
Gate-Source cut-off voltage	$V_{GS(off)}$	V_{DS} = 3 V, I_{DS} = 720 µA		V	–2.0	—	–1.0
Transconductance	gm	V_{DS} = 3 V, I_{DS} = 60 mA		mS	125	—	—
Noise figure	F	(*1), f = 850 MHz		dB	—	—	2.5
Linear gain	G_{LIN}	(*1), P_{IN} = –10 dBm	f = 850 MHz	dB	14.0	17.0	—
			f = 1.5 GHz		—	13.5	—
			f = 1.9 GHz		—	11.0	—
		(*2), P_{IN} = –10 dBm	f = 850 MHz		—	17.0	—
			f = 1.5 GHz		—	13.0	—
			f = 1.9 GHz		—	10.0	—
Output power	P_O	(*1), P_{IN} = 10 dBm	f = 850 MHz	dBm	20.0	22.0	—
			f = 1.5 GHz		—	20.0	—
			f = 1.9 GHz		—	18.0	—
		(*2), P_{IN} = 10 dBm	f = 850 MHz		—	20.0	—
			f = 1.5 GHz		—	16.0	—
			f = 1.9 GHz		—	15.0	—

*1 Self-bias condition: V_{DD} = 5.2 V, V_G = 0 V
*2 Self-bias condition: V_{DD} = 3 V, V_G = 0 V

