# RF2607

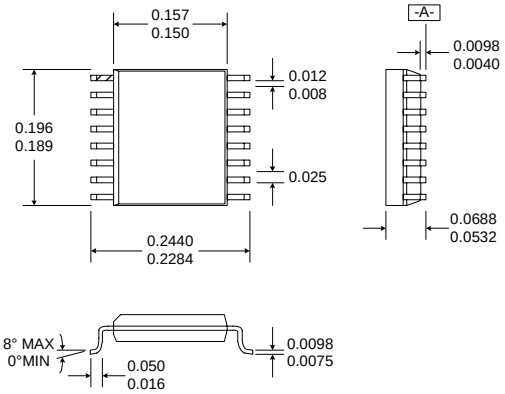
CDMA/FM RECEIVE AGC AMPLIFIER

## Typical Applications

- CDMA/FM Cellular Systems
- Supports Dual-Mode AMPS/CDMA
- Supports Dual-Mode TACS/CDMA
- General Purpose Linear IF Amplifier
- Commercial and Consumer Systems
- Portable Battery-Powered Equipment

## Product Description

The RF2607 is a complete AGC amplifier designed for the receive section of dual-mode CDMA/FM cellular applications. It is designed to amplify IF signals while providing more than 90dB of gain control range. Noise Figure, $IP_3$, and other specifications are designed to be compatible with the IS-95 Interim Standard for CDMA cellular communications. This circuit is designed as part of the RFMD CDMA chipset, consisting of a Transmit IF AGC Amp, a Transmit Upconverter, a Receive LNA/Mixer, and this Receive IF AGC Amp. The IC is manufactured on an advanced high frequency Silicon Bipolar process, and is packaged in a standard miniature 16-lead plastic SSOP package.

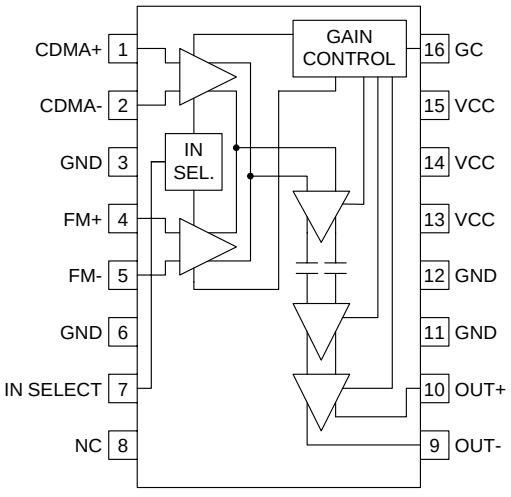



**NOTES:**
1. Shaded lead is Pin 1.
2. All dimensions are excluding mold flash.
3. Lead coplanarity - 0.005 with respect to datum "A".

Package Style: SSOP-16

### Optimum Technology Matching® Applied

- [x] Si BJT
- [ ] GaAs HBT
- [ ] GaAs MESFET
- [ ] Si Bi-CMOS
- [ ] SiGe HBT
- [ ] Si CMOS




Functional Block Diagram

## Features

- Supports Dual Mode Operation
- -48dB to +48dB Gain Control Range
- IS95 CDMA Compatible
- Digitally Selectable Inputs
- -2dBm Input $IP_3$
- 12MHz to 285MHz Operation

## Ordering Information

| | |
|---|---|
| RF2607 | CDMA/FM Receive AGC Amplifier |
| RF2607 PCBA | Fully Assembled Evaluation Board |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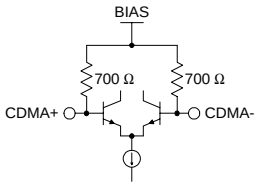
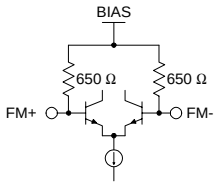
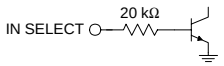
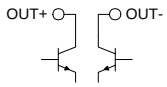
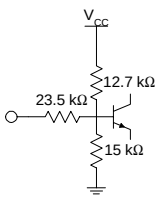
## Absolute Maximum Ratings

| Parameter | Value | Unit |
|---|---|---|
| Supply Voltage | -0.5 to +7.0 | $V_{DC}$ |
| Control Voltage | -0.5 to +5.0 | $V_{DC}$ |
| Input RF Power | +10 | dBm |
| Operating Ambient Temperature | -40 to +85 | °C |
| Storage Temperature | -40 to +150 | °C |

