ODRKGF1531P-01
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Electronic Components

KGF1531P

Dual Gate IC

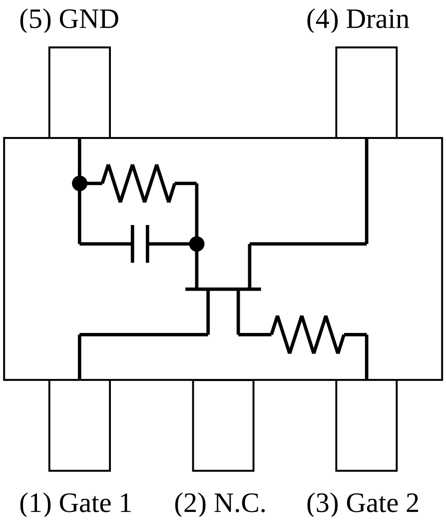
GENERAL DESCRIPTION

The KGF1531P is a high-performance GaAs FET small-signal dual gate mixer for the L-band frequencies that feature features low voltage operation, low current operation, high conversion gain, and low distortion. The KGF1531P specifications are guaranteed to a fixed matching circuit for 3V and 1.9GHz; external impedance-matching circuits are also required. Because of its high 3rd order intercept point, the KGF1531P is ideal as a small-signal receiving mixer for L-band personal handy phones, such as digital keying cordless phone that require low inter-modulation properties.

FEATURES

- Low voltage and low current operation: 3V, <8mA
- Specification guaranteed as the mixer operation to fixed matching circuits for 3V, .9GHz
- High conversion gain: 12dB(typ.) at 1.9GHz
- Low distortion: 3rd-order intercept point: 12.5dBm(typ.) at 1.9GHz
- Self-bias circuit configuration with built-in source capacitor
- Package: SOT-23-5 with lead-free plating terminals

FUNCTION DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Condition	Min	Max	Unit	Note
Drain - source Voltage	V_{DS}	Ta=25°C	—	4.0	V	
Gate - source Voltage	V_{GS}	Ta=25°C	- 3.0	0.4	V	
Drain Current	I_{DS}	Ta=25°C	—	50	mA	
Total Power Dissipation	P_{TOT}	Ta=Tc=25°C	—	200	mW	
Channel Temperature	T_{CH}	—	—	150	°C	
Storage Temperature	T_{STG}	—	-45	125	°C	

ELECTRICAL CHARACTERISTICS

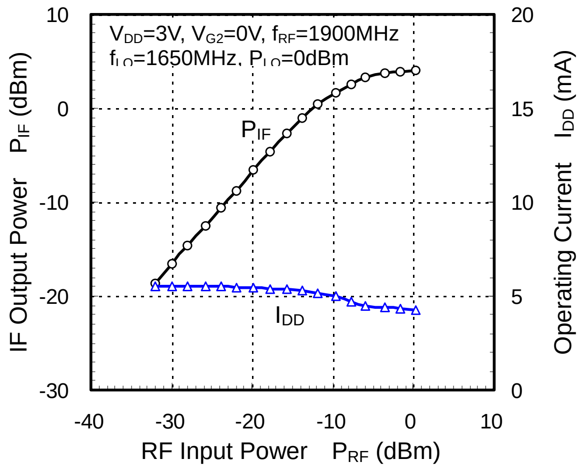
(Ta=25°C)

