OKI electronic components

KGF1313

Power FET (Plastic Package Type)

GENERAL DESCRIPTION

The KGF1313, housed in a SOT-89 type plastic-mold package, is a discrete power FET with frequencies ranging from the UHF-band to the L-band. This device features high efficiency and high output power. The KGF1313 specifications are guaranteed to a fixed matching circuit for 3.4 V and 1.9 GHz; external impedance-matching circuits are also required. Because of its high efficiency, high output power (more than 27 dBm), and plastic package, the KGF1313 is ideal as a transmitter-final-stage amplifier for personal handy phones, such as digital keying cordless phones.
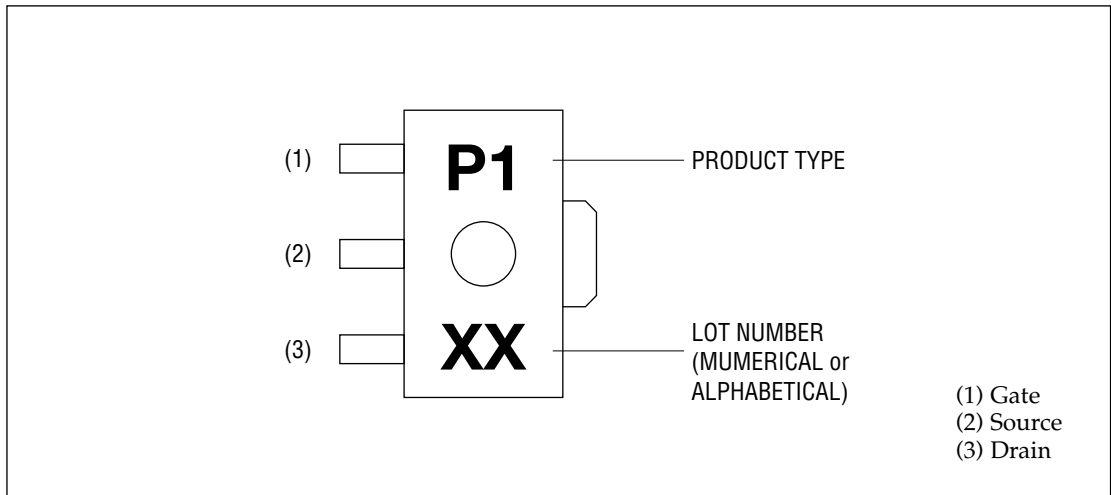
FEATURES

• Specifications guaranteed to a fixed matching circuits for 3.4 V, 1.9 GHz
• High output power: 27 dBm (min.) at 1.9 GHz
• High efficiency: 50% (typ.) at 1.9 GHz
• Low thermal resistance: 23°C/W (typ.)
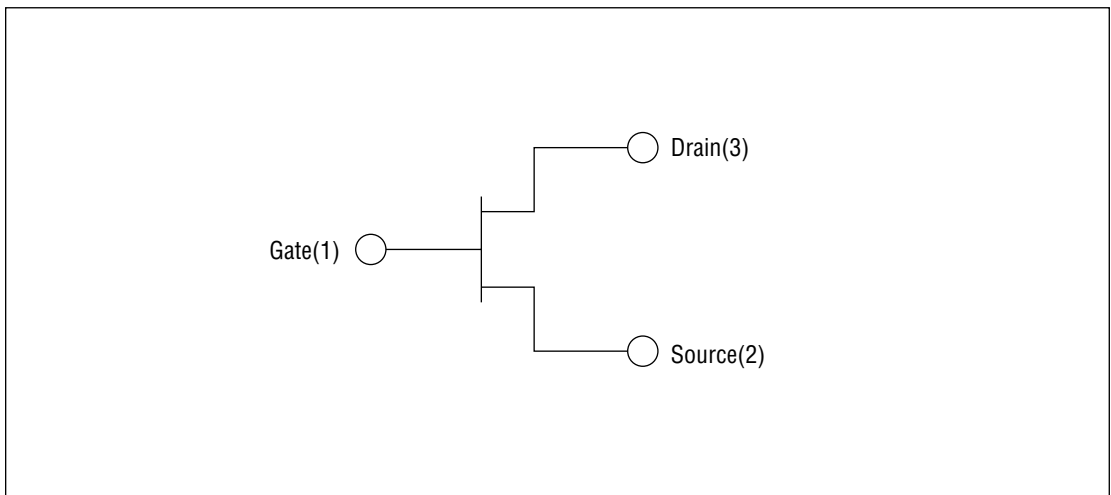• Package: 3PMMP (SOT-89 type)

