OKI electronic components

KGF1521

Small-Signal Amplifier

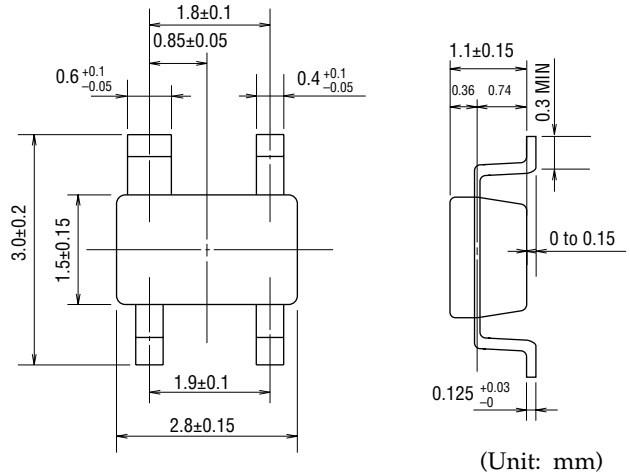
GENERAL DESCRIPTION

The KGF1521 is a high-performance GaAs FET small-signal amplifier for L-band frequencies that features low voltage operation, low current operation, low noise, and low distortion. The KGF1521 specifications are guaranteed to a fixed matching circuit for 3 V and 1.9 GHz; external impedance-matching circuits are also required. Because of its high 3rd-order intercept point, even at its low operating current, the KGF1521 is ideal as a small-signal amplifier for L-band personal handy phones, such as digital keying cordless phones that require low intermodulation properties.

FEATURES

- Low voltage and low current operation: 3 V, 2.5 mA (max.)
- Specifications guaranteed to a fixed matching circuit for 3 V, 1.9 GHz
- Low noise figure: 1.8 dB (typ.) at 1.9 GHz
- High linear gain: 12.5 dB (typ.) at 1.9 GHz
- High output power: 1 dB compression point = 0 dBm (typ.) at 1.9 GHz
- Low distortion: 3rd-order intercept point = 12 dBm (typ.) at 1.9 GHz
- Self-bias circuit configuration with built-in source capacitor
- Package: 4PSOP

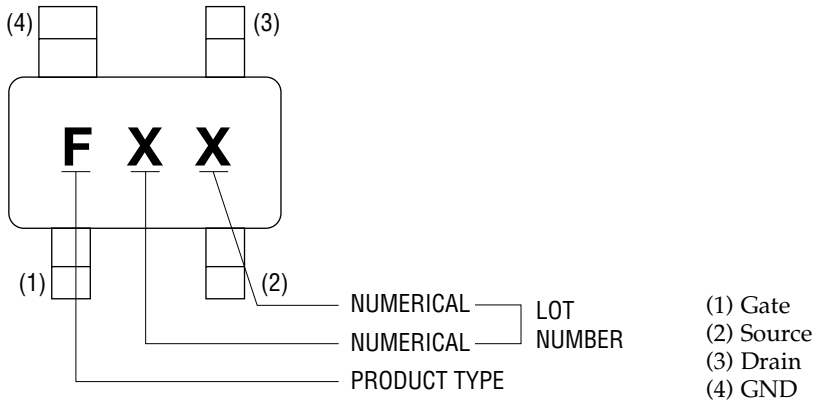
PACKAGE DIMENSIONS



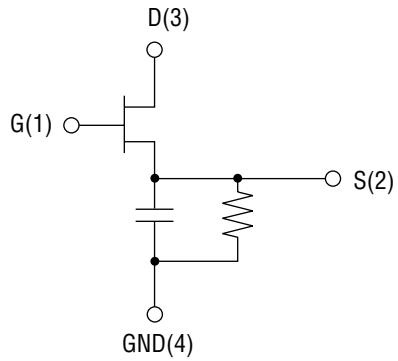
(Unit: mm)

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

MARKING



CIRCUIT



ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Unit	Min.	Max.
Drain-source voltage	V_{DS}	Ta = 25°C	V	—	4.0
Gate-source voltage	V_{GS}	Ta = 25°C	V	–3.0	0.4
Drain current	I_{DS}	Ta = 25°C	mA	—	50
Total power dissipation	P_{tot}	Ta = 25°C	mW	—	200
Channel temperature	T_{ch}	—	°C	—	150
Storage temperature	T_{stg}	—	°C	–45	125

