

OKI electronic components

KGF1191

Small-Signal Amplifier

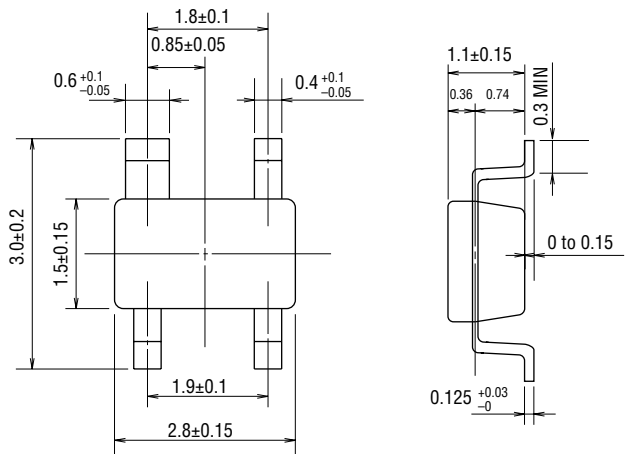
GENERAL DESCRIPTION

The KGF1191 is a two-stage small-signal amplifier, with frequencies ranging from the UHF-band to the L-band, that features low voltage operation, low current operation, high gain, and high isolation. The KGF1191 specifications are guaranteed to a fixed matching circuit for 3 V and 850 MHz; external impedance-matching circuits are also required. Because of the high gain and high isolation at 3 V, the KGF1191 is ideal as an intermediate-stage amplifier for portable phones.

FEATURES

- Low voltage and low current: 3 V, 5 mA (max.)
- Specifications guaranteed to a fixed matching circuit for 3 V and 850 MHz
- High linear gain: 24 dB (typ.)
- High isolation: -35 dB (typ.)
- Self-bias circuit configuration with built-in source capacitor
- Package: 4PSOP