PACKAGE DIMENSIONS
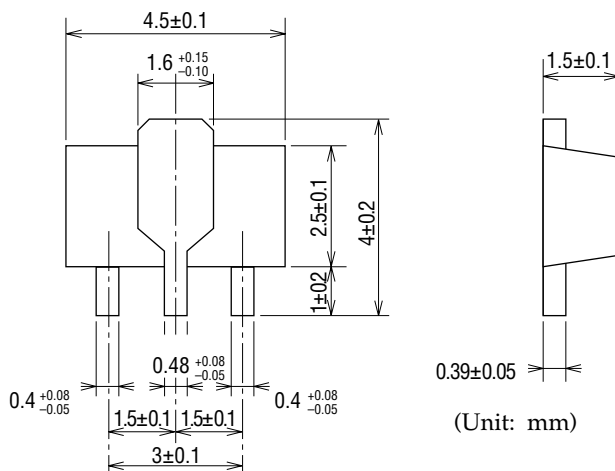
Package material	Epoxy resin
Lead frame material	Cu
Pin treatment	Solder plating
Solder plate thickness	5 μm or more

(Unit: mm)

MARKING

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(1) ──┤ P1 ├── PRODUCT TYPE
(2) ──┤ ○  │
(3) ──┤ XX ├── LOT NUMBER
              (MUMERICAL or
              ALPHABETICAL)
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(1) Gate
(2) Source
(3) Drain

CIRCUIT

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                    ○ Drain(3)
Gate(1) ○───┤
                    ○ Source(2)
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ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Unit	Min.	Max.
Drain-source voltage	V_{DS}	Ta = 25°C	V	—	7.0
Gate-source voltage	V_{GS}	Ta = 25°C	V	−5.0	0.4
Drain current	I_{DS}	Ta = 25°C	A	—	2.0
Total power dissipation	P_{tot}	Ta = Tc = 25°C	W	—	4.5
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} = −5 V	μA	—	—	100
Gate-drain leakage current	I_{GDO}	V_{GD} = −12 V	μA	—	—	500
Drain-source leakage current	$I_{DS(off)}$	V_{DS} = 7 V, V_{GS} = −5 V	μA	—	—	1500
Drain current	I_{DSS}	V_{DS} = 1.5 V, V_{GS} = 0 V	A	1.3	—	—
Gate-source cut-off voltage	$V_{GS(off)}$	V_{DS} = 3 V, I_{DS} = 4.0 mA	V	−3.0	—	−2.0
Output power	P_O	(*1), P_{IN} = 20 dBm	dBm	27.0	27.5	—
Drain efficiency	η_D	(*1), P_{IN} = 20 dBm	%	45	50	—
Linear gain	G_{LIN}	(*1), P_{IN} = 0 dBm	dB	—	9.5	—
Thermal resistance	R_{th}	Channel to case	°C/W	—	15	—

*1 Condition: f = 1.9 GHz, V_{DS} = 3.4 V, I_{DSQ} = 200 mA
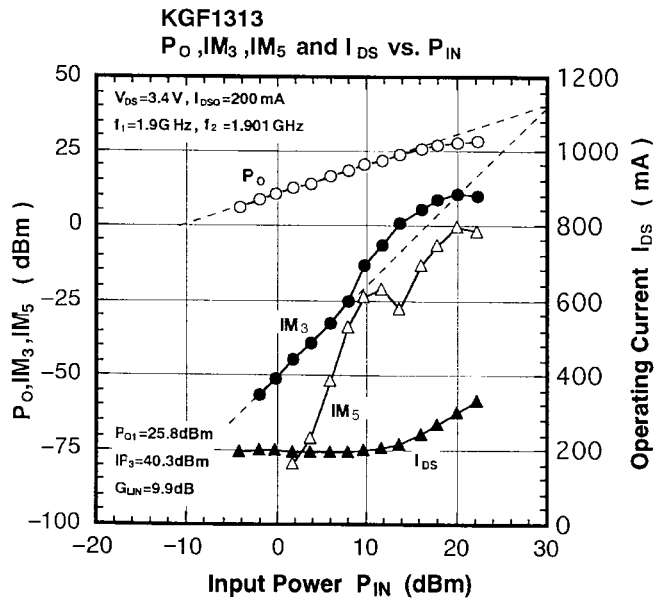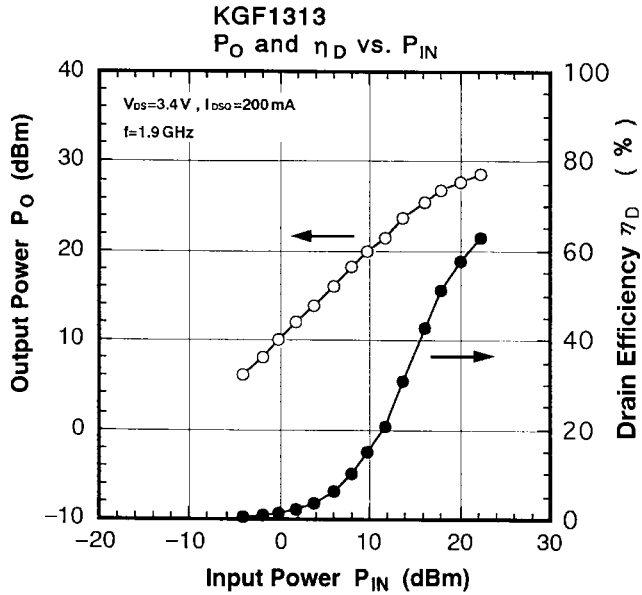
RF CHARACTERISTICS