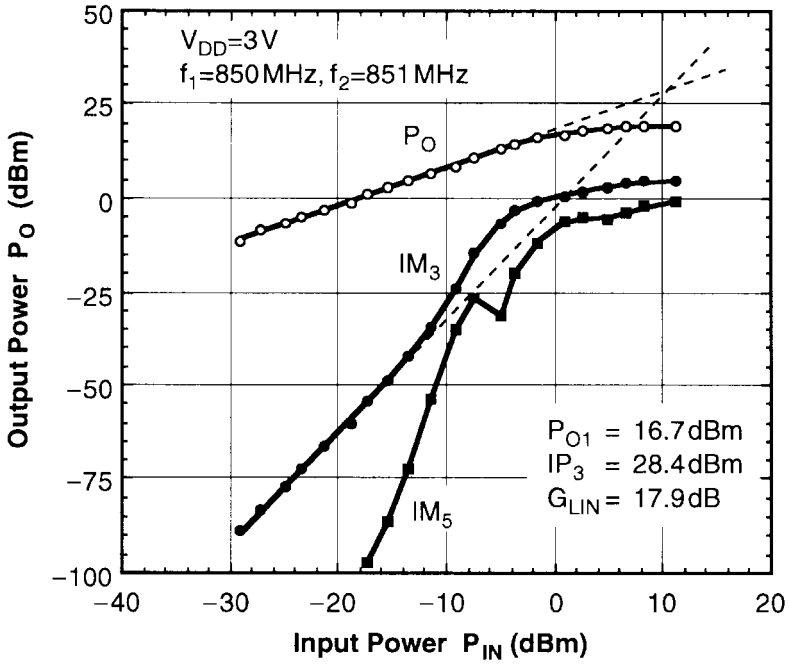
RF CHARACTERISTICS



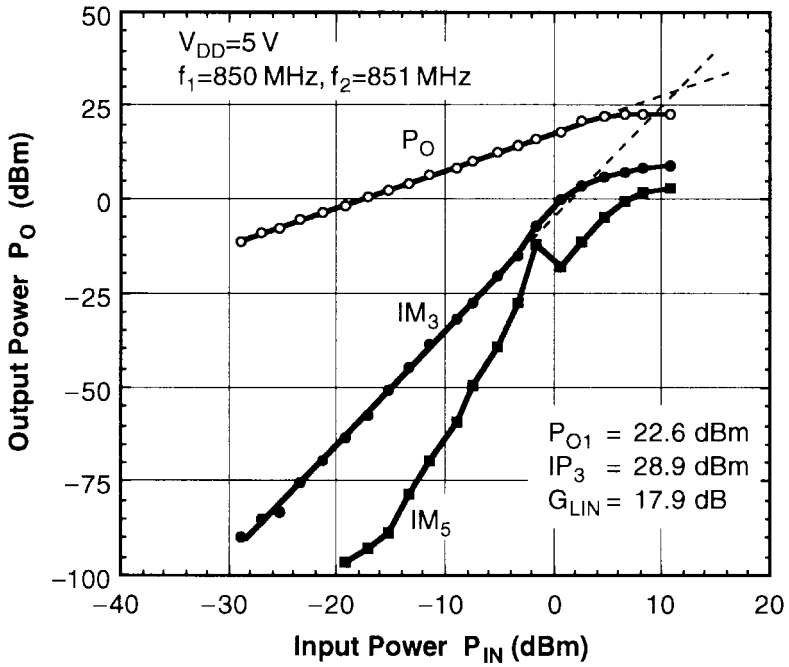


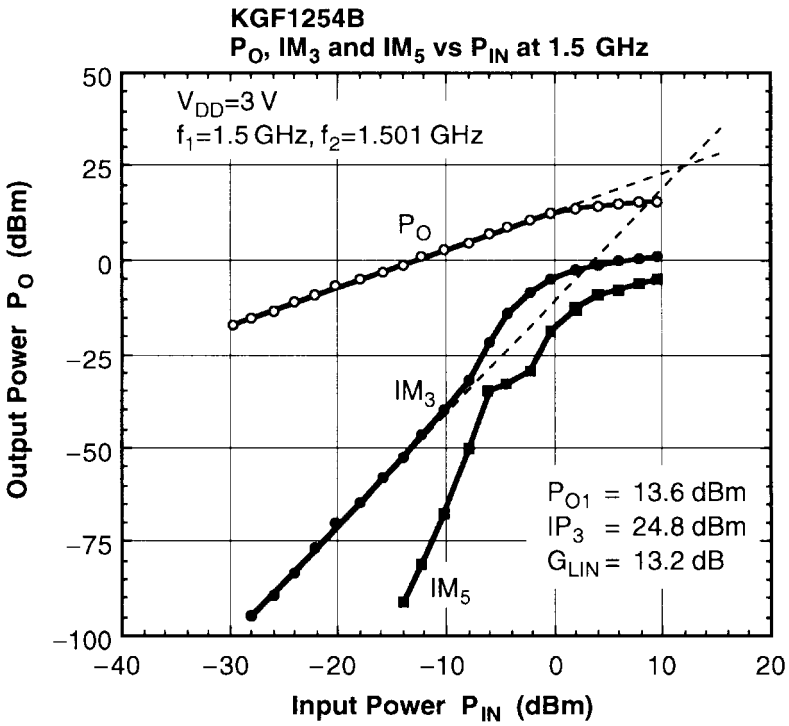

KGF1254B
P_O and I_D vs. P_{IN} at 1.9 GHz
V_{DD}=5 V
V_{DD}=3 V
Output Power P_O (dBm)
Operating Current I_D (mA)
Input Power P_{IN} (dBm)
30
20
10
0
−10
−20
−30
120
100
80
60
40
20
0
−40
−30
−20
−10
0
10
20

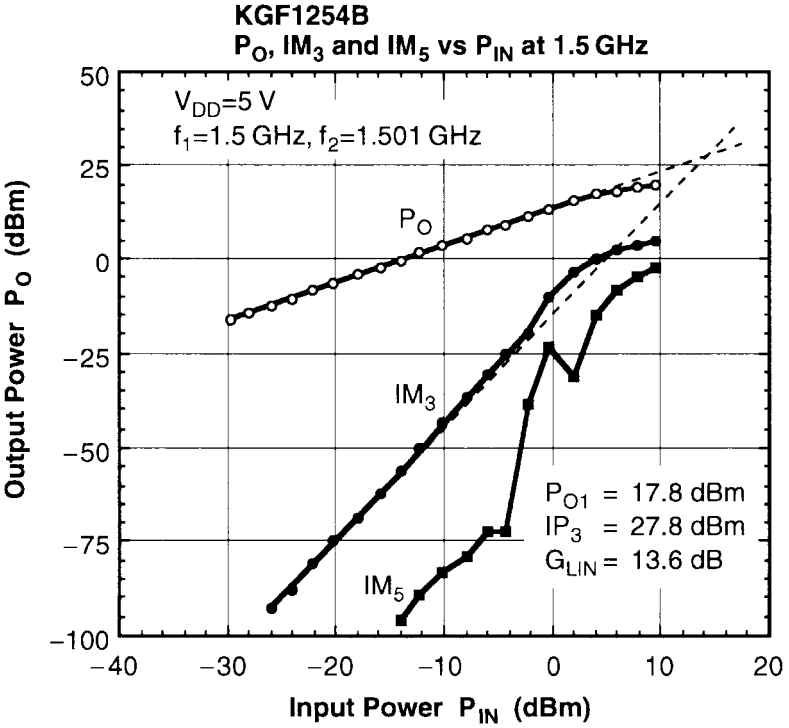
KGF1254B
P_O, IM_3 and IM_5 vs P_{IN} at 850 MHz

