# RF2360

LINEAR GENERAL PURPOSE AMPLIFIER

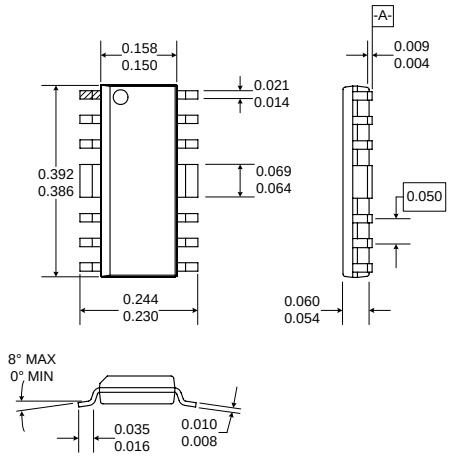
***RoHS Compliant & Pb-Free Product***

## Typical Applications

- CATV Distribution Amplifiers
- Cable Modems
- Broadband Gain Blocks
- Laser Diode Driver
- Return Channel Amplifier
- Base Stations

## Product Description

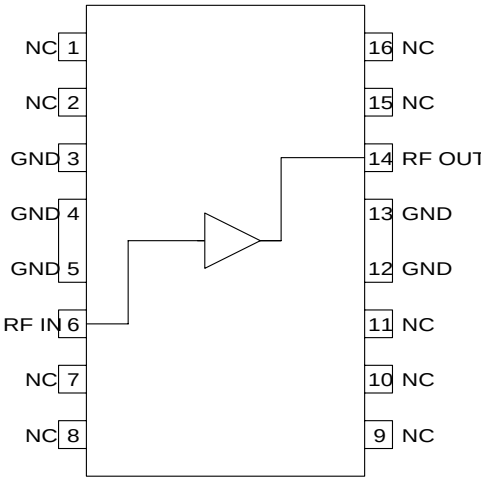
The RF2360 is a general purpose, low-cost, high-linearity RF amplifier IC. The device is manufactured on a Gallium Arsenide process and is featured in an SOP-16 batwing package. It has been designed for use as an easily cascadable 75Ω gain block with a Noise Figure of less than 2dB. Gain flatness better than 0.5dB from 5MHz to 1000MHz, and high linearity make this part ideal for cable TV applications. Other applications include IF and RF amplification in wireless voice and data communication products operating in frequency bands up to 1000MHz. The device is self-contained with 75Ω input and output impedances providing less than 2:1 VSWR matching. For higher input and output return losses, see the evaluation schematic.




Package Style: Standard Batwing

## Optimum Technology Matching® Applied

- ☐ Si BJT
- ☐ Si Bi-CMOS
- ☐ InGaP/HBT
- ☐ GaAs HBT
- ☐ SiGe HBT
- ☐ GaN HEMT
- ☑ GaAs MESFET
- ☐ Si CMOS
- ☐ SiGe Bi-CMOS




Functional Block Diagram

## Features

- 5MHz to 1500MHz Operation
- Internally Matched Input and Output
- 20dB Small Signal Gain
- 1.2dB Noise Figure
- +24dBm Output Power
- Single 6V to 9V Positive Power Supply

## Ordering Information

| | |
|---|---|
| RF2360 | Linear General Purpose Amplifier |
| RF2360 PCBA | Fully Assembled Evaluation Board 50Ω |
| RF2360 411 | Fully Assembled Evaluation Board 75H |
| RF2360 412 | Fully Assembled Evaluation Board 75L |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## Absolute Maximum Ratings

| Parameter | Rating | Unit |
|---|---|---|
| Device Current | 175 | mA |
| Device Voltage | 9 | V |
| Input RF Power | +13 | dBm |
| Output Load VSWR | 20:1 | |
| Ambient Operating Temperature | -40 to +85 | °C |
| Storage Temperature | -40 to +150 | °C |