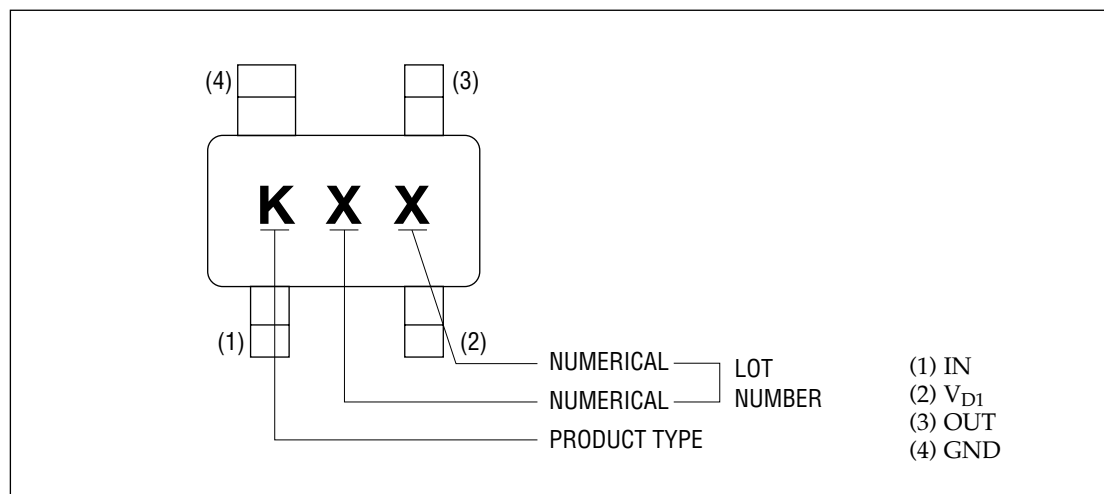
PACKAGE DIMENSIONS



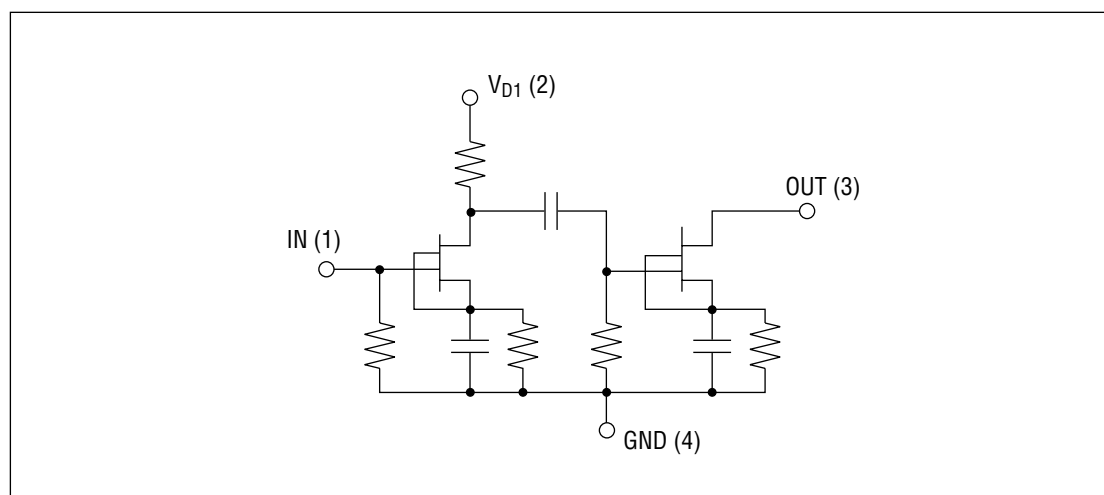
(Unit: mm)

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

MARKING



CIRCUIT



ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Unit	Min.	Max.
Supply voltage	V_{DD}	$T_a = 25^\circ\text{C}$	V	—	7