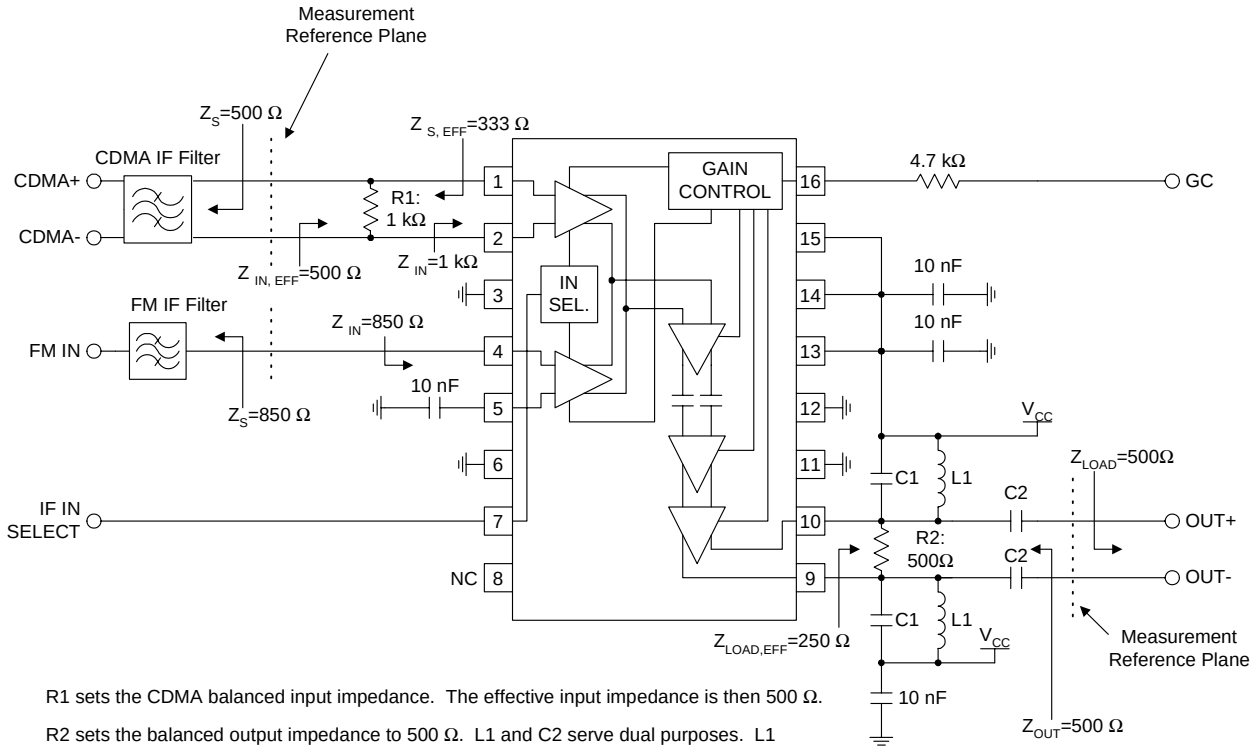
**Caution!** ESD sensitive device.