**Caution!** ESD sensitive device.

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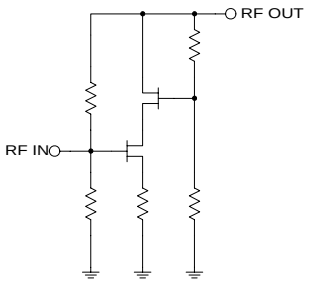
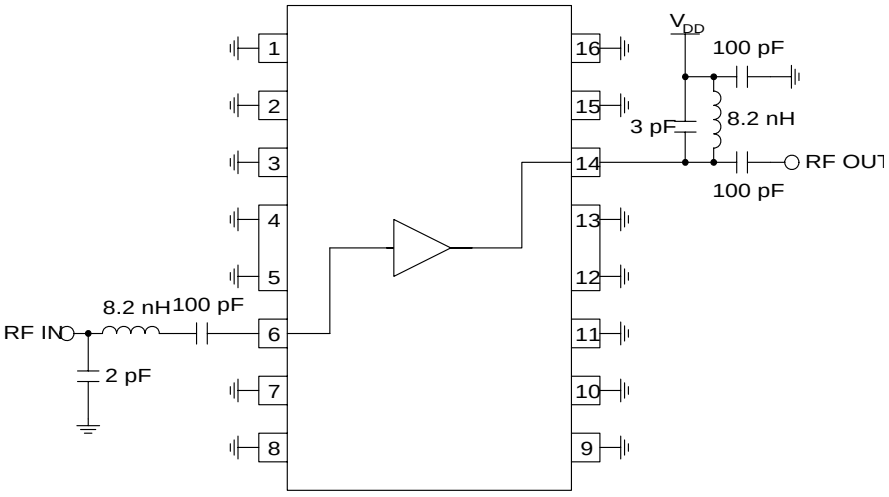
| Parameter | Specification | | | Unit | Condition |
|---|---|---|---|---|---|
| | Min. | Typ. | Max. | | |
| **Overall (50Ω)** | | | | | T=25 °C, $V_{DD}$=7V, 50Ω System, $P_{IN}$=-8dBm |
| Frequency Range | 5 | | 1500 | MHz | 3dB Bandwidth |
| Input VSWR | | 1.6:1 | | | Appropriate values for the output DC blocking capacitor and bias inductor are required to maintain this VSWR over the intended operating frequency range. |
| Output VSWR | | 1.2:1 | | | See note for Input VSWR. |
| Gain | | 20 | | dB | At 500MHz |
| Gain Flatness | | +/-0.9 | | dB | 5MHz to 1000MHz |
| Noise Figure | | 1.2 | | dB | At 500MHz |
| Noise Figure | | 1.5 | | dB | From 5MHz to 1000MHz |
| Output $IP_3$ | | 33.7 | | dBm | At 10MHz, Delta F1 and F2 = 1MHz |
| Output $IP_3$ | | 37.2 | | dBm | At 500MHz |
| Output $IP_3$ | | 36.4 | | dBm | At 1000MHz |
| Output $IP_2$ | | 46.3 | | dBm | At 100MHz, Delta F1 and F2 = 156MHz |
| Output $IP_2$ | | 44.4 | | dBm | At 1000MHz |
| Output $P_{1dB}$ | | 21 | | dBm | At 10MHz |
| Output $P_{1dB}$ | | 24 | | dBm | At 500MHz |
| Output $P_{1dB}$ | | 23.7 | | dBm | At 1000MHz |
| Reverse Isolation | | 24 | | dB | At 500MHz |
| | | | | | T=25 °C, $V_{DD}$=9V, $P_{IN}$=-8dBm |
| Gain | | 20 | | dB | At 500MHz |
| Gain Flatness | | +/-0.9 | | dB | 5MHz to 1000MHz |
| Noise Figure | | 1.1 | | dB | At 500MHz |
| Noise Figure | | 1.5 | | dB | From 5MHz to 1000MHz, |
| Output $IP_3$ | | 34.8 | | dBm | At 10MHz, Delta F1 and F2 = 1MHz |
| Output $IP_3$ | | 38.1 | | dBm | At 500MHz |
| Output $IP_3$ | | 38.7 | | dBm | At 1000MHz |
| Output $IP_2$ | | 44.1 | | dBm | At 100MHz, Delta F1 and F2 = 156MHz |
| Output $IP_2$ | | 48.6 | | dBm | At 1000MHz |
| Output $P_{1dB}$ | | 22.5 | | dBm | At 10MHz |
| Output $P_{1dB}$ | | 25.1 | | dBm | At 500MHz |
| Output $P_{1dB}$ | | 25.3 | | dBm | At 1000MHz |
| **Power Supply** | | | | | |
| Supply Voltage ($V_{DD}$) | 6 | 7 | 9 | V | |