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Gate-source Leakage Current		I_{GSS}	V_{GS}=-3V	—	—	30	μA
Gate-drain Leakage Current		I_{GDO}	V_{GD}=-6V	—	—	30	μA
Drain-source Leakage Current		$I_{GS(off)}$	V_{DS}=3V, $V_{GS(1,2)}$=-2V	—	—	30	μA
Drain Current		I_{DSS}	V_{DS}=1.5V, V_{GS}=0V	15	25	—	mA
Gate-source Cut-off Voltage		$V_{GS(off)}$	V_{DS}=3V, I_{DS}=100μA	- 1.4	—	- 0.6	V
Operating Current		I_{DD}	(*1), P_{RF}=-20dBm	—	6.0	8.0	mA
Noise Figure		F	(*1)	—	5.0	—	dB
Conversion Gain		G_C	(*1), P_{RF}=- 20dBm	10.0	12.0	—	dB
Output Power		P_{O1}	(*1),	0	1.0	—	dBm
Port to Port Isolation	L-R	ISO	(*1), P_{RF}=- 20dBm	—	15	—	dB
	R-I				22		
	L-I				28		
3rd -order Intercept Point		IP_3	(*1), f_{RF-2}=1901MHz	—	12.5	—	dBm

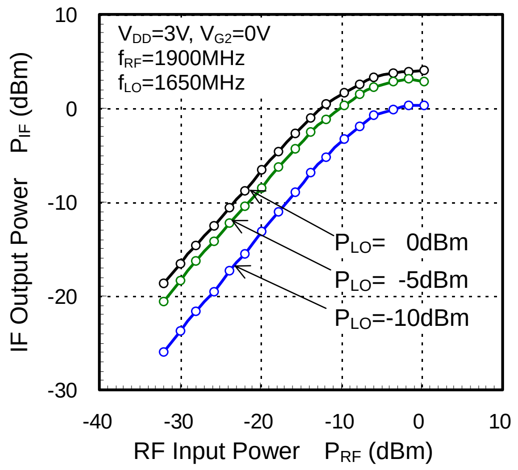
(*1): V_{DD}=3V, $V_{G(1,2)}$=0V, f_{RF}=1900MHz, f_{LO}=1650MHz, P_{LO}=0dBm