Gate voltage	V_G	$T_a = 25^\circ\text{C}$	V	-3.0	0.4
Total power dissipation	P_{tot}	$T_a = 25^\circ\text{C}$	mW	—	200
Channel temperature	T_{ch}	—	$^\circ\text{C}$	—	150
Storage temperature	T_{stg}	—	$^\circ\text{C}$	-45	125

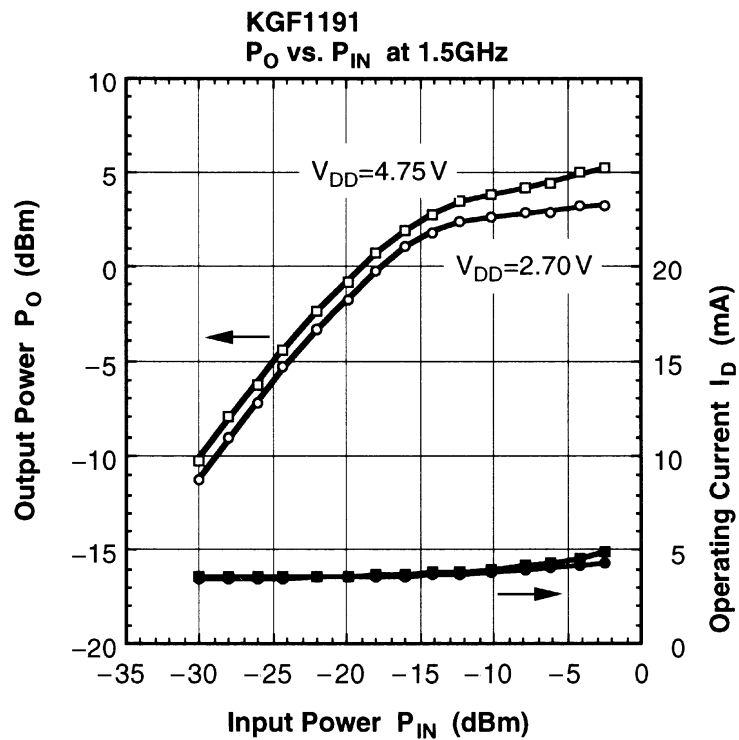
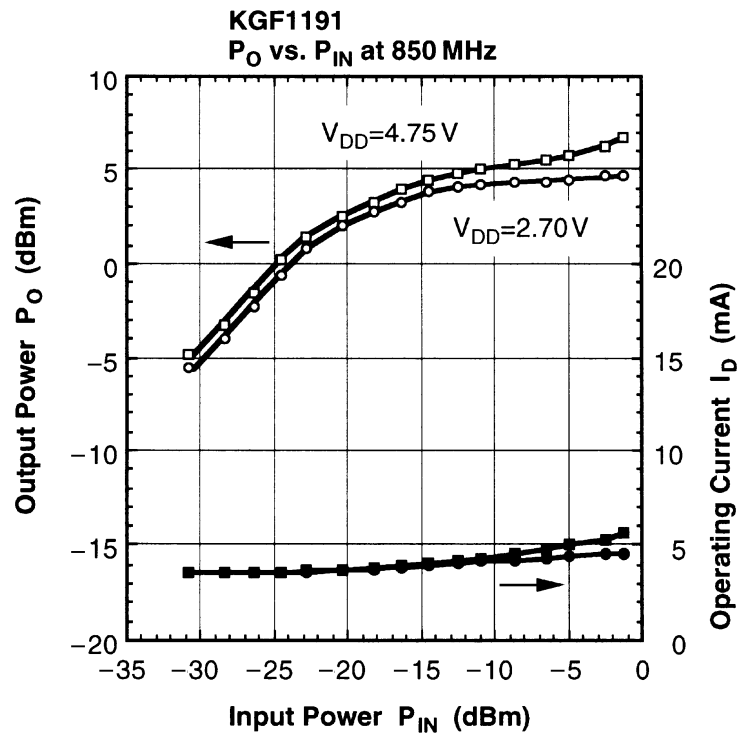
ELECTRICAL CHARACTERISTICS