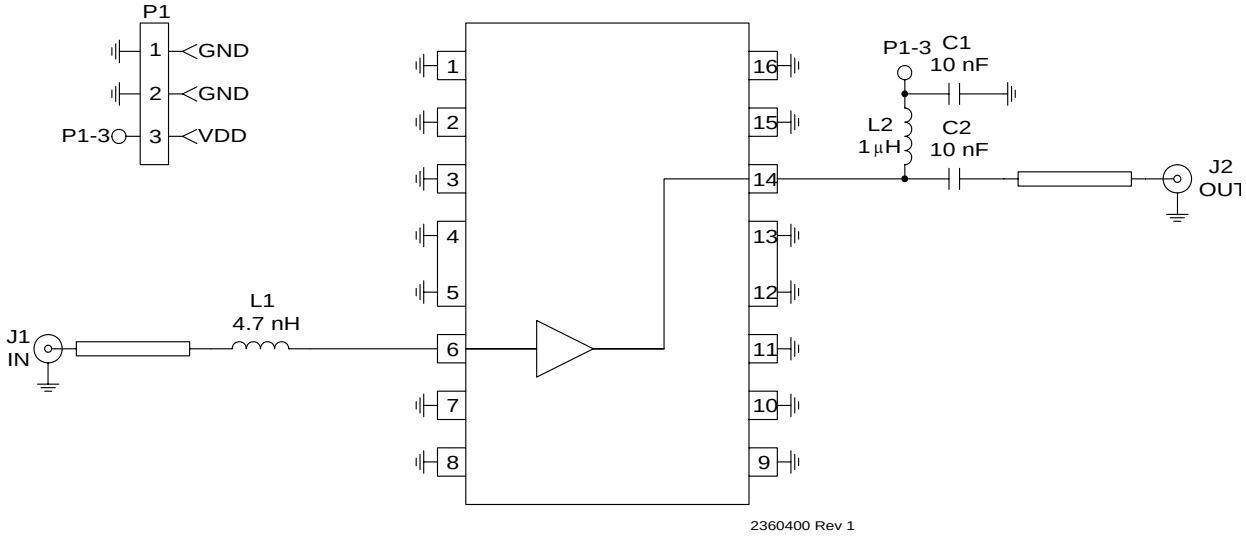
| Parameter | Specification | | | Unit | Condition |
|---|---|---|---|---|---|
| | Min. | Typ. | Max. | | |
| **Overall (75Ω)** | | | | | T=25°C, $V_{DD}$=7V, 75Ω System, $P_{IN}$=-8dBm |
| Frequency Range | 5 | | 1500 | MHz | 3dB Bandwidth |
| Input VSWR | | 1.6:1 | | | Appropriate values for the output DC blocking capacitor and bias inductor are required to maintain this VSWR over the intended operating frequency range. |
| Output VSWR | | 1.3:1 | | | See note for input VSWR. |
| Gain | | 20 | | dB | At 500MHz |
| Gain Flatness | | ±0.5 | | dB | 5MHz to 1000MHz |
| Output $IP_3$ | | 36.8 | | dBm | At 50MHz, Delta F1 and F2 = 1MHz |
| | | 36.0 | | dBm | At 500MHz |
| Output $IP_2$ | | 50.1 | | dBm | At 500MHz, Delta F1 and F2 = 55.25MHz |
| Output $IP_{1dB}$ | | 21 | | dBm | At 10MHz |
| | | 23 | | dBm | At 500MHz |
| | | 22 | | dBm | At 1000MHz |
| Operating Current Range | 100 | 104 | 109 | mA | |
| **110 Channels** | | | | | 10dBmV per channel, flat, at the input of the amplifier; $V_{CC}$=7V, $I_{CC}$=120mA |
| CTB | | -75 | | dBc | At 55.25MHz |
| | | -77 | | dBc | At 331.25MHz |
| | | -75 | | dBc | At 547.25MHz |
| CSO+1.25MHz | | -91 | | dBc | At 55.25MHz |
| | | -60 | | dBc | At 331.25MHz |
| | | -57 | | dBc | At 547.25MHz |
| CSO-1.25MHz | | -55 | | dBc | At 55.25MHz |
| | | -54 | | dBc | At 331.25MHz |
| | | -56 | | dBc | At 547.25MHz |
| CNR | | +66 | | dB | At 55.25MHz |
| | | +65 | | dB | At 331.25MHz |
| | | +65 | | dB | At 547.25MHz |
| **Power Supply** | | | | | |
| Supply Voltage ($V_{DD}$) | 6 | 7 | 9 | V | |
| Operating Current Range | 115 | 120 | 130 | mA | |