TYPICAL CHARACTERISTICS

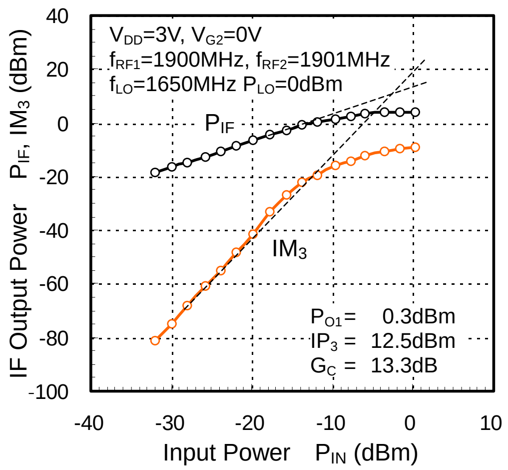
P_{IF} and I_{DD} vs. P_{RF}



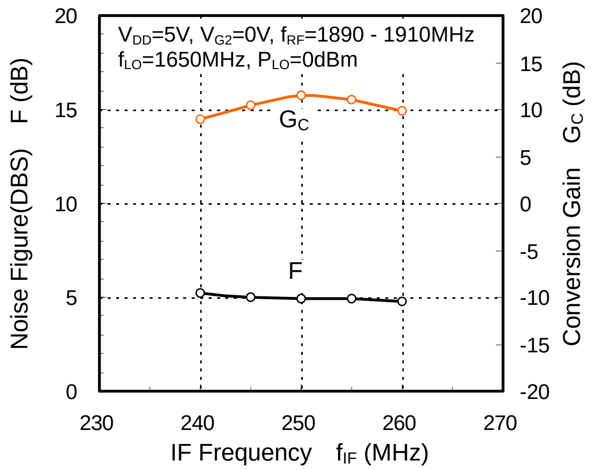
P_{IF} vs. P_{RF} and P_{LO}



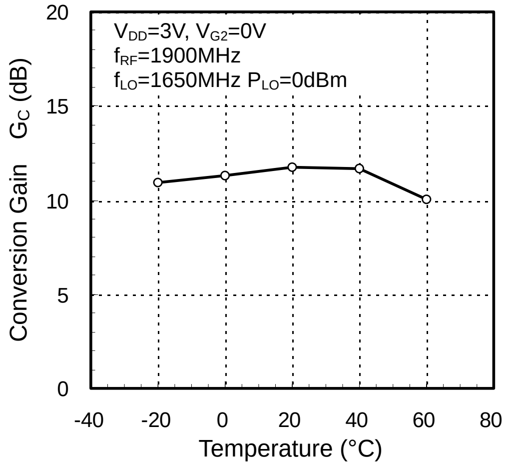
P_{IF} and IM_3 vs. P_{RF}



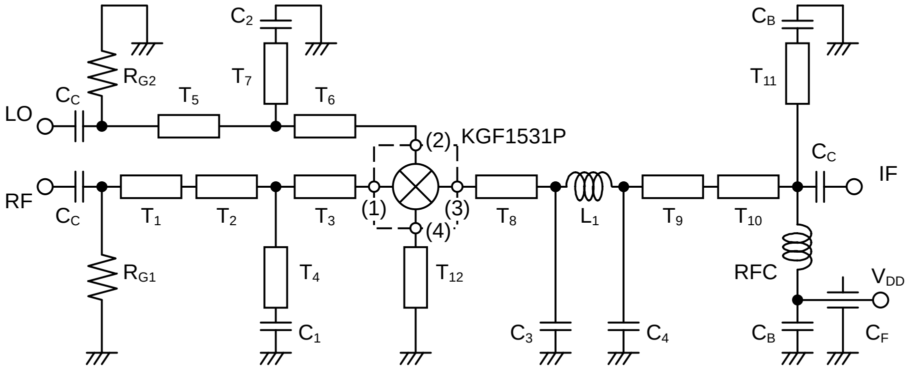
F and G_C vs. IF



Temperature Characteristics



Test circuit

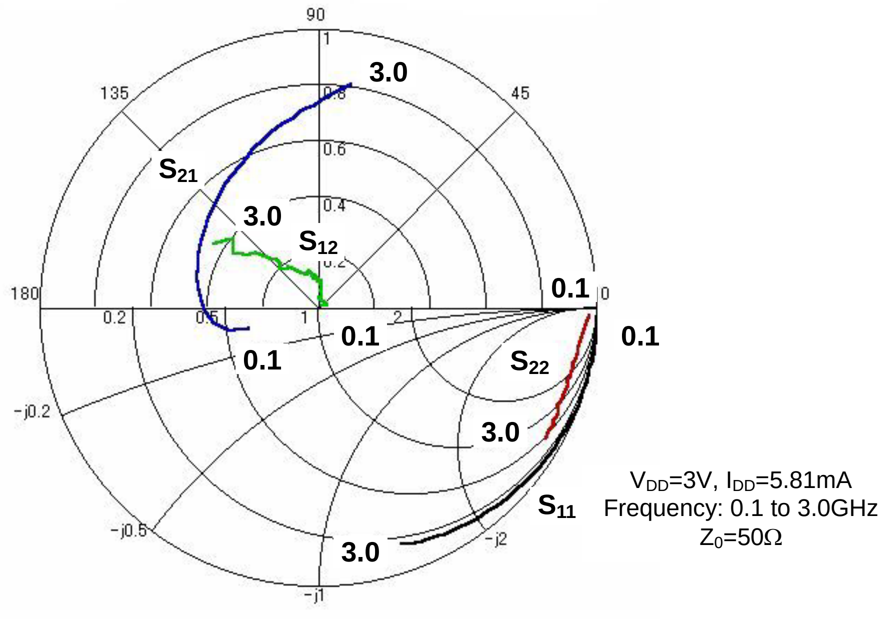


f_{RF}=1900MHz f_{LO}=1650MHz   Board: Glass epoxy (t=0.8mm, ε= 4.3)
T_1: Z_0=75Ω, E=25deg T_2: Z_0=100Ω, E=2deg T_3: Z_0=100Ω, E=68deg T_4: Z_0=100Ω, E=10deg
T_5: Z_0=75Ω, E=24deg T_6: Z_0=100Ω, E=72deg T_7: Z_0=100Ω, E=10deg
T_8: Z_0=100Ω, E=5deg T_9: Z_0=100Ω, E=65deg T_{10}: Z_0=75Ω, E=21deg T_{11}: Z_0=75Ω, E=40deg
T_{12}: Z_0=100Ω, E=5deg L_1 =60nH
C_1 =1.15pF C_2 =1.3pF C_3 =2.5pF C_4 =18pF
C_C =1,000pF C_B =1,000pF   Cf=1,000pF
R_{G1} = R_{G2} =1kΩ   RFC =60nH

TYPICAL S PARAMETERS

V_{DD}=3V V_{G2}=0V, I_{DD}=5.81mA

Freq(MHz)	MAG(S11)	ANG(S11)	MAG(S21)	ANG(S21)	MAG(S12)	ANG(S12)	MAG(S22)	ANG(S22)
100	1.001	-1.96	0.258	-162.99	0.001	26.53	0.973	-1.51
200	1.003	-3.97	0.332	-165.54	0.002	18.72	0.964	-2.97
300	1.004	-6.20	0.380	-172.21	0.002	83.14	0.959	-3.95
400	1.002	-8.26	0.406	-178.45	0.002	71.02	0.957	-5.01
500	1.003	-10.54	0.424	175.49	0.003	79.10	0.952	-5.67
600	1.000	-12.72	0.438	170.26	0.003	82.44	0.949	-6.81
