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

OKI electronic components

KGF1146

Small-Signal Amplifier

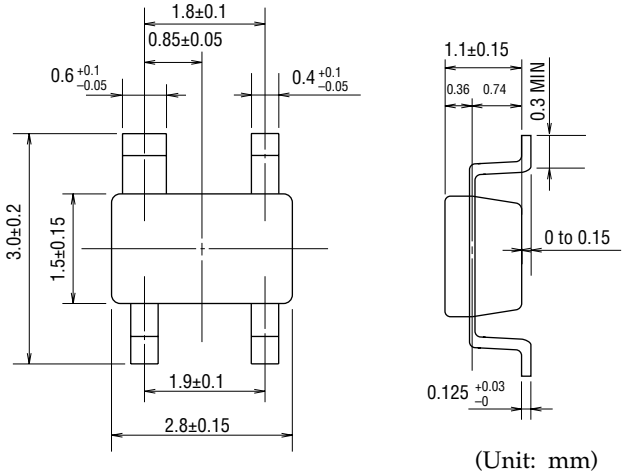
GENERAL DESCRIPTION

The KGF1146 is a two-stage small-signal UHF-band amplifier that features low current operation, high output power, and high isolation. The KGF1146 specifications are guaranteed to a fixed matching circuit for 5 V and 850 MHz; external impedance-matching circuits are also required. Because of the high isolation, the KGF1146 is an ideal part for a VCO-buffer amplifiers and an intermediate-stage amplifier for personal handy phones, such as cellular phones.

FEATURES

- Low current operation: 2.5 mA (max.)
- High output power: 1.5 dBm (min.)
- High isolation: –40 dB
- Self-bias circuit configuration with built-in source capacitor
- Package: 4PSOP