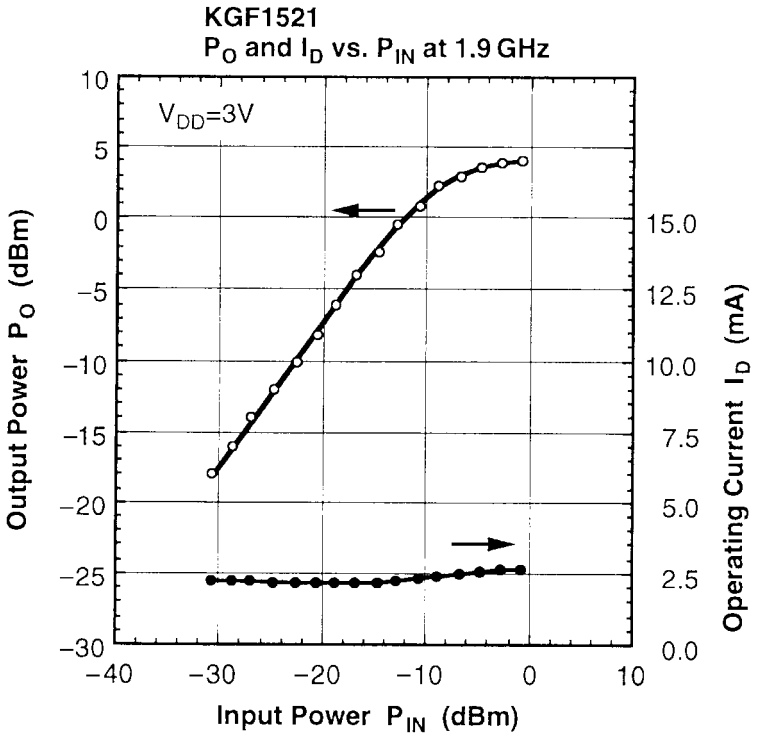
ELECTRICAL CHARACTERISTICS

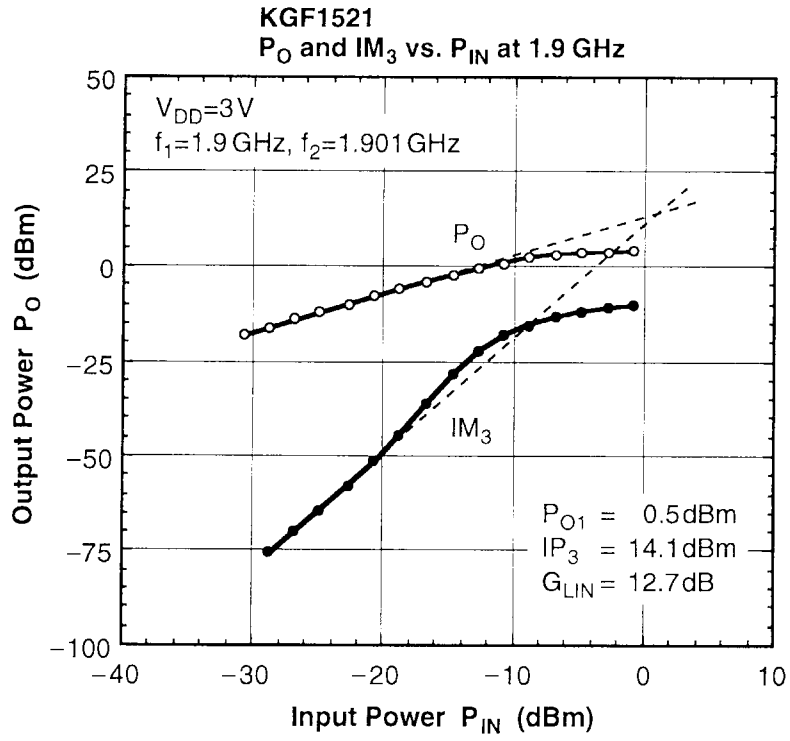
(Ta = 25°C)