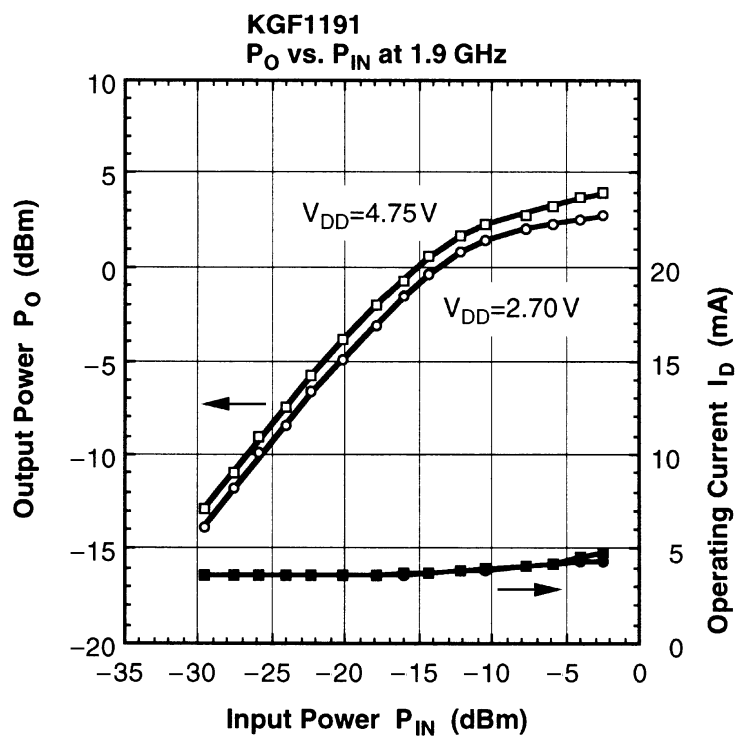
(Ta = 25°C)