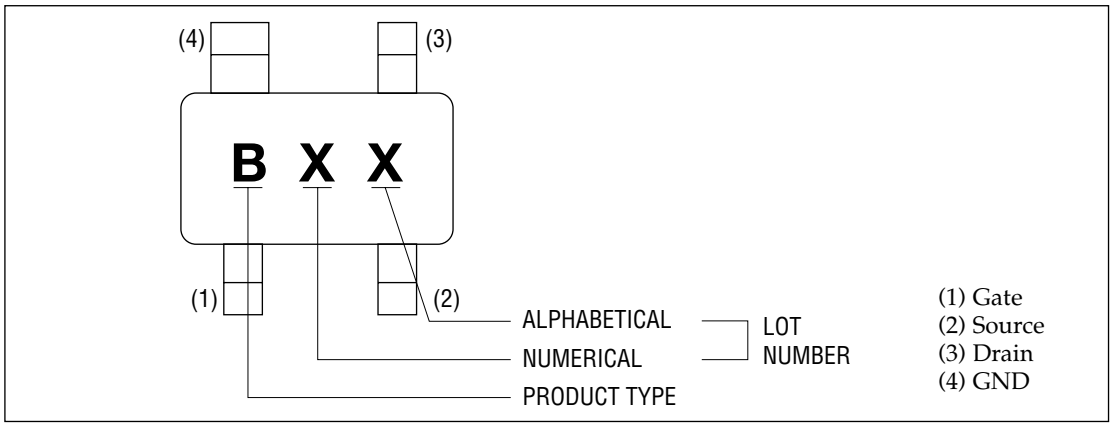
PACKAGE DIMENSIONS



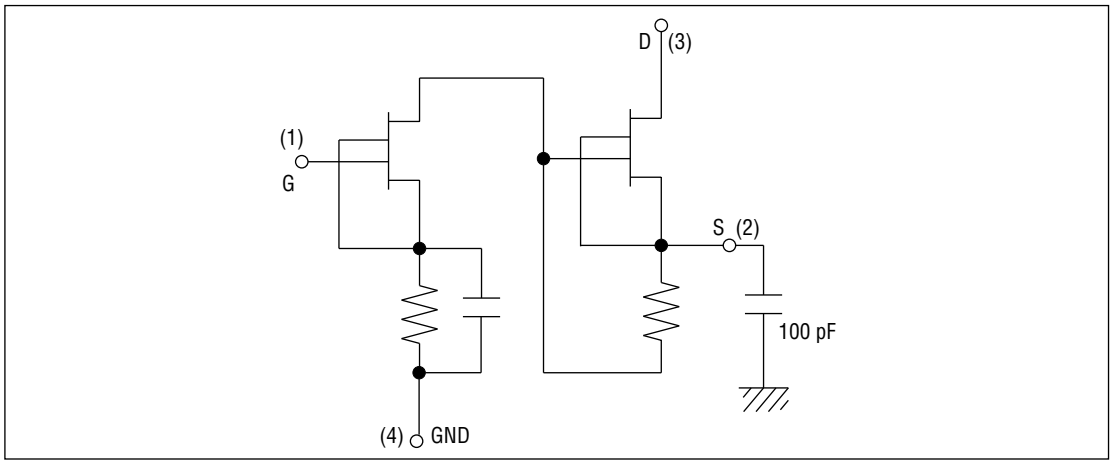
(Unit: mm)

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

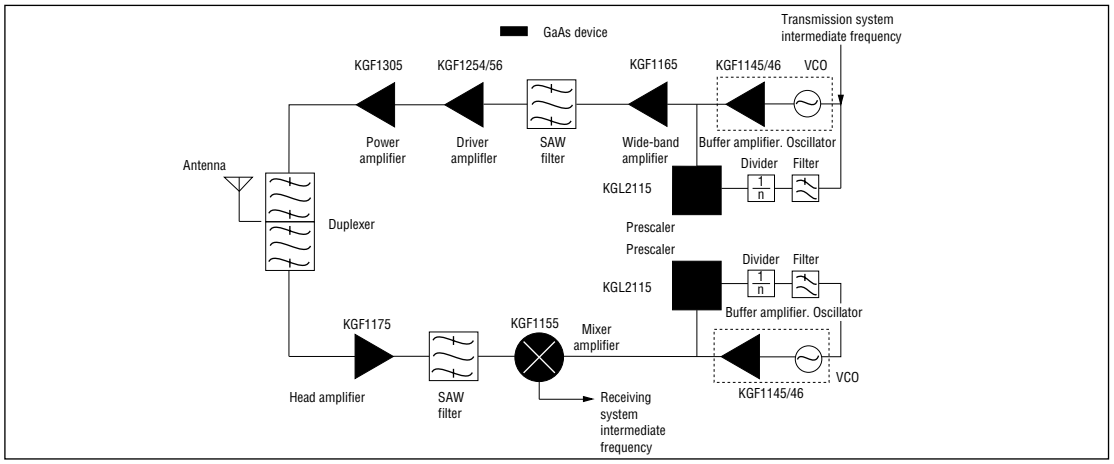
MARKING



CIRCUIT



APPLICATION EXAMPLE FOR PORTABLE PHONES



ABSOLUTE MAXIMUM RATINGS

(Ta = 25°C)

Item	Symbol	Unit	Min.	Max.
Drain-source voltage	V_{DS}	V	—	6
Gate-source voltage	V_{GS}	V	–3	0.4
Drain current	I_{DS}	mA	—	60
Total power dissipation	Ptot	mW	—	200
Channel temperature	Tch	°C	—	150
Storage temperature	Tstg	°C	–45	125

ELECTRICAL CHARACTERISTICS

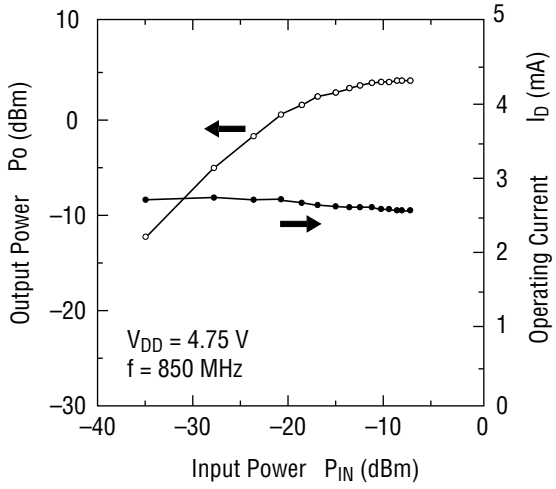
(Ta = 25°C)