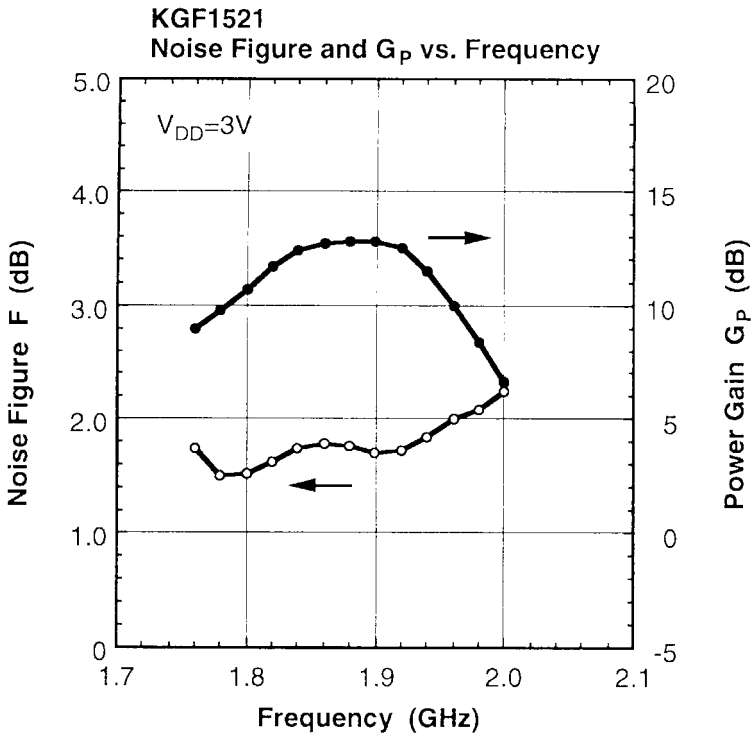
Item	Symbol	Condition	Unit	Min.	Typ.	Max.
Gate-source leakage current	I_{GSS}	V_{GS} = –3 V	µA	—	—	30
Gate-drain leakage current	I_{GDO}	V_{GD} = –6 V	µA	—	—	30
Drain-source leakage current	$I_{DS(off)}$	V_{DS} = 3 V, V_{GS} = –2 V	µA	—	—	30
Drain current	I_{DSS}	V_{DS} = 3 V, V_{GS} = 0 V	mA	15	25	—
Operating current	I_D	(*1), P_{IN} = –20 dBm	mA	—	2.0	2.5
Gate-source cut-off voltage	$V_{GS(off)}$	V_{DS} = 3 V, I_{DS} = 100 µA	V	–1.4	—	–0.6
Transconductance	gm	V_{DS} = 3 V, I_{DS} = 2 mA	mS	14	17	—
Noise figure	F	(*1)	dB	—	1.8	2.5
Linear gain	G_{LIN}	(*1), P_{IN} = –20 dBm	dB	11.0	12.5	—
Output power	P_{O1}	(*1)	dBm	–3.0	0	—
Third-order intercept point	IP_3	(*2), f_2 = 1.901 GHz	dBm	—	12	—