| Parameter | Specification | | | Unit | Condition |
|---|---|---|---|---|---|
| | Min. | Typ. | Max. | | |
| **Overall** | | | | | T=25°C, 85MHz, $V_{CC}$=3.6V, $Z_S$ =500Ω, $Z_L$=500Ω, 500Ω External CDMA Input Terminating Resistor, 500Ω External Output Terminating Resistor (Effective $Z_S$=333Ω, Effective $Z_L$=250Ω) (See application schematic) |
| Frequency Range | | 12 to 285 | | MHz | |
| CDMA Maximum Gain | +45 | +48 | | dB | $V_{GC}$=2.9V |
| CDMA Minimum Gain | | -48 | -45 | dB | $V_{GC}$=0.2V |
| FM Maximum Gain | +45 | +49 | | dB | $V_{GC}$=2.9V |
| FM Minimum Gain | | -48 | -45 | dB | $V_{GC}$=0.2V |
| Gain Slope | | 47 | | dB/V | Measured in 0.5V increments |
| Gain Control Voltage Range | | 0 to 3 | | $V_{DC}$ | Source impedance of 4.7kΩ |
| Gain Control Input Impedance | | 30 | | kΩ | |
| Noise Figure | | 5 | | dB | At maximum gain and 85MHz |
| Input $IP_3$ | -44 | -40 | | dBm | At +40dB gain, referenced to 500Ω |
| | | -2 | | dBm | At minimum gain, referenced to 500Ω |
| Stability (Max VSWR) | 10:1 | | | | Spurious<-70dBm |
| **IF Input** | | | | | |
| Input Impedance | | 1 | | kΩ | CDMA, differential |
| Input Impedance | | 850 | | Ω | FM, single-ended |
| CDMA to FM Isolation | | 30 | | dB | |
| **Power Supply** | | | | | |
| Voltage | | 3.3 to 3.6 | | V | |
| Current Consumption | | 13 | | mA | Minimum gain |
| Current Consumption | | 14 | 17 | mA | Maximum gain |

| Pin | Function | Description | Interface Schematic |
|---|---|---|---|
| 1 | CDMA+ | CDMA balanced input pin. This pin is internally DC-biased and should be DC blocked if connected to a device with a DC level other than $V_{CC}$ present. A DC to connection to $V_{CC}$ is acceptable. For single-ended input operation, one pin is used as an input and the other CDMA input is AC-coupled to ground. The balanced input impedance is 1kΩ, while the single-ended input impedance is 500Ω. |  |
| 2 | CDMA- | Same as pin 2, except complementary input. | See pin 1. |
| 3 | GND | Ground connection. For best performance, keep traces physically short and connect immediately to ground plane. | |
| 4 | FM+ | FM balanced input pin. This pin is internally DC-biased and should be DC blocked if connected to a device with DC present. For single-ended input operation, one pin is used as an input and the other FM input is AC-coupled to ground. The balanced input impedance is 1.7kΩ, while the single-ended input impedance is 850Ω. |  |
| 5 | FM- | Same as pin 4, except complementary input. | See pin 4. |
| 6 | GND | Same as pin 3. | |
| 7 | IN SELECT | Selects which IF input (CDMA or FM) is used. This is a digitally controlled input. A logic "high" selects the CDMA input amplifier. A logic "low" selects the FM input amplifier. The threshold voltage is approximately 1.3V. |  |
| 8 | NC | No Connection pin. This pin is internally biased and should not be connected to any external circuitry, including ground or $V_{CC}$. | |
| 9 | OUT- | Balanced output pin. This is an open-collector output, designed to operate into a 250Ω balanced load. The load sets the operating impedance, but an external choke or matching inductor to $V_{CC}$ must also be supplied in order to correctly bias this output. This bias inductor is typically incorporated in the matching network between the output and next stage. Because this pin is biased to $V_{CC}$, a DC-blocking capacitor must be used if the next stage's input has a DC path to ground. |  |
| 10 | OUT+ | Same as pin 9, except complementary output. | See pin 9. |
| 11 | GND | Same as pin 3. | |
| 12 | GND | Same as pin 3. | |
| 13 | VCC | Supply voltage pin. External bypassing is required. The trace length between the pin and the bypass capacitors should be minimized. The ground side of the bypass capacitors should connect immediately to ground plane. | |
| 14 | VCC | Same as pin 13. | |
| 15 | VCC | Same as pin 13. | |
| 16 | GC | Analog gain adjustment for all amplifiers. Valid control ranges are from 0V to 3.0V. Maximum gain is selected with 3.0V. Minimum gain is selected with 0V. These voltages are only valid for a 4.7kΩ DC source impedance. |  |