| Pin | Function | Description | Interface Schematic |
|---|---|---|---|
| 1 | NC | No connection. This pin should be connected to the ground plane. | |
| 2 | NC | Same as pin 1. | |
| 3 | GND | Ground connection. Keep traces physically short and connect immediately to ground plane for best performance. Each ground pin should have a via to the ground plane. | |
| 4 | GND | Same as pin 3. | |
| 5 | GND | Same as pin 3. | |
| 6 | RF IN | RF input pin. This pin is internally DC blocked. An external DC blocking capacitor is not required. | |
| 7 | NC | Same as pin 1. | |
| 8 | NC | Same as pin 1. | |
| 9 | NC | Same as pin 1. | |
| 10 | NC | Same as pin 1. | |
| 11 | NC | Same as pin 1. | |
| 12 | GND | Same as pin 3. | |
| 13 | GND | Same as pin 3. | |
| 14 | RF OUT | RF output and bias pin. Because DC is present on this pin, a DC blocking capacitor, suitable for the frequency of operation, should be used in most applications. For biasing, only an RF choke is needed. |  |
| 15 | NC | Same as pin 1. | |
| 16 | NC | Same as pin 1. | |

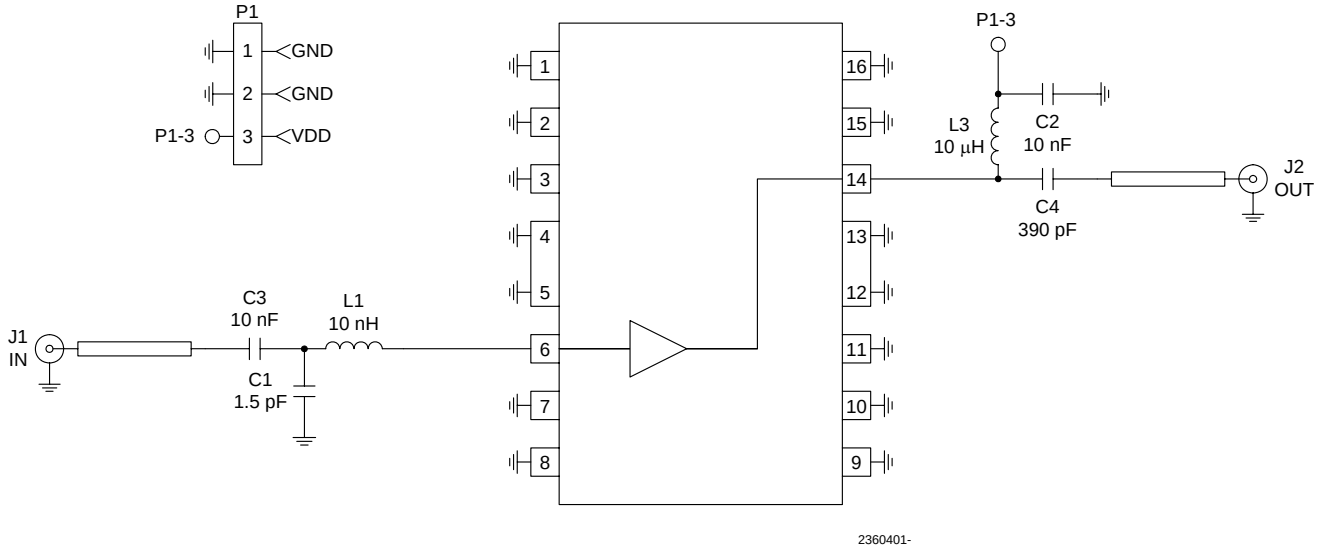
## Application Schematic
## 869-894MHz Narrowband Operation