700	1.002	-14.88	0.449	165.51	0.004	81.50	0.948	-7.77
800	0.998	-17.17	0.456	161.01	0.004	80.83	0.943	-8.35
900	0.998	-19.31	0.468	156.94	0.005	86.47	0.944	-9.53
1000	0.998	-21.62	0.477	152.70	0.005	81.85	0.942	-10.46
1100	0.992	-23.83	0.487	148.85	0.005	92.46	0.939	-11.44
1200	0.992	-26.08	0.496	145.19	0.005	89.46	0.937	-12.38
1300	0.986	-28.27	0.506	141.19	0.006	97.17	0.941	-13.21
1400	0.985	-30.79	0.520	137.19	0.005	96.19	0.937	-14.29
1500	0.981	-33.04	0.532	133.45	0.007	101.28	0.937	-14.93
1600	0.980	-35.70	0.544	129.90	0.007	104.42	0.932	-16.05
1700	0.974	-38.00	0.559	126.24	0.006	109.90	0.941	-16.95
1800	0.970	-40.33	0.567	122.92	0.006	110.52	0.934	-18.33
1900	0.965	-43.00	0.582	118.92	0.007	113.49	0.933	-19.09
2000	0.963	-45.49	0.597	115.02	0.009	125.63	0.934	-19.88
2100	0.958	-47.87	0.617	112.10	0.009	127.29	0.934	-20.89
2200	0.952	-50.33	0.632	108.44	0.010	134.42	0.928	-22.12
2300	0.950	-53.07	0.656	105.10	0.010	129.88	0.935	-23.09
2400	0.942	-55.54	0.673	101.00	0.011	130.80	0.939	-23.58
2500	0.934	-58.04	0.688	97.46	0.012	132.64	0.938	-24.75
2600	0.931	-60.57	0.707	95.17	0.015	137.97	0.934	-25.84
2700	0.923	-63.20	0.728	90.91	0.016	143.48	0.945	-26.54
2800	0.916	-65.84	0.753	88.14	0.018	146.78	0.938	-27.65
2900	0.910	-68.35	0.782	84.96	0.020	140.46	0.936	-28.78
3000	0.901	-70.57	0.811	81.69	0.022	148.38	0.943	-30.01