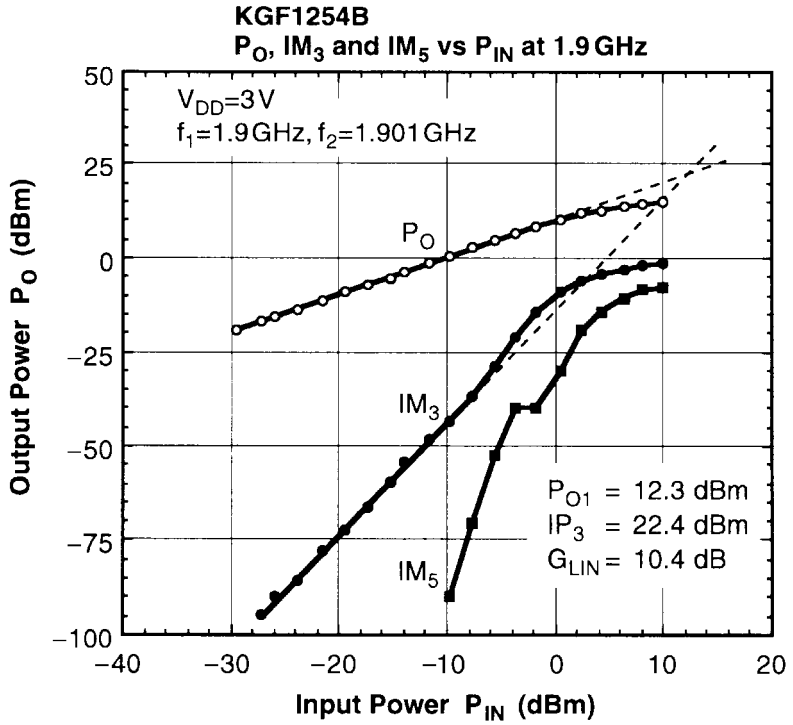


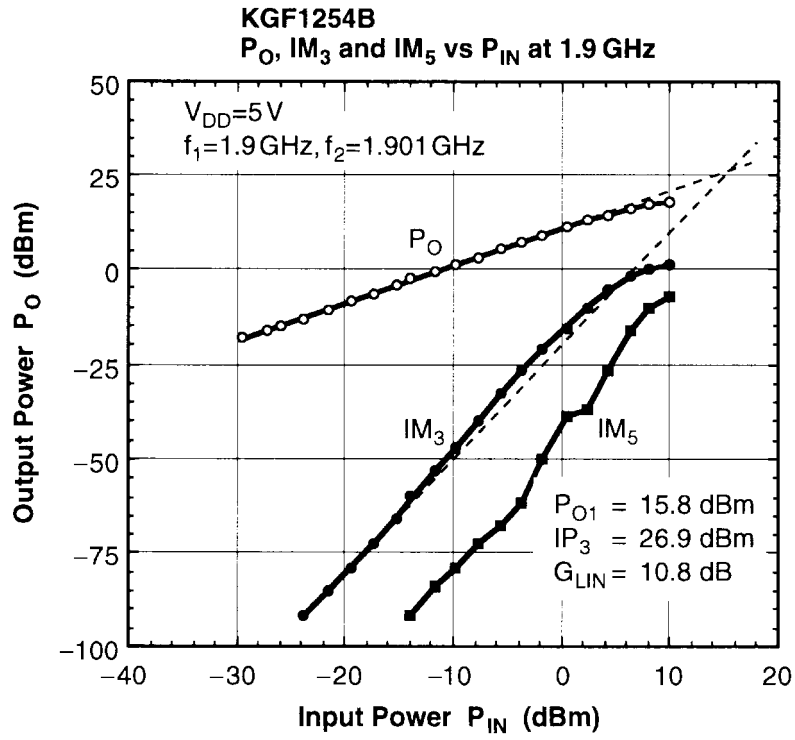
KGF1254B
P_O, IM_3 and IM_5 vs P_{IN} at 850 MHz