# Evaluation Board Schematic - 50Ω

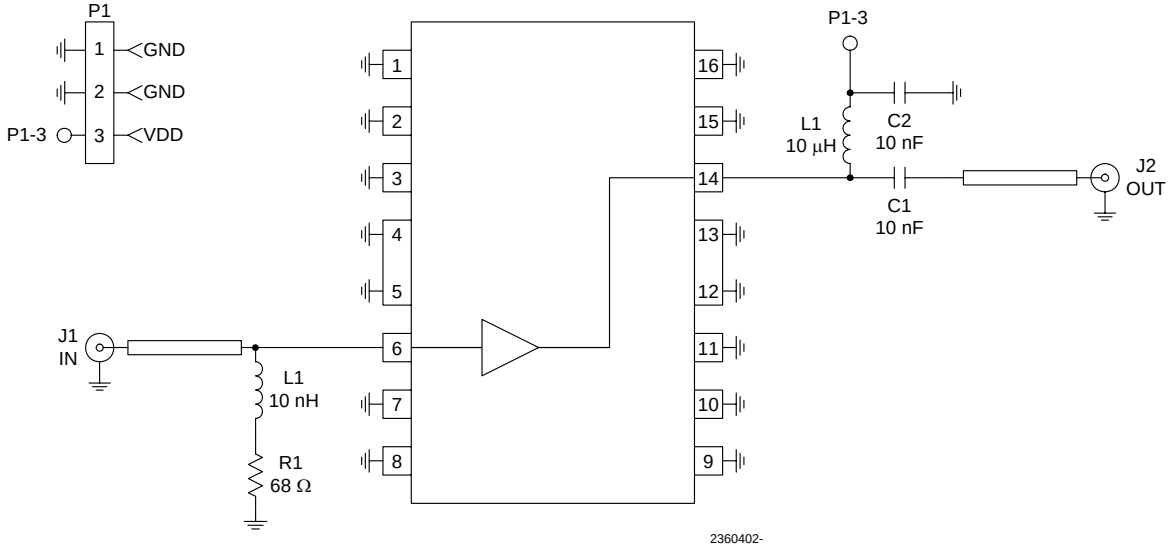


## Evaluation Board Schematic - 75Ω High Frequency (50MHz to 2000MHz)



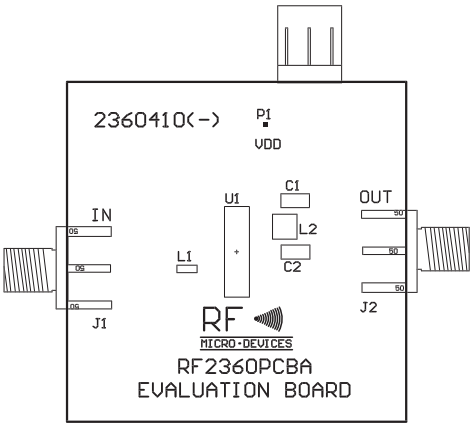

**NOTES:**
J1 and J2 are 75 Ω F connectors.

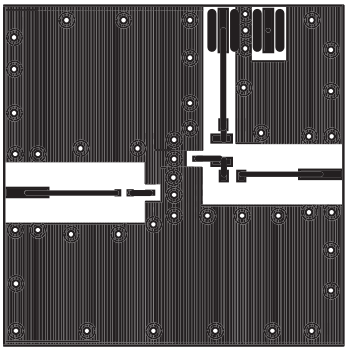
## Evaluation Board Schematic - 75Ω Low Frequency (5MHz to 200MHz)

