# OKI Semiconductor

# KGF2441

## GaAs Adjustable Gain Control Amplifier for CDMA Cellular Phones

### DESCRIPTION

The KGF2441 Adjustable Gain Control (AGC) amplifier is designed for use as an intermediate-frequency (IF) amplifier in cellular, PCS, ISM and CDMA spread-spectrum voice-data communications radios. It takes advantage of the low-distortion characteristics of GaAs to combine a greater than 80 dB dynamic control range with an IP3 of -4.5 dBm and less than 8 dB noise figure, with a single 5-volt supply of 5 milliamps. Specified for 130 MHz, its usable range extends from 70 MHz to 260 MHz. The KGF2441 has been specifically designed to enhance the performance of CDMA radios.

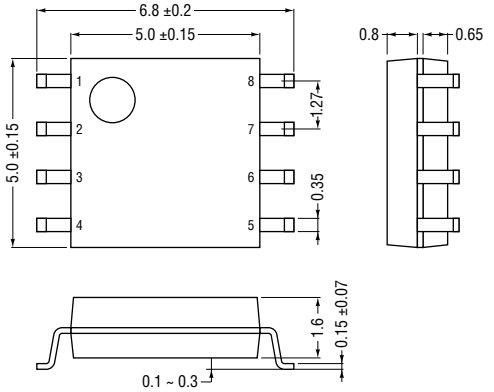
The KGF2441 functions over the popular frequency ranges required by RF system designers. Its smaller physical size eliminates additonal gain stages and can expand the number of users in a WLAN or wireless system. Negative power supplies are not required. The low distortion level permits a single device to be used in both the transmitter and receiver. No critical impedance matching is required on inputs or outputs

The KGF2441 is manufactured using OKI's new 0.5 µm high implant density technology, permitting high efficiency with a wide dynamic amplitude range. This AGC amplifier complements OKI's other RF MMIC and FET products also designed for use in similar systems. It can also be used with OKI's baseband silicon products.

### FEATURES

- 130 MHz IF Amplifier (70 MHz - 260 MHz)
- Wide Dynamic Range: > 80 dB
- Maximum gain: > 30 dB
- Maximum attenuation: -60 dB
- High Gain Slope Linearity
- IP3: -4.5 dBm
- Noise figure: 7.8 dB
- High Input and Output Impedance: 1000Ω/250Ω
- Single Power Supply Voltage: +5 V at 5 mA
- Positive Gain Control Voltage: 0 to +5 V
- Low Power Consumption: < 10mA
- 8 pin plastic industry standard SOP
- 0.5 µm GaAs technology

## OUTLINE DIMENSIONS




Dimensions in mm.

| Pinout | | | |
|---|---|---|---|
| Pin Num | Signal | Pin Num | Signal |
| 1 | VOUT | 5 | VIN |
| 2 | VDD3 | 6 | GND |
| 3 | VDD2 | 7 | VAGC |
| 4 | VDD1 | 8 | GND |

## ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings [1]

| Parameter | Symbol | Condition | Min. | Max. | Unit |
|---|---|---|---|---|---|
| Supply Voltage 1 | $V_{DD1}$ | $T_a$ = 25 ˚C | – | 5.5 | V |
| Supply Voltage 2 | $V_{DD2}$ | | – | 5.5 | V |
| Supply Voltage 3 | $V_{DD3}$ | | – | 5.5 | V |
| Gain control voltage | $V_{AGC}$ | | 0 | $V_{DD}$ - 2 [2] | V |
| Input Voltage | $V_{IN}$ | | -3 | 0.4 | V |
| Output Voltage | $V_{OUT}$ | | $V_{DD}$/2-0.4 | $V_{DD}$/2 + 3 or $V_{DD}$ | V |
| Total power dissipation | $P_{TOT}$ | | – | 200 | mW |
| Storage temperatures | $T_{STG}$ | – | -45 | 125 | ˚C |

1. Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
2. In test circuit configuration (see Figure 1).