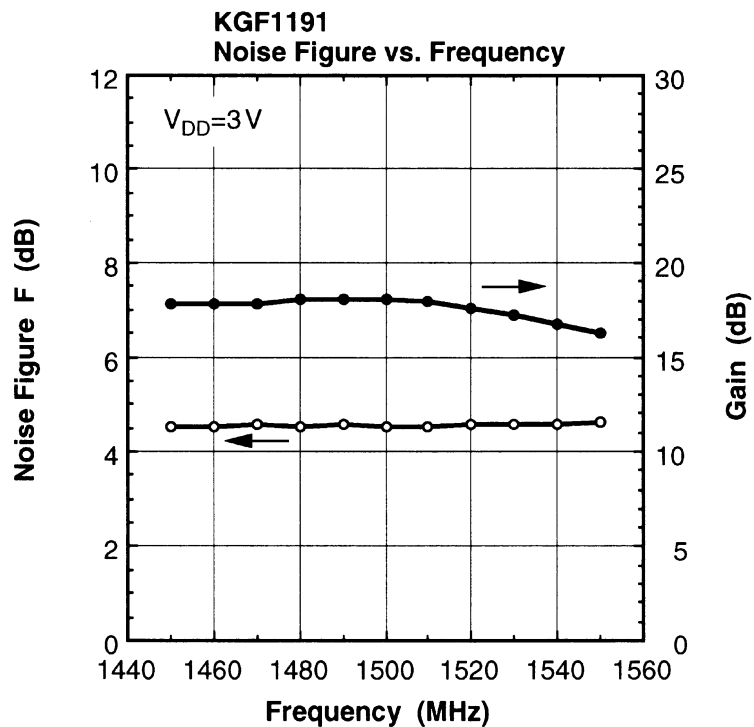
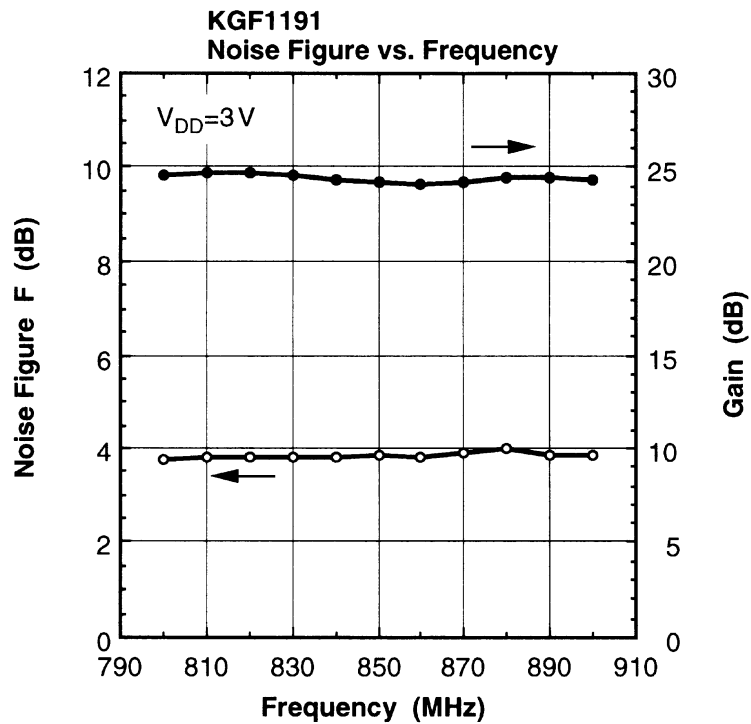
Item	Symbol	Condition	Unit	Min.	Typ.	Max.
Operating current	I_D	(*1), $P_{IN} = -13\text{ dBm}$	mA	—	—	5.0
Noise figure	F	(*1)	f = 850 MHz	—	4.0	5.0
			f = 1.5 GHz	—	4.5	—
			f = 1.9 GHz	—	5.0	—
Linear gain	G_{LIN}	(*1), $P_{IN} = -30\text{ dBm}$	f = 850 MHz	18.0	24.0	—
			f = 1.5 GHz	—	19.0	—
			f = 1.9 GHz	—	15.0	—
Output power	P_O	(*1), $P_{IN} = -13\text{ dBm}$	f = 850 MHz	0	3.0	—
			f = 1.5 GHz	—	1.5	—
			f = 1.9 GHz	—	0	—
Isolation	ISO	(*1), $P_{IN} = -20\text{ dBm}$	f = 850 MHz	—	-35.0	—
			f = 1.5 GHz	—	-30.0	—
			f = 1.9 GHz	—	-30.0	—

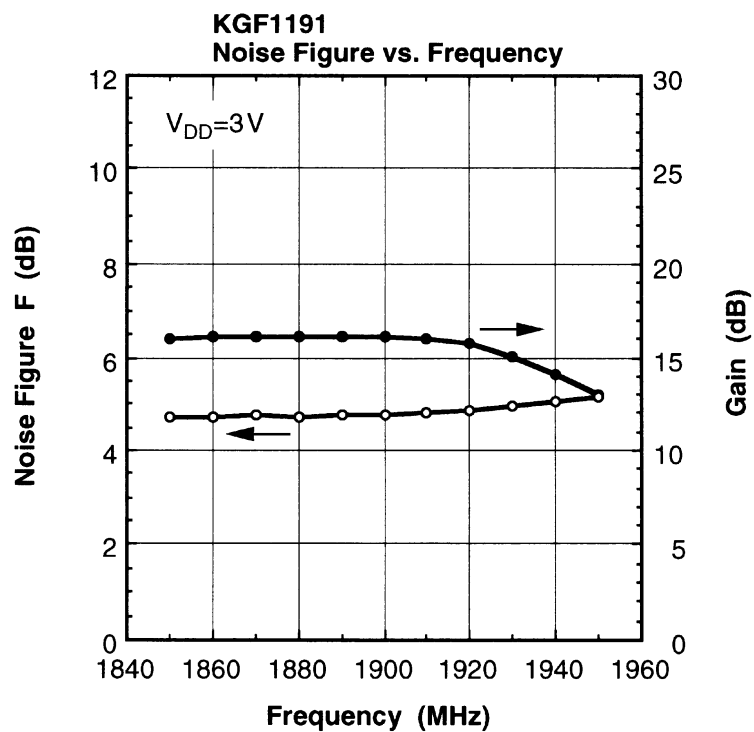
*1 Self-bias condition: $V_{DD} = 3 \pm 0.3\text{ V}$, $V_G = 0\text{ V}$