# Application Schematic

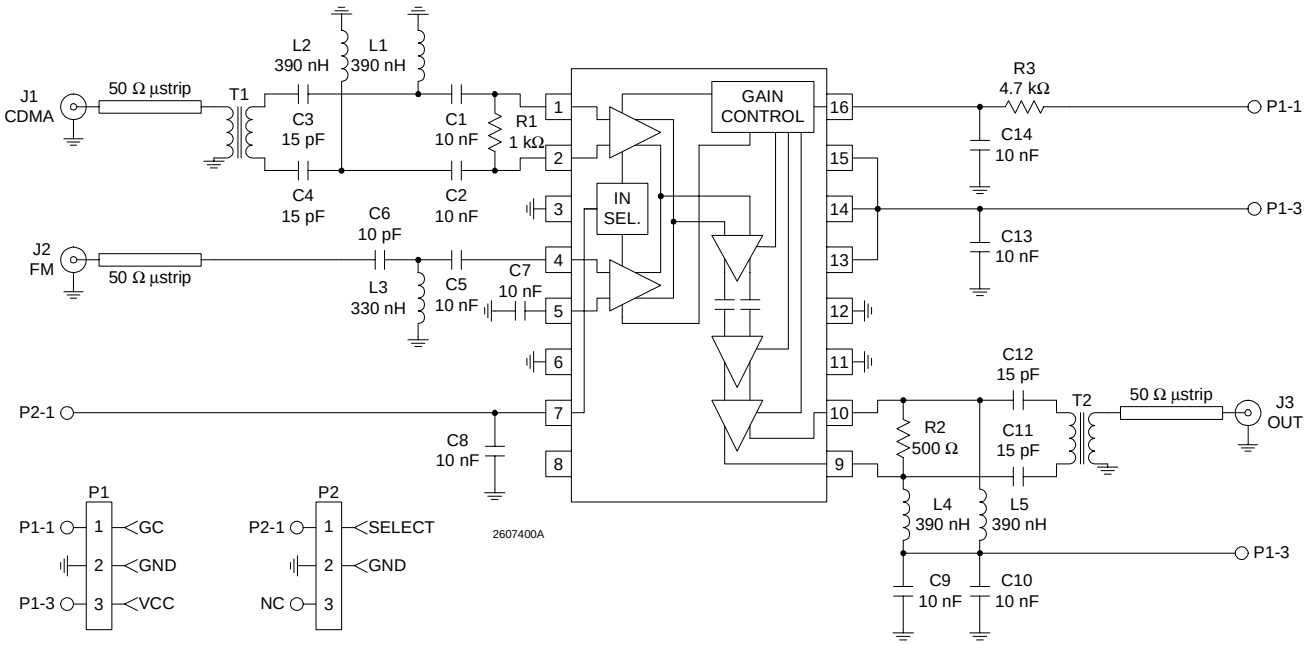



R1 sets the CDMA balanced input impedance. The effective input impedance is then 500 Ω.

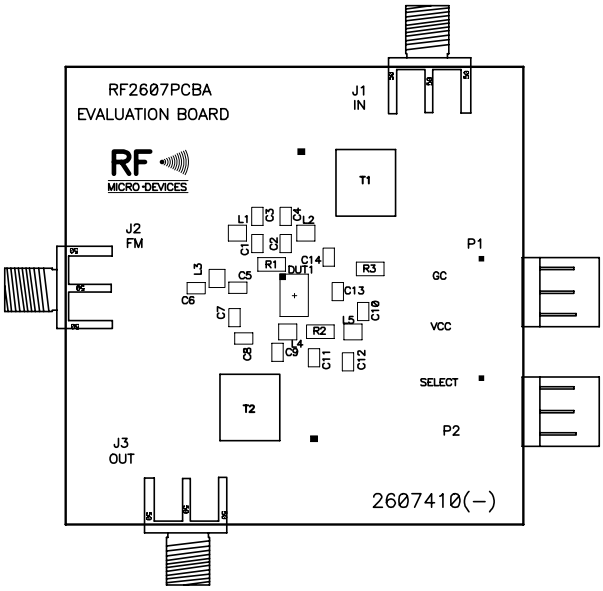
R2 sets the balanced output impedance to 500 Ω. L1 and C2 serve dual purposes. L1 serves as an output bias choke, and C2 serves as a series DC block. In addition, the values of L1 and C2 may be chosen to form an impedance matching network of the load impedance is not 500 Ω. Otherwise, the values of L1 and C1 are chosen to form a parallel-resonant tank circuit at the IF when the load impedance is 500 Ω.