*1 Self-bias condition: V_{DD} = 3 V ± 0.3 V, V_G = 0 V, f = 1.9 GHz

RF CHARACTERISTICS







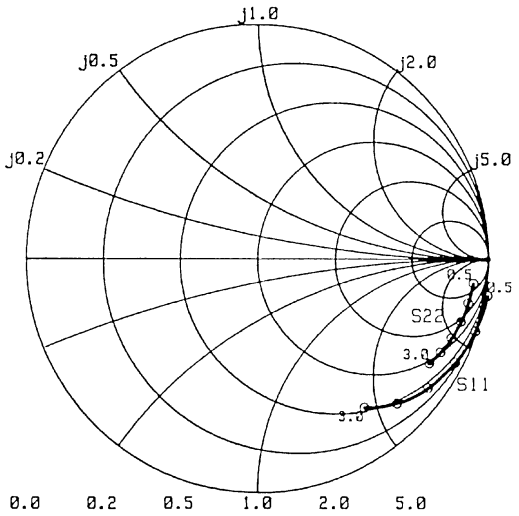
Typical S Parameters

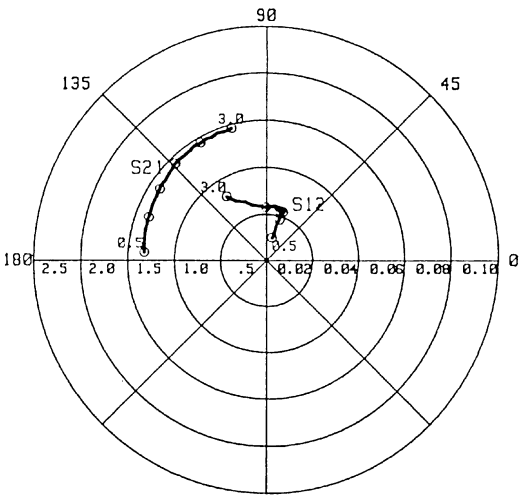
V_{DD} = 3 V, I_D = 2.23 mA

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	1.006	–9.13	1.330	176.30	0.010	77.66	0.939	–6.40
600.0	1.004	–10.96	1.338	172.44	0.012	75.14	0.937	–7.42
700.0	1.001	–12.83	1.346	168.98	0.013	74.67	0.934	–8.59
800.0	0.998	–14.68	1.353	165.93	0.015	74.75	0.933	–9.60
900.0	0.995	–16.53	1.354	163.08	0.016	74.68	0.932	–10.71
1000.0	0.992	–18.33	1.359	160.07	0.018	72.86	0.930	–11.75
1100.0	0.987	–20.18	1.359	157.16	0.018	73.49	0.927	–12.88
1200.0	0.983	–22.02	1.369	154.84	0.020	72.57	0.926	–13.89
1300.0	0.978	–23.88	1.374	152.28	0.021	71.18	0.925	–14.99
1400.0	0.972	–25.70	1.376	149.79	0.022	70.96	0.922	–16.04
1500.0	0.966	–27.62	1.388	146.67	0.022	71.48	0.920	–17.08
1600.0	0.959	–29.46	1.397	144.51	0.022	70.80	0.918	–18.12
1700.0	0.950	–31.22	1.393	141.98	0.023	70.04	0.914	–18.95
1800.0	0.941	–33.22	1.409	138.88	0.023	71.52	0.911	–20.20
1900.0	0.935	–35.13	1.418	136.15	0.023	72.15	0.910	–21.19
2000.0	0.924	–37.04	1.434	133.84	0.022	75.12	0.905	–22.16
2100.0	0.915	–38.95	1.440	131.23	0.023	80.13	0.903	–23.29
2200.0	0.905	–40.60	1.435	128.21	0.024	80.50	0.900	–24.24
2300.0	0.893	–42.34	1.440	125.19	0.023	82.84	0.894	–25.15
2400.0	0.881	–44.23	1.458	122.85	0.023	87.86	0.892	–26.13
2500.0	0.866	–15.91	1.448	120.01	0.023	91.51	0.887	–26.95
2600.0	0.852	–47.73	1.455	116.96	0.024	97.20	0.883	–27.96
2700.0	0.837	–49.40	1.447	114.13	0.025	105.76	0.879	–28.80
2800.0	0.821	–51.16	1.467	111.27	0.027	110.78	0.874	–29.63
2900.0	0.806	–52.74	1.454	108.42	0.029	118.12	0.871	–30.58
3000.0	0.790	–54.25	1.462	105.45	0.032	122.68	0.868	–31.21

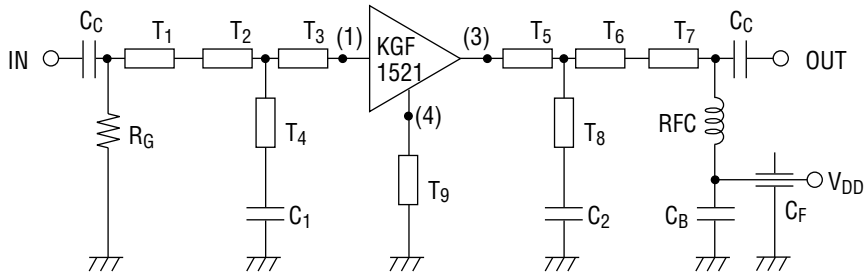
Typical S Parameters

V_{DD} = 3 V, I_D = 2.23 mA
Frequency : 0.5 to 3.0 GHz
Z_0 = 50 Ω





Test Circuit and Bias Configuration for KGF1521 at 1.9 GHz



T_1: Z_0 = 75 Ω, E = 23 deg
T_2: Z_0 = 100 Ω, E = 2 deg
T_3: Z_0 = 100 Ω, E = 68 deg
T_4 = T_8: Z_0 = 100 Ω, E = 10 deg
T_5: Z_0 = 100 Ω, E = 87 deg
T_6: Z_0 = 100 Ω, E = 25 deg
T_7: Z_0 = 75 Ω, E = 20 deg
T_9: Z_0 = 100 Ω, E = 5 deg
C_1 = 1.40 pF, C_2 = 1.35 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