RF CHARACTERISTICS







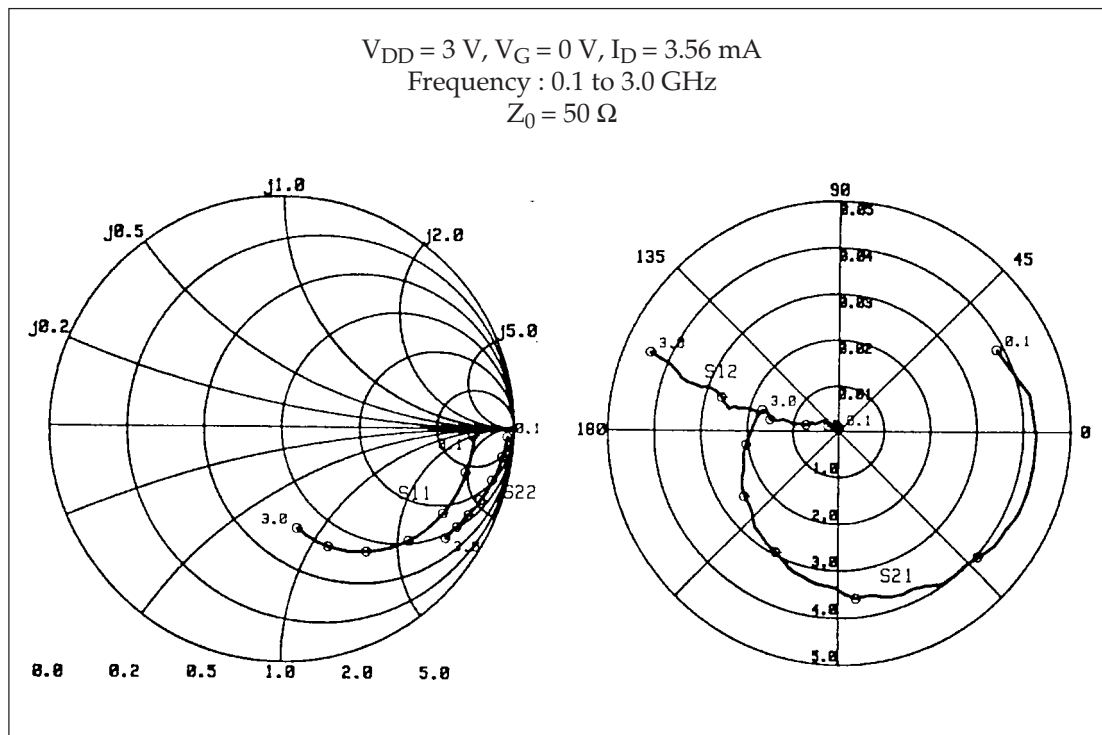


Typical S Parameters

 $V_{DD} = 3\text{ V}$, $V_G = 0\text{ V}$, $I_D = 3.56\text{ mA}$

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)
100.0	0.826	-2.48	3.689	26.33	0.001	102.87	0.969	-2.13
200.0	0.828	-5.42	4.054	-2.68	0.002	178.63	0.965	-3.46
300.0	0.826	-8.25	4.047	-19.24	0.001	85.27	0.960	-4.74
400.0	0.823	-10.98	3.944	-32.66	0.002	81.51	0.957	-6.19
500.0	0.818	-13.69	3.811	-43.77	0.002	96.73	0.954	-7.65
600.0	0.813	-16.49	3.742	-53.51	0.001	139.53	0.950	-8.87
700.0	0.808	-19.25	3.565	-62.73	0.002	122.83	0.945	-10.31
800.0	0.802	-22.02	3.510	-70.82	0.002	119.07	0.941	-11.55
900.0	0.796	-24.75	3.362	-78.70	0.002	132.88	0.937	-12.91
1000.0	0.789	-27.55	3.339	-85.73	0.003	141.62	0.932	-14.08
1100.0	0.781	-30.33	3.105	-93.15	0.004	145.54	0.928	-15.36
1200.0	0.770	-33.16	3.050	-99.64	0.004	148.84	0.922	-16.66
1300.0	0.761	-35.86	2.945	-105.81	0.004	160.42	0.920	-17.82
1400.0	0.750	-38.93	2.877	-111.89	0.005	167.88	0.912	-19.06
1500.0	0.737	-41.28	2.709	-118.68	0.007	167.34	0.909	-19.98
1600.0	0.723	-44.23	2.629	-124.25	0.009	167.54	0.906	-21.15
1700.0	0.713	-47.11	2.547	-129.31	0.010	168.93	0.901	-22.12
1800.0	0.696	-49.54	2.419	-135.82	0.010	171.82	0.898	-23.36
1900.0	0.690	-52.26	2.315	-141.51	0.013	167.51	0.893	-23.98
2000.0	0.663	-55.32	2.285	-145.96	0.016	169.19	0.885	-25.32
2100.0	0.645	-57.91	2.227	-151.50	0.016	170.19	0.882	-26.00
2200.0	0.629	-60.52	2.091	-157.05	0.019	165.87	0.875	-27.26
2300.0	0.610	-62.96	2.006	-162.57	0.022	169.05	0.874	-28.24
2400.0	0.589	-66.12	1.971	-167.19	0.025	165.57	0.867	-28.90
2500.0	0.571	-68.72	1.875	-171.67	0.028	165.24	0.866	-30.12
2600.0	0.551	-70.99	1.801	-176.77	0.031	162.81	0.864	-30.61
2700.0	0.532	-73.75	1.742	-178.62	0.034	161.97	0.856	-31.85
2800.0	0.508	-76.47	1.706	-173.98	0.038	160.90	0.858	-32.49
2900.0	0.484	-79.35	1.671	-169.70	0.041	160.05	0.853	-33.54
3000.0	0.462	-81.93	1.608	-164.43	0.046	157.80	0.850	-34.74