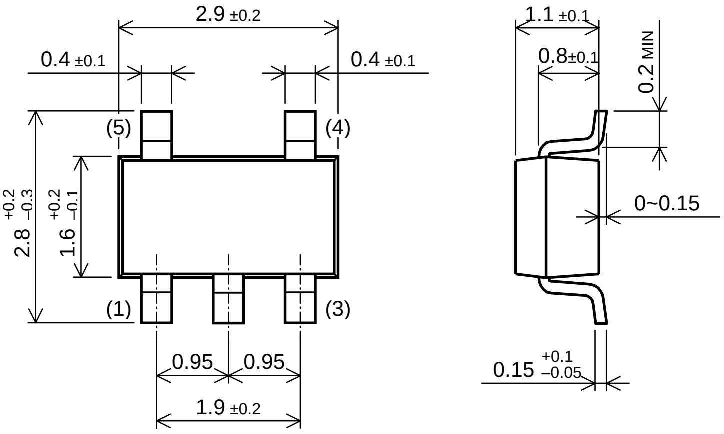


V_{DD}=3V, I_{DD}=5.81mA
Frequency: 0.1 to 3.0GHz
Z_0=50Ω

PACKAGE

SOT-23-5 (lead-free terminal plating of Sn-Ag material)

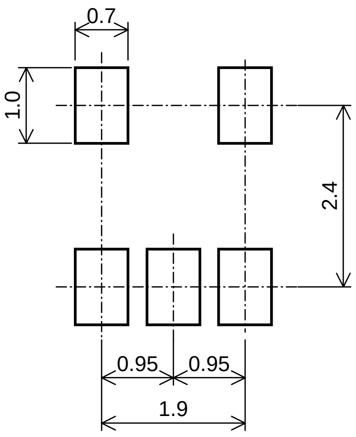
unit: mm



Pin Configuration	
(1)	Gate 1
(2)	N.C.
(3)	Gate 2
(4)	Drain
(3)	GND

Footprint

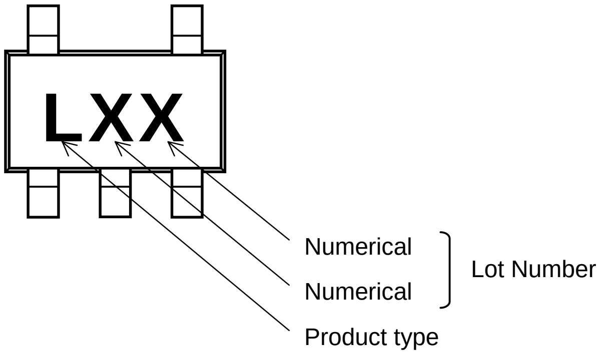
unit: mm



notes:

1) This footprint is an example. The size of footprint depends on accuracy of your mounter.
2) The mounting design should fully be considered in RF grounding and heat dissipation for the better RF performance of the product.
3) Vias are effective in a RF grounding and heat dissipation.

MARKING



SAFETY AND HANDLING INFORMATION ON GAAS DEVICES

Arsenic Compound (GaAs Devices)
The product contains arsenic (As) as a compound.
This material is stable for normal use, however, its dust or vapor may be potentially hazardous to the human body.
Avoid ingestion, fracture, burning or chemical treatment to the product.

- Do not put the product in your mouth.
- Do not burn or destroy the product.
- Do not perform chemical treatment for the product.

Keep laws and ordinances related to the disposal of the products.

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1. The information contained herein can change without notice owing to product and/or technical improvements. Before using the product, please make sure that the information being referred to is up-to-date.

2. The outline of action and examples for application circuits described herein have been chosen as an explanation for the standard action and performance of the product. When planning to use the product, please ensure that the external conditions are reflected in the actual circuit, assembly, and program designs.

3. When designing your product, please use our product below the specified maximum ratings and within the specified operating ranges including, but not limited to, operating voltage, power dissipation, and operating temperature.

4. Oki assumes no responsibility or liability whatsoever for any failure or unusual or unexpected operation resulting from misuse, neglect, improper installation, repair, alteration or accident, improper handling, or unusual physical or electrical stress including, but not limited to, exposure to parameters beyond the specified maximum ratings or operation outside the specified operating range.

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