KGF1254B
P_O, IM_3 and IM_5 vs P_{IN} at 1.5 GHz
V_{DD}=3 V
f_1=1.5 GHz, f_2=1.501 GHz
P_O
IM_3
IM_5
P_{O1} = 13.6 dBm
IP_3 = 24.8 dBm
G_{LIN} = 13.2 dB
Output Power P_O (dBm)
Input Power P_{IN} (dBm)
50
25
0
−25
−50
−75
−100
−40
−30
−20
−10
0
10
20


KGF1254B
P_O, IM_3 and IM_5 vs P_{IN} at 1.5 GHz
V_{DD}=5 V
f_1=1.5 GHz, f_2=1.501 GHz
P_O
IM_3
IM_5
P_{O1} = 17.8 dBm
IP_3 = 27.8 dBm
G_{LIN} = 13.6 dB
Output Power P_O (dBm)
Input Power P_{IN} (dBm)
50
25
0
−25
−50
−75
−100
−40
−30
−20
−10
0
10
20


KGF1254B
P_O, IM_3 and IM_5 vs P_{IN} at 1.9 GHz
V_{DD}=3 V
f_1=1.9 GHz, f_2=1.901 GHz
P_O
IM_3
IM_5
P_{O1} = 12.3 dBm
IP_3 = 22.4 dBm
G_{LIN} = 10.4 dB
Output Power P_O (dBm)
Input Power P_{IN} (dBm)
50
25
0
−25
−50
−75
−100
−40
−30
−20
−10
0
10
20


KGF1254B
P_O, IM_3 and IM_5 vs P_{IN} at 1.9 GHz
V_{DD}=5 V
f_1=1.9 GHz, f_2=1.901 GHz
P_O
IM_3
IM_5
P_{O1} = 15.8 dBm
IP_3 = 26.9 dBm
G_{LIN} = 10.8 dB
Output Power P_O (dBm)
Input Power P_{IN} (dBm)
50
25
0
−25
−50
−75
−100
−40
−30
−20
−10
0
10
20