Item	Symbol	Condition	Unit	Min.	Max.
Gate-source leakage current	I_{GSS}	V_{GS} = –3 V	μA	—	12
Gate-drain leakage current	I_{GDO}	V_{GDO} = –6 V	μA	—	60
Drain-source leakage current	$I_{DS(off)}$	V_{DS} = 3 V, V_{GS} = –2.0 V	μA	—	120
Drain current	I_{DSS}	V_{DS} = 3 V, V_{GS} = 0 V	mA	15	—
Operating current	I_D	(*1), P_{IN} = –10 dBm	mA	—	2.5
Gate-source cut-off voltage	$V_{GS(off)}$	V_{DS} = 3 V, I_{DS} = 120 μA	V	–1.5	–0.5
Transconductance	g_m	V_{DS} = 3 V, I_{DS} = 2.0 mA	mS	8	—
Output power	P_O	(*1), P_{IN} = –10 dBm	dBm	1.5	—
Isolation	ISO	(*1), P_{IN} = –10 dBm	dB	40	—

*1 Self-bias condition: V_{DD} = 5.0 ± 0.25 V, V_G = 0 V, f = 850 MHz

RF CHARACTERISTICS

Po vs. P_{IN}



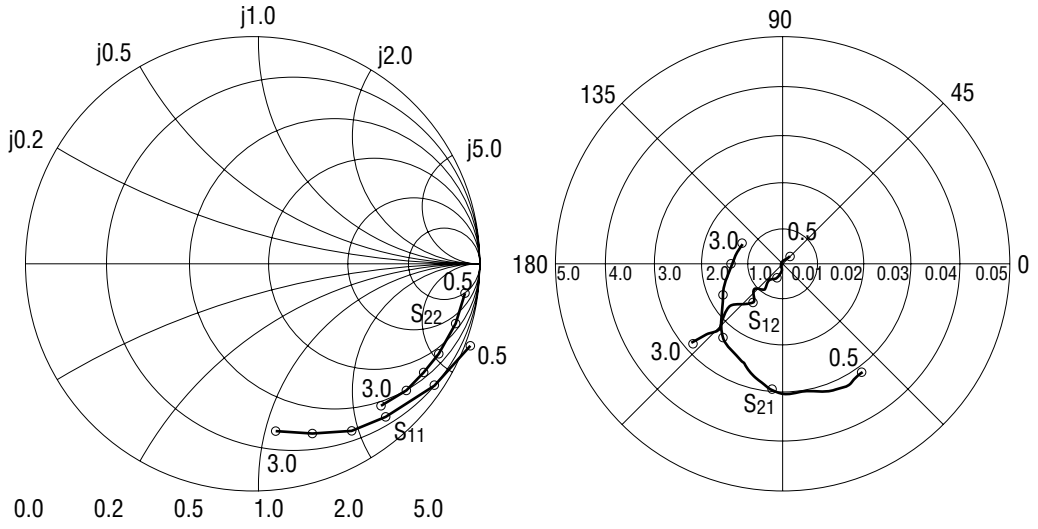
Typical S Parameters

V_{DD} = 5 V, I_D = 1.85 mA

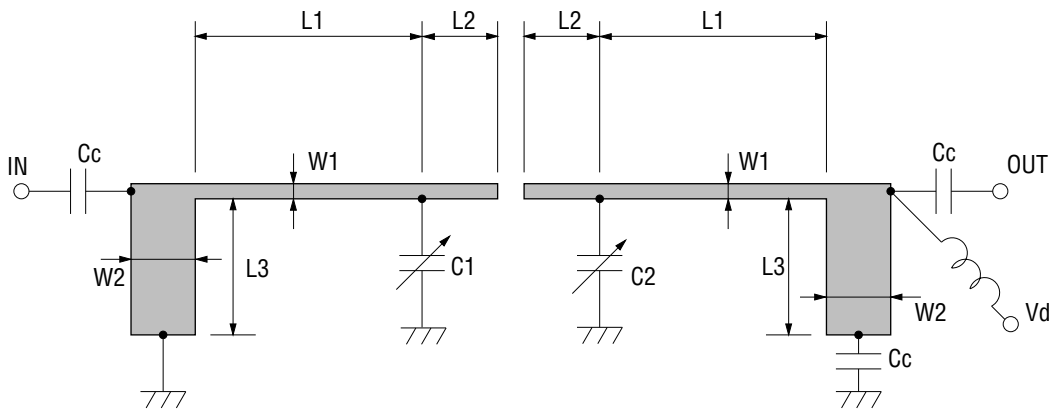
Freq(MHz)	MAG(S_{11})	ANG(S_{11})	MAG(S_{21})	ANG(S_{21})	MAG(S_{12})	ANG(S_{12})	MAG(S_{22})	ANG(S_{22})
500.0	1.016	–13.78	3.144	–53.83	0.002	91.21	0.954	–7.09
600.0	1.008	–16.42	3.184	–65.20	0.002	72.13	0.954	–8.39
700.0	1.002	–19.14	3.091	–76.19	0.001	88.37	0.954	–9.92
800.0	0.995	–21.80	3.060	–84.59	0.002	87.52	0.952	–11.21
900.0	0.988	–24.38	2.952	–92.88	0.003	75.89	0.950	–12.84
1000.0	0.981	–26.95	2.961	–98.49	0.002	69.05	0.948	–14.07
1100.0	0.973	–29.64	2.741	–105.75	0.001	51.70	0.952	–15.34
1200.0	0.963	–32.24	2.687	–111.43	0.002	89.09	0.944	–16.82