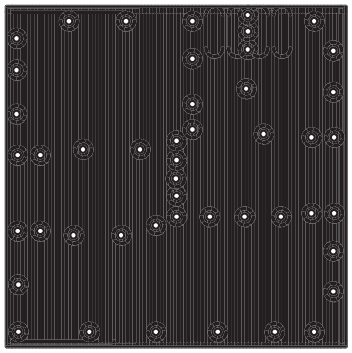



**NOTES:**
J1 and J2 are 75 Ω F connectors.

# Evaluation Board Layout - 50Ω
## Board Size 1.5” x 1.5”
Board Thickness 0.031”, Board Material FR-4

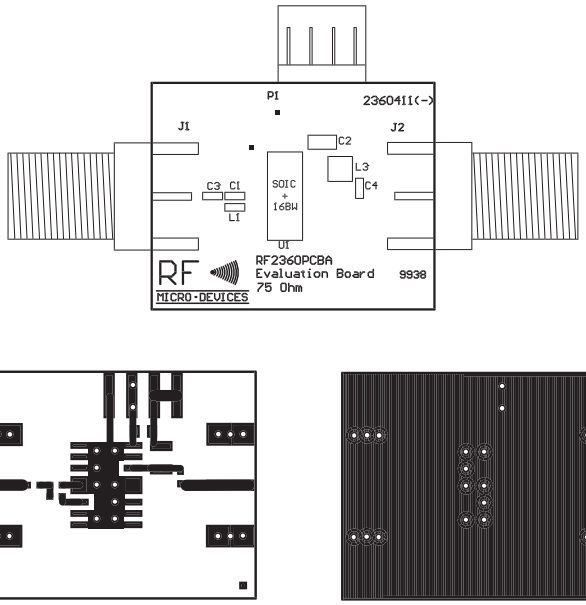


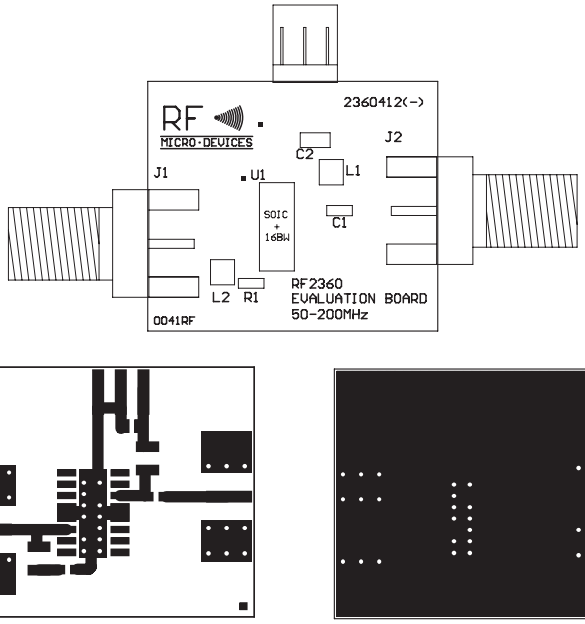


## Evaluation Board Layout - 75Ω High Frequency (50MHz to 2000MHz)
## Board Size 1.25” x 1.0”

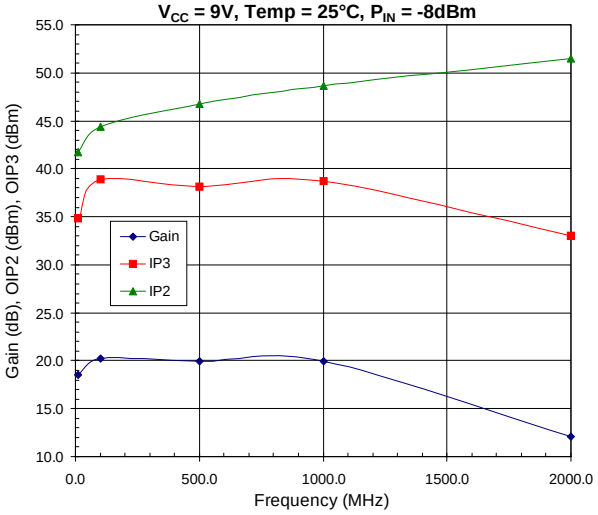
Board Thickness 0.062”, Board Material FR-4