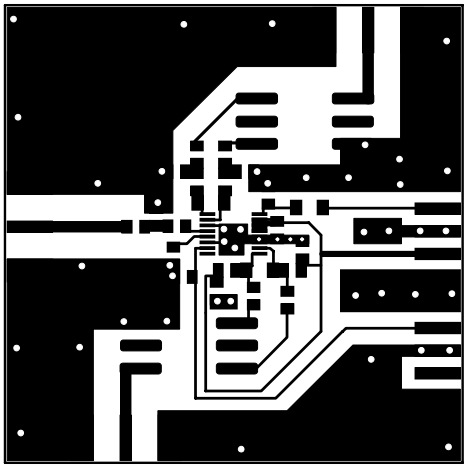
# Evaluation Board Schematic

(Download Bill of Materials from www.rfmd.com.)

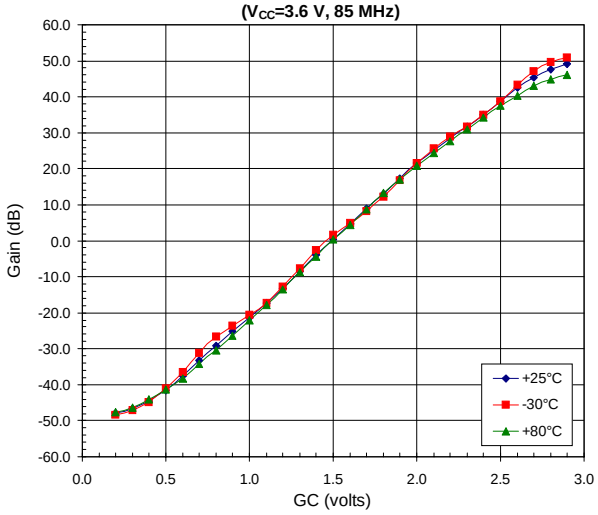


## Evaluation Board Layout

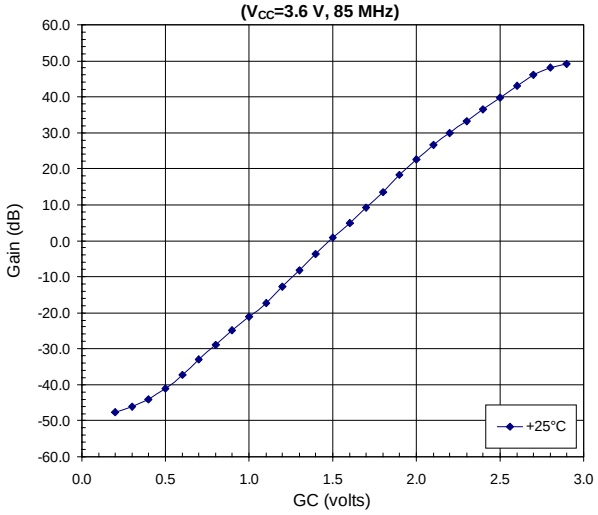


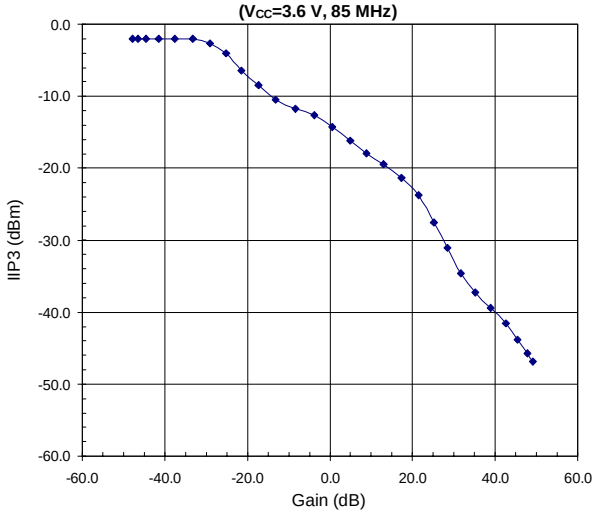
**CDMA Gain versus Gain Control Voltage**
**($V_{CC}$=3.6 V, 85 MHz)**