Typical S Parameters

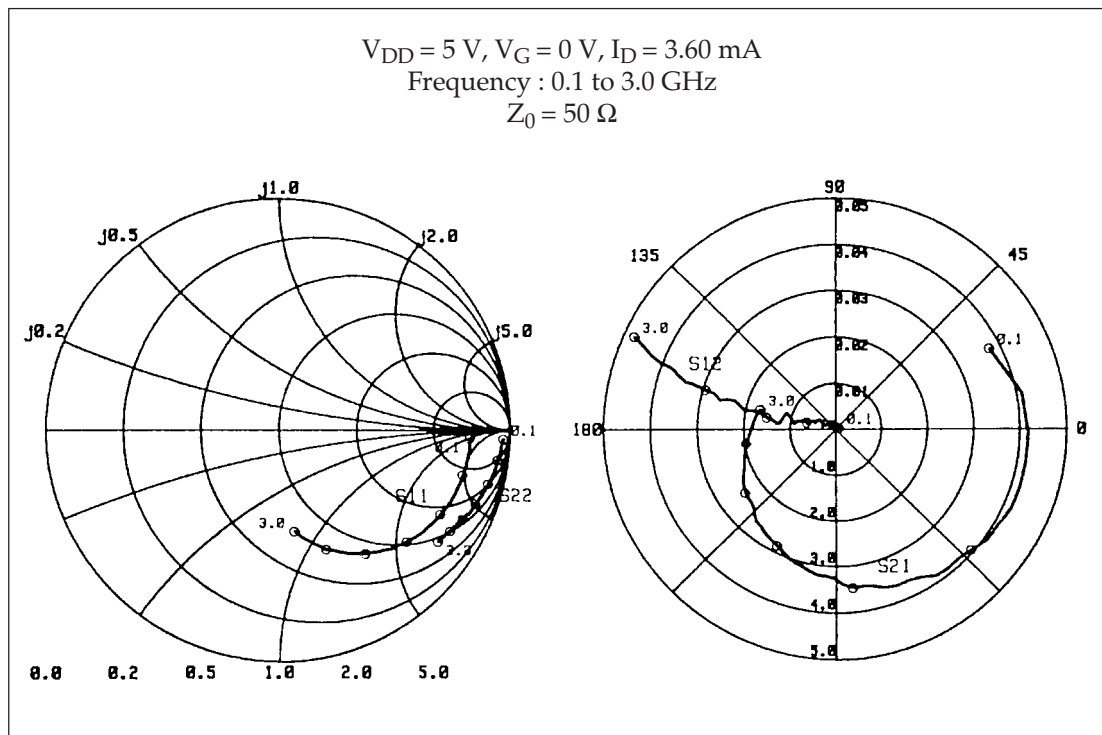


Typical S Parameters

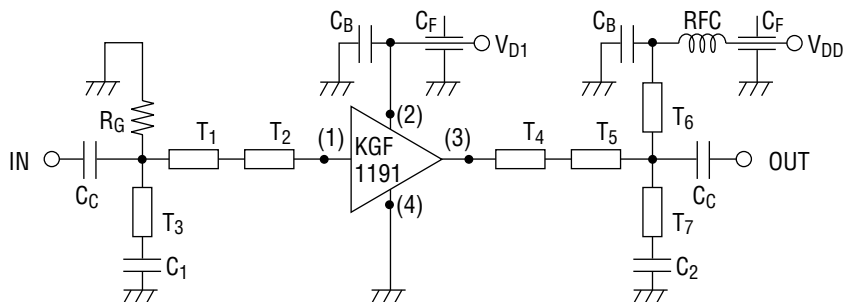
 $V_{DD} = 5\text{ V}$, $V_G = 0\text{ V}$, $I_D = 3.60\text{ mA}$

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)
100.0	0.821	-2.46	3.840	27.87	0.001	106.42	0.970	-2.14
200.0	0.824	-5.35	4.257	-1.07	0.001	14.24	0.966	-3.35
300.0	0.821	-8.20	4.265	-17.53	0.001	111.02	0.963	-4.61
400.0	0.819	-10.93	4.173	-30.85	0.001	102.62	0.960	-5.99
500.0	0.814	-13.64	4.041	-41.88	0.001	107.82	0.957	-7.42
600.0	0.810	-16.52	3.984	-51.44	0.002	104.70	0.952	-8.74
700.0	0.805	-19.23	3.803	-60.76	0.002	119.01	0.948	-10.13
800.0	0.799	-22.06	3.755	-68.89	0.001	118.47	0.946	-11.33
900.0	0.792	-24.80	3.609	-76.94	0.002	142.84	0.940	-12.76
1000.0	0.786	-27.81	3.601	-83.94	0.003	153.34	0.933	-13.87
1100.0	0.775	-30.47	3.355	-91.50	0.003	147.32	0.929	-15.16
1200.0	0.765	-33.34	3.309	-98.33	0.004	148.53	0.925	-16.33
1300.0	0.755	-36.06	3.208	-104.65	0.005	156.44	0.922	-17.45
1400.0	0.743	-39.21	3.128	-110.68	0.006	163.77	0.914	-18.75
1500.0	0.729	-41.61	2.946	-117.74	0.007	168.64	0.909	-19.67
1600.0	0.714	-44.53	2.882	-123.29	0.009	169.40	0.905	-20.74
1700.0	0.700	-47.43	2.792	-128.77	0.010	173.81	0.903	-21.84
1800.0	0.684	-49.85	2.659	-135.06	0.010	170.88	0.896	-22.79
1900.0	0.667	-52.61	2.532	-140.91	0.013	168.32	0.888	-23.52
2000.0	0.646	-55.60	2.502	-145.68	0.015	170.35	0.887	-24.80
2100.0	0.629	-58.35	2.434	-151.11	0.018	168.88	0.880	-25.51
2200.0	0.613	-60.75	2.279	-156.84	0.019	166.36	0.874	-26.69
2300.0	0.593	-63.14	2.192	-162.33	0.023	167.44	0.874	-27.52
2400.0	0.570	-66.00	2.137	-167.16	0.025	168.58	0.865	-28.22
2500.0	0.551	-68.61	2.050	-171.55	0.027	163.96	0.866	-29.33
2600.0	0.530	-70.87	1.959	-176.76	0.030	161.14	0.860	-29.76
2700.0	0.509	-73.62	1.898	-178.81	0.033	161.94	0.856	-30.88
2800.0	0.486	-76.19	1.749	-173.93	0.036	161.44	0.855	-31.65
2900.0	0.462	-78.64	1.810	-169.62	0.040	158.20	0.852	-32.56
3000.0	0.440	-81.11	1.734	-164.47	0.044	157.30	0.850	-33.67