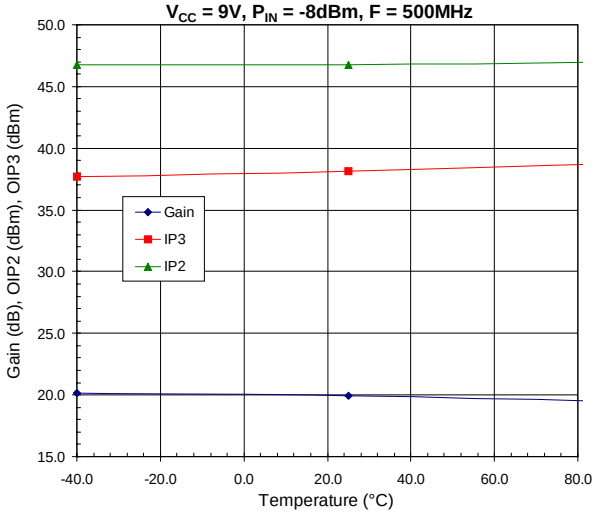

## Evaluation Board Layout - 75Ω Low Frequency (5MHz to 200MHz)



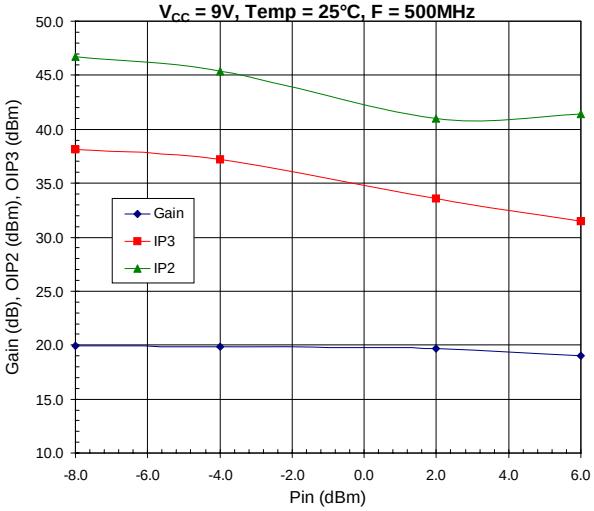
**Gain, OIP2 and OIP3 versus Frequency**
**$V_{CC}$ = 9V, Temp = 25°C, $P_{IN}$ = -8dBm**



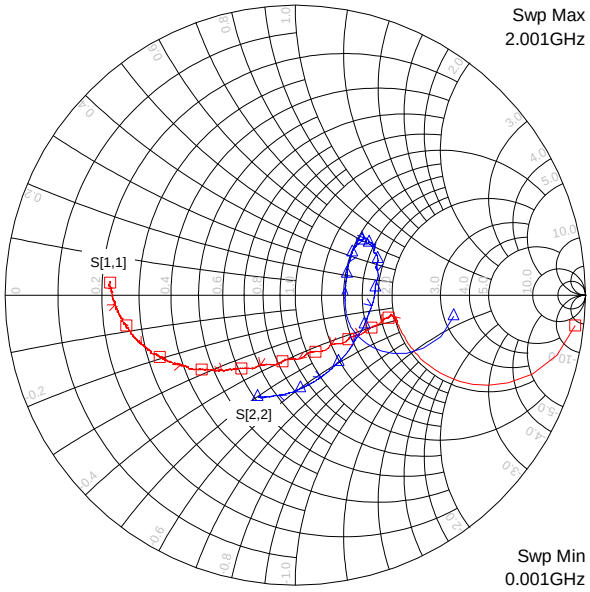

**Gain, OIP2 and OIP3 versus Temperature**
**$V_{CC}$ = 9V, $P_{IN}$ = -8dBm, F = 500MHz**



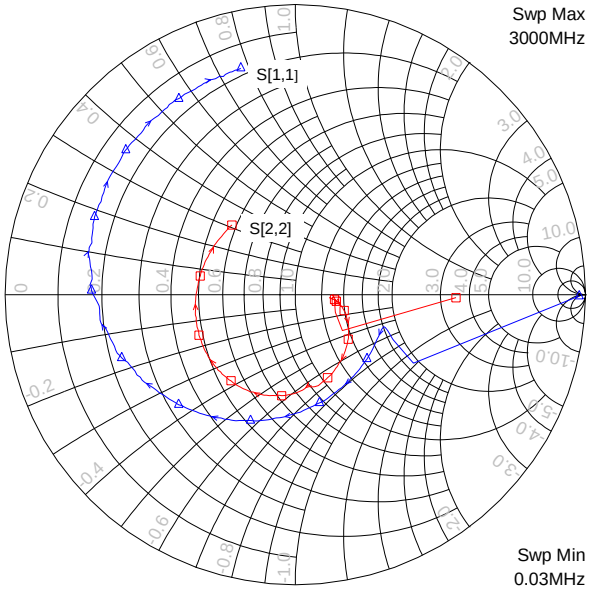

**Gain, OIP2 and OIP3 versus $P_{IN}$**
**$V_{CC}$ = 9V, Temp = 25°C, F = 500MHz**



### 75 Ohm, 8V, 25°C




### 50 Ohm, 8V – Return Loss




### 75 Ohm, 8V – Return Loss