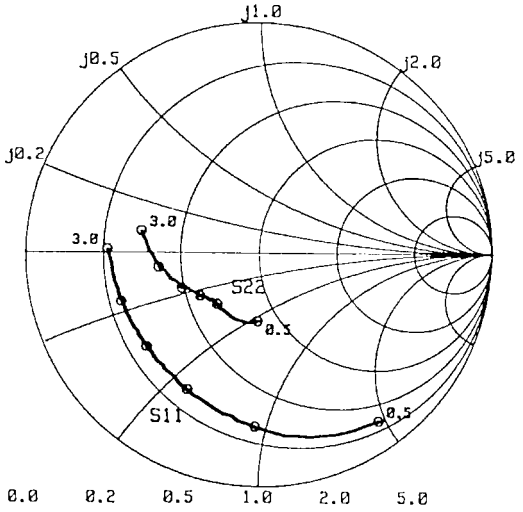
Typical S Parameters of KGF1254B

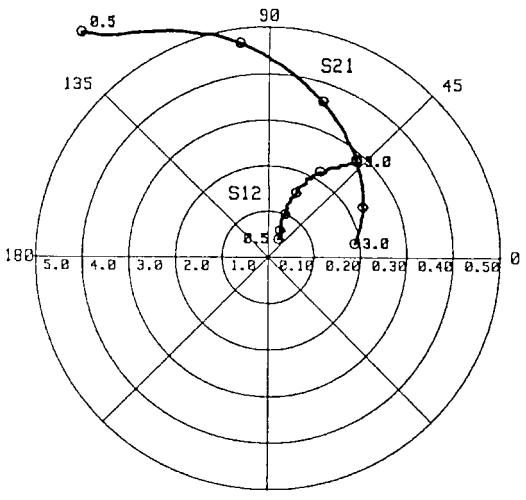
V_{DD} = 3 V, V_G = 0 V, I_D = 43.8 mA

Freq(MHz)	MAG(S_{11})	ANG(S_{11})	MAG(S_{21})	ANG(S_{21})	MAG(S_{12})	ANG(S_{12})	MAG(S_{22})	ANG(S_{22})
500.0	0.882	–54.29	6.342	129.65	0.044	59.98	0.291	–91.01
600.0	0.858	–61.91	5.839	124.19	0.050	57.96	0.299	–102.52
700.0	0.828	–70.32	5.529	117.60	0.050	59.06	0.296	–112.71
800.0	0.797	–77.65	5.244	110.96	0.055	63.86	0.289	–119.30
900.0	0.770	–84.78	4.984	104.10	0.058	63.60	0.287	–125.16
1000.0	0.741	–91.04	4.689	97.72	0.062	65.29	0.279	–128.77
1100.0	0.720	–97.10	4.430	91.83	0.068	66.39	0.276	–132.96
1200.0	0.700	–102.38	4.176	86.10	0.076	67.73	0.280	–135.93
1300.0	0.681	–107.86	3.958	80.86	0.084	69.74	0.290	–137.58
1400.0	0.666	–113.07	3.747	75.51	0.093	69.37	0.292	–140.07
1500.0	0.656	–117.36	3.590	70.87	0.099	68.47	0.307	–143.39
1600.0	0.648	–122.06	3.402	65.72	0.108	70.21	0.309	–146.87
1700.0	0.636	–126.25	3.263	61.49	0.119	70.91	0.318	–148.45
1800.0	0.629	–130.79	3.095	57.06	0.128	68.98	0.330	–151.18
1900.0	0.629	–135.10	2.973	52.30	0.138	69.75	0.348	–154.04
2000.0	0.623	–139.85	2.851	48.02	0.152	66.93	0.358	–155.23
2100.0	0.620	–144.21	2.717	43.82	0.166	67.20	0.363	–159.28
2200.0	0.616	–147.51	2.619	39.65	0.178	64.35	0.386	–163.29
2300.0	0.621	–152.56	2.498	35.18	0.192	64.22	0.395	–165.34
2400.0	0.623	–156.23	2.408	31.36	0.205	61.50	0.406	–169.53
2500.0	0.623	–160.44	2.304	27.83	0.218	58.91	0.429	–171.79
2600.0	0.625	–164.40	2.217	23.62	0.230	56.57	0.441	–175.67
2700.0	0.632	–168.81	2.128	19.87	0.243	54.01	0.457	–179.59
2800.0	0.635	–172.79	2.047	16.31	0.256	52.28	0.471	177.80
2900.0	0.638	–177.44	1.965	12.51	0.270	49.71	0.486	173.52
3000.0	0.647	178.65	1.895	8.54	0.283	47.52	0.508	169.33