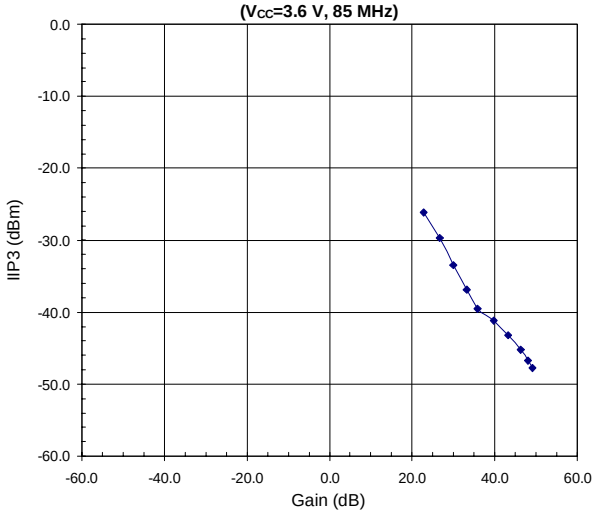

**FM Gain versus Gain Control Voltage**
**($V_{CC}$=3.6 V, 85 MHz)**



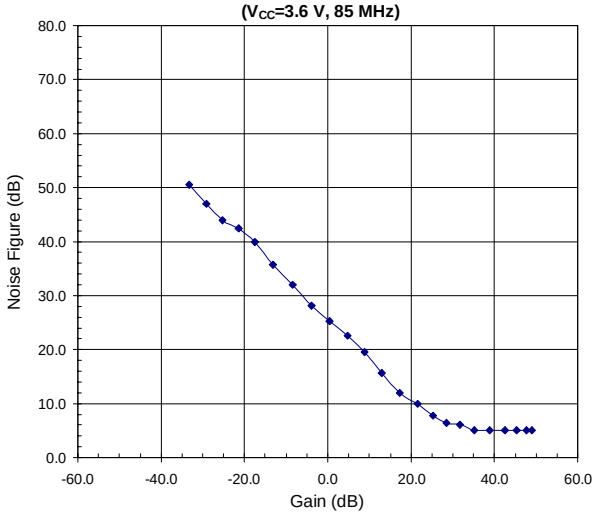

**CDMA IIP3 versus Gain**
**($V_{CC}$=3.6 V, 85 MHz)**



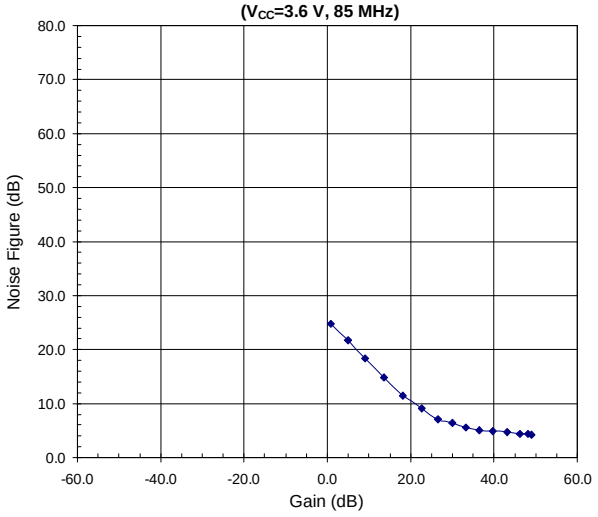

**FM IIP3 versus Gain**
**($V_{CC}$=3.6 V, 85 MHz)**



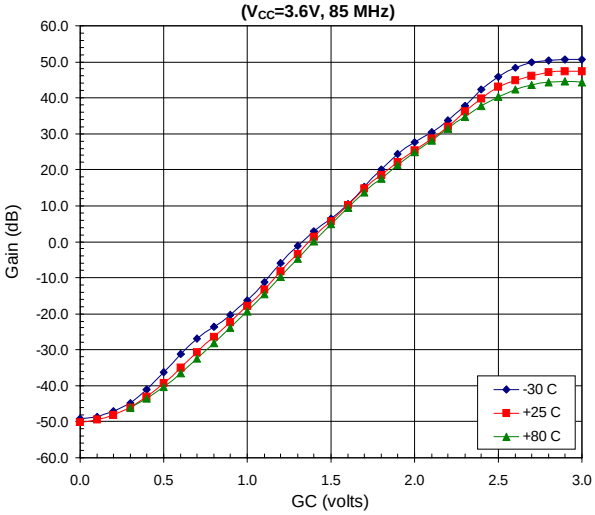

**CDMA Noise Figure versus Gain**
**($V_{CC}$=3.6 V, 85 MHz)**



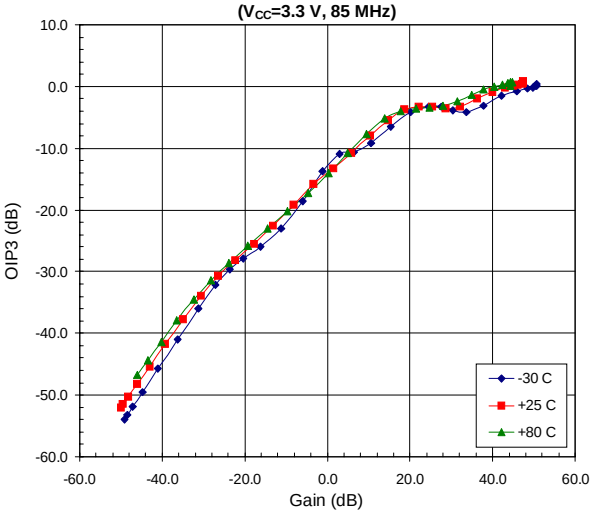