Matching conditions
     Gamma S (Source impedance) : 4.88 - j0.28 (Ω)
     Gamma L (Load impedance) : 12.66 - j5.96 (Ω)
Bias conditions
     V_{DS}**=3.4 V,** I_{DSQ}**=200 mA,** **f=1.9 GHz**

KGF1313
P_O and η_D vs. P_{IN}

V_{DS}=3.4 V , I_{DSQ}=200 mA
f=1.9 GHz

KGF1313
P_O , IM_3 , IM_5 and I_{DS} vs. P_{IN}

V_{DS}=3.4 V , I_{DSQ}=200 mA
f_1=1.9 G Hz , f_2=1.901 GHz

P_O

IM_3

IM_5

I_{DS}

P_{O1}=25.8 dBm
IP_3=40.3 dBm
G_{LIN}=9.9 dB

Typical S Parameters

V_{DS} = 3.4 V, V_{GS} = −1.43 V, I_{DS} = 200 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	0.929	−144.45	4.159	98.07	0.030	29.22	0.715	−178.78
600.0	0.926	−151.64	3.643	93.23	0.031	27.84	0.717	179.91
700.0	0.925	−157.14	3.189	88.93	0.032	26.84	0.720	178.56
800.0	0.923	−161.46	2.833	85.11	0.033	26.40	0.721	177.48
900.0	0.923	−165.18	2.543	81.97	0.034	26.26	0.721	176.49
1000.0	0.921	−168.30	2.314	78.72	0.035	25.70	0.719	175.41
1100.0	0.919	−171.07	2.121	75.71	0.036	25.89	0.719	174.68
1200.0	0.917	−173.67	1.959	72.79	0.037	25.53	0.718	173.46
1300.0	0.915	−175.87	1.823	70.07	0.038	25.89	0.716	172.74
1400.0	0.913	−178.12	1.702	67.46	0.040	25.44	0.717	171.75
1500.0	0.911	179.76	1.602	64.62	0.041	25.55	0.713	170.66
1600.0	0.907	177.80	1.511	62.17	0.042	25.16	0.714	169.82
1700.0	0.903	175.91	1.428	59.34	0.043	24.95	0.708	168.55
1800.0	0.901	174.04	1.361	56.91	0.044	24.92	0.710	167.77
1900.0	0.896	172.38	1.292	54.42	0.046	24.41	0.704	166.73
2000.0	0.894	170.48	1.236	51.87	0.047	24.23	0.706	165.70
2100.0	0.890	168.74	1.180	49.30	0.048	23.93	0.700	164.81
2200.0	0.885	167.12	1.130	47.08	0.049	23.58	0.702	163.51
2300.0	0.882	165.38	1.086	44.40	0.051	23.06	0.697	162.59
2400.0	0.876	163.78	1.043	42.64	0.052	22.40	0.697	161.49
2500.0	0.875	162.12	1.011	39.67	0.053	21.91	0.692	160.22
2600.0	0.870	160.47	0.972	37.75	0.054	21.43	0.691	159.44
2700.0	0.866	158.91	0.942	35.06	0.056	20.25	0.689	158.03
2800.0	0.863	157.28	0.911	33.01	0.057	19.79	0.687	157.02
2900.0	0.858	155.62	0.875	30.62	0.059	18.82	0.688	155.85
3000.0	0.858	153.95	0.856	28.46	0.059	18.59	0.683	154.65