Typical S Parameters of KGF1254B

V_{DD} = 3 V, V_G = 0 V, I_D = 43.8 mA
Frequency : 0.5 to 3.0 GHz
Z_0 = 50 Ω





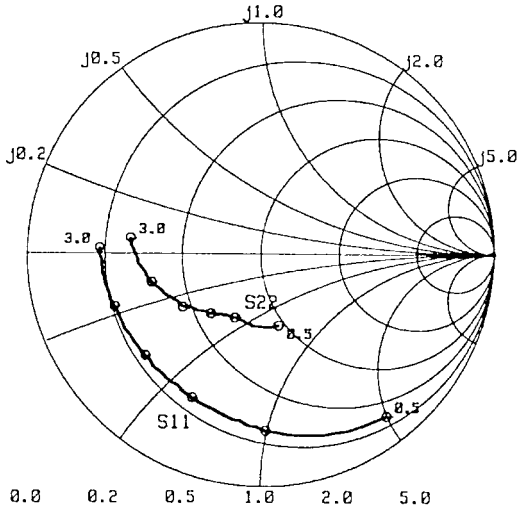
Typical S Parameters of KGF1254B

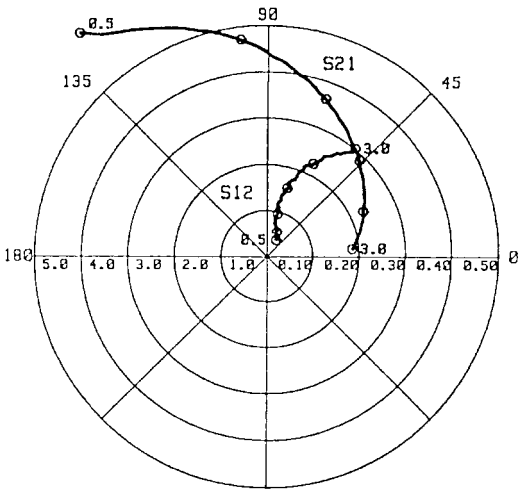
V_{DD} = 5 V, V_G = 0 V, I_D = 45.1 mA

Freq(MHz)	MAG(S_{11})	ANG(S_{11})	MAG(S_{21})	ANG(S_{21})	MAG(S_{12})	ANG(S_{12})	MAG(S_{22})	ANG(S_{22})
500.0	0.885	–52.63	6.302	130.04	0.040	61.92	0.322	–76.26
600.0	0.864	–59.83	5.861	124.38	0.043	59.74	0.321	–86.96
700.0	0.836	–67.93	5.553	117.38	0.045	60.36	0.315	–96.63
800.0	0.812	–75.08	5.277	110.70	0.047	62.83	0.307	–102.22
900.0	0.786	–82.06	5.005	103.96	0.051	62.81	0.300	–107.66
1000.0	0.765	–88.22	4.724	97.24	0.056	68.01	0.299	–111.14
1100.0	0.743	–94.20	4.471	91.06	0.062	71.47	0.298	–114.83
1200.0	0.725	–99.50	4.221	85.19	0.068	73.68	0.303	–119.37
1300.0	0.707	–105.20	3.978	79.95	0.079	76.17	0.311	–122.26
1400.0	0.697	–110.17	3.783	74.02	0.084	76.17	0.326	–125.15
1500.0	0.689	–114.84	3.624	69.53	0.094	75.92	0.334	–128.57
1600.0	0.679	–119.36	3.432	64.21	0.105	79.05	0.341	–132.48
1700.0	0.673	–123.74	3.289	59.89	0.115	77.97	0.353	–135.45
1800.0	0.667	–128.52	3.123	55.16	0.127	76.07	0.367	–138.21
1900.0	0.669	–133.13	2.995	50.31	0.139	76.30	0.388	–142.51
2000.0	0.661	–137.70	2.872	45.87	0.154	73.45	0.403	–144.74
2100.0	0.660	–142.35	2.730	41.41	0.166	74.08	0.408	–149.35
2200.0	0.660	–145.82	2.630	37.21	0.180	69.70	0.427	–153.97
2300.0	0.667	–151.02	2.497	32.36	0.199	68.97	0.444	–157.05
2400.0	0.663	–155.34	2.411	28.42	0.215	67.08	0.459	–161.21
2500.0	0.665	–159.71	2.294	24.90	0.225	63.38	0.479	–164.88
2600.0	0.671	–163.88	2.208	20.26	0.241	60.62	0.493	–168.63
2700.0	0.677	–168.72	2.118	16.64	0.259	57.47	0.510	–173.48
2800.0	0.682	–173.12	2.025	12.64	0.272	55.78	0.523	–177.27
2900.0	0.680	–177.75	1.936	8.81	0.284	52.98	0.542	178.12
3000.0	0.688	178.08	1.854	4.75	0.301	50.65	0.557	173.21