**FM Noise Figure versus Gain**
**($V_{CC}$=3.6 V, 85 MHz)**



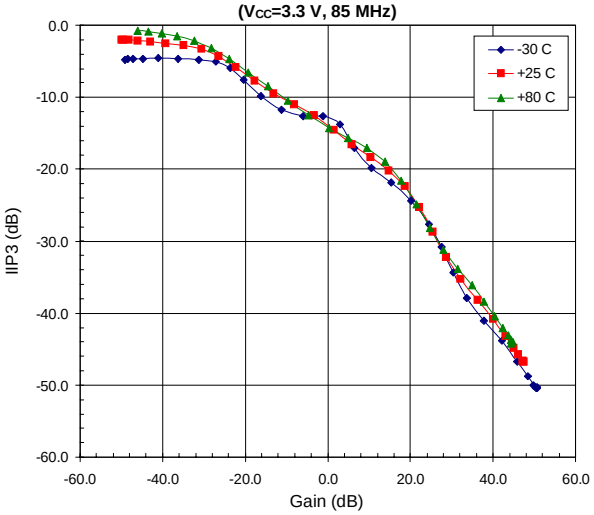
**CDMA Gain versus Gain Control Voltage**
**($V_{CC}$=3.6V, 85 MHz)**




**CDMA OIP3 versus Gain**
**($V_{CC}$=3.3 V, 85 MHz)**




**CDMA IIP3 versus Gain**
**($V_{CC}$=3.3 V, 85 MHz)**

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IF AMPLIERS