Typical S Parameters

$V_{DS} = 3.4$ V, $V_{GS} = -1.43$ V, $I_{DS} = 200$ mA

Frequency : 0.5 to 3.0 GHz

$Z_0 = 50$ Ω
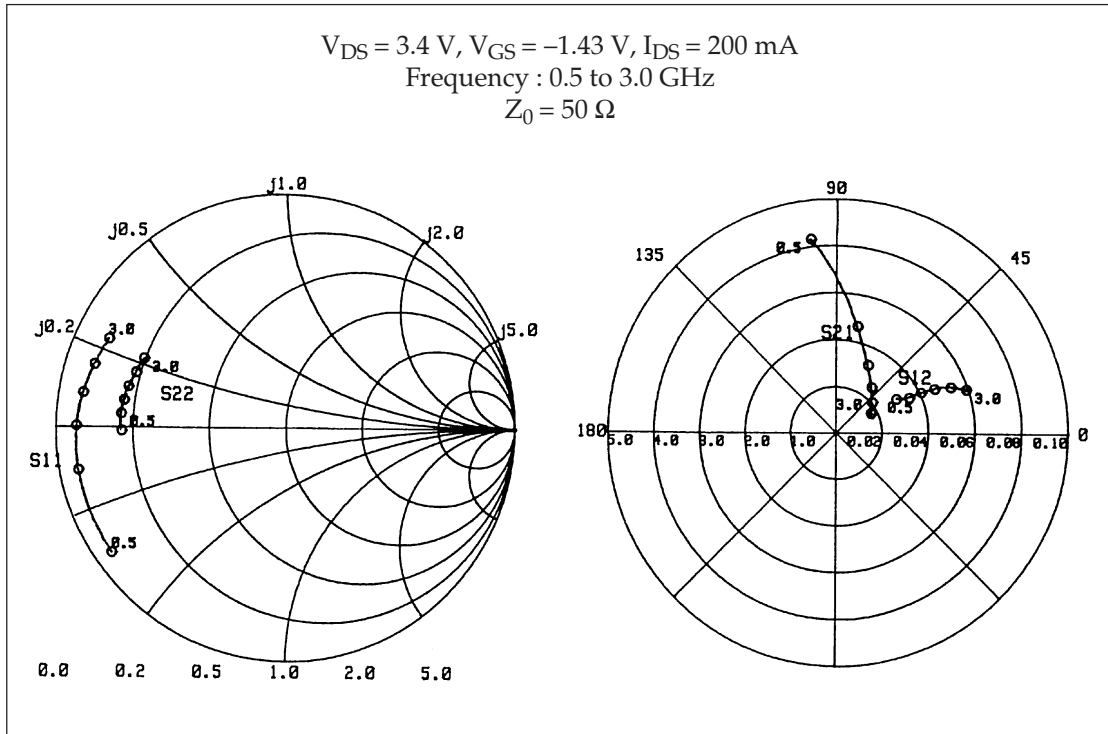
Test Circuit and Bias Configuration for KGF1313 at 1.9 GHz
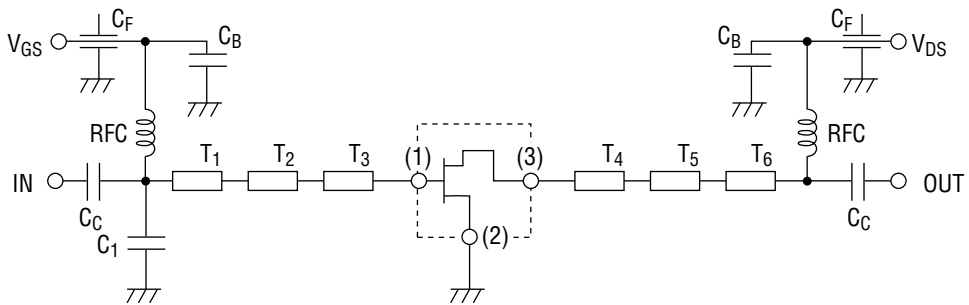
f = 1.9 GHz
T_1: Z_0 = 80 Ω, E = 77 deg T_4: Z_0 = 30 Ω, E = 53 deg
T_2: Z_0 = 10 Ω, E = 18 deg T_5: Z_0 = 27 Ω, E = 42 deg
T_3: Z_0 = 30 Ω, E = 53 deg T_6: Z_0 = 80 Ω, E = 43 deg
C_1 = 0.8 pF
C_C = 1000 pF, C_F = 1000 pF, C_B = 1000 pF, RFC = 60 nH