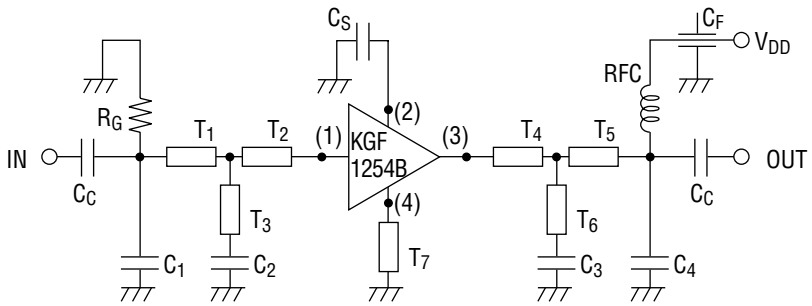
Typical S Parameters of KGF1254B

V_{DD} = 5 V, V_G = 0 V, I_D = 45.1 mA
Frequency : 0.5 to 3.0 GHz
Z_0 = 50 Ω



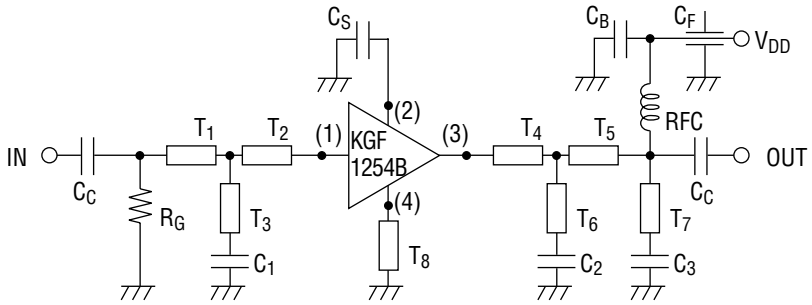


Test Circuit and Bias Configuration for KGF1254B at 850 MHz



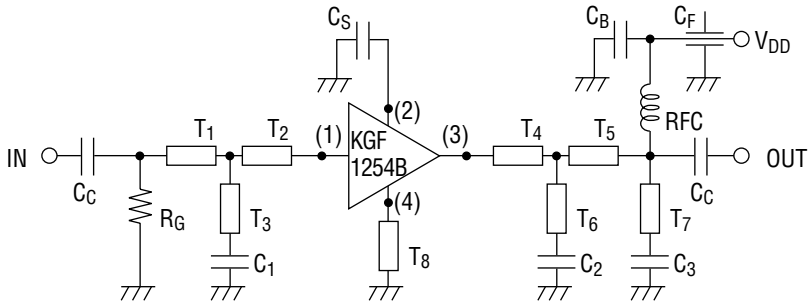
T_1: Z_0 = 75 Ω, E = 30 deg
T_2: Z_0 = 75 Ω, E = 28 deg
$T_3 = T_6$: Z_0 = 100 Ω, E = 5 deg
T_4: Z_0 = 75 Ω, E = 30 deg
T_5: Z_0 = 75 Ω, E = 30 deg
T_7: Z_0 = 100 Ω, E = 1 deg
C_1 = 7.0 pF, C_2 = 0.8 pF, C_3 = 5.0 pF, C_4 = 5.5 pF, C_S = 100 pF
$C_{C(DC\ Block)}$ = 1000 pF, $C_{F(Feed\ through)}$ = 1000 pF
RFC = 200 nH, R_G = 1000 Ω

Test Circuit and Bias Configuration for KGF1254B at 1.5 GHz



T_1: Z_0 = 75 Ω, E = 65 deg
T_2: Z_0 = 75 Ω, E = 40 deg
$T_3 = T_6 = T_7$: Z_0 = 100 Ω, E = 8 deg
T_4: Z_0 = 75 Ω, E = 50 deg
T_5: Z_0 = 75 Ω, E = 50 deg
T_8: Z_0 = 100 Ω, E = 1 deg
C_1 = 2.4 pF, C_2 = 1.2 pF, C_3 = 0.6 pF, C_S = 100 pF
$C_{C(DC\ Block)}$ = 1000 pF, $C_{B(By\text{-}pass)}$ = 1000 pF, $C_{F(Feed\ through)}$ = 1000 pF
RFC = 60 nH, R_G = 1000 Ω

Test Circuit and Bias Configuration for KGF1254B at 1.9 GHz



T_1: Z_0 = 75 Ω, E = 65 deg
T_2: Z_0 = 75 Ω, E = 40 deg
T_3 = T_6 = T_7: Z_0 = 100 Ω, E = 1 deg
T_4: Z_0 = 75 Ω, E = 50 deg
T_5: Z_0 = 75 Ω, E = 50 deg
T_8: Z_0 = 100 Ω, E = 1 deg
C_1 = 1.7 pF, C_2 = 1.3 pF, C_3 = 0.2 pF, C_S = 100 pF
$C_{C(DC\ Block)}$ = 1000 pF, $C_{B(By\text{-}pass)}$ = 1000 pF, $C_{F(Feed\ through)}$ = 1000 pF
RFC = 60 nH, R_G = 1000 Ω