1300.0	0.956	–34.90	2.557	–117.29	0.001	31.04	0.945	–18.09
1400.0	0.945	–37.58	2.481	–122.72	0.001	96.43	0.941	–19.74
1500.0	0.938	–40.39	2.316	–129.37	0.001	138.33	0.941	–20.90
1600.0	0.929	–42.98	2.187	–134.82	0.001	124.06	0.937	–22.03
1700.0	0.918	–46.03	2.009	–140.24	0.002	–115.76	0.941	–23.52
1800.0	0.906	–48.76	1.872	–151.35	0.001	–129.25	0.932	–24.82
1900.0	0.897	–51.64	1.775	–155.91	0.003	–128.46	0.934	–26.27
2000.0	0.880	–54.61	1.710	–161.08	0.003	–121.98	0.929	–27.28
2100.0	0.868	–57.75	1.650	–166.40	0.005	–139.31	0.926	–28.67
2200.0	0.855	–60.87	1.562	–171.49	0.007	–126.58	0.927	–29.86
2300.0	0.847	–63.86	1.499	–176.27	0.008	–127.50	0.923	–30.90
2400.0	0.830	–66.88	1.470	179.50	0.009	–139.94	0.924	–32.30
2500.0	0.819	–69.77	1.413	176.86	0.013	–129.23	0.920	–33.42
2600.0	0.804	–72.90	1.364	174.40	0.014	–134.15	0.919	–34.91
2700.0	0.792	–76.11	1.337	169.45	0.016	–136.16	0.914	–35.62
2800.0	0.778	–79.41	1.304	164.51	0.019	–140.71	0.916	–37.07
2900.0	0.770	–82.77	1.287	159.93	0.024	–134.62	0.914	–37.84
3000.0	0.754	–85.91	1.238	155.02	0.028	–137.56	0.916	–38.89

Typical S Parameters

V_{DD} = 5 V, I_D = 1.85 mA
Frequency : 0.5 to 3.0 GHz
Z_0 = 50 Ω



Test Circuit



L1 = 20 mm
L2 = 8 mm
L3 = 10 mm

W1 = 1 mm
W2 = 3 mm
Cc = 1000 pF

C1, C2: Trimmer Capacitor
(Murata Giga-Trimmer,
max. 4.5 pF)

Substrate parameters
ε_r = 2.6
h = 1.6 mm

C1 and C2 are tuned to obtain maximum output power.