### Recommended Operating Conditions ($T_A$ = 25 °C, f = 130 MHz, $V_{DD}$ = 5 V)

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Maximum gain | $G_{max}$ | $V_{AGC}$ = 0 V | 30 | – | – | dB |
| Attenuation | $G_{min}$ | $V_{AGC}$ = 5 V | -50 | -60 | – | dB |
| Output $IP_3$ | $IP_3$ | $V_{AGC}$ = 0 V, $f_{LO}$ = 129 MHz | – | -4.5 | – | dBm |
| Noise figure | F | $V_{AGC}$ = 0 V | – | 8 | 10 | dB |
| Supply current | $I_{DD}$ | $V_{AGC}$ = 0 V | – | 5 | 10 | mA |
| Input impedance | $Z_{IN}$ | $V_{AGC}$ = 0 V | 800 | – | 1200 | Ω |
| Output impedance | $Z_{OUT}$ | $V_{AGC}$ = 0 V | – | 175 | – | Ω |

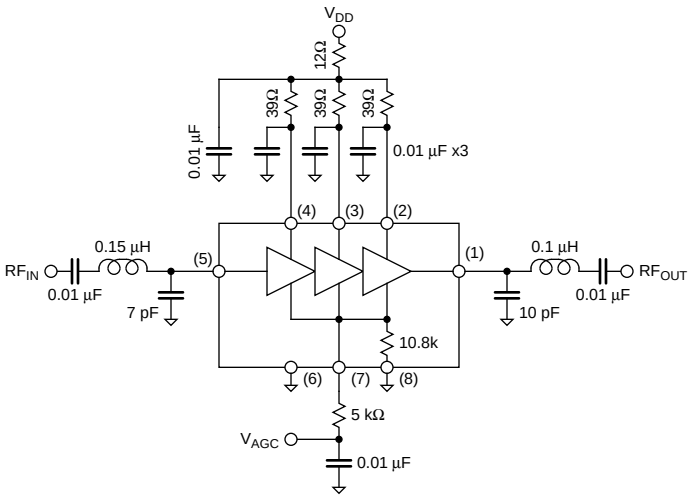



**Figure 1. Test Circuit**

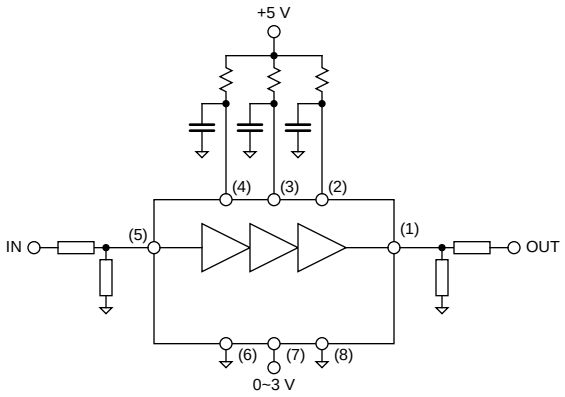



**Figure 2. Measurement Configuration**

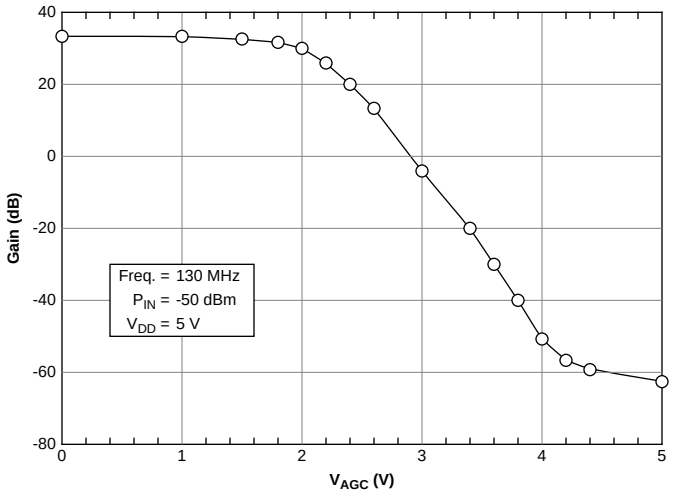



**Figure 3. Measured Gain Profile (using Test Circuit 1)**

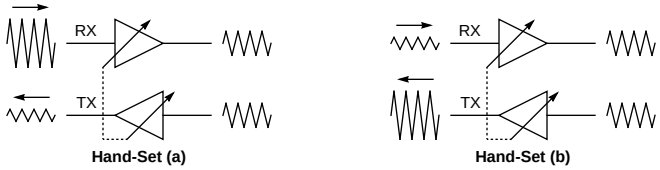



**Figure 4. Base Station and Handset Diagram**