Typical S Parameters

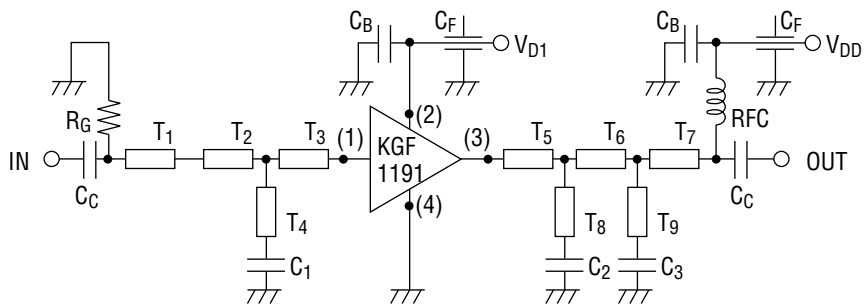


Test Circuit and Bias Configuration for KGF1191 at 850 MHz



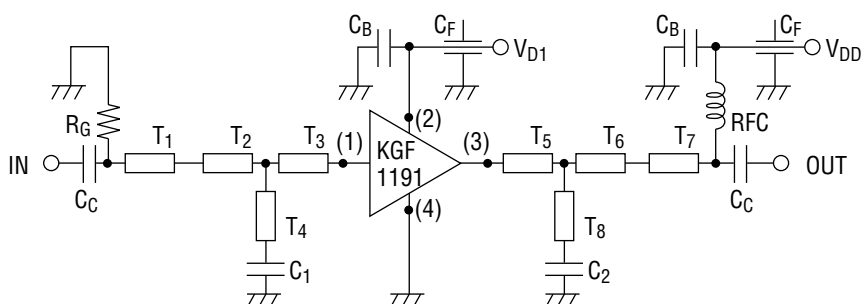
T_1 : $Z_0 = 130 \Omega$, $E = 50 \text{ deg}$ T_4 : $Z_0 = 100 \Omega$, $E = 62 \text{ deg}$
 T_2 : $Z_0 = 100 \Omega$, $E = 15 \text{ deg}$ T_5 : $Z_0 = 100 \Omega$, $E = 18 \text{ deg}$
 $T_3 = T_7$: $Z_0 = 100 \Omega$, $E = 6 \text{ deg}$ T_6 : $Z_0 = 60 \Omega$, $E = 15 \text{ deg}$
 $C_1 = 0.6 \text{ pF}$, $C_2 = 5.0 \text{ pF}$
 $C_C(\text{DC Block}) = 1000 \text{ pF}$, $C_B(\text{By-pass}) = 1000 \text{ pF}$, $C_F(\text{Feed through}) = 1000 \text{ pF}$
 $\text{RFC} = 200 \text{ nH}$, $R_G = 1000 \Omega$

Test Circuit and Bias Configuration for KGF1191 at 1.5 GHz



T_1 : $Z_0 = 75 \Omega$, $E = 31 \text{ deg}$ T_5 : $Z_0 = 100 \Omega$, $E = 61 \text{ deg}$
 T_2 : $Z_0 = 100 \Omega$, $E = 10 \text{ deg}$ T_6 : $Z_0 = 100 \Omega$, $E = 16 \text{ deg}$
 T_3 : $Z_0 = 100 \Omega$, $E = 65 \text{ deg}$ T_7 : $Z_0 = 75 \Omega$, $E = 31 \text{ deg}$
 T_4 : $Z_0 = 100 \Omega$, $E = 8 \text{ deg}$ $T_8 = T_9$: $Z_0 = 100 \Omega$, $E = 12 \text{ deg}$
 $C_1 = 2.0 \text{ pF}$, $C_2 = 2.5 \text{ pF}$, $C_3 = 2.7 \text{ pF}$
 $C_C(\text{DC Block}) = 1000 \text{ pF}$, $C_B(\text{By-pass}) = 1000 \text{ pF}$, $C_F(\text{Feed through}) = 1000 \text{ pF}$
 $\text{RFC} = 60 \text{ nH}$, $R_G = 1000 \Omega$

Test Circuit and Bias Configuration for KGF1191 at 1.9 GHz



T_1 : $Z_0 = 75 \Omega$, $E = 40 \text{ deg}$

T_2 : $Z_0 = 100 \Omega$, $E = 35 \text{ deg}$

T_3 : $Z_0 = 100 \Omega$, $E = 88 \text{ deg}$

$T_4 = T_8$: $Z_0 = 100 \Omega$, $E = 12 \text{ deg}$

$C_1 = 0.7 \text{ pF}$, $C_2 = 1.4 \text{ pF}$

$C_C(\text{DC Block}) = 1000 \text{ pF}$, $C_B(\text{By-pass}) = 1000 \text{ pF}$, $C_F(\text{Feed through}) = 1000 \text{ pF}$

$\text{RFC} = 60 \text{ nH}$, $R_G = 1000 \Omega$

T_5 : $Z_0 = 100 \Omega$, $E = 88 \text{ deg}$

T_6 : $Z_0 = 100 \Omega$, $E = 35 \text{ deg}$

T_7 : $Z_0 = 75 \Omega$, $E = 40 